InteliLite® Telecom DC

Modular DC Generator Controller

SW version 1.0, April 2015

Reference Guide

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1 Document information

DOCUMENT HISTORY

REVISION NUMBER	RELATED SW. VERSION	DATE
1.0	1.0	19.5.2015

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.

1.1 Clarification of notation

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

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

CAUTION!
This type of paragraph highlights a procedure, adjustment, etc. which may cause damage or improper functioning of the equipment if not carried out correctly and may not be clear at first sight.

WARNING!
This type of paragraph indicates things, procedures, adjustments, etc. which demand a high level of attention, otherwise personal injury or death may occur.

1.2 Conformity Declaration

CE

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.

2 System overview

2.1 What describes this manual?

IMPORTANT SAFETY INSTRUCTIONS

This manual contains important instructions that shall be followed during installation and maintenance of the InteliLite Telecom DC generator controllers.

This manual describes InteliLite Telecom DC application examples for single DC generator applications.

This manual provides general information how to install and operate InteliLite Telecom DC controller.

This manual is intended for ooperators of engines, for engine control panel builders or for everybody who is concerned with installation, operation and maintenance of the engine applications.

2.2 Warnings

InteliLite Telecom DC controller can be remotely controlled. In case of the work on the engine check, that nobody can remotely start the engine.

To be sure:

Disconnect remote control via RS232 line,
Disconnect input REM START/STOP or
Disconnect output STARTER

NOTE:
Because of large variety of InteliLite Telecom DC parameters setting, it is not possible to describe all combination. Some of InteliLite Telecom DC 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.

NOTE:
SW and HW must be compatible (e.g. InteliLite Telecom DC firmware and InteliLite Telecom DC hardware) otherwise the function will be disabled. If wrong software is uploaded the message HARDWARE INCOMPATIBLE appears on the controller screen.

In the case of using Boot load (jumper) programming – close Boot jumper, follow instruction in LiteEdite and upload correct software.

2.3 General description

CAUTION!
The DC generator and batteries voltage may reach the levels dangerous for human health. Do not touch the terminals for voltage and current measurements! Always connect the grounding terminal!

CAUTION!
All parameters are pre-set to their typical or safe values. Before the first start-up some of the setpoints have to be adjusted according to the generator parameters.

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

InteliLite Telecom DC 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 DC generator controls.

InteliLite Telecom DC is an electronic programmable unit which drives a generator with rectifier so that the output of the generator is DC voltage or can drive PMA (Permanent Magnet Alternator) or control excitation of AVR (Automatic Voltage Regulator).

The DC voltage is used to charge batteries or to energize the load. In order to ensure the longest possible life cycle of the battery. InteliLite Telecom DC can manage control (speed, excitation) to the constant current or voltage according to the measured values (current, voltage) in the connected system.

The key features are:

- Predefined algorithm for hybrid application, which prolong life cycle of batteries and save operation and maintenance costs.
- Three separate conditions of charging cycles, depends on the application type (Voltage, Ah and Remote condition).
- Voltage and current compensations depends on the temperature of system.
- Variable speed or excitation regulation of generator voltage and current.
- Important statistic overview for maintenance.
- Communication - via communication modules e.g. IL-NT-GPRS, IB-Lite, IL-NT-S-USB and PC tools WebServer, WebSupervisor, InteliMonitor etc.
- Process logic - active control of engine, generator, history log, configuration-no programming

2.4 Configurability and monitoring

InteliLite Telecom DC is using as configuration, monitoring and controlling tool LiteEdit software. For simple configuration, monitoring and controlling can be used InteliMonitor, which includes SCADA.

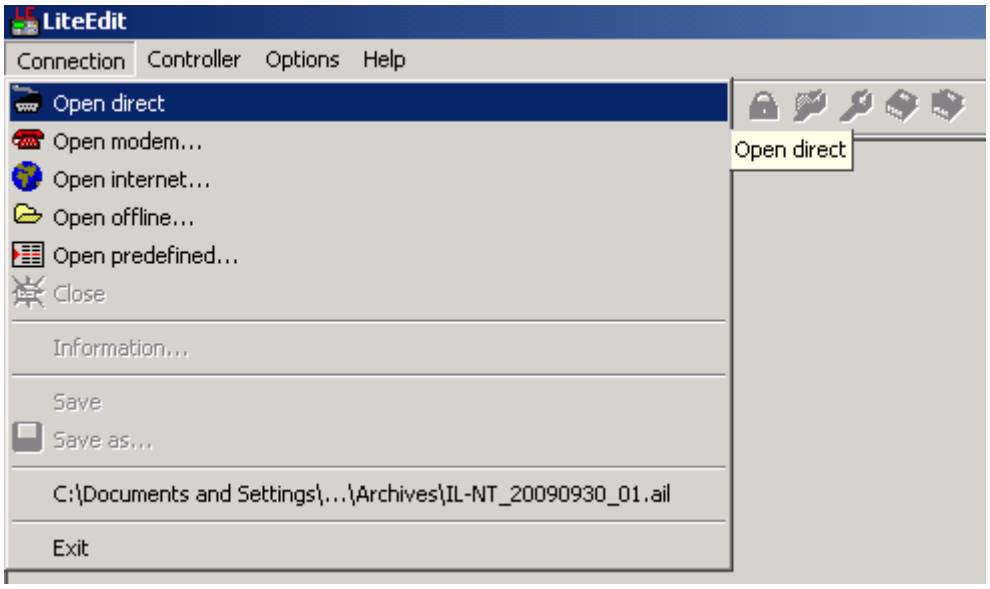
InteliLite Telecom DC controller also supports remote monitoring and control via internet, AirGate or cellular network connection. For this remote control are used web tools WebSupervisor and WebServer.

NOTE:
It is recommended to use LiteEdit version 5.1.2 and/or newer.

2.4.1 Open connection from LiteEdit

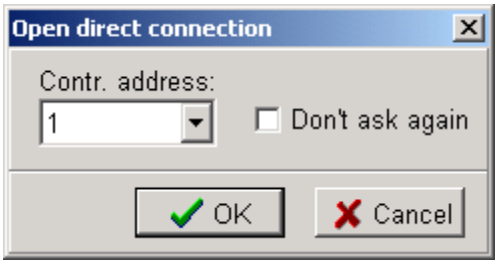
PC tool LiteEdit is used for monitoring, programming and configuration of InteliLite Telecom DC controllers.

1. Go to menu ***Connection*** and select the type of connection you desire.

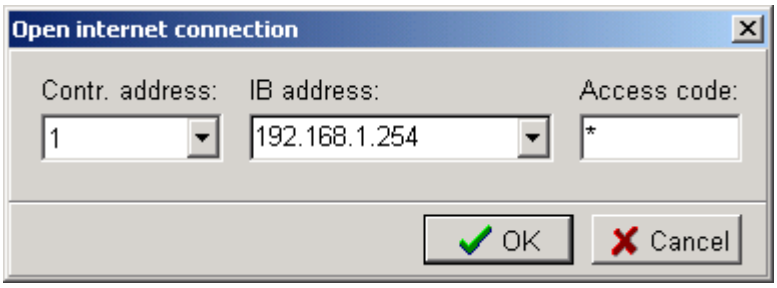


LITEEDIT - CONNECTION MENU

2. Enter controller address and further information depending on the selected connection type.

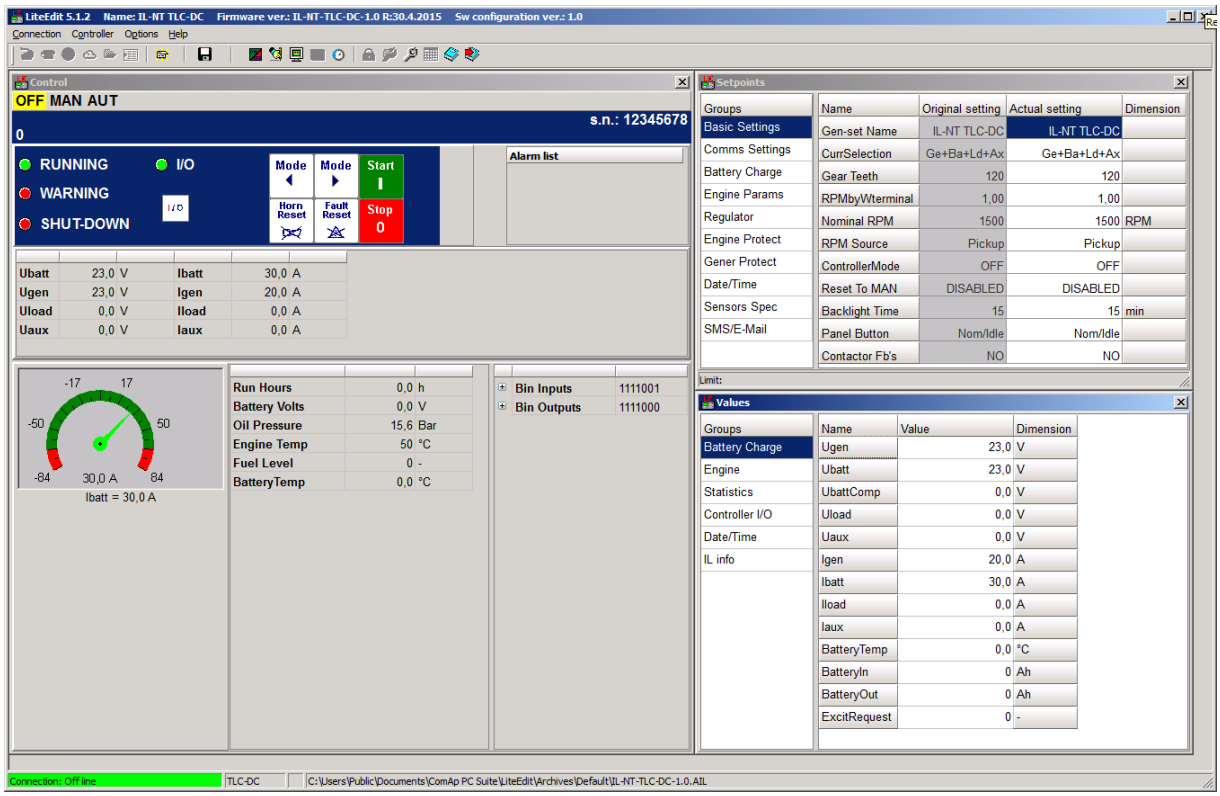


FOR DIRECT CONNECTION ENTER CONTROLLER ADDRESS



FOR INTERNET CONNECTION ENTER CONTROLLER ADDRESS, IP ADDRESS OF THE IB-LITE MODULE FITTED IN THE CONTROLLER YOU WANT TO REACH, ACCESS CODE

3. You will see the Control window and you can continue with configuration of Setpoints, inputs, outputs etc.



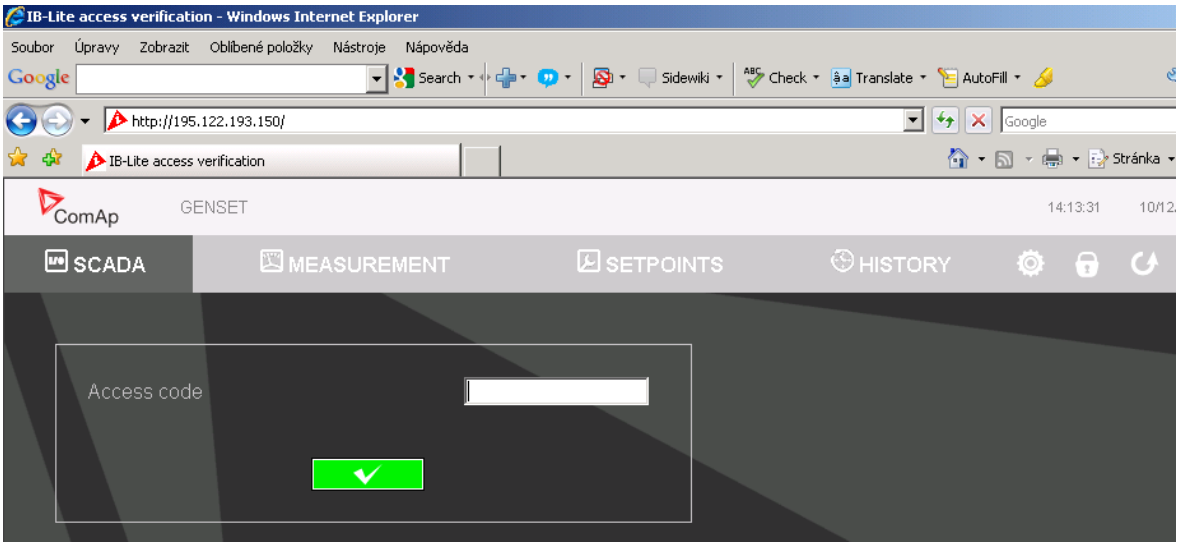
LITEEDIT CONTROL WINDOW

NOTE:
For detail description of LiteEdit and InteliMonitor PC tools see the *LiteEdit Reference Guide, InteliMonitor Reference Guide* and *InteliLite NT Communication Guide.*

2.4.2 Open connection from web browser

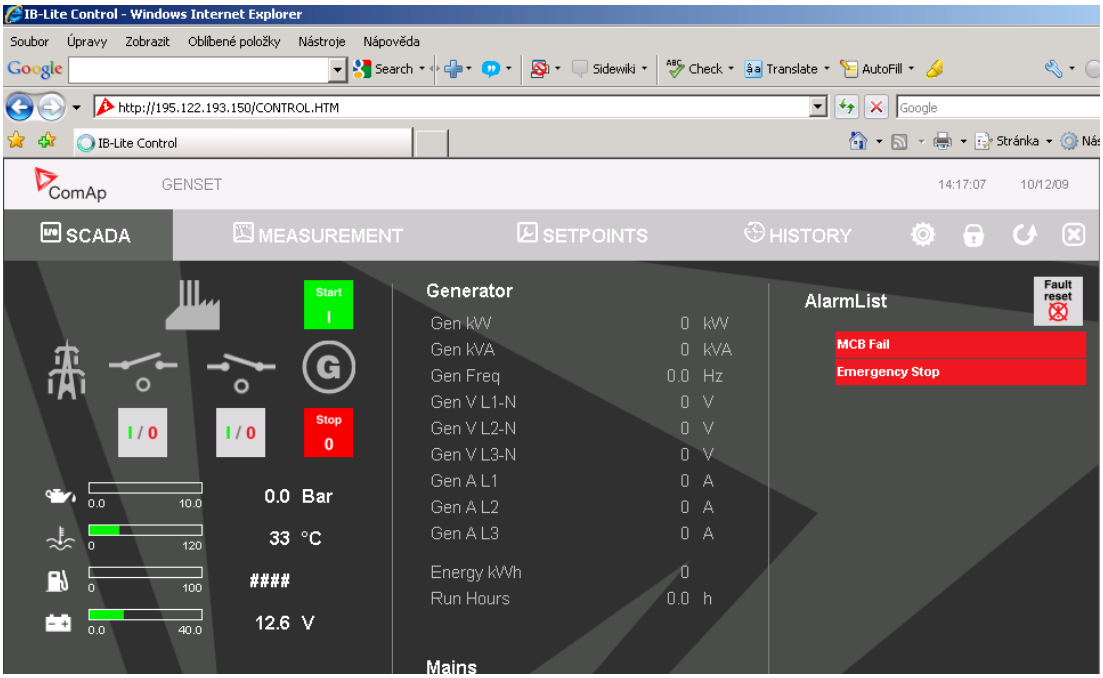
It is possible to connect from a web browser to InteliLite Telecom DC controllers, mounted with IB-Lite module (or IB-NT with specific conditions) and connected to internet.

1. Open web browser
2. Enter IP address from controller **Comms Settings:** *IBLite IP Addr*
3. Access verification page appears



ACCESS VERIFICATION PAGE

4. Enter access code and Scada page appears



SCADA PAGE

NOTE:

You can try the WebServer from ComAp webpage: http://ib-lite-test.comap.cz/. The access code is 0.

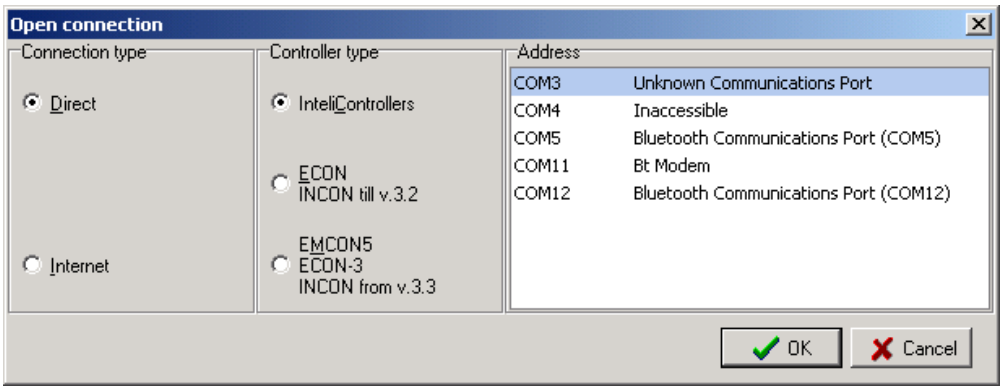
NOTE:

WebSupervisor is possible to use as a control and monitor tool. For access is necessary to be registered. Connection setting and other information you can find in the *WebSupervisor Reference Guide.*

2.4.3 Open connection from WinScope

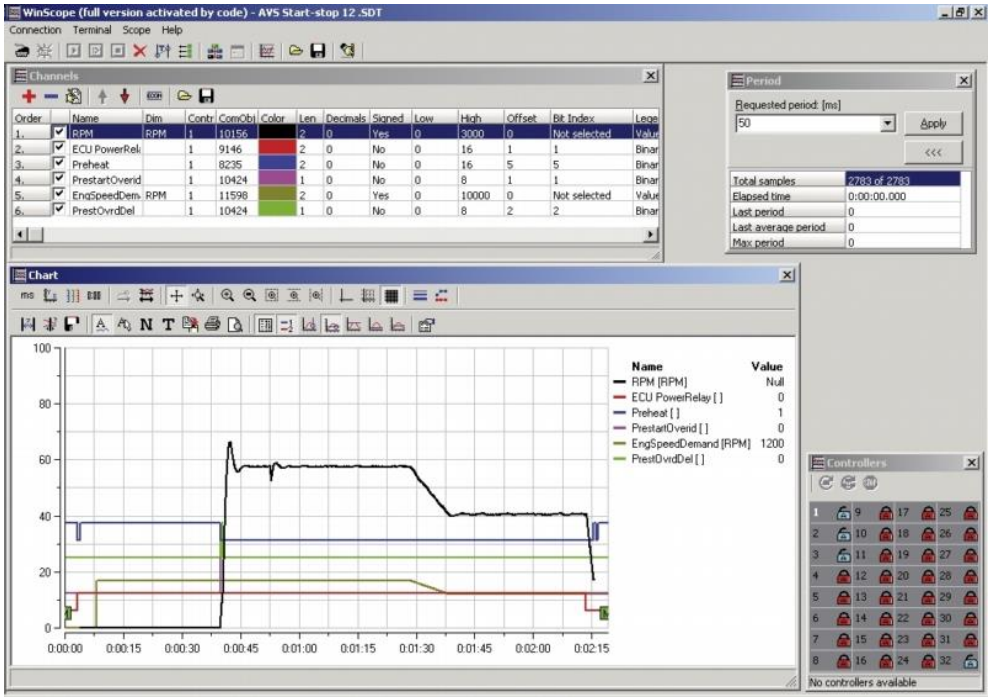
WinScope is powerful PC tool for observation of controller's states and measurements.

1. Go to menu ***Connection*** -> ***Open connection...*** and select the type of connection you desire in Open connection window (Inteli controllers).



WINSCOPE - OPEN CONNECTION WINDOW

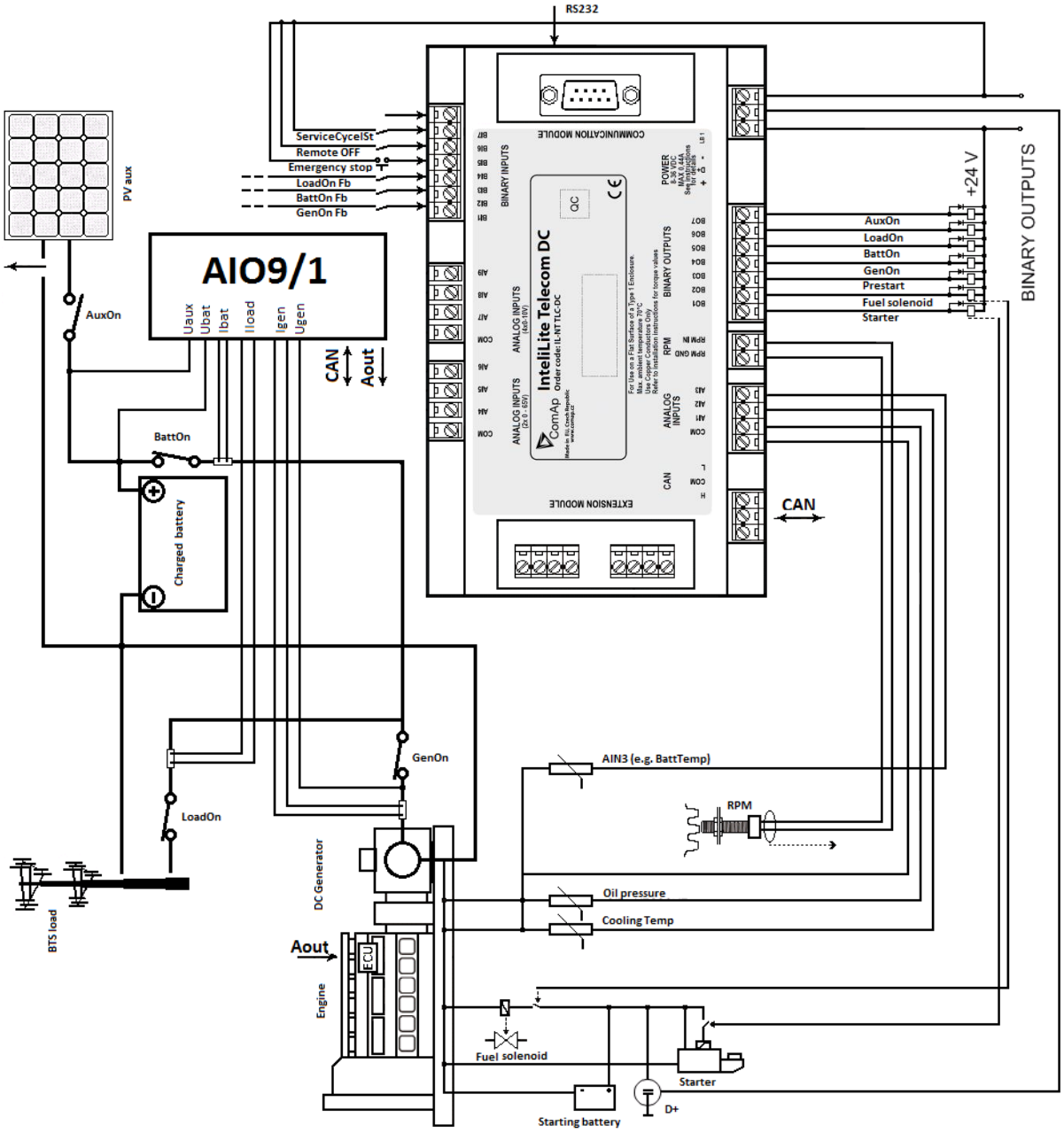
2. Proceed with selection of channels etc. according to *WinScope Reference Guide*



2.5 Applications overview

2.5.1 Typical application – wiring diagram

See basic wiring scheme for single DC generator, which is supplying battery and BTS load, with InteliLite Telecom DC controller and AIO9/1 external module in default configuration



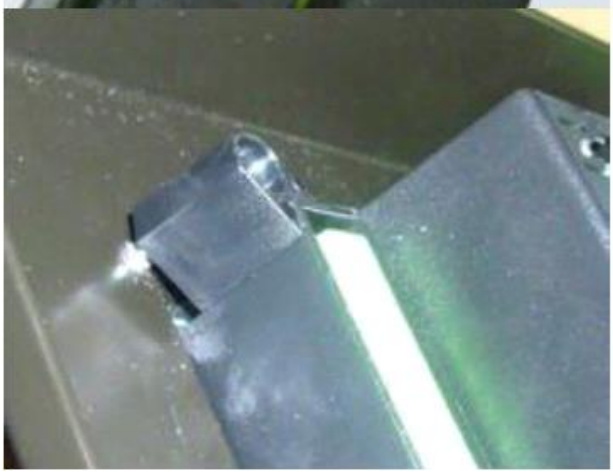
APPLICATION DESCRIPTION

NOTE:
For Inteli AIO module terminal connection see the chapter 3.6.

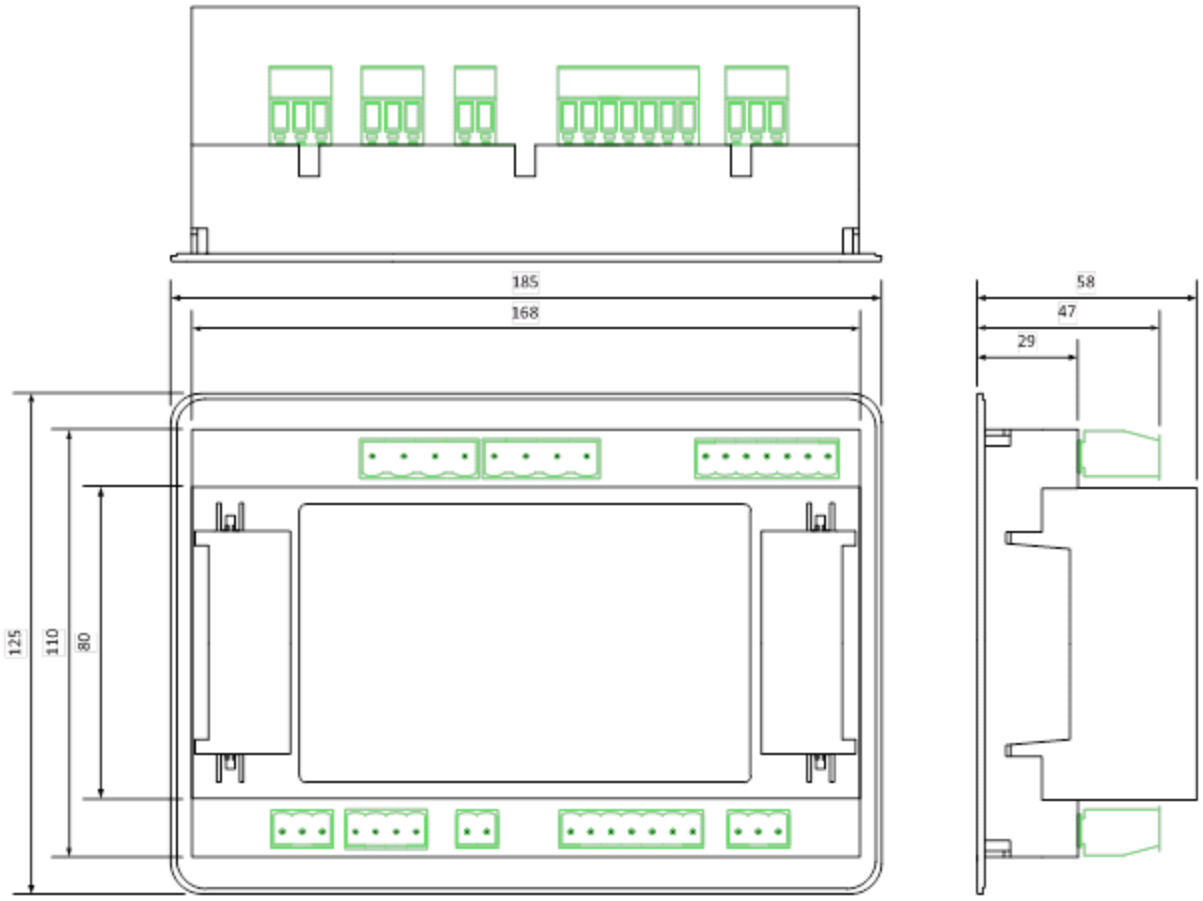
3 Installation

3.1 Mounting

The controller is used to be mounted onto the switchboard door. Requested cutout size is 172 x 112 mm. Use the screw holders delivered with the controller to fix the controller into the door as described on pictures below.



3.2 Dimensions



HINT:

Recommended mounting cutout size is 175 x 115 mm

3.3 Package contents

InteliLite Telecom DCcontroller is delivered in the box as one set containing the

- InteliLite Telecom DC controller programmed with default configuration
- 4x Fixing clips
- Complete connectors (female) set for controller wiring

AIO9/1 - The AIO9/1 is external module that is not part of the package. See ComAp website for purchasing information.

The module measures battery, load, generator and auxiliary source voltage and current through CAN interface. It provides galvanic separation of the current sensing resistor shunts and analog output for Sped or Excitation control. It should be used together with ID Lite DC controller in telecom application.

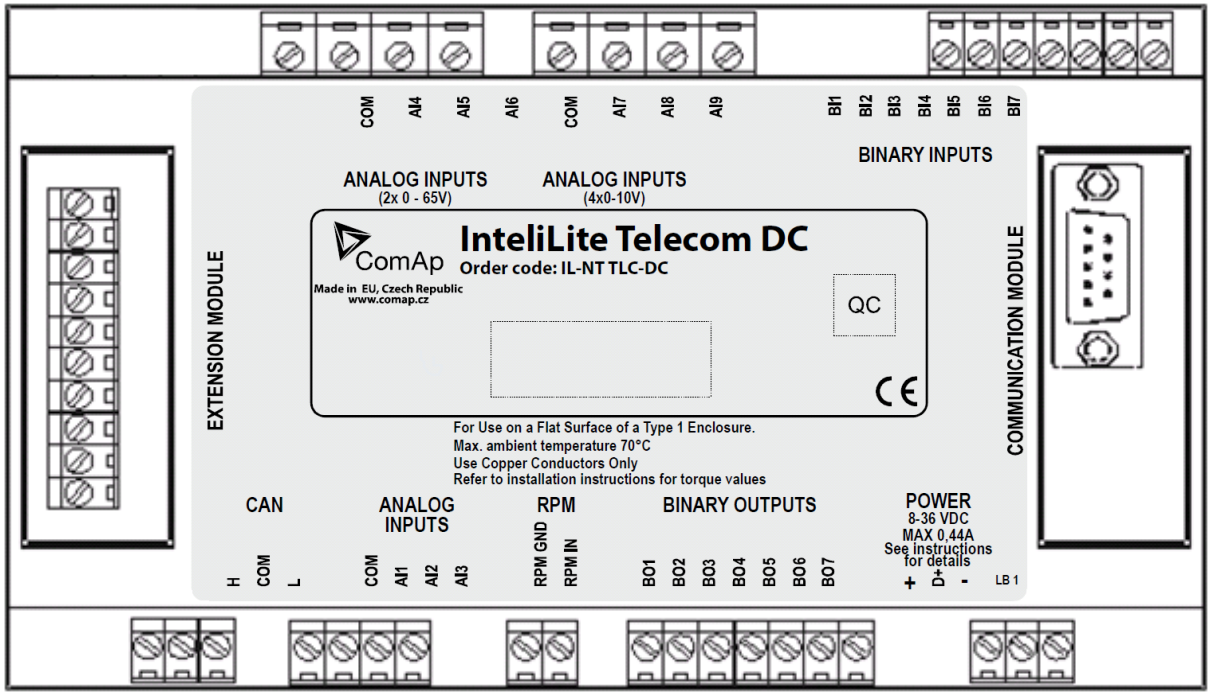
3.3.1 Software package

InteliLite Telecom DC is distributed as IL-NT-TLC-DC-x.y.iwe package and it is compatible with the PC tool LiteEdit x.y.z and ECU list-x.y, where x, y, z are numbers of software version. Find installation files on ComAp web. Version of published files on the webpage are compatible each other.

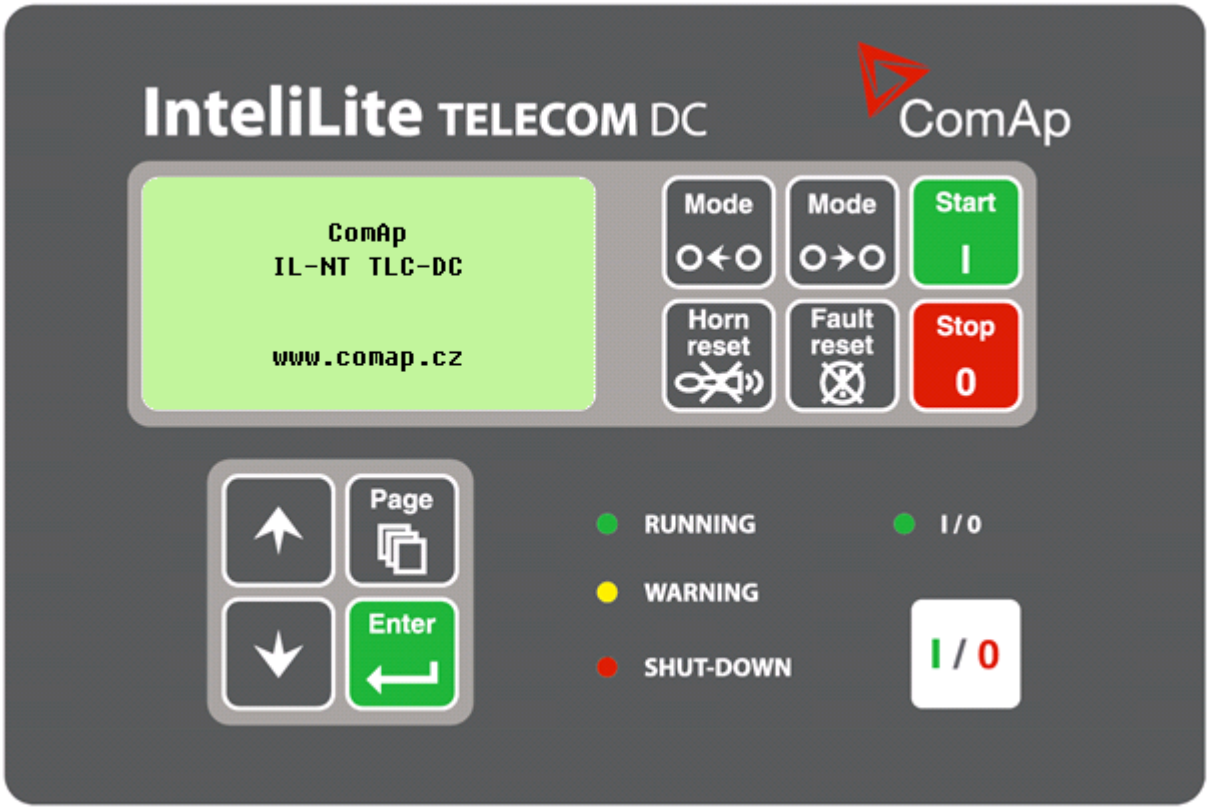
3.3.2 Components

Accessories	Description	Optional / Obligatory
IL-NT TLC-DC	InteliLite Telecom DC control unit	Obligatory
External modules		
AIO9/1	Input output module with galvanic separation	Optional external
Communication plug-in		
IL-NT RS232	RS232 communication card	Optional plug-in
IL-NT 232/485	Combined communication card	Optional plug-in
IL-NT S-USB	USB communication card	Optional plug-in
IB-Lite	Ethernet/Internet interface	Optional plug-in
IL-NT-GPRS	GSM/GPRS modem	Optional plug-in

3.4 Terminals and fron face



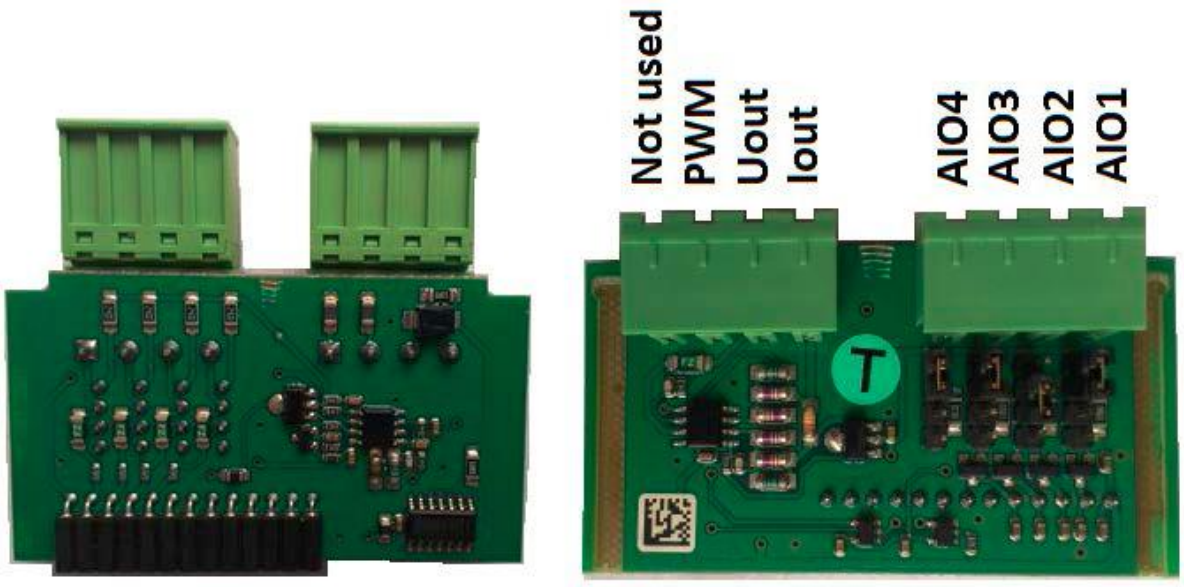
TERMINALS



FRONT FACE

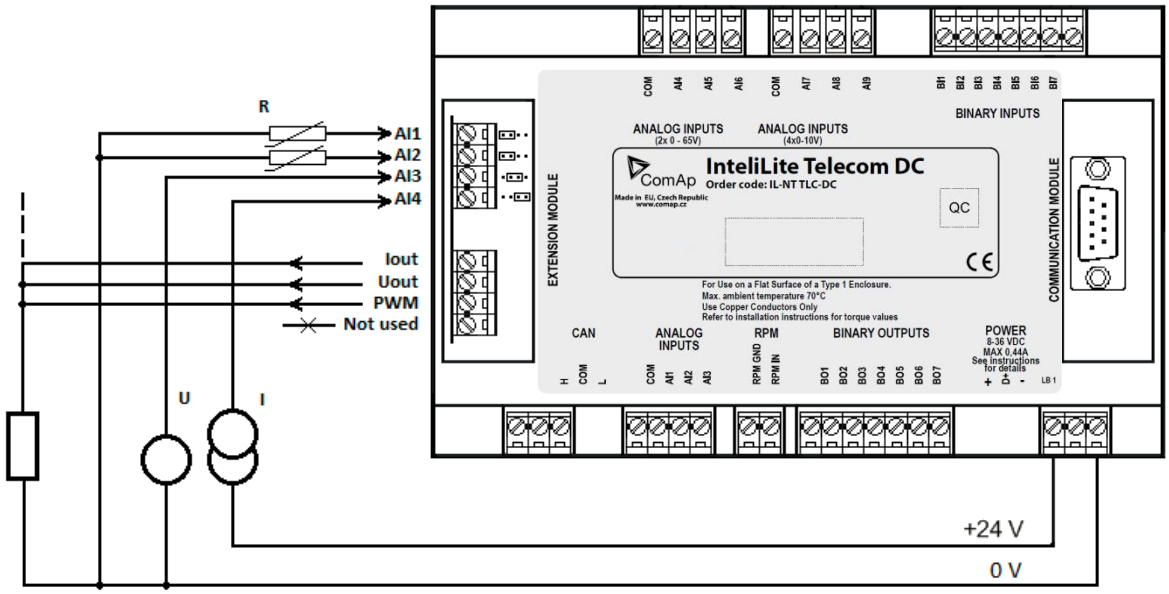
3.5 IL-NT AIO

IL-NT AIO is optional plug-in card. This card offers additional four analog inputs and one analog output. Analog inputs can be use for different types of sensor (resistive, current and voltage) and variable analog output, which can be used as PWM. Adjustment of extension plug-in modul is possible via LiteEdit.



Type of analog input is selectable by jumper. Each analog input has own line of jumper position. The top position (closest to green conector on the pic above) is for resistive input, central position for voltage input and lowest position is for current input.

Input or Output	Description
AI1 – AI4	2600 Ω / 4 V / 20 mA
Iout Uout PWM	0 – 20 mA (max 22 mA) max 100 Ω load 0 – 4,5 V (max 10 mA) PWM 5 V / 15 mA / 500 Hz
Not used	Do not connect!



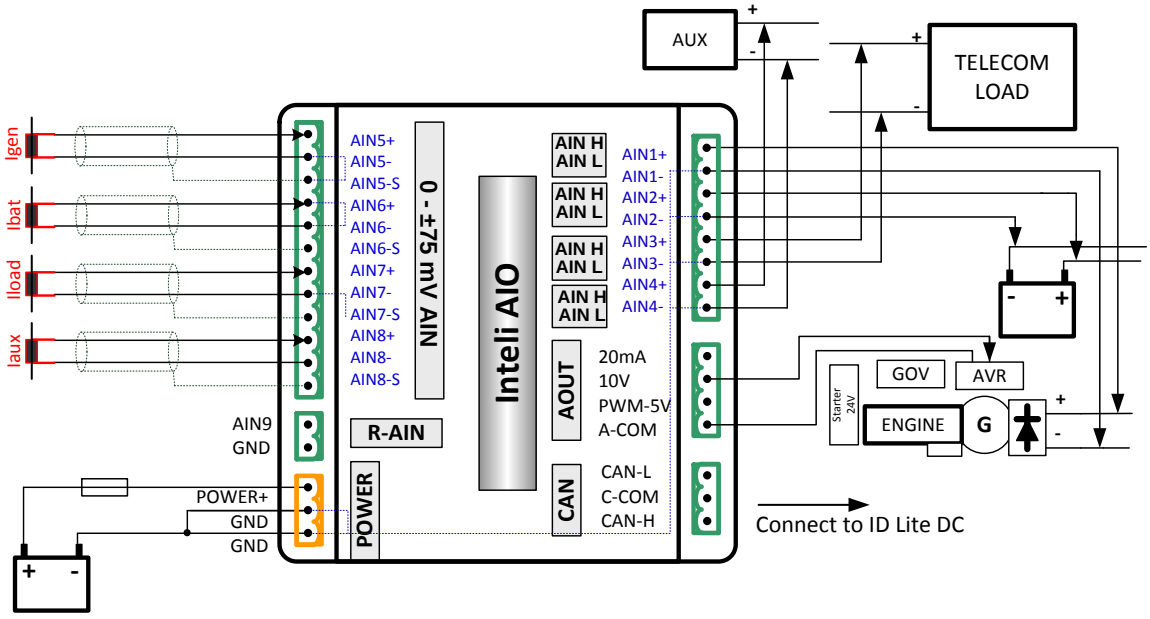
3.6 AIO9/1

The AIO9/1 external module should be used with InteliLite Telecom DC (and higher) controller in telecom application. Module measures battery, generator, load and aux voltage and current without additional sensors. AIO9/1 analog output can control the engine speed or generator voltage.

Features

- 4x differential inputs AI1 to AI4 for voltage measurement in range of 0 – 65 V DC or -65 – 0 V DC (supporting grounded battery plus as well).
- 4x shielded, **differential milivolt inputs** AI5 to AI8 for measurement on resistor shunts (0 ± 75 mV) for DC current measuring.
- Speed Governor or Voltage Regulator output: 1**x galvanically separated analog output** with 0 – 20 mA, 0 – 10 V DC, PWM option.
- Resistance analog input 0 – 2500 Ω for temperature sensor (charging temperature compensation).
  All inputs are fix linked to specific AIO9/1 terminals (not configurable except sensor characteristics).

  Typical application – wiring diagram

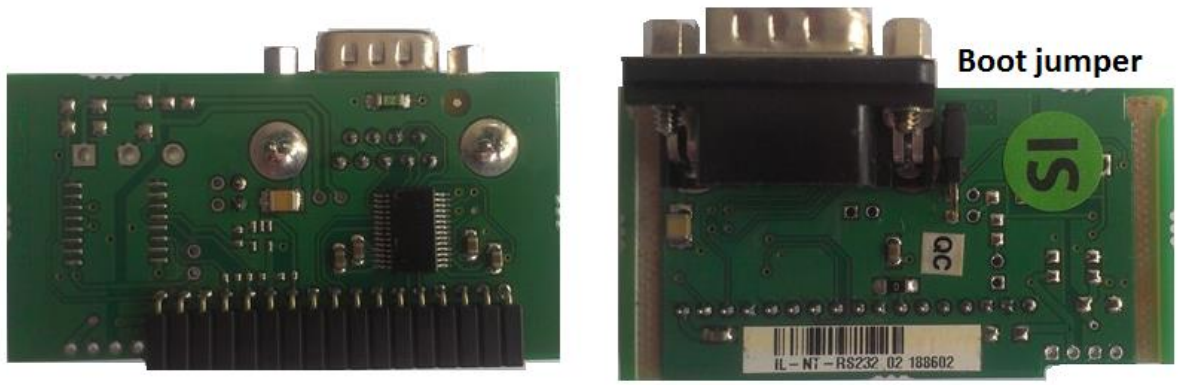


Modify default configuration according to actual project wiring – e.g. set corresponding Analog input as not used when not used.

3.7 Communication modules

3.7.1 IL-NT RS232

IL-NT RS232 is optional plug-in card, which enables InteliLite Telecom DC controller for RS232 serial communication. This is required for computer or ModBus connection. The card has to be inserted into the expansion "Communication module" slot back on the controller, similarly to extension modules.



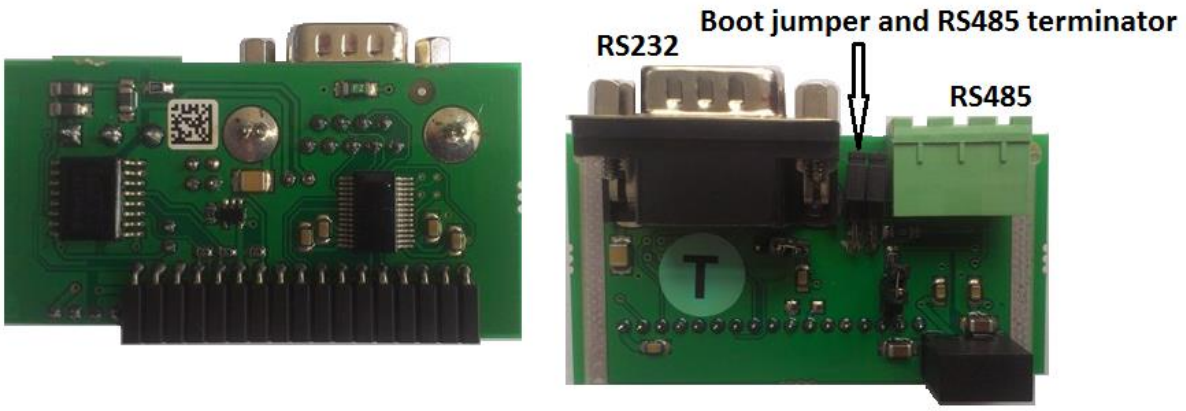
HINT

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

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

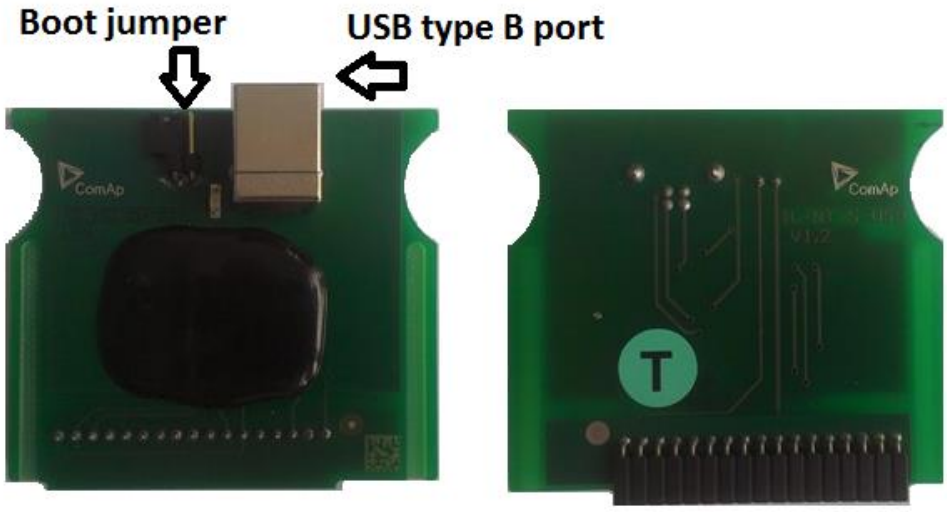
3.7.2 IL-NT RS232-485

IL-NT RS232-485 is optional plug-in card, which enables InteliLite Telecom DC controller RS232 and RS485 serial communication. This is required for computer or Modbus connection. 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. Adjustment of communication type, baud rate etc. is via Comms Setting group of setpoint in LiteEdit or the controller screen.



3.7.3 IL-NT S-USB

IL-NT S-USB is optional plug-in card to enable communication of InteliLite Telecom DC controller via USB port. This is required for computer or Modbus connection. This module contains USB slave port, which is connected internally to the COM1 of the controllers. It is designed as an easy removable service module.
This module requires a FTDI USB Serial converter driver installed in the PC. The driver creates a virtual serial port (COM) in the PC, which must be used in LiteEdit as communication port when a connection is being opened.



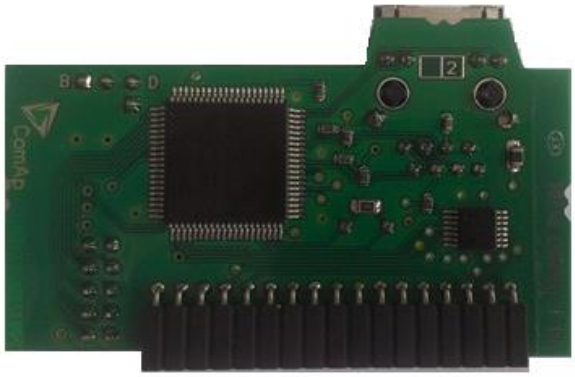
NOTE:
The FTDI driver is installed together with LiteEdit.

When the USB cable from the controller is plugged-in first time into different USB ports on the PC including USB hubs, it can be recognized as new hardware and the drivers are installed again with different number of the virtual serial port.

CAUTION!
Use shielded USB cable only! (ComAp order code: USB-LINK CABLE 1.8m)

3.7.4 IB-Lite

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



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

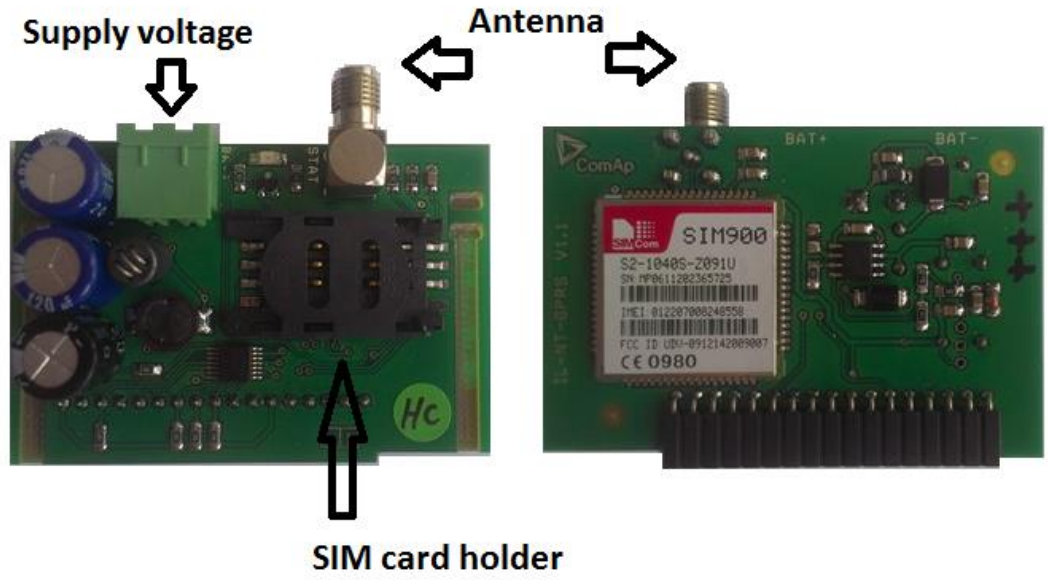
HINT
The module requires configuration settings before usage. See IB-Lite 1.x Reference Guide.

3.7.5 IL-NT GPRS

IL-NT GPRS is optional plug-in card, which works as GSM/GPRS modem which can work in two modes of operation based on settings in setpoint COM1 Mode.

- Settings DIRECT = module works in GPRS network and enables connection via AirGate to LiteEdit and WebSupervisor as well as sending SMS alarms.
- Settings MODEM = module works as standard GSM modem enabling CSD (Circuit Switch Data) connection to controller with LiteEdit or other ComAp PC SW and sending alarm SMSes.

Module is usually used for connection to remote monitoring and controlling system WebSupervisor http://websupervisor.comap.cz or to PC tools. Module is capable of sending alarm SMS based on settings in SMS/Email setpoint group.



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

CAUTION!
GPRS and CSD connection is not suitable for firmware update process, kindly used wired connection instead like RS232, USB, RS485 or ethernet via IB-Lite!

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

HINT
Use of this plug-in brings WSUP Locate function. This function allows monitoring actual engine position based on GSM signal information. The position is automatically updated and stored in WSV history. You can track the position of the engine in WebSupervisor even in history.

HINT
Unlike GPS system, the function works indoor or wherever the GSM signal is. Precision of localizationis not as precise as with GPS and depends on density of operator's GSM/BTS tower around the controller.

4 Putting it into operation

4.1 How to install

To ensure proper function:
Wiring for binary inputs and analog inputs must not be run with power cables.
Analog and binary inputs should use shielded cables, especially when length > 3 m.

NOTE:
During the configuration of controller or setpoints changes is required a password to the controller. The default password from ComAp is “0”.

4.1.1 Grounding

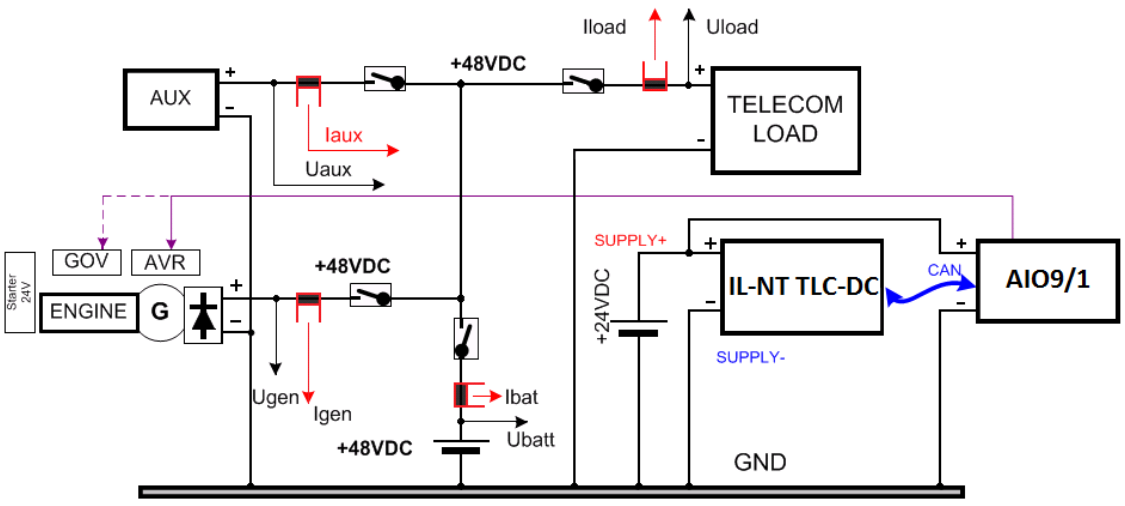
To ensure proper function:
Use cable min. 2,5 mm^2.
Brass M4x10 screw with star washer securing ring type grounding terminal shall be used.
The negative “-“ terminal of the battery has to be properly grounded.
Switchboard and engine has to be grounded in common spot.
Use cable as short as possible to the grounding point.

CAUTION!
In telecommunication application is in some countries standard to use grounding to PLUS pole (terminal). ComAp controllers using standard grounding to MINUS pole (terminal).

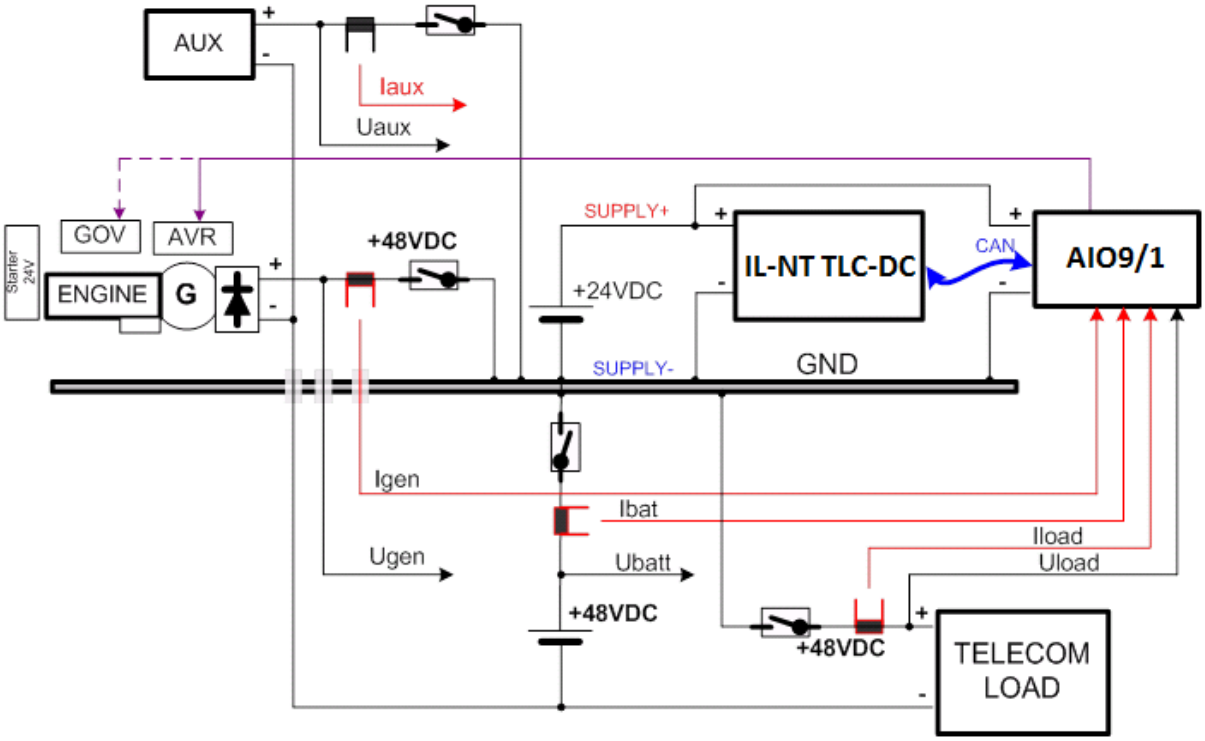
It is necessary to ensure proper grounding wiring for telecom load and for other part of system!

In case you export DC solution out of your country make sure that your customer know about this potential issue and is able to do necessary changes in wiring of the DC system!

Example of wiring for standard MINUS pole grounding InteliLite Telecom DCand AIO9/1 module:



Example of wiring for nonstandard PLUS pole grounding InteliLite Telecom DCand AIO9/1 module:



4.1.2 Wiring

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

PA256:

Specified tightening torque 0.5 Nm (4.4 In-lb)

2EDGK:

Specified tightening torque 0.4 Nm (3.5 In-lb)

For field type terminals:
Use only diameter 2.0-0.5 mm (12-26 AWG) conductor, rated for 75°C minimum.
For Generator Voltage terminals
Use only diameter 2.0-0.5 mm (12-26 AWG) conductor, rated for 90°C minimum.

Use copper conductors only.

4.1.3 Power supply

Use minimally power supply cable of 1.5 mm^2.

CAUTION!
Maximum continuous controller power supply voltage is 36 V DC.

Maximum allowable controller power supply voltage is 39 V DC.

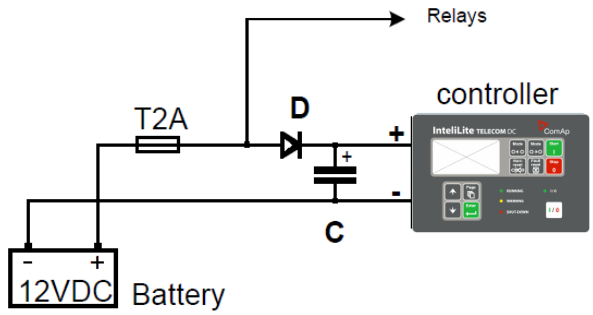
The InteliLite Telecom DC power supply terminals are protected against large pulse power disturbances. When there is a potential risk the controller being subjected to conditions outside its capabilities, an outside protection devise should be used.

HINT
The InteliLite Telecom DCcontroller should be grounded properly in order to protect against lighting strikes!! The maximum allowable current through the controller's negative terminal is 4 A (this is dependent on binary output load).

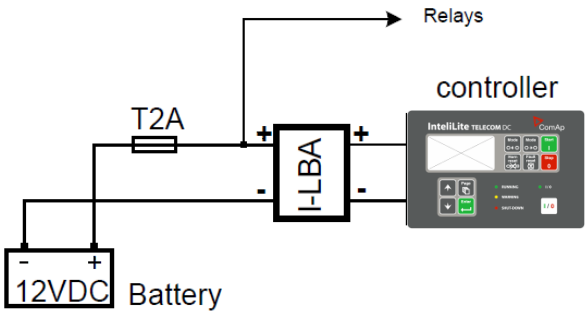
For the connections with 12 V DC power supply, the InteliLite Telecom DCincludes internal capacitors that allow the controller to continue operation during cranking if the battery voltage dip occurs. If the voltage before dip is 12 V, after 150 ms the voltage recovers to 7 V, the controller continues 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 or I-LBA module.

Connecting the external capacitor



Connecting I-LBA – Low Battery Adaptor module



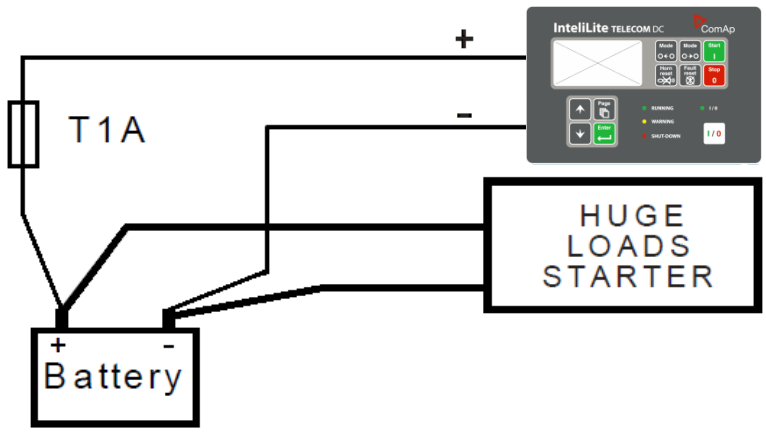
Connecting the external capacitor. The capacitor size depends on required time. It shall be approximately thousands of uF (microFarads). The capacitor size should be 5000 uF to with stand 150ms voltage dip under following conditions: Voltage before dip is 12 V, after 150 ms the voltage recovers to minimum allowed voltage i.e. 8 V.

Connecting I-LBA. The I-LBA module ensures minimaly 350 ms voltage dip under following conditions: RS232 and other plug-in module is connected. Voltage before dip is 12 V and after 350 ms the voltage recovers to minimum allowed voltage 5 V. The I-LBA enables controller operation from 5 V (for 10 to 30 s). The wiring resistance from battery should be up to 0.1 Ω for I-LBA proper function.

4.1.4 Power supply fusing

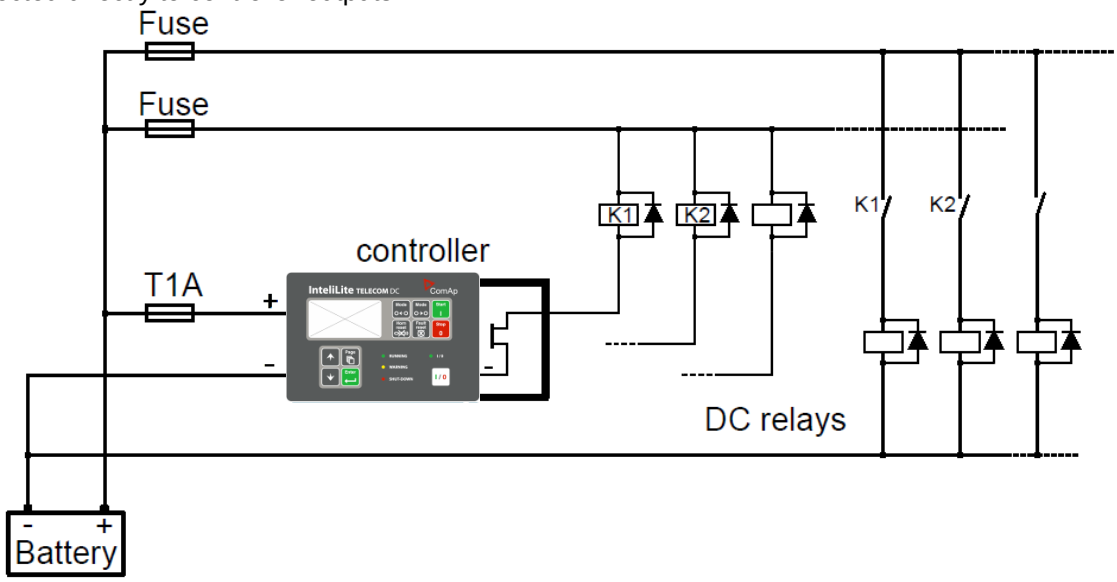
A one-amp fuse should be connected in-line with the battery positive terminal to the controller and modules. These items should never be connected directly to the starting battery.

Fuse value and type depends on number of connected devices and wire length. Recommended fuse (not fast) type - T1A. Not fast due to internal capacitors charging during power up.



4.1.5 Binary output protections

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

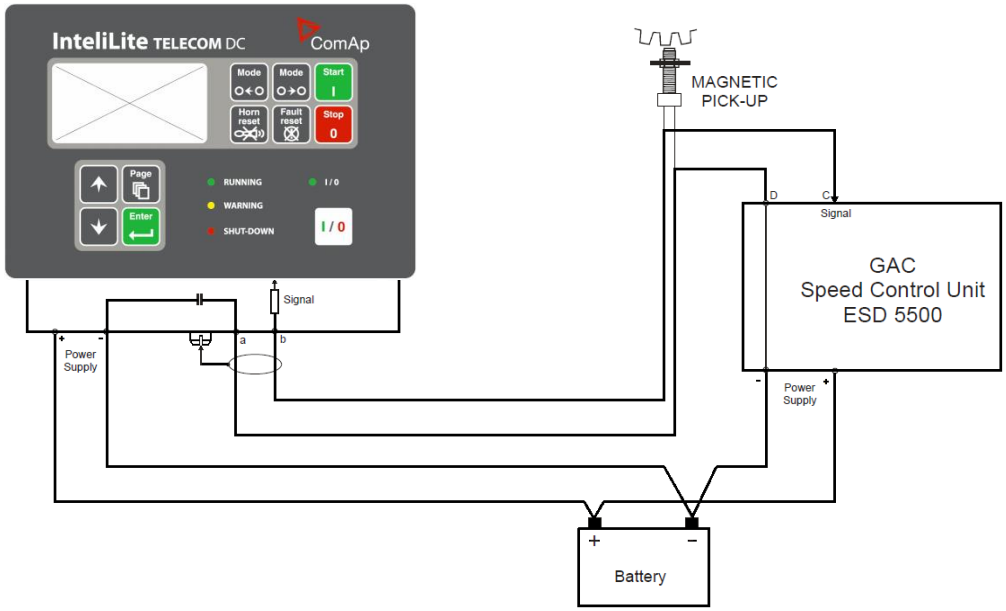


4.1.6 Magnetic pick-up

To ensure proper function:
Use a shielded cable

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

- Check ground connection from pick-up to controllers, eventually disconnect ground connection to one of them
- Galvanic separate RPM input using ComAp separation transformer RPM-ISO (1:1)
- Use separate pick-up for Speed governor



HINT
If RPM > 2 then the controller is in the state Not ready and the engine will not be allowed to start. Sd Stop fail would be displayed in the alarm list.

4.2 Analog inputs

On the InteliLite Telecom DCcontroller nine analog inputs are available. See the tables here bellow with specific characteristics.

All here mentioned properties can be modified by LiteEdit PC tool only, in the window Modify 

4.2.1 Table of controller analog inputs

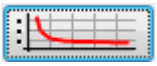
Input	Range	Use	Configurability of default use	Option Setpoint
AI1	**0 - 2 ,4 kΩ**	**Oil Pressure**	**NO**	
AI2	**0 - 2,4 kΩ**	**Cooling Temp / Custom**	**YES**	
AI3	**0 - 2,4 kΩ**	**Batt Temp / Custom**	**YES**	***BatteryTempSel***

HINT
The nominal range of Analog inputs measuring resistivity is 0- 2,4 kΩ, nevertheless the input is able to measure up to 15 kΩ, but with lower precision.

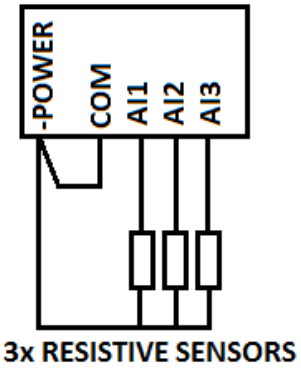
When Engine Control Unit is connected, it is possible to read InteliLite Telecom DC Analog inputs values AIN1, 2, 3 from CAN bus (J1939).

4.2.2 Table of analog inputs options

LiteEdit	Modify	Possibility
Type	Not used Alarm Monitoring	Analog input isn't used Analog input is used for monitoring and protection Analog input is used only for monitoring
Name	… text	Up to 14 ASCII characters

	Name in history	Up to 4 ASCII characters for the name used in history records
Config	Analog Binary Tri state	Analog measuring in specified range. Binary: open/close - threshold 750 Ω or 7 V DC Three (Triple)-state: open/close - threshold 750 Ω (only AIN1-AIN3), failure <10 Ω or > 2400 Ω
Alarm properties	Direction	Under limit Under step. Sensor fail does not activate protection. Over limit Overstep. Sensor fail does not activate protection. UnderLimit+Fls Under step and Sensor fail activates protection. OverLimit+Fls Overstep and Sensor fail activates protection.
	Type	Sensor fail Warning Wrn+Sd CoolDown
	Engine running only	Check box: Alarms are valid only for running engines, if box is checked
Sensor	Sensor name 	… text Resolution: number of decimal points Dimension: bar, %, °C, etc. Table and graph: customize curves
Contact type	NC NO	Valid only for binary and three-state inputs Valid only for binary and three-state inputs

4.2.3 Connection of InteliLite Telecom DCanalog inputs

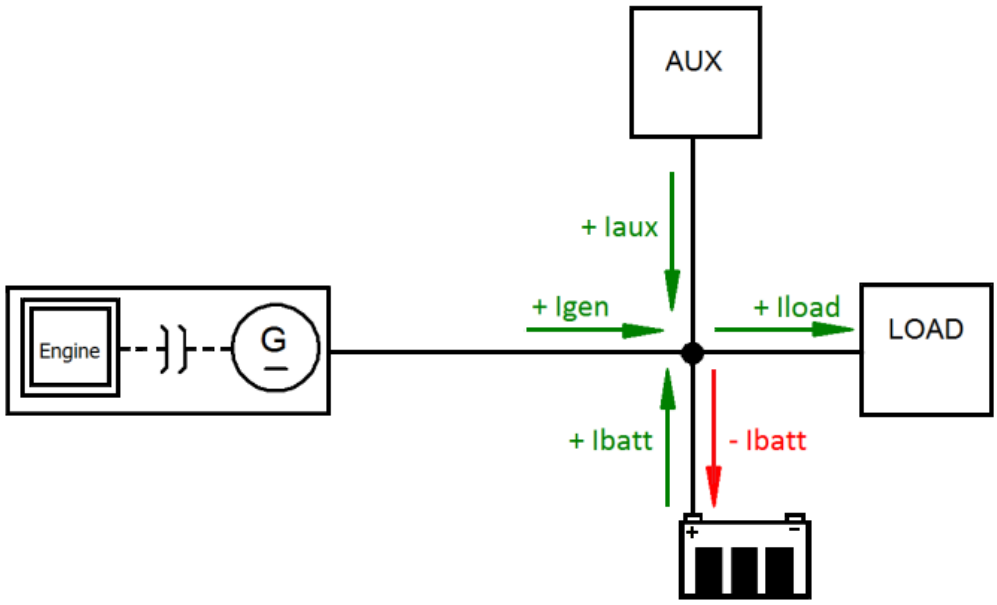


Standard connection of three resistive sensors to analog inputs.

4.2.4 Current measurement

IL-NT-TLC-DC is using the AIO9/1 with **Basic settings**: *CurrSelection* = Ge+Ba+Ld+Ax – i.e. all values are measured or configured as Not Used.

Related value	Dimension	Location
Analog input values from CU or AIO9/1		
Igen	**[A]**	**Generator current**
Iload		**Load current**
Ibatt		**Charging – negative value (current into the battery)** **Discharging – positive value (current from the battery)**
Iaux		**Auxiliary current**



HINT
Modify default current characteristics in LiteEdit according the shunts.

Voltage inputs of extension module AIO9/1				
Analog input	**Signal**	**Positive (+)**	**Negative (-)**	**Max.Range**
AIN1	Ugen	A	B	0 to +65 V or -65 to 0 V
AIN2	Ubat	A	B	0 to +65 V or -65 to 0 V
AIN3	Uload	A	B	0 to +65 V or -65 to 0 V
AIN4	Uaux	A	B	0 to +65 V or -65 to 0 V

mV inputs of extension module AIO9/1 – galvanically separated					
Analog input	**Signal**	**positive (+)**	**Negative (-)**	**Shielded**	**Max.Range**
AIN5	Igen	A	B	C	0 ± 75 mV / (±200 A)
AIN6	Ibat	A	B	C	0 ± 75 mV / (±200 A)
AIN7	Iload	A	B	C	0 ± 75 mV / (±200 A)
AIN8	Iaux	A	B	C	0 ± 75 mV / (±200 A)
AIN9	resistive	A	B		0 – 2400 Ω

Analog output of extension module AIO9/1			
Output	Signal	terminal	Range
Current	mA	I	4 – 20 mA
Voltage	V	U	0 – 5 V
PWM	PWM	P	200 Hz
Ground	GND	12	

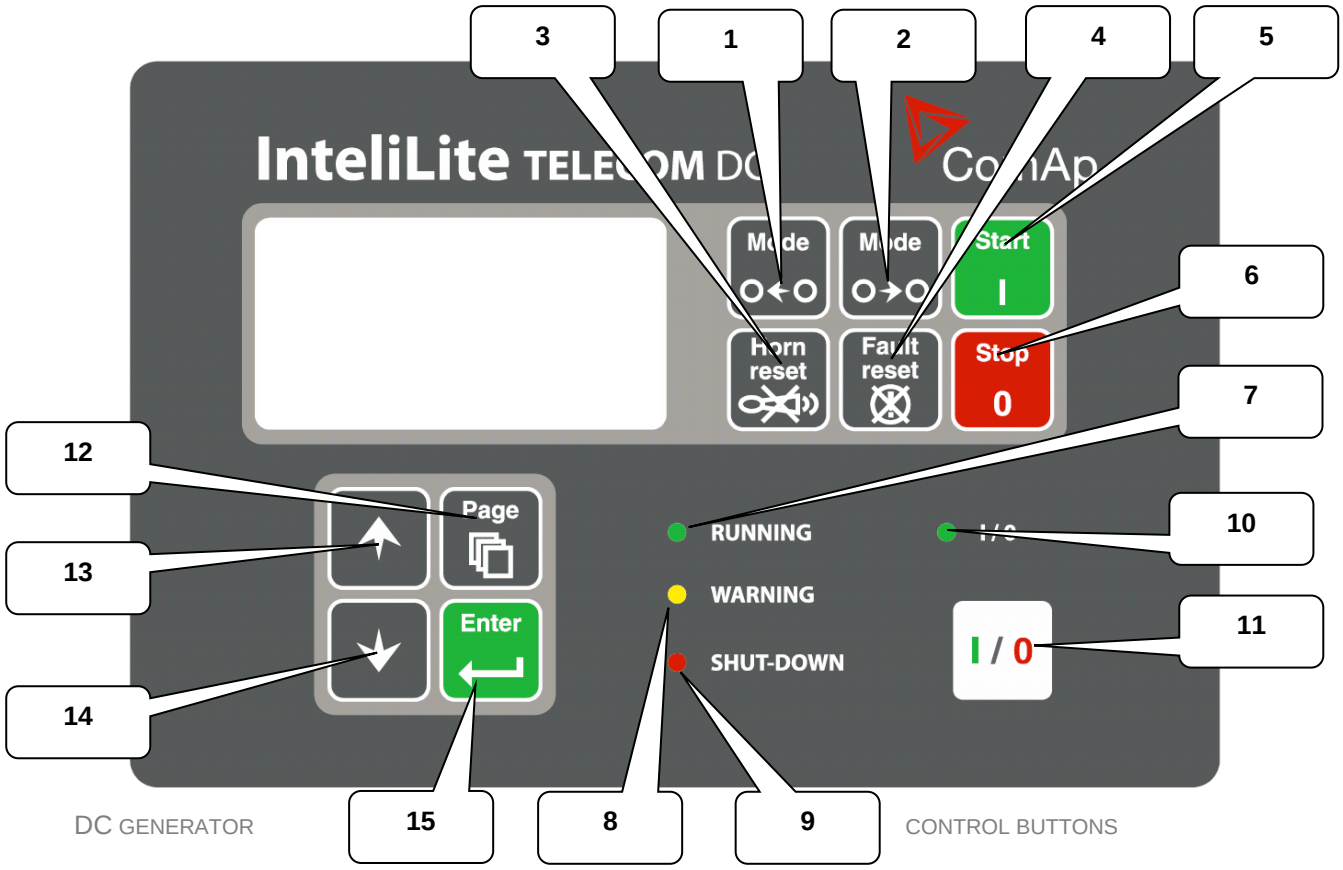
Communication and supply terminals	
Signal	Terminal
CAN H	H
CAN L	L
COM	COM
SUPPLY POSITIVE	+
SUPPLY NEGATIVE	-

The InteliLite Telecom DC controller analog inputs AIN4, AIN5 and AIN6 to AIN9 are dedicated for custom use.

NOTE:
For the proper function of the system is absolute minimum to measure battery and generator voltage and current.

5 Operator guide

5.1 Front panel elements



POSITION	BUTTON	DESCRIPTION
1		**MODE LEFT** button. Use this button to change the mode. The button works only if the main screen with the indicator of currently selected mode is displayed. **NOTE:** This button will not work if the controller mode is forced by one of binary inputs Remote OFF, Remote MAN, Remote AUT, Remote TEST.
2		**MODE RIGHT** button. Use this button to change the mode. The button works only if the main screen with the indicator of currently selected mode is displayed. **NOTE:** This button will not work if the controller mode is forced by one of binary inputs Remote OFF, Remote MAN, Remote AUT, Remote TEST.

3		**HORN RESET** button. Use this button to deactivate the horn output without confirmation of the alarms.
4		**FAULT RESET** button. Use this button to acknowledge alarms and deactivate the horn output. Inactive alarms will disappear immediately and status of active alarms will be changed to "confirmed" so they will disappear as soon as their reasons dismiss.
5		**START** button. Works in MAN mode only. Press this button to initiate the start sequence of the engine.
6		**STOP** button. Works in MAN mode only. Press this button to initiate the stop sequence of the engine.
7		Engine running
8		A failure but engine keeps running
9		Engine is stopped because of red alarm.
10		Status of I/0 button:
11		ON/OFF button: according to the user setup, the button switches the corresponding Logical binary output according the **Basic settings**: *Panel Button* setpoint (Toggle, Nominal/Iddle, Close load etc.)
12		**PAGE** button. Use this button to switch over display pages. See Display Screens and Pages Structure chapter below this table for more details.
13		**UP** button. Use this button to select the set point, select the screen or increase set point value
14		**DOWN** button. Use this button to select the set point, select the screen or decrease set point value

15		**ENTER** button. Use this button to finish editing a setpoint or moving right in the history page.

5.2 Init screens

Following screens are displayed after powering on the controller or you can be displayed from main metering screen after holding ENTER and pressing PAGE button. Pressing PAGE button again will switch to another following screen.

5.2.1 Init screen

This is a first screen after controller's start which is dedicated for information provided by customers such as contact numbers, service technician contact and customer message for end users of engine. Configuration of this screen is only done by LiteEdit PC tool.

5.2.2 Firmware screen

This screen contains information about controller's type, controller manufacturer ComAp, uploaded firmware, version of firmware, used application and branch. There is also information about currently configured electronic engine unit, respectively about ESF file. Details for recognition of configured electronic engine are in chapter ECU controlled engine support.

5.2.3 Languages screen

InteliLite Telecom DCcontroller offers configurable language support. On this screen is possible to switch between languages configured in controller. Second way, how to change language, is by binary input Lang Selection.

5.2.4 User Interface screen

InteliLite Telecom DC controller allows to choose the user interface as customer prefers.
There are two choices available: USER or ENGINEER interface.

USER interface is simple menu displaying just measurement, alarm and init screens.

ENGINEER interface allow changing the controller's settings, reviewing the history, measurements and alarms. This mode is default.

This screen also contains Serial and Pwd. dec. (Password decode) numbers These numbers you can use in case of forgotten passwords.

NOTE:
If the password for the controller is forgetten, then is necessary to send Serial and Pwd. dec. numbers to technical support team. They are able to renewed password for your controller.

5.3 Display menus

There are 3 display menus available: MEASUREMENT and ADJUSTMENT and HISTORY in Engineer interface and only MEASUREMENT in User interface.

Each menu consists of several screens. Press repeatedly PAGE button to select requested menu.

5.3.1 Switching between User and Engineer menus

Hold ENTER and then press PAGE to activate info Firmware screen and the panel LED test. Within 10s press PAGE to switch to Language selection screen and the second time PAGE to switch to User interface selection. Use ⇑ and ⇓ to select appropriate interface and press ENTER

5.4 How to select the controller mode?

Use MODE→ or ←MODE to select requested engine operation mode (OFF – MAN – AUT)

5.5 How to view measured data?

1. Use repeatedly PAGE button to select the MEASUREMENT menu.
2. Use ⇑ and ⇓ to select the screen with requested data.

5.6 How to view and edit setpoints?

1. Use repeatedly PAGE button to select the ADJUSTMENT menu.
2. Use ⇑ or ⇓ to select requested set points group.
3. Press ENTER to confirm.
4. Use ⇑ or ⇓ to select requested set point.
5. Set points marked **"*"** are password protected.
6. Press ENTER to edit.
7. Use ⇑ or ⇓ to modify the set point. When ⇑ or ⇓ is pressed for 2 sec, auto repeat function is activated.
8. Press ENTER to confirm or PAGE to leave without change.
9. Press PAGE to leave selected set points group.

5.6.1 How to change the display contrast?

Press ENTER and ⇑ or ⇓ at the same time to adjust the best display contrast

HINT
Only in MEASUREMENT screen.

5.6.2 How to check software revision?

Hold ENTER and then press PAGE. This activates the panel LED test and controller's display is switched to Firmware screen. On the display you can see (for 10 seconds) InteliLite Telecom DC Firmware screen containing:

1) *Controller name* (see **Basic setting** group)
2) *Firmware version* *IL-NT-TLC-DC-x.y*
3) ESF: version of ESF file, if ECU is configured
4) SW version: the first is the firmware version number
   the second is configuration table number
5) Application: TLC-DC
6) Branch: TLC-DC

HINT
Only in MEASUREMENT screen.

5.6.3 How to check the serial number and choose interface?

Hold ENTER and then three times press PAGE. On the display you can see InteliLite Telecom DCUser Interface screen containing:

1) User interface: can choose User(block adjustment function of controller) or Engineer interface
2) Serial: 8 character number
3) Pwd. dec: 10 character number
4) DiagData: 1 character number

HINT
Only in MEASUREMENT screen.

5.6.4 How to change language?

Hold ENTER and then two times press PAGE to get to Languages selection screen. Use ⇑ or ⇓ to select desired langue and press ENTER to confirm selection.

5.7 How to find active alarms?

Active alarm list is the last screen in the MEASUREMENT menu.
Select MEASUREMENT menu. Press ⇑ you will see the list of all active alarms with the number of alarms at the top-right corner three state alarms are introduced:

Example	Description
*Wrn Water temp	Active not accepted alarm
Wrn water temp	Active accepted alarm
*Wrn Water temp	Inactive not accepted alarm
	Inactive accepted alarm

Press FAULT RESET accepts all alarms. Non-active alarms immediately disappear from the list.
Active alarm list appears on the screen when a new alarm comes up and Main MEASUREMENT screen is active.

HINT
Alarm list does not activate when you are reviewing the values or setpoints.

Second alarm list for ECU alarms is also available. It is displayed one screen above the standard alarm list on the controller display or under the standard alarm list in Control window of LiteEdit. If an alarm appears in this alarm list, it is signalized in the standard alarm list and by exclamation mark on the main measure screen.

Control from the front panel	
↑↓	One screen up/down
Enter	Cursor move within the ECU alarm list
Enter + Fault reset	ECU fault code reset

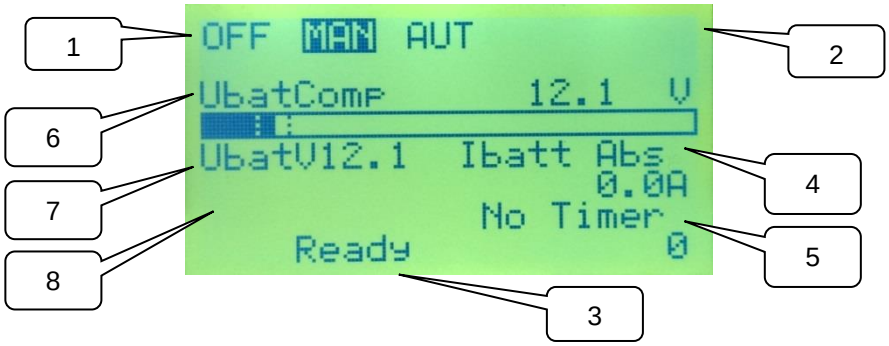
5.8 How to list History records?

1. Use repeatedly PAGE button to select the History menu.
2. Use ⇑ or ⇓ to select requested History line – see Reason, Date and Time.
3. Press ENTER to go-on line to right – see recorded values.
4. Use repeatedly PAGE button to go back to Measurement screen.

5.9 MEASUREMENT screens description

5.9.1 Main measure screen

Charging procedure overview is located on the first screen.



1. Operation mode of the generator
2. Indication: **"L"** = Access lock, **"!"** = active Alarm
3. Status of the generator
4. Absolute measured value of current going in/out of batteries
5. Timer - events counting time (e.g. prestart, cooling, etc.)
6. Compensated voltage of the batteries
7. Measured voltage of the batteries
8. Status of the charging cycle (Bulk, Absorption, AUX charge, Discharge)

5.9.2 InteliLite Telecom DC Battery information screen

BatteryIn	(Information about ampere hours during one cycle into the battery)
BatteryOut	(Information about ampere hours during one cycle out of the battery)
TotalBattCh	(Information about ampere hours during all cycles into the battery)
TotalBattDi	(Information about ampere hours during all cycles out of the battery)
NumOfCycl	(Total number of battery charging cycles)

5.9.3 InteliLite Telecom DCAnalog inputs screen 1

NOTE:
This configuration is recommended to use for DC application. In case of use external AIO9/1 module additional screens are going to be displayed and the controller's analog inputs can be used for different purposes.

Oil pressure	(Analog Input 1: bar-graph with protection limits indication, usually Oil pressure dedicated)
Engine temp	(Analog Input 2: bar-graph with protection limits indication, usually engine temperature dedicated)
Fuel Level	(Analog Input 3: bar-graph with protection limits indication, usually fuel level dedicated)
Battery Volts	(Power supply bar-graph with protection limits indication)

5.9.4 InteliLite Telecom DCAnalog inputs screen 2

Ubatt (Analog Input 4: Battery bank voltage)
Ugen (Analog Input 5: Generator output voltage)
Uload (Analog Input 6: Load input voltage)
Uaux (Analog Input 7: Auxiliary source voltage)

5.9.5 InteliLite Telecom DCAnalog inputs screen 3

IbattAbs (Analog Input 9: Absolute value of battery current)
Igen (Analog Input 8: Output generator current)
Iload (Analog Input 7: Measured current into the load)
Iaux (Calculated current from auxiliary source)

5.9.6 InteliLite Telecom DC Binary inputs screen

This screen shows binary inputs BI1 to BI7 states and their names.

5.9.7 InteliLite Telecom DC Binary outputs screen

This screen shows binary outputs BO1 to BO7 states and their names.

5.9.8 IL-NT-BIO8 Binary inputs screens

IN: BIO8 BI1 Alarm
IN: BIO8 BI2 Alarm
IN: BIO8 BI3 Alarm
IN: BIO8 BI4 Alarm
IN: BIO8 BI5 Alarm
IN: BIO8 BI6 Alarm
IN: BIO8 BI7 Alarm
IN: BIO8 BI8 Alarm this line is displayed on the following screen

HINT
These screens are shown/hidden depending on whether the IL-NT-BIO8 is configured or not.

5.9.9 IL-NT-IO1 Binary inputs screen

IN: BIO8 BI1 Alarm
IN: BIO8 BI2 Alarm
IN: BIO8 BI3 Alarm
IN: BIO8 BI4 Alarm

HINT
This screen is shown/hidden depending on whether the IL-NT-IO1 is configured or not.

Analog outputs are not displayed on any screen!

5.9.10 IL-NT-AIO Analog inputs screen

AIO AI1 (AI1 barograph with protection limits indication, displayed only if is configured)
AIO AI2 (AI2 barograph with protection limits indication, displayed only if is configured)
AIO AI3 (AI3 barograph with protection limits indication, displayed only if is configured)
AIO AI4 (AI4 barograph with protection limits indication, displayed only if is configured)

HINT
This screen is shown/hidden depending on whether the IL-NT-AIO is configured or not.

Analog output AO1 is not displayed on any screen! It is visible among values in LiteEdit.

5.9.11 ECU State screen

ECU State	
ECU YellowLamp	
ECU RedLamp	
WaitToStart	
SpeedReq Abs	Required RPM of the engine
SpeedReq Rel	%

HINT
This screen is shown/hidden depending on whether the ECU is configured or not.

5.9.12 ECU Values screen

It depends on the ESF file which is configured. See practical example of the screen below for Caterpillar J1939 2.1.

Practical example:

Fuel rate	L/h or gph
CoolantTemp	°C or °F
IntakeTemp	°C or °F
Oil pressure	Bar or psi
Boost pressure	Bar or psi
Load	% (Percentual load at current speed)

HINT
This screen is shown/hidden depending on whether the ECU is configured or not.

5.9.13 Statistic Values screen

Number of starts	
ShutDown	Number of engine ShutDown stops (without Emergency stops)
SpeedReq Abs	Required RPM of the engine
RPM	RPM measured by pick up sensor
Run hours	Running hours of the generator

HINT
Running time is measured in complete minutes, displayed in complete hours. Values are stored in nonvolatile memory.

5.9.14 ECU AlarmList

Diagnostic messages are read from ECU and displayed in this second alarm list. For Standard J1939 engines SPN (Suspect Parameter Number), FMI (Failure Mode Identifier) and OC (Occurrence Counter) are shown together with verbal description if available.

Following image shows displaying of ECU alarms in the second alarm list. The additional information for the row selected by cursor is on the last row (SPN, OC and FMI codes).

If the verbal description of alarm is not available, the SPN (decimal and hexadecimal) is displayed.

HINT
For FMI = 0 and 1, WRN is displayed. For other FMI codes, FLS is displayed.

5.9.15 Alarm list

Alarm list displays active or inactive alarms occurred on InteliLite Telecom DC unit. InteliLite Controller automatically switches to the Alarm list screen when any new alarm appears, but from Main measure screen only. See chapter Alarm management.

6 Function description

6.1 Operation states and modes

Engine State	Meaning
Init	Auto test during controller power on
Not ready	Engine is not ready to start
Prestart	Prestart sequence in process, Prestart output is closed
Cranking	Engine is cranking
Pause	Pause between start attempts
Starting	Starting speed is reached and the *Idle timer* is running
Running	Engine is running at nominal speed
Stop	Stop
Shutdown	Shut-down alarm activated
Ready	Engine is ready to run
Cooling	Engine is cooling before stop
EmergMan	Emergency Manual engine operation
AfterCool	Engine after cooling - Cooling Pump output is closed
Charging State	**Meaning**
Bulk	Maximum constant current charging battery bank
Absorption	Constants voltage charging algorithm with regulated drop of current
AUXCharge	Auxiliary source charging battery bank
Discharge	Battery bank supply load
Controller Mode	**Meaning**
OFF mode	No start of the engine is possible. Binary outputs STARTER and FUEL SOLENOID are not energized. No reaction if START, STOP buttons are pressed
MAN mode	Manual control of DC generator, start and stop of the engine by buttons START, STOP on the front panel or by binary inputs or by PC tool. Engine can run without load unlimited time. The controller does not automatically stop the running engine.
AUT mode	The charging cycle is running according to group of setpoints *Battery Charge* or depends on the remote signal. Except standard charging cycle is possible to affect running of DC generator by setpoints *ServiceCycle* and *ChrgLimitTime*

6.2 Charging cycle

InteliLite Telecom DC is bringing, except standard starting procedure and protection, advantage of smart charging algorithm. In general in DC application we are expecting battery bank which needs to be charged and by ComAp solution we can reach significant fuel saving.

Battery bank is taken as primary source of energy for DC load and DC generator is working only as charging device and system backup.

Charging cycle initiates by three basic conditions:

1. Battery voltage start,
2. External REMOTE START/STOP signal or
3. Discharged ampere hours.

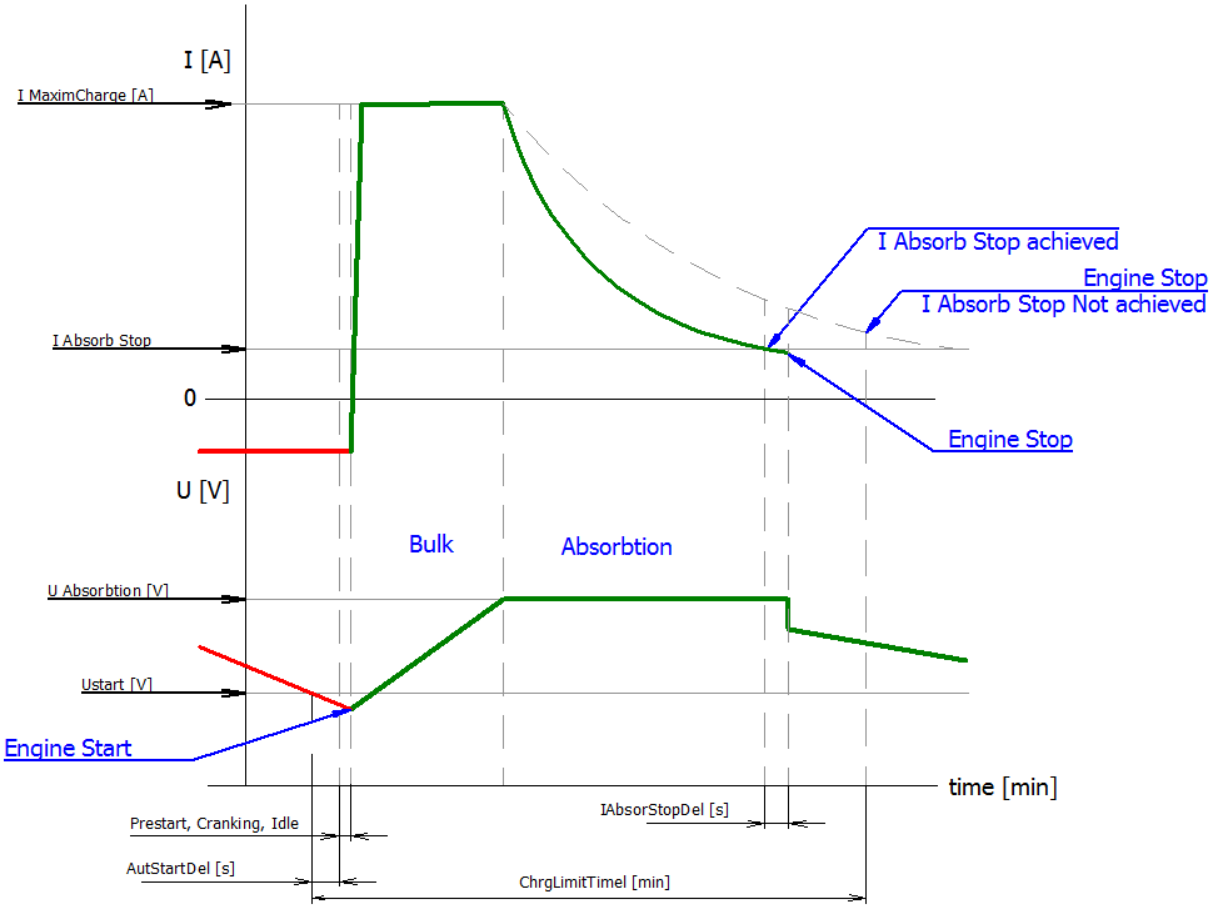
NOTE:
Each starting condition has certain stopping condition, e.g. if once charging cycle start on the battery voltage condition *Ustart*, generator stop only on the *I Absorp Stop* condition and do not stop on *Charge Limit* condition.

Performed charging characteristic by InteliLite Telecom DC you can see below with description of important points.

This characteristic is given by producer of batteries to extend life cycle of battery cells.

HINT
Setpoints for proper adjustment should be recommended by battery producer, usually is possible to find them in the battery datasheet.

E.g. if you have battery with capacity C=1600Ah, then usual recommended charging current is 0.1-0.3C, setpoint I Max Charge then can be adjust as 160-480 Amps, depends on the recommendation of battery manufacturer and available DC generator output power.

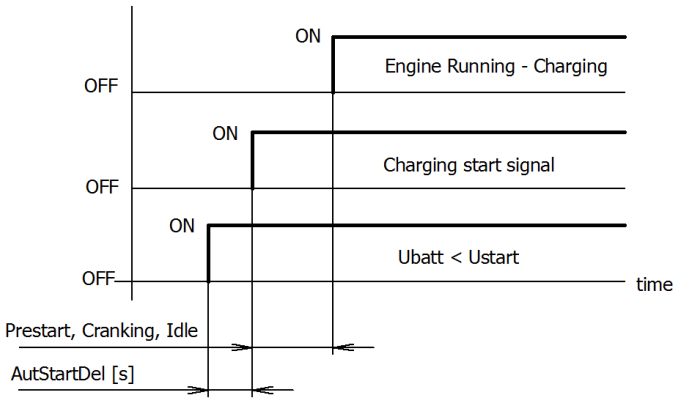


6.2.1 Battery voltage start

The generator starts cranking in AUT mode if battery voltage level drops under adjusted limit.

For controller it means if measure and compensate value *Ucomp* has lower value than *Ustart* and stays under this limit longer than *AutStartDel*.

NOTE:
Related setpoint, that affect start delay, are *AutStartDel, Prestart time, Preglow time, Cranking time, Idle time* etc.



6.2.1.1 *Bulk Cycle*

Bulk cycle is intended to charge the battery with nominal (maximum possible) charging current *I Max Charge*. Bulk cycle is finished when battery voltage *Ucomp (Ucomp* = Ubatt + temp. compensation) reaches the nominal voltage of the battery *U Absorbtion*.

6.2.1.2 *Absorption cycle*

Absorption cycle maintains the battery voltage *Ubatt* at constant voltage level *U Absorption* as long as the battery charging current *Ibatt* drops below *I Absorp Stop* limit (this limit stops the charging process)

NOTE:
In case the *I Absorbtion Stop* limit is not achieved, the charging process will stop once *ChrgLimitTime* period is elapsed.

6.2.1.3 *Stopping*

As soon as all condition for stopping are achieved the generator is stopped with *IAbsorStopDel*.

6.2.2 External REMOTE START/STOP signal

Binary input REMOTE START/STOP can be use to initialize start and stop of the DC generator.

If the binary input REMOTE START/STOP is activated, the charging is regulated only on constant current level, given by setpoint *I Max Charge.* The controller cannot go into the Absorption part of cycle.

This feature can be used to run permanently DC generator to supply directly the load or more often is used for charging special types of batteries (e.g. Li-Ion), that has own charging management system (BMS).

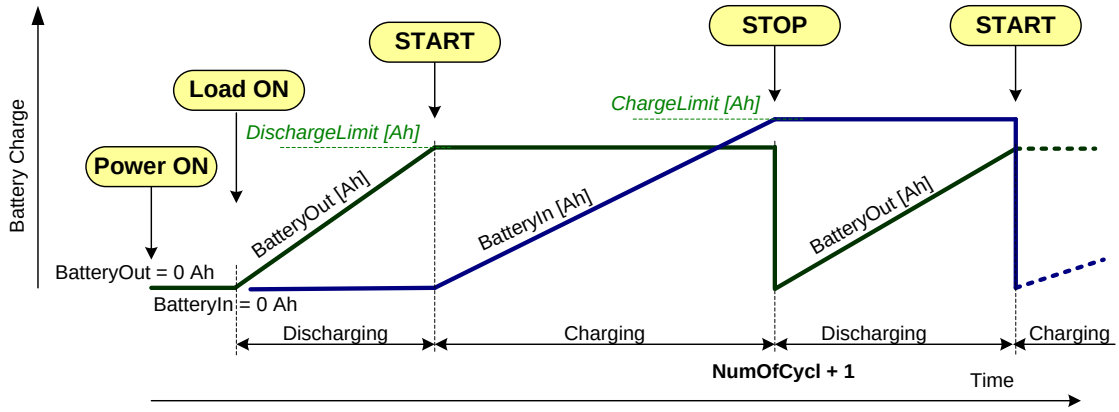
6.2.3 Discharged ampere hours

DC generator and charging procedure start automatically in AUT mode. Start is activated by reaching discharge current limit.

The controller is measuring current and voltage during charging and discharging the battery and recount it into the Ampere hours. Values are displayed as *BatteryIn* and *BatteryOut* in one cycle.

These actual values *BatteryIn* and *BatteryOut* are compared with two setpoints **Battery Charge**: *ChargeLimit* and *DischargeLimit.* When the *DichargeLimit* is reached the engine is started and when the *ChargeLimit* is reached engine is stopped.

The controller at the same time is counting number of cycles and saving into the value statistic *NumOfCycles.* Over all cycles are also counted *TotBattChrg* and *TotBattDischrg* Ampere hours.



6.2.4 Values related to charging cycle

RELATED VALUES	DIMENSION	DETAILS
Ubatt	[V]	Battery voltage – measured
Ugen	[V]	Generator voltage - measured
BatteryIn	[Ah]	Charging battery current in Ampere hours – counted
BatteryOut	[Ah]	Discharging battery current in Ampere hours – counted
UbattComp	[V]	Compensated battery voltage – calculated See Temperature compensation
Uaux	[V]	Auxiliary – external power source voltage - measured
ExcitRequest	[-]	Output signal of controller for excitation or speed control
Igen	[A]	Generator current – measured / calculated See Current measurement
Iload	[A]	Load current – measured / calculated See Current measurement
Ibatt	[A]	Battery current – measured / calculated See Current measurement
Ibatt Abs	[A]	Battery current value for displaying on the screen of the controller
Iaux	[A]	Auxiliary current – measured / calculated See Current measurement
BatteryTemp	[-]	Available for temperature measurement see BatteryTempSel

6.3 Temperature compensation

The battery bank is through the year and region used in different temperature condition. This negatively affect life cycle of battery bank. To prolong the life cycle of the battery bank and better follow charging characteristic under different temperature conditions, the controller is calculating compensation of voltage and current depending on the measured battery bank temperature.

The compensated voltage *Ucomp* is calculated based on measured battery, *Ubatt* and compensation constant *Batt Temp Comp*.

NOTE:
Ucomp = Ubatt – Batt Temp CompΔt_{25},* voltage is compensated by mV for each °C. Reference temperature is given Δt_{25} = 25°C - *BatteryTemp*.

The compensated current is calculated based on measured battery temperature, *Ibatt* and compensation constant *Curr Temp Comp.* This compensation is affecting limit for charging current *I Max Charge*.

NOTE:
I Max Charge = Ibatt – Curr Temp CompΔt_{50},* current limit is compensated by A for each °C. Reference temperature is given Δt_{50} = 50°C - *BatteryTemp*.

Battery temperature compensation is possible disabled by adjustment of setpoint *BatteryTempSel* to OFF.

7 Setpoints

Setpoints are analog, binary or special data objects which are used for adjusting the controller to the specific environment. Setpoints are organized into groups according to their meaning. Setpoints can be adjusted from the controller front panel, PC tools, MODBUS, etc.

7.1 Setpoints Password protection

Each setpoint can be protected by a password against unauthorized changes. Password protection can be assigned to the setpoints during the configuration procedure. See the chapter Operator guide for instructions on how to enter and modify a password. See also the LiteEdit help to learn about working with a password in LiteEdit. Password protection can be adjusted in LiteEdit in window Modify by pushing this icon  .

7.2 Basic Settings

7.2.1 Gen-set name

User defined name, used for generating set = unit identification at remote phone or mobile connection.

Gen-set Name is maximally 15 characters long and have to be entered using LiteEdit software.

7.2.2 CurrSelection [-]

Options:
Ge+Ba+Ld
Ge+Ba+Ax
Gen+Load
Gen+Batt
Batt+Load
Ge+Ba+Ld-Ax
Ge+Ba+Ld+Ax]

Selection of various current measuring points depends on the system wiring and configuration.

Preferred:
Ge+Ba+Ld-Ax, Ge+Ba+Ld+Ax: Dedicated for InteliLite Telecom DC with AIO9/1 external module where all values are measured or configured to Not used.

Other options:
Ge+Ba+Ld, Ge+Ba+Ax, Gen+Load, Gen+Batt, Batt+Load: Options used for former InteliDrive Lite DC firmware versions up to 1.3. In such case refer to corresponding manual.

7.2.3 Gear Teeth [-]

The number of teeth on the engine gear for the pick-up sensor. The setpoint is ignored when ECU is configured.

NOTE:
The RPM pickup input is ignored when **Engine params**: *Gear Teeth* = 0. The engine running state is then detected based on **Engine params**: *Starting Oil P* or **Engine params**: *D+ Function* = ENABLED.

Step: 1 [-]

Range: 0…500 [-]

Default value: 120 [-]

7.2.4 RPMbyWterminal [-]

The constant of this setpoint multiplies the speed value obtained from the controller input RPM.

Step: 0,01 [-]

Range: 0,50…2,00 [-]

Default value: 1,00 [-]

HINT

The default value is and must be 1, when the classical pick-up speed sensor is used to measure the engine speed.

The setpoint is useful when the engine does not have the speed sensor and the speed is measured by the W terminal of the charging alternator. The setpoint allows tuning the ratio between the frequency and the RPM value which can not to correspond to the entire values of teeth numbers (because of the different non-integral ratio of the engine and alternator pulleys).

7.2.5 Nominal RPM [RPM]

Nominal engine speed, base for overspeed protection and scale on RPM gauges.

Step: 1 [RPM]

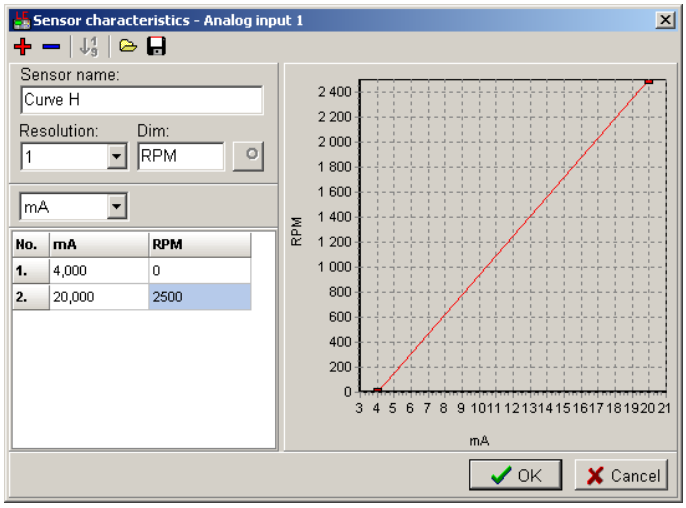
Range: 100…4000 [RPM]

Default value: 1500 [RPM]

7.2.6 RPM Source [-]

Steps: PickUp, AIO-AIN1, AIO-AIN2, AIO-AIN3, AIO-AIN4

Switch from where the RPM is measured. When source is Analog input the converted value is going to be in RPM range – see example below.



7.2.7 ControllerMode [-]

Options: OFF, MAN, AUT

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

HINT
Controller Mode change can be separately password protected.

7.2.8 Reset To MAN [-]

Options: ENABLED, DISABLED

DISABLED: Controller stays in AUT mode after Fault reset. Default state.

ENABLED: Automatic switch from AUT to MAN mode after Fault reset to avoid automatic engine start. This function is active for Shut down protection only.

7.2.9 Backligh Time [min]

The display backlight is switched off after timeout.

Step: 1 [min]

Range: 0…241 [min]

Default value: 0 (“0” means that the display lights all the time)

NOTE:
Value “0” means that the display is backlit all the time.

7.2.10 Panel Button

Steps: Nom/Idle, N/I Init, CloseLoad, Toggle

Adjust the function of front panel button I/O.

Default value: Nom/Idle

Nom/Idle: Switches between Nominal and Idle speed request. The function is allowed in MAN mode only, after reaching the status RUN and the requested speed set by the setpoint *ECU SpeedAdj*. (i.e. not during IDLE speed warm-up run in Starting status).

N/I Init: Switching between Nominal and Idle speed request. After the starting, the speed according to the setpoint *Idle Speed* is reached and this status is maintained until the I/0 button is pressed. The function is allowed in MAN mode only and is blocked during Cooling time.

HINT
When LBI Nominal/Idle is configured (to a physical binary input), it has priority and the switching between the nominal and the idle speed by I/0 button is blocked.

CloseLoad: When the engine is in the status Ready to Load, this option switches ON and OFF the LBO *Close Load*. When the engine is not in the status Ready to Load, the button has no influence.

NOTE:
The applications without the information about the speed cannot reach the status Ready to Load and therefore, the load cannot be switched by the I/O button. Necessary settings: setpoint *Gear teeth* = 0, setpoint *RPM source* = PickUp (no ECU), the condition sufficient for LBO *Close Load* activating by the I/O button is the Running state.

Toggle: Switches ON and OFF the LBO *Toggle*, no other consequences.

NOTE:
Panel LED above Toggle button is lit when particular function is activated.

The applications without the information about the speed cannot reach the status Ready to Load and therefore, the load cannot be switched by the I/O button.

7.2.11 Contactor Fb's [-]

Options: NO, YES

Disabled or enabled need of feedbacks from the circuit breakers.

NO: Block the protection of circuit breakers. Protection is checking, if the breaker is correctly closed at the right time, alarms are disabled. Default state.

YES: If YES then the breakers are closed automatically in AUT mode by binary outputs signals *GCB Close/Open*, *BCB Close/Open* etc. and feedback is required as binary input signal. In case of no feedback then alarm *Sd GCB Fail*, *Sd BCB Fail* etc. appears. It is allowed to control feedback in MAN mode as well. Have to only configure binary inputs *GCB Close/Open*, *BCB Close/Open* etc.

7.3 Comms Settings

7.3.1 ControllerAddr [-]

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

Addresses: 1…32 [-]

HINT
When opening connection to the controller its address has to correspond with the setting in PC tool.

7.3.2 COM1 Mode [-]

Options: DIRECT
MODEM
MODBUS
ECU LINK

Communication protocol switches for the COM1 channel.

DIRECT: LiteEdit communication protocol via direct cable or AirGate, WebSupervisor communication protocol via AirGate.

MODEM: LiteEdit communication protocol via modem.

MODBUS: Modbus protocol. See detailed description in InteliLite NT Communication Guide.

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

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

For detail description see chapter Modbus protocol.

7.3.3 COM2 Mode [-]

Options: DIRECT
MODBUS
ECU LINK

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

DIRECT: LiteEdit communication protocol via direct cable.

MODBUS: Modbus protocol. See detailed description in InteliLite NT Communication Guide

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

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

For detail description see chapter Modbus protocol.

7.3.4 ModemIniString [-]

In case that your modem needs additional initialization e.g. AT commands, it can be entered here. Otherwise leave this setpoint blank.

7.3.5 ModbusComSpeed [bps]

Options: 9600, 19200, 38400, 57600

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

HINT
In case of ModBus/TCP communication via IB-Lite communication module is automatically adjusted COM1 Mode = DIRECT, COM2 = MODBUS and ModbusComSpeed = 57600. There isn't required any other additional setting (of course except IB-Lite setpoints, see below)

7.3.6 IBLite IP Addr [-]

IP address of IB-Lite module

7.3.7 IBLite NetMask [-]

IB-Lite network mask

7.3.8 IBLite GateIP [-]

IP address of gateway for IB-Lite

7.3.9 IBLite DHCP [-]

Options: DISABLED, ENABLED

Dynamic Host Configuration Protocol for IP address setting can be used or blocked.

DISABLED: Block the function of DHCP, this option is worth, if you want to adjust stable IP address e.g. for WebServer connection or InteliMonitor PC tool.

HINT
Can occurred collision of IP addresses in local network with devices as printer, router etc.!

ENABLED: Dynamically change IP address of the controller after each switch on of the controller. IP address collision protection. Default state.

7.3.10 ComAp Port [-]

This setpoint is for adjustment of port for ComAp communication over IB-Lite or IL-NT-GPRS module. Standard ComAp port is 23, what is default value of this setpoint.

7.3.11 APN Name [-]

Name of APN access point for GPRS network

HINT
This information shall provide your telecommunication operator.

7.3.12 APN User Name [-]

User name for APN access point

HINT
This information shall provide your telecommunication operator.

7.3.13 APN User Pass [-]

User password for APN access point

HINT
This information shall provide your telecommunication operator.

7.3.14 AirGate [-]

Options: DISABLED, ENABLED

The option allows or blocks the function of AirGate. For AirGate function is necessary to use communication plug-in modules IB-Lite or IL-NT-GPRS or InteliLite Telecom DC partly supports IB-NT too.

DISABLED: Blocks the function of Air Gate.

ENABLED: Allows function of AirGate. Default state.

7.3.15 AirGate IP [-]

AirGate Address. The default address is „airgate.comap.cz“.

HINT
To reduce the data traffic over cellular network you can set in setpoint group „Comms Settings“ the parameter „AirGate IP“ = 80.95.108.26. This will save significant data amount needed for translation of AirGate server IP address. In case of changing the server IP address this settings has to be updated or returned to default „airgate.comap.cz“.

WARNING!
All manipulations with IL-NT-GPRS module has to be done with DC power supply switched off. Module can be only powered while is plugged into the controller and together with controller!

7.3.16 SMTP User Name [-]

User name or name of e-mail account is used for verification of email sender on SMTP server. If parameter left empty, no verification is expected. It is working for IB-Lite only.

7.3.17 SMTP User Pass [-]

User password of e-mail account is used for verification of e-mail sender on SMTP server. If parameter left empty, no verification is expected. It is working for IB-Lite only.

7.3.18 SMTP Server IP [-]

Adjust IP address of SMTP server. It is working for IB-Lite only.

7.3.19 Contr MailBox [-]

E-mail address used as “Sender” of alarm e-mails from IB-Lite.

HINT
If SMTP server requires verification of sender, e-mail address has to be registered to SMTP server and setpoints “SMTP UserName” and “SMTP UserPass” has to be set to correct values.

7.3.20 Time Zone [-]

List of time zones used for time reference.

7.3.21 DNS IP Address [-]

This is IP address of Domain Name Server.

7.4 Battery Charge

7.4.1 U Start [V]

Ustart is starting level for the battery charging cycle. As soon the compensated battery voltage *Ucomp* drops under certain level the generator starts charging.

Related setpoints: *AutStartDel*

Step: 0,1 [V]

Range: 0,0…65,0 [V]

Default value: 47,0 [V]

NOTE:
Ustart level depends on the type of battery. Producer of the battery bank should provide this information. For VRLA batteries is usually going about 50% of Depth of Discharge.

7.4.2 AutStartDel [s]

Automatic Start Delay. The DC generator starts with delay for more details see Battery voltage star. Setpoint avoids unwanted start of the DC generator.

Related setpoints: *Ustart*

Step: 1 [s]

Range: 0…600 [s]

Default value: 2 [s]

7.4.3 I Max Charge [A]

This is nominal (maximal) charging current which can be achieved in Bulk cycle. To this value is regulated charging current for battery bank in Bulk cycle during standard charging or while is used Ext start/stop signal.

This limit charging value can be reduced if the battery temperature go over 50°C by temperature compensation – see setpoint *Curr Temp Comp*.

Step: 0,1 [A]

Range: 0,0…1000,0 [A]

Default value: 20,0 [A]

NOTE:
Ustart level depends on the type of battery. Producer of the battery bank should provide this information. Usually is this value in the range 0,1-0,3*C, where C is battery capacity in Ah.

E.g.: For battery with C=1600Ah, maximum charging current is given by producer as 0,15*C. In this case I Max Charge is going to be adjusted as 240A.

7.4.4 I Gen Nom [A]

Maximal output current of the generator. As soon the DC generator achieves *IgenNom* any other increasing of *Igen* will be restricted or will be reduced.

Step: 0,1 [A]

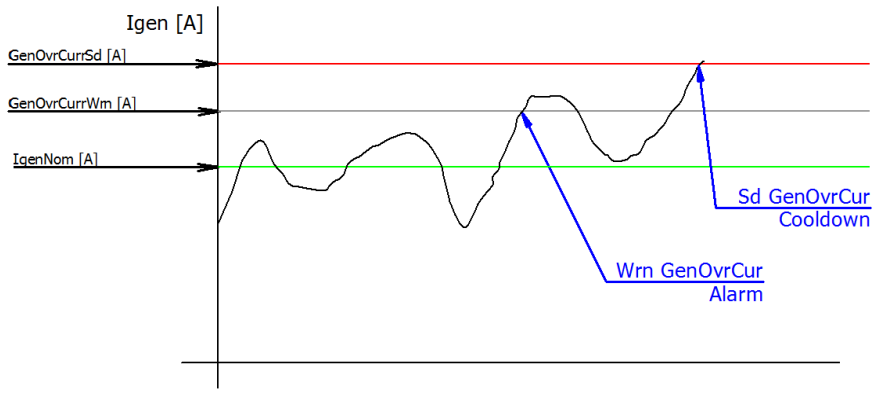
Range: 0,0…1000,0 [A]

Default value: 20,0 [A]

NOTE:
Nominal current of the generator is given by used alternator and should be specify by alternator producer.

For design of the system should be on mind that nominal output current of the DC generator should be the same or higher than maximum charging current of the battery bank and consumption of the load together.

Related setpoints*: GenOvrCurrWrn, GenOvrCurrSd and OvercurrentDelay*



7.4.5 U Absorption [V]

Constant level of voltage is achieved in Absorption cycle, to this level is working regulation in Absorption cycle. Can be used optimization by temperature compensation, see setpoint *Batt Temp Comp* with reference temperature 25°C.

Step: 0,1 [V]

Range: 0,0…65,0 [V]

Default value: 50,0 [V]

NOTE:
U Absorption level depends on the type of battery. Producer of the battery bank should provide this information.

7.4.6 I Absorp Stop [A]

I Absorp Stop specify battery current level for charging cycle termination. If the charging current drop to this level the DC generator is stopped after *IAbsorpStopDel.*

Related setpoints: *IAbsorpStopDel*

Step: 0,1 [A]

Range: 0,0…200,0 [A]

Default value: 2,0 [A]

NOTE:
I Absorp Stop level depend on the type of battery. Producer of the battery bank should provide this information. Usually is this value in the range 0.01-0.03*C, where C is battery capacity in Ah.

E.g.: Is battery with C=1600Ah, maximum charging current is given by producer as 0.015*C. In this case I Max Charge is going to be adjusted as 24A.

7.4.7 IAbsorStopDel [s]

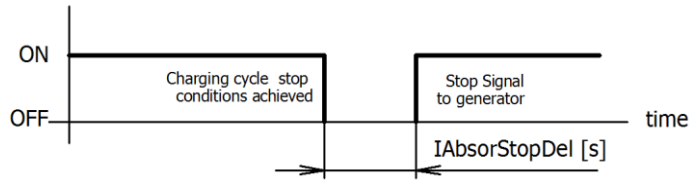
Delay between termination of charging cycle and engine stop procedure.

Related setpoints: *I Absorp Stop*

Step: 1 [s]

Range: 0…600 [s]

Default value: 0 [s]



7.4.8 U Gen Nom [V]

Setpoint is giving nominal voltage of the DC generator, where DC generator will regulate to this level in MAN mode.

HINT
It is possible to use DC generator in MAN mode as stable DC supply.

Step: 0,1 [V]

Range: 0,0…65,0 [V]

Default value: 50,0 [V]

7.4.9 NextStartDelay [min]

Delay between previous finished charging cycle and new charging cycle. Feature can avoid unwanted start of the DC generator.

Step: 1 [min]

Range: 0…300 [min]

Default value: 30 [min]

7.4.10 ChrgTimeout [min]

Set the maximum time period of charging cycle. The charging process is finished as soon as *ChrgLimitTime* elapsed regardless on other charging conditions and “Wrn ChrgTimeout” message is reported in history.

Step: 1 [min]

Range: 0…999 [min]

Default value: 60 [min]

NOTE:
ChrgLimitTime should be adjusted a bit longer than expected standard charging characteristic given by battery producer.

HINT
Adjustment can avoid running of the generator for charging batteries, which are damaged. In the case the continuous load supplying isn’t priority of the system.

7.4.11 ServiceCycle [min]

Service cycle time – The battery can be charged in **AUT** mode regardless on battery voltage (*U compens*) for service purpose.

The activation can be done in both operation states Stop or Run by binary input *ServiceCycleSt.*

Step: 1 [min]

Range: 0…300 [min]

Default value: 30 [min]

NOTE:

If the Service Cycle is activated while the generator is running, the engine will be stopped after Service cycle time regardless on other charging conditions.

7.4.12 BatteryTempSel [-]

Options: OFF, AIN3, AIO1, AIO2, AIO3, AIO4, AIO9/1

Selection of battery temperature compensation enables or disables compensation feature. Setpoint allows adjust input for temperature sensor.

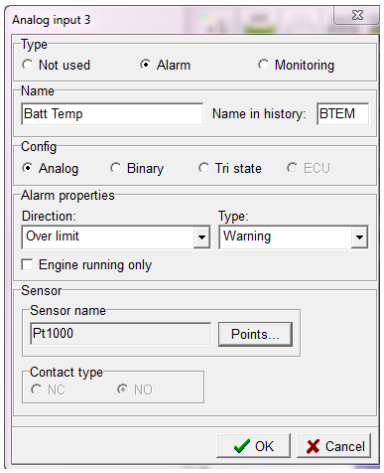
OFF: Temperature compensation measurement and correction is disabled, Ubatt=UbatComps. Default adjustment.

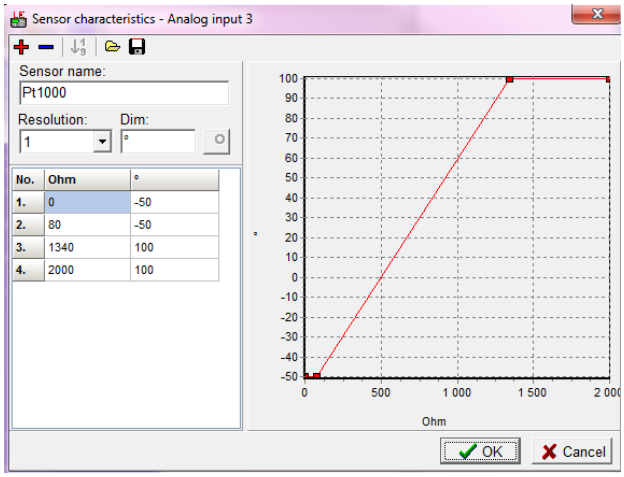
AIN3: Resistive analog input number 3 of the control unit can be used for temperature sensor. (0-2400 Ω)

AIO1...AIO4: Any of the analog inputs from plug-in IL-NT AIO module can be used for temperature sensing. (0-2600 Ω, 0-20mA, 0-4V)

AIO9/1: Temperature is measured by AIO9/1: AIN9

To configure the input curve go to LiteEdit->Modify configuration->Selection of the correct analog input according to *BatteryTempSel.*





7.4.13 Batt Temp Comp [mV/°C]

Temperature compensation constant make correction of measured battery voltage depends on the temperature. The system has higher accuracy of charging characteristic.

Battery is changing its voltage capacity depends on temperature, compensation is recommended to use in areas where exist big differences in temperatures between charging cycles as in deserts and so on.

Step: 1 [mV/°C]

Range: 0…2000 [mV/°C]

Default value: 0 [mV/°C]

NOTE:
Battery temperature compensation depends on the type of battery. Producer of the battery bank should provide this information.

7.4.14 Curr Temp Comp [A/°C]

Temperature compensation constant reduces maximal battery charging current *I Max Charge*.

Step: 0,1 [A/°C]

Range: 0,0…10,0 [A/°C]

Default value: 0,0 [A/°C]

NOTE:
Battery temperature compensation depends on the type of battery. Producer of the battery bank should provide this information.

NOTE:
Enter the temperature compensation constant for the entire cell assembly.
E.g.: battery 48V, 24 Cells (2V/Cell)
- Temperature compensation constant given by the battery manufacturer -5.0mV/°C per one cell
- Temperature compensation constant for complete battery → -5.0*24 = -120mV/°C

7.4.15 ChargeLimit [Ah]

Limit to finish the charging procedure and stop the engine.

The charging current is monitored all the time. The battery is charged and the actual **BatteryIn** [Ah] value is calculated. When the actual **BatteryIn** value is over the *ChargeLimit* the engine stops.

Step: 1 [Ah]

Range: 0…10.000 [Ah]

Default value: 500 [Ah]

7.4.16 DischargeLimit [Ah]

Limit to start engine to charge battery.

The discharging current is monitored all the time. The battery is connected to the load and the actual **BatteryOut** [Ah] value is calculated. When the actual **BatteryOut** value is over the *DischargeLimit* the engine starts and charges battery till the *ChargeLimit* is reached.

Step: 1 [Ah]

Range: 1…10.000 [Ah]

Default value: 1000 [Ah]

7.5 Engine params

7.5.1 Starting RPM [RPM]

“Firing” speed when InteliLite Telecom DC controller stops cranking (starter goes OFF).

Sd Underspeed protection is activated when RPM drops back below the *Starting RPM* for more than 5 second the engine starting procedure.

HINT
Limit is ignored when Gear Teeth = 0 i.e. in engine operation without speed pickup (running state is indicated from D+ or Starting POil.

Step: 1 [RPM]

Range: 5…1500 [RPM]

Default value: 350 [RPM]

RPM meas fail indication:
Can appears during "Cranking state" i.e. Starter (or J1939 Start command) is activated then one running condition was detected (D+ was activated or (POil > Starting POil) condition was filled) - i.e. Starter was switched off based on previous condition and within time (Cranking time and fix 5s) minimum RPM does not appear (RPM > Starting RPM), then is activated RPM meas fail.

7.5.2 Starting Oil P [Bar]

Controller stops cranking (starter goes OFF) when Oil Pressure (typically measured on AIN1) is over *Starting POil*.

NOTE:
Oil Pressure can be also measured on binary sensor. Then is necessary adjust AIN1 as Binary input and *Starting POil*=1.

Step: 0,1 [Bar]

Range: 0,0…10,0 [Bar]

Default value: 4,5 [Bar]

HINT
There are three conditions for stop cranking: Starting RPM (just in case the Gear teeth > 0), StartingPOil and D+ (if enabled). Starter goes off when any of these conditions is valid.

7.5.3 Prestart Time [s]

Time of the PRESTART output closed prior to the engine start – i.e. before the binary outputs Fuel solenoid and Starter are closed and opens when *Starting RPM* speed is reached. Set to zero if you want to leave the output PRESTART opened.

Step: 1 [s]

Range: 0…600 [s]

Default value: 2 [s]

7.5.4 Preglow Time [s]

Time of the *Glow Plugs* output closed prior to the engine start. Set to zero if you want to leave the output *Glow Plugs* opened.

HINT
Function with shorter period (*Prestart time* or *Preglow time*) starts later to finish both in the same time – when *Starting RPM* speed is reached.

Step: 1 [s]

Range: 0…600 [s]

Default value: 0 [s]

7.5.5 MaxCrank Time [s]

This setpoint is giving maximum time limit of engine cranking.

Step: 1 [s]

Range: 1…60 [s]

Default value: 5 [s]

7.5.6 CrnkFail Pause [s]

Pause between crank (engine start) attempts.

Step: 1 [s]

Range: 5…60 [s]

Default value: 8 [s]

7.5.7 Crank Attempts [-]

Maximum number of crank (engine start) attempts.

Step: 1 [-]

Range: 1…10 [-]

Default value: 3 [-]

7.5.8 Idle Time [s]

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

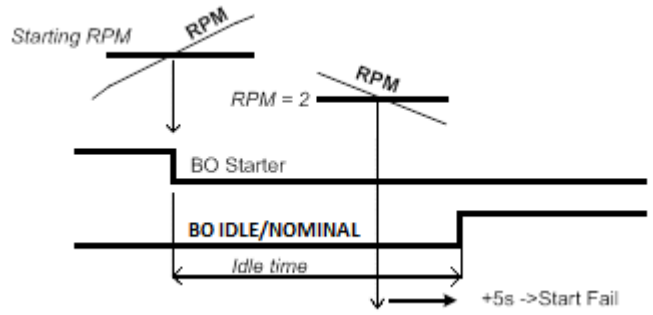
During the *Idle time* timer running the binary output IDLE/NOMINAL is opened, when it expires the IDLE/NOMINAL output closes. Binary output IDLE/NOMINAL opens during Cooling period again.

Note:
Engine can be switched between Idle and Running state by Binary input Nominal/Idle in MAN mode.

Step: 1 [s]

Range: 0…600 [s]

Default value: 12 [s]



7.5.9 Idle Speed [RPM]

Speed request in engine Idle state i.e. after engine start or when switched to Idle in MAN mode by Binary input Nominal/Idle and after Engine ShutDown.

Step: 1 [RPM]

Range: *Starting RPM…MinSpeedLim*

Default value: 800 [RPM]

7.5.10 Cooling Speed [-]

Options: IDLE, NOMINAL

Selects the function of the Binary output IDLE/NOMINAL during engine Cooling state.
IDLE: Cooling is executed at Idle Speed.

NOMINAL: Cooling is executed at Nominal Speed. Default state.

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

7.5.11 Cooling Time [s]

Run time of the unloaded engine to cool the engine before stop.

Step: 1 [s]

Range: 0…3600 [s]

Default value: 30 [s]

7.5.12 AfterCool Time [s]

Run time of engine after cooling pump. Binary output *Cooling pump* is closed when the engine starts and opens *AfterCool time* delayed after engine stops.

Step: 1 [s]

Range: 0…3600 [s]

Default value: 180 [s]

7.5.13 Stop Time [s]

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

Step: 1 [s]

Range: 0…240 [s]

Default value: 60 [s]

HINT

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

Stop fail is detected if there is difference between those conditions.

7.5.14 Fuel Solenoid [-]

Options: DIESEL, GAS

Setpoint setting determines behavior of the Binary output FUEL SOLENOID.

DIESEL: Output closes 1 sec before Binary output STARTER.

The output opens if Emergency stop comes or Cooled engine is stopped and in pause between repeated starts.

GAS: In this mode of operation the output closes to open the gas valve and enable the engine to start. The delay of Fuel solenoid output activation in relation to Starter output is defined by *FuelSol offset*. The output closes only if RPM > 30 (i.e. the starter motor is engaged).

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

HINT

In the case of gas engine, the underspeed protection cannot be blocked by the Sprinkler function.

For gas engines, it is strongly recommended to use the pick-up sensor, as non-zero RPM detection is required during the start procedure.

7.5.15 FuelSol Offset [s]

This setpoint adjusts the Fuel solenoid output activation in relation to Starter output when *Fuel solenoid* = GAS. Setpoint values mean that fuel valve is opened after the Starter. *FuelSol offset* has effect for both *Fuel solenoid* = DIESEL or GAS.

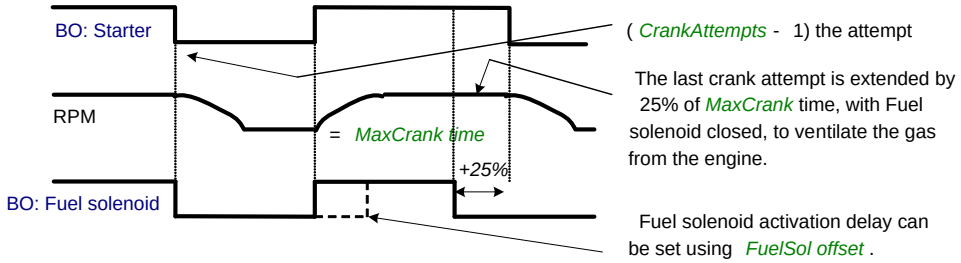
Step: 0,1 [s]

Range: 0,0…30,0 [s]

Default value: 0,5 [s]

Engine starting procedure when **Engine params**: *Fuel solenoid* = GAS

NOTE:
A new feature has been added which prolongs the last cranking attempt by 25% of MaxCrank time with closed Fuel valve (Fuel Solenoid binary output) in order to ventilate the remaining gas. This function is valid only when **Engine params**: *Fuel solenoid* = GAS



NOTE:
Is modified functionality of the **Ignition** binary output. The Ignition binary output will close 1 second (fixed value) after activation of binary output Fuel solenoid (when *Fuel solenoid* = GAS setting is active). Generally, the output closes after reaching value of CrankRPM = 30RPM (fixed value). The output opens after stopping of the engine or during crank fail pauses among crank attempts.

7.5.16 D+ Function [-]

Options: ENABLED, CHRGFAIL, DISABLED

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

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

DISABLED: The D+ terminal is not used. Default state.

HINT
The magnetization current is provided independently on this setpoint value.

The D+ charge fail protection becomes active after **Engine params**: *Idle time* reaches zero.

7.5.17 ECU FreqSelect [-]

Options: PRIMARY, SECONDARY, DEFAULT

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

Volvo – "Volvo Aux" is selected in ECU configuration:

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

Scania – "Scania S6 Singlespeed" is selected in ECU configuration:

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

Frequency change for Volvo Penta engines with EMS2

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

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

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

Procedure if ECU not energized:

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

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

Procedure with ECU powered on:

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

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

7.5.18 ECU Control [-]

Options: ENABLED, DISABLED

The setpoint enables adjustment of the electronic engine control by following settings.

ENABLED: There is a full available control of an electronic engine given by the setting of the ECU unit of the engine, i.e. Start request, Stop request, Speed request are enabled if available. Default state.

DISABLED: Control of an electronic engine is fully blocked and the InteliLite Telecom DC can only monitor the values of an electronic engine.

7.5.19 ECU SpeedAdj [RPM]

Enables to adjust engine speed in ECU via CAN bus. Speed request value after the Idle time is over and no other speed selection is activated.

Speed request in % range is calculated using the setpoints *0%ofSpeedReq* and *100%ofSpeedReq.*

Step: 1 [RPM]

Range: *MinSpeedLim…MaxSpeedLim*

Default value: 1500 [RPM]

7.5.20 RetToSpeedAdj [-]

Options: DISABLED, ENABLED

Selection among LBI Speed Sel1, 2, 3 behaviors.

DISABLED: Speed request is set by LBI Speed Sel1, 2, 3 (see appropriate setpoints) by rising edge (button, no switch) - i.e. Speed request stay constant after the input is opened and can be changed by BI Speed Up and Speed Down. Default state.

ENABLED: Speed request goes to *ECU SpeedAdj* when the LBI Speed Sel1, 2, 3 are opened. Speed request can be changed by Binary inputs Speed Up and Speed Down when LBI Speed Sel1, 2, 3 are closed.

7.5.21 MinSpeedLim [RPM]

The setpoint presets the minimum engine speed in the “Running” operation state. Also see other conditions in the chapter below.

Step: 1 [RPM]

Range: *Starting RPM…MaxSpeedLim*

Default: 1200 [RPM]

7.5.22 MaxSpeedLim [RPM]

The setpoint presets the maximum engine speed in the “Running” operation state. Also see other conditions in the chapter below.

Step: 1 [RPM]

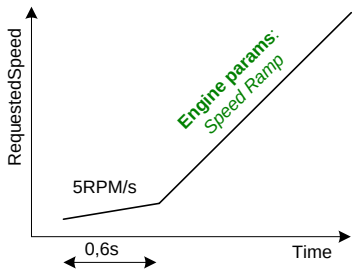
Range: *MinSpeedLim…*4000 [RPM]

Default: 2700 [RPM]

7.5.23 Speed Ramp [RPM/s]

Any Speed request change is done via this Ramp function. The Ramp via Binary SpeedUp and SpeedDown inputs is dual rate, see below.

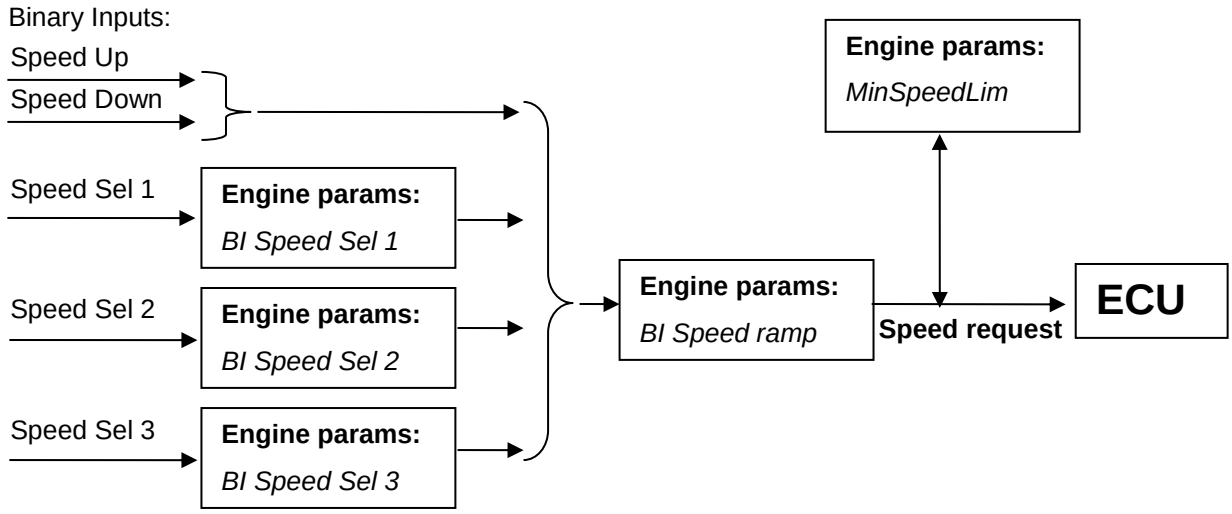
The Binary inputs SpeedUp and SpeedDown ramp function is for the 0.6s constant 5RPM/s. Does not depend on **Engine params**: *Speed Ramp* setting. This enables fine setting of Engine speed to specific value e.g. 1500 RPM.



Step: 1 [RPM/s]

Range: 1…*MaxSpeedLim*

Default: 50 [RPM]



7.5.24 0%ofSpeedReq [RPM]

Limit for Speed Request transformation from RPM to % range for ECU engines using % format. See practical example below.

Step: 1 [RPM]

Range: 0…3000 [RPM]

Default: 0 [RPM]

Practical example:

If ECU is configured, then on one of the measurement screen you can see two lines SpeedReq Abs and SpeedReq Rel.

In default setting:

0 RPM	= 0%
800 RPM	= 33.3%
2400RPM	= 100%

Different setting:

800RPM	= 0%
1200RPM	= 33.3%
2400RPM	= 100%

It is possible easily configure own output curve and use it for analog output Speed Request.

7.5.25 100%ofSpeedReq [RPM]

Limit for Speed Request transformation from RPM to % range for ECU engines using % format.

Step: 1 [RPM]

Range: 0…4000 [RPM]

Default: 2000 [RPM]

7.5.26 Running Timer [min]

Automatic engine stop in MAN mode or delayed engine stop in AUT mode. Start engine in MAN mode by START button. Engine stops itself after *Running Timer* is over. Engine stays running when *Running Timer* = 0

Step: 1 [min]

Range: 0…1000 [min]

Default: 0 [min]

7.5.27 FuelTankVolume [L]

This setpoint is describing volume of fuel tank for counting fuel consumption depending on Fuel level drop.

Step: 1 [L]

Range: 0…10000 [L]

Default: 200 [L]

7.5.28 MaxFuelDrop [%/h]

This is setting protection against the fuel leakage or theft.

Function monitors the AIN3 Fuel level value in percentage scale without decimals. The alarm and history record “Wrn FuelTheft” is activated when Fuel level change is faster than setpoint limit. Function is switched off when Max Fuel Drop = 0 %/h.

The drop out limit on stopped engine is 5% to avoid unwanted Alarm activation due to AIN3: Fuel level fluctuations.

Active alarm "Wrn FuelTheft" can be sent via SMS and displayed by WebSupervisor (if used).

Step: 1 [%/h]

Range: 0…50 [%/h]

Default: 25 [%/h]

HINT
Set 0 to disable Fuel Theft Protection function into MaxFuelDrop setpoint.

NOTE:
For fuel level and measurement, protection and for temperature can be used the same analog inputs, make sure that one of features is disabled or different inputs are used.

7.6 Regulator

7.6.1 KindOfRegul [-]

Options: Excit, Speed

Depends on the type of generator and preferable way of regulation can be used different regulation loop for output control of generator.

Excit: (single speed engines)

For this case configure the value **BatteryCharge**: *ExcitRequest* to AIO9/1 analog output AO1. Conversion output curve where max *Excitation Request* = 10000 can be converted to full AO1 range = 100,00% (= 10 V DC or 20 mA).

Corresponding generator excitation PI loop setpoints are **Regulator**: *ExcitReqRamp, ExcitUpLimit, ExcitDnLimit, ExcitGain, Excit Integral*.

Speed: (variable speed engines with Permanent Magnet Alternators)

For this case configure the value **Engine Values**: *SpeedReq Abs* [RPM]: to AIO9/1 analog output AO1. Conversion output curve where max *SpeedReqAbs* (depends on engine) can be converted to full AO1 range = 100,00% (= 10 V DC or 20 mA).

Corresponding engine speed control PI loop setpoints are **Regulator**: *Reg Bias, Reg Gain, Reg Integral* and **Engine params**: *MinSpeedLim, MaxSpeedLim*.

HINT

DC generator with PMA is usually controlled by Speed regulation loop, but in case of unexpected unload generator can easily get to overspeed and is shutdown. In this case is recommended to use AVR control with droop function to avoid fluctuation and overvoltage device as e.g. Zener diode.

For DC generators where alternator is composed from more than three poles is preferable to use excitation control of AVR, be sure that AVR is possible to control by our analog output signal as PWM (5V,500 Hz), 0-20 mA or 0-4.5 V.

Even DC alternator needs rectifier depends on the requirements from customer, but usually voltage ripples shouldn't be more than 1%, so it is recommended to use DC alternator with in build rectifier or to use some simple rectifier, because is going about low voltage application is possible to use rectify bridges with power diodes and capacitors.

7.6.2 Reg Bias [-]

Regulator bias is constant value at the PI regulator output.

Step: 1 [-]

Range: 0…10000 [-]

Default: 0 [-]

7.6.3 Reg Gain [%]

This setpoint is giving regulator gain factor. See Hint below.

Step: 0,1 [%]

Range: -200,0…+200,0 [%]

Default: 10,0 [%]

7.6.4 Reg Integral [%]

This setpoint is giving regulator integration factor. See Hint below.

Step: 0,1 [%]

Range: 0,0…+100,0 [%]

Default: 10,0 [%]

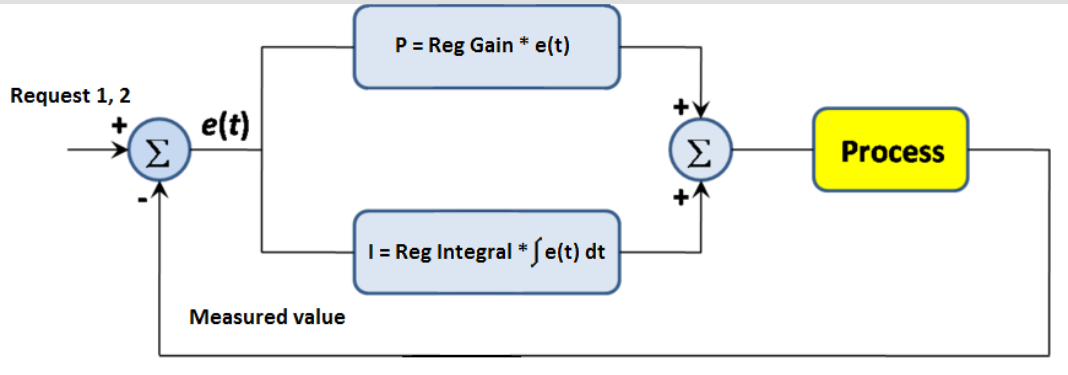
HINT

InteliLite Telecom DC controllers include PI loop for speed or analog output regulation. The requested value is given by setpoints Request 1, 2. This loop is working like Proportional-Integral regulation with setpoints Reg Gain and Reg Integral for each part and these parts affect each other.

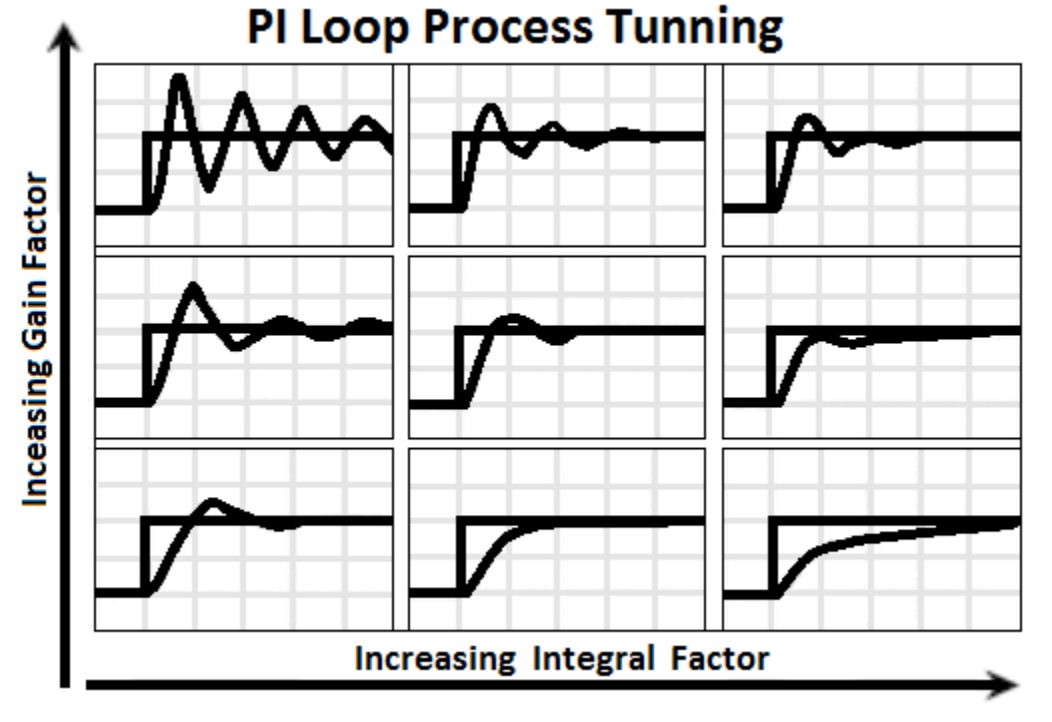
The controller output is given by:

Reg Gain * e(t) + Reg Integral * ∫ e(t) dt,

where e(t) is deviation of actual value e(t) = Request 1, 2 – Measured value.



Here are two tuning parameters that can be adjusted Reg Gain and Reg Integral. These parameters interact each other, see the graphic below. Picture shows how differences in Gain and Integral can affect PI loop's responsiveness. The central pic is as base case with fast change with minimum oscillations to required level. Upper left graph shows high gain and low integral values, what produce large oscillation with slow smoothing. Opposite case is on the lower right graph, which shows low gain and high integral values. The response of the system is sluggish.



7.6.5 Reg CMP Input [-]

Options: CU:AI1, CU:AI2, CU:AI3, CU:AI4, CU:AI5, CU:AI6, CU:AI7, CU:AI8, CU:AI9, AIO:AI1, AIO:AI2, AIO:AI3, AIO:AI4

Setpoint for comparator (with hysteresis) analog input selection. Available for all controller analog inputs or for IL-NT-AIO plug-in module inputs. Comparator output is linked to Logical Binary Output SpeedSwitch.

Default state: CU:AI1

7.6.6 Reg CMP On [-]

Limit to close LBO SpeedSwitch.

Step: 1 [-]

Range: -10000…+10000 [-]

Default: 0 [-]

7.6.7 Reg CMP Off [-]

Limit to open the LBO SpeedSwitch.

Step: 1 [-]

Range: -10000…+10000 [-]

Default: 0 [-]

7.6.8 ExcitReq Ramp [1/s]

Ramp for excitation output

Step: 1 [1/s]

Range: 1…10000 [1/s]

Default: 1000 [1/s]

7.6.9 ExcitUpLimit [-]

Excit limit regulator PI output upper limit.

Step: 1 [-]

Range: 0…10000 [-]

Default: 10000 [-]

7.6.10 ExcitDnLimit [-]

Excit limit regulator PI output low limit.

Step: 1 [-]

Range: 0…10000 [-]

Default: 0 [-]

7.6.11 Excit Gain [%]

This is setpoint is giving Excit limit gain factor.

Step: 0,1 [%]

Range: -200,0...+200,0 [%]

Default: 10,0 [%]

7.6.12 Excit Integral [%]

This setpoint is giving Excit limit integration factor.

Step: 0,1 [%]

Range: 0,0...+100,0 [%]

Default: 10,0 [%]

HINT

Requested speed or excitation has to be connected to the analog output of the controller, control unit doesn't have in build analog output, that's why is used plug-in module IL-NT AIO or external module AIO9/1. Then is necessary over window *Modify configuration* to configure value SpeedReq Abs or ExcitRequst to the analog output of the module.

7.7 Engine Protect

7.7.1 ProtectHoldOff [s]

During the start of the engine, some engine protections have to be blocked (e.g. Oil pressure). The protections are unblocked after the *Protection del* time. The time starts after reaching *Start RPM*.

Step: 1 [s]

Range: 0…300 [s]

Default: 5 [s]

7.7.2 BIN6 Del [s]

Specific protection delay is possible to use on Binary Input 6. Delay is active for Wrn or Sd protection only - not for functions like Rem Start/Stop. Protection delay is active for both Binary input NO / NC configuration. *BIN6 del* starts after *Eng prot del* when BI6 protection is configured "Running only".

Step: 1 [s]

Range: 0…300 [s]

Default: 1 [s]

7.7.3 Horn Timeout [s]

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

Step: 1 [s]

Range: 0…600 [s]

Default: 10 [s]

7.7.4 Overspeed Sd [%]

Limit for engine ShutDown overspeed protection.

Step: 1% of nominal RPM

Range: 50…150 [%]

Default: 115 [%]

7.7.5 Underspeed [%]

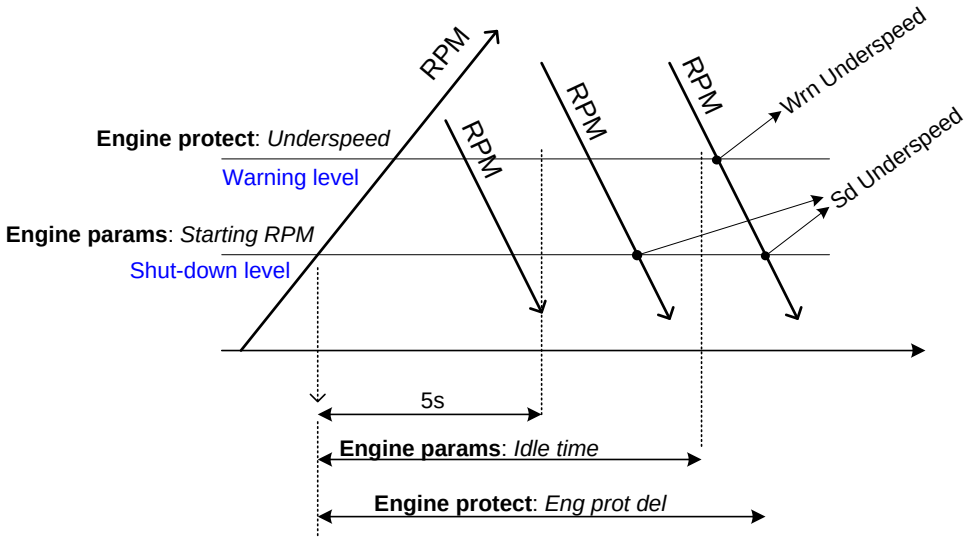
Limit for Warning Underspeed protection. Active protection is indicated as “Wrn Underspeed” in Alarm list. Under speed Warning protection is inactive 5s after RPM is over **Engine params**: *Starting RPM* and during the Idle time.

The “Ready to load” output is deactivated when Wrn underspeed protection is active and needs the Fault reset for activation after RPM is over Underspeed limit.

Step: 1% of nominal RPM

Range: *Starting RPM*…100 [%]

Default: 25 [%]



7.7.6 UnderspeedSd [-]

Options: DISABLED, ENABLED

DISABLED: Disables the SdUnderspeed protection in case the engine RPM drops below the Starting RPM.

ENABLED: Function as on the picture above. Default state.

7.7.7 AIN1 Wrn [Bar]

Warning limit level for ANALOG INPUT 1

Step: 0.1 [Bar]

Range: -10…+1000 [Bar]

Default: 2.0 [Bar]

7.7.8 AIN1 Sd [Bar]

Shutdown limit level for ANALOG INPUT 1

Step: 0.1 [Bar]

Range: -10...+1000 [Bar]

Default: 1.0 [Bar]

7.7.9 AIN1 Del [s]

Delay for ANALOG INPUT 1

Step: 1 [s]

Range: 0…180 [s]

Default: 3 [s]

NOTE:
Analog input 1 is usually determined to Oil Pressure measurement and it is resistive type of input with range 0-2500 Ω.

7.7.10 AIN2 Wrn [ ]

Warning limit level for ANALOG INPUT 2

Step: 1 [°C]

Range: -100…10000 [°C]

Default: 80 [°C]

7.7.11 AIN2 Sd [ ]

Shutdown limit level for ANALOG INPUT 2

Step: 1 [°C]

Range: -100…10000 [°C]

Default: 90 [°C]

7.7.12 AIN2 Del [s]

Delay for ANALOG INPUT 2 alarm.

Step: 1 [s]

Range: 0…180 [s]

Default: 5 [s]

NOTE:
Analog input 2 is usually determined to Engine Temperature measurement and it is resistive type of input with range 0-2500 Ω.

7.7.13 AIN3 Wrn [ ]

Warning limit level for ANALOG INPUT 3

Step: 1 [-]

Range: -100…+10000 [-]

Default: 20 [-]

7.7.14 AIN3 Sd [ ]

Shutdown limit level for ANALOG INPUT 3

Step: 1 [-]

Range: -100 - +10000 [-]

Default: 10 [-]

7.7.15 AIN3 Del [s]

Delay for ANALOG INPUT 3

Step: 1 [s]

Range: 0…180 [s]

Default: 10 [s]

NOTE:
Analog input 3 is usually determined to Fuel Level measurement and it is resistive type of input with range 0-2500 Ω, but also can be configured as input for temperature compensation of battery voltage and charging current in this case has to be adjusted setpoint *BatteryTempSel.*

7.7.16 Batt Overvolt [V]

High supply voltage Warning limit

Step: 0.1 [V]

Range: Batt undervolt…40.0 [V]

Default: 36.0 [V]

7.7.17 Batt Under V [V]

Low supply voltage Warning limit.

Step: 0.1 [V]

Range: 8.0…Batt overvolt

Default: 18.0 [V]

7.7.18 Batt Volt Del [s]

Delay for low and high supply voltage alarm.

Step: 1 [s]

Range: 0…600 [s]

Default: 5 [s]

7.7.19 Gen CB Del [s]

Delay in between Aux CB open and Gen CB closed as well as Gen CB open and AUX CB close.

See *Circuit Breakers control*

Step: 1 [s]

Range: 0…600 [s]

Default value: 5 [s]

7.7.20 WrnMaintenance [h]

Counting down when engine running. Service time alarm appears if reaches zero.

Step: 1 [h]

Range: 0…10000 [h]

Default: 10000 [h]

NOTE:
Value 10000 is turning off the WrnMaintenance protection.

7.8 Gener Protect

7.8.1 Gen >V Wrn [V]

Is protection level of *Gen >V*. Above this limit a Warning is activated.

Step: 0.1 [V]

Range: *Gen <V Wrn*…65.0 [V]

Default value: 60.0 [V]

7.8.2 Gen <V Wrn [V]

Is protection level of *Gen <v*. Below this limit a Warning is activated.

Step: 0.1 [V]

Range: 0.0…*Gen >V Wrn* [V]

Default value: 12.0 [V]

7.8.3 Gen >V Sd [V]

Is protection level of *Gen V*. Above this limit a Shutdown is activated.

Step: 0.1 [V]

Range: *Gen <V Sd*…65.0 [V]

Default value: 60.0 [V]

7.8.4 Gen <V Sd

Is protection level of *Gen V*. Below this limit a Shutdown is activated.

Step: 0.1 [V]

Range: 0.0… *Gen >V Sd* [V]

Default value: 12.0 [V]

7.8.5 Gen V Delay [s]

Delay for *Gen >V* / *Gen <V* alarm.

Step: 1 [s]

Range: 0…600 [s]

Default value: 3 [s]

7.8.6 Load >A Wrn [A]

Limit for overcurrent warning – *Iload*

Step: 0.1 [A]

Range: 0.0…*Load >A Sd* [A]

Default value: 65.0 [A]

7.8.7 Load >A Sd [A]

Limit for overcurrent shutdown – *Iload*

Step: 0.1 [A]

Range: *Load >A Wrn* …1000.0 [A]

Default value: 70.0 [A]

7.8.8 Batt >A Wrn [A]

Limit for overcurrent warning – *Ibatt*

Step: 0.1 [A]

Range: 0.0…*Batt >A Sd* [A]

Default value: 65.0 [A]

7.8.9 Batt >A Sd [A]

Limit for overcurrent shutdown – *Ibatt*

Step: 0.1 [A]

Range: *Batt >A Wrn* …1000.0 [A]

Default value: 70.0 [A]

7.8.10 Gen >A Wrn [A]

Limit for overcurrent warning – *Igen*

Related setpoints: *IgenNom*

Step: 0.1 [A]

Range: 0.0…*Gen >A Sd* [A]

Default value: 65.0 [A]

7.8.11 Gen>A Sd [A]

Limit for overcurrent shutdown – *Igen*

Step: 0.1 [A]

Range: *Gen >A Wrn* …1000.0 [A]

Default value: 70.0 [A]

7.8.12 Aux >A Wrn [A]

Limit for overcurrent warning – *Iaux*

Step: 0.1 [A]

Range: 0.0…*Aux >A Sd* [A]

Default value: 65.0 [A]

7.8.13 Aux >A Sd [A]

Limit for overcurrent shutdown – *Iaux*

Step: 0.1 [A]

Range: *Aux >A Wrn* …1000.0 [A]

Default value: 70.0 [A]

7.8.14 OvercurrDel [s]

This is comon overcurrent delay for all overcurrent protection above.

Step: 0.1 [s]

Range: 0.0…10.0 [s]

Default value: 0.0 [s]

7.9 Date/Time

7.9.1 Time Stamp Per [min]

This setpoint is dedicated to adjustment of time interval for periodical history records.

Step: 1 [min]

Range: 0…200 [min]

Default: 60 [min]

7.9.2 SummerTimeMod [-]

Options: DISABLED, WINTER, SUMMER, WINTER-S, SUMMER-S

DISABLED: Automatic switching between summer and wintertime is disabled.

WINTER (SUMMER): Automatic switching between summer and winter time is enabled and it is set to winter (summer) season.

WINTER-S (SUMMER-S): Modification for southern hemisphere.

7.9.3 Time [HH:MM:SS]

Actual time.

7.9.4 Date [DD:MM:YYYY]

Actual date.

7.9.5 Timer1Function [-]

Options: NoFunc, AutoRun, AutoRegCMP, AutoBatt, LightTowerON

No Func: Operates just corresponding LBO Timer1 according the Timer1 setting, see *Timer1 repeat*, *Time1 ON time*, *Timer1Duration*. Function operates in all OFF-MAN-AUT modes. Default state.

AutoRun: Engine automatically starts and stops in AUT mode (similar to LBI Rem start/stop, the same record in the history) according the Timer1 setting.

AutoRegCMP: Start and stop engine in AUT mode according to the LBO Speed switch - see **Regulator**: *Reg CMP* setpoints. The comparator function (output) works opposite when **Regulator**: *Reg CMP On < Reg CMP Off*. The **Date/Time**: *Timer1 repeat*, *Timer1 ON time*, *Timer1Duration* settings are not important in this case.

AutoBatt: Engine starts when actual Battery voltage < **Engine protect:** Batt undervolt + Batt volt del and stays running for **Date/Time:** Timer1 Duration. Function operates in AUT mode.

LightTowerON:Binary output LightTowerON is activated when the timer condition *Timer1 On time* is met with internal clocks *Time* and binary output is deactivated if the Timer1Duration elapsed, except binary input LightTowerON is active.

7.9.6 Timer1repeat [-]

Options: NONE, MONDAY, TUESDAY, WEDNESDAY, THURSDAY, WEDNESDAY, FRIDAY, SATURDAY, SUNDAY, MON-FRI, MON-SAT, MON-SUN, SAT-SUN

This setpoint defines Timer1 activation. Binary output Timer1 is internally linked with Rem Start/Stop binary input. Refer to binary inputs for details.

NONE: Timer function is disabled. Default state.

MONDAY, TUESDAY, WEDNESDAY, THURSDAY, WEDNESDAY, FRIDAY, SATURDAY, SUNDAY:

Timer is activated on daily basis.

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

Timer is activated on selected day interval.

7.9.7 Timer1 ON time [HH:MM:SS]

Display day time when Timer 1 output is activated.

7.9.8 Timer1Duration [min]

Adjusts duration of Timer 1 output.

Step: 1 [min]

Range: 1…1440 [min]

Default: 5 [min]

7.9.9 Timer2Function [-]

Options: NoFunc, AutoRun, AutoRegCMP, AutoBatt, LightTowerON

No Func: Operates just corresponding LBO Timer2 according the Timer2 setting, see *Timer2 repeat*, *Time2 ON time*, *Timer2Duration*. Function operates in all OFF-MAN-AUT modes. Default state.

AutoRun: Engine automatically starts and stops in AUT mode (similar to LBI Rem start/stop, the same record in the history) according the Timer2 setting.

AutoRegCMP: Start and stop engine in AUT mode according to the LBO Speed switch - see **Regulator**: *Reg CMP* setpoints. The comparator function (output) works opposite when **Regulator**: *Reg CMP On* < *Reg CMP Off*. The **Date/Time**: *Timer2 repeat*, *Timer2 ON time*, *Timer2Duration* settings are not important in this case.

AutoBatt: Engine starts when actual Battery voltage < **Engine protect:** Batt undervolt + Batt volt del and stays running for **Date/Time:** Timer2 Duration. Function operates in AUT mode.

LightTowerON: Binary output LightTowerON is activated when the timer condition *Time2 On time* is met with internal clocks *Time* and binary output is deactivated if the Timer2Duration elapsed, except binary input LightTowerON is active.

7.9.10 Timer2repeat [-]

Options: NONE, MONDAY, TUESDAY, WEDNESDAY, THURSDAY, WEDNESDAY, FRIDAY, SATURDAY, SUNDAY, MON-FRI, MON-SAT, MON-SUN, SAT-SUN

This setpoint defines Timer2 activation. Binary output Timer2 is internally linked with Rem Start/Stop binary input. Refer to binary inputs for details.

NONE: Timer function is disabled. Default state.

MONDAY, TUESDAY, WEDNESDAY, THURSDAY, WEDNESDAY, FRIDAY, SATURDAY, SUNDAY:

Timer is activated on daily basis.

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

Timer is activated on selected day interval.

7.9.11 Timer2 ON time [HH:MM:SS]

Display day time when Timer 2 output is activated.

7.9.12 Timer2Duration [min]

Adjusts duration of Timer 2 output.

Step: 1 [min]

Range: 1…1440 [min]

Default: 5 [min]

7.10 Sensor Spec

7.10.1 Calibr AI1, AI2, AI3, AI4, AI5, AI6, AI7, AI8, AI9 [-]

Calibrate the constant to adjust the measured value of InteliLite Telecom DC analog inputs. Physical dimension of calibrating constant is corresponding to Analog input.

Step: 1 [-]

Range: -1000...+1000 [-]

Default: 0 [-]

HINT
Calibration constants have to be adjusted when measured value is near the alarm level.

7.10.2 Calibr AIO1, AIO2, AIO3, AIO4 [-]

Calibrate the constant to adjust the measured value of plug-in analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. Those setpoints are visible only when Inteli AIO plug-in module is configured.

Step: 1 [-]

Range: -1000…+1000 [-]

Default: 0 [-]

7.10.3 Calibr AIO9-1 … AIO9-9 [-]

Calibration constants for external AIO9/1 module analog inputs. Those setpoints are visible only when AIO9/1 extension module is configured.

Step: 0,1 [-]

Range: -1000,0…+1000,0 [-]

Default: 0,0 [-]

7.11 AIO module

Setpoints are visible only when plug-in Inteli AOI module is configured.

7.11.1 AnlInAIO1, AIO2, AIO3, AIO4 Wrn [ ]

The level for IL-NT-AIO plug-in card Analog input 1, 2, 3, 4 alarm detection.

Step: 1 [-]

Range: -100…+10000 [-]

Default: 0 [-]

7.11.2 AnlInAIO1, AIO2, AIO3, AIO4 Sd [ ]

The level for IL-NT-AIO plug-in card Analog input 1, 2, 3, 4 alarm detection.

Step: 1 [-]

Range: -100…+10000 [-]

Default: 0 [-]

7.11.3 AnlInAIO1, AIO2, AIO3, AIO4 Del [s]

Delay for IL-NT-AIO plug-in card Analog input 1, 2, 3, 4 alarms.

Step: 1 [s]

Range: 0…180 [s]

Default: 5 [s]

HINT
Plug-in analog inputs protection alarms can be configured following way

Configuration	Protection
Under limit	Protection is activated only when measured value is under measured level.
Over limit	Protection is activated only when measured value is over measured level.
UnderLimit+fls	Level 2 protection is activated by sensor fail too.
OverLimit+fls	Level 2 protection is activated by sensor fail too.

7.12 SMS/E-Mail

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

To enable this function, you should select with setpoints *Yel Alarm Msg* and *Red Alarm Msg*, which levels of alarms shall be announced (red/yellow/both) and also enter valid cellular network phone number and/or e-mail address to the setpoints *TelNo/Addr Ch1* and *TelNo/Addr Ch2*. It is possible to put either number or e-mail to both setpoints.

NOTE:

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

The list of all supported terminals shows the table below:

Terminal	Active alarm sms	Active event sms	Active alarm email	Active event email
IB-Lite	NA	NA	yes	yes
IL-NT-GPRS	yes	yes	Not supported	Not supported

HINT
There are 5 attempts for any active call (SMS/E-Mail). Timeout for connection is 90 sec and after 120 sec controller starts the next attempt. During the time the IL-NT-GPRS is trying to send an active call type, incoming calls are blocked.

7.12.1 Yel Alarm Msg [-]

Opions: OFF, ON

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

HINT
The target address (cellular network phone number or e-mail address) must be set correctly to the setpoint(s) *TelNo/Addr Ch1* resp. *TelNo/Addr Ch2*.

7.12.2 Red Alarm Msg [-]

Options: OFF, ON

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

HINT
The target address (cellular network phone number or e-mail address) must be set correctly to the setpoint(s) *TelNo/Addr Ch1* resp. *TelNo/Addr Ch2*.

7.12.3 TelNo/Addr Ch1, 2 [-]

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

CAUTION!
These setpoints can be modified from PC only!

For cellular network numbers use either national format (i.e. like number you will dial if you want to make a local call) or full international format with "+" character followed by international prefix at the beginning.

7.12.4 SMS Language [-]

Select 1 to receive a message in primary controller language or 2 for secondary one.

8 Values

Values are displayed on the controller screen or are accessible via icon  in the LiteEdit PC tool.

See the table with all values visible in LiteEdit.

NOTE:
Some values are visible only if the ECU unit is configured.

8.1 Battery Charge

Name	Dimension	Description
Ugen	0,1V	Generator voltage
Ubatt	0,1V	Battery voltage without temperature compensation
UbatComp	0,1V	Battery voltage with temperature compensation.
Uload	0,1V	Load voltage, if measured
Uaux	0,1V	Auxiliary voltage, if measured
Igen	0,1A	Generator current
Ibatt	0,1A	Battery current – visible in LiteEdit only. Ibatt >0 means discharging; Ibatt <0 means charging.
Iload	0,1A	Load current can be measured or calculated
Iaux	0,1A	Auxiliary current usually calculated, can be measured
BatteryTemp	0,1°C	Battery Temperature
BatteryIn	1Ah	Battery charging current counter – optional condition for charging stop.
BatteryOut	1Ah	Battery discharging current counter / optional condition for charging start
ExcitRequest	-	Requested excitation output signal.

8.2 Engine

Name	Dimension	Description
RPM	1RPM	Engine RPM
ECU State	binary	ECU YellowLamp, ECU RedLamp, ECU WaitToStart
ECU FreqSelect	-	Selected ECU frequency
SpeedReq Abs	1RPM	Requested speed of engine regulation output signal in RPM.
SpeedReq Rel	0.1%	Requested speed of engine regulation output signal in percent.
ECU-AIN x	-	List of analog values received from ECU
DPF1Soot Load	1%	ECU value
DPF1 Ash Load	1%	ECU value

8.3 Statistics

Name	Dimension	Description
Run Hours	0,1h	Running hours of the DC generator
Num Starts	-	Number of engine starts
Maintenance	1h	Remainin runnigh hours to activate Maintenance warning alarm
Num E-Stop	-	Number of engine emergency stops
ShutDowns	-	Number of engine shutdowns

DayFuelConsum	1L	Day consumption counted per day by internal hours, reset everyday on midnight. Hours adjusted in group of setpoints Date/Time or reset by binary input ClearDayCons
TotFuelConsum	1L	Total consumption counted by running, reset is by binary input ClearTotalCons
TotBattChrg	1Ah	Statistic value: Total battery charge
TotBattDischrg	1Ah	Statistic value: Total battery discharge
NumOfCycles	-	Number of charging cycles – i.e. from engine start to stop in AUT mode

8.4 Controler I/O

Name	Dimension	Description
AIN1	Configurable	Usually used for engine oil pressure sensing
AIN2	Configurable	Usually used for coolant temperature sensing
AIN3	Configurable	Usually used for fuel sensor or for temperature sensor
AIN4	Configurable	Configurable
AIN5	Configurable	Configurable
AIN6	Configurable	Configurable
AIN7	Configurable	Configurable
AIN8	Configurable	Configurable
AIN9	Configurable	Configurable
Battery Volts	0,1V	Voltage of battery supplying the controler
D+	0,1V	Power terminals: Alternator D+ terminal measurement
Bin Inputs	-	Binary inputs statuses
Bin Outputs	-	Binary outputs statuses
RemoteControl	-	Remote control inputs statuses
GSM SignalLvl	%	IL-NT-GPRS module shows the strength of the GSM signal. It is a relative value helping to find the best signal and for troubleshooting cases.
GSM ErrorRate	-	IL-NT-GPRS module shows this information for relative evaluation of signal quality. The lower value, the higher the signal quality.
GSM Diag Code	-	Diagnostic code for the IL-NT-GPRS modem. Standard GSM modems usually support this value as well. Helps in troubleshooting.
AirGate Diag	-	Diagnostic code for AirGate connection. Helps in troubleshooting.
AirGate ID	-	Identification name generated by AirGate server for the purpose of establishing communication via WebSupervisor, LiteEdit or InteliMonitor.
Modem Status	-	Status of the modem if connected to COM1.

8.5 Date/Time

Shows current Date and Time.

8.6 IL info

Shows general information about the InteliLite controller.

8.7 AIO module

Shows values of AIN1-AIN4 analog inputs measured by IL-NT-AIO module if is configured.

8.8 AIO9/1

Shows values of AI9 and AO1 analog input and output of AIO9/1 module if is configured.

9 Binary input functions

HINT
Any Binary input can be configured to any controller terminal or changed to different function by LiteEdit PC tool. There is adjustable delay when any binary input is configured as protection.

9.1 Binary inputs InteliLite Telecom DC default configuration

BI1 GCB Feedback

BI2 BCB Feedback

BI3 LCB Feedback

BI4 Emergency stop

BI5 Remote OFF

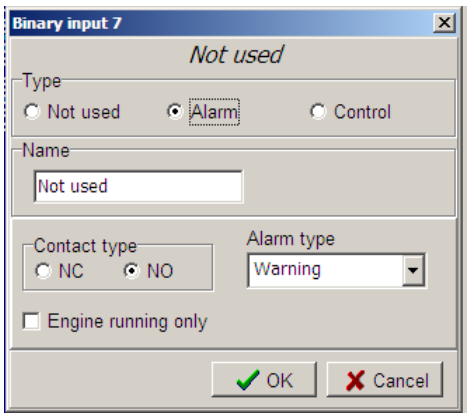
BI6 ServiceCycleSt

BI7 Not used

9.2 Configuration of binary inputs

Each binary input can be configured in several ways. The settings can be made in the PC program LiteEdit, in window Modify. After choosing a concrete binary input, its window appears where the user can choose if the binary input will be used to protect (option Alarm) or control (option Control).

Binary Alarm configuration items – see the picture and the table with explanations.



Name		14 characters ASCII string
Contact type	NC	Normally closed
	NO	Normally opened
Alarm type	Warning	
	Shutdown	
	CoolDown	
Alarm active	All the time	
	Engine running only	

9.3 Binary inputs list

9.3.1 Not used

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

9.3.2 Ext start/stop

Binary input is used for external request for engine run in AUT mode only. If used DC generator output is controlled to constant current level.

NOTE:
Output of the generator doesn't follow charging cycle of the battery. This way of starting is usually used in case of additional smart charger which distribute specific current to each cell of battery bank. For example could be taken Lithium battery charging system.

NOTE:
As signal into the controller is expected continuous logical level signal, no pulse signal for start and stop.

9.3.3 Emergency stop

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

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

9.3.4 Sprinkler

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

- all InteliLite Telecom DC alarms are detected,
- InteliLite Telecom DC front panel RED LED blinks or lights,
- Alarm is recorded on the InteliLite Telecom DC alarm list screen,
- BUT engine remains running.

HINT
Warning *SprinklActive* is indicated in the Alarm list if sprinkler mode active to inform the operator that the engine is not protected.

9.3.5 Access lock

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

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

9.3.6 Remote OFF

If closed, InteliLite Telecom DC is switched to OFF mode (there are three modes OFF-MAN-AUT). When opens controller is switched back to previous mode.

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

9.3.7 Remote MAN

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

9.3.8 Remote AUT

If the input is active, AUT 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.

9.3.9 RemControlLock

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

9.3.10 Emergency MAN

If the input is activated the controller behaves like when switched to OFF mode and opens all binary outputs. There is one exception – Stop solenoid doesn't activate on this transition.

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

The controller shows "Emerg Man" state and the engine can not be started.

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

Function is active in any controller mode.

9.3.11 Start Button

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

9.3.12 Stop Button

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

9.3.13 FaultResButton

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

9.3.14 HornResButton

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

9.3.15 ServiceCyclSt

Binary input activates service charging cycle in AUT mode for preadjusted time. Adjust time period is possible by setpoint *ServiceCyclSt.*

9.3.16 Nominal/Idle

Input works in MAN mode only switching between running states Nominal/Idle. Active NOMINAL/IDLE input activates binary output IDLE/NOMINAL and sends Speed request = **Engine params:** Idle speed and/or active (binary) IDLE command to the ECU (e.g. to Volvo EMS).

In **MAN mode switch between Idle RPM and Nominal Generator Voltage (*UgenNom*) ?

Eng.state	Sped request in MAN mode	Sped request in AUT mode
Idle	Engine params: Idle speed	Engine params: Idle speed
Running	Engine params: ECU SpeedAdj	… anything within Engine params: MinSpeedLim Engine params: MaxSpeedLim

Active input opens the binary output READY TO LOAD during the engine running state. READY TO LOAD can be closed back (if other conditions are fulfilled – see the READY TO LOAD description) if NOMINAL/IDLE is opened.

9.3.17 GCB Feedback

This is feedback signal from the generator circuit breaker. If setpoint *Contactor Fb's* is YES then breaker sequences are checked and protected by shutdown alarm message Sd GCB Fail.

9.3.18 BCB Feedback

This is feedback signal from the battery circuit breaker. If setpoint *Contactor Fb's* is YES then breaker sequences are checked and protected by shutdown alarm message Sd BCB Fail.

9.3.19 LCB Feedback

This is feedback signal from the load circuit breaker. If setpoint *Contactor Fb's* is YES then breaker sequences are checked and protected by shutdown alarm message Sd LCB Fail.

9.3.20 ACB Feedback

This is feedback signal from the generator circuit breaker. If setpoint *Contactor Fb's* is YES then breaker sequences are checked and protected by shutdown alarm message Sd ACB Fail.

9.3.21 GCB Trip

In MAN mode is control over generator breaker given by binary input GCB Close/Open. If mode is change from AUT to MAN mode status of breakers depends on the state of this binary input.

9.3.22 BCB Trip

In MAN mode is control over battery breaker given by binary input BCB Close/Open. If mode is change from AUT to MAN mode status of breaker depends on the state of this binary input.

9.3.23 LCB Trip

In MAN mode is control over load breaker given by binary input LCB Close/Open. If mode is change from AUT to MAN mode status of breaker depends on the state of this binary input.

9.3.24 ACB Trip

In MAN mode is control over auxiliary breaker given by binary input ACB Close/Open. If mode is change from AUT to MAN mode status of breaker depends on the state of this binary input.

9.3.25 Lang selection

Switch display texts between two languages.

9.3.26 ClearDayCons

DayCons is the counter which cumulates the instantaneous consumption coming from ECU. It shows the total consumption since the counter reset. Counter reset happen at the midnight of the controller clocks. LBI ClearDayCons resets the counter DayConsum.

HINT
The function works when the controller is connected to an ECU or in other case is consumption counted from the changes of analog input value Fuel rate and setpoint **Engine params:** *FuelTankVolume.*

9.3.27 ClearTotalCons

TripCon is the counter which cumulates the instantaneous consumption coming from ECU. It shows the total consumption since last reset by LBI ClearTotalCon. This LBI resets the counter TotConsum.

HINT
The function works when the controller is connected to an ECU or in other case is consumption counted from the changes of analog input value Fuel rate and setpoint **Engine params:** *FuelTankVolume.*

9.3.28 LightTowerON

Binary input activates binary output LightTowerON. If is activated this binary input then binary output is activated the controller mode or Timer states aren't important.

9.3.29 Rem start/stop

Activating this LBI starts the engine. No further action is taken.

10 Binary output functions

HINT
Any Binary input can be configured to any InteliLite Telecom DC controller terminal or changed to different function by LiteEdit PC tool. There is adjustable delay when any binary input is configured as protection.

10.1 Binary outputs InteliLite Telecom DC default

BO1	**Starter**
BO2	**Fuel solenoid**
BO3	**Prestart**
BO4	**GCB Close/Open**
BO5	**BCB Close/Open**
BO6	**LCB Close/Open**
BO7	**ACB Close/Open**

10.2 Binary outputs – list

Configuration of binary outputs is feasible easily by combo box menu in the configuration window Modify.

10.2.1 Not used

Output has no function.

10.2.2 Starter

Closed relay energizes the starter of engine.

The relay opens if:

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

10.2.3 Fuel Solenoid

Closed output opens the fuel solenoid and enables the engine start.

The output opens if:

- Emergency stop comes or
- cooled engine is stopped or
- in pause between repeated starts

10.2.4 Stop Solenoid

The closed output energizes stop solenoid to stop the engine.

The output is active at least for *Stop time*, if the stop lasts longer; it stays active until all symptoms say the engine is stopped.

The engine is stopped if:

- RPM < 2 and
- Oil pressure < **Engine params**: *StartingPoil*

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

10.2.5 ServiceCycleSt

Binary output ServiceCycleSt is active during time period, which is given by setpoint *ServiceCycleSt*, after activation of service cycle by binary input ServiceCycleSt.

10.2.6 Stop Pulse

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

10.2.7 Ignition

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

10.2.8 Prestart

The output closes prior to the engine start (*Prestart*) and opens when *Starting RPM* speed is reached. During repeated crank attempts the output is closed too.

The output could be used for pre-glow, pre-heat or prelubrication.

10.2.9 Glow Plugs

The output closes prior to the engine start and opens when *Starting RPM* speed is reached. During repeated crank attempts the output is closed too.

The output could be used for pre-glow or pre-heat.

10.2.10 Cooling Pump

The output closes when engine starts and opens after **Engine params**: *AfterCool time* after stop of the engine

10.2.11 Idle/Nominal

The output either follows the Nominal/Idle binary input or I/O button in MAN mode or follows the engine state in AUT mode:

The output *Idle/Nominal* closes after the timer *Idle time* elapses. The *Idle time* counter starts to countdown when *Start speed* reached. The *Underspeed* protection is not evaluated during idle time. *Start fail* protection occurs if the RPM drop below 2RPM during idle state.

HINT
When LBI Nominal/Idle is configured (to a physical binary input), it has priority and the switching between the nominal and the idle speed by I/0 button is blocked.

10.2.12 Air Valves

Output closes together with *Prestart* and opens after the engine is stopped.

Stopped engine conditions: RPM = 0, **Engine params**: *Starting Poil, D+function* (if enabled).

10.2.13 Alarm

The output closes if:

- any warning, cooldown or shutdown comes up or
- the engine malfunctions

The output opens if

- FAULT RESET is pressed

The output closes again if a new fault comes up.

10.2.14 Horn

The output closes if:

- any warning or shutdown comes up or
- the engine malfunctions

The output opens if:

- FAULT RESET is pressed or
- HORN RESET is pressed or
- Max time of LBO HORN is exceeded (*Horn timeout*)

The output closes again if a new fault comes up.

10.2.15 Ready

The output is closed if following conditions are fulfilled:

- Engine is not running and
- No Shut down or Slow stop alarm is active
- Controller is not in OFF mode

10.2.16 Ready to Load

The output is closed if engine is running and no alarm is active - it is possible to close load. The output opens when Wrn Underspeed protection is active and during cooling state.

10.2.17 Running

Output closes if the engine is in Running state.

10.2.18 Cooling

The output closes when engine is in Cooling state.

10.2.19 Fault Reset

One second pulse as echo for panel Fault reset button.

10.2.20 ChrgAlternFail

Output closes if engine is running and D+ input not energized.

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

HINT
Threshold level for D+ input is 80% supply voltage.

10.2.21 AL Stop Fail

Output closes when the engine has to be stopped, but speed or oil pressure is detected. This protection goes active 60s after stop command.

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.22 AL Overspeed

Output closes if the engine over speed alarm activates.

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.23 AL Underspeed

Output closes if the engine “Sd Underspeed” alarm activates i.e. when RPM is below the **Engine params**: *Starting RPM* limit.

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.24 AL Start Fail

Output closes after the engine start-up fails.

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.25 AL Battery Fail

Output closes when InteliLite Telecom DC performs reset during start procedure (probably due to weak power supply) or battery supply over/under voltage warning appears.

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.26 AL Common Wrn

Output closes when any warning alarm appears.

The output opens, if

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

10.2.27 AL Common Sd

Output closes when any shutdown alarm appears.

The output opens, if

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

10.2.28 AL Common BOC

Output closes when any cooldown alarm appears.

The output opens, if

- No Cd alarm is active and
- FAULT RESET is pressed

10.2.29 AL Common Fls

Output closes when any sensor fail alarm appears.

The output opens, if

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

10.2.30 AL AI1 Sd

Output closes if the analog input 1 shutdown alarm activates (typically oil pressure).

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.31 AL AI1 Wrn

Output closes if the analog input 1 warning alarm activates (typically oil pressure).

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.32 AL AI2 Sd

Output closes if the analog input 2 shutdown alarm activates (typically engine temperature).

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.33 AL AI2 Wrn

Output closes if the analog input 2 warning alarm activates (typically engine temperature).

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.34 AL AI3 Sd

Output closes if the analog input 3 shutdown alarm activates (typically fuel level).

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.35 AL AI3 Wrn

Output closes if the analog input 3 warning alarm activates (typically fuel level).

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

NOTE:
Sd and Wrn binary outputs can be hidden depends on their configuration as analog inputs in LiteEdit->Modify.

10.2.36 Mode OFF

The output is closed, if OFF mode is selected.

10.2.37 Mode MAN

The output is closed, if MAN mode is selected.

10.2.38 Mode AUT

The output is closed, if AUT mode is selected.

10.2.39 Maintenance

Output closes if the Maintenance alarm activates. Service time is adjusted by setpoint **Engine protect:** *WrnMaintenance*

10.2.40 ChrgTimeout

Output closes if the Wrn ChrgTimeout alarm activates. Maximum charging time is adjusted by setpoint **Battery Charge:** *ChrgLimitTime.*

10.2.41 BI1, BI2, BI3, BI4, BI5, BI6, BI7, BI8, BI9, BI10 Status

In case the binary input is configured to any control function, the binary output depicts the state of the binary input. BI1, BI2, BI3, BI4, BI5, BI6 are assigned for controller binary inputs, BI7, BI8, BI9, BI10 are assigned for IL-NT IO1 optional card.

10.2.42 Ctrl HeartBeat

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

10.2.43 BIO8 1, 2, 3, 4, 5, 6, 7, 8 Status

In case the assigned binary input of IL-NT BIO8 optional card is configured to any control function, the output propagates the state of the input.

HINT
These binary outputs are possible to configure only if the IL-NT-BIO8 is configured.

10.2.44 Exerc Timer 1

Output activates when Timer1 is active. Simultaneously the engine is started when is in AUT mode.

10.2.45 Exerc Timer 2

Output activates when Timer2 is active. Simultaneously the engine is started when is in AUT mode.

10.2.46 SpeedSwitch

Binary output from Speed switch comparator, output correspond to the comparator state – see **Regulator** setpoint group.

10.2.47 Close Load

Output is controlled by panel 0/1 button when **Basic settings:** *Panel Button* = Close Load, engine is running and no Sd/Cd alarm is active. Close Load output is not closed in Idle and Cooling states and is disconnected when any Sd/Cd alarm is activated.

10.2.48 Toggle

Output is controlled by panel 0/1 button when Basic settings: Panel Button = Toggle. This setting changes the Toggle output without any relation to Engine state or Alarm activity even if in OFF mode.

10.2.49 GCB Close/Open

Binary output is closing depends on the charging algorithm in the AUT mode. In MAN mode corresponding to the state of the binary input GCB Close/Open.

10.2.50 BCB Close/Open

Binary output is closing depends on the charging algorithm in the AUT mode. In MAN mode corresponding to the state of the binary input BCB Close/Open.

10.2.51 LCB Close/Open

Binary output is closing depends on the charging algorithm in the AUT mode. In MAN mode corresponding to the state of the binary input LCB Close/Open.

10.2.52 ACB Close/Open

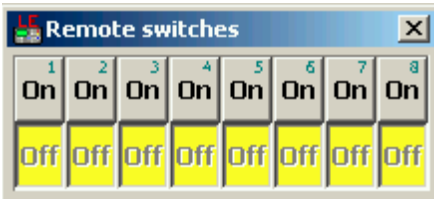
Binary output is closing depends on the charging algorithm in the AUT mode. In MAN mode corresponding to the state of the binary input ACB Close/Open.

10.2.53 LightTowerON

State of the binary output is activated by function in setpoint group **Date/Time**->*Timer1,2Functio* or by binary input LightTowerON. Active binary input state has priority before Timer function.

10.2.54 RemoteControl1, 2, 3, 4, 5, 6, 7, 8

Allows configure Remote control switches to physical binary outputs. These switches are accessible from PC tools LiteEdit (see picture below) or InteliMonitor by button  and it can be controlled via ModBus communication.



10.2.55 Wrn AnImAIO1, 2, 3, 4

Output closes if the warning alarms for IL-NT-AIO analog inputs 1, 2, 3 or 4 activates.

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.56 Sd AnImAIO1, 2, 3, 4

Output closes if the shutdown alarms for IL-NT-AIO analog inputs 1, 2, 3 or 4 activates.

The output opens, if

- alarm is not active and
- FAULT RESET is pressed

10.2.57 ECU Comm OK

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

10.2.58 ECU Comm Error

The output is an inversion of binary output *ECU CommOK*, i.e. the output is closed when ECU is not communicating and all values from ECU show #####.

10.2.59 ECU YellowLamp

The output copies warning information from ECU.

10.2.60 ECU RedLamp

The output copies shutdown information from ECU.

10.2.61 ECU PowerRelay

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

10.2.62 Regener Needed

The output closes if the ECU indicates the need for DPF regeneration.

10.2.63 HEST Lamp

The output closes if the ECU indicates High Exhaust System Temperature (DPF indicator).

HINT
ECU binary outputs are possible to configure only if ECU is configured.

11 Communication

NOTE:
Refer to InteliCommunication Guide for all additional information.

11.1 Direct cable connection

InteliLite Telecom DC can be connected directly with PC via optional communication plug-in modules IL-NT RS232, IL-NT RS232-485, IL-NT S-USB.

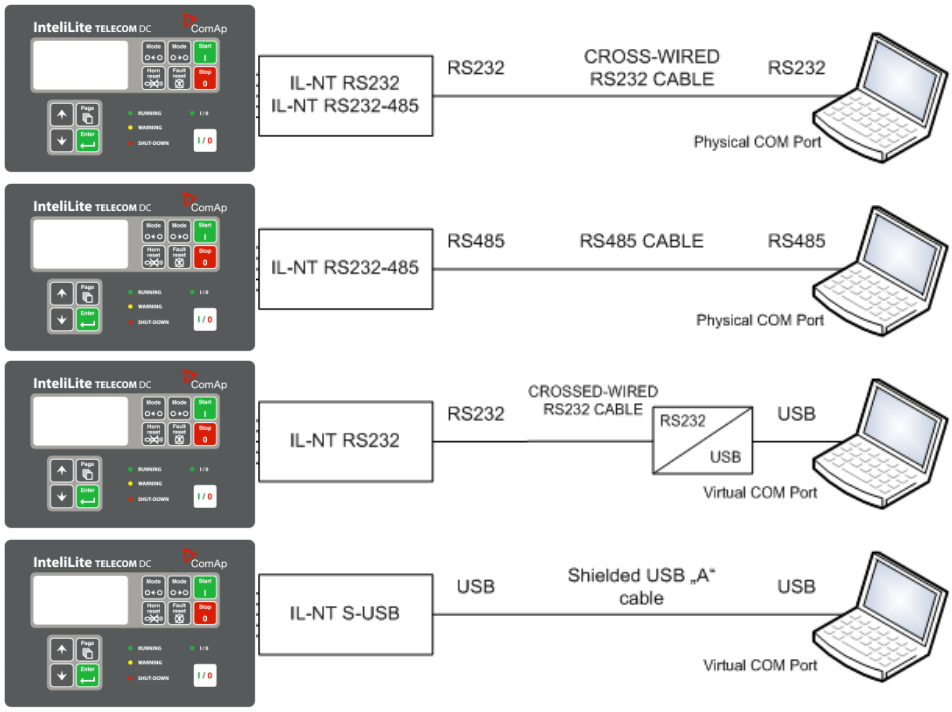
Use the standard serial/USB cable to connect PC with controller. In the area with electromagnetic interference should be used shielded cables.

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).

The setpoint *COM1 Mode* or *COM2 Mode* (according to the interface used) must be set to DIRECT position for this kind of connection.

The communication speed of direct connection is up to 38400 bps, via USB it is up to 115200 bps.

HINT
The RS485 communication line has to be terminated by 120 Ω resistors on both ends. RS485 uses channel COM2 in InteliLite Telecom DC controller.



DIRECT CABLE CONNECTION TYPES

NOTE:
It is possible to create multiple controller connection through RS485. Be aware of controller address collision. Manage address setting for each controller in setpoint **Comms Settings:** *ControllerAddr*

11.2 Remote connection

11.2.1 Internet connection

InteliLite Telecom DC controllers can be monitored from PC tools as LiteEdit or InteliMonitor over the Internet using Internet Bridge IB-NT connected to the controller via IL-NT RS232-485 port, via optional IB-Lite plug-in module or via IL-NT GPRS for cellular internet network. See **Comms Settings.**

11.2.2 AirGate connection

InteliLite Telecom DC controllers can be monitored from PC tools as LiteEdit or InteliMonitor via AirGate. AirGate technology is for easy plug and play wireless communication. Common SIM card with GPRS service is suitable for this system. It overcomes problems with special SIM card (fixed and public IP) necessity, with firewalls and difficult communication settings. For AirGate connection is possible to use IB-NT, IB-Lite or IL-NT GPRS modules. For setting see the setpoints in group **Comms Settings.**

11.2.3 Modem connection

PC can be connected to the controller also remotely via modems. Either an analog, GSM or 3G modem must be connected to the RS232 interface. Setpoint **Comms Settings:** *COM1 Mode* has to be set to MODEM.

11.3 Modbus connection

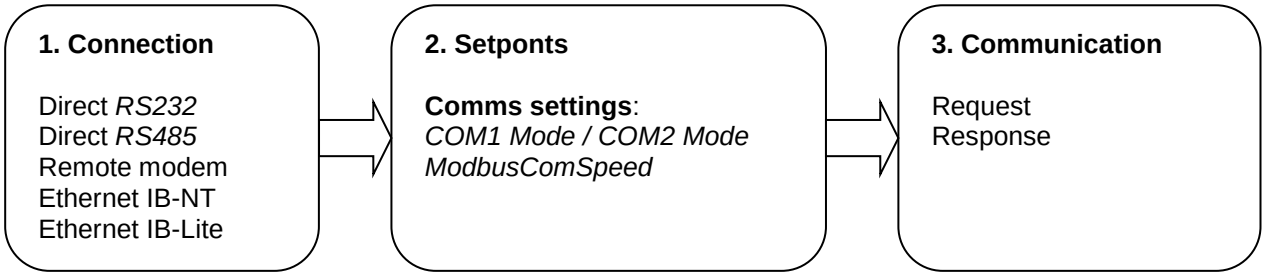
Modbus protocol was implemented into the controllers to allow design of own supervision software for customer or to use ComAp SCADA software.

11.3.1 Modbus step by step

Use LiteEdit: Controller->Generate Cfg image->Modbus registers command to get registers list.

- 9600 bps, 8 data bits, 1 stop bit, no parity
- Transfer mode RTU
- Function 3 (Read Multiply Registers) max length of block is 127 registers
- Function 6 (Write Single Register)
- Function 16 (Write Multiply Registers) max 16 registers
- The response to an incoming message is sent with minimum 4.096 ms delay after message reception

The complete description of Modbus communication protocol can be found in *Modbus Protocol Reference Guide PI-MBUS-300* and *Open Modbus Specification Release 1.0*. Both documents are available from web site at http://www.modicon.com/openmbus/ .



Practical example:

Request: 01 03 00 35 00 03 15 C5
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
00 35 = Register address: Register number (40054) – 40001 = 53 DEC => 35 HEX *IL-NT*
Register address: Register number (40061) – 40001 = 60 DEC => 3C HEX *IC-NT*
00 03 = Number of registers (40054 – Oil press, 40055 – Engine temp, 40056 – Fuel level) = 3 DEC = > 03 HEX
C5 15 = CRC (write LSB MSB !)

A part of Cfg Image (Modbus Register …)

Register(s)	Com.Obj.	Name	Dim	Type	Len	Dec	Min	Max	Group
40051	8213	Battery Volts	V	Integer	2	1	-	-	Controller
40052	10124	(N/A)							
40053	10603	D+	V	Integer	2	1	-	-	Controller
40054	8227	Oil Pressure	Bar	Integer	2	1	-	-	Controller
40055	8228	Engine Temp	°C	Integer	2	0	-	-	Controller
40056	8229	Fuel Level	%	Integer	2	0	-	-	Controller
40057	8978	IOM AI1	U4	Integer	2	0	-	-	Extension

Response: 01 03 06 00 27 00 2E 00 2B 35 64
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
06 = Length of read data in Bytes (in HEX)
00 27 = 27 HEX => 39 DEC => 3,9 Bar (Oil pressure is represented with 1 decimal in Bars)
00 2E = 2E HEX => 46 DEC => 46°C (Engine temperature is represented with 0 decimals in °C)
00 2B = 2B HEX => 43 DEC => 43% (Fuel level is represented with 0 decimals in %)
64 35 = CRC

11.4 ECU engine support

InteliLite Telecom DC firmware branch covers both standard and electronic controlled (monitored) engines. The appropriate engine/ECU type is selected in PC tool LiteEdit like other peripheries. Press the 

button in LiteEdit configuration window Modify.

HINT
Import latest ECU list – ECU list-x.x.iwe for update engine ECU specification.

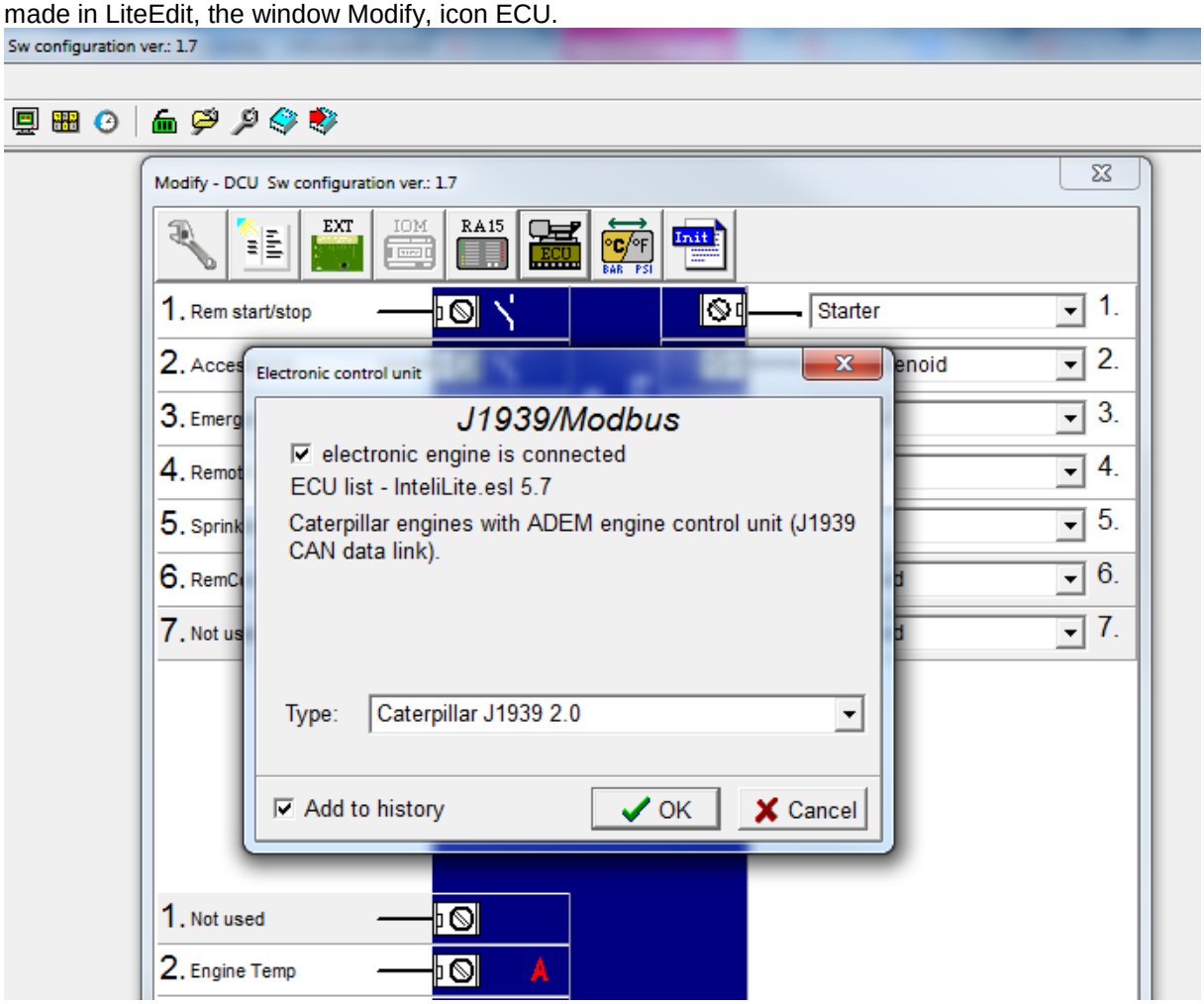
Select the proper ESL file in LiteEdit->Options->ESL files - typically Allspeed.esl.

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

The InteliLite Telecom DC controller always sends either speed request = 0% or the IDLE command via J1939 in controller Idle state. In the MAN mode the Idle operation can be controlled by Nominal/Idle binary input.

11.5 Choosing the ECU to configure

According to the model of ECU, choose and configure the right ECU option. The configuration can be made in LiteEdit, the window Modify, icon ECU.



HINT
If the connected engine is Cummins communicating via RS232, it is necessary to set the setpoint **Comms settings**: *COM1 mode* (or *COM2 mode* if IL-NT-RS232-485) = ECULINK.

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

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

The engine is started via standard contact output or via CAN bus.

Practical examples of values read from ECU:

Value name	Short name	Dimension	Type	Frame name
EngOil Filter Diff.Press	OilDiffPres	bar	ANA	DD

Amber Warning Lamp	AmberWrnLamp	-	BIN	DM1
Malfunction Lamp	MalfunctLamp	-	BIN	DM1
Protect Lamp	ProtectLamp	-	BIN	DM1
Red Stop Lamp	RedStopLamp	-	BIN	DM1
Engine speed	RPM	RPM	ANA	EEC1
Engine Oil Pressure	EngOil Press	bar	ANA	EFLP1
Coolant Temp	Coolant Temp	°C	ANA	ET1
Total Engine Hours	EngineHours	h	ANA	HR
Boost Pressure	Boost Press	bar	ANA	IC
Intake Manifold Temp	Intake Temp	°C	ANA	IC

If Cummins-Modbus x.x option is selected, following values are read from Modbus Register Data (for QSX15, QSK45, QSK60):

Value name	Short name	Dimension	Type	Frame name
Red Shutdown Lamp	Red Lamp	-	BIN	10005
Yellow Warning Lamp	Yellow Lamp	-	BIN	10006
Engine Speed	RPM	RPM	ANA	30001
Coolant Temp	Coolant Temp	°C	ANA	30002
Oil Pressure (psig)	Oil Press	bar	ANA	30003
Oil Pressure (psia)	Oil Press	bar	ANA	30003
Running Time	Running Time	h	ANA	30008
Fuel Rate (UK)	Fuel	L/h	ANA	30018
Fuel Rate (US)	Fuel	L/h	ANA	30018
Intake Manifold Press	Intake Press	bar	ANA	30530
Intake Manifold Temp	Intake Temp	°C	ANA	30531

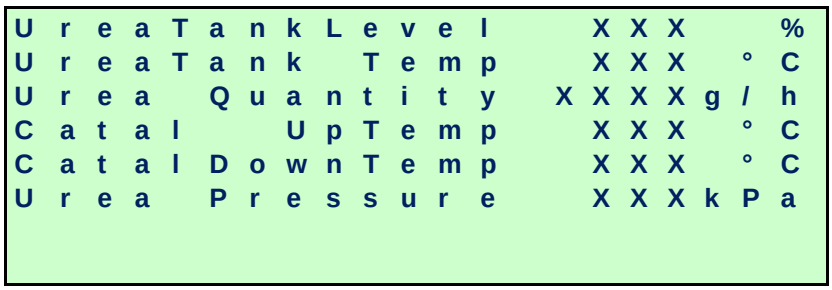
11.6 ECU Analog inputs

Reading of mentioned values from ECU enables to use analog inputs of the unit for other purposes, e.g. measuring, displaying and alarm activation related to various quantities. The configuration thus allows using nine analog inputs on the central unit and four analog inputs on plug-in module if connected.

If the engine without ECU is controlled by the controller, the first analog input is permanently configured to Oil Pressure, other analog inputs remain freely configurable.

11.7 Tier 4 engines support

When the configured ECU supports Tier4 standard, on the controller appears a supplementary screen where are displayed the values related to the Tier4.



ECU State	000
ECU YellowLamp	0
ECU RedLamP	0
WaitToStrt	0
SpeedReq Abs	0
SpeedReq Rel	800RPM
Soot Load	100%
Ash Load	100%

NOTE:
Tier4 values Soot Load and Ash Load are visible on ECU screen as well.

12 Troubleshooting

12.1 Alarm management

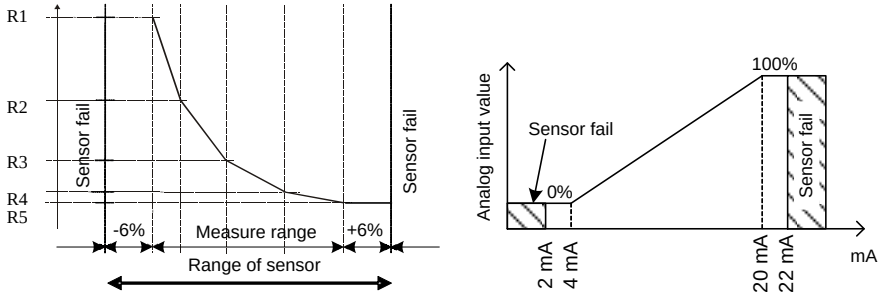
Following alarms are available:

- Sensor fail
- Warning
- Cooldown
- Shut down

NOTE:
Type of protection for binary and analog inputs is adjustable in PC tool LiteEdit. In window Modify after double click on input adjust Alarm type.

12.1.1 Sensor fail (Fls)

Sensor fail is detected when measured value is 6% out of selected sensor characteristic. Sensor fail is indicated by ##### symbol instead of measured value.



12.1.2 Warning (Wrn)

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

12.1.3 Cooldown (Cd)

When cooldown comes up, engine is stopped slowly over cooling state.

12.1.4 Shut down (Sd)

When the shutdown alarm comes up, the controller opens all outputs e.g. FUEL SOLENOID, STARTER and PRESTART to stop the engine immediately. Alarm outputs and common shutdown output are closed. Active or not reset protection disables start.

HINT
Engine running only alarms are activated after **Engine protect**: *Eng prot del,* after the engine RPM > **Engine params**: *Starting RPM* during the engine starting procedure.

HINT
If LBI Sprinkler is active engine does not react on shutdown protection only for Emergency stop and Overspeed protection.

12.1.5 **List of possible alarms

Events specification	Protection type	Information on binary output available (See list of Binary outputs)	Description
Wrn Oil Press	WRN	YES	Oil pressure is smaller than *Wrn Oil press* setpoint.
Sd Oil Press	SD	YES	Oil pressure is smaller than *Sd Oil press* setpoint.
Sd NotOilPress	SD	YES	No information about the oil pressure from the binary oil pressure sensor.
Wrn Engine Temp	WRN	YES	Water temperature is greater than *Wrn Water temp* setpoint.
Sd Engine Temp	SD	YES	Water temperature is greater than *Sd Water temp* setpoint.
Wrn Fuel Level	WRN	YES	Fuel level is smaller than *Wrn Fuel Level* setpoint.
Sd Fuel Level	SD	YES	Fuel level is smaller than *Sd Fuel Level* setpoint.
Batt Fail	WRN	YES	Battery voltage is out of limits given by *Batt overvolt* and *Batt undervolt* setpoints.
Wrn AIN	WRN	YES	Warning alarm configurable on the input of the controller
Sd AIN	SD	YES	Shutdown alarm configurable on the input of the controller.
Wrn AIO	WRN	YES	Warning alarm configurable on the input of plug-in.
Sd AIO	SD	YES	Shutdown alarm configurable on the input of plug-in.
Binary input	Configurable	YES	Configurable Warning/Shutdown alarms on the inputs of the controller.
Battery flat	SD	YES	If the controller switches off during starting sequence due to bad battery condition it doesn't try to start again and activates this protection.
Start Fail	SD	YES	Engine start failed.
RPM meas fail	SD	NO	At least one running condition was detected (Poil>Starting POil or energized D+) and do not appear RPM>Starting RPM.
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, write at least one new parameter.
Overspeed	SD	YES	The protection comes active if the speed is greater than *Overspeed* setpoint.
Underspeed	SD	YES	During starting of the engine when the RPM reached the value of *Starting RPM* setpoint the starter is switched off and the speed of the engine can drop under *Start RPM* again. Then the Underspeed protection becomes active. Protection evaluation starts 5 seconds after reaching *StartingRPM*.
EmergencyStop	SD	NO	If the input *Emergency stop* is opened

Events specification	Protection type	Information on binary output available (See list of Binary outputs)	Description
			shutdown is immediately activated.
PickupFault	SD	NO	Failure of magnetic pick-up sensor for speed measurement.
Stop Fail	SD	YES	Engine stop failed.
WrnMaintenance	WRN	NO	The period for servicing is set by the *NextServTime* setpoint. The protection comes active if the running hours of the engine reach this value.
ChrgAlternFail	WRN	YES	Failure of alternator for charging the battery.
Wrn ChrgTimeout	WRN	NO	Charging procedure is longer than **Battery Charge**: *ChrgLimitTime*.
SprinklActive	WRN	NO	The protection is active if the output *Sprinkler* is closed.
Wrn RA15 fail	WRN	NO	Warning alarm in case of lost connection to IGL-RA15 module.
Wrn ECU Alarm	WRN	NO	ECU alarm list is not empty
Low BackupBatt	WRN	NO	RTC backup battery is flat

12.2 History file

InteliLite Telecom DC stores a record of each important event into the history file. The history file seats 255 records. When the history file is full, the oldest records are removed.

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

12.2.1 Record structure

Abbreviation	Historical value
Num	Number of historical event
Reason	Event specification
Date	Date of historical event in format DD/MM/YY
Time	Time of historical event in format HH:MM:SS
Mode	OFF-MAN-AUT
RPM	Engine speed
Ugen	Generator voltage
Ubat	Battery voltage
Ucmp	Battery voltage – compensated value
Uld	Load voltage
Uaux	Auxiliary input voltrage
Igen	Generator current
Ibat	Battery current
Iloa	Load current
Iaux	Auxiliarry source current
BatI	Battery Charge in Ahours (during single charging cycle)
BatO	Battery DisCharge in Ahours (during single charging cycle)
OilP (AIN1)	Controller Analog input 1 value (default Oil pressure)
EngT (AIN2)	Controller Analog input 2 value (default Water temperature)
FLvl (AIN3)	Controller Analog input 3 value (default Fuel level)
Usup	Supply battery voltage

BIN	Controller Binary inputs
BOUT	Controller Binary inputs
FC	ECU alarm Failure Code
FMI	ECU alarm Failure Mode Identifier
RHr	Run hours

HINT
The ECU values are not recorded to history.

12.3 Diagnostic messages read from ECU

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

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

Detail SPM/FMI code specification see in:

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

12.4 List of ECU diagnostic codes

Fault code	Diagnostic code	Fault code	Diagnostic code	Fault code	Diagnostic code
51	ThrottlePos	158	BattPotential	636	PositionSensor
91	AccelPedalPos	168	ElectricalPot	637	TimingSensor
94	FuelDelPress	172	AirInlet Temp	639	J1939 CAN Bus
97	WaterInFuelInd	174	Fuel Temperat	651	InjectorCyl#1
98	EngineOilLevel	175	EngOil Temp	652	InjectorCyl#2
100	EngOil Press	189	RatedEngSpeed	653	InjectorCyl#3
101	CrankcasePress	190	EngineSpeed	654	InjectorCyl#4
102	Boost Press	231	J1939 Datalink	655	InjectorCyl#5
105	Intake Temp	237	VIN	656	InjectorCyl#6
106	AirInletPress	515	EngDesOpSpeed	677	EngStartRelay
107	AirFiltDifPres	620	5V SupplyFail	898	RequestedSpeed
108	BarometricPres	626	PrehActuator	970	AuxEngSdSwitch
110	EngCool Temp	628	EMSProgFailure	971	EngDerateSwtch
111	Coolant Level	629	Controller#1	1109	EngSdApproach
153	CrankcasePress	630	CalibrMemFail	1110	Engine Sd

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

For Scania Fault codes (FC) are displayed. Following messages are available for particular groups of Fault codes:

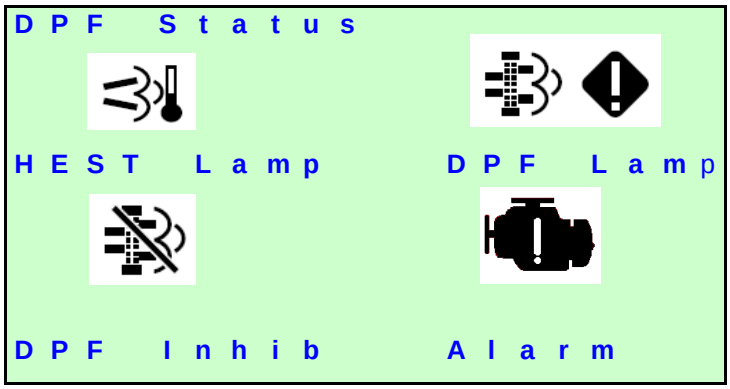
Fault code	Diagnostic code	Fault code	Diagnostic code
0x1000	Overspeed	0x6702	AlternatorChrg
0x1100	EngSpdSensor1	0x6A00	ExhaustBrkAct
0x1200	EngSpdSensor2	0xB000	OilPressProt
0x2000	WtrTempSensor	0xB100	CoolantLevProt
0x2100	ChrgAirTmpSens	0xB200	OverheatCoolWt
0x2200	ChrgAirPrsSens	0xB300	EmergencyStop
0x2300	OilTempSensor	0xB501	CoolantLevel
0x2400	OilPressSensor	0xC000	PDEInjctorCyl1
0x2600	SensorSupply1	0xC100	PDEInjctorCyl2
0x2700	SensorSupply2	0xC200	PDEInjctorCyl3
0x2800	ExtrAnalogInp	0xC300	PDEInjctorCyl4
0x3200	BatteryVoltage	0xC400	PDEInjctorCyl5
0x3300	CAN msg not ok	0xC500	PDEInjctorCyl6
0x3403	CAN version	0xC600	PDEInjctorCyl7
0x4300	HWWatchdog	0xC700	PDEInjctorCyl8
0x6200	FanActuator	0xE200	OverheatProt
0x6400	WasteGateAct	0xE600	CoordEmergStop
0x6600	StarterActuatr		

12.5 Tier 4 diagnostic codes

If the configured ECU supports Tier 4 standard, on the controller screen are displayed supplementary values relative to the DPF status.

In ECU list-5.6 supported for John Deere, Cummins CM2250, CM850 and Deutz EMR4.

Practical example of the screen:



Meaning of the pictograms:

	HEST Lamp SPN 3698	Exhaust High Temperature. Visible when SPN 3698 = 1
	DPF Inhibit SPN 3702	Visible when SPN 3702 = 1
	DPF Lamp SPN 3696 SPN 3697	Visible when CM1: SPN 3696 (Force switch) = 1 or SPN 3697 (DPF Lamp Command) = 1. Blinks – changes to inverse (1Hz) when 3697 = 100.
	DPF Lamp + Warning	Active when 3697 = 1 and SPN 3701 = 4

	DPF Lamp + STOP	Active when 3697 = 1 and SPN 3701 = 5
	Yellow Lamp	Active when DM1 Yellow lamp is active.
	Red Lamp	Active when DM1 Red lamp is active.

13 Technical data

13.1 InteliLite Telecom DC

Power supply

Power supply range	8-36 V DC
Power supply drop-out immunity	50 ms (from min.10 V)
Power consumption	approx. 200 mA/8 V; 50 mA/36 V
Peak power consumption (LT)	approx. 0.56 A/8 V; 1.8 A/36 V
Backup battery type	CR 1225
Estimated backup battery lifetime	10 years

Operating conditions

Operating temperature	-20 to +70 °C
Operating temperature (LT version)	-40 to +70 °C
Operating humidity	95% non-condensing (IEC/EN 60068-2-30)
Protection degree (front panel)	IP65
Vibration	5-25 Hz, +/- 1.6 mm; 25-100 Hz, a = 4 g
Shocks	a_{max} 200 m/s^2
Storage temperature	-30 to +80 °C

Physical dimensions

Dimensions	185 x 125 x 60 mm (WxHxD)
Weight	
Mounting cutout size	175 x 115 mm (WxH)

Standard conformity

Electromagnetic compatibility	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4
Low voltage directive	EN 61010-1:95 +A1:97

Binary inputs

Number of binary inputs	7
Galvanic insulation	Not insulated
Input range	0 - 36V DC
Close contact indication	< 0,8 VDC
Open contact indication	> 2VDC
Input resistance	4.2 kΩ

Binary outputs

Number of binary outputs	7
Galvanic insulation	Not insulated
Type	Transistor, switching to negative supply terminal
Operating voltage	8–36 V DC
Switching current	500 mA (suppression diodes required for inductive loads)

Analog inputs

Power supply range	8-36 V DC
Number of analog inputs	9
Galvanic insulation	Not insulated
Electrical range	3x 0~2500 Ω 2x -65 V DC ~ +65 V DC 4x 0 ~ +10 V DC
Resolution	10 bits, 4 digits
Supported sensor types	Predefined: VDO 10Bar, VDO Temperature, VDO Fuel level etc. User-defined: up to 30 points non-linear sensors can be defined by the user
Precision	1% from the range

Pick-up input

Input voltage	2–70 Vpp
Frequency range	4 Hz–10 kHz (min 2 V_{pp} @ 4 kHz, 6 V_{pp} @ 10 kHz)
Accuracy	0.2%

Remote communication interface

RS232	Optional using the plug-in module IL-NT RS232, D-SUB9M socket
RS485	Optional using the plug-in module IL-NT RS232-485, plug-in terminal block
Baud rate	Depending on selected mode (up to 57600 bps)
USB	Optional using the plug-in module IL-NT S-USB
Ethernet	Optional using the plug-in module IB-Lite
Cell	Optional using the plug-in module IL-NT-GPRS

Extension module interface

Type	CAN bus
Galvanic insulation	Insulated, 500 V
Baud rate	250 kbps
Bus length	Max. 200 m
Termination resistor	120 Ω, built-in, jumper activated

13.2 AIO9/1

Power supply	8 to 36 V DC
Protection	IP20
Current consumption	150 mA at 24 V ÷ 400 mA at 8 V
Storage temperature	-40°C to +80°C
Operating temperature	-30°C to +80°C
Dimension (WxHxD)	110 x 110 x 46 mm (4,3”x4,3”x1,8”)
Weight	248 g
Interface to controller	CAN 1 – galvanic separated from power supply and measurement 120 Ω built-in terminating resistor activated by jumper bus length max 200 m
Analog inputs	9x (not electrically separated)
	AIN1-AIN4 – Voltage inputs **Range**: ±65V (nominal) (measurement up to ±70 V) **Accuracy of measurement:** 0-65V ±0,25% of actual value ±120 mV Measurement is not galvanic separated from power supply, but IN- is not interconnected with GND – there is floating measurement. **AIN5-AIN8 –** Voltage inputs **Range:** ±75 mV (nominal) (measurement up to ±80 mV) **Accuracy of measurement:** ±0,1% of actual value + ±75 µV Galvanic separated from power supply **AIN9 resistance input** **Range:** 0- 2400 Ω **Accuracy of measurement:** ±0,5% of actual value + ± 4 Ω Pt1000, Ni1000 ±2,5 °C It is not galvanic separated from power supply.
Analog output	**I 0-20 mA** /500 Rmax. ±1% of actual value ±200 µA **U 0-10 V** ±0.5% of actual value ±50 mV **PWM 5 V**, 200 Hz-2.4kHz 15 mA max. Galvanic separated from power supply
Galvanic separation	CAN bus is galvanic separated from the measurement and power supply

14 Language support

InteliLite Telecom DC controllers support different languages. In default setting of controller is accessible English, which isn't possible remove. In the controller is possible to add second language via LiteEdit (see the table below). These languages are possible modify via Translator tool in LiteEdit.

Following language code pages are supported:

Code page	Language	Windows code
0	West European languages	Windows 1252
134	Chinese*	GB 2312
161	Greek	Windows 1253
162	Turkish	Windows 1254
177	Hebrew*	Windows 1255
204	Russian*	Windows 1251
238	East European languages	Windows 1250

* These languages are available only with special archive and cannot be aaded via LiteEdit.