Communication Guide for ComAp Controllers

InteliDrive Lite
InteliDrive Lite EM
InteliDrive Nano
InteliDrive DCU
InteliDrive Mobile

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ComAp

COMMUNICATION GUIDE

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AMPS

Quality Management ISO 9001:2008
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DEKRA certified

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Document information

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1.0	23.7.2012
1.1	13.8.2015

Clarification of notation

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

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

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

Conformity Declaration

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.

Introduction

This guide introduces the way how to connect to ComAp InteliDrive controllers in order to access controller data and configure the controller.

Communication between controller(s) and superior, service or monitoring system (usually PC) is described within the manual providing essential information about the key components and methods of their usage.

This guide is not dedicated to the communication among controllers, communication with peripheral modules or ECU. Refer to the corresponding Reference Guides or Comap Electronic Engines Support guide to acquire necessary information in this field.

Communication interfaces

All the InteliDrive controllers have some of communication interfaces for monitoring, programing or configuration. In the table below is shown summarization of these inrefaces.

ID controller	InteliDrive Lite	New InteliDrive Lite	InteliDrive Lite EM
	ID-LITE	ID-FLX-LITE	ID-EM
Communication module			
Direct connection	YES *	YES *	YES *
Internet connection	YES *	YES *	YES *
Modem connection	YES *	YES *	YES*
USB	YES *	YES *	YES *
RS485	YES *	YES *	YES *
RS232	YES *	YES *	YES *
CAN1	YES	YES	YES
CAN2	NO	NO	NO
GPRS	YES *	YES *	YES *
GPS	NO	NO	NO
ID controller	**InteliDrive Nano**	**InteliDrive DCU**	**InteliDrive Mobile**
	ID-NANO	ID-DCU	ID-MOBILE
Communication module			
Direct connection	YES	YES	YES
Internet connection	NO	YES ***	YES *
Modem connection	NO	YES ***	NO
USB	YES	NO	NO
RS485	NO	NO	YES
RS232	NO	YES	NO
CAN1	YES	YES **	YES
CAN2	NO	YES **	YES
GPRS	NO	NO	YES
GPS	NO	NO	YES

*) Plug-in modules required (IB-Lite, IL-NT-GPRS etc., details below)
**) ID-Com extension module required
***) Communication modules required (IG-IB, IB-NT etc.)

Direct connection can be used for monitoring, programming and configuration, Internet and Modem connection is usually used for monitoring via ComAp Web server or WebSupervisor.

Modem connection allows connection to the different networks (Internet, 2G, 3G), depends on the modem.

Available communication modules

Following communication modules are dedicated to be used with ID-Lite, ID-FLX-Lite, ID-EM, ID-Nano, ID-DCU and ID-Mobile controllers and are delivered separately from the controller. For more information about particular module go to chapter Communication modules.

SUPPORTED CONNECTIONS

ID controller	InteliDrive Lite	New InteliDrive Lite	InteliDrive Lite EM
	ID-LITE	ID-FLX-LITE	ID-EM
Communication module			
IB-NT	NO	NO	NO
IB-Lite	YES	YES	YES
IG-IB	NO	NO	NO
ID-COM	NO	NO	NO
I-LB/I-LB+	NO	NO	NO
IL-NT-GPRS	YES	YES	YES
IL-NT-RS232	YES	YES	YES
IL-NT-RS232-485	YES	YES	YES
IL-NT-S-USB	YES	YES	YES
ID-Mobile-GPRS	NO	NO	NO
ID-Mobile-GPS	NO	NO	NO
ID controller	**InteliDrive Nano**	**InteliDrive DCU**	**InteliDrive Mobile**
	ID-NANO	ID-DCU	ID-MOBILE
Communication module			
IB-NT	NO	YES*	YES*
IB-Lite	NO	NO	NO
IG-IB	NO	YES	YES
ID-COM	NO	YES	NO
I-LB/I-LB+	NO	YES	YES
IL-NT-GPRS	NO	NO	NO
IL-NT-RS232	NO	NO	NO
IL-NT-RS232-485	NO	NO	NO
IL-NT-S-USB	NO	NO	NO
ID-Mobile-GPRS	NO	NO	YES
ID-Mobile-GPS	NO	NO	YES

*) version IB-NT 1.2 and higher

Available PC tools

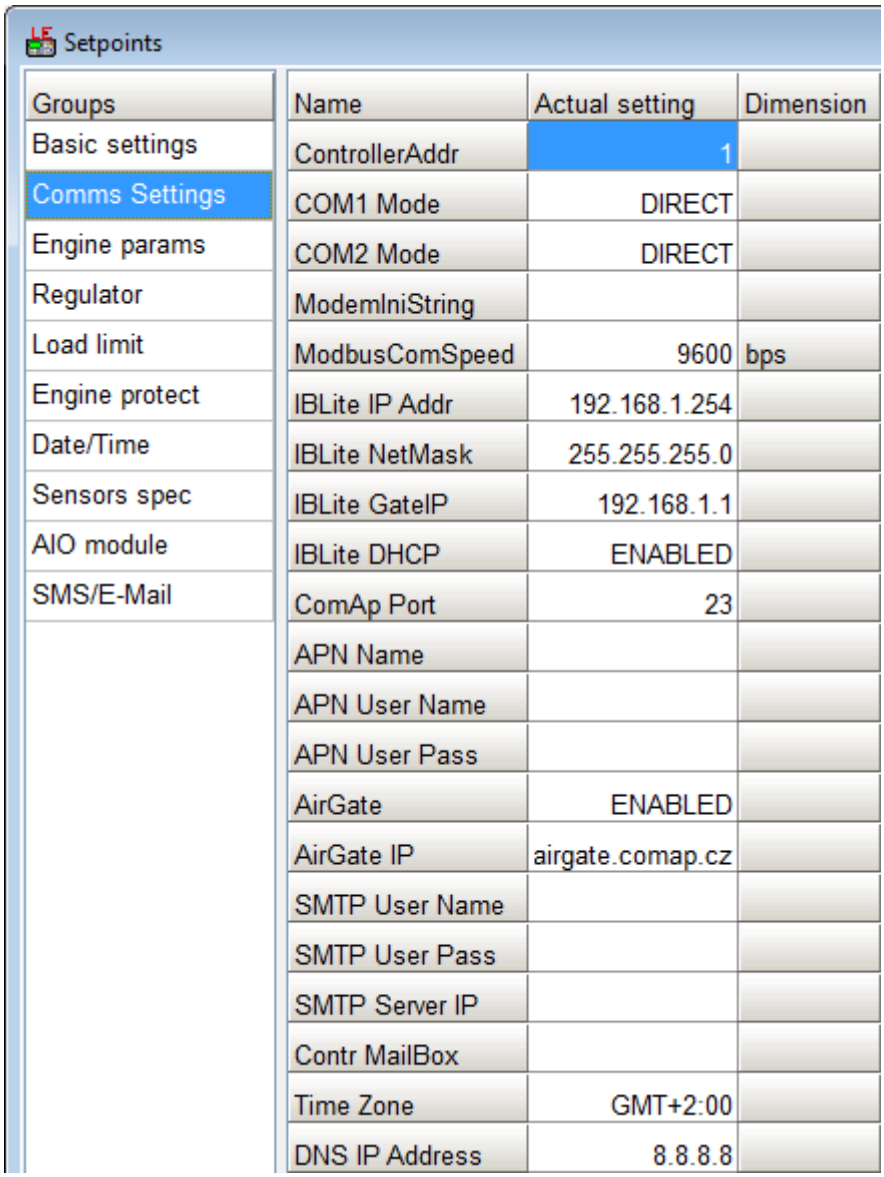
ID controller	InteliDrive Lite	New InteliDrive Lite	InteliDrive Lite EM
	ID-LITE	ID-FLX-LITE	ID-EM
Communication module			
DriveEdit	NO	NO	NO
LiteEdit	YES	YES	YES
Web browser	YES	YES	YES
DriveMonitor	NO	NO	NO
DriveConfig	NO	NO	NO
InteliMonitor	YES	YES	YES
WinScope	YES	YES	YES
ID controller	**InteliDrive Nano**	**InteliDrive DCU**	**InteliDrive Mobile**
	ID-NANO	ID-DCU	ID-MOBILE
Communication module			
DriveEdit	YES	NO	NO
LiteEdit	NO	NO	NO
Web browser	YES	YES	YES
DriveMonitor	NO	YES	YES
DriveConfig	NO	YES	YES
InteliMonitor	NO	YES	YES
WinScope	NO	YES	YES

NOTE:
Details about ComAp PC tools can be found in the particular reference guides available on www.comap.cz for all ComAp Club members.

How to open connection

It is possible to connect to the controller using ComAp PC tools (LiteEdit, InteliMonitor, WinScope, DriveConfig, DriveMonitor) or from web browser. Description how to open the connection follows.

CAUTION!
When opening the connection to the controller it's address (ControllerAddr) has to correspond with PC SW communication setup setting.



THE CONTROLLER ADDRESS HAS TO MATCH WITH SETUP IN LITEEDIT/INTELIMONITOR

Groups	Name	Password	Value	Dim
Basic Settings	ControllerAddr	0 1 2 3	1	
Comms Settings	RS485 Mode	0 1 2 3	STANDARD	
Engine Params	MODBUS	0 1 2 3	9600	bps
Engine Protect	ECU Diag	0 1 2 3	ENABLED	
Analog Inputs	SHxOcol Detect	0 1 2 3	ENABLED	
Act. Calls/SMS	ComApPort	0 1 2 3	23	
Date/Time	APN Name	0 1 2 3		
Position	APN UserName	0 1 2 3		
Display	APN UserPass	0 1 2 3		
	AirGate IP	0 1 2 3	airgate.comap.cz	
	DNS IP	0 1 2 3	8.8.8.8	

THE CONTROLLER ADDRESS HAS TO MATCH WITH SETUP IN DRIVECONFIG

NOTE:
The controller ID-Nano does not have setpoints as Controller Addr, because it is possible to connect it just directly.

NOTE:
The controller ID-Nano is using for monitoring, programming and adjusment PC tool DriveEdit, any other PC tool is available.

Open connection from DriveEdit

DriveEdit is ComAp's PC tool for ID-Nano controller.

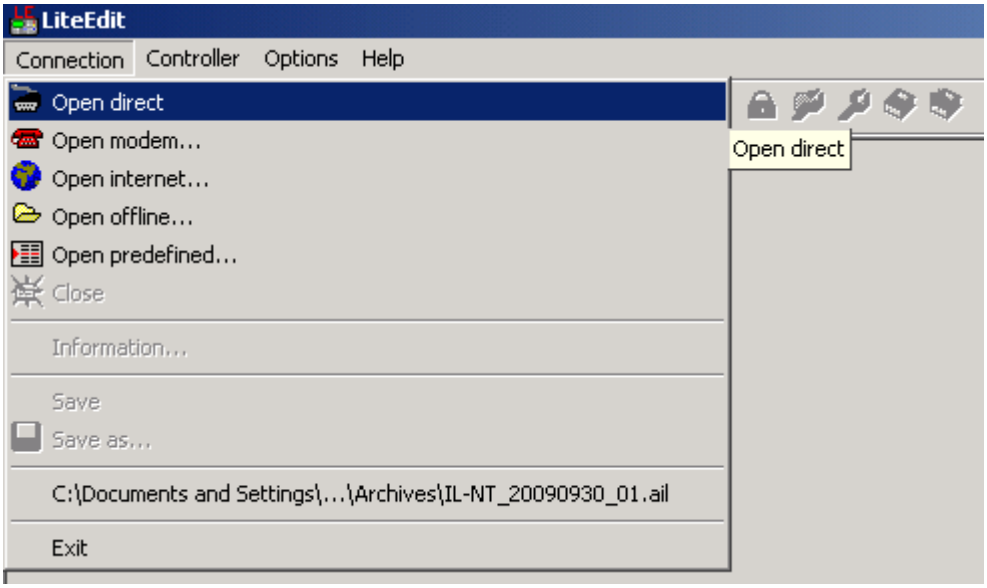
1. After opening DriveEdit click on the icon Download from controller

DRIVEEDIT SCREEN AFTER START – FOR CONNECTION CLICK ON DOWNLOAD FROM CONTROLLER

Open connection from LiteEdit

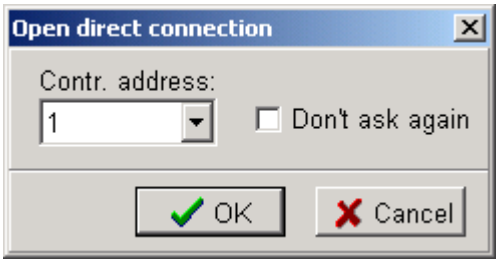
PC tool LiteEdit is used for monitoring, programming and setting of ID-Lite, ID-FLX-Lite and ID-EM controllers.

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

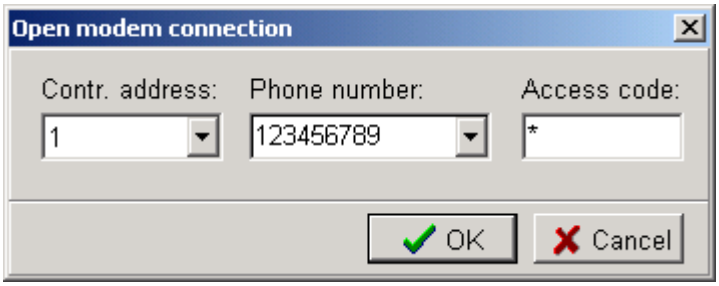


LITEEDIT - CONNECTION MENU

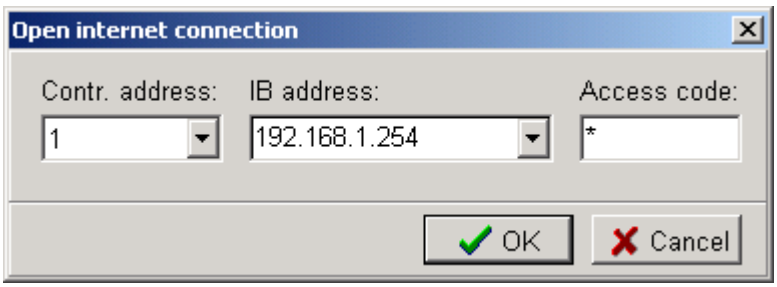
2. Enter controller address and further information depending on the selected connection type.



FOR DIRECT CONNECTION ENTER CONTROLLER ADDRESS

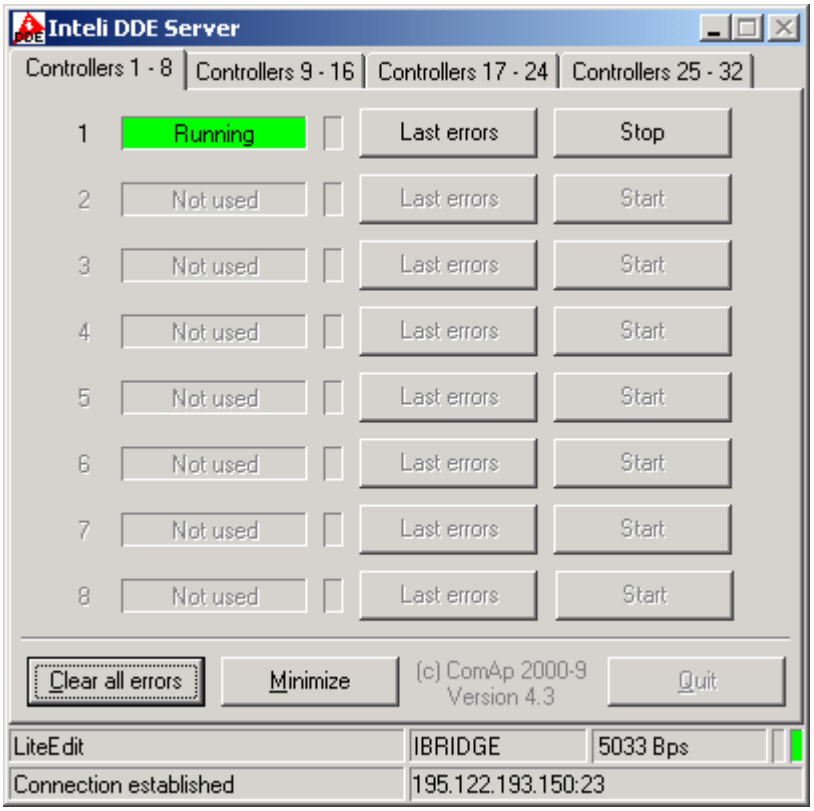


FOR MODEM CONNECTION ENTER CONTROLLER ADDRESS, PHONE NUMBER OF THE MODEM SITUATED AT THE CONTROLLER YOU WANT TO REACH, ACCESS CODE



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 can check the status of communication in InteliDDE Server

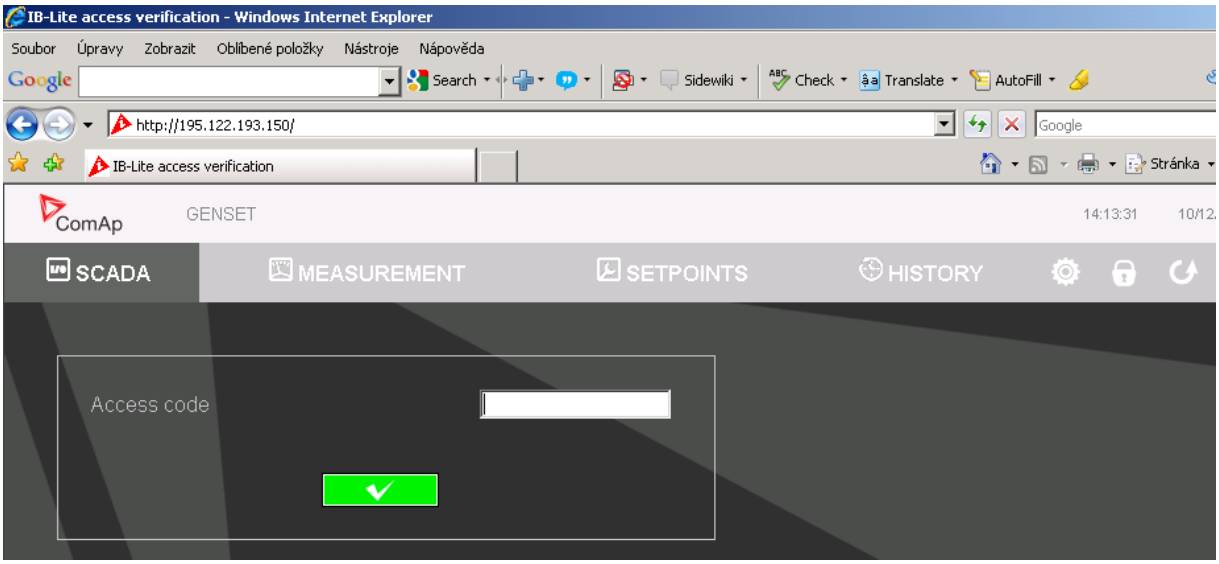


COMMUNICATION WITH THE CONTROLLER WITH ADDRESS 1 IS RUNNING THROUGH IB-LITE ON IP ADDRESS 195.122.193.150, STANDARD PORT 23

Open connection from web browser

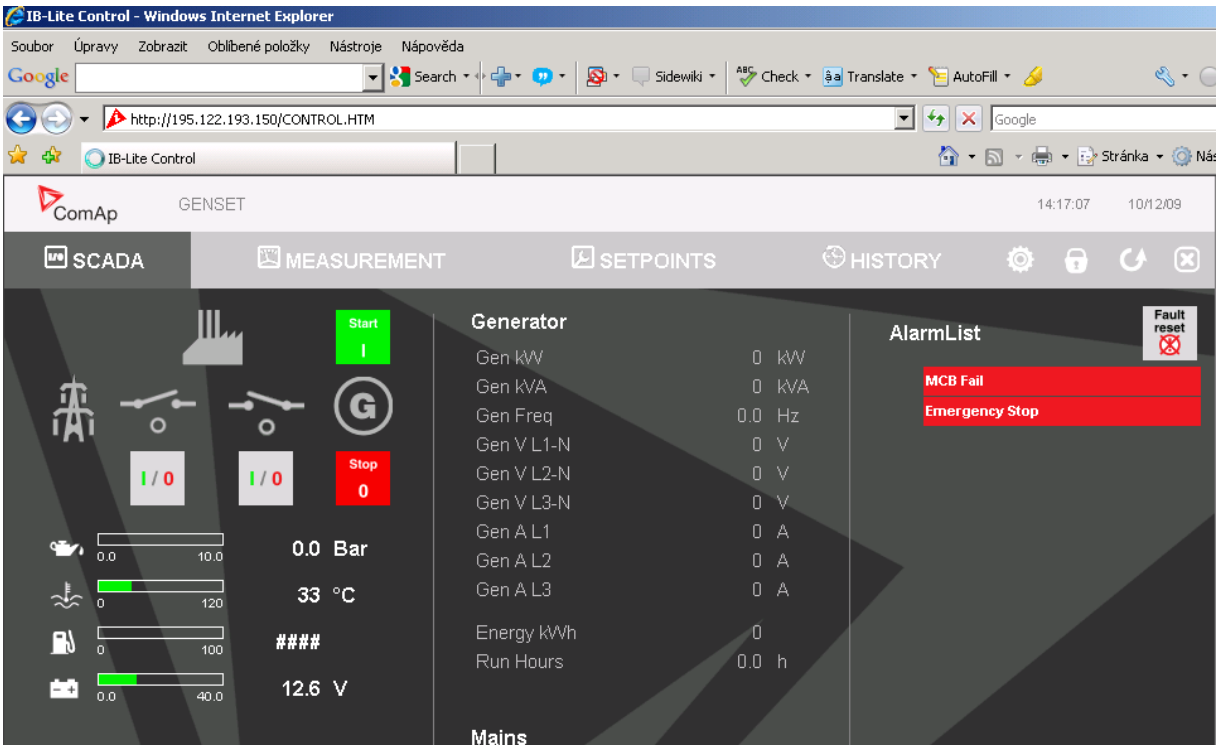
It is possible to connect from a web browser to any of InteliDrive controllers, except ID-Nano, mounted with IB-Lite module or IG-IB or IB-NT and connected to internet (for more details about internet connection see related chapter or IB-Lite reference guide).

1. Open web browser
2. Enter IP address
3. Access verification page appears



ACCESS VERIFICATION PAGE

4. Enter access code and Scada page appears



SCADA PAGE

NOTE:
You can try the Web server from ComAp webpage. The access code is 0.

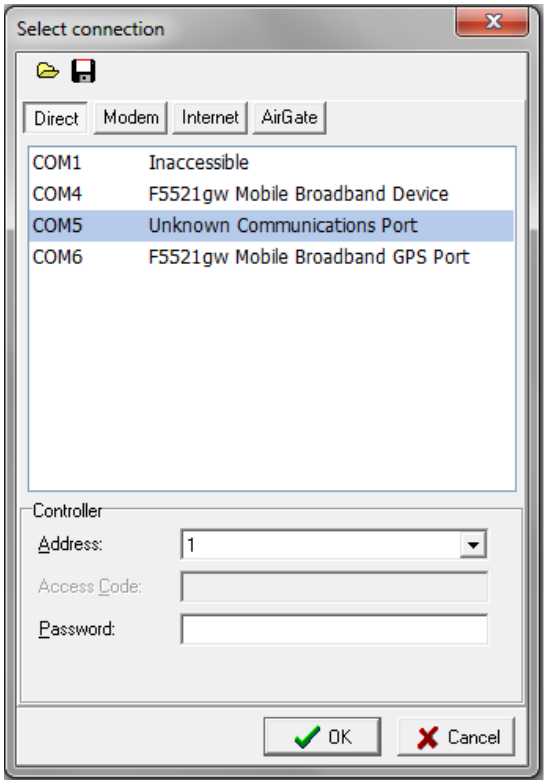
NOTE:

Webupervisor 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-2.0 Reference Guide.pdf

Open connection from DriveConfig

Controling and programming tool for ID-DCU and ID-Mobile.

1. Go to ***Options*** -> ***Select connection…*** and select type of connection you desire.



2. Enter necessayry information depending on the selectet type of connection

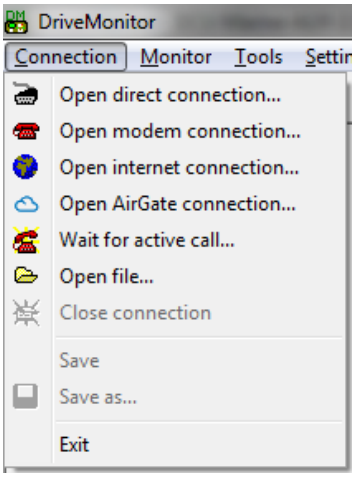
NOTE:
For Modem, Internet connection is necessary to set phone number or IP address. AirGate connection can be used just for ID-Mobile, not in ID-DCU.

NOTE:
Use the controller with its PC tools, otherwise connection is not going to work. See the table Available PC tools above.

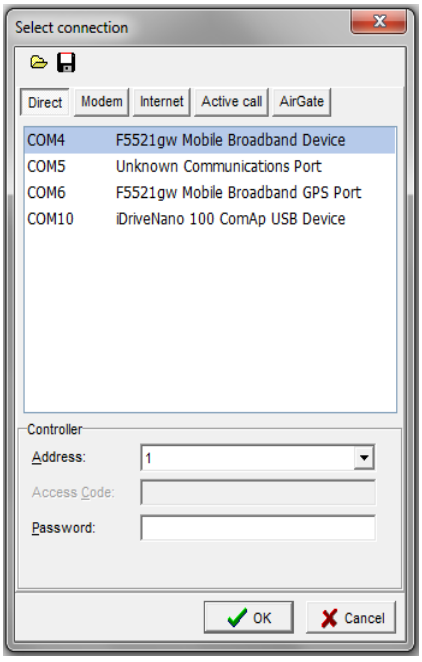
Open connection from DriveMonitor

DriveMonitor is monitoring tool for ID-DCU and ID-Mobile controllers.

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



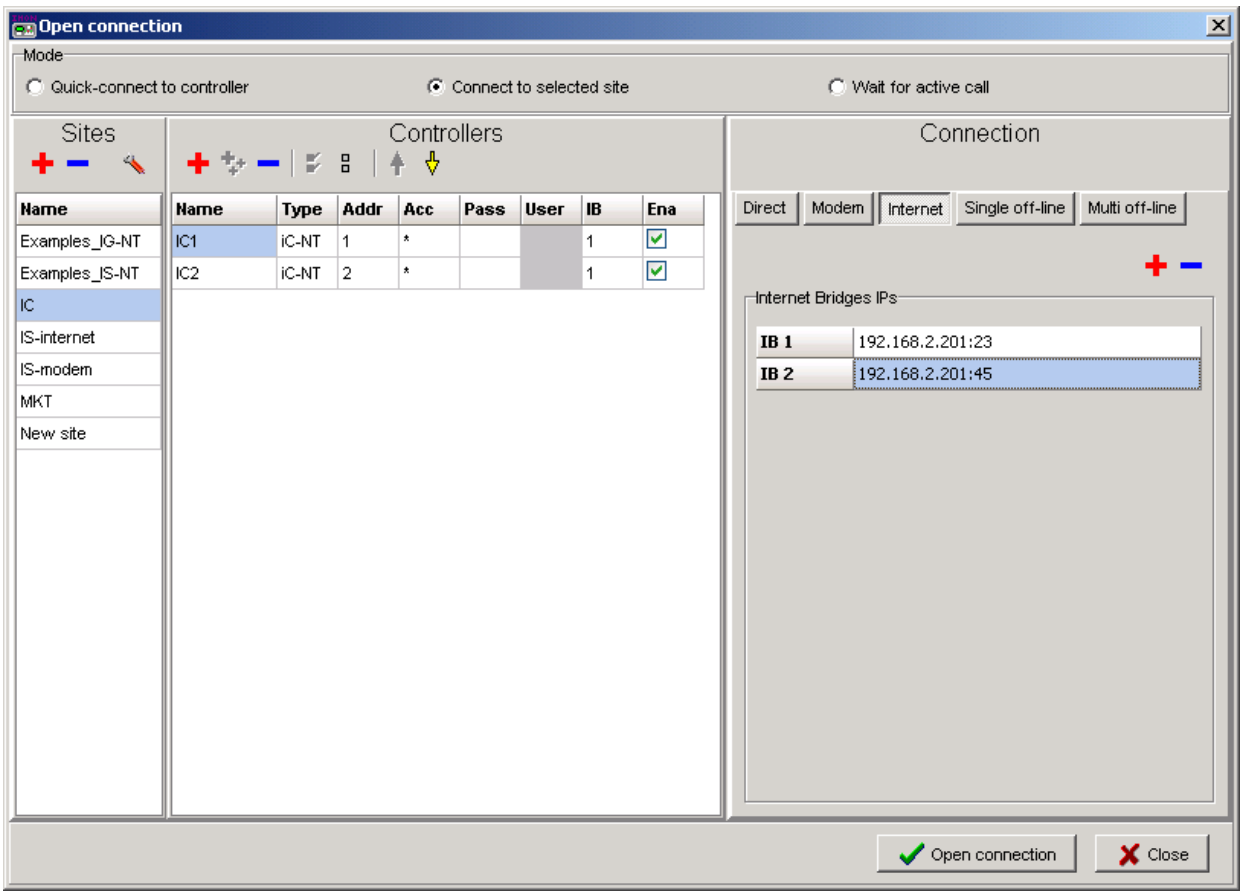
2. Enter necessayry information depending on the selectet type of connection



Open connection from InteliMonitor

InteliMonitor is working as monitoring tool for InteliDrive controllers, except ID-Nano. Can be used for drawing of own SCADA interface via Line Diagram Editor. Three bacis types of connection direct, modem and internet.

1. Go to menu ***Connection*** -> ***Open connection...*** and select the type of connection you desire and site where you would like to connect.

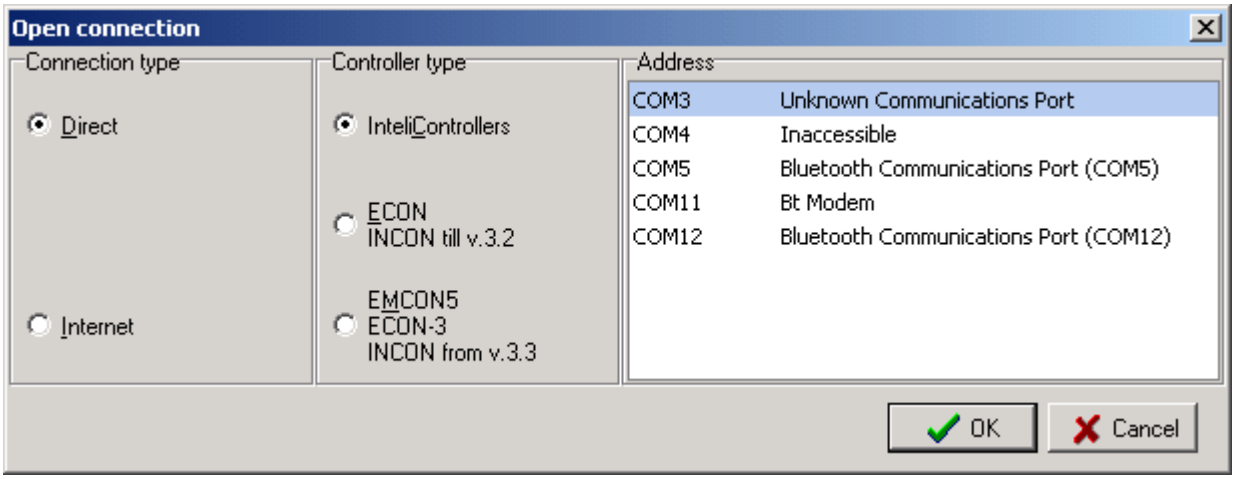


INTELIMONITOR - OPEN CONNECTION WINDOW

2. Enter necessary information depending on the selected connection type.
3. Press Open connection button

Open connection from WinScope

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



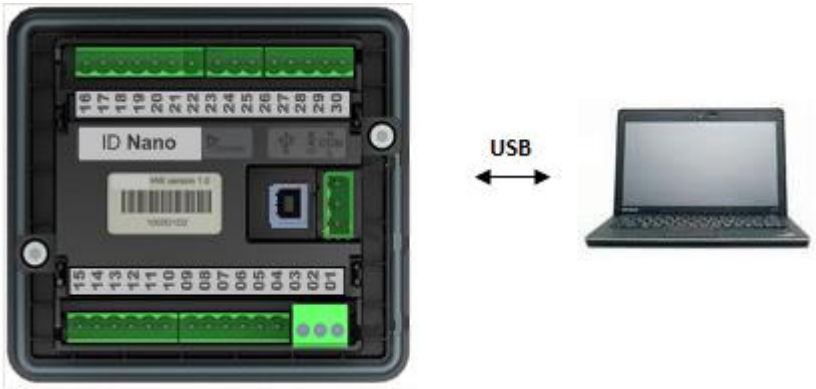
WINSCOPE - OPEN CONNECTION WINDOW

2. Proceed with selection of channels etc. according to WinScope reference guide

Controllers communication capabilities

ID-Nano

Communication capability of ID-Nano is only integrated USB conector for direct connection. USB interface is for controlling, monitoring and programming.

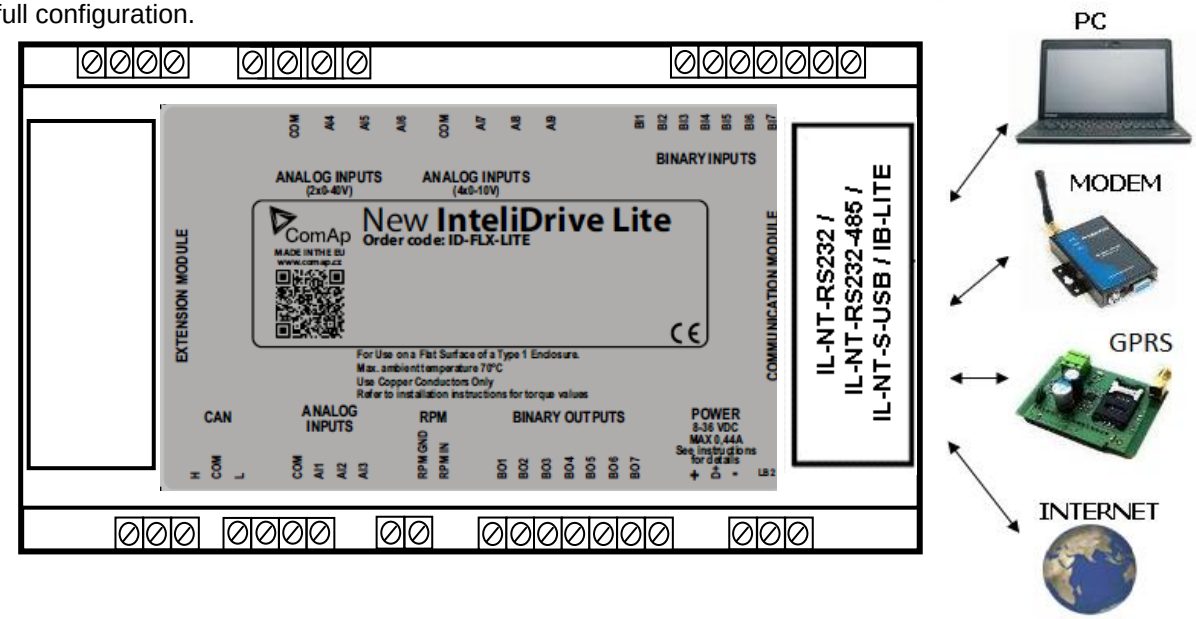


POSSIBLE CONNECTIONS FOR ID-NANO

NOTE:
CAN interface is for communication and control via ECU, it isn't classical communication interface for purpose of this communication guide.

ID-Lite, ID-FLX-Lite and ID-EM

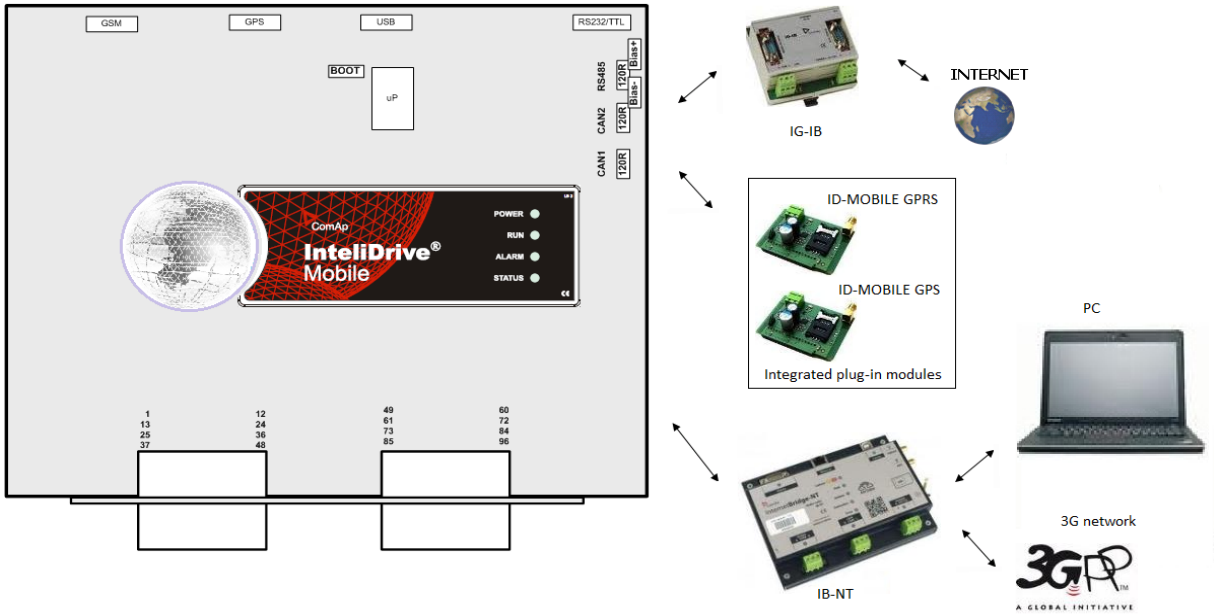
The following diagram shows the communication capabilities of ID-Lite, ID-FLX-Lite and ID-EM controller in full configuration.



POSSIBLE CONNECTIONS TO ID-LITE/ID-FLX-LITE/ID-EM CONTROLLER - DIRECT FROM PC, THROUGH MODEM, INTERNET AND GPRS MODULE.

ID-Mobile

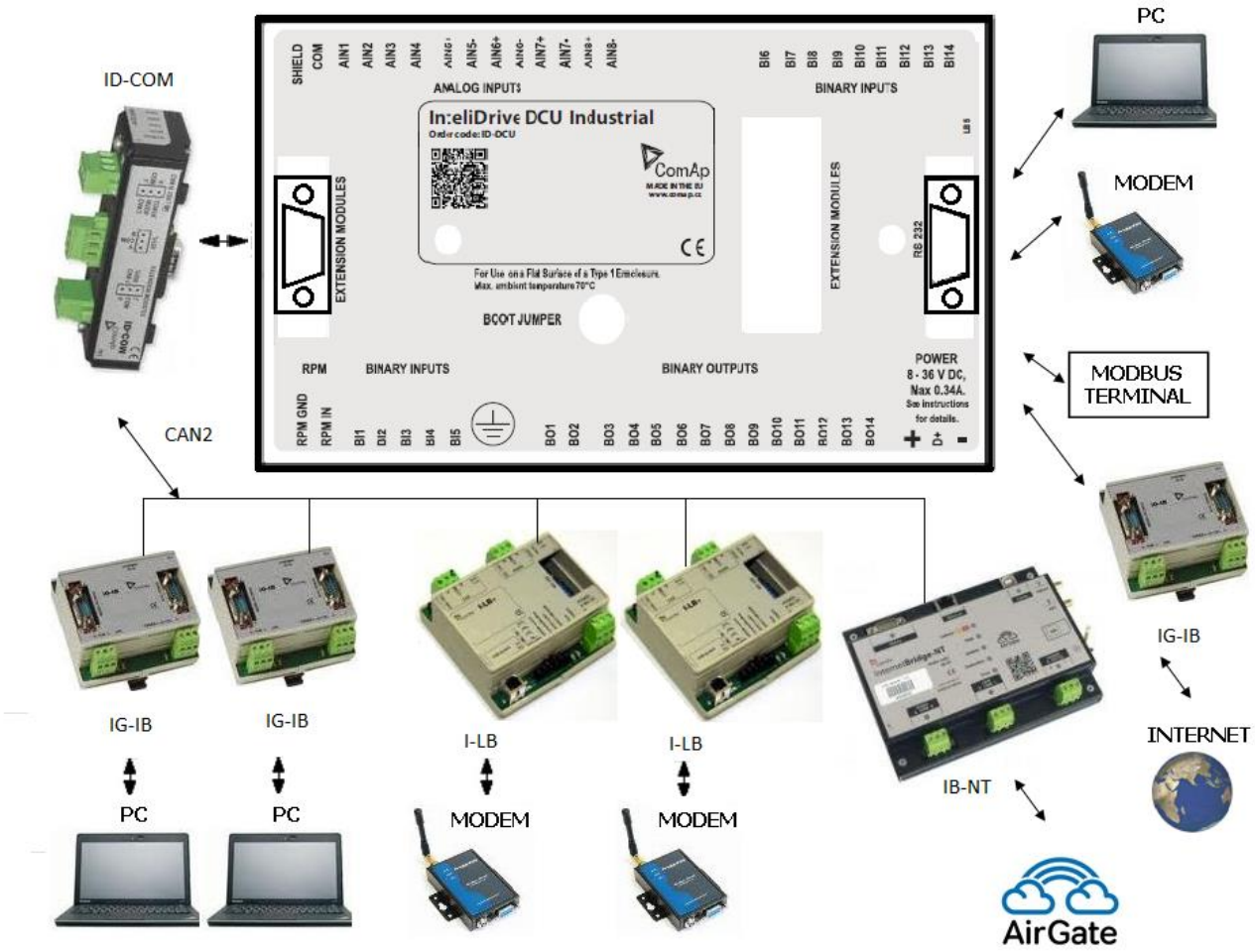
The following diagram shows the communication capabilities of ID-Mobile controller.



POSSIBLE CONNECTIONS TO ID-MOBILE CONTROLLER – VIA IB-NT FROM PC OR TO 3G NETWORK, THROUGH IG-IB TO INTERNET AND FROM INTEGRATED PLUG-IN MODULES.

ID-DCU

The following diagram shows the communication capabilities of ID-DCU controller.



POSSIBLE CONNECTIONS TO ID-DCU CONTROLLER - DIRECT FROM PC, THROUGH MODEM, INTERNET AND FROM MODBUS TERMINAL. CONNECTION VIA ID-COM CAN2 FOR IG-IB AND I-LB, EXAMPLE OF BUS COMMUNICATION THE CONTROLLER AND PERIPHERALS .

Communication modules

Communication module enables connection of a remote computer or other remote device such as PLC to the controller. The module is to be plugged-in into the slot in the rear side of the controller. The slot is accessible after slot cover is removed. The modules also can be mounted diractly to the box via RS232 or wired (for example case of ID-Mobile or CAN2).

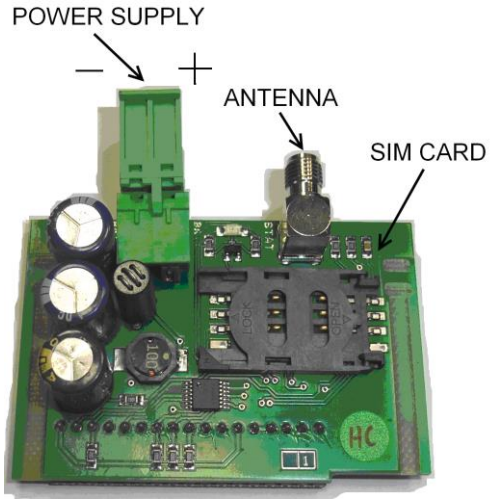
SLOT FOR COMMUNICATION MODULES

NOTE:
The modules are compatible with the ID-Lite, ID-FLX-Lite, ID-EM, ID-Mobile, and ID-DCU controllers. More information about how to install modules can be found in the controller's manuals.

IL-NT-GPRS

External communication module for connection to 2G mobile network with possibilities of data transmission. Useful for Active SMS/e-mails or for monitoring and congifuration of ComAp's PC tools. It is necessary to use with data simcard provided by your operator! Available for ID-Lite, ID-FLX-Lite, ID-EM.

NOTE:
ID-Mobile is using similar modules ID-MOBILE-GPS and ID-MOBILE-GPRS, they just have different hardware design, because of plug-in slots which are inside the controller. Functionality is the same as for IL-NT-GPRS. GPS extension module is working as location system.

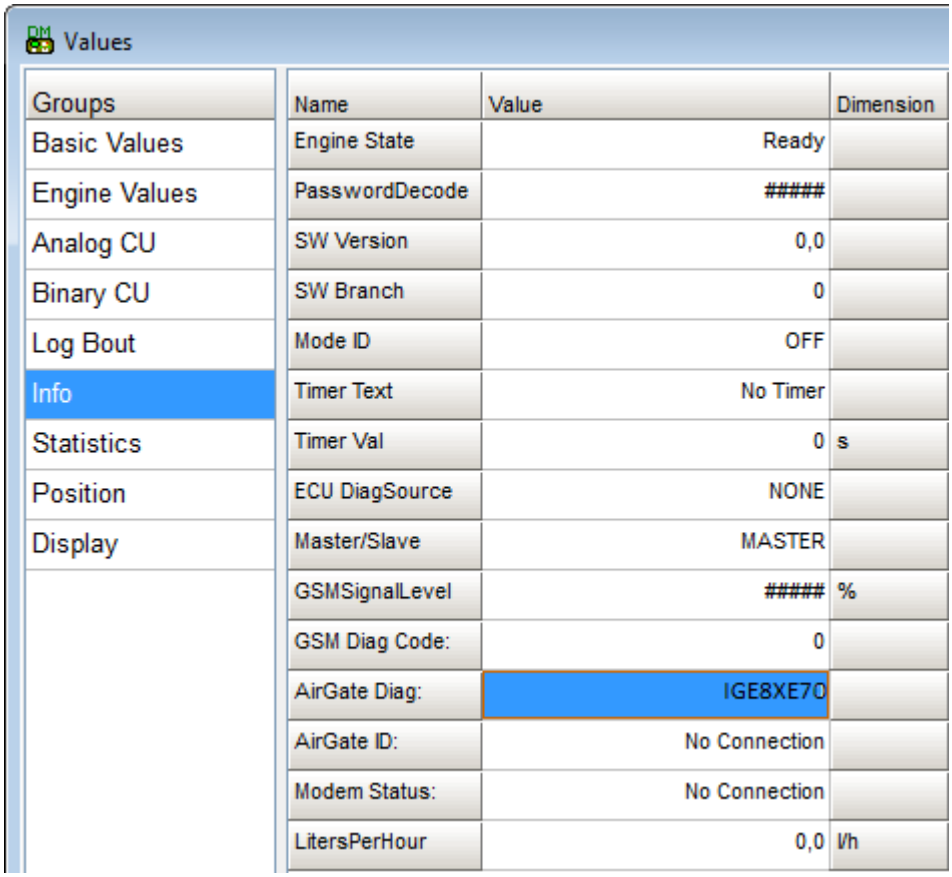


NOTE:
Contact SIM card operator for getting GPRS APN (APN = Access Point Name) name, username and password. Example: APN Name = internet.t-mobile.cz, UserName = [blank], Password = [blank].

NOTE:
Make sure SIM card does not require PIN code. If it does, it is possible to disable it in any common network unlocked mobile telephone.

Wait for approx 2 - 4 minutes for first connection of the system to AirGate. AirGate will generate automatically the AirGate ID value. Then navigate to last of measurement screens where you will find signal strength bar and AirGate ID identifier.

AirGate ID you can get for example, in the case of ID-Mobile, from DriveMonitor. Between Values is group Info and there you can see your ID, when is plug-in module connected.



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

- GSM Diag Code – Diagnostic code for IL-NT-GPRS modem

  Table of Diagnostic Codes:

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	IL-NT-GPRS is switched off
3	IL-NT-GPRS is switched on
4	IL-NT-GPRS – error in initialization
5	IL-NT-GPRS – not possible to set the APN
6	IL-NT-GPRS – not possible to connect to GPRS network
7	IL-NT-GPRS – not possible to retrieve IP address
8	IL-NT-GPRS – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network
20	Unsuccesful registration to CDMA network

- AirGate Diag – Diagnostic Code for AirGate connection

  Table of Diagnostic Codes:

Code	Description
0	Waiting for connection to AirGate Server
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

Use IL-NT GPRS plug-in module

SMSmessage format

SMS message format:

- Start with # character, followed *controller address*, followed colon character and *access code,*
- Commands are comma separated,
- Commands are not case sensitive,
- Maximum message length is limited up to 160 characters,
- Controller answers only message with valid Access code,
- Answer exceeds 160 characters is separated to more messages.

SMS message header

Every SMS must start with header in format:

```
#address:access command1, command2
```

where `address` is controller address 1 to 32
`access` is valid access code set-up by PC SW (up to 15 characters length),
`#` character indicates beginning of message,
`:` character separates *controller address* and *access code*

Hint:
For direct communication to one controller is possible skip address setting.

SMS message commands

1. *Controller address*
   Controller address is unique controller identification number located in setpoint group **Basic Settings :** *Contr addr [1 to 32]*.

   Syntax: **#XX**
   XX … controller address [1 to 32]
   Example: #5
   Message is addressed to controller with address 5.

2. *Access code*
   InteliGen / InteliSys Access code is 15 characters length string. Access code is separated from controller address by column.

   Syntax: #5**:X**
   X … controller access code up to 15 characters length
   Example: #5:accesscode
   Message is addressed to controller with address 5 and its access code is set to value 'accesscode'.

3. *Read value or setpoint*
   Command for reading of selected value or setpoint. Return value is in appropriate numerical or string format.

   Syntax: **r XXXX** (or rXXXX)
   r … command
   XXXX… value or setpoint code
   Example: #5:accesscode **r 8252**
   Reading of setpoint 8252 (8252 = Gear teeth)

   Hint:
   Access code can't contain space character. Access code can be changed in InteliMonitor only.

4. *Adjust setpoint*
   Command for adjusting of selected setpoint. Answer message contains only confirmation of successful adjusting or appropriate error.

   Syntax: **w XXXX YYYY** (or wXXXX YYYY)
   w … command
   XXXX… setpoint code
   YYYY… value of setpoint in appropriate format
   Example: #5:accesscode **w 8252 144**
   Adjusting of setpoint 8252 to value 144 (8252 = Gear teeth).

   Return code:
   `ok` … adjusting setpoint was correct
   `w_err` … adjusting setpoint was not successful
   `er_pass` … adjusting setpoint required that valid password was entered
   `er_old` … command for adjusting was read out from SMS during GSM modem initialization – in this case command will not be served.

5. *Enter password*
Password setting command. Password has to be set before adjusting of protected setpoint or calling protected gen-set control command. Setting password command is not necessary before every adjusting. Password is a number in range 0 to 65535 and is valid for all rest of SMS.

Syntax: **p PPPP** (or pPPPP)
p … command
PPPP… password
Example: #5:accesscode **p 1234,** w 8252 144
Setting password before adjusting protected setpoint.

Return code: ok … setting password was successful
er_pass … setting password is not valid

6. *Motor control*
SMS command for invoking gen-set control command as Start, Stop, Fault reset etc.
Syntax: **c Y** (or cY)
c … command
Y … type of operation

Y	Type of operation		Y	Type of operation
1	Start		7	~~MCB ON~~
2	Stop		8	~~MCB OFF~~
3	Horn Reset		9	~~GCB ON/OFF~~
4	Fault Reset		10	~~MCB ON/OFF~~
5	~~GCB ON~~		11	Next Mode
6	~~GCB OFF~~		12	Previous Mode

Example: #5:accesscode p 1234, **c1**
This SMS command invokes motor start. Password setting is needed in case of password protection was configured for motor commands.

Return code: ok … command was accepted
er_pass … valid password was not set before executing the command
c? … unknown command
c_er … gen-set command execution is not allowed in actual state (e.g. attempt to start the motor in OFF mode).
er_old … command was read out from SMS during GSM modem initialization – in this case command will not be served.

7. *Read Alarm list*
Read actual Alarm list.

Syntax: **a**
a … command
Example: #5:accesscode **a**
Request of actual Alarm list.

Return code: AL=(items of alarm list) … comma separated items of Alarm list. Exclamation mark in front of Alarm list item indicates inverse record (still active alarm).

Note: *1. Answer message contains at most eight items of Alarm list.*
2. Alarm list is not separated to more messages.

8. *Answer message*

Answer message start with # character followed by the controller name. Colon separates this header form return codes of SMS commands. Answer message is generated during serving of received message and is sent in case that 160 characters or end of received message are achieved. Answer message is sent to the originator phone number. Tree dots at the end of message indicate separation and next following message.

Example:
```
#5:accesscode r8252,w8252 100,r8252
```
answer message
```
#Gen-setname: 144,ok,100
```

9. *Examples of SMS commands*

Here are following several examples of SMS messages addresses to controller *IG/IS-NT* with address 5, named '*Gen-set name*'. Access code in this controller is set to '*accesscode*' and password is '*1234*'. In examples are used setpoints and values 8276 – Nomin.power, 10123 – RPM, 8315 – Controller Mode, 8235 – binary inputs, 8296 – Gen > f.

Example 1 – reading value

SMS:	#5:accesscode r8276	*read value 8276*
Answer:	#Gen-set name:100	

Example 2 – adjusting setpoint

SMS:	#5:accesscode p 1234, r8276,w8276 110,r8276	*read value 8276,* *write 110,* *read value 8276*
Answer:	#controller name:ok,100,ok,110	*Password was accepted,* *read value of 8276 is 100,* *writing to 8276 was ok,* *new value of 8276 is 110*
	If wrong password sent: #Gen-set name:p_er,100, w_pass, 100	*Password was not accepted,* *read value of 8276 is 100* *writing to 8276 was not successful* *read value of 8276 is still 100*

Example 3 – Gen-set control and delay time

SMS:	#5:accesscode r8276,c1,d30,r10123	*read value 8276,* *invoke gen-set command START,* *delay 30 sec,* *read value 10123*
Answer:	#controller name:110,ok,d_ok,1499	*read value of 8276 is 110,* *Gen-set command START was accepted,* *confirm delay command,* *read value of 10123 is 1499*

Example 4 – adjusting special setpoint

SMS:	#5:accesscode r8315,w8315 0,r8315	*read value 8315,* *write 0 (index of stringlist type),* *read value 8315*
Answer:	# controller name:MAN,ok,OFF	*read value of 8315 as string,* *writing was ok,* *read new value of 8315 as string*

Hint:

Setpoints Stringlist type (e.g. Controller Mode) is read as string and adjusted as index of string item in string list. e.g. Controller Mode:

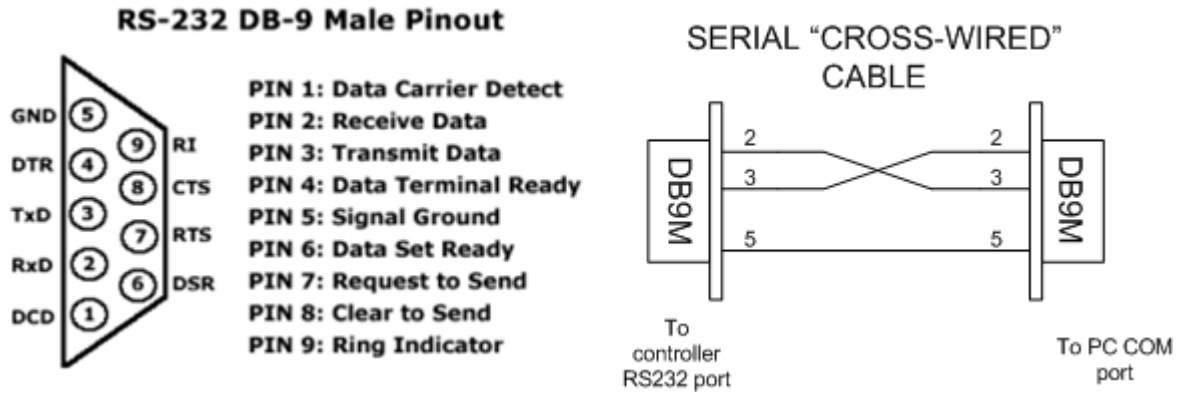
Read value [as string]	Write value [as index]
OFF	0
MAN	1
SEM	2
AUT	3
TEST	4

Example 6 – reading actual Alarm list

SMS:	#5:accesscode a	*read actual Alarm list*
Answer:	# controller name:AL=(!Wrn PrimWater temp, !Wrn SecWater temp, Batt volt)	*Actual Alarm list contains three items.*

IL-NT-RS232

This module contains a RS232 port with all modem signals connected internally to the COM1 of the controller. DB9M connector is used on the RS232 side. Available for ID-Lite, ID-FLX-Lite, ID-EM.



RS232 PINOUT AND CABLE WIRING

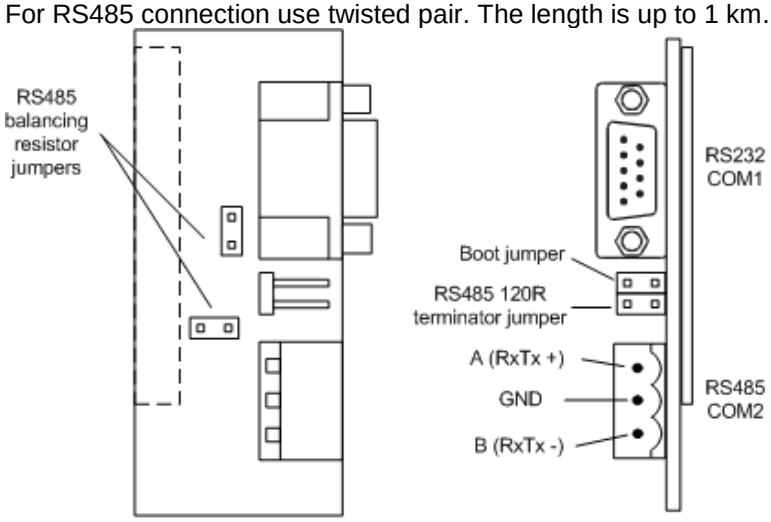
NOTE:

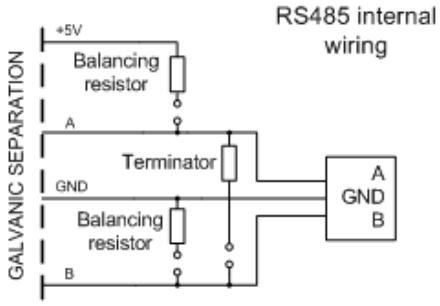
The Comap order code is AT-LINK CABLE

IL-NT-RS232-485

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. Available for ID-Lite, ID-FLX-Lite, ID-EM.

For RS485 connection use twisted pair. The length is up to 1 km.





IL-NT-RS232-485 MODULE

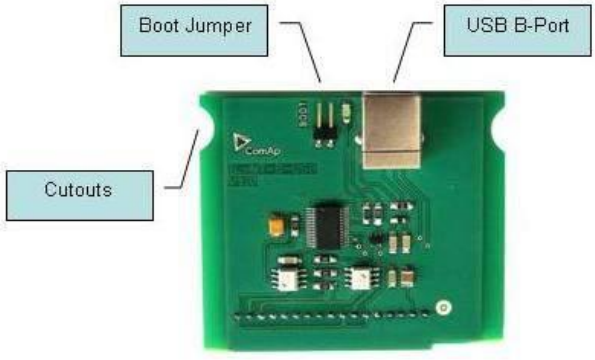
NOTE:
The IL-NT-RS232-485 enable e.g. connection of controllers into the bus or it is used for remote display connection.

IL-NT-S-USB

This module contains USB slave port connected internally to the COM1 of the controller and is designed as an easy removable service module. Available for ID-Lite, ID-FLX-Lite, ID-EM.

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 beeing opened.

NOTE:
The FTDI driver is installed together with LiteEdit.
NOTE:
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)

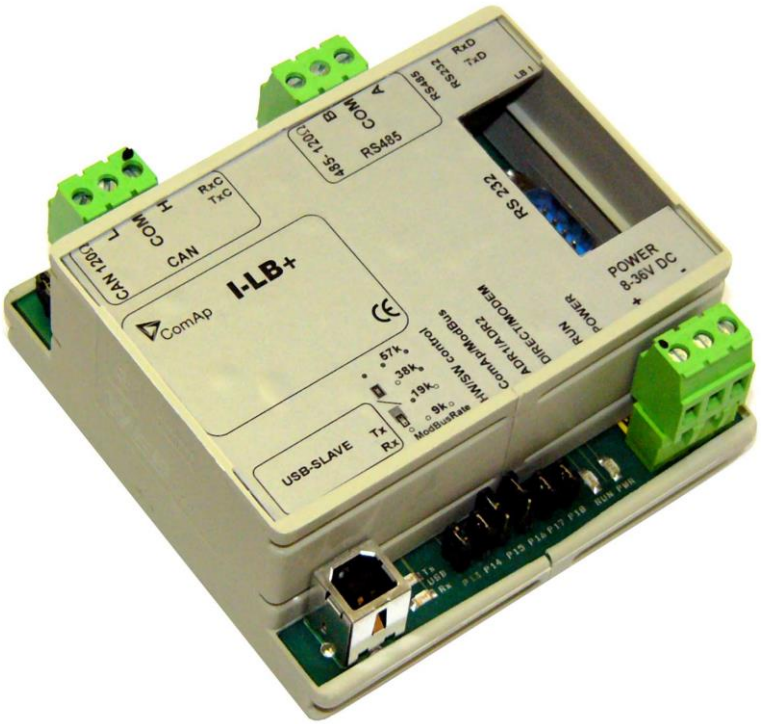


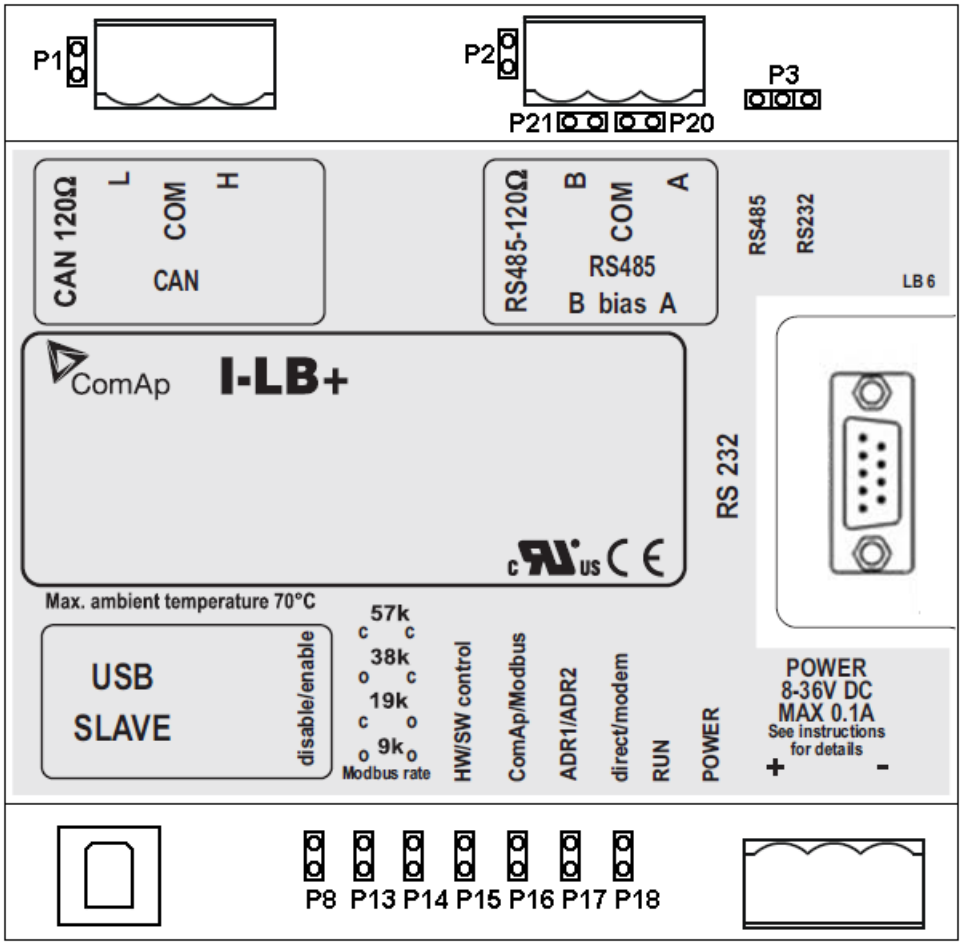
USB A-B CABLE AND IL-NT-S-USB

Comms extension - I-LB+ Local bridge

Description

I-LB+ is communication modules for communication with all devices connected to CAN(2) bus. I-LB+ is successors of the IG-MU unit designed to be used with IG/IS controllers. It therefore provides additional communication port and higher communication speed. Speed for direct/modem connection can be up to 57600 bps (IG-MU only 19200 bps). I-LB / I-LB+ can be connected with PC via USB, RS232 or RS485. I-LB is without USB port, I-LB+ is with USB port (speed ≈ 115200 bps).





Jumper setings:

Jumper	Description	State
P1	CAN terminating resistor	Opened – not connect
P2	RS485 terminating resistor	Opened – not connect
P3	RS232 or RS485	1–2 – active RS485
P8	USB enable/disable	Opened – disabled
P13	Modbus rate	9600, 19200, 38400, 57600 bps (according to picture: O = Open, C = Close.
P14	Modbus rate	
P15	HW or SW modem control	Opened – HW control
P16	ComAp or Modbus	Opened – ComAp protocol
P17	ADR1 or ADR2	Opened – ADR1
P18	Direct or Modem	Opened – Direct

According Addr.1/Addr.2 setings real CAN address is assigned to port.

	RS232/485 DIRECT	MODEM	USB
Addr. 1	124	125	123
Addr. 2	123	122	124

It is possible to use those combinations simultaneously:

- 2x direct RS232/RS485 and 2x MODEM (USB communication has to be disabled, P8 is opened)
- 1x USB and 1x RS232/RS485

Jumper selection tree

ComAp / ModBus – selects between ComAp PC tools (InteliMonitor, WinScope, ...) and third party PC SW for monitoring:

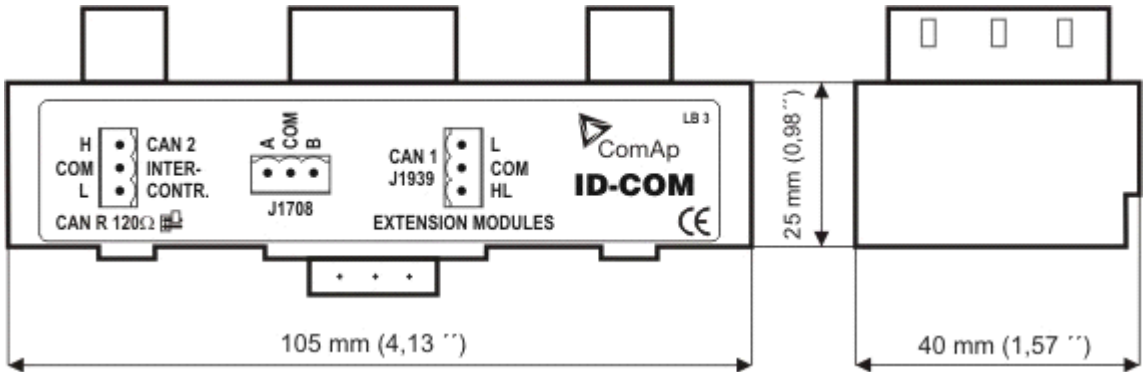
- **ComAp**
  - **Direct / Modem** – selects between direct connection (via RS232 or RS485) and modem connection type
    - **DIRECT**
      - **RS232 / RS485** – selection of serial communication type
      - **ADR1 / ADR2** – selection between two available local communication channels; if I-LB+ is used, the USB communication automatically occupies the other channel
    - **MODEM**
      - **HW / SW control** – selection between modems with full interface
      - **ADR1 / ADR2** – selection between two available modem communication channels; IG/IS-NT controllers only, in ID the secondary modem channel not available
      - Setting **RS232 / RS485** jumper to RS232 position is obligatory

- **ModBus (not available at USB port of I-LB+, USB port always works in ComAp mode)**
  - **Direct / Modem** – selects between direct connection (via RS232 or RS485) and modem connection type
    - **DIRECT**
      - **RS232 / RS485** – selection of serial communication type
      - **ADR1 / ADR2** – selection between two available local communication channels; if I-LB+ is used, the USB communication automatically occupies the other channel
    - **MODEM**
      - **ADR1 / ADR2** – selection between two available modem communication channels; IG/IS-NT controllers only, in ID the secondary modem channel not available
      - Setting **HW / SW control** has no influence; a modem with HW control is always expected in this mode
  - **ModBus Rate** (9600 / 19200 / 38400 / 57600 bps) – selects the communication speed when ModBus protocol is selected, no matter if in Direct or Modem mode

For more information read IGS-NT accessory modules manual.

ID-COM

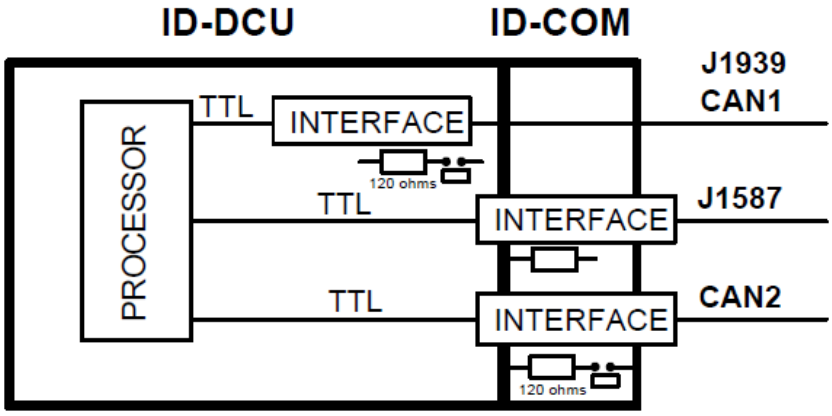
Communication module for multiple engine installation remote display and redundancy communication. ID-COM is directly mounted to the ID-DCU box.



Interface for CAN1 Extension and J1939 modules, for CAN2 Inter-controller and I-RD-CAN modules and interface for J1708 redundancy line.

CAN1 Extension modules: EMS, IS-AIN8, IS-BIN16/8, IGS-PTM, IGL-RA15

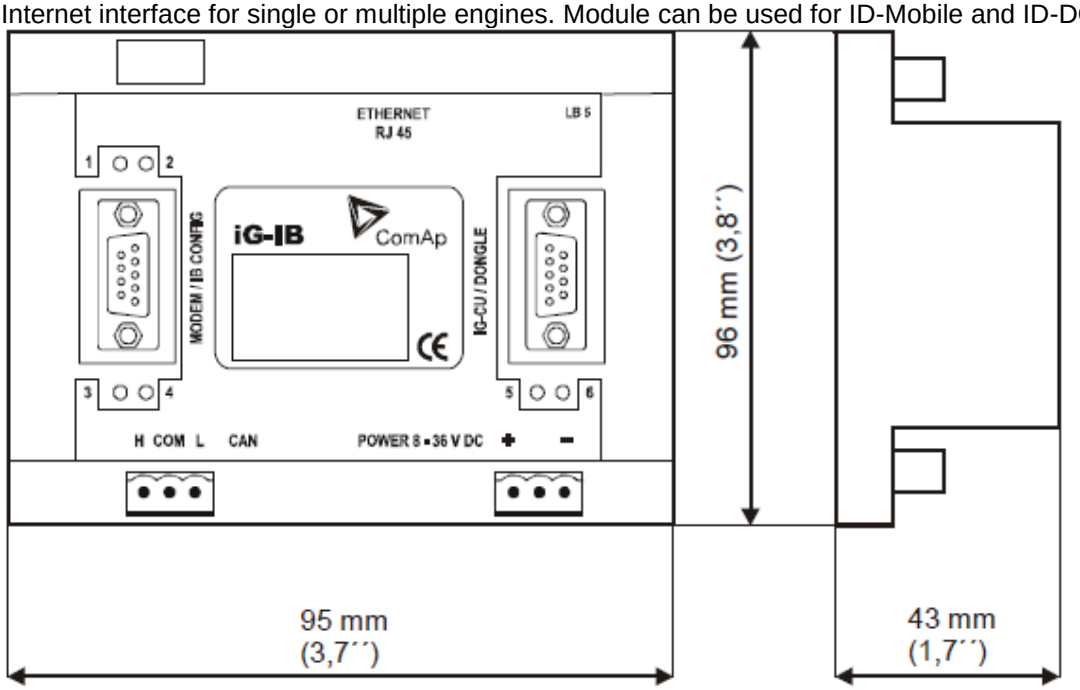
CAN2 Intercontroller: I-RD-CAN, IG-MU, I-LB, I-LB+, IG-IB, others IDDCU



NOTE:
Put jumper to connect the internal 120 ohms terminating resistor for CAN2 interface.
ID-COM module is not required when inter-controller CAN2 and J1587 lines are not used. In this case connect Extension modules CAN1 directly to Extension modules port ID-COM on ID-DCU (9-pin connector:5=H, 9=L).

IG-IB

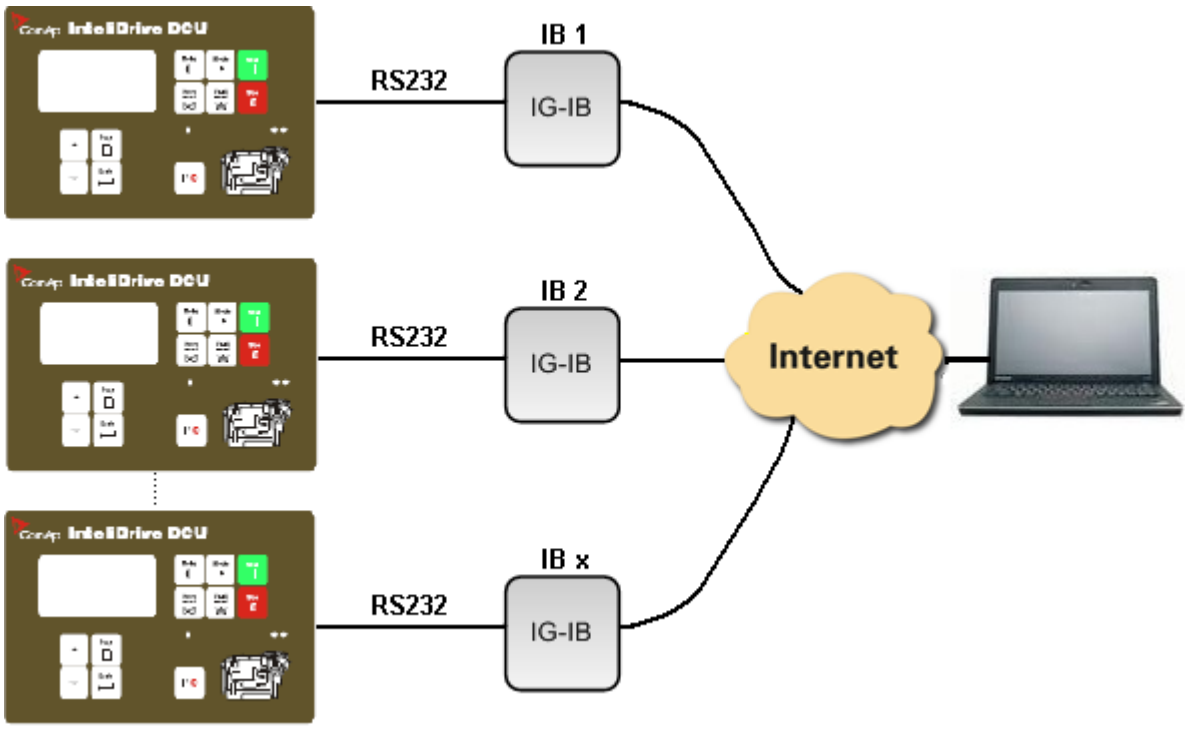
Internet interface for single or multiple engines. Module can be used for ID-Mobile and ID-DCU.



Use the next type of internet connection for faster communication with more than 10 controllers

One IG-IB is connected to each controller via RS232 for faster communication. It means that up to 32 IG-IB's can be used on one site. Use this connection for communication with 10 or more controllers. Communication speed gain achieved with this connection is not significant for less than 10 controllers.

IP addresses of IG-IB's needs to be set in InteliMonitor in this way (if port number 24 is used instead of the default port 23):



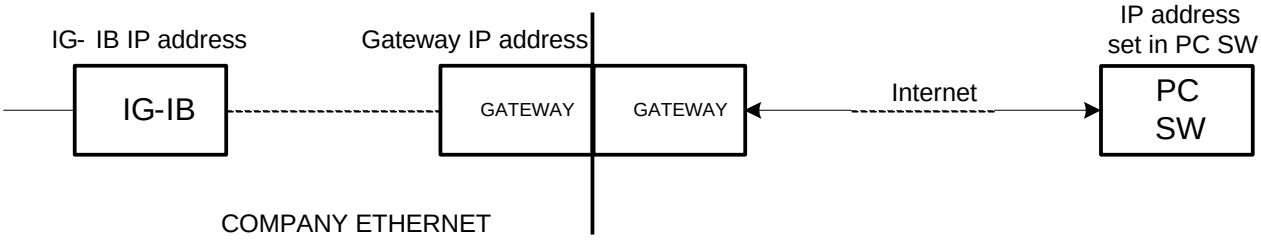
Up to 3000 Bps

Hint:

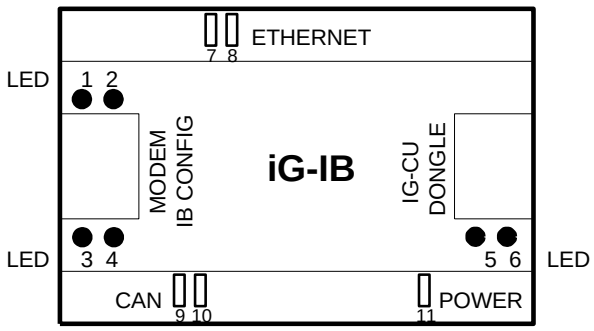
IG-IB communication is typically faster than modem:

- when IG-IB is connected to controller via CAN and LAN - 3000 Bps
- when IG-IB is connected to controller via RS232 and LAN - 1200 Bps
- when IG-IB is connected to controller via CAN and Internet - ~500 Bps
- when IG-IB is connected to controller via RS232 and Internet - ~500 Bps (depends on the internet line throughput).

Note that IP address you set can be different from the IP address of iG-IB (when the iG-IB IP address is not public). It depends on gateway setting:



Indication and Diagnostic LED's



LED 1,2	Mode of iG-IB operation - see the table below
LED 3,4	Modem / Config line Rx, Tx activity
LED 5, 6	IG-CU data Rx, Tx activity
LED 7	Ethernet LINK (connection)
LED 8	Ethernet ACT (activity)
LED 9,10	CAN interface activity
LED 11	POWER supply indication

LED1	**LED2**	IG-IB V2.0
Light	Dark	After power switch on = iG-IB hardware fail. Unit has to be sent to repair.
Blinks together		Wrong configuration, iG-IB must be configured by IBConfig software tool 2.0
Lights both		Active IBConfig software. iG-IB does not communicate to ETHERNET or modem.
Blinks alternately		Invalid firmware or firmware downloading
Light	Dark	E-mail data reading from controller
Dark	Light	E-mail data sending to internet
Dark both		OK running state
Fast 0,1s blink	Dark	Modem initialization
Slow 0,3s blink	Dark	CAN bus rate detection

Hint:

Maximal length of UTP cable must be smaller than 100m to the nearest Switch/hub according to IEEE802.3 (100Base-T)

IG-IB Configuration

It is necessary to configure unit before its first use because new IG-IB from factory is not configured.

Internet Bridge can be connected to Internet
- via LAN – Ethernet connector or
- via dial up – MODEM connector.

Maximal length of UTP cable (between IG-IB and Switching hub) is 100m according to IEEE 802.3.

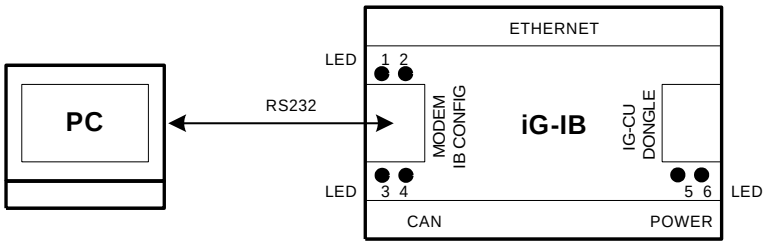
Corresponding firmware must be downloaded to IG-IB depends on required connection type.

IG-IB interface	**Firmvare V2.5**
LAN – Ethernet	IG-IB-ethn_2.5.bin
Dial up – Modem	IG-IB-dial_2.5.bin

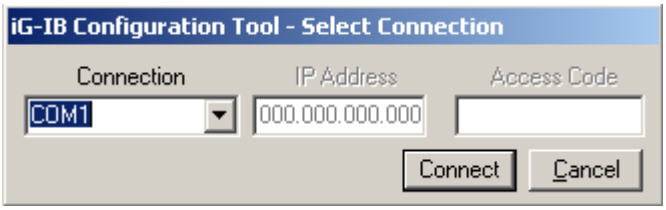
For IG-IB V2.5 firmware configuration use IG-IB configuration tool (IBConfig.exe) at least V1.2 or higher.
IBConfig of V1.2 can be used for IG-IB firmware 1.0 and 1.1 as well.
For IG-IB V2.1 firmware configuration use IBConfig at least V1.4 or higher.

IG – IB jumpers:
The hardware jumpers have following meaning:
P1 – test mode – should be disconnected!
P2 – internal use – should be disconnected!
P3 – reset – should be disconnected!

Connect
iG-IB power supply,
"MODEM/IB CONFIG" RS232 interface cable to PC and
Run
… \ ComAp \ TOOLS \ IBConfig \ IBConfig.exe software.



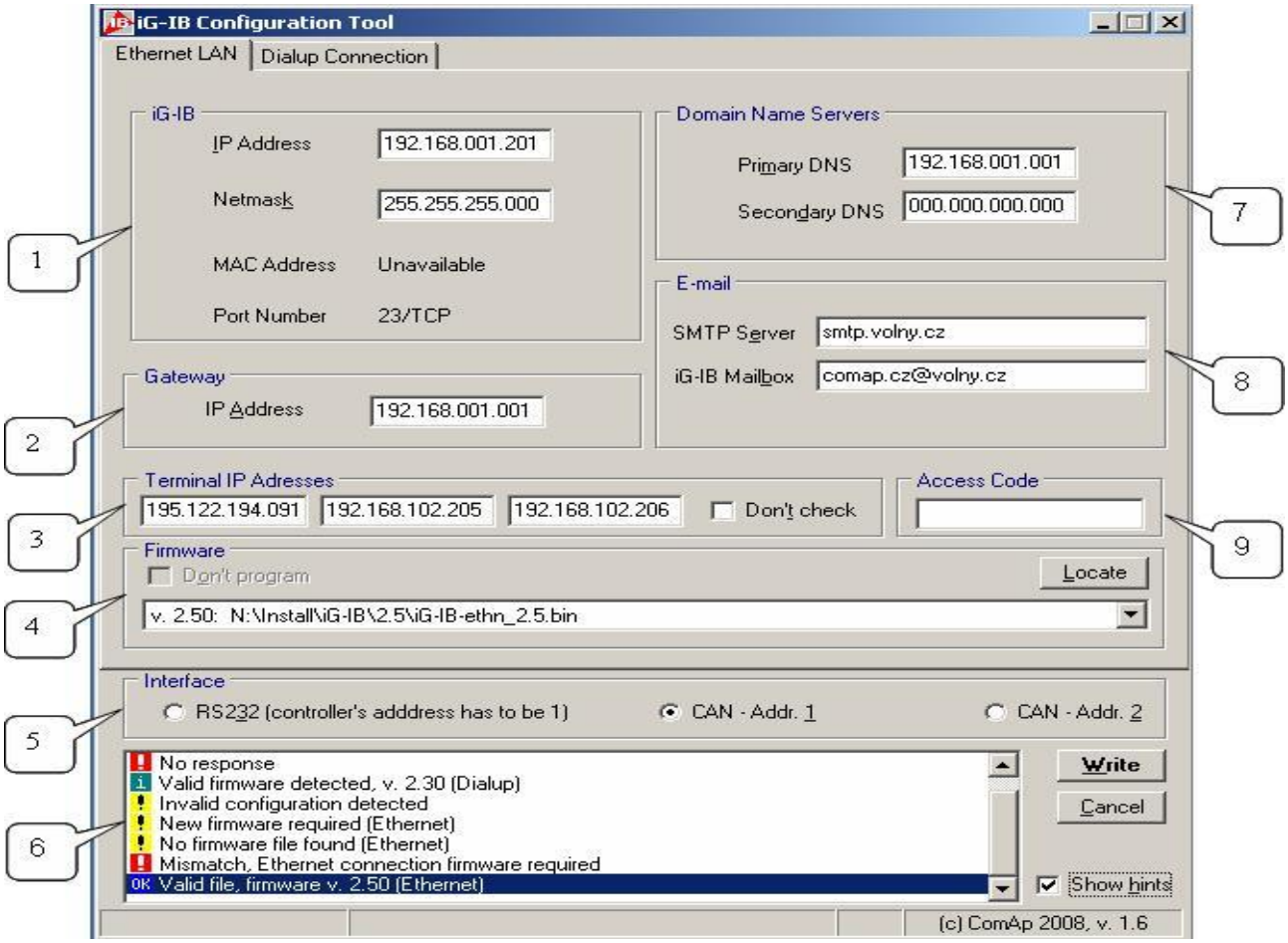
Set COM port:



Remote access (TCP/IP connection) to IG-IB may be denied if incorrect Access Code is used. Access denied warning is displayed by IBConfig then:

What you need to do in such case is to paste the string (it is saved automatically) into an e-mail and send it to your distributor to obtain a correct access code.

Ethernet LAN Configuration



These settings are only as an example!

Please notice:
Setting CAN-Addr.1 was interchanged with setting CAN-Addr.2 starting with IBConfig-1.6. It means that IG-IB's CAN address has to be set to CAN-Addr.2, if I-LB which is set to the address ADR1 is connected to the same CAN bus as IG-IB. Use option CAN-Addr.1 if I-LB is set to ADR2.
It is necessary to set IG-IB's CAN address using IBConfig-1.5 in this way: IG-IB's CAN address has to be set to CAN-Addr.1, if I-LB which is set to the address ADR1 is connected to the same CAN bus as IG-IB. Use option CAN-Addr.2 if I-LB is set to ADR2.

Set following items in IG-IB configuration window.

1	**IG-IB**	IP Address Netmask MAC Address Port Number	Ask your IT manager Ask your IT manager Ask your IT manager Ask your IT manager
2	**Gateway**	IP Address	Ask your IT manager
3	**Terminal IP Addresses**	Don't check	Connection will be restricted to these terminal IP addresses, i.e. IG-IB won't connect to any other address. Tick "***Don't check***" if you want to allow connection to all terminal IP addresses.
4	**Firmware**		Firmware file name (*.bin) is displayed in this window when old iG-IB firmware version is detected. It is possible to select any iG-IB "****.bin***" firmware file using **Locate** button. iG-IB firmware is located in WinEdit directory ***\Program files\Comap\WinEdit\Tools\IBConfig\Firmware\ *.bin***. If you check "***Don't program***" checkbox, the firmware is not downloaded (only settings).
5	**Interface**	RS232	Connection of IG-IB to controller via RS232

		CAN1 CAN2	Connection of IG-IB to controller via CAN Two IG-IB's on CAN bus
6	**Message window**		Messages window contains messages regarding detected (actual) firmware version and configuration validity. Here you can also get information on configuration process. If you get the "***No response***" message, check once more COM setting and communication cable. If everything is OK and you still get the "***No response***" message the unit must be reprogrammed in the factory.
7	**Domain Name Servers**	Primary DNS Secondary DNS	Get from your IT manager
8	**E-mail**	SMTP Server IG-IB Mailbox	Necessary only when Active e-mails are enabled in Controller. It is used as a sender address when iG-IB sends active e-mail. See Setpoints ***Act.cals/SMS***: *AcallCHxType* = E-MAIL or EML-SMS.
9	**Access Code**		Code for unblocking the remote communication with the controller. Use InteliMonitor/DriveMonitor to enter or change access code.

IG-IB connection to internet (Ethernet)

Hint:

Your local LAN connection to the Internet is probably configured to enable access the servers located on the Internet, but to disable access in the reverse direction.

If iG-IB is to be visible from the Internet, then your IT manager should create a communication channel on the Internet access server.

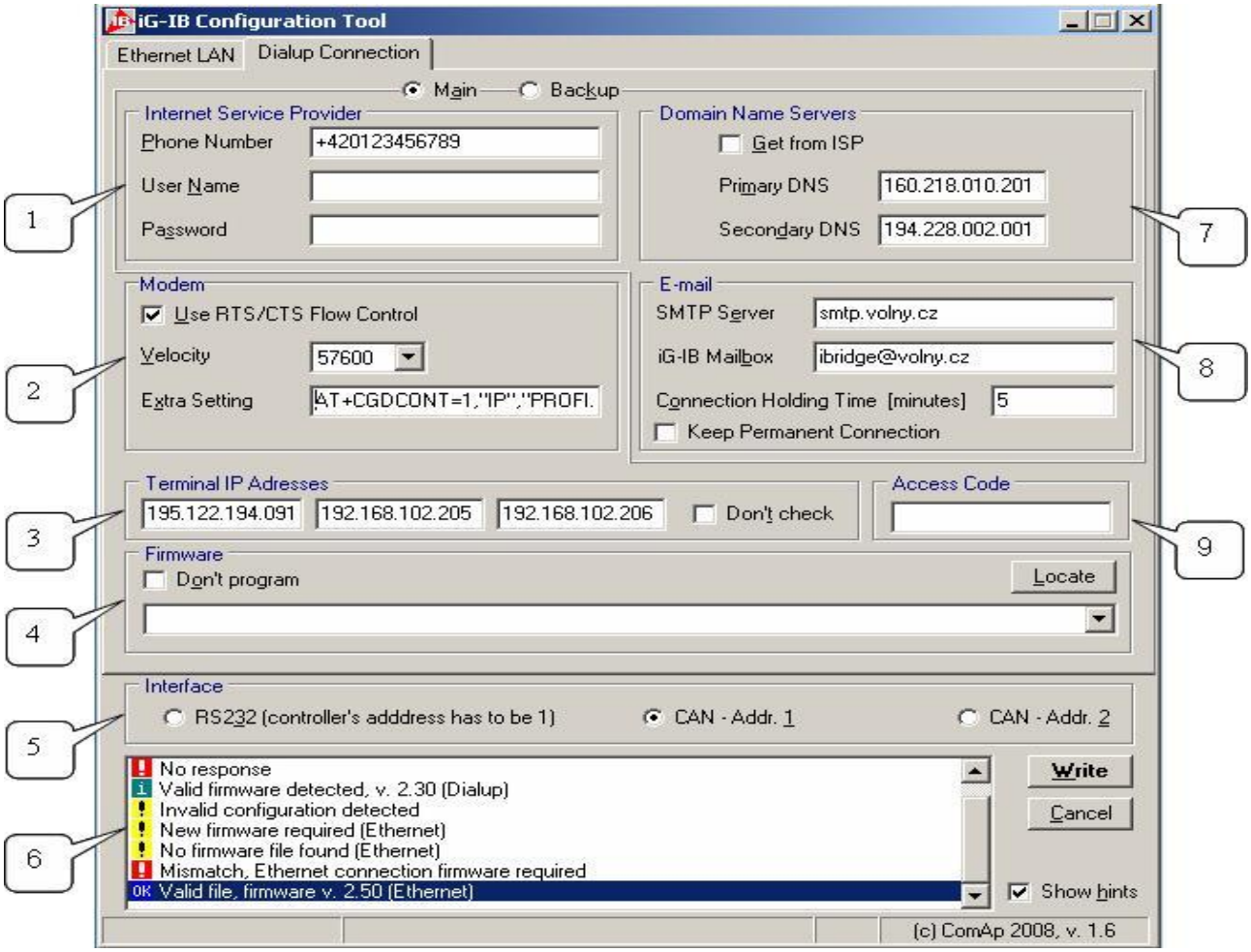
The iG-IB uses the TCP-communication and listens at the port 23 (known as Telnet port).

Hint:

Some providers have strict requirements for e-mail iG-IB Mailbox address = existing mailbox.

Dialup Connection Configuration

Use firmware V2.0 and higher for dialup connection.



Connection to ISP

There are two Internet Service Provider sets 

and 

.
Phone number is dialed using ATD command. The main ISP is dialed as first. The backup ISP is dialed when it is not possible to open the main ISP connection.
IP addresses for DNS servers can be obtained from ISP (“Get from ISP”) or explicitly set in configuration.

Modem initialization

Modem must accept following ASCII characters: Escape = ASCII 43 (=character +), ASCI 13 (= CR) and ASCII 10 (= LF). Then Following commands are sent to Modem.
1. ATZ
2. ATE0V0Q0S0=0
3. ATV0Q0X0S0=1

Active e-mail

Active e-mail can be sent only when operating modem is detected. IG-IB makes five open connection attempts on active e-mail request. There are three attempts to sent e-mail when connection is opened. Connection is opened for “Connection holding time” after e-mail is successfully sent.

Note for iG-IB firmware version 1.0 or 1.1 users: active e-mail sending may fail if selected SMTP server returns a multiline responses. Use firmware version 2.0 to solve this problem.

Configuration items

1	**Internet Service Provider**	Phone Number User Name Password	Data from local Internet provider
2	**Modem**	Use RTS/CTS Flow Control Velocity Extra Setting	Check if the modem requires RTS/CTS signals. Only when velocity auto detect is not active. Those “special” commands for modem configuration are sent to modem during init procedure.
3	**Terminal IP Addresses**	 Don’t check	Connection will be restricted to these terminal IP addresses, i.e. IG-IB won’t connect to any other address. Tick “***Don’t check***” if you want to allow connection to all terminal IP addresses.
4	**Firmware**		Firmware file name (*.bin) is displayed in this window when old iG-IB firmware version is detected
5	**Interface**	RS232 CAN1 CAN2	Connection to controller Connection to controller Two IG-IB’s on CAN bus
6	**Messages window**		Messages window contains messages regarding detected (actual) firmware version and configuration validity. Here you can also get information on configuration process.
7	**Domain Name Servers**	Get from ISP Primary DNS Secondary DNS	Get from your IT manager
8	**E-mail**	SMTP Server IG-IB mail box Connection Holding Time Keep Permanent Connection	 E-mail setting is necessary only when Active e-mails are enabled in Controller. It is used as a sender address when iG-IB sends active e-mail. After e-mail is successfully sent, waiting for operator response. If checked connection to ISP is never terminated. It is established immediately after IG-IB is initialized. If the communication is interrupted, it is re-established. It is necessary that the IP address of IG-IB is static so that the PC software (e.g. WinEdit) “knows” to which address to re-connect. If this option is not selected, the connection to ISP is established on request from terminal only. IP address obtained from ISP is then sent to the terminal via email (IP address can be dynamic in this case).
9	**Access Code**		Code for unblocking the remote communication with the controller. Use InteliMonitor/DriveMonitor to enter or change access code.

Hint:
Some providers have strict requirements for e-mail iG-IB Mailbox address = existing mailbox.

IG-IB Interface

There are following connectors on iG-IB unit:

Modem / IB Config	RS232 interface for iG-IB configuration or Modem connection (not supported in SW version1.0)
Dongle	RS232 interface to Controller or for Dongle for multiple controllers communication (controller data are transferred via CAN bus)
CAN bus	Interface to one or group of controllers (IG/IS-NT, ID)
Ethernet to LAN	Interface to Ethernet

IG-IB Dongle

IG-IB Dongle limits number of accessible controllers.
Following addresses must be used for given dongle type (e.g. dongle IG-IB3 enables connection to controllers with addresses 1,2 and 3 only).

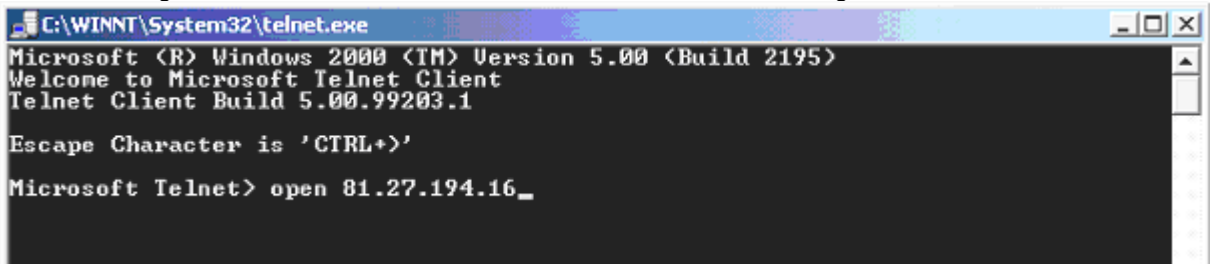
Dongle type	Number of accessible controllers
No dongle	1
Dongle IG-IB3	2 to 3
Dongle IG-IB7	2 to 7
Dongle IG-IB15	2 to 15
Dongle IG-IB32	2 to 32

Hint:

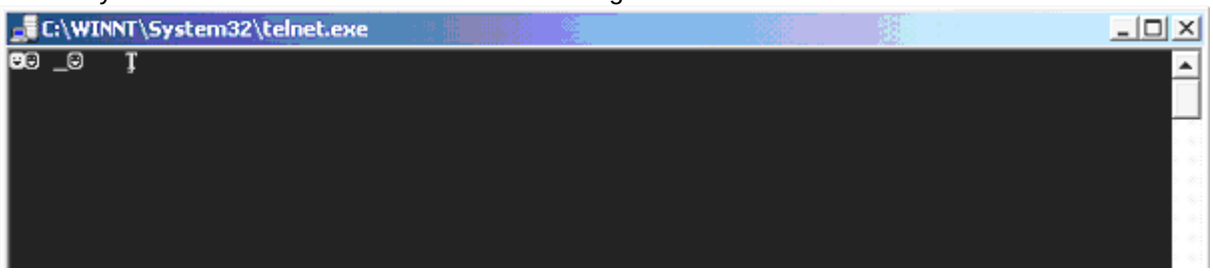
From IG-IB-2.1 the dongle sets the limit of number of connected controllers. If the controller is connected via RS232, the address 1 is supposed. Currently it is possible to order only dongle IG-IB32 as replace for all others dongles that got obsolete.

Internet Connection Diagnostics

Following method is Comap PC SW independent way how to check connection from PC via Internet to some controller.
The basic diagnostic of iG-IB to internet connection could be done using telnet software:



1) Start telnet software
2) In telnet window write command „open xxx.xxx.xxx.xxx“
3) If the connection is OK, you should get a nontext (binary - firmware version) answer. Depending on the font you use in the telnet window correct message looks like:



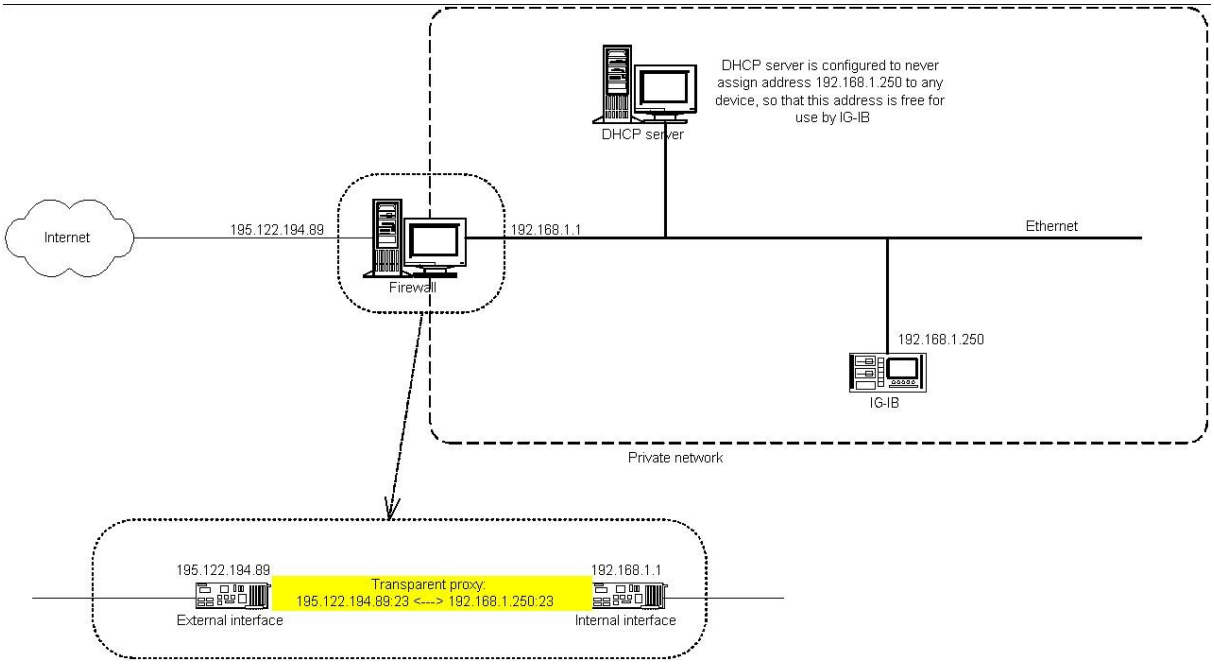
Hint:

Telnet software is included in standard Windows installation. To run telnet use Windows Start – Run button and write “telnet”, OK.

How to Access IG-IB behind Firewall

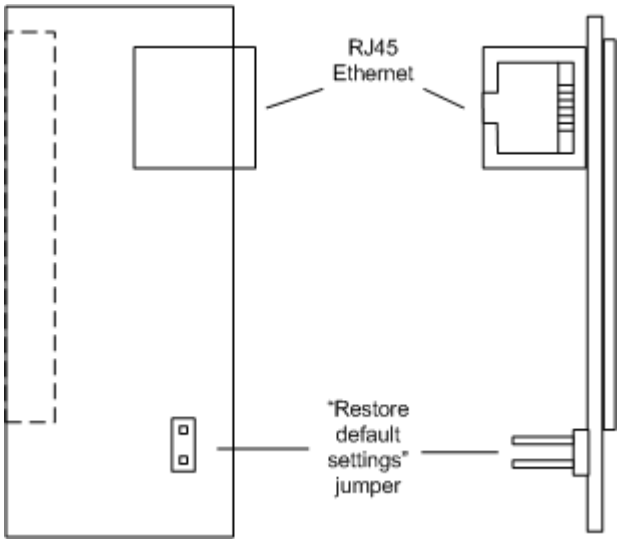
The solution principle is shown in attached picture. All addresses in this text and in the picture are fictive and will be different on real installation, port numbers are real. If the network software is configured as shown in picture, users from Internet will be able to connect from Comap PC SW to address 195.122.194.89 and communicate with IG-IB behind firewall. So in fact, we enter to PC SW different address than is configured in IG-IB, as is correctly noted in the manual.
Needed changes are these:
1. DHCP server in private network (if used): exclude address 192.168.1.250 from the address poll which are available to lease from this server, so that this address couldn't be assigned to any device in the network. This will make this address available for use by IG-IB.

2. Firewall: Configure transparent proxy channel from external interface 195.122.194.89, port 23 to protected network, internal address 192.168.1.250, port 23. This transparent proxy will do all network address translation needed when communicating from public network with internal private network.
Port 23 on interface 195.122.194.89 should be usually free for this use, as normally is this port used for telnet service and telnet is considered dangerous to use on firewalls.



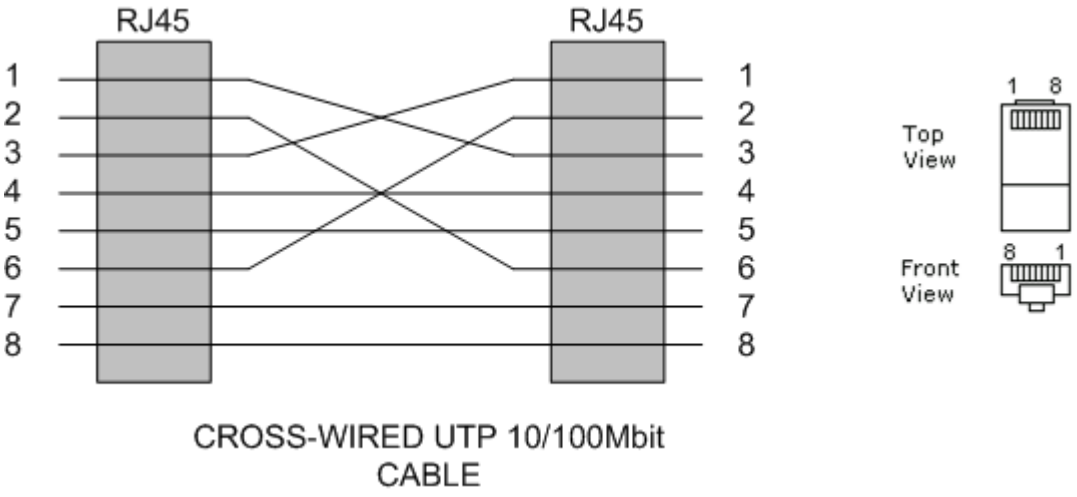
IB-Lite

IB-Lite is a plug-in module with Ethernet 10/100 Mbit interface in RJ45 connector. The module is internally connected to both COM1 and COM2 serial channels and provides an interface for connecting a PC with LiteEdit or InteliMonitor through ethernet/internet network, for sending active e-mails and for integration of the controller into a building management (Modbus/TCP protocol). IB-Lite module cooperate with ID-Lite, ID-FLX-Lite and ID-EM.



IB-LITE MODULE

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.



CROSS-WIRED UTP CABLE

IB-Lite setup procedure

NOTE:
Setup of the module requires certain level of knowledge of networks administration. Ask your IT specialist for assistance.

Default setting of the module is IP = 192.168.1.254, Netmask = 255.255.255.0, Gateway = 192.168.1.1, mode 100Mbit. Default user name for service web pages is "comap", password "comap".

To restore default setting close the "restore default setting" jumper located on the module before switching the controller on and remove it few seconds after the controller was switched on.

Configuration

1. Plug the module into the controller and power the controller on.
2. Connect the module into your ethernet network. If the default address does not match local network parameters (i.e. the network segment does not use IP range 192.168.1.xxx or the IP 192.168.1.254

is occupied), connect the module directly to your PC using cross-wired cable. See details in the Installation chapter.

3. If you are connected direcly, you have to change temporarily IP address and subnet mask of your PC Ethernet connection. Use following setting: DHCP disabled, IP from the range 192.168.1.1 - 192.168.1.253 and subnet mask 255.255.255.0. After the IB-Lite setup is finished, restore your PC setting back to original values.
4. Start web browser and put `http://192.168.1.254/sp_config.htm` into the address line.
5. After successful login the configuration page will be displayed.
6. It is recommended to change the user name and password and keep the new values confidential.
7. Consult proper IP settings with your IT specialist.
8. Consult proper e-mail settings with your e-mail provider. Please note, that also most of public SMTP servers require authentification and e-mails must be sent from an existing addresses.
9. If you want to enable access only for clients with specified IP addresses, tick the checkbox "Trusted clients" and fill-in the allowed IP addresses.

NOTE:
For connection from PC see the manual of the PC program (InteliMonitor, LiteEdit). Open the Open connection window and set:

- Internet type of connection
- Controller address
- Access code
- IB-Lite IP address

Note that IP address you set can be different from the IP address of IB-Lite (when the IB-Lite IP address is not public). It depends on gateway setting, for more information see IB-Lite manual accessible on www.comap.cz.

Firmware upgrade

1. Follow steps 1-3 of the configuration procedure above.
2. Start web browser and put `http://192.168.1.254/sp_fw_upld.htm` into the address line.
3. After successful login the configuration page will be displayed.
4. Press the button "Browse" and select the appropriate firmware file.
5. Press "Upload new firmware" button. After the firmware upload is finished, the module will restart.

NOTE:
Interrupting the upload will NOT cause any damage. Just repeat the upload again.

NOTE:
Can occur errors if you don't use newest firmware versions of the controller and module. Then is necessary to upgrade version of both or to find appropriate older versions of firmwares.

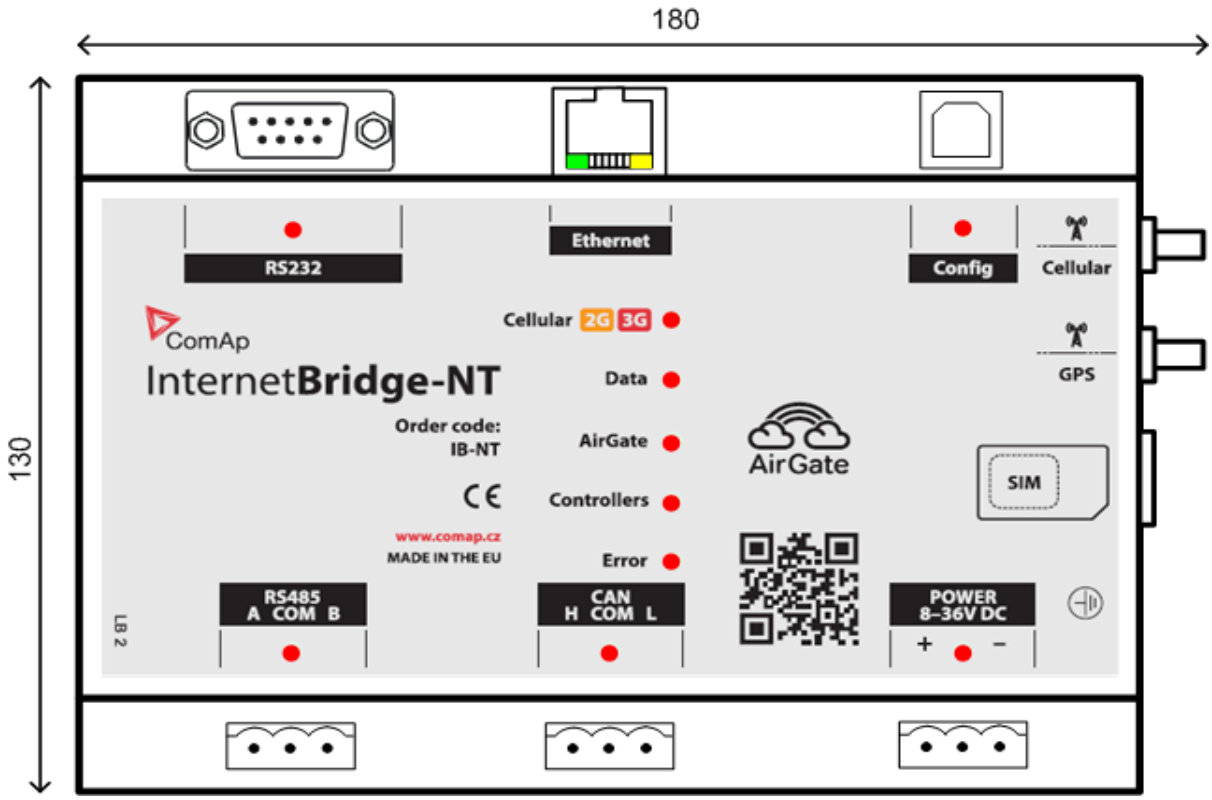
IB-NT

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

NOTE:
IB-NT is compatible with ID-DCU and ID-Mobile from version 1.2 and higher. Version IB-NT 1.2 just partilally supports InteliDrive controllers, all the features except WebSupervisor.

IB-NT has following features:

- Direct ethernet connection to ComAp PC programs
- AirGate® support
- SMTP protocol for sending of active emails from the controller
- HTTP protocol for web-based monitoring and adjustment
- MODBUS/TCP server
- SNMP protocol



LED indicators

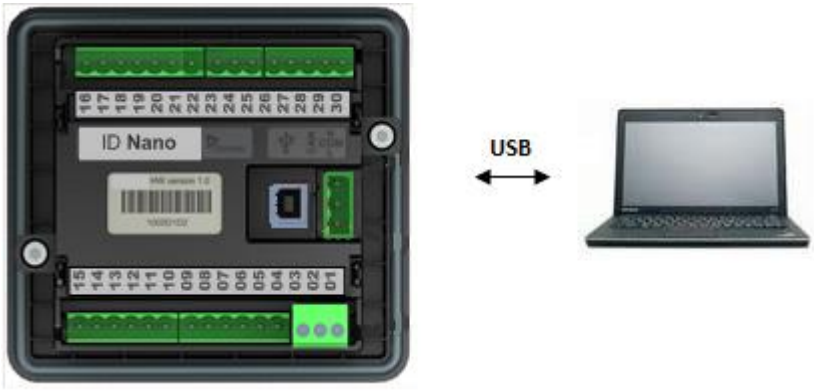
The LED indicators are located on the front panel. Led diodes that are located at the communication ports indicate communication activity at the respective port.

CELLULAR	Yellow: the module is attached into 2G network (GPRS/EDGE)
	Red: the module is attached to 3G network (UMTS)
	Blinking: the module registered cellular network but not attached to the APN.
DATA	Blinks once when a data packet is sent to the WAN interface.
AIRGATE	The module is connected to the AirGate®.
CONTROLLERS	At least one controller is connected to the module via configured interface.
ERROR	There is a problem that causes the module is not working properly.
RJ45 GREEN	Led is on if the Ethernet interface is in 100Mbit mode and is off in 10Mbit mode.
RJ45 ORANGE	Blinks when any data are sent or received at the Ethernet port.

Direct cable connection

Direct cable connection for ID-Nano

Communication capability of ID-Nano is only direct USB connection between the controller and engine. USB interface is intagrated on the rear side of the controller.

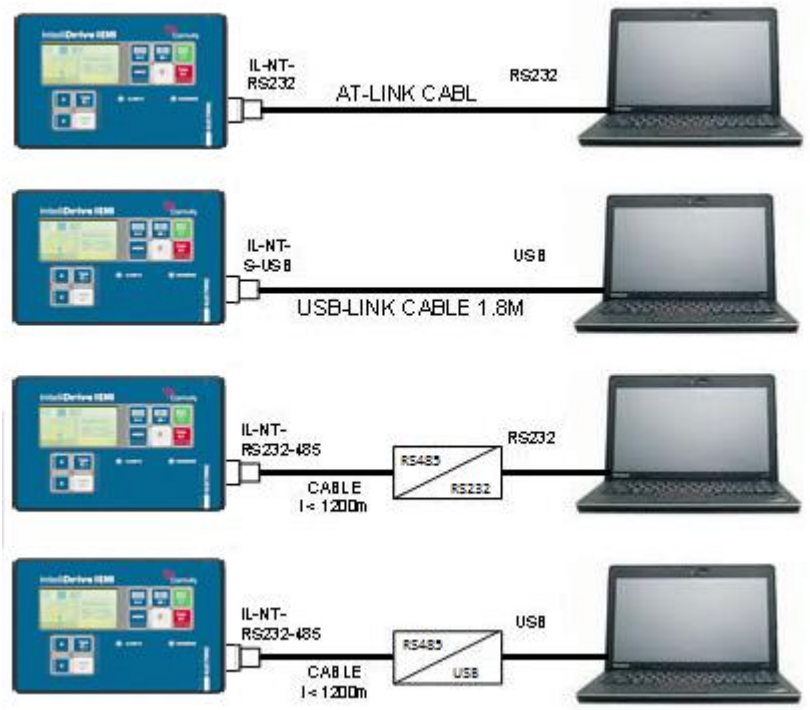


NOTE:
ID-Nano also has CAN interface, but this CAN connection is only for control communication between the controller and ECU. For purpose of this communication guide is not interesting.

Direct cable connection for ID-Lite, ID-FLX-Lite, ID-EM

An external communication module is necessary to enable direct cable connection to a PC. The module is plugged-in into the slot located on the rear side of the controller.

RS232, USB or RS485 interface can be used for direct cable connection to a PC. The setpoint COM1 Mode or COM2 Mode (according to the interface used) must be set to DIRECT position for this kind of connection.



DIRECT CABLE CONNECTION TYPES

Following modules are available for direct connection to a PC:

1. IL-NT-RS232
2. IL-NT-RS232-485
3. IL-NT-S-USB (USB easy removable service module)

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

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

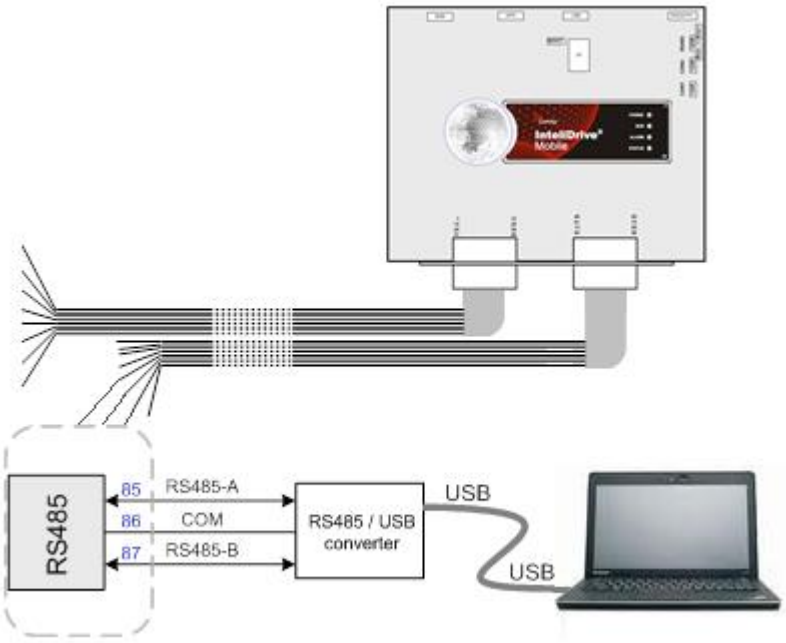
The RS485 communication line has to be terminated by 120 Ohm resistors on both ends. Follow RS485 converter user manual. More information about RS232/485 converter see in chapter Recommended converters.

NOTE:
Use cross-wired serial communication cable with DB9 female connectors and signals Rx, Tx, GND for RS232 connection.

NOTE:
For connection to multiple controllers refer to separate chapter Connection to multiple controllers.

Direct cable connection for ID-Mobile

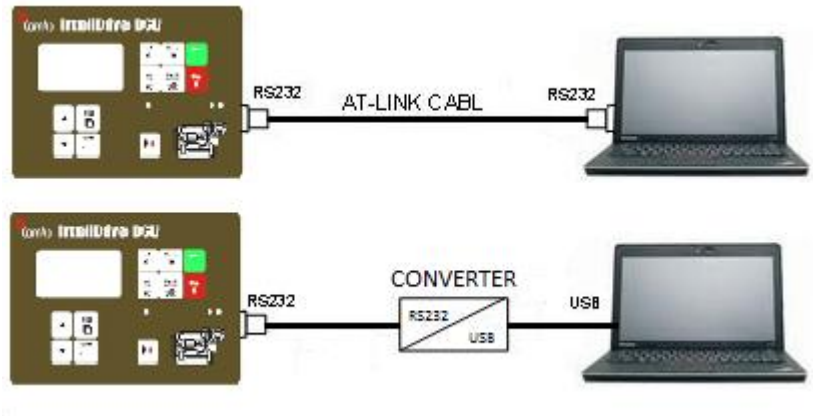
RS485 is used mainly for ID-Mobile configuration. RS485 communication is electrically separated. Setpoint RS485 mode has to be set to STANDARD. For direct connection to PC is necessary to use RS485/USB converter.



NOTE:
Solution how to directly access RS485 from ID-Mobile can be to use ID-Mobile Service Module. It is usual solution to access any of 96 ID-Mobile signals. For details you can see ID-Mobile User Guide.

Direct cable conection for ID-DCU

An internal RS232 communication module enables direct connection to PC. Two options of connection controller and PC have the serial interface RS232 or for connection to PC is necessary to use RS232-USB converter. For direct communication has to be adjust the setpoint RS232 Mode to STANDARD.



Modem connection

Modem connection for ID-Lite, ID-FLX-Lite, ID-EM

A PC can be connected to the controller also remotely via modems. Either an analog or GSM or ISDN modem must be connected to the RS232 interface. Setpoint COM1 Mode has to be set to MODEM

CAUTION!
For connection using GSM modems the CSD protocol must work in the network.

MODEM CONNECTION TYPES FOR ID-LITE, ID-FLX-LITE, ID-EM.

Following modules can be used for modem connection to a PC:

1. IL-NT-RS232
2. IL-NT-RS232-485

In case of troubles with the modem communication an additional initialization string may be required. The reason can be for example some national telephone network specific feature. Use the setpoint ModemIniString to add some necessary AT commands which will be sent to the modem during the initialization. See the documentation of the modem for details.

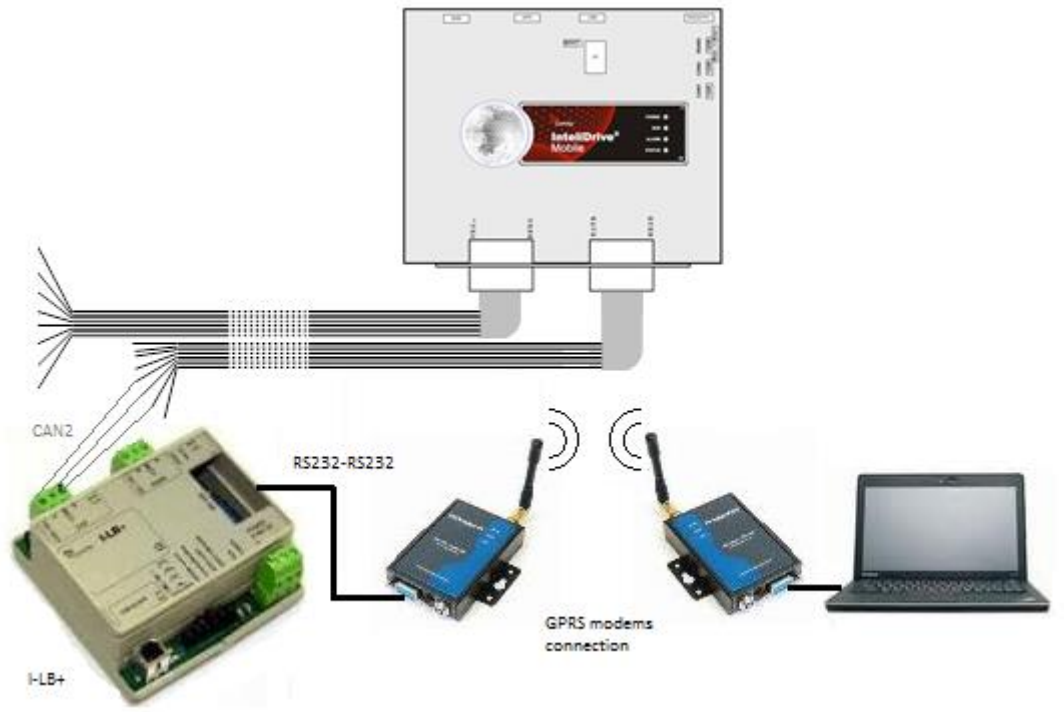
NOTE:
Use the same kind of modem (e.g. analog, GSM or ISDN) as used on the controller also at PC side.

NOTE:
The communication speed is up to 38400 bps (limited by modem used).

NOTE:
For connection to multiple controllers refer to separate chapter Connection to multiple controllers.

Modem connection for ID-Mobile

For ID-Mobile is necessary to use communication module I-LB/I-LB+ or IB-NT (v.1.2 and higher). The setpoints RS485 mode must be set to MODEM, resp. MODBUS.



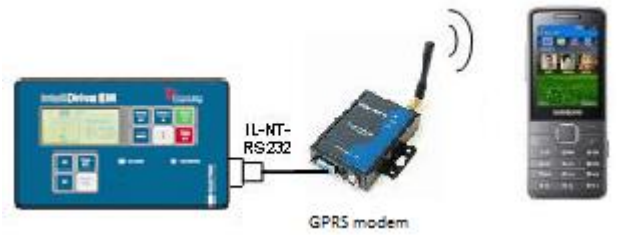
MODEM CONNECTION TYPES FOR ID-MOBILE.

Modem connection for ID-DCU

For ID-DCU exist two possibilities of modem connection. First option is to use direct connection of the modem to the controller via RS232. Second option is to use additional modul I-LB/I-LB+ for connection with modem, this option available connection for multiple engines.

Active SMS

If active calls are activated for alarms on site (yellow/red alarms) the controller sends data, SMS message or e-mail to the predefined GSM number or e-mail address.



ACTIVE SMS

The controller sends SMS using modem connected to RS232 of InteliDrive Lite

Example of SMS sent by the controller in case that the water temperature exceeded the warning limit and Emergency stop input has been : #Engine name:AL=(Wrn Water temp; !Emergency stop)

NOTE:
The format of SMS and more information about active SMS you can see in chapter IL-NT-GPRS

Modem setup procedure

Analog modems obviously do not require any setup. The only case it could be needed is if the modem has been bought in other country with different telephony system than the target country where the modem will be used.

GSM modems need to be set-up prior to using with the controller. Use the *gm_setup* program (installed together with the LiteEdit) to make the initial setup of the modem. The setup must be done while a SIM card is inserted.

General conditions
Following conditions must be fulfilled:

1. There must be GSM modem on PC and controller side (not different modem types e.g. analog and GSM modem).
2. Data communication capability must be enabled for the SIM cards (CSD (Circuit Switch Data) must be supported). Ask your operator for this service. If it is not enabled, Gm_setup program shows "Command failure" message at the end of the log. To check SIM card data setting move SIM card from the GSM modem connected to the controller to mobile phone, call from LiteEdit to this mobile phone and check (on mobile phone) DATA call indication of incoming call. If phone does not indicate DATA - solve this with your GSM operator.

Modem configuration

1. Connect to the modem from your PC.
2. Run Gm_setup.exe (the program is in ../Tools/Gm_setup directory)
3. Select communication port (COM 1 - 32) and press Setup.
4. Enter SIM card PIN after you will be asked.
5. Enter SMS center address after you will be asked (ask your operator about this number).
6. If the Gm_setup writes "Setup terminated successfully" the SIM card is configured for the communication with the controller.

NOTE:
All SMS on SIM card will be erased during GSM modem initialization.

Controller configuration

1. In SMS/E-mail group of setpoints:

   To enable sending of SMS from the controller in case of alarms, 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 GSM phone number and/or e-mail address to the setpoints TelNo/Addr Ch1 and TelNo/Addr Ch2.

2. Connect the controller to the modem or I-LB unit that has the modem connected.

Active Call

When active calls are activated for alarms on site (warning, shut-down…) the controller calls to the preselected telephone number and sends the archive file.

Software (e.g. InteliMonitor, DriveMonitor) on the PC side must be running and waiting for active call.

Hint:
Active call uses for communication the modem connection.

NOTE:
Active call support only controllers ID-Mobile and ID-DCU.

NOTE:
The controller sends e-mail, when is connected to internet, that's why is important to use communication modules, which allows internet access IB-Lite, IG-IB or IB-NT.
Email contains header with serial number and application info, alarm list, 20 History records (reason, date, time).
See the chapter Internet communication.

Internet connection

A PC can be connected to the controller also remotely via Ethernet (Internet, Intranet). An appropriate ethernet communication module must be used.

CAUTION!
It is necessary to fulfil one of the following conditions:

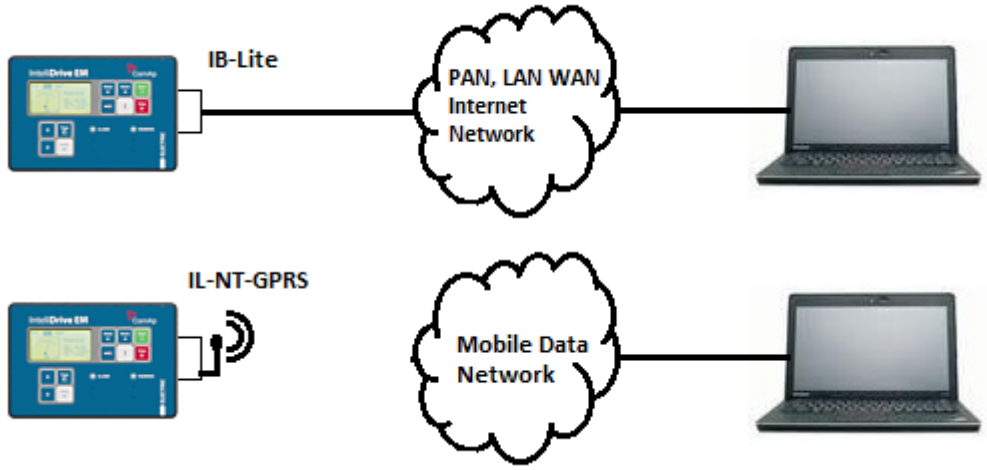
1. Provide static and public IP address
2. Provide static IP address within VPN

Internet connection ID-Lite, ID-FLX-Lite, ID-EM

For connecting the ID-Lite, ID-FLX-Lite or ID-EM controller to the internet use a plug-in communication module IB-Lite.

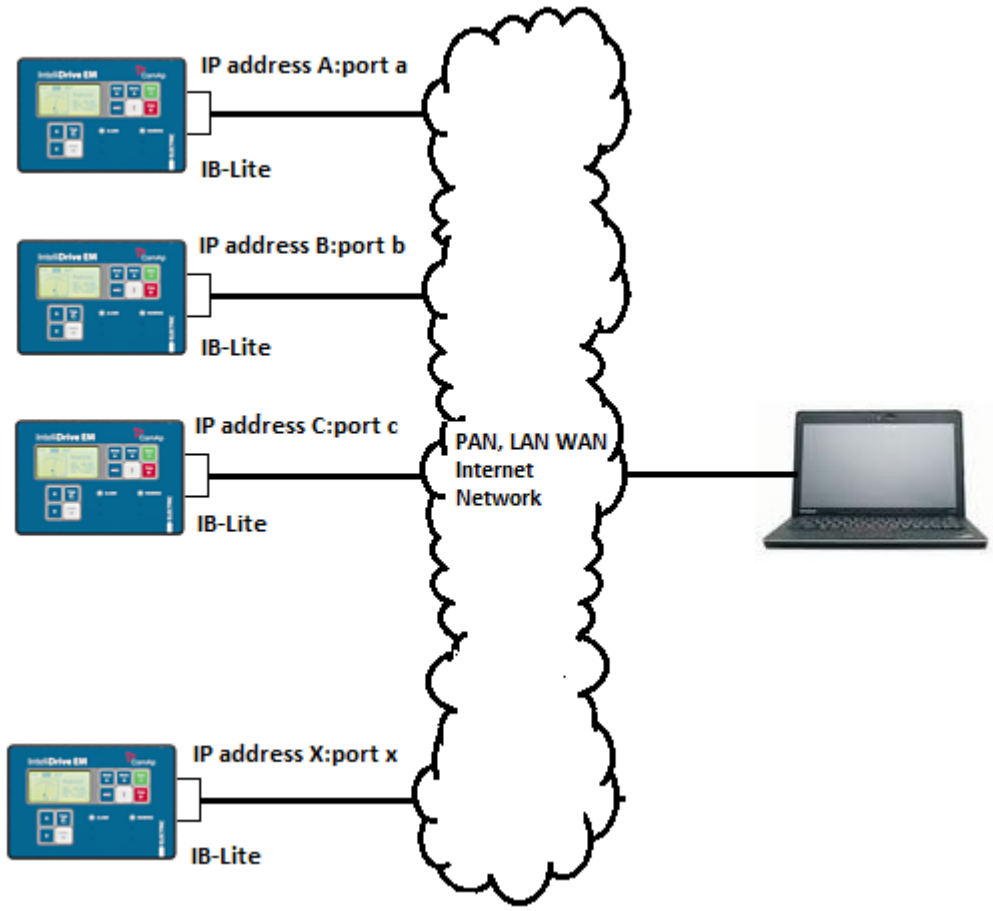
The setpoint COM1 Mode must be set to the DIRECT position.

For data network connection can be used IL-NT-GPRS as well, just the connection is wireless and via mobile network. There is no direct cable connection, but setpoints must be set to DIRECT position.



INTERNET CONNECTION USING IB-LITE

CAUTION!
This type of connection is possible only for the ID-Lite, ID-FLX-Lite, ID-EM controllers which have the ControllerAddr setpoint available



INTERNET CONNECTION TO MULPTIPLE INETLIDRIVES USING IB-LITE

Each IB-Lite can have different IP address and different port number. There cannot be two IB-Lites with the same combination of IP address and port number on one site.

Default port number is 23. Default IP address is 192.168.2.254.

It is possible to connect simultaneously

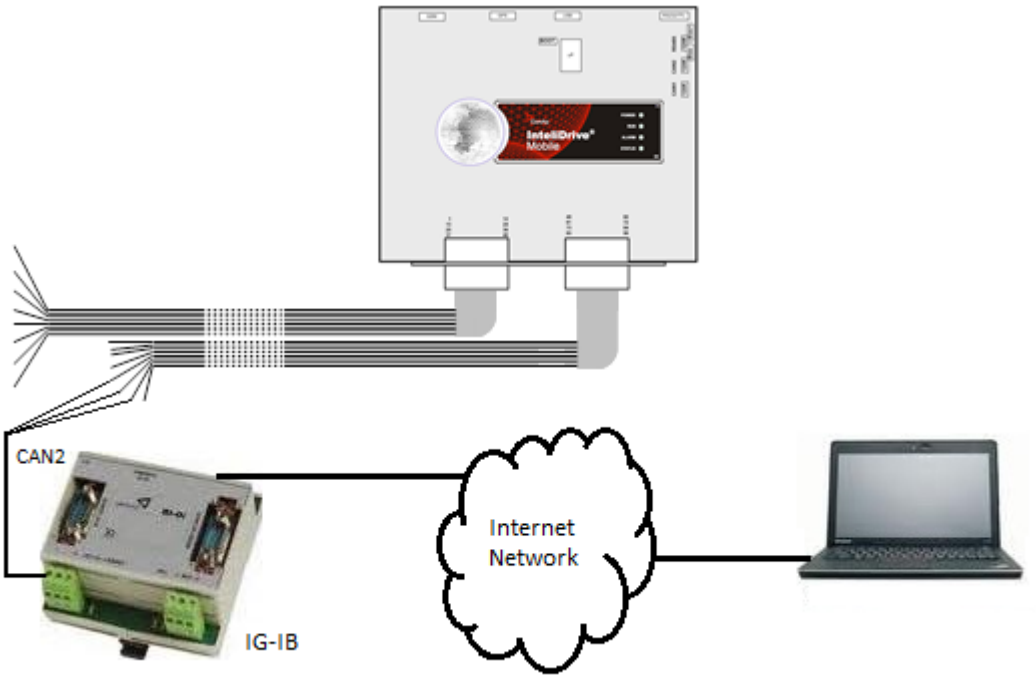
- 2 clients with LiteEdit/InteliMonitor (Comap/TCP protocol)
- 1 client Modbus/TCP
- 2 clients with web interface

In the case of connection from web browser there is 5 minutes timeout after closing the browser window. After that the client is automatically logged out.

NOTE:
Using a web browser. The IB-Lite module with firmware version 1.1 and above makes possible using any web browser for basic monitoring and adjustment of the controller. Simply put the IP address of the module into the address line in your web browser like `http://192.168.1.254` and then enter access code. More info in the chapter IB-Lite.

Internet connection ID-Mobile

For connecting the ID-Mobile controller to the internet use a communication modules IG-IB or IB-NT(v.2 and higher).

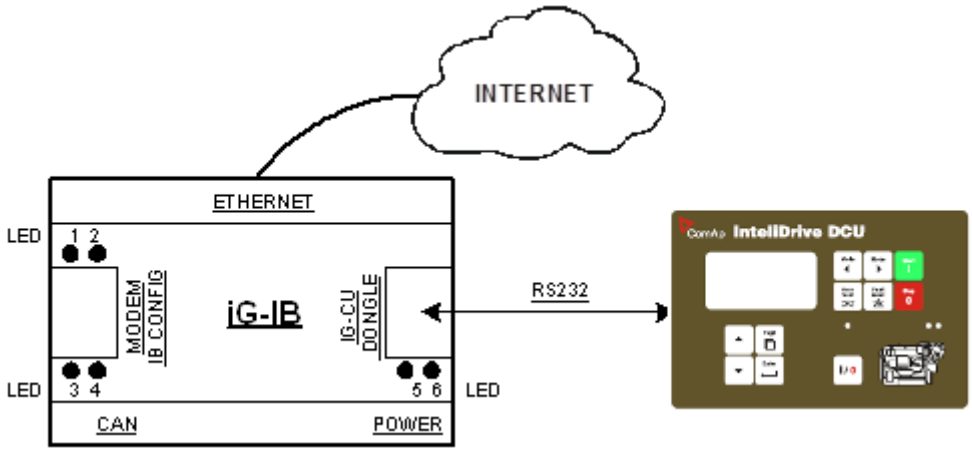


INTERNET CONNECTION TO ID-MOBILE USING IG-IB

NOTE:
Multiple connection to internet for ID-Mobile is analogous to ID-Lite, just IB-Lite is changed to appropriate communication module (IG-IB, IB-NT) and software (e.g. DriveConfig, DriveMonitor, WebSupervisor).

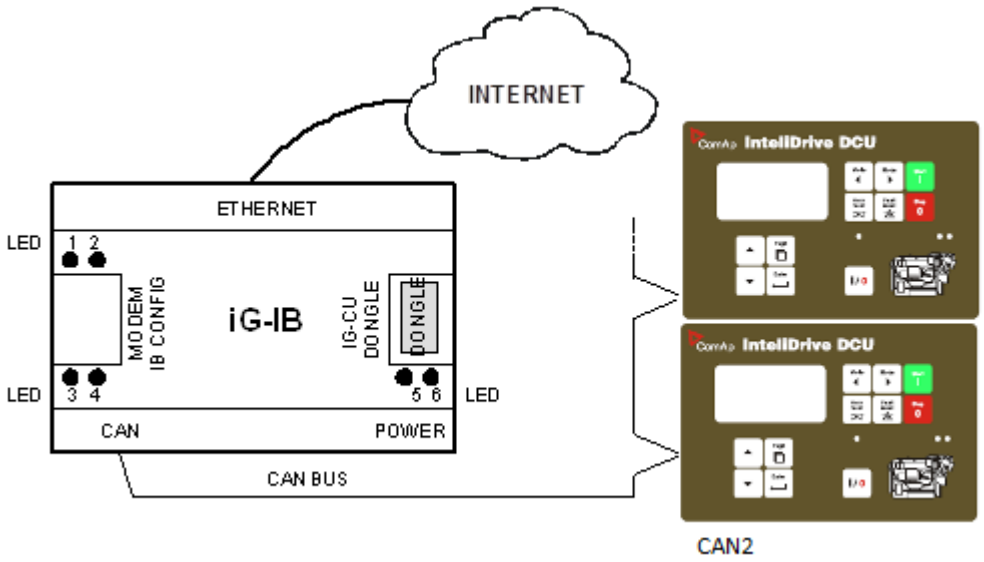
Internet connection ID-DCU

For connection of the ID-DCU controller to the internet use a communication module IG-IB.



INTERNET CONNECTION TO ID-DCU USING IG-IB, ONE CONTROLLER TO INTERNET VIA RS232

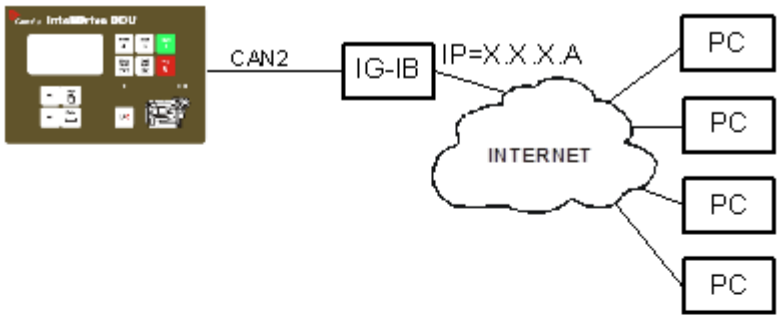
In this case no dongle is necessary.
One unit could be also connected via CAN interface.

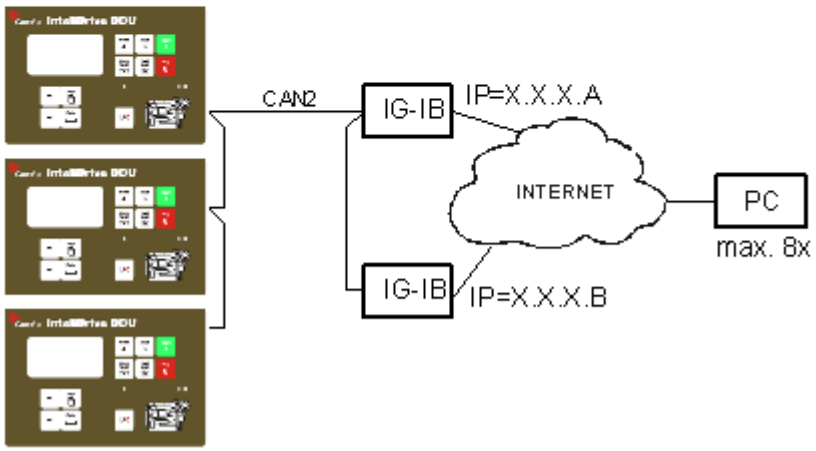


INTERNET CONNECTION TO MORE THAN ONE ID-DCU USING IG-IB, MORE CONTROLLERS TO INTERNET VIA CAN BUS

The dongle must be used. The type of IG-IB dongle limits number of accessible controllers (up to 32). Dongles for up to 3, 7, 15 and 32 controllers are available. See also chapter IG-IB.

NOTE:
Max four PCs can be connected to one iG-IB at once





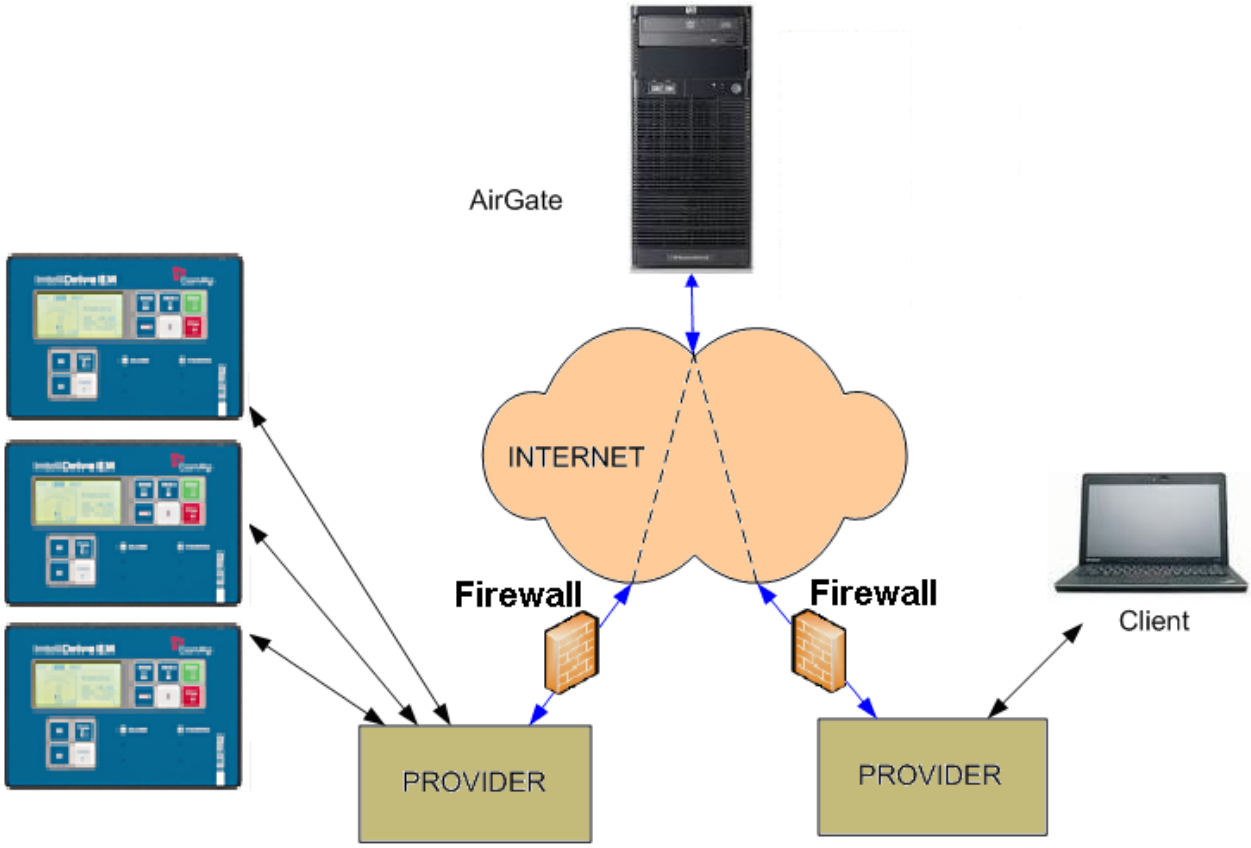
If more than 8 ID-DCU or other controllers are used with intercontroller CAN bus and monitored via IG-IB or other monitoring SW can be delayed up to several seconds. The same holds for values reading, i.e. refresh of measured power etc. in InteliMonitor or other PC SW.

Hint:
Contact local IT manager in any case before using iG-IB.

Internet connection via AirGate

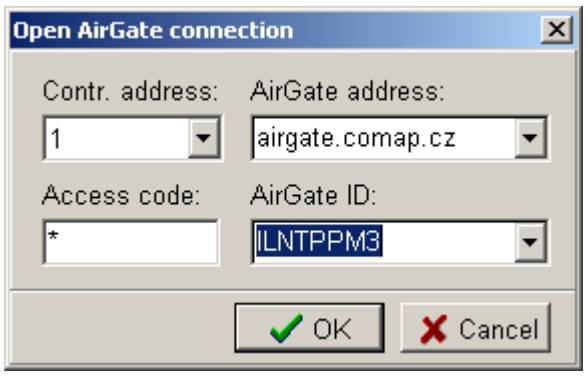
This connection type is used for connection to controllers/sites, that are connected to the Internet, however they do not have public and static IP address. The controllers connect by themselves to the AirGate server and cyclically ask whether there is a connection request from a client or not. On the other side the clients (InteliMonitor, WebSupervisor) connect to the AirGate server instead of connecting directly to the controller. The server then creates a "tunnel" between the client and the controller. Internet connection via AirGate server is supported by controllers ID-Lite, ID-FLX-Lite, ID-EM and ID-Mobile with ethernet connection possibility. The connection to ethernet is realized the same way as internet connection.

CAUTION!
To avoid unauthorized access to the controller change the access code and keep it secret!



Airgate connection settings

Once this AirGate ID is displayed, connection via AirGate was succesfull. This value will be needed for LiteEdit, DriveConfig, WebSupervisor etc. connection. Kindly make a note for future reference.



Parameters can be set via any type of connection (USB, RS232, Ethernet). Setup is provided via InteliMonitor. For ethernet connection set these parameters in *Comms Settings* group:

IP addr mode	0 ON OFF OFF OFF OFF OFF OFF OFF	AUTOMATIC
IP address	0 ON OFF OFF OFF OFF OFF OFF OFF	192.168.1.254
Net mask	0 ON OFF OFF OFF OFF OFF OFF OFF	255.255.255.0
Gateway IP	0 ON OFF OFF OFF OFF OFF OFF OFF	192.168.1.1
ComApProtoPort	0 ON OFF OFF OFF OFF OFF OFF OFF	23
AirGate	0 ON OFF OFF OFF OFF OFF OFF OFF	ENABLED
AirGate IP	0 ON OFF OFF OFF OFF OFF OFF OFF	airgate.comap.cz

CAUTION!
Connection via AirGate is supported by controllers with direct connection to LAN only or via IB-NT module. Airgate connection is not available for connection via IG-IB module.

NOTE:
AirGate enables only creation of communication between controller and client. AirGate server does not save any data from controller as history, values or adjustment of setpoints.

Active E-mails

When active e-mails are activated for alarms on site (warning, shut-down…) Controller sends e-mail message to the predefined e-mail address.

Terminal attempt order active call

1) IG-IB connected to RS232 and internet connection currently active [1]
2) IG-IB connected via CAN (address 2) and internet connection currently active [1]
3) IG-IB connected via CAN (address 1) and internet connection currently active [1]

4) IG-IB connected to RS232 and internet connection currently inactive [2]
5) IG-IB connected via CAN (address 2) and internet connection currently inactive [2]
6) IG-IB connected via CAN (address 1) and internet connection currently inactive [2]

[1] – For IG-IB connected to Internet via leased line – always active;
For IG-IB connected to Internet using dial-up connection – active only when IG-IB is connected to Internet provider.
[2] – Only for dial-up connection – when IG-IB is not connected to Internet provider.

Here is shown sample of active e-mail (from controller)
You should use LiteEdit and set Setpoints **Act.cals/SMS** *AcallCHxType* = E-MAIL and specify the e-mail address if you want to send active messages from controller using e-mail.

Example of active E-mail for Ethernet - LAN connection

```
iG-IB
-----------------------------------------------
IP address:      192.168.1.10
Connection:      Ethernet LAN

Controller
-----------------------------------------------
Name:            InteliSys
Serial number:   06F20093
SW branch:       Standard
SW version:      2.7
Application:     SPtM
Appl. version:   2.7
Time:            15:21:06
Date:            13/06/03

Alarm list
-----------------------------------------------
!Sd SD 11

History events
-----------------------------------------------
  0  13/06/03  15:21:05  NotReady
 -1  13/06/03  15:21:02  Sd SD 11
 -2  13/06/03  15:20:56  Running
 -3  13/06/03  15:20:46  Started
 -4  13/06/03  15:20:44  Start
 -5  13/06/03  15:20:40  Ready
 -6  13/06/03  15:17:18  Passw3 entered
 -7  13/06/03  14:58:37  NotReady
 -8  13/06/03  14:58:37  PickupFault
 -9  13/06/03  14:58:37  Ready
-10  13/06/03  14:58:33  Stop
-11  13/06/03  14:58:03  Cooling
-12  13/06/03  14:58:03  RemControlUART
-13  13/06/03  14:52:11  Running
-14  13/06/03  14:52:01  Started
-15  13/06/03  14:51:59  Start
-16  13/06/03  14:51:59  RemControlUART
-17  13/06/03  14:37:27  Ready
-18  13/06/03  14:37:21  Switched On
-19  11/06/03  12:29:47  Ready
```

Example of active E-mail for Dialup connection

```
iG-IB
-----------------------------------------------
IP address:      192.168.1.10
Connection:      Dialup (until 10:52:05)

… the rest of message is the same like in Ethernet LAN connection example above.
```

Hint:
IG-IB does not respond e-mails which are sent to iG-IB mailbox.

Active call – Email-SMS

You should set Setpoints **Act.cals/SMS** *AcallCHxType* = EML-SMS and specify the e-mail address of a mobile phone if you want to send active messages from controller using SMS e-mail.

The Active call – EML-SMS service informs the user of mobile phone about current items in the Alarm list.

Example of active EML-SMS

```
IS_ABC: B:AL=(Sd Water Temp,Wrn Water Temp,!Emerg Stop,ActCallCH1Fail)
```

Hint:
EML-SMS channel setting depends on local GSM provider.
Should be e.g. +420602123456@sms.eurotel.cz for Eurotel Czech Republic.

E-mail box for tests

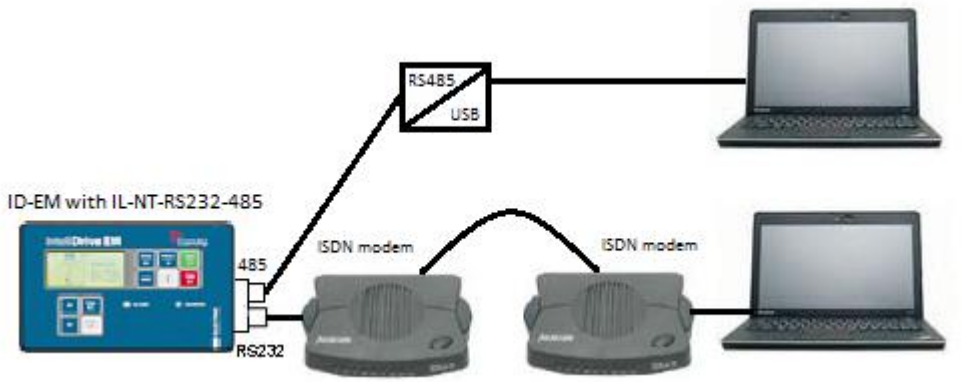
It is possible to use following data for active E-mail testing, before you create your own Mailbox.
Refer to chapter Ethernet-LAN configuration:
Item 5. Domain Name Servers and
Item 6. E-mail

Primary DNS: 212.20.96.34
Secondary DNS: 212.20.96.38
SMTP Server: smtp.volny.cz
iG-IB Mailbox: comap.cz@volny.cz

Special cases of connection

Combination of direct cable and modem connections

The controller can be accessed through direct and modem connection simultaneously. One PC is connected via direct cable connection using RS485 (COM2 port) and second PC is connected via modem (COM1 port).



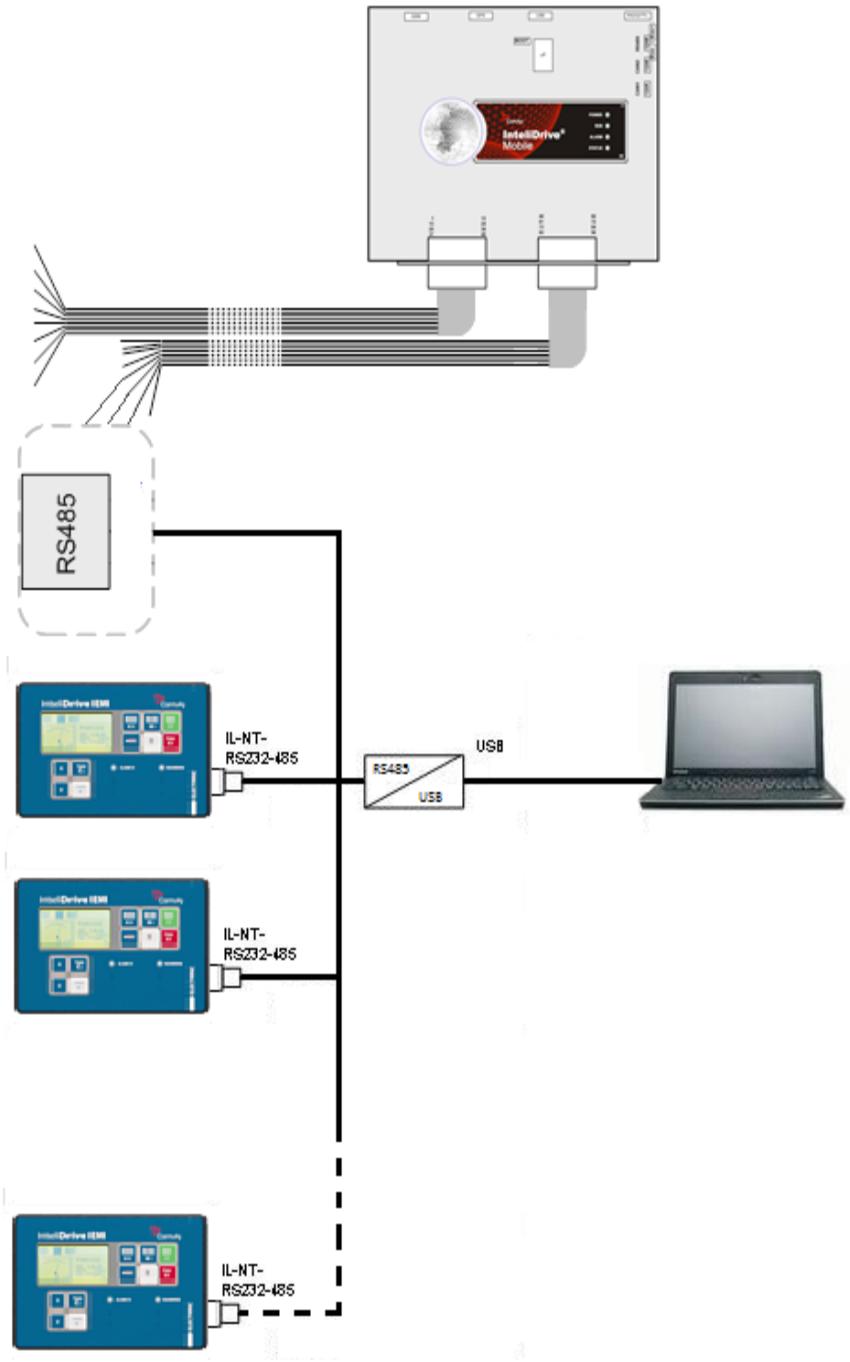
COMBINED CONNECTION TO THE SINGLE CONTROLLER

Direct cable connection to multiple controllers

It is possible to connect to multiple controllers on the site using RS485 network (ID-Lite, ID-FLX-Lite, ID-EM, ID-DCU- ID-Mobile controllers).

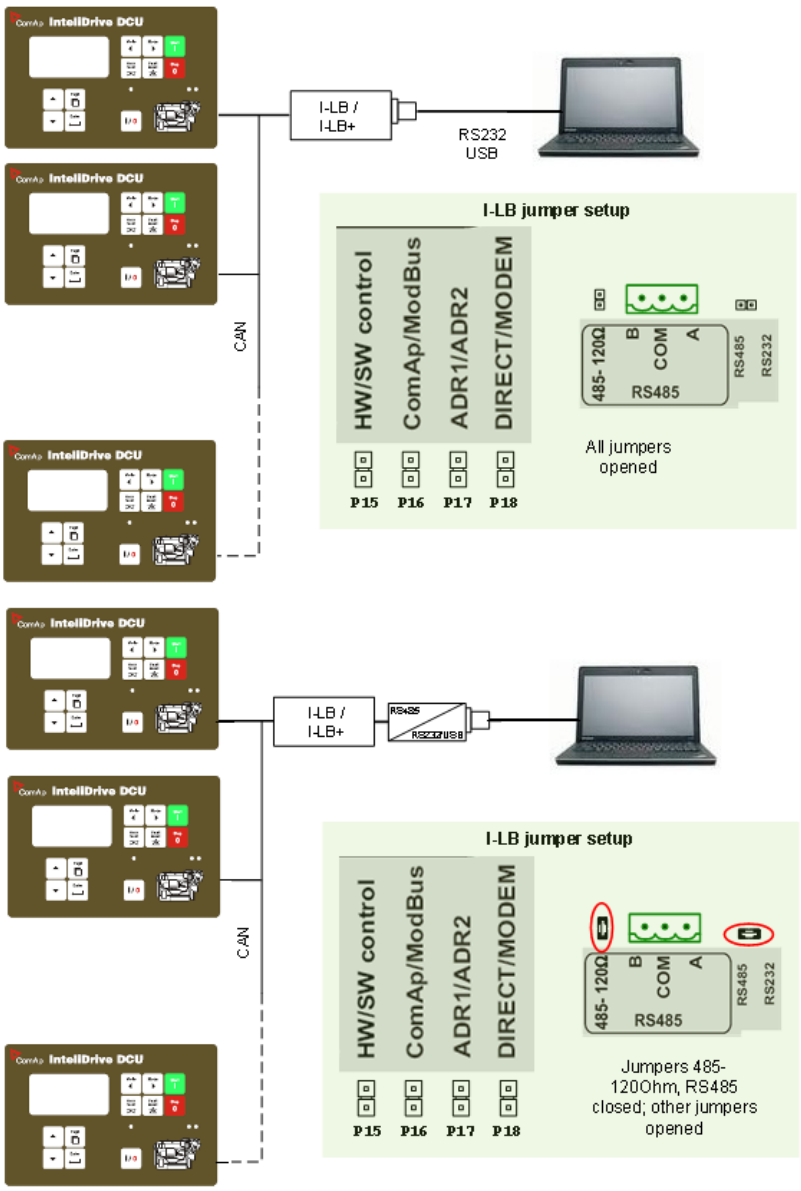
Controllers are possible to combine each other. Is neccesary just to creat RS485 bus or CAN bus connection among them, depeneds on the types of controllers.

Hint:
Useful for example for connection and cooperation of controllers in SCADA system (InteliMonitor) etc.



DIRECT CABLE CONNECTION TO MULTIPLE CONTROLLERS ID-MOBILE AND ID-EM

Using I-LB/I-LB+ module connection to multiple ID-DCU only controllers is also possible. The controllers are connected by the intercontroller CAN bus (marked as CAN2 on the rear sticker). There is another CAN bus port (marked as CAN1) which is used for connection of peripheral modules like IGL-RA15, IGS-PTM, IS-AIN8 etc. or ECU. The CAN bus length is limited to 200 meters if setpoint CAN Bus Mode is set to 32C (communication speed is 250kbps) or to 900 meters if it is set to 8C (communication speed is 50kbps). This setpoint defines the maximum number of controllers connected to the CAN bus.

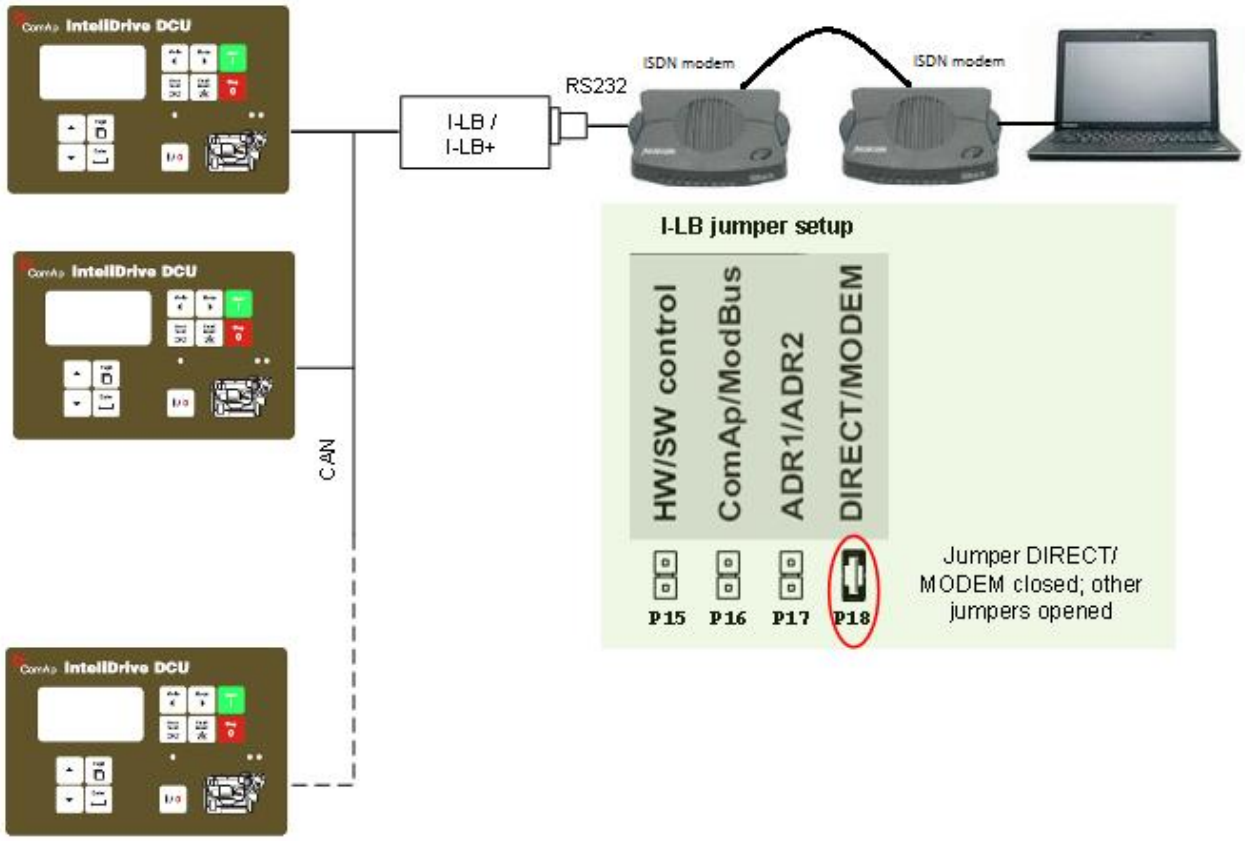


DIRECT CABLE CONNECTION TO MULTIPLE ID-DCU OR ID-MOBILE CONTROLLERS THROUGH I-LB/I-LB+ MODULE

NOTE:
I-LB unit must be switched to RS485 mode for remote direct connection by "DIRECT/MODEM" and "RS485" jumper. The terminating resistor is intergrated - use "RS485-120Ohm" jumper.

Modem connection to multiple controllers (ID-DCU, ID-Mobile)

Modem connection to multiple ID-DCU, ID-Mobile controllers on the site is possible via I-LB module. Recommended modem types see in chapter Modem Recommendations.



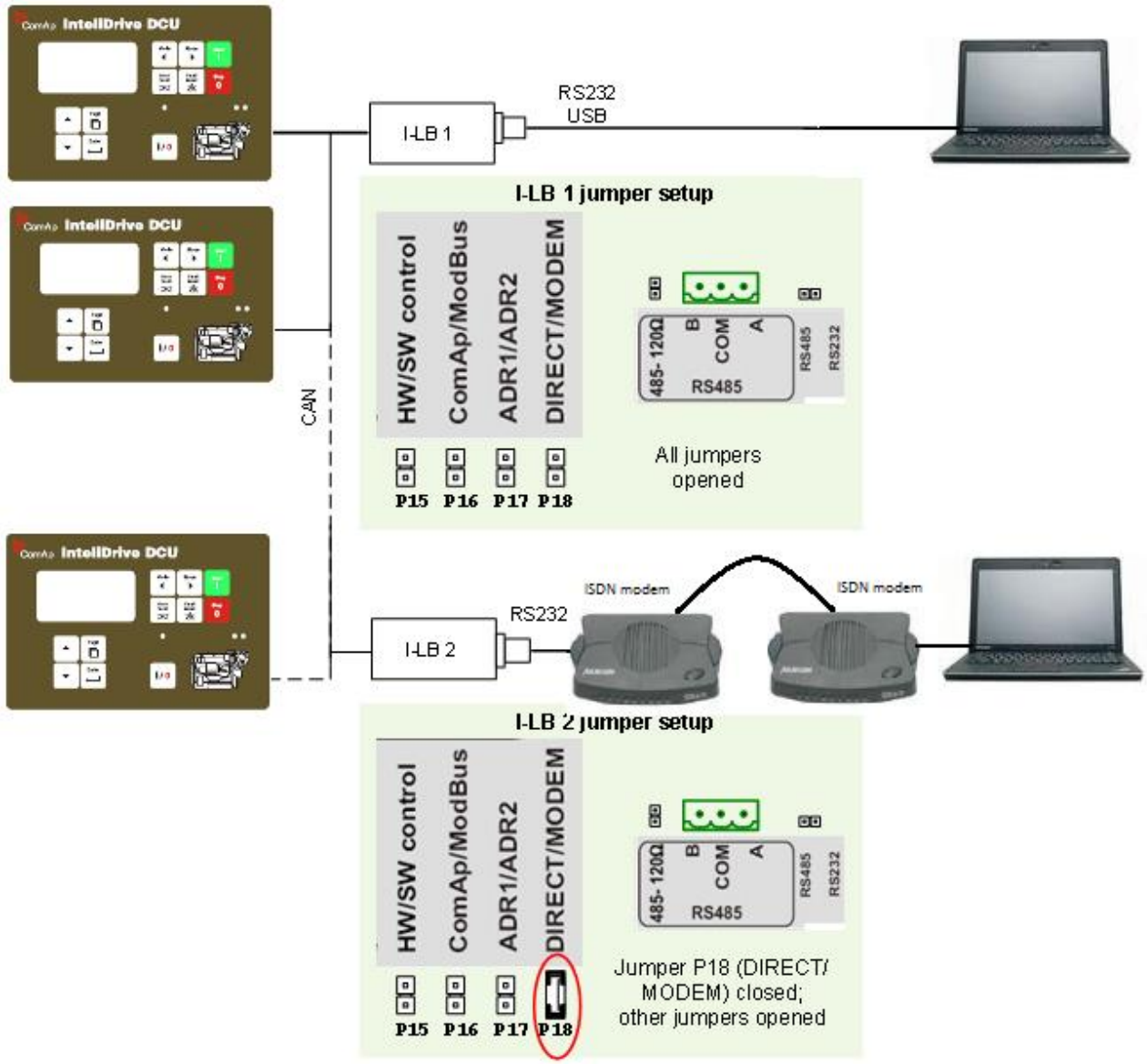
MODEM CONNECTION TO MULTIPLE CONTROLLERS VIA I-LB/I-LB+

I-LB has to be connected to modem via null modem cable with full handshaking where the DSR (Data Set Ready) signal detects modem presence.

NOTE:
The controller address has to be set correctly - each gen-set in the group must have it's own unique number in the range 1 to 32 (ControllerAddr).

Combined direct and modem connection to multiple ID-DCU controllers

The controllers can be accessed through direct and modem connection simultaneously. One PC is connected via direct cable connection using RS232 and second PC is connected via modem.



COMBINED CONNECTION TO MULTIPLE CONTROLLERS

Appendix I

Recommended communication cables

Recommended communication cables for ComAp controllers

Interface	Cable	Connector	max. Length	Max. Comm. Rate
RS232	Serial cross-wired cable standard Null-modem cable	DB 9 Male Pinout	10 m	57.6kBd
RS485	Shield twisted pair [1)]	NONE	1000 m	57.6kBd
Ethernet	STP or UTP cable	RJ45	100 m	10/100 Mbps
USB	Standard USB A-B cable	USB A-USB B	5 m	115200 Bd
CAN	Shield twisted pair [2)]	NONE	200 m / 900 m	250 kBd

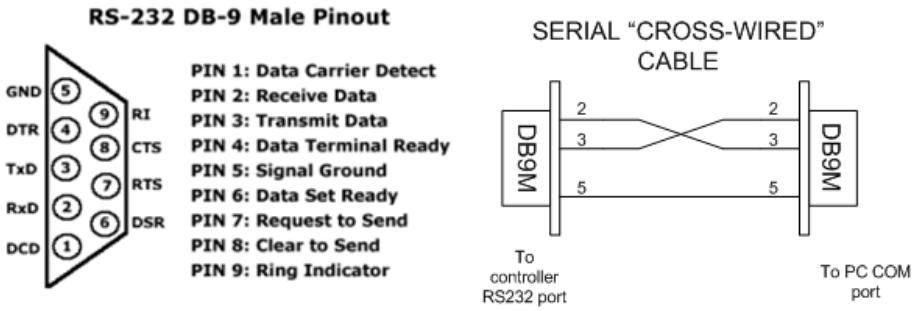
1) RS 485 cable
B) For longer distances: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)
Recommended data cables: BELDEN (http://www.belden.com)
A) For shorter distances: 3105A Paired - EIA Industrial RS-485 PLTC/CM (1x2 conductors)

2) CAN bus cable
Galvanically separated
Maximal CAN bus length 200m Speed 250kBd
Nominal impedance 120Ω
Cable type twisted pair (shielded)
Following dynamic cable parameters are important especially for maximal 200 meters CAN bus length and 32 iS-COM units connected:
Nominal Velocity of Propagation min. 75% (max. 4,4 ns/m)
Recommended data cables: BELDEN (http://www.belden.com)
A) For shorter distances: 3105A Paired - EIA Industrial RS-485 PLTC/CM (1x2 conductors)
B) For longer distances: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)

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

RS232 cable

It is recommended to use standard Null-modem cable for local connection between controller and PC, although the three wires (TxD, RxD, GND) RS 232 connection is enough for direct controller to PC communication:



Cables for direct and modem connections
PC to RS232 on controller / I-LB
DB9 Female to DB9 Female

2	3
3	2
5	5

Modem to RS232 on controller / I-LB
Comms settings: MODEM (HW) or I-LB jumper HW control

DB9 Male to DB9 Female

1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Comms settings: MODEM (SW) or I-LB jumper SW control

DB9 Male to DB9 Female

2	2
3	3
5	5

USB cable

Use standard USB A-B cable (distance up to 5 meters).

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

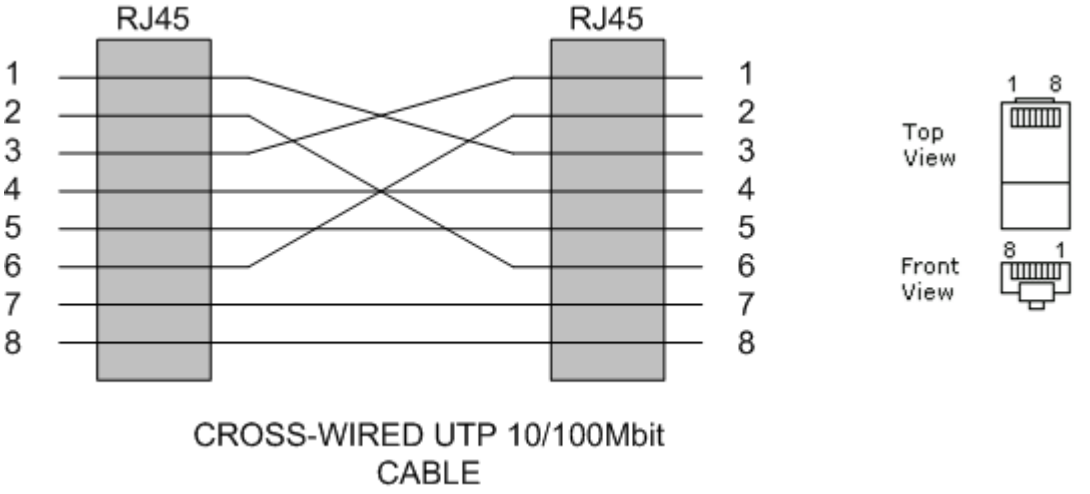
! IMPORTANT !

To use USB connection it is necessary to install drivers on your PC.
The drivers can be downloaded from the website http://www.ftdichip.com/Drivers/VCP.htm.
Download the driver for your operating system and follow the enclosed instructions.

After successful installation of the driver and connection of the controller or I-LB+ to the PC the new Virtual Communications Port appears in ComAp PC tools and it is possible to open connection via USB.

Ethernet cable

It is recommended to use standard UTP or STP cable with connectors RJ 45. Maximal length of cable is 100 m. For direct connection between Controller and PC is necessary to use cross-wired cable (only in case that your PC does not have automatic recognizing of direct and cross-wired cable).

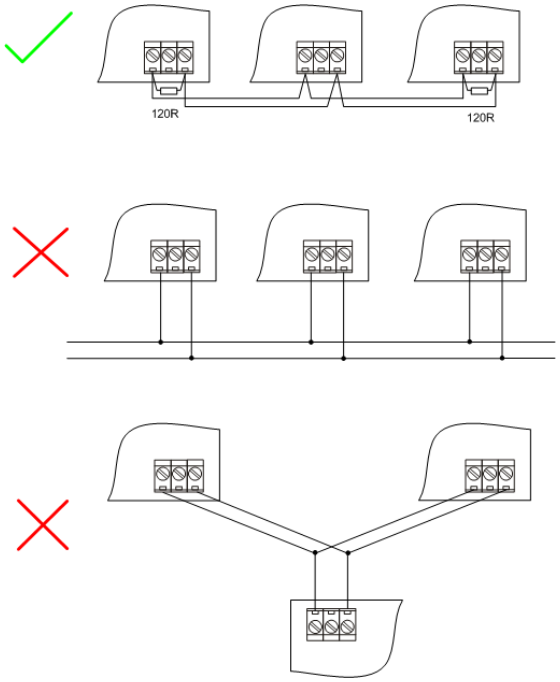


CROSS-WIRED UTP 10/100Mbit CABLE

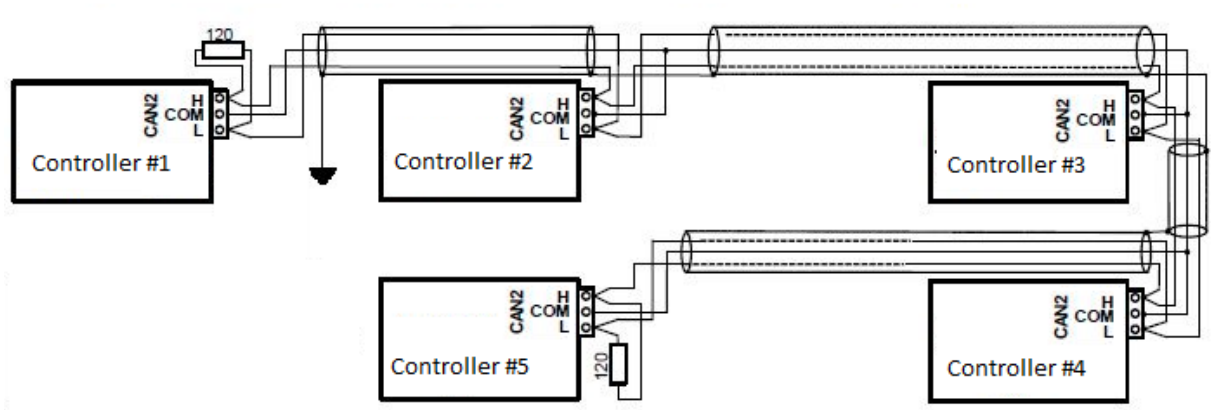
Recommended CAN/RS485 connection

CAN bus connection

The bus has to be terminated by 120 Ohm resistors at both ends.
External units can be connected on the CAN bus line in any order, but keeping line arrangement (no tails, no star) is necessary.

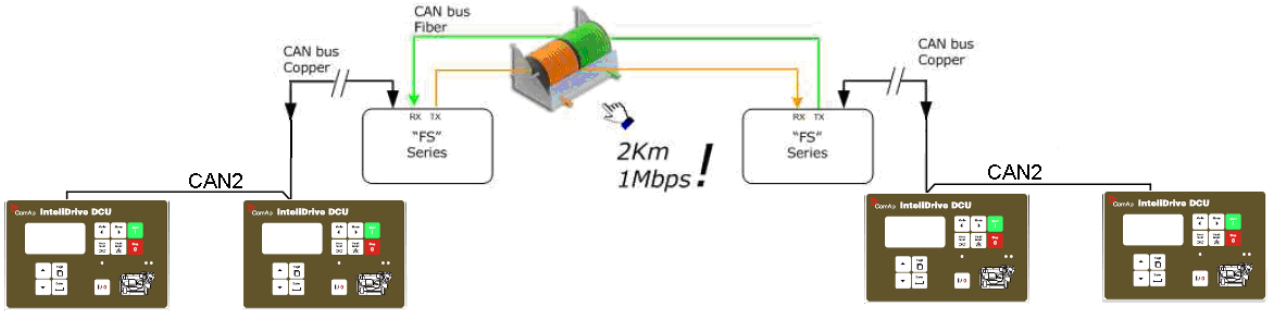


Standard maximum bus length is 200m for 32C CAN BUS MODE and 900m for 8C CAN BUS MODE (setpoint in comms setings group)
Shielded cable has to be used, shielding has to be connected to PE on one side (controller side).
Recommended data cables: BELDEN (http://www.belden.com)
A) For shorter distances: 3105A Paired - EIA Industrial RS-485 PLTC/CM (1x2 conductors)
B) For longer distances: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)
C) In case of surge hazard: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)



CAN bus extension options

CAN/fiber optic converter



- Extends CAN bus length by 2000m.

Recommended converter

- ADF Web HD67181FS or HD67181FSX (www.ADFweb.com)
  http://www.adfweb.com/home/products/optics_fibres_can_bus_repeaters.asp

Recommended settings

Use converter Baud Rate Setting to 250k if setpoint *Comms setting: CAN bus mode* is set to 32C in controllers:

Use converter Baud Rate Setting to 50k if setpoint *Comms setting: CAN bus mode* is set to 8C in controllers:

CAUTION!
This device can extend total CAN bus length by 2000 m using optical link, but total length of metalic CAN bus must not exceed these values:
200 m if setpoint *Comms setting: CAN bus mode is set to 32C in controllers*
900 m if setpoint *Comms setting: CAN bus mode is set to 8C in controllers*

CAN-Ethernet gateway

CAN-Ethernet gateway allows you to merge up to four CAN bus branches into one global CAN bus using Ethernet connection. For detailed information about this option contact ComAp technical support department.

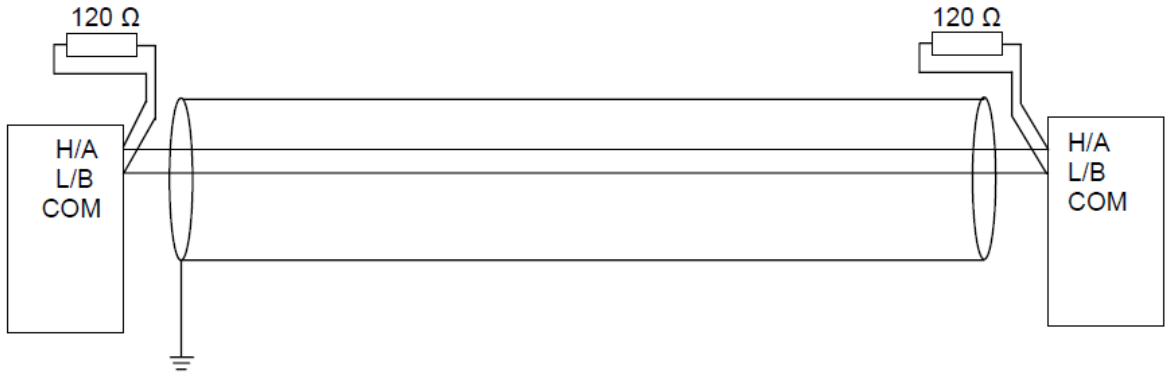
Hint:
For CAN bus extension is possible to use I-CR module. It allows extension of CAN to more segments with next 200m adition length. for more information read chapter I-CR Module for CAN bus extension.

RS485 connection

External units can be connected on the RS485 line in any order, but keeping line arrangement (no tails, no star) is necessary.
Standard maximum line length is 1000m.
Shielded cable has to be used, shielding has to be connected to PE on one side (controller side).

RS485 and CAN bus line has to be terminated by 120 ohm resistors on the both ends. Always check the number and placement of terminating resistors in the CAN bus line, only correct wiring ensures reliable operation! Resistors must be placed at either end of the line (see picture), and correct number of resistors must be used! Correct number can be checked using ohmmeter - when power supply for ALL devices on the CAN bus line is switched off, the resistance measured between A and B wire should be 60 Ohms. For longer

distances is recommended to connect CAN COM terminals between all controllers and cable shielding to the ground in one point. External units can be connected on the CAN bus line in any order, but line arrangement (no tails no star) is necessary.

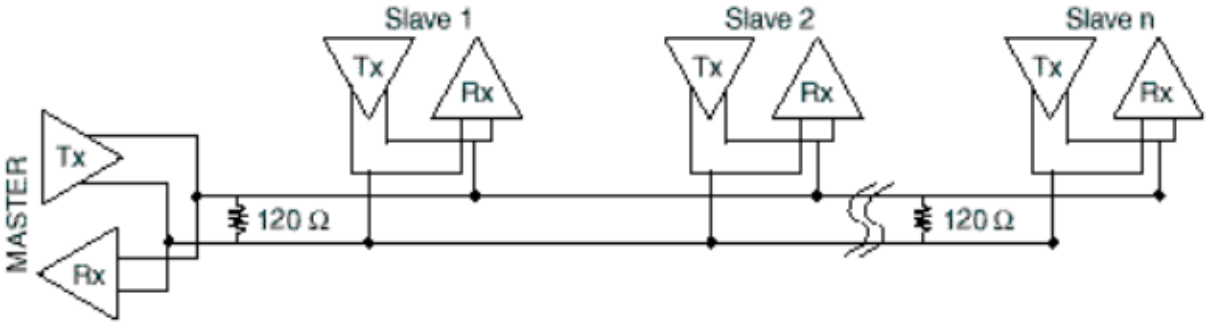


In some cases is necessary to use the optical isloation of RS485 line. Some modules has ebmaded optical isolation some needs aditional equipment to ensure the required separation. The need of galvanic separation depends on distance between the nodes and surrounding of transmittion line. See the table of recommended connection of RS485.			
Surrounding/Powersupply	Distance between two nodes / the need of galvanic separation		
	<15m	15 -100 m	>100m
Same power supply No disturbance	no optical isolation	on one end	on one end
Same power supply High disturbance	on one end	on both ends	on both ends
Diferent power supply No disturbance	on one end	on one end	on both ends
Diferent power supply High disturbance	on both ends	on both ends	on both ends

Availability of embaded galavanic separation of RS485 port in ComAp products	
All IGS-NT controllers - port RS485(1)	NO
All IGS-NT controllers - port RS485(2)	YES
IG-Display, IS-Display - port RS485	YES
InteliVision 8 - port RS485, CAN	YES
InteliVision 5 - port RS485	NO
InteliVision 5 RD - port RS485	YES
InteliVision 5 CAN - port CAN	YES

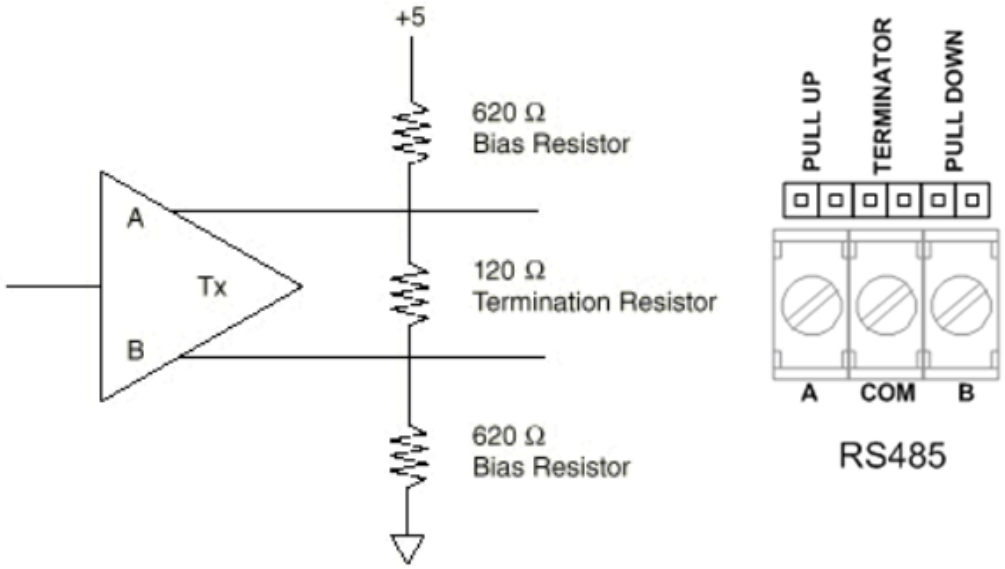
Termination Resistors

Because each differential pair of wires is a transmission line, you must properly terminate the line to prevent reflections. A common method of terminating a two-wire multidrop RS-485 network is to install terminating resistors at each end of the multidrop network. If you daisy-chained multiple instruments together, you need a terminating resistor at only the first and last instruments. The terminating resistor should match the characteristic impedance of the transmission line (typically 100–120 Ohms).



Bias Resistors

The transmission line into the RS-485 port enters an indeterminate state when it is not being transmitted to. This indeterminate state can cause the receivers to receive invalid data bits from the noise picked up on the cable. To prevent these data bits, you should force the transmission line into a known state. By installing two 620 Ohm bias resistors at one node on the transmission line, you can create a voltage divider that forces the voltage between the differential pair to be less than 200 milli-Volts, the threshold for the receiver. You should install these resistors on only one node. The figure below shows a transmission line using bias resistors.
Bias resistors are placed directly on the PCB of controller. Use jumpers PULL UP / PULL DOWN to connect the bias resistors.



Modem recommendations

The controller has to be connected to modem via standard modem cable where the DSR (Data Send Ready) signal detects modem presence (ComAp order code AT-LINK CABL).

Hint:

It is recommended to use the same type of modem on the both sides of connection.
For GSM modem proper set-up use automatic ComAp GSM set-up software from the installation package. Setup software runs independently. In MS Windows select: Start - Program files – Comap PC Suite– Tools – Gm_setup.exe

Analog modem with DC supply

Devolo Microlink 56k I is designed for the industrial applications. Power supply range is 9 - 30 V AC and 9 - 42 V DC. See http://www.devolo.de/.
INSYS Modem 56k small INT 2.0, 10-32 VDC. See www.insys-tec.cz.

Recommended ISDN modem

Askey TAS-200E (power supply 12 V DC)
ASUScom TA-220ST
Devolo Microlink ISDN i

Hint:

The ISDN modems must work in the X.75 or V.120 protocols. The internet connection (HDLC-PPP) does not work.

Recommended CDMA modems

Maxon MM-5100, 800MHz, 1xRTT (tested in Australia)
AirLink Raven XT (tested in USA)

Hint:
The usage possibility depends on the network type.

Recommended GSM modems

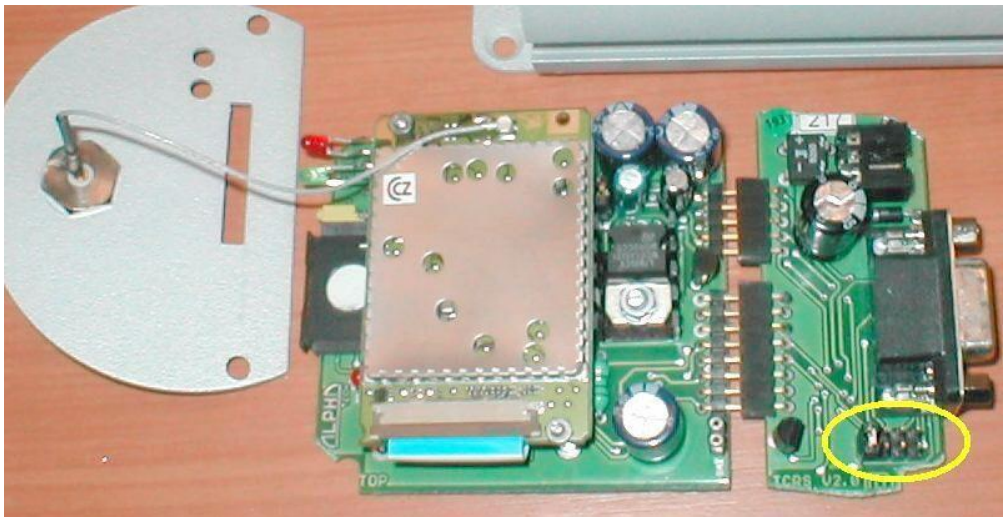
Siemens M20, TC35, TC35i, ES75, MC39 (baud rate 9600 bps), TC65.
Wavecom M1200/WMOD2 (baud rate 9600 bps).
Wavecom - Maestro 20, dual 900/1800MHz.
Wavecom – Fastrack M1306B (GSM/GPRS CI.10 Modem), dual 900/1800 MHz (Fastrack M1206B is **NOT** recommended)
FALCOM A2D, dual 900/1800MHz.
CEP GS64 Terminal
Wavecom Fastrack Supreme 10

GSM modem wiring notes
ID-Lite, ID-FLX-Lite, ID-EM controllers automatically detect modem connection via RS232 - DSR (Data Set Ready) signal. Controllers detect modem when DSR is active and direct connection when passive or not connected.

Any connected modem has to be set to active DSR after switch on and has to be connected via standard modem cable.

Leave I-LB jumper “HW/SW control” opened for this connection.

Hint:
Make sure all signals are connected and activated in modem when it is not possible to open connection. Some types of GSM module have jumpers select table control and handshaking signals.



TC35 Alphatech GSM modem: the first jumper from the left is closed.

When modem **TC35i** does not respond for sending command SMSes, do the following:

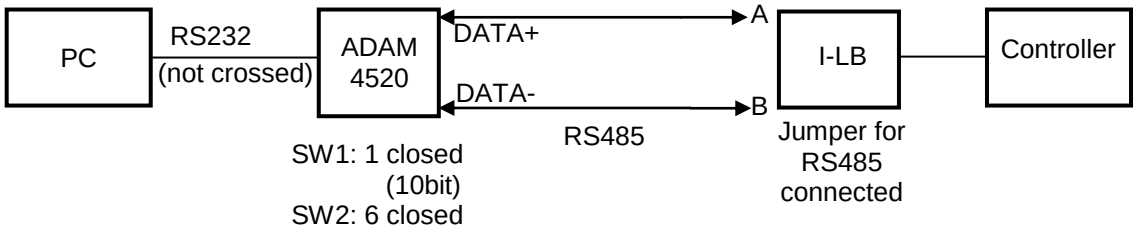
1. Send **AT+CPMS="MT","MT","MT"** command via hyperterminal or by means of ModemIniString parameter.
2. Send **AT+CPMS="SM","SM","SM"** command via hyperterminal or by means of ModemIniString parameter.
3. Restart the modem.

3G modems

The functionality of 3G modems with Comap controllers depends on the operator and his network settings. Therefore it is recommended to first test the controller with such modem.

Recommended converters

Converter RS232 ↔ RS485



General properties of RS232 to RS485 converters:

- Has to be set to passive DSR signal (when DSR connected) after switch on.
- No external data flow control signals are allowed – automatic data flow control required.

Recommended converters

- External:
  ADAM 4520,
  ADVANTECH, (http://www.advantech.com/)

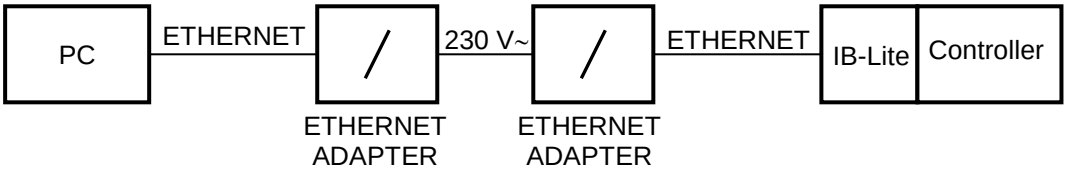
  - DIN rail, automatic RS485 bus supervision, no external data flow control signals, galvanic isolated,
  - When communication is working the LED on ADAM 4520 is going from full illumination to short darkness then again full illuminated
  - When communication of IG-MU is working, PWR and RUN LEDs full red illuminated; TxD and RxD flashing when transmitting
  - When ADAM module is used then connect Rx, Tx-A to DATA+ and Rx, Tx-B to DATA-. Shielding connect to ADAM GND on both sides and external 120ohm resistor between DATA+ and DATA- on ADAM side (in off state). Internal ADAM 4520 switches: set Data format 10 bit and baud rate. Cable must not be crossed (RxD-TxD) RS232 for connection between ADAM and PC SUB9 RS232 connector wiring: 2 – 2, 3 – 3, 5 – 5, 7 – 7.

- Internal for PC:
  PCL-745B or PCL745S,
  ADVANTECH, (http://www.advantech.com/)
  (Dual port RS422/485 Interface card, automatic RS485 bus supervision, no external data flow control signals, galvanic isolated, baud rate 19200 bps)

Hint:

In the case of surge hazard (connection out of building in case of storm etc.) see the “Recommended CAN/RS485 connection” chapter of the IGS-NT-2.2-Installation guide.pdf.

Converter 230 V AC ↔ TCP/IP

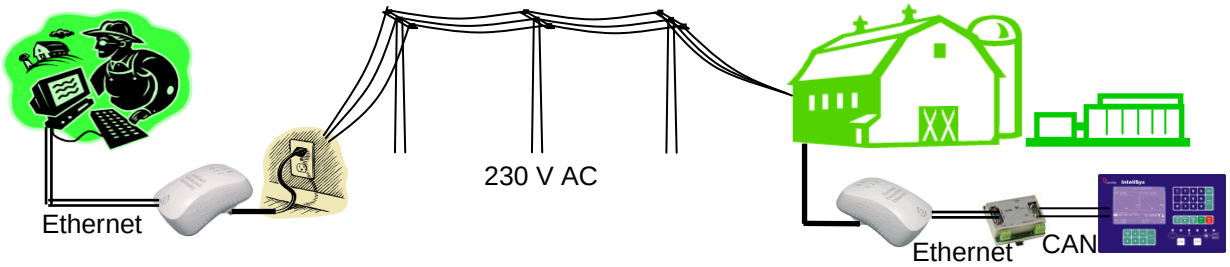


- For installations where IB-Lite is used but internet connection is not available
- The connection can be established using electric grid (230 V AC) using Ethernet/230VAC converters
- Can be used for distances up to 200 meters

Recommended converter

- Powerline Ethernet Wall Mount,
  Corinex Communications (http://www.corinex.com/)

Example



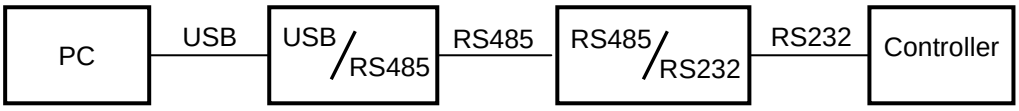
Converter USB ↔ RS232

- Useful for PC/laptops without serial port

Recommended converters

- **UCAB232 Full**,
  ASIX (http://www.asix.cz/)
  UCAB232 is designated for all standard RS232 devices (mouses, modems, data terminals, barcode readers, serial printers) and industrial applications. UCAB232 supports Baud rates from 300 Bd to 250 kBaud (guaranteed) / 500 kBaud (typ.).
- **VPI - USS-101/111**,
  VPI (http://www.vpi.us/usb-serial.html)
  Supports serial devices with speeds up to 230kb/sec (e.g. PDAs, modems, scanners, etc.).
- **C-232-MM**,
  (http://www.usbgear.com/item_288.html)
  The USB Serial Adapter provides instant connectivity with modems, ISDN TAs, PDS, handheld & pocket PCs, digital cameras, POS, serial printers, etc. It supports data rates up to 230 Kbps.

Converter USB ↔ RS485



- Extends distance between PC and controller up to 1200 meters

Recommended converter

- SB485,
  PaPouch elektronika
  (http://www.papouch.com/)

Converter RS-422/485 ↔ Ethernet

Recommended converter

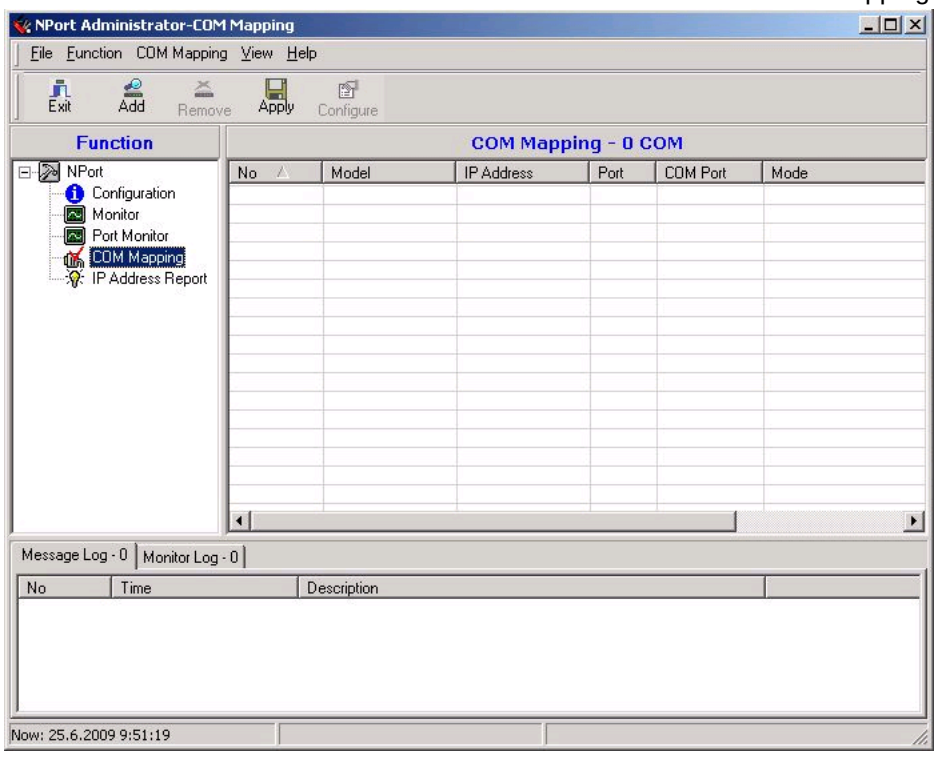
- Nport 6110, MOXA (www.moxa.com)
- NPort 5110
- NPort 5130

Recommended settings

NPort5110

Item	Value
Operation mode	Real COM mode
Network settings – IP address	Static IP

The IP address must be also set in NPort Administrator program. From MOXA webpage download the *NPort Administration Suite.* There is NPort Administrator with function COM mapping:



Here assign the COM port and the IP address.

Nport6110

(Settings in Modbus Gateway Configurator – download from http://web4.moxa.com/support/download.asp)

Card	Item	Value
Network settings	IP Configuration	Static IP
Modbus Settings	Attached Serial Device type	Modbus RTU slave
	Initial delay time	1000
Advanced Modbus Settings	Auto Slave Unit ID	Enable
	Character Timeout	10
	Message Timeout	100
	Modbus/TCP Exception	Yes
Modbus Serial Settings	Interface Mode	Select interface you are using
	Baud Rate	Select Baud rate you are using
	Parity	None
	Data Bits	8
	Stop Bit	1

Controller

ID-DCU
Comms settings: *RS232 Mode* = MODBUS
Comms settings: *MODBUS* = 9600 / 19200 / 38400

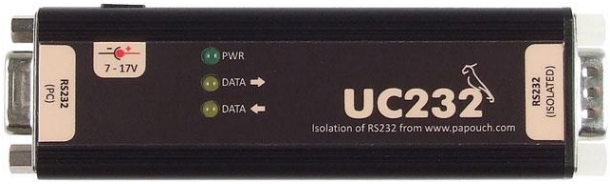
When using RS485 ID-Mobile
Comms settings: *RS485 Mode* = MODBUS

Isolator RS232

- For galvanic separation of the line between Inteli controllers and PC
- Useful when different ground potentials are present

Recommneded isolators

- UC232,
  PaPouch elektronika (http://www.papouch.com/)



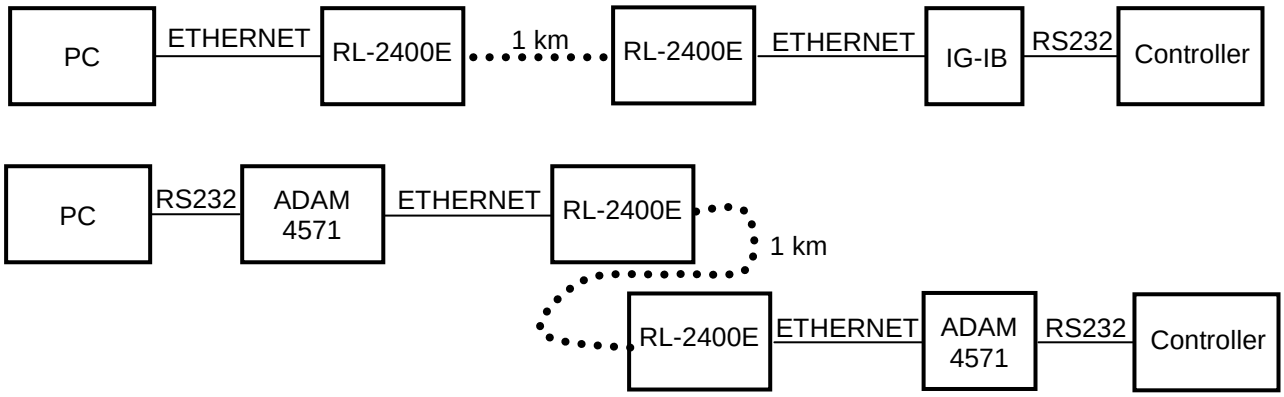
The isolator UC232 can be used instead of UC232-7. The only difference is that UC232 needs external power supply. It can be 5V stabilized or 7-17V unstabilized. The power supply voltage must be specified in the order. Suitable 5V power supply is also available from the Papouch company.

- UC UC232-7,
  PaPouch elektronika (http://www.papouch.com/)

Recommended optical USB extension cables

- Opticis M2-100-xx http://opticis.com
- USB Rover 200 http://www.icron.com

Radio link



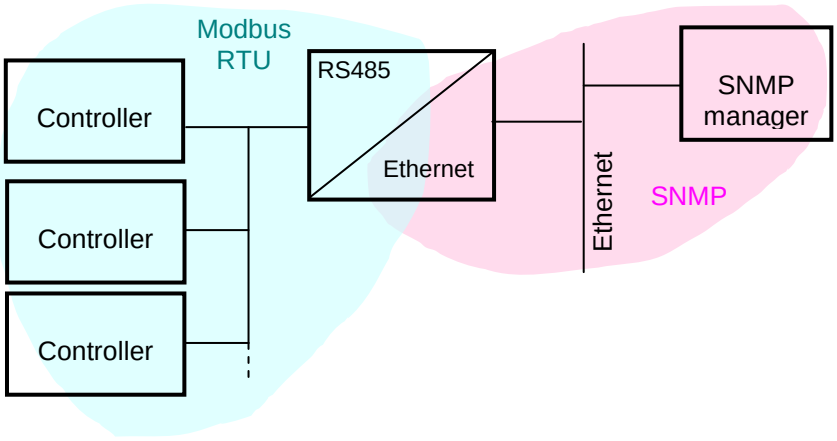
- Useful when the control room is distant from the site
- Can be more economical than to hard wire it

Recommended equipment

- RadioLinx RL-2400E wireless Ethernet switch, ProSoft Technology Inc. (www.prosoft-technology.com)
- ADAM-4571, ADVANTECH (www.advantech.com)
- MOXA DE311, MOXA (www.moxa.com)
- MOXA Nport 5230, MOXA



Converter Modbus RTU ↔ SNMP



- For connection of 1-32 controllers (stadard line) controllers to a SNMP supervision system
- Supports GET, SET, TRAP transactions

Hint:
For testing purposes there is IG-NT controller with this converter on address 195.122.193.153 (controller address = 1). Appropriate MIB table is available on www.comap.cz.

MIB Table
The MIB table contains following data objects
Read only:

Modbus Register(s)	Com.Obj.	Name	Dim	Type*	Decimals
40003	8253	Binary inputs		Binary16	
40012	8239	Binary outputs		Binary16	
40013	8213	Ubat	V	Integer16	1
40016	9155	Analog inp. 1 CU		Integer16	1
40017	9156	Analog inp. 2 CU		Integer16	0
40018	9157	Analog inp. 3 CU		Integer16	0
40168	9574	ControllerMode		Unsigned16	-
40249	8192	Gen V L1-N	V	Unsigned16	0
40250	8193	Gen V L2-N	V	Unsigned16	0
40251	8194	Gen V L3-N	V	Unsigned16	0
40256	8210	Gen freq	Hz	Unsigned16	1
40261	8204	Pwr factor		Integer16	2
40262	8395	Load char		Char	
40264	8202	Act power	kW	Integer16	0
40288	8195	Mains V L1-N	V	Unsigned16	0
40289	8196	Mains V L2-N	V	Unsigned16	0
40290	8197	Mains V L3-N	V	Unsigned16	0
40296	8211	Mains freq	Hz	Unsigned16	1
43589	8207	Num starts		Unsigned16	0
43587	8206	Run hours	h	Integer 32	0
46354		Num items alarmlist		Unsigned16	
46669		Item 1 alarmlist		String	
46694		Item 2 alarmlist		String	
46719		Item 3 alarmlist		String	

Modbus Register(s)	Com.Obj.	Name	Dim	Type*	Decimals
46744		Item 4 alarmlist		String	
46769		Item 5 alarmlist		String	
46794		Item 6 alarmlist		String	
46819		Item 7 alarmlist		String	
46844		Item 8 alarmlist		String	
46869		Item 9 alarmlist		String	
46894		Item 10 alarmlist		String	
46919		Item 11 alarmlist		String	
46944		Item 12 alarmlist		String	
46969		Item 13 alarmlist		String	
46994		Item 14 alarmlist		String	
47019		Item 15 alarmlist		String	
47044		Item 16 alarmlist		String	

Read / Write

43027	8315	ControllerMode	Unsigned16
46359		Action argument	Integer32

Write only

24470	24470	User identification number	Unsigned16
24524	24524	Password	Unsigned16
46361		Action command	Unsigned16

* SNMI data types are INTEGER32 for all numerical values except “Run hours”, which is GAUGE32. The column “Type” means how the data shall be interpreted.

Converter settings

Setup of the converter is done via TELNET at port **9999** instead of standard port 21. The default IP address is 192.168.1.254.

To enter setup mode:

1. Connect the converter to LAN
2. Put command “telnet 192.168.1.254 9999” to the windows command line on any computer connected to the same LAN

Setup procedure:

1. Press “0” key to change server configuration (converter IP address, netmask, gateway address etc..)
2. Press “1” key to change device configuration (read/write community, SNMP manager address*..)
3. Press “9” key to save parameters to the memory and exit setup mode

**SNMP manager address* is IP address of the device the TRAPs are addressed to.

Controller settings

ID-DCU

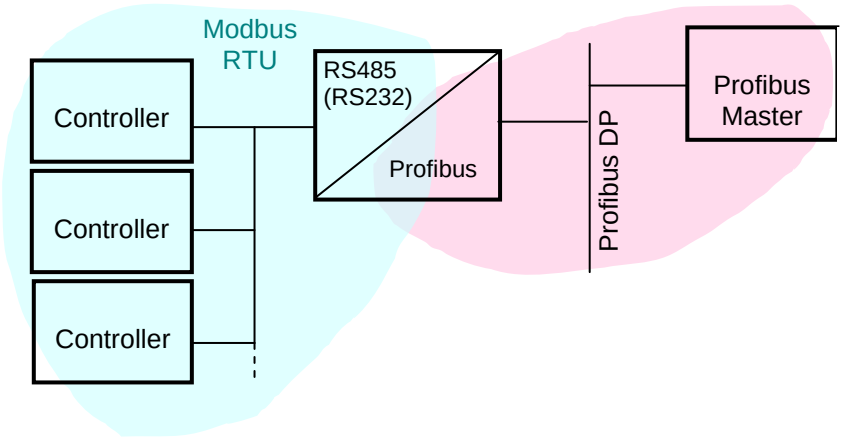
Comms settings: *RS232 Mode* = MODBUS

Comms settings: *MODBUS* = 57600

Hint:

The converter provides communication only with controllers (addresses) that are present on startup of the converter. It means any controller powered-up later than the converter is not recognized and supported. The converters are supposed to work with controllers.

Converter Modbus RTU ↔ Profibus



- For connection of 1-32 controllers to a Profibus network
- RS485 or RS232 physical layer for connection to the controller(s)
- Full Profibus-DP slave functionality according IEC61158
- 244 bytes input data size (122 Modbus registers)
- 244 bytes output data size (122 Modbus registers)
- 416 bytes total
- See deatils on the web page of the manufacturer: http://www.geindustrial.com/cwc/Dispatcher?REQUEST=PRODUCTS&pnlid=6&id=p485

Converter settings

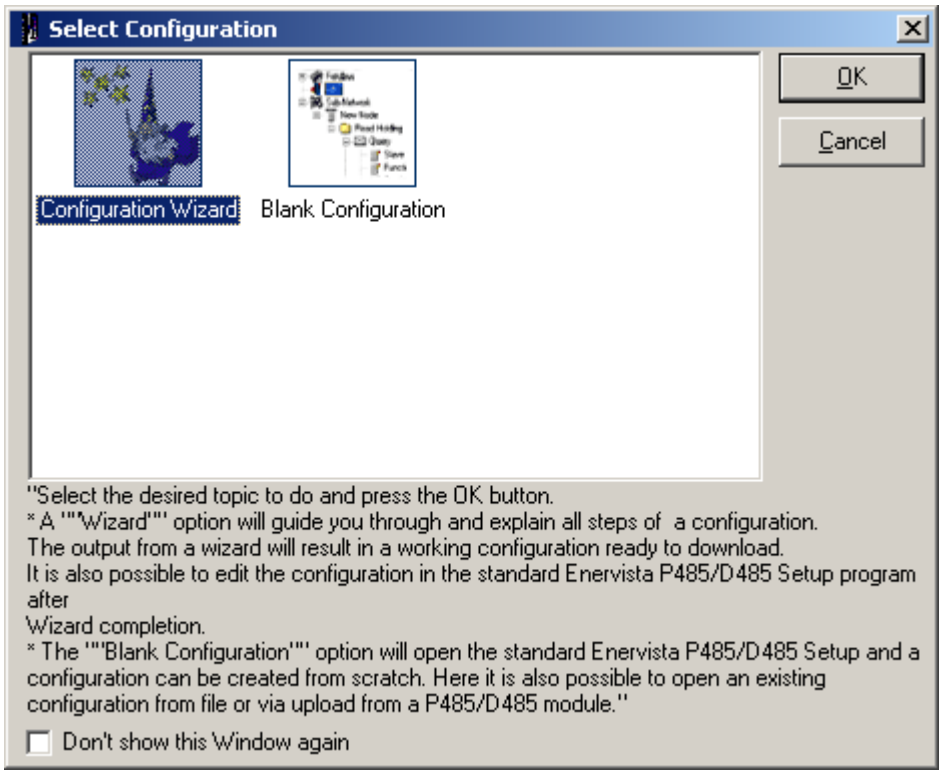
- Use EnerVista software to setup the converter. It can be downloaded from the web page http://pm.geindustrial.com/download/download.asp?id=p485&file=1.
- To configure the converter in the Profibus network, download the description file http://www.geindustrial.com/products/software/d485/P48509E5.zip and import it to the Profibus configuration tool.

Follow instructions in the P485 manual while configuring the converter. The setup wizard incorporated in the Enervista software will make the setup process much easier, but finally some manual corrections are needed. Below are some notes specific to the connection with ComAp controllers.

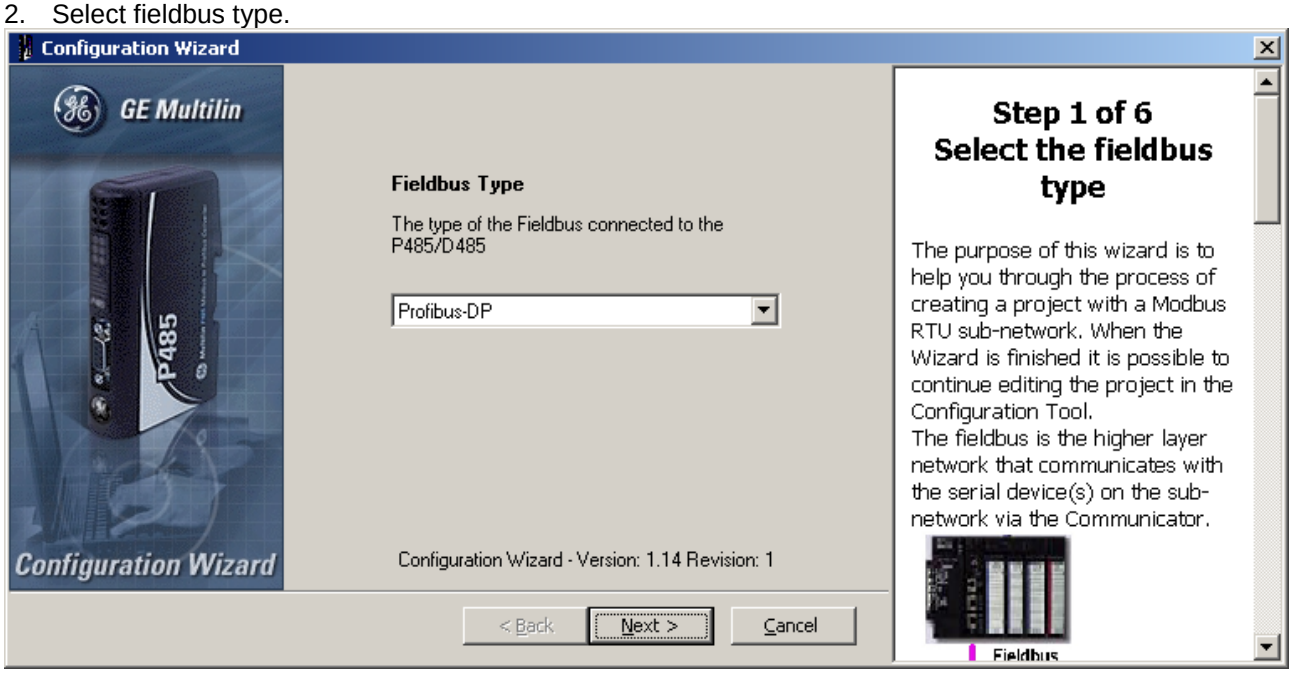
1. The physical layer for Modbus communication is select table. The selected type (RS232/RS485) and speed must be same in the P485 and controller, see Controller settings.
2. Use RS485 in case more controllers are connected to the P485.
3. A *Device* mentioned in the wizard represents a controller type. Once a device is defined, more nodes of the same type (device) can be created easily.
4. A *modbus network node* represents a controller. The *slave address* must correspond to the Controller address setpoint of the related controller.
5. See Modbus Connection chapter in this document for details about Modbus, register numbers, sizes etc.
6. **Use triggered update mode for writing objects (registers) to the controller. Never use cyclic update mode!**

Setup example (using wizard):

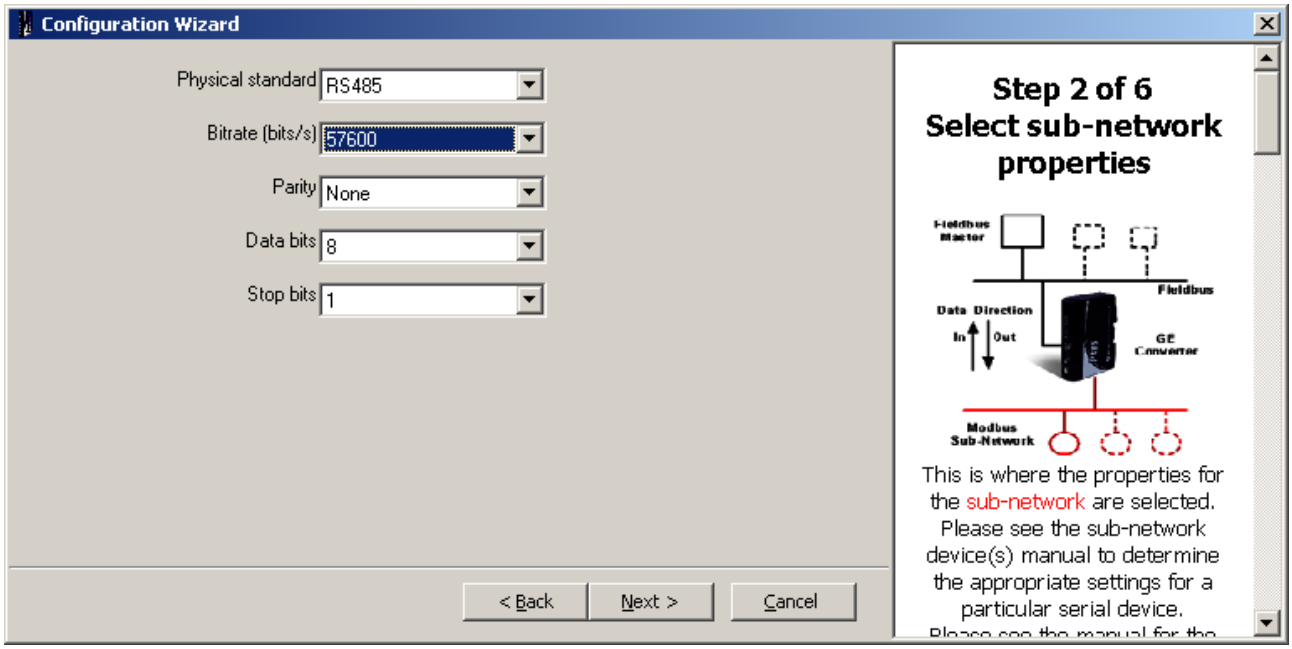
1. Select wizard.



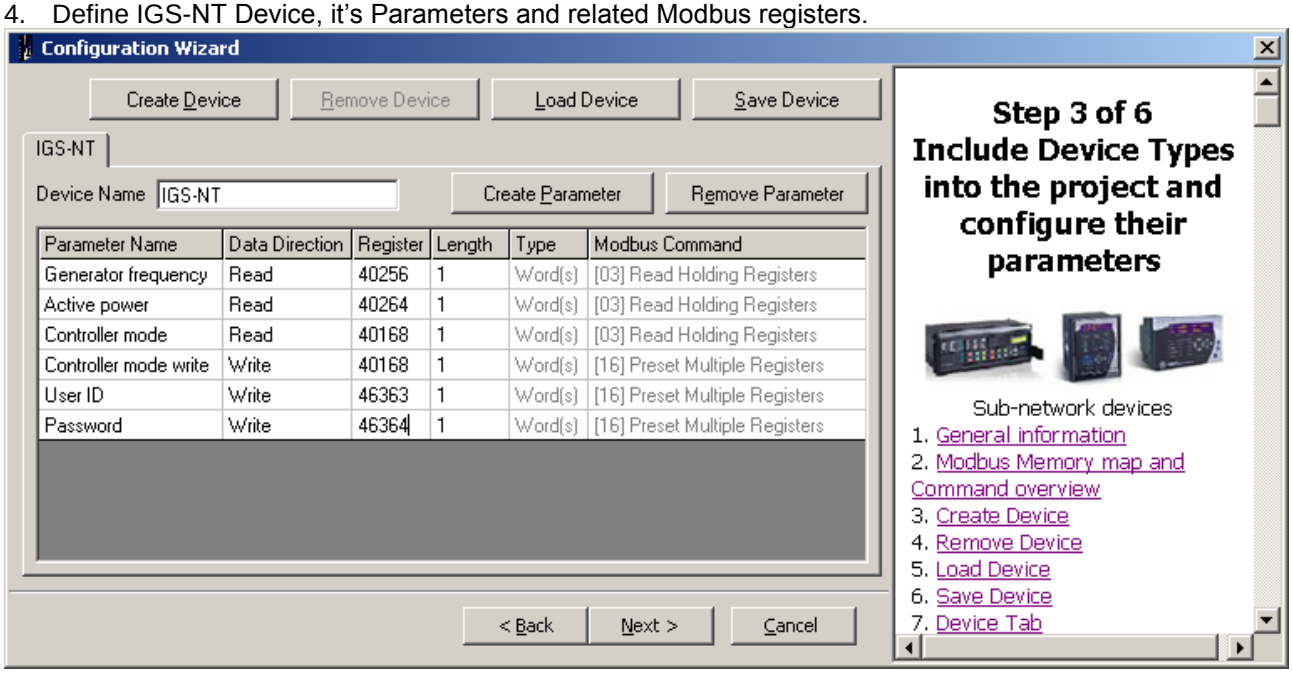
2. Select fieldbus type.



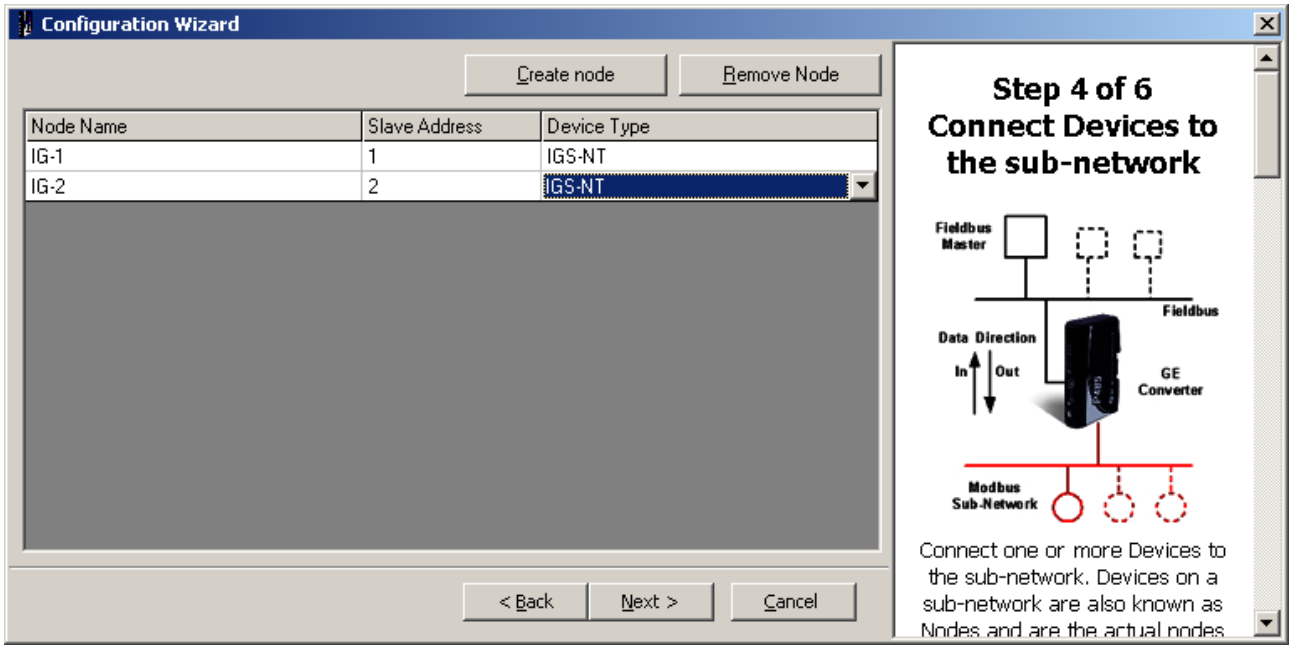
3. Select physical layer and communication parameters for Modbus.



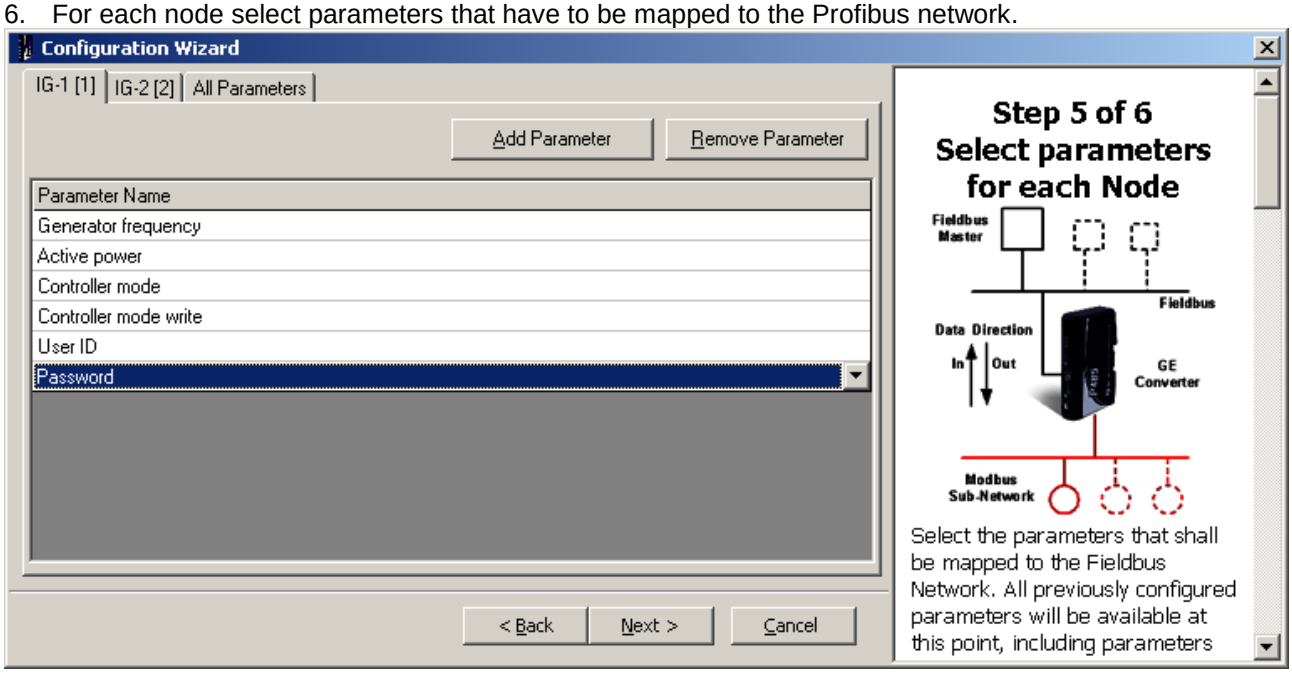
4. Define IGS-NT Device, it's Parameters and related Modbus registers.



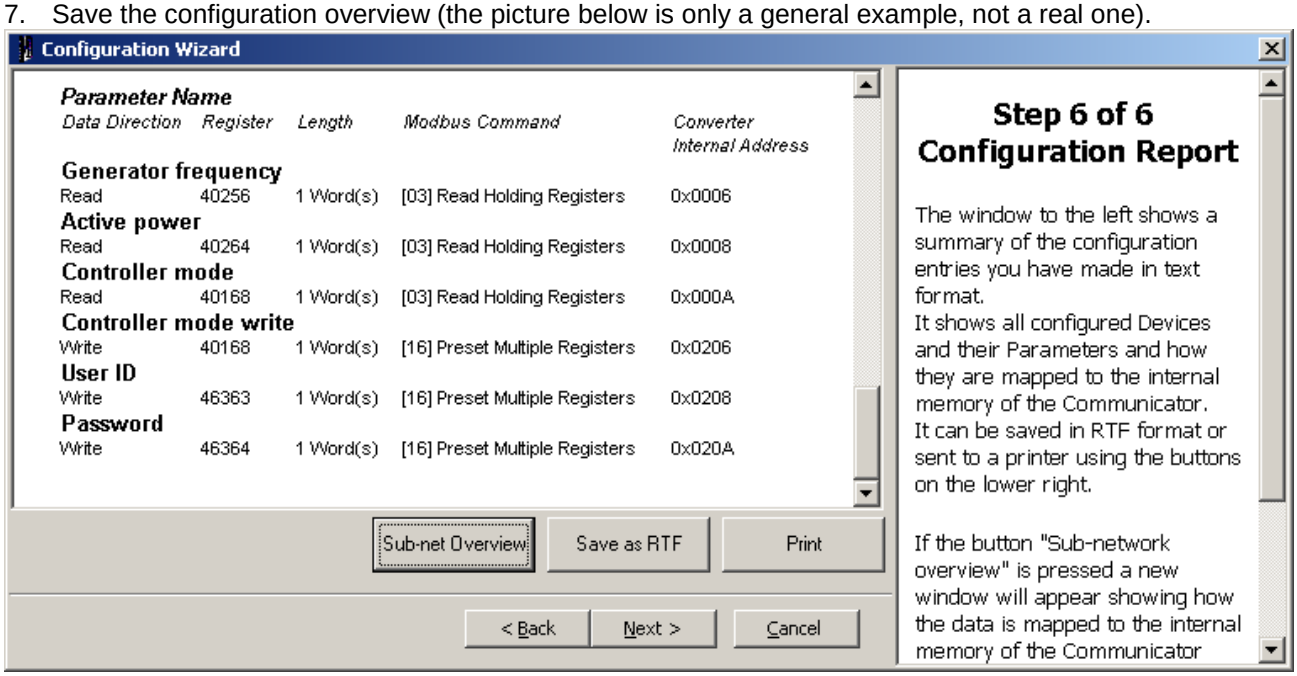
5. Define nodes connected to the Modbus network.



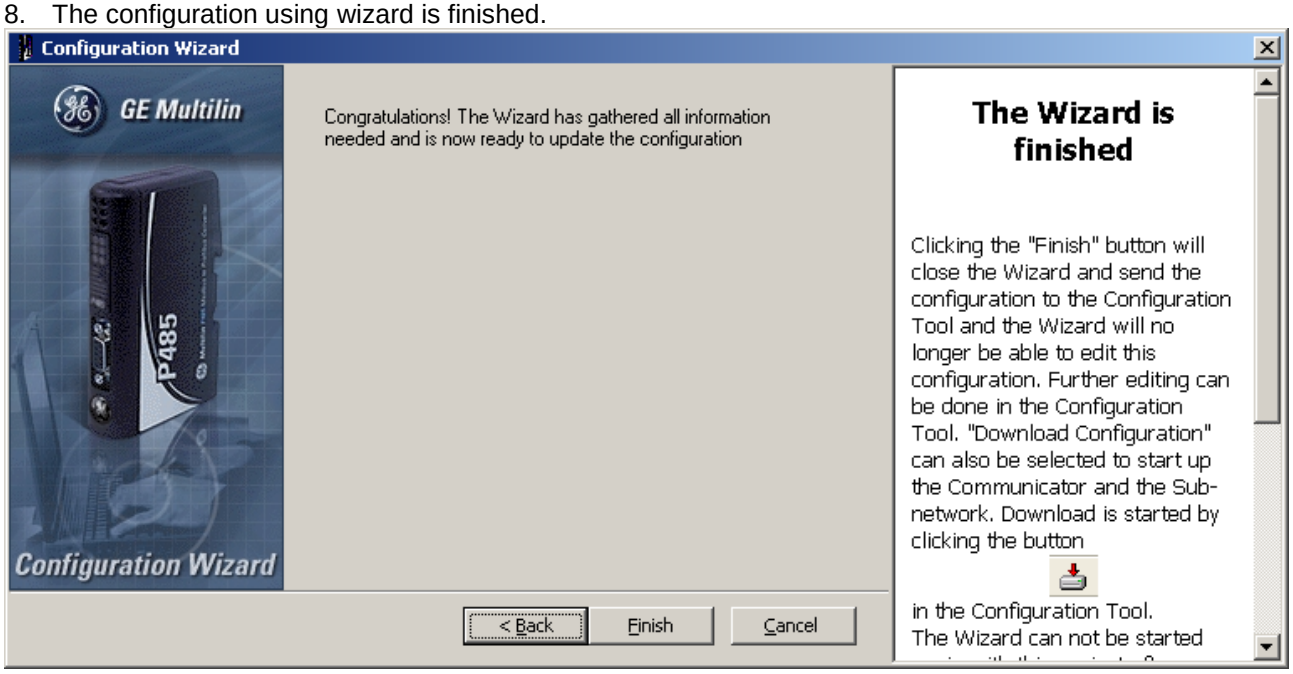
6. For each node select parameters that have to be mapped to the Profibus network.



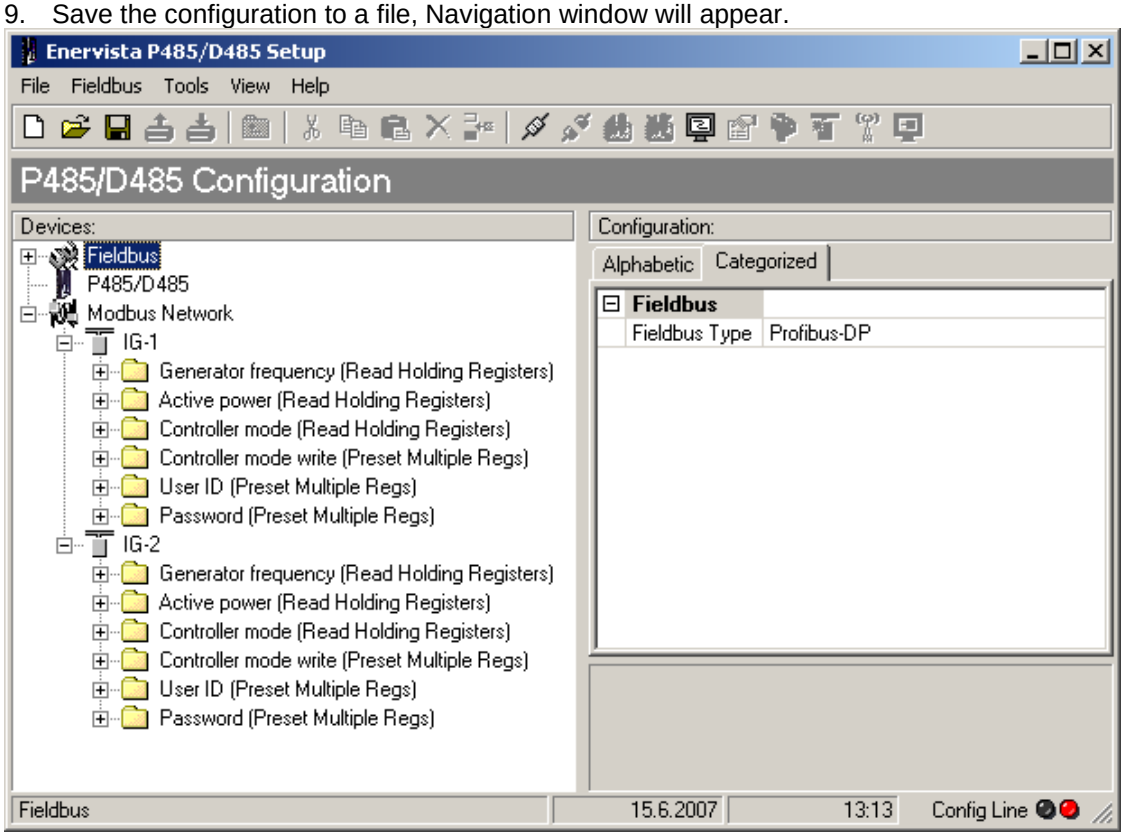
7. Save the configuration overview (the picture below is only a general example, not a real one).



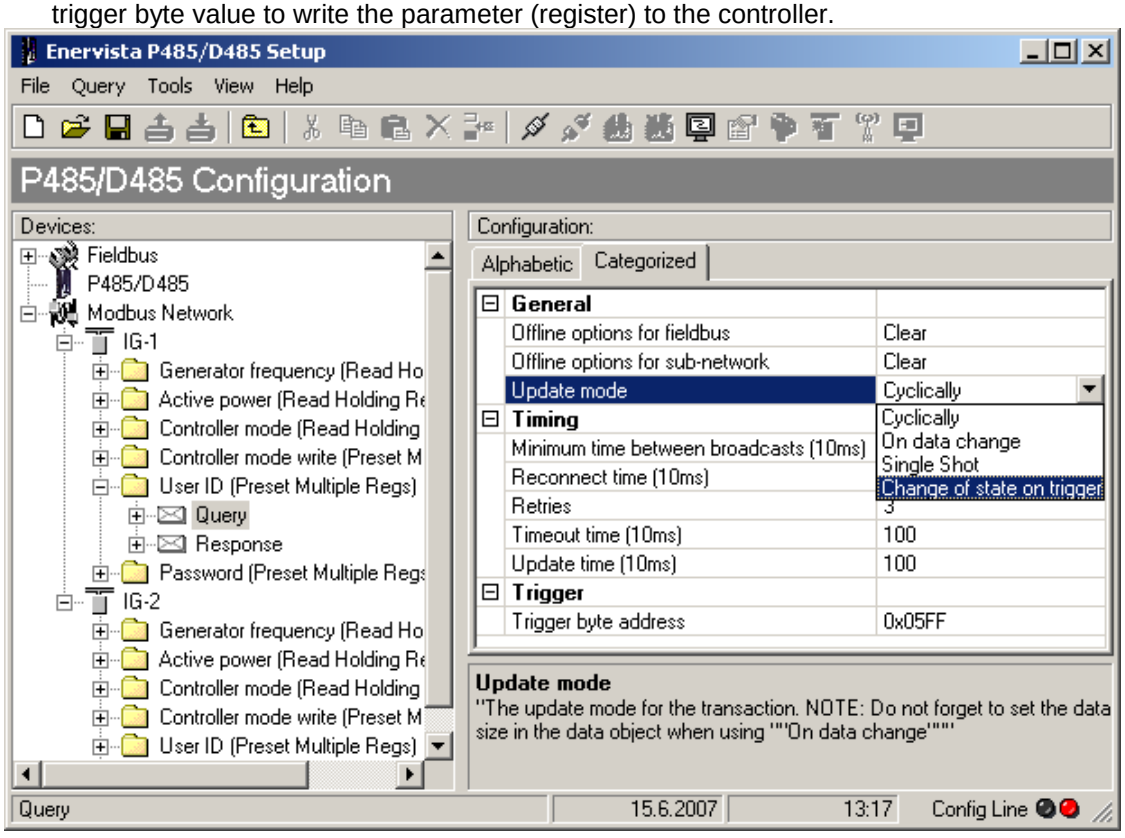
8. The configuration using wizard is finished.



9. Save the configuration to a file, Navigation window will appear.



10. For each write-type parameter modify the property *Update mode* to triggered mode and define *trigger byte address*. The Profibus master must update the parameter data field first and then increase the trigger byte value to write the parameter (register) to the controller.



11. Write the configuration to the P485 and save it also to disk as backup.

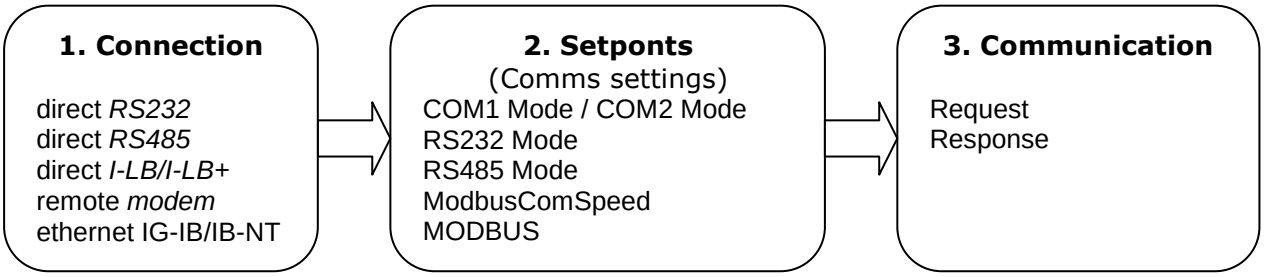
Appendix II

Modbus connection

Modbus protocol was implemented into the controllers to enable the customer to design its own supervision software.

To learn more about Modbus interface see the training videos on
http://www.comap.cz/support/training/training-videos/

Modbus step by step



Important setpoints in the controller

There are a lot of possibilities of Modbus connection to single or multiple controllers : direct via RS232, RS485, via Modem or ethernet.

Controller configuration:
ID-Lite, ID-FLX-Lite, ID-EM
Basic Settings:*COM1 Mode* = [DIRECT, MODEM, MODBUS, ECU LINK]
Basic Settings:*COM2 Mode* = [DIRECT, MODEM, MODBUS, ECU LINK]
ID-DCU
Basic Settings:*RS232 Mode* = [DIRECT, MODBUS, ECU LINK]
ID-Mobile
Comms Settings:*RS485 Mode* = [DIRECT, MODBUS, ECU LINK]

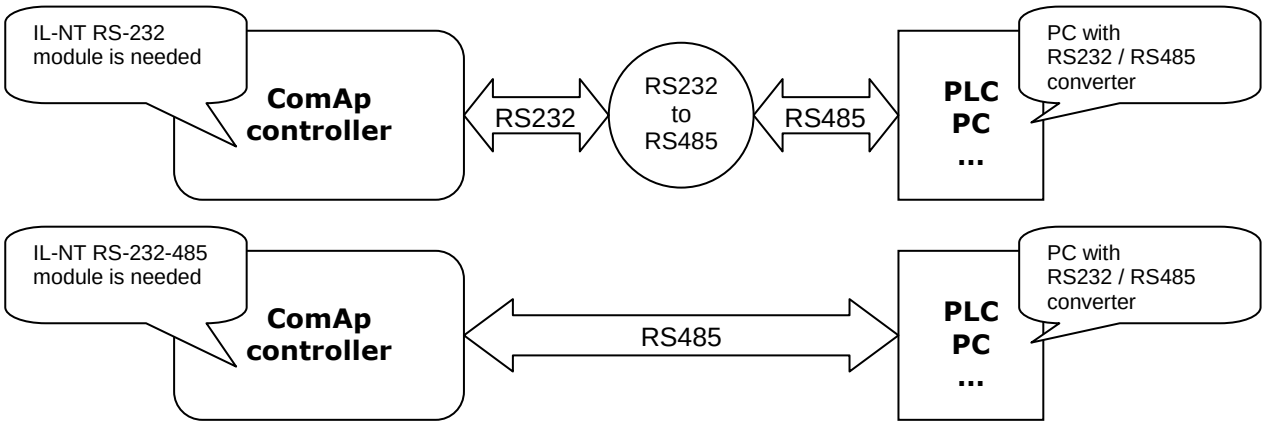
Selection of Modbus communication speed:
ID-Lite, ID-FLX-Lite, ID-EM
Basic Settings:*ModbusComSpeed* = [9600 , 19200 , 38400 , 57600] bps
ID-DCU
Basic Settings:*MODBUS* = [9600 , 19200 , 38400] bps
ID-Mobile
Comms Settings:*MODBUS* = [9600 , 19200 , 38400 , 57600] bps

Example for ID-Lite, analogous for other InteliDrive controllers

Modbus communication via RS232 – single controller
Controller configuration:
Basic Settings:*COM1 Mode, (COM2 Mode)* = **MODBUS**
Basic Settings:*ModbusComSpeed* = **select of Modbus communication speed**

Modbus communication via RS485

Controller configuration:
Basic Settings:*COM1 Mode, (COM2 Mode)* = **MODBUS**
Basic Settings:*ModbusComSpeed* = **select of Modbus communication speed**



Hint:

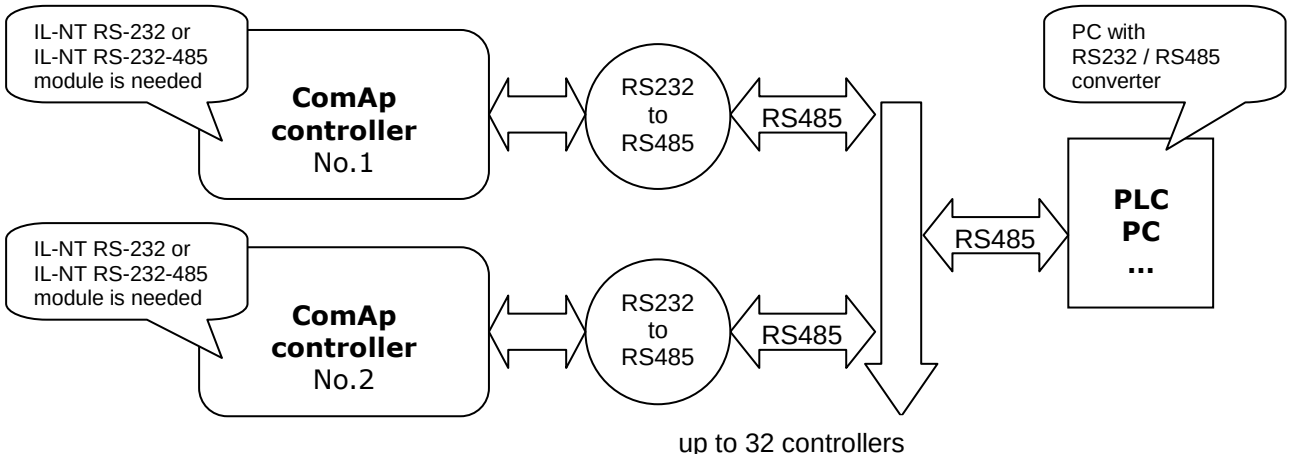
The RS232/RS485 converter is not included in the IL-NT RS-232 accessory module for IL-NT and IC-NT controllers (external RS232/RS485 converter is needed).
The RS232/RS485 converter is included in the IL-NT RS-232-485 accessory module for IL-NT and IC-NT controllers (no external RS232/RS485 converter is needed).

Hint:

RS485 communication line has to be terminated by 120 ohms resistors at both ends – follow converter user manual. RS485 communication can be used for more controller monitoring and controlling via InteliMonitor.

Modbus communication via RS485 – multiple controllers

Controller configuration:
Basic Settings:*COM1 Mode, (COM2 Mode)* = **MODBUS**
Basic Settings:*ModbusComSpeed* = **select of Modbus communication speed**



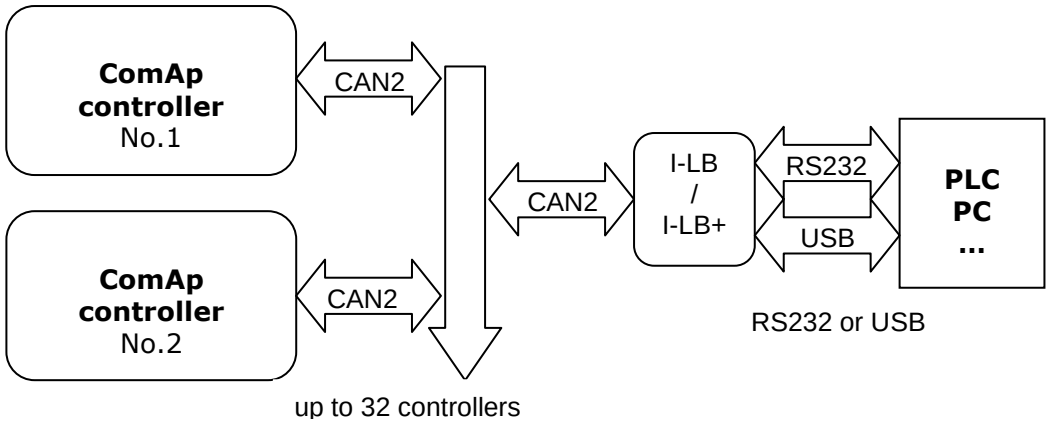
Hint:

External RS232/RS485 converter is not needed, when IL-NT RS232-485 accessory module is used.

Example for ID-DCU, ID-Mobile

Modbus communication via I-LB

I-LB / I-LB+ configuration:
Jumpers P13, P14 = **select of Modbus communication speed**
Jumper P16 = **Modbus**
Jumper P17 = **Address 1 or Address 2**
Jumper P18 = **Direct**

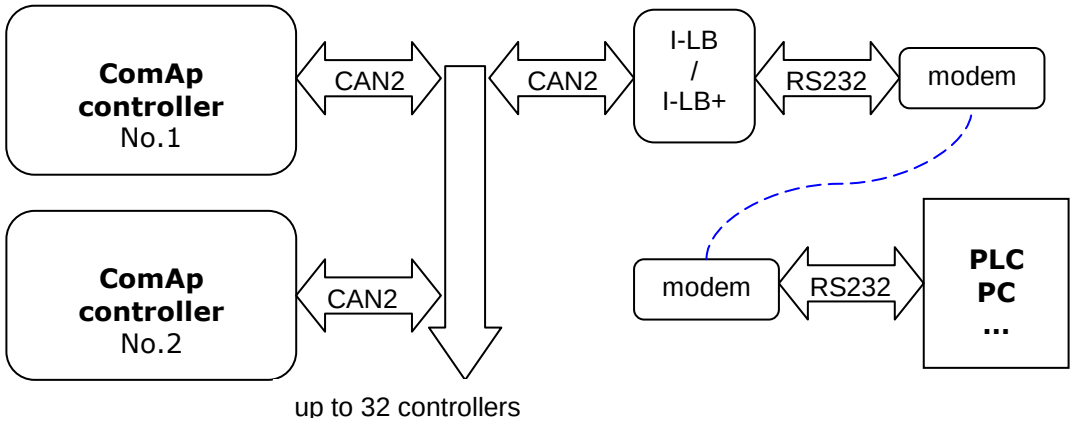


Hint:
To use I-LB Modbus communication connect Modbus jumper in I-LB unit (P16). Additionally, you can choose the communication speed using the speed selection jumpers (P13, P14). Their combination allows the speed settings of 9600 / 19200 / 38400 / 57600 bps.

Modbus communication via modem

I-LB / I-LB+ configuration:
Jumpers P13, P14 = **select of Modbus communication speed**
Jumper P16 = **Modbus**
Jumper P17 = **Address 1 or Address 2**
Jumper P18 = **Modem**

and correct modems settings – see modem data sheet.



Modbus communication

Hint:
In the firs time, you have to correctly configure the controller connection.

Data reading

The function Read Multiple Registers has to be used for data reading. The terminal sends a query and from the controller receives either the normal response containing the requested data or the exceptional response indicating a read error.

- It is possible to use function 3 for reading (*Read Multiple Registers*).
- It is not possible to read from the middle. The register number must correspond with the beginning of the data object. The only exception are the objects of „multipacket values“ (registers 46367 – 46491) and „data part of the history record“ (registers 46543 – 46667).
- All read registers must be implemented. If an unimplemented register appears among the read registers, the controller returns an error message.
- Even unnamed values can be included among read registers (See Cfg image - column Name = (N/A)). The read value must be treated as meaningless.
- The length of a block is 127 registers.

Data writing

All data can be written by the function Write Multiple Registers. Data up to 2 bytes can be written by the function Write Single Register, too. The terminal sends a query containing a written data and the controller either confirms it (normal response) or refuses it (exceptional response).

- For writing it is possible to use function 6 (*Write Single Register*) or function 16 (*Write Multiple Registers*).
- Using function 16 it is possible to write maximum 16 registers at once.
- Data cannot be written from the middle. Register number must correspond with the beginning of the data object. Written data must be complete to perform writing of all requested data objects.
- Writing to EEPROM is executed using a queue. The queue is common for writing from all terminals. The request for next writing is accepted in case that there is empty space in the queue. Otherwise the controller returns an error message and the terminal must repeat the request.
- All written registers must be implemented. If an unimplemented register appears among the read registers, the controller returns an error message.
- It is possible to include also unnamed registers in the written sequence (See Cfg image - column Name = (N/A)). The controller confirms this writing but writing of unnamed registers is not performed.

Request:

- controller address (1 - 32), you can set or check your controller's address in the controller setpoints. *Setpoints -> Comms settings -> Contr.address*
- Modbus function code, you can use the 3, 6, 16 Modbus function code,

  Function 3 (Read Multiple Registers)
  Function 6 (Write Single Register)
  Command 10
  Function 16 (Write Multiple Registers)

- Register address (40001 - 47168), it means Modbus address of controller communication object (setpoint, value, et al.). You can crate list of Modbus registers, if you can't find the register address in this list, see the table of dedicated communication objects.
- Number of registers (1 - 127). It means, how many registers you want read.
- CRC (no range)

After sent your request, you receive the response. The response has also five parts:

- Controller address (1 - 32), the same as the address in the request
- Modbus function code (3,6,16, …), mostly the same as in the request
- Length of data (1 - 127), here is specified the length of the received data
- Data (0 - FF), data are in the HEX form, length is defined above
- CRC (no range)

Examples of Modbus communication

In this chapter are some examples, how does communicate controller via Modbus.

Battery voltage – reading (read multiple registers)

Request: **01 03 00 32 00 01** 25 5C

01 = Controller address
– *see your controller settings*

03 = Modbus function code (Read Multiple Registers)

00 32 = Register address: Register number (Ubat => 40051 for *IL-NT*) (Ubat => 40058 for *IC-NT*)
– 40051 - 40001 = 50 DEC => 0032 HEX
– *see your Cfg Image or list of dedicated communication objects*

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

00 01 = Number of registers
– 40013, it is one register = 01 DEC => 0001 HEX
– *you have to calculate number of register which you want read*

5C 25 = CRC
–*CRC has to be written LSB then MSB ! See how to calculate CRC. or implementation in C language – page 101.*

Response: **01 03 02 00 DC** B9 DD

01 = Controller address
– *see your controller settings*

03 = Modbus function code (Read Multiple Registers)

02 = Length of read data in Bytes (in HEX)
– 02 HEX => 2 DEC
– *define the length of data*

00 DC = Value of battery voltage
– DC HEX => 220 DEC => Batt. voltage is represented with 1 decimal => 22,0 VDC
– *convert the data from hex to dec. Use the multiplication factor (In this case 0.1) !*

DD B9 = CRC
– *check with your CRC, because of data validity*

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

Values (Oil press, Engine temp, Fuel level) – reading

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

Binary input - reading

Request: **01 03 00 3D 00 01 15 C6**

01 = Controller address
03 = Modbus function code (Read Multiple Registers)
00 3D = Register address: Register number (40062) – 40001 = 61 DEC => 3D HEX *IL-NT*
Register address: Register number (40069) – 40001 = 68 DEC => 44 HEX *IC-NT*
00 01 = Number of registers (40001) = 01 DEC => 01 HEX
C6 15 = CRC (write LSB MSB !)

Response: **01 03 02 18 01 73 84**

01 = Controller address
03 = Modbus function code (Read Multiple Registers)
02 = Length of read data in Bytes (in HEX)
18 01 = Object data value (Binary input = 0001100000000001 i.e. B1, B12 and BI3 are set)*
84 73 = CRC

* Table of binary inputs (BI)

BI16	BI15	BI14	BI13	BI12	BI11	BI10	BI9	BI8	BI7	BI6	BI5	BI4	BI3	BI2	BI1
1				**8**				**0**				**1**			
0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1

Password decode - reading

Request: **01 03 00 71 00 02 94 10**

01 = Controller address
03 = Modbus function code (Read Multiple Registers)
00 71 = Register address: Register number (40114) – 40001 = 113 DEC => 71 HEX *IL-NT*
Register address: Register number (40143) – 40001 = 142 DEC => 8E HEX *IC-NT*
00 02 = Number of registers (40112 and 40113) = 02 DEC => 02 HEX
10 94 = CRC (write LSB MSB !)

Response: **01 03 04 68 73 90 00 7B 88**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
04 = Length of read data in Bytes (in HEX)
68 73 90 00 = 68739000 HEX => 1752403968 DEC = > password decode is **1752403968**
88 7B = CRC

Gen-set name - reading

Request: **01 03 0B C5 00 08 56 15**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
0B C5 = Register address: Register number (43014) – 40001 = 3013 DEC => BC5 HEX *IL-NT*
Register address: Register number (43017) – 40001 = 3016 DEC => BC8 HEX *IC-NT*
00 08 = Number of registers (43001 - 43008) = 08 DEC => 08 HEX
15 56 = CRC (write LSB MSB !)

Response: **01 03 10 49 4C 2D 4E 54 2D 41 4D 46 32 35 00 14 00 00 00 96 04**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
10 = Length of read data in Bytes (in HEX)
49 4C = Object data value (IL)
2D 4E = Object data value (-N)
54 2D = Object data value (T-)
41 4D = Object data value (AM)
46 32 = Object data value (F2)
35 00 = Object data value (5 _)
14 00 = Object data value (_ _)
00 00 = Object data value (_ _) =.> gen-set name is **IL-NT-AMF25**
04 96 = CRC

Controller Mode - reading

Request: **01 03 00 46 00 01 65 DF**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
00 46 = Register address: Register number (40071) – 40001 = 070 DEC => 46 HEX *IL-NT*
Register address: Register number (40080) – 40001 = 079 DEC => 4F HEX *IC-NT*
00 01 = Number of registers (40163)
DF 65 = CRC (write LSB MSB !)

Response: **01 03 02 00 00 B8 44 84**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
02 = Length of read data in Bytes (in HEX)
00 00 = Object data value – see the List#10 in the Cfg Image => **(OFF)**
84 44 = CRC

A part of Cfg Image (Modbus Register …)

Register(s)	Com.Obj.	Name	Dim	Type	Len	Dec	Min	Max	Group
43131	8315	ControllerMode		List#10	1	-	60	63	Basic Settings
43132	8482	Yel Alarm Msg		List#11	1	-	188	189	SMS/E-Mail
43133	8484	Red Alarm Msg		List#11	1	-	188	189	SMS/E-Mail

A part of Cfg Image (Modbus Register …)

List#10

Value	Name
0	OFF
1	MAN
2	AUT
3	TEST

Gear teeth – writing

Request: **01 06 0B D7 00 7D FB F7**
01 = Controller address
06 = Modbus function code (Write Single Register)
0B D7 = Register address: Register number (43032) – 40001 = 3031 DEC => BD7 HEX *IL-NT*
Register address: Register number (43035) – 40001 = 3034 DEC => BDA HEX *IC-NT*
00 7D = Gear teeth > 125 DEC => 7D HEX
F7 FB = CRC (write LSB MSB !)

Response: **01 06 0B D7 00 7D FB F7**
01 = Controller address
06 = Modbus function code (Write Single Register)
0B D7 = Register addres
00 7D = Set the setpoint gear teeth to > 7D HEC => 125 DEC = **125**
F7 FB = CRC

Nominal RPM – writing

Request: **01 06 0B D5 01 F4 9A 01**
01 = Controller address
06 = Modbus function code (Write Single Register)
0B D5 = Register address: Register number (43030) – 40001 = 3029 DEC => BD5 HEX *IL-NT*
Register address: Register number (43033) – 40001 = 3032 DEC => BD8 HEX *IC-NT*
01 F4 = Nominal power > 500 DEC => 1F4 HEC
01 9A = CRC (write LSB MSB !)

Response: **01 06 0B D5 01 F4 9A 01**
01 = Controller address
06 = Modbus function code (Write Single Register)
0B D5 = Register addres
01 F4 = Set the setpoint nominal power to > 1F4 HEC => 500 DEC = **500**
01 9A = CRC

Mode – writing

Request: **01 06 0C 3A 00 00 AA 97**
01 = Controller address
06 = Modbus function code (Write Single Register)
0C 3A = Register address: Register number (43131) – 40001 = 3130 DEC => C3A HEX *IL-NT*
Register address: Register number (43157) – 40001 = 3156 DEC => C54 HEX *IC-NT*
00 00 = Set the controller mode to > OFF **=>** 00 **–** see the List#10 in the Cfg Image
97 AA = CRC (write LSB MSB !)

A part of Cfg Image (Modbus Register …)

List#10

Value	Name
0	OFF
1	MAN
2	AUT
3	TEST

Response: **01 06 0C 3A 00 00 AA 97**
01 = Controller address
06 = Modbus function code (Write Single Register)
0C 3A = Register addres
00 00 = Object data value > **OFF**
97 AA = CRC (write LSB MSB !)

History – reading

See more information about History reading on page *101.*

Hint:
If you use the ModScan32 PC tool, use the script for this issue.

1 of 3 - first the index of history record must be entered:
Request: **01 06 18 D4 00 00 CF 52**
01 = Controller address
06 = Modbus function code (Write Single Register)
18 D4 = Register address of the history index (46357) – 40001 = 6356 DEC => 18D4 HEX
00 00 = First history record (index = 0)
52 CF = CRC (write LSB MSB !)

Response: **01 06 18 D4 00 00 CF 52**

A part of dedicated communication objects table

Registers (*)	Register addresses (*)	Number of registers	Access	Data type	Meaning
46354	6353	1	read	Unsigned8	Number of records in the alarm list
46356	6355	1			Reserved (register not implemented)
46357	6356	1	read/write	Integer16	Index of requested history record (# 5)
46493 – 46541	6492 – 6540	50	read	String	Header of the particular history record (# 1)
46543 – 46667	6542 – 6666	125	read	Domain	Data part of the particular history record (# 2)
46668	6667	1			Reserved (register not implemented)
46669 – 46693	6668 – 6692	25	read	String	1. record in alarm list (# 1)
46694 – 46718	6693 – 6717	25	read	String	2. record in alarm list (# 1)
46719 – 46743	6718 – 6742	25	read	String	3. record in alarm list (# 1)

2 of 3 - reading of history record header:
Request: **01 03 19 5C 00 32 03 51**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
19 5C = Register address of history record header (46493) *2 – 40001 = 6492 DEC => 195C HEX
00 32 = Number of registers > 46493 – 46541 => 50 DEC => 32 HEX
51 03 = CRC (write LSB MSB !)

Response: **01 03 64 4D 43 42 20 63 6C 6F 73 65 64 20 20 20 20 20 20 20 20 20 30 33 2F 30 39 2F 32 30 30 38 20 20 31 35 3A 34 34 3A 35 37 2E 39 00 … 00 00 0E E0**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
64 = Length of read data in Bytes (in HEX)
4D .. 39 … = Object data value > 1.record in alarmlist is **MCB closed** **03.09.2008 15:44:57.9**
E0 0E = CRC

3 of 3 - reading of the data part of history record:
Request: **01 03 19 8E 00 7D E2 9C**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
19 8E = Register address of history record header (46543) – 40001 = 6542 DEC => 198E HEX
00 7D = Number of registers > 46542 – 46667 => 125 DEC => 7D HEX
9C E2 = CRC (write LSB MSB !)

Response: **01 03 FA 00 00 00 00 00 00 00 20 00 … 00 00 F4 01 FD 00 FD 00 FD 00 00 00 00 00 00 00 00 64 20 00 00 00 00 64 00 D8 00 55 01 00 00 A1 00 7A 00 64 00 0A 00 18 00 00 00 00 … 00 00 20 3B**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
FA = Length of read data in Bytes (in HEX)
00 .. 00 = Object data value > for reading this data see table 7 *History Record* in **Communication object description** (in PC tool -> File –> Generate Cfg Image –> Generate Cfg Image (Comm. Objects …))
3B 20 = CRC

AlarmList – reading

See more information about AlarmList reading on page *101.*

Request: **01 03 1A 0C 00 19 43 B1**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
1A 0C = Register address: Register number (46669) – 40001 = 6668 DEC => 1A0C HEX
00 19 = Number of registers > 46669 – 46693 => 25 DEC => 19 HEX
B1 43 = CRC (write LSB MSB !)

A part of dedicated communication objects table

Registers (*)	Register addresses (*)	Number of registers	Access	Data type	Meaning
46354	6353	1	read	Unsigned8	Number of records in the alarm list
46357	6356	1	read/write	Integer16	Index of requested history record (# 5)
46364	6363	1	write	Unsigned16	Entering of password for writing (# 4)
46542	6541	1			Reserved (register not implemented)
46668	6667	1			Reserved (register not implemented)
46669 – 46693	6668 – 6692	25	read	String	1. record in alarm list (# 1)
46694 – 46718	6693 – 6717	25	read	String	2. record in alarm list (# 1)
46719 – 46743	6718 – 6742	25	read	String	3. record in alarm list (# 1)

Response: **01 03 32 2A 53 64 20 53 44 20 31 32 … 00 00 18 F5**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
32 = Length of read data in Bytes (in HEX)
2A 53 = Object data value (* S)
64 20 = Object data value (d _)
53 44 = Object data value (S D)
20 31 = Object data value (_ 1)
32 00 … = Object data value (2) = > 1.record in alarmlist is ***Sd SD 12** (inactive, not accepted)
F5 18 = CRC

Response: **01 03 32 21 2A 53 64 20 53 44 20 31 32 00 00 … 00 00 89 38**
01 = Controller address
03 = Modbus function code (Read Multiple Registers)
32 = Length of read data in Bytes (in HEX)
21 2A = Object data value (! *)
53 64 = Object data value (S d)
20 53 = Object data value (_ S)
44 20 = Object data value (D _)
31 32 … = Object data value (1 2) = > 1.record in alarmlist is **!*Sd SD 12** (active, not accepted)

38 89 = CRC

Change the communication language (only String type data)

Write to the communication object 6350 the index of language to be used.

A part of dedicated communication objects table

Registers (*)	Register addresses (*)	Number of registers	Access	Data type	Meaning
46349 – 46350	6348 – 6349	2	read/write	Date	Actual date
46351	6350	1	read/write	Unsigned8	Language index selected for displaying of texts specified by data type String (# 7)
46352 – 4653	6351 – 6352	2	read	Domain	Code of the last communication fault See Error list
46354	6353	1	read	Unsigned8	Number of records in the alarm list
46349 – 46350	6348 – 6349	2	read/write	Date	Actual date
46351	6350	1	read/write	Unsigned8	Language index selected for displaying of texts specified by data type String (# 7)

Request: **01 06 18 CE 00 01 2F 55**
01 = Controller address
06 = Modbus function code (Write Single Register)
18 CE = Register address: Register number (46351) – 40001 = 6350 DEC => 18CE HEX
00 01 = Set the language index to > 1
55 2F = CRC (write LSB MSB !)

Response: **01 06 18 CE 00 00 EE 95**
01 = Controller address
06 = Modbus function code (Read Multiple Registers)
18 CE = Register address
00 01 = Language index set to > **1**
55 2F = CRC

Reset / Confirm Alarm

Request: **01 10 18 D6 00 03 06 08 F7 00 00 00 01 49 CB**
01 = controller address
10 = Modbus command
18 D6 = Register address: Object for engine commands (46359) – 40001 = 6358 DEC => 18D6 HEX
00 03 = number of Modbus registers
06 = data length in bytes (08F70000+0001)
08F70000 = argument for **Fault reset** (page 107)
0001 = command number (page 107)
CB 49 = CRC (write LSB MSB !)

A part of dedicated communication objects table

Registers (*)	Register addresses (*)	Number of registers	Access	Data type	Meaning
46359 – 46360	6358 – 6359	2	read/write	Unsigned32	For writing:command argument For reading: command release value (# 3)
46361	6360	1	write	Unsigned16	Command (# 3)

A part of list of commands

Command	Meaning	Argument (*)	Return value (*)	
1	Engine start	01FE0000	000001FF	OK
			2	Argument has not been written
	Engine stop	02FD0000	000002FE	OK
			2	Argument has not been written
	Horn reset	04FB0000	000004FC	OK
	Fault reset	08F70000	000008F8	OK

ECU Fault reset	10EF0000 other	000010F0 1	OK Wrong argument

Response: **01,10,18,D6,00,03,67,50**
01 = Controller address
10 = Modbus command
18 D6 = Register addres
00 03 = Release value, number of written Modbus registers
50 67 = CRC

Start the engine – in one step

To start the engine it is necessary to enter an appropriate user and his password first to enable commands, if these are protected by level 1-7.

Request: **01 10 18 D6 00 03 06 01 FE 00 00 00 01 95 53**
01 = controller address
10 = Modbus command (Write Multiple Register)
18D6 = 6538 object for engine commands (46359) – 40001 = 6358 DEC => 18D6 HEX
0003 = number of Modbus registers
06 = data length in bytes (01FE0000+0001)
01FE0000 = argument for **Engine start** (page 107)
0001 = command number (page 107)
53 95 = CRC (write LSB MSB !)

Response: **01 10 18 D6 00 03 67 50**
01 = Controller address
10 = Modbus function code (Read Multiple Registers)
18 D6 = Register addres
00 03 = Release value, number of written Modbus registers
50 67 = CRC

Start the engine – in two steps

Request 1: **01 10 18 D6 00 02 04 01 FE 00 00 B4 D5**
01 = Controller address
10 = Modbus function code (Write Multiple Register)
18 D6 = Register address for command argument (46359) – 40001 = 6358 DEC => 18D6 HEX
00 02 = Number of registers
04 = Number of bytes that will be written (01FE0000)
01 FE 00 00 = command number (page 107)
D5 B4 = CRC (write LSB MSB !)

Request 2: **01 06 18 D8 00 01 CE 91**
01 = Controller address
06 = Modbus function code (Write Single Register)
18 D8 = Register address for command (46361) – 40001 = 6360 DEC => 18D8 HEX
00 01 = command number (page 107)
91 CE = CRC

Modbus protocol description

- Direct connection:
  - RS232 only with IL-NT RS-232 or IL-NT RS-232-485, RS485 only with IL-NT RS-232-485, (I-LB)
  - 8 data bits
  - 1 stop bit
  - no parity
- Modem connection

  - 8 data bits
  - 1 stop bit
  - no parity
- Communication speed:
  - 9600 / 19200 / 38400 / 57600 bps
- Transfer mode RTU
- Function codes
  - 3 (Read Multiple Registers)
  - 6 (Write Single Register)
  - 10 (Command)
  - 16 (Write Multiple Registers)
- The response to an incoming message depends on the communication speed. The delay is not shorter than the time needed to send/receive 3 and ½ characters.

The complete description of Modbus communication protocol can be found in
http://modbus.org/docs/PI_MBUS_300.pdf
and
http://www.rtaautomation.com/modbustcp/files/Open_ModbusTCP_Standard.pdf.

Read Multiple Registers

Query

Byte	Meaning	Note
0	Controller address	1 to 32
1	3	Modbus function code
2 3	Communication object number - upper byte (MSB) - lower byte (LSB)	See List of communication objects
4 5	Communication object length expressed by the number of registers - upper byte (MSB) - lower byte (LSB)	Greater than 0
6 7	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Standard response

Byte	Meaning	Note
0	Controller address	Same as in the query
1	3	Same as in the query
	Length of read data in bytes (L)	Number of registers * 2
3 4	Data of the 1st register - upper byte (MSB) - lower byte (LSB)	
5 6	Data of the 2nd register - upper byte (MSB) - lower byte (LSB)	
…		
L + 1 L + 2	Data of the last register - upper byte (MSB) - lower byte (LSB)	
L + 3 L + 4	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Exceptional response

Byte	Meaning	Note
0	Controller address	Same as in the query
1	131	Modbus fun.number + 128
2	2	See Error list
3 4	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Write Single Register

Query

Byte	Meaning	Note
0	Controller address	1 to 32
1	6	Modbus function code

Byte	Meaning	Note
2 3	Communication object number - upper byte (MSB) - lower byte (LSB)	See List of communication objects
4 5	Data - upper byte (MSB) - lower byte (LSB)	
6 7	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Standard response

Byte	Meaning	Note
0	Controller address	Same as in the query
1	6	Same as in the query
2 3	Communication object number - upper byte (MSB) - lower byte (LSB)	Same as in the query
4 5	Data - upper byte (MSB) - lower byte (LSB)	Same as in the query
6 7	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Exceptional response

Byte	Meaning	Note
0	Controller address	Same as in the query
1	134	Modbus fun.number + 128
2	2	See Error list
3 4	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Write Multiple Registers

Query

Byte	Meaning	Note
0	Controller address	1 to 32
1	16	Modbus function code
2 3	Communication object number - upper byte (MSB) - lower byte (LSB)	See List of communication objects
4 5	Communication object length expressed by the number of registers - upper byte (MSB) - lower byte (LSB)	Greater than 0
6	Length of written data in bytes (L)	Number of registers * 2
7 8	Data of the 1st register - upper byte (MSB) - lower byte (LSB)	
9 10	Data of the 2nd register - upper byte (MSB) - lower byte (LSB)	
…		
L + 5 L + 6	Data of the last register - upper byte (MSB) - lower byte (LSB)	
L + 7 L + 8	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Standard response

Byte	Meaning	Note
0	Controller address	Same as in the query
1	16	Same as in the query
2 3	Communication object number - upper byte (MSB) - lower byte (LSB)	Same as in the query
4 5	Communication object length expressed by the number of registers - upper byte (MSB) - lower byte (LSB)	Same as in the query

Byte	Meaning	Note
6 7	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Exceptional response

Byte	Meaning	Note
0	Controller address	Same as in the query
1	144	Function code + 128
2	2	See Error list
3 4	Check field CRC - lower byte (LSB) - upper byte (MSB)	See Check field calculation

Alarm list reading

It is not possible to read alarm list simultaneously from more terminals. If the terminal starts reading, the reading is locked for other terminals. It is unlocked 5 seconds after last reading of alarm list. The locked terminal indicates to another terminal an error message.
The whole alarm list is stored in the cache memory at the moment of locking and the following reading of records is performed from this memory. Locking is done only while reading the first record. So the successive reading from the first to the last record is supposed.

History reading

It is not possible to read history from more terminals simultaneously. Reading must be started by writing of an index of requested history record. If the index is not written it is not possible to read neither history header nor data part of the record. In this case the controller returns an error message. If the terminal writes the index of requested record, history reading is locked for other terminals (i.e. reading and writing of an index of requested record, reading of header and data part of the record). It is unlocked 5 seconds after the last history reading. Locked history is indicated to other terminals by an error message.

Requested history record is stored at the moment of locking in the cache memory and following reading is performed from this memory.

Check field calculation

The check field allows the receiver to check the validity of the message. The check field value is the Cyclical Redundancy Check (CRC) based on the polynomial $x^{16}+x^{15}+x^{2}+1$. CRC is counted from all message bytes preceding the check field. The algorithm of CRC calculation is introduced below on an example of a C language function.

```
unsigned short count_CRC(unsigned char *addr, int num)
{
  unsigned short CRC = 0xFFFF;
  int i;

  while (num--)
  {
    CRC ^= *addr++;
    for (i = 0; i < 8; i++)
    {
      if (CRC & 1)
      {
        CRC >>= 1;
        CRC ^= 0xA001;
      }
      else
      {
        CRC >>= 1;
      }
    }
  }
  return CRC;
}
```

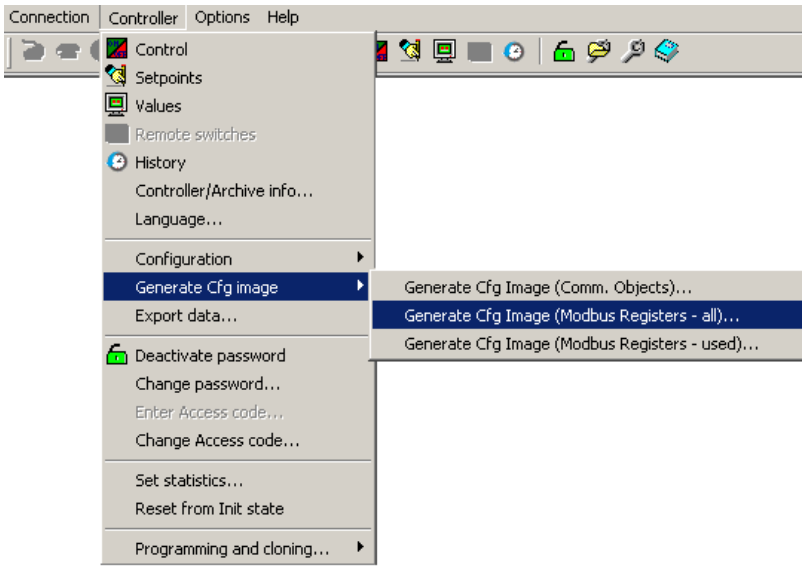
"0103000C0001" (hex)	
1 byte checksum	17
CRC-16	0x1244
CRC-16 (Modbus)	0x0944
CRC-16 (Sick)	0x2110
CRC-CCITT (XModem)	0xCE32
CRC-CCITT (0xFFFF)	0xC022
CRC-CCITT (0x1D0F)	0xFF0C
CRC-CCITT (Kermit)	0xCDAD
CRC-DNP	0x6CB2
CRC-32	0x4323C124

Online CRC calculator: http://www.lammertbies.nl/comm/info/crc-calculation.html
Controllers use the CRC-16 (Modbus). Data in examples in this manual are in HEX format.

Cfg Image Modbus registers and Communication object list

Communication objects can be spitted into two groups:

1. Communication objects dependent on the application type.
2. Communication objects independent on the application type.



Use LiteEdit menu command Controller
--> Generate Cfg Image
-> Generate Cfg Image (Comm. Objects …)

and

-> Generate Cfg Image (Modbus Registers all/used).

A part of Cfg Image (Modbus Register …) file for IL-NT controller

Register(s)	Com.Obj.	Name	Dim	Type	Len	Dec	Min	Max	Group
40001	8192	Gen V L1-N	V	Unsigned	2	0	-	-	Generator
40002	8193	Gen V L2-N	V	Unsigned	2	0	-	-	Generator
40003	8194	Gen V L3-N	V	Unsigned	2	0	-	-	Generator
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
40058	8759	IOM AI2	U5	Integer	2	0	-	-	Extension
40059	8760	IOM AI3	U6	Integer	2	0	-	-	Extension
40060	8761	IOM AI4	U7	Integer	2	0	-	-	Extension
40061	8237	(N/A)							
40062	8235	Bin Inputs		Binary#1	2	-	-	-	Controller
40063	8239	Bin Outputs		Binary#2	2	-	-	-	Controller
40064	8602	IOM Bin Inp		Binary#3	2	-	-	-	Extension
40065	8316	Led GCB Green		Unsigned	1	0	-	-	Invisible
40066	8318	Led MCB Green		Unsigned	1	0	-	-	Invisible
40067	8320	Led GEN Green		Unsigned	1	0	-	-	Invisible
40068	8321	Led GEN Red		Unsigned	1	0	-	-	Invisible
40069	8322	Led MAINSGreen		Unsigned	1	0	-	-	Invisible
40070	8323	Led MAINS Red		Unsigned	1	0	-	-	Invisible
40071	8330	Engine State		Unsigned	2	0	-	-	IL Info
40072	8455	Breaker State		Unsigned	2	0	-	-	IL Info
40073	8954	Timer Text		Unsigned	2	0	-	-	IL Info
40074	8955	Timer Value	s	Unsigned	2	0	-	-	IL Info
40075	8707	FW Branch		Unsigned	1	0	-	-	IL Info
40076	8393	FW Version		Unsigned	1	1	-	-	IL Info
40077	8480	Application		Unsigned	1	0	-	-	IL Info
40078	8449	(N/A)							
40079	9651	ControllerMode		Unsigned	1	0	-	-	Invisible
40080	9574	ControllerMode		Unsigned	1	0	-	-	Invisible
40081	11134	(N/A)							
40082	9978	Ig Nom		Unsigned	2	0	-	-	Invisible
40083	8450	IgMax		Unsigned	2	0	-	-	Invisible
40084	8451	ST		Unsigned	2	0	-	-	Invisible

A part of Cfg Image (Modbus Register …) file for IC-NT controller

Register(s)	Com.Obj.	Name	Dim	Type	Len	Dec	Min	Max	Group
40001	9143	LogBout0		Binary	2	-	-	-	Invisible
40002	9144	LogBout1		Binary	2	-	-	-	Invisible
40003	9145	LogBout2		Binary	2	-	-	-	Invisible
40004	9146	LogBout3		Binary	2	-	-	-	Invisible
40005	9147	LogBout4		Binary	2	-	-	-	Invisible
40006	9148	LogBout5		Binary	2	-	-	-	Invisible
40007	9149	LogBout6		Binary	2	-	-	-	Invisible
40008	8192	Gen V L1-N	V	Unsigned	2	0	-	-	Generator
40009	8193	Gen V L2-N	V	Unsigned	2	0	-	-	Generator
40010	8194	Gen V L3-N	V	Unsigned	2	0	-	-	Generator
40058	8213	Battery Volts	V	Integer	2	1	-	-	Controller
40059	10124	CPU Temp	°C	Integer	2	1	-	-	Controller
40060	10603	D+	V	Integer	2	1	-	-	Controller
40061	8227	Oil Press	Bar	Integer	2	1	-	-	Controller
40062	8228	Water Temp	°C	Integer	2	0	-	-	Controller
40063	8229	Fuel Level	%	Integer	2	0	-	-	Controller
40064	8978	IOM AI1	U4	Integer	2	0	-	-	Extension
40065	8759	IOM AI2	U5	Integer	2	0	-	-	Extension
40066	8760	IOM AI3	U6	Integer	2	0	-	-	Extension
40067	8761	IOM AI4	U7	Integer	2	0	-	-	Extension
40068	8237	(N/A)							
40069	8235	Bin Inputs		Binary#1	2	-	-	-	Controller
40070	8239	Bin Outputs		Binary#2	2	-	-	-	Controller
40071	8602	IOM Bin Inp		Binary#3	2	-	-	-	Extension
40072	8316	Led GCB gr		Unsigned	1	0	-	-	Invisible
40073	8318	Led MCB gr		Unsigned	1	0	-	-	Invisible
40074	8320	Led GEN gr		Unsigned	1	0	-	-	Invisible
40075	8321	Led GEN red		Unsigned	1	0	-	-	Invisible
40076	8322	Led MAINS gr		Unsigned	1	0	-	-	Invisible
40077	8323	Led MAINS red		Unsigned	1	0	-	-	Invisible
40078	11420	Led BUS		Unsigned	1	0	-	-	Invisible
40079	9647	Led MCB fdb		Unsigned	1	0	-	-	Invisible
40080	8330	Engine State		Unsigned	2	0	-	-	Info
40081	8455	Breaker State		Unsigned	2	0	-	-	Info
40082	8954	Timer Text		Unsigned	2	0	-	-	Info
40083	8955	Timer Value	s	Unsigned	2	0	-	-	Info
40084	8707	FW Branch		Unsigned	1	0	-	-	Info
40085	8393	FW Version		Unsigned	1	1	-	-	Info
40086	8480	(N/A)							
40087	8449	ST		Binary	2	-	-	-	Invisible
40088-40089	11388	(N/A)							
40090	9651	ControllerMode		Unsigned	1	0	-	-	Invisible
40091	8450	ST		Unsigned	2	0	-	-	Invisible

Description of Cfg Image

Header	Descritpion
Registers(s)	Register number; register address = register number – 1
Com.Obj.	Corresponding communication object number
Name	Communication object name
Dim	Value dimension
Type	Value data type (see Data types)
Len	Data length in Bytes (max. 64)
Dec	Number of decimals
Min	Value low limit
Max	Value high limit
Group	Group of setpoints/values

Dedicated communication objects

These objects are always available regardless of the controller software modification:

Registers (*)	Register addresses (*)	Number of registers	Access	Data type	Meaning
46347 – 46348	6346 – 6347	2	read/write	Time	Actual time
46349 – 46350	6348 – 6349	2	read/write	Date	Actual date
46351	6350	1	read/write	Unsigned8	Language index selected for displaying of texts specified by data type String (# 7)
46352 – 4653	6351 – 6352	2	read	Domain	Code of the last communication fault See Error list
46354	6353	1	read	Unsigned8	Number of records in the alarm list
46355	6354	1	read	Unsigned16	Number of records in history (# 6)
46356	6355	1			Reserved (register not implemented)
46357	6356	1	read/write	Integer16	Index of requested history record (# 5)
46358	6357	1	write	Unsigned16	Remote key
46359 – 46360	6358 – 6359	2	read/write	Unsigned32	For writing:command argument For reading: command release value (# 3)
46361	6360	1	write	Unsigned16	Command (# 3)
46362	6361	1			Reserved (register not implemented)
46363	6362	1	read/write	Unsigned8	User identification number (# 4)
46364	6363	1	write	Unsigned16	Entering of password for writing (# 4)
46365	6364	1			Reserved (register not implemented)
46366 – 46490	6365 – 6489	125	read	Domain	Values multipacket(#8)
46491	6490	1			Reserved (register not implemented)
46493 – 46541	6492 – 6540	50	read	String	Header of the particular history record (# 1)
46542	6541	1			Reserved (register not implemented)
46543 – 46667	6542 – 6666	125	read	Domain	Data part of the particular history record (# 2)
46668	6667	1			Reserved (register not implemented)
46669 – 46693	6668 – 6692	25	read	String	1. record in alarm list (# 1)
46694 – 46718	6693 – 6717	25	read	String	2. record in alarm list (# 1)
46719 – 46743	6718 – 6742	25	read	String	3. record in alarm list (# 1)
46744 – 46768	6743 – 6767	25	read	String	4. record in alarm list (# 1)
46769 – 46793	6768 – 6792	25	read	String	5. record in alarm list (# 1)
46794 – 46818	6793 – 6817	25	read	String	6. record in alarm list (# 1)
46819 – 46843	6818 – 6842	25	read	String	7. record in alarm list (# 1)
46844 – 46868	6843 – 6867	25	read	String	8. record in alarm list (# 1)
46869 – 46893	6868 – 6892	25	read	String	9. record in alarm list (# 1)
46894 – 46918	6893 – 6917	25	read	String	10. record in alarm list (# 1)
46919 – 46943	6918 – 6942	25	read	String	11. record in alarm list (# 1)
46944 – 46968	6943 – 6967	25	read	String	12. record in alarm list (# 1)
46969 – 46993	6968 – 6992	25	read	String	13. record in alarm list (# 1)
46994 – 47018	6993 – 7017	25	read	String	14. record in alarm list (# 1)
47019 – 47043	7018 – 7042	25	read	String	15. record in alarm list (# 1)
47044 – 47068	7043 – 7067	25	read	String	16. record in alarm list (# 1)
47069 – 47168	7068 – 7167	100			Reserved (registers not implemented)

(*) in DEC

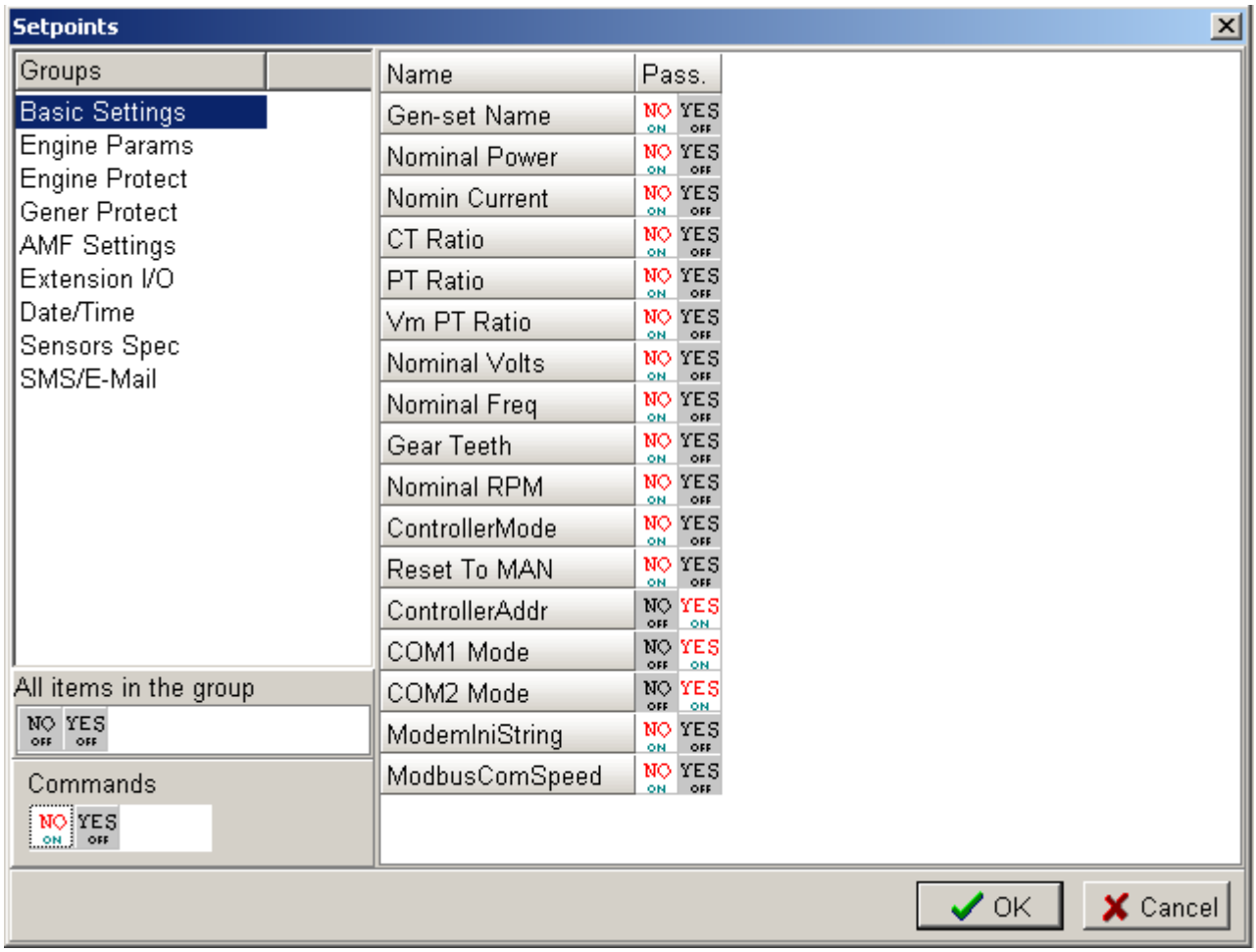
 # 1
The result of reading of an unused record is an empty string.
 # 2
The result of reading of an unused record is a domain with zero value.
 # 3
An argument must be written before writing of a command code, because immediately after the command code has been written, the command is executed. It is recommended to write an argument and command simultaneously, in a multiple registers write. As the argument has lower register address than command, the required sequence is maintained. See List of commands and modbus communication examples.
 # 4
Before entering the password for writing it is necessary to define user identification number. It is recommended to enter user identification number and password simultaneously. Entered password stays valid 5 minutes after the last successful writing.
 # 5
The latest record has index 0, older record has index -1, next record has index -2, …

 # 6
It is possible to read and write only in case that history reading is not locked by another terminal. Second necessary condition is to previously write the index.
 # 7
Implicitly = 0.
#8
„Values multipacket“ contains values that are currently configured in the history record.

Access to dedicated communication objects of the controller

Dedicated communication objects are setpoints and commands that are protected by a password against writing. The set of protected objects is given in the controller configuration and is fixed for a particular controller.

In IL-NT controllers it is possible to define password for setpoints. If is the setpoint protected, the user can change this setpoint only after unlocking setpoint with this password. After writing the password will be unlocked all protected setpoints. For example setpoints in the Basic Settings group can be configured in LiteEdit on Setpoints card:



Commands

Command (*)	Meaning	Argument (*)	Return value (*)	
1	Engine start	01FE0000	000001FF	OK
			2	Argument has not been written
	Engine stop	02FD0000	000002FE	OK
			2	Argument has not been written
	Horn reset	04FB0000	000004FC	OK
	Fault reset	08F70000	000008F8	OK
	ECU Fault reset	10EF0000	000010F0	OK
		other	1	Wrong argument
2	Close generator circuit breaker	11EF0000	000011F0	OK
			2	Argument has not been written
	Open generator circuit breaker	11F00000	000011F1	OK
			2	Argument has not been written
	Close/open mains circuit breaker	12ED0000	000012EE	OK
			2	Argument has not been written
	Close mains circuit breaker	12EE0000	000012EF	OK
			2	Argument has not been written
	Open mains circuit breaker	12EF0000	000012F0	OK
			2	Argument has not been written
		other	1	Wrong argument
5	Reset from Init state (#1)	44440000	00004445	OK
			1	Not possible to perform
7	Statistics reset	007C0000	0000007D	OK
			1	Not possible to perform
8	Set kWh counter	New value	N/A	
C	Set kVAhr counter	New value	N/A	
E	Set counter of engine starts	New value	N/A	
D	Set runhours counter	New value	N/A	
19	Set counter of unsuccessful engine starts	New value	N/A	

(*) in HEX

 # 8
If the controller setpoints are not valid after it is switched on, the controller goes to a blocked state. In this state it is necessary to modify the setpoints from the controller keypad and switch off and on the controller or from the external terminal and unblock the controller by **Reset from Init state** command. Another condition necessary to unblock the application function of the controller is valid configuration.

Modbus appendix

Error list

If the controller encounters an error when processing the query, it returns the exceptional response instead of the normal one to the terminal. An exception has always the value 2 (*Illegal Data Address*). After receiving the exceptional response, the terminal should read the communication object 24523 containing the last error specification. The meaning of an error can be found out from the following table.

MSB1 (*)	LSB1 (*)	MSB2 (*)	LSB2 (*)	Meaning
0	0	0	0	No error.

MSB1 (*)	LSB1 (*)	MSB2 (*)	LSB2 (*)	Meaning
0	0	2	6	Comm. Object nonexistent.
0	0	1	6	Illegal access: Read (write) of the communication object. Object intended only for write (read).
255	0	0	8	Controller application isn't active
254	0	0	8	Inexpectant message
253	0	0	8	No more unread records in event history.
252	0	0	8	Setpoint not defined in controller configuration.
251	0	0	8	Bad write data length.
250	0	0	8	Invalid password.
249	0	0	8	No more free space in front for EEPROM
248	0	0	8	Too long parameter
247	0	0	8	Invalid controller configuration.
246	0	0	8	Undefined command
245	0	0	8	Command can't be done
244	0	0	8	Too long data answer form peripheries (max. 4B)
243	0	0	8	Too long data for peripheries (max. 4B)
242	0	0	8	Unavailable peripheries
241	0	0	8	Required operation isn't available in peripheries
240	0	0	8	Operation cannot be performed now, the terminal has to repeat the request. This error can occur when an operation with EEPROM memory (setpoint write, history record read) is required at the same time while an internal EEPROM write cycle takes place.
239	0	0	8	Controller programming can't be carry out
238	0	0	8	Write cannot be performed – power supply failure detected.
237	0	0	8	Another active call request is present. This error code can be returned by the controller as the response to the communication object. Object 24540 write – active call termination.
236	0	0	8	Programming error
235	0	0	8	This error is reported by iG-MU module (*Modem Bridge*) in the case of a connection failure between the module and the addressed controller. The terminal can evaluate this error as a communication *timeout* with the controller.
234	0	0	8	Write cannot be performed – periphery not responding.
233	0	0	8	Write cannot be performed – setpoint nonexistent in any periphery.
232	0	0	8	Bad access code for communication from a remote terminal.
231	0	0	8	Invalid controller address: value out of range 1 to 32 or already used. This error is a reaction on communication object. Object 24537 write.
230	0	0	8	Error in definition for communication oscilloscope objects
229	0	0	8	Undefined action. A reaction on communication object. Object 24521 write.
228	0	0	8	Action (although defined) cannot be performed. A reaction on communication object. Object 24521 write.
227	0	0	8	Written object value is not acceptable.
226	0	0	8	No more free slots
225	0	0	8	No connection
224	0	0	8	Locked, block reading is active
223	0	0	8	Locked, commanding is active
222	0	0	8	Locked, the history reading is active
221	0	0	8	Locked, the programming is active
220	0	0	8	Communication error
219	0	0	8	Request for – data
218	0	0	8	Request for – SMS
217	0	0	8	Request for – email
216	0	0	8	Request for – mobile email
215	0	0	8	Request for - fax

MSB1 (*)	LSB1 (*)	MSB2 (*)	LSB2 (*)	Meaning
214	0	0	8	Wrong access code, the connection must be terminated.
213	0	0	8	Reserved for HW key
212	0	0	8	Reserved for DENOX
211	0	0	8	Unsufficient access rights.
210	0	0	8	The request can be submitted only by the administrator (User 0).
209	0	0	8	The administrator has entered a wrong user identification number.
208	0	0	8	Not possible to write, the communication object has forced value.
207	0	0	8	The administrator requests an unsupported operation.
206	0	0	8	Selected communication mode doesn't allow required interface
205	0	0	8	Selected interface doesn't allow required communication mode
204	0	0	8	HW data flow control for modem communication. Sending as answer to request to read 24437 communication object
203	0	0	8	SW data flow control for modem communication. Sending as answer to request to read 24437 communication object
202	0	0	8	Access denied from actual IP address
201	0	0	8	Unknown fault.
200	0	0	8	Invalid register.
199	0	0	8	Reading of alarm list is locked.
198	0	0	8	Reading of history is locked.
197	0	0	8	Reading of alarm list has to be started by reading the first record.
196	0	0	8	The history record is not defined for reading of history.
195	0	0	8	It is not possible to request such number of registers.
201	0	0	8	Unknown fault.
200	0	0	8	Invalid register.
199	0	0	8	Reading of alarm list is locked.
198	0	0	8	Reading of history is locked.

(*) in DEC

Data types

The following table contains the communication objects data types and their representation in the data part of the communication function.

Data type	Meaning	Number of registers	Data part of the communication function[1]
Integer8	Signed integer – 8 bits	1	MSB1 = sign extension LSB1 LSB1 = comm. object value
Unsigned8	Unsigned integer – 8 bits	1	MSB1 = 0 LSB1 = comm. object value
Integer16	Signed integer – 16 bits	1	MSB1 = comm. object value, bits 15-8 LSB1 = comm. object value, bits 7-0
Unsigned16	Unsigned integer – 16 bits	1	MSB1 = comm. object value, bits 15-8 LSB1 = comm. object value, bits 7-0
Integer32	Signed integer – 32 bits	2	MSB1 = comm. object value, bits 31-24 LSB1 = comm. object value, bits 23-16 MSB2 = comm. object value, bits 15-8 LSB2 = comm. object value, bits 7-0
Unsigned32	Unsigned integer – 32 bits	2	MSB1 = comm. object value, bits 31-24 LSB1 = comm. object value, bits 23-16 MSB2 = comm. object value, bits 15-8 LSB2 = comm. object value, bits 7-0
Binary8	Binary number – 8 bits	1	MSB1 = 0 LSB1 = comm. object value

[1] MSBx = register x, bits 15-8
LSBx = register x, bits 7-0

Binary16	Binary number – 16 bits	1	MSB1 = comm. object value, bits 15-8 LSB1 = comm. object value, bits 7-0
Binary32	Binary number – 32 bits	2	MSB1 = comm. object value, bits 31-24 LSB1 = comm. object value, bits 23-16 MSB2 = comm. object value, bits 15-8 LSB2 = comm. object value, bits 7-0
Char	ASCII character	1	MSB1 = 0 LSB1 = comm. object value
List	String list	1	MSB1 = 0 LSB1 = comm. object value
ShortStr	ASCII string of max. length of 15 characters (zero terminated string)	8	MSB1 = 1. character of the string LSB1 = 2. character of the string MSB2 = 3. character of the string LSB2 = 4. character of the string …
LongStr	ASCII string of max. length of 31 characters (zero terminated string)	16	MSB1 = 1. character of the string LSB1 = 2. character of the string MSB2 = 3. character of the string LSB2 = 4. character of the string …
Date	Date	2	MSB1 = BCD(day) LSB1 = BCD(month) MSB2 = BCD(year) LSB2 = 0 example: MSB1 = 18 (HEX) LSB1 = 04 (HEX) MSB2 = 01 (HEX) LSB2 = 0 ⇒ Date = 18.4.(20)01
Time	Time	2	MSB1 = BCD(hour) LSB1 = BCD(minute) MSB2 = BCD(second) LSB2 = 0 example: MSB1 = 20 (HEX) LSB1 = 24 (HEX) MSB2 = 02 (HEX) LSB2 = 0 ⇒ Time = 20:24:02
Domain	Field n bytes C-declaratione: unsigned char x[n]	n	MSB1 = x[0] LSB1 = x[1] MSB2 = x[2] LSB2 = x[3] … n is even number: MSBm-1 = x[n-2] LSBm = x[n-1] n is odd number: MSBm-1 = x[n-1] LSBm = 0
String	String (Zero terminated string)	depends on register number	string characters coding depends on chosen language (8bit coding, EUC)

Communication status

Communication object number:

24571

Operation:

Read only

Data type:

Binary32

Meaning:

Bit 0	Internal terminal in InteliSys does not work (0 for other controllers)
Bit 1	Invalid controller software (based on CRC).
Bit 2	Invalid controller configuration (based on CRC).
Bit 3	In the event history is present at least one unread record.
Bit 4	P type setpoints are invalid. P type setpoints are representing the controller setpoints. Values of these setpoints can be set from connected terminals. If these setpoints are invalid, the application functions are blocked. Setpoints recovery is needed.
Bit 5	R type setpoints are invalid. R type setpoints are representing the data, that is only initialized from connected terminals, but its updating is made by the controller itself (e.g. statistic or time and date). If these setpoints are invalid, their change from the controller is blocked. Setpoints recovery is needed.
Bit 6	The event history was cleared.
Bit 7	The event history was filled up at least once.
Bit 8	P type setpoint change occurred (reading resets this bit).
Bit 9	R type setpoint change occurred (reading resets this bit).
Bit 10	Controller type – see the table below.
Bit 11	Alarm list not empty.
Bit 12	Alarm list change (reading resets this bit).
Bit 13	New item added into alarm list (reading resets this bit).
Bit 14	Internal controller terminal is locked up for setpoint change.
Bit 15	Invalid configuration format.
Bit 16	Diagnostic codes change (reading resets this bit, only for IL-NT /ID controllers).
Bits 20	Controller type (*)
Bit 21-17	Reserve (= 0)
Bits 22-21	Password level for Setpoints and Commands write (only for IL-NT /ID controllers).
Bit 23	Controller was initiated.
Bits 28-24	Communication module version.
Bits 29	Remote terminal is connected.
Bits 30	Controller type – see the table below.
Bits 31	Reserve (= 0)

(*) Controller type

Bit 20	Bit 30	Bit 10	Controller
0	0	0	InteliSys
0	0	1	InteliGen
0	1	0	IL-NT
0	1	1	InteliDrive
1	0	0	IG/IS-NT
1	0	1	Reserve
1	1	0	Reserve
1	1	1	Reserve

Hint:

The MODE< and MODE> commands have not been implemented to the register oriented modbus commands.