User Manual

Revision 2.101
English

CANopen / Modbus TCP Slave - Converter

(Order Code: HD67505-A1 – HD67505-B2)

for Website information:
www.adfweb.com?Product=HD67505

for Price information:
www.adfweb.com?Price=HD67505-A1
www.adfweb.com?Price=HD67505-B2

Benefits and Main Features:

- Very easy to configure
- Low cost
- Rail mountable
- Wide supply input range
- Galvanic isolation
- Industrial temperature range: -40°C / 85°C (-40°F / 185°F)

HD67505-A1

HD67505-B2

For other Gateways / Bridges:

CANopen to Modbus / DeviceNET

See also the following links:

www.adfweb.com?product=HD67001	(Modbus RTU Master)
www.adfweb.com?product=HD67502	(Modbus RTU Slave)
www.adfweb.com?Product=HD67504	(Modbus TCP Master)
www.adfweb.com?product=HD67134	(DeviceNET)

CAN bus to Modbus

See also the following links:

www.adfweb.com?product=HD67011	(Modbus RTU Master)
www.adfweb.com?product=HD67012	(Modbus RTU Slave)
www.adfweb.com?product=HD67514	(Modbus TCP Master)
www.adfweb.com?product=HD67515	(Modbus TCP Slave)

Do you have an your customer protocol?
See the following links:
www.adfweb.com?Product=HD67003

Do you need to choose a device? do you want help?
Ask it to the following link:
www.adfweb.com?Cmd=helpme

INDEX:

UPDATED DOCUMENTATION:

Dear customer, we thank you for your attention and we remind you that you need to check that the following document is:

- Updated
- Related to the product you own

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REVISION LIST:

Revision	Date	Author	Chapter	Description
1.000	18/02/2009	Fl	All	First release version
1.001	05/05/2010	Ml Dp	All	Revision
2.000	10/11/2011	Fl	All	Codes changed
2.001	12/03/2012	Dp	All	Add SDO Server, Revision
2.100	12/12/2012	Dp	All	Add NodeGuard
2.101	07/02/2013	Nt	All	Added new chapters

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SECURITY ALERT:

GENERAL INFORMATION

To ensure safe operation, the device must be operated according to the instructions in the manual. When using the device are required for each individual application, legal and safety regulation. The same applies also when using accessories.

INTENDED USE

Machines and systems must be designed so the faulty conditions do not lead to a dangerous situation for the operator (i.e. independent limit switches, mechanical interlocks, etc.).

QUALIFIED PERSONNEL

The device can be used only by qualified personnel, strictly in accordance with the specifications.
Qualified personnel are persons who are familiar with the installation, assembly, commissioning and operation of this equipment and who have appropriate qualifications for their job.

RESIDUAL RISKS

The device is state of the art and is safe. The instrument can represent a potential hazard if they are inappropriately installed and operated by personnel untrained. These instructions refer to residual risks with the following symbol:

This symbol indicates that non-observance of the safety instructions is danger for people to serious injury or death and / or the possibility of damage.

CE CONFORMITY

The declaration is made by us. You can send an email to support@adfweb.com or give us a call if you need it.

CONNECTION SCHEME:

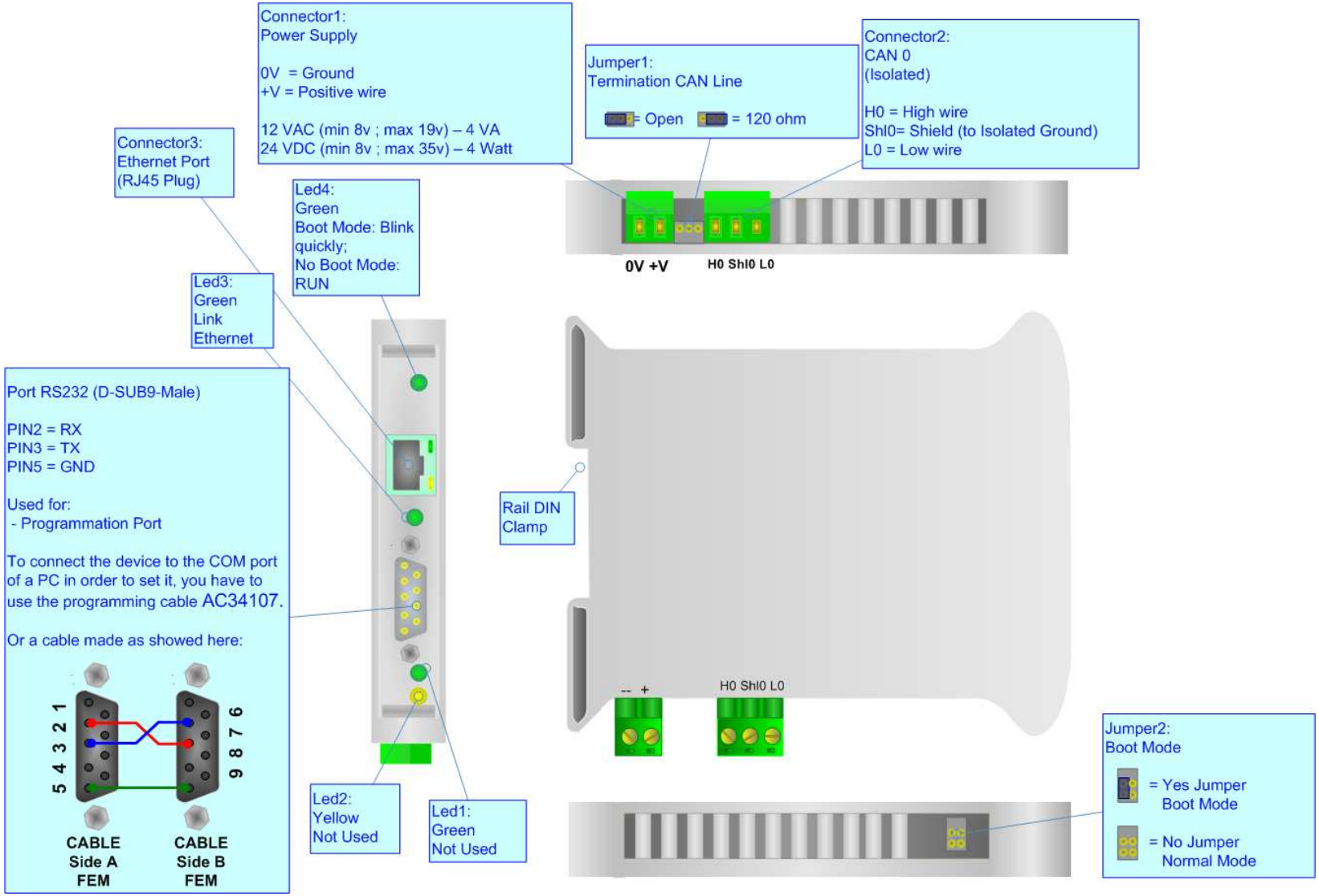


Figure 1: Connection Scheme for HD67505-A1

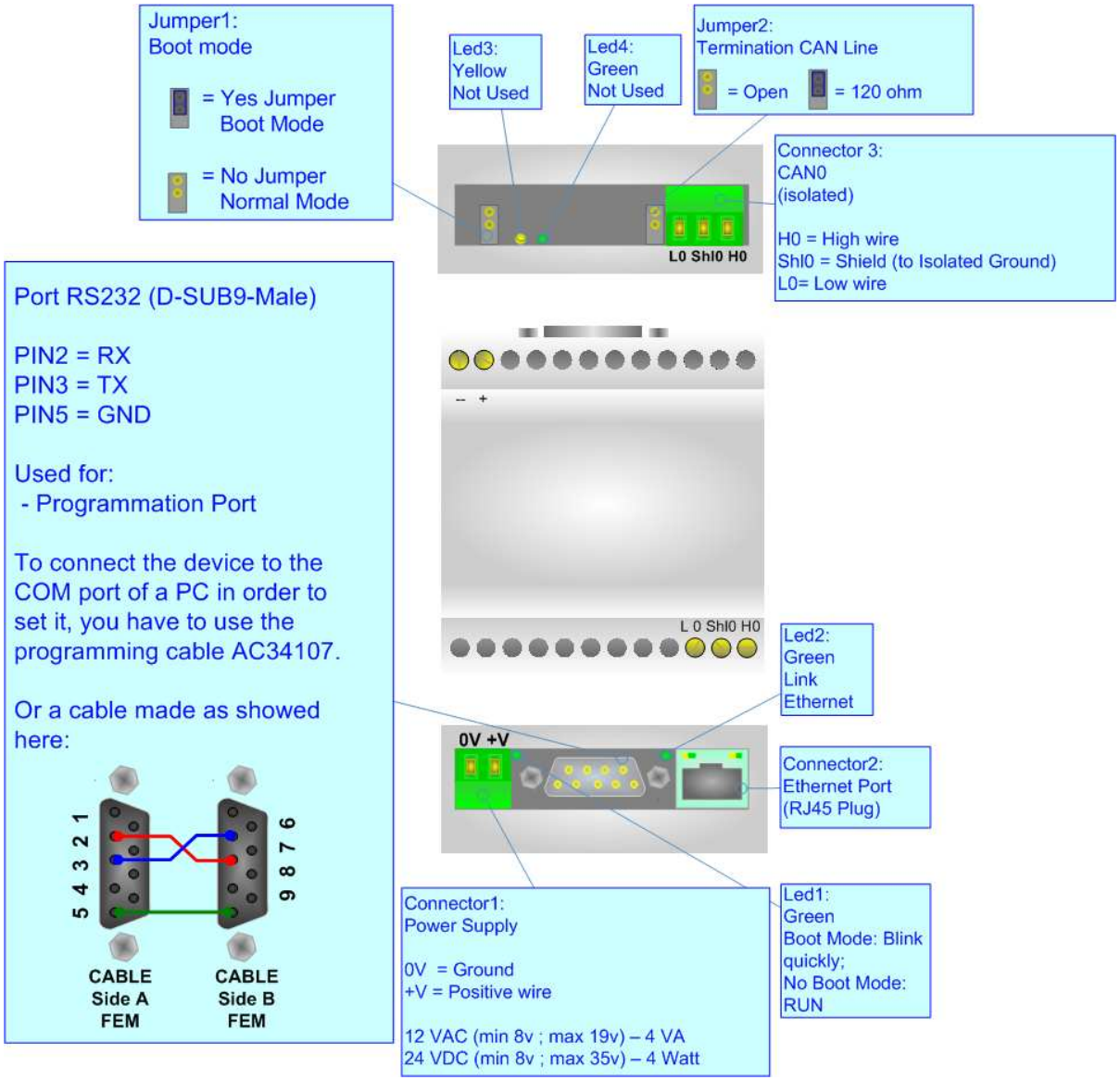


Figure 2: Connection Scheme for HD67505-B2

POWER SUPPLY:

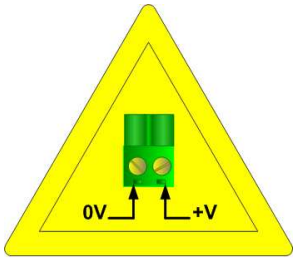
The devices can be powered at 8…19V AC and 8…35V DC. The consumption depends to the code of the device. For more details see the two tables below.

VAC ~		VDC ⎓	
Vmin	**Vmax**	**Vmin**	**Vmax**
8V	**19V**	**8V**	**35V**

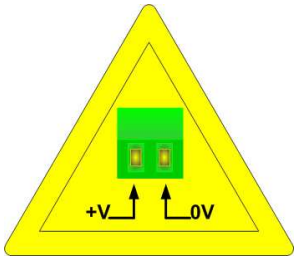
Consumption at 24V DC:

Device	Consumption [W/VA]
HD67505-A1	4
HD67505-B2	5

Caution: Not reverse the polarity power



HD67505-A1



HD67505-B2

CHARACTERISTICS:
The CANopen Modbus TCP Server Gateway allows the following characteristics:

- two-directional information between networks CANopen and ModBUS TCP;
- electrical isolation between two BUSes;
- to write SDO from ModBUS Word;
- to read SDO from ModBUS Word;
- to read EMCY from ModBUS Word;
- to read PDO from ModBUS Word;
- To write PDO from ModBUS Word;
- Communication Ethernet 10/100 (TCP Version);
- Temperature range -40°C to 85°C.

To configure the CANopen Gateway, use the available software that runs with Windows, called SW67505. It is downloadable on the site www.adfweb.com and its operation is described in this document.
The Gateway can be configured up to a maximum 1500 SDO, 16 TPDO and 16RPDO.
While the maximum number of the following:

- EMCY;
- EMCY Word;

depend on the available memory of the Gateway and the number defined SDO.

FUNCTION SCHEME:

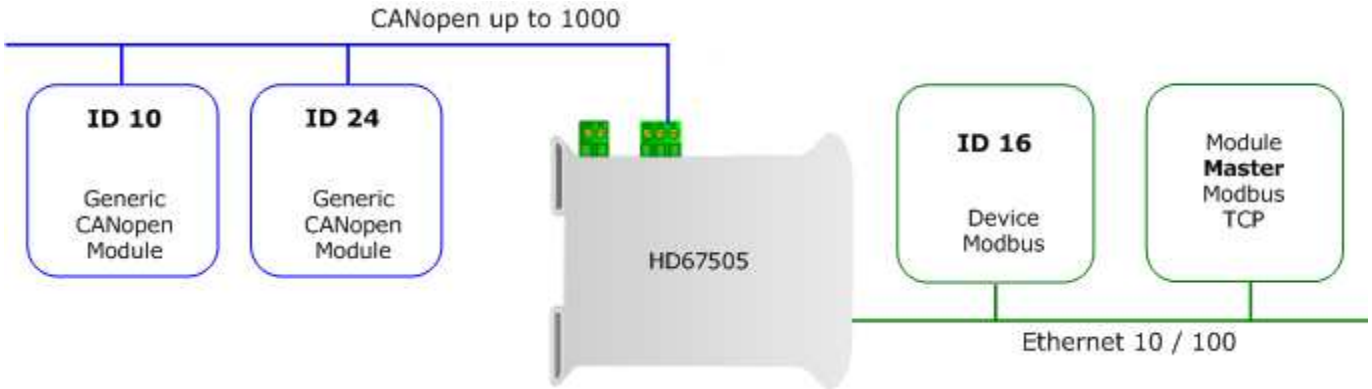


Figure 3: Function scheme of HD67505-A1 between a CANopen and Modbus TCP

CONFIGURATION:

The "Gateway CANopen to Modbus", allows a CANopen network to communicate with a Modbus network.

You need Compositor SW67505 software on your PC in order to perform the following:

- Define that the SDO of the CANopen are accessible from Modbus;
- Define how to update SDO in CANopen from Modbus;
- Define that the EMCY of the CANopen are accessible from Modbus;
- Define how and which EMCY generated in CANopen can be filtered;
- Define which and how the PDO of CANopen are accessible from Modbus;
- Update the new configurations of the device;
- Save, duplicate, modify, export the configurations.

USE OF COMPOSITOR SW67505:

When launching the SW67505 the following window appears.
(The SW67505 is downloadable on the site
http://www.adfweb.com/home/download/download.asp
This manual is referenced to the last version of the software present on our web site).

The following explains the function of the buttons:

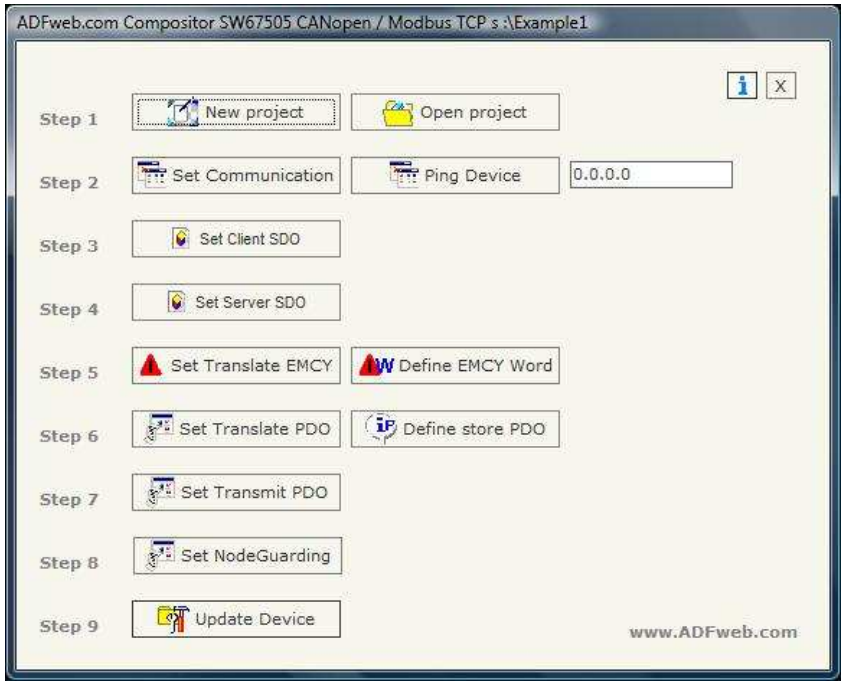


Figure 4: Main window for SW67505

NEW PROJECT / OPEN PROJECT:

The "New Project" button creates the folder which contains the entire device configuration.
A device configuration can also be imported and exported:

- To clone the configurations of the Gateway in order to configure another Gateway device in the same manner, it is necessary to maintain the folder and all its contents;
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate the project folder with another name and open it with the button "Open Project".

When a new project is created or an existent project is open, it will be possible to access the various configuration sections of the software:

- **"Set Communication"**
- **"Set SDO Access"**
- **"Set Translate EMCY"**
  - Otherwise the "**Define EMCY Word"**
- **"Set Translate PDO"**
  - Otherwise the "**Define Store PDO" .**

SET COMMUNICATION:

This section defines the fundamental communication parameters of two Buses, CANopen and Modbus.

By pressing the "Set Communication" button from the Main Window for SW67505 (Fig. 4) the window "Set Communication" appears (Fig. 5):

- In the field "Device ID", the CANopen address is defined;
- In the field "Baudrate", the Baud Rate of the CANopen is defined;
- The check box "Set Operational State at Start-Up" is used to set the operational state of the device at start-up;
- The check box "Network Start at Start-Up" is used to send the command of the operational to the CANopen Network (i.e. when the device start up send at Modbus Network a command and all device is in operational);
- In the field "Delay" the delay before send the network command for the CANopen is defined;
- "SDO Timeout" is the maximum time that the device attends for the answer from the Slave interrogated;
- The check box "Can Start on Modbus Command" is used to send the Modbus command (sender word) of Operational/Pre-Operational State to one or all devices in CAN network.
    - The sender word must have:
        - The high byte with the value of 1 for Operational or 2 for Pre-Operational.
        - The low byte must have the address of the device that is commanded to do the action (Operational/PreOperational), if you put zero all the devices present in CANopen network take the state setted;
            - Example if you want to set the state of Operational to the device CANopen with address 3, You must write the word "259" in the field "Add. Word Modbus". Note: 259=0x0103.
        - In field "Add. Word Modbus" the address of Modbus register used for this operation is defined.
- The check box "Enable NodeGuarding" is used to enable the NodeGuard of CANopen Slave, the two fields (Modbus Address) are used for indicate which Modbus register use for save the state of the CANopen device. Every bit represents a CANopen deivce, if the devise is present the bit is equal to 1 otherwise 0.
- In the field "IP Address", insert the IP address that you want to give at slave Modbus;

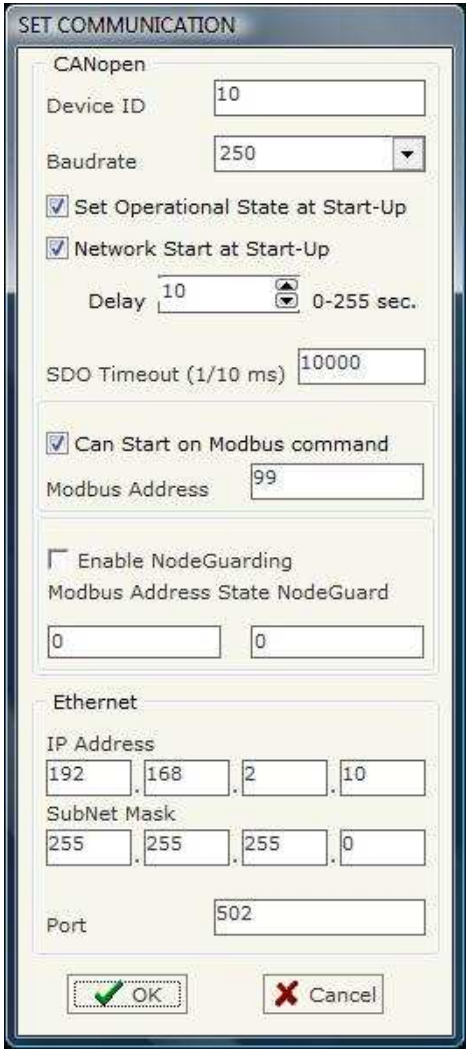


Figure 5:
" Set Communication" window

- In the field “SubNet Mask”, insert the SubNet Mask;
- In the field “Port”, insert the number of Port;

SET CLIENT SDO:

Section "SET Client SDO"

The following objects can be defined in the section "SET Client SDO ":

- Which SDO of the CANopen are accessible from a word ModBUS;
- Which word of the ModBUS are accessible from a SDO of the CANopen.

By pressing the "SET Client SDO" button from the Main Window for SW67505 (Fig. 4) the window "SDO Client" appears (Fig. 6).

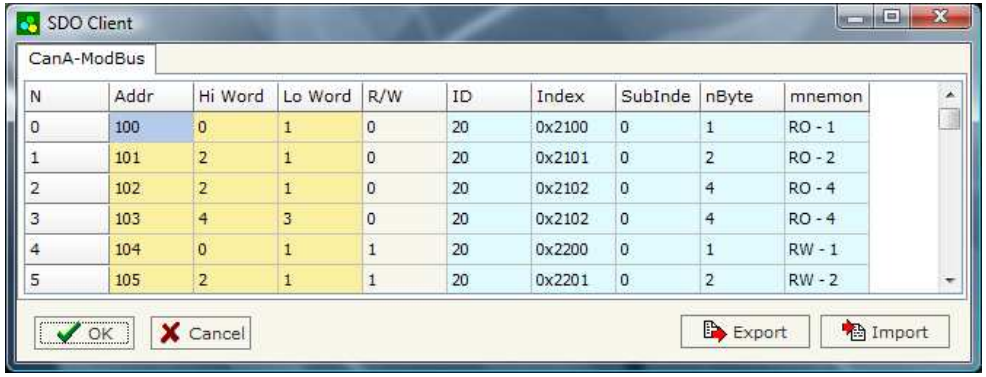


Figure 6: "SDO Client" window

The data of the columns have the following meanings:

- In the field "Addr Word" insert the address of the SDO that supports the ModBUS word;
- In the field "Hi Word" insert the correspondence between the Hi byte of the ModBUS word and a SDO byte (note: the inserted number can be 0, 1, 2, 3, 4);
  - 1 = First byte of the SDO;
  - 2 = Second byte of the SDO;
  - 3 = Third byte of the SDO;
  - 4 = Fourth byte of the SDO;
  - 0 = No byte.
- In the field "Lo word" insert the correspondence between the Lo byte of the ModBUS word and a SDO byte (note: the inserted number can be 0, 1, 2, 3, 4);
  - 1 = First byte of the SDO;
  - 2 = Second byte of the SDO;
  - 3 = Third byte of the SDO;
  - 4 = Fourth byte of the SDO;
  - 0 = No byte.
- In the field "R/W" insert number "0" if the SDO is only in reading or insert number "1" if the SDO is also in writing;
- The field "ID" indicates the address of the CANopen device;
- In the fields "Index", "SubIndex" there are the coordinates of the SDO in the CANopen;
- The field "nByte" indicates the length of the SDO;
- In the field "Mnemonic" a description is defined.

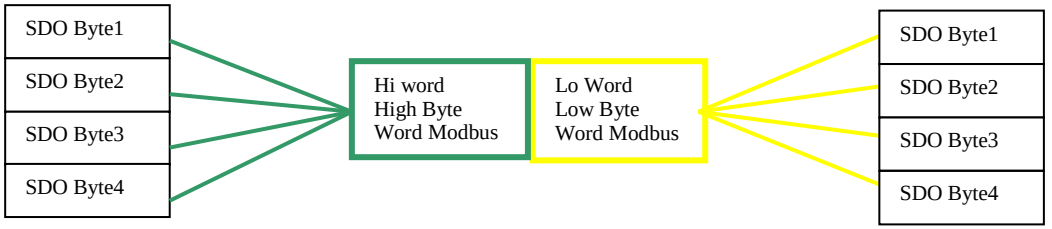


Figure 7: Scheme of the word configuration

Example 1:

If you want to write data in the form of SDO in the CANopen from the ModBUS network on the device at the address:

- Address 1;
- Index 0x200A;
- Subindex 1;
- By dimensions 2 bytes.

By the following word ModBUS on the Gateway:

- Addr Word 0x1900.

In the above scenario:

The Modbus Master can read (note RW=0):

- to the address Modbus of the Gateway (Note: the one specified in the "SET Communication");
- to the word ModBUS 0x1900 (note: Addr word 0x1900);
- the first byte of the SDO found in the low byte of the ModBUS word (note: Lo Word=1);
- the second byte of the SDO found in high byte of the ModBUS word (note: Hi Word=2);

The SDO:

- two byte dimension (note: nByte=2);
- belonging to a CANopen device ID 1 (note: ID=1);
- of the following coordinates: Index 0x200A and Subindex 1.

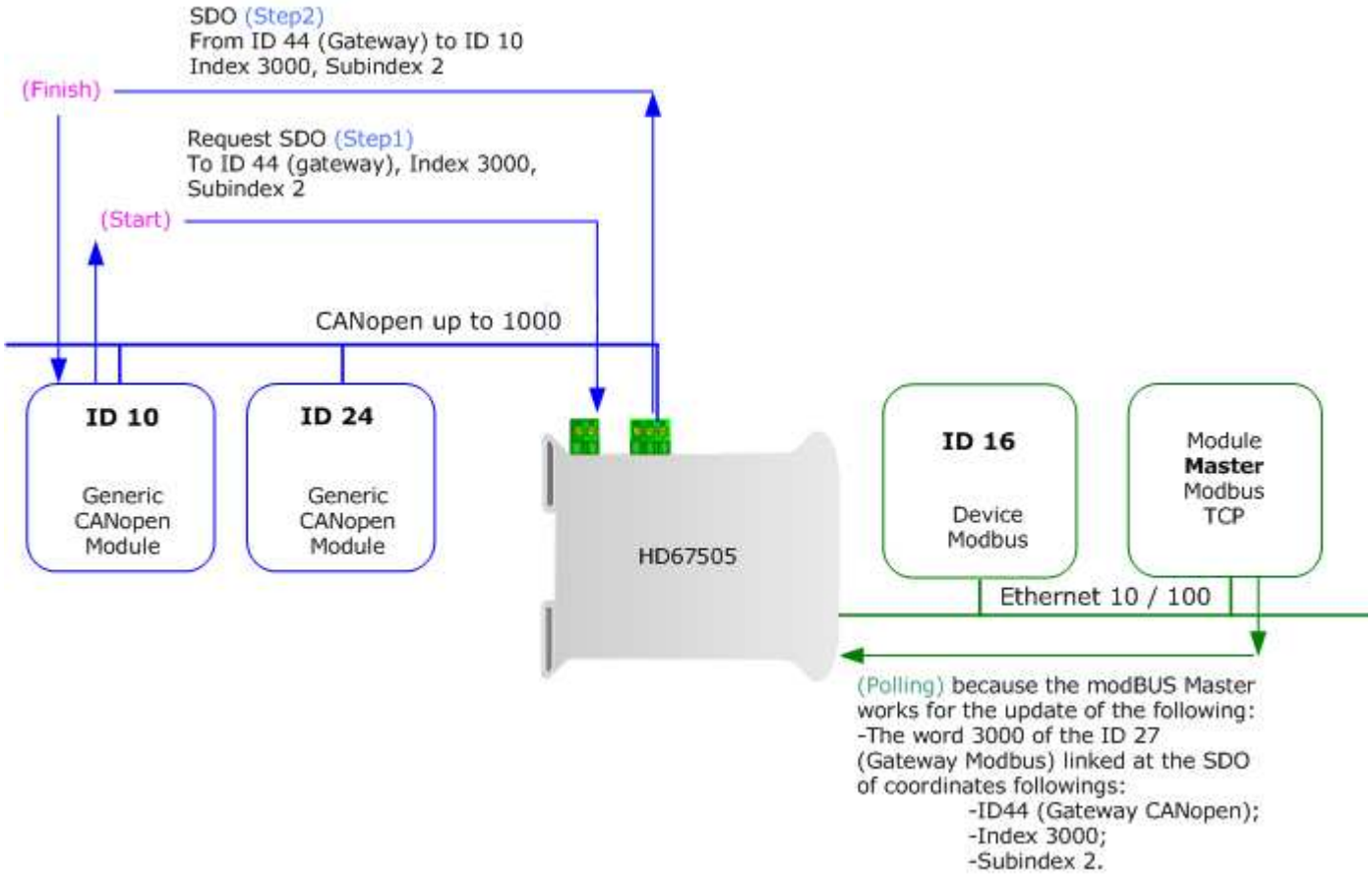


Figure 8: Chart of SDO request from Modbus side

SET SERVER SDO:

Section "SET Server SDO"

The following objects can be defined in the section "SET Server SDO ":

- Which SDO object are accessible from the other devices of the CANopen network and the Registers ModBUS to read/write this informatin;
- Which registers ModBUS are accessible to read/write a SDO object.

Figure 9: SDO Server

By pressing the "SET Server SDO" button from the Main Window for SW67505 (Fig. 4) the window "SDO Server" appears (Fig. 9).

The data of the columns have the following meanings:

- In the field "Addr" insert the Modbus register address where read/write data of the SDO;
- In the field "Hi Word" insert the correspondence between the Hi byte of the ModBUS register and a SDO byte (note: the inserted number can be 0, 1, 2, 3, 4);
  - 1 = First byte of the SDO;
  - 2 = Second byte of the SDO;
  - 3 = Third byte of the SDO;
  - 4 = Fourth byte of the SDO;
  - 0 = No byte.
- In the field "Lo word" insert the correspondence between the Lo byte of the ModBUS register and a SDO byte (note: the inserted number can be 0, 1, 2, 3, 4);
  - 1 = First byte of the SDO;
  - 2 = Second byte of the SDO;
  - 3 = Third byte of the SDO;
  - 4 = Fourth byte of the SDO;
  - 0 = No byte.
- In the field "R/W" select "ReadOnly" if the Modbus register is only in reading or "ReadWrite" if the Modbus Register is also in writing;
- In the fields "Index", "SubIndex" there are the coordinates of the SDO in the CANopen;
- The field "nByte" indicates the length of the SDO;
- In the field "Mnemonic" a description is defined.

SET TRANSLATE EMCY:

By pressing the "Set Translate EMCY" button from the Main Window for SW67505 (Fig. 4) the window "Set Translate EMCY" appears (Fig. 9).

A user who has to pass a EMCY from CAN open to Modbus needs to insert the coordinates of the EMCY to be transmitted in the field "Set Translate EMCY" of the window.

- In the field **"ID EMCY"** insert the Node ID of your CANopen device that transmit the EMCY;
- In the field **"EMCY Error Code"** insert the value of your error code (the maximum value is 0xFFFF);
- In the field **"Error Register"** insert the value of your error register (the maximum value is 0xFF).

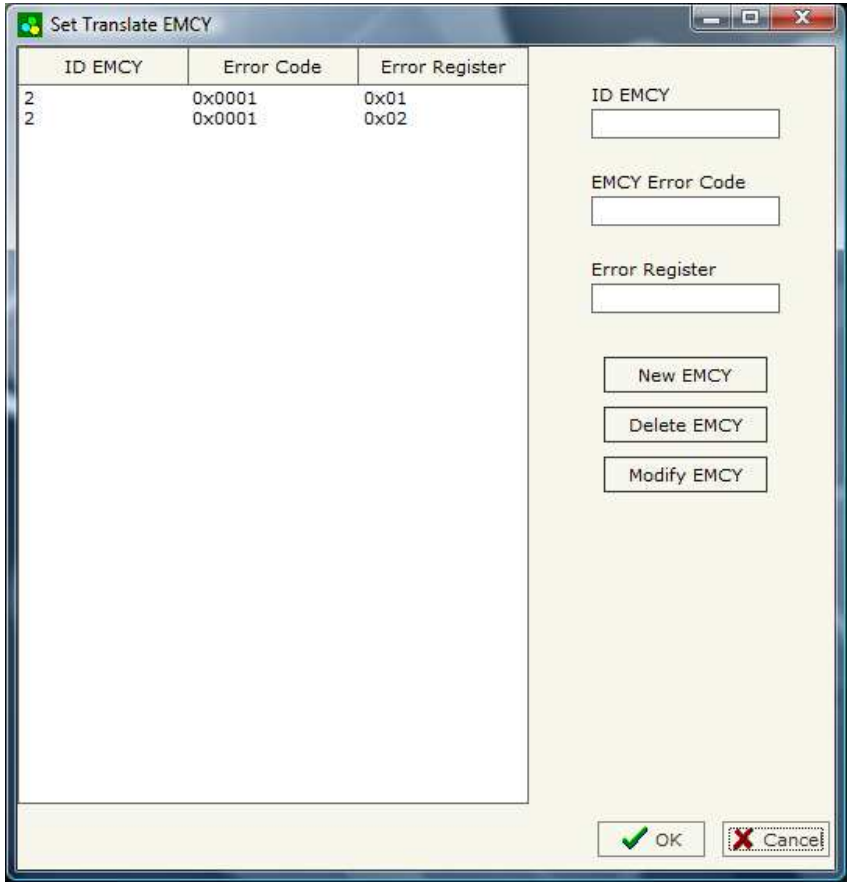


Figure 10: "Set Translate EMCY" window

DEFINE EMCY WORD:

By pressing the "Define EMCY word" button from the Main Window for SW67505 (Fig. 4) the window "Word EMCY" appears (Fig. 10):

- In the field **"List of EMCY"** there are the EMCY that you insert in the list of window "Set translate EMCY";
- In the field **"List of Modbus Register"** there are the Modbus register that you insert;
- In the field **"Number of Modbus register"** insert the number of register that contain the Modbus word;
- In the field **"Hi byte of Modbus register"** select which byte you would locate in the Hi position;
- In the field **"Lo byte of Modbus register"** select which byte you would locate in the Lo position.

For example:

Click on the List of EMCY, insert the valid address in the field "Number of Modbus register", select the byte position (First byte in "Hi byte of Modbus register" and Second Byte in "Lo byte of Modbus register"), click the "New" button, then in the field "List of Modbus register" the number of Modbus register will appear.

The maximum number of setting byte is 500.

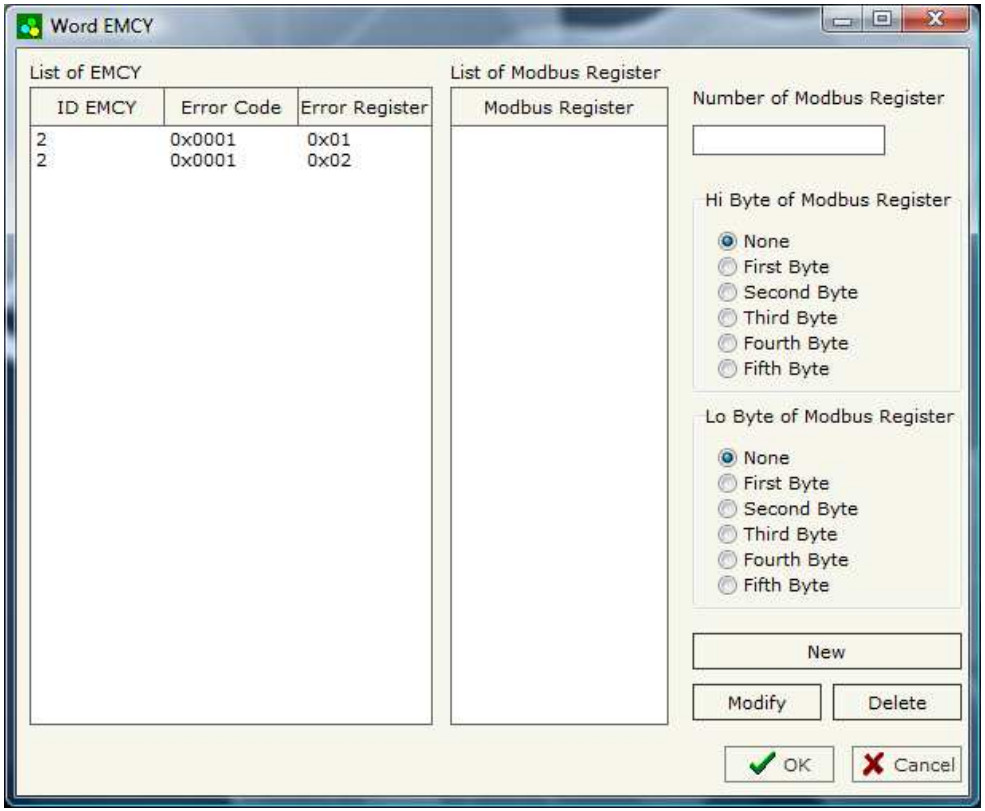


Figure 11: "Word EMCY" window

SET TRANSLATE PDO:

By pressing the "Set Translate PDO" button from the Main Window for SW67505 (Fig. 4) the window "RPDO" appears (Fig. 11).

A user who has to pass a PDO from CAN open to Modbus needs to insert the coordinates of the PDO to be transmitted in the field "SET Translate PDO" of the window.

- In the field **"cobid"** insert the Cob_ID of the PDO;
- In the field **"id_dev_ori"** insert the address of the original device of **BUS A** (note: an alias can be inserted in the field instead of the actual address of the PDO generator);
- In the field **"dimension"** insert the number of byte of PDO.

The maximum number of TPDO you can insert is 15.

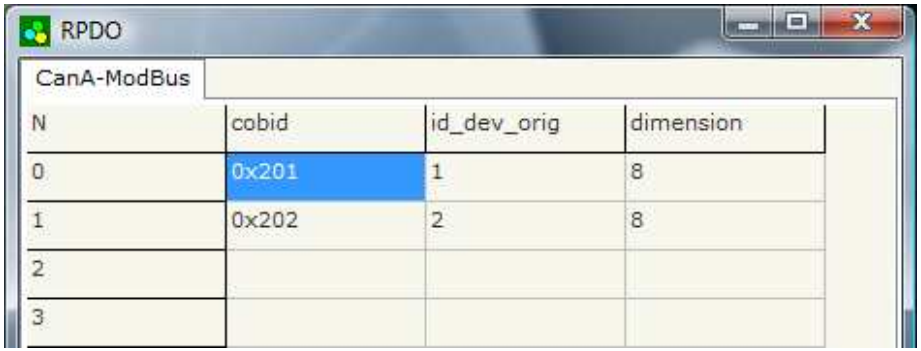


Figure 12: "RPDO" window

DEFINE STORE PDO:

By pressing the "Define store PDO" button from the Main Window for SW67505 (Fig. 4) the window "INFOPDO" appears (Fig. 12):

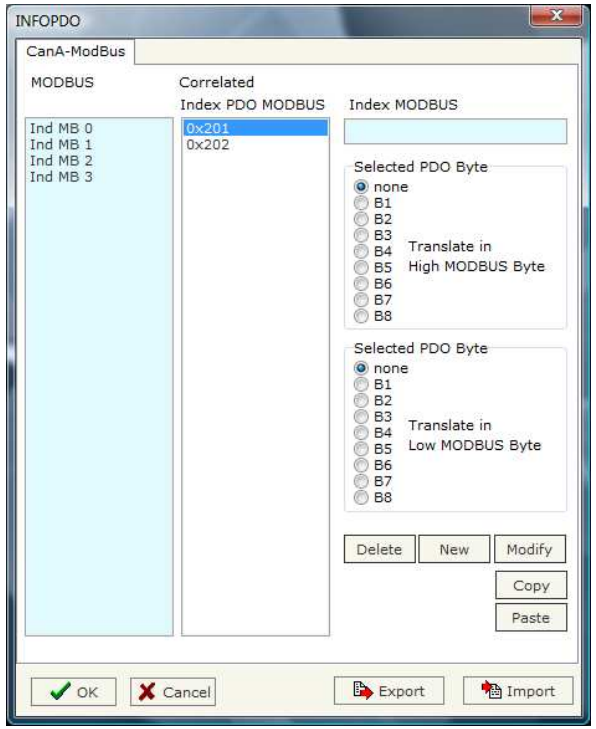


Figure 13: "INFOPDO" window

SET TRANSMIT PDO:

It is possible to write the PDOs using the Preset Multiple Registers Function (Modbus function 16). You have to write all the Modbus register (that represent the PDO Data) with one Modbus command.

By pressing the "Set Transmit PDO" button the window "Transmit PDO" appears.

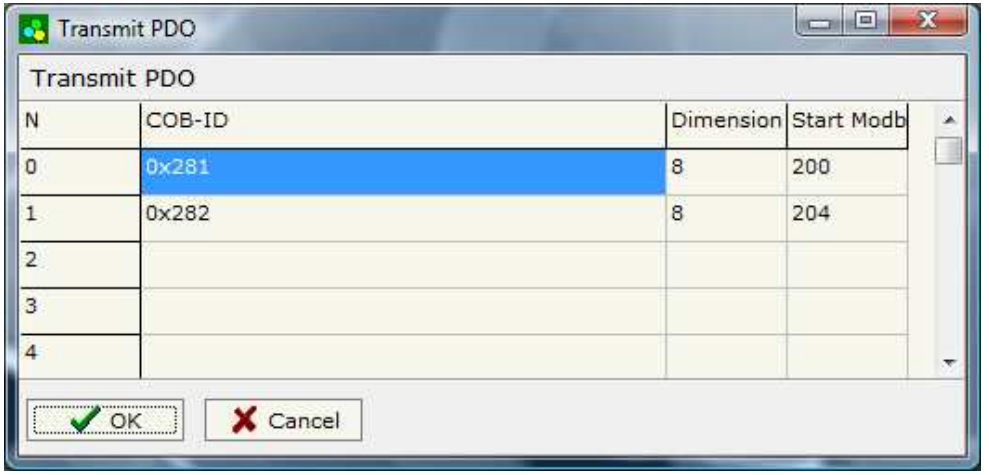


Figure 14: "Transmit PDO" window

The user who has to write a PDO from Modbus to CANopen needs to insert the coordinates of the PDO to be transmitted in the field "SET Transmit PDO" of the window.

- In the field **"COB-ID"** insert the COB-ID of the PDO;
- In the field **"Dimension"** insert the number of byte of PDO;
- In the field **"Start Modbus Address"** insert the number of Modbus register that you would like to start for writing the PDO.

The maximum number of RPDO you can insert is 15.

PING DEVICE:

If it is necessary to do a Ping on the net, before pressing the "Ping Device" button insert a value in the field on the right and then press the button. In order to do this, the gateway must be in RUN mode. To use this feature in Vista and 7 you have to open the software with Administrator right.

SET NODEGUARDING

By pressing the "Set Node Guarding" button from the Main Window for SW67502 (Fig. 3) the right window appears (Fig. 13).

- In the field "Node ID" insert the address of the device that you want to control. It is possible to insert up to 32 address;
- In the field "Guard Time" insert a time. This value indicates the delay between two interrogations;
- In the field "Life Time Factor" insert the number of attempts before considering the device absent;

In the field "Mnemonic" you can insert a brief description.

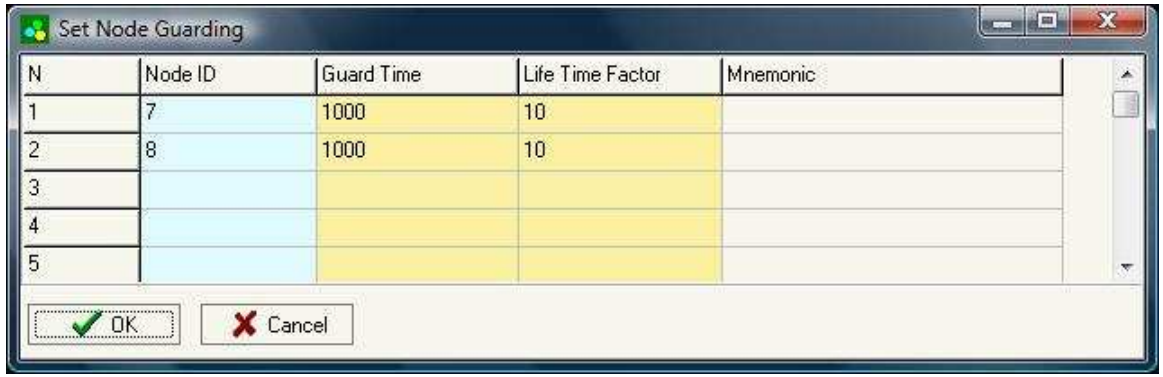


Figure 13: "Set Node Guarding" window

UPDATE DEVICE:

Section "Update Firmware from Serial" (Fig.14).

In order to load the parameters or update the firmware in the gateway, follow these instructions:

- Turn off the device;
- Connect the Null Modem cable from your PC to the gateway;
- Insert the Boot Jumper (see Fig. 2 for more info);
- Turn on the device;
- Check the "BOOT Led". It must to blink quickly (See Fig. 2 for more info);
- Select COM port and press the "Connect" button;
- Press the "Next" button;
- Select operations you want to do. You can select only Firmware or only Project or both;
- Press the "Execute update firmware" to start the upload;
- When all the operations are "OK" turn off the device;
- Disconnect the Boot jumper;
- Turn on the device.

At this point the configuration/firmware on the device is correctly updated.

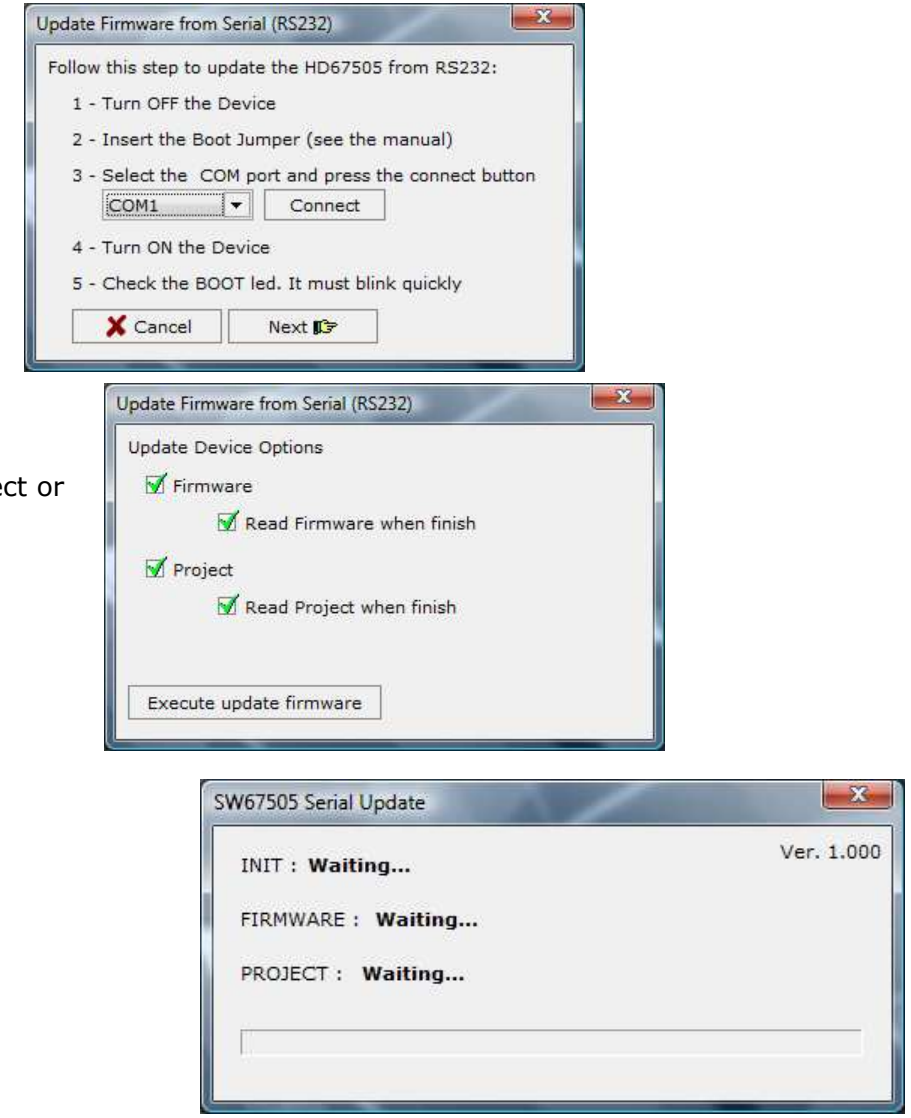


Figure 15: Update device procedure

CHARACTERISTICS OF THE CABLES:

The connection from RS232 socket to a serial port (example one from a personal computer) must be made with a Null Modem cable (a serial cable where the pins 2 and 3 are crossed).
It is recommended that the RS232 Cable not exceed 15 meters.

The connection at Ethernet socket must be with a Ethernet Cable with a RJ45 Plug.

Can bus cable characteristic:

DC parameter:		Impedance	70 Ohm/m
AC parameters:		Impedance	120 Ohm/m
		delay	5 ns/m
Length		**Baud Rate [bps]**	**Length MAX [m]**
		10 K	5000
		20 K	2500
		50 K	1000
		100 K	650
		125 K	500
		250 K	250
		500 K	100
		800 K	50
		1000 K	25

MECHANICAL DIMENSIONS:

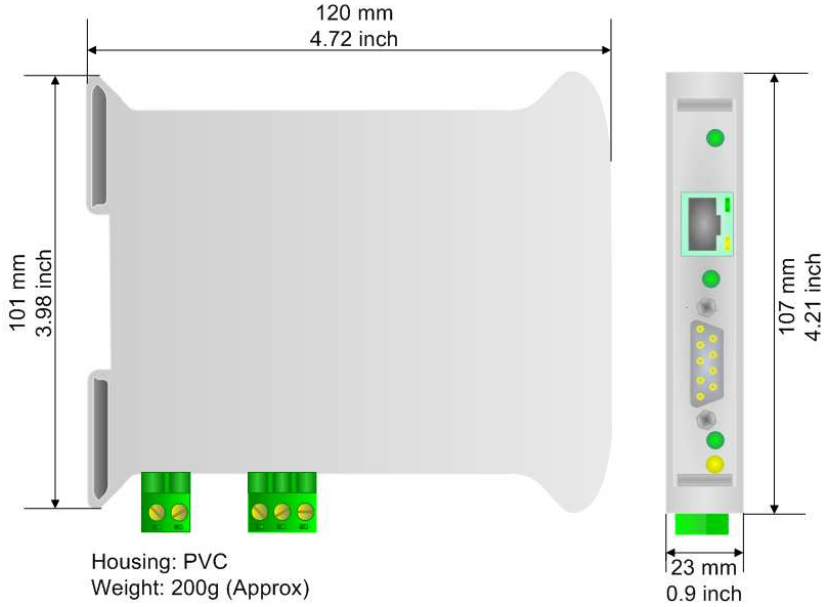


Figure 15: Mechanical dimensions scheme for HD67505-A1

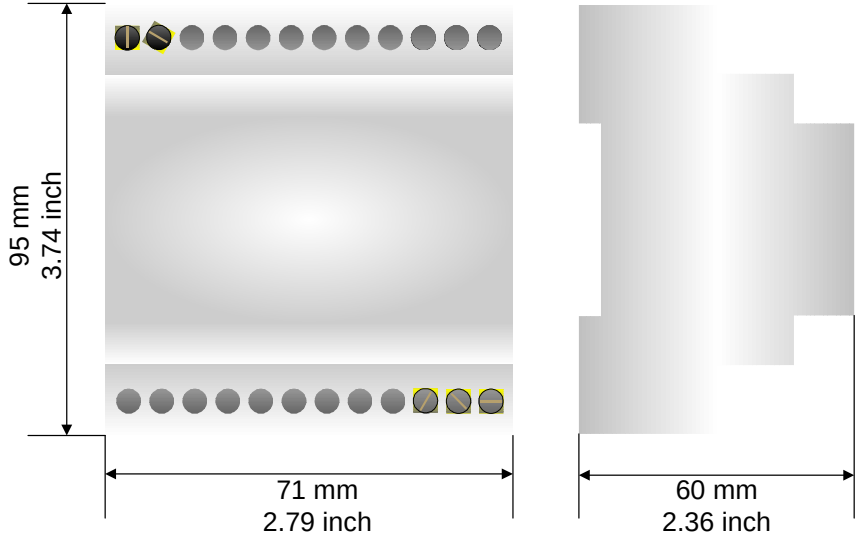


Figure 16: Mechanical dimensions scheme for HD67505-B2

ORDER CODE:

Order Code: **HD67505-A1** - CANopen / Modbus TCP Slave - Converter

Order Code: **HD67505-B2** - CANopen / Modbus TCP Slave - Converter

ACCESSORIES:

Order Code: **AC34107** - Null Modem Cable Fem/Fem DSub 9 Pin 1,5 m

Order Code: **AC34114** - Null Modem Cable Fem/Fem DSub 9 Pin 5 m

Order Code: **AC34001** - Rail DIN - Power Supply 220/240V AC 50/60Hz – 12 V AC

Order Code: **AC34002** - Rail DIN - Power Supply 110V AC 50/60Hz – 12 V AC

DISCLAIMER

All technical content within this document can be modified without notice. The content of the document content is a recurring audit.
For losses due to fire, earthquake, third party access or other accidents, or intentional or accidental abuse, misuse, or use under abnormal conditions repairs are charged to the user. ADFweb.com S.r.l. will not be liable for accidental loss of use or inability to use this product, such as loss of business income. ADFweb.com S.r.l. shall not be liable for consequences of improper use.

OTHER REGULATIONS AND STANDARDS

WEEE INFORMATION

Disposal of old electrical and electronic equipment (as in the European Union and other European countries with separate collection systems).
This symbol on the product or on its packaging indicates that this product may not be treated as household rubbish. Instead, it should be taken to an applicable collection point for the recycling of electrical and electronic equipment. If the product is disposed correctly, you will help prevent potential negative environmental factors and human health, which could otherwise be caused by inappropriate disposal. The recycling of materials will help to conserve natural resources. For more information about recycling this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE

The device respects the 2002/95/EC Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (commonly referred to as Restriction of Hazardous Substances Directive or RoHS).

CE MARKING

The product conforms with the essential requirements of the applicable EC directives.

WARRANTIES AND TECHNICAL SUPPORT:

For fast and easy technical support for your ADFweb.com SRL products, consult our internet support at www.adfweb.com.
Otherwise contact us at the address support@adfweb.com

RETURN POLICY:

If while using your product you have any problem and you wish to exchange or repair it, please do the following:

1) Obtain a Product Return Number (PRN) from our internet support at www.adfweb.com. Together with the request, you need to provide detailed information about the problem.
2) Send the product to the address provided with the PRN, having prepaid the shipping costs (shipment costs billed to us will not be accepted).

If the product is within the warranty of twelve months, it will be repaired or exchanged and returned within three weeks. If the product is no longer under warranty, you will receive a repair estimate.

PRODUCTS AND RELATED DOCUMENTS:

Part	Description	URL
HD67121	Gateway CANopen / Canopen	www.adfweb.com?product=HD67121
HD67001	Gateway CANopen / Modbus – RTU Master	www.adfweb.com?product=HD67001
HD67505	Gateway CANopen / Modbus – Ethernet TCP	www.adfweb.com?product=HD67505
HD67134	Gateway CANopen / DeviceNet	www.adfweb.com?product=HD67134
HD67117	CAN bus Repeater	www.adfweb.com?product=HD67117
HD67216	CAN bus Analyzer	www.adfweb.com?product=HD67216