User Manual

Revision 3.002
English

Gateway / Bridge
CANopen to Modbus TCP Server

(Order Code: HD67005)

for Website information:
www.adfweb.com?Product=HD67005

for Price information:
www.adfweb.com?Price=HD67005

Benefits and Main Features:

- Very easy to configure
- Low cost
- Rail mountable
- Wide supply input range
- Galvanic isolation
- Industrial temperature range:
  -30°C / 70°C (-22°F / 158°F)

HD67005

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=HD67004	(Modbus TCP Client)
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=HD67014	(Modbus TCP Client)
www.adfweb.com?product=HD67515	(Modbus TCP Server)

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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With this "Document Code" go to web page www.adfweb.com/download/ and search for the corresponding code on the page. Click on the proper "Document Code" and download the updates.

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REVISION LIST:

Revision	Date	Author	Chapter	Description
1.000	09/07/2004	Mt	All	First release version
1.001	25/07/2005	Dp	All	
1.005	19/06/2006	Ddt	All	Documentation code changed
1.006	22/06/2007	Av	All	Revision
1.007	26/06/2007	Av	All	Revision
2.000	09/07/2007	Av	All	New document format
3.000	09/11/2007	Av	All	New software version
3.001	20/06/2008	Av	All	Change figure 2
3.002	18/06/2009	Ml	All	Revision

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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;
- Communication Ethernet 10/100 (TCP Version) ;
- Temperature range -30°C to 70°C.

To configure the CANopen Gateway, use the available software that runs with Windows, called SW67005. 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.
While the maximum number of the following:

- EMCY
- EMCY Word
- PDO
- Store PDO

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

CONNECTION SCHEME:

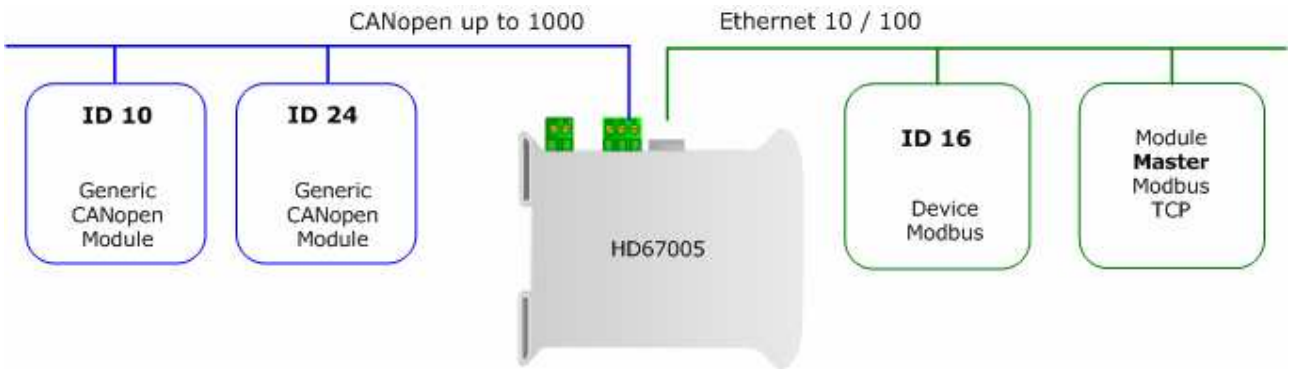

Figure 1: Connection scheme of HD67005 between a CANopen and Modbus TCP

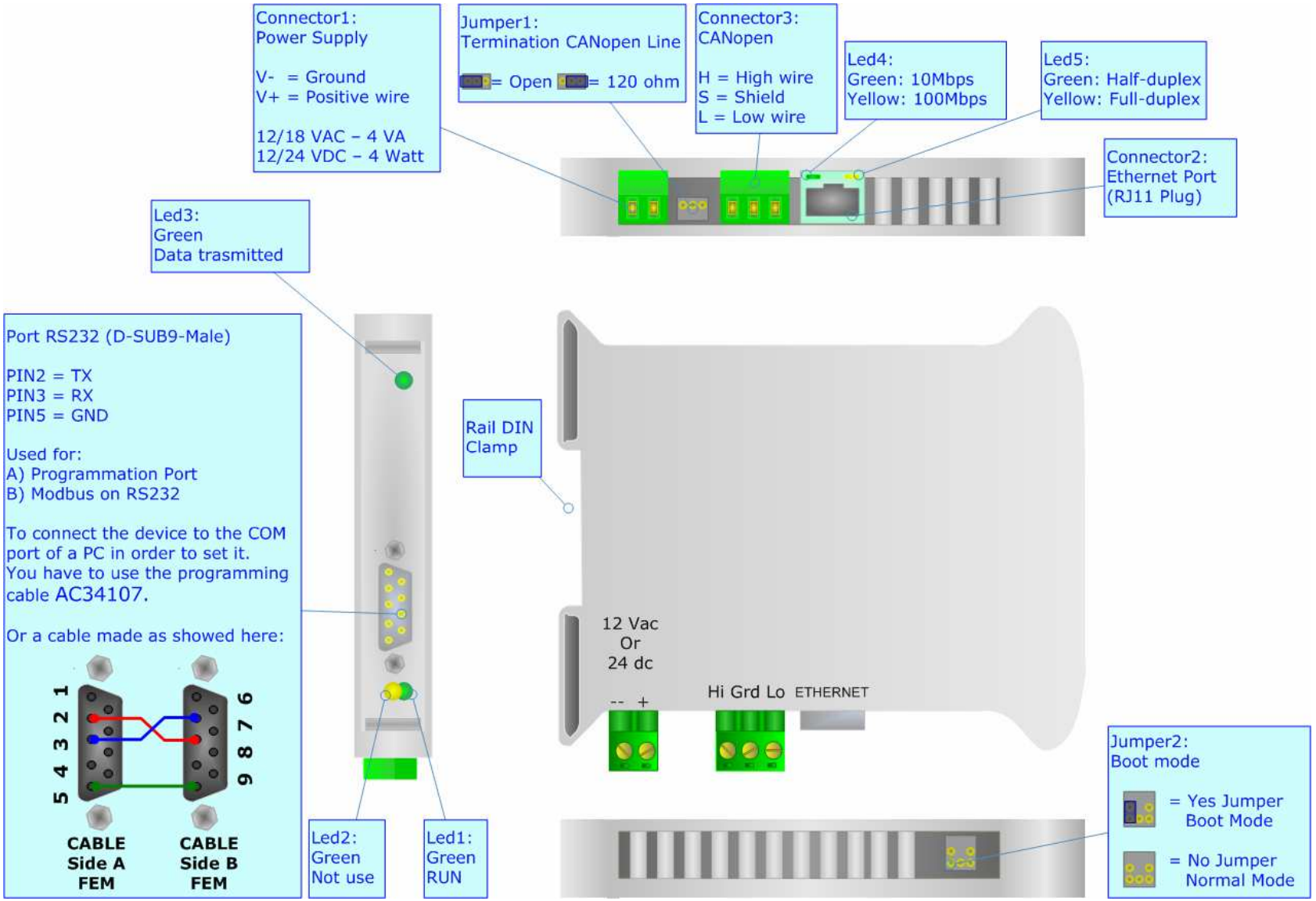

Figure 2: Connection Scheme for HD67005

CONFIGURATION:

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

You need Compositor SW67005 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 SW67005:

When launching the SW67005 the following window appears
(The SW67005 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).

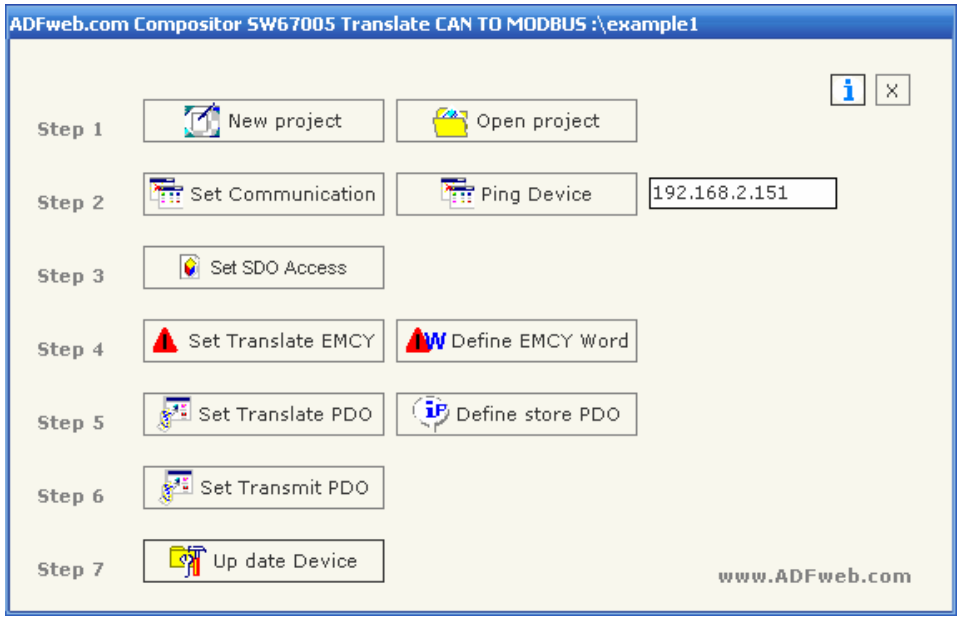

Figure 3: Main window for SW67005

The following explains the function of the buttons:

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 SW67005 (Fig. 3) the window "Set Communication" appears (Fig. 4):

- In the field "DevID", the CANopen address is defined;
- In the field "Baud Rate", 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 sen 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;
- 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);
            - 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: 257=0x01.11;
        - If in the field "Add. Word Modbus" you set 0, then this action commands all the devices.
- The Gateway has two alternative for PDO: 15RPDO and 3RPDO or 8 RPDO and 8 TPDO. Select the desired choice.
- In the field "IP", insert the IP address that you want to give at slave Modbus;
- In the field "SubNet Mask", insert the SubNet Mask;
- "SDO Timeout" is the maximum time that the device attends for the answer from the Slave interrogated;
- Data bits and Stop bits, are a serial parameter and they are fixed in order at 8 and 1 for default.

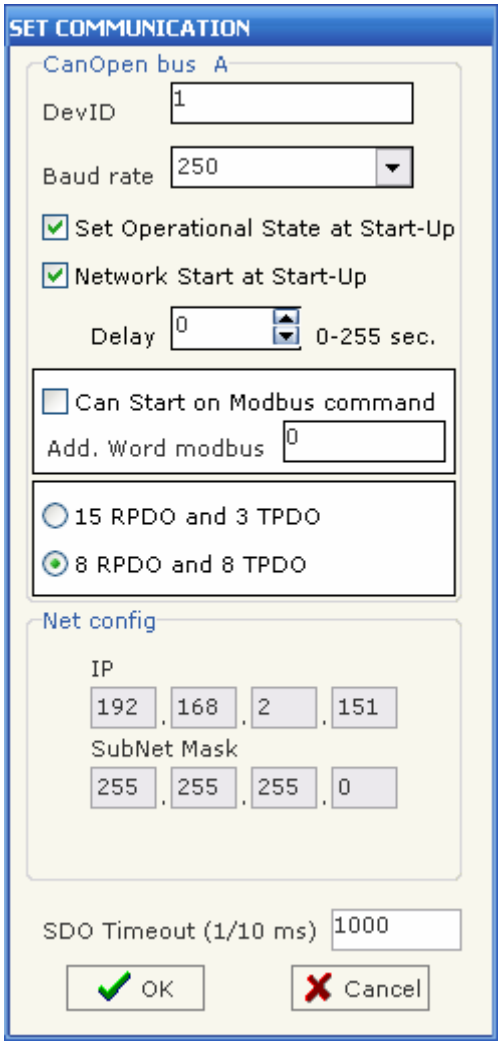

Figure 4:
" Set Communication" Window

SET SDO ACCESS:

Section "SET SDO Access"

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

- 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 SDO Access" button from the Main Window for SW67005 (Fig. 3) the window "SDO" appears (Fig. 5).

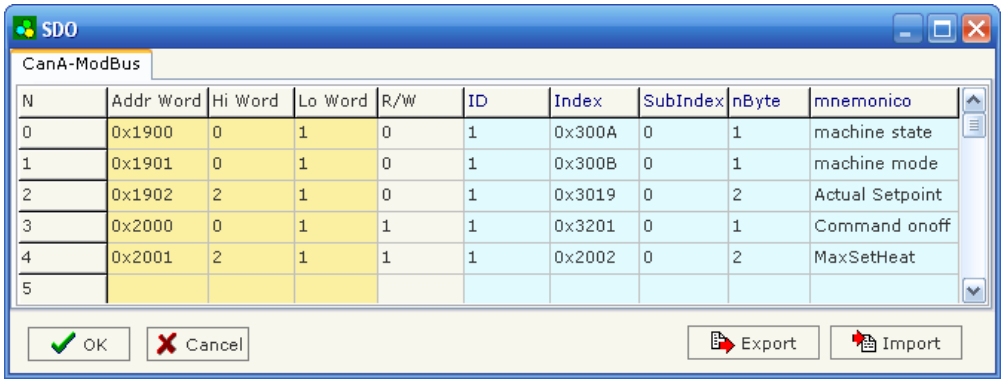

Figure 5: "SDO" Window

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 low 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 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 "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" indicate 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 "Mnemnico" you can insert a brief description.

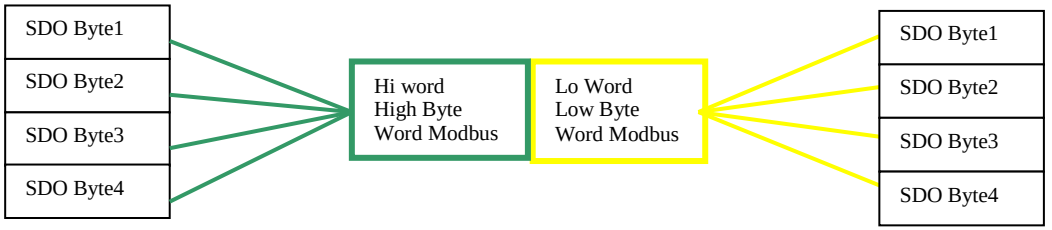

Figure 6: Scheme of the word configuration

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.

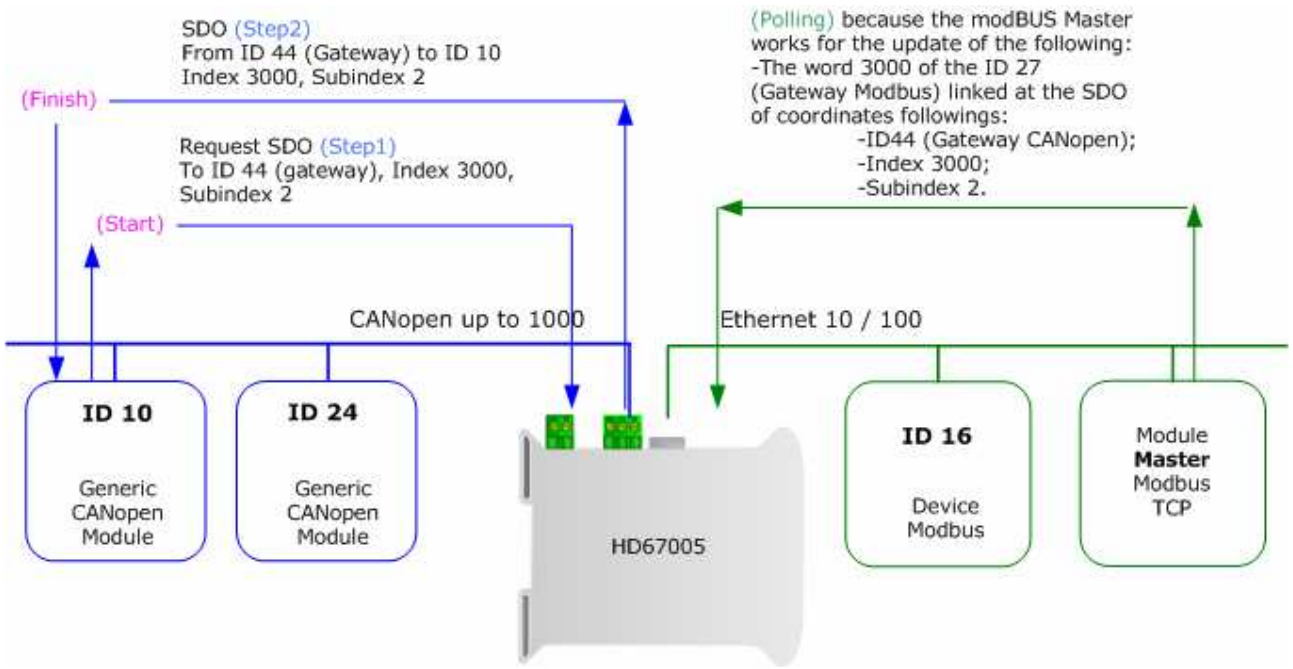

Figure 7: Chart of SDO request from Modbus side

SET TRANSLATE EMCY:

By pressing the "Set Translate EMCY" button from the Main Window for SW67005 (Fig. 3) the window "Set Translate EMCY" appears (Fig. 8).

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 who 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).

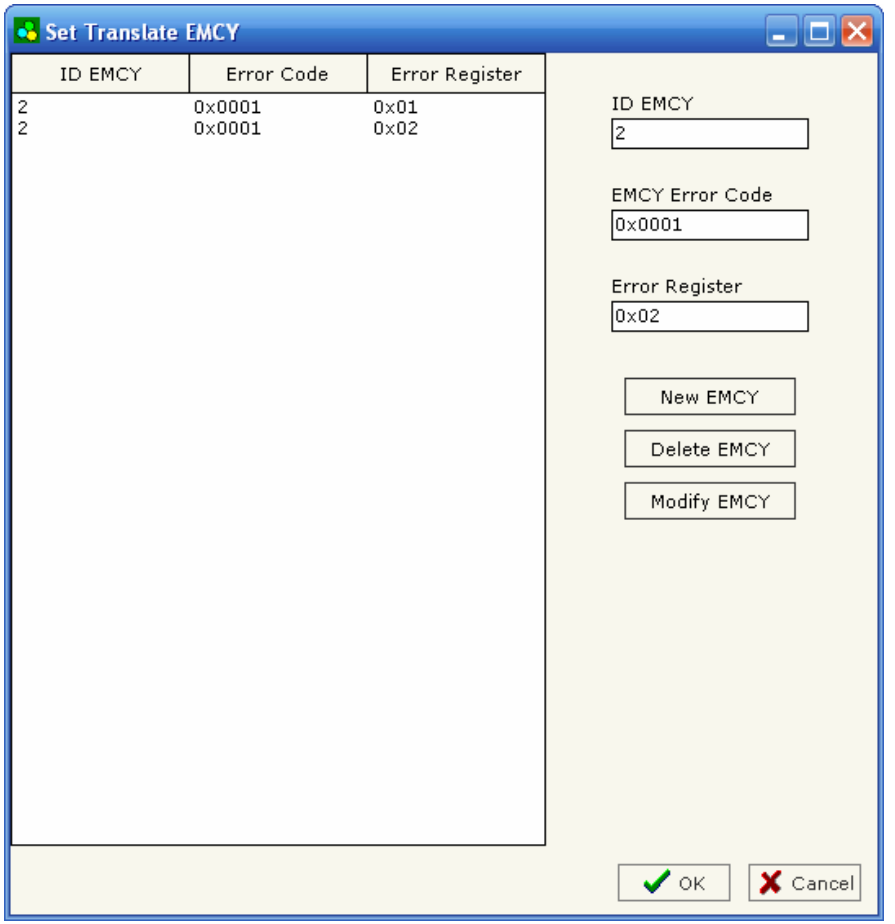

Figure 8: "Set Translate EMCY" window

DEFINE EMCY WORD:

By pressing the "Define EMCY word" button from the Main Window for SW67005 (Fig. 3) the window "Word EMCY" appears (Fig. 9):

- 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 are 500.

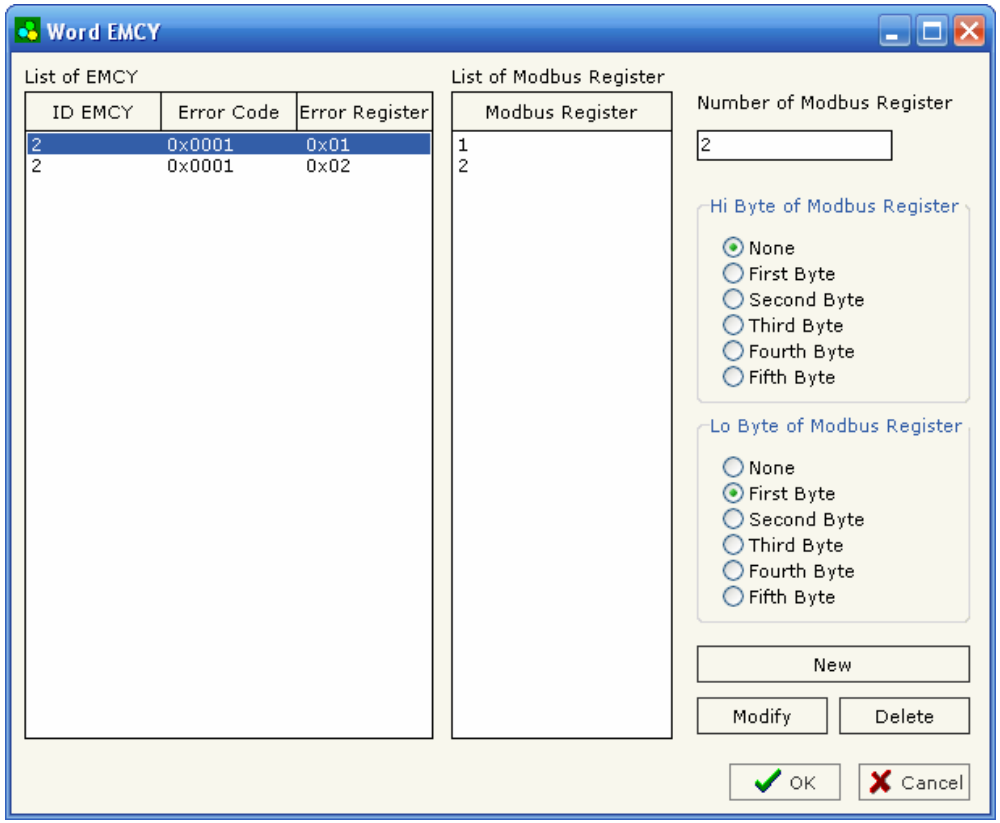

Figure 9: "Word EMCY" window

SET TRANSLATE PDO:

By pressing the "Set Translate PDO" button from the Main Window for SW67005 (Fig. 3) the window "RPDO" appears (Fig. 10).

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.

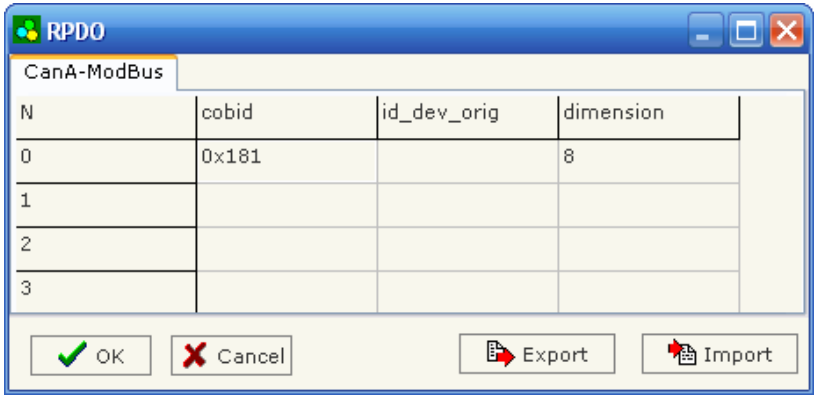

Figure 10: "RPDO" window

DEFINE STORE PDO:

By pressing the "Define store PDO" button from the Main Window for SW67005 (Fig. 3) the window "INFOPDO" appears (Fig. 11).

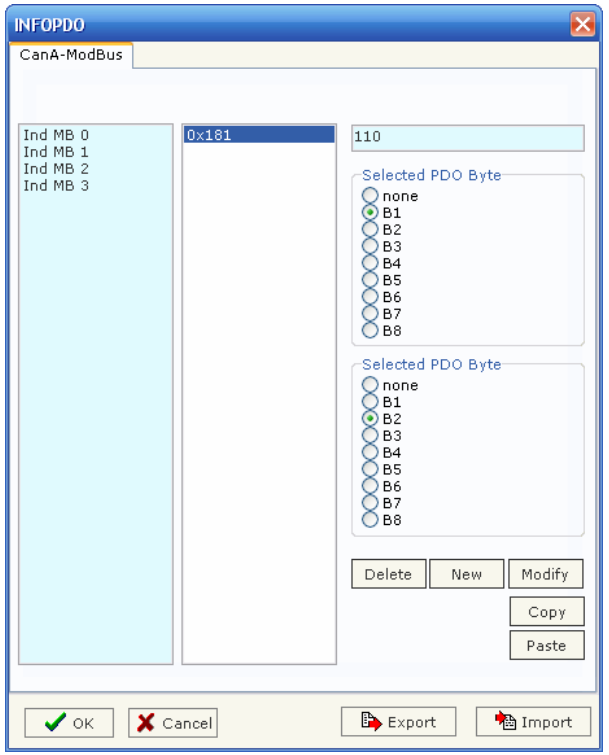

Figure 11: "INFOPDO" window

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:

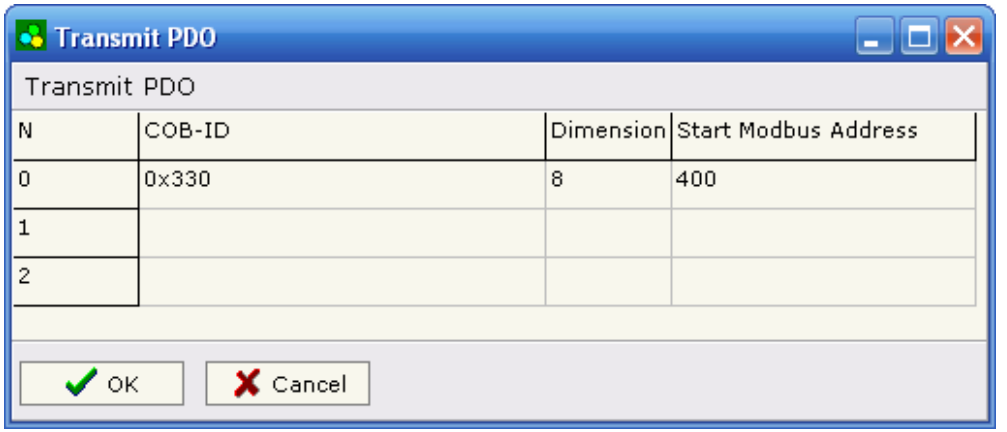

Figure 12: "Transmit PDO" window

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.

PING DEVICE:

If is necessary to do a Ping on the net, before pressing the "Ping Device" button insert a value in the right field and then press the button. For doing this, the gateway must be in RUN mode.

UPDATE DEVICE:

Section "Update Device":
Insert the boot jumper, see figure 2.
In order to load the parameters after they are set, set the Com port you used for update, then you must click the button "Execute update firmware" on the principal window.

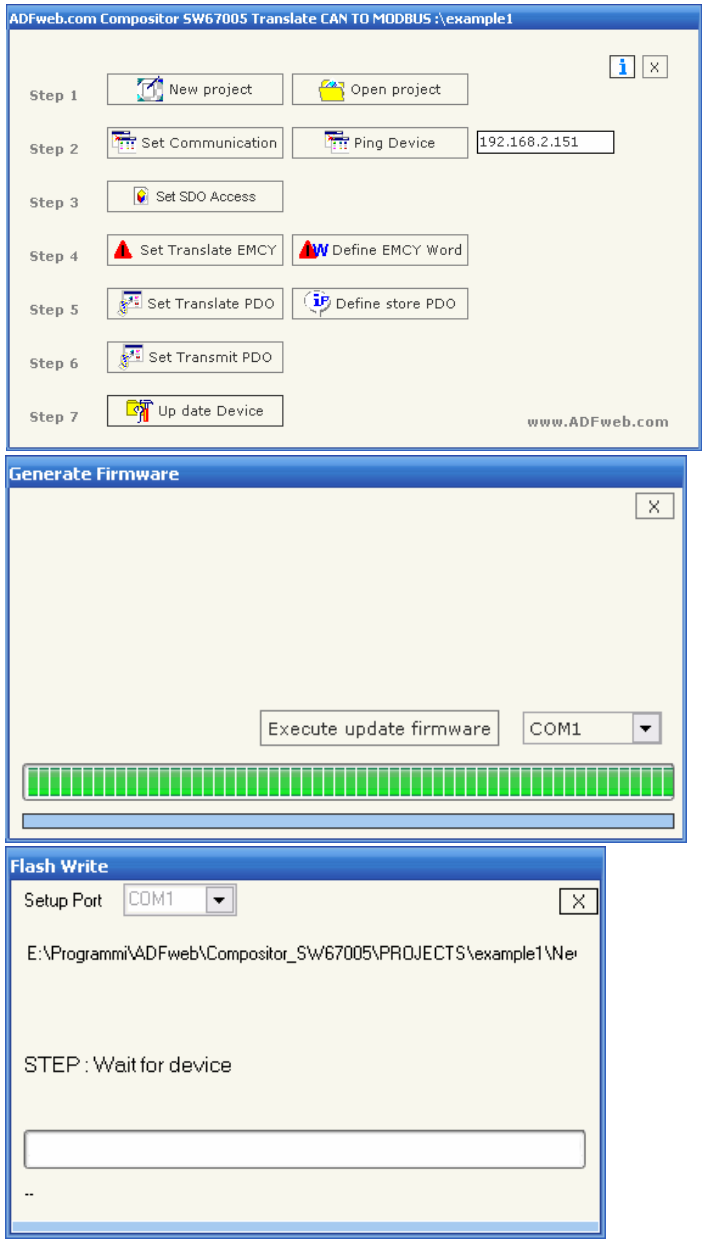

Figure 13: Update device procedure

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:

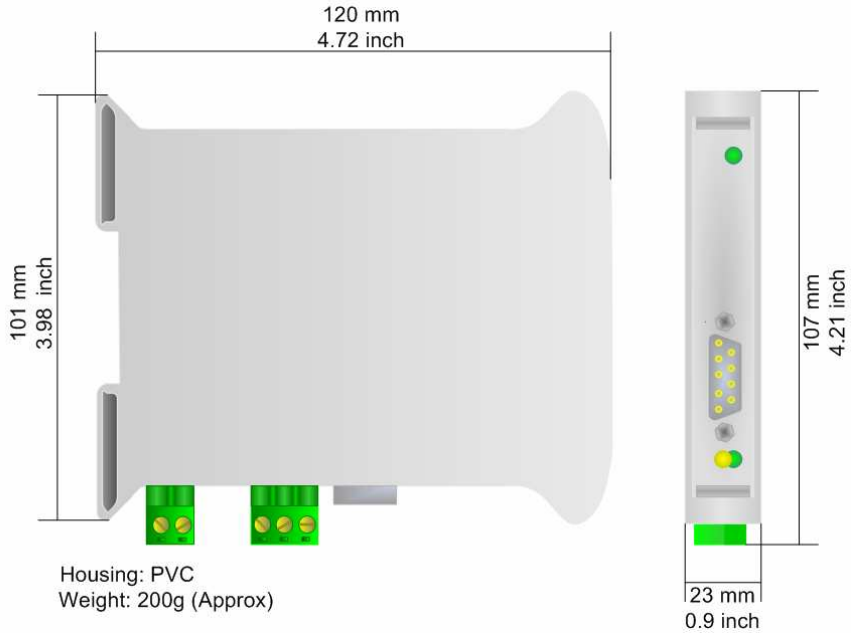

Figure 14: Mechanical dimensions scheme

ORDER CODE:

Order Code: **HD67005** **-** Gateway – CANopen to Modbus RTU Server

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

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
HD67004	Gateway CANopen / Modbus – Ethernet TCP	www.adfweb.com?product=HD67004
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