User Manual
English

Gateway / Bridge
Modbus TCP Server to Modbus RTU Master
(Order Code: Z-GW-MB)
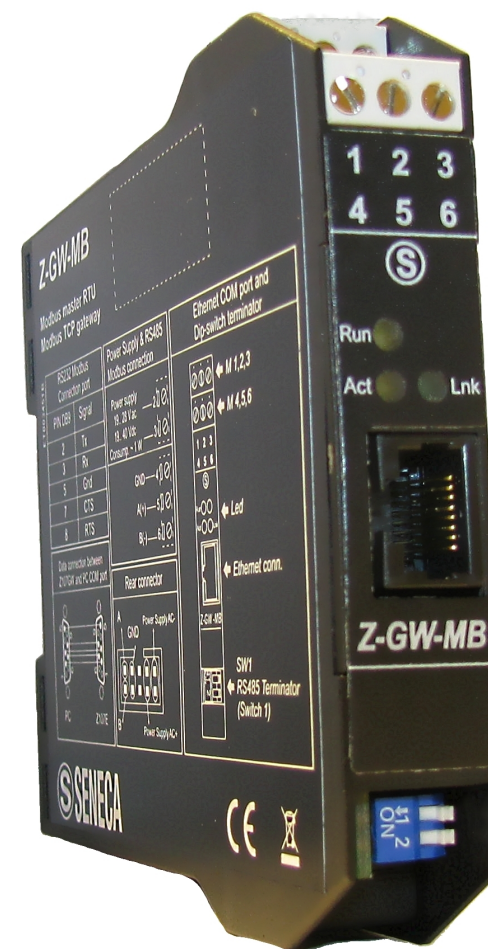
for Website information:
www.seneca.it

for Technical information:
http://www.seneca.it/prodotti.php

Or send an email to:
support@seneca.it

Benefits and Main Features:

Very easy to configure

Low Cost

Rail mountable

Wide supply input range

Galvanic Isolation

Industrial temperature range:

-20°C / 70 °C

Z-GW-MB

INDEX:

CHARACTERISTICS:

The Modbus TCP to Modbus RTU Gateway allows the following characteristics:

- ➢ Opto-isolation RS485;
- ➢ Choice possibility between RS232 or RS485;
- ➢ Mountable on Rail DIN;
- ➢ Temperature range -20°C to 70°C;
- ➢ EMS EN 61000-6-2.

This device is able to manage a maximum of **ten simultaneous connections from Ethernet side**.

To configure the Gateway, use the available software that runs with Windows, called SW67507. It is downloadable on the site www.seneca.it and its operation is described in this document.

It can be used in two operative ways: routing and natting. In the "Routing Mode" the command Modbus is forwarded on the serial line using the same requested addresses. In the "Natting Mode" the device addresses and data are altered through a translation table of the addresses.

POWER SUPPLY:

Recommended power supply	
V **dc**	V **ac**
24 V	12 V

Vdc		Vac	
V min	V max	V min	V max
12 V	40 V	12 V	28 V

FUNCTION SCHEME:

Modbus TCP 10/100 from RJ45

Gerneric module Modbus TCP **SLAVE**

Gerneric module Modbus TCP **MASTER**

Modbus RTU up to 115200 from Screw terminal M4,5,6 **(RS485)**

Gerneric module Modbus RTU **SLAVE**

Gerneric module Modbus RTU **SLAVE**
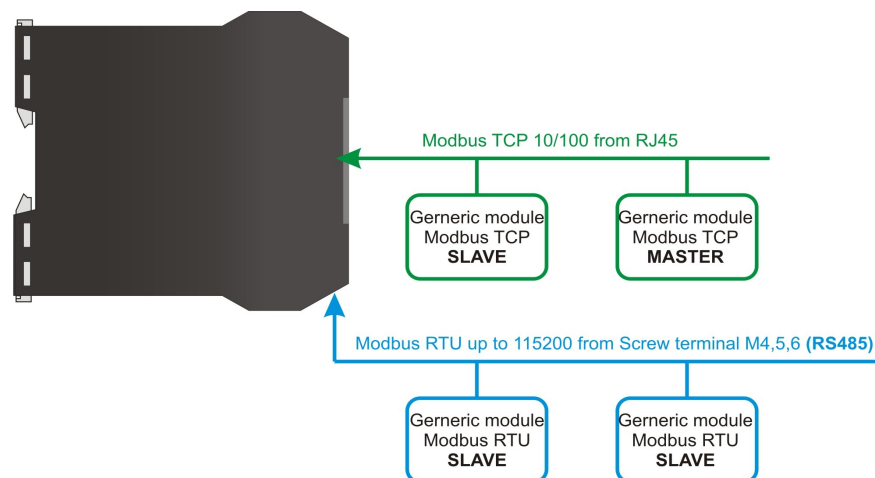
Figure 1: Connection scheme of Z-GW-MB between Modbus TCP and Modbus RTU (communication RS485)

Modbus RTU up to 115200 from DB9-F **(RS232)**

Gerneric module Modbus RTU **SLAVE**

Gerneric module Modbus RTU **SLAVE**

Modbus TCP 10/100 from RJ45

Gerneric module Modbus TCP **SLAVE**

Gerneric module Modbus TCP **MASTER**

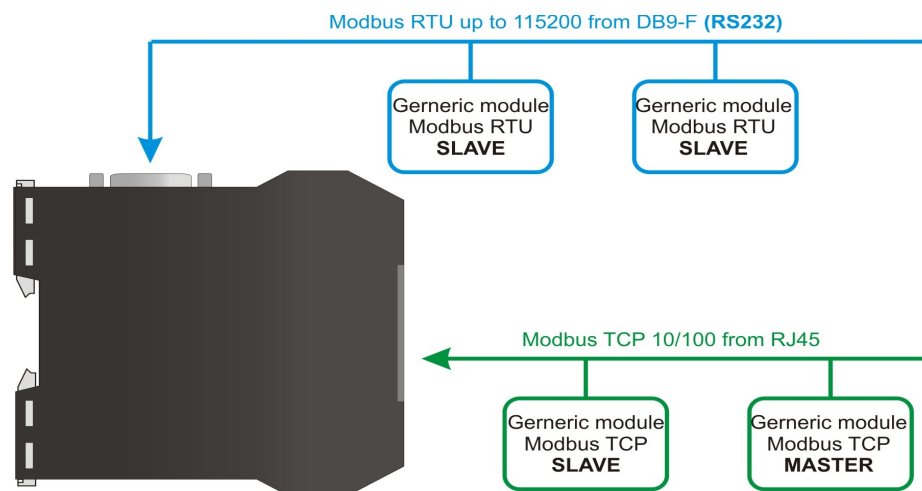*Figure 2: Connection scheme of Z-GW-MB between Modbus TCP and Modbus RTU (communication RS232)*

CONNECTION SCHEME:

Description	Pin
Rx	2
Tx	3
Gnd	5
Rts	7
Cts	8

RS232
DB9-F

Terminal	Desc
6	B
5	A
4	GND
3	Power +
2	Power -
1	Not Used

Ethernet
modbus TCP

DIN rail
Insertion
by IDC10

Z-GW-MB

DIP-Switch	Position	Description
1		OFF= Disable the terminetor of the RS485 / RS232 communication.
1		ON= Enable the terminetor of the RS485 / RS232 communication.
2		OFF= Restores the normal operation mode of the Z-GW-MB
2		ON= Enable the «BOOT» mode that let the software configuration

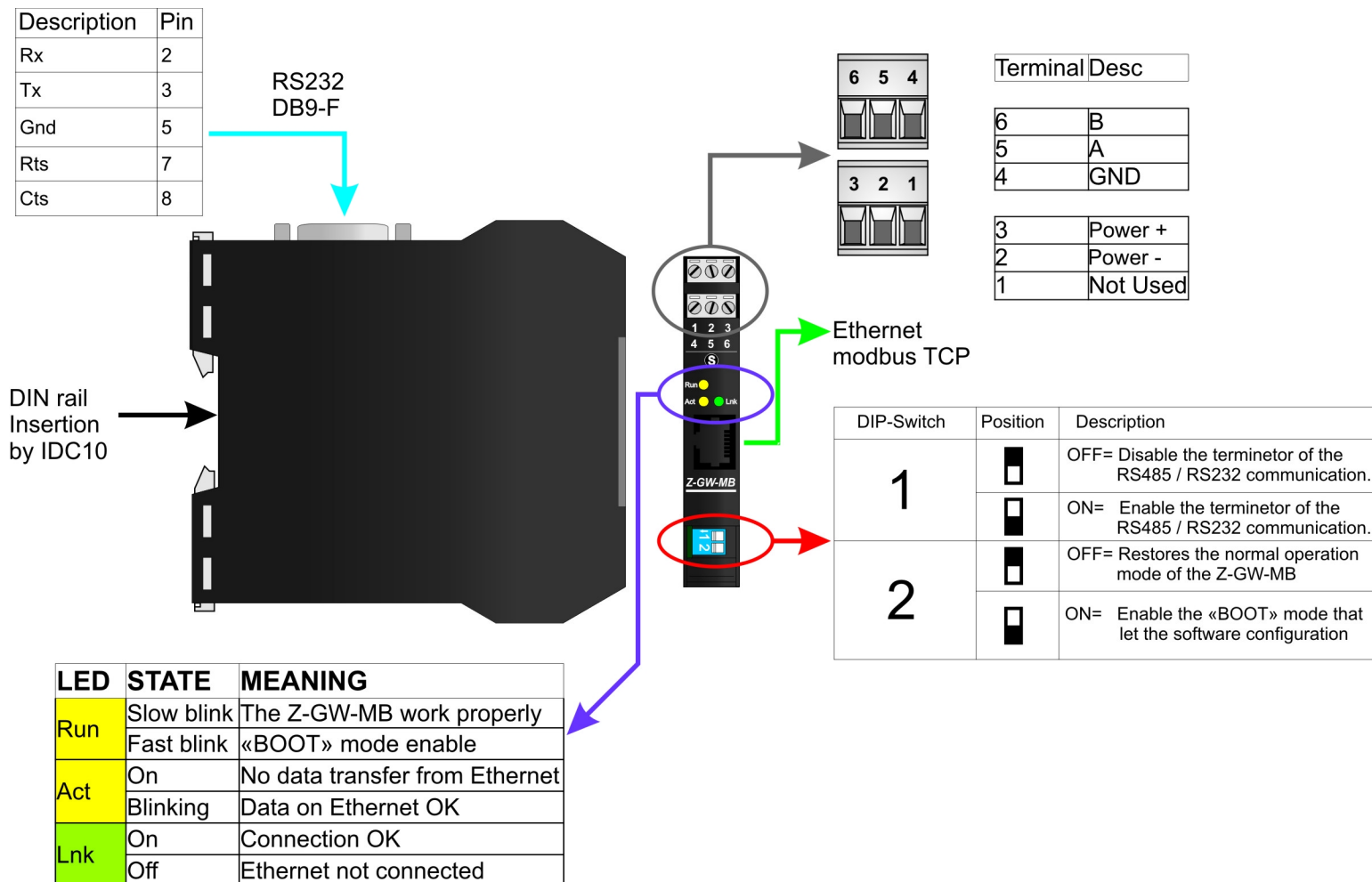| LED	STATE	MEANING
Run	Slow blink	The Z-GW-MB work properly
Run	Fast blink	«BOOT» mode enable
Act	On	No data transfer from Ethernet
Act	Blinking	Data on Ethernet OK
Lnk	On	Connection OK
Lnk	Off	Ethernet not connected

Figure 3: Connection Scheme for Z-GW-MB

USE OF COMPOSITOR SW67507:

The software allows the device parameters to be defined.

When launching the SW67507, the following window appears.
(The SW67507 is downloadable on the site
www.seneca.it
This manual is referenced to the last version of the software present on our web site)
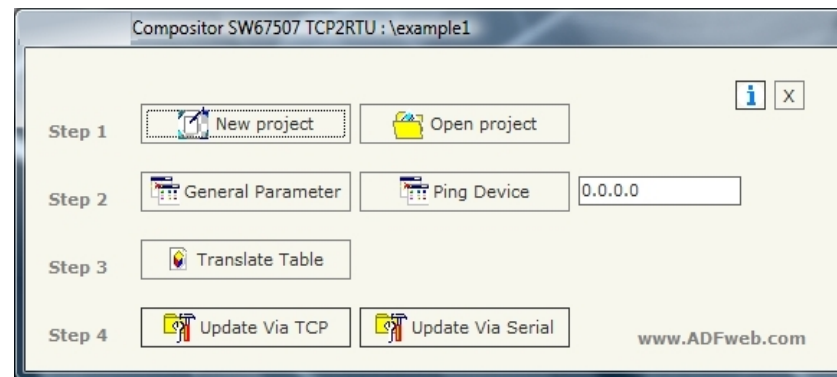

Figure 5: Main window for SW67507

NEW PROJECT / OPEN PROJECT:

The "New Project" button creates the folder which contains the entire device configuration.

A device configuration can also be imported or exported:

➢ To clone the configurations of a Programmable ModBus RTU into Modbus TCP Gateway in order to configure another 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 the new folder 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:

   o **"General Parameter";**
   o **"Translate Table".**

GENERAL PARAMETER:

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

By pressing the "General Parameter" button from the main window for SW67507 (Fig. 5) the window "General Parameter" appears (Fig. 6).

- ➢ The field "Operation Mode" defines the operation of the Gateway in Routing or NAT modes (see the description in the following page);
- ➢ In the field "IP Address" insert the IP address that you want to give to the slave Modbus TCP;
- ➢ In the field "Subnet Mask" insert the Subnet Mask;
- ➢ In field "Gateway" insert the Defualt Gateway IP address for use the gateway in WAN or Internet. For enable this feature is necessary to check the Gateway option.
- ➢ In the field "Port" insert the number of port;
- ➢ If the field "RS232" is checked the serial line in use is the RS232, otherwise is the RS485;
- ➢ In the field "Baud rate" the velocity of the Modbus RTU is defined;
- ➢ In the field "Parity" the Modbus RTU parity is defined;
- ➢ "Timeout" is the maximum time that the device attends for the answer from the Slave interrogated;
- ➢ Checking "Enable UDP Port" field it is possible to make a Broadcast request. This request must be made at Port 64223 ($FADF) with these six byte of data: $53, $45, $41, $52, $43, $48. Each device in response sends a total of 10 Bytes. These bytes are four for the IP and the other for the MAC address (Example of response: 0xC0,

Figure 6: "General Parameter" window

0xA8, 0x01, 0x2A, 0x11, 0x22, 0x33, 0x44, 0x55, 0x58. So the IP is: 192.168.1.42; and the MAC Address: 11-22-33-44-55-58).

➢ If the field "Enable Special Command" is checked, it is possible to send a no-Modbus request through the gateway. i.e. a TCP frame with the first two caracters 0x55 and 0xAA is sent in the Modbus RTU line as is. If you don't want to send the first two bytes (0x55, 0xAA) in the RTU line it is possible to check the field "Cancel the first two bytes".

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.

OPERATIONAL MODE:

ROUTING:

A few characteristics of the Modbus RTU package have been modified in the standard of the Modbus TCP protocol. Two bytes of the final CRC were eliminated (no longer necessary for the information to reach its already corrected destination). The first byte of the slave identification was changed, leaving the one that is called PDU. A frame denominated as MBAP header with dimensions of 7 bytes was added to the head of the PDU.
It is composed by the following:
➢ Word transaction identifier (recopied from the slave in the response phase);
➢ Word protocol identifier (0=Modbus protocol);
➢ Word length (number of successive bytes);
➢ Byte unit identifier (used for the routing operation).

By using the last byte of the MBAP header, it is possible to carry out the routing from a requested Modbus TCP toward a serial line using the address from the slave which is specified by the byte unit identifier.

Example:
A requested Modbus TCP made in the device as the address 192.168.0.200 for the holding register address $2000, which is MBAP unit identifier has the value of 2. It will be followed by the request on the serial for the device with the address 2 at the word $2000.
After the request is made, the RTU will respond. The master TCP will be given the same response which will be reconstructed according to the specifications of the Modbus TCP.

If the RTU slave responds with an exception, that exception code will be transmitted again to the TCP master. If the RTU slave does not respond in the estimated time defined by the Timeout parameter, an exception response will be given: error code $0B.
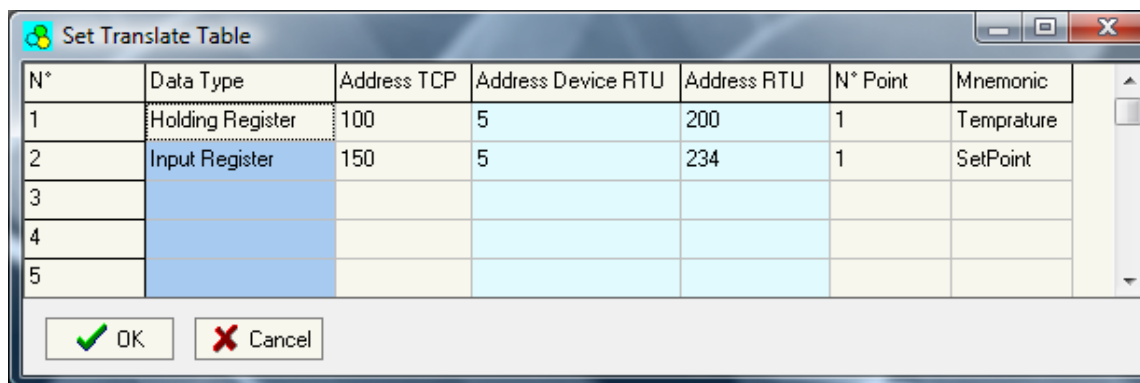
NATTING:

When using the operation mode, Natting, the requested data will be processed through a table of translations of the Modbus network addresses.

TRANSLATE TABLE:

Within the section "Translate Table" you can define the variables that can be read or written by the TCP bus on the RTU bus when the device is in NAT mode.

By pressing the "Translate Table" button from the main window for SW67507 (Fig. 5) the window "Set Translate Table" appears (Fig. 7).

N°	Data Type	Address TCP	Address Device RTU	Address RTU	N° Point	Mnemonic
1	Holding Register	100	5	200	1	Temprature
2	Input Register	150	5	234	1	SetPoint
3						
4						
5						

Figure 7: "Set Translate Table" window

The data of the columns have the following meanings:

➢ In the field "Data Type" insert the type of data that is being considered;
➢ In the field "Address TCP" insert the virtual address of the present data in a device in the TCP Modbus;
➢ In the field "Address Device RTU" insert the address of the device on the RTU Modbus that contains the data;
➢ In the field "Address RTU" insert the address of the data on the RTU device;
➢ In the field "N° Point" insert the number of consecutive data that you want to configure. For example, you create Address TCP=1000, Address RTU=100 and N° point = 5, the following gets set-up automatically: addresses TCP 1001, 1002, 1003, 1004 and the variables RTU 101, 102, 103, 104;
➢ In the field "Mnemonic" you can insert a brief description.

Example 1:

If you want, from TCP network, write a data it the RTU network on the device at:

➢ Address 5;

➢ Through Gateway WORD 100 (Address RTU);

➢ Address TCP 1000.

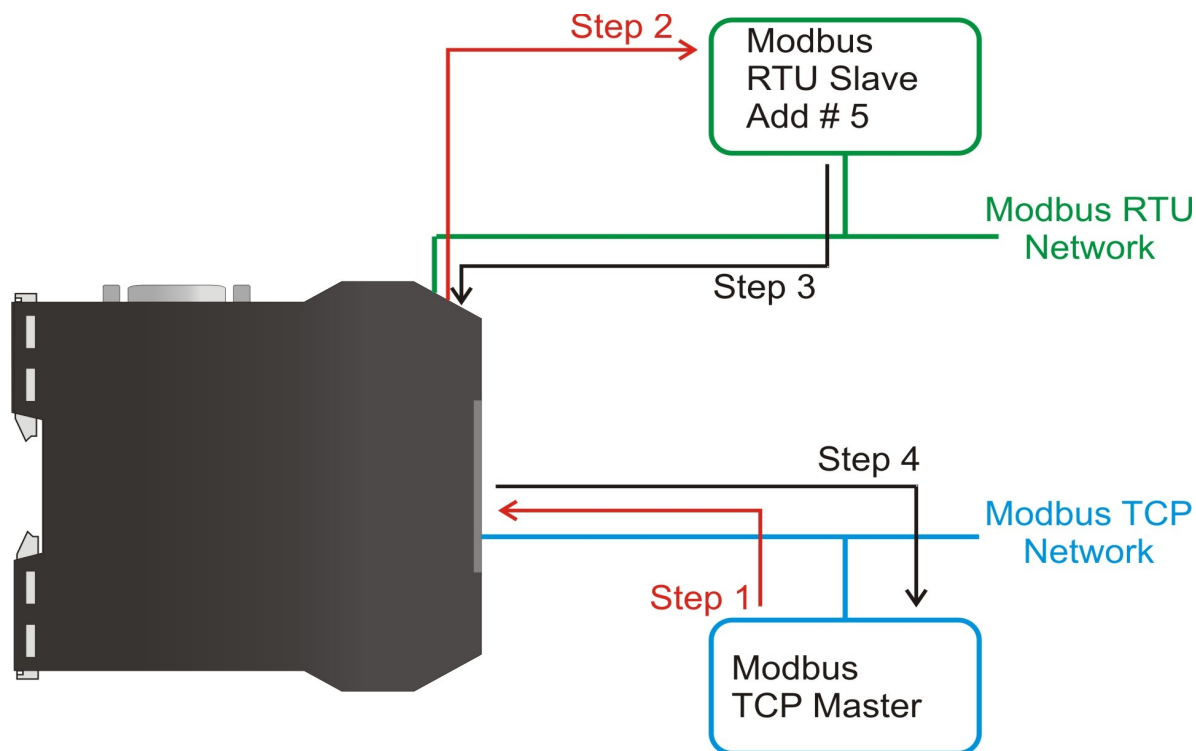In the above scenario:

Specify the type of data between:

➢ Holding Register (word in read and write);

➢ Input Register (word in read).

From the side of the MODBUS TCP:

➢ Address of data to read.

From the side of the MODBUS RTU:

➢ Address of the device to interrogate;

➢ Address of data to read on device.

Step1	Request to the gateway, from the «Holding Regiser» in address 1000
Step 2	Request by the gateway, from the «Holding Register» in address 100 to the device in address 5
Step 3	Return to the gateway, from the variable 100 of the device in address 5
Step 4	Return to the TCP Master, from the variable 100 of the device in address 5

Figure 8: Chart of Request data from Modbus TCP

If the RTU slave responds with an exception, that exception code will be transmitted to the TCP Master. If the RTU slave does not respond within the estimated time defined by the Timeout parameter, an exception response will be given: error code $0B.

UPDATE VIA TCP:

Section "Update Via TCP" (Fig. 9):

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

- ➤ Connect the Ethernet cable to the Gateway;
- ➤ Insert the IP address of the Gateway;
- ➤ Press the "Ping" button for check the connection of the Gateway;
- ➤ Press the "Next" button;
- ➤ Select the operations you want to do. You can select only "Firmware", only "Project" or both of them;
- ➤ Press the "Execute update firmware" button to start the upload.

When all the operations are "OK" the configuration/firmware on the device is correctly updated.
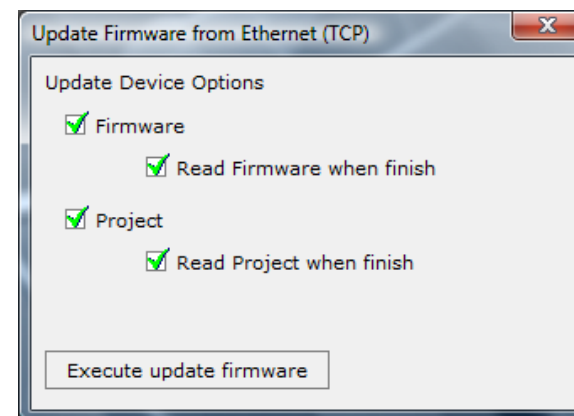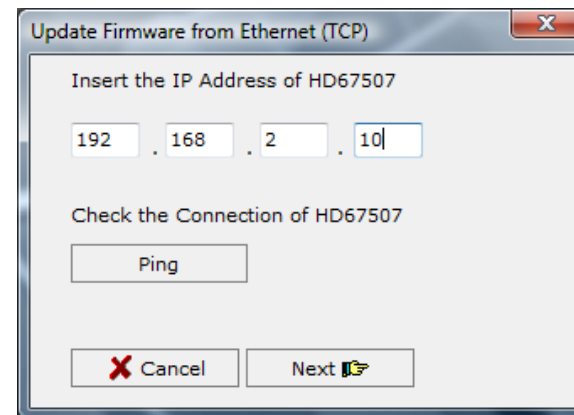To use this feature in Vista and 7 you have to open the software with Administrator right.
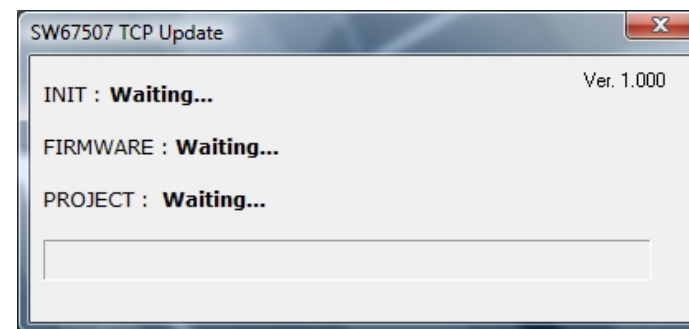
Figure 9: "Update Via TCP" windows

UPDATE VIA SERIAL

Section "Update Via Serial" (Fig. 10):

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 (For more info see the "Connection scheme" of the Gateway);
➢ Turn ON the device;
➢ Check the "BOOT Led". It must blink quickly (more info see the "Connection scheme" of the Gateway);
➢ Select the COM port and press the "Connect" button;
➢ Press the "Next" button;
➢ Select the operations you want to do. You can select only "Firmware", only "Project" or both of them;
➢ Press the "Execute update firmware" button to start the upload;
➢ When all the operations are "OK" turn OFF the device;
➢ Disconnect the Boot Jumper;
➢ Turn ON the device.

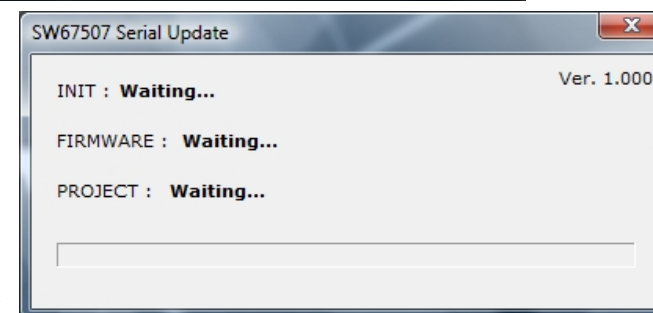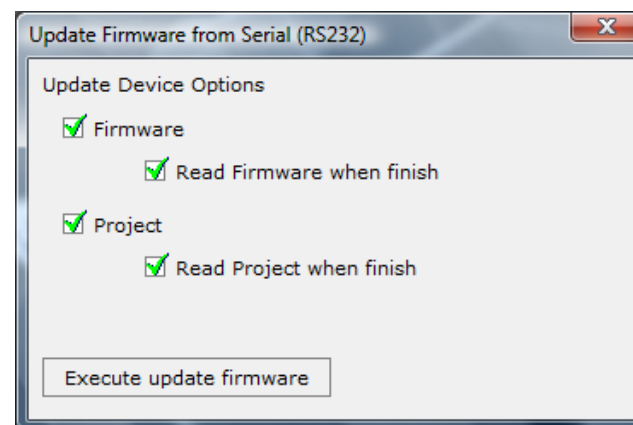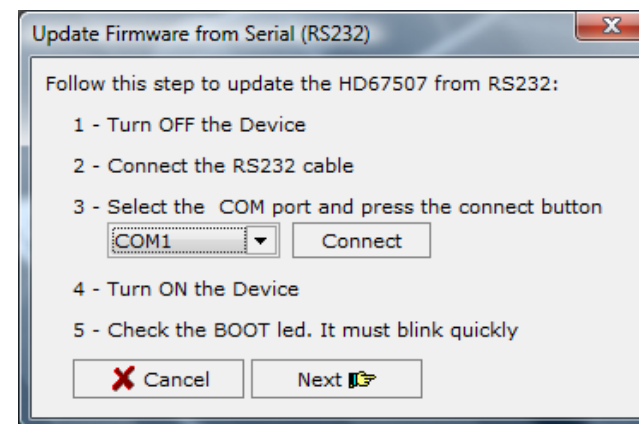At this point the configuration/firmware on the device is correctly updated.

Figure 10: "Update Via Serial" windows

CHARACTERISTICS OF THE CABLES:

The connection from RS232 socket to a serial port (example one from a personal computer) must be made with a pin-to-pin cable (a serial cable where the pins 2 and 3 are NOT crossed).
It is recommended that the RS232C Cable not exceed 3 meters.

DETAILS ABOUT THE ETHERNET CABLE:

Linking of Ethernet connector to a HUB must be carried out by a Category 5E cable. The cable has to conform to the T568 norms relative to connections in cat.5 up to 100 Mbps. The length cannot go beyond 100 meters.
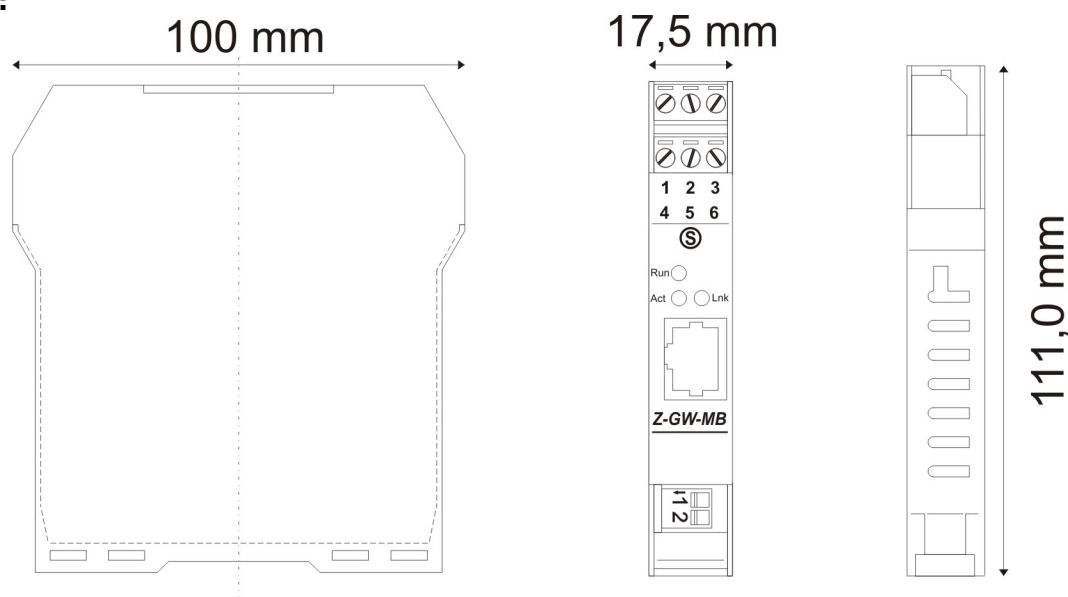
MECHANICAL DIMENSIONS:

Figure 11: Mechanical dimensions scheme for Z-GW-MB

ORDER CODE

Order Code: **Z-GW-MB**   -   Gateway – Modbus TCP Server to Modbus RTU Master

ACCESSORIES:

ORDER CODE		DESCRIPTION
Order Code: Z-PC-DINAL1-35	-	DIN rail support with screw terminals P=35 mm
Order Code: Z-PC-DINAL2-17,5	-	DIN rail support with screw terminals P=17,5 mm
Order Code: Z-PC-DIN1-35	-	DIN 1 slot support for rear connector P=35 mm
Order Code: Z-PC-DIN2-17,5	-	DIN 2 slot support for rear connector P=17,5 mm
Order Code: Z-PC-DIN4-35	-	DIN 4 slot support for rear connector P=35 mm
Order Code: Z-PC-DIN8-17,5	-	DIN 8 slot support for rear connector P=17,5 mm
Order Code: PM001450	-	Ethernet cable 1,5 m
Order Code: PM002490	-	RS232 cable (DB9M-DB9F), pin to pin

WARRANTIES AND TECHNICAL SUPPORT:

For fast and easy technical support for your Seneca srl products, consult our internet support at www.seneca.it
Otherwise contact us at the address support@seneca.it

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.seneca.it 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	Other documentation
Z-GW-MB	Gateway Modbus TCP Server to RTU Master	MI002251-I-E from INSTALLATION MANUAL www.seneca.it