User Manual

Revision 1.010
English

Gateway
Modbus Master on RS232 / RS485 from/to M-Bus Slave

(Order Code: HD67059M-232 – HD67059M-485)

for Website information:
www.adfweb.com?Product=HD67059M-232
www.adfweb.com?Product=HD67059M-485

for Price information:
www.adfweb.com?Price=HD67059M-232
www.adfweb.com?Price=HD67059M-485

Benefits and Main Features:

- Very easy to configure
- Electrical isolation
- Power Supply 8…21 VAC or 8…35 VDC
- Industrial temperature range:
  -30°C / 70°C (-22°F / 158°F)

Similiar Products

For others M-Bus products see also the following link:

Converter M-Bus to
www.adfweb.com?Product=HD67021 **(RS232)**
www.adfweb.com?Product=HD67022 **(RS485)**
www.adfweb.com?Product=HD67030 **(Ethernet)**

Analyzer / Scanner /Sniffer M-Bus
www.adfweb.com?Product=HD67031

Isolator / Repeater M-Bus
www.adfweb.com?Product=HD67032M

Gateway M-Bus / Modbus RTU
www.adfweb.com?Product=HD67029M-232 **(on RS232)**
www.adfweb.com?Product=HD67029M-485 **(on RS485)**

Gateway M-Bus / Modbus TCP
www.adfweb.com?Product=HD67044

Gateway M-Bus / CANopen
www.adfweb.com?Product=HD67051-B2

Gateway M-Bus / PROFIBUS
www.adfweb.com?Product=HD67053M

Gateway M-Bus Concentrator
www.adfweb.com?Product=HD67054M

Do you have an your customer protocol?
www.adfweb.com?Product=HD67003

Do you need to choose a device? do you want help?
www.adfweb.com?Cmd=helpme

INDEX:

UPDATED DOCUMENTATION:

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- Related to the product you own

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REVISION LIST:

Revision	Date	Author	Chapter	Description
1.000	18/02/2010	FI	All	First release version
1.001	09/07/2010	FI	All	Document update
1.002	08/04/2011	FI	All	Revision
1.010	05/10/2011	FI	All	Software changed (v1.100)

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CONNECTION SCHEME:

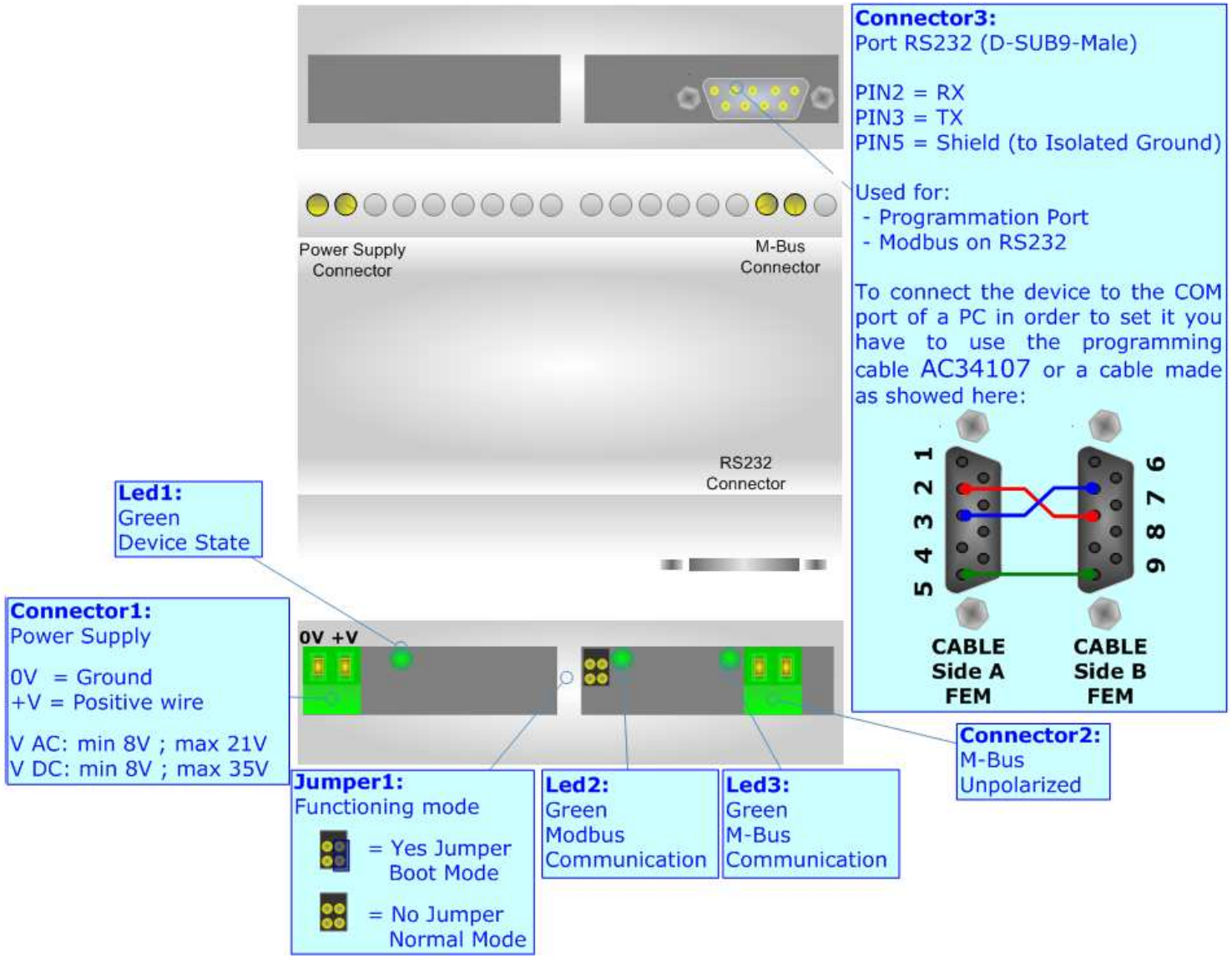


Figure 1: Connection scheme for HD67059M-232

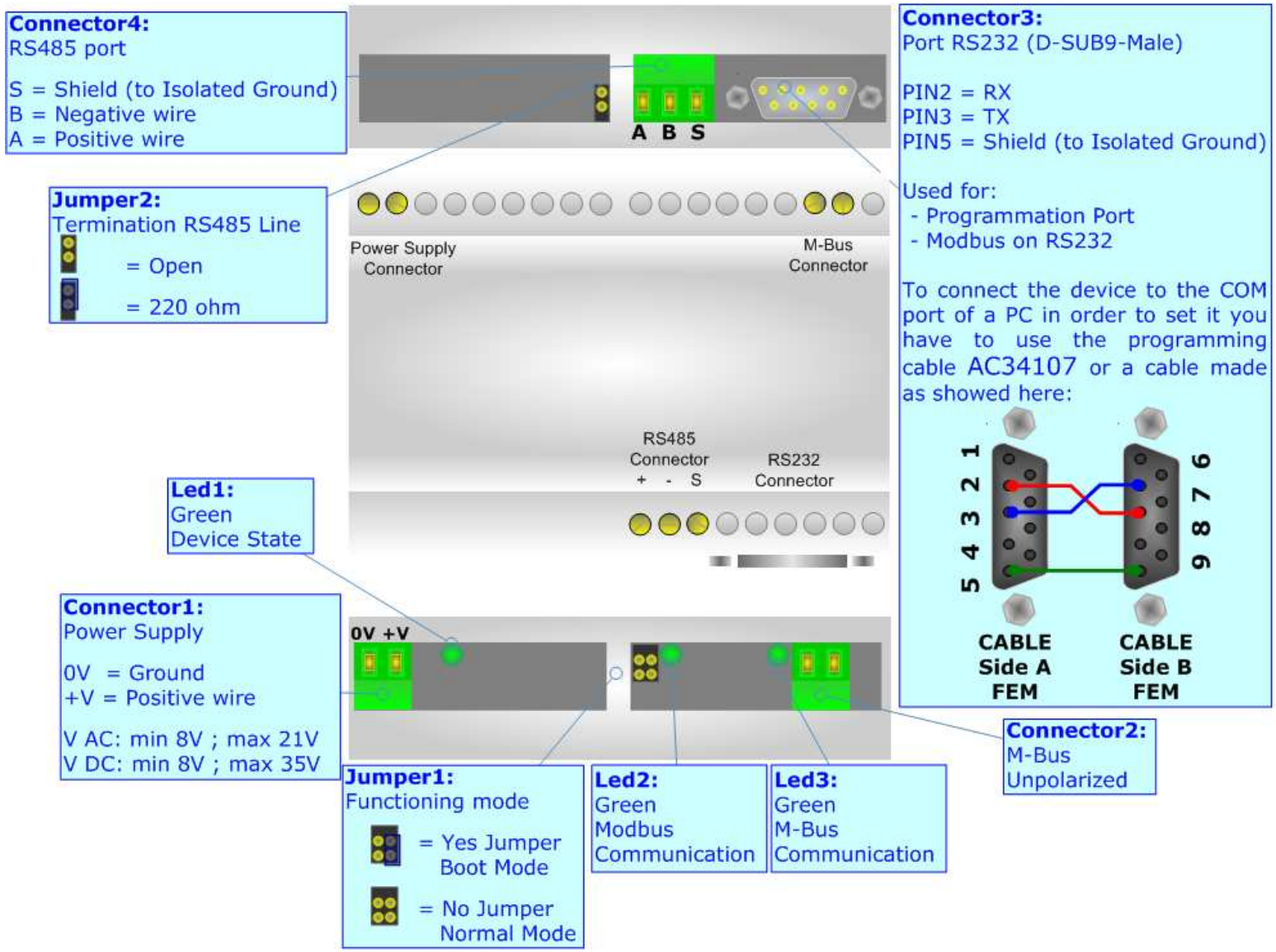


Figure 2: Connection scheme for HD67059M-485

CHARACTERISTICS:

The HD67059M-232 / HD67059M-485 is a Gateway Modbus RTU/ASCII Master to M-Bus slave.
It allows to transfer Modbus information into M-Bus slave devices. It allows the following characteristics:

- Electrical isolation between RS232/RS485 and M-Bus;
- 35mm DIN Rail mounting;
- Temperature range -30°C to 70°C.

POWER SUPPLY:

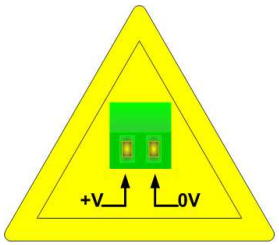
The devices can be powered at 8…21V AC and 8…35V DC. The consumption depends to the code of the device. For more details see the two tables below.

VAC ~		VDC ⎓	
Vmin	**Vmax**	**Vmin**	**Vmax**
8V	**21V**	**8V**	**35V**

Consumption at 24V DC:

Device	No Load [W/VA]	Full Load [W/VA]
HD67059M-232	4	4
HD67059M-485		4

Caution: Not reverse the polarity power



HD67059M-xxx

FUNCTION MODES:

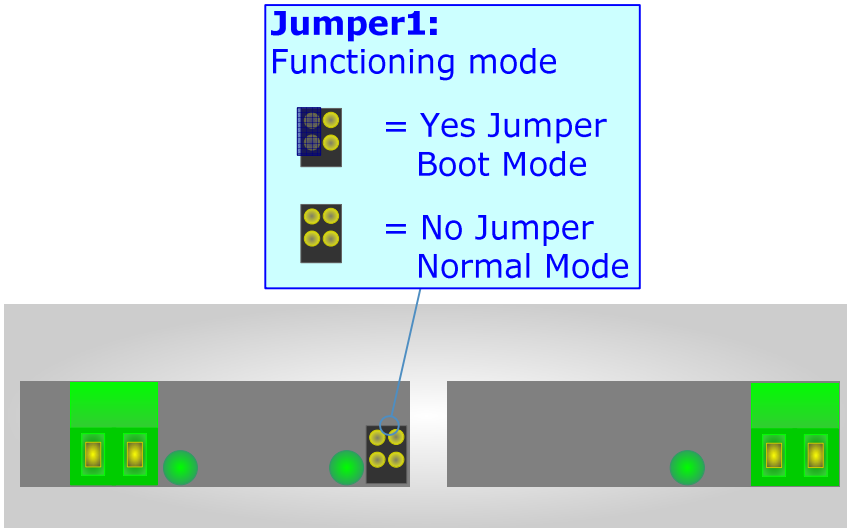
The device has got two functions mode depending of the position of 'Jumper1':

- The first, with the Jumper not inserted (factory setting), is used for the normal working of the device.
- The second, with the Jumper inserted, is used for upload the Firmware.

To put the device on Normal or Boot Mode you must turn Off the device, positioning the Dip-Switch and then turn On the device.

For the operations to follow for the updating (see 'UPDATE DEVICE' section).

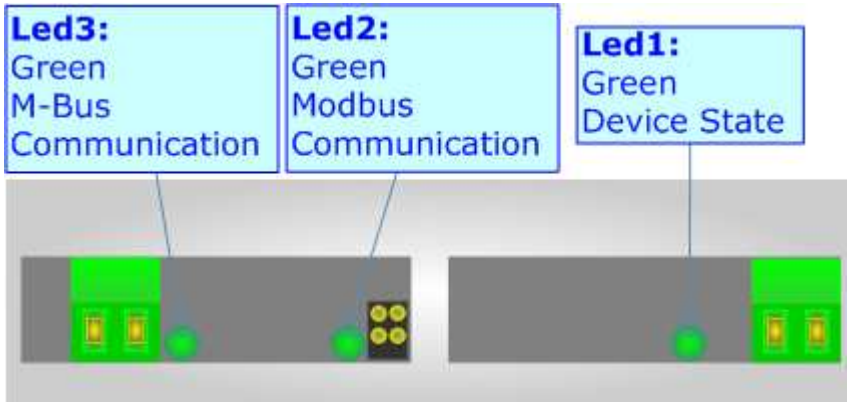
According to the functioning mode, the LEDs will have specifics functions (see 'LEDS' section).



LEDS:

The device has got three LEDs that are used to give information of the functioning status.
The various meanings of the LEDs are described in the table below.

LED	Normal Mode	Boot Mode
1: Device State	Blink slowly	Blink quickly
2: Modbus Communication	Change state when receive a correct Modbus response	Off
3: M-Bus Communication	Blink quickly when receive a M-Bus request	Off



USE OF COMPOSITOR SW67059:

To configure the Gateway, use the available software that runs with Windows, called SW67059. It is downloadable on the site www.adfweb.com and its operation is described in this document.

When launching the SW67059 the right window appears (Fig. 3).

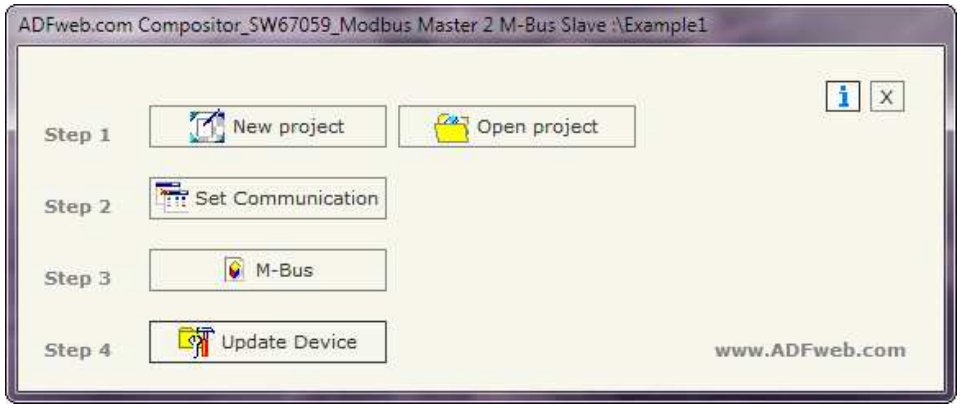


Figure 3: Main window for SW67059

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 Master to M-Bus Slave 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 sections of the software:
  - ***"Set Communication";***
  - ***"M-Bus";***
  - **"Update Device".**

SET COMMUNICATION:

This section define the fundamental communication parameters of two Buses, Modbus and M-Bus.

By Pressing the "**Set Communication**" button from the main window for SW67059 (Fig. 3) the window "Set Communication" appears (Fig. 4).
The window is divided in two sections, one for the Modbus line (Serial) and the other for the M-Bus.

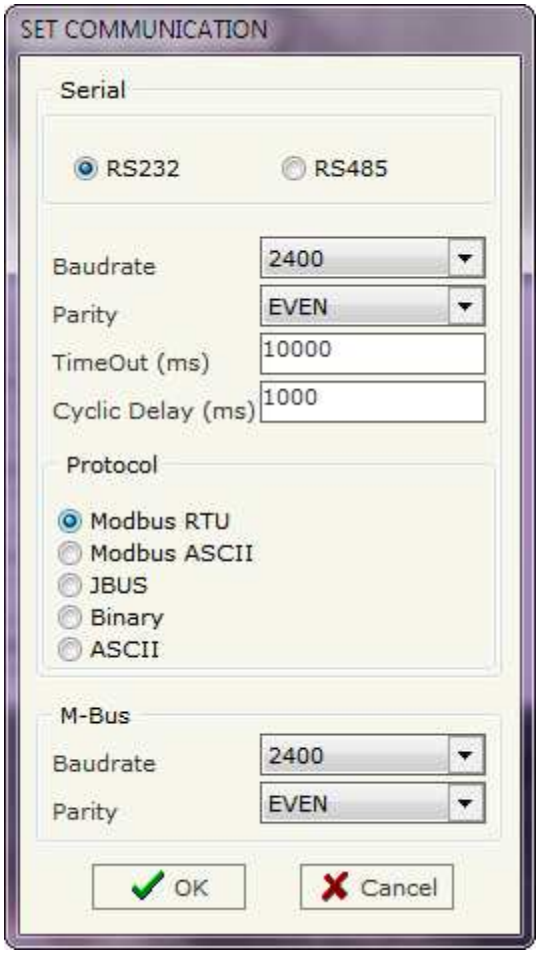


Figure 4: "Set Communication" window

The means of the fields for Serial are:

- If the field "**RS232**" is checked, the serial line in use is the RS232, otherwise if the field "**RS485**" is checked, the serial line in use is the RS485;
- In the field "**Baud Rate**" the baudrate for the serial line is defined;
- In the field "**Parity**" the parity of the serial line is defined;
- In the field "**TimeOut**" there is the maximum time that the device attends for the answer from the Slave interrogated;
- In the field "**Cyclic Delay**" the delay between two requests is defined;
- In the subsection "Protocol" it is possible to select the protocol to use in Modbus line from the following:
  - **Modbus RTU**;
  - **Modbus ASCII**;
  - **JBUS**;
  - **Binary**: simple protocol defined by Us, whose functions are described in the document "Simple Protocol" downloadable at www.adfweb.com/download/filefold/Simple_Protocol_ENG.pdf;
  - **ASCII**: simple protocol defined by Us, whose functions are described in the document "Simple Protocol" downloadable at www.adfweb.com/download/filefold/Simple_Protocol_ENG.pdf.

The means of the fields for M-Bus are:

- In the field "**Baudrate**" the baudrate of M-Bus is defined;
- In the field "**Parity**" the parity of the M-Bus is defined.

M-BUS:

By Pressing the "**M-Bus**" button from the main window for SW67059 (Fig. 3) the window "M-Bus Network" appears (Fig. 5).

SECTION NODES:

In the section "Nodes" it is possible to insert the node IDs of M-Bus slaves. In order to create a new node it is necessary to insert the "**Primary Address**" (from 1 to 250) and the "**Secondary Address**" (from 0 to 99999999). In the field "**Description**" it is possible to write a short description of the node.

After that, pressing the "**ADD NODE**" button, the M-Bus Network at the left side of the window was updated.
In order to modify a created node it is necessary to select the node, change the wrong items and then press the "**MODIFY NODE**" button. At maximum can be created up to 20 nodes.

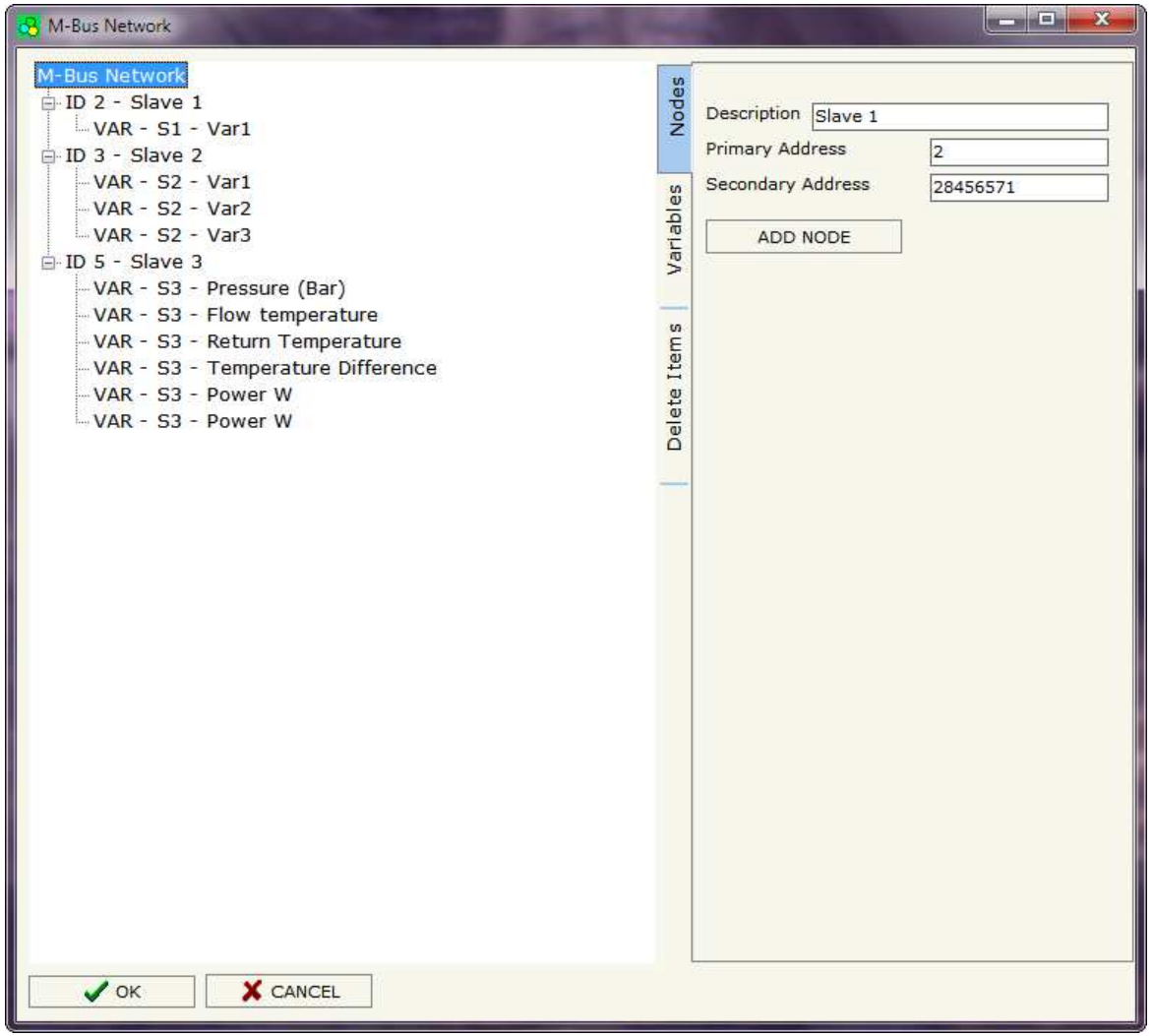
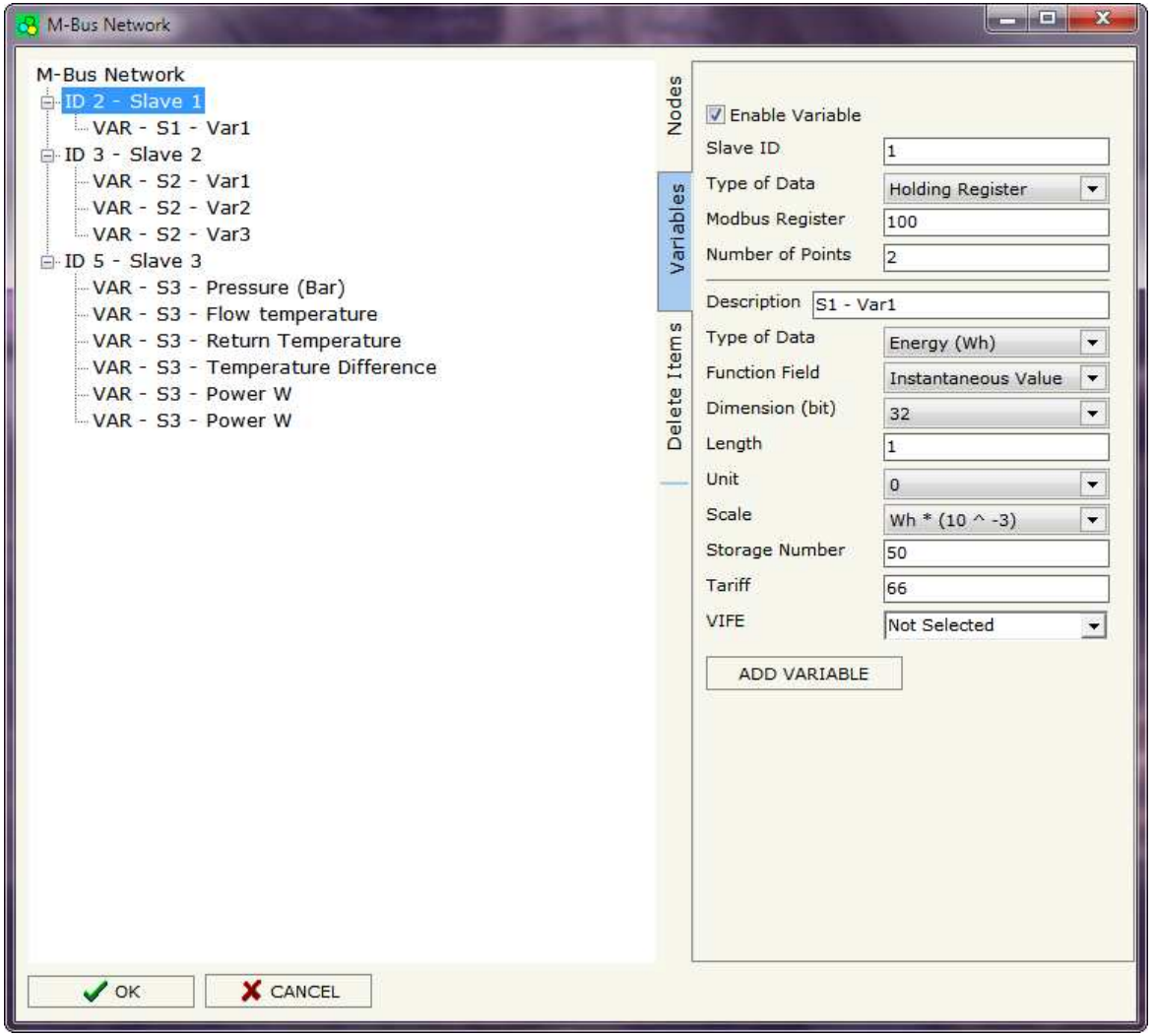


Figure 5: "M-Bus Network" window

SECTION VARIABLES:

Selecting the desired node it is possible to add a variable.
In the node it is possible to add up to 10 variables.
In order to create a new variable it is necessary to fill these items:

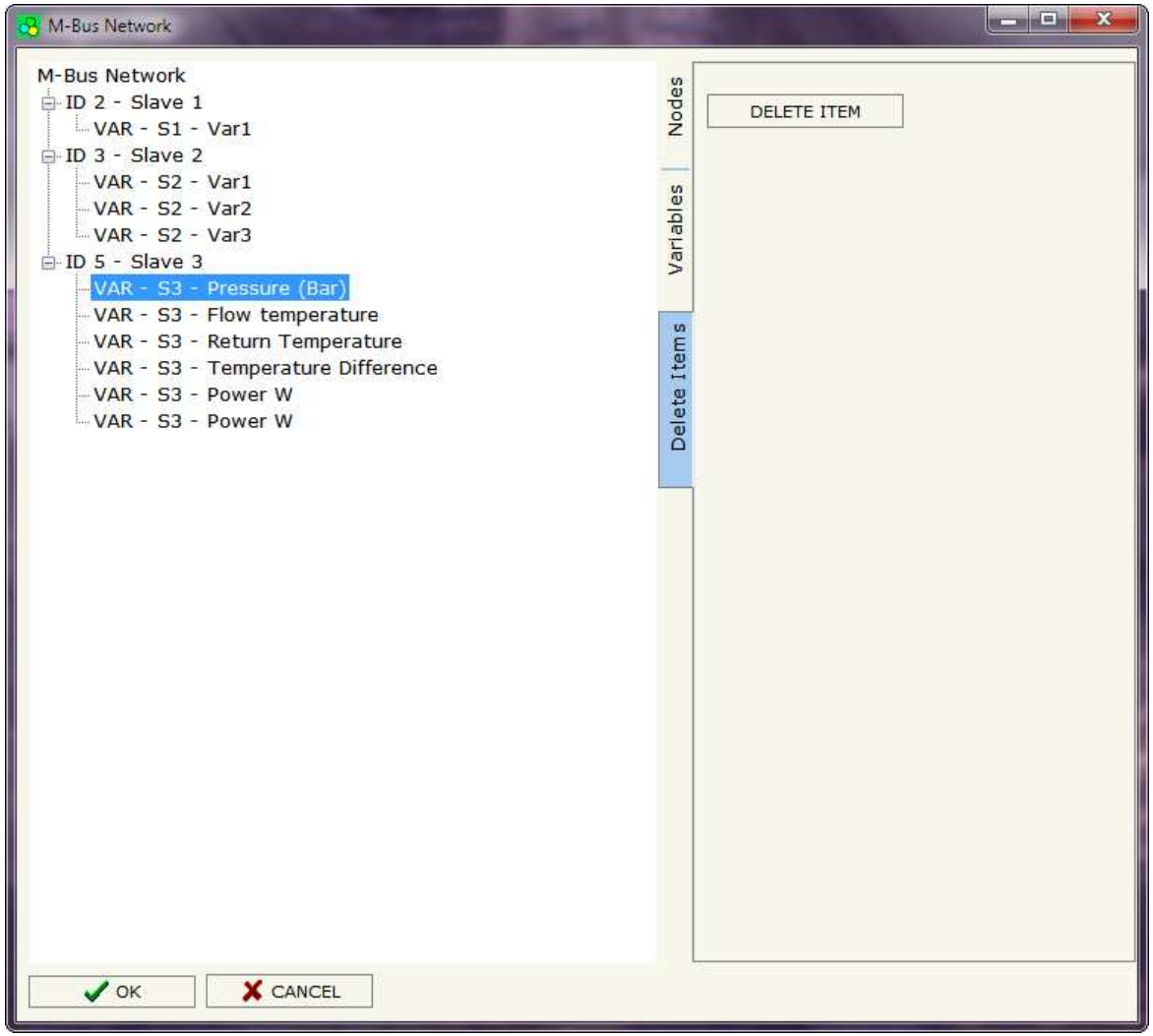


- To use the created variable the field "**Enable Variable**" must be checked. If you have created a variable but for the moment it is unused it is possible to uncheck the field "Enable Variable" without delete it;
- In the field "**Slave ID**" you have to insert the Modbus slave id of the device that contain the values that you want to import on M-Bus;
- In the field "**Type of Data**" you have to select the type of Modbus data. It is possible to select: Coil Status, Input Status, Holding Register, Input Register;
- In the field "**Modbus Register**" the start address of the register to be read is defined;
- In the field "**Number of Points**" insert the number of consecutive registers to be read;
- In the field "**Description**" it is possible to write a description of the variable;
- The field "**Type of Data**" is used to select the unit of measure;
- In the field "**Function Field**" it is necessary to select the type of data;
- The field "**Dimension**" is used to select the dimension of the variable (8, 16, 24, 32, 48, 64 bit, 32 bit Real or Variable Length);
- In the field "**Length**" you have to insert the length of the variable only if the "Dimension" is "Variable Length";
- In the field "**Unit**" if it is necessary it is possible to select the unit of that variable. The Unit is used for indicates from which device the data come;

- In the field "**Scale**" it is necessary to select the value of Scale of the measure;
- In the field "**Storage Number**" if it is necessary it is possible to insert the value of storage counter of that variable. With this field the slave can indicate and transmit various stored counter states or historical values, in the order in which they occur;
- In the field "**Tariff**" if it is necessary it is possible to insert the value of the tariff of that variable. The Tariff is used for indicates from which device the data come;
- In the field "**VIFE**" it is possible to select a sub-type of "Type of Data".

Having completed this fields, to add the variable the button "**ADD VARIABLE**" must be pressed.

In order to modify a created variable it is necessary to select the desired variable, change the wrong items and then press the "**MODIFY VARIABLE**" button.



SECTION DELETE ITEMS:

If it is necessary to delete a node or a variable, you have to select the node or the variable and then press the "**DELETE ITEM**" button.

Possible choices for the fields used to create a variable:

Type of Data:
|_Energy (Wh)
|_Energy (J)
|_Volume (m^3)
|_Mass (Kg)
|_On Time
|_Operating Time
|_Power (W)
|_Power (J/h)
|_Volume Flow (m^3/h)
|_Volume Flow Ext. (m^3/min)
|_Volume Flow Ext. (m^3/s)
|_Mass Flow (Kg/h)
|_Flow Temperature (°C)
|_Return Temperature (°C)
|_Temperature Difference (K)
|_External Temperature (°C)
|_Pressure (bar)
|_Averaging Duration
|_Actuality Duration
|_Type of data in VIFE
|_Time Point

Function Field:
|_Instantaneous Value
|_Minimum Value
|_Maximum Value
|_Value During Error State

Dimension (bit):
|_8
|_16
|_24
|_32
|_32 real
|_48
|_64
|_Variable Length

VIFE:

|_ Not Selected
|_ Credit of the nominal local legal currency units
|_ Debit of the nominal local legal currency units
|_ Access Number (transmission count)
|_ Medium (as in fixed header)
|_ Manufacturer (as in fixed header)
|_ Parameter set identification
|_ Model/Version
|_ Hardware Version #
|_ Firmware Version #
|_ Software Version #
|_ Customer Location
|_ Customer
|_ Access Code User
|_ Access Code Operator
|_ Access Code System Operator
|_ Access Code Developer
|_ Password
|_ Error flags (binary)
|_ Error mask
|_ Digital Output (binary)
|_ Digital Input (binary)
|_ Baudrate [Baud]
|_ response delay time [bittimes]
|_ Retry
|_ First storage # for cyclic storage
|_ Last storage # for cyclic storage
|_ Size of storage block
|_ Storage interval [sec(s)..day(s)]
|_ Storage interval month(s)
|_ Storage interval year(s)
|_ Duration since last readout[sec(s)..day(s)]
|_ Start (date/time) of tariff
|_ Duration of tariff (nn=01..11:min to day)
|_ Period of tariff [sec(s) to day(s)]
|_ Period of tariff months(s)
|_ Period of tariff year(s)
|_ dimensionless/ no VIF
|_ Volts
|_ Ampere
|_ Reset counter
|_ Comulation counter
|_ Control signal
|_ Day of week
|_ Week number
|_ Time point of day change
|_ State of parameter activation
|_ Special supplier information
|_ Duration since last comulation [hour(s)..year(s)]
|_ Operation time battery [hour(s)..year(s)]
|_ Date and time of battery change
|_ Energy MWh
|_ Energy GJ
|_ Volume
|_ Mass
|_ Volume 0,1 feet^3
|_ Volume 0,1 american gallon
|_ Volume 1 american gallon
|_ Volume flow 0,001 american gallon/min
|_ Volume flow 1 american gallon/min
|_ Volume flow 1 american gallon/h
|_ Power MW
|_ Power GJ/h
|_ Flow Temperature
|_ Return Temperature
|_ Temperature Difference
|_ External Temperature
|_ Cold/Warm Temperature Limit °F
|_ Cold/Worm Temperature Limit °C
|_ Cumul. count max power
|_ per second

|_ per minute
|_ per hour
|_ per day
|_ per week
|_ per month
|_ per year
|_ per revolution/measurement
|_ increment per input pulse on input channel
|_ increment per output pulse on output channel
|_ per liter
|_ per m^3
|_ per kg
|_ per K (Kelvin)
|_ per kWh
|_ per GJ
|_ per kW
|_ per (K*l)(Kelvin*liter)
|_ per V (Volt)
|_ per A (Ampere)
|_ multiplied by sek
|_ multiplied by sek/V
|_ multiplied by sek/A
|_ start date(/time) of
|_ VIF contains uncorrected unit instead of corrected unit
|_ Accumulation only if positive contributions
|_ Accumulation of abs value only if negative contributions
|_ upper/lower limit value
|_ # of exceeds of lower/upper limit
|_ Date(/time) of begin/end of first/last lower/upper limit exceed
|_ Duration of limit exceed
|_ Duration of first/last
|_ Date(/time) of first/last begin/end
|_ Multiplicative currection factor
|_ Additive correction constant * unit of VIF (offset)
|_ Moltiplicative correction factor: 10^3
|_ future value
|_ next VIFE's and data of this block are manufacturer specific
|_ None
|_ Too many DIFE's
|_ Storage number not implemented
|_ Unit number not implemented
|_ Tariff number not implemented
|_ Function not implemented
|_ Data class not implemented
|_ Data size not implemented
|_ Too many VIFE's
|_ Illegal VIF-Group
|_ Illegal VIF-Exponent
|_ VIF/DIF mismatch
|_ Unimplemented action
|_ No data available (undefined value)
|_ Data overflow
|_ Data underflow
|_ Data error
|_ Premature end of record

UPDATE DEVICE:

Section "Update device" (Fig. 6):
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 form your PC to the Gateway;
- Insert the Boot Jumper (For more info see Fig. 1);
- Select the COM port and press the "**Connect**" button;
- Turn on the device;
- Check the BOOT Led. It must blink quickly (For more info see Fig. 1, Fig. 2);
- Press the "**Next**" button;
- Select which 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;
- Disconnect the RS232 Cable;
- Turn on the device.

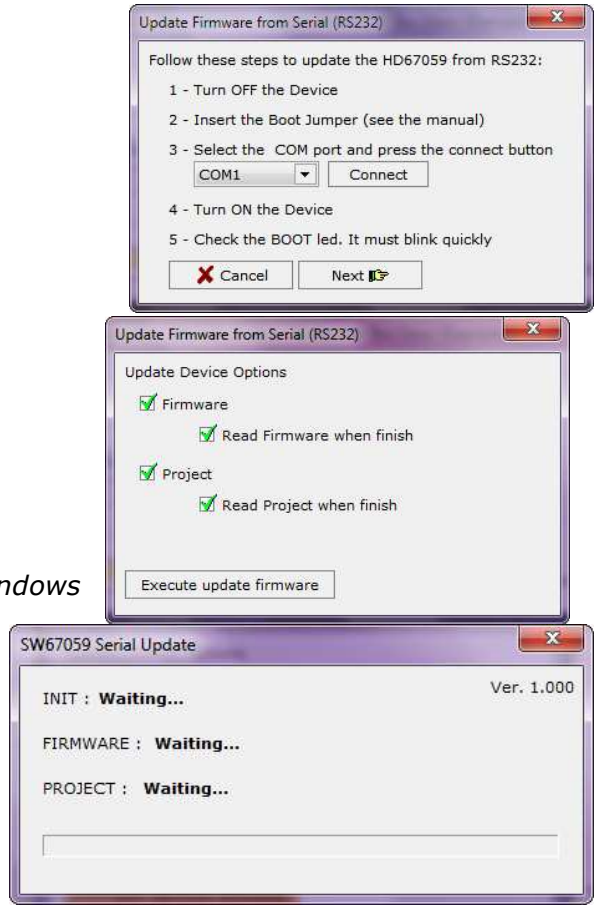


Figure 6: "Update Device" windows

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

Note:
When you install a new version of the software it is better if the first time you do the update of the Firmware in the HD67059M-xxx device.

Warning:
If the Fig. 7 appears when you try to do the Update before require assistance try these points:

- Check if the serial COM port selected is the correct one;
- Check if the serial is connected between the PC and the device;
- Try to repeat the operations for the updating;
- If you are using a dongle try with a native COM port or change the dongle;
- Try with another PC.

Figure 7: "Protection" window

SUPPORTED FUNCTIONS:

Function	Master	C-Field	HD67059M-xxx
Slave Initialization	SND_NKE	$40	ACK
Send User Data to Slave	SND_UD	$53 / $73	ACK
Request for Slave Data	REQ_UD2	$5B / $7B	RSP_UD

SND_NKE:

Request:

Byte #	value	Meaning / Description
1	$10	Start character
2	$40	C-Field (SND_NKE)
3	A	A-Field (M-Bus primary address of meter)
4	CS	Checksum
5	$16	Stop character

Response:

Byte #	value	Meaning / Description
1	$E5	Acknowledge

SND_UD (APPLICATION RESET):

Request:

Byte #	value	Meaning / Description
1	$68	Start character
2	$03	Frame length
3	$03	Frame length
4	$68	Start character
5	$53/$73	C-Field (SND_UD)

6	A	A-Field (M-Bus primary address of meter)
7	$50	CI-Field (Application Reset)
8	CS	Checksum
9	$16	Stop character

Response:

Byte #	value	Meaning / Description
1	$E5	Acknowledge

SND_UD (SELECTION OF SLAVES):

Request:

Byte #	value	Meaning / Description
1	$68	Start character
2	$0B	Frame length
3	$0B	Frame length
4	$68	Start character
5	$53/$73	C-Field (SND_UD)
6	$FD	A-Field (Addressing performed in network Layer)
7	$52	CI-Field (Application Reset)
8	IDn	Identification number
9	IDn	Identification number
10	IDn	Identification number
11	IDn	Identification number
12	$FF	Manufacturer's ID
13	$FF	Manufacturer's ID
14	$FF	Version
15	$FF	Medium
16	CS	Checksum
17	$16	Stop character

Response:

Byte #	value	Meaning / Description
1	$E5	Acknowledge

REQ_UD2:

Request:

Byte #	value	Meaning / Description
1	$10	Start character
2	$5B/$7B	C-Field (REQ_UD2)
3	A	A-Field (M-Bus primary address of meter)
4	CS	Checksum
5	$16	Stop character

Response:

Byte #	value	Meaning / Description
1	$68	Start character
2	Len	Frame length
3	Len	Frame length
4	$68	Start character
5	$08	C-Field (RSP_UD)
6	A	A-Field (M-Bus primary address of meter)
7	$72	CI-Field (Variable data respond)
8	$59	Identification number
9	$70	Identification number
10	$06	Identification number
11	$00	Identification number
12	$86	Manufacturer's ID
13	$04	Manufacturer's ID
14	$01	Version
15	$00	Medium
16	Acc	Access number (incremented at each response)

17	$00	Status
18	$00	Siganture
19	$00	Siganture
20...n	Data	Data (See ”Data Record Structres”)
n+1	CS	Checksum
n+2	$16	Stop character

Data Record Structures:

DIF	DIFE	VIF	VIFE	Data
1 Byte	0 – 10 (1 Byte each)	1 Byte	0 – 10 (1 Byte each)	N Byte
Data information Block DIB		Value information Block		
Data Record Header DHR				

Each M-Bus Variable defined with the”Compositor SW67059” has this structure.

CHARACTERISTICS OF THE CABLES:

Rs232:

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 RS232C Cable not exceed 15 meters.

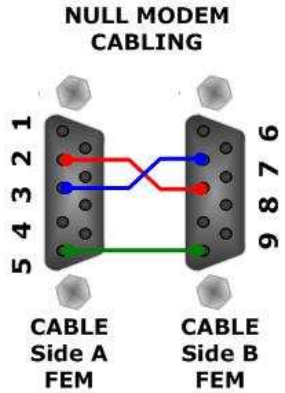


Figure 8: Null modem cabling

M-Bus:

A two wire standard telephone cable (JYStY N*2*0.8 mm) is used as the transmission medium for the M-Bus. The maximum distance between a slave and the repeater is 350m; this length corresponds to a cable resistance of up 29Ω. This distance applies for the standard configuration having Baud rates between 300 and 9600 Baud, and a maximum of 250 slaves. The maximum distance can be increased by limiting the Baud rate and using fewer slaves, but the bus voltage in the space state must at no point in a segment fall below 12V, because of the remote powering of the slaves. In the standard configuration the total cable length should not exceed 1000m, in order to meet the requirement of a maximum cable capacitance of 180nF. *(Taken from M-Bus specifics)*

MECHANICAL DIMENSIONS:

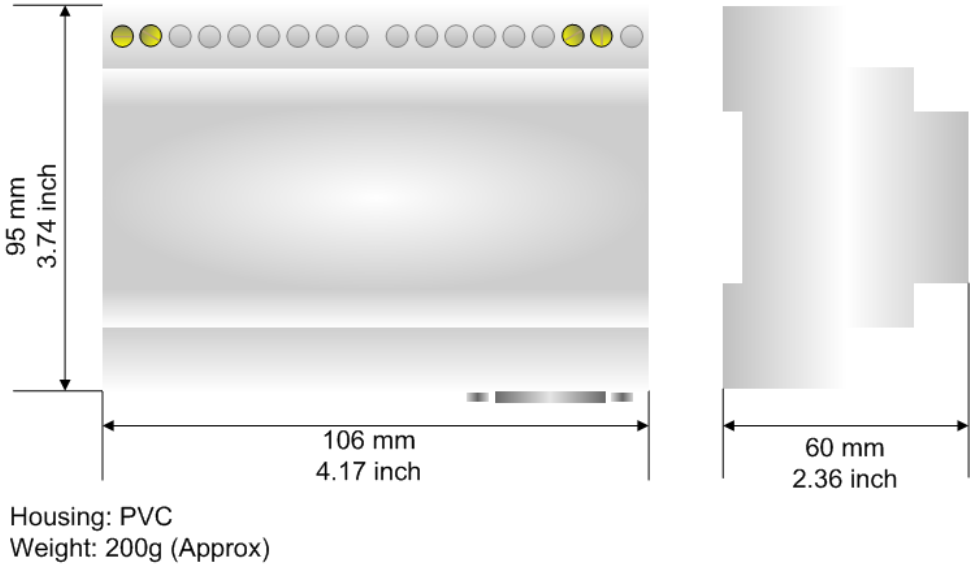


Figure 9: Mechanical dimensions scheme for HD67059M-232

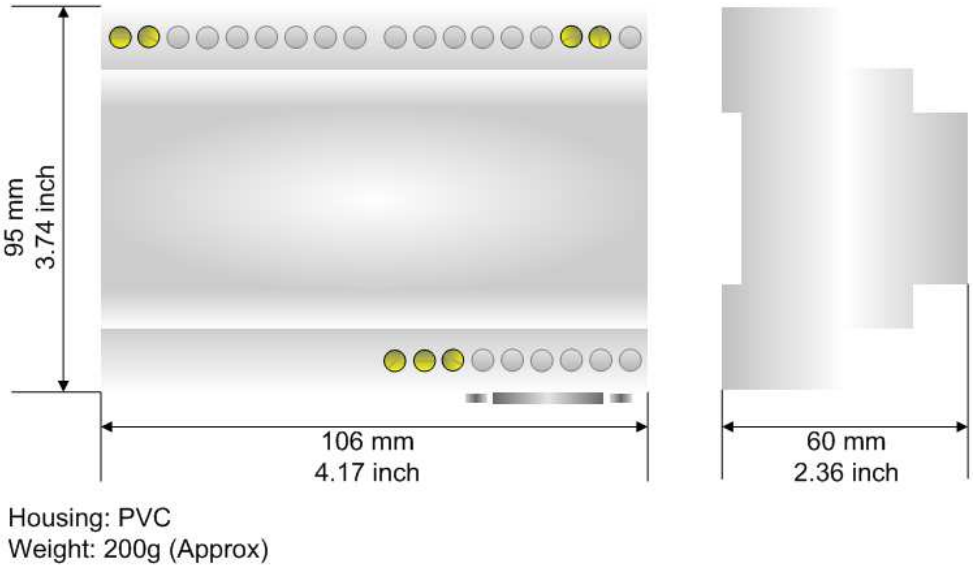


Figure 10: Mechanical dimensions scheme for HD67059M-485

ORDER CODES:

Order Code: **HD67059M-232** **-** Gateway Modbus Master on RS232 to M-Bus Slave

Order Code: **HD67059M-485** **-** Gateway Modbus Master on RS485 to M-Bus Slave

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
HD67120	Converter Ethernet to RS232/RS485	www.adfweb.com?product=HD67120
HD67119	Converter USB 2.0 to RS485 Isolated	www.adfweb.com?product=HD67119
HD67507	Gateway Modbus TCP Server to RTU Master	www.adfweb.com?product=HD67507
HD67510	Gateway Modbus TCP Client to RTU Slave	www.adfweb.com?product=HD67510