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Industrial Electronic Devices

User Manual

Revision 1.100
English

EtherNet/IP / M-Bus Master - Converter

(Order Code: HD67077-B2-20, HD67077-B2-40,
HD67077-B2-80, HD67077-B2-160,
HD67077-B2-250)

For Website information:
www.adfweb.com?Product=HD67077-B2

For Price information:
www.adfweb.com?Price=HD67077-B2-20
www.adfweb.com?Price=HD67077-B2-40
www.adfweb.com?Price=HD67077-B2-80
www.adfweb.com?Price=HD67077-B2-160
www.adfweb.com?Price=HD67077-B2-250

Benefits and Main Features:

⊕ Very easy to configure

⊕ Up to 250 standard M-Bus devices connected to the Converter

⊕ Power Supply 15…21V AC or 18…35V DC

⊕ Temperature range: -40°C/+85°C (-40°F/+185°F)

User Manual

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)

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

Gateway M-Bus Slave / Modbus RTU master
www.adfweb.com?Product=HD67059M-232

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:

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  ➢ 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	18/06/2010	Fl	All	First release version
1.010	14/11/2012	Fl	All	Software changed (v1.000)
1.011	15/02/2013	Nt	All	Added new chapters
1.100	14/04/2023	Ln	All	New version of hardware

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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
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EXAMPLE OF CONNECTION:

Ethernet/IP

HD67077-B2-xxx

Internet

M-Bus

Slave M-Bus

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CONNECTION SCHEME:

Connector3:
Ethernet Port
(RJ45 Plug)

Led1:
Green
Device state

Led2:
Yellow
Not used

Led3:
Yellow
M-Bus comm.

Led4:
Yellow
EtherNet/IP comm.

Power Supply
0V +V
15...21V AC
18...35V DC

M-Bus

LED

Device state

Not used

M-Bus comm.

EthernNet/IP comm.

www.ADFweb.com
EthernNet/IP / M-bus - Converter
HD67077-B2-20

MAC: 10-64-E2-09-30-EE
Serial Nr.: P1268   Q.n. - - - -

ETHERNET

Connector1:
Power Supply

0V = Ground
+V = Positive wire

V AC: min 15V ; max 21V
V DC: min 18V ; max 35V

0V +V

Dip-Switch A:
-Dip1 – Functioning Mode

= Normal Mode

= Boot Mode

Connector2:
M-Bus master
(unpolaryzed)

Figure 1: Connection scheme for HD67077-B2-xxx

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CHARACTERISTICS:

The HD67077-B2-xxx is a M-Bus Master / EtherNet/IP Converter.

It allows the following characteristics:

→ Electrical isolation between Ethernet and M-Bus;
→ Mountable on 35mm Rail DIN;
→ Power Supply 15…21V AC or 18…35V DC;
→ Temperature range -40°C to 85°C.

At the Converter can be connected up to 250 standard M-Bus devices. This number depends of the code expressed by the xxx number:

→ HD67077-B2-20 support up to 20 M-Bus devices;
→ HD67077-B2-40 support up to 40 M-Bus devices;
→ HD67077-B2-80 support up to 80 M-Bus devices;
→ HD67077-B2-160 support up to 160 M-Bus devices;
→ HD67077-B2-250 support up to 250 M-Bus devices.

CONFIGURATION:

You need Compositor SW67077 software on your PC in order to perform the following:

→ Define the parameter of EtherNet/IP line;
→ Define the parameter of M-Bus line;
→ Define which M-Bus variables are readable on EtherNet/IP ;
→ Update the device.

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POWER SUPPLY:

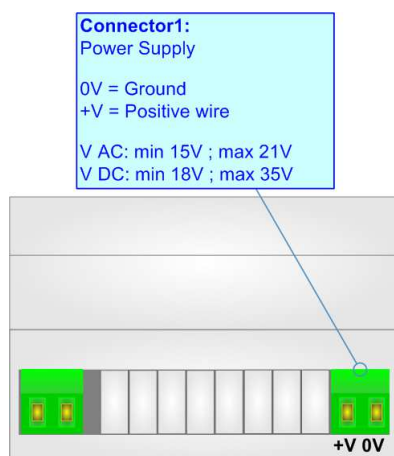The devices can be powered at 15…21V AC and 18…35V DC. The consumption depends to the code of the device. For more details see the two tables below.

VAC		VDC	
Vmin	**Vmax**	**Vmin**	**Vmax**
15V	**21V**	**18V**	**35V**

Consumption at 24V DC:

Device	No Load [W/VA]	Full Load [W/VA]*
HD67077-B2-20	3.5	4
HD67077-B2-40		5
HD67077-B2-80		8
HD67077-B2-160		14
HD67077-B2-250		30

* This value is with all the Slave M-Bus devices of the code (20, 40, 80, 160, 250) connected to the line

Connector1:
Power Supply

0V = Ground
+V = Positive wire

V AC: min 15V ; max 21V
V DC: min 18V ; max 35V

+V 0V

Caution: Not reverse the polarity power

+V   0V
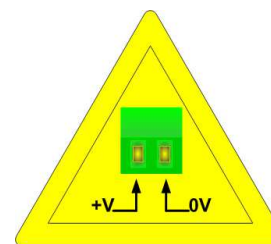
HD67077-B2-xxx

FUNCTION MODES:

The device has got two functions mode depending of the position of the 'Dip1 of Dip-Switch A':

➔ The first, with 'Dip1 of Dip-Switch A' at "OFF" position, is used for the normal working of the device.

➔ The second, with 'Dip1 of Dip-Switch A' at "ON" position, is used for upload the Project and/or Firmware.

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.

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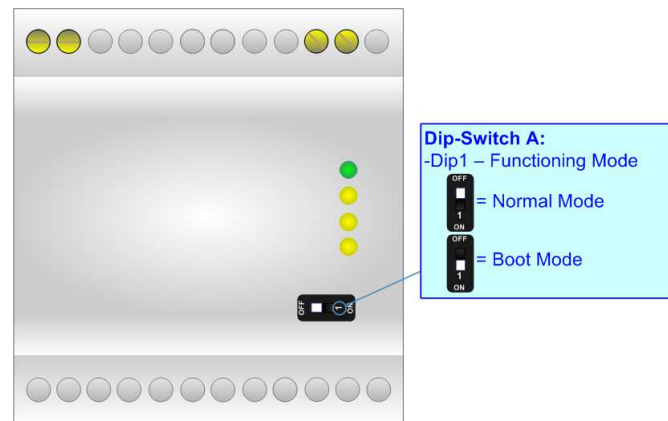
LEDS:

The device has got two 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 (green)	Blinks slowly (~1Hz)	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
2: Not used	OFF	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: M-Bus Comm.	Blinks quickly when a reply to a M-Bus request arrives	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: EtherNet/IP Comm.	Changes state when receive a correct EtherNet/IP request	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress

Industrial Electronic Devices
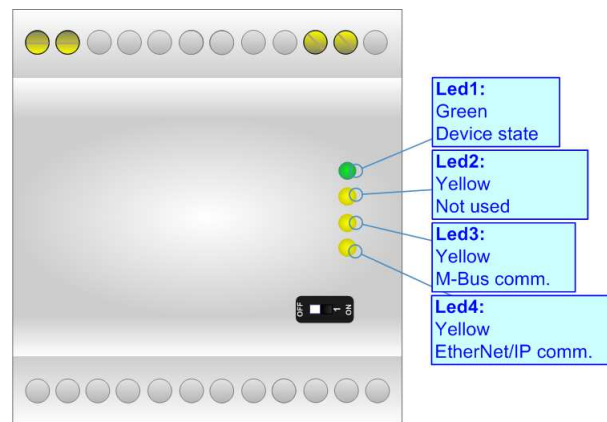
ETHERNET/IP :

The EtherNet/IP connection must be made using Connector3 of HD67077-B2 with at least a Category 5E cable. The maximum length of the cable should not exceed 100m. The cable has to conform to the T568 norms relative to connections in cat.5 up to 100 Mbps. To connect the device to an Hub/Switch is recommended the use of a straight cable, to connect the device to a PC/PLC/other is recommended the use of a cross cable.

Connector3:
Ethernet Port
(RJ45 Plug)
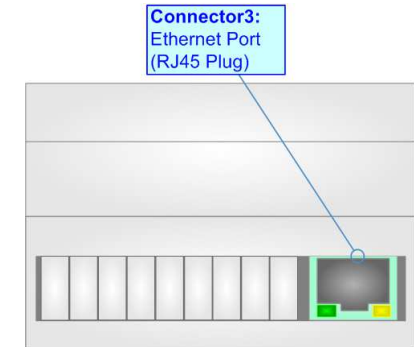
M-BUS:

The M-Bus is a unpolarized 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)*

Connector2:
M-Bus master
(unpolaryzed)

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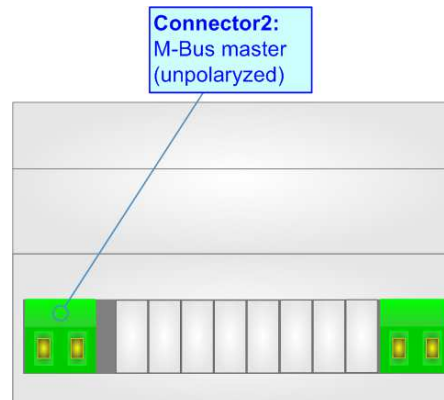
USE OF COMPOSITOR SW67077:

To configure the Converter, use the available software that runs with Windows called SW67077. It is downloadable on the site www.adfweb.com and its operation is described in this document. *(This manual is referenced to the last version of the software present on our web site)*. The software works with MSWindows (XP, Vista, Seven, 8, 10, 11; 32/64bit).

When launching the SW67077, the window below appears (Fig. 2).

Note:
    It is necessary to have installed .Net Framework 4.

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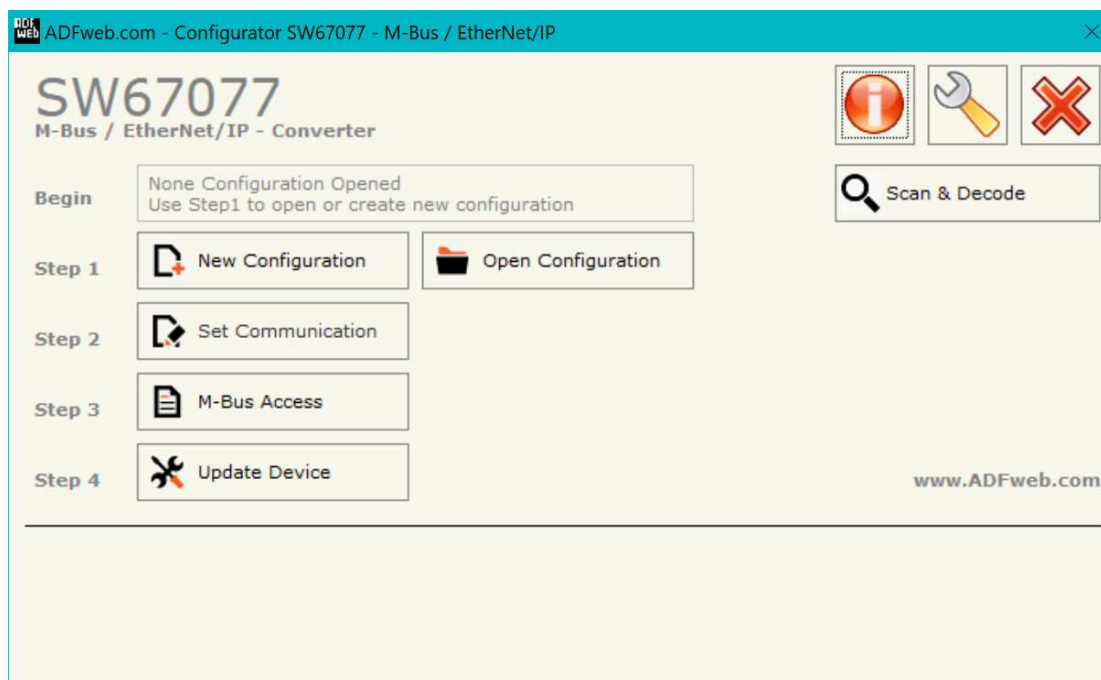
NEW CONFIGURATION / OPEN CONFIGURATION:

The "**New Configuration**" button creates the folder which contains the entire device's configuration.

A device's configuration can also be imported or exported:

- To clone the configurations of a programmable "M-Bus Master / EtherNet/IP - Converter" 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 Configuration**".
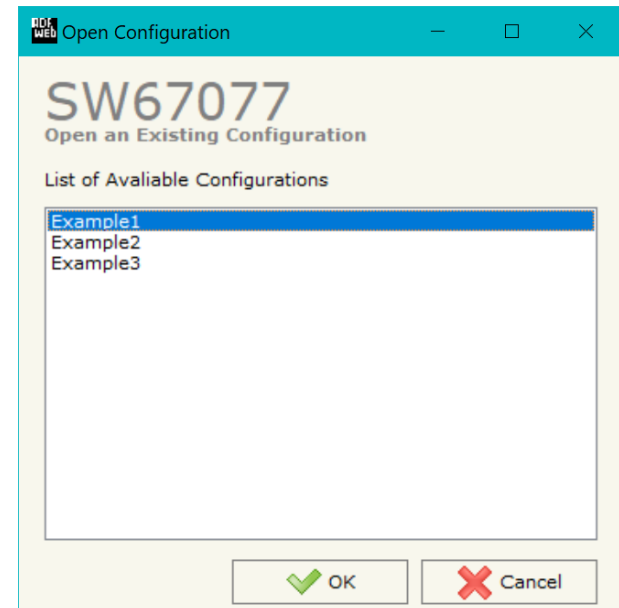
SOFTWARE OPTIONS:

By pressing the "**Settings**" ( ) button there is the possibility to change the language of the software and check the updatings for the compositor.
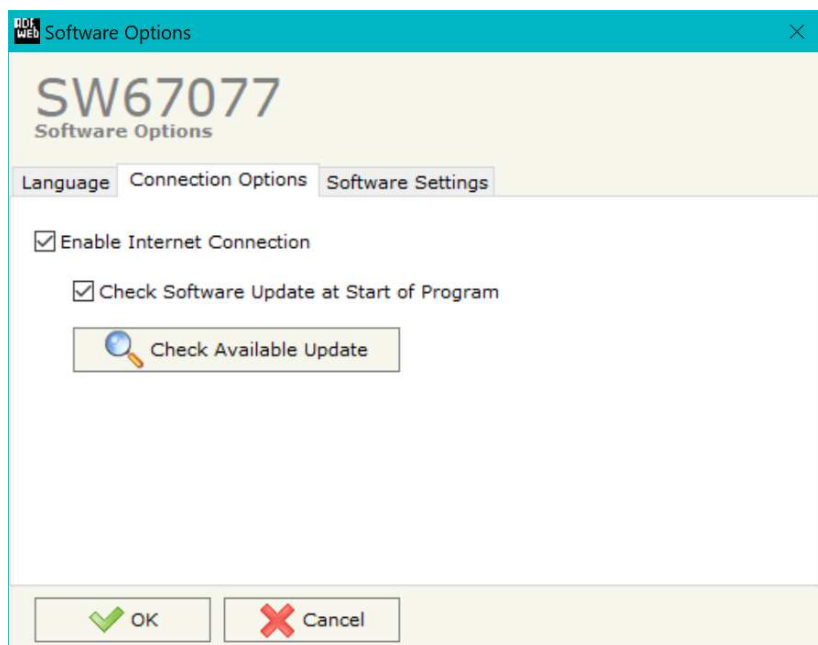
In the section "Language" it is possible to change the language of the software.

In the section "Connection Options", it is possible to check if there are some updatings of the software compositor in ADFweb.com website.
Checking the option "**Check Software Update at Start of Program**", the SW67077 checks automatically if there are updatings when it is launched.

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SET COMMUNICATION:

This section define the fundamental communication parameters of two buses, EtherNet/IP and M-Bus.

By Pressing the "**Set Communication**" button from the main window for SW67077 (Fig. 2) the window "Set Communication" appears (Fig. 3).
The window is divided in two sections, one for the EtherNet/IP and the other for the M-Bus.

The means of the fields for "EtherNet/IP " are:

- In the fields "**IP ADDRESS**" insert the IP address that you want to give to the Converter;
- In the fields "**SubNet Mask**" insert the SubNet Mask;
- In the fields "**GATEWAY**" insert the default gateway that you want to use. This feature can be enabled of disabled pressing the Check Box field;
- In the field "**Port**" the port number used for EtherNet/IP communication is defined. It is fixed to 44818;
- In the field "**Number Byte Output**" insert the number of bytes that the Converter sends on EtherNet/IP with the data of the Slaves M-Bus contained;
- If "**Normal Mode**" is checked the 500 bytes of EtherNet/IP are used for storing the data of all M-Bus slaves; otherwise if "**Single Slave Mode**" is checked, all 500 bytes are used for storing the data of a single slave (see section "Single Slave Mode Functioning" at page 23 for more details).

The means of the fields for M-Bus are:

- In the field "**Baudrate**" it is possible to select the baudrate of the M-Bus line;
- In the field "**Parity**" it is possible to select the parity of the line;
- If the field "**Cyclic Delay**" insert the time (expressed in seconds) between two scans;
- In the field "**Node State value when slave device is not present**" it is possible to insert the value to assign to the "Node State" when the Gateway doesn't find the interrogated slave M-Bus.
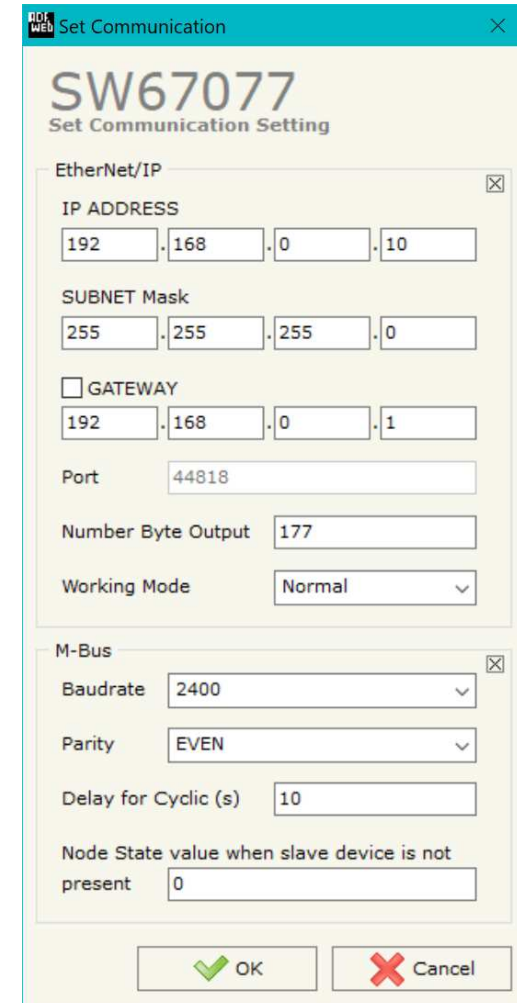
Figure 3: "Set Communication" window

M-BUS

By Pressing the "**M-Bus**" button from the main window for SW67077 (Fig. 2) the window "M-Bus Network" appears (Fig. 4).

In the section "Nodes" it is possible to create the nodes of M-Bus line:

➡ In the field "**Description**" it is possible to write a short description of the node.

SECTION NODES (M-BUS NODES):

➡ In order to create a new node it is necessary to select which address use, selecting "**Primary ID**" or "**Secondary ID**", to makes the requests and then insert the "Primary Address" (from 1 to 250) or the Secondary Address" (from 0 to 99999999) of M-Bus device.

➡ If the field "**Node State**" is checked, the Status byte of the M-Bus node is mapped inside the EtherNet/IP array (1 byte).

➡ If the field "**Identification Number**" is checked, the Identification Number of the M-Bus node is mapped inside the EtherNet/IP array (4 bytes).

➡ In the field "**Swap Identification Num**." it is possible to select the swap mode of the Identification Number. If swap isn't necessary you have to select "None"; otherwise see the section "Swap Identification" (page 25) of this document for select the swap mode.

➡ If the field "**Convert BCD in Integer Identification Num.**" is checked, the converter converts the Identification Number that is normally expressed in BCD in a Integer value.

➡ If the field "**Send SND_NKE**" is checked, the converter sends the "SND_NKE" frame to start the communication.
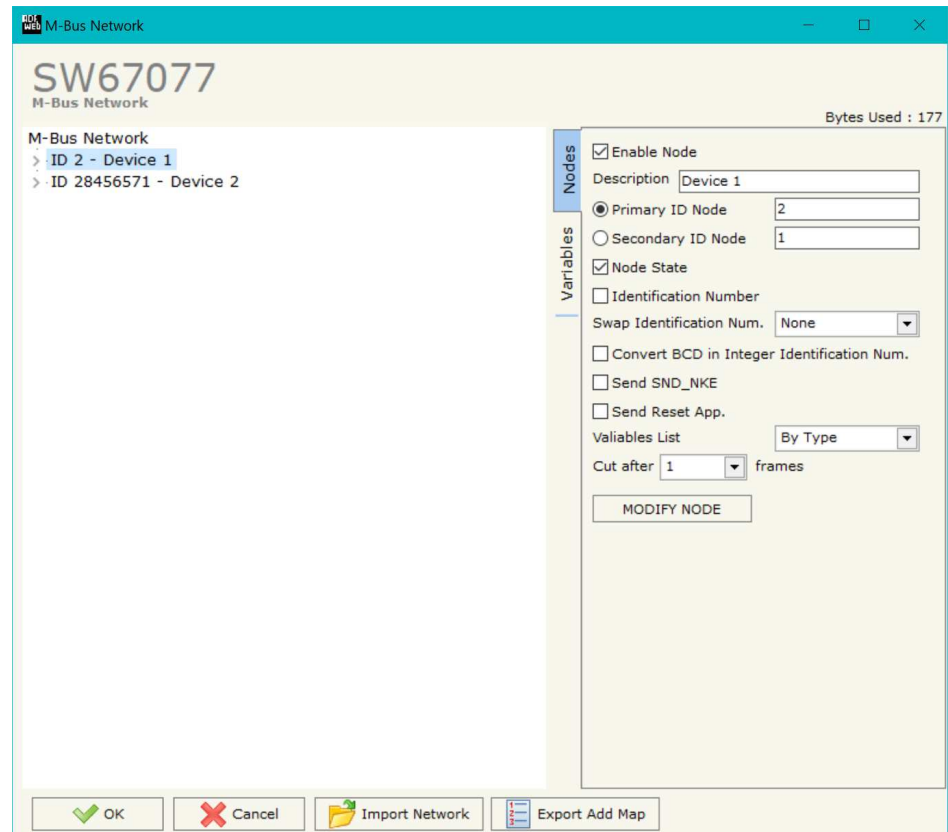

Figure 4: "M-Bus Network" window

➔ In the field "**Send Reset App.**" is checked, the converter sends the "Application Reset" command to the slave.

➔ In the field "**Variables List**" it is possible to select which type of variables definition to use. If is selected "By Type" it is necessary to fill all fields in the section Variables with the correct values; otherwise if "By Position" is selected, it is possible to insert the progressive number of the variable ned (page 26 for more information).

➔ In the field "**Cut after**" it is possible to select after how many frames stops data requests. It is used when the slave has got many data frames and you don't need to read all them.

After that, pressing the "**ADD NODE**" button, a new node appears in the left side of the window. In order to modify a created node it is necessary to select the desired node, change the wrong items and then press the "**MODIFY NODE**" button.

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SECTION VARIABLES (BY TYPE):

Selecting the desired node it is possible to add a variable. 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 "**Description**" it is possible to write a description of the variable (it isn't a necessary information, it helps the readability of the tree of network);

+ The field "**Type of Data**" is used to select the unit of measure;

+ In the field "**VIF ASCII String**" insert the string of VIF. It is possible to use this field only if the "Type of Data" is "VIF is in ASCII";

+ 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, 32 real, 48, 64 bit, Variable Length);

+ In the field "**Length(Variable Len)**" insert the length of the data in the case of 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;

+ If the field "**Scale**" is checked, the converter reserves a bytes on EtherNet/IP array with Scale value (see page 26 for more info);

+ 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;
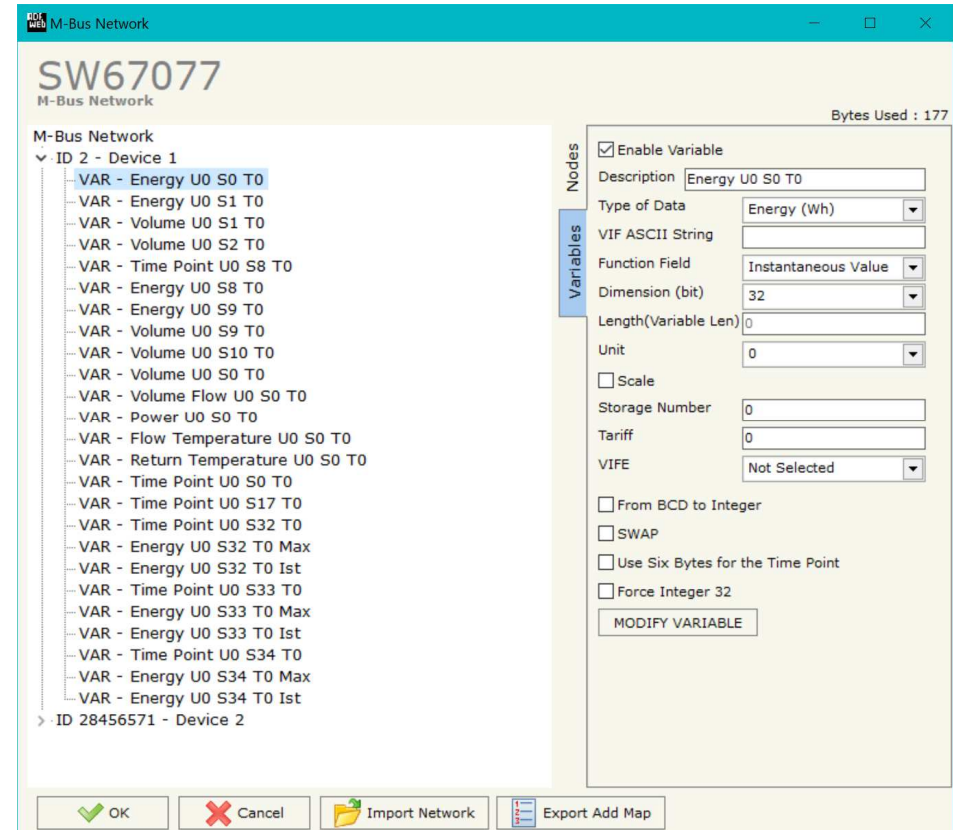
➤ In the field "**VIFE**" it is possible to select a sub-type of "Type of Data";

➤ If the field "**From BCD to Integer**" is checked the converter converts the BCD value of variable in Integer format. This happens only if the variable is in BCD format; if it isn't nothing changes.

➤ If the field "**SWAP**" is checked, the bytes of data of that variable are swapped. Example: from 0x01020304 to 0x04030201;

➤ If the field "**Use Six Bytes for the Time Point**" and the "Type of Data" is "Time Point", it is possible to read the information of Year, Month, Day, Hour, Minutes, Seconds on six consecutive positions of the array without decoding (if not selected, the values are the same of the reply of the slave device, so coded with a determinate structure (page 27 for more information)).

➤ If the field "**Force Integer 32**" is checked the converter maps the variables with a dimension <32 bit in 4 bytes of the EtherNet/IP array as Int32 value.

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.

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SECTION VARIABLES (BY POSITION):

Selecting the desired node it is possible to add a variable. 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 "**Description**" it is possible to write a description of the variable (it isn't a necessary information, it helps the readability of the tree of network);

- The field "**Dimension**" is used to select the dimension of the variable (8, 16, 24, 32, 32 real, 48, 64 bit, Variable Length);

- In the field "**Length(Variable Len)**" insert the length of the data in the case of the dimension is "Variable Length";

- If the field "**Scale**" is checked, the converter reserves a bytes on EtherNet/IP array with Scale value (see page 26 for more info);

- If the field "**From BCD to Integer**" is checked the converter converts the BCD value of variable in Integer format. This happens only if the variable is in BCD format; if it isn't nothing changes.

- If the field "**SWAP**" is checked, the bytes of data of that variable are swapped. Example: from 0x01020304 to 0x04030201;

- If the field "**Use Six Bytes for the Time Point**" and the "Type of Data" is "Time Point", it is possible to read the information of Year, Month, Day, Hour, Minutes, Seconds on six consecutive positions of the array without decoding (if not selected, the values are the same of the reply of the slave device, so coded with a determinate structure (page 27 for more information)).

- If the field "**Force Integer 32**" is checked the converter maps the variables with a dimension <32 bit in 4 bytes of the EtherNet/IP array as Int32 value.

- In the field "**Position**" the position of the variable inside the M-Bus frame sent by the M-Bus slave is defined.

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.

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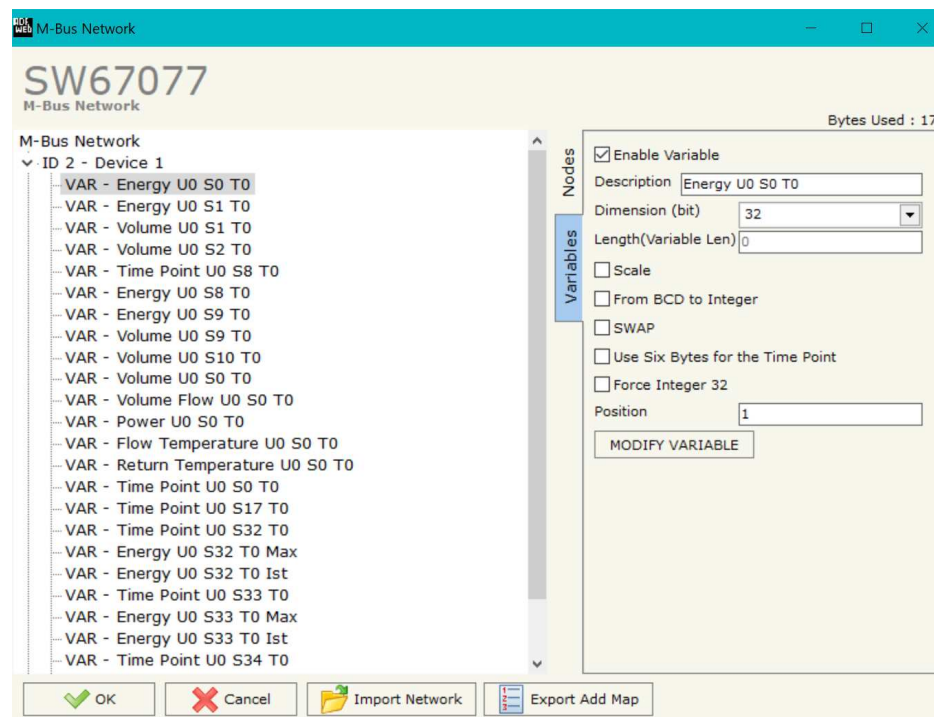
COPY, PASTE AND DELETE ITEMS:

By pressing the right button of the mouse over an item (Variable or Node) it is possible to Copy, Paste and Delete.

It is possible to Copy a variable from a Node and copy it to another Node, or copy a Variable from a project and paste in another one.

It is also possible to copy an entire Node with all its Variables.

Note:
By pressing the "**Import Network**" button it is possible to import the file generated by the Analyzer HD67031.

Note:
By pressing the "**Export Add Map**" button it is possible to export a .csv file with the description of the EtherNet/IP map.

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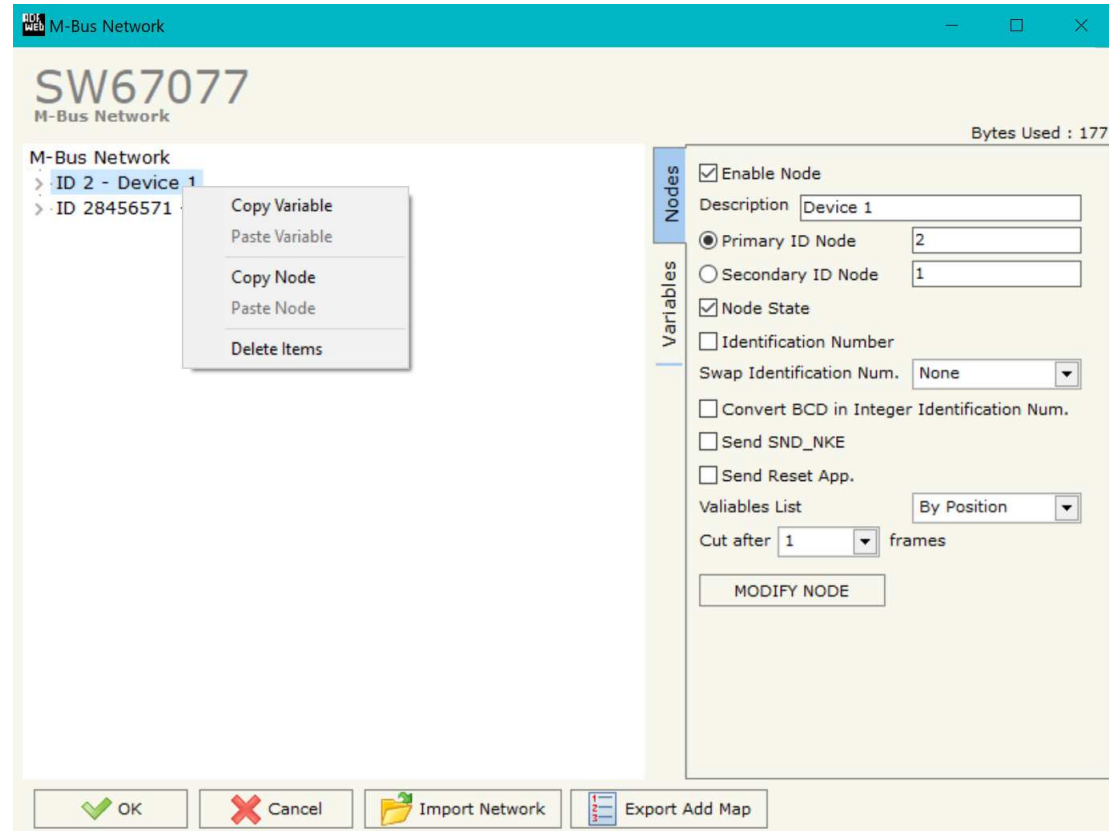
Example:

```
0x68 – Start Byte
0xBD – L Fied
0xBD – L Field
0x68 – Start Byte
0x08 – C Field
0x02 – A Field
0x72 – CI Field

0x71 – Identification Number (Byte 4of4)
0x65 – Identification Number (Byte 3of4)
0x45 – Identification Number (Byte 2of4)
0x28 – Identification Number (Byte 1of4)
0x4D – Manufacturer (Byte 2of2)
0x6A – Manufacturer (Byte 1of2)
0x81 – Version
0x04 – Medium
0x3E – Access Number
0x27 – Status
0x00 – Signature (Byte 2of2)
0x00 – Signature (Byte 1of2)

0x04 – DIF
0x79 – VIF            Identification
0x00 – Data (Byte 4of4)
0x00 – Data (Byte 3of4)
0x00 – Data (Byte 2of4)
0x00 – Data (Byte 1of4)

0x04 – DIF
0x06 – VIF            Energy
0x00 – Data (Byte 4of4)
0x00 – Data (Byte 3of4)
0x00 – Data (Byte 2of4)
0x00 – Data (Byte 1of4)

0x44 – DIF
0x06 – VIF            Energy
0x00 – Data (Byte 4Of4)
0x00 – Data (Byte 3Of4)
0x00 – Data (Byte 2Of4)
0x00 – Data (Byte 1Of4)
…
…   Other Variables
…
0x55 – Check Sum
0x16 – Stop Byte
```

Fixed Data Header

Identification Number (or Secondary Address) putted in the reserved fields if "**Identification Number**" is checked

Status of the meter putted in the reserved field if "**Node State**" is checked

First Variable (①)

Second Variable (②)

Third Variable (③)

To be use in the "**Position**" field

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
|_VIF is in ASCII
|_Unit for H.C.A.
|_Fabrication No
|_(Enhaced) Identification
|_Bus Address

|_24
|_32
|_32 real
|_48
|_64
|_Variable Length

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

Dimension (bit):
|_8
|_16

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

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|_ 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   orrection 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

Swap Identification:

This field is used for select the Swap mode of Identification Number.

At the moment there are these possibilities:

- None;
- Type 1.

Examples:

- Identification Number (Secondary Address): 28456571; Convert BCD in Integer Identification Num. Not checked.

None	Type 1
0x28	0x65
0x45	0x71
0x65	0x28
0x71	0x45

- Identification Number (Secondary Address): 28456571; Convert BCD in Integer Identification Num. Checked.

None	Type 1
0x01	0x36
0xB2	0x7B
0x36	0x01
0x7B	0xB2

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To know the meaning of value read in the "Scale" byte position, you must follow this table (x = Value read in Scale location):

Description	Range Coding		Range
Energy	$10^{(x-3)}$	Wh	0.001 Wh to 10000 Wh
Energy	$10^{(x)}$	J	0.001 kJ to 10000 kJ
Volume	$10^{(x-6)}$	m^3	0.001 l to 10000 l
Mass	$10^{(x-3)}$	kg	0.001 kg to 10000 kg
On Time	x = 0 Seconds x = 1 Minutes x = 2 Hours x = 3 Days		
Operating Time	coded like On Time		
Power	$10^{(x-3)}$	W	0.001 W to 10000 W
Power	$10^{(x)}$	J/h	0.001 kJ/h to 10000 kJ/h
Volume Flow	$10^{(x-6)}$	m^3/h	0.001 l/h to 10000 l/h
Volume Flow Ext.	$10^{(x-7)}$	m^3/min	0.0001 l/min to 1000 l/min
Volume Flow Ext.	$10^{(x-9)}$	m^3/s	0.001 ml/s to 10000 ml/s
Mass Flow	$10^{(x-3)}$	kg/h	0.001 kg/h to 10000 kg/h
Flow Temperature	$10^{(x-3)}$	°C	0.001 °C to 1 °C
Return Temperature	$10^{(x-3)}$	°C	0.001 °C to 1 °C
Temperature Difference	$10^{(x-3)}$	K	1 mK to 1000 mK
External Temperature	$10^{(x-3)}$	°C	0.001 °C to 1 °C
Pressure	$10^{(x-3)}$	bar	1 mbar to 1000 mbar
Averaging Duration	coded like On Time		
Actuality Duration	coded like On Time		
Time Point	x = 0 Date x = 1 Time&Date		Data type G Data type F
Unit for H.C.A.			dimensionless

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Data type F:

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	21^0	2^9	2^8
2^{23}	2^{22}	2^{21}	22^0	2^{19}	2^{18}	2^{17}	2^{16}
2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}

Min (0 … 59);
Hour (0 … 23);
Day (1 … 31);
Month (1 … 12);
Year (0 … 99);
Time Invalid (0=Valid, 1=Invalid);
Summer Time (0=Standard Time, 1=Summer Time);
Reserved (0).

Data type G:

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	21^0	2^9	2^8

Day (1 … 31);
Month (1 … 12);
Year (0 … 99).

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SINGLE SLAVE MODE FUNCTIONING:

By checking the field "Single Slave Mode" it is possible to save 500 bytes of data for a single M-Bus Slave Device.
For having the data it is necessary that the Master EtherNet/IP writes the first four bytes of his Input Data with the Primary or Secondary Address of the slave which want to receive the data.

Example of DeviceNet Master OUT array (data that a master DeviceNet send) using the Primary Address of the Slave M-Bus

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
0x00	0x00	0x00	0x3A	Empty or other values	Empty or other values	Empty or other values

Example of DeviceNet Master OUT array (data that a master DeviceNet send) using the Secondary Address of the Slave M-Bus

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
0x28	0x45	0x65	0x71	Empty or other values	Empty or other values	Empty or other values

If the address is defined in the section M-Bus and the reply frame of the slave interrogated is received, the Converter puts the requested address in the first four bytes. Then follow the normal data of the selected slave.

Example of EtherNet/IP Master IN array (data that a master EtherNet/IP receive) using the Primary Address of the Slave M-Bus

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
0x00	0x00	0x00	0x3A	Data …	…	… Data

Example:
In "Set Communication" the "N Byte OUT" is 30.
There was defined these variables: **Var.1**: 32 bit, No Scale; **Var.2**: 48 bit, No Scale; **Var.3**: 16 bit, Si Scale; **Var.4**: 64 bit, Si scale.
The EtherNet/IP array is the follow:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Var.1	Var.1	Var.1	Var.1	Var.2	Var.2	Var.2	Var.2	Var.2	Var.2

Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17	Byte 18	Byte 19
Var.3	Var.3	Var.3 Scale	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4

Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29
Var.4	Var.4 Scale								

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UPDATE DEVICE:

By pressing the "**Update Device**" button, it is possible to load the created Configuration into the device; and also the Firmware, if necessary. This by using the Ethernet port.

If you don't know the actual IP address of the device you have to use this procedure:

- Turn OFF the Device;
- Put Dip1 of 'Dip-Switch A' in ON position;
- Turn ON the device
- Connect the Ethernet cable;
- Insert the IP "**192.168.2.205**";
- Select which operations you want to do;
- Press the "**Execute update firmware**" button to start the upload;
- When all the operations are "OK" turn OFF the Device;
- Put Dip1 of 'Dip-Switch A' in OFF position;
- Turn ON the device.

If you know the actual IP address of the device, you have to use this procedure:

- Turn ON the Device with the Ethernet cable inserted;
- Insert the actual IP of the Converter;
- Select which operations you want to do;
- Press the "**Execute update firmware**" button to start the upload;
- When all the operations are "OK" the device automatically goes at Normal Mode.

At this point the configuration/firmware on the device is correctly updated.
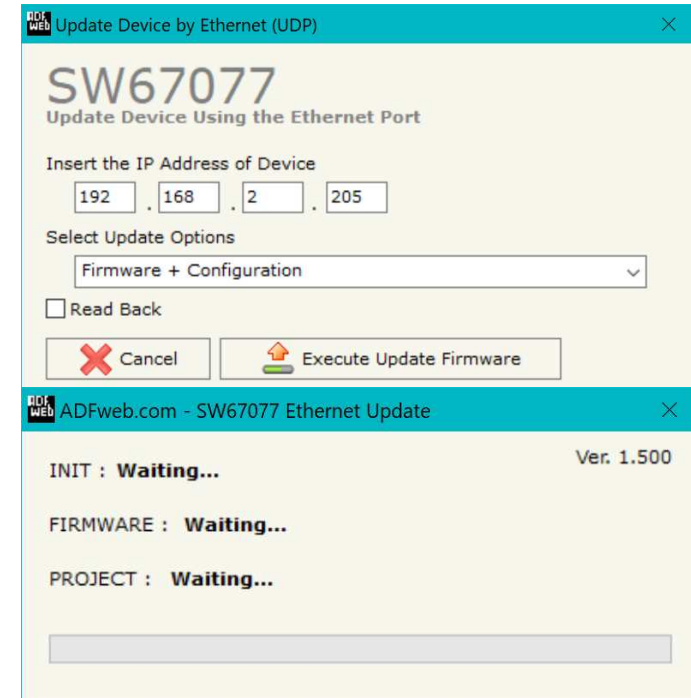
Figure 5: "Update device" windows

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Note:
When you receive the device, for the first time, you also have to update the Firmware in the HD67077 device.

Warning:
If Fig. 6 appears when you try to do the Update try these points before seeking assistance:

➧ Check if the serial COM port selected is the correct one;
➧ Check if the serial cable is connected between the PC and the device;
➧ Try to repeat the operations for the updating;
➧ Try with another PC;
➧ Try to restart the PC;

➧ Check the LAN settings;
➧ If you are using the program inside a Virtual Machine, try to use in the main Operating System;
➧ If you are using Windows Seven, Vista, 8, 10 or 11 make sure that you have the administrator privileges;
➧ In case you have to program more than one device, using the "UDP Update", you have to cancel the ARP table every time you connect a new device on Ethernet. For do this you have to launch the "Command Prompt" and write the command "arp -d". Pay attention that with Windows Vista, Seven, 8, 10, 11 you have to launch the "Command Prompt" with Administrator Rights;
➧ Pay attention at Firewall lock.

Figure 6: "Error" window

Warning:
In the case of HD67077 you have to use the software "SW67077": www.adfweb.com\download\filefold\SW67077.zip.

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SCAN & DECODE FUNCTION:

"SCAN & DECODE" functions are integrated in the configurator software SW67077. It is possible to access to these functions by simple click on the " Scan & Decode " button.

It has the following characteristics:

- Possibility to scan M-Bus network;
- Automatic decode of M-Bus telegrams;
- Easy connection directly through the Ethernet port of the converters.

For the description of the function, it is possible to refer to this manual: www.adfweb.com/download/filefold/SCAN&DECODE_ENG.pdf

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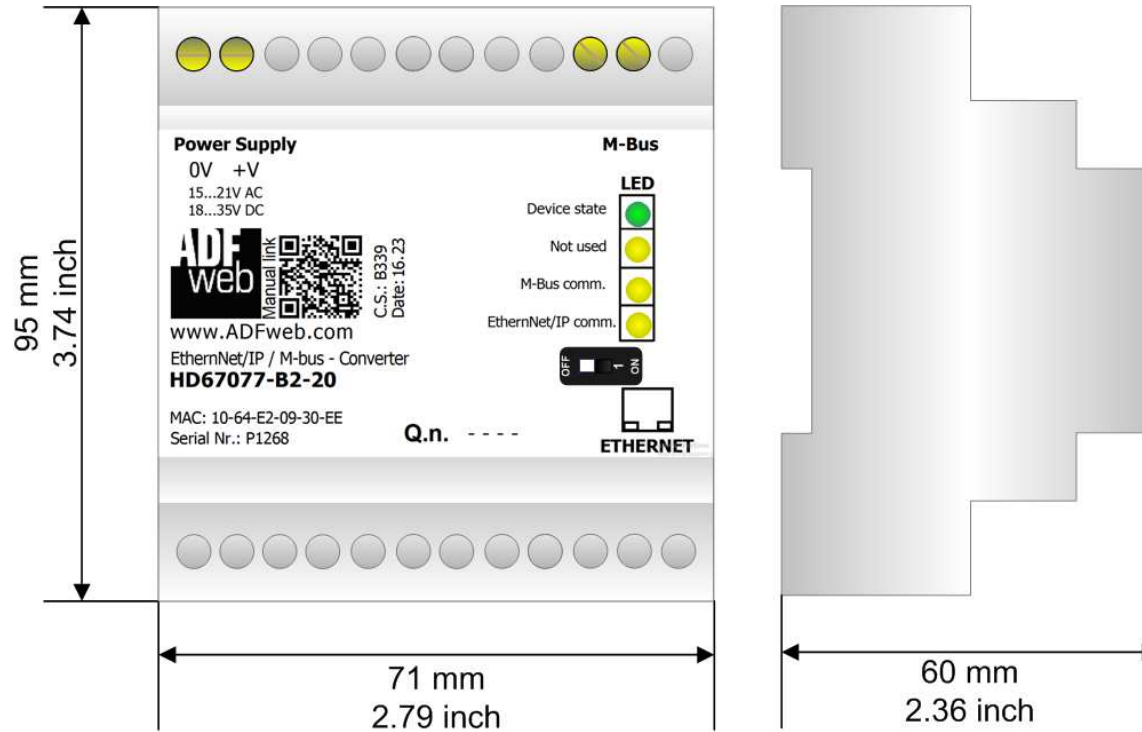
MECHANICAL DIMENSIONS:

Figure 7: Mechanical dimensions scheme for HD67077-B2-xxx

ORDERING INFORMATIONS:

The ordering part number is formed by a valid combination of the following:

HD67077 – B 2 – xxx

Maximum number of slaves supported
20: up to 20 standard slaves (1.5mA consumption) connected to M-Bus
40: up to 40 standard slaves (1.5mA consumption) connected to M-Bus
80: up to 80 standard slaves (1.5mA consumption) connected to M-Bus
160: up to 160 standard slaves (1.5mA consumption) connected to M-Bus
250: up to 250 standard slaves (1.5mA consumption) connected to M-Bus

Connectors Type
2: Fixed Screw Terminal

Enclosure Type
B: Modulbox 4M, 35mm DIN Rail mounting

Device Family
HD67077: EtherNet/IP / M-Bus Master - Converter

Order Code: **HD67077-B2-20**   **-**   Converter EtherNet/IP / M-Bus Master (up to 20 slaves connected to M-Bus)
Order Code: **HD67077-B2-40**   **-**   Converter EtherNet/IP / M-Bus Master (up to 40 slaves connected to M-Bus)
Order Code: **HD67077-B2-80**   **-**   Converter EtherNet/IP / M-Bus Master (up to 80 slaves connected to M-Bus)
Order Code: **HD67077-B2-160** **-**   Converter EtherNet/IP / M-Bus Master (up to 160 slaves connected to M-Bus)
Order Code: **HD67077-B2-250** **-**   Converter EtherNet/IP / M-Bus Master (up to 250 slaves connected to M-Bus)

ACCESSORIES:

Order Code: **APW020**   -   Power Supply for M-Bus Master device that supports up to 20 Slaves
Order Code: **APW040**   -   Power Supply for M-Bus Master device that supports up to 40 Slaves
Order Code: **APW080**   -   Power Supply for M-Bus Master device that supports up to 80 Slaves
Order Code: **APW160**   -   Power Supply for M-Bus Master device that supports up to 160 Slaves
Order Code: **APW250**   -   Power Supply for M-Bus Master device that supports up to 250 Slaves

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PLC CONFIGURATION:

The configuration and commissioning of the EtherNet/IP Converter as described on the following pages was accomplished with the help of the RSLogix 5000-software of Rockwell Automation. In case of using a control system from another supplier please attend to the associated documentation.
These are the steps to follow:

1) Create a "Generic Ethernet Module" under the Ethernet section in the I/O Configuration tree.
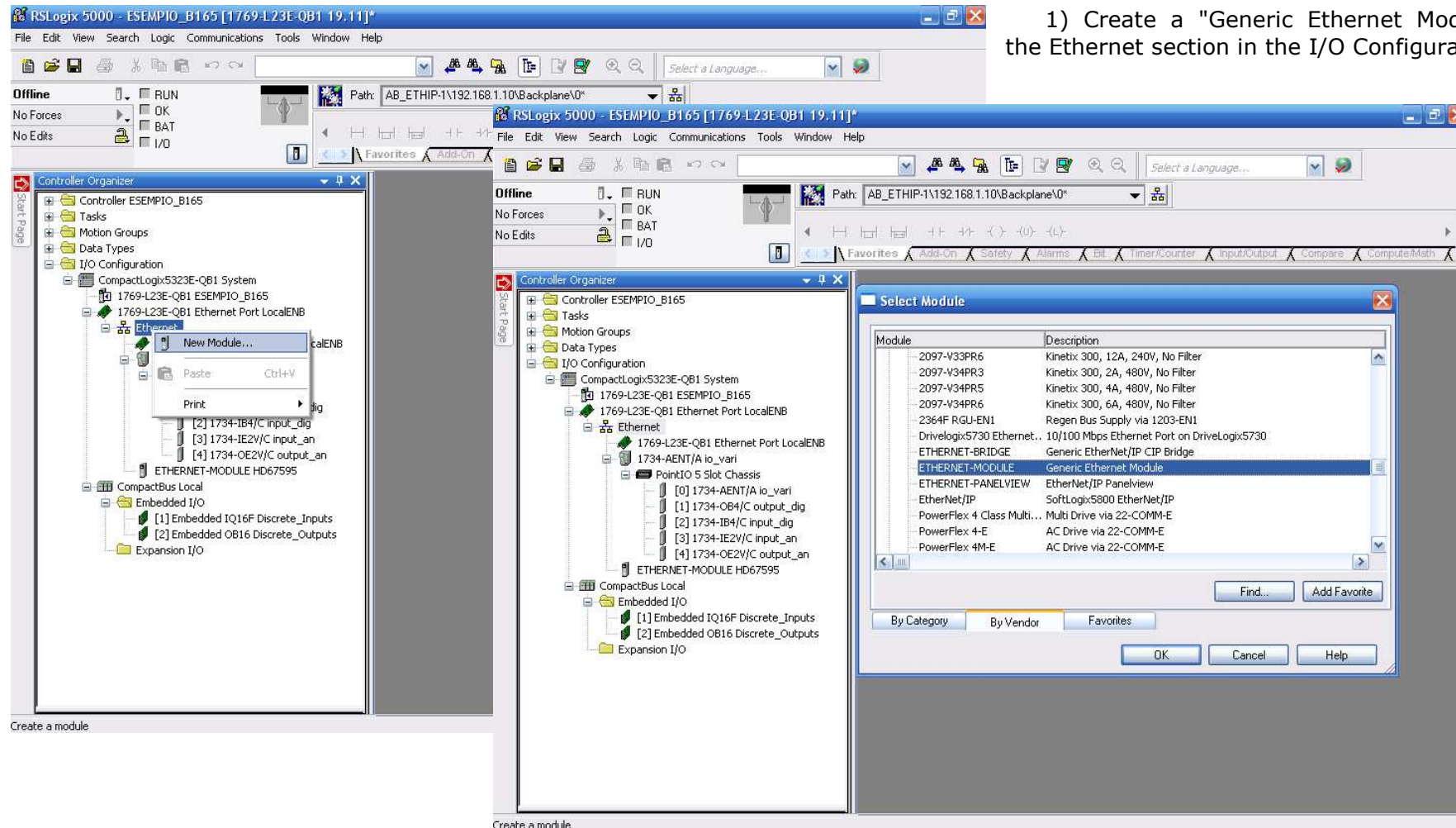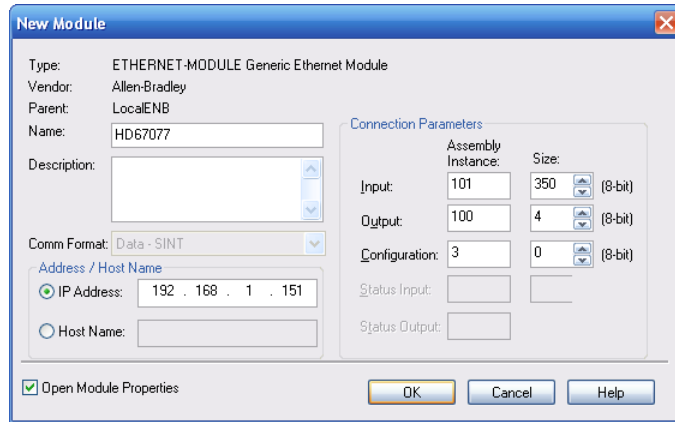
2) Edit the settings of the new Generic Ethernet Module. As shown in the screen shot below, the module was named "HD67077" and the IP-address assigned is 192.168.1.151.

For the Comm Format "Data – SINT" shall be selected as the data type.

The HD67077-A1 can uses up to 500 bytes for input assembly instance 101 and 4 bytes for output assembly instance 100.

Note:
The Output is fixed to 4 and is not possible to change it.

RSLogix 5000 requires a "Configuration Assembly Instance". Both modules do not provide a configuration assembly instance. Therefore it is allowed to select an instance of 3 and to set the value to zero.

The setting of 10msec for the "Requested Packet Interval (RPI)" is adequate but it is possible to change this value as required. A lower value of 2ms shall not be selected.

---

3) After the configuration is completed, the controller tags are created.

---
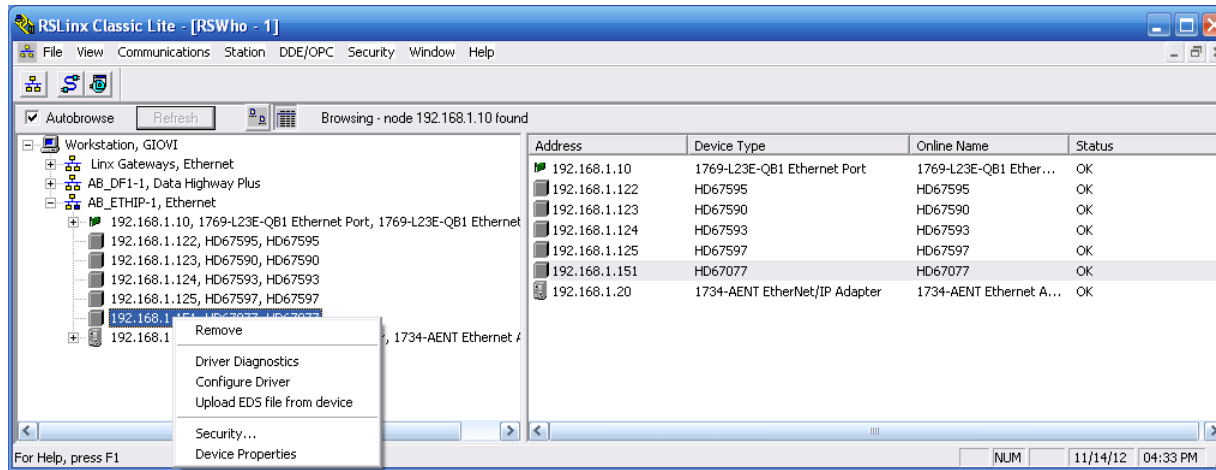
4) With "RSLinks Classic Lite", after have done a network scan (RSWho), and finding the EtherNet/IP device, it is possible to load the EDS file for the device in order to have the "Module Info" compiled.

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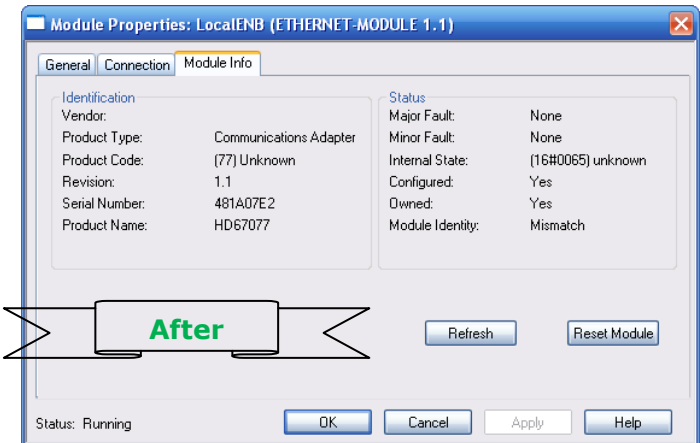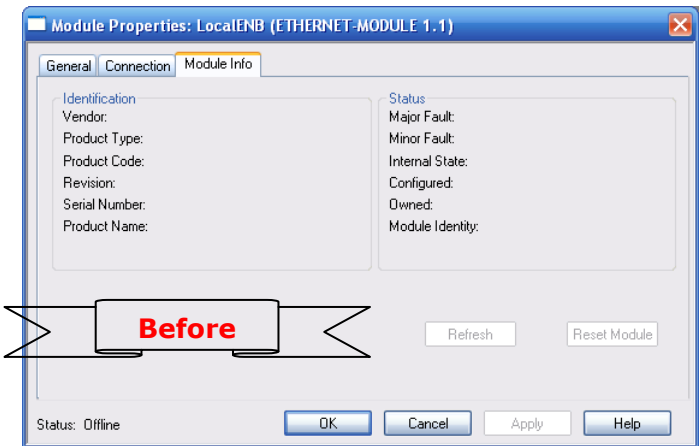
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WEEE INFORMATION

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 impact of 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.

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RETURN POLICY:

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

- 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.
- 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.

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