User Manual

Revision 1.001
English

EtherCAT Master / EtherNet/IP Slave - Converter

(Order Code: HD67E77-A1)

For Website information:
www.adfweb.com?Product=HD67E77

For Price information:
www.adfweb.com?Price=HD67E77-A1

Benefits and Main Features:

- Triple Electrical isolation
- Temperature range: -40°C/+85°C (-40°F/+185°F)



For other EtherCAT Master products see also the following link:

Converter EtherCAT Slave to	
www.adfweb.com?Product=HD67E50	**(Serial)**
www.adfweb.com?Product=HD67E51	**(Modbus Master)**
www.adfweb.com?Product=HD67E52	**(Modbus Slave)**
www.adfweb.com?Product=HD67E53	**(Modbus TCP Master)**
www.adfweb.com?Product=HD67E54	**(Modbus TCP Slave)**
www.adfweb.com?Product=HD67E55	**(BACnet Master)**
www.adfweb.com?Product=HD67E56	**(BACnet Slave)**
www.adfweb.com?Product=HD67E57	**(CAN)**
www.adfweb.com?Product=HD67E58	**(CANopen)**
www.adfweb.com?Product=HD67E59	**(DeviceNet Master)**
www.adfweb.com?Product=HD67E60	**(DeviceNet Slave)**
www.adfweb.com?Product=HD67E61	**(DMX)**
www.adfweb.com?Product=HD67E62	**(Ethernet)**
www.adfweb.com?Product=HD67E64	**(IEC61850 Client)**
www.adfweb.com?Product=HD67E65	**(IEC61850 Server)**
www.adfweb.com?Product=HD67E66	**(J1939)**
www.adfweb.com?Product=HD67E67	**(MQTT)**
www.adfweb.com?Product=HD67E68	**(NMEA0183)**
www.adfweb.com?Product=HD67E69	**(NMEA2000)**
www.adfweb.com?Product=HD67E70	**(OPC UA Client)**
www.adfweb.com?Product=HD67E71	**(OPC UA Server)**
www.adfweb.com?Product=HD67E72	**(PROFINET Master)**
www.adfweb.com?Product=HD67E73	**(Modbus TCP Master)**
www.adfweb.com?Product=HD67E74	**(SNMP Manager)**
www.adfweb.com?Product=HD67E75	**(SNMP Agent)**
www.adfweb.com?Product=HD67E76	**(EtherNet/IP Master)**
www.adfweb.com?Product=HD67E78	**(S7comm Client)**

User Manual

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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

To obtain the most recently updated document, note the "document code" that appears at the top right-hand corner of each page of this document.

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.

REVISION LIST:

Revision	Date	Author	Chapter	Description
1.000	15/09/2021	Ff	All	First Release
1.001	11/03/2025	Ln	All	New design

WARNING:

ADFweb.com reserves the right to change information in this manual about our product without warning.
ADFweb.com is not responsible for any error this manual may contain.

TRADEMARKS:

All trademarks mentioned in this document belong to their respective owners.

SECURITY ALERT:

GENERAL INFORMATION

To ensure safe operation, the device must be operated according to the instructions in the manual. When using the device, legal and safety regulation are required for each individual application. 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 instruments can represent a potential hazard if they are inappropriately installed and operated by untrained personnel. These instructions refer to residual risks with the following symbol:

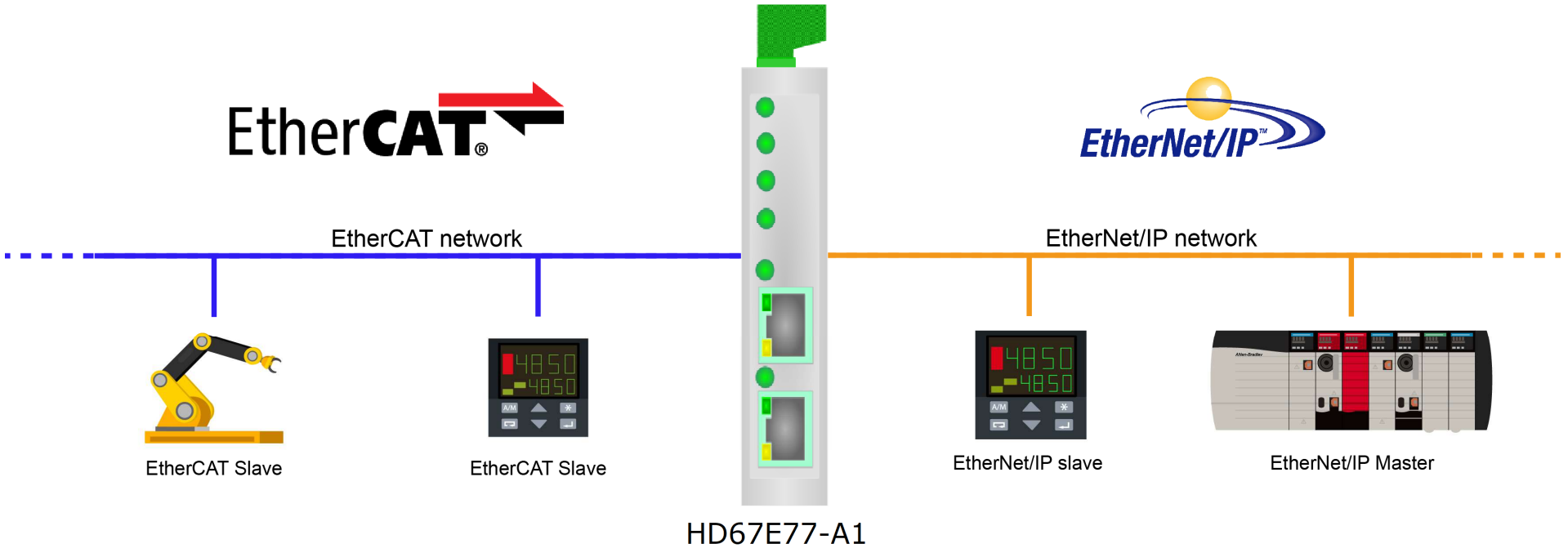


This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

CE CONFORMITY

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

EXAMPLE OF CONNECTION:



CONNECTION SCHEME:

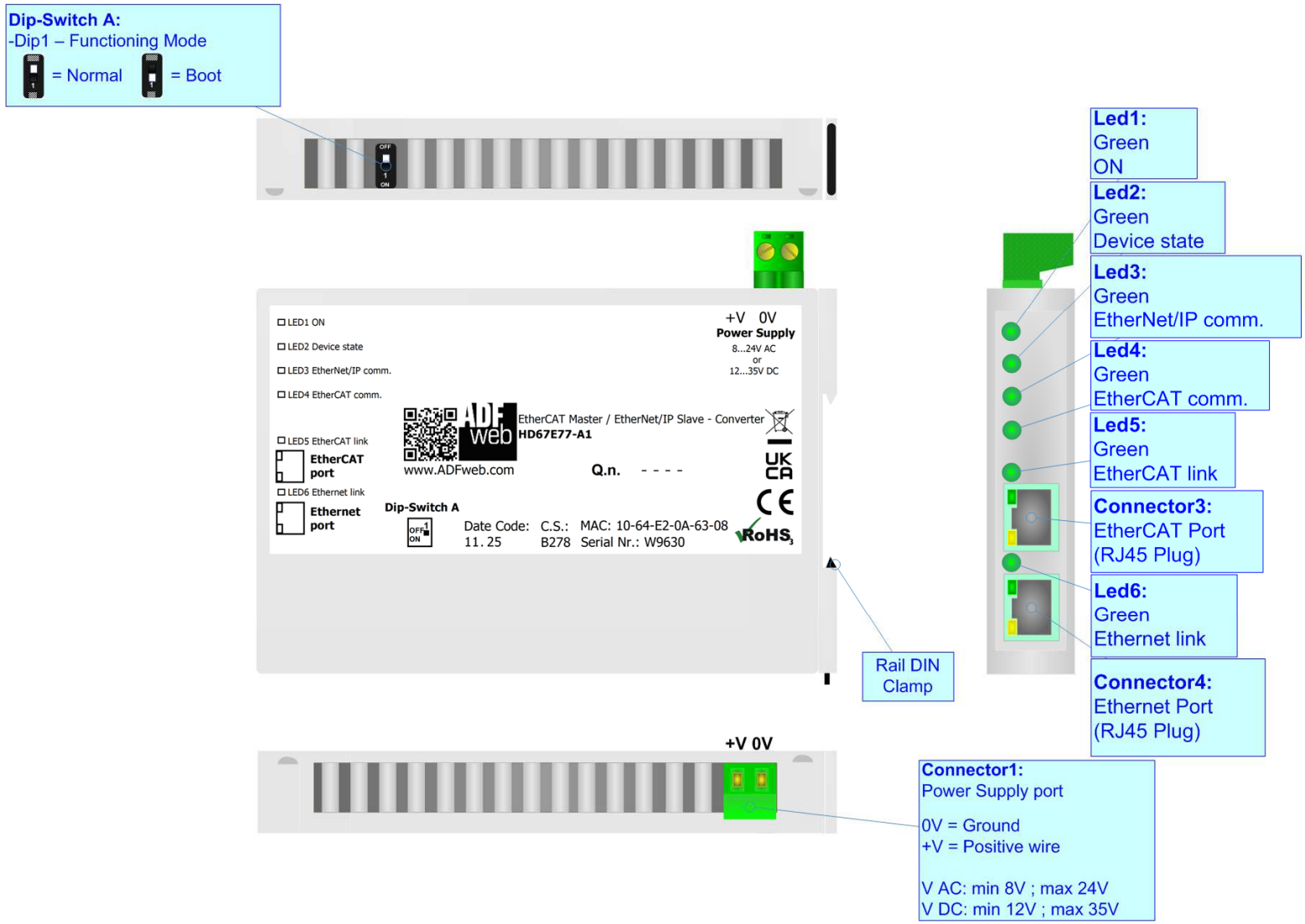


Figure 1: Connection scheme for HD67E77-A1

CHARACTERISTICS:

The HD67E77-A1 are EtherCAT Master / EtherNet/IP Slave - Converters.

It allows for the following characteristics:

- Isolation between EtherCAT – EtherNet/IP – Power Supply;
- Two-directional information between EtherCAT bus and EtherNet/IP bus;
- Mountable on 35mm Rail DIN;
- Wide power supply input range: 8…24V AC or 12…35V DC;
- Wide temperature range: -40°C / +85°C [-40°F / +185°F].

CONFIGURATION:

You need Compositor SW67E77 software on your PC in order to perform the following:

- Define the parameters of EtherCAT line;
- Define the parameters of EtherNet/IP line;
- Define EtherCAT slaves from which reading/writing the data;
- Update the device.

POWER SUPPLY:

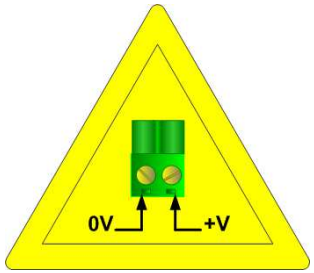
The devices can be powered at 8…24V AC and 12…35V DC. For more details see the two tables below.

VAC ~		VDC ⎓	
Vmin	**Vmax**	**Vmin**	**Vmax**
8V	**24V**	**12V**	**35V**

Consumption at 24V DC:

Device	Consumption [W/VA]
HD67E77-A1	3.5

Caution: Do not reverse the polarity power

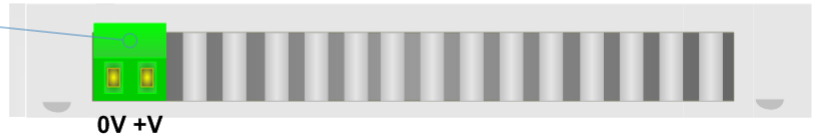


HD67E77-A1

Connector1:
Power Supply port

0V = Ground
+V = Positive wire

V AC: min 8V ; max 24V
V DC: min 12V ; max 35V



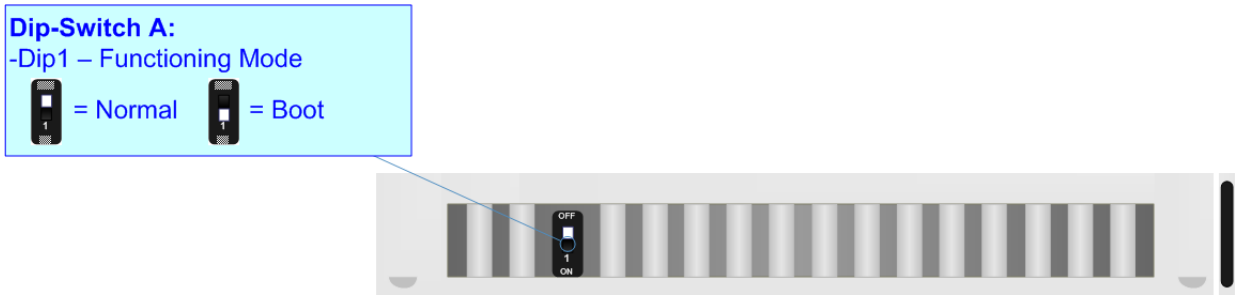
FUNCTION MODES:

The device has got two function modes depending on 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 uploading the Project and/or Firmware.

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

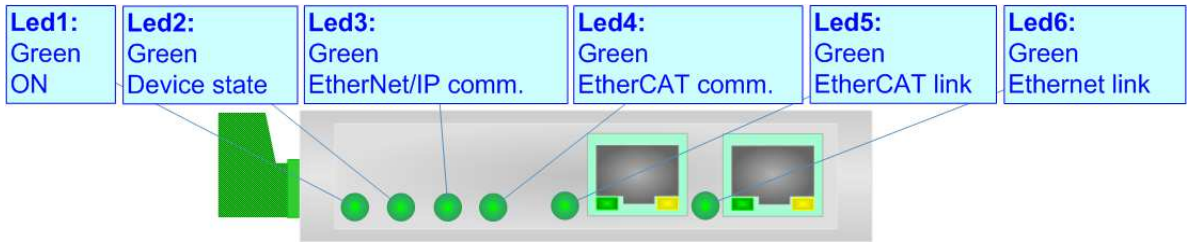
According to the functioning mode, the LEDs will have specific functions, see 'LEDS' section.



LEDS:

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

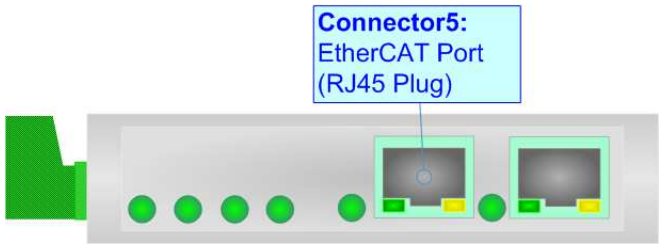
LED	Normal Mode	Boot Mode
1: ON [supply voltage] (green)	**ON:** Device powered **OFF:** Device not powered	**ON:** Device powered **OFF:** Device not powered
2: Device State (green)	Blinks slowly (~1Hz)	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: EtherNet/IP comm. (green)	It blinks when EtherNet/IP communication is running	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: EtherCAT comm. (green)	It blinks when EtherCAT communication is running	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
5: EtherCAT link (green)	**ON:** EtherCAT cable connected **OFF:** EtherCAT cable disconnected	**ON:** EtherCAT cable connected **OFF:** EtherCAT cable disconnected
6: Ethernet link (green)	**ON:** Ethernet cable connected **OFF:** Ethernet cable disconnected	**ON:** Ethernet cable connected **OFF:** Ethernet cable disconnected



ETHERCAT

EtherCAT (Ethernet for Control Automation Technology) is an Ethernet-based fieldbus system, invented by Beckhoff Automation.
The protocol is standardized in IEC 61158 and is suitable for both hard and soft real-time computing requirements in automation technology. With EtherCAT, the standard Ethernet packet or frame (according to IEEE 802.3) is no longer received, interpreted, and copied as process data at every node. The EtherCAT slave devices read the data addressed to them while the telegram passes through the device, processing data "on the fly". In other words, real-time data and messages are prioritized over more general, less time-sensitive or heavy load data.

EtherCAT connection must be made using Connector5 of the HD67E77-A1.



ETHERNET:

EtherNet/IP connection and the updating of the converter must be made using Connector6 of the HD67E77-A1 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.



USE OF COMPOSITOR SW67E77:

To configure the Converter, use the available software that runs with Windows called SW67E77. 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 or 11; 32/64bit).

When launching the SW67E77, the window below appears (Fig. 2).

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

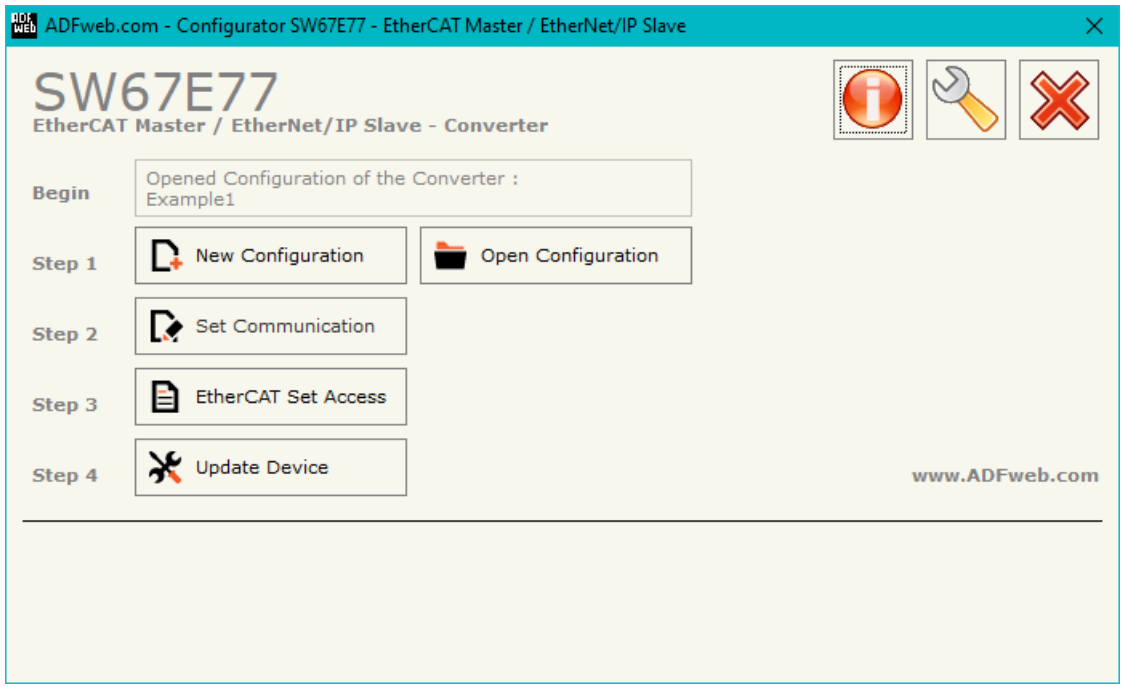
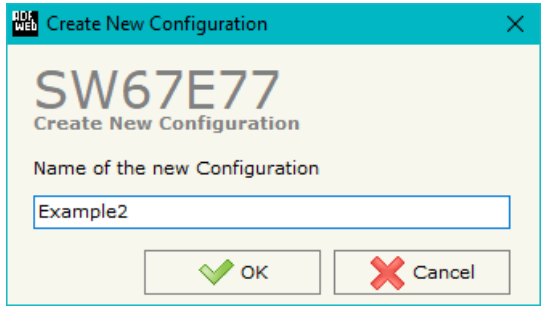


Figure 2: Main window for SW67E77

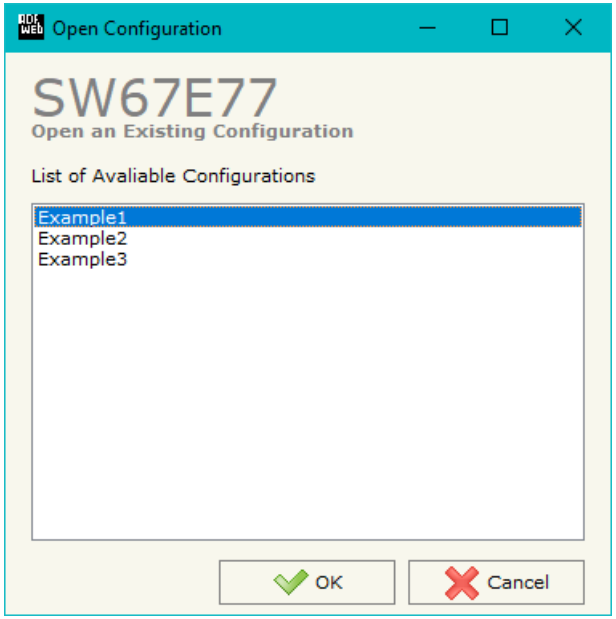
NEW CONFIGURATION / OPEN CONFIGURATION:

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 "EtherCAT Master / EtherNet/IP Slave - 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**".

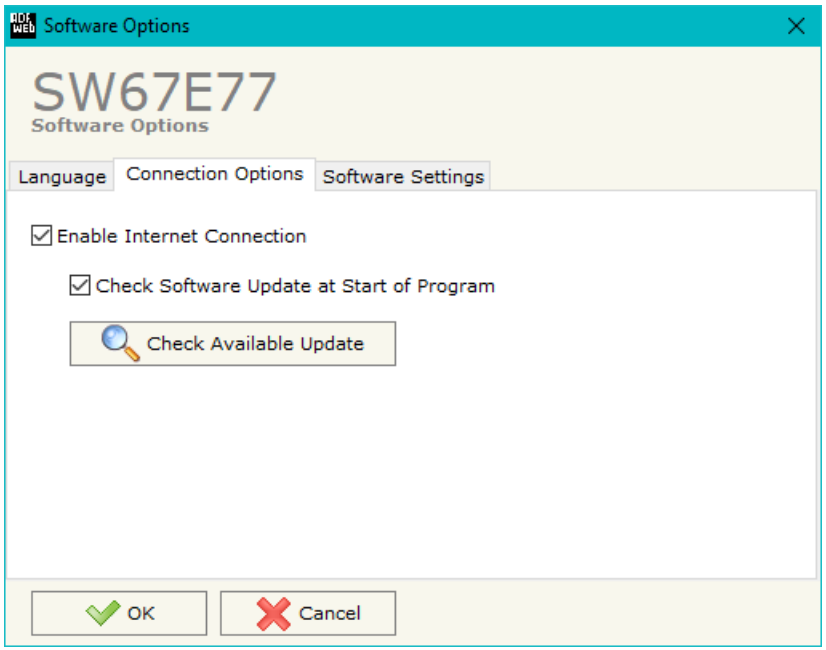


SOFTWARE OPTIONS:

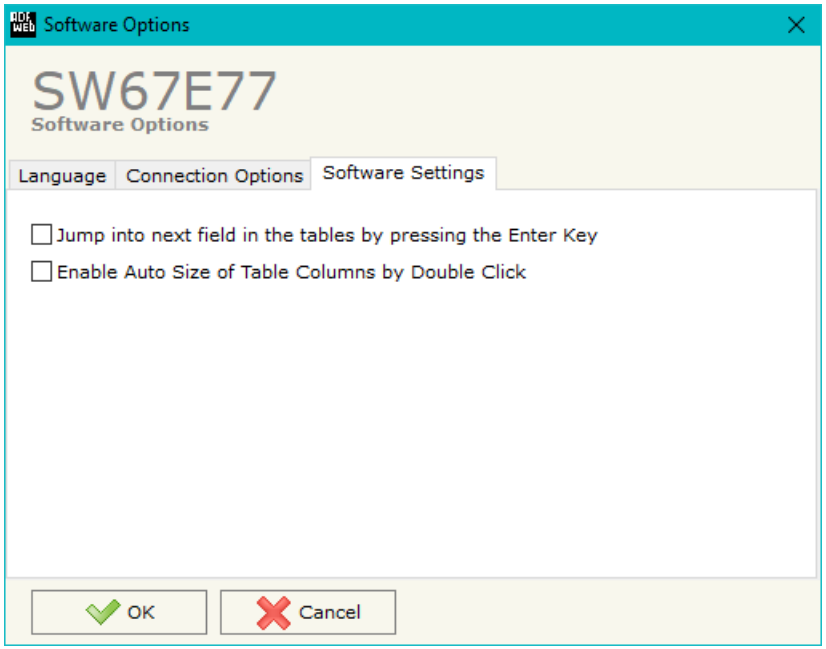
By pressing the "**Settings**" ( ) button there is the possibility to change the language of the software and check the updatings for the compositor.

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 SW67E77 checks automatically if there are updatings when it is launched.



In the section "Software Settings", it is possible to enable/disable some keyboard's commands for an easier navigation inside the tables contained in the different sections of the software.

SET COMMUNICATION:

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

By Pressing the "**Set Communication**" button from the main window for SW67E77 (Fig. 2) the window "Set Communication" appears (Fig. 3).

The means of the fields for "Ethernet Connection" are:

- In the field "**Device Name (Hostname)**" the Hostname to assign to the converter is defined;
- If the field "**Obtain an IP Address Automatically (DHCP for Cable Connection)**" is checked, DHCP for LAN connection is enabled;
- If the field "**Enable DNS**" is checked, DNS protocol is enabled;
- In the field "**Primary DNS**" the IP Address of the primary DNS server is defined;
- In the field "**Secondary DNS**" the IP Address of the secondary DNS server is defined.

The means of the fields for the "EtherCAT Master" section are:

- If the field "**Clear Data on EtherCAT Fault**" is checked, the data on EtherNet/IP side is reset to '0' in case of EtherCAT fault;
- If the field "**Automatic Reset when EtherCAT Fails**" is checked, the converter restarts in case of EtherCAT error.

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

- In the fields "**IP Address**" the IP address of EtherNet/IP side of the converter is defined;
- In the fields "**Subnet Mask**" the SubNet Mask of EtherNet/IP side of the converter is defined;
- In the fields "**Gateway**" the default gateway of the network is defined. This feature can be enabled or disabled pressing the Check Box field. This feature is used for going out of the net;
- In the field "**Port**" the port used for EtherNet/IP communication is defined;
- In the field "**Number Bytes Input**" the number of input bytes of the converter is defined;
- In the field "**Number Bytes Output**" the number of output bytes of the converter is defined.

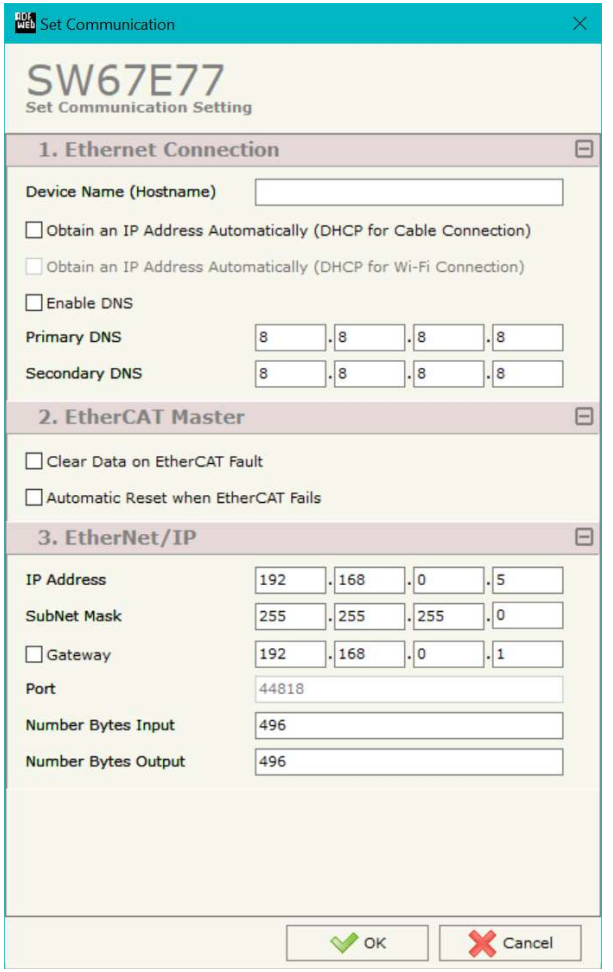


Figure 3: "Set Communication" window

ETHERCAT SET ACCESS:

By Pressing the "**EtherCAT Set Access**" button from the main window for SW67E77 (Fig. 2) the window "EtherCAT Master Access" appears (Fig. 4). This section is used to define the list of the EtherCAT slave devices to connect and the parameters to read/write.

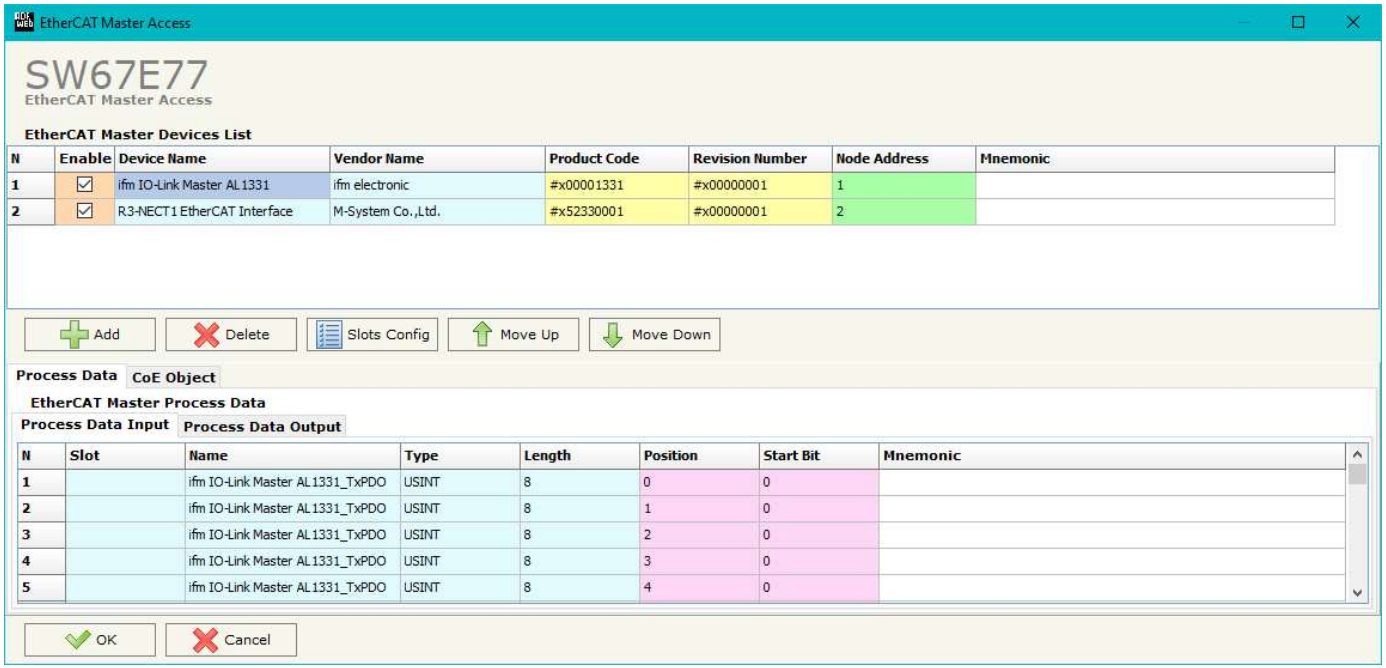


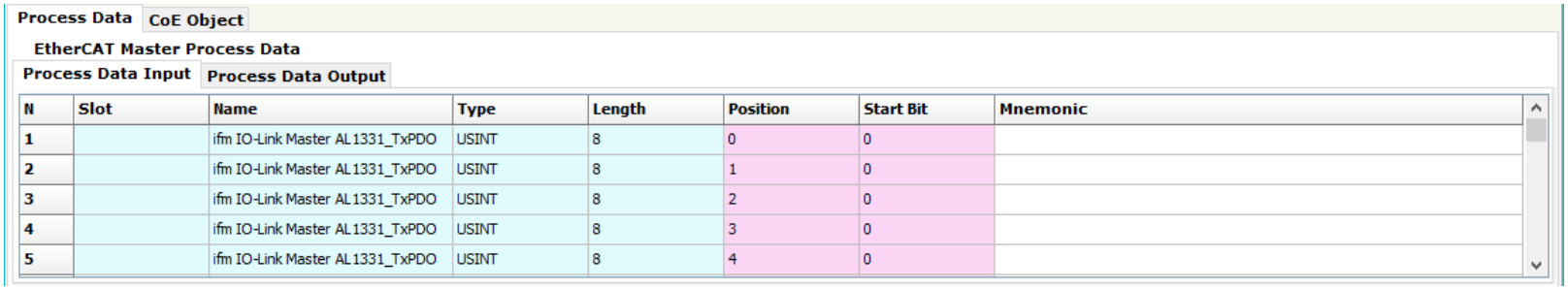
Figure 4a: "EtherCAT Master Access" window

Below the "**EtherCAT Master Devices List**", the list of the EtherCAT devices to connect is defined. It is possible to import the slaves using the standard ESI file provided by the manufacturer of the device. For each node, it is necessary to indicate the "**Node Address**" into the related column. If a slave device has more device instances, it is possible to select them using "**Slots Config**" button.

Note:
The EtherCAT devices must be listed with the correct order, respecting the order of the physical connection to have a correct communication.

For each EtherCAT slave device, it is possible to define the map from/to the other bus for Process Data and for CoE objects.
The list of accessible objects is imported directly from ESI file.

PROCESS DATA



N	Slot	Name	Type	Length	Position	Start Bit	Mnemonic
1		ifm IO-Link Master AL1331_TxPDO	USINT	8	0	0	
2		ifm IO-Link Master AL1331_TxPDO	USINT	8	1	0	
3		ifm IO-Link Master AL1331_TxPDO	USINT	8	2	0	
4		ifm IO-Link Master AL1331_TxPDO	USINT	8	3	0	
5		ifm IO-Link Master AL1331_TxPDO	USINT	8	4	0	

Figure 4b: "Process Data" table

The means of the fields are:

- In the field "**Slot**" the selected Slot is defined;
- In the field "**Name**" the name of the variable is defined;
- In the field "**Type**" the format of the EtherCAT variable is defined;
- In the field "**Lenght**" the dimension in bit of the variable is defined;
- In the field "**Position**" the starting address of the EtherNet/IP array where the variable is mapped is defined;
- In the field "**Start Bit**" the starting bit of the selected Position where the variable is mapped is defined;
- In the field "**Mnemonic**" a description of the variable is defined.

CoE Object

Process Data | CoE Object

EtherCAT Master CoE Objects List

N	Enable	Index	SubIndex	Name	Bit Length	Access	Pos Read	Start Bit R	Time Read	Pos Write	Start Bit W	On Change	On CMD	On Timer	Time	Mnemonic
1	☐	#x1000	0	Device Type	32	ro						☐	☐	☐		
2	☐	#x1008	0	Manufacturer Device Name	112	ro						☐	☐	☐		
3	☐	#x1009	0	Manufacturer Hardware	200	ro						☐	☐	☐		
4	☐	#x100a	0	Manufacturer Software	256	ro						☐	☐	☐		
5	☐	#x1018	0	Number of entries	8	ro						☐	☐	☐		
6	☐	#x1018	1	Vendor Id	32	ro						☐	☐	☐		

Figure 4c: "CoE Object" table

The means of the fields are:

- If the field "**Enable**" is checked, the EtherCAT variable is enabled;
- In the field "**Index**" the index of the EtherCAT variable is defined;
- In the field "**SubIndex**" the SubIndex of the EtherCAT variable is defined;
- In the field "**Name**" the name of the EtherCAT variable is defined;
- In the field "**Bit Lenght**" the dimension of the EtherCAT variable is defined;
- In the field "**Access**" the allowed access to the EtherCAT variable is defined;
- In the field "**Pos Read**" the starting address of the EtherNet/IP array where the read value of the variable is mapped is defined;
- In the field "**Start Bit R**" the starting bit of the selected Position where the variable is mapped is defined;
- In the field "**Time Read**" the cyclical time in ms for the data reading is defined;
- In the field "**Pos Write**" the starting address of the EtherNet/IP array where the value to write to the variable is taken is defined;
- In the field "**Start Bit R**" the starting bit of the selected Position where the value to write is taken is defined;
- If the field "**On Change**" is checked, the writing command is sent only when the data from EtherNet/IP is changed;
- If the field "**On CMD**" is checked, the writing command is sent when an explicit message from EtherNet/IP is received;
- If the field "**On Timer**" is checked, the writing command is sent cyclically with the "**Time**" defined;
- In the field "**Mnemonic**" a description of the variable is defined.

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.

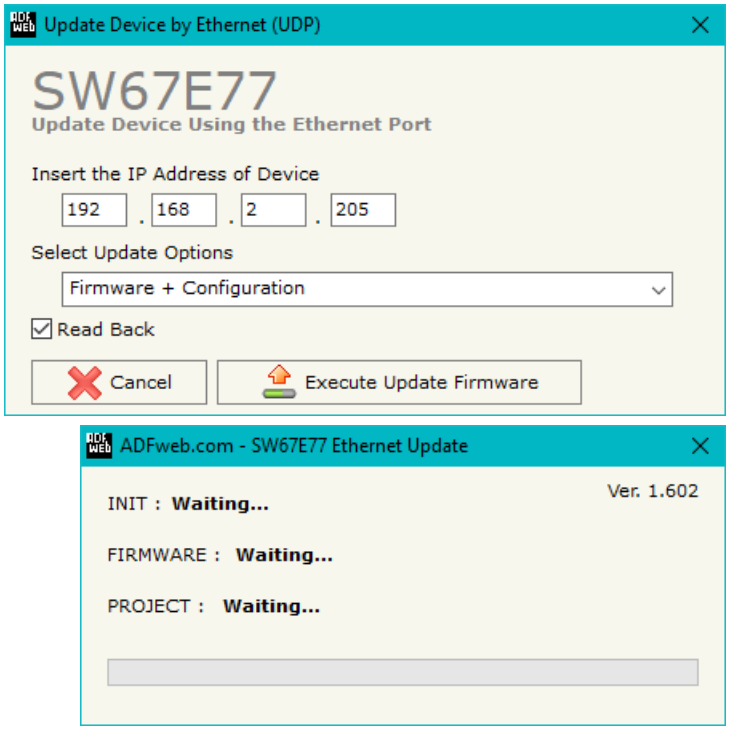


Figure 5: "Update device" windows

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.

Note:
When you receive the device, for the first time, you also have to update the Firmware in the HD67E77 device.

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

- 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 or 11 you have to launch the "Command Prompt" with Administrator Rights;
- Pay attention at Firewall lock.

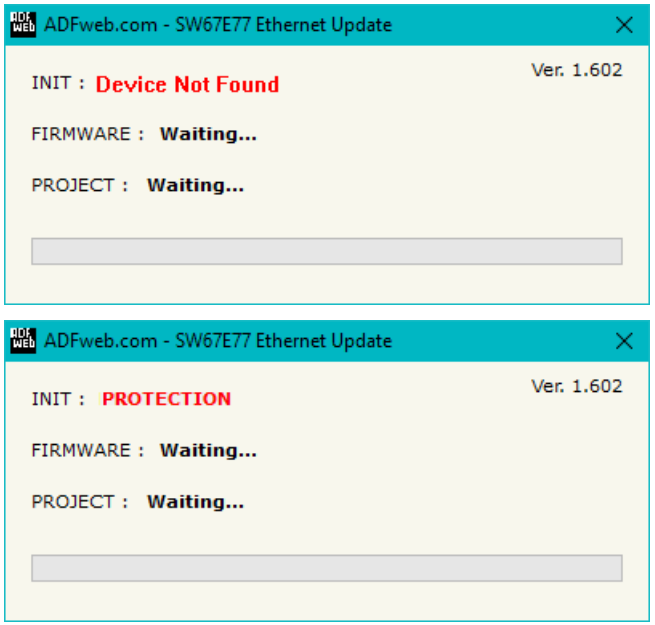


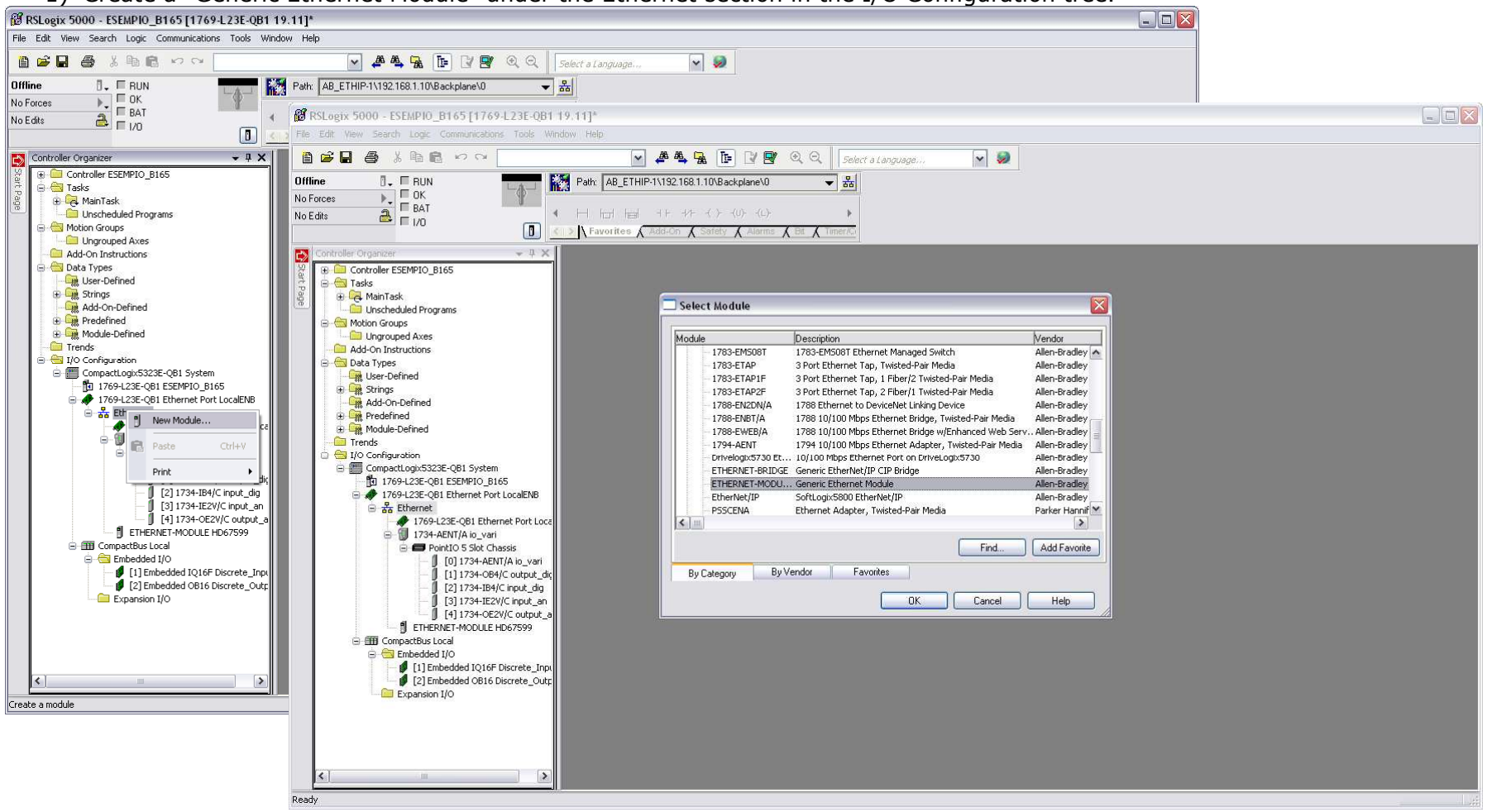
Figure 6: "Error" window

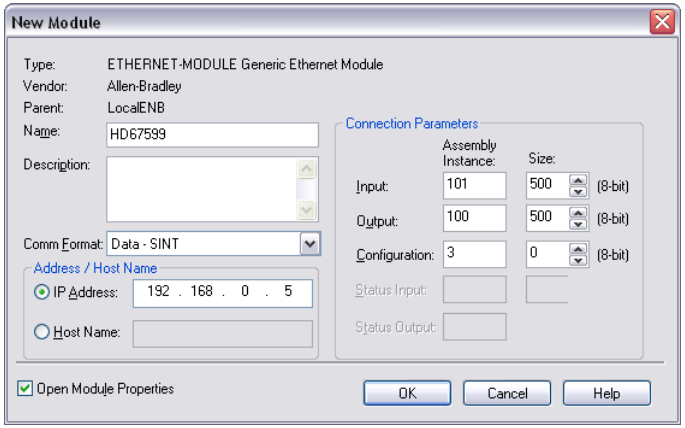
Warning:
In the case of HD67E77 you have to use the software "HD67E77": www.adfweb.com\download\filefold\SW67E77.zip.

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.



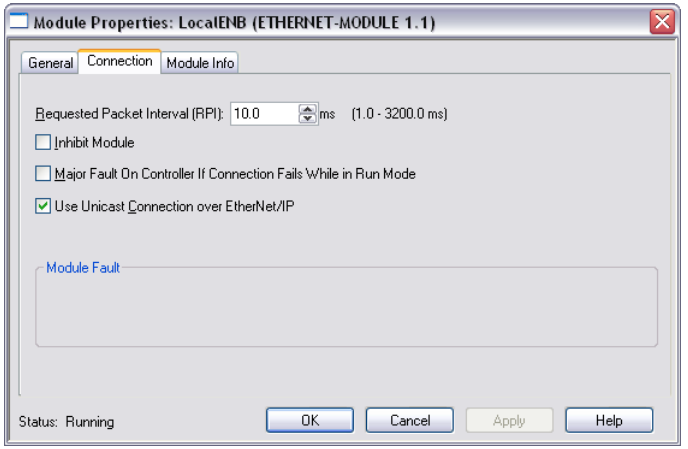


2) Edit the settings of the new Generic Ethernet Module. As shown in the screen shot below, the module was named "HD67E77" and the IP-address assigned is 192.168.0.5.

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

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.

3) 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.

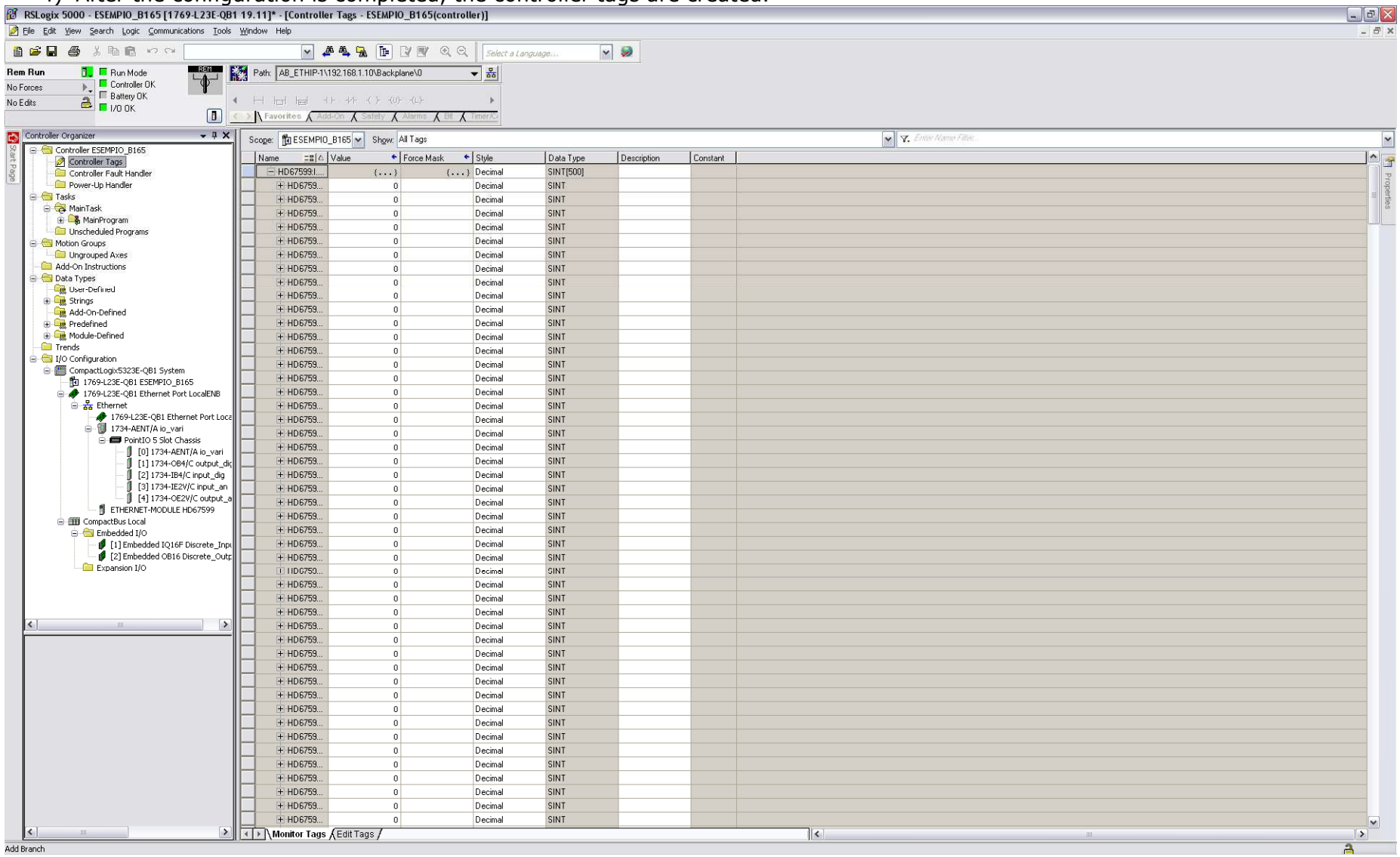


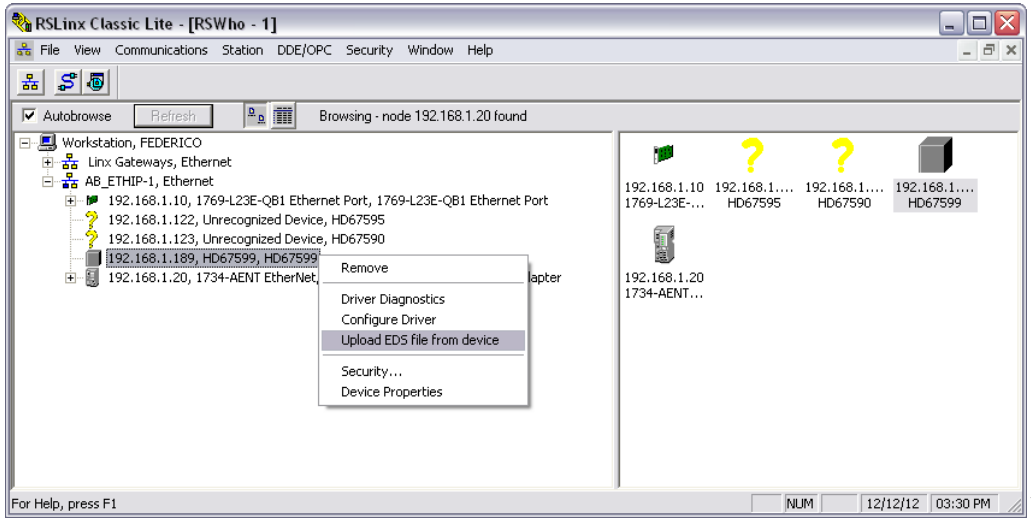


Warning:

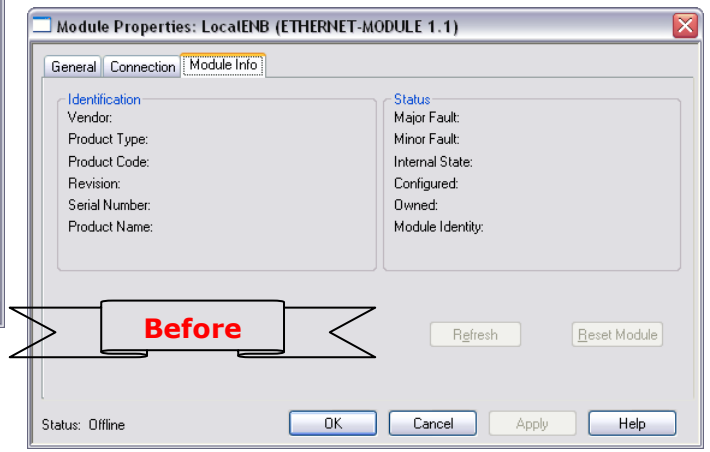
The field "Use Unicast Connection over EtherNet/IP" must be checked.

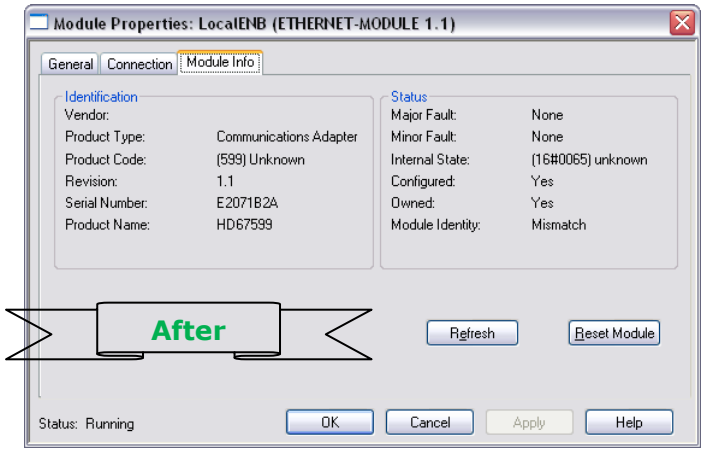
4) After the configuration is completed, the controller tags are created.





5) 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.





MECHANICAL DIMENSIONS:

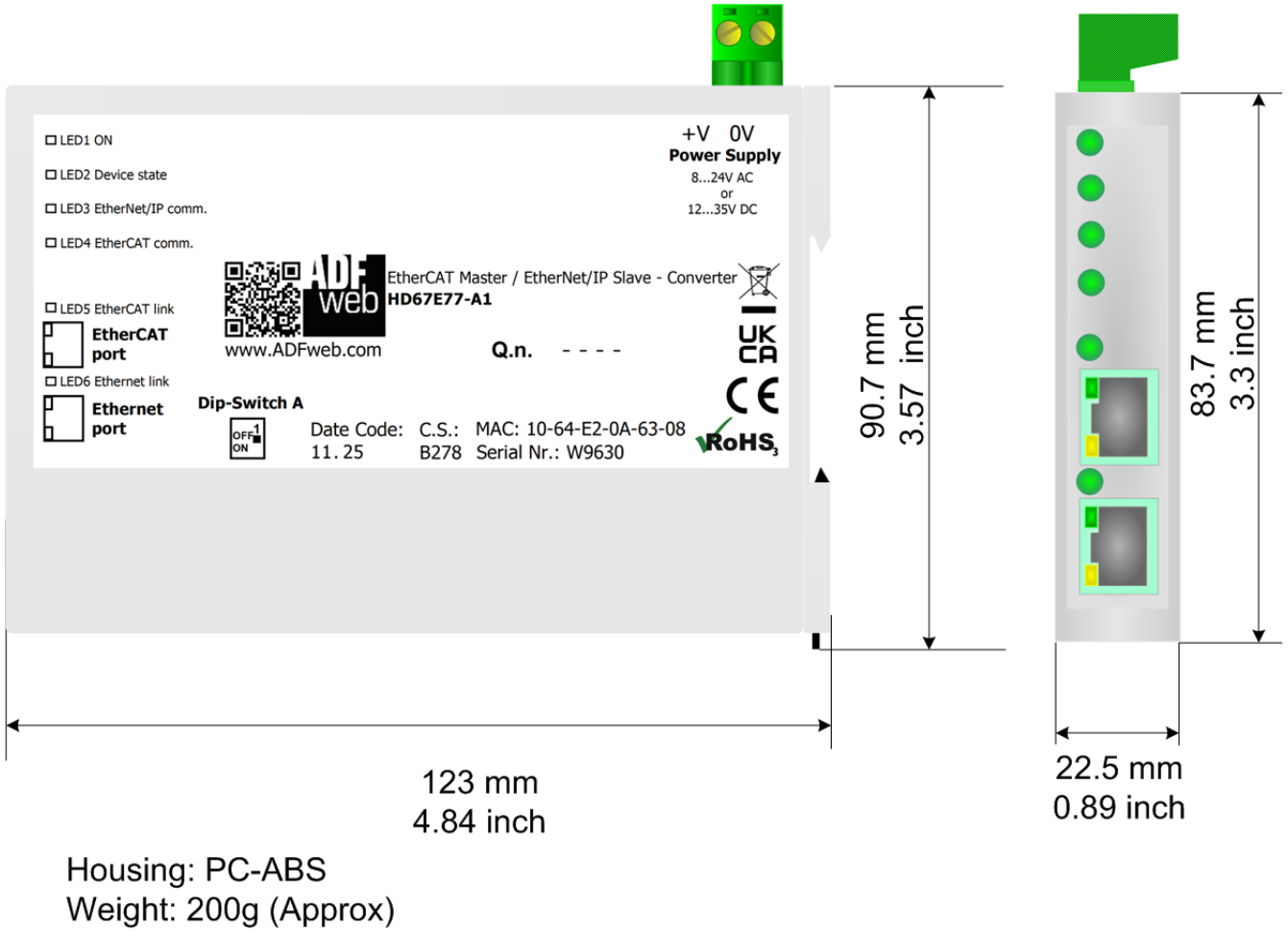


Figure 7: Mechanical dimensions scheme for HD67E77-A1

ORDERING INFORMATIONS:

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

HD67E77 – xx

Connectors Type
1: Removable 5mm Screw Terminal

Enclosure Type
A: 1M, 35mm DIN Rail mounting

Device Family
HD67E77: EtherCAT Master / EtherNet/IP Slave - Converter

Order Code: **HD67E77-A1** **-** EtherCAT Master / EtherNet/IP Slave – Converter

ACCESSORIES:

Order Code: **AC34011** **-** 35mm Rail DIN - Power Supply 220/240V AC 50/60Hz – 12 V DC

Order Code: **AC34012** **-** 35mm Rail DIN - Power Supply 220/240V AC 50/60Hz – 24 V DC

DISCLAIMER:

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

OTHER REGULATIONS AND STANDARDS:

WEEE INFORMATION



Disposal of old electrical and electronic equipment (as in the European Union and other European countries with separate collection systems).

This symbol on the product or on its packaging indicates that this product may not be treated as household rubbish. Instead, it should be taken to an applicable collection point for the recycling of electrical and electronic equipment. If the product is disposed correctly, you will help prevent potential negative environmental factors and 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.

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:

- 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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