User Manual

Revision 1.001
English

EtherNet/IP Slave / HART Master - Converter

(Order Code: HD67906-A1)

For Website information:
www.adfweb.com?Product=HD67906

For Price information:
www.adfweb.com?Price=HD67906-A1

Benefits and Main Features:

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

For other HART products see also the following link:

Converter IEC 61850 Server to

www.adfweb.com?Product=HD67900	**(Serial)**
www.adfweb.com?Product=HD67901	**(BACnet Slave)**
www.adfweb.com?Product=HD67902	**(CAN)**
www.adfweb.com?Product=HD67903	**(CANopen)**
www.adfweb.com?Product=HD67904	**(DeviceNet Slave)**
www.adfweb.com?Product=HD67905	**(Ethernet)**
www.adfweb.com?Product=HD67906	**(EtherNet/IP Slave)**
www.adfweb.com?Product=HD67908	**(Modbus Slave)**
www.adfweb.com?Product=HD67909	**(Modbus TCP Slave)**
www.adfweb.com?Product=HD67910	**(MQTT)**
www.adfweb.com?Product=HD67912	**(PROFINET Slave)**
www.adfweb.com?Product=HD67913	**(SNMP Agent)**

Do you have your customer protocol? Then go to:
www.adfweb.com?Product=HD67003

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

User Manual

INDEX:

	Page
INDEX	2
UPDATED DOCUMENTATION	2
REVISION LIST	2
WARNING	2
TRADEMARKS	2
SECURITY ALERT	3
EXAMPLE OF CONNECTION	4
CONNECTION SCHEME	5
CHARACTERISTICS	6
CONFIGURATION	6
POWER SUPPLY	7
FUNCTION MODES	8
LEDS	9
HART	10
ETHERNET	11
USE OF COMPOSITOR SW67906	12
NEW CONFIGURATION / OPEN CONFIGURATION	13
SOFTWARE OPTIONS	14
SET COMMUNICATION	16
HART VARIABLES	17
UPDATE DEVICE	19
SCAN FUNCTION	21
HART DIAGNOSTIC OVER ETHERNET/IP	23
MECHANICAL DIMENSIONS	24
PLC CONFIGURATION	25
ORDERING INFORMATIONS	29
ACCESSORIES	29
DISCLAIMER	30
OTHER REGULATIONS AND STANDARDS	30
WARRANTIES AND TECHNICAL SUPPORT	31
RETURN POLICY	31

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	18/09/2018	Ff	All	First Release
1.001	24/07/2025	Mdb	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:

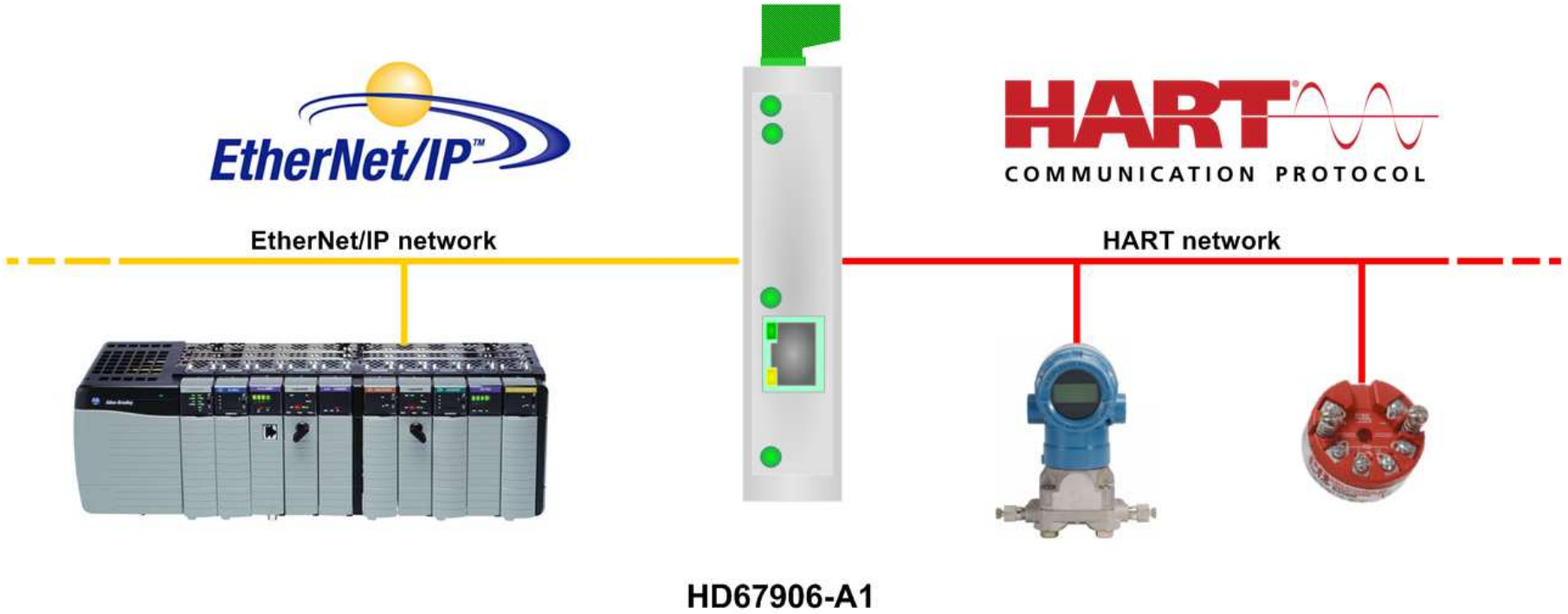


This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

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.

EXAMPLES OF CONNECTION:



CONNECTION SCHEME:

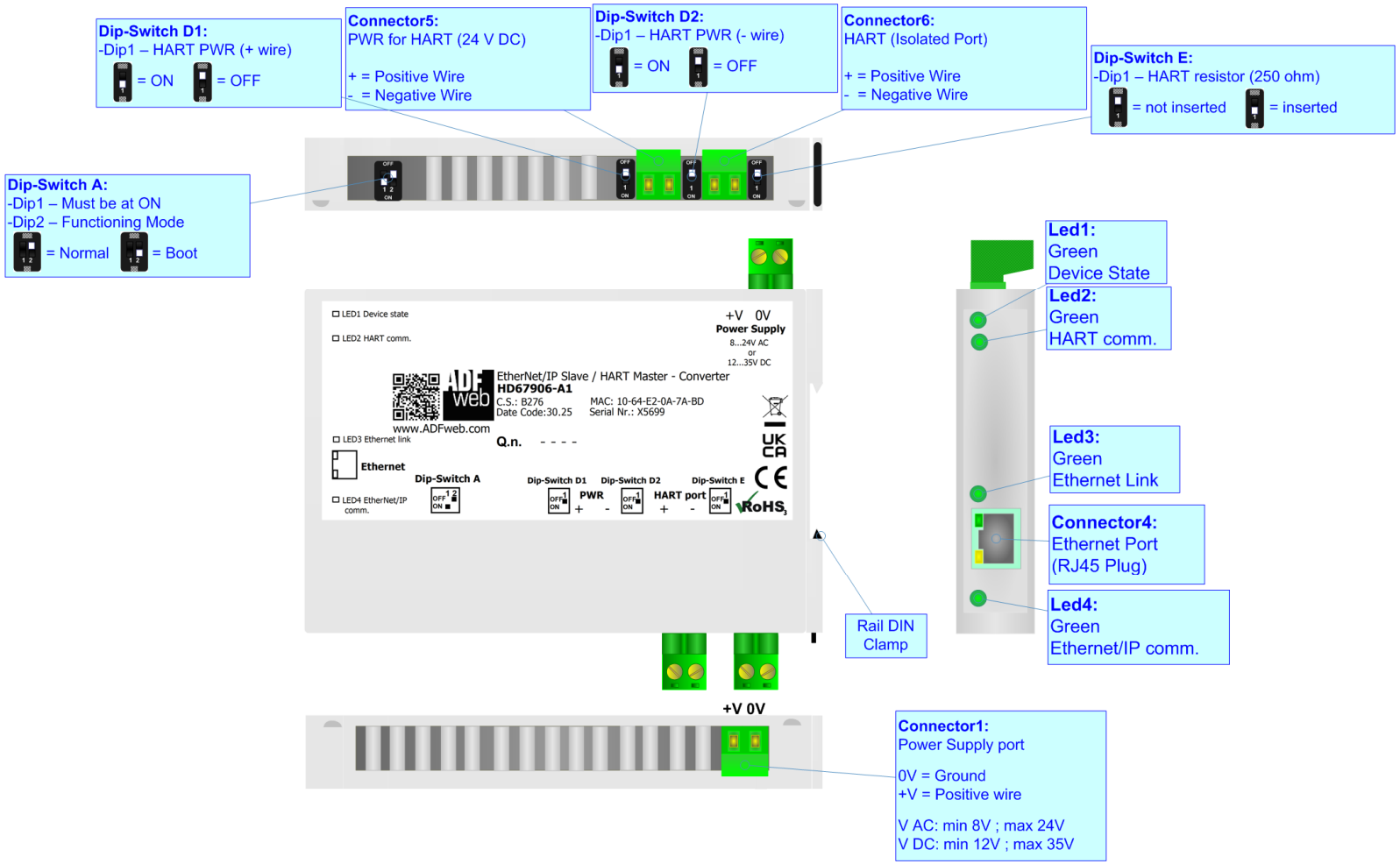


Figure 1a: Connection scheme for HD67906-A1

CHARACTERISTICS:

The HD67906-A1 are EtherNet/IP Slave / HART Master - Converters.

It allows for the following characteristics:

- Triple isolation between Ethernet - Power Supply, Ethernet - HART, HART - Power Supply;
- Two-directional information between Ethernet bus and HART 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 SW67906 software on your PC in order to perform the following:

- Define the parameters of EtherNet/IP line;
- Define the parameters of HART line;
- Define HART variables in read/write;
- Define HART rules for gateway functions;
- 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]
HD67906-A1	3.5

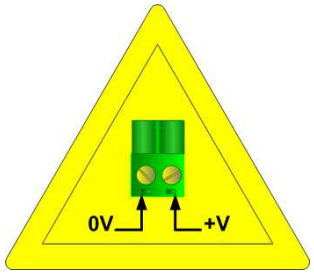
Caution: Do not reverse the polarity power

Connector1:
Power Supply port

0V = Ground
+V = Positive wire

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





HD67906-A1

FUNCTION MODES:

The device has got two function modes depending on the position of the 'Dip2 of Dip-Switch A':

- The first, with 'Dip2 of Dip-Switch A' at "OFF" position, is used for the normal working of the device.
- The second, with 'Dip2 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.

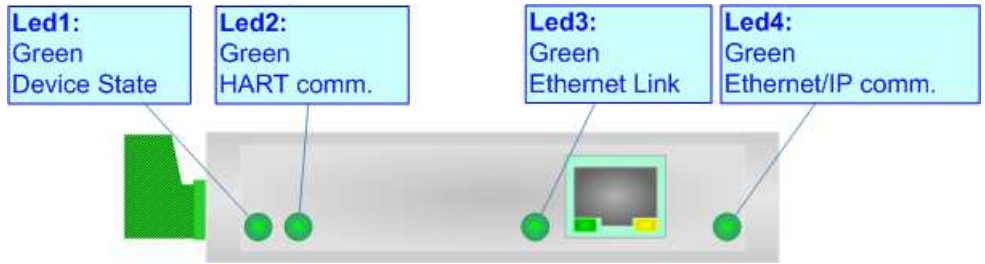


Warning:
Dip1 of 'Dip-Switch A' must be at ON position to work even if the Ethernet cable is not inserted.

LEDS:

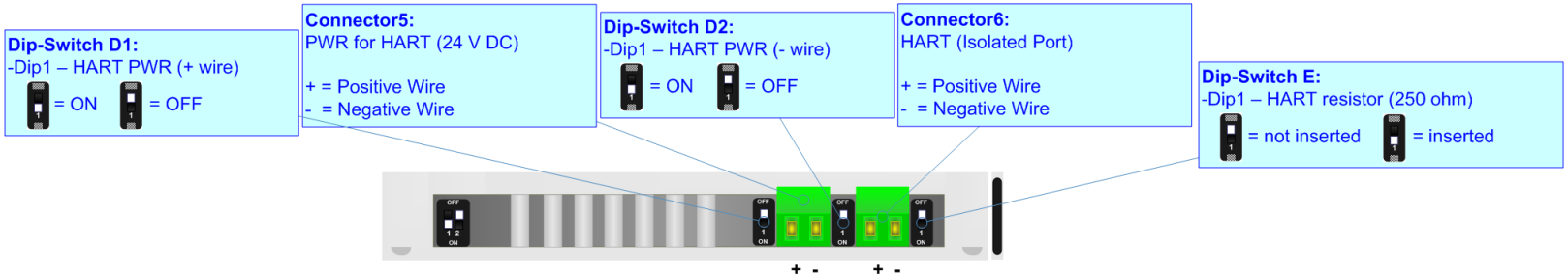
The device has got four LEDs that are used to give information about the functioning status.
The various meanings of the LEDs are described in the table below.

LED	Normal Mode	Boot Mode
1: Device State (green)	Blinks slowly (~1Hz)	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
2: HART comm. (green)	It blinks when HART communication is running	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: Ethernet link (green)	**ON:** Ethernet cable connected **OFF:** Ethernet cable disconnected	**ON:** Ethernet cable connected **OFF:** Ethernet cable disconnected
4: EtherNet/IP comm. (green)	It blinks when an EtherNet/IP command is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress



HART:

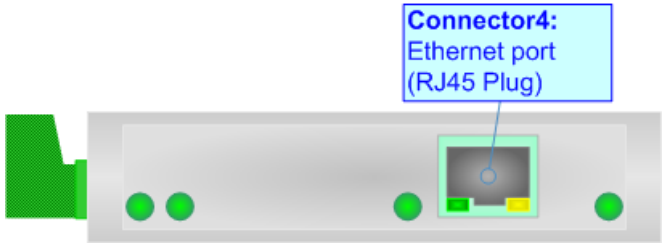
"HART" is an acronym for Highway Addressable Remote Transducer. The HART Protocol makes uses Frequency Shift Keying (FSK) standard to superimpose digital communication signals at a low level on top of the 4-20mA. This enables two-way field communication to take place and makes it possible for additional information beyond just the normal process variable to be communicated to/from a smart field instrument.



It is possible to provide the current loop for HART communication and an additional low power supply @ 24 V DC for feeding HART devices by setting Dip-Switch D1 and D2 at ON position.
Current loop for HART is required when there is not an external device in the bus that provides it.
Is is possible to enable the 250 ohm HART resistor by setting dip switch E at ON position.

ETHERNET:

The updating of the converters and Ethernet communication must be made using Connector4 of the HD67906-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 SW67906:

To configure the Converter, use the available software that runs with Windows called SW67906. 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 SW67906, the window below appears (Fig. 2).

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

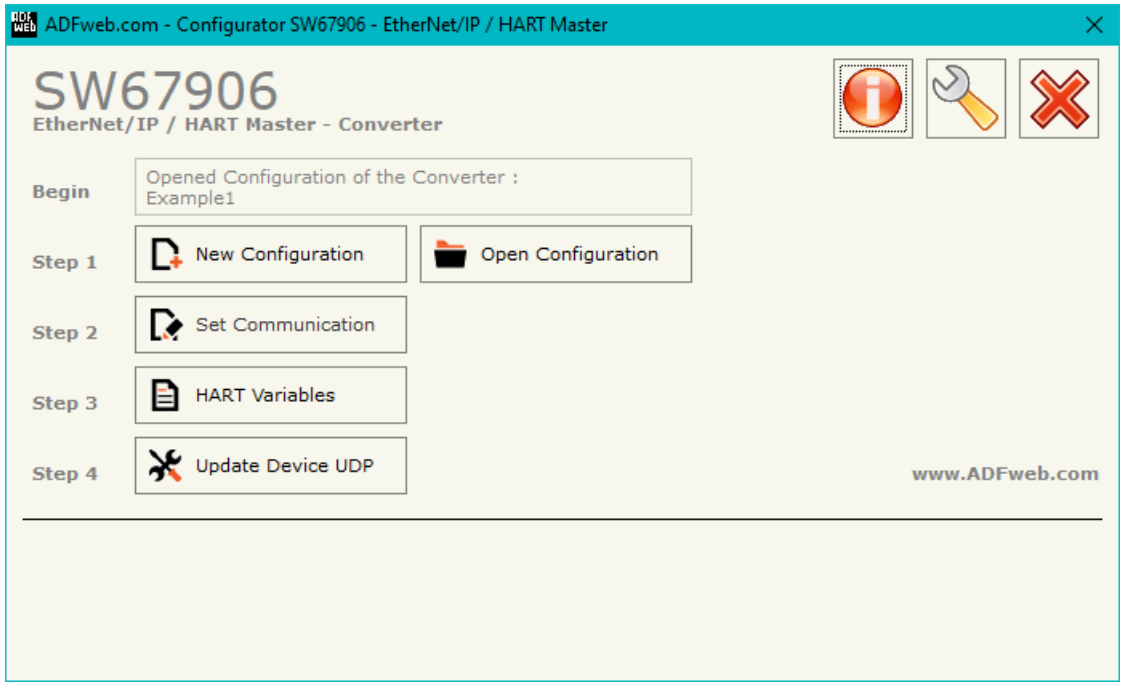
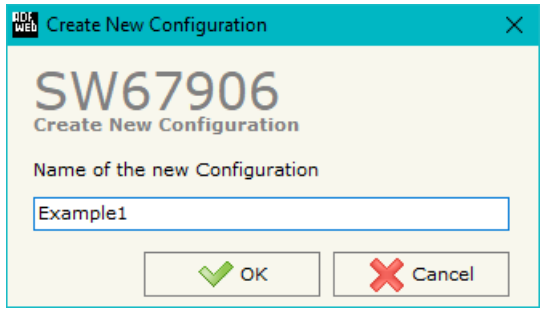


Figure 2: Main window for SW67906

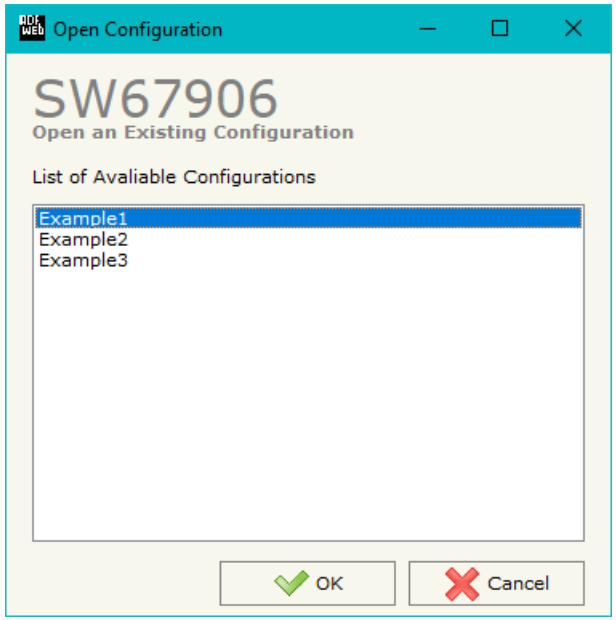
NEW CONFIGURATION / OPEN CONFIGURATION:

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



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

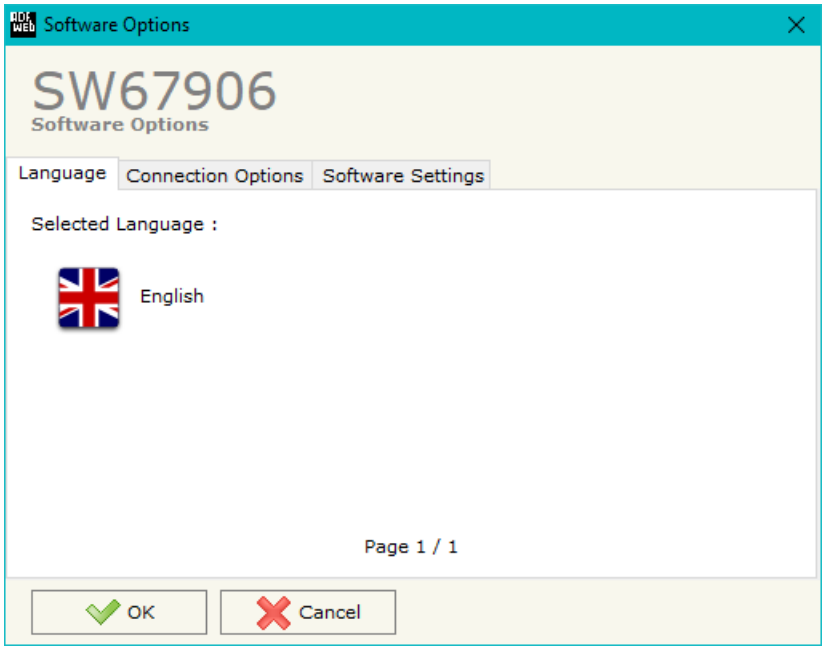
- To clone the configurations of a programmable "EtherNet/IP Slave / HART Master" in order to configure another device in the same manner, it is necessary to maintain the folder and all its contents;
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate the project folder with another name and open the new folder with the button "**Open Configuration**".

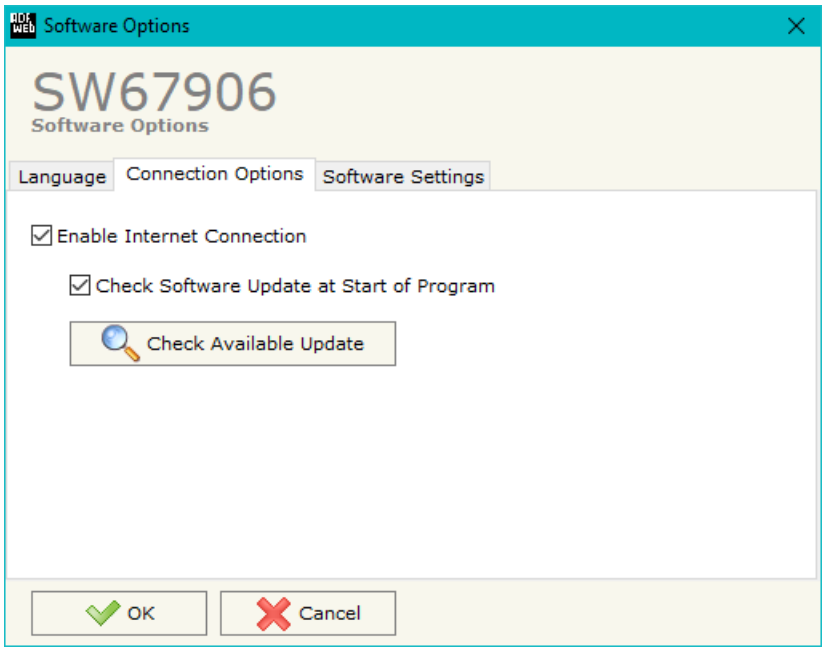


SOFTWARE OPTIONS:

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 SW67906 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 HART and EtherNet/IP buses.

By Pressing the "**Set Communication**" button from the main window for SW67906 (Fig. 2) the window "Set Communication" appears (Fig. 3).

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

- In the field "**Address**" the type of Master is defined;
- In the field "**Retry Limit**" the maximum number of retries in case of missing response from HART device is defined;

The meaning of the fields of "EtherNet/IP" are:

- In the field "**IP Address**" the IP address to assign to the converter is defined;
- In the field "**SubNet Mask**" the SubNet Mask of the converter is defined;
- In the field "**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 "**Diagnostic Port**" the port to use for the "Diagnostic mode" is defined;
- In the field "**Number Bytes Input**" the number of byte from the EtherNet/IP Master to the converter is defined;
- In the field "**Number Bytes Output** " the number of byte from the converter to the EtherNet/IP Master is defined;

The meaning of the fields of "Web Pages" are:

- In the field "**User**" the user name for webserver's authentication is defined;
- In the field "**Password**" the password for webserver's authentication is defined.

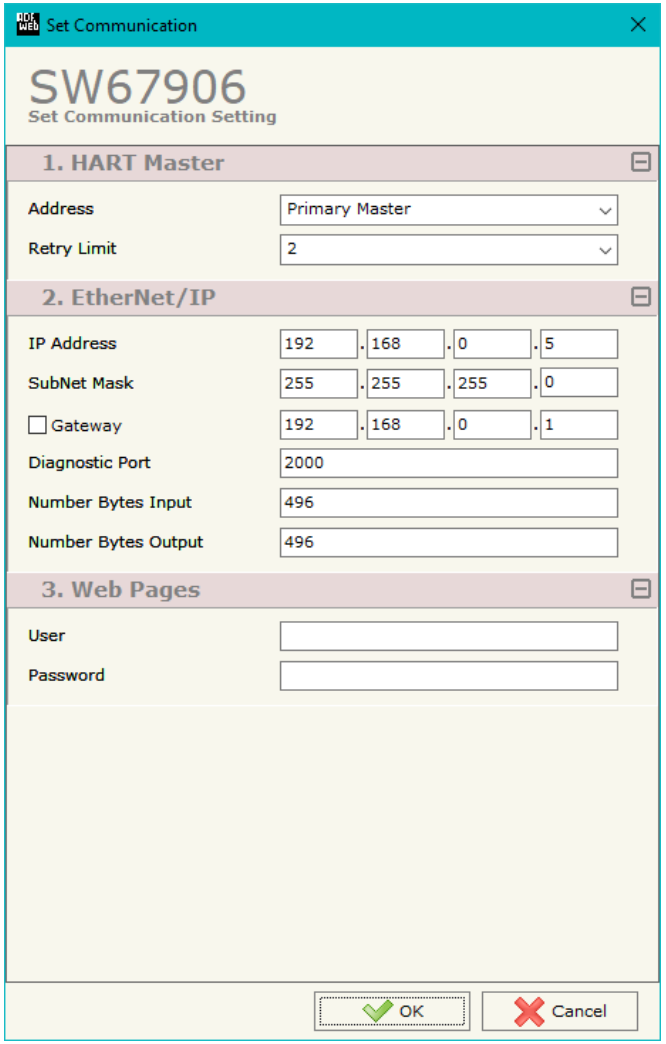


Figure 3: "Set Communication" window

HART VARIABLES:

By Pressing the "**HART Variables**" button from the main window for SW67906 (Fig. 2) the window "Definition of HART Variables List" appears (Fig. 4).
This section is used to define the HART variables to read/write with the EtherNet/IP Master.

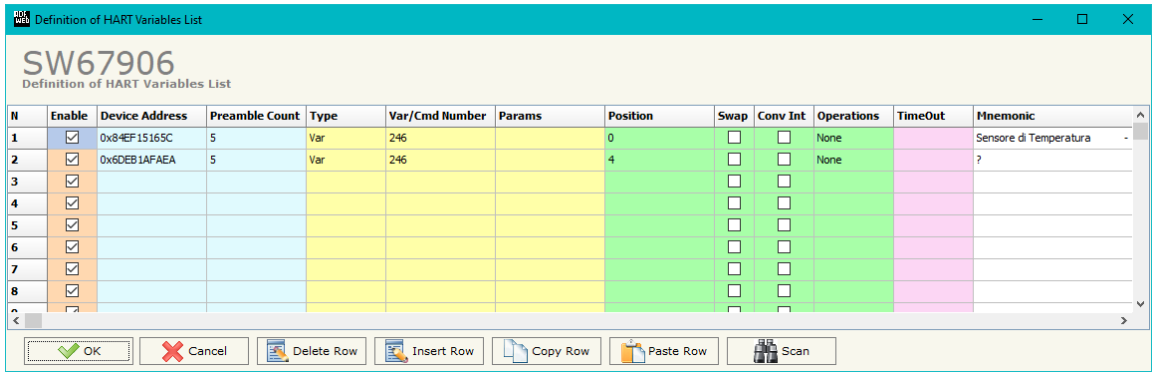


Figure 4: "HART Variables" window

The means of the fields are:

- If the field "**Enable**" is checked, the HART variable is enabled;
- In the field "**Device Address**" the address of HART device is defined;
- In the field "**Preamble Count**" the number of bytes for the synchronization is defined;
- If the field "**Type**" the type of HART parameter is defined;
- In the field "**Var/Cmd Number**" the identification of variable/command to read/write is defined. From HART standard, the most used numbers are:
  - 246: Primary Variable;
  - 247: Secondary Variable;
  - 248: Tertiary Variable;
  - 249: Quaternary Variable.
- In the field "**Params**" the parameters for the commands are defined;
- In the field "**Position**" the starting byte of the EtherNet/IP array where mapping the HART data is defined;
- In the field "**Swap**" the bytes' order is reversed;

- In the field "**Conv Int**" the data from HART device is converted in Integer format;
- In the field "**Operations**" a post-operation on the data read is defined;
- In the field "**Timeout**" the timeout in ms for HART variable is defined. If the variable is not received for the time defined, the data on EtherNet/IP side are set to '0';
- In the field "**Mnemonic**" a description of the variable is defined.

Note:
In order to configure the HART devices and their variables, it is possible to scan the HART network and get the data automatically. It is enough to click on "Scan" button. See page 21 for more info.

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 Dip2 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 Dip2 of 'Dip-Switch A' in OFF position;
- Turn ON the device.

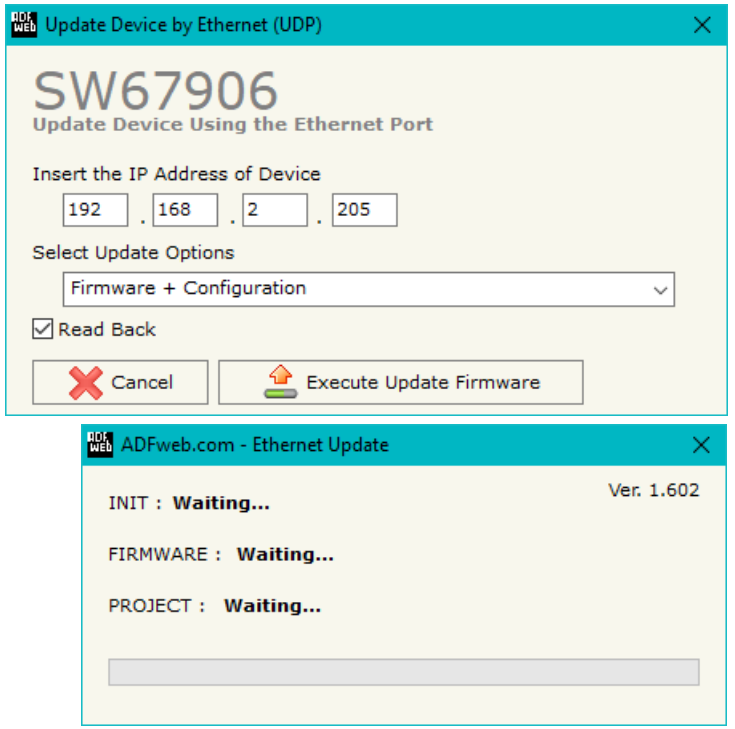


Figure 5: "Update device" windows

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 HD67906 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 HD67906 you have to use the software "SW67906": www.adfweb.com\download\filefold\SW67906.zip.

SCAN FUNCTION:

"SCAN" function is integrated in the configurator software SW67906. It is possible to access to these functions by simple click on the "Scan" button in "HART Variables" section.

It has the following characteristics:

- Possibility to scan HART network;
- Automatic decode of HART messages;
- Easy connection directly through the Ethernet port of the converter.

In order to start the Scan, it is necessary to use this procedure after having set the IP Address inside the converter:

- Connect the converter in Normal Mode to the PC using Ethernet port;
- Open the section "HART Variables" of SW67906;
- Click on "Scan" button. The window that appears will be like below:

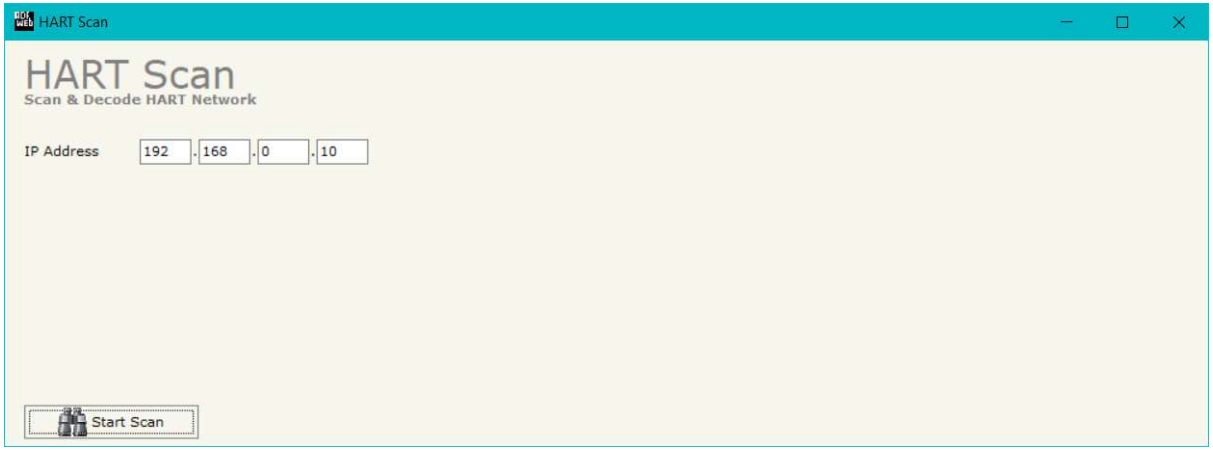


Figure 7a: "HART Scan" window

- Insert the IP Address configured in the converter;
- Start the Scan by clicking on "Start Scan" button. The window will appear like below:

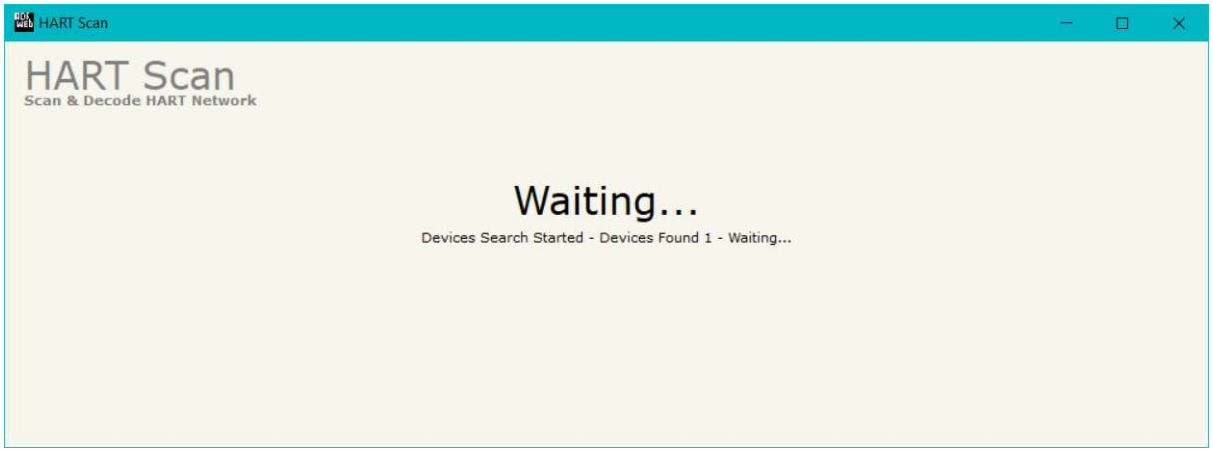
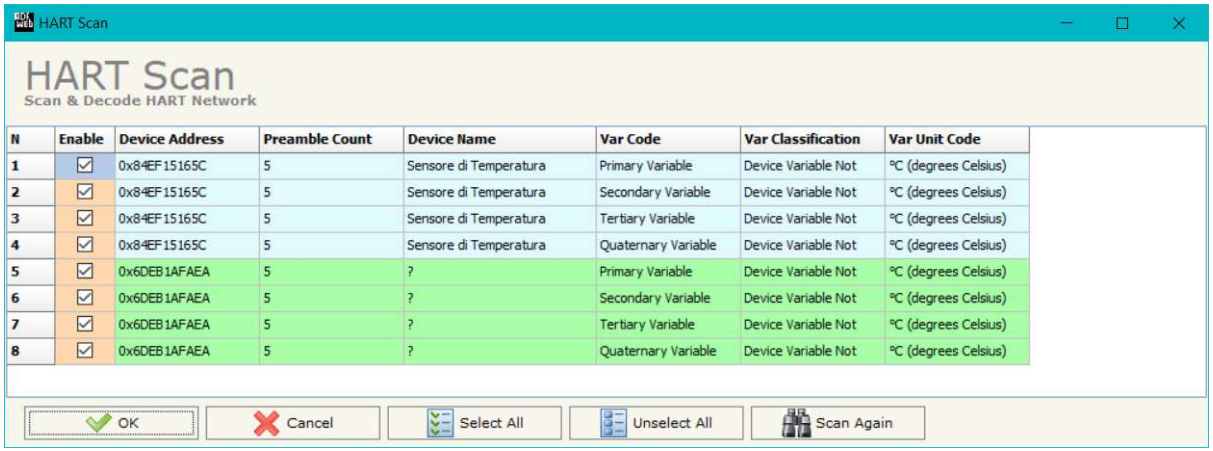


Figure 7b: "HART Scan" window

- When the Scan is complete, the software will show the results. You can import the data by clicking on "OK" button after having selected the required variables. The results will be displayed as below:



N	Enable	Device Address	Preamble Count	Device Name	Var Code	Var Classification	Var Unit Code
1	☑	0x84EF15165C	5	Sensore di Temperatura	Primary Variable	Device Variable Not	°C (degrees Celsius)
2	☑	0x84EF15165C	5	Sensore di Temperatura	Secondary Variable	Device Variable Not	°C (degrees Celsius)
3	☑	0x84EF15165C	5	Sensore di Temperatura	Tertiary Variable	Device Variable Not	°C (degrees Celsius)
4	☑	0x84EF15165C	5	Sensore di Temperatura	Quaternary Variable	Device Variable Not	°C (degrees Celsius)
5	☑	0x6DEB1AFAEA	5	?	Primary Variable	Device Variable Not	°C (degrees Celsius)
6	☑	0x6DEB1AFAEA	5	?	Secondary Variable	Device Variable Not	°C (degrees Celsius)
7	☑	0x6DEB1AFAEA	5	?	Tertiary Variable	Device Variable Not	°C (degrees Celsius)
8	☑	0x6DEB1AFAEA	5	?	Quaternary Variable	Device Variable Not	°C (degrees Celsius)

Figure 7c: "HART Scan" window

HART DIAGNOSTIC OVER ETHERNET/IP:

It is possible to save the HART Diagnostic on Output EtherNet/IP array using the field "Diagnostic" of the section "Set Communication".
In this case, the status of each HART request defined in the section "HART Variables" is saved starting from the byte of the EtherNet/IP array defined in the section "Set Communication".
Each bit will represent the status of a HART request:

- If for a request the converter receives a correct response, the status bit is put to '0';
- If for a request the converter receives a wrong response or it doesn't receive any response, the status bit is put to '1'.

Example:
In the section "HART Variables" 16 HART requests are defined. The first 8 requests are working and the others are not working.

The status bits of the HART Diagnostic on EtherNet/IP will be:

Byte x								Byte x+1							
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

where 'x' is the starting byte of the EtherNet/IP array where the HART diagnostic is saved.

MECHANICAL DIMENSIONS:

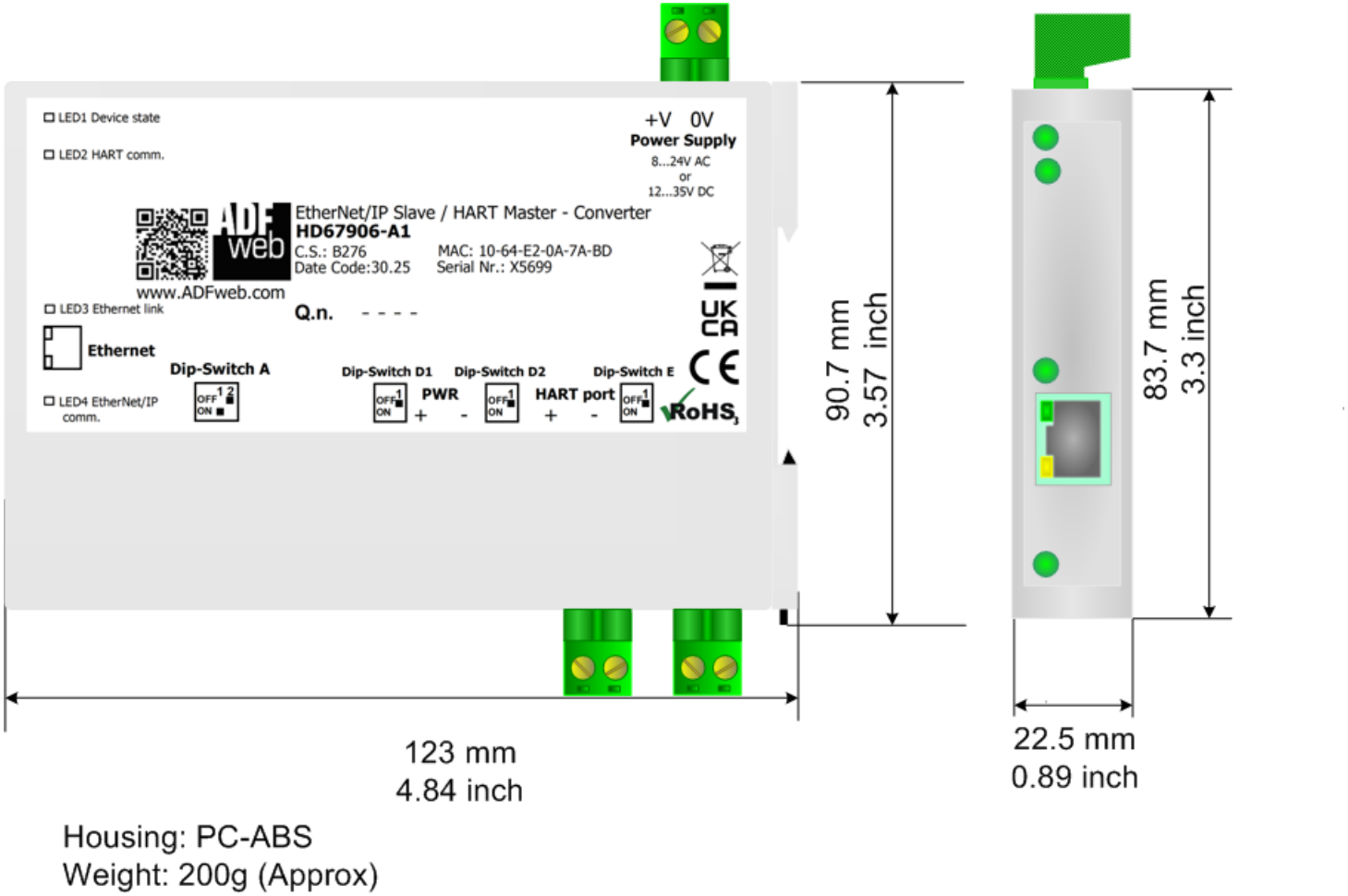
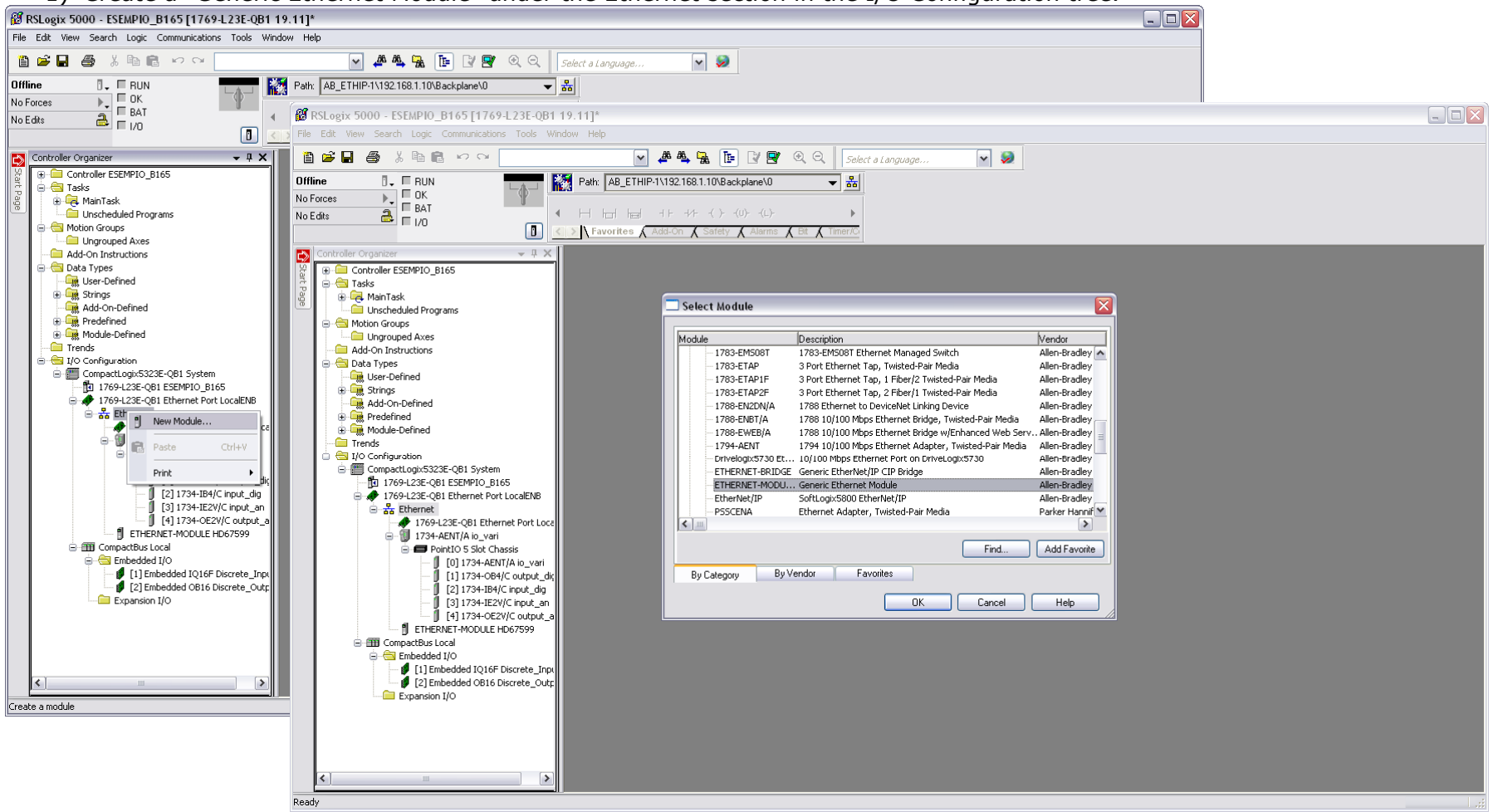


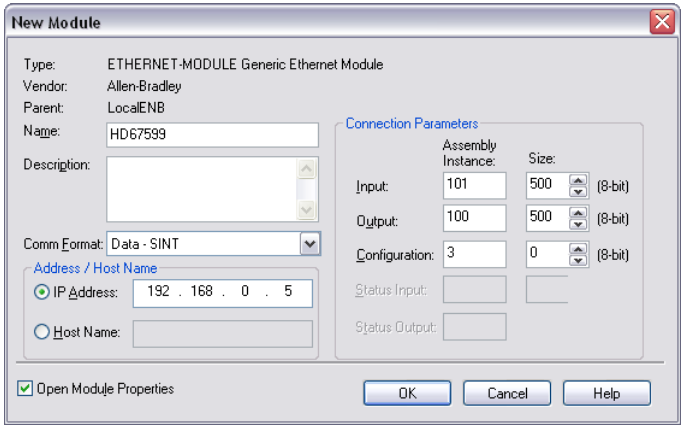
Figure 8: Mechanical dimensions scheme for HD67906-A1

PLC CONFIGURATION (for EtherNet/IP):

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.



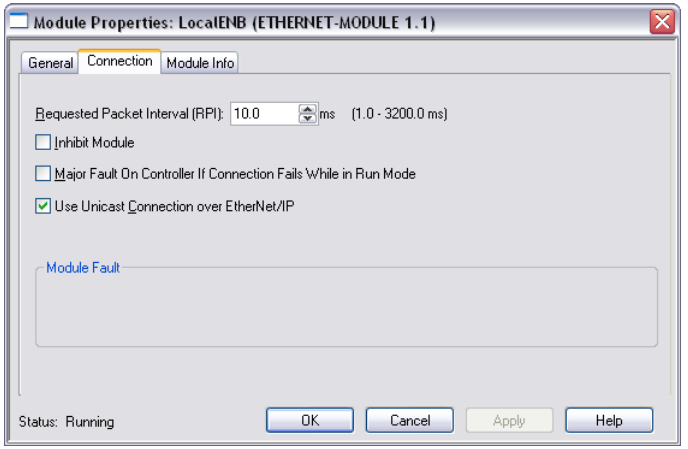


2) Edit the settings of the new Generic Ethernet Module. As shown in the screen shot below, the module was named "HD67906" and the IP-address assigned is 192.168.0.5.

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

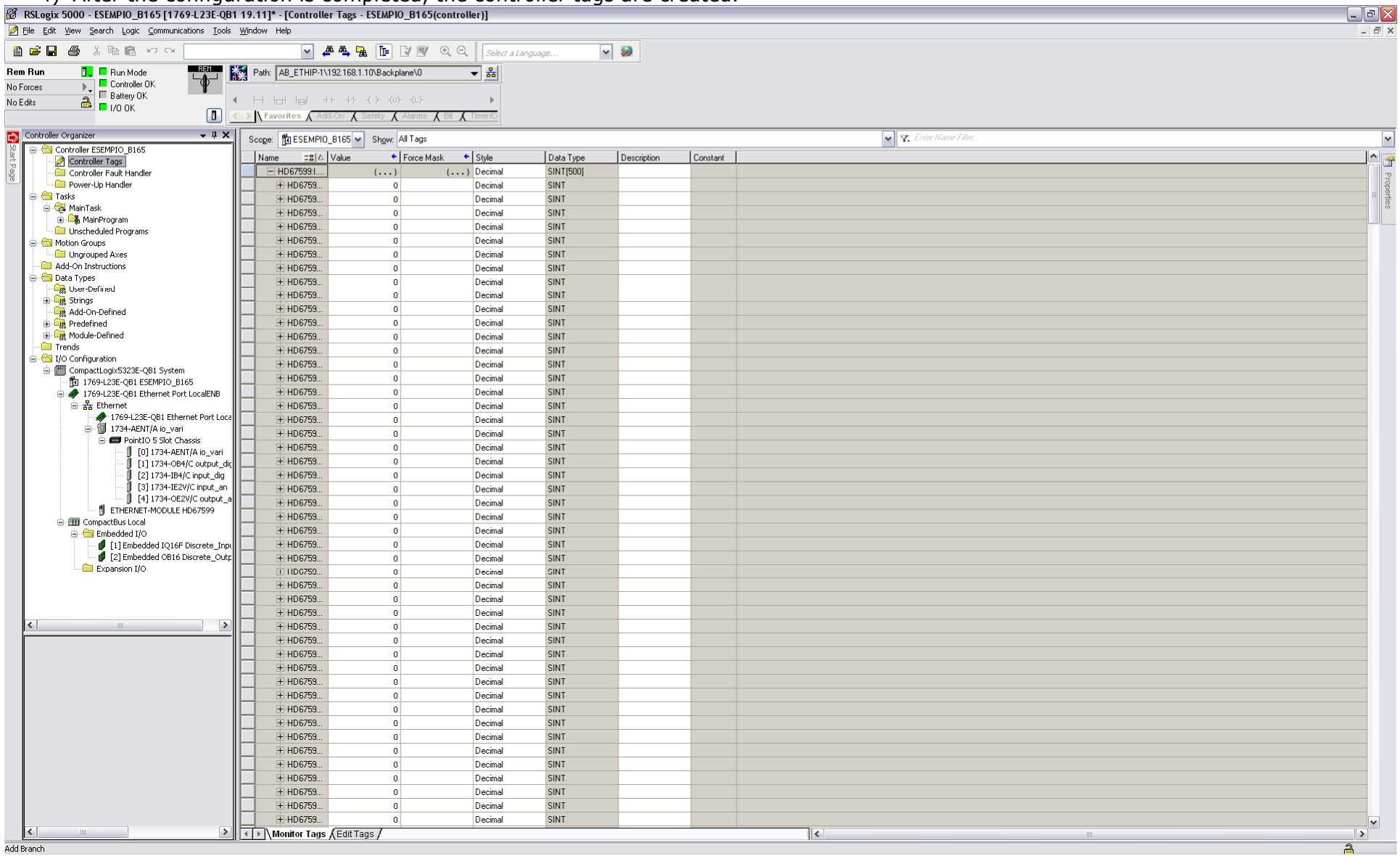
RSLogix 5000 requires a configuration assembly instance. Both modules do not provide a configuration assembly instance. Therefore it is allowed to select an instance of 3 and to set the value to zero.

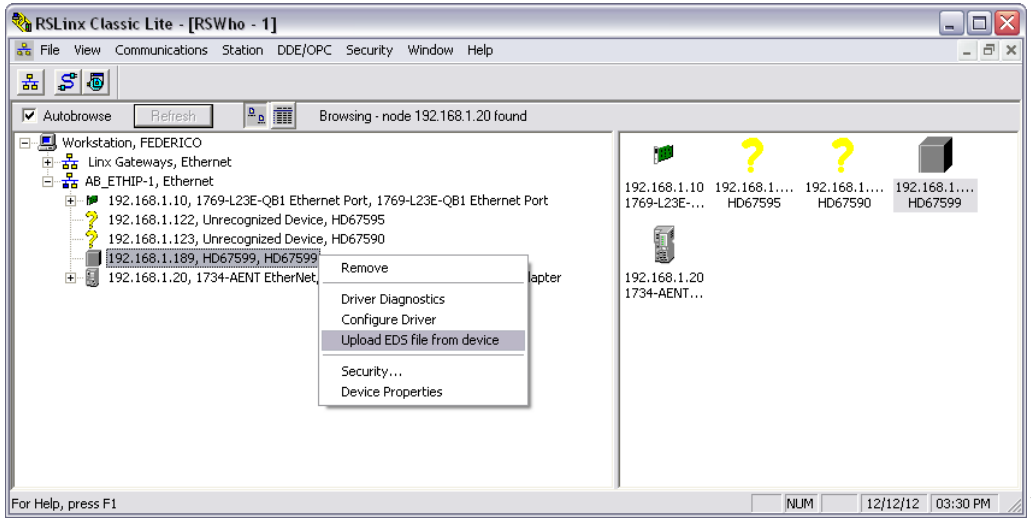
3) The setting of 10msec for the "Requested Packet Interval (RPI)" is adequate but it is possible to change this value as required. A lower value of 2ms shall not be selected.



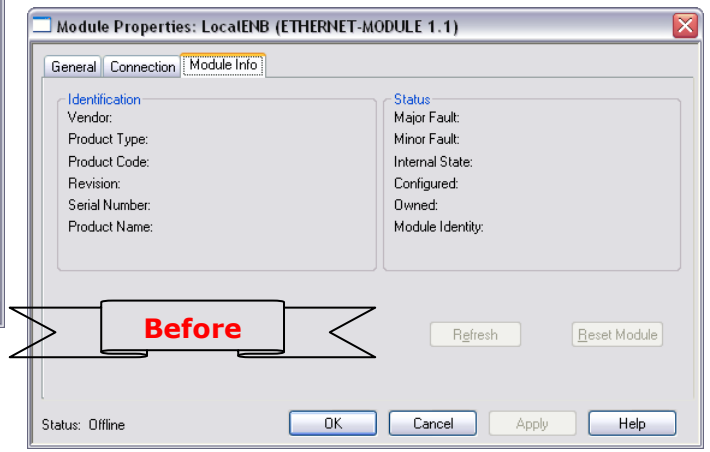
Warning:
The field "Use Unicast Connection over EtherNet/IP" must be checked.

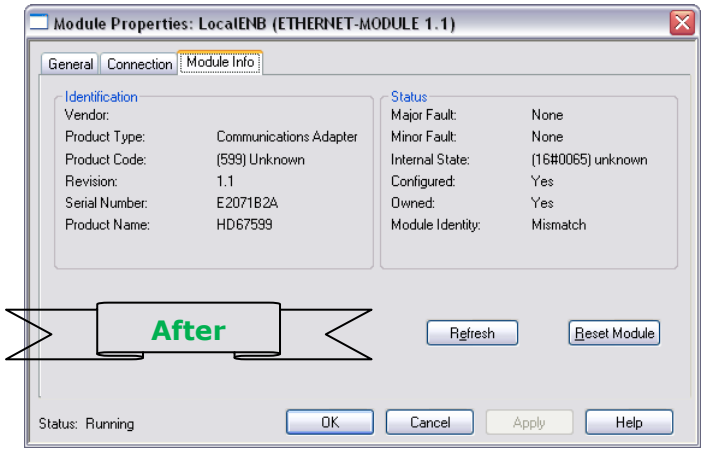
4) After the configuration is completed, the controller tags are created.





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.





ORDERING INFORMATIONS:

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

HD67906 – xx

Connectors Type
1: Removable 5mm Screw Terminal

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

Device Family
HD67906: EtherNet/IP Slave / HART Master - Converter

Order Code: **HD67906-A1** **-** EtherNet/IP Slave / HART Master - 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 2011/65/EU + 2015/863 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.

ADFweb.com S.r.l.
Via Strada Nuova, 17
IT-31010 Mareno di Piave
TREVISO (Italy)
Phone +39.0438.30.91.31
Fax +39.0438.49.20.99
www.adfweb.com