![ADFweb logo] **Industrial Electronic Devices**

User Manual
Revision 1.000
English

Ethernet / MQTT - Converter
(Order Code: HD67930-B2)

For Website information:
www.adfweb.com?Product=HD67930-B2

For Price information:
www.adfweb.com?Price=HD67930-B2

Benefits and Main Features:
- ⊕ Very easy to configure
- ⊕ Power Supply 18…35V DC and 8…24 V AC
- ⊕ Temperature range: -40°C/+85°C (-40°F/+185°F)

User Manual

For others MQTT products, see also the following links:

Converter MQTT to

www.adfweb.com?Product=HD67931	**(M-Bus)**
www.adfweb.com?Product=HD67932	**(Serial)**
www.adfweb.com?Product=HD67933	**(Modbus Master)**
www.adfweb.com?Product=HD67934	**(Modbus Slave)**
www.adfweb.com?Product=HD67935	**(Modbus TCP Master)**
www.adfweb.com?Product=HD67936	**(Modbus TCP Slave)**

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

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INDEX:

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	05/12/2017	Ff	All	First release version

WARNING:

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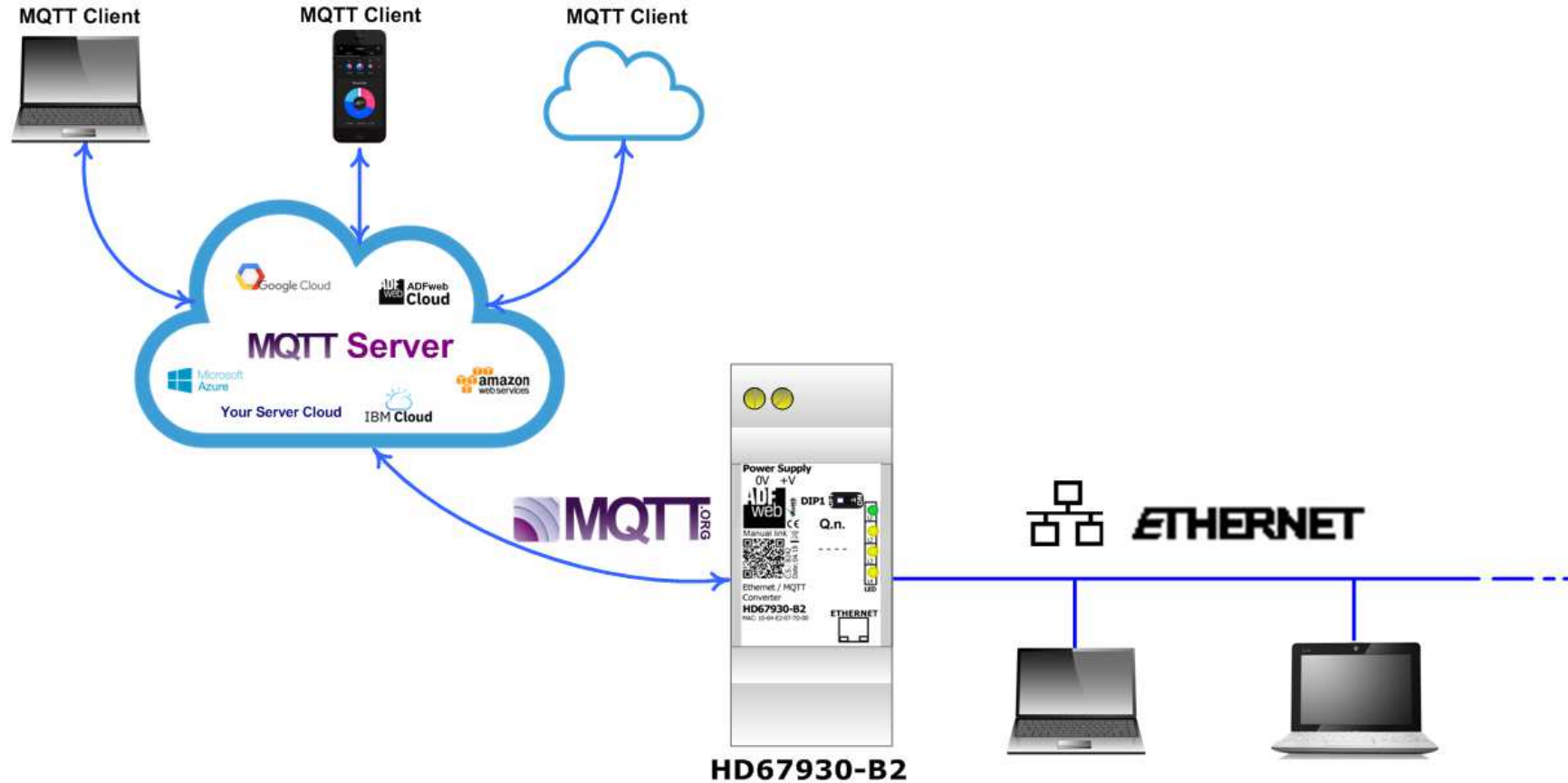
⚠ This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

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.
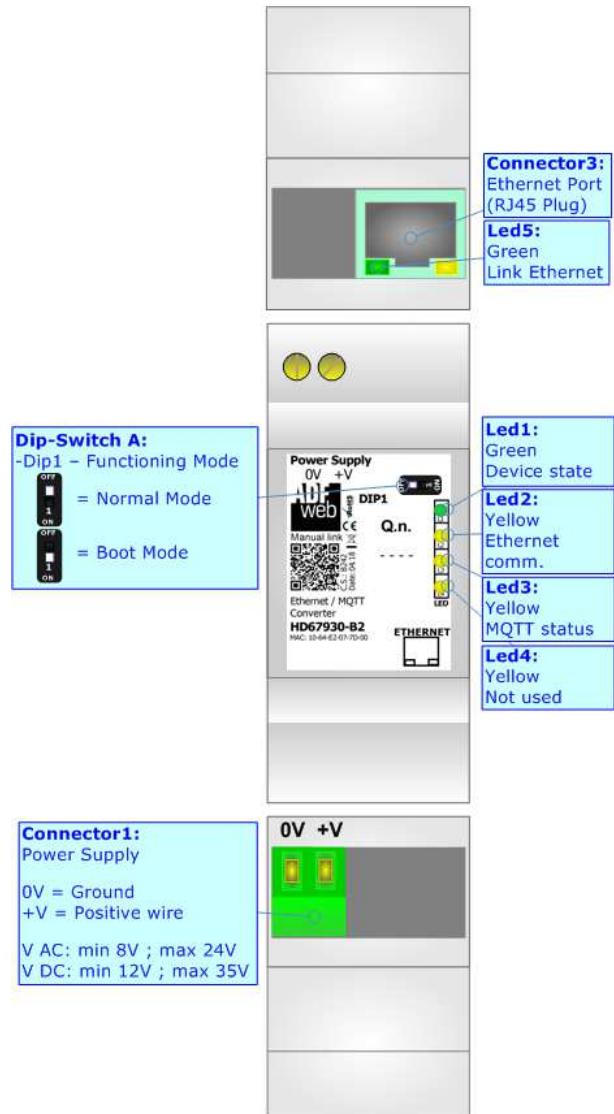
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EXAMPLE OF CONNECTION:

ADFweb.com
tel. +39 - 0438.30.91.31
www.adfweb.com
info@adfweb.com

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CONNECTION SCHEME:

Connector3:
Ethernet Port
(RJ45 Plug)

Led5:
Green
Link Ethernet

Dip-Switch A:
-Dip1 – Functioning Mode

= Normal Mode

= Boot Mode

Led1:
Green
Device state

Led2:
Yellow
Ethernet
comm.

Led3:
Yellow
MQTT status

Led4:
Yellow
Not used

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

Figure 1: Connection scheme for HD67930-B2

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CHARACTERISTICS:

The HD67930-B2 is a Ethernet / MQTT Converter.

It allows the following characteristics:

- Electrical isolation between Ethernet and Power Supply;
- Mountable on 35mm Rail DIN;
- Wide power supply input range: 18…35V DC and 8…24V AC;
- Wide temperature range: -40°C / 85°C [-40°F / +185°F].

CONFIGURATION:

You need Compositor SW67930 software on your PC in order to perform the following:

- Define the parameter of MQTT;
- Define the parameter of Ethernet line;
- Define the Ethernet frame to send to MQTT Server;
- Define which Ethernet frames sending from MQTT Server;
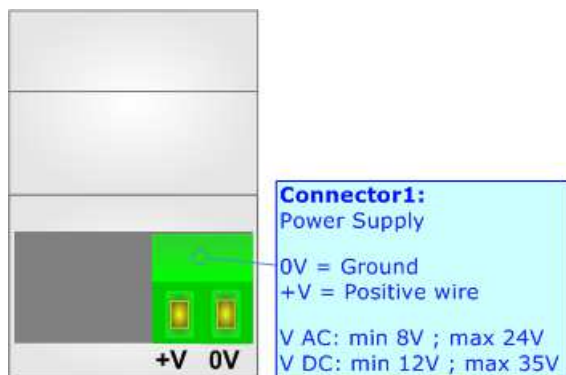- Update the device.

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POWER SUPPLY:

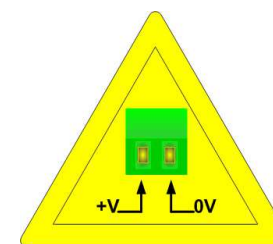The devices can be powered at 8...24V AC and 12...35V DC. For more details see the two tables below.

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

Consumption at 24V DC:

Device	Consumption [W/VA]
HD67930-B2	3.5

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

+V 0V

Caution: Not reverse the polarity power

+V   0V

HD67930-B2

Industrial Electronic Devices

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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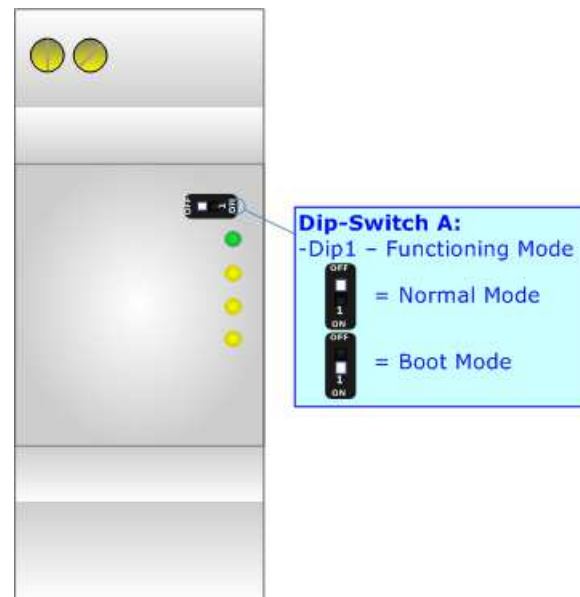
LEDS:

The device has got five 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: Ethernet communication (yellow)	Blinks when Ethernet communication is running	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: MQTT status (yellow)	**ON:** MQTT not connected **OFF:** MQTT connected **Blinking:** MQTT communication	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: Not used (yellow)	OFF	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
5: Ethernet Link (green)	**ON:** Ethernet cable connected **OFF:** Ethernet cable disconnected	**ON:** Ethernet cable connected **OFF:** Ethernet cable disconnected

Industrial Electronic Devices
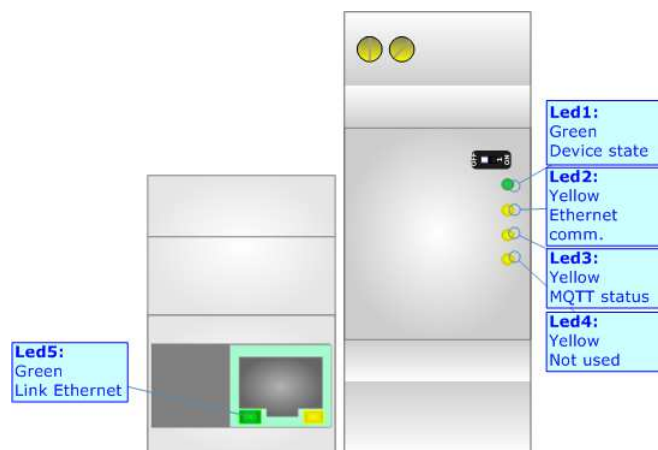
ETHERNET:

The Ethernet port is used for programming the device and for MQTT/Ethernet communication.

The Ethernet connection must be made using Connector2 of HD67930-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 is recommended the use of a cross cable.

Connector3:
Ethernet Port
(RJ45 Plug)

Industrial Electronic Devices
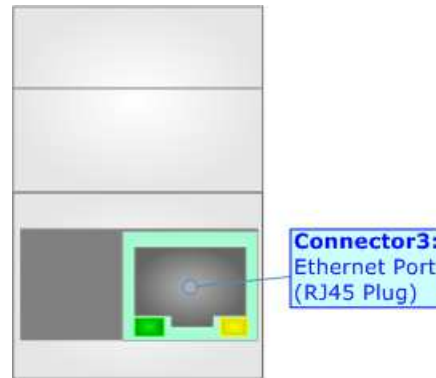
USE OF COMPOSITOR SW67930:

To configure the Converter, use the available software that runs with Windows called SW67930. It is downloadable on the site www.adfweb.com and its operation is described in this document. The software works with MS Windows (XP, Vista, Seven, 8, 10; 32/64bit).

When launching the SW67930, the window below appears (Fig. 2).

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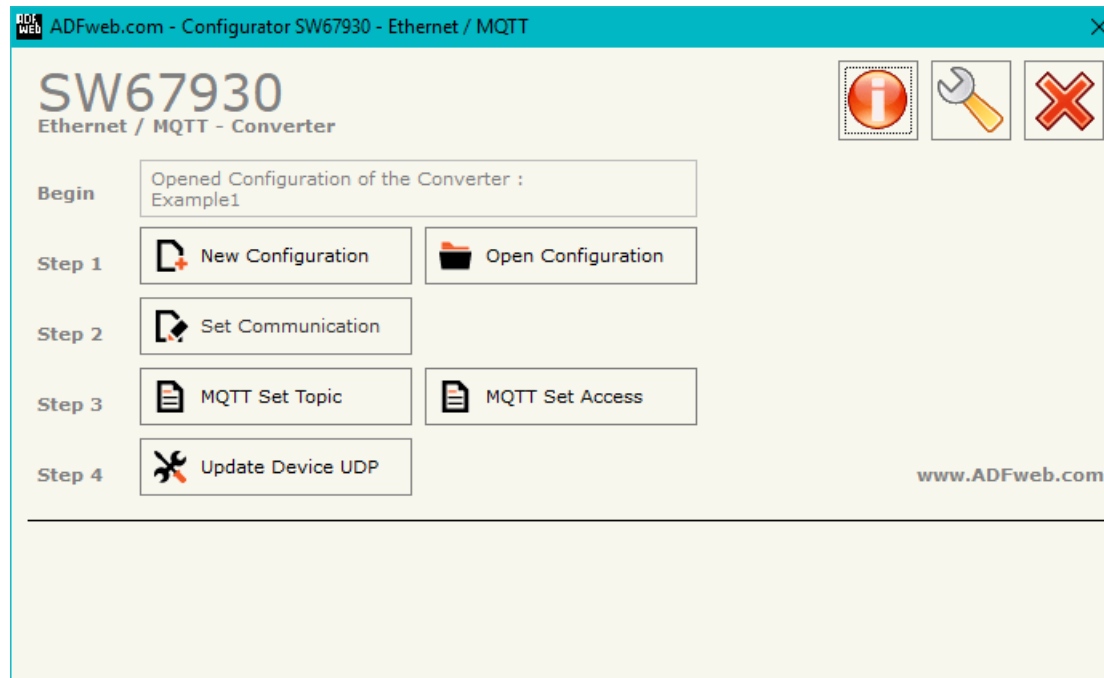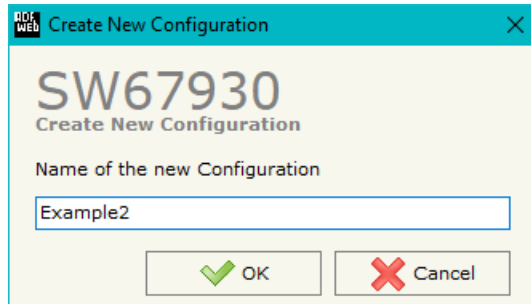It is necessary to have installed .Net Framework 4.


Figure 2: Main window for SW67930

Industrial Electronic Devices

NEW CONFIGURATION / OPEN CONFIGURATION:

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

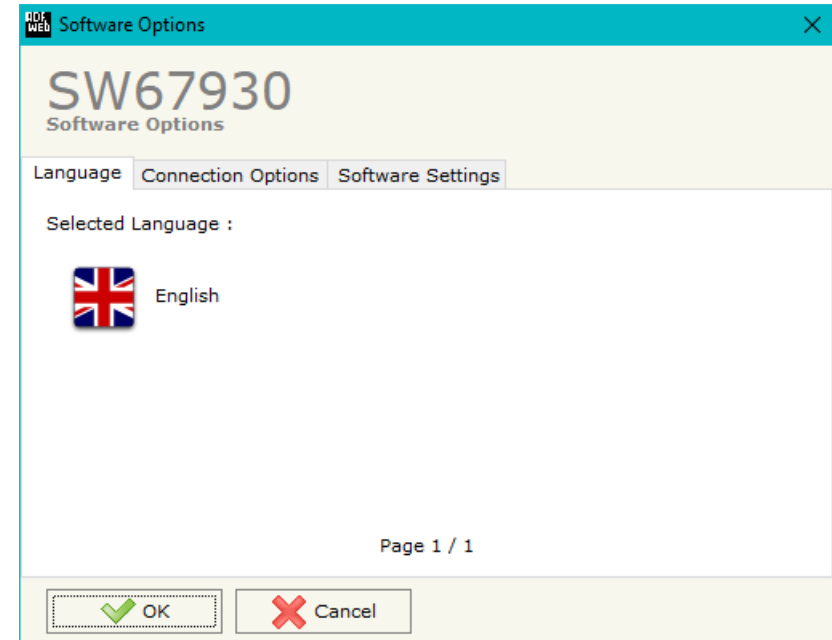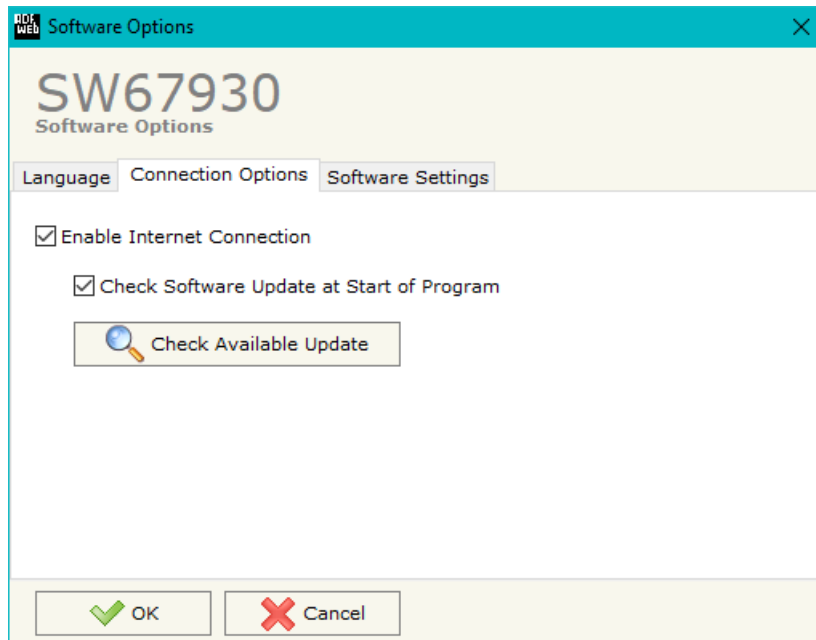A device's configuration can also be imported or exported:

➜ To clone the configurations of a Programmable "Ethernet / MQTT - 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**".
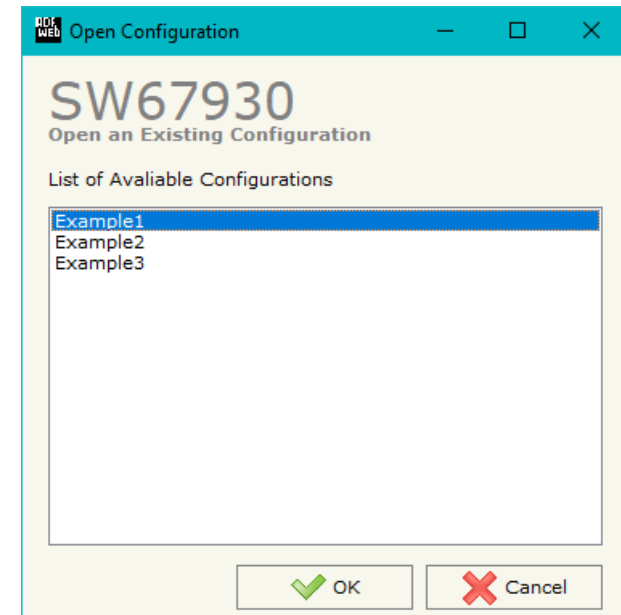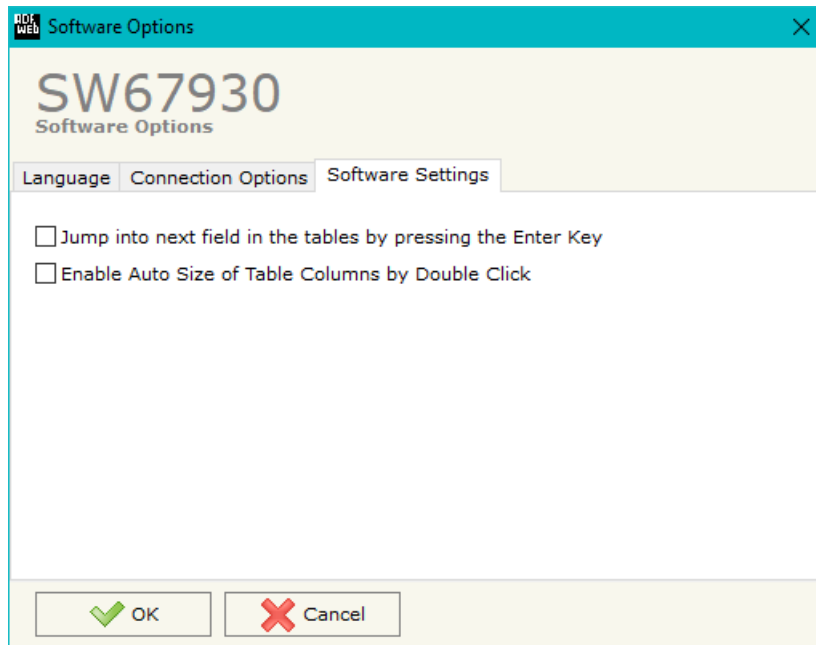
SOFTWARE OPTIONS:

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.

Software Options

SW67930
Software Options

| Language | Connection Options | Software Settings |

Selected Language :

🇬🇧 English

Page 1 / 1

✓ OK   ✗ Cancel

Software Options

SW67930
Software Options

| Language | Connection Options | Software Settings |

☑ Enable Internet Connection

  ☑ Check Software Update at Start of Program

  🔍 Check Available Update

✓ OK   ✗ Cancel

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 SW67930 check automatically if there are updatings when it is launched.

Industrial Electronic Devices

Software Options

SW67930
Software Options

Language | Connection Options | Software Settings

☐ Jump into next field in the tables by pressing the Enter Key

☐ Enable Auto Size of Table Columns by Double Click

✓ OK   ✗ Cancel

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:

By Pressing the "**Set Communication**" button from the main window for SW67930 (Fig. 2) the window "Set Communication" appears (Fig. 3).

The window is divided in different sections in order to define the different parameters of the converter:

- ➜ Ethernet
- ➜ MQTT
- ➜ Wi-Fi
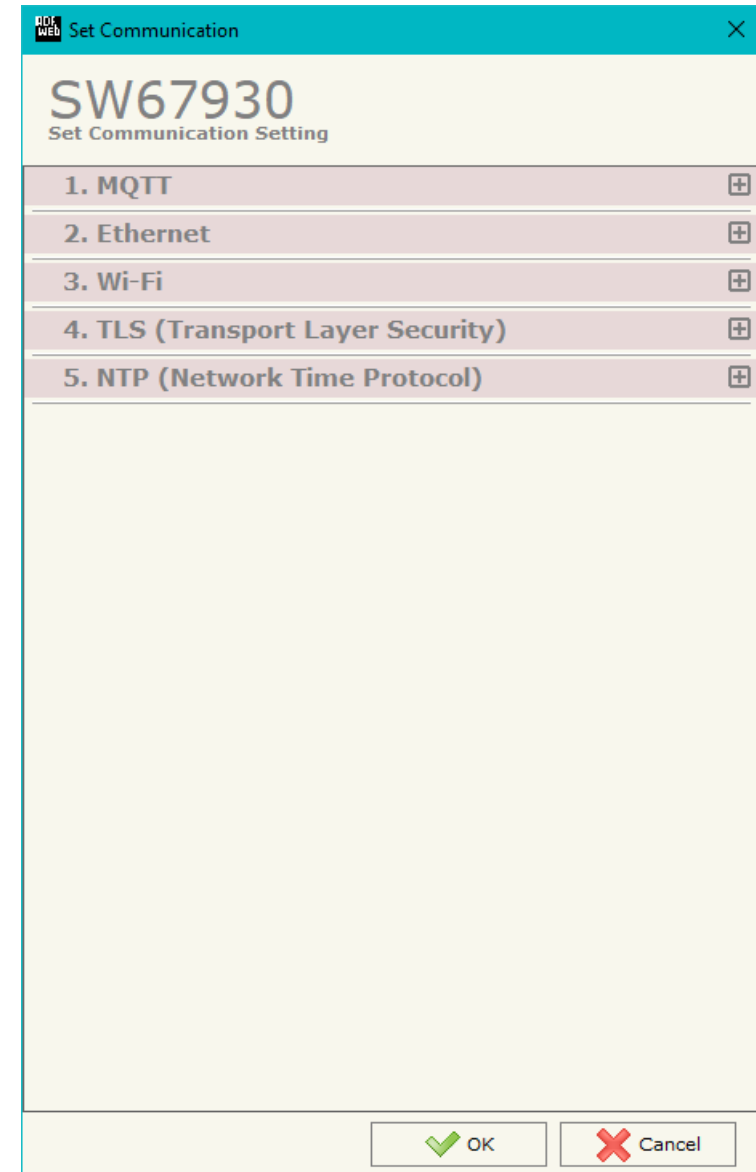- ➜ TLS (Transport Layer Security)
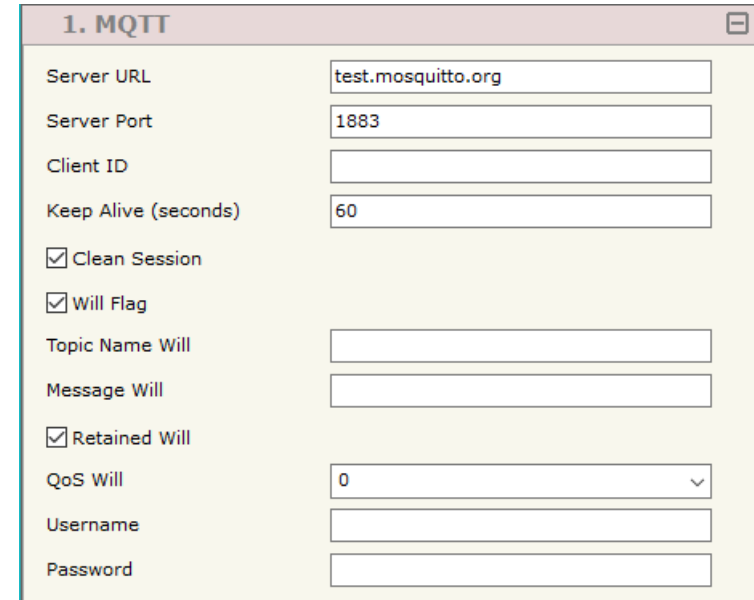- ➜ NTP (Network Time Protocol)

Figure 3a: "Set Communication" window

MQTT:

This section is used to define the main parameters of MQTT line. The means of the fields are:

➔ In the field "**Server URL**" the URL or the IP Address of the MQTT Server is defined;

➔ In the field "**Server Port**" the port used for MQTT communication is defined;

➔ In the field "**Client ID**" the Client ID of the converter is defined (if ned);

➔ In the field "**Keep Alive (seconds)**" the delay with which the Keep Alive message is sent on MQTT is defined;

➔ If the field "**Clean Session**" is checked, the last MQTT messages are deleted by the Server and the Client in case of missing ACK. If unchecked, the Server and the Client hold the last MQTT messages and, in case of incorrect disconnection or missing ACK, they try to send again them since all the ACK messages are exchanged correctly (valid only for QoS 1 and QoS 2);

➔ If the field "**Will Flag**" is checked, the converter will publish the Will topic at the connection to the Server. With this feature, in case of incorrect disconnection, the Server will publish this topic to all the MQTT Clients that subscribed it;

➔ In the field "**Topic Name Will**" the topic used for Will message is defined;

➔ In the field "**Message Will**" the payload of the Will message is defined;

➔ In the field "**Retained Will**" the converter will send the Will message with Retain flag enabled. In this way, the Server will hold the last Will message;

➔ In the field "**QoS Will**" the QoS type for Will message is defined;

➔ Im the field "**Username**" the username for the connection to the MQTT server is defined;

➔ In the field "**Password**" the password for the connection to the MQTT server is defined.
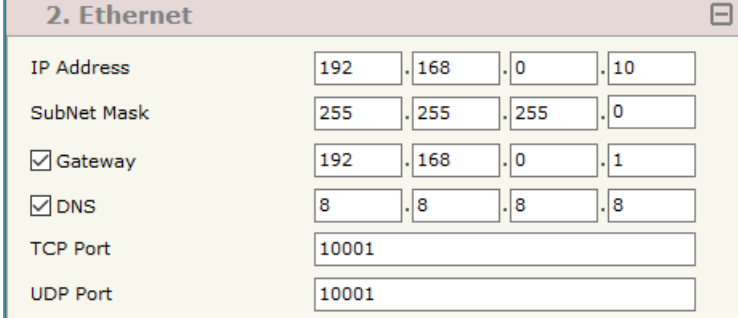
Figure 3b: "Set Communication → MQTT" window

Industrial Electronic Devices

ETHERNET:

This section is used to define the general parameters of Ethernet. The means of the fields are:

+ In the field "**Ip Address**" the IP address of 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 net 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 "**DNS**" the DNS address is defined. This field is required if the server address is define by URL and not IP Address;
+ In the field "**TCP Port**" the TCP port used for receiving data over TCP is defined;
+ In the field "**UDP Port**" the UDP port used for receiving data over TCP is defined.

Figure 3c: "Set Communication → Ethernet" window
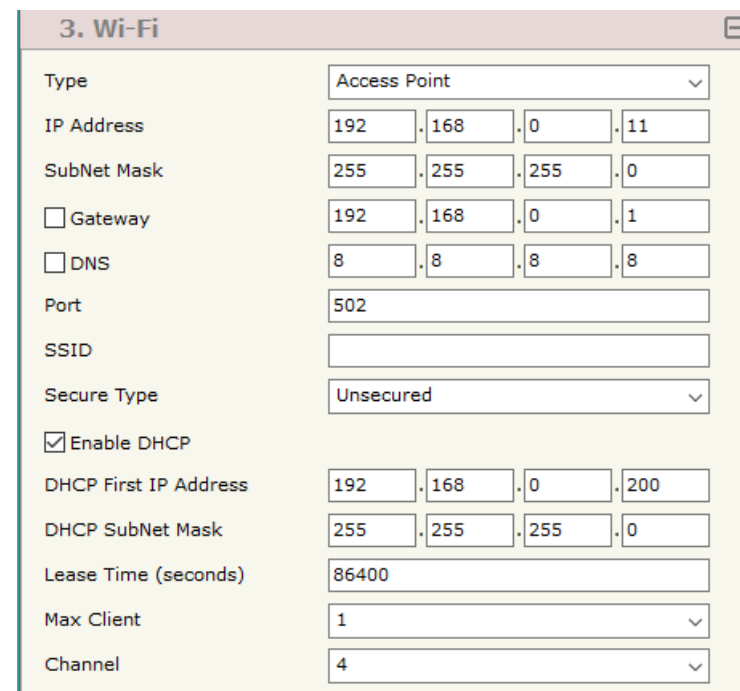
Industrial Electronic Devices

WI-FI:

This section is used to define the general parameters of Wi-Fi. It is possible to defined the type of Wi-Fi communication:

+ Access Point;
+ Client.

The means of the fields for Access Point configuration are:

+ In the field "**IP Address**" the IP address of 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 net 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 "**DNS**" the DNS address is defined. This field is required if the server address is define by URL and not IP Address.
+ In the field "**Port**" the port used for MQTT communication is defined;
+ In the field "**SSID**" the name of the Wi-Fi network to create is defined;
+ In the field "**Password**" the password used for Wi-Fi connection is defined;
+ In the field "**Type**" the type of security protocol used by the Wi-Fi network is defined;
+ If the field "**Enable DHCP**" is checked, the converter acts as DHCP Server for the Clients connected. If the option is enabled, in the fields "**DHCP First IP Address**" and "**DHCP SUBNET Mask**" the IP Addresses range used for DHCP is defined. In the field "**Lease Time (seconds)**" the required time for the renewing of the IP Address assigned to the Client is defined;
+ In the field "**Max Client**" the maximum number of Wi-Fi Clients accepted is defined;
+ In the field "**Channel**" the channel for Wi-Fi communication is defined.

Figure 3d: "Set Communication → Wi-Fi" window

The means of the fields for Client configuration are:

➔ If the field "**Obtain an IP Address automatically**" is checked, the converter gets the IP Address using DHCP. Otherwise, the IP Address is defined as static;

➔ In the field "**IP Address**" the IP address of 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 net 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 "**DNS**" the DNS address is defined. This field is required if the server address is define by URL and not IP Address.

➔ In the field "**Port**" the port used for MQTT communication is defined;

➔ In the field "**SSID**" the name of the Wi-Fi network to connect is defined;

➔ In the field "**Password**" the password used to connect to the Wi-Fi network is defined.

Figure 3e: "Set Communication → Wi-Fi" window

TLS (TRANSPORT LAYER SECURITY):

This section is used to define the parameters of TLS protocol. The means of the fields are:

➔ If the field "**Enable TLS**" is checked, the TLS protocol for secure connection is enabled;

➔ If the field "**Server Authentication**" is checked, the authentication of the Server using TLS is enabled. If enabled, in the field "**Server Certificate**" the certificate from the Server is defined;

➔ If the field "**Client Authentication**" is checked, the authentication of the Client using TLS is enabled. If enabled:

○ in the field "**Client Certificate**" the certificate from the Client is defined;

○ in the field "Client Key" the private key of the Client is defined;

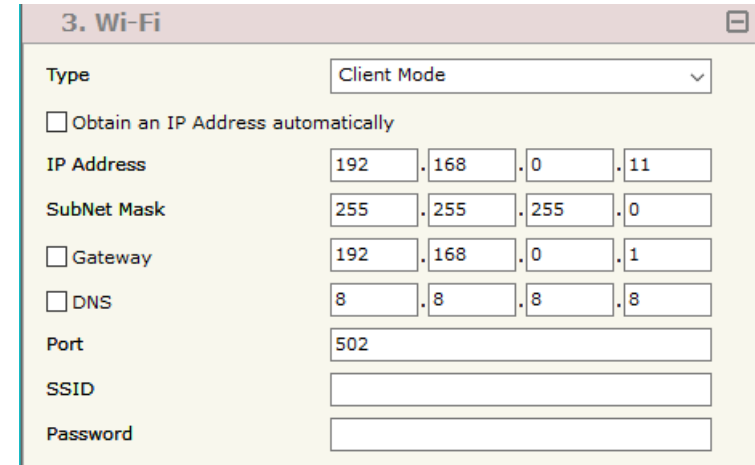○ in the field "Client Key Password" the password for the private key of the Client is defined.
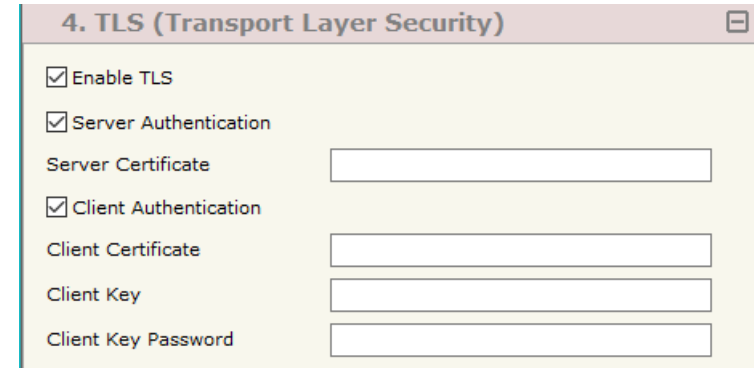
Figure 3f: "Set Communication → TLS" window

Industrial Electronic Devices

NTP (NETWORK TIME PROTOCOL):

This section is used to define the parameters of NTP protocol. The means of the fields are:

- In the field "**Server URL**" the URL or the IP Address of the NTP Server is defined;
- In the field "**Poll Time (seconds)**" the polling time for the time synchronization is defined.

Figure 3g: "Set Communication → NTP" window

Industrial Electronic Devices

MQTT SET TOPIC:

By Pressing the "**MQTT Set Topic**" button from the main window for SW67930 (Fig. 2) the window "Set MQTT Topics" appears (Fig. 4).
This section is used to define the MQTT topics where the converter will publish the data from Ethernet and the topic that the converter will subscribes for writing the data to Ethernet.
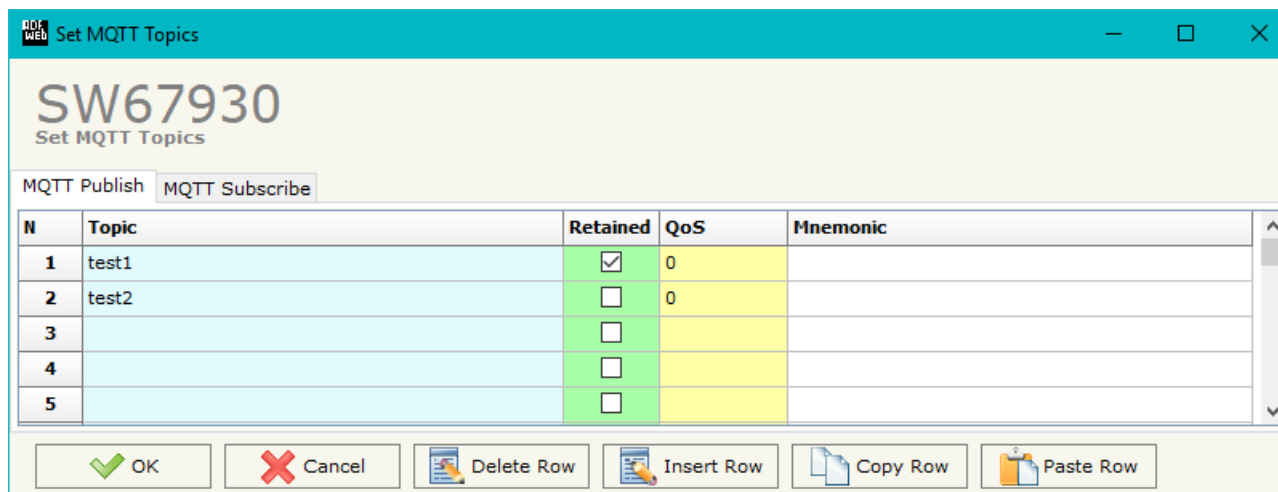

Figure 4: "Set MQTT Topics" window

The means of the fields are:

- In the field "**Topic**" the MQTT topic is defined;
- If the field "**Retained**" is defined, the retained flag is enabled. The MQTT server will hold the last topic published;
- In the field "**QoS**" the QoS level is defined;
- In the field "**Mnemonic**" a description of the topic is defined.

MQTT SET ACCESS:

By Pressing the "**MQTT Set Access**" button from the main window for SW67930 (Fig. 2) the window "Set MQTT Topics" appears (Fig. 5).
This section is used to link the MQTT topics to the Ethernet devices that will send and receive the Ethernet messages. It is also possible to define the Ethernet format of the Ethernet messages, defining the part of them to map on MQTT side.

The data of the columns in the "MQTT Publish" have the following meanings:

+ If the field "**Enable**" is checked, the MQTT rule is enabled;
+ In the field "**Topic**" the topic created in the section "MQTT Set Topic → MQTT Publish" is selected;
+ In the field "**IP Address**" the IP Address of the Ethernet device from which receiving data is defined;
+ In the field "**Ethernet Data Form**" the data format of the Ethernet message is defined. It is possible to associate specific parts of the Ethernet message to a keyword and map just them on MQTT side. Please, see page XX for more info;

Figure 5a: "MQTT Set Access → MQTT Publish" window

+ In the field "**Template MQTT**" the structure of the payload of the MQTT message to publish is defined. It is possible to define a fixed part and the variable part using the keywords defined in the field "Ethernet Data Form";
+ In the field "**Mnemonic**" the description of the rule is defined.
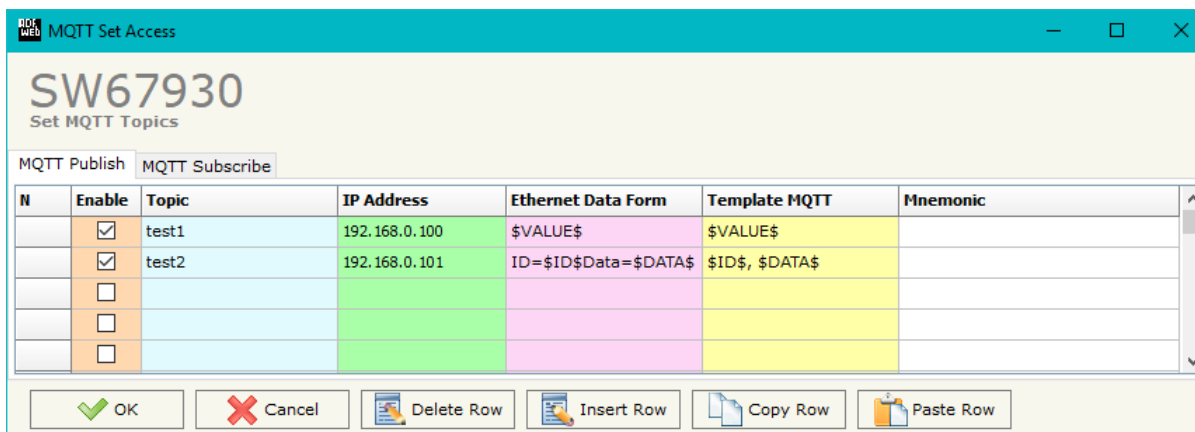

Note:
In order to send Ethernet messages to the converter, if TCP is used, the converter acts as server, so the Ethernet device must open the TCP connection as Client to the TCP port defined in the section "Set Communication".

Industrial Electronic Devices

The data of the columns in the "MQTT Subscribe" have the following meanings:

➔ If the field "**Enable**" is checked, the MQTT rule is enabled;

➔ In the field "**Topic**" the topic created in the section "MQTT Set Topic → MQTT Publish" is selected;

➔ In the field "**IP Address**" the IP Address of the Ethernet device to which transmitting data is defined;

➔ In the field "**Port**" the port of the Ethernet device to which sending the data is defined;

➔ In the field "**Type**" the protocol used is defined (TCP or UDP);

Figure 5b: "MQTT Set Access → MQTT Subscribe" window

➔ In the field "**Template MQTT**" the structure of the payload of the MQTT message to publish is defined. It is possible to define a fixed part and the variable part using the keywords;

➔ In the field "**Ethernet Data Form**" the data format of the Ethernet message is defined. It is possible to associate specific parts of the MQTT payload to a keyword and map just them on Ethernet message. Please, see page XX for more info;

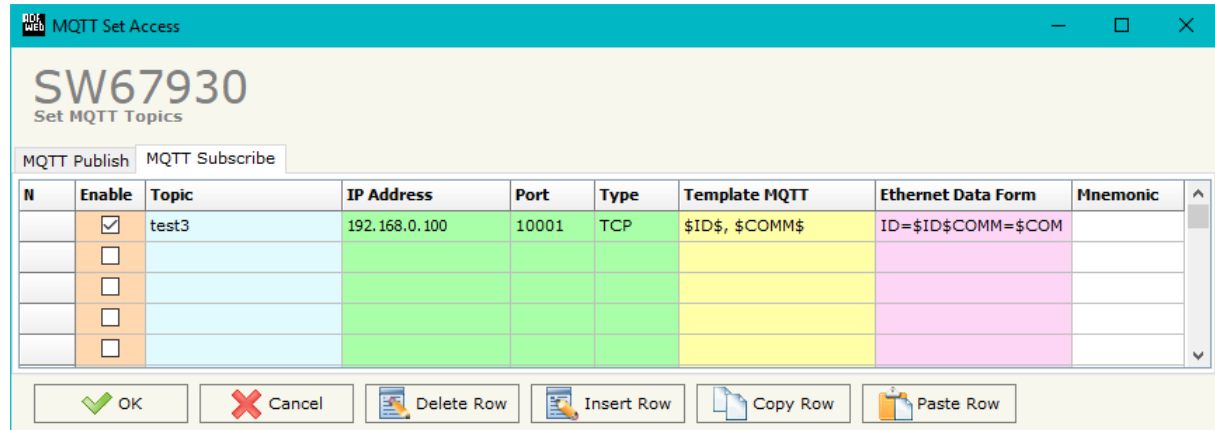➔ In the field "**Mnemonic**" the description of the rule is defined.

Note:
   If TCP is used, the converter acts as Client to send messages to the Ethernet devices, so the Ethernet device must accept the connection to the specific TCP port defined.

Note:
   In the field "Template MQTT" and "Ethernet data Form" it is necessary to use only the key word $VALUE$ in order to map the entire Ethernet/MQTT payload.

Note:
   The "Ethernet Data Form" field is defined as text string. The filter of the Ethernet payload using the keywords can be done only with ASCII Ethernet messages. In case of Ethernet messages that contain Binary values, it is necessary to map the entire message on MQTT using the $VALUE$ keyword.

Industrial Electronic Devices

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.
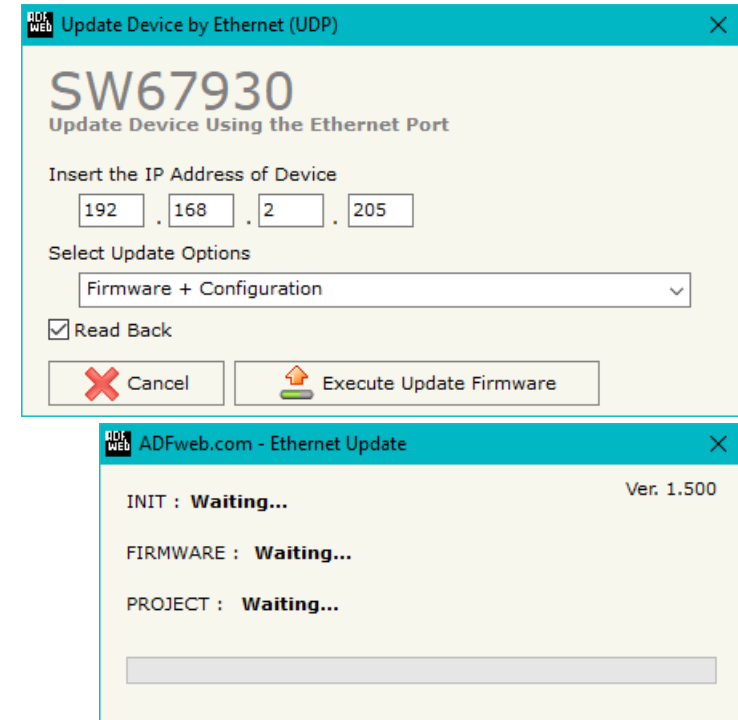
Figure 6: "Update device" windows

Industrial Electronic Devices

Note:
When you receive the device, for the first time, you also have to update the Firmware in the HD67930 device.

Warning:
If Fig. 7 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 or 10 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 you have to launch the "Command Prompt" with Administrator Rights;
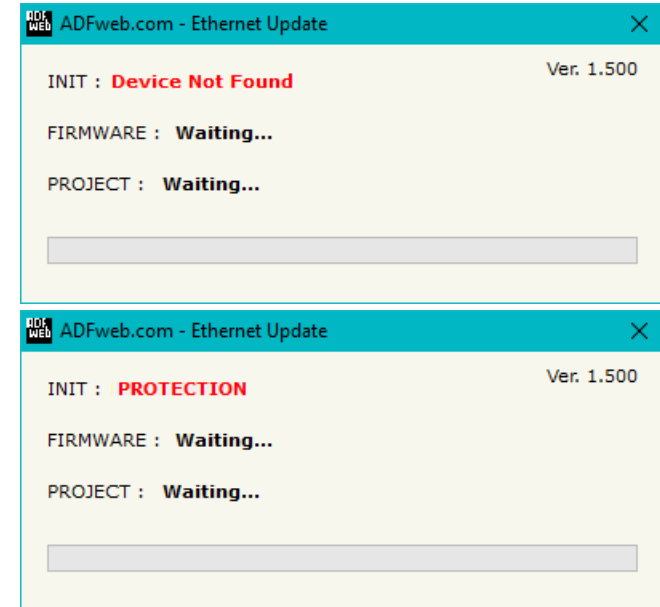➔ Pay attention at Firewall lock.

Figure 7: "Error" window

Warning:
In the case of HD67930 you have to use the software "SW67930": www.adfweb.com\download\filefold\SW67930.zip.

Industrial Electronic Devices

TEMPLATE STRING: ETHERNET AND MQTT PAYLOAD

In the section "Set MQTT Access" of the SW67930, it is possible to define the expected format of the Ethernet message received/transmitted.
This feature allows to define a fixed part of the Ethernet message and some parts to map from/to MQTT side. The parts to link to MQTT side is made using keywords, defined between '$' chars.

Example

From Ethernet side, the Client sends a message with this ASCII format:

"ID=xxxx, Register=xxxx, Desc=xxxxx, Data=xxxxx"

Where 'xxx' parts are variable parts of the message.

On MQTT side, we want to receive just the variable parts, discharging the fixed parts that are not necessary. In this case, the Ethernet format will be defined in this way:

"ID=ID, Register=REG, Desc=$DESC$, Data=$DATA$"

Supposing that the real string from the Ethernet message is:

"ID=0001, Register=0100, Desc=Temp1, Data=02345"

We wil have:

ID = 0001
REG = 0100
$DESC$ = Temp1
$DATA$ = 02345

Industrial Electronic Devices

At this point, it is possible to define the MQTT template as preferred. An example can be using JSON format:
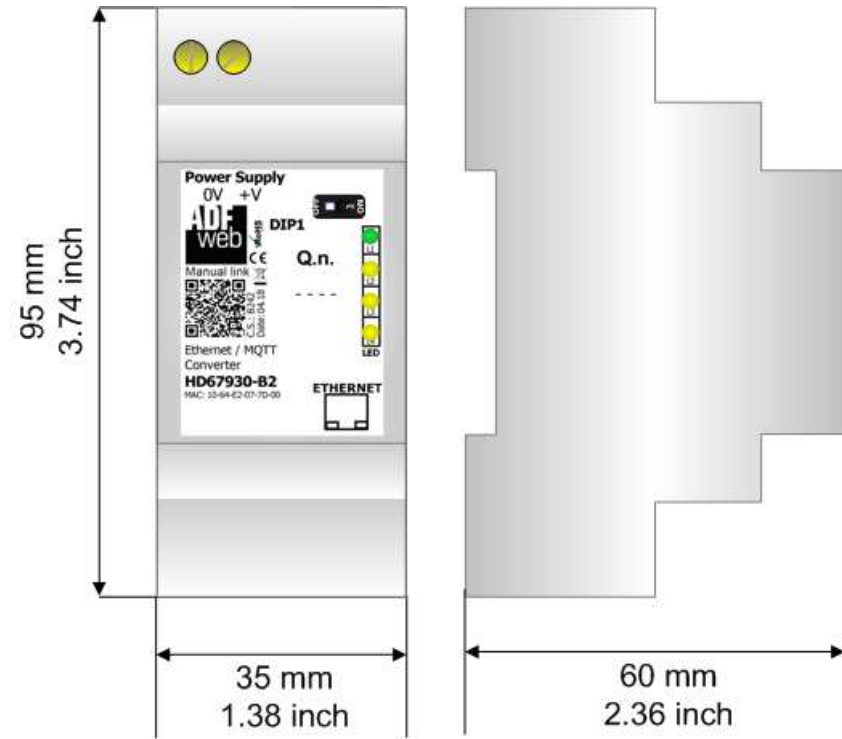
```
{
 "ID": "$ID$",
 "REG": "$REG$",
 "DESC": "$DESC$",
 "DATA": "$DATA$"
}
```

The output on MQTT side will be:

```
{
 "ID": "0001",
 "REG": "0100",
 "DESC": "Temp1",
 "DATA": "02345"
}
```

It is possible to use the same concept from the messages from MQTT to Ethernet.

Industrial Electronic Devices
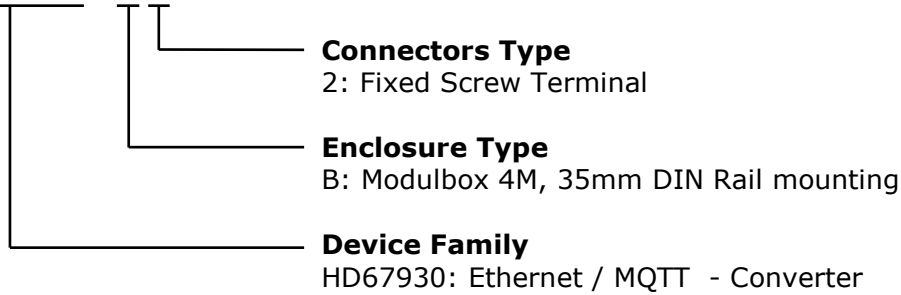
MECHANICAL DIMENSIONS:

Figure 8: Mechanical dimensions scheme for HD67930-B2

ORDERING INFORMATIONS:

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

HD67930 – B 2

Connectors Type
2: Fixed Screw Terminal

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

Device Family
HD67930: Ethernet / MQTT - Converter

Order Code: **HD67930-B2**   -   Ethernet / MQTT – 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

Industrial Electronic Devices

DISCLAIMER:

All technical content within this document can be modified without notice. The content of the document is a under continual renewal.
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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.

ADFweb.com S.r.l.

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.