Industrial Electronic Devices

User Manual

- ⊕
- ⊕
- ⊕

User Manual

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	18/09/2020	VDB	All	First Release

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.

Industrial Electronic Devices

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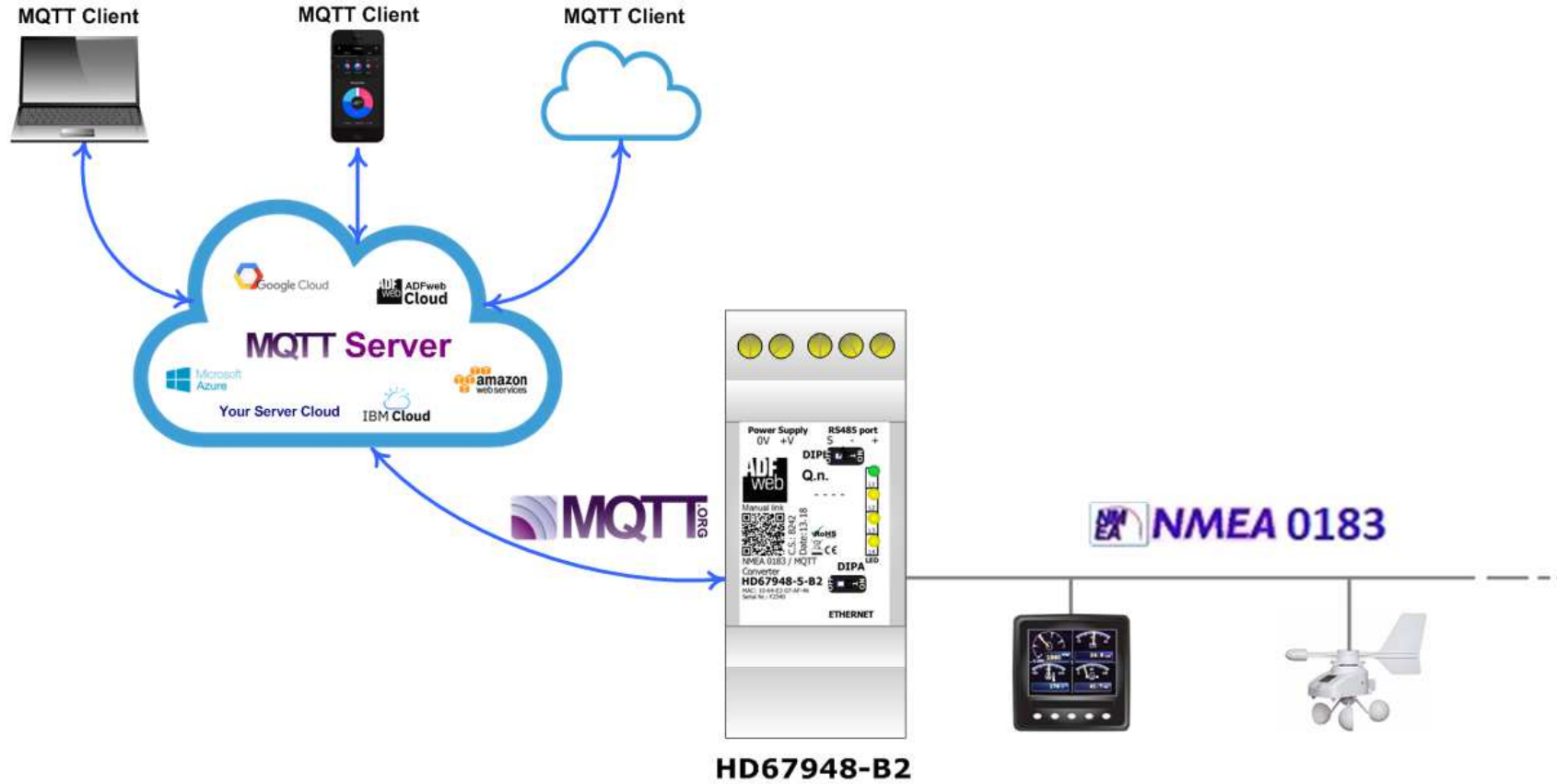
⚠️ This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

CE CONFORMITY
The declaration is made by our company. You can send an email to or give us a call if you need it.
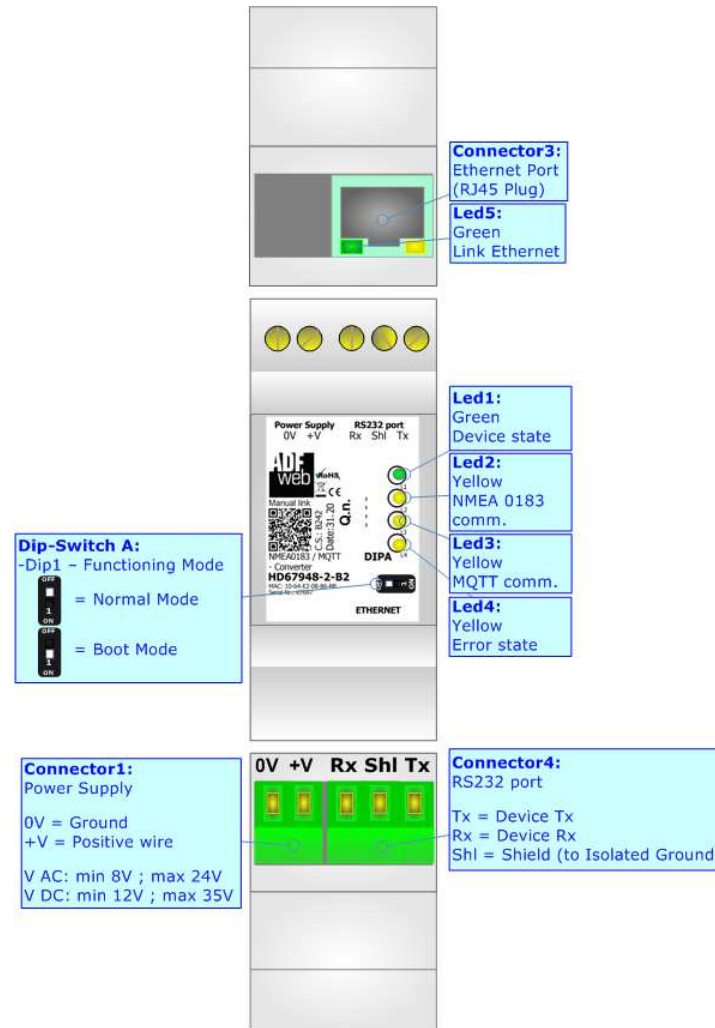
EXAMPLE OF CONNECTION:

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

Industrial Electronic Devices

CONNECTION SCHEME:

Connector3:
Ethernet Port
(RJ45 Plug)

Led5:
Green
Link Ethernet

Led1:
Green
Device state

Led2:
Yellow
NMEA 0183
comm.

Led3:
Yellow
MQTT comm.

Led4:
Yellow
Error state

Dip-Switch A:
-Dip1 – Functioning Mode

= Normal Mode

= Boot Mode

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

0V +V   Rx Shl Tx

Connector4:
RS232 port

Tx = Device Tx
Rx = Device Rx
Shl = Shield (to Isolated Ground)

Figure 1a: Connection scheme for HD67948-2-A1

ADFweb.com S.r.l.

Connector3:
Ethernet Port
(RJ45 Plug)

Led5:
Green
Link Ethernet

Dip-Switch B:
-Dip1 – Termination RS485 line

= Open   = 120 ohm

Led1:
Green
Device state

Led2:
Yellow
NMEA 0183
comm.

Led3:
Yellow
MQTT comm.

Dip-Switch A:
-Dip1 – Functioning Mode

= Normal Mode

= Boot Mode

Led4:
Yellow
Error state

Connector4:
RS485 port

S = Shield (to Isolated Ground)
- = Negative wire
+ = Positive wire

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

0V +V   S   -   +

Figure 1b: Connection scheme for HD67948-5-A1

Industrial Electronic Devices

CHARACTERISTICS:

The HD67948-x-A1 are NMEA 0183 / MQTT - Converters.

It allows for the following characteristics:

- Isolation between NMEA 0183 – MQTT – Power Supply;
- Two-directional information between NMEA 0183 bus and MQTT 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 SW67948-x-A1 software on your PC in order to perform the following:

- Define the parameters of NMEA 0183 line;
- Define the parameters of MQTT line;
- Define the list of NMEA 0183 sentences in reception;
- Define the list of MQTT topics to publish/subscribe to the server;
- Update the device.

Industrial Electronic Devices
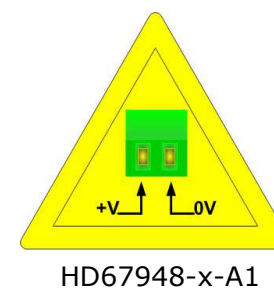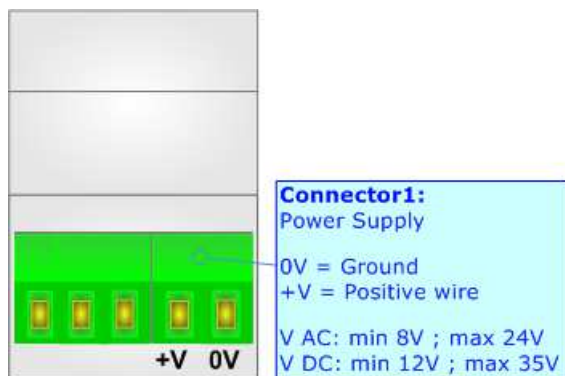
POWER SUPPLY:

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]
HD67948-x-A1	3.5

Caution: Do not reverse the polarity power

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

+V   0V

+V   0V

HD67948-x-A1

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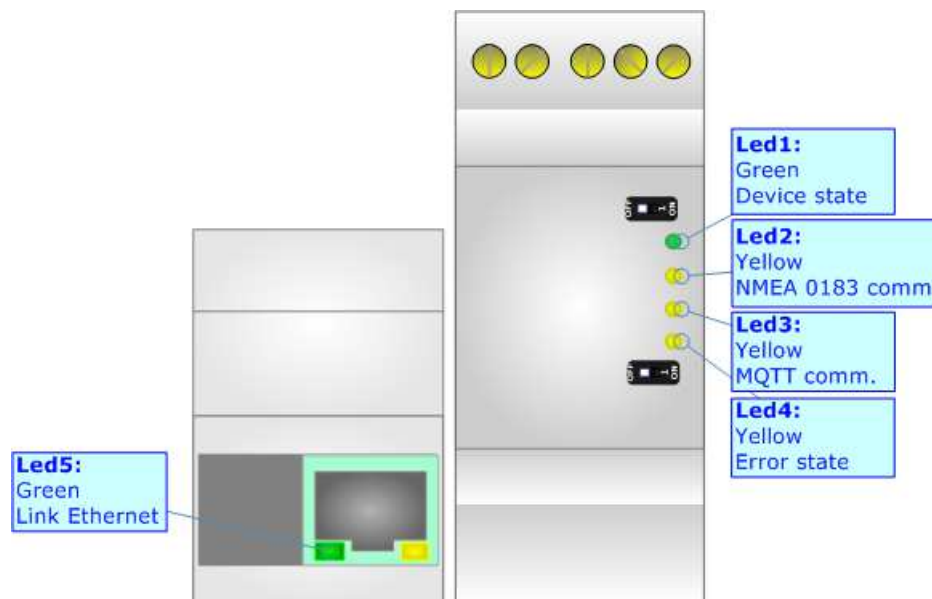
According to the functioning mode, the LEDs will have specific functions, see 'LEDS' section.

Industrial Electronic Devices
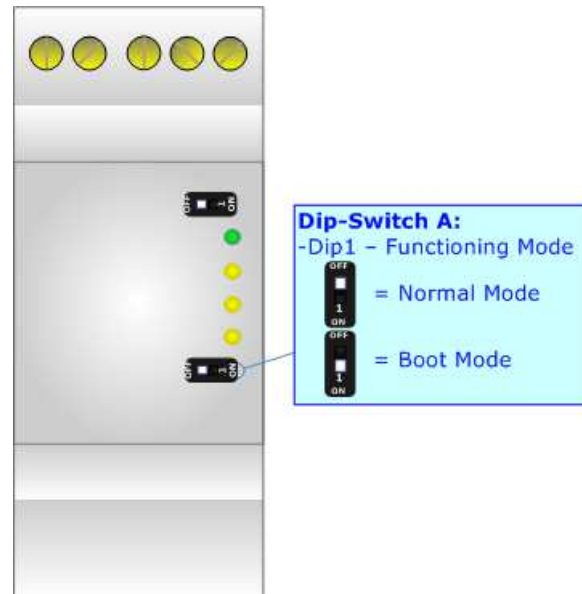
LEDS:

The device has got seven LEDs that are used to give information about the functioning status.
The various meanings of the LEDs are described in the table below.
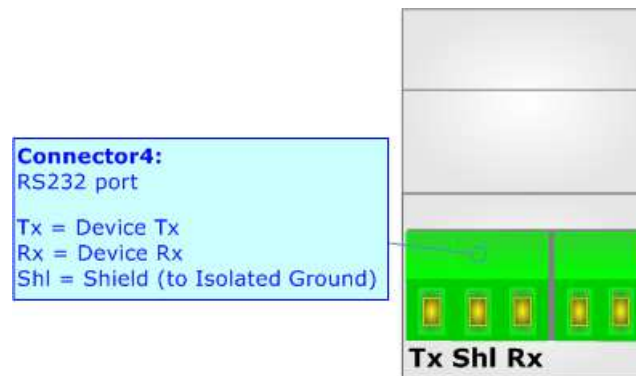
LED	Normal Mode	Boot Mode
1: Device State (green)	Blinks slowly (~1Hz)	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
2: NMEA 0183 comm. (green)	It blinks when NMEA 0183 communication is running	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: MQTT comm. (green)	It blinks when MQTT communication is running	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: Error state (green)	**ON:** An error in the communication busses occurs **OFF:** No errors are present	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress

Led1:
Green
Device state

Led2:
Yellow
NMEA 0183 comm.

Led3:
Yellow
MQTT comm.

Led4:
Yellow
Error state

Led5:
Green
Link Ethernet

*ADFweb.com S.r.l.*

Industrial Electronic Devices

RS232:

The connection from RS232 socket to a serial port (example one from a personal computer) must be made with a NULL MODEM cable (a serial cable where the pins 2 and 3 are crossed).
It is recommended that the RS232 cable not exceed 15 meters.

Connector4:
RS232 port

Tx = Device Tx
Rx = Device Rx
Shl = Shield (to Isolated Ground)

Tx Shl Rx

Industrial Electronic Devices

RS485:

For terminate the RS485 line with a 120Ω resistor it is necessary to put ON dip 1, like in figure.
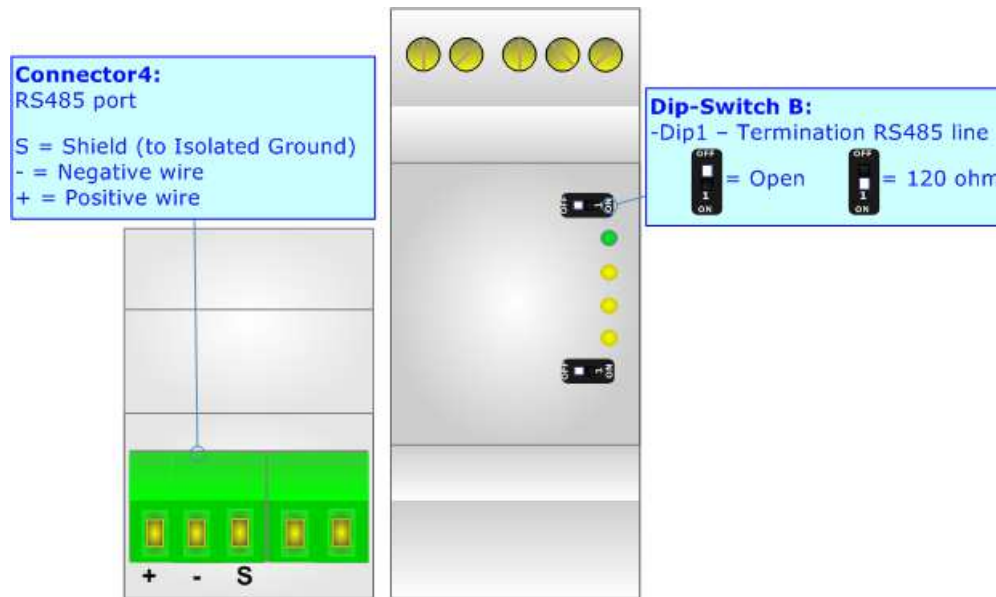
The maximum length of the cable should be 1200m (4000 feet).

Here some codes of cables:

- Belden: p/n 8132 - 2x 28AWG stranded twisted pairs conductor + foil shield + braid shield;
- Belden p/n 82842 - 2x 24AWG stranded twisted pairs conductor + foil shield + braid shield;
- Tasker: p/n C521 - 1x 24AWG twisted pair conductor + foil shield + braid shield;
- Tasker: p/n C522 - 2x 24AWG twisted pairs conductor + foil shield + braid shield.

Industrial Electronic Devices

ETHERNET:

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

Ethernet connection and the updating of the converter must be made using Connector9 and/or Connector10 of the HD67948-x-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.

Connector3:
Ethernet Port
(RJ45 Plug)

Industrial Electronic Devices
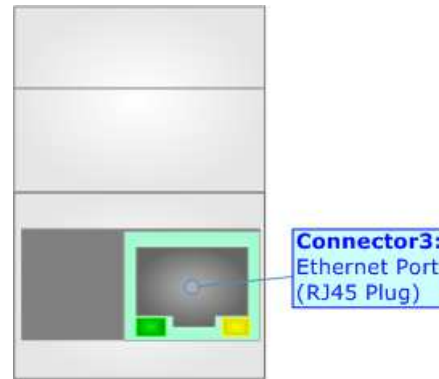
USE OF COMPOSITOR SW67948:

To configure the Converter, use the available software that runs with Windows called SW67948. 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; 32/64bit).

When launching the SW67948, the window below appears (Fig. 2).
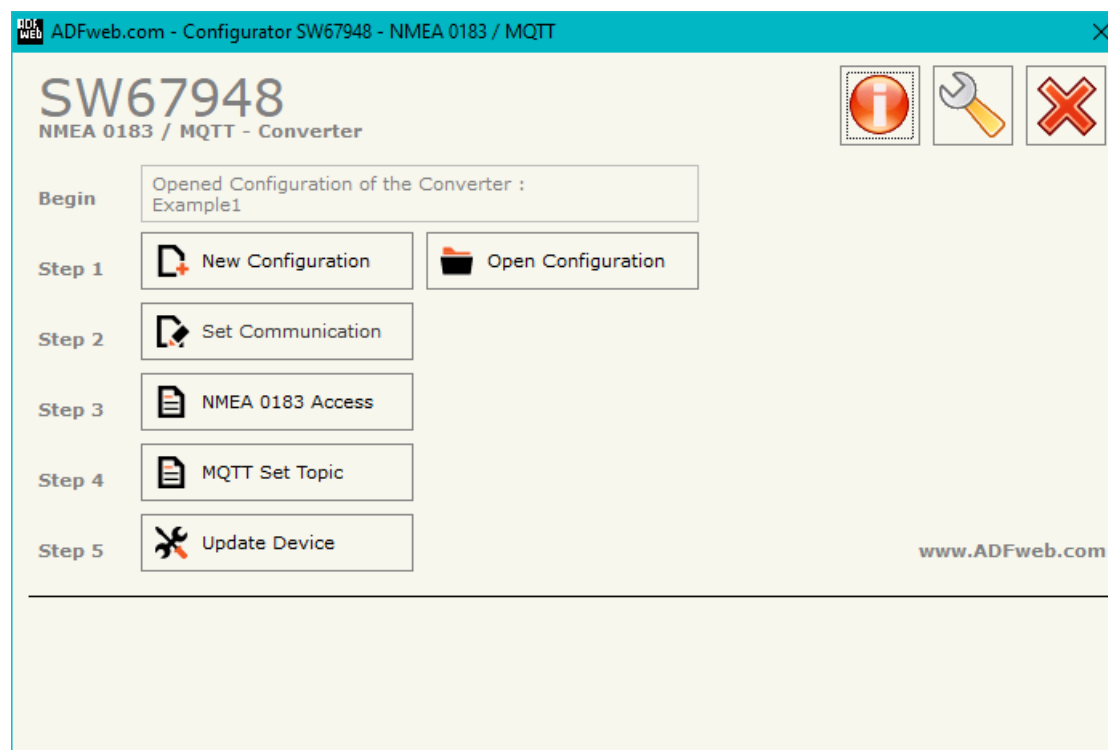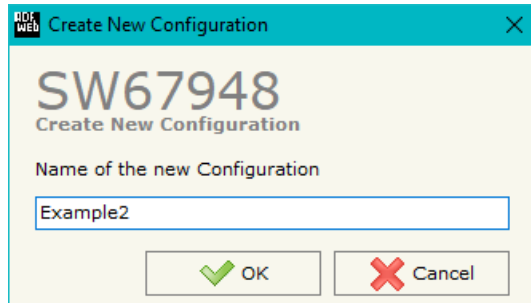
Note:
It is necessary to have installed .Net Framework 4.


Figure 2: Main window for SW67948

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 "NMEA 0183 / 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**".

Industrial Electronic Devices
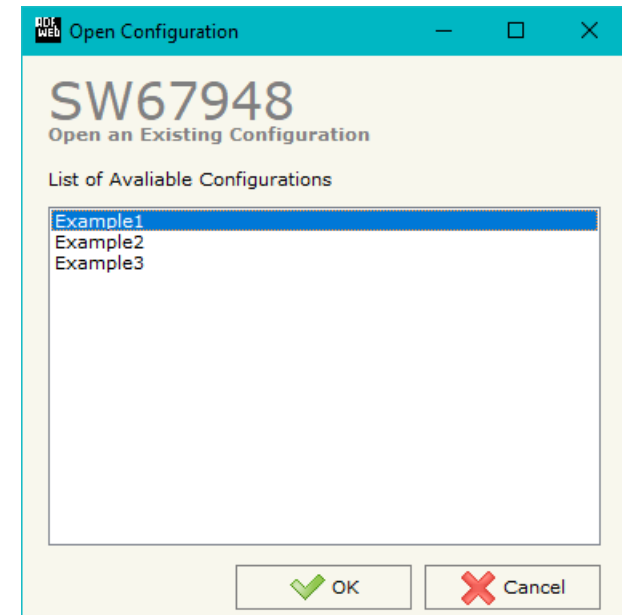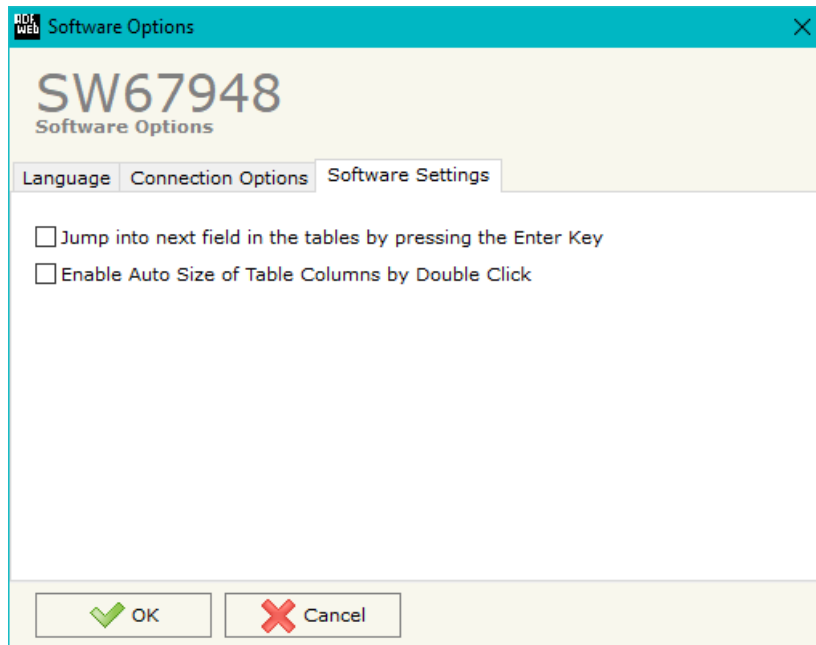
SOFTWARE OPTIONS:

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.
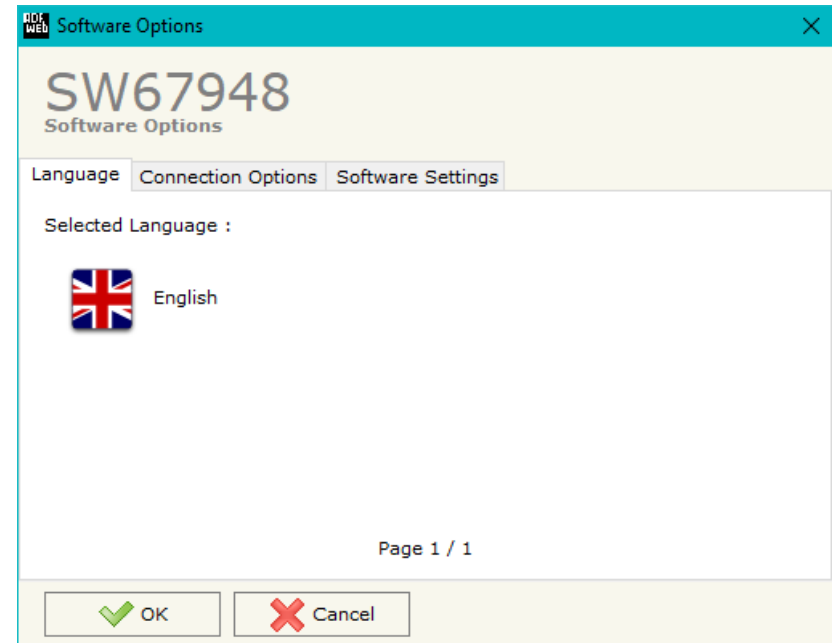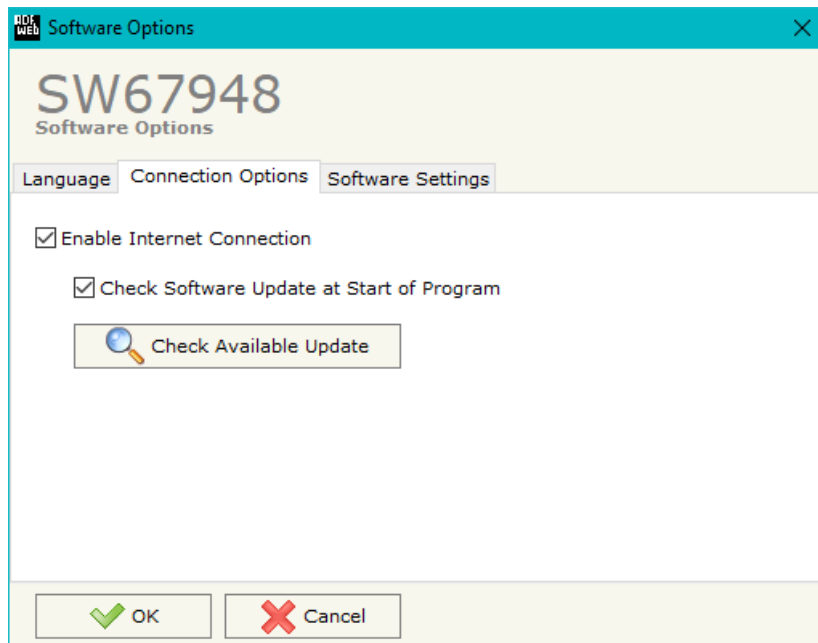
In the section "Connection Options", it is possible to check if there are some updatings of the software compositor in ADFweb.com website.
Checking the option "**Check Software Update at Start of Program**", the SW67948 checks automatically if there are updatings when it is launched.

Software Options

SW67948

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.

Industrial Electronic Devices

SET COMMUNICATION:

This section define the fundamental communication parameters of two buses, NMEA 0183 and MQTT.

By Pressing the "**Set Communication**" button from the main window for SW67948 (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:

- ➡ MQTT
- ➡ Serial
- ➡ TLS (Transport Layer Security)
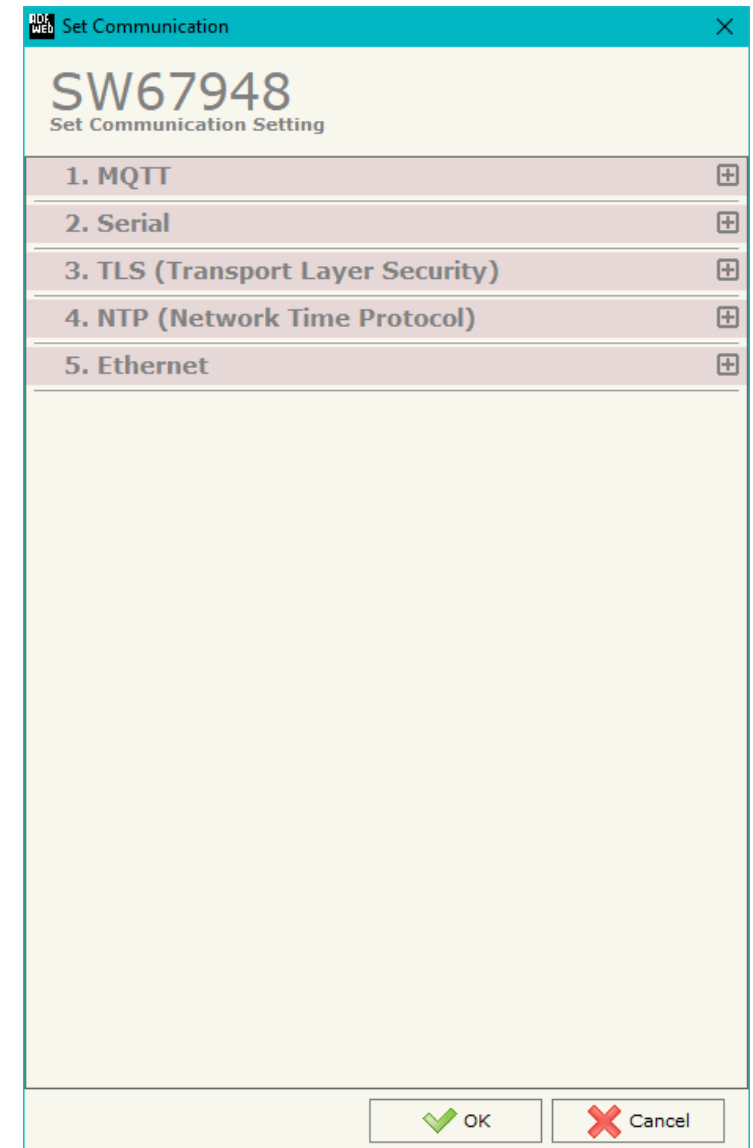- ➡ NTP (Network Time Protocol)
- ➡ Ethernet

Figure 3a: "Set Communication" window

ADFweb

Industrial Electronic Devices

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;

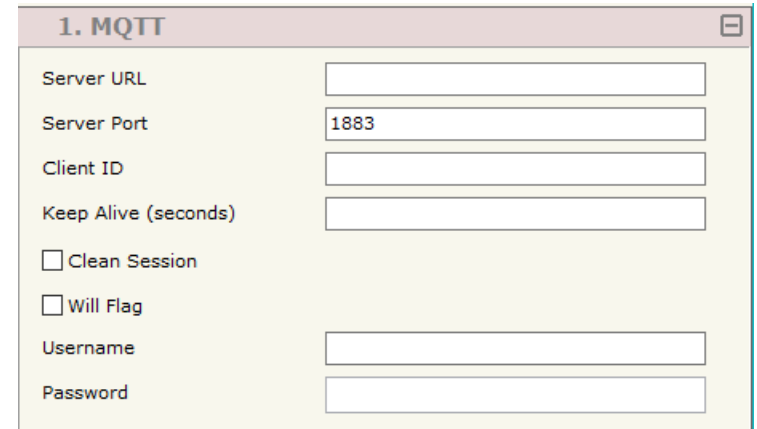➢ In the field "**Password**" the password for the connection to the MQTT server is defined.

1. MQTT

Server URL [   ]
Server Port [1883   ]
Client ID   [   ]
Keep Alive (seconds) [   ]
☐ Clean Session
☐ Will Flag
Username [   ]
Password [   ]

Figure 3b: "Set Communication → MQTT" window

<u>**SERIAL:**</u>

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

- ✦ In the field "**Baudrate**" the baudrate for the serial line is defined;
- ✦ In the field "**Parity**" the parity of the serial line is defined;
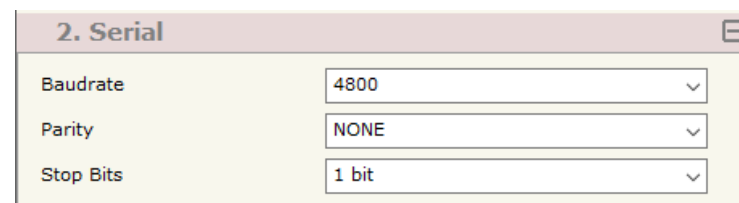- ✦ In the field "**Stop Bits**" the number of Stop Bits of the serial line is defined.

Figure 3c: "Set Communication → Serial" window

<u>**TLS:**</u>

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:
  - o in the field "**Client Certificate**" the certificate from the Client is defined;
  - o in the field "Client Key" the private key of the Client is defined;
  - o in the field "Client Key Password" the password for the private key of the Client is defined.

Figure 3d: "Set Communication → TLS" window

<u>**NTP (NETWORK TIME PROTOCOL):**</u>

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;
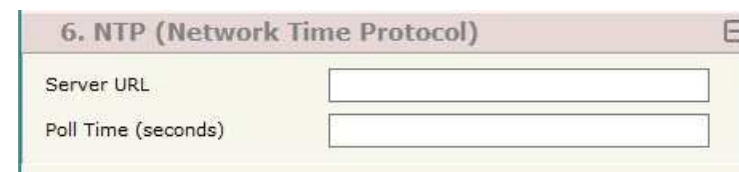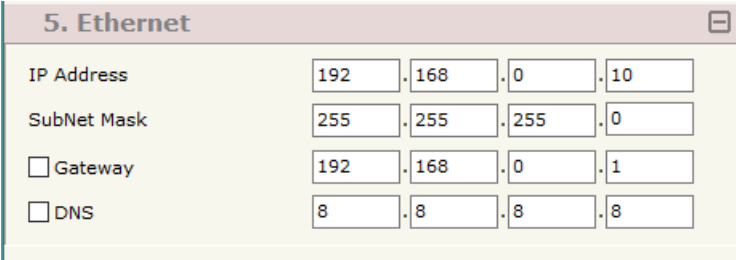- ✦ In the field "**Poll Time (seconds)**" the polling time for the time synchronization is defined.

Figure 3e: "Set Communication → NTP" 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.

Figure 3f: "Set Communication → Ethernet" window

Industrial Electronic Devices

NMEA 0183 ACCESS:

By pressing the "**NMEA 0183 Access**" button from the main window for SW67948 (Fig. 2) the "Definition of NMEA 0183 Sentences" window appears (Fig. 4).
The NMEA 0183 sentences inserted in this table contain the output data of MQTT. These sentences are accepted by the converter.

Figure 4: "Definition of NMEA 0183 Sentences" window

The data of the columns have the following meanings:

- If the field "**Enable**" is checked, the NMEA 0183 sentence is enabled;
- In the field "**Sentence**" the NMEA 0183 sentence is defined;
- In the field "**Index**" the Index of the NMEA 0183 sentence is defined;
- In the field "**Data Field**" the parameter of the selected sentence to map on MQTT side is defined;
- In the field "**Post operation**" the post operation on the data received is defined;
- If the field "**Swap All**" is checked, the bytes order on MQTT side will be reversed;
- If the field "**Swap 16**" is checked, a swap by word will be applied;
- In the field "**Position**" the byte of the memory array where mapping the data is defined;
- In the field "**Mnemonic**" a brief description is defined.

Industrial Electronic Devices

MQTT SET TOPIC:

By Pressing the "**MQTT Set Topic**" button from the main window for SW67948 (Fig. 2) the window "Set MQTT Topics" appears (Fig. 5).
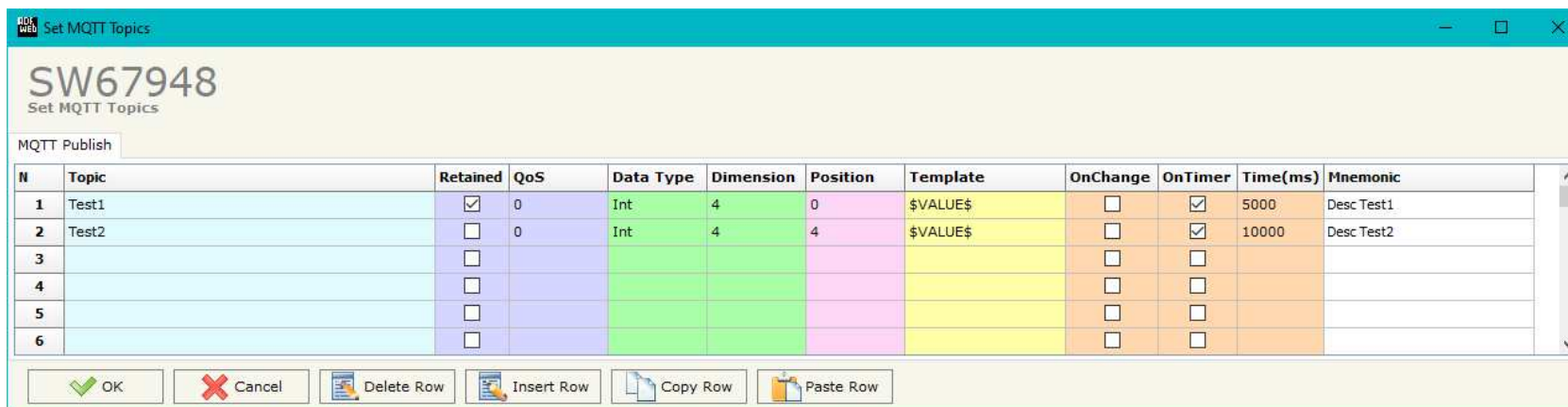This section is used to define the MQTT topics where the converter will publish the data from NMEA 0183.

Figure 5: "Set MQTT Topics → MQTT Publish" 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 "**Data Type**" the type of data to use is defined;
- In the field "**Dimension**" the dimension in byte of the data is defined;
- In the field "**Position**" the starting byte of the internal memory array where taking the data is defined;
- In the field "**Template**" the structure of the MQTT payload is defined. With a double click on it, it is possible to open a window for editing it;
- If the field "**On Change**" is checked, the converter publishes the topic when the data from NMEA 0183 are changed;
- If the field "**On Timer**" is checked, the converter publishes the topic cyclically with the delay defined in the field "**Time (ms)**";
- In the field "**Mnemonic**" a description of the topic 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.

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.

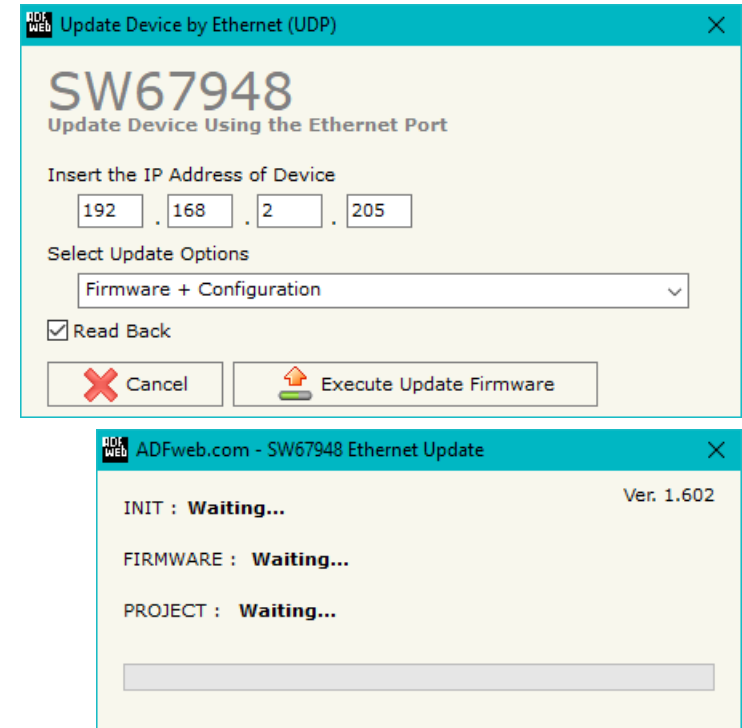At this point the configuration/firmware on the device is correctly updated.

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 HD67948 device.

Warning:
If Fig. 7 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 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.

Warning:
In the case of HD67948 you have to use the software "HD67948": www.adfweb.com\download\filefold\SW67948.zip.

Figure 7: "Error" window

Industrial Electronic Devices

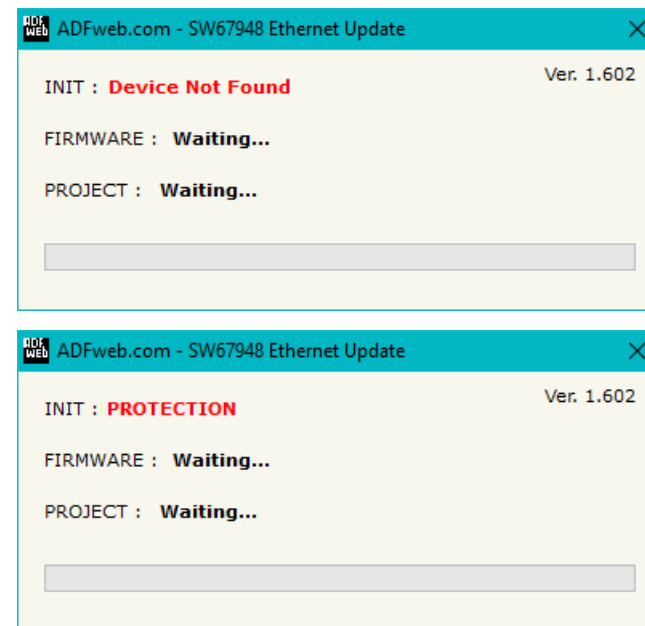**TEMPLATE STRING: DEFINITION OF MQTT PAYLOAD**

In the section "Set Communication" of the SW67948, it is possible to define a Template string for the MQTT messages. The template is necessary in order to define the structure of the payload of the MQTT message and the info contained.
It is possible to have a simple text format or a JSON format.

The definition of the template can be done using Key words, used to link a specific information from/to NMEA 0183. The key words used and their meanings are:
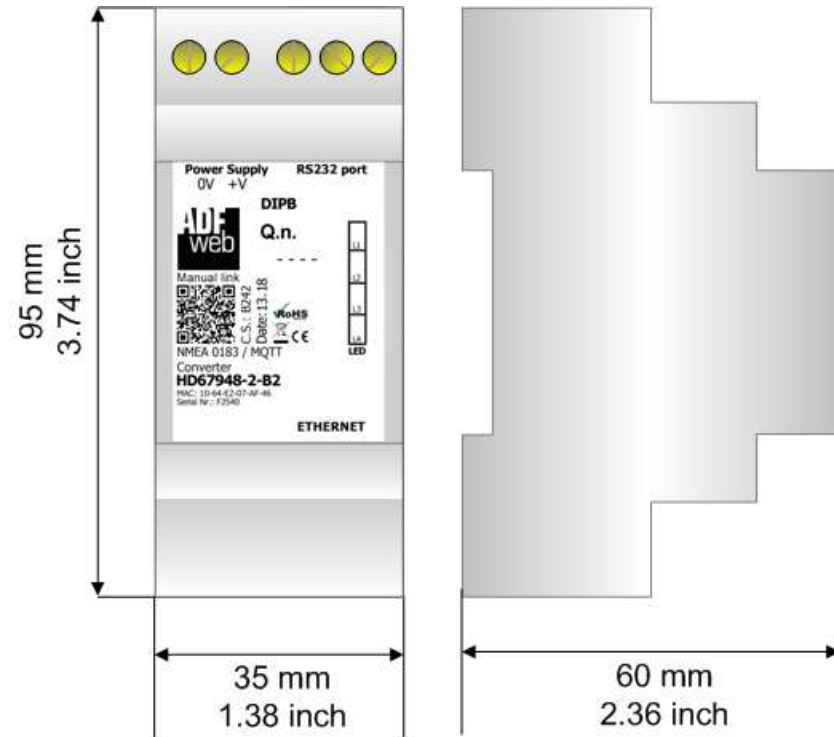
- VALUE: value of the NMEA 0183 data
- TIME: date and time of the MQTT message
- DESC: description of the message

Warning:
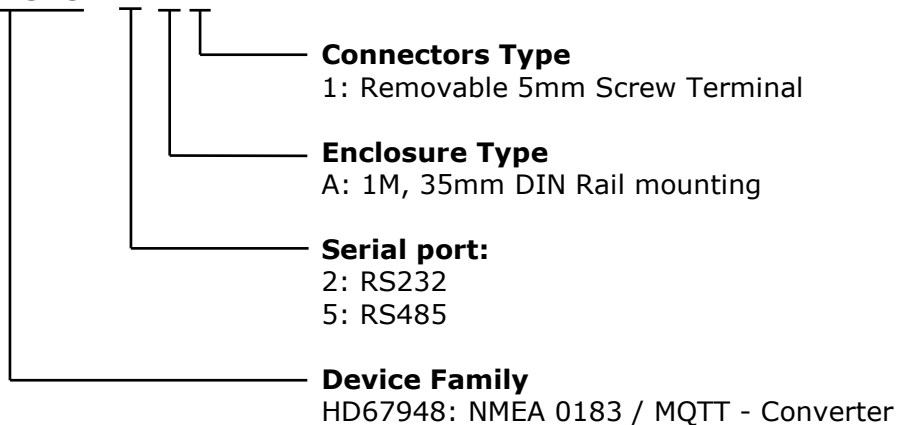The key words must be defined between "$" chars in order to be recognized (Ex.: $VALUE$).

Industrial Electronic Devices

MECHANICAL DIMENSIONS:

Figure 8: Mechanical dimensions scheme for HD67948-x-A1

Industrial Electronic Devices

ORDERING INFORMATIONS:

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

HD67948 – x - xx

Connectors Type
1: Removable 5mm Screw Terminal

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

Serial port:
2: RS232
5: RS485

Device Family
HD67948: NMEA 0183 / MQTT - Converter

Order Code: **HD67948-2-A1**   -   NMEA 0183 / MQTT – Converter (NMEA 0183: RS232)
Order Code: **HD67948-5-A1**   -   NMEA 0183 / MQTT – Converter (NMEA 0183: RS485)

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.
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.

Industrial Electronic Devices

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