

User Manual

Revision 1.000

English

DeviceNet Slave / MQTT - Converter

(Order Code: HD67943-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)



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
CAN	10
ETHERNET	11
USE OF COMPOSITOR SW67943	12
NEW CONFIGURATION / OPEN CONFIGURATION	13
SOFTWARE OPTIONS	14
SET COMMUNICATION	16
MQTT SET TOPIC	22
UPDATE DEVICE	24
TEMPLATE STRING: DEFINITION OF MQTT PAYLOAD	26
MECHANICAL DIMENSIONS	27
ORDERING INFORMATIONS	28
ACCESSORIES	28
DISCLAIMER	29
OTHER REGULATIONS AND STANDARDS	29
WARRANTIES AND TECHNICAL SUPPORT	30
RETURN POLICY	30

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:

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:

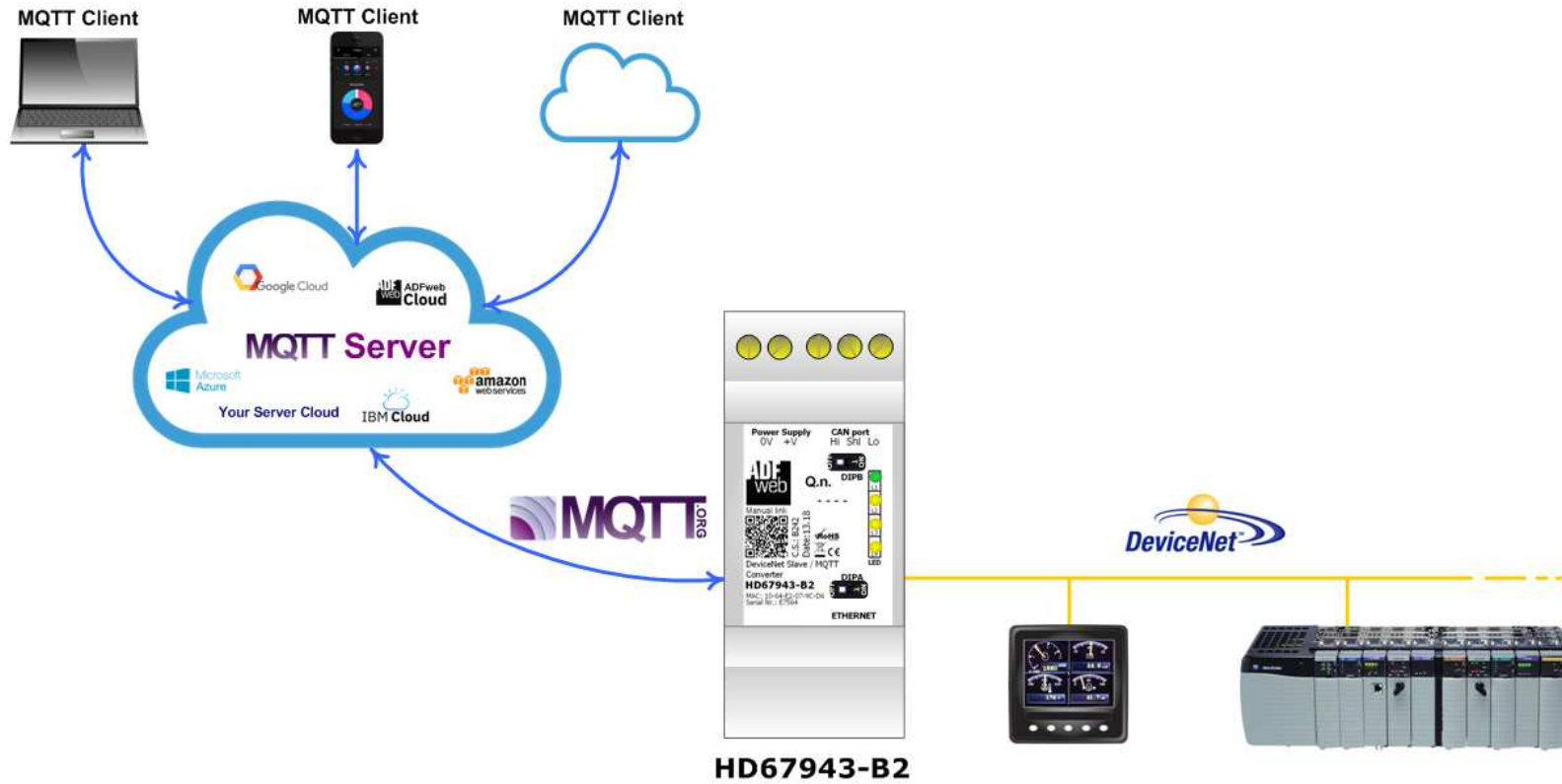


This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

CE CONFORMITY

The declaration is made by our company. You can send an email to [or](#) give us a call if you need it.

EXAMPLE OF CONNECTION:



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

CONNECTION SCHEME:

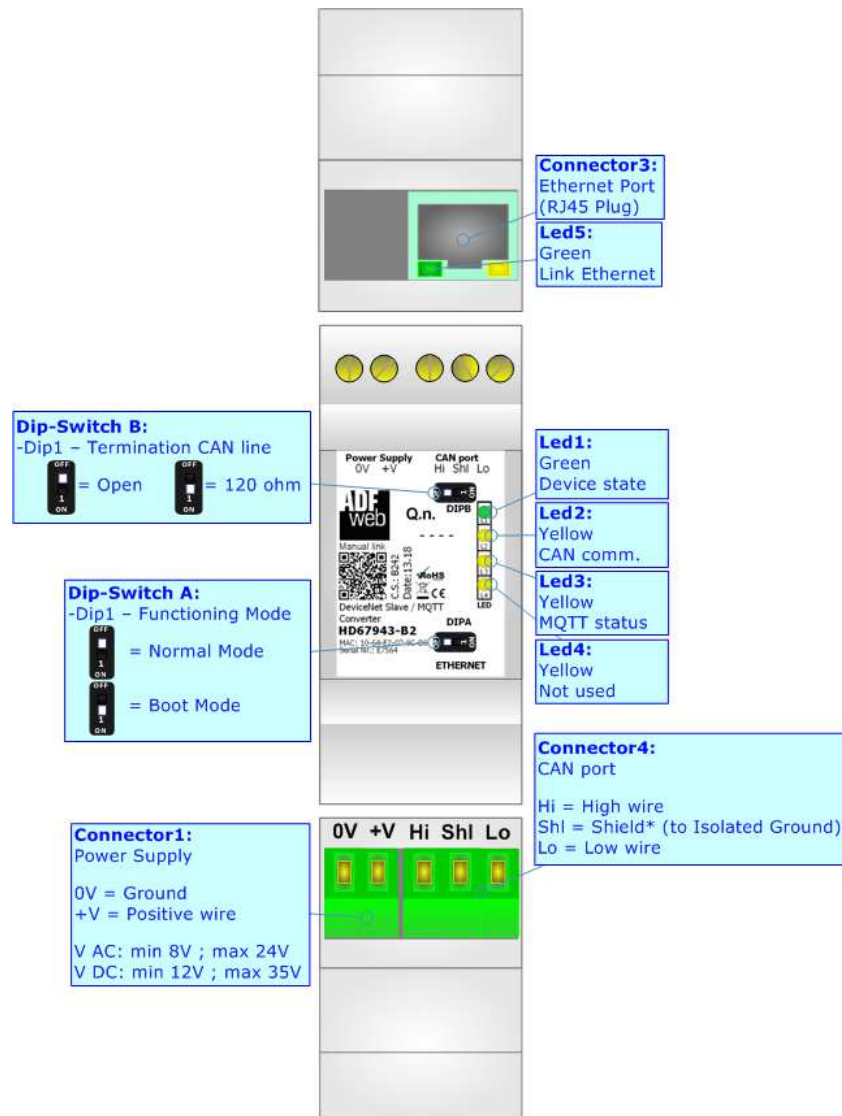


Figure 1: Connection scheme for HD67943-B2

CHARACTERISTICS:

The HD67943-B2 is a DeviceNet Slave / MQTT Converter.

It allows the following characteristics:

- Electrical isolation between Ethernet and CAN;
- 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 SW67943 software on your PC in order to perform the following:

- Define the parameter of MQTT;
- Define the parameter of DeviceNet line;
- Define the MQTT topics to be published/subscribed in the MQTT Server;
- Update the device.

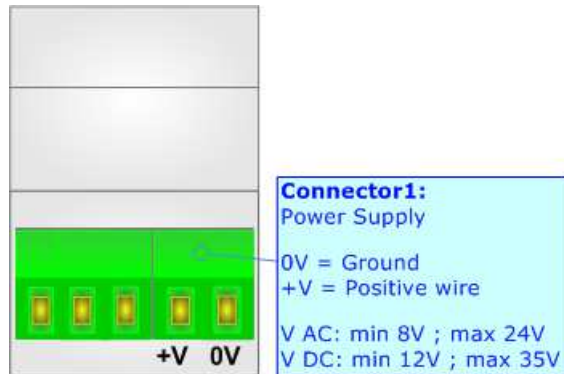
POWER SUPPLY:

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

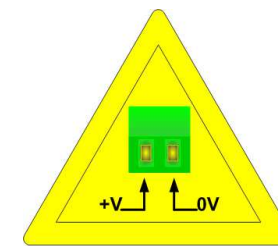
VAC 		VDC 	
Vmin	Vmax	Vmin	Vmax
8V	24V	12V	35V

Consumption at 24V DC:

Device	Consumption [W/VA]
HD67943-B2	3.5



Caution: Not reverse the polarity power



HD67943-B2

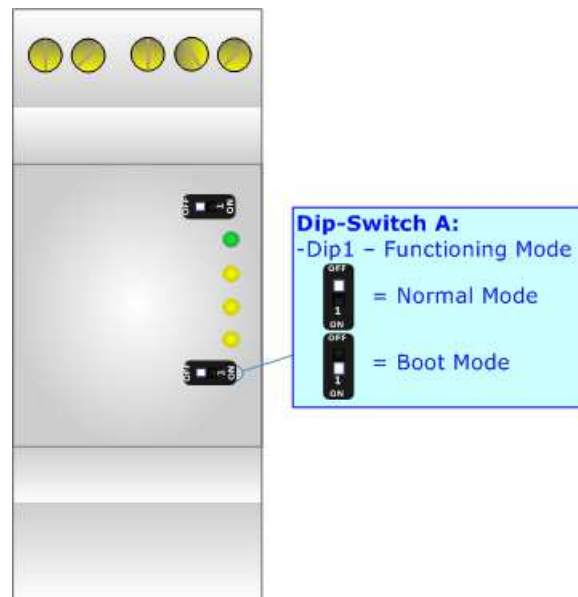
FUNCTION MODES:

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.

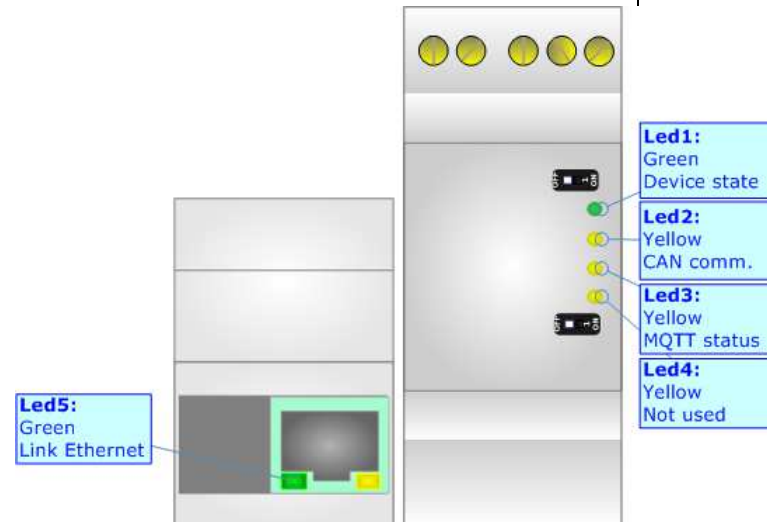
According to the functioning mode, the LEDs will have specifics functions, see 'LEDS' section.



LEDS:

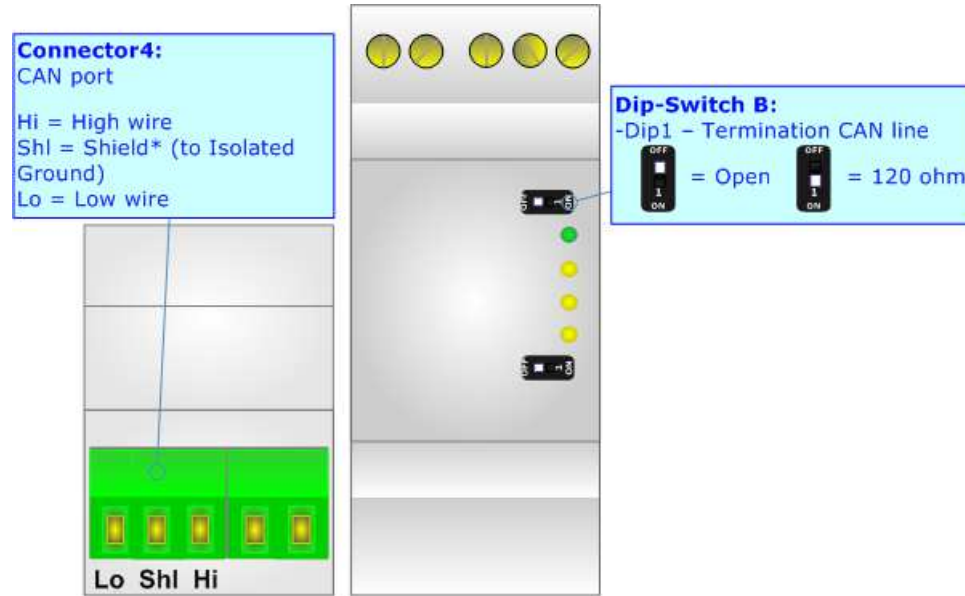
The device has got five LEDs that are used to give information of the functioning status. The various meanings of the LEDs are described in the table below.

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: DeviceNet communication (yellow)	Blinks when DeviceNet 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



CAN:

For terminating the DeviceNet line with a 120Ω resistor it is necessary that the Dip1 of 'Dip-Switch B' is at ON position.



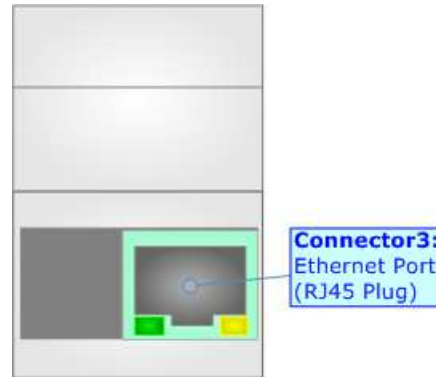
Cable characteristics:

DC parameter:	Impedance	70 Ohm/m
AC parameters:	Impedance	120 Ohm/m
	Delay	5 ns/m
Length	Baud Rate [bps]	Length MAX [m]
	125 K	500
	250 K	250
	500 K	100

ETHERNET:

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

The Ethernet connection must be made using Connector2 of HD67943-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.



USE OF COMPOSITOR SW67943:

To configure the Converter, use the available software that runs with Windows called SW67943. 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 SW67943, the window below appears (Fig. 2).

**Note:**

It is necessary to have installed .Net Framework 4.

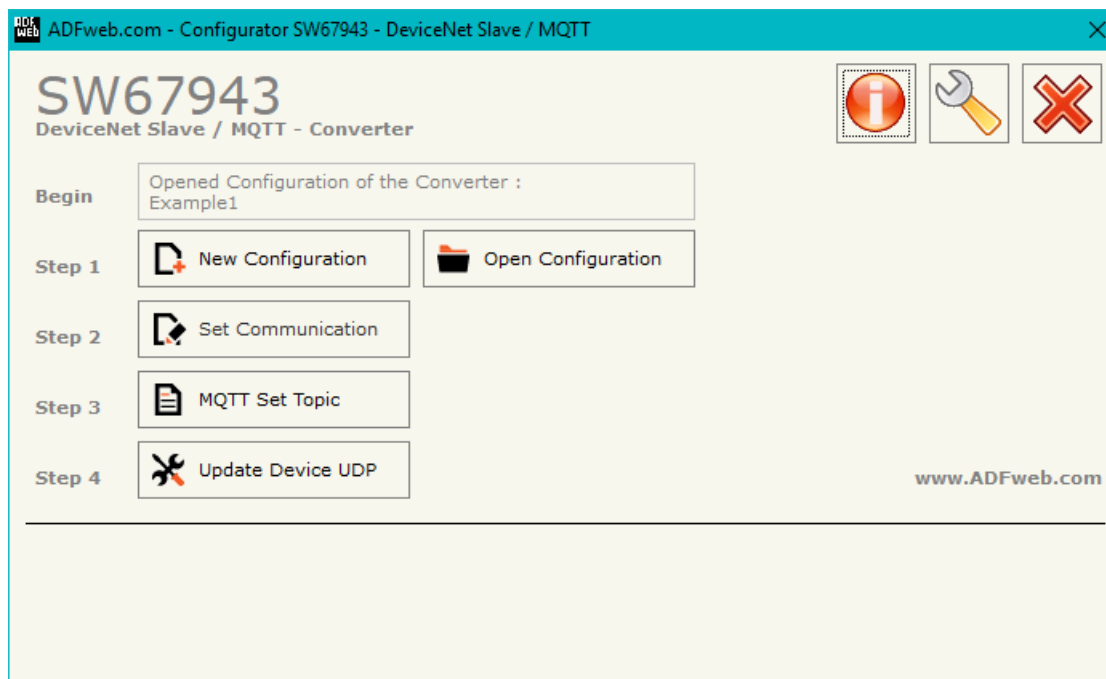
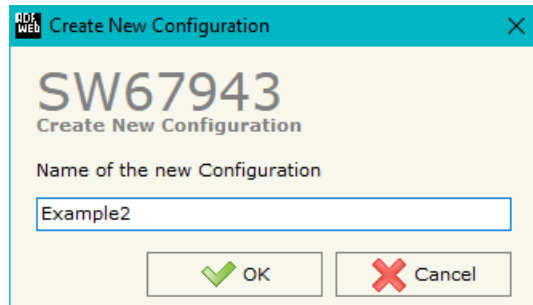


Figure 2: Main window for SW67943

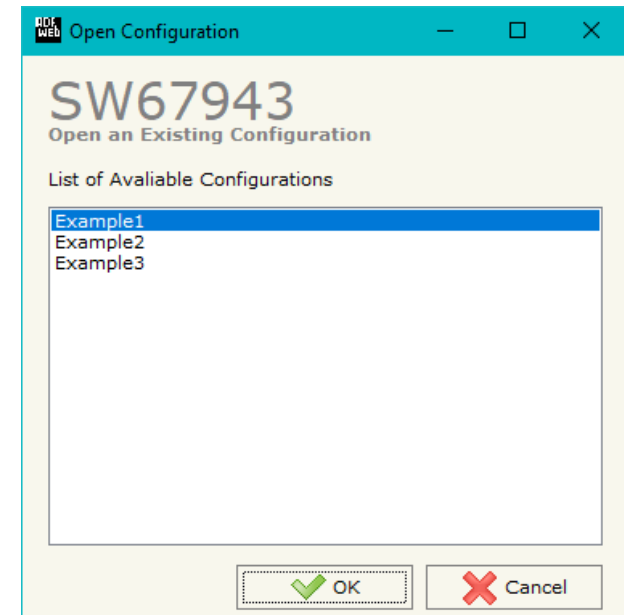
NEW CONFIGURATION / OPEN CONFIGURATION:

The “**New Configuration**” button creates the folder which contains the entire device’s configuration.




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

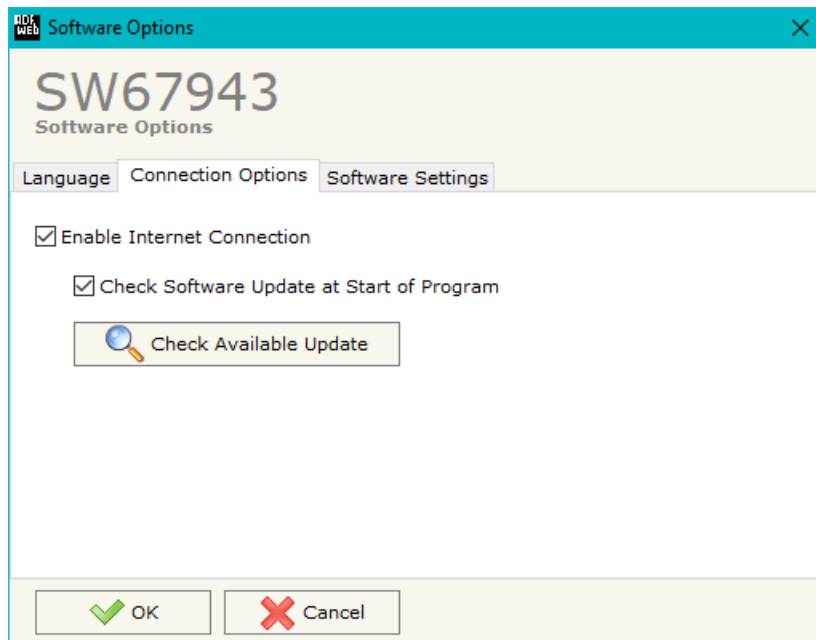
- To clone the configurations of a Programmable “DeviceNet Slave / MQTT - Converter” in order to configure another device in the same manner, it is necessary to maintain the folder and all its contents;
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate the project folder with another name and open the new folder with the button “**Open Configuration**”.



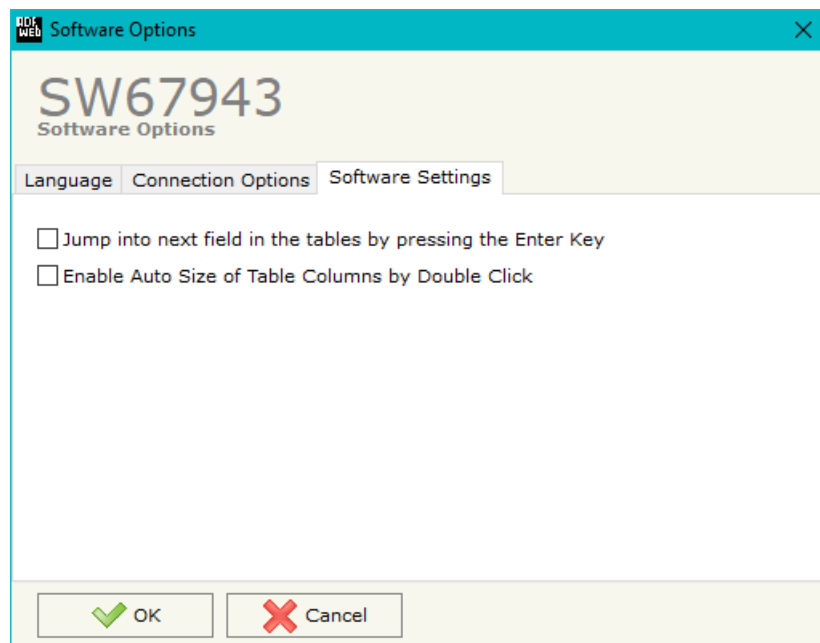
SOFTWARE OPTIONS:

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.



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 SW67943 check 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:

By Pressing the “**Set Communication**” button from the main window for SW67943 (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:

- ➔ DeviceNet Slave
- ➔ MQTT
- ➔ Ethernet
- ➔ Wi-Fi
- ➔ TLS (Transport Layer Security)
- ➔ NTP (Network Time Protocol)

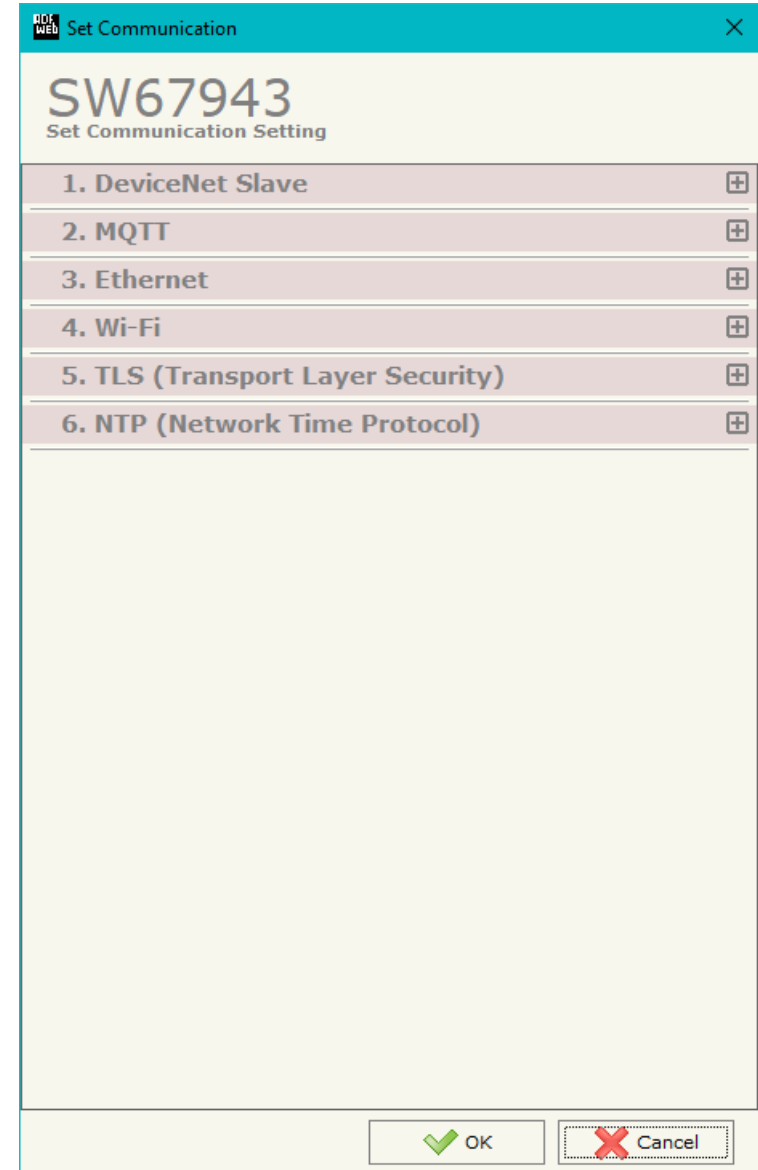
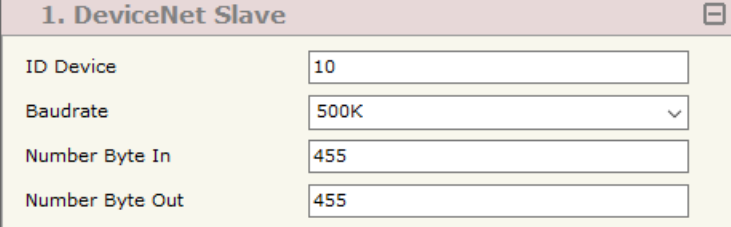


Figure 3a: “Set Communication” window

DEVICENET SLAVE:

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

- In the field "**ID Device**" the address for the DeviceNet Slave is defined;
- In the field "**Baudrate**" the data rate of the DeviceNet Slave bus is defined;
- In the field "**Number Byte IN**" the number input bytes of DeviceNet Slave is defined (at max 455 bytes);
- In the field "**Number Byte OUT**" the number output bytes of DeviceNet Slave is defined (at max 455 bytes).



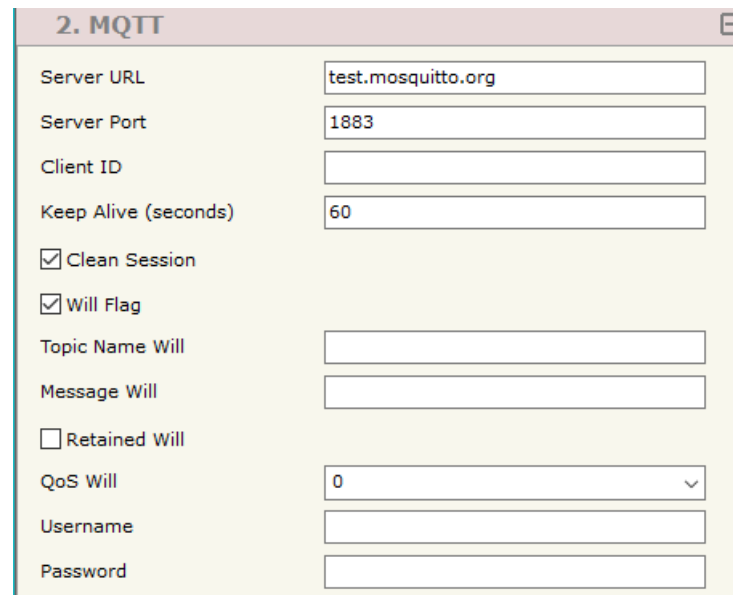
1. DeviceNet Slave	
ID Device	<input type="text" value="10"/>
Baudrate	<input type="text" value="500K"/>
Number Byte In	<input type="text" value="455"/>
Number Byte Out	<input type="text" value="455"/>

Figure 3b: "Set Communication → DeviceNet Slave" 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;
- In 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;
- In the field "**Send Time (seconds)**" the delay with which the MQTT messages are published is defined.



The screenshot shows a configuration window titled "2. MQTT". It contains the following fields and options:

Server URL	test.mosquitto.org
Server Port	1883
Client ID	
Keep Alive (seconds)	60
<input checked="" type="checkbox"/> Clean Session	
<input checked="" type="checkbox"/> Will Flag	
Topic Name Will	
Message Will	
<input type="checkbox"/> Retained Will	
QoS Will	0
Username	
Password	

Figure 3c: "Set Communication → MQTT" window

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.

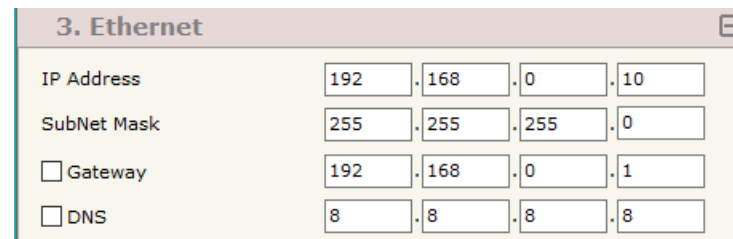
WI-FI:

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.

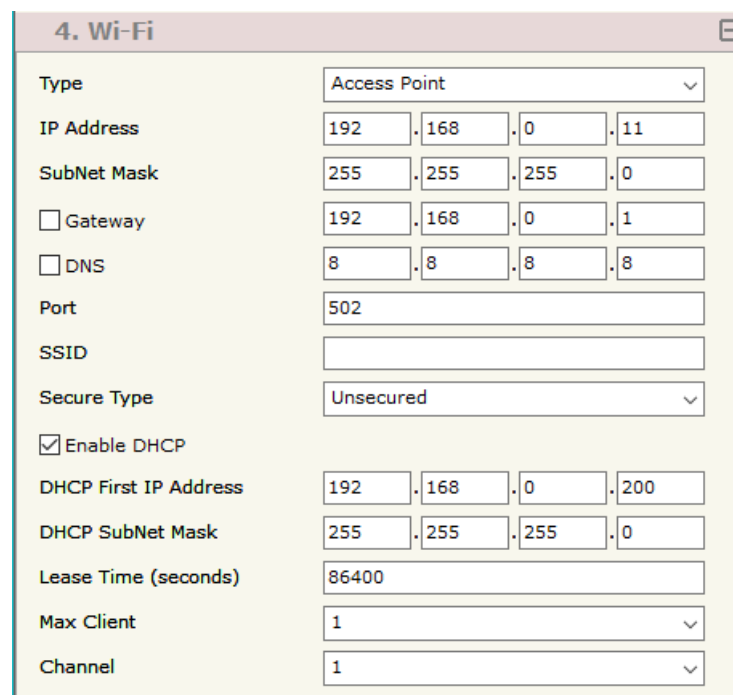
The means of the fields for Access Point configuration are:

- 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;



3. Ethernet				
IP Address	192	.168	.0	.10
SubNet Mask	255	.255	.255	.0
<input type="checkbox"/> Gateway	192	.168	.0	.1
<input type="checkbox"/> DNS	8	.8	.8	.8

Figure 3d: "Set Communication → Ethernet" window



4. Wi-Fi	
Type	Access Point
IP Address	192 .168 .0 .11
SubNet Mask	255 .255 .255 .0
<input type="checkbox"/> Gateway	192 .168 .0 .1
<input type="checkbox"/> DNS	8 .8 .8 .8
Port	502
SSID	
Secure Type	Unsecured
<input checked="" type="checkbox"/> Enable DHCP	
DHCP First IP Address	192 .168 .0 .200
DHCP SubNet Mask	255 .255 .255 .0
Lease Time (seconds)	86400
Max Client	1
Channel	1

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

- 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.

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.

Type	Client Mode
<input type="checkbox"/> Obtain an IP Address automatically	
IP Address	192 . 168 . 0 . 11
SubNet Mask	255 . 255 . 255 . 0
<input type="checkbox"/> Gateway	192 . 168 . 0 . 1
<input type="checkbox"/> DNS	8 . 8 . 8 . 8
Port	502
SSID	
Password	

Figure 3f: "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.

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.

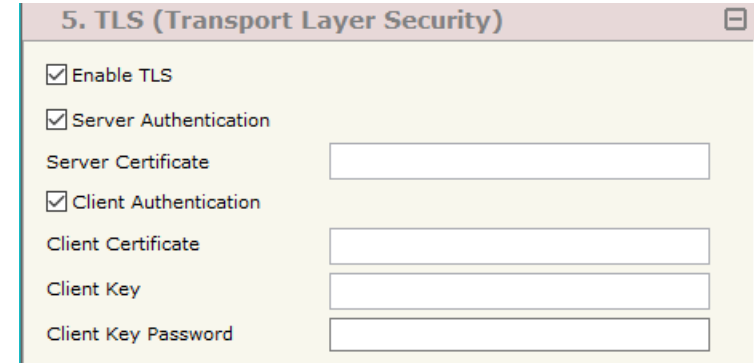


Figure 3g: “Set Communication → TLS” window

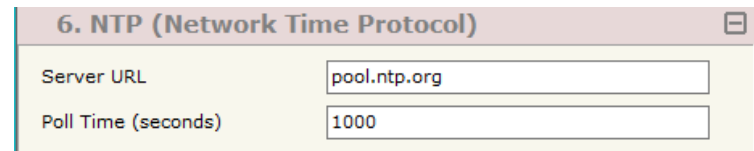


Figure 3h: “Set Communication → NTP” window

MQTT SET TOPIC:

By Pressing the **"MQTT Set Topic"** button from the main window for SW67943 (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 DeviceNet and the topic that the converter will subscribes for writing the data to DeviceNet.

MQTT PUBLISH

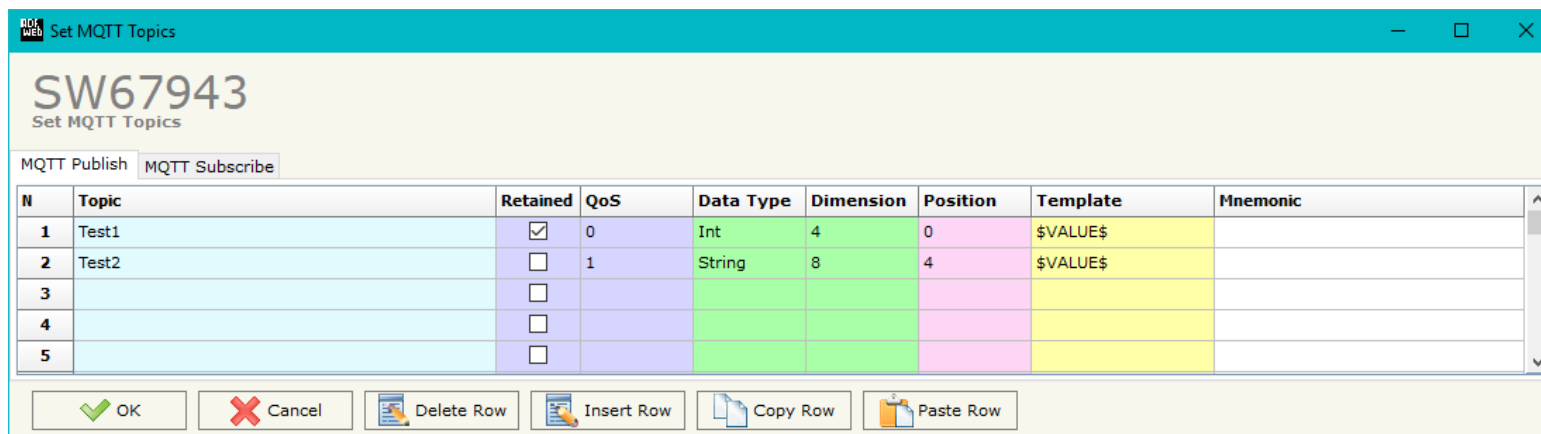


Figure 4a: "Set MQTT Topics → MQTT Publish" window

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 DeviceNet 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;
- In the field **"Mnemonic"** a description of the topic is defined.

MQTT SUBSCRIBE

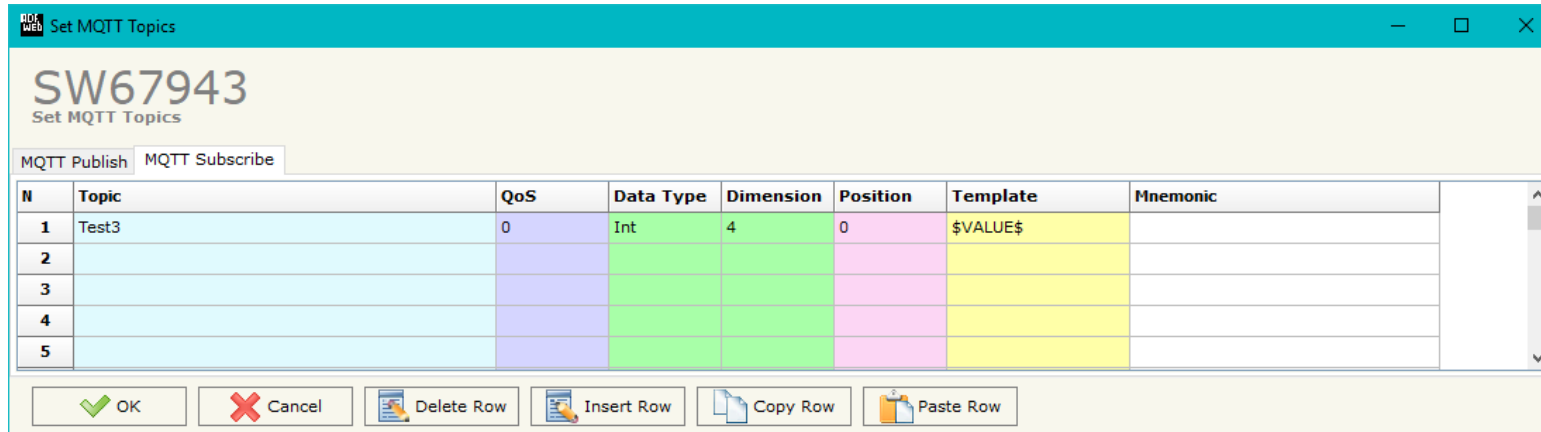


Figure 4b: "Set MQTT Topics → MQTT Subscribe" window

The means of the fields are:

- In the field "**Topic**" the MQTT topic is defined;
- 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 DeviceNet array where placing 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;
- 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.

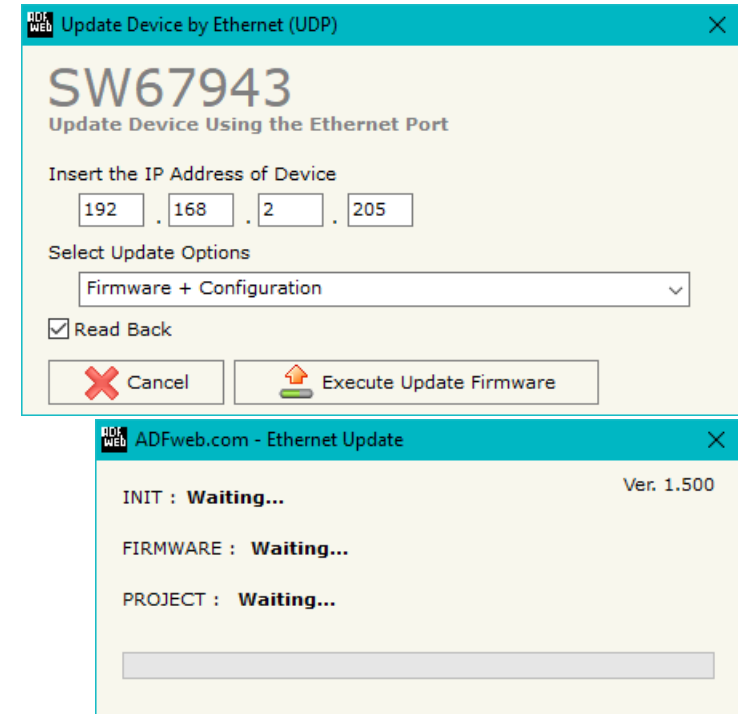


Figure 5: “Update device” windows

**Note:**

When you receive the device, for the first time, you also have to update the Firmware in the HD67943 device.

**Warning:**

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

- Check if the serial COM port selected is the correct one;
- Check if the serial cable is connected between the PC and the device;
- Try to repeat the operations for the updating;
- Try with another PC;
- Try to restart the PC;
- Check the LAN settings;
- If you are using the program inside a Virtual Machine, try to use in the main Operating System;
- If you are using Windows Seven, Vista, 8 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.

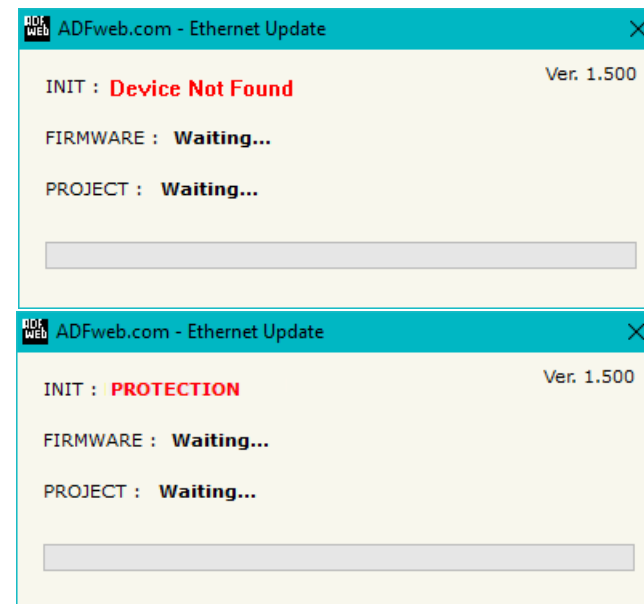


Figure 6: "Error" window

**Warning:**

In the case of HD67943 you have to use the software "SW67943": www.adfweb.com/download/filefold/SW67943.zip.

TEMPLATE STRING: DEFINITION OF MQTT PAYLOAD

In the section "Set Communication" of the SW67943, 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 DeviceNet. The key words used and their meanings are:

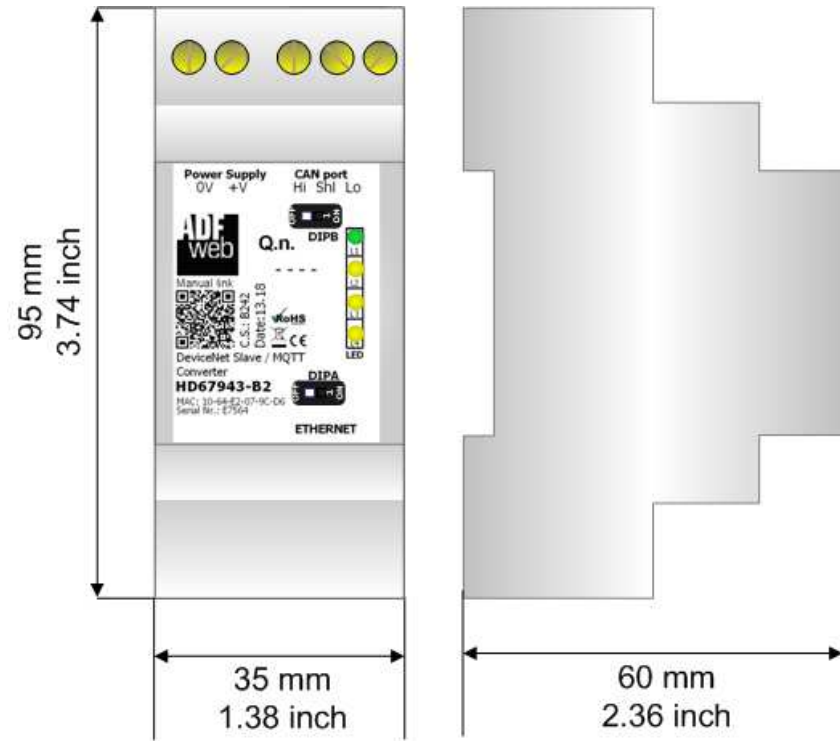
- VALUE: value of the DeviceNet variable
- TIME: date and time of the MQTT message
- DESC: description of the message



Warning:

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

MECHANICAL DIMENSIONS:



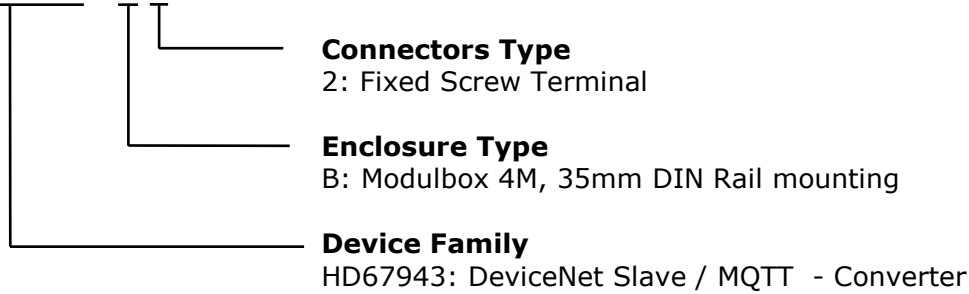
Housing: PVC
 Weight: 200g
 (Approx)

Figure 7: Mechanical dimensions scheme for HD67943-B2

ORDERING INFORMATIONS:

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

HD67943 – B 2



Order Code: **HD67943-B2** - DeviceNet Slave / 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

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.



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

