Industrial Electronic Devices

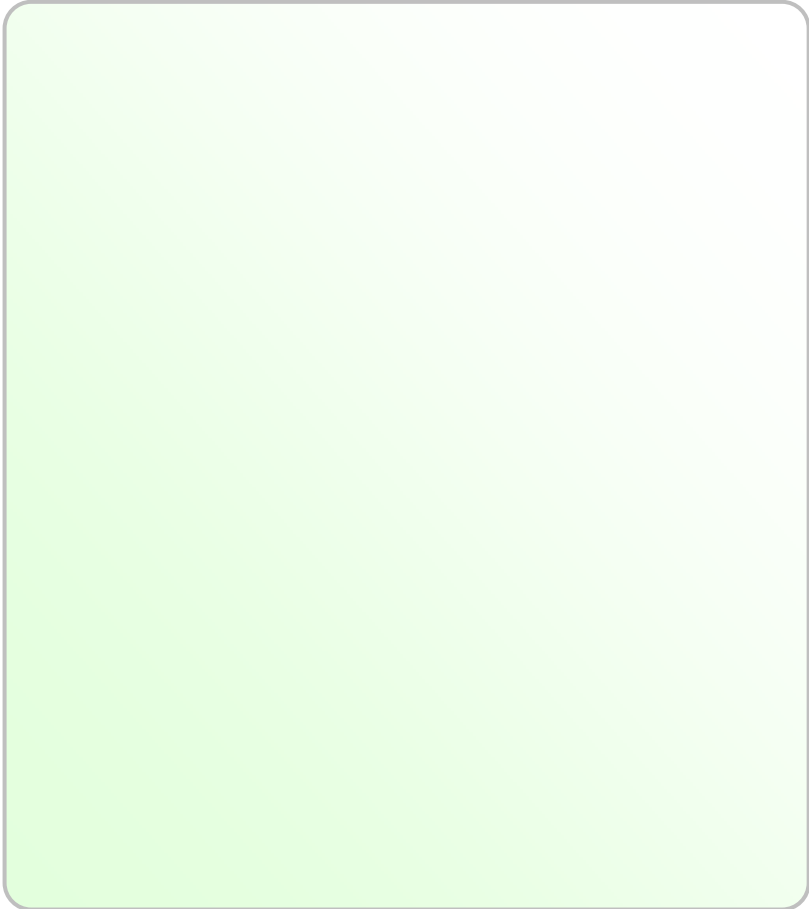# User Manual

Revision 1.000
English

⊕ Triple electrical isolation

⊕ Power Supply 18…35V DC and 8…24 V AC

⊕ Temperature range: -40°C/+85°C (-40°F/+185°F)

Industrial Electronic Devices

INDEX:

UPDATED DOCUMENTATION:

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- ꔷ Updated
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REVISION LIST:

Revision	Date	Author	Chapter	Description
1.000	13/03/2019	Tf	All	First release version

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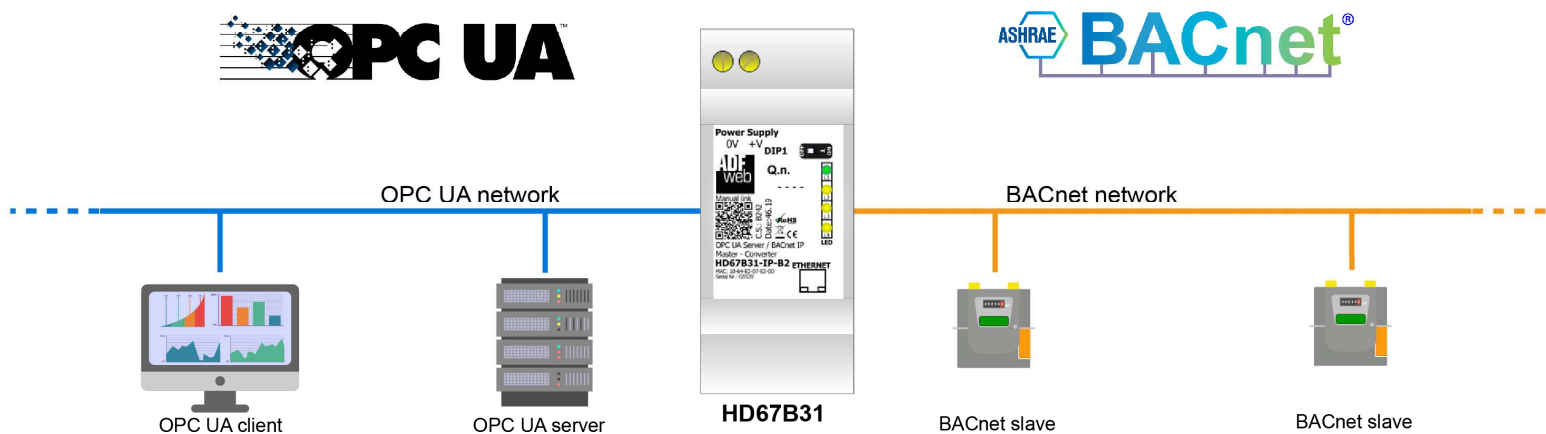
This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

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

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EXAMPLE OF CONNECTION:

OPC UA network

BACnet network

OPC UA client

OPC UA server

HD67B31

BACnet slave

BACnet slave

ADFweb.com srl
Tel. +39 0438 309 131 - Fax +39 0438 492 099
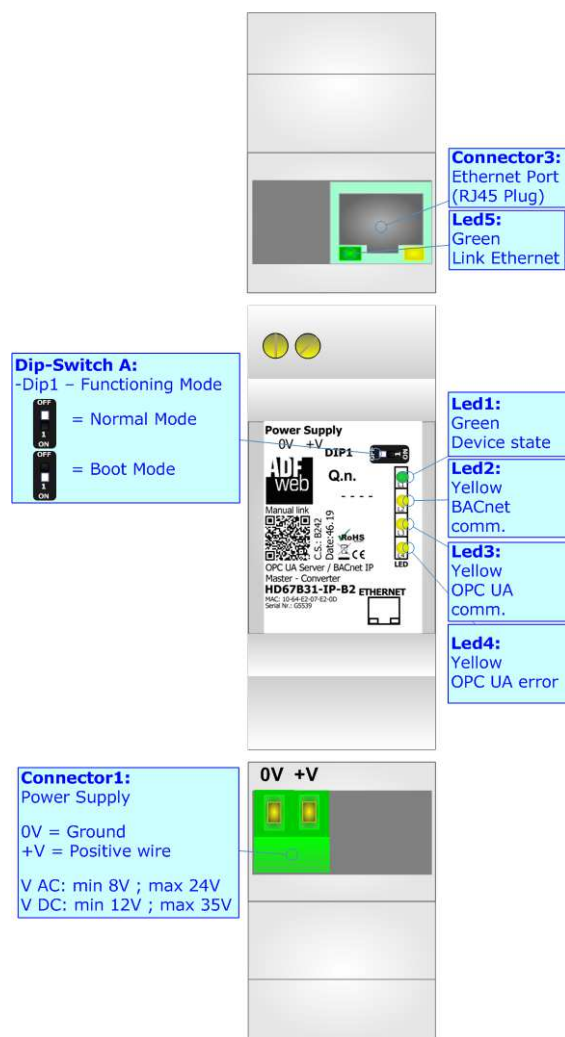info@adfweb-com - www.adfweb.com

CONNECTION SCHEME:

Connector3:
Ethernet Port
(RJ45 Plug)

Led5:
Green
Link Ethernet

Dip-Switch A:
-Dip1 – Functioning Mode

OFF
1 ON   = Normal Mode

OFF
1 ON   = Boot Mode

Led1:
Green
Device state

Led2:
Yellow
BACnet
comm.

Led3:
Yellow
OPC UA
comm.

Led4:
Yellow
OPC UA error

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

Figure 1a: Connection scheme for HD67B31-IP-B2

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
BACnet comm.

Led3:
Yellow
OPC UA comm.

Dip-Switch A:
-Dip1 – Functioning Mode

= Normal Mode

= Boot Mode

Led4:
Yellow
OPC UA error

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 HD67B31-MSTP-B2

CHARACTERISTICS:

The HD67B31-B2 is a OPC UA Server / BACnet Master converter.

It allows the following characteristics:

- Up to 1500 bytes in reading and 1500 bytes in writing;
- Two-directional information between BACnet and OPC UA;
- 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 SW67B31 software on your PC in order to perform the following:

- Define the parameter of OPC UA;
- Define the parameter of BACnet line;
- Update the device.

POWER SUPPLY:

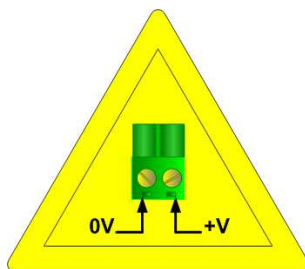The devices can be powered between a wide range of tensions. For more details see the two tables below.

	VAC $\sim$		VDC	
	Vmin	**Vmax**	**Vmin**	**Vmax**
HD67B31-B2	**8V**	**24V**	**12V**	**35V**

Consumption at 24V DC:

Device	W/VA
HD67B31-B2	4

⚠ **Caution: Not reverse the polarity power**

HD67B31-xxx-B2

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

+V 0V
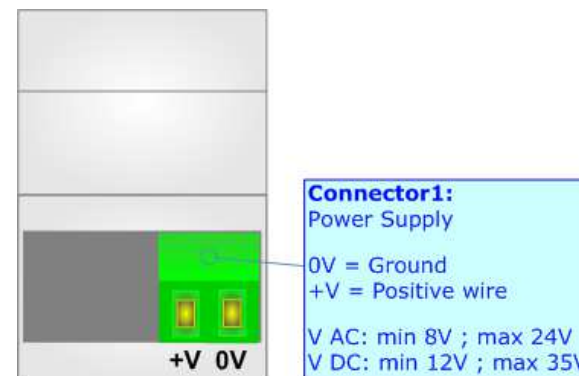
FUNCTION MODES:

The device has got two functions mode depending of the position of the Dip1 of 'Dip-Switch A':

- The first, with Dip1 in Off position (factory setting), is used for the normal working of the device.
- The second, with Dip1 in On position, is used for upload the Project/Firmware.

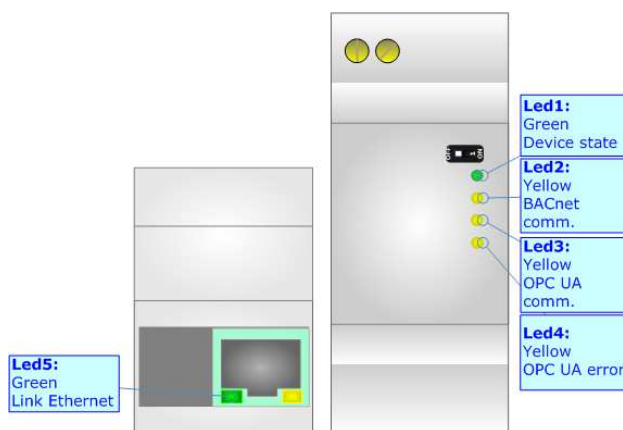For the operations to follow for the updating (see 'UPDATE DEVICE' section).

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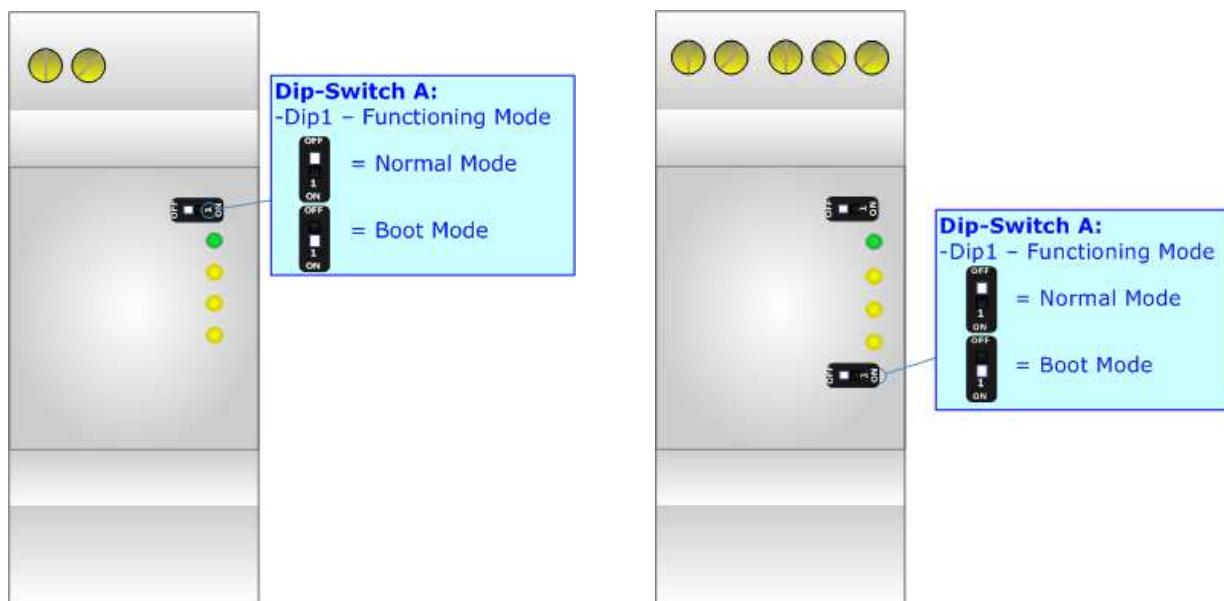
LEDS:

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: BACnet comm. (yellow)	**Flashing:** BACnet response **OFF:** No BACnet response	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: OPC UA comm. (yellow)	**Flashing:** OPC UA request **OFF:** No OPC UA request	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: OPC UA error (yellow)	**ON:** An error has occurred **OFF:** The device is correctly running	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
5: Link Ethernet (green)	**ON:** Ethernet cable connected **OFF:** Ethernet cable disconnected	**ON:** Ethernet cable connected **OFF:** Ethernet cable disconnected

Led1:
Green
Device state

Led2:
Yellow
BACnet comm.

Led3:
Yellow
OPC UA comm.

Led4:
Yellow
OPC UA error

Led5:
Green
Link Ethernet

RS485 (for BACnet MS/TP):

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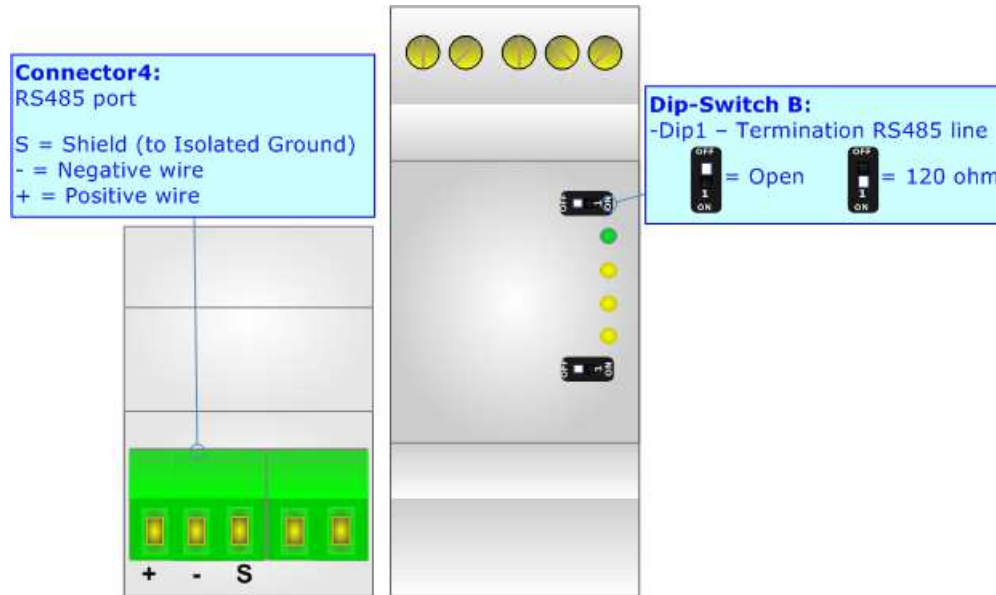
The maximum length of the cable should be 1200m (4000 feet).

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.

ETHERNET:

The Ethernet connection must be made using Connector3 of HD67B31-xxx-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/PLC/other is recommended the use of a cross cable.

Connector3:
Ethernet Port
(RJ45 Plug)

USE OF COMPOSITOR SW67B31:

To configure the Converter, use the available software that runs with Windows called SW67B31. 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 SW67B31, the window below appears (Fig. 2).

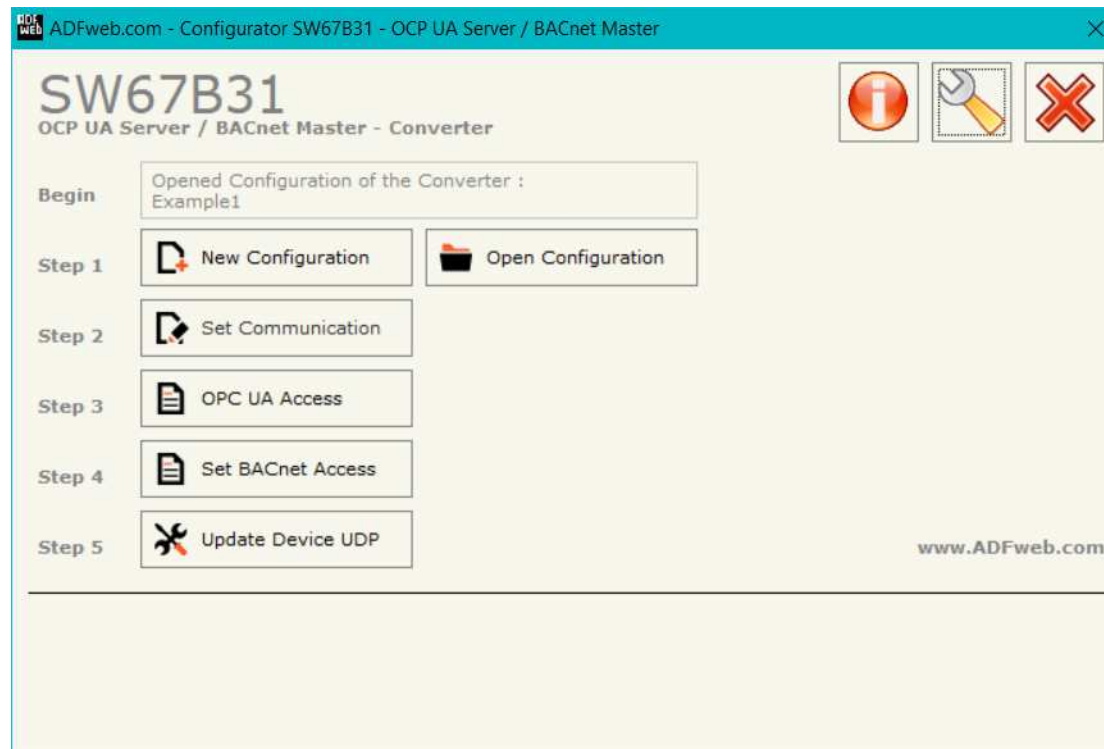Note:
   It is necessary to have installed .Net Framework 4.

Figure 2: Main window for SW67B31

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 "OPC UA Server / BACnet Master - 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**".
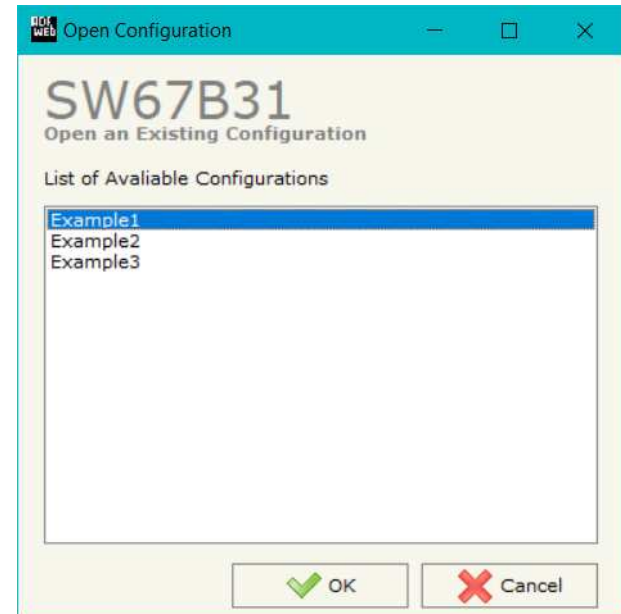
SOFTWARE OPTIONS:

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.
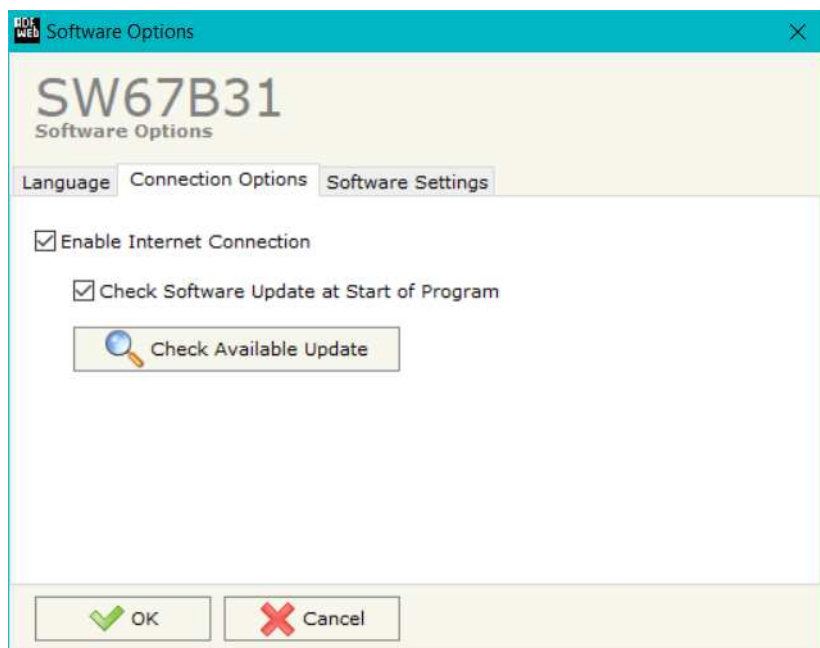
In the section "Connection Options", it is possible to check if there are some updatings of the software compositor in ADFweb.com website.
Checking the option "**Check Software Update at Start of Program**", the SW67B31 check automatically if there are updatings when it is launched.
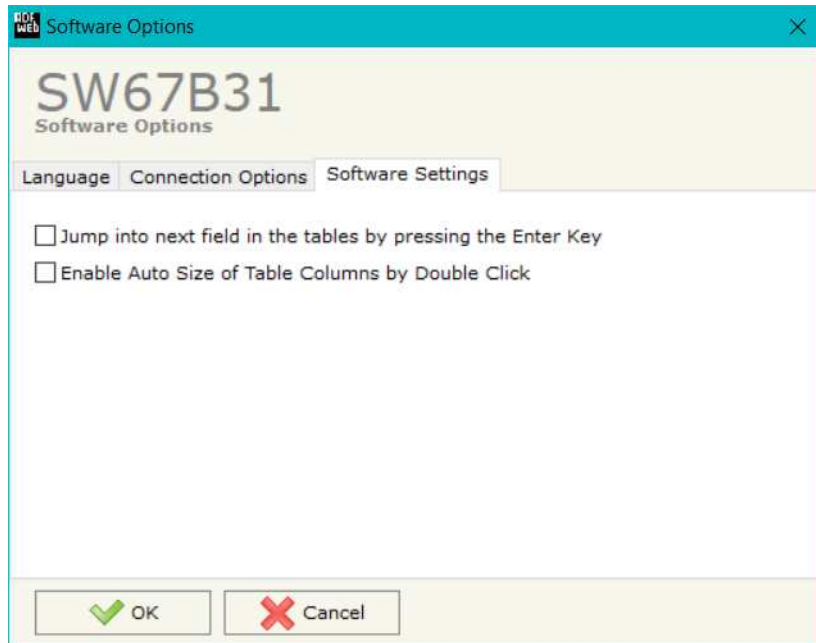
In the section "Software Settings", it is possible to enable/disable some keyboard's commands for an easier navigation inside the tables contained in the different sections of the software.

SET COMMUNICATION:

This section define the fundamental communication parameters of two buses, OPC UA Server and BACnet Master.

By Pressing the "**Set Communication**" button from the main window for SW67B31 (Fig. 2) the window "Set Communication" appears (Fig. 3a).

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

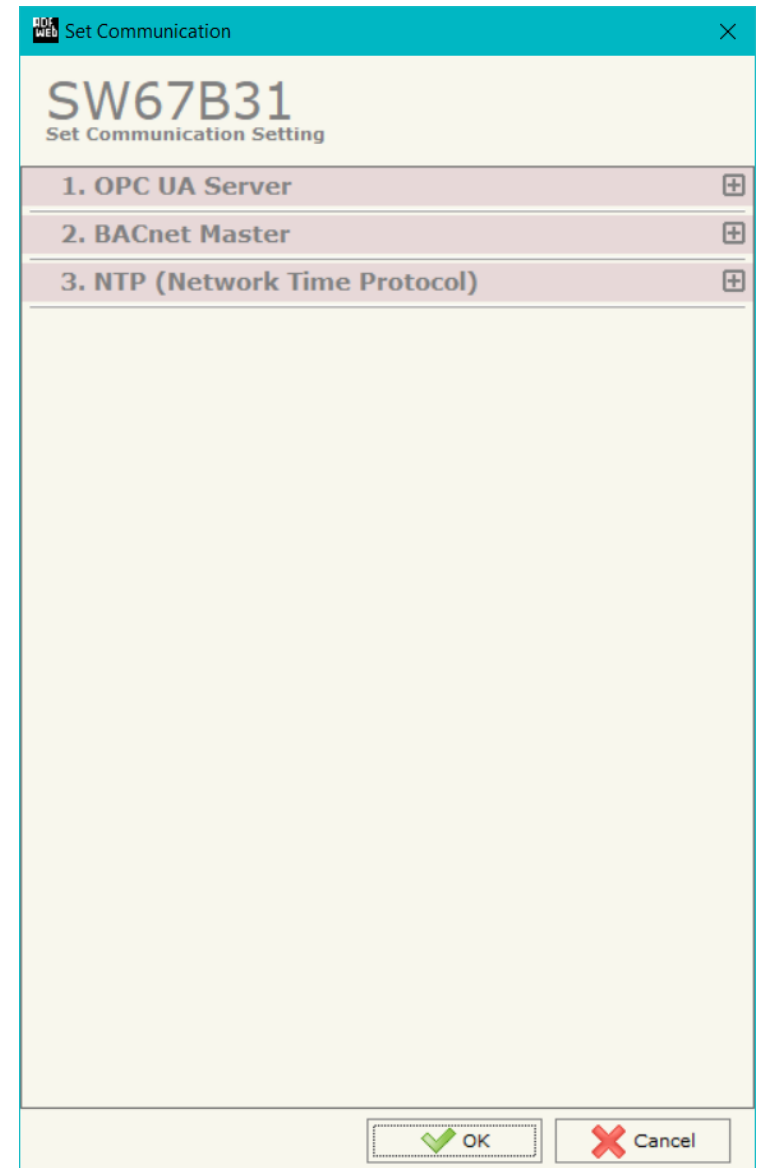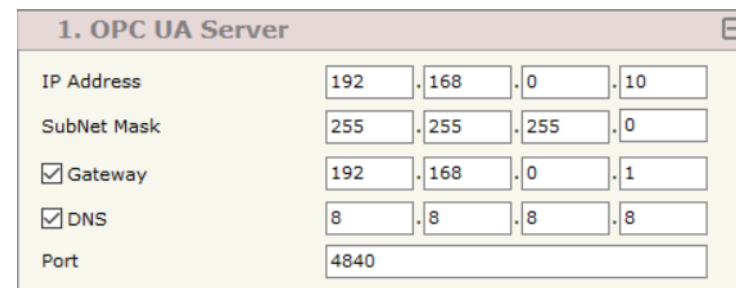- OPC UA Server
- BACnet Master
- NTP (Network Time Protocol)

Figure 3a: "Set Communication" window

Industrial Electronic Devices

OPC UA SERVER:

The means of the fields for "OPC UA Server" are:

+ In the field "**IP Address**" the IP address for OPC UA side of the converter is defined;
+ In the field "**SubNet Mask**" the SubNet Mask for OPC UA side 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 IP Address of the DNS server is defined. This feature can be enabled or disabled pressing the Check Box field;
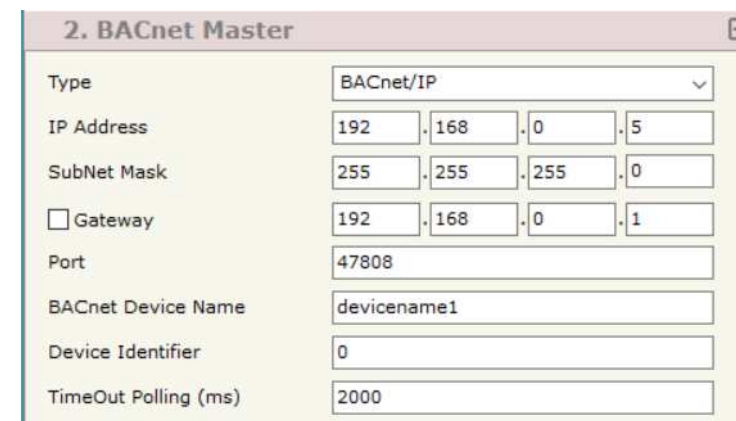+ In the field "**Port**" the port of OPC UA Server is defined.

Figure 3b: "Set Communication → OPC UA Server" window

BACNET MASTER (FOR BACNET/IP):

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

+ the fields "**IP ADDRESS**" the IP address of BACnet/IP side of the converter is defined;
+ In the fields "**SUBNET Mask**" the SubNet Mask of BACnet/IP side of the converter is defined;
+ In the fields "**GATEWAY**" the default gateway of the network is defined. This feature can be enabled or disabled pressing the Check Box field. This feature is used for going out of the net;
+ In the field "**Port**" the port used for BACnet communication is defined. The default port used for BACnet communication is 47808, but is possible to insert any value;
+ In the field "**BACnet Device Name**" the name of BACnet/IP side of the converter is defined;
+ In the field "**Device Identifier**" the ID of BACnet/IP side of the converter is defined;
+ In the field "**TimeOut Polling (ms)**" the timeout for the BACnet requests is defined.

Figure 3c: "Set Communication → BACnet Master" window

Industrial Electronic Devices
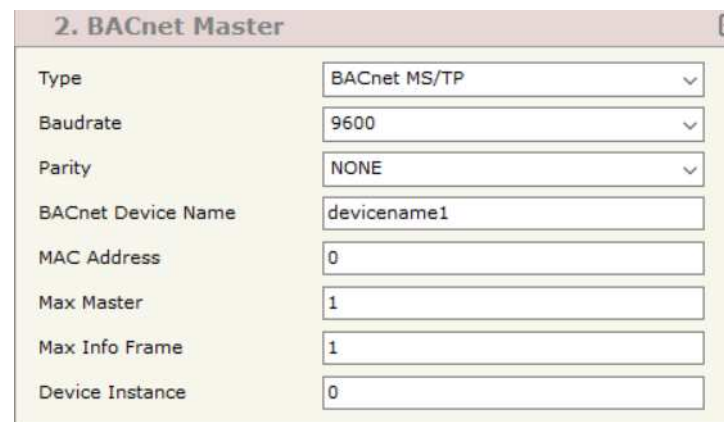
BACNET MASTER (FOR BACNET MS/TP):

This section is used to define the main parameters of BACnet MS/TP line. The means of the fields are:

* In the field "**Baudrate**" the data rate of the BACnet line is defined;
* In the field "**Parity**" the parity of the line is defined;
* In the field "**BACnet Device Name**" the name to give to the BACnet node is defined;
* In the field "**MAC Address**" the MAC of BACnet node (from 0 to 254) is defined;
* The field "**Max Master**" specifies the highest allowable address for master nodes. The value shall be less than or equal to 127;
* The field "**Max Info Frames**" specifies the maximum number of information frames the node may send before it must pass the token;
* In the field "**Device Instance**" the of the BACnet MS/TP side of the converter is defined.

Figure 3d: "Set Communication → BACnet Master" window
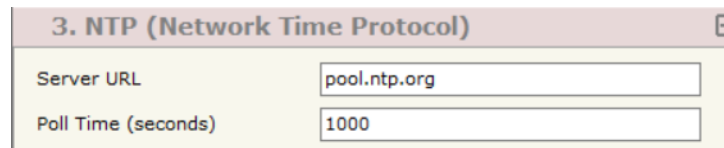
NTP (NETWORK TIME PROTOCOL)

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 3e: "Set Communication → NTP (Network Time Protocol" window

OPC UA ACCESS:

By Pressing the "**OPC UA Access**" button from the main window for SW67B31 (Fig. 2) the window "OPC UA Server Access" appears (Fig. 4). This section is used to define the list of OPC UA variables to read/write.

N	Enable	Type	Position	Length	Name	R/W	Mnemonic
1	☑	Int32	0	4	Test_Int32	Read Only	
2	☑	Float	4	4	Test_Float	Read Only	
3	☑	String	8	20	Test_String	Read Only	
4	☑						
5	☑						

Figure 4: "OPC UA Server Access" window

The means of the checkboxes inside the table are:

➔ In the field "**Type**" the data format of the OPC UA variable is defined;
➔ In the field "**Position**" the starting byte of the internal memory arrays where getting the value is defined;
➔ In the field "**Length**" the byte length of the OPC UA variable is defined;
➔ In the field "**Name**" the name of the OPC UA variable is defined;
➔ In the field "**R/W**" the access type of the OPC UA variable is defined;
➔ In the field "**Mnemonic**" a description of the OPC UA variable is defined.

SET BACNET ACCESS:

By Pressing the "**Set BACnet Access** " button from the main window of SW67B31 (Fig. 2), the window "Set BACnet Access" appears (Fig. 5). The window is divided in two parts, the "**BACnet Read**" that contains the BACnet objects that the converter reads from the BACnet slaves and "**BACnet Write**" that contains the BACnet objects that the converter writes into the BACnet slaves.

N	Enable	IP Address	Object Type	Instance	Property	NByte	En Dest	D Net	D Len	D Add	Poll Time	Max Err	Position	Start Bit	Mnemonic
1	☑	192.168.0.21	Integer Value	0	Present Value (85)	4	☐				1000	0	0	0	
2	☑						☐								
3	☑						☐								
4	☑						☐								
5	☑						☐								

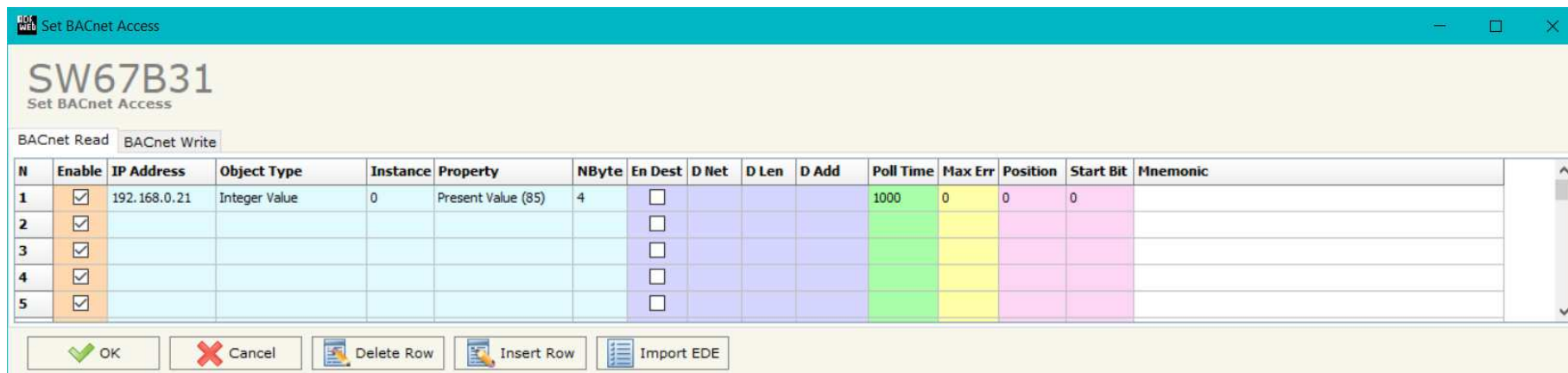OK   Cancel   Delete Row   Insert Row   Import EDE

Figure 5a: "Set BACnet Access → BACnet Read" window

The means of the fields in the window (BACnet in Read) are the following:

- In the field "**IP Address / ID**" the IP address / ID of the slave that contains the data to be read is defined;
- In the field "**Object Type**" the object to be read is defined;
- In the field "**Instance**" the instance number of the object is defined;
- In the field "**Property**" the property to be read is defined;
- In the field "**NByte**" the number of bytes of the BACnet object is defined;
- By checking the field "**En Dest**" it is possible to enable the Destination Network (D Net), Destination Length (D Len) and Destination Address (D Adr). These informations are used for make a request to other segments of network (through a BACnet router);
- In the field "**D Net**" the destination network (from 1 to 65535) is defined;
- In the field "**D Len**" the length of "D Add" field (1 or 2 or 6) is defined;

- In the field "**D Add**" the address of the endpoint is defined. If "D Len" is '1' it is possible to insert a number from 1 to 255; if "D Len" is '2' it is possible to insert a number from 1 to 65535; if "D Len" is '6' it is possible to insert an IP and port in this format "192.168.2.188:47808";
- In the field "**Poll Time**" the frequency of the request is defined (in ms);
- In the field "**Max Error**" the number of consecutive errors that the Master waits before resetting the data for the specific requests is defined;
- In the field "**Position**" the starting byte of the internal memory array where mapping the data read is defined;
- The field "**Start Bit**" is used for the "Binary Output" BACnet objects. It is possible to select the bit in the byte where saving the data;
- In the field "**Mnemonic**" a description of the data inserted in the row is defined.
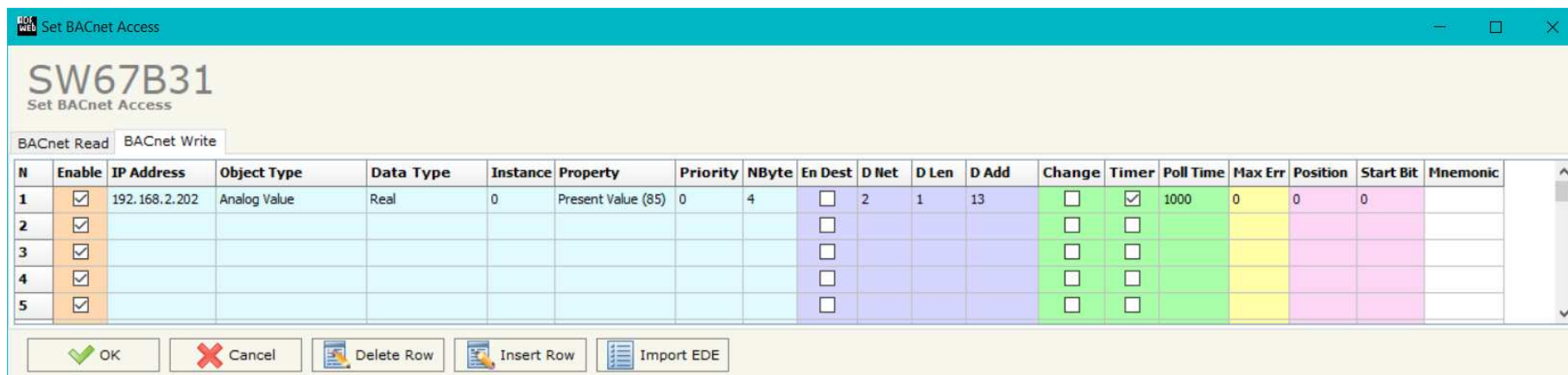
Figure 5b: "Set BACnet Access → BACnet Write" window

The means of the fields in the window (Write) are the following:

- In the field "**IP Address / ID**" the IP address / ID of the slave that contains the data to be written is defined;
- In the field "**Object Type**" the object to be written is defined;
- In the field "**Data Type**" the type of data to write is defined;
- In the field "**Instance**" the instance number of the object is defined;
- In the field "**Property**" the property to be read is defined;
- In the field "**Priority**" the priority of the BACnet request is defined;
- In the field "**NByte**" the number of bytes of the BACnet object is defined;
- By checking the field "**En Dest**" it is possible to enable the Destination Network (D Net), Destination Length (D Len) and Destination Address (D Adr). These informations are used for make a request to other segments of network (through a BACnet router);
- In the field "**D Net**" the destination network (from 1 to 65535) is defined;
- In the field "**D Len**" the length of "D Add" field (1 or 2 or 6) is defined;
- In the field "**D Add**" the address of the endpoint is defined. If "D Len" is '1' it is possible to insert a number from 1 to 255; if "D Len" is '2' it is possible to insert a number from 1 to 65535; if "D Len" is '6' it is possible to insert an IP and port in this format "192.168.2.188:47808";
- By checking the field "**Change**" the BACnet write request is made only if MQTT data are changed; otherwise (if is selected the field "**Timer**") it is sent cyclically, using the "Poll Time";
- In the field "**Poll Time**" the frequency of the request is defined (in ms);

- In the field "**Max Error**" the number of consecutive errors that the Master waits before stopping the specific requests is defined;
- In the field "**Position**" the starting byte of the internal memory array from which taking the data to write is defined;

- The field "**Start Bit**" is used for the "Binary Output" BACnet objects. It is possible to select the bit in the byte from which taking the data;
- In the field "**Mnemonic**" a description of the data inserted in the row is defined.

UPDATE DEVICE:

By pressing the "**Update Device**" button, it is possible to load the created Configuration into the device; and also the Firmware, if necessary. This by using the Ethernet port.

If you don't know the actual IP address of the device you have to use this procedure:

- Turn OFF the Device;
- Put Dip1 of 'Dip-Switch A' in ON position;
- Turn ON the device
- Connect the Ethernet cable;
- Insert the IP "**192.168.2.205**";
- Select which operations you want to do;
- Press the "**Execute update firmware**" button to start the upload;
- When all the operations are "OK" turn OFF the Device;
- Put Dip1 of 'Dip-Switch A' in OFF position;
- Turn ON the device.

Figure 6: "Update device" windows

If you know the actual IP address of the device, you have to use this procedure:

- Turn ON the Device with the Ethernet cable inserted;
- Insert the actual IP of the Converter;
- Select which operations you want to do;
- Press the "**Execute update firmware**" button to start the upload;
- When all the operations are "OK" the device automatically goes at Normal Mode.

At this point the configuration/firmware on the device is correctly updated.
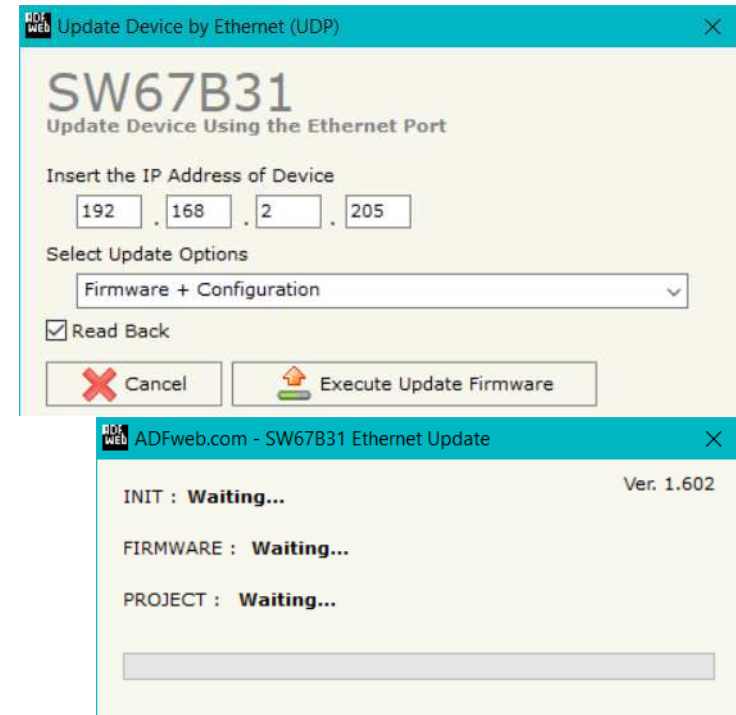
Note:
When you receive the device, for the first time, you also have to update the Firmware in the HD67B31 device.

Warning:
If Fig. 11 appears when you try to do the Update try these points before seeking assistance:

- 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 HD67B31 you have to use the software "SW67B31": www.adfweb.com\download\filefold\SW67B31.zip.

MECHANICAL DIMENSIONS:
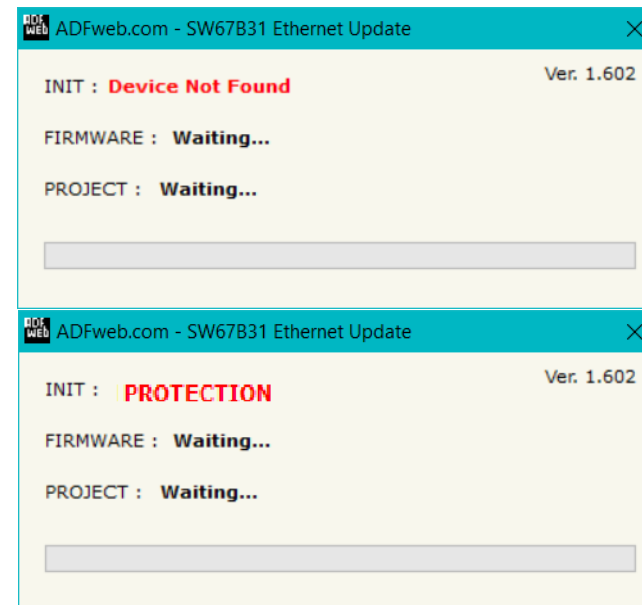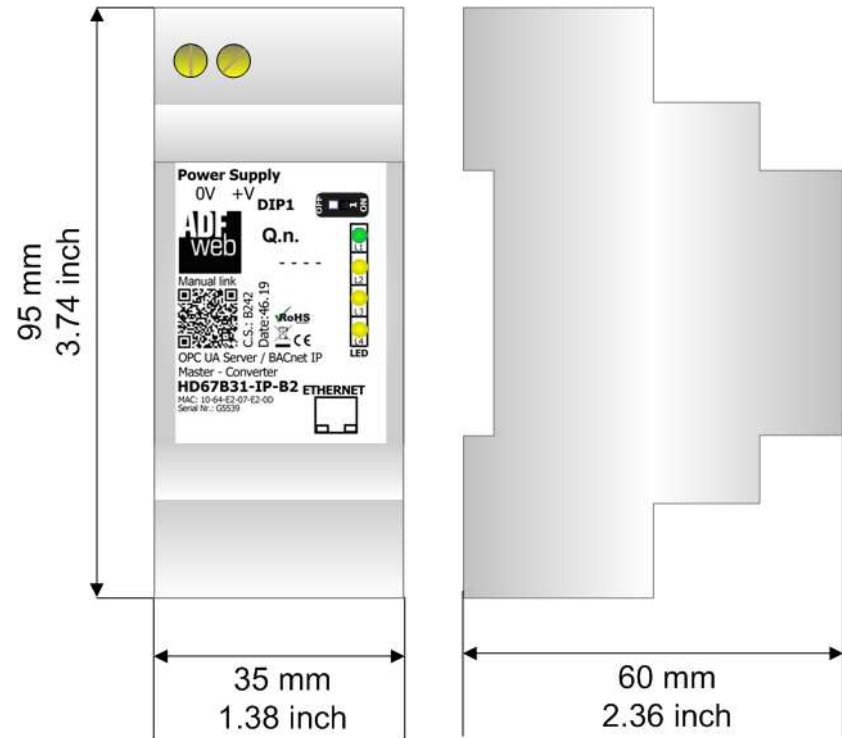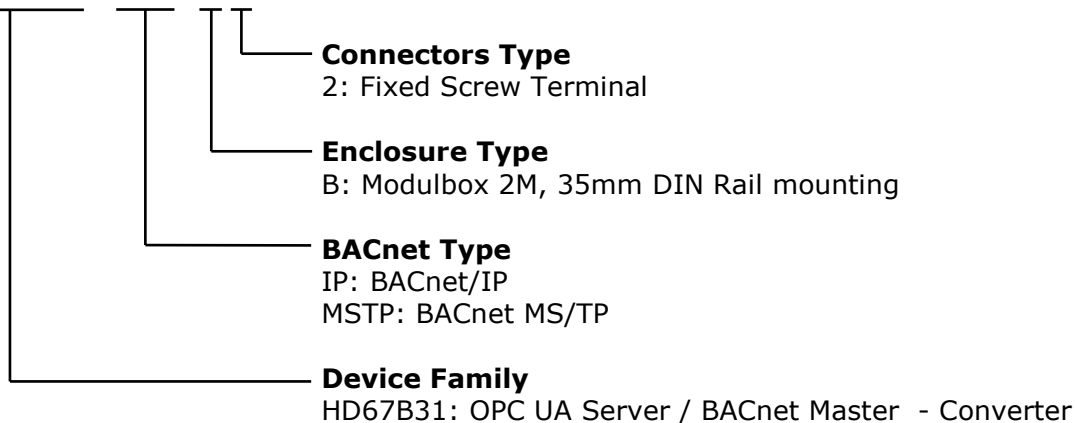

Figure 8: Mechanical dimensions scheme for HD67B31-xxx-B2

ORDERING INFORMATIONS:

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

HD67B31 – xxx - B 2

Connectors Type
2: Fixed Screw Terminal

Enclosure Type
B: Modulbox 2M, 35mm DIN Rail mounting

BACnet Type
IP: BACnet/IP
MSTP: BACnet MS/TP

Device Family
HD67B31: OPC UA Server / BACnet Master - Converter

Order Code: **HD67B31-IP-B2**   -   OPC UA Server / BACnet/IP Master – Converter
Order Code: **HD67B31-MSTP-B2**   -   OPC UA Server / BACnet MS/TP Master – Converter

ACCESSORIES:

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

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

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.