![ADFweb logo]

Industrial Electronic Devices

User Manual

Revision 1.000
English

OPC UA Client / NMEA2000 - Converter

(Order Code: HD67B21-B2)

for Website information:
http://www.adfweb.com/?Product=HD67B21

for Price information:
http://www.adfweb.com/?Price=HD67B21-B2

Benefits and Main Features:

⊕ Triple electrical isolation

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

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

User Manual

For others OPC UA Client devices, see also the following links:

OPC UA Client from/to …

www.adfweb.com?Product=HD67B08	(**Serial**)
www.adfweb.com?Product=HD67B09	(**Modbus Slave**)
www.adfweb.com?Product=HD67B10	(**Modbus TCP Slave**)
www.adfweb.com?Product=HD67B11	(**BACnet**)
www.adfweb.com?Product=HD67B12	(**CAN**)
www.adfweb.com?Product=HD67B13	(**CANopen**)
www.adfweb.com?Product=HD67B14	(**DeviceNet Slave**)
www.adfweb.com?Product=HD67B15	(**DMX**)
www.adfweb.com?Product=HD67B16	(**EtherNet/IP Slave**)
www.adfweb.com?Product=HD67B17	(**J1939**)
www.adfweb.com?Product=HD67B18	(**KNX**)
www.adfweb.com?Product=HD67B19	(**MQTT**)
www.adfweb.com?Product=HD67B20	(**NMEA0183**)
www.adfweb.com?Product=HD67B22	(**PROFINET**)
www.adfweb.com?Product=HD67B23	(**SNMP Agent**)

Do you have an your customer protocol?
See the following links:
www.adfweb.com?Product=HD67003

Do you need to choose a device? do you want help?
Ask it to the following link:
www.adfweb.com?Cmd=helpme

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	13/03/2019	Tf	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:
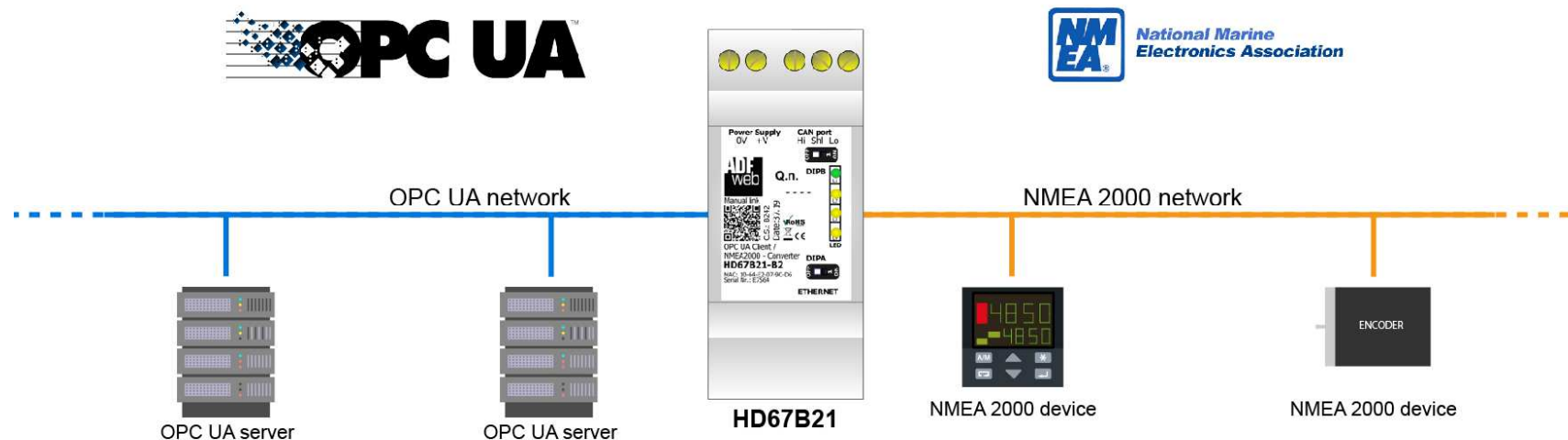
⚠️ This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

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.

EXAMPLE OF CONNECTION:

ADFweb.com
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 B:
-Dip1 – Termination CAN line

= Open   = 120 ohm

Led1:
Green
Device state

Led2:
Yellow
OPC UA
comm.

Led3:
Yellow
NMEA 2000
comm.

Dip-Switch A:
-Dip1 – Functioning Mode

= Normal Mode

= Boot Mode

Led4:
Yellow
Error state

Power Supply   CAN port
0V +V   Hi Shl Lo

Q.n.   DIPB

OPC UA Client /
NMEA2000 - Converter
HD67B21-B2

DIPA

ETHERNET

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

0V +V Hi Shl Lo

Connector4:
CAN port

Hi = High wire
Shl = Shield* (to Isolated Ground)
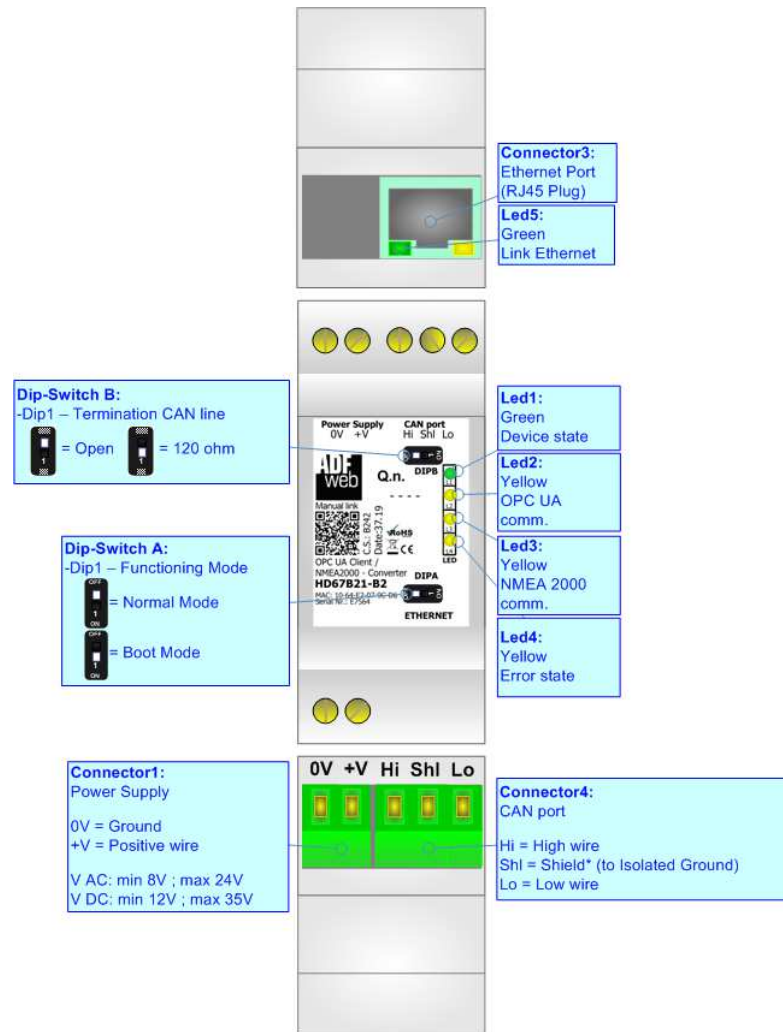Lo = Low wire

Figure 1: Connection scheme for HD67B21-B2

CHARACTERISTICS:

The HD67B21-B2 is a OPC UA Client / NMEA2000 converter.

It allows the following characteristics:

- Up to 1500 bytes in reading and 1500 bytes in writing;
- Two-directional information between NMEA2000 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 SW67B21 software on your PC in order to perform the following:

- Define the parameter of OPC UA;
- Define the parameter of NMEA2000 line;
- Define the list of OPC UA servers connected to the converter;
- Define the list of NMEA2000 messages in reception and transmission;
- Update the device.

POWER SUPPLY:

The devices can be powered between a wide range of tensions. For more details see the two tables below.
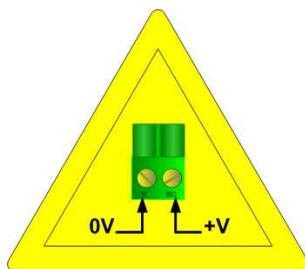
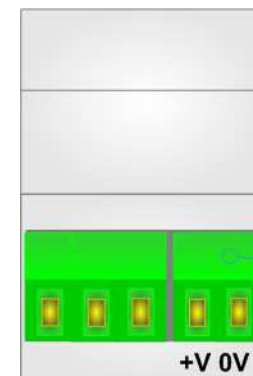|	VAC 〜		VDC ▬▬▬	
	Vmin	**Vmax**	**Vmin**	**Vmax**
HD67B21-B2	**8V**	**24V**	**12V**	**35V**

Consumption at 24V DC:

Device	W/VA
HD67B21-B2	4

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

HD67B21-B2

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

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).
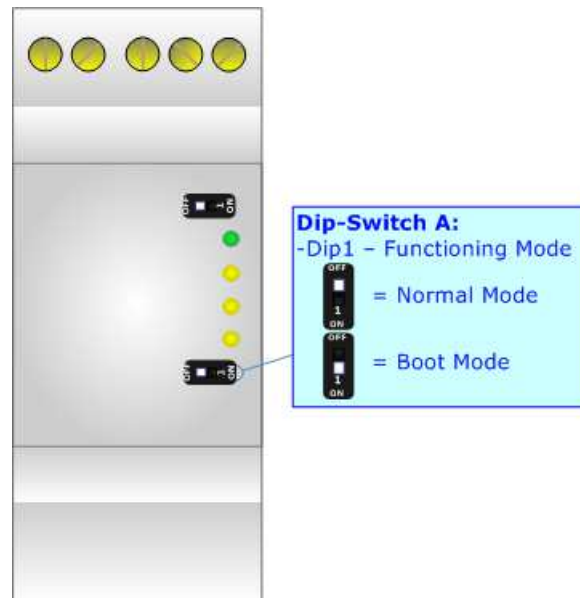
LEDS:

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: OPC UA comm. (yellow)	**Flashing:** OPC UA response **OFF:** No OPC UA response	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: NMEA2000 comm. (yellow)	**Flashing:** NMEA2000 communication **OFF:** No NMEA2000 communication	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: Error state (yellow)	**ON:** At least one OPC UA Server is disconnected **OFF:** all OPC UA Servers are connected	**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
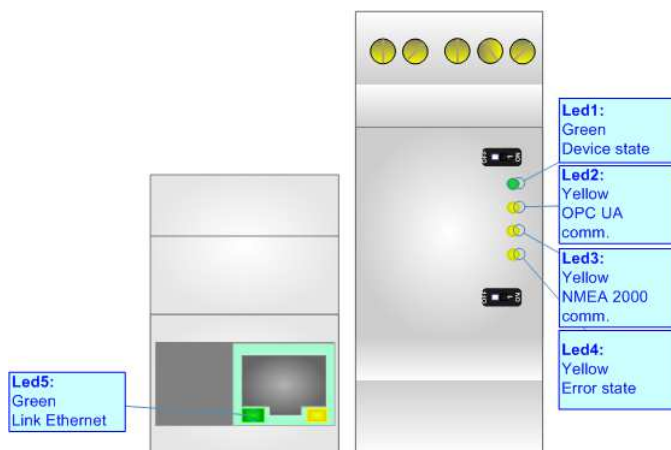
CAN:

For terminating the CAN line with a 120Ω resistor it is necessary that the Dip1 of 'Dip-Switch A' 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]
		10 K	5000
		20 K	2500
		50 K	1000
		100 K	650
		125 K	500
		250 K	250
		500 K	100
		800 K	50
		1000 K	25

ETHERNET:

The Ethernet connection must be made using Connector3 of HD67B21-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)
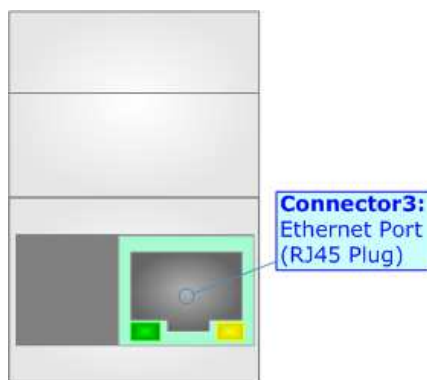
USE OF COMPOSITOR SW67B21:

To configure the Converter, use the available software that runs with Windows called SW67B21. 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 SW67B21, the window below appears (Fig. 2).

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

Figure 2: Main window for SW67B21

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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 Client / NMEA2000 - 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**".
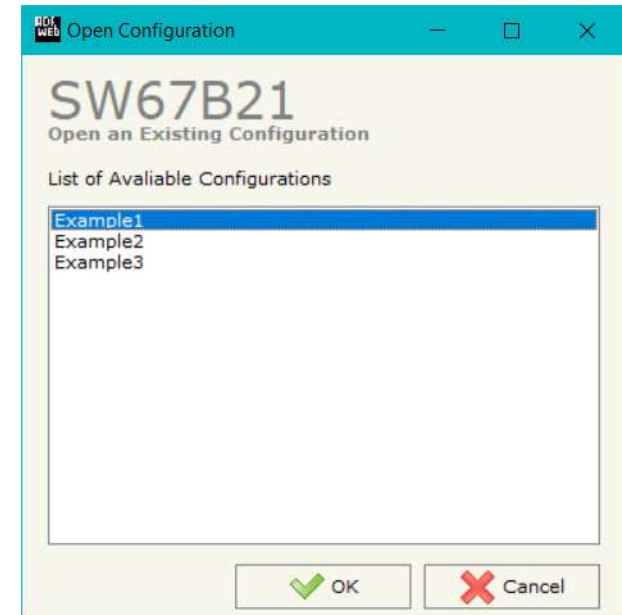
SOFTWARE OPTIONS:

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.
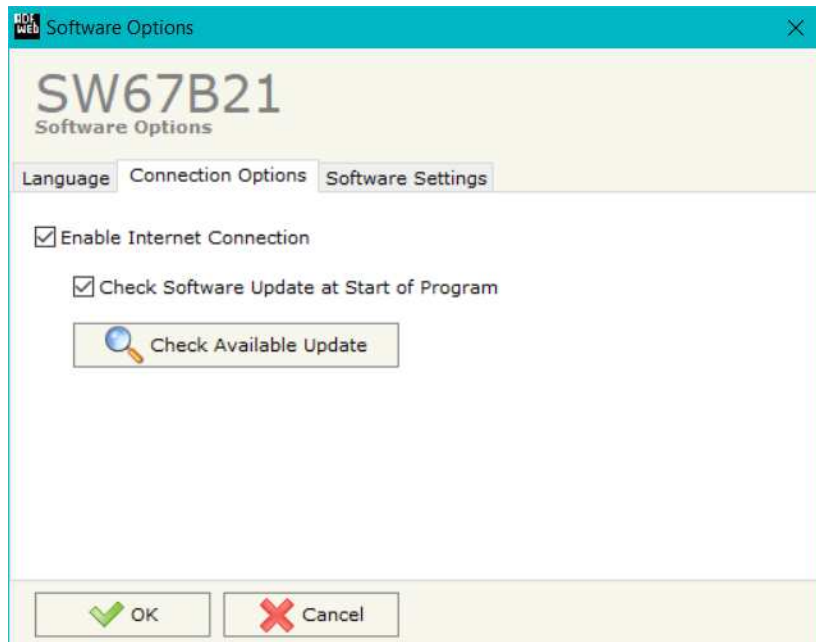
In the section "Connection Options", it is possible to check if there are some updatings of the software compositor in ADFweb.com website.
Checking the option "**Check Software Update at Start of Program**", the SW67B21 check automatically if there are updatings when it is launched.
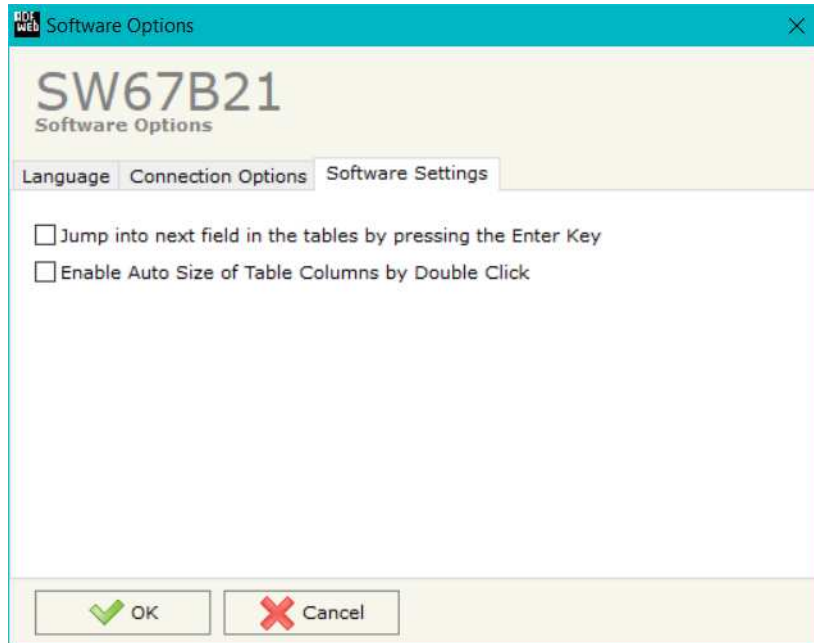
In the section "Software Settings", it is possible to enable/disable some keyboard's commands for an easier navigation inside the tables contained in the different sections of the software.

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SET COMMUNICATION:

This section define the fundamental communication parameters of two buses, OPC UA and NMEA2000.

By Pressing the "**Set Communication**" button from the main window for SW67B21 (Fig. 2) the window "Set Communication" appears (Fig. 3).

The means of the fields for "OPC UA Client" are:
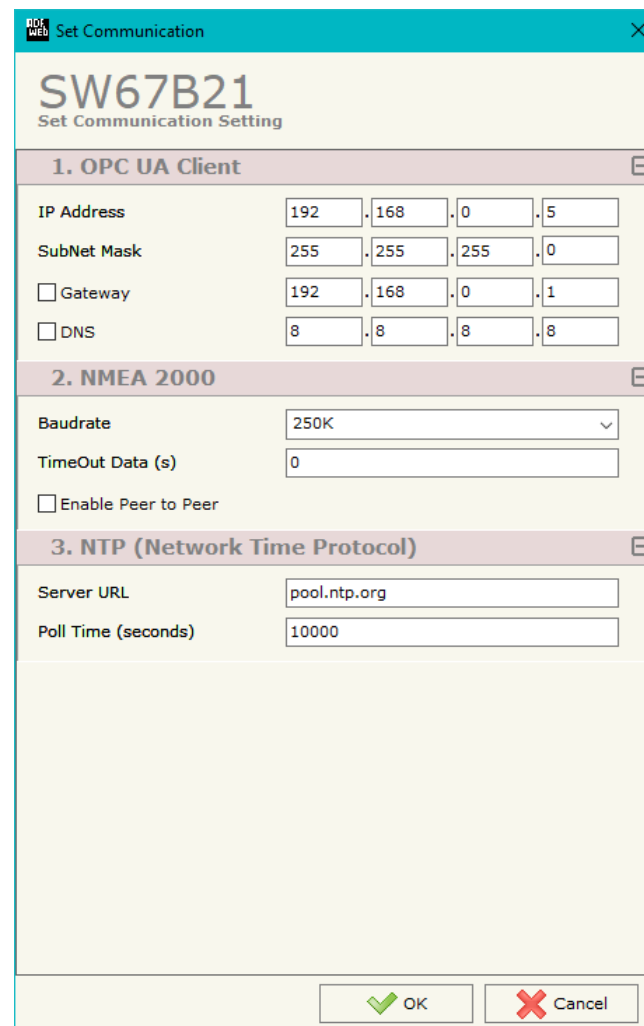
➜ In the field "**IP Address**" the IP address for OPC UA side of the converter is defined;

➜ 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.

The means of the fields for "J1939" are:

➜ In the field "**Baudrate**" the data rate of J1939 is defined;

➜ In the field "**TimeOut Data**" a time is defined. When a NMEA2000 message is not received in this time, the data on OPC UA side are set to 0xFF;

➜ If the field "**Enable Peer to Peer**" is checked, the gateway will mask the Source Address of the NMEA2000 messages received.

The means of the fields for "NTP (Network Time Protocol)" 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 3: "Set Communication" window

OPC UA ACCESS:

By Pressing the "**OPC UA Client Access**" button from the main window for SW67B21 (Fig. 2) the window "OPC UA Client Access" appears (Fig. 4).
This section is used to define the list of the OPC UA Servers to read/write with the OPC UA Client.
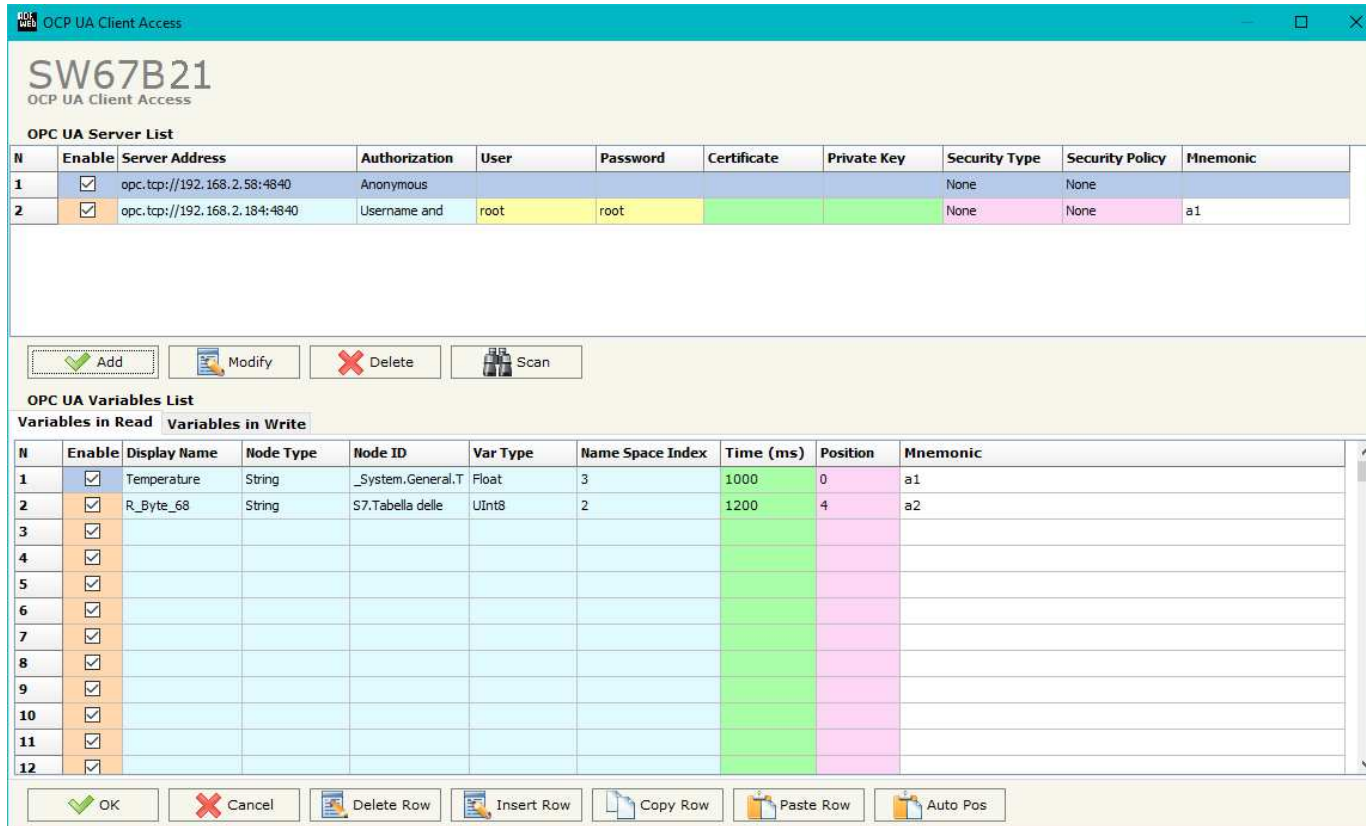

Figure 4: "OPC UA Client Access" window

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By clicking on "**Add**", it is possible to add a new OPC UA Server inserting its characteristics (Server Address, Authorization, Security Type…). The window "Add OPC UA Server" appears (Fig. 5). By clicking on "**Modify**", it is possible to change these characteristics for the selected Server. The window "Modify OPC UA Server" appears (Fig. 6).

Figure 5: "Add OPC UA Server"   Figure 6: "Modify OPC UA Server"

By clicking on "**Scan**", it is possible to get the list of available variables from the selected Server. The window "Scan Server OPC UA" appears (Fig. 7).

Figure 7: "Scan Server OPC UA" window

The means of the checkboxes inside the table are:

→ If the field "**Read**" is checked, the variable can be read;
→ If the field "**Write**" is checked, the variable can be written.

Note:
For each variable, it is possible to uncheck these fields and the variable will not be used in read/write.

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After the scan, the selected variables will appear in "Variables in Read" and/or "Variables in Write" sections, in the lower part of the window "OPC UA Client Access" (Fig. 4).
The "Variables in Read" section is used to define the OPC UA variables to make available on NMEA2000 side (Fig. 8).

Figure 8: "Variables in Read" section

The means of the fields are:

- If the field "**Enable**" is checked, the OPC UA variable is enabled;
- In the field "**Display name**" the name of the OPC UA variable is defined;
- In the field "**Node Type** " the type of the OPC UA node, which includes the variable, is defined;
- In the field "**Node ID**" the name of the OPC UA node, which includes the variable, is defined;
- In the field "**Var Type**" the data format of the OPC UA variable is defined;
- In the field "**Name Space Index**" the Name Space Index of the node, which includes the variable, is defined;
- In the field "**Time (ms)**" the delay in ms between two readings of the variable is defined;
- In the field "**Position**" the starting byte of the internal memory arrays where saving the value is defined;
- In the field "**Mnemonic**" a description of the variable is defined.

The "Variables in Write" section is used to define the OPC UA variables to write from NMEA2000 side (Fig. 9).

N	Enable	Display Name	Node Type	Node ID	Var Type	Name Space Index	On Change	On CMD	On Timer	Time (ms)	Position	Mnemonic
1	☑	R_Byte_68	String	S7.Tabella delle	UInt8	2	☑	☐	☐	0	0	
2	☑	R_Byte_69	String	S7.Tabella delle	UInt8	2	☑	☐	☐	0	1	
3	☑	R_Word_70	String	S7.Tabella delle	UInt16	2	☑	☐	☐	0	2	
4	☑	R_Real_72	String	S7.Tabella delle	UInt32	2	☑	☐	☐	0	4	
5	☑	R_Int16_76	String	S7.Tabella delle	UInt16	2	☑	☐	☐	0	8	
6	☑	R_Int32_78	String	S7.Tabella delle	UInt32	2	☑	☐	☐	0	10	
7	☑	R_Bit_82.0	String	S7.Tabella delle	Boolean	2	☑	☐	☐	0	14	
8	☑	R_Bit_82.1	String	S7.Tabella delle	Boolean	2	☑	☐	☐	0	15	
9	☑	R_Bit_82.2	String	S7.Tabella delle	Boolean	2	☑	☐	☐	0	16	
10	☑	R_Bit_82.3	String	S7.Tabella delle	Boolean	2	☑	☐	☐	0	17	
11	☑	R_Bit_82.4	String	S7.Tabella delle	Boolean	2	☑	☐	☐	0	18	

Figure 9: "Variables in Write" section

In "Variables in Write" section (Fig. 8), the means of the fields are:

- If the field "**Enable**" is checked, the OPC UA variable is enabled;
- In the field "**Display name**" the name of the OPC UA variable is defined;
- In the field "**Node Type** " the type of the OPC UA node, which includes the variable, is defined;
- In the field "**Node ID**" the name of the OPC UA node, which includes the variable, is defined;
- In the field "**Var Type**" the data format of the OPC UA variable is defined;
- In the field "**Name Space Index**" the Name Space Index of the node, which includes the variable, is defined;
- If the field "**On Change**" is checked, the OPC UA variable is sent when the data on NMEA2000 changes the value;
- If the field "**On CMD**" is checked, the OPC UA variable is sent when a NMEA2000 message is received;
- If the field "**On Timer**" is checked, the OPC UA variable is sent cyclically;
- In the field "**Time (ms)**" the delay in ms between two writings of the variable is defined (if "On Timer" is checked);

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- In the field "**Position**" the starting byte of the internal memory arrays where getting the value is defined;
- In the field "**Mnemonic**" a description of the variable is defined.

Note:
    By clicking on "**Auto Pos**", the position of the internal memory arrays where saving/getting the value of variable is automatically calculated.
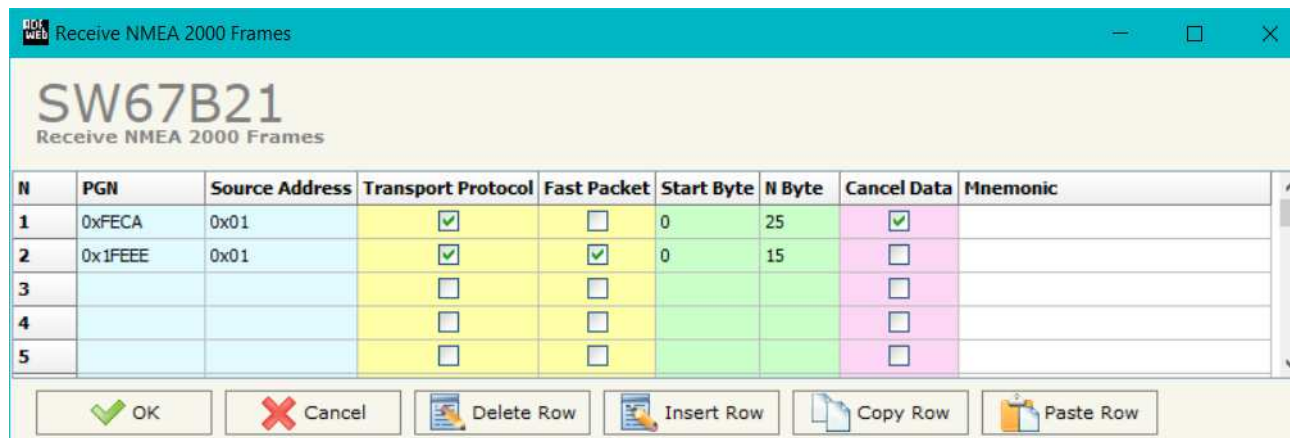
Note:
    A variable can be added manually in "Variables in Read" and/or "Variables in Write" sections without scanning the OPC UA Server.

RECEIVE NMEA 2000:

By pressing the "**Receive NMEA 2000**" button from the main window for SW67B21 (Fig. 2) the window "Receive NMEA 2000 Frames" appears (Fig. 10).

N	PGN	Source Address	Transport Protocol	Fast Packet	Start Byte	N Byte	Cancel Data	Mnemonic
1	0xFECA	0x01	☑	☐	0	25	☑	
2	0x1FEEE	0x01	☑	☑	0	15	☐	
3			☐	☐			☐	
4			☐	☐			☐	
5			☐	☐			☐	
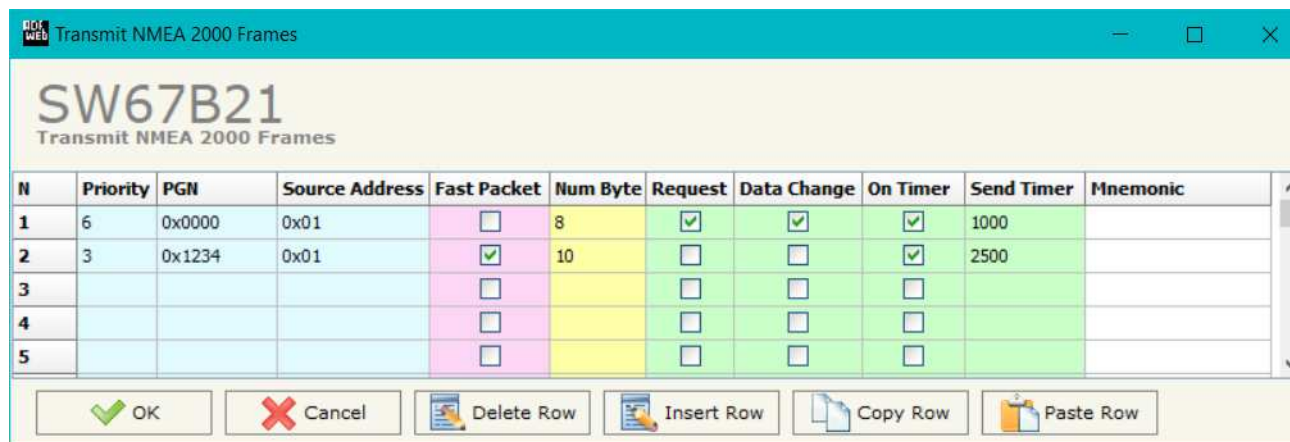
Figure 10: "Receive NMEA 2000 Frames" window

The means of the fields of the table are:

+ In the field "**PGN**" the PGN of the NMEA 2000 message to receive is defined (in the NMEA 2000 protocol, the PGN is an identifier);
+ In the field "**Source Address**" the address of the device that sends the frame is defined.
+ If the field "**Transport Protocol**" is checked, the frame can use transport protocol functions;
+ If the field "**Fast Packet**" is checked, the frame will use the Fast Packet functions;
+ In the field "**Start Byte**" the starting byte to save internal memory array is defined;
+ In the field "**Num Bytes**" the number of consecutive byte from the starting one is defined. For example, if the Start Byte is '20' and Num Bytes is '10', it is possible to read the byte from 20 to 30;
+ If the field "**Cancel Data**" is checked, when the data is oldest of the time inserted in the "TimeOut Data", the converter sets "0xFF" in the bytes of the internal memory array reserved for the PGN;
+ In the field "**Mnemonic**" the description for the frame is defined.

TRANSMIT NMEA 2000

By pressing the "**Transmit NMEA 2000**" button from the main window of SW67B21 the window "Transmit NMEA 2000 Frames" appears (Fig. 11).

Figure 11: "Transmit NMEA 2000 frame" window

The means of the fields of the table are:

+ In the field "**Priority**" the priority of the NMEA 2000 message is defined. In NMEA 2000 protocol, the priority is a number between 0 and 7. '0' is the highest priority and '7' is the lowest;
+ In the field "**PGN**" the PGN of the NMEA 2000 message to send is defined (in NMEA 2000 protocol the PGN is an identifier);
+ In the field "**Source Address**" the address of the device that sends the frame is defined;
+ If the field "**Fast Packet**" is checked, the frame will use the Fast Packet functions;
+ In the field "**Num Byte**" the number of bytes of the NMEA 2000 message is defined;
+ If the field "**On Request**" is checked, the NMEA 2000 frame is sent when arrive a request frame from the NMEA 2000 network;
+ If the field "**Data Change**" is checked, the NMEA 2000 frame is sent when a byte from OPC UA side changes value;
+ If the field "**On Timer**" is checked, the NMEA 2000 frame is sent cyclically;
+ In the field "**Send Timer**" the delay (in milliseconds) with which sending the NMEA 2000 message is defined;
+ In the field "**Mnemonic**" a description for the frame 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.

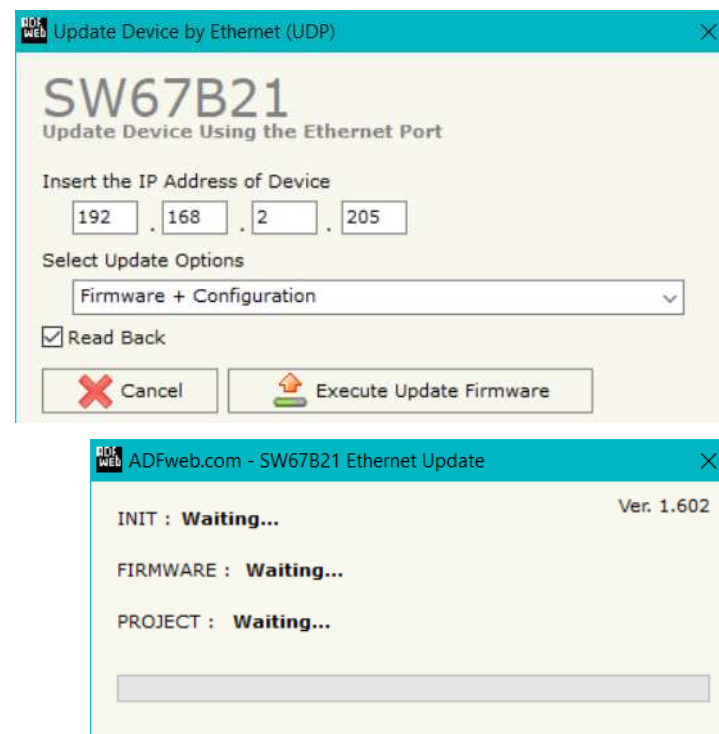At this point the configuration/firmware on the device is correctly updated.

Figure 12: "Update device" windows

Note:
When you receive the device, for the first time, you also have to update the Firmware in the HD67B21 device.

Warning:
If Fig. 13 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;
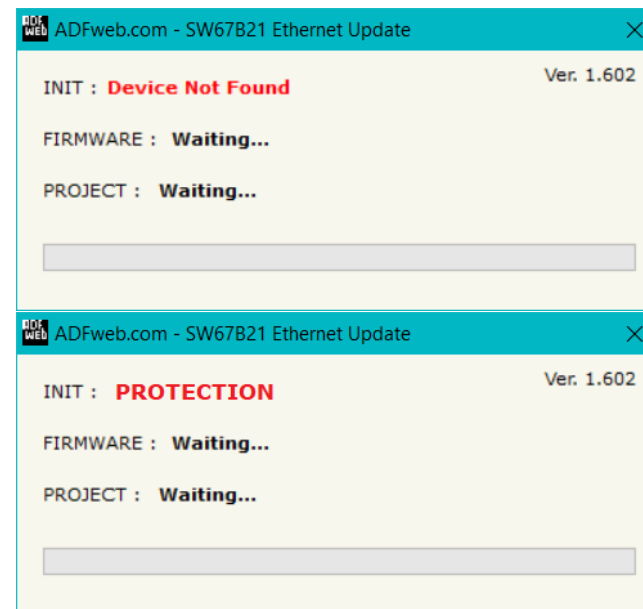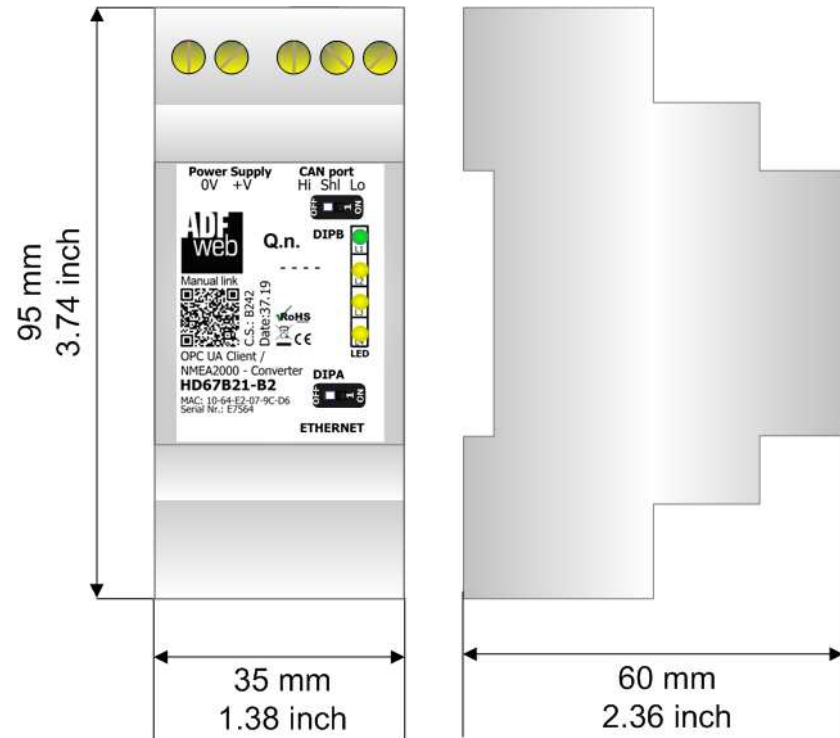➜ Pay attention at Firewall lock.

Figure 13: "Error" window

Warning:
In the case of HD67B21 you have to use the software "SW67B21": www.adfweb.com\download\filefold\SW67B21.zip.

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MECHANICAL DIMENSIONS:

Figure 14: Mechanical dimensions scheme for HD67B21-B2

ORDERING INFORMATIONS:

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

HD67B21 – B 2

Connectors Type
2: Fixed Screw Terminal

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

Device Family
HD67B21: OPC UA Client / NMEA2000 - Converter
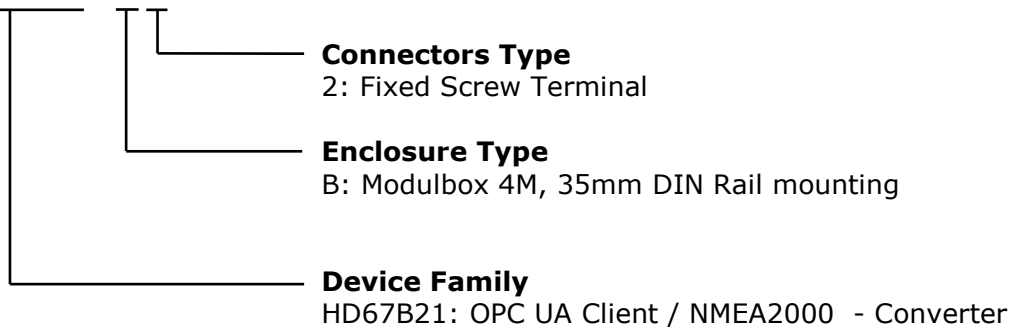
Order Code: **HD67B21-B2**   -   OPC UA Client / NMEA2000 – Converter

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.

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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.