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Industrial Electronic Devices

User Manual
Revision 1.101
English

J1939 / Modbus Master – Converter
(Order Code: HD67431)

For Website information:
www.adfweb.com?Product=HD67431

For Price information:
www.adfweb.com?Price=HD67431

Benefits and Main Features:

⊕ Very easy to configure

⊕ Wide supply input range

⊕ Electrical isolation

⊕ Industrial temperature range:

⊕ -40°C / 105°C (-40°F / 221°F)

User Manual

For other Gateways / Bridges:
CAN from/to Modbus
See also the following links:

www.adfweb.com?product=HD67012	(Modbus RTU Slave)
www.adfweb.com?product=HD67514	(Modbus TCP Master)
www.adfweb.com?product=HD67515	(Modbus TCP Slave)

CANopen from/to Modbus
See also the following links:

www.adfweb.com?product=HD67001	(Modbus RTU Master)
www.adfweb.com?product=HD67502	(Modbus RTU Slave)
www.adfweb.com?product=HD67504	(Modbus TCP Master)
www.adfweb.com?product=HD67505	(Modbus TCP Slave)

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

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INDEX:

UPDATED DOCUMENTATION:

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- ♦ 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	10/01/2013	Dp	All	First release version
1.001	12/09/2013	Dp	All	Revision
1.100	09/05/2016	Ff	All	New hardware version
1.101	13/03/2017	Ff	All	Revision

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SECURITY ALERT:

GENERAL INFORMATION
To ensure safe operation, the device must be operated according to the instructions in the manual. When using the device, legal and safety regulation are required for each individual application. The same applies also when using accessories.

INTENDED USE
Machines and systems must be designed so the faulty conditions do not lead to a dangerous situation for the operator (i.e. independent limit switches, mechanical interlocks, etc.).

QUALIFIED PERSONNEL
The device can be used only by qualified personnel, strictly in accordance with the specifications.
Qualified personnel are persons who are familiar with the installation, assembly, commissioning and operation of this equipment and who have appropriate qualifications for their job.

RESIDUAL RISKS
The device is state-of-the-art and is safe. The instruments can represent a potential hazard if they are inappropriately installed and operated by untrained personnel. These instructions refer to residual risks with the following symbol:
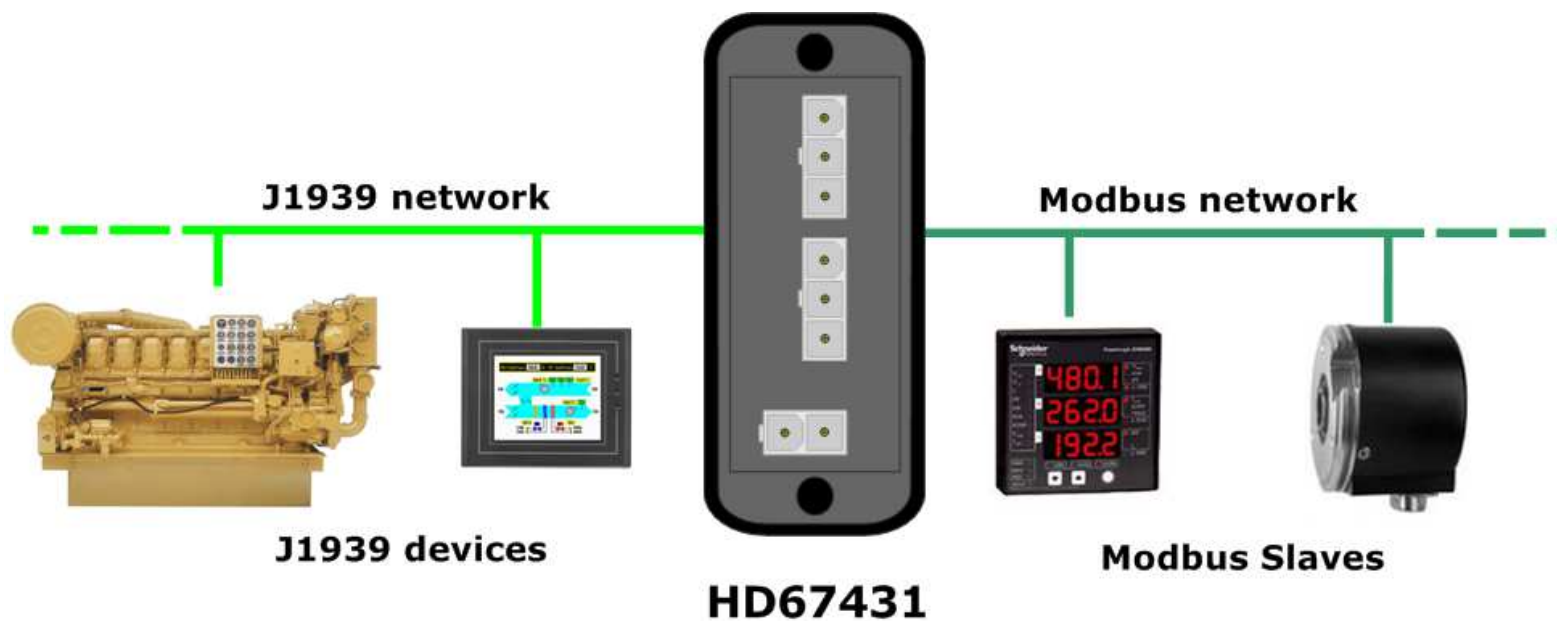
This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

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

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EXAMPLE OF CONNECTION:

J1939 network

Modbus network

J1939 devices

HD67431

Modbus Slaves

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CONNECTION SCHEME:

Figure 1a: Connection scheme for HD67431-E4x-xxx

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Connector3:
CAN port

Hi = High wire
Lo = Low wire
ShI0 = Shield (to Isolated Ground)

Lo →
ShI0 →
Hi →

Connector2:
RS485 port

+ = Positive wire
- = Negative wire
ShI1 = Shield (to Isolated Ground)

+ →
- →
ShI1 →

Connector1:
Power Supply port

0V = Ground
+V = Positive wire

V AC: min 8V ; max 26V
V DC: min 10V ; max 40V

0V →
+V →

Connector4:
USB port

Led 1:
Green
Device State

Led 2:
Green
CAN comm.

Led 3:
Yellow
Boot Mode

Led 4:
Green
RS485 comm.

Figure 1b: Connection scheme for HD67431-E7x-xxx

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CHARACTERISTICS:

The "HD67431" series are rugged devices used to interface J1939 devices with Modbus Slaves.
With his particular enclosure, equipped with four fixing lugs, makes available the mounting of the device in any plane surface (horizontal, vertical, oblique).
It is possible to have the device varnished or totally resined and also in both cases with "Mini-Fit®" connectors or "AMP SuperSeal 1.5" connectors. If is resined, the enclosure, like the "AMP SuperSeal 1.5" connectors, is waterproof (IP67).

All the four series have these characteristics:

- Triple 4kV isolation between Power Supply / RS485 / J1939;
- Varnished / Resined (optionally);
- Wide power supply input range: 8…26V AC | 10…40V DC;
- Mini-Fit® / AMP SuperSeal 1.5 connectors;
- Metal enclosure with fixing lugs;
- Possibility to use Metal hose clamps for fixing it without using lugs;
- Microprocessor for data control;
- Wide temperature range: -40°C / 105°C (-40°F / 221°F).

CONFIGURATION:

You need Compositor SW67431 software on your PC in order to perform the following:

- Define the J1939 frames read from Converter;
- Define the J1939 frames write from the Converter;
- Define the Modbus request in read;
- Define the Modbus request in Write;
- Update the device.

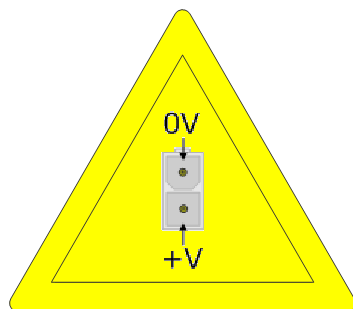Industrial Electronic Devices

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**
HD67431-Exx-xxx	**8V**	**26V**	**10V**	**40V**

Consumption at 24V DC:

Device	W/VA
HD67431-Exx-xxx	4

⚠️ **Caution: Not reverse the polarity power**
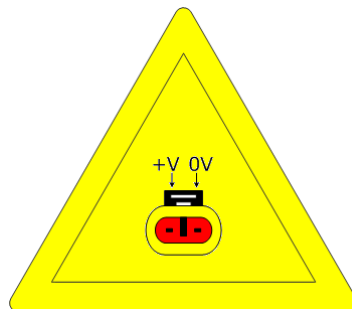
HD67431-E4x-xxx   HD67431-E7x-xxx

Note: It is possible to use also negative tensions. In this case the polarity must be inverted.

Connector1:
Power Supply port
0V = Ground
+V = Positive wire
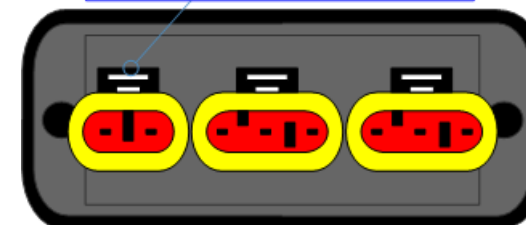V AC: min 8V ; max 26V
V DC: min 10V ; max 40V
←0V
←+V

Connector1:
Power Supply port
0V = Ground
+V = Positive wire
V AC: min 8V ; max 26V
V DC: min 10V ; max 40V
+V 0V

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LEDS:

The device has got four 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: CAN Communication (green)	Blinks when J1939 frames are received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: Boot Mode (yellow)	OFF	ON
4: RS485 communication (green)	Blinks when a Modbus response is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress

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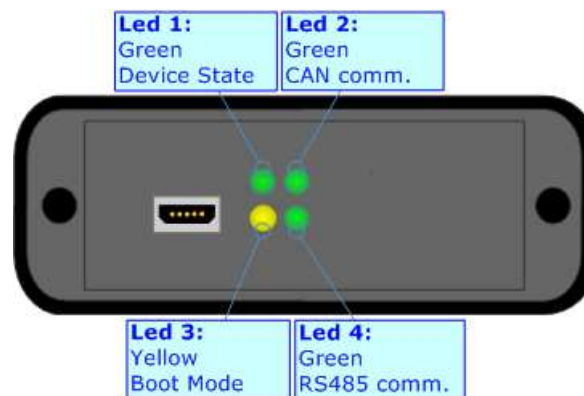
RS485:

The connection of the RS485 in the HD67431-E4x-xxx device must be made with a 3way MiniFit Female connector. The pinout of Male MiniFit connector of the board is at right side of the page.
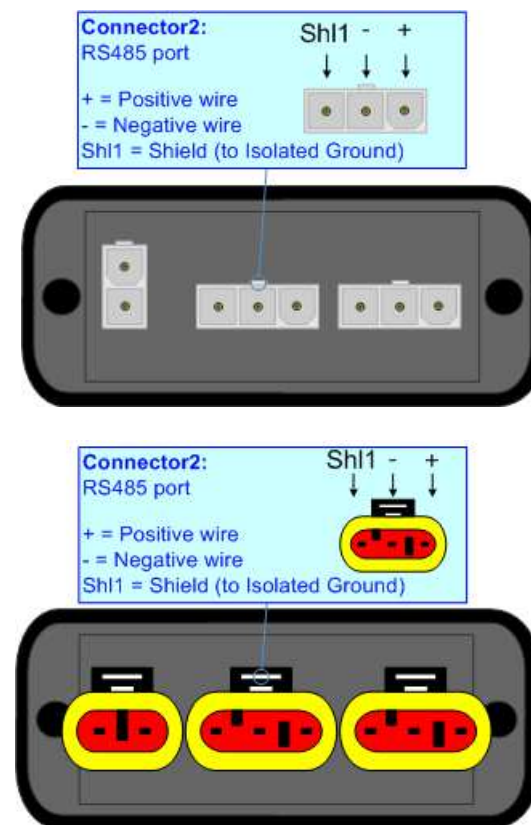
The connection of the RS485 in the HD67431-E7x-xxx device must be made with a AMP SuperSeal 1.5 Male connector. The pinout of Female connector of the board is at right side of the page.

The termination of RS485 line, with a 220Ω resistor, in the HD67431-Exx-xxx is made internally of the device; when the order is performed. If the device have the RS485 terminated the code is the follow: HD67431-Exx-xYx; otherwise is this other: HD67431-Exx-xNx.

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.

Link for Mini-Fit® connectors: http://www.molex.com/molex/products/group?key=minifit_products&channel=products
Link for SuperSeal 1.5 connectors: http://www.te.com/catalog/cinf/en/c/10876/956

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CAN:

The connection of the J1939 in the HD67431-E4x-xxx device must be made with a 3way MiniFit Female connector. The pinout of Male MiniFit connector of the board is at right side of the page.

The connection of the J1939 in the HD67431-E7x-xxx device must be made with a AMP SuperSeal 1.5 Male connector. The pinout of Female connector of the board is at right side of the page.

The termination of J1939 line, with a 120Ω resistor, in the HD67431-Exx-xxx is made internally of the device; when the order is performed. If the device have the J1939 terminated the code is the follow: HD67431-Exx-Yxx; otherwise is this other: HD67431-Exx-Nxx.


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

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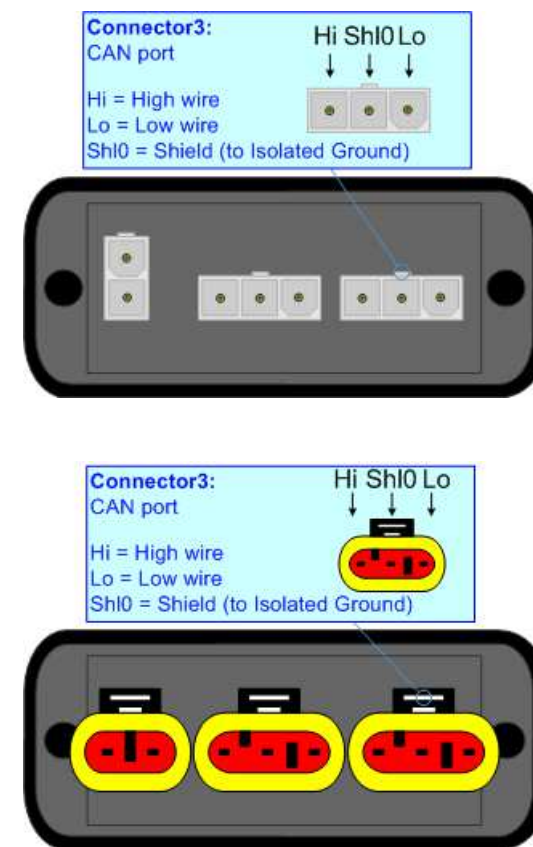
USB:

The USB port is used to start the converter in Boot Mode and to program the converter. It is necessary to use a Micro USB type B cable.

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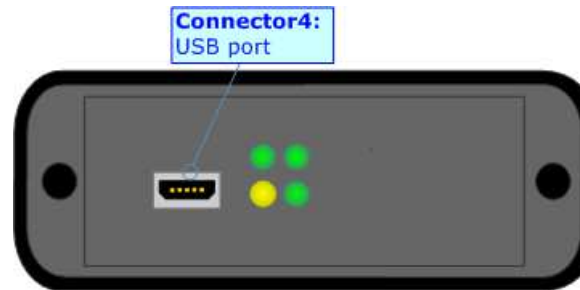
USE OF COMPOSITOR SW67431:

To configure the Converter, use the available software that runs with Windows called SW67431. 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 SW67431, the window below appears (Fig. 2).

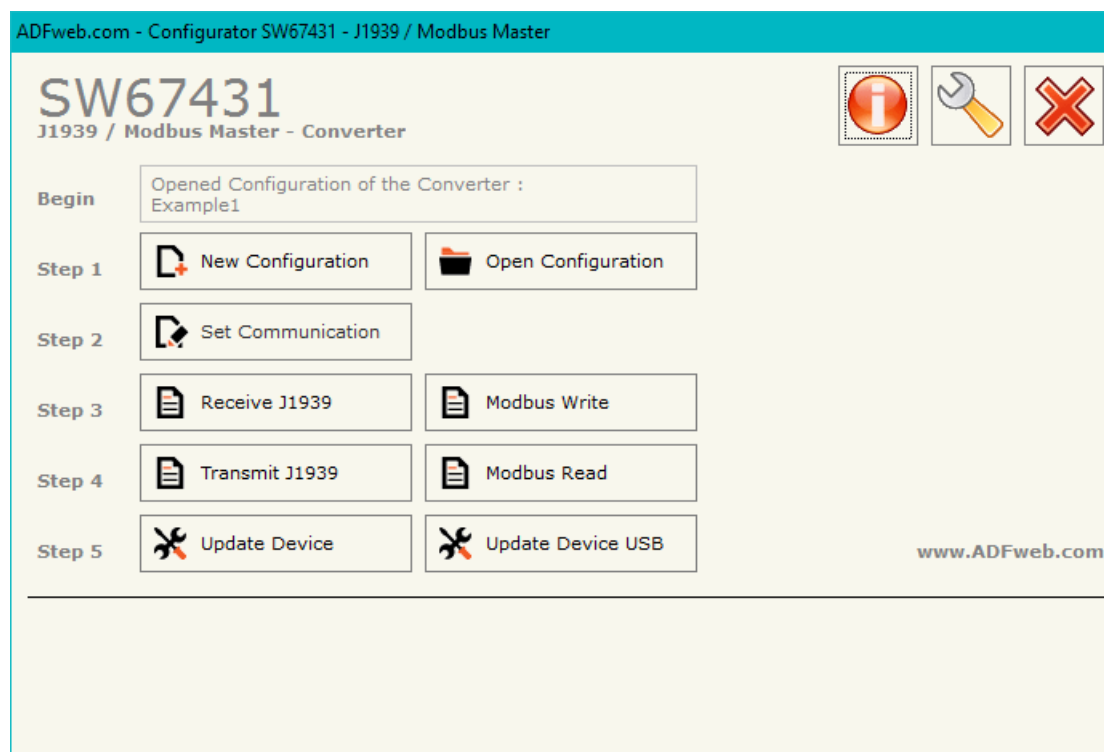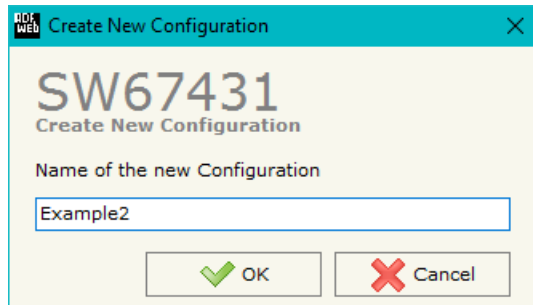Note:
   It is necessary to have installed .Net Framework 4.


Figure 2: Main window for SW67431

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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 "J1939 / Modbus 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**".

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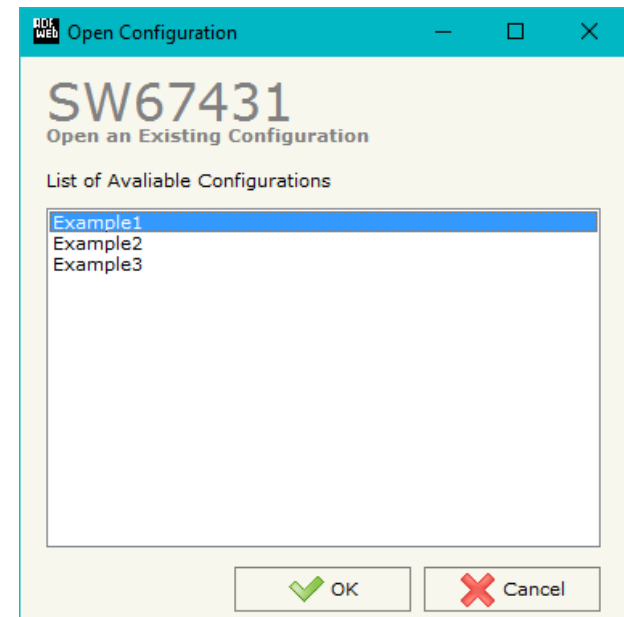
SOFTWARE OPTIONS:

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.
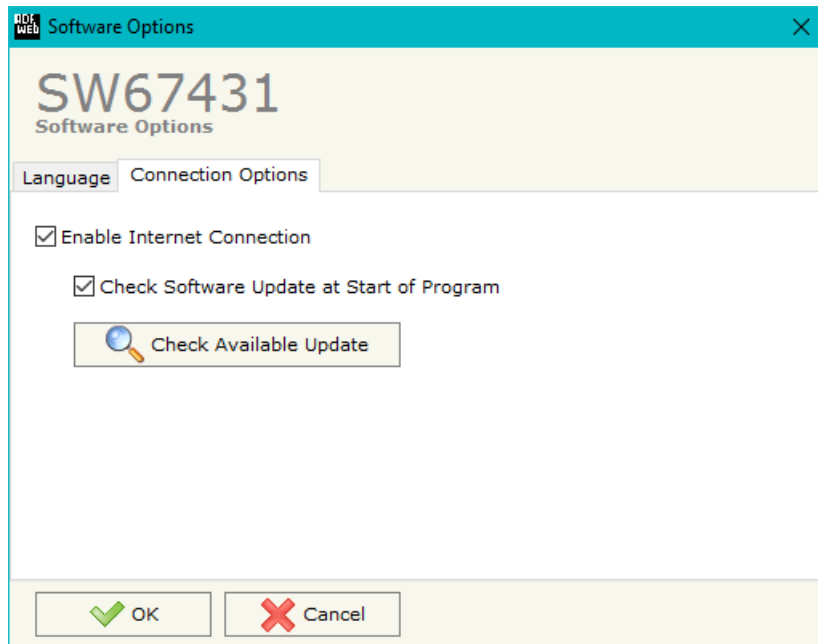
In the section "Connection Options", it is possible to check if there are some updatings of the software compositor in ADFweb.com website.
Checking the option "**Check Software Update at Start of Program**", the SW67431 checks automatically if there are updatings when it is launched.

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SET COMMUNICATION:

This section define the fundamental communication parameters of two buses, J1939 and Modbus.

By Pressing the "**Set Communication**" button from the main window of SW67431 (Fig. 2) the window "Set Communication" appears (Fig. 3).

The meaning of the fields of "J1939" are:

→ In the field "**Baudrate**" the data rate of the bus is defined;
→ In the field "**TimeOut Data (s)**" insert a time, if a J1939 packet is not received in this time, the data on Modbus are set to "FF";
→ If the field "**Enable Peer to Peer**" is checked the gateway accepts any ID that have the PGN inserted in the section "Receive J1939";
→ In the field "**Device ID J1939**" the J1939 ID of the converter is defined.

The meaning of the fields of "Modbus Master" are:

→ In the field "**Baudrate**" the data rate of the bus is defined;
→ In the field "**Parity**", the serial parity is defined;
→ In the field "**Stop Bits**" the number of stop bit is defined;
→ In the field "**TimeOut (ms)**", insert the maximum time that the device has to attend for the answer from the Slave interrogated;
→ In the field "**Cyclic Delay (ms)**", insert the delay between a Modbus request and the follow.

Figure 3: "Set Communication" window

RECEIVE J1939:

By pressing the "**Receive J1939**" button from the main window for SW67431 (Fig. 2) the window "Receive J1939 Frames" appears (Fig. 4).
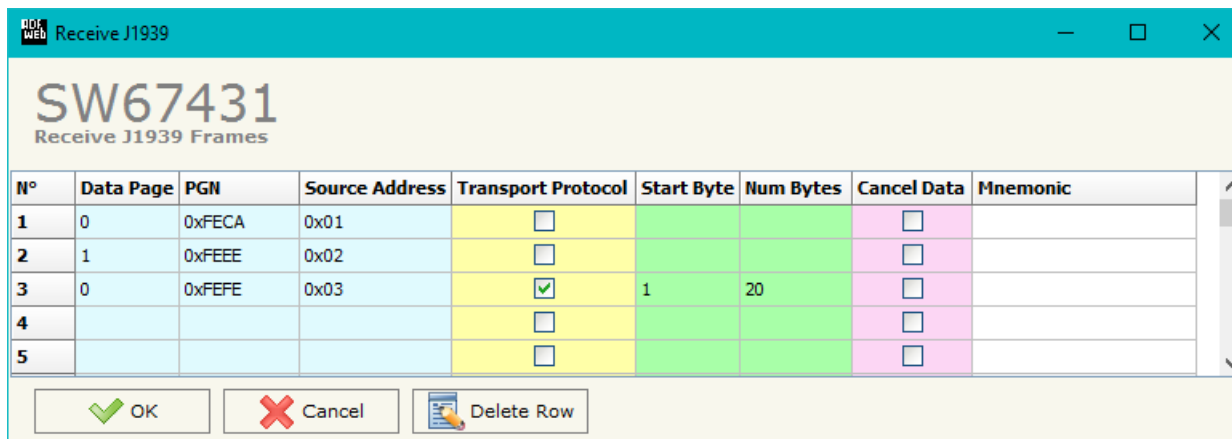

Figure 4: "Receive J1939 Frames" window

The means of the fields of the table are:

- In the field "**Data Page**" insert the Data Page, the value is 0 or 1 (usually is 0);
- In the field "**PGN**" insert the PGN of the data you want to receive (in the J1939 protocol the PGN is an identifier);
- In the field "**Source Address**" insert the ID of J1939 device that transmits the frame;
- If the field "**Transport Protocol**" is checked the frame uses Transport Protocol functions;
- In the field "**Start Byte**" insert the byte that you want to start to read if the Transport Protocol is used;
- In the field "**Num Bytes**" insert the number of byte you want to read, for example your start byte is 1 an Num Bytes is 20, you can read the byte from 1 to 20 (if Transport Protocol is used);
- If the field "**Cancel Data**" is checked, the data in the frame will be erased after the expiration of the "TimeOut Data" defined in "Set Communication" section;
- In the field "**Mnemonic**" the description for the frame is defined.

MODBUS WRITE:

By pressing the "**Modbus Write**" button from the main window for SW67431 (Fig. 2) the window "Modbus Write Requests" appears (Fig. 5).

N°	Slave ID	Type	Address	NPoint	Poll Time	On Change	Max Error	Registers / Status Map	Mnemonic
1	1	Holding Register	100	4	1000	☐	0	[1,2][3,4][5,6][7,8]	
2	1	Holding Register	150	4	0	☑	0	[9,10][11,12][13,14][15,16]	
3	2	Holding Register	100	10	2500	☑	0	[17,18][19,20][21,22][23,24][25,26][2	
4						☐			
5						☐			

[✔ OK] [✖ Cancel] [Delete Row] [Insert Row] [Map]
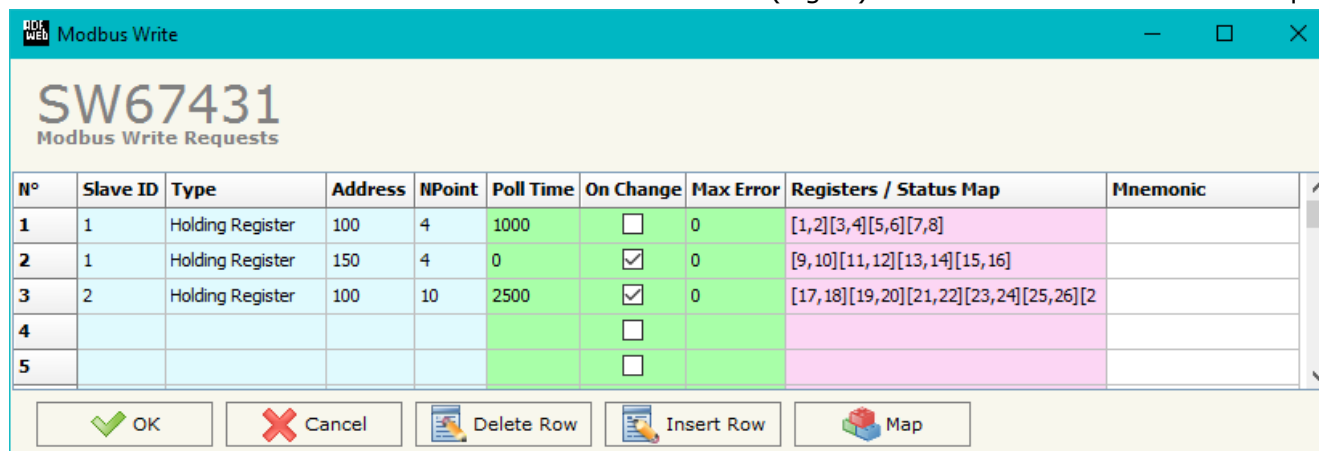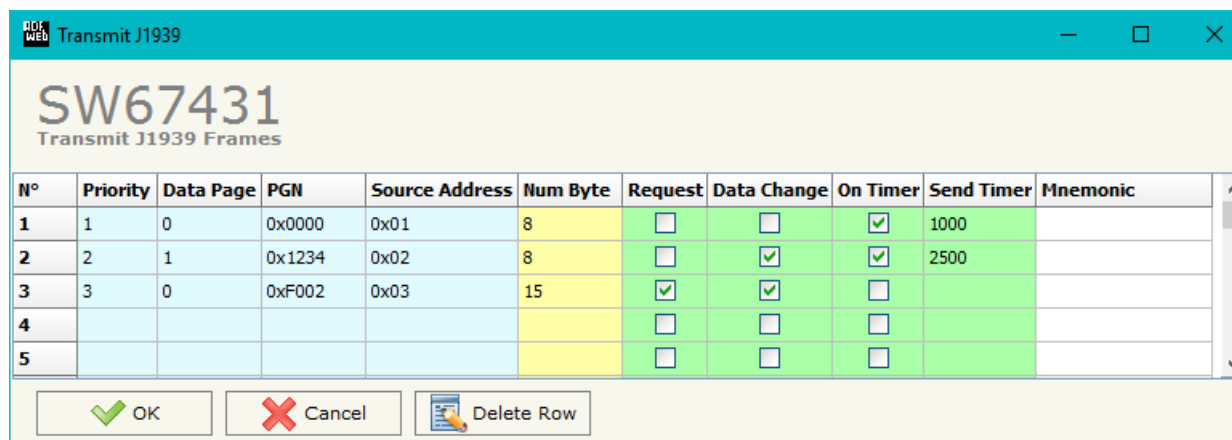
Figure 5: "Modbus Write Requests" window

The means of the fields of the table are:

➤ In the field "**Slave ID**" insert the ID Modbus slave in which you will write the data;

➤ In the field "**Type**" insert the type of Data;

➤ In the field "**Address**" insert the start address of the Modbus register to be written;

➤ In the field "**NPoint**" insert the number of consecutive Modbus registers;

➤ In the field "**Poll Time**" insert the delay between two Modbus requests (if the field "On Change" is unchecked);

➤ If the field "**On Change**" is checked, the Modbus write request is send only when the data change; if it is unchecked, the Modbus write request is sent cyclically;

➤ In the field "**Max Error**" insert the number of consecutive errors that the gateway waits before suspending the poll until the next reboot. If is set to zero this function is disabled;

➤ In the field "**Registers / Status Map**" insert the map of each registers/status. For the register you have to insert the address of the byte to put in the High part and in the Low part of the register divided by comma (",") all included in square brackets (ex. [1,2]). For the status you have to insert the address of the byte and the number of bit divided by comma (",")all included in square brackets (ex. [1,2]). The value 0 means that no byte are selected. Press the "Map" button to use the "Configure Registers/Status" windows (see Configure Register/Status chapter);

➤ In the field "**Mnemonic**" insert a description for the request.

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TRANSMIT J1939:

By pressing the "**Transmit J1939**" button from the main window of SW67431 the window "Transmit J1939 Frames" appears (Fig. 6):

Figure 6: "Transmit J1939 Frames" window

The means of the fields of the table are:

- In the field "**Priority**" insert the priority of the frame, in J1939 protocol is a number among 0,1,2,3,4,5,6,7. The number 0 is the highest priority and 7 is the lowest;
- In the field "**Data Page**" insert the data page, in the J1939 protocol it is 0 or 1;
- In the field "**PGN**" insert the PGN of the data you would to transmit to J1939 (in the J1939 protocol the PGN is an identifier);
- In the field "**Source Address**" insert the ID of device which sending the frame to;
- In the field "**Num Byte**" insert the dimension of the PGN (number of bytes);
- If the option "**Request**" is checked, the PGN is transmitted when a J1939 request is sent (On Request);
- If the option "**Data Change**" is checked, the PGN is transmitted when the data from Modbus changes;
- If the option "**On Timer**" is checked, the PGN is transmitted cyclically;
- In the field "**Send Timer**" insert the delay with which the PGN is sent (only if you use the Transmition Type "On Timer");
- In the field "**Mnemonic**" the description for the frame is defined.

MODBUS READ:

By pressing the "**Modbus Read**" button from the main window for SW67431 (Fig. 2) the window "Modbus Read" appears (Fig. 7).

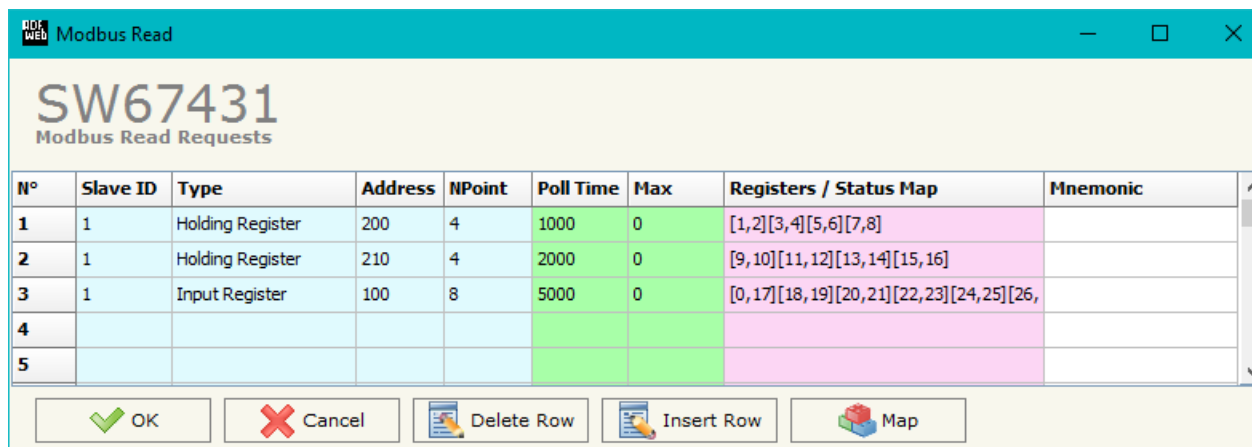| N°	Slave ID	Type	Address	NPoint	Poll Time	Max	Registers / Status Map	Mnemonic
1	1	Holding Register	200	4	1000	0	[1,2][3,4][5,6][7,8]	
2	1	Holding Register	210	4	2000	0	[9,10][11,12][13,14][15,16]	
3	1	Input Register	100	8	5000	0	[0,17][18,19][20,21][22,23][24,25][26,	
4								
5								

Figure 7: "Modbus Read Requests" window

The means of the fields of the table are:

- In the field "**Slave ID**" insert the ID Modbus slave from which you will read the data;
- In the field "**Type**" insert the type of Data;
- In the field "**Address**" insert the address of the Modbus register of the slave from which you will read the data;
- In the field "**NPoint**" insert the number of consecutive Modbus registers;
- In the field "**Poll Time**" insert the delay between two Modbus requests;
- In the field "**Max Error**" insert the number of consecutive errors that the gateway waits before suspending the poll until the next reboot. If is set to zero this function is disabled;
- In the field "**Registers / Status Map**" insert the map of each registers/status. For the register you have to insert the address of the byte to put in the High part and in the Low part of the register divided by comma (",") all included in square brackets (ex. [1,2]). For the status you have to insert the address of the byte and the number of bit divided by comma (",")all included in square brackets (ex. [1,2]). The value 0 means that no byte are selected. Press the "Map" button to use the "Configure Registers/Status" windows (see Configure Register/Status chapter);
- In the field "**Mnemonic**" insert a description for the request.

CONFIGURE REGISTERS/STATUS:

By pressing the "**Map**" button in "Modbus Write" or "Modbus Read" windows (Fig. 5 and 7) the window "Configure of Registers"appears (Fig. 8).
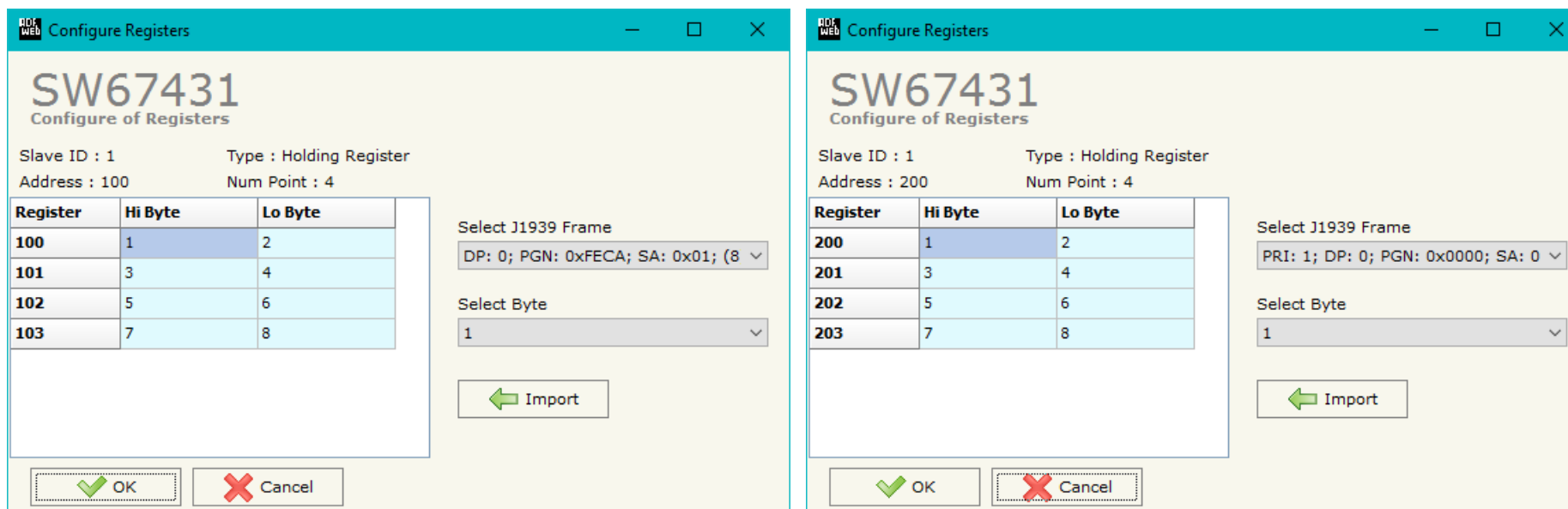

Figure 8: "Configure of Registers" window

With this window it is possible to insert for each register or status, the byte to put in the high and low part (for the register) or the byte and the bit (for the status).
In the right side of the window there is the possibility to select the byte to insert in the register/status selecting the PGN and the byte of the J1939 frame.
Selecting the "None" value that part of the Modbus register/status is leave to zero.
For the Status, the Bit 1 is Less Significant Bit (LSB) and the Bit 8 is Most Significant Bit (MSB) of the selected byte.

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UPDATE DEVICE (ONLY FOR THE HARDWARE WITHOUT USB PORT):

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

In order to load the parameters or update the firmware in the Converter, follow these instructions:

- Connect the AC67400 to the PC;
- Connect the CAN port of AC67400 to CAN port of HD67431;
- Feed the HD67431;
- Turn on the device;
- Select the "**COM port**" and press the "*Connect*" button;
- Press the "*Next*" button;
- 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;
- Disconnect the AC67400;
- Turn on the device.

At this point the configuration/firmware on the device is correctly update.
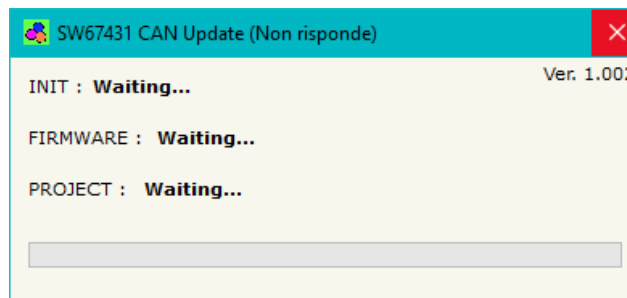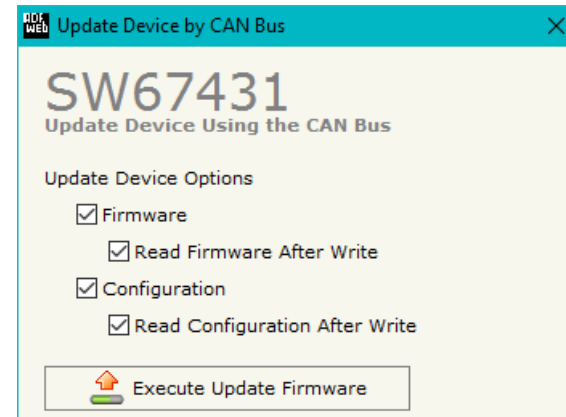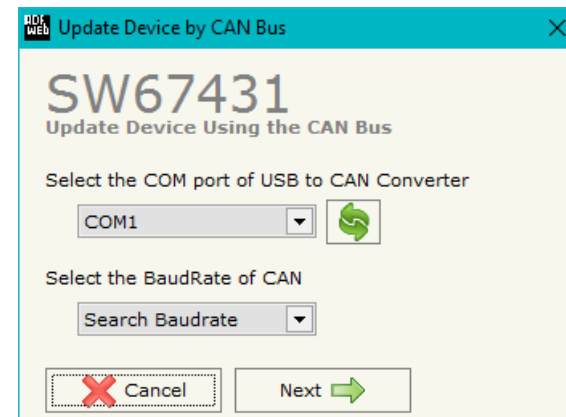
Figure 9: "Update Device" windows

UPDATE DEVICE USB:

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

In order to load the parameters or update the firmware in the device, follow these instructions:

- Connect the USB cable from your PC to the Converter;
- Select the "**COM port**";
- Select which operations you want to do.
- Press the "**Execute update firmware**" button to start the upload;
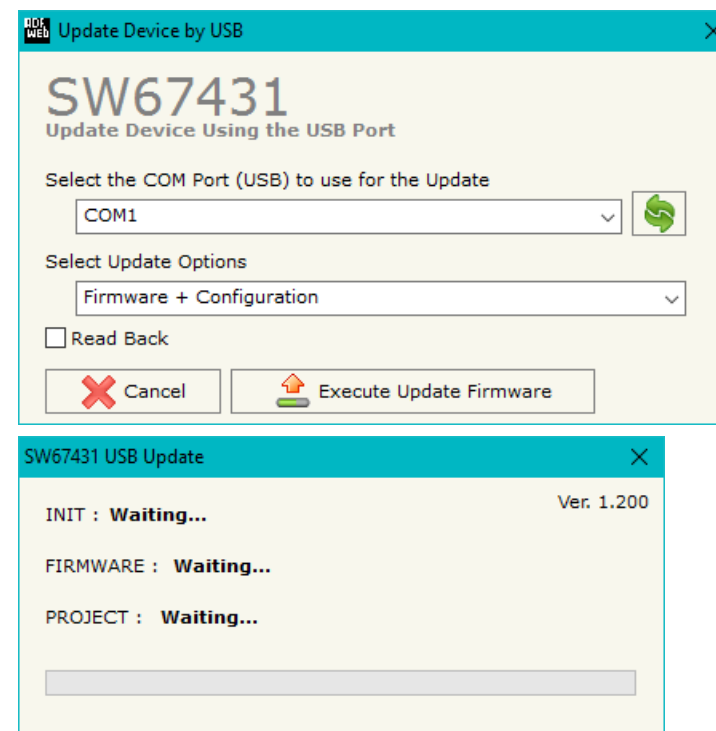- When all the operations are "OK", disconnect the USB cable;

Figure 10: "Update Device" windows

Figure 9: Update device procedure.

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Note:
   When you install a new version of the software it is better if the first time you do the update of the Firmware in the HD67431 device.

Note:
   When you receive the device, for the first time, you have to update also the Firmware in the HD67431 device.

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

- Check if the serial COM port selected is the correct one;
- Check if the AC67400 is connected between the PC and the device;
- Check if the USB 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;
- If you are using the program inside a Virtual Machine, try to use in the main Operating System;
- If you are using Windows Seven or Vista or 8 or 10, make sure that you have the administrator privileges;
- Pay attention to Firewall lock.

Figure 11: "Protection" window

ADFweb

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MECHANICAL DIMENSIONS:

ADFweb.com S.r.l

E-type enclosure measures without fixing lugs

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40

74

51,5

92

105

B6

Type A

ADFweb.com S.r.l
Via Strada Nuova, 17
IT-31010 Mareno di Piave
TREVISO (ITALY)
TEL (0438)30.91.31 - 30.91.30
FAX (0438)49.20-48.30.91

E-type enclosure measures
with fixing lugs Type A

![ADFweb logo]

Industrial Electronic Devices

40

112,5

95

60

83

Type B

ADFweb.com S.r.l

E-type enclosure measures
with fixing lugs Type B

Industrial Electronic Devices

Type C

ADFweb.com S.r.l

E-type enclosure measures
with fixing lugs Type C

40

112,5

95

92

105

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ORDERING INFORMATIONS:

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

HD67431 – E y z – s d f

Fixing lugs
A: Type A
B: Type B
C: Type C
D: without fixing lugs

RS485 Termination
Y = Terminated with 120Ω
N = Not terminated

J1939 Termination
Y = Terminated with 120Ω
N = Not terminated

Varnished/Resinated
V = Varnished
R = Resined

Connectors Type
4 = MiniFit
7 = SuperSeal 1.5

Enclosure Type
E: Metal enclosure

Device Family
HD67431 = J1939 / Modbus Master - Converter

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ACCESSORIES:

Order Code: **AC34001**   -   Rail DIN - Power Supply 220/240V AC 50/60Hz – 12 V AC

Order Code: **AC34002**   -   Rail DIN - Power Supply 110V AC 50/60Hz – 12 V AC

Order Code: **AC67402**   -   Cable Super Seal 1.5 MALE 2-pole - 1.0 Meter

Order Code: **AC67402-3** -   Cable Super Seal 1.5 MALE 2-pole - 3.0 Meters

Order Code: **AC67403**   -   Cable Super Seal 1.5 MALE 3-pole - 1.0 Meter

Order Code: **AC67403-3** -   Cable Super Seal 1.5 MALE 3-pole - 3.0 Meters

Order Code: **AC67410**   -   Accessory Automotive Devices - Support for rail DIN

Industrial Electronic Devices

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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.

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