

User Manual

Revision 1.001
English

NMEA 2000 / Ethernet – Converter

(Order Code: HD67453)

For Website information:

www.adfweb.com?Product=HD67453

For Price information:

www.adfweb.com?Price=HD67453

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 others Gateways / Bridges:

J1939 to Modbus

See also the following links:

www.adfweb.com?Product=HD67212 (Modbus RTU)

CANopen to Modbus

See also the following links:

www.adfweb.com?Product=HD67001 (Modbus RTU Master)

www.adfweb.com?Product=HD67002 (Modbus RTU Slave)

www.adfweb.com?Product=HD67004 (Modbus TCP Master)

www.adfweb.com?Product=HD67005 (Modbus TCP Slave)

For others Gateways / Bridges:

For **CAN bus 2.0A** and/or **CAN bus 2.0B to Modbus**

See also the following links:

www.adfweb.com?Product=HD67011 (Modbus RTU Slave)

www.adfweb.com?Product=HD67012 (Modbus RTU Master)

www.adfweb.com?Product=HD67014 (Modbus TCP Slave)

www.adfweb.com?Product=HD67015 (Modbus TCP Master)

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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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	11/12/2015	Ff	All	First released version
1.001	13/03/2017	Ff	All	Revision

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:

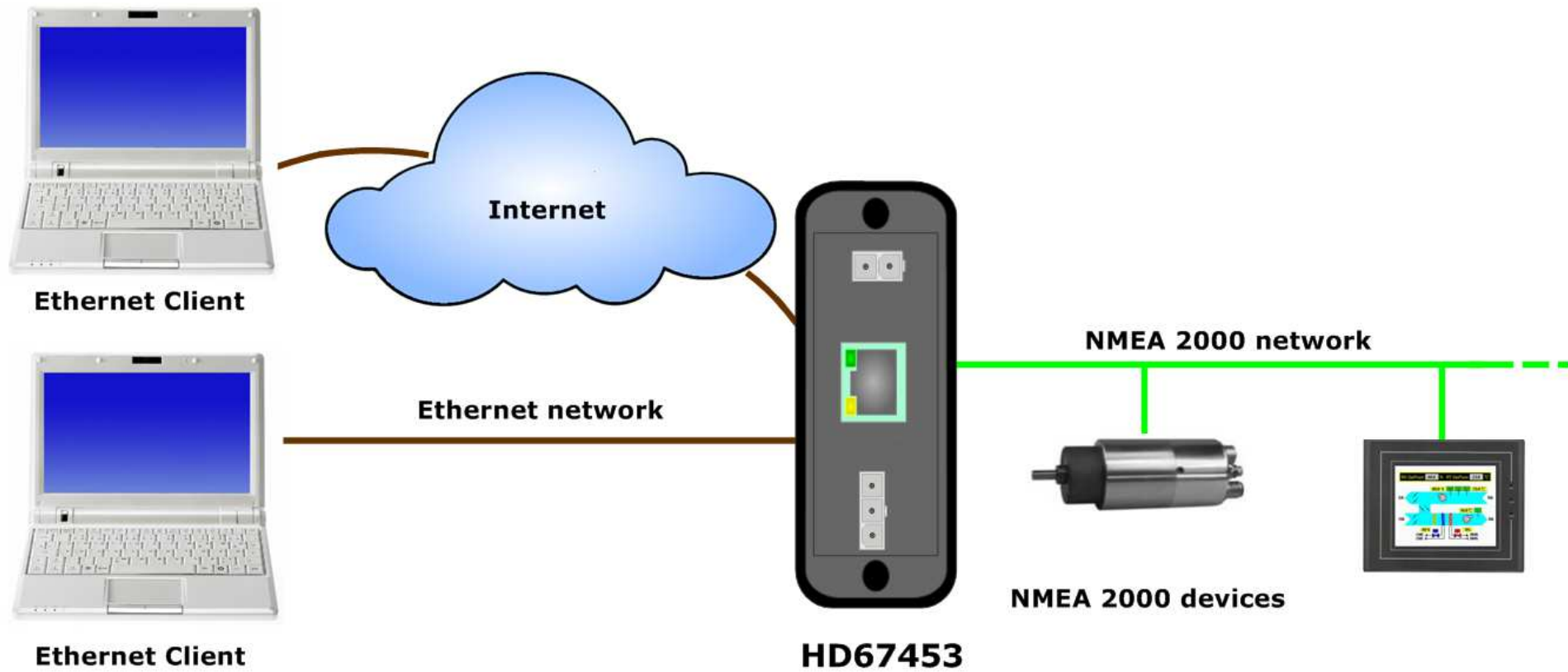


This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

CE CONFORMITY

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

EXAMPLE OF CONNECTION:



CONNECTION SCHEME:



Figure 1a: Connection scheme for HD67453-E4x-xx

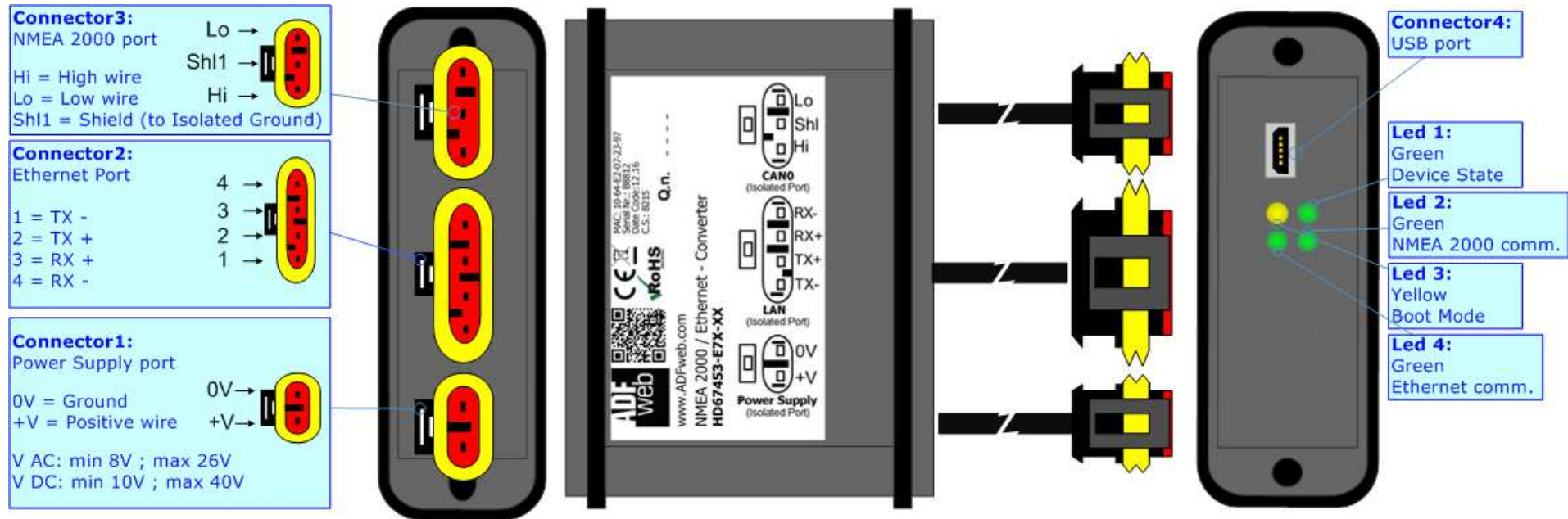


Figure 1b: Connection scheme for HD67453-E7x-xx

CHARACTERISTICS:

The "HD67453" series are rugged devices used to interface NMEA 2000 devices with Ethernet network.

With its 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 (IP63).

All the four series have these characteristics:

- Triple 4kV isolation between Power Supply / Ethernet / NMEA 2000;
- 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 SW67453 software on your PC in order to perform the following:

- Define the parameters for the Ethernet side;
- Define the parameters for the NMEA 2000 side;
- Define which NMEA 2000 messages are readable on Ethernet side;
- Update the device.

POWER SUPPLY:

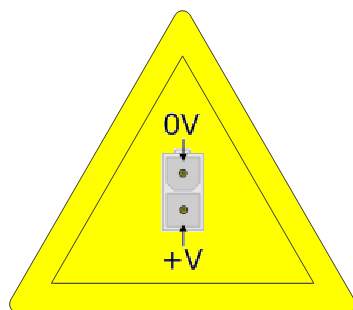
The devices can be powered between a wide range of tensions. For more details see the two tables below.

	VAC		VDC	
	Vmin	Vmax	Vmin	Vmax
HD67453-Exx-xx	8V	26V	10V	40V

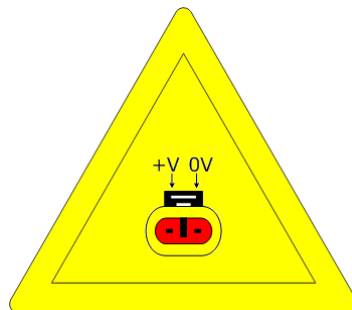
Consumption at 24V DC:

Device	W/VA
HD67453-Exx-xx	4

Caution: Not reverse the polarity power

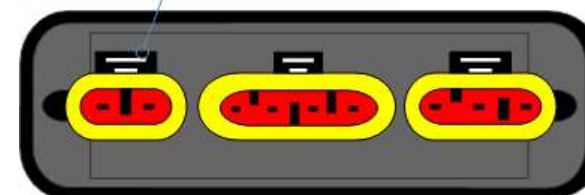


HD67453-E4x-xx



HD67453-E7x-xx

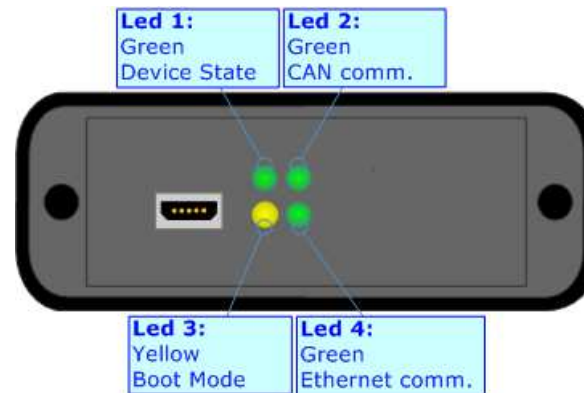
Note: It is possible to use also negative tensions. In this case the polarity must be inverted.



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 NMEA 2000 frames are received	Blinks quickly: Boot state Blinks very slowly (~0.5Hz): update in progress
3: Boot Mode (green)	OFF	ON
4: Ethernet communication (yellow)	Blinks when an Ethernet request is received	Blinks quickly: Boot state Blinks very slowly (~0.5Hz): update in progress



NMEA 2000:

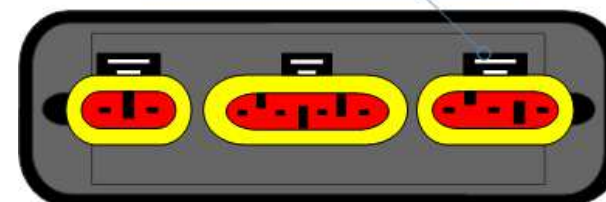
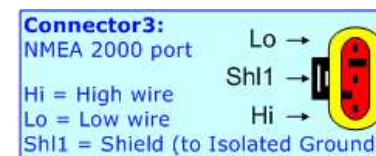
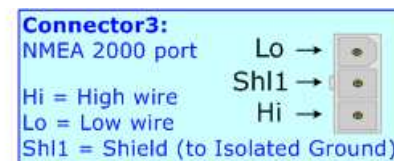
The connection of NMEA 2000 in the HD67453-E4x-xx device must be made with a 3way MiniFit Female connector. The pinout of Male Mini-Fit connector of the board is at right side of the page.

The connection of NMEA 2000 in the HD67453-E7x-xx 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 NMEA 2000 line, with a 120Ω resistor, in the HD67453-Exx-xx is made internally of the device; when the order is performed. If the device have the NMEA 2000 terminated the code is the follow: HD67453-Exx-Yx; otherwise is this other: HD67453-Exx-Nx.

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

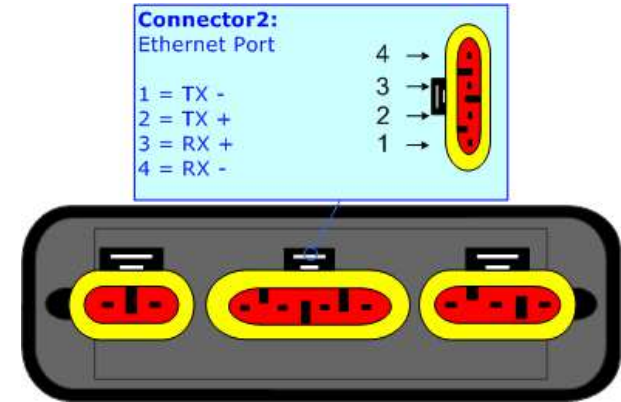


ETHERNET:

The connection of Ethernet in the HD67453 device must be made 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.

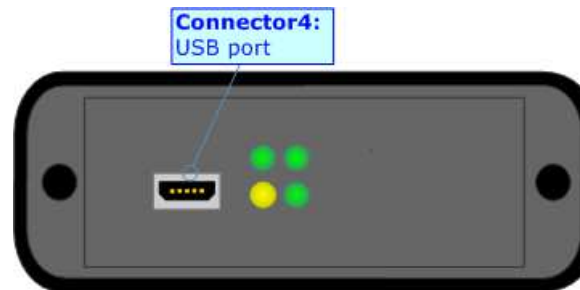
The connection of Ethernet in the HD67453-E4x-xx device must be made with RJ45 connector.

The connection of the Ethernet in the HD67453-E7x-xx 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.



USB:

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



USE OF COMPOSITOR SW67453:

To configure the Converter, use the available software that runs with Windows called SW67453. 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 SW67453, the window below appears (Fig. 2).



Note:

It is necessary to have installed .Net Framework 4.

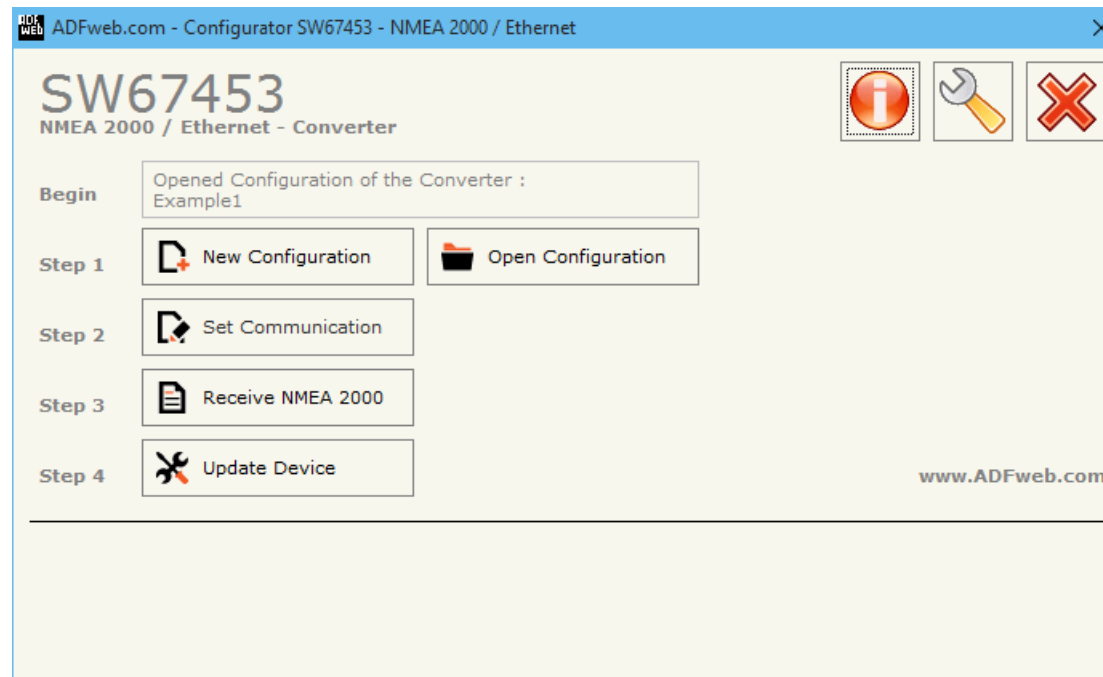
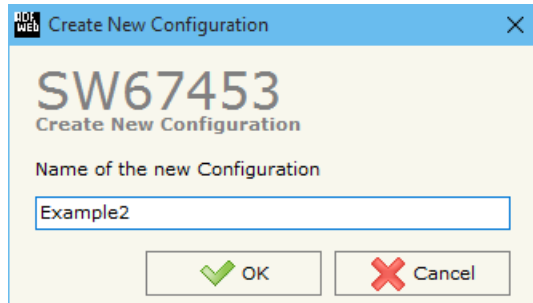


Figure 2: Main window for SW67453

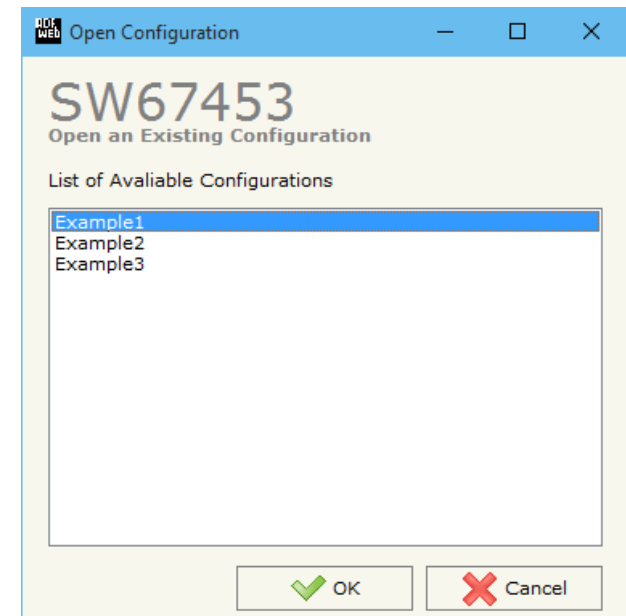
NEW CONFIGURATION / OPEN CONFIGURATION:

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




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

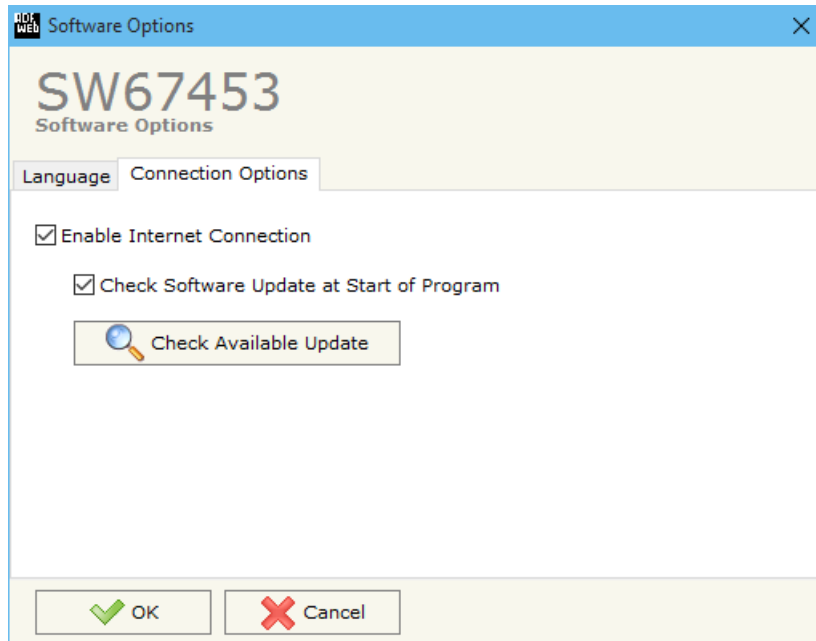
- To clone the configurations of a programmable “NMEA 2000 / Ethernet - Converter” in order to configure another device in the same manner, it is necessary to maintain the folder and all its contents;
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate 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 SW67453 checks automatically if there are updatings when it is launched.

SET COMMUNICATION:

This section define the fundamental communication parameters of two buses, NMEA 2000 and Ethernet.

By Pressing the "**Set Communication**" button from the main window of SW67453 (Fig. 2) the window "Set Communication" appears (Fig. 3).

The meaning of the fields of "NMEA 2000" are:

- In the field "**Baudrate**", the speed of NMEA 2000 is defined;
- In the field "**TimeOut Data (s)**" insert a time, when this time is elapsed the data isn't reliable;
- If the field "**Enable Peer to Peer**" is checked, the converter accept any ID that have the PGN inserted in the section "Receive NMEA 2000";
- If the field "**Filter FECA (ms)**" is checked, when the FECA PGN arrives the converter puts the values in Standby. If the time, expressed in milliseconds and written at the right side of "Filter FECA (ms)", is elapsed and there aren't arrived the frames of Transport Protocol the converter put the data of FECA into Ethernet array. Otherwise if the Transport Protocol arrives before the time is elapsed the gateway put his data into Ethernet array discarding the data of FECA. When this field is checked the values aren't updated when the FECA frame arrive but there is an offset of xx ms. You can use this function if there is only one NMEA 2000 device in the network;
- In the field "**Device ID NMEA 2000**" the NMEA 2000 address of the converter is defined.

The meaning of the fields of "Ethernet" are:

- In the field "**IP ADDRESS**" insert the IP address that you want to give to the Converter;
- In the field "**SUBNET Mask**" insert the SubNet Mask;
- In the field "**GATEWAY**" insert the default gateway that you want to use. 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 number used for Ethernet communication is defined;
- In the field "**Protocol**" the Ethernet protocol is defined.

The screenshot shows a software window titled "Set Communication" for device "SW67453". It is divided into two sections: "NMEA 2000" and "Ethernet".

NMEA 2000 Section:

- Baudrate: 250K (dropdown)
- TimeOut Data (s): 0 (text box)
- Enable Peer to Peer:
- Filter FECA (ms): 50 (text box)
- Device ID NMEA 2000: 1 (text box)

Ethernet Section:

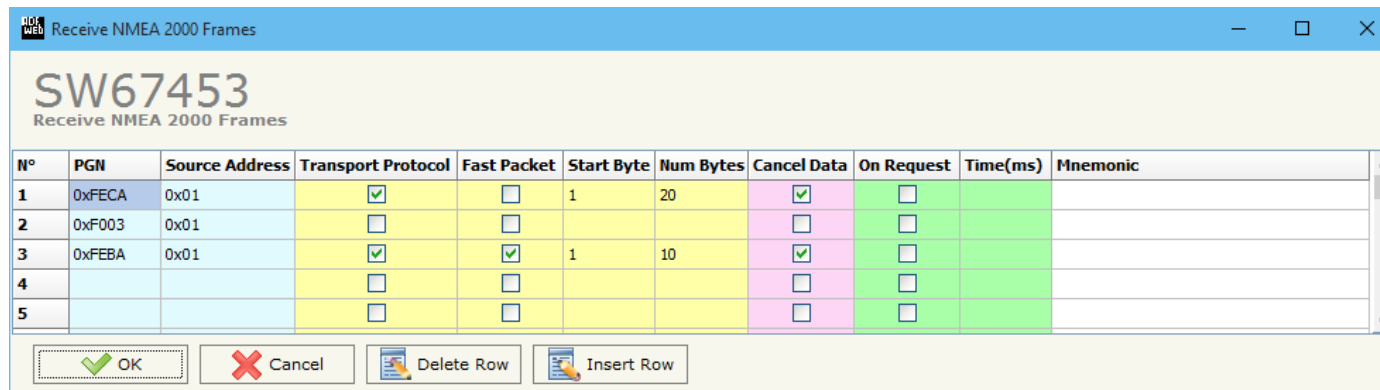
- IP ADDRESS: 192, 168, 0, 10 (four text boxes)
- SUBNET Mask: 255, 255, 255, 0 (four text boxes)
- GATEWAY:
- Port: 502 (text box)
- Protocol: TCP (dropdown)

Buttons: OK (green checkmark), Cancel (red X).

Figure 3: "Set Communication" windows

RECEIVE NMEA 2000:

By pressing the **Receive NMEA 2000** button from the main window of SW67453 (Fig. 2) the window "Receive NMEA 2000 Frames" appears (Fig. 4).



N°	PGN	Source Address	Transport Protocol	Fast Packet	Start Byte	Num Bytes	Cancel Data	On Request	Time(ms)	Mnemonic
1	0xFECA	0x01	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	20	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
2	0xF003	0x01	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
3	0xFEBA	0x01	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
4			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
5			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		

Figure 4: "Receive NMEA 2000 Frames" window

The meaning of the fields of the table are:

- In the field **PGN** insert the PGN of the data you would to read on Ethernet from NMEA 2000 (in NMEA 2000 protocol the PGN is an identifier);
- In the field **Source Address** insert the address of the device that sends the frame;
- If the field **Transport Protocol** is checked the frame uses Transport Protocol functions;
- In the field **Start Byte** insert the byte which you would start to read, this field is enable only when the field Transport Protocol is checked;
- In the field **Num Bytes** insert the number of byte you would read, for example your Start Byte is 20 an Num Bytes is 10, you can read the byte from 20 to 30;
- If the field **Cancel Data** is checked, when the data is older than the time inserted in the "TimeOut Data (s)", you visualize "FFFF" as data for this PGN in the Ethernet array;
- If the field **On Request** is checked, the converter send the request frame to the related PGN in order to receive the frame with the data;
- In the field **Time (ms)** is possible to insert the interval used to send the frame "On Request";
- In the field **Mnemonic** the 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.

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

- Connect the USB cable;
- Connect the Ethernet cable;
- Turn ON the converter;
- Insert the IP **"192.168.2.205"**;
- Press the **"Ping"** button, "Device Found! must appear";
- 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", the updating is done;
- Remove the USB cable;

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

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;
- Press the **"Ping"** button, must appear "Device Found!";
- 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" the device automatically goes at Normal Mode.



Note:

When you install a new version of the software, if it is the first time it is better you do the update of the Firmware in the HD67453 device.

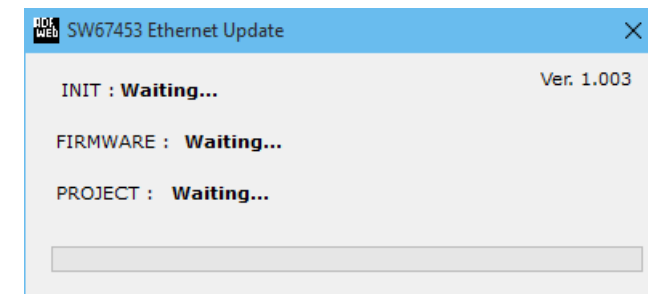
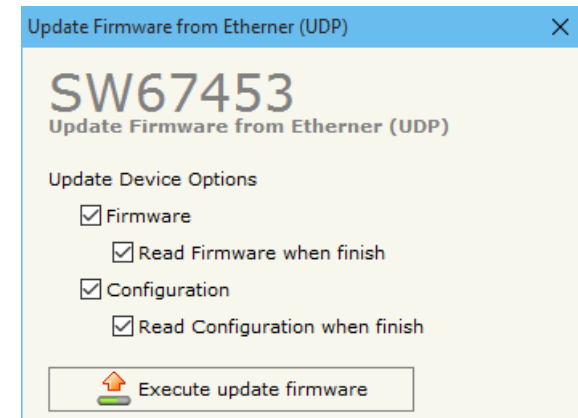
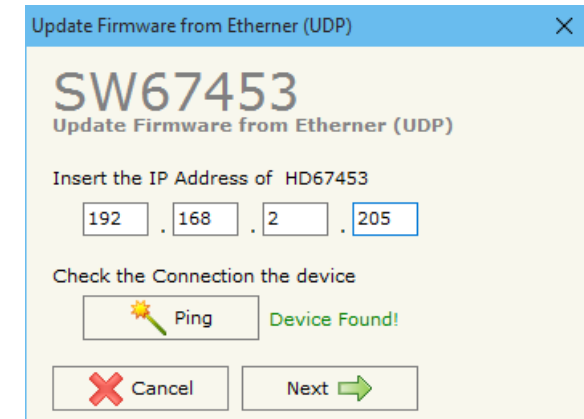


Figure 5: "Update Device" windows

**Note:**

When you receive the device, for the first time, you also have to update the Firmware in the HD67453 device.

**Warning:**

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

- ➔ Try to repeat the operations for the updating;
- ➔ 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 and 8 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 you have to launch the "Command Prompt" with Administrator Rights;
- ➔ Pay attention at Firewall lock.

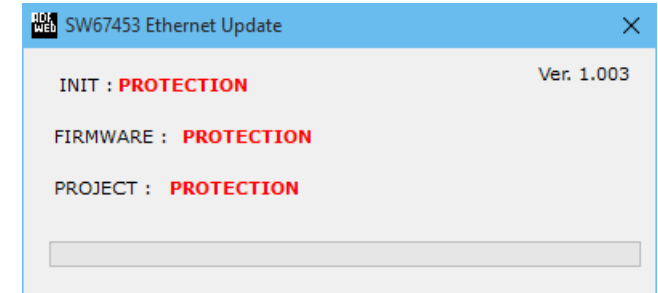


Figure 6: "Protection" window

In the case of HD67453 you have to use the software "SW67453": www.adfweb.com/download/filefold/SW67453.zip.

ETHERNET PROTOCOL

This protocol is able to read and write frames in the NMEA 2000 net.

Write Frames

The transmission is very simple, it require only what are the packets to send. In a single request it is possible to write at maximum 19 frames in the NMEA 2000 net. The Bytes that composed the request are these:

Byte Number	Description
1	Read / Write Identifier (Read=0x01 / Write=0x02)
2	Number of frames to send
3	Priority
4	Data Page
5	PGN Hi
6	PGN Lo
7	Source Address
8÷15	Data (Byte 8 is the higher, byte 15 is the lower)

A single frame is composed by 13 bytes (byte 3 to byte 15). Now if the "Number of frame to send" (Byte Number 2) has got a value greater than one the next frame is composed from byte 3 to byte 15 and so for all the frames.

The response is composed by only one byte. It can have two values:

- 0x00: No Errors;
- 0x01: Parameter Error.

Example:

We want to write two frames with the following characteristics:

Frame 1: Priority=6; Data Page=0; PGN=FECA; Source Address=1; Data=0x0102030405060708;

Frame 2: Priority=6; Data Page=0; PGN=FFCA; Source Address=2; Data=0x1122334455667788.

So the string of hexadecimal numbers is:

REQ:[02][01][06][00][FE][CA][01][01][02][03][04][05][06][07][08][06][00][FF][CA][02][11][22][33][44][55][66][77][88]
RES:[01]

Read Frames

For reading Data it is necessary to have a map in the RAM memory that contains the Data that passing in the bus. This map is implemented in the "Compositor SW67453" but it has some standard address given by the software.

The Bytes that composed the request are these:

Byte Number	Description
1	Read / Write Identifier (Read=0x01 / Write=0x02)
2	Starting Address Hi
3	Starting Address Lo
4	Number of Byte to read Hi
5	Number of Byte to read Lo

The Bytes that composed the respons are these:

Byte Number	Description
1	Error
2	TimeOut
3÷n+2	Data

n=Number of Byte

The Error Byte (Byte 1) can have three values:

- 0x00: No error;
- 0x01: Starting Address doesn't exist;
- 0x02: Too many Data to read.

The TimeOut Byte (Byte 2) can have three values:

- 0x00: TimeOut not used;
- 0x01: Data consistent;
- 0x02: Data not consistent.

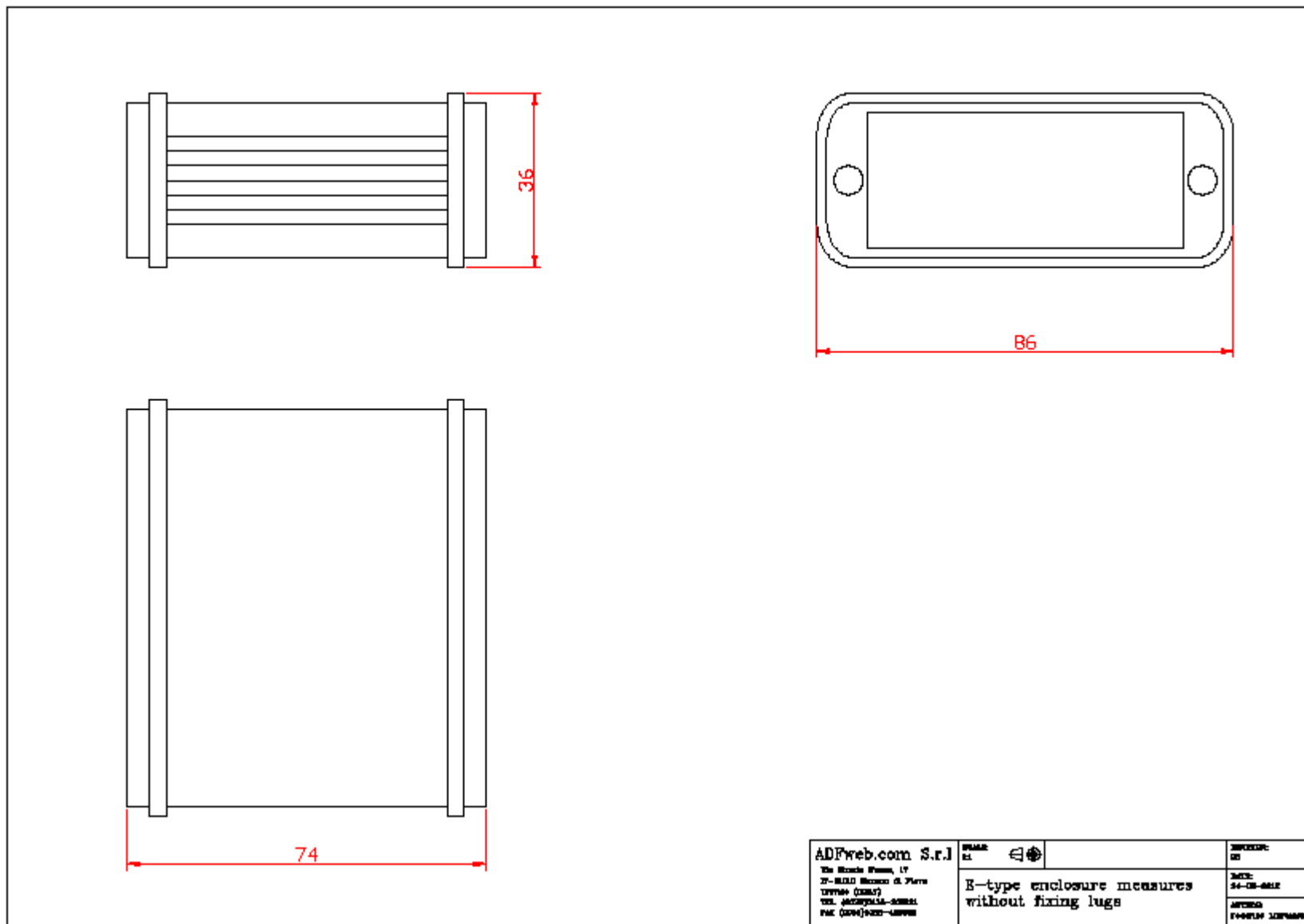
Example:

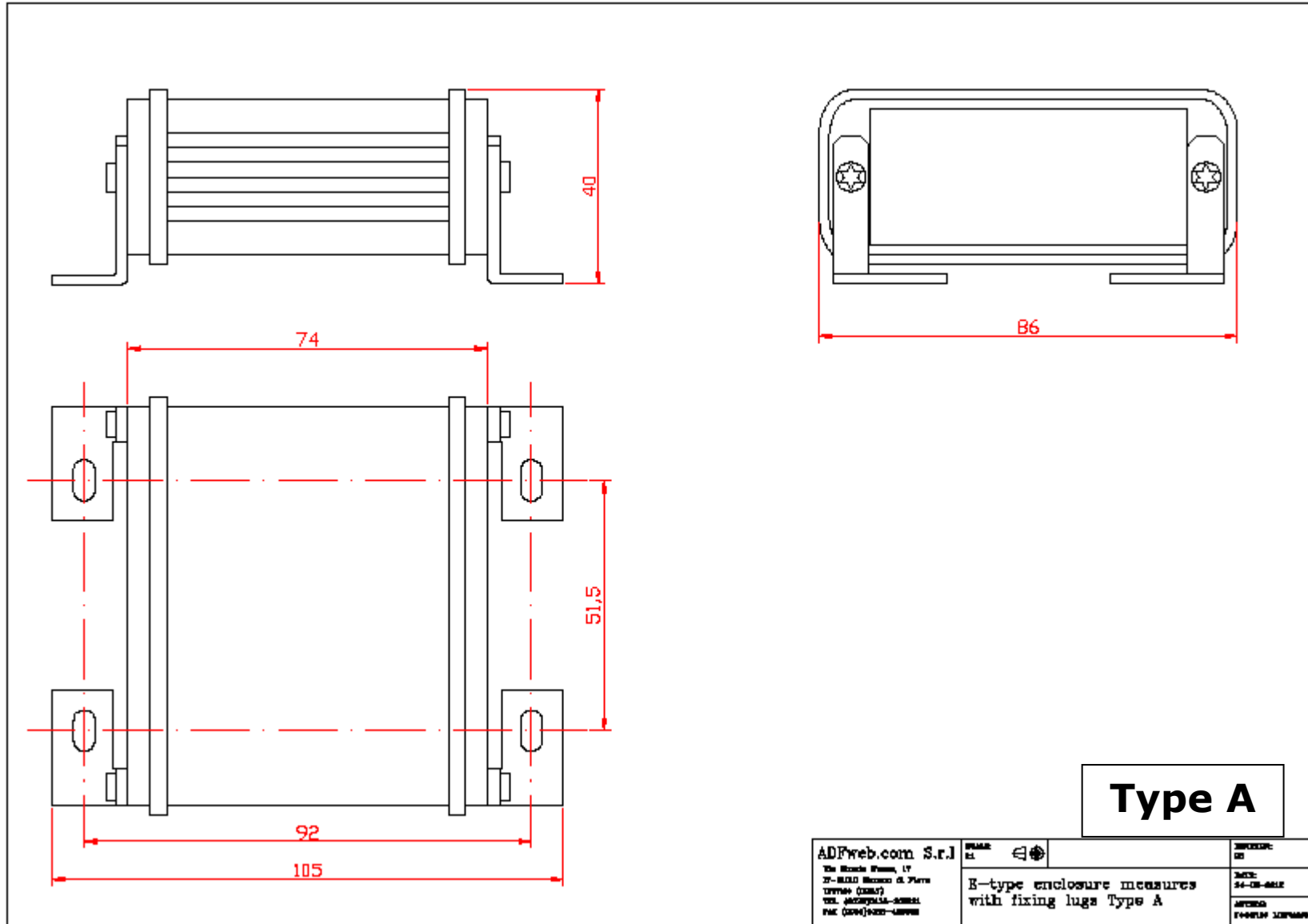
We want to read ten frames from Starting Address 1. So the string of hexadecimal numbers is:

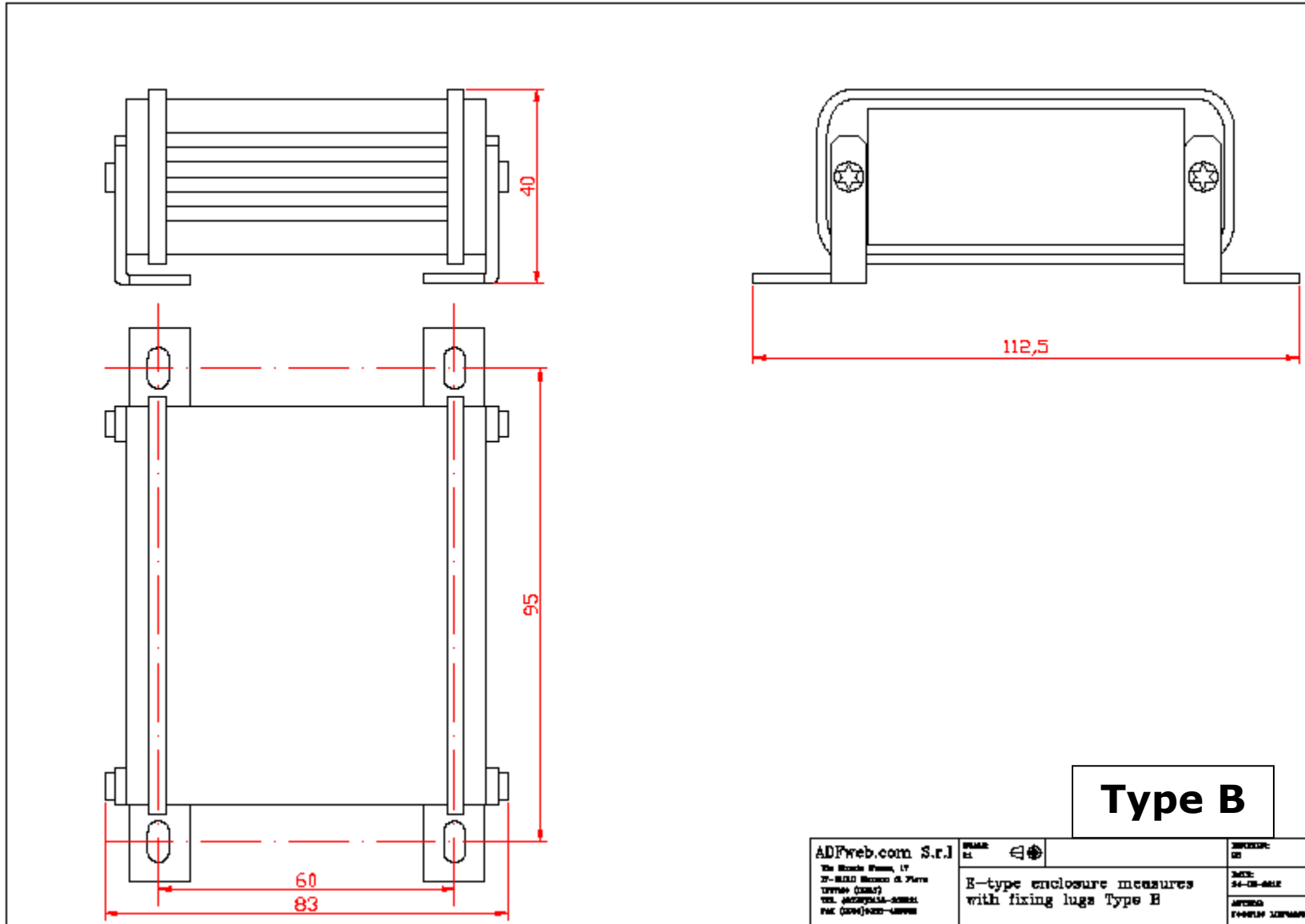
REQ:[01][00][00][00][10]

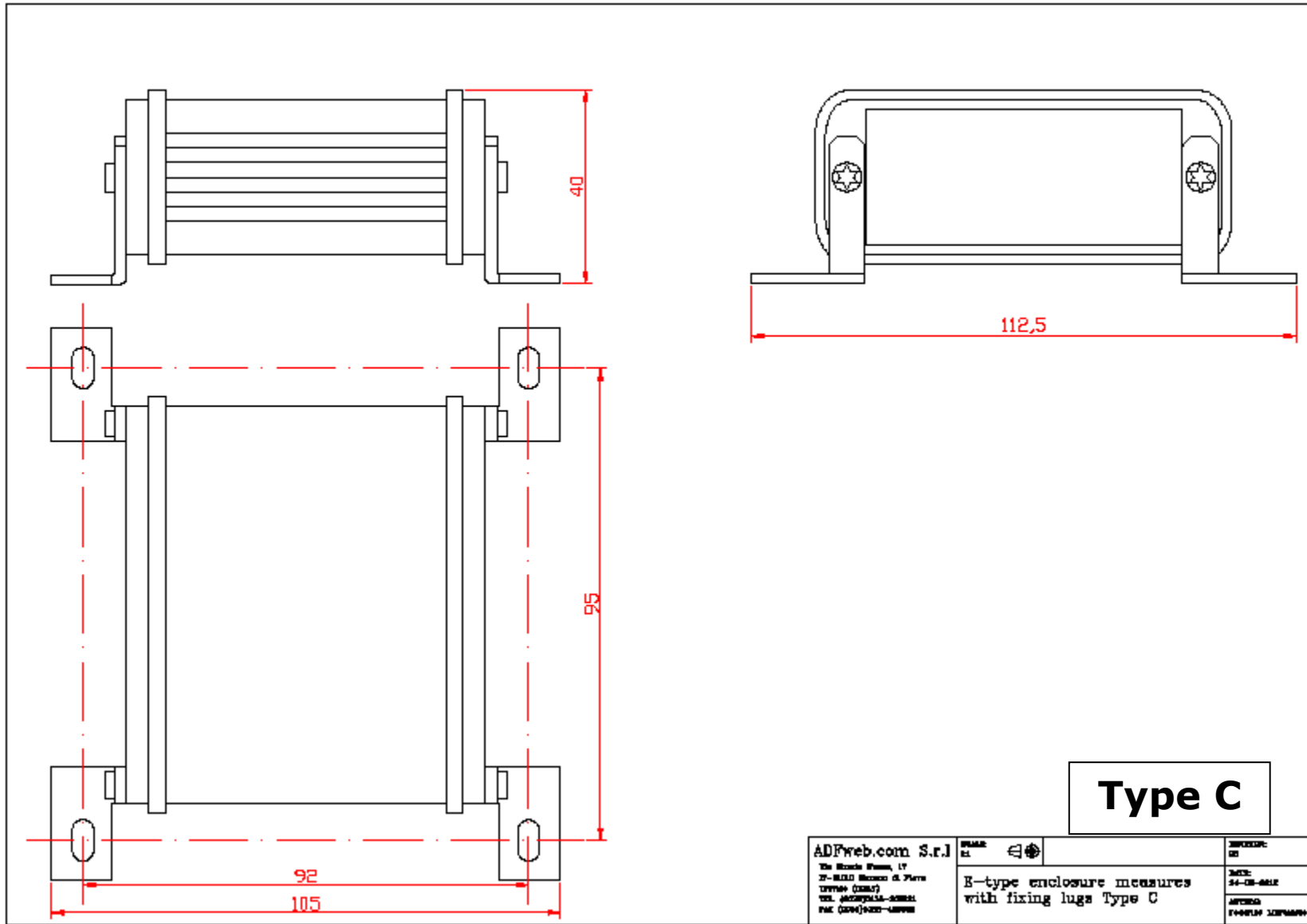
RES:[00][01][01][02][03][04][05][06][07][08][09][0A][0B][0C][0D][0E][0F][10]

MECHANICAL DIMENSIONS:





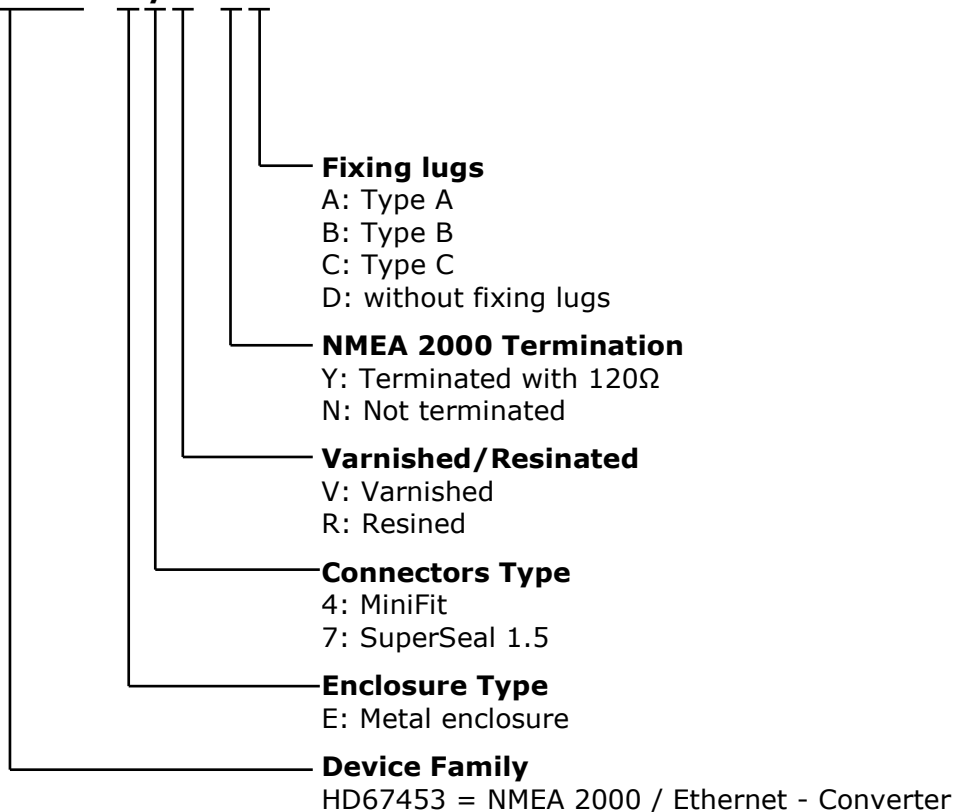




ORDERING INFORMATIONS:

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

HD67453 - E y z - s f



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

DISCLAIMER:

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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

