User Manual

Revision 1.100
English

NMEA 2000 / Ethernet - Converter

(Order Code: HD67223-A1 – HD67223-B2)

For Website information:
www.adfweb.com?Product=HD67223-A1
www.adfweb.com?Product=HD67223-B2

For Price information:
www.adfweb.com?Price=HD67223-A1
www.adfweb.com?Price=HD67223-B2

Benefits and Main Features:

- Mountable on Rail DIN
- TCP/UDP protocols changeable with software
- Industrial temperature range: -40°C / +85°C (-40°F / +185°F)

For others Converter / Adapter:
RS232 / RS485
See also the following link:
www.adfweb.com?Product=HD67118

USB / RS485
See also the following link:
www.adfweb.com?Product=HD67119

Do you have an your customer protocol?
See the following link:
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

User Manual

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	09/07/2010	Dp	All	First release version
1.001	12/02/2013	Nt	All	Added new chapters
1.100	08/08/2025	Mdb	All	New design

WARNING:

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ADFweb.com is not responsible for any error this manual may contain.

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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 are required for each individual application, legal and safety regulation. 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 instrument can represent a potential hazard if they are inappropriately installed and operated by personnel untrained. These instructions refer to residual risks with the following symbol:

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

CE CONFORMITY

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

CONNECTION SCHEME:

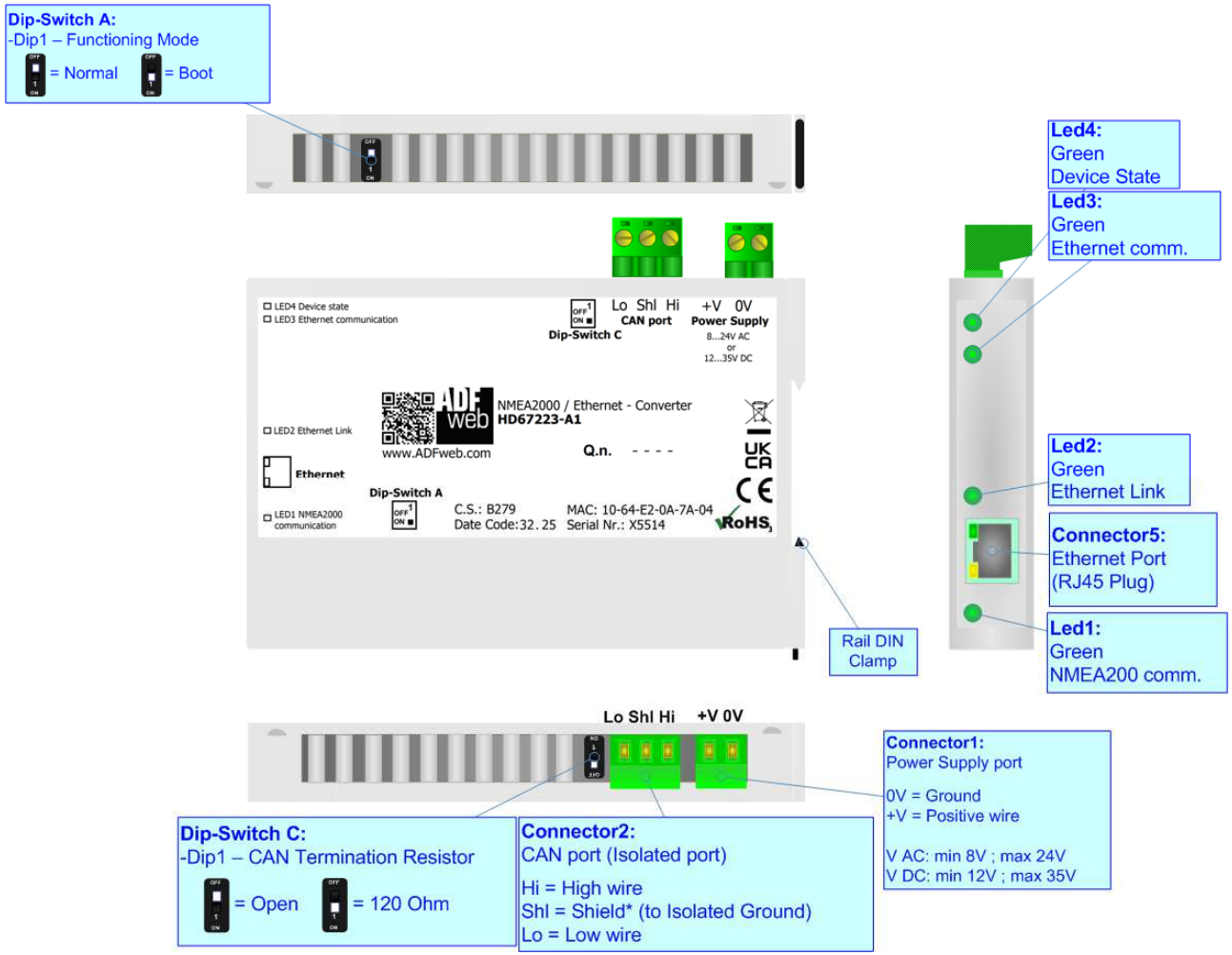


Figure 1: Connection scheme HD67223-A1

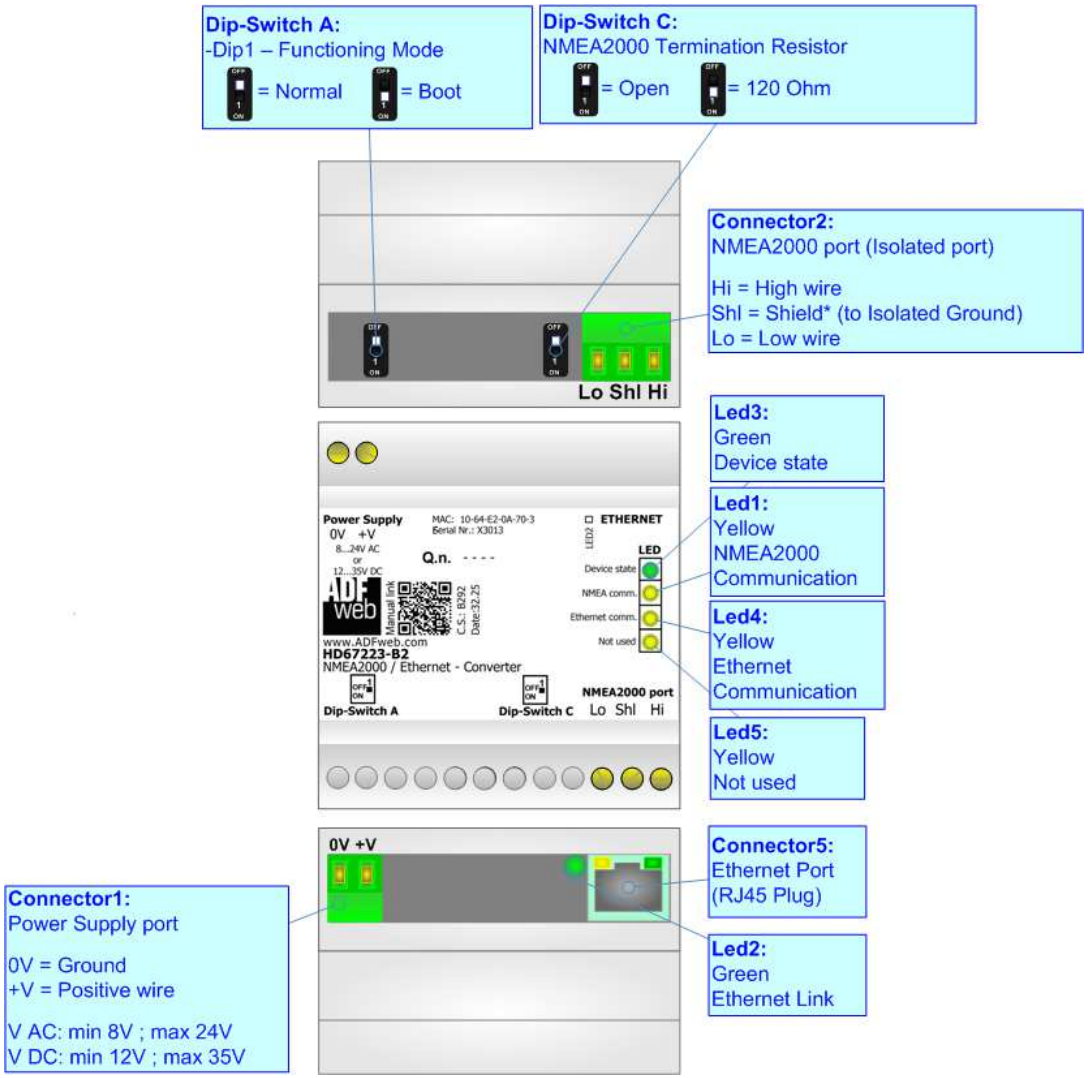


Figure 2: Connection scheme for HD67223-B2

CHARACTERISTICS:

The HD67223-A1 is a NMEA2000 / Ethernet Converter.

It has the following characteristics:

- Up to 244 bytes in reading and 244 bytes in writing;
- Isolation between Power Supply – Ethernet.
- Two-directional information between NMEA2000 bus and Ethernet bus;
- 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 SW67223 software on your PC in order to perform the following:

- Define the parameter of NMEA2000 bus;
- Define the parameter of Ethernet line;
- Update the device.

POWER SUPPLY:

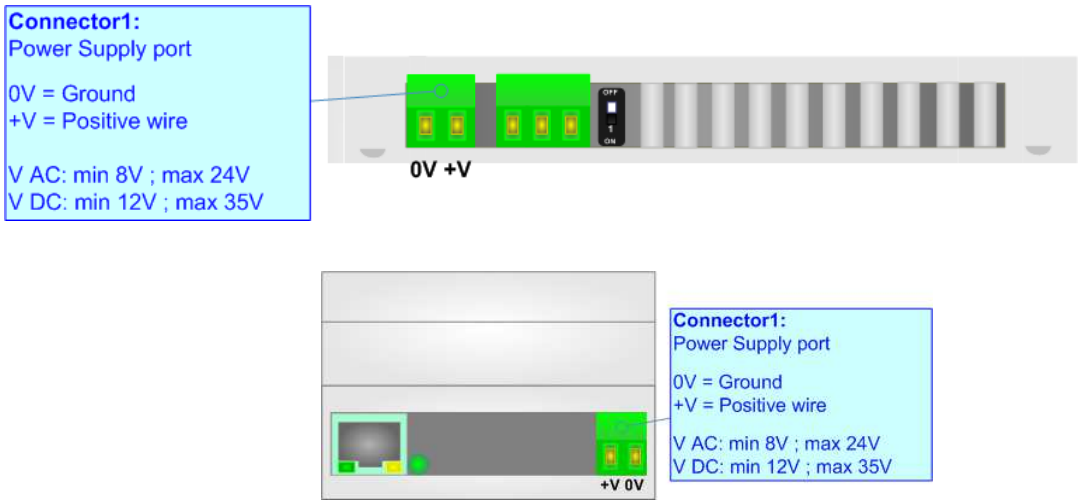
The devices can be powered at 8…24V AC and 12…35V DC. For more details see the two tables below.

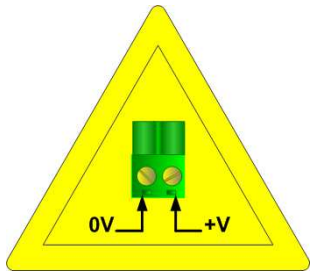
VAC ~		VDC ⎓	
Vmin	**Vmax**	**Vmin**	**Vmax**
8V	**24V**	**12V**	**35V**

Consumption at 24V DC:

Device	Consumption [W/VA]
HD67223-A1	3.5

Caution: Do not reverse the polarity power





HD67223-A1

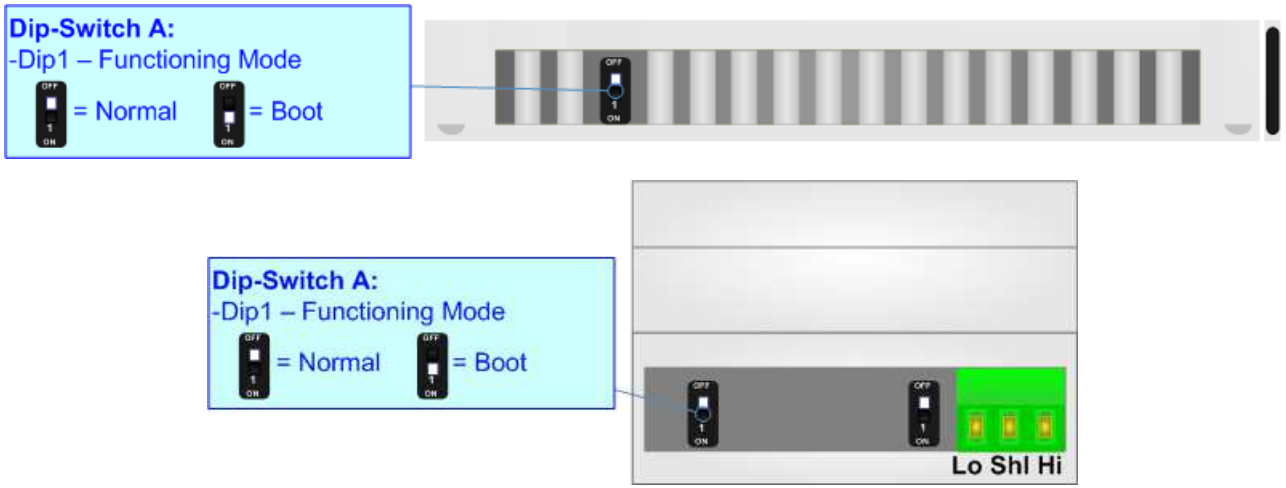
FUNCTION MODES:

The device has got two function modes depending on the position of the 'Dip1 of Dip-Switch A':

- The first, with 'Dip1 of Dip-Switch A' at "OFF" position, is used for the normal working of the device.
- The second, with 'Dip1 of Dip-Switch A' at "ON" position, is used for uploading the Project and/or Firmware.

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

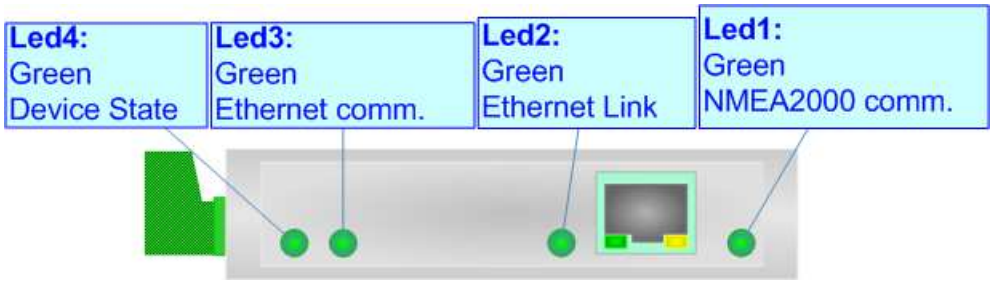
According to the functioning mode, the LEDs will have specific functions, see 'LEDS' section.



LEDS (for A1 version):

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

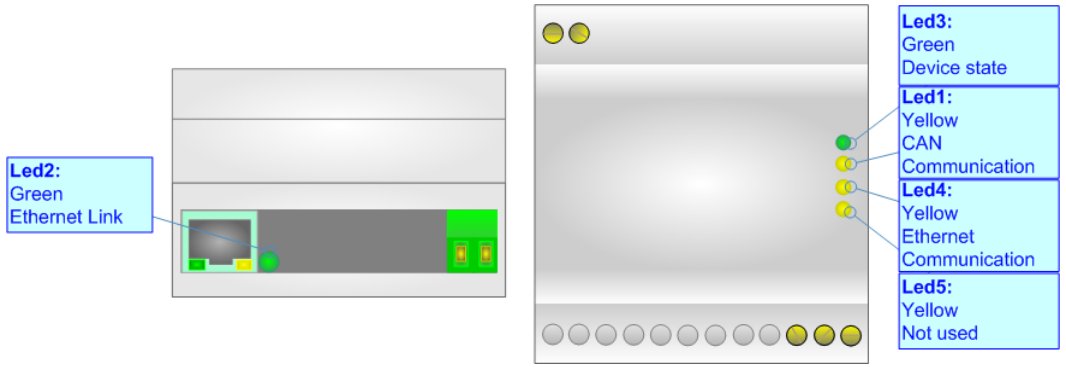
LED	Normal Mode	Boot Mode
1: NMEA2000 comm.	Blinks when NMEA2000 frame is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
2: Ethernet Link	**ON:** Ethernet cable connected **OFF:** Ethernet cable not connected	**ON:** Ethernet cable connected **OFF:** Ethernet cable not connected
3: Ethernet comm.	Blinks when Ethernet frame is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: Device State	**ON:** Device powered **OFF:** Device not powered	**ON:** Device powered **OFF:** Device not powered



LEDS (for B2 version):

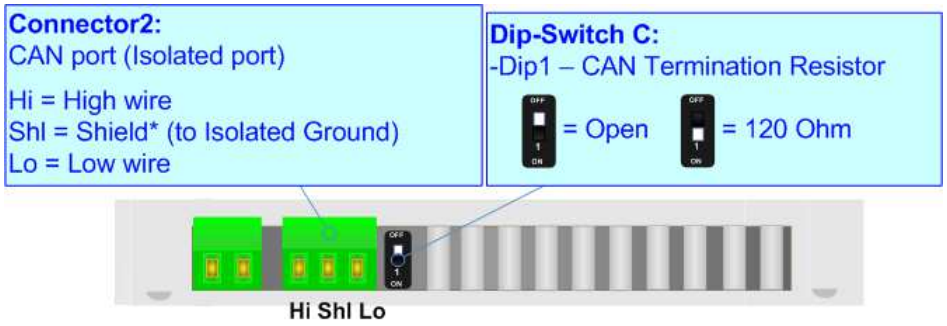
The device has got five LEDs that are used to give information about the functioning status.
The various meanings of the LEDs are described in the table below.

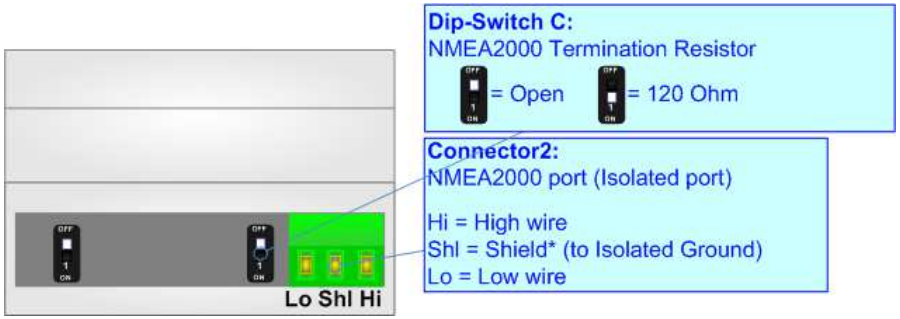
LED	Normal Mode	Boot Mode
1: NMEA2000 comm.	Blinks when NMEA2000 frame is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
2: Ethernet Link	**ON:** Ethernet cable connected **OFF:** Ethernet cable not connected	**ON:** Ethernet cable connected **OFF:** Ethernet cable not connected
3: Device state	**ON:** Device powered **OFF:** Device not powered	**ON:** Device powered **OFF:** Device not powered
4: Ethernet comm.	Blinks when Ethernet frame is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
5: Not used	**OFF**	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress



CAN:

For terminate the CAN line with a 120Ω resistor it is necessary that the Dip1 of 'Dip-Switch C' is at ON position.





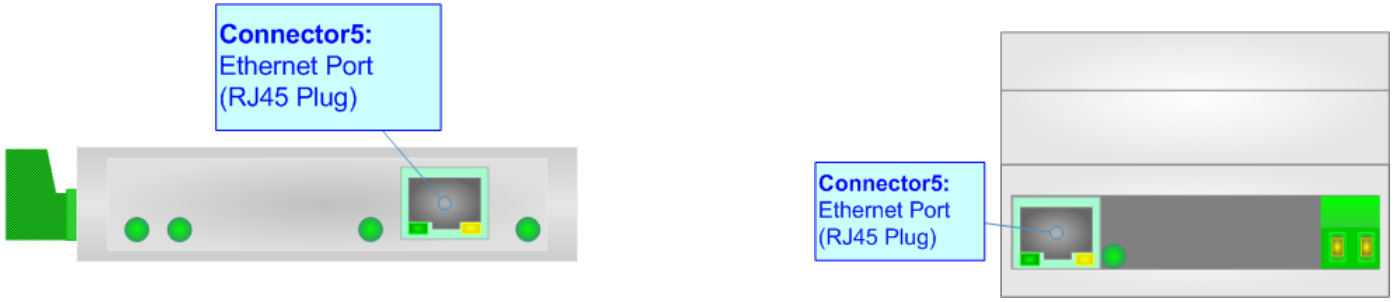
Cable characteristics:

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 and the updating of the converter must be made using Connector5 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.



USE OF COMPOSITOR SW67223:

To configure the Converter, use the available software that runs with Windows called SW67223. 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 or 11; 32/64bit).

When launching the SW67223, the window below appears (Fig. 2).

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

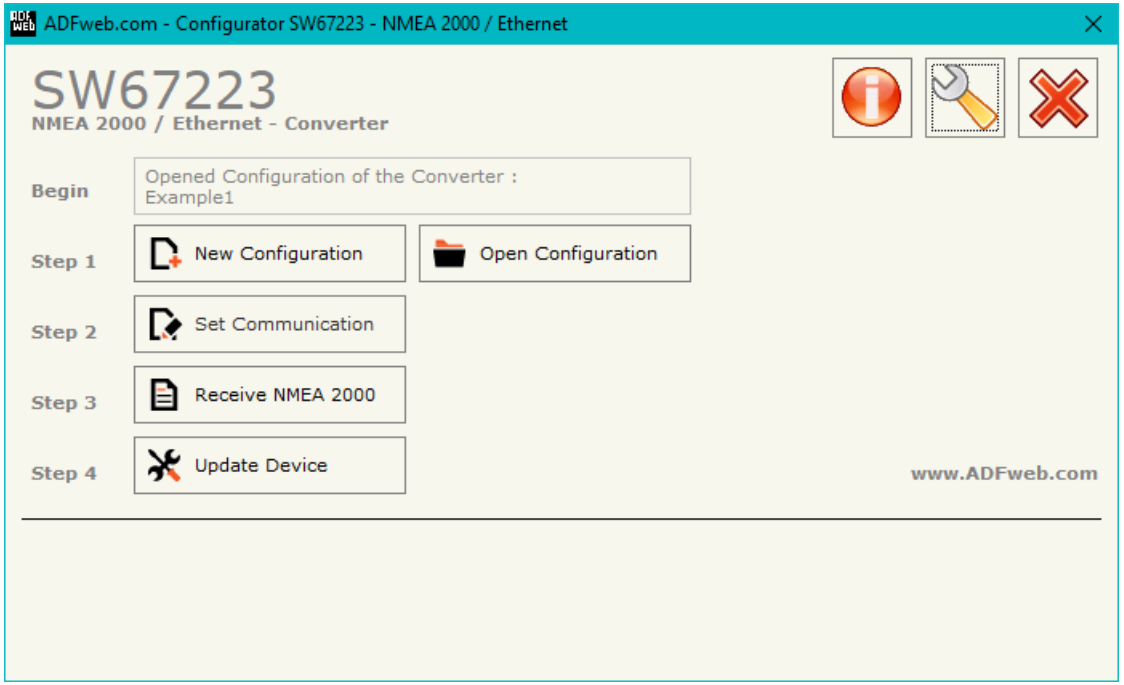
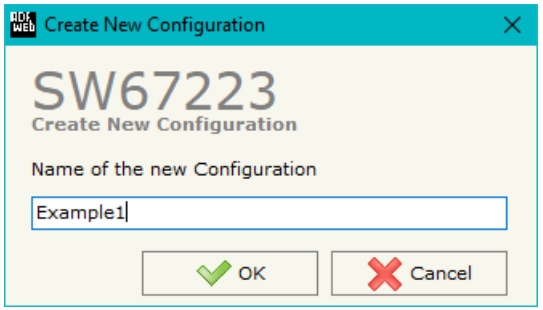


Figure 2: Main window for SW67223

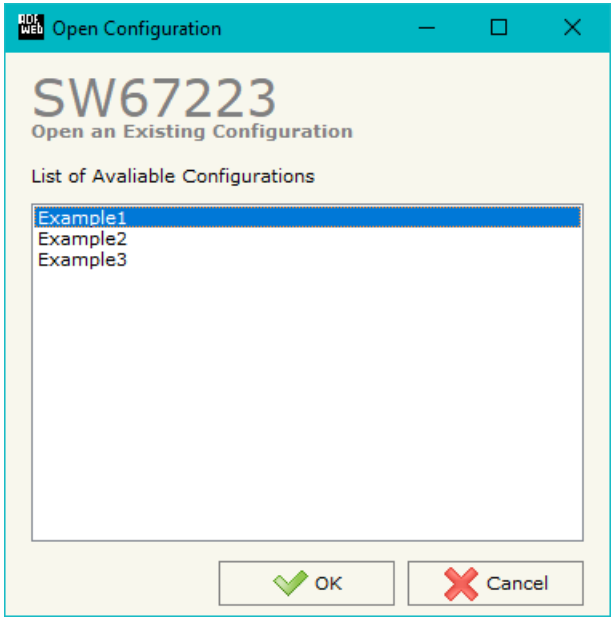
NEW CONFIGURATION / OPEN CONFIGURATION:

The "**New Configuration**" button creates the folder which contains the entire device's configuration.



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

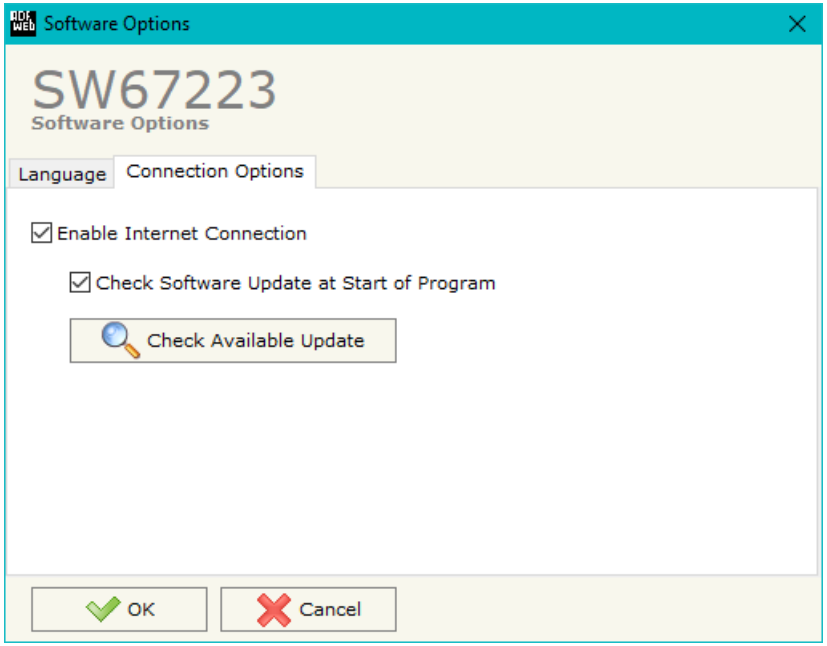
- To clone the configurations of a Programmable "NMEA 2000 / Ethernet - Converter" in order to configure another device in the same manner, it is necessary to maintain the folder and all its contents;
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate 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 SW67223 check automatically if there are updatings when it is launched.

SET COMMUNICATION:

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

By pressing the "**Set Communication**" button from the main window for SW67223 (Fig. 2) the window "Set Communication" appears (Fig. 3).

The window is divided in two section, one for the NMEA 2000 and the other for the Ethernet.

The means of the fields for NMEA 2000 are:

- In the field "**Baudrate**" the baudrate for the NMEA 2000 is defined;
- In the field "**TimeOut Data**" insert a time, when this time is elapsed the data isn't reliable, and in the Modbus register you can read "FFFF";
- If the field "**Enable Peer to Peer**" is checked the gateway accept any ID that have the PGN inserted in the section "Receive NMEA";
- If the field "**Filter FECA**" is checked there is a filter to the alarms with PGN 0xFECA. If the device send first a message with PGN 0xFECA, after it would send a Transport Protocol frame for sending the alarms. If this frame arrives within the mS write in the box, the frame with 0xFECA is discarded and the Transport Protocol frame is held. Otherwise the frame with PGN 0xFECA is hold;

The means of the fields for Ethernet are:

- In the field "**IP ADDRESS**" insert the IP address;
- In the field "**SUBNET Mask**" insert the Subnet Mask;
- In the field "**Port**" insert the number of port;
- If the field "**Protocol**" is checked the Ethernet protocol used is the TCP, otherwise if the field "UDP" is checked the Ethernet protocol used is the UDP.

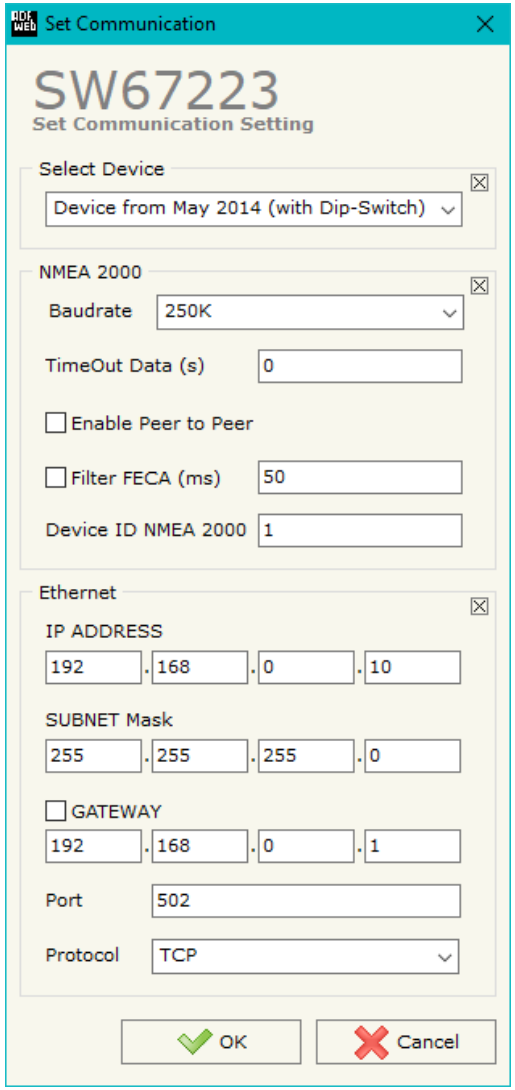


Figure 3: "Set Communication" window

RECEIVE NMEA

By pressing the "**Receive NMEA**" button from the main window for SW67223 (Fig. 2) the window "Receive NMEA 2000 Frame" appears (Fig. 4).

The means of the fields are:

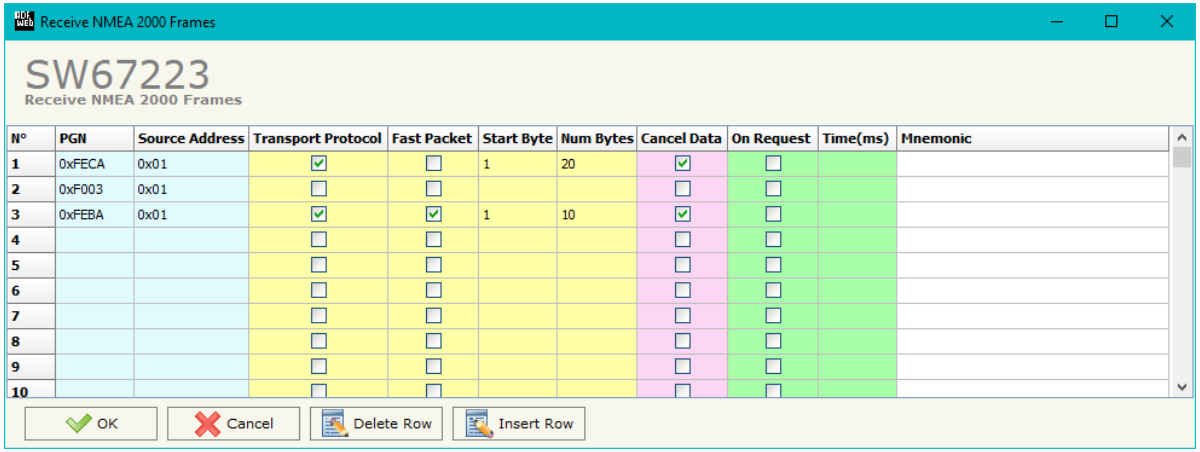


Figure 4: "Receive NMEA2000" window

- In the field "**PGN**" insert the PGN of the data you would to read from Ethernet to NMEA 2000 (it is an identifier);
- In the field "**Source Address**" insert the address of the device that send the frame;
- If the field "**Transport Protocol**" is checked the frame use transport protocol functions;
- If the field "**Fast Packet**" is checked the frame could use the Fast Packet Protocol functions;
- In the field "**Start Byte**" insert the Start Byte of the Trasnport Protocol. Insert a value only if the Multi Frame is enabled;
- In the field "**Num Bytes**" insert the number of bytes that composed the Transport Protocol. Insert a value onlt if the Multi Frame is enabled;
- If the field "**Cancel Data**" is checked, the data in the frame will be erased after the "TimeOut Data" is expired;
- 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**" a description of 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**";
- 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" turn off the Device;
- Put Dip1 of 'Dip-Switch A' in OFF position;
- Turn on the device.

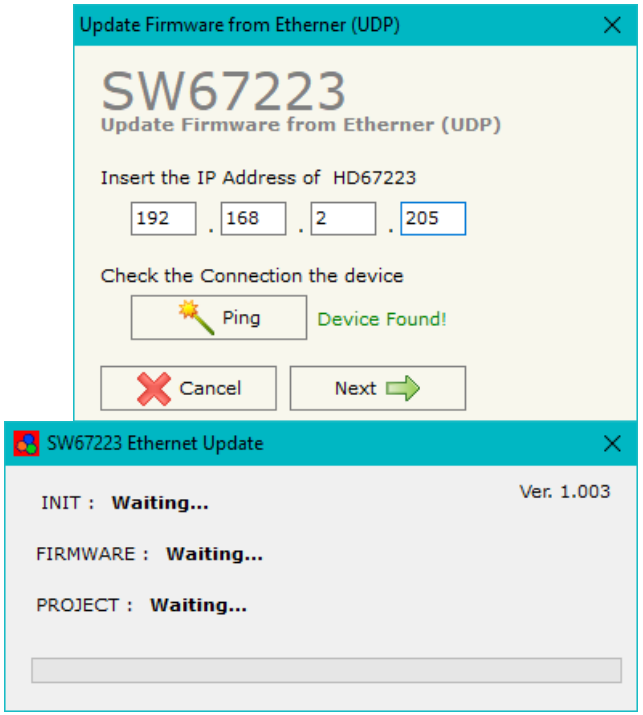


Figure 5: "Update device" windows

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 receive the device, for the first time, you have to update also the Firmware in the HD67223 device.

Warning:

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

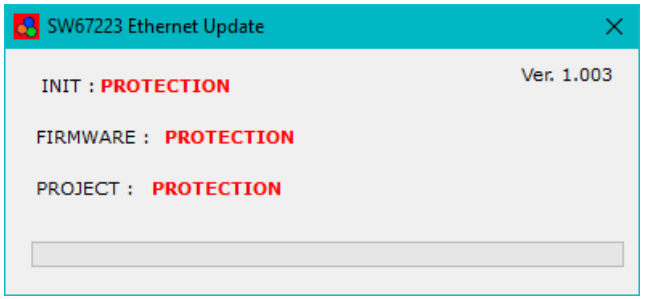


Figure 6: "Protection" error

- 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, 10 or 11 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 or 11 you have to launch the "Command Prompt" with Administrator Rights;
- Pay attention at Firewall lock.

In the case of HD67223 you have to use the software "SW67223": www.adfweb.com\download\filefold\SW67223.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 SW67223" but it has some standard address given by the software. It is possible to see this map in Fig. 5.

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:

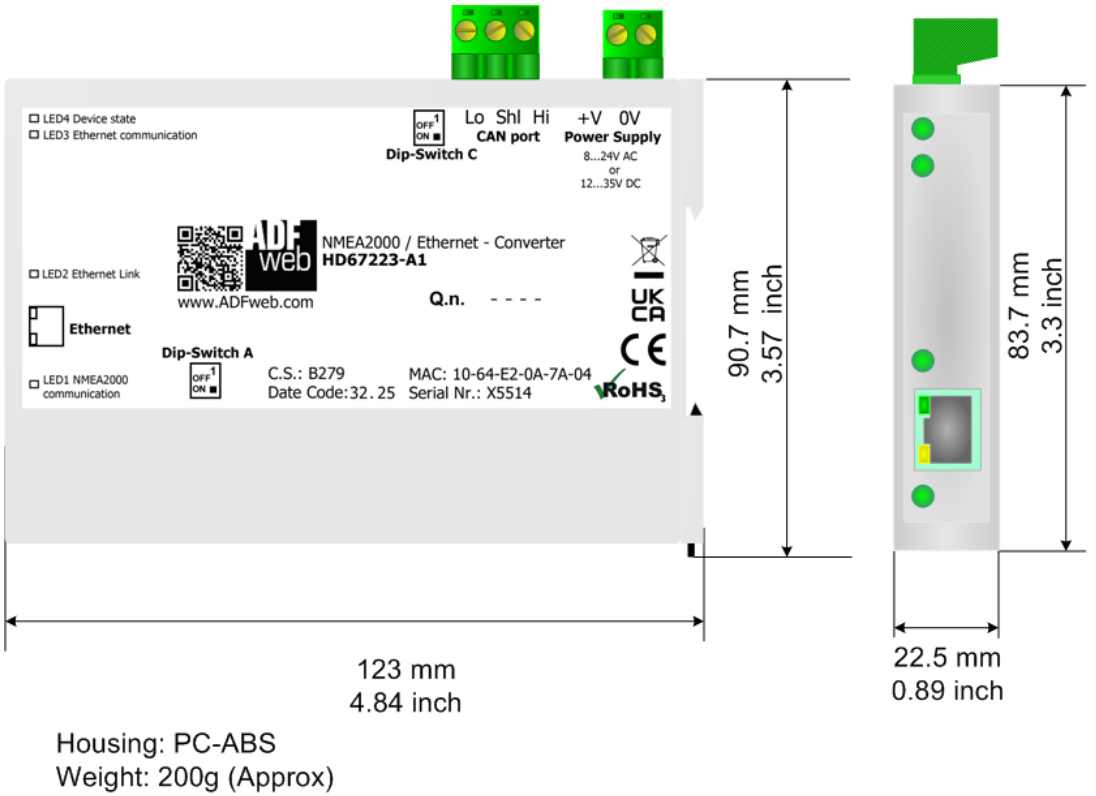


Figure 7a: Mechanical dimensions scheme for HD67223-A1

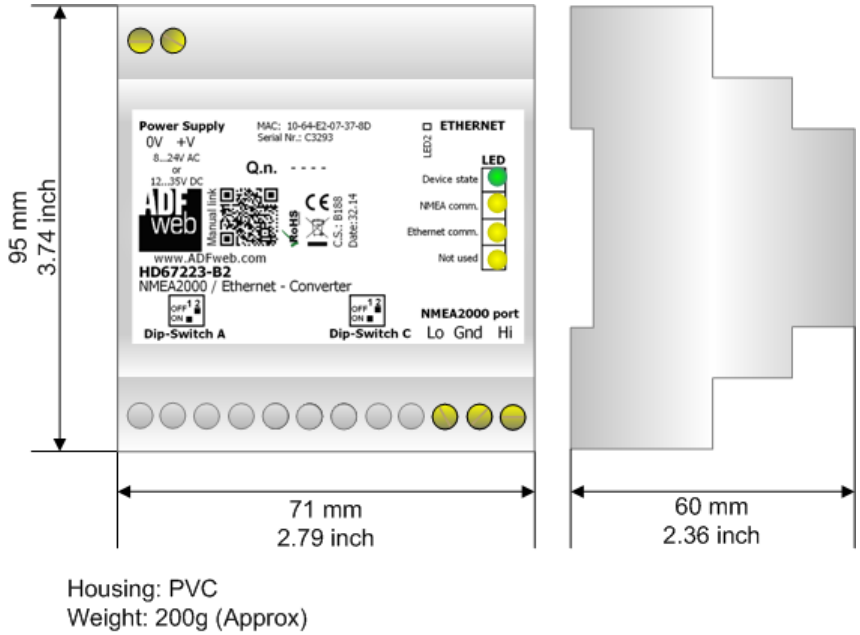


Figure 7b: Mechanical dimensions scheme for HD67223-B2

ORDER CODE:

Order Code: **HD67223-A1** **-** NMEA 2000 / Ethernet - Converter

Order Code: **HD67223-B2** **-** NMEA 2000 / Ethernet - 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

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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 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:

1) 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.
2) 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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