Industrial Electronic Devices

# User Manual
Revision 1.100
English

## NMEA 2000 / CANopen - Converter
(Order Code: HD67250-A1, HD67250-A3, HD67250-A4)

for Website information:
www.adfweb.com?Product=HD67250

for Price information:
www.adfweb.com?Price=HD67250-A1
www.adfweb.com?Price=HD67250-A3
www.adfweb.com?Price=HD67250-A4

## Benefits and Main Features:

⊕ Very easy to configure

⊕ Electrical isolation

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

User Manual

For others Gateways / Bridges:

**NMEA2000 to Modbus**

See also the following links:
www.adfweb.com?Product=HD67225 (Modbus TCP)

**CANopen 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=HD67004  (Modbus TCP Master)
www.adfweb.com?Product=HD67505  (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=HD67514  (Modbus TCP Slave)
www.adfweb.com?Product=HD67515  (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

Industrial Electronic Devices

**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 | 12/07/2010 | Dp | All | First release version |
| 1.001 | 11/02/2013 | Nt | All | Added new chapters |
| 1.100 | 09/05/2016 | Ff | All | New Hardware version |
| | | | | |

**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.

Industrial Electronic Devices

**SECURITY ALERT:**

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

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

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

**RESIDUAL RISKS**
The device is state-of-the-art and is safe. The instruments can represent a potential hazard if they are inappropriately installed and operated by untrained personnel. These instructions refer to residual risks with the following symbol:

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

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

Industrial Electronic Devices

**EXAMPLE OF CONNECTION:**



**HD67250**

![ADFweb logo] Industrial Electronic Devices

**CONNECTION SCHEME:**

**Dip-Switch A:**
-Dip1 – Must be at ON
-Dip2 – Functioning Mode

= Normal    = Boot

**Led4:**
Green
CANopen comm.

**Led3:**
Green
NMEA 2000 comm.

**Led2:**
Green
Ethernet Link

**Connector4:**
Ethernet Port
(RJ45 Plug)

**Led1:**
Green
Device state

Rail DIN Clamp

NMEA 2000 / CANopen - Converter
HD67250-A1

LED4 CANopen comm.
LED3 NMEA 2000 comm.

Lo Shl Hi
**CAN 1 port**
Used for NMEA2000

120 ohm Termination resistor

Lo Shl Hi
**CAN 0 port**
Used for CANopen

+V 0V
**Power Supply**
8...24V AC
or
12...35V DC

120 ohm Termination resistor

LED2 Ethernet link

Ethernet

www.ADFweb.com
Dip-Switch A

LED1 Device State

Date Code: 20.16
C.S.:B211

Q.n. ----

MAC: 10-64-E2-07-5D-7E
Serial Nr.: D1358

**Dip-Switch C:**
-Dip1 – NMEA 2000 Termination Resistor

= Open    = 120 Ohm

**Connector3:**
NMEA 2000 port (Isolated port)

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

**Dip-Switch B:**
-Dip1 – CANopen Termination Resistor

= Open    = 120 Ohm

Lo Shl Hi    Lo Shl Hi   +V 0V

**Connector2:**
CANopen port (Isolated port)

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

**Connector1:**
Power Supply port

0V = Ground
+V = Positive wire

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

*Figure 1a: Connection scheme for HD67250-A1*

Industrial Electronic Devices

**Dip-Switch A:**
-Dip1 – Must be at ON
-Dip2 – Functioning Mode

= Normal      = Boot

**Led4:**
Green
CANopen comm.

**Led3:**
Green
NMEA 2000 comm.

□ LED4 CANopen comm.
□ LED3 NMEA 2000 comm.

120 ohm Termination resistor

**CAN 1 port**
1 = CAN_SHL
2 = Not connected
3 = Not connected
4 = CAN_H
5 = CAN_L

120 ohm Termination resistor

**CAN 0 port**
1 = CAN_SHL
2 = Not connected
3 = Not connected
4 = CAN_H
5 = CAN_L

+V  0V
**8...24V AC**
or
**12...35V DC**
**Power Supply**

□ LED2 Ethernet Link

Ethernet

NMEA 2000 / CANopen - Converter
**HD67250-A3**

www.ADFweb.com
**Dip-Switch A**

Q.n.  - - - -

□ LED1 Device State

C.S.: B211  Date Code: 20.16

**RoHS**

**Led2:**
Green
Ethernet Link

**Connector4:**
Ethernet Port
(RJ45 Plug)

**Led1:**
Green
Device state

Rail DIN
Clamp

**Dip-Switch C:**
-Dip1 – NMEA 2000 Termination Resistor

= Open      = 120 Ohm

**Connector1:**
Power Supply port

1,4,5 = Not Connected
2 = +V = Positive wire
3 = 0V  = Ground

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

1  5  2
4  3

**Connector3:**
NMEA 2000 port (Isolated port)

1 = Shield* (to Isolated Ground)
2 = Not Connected
3 = Not Connected
4 = High wire
5 = Low wire

1  5  2
4  3

**Dip-Switch B:**
-Dip1 – CANopen Termination Resistor

= Open      = 120 Ohm

**Connector2:**
CANopen port (Isolated port)

1 = Shield* (to Isolated Ground)
2 = Not Connected
3 = Not Connected
4 = High wire
5 = Low wire

1  5  2
4  3

*Figure 1b: Connection scheme for HD67250-A3*

ADFweb.com Srl – IT31010 – Mareno – Treviso                    INFO:  www.adfweb.com       Phone +39.0438.30.91.31

Industrial Electronic Devices

**Dip-Switch A:**
-Dip1 – Must be at ON
-Dip2 – Functioning Mode

= Normal       = Boot

□ LED4 CANopen comm.
□ LED3 NMEA 2000 comm.

Lo Shl Hi
**CAN 1 port**
Used for
NMEA 2000

120 ohm
Termination
resistor

Lo Shl Hi
**CAN 0 port**
Used for CANopen

120 ohm
Termination
resistor

+V 0V
**Power Supply**
8...24V AC
or
12...35V DC

NMEA 2000 / CANopen - Converter
**HD67250-A4**

□ LED2 Ethernet Link

Ethernet

www.ADFweb.com           Q.n.   - - - -

**Dip-Switch A**

□ LED1 Device state

C.S.: B211         MAC: 10-64-E2-07-50-D3
Date Code: 20 . 16    Serial Nr.: C8131

RoHS

**Led4:**
Green
CANopen comm.

**Led3:**
Green
NMEA 2000 comm.

**Led2:**
Green
Ethernet Link

**Connector4:**
Ethernet Port
(RJ45 Plug)

**Led1:**
Green
Device state

Rail DIN
Clamp

**Dip-Switch C:**
-Dip1 – NMEA 2000 Termination Resistor

= Open       = 120 Ohm

Lo Shl Hi        Lo Shl Hi        +V 0V

**Connector1:**
Power Supply port

0V = Ground       ←0V
+V = Positive wire  ←+V

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

**Connector3:**
NMEA 2000 port (Isolated port)

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

Hi Shl Lo

**Dip-Switch B:**
-Dip1 – CANopen
Termination Resistor

= Open   = 120 Ohm

**Connector2:**
CANopen port
(Isolated port)

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

Hi Shl Lo

*Figure 1c: Connection scheme for HD67250-A4*

Industrial Electronic Devices

## CHARACTERISTICS:

The HD67250 is a NMEA 2000 / CANopen Converter.

They have the following characteristics:

➢ Triple isolation between NMEA 2000 - Power Supply, NMEA 2000 - CANopen, CANopen - Power Supply;
➢ Two-directional information between CANopen bus and NMEA 2000 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 SW67250 software on your PC in order to perform the following:

➢ Define the parameters of NMEA 2000 line;
➢ Define the parameters of CANopen line;
➢ Define the NMEA 2000 messages in reception and in which CANopen objects they will be mapped;
➢ Define the NMEA 2000 messages in transmission and from which CANopen objects they will be taken;
➢ Update the device.

Industrial Electronic Devices

**POWER SUPPLY:**

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

| VAC $\sim$ | | VDC $=$ | |
|---|---|---|---|
| **Vmin** | **Vmax** | **Vmin** | **Vmax** |
| **8V** | **24V** | **12V** | **35V** |

Consumption at 24V DC:

| Device | Consumption [W/VA] |
|---|---|
| HD67250-A1 | 3.5 |
| HD67250-A3 | 3.5 |
| HD67250-A4 | 3.5 |



**Connector1:**
Power Supply port

0V = Ground
+V = Positive wire

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

**Connector1:**
Power Supply port

1,4,5 = Not Connected
2 = +V = Positive wire
3 = 0V = Ground

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

**Connector1:**
Power Supply port

0V = Ground
+V = Positive wire

V AC: min 8V ; max 24V
V DC: min 12V ; max 35V
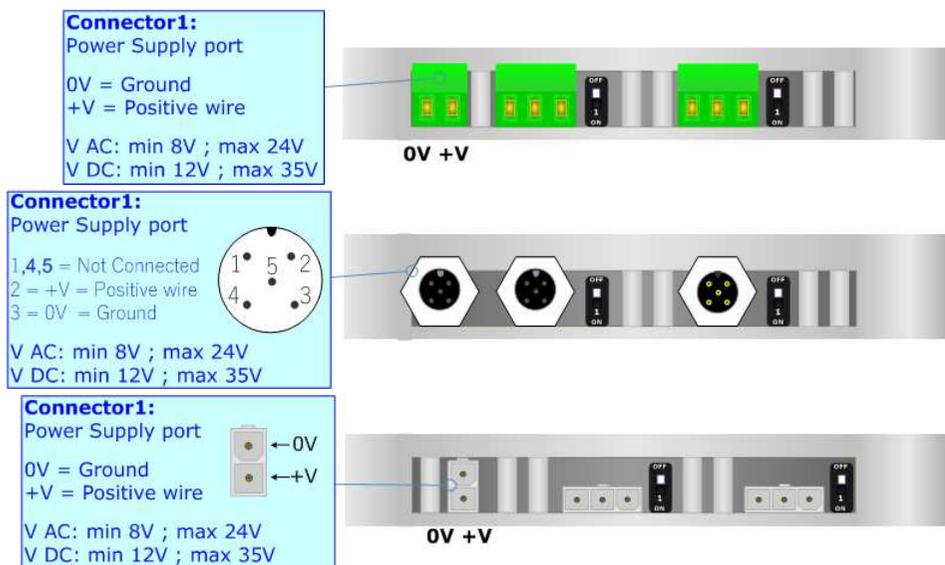
**Caution: Do not reverse the polarity power**

HD67250-A1       HD67250-A3       HD67250-A4

*Industrial Electronic Devices*
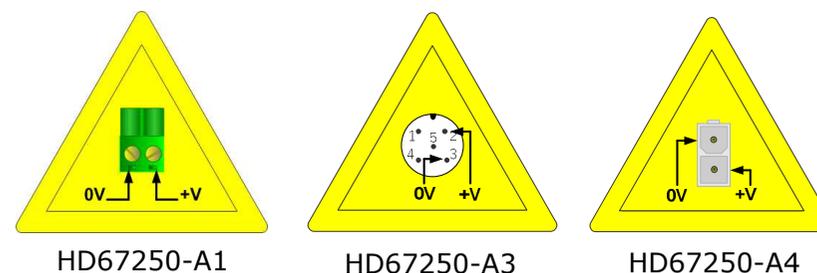
**FUNCTION MODES:**

The device has got two function modes depending on the position of the 'Dip2 of Dip-Switch A':

- The first, with 'Dip2 of Dip-Switch A' at "OFF" position, is used for the normal working of the device.
- The second, with 'Dip2 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.



Warning:
Dip1 of 'Dip-Switch A' must be at ON position to work even if the Ethernet cable is not inserted.

---

*ADFweb.com Srl – IT31010 – Mareno – Treviso*          *INFO:*  www.adfweb.com     *Phone +39.0438.30.91.31*

Industrial Electronic Devices

**LEDS:**

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: Device state | Blinks slowly (~1Hz) | **Blinks quickly:** Boot state <br> **Blinks very slowly (~0.5Hz):** update in progress |
| 2: Ethernet Link | **ON:** Ethernet cable connected <br><br> **OFF:** Ethernet cable disconnected | **ON:** Ethernet cable connected <br><br> **OFF:** Ethernet cable disconnected |
| 3: NMEA 2000 comm. | Blinks when a NMEA 2000 frame is received | **Blinks quickly:** Boot state <br> **Blinks very slowly (~0.5Hz):** update in progress |
| 4: CANopen comm. | Blinks when a CANopen frame is received | **Blinks quickly:** Boot state <br> **Blinks very slowly (~0.5Hz):** update in progress |

Industrial Electronic Devices
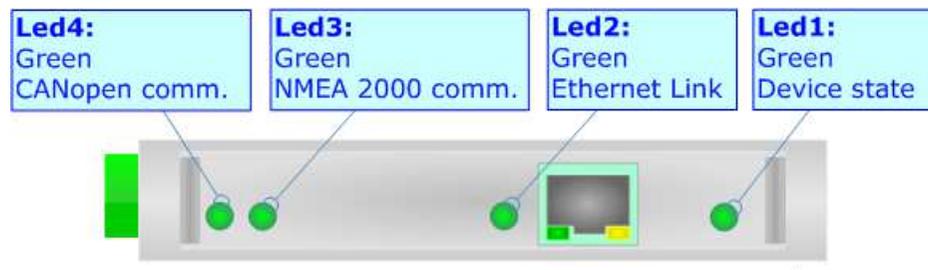
**CANOPEN:**

To terminate the CANopen line with a 120Ω resistor it is necessary that the Dip1 of 'Dip-Switch B' 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 |

Here some codes of cable:

- Belden: p/n 3105A - 1x 22WG stranded twisted pairs conductor + foil shield + braid shield.

Industrial Electronic Devices

**NMEA 2000:**

To terminate the NMEA 2000 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 |

Here some codes of cable:

- Belden: p/n 3105A - 1x 22WG stranded twisted pairs conductor + foil shield + braid shield.

*Industrial Electronic Devices*

**ETHERNET:**

The Ethernet connection must be made using Connector4 HD67250 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 is recommended the use of a cross cable.

**Connector4:**
**Ethernet Port**
**(RJ45 Plug)**

Industrial Electronic Devices

**USE OF COMPOSITOR SW67250:**

To configure the Converter, use the available software that runs with Windows called SW67250. It is downloadable from 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 SW67250, the window below appears (Fig. 2).

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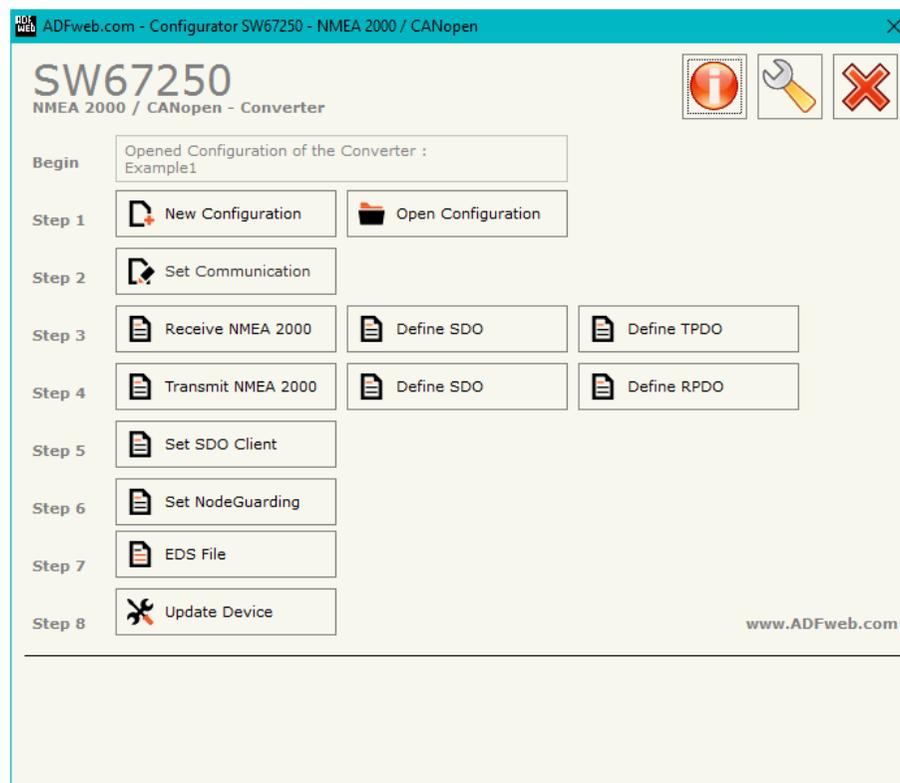


*Figure 2: Main window for SW67250*

Industrial Electronic Devices

**NEW CONFIGURATION / OPEN CONFIGURATION:**

The "**New Configuration**" button creates the folder which contains the entire device's configuration.
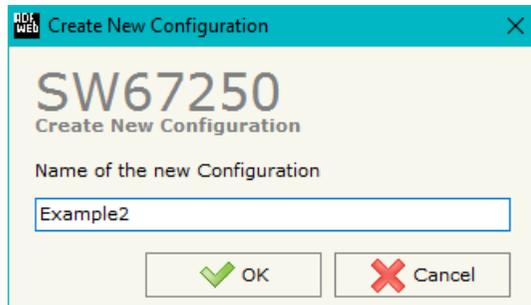
A device's configuration can also be imported or exported:

- To clone the configurations of a Programmable "NMEA 2000 / CANopen - 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**".
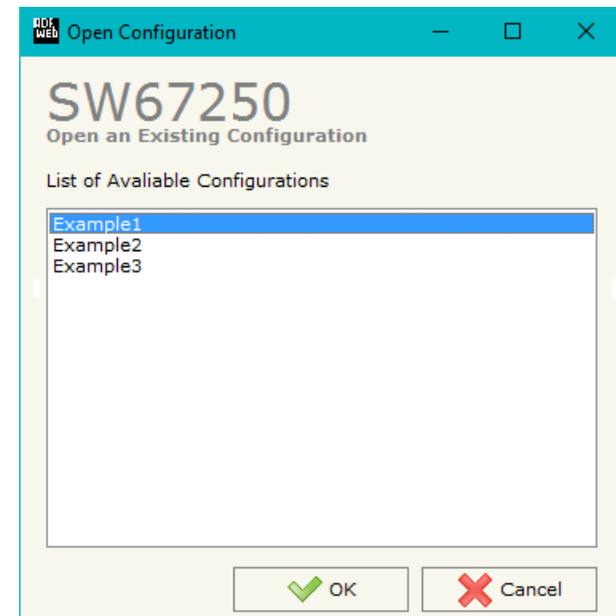
**SOFTWARE OPTIONS:**

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.
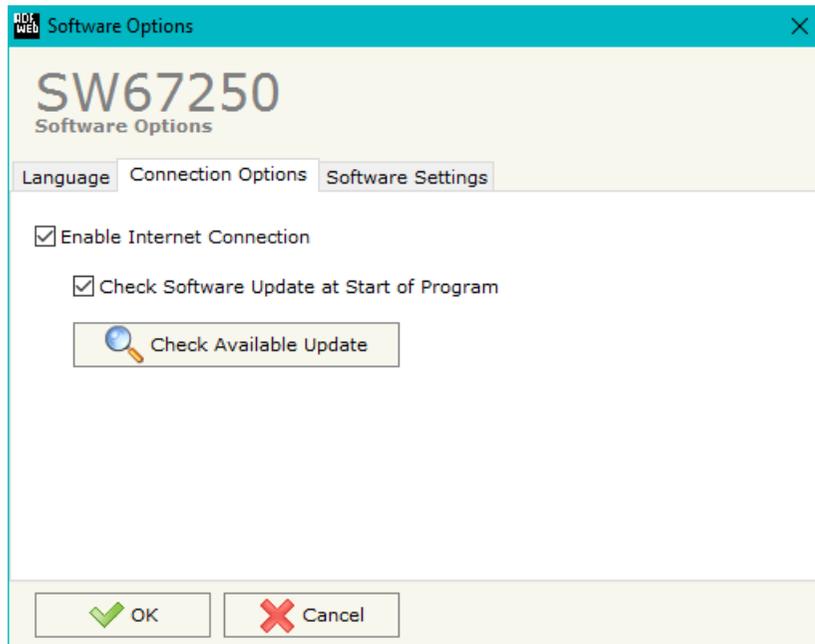
In the section "Connection Options", it is possible to check if there are some updatings of the software compositor in ADFweb.com website.
Checking the option "**Check Software Update at Start of Program**", the SW67250 check automatically if there are updatings when it is launched.

ADF web

Industrial Electronic Devices

**Software Options**

**SW67250**
Software Options

Language | Connection Options | Software Settings

☐ Jump into next field in the tables by pressing the Enter Key

☐ Enable Auto Size of Table Columns by Double Click

OK        Cancel

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.

ADF web

Industrial Electronic Devices

**SET COMMUNICATION:**

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

By Pressing the "**Set Communication**" button from the main window for SW67250 (Fig. 2) the window "Set Communication" appears (Fig. 3).

In the section "Select Device" it is possible to select the type of converter used:

- Device with Serial (RS232);
- Device with Ethernet.

The means of the fields for "NMEA 2000" section are:

- In the field "**Baudrate**" the data rate of the NMEA 2000 is defined;
- In the field "**TimeOut (s)**" the timeout of the data is defined. If the NMEA 2000 frame is not received in this time, on CANopen side the value of the data of the NMEA 2000 frame become "FF" (only if "Device with Serial (RS232)" is set);
- If the field "**Enable Peer to Peer**" is cheked, the converter accept any ID that have the PGN inserted in the section "Receive NMEA 2000";
- In the field "**ID Device**" the NMEA 2000 address of the converter is defined (only if "Device with Ethernet" is set).

The means of the fields for "CANopen" are:

- In the field "**ID Device**" the CANopen ID for the converter is defined;
- In the field "**Baudrate**" the data rate of the CANopen is defined;
- If the field "**Set Operational State at Start-up**" is checked, the state of the CANopen is defined. I.e. if it is checked the board starts in Operational State, else it starts in Pre-Operational;
- If the field "**Network Start at Start-up**" is checked, the state of the CANopen network is defined. I.e. if it is checked the board sends a command to set the Operational State of all the devices present in the network. In the field "**Delay (s)**" the delay before sending the network command for the CANopen is defined;
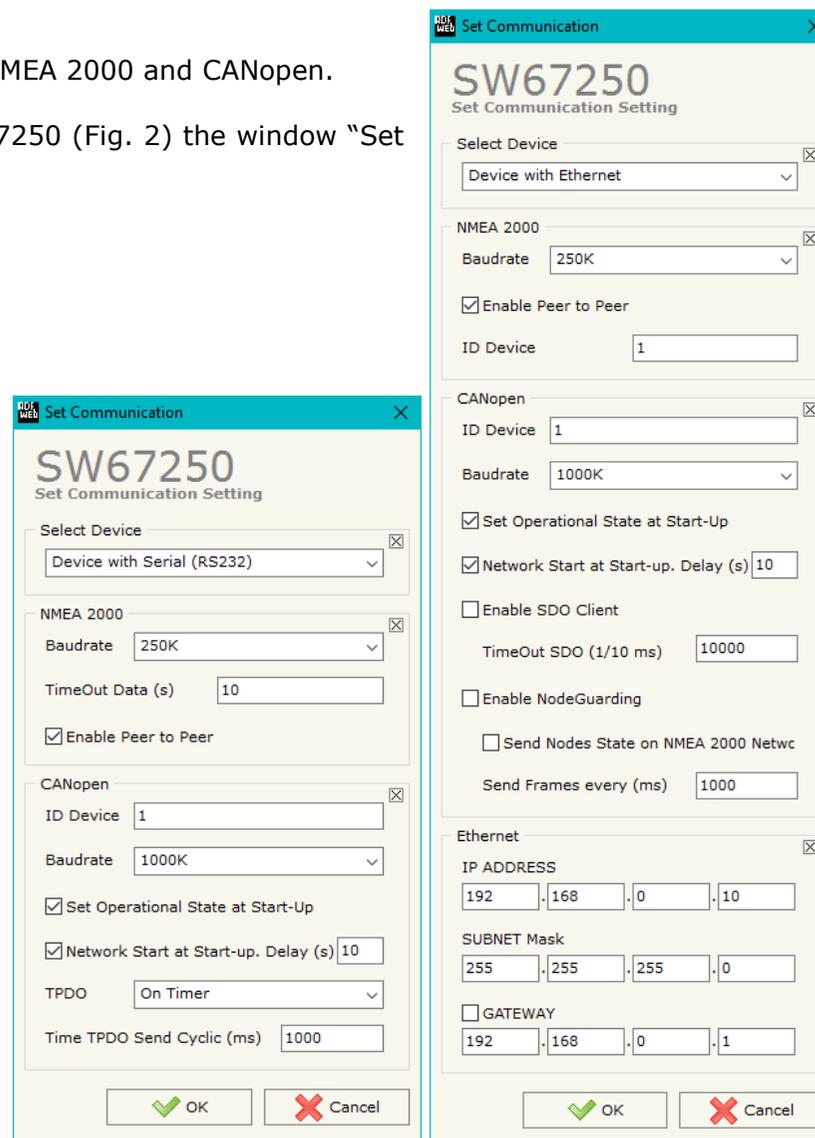
*Figure 3: "Set Communication" windows*

Industrial Electronic Devices

➡ If the field "**Enable SDO Client**" is checked, the SDO Client function is enabled. In the field "**TimeOut SDO (1/10ms)**" the timeout for the SDO requests is defined;

➡ If the field "**Enable NodeGuarding**" is checked, the NodeGuarding function is enabled. It is possible to send the NodeGuarding information on NMEA 2000 checking the option "**Send Nodes State on NMEA 2000 Network**" with the defined delay in "**Send Frames every (ms)**" field (only if "Device with Ethernet" is set);

➡ In the field "**TPDO**" the transmission mode for the TPDOs is defined: it is possible to choose 'On Timer' or 'On Change'. If "On Timer" is defined, the delay between the TPDOs is defined in the field "**TPDO Send Time (ms)**" (only if "Device with Serial (RS232)" is set).

The means of the fields for "Ethernet" section are (only if "Device with Ethernet" is set):

➡ In the field "**IP Address**" the IP address of the converter is defined;

➡ In the field "**Subnet Mask**" the Subnet Mask of the converter is defined;

➡ If the field "**Gateway**" is checked it is possible to insert, in the field under, the IP Address of the Converter used for going out to the net.

![ADFweb logo] Industrial Electronic Devices

**RECEIVE NMEA 2000:**

By pressing the "**Receive NMEA 2000**" button from the main window for SW67250 (Fig. 2) the window "Receive NMEA 2000 Frames Set Access" appears (Fig. 4). In this section, it is possible to define the NMEA 2000 frames that the converter will receive from NMEA 2000 network.

If "Device with Serial (RS232)" is set in the section "Set Communication", the window appears like below:



| N | Enable | Data Page | PGN | Source Address | Transport Protocol | Fast Packet | Start Byte | Num Bytes | Cancel Data | Mnemonic |
|---|--------|-----------|-----|----------------|--------------------|-------------|------------|-----------|-------------|----------|
| 1 | ☑ | 0 | 0xFECA | 0x01 | ☑ | ☑ | 1 | 20 | ☐ | |
| 2 | ☑ | 1 | 0xFEBA | 0x00 | ☐ | ☐ | | | ☐ | |
| 3 | ☑ | 0 | 0xFEAA | 0x00 | ☑ | ☐ | 1 | 20 | ☐ | |
| 4 | ☑ | 0 | 0xFEDA | 0x00 | ☐ | ☑ | 1 | 10 | ☐ | |
| 5 | ☑ | | | | ☐ | ☐ | | | ☐ | |

OK    Cancel    Delete Row    Insert Row    Copy Row    Paste Row
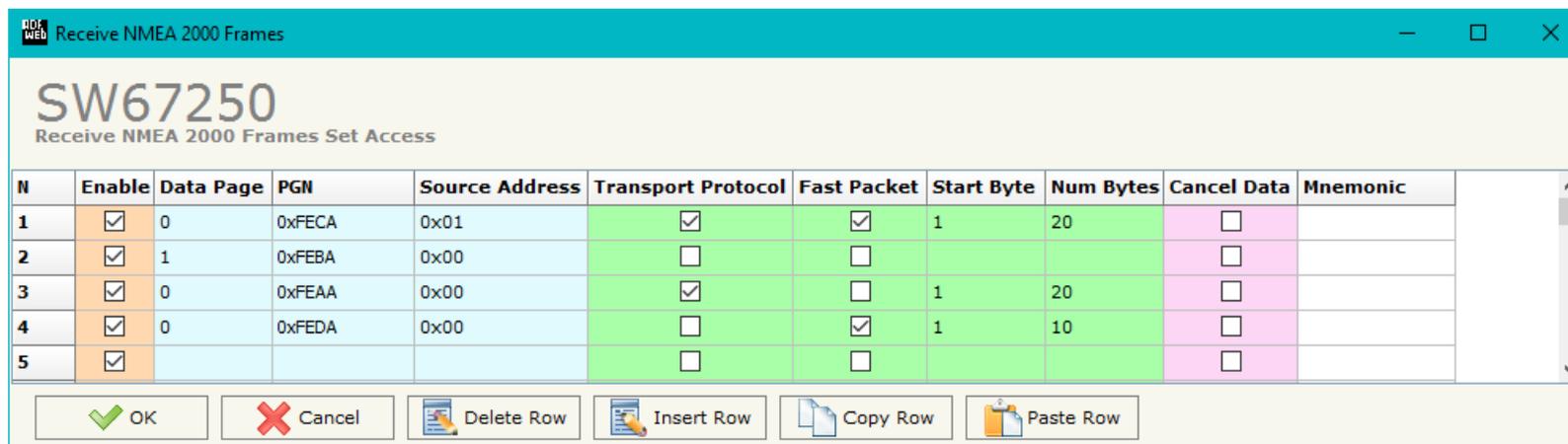
*Figure 4a: "Receive NMEA 2000 Frame Set Access" window*

- In the field "**Data Page**" insert the data page, the value is 0 or 1;
- In the field "**PGN**" insert the PGN of the data you would to read on CANopen 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;
- If the field "**Fast Packet**" is checked the frame uses Fast Packet 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 on CANopen side;

➔ In the field "**Mnemonic**" the description for the frame is defined.

If "Device with Ethernet" is set in the section "Set Communication", the window appears like below:



| N | Enable | PGN | Source Address | Transport Protocol | Fast Packet | Start Byte | Num Bytes | TimeOut | Mnemonic |
|---|--------|-----|----------------|--------------------|-------------|-----------|-----------|---------|----------|
| 1 | ☑ | 0xFECA | 0x01 | ☑ | ☑ | 1 | 20 | 10000 | |
| 2 | ☑ | 0x1FEBA | 0x00 | ☐ | ☐ | | | 0 | |
| 3 | ☑ | 0xFEAA | 0x00 | ☑ | ☐ | 1 | 20 | 0 | |
| 4 | ☑ | 0xFEDA | 0x00 | ☐ | ☑ | 1 | 10 | 10000 | |
| 5 | ☑ | | | ☐ | ☐ | | | | |

OK    Cancel    Delete Row    Insert Row    Copy Row    Paste Row
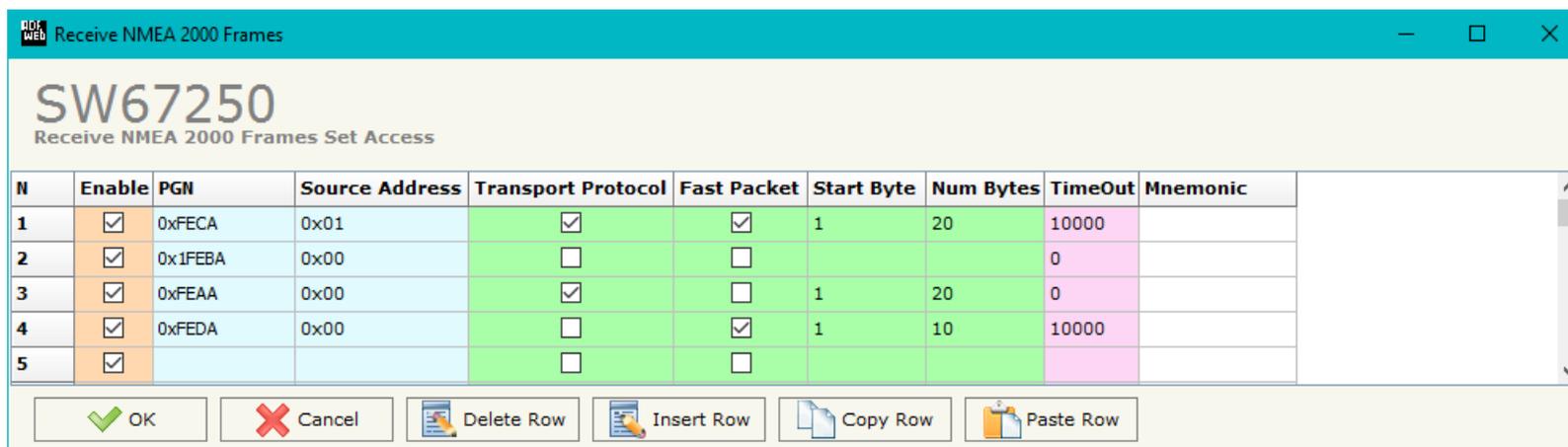
*Figure 4b: "Receive NMEA 2000 Frame Set Access" window*

➔ 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;

➔ If the field "**Fast Packet**" is checked the frame uses Fast Packet 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;

➔ In the field "**TimeOut**" insert the TimeOut; if the NMEA 2000 frame is not received in the timeout defined, the value of the data on CANopen side become "FF";

➔ In the field "**Mnemonic**" the description for the frame is defined.

**DEFINE SDO**

By pressing the "**Define SDO**" button near "Receive NMEA 2000" from the main window for SW67250 (Fig. 2) the window "Define Read Server SDOs for Receive NMEA 2000 Frames" appears (Fig. 5):

> ➢ In the field "**List of Receive NMEA 2000 Frames**" there is the list of NMEA 2000 Frames that you inserted in "Receive NMEA 2000" section.
> ➢ In the field "**List of Server SDO in Read**" there are the SDOs Objects in read.
> ➢ In the field "**Create/Modify a Server SDO**" you can define the Index, SubIndex and the Dimension of the SDO Object to create and the bytes of the NMEA 2000 frame which you will map in.

For example:

Click on the NMEA 2000 frame, insert the valid parameters in the fields "Index SDO", "SubIndex SDO" and "Dimension SDO", select which bytes of the NMEA 2000 frame you want to map inside the SDO, click the "Create" button. In the field "List of Server SDO in Read" appears the new SDO Object created.
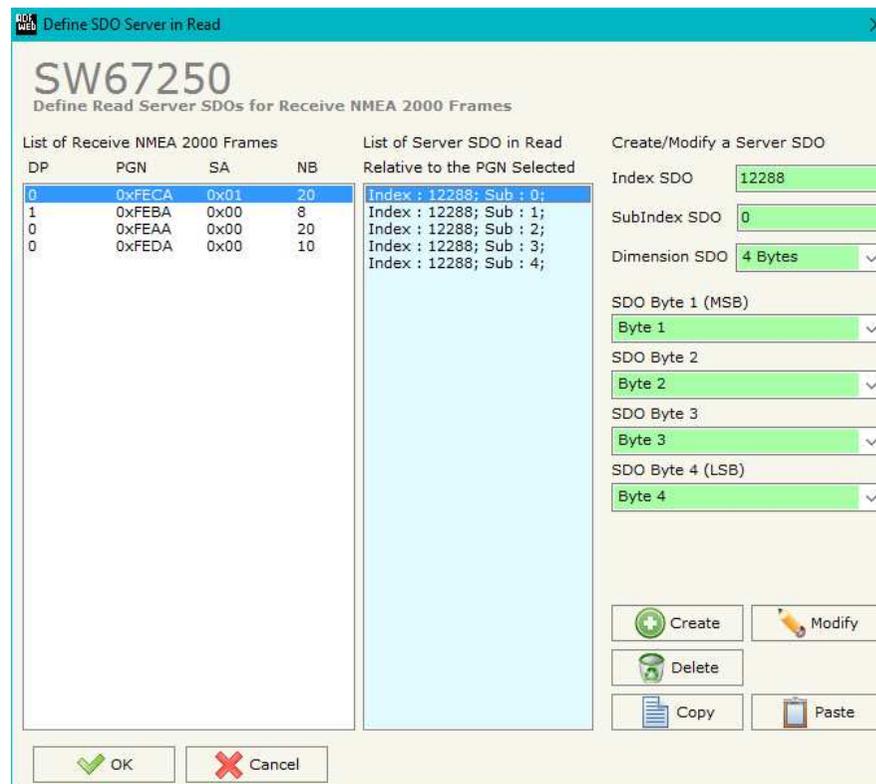


*Figure 5: "Define Read Server SDOs for Receive NMEA 2000 Frames" window*

---

**DEFINE TPDO:**

By pressing the "**Define TPDO**" button from the main window of SW67250 (Fig. 2) the window "Define Transmit PDO" appears (Fig. 6): in this section, it is possible to define the PDO frames that the converter will send to the CANopen network.

If "Device with Serial (RS232)" is set in the section "Set Communication", the window appears like below:



| N | CobID | Dimension | DNMEA 2000 Frames | Start | Mnemonic |
|---|-------|-----------|-------------------|-------|----------|
| 1 | 0x201 | 8 | 2;DP:1;PGN:0xFEBA;SA:0x00;NB:8; | 1 | |
| 2 | 0x202 | 8 | 1;DP:0;PGN:0xFECA;SA:0x01;NB:20; | 2 | |
| 3 | 0x203 | 5 | 4;DP:0;PGN:0xFEDA;SA:0x00;NB:10; | 3 | |
| 4 | | | | | |
| 5 | | | | | |
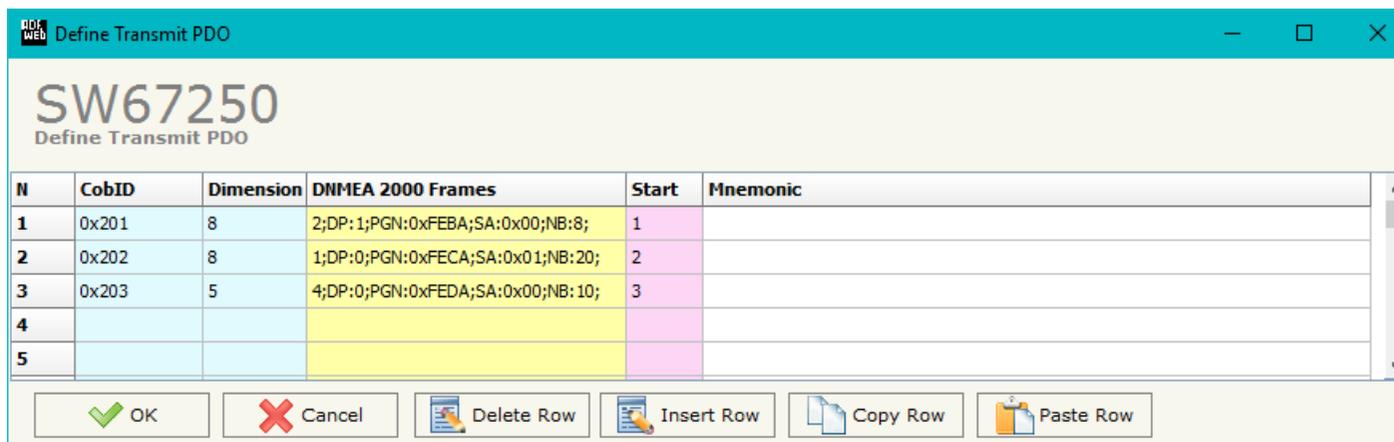
*Figure 6a: "Define Transmit PDO" window*

- In the field "**CobID**", the Cob-ID of the PDO is defined;
- In the field "**Dimension**" insert the number of bytes of the TPDO frame (the maximum dimension is 8 Bytes);
- In the field "**NMEA 2000 Frames**", the NMEA 2000 frame to link to the TPDO is defined;
- In the field "**Start**", the starting byte of the NMEA frame to start to map is defined;
- In the field "**Mnemonic**" a description of the frame is defined.

Industrial Electronic Devices

If "Device with Ethernet" is set in the section "Set Communication", the window appears like below:



*Figure 6b: "Define Transmit PDO" window*

- In the field "**CobID**", the Cob-ID of the PDO is defined;
- In the field "**Dimension**" insert the number of bytes of the TPDO frame (the maximum dimension is 8 Bytes);
- In the field "**NMEA 2000 Frames**", the NMEA 2000 frame to link to the TPDO is defined;
- In the field "**Start**", the starting byte of the NMEA frame to start to map is defined;
- If the field "**Data Change**" is checked the TPDO frame is sent when the data into the linked NMEA 2000 frame change;
- If the field "**On NMEA**", the TPDO is transmitted when the NMEA 2000 frame linked is received;
- If the field "**On Timer**" is checked the TPDO is sent cyclically;
- In the field "**Timer (ms)**" insert the cyclic delay for the "On Timer" option;
- 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 SW67250 the window "Transmit NMEA 2000 Frames Set Access" appears (Fig. 7): in this section, it is possible to define the NMEA 2000 frames that the converter will send to the NMEA 2000 network.

If "Device with Serial (RS232)" is set in the section "Set Communication", the window appears like below:

| N | Enable | Priority | Data Page | PGN | Source Address | Mnemonic |
|---|--------|----------|-----------|--------|----------------|----------|
| 1 | ☑ | 0x6 | 0 | 0x1234 | 1 | |
| 2 | ☑ | 0x6 | 0 | 0x1235 | 1 | |
| 3 | ☑ | | | | | |
| 4 | ☑ | | | | | |
| 5 | ☑ | | | | | |
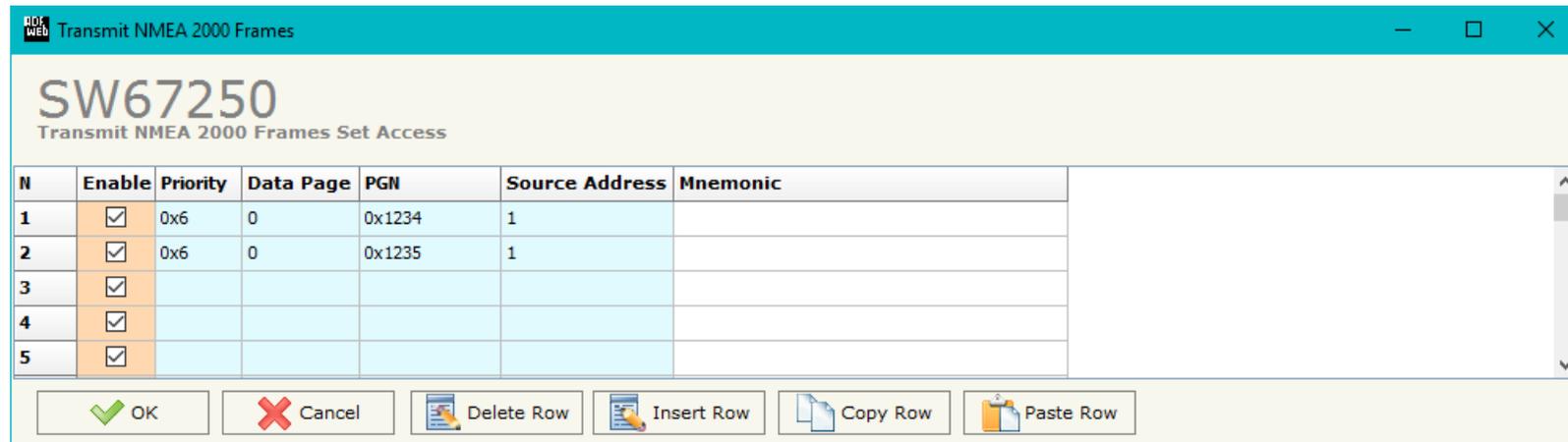
*Figure 7a: "Transmit NMEA 2000 Frames Set Access" window*

➤ In the field "**Priority**" insert the priority of the frame, in NMEA 2000 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, the value is 0 or 1;

➤ In the field "**PGN**" insert the PGN of the data you would to write from CANopen to NMEA 2000 (in NMEA 2000 protocol the PGN is an identifier);

➤ In the field "**Source Address**" you insert the ID of device that sends the frame;

➤ In the field "**Mnemonic**" the description for the frame is defined.

**Industrial Electronic Devices**

If "Device with Ethernet" is set in the section "Set Communication", the window appears like below:
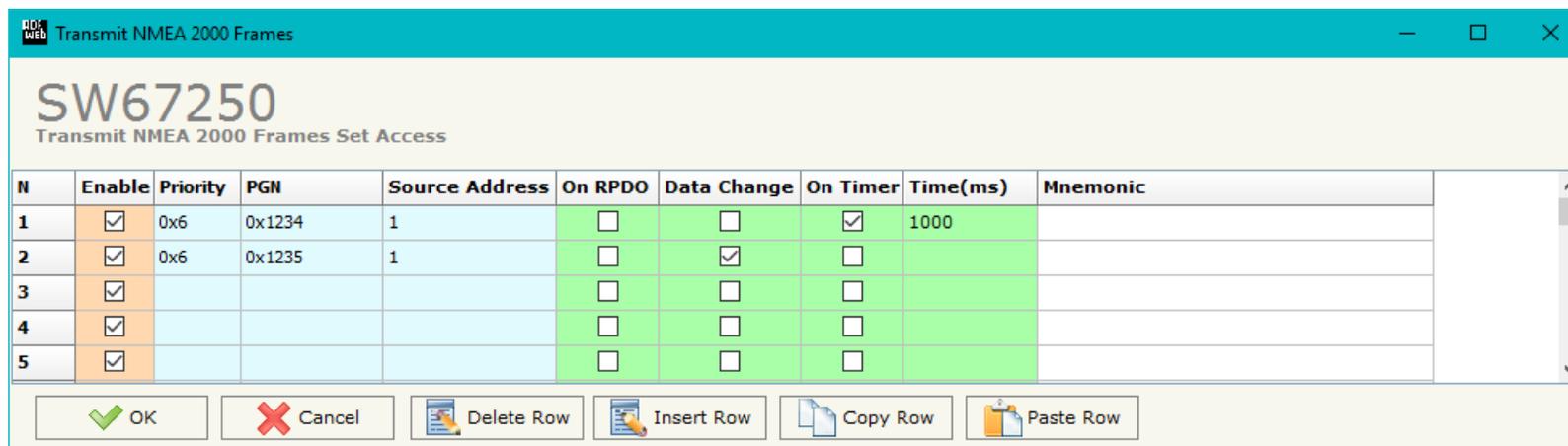


*Figure 7b: "Transmit NMEA 2000 Frames Set Access" window*

- In the field "**Priority**" insert the priority of the frame, in NMEA 2000 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 "**PGN**" insert the PGN of the data you would to write from CANopen to NMEA 2000 (in NMEA 2000 protocol the PGN is an identifier);
- In the field "**Source Address**" you insert the ID of device that send the frame;
- If the field "**On RPDO**", the NMEA 2000 frame is transmitted when the RPDO linked is received;
- If the field "**On Change**" is checked the NMEA 2000 frame is sent when the data of the RPDO linked change;
- If the field "**On Timer**" is checked the NMEA 2000 frame is sent cyclically;
- In the field "**Timer (ms)**" insert the cyclic delay for the "On Timer" option;
- In the field "**Mnemonic**" the description for the frame is defined.

**DEFINE SDO**

By pressing the "**Define SDO**" button near "Transmit NMEA 2000" from the main window for SW67250 (Fig. 2) the window "Define Write Server SDOs for Transmit NMEA 2000 Frames" appears (Fig. 8):

➢ In the field "**List of Transmit NMEA 2000 Frames**" there is the list of NMEA 2000 Frames that you inserted in "Transmit NMEA 2000" section.

➢ In the field "**List of Server SDO in Write**" there are the SDOs Objects in read.

➢ In the field "**Create/Modify a Server SDO**" you can define the Index, SubIndex and the Dimension of the SDO Object to create and the bytes of the NMEA 2000 frame which you will map to.

➢ With the field "**Send NMEA frame When Write SDO**" it is possible to decide when sending the NMEA 2000 frame. If this option is "True", the NMEA 2000 frame is transmitted when the selected SDO is written.

For example:

Click on the NMEA 2000 frame, insert the valid parameters in the fields "Index SDO", "SubIndex SDO" and "Dimension SDO", select which bytes of the NMEA 2000 frame you want to map inside the SDO, click the "Create" button. In the field "List of Server SDO in Write" appears the new SDO Object created.
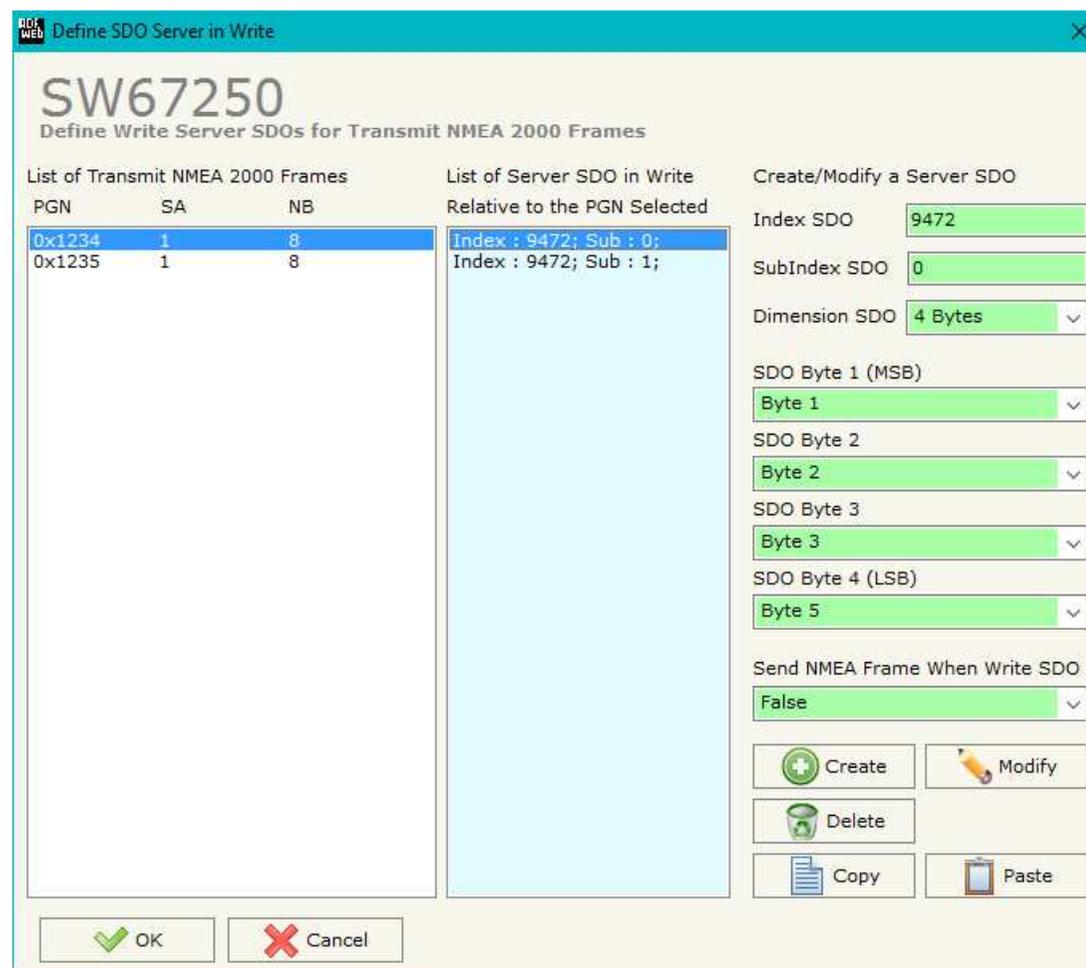


*Figure 8: "Define Write Server SDOs for Transmit CAN Frames" window*

**DEFINE RPDO:**

By pressing the "**Define RPDO**" button from the main window for SW67250 (Fig. 2) the window "Define Receive PDO" appears (Fig. 9). In this section, it is possible to define the PDO frames that the converter will receive from CANopen network.

If "Device with Serial (RS232)" is set in the section "Set Communication", the window appears like below:
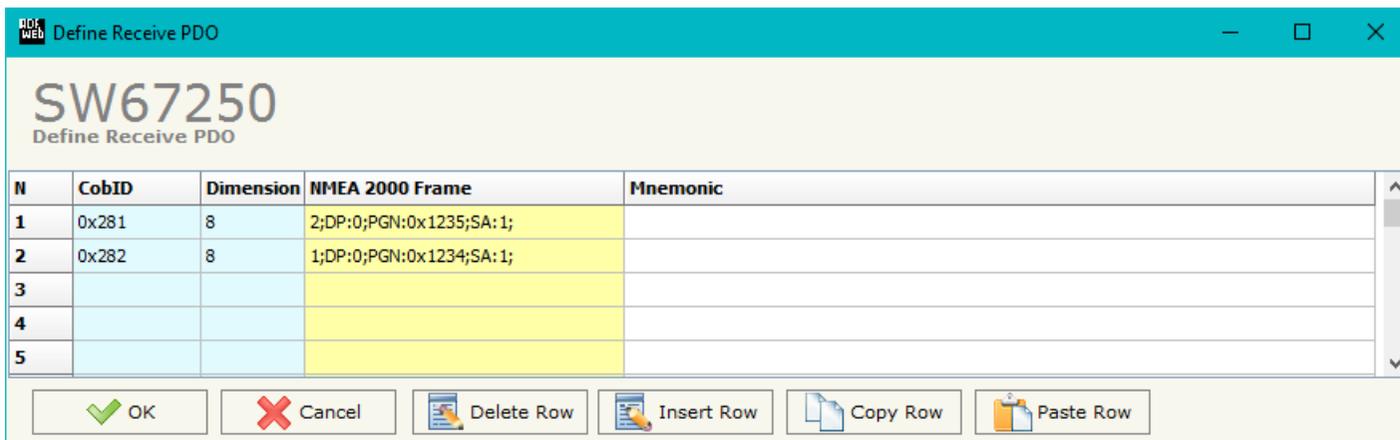


*Figure 9a: "Define Receive PDO" window*

- In the field "**Cob-ID**", the Cob-ID of the PDO is defined;
- In the field "**Dimension**" insert the number of bytes of the RPDO frame (the maximum dimension is 8 Bytes);
- In the field "**NMEA 2000 Frame**", the NMEA 2000 frame to link to the RPDO is defined;
- In the field "**Mnemonic**", a description of the PDO is defined.

Industrial Electronic Devices

If "Device with Ethernet" is set in the section "Set Communication", the window appears like below:
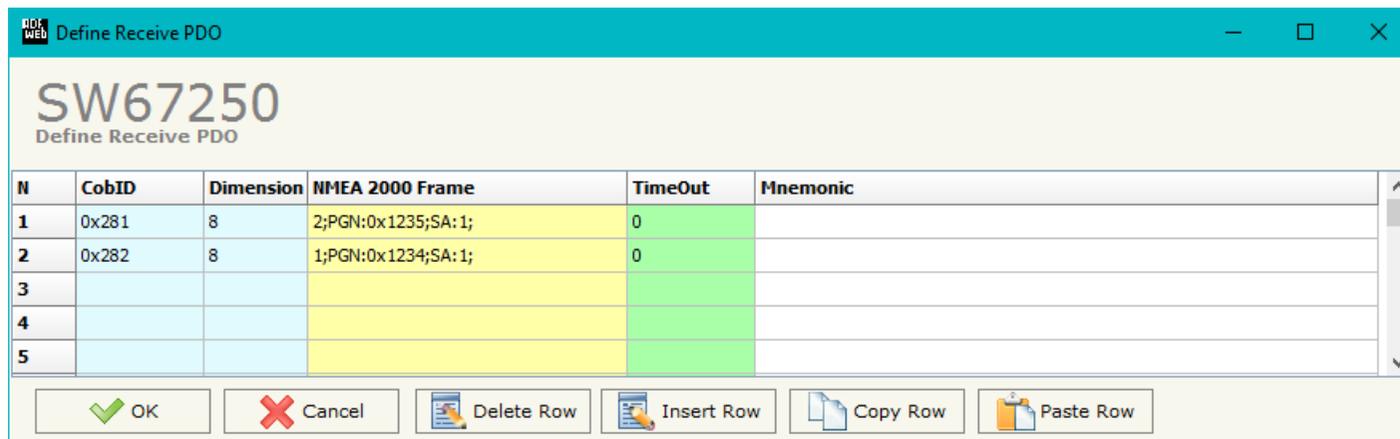


Figure 9b: "Define Receive PDO" window

- In the field "**Cob-ID**", the Cob-ID of the PDO is defined;
- In the field "**Dimension**" insert the number of bytes of the RPDO frame (the maximum dimension is 8 Bytes);
- In the field "**NMEA 2000 Frame**", the NMEA 2000 frame to link to the RPDO is defined;
- If the field "**TimeOut**" the TimeOut is defined; after the TimeOut defined, the value of the data of the PDO become "0xFF";
- In the field "**Mnemonic**" a description of the frame is defined.

**ADFweb**

Industrial Electronic Devices

**SET SDO CLIENT:**

By pressing the "**Set SDO Client**" button from the main window of SW67250 (Fig. 2) the window "Define NMEA 2000 Frames to use the Client SDO" appears (Fig. 10).

In this window is possible to configure five NMEA 2000 messages used to read and write SDO data from other devices in the network CANopen.

The first two frames are used to read a SDO, the last three messages are used to write a SDO.

*Figure 10: "Define NMEA 2000 Frames to use the Client SDO" window*

**READ SDO**

*Request frame NMEA 2000 to read a SDO*
When the gateway receive this message, it sends a read SDO request to CANopen network.
The coordinates of the SDO are inside the data bytes of the NMEA 2000 message in this format:

| Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 | Byte8 |
|-------|-------|-------|-------|-------|-------|-------|-------|
| ID Device | Index | Index | SubIndex | Num Byte | Not used = 0 | Not used = 0 | Not used = 0 |

*Answer frame NMEA 2000 of a read SDO*
The gateway sends this frame with the answer of the SDO.
The Data bytes of this message are so formed:

| Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 | Byte8 |
|-------|-------|-------|-------|-------|-------|-------|-------|
| ID Device REQ | Index REQ | Index REQ | SubIndex REQ | Data byte 1 | Data byte 2 | Data byte 3 | Data byte 4 |

Industrial Electronic Devices

**WRITE SDO**

*Request frame NMEA 2000 to write a SDO (1/2)*
When the gateway receive this message it save the coordinates of write SDO request.
The coordinates of the SDO are inside the data bytes of the NMEA 2000 message in this format:

| Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 | Byte8 |
|---|---|---|---|---|---|---|---|
| ID Device | Index | Index | SubIndex | Num Byte | Not used = 0 | Not used = 0 | Not used = 0 |

*Request frame NMEA 2000 to write a SDO (2/2)*
When the gateway receive this message it send the SDO write request in CANopen network.
The coordinates of the SDO are inside the data bytes of the NMEA 2000 message in this format:

| Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 | Byte8 |
|---|---|---|---|---|---|---|---|
| Data Byte 1 | Data Byte 2 | Data Byte 3 | Data Byte 4 | Not used = 0 | Not used = 0 | Not used = 0 | Not used = 0 |

*Answer frame NMEA 2000 of a write SDO*
The gateway send this frame when a Write SDO request finish correctly.
The Data byte of this message are so formed:

| Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 | Byte8 |
|---|---|---|---|---|---|---|---|
| ID Device REQ | Index REQ | Index REQ | SubIndex REQ | 1 | Not used = 0 | Not used = 0 | Not used = 0 |

Industrial Electronic Devices

**SET NODEGUARDING (only for "Device with Ethernet"):**

By pressing the "**Set NodeGuarding**" button from the Main Window of SW67250 (Fig. 2) the "Define Node Guarding" window appears (Fig. 11).

- In the field "**Node ID**", the address of the CANopen device that you want to control is defined. It is possible to insert up to 32 address;
- In the field "**Guard Time**", the Guard Time is defined. This value indicates the delay between two interrogations;
- In the field "**Life Time Factor**", the number of attempts before considering the device absent is defined;
- In the field "**Mnemonic**", a description is defined.

In the fields below, it is possible to define the NMEA 2000 messages where mapping the informations of the Node Guarding.
The first byte of each NMEA 2000 frame will contain the status of 7 CANopen devices (1 = present or 0 = not present). The others 7 bytes will contain the status of the monitored CANopen devices.
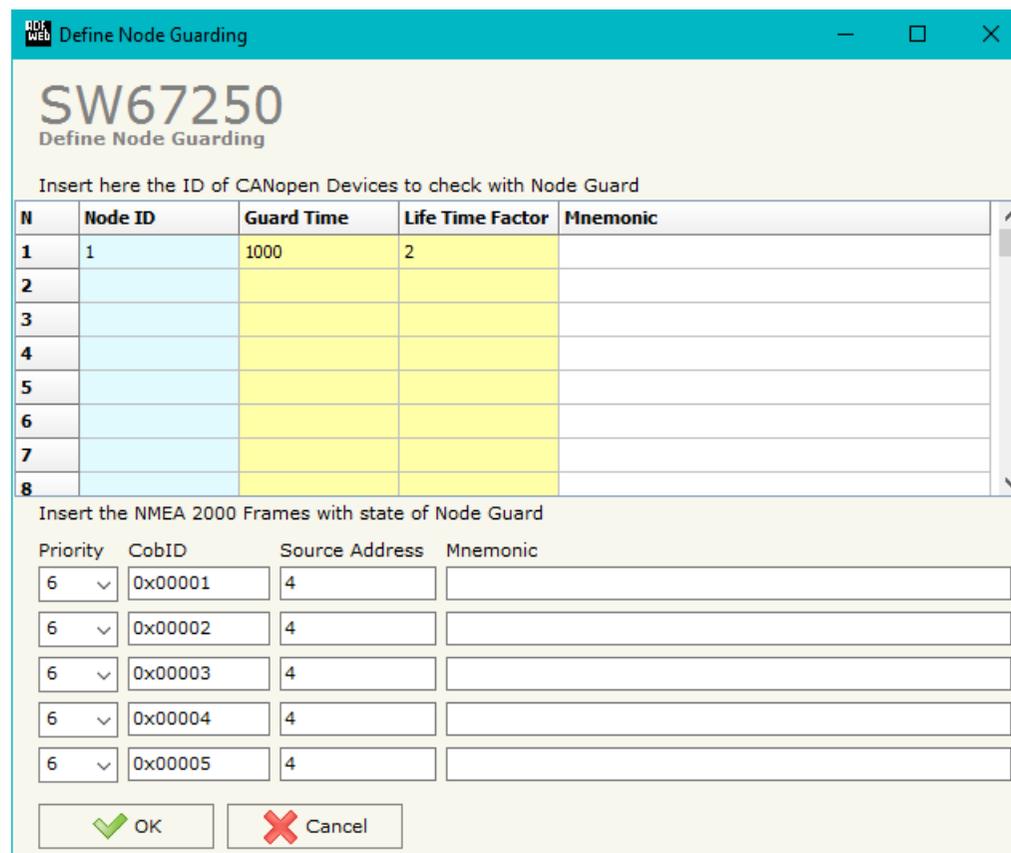


*Figure 11: "Define Node Guarding" window*

**EDS FILE:**

By Pressing the "**EDS File**" button from the main window for SW67250 (Fig. 2) it is possible to generate the EDS file to be imported into the CANopen Client.

## UPDATE DEVICE (for "Device with Serial (RS232)"):

By pressing the "**Update Device**" button it is possible to load the created Configuration into the device, and also the Firmware if is necessary, using the RS232 port.

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

➡ Turn OFF the Device;
➡ Connect the RS232 cable from your PC to the Converter;
➡ Put the converter in Boot Mode;
➡ Select the "**COM port**";

➡ Select which operations you want to do.
➡ Turn on the device;
➡ Check the "Device state" Led. It must blink quickly (see "LEDS" section);
➡ Press the "**Execute update firmware**" button to start the upload;
➡ When all the operations are "OK" turn off the device;
➡ Put the converter in Run Mode;
➡ Disconnect the RS232 cable;
➡ Turn ON the device.
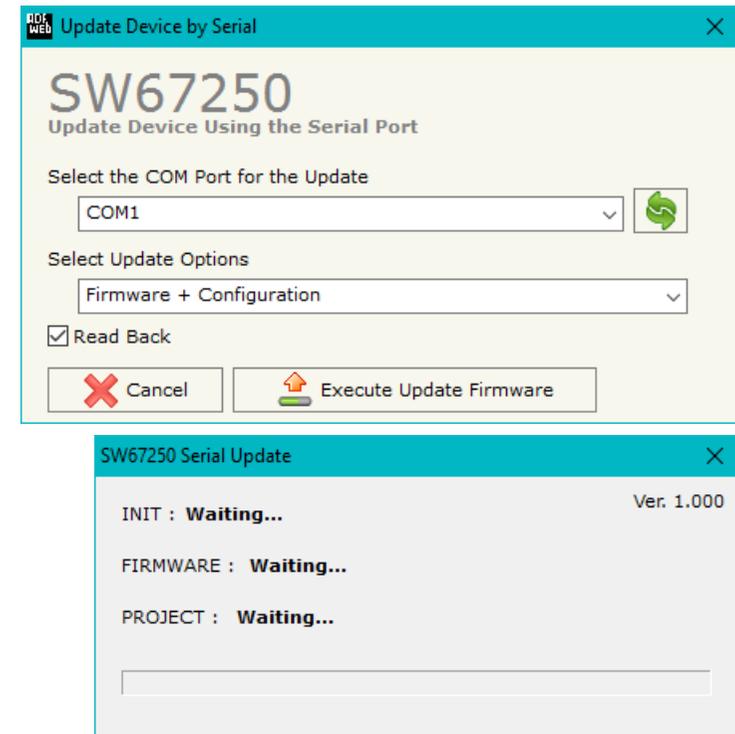
*Figure 12: "Update via Serial" windows*

Industrial Electronic Devices

**UPDATE DEVICE (for "Device with Ethernet"):**

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:

- Turn off the Device;
- Put Dip2 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 Dip2 of 'Dip-Switch A' in OFF position;
- Turn on the device.

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;
- 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.
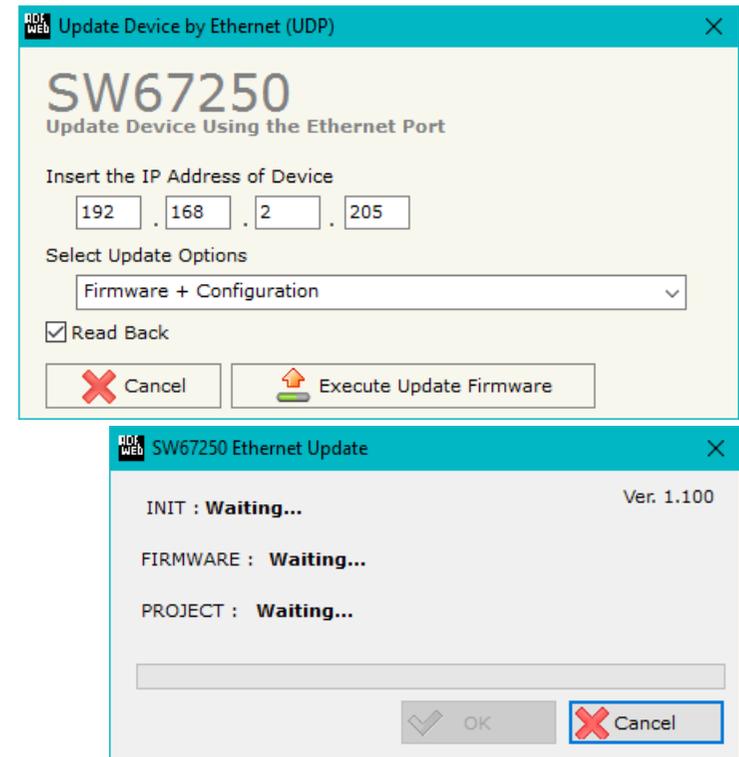


*Figure 13: "Update via Ethernet" windows*

**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 HD67250 device.

**Note:**

When you receive the device, for the first time, you also have to update the Firmware in the HD67250 device.

**Warning:**

If Fig. 14 appears when you try to do the Update try these points before seeking assistance:

- Check if the serial COM port selected is the correct one;
- Check if the serial cable is connected between the PC and the device;
- Try to repeat the operations for the updating;
- If you are using a USB←→RS232 converter try with a native COM port or change the converter;
- 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 and 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.
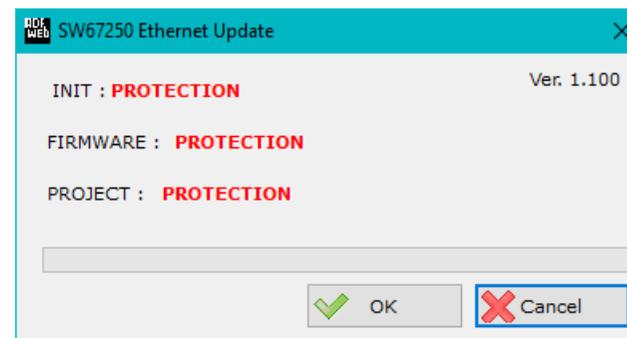
*Figure 14: "Protection" window*

In the case of HD67250 you have to use the software "SW67250": www.adfweb.com\download\filefold\SW67250.zip.

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

Industrial Electronic Devices
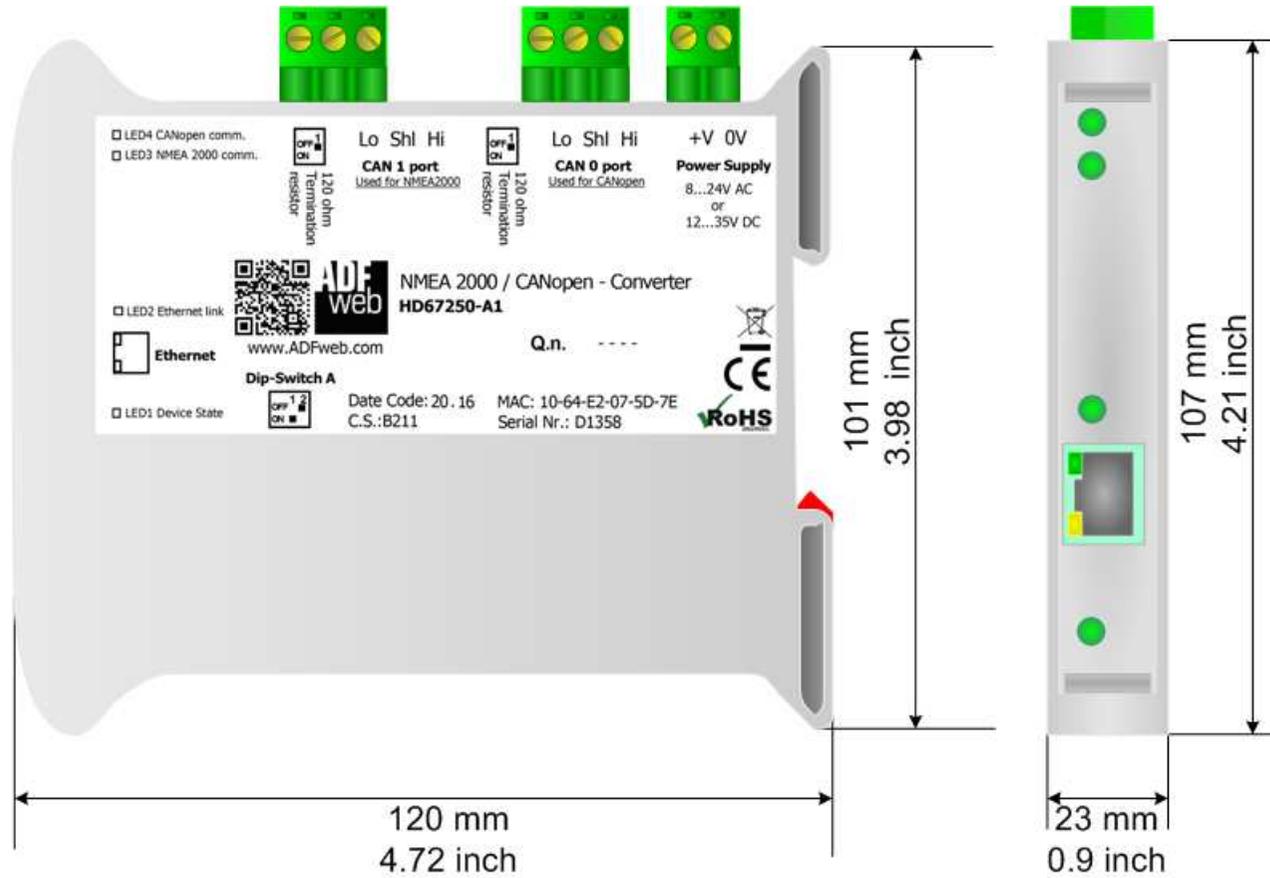
**MECHANICAL DIMENSIONS:**



*Figure 15: Mechanical dimensions scheme for HD67250-Ax*

*Industrial Electronic Devices*

## ORDERING INFORMATIONS:

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

**HD67250 – A x**

**Connectors Type**
1: Removable 5mm Screw Terminal
3: M12 connectors
4: Mini-Fit connectors

**Enclosure Type**
A: 1M, 35mm DIN Rail mounting

**Device Family**
HD67250: NMEA 2000 / CANopen – Converter
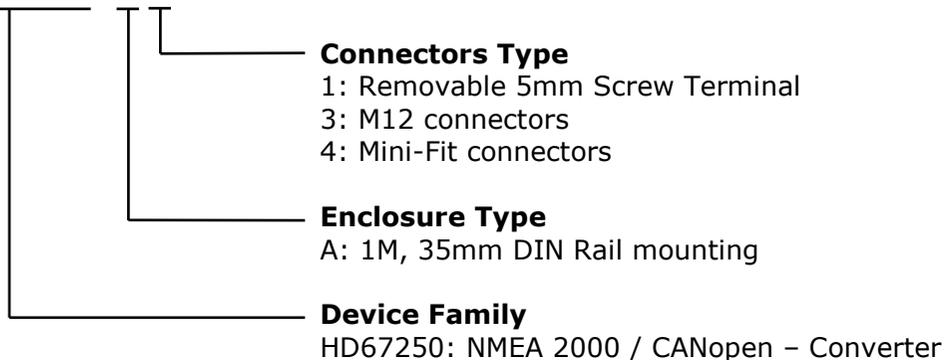
Order Code: **HD67250-A1**　　　-　　　NMEA 2000 / CANopen – Converter (Terminal Blocks connectors)
Order Code: **HD67250-A3**　　　-　　　NMEA 2000 / CANopen – Converter (M12 connectors)
Order Code: **HD67250-A4**　　　-　　　NMEA 2000 / CANopen – Converter (Mini-Fit connectors)

## ACCESSORIES:

Order Code: **AC34001**　　-　　35mm Rail DIN - Power Supply 220/240V AC 50/60Hz – 12 V AC

Order Code: **AC34002**　　-　　35mm Rail DIN - Power Supply 110V AC 50/60Hz – 12 V AC

Industrial Electronic Devices

**DISCLAIMER:**

All technical content within this document can be modified without notice. The content of the document is a under continual renewal.
For losses due to fire, earthquake, third party access or other accidents, or intentional or accidental abuse, misuse, or use under abnormal conditions repairs are charged to the user. ADFweb.com S.r.l. will not be liable for accidental loss of use or inability to use this product, such as loss of business income. ADFweb.com S.r.l. shall not be liable for consequences of improper use.

**OTHER REGULATIONS AND STANDARDS:**

**WEEE INFORMATION**

Disposal of old electrical and electronic equipment (as in the European Union and other European countries with separate collection systems).

This symbol on the product or on its packaging indicates that this product may not be treated as household rubbish. Instead, it should be taken to an applicable collection point for the recycling of electrical and electronic equipment. If the product is disposed correctly, you will help prevent potential negative environmental factors and impact of human health, which could otherwise be caused by inappropriate disposal. The recycling of materials will help to conserve natural resources. For more information about recycling this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

**RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE**

The device respects the 2002/95/EC Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (commonly referred to as Restriction of Hazardous Substances Directive or RoHS).

**CE MARKING**

The product conforms with the essential requirements of the applicable EC directives.

**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