![ADFweb logo] **Industrial Electronic Devices**

User Manual

Revision 1.006
English

J1939 / CANopen - Converter

(Order Code: HD67150)

for Website information:
www.adfweb.com?Product=HD67150

for Price information:
www.adfweb.com?Price=HD67150

Benefits and Main Features:

► Very easy to configure

► Low cost

► Electrical isolation

► Industrial temperature range:
-40°C / 85°C (-40°F / 185°F)

HD67150

For others Gateways / Bridges:

J1939 to Modbus

See also the following links:
www.adfweb.com?Product=HD67215 (Modbus TCP)

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

INDEX:

UPDATED DOCUMENTATION:

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  ➢ Updated
  ➢ Related to the product you own

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REVISION LIST:

Revision	Date	Author	Chapter	Description
1.001	17/11/2008	Fl	All	Change figure 1
1.002	11/05/2010	Dp	All	Revision
1.003	10/03/2011	Fl	All	Change figure 1
1.005	11/10/2011	Dp	All	Revision
1.006	13/02/2013	Nt	All	Added new chapters

WARNING:

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SECURITY ALERT:

GENERAL INFORMATION
To ensure safe operation, the device must be operated according to the instructions in the manual. When using the device 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:

Connector1:
Power Supply
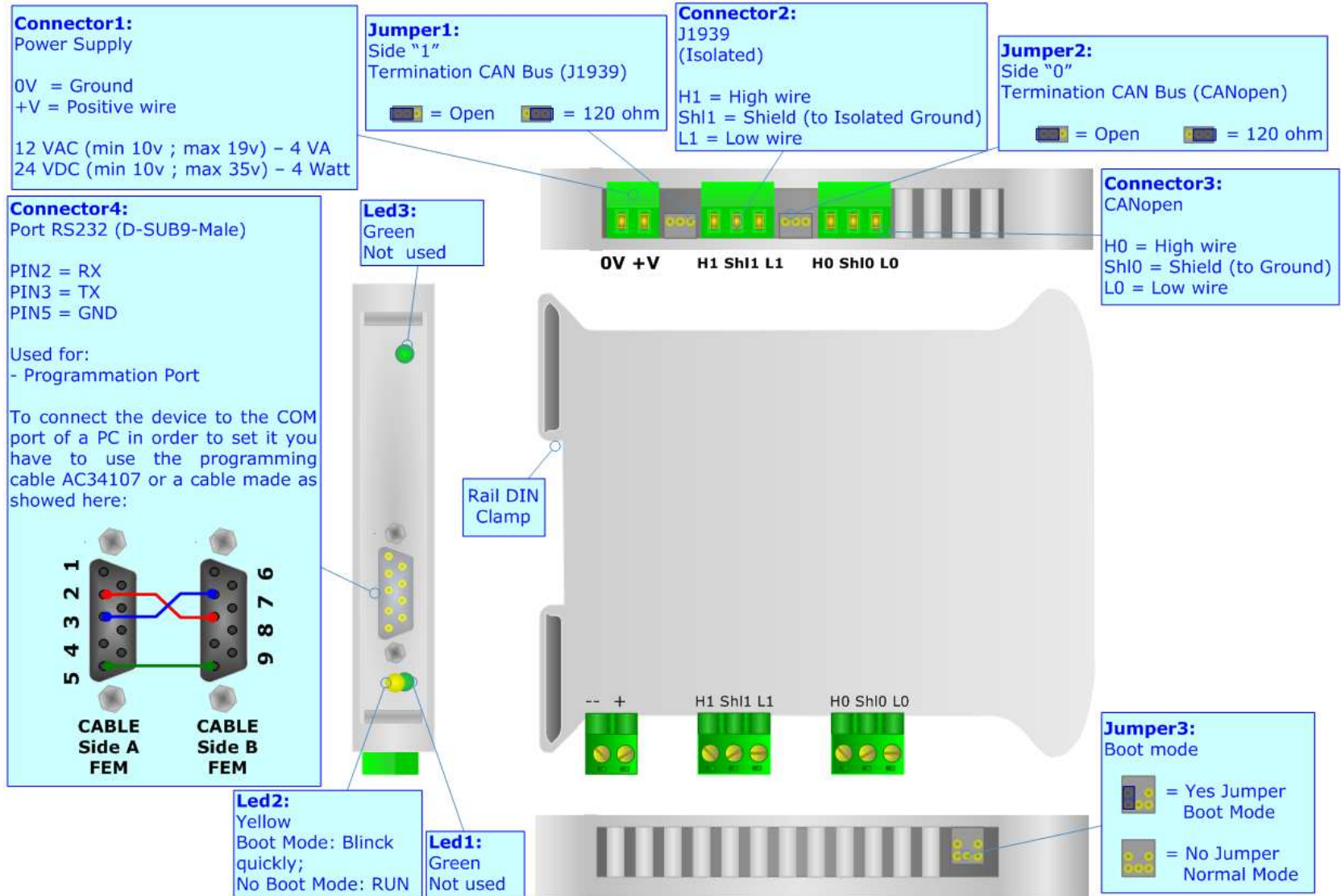
0V = Ground
+V = Positive wire

12 VAC (min 10v ; max 19v) – 4 VA
24 VDC (min 10v ; max 35v) – 4 Watt

Jumper1:
Side "1"
Termination CAN Bus (J1939)

☐ = Open   ☐ = 120 ohm

Connector2:
J1939
(Isolated)

H1 = High wire
Shl1 = Shield (to Isolated Ground)
L1 = Low wire

Jumper2:
Side "0"
Termination CAN Bus (CANopen)

☐ = Open   ☐ = 120 ohm

Connector4:
Port RS232 (D-SUB9-Male)

PIN2 = RX
PIN3 = TX
PIN5 = GND

Used for:
- Programmation Port

To connect the device to the COM port of a PC in order to set it you have to use the programming cable AC34107 or a cable made as showed here:

Led3:
Green
Not used

Connector3:
CANopen

H0 = High wire
Shl0 = Shield (to Ground)
L0 = Low wire

0V +V   H1 Shl1 L1   H0 Shl0 L0

1 2 3 4 5

6 7 8 9

CABLE
Side A
FEM

CABLE
Side B
FEM

Rail DIN Clamp

-- +   H1 Shl1 L1   H0 Shl0 L0

Led2:
Yellow
Boot Mode: Blinck quickly;
No Boot Mode: RUN

Led1:
Green
Not used

Jumper3:
Boot mode

☐ = Yes Jumper Boot Mode

☐ = No Jumper Normal Mode

Figure 1: Connection scheme for HD67150

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CHARACTERISTICS:

The CAN Filter CobID Gateway allows the following characteristics:

- ➢ Two-directional translation of information between two distinct CAN Buses;
- ➢ Electrical isolation between two Buses;
- ➢ Filter of CAN frames;
- ➢ Temperature range -40°C to 85°C.

The CAN Filter CobID Gateway must be used for interfacing two CAN lines. Otherwise, in order to extend the length and electrical isolation of more branches than CANopen line you must use CAN Repeater device (note: view PRODUCTS AND RELATED DOCUMENTS).

POWER SUPPLY:

Recommended Power Supply	
VDC	VAC
24v	12v

VDC		VAC	
Vmin	Vmax	Vmin	Vmax
10v	35v	10v	19v

Caution: Not reverse the polarity power .

HD67150

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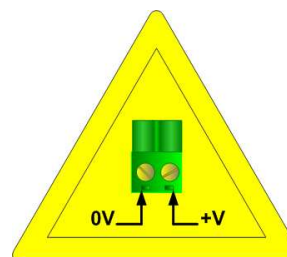
CONFIGURATION:

The "Gateway J1939 to CANopen", allows a J1939 network to communicate with a CANopen network.

You need Compositor SW67150 software on your PC in order to perform the following:
- ➢ Define the parameter of J1939;
- ➢ Define the parameter of CANopen;
- ➢ Define the SDO;
- ➢ Define the TPDO;
- ➢ Define the RPDO;
- ➢ Define which J1939 frames are readable from the CANopen;
- ➢ Define which J1939 frames are writable from the CANopen.

USE OF COMPOSITOR SW67150:

To configure the Gateway, use the available software that runs with Windows, called SW67150. It is downloadable on the site www.adfweb.com and its operation is described in this document.

When launching the SW67150 the right window appears (Fig. 2):

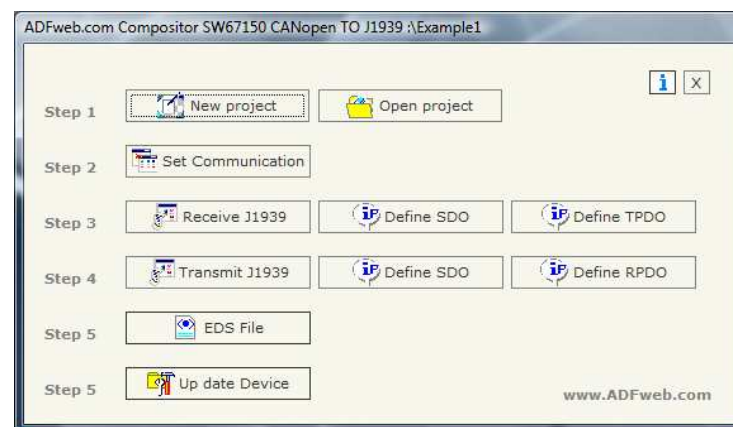**The following explains the function of the buttons:**

Figure 2: Main window for SW67150

NEW PROJECT / OPEN PROJECT:

The "New Project" button creates the folder which contains the entire device configuration.
A device configuration can also be imported and exported:

> ➢ To clone the configurations of a Programmable J1939 to CANopen Gateway 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 Project".

When a new project is created or an existent project is open, it will be possible to access the various configuration section of the software:

> ➢ **Set Communication;**
> ➢ **Receive J1939;**
> ➢ **Transmit J1939;**
> ➢ **Define SDO;**
> ➢ **Define TPDO;**
> ➢ **Define RPDO;**
> ➢ **Set SDO Client;**
> ➢ **Set NodeGuarding;**
> ➢ **EDS file.**

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SET COMMUNICATION:

This section defines the fundamental communication parameters of two Buses, J1939 and CANopen.

By pressing the "Set communication" button from the main window of SW67150 (Fig. 2) the window "Set Communication" appears (Fig. 3):

- In the fields "Baud Rate", the velocity of the two buses are defined;
- In the field "Time out Data" insert a time, when this time is elapsed the data isn't reliable, and in the CANopen register you can read "FFFF";
- If the field "Peer to Peer" is checked is taken in consideration only the PGN field and not the ID Device field;
- If the field "Set Operational State at Start-Up" is checked, when the device is switched on it goes in operational mode otherwise in pre-operational mode;
- If the field "Network Start at Start-up" is checked, when the device is switched on it puts in Operational Mode all the nodes presents on the network;
- In the field "Delay" insert a time, this time indicates how many seconds the gateway wait before sending the message of Start-up;
- In the field "ID Dev.", the CANopen address is defined.
- In the field "TPDO", the way to send the PDO is select. Is possible to send the PDO only when a data byte change (Send on Change Data) or cyclically with an interval expressed in milliseconds (Send Cyclically).
- In the field "NODEGUARD" is possible to enable the Nodeguard, used to check the state of CANopen devices (Enable NodeGuard). It is possible to send cyclically the state of this CANopen devices directly to the J1939 network (send state on J1939 network and Send Frame every (ms)). For more info see page 16.
- In the field "SDO CLIENT" is possible to active the possibility to send SDO Client request from a command J1939 (Enable SDO Client). It is possible to set the maximum Timeout of this SDO request expressed in tenths of a millisecond (Timeout SDO (1/10 ms). For more info see page 14.
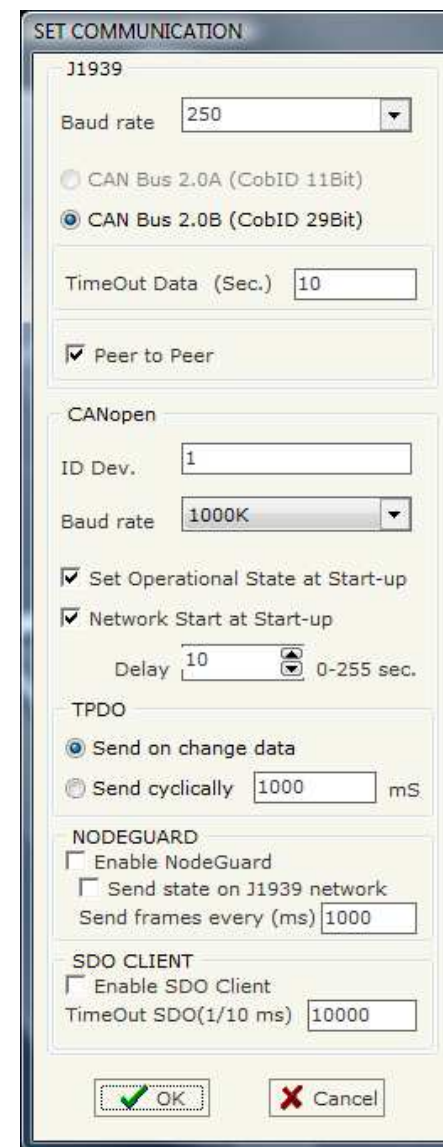

Figure 3: "Set Communication" window

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RECEIVE J1939:

By pressing the "Receive J1939" button from the main window of SW67212 (Fig. 2) the window "Receive J1939 frame" appears (Fig. 4):

In the right scenario:
- ➤ In the field "PGN" insert the PGN of the data you would to read from CANopen. (in the J1939 protocol the PGN is an identifier);
- ➤ In the field "ID Device" insert the ID of J1939 device that transmit the frame;
- ➤ If the field "Delete" is checked when the "Time Out Data" has expired in the CANopen side it is possible to read "0xFF". It will indicate that this register is not reliable;
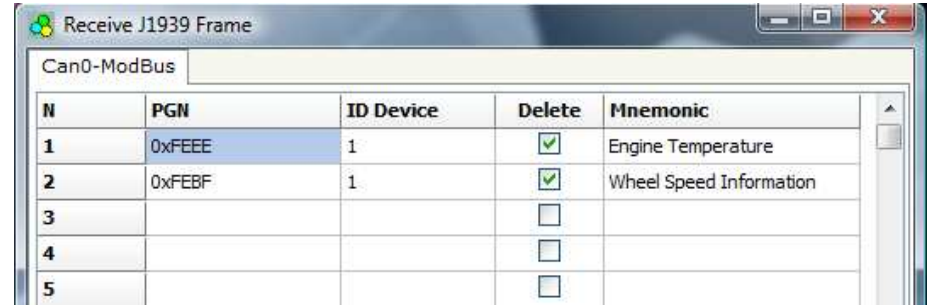- ➤ In the field "Mnemonic" the description for the frame is defined.

Figure 4: "Receive J1939 frame" window

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DEFINE SDO (Step 3):

By pressing the "Define SDO" button from the main window of SW67150 (Fig. 2) in "Step 3" the window "Receive J1939 Frame Info SDO" appears (Fig. 5):

  ➢ In the field "Correlated" there are PGN and ID_DEV who you insert in the list (Receive J1939);
  ➢ In the field "SDO" there are the SDO frames;
  ➢ In the field "Index SDO" there is the address of the SDO;
  ➢ In the field "SubIndex SDO" there is the SubIndex of SDO;
  ➢ In the field "Dimension SDO" is possible to select the dimension of the SDO;
  ➢ Depending on the dimension of SDO it is possible to enter from one to four byte of J1939 frame frame and then it is possible to set on that J1939 byte insert the SDO byte;
  ➢ With "Delete, New, Modify, Copy, Paste" buttons it is possible to delete, add, modify, copy and paste a SDO;
  ➢ With "Export or Import" buttons it is possible to Export or Import an existing Project.

For example:

Click on the PGN, insert the valid Index, SubIndex and Dimension for the SDO, then select which bytes of the J1939 frame map in the SDO bytes and click the "New" button for create a new SDO. In the field SDO appears the names of SDO (The first SDO is named IND SDO 0, second IND SDO 1, third Ind SDO 2 and so on).
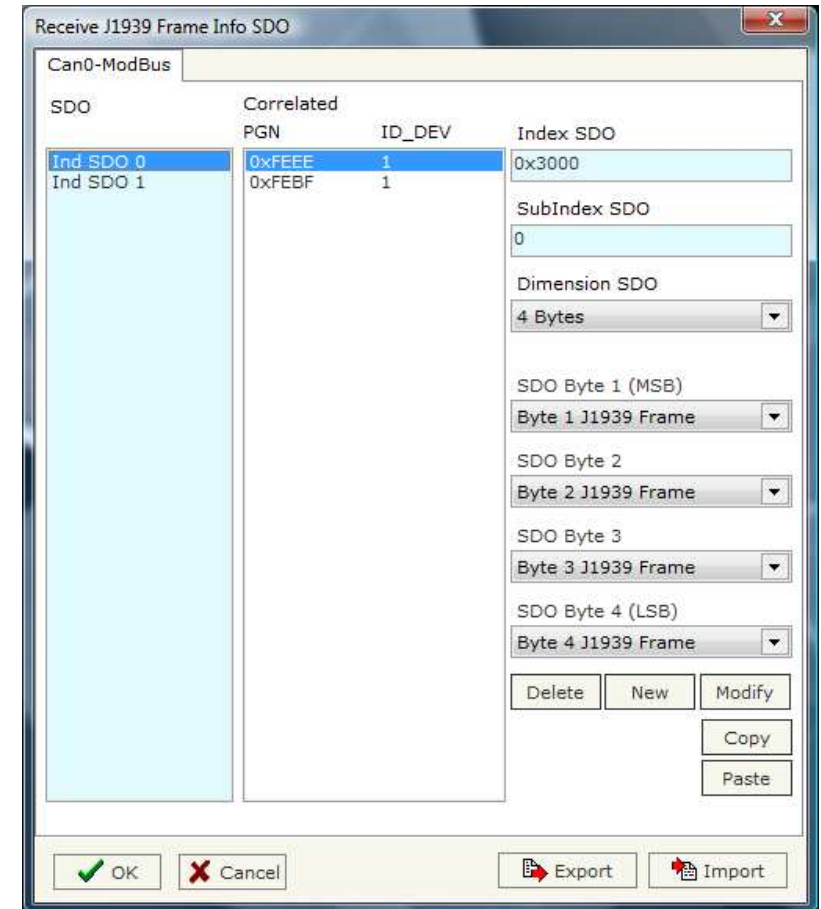

Figure 5: "Receive J1939 Frame Info SDO" window

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DEFINE TPDO:

By pressing the "Define TPDO" button from the main window of SW67150 (Fig. 2) the window "Transmit J1939 Frame Info PDO" appears (Fig. 6):

➢ In the field "COB-ID" it is possible to insert the COB-ID of the PDO frame;
➢ In the field "Dimension" it is possible to insert the number of Byte (Max=8 Byte) of the PDO frame;
➢ In the field "J1939 Frame" it is possible to select one of the J1939 Frame created with the window "Receive J1939 Frame".
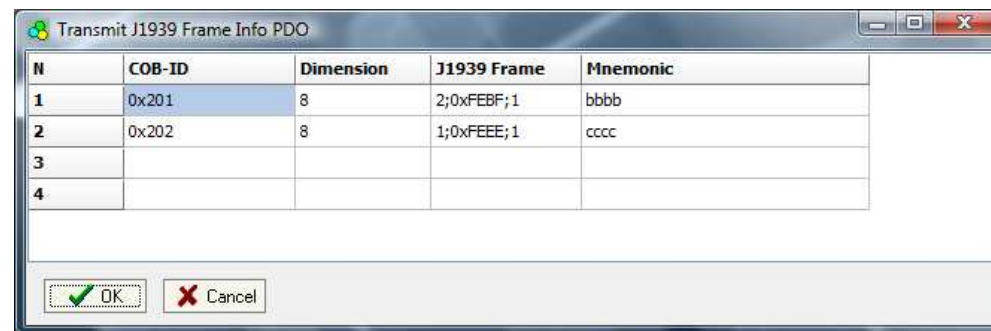➢ In the field "Mnemonic" the description for the PDO is defined.

N	COB-ID	Dimension	J1939 Frame	Mnemonic
1	0x201	8	2;0xFEBF;1	bbbb
2	0x202	8	1;0xFEEE;1	cccc
3				
4				

Figure 6: "Transmit J1939 Frame Info PDO" window

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TRANSMIT J1939:

By pressing the "Transmit J1939" button from the main window of SW67150 (Fig. 2) the window "Transmit J1939 Frame" appears (Fig. 7):

> ➤ In the field "Priority" insert the priority of the frame, in J1939 protocol is a number among 0,1,2,3,4,5,6,7. The number 0 is the highest priority and 7 is the lowest;
> ➤ In the field "Data Page" insert the data page, in the J1939 protocol is 0 or 1;
> ➤ In the field "PGN" insert the PGN of the data you would to write from modbus to J1939. (in the J1939 protocol the PGN is an identifier);
> ➤ In the field "ID device" you insert the ID of device that send the frame.
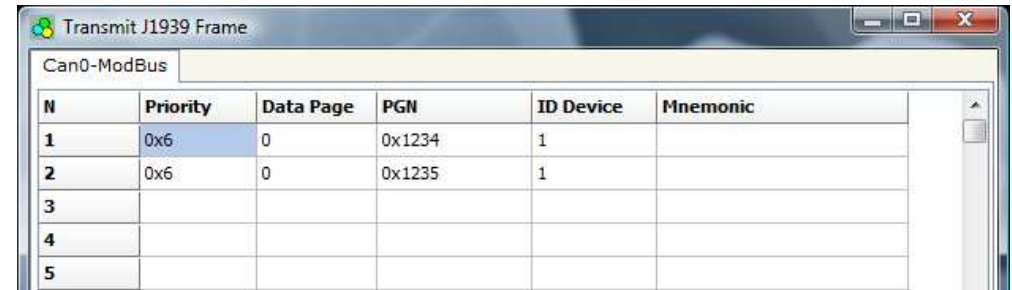> ➤ In the field "Mnemonic" the description for the frame is defined.

Figure 7: "Transmit J1939 Frame" window

DEFINE SDO (Step 4):

By pressing the "Define SDO" button from the main window of SW67150 (Fig. 2) in "Step 4" the window "Transmit J1939 Frame Info SDO" appears (Fig. 8):

- In the field "Correlated" there are PRIOR, DP, PNG, ID_DEV who you insert in the list (Transmit J1939);
- In the field "SDO" there are the SDO frames;
- In the field "Index SDO" there is the address of the SDO;
- In the field "SubIndex SDO" there is the SubIndex of SDO;
- In the field "Dimension SDO" it is possible to select how many byte insert in the SDO;
- Depending on the dimension of SDO it is possible to enter from one to four byte of J1939 frame and then it is possible to set on that J1939 byte insert the SDO byte;
- In the field "Send Frame when write SDO" it is possible to select "False" for don't sending the J1939 frame when write the SDO or selecting "True" for sending the J1939 frame when write the SDO
- With "Delete, New, Modify, Copy, Paste" buttons it is possible to delete, add, modify, copy and paste a SDO;
- With "Export or Import" buttons it is possible to Export or Import an existing Project.
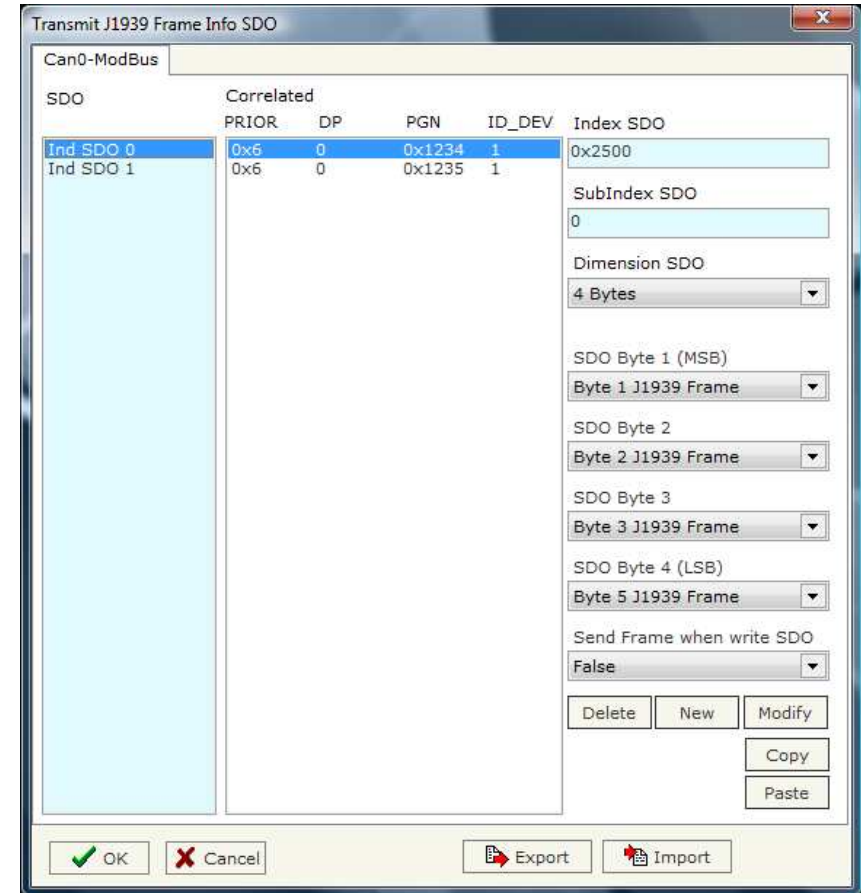

Figure 8: "Transmit J1939 Frame Info SDO" window

DEFINE RPDO:

By pressing the "Define RPDO" button from the main window of SW67150 (Fig. 2) the window "Receive J1939 Frame Info PDO" appears (Fig. 9):

> ➢ In the field "COB-ID" it is possible to insert the COB-ID of the PDO frame;
> ➢ In the field "Dimension" it is possible to insert the number of Byte (Max=8 Byte) of the PDO frame;
> ➢ In the field "J1939 Frame" it is possible to select one of the J1939 Frame created with the window "Transmit J1939 Frame".
> ➢ In the field "Mnemonic" the description for the PDO is defined

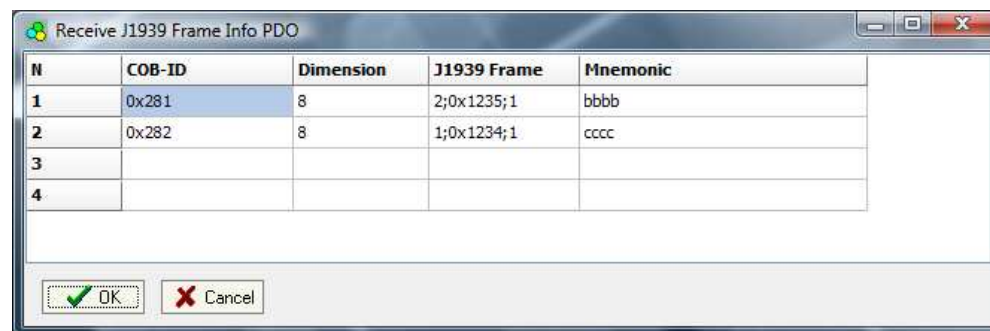| N	COB-ID	Dimension	J1939 Frame	Mnemonic
1	0x281	8	2;0x1235;1	bbbb
2	0x282	8	1;0x1234;1	cccc
3				
4				

Figure 9: "Receive J1939 Frame Info PDO" window

SET SDO CLIENT:

By pressing the "Set SDO Client" button from the main window of SW67150 (Fig. 2) the window "Set SDO Client" appears (Fig. 10).

In this window is possible to configure five J1939 messages used to read and write SDO data from other devices in the network CANopen.

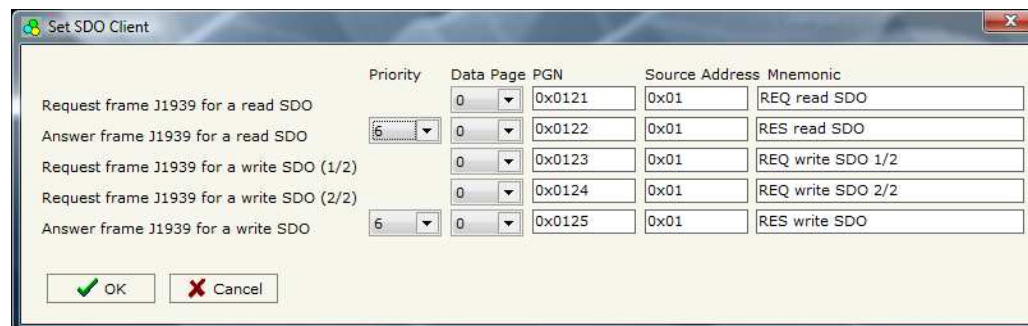The first two frames are used to read a SDO, the last three messages are used to write a SDO.

Figure 10: "Set SDO Client" window

READ SDO

Request frame J1939 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 J1939 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 J1939 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

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WRITE SDO

Request frame J1939 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 J1939 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 J1939 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 J1939 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 J1939 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

SET NODEGUARDING:

By pressing the "Set NodeGuarding" button from the main window of SW67150 (Fig. 2) the window "Set Node Guarding" appears (Fig. 11)

In this window is possible to config up to 32 device to check with the NodeGuard and up to 5 J1939 messages to send the state of the CANopen device into the J1939 network.

In the first part of the windows is possible to insert the devices to check with NodeGuard

> In the field "Node ID" insert the address of the device that you want to control. It is possible to insert up to 32 address;
> In the field "Guard Time" insert a time. This value indicates the delay between two interrogations;
> In the field "Life Time Factor" insert the number of attempts before considering the device absent;
> In the field "Mnemonic" you can insert a brief description.
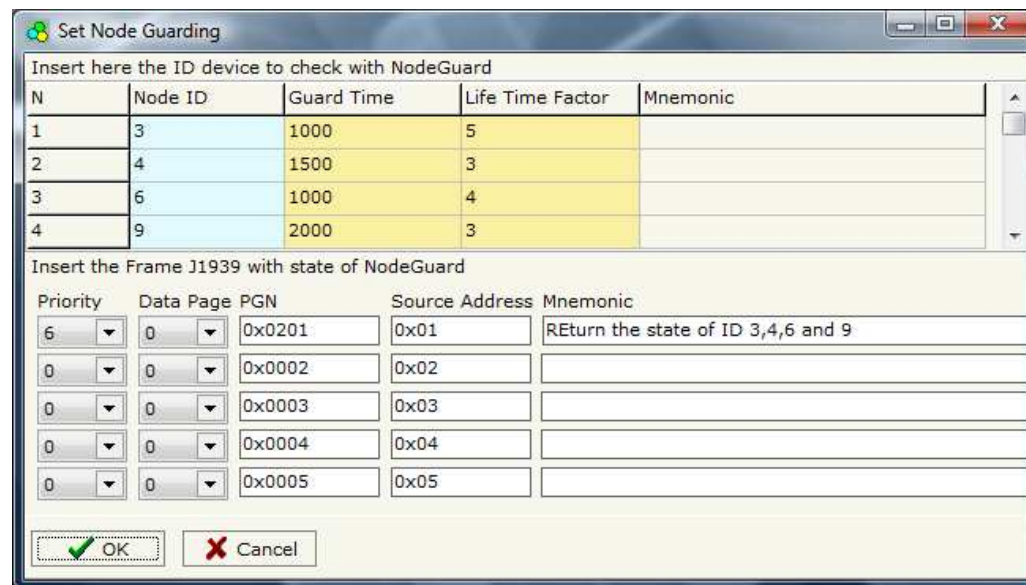
In the second part of the windows is possible to configure the Five J1939 messages to send the state of CANopen devices in J1939 network.
In every J1939 message there is the state of seven CANopen Devices.
In the first data byte each bit represents a CANopen device. If it present the bit will be equal to 1 otherwise 0.
From the second byte to the eighth represents the state of the device.
These bytes can take this values:

Value	Meaning
0	UNKNOW
1	INITIALISING
4	STOPPED
5	OPERATIONAL
127	PRE_OPERATIONAL

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EDS FILE:

By pressing the "EDS File" button it is possible to save the EDS file for the CANopen side.
With this feature you can save the configuration of the gateway of the CANopen side.

UPDATE DEVICE:

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

➢ Turn OFF the device;
➢ Connect the Null Modem Cable from your PC to the Gateway;
➢ Insert the Boot Jumper (For more info see Fig. 1);
➢ Turn ON the Device;
➢ Check the Boot Led. It must blink quickly (For more info see Fig. 1)
➢ Select the COM port and press the "Execute update firmware" button to start the upload;
➢ When all the operation are "OK" turn OFF the Device;
➢ Disconnect the Boot Jumper;
➢ Disconnect the RS232 cable;

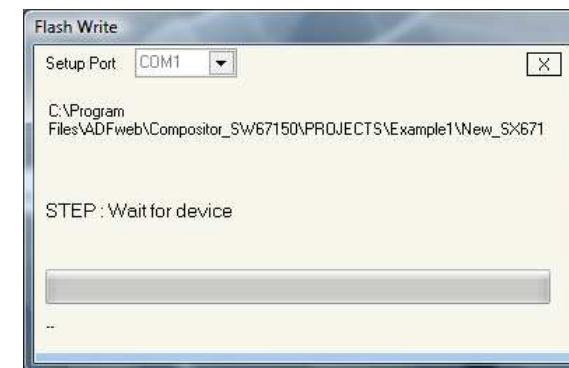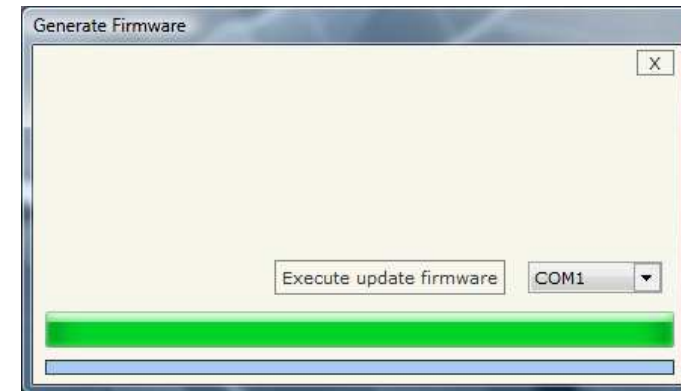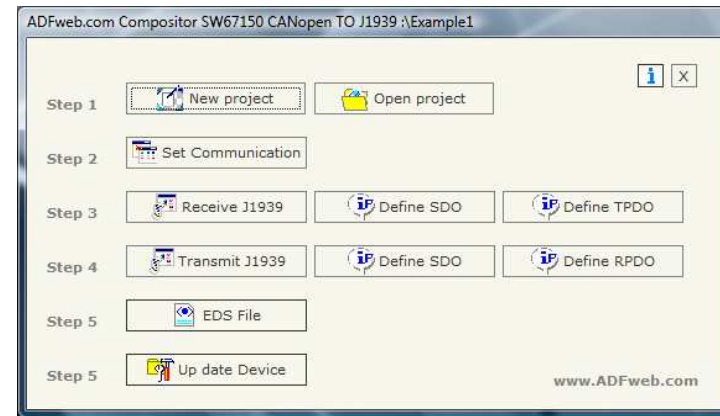Turn ON the device. At this point the configuration/firmware on the device is correctly updated.

Figure 12: Update device procedure

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CHARACTERISTICS OF THE CABLES:

The connection from RS232 socket to a serial port (example one from a personal computer), must be made with a Null Modem cable (a serial cable where the pins 2 and 3 are crossed).
It is recommended that the RS232C Cable not exceed 15 meters.
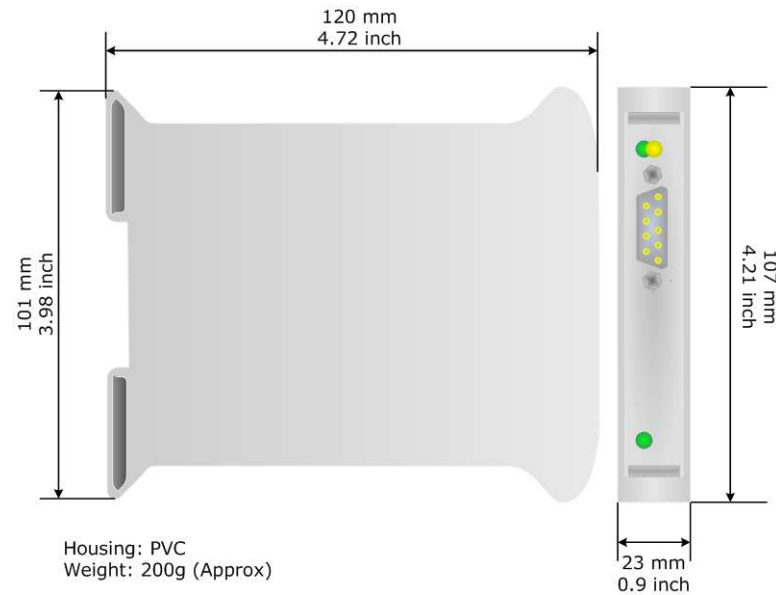
MECHANICAL DIMENSIONS:

120 mm
4.72 inch

101 mm
3.98 inch

107 mm
4.21 inch

Housing: PVC
Weight: 200g (Approx)

23 mm
0.9 inch

Figure 13: Mechanical dimensions scheme

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ORDER CODE:

Order Code: **HD67150**   -   J1939 / CANopen - Converter

ACCESSORIES:

Order Code: **AC34107**   -   Null Modem Cable Fem/Fem DSub 9 Pin 1,5 m

Order Code: **AC34114**   -   Null Modem Cable Fem/Fem DSub 9 Pin 5 m

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

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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.

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WARRANTIES AND TECHNICAL SUPPORT:

For fast and easy technical support for your ADFweb.com SRL products, consult our internet support at www.adfweb.com.
Otherwise contact us at the address support@adfweb.com

RETURN POLICY:

If while using your product you have any problem and you wish to exchange or repair it, please do the following:
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.

PRODUCTS AND RELATED DOCUMENTS:

Part	Description	URL
HD67121	Gateway CANopen / Canopen	www.adfweb.com?product=HD67121
HD67002	Gateway CANopen / Modbus - RTU	www.adfweb.com?product=HD67002
HD67004 HD67005	Gateway CANopen / Modbus – Ethernet TCP	www.adfweb.com?product=HD67004
HD67134	Gateway CANopen / DeviceNet	www.adfweb.com?product=HD67134
HD67117	CAN bus Repeater	www.adfweb.com?product=HD67117
HD67216	CAN bus Analyzer	www.adfweb.com?product=HD67216