![ADFweb logo] ADF web

Industrial Electronic Devices

User Manual

Revision 1.000
English

LoRaWAN / PROFINET Slave - Converter

(Order Code: HD67D33-B2-868MHz)

For Website information:
www.adfweb.com?Product=HD67D33-B2

For Price information:
www.adfweb.com?Price=HD67D33-B2-868MHz

Benefits and Main Features:

✦ Very easy to configure

✦ Power Supply 18…35V DC and 8…24 V AC

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

User Manual

For others LoRaWAN products, see also the following links:

Converter LoRaWAN to

Link	Protocol
www.adfweb.com?Product=HD67D01	(Modbus Master)
www.adfweb.com?Product=HD67D02	(Modbus Slave)
www.adfweb.com?Product=HD67D03	(Modbus TCP Master)
www.adfweb.com?Product=HD67D04	(Modbus TCP Slave)
www.adfweb.com?Product=HD67D05	(Serial)
www.adfweb.com?Product=HD67D15	(M-Bus)
www.adfweb.com?Product=HD67D16	(BACnet Master)
www.adfweb.com?Product=HD67D17	(BACnet Slave)
www.adfweb.com?Product=HD67D18	(Ethernet)
www.adfweb.com?Product=HD67D19	(CAN)
www.adfweb.com?Product=HD67D20	(CANopen)
www.adfweb.com?Product=HD67D21	(DeviceNet Master)
www.adfweb.com?Product=HD67D22	(DeviceNet Slave)
www.adfweb.com?Product=HD67D23	(DMX)
www.adfweb.com?Product=HD67D24	(EtherNet/IP Master)
www.adfweb.com?Product=HD67D25	(EtherNet/IP Slave)
www.adfweb.com?Product=HD67D26	(J1939)
www.adfweb.com?Product=HD67D27	(KNX)
www.adfweb.com?Product=HD67D28	(NMEA 0183)
www.adfweb.com?Product=HD67D29	(NMEA 2000)
www.adfweb.com?Product=HD67D30	(PROFIBUS Master)
www.adfweb.com?Product=HD67D31	(PROFIBUS Slave)
www.adfweb.com?Product=HD67D32	(PROFINET Master)
www.adfweb.com?Product=HD67D34	(IEC61850 Client)
www.adfweb.com?Product=HD67D35	(IEC61850 Server)
www.adfweb.com?Product=HD67D36	(MQTT)
www.adfweb.com?Product=HD67D37	(OPC UA Client)
www.adfweb.com?Product=HD67D38	(OPC UA Server)
www.adfweb.com?Product=HD67D39	(S7comm)
www.adfweb.com?Product=HD67D40	(SNMP Manager)
www.adfweb.com?Product=HD67D41	(SNMP Agent)

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	04/12/2020	Ff	All	First release 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.

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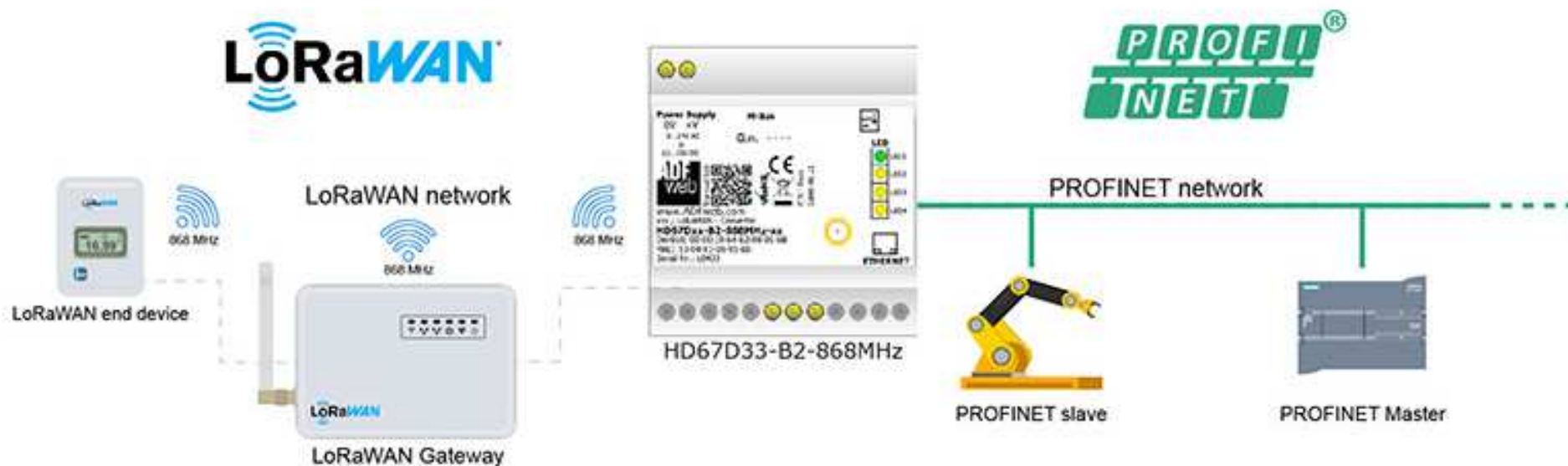
CE CONFORMITY
The declaration is made by our company. You can send an email to support@adfweb.com or give us a call if you need it.

Industrial Electronic Devices

EXAMPLE OF CONNECTION:

PROFINET or S7comm / LoRaWAN - Converter
HD67D33-B2

HD67D33-B2-868MHz

Industrial Electronic Devices

CONNECTION SCHEME:

Connector2:
Ethernet Port
(RJ45 Plug)

Connector5:
Antenna

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

Led1:
Green
Device state

Led2:
Yellow
LoRaWAN comm.

Led3:
Yellow
PROFINET comm.

Led4:
Yellow
Error state

www.ADFweb.com
LoRaWAN / PROFINET Slave - Converter
HD67D33-B2-868MHz
DevEUI: 00:00:10-64-E2-08-98-FA
MAC: 10-64-E2-08-98-FA
Serial Nr.: L2368

ETHERNET

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

Dip-Switch A:
-Dip1 – Functioning Mode

= Normal Mode

= Boot Mode

Figure 1: Connection scheme for HD67D33-B2-xxxMHz

CHARACTERISTICS:

The HD67D33-B2 is a LoRaWAN / Profinet Slave Converter.

It allows the following characteristics:

- Electrical isolation between PROFINET and Power Supply;
- Two-directional information between EtherCAT bus and PROFINET bus;
- Mountable on 35mm Rail DIN;
- Wide power supply input range: 12…35V DC and 8…24V AC;
- Wide temperature range: -40°C / 85°C [-40°F / +185°F].

CONFIGURATION:

You need Compositor SW67D33 software on your PC in order to perform the following:

- Define the parameter of PROFINET line;
- Define the parameter of LoRaWAN line;
- Define the list of LoRaWAN messages in uplink and downlink to the LoRaWAN gateway;
- Export the GSDML file for configuration of PROFINET Master;
- 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 〜		VDC ▭▭	
Vmin	**Vmax**	**Vmin**	**Vmax**
8V	**24V**	**12V**	**35V**

Consumption at 24V DC:

Device	Consumption [W/VA]
HD67D33-B2-xxxMHz	3.5

Connector1:
Power Supply

0V = Ground
+V = Positive wire

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

V+ 0V
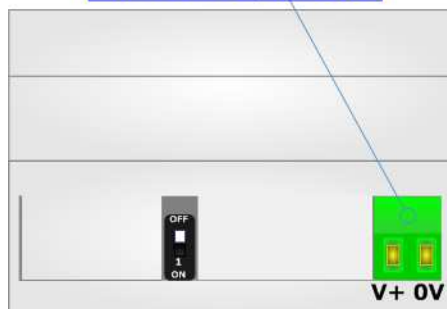
Caution: Not reverse the polarity power

+V   0V

HD67D33-B2-xxxMHz

Industrial Electronic Devices
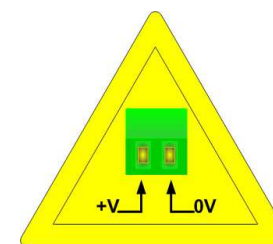
FUNCTION MODES:

The device has got two functions mode depending of 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 upload the Project and/or Firmware.

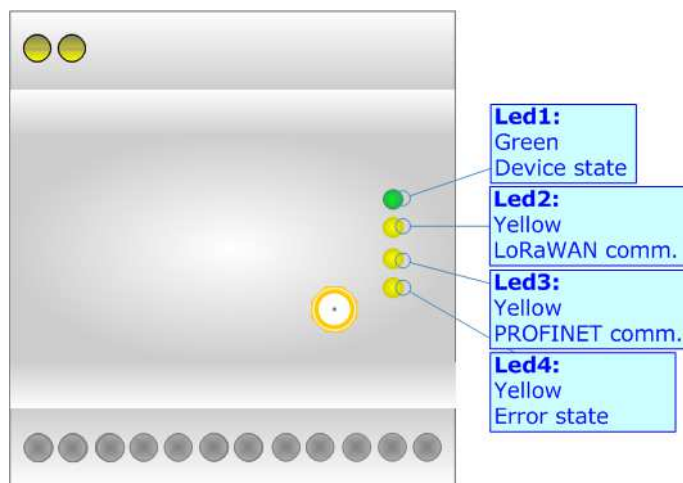For the operations to follow for the updating, see 'UPDATE DEVICE' section.

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

Industrial Electronic Devices
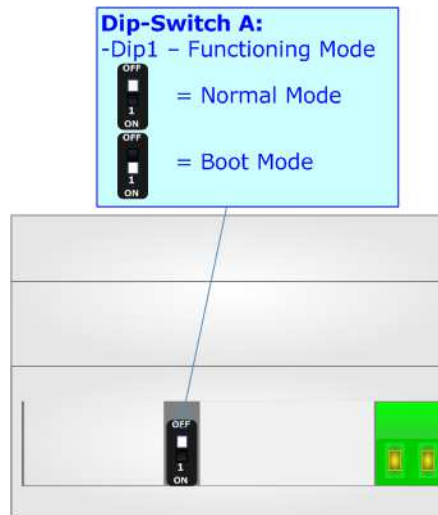
LEDS:

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

LED	Normal Mode	Boot Mode
1: Device State (green)	Blinks slowly (~1Hz)	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
2: LoRaWAN communication (yellow)	Blinks when LoRaWAN data is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
3: PROFINET communication (yellow)	Blinks when a PROFINET request is received	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
4: Error state (yellow)	**ON:** An error in the communication busses occurs **OFF:** No errors are present	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress

Led1:
Green
Device state

Led2:
Yellow
LoRaWAN comm.

Led3:
Yellow
PROFINET comm.

Led4:
Yellow
Error state

ADFweb.com S.r.l.

*Industrial Electronic Devices*

LORAWAN:

The LoRaWAN® specification is a Low Power, Wide Area (LPWA) networking protocol designed to wirelessly connect battery operated 'things' to the internet in regional, national or global networks, and targets key Internet of Things (IoT) requirements such as bi-directional communication, end-to-end security, mobility and localization services.
LoRaWAN® network architecture is deployed in a star-of-stars topology in which gateways relay messages between end-devices and a central network server.
The wireless communication takes advantage of the Long Range characteristics of the LoRa physical layer, allowing a single-hop link between the end-device and one or many gateways. All modes are capable of bi-directional communication, and there is support for multicast addressing groups to make efficient use of spectrum during tasks such as Firmware Over-The-Air (FOTA) upgrades or other mass distribution messages.

Converters from HD67D33 serie act as end-devices and they can communicate with one or more LoRwaWAN Gateways.
The converters support all the standard datarates and they work both on public and private networks.

Connector5:
Antenna

ADFweb.com S.r.l.

Industrial Electronic Devices
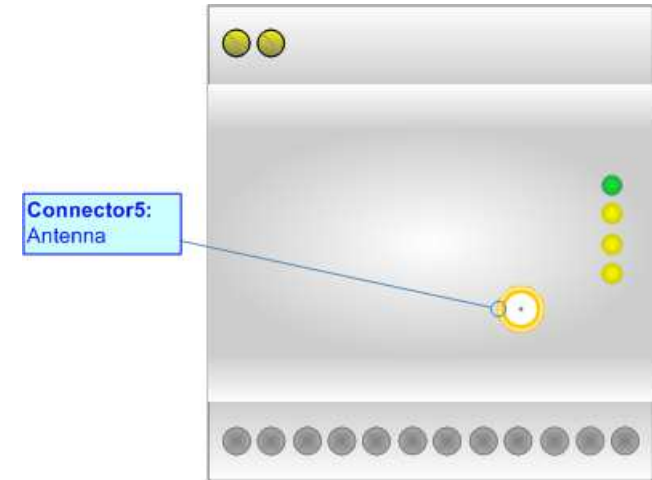
ETHERNET:

The Ethernet port is used for programming the device and for PROFINET communication.
The Ethernet connection must be made using Connector2 of HD67D33-B2 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.

Connector2:
Ethernet Port
(RJ45 Plug)

Industrial Electronic Devices
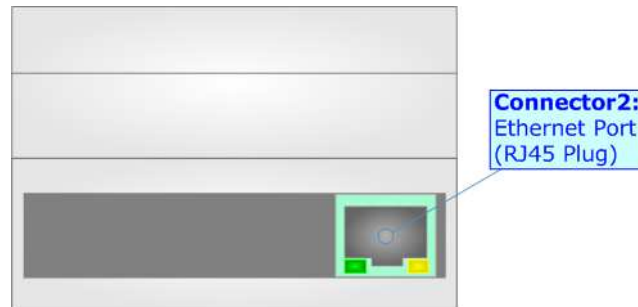
USE OF COMPOSITOR SW67D33:

To configure the Converter, use the available software that runs with Windows called SW67D33. It is downloadable on the site www.adfweb.com and its operation is described in this document. The software works with MS Windows (XP, Vista, Seven, 8, 10; 32/64bit).

When launching the SW67D33, the window below appears (Fig. 2).
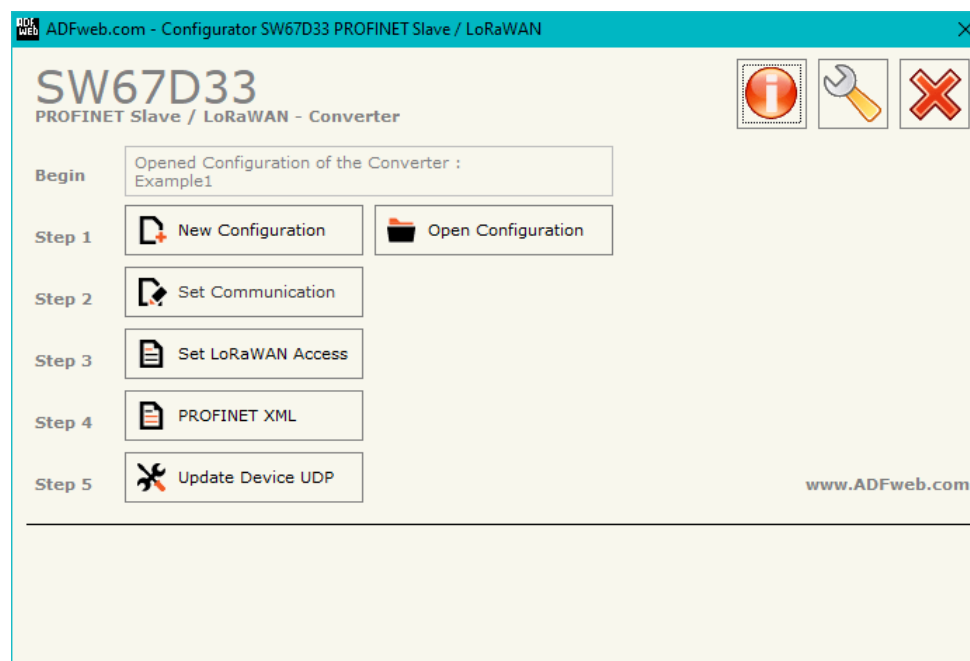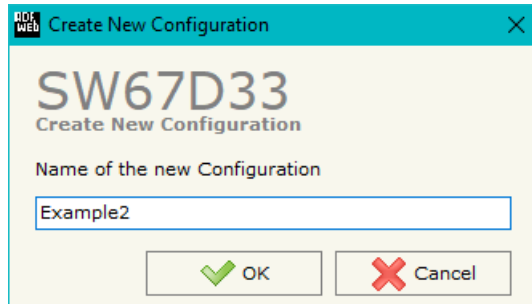
Note:
It is necessary to have installed .Net Framework 4.


Figure 2: Main window for SW67D33

![ADFweb logo]
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 "LoRaWAN / PROFINET Slave - 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**".

Industrial Electronic Devices
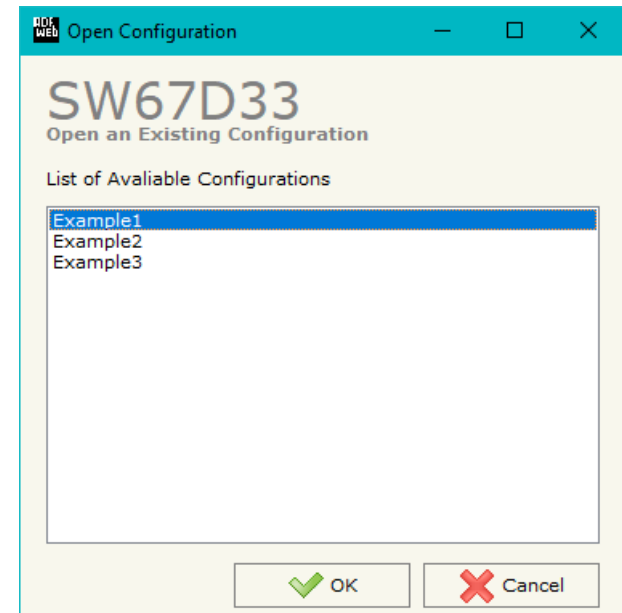
SOFTWARE OPTIONS:

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.
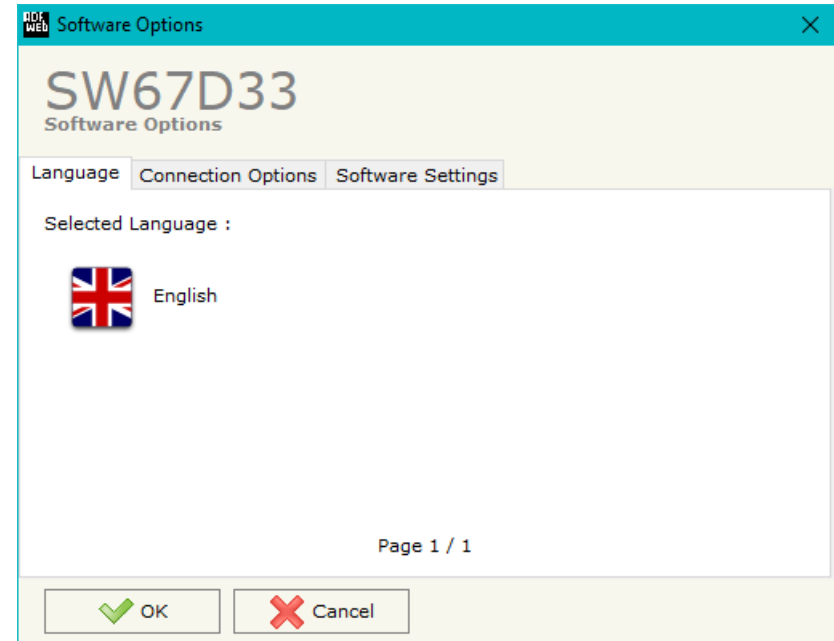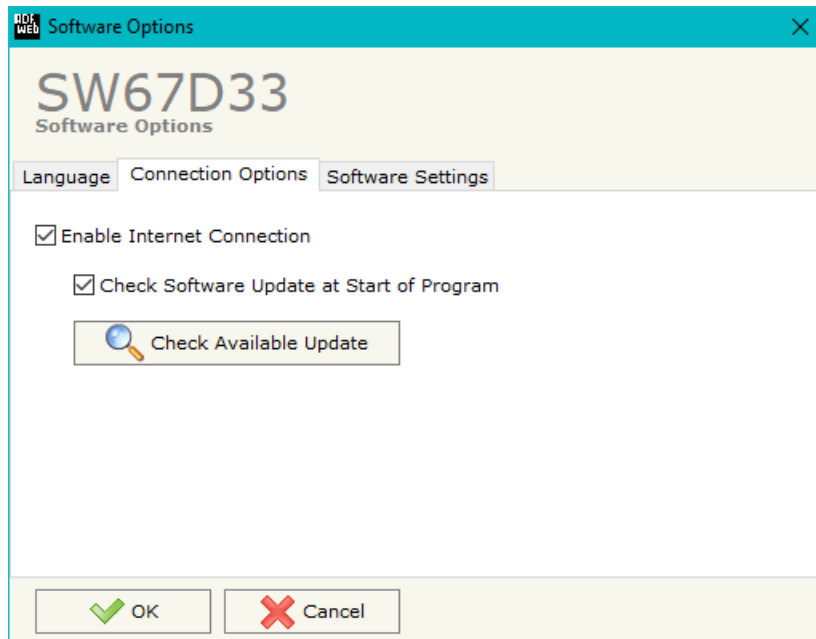
In the section "Connection Options", it is possible to check if there are some updatings of the software compositor in ADFweb.com website.
Checking the option "**Check Software Update at Start of Program**", the SW67D33 check automatically if there are updatings when it is launched.
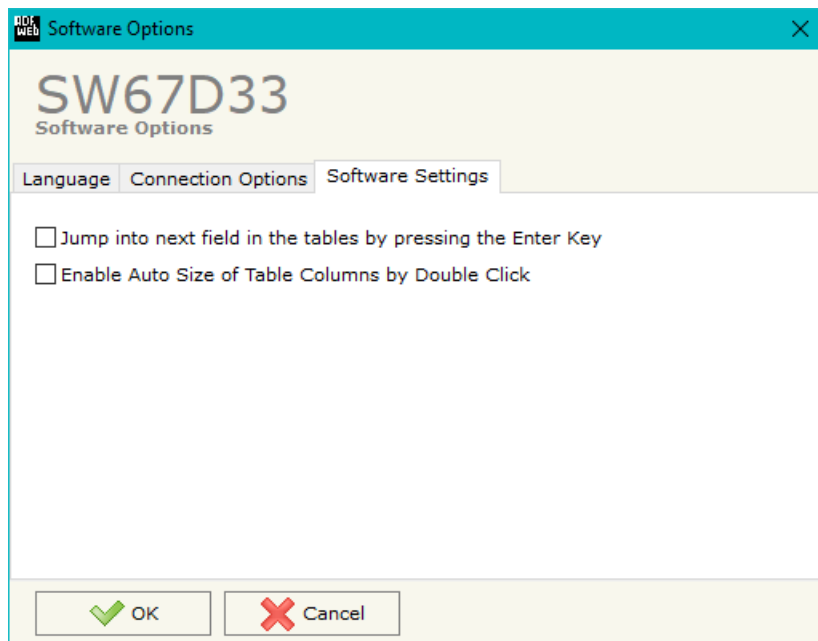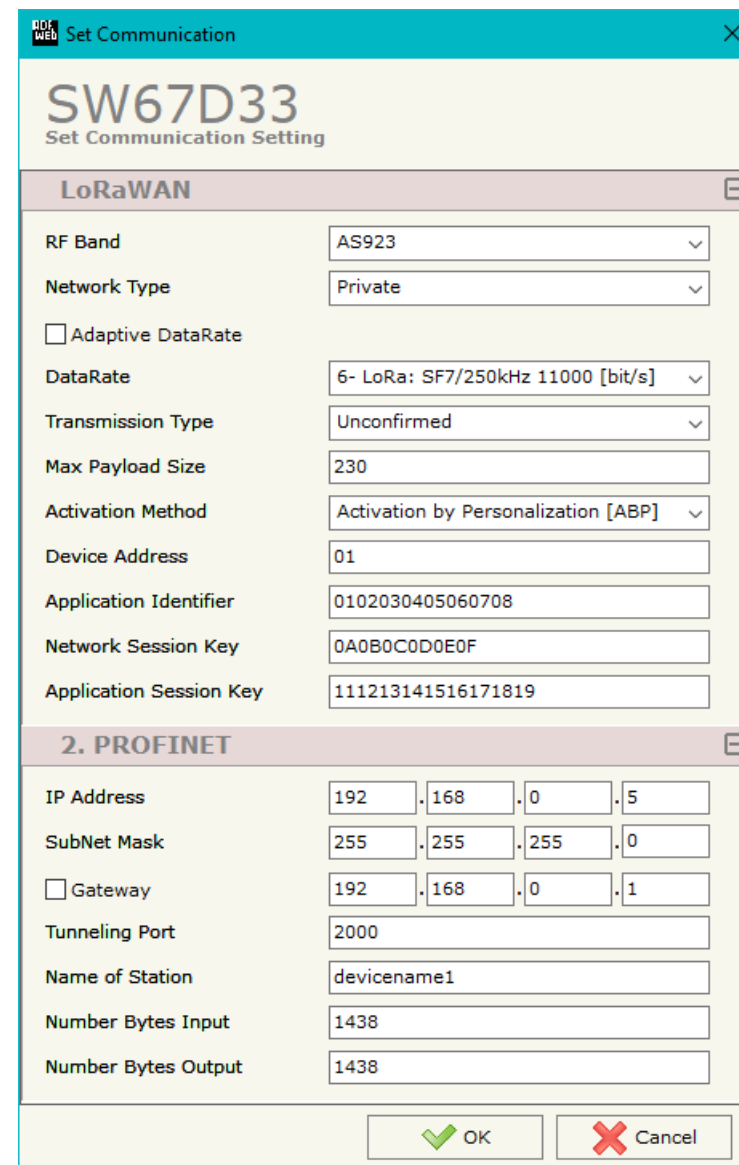
In the section "Software Settings", it is possible to enable/disable some keyboard's commands for an easier navigation inside the tables contained in the different sections of the software.

SET COMMUNICATION:

By Pressing the "**Set Communication**" button from the main window for SW67D33 (Fig. 2) the window "Set Communication" appears (Fig. 3).

The means of the fields for the "LoRaWAN" section are:

- In the field "**RF Band**" the wireless band used for LoRaWAN communication is defined;
- In the field "**Network Type**" the type of LoRaWAN network is defined;
- If the field "Adaptive Data Rate" is checked, the converter will enable the ADR functionalities to select the best data rate to be used in relation to the environmental conditions;
- In the field "**Data Rate**" the data rate for LoRaWAN communication is defined;
- In the field "**Transmission Type**" the type of LoRaWAN communication is defined;
- In the field "**Max Payload Size**" the maximum dimension of the LoRaWAN messages is defined (fixed in relation to the data rate selected);
- In the field "**Activation Method**" the method used to join into a LoRaWAN network is defined;
- In the field "**Device Address**" the device identifier (DevEUI) is defined (only for ABP method);
- In the field "**Application Identifier**" the application identifier (AppEUI) is defined (only for ABP method);
- In the field "**Network Session Key**" the key used for the communication with the LoRaWAN gateway (NwkSKey) is defined (only for ABP method);
- In the field "**Application Session Key**" the key for encryption and decryption of the payload (AppSKey) is defined (only for ABP method);
- If OTAA method is selected, in the field "**Application Key**" the secret key for the dynamic activation of the converter in the LoRAWAN network is defined.

Figure 3: "Set Communication" window

Industrial Electronic Devices
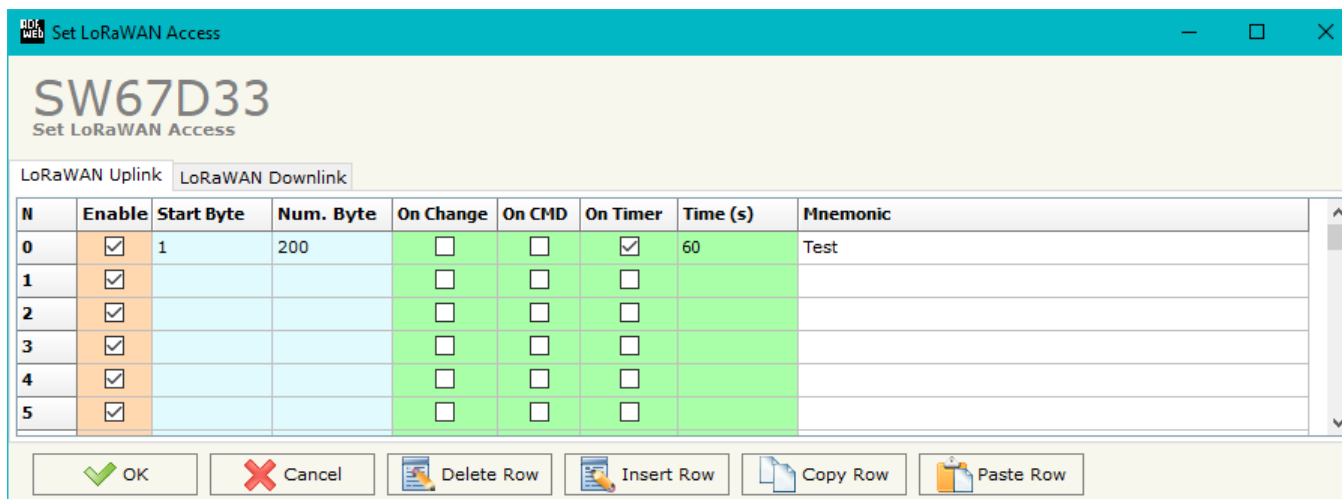
The means of the fields for "PROFINET" are:

- In the fields "**IP Address**" the IP address for PROFINET side of the converter is defined;
- In the fields "**SubNet Mask**" the SubNet Mask for PROFINET side of the converter is defined;
- In the fields "**Gateway**" the default gateway of the net is defined. This feature can be enabled or disabled pressing the Check Box field. This feature is used for going out of the net;
- In the field "**Tunneling Port**" the port to use for the "Tunneling mode" is defined;
- In the field "**Name of Station**" the name of PROFINET side of the converter is defined;
- In the field "**Number Bytes Input**" the number of byte from the PROFINET Master to the converter is defined (it is possible to use up to 1439 byte);
- In the field "**Number Bytes Output** " the number of byte from the converter to the PROFINET Master is defined (it is possible to use up to 1439 byte).

Industrial Electronic Devices

LORAWAN ACCESS:

By Pressing the "**LoRaWAN Access**" button from the main window for SW67D33 (Fig. 2) the window "Set LoRaWAN Access" appears (Fig. 4).

This section is used to define the LoRAWAN messages where the converter will place the data read from PROFINET (Uplink) and the LoRAWAN messages that the converter will take (Downlink) for writing the data to PROFINET.

LoRaWAN Uplink

Figure 4a: "LoRaWAN Access → LoRaWAN Uplink" window

The means of the fields are:

- If the field "**Enable**" is checked, the LoRaWAN message is enabled;
- In the field "**Start Byte**" the starting byte of the internal memory array where taking the data is defined;
- In the field "**Num. Byte**" the number of consecutive bytes to take from the internal array starting from "Start Byte" is defined;
- If the field "**On Change**" is checked, the LoRaWAN message is sent only when the data from PROFINET change;
- If the field "**On CMD**" is checked, the LoRaWAN message is sent when a PROFINET request is received;
- If the field "**On Timer**" is checked, the LoRaWAN message is sent cyclically with the delay defined in "**Time (s)**" field;
- In the field "**Mnemonic**" a description of the message is defined.

Industrial Electronic Devices
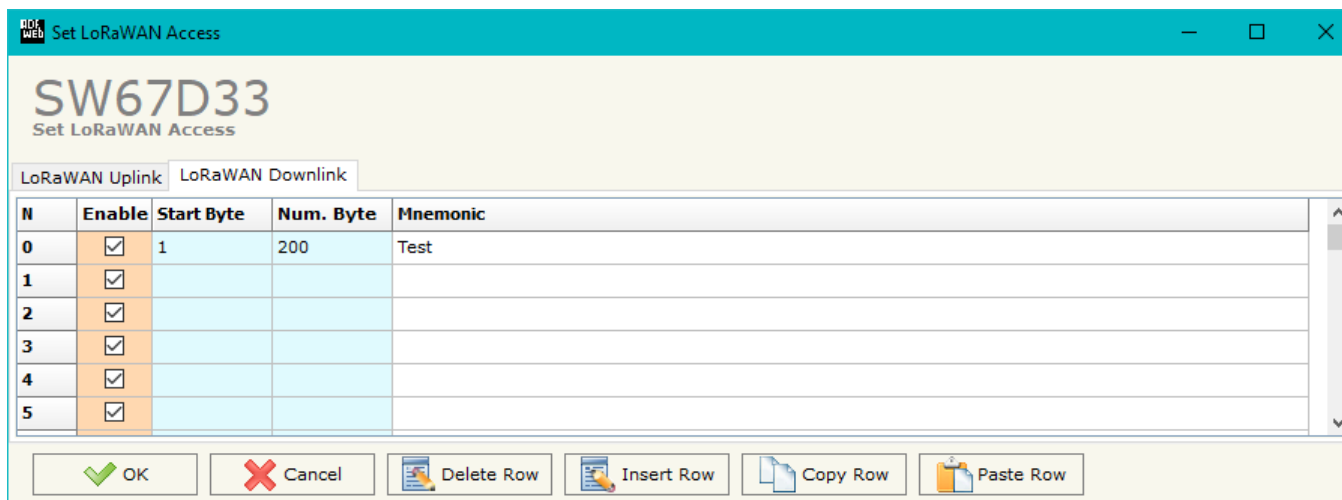
LoRaWAN Downlink

Figure 4b: "LoRaWAN Access → LoRaWAN Downlink" window

The means of the fields are:

- If the field "**Enable**" is checked, the LoRaWAN message is enabled;
- In the field "**Start Byte**" the starting byte of the internal memory array where placing the data is defined;
- In the field "**Num. Byte**" the number of consecutive bytes to write to the internal array starting from "Start Byte" is defined;
- In the field "**Mnemonic**" a description of the message is defined.

PROFINET XML:

By pressing the "**PROFINET XML**" button it is possible to save the GSDML file for the PROFINET side of the converter.
The GSDML file is used to configure the PROFINET Master.

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**";
- 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.

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.

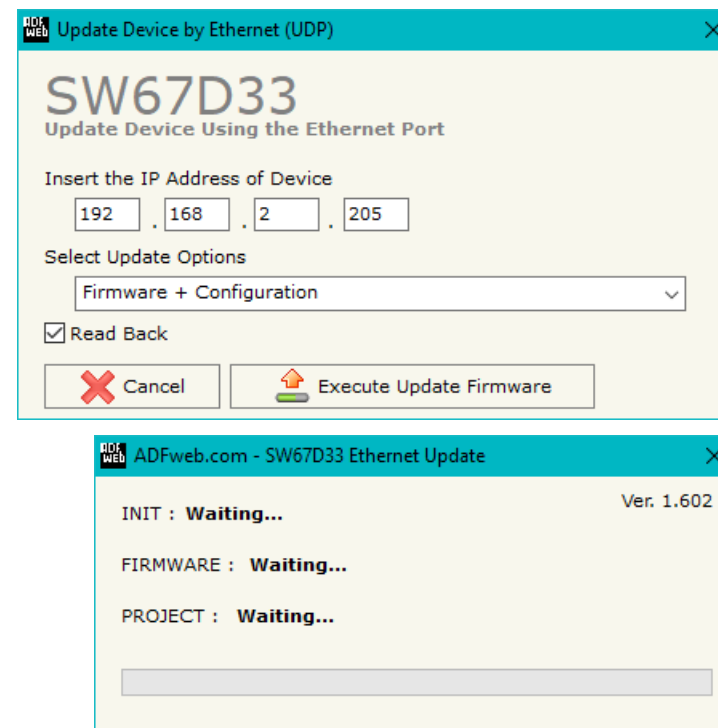At this point the configuration/firmware on the device is correctly updated.

Figure 5: "Update device" windows

![ADFweb logo] Industrial Electronic Devices

Note:
   When you receive the device, for the first time, you also have to update the Firmware in the HD67D33 device.

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

+ Try to repeat the operations for the updating;
+ Try 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 or 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.

Warning:
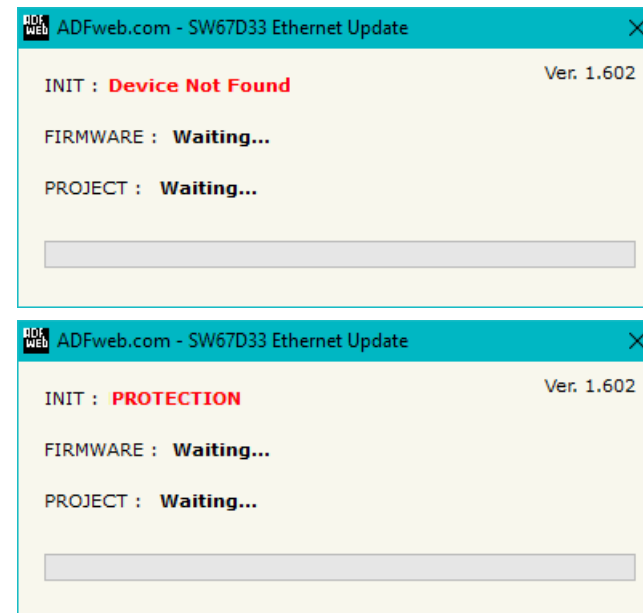   In the case of HD67D33 you have to use the software "SW67D33": www.adfweb.com\download\filefold\SW67D33.zip.

Figure 6: "Error" window

Industrial Electronic Devices

LORAWAN PAYLOAD

The LoRAWAN messages in Uplink and Downlink are structured into a defined format in order to recognize them from LoRaWAN gateway side and to understand to which PROFINET requests they are associated.

The payload of the LoRaWAN messages is defined in Hex format:

* The first byte refers to the row of the tables defined into "LoRaWAN Access" section of SW67D33: it can have a value between 0 and 255 (0xFF);
* The following bytes will contain the data to be linked to the internal memory arrays of the converter (using "Start Byte" and "Num. Byte" of "LoRaWAN Access" section of SW67D33);

Example 1:

the converter is sending a LoRaWAN message related to row 4 of "LoRaWAN Access → LoRaWAN Uplink" table of "LoRaWAN Access" section of SW67D33 with a "Num. Byte" set of '4'. The data from these 4 bytes is "01 02 03 04" (hex).
The payload of the LoRaWAN message will look like "04 01 02 03 04" where:

* 04: index of the row of "LoRaWAN Access → LoRaWAN Uplink" table;
* 01 02 03 04: data taken from internal memory array of the converter.

Example 2:

The external LoRaWAN gateway needs to send a LoRaWAN message to the converter and link it to row 3 of "LoRaWAN Access → LoRaWAN Downlink" table of "LoRaWAN Access" section of SW67D33. The "Num. Byte" set is '4' and the data to be written is "55 66 77 88" (hex).
The payload of the LoRaWAN message will look like "03 55 66 77 88" where:

* 03: index of the row of "LoRaWAN Access → LoRaWAN Downlink" table;
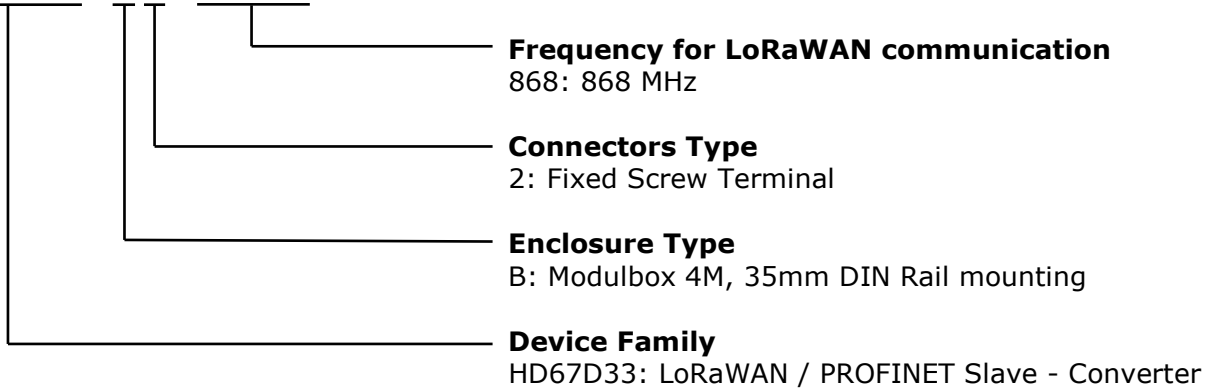* 55 66 77 88: data to be written to the internal memory array of the converter.

ADFweb.com S.r.l.

Industrial Electronic Devices
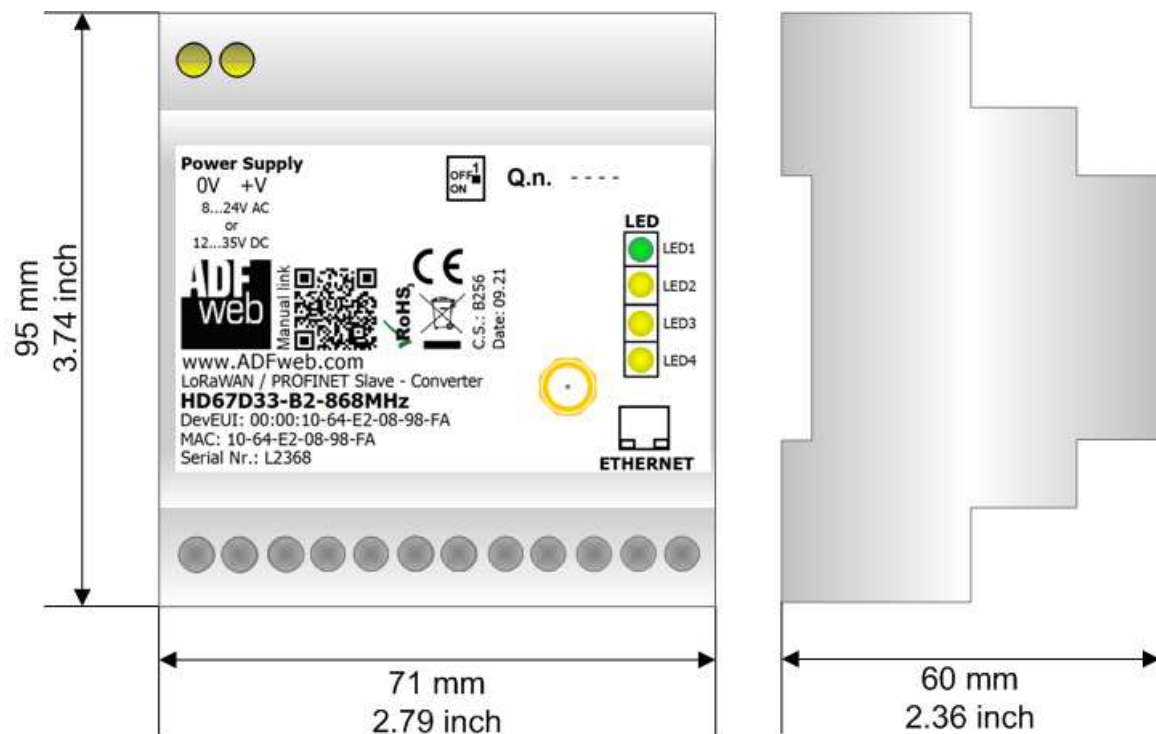
MECHANICAL DIMENSIONS:

Figure 7: Mechanical dimensions scheme for HD67D33-B2

Industrial Electronic Devices

ORDERING INFORMATIONS:

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

HD67D33 - B 2 - xxxMHz

Frequency for LoRaWAN communication
868: 868 MHz

Connectors Type
2: Fixed Screw Terminal

Enclosure Type
B: Modulbox 4M, 35mm DIN Rail mounting

Device Family
HD67D33: LoRaWAN / PROFINET Slave - Converter

Order Code: **HD67D33-B2-868MHz**   **-**   LoRaWAN / PROFINET Slave – 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:

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

OTHER REGULATIONS AND STANDARDS:

WEEE INFORMATION

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

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

RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE

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

CE MARKING

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

Industrial Electronic Devices

WARRANTIES AND TECHNICAL SUPPORT:

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

RETURN POLICY:

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

- Obtain a Product Return Number (PRN) from our internet support at www.adfweb.com. Together with the request, you need to provide detailed information about the problem.
- Send the product to the address provided with the PRN, having prepaid the shipping costs (shipment costs billed to us will not be accepted).

If the product is within the warranty of twelve months, it will be repaired or exchanged and returned within three weeks. If the product is no longer under warranty, you will receive a repair estimate.

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