IntesisBox® Modbus Server

KILSEN KSA-7xx

User's Manual
08/2013
r1.2 eng

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2/20

Gateway for the integration of KILSEN KSA-7XX fire panels into Modbus (RTU or TCP) control systems.

Reference:

IBOX-MBS-KILSEN

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3/20

Table of contents

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1. Introduction

1.1 Presentation

The scope of this integration is to get access to the status of the elements in the KILSEN fire panels for monitoring using a Modbus master device. To do it so, the Gateway is working as a Slave device, from the Modbus side, answering to the data petitions coming from the Modbus Master device. From the KILSEN side, IntesisBox works as a peripheral connected to the EIA232 port, sending the data provided from KILSEN to the Modbus side.

IntesisBox is connected to the EIA232 port of the KILSEN fire panel and allows monitoring of elements and zones through independent Modbus registers. The Modbus register map is fixed for 7 panels, with 15 loops per panel (35 loops) and 255 elements per loop (8925 elements). Available statuses for each element are: normal, alarm, pre-alarm, fault and disconnect. Available statuses for zones are: normal and alarm. Moreover, it also includes 7 registers for general status of the fire panel.

Command signals to the KILSEN panel are not supported. Only monitoring is allowed.
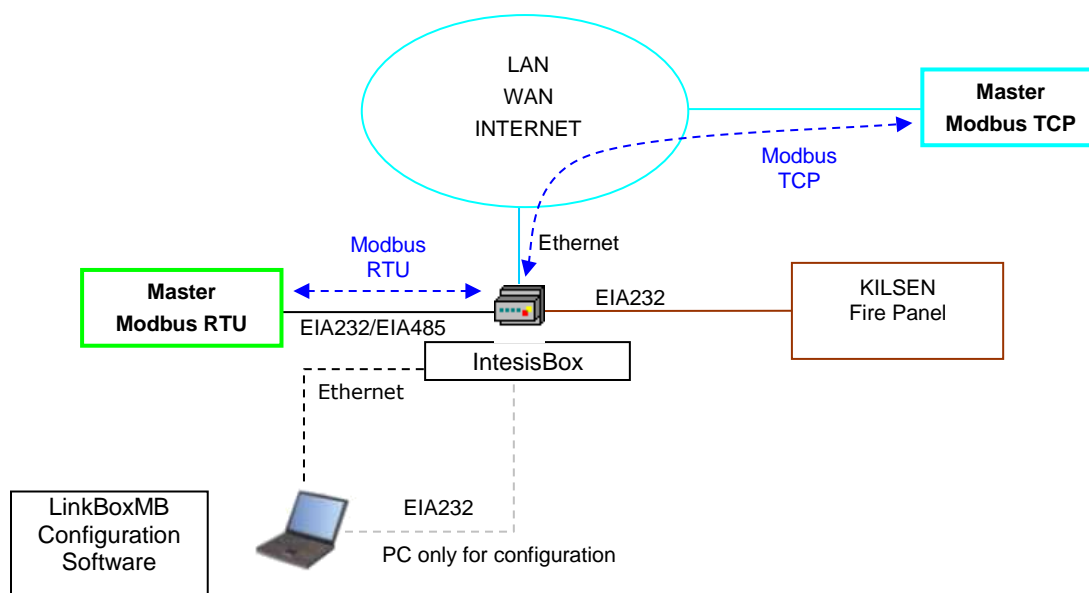
Figure 1.1 KILSEN fire panel integration using IntesisBox Modbus Server

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5/20

1.2 Description

General overview

KILSEN communication protocol is based on events. The element status in the system (detectors, modules, etc.) is transmitted through the protocol by means of events once they are produced.

The IntesisBox target is to associate the status of the elements in the KILSEN system into values in proper Modbus registers addresses.

IntesisBox is using a fixed relation between the elements in the KILSEN system and the addresses in the Modbus registers. This is that each element in the fire panel corresponds to a specific and already set address in the Modbus register map.

Setup

The IntesisBox set up process consists basically in:

- Introducing the communication parameters needed for the Modbus side and also for the KILSEN side.
- Send the configuration once it is finished using the LinkBoxMB configuration software through the console port. Once configuration is sent, IntesisBox will restart with the new configuration active.

IntesisBox can be configured as a Modbus TCP slave, as a Modbus RTU slave (EIA232/EIA485) or both simultaneously.

Control over the KILSEN fire panel is not allowed. Therefore, no commands can be sent to the fire panel.

All elements up to 7 KILSEN fire panels are already configured by default in our gateway.

All general events are also detected by IntesisBox and transmitted to Modbus.

Integration

Integration process is as follows:

Once IntesisBox is configured and connected with both systems (KILSEN and Modbus), a "*keep alive*" communication message between the panel and our gateway is sent. The gateway is also "listening" continuously waiting for an event to be received from the KILSEN side. With every new event received, the new status is updated automatically in the IntesisBox internal memory being ready for the Modbus master device to read it.

As mentioned previously, the KILSEN communication protocol is based in spontaneous messages. This is that a message will be only sent if there is a change in the status of any element. The message will be sent as soon as this change is produced. Due to this functionality, when IntesisBox starts up, the KILSEN status is unknown. To synchronize both systems, IntesisBox sends a request message to the panel and it informs on the current status of its elements.

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1.3 IntesisBox Capacity

Element	Max.	Notes
Number of Panels	7	IntesisBox can integrate up to 7 panels
Number of Elements	8925	IntesisBox can integrate up to 8925 elements (255 elements per loop)
Number of Loops	35	IntesisBox can integrate up to 35 loops (5 loops per panel)
Number of Zones	255	IntesisBox can integrate up to 255 zones
Number of Points	All available in 7 complete panels	Number of points defined on IntesisBox

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7/20

2. IntesisBox Modbus interface

2.1 Description

IntesisBox acts as a slave Modbus device. This interface can be the Ethernet port (if Modbus TCP is used) or the EIA232 or EIA485 (if Modbus RTU is used). To get access to the internal points and resources of IntesisBox from the Modbus side, Modbus register addresses used must be the ones already set in the IntesisBox and related with the KILSEN elements. See section 4.1.2 for more information regarding the specific address for each signal.

2.2 Signals definition

Each signal defined in IntesisBox corresponds to a KILSEN element. Each possible status for the element (normal, alarm…) in the KILSEN system is transmitted to the Modbus side with the value indicated in the signals table (see section 4.1.2). From the Modbus side all registers are analog type.

2.3 Supported functions

Modbus functions 03 and 04 (*read holding registers* y *read input registers*) can be used to read the Modbus registers.

If '*poll records*' are used to read more than one register at a time, it is compulsory that the range of addresses in that poll are valid. If not, the corresponding Modbus error code will be returned.

All registers are 2 bytes long and its content is expressed as MSB...LSB.

The Modbus error codes are fully supported and will be sent every time a not valid Modbus action or Modbus address is required.

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3. IntesisBox KILSEN interface

3.1 Description

Communication basis for this product lay son the fact that KILSEN panel acts as a master and once it has detected the peripherals starts a communication process with them. IntesisBox acts as a slave and only answers to the panel once is asked. Our gateway is not sending anything to the panel by its own decision. If there is no communication, the bus viewer is empty. Although the panel has nothing to send, it maintains communication continuously by means of a "*keep alive*" frame. IntesisBox is identified in such a manner that the panel knows that it needs to resend all the events to IntesisBox as soon as they happen.

3.2 Signals definition

Each panel, in case of having more than one in the net, sends al its events identified with the panel number.

Different element statuses are shown in the corresponding Modbus register for this element as: 0-Normal, 1-Alarm, 2-PreAlarm, 3-Fault, 4-Disconnected.

Once the "Alarm" event is received for an element, the whole zone of this element is also turned into "Alarm" as well.

Once the "reset" event is received from the panel, all register turn into 0-Normal status.

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4. LinkBoxMB. Setup and monitoring.

How to properly install and use LinkBoxMB is explained in detail in its own manual. This manual can be found in the installation folder (if the Software is already installed) or can be downloaded from our website using the link provided with the installation manual, included when purchasing IntesisBox.

In this section, only specific use of LinkBoxMB for IntesisBox Modbus Server – KILSEN device will be explained.

The external protocol in this IntesisBox is KILSEN.

4.1　Project setup

In order to configure the available parameters, click on the *Config* button in the Button bar (Figure 4.1). The configuration window will popup showing the connection tab.
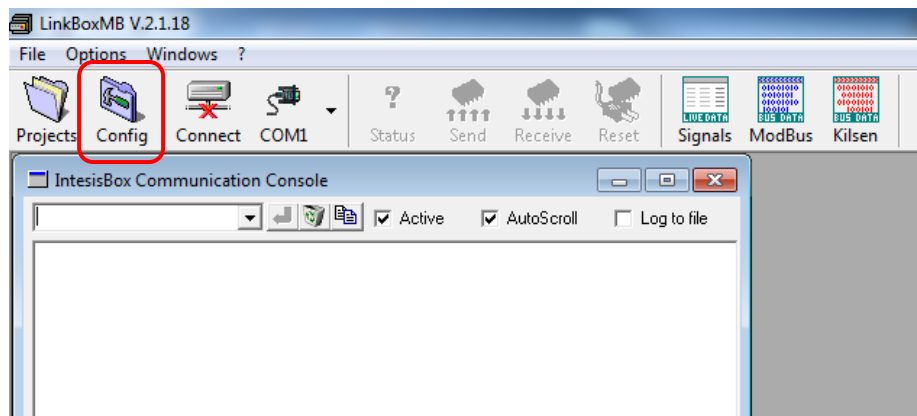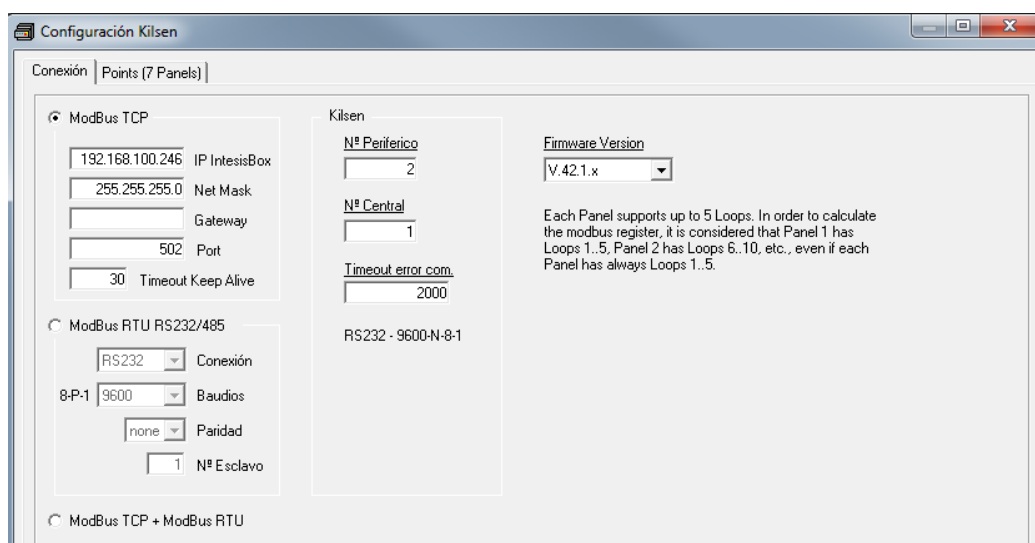

Figure 4.1 LinkBoxMB menu and button bar

Figure 4.2 KILSEN configuration window

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4.1.1 Connection setup

To configure the communication parameters properly, select the Connection tab, inside the KILSEN configuration window.

This tab allows configuration of both communication sides: Modbus and KILSEN.

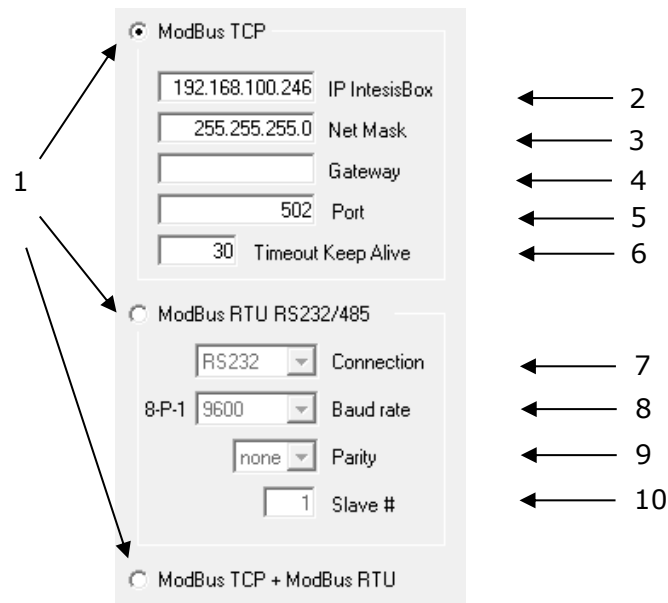**Modbus configuration parameters:**

Figure 4.3 IntesisBox Modbus interface configuration

1. Select the connection type (TCP, RTU or both).

If Modbus TCP is selected:

2. IntesisBox IP address.
3. IntesisBox Net Mask address.
4. Default Gateway needed by IntesisBox. Left it in blank if there is no need of usage.
5. TCP port to be used. By default 502.
6. Time (in seconds) without activity before sending a *Keep Alive* message.

If Modbus RTU is selected:

7. Port to be used (EIA232 or EIA485).
8. Transmission speed (Baud rate) to be used in the Modbus RTU port.
9. Parity used in the Modbus RTU data transmission.
10. IntesisBox Modbus slave address.

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KILSEN configuration parameters:

Figure 4.4 KILSEN configuration interface

1. Peripheral number assigned to IntesisBox inside the KILSEN system. This parameter is important as it identifies the IntesisBox inside the KILSEN network and must not coincide with any other panel or peripheral. By default is set to '2'.

2. KILSEN panel number where IntesisBox is connected to. This parameter is not used (the peripheral number has priority on this parameter).

3. Elapsed time (in milliseconds) without communication between the KILSEN panels an IntesisBox before the communication error signal is activated.

4. Information note on the data transmission parameters between the KILSEN panel and IntesisBox:

    - Physical interface: EIA232
    - Transmission speed: 9600 bps
    - Parity: Without parity
    - Number of data bits: 8 bits
    - Stop bits: 1 stop bit

Firmware version selection:
Use the firmware version selector to match the firmware version you run on IntesisBox with the one configured on LinkBoxMB. To know which firmware version you have, send the *info?* command through the communication console on LinkBoxMB.

Figure 4.5 Firmware version selection

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4.1.2 Signals

Select the *Points (7 Panels) tab*, inside the KILSEN configuration window, for a description on the available signals on IntesisBox.

Figure 4.6 Points list

This window is only a summary for the signals available on IntesisBox and its associated functionality. Remember that the Modbus register map is fixed and the Gateway is only capable of reading the values provided by the fire panels.

1. *Address/Formula.* Shows the Modbus addresses corresponding to each signal with the following remarks:

   - Modbus address 1 corresponds to the communication error signal. When communication between the panel and the gateway is correct, the register will have a '0' value. When the panel is not answering to IntesisBox this register will have a '1' value.

   - Modbus addresses 2 to 7 correspond to general or panel signals. Any of the 7 panels can activate these signals. Check the KILSEN manual for more information on its meaning.

   - Modbus addresses 257 to 9215correspond to element status, received from the panels.

     To know the proper Modbus register address for each element:

     Modbus address = (Loop Number x 256) + Element Number

     Loop: 1 to 35

     Element: 1 to 255

   - Modbus addresses 10001 to 10255 correspond to zone status.

     To know the proper Modbus register address for each zone:

     Modbus address= 10000 + Zone Number

     Zone: 1 to 255

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IBOX-MBS-KILSEN support up to 7 Panels (up to 3 Panels in previous Firmware versions) and each of the panels supports up to 5 Loops. For the Modbus register address calculus, we need to consider that Panel 1 has Loops 1..5, Panel 2 has Loops 6..10 and so on, although locally, each panel has loops 1..5.

Let's see a pair of examples below:

a) To read the status of Element 2 / Loop 3 / Panel 5:

Panel 5 has Loops 21..25, therefore the corresponding Loop is 23.

Modbus address = (Loop x 256) + Element = (23 x 256) + 2 = **5890**

b) To read the status of Zone 10:

c) Modbus address = 10000 + 10 = **10010**

2. *R/W*. It indicates if it is a read or write signal. In the case of *IBOX-MBS-KILSEN* all are only for reading.

3. *Signal*. Brief description of the signal.

4. *Values*. Registers can take different values depending on the status of the element inside the loop.

   o '0' when status is normal (with no alarm).
   o '1' when status is alarm.
   o '2' when status is pre-alarm.
   o '3' when status is fault.
   o '4' when status is disconnected.

4.2   Save setup

Once you finished with the project configuration, follow steps next to save the project:

1. Click on the Accept button.

2. A pop-up window will appear asking you for file generation to be sent to the Gateway:

   a) If you select "Yes", a binary file will be generated (KILSEN.LBOX) and will be stored in the Project folder.

   b) If you select "No", no file will be generated. You will need to start from step 1.

3. Once again in the configuration window, click on *Exit*. Now configuration is ready to be sent to the gateway (check LinkBoxMB manual for more information).

Configuration cannot be downloaded from the Gateway to your PC. It only can be uploaded from the PC to the Gateway.

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5. Configuration process and troubleshooting

5.1 Requirements

It is necessary to have a Modbus master device on and properly connected to the Modbus port of IntesisBox. Remember not to exceed the 15 m cable length in case of using EIA232 communication.

It is necessary to have the KILSEN panel withe the EIA232 port on and at a maximum distance of 15 m from the IntesisBox installation location (due to the EIA232 communication limitation).

Intesis Software does not include connectors, connection cables or PC for the use of LinkBoxMB with this standard integration solution. Included articles, by Intesis Software, in this integration are:

- IntesisBox Modbus Server with KILSEN Firmware loaded.
- LinkBoxMB Software for IntesisBox configuration.
- Console cable needed for the configuration of IntesisBox through EIA232.
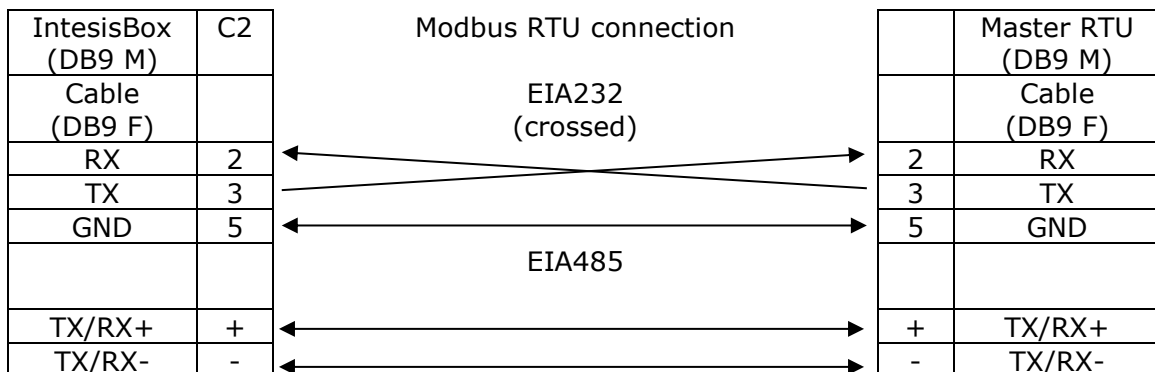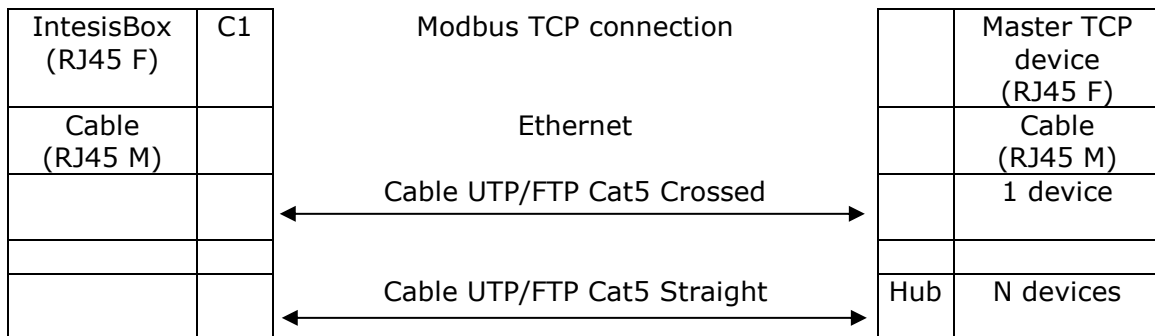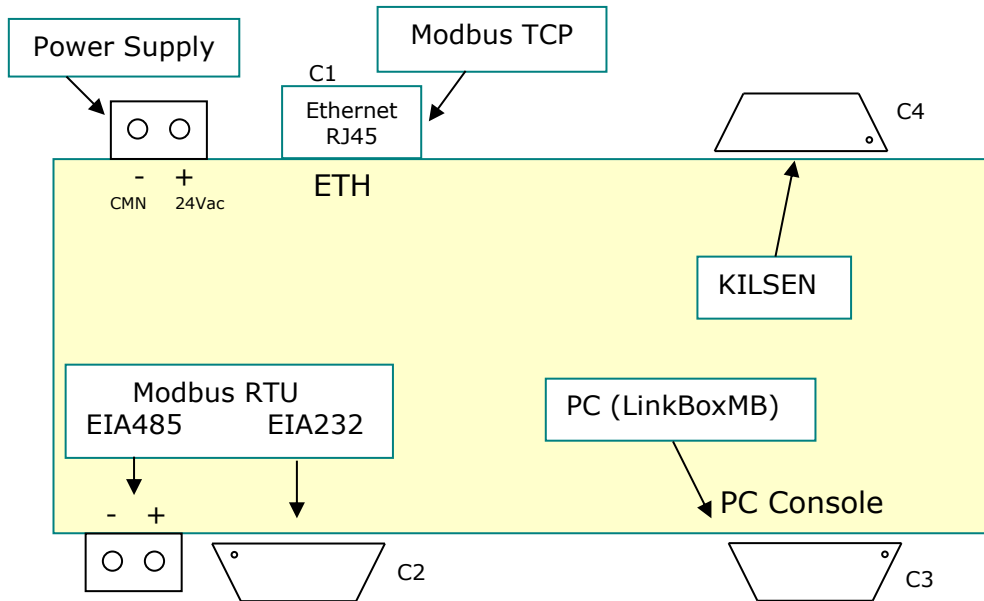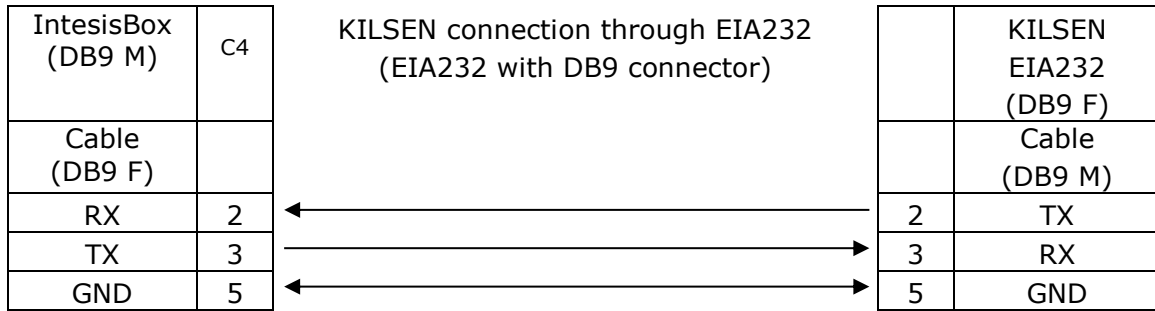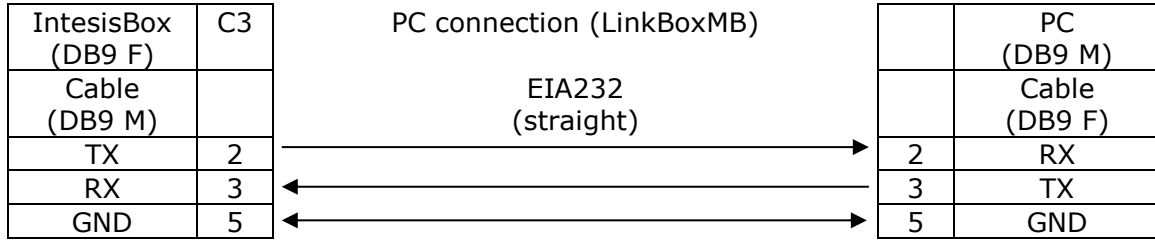- Product documents.

5.2 Commissioning

1. Install LinkBoxMB in your computer. Use the program "setup" provided with the Gateway and follow instructions from the installation wizard.

2. Install IntesisBox in the desired location. It can be mounted in a DIN rail or on a stable non-vibrating surface. It is recommended to use the DIN rail, mounted inside an industrial metallic cabinet, connected to ground and with restricted Access (beside the KILSEN panel).

3. Connect the communication cable from the Modbus master device to the port marked as **Modbus** on the IntesisBox. Use EIA232, EIA485 or Ethernet depending on the Modbus communication you want to use. See details for this communication cable in section 6.

4. Connect the communication cable coming from the EIA232 port of the KILSEN panel to the IntesisBox port marked as **KILSEN**. See details for this communication cable in section 6.

5. Turn on IntesisBox. Power supply can be from 9 to 30 Vcc or 24 Vac. Respect polarity.

    WARNING! To avoid ground loops that can damage IntesisBox and/or other equipment connected, we strongly recommend:
    - Use a CC power supply, floating or with the negative pole connected to ground. **Never use a CC power supply with the positive pole connected to ground.**
    - Use an AC power supply only if it is floating and is not powering any other device.

6. Connect IntesisBox to the computer.

7. Run LinkBoxMB. Create or edit your project and send the configuration file to IntesisBox as explained in the LinkBoxMB manual.

8. Setup KILSEN panel (see section 9 for more information).

9. Check communication status using the viewers (check LinkBoxMB manuals).

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6. Connections

IntesisBox (RJ45 F)	C1	Modbus TCP connection		Master TCP device (RJ45 F)
Cable (RJ45 M)		Ethernet		Cable (RJ45 M)
		Cable UTP/FTP Cat5 Crossed		1 device
		Cable UTP/FTP Cat5 Straight	Hub	N devices

IntesisBox (DB9 M)	C2	Modbus RTU connection			Master RTU (DB9 M)
Cable (DB9 F)		EIA232 (crossed)			Cable (DB9 F)
RX	2		2		RX
TX	3		3		TX
GND	5		5		GND
		EIA485			
TX/RX+	+		+		TX/RX+
TX/RX-	-		-		TX/RX-

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IntesisBox (DB9 F)	C3	PC connection (LinkBoxMB)		PC (DB9 M)
Cable (DB9 M)		EIA232 (straight)		Cable (DB9 F)
TX	2	→	2	RX
RX	3	←	3	TX
GND	5	↔	5	GND

IntesisBox (DB9 M)	C4	KILSEN connection through EIA232 (EIA232 with DB9 connector)		KILSEN EIA232 (DB9 F)
Cable (DB9 F)				Cable (DB9 M)
RX	2	←	2	TX
TX	3	→	3	RX
GND	5	↔	5	GND

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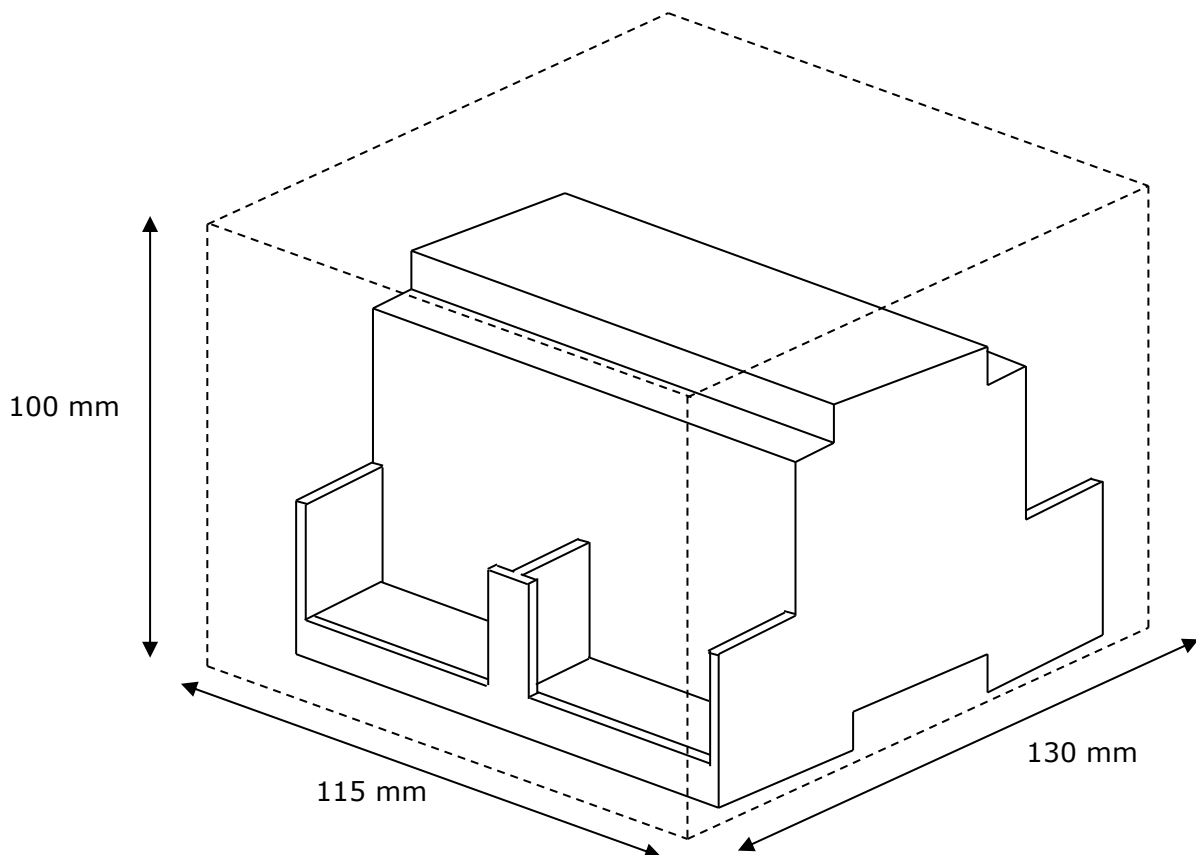
7. Technical features

Enclousure	Plastic, PC type (UL 94 V-0). Dimensions: 107mm x 105mm x 58mm.
Color	Gray. RAL 7035.
Power supply	From 9 to 30Vcc +/-10%, Max.: 125mA 24Vca +/-10% 50-60Hz, Max.: 127mA A NEC Class 2 power supply or a limited (LPS) SELV type must be used. Plug-in screw terminal block 2 poles.
Terminal wiring (for low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.75 … 1.25mm^2 2 cores: 0.75 … 1.25mm^2 3 cores: not permitted
Mounting	Wall. DIN rail EN60715 TH35.
Modbus TCP port	1 x Ethernet 10Base-T (RJ45).
Modbus RTU port	1 x Serial EIA232 (DB9 male DTE). SELV 1 x Serial EIA485 (Plug-in screw terminal block 2 poles). SELV
KILSEN port	1 x EIA232 (DB9 macho, DTE). SELV
LED indicators	1 x Power supply. 2 x KILSEN port activity (Tx, Rx). 2 x Modbus RTU port activity (Tx, Rx). 2 x Ethernet port activity and link (LNK, ACT).
Console port	EIA232. (DB9 female DCE). SELV
Configuration	Via console port.[1]
Firmware	Allows upgrades via console port.
Operational temperature range	From 0°C to +70°C
Operational humidity range	From 5% to 95%, non-condensing
Protection	IP20 (IEC60529).
RoHS conformrity	Compliant with RoHS directive (2002/95/CE).
Norms and standards	CE conformity to EMC directive (2004/108/EC) and Low-voltage directive (2006/95/EC) EN 61000-6-2; EN 61000-6-3; EN 60950-1; EN 50491-3

[1] Standard cable DB9male-DB9female 1.8 meters long is supplied with the device for connection to a PC COM port for configuring and monitoring the device. The configuration software, compatible with Windows® operating systems, is also supplied.

8. Dimensions
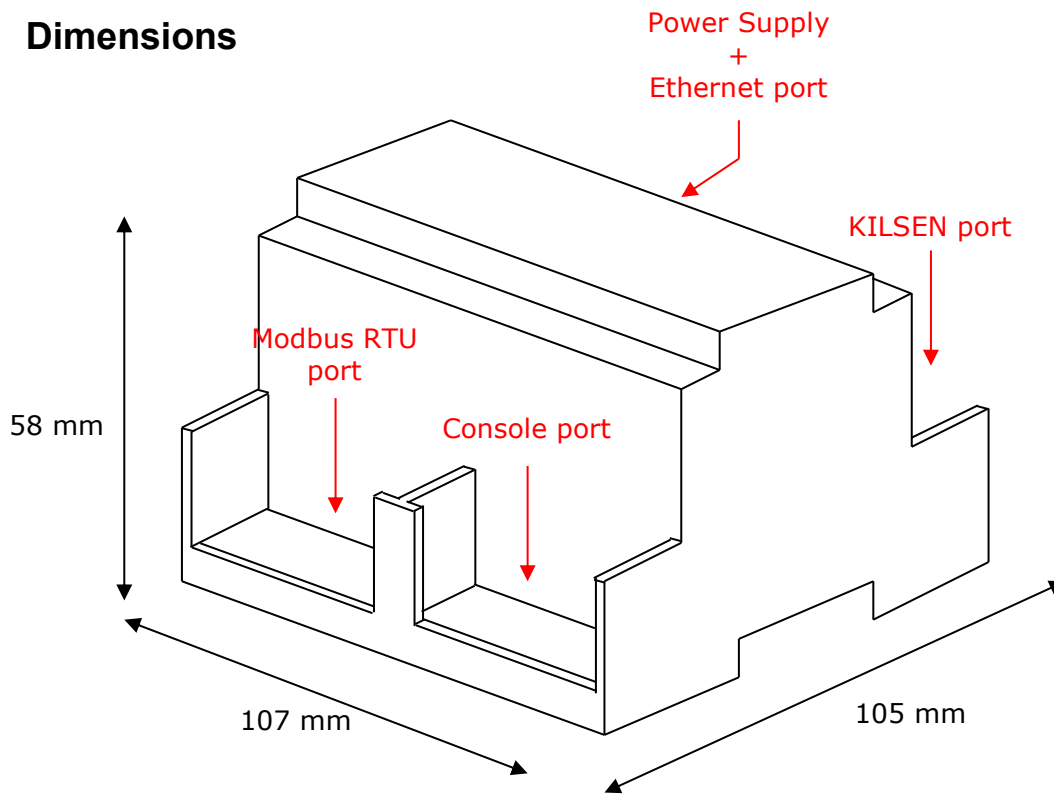
Free space recommended for its installation in a cabinet (Wall mounted or DIN rail mounted), with enough space for connections.

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19/20

9. KILSEN setup procedure

9.1 EIA232 connection

TX panel terminal -> IntesisBox RX (pin 2)
RX panel terminal <- IntesisBox TX (pin 3)
GND <-> IntesisBox GND (pin 5)

Terminals are placed in the top of the Mother Board of the panel (connector array). The Mother Board has some slots where the Loop cards and communications cards are plugged. It is important to check in which slot is the communication card connected, so you can use the right terminals from the connector array and also to check if your communication card is connected to COM 1 or COM 2. Communication card to be used is EIA232. EIA485 cards are also available for these panels, but it is not correct to use these cards for this type of integration.

9.2 Panel menus navigation

The name of the menu is indicated in *italics*:

<Step 1. Used to indicate that the panel is working as master>
Configure
   System
      Peripherals
         Port1 (or Port2)
            Network options
               Is Master: YES   <-- Select YES with the * key

<Step 2. Used to make the panel finds the peripherals. IntesisBox is a peripheral>
Configure
   System
      Peripherals
         Port1 (or Port2)
            Autosearch
               (When starting autosearch, the panel will find IntesisBox and from now on it will star communicating)

NOTE: Text or structure from the menus may vary depending on the panel version you have, but the concept is the same. In this example, we used Port 1 as it is the most common, but remember that you need to check first which is the COM port used on the Mother Board. Procedure would be exactly the same if port used was 2.

9.3 Keyboard keys to navigate through the menus

*   Change value
#   Cancel
Enter   Accept

Password
Password KILSEN by default: 1234 user
Password KILSEN by default: 9898 configuration

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