

 **IntesisBox<sup>®</sup> Modbus Server**  
KNX TP-1 (EIB)

User's Manual

Issue date: 03/2016  
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Gateway for integration of KNX TP-1 (EIB) systems into Modbus (RTU and TCP) control systems (i.e. SCADA, BMS, PLC...).

Different models available for this gateway, with the following **Order Codes**:

- **IBOX-MBS-KNX-100.** Model supporting up to 100 points.
- **IBOX-MBS-KNX-A.** Model supporting up to 500 points.
- **IBOX-MBS-KNX-B.** Model supporting up to 3000 points.

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## 1. Description

### 1.1 Introduction

*IntesisBox® Modbus Server - KNX* is a communication gateway for KNX TP-1 (EIB) systems to Modbus slave (RTU and TCP).

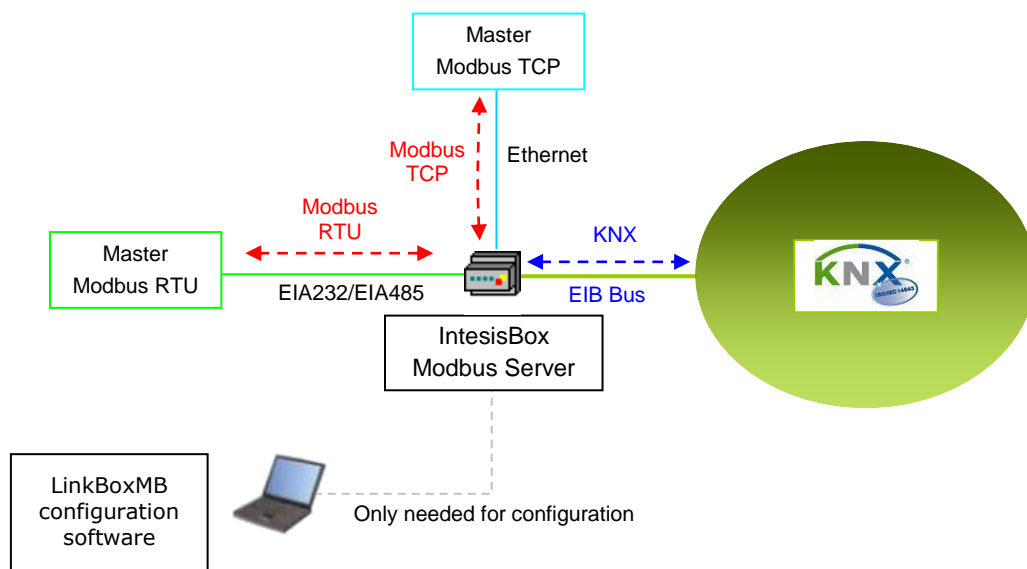
This gateway allows to integrate KNX equipment inside a supervision/control/automation system through PLC, SCADA, and in general through any device or system with Modbus master (TCP or RTU) interface.

The aim of this integration is to make accessible KNX system signals and resources from a Modbus master device or system, as if it was a part of the own Modbus system and vice-versa. For this, *IntesisBox Modbus Server - KNX* acts as a Modbus slave device in its Modbus interface, allowing a Modbus master device to read and write its internal points. And from the KNX system point of view, the gateway simulates a KNX device and acts as if it was *one more device* into the KNX system.

## 1.2 Functionality

Every one of the defined signals into the IntesisBox® is associated to a Modbus address, with this, all the system is seen as a single Modbus slave unit from the Modbus system point of view.

From the KNX system point of view, every signal in IntesisBox® has an associated group address (the sending group address) and also it can have one or more listening addresses.



### Integration of KNX and Modbus using *IntesisBox Modbus Server - KNX gateway*

The integration operation is as follow:

From the KNX system point of view, in the start-up process of the gateway and also after a detection of a KNX bus reset, the gateway polls the KNX signals configured to be updated in this situation and maintain the received values in memory to be served to the Modbus system when requested. Also listen for any KNX telegram related to the internal points configured in it and acts accordingly to the configuration of the related point.

From the Modbus system point of view, after the start up process, the gateway listen for any read or write request, and serves any read request or performs any writing request of its internal points received from Modbus system. The values received from Modbus become available to be read by the KNX system and vice-versa.

If a signal has been configured as of type "T" Transmit (in the KNX part), any new value for the signal coming from the Modbus system is notified to the KNX system with the corresponding telegram.

When, from the KNX system, a signal is changed (written from any other KNX device for example), the new value is updated in the gateway's memory, ready to be served to Modbus when requested.

Also the following functionality is supported by the gateway:

For every point, in the KNX part, one main group address (the sending group address) and different listening group addresses can be defined. With this, from KNX, every point can be addressed not only using its main group address but also using the other defined listening addresses for the point.

Any change in a gateway's point with the feature "T" activated (in the KNX part), will force the transmission of this point value with the corresponding telegram to the KNX system.

When the gateway starts up, or after an KNX bus reset, all the points with the feature "U" or "U2" activated (in the KNX part) will be forced to be read in the KNX system to update its values in the gateway's internal memory.

Any point with the feature "W" activated (in the KNX part), can be written in any moment from the KNX system.

Any point with the feature "R" activated (in the KNX part), can be read in any moment from the KNX system.

All the mentioned features (W,R,T,U) related to the KNX part are configurable per every point in the gateway, with only a few necessary restrictions (see below in this document).

KNX-EIB EIS (data types) supported are: switching (1 bit), dimming (4 bit), float (16 bit), scaling (8 bit), drive control (1 bit), priority (2 bit), float IEEE (32 bit), counter (8 bit), counter (16 bit), counter (32 bit), ASCII char (8 bit).

### 1.3 Capacity of IntesisBox®

Element	100 Version	A Version	B Version	Notes
KNX communication objects	100	500	3000	Maximum number of different KNX communication objects that can be defined.
KNX (EIB) listening group addresses	1000	1000	1000	Maximum number of different KNX group addresses that can be defined as listening group addresses, one or more of these listening group addresses can be assigned to each point. With this, more than one KNX group address can actuate on the same IntesisBox's point.
Modbus TCP simultaneous connections	4	4	4	Maximum number of simultaneous Modbus TCP connections.

There are three different versions of *IntesisBox® Modbus Server - KNX* with different capacity each of them:

- 100 version with capacity of 100 KNX communication objects\*. *Ref. IBOX-MBS-KNX-100.*
- A version with capacity of 500 KNX communication objects \*. *Ref. IBOX-MBS-KNX-A.*
- B version with capacity of 3000 KNX communication objects \*. *Ref. IBOX-MBS-KNX-B.*

\* If 32bit Modbus registers are used, the maximum number of KNX communication objects allowed by the LinkBoxMB license is reduced by half. In this case, the maximum number is 50, 250, and 1500 communication objects for the IBOX-MBS-KNX-100, the IBOX-MBS-KNX-A and the IBOX-MBS-KNX-B respectively.

IntesisBox model	Maximum Number of Communication Objects	
	16 bit Modbus registers	32 bit Modbus registers
IBOX-MBS-KNX-100	100	50
IBOX-MBS-KNX-A	500	250
IBOX-MBS-KNX-B	3000	1500



## 2. Interfaces

### 2.1 Modbus

#### 2.1.1 Description

IntesisBox® acts as a slave device in its Modbus interface, this interface can be the Ethernet port (if using Modbus TCP), or the EIA232 port or the EIA485 port (if using Modbus RTU). To access the points and resources of the IntesisBox® from a Modbus master device, you must specify as the Modbus register addresses, those configured inside IntesisBox® corresponding to KNX signals. See details below in this document.

The IntesisBox® is able to have Modbus RTU mode active, Modbus TCP mode active, or both modes active at the same time.

#### 2.1.2 Functions supported

This part is common for Modbus TCP & RTU.

Modbus functions 01 and 02 (*coils and digital input registers*) can be used to read Modbus registers.

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

Modbus functions 05 and 15 (*Single digital Holding Registers and Write Multiple Holding Registers*) can be used to write Modbus registers.

Modbus functions 06 and 16 (*Single Multiple Holding Registers and Write Multiple Holding Registers*) can be used to write Modbus registers.

If *poll records* are used to read or write more than one register, it is necessary that the range of addresses requested contains valid addresses; if not the corresponding Modbus error code will be returned.

All the registers are of 2 bytes, even if they are associated to signals of type bit in the external system, and its content is expressed in MSB..LSB.

Modbus error codes are fully supported; they will be sent whenever a non-valid Modbus action or address is required.

#### 2.1.3 Modbus RTU

Baud rate can be selected from 1200, 2400, 4800, 9600, 19200, 38400 and 56700.

Data Bits:8

Parity can be selected from: none, even, odd.

Stop Bits:1.

Modbus slave number can be configured. Physical connection (EIA232 or EIA485) can also be selected.

Only the lines RX, TX and GND of the EIA232 connector are used (TX/RX+ and TX/RX- for EIA485).

### 2.1.4 Modbus TCP

The TCP port to use can be configured (by default 502 is used).

The IP address, subnet mask and default router address to use by IntesisBox® can be also configured.

### 2.1.5 Address Map

The Modbus address map is fully configurable; any point in the IntesisBox® can be freely configured with the desired Modbus register address.

### 2.1.6 Points definition

Every point defined in the gateway has the Modbus *Format, Point and R/W* features associated to it that can be configured. These features are explained in section 5.1.2 Signals list.

## 2.2 KNX TP-1 (EIB)

IntesisBox Modbus Server - KNX supports the KNX TP-1 physical layer, as defined in the KNX standard. It behaves as one more device of the KNX system, with the same configuration and functional characteristics as other KNX devices.

KNX TP-1 (EIB) bus provides a 30V DC current, which can even directly power certain low-consumption KNX devices. IntesisBox does not drain any significant current from the KNX bus - it has a separate own power supply. Another important electrical aspect is that the KNX TP-1 (EIB) port of IntesisBox is optically isolated (~2500Vrms AC) from all its other ports (EIA232, EIA485, Ethernet) and power supply.

At logical level, all KNX devices feature an interface of communication objects, by which their functionality is abstracted. As a basic example, a KNX interface of an AC indoor unit would typically consist of an interface of datapoints such as "On/Off", "Setpoint temperature", "Operating mode", etc.

Associations between communication objects from different KNX devices are actually done by means of so-called group addresses.

KNX telegrams within a working KNX installation are always addressed to a certain KNX group address. Typically, whenever a communication object on a KNX device changes its value, the new value is updated to the bus, by sending a "write" telegram addressed to its associated group address. The rest of KNX devices in the installation that have a communication object associated to this group address will act accordingly on reception of the new value.

Other operations are possible. KNX devices can also decide to read the current value of the communication objects, by sending a "read" telegram to a certain group address (previously known to be associated to the targeted comm. object). This operation is performed by many

devices on bus start-up or recovery – in this way, the device gets the latest value of the group addresses it has associated right from its start-up.

Each datapoint defined in IntesisBox KNX configuration needs to have at least a single KNX group address associated with it. This group address will be used either for sending updates to KNX of the datapoint value (that have been generated on the other Modbus TCP & RTU interface of the IntesisBox), or receiving updates from KNX of the datapoint value (that will be propagated to the Modbus TCP & RTU side in this case)

From the point of view of KNX functionality, each datapoint of IntesisBox can hold following group address associations:

- A single KNX group address with which update/write telegrams will be sent, whenever the datapoint changes (as a result of a change coming from the other interface of IntesisBox, Modbus TCP & RTU in this case).
- One or more KNX group addresses from which this datapoint of IntesisBox will be updated/written from the KNX installation (resulting in a change to the other side of IntesisBox, Modbus TCP & RTU in this case).
- A single KNX group address from which IntesisBox will read the object value on KNX bus recovery / IntesisBox start-up.

Behavior of IntesisBox' datapoints with regard to their associated group addresses is defined by means of flags (R, W, T, U and U2), explained in section 5.1.2.

Additional to the binding aspect commented above, it is also important to notice that each KNX communication object has a defined *EIS type*. The EIS type of a communication object defines the bit length and coding of the data it represents. Communication objects associated by means of a group address need to match the same EIS type, in order to communicate consistently.

So, at configuration time it is required that for each datapoint configured on IntesisBox an EIS type is defined. Datapoints on IntesisBox Modbus support the following EIS-types:

- EIS1 - Switching (1bit raw)
- EIS2 - Dimming (4bit raw)
- EIS5 - Value (16bit - floating type)
- EIS6 - Scaling (8bit - scaled 0%-100% in values 0-255)
- EIS7 - Drive Control (1bit raw)
- EIS8 - Priority (2bit raw)
- EIS9 - IEEE 754 float (32bit - floating type)
- EIS10 - 16bit Counter (16bit raw)
- EIS11 - 32bit Counter (32bit raw)
- EIS13 - ASCII char (8bit raw)
- EIS14 - 8bit Counter (8bit raw)

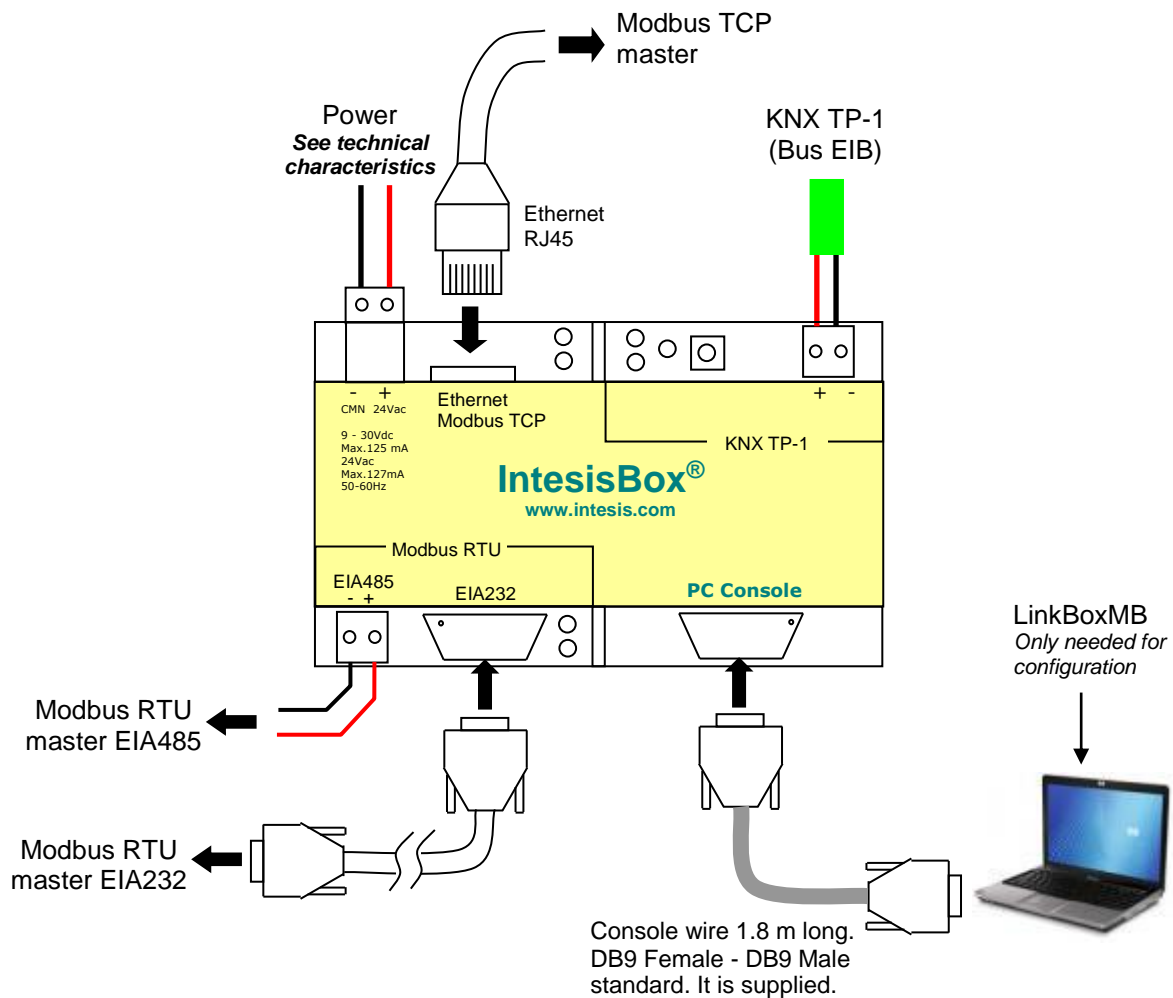
ETS3 or ETS4 software tools are not used to configure IntesisBox. Though, it's typical that the choice of which KNX group addresses to use is restricted or defined by an ETS-based project. If that's the case, the KNX installer/integrator needs to provide the set of group addresses prior to doing the configuration of datapoints in LinkBoxMB.

Also, a *dummy* ETS application is provided by Intesis Software (section 6), which can be imported into ETS. This application is nor downloadable into IntesisBox Modbus neither usable for IntesisBox configuration. Rather, it poses as a means of having a device in the ETS project representing the IntesisBox Modbus and its own datapoints/communication objects, and to which group addresses are associated.

### 3. Quick Setup

1. Install LinkBoxMB. Details in section 5.
2. Install IntesisBox in the desired installation site (DIN rail mounting inside a metallic industrial cabinet connected to ground is recommended).
3. Power up and connect the communication cables. Details in section 4.
4. Open LinkBoxMB, open a project or create a new one. Details in section 5.
5. Connect to the IntesisBox (details in section 4).
6. (optional) Configure the IntesisBox. Details in section 5.1
7. Check if there is communication in both Modbus and KNX buses (section 5).
8. The IntesisBox is ready to be used in your system.

## 4. Connections



**Figure 4.1** Device connection diagram

### 4.1 Power device

The first step to perform is to power up the device. To do so a power supply working with any of the voltage range allowed is needed (check section 6). Once connected the ON led (Figure 4.1) will turn on.

**WARNING!** In order to avoid earth loops that can damage the gateway and/or any other equipment connected to it, we strongly recommend:

- The use of DC power supplies, floating or with the negative terminal connected to earth. **Never use a DC power supply with the positive terminal connected to earth.**
- The use of AC power supplies only if they are floating and not powering any other device.

## 4.2 Connect to KNX

Connect + and – terminals of the KNX bus to the IntesisBox KNX connector (Figure 4.1). The polarity is important. Once connected correctly the KNX Tx led (Figure 4.1) will start blinking. If that doesn't happen check that the cable is connected properly.

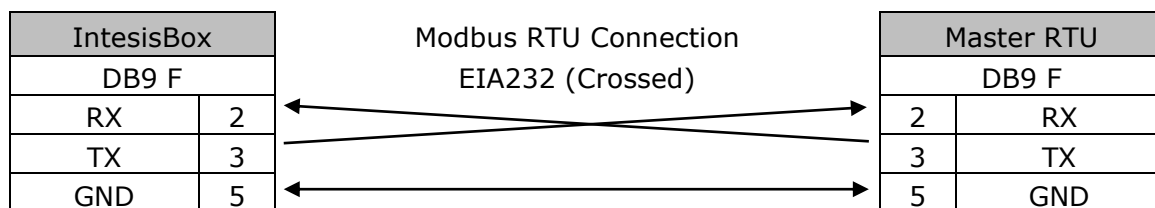
How to check if there is communication with the KNX bus is explained in the LinkBoxMB Manual (section 5).

## 4.3 Connect to Modbus

### 4.3.1 Connect to Modbus RTU

Connect the communication cable coming from the Modbus RTU network to the port marked as Modbus RTU of IntesisBox (Figure 4.1). Two methods to connect to the Modbus network can be used:

- The RS485 port if the network is RS485 2-wire. Connect the + and the – to the respective port in the master device (polarity matters)
- The RS232 port if the connection is point to point to one single master.



**Table 4.1** Modbus RS232 cable pinout

How to check if there is communication with the Modbus bus is explained in the LinkBoxMB Manual (section 5).

### 4.3.2 Connect to Modbus TCP

Connect the communication cable coming from the network hub or switch to the ETH port (Figure 4.1) of IntesisBox. The cable to be used depends on where the IntesisBox is being connected:

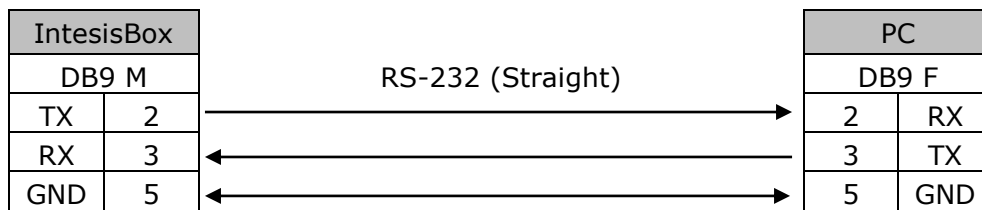
- Connecting directly to a Modbus TCP master device: crossover Ethernet UTP/FTP CAT5 cable
- Connecting to a hub or switch of the LAN of the building: a straight Ethernet UTP/FTP CAT5 cable

In case there is no communication with the IntesisBox, check that the Modbus TCP devices they are operative and reachable from the network connection used by IntesisBox. Check the IntesisBox Ethernet interface sending Pings to its IP address using a PC connected to the same Ethernet network.

**4.4 Connect to PC (LinkBoxMB)**

This action allows the user to have access to configuration and monitoring of the device (more information can be found in the LinkBoxMB User Manual [section5]). Two methods to connect to the PC can be used:

- Ethernet: Using the ETH port (Figure 4.1) of IntesisBox. How to check connectivity is explained in section 4.3.
- Serial cable: To connect the device to the PC the serial cable supplied should be plugged to the PC console port (Figure 4.1). The cable is a RS-232 straight cable and its pinout is at explained in Table 4.2.



**Table 4.2** Configuration serial cable pinout

## 5. LinkBoxMB. Configuration & monitoring tool for IntesisBox® Modbus Server series

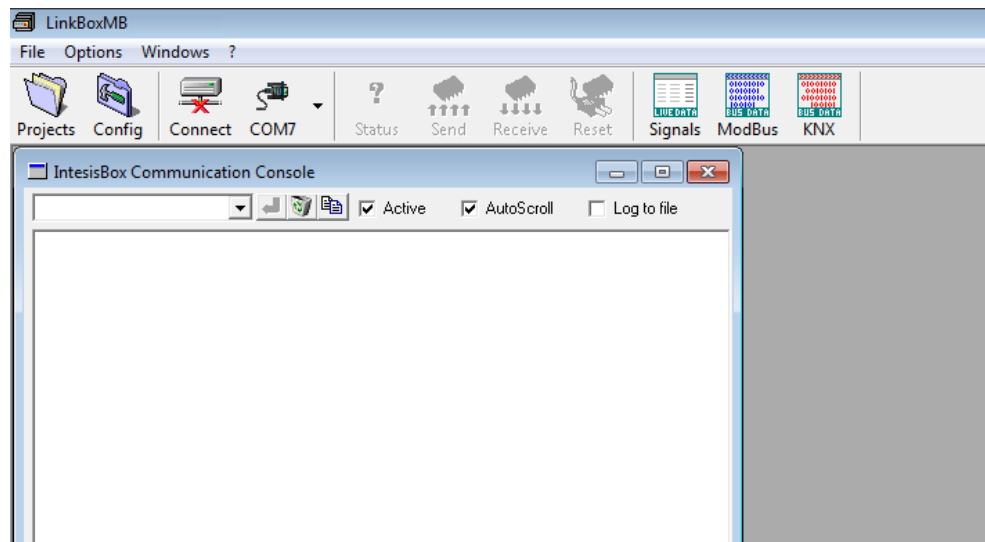
How to install and use the LinkBoxMB is explained in its Manual. It can be found in the installation folder (if the Software is already installed) or it can be downloaded from the link that can be found in the installation sheet supplied with the IntesisBox®.

In this section only the specific project configuration for IntesisBox® Modbus Server - KNX is going to be explained.

The External Protocol in this IntesisBox® is KNX.

### 5.1 Project configuration

To configure the integration connection parameters, and the points list, click on *Config* in the *Button Bar* (Figure 4.1). The *KNX Configuration* window will be opened. For integrations with a large number of points an alternative CSV based configuration method is explained in in the LinkBoxMB Manual.



**Figure 4.1** Menu and Button Bar in LinkBoxMB



### 5.1.1 Connection configuration

Two subsets of information are configured using this window, the Modbus TCP & RTU parameters of the IntesisBox®, and the parameters of the KNX interface.

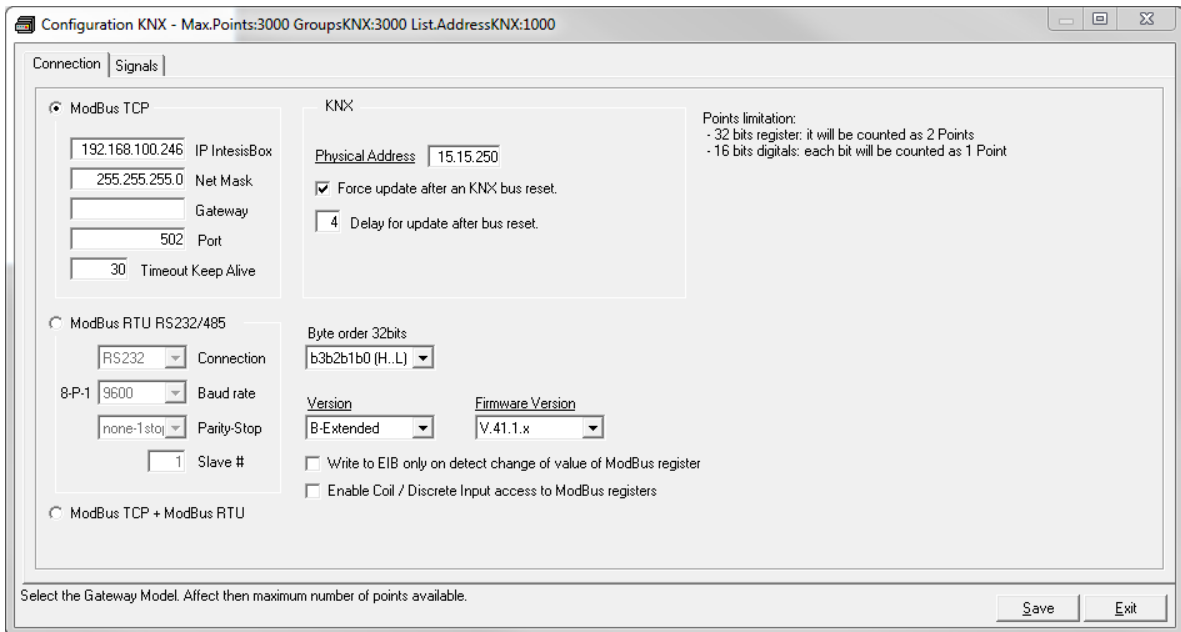


Figure 4.2 Configuration: Connection Tab

Modbus interface configuration parameters:

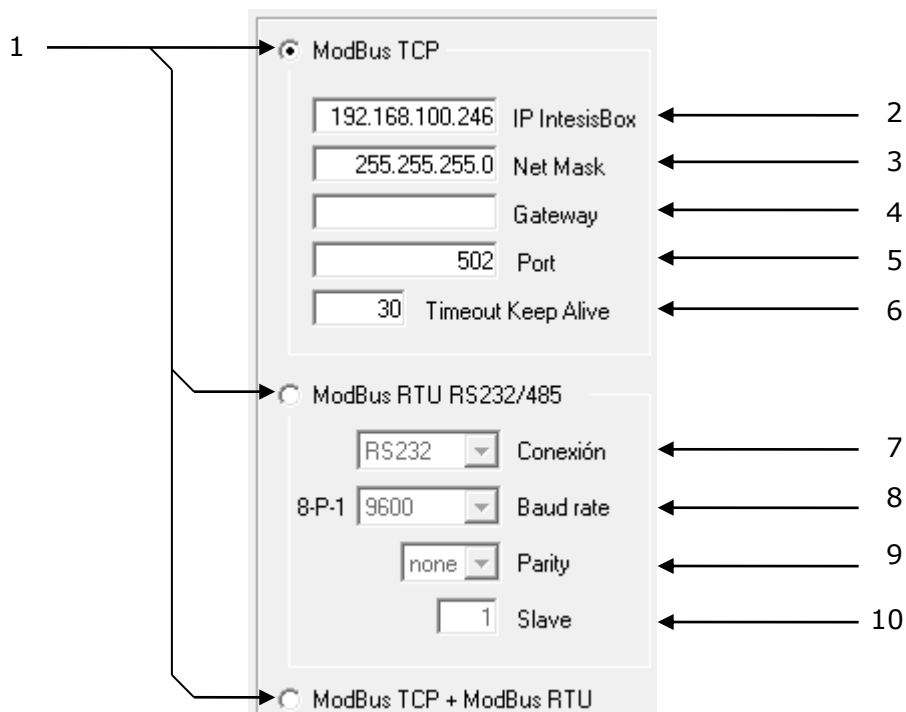


Figure 4.3 Modbus TCP & RTU interface Configuration

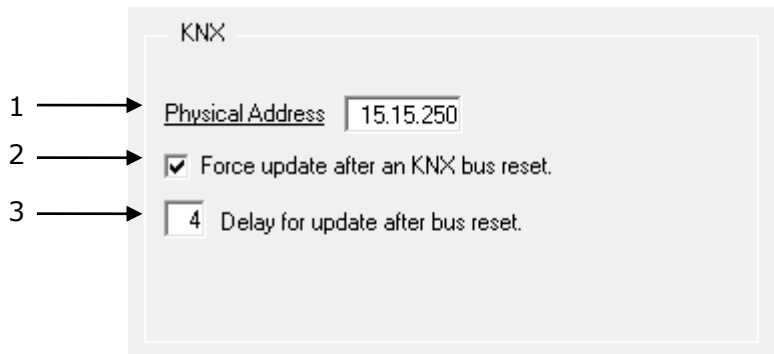
1. Select the type of **Modbus** communication to use: **TCP**, **RTU** or **TCP+RTU**.

If Modbus TCP is selected, then:

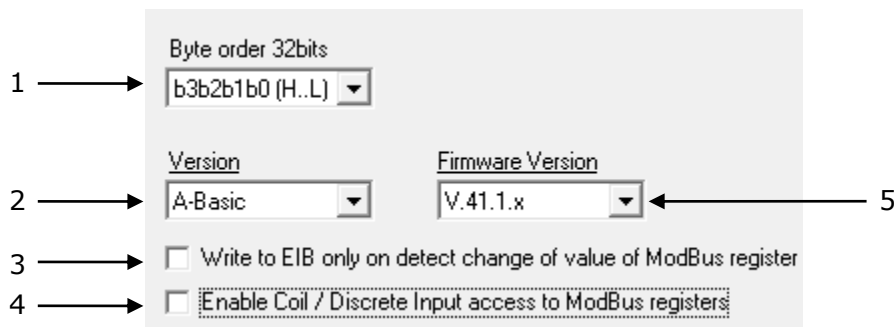
2. **IP IntesisBox:** Enter the IP address for the IntesisBox, by default 192.168.100.246. If a wrong configuration is send or if there is any problem when downloading the configuration, the default IP will be automatically set to allow communication.
3. **Net Mask:** Enter the IP Net Mask for the gateway (supplied by the network administrator).
4. **Gateway:** Enter the Default Gateway address (router address) in case the gateway (IntesisBox) is in a different sub network than other Modbus devices (supplied by the network administrator). Leave blank if there is no need of router address..
5. **Port:** Enter the TCP port to use, by default 502.
6. **Timeout Keep Alive:** Enter a value in seconds between 0 and 65535 (the default value is 30s). This parameter defines the inactivity time of the incoming TCP connection, after which the IntesisBox® will begin the process of TCP Keep-Alive checking. In case of detecting that the device that has established a TCP connection with the IntesisBox® is unresponsive, the connection with this device (TCP socket) will be closed. This allows freeing up unused connections (IntesisBox® allows up to 4 simultaneous Modbus-TCP connections). In any case, the minimum required time from detecting inactivity in a TCP connection and closing it, in practice will never lower than 1 minute.

If Modbus RTU is selected, then:

7. **Connection:** Select the connection used (EIA232 or EIA485).
8. **Baud Rate:** Select the baud rate.
9. **Parity:** Select the parity.
10. **Slave:** Enter the Modbus slave number for IntesisBox®.

KNX interface configuration parameters:**Figure 4.4** KNX interface Configuration

1. **Physical Address:** Enter the KNX physical address for the gateway.
2. **Force update:** Check this if you want the gateway to update the signals configured as "U" or "U2" after a KNX bus reset. Details about configuring signals as "U" and "U2" in section 4.1.2.
3. **Delay:** Delay (in seconds), after gateway start-up or bus reset detection, to start the update process.

Gateway configuration parameters:**Figure 4.5** Gateway configuration

**1. Byte order 32 bits:** Select the byte order of 32 bits Modbus registers, it can be one of these three possibilities:

- b3b2b1b0 (H...L).
- b0b1b2b3 (L...H).
- b1b0b3b2.

## 2. **Version:** Select the IntesisBox® model used.

There are three models of IntesisBox® supporting different number of points. You can identify the model of IntesisBox® by the **order code** printed in the front label:

- **IBOX-MBS-KNX-100.** Model supporting up to 100 points.
- **IBOX-MBS-KNX-A.** Model supporting up to 500 points.
- **IBOX-MBS-KNX-B.** Model supporting up to 3000 points.

You can identify also the model of your IntesisBox through the identification given by it in response to an INFO? command, it is something like this:

IntesisBox\_MODBUS\_SVR\_KNX-**100**... -> this is the model with up to 100 internal points  
IntesisBox\_MODBUS\_SVR\_KNX-**A**... -> this is the model with up to 500 internal points  
IntesisBox\_MODBUS\_SVR\_KNX-**B**... -> this is the model with up to 3000 internal points

## 3. **Write to EIB...:** Select this option if you want a KNX telegram to be sent every time that a Modbus write is performed on its corresponding register, or only when the register value changes from its previous value.

## 4. **Enable Coil / Discrete input access to Modbus registers:** Enable access to 16 bits registers with Modbus function codes 01, 02, 05 and 15.

When this checkbox is enabled a new column for the bit selection will appear in the signals list. For more information check section 5.1.2

It will be checked whether registers are different to 0 (zero). Only available from V.41.1.xx firmware versions and onwards.

## 5. **Firmware Version of the gateway:** Select the current firmware version of the gateway.

You can identify also the firmware of your IntesisBox through the identification given by it in response to an INFO? command, it is something like this:

>IntesisBox\_MODBUS\_SRV\_KNX-100 **V.41.x.xx** SN12345P111

Select **V.41.0.xx**, **V.41.1.xx** or **V.41.2.xx** corresponding to the IBOX firmware version.

If version **V.41.1.xx** is selected, new functions available from firmware V41.1.xx and onwards will automatically be enabled.

- Coil / Discrete Input access to Modbus registers.
- 16 bits digitals: each bit will be counted as 1 point.
- Signals Bit column for assigning the 16 bits digitals.

If version **V.41.2.xx** is selected, new functions available from firmware V41.2.xx and onwards will automatically be enabled.

- Includes KNX extended addresses (16 to 31)

### 5.1.2 Signals list

Select the Signals tab to configure the signals list (the IntesisBox® internal points).

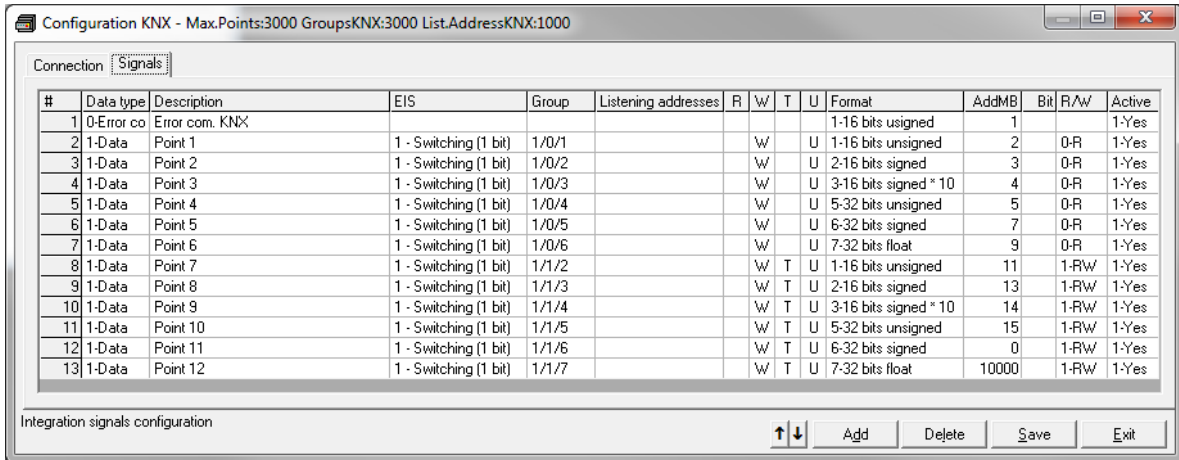


Figure 4.6 Signal list

# (Signal's number)	
<b>Description</b>	Enumeration of the rows in the grid (signals). If clicked on them the whole row will be selected (to be used to delete/add rows)
<b>Restrictions</b>	Cannot be edited

Data type	
<b>Description</b>	Select the type of signal
<b>Values</b>	<ul style="list-style-type: none"> <li><i>Communication Error</i>: indicate to the Modbus side a communication error within the KNX system</li> <li><i>Data</i>: for normal signals</li> </ul>
<b>Restrictions</b>	Cannot be edited

Description	
<b>Description</b>	Signal's description (optional). Used to describe the signal at user level.
<b>Restrictions</b>	30 characters maximum
<b>Comments</b>	If the description gives some good information about the physical location of the KNX point related, it may help during the gateway's integration phase into the Modbus system.

<b>EIS</b>	
<b>Description</b>	KNX data type (Data point) to encode the signal's value. It will depend on the Modbus type of signal associated to it in every case .Edit using the mouse right-button-click pop-up menu available on the column
<b>Values</b>	<ul style="list-style-type: none"> <li>• Switching (1 bit)</li> <li>• Dimming (4 bit)</li> <li>• Float (16 bit)</li> <li>• Scaling (8 bit)</li> <li>• Drive control (1 bit)</li> <li>• Priority (2 bit)</li> <li>• Float IEEE (32 bit)</li> <li>• Counter (8 bit)</li> <li>• Counter (16 bit)</li> <li>• Counter (32 bit)</li> <li>• ASCII char (8 bit)</li> <li>• Counter (8 bit)</li> </ul>
<b>Restrictions</b>	Only the EIS defined in values are allowed.

<b>Group</b>	
<b>Description</b>	Main KNX group address for the signal. Flags <i>R,W,T,U</i> explained below will only apply for this main KNX group address, not for listening addresses.
<b>Values</b>	Group address in one of the following formats: <ul style="list-style-type: none"> <li>• P/I/S</li> <li>• P/S</li> <li>• Single level (value 1 to 32767)</li> </ul>
<b>Restrictions</b>	<p>Duplicated groups are not allowed.</p> <p>Empty groups are allowed, but only if they have just W activated and one or more listening addresses.</p> <p>When using the main groups 15 or higher in ETS, you should take into account that these group addresses are not filtered by TP1 couplers and could therefore negatively influence the dynamics of the entire bus system.</p>

<b>Listening addresses</b>	
<b>Description</b>	KNX group addresses that will be listened by IntesisBox® for this signal. If IntesisBox® receives a KNX telegram whose destination is one of these listening addresses, the telegram will be taken into account and the corresponding action will be performed on this signal.
<b>Values</b>	Group addresses in one of the following formats: <ul style="list-style-type: none"> <li>• P/I/S</li> <li>• P/S</li> <li>• Single level (value 1 to 32767)</li> </ul> More than one address can be entered, comma separated.
<b>Restrictions</b>	It is not allowed a listening address that is the same as the sending group (circular reference).  Listening addresses are not allowed if the flag W is not activated. Without W activated, the listening addresses would not work.

<b>R</b>	
<b>Description</b>	Indicates if this signal is allowed to be read from KNX system.
<b>Values</b>	<ul style="list-style-type: none"> <li>• "R": flag activated</li> <li>• Blank: flag not activated</li> </ul>
<b>Restrictions</b>	Can't be active when the Modbus signal is set to R.  Needs the T flag active and therefore the software activates it automatically  Can't be simultaneously active with flag U and it is disabled if that flag is activated. It has no restriction with U2

<b>W</b>	
<b>Description</b>	Indicates if this signal is allowed to be written from KNX system.
<b>Values</b>	<ul style="list-style-type: none"> <li>• "W": flag activated</li> <li>• Blank: flag not activated</li> </ul>
<b>Comments</b>	If it is not active, no write on the group address neither on the listening addresses could be done from KNX  KNX Update telegrams (responses to Read) are handled in the same way as Write telegrams, in all cases.

<b>T</b>	
<b>Description</b>	Indicates if this signal will generate a telegram sending to the KNX system following a change of the signal's value, that is to say, any change of value of this signal in Modbus side will be transmitted to the KNX system if this flag is activated.
<b>Values</b>	<ul style="list-style-type: none"> <li>• "T": flag activated</li> <li>• Blank: flag not activated</li> </ul>
<b>Restrictions</b>	Can't be active when the Modbus signal is set to R.

<b>U</b>	
<b>Description</b>	Indicates if this signal will be updated (sending read requests) whenever IntesisBox® starts up or after a KNX bus reset.
<b>Values</b>	<ul style="list-style-type: none"> <li>• "U": flag activated for the main KNX group address. A read of the main KNX group address will be performed in the KNX system for the update.</li> <li>• "U2": flag activated for the first listening address defined. A read of the first listening address defined for the point will be performed in the KNX system for the update).</li> <li>• Blank: flag not activated</li> </ul>
<b>Restrictions</b>	Needs the W flag active and therefore the software activates it automatically When "U" is selected it disables the R flag.
<b>Comments</b>	<b>DO NOT BE CONFUSED: Philosophy of IntesisBox® point's U flag is not the same as KNX device's U flag. In KNX devices, U flag means that the point's value will be updated whenever a write telegram for the group address is received by the device.</b>

<b>Format</b>	
<b>Description</b>	Modbus data format to encode the signal value.
<b>Values</b>	<ul style="list-style-type: none"> <li>• 16 bits unsigned</li> <li>• 16 bits signed</li> <li>• 16 bits signed * 10</li> <li>• 16 bits digitals (Only from V.41.1.xx)</li> <li>• 32 bits unsigned</li> <li>• 32 bits signed</li> <li>• 32 bits float</li> </ul>
<b>Comments</b>	Edit using the mouse right-button-click pop-up menu



<b>Point (AddMB)</b>	
<b>Description</b>	Modbus register address for the point
<b>Values</b>	Maximum points accepted by the gateway version: <ul style="list-style-type: none"> <li>• 100 version: from 1 to 100</li> <li>• A version: from 1 to 500</li> <li>• B version: from 1 to 3000</li> </ul>
<b>Restrictions</b>	<b>Note that every address entered here corresponds to a 16 bits register, if you select a 32 bits format for the point, then it takes two consecutive addresses in the address map, this means that, for example, if you have one point with address 1 and a format of 32 bits float, then address 2 cannot be used for any other point, the subsequent free address to use will be 3.</b>
<b>Comments</b>	Edit using the mouse right-button-click pop-up menu

<b>Bit</b>	
<b>Description</b>	Define here the bit register within the Modbus word. Use only when the register Format = 16 bits digitals.
<b>Values</b>	<ul style="list-style-type: none"> <li>• Bit register from 0 to 15</li> </ul>
<b>Comments</b>	Edit using the mouse left-button and enter a numeric value or select a range of cells and mouse right-button for Auto Enumeration.

<b>R/W</b>	
<b>Description</b>	Signal type (from Modbus system point of view). Edit using the mouse right-button-click menu available on the column and select one of the possible values.
<b>Values</b>	<ul style="list-style-type: none"> <li>• R: Read only signals</li> <li>• W: Write only signals</li> <li>• R/W: Read/Write signals</li> </ul>

<b>Restrictions</b>	<p>A selection in this column will affect the KNX flags for the signal (some necessary restrictions on KNX flags are necessary depending on the signal type, see below).</p> <ul style="list-style-type: none"> <li>• For <i>R</i> signals (read only), KNX flags R &amp; T are not allowed, flag W is mandatory (activated automatically) and flags U &amp; U2 are optional.</li> <li>• For <i>W</i> signals (write only), KNX flags W, U &amp; U2 are not allowed. Flag T is mandatory and flag R is optional.</li> <li>• For <i>R/W</i> signals (read/write), KNX flags W &amp; T flags are mandatory (activated automatically), and flags R, U and U2 are optional.</li> <li>• It is not possible to activate simultaneously KNX flags R &amp; U, in return R &amp; U2 can be used simultaneously.</li> <li>• When flag U is activated, it is necessary to deactivate R (it is done automatically).</li> </ul>
<b>Comments</b>	<b>NOTE that philosophy of U flag in IntesisBox® is not the same as in other general KNX equipment.</b>

<b>Active</b>	
<b>Description</b>	Indicates if the signal is active or not for the integration
<b>Values</b>	<ul style="list-style-type: none"> <li>• 0: Not active</li> <li>• 1: Active</li> </ul>

<b>↕</b>	
<b>Description</b>	Buttons to move the selected row (or rows) up or down inside the grid. To move up or down inside the grid a single row or a group of consecutive rows, just select the row or rows using the left button of the mouse and push the desired up or down button.
<b>Comments</b>	This can be done also using the key combinations <i>ALT+arrow up</i> or <i>ALT+arrow down</i> instead of up or down buttons

<b>Add</b>	
<b>Description</b>	Button that adds a row under the selected one.

<b>Delete</b>	
<b>Description</b>	Buttons to delete the selected row (or rows).

<b>Save</b>	
<b>Description</b>	Save the configuration (details in section 5.1.3)

<b>Exit</b>	
<b>Description</b>	Exits the configuration window.

### 5.1.3 Saving the configuration

When the configuration of the project is finished follow the next steps:

1. Click the button *Save*. Once accepted the pop-up message, that will save the project in the folder on hard disk (more information in LinkBoxMB Manual).
2. You will be prompted to generate the configuration file to be sent to the gateway,
  - a. If *YES* is selected, the binary file (KNX.LBOX) containing the configuration for the gateway will be generated and saved also into the project folder.
  - b. If *NO* is selected, the binary file needs to be created before following the next steps. To do so open the Configuration window (section 5.1) and restart from step 1.
3. Once in the configuration window again, click on exit. The configuration is ready to be sent to the IntesisBox® (check LinkBoxMB Manual).

***The configuration cannot be received from the gateway to LinkBoxMB, it can only be sent.***

## 6. IntesisBox® and ETS

### 6.1 Integration of IntesisBox® in ETS

As explained the IntesisBox® is configured with the LinkBoxMB but in some projects it might be needed to integrate the gateway in the ETS project, for example to allow the line couplers have a correct configuration of their filter tables. To do so a Dummy device can be used in ETS to simulate the IntesisBox® and associate also to this Dummy device all group addresses used in IntesisBox®.

The dummy device can be downloaded from:

[http://www.intesis.com/down/eib/Dummy\\_Intesis.zip](http://www.intesis.com/down/eib/Dummy_Intesis.zip)

## 7. Mechanical & Electrical characteristics.



Enclosure	Plastic, type PC (UL 94 V-0). Dimensions: 107mm x 105mm x 58mm.
Colour	Light Grey. RAL 7035.
Power	9 to 30Vdc +/-10%, Max.: 125mA. 24Vac +/-10% 50-60Hz, Max.: 127mA Must use a NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply. Plug-in terminal block for power connection (2 poles).
Terminal wiring (for power supply and low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.5mm <sup>2</sup> ... 2.5mm <sup>2</sup> 2 cores: 0.5mm <sup>2</sup> ... 1.5mm <sup>2</sup> 3 cores: not permitted
Mounting	Wall. DIN rail EN60715 TH35.
Modbus RTU ports	1 x Serial EIA232 (DB9 male DTE). SELV 1 x Serial EIA485 (Plug-in screw terminal block 2 poles). SELV
Modbus TCP port	1 x Ethernet 10Base-T RJ45.
KNX port	1 x KNX TP1 (EIB) port opto-isolated. Plug-in terminal block (2 poles). TNV-1
LED indicators	1 x Power. 2 x KNX port activity (Tx, Rx). 2 x Serial port (Modbus RTU) activity (Tx, Rx). 2 x Ethernet port (Modbus TCP) link and activity (LNK, ACT). 1 x KNX programming/bus. <sup>1</sup>
Push buttons	1 x KNX programming. <sup>1</sup>
Console port	EIA232. DB9 female connector (DCE). SELV
Configuration	Via console port <sup>2</sup> or Ethernet connection. <sup>3</sup>
Firmware	Allows upgrades via console port.
Operational temperature	0°C to +70°C
Operational humidity	25-90% at 50°C, non condensing
Protection	IP20 (IEC60529).
RoHS conformity	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

<sup>1</sup> Not operational for the moment. Reserved for future use.

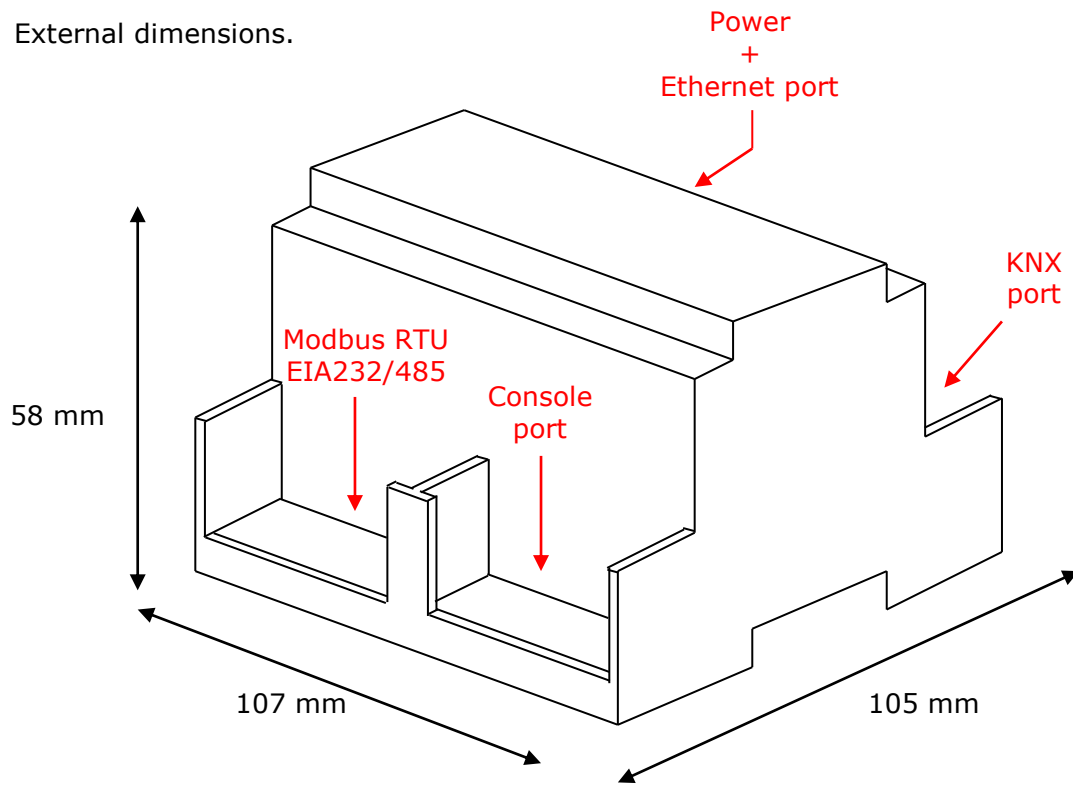
<sup>2</sup> Standard cable DB9male-DB9female 1,8 meters long is supplied with the device for connection to a PC COM port for configuring and monitoring the device. The configuration software, compatible with Windows® operating systems, is also supplied.

<sup>3</sup> Available from firmware version V.4x.0.13 and onwards.



### 8. Dimensions.

External dimensions.



Free space recommended to install the device, with spacing enough for external connections.

