IntesisBox® KNX

LG Air Conditioning

User's Manual

Issue Date: 18/04/2011

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Gateway for integration of LG air conditioning systems into KNX TP-1 (EIB) control systems.

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

LG-AC-KNX-4
Model supporting integration of up to 4 indoor units.

LG-AC-KNX-8
Model supporting integration of up to 8 indoor units.

LG-AC-KNX-16
Model supporting integration of up to 16 indoor units.

LG-AC-KNX-64
Model supporting integration of up to 64 indoor units.

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1. Description

IntesisBox® KNX – LG AC is a communication gateway for the integration of LG air conditioning systems into KNX TP-1 (EIB).

There are four models available: LG-AC-KNX-4, with capacity of up to 4 indoor units, LG-AC-KNX-8, with capacity of up to 8 indoor units, LG-AC-KNX-16, with capacity of up to 16 indoor units and LG-AC-KNX-64, with capacity of up to 64 indoor units. The compatible LG units are listed in section 6.

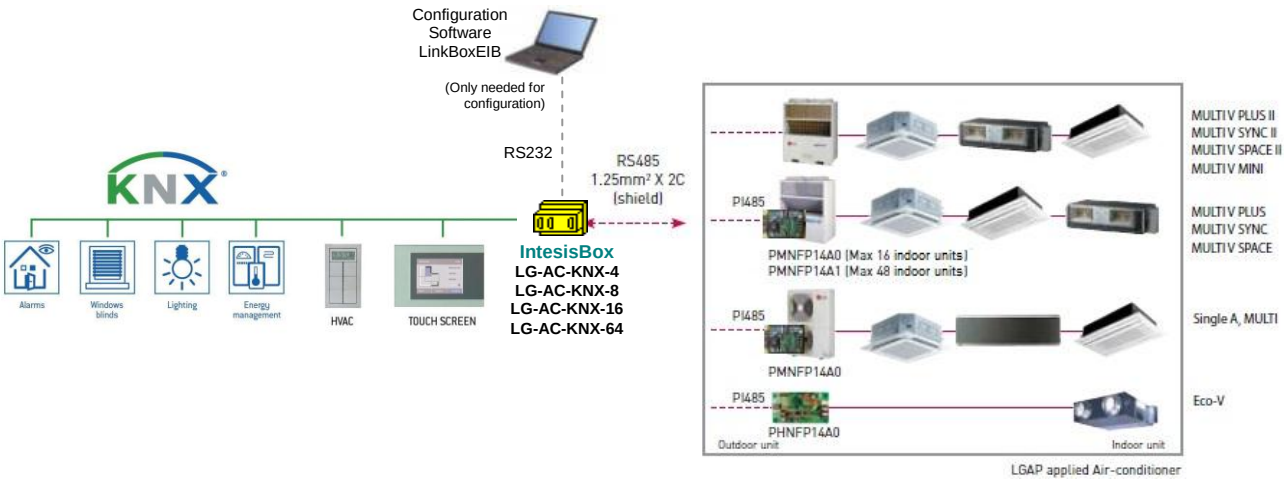

Figure 1.1 System integration using the *IntesisBox® KNX – LG AC*

Main features:

- Direct connection to KNX TP-1 (EIB) bus.
- Direct connection to LG RS485 bus.
- Bidirectional: Supervision and control.
- Independent communication management.
- Simple configuration using the software LinkBoxEIB supplied with the purchase of IntesisBox with no additional cost.
- Standard box for DIN module
- Power supply: selectable from 9 to 30 Vdc or 24 Vac

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1.1 Functionality

IntesisBox KNX continuously *polls* (reads) the LG PI485 bus for all configured signals and keeps the updated status of all of them in its memory ready to be served when requested from KNX.

When a change of status is detected in a LG's AC signal, a write telegram is sent to the KNX bus, of the associated *KNX Group*.

When it is received a telegram from the KNX bus, and if its *KNX Group address* is associated to an LG's AC signal, a message is sent immediately to the LG bus to perform the corresponding action in the LG's AC system.

In the continuous polling if no response is detected, the corresponding virtual signal inside the gateway will be activated indicating communication error. There is a virtual signal for each AC indoor unit indicating communication error with the indoor unit – this signal will be normally activated if the indoor unit is not properly setup.

The IntesisBox KNX-LG cannot work in a multimaster system. That means that when connected in the system no Central control or other gateways can be used. If this indication is not followed neither the IntesisBox nor the other master would work.

1.2 Capacity of IntesisBox KNX - LG

Element	Capacity	Notes
Number of indoor units	64 *	Maximum number AC indoor units that can be controlled.
Number of KNX Groups	4000	Maximum number of KNX Groups that can be used in IntesisBox.
Number of listening addresses per object.	255	Maximum number of listening addresses that can be associated to an object.

Table 1.1 Capacity of IntesisBox KNX-LG

* There are four different models of *IntesisBox KNX – LG AC* with different capacities. The table above shows the capacity for the top model (with maximum capacity).

Their order codes are:

- Model supporting up to 4 indoor units. *Ref.: LG-AC-KNX-4*
- Model supporting up to 8 indoor units. *Ref.: LG-AC-KNX-8*
- Model supporting up to 16 indoor units. *Ref.: LG-AC-KNX-16*
- Model supporting up to 64 indoor units. *Ref.: LG-AC-KNX-64*

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1.3 KNX system

In this section, a common description for all IntesisBox KNX series gateways is given, from the point of view of KNX system which is called from now on *internal system*.

1.3.1 Description

IntesisBox KNX connects directly to the KNX TP-1 bus and behaves as one more device of the KNX system, with the same configuration and functional characteristics as other KNX devices.

Internally, the electronic circuit part connected to the KNX TP-1 bus is opto-isolated from the rest of the electronics.

IntesisBox KNX receives, manages and sends all the telegrams related to its configuration to the KNX bus.

On receiving telegrams of KNX Groups associated to the external system (LG AC System in this case), the corresponding messages are sent to the external system to maintain both systems synchronized in every moment.

When a change in a signal of the external system is detected, a telegram is sent to the KNX bus (of the associated KNX group) to maintain both systems synchronized in every moment.

In case of KNX bus voltage failure, on bus recovery IntesisBox will retransmit the status of all the KNX groups marked as *"T" Transmit*. Also the *Updates* of the groups marked as *"U" Update* will be performed – this last behavior can be deactivated.

1.3.2 Points definition

Each signal of the external system (LG AC system) to use has the following KNX properties:

Property	Description
Signal	Signal's Description. Only for informative purposes, allows identifying the signal conveniently.
EIS (DataPoint)	It's the KNX data type used to code the signal's value. It will depend on the type of signal associated in the external system in every case. In some integration it is selectable, in others it is fixed due to the intrinsic characteristics of the signal.
Group	It's the KNX group to which the signal is associated. It is also the group to which the read (R), write (W), transmit (T) and update (U) actions are applied. Is the sending group.
Listening addresses	They are additional addresses that can write the signal, additionally to the Group address.
R	Read. When active, read telegrams on signal's group will be allowed.
W	Write. When active, write telegrams on signal's group and listening addresses will be allowed.
T	Transmit. When active, a write telegram of the group will be sent to the KNX bus upon change of the signal. The write will be triggered using the address in field "Group".

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U	Update. When active, on IntesisBox start-up or after a KNX bus voltage recovery, read telegrams using the address in field "group" will be sent to KNX bus. The received value for each read request will be sent to the external system as if it had been received by a write telegram.
Active	Enables or disables the signal in IntesisBox's configuration.

These properties are common for all IntesisBox KNX series gateways. Each integration may have specific properties according to the type of signals of the external system in every case.

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1.4 LG to KNX integration

The following list shows the available signals to integrate for each LG AC or VENT indoor unit, and the type of KNX object on which their information is available.

Property	EIS type	Signal type (R/W)	Description / Status	
On / Off	1 – Switching (1bit)	R/W	**Start/Stop AC/VENT Unit** 0 – OFF, 1 – ON	
Mode	14 – Counter (8bit)	R/W	**AC Mode** 0 – COOL, 1 – HEAT, 2 – DRY, 3 – FAN, 4 – AUTO ***Mode (VENT unit)*** *0 – NORMAL, 1 – HEAT EXCHANGE, 2 – AUTO*	
Mode::Cool	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	Only one of these objects will be set / read to "1" at the same time (all objects will be updated on bus upon a Mode change)
Mode::Heat	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	
Mode::Dry	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	
Mode::Fan	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	
Mode::Auto	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	
Setpoint Temperature	EIS 5 – Float (2byte)	R/W	**Temperature Set Point** (only integer numbers allowed) 16..30 ºC **(This parameter is not applicable for VENT units)**	
Ambient Temperature	EIS 5 – Float (2byte)	R	**Ambient Temperature (only integer numbers)** Read: 10ºC to 40ºC **(This parameter is not applicable for VENT units)**	
Swing	14 – Counter (8bit)	R/W	**AC Swing** 0 – Stop, 1 – Start **(This parameter is not applicable for VENT units)**	
Fan Speed	14 – Counter (8bit)	R/W	**AC Fan Speed** 0 – AUTO, 1 – LOW, 2 – MID, 3 – HIGH	
FanSpeed::Auto	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	Only one of these objects will be set / read to "1" at the same time (all objects will be updated on bus upon a Mode change)
FanSpeed::Low	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	
FanSpeed::Mid	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	
FanSpeed::High	1 – Switching (1bit)	R/W	0 – Inactive, 1 – Active	
Remote Restriction	1 – Switching (1bit)	R/W	**Remote Control Enablement / Disablement** 0 – Remote control enabled, 1 – Remote control disabled	
Error Sign	1 – Switching (1bit)	R/W	**Error Code / Communication error with the Indoor Unit** 0 – No error present, 1 – Error code present, or communication error with the indoor unit	
Error Code	10 – Counter (16bit)	R/W	**Error Code** More info in section 7	
Filter Alarm	1 – Switching (1bit)	R/W	**Filter Alarm Status** 0 – No alarm, 1 – Filter alarm present **(This parameter is not applicable for AC units)**	
Filter Alarm Reset	1 – Switching (1bit)	W	**Filter Alarm Reset** Write: 1 – Filter alarm reset **(This parameter is not applicable for AC units)**	

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2. Connection

The device uses a standard enclosure allowing DIN EN60715 TH35 rail mounting. Its plastic meets standard PC UL 94 V0.

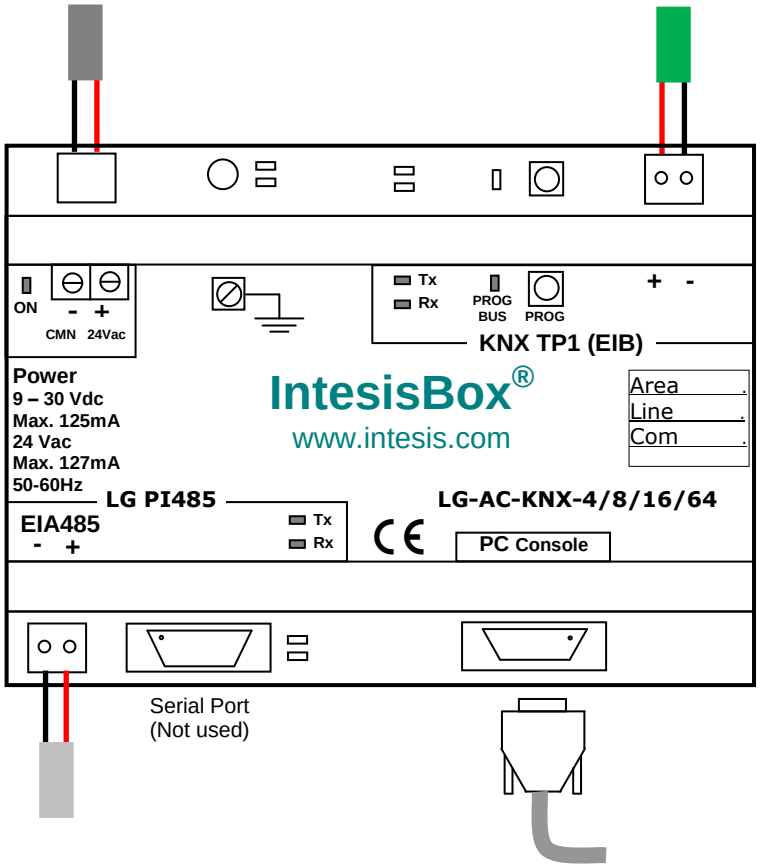

Figure 2.1 Device connection diagram

Ensure proper space for all connectors when mounted.

The items supplied by Intesis Software for this integration are:

- IntesisBox KNX - LG hardware
- Console cable. Standard DB9F-DB9M cable 1.8 meter long.
- Installation sheet, containing a link to the *LinkBoxEIB* software and this manual.

2.1 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 Table 4.1). Once connected the ON led (Figure 2.1) 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:

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- 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.

2.2 Connect to KNX

Connect + and – terminals of the KNX bus to the IntesisBox KNX connector (see Figure 2.1). The polarity is important. Once connected correctly the KNX Tx led (Figure 2.1) 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 section 3.6.2.

2.3 Connect to LG PI485

The EIA485 port (Figure 2.1) needs to be connected to the LG PI485 AC system. This integration requires, in some cases, the use of an additional PCB so the LG AC system can connect to that bus. These additional interfaces can be connected to the outdoor units of the LG AC system (PMNFP14A0 or PMNFP14A1) or directly to the indoor unit (PHNFP14A0). Further details about the needed PCB can be seen in Figure 1.1 and section 8.1.

The PMNFP14A0, PMNFP14A1 and PHNFP14A0 are supplied by LG. Contact your nearest LG AC Systems distributor for details.

How to check if there is communication with the LG PI485 bus is explained in section 3.6.2.

2.4 Connect to PC

To connect the device to the PC the serial cable supplied should be plugged to the PC console port (Figure 2.1). This action allows the user to have access to configuration and monitoring of the device (more information can be found in section 3).

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3. Configuration: LinkBoxEIB.

LinkBoxEIB is a Windows compatible software tool developed specifically to monitor and configure the IntesisBox KNX series, including IntesisBox KNX-LG device. In this section its use to configure the IntesisBox is explained

3.1 LinkBoxEIB Installation

Periodically, new free versions of LinkBoxEIB are released including improvements, fixes, support for new firmware versions of IntesisBox or support for newer products of IntesisBox KNX series family of devices. Check the link in the installation sheet supplied with the device to access to ensure that you have latest version of the tool.

The tool is supplied in the shape of a self-extracting setup utility. Supported operating systems are Windows XP, Windows Vista and Windows 7.

3.2 Project definition

The tool is based on the concept of configuration projects. After starting *LinkBoxEIB* by clicking its program entry under Windows Start menu (or any other established link), a project manager window will pop up asking the configuration project to open.

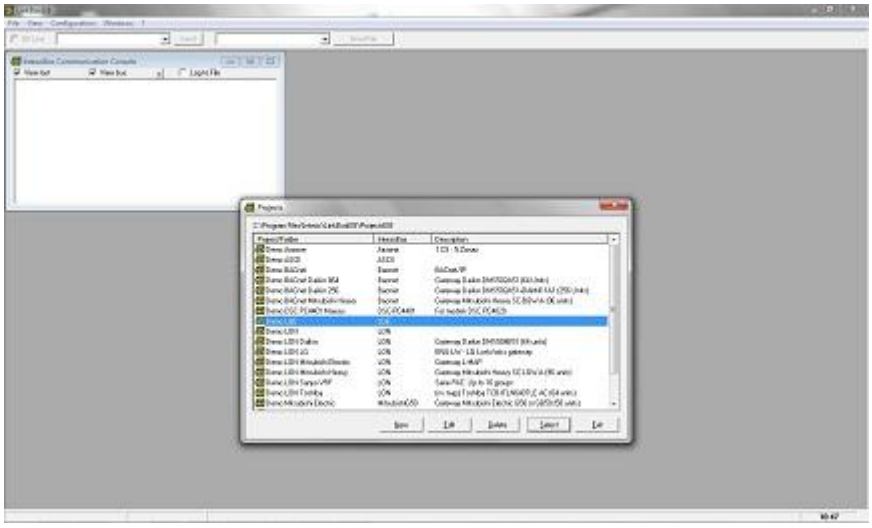

Figure 3.1 LinkBoxEIB start– Projects window

After installation, LinkBoxEIB contains a demo/sample configuration project for each of the existing IntesisBox KNX products.

Select the project "*Demo LGE*" by clicking on it in the list and press button "New". A pop-up will ask whether to create a project as a copy of the selected one (*Demo LGE*), or to create a new project from scratch.

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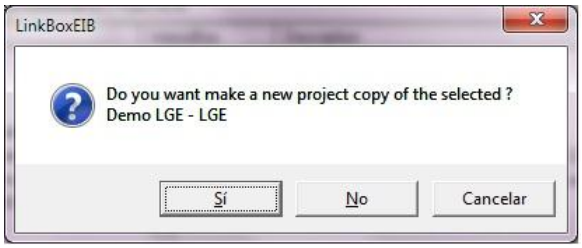

Figure 3.2 New project creation prompt

Click *Yes*, and you will be asked a project name and a brief description for it in the following window:

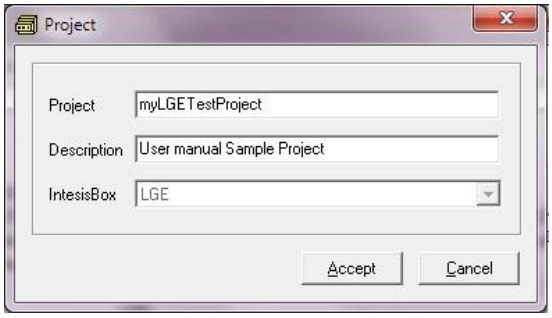

Figure 3.3 Project name and description prompt

Having edited these fields, clicking *Accept* will bring you back to the Projects window, this time showing the recently created project in the list.

Mark the project you have just created and click *Select* to open it.

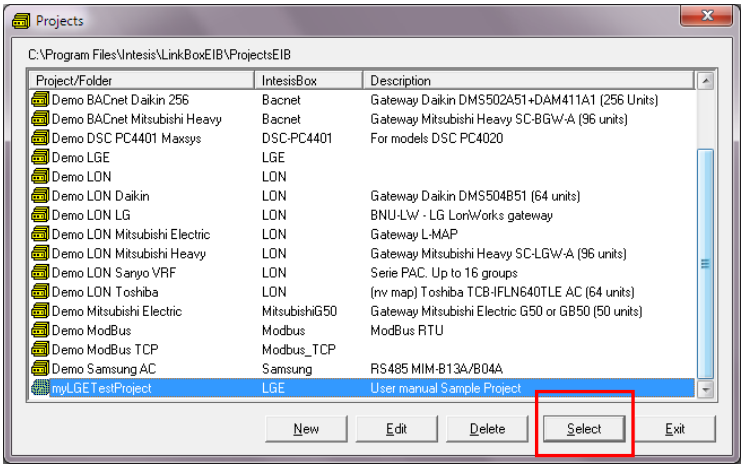

Figure 3.4 Opening a project

The configuration project will be opened so that you can start to work with it.

The status bar of *LinkBoxEIB*'s main window shows the project name and its description, so that you know which project you are working on at any time.

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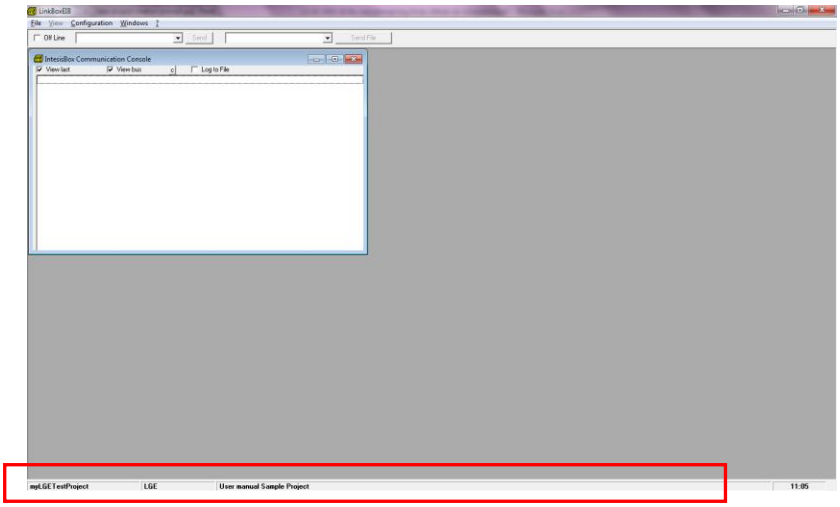

Figure 3.5 Project's name in LinkBoxEIB status bar

For a given project, *LinkBoxEIB* creates a set of files in a separate folder where the configuration data is kept.

You can directly access these files with Windows (file) Explorer. The location of project files differs in Windows XP and Windows Vista/Windows 7.

For Windows XP, you will find them in folder:

```
C:\Program Files\Intesis\LinkBoxEIB\Projects\ProjectsEIB\<<your_project_name>>
```

Where <<your_project_name>> stands for the name you have given to the project at the time of creating it

For Windows Vista and Windows 7, the location will be:

```
C:\Users\<<your_user_account>>\AppData\Local\VirtualStore\Program Files\Intesis\LinkBoxEIB\
ProjectsEIB \<<your_project_name>>
```

Where <<your_user_account>> stands for the windows user under which you have created the new project, and <<your_project_name>> stands for the name you have given to the project at the time of creating it.

In this folder, you will find following files:

- *Project.ini*: ASCII file containing descriptive information about your project
- *LGE.ini* and LGE.*dat*: ASCII files containing the configuration of the project itself.

It is reasonable that, once you get a working configuration for a certain installation, you perform a backup of these files/their folder from your hard-drive.

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3.3 Offline and Online working modes

LinkBoxEIB allows both working *Offline*, that meaning that there is no physical connection to the IntesisBox – and also *Online*, where the IntesisBox needs to be powered-up and there is an established communication link between IntesisBox and the PC running the software tool.

Being offline allows the creation and edition of configuration projects. That includes setting the linked signals, which kind of AC units,…

When online the Software can perform other functionalities such as monitoring the communication and sending the configuration files to the device

3.3.1 Switching from Offline to Online mode

At this point you might want to change *LinkBoxEIB* working mode to online – i.e. having a working link between *LinkBoxEIB* and IntesisBox. This will allow you to exchange configuration values with the device, as you edit them.

In order to do so:

- Plug all the connections as explained in section 2
- Select menu option *Configuration->Connection…*. a small window (Figure 3.6) showing the connection parameters will appear.

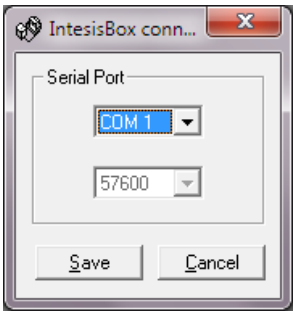

Figure 3.6 Connection window

- In it, you can select the communication parameters of the physical link with IntesisBox, using the serial port/EIA232 connection. Select the Communication port where the IntesisBox is connected. Baud-rate is always 57600bps and cannot be changed.
- Once done setting up suitable parameters, click *Save*.
- To switch *LinkBoxEIB* to Online mode, tick the check-box reporting Offline status in the upper left part of the main window (Figure 3.7). Upon successful connection, status will change to Online with a green background.

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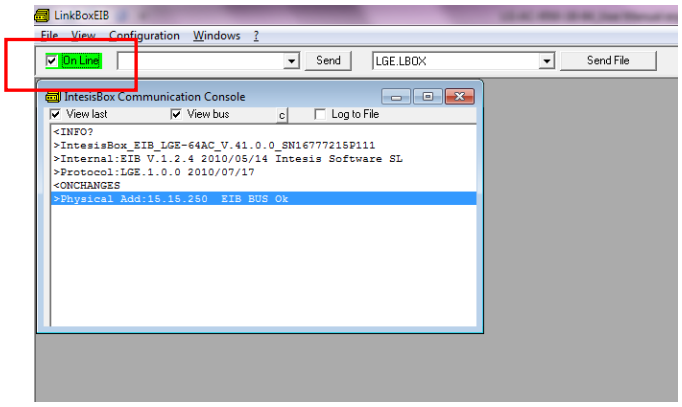

Figure 3.7 Online mode

- Once connected text will appear in the *IntesisBox Communication Console* window, as shown in Figure 3.7. This window always shows the (ASCII-based) communication between *LinkBoxEIB* and IntesisBox, such as the firmware version loaded on IntesisBox and its configuration status among other information.

3.3.2 Switching from Online to Offline mode

To switch *LinkBoxEIB* to Offline mode, untick the check-box reporting Online status in the upper left part of the main window (Figure 3.7). Upon successful disconnection, status will change to Offline and the green background will turn grey.

3.4 Project Configuration

To configure the integration connection parameters and the signals list, select menu *Configuration -> IntesisBox*. The *LG AC* configuration window will be opened (Figure 3.8).

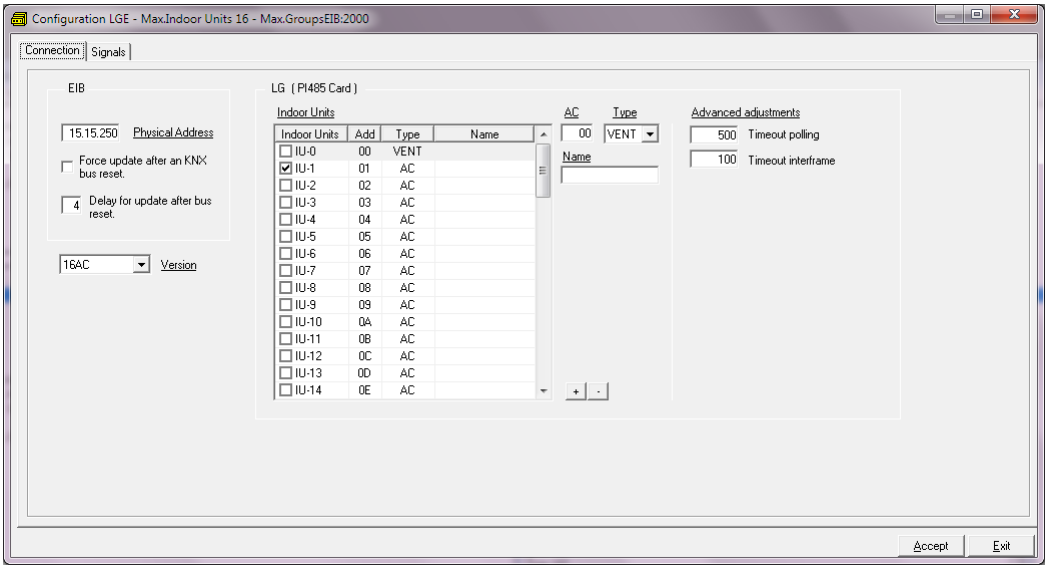

Figure 3.8 LG configuration window

How to interact with this window is explained in sections 3.4.1 (connection tab) and 3.4.2 (signals tab).

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3.4.1 Connection configuration

Select the Connection tab to configure the connection parameters.

Three subsets of information are configured using this tab (Figure 3.9): the parameters of the KNX (EIB) interface [1], the IntesisBox model [2] and the parameters of the LG system (PI485 card) [3].

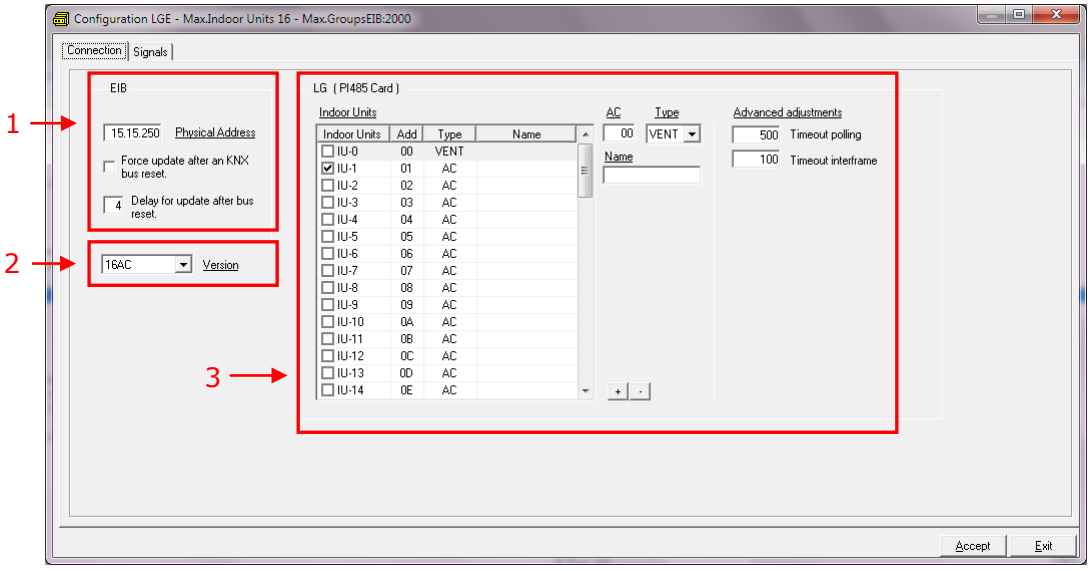

Figure 3.9 Connection configuration tab

[1] KNX interface configuration parameters:

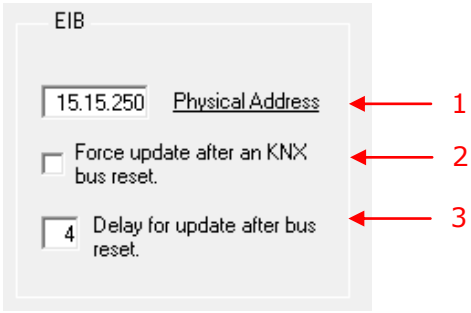

Figure 3.10 KNX configuration

1. Enter the physical address desired for IntesisBox inside the KNX network.

2. Mark this checkbox if you want IntesisBox to send "read" requests to KNX' bus each time that bus is recovered (it will be triggered only for those signals that, later on in configuration, are setup with its "U" or "U2" flag)

3. In case of marking the previous checkbox, here you can enter a delay (in seconds) that the IntesisBox will wait before triggering "Read" requests once the bus connection is recovered. This delay is meant to reduce initial bus load in case that there is other devices that also send "read" requests on bus recovery.

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[2] IntesisBox version

In the left part of the IntesisBox configuration window, select which version of the *IntesisBox KNX – LG* gateway you are to set up. (*4AC* for *LG-AC-KNX-4, 8AC* for *LG-AC-KNX-8, 16AC* for *LG-AC-KNX-16* and *64AC* for *LG-AC-KNX-64*)

[3] LG AC PI485 interface configuration parameters:

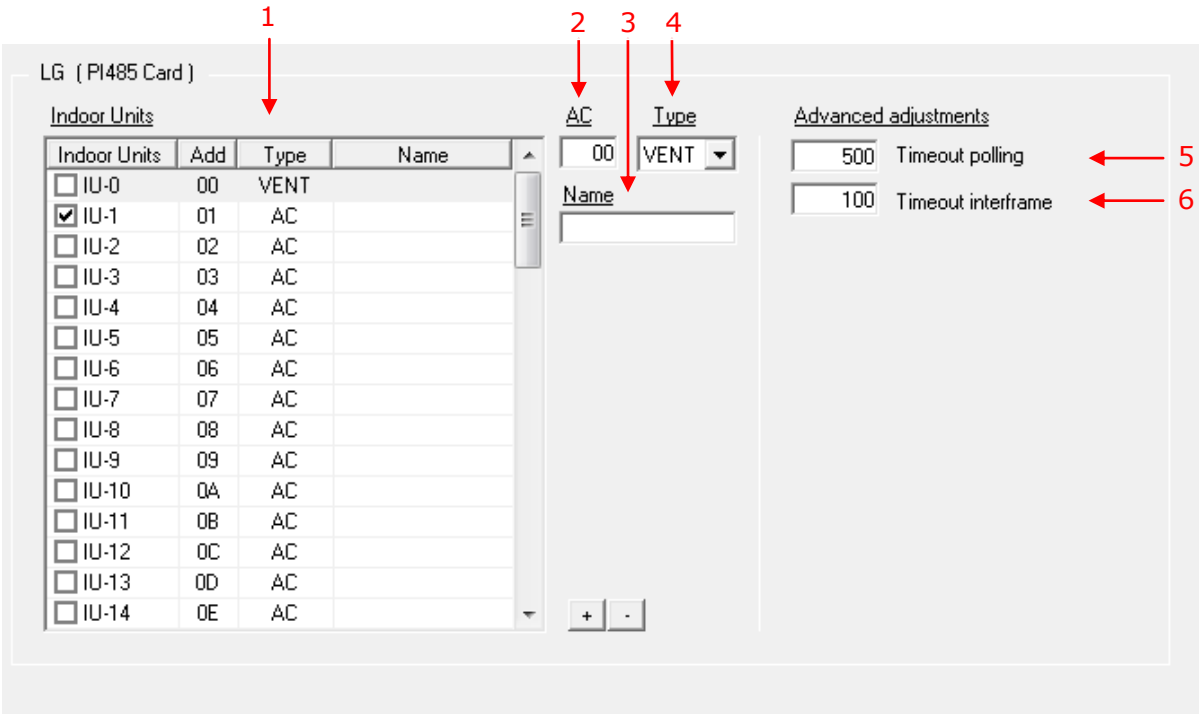

Figure 3.11 LG AC Configuration

1. In this list, you can individually enable each of the 64 indoor units available on the system. The index in the column "Indoor units" (i.e. the number x in "IU-xx") is the reference that will be used later on (in tab "Signals") to refer to this AC indoor unit. Values for columns "Add", "Type" and "Name" in each indoor unit (IU) can be changed by selecting the IU in the list, by means of textboxes 2, 3 and 4.

2. Address of the selected IU in the LG system. Its value has range 0..FF (Hex). More information about how to set this address in section 8.2

3. Optionally you can enter a Name, that will appear on the list for each IU.

4. Type of Indoor Unit. Each kind of IU (VENT or AC) has different characteristics. If the wrong one is selected the system might not work properly.

Additional configuration parameters should generally be left to their default value. They only might need to be tuned in some very specific cases (installations with large number of units, scenarios with large bursts of KNX commands sent at once, …)

5. Waiting time for the response after the polling is performed.

6. Minimum time between an RX and a TX frame (channel idle time)

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3.4.2 Signals configuration

Select the Signals tab to configure the signals list (the communication objects).

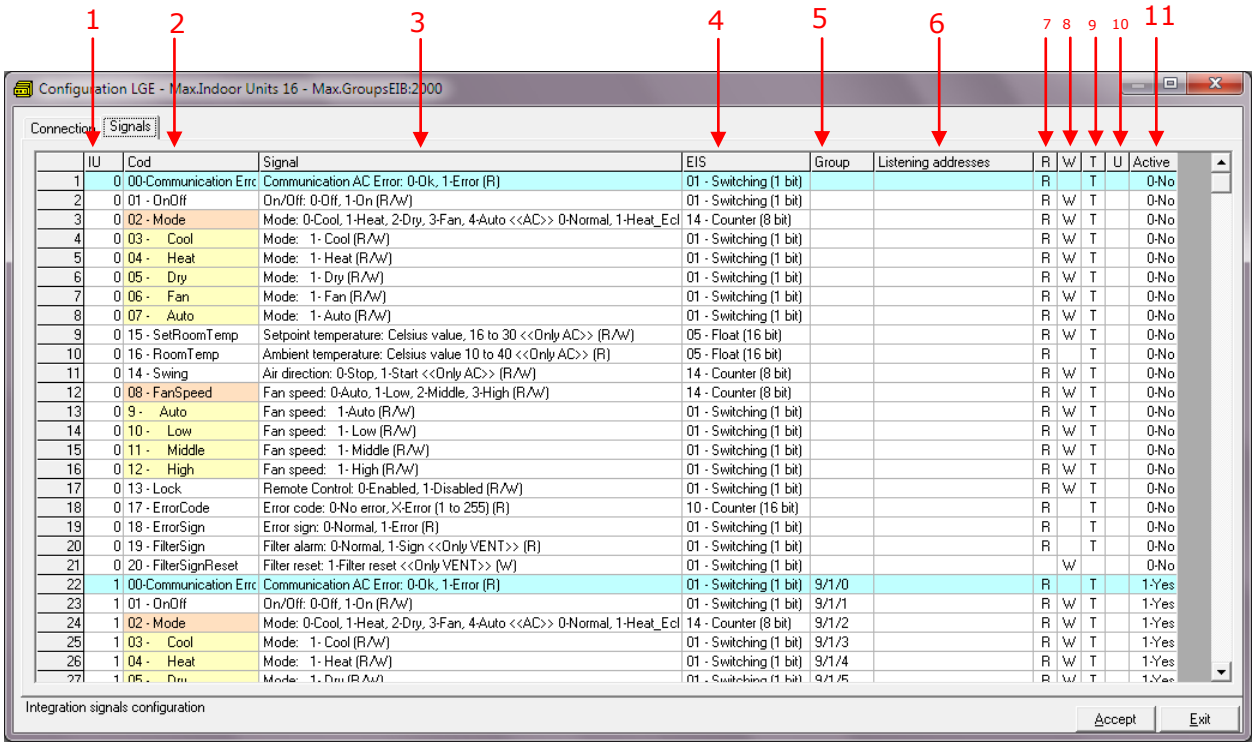

Figure 3.12 Signals list

1. IU (Indoor Unit index). This number is associated in the table "Indoor Units" of tab connections, with a certain Main Address (0..FF). Not editable.

2. *Signal Code*. Identifies available signals in each LG Indoor Unit. An identification code is given to every different signal. In section 1.4, an explanation of each signal is given.

3. *Signal*. Signal's descriptive name (optional). Useful to identify the signal. The default descriptive name corresponds to the signal's code and shows its possible values, but can be modified.

4. *EIS*. KNX data type (Data point) to encode the signal's value. Not editable.

5. *Group*. Main KNX group address for the signal. Addresses can be expressed as "2-level" (P/I/S) or "3-level"(P/S). Features *W,R,T,U* explained below will only apply for this main KNX group address, not for listening addresses (if defined).

6. *Listening addresses*. Additional KNX addresses from which the signal can be written to (only if W flag is enabled). Format: P/I/S or P/S. More than one address can be entered in this field, separating them by commas.

7. *R*. Indicates if this signal is allowed to be read from KNX system. Enable or disable by right clicking the cell. Freely configurable, but default value is recommended and should fit most scenarios.

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8. *W*. Indicates if this signal is allowed to be written from KNX system. Enable or disable by right clicking the cell. Freely configurable, but default value is recommended and should fit most scenarios.

9. *T*. Indicates if this signal will generate a "write" telegram to the KNX system when its own value changes. Enable or disable by right clicking the cell. Freely configurable, but default value is recommended and should fit most scenarios.

10. *U*. Indicates if this signal will be requested (by means of a "read" telegram) on bus recovery. "U" the request is on Group address and "U2" is on first listening address. Note that it only makes sense if the own signal has its "W" flag enabled. Enable or disable by right clicking the cell.

11. *Active*. It allows disabling a particular signal in the integration.

The columns *R, W, T, U* and *Active* can be modified using mouse double-click over the desired cell, selecting one or more cells in the same column and using the contextual menu appearing with mouse right button click over the cells selected, or just entering the first letter of the word (R,W,T,U…).

The values by default for columns R, W, T, U have been tested and are the recommended ones for the integration. Do not modify these values if you are not sure on how they will affect to the integration's correct functioning.

Those cells appearing in orange color at their "Code" cell, represent indoor unit parameters that can be controlled or monitored using either/both EIS-Counter and/or EIS-Switching types. Right-click the corresponding "Code" cell in order to Show/Hide its associated switching-signals, to your convenience.
By default, all multibit signals are unfolded (showed), if you do not want to use them you can *Hide-All* to reduce the size of the signals list and to work more comfortably.

3.4.3 Remember

- If "T" is not activated, the changes from LG's indoor will not be transmitted to KNX for the applicable signal.
- If "R" is not activated, other KNX devices won't be able to read the applicable signal.
- If "W" is not activated, other KNX devices won't be able to write the applicable signal.
- If "U" is activated, IntesisBox will send "read" telegrams on bus recovery/start-up, for its corresponding Main Group address.
- If "U2" is activated, IntesisBox will send "read" telegrams on bus recovery/start-up, for its corresponding first listening address.
- Signals that are input-only of LG AC system, should be configured as W (required), U (optional)
- Signals that are output-only of LG AC system, should be configured as T (required), R (optional)
- Signals that are input-output of LG AC system, should be configured as W-T (required)

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3.4.4 Restrictions

- Addresses can be expressed as "2-level" (P/S) or "3-level"(P/I/S) being
  - P: *Main group*
  - I: Middle group
  - S: Subgroup
- Two different signals cannot have the same "Main Group"
- No signal is allowed with none of R-W-T-U flags being active.
- Empty groups are allowed, but only if they have W as the only active flag and one or more listening addresses.
- Listening addresses will not have any effect if the flag W is not active.

3.5 Saving the configuration and programming the gateway

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

1. Click the button *Save.* That will save the project in the folder on hard disk (section 3.2).
2. You will be prompted to generate the configuration file to be sent to the gateway,
   a. If *YES* is selected, the binary file (LG.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 3.4) and restart from step 1
3. Click on the button *Send File*
4. Click *Accept* when asked.
5. Check the Communication console. The information about the device should appear once it is programmed. If an error is shown check that the .LBOX was was correctly generated and that all the steps explained in the previous sections have been followed.
6. IntesisBox will reboot automatically once the new configuration is loaded.

The configuration cannot be downloaded from the gateway to LinkBoxEIB, it can only be uploaded.

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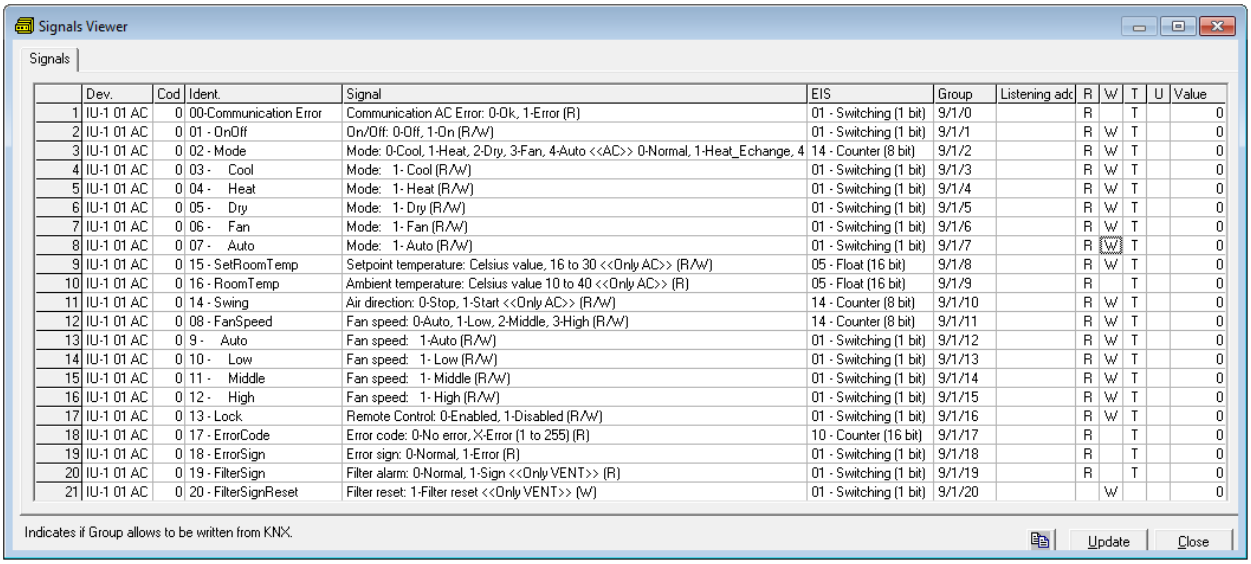
3.6 Monitoring

3.6.1 Signals viewer

Once the gateway is running with the correct configuration, to supervise the status of the configured signals, select menu *View -> Signals*. The Signals Viewer window will be opened. This window shows all signals active within the gateway with its main configuration parameters and its real time value in the column Value.

If you connect to the IntesisBox when it's been running for a certain time, you should press the *Update* button to get updated values. After pressing *Update*, all signal values will keep continuously updated until the connection is closed.



	Dev.	Cod	Ident.	Signal	EIS	Group	Listening adc	R	W	T	U	Value
1	IU-1 01 AC	0	00-Communication Error	Communication AC Error: 0-Ok, 1-Error (R)	01 - Switching (1 bit)	9/1/0		R		T		0
2	IU-1 01 AC	0	01 - OnOff	On/Off: 0-Off, 1-On (R/W)	01 - Switching (1 bit)	9/1/1		R	W	T		0
3	IU-1 01 AC	0	02 - Mode	Mode: 0-Cool, 1-Heat, 2-Dry, 3-Fan, 4-Auto <<AC>> 0-Normal, 1-Heat_Echange, 4	14 - Counter (8 bit)	9/1/2		R	W	T		0
4	IU-1 01 AC	0	03 - Cool	Mode: 1- Cool (R/W)	01 - Switching (1 bit)	9/1/3		R	W	T		0
5	IU-1 01 AC	0	04 - Heat	Mode: 1- Heat (R/W)	01 - Switching (1 bit)	9/1/4		R	W	T		0
6	IU-1 01 AC	0	05 - Dry	Mode: 1- Dry (R/W)	01 - Switching (1 bit)	9/1/5		R	W	T		0
7	IU-1 01 AC	0	06 - Fan	Mode: 1- Fan (R/W)	01 - Switching (1 bit)	9/1/6		R	W	T		0
8	IU-1 01 AC	0	07 - Auto	Mode: 1- Auto (R/W)	01 - Switching (1 bit)	9/1/7		R	W	T		0
9	IU-1 01 AC	0	15 - SetRoomTemp	Setpoint temperature: Celsius value, 16 to 30 <<Only AC>> (R/W)	05 - Float (16 bit)	9/1/8		R	W	T		0
10	IU-1 01 AC	0	16 - RoomTemp	Ambient temperature: Celsius value 10 to 40 <<Only AC>> (R)	05 - Float (16 bit)	9/1/9		R		T		0
11	IU-1 01 AC	0	14 - Swing	Air direction: 0-Stop, 1-Start <<Only AC>> (R/W)	14 - Counter (8 bit)	9/1/10		R	W	T		0
12	IU-1 01 AC	0	08 - FanSpeed	Fan speed: 0-Auto, 1-Low, 2-Middle, 3-High (R/W)	14 - Counter (8 bit)	9/1/11		R	W	T		0
13	IU-1 01 AC	0	9 - Auto	Fan speed: 1-Auto (R/W)	01 - Switching (1 bit)	9/1/12		R	W	T		0
14	IU-1 01 AC	0	10 - Low	Fan speed: 1- Low (R/W)	01 - Switching (1 bit)	9/1/13		R	W	T		0
15	IU-1 01 AC	0	11 - Middle	Fan speed: 1- Middle (R/W)	01 - Switching (1 bit)	9/1/14		R	W	T		0
16	IU-1 01 AC	0	12 - High	Fan speed: 1- High (R/W)	01 - Switching (1 bit)	9/1/15		R	W	T		0
17	IU-1 01 AC	0	13 - Lock	Remote Control: 0-Enabled, 1-Disabled (R/W)	01 - Switching (1 bit)	9/1/16		R	W	T		0
18	IU-1 01 AC	0	17 - ErrorCode	Error code: 0-No error, X-Error (1 to 255) (R)	10 - Counter (16 bit)	9/1/17		R		T		0
19	IU-1 01 AC	0	18 - ErrorSign	Error sign: 0-Normal, 1-Error (R)	01 - Switching (1 bit)	9/1/18		R		T		0
20	IU-1 01 AC	0	19 - FilterSign	Filter alarm: 0-Normal, 1-Sign <<Only VENT>> (R)	01 - Switching (1 bit)	9/1/19		R		T		0
21	IU-1 01 AC	0	20 - FilterSignReset	Filter reset: 1-Filter reset <<Only VENT>> (W)	01 - Switching (1 bit)	9/1/20			W			0

Figure 3.13 Signal Viewer

The signals viewer can be used even though only one system is connected to the IntesisBox, *KNX* or *LG AC*.

In order to force a specific value to a signal, double-click its *Value* field. This will display a dialog in which the desired value can be entered. Changing its value in this way, will make:

- If the signal has its T flag active, a write telegram with this value will be sent to KNX (using its corresponding group address)
- If the signal has its W flag active, the corresponding action will be performed on LG's AC system

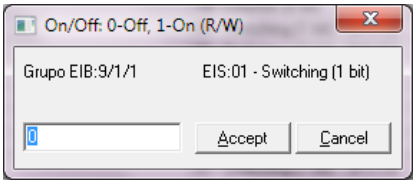


Figure 3.14 Value edition

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The signals viewer window has a button, in the right lower side of the window, to copy to the Windows Clipboard all the contents of the window (in tab separated text format).

3.6.2 Bus monitoring

To monitor any of the buses the software needs to be connected to the device (section 3.3.1). To do so follow these steps:

- To monitor the communication between the gateway and the KNX system, select the menu *View -> Bus -> EIB*. The *EIB communication Viewer* window will be opened. This window shows in real time all the communication frames between the gateway and the KNX system as well as debugging messages referred to the internal protocol (KNX) sent by the gateway.

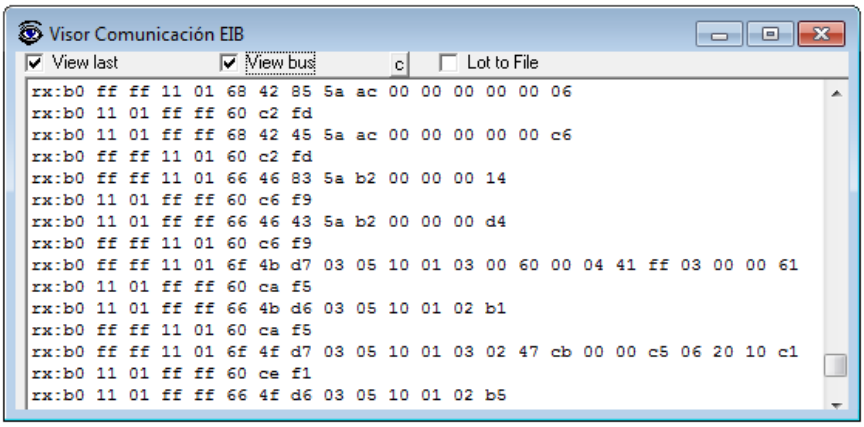

Figure 3.15 EIB bus Viewer

- To monitor the communication between the gateway and the external system (*LG AC* in this case), select the menu *View -> Bus -> LGE*. The *External protocol communication viewer* window will be opened. This window shows in real time all the communication frames between the gateway and the LG PI485 system as well as debugging messages referred to external protocol (LG) sent by the gateway.

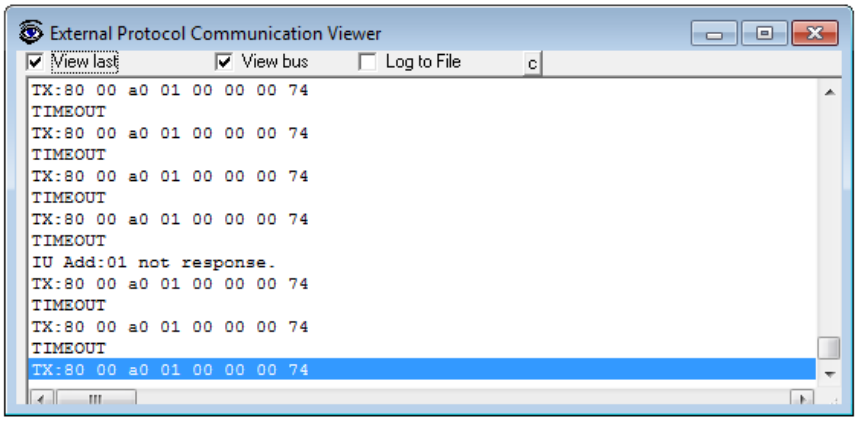

Figure 3.16 LG Bus Viewer

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4. Electrical and Mechanical characteristics

Envelope	Plastic type PC (UL 94 V-0). Size: 107mm x 105mm x 58mm.
Color	Grey. RAL 7035.
Power	9 to 30VDC +/-10% 1.4W. 24VAC +/-10% 1.4VA. Power connector is a 2 pole plug-in screw terminal block.
Mounting options	Wall DIN rail EN60715 TH35.
KNX (EIB) port	1 x KNX TP1 (EIB) opto-isolated (Plug-in screw terminal block 2 poles)
RS485 (LG) port	1 x RS485 connector (Plug-in screw terminal block 2 poles)
LED indicators	1 x Power. 2 x KNX port activity (Tx, Rx). 2 x RS485 port (Tx, Rx). 1 x KNX programming/bus.[1]
Push buttons	1 x KNX programming.[1]
Console port	RS232. DB9 female connector (DCE).
Configuration	Via console port.[2]
Firmware	Allows upgrades via console port.
Operational temperature range	-40°C to +70°C
Operational humidity range	5% to 95%, non-condensing
Protection	IP20 (IEC60529).
RoHS conformity	Compliant with RoHS directive (2002/95/CE).
Certifications	CE

Table 4.1 Device Electrical and Mechanical characteristics

[1] Not operational for the moment. Reserved for future use.
[2] Along with the device it is also supplied a standard DB9 male - DB9 female 1.8 m. cable for configuring and monitoring the device using a PC via serial COM port. The configuration software LinkBoxEIB, compatible with MS Windows® operating systems, is also supplied with the device.

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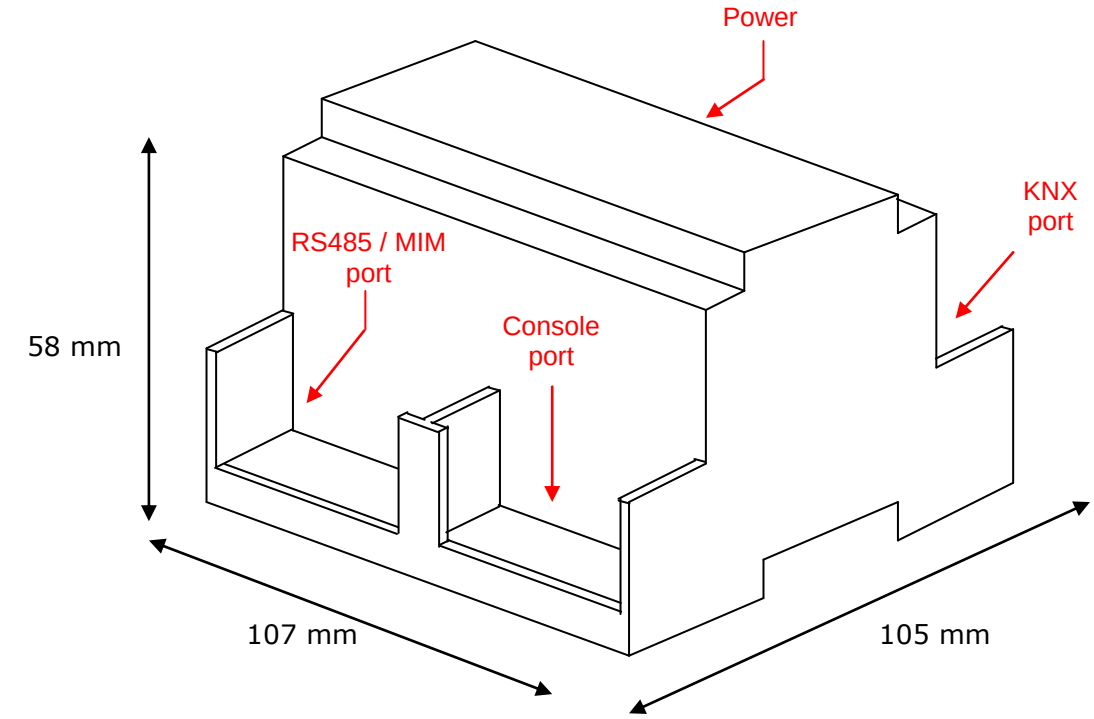
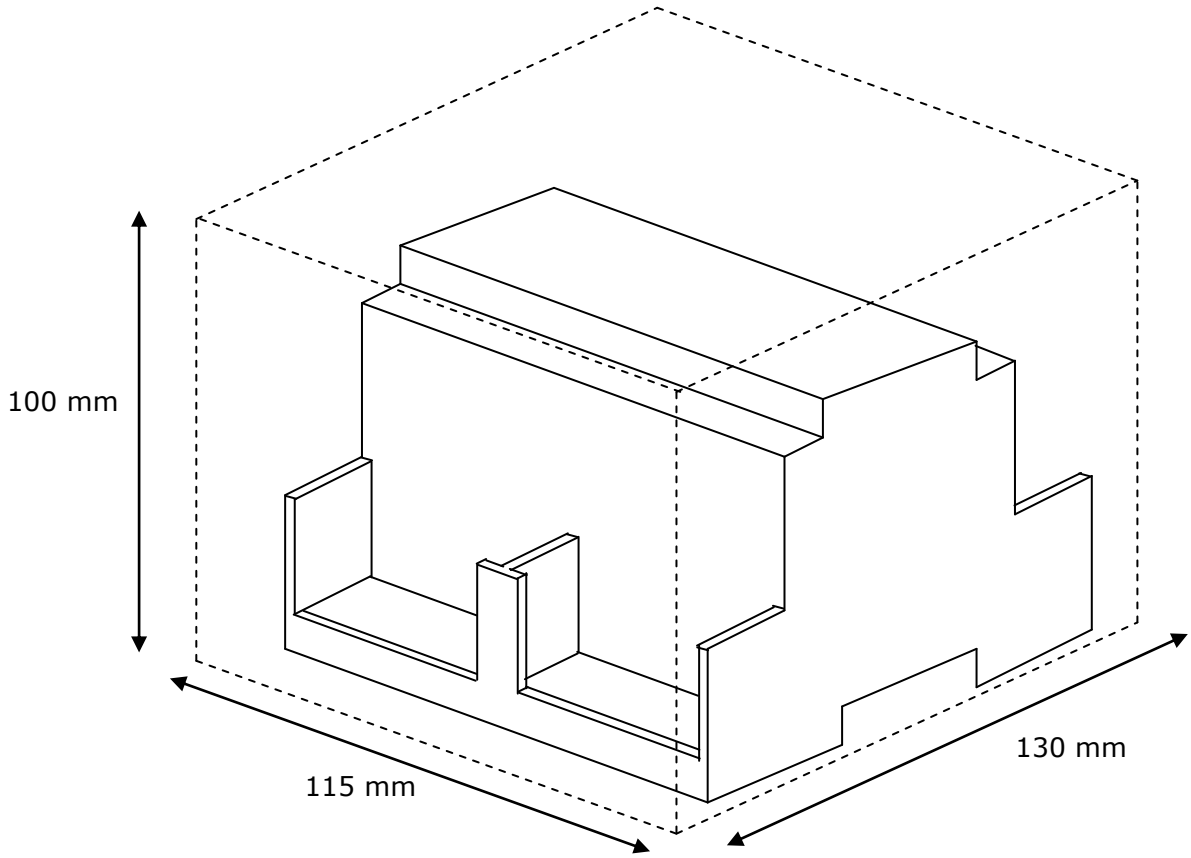
5. Dimensions



Recommended available space for its installation into a cabinet (wall or DIN rail mounting), with space enough for external connections:



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6. AC Unit Types compatibility

A list of LG unit model references compatible with LG-AC-KNX-4/8/16/64 and their available features can be found in:

http://www.intesis.com/pdf/IntesisBox_LG-AC-xxx-MIU_AC_Compatibility.pdf

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URL http://www.intesis.com
Email info@intesis.com
tel +34 938047134

7. Error codes for Indoor Units

Refer to the Error Code table of LG AC product manual for the error code.

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8. Annexes

The explanations given in the following sections are just informative. Any action described should be performed by LG qualified personnel.

8.1 PMNFP14Ax and PHNFP14A0 connection boards

8.1.1 PMNFP14Ax

In this section it can be found a brief description and configuration of the board PMNFP14A0. This board is to be used with MultiV Plus, Multi Standard and MPS Inverter Product.

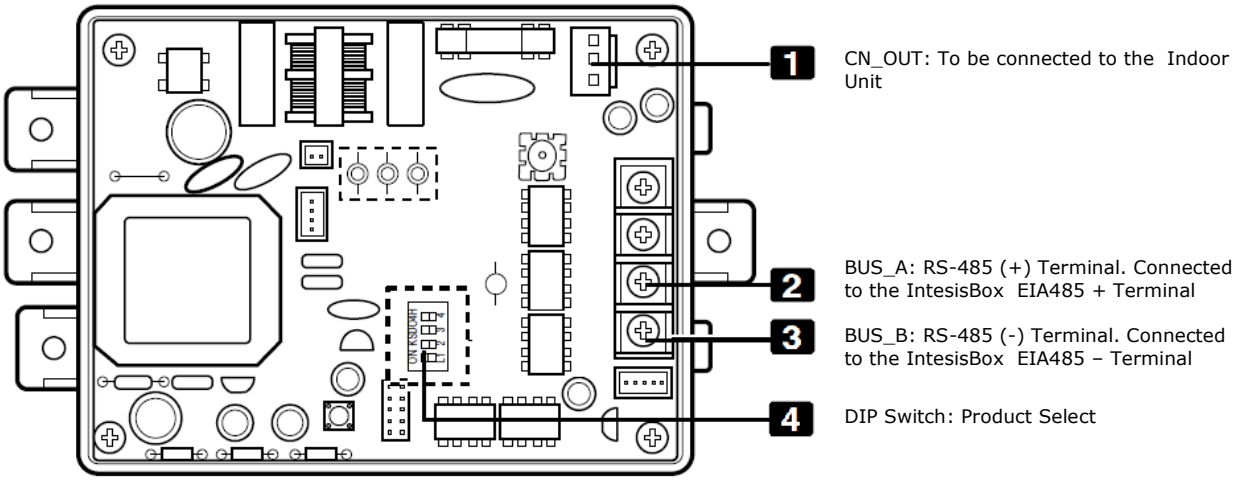
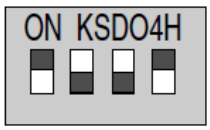
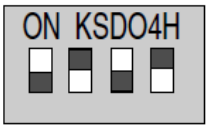


Figure 8.1 PMNFP14A0 board description

To allow the LG system to work with the IntesisBOX KNX – LG the DIP switch (number 4 in Figure 8.1) needs to be configured in as shown in Figure 8.2.



1 and 4 ON, All others OFF: MultiV Plus & MPS Inverter Product + IntesisBox



2 and 4 ON, All others OFF: Multi Standard Product Inverter Product + IntesisBox

Figure 8.2 DIP switch configuration

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8.1.2 PHNFP14A0

In this section it can be found a brief description and configuration of the board PHNFP14A0. This board is to be used with ECO-V products.

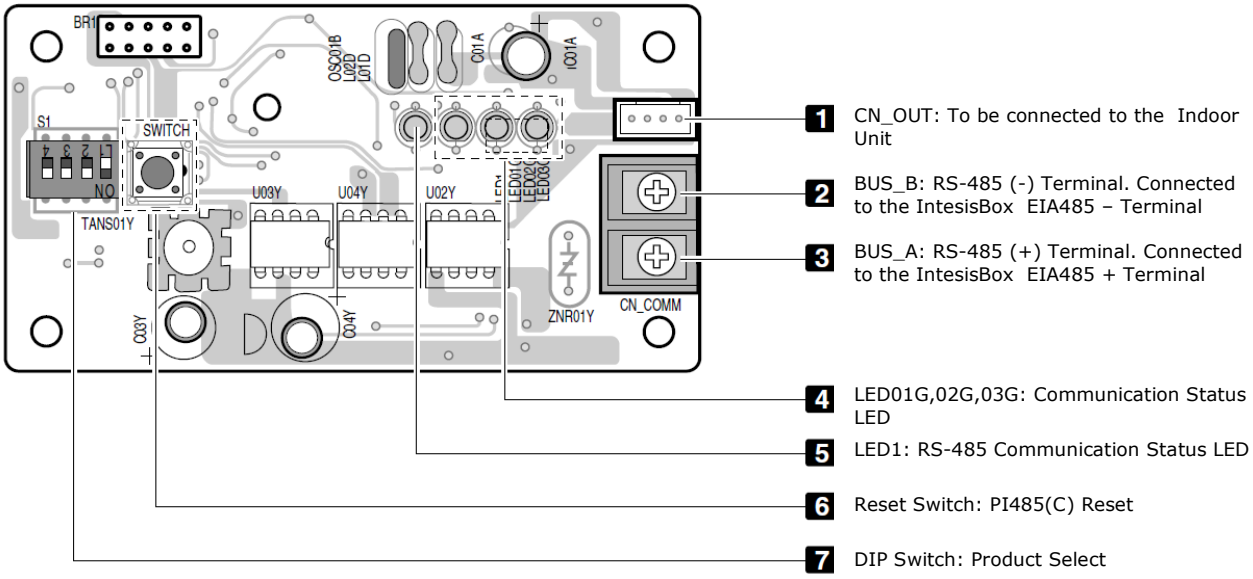
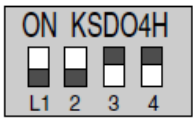


Figure 8.3 PHNFP14A0 board description

To allow the LG system to work with the IntesisBOX KNX – LG the DIP switch (number 7 in Figure 8.3) needs to be configured in as shown in Figure 8.4.



3, 4 ON+ALL OFF:
ECO-V Products + IntesisBox

Figure 8.4 DIP switch configuration

For more information read the LG PC Central Controller Installation Manual and the LG PI485 GATEWAY Installation Manual

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8.2 Indoor unit PCB address

Each indoor Unit needs to have an address so that the IntesisBox can communicate with it. Once set, this address is the one that is going to be used in the connection tab of LinkBoxEIB (section 3.4.1).

Setting the Indoor units addresses should be performed by LG qualified personnel at installation time and the LG installer needs to provide the list of addresses for Main addresses in an AC system before doing the configuration of IntesisBox.

To set the Indoor unit address there are two rotary switches (Figure 8.5), rotary low and Rotary High that allow the installer to set the desired address in the range.

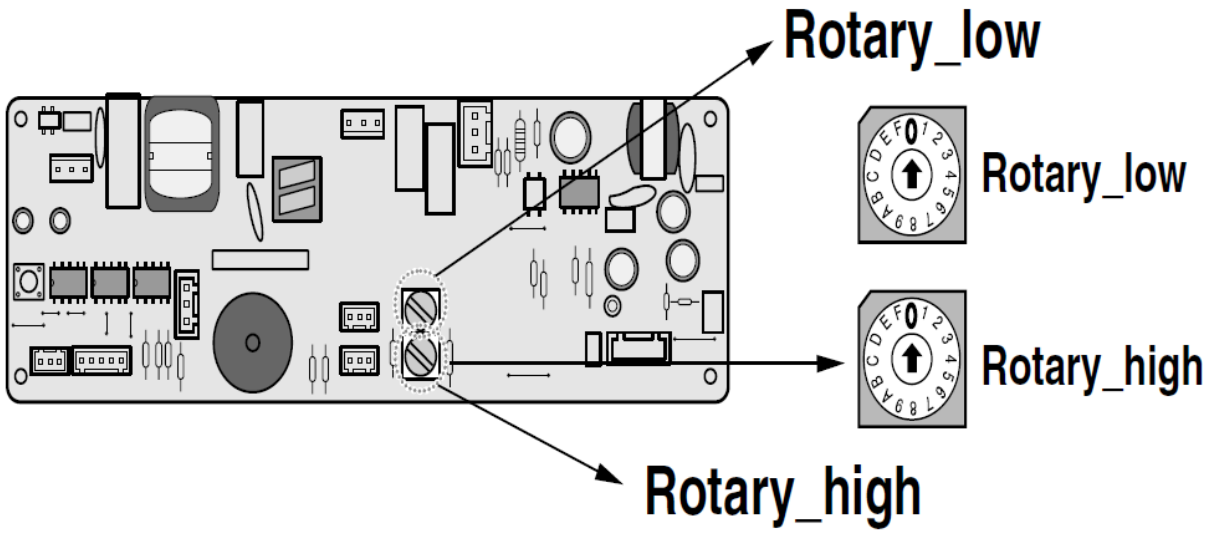

Figure 8.5 Ac Indoor address configuration

For more information read the LG PC Central Controller Installation Manual

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