

 **IntesisBox[®] KNX**
Samsung Air Conditioning

User's Manual

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

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

SM-ACN-KNX-4

Model supporting integration of up to 4 indoor units.

SM-ACN-KNX-8

Model supporting integration of up to 8 indoor units.

SM-ACN-KNX-16

Model supporting integration of up to 16 indoor units.

SM-ACN-KNX-64

Model supporting integration of up to 64 indoor units.

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1. Description

1.1 Introduction

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

A complete Samsung's AC system supports up to 16 outdoor units – all of them (and their respective indoor units) can be integrated with IntesisBox, allowing a maximum of 4 indoor units (SM-ACN-KNX-4), 8 indoor units (SM-ACN-KNX-8), 16 indoor units (SM-ACN-KNX-16) or 64 indoor units (SM-ACN-KNX-64).

This integration requires the Samsung AC system being equipped with a Samsung MIM-N10 only for ERV systems. Otherwise, direct connection to the R1/R2 connector of the outdoor unit will be enough.

MIM-N10 is supplied by Samsung. Contact your nearest Samsung AC Systems distributor for details.

1.2 Integration signals

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

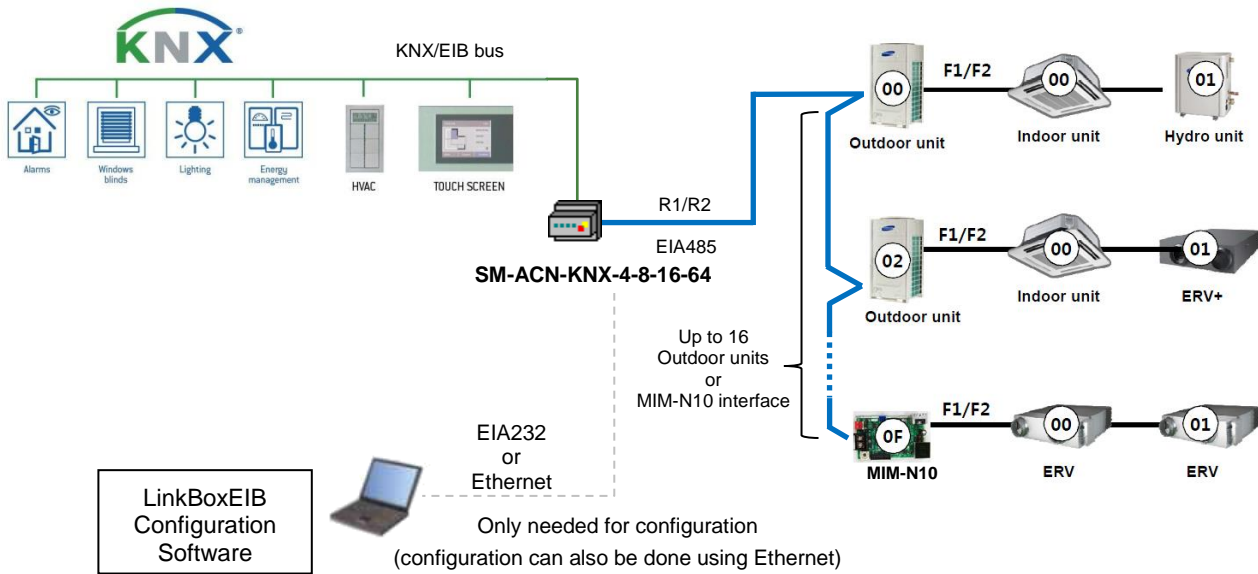
Signal	EIS type	Signal type
CommError	1 – Switching (1bit)	R
CommStatus	14 – Counter (8bit)	R
Unit Type	14 – Counter (8bit)	R
On / Off	1 – Switching (1bit)	R/W
OpMode	14 – Counter (8bit)	R/W
Mode::Cool	1 – Switching (1bit)	R/W
Mode::Heat	1 – Switching (1bit)	R/W
Mode::Dry	1 – Switching (1bit)	R/W
Mode::Fan	1 – Switching (1bit)	R/W
Mode::Auto	1 – Switching (1bit)	R/W
Mode::CoolStorage	1 – Switching (1bit)	R/W
Mode:: Hot Water	1 – Switching (1bit)	R/W
FanSpeed	14 - Counter (8 bit)	R/W
FanSpeed ::Auto	1 – Switching (1bit)	R/W
FanSpeed ::Low	1 – Switching (1bit)	R/W
FanSpeed ::Mid	1 – Switching (1bit)	R/W
FanSpeed ::High	1 – Switching (1bit)	R/W
UpDownSwing	1 – Switching (1bit)	R/W
FilterAlarm	1 – Switching (1bit)	R
FilterReset	1 – Switching (1bit)	W
SetpointTemp	5 – Float (16bit)	R/W
AmbientTemp	5 – Float (16bit)	R
ErrorCode	10-Counter (16bit sig.)	R
RC Restriction	1 – Switching (1bit)	R, R/W
BuzzerSound	1 – Switching (1bit)	W

Signal	EIS type	Signal type
WaterInTemp	5 – Float (16bits)	R
WaterOutTemp	5 – Float (16bits)	R
WaterOutSetpoint	5 – Float (16bits)	R/W
VentOnOff	1 – Switching (1bit)	R/W
VentOpMode	14 – Counter (8bit)	R/W
VentOpMode::HeatEx	1 – Switching (1bit)	R/W
VentOpMode::Sleep	1 – Switching (1bit)	R/W
VentOpMode::Auto	1 – Switching (1bit)	R/W
VentFanSpeed	14 – Counter (8bit)	R/W
VentFanSpeed::Low	1 – Switching (1bit)	R/W
VentFanSpeed::High	1 – Switching (1bit)	R/W
VentFanSpeed::Turbo	1 – Switching (1bit)	R/W
Discharge Temp Cool	5 – Float (16bit)	R/W
Discharge Temp Heat	5 – Float (16bit)	R/W
Water Out Av Temp	5 – Float (16bit)	R/W
Hot Water On/Off	1 – Switching (1bit)	R/W
Hot Water Mode (HWM)	5 – Float (16bit)	R/W
HWM::Eco	1 – Switching (1bit)	R/W
HWM::Standard	1 – Switching (1bit)	R/W
HWM::Power	1 – Switching (1bit)	R/W
HWM::Force	1 – Switching (1bit)	R/W
HW Setpoint Temp.	5 – Float (16bit)	R/W
HW Current temp.	5 – Float (16bit)	R
Error Slave Chiller Unit	5 – Float (16bit)	R
Slave Chiller Unit in Error	5 – Float (16bit)	R

* Note: Depending on the indoor unit type, some signals may not be present. Check section 2.2.2 for more information.

1.3 Functionality

Every one of the mentioned signals have to be associated to an *KNX group address*, with this, all the system is seen as a *one more KNX device*, with the same configuration and functioning characteristics.



IntesisBox KNX continuously *polls* (reads) the Samsung system for all configured signals and maintains 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 Samsung'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 a Samsung's AC signal, a message is sent immediately to the corresponding MIM or Outdoor Unit to perform the corresponding action in the Samsung's AC system.

In the continuous polling of each Outdoor Unit, if no response of a certain Outdoor Unit is detected, the corresponding virtual signal inside the gateway will be activated indicating communication error with the Outdoor Unit. Likewise, there is also a virtual signal per every AC indoor unit indicating communication error with the indoor unit – this signal will be normally activated if the indoor unit is not properly setup.

1.4 Capacity of IntesisBox

Element	Capacity	Notes
Number of Samsung Outdoor Units	16	Maximum number of Samsung Outdoor Units that the AC system supports.
Number of indoor units	64 *	Maximum number AC indoor units that can be controlled.

* There are four different models of *IntesisBox KNX – SAMSUNG NASA 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.: SM-ACN-KNX-4*
- Model supporting up to 8 indoor units. *Ref.: SM-ACN-KNX-8*
- Model supporting up to 16 indoor units. *Ref.: SM-ACN-KNX-16*
- Model supporting up to 64 indoor units. *Ref.: SM-ACN-KNX-64*

2. KNX interface of IntesisBox

2.1 Description

IntesisBox KNX- SAMSUNG supports the KNX TP-1 (EIB) physical layer, as defined in the KNX standard. It behaves as *another* 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 a 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 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 SAMSUNG interface of the IntesisBox), or receiving updates *from* KNX of the datapoint value (that will be propagated to the SAMSUNG 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, Samsung 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, SAMSUNG 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 2.2.2.

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 KNX support the following EIS-types:

- EIS1 - Switching (1bit raw)
- EIS5 - Value (16bit – floating type)
- EIS10 - 16bit Counter (16bit 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 LinkBoxEIB.

Also, a *dummy* ETS application is provided by Intesis Software (section 5), which can be imported into ETS. This application is not downloadable into IntesisBox KNX neither usable for IntesisBox configuration. Rather, it poses as a means of having a device in the ETS project representing the IntesisBox KNX and its own datapoints/communication objects, and to which group addresses are associated.

2.2 Communication objects available

Address map is configurable for each indoor unit and can be modified through the supplied software LinkBoxEIB. Next, there are two tables showing different datapoints/communication objects available either for each indoor unit control and status and Outdoor Unit status. Please, remember that in the tables **R/W** stands for *Read* and *Write*, **R** stands for *Read Only* and **W** stands for *Write Only*.

2.2.1 Communication objects per each outdoor unit:

Property	EIS type	Signal type (R/W)						Description / Status
		IU	HE/ HT	AHU	ERV	ERV+	Chiller	
OU_CommError	1 – Switching (1bit)	R	R	R	R	R	R	Communication Status <ul style="list-style-type: none"> ▪ 0 – Communication OK ▪ 1 – Communication ERROR

2.2.2 Communication objects per each indoor unit:

Property	EIS type	Signal type (R/W)						Description / Status
		IU	HE/ HT	AHU	ERV	ERV+	Chiller	
CommError	1 – Switching (1bit)	R	R	R	R	R	R	Communication Status ¹ <ul style="list-style-type: none"> ▪ 0 – Communication OK ▪ 1 – Communication ERROR
CommStatus	14 – Counter (8bit)	R	R	R	R	R	R	Communication status <ul style="list-style-type: none"> ▪ b0: Exist ▪ b1: Ready ▪ b2: Data Updated ▪ b3: Type OK
Unit Type	14 – Counter (8bit)	R	R	R	R	R	R	Unit type: <ul style="list-style-type: none"> ▪ 0: Not defined ▪ 1: IU ▪ 2: HE ▪ 3: HT ▪ 4: AHU ▪ 5: ERV ▪ 6: ERV+
On / Off	1 – Switching (1bit)	R/W	R/W	R/W	-	R/W	R/W	Indoor Unit On/Off <ul style="list-style-type: none"> ▪ 0: Off ▪ 1: On
OpMode	14 – Counter (8bit)	R/W	R/W	R/W	-	R/W	R/W	Operation Mode <ul style="list-style-type: none"> ▪ 0: Cool ▪ 1: Heat ▪ 2: Dry ▪ 3: Fan ▪ 4: Auto
	DPT 20.105 (8bit)	R/W	R/W	R/W	-	R/W	R/W	Operation Mode <ul style="list-style-type: none"> ▪ 0: Auto ▪ 1: Heat ▪ 3: Cool ▪ 9: Fan ▪ 14: Dry
	DPT 1.100 (1bit)	R/W	R/W	R/W	-	R/W	R/W	Operation Mode <ul style="list-style-type: none"> ▪ 0: Cool ▪ 1: Heat
Mode::Cool	1 – Switching (1bit)	R/W	R/W	R/W	-	R/W	R/W	Mode Cool <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active
Mode::Heat	1 – Switching (1bit)	R/W	R/W	R/W	-	R/W	R/W	Mode Heat <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active
Mode::Dry	1 – Switching (1bit)	R/W	R/W	R/W	-	R/W	-	Mode Dry <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active
Mode::Fan	1 – Switching (1bit)	R/W	R/W	R/W	-	R/W	-	Mode Fan <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active
Mode::Auto	1 – Switching (1bit)	R/W	R/W	R/W	-	R/W	-	Mode Auto <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active
Cool Storage	1 – Switching (1bit)	-	-	-	-	-	R/W	Cool Storage <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active
Hot Water	1 – Switching (1bit)	-	-	-	-	-	R/W	Hot Water <ul style="list-style-type: none"> ▪ 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)

¹ CommErr will be "0-Ok" when all ComStatus flags stay at '1'. On startup, CommErr will be "1-Error" until all indoor units are checked (Data updated).

FanSpeed	14 - Counter (8 bit)	R/W	-	-	-	-	-	Fan Speed <ul style="list-style-type: none"> ▪ 0: Auto ▪ 1: Low ▪ 2: Middle ▪ 3: High 	
FanSpeed ::Auto	1 – Switching (1bit)	R/W	-	-	-	-	-	FanSpeed Auto <ul style="list-style-type: none"> ▪ 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	-	-	-	-	-	FanSpeed Low <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active 	
FanSpeed ::Mid	1 – Switching (1bit)	R/W	-	-	-	-	-	FanSpeed Mid <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active 	
FanSpeed ::High	1 – Switching (1bit)	R/W	-	-	-	-	-	FanSpeed High <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active 	
UpDownSwing	1 – Switching (1bit)	R/W	-	-	-	-	-	Vanes Up/Down Swing <ul style="list-style-type: none"> ▪ 0: Swing Off ▪ 1: Swing On 	
FilterAlarm	1 – Switching (1bit)	R	-	R	R	R	-	Filter Alarm <ul style="list-style-type: none"> ▪ 0: Filter Alarm Not Present ▪ 1: Filter Alarm Present 	
FilterReset	1 – Switching (1bit)	W	-	-	W	W	-	Filter Reset <ul style="list-style-type: none"> ▪ 0: No Clear Filter Alarm ▪ 1: Clear Filter Alarm 	
SetpointTemp	5 – Float (16bit)	R/W	-	R/W	-	-	-	Setpoint temperature (Celsius value x10) <ul style="list-style-type: none"> ▪ In Heat Mode: 18°C to 30°C ▪ Other Modes: 16°C to 30°C 	
AmbientTemp	5 – Float (16bit)	R	-	R	-	-	-	Ambient temperature (Celsius value x10) <ul style="list-style-type: none"> ▪ -41°C to 100°C 	
ErrorCode	10-Counter (16bit sig)	R	R	R	R	R	R	Indoor Unit Error Code <ul style="list-style-type: none"> ▪ 0: No Error ▪ 100-999: Error Code¹ 	
RC Restriction	1 – Switching (1bit)	R/W	R	R/W	R/W	R/W	R/W	Remote Controller Restriction <ul style="list-style-type: none"> ▪ 0: Remote Controller Enabled ▪ 1: Remote Controller Disabled 	
BuzzerSound	1 – Switching (1bit)	W	-	-	-	-	-	Buzzer Off <ul style="list-style-type: none"> ▪ 0: Turns the buzzer on ▪ 1: Turns the buzzer off 	
WaterInTemp	5 – Float (16bits)	-	R	-	-	-	-	Water Inlet Temperature (Celsius value x10) <ul style="list-style-type: none"> ▪ T °C 	
WaterOutTemp	5 – Float (16bits)	-	R	-	-	-	-	Water Outlet Temperature (Celsius value x10) <ul style="list-style-type: none"> ▪ T °C 	
WaterOutSetpoint	5 – Float (16bits)	-	R/W	-	-	-	R/W	Water Outlet Setpoint Temp (Celsius value x 10) <ul style="list-style-type: none"> ▪ HE Cool: 5°C to 25°C ▪ HE Heat: 15°C to 50°C ▪ HT: 25°C to 80°C 	
VentOnOff	1 – Switching (1bit)	-	-	-	R/W	R/W	-	Ventilation On/Off <ul style="list-style-type: none"> ▪ 0: Off ▪ 1: On 	
VentOpMode	14 – Counter (8bit)	-	-	-	R/W	R/W	-	Ventilation Operation Mode <ul style="list-style-type: none"> ▪ 0: Bypass ▪ 1: HeatEx ▪ 2: Sleep ▪ 3: Auto 	
VentOpMode::Bypass	1 – Switching (1bit)	-	-	-	R/W	R/W	-	Ventilation Op. Mode Bypass <ul style="list-style-type: none"> ▪ 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)
VentOpMode::HeatEx	1 – Switching (1bit)	-	-	-	R/W	R/W	-	Ventilation Op. Mode Heat Ex. <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active 	
VentOpMode::Sleep	1 – Switching (1bit)	-	-	-	R/W	R/W	-	Ventilation Op. Mode Sleep <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active 	
VentOpMode::Auto	1 – Switching (1bit)	-	-	-	R/W	R/W	-	Ventilation Op. Mode Auto <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active 	
VentFanSpeed	14 – Counter (8bit)	-	-	-	R/W	R/W	-	Ventilation Fan Speed <ul style="list-style-type: none"> ▪ 0: Low ▪ 1: High ▪ 2: Turbo 	
VentFanSpeed::Low	1 – Switching (1bit)	-	-	-	R/W	R/W	-	Ventilation FanSpeed Low <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active 	

¹ See list of indoor unit error codes and their meaning in section 10.

VentFanSpeed::High	1 – Switching (1bit)	-	-	-	R/W	R/W	-	Ventilation FanSpeed High <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active
VentFanSpeed::Turbo	1 – Switching (1bit)	-	-	-	R/W	R/W	-	Ventilation FanSpeed Turbo <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1:Active
DischTempCool	5 – Float (16bit)	-	-	R/W	-	-	-	Discharge Temp on Cool (Celsius value x 10) <ul style="list-style-type: none"> ▪ 8°C to 25°C
DischTempHeat	5 – Float (16bit)	-	-	R/W	-	-	-	Discharge Temp on Heat (Celsius value x 10) <ul style="list-style-type: none"> ▪ 18°C to 43°C
WaterOutAvgTemp	5 – Float (16bit)	-	-	-	-	-	R/W	Discharge Temp on Cool (Celsius value x 10) <ul style="list-style-type: none"> ▪ T °C
Hot Water On/Off	1 – Switching (1bit)	-	R/W	-	-	-	-	Hot Water On/Off <ul style="list-style-type: none"> ▪ 0: Off ▪ 1: On
Hot Water Mode	5 – Float (16bit)	-	R/W	-	-	-	-	Hot Water Mode <ul style="list-style-type: none"> ▪ 0: Eco ▪ 1: Standard ▪ 2: Powerful ▪ 3: Force (EHS only)
HWM::Eco	1 – Switching (1bit)	-	R/W	-	-	-	-	Hot Water Mode Eco <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1: active
HWM::Standard	1 – Switching (1bit)	-	R/W	-	-	-	-	Hot Water Mode Standard <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1: active
HWM::Power	1 – Switching (1bit)	-	R/W	-	-	-	-	Hot Water Mode Power <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1: active
HWM::Force	1 – Switching (1bit)	-	R/W	-	-	-	-	Hot Water Mode Force (EHS) <ul style="list-style-type: none"> ▪ 0: Inactive ▪ 1: active
Hot Water Setpoint Temp.	5 – Float (16bit)	-	R/W	-	-	-	-	Hot Water Setpoint Temp. (Celsius value x 10) <ul style="list-style-type: none"> ▪ HE/EHS 30°C to 75°C ▪ HT 35°C to 75°C
Hot Water Current Temp.	5 – Float (16bit)	-	R/W	-	-	-	-	Hot Water Current Temp. (Celsius value x 10) <ul style="list-style-type: none"> ▪ T °C
Error of Slave Chiller Unit	5 – Float (16bit)	-	-	-	-	-	R	Error of Slave Chiller Unit <ul style="list-style-type: none"> ▪ 0: No Error ▪ x: Error (value 100 to 999)
Slave Chiller Unit Error	5 – Float (16bit)	-	-	-	-	-	R	Slave Chiller Unit Error <ul style="list-style-type: none"> ▪ b0: 1-Error in Unit0 ▪ ... ▪ b7: 1-Error in Unit7 ▪ b8: 1-Error in Unit8 ▪ ... ▪ b15: 1-Error in Unit15

3. IntesisBox KNX Device Connections

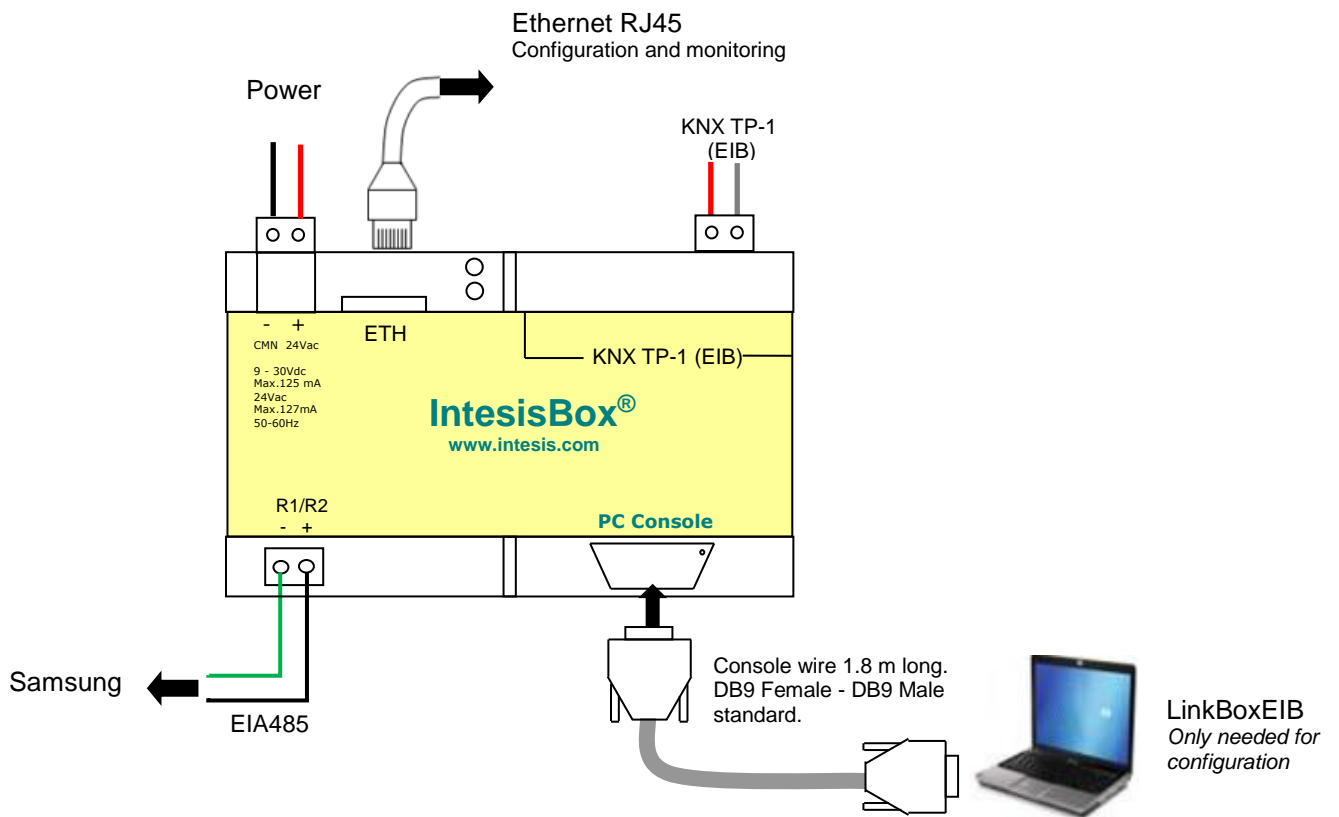
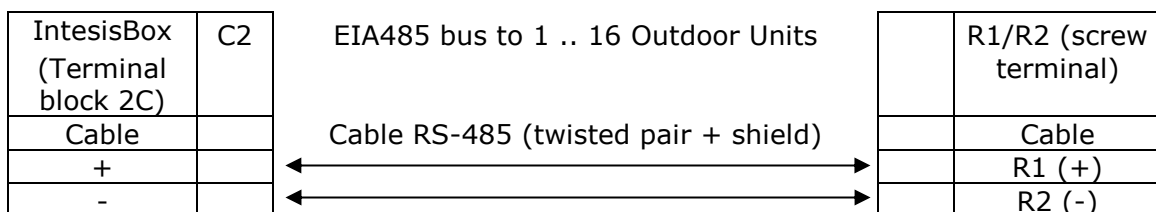


Figure 3.1 Integration of Samsung AC into KNX TP-1 (EIB) system

3.1 Connect to Samsung adaptor

Use the EIA485 connector in the left bottom corner of the IntesisBox device in order to connect the Samsung R1/R2 connector to the IntesisBox. Remember to follow all safety precautions indicated by Samsung.

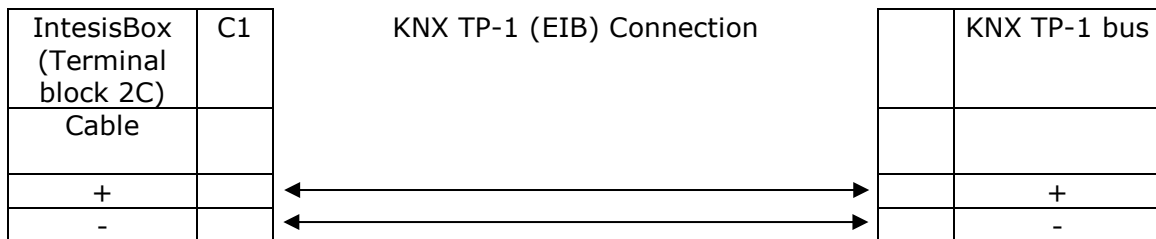


3.2 Connect to KNX Interface

Connect + and – terminals of the KNX bus to the IntesisBox KNX connector (C1). The polarity is important.

How to check if there is communication with the KNX bus is explained in the LinkBoxEIB Manual (section 0).

To check connectivity and correct functioning, use LinkBoxEIB software (see LinkBoxEIB User Manual).



3.3 Connect to PC (LinkBoxEIB)

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

- Ethernet: Using the ETH port (**Figure 3.1**) of IntesisBox.
- Serial cable: Connect the IntesisBox device to the PC serial port using the serial cable provided. One end should be connected to the Console EIA232 port of the IntesisBox device (**Figure 3.1**) and the other end to the PC serial port.

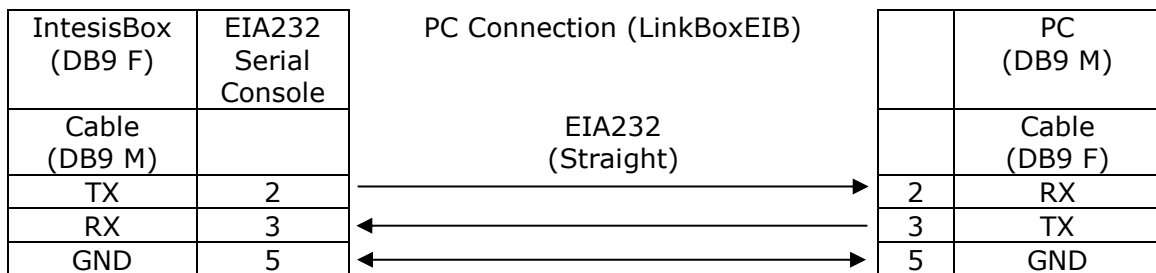


Table 3.1 EIA232 serial connection pin assign

3.4 Power Device

To power up the device, what you need is to plug properly the Power Supply connector to the IntesisBox device using a proper cable and connecting one end to the power supply connector (see **Figure 3.1**) and the other end to the power line.

4. LinkBoxEIB. Configuration & monitoring tool for IntesisBox KNX series.

4.1 Introduction

LinkBoxEIB is a Windows® compatible software developed specifically to monitor and configure IntesisBox KNX series.

The installation procedure and main functions are explained in the *LinkBoxEIB User Manual*. This document can be found in the Doc folder, or can be downloaded from the link indicated in the installation sheet supplied with the IntesisBox device.

In this section, only the specific case of Samsung indoor unit's integration to KNX networks will be covered.

4.2 Connections configuration

To configure the IntesisBox connection parameters and to see the points list, press on the **Config** button in the *menu bar* (see Figure 4.1). The *Samsung Configuration* window will open (see Figure 4.2). For integrations with large number of points, there is available an alternative CSV installation procedure explained in the LinkBoxEIB User Manual.

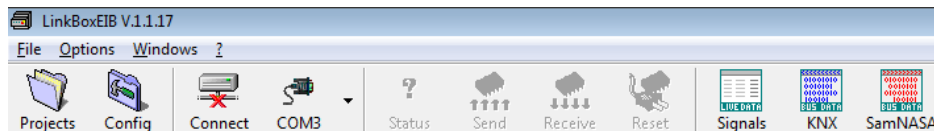


Figure 4.1 LinkBoxEIB menu bar

4.2.1 Configuration tab

Select the **Connection** tab to configure the connection parameters. Three subsets of information are shown in this window: EIB (KNX interface), IntesisBoxIP (IP interface for configuration) and Samsung interface parameters (see Figure 4.2).

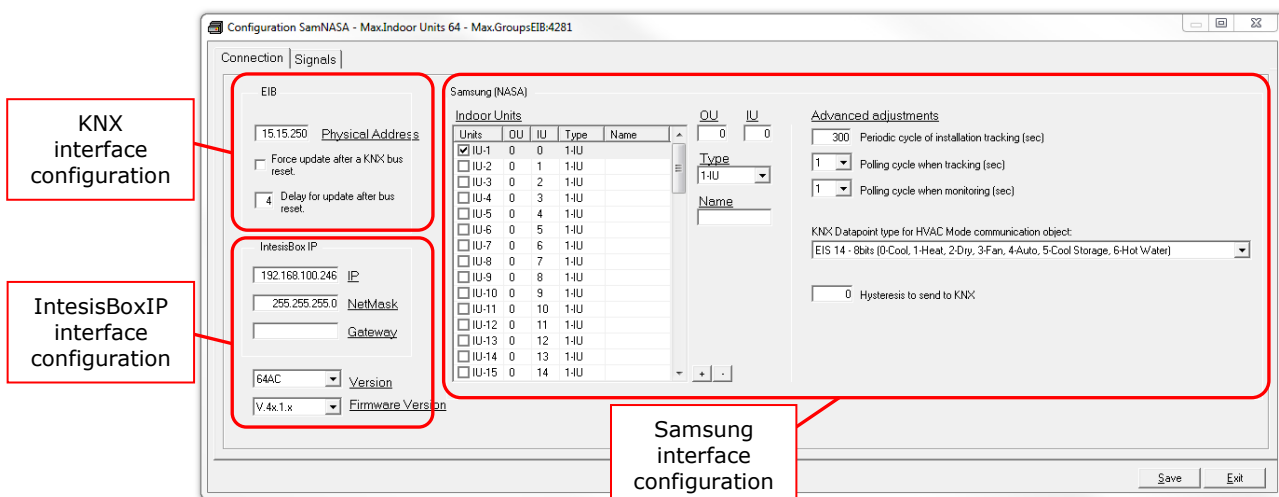


Figure 4.2 LinkBoxEIB configuration tab

Next, there is an explanation for each of the configuration parameters in each mode.

- KNX interface configuration parameters:

Figure 4.3 KNX interface configuration

- 1. Physical Address:** Enter the KNX physical address for the gateway.
 - 2. Force update after a KNX bus reset:** Affects to the KNX groups with the Update feature activated (U).
 - 3. Delay for update after bus reset:** Enter the desired delay after a bus reset. It is expressed in seconds.
- IntesisBoxIP interface configuration parameters and version selection:

Figure 4.4 IntesisBoxIP interface configuration

- 1. IP:** Enter the IP address for the gateway.
- 2. NetMask:** Enter the IntesisBox net mask address.
- 3. Gateway:** Enter the router or default gateway address if needed. In case you don't want to use it, left blank.
- 4. Gateway version:** Selection of the *IntesisBox KNX – Samsung NASA* gateway you are setting up.
- 5. Gateway Firmware Version:** Selection of the actual Firmware Version of the IntesisBox. (This info is shown in the *Intesis Communication Console* when connected).

- Samsung interface configuration parameters:

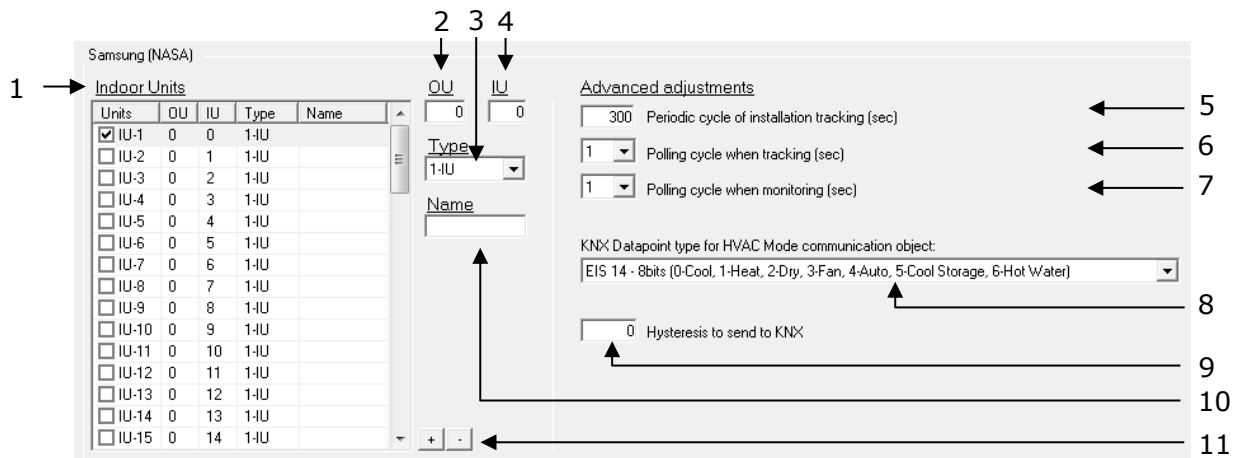


Figure 4.5 Samsung interface configuration

- 1. Indoor Units list.** In this list, you can individually enable each of the 64 indoor units available on the system. The index in the column "Indoor unit" (i.e. the number x in "IU-xxx") is the reference that will be used later on (in tab "Signals") to refer to this AC indoor unit. Values for columns "OU", "IU", "Type" and "Name" in each indoor unit (IU) can be changed by selecting the IU in the list, by means of textboxes 2, 3, 4 and 9.
- 2. Outdoor Unit address.** Address of the Outdoor Unit to which the selected IU is connected to. Its value range is 0 to 15.
- 3. Indoor Unit Type.** You need to select the type of indoor unit so the right signals can be applied. By default is IU type.
- 4. Indoor Unit address.** Main Address of the selected IU in the Samsung system. Its value range is 0 to 63.
- 5. Periodic cycle of installation.** This parameter indicates the cadence for the periodic tracking of the system looking for outdoor units. This is how often the tracking cycle is executed. If there is no outdoor unit connected, a communication error is shown.

Value ranges vary from 60 to 3000 seconds. Default and recommended value is 300s. If you want to disable this function, set the value to 0 seconds
- 6. Polling cycle when tracking.** This parameter indicates the minimum time between two consecutive TX frames sent by the IntesisBox for the periodic scan of the system when tracking. Default and recommended value is 1s.
- 7. Polling cycle when monitoring.** This parameter indicates the minimum time between two consecutive TX frames sent by the IntesisBox for the periodic scan of the system when monitoring. Default and recommended value is 1s.
- 8. KNX Datapoint type for HVAC Mode communication object:** Select the desired codification so the Mode object matches your integration needs.

9. Hysteresis to send to KNX: Minimal difference threshold for the updated date received from Samsung, to send a write to KNX. Value range is 0 to 1. (e.g., 0.5.)

10. Name: Enter here the desired descriptive Indoor Unit name (optional).

11. + / - : Select or unselect all units in the **Indoor Units** list.

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 commands sent at once ...)

4.2.2 Signals configuration

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

Signals list

1. Indoor Unit index (IU). This number is associated in the table "Indoor Units" of tab connections, with a certain OU address (0..15) and Main Address (0..63). Not editable.

2. **Signal Code.** Identifies available signals in each Samsung Indoor Unit. An identification code is given to every different signal with an individual code. In section 2.2, an explanation of each signal is given. Not editable.
3. **Signal availability.** Depending on the Indoor unit type, different signals will be available. The ones present are shown with an 'x'. The ones not available with an '-' and with a gray cell background.
4. **Signal.** Signal's descriptive name. Useful to identify the signal. Not editable.
5. **EIS.** KNX data type (Data point) to encode the signal's value. Not editable.
6. **Group.** Main KNX group address for the signal. Format: P/I/S or P/S. Features *W,R,T,U* explained below will only apply for this main KNX group address, not for listening addresses (if defined).
7. **Listening addresses.** Additional KNX addresses from which the signal can be written to (if, and 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.
8. **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.
9. **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.
10. **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.
11. **U.** Indicates if this signal will be requested (by means of a "read" telegram) on bus recovery. Note that it only makes sense if the own signal has its "W" flag enabled. Enable or disable by right clicking the cell.
12. **Active.** It allows disabling a particular signal in the integration.
13. **Show available signals.** When checked, all signals not present according to the Indoor Unit Type selection ('-' and a gray cell background) will be hidden from the signals table.

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 correct ones for the integration, do not modify this 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.

4.3 Saving the configuration and sending it to the gateway

When the configuration is finished, follow the next steps.

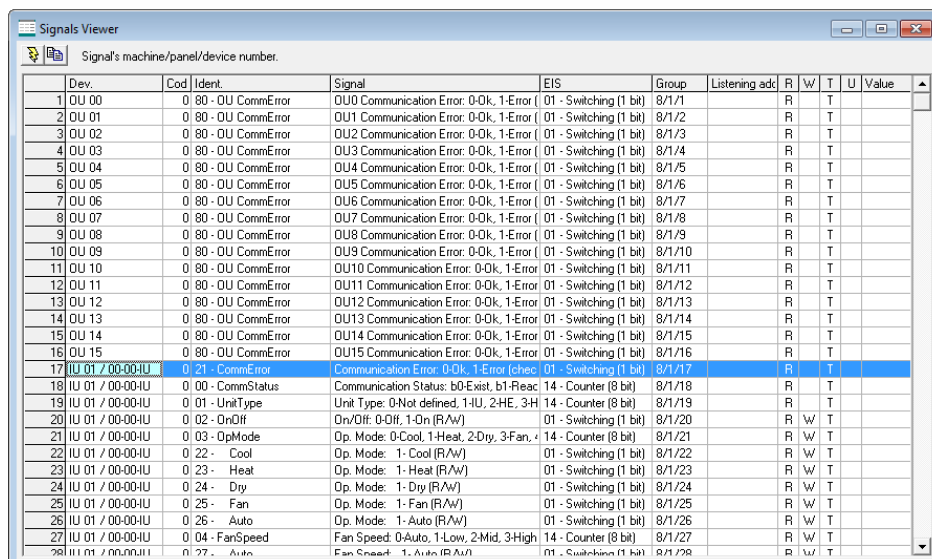
- 1.- Click on **Save** button to save the project to the project folder on your hard disk (more information in LinkBoxEIB User Manual).
- 2.- You will be prompted to generate the configuration file to be sent to the gateway.
 - a.- If **Yes** is selected, the binary file (SAMNASA.Lbox) containing the configuration for the gateway will be generated and saved also into the project folder.
 - b.- If **NO** is selected, remember that the binary file with the project needs to be generated before the IntesisBox starts to work as expected.
- 3.- Once in the configuration window again, click on **exit**. Configuration file is ready to be sent to the IntesisBox device.
- 4.- Press the **Send File** button to send the binary file to the IntesisBox device. The process of file transmission can be monitored in the IntesisBox Communication Console window. IntesisBox will reboot automatically once the new configuration is loaded.

After any configuration change, do not forget to send the configuration file to the IntesisBox using button Send File.

4.4 Signals viewer

Once the gateway is running with the correct configuration, to supervise the status of the configured signals, press the **Signals** button on the *menu* bar (see Figure 4.1). The Signals Viewer window will open (see Figure 4.6).

This window shows all signals active within the gateway with its main configuration parameters and its real time value¹ in the **Value** column.



Dev	Cod	Ident	Signal	EIS	Group	Listening add	R	W	T	U	Value
1	0U 00	0 80 - DU CommError	DU0 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/1		R	T			
2	0U 01	0 80 - DU CommError	DU1 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/2		R	T			
3	0U 02	0 80 - DU CommError	DU2 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/3		R	T			
4	0U 03	0 80 - DU CommError	DU3 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/4		R	T			
5	0U 04	0 80 - DU CommError	DU4 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/5		R	T			
6	0U 05	0 80 - DU CommError	DU5 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/6		R	T			
7	0U 06	0 80 - DU CommError	DU6 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/7		R	T			
8	0U 07	0 80 - DU CommError	DU7 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/8		R	T			
9	0U 08	0 80 - DU CommError	DU8 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/9		R	T			
10	0U 09	0 80 - DU CommError	DU9 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/10		R	T			
11	0U 10	0 80 - DU CommError	DU10 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/11		R	T			
12	0U 11	0 80 - DU CommError	DU11 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/12		R	T			
13	0U 12	0 80 - DU CommError	DU12 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/13		R	T			
14	0U 13	0 80 - DU CommError	DU13 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/14		R	T			
15	0U 14	0 80 - DU CommError	DU14 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/15		R	T			
16	0U 15	0 80 - DU CommError	DU15 Communication Error: 0-Ok, 1-Error	01 - Switching (1 bit)	8/1/16		R	T			
17	0U 01 / 00-00-0U	0 21 - CommError	Communication Error: 0-Ok, 1-Error (chase)	01 - Switching (1 bit)	8/1/17		R	T			
18	0U 01 / 00-00-0U	0 00 - CommStatus	Communication Status: b0-Exist, b1-Reac	14 - Counter (8 bit)	8/1/18		R	T			
19	0U 01 / 00-00-0U	0 01 - UnitType	Unit Type: 0-Not defined, 1-U, 2-HE, 3-H	14 - Counter (8 bit)	8/1/19		R	T			
20	0U 01 / 00-00-0U	0 02 - OnOff	On/Off: 0-Off, 1-On (R/W)	01 - Switching (1 bit)	8/1/20		R	W	T		
21	0U 01 / 00-00-0U	0 03 - OpMode	Op. Mode: 0-Cool, 1-Heat, 2-Dry, 3-Fan, 4	14 - Counter (8 bit)	8/1/21		R	W	T		
22	0U 01 / 00-00-0U	0 22 - Cool	Op. Mode: 1 - Cool (R/W)	01 - Switching (1 bit)	8/1/22		R	W	T		
23	0U 01 / 00-00-0U	0 23 - Heat	Op. Mode: 1 - Heat (R/W)	01 - Switching (1 bit)	8/1/23		R	W	T		
24	0U 01 / 00-00-0U	0 24 - Dry	Op. Mode: 1 - Dry (R/W)	01 - Switching (1 bit)	8/1/24		R	W	T		
25	0U 01 / 00-00-0U	0 25 - Fan	Op. Mode: 1 - Fan (R/W)	01 - Switching (1 bit)	8/1/25		R	W	T		
26	0U 01 / 00-00-0U	0 26 - Auto	Op. Mode: 1 - Auto (R/W)	01 - Switching (1 bit)	8/1/26		R	W	T		
27	0U 01 / 00-00-0U	0 04 - FanSpeed	Fan Speed: 0-Auto, 1-Low, 2-Mid, 3-High	14 - Counter (8 bit)	8/1/27		R	W	T		
28	0U 01 / 00-00-0U	0 27 - Auto	Fan Speed: 1 - Auto (R/W)	01 - Switching (1 bit)	8/1/28		R	W	T		

Figure 4.6 LinkBoxEIB Signals Viewer

The signals viewer can be used even though only one system is connected to the IntesisBox, KNX or Samsung AC. Therefore, it becomes convenient for supervision and testing the system.

¹ In case you connect to the IntesisBox when it's been running for a certain time, you should press the *Refresh* button to get updated values. After pressing *Refresh*, all signal values will keep continuously updated until the connection is closed.

In order to force a specific value to a signal, double-click its row in the table. This will display a dialog in which the desired value can be entered (see Figure 4.7). Changing its value in this way, will make:

- The content of the corresponding KNX group address will be changed to this value.
- If the signal is write-enabled, it will trigger a suitable command to Samsung AC system.

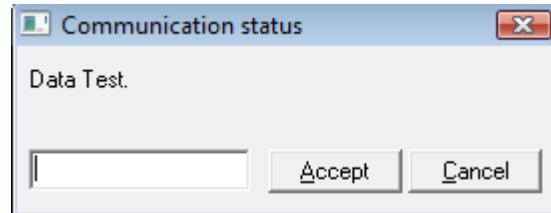


Figure 4.7 Signal value change window

4.5 Files

LinkBoxEIB saves the gateway configuration in the following files inside the project folder:

PROJECT.INI	Ini file containing general information related to the project
SAMNASA.INI	Ini file containing the information related to the values configured through the "Connection" tab in IntesisBox configuration
SAMNASA.DAT	Text file (tab separated values) with the signals information (signals list). This file can be edited with Excel to edit large configurations systematically. After editing it with excel, you will need to re-open it with LinkBoxEIB so to generate the corresponding binary downloadable file.
SAMNASA.LBOX	Binary file created from the information in the files described above. This is the file uploaded to the gateway.

It is strongly recommended to back up the project folder containing these files in external media, once the installation process is finished. This way you will be able to do future configuration changes in case of reinstallation of LinkBoxEIB due, for example, to a failure of the hard disk in the PC where LinkBoxEIB was previously installed.

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

5. IntesisBox and ETS

5.1 Integration of IntesisBox in ETS

As explained the IntesisBox is configured with the LinkBoxEIB 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

6. Setup process and troubleshooting

6.1 Pre-requisites

It is necessary to have a KNX TP-1 (EIB) system operative and ready to be connected to the KNX port of IntesisBox.

It is necessary to have suitable RS485 bus network connection near IntesisBox with all Samsung units connected to this network using the R1/R2 connectors.

Connection cables, PC for LinkBoxEIB, is not supplied by Intesis Software for this standard integration. The items supplied by Intesis Software for this integration are:

- IntesisBox KNX gateway with KNX internal protocol and Samsung AC external protocol firmware loaded.
- Console cable. Standard DB9F-DB9M cable 1.8 meters long.
- LinkBoxEIB software.
- Product documentation.

6.2 Setup procedure

1. Install LinkBoxEIB on your laptop.
2. Install IntesisBox in the desired installation site. The mounting can be on DIN rail or on a stable not vibrating surface (DIN rail mounting inside a metallic industrial cabinet connected to ground is recommended).
3. Connect the KNX TP-1 (EIB) bus cable to the port marked as **KNX TP-1 (EIB)** of IntesisBox. (See details for this bus cable in section *Connections* of this document).
4. Connect the RS485 cable attached to Samsung's AC MIMs or Outdoor Units to the port marked as **R1/R2** of IntesisBox. (See details for this communication cable in section *Connections* of this document).
5. Power up IntesisBox using a standard power supply 220/125VAC-12VDC/300mA for example.

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.
6. Connect the communication cable coming from the serial port of your laptop PC to the port marked as **PC** of IntesisBox. (See details for this communication cable in section *Connections* of this document).
 7. Open LinkBoxEIB, and proceed as explained in section 0.
 8. You can check proper communication between the elements of the integration using LinkBoxEIB bus viewers and signal viewers. Check the LinkBoxEIB manual for more information.

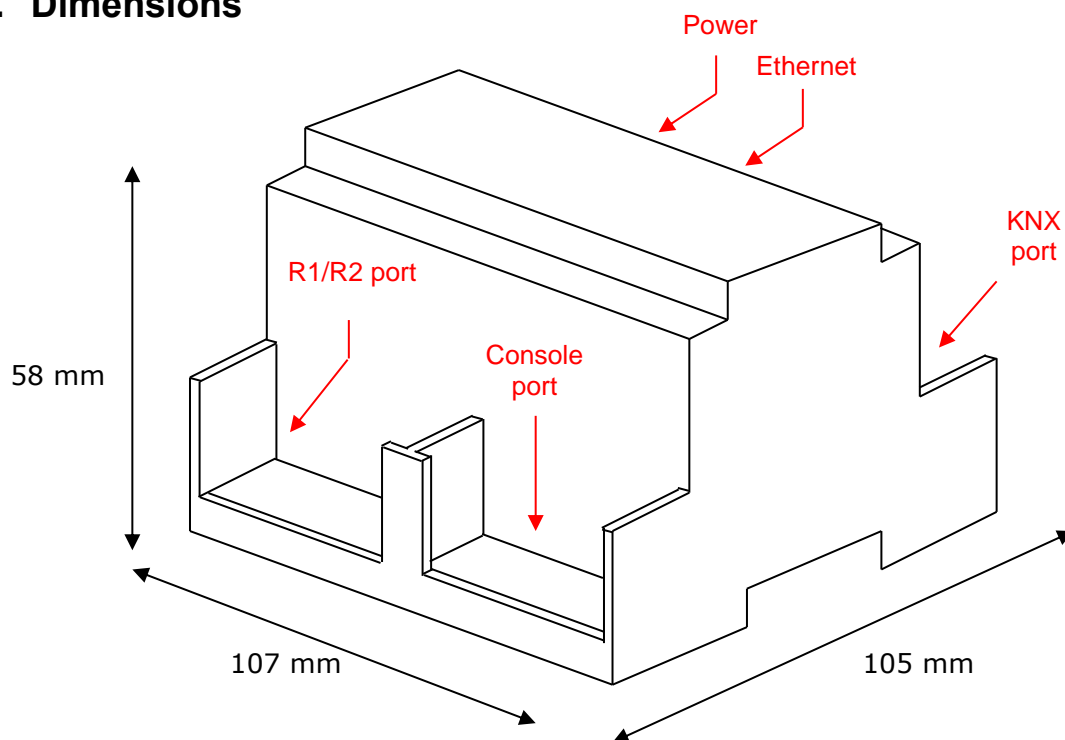
7. Electrical and Mechanical characteristics

Envelope	Plastic type PC (UL 94 V-0). Size: 107mm x 105mm x 58mm.
Color	Grey. RAL 7035.
Power	9 to 30Vdc +/-10%, 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 ² ... 2.5mm ² 2 cores: 0.5mm ² ... 1.5mm ² 3 cores: not permitted
Mounting options	Wall DIN rail EN60715 TH35.
KNX (EIB) port	1 x KNX TP1 (EIB) port opto-isolated. Plug-in terminal bloc (2 poles). TNV-1
Samsung AC port	1 x EIA485. Plug-in screw terminal block (2 poles). SELV
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	EIA232. DB9 female connector (DCE).
Configuration	Via console port. ²
Firmware	Allows upgrades via console port.
Operational temperature range	0°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 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

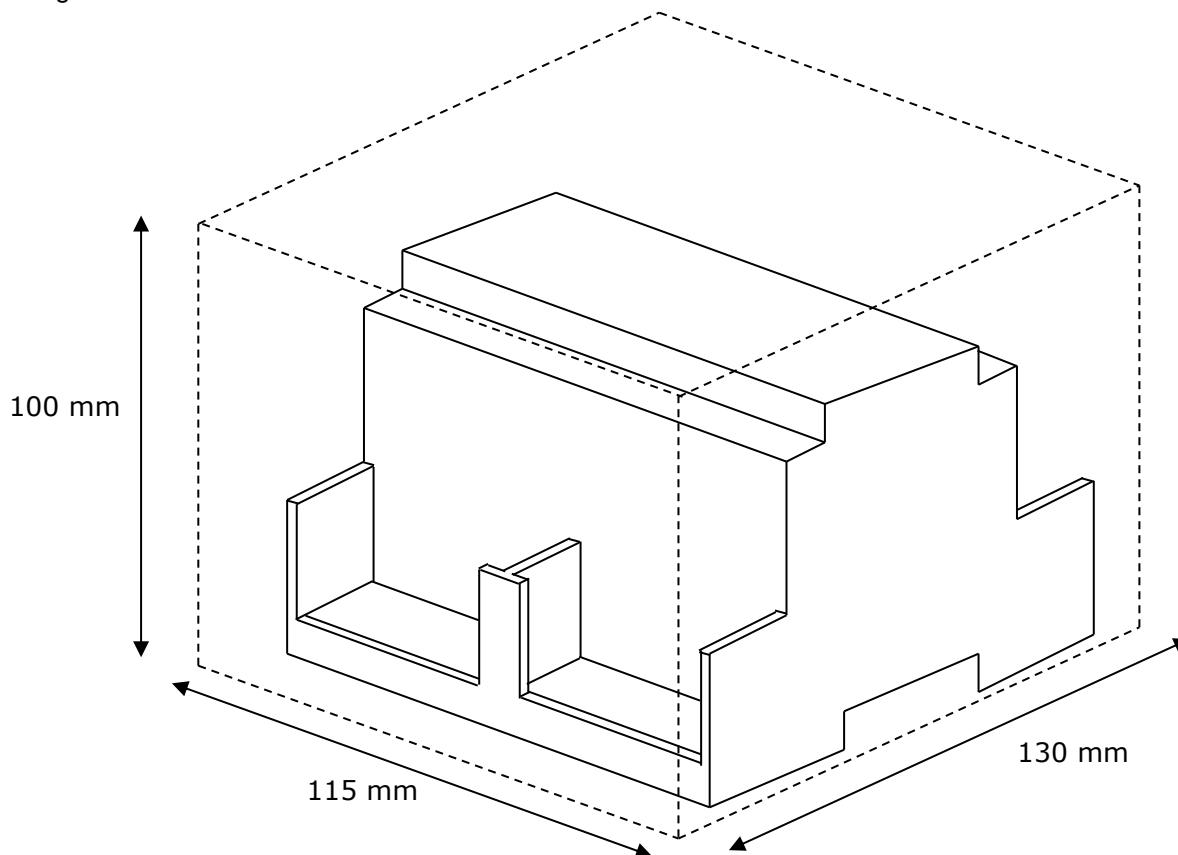
¹ Not operational for the moment. Reserved for future use.

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.

8. Dimensions



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



9. AC Unit Types compatibility

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

https://www.intesisbox.com/intesis/support/compatibilities/IntesisBox_SM-ACN-xxx-MIU_AC_Compatibility.pdf

10. Error codes for Indoor Units

This list contains all possible values shown in communication object "Error Code" for each indoor unit.

Error Code	Description
101	Indoor unit communication error. Indoor unit cannot receive any data from outdoor unit.
102	Communication error between indoor unit and outdoor unit. Displayed in indoor unit.
108	Error due to repeated address setting (When 2 or more devices has same address within the
110	Communication error between Hydro unit HT(Main PBA) and Control kit PBA(Detection from the Control kit)
121	Error on indoor temperature sensor of indoor unit (Short or Open)
122	Error on EVA IN sensor of indoor unit (Short or Open)
123	Error on EVA OUT sensor of indoor unit (Short or Open)
128	EVA IN temperature sensor of indoor unit is detached from EVA IN pipe
129	EVA OUT temperature sensor of indoor unit is detached from EVA OUT pipe
130	Heat exchanger in/out sensors of indoor unit are detached
135	RPM feedback error of indoor unit's cleaning fan
151	Error due to opened EEV of indoor unit (2nd detection)
152	Error due to closed EEV of indoor unit (2nd detection)
153	Error on floating switch of indoor unit (2nd detection)
154	RPM feedback error of indoor unit
161	Mixed operation mode error of indoor unit; When outdoor unit is getting ready to operate in cooling (or heating) and some of the indoor unit is trying to operate in heating (or cooling) mode
162	EEPROM error of MICOM (Physical problem of parts/circuit)
163	Indoor unit's remote controller option input is Incorrect or missing. Outdoor unit EEPROM data error
180	Simultaneous opening of cooling/heating MCU SOL V/V (1st detection)
181	Simultaneous opening of cooling/heating MCU SOL V/V (2nd detection)
185	Cross wiring error between communication and power cable of indoor unit
186	Connection error or problem on SPi
190	No temperature changes in EVA IN during pipe inspection or changes in temperature indoor unit with wrong address
191	No temperature changes in EVA OUT during pipe inspection or changes in temperature is seen in indoor unit with wrong address
198	Error due to disconnected thermal fuse of indoor unit
201	Communication error between indoor and outdoor units (installation number setting error, repeated indoor unit address, indoor unit communication cable error)
202	Communication error between indoor and outdoor units (Communication error on all indoor unit, outdoor unit communication cable error)
203	Communication error between main and sub outdoor units
205	Communication error on all PBA within the outdoor unit C-Box, communication cable error
206	E206-C001: HUB PBA communication error / E206-C002: FAN PBA communication error E206-C003: INV1 PBA communication error / E206-C004: INV2 PBA communication error
211	When single indoor unit uses 2 MCU ports that are not in series.
212	If the rotary switch (on the MCU) for address setting of the indoor unit has 3 or more of the same address

213	When total number of indoor units assigned to MCU is same as actual number of installed indoor units but there is indoor unit that is not installed even though it is assigned on MCU
214	When number of MCU is not set correctly on the outdoor unit or when two or more MCU was installed some of them have the same address
215	When two different MCU's have same address value on the rotary switch
216	When indoor unit is not installed to a MCU port but the switch on the port is set to On.
217	When indoor unit is connected to a MCU port but indoor unit is assigned to a MCU and the switch on the port is set to Off
218	When there's at least one or more actual number of indoor unit connection compared to number of indoor units assigned to MCU
219	Error on temperature sensor located on MCU intercooler inlet (Short or Open)
220	Error on temperature sensor located on MCU intercooler outlet (Short or Open)
221	Error on outdoor temperature sensor of outdoor unit (Short or open)
231	Error on COND OUT temperature sensor of main outdoor unit (Short or Open)
241	COND OUT sensor is detached
251	Error on discharge temperature sensor of compressor 1 (Short or Open)
257	Error on discharge temperature sensor of compressor 2 (Short or Open)
262	Discharge temperature sensor of compressor 1 is detached from the sensor holder on the pipe
263	Discharge temperature sensor of compressor 2 is detached from the sensor holder on the pipe
266	Top sensor of compressor 1 is detached
267	Top sensor of compressor 2 is detached
269	Suction temperature sensor is detached from the sensor holder on the pipe
276	Error on top sensor of compressor 1 (Short or Open)
277	Error on top sensor of compressor 2 (Short or Open)
291	Refrigerant leakage or error on high pressure sensor (Short or Open)
296	Refrigerant leakage or error on low pressure sensor (Short or Open)
308	Error on suction temperature sensor (Short or Open)
311	Error on temperature sensor of double layer pipe/liquid pipe(sub heat exchanger) (Short or Open)
321	Error on EVI (ESC) IN temperature sensor (Short or Open)
322	Error on EVI (ESC) OUT temperature sensor (Short or Open)
323	Error on suction sensor 2 (Short or Open)
346	Error due to operation failure of Fan2
347	Motor wire of Fan2 is not connected
348	Lock error on Fan2 of outdoor unit
353	Error due to overheated motor of outdoor unit's Fan2
355	Error due to overheated IPM of Fan2
361	Error due to operation failure of inverter compressor 2
364	Error due to over-current of inverter compressor 2
365	V-limit error of inverter compressor 2
366	Error due to over voltage /low voltage of inverter PBA2
367	Error due to unconnected wire of compressor 2
368	Output current sensor error of inverter PBA2
369	DC voltage sensor error of inverter PBA2
374	Heat sink temperature sensor error of inverter PBA2
378	Error due to overcurrent of Fan2
385	Error due to input current of inverter 2
386	Over-voltage/low-voltage error of Fan2

387	Hall IC connection error of Fan2
389	V-limit error on Fan2 of compressor
393	Output current sensor error of Fan2
396	DC voltage sensor error of Fan2
399	Heat sink temperature sensor error of Fan2
400	Error due to overheat caused by contact failure on IPM of Inverter PBA2
407	Compressor operation stop due to high pressure protection control
410	Compressor operation stop due to low pressure protection control or refrigerant leakage
416	Compressor operation stop due to discharge temperature protection control
425	Phase reversal or phase failure (3Ø outdoor unit wiring, R-S-T-N), connection error on 3 phase input
428	Compressor operation stop due abnormal compression ratio
438	EVI (ESC) EEV leakage or internal leakage of intercooler or incorrect connector insertion of EVI (ESC) EEV
439	Error due to refrigerant leakage
440	Heating mode restriction due to high air temperature
441	Cooling mode restriction due to low air temperature
442	Refrigerant charging restriction in heating mode when air temperature is over 15 °C
443	Operation prohibited due to the pressure drop
445	CCH is deatched
446	Error due to operation failure of Fan1
447	Motor wire of Fan1 is not connected
448	Lock error on Fan1
452	Error due to ZPC detection circuit problem or power failure
453	Error due to overheated motor of outdoor unit's Fan1
455	Error due to overheated IPM of Fan1
461	Error due to operation failure of inverter compressor 1
462	Compressor stop due to full current control or error due to low current on CT2
464	Error due to over-current of inverter compressor 1
465	V-limit error of inverter compressor 1
466	Error due to over voltage /low voltage of inveter PBA1
467	Error due to unconnected wire of compressor 1
468	Output current sensor error of inverter PBA1
469	DC voltage sensor error of inver PBA1
474	Heat sink temperature sensor error of inverter PBA1
478	Error due to overcurrent of Fan1
485	Error due to input current of inverter 1
486	Error due to over voltage/low voltage of Fan
487	Hall IC error of Fan1
489	V-limit error on Fan1 of compressor
493	Output current sensor error of Fan1
496	DC voltage sensor error of Fan1
499	Heat sink temperature sensor error of Fan1
500	Error due to overheat caused by contact failure on IPM of Inverter PBA1
503	Error due to alert the user to check if the service valve is closed
504	Error due to self diagnosis of compressor operation
505	Error due to self diagnosis of high pressure sensor
506	Error due to self diagnosis of low pressure sensor
560	Outdoor unit's option switch setting error (when inappropriate option switch is on)

563	Error due to module installation of indoor unit with old version (Micom version needs to be checked)
573	Error due to using single type outdoor unit in a module installation
601	Communication error between remote controller and the DVM Hydro unit / Hydro unit HT
602	Communication error between master and slave remote controller
604	Tracking error between remote controller and the DVM Hydro unit / Hydro unit HT
618	Error due to exceeding maximum numbers of Hydro unit installation (16 units)
627	Error due to exceeding maximum numbers of wired remote controller installation (2 units)
633	Error caused by installing mixed models
653	Remote controller's temperature sensor is disconnected or has problem
654	Data error on remote controller (Memory read/write error)
702	Error due to closed EEV of indoor unit (1st detection)
703	Error due to opened EEV of indoor unit (1st detection)
901	Error on the sensor of water inlet pipe (Short or Open)
902	Error on the sensor of water outlet pipe (Short or Open)
904	Error on water tank (Short or open)
907	Error due to pipe rupture protection
908	Error due to freeze prevention(Re-operation is possible)
909	Error due to freeze prevention(Re-operation is impossible)
910	Water temperature sensor on water outlet pipe is detached
911	Flow switch off error, When the switch is turned off within 10 seconds after a pump starts its operation(Re-operation is possible)
913	Six times detection for Flow Switch Error(Re-operation is not possible)
914	Error due to incorrect thermostat connection
915	Error on DC fan(Non-operating)
573	Error due to using single type outdoor unit in a module installation
601	Communication error between remote controller and the DVM Hydro unit / Hydro unit HT
602	Communication error between master and slave remote controller
604	Tracking error between remote controller and the DVM Hydro unit / Hydro unit HT
618	Error due to exceeding maximum numbers of Hydro unit installation (16 units)
627	Error due to exceeding maximum numbers of wired remote controller installation (2 units)
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