IntesisBox® KNX

Panasonic VRF Air Conditioning

User Manual

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Intesis

Member of the HMS group

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Gateway for the integration of Panasonic VRF systems into KNX home automation systems.

Order code:

IBKNXPAN016O000, 16 indoor units
IBKNXPAN064O000, 64 indoor units

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1 Description

1.1 Introduction

This document describes the integration of Panasonic VRF air conditioning systems into KNX home automation systems using gateway *IntesisBox KNX – Panasonic VRF.*

The aim of this integration is to monitor and control your Panasonic air conditioning system, from your KNX TP-1 installation. To do it so, IntesisBox performs as a one more KNX device, sending and receiving telegrams to group addresses in the KNX network.

IntesisBox makes available the Panasonic air conditioning system indoor units datapoints through independent KNX objects.

Up to 64 indoor units supported, depending on product version.

This document assumes that the user is familiar with KNX and Panasonic technologies and their technical terms.
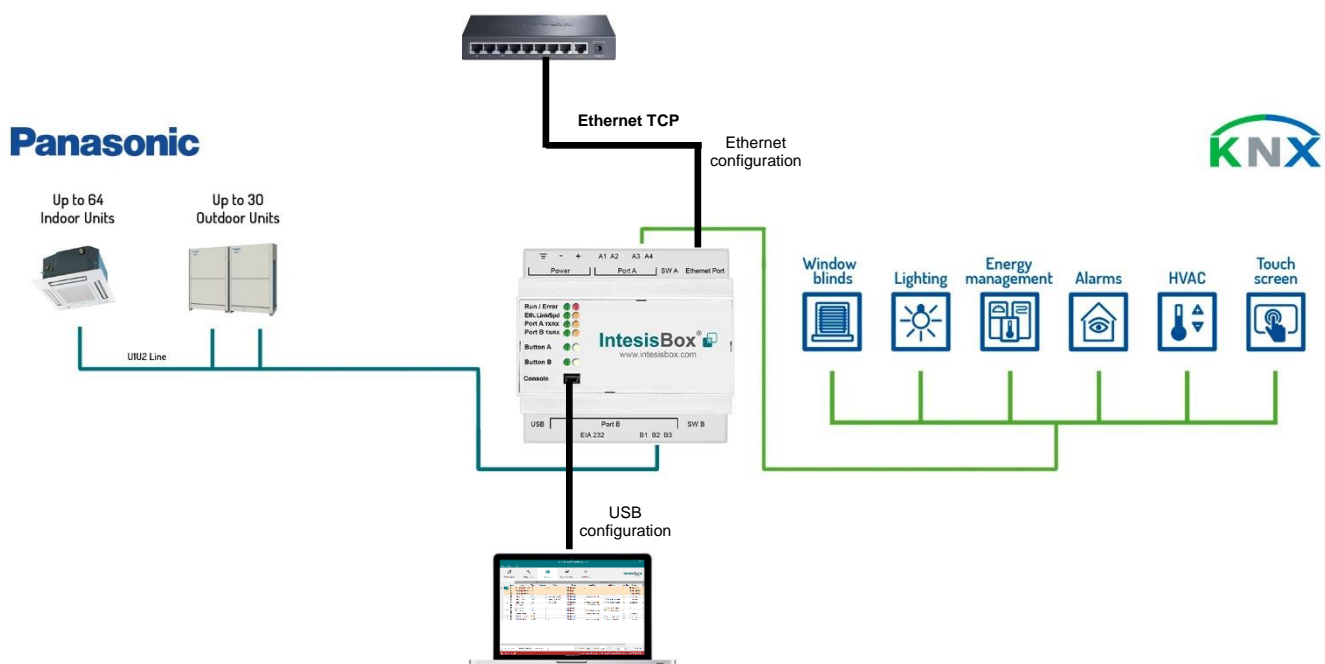
Integration of Panasonic VRF systems into
KNX control systems

1.2 *Functionality*

IntesisBox® continuously monitors Panasonic VRF network for all configured signals and keeps the updated status of all of them in its memory. It triggers updates on configured group addresses to KNX network on value change.

Each indoor unit is offered as a set of KNX objects.

Element	Object supported
Outdoor Unit	• Status
Indoor Unit	• Status • Command • Communication status
General signals (all units)	• Command

1.3 *Capacity of IntesisBox*

Element	Max.	Notes
Number of indoor units	64	Number of indoor units that can be controlled through IntesisBox

Its order code is:

- IBKNXPAN016O000: Model supporting up to 16 indoor units
- IBKNXPAN064O000: Model supporting up to 64 indoor units

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2 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.* Connection with the Panasonic system is also called from now on *external system*.

2.1 *Description*

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

Internally, the circuit part connected to the KNX 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 WRITE telegrams of KNX group addresses associated to communication objects, the corresponding messages are sent to the external system (Panasonic installation).

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

The status of the KNX bus is checked continuously and, if a bus drop-down is detected, for example due to failure in the bus power supply, after the KNX bus is restored again, IntesisBox will send READ telegrams to group addresses of all communication objects marked with flag 'Ri'. The behavior of each individual point into IntesisBox is determined by the flags configured for the communication object. See details below.

2.2 *Points definition*

Every group object in configuration has following KNX properties:

Property	Description
Description	Descriptive information about the communication object or signal.
Object function	Information on range of values for the group object.
DPT	Datapoint type. It is the KNX data type used to encode the signal's value. It will depend on the type of signal associated in the external system in every case.
Group	It is the KNX group to which the point is associated. It is also the group to which the read (R), write (W), transmit (T), update (U) and read on init (Ri) flags are applied. It is the sending group.
Listening addresses	They are the addresses that can write on the group object, a part of the main group address.
R	Read. If this flag is activated, READ telegrams of this group address will be accepted.
Ri	Read on Init. If this flag is activated, the object will trigger corresponding READ request (on associated group address) on initialization.
W	Write. If this flag is activated, WRITE telegrams on this group object will be accepted.
T	Transmit. If this flag is activated, when the group object value changes, due to a change in the external system, a WRITE telegram of the associated group address will be sent to the KNX bus.
U	Update. If this flag is activated, UPDATE telegrams (response to READ telegrams) on this group object will be accepted.
Active	If activated, the point will be active in IntesisBox, if not, the behavior will be as if the point is not defined. This allows deactivating points without the need of delete them for possible future use.

These properties are common for all IntesisBox KNX series gateways. Although each integration may have specific properties according to the type of signals of the external system.

See list of communication objects in **9 APPENDIX A – COMMUNICATION OBJECTS TABLE.**

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3   Connections

Find below information regarding the IntesisBox connections available.
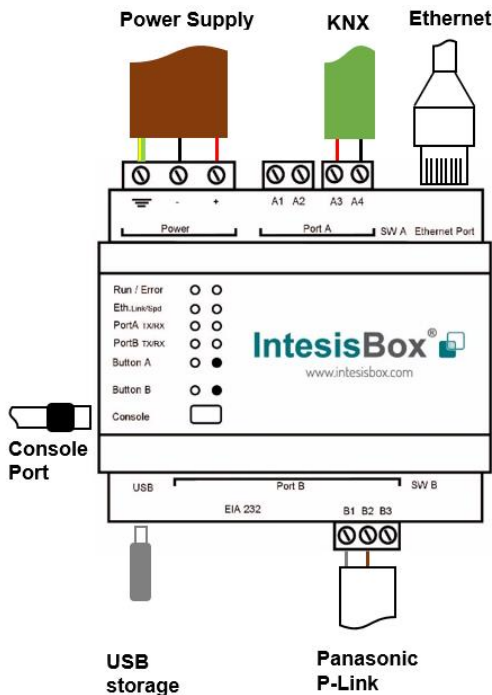
Power Supply
Must use NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply.

If using DC power supply:
Respect polarity applied of terminals (+) and (-). Be sure the voltage applied is within the range admitted (check table below). The power supply can be connected to earth but only through the negative terminal, never through the positive terminal.

If using AC power supply:
Make sure the voltage applied is of the value admitted (24 Vac). Do not connect any of the terminals of the AC power supply to earth, and make sure the same power supply is not supplying any other device.

Ethernet
Connect the cable coming from the IP network to the connector ETH of the gateway. Use an Ethernet CAT5 cable. If communicating through the LAN of the building, contact the network administrator and make sure traffic on the port used is allowed through all the LAN path (check the gateway user manual for more information). Default IP is 192.168.100.246. DHCP is enabled by default.

PortA / KNX
Connect the KNX TP1 bus to connectors A3 (+) and A4 (-) of gateway's PortA. Respect the polarity.

PortB / Panasonic VRF
Connect the P-Link terminals of Panasonic Outdoor Unit to the connectors B1 and B2 of gateway's PortB. There is no polarity to be respected.

Console Port
Connect a mini-type B USB cable from your computer to the gateway to allow communication between the Configuration Software and the gateway. Remember that Ethernet connection is also allowed. Check the user manual for more information.

USB
Connect a USB storage device (not a HDD) if required. Check the user manual for more information.

Ensure proper space for all connectors when mounted (see section **6 DIMENSIONS**)

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3.1 *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. Once connected the ON led will turn on.

WARNING! 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.

3.2 *Connect to Panasonic installation*

Use the Port B connector of the IntesisBox device to connect Panasonic VRF bus to the IntesisBox. Remember to follow all safety precautions indicated by Panasonic.

Connect the P-Link terminals of Panasonic Outdoor Unit to the connectors B1 and B2 of gateway's PortB. Bus is not sensitive to polarity.

3.3 *Connection to KNX*

Connect the KNX TP1 bus to connectors A3 (+) and A4 (-) of gateway's PortA. Respect the polarity.

3.4 *Connection to the configuration tool*

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

- **Ethernet:** Using the Ethernet port of IntesisBox.
- **USB:** Using the console port of IntesisBox, connect a USB cable from the console port to the PC.

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4 Set-up process and troubleshooting

4.1 *Pre-requisites*

It is necessary to have a KNX installation, device or interface operative and well connected to the corresponding KNX port of IntesisBox. It is also required to have a Panasonic VRF installation, with accessible P-LINK port for connection of IntesisBox.

Connectors, connection cables, PC to use the configuration tool and other auxiliary material, if needed, are not supplied by Intesis Software SLU for this standard integration.

Items supplied by Intesis Software for this integration are:

- IntesisBox gateway.
- Link to download the configuration tool.
- USB Console cable to communicate with IntesisBox.
- Product documentation.

4.2 *IntesisBox MAPS. Configuration & monitoring tool for IntesisBox KNX series*

4.2.1 Introduction

IntesisBox MAPS is a Windows® compatible software developed specifically to monitor and configure IntesisBox new generation gateways.

The installation procedure and main functions are explained in the *IntesisBox MAPS KNX User Manual.* This document can be downloaded from the link indicated in the installation sheet supplied with the IntesisBox device or in the product website at www.intesisbox.com.

In this section, only the specific case of Panasonic to KNX systems will be covered.

Please check the IntesisBox MAPS KNX User Manual for specific information about the different parameters and how to configure them.

4.2.2 Connection

To configure the IntesisBox connection parameters press on the **Connection** button in the *menu bar*.
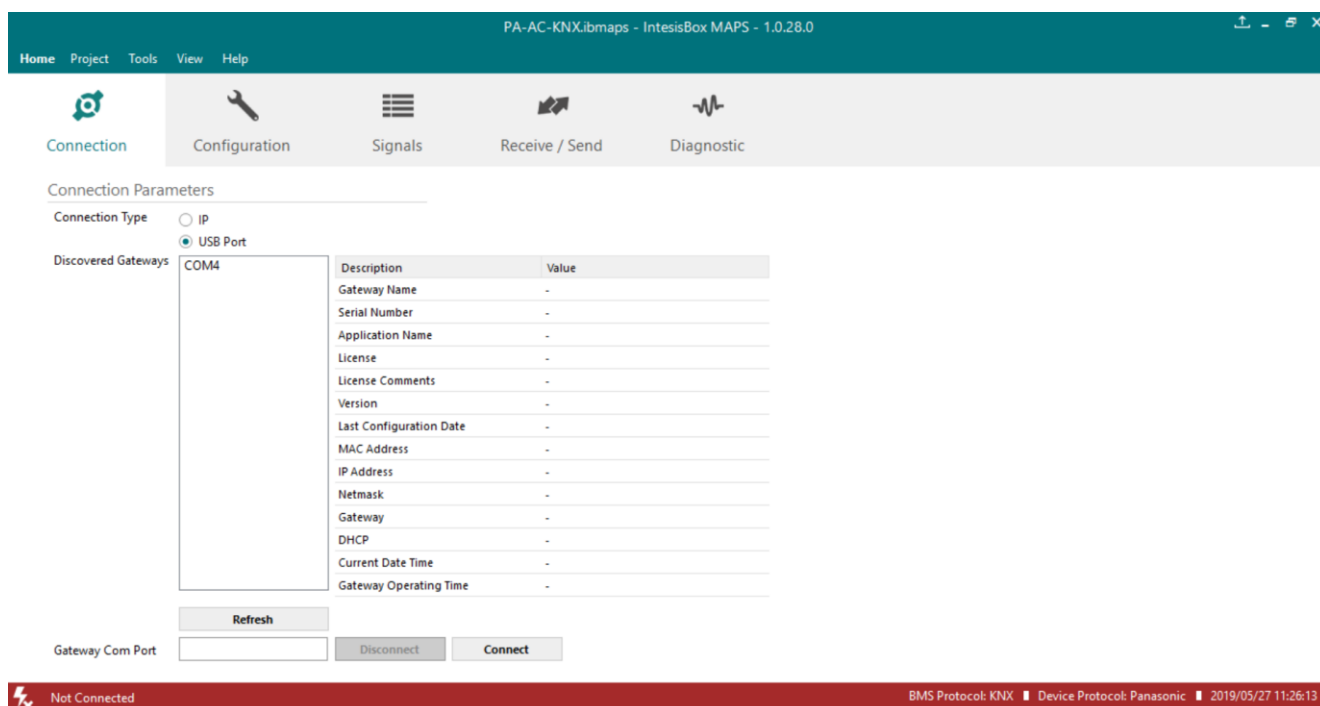

Figure 4.1 MAPS connection

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4.2.3 Configuration tab

Select the **Configuration** tab to configure the connection parameters. Three subsets of information are shown in this window: General (Gateway general parameters), KNX (KNX interface configuration) and Panasonic (Panasonic interface parameters).

Figure 4.2 IntesisBox MAPS configuration tab

4.2.4 KNX configuration

Set parameters of KNX interface of IntesisBox.

Figure 4.3 IntesisBox MAPS KNX configuration tab

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1. **Device configuration**

    1.1. Physical Address. KNX physical address of the device in the network

    1.2. Extended Addresses. Enables usage of KNX Extended addresses (range from 16/0/0 to 32/7/255).

2. **Operating Mode.** Settings related to KNX interface for control and feedback of AC unit's operating mode.

    2.1. KNX DPT for HVAC operation mode comm object. Base DPT. Base DPT to use for control/monitor the operating mode. Following DPT types are offered:

    - o   DPT_20.105. DPT_HVACContrMode: 0-Auto, 1-Heat, 3-Cool, 9-Fan, 14-Dry
    - o   DPT_5.x (non-standarized): 0-Auto, 1-Heat, 2-Dry, 3-Fan, 4-Cool
    - o   Legacy DPT_5.x (non-standarized): 0-Cool, 1-Heat, 2-Fan, 3-Dry, 4-Auto

    2.2. KNX DPT for HVAC operation mode comm object. Extra DPT. Additional DPT to use for control/monitor the operating mode.

    - o   DPT_1.100. DPT_Heat/Cool: 0-Cool, 1-Heat.
    - o   DPT_5.001. DPT_Scaling: Enables objects "Control_ Heat Mode & On" and "Control_ Cool Mode & On". Their type is DPT_Scaling (0…100%), and their ending is to be able to control parameters On/Off, Cool/Heat of indoor unit from a single percentage object. They are meant to provide compatibility with certain thermostats oriented to the operation of valves for Heating/Cooling. Whenever a value > 0% is received at each of these two objects, the corresponding operating mode and ON operation is sent to the indoor unit. Whenever both values are 0%, indoor unit is set to OFF

    2.3. Use of 1-bit Operating Modes. 1-bit Control Objects. Enables a bit-type object for the control of each operating mode.

    2.4. Use of 1-bit Operating Modes. 1-bit Status Objects. Enables a bit-type object for monitoring each operating mode.

3. **Temperature Sensor.**

    3.1. Ambient temperature provided from KNX. Enables object Control_ KNX ambient temperature.

!   **NOTE:** Indoor unit does not accept, by itself, that an ambient temperature for control of operation of the indoor unit is provided. To allow regulation of indoor unit according to a temperature reference from KNX, what IntesisBox does is passing a different temperature setpoint to the indoor unit than the one required by the user. The passed setpoint is such that the difference 'Ambient temperature reported by Panasonic IU – AC setpoint' is equal to 'Ambient temperature reported by KNX – AC setpoint required by KNX', using the following formula:

"AC Setp. Temp" = "AC Ret. Temp" - ("KNX Amb. Temp." - "KNX Setp. Temp")

Where:
- AC Setp. Temp: AC indoor unit setpoint temperature
- AC Ret. Temp: AC indoor unit return temperature
- KNX Amb. Temp.: Ambient temperature provided from KNX
- KNX Setp. Temp: Setpoint temperature provided from KNX

Consequently, when using this feature (Ambient temp provided from KNX), setpoint at AC and setpoint in KNX will not necessarily be the same (consequently, the user will not be able to operate setpoint from AC System controllers as the remote controller).

---

4. **Fan Speed.** Settings related to KNX interface for control and feedback of AC unit's fan speed.

    4.1. Auto Fan Speed. Configures availability of Auto Fan Speed control/monitoring objects. Necessary if your indoor unit has auto fan speed.

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4.2. KNX DPT for Fan Speed comm objects. DPT_5.001, DPT_Scaling. Control/monitoring of Fan Speed is performed by means of scaling (percentage) objects. Thresholds for control object and values for status object will vary according to number of fanspeeds of the unit.

4.3. KNX DPT for Fan Speed comm objects. DPT_5.010, DPT_Value_1_Ucount. Control/monitoring of Fan Speed is performed by means of enumerated values.

4.4. Use of 1-bit Fan Speed. 1-bit Control Objects. Enables a bit-type object for control of fan speed.

4.5. Use of 1-bit Fan Speed. 1-bit Status Objects. Enables a bit-type object for monitoring of each fan speed.

5. **Vanes Position.** Settings related to KNX interface for control and feedback of AC unit's vanes position.

5.1. Auto&Swing Vanes. Configures availability of Auto and Swing control/monitoring objects.

5.2. KNX DPT for Vane Position comm objects. DPT_5.001, DPT_Scaling. Control/monitoring of Vanes Positions is performed by means of scaling (percentage) objects. Thresholds for control object and values for status object will vary according to number of vanes positions of the unit.

5.3. KNX DPT for Vane Position comm objects. DPT_5.010, DPT_Value_1_Ucount. Control/monitoring of Vanes Positions is performed by means of enumerated values.

5.4. Use of 1-bit Fan Speed. 1-bit Control Objects. Enables a bit-type object for control of Vanes Positions.

5.5. Use of 1-bit Fan Speed. 1-bit Status Objects. Enables a bit-type object for monitoring of each Vanes Position.

4.2.5 Panasonic configuration

Set parameters for the connection with Panasonic installation.
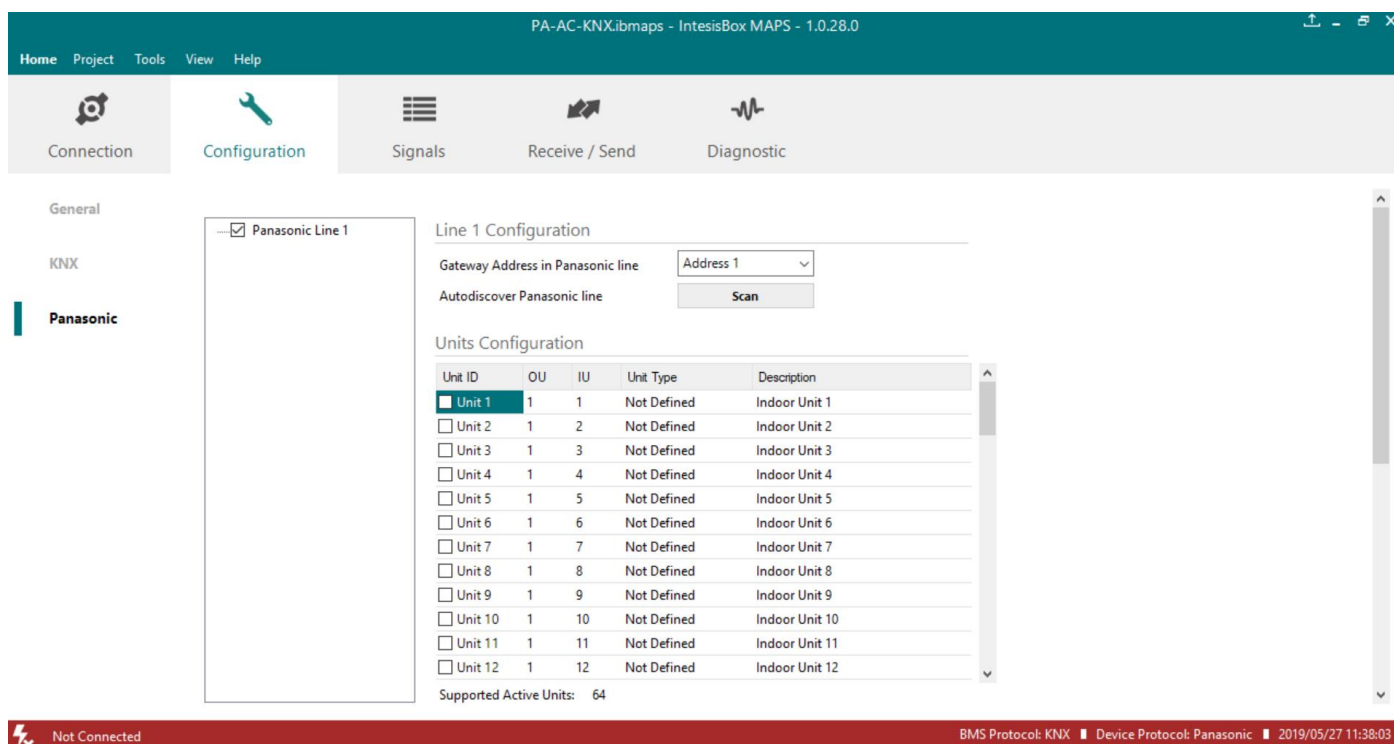
Figure 4.4 IntesisBox MAPS Panasonic configuration tab

Line configuration section:

Each line of Panasonic needs to be addressed by using the parameter "**Gateway Address in Panasonic line**". There are 2 addresses reserved for the gateway in the Panasonic bus: address 1 and address 2.

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In **Units Configuration** section you need to enter, for each unit:

- **Unit ID**. If it's active (checkbox at Unit xx), ranging from 1 to 64 indoor units that will be integrated (maximum number of units will depend on IntesisBox model)

- **OU address**. Address 1…30 of Outdoor Unit in Panasonic line.

- **IU address**. Address 1...64 of Unit in Panasonic line.

- **Unit type**. Type will default to 'Not Defined'. When units have been detected after scan, it can be one of the following: TBD, GHP, PAC and VRF.

- **Description**. Descriptive name to ease identification of the unit (for example, 'living room floor 1 unit', etc.).

Additional to manual entry of each unit, autodiscover of present units in a P-Link installation is possible. To do so, click button **Scan**.

Figure 4.5 IntesisBox MAPS Scan Panasonic Units window

Scan parameters:

There are 2 different types of Scan to be applied. By default, the fastest one is defined since it is assumed that Panasonic units (indoor units and outdoor units) have been addressed. However, and only in case the units do not have an address assigned, the parameter **"Installation with units not addressed (no central address assigned)"** must be selected.

Please take into consideration that when the installation is not addressed, the scan process might take longer than the standard scan (up to 60 min). To decrease this time, it is highly recommended to reduce the OU range to be scanned as much as possible:

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Figure 4.6 IntesisBox MAPS Long Scan Panasonic Units window

By pressing **Scan** button, connected Panasonic line will be scanned for available units. Error window will appear if there is a problem in the connection with P-Link bus (units not powered, bus not connected, …).

A progress bar will appear during the scan, which will take up to a few minutes. After scan is completed, detected units will be shown.

Figure 4.7 IntesisBox MAPS Scan Panasonic Units window with scan results

Select with its checkbox units to add (or replace) in installation, according to selection **Replace Units** / **Add Units**. After units to be integrated are selected, click button **Apply**, and changes will appear in previous **Units Configuration** window.

Global Parameters:

In this section it is possible to select the temperature units for monitoring of the temperature signals available in the gateways, Celsius (ºC) or Fahrenheit (ºF).

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4.2.6 Signals

All available KNX objects, its corresponding description and other main parameters are listed in the signals tab.

Figure 4.7 IntesisBox MAPS Signals tab

4.2.7 Sending the configuration to IntesisBox

When the configuration is finished, follow the next steps.

1.- Save the project (Menu option **Project->Save**) on your hard disk (more information in IntesisBox MAPS User Manual).

2.- Go to tab '**Receive / Send**' of MAPS, and in **Send** section, press **Send** button. IntesisBox will reboot automatically once the new configuration is loaded.
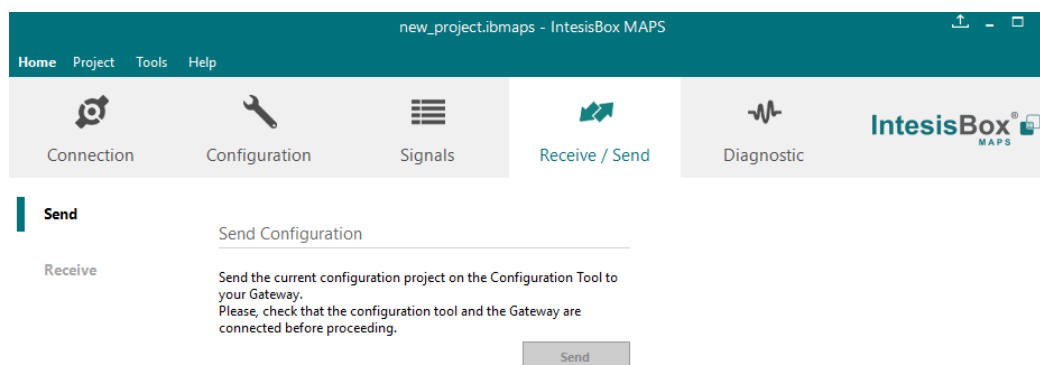
Figure 4.8 IntesisBox MAPS Receive/Send tab

After any configuration change, do not forget to send the configuration file to the IntesisBox using the Send button in the Receive / Send section.

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4.2.8 Diagnostic

To help integrators in the commissioning tasks and troubleshooting, the Configuration Tool offers some specific tools and viewers.

To start using the diagnostic tools, connection with the Gateway is required.

The Diagnostic section is composed by two main parts: Tools and Viewers.

- **Tools**
  Use the tools section to check the current hardware status of the box, log communications into compressed files to be sent to the support, change the Diagnostic panels' view or send commands to the gateway.

- **Viewers**
  To check the communication, viewer for the Internal and External protocols are available. It is also available a generic Console viewer for general information about communications and the gateway status and finally a Signals Viewer to simulate the BMS behavior or to check the current values in the system.
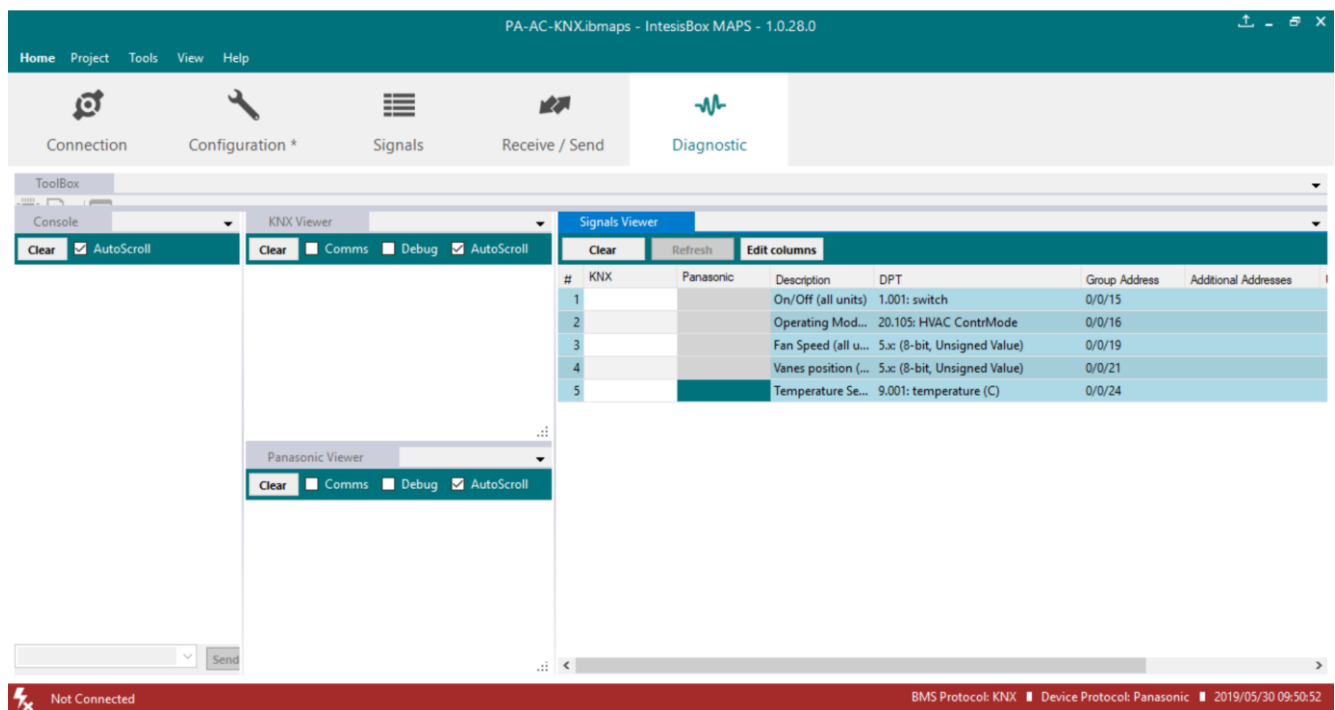
Figure 4.9 Diagnostic

More information about the Diagnostic section can be found in the Configuration Tool manual.

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4.2.9 Set-up procedure

1. Install IntesisBox MAPS on your laptop, use the setup program supplied for this and follow the instructions given by the Installation wizard.

2. Install IntesisBox in the desired installation site. Installation can be on DIN rail or on a stable not vibrating surface (DIN rail mounted inside a metallic industrial cabinet connected to ground is recommended).

Connect the KNX communication cable coming from the KNX network to the port marked as Port A on IntesisBox (More details in **3 CONNECTIONS**).

3. Connect the communication cable coming from the Panasonic VRF installation to the port marked as Port B of IntesisBox (More details in **3 CONNECTIONS**).

4. Power up IntesisBox. The supply voltage can be 9 to 36 Vdc or just 24 Vac. Take care of the polarity of the supply voltage applied.

    WARNING! To avoid earth loops that can damage IntesisBox 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.

5. If you want to connect using IP, connect the Ethernet cable from the laptop PC to the port marked as Ethernet of IntesisBox (More details in **3 CONNECTIONS**).

    If you want to connect using USB, connect the USB cable from the laptop PC to the port marked as Console of IntesisBox (More details in **3 CONNECTIONS**).

6. Open IntesisBox MAPS, create a new project selecting a copy of the one named **IBOX-KNX-PA**.

7. Modify the configuration as desired, save it and download the configuration file to IntesisBox as explained in the IntesisBox MAPS user manual.

8. Visit the Diagnostic section and check that there is communication activity, some TX frames and some other RX frames. This means that the communication with the KNX installation and Panasonic installation is OK. In case there is no communication activity between IntesisBox and the KNX side and/or Panasonic units, check that those are operative: check communication cable used to connect all devices and any other communication parameter.

Figure 4.50 Enable COMMS

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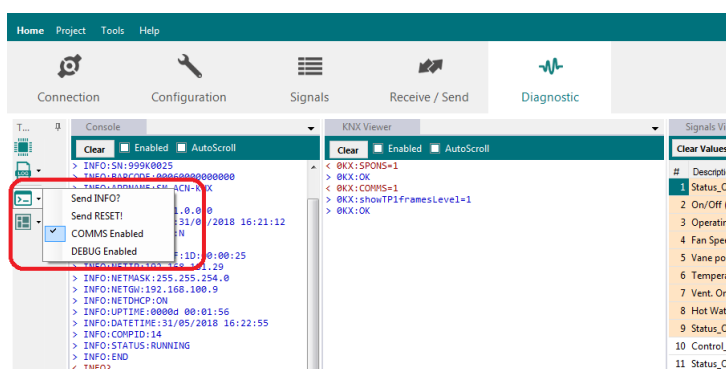
5   Electrical & Mechanical Features

Enclosure	Plastic, type PC (UL 94 V-0) Net dimensions (dxwxh): 90x88x56 mm Recommended space for installation (dxwxh): 130x100x100mm Color: Light Grey. RAL 7035	**Battery**	Size: Coin 20mm x 3.2mm Capacity: 3V / 225mAh Type: Manganese Dioxide Lithium
Mounting	Wall. DIN rail EN60715 TH35.	**Console Port**	Mini Type-B USB 2.0 compliant 1500VDC isolation

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
		USB port	Type-A USB 2.0 compliant
			Only for USB flash storage device
			(USB pen drive)
			Power consumption limited to 150mA
			(HDD connection not allowed)

Power	1 x Plug-in screw terminal block (3 poles)
	   9 to 36VDC +/-10%, Max.: 140mA.
	   24VAC +/-10% 50-60Hz, Max.: 127mA
	   Recommended: 24VDC
		Push Button	Button A: Check the user manual
			Button B: Check the user manual

		Operation Temperature	0°C to +60°C
Ethernet	1 x Ethernet 10/100 Mbps RJ45 2 x Ethernet LED: port link and activity	**Operational Humidity**	5 to 95%, no condensation
		Protection	IP20 (IEC60529)

Port A	1 x KNX TP-1 Plug-in screw terminal block orange (2 poles)
	   2500VDC isolation from other ports
	   KNX power consumption: 5mA
	   Voltage rating: 29VDC
	1 x Plug-in screw terminal block green (2 poles)
	   Reserved for future use
		LED Indicators	10 x Onboard LED indicators
			   2 x Run (Power)/Error
			   2 x Ethernet Link/Speed
			   2 x Port A TX/RX
			   2 x Port B TX/RX
			   1 x Button A indicator
			   1 x Button B indicator

Switch A (SWA)	1 x DIP-Switch for PORT A configuration: Reserved for future use		

PORT B	1 x Serial EIA232 (SUB-D9 male connector)
	   Reserved for future use
	1 x Panasonic Plug-in screw terminal block (3 poles)
	   1500VDC isolation from other ports		

Switch B (SWB)	1 x DIP-Switch for PORT B configuration: Reserved for future use (leave OFF, default)		

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6 Dimensions

56 mm (h)

88 mm (w)   90 mm (d)
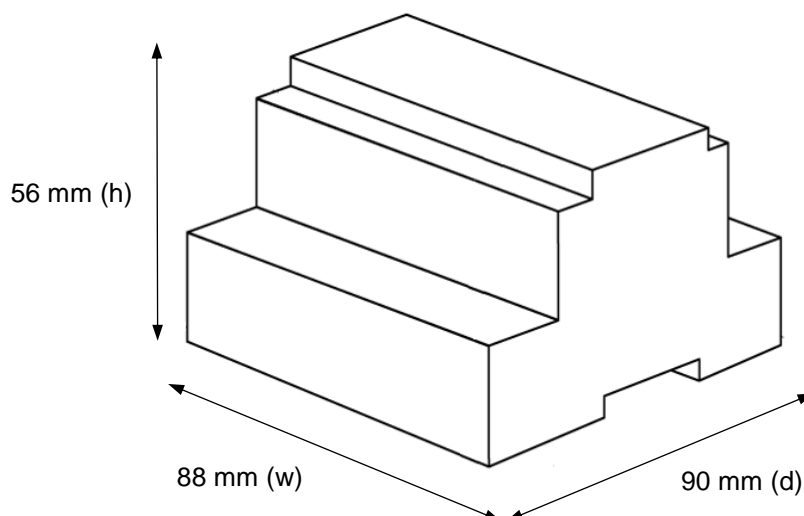
Recommended available space for its installation into a cabinet (wall or DIN rail mounting), with space enough for external connections

100 mm (h)

100 mm (w)   130 mm (d)

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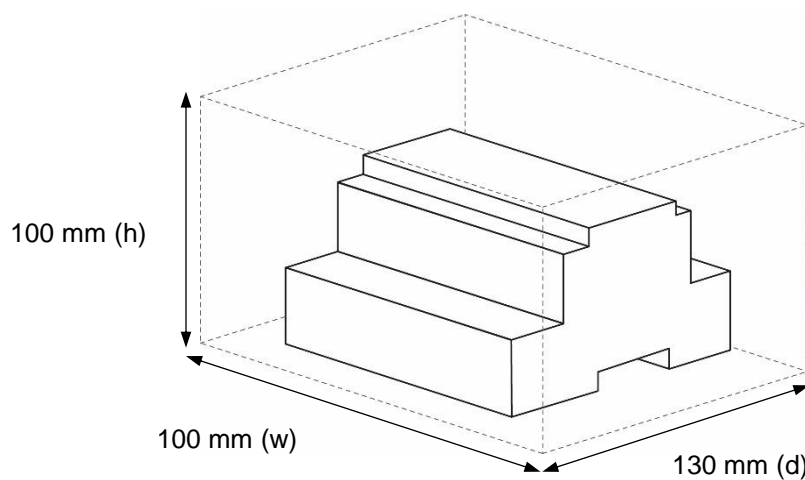
7   AC Unit Types compatibility

The gateway is compatible with Panasonic VRF units belonging to ECOi, ECOg and PACi series.

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8   Error codes for Indoor and Outdoor Units

Below you can find a list of error codes from Panasonic air conditioning system.

Error Code	Error in Control Panel	Error category	Error Description
0	N/A	IntesisBox	No active error
1	A01	GHP Engine Issues	GHP - Engine oil pressure fault
2	A02		GHP - Engine oil level fault
3	A03		GHP - Engine over speed
4	A04		GHP - Engine under speed
5	A05		GHP - Ignition power supply failure
6	A06		GHP - Engine start up failure
7	A07		GHP - Fuel gas valve failure
8	A08		GHP - Engine stalled
9	A09		GHP - Engine overload
10	A10		GHP - High exhaust gas temp
11	A11		GHP - Engine oil level failure
12	A12		GHP - Throttle actuator fault
13	A13		GHP - Fuel gas valve adjustment failure
14	A14		GHP - Engine oil pressure sensor fault
15	A15		GHP - Starter power output short circuit
16	A16		GHP - Starter motor locked
17	A17		GHP - Starter current (CT) coil failed
19	A19		GHP - Wax Valve (3 Way) fault
20	A20		GHP - Cooling water temp high
21	A21		GHP - Cooling water level fault
22	A22		GHP - Cooling water pump fault
23	A23		GHP - Engine crank angle sensor failure
24	A24		GHP - Engine cam angle sensor failure
25	A25		GHP - Clutch fault
26	A26		GHP - Misfire
27	A27		GHP - Catalyst temperature fault
28	A28		GHP - Generator fault
29	A29		GHP - Converter fault
30	A30		GHP - Fuel gas pressure low
33	C01	Central Controller Issues	Duplicated setting of control address
34	C02		Central control number of units mis-matched
35	C03		Incorrect wiring of central control
36	C04		Incorrect connection of central control
37	C05		System Controller fault, error in transmitting comms signal, i/door or o/door unit not working, wiring fault
38	C06		System Controller fault, error in receiving comms signal, i/door or o/door unit not working, wiring fault, CN1 not connected correctly
44	C12		Batch alarm by local controller
48	C16		Transmission error from adaptor to unit
49	C17		Reception error to adaptor from unit
50	C18		Duplicate central address in adaptor
51	C19		Duplicate adaptor address
52	C20		Mix of PAC & GHP type units on adaptor
53	C21		Memory fault in adaptor
54	C22		Incorrect address setting in adaptor
55	C23		Host terminal software failure
56	C24		Host terminal hardware failure
57	C25		Host terminal processing failure
58	C26		Host terminal communication failure
60	C28		Reception error of S-DDC from host terminal
61	C29		Initialization failure of S-DDC

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Error Code	Error in Control Panel	Error category	Error Description
63	C31		Configuration change detected by adaptor
65	E01		Remote control detecting error from indoor unit, Address not set/Auto address failed. Check interconnecting wiring etc. Re-address system.
66	E02		Remote detecting error from indoor unit,
67	E03		Indoor unit detecting error from remote,
68	E04		Indoor seeing error from outdoor. Qty of i/d units connected are less than qty set. Check; all i/d units are ON, reset turn off all units wait 5min power up
69	E05		Indoor unit detecting error from outdoor unit, Error in sending comms signal
70	E06		Outdoor unit detecting error from indoor unit, Error in receiving comms signal
71	E07		Outdoor unit detecting error from indoor unit, Error in sending comms signal
72	E08		Incorrect setting indoor/controller, Indoor address duplicated
73	E09		Incorrect setting indoor/controller, Remote address duplicated, or IR wireless controller not disabled
74	E10		Indoor unit detecting error from 'option' plug, Error in sending comms signal
75	E11	Addressing and Communication Problems	Indoor unit detecting error from 'option' plug, Error in receiving comms signal
76	E12		Auto addressing failed, Auto address connector CN100 shorted during auto addressing
77	E13		Indoor unit failed to send signal to remote controller
78	E14		Setting Failure, Duplication of master indoor units
79	E15		Auto addressing failed, Number of indoor units connected are less than number set
80	E16		Auto addressing failed, Number of indoor units connected are more than number set
81	E17		Group control wiring error, Main indoor unit not sending signal for sub indoor units
82	E18		Group control wiring error, Main indoor unit not receiving signal for sub indoor units
84	E20		Auto addressing failed, no indoor units connected
88	E24		Auto addressing failed, Error on sub outdoor unit
89	E25		Auto addressing failed, Error on outdoor unit address setting
90	E26		Auto addressing failed, Quantity of main and sub outdoor units do not correspond to the number set on main outdoor unit P.C.B.
93	E29		Auto addressing failed, sub outdoor unit not receiving comms for main outdoor unit
95	E31		Between units, Comms failure with MDC, does E31 remain after power is re-instated? If so replace PCB. & power PCB
97	F01		Indoor Heat Exch inlet temp sensor failure (E1)
98	F02		Indoor Heat Exch freeze temp sensor failure (E2)
99	F03		Indoor Heat Exch outlet temp sensor failure (E3)
100	F04		Outdoor Discharge temp sensor failure (TD) or (DISCH1)
101	F05		Outdoor Discharge temp sensor failure (DISCH2)
102	F06		Outdoor Heat Exch temp sensor failure (C1) or (EXG1)
103	F07		Outdoor Heat Exch temp sensor failure (C2) or (EXL1)
104	F08	Sensor Faults	Outdoor Air temp sensor failure (TO)
106	F10		Indoor inlet temp sensor failure
107	F11		Indoor outlet temp sensor failure
108	F12		Outdoor Intake sensor failure (TS)
109	F13		GHP - Cooling water temperature sensor failure
112	F16		Outdoor High-pressure sensor failure
113	F17		GHP - Cooling water temperature sensor fault
114	F18		GHP - Exhaust gas temperature sensor fault

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Error Code	Error in Control Panel	Error category	Error Description
116	F20		GHP Clutch coil temperature fault
119	F23		Outdoor Heat Exch temp sensor failure (EXG2)
120	F24		Outdoor Heat Exch temp sensor failure (EXL2)
125	F29		Indoor EEPROM error
126	F30		Clock Function (RTC) fault
127	F31		Outdoor EEPROM error
129	H01	Compressor Issues	Compressor Fault, Over current (Comp1)
130	H02		Compressor Fault, Locked rota current detected (Comp1)
131	H03		Compressor Fault, No current detected (Comp1)
133	H05		Compressor Fault, Discharge temp not detected (Comp1)
134	H06		Compressor Fault, Low Pressure trip
135	H07		Compressor Fault, Low oil level
136	H08		Compressor Fault, Oil sensor Fault (Comp1)
139	H11		Compressor Fault, Over current (Comp2)
140	H12		Compressor Fault, Locked rota current detected (Comp2)
141	H13		Compressor Fault, No current detected (Comp2)
143	H15		Compressor Fault, Discharge temp not detected (Comp2)
149	H21		Compressor Fault, Over current (Comp3)
150	H22		Compressor Fault, Locked rota current detected (Comp3)
151	H23		Compressor Fault, No current detected (Comp3)
153	H25		Compressor Fault, Discharge temp not detected (Comp3)
155	H27		Compressor Fault, Oil sensor fault (Comp2)
156	H28		Compressor Fault. Oil sensor (connection failure)
159	H31		Compressor Fault. IPM trip (IMP current on temperature)
193	L01	Incorrect Settings	Setting Error, Indoor unit group setting error
194	L02		Setting Error, Indoor/outdoor unit type/model miss-matched
195	L03		Duplication of main indoor unit address in group control
196	L04		Duplication of outdoor unit system address
197	L05		2 or more controllers have been set as 'priority' in one system - shown on controllers set as 'priority'
198	L06		2 or more controllers have been set as 'priority' in one system - shown on controllers not set as 'priority'
199	L07		Group wiring connected on and individual indoor unit
200	L08		Indoor unit address/group not set
201	L09		Indoor unit capacity code not set
202	L10		Outdoor unit capacity code not set
203	L11		Group control wiring incorrect
205	L13		Indoor unit type setting error, capacity
207	L15		Indoor unit paring fault
208	L16		Water heat exch unit setting failure
209	L17		Miss-match of outdoor unit with different refrigerant
210	L18		4-way valve failure
211	L19		Water heat exch unit duplicated address
213	L21		Gas type setup failure
225	P01	Indoor Unit Problems	Indoor unit fault, Fan motor thermal overload
226	P02		Outdoor unit fault, Compressor motor thermal overload, over or under voltage
227	P03		Outdoor unit fault, Compressor discharge temperature too high (Comp1) over 111 ºC. Low on ref gas, exp valve, pipework damage.
228	P04		Outdoor unit fault, High pressure trip
229	P05		Outdoor unit fault, Open phase on power supply. Check power on each phase, inverter pcb, control pcb
233	P09		Indoor unit fault, Ceiling panel incorrectly wired
234	P10		Indoor unit fault, Condensate float switch opened
235	P11		GHP - Water Heat exch low temp (frost protection) fault
236	P12		Indoor unit fault, Fan DC motor fault

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Error Code	Error in Control Panel	Error category	Error Description
238	P14		Input from leak detector (If fitted)
239	P15		Refrigerant loss, high discharge temp and EEV wide open and low compressor current draw.
240	P16		Outdoor unit fault, Open phase on compressor power supply
241	P17		Outdoor unit fault, Compressor discharge temperature too high (Comp2) over 111 degC. Low on ref gas, exp valve, pipework damage.
242	P18		Outdoor unit fault, By-pass valve failure
243	P19		Outdoor unit fault, 4 way valve failure, i/door temp rises in cooling or fills in heating. Check wiring, coil, pcb output, valve operation.
244	P20		Ref gas, high temp/pressure fault, heat exch temp high C2, 55-60 degC, cooling over-load, sensor fault.
246	P22		Outdoor unit fan motor fault, fan blade jammed, check connections, does fan turn freely, motor resistance 30-40ohm on each pair, no fan fault, yes pcb fault.
250	P26		Outdoor unit fault, Compressor overcurrent - check winding resistance, Inverter failure - check internal resistance term HIC + & - to UVW 200-300Kohm or more
252	P29		Outdoor unit fault, Inverter circuit fault - Motor-current Detection Circuit (MDC) fault, check comp windings, sensors C1 & TS, if ok possible pcb failure.
253	P30		Indoor unit fault, System controller detected fault on sub indoor unit
255	P31		Simultaneous operation multi control fault, Group controller fault
256	N/A	IntesisBox	Error in the communication of PA-AC-KNX-64/128 device with the CZ-CFUNC2 communication adaptor.
257	N/A		Indoor Unit doesn't exist
258	N/A		Scan in process

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9 Appendix A – Communication Objects Table

TOPIC		NAME	LENGHT	DATAPOINT TYPE		FLAGS				FUNCTION
				DPT_NAME	DPT	R	W	T	U	
GLOBAL SIGNALS	ON/OFF	On/Off (all units)	1 bit	DPT_Switch	1.001		W			0-Off, 1-On
	Operating mode	Operating Mode (all units)	1 byte	DPT_HVACContrMode	20.105		W			0-Auto, 1-Heat, 3-Cool, 9-Fan, 14-Dry
			1 byte (unsigned)	Non-standarized	5.x		W			0-Auto, 1-Heat, 2-Dry, 3-Fan, 4-Cool
			1 byte (unsigned)	Non-standarized	5.x		W			0-Cool, 1-Heat, 2-Fan, 3-Dry, 4-Auto
		Fan Speed (all units)	1 byte (unsigned)	Non-standarized	5.x		W			1-Quiet, 2-Low, 3-Med-Low, 4-Med-High, 5-High
		Fan speed AUTO (all units)	1 bit	DPT_Switch	1.001		W			0-Stop auto fan, 1-Set auto fan
	Vanes position	Vanes position (all units)	1 byte (unsigned)	Non-standarized	5.x		W			1-Position 1, 2-Position 2, 3-Position 3, 4-Position 4, 5-Position 5
		Vanes position Swing (all units)	1 bit	DPT_Switch	1.001		W			0-Stop swing vanes, 1-Set swig vanes
	Temperature Setpoint.	Temperature Setpoint (ºC) (all units)	2 bytes	DPT_Value_Temp	9.001		W			ºC
OUTDOOR UNIT SIGNALS	Error OU	Status_Communication Error OU	1 bit	DPT_Alarm	1.005	R		T		0-No error, 1-Error
	Demand Limit. Ratio	Status_Demand Limit. Ratio	1 byte	DPT_Percent_U8	5.004	R		T		0…200 % (255-No limit)
	Pressure sensor	Status_High Pressure Sensor	1 bit	DPT_Pressure (Pa)	14.058	R		T		Pa
		Status_Low Pressure Sensor	1 bit	DPT_ Pressure (Pa)	14.058	R		T		Pa
	Compressor operation time	Status_Compressor 1 operation time	2 bytes	DPT_time (h)	7.007	R		T		0…16777215 hours
		Status_Compressor 2 operation time	2 bytes	DPT_time (h)	7.007	R		T		0…16777215 hours
		Status_Compressor 3 operation time	2 bytes	DPT_time (h)	7.007	R		T		0…16777215 hours
INDIVIDUAL SIGNALS	ON / OFF	Control _On/Off	1 bit	DPT_Switch	1.001		W			0-Off,1-On
		Status _On/Off	1 bit	DPT_Switch	1.001	R		T		0-Off,1-On
	Operating mode	Control _Operation mode	1 byte	DPT_HVACContrMode	20.105		W			0-Auto, 1-Heat, 3-Cool, 9-Fan, 14-Dry
		Status _Operation mode	1 byte	DPT_HVACContrMode	20.105	R		T		0-Auto, 1-Heat, 3-Cool, 9-Fan, 14-Dry
		Control _Operation mode	1 byte (unsigned)	Non-standarized	5.x		W			0-Auto, 1-Heat, 2-Dry, 3-Fan, 4-Cool

		Status _Operation mode	*1 byte (unsigned)*	*Non-standarized*	*5.x*	*R*	*T*	*0-Auto, 1-Heat, 2-Dry, 3-Fan, 4-Cool*
		Control _Operation mode	*1 byte (unsigned)*	*Non-standarized*	*5.x*		*W*	*0-Cool, 1-Heat, 2-Fan, 3-Dry, 4-Auto*
		Status _Operation mode	*1 byte (unsigned)*	*Non-standarized*	*5.x*	*R*	*T*	*0-Cool, 1-Heat, 2-Fan, 3-Dry, 4-Auto, 5-AutoHeat, 6-AutoCool*
		Control _Mode Cool/Heat	*1 bit*	*DPT_Heat/Cool*	*1.100*		*W*	*0-Cool, 1-Heat*
		Status _Mode Cool/Heat	*1 bit*	*DPT_Heat/Cool*	*1.100*	*R*	*T*	*0-Cool, 1-Heat*
		Control _Heat mode&ON	*1 byte*	*DPT_Scaling*	*5.001*		*W*	*0%-Off, 1%-100%-On+Heat*
		Control _Cool mode&ON	*1 byte*	*DPT_Scaling*	*5.001*		*W*	*0%-Off, 1%-100%-On+Cool*
		Control _Auto mode	*1 bit*	*DPT_Switch*	*1.001*		*W*	*1-Set auto mode*
		Status _Auto mode	*1 bit*	*DPT_Switch*	*1.001*	*R*	*T*	*1-Auto mode active, 0-Auto mode not active*
		Control _Heat mode	*1 bit*	*DPT_Switch*	*1.001*		*W*	*1-Set heat mode*
		Status _Heat mode	*1 bit*	*DPT_Switch*	*1.001*	*R*	*T*	*1-Heat mode active, 0-Heat mode not active*
		Control _Cool mode	*1 bit*	*DPT_Switch*	*1.001*		*W*	*1-Set cool mode*
		Status _Cool mode	*1 bit*	*DPT_Switch*	*1.001*	*R*	*T*	*1-Cool mode active, 0-Cool mode not active*
		Control _Fan mode	*1 bit*	*DPT_Switch*	*1.001*		*W*	*1-Set fan mode*
		Status _Fan mode	*1 bit*	*DPT_Switch*	*1.001*	*R*	*T*	*1-Fan mode active, 0-Fan mode not active*
		Control _Dry mode	*1 bit*	*DPT_Switch*	*1.001*		*W*	*1-Set dry mode*
		Status _Dry mode	*1 bit*	*DPT_Switch*	*1.001*	*R*	*T*	*1-Dry mode active, 0-Dry mode not active*
	Fan speed	*Control_Fan speed enumerated*	*1 byte (unsigned)*	*Non-standarized*	*5.x*		*W*	*1-Low, 2-Med, 3-High*
		Status _Fan speed enumerated	*1 byte (unsigned)*	*Non-standarized*	*5.x*	*R*	*T*	*1-Low, 2-Low+, 3-Med, 4-Med+, 5-High*
		Control _Fan speed scaling	*1 byte*	*DPT_Scaling*	*5.001*		*W*	*Thersholds (0%..49%; 50%..82%; 83%..100%)*
		Status _Fan speed scaling	*1 byte*	*DPT_Scaling*	*5.001*	*R*	*T*	*Thersholds (20%; 40%, 60%; 80%; 100%)*
		Control_ Fan speed low	*1 bit*	*DPT_Switch*	*1.001*		*W*	*1-Set fan speed low*
		Status_Fan speed low	*1 bit*	*DPT_Switch*	*1.001*	*R*	*T*	*1-Speed low active, 0-Speed low not active*
		Control_ Fan speed low+	*1 bit*	*DPT_Switch*	*1.001*		*W*	*1-Set fan speed low+*
		Status_Fan speed low+	*1 bit*	*DPT_Switch*	*1.001*	*R*	*T*	*1-Speed low+ active, 0-Speed low+ not active*
		Control_Fan speed med	*1 bit*	*DPT_Switch*	*1.001*		*W*	*1-Set fan speed med*

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		Status_Fan speed med	1 bit	DPT_Switch	1.001	R		T	1-Speed med active, 0-Speed med not active
		Control_Fan speed med+	1 bit	DPT_Switch	1.001		W		1-Set fan speed med+
		Status_Fan speed med+	1 bit	DPT_Switch	1.001	R		T	1-Speed med+ active, 0-Speed med+ not active
		Control_Fan speed high	1 bit	DPT_Switch	1.001		W		1-Set fan speed high
		Status_Fan speed high	1 bit	DPT_Switch	1.001	R		T	1-Speed high active, 0-Speed high not active
		Control_Fan speed Man/Auto	1 bit	DPT_Switch	1.001		W		0-Manual; 1-Auto
		Status_Fan speed Man/Auto	1 bit	DPT_Switch	1.001	R		T	0-Manual; 1-Auto
	Vanes position	Control_Vanes enumerated	1 byte (unsigned)	Non-standarized	5.x		W		1-Position 1..5-Position 5
		Status_Vanes enumerated	1 byte (unsigned)	Non-standarized	5.x	R		T	1-Position 1..5-Position 5
		Control_Vanes scaling	1 byte	DPT_Scaling	5.001		W		Thersholds (0%..29%; 30%..49%; 50%..69%; 70%..89%, 90%..100%)
		Status_Vanes scaling	1 byte	DPT_Scaling	5.001	R		T	Thersholds (20%; 40%; 60%; 80%;100%)
		Control_ Vanes pos-1	1 bit	DPT_Switch	1.001	R		T	1-Set position-1 vanes
		Status_ Vanes pos-1	1 bit	DPT_Switch	1.001		W		1-Vane position-1 active, 0-Vane position-1 not active
		Control_ Vanes pos-2	1 bit	DPT_Switch	1.001	R		T	1-Set position-2 vanes
		Status_ Vanes pos-2	1 bit	DPT_Switch	1.001		W		1-Vane position-2 active, 0-Vane position-2 not active
		Control_ Vanes pos-3	1 bit	DPT_Switch	1.001	R		T	1-Set position-3 vanes
		Status_ Vanes pos-3	1 bit	DPT_Switch	1.001		W		1-Vane position-3 active, 0-Vane position-3 not active
		Control_ Vanes pos-4	1 bit	DPT_Switch	1.001	R		T	1-Set position-4 vanes
		Status_ Vanes pos-4	1 bit	DPT_Switch	1.001		W		1-Vane position-4 active, 0-Vane position-4 not active
		Control_ Vanes pos-5	1 bit	DPT_Switch	1.001	R		T	1-Set position-5 vanes
		Status_ Vanes pos-5	1 bit	DPT_Switch	1.001		W		1-Vane position-5 active, 0-Vane position-5 not active
		Control_ Vanes swing	1 bit	DPT_Switch	1.001	R		T	0-Stop swing vanes; 1-Set Swing on
		Status_ Vanes swing	1 bit	DPT_Switch	1.001		W		0-Vanes swing not active; 1-Vanes swing active
	Temperature	Control_Temperature Setpoint (ºC)	2 bytes	DPT_Value_Temp	9.001		W		ºC
		Status_Temperature Setpoint (ºC)	2 bytes	DPT_Value_Temp	9.001	R		T	ºC
		Status_AC Ambient Temperature (ºC)	2 bytes	DPT_Value_Temp	9.001	R		T	-35…92.5 ºC

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		Control_KNX ambient Temperature (ºC)	2 bytes	DPT_Value_Temp	9.001		W		ºC
	AC settings	Control_Wired remote controller	1 bit	DPT_Switch	1.001		W		0-Body sensor, 1-remote control sensor
		Status_Wired remote controller	1 bit	DPT_Switch	1.001	R		T	0-Body sensor, 1-remote control sensor
		Control_Disch. Setpoint cool (ºC)	2 bytes	DPT_Value_Temp	9.001		W		-10…10ºC
		Status_Disch. Setpoint cool (ºC)	2 bytes	DPT_Value_Temp	9.001	R		T	-10…10ºC
		Control_Disch. Setpoint heat (ºC)	2 bytes	DPT_Value_Temp	9.001		W		-10…10ºC
		Status_Disch. Setpoint heat (ºC)	2 bytes	DPT_Value_Temp	9.001	R		T	-10…10ºC
		Status_Disch. current temperature (ºC)	2 bytes	DPT_Value_Temp	9.001	R		T	-35…92.5 ºC
		Status_Heat exchanger temperature (ºC)	2 bytes	DPT_Value_Temp	9.001	R		T	-1…26 ºC
	Error code	Status_Unit error	1 bit	DPT_Alarm	1.005	R		T	0-No error, 1-Error
		Status_Unit error code	2 bytes (signed)	Non-standarized	8.x	R		T	0-No Error, X-Error (0…255)
	Emergency filter	Status_FilterSign	1 bit	DPT_Alarm	1.005	R		T	0-Normal, 1-Alarm
		Control _FilterReset	1 bit	DPT_Reset	1.015		W		0-No reset, 1-Reset
	Communication with IU	Status_Communication status with IU	1 bit	DPT_switch	1.001	R		T	0-Not exist, 1-Exist
	Remote control disablement	Control_On/Off Remote control disablement	1 bit	DPT_Bool	1.002		W		0-No disabled, 1-Disabled
		Status_On/Off Remote control disablement	1 bit	DPT_Bool	1.002	R		T	0-No disabled, 1-Disabled
		Control_Mode Remote control disablement	1 bit	DPT_Bool	1.002		W		0-No disabled, 1-Disabled
		Status_Mode Remote control disablement	1 bit	DPT_Bool	1.002	R		T	0-No disabled, 1-Disabled
		Control_Setpoint Remote control disablement	1 bit	DPT_Bool	1.002		W		0-No disabled, 1-Disabled
		Status_Setpoint Remote control disablement	1 bit	DPT_Bool	1.002	R		T	0-No disabled, 1-Disabled
	Type of unit	Status_Unit type	1 byte (unsigned)	Non-standarized	5.x	R		T	1-Not Defined, 2-TBD, 3-GHP. 4-PAC, 5-VRF

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