ENGLISH

700 Series Air Gateway - IN770AIR***O000

HITACHI VRF SYSTEMS
to Modbus, KNX, BACnet, MQTT, and Home Automation

USER MANUAL
Version 1.1.8
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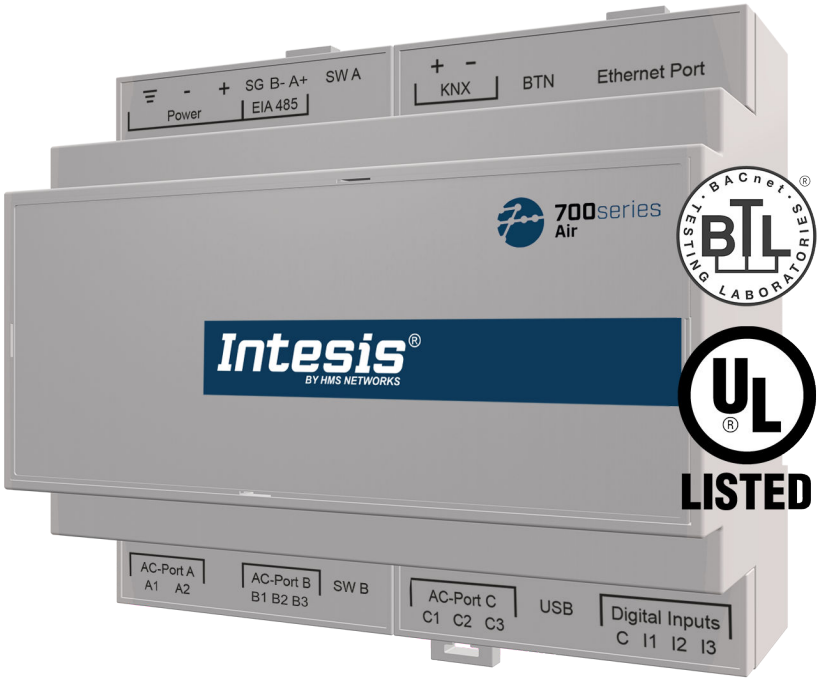

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1. Description, Compatible AC systems, and Order Codes

IN770AIR*O000 Gateway**.

Modbus®, KNX®, BACnet®, MQTT, and Home Automation gateway for Hitachi® HVAC systems.

This gateway is compatible with VRF units commercialized by Hitachi.

Use the compatibility tool to get a complete list of compatible units: https://compatibility.intesis.com/

You can set up this Intesis gateway for Modbus TCP, Modbus RTU, KNX TP, BACnet/IP, BACnet MS/TP, MQTT, or Home Automation.

ORDER CODE	LEGACY ORDER CODE
IN770AIR***O000 [1]	INBACHIT016O000 INBACHIT064O000 INKNXHIT016O000 INKNXHIT064O000 INMBSHIT016O000 INMBSHIT064O000
[1] *** stands for XXS, 00S, or 00M, depending on the license you have purchased. To know more, see Licensing (page 2).	

NOTE
The order code may vary depending on the product seller and the buyer's location.

2. Licensing

Distribution license(s) for the IN770AIR∗∗∗O000 gateway:

Order Code	License	Maximum AC units	
		Indoor units	Outdoor units
IN770AIRXXSO000	XXS	4	4
IN770AIR00SO000	Small	16	16
IN770AIR00MO000	Medium	64	64

NOTE
The order code may vary depending on the product seller and the buyer's location.

3. General Information

3.1. Intended Use of the User Manual

This manual contains the main features of this Intesis gateway and the instructions for its appropriate installation, configuration, and operation.

Any person who installs, configures, or operates this gateway or any associated equipment should be aware of this manual's contents.

Keep this manual for future reference during the installation, configuration, and operation.

3.2. General Safety Information

IMPORTANT
Follow these instructions carefully. Improper work may seriously harm your health and damage the gateway and/or any other equipment connected to it.

Only technical personnel, following these instructions and the country legislation for installing electrical equipment, can install and manipulate this gateway.

Install this gateway indoors, in a restricted access location, avoiding exposure to direct solar radiation, water, high relative humidity, or dust.

Preferably, mount this gateway on a DIN rail inside a grounded metallic cabinet, following the instructions in this manual.

If mounting on a wall, firmly fix this gateway on a non-vibrating surface, following the instructions in this manual.

Connect this gateway only to networks without routing to the outside plant.

All communication ports are considered for indoor use and must only be connected to SELV circuits.

Disconnect all systems from power before manipulating and connecting them to the gateway.

Use SELV-rated NEC class 2 or limited power source (LPS) power supply.

CAUTION
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 a positive terminal connected to earth**.
- The use of AC power supplies only if they are floating and not powering any other device.

Use a circuit breaker between the gateway and the power supply. Rating: 250 V, 6 A.

Supply the correct voltage to power the gateway. The admitted range is detailed in the technical specifications table.

Respect the expected polarity of power and communication cables when connecting them to the gateway.

This Intesis gateway is designed for installation in an enclosure. When the device is mounted outside an enclosure, precautions should be taken to avoid electrostatic discharges to the unit in environments with static levels above 4 kV. When working in an enclosure (e.g., making adjustments, setting switches, etc.), typical anti-static precautions should be observed before touching the unit.

Binary inputs are potential-free contacts. Do not connect any voltage.

These safety instructions in other languages can be found here.

3.3. Admonition Messages and Symbols

CAUTION
Instruction that must be followed to avoid a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.

IMPORTANT
Instruction that must be followed to avoid a risk of reduced functionality and/or damage to the equipment or to avoid a network security risk.

NOTE
Additional information which may facilitate installation and/or operation.

TIP
Helpful advice and suggestions.

NOTICE
Remarkable Information.

4. Overview

Protocol combinations supported by the IN770AIR***O000 gateway:

Gateway's client interface	↔	Gateway's server interface
Hitachi VRF systems	to	Modbus TCP and RTU
		KNX TP
		BACnet/IP or MS/TP
		MQTT
		Home Automation

IMPORTANT
This document assumes that the user is familiar with these technologies.

Figure 1. Integration of Hitachi units into Modbus systems

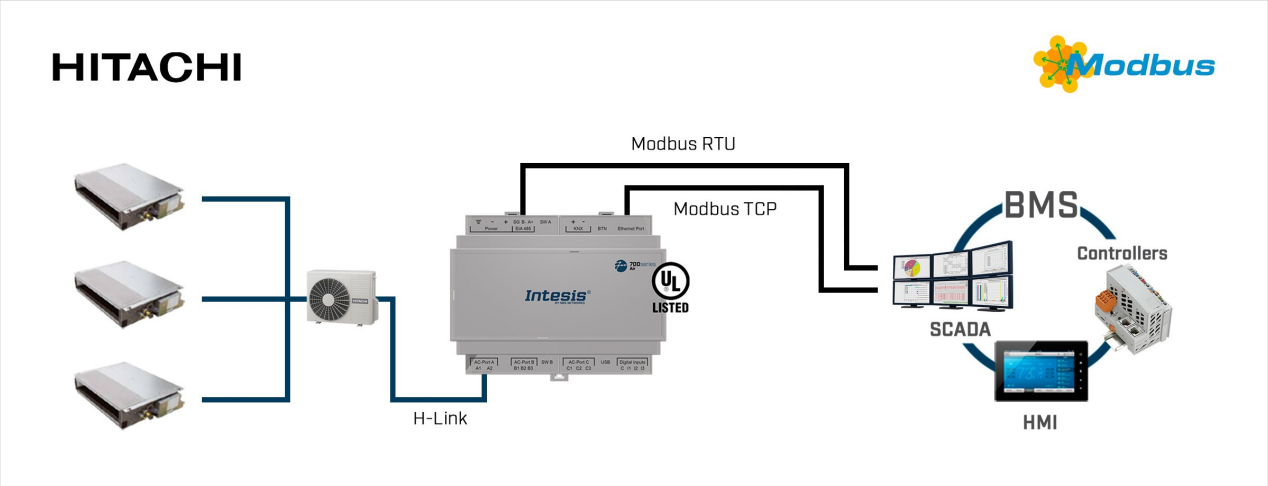


Figure 2. Integration of Hitachi units into KNX TP systems

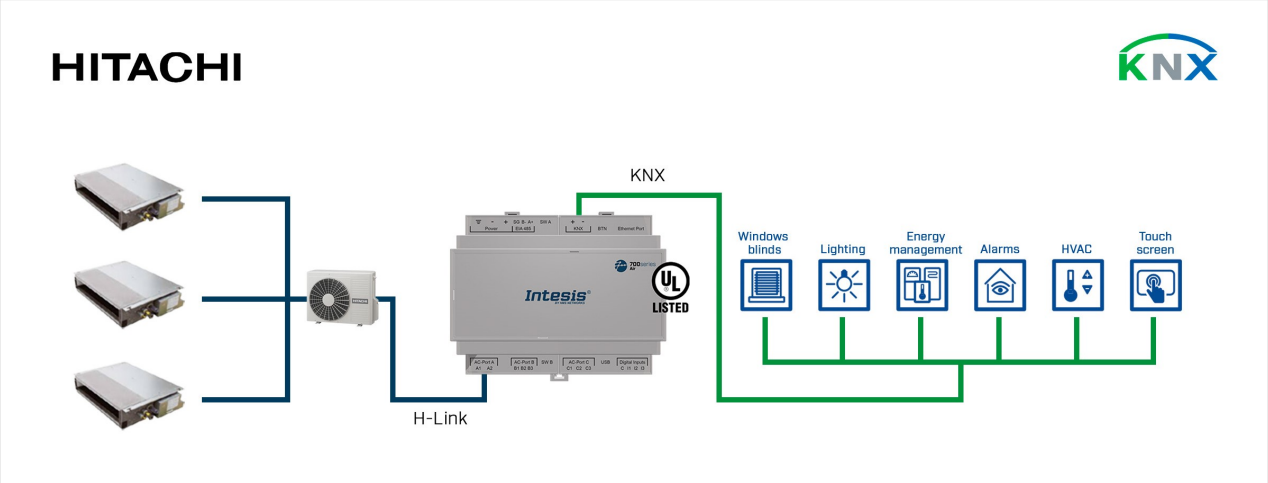


Figure 3. Integration of Hitachi units into BACnet systems

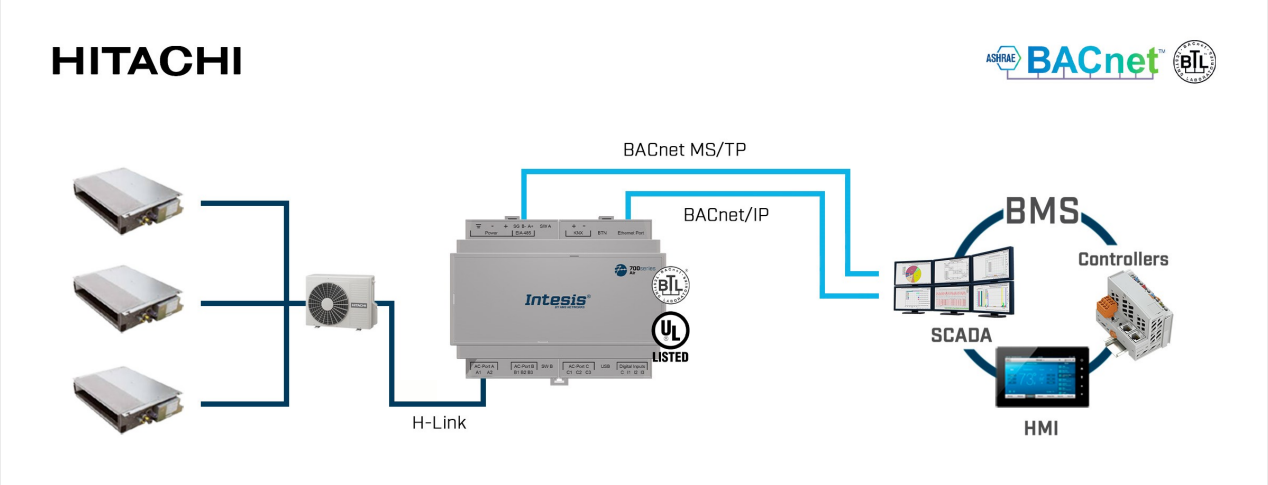


Figure 4. Integration of Hitachi units into MQTT systems

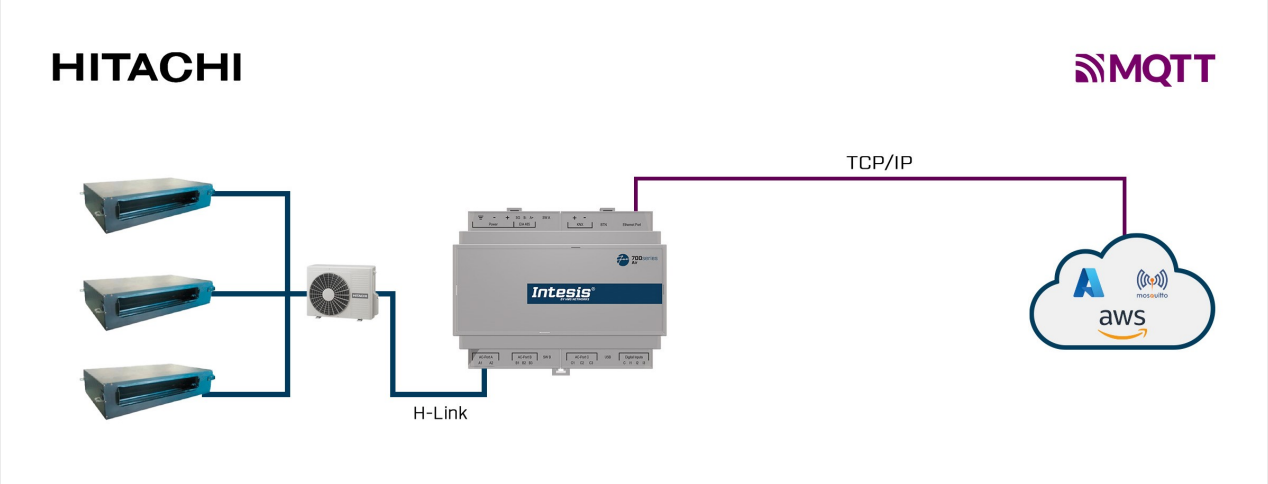
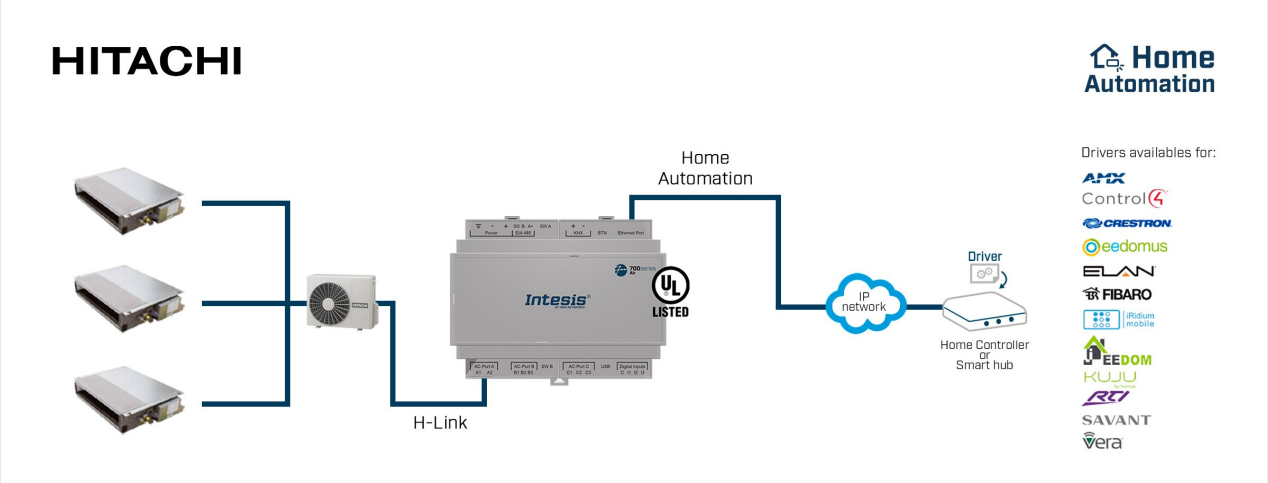


Figure 5. Integration of Hitachi units into Home Automation systems



4.1. Inside the Package

ITEMS INCLUDED

- Intesis IN770AIR∗∗∗O000 Gateway
- Installation guide

4.2. Main Features

- Several protocol combinations available: Configurable for Modbus TCP and RTU, KNX TP, BACnet/IP and MS/TP, MQTT, and Home Automation communication protocols.
- Late configuration: Change between protocol combinations easily.
- Three licenses with different capacities.
- Scan function: Find the units connected to the H-Link bus.
- Specific signals to monitor outdoor units.
- 2 x DIP switches for the EIA-485 connector termination and polarization configuration.
- 14 LEDs indicate the operating status for both the gateway and the communication bus.
- DIN rail and wall mounting case.
- Accredited with the main certifications for electronic equipment.
- Three binary inputs to integrate energy meters.
- Multiple ports for serial and TCP/IP communication:
  - Green pluggable terminal block for EIA-485 (3 poles)
  - Orange pluggable terminal block for KNX (2 poles)
  - Ethernet
  - Green pluggable terminal block for binary inputs (4 poles)
  - USB Type-C port for connection to the PC
  - Green pluggable terminal block for AC connection (2 poles)
  - Green pluggable terminal block for AC connection (3 poles)
  - Green pluggable terminal block for AC connection (3 poles)

4.3. Gateway General Functionality

With this Intesis IN770AIR∗∗∗O000 gateway, you can easily integrate Hitachi VRF systems into an installation based on Modbus TCP, Modbus RTU, KNX TP, BACnet/IP, BACnet MS/TP, MQTT, or Home Automation. To do so, the gateway acts as a server device of the installation itself, accessing all signals from each unit and allowing control of the whole HVAC network.

The gateway continuously polls the HVAC network, storing in its memory the current status of every signal you want to track and serving this data to the installation when requested. When a signal status changes, the gateway communicates it to the installation, waits for the response, and performs the corresponding action.

A signal's lack of response activates a communication error, allowing you to determine which signal from which unit is not working correctly.

5. Quick Start Guide

IMPORTANT
While the following procedure outlines the fundamental steps for installing, wiring, and configuring the gateway, it is crucial to thoroughly review all documentation to prevent errors.

1. Install Intesis MAPS on your laptop. Use the setup program supplied and follow the instructions given by the installation wizard.
2. Mount the gateway at the desired installation site. The gateway can be mounted on a DIN rail or on a wall. Mounting the gateway on a DIN rail inside a metallic industrial cabinet grounded to earth is recommended. See Mounting (page 10).
3. Disconnect all systems from power before wiring the gateway.
4. Connect the BMS communication wires to the gateway. See Gateway Connectors (page 12).
   a. If using Modbus TCP, BACnet/IP, MQTT, or Home Automation, connect the communication cable coming from the Modbus/BACnet/MQTT/Home Automation network to the port marked as **Ethernet** on the gateway.
   b. If using Modbus RTU or BACnet MS/TP, connect the communication cables coming from the Modbus/BACnet network to the port marked as **EIA 485** on the gateway.
   c. If using KNX TP, connect the communication cables coming from the KNX network to the port marked as **KNX** on the gateway.
5. Connect the communication cable from the Hitachi system to the port marked as **AC-Port A** on the gateway.
6. Power the gateway. The supply voltage can be from 12 to 36 VDC or just 24 VAC. Observe the polarity. See Connection to the Power Supply (page 14).
7. Connect the gateway to your laptop to configure it with Intesis MAPS. See Connection to a Computer for Configuration (page 19).
   a. If you want to connect via USB, connect a USB cable from the laptop to the port marked as **USB** on the gateway.
   b. If you want to connect via IP, connect the Ethernet cable from the laptop to the port marked as **Ethernet Port** on the gateway.
8. Open Intesis MAPS and create a new project by selecting the needed project template.
9. Modify the configuration as needed, save it, and send the configuration file to the gateway.
   Consult the Intesis MAPS configuration guide for Hitachi.
10. Go to the **Diagnostic** tab and check the communication activity between the gateway, the BMS, and the Hitachi systems. If there is no communication activity, check that all systems are operative, the wiring of all devices is right, and the configuration of the gateway is correct.

6. Compatibility with Hitachi CSNET Manager

ONLY FOR KNX AND BACNET

This Intesis gateway is compatible with Hitachi HVAC installations using the CSNET Manager central station only when it is configured for KNX or BACnet.

7. Hardware

7.1. Mounting

IMPORTANT
Before mounting, please ensure that the chosen installation place preserves the gateway from direct solar radiation, water, high relative humidity, or dust.

NOTE
Mount the gateway on a wall or over a DIN rail. We recommend the DIN rail mounting option, preferably inside a grounded metallic industrial cabinet.

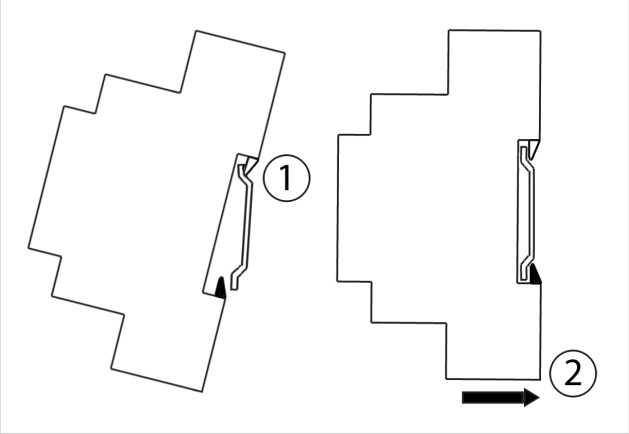
IMPORTANT
Ensure the gateway has sufficient clearances for all connections when mounted. See Dimensions (page 24).

DIN RAIL MOUNTING

Keep the clips in their original position.

1. Fit the gateway's top-side clips in the upper edge of the DIN rail.
2. Press the low side of the gateway gently to lock it in the DIN rail.
3. Make sure the gateway is firmly fixed.

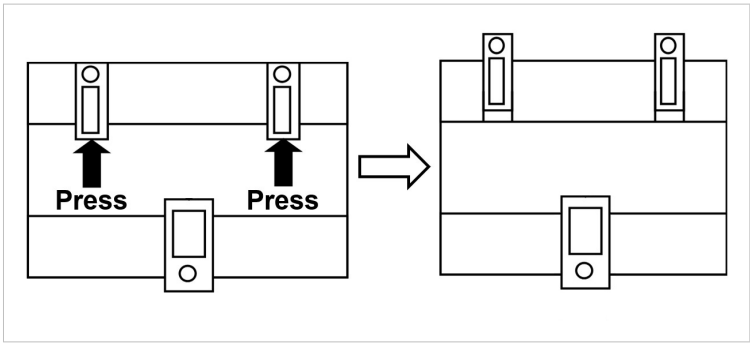
NOTE
For some DIN rails, to complete step 2, you may need a small screwdriver or similar to pull the bottom clip down.



WALL MOUNTING

IMPORTANT
For reasons of security, the maximum height for wall mounting is two meters (6.5 feet).

1. Press the top-side mobile clips in the rear panel until you hear a *click*.



2. Use the clip holes to fix the gateway on the wall using screws.

NOTE
Use M3 screws, 25 mm (1") length.

3. Make sure the gateway is firmly fixed.

7.2. Connection

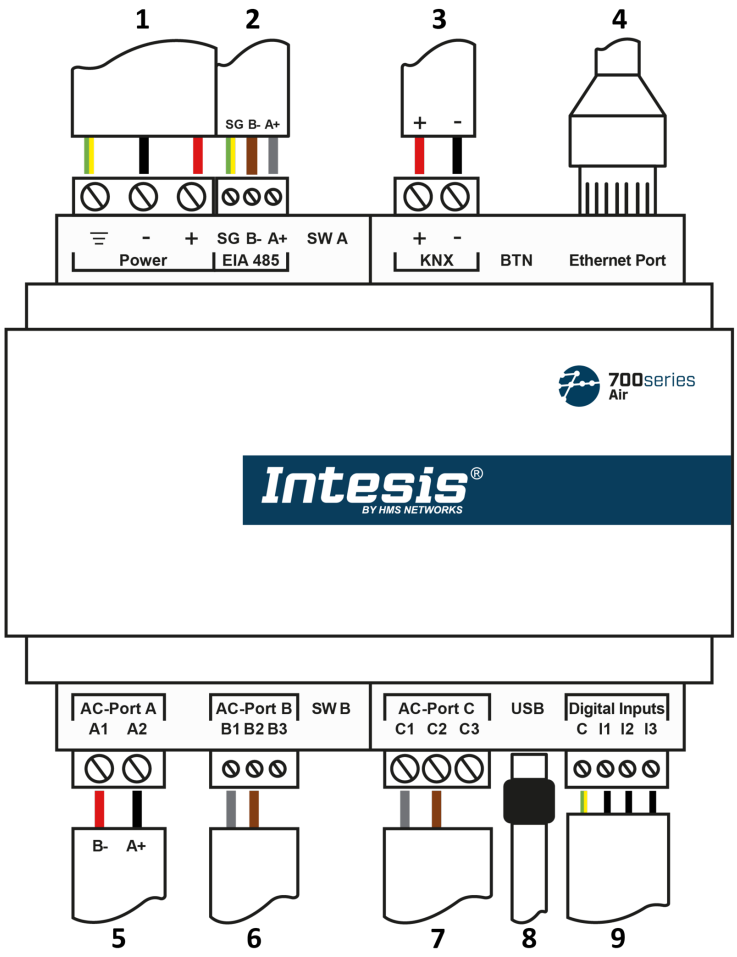
CAUTION
Disconnect all systems from power before manipulating and connecting them to the gateway.

IMPORTANT
Keep communication cables away from power and ground wires.

NOTE
Mount the gateway in the desired place before wiring it.

7.2.1. Gateway Connectors

Figure 6. Wiring diagram



1. **Power Supply** (12-36 VDC / 24 VAC)
2. **Port EIA-485**
3. **Port KNX**
4. **Ethernet**
5. **Hitachi** (H-Link - TB2)
6. **Not used**
7. **Not used**
8. **Console**
9. **Binary inputs (dry contact)** optional

WIRING THE CONNECTORS

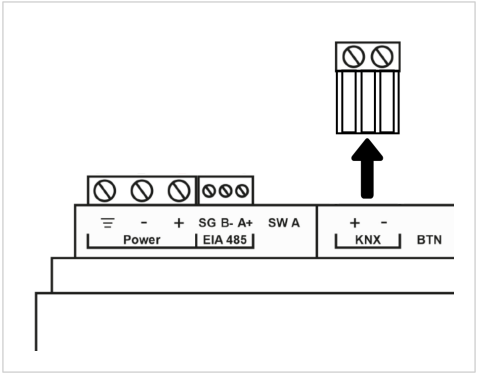
IMPORTANT
For all connectors, use solid or stranded wires (twisted or with ferrule).

Cross-section/gauge per terminal:

- One core: 0.2..2.5 mm^2 / 24..11 AWG
- Two cores: 0.2..1.5 mm^2 / 24..15 AWG
- Three cores: Not permitted

NOTE
To know more about each port's specifications, see Technical Specifications (page 23).

TIP
Terminal block connectors can be unplugged to facilitate the wiring process.



COMMUNICATION PORTS

PORT	USAGE	WIRING			
EIA-485	BACnet MS/TP and Modbus RTU	**SG**: Signal ground	**B-**	**A+**	
KNX	KNX bus	**+**		**-**	
Ethernet	**As a TCP/IP port**: BACnet/IP, Modbus TCP, MQTT, and Home Automation **As a console port**: Connection to a computer for configuration purposes	Ethernet cable (CAT5 or higher) When using the building LAN, contact the network administrator and make sure traffic is allowed. When starting up the gateway for the first time, DHCP will be enabled for 30 seconds. After that time, the default IP 192.168.100.246 will be set.			
AC-Port A No polarity to observe	Hitachi H-Link	**A1**: H-Link (TB2)		**A2**: H-Link (TB2)	
AC-Port B	*Not used*				
AC-Port C	*Not used*				
USB	Connection to a computer for configuration purposes	USB Type-C			
Digital Inputs	Dry contact for metering devices	**C**: Common	**I1**: Input 1	**I2**: Input 2	**I3**:Input3

7.2.2. Connection to the Power Supply

The power supply connector is a green pluggable terminal block (three poles) labeled as **Power**.

Apply the voltage within the admitted range and of enough power:

- **For DC**: 12..36 VDC (±10%), Max: 250 mA
- **For AC**: 24 VAC (±10%), 50-60 Hz, Max: 127 mA

NOTE
Recommended voltage: 24 VDC, Max: 127 mA

IMPORTANT
Use a circuit breaker between the gateway and the power supply. Rating: 250 V, 6 A.

IMPORTANT
- **When using a DC power supply:** Respect the polarity labeled on the power connector for the positive and negative wires.
- **When using an AC power supply:** Ensure the same power supply is not powering any other device.

IMPORTANT
- Use SELV-rated NEC class 2 or limited power source (LPS) power supply.
- Respect the polarity.
- Connect the gateway's ground terminal ⏚ to the installation grounding.

IMPORTANT
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.
- The use of AC power supplies only if they are floating and not powering any other device.

CAUTION
Never use a DC power supply with a positive terminal connected to earth.

7.2.3. Connection to the AC/AW Unit

Connect the Hitachi air conditioning network bus (H-Link) to the gateway using the **A1** and **A2** poles of the **AC-Port A**.

NOTE
There is no polarity to observe.

NOTE
See the Wiring diagram (page 12).

7.2.4. Connection to Modbus

FOR MODBUS TCP

Connect the Modbus TCP Ethernet cable to the gateway's **Ethernet Port**.

NOTE
The gateway features a temporary DHCP mode that is enabled for 30 seconds when an Ethernet link is detected, provided the gateway still has its factory settings or has been factory reset. During this time, if the gateway is connected to a DHCP-enabled network, the server will assign it a dynamic IP address. If no DHCP server is available, the default IP address 192.168.100.246 will be automatically assigned after 30 seconds.

IMPORTANT
If communicating through the LAN of the building, contact the network administrator and make sure traffic on the used port is allowed through all LAN paths.

FOR MODBUS RTU

Connect the Modbus RTU communication cable to the gateway's **EIA-485** port.

The connector for the EIA-485 bus is a green pluggable terminal block labeled **SG** (signal ground), **B-**, and **A+**.

IMPORTANT
Observe polarity.

IMPORTANT
Observe the standard restrictions of the EIA-485 bus:

- Maximum distance of 1200 meters (0.75 miles).
- Maximum of 32 devices connected to the bus.
- A 120 ohms (Ω) termination resistor is needed at each end of the bus. The gateway has an internal bus biasing circuit incorporating the termination resistor. It can be enabled using the DIP switch block (**SW A**) dedicated to the **EIA-485** port:
  Position 1
  - ON: 120 Ω termination active.
  - OFF: 120 Ω termination inactive.

  Positions 2 and 3
  - ON: Polarization active.
  - OFF: Polarization inactive.

  For further details, see DIP Switches (page 22).

To know more, refer to the document Polarity Issues in RS485 Networks.

IMPORTANT
When installing the gateway at the end of the bus with the termination resistor enabled, do not install an additional termination resistor at that end.

NOTE
See the Wiring diagram (page 12).

7.2.5. Connection to KNX

Connect the KNX TP communication cable to the gateway's **KNX** port.

IMPORTANT
Observe polarity.

NOTE
See the Wiring diagram (page 12).

7.2.6. Connection to BACnet

FOR BACNET/IP

Connect the BACnet/IP Ethernet cable to the gateway's **Ethernet Port**.

NOTE
The gateway features a temporary DHCP mode that is enabled for 30 seconds when an Ethernet link is detected, provided the gateway still has its factory settings or has been factory reset. During this time, if the gateway is connected to a DHCP-enabled network, the server will assign it a dynamic IP address. If no DHCP server is available, the default IP address 192.168.100.246 will be automatically assigned after 30 seconds.

IMPORTANT
If communicating through the LAN of the building, contact the network administrator and make sure traffic on the used port is allowed through all LAN paths.

FOR BACNET MS/TP

Connect the BACnet MS/TP communication cable to the gateway's **EIA-485** port.

The connector for the EIA-485 bus is a green pluggable terminal block labeled **SG** (signal ground), **B-**, and **A+**.

IMPORTANT
Observe polarity.

IMPORTANT
Observe the standard restrictions of the EIA-485 bus:

- Maximum distance of 1200 meters (0.75 miles).
- Maximum of 32 devices connected to the bus.
- A 120 ohms (Ω) termination resistor is needed at each end of the bus. The gateway has an internal bus biasing circuit incorporating the termination resistor. It can be enabled using the DIP switch block (**SW A**) dedicated to the **EIA-485** port:
  Position 1
  - ON: 120 Ω termination active.
  - OFF: 120 Ω termination inactive.

  Positions 2 and 3
  - ON: Polarization active.
  - OFF: Polarization inactive.

  For further details, see DIP Switches (page 22).

To know more, refer to the document Polarity Issues in RS485 Networks.

IMPORTANT
When installing the gateway at the end of the bus with the termination resistor enabled, do not install an additional termination resistor at that end.

NOTE
See the Wiring diagram (page 12).

7.2.7. Connection to MQTT

Connect an Ethernet cable from your network to the gateway's **Ethernet Port**.

NOTE
When commissioning the gateway for the first time, DHCP will be enabled for 30 seconds. During that time, if there is a DHCP server, an IP address will be automatically assigned to the gateway. After that time, the default IP address 192.168.100.246 will be automatically set.

IMPORTANT
If communicating through the LAN of the building, contact the network administrator and make sure traffic on the used port is allowed through all LAN paths.

NOTE
See the Wiring diagram (page 12).

7.2.8. Connection to Home Automation

Connect the Home Automation Ethernet cable to the gateway's **Ethernet Port**.

NOTE
When commissioning the gateway for the first time, DHCP will be enabled for 30 seconds. During that time, if there is a DHCP server, an IP address will be automatically assigned to the gateway. After that time, the default IP address 192.168.100.246 will be automatically set.

IMPORTANT
If communicating through the LAN of the building, contact the network administrator and make sure traffic on the used port is allowed through all LAN paths.

NOTE
See the Wiring diagram (page 12).

7.2.9. Connection to a Computer for Configuration

Use a USB Type-C cable (not supplied) to connect the gateway through its **USB** port to a computer to configure it with Intesis MAPS.

NOTE
You can use the **Ethernet Port** to connect the gateway and the computer instead.

NOTE
To know more about the gateway configuration, consult the Intesis MAPS Guide for Hitachi.

NOTE
See the Wiring diagram (page 12).

7.2.10. Connection to Energy Meters (Digital Inputs)

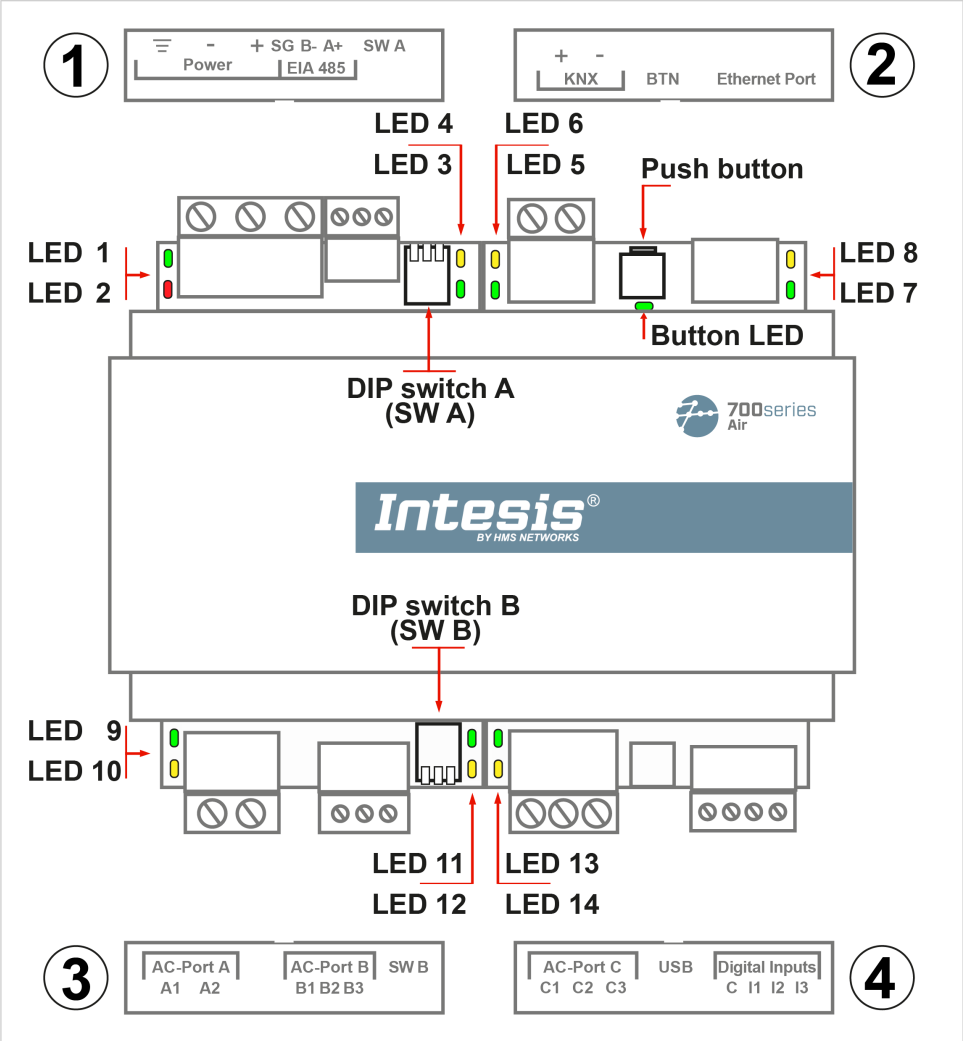
The **Digital Inputs** connector is a green pluggable terminal block (four poles) placed at the bottom right side of the gateway.

IMPORTANT
The **Digital Inputs** connector is a potential-free contact for energy metering only. It does not support any other kind of third-party elements.

NOTE
See the Wiring diagram (page 12).

7.3. Gateway Layout

Figure 7. Disposition of hardware elements in the gateway



NOTICE
Plastic covers numbered in the image as ①, ②, ③, and ④ can be easily disassembled by inserting a small flat-head screwdriver into the designated notch, located on the edge closest to the gateway's main body, and gently prying to disengage them.

NOTE
LEDs and DIP switches are hidden behind the removable plastic covers and can only be accessed by disassembling the covers.

The following sections explain each element in more detail: LEDs, DIP switches, and the push button.

7.4. LED Indicators

Table 1. LEDs location and behavior

Cover	LED	Color	Description
Top side			
Under frontal cover ①	LED 1 (PWR)	Green	Power on (not programmable)
	LED 2 (ERR)	Red	Blinking: Hardware error
	LED 3	Green	485 Tx (RS485 for BACnet or Modbus)
	LED 4	Yellow	485 Rx (RS485 for BACnet or Modbus)
Under frontal cover ②	LED 5	Green	KNX Port Tx
	LED 6	Yellow	KNX Port Rx
	BUTTON LED	Green	**KNX**: Programming mode on **BACnet**: BACnet link established **Modbus**, **MQTT**, and **Home Automation**: Not used
	LED 7	Green	Ethernet link established
	LED 8	Yellow	Ethernet speed
Bottom side			
Under frontal cover ③	LED 9	Green	AC-Port A Tx (HBS)
	LED 10	Yellow	AC-Port A Rx (HBS)
	LED 11	Green	AC-Port B Tx (RS485)
	LED 12	Yellow	AC-Port B Rx (RS485)
Under frontal cover ④	LED 13	Green	AC-Port C Tx (UFO-SLQ)
	LED 14	Yellow	AC-Port C Rx (UFO-SLQ)

NOTE

LEDs are hidden behind the four frontal labeled covers (see the figure Disposition of hardware elements in the gateway (page 20)). These covers are pressure-fitted, so they can be removed simply by pulling. The recommended method is to insert a small flat-head screwdriver into the designated notch—located on the edge closest to the gateway's main body—and gently pry to disengage the cover.

7.5. DIP Switches

The gateway has two DIP switches (see the figure Disposition of hardware elements in the gateway (page 20)):

- DIP switch A (SW A)
- DIP switch B (SW B)

Each DIP switch is dedicated to a 485 port, and its function is to activate or deactivate the termination resistor (position 1) and the polarization (positions 2 and 3) of each port.

Position			Description
1	2	3	
OFF	X	X	120 Ω termination inactive
ON	X	X	120 Ω Termination active
X	OFF	OFF	Polarization inactive
X	ON	ON	Polarization active

IMPORTANT
Observe the **ON** indicator on the DIP switch as a reference.

NOTE
Default positions are:

- DIP switch A (SW A): **OFF, OFF, OFF** (120 Ω termination and polarization inactive)
- DIP switch B (SW B): **OFF, OFF, OFF** (120 Ω termination and polarization inactive)

7.6. Push Button

Find the push button on the top side, between the KNX and the Ethernet connectors (see the figure Disposition of hardware elements in the gateway (page 20)).

NOTE
The button is hidden and only accessible using a thin object like a paper clip.

Common functionality:

RESET FACTORY SETTINGS

IMPORTANT
This action will restore the gateway to its original state, erasing all project data and settings.

1. Push the button.
2. Power on the gateway.
3. Wait four seconds.
4. Release the button.

Functionalities depending on the current project:

- **BACnet**: Push the button to send an I-Am message to all BACnet ports.
- **KNX**: Push the button to switch between normal mode and programming mode.

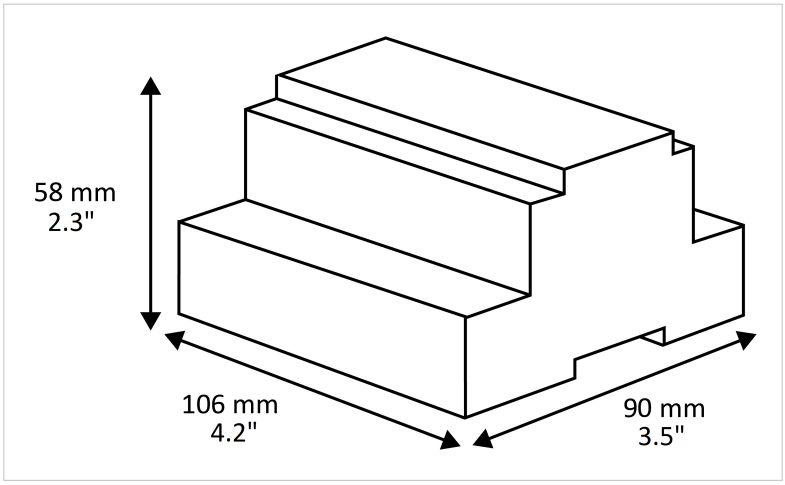
7.7. Technical Specifications

Housing	Plastic, type PC (UL 94 V-0). Color: Light Grey. RAL 7035 Net dimensions (HxWxD): Millimeters: 90 x 106 x 58 mm / Inches: 3.5 x 4.2 x 2.3" Protection: IP20	
Mounting	Wall: Use M3 25 mm (1") length screws. Secure mounting: below 2 meters (6 feet) DIN rail (recommended mounting) EN60715 TH35	
Wires (for power supply and low-voltage signals)	Wire cross-section/gauge per terminal: One core: 0.2..2.5 mm^2 (24..14 AWG) Two cores: 0.2..1.5 mm^2 (24..16 AWG) Three cores: Not permitted Use solid or stranded wires (twisted or with ferrule). For distances longer than 3.05 meters (10 feet), use class 2 cables	
Power	1 x Green pluggable terminal block (3 poles) 12 to 36 VDC +/-10%, Max.: 250 mA 24 VAC +/-10% 50-60 Hz, Max.: 127 mA Recommended: 24 VDC, Max.: 127 mA	
Ethernet	1 x Ethernet 10/100 Mbps RJ45	
Port EIA 485	1 x Green pluggable terminal block (3 poles) SGND (Reference ground or shield)	
Port KNX	1 x Orange pluggable terminal block (2 poles): A, B	
AC Ports	AC-Port A (serial, 2 poles): AC bus connection (H-Link (TB2)) AC-Port B (serial, 3 poles): Not used AC-Port C: (serial, 3 poles): Not used	
LEDs	2 x Run (Power/Error) 2 x Port EIA-485 TX/RX 2 x Port KNX TX/TR 1 x Button indicator	2 x Ethernet Link/Speed 2 x AC-Port A TX/RX 2 x AC-Port B TX/RX 2 x AC-Port C TX/RX
Binary inputs	1 x Green pluggable terminal block (4 poles) I1, I2, I3, and Common	
Console port	USB Type-C compliant	
DIP switches	**SW A** Position 1: On: 120 Ω termination active Off: 120 Ω termination inactive (default) Position 2 and 3: On: Polarization active Off: Polarization inactive (default)	**SW B** Position 1: On: 120 Ω termination active Off: 120 Ω termination inactive (default) Position 2 and 3: On: Polarization active Off: Polarization inactive (default)
Push button	1 x Push button Factory reset I-Am message (for BACnet only) Normal mode/programming mode switch (for KNX only)	
Operational temperature	Celsius: 0..60°C Fahrenheit: 32..140°F	
Operational humidity	5..95%. No condensation	
Isolation between comm. ports	1000 VDC	

7.8. Dimensions

NET DIMENSIONS (HxWxD)
Millimeters: 90 x 106 x 58 mm
Inches: 3.5 x 4.2 x 2.3"

IMPORTANT
Leave enough clear space to wire the gateway easily and for the subsequent manipulation of elements, such as connectors, DIP switches, etc.



8. Available Protocol Combinations

8.1. Integration into Modbus Systems

8.1.1. Modbus Registers

NOTICE
This part is common for Modbus RTU and TCP.

FUNCTIONS TO READ MODBUS REGISTERS

- 03 Read Holding Registers.
- 04 Read Input Registers.

FUNCTIONS TO WRITE MODBUS REGISTERS

- 06 Single Holding Registers.

Modbus register contents are expressed in most significant bit (MSB) .. less significant bit (LSB).

NOTICE
Read/write parameter terminology:

- **R**: Read-only register.
- **W**: Write-only register.
- **RW**: Read and write register.
- **T**: Trigger-only register

SPX-RAMHLK ADAPTER
When using an SPX-RAMHLK adapter, the signals supported are only those marked with *SPX-RAMHLK allowed*.

Table 2. Global signals

Register name	Possible values	Modbus address	R/W
On (all units) *SPX-RAMHLK allowed*	1: Set the units On	0	T
Off (all units) *SPX-RAMHLK allowed*	1: Set the units Off	1	T
Operation Mode Auto (all the units) *SPX-RAMHLK allowed*	1: Set Auto Mode	2	T
Operation Mode Heat (all the units) *SPX-RAMHLK allowed*	1: Set Heat Mode	3	T
Operation Mode Dry (all the units) *SPX-RAMHLK allowed*	1: Set Dry Mode	4	T
Operation Mode Fan (all the units) *SPX-RAMHLK allowed*	1: Set Fan Mode	5	T

Register name	Possible values	Modbus address	R/W
Operation Mode Cool (all the units) *SPX-RAMHLK allowed*	1: Set Cool Mode	6	T
Fan Speed Auto (all the units) *SPX-RAMHLK allowed*	1: Set Fan Speed Auto	7	T
Fan Speed Low (all the units) *SPX-RAMHLK allowed*	1: Set Fan Speed Low	8	T
Fan Speed Mid (all the units) *SPX-RAMHLK allowed*	1: Set Fan Speed Mid	9	T
Fan Speed High (all the units) *SPX-RAMHLK allowed*	1: Set Fan Speed High	10	T
Fan Speed High+ (all the units)	1: Set Fan Speed High+	11	T
Vane Position Auto (all the units)	1: Set Vane Position Auto	12	T
Vane Position 1 (all the units)	1: Set Vane Position 1	13	T
Vane Position 2 (all the units)	1: Set Vane Position 2	14	T
Vane Position 3 (all the units)	1: Set Vane Position 3	15	T
Vane Position 4 (all the units)	1: Set Vane Position 4	16	T
Vane Position 5 (all the units)	1: Set Vane Position 5	17	T
Vane Position 6 (all the units)	1: Set Vane Position 6	18	T
Vane Position 7 (all the units)	1: Set Vane Position 7	19	T
Temperature Setpoint (x10) (all units) *SPX-RAMHLK allowed*	Cool: 19..30°C / 66..86°F Heat: 17..30°C / 62.6..86°F	20	T

Table 3. Outdoor unit signals

Register name	Possible values	Modbus address formula	R/W
Communication Error OU	0: No Error 1: Error	(OU address[0 .. 63] × 25) + 10000 + 0	R
Outdoor Air Temp. *SPX-RAMHLK allowed*	-50..99°C / -58..210.2°F	(OU address[0 .. 63] × 25) + 10000 + 1	R
Comp.Top Temp. *SPX-RAMHLK allowed*	0..200°C / 32..392°F	(OU address[0 .. 63] × 25) + 10000 + 2	R
Total Real Comp. Freq. *SPX-RAMHLK allowed*	0..255 Hz	(OU address[0 .. 63] × 25) + 10000 + 3	R
Total Comp. Current *SPX-RAMHLK allowed*	0..255 A	(OU address[0 .. 63] × 25) + 10000 + 4	R
Out Exp. Valve 1 Open	0..100%	(OU address[0 .. 63] × 25) + 10000 + 5	R
Discharge Pressure (x10)	-50..99 (-5.0..9.9) MPa	(OU address[0 .. 63] × 25) + 10000 + 6	R
Suction Pressure (x10)	-50..99 (-5.0..9.9) MPa	(OU address[0 .. 63] × 25) + 10000 + 7	R

Table 4. Indoor unit signals

Register name	Possible values	Modbus address formula	R/W
On/Off *SPX-RAMHLK allowed*	0: Off 1: On	(IU address[0 .. 63] × 100) + 0	RW
Operation Mode *SPX-RAMHLK allowed*	0: Auto 1: Heat 2: Dry 3: Fan 4: Cool	(IU address[0 .. 63] × 100) + 1	RW
Fan Speed *SPX-RAMHLK allowed (values may vary)*	0: Auto 1: Low 2: Mid 3: High 4: High+	(IU address[0 .. 63] × 100) + 2	RW
Air louver	0: Auto 1..7: Position 1..Position 7	(IU address[0 .. 63] × 100) + 3	RW
Temperature Setpoint (x10°C) *SPX-RAMHLK allowed*	Cool: 19..30°C Heat: 17..30°C	(IU address[0 .. 63] × 100) + 4	RW
Remote Sensor Temp. (x10°C)	-63..63°C	(IU address[0 .. 63] × 100) + 5	R
Inlet Temp. (x10°C) *SPX-RAMHLK allowed*	-63..63°C	(IU address[0 .. 63] × 100) + 6	R
Outlet Temp. (x10°C)	-63..63°C	(IU address[0 .. 63] ×100) + 7	R
GasPipe Temp. (x10°C)	-63..63°C	(IU address[0 .. 63] × 100) + 8	R
LiquidPipe Temp. (x10°C)	-63..63°C	(IU address[0 .. 63] × 100) + 9	R
Unit Error code *SPX-RAMHLK allowed*	Error code	(IU address[0 .. 63] × 100) + 10	R
Filter Alarm	0: Normal 1: Alarm	(IU address[0 .. 63] × 100) + 11	R
Filter Alarm Reset	1: Reset	(IU address[0 .. 63] × 100) + 12	W
Communication Status *SPX-RAMHLK allowed*	0: Not Exist 1: Exist	(IU address[0 .. 63] × 100) + 13	R
Allow On/Off from RC *SPX-RAMHLK allowed*	0: Allow 1: Not allow	(IU address[0 .. 63] × 100) + 14	RW
Allow Mode from RC *SPX-RAMHLK allowed*	0: Allow 1: Not allow	(IU address[0 .. 63] × 100) + 15	RW
Allow Setpoint from RC *SPX-RAMHLK allowed*	0: Allow 1: Not allow	(IU address[0 .. 63] × 100) + 16	RW
Allow Fan from RC *SPX-RAMHLK allowed*	0: Allow 1: Not allow	(IU address[0 .. 63] × 100) + 17	RW
Unit type	0: Not Defined 1: SS 2: FC 3: VRF 4: IU 5: ES	(IU address[0 .. 63] × 100) + 18	R
Unit Address *SPX-RAMHLK allowed*	0..63	(IU address[0 .. 63] × 100) + 19	R
System Address *SPX-RAMHLK allowed*	0..63	(IU address[0 .. 63] × 100) + 20	R

Register name	Possible values	Modbus address formula	R/W
Dehumidification	0: Disabled 1: Enabled	(IU address[0 .. 63] × 100) + 21	R
Dehumidification Correction	0: 0 1: (-1) 2: (-2)	(IU address[0 .. 63] × 100) + 22	RW
Compresor Stop Cause	255: Operation Off Any other value: See the AC user manual	(IU address[0 .. 63] × 100) + 23	R
Expansion valve open *SPX-RAMHLK allowed*	0..100%	(IU address[0 .. 63] × 100) + 24	R
Operation Condition *SPX-RAMHLK allowed*	0: Off 1: Thermo Off 2: Thermo On 3: Alarm	(IU address[0 .. 63] × 100) + 25	R
RC SW Temperature	-63..63°C	(IU address[0 .. 63 × 100) + 26	R
RC SW Config	0: Without RCS 1: With RCS	(IU address[0 .. 63] × 100) + 27	R
Consumption Yesterday	Wh/KWh	(IU address[0 .. 63] × 100) + 28	R
Consumption Today	Wh/KWh	(IU address[0 .. 63] × 100) + 30	R
Consumption Total	Wh/KWh	(IU address[0 .. 63] × 100) + 32	R
Consumption Yesterday Heat	Wh/KWh	(IU address[0 .. 63] × 100) + 34	R
Consumption Today Heat	Wh/KWh	(IU address[0 .. 63] × 100) + 36	R
Consumption Total Heat	Wh/KWh	(IU address[0 .. 63] × 100) + 38	R
Consumption Yesterday Cool	Wh/KWh	(IU address[0 .. 63] × 100) + 40	R
Consumption Today Cool	Wh/KWh	(IU address[0 .. 63] × 100) + 42	R
Consumption Total Cool	Wh/KWh	(IU address[0 .. 63] × 100) + 44	R

NOTE
The unit for the consumption signals (Wh/kWh) can be set with Intesis MAPS.

8.2. Integration into KNX Systems

8.2.1. KNX Signals

NOTE
Physical Address: The gateway supports (P/S) and (P/I/S) format levels.

NOTICE
Communication object flags:

- **Ri (Read on initialization)**: The gateway requests this signal's updated data after an initialization instead of waiting for a change in the signal.
- **R**: The KNX system can read this signal.
- **W**: The KNX system can write this signal.
- **T**: The KNX system receives a telegram when this signal changes its value.
- **U**: This signal's data is updated after a reboot of either the gateway or the bus.

SPX-RAMHLK ADAPTER
When using an SPX-RAMHLK adapter, the signals supported are only those marked with *SPX-RAMHLK allowed*.

CSNET MANAGER
The signals related to fan speeds vary depending on the presence of a Hitachi CSNET Manager central station.

Table 5. Global signals

Object name	Possible values	DPT	Flags
On/Off (all units) *SPX-RAMHLK allowed*	0: Off 1: On	1.001: switch (1bit)	W
Operating Mode (all units) *SPX-RAMHLK allowed*	0: Auto 1: Heat 3: Cool 9: Fan 14: Dry	20.105: HVAC ContrMode (1 byte)	W
Operating Mode (all units) *SPX-RAMHLK allowed*	0: Auto 1: Heat 2: Dry 3: Fan 4: Cool	5.x (1byte)	W
Fan Speed (all units) *SPX-RAMHLK allowed (values may vary)*	1: Low 2: Mid 3: High 4: High+	5.x (1byte)	W
Fan Speed AUTO (all units) *SPX-RAMHLK allowed*	1: Set auto fan 0: Auto fan	1.001: switch (1bit)	W
Vane position (all units)	1..7: Position 1..osition 7	5.x (1byte)	W

Object name	Possible values	DPT	Flags
Vane position AUTO (all units)	1: Set auto vane 0: Stop auto vane	1.001: switch (1bit)	W
Temperature Setpoint (all units) *SPX-RAMHLK allowed*	Cool: 19..30°C / 66.2..86°F Heat: 17..30°C / 62..86°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	W

Table 6. Outdoor units signals

Object name	Possible values	DPT	Flags
Status_Communication Error OU	0: No error 1: Error	1.005: alarm (1bit)	R, T
Status_Outdoor Air Temperature *SPX-RAMHLK allowed*	-50..99°C / -58..210°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Status_Compresor Top Temperature *SPX-RAMHLK allowed*	0..200°C / 32..392°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Status_Total Real Compresor Freq. *SPX-RAMHLK allowed*	0..255 Hz	14.033: frequency (Hz) (4byte)	R, T
Status_Total Compresor Current *SPX-RAMHLK allowed*	0..255 A	14.019: electric current (A) (4byte)	R, T
Status_Out Exp. Valve 1 Open	0..100%	5.001: percentage (0..100%) (1 byte)	R, T
Status_Discharge Pressure (x10)	-50..99 (-5.0..9.9) MPa	14.058: pressure (Pa) (4byte)	R, T
Status_Suction Pressure (x10)	-50..99 (-5.0..9.9) MPa	14.058: pressure (Pa) (4byte)	R, T

Table 7. Indoor units signals

Object name	Possible values	DPT	Flags
Control_On/Off *SPX-RAMHLK allowed*	0: Off 1: On	1.001: switch (1bit)	Ri, W, U
Status_On/Off *SPX-RAMHLK allowed*	0: Off 1: On	1.001: switch (1bit)	R, T
Control_Operation mode *SPX-RAMHLK allowed*	0: Auto 1: Heat 3: Cool 9: Fan 14: Dry	20.105: HVAC ContrMode (1 byte)	Ri, W, U
Status_Operation mode *SPX-RAMHLK allowed*	0: Auto 1: Heat 3: Cool 9: Fan 14: Dry	20.105: HVAC ContrMode (1 byte)	R, T
Control_Operation mode *SPX-RAMHLK allowed*	0: Auto 1: Heat 2: Dry 3: Fan 4: Cool	5.x (1byte)	Ri, W, U
Status_Operation mode *SPX-RAMHLK allowed*	0: Auto 1: Heat 2: Dry 3: Fan 4: Cool	5.x (1byte)	R, T

Object name	Possible values	DPT	Flags
Control_Mode Cool/Heat *SPX-RAMHLK allowed*	0: Cool 1: Heat	1.100: cooling/heating (1bit)	Ri, W, U
Status_Mode Cool/Heat *SPX-RAMHLK allowed*	0: Cool 1: Heat	1.100: cooling/heating (1bit)	R, T
Control_Heat mode&ON *SPX-RAMHLK allowed*	0%: Off 1..100%: On+Heat	5.001: percentage (0..100%) (1byte)	Ri, W, U
Control_Cool mode&ON *SPX-RAMHLK allowed*	0%: Off 1..100%: On+Cool	5.001: percentage (0..100%) (1byte)	Ri, W, U
Control_Auto mode *SPX-RAMHLK allowed*	1: Set auto mode	1.001: switch (1bit)	Ri, W, U
Status_Auto mode *SPX-RAMHLK allowed*	1: Auto mode active 0: Auto mode not active	1.001: switch (1bit)	R, T
Control_Heat mode *SPX-RAMHLK allowed*	1: Set heat mode	1.001: switch (1bit)	Ri, W, U
Status_Heat mode *SPX-RAMHLK allowed*	1: Heat mode active 0: Heat mode not active	1.001: switch (1bit)	R, T
Control_Cool mode *SPX-RAMHLK allowed*	1: Set cool mode	1.001: switch (1bit)	Ri, W, U
Status_Cool mode *SPX-RAMHLK allowed*	1: Cool mode active 0: Cool mode not active	1.001: switch (1bit)	R, T
Control_Fan mode *SPX-RAMHLK allowed*	1: Set fan mode	1.001: switch (1bit)	Ri, W, U
Status_Fan mode *SPX-RAMHLK allowed*	1: Fan mode active 0: Fan mode not active	1.001: switch (1bit)	R, T
Control_Dry mode *SPX-RAMHLK allowed*	1: Set dry mode	1.001: switch (1bit)	Ri, W, U
Status_Dry mode *SPX-RAMHLK allowed*	1: Dry mode active 0: Dry mode not active	1.001: switch (1bit)	R, T
Control_Fan speed enumerated *SPX-RAMHLK allowed (values may vary)*	1: Low 2: Mid 3: High 4: High+	5.010: counter pulses (0..255)	Ri, W, U
Status_Fan speed enumerated *SPX-RAMHLK allowed (values may vary)*	1: Low 2: Mid 3: High 4: High+	5.010: counter pulses (0..255)	R, T
Control_Fan speed scaling **NOTE** No CSNET Manager is present *SPX-RAMHLK allowed*	Thresholds: 0..37% 38..62% 63..87% 88..100%	5.001: percentage (0..100%) (1byte)	Ri, W, U
Status_Fan speed scaling **NOTE** No CSNET Manager is present *SPX-RAMHLK allowed*	Thresholds: 25 % 50 % 75 % 100%	5.001: percentage (0..100%) (1byte)	R, T

Object name	Possible values	DPT	Flags
Control_Fan speed enumerated **NOTE** CSNET Manager is present	1: Low 2: Mid 3: High	5.010: counter pulses (0..255)	W
Status_Fan speed enumerated **NOTE** CSNET Manager is present	1: Low 2: Mid 3: High	5.010: counter pulses (0..255)	R, T
Control_Fan speed scaling **NOTE** CSNET Manager is present	Thresholds: 0..50% 51..83% 84..100%	5.001: percentage (0..100%) (1byte)	W
Status_Fan speed scaling **NOTE** CSNET Manager is present	Thresholds: 33% 67% 100%	5.001: percentage (0..100%) (1byte)	R, T
Control_Fan speed low *SPX-RAMHLK allowed*	1: Set fan speed low	1.001: switch (1bit)	Ri, W, U
Status_Fan speed low	1: Speed low active 0: Speed low not active	1.001: switch (1bit)	R, T
Control_Fan speed mid	1: Set fan speed mid	1.001: switch (1bit)	Ri, W, U
Status_Fan speed mid	1: Speed mid active 0: Speed mid not active	1.001: switch (1bit)	R, T
Control_Fan speed high *SPX-RAMHLK allowed*	1: Set fan speed high	1.001: switch (1bit)	Ri, W, U
Status_Fan speed high *SPX-RAMHLK allowed*	1: Speed high active 0: Speed high not active	1.001: switch (1bit)	R, T
Control_Fan speed high+ **NOTE** No CSNET Manager is present	1: Set fan speed high+	1.001: switch (1bit)	Ri, W, U
Status_Fan speed high+ **NOTE** No CSNET Manager is present	1: Speed high+ active 0: Speed high+ not active	1.001: switch (1bit)	R, T
Control_Fan speed Man/Auto **NOTE** No CSNET Manager is present *SPX-RAMHLK allowed*	0: Manual 1: Auto	1.001: switch (1bit)	Ri, W, U

Object name	Possible values	DPT	Flags
Status_Fan speed Man/Auto **NOTE** No CSNET Manager is present *SPX-RAMHLK allowed*	0: Manual 1: Auto	1.001: switch (1bit)	R, T
Control_Vane position enumerated	1..7: Position 1..Position 7	5.010: counter pulses (0..255)	Ri, W, U
Status_Vane position enumerated	1..7: Position 1..Position 7	5.010: counter pulses (0..255)	R, T
Control_Vane position scaling	Thresholds: 0..21% 22..36% 37..50% 51..64% 65..79% 80..93% 94..100%	5.001: percentage (0..100%) (1byte)	Ri, W, U
Status_Vane position scaling	Thresholds: 0..14% 15..29% 30..43% 44..57% 58..71% 72..86% 87..100%	5.001: percentage (0..100%) (1byte)	R, T
Control_Vane position auto	1: Set auto vane 0: Stop auto vane	1.001: switch (1bit)	Ri, W, U
Status_Vane position auto	1: Vane auto active 0: Vane auto not active	1.001: switch (1bit)	R, T
Control_Vane position-1	1: Set position-1 vane	1.001: switch (1bit)	Ri, W, U
Status_Vane position-1	1: Vane position-1 active 0: Vane position-1 not active	1.001: switch (1bit)	R, T
Control_Vane position-2	1: Set position-2 vane	1.001: switch (1bit)	Ri, W, U
Status_Vane position-2	1: Vane position-2 active 0: Vane position-2 not active	1.001: switch (1bit)	R, T
Control_Vane position-3	1: Set position-3 vane	1.001: switch (1bit)	Ri, W, U
Status_Vane position-3	1: Vane position-3 active 0: Vane position-3 not active	1.001: switch (1bit)	R, T
Control_Vane position-4	1: Set position-4 vane	1.001: switch (1bit)	Ri, W, U
Status_Vane position-4	1: Vane position-4 active 0: Vane position-4 not active	1.001: switch (1bit)	R, T
Control_Vane position-5	1: Set position-5 vane	1.001: switch (1bit)	Ri, W, U
Status_Vane position-5	1: Vane position-5 active 0: Vane position-5 not active	1.001: switch (1bit)	R, T
Control_Vane position-6	1: Set position-6 vane	1.001: switch (1bit)	Ri, W, U
Status_Vane position-6	1: Vane position-6 active 0: Vane position-6 not active	1.001: switch (1bit)	R, T
Control_Vane position-7	1: Set position-7 vane	1.001: switch (1bit)	Ri, W, U

Object name	Possible values	DPT	Flags
Status_Vane position-7	1: Vane position-7 active 0: Vane position-7 not active	1.001: switch (1bit)	R, T
Control_Temperature Setpoint *SPX-RAMHLK allowed*	**Cool:** 19..30°C / 66..86°F **Heat:** 17..30°C / 63..86°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	Ri, W, U
Status_Temperature Setpoint *SPX-RAMHLK allowed*	**Cool:** 19..30°C / 66..86°F **Heat:** 17..30°C / 63..86°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Status_AC Ambient Temperature *SPX-RAMHLK allowed*	-63..63 °C / -81..145°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Status_Remote Sensor Temperature	-63..63°C / -81..145°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Control_KNX ambient Temperature *SPX-RAMHLK allowed*	°C / °F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	Ri, W, U
Status_Outlet Temperature	-63..63°C / -81..145°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Status_GasPipe Temperature	-63..63°C / -81..145°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Status_LiquidPipe Temperature	-63..63°C / -81..145°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Status_Unit error *SPX-RAMHLK allowed*	0: No error 1: Error	1.005: alarm (1bit)	R, T
Status_Unit error code	0: No Error 100..999: Error	8.x (2 byte)	R, T
Status_FilterSign	0: Normal 1: Alarm	1.005: alarm (1bit)	R, T
Control_FilterReset	0: No reset 1: Reset	1.015: reset (1bit)	Ri, W, U
Status_Communication status *SPX-RAMHLK allowed*	0: Not exist 1: Exist	1.001: switch (1bit)	R, T
Control_Allow On/Off from RC	0: Allowed 1: Not allowed	1.002: boolean (1bit)	Ri, W, U
Status_Allow On/Off from RC	0: Allowed 1: Not allowed	1.002: boolean (1bit)	R, T
Control_Allow Mode from RC	0: Allowed 1: Not allowed	1.002: boolean (1bit)	Ri, W, U
Status_Allow Mode from RC	0: Allowed 1: Not allowed	1.002: boolean (1bit)	R, T
Control_Allow Setpoint from RC	0: Allowed 1: Not allowed	1.002: boolean (1bit)	Ri, W, U
Status_Allow Setpoint from RC	0: Allowed 1: Not allowed	1.002: boolean (1bit)	R, T
Control_Allow Fan Speed from RC	0: Allowed 1: Not allowed	1.002: boolean (1bit)	Ri, W, U
Status_Allow Fan Speed from RC	0: Allowed 1: Not allowed	1.002: boolean (1bit)	R, T

Object name	Possible values	DPT	Flags
Status_Unit type	1: SS 2: FC 3: VRF 4: IU 5: ES 13: Not Defined	5.x (1byte)	R, T
Status_Unit adress *SPX-RAMHLK allowed*	0..63	5.010: counter pulses (0..255)	R, T
Status_System adress *SPX-RAMHLK allowed*	0..63	5.010: counter pulses (0..255)	R, T
Status_Dehumidification	0: Off 1: On	1.001: switch (1bit)	R, T
Control_Dehumidification correction	0..2	5.010: counter pulses (0..255)	Ri, W, U
Status_Dehumidification correction	0..2	5.010: counter pulses (0..255)	R, T
Status_Compresor stop cause	0..254: Cause 255: Operation Off	8.x (2 byte)	R, T
Status_Expansion valve open *SPX-RAMHLK allowed*	0..100%	5.001: percentage (0..100%) (1byte)	R, T
Status_Operation condition *SPX-RAMHLK allowed*	0: Off 1: Thermo Off 2: Thermo On 3: Alarm	5.x (1byte)	R, T
Status_RC SW Temperature	-63..63°C / -81..145°F	9.001: temperature (°C) (2 byte) 9.027: temperature (°F) (2 byte)	R, T
Status_RC SW Configuration	0: Without RCS 1: With RCS	1.001: switch (1bit)	R, T
Status_Consumption Yesterday	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T
Status_Consumption Today	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T
Status_Consumption Total	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T
Status_Consumption Yesterday Heat	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T
Status_Consumption Today Heat	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T
Status_Consumption Total Heat	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T
Status_Consumption Yesterday Cool	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T
Status_Consumption Today Cool	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T
Status_Consumption Total Cool	Wh/KWh	13.010 active energy (Wh) (4byte) 13.013 active energy (kWh) (4 byte)	R, T

NOTE
The unit for temperature signals (°C/°F) and for the consumption signals (Wh/kWh) can be set with Intesis MAPS.

8.3. Integration into BACnet Systems

NOTICE
You can consult the Protocol Implementation Conformance Statement (PICS) document here.

8.3.1. BACnet Objects

NOTICE
This part is common for BACnet MS/TP and BACnet/IP.

Table 8. Available object types

Input object types	Output object types
Analog input	Analog output
Binary input	Binary output
Multistate input	Multistate output

SPX-RAMHLK ADAPTER
When using an SPX-RAMHLK adapter, the signals supported are only those marked with *SPX-RAMHLK allowed*.

CSNET MANAGER
The number of fan speeds available varies depending on the presence of a Hitachi CSNET Manager central station.

Table 9. Global signals

Object name	Possible values	Object type	Object instance
On/Off (all units) *SPX-RAMHLK allowed*	0: Off 1: On	4-Binary Output	0 + 0
Mode (all units) *SPX-RAMHLK allowed*	1: Heat 2: Cool 3: Fan 4: Dry 5: Auto	14-Multistate Output	0 + 0
FanSpeed (all units) **NOTE** No CSNET Manager is present *SPX-RAMHLK allowed*	1: Auto 2: Low 3: Mid 4: High 5: High+ (For H-Link only)	14-Multistate Output	0 + 1
FanSpeed (all units) **NOTE** CSNET Manager is present	1: Low 2: Mid 3: High (For CSNET only)	14-Multistate Output	0 + 1
Vane Position (all units)	1: Auto 2..8: Pos1..Pos7	14-Multistate Output	0 + 2

Object name	Possible values	Object type	Object instance
Temperature Setpoint (all units) *SPX-RAMHLK allowed*	Cool: 19..30°C / 66..86°F Heat: 17..30°C / 63..86°F	1-Analog Output	0 + 0

Table 10. Oudoor unit signals

Object name	Possible values	Object type	Object instance
OUXX_Outdoor Air Temp. *SPX-RAMHLK allowed*	-50..99°C / -58..210°F	0-Analog Input	(OU address × 25) + 20000 + 0
OUXX_Comp.Top Temp. *SPX-RAMHLK allowed*	0..200°C / 32..392°F	0-Analog Input	(OU address × 25) + 20000 + 1
OUXX_Total Real Comp. Freq. *SPX-RAMHLK allowed*	0..255 Hz	0-Analog Input	(OU address × 25) + 20000 + 2
OUXX_Total Comp. Current *SPX-RAMHLK allowed*	0..255 A	0-Analog Input	(OU address × 25) + 20000 + 3
OUXX_Out Exp. Valve 1 Open	0..100%	0-Analog Input	(OU address × 25) + 20000 + 4
OUXX_Discharge Pressure	-5.0..9.9 MPa	0-Analog Input	(OU address × 25) + 20000 + 5
OUXX_Suction Pressure	-5.0..9.9 MPa	0-Analog Input	(OU address × 25) + 20000 + 6
OUXX_Communication Status	0: Not Exist 1: Exist	3-Binary Input	(OU address × 25) + 20000 + 0

Table 11. Indoor units signals

Object name	Possible values	Object type	Object instance
OXXUXX_On/Off_S *SPX-RAMHLK allowed*	0: Off 1: On	3-Binary Input	(IU address × 100) + 0
OXXUXX_On/Off_C *SPX-RAMHLK allowed*	0: Off 1: On	4-Binary Output	(IU address × 100) + 0
OXXUXX_Mode_S *SPX-RAMHLK allowed*	1: Heat 2: Cool 3: Fan 4: Dry 5: Auto	13-Multistate Input	(IU address × 100) + 0
OXXUXX_Mode_C *SPX-RAMHLK allowed*	1: Heat 2: Cool 3: Fan 4: Dry 5: Auto	14-Multistate Output	(IU address × 100) + 0
OXXUXX_Setpoint_S *SPX-RAMHLK allowed*	Cool: 19..30°C / 66..86°F Heat: 17..30°C / 63..86°F	0-Analog Input	(IU address × 100) + 0
OXXUXX_Setpoint_C *SPX-RAMHLK allowed*	Cool: 19..30°C / 66..86°F Heat: 17..30°C / 63..86°F	1-Analog Output	(IU address × 100) + 0
OXXUXX_FanSpeed_S **NOTE** No CSNET Manager is present *SPX-RAMHLK allowed (values may vary)*	1: Auto 2: Low 3: Mid 4: High 5: High+	13-Multistate Input	(IU address × 100) + 1

Object name	Possible values	Object type	Object instance
OXXUXX_FanSpeed_C *SPX-RAMHLK allowed (values may vary)* **NOTE** No CSNET Manager is present	1: Auto 2: Low 3: Mid 4: High 5: High+	14-Multistate Output	(IU address × 100) + 1
OXXUXX_FanSpeed_S **NOTE** CSNET Manager is present	1: Low 2: Mid 3: High	13-Multistate Input	(IU address × 100) + 1
OXXUXX_FanSpeed_C **NOTE** CSNET Manager is present	1: Low 2: Mid 3: High	14-Multistate Output	(IU address × 100) + 1
OXXUXX_Vane Position_S	1: Auto 2..8: Pos1..Pos7	13-Multistate Input	(IU address × 100) + 2
OXXUXX_Vane Position_C	1: Auto 2..8: Pos1..Pos7	14-Multistate Output	(IU address × 100) + 2
OXXUXX_Remote Sensor Temp.	-63..63°C / -81..145°F	0-Analog Input	(IU address × 100) + 1
OXXUXX_Inlet Temp. *SPX-RAMHLK allowed*	-63..63°C / -81..145°F	0-Analog Input	(IU address × 100) + 2
OXXUXX_Outlet Temp.	-63..63°C / -81..145°F	0-Analog Input	(IU address × 100) + 3
OXXUXX_GasPipe Temp.	-63..63°C / -81..145°F	0-Analog Input	(IU address × 100) + 4
OXXUXX_LiquidPipe Temp.	-63..63°C / -81..145°F	0-Analog Input	(IU address × 100) + 5
OXXUXX_Unit Error code *SPX-RAMHLK allowed*	Error code	0-Analog Input	(IU address × 100) + 6
OXXUXX_FilterSign	0: Normal 1: Alarm	3-Binary Input	(IU address × 100) + 1
OXXUXX_FilterReset	1: Reset	4-Binary Output	(IU address × 100) + 1
OXXUXX_Communication Status *SPX-RAMHLK allowed*	0: Not Exist 1: Exist	3-Binary Input	(IU address × 100) + 2
OXXUXX_Allow On/Off from RC_S *SPX-RAMHLK allowed*	0: Allowed 1: Not allowed	3-Binary Input	(IU address × 100) + 3
OXXUXX_Allow On/Off from RC_C *SPX-RAMHLK allowed*	0: Allowed 1: Not allowed	4-Binary Output	(IU address × 100) + 2
OXXUXX_Allow Mode from RC_S *SPX-RAMHLK allowed*	0: Allowed 1: Not allowed	3-Binary Input	(IU address × 100) + 4
OXXUXX_Allow Mode from RC_C *SPX-RAMHLK allowed*	0: Allowed 1: Not allowed	4-Binary Output	(IU address × 100) + 3
OXXUXX_Allow Setpoint from RC_S *SPX-RAMHLK allowed*	0: Allowed 1: Not allowed	3-Binary Input	(IU address × 100) + 5
OXXUXX_Allow Setpoint from RC_C *SPX-RAMHLK allowed*	0: Allowed 1: Not allowed	4-Binary Output	(IU address × 100) + 4
OXXUXX_Allow Fan from RC_S *SPX-RAMHLK allowed*	0: Allowed 1: Not allowed	3-Binary Input	(IU address × 100) + 6
OXXUXX_Allow Fan from RC_C *SPX-RAMHLK allowed*	0: Allowed 1: Not allowed	4-Binary Output	(IU address × 100) + 5

Object name	Possible values	Object type	Object instance
OXXUXX_Unit type	1: Not Defined 2: SS 3: FC 4: VRF 5: IU 6: ES	13-Multistate Input	(IU address × 100) + 3
OXXUXX_Unit Address *SPX-RAMHLK allowed*	0..63	0-Analog Input	(IU address × 100) + 7
OXXUXX_System Address *SPX-RAMHLK allowed*	0..63	0-Analog Input	(IU address × 100) + 8
OXXUXX_Dehumidification	0: Disabled 1: Enabled	3-Binary Input	(IU address × 100) + 7
OXXUXX_Dehum. Correction_S	1: 0 2: (-1) 3: (-2)	13-Multistate Input	(IU address × 100) + 4
OXXUXX_Dehum. Correction_C	1: 0 2: (-1) 3: (-2)	14-Multistate Output	(IU address × 100) + 3
OXXUXX_Comp. Stop Cause	255: Operation Off Any other value: See the AC user manual	0-Analog Input	(IU address × 100) + 9
OXXUXX_Exp. Valve Open *SPX-RAMHLK allowed*	0..100%	0-Analog Input	(IU address × 100) + 10
OXXUXX_Operat. Condition *SPX-RAMHLK allowed*	1: Off 2: Thermo Off 3: Thermo On 4: Alarm	13-Multistate Input	(IU address × 100) + 5
OXXUXX_RC SW Temp.	-63..63°C / -81..145°F	0-Analog Input	(IU address × 100) + 11
OXXUXX_RC SW Config	0: Without RCS 1: With RCS	3-Binary Input	(IU address × 100) + 8
OXXUXX_Consumption Yesterday_S	Wh/KWh	0-Analog Input	(IU address × 100) + 12
OXXUXX_Consumption Today_S	Wh/KWh	0-Analog Input	(IU address × 100) + 13
OXXUXX_Consumption Total_S	Wh/KWh	0-Analog Input	(IU address × 100) + 14
OXXUXX_Consumption Yesterday_S Heat	Wh/KWh	0-Analog Input	(IU address × 100) + 15
OXXUXX_Consumption Today_S Heat	Wh/KWh	0-Analog Input	(IU address × 100) + 16
OXXUXX_Consumption Total_S Heat	Wh/KWh	0-Analog Input	(IU address × 100) + 17
OXXUXX_Consumption Yesterday_S Cool	Wh/KWh	0-Analog Input	(IU address × 100) + 18
OXXUXX_Consumption Today_S Cool	Wh/KWh	0-Analog Input	(IU address × 100) + 19
OXXUXX_Consumption Total_S Cool	Wh/KWh	0-Analog Input	(IU address × 100) + 20

NOTE
The unit for temperature (°C/°F) and for the consumption signals (Wh/kWh) can be set with Intesis MAPS.

8.4. Integration into MQTT Systems

8.4.1. MQTT Topics

When using the MQTT protocol, the gateway publishes topics to share its status information and subscribes to topics to receive commands. Both actions are performed through an external MQTT broker, which manages communication between the gateway and other MQTT clients, such as the BMS.

In MQTT, a topic is a string identifier used to route messages between clients via the broker. A topic follows a hierarchical structure with different levels, which vary depending on the MQTT broker:

- **AWS IoT Core / Generic**:
  - **For Publishing**: <macGW>/<IUxx>/status/<metricName>
  - **For Subscribing**: <macGW>/<IUxx>/cmd/<metricName>
- **Azure IoT Hub:**
  - **For Publishing**: devices/<macGW>/messages/events/&IU=<IUxx>&metricName=<metricName>
  - **For Subscribing**: devices/<macGW>/messages/devicebound/&IU=<IUxx>&metricName=<metricName>

The following tables list all available topics.

Table 12. Publishing topics

MQTT topics	Description	Possible values
AWS IoT Core / Generic: <macGW>/<IUxx>/status/onOffSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=onOffSts	On/Off Status	0: Off 1: On
AWS IoT Core / Generic: <macGW>/<IUxx>/status/modeSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=modeSts	Operation Mode Status	0: Auto 1: Heat 2: Dry 3: Fan 4: Cool
AWS IoT Core / Generic: <macGW>/<IUxx>/status/setTempSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=setTempSts	Temperature Setpoint Status	**Cool:** 19..30°C / 66.2..86°F **Heat:** 17..30°C / 62.6..86°F
AWS IoT Core / Generic: <macGW>/<IUxx>/status/fanSpeedSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=fanSpeedSts	Fan Speed Status	0: Auto 1: Low 2: Mid 3: High 4: High+
AWS IoT Core / Generic: <macGW>/<IUxx>/status/vanesSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=vanesSts	Vane Position Status	0: Auto 1: Pos. 1 2: Pos. 2 3: Pos. 3 4: Pos. 4 5: Pos. 5 6: Pos. 6 7: Pos. 7

MQTT topics	Description	Possible values
AWS IoT Core / Generic: <macGW>/<IUxx>/status/remoteSensorTempSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=remoteSensorTempSts	Remote Sensor Temp Status	-63..63°C / -81.4..145.4°F
AWS IoT Core / Generic: <macGW>/<IUxx>/status/tempInSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=tempInSts	Inlet Temp Status	
AWS IoT Core / Generic: <macGW>/<IUxx>/status/tempOutSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=tempOutSts	Outlet Temp Status	
AWS IoT Core / Generic: <macGW>/<IUxx>/status/errorCodeSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=errorCodeSts	Unit Error Code Status	0: No error 1: Error
AWS IoT Core / Generic: <macGW>/<IUxx>/status/CommErrorSts **Azure IoT Hub:** devices/<macGW>/messages/events/&IU=<IUxx>&metricName=CommErrorSts	Communication Status	0: No comm. 1: Comm. active

Table 13. Subscribing topics

MQTT topics	Description	Possible values
AWS IoT Core / Generic: <macGW>/<IUxx>/cmd/onOffCmd **Azure IoT Hub:** devices/<macGW>/messages/devicebound/&IU=<IUxx>&metricName=onOffCmd	On/Off Control	0: Off 1: On
AWS IoT Core / Generic: <macGW>/<IUxx>/cmd/modeCmd **Azure IoT Hub:** devices/<macGW>/messages/devicebound/&IU=<IUxx>&metricName=modeCmd	Operation Mode Control	0: Auto 1: Heat 2: Dry 3: Fan 4: Cool
AWS IoT Core / Generic: <macGW>/<IUxx>/cmd/fanSpeedCmd **Azure IoT Hub:** devices/<macGW>/messages/devicebound/&IU=<IUxx>&metricName=fanSpeedCmd	Fan Speed Control	0: Auto 1: Low 2: Mid 3: High 4: High+

MQTT topics	Description	Possible values
AWS IoT Core / Generic: <macGW>/<IUxx>/cmd/vanesCmd **Azure IoT Hub:** devices/<macGW>/messages/devicebound/&IU=<IUxx>&metricName=vanesCmd	Vane Position Control	0: Auto 1: pos. 1 2: pos. 2 3: Pos. 3 4: Pos. 4 5: Pos. 5 6: Pos. 6 7: Pos. 7
AWS IoT Core / Generic: <macGW>/<IUxx>/cmd/setTempCmd **Azure IoT Hub:** devices/<macGW>/messages/devicebound/&IU=<IUxx>&metricName=setTempCmd	Temperature Setpoint Control	**Cool:** 19..30°C / 66.2..86°F **Heat:** 17..30°C / 62.6..86°F

The content of the transmitted topics is handled in a JSON format.

Example 1. Payload example:

```
Topic:
<macGW>/<IUxx>/cmd/setTempCmd

Payload:
{
"name": "setTempCmd",
"timestamp": "<timestamp>",
"dataType": "float",
"isValid": "true",
"value": "0.0,"
"unit": "ºC"
}
```

NOTICE
To know more about the gateway configuration, consult the Intesis MAPS Guide for Hitachi.

8.5. Integration into Home Automation Systems

8.5.1. Home Automation Signals

The following tables list all available Home Automation signals for this gateway.

NOTE

- **SET**: Command used to control the indoor unit. It is sent by the client.
- **CHN**: Command used to get notifications of changes in the status of a specific function of the gateway. It is sent spontaneously by the gateway itself.
- **GET**: Command used to get the status of a specific function. It is sent by the client.

To know more about the Home Automation protocol, see the WMP protocol specifications manual.

Table 14. Indoor unit signals

Name	Possible values	acNum[1]	Commands supported
On/Off	ON OFF	See the note below	SET/CHN/GET
Operation Mode	HEAT DRY COOL AUTO FAN		SET/CHN/GET
Fan Speed	1 4 2 AUTO 3		SET/CHN/GET
Vane Position	1 5 2 6 3 7 4 AUTO		SET/CHN/GET
Temperature Setpoint (x10)	°C / °F		SET/CHN/GET
AC Ambient Temperature (x10)	°C / °F		CHN/GET
Unit Error code	0: No Error X: Error		CHN/GET
Error IU	OK ERR		CHN/GET

NOTE

[1] This index must be set according to the Unit ID Index.

For outdoor units, the acNum value must be the same as the minimum indoor unit associated in the CONFIGURATION section.

9. Late Configuration: Change the Gateway's Protocol

Reconfiguring the gateway with a different protocol is very easy:

1. Connect the gateway to the computer and open the configuration tool Intesis MAPS.
2. Select the new template you need.
3. Click **Next** or double-click the template in the list.
4. A message will pop up, asking if you want to save the project currently loaded in the gateway.
5. Click **Yes** or **No**, depending on your needs.
6. Configure the needed parameters and signals for your new project.
7. Send the configuration to the gateway.

NOTE
To know more about the gateway configuration, consult the Intesis MAPS Guide for Hitachi.

10. Error Codes

NOTE
These error codes are the same for all applications.

Error Code	Error Category	Description
0	Intesis gateway	No Communication Error OU
1	Indoor unit	Activation of Protection Device (Float Switch). Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch or Drain Pan)
2	Outdoor unit	Activation of Protection Device (High Pressure Cut). Activation of PSH (Pipe Clogging, Excessive Refrigerant! lnert Gas Mixing)
3	Transmission	Abnormality between indoor and outdoor units. Incorrect Wiring, Loose Terminals, Disconnect Wire, Blowout of Fuse, Outdoor Unit Power OFF
4		Abnormality between lnverter PCB and Outdoor PCB. lnverter PCB - Outdoor PCB Transmission Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
4.		Abnormality between Fan Controller and Outdoor PCB. Fan Controller - Outdoor PCB Transmission Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
5	Supply phase	Abnormality Power Source Phases. lncorrect Power Source, Connection to Reversed Phase, Open-Phase
6	Voltage	Abnormal inverter voltage. Outdoor Voltage Drop, insufficient Power Capacity
6.		Abnormal fan controller voltage. Outdoor Voltage Drop, lnsufficient Power Capacity
7	Cycle	Decrease in Discharge Gas Superheat. Excessive Refrigerant! Charge, Failure of Thermistor, lncorrect Wiring, lncorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
8		lncrease in Discharge Gas Temperature. lnsufficient Refrigerant! Charge, Pipe Clogging, Failure of Thermistor, lncorrect Wiring, lncorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector)
10	Transmission	Abnormality between Outdoor and Outdoor. Abnormality between Outdoor and Outdoor. lncorrect Wiring, Breaking Wire, Loose Terminals
11	Outdoor Unit	lncorrect Outdoor Unit Address Setting. Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant! Cycle System
12		lncorrect Outdoor Unit Main Unit Setting. Two (or more) Outdoor Units Set as "Main Unit" Exist in Same Refrigeran! Cycle System
17	Sensor on Indoor Unit	lnlet Air Thermistor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
18		Outlet Air Thermistor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
19		Freeze Protection Thermistor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
20		Gas Piping Thermistor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
25	Fan motor	Fan Motor Overheat, Locking
33	Sensor on Outdoor Unit	High Pressure Sensor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
34		Outdoor Air Thermistor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
35		Discharge Gas Thermistor on Top of Compressor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
36		Heat Exchanger Liquid Pipe Thermistor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
37		Heat Exchanger Gas Pipe Thermistor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
41		Low Pressure Sensor. lncorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit

Error Code	Error Category	Description
49	System	Incorrect Capacity Code Setting of Combination Excessive or Insufficient Indoor Unit Total Capacity Code
53		Duplication of Indoor Unit No. in same Ref. Gr.
54		Indoor Unit is Designed for R22
56		Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
57	Compressor	Abnormality Running Current at Constan! Speed Compressor. Overcurrent, Blowout Fuse, Current Sensor Failure, Instantaneous Power Failure, Voltage Drop, Abnormal Power Supply
58	Outdoor Unit	Abnormality of Outdoor Unit Capacity. Outdoor Unit Capacity > 510kBtu/h
59		Incorrect Setting of Outdoor Unit Models Combination or Voltage. Incorrect Setting of Main and Sub Unit(s) Combination or Voltage.
61		Abnormality Transmission between Main Unit and Sub Unit(s). Incorrect Wiring, Disconnect Wire, Breaking Wire, PCB Failure.
67	Protection Device	Activation of Low Compression Ratio Protection Device. Defective Compression (Failure of Compressor of Inverter, Loose Power Supply Connection).
68		Activation of Low Pressure Increase Protection Device. Overload at Cooling, High Temperature at Heating, Expansion Valve Locking (Loose Connector).
69		Activation of High Pressure Increase Protection Device. Overload Operation (Clogging, Short-Pass), Pipe Clogging, Excessive Refrigerant!, Inert Gas Mixing
71		Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection). Insuffcient Refrigerant!, Refrigerant! Piping, Clogging, Expansion Valve Locking at Open Position (Loose Connector)
72		Activation of Inverter Overcurrent Protection Device. Overload Operation, Compressor Failure
81	Sensor	Abnormal Inverter Current Sensor. Current Sensor Failure
83	Inverter	Inverter Error Signal Detection. Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short Circuit)
84		Abnormality of Inverter Fin Temperature. Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
85		Inverter Failure. Inverter PCB Failure
87	Fan Controller	Activation of Fan Controller Protection. Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short Circuit), Instantaneous Overcurrent
90		Abnormality of Fan Controller Fin Temperature. Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
91		Activation of Overcurrent Protection. Fan Motor Failure
92		Abnormality of Fan Controller Sensor. Failure of Current! Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Low Voltage, Earth Fault, Step-Out)
177	Outdoor Unit No. Setting	Incorrect Setting of Unit and Refrigerant! Cycle No. Over 64 Number is Set for Address or Refrigerant! Cycle.
181	Indoor Unit No. Setting	Incorrect Indoor Unit Connection Number Setting. More than 17 Non-Corresponding to Hi-NET Units are Connected to One System.
193	Switch Box Unit	2 or more Switch Box Units are connected between outdoor unit and indoor unit.
194		9 or More Indoor Units Connected to Switch Box Unit
195		The indoor units of different refrigerant! cycle is connected to Switch Box unit.
238	Compressor	Compressor Protection Alarm. (It cannot be reset from remote Controller). This alarm code appears when the following alarms occur three times within six hours: 02, 07, 08, 39, 43 to 45, 47

IMPORTANT
These error codes may differ depending on the specific unit model.

NOTE
If you detect a non-listed error code, please contact Hitachi technical support.