

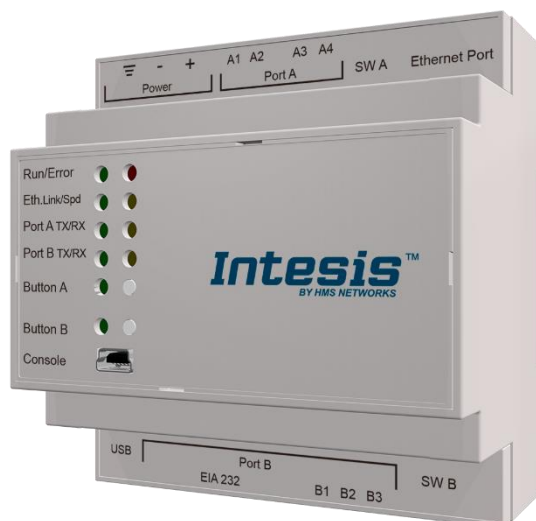
WMP

Hitachi VRF Air Conditioning

Gateway for the integration of Hitachi VRF systems into Home Automation systems
(WMP)

USER MANUAL

Issue date: 09/2020 r1.1 ENGLISH



Important User Information

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Gateway for the integration of Hitachi VRF systems into Home Automation systems (WMP).

ORDER CODE	LEGACY ORDER CODE
INMBSHIT016O000	HI-AC-MBS-16
INMBSHIT064O000	HI-AC-MBS-64

INDEX

1. Description.....	5
1.1. Introduction	5
1.2. Functionality	6
1.3. Capacity of Intesis.....	6
2. Intesis WMP interface.....	7
2.1. HVAC WMP Commands supported.....	7
2.2. HVAC WMP Functions allowed	7
2.3. Link with Home Automation system.....	7
3. Connections.....	8
3.1. Power device	9
3.2. Connect to Hitachi VRF installation	9
3.3. Connection to Home Automation (WMP).....	9
3.4. Connection to PC (Configuration tool)	9
4. Set-up process and troubleshooting.....	10
4.1. Pre-requisites.....	10
4.2. Intesis MAPS. Configuration & monitoring tool for Intesis Home Automation (WMP) series	10
4.2.1. Connection	10
4.2.2. Configuration tab	11
4.2.3. General configuration.....	11
4.2.4. Home Automation (WMP) system configuration	11
4.2.5. Hitachi configuration.....	12
4.2.6. Signals.....	14
4.2.7. Sending the configuration to Intesis.....	14
4.2.8. Diagnostic.....	15
4.2.9. Set-up procedure	16
5. Electrical & Mechanical Features	18
6. Dimensions	19
7. AC Unit Types compatibility.....	20
8. Error codes for Indoor and Outdoor Units	21

1. Description

1.1. Introduction

This document describes the integration of Hitachi VRF air conditioning systems into Home Automation systems using the Home Automation (WMP) to Hitachi VRF communication gateway.

The aim of this integration is to monitor and control Hitachi air conditioning systems, remotely, from a Home Automation system. To do it so, Intesis communicates with Intesis WMP protocol, allowing controlling and update the signals requested from the Home Automation hub.

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

This document assumes that the user is familiar with Home Automation (WMP) and Hitachi technologies and their technical terms.

HITACHI

Home Automation



Drivers availables for:

- AMX
- Control4
- CRESTRON
- eedomus
- ELAN
- FIBARO
- ifidius mobile
- EEDOM
- KUJU
- RZI
- SAVANT
- vera

Integration of Hitachi VRF compatible systems into Home Automation (WMP) systems.

1.2. Functionality

Intesis™ continuously monitors Hitachi VRF network for all configured signals and keeps them updated in its memory available for reading and updating them towards the Home Automation system via Intesis WMP protocol.

Commands toward the indoor units are permitted.

Each indoor unit is offered as a set of WMP commands.

Element	WMP commands supported
Indoor Unit	<ul style="list-style-type: none">• SET (control)• CHN (status)• GET (read)

1.3. Capacity of Intesis

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

* There are different models of *Intesis WMP – Hitachi VRF* each one with different capacity. The table above shows the capacity for the top model (with maximum capacity).

Their order codes are:

- INMBSHIT016O000, Model supporting up to 16 indoor units.
- INMBSHIT064O000, Model supporting up to 64 indoor units.

2. Intesis WMP interface

In this section, a common description for all Intesis WMP series gateways is given, from the point of view of the Home Automation system which is called from now on *internal system*. Connection with the Hitachi VRF system is also called from now on *external system*.

There is a specific Home Automation (WMP) manual available about WMP protocol with available examples. Here is included the specific information regarding to WMP protocol and its integration in this product, for further explanations, refer to the referred WMP manual available in www.intesis.com.

2.1. HVAC WMP Commands supported

Intesis WMP commands SET/CHN/GET can be used with the different WMP functions.

2.2. HVAC WMP Functions allowed

Depending on the signal, different commands are allowed. WMP protocol uses different functions to refer to different signals of the HVAC system.

In the table below are listed the available WMP signals for the HVAC control, the function to identify the signal, its available values and the commands allowed to interact with them.

OUTDOOR UNITS SIGNALS

Signal description	Function	Values	Commands
Comm Error OU	ERROROU	OK/ERR	CHN/GET

INDIVIDUAL UNITS

Signal description	Function	Values	Commands
On/Off	ONOFF	ON/OFF	SET/CHN/GET
Operation Mode	MODE	HEAT/COOL/FAN/DRY/AUTO	SET/CHN/GET
Fan Speed	FANSP	1/2/3/4/AUTO	SET/CHN/GET
Vane Position	VANEUD	1/2/3/4/5/6/7/AUTO	SET/CHN/GET
Temperature Setpoint (x10) (°C)	SETPTMP	(°C)	SET/CHN/GET
AC Ambient Temperature (x10) (°C)	AMBTMP	(°C)	CHN/GET
Unit Error code (0-No Error,X-Error)	ERRCODE	0/X (see user manual)	CHN/GET
Error IU	ERRSTATUS	OK/ERR	CHN/GET

2.3. Link with Home Automation system

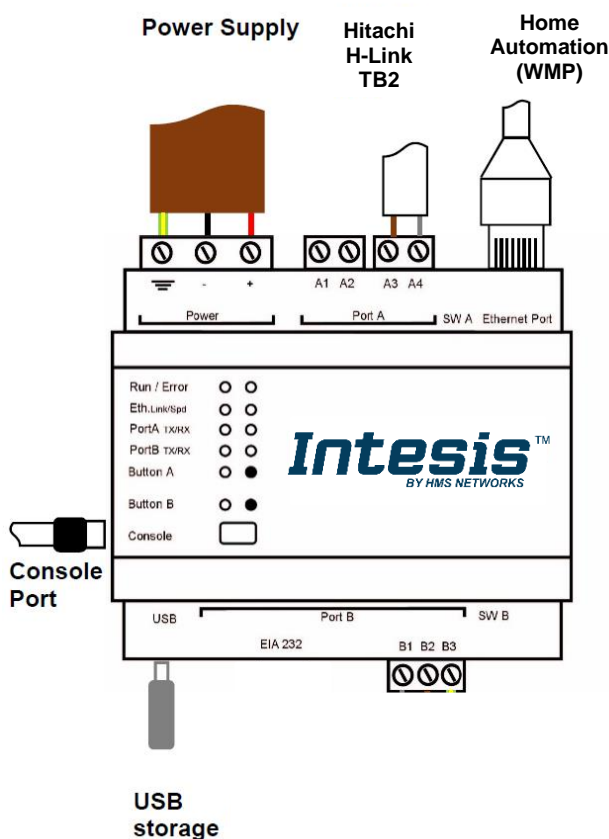
This gateway supports one IP connection to communicate with the home automation hub or central controller but allows to communicate with several AC units. To identify the ac unit to control from the Home Automation side, WMP protocol has implemented the acnum parameter. Basically, this parameter links the home automation side identifying the AC unit to control in the AC system.

Given an AC unit, all its individual signals have one unique acnum and this number is always different among all the ac units configured in the gateway. Only in some specific cases, outdoor units might share the acnum with one indoor unit as the commands are independent between themselves.

Acnum is given in the configuration section. See [4.2.5 HITACHI CONFIGURATION](#) for more information.

3. Connections

Find below information regarding the Intesis 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 / Home Automation (WMP) / Console (UDP & TCP)

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 / H-Link Hitachi

Connect the H-Link terminals (TB2) of Hitachi Outdoor Unit to the connectors A3 and A4 of gateway's PortA. There is no polarity to be respected.

PortB / Free

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 HDD) if required. Check the user manual for more information.

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

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 (check [5 ELECTRICAL & MECHANICAL FEATURES](#)). 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 Hitachi VRF installation

Use the PortA connector in the top corner of the Intesis device in order to connect H-Link bus to the Intesis. Remember to follow all safety precautions indicated by Hitachi.

Connect the Hitachi H-Link/TB2 bus to connectors A3 and A4 of gateway's PortA. Bus is not sensitive to polarity.

3.3. Connection to Home Automation (WMP)

The gateway's Ethernet port connection is used for the Home Automation (WMP) TCP communication. Connect the communication cable coming from the network hub or switch to the Ethernet port of Intesis. The cable to be used shall be a straight Ethernet UTP/FTP CAT5 cable.

TCP port to use (default 3310) and keep alive period must be configured.

IP settings of the gateway (DHCP status, own IP, netmask and default gateway) must be configured as well.

3.4. Connection to PC (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 Intesis.
- **USB:** Using the console port of Intesis, connect a USB cable from the console port to the PC.

4. Set-up process and troubleshooting

4.1. Pre-requisites

It is necessary to have the Home Automation system (normally a central hub) operative, configured and properly connected to the Ethernet port of the gateway and the Hitachi VRF installation connected to the corresponding port.

Connectors, connection cables, PC for the Configuration Tool usage and other auxiliary material, if needed, are not supplied by Intesis for this standard integration.

Items supplied by HMS Networks for this integration are:

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

4.2. Intesis MAPS. Configuration & monitoring tool for Intesis Home Automation (WMP) series

4.2.1. Connection

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

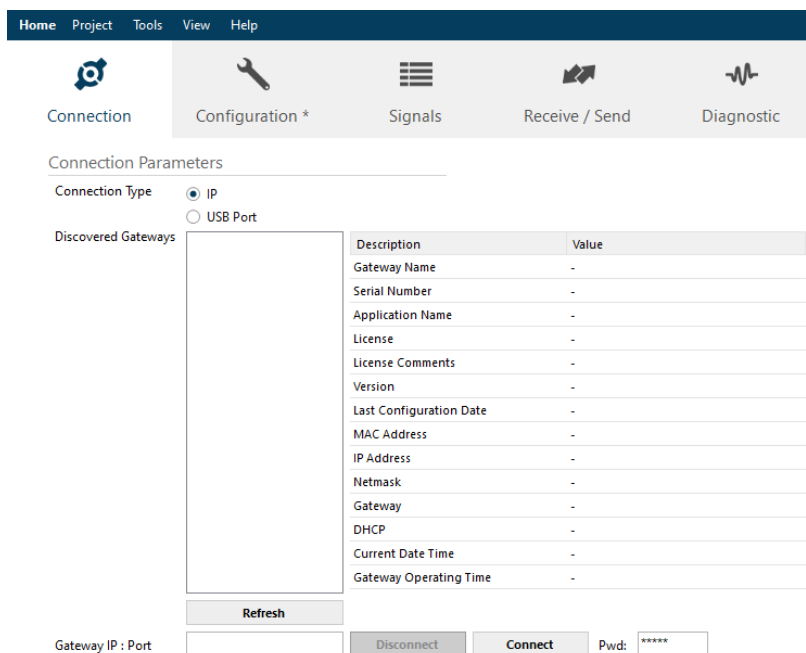
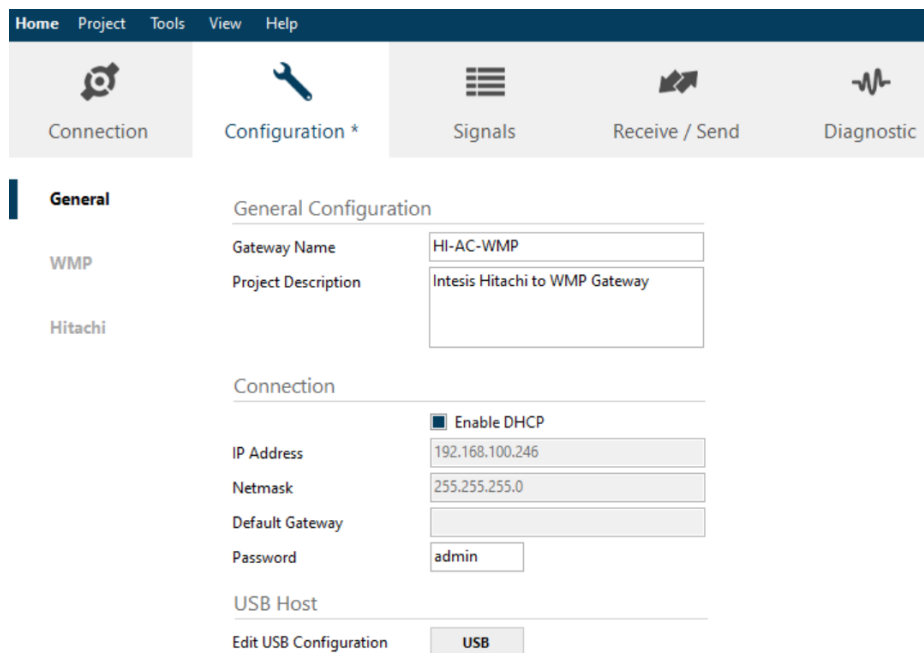


Figure 4.1 MAPS connection

4.2.2. Configuration tab

Select the **Configuration** tab to configure the connection parameters. Three subsets of information are shown in this window: General (Gateway general parameters), WMP (Home Automation system) and Hitachi (Hitachi VRF interface parameters).



The screenshot shows the Intesis MAPS configuration interface. At the top, there is a navigation bar with 'Home', 'Project', 'Tools', 'View', and 'Help'. Below this is a toolbar with five icons: a gear for 'Connection', a wrench for 'Configuration *', a list icon for 'Signals', a double-headed arrow for 'Receive / Send', and a pulse icon for 'Diagnostic'. The 'Configuration *' tab is active. On the left, there is a sidebar with three sections: 'General', 'WMP', and 'Hitachi'. The 'General' section is selected, showing 'General Configuration' with fields for 'Gateway Name' (HI-AC-WMP) and 'Project Description' (Intesis Hitachi to WMP Gateway). Below this is the 'Connection' section, which includes a checked 'Enable DHCP' checkbox, and input fields for 'IP Address' (192.168.100.246), 'Netmask' (255.255.255.0), 'Default Gateway', and 'Password' (admin). At the bottom, there is a 'USB Host' section with an 'Edit USB Configuration' button set to 'USB'.

Figure 4.2 Intesis MAPS configuration tab

4.2.3. General configuration

These are the general settings of the gateway. Here you can find:

- General configuration

In this section you can include a name and description to identify the gateway.

- Connection

Here are the settings related to the IP address (via DHCP/specific IP address) and the password set for the IP configuration of the gateway in MAPS.

- USB Host

In this section it is possible to configure the different settings for the USB host port.

4.2.4. Home Automation (WMP) system configuration

These are the settings available for the Home Automation system (WMP communication):

General

WMP

AC manufacturer

Available Commands

Command	Description
ID	Device ID
INFO	Device Info
DISCOVER	Device discovering via UDP
PING	Ping to device
STATUS	Unit status in one string
LIMITS	Current limits for different signals

TCP Configuration

Port

Keep Alive mins

Figure 4.3 Intesis MAPS Home Automation configuration tab

1. Available commands

This is an informative section displaying all commands available for the WMP communication.

2. TCP Configuration.

This section allows to configure the TCP settings for the WMP communication with the Home Automation system.

- **Port:** WMP TCP communication port setting. Default port 3310.
- **Keep Alive.** Set the time of inactivity to send a keep Alive message. Default 10 minutes.

4.2.5. Hitachi configuration

Set parameters for the connection with Hitachi installation.

The screenshot shows the Intesis MAPS interface with the 'Configuration *' tab selected. Under 'General', the 'WMP' section is active. The 'Hitachi' section is expanded to show 'Units Configuration'. There is an 'Autodiscover' button and a 'Scan' button. Below is a table of units:

Unit ID	Unit Type	IU	OU	Description
<input checked="" type="checkbox"/> Unit 1	Not Defined	1	1	Indoor Unit 1
<input type="checkbox"/> Unit 2	Not Defined	2	1	Indoor Unit 2
<input type="checkbox"/> Unit 3	Not Defined	3	1	Indoor Unit 3
<input type="checkbox"/> Unit 4	Not Defined	4	1	Indoor Unit 4
<input type="checkbox"/> Unit 5	Not Defined	5	1	Indoor Unit 5
<input type="checkbox"/> Unit 6	Not Defined	6	1	Indoor Unit 6
<input type="checkbox"/> Unit 7	Not Defined	7	1	Indoor Unit 7
<input type="checkbox"/> Unit 8	Not Defined	8	1	Indoor Unit 8

Supported Active Units: -

Figure 4.4 Intesis MAPS Hitachi configuration tab

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

- **Active.** 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 Intesis model)

- **IU address.** Address 1..64 of Unit in Hitachi H-Link bus.
- **OU address.** Address 1..64 of Outdoor Unit in Hitachi H-Link bus.
- **Description.** Descriptive name to easy identification of the unit (for example, 'living room floor 1 unit', etc).

Additional to manual entry of each unit, autodiscover of present units in an H-Link installation is possible. To do so, click button **Scan**. Following window will appear:

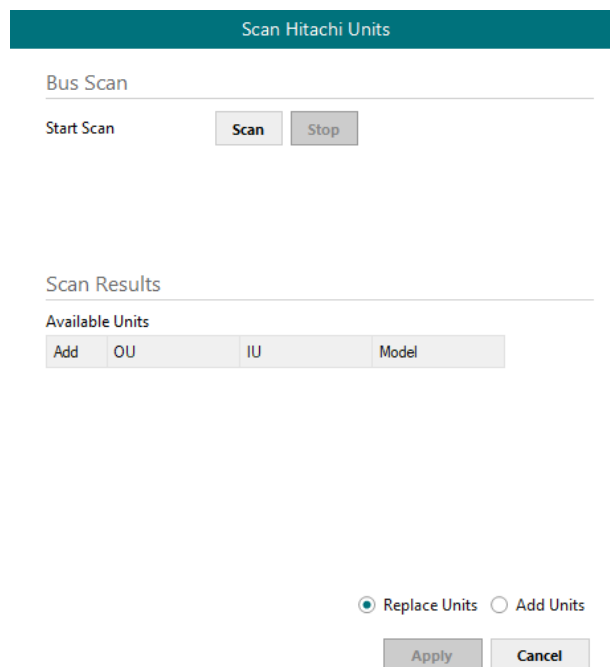


Figure 4.5 Intesis MAPS Scan Hitachi Units window

By pressing **Scan** button, connected Hitachi H-Link bus will be scanned for available units. Error window will appear if there is a problem in the connection with H-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 in available units as follows:

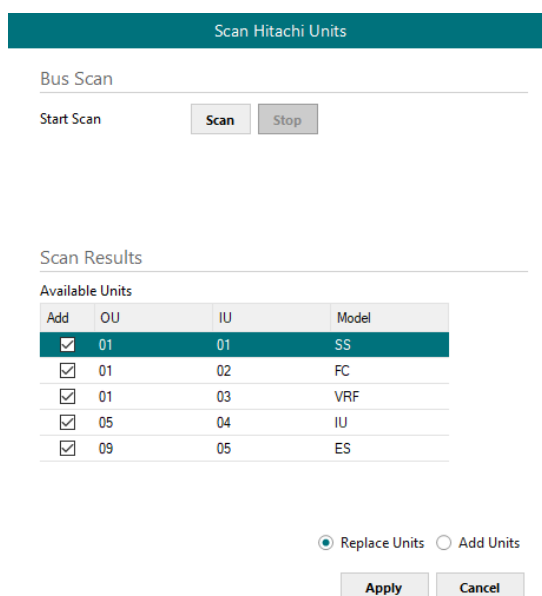


Figure 4.6 Intesis MAPS Scan Hitachi Units window with scan results

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.

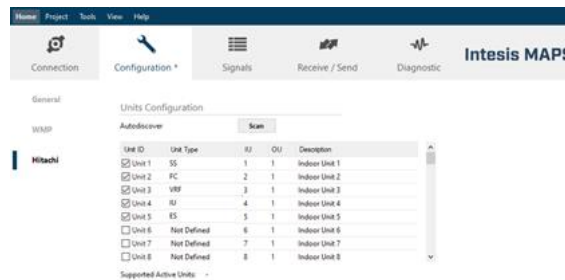


Figure 4.7 Intesis MAPS Hitachi configuration tab after importing scan results

Acnum

Acnum is the parameter or number associated to every ac unit. This parameter identifies the ac unit from the home automation side.

In this gateway, this number corresponds with the unit ID available during the configuration process. This number cannot be edited and is automatically generated during the manual or automatic (using SCAN) configuration process. You can check the indoor units Unit ID number in its column.

For the outdoor units, acnum corresponds with the lowest Unit ID of its associated indoors.

4.2.6. Signals

All available WMP signals, its corresponding description and other main parameters are listed in the signals tab. The acnum of every unit is also displayed in a column in the signals view.

#	Active	Description	WMP			Hitachi		
			AcNum	Format	Values	Commands	Unit ID	IU
1	<input checked="" type="checkbox"/>	Comm Error OU	1	ERROROU	OK/ERR	CHN/GET	-	-
2	<input checked="" type="checkbox"/>	On/Off	1	ONOFF	ON/OFF	SET/CHN/GET	Unit 1 - Indoor...	1
3	<input checked="" type="checkbox"/>	Operation Mode	1	MODE	HEAT/COOL/FAN/DRY/AUTO	SET/CHN/GET	Unit 1 - Indoor...	1
4	<input checked="" type="checkbox"/>	Fan Speed	1	FANSP	1/2/3/4/AUTO	SET/CHN/GET	Unit 1 - Indoor...	1
5	<input checked="" type="checkbox"/>	Vane Position UD	1	VANEUD	1/2/3/4/5/6/7/AUTO	SET/CHN/GET	Unit 1 - Indoor...	1
6	<input checked="" type="checkbox"/>	Temperature Setpoint (x10) (°C)	1	SETPTEMP	(°C)	SET/CHN/GET	Unit 1 - Indoor...	1
7	<input checked="" type="checkbox"/>	AC Ambient Temperature (x10)(°C)	1	AMBTEMP	(°C)	CHN/GET	Unit 1 - Indoor...	1
8	<input checked="" type="checkbox"/>	Unit Error code (0-No Error,X-Error)	1	ERRCODE	0/X (see user manual)	CHN/GET	Unit 1 - Indoor...	1
9	<input checked="" type="checkbox"/>	Error IU	1	ERRSTATUS	OK/ERR	CHN/GET	Unit 1 - Indoor...	1
10	<input checked="" type="checkbox"/>	On/Off	2	ONOFF	ON/OFF	SET/CHN/GET	Unit 2 - Indoor...	2
11	<input checked="" type="checkbox"/>	Operation Mode	2	MODE	HEAT/COOL/FAN/DRY/AUTO	SET/CHN/GET	Unit 2 - Indoor...	2
12	<input checked="" type="checkbox"/>	Fan Speed	2	FANSP	1/2/3/4/AUTO	SET/CHN/GET	Unit 2 - Indoor...	2

Figure 4.8 Intesis MAPS Signals tab

4.2.7. Sending the configuration to Intesis

When the configuration is finished, follow the next steps.

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

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

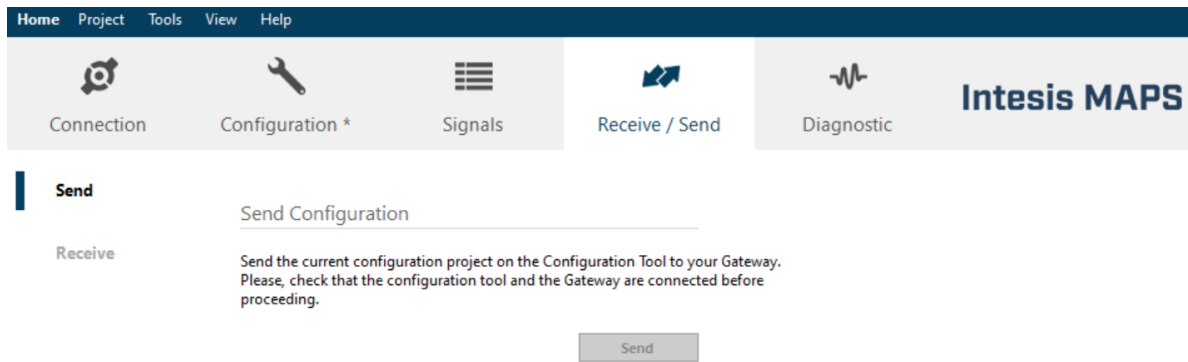


Figure 4.9 Intesis MAPS Receive/Send tab

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

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 status, 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.

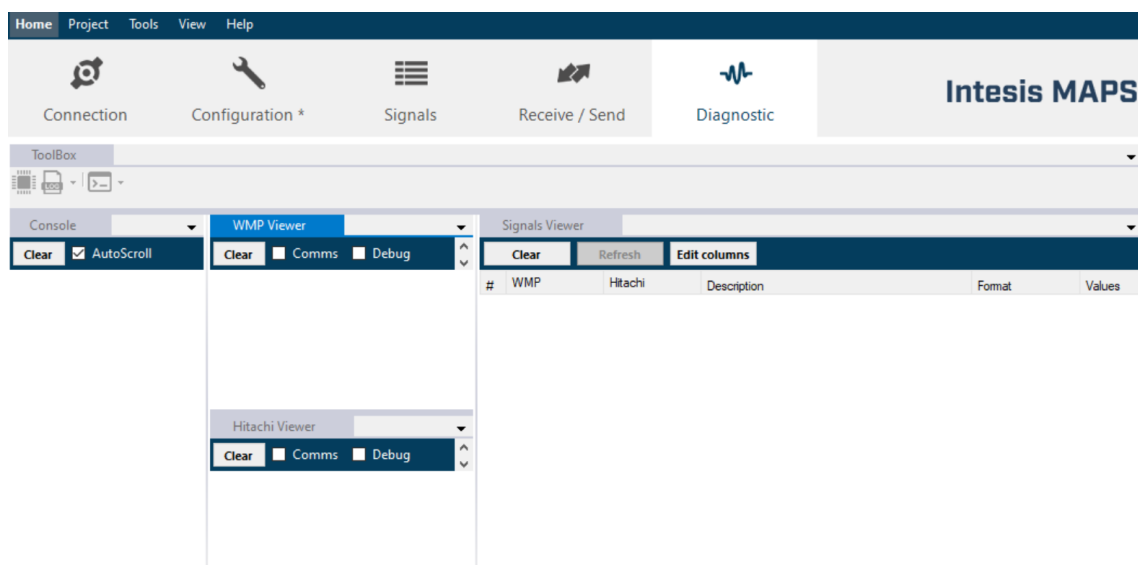


Figure 4.10 Diagnostic

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

4.2.9. Set-up procedure

1. Install Intesis MAPS on your laptop, use the setup program supplied for this and follow the instructions given by the Installation wizard.
2. Install Intesis 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).
3. For the Home Automation (WMP) communication, connect the communication cable coming from the Ethernet port of the WMP TCP installation to the port marked as Ethernet Port of Intesis. More details in [3 CONNECTIONS](#).
4. Connect the communication cable coming from the **Hitachi VRF** installation to the port marked as Port A of Intesis.
5. Power up Intesis. 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 Intesis and/or any other equipment connected to it, we strongly recommend:

- The use of DC power supplies, floating or with the negative terminal connected to earth. **Never use a DC power supply with the positive terminal connected to earth.**
 - The use of AC power supplies only if they are floating and not powering any other device.
6. If you want to connect using IP, connect the Ethernet cable from the laptop PC to the port marked as Ethernet of Intesis. 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 Intesis. More details in [3 CONNECTIONS](#).
 7. Open Intesis MAPS, create a new project selecting a copy of the one named IBOX-WMP-HI-Template.
 8. Modify the configuration as desired, save it and download the configuration file to Intesis as explained in the Intesis MAPS user manual.
 9. Visit the Diagnostic section, enable COMMS () and check that there is communication activity, some TX frames and some other RX frames. This means that the communication with the Home Automation Hub is OK. In case there is no communication activity between Intesis and the Home Automation hub or controller, check that those are operative: check the baud rate, the communication cable used to connect all devices and any other communication parameter.

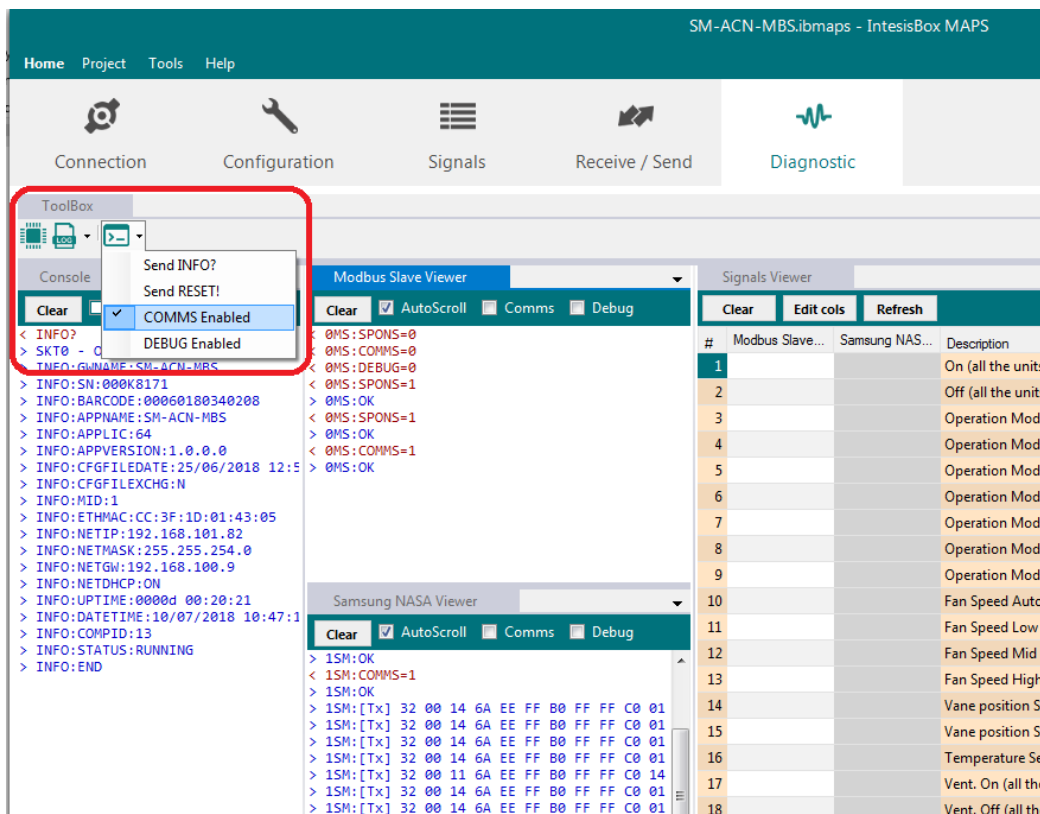


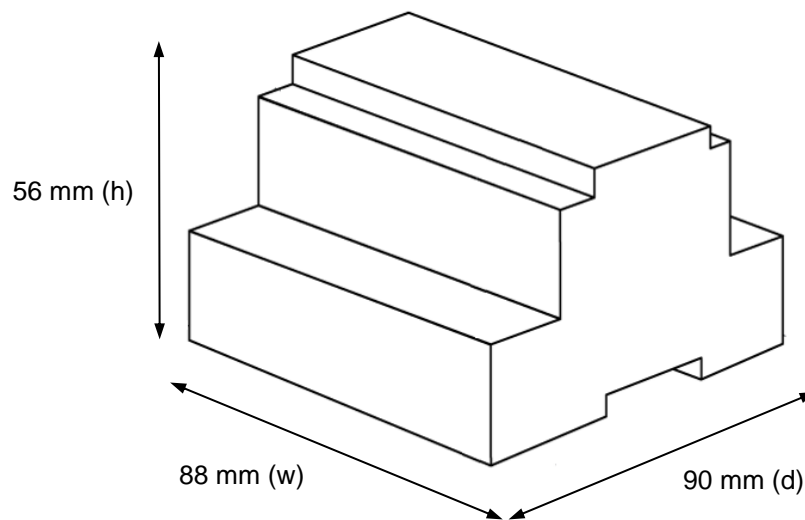
Figure 4.11 Enable COMMS

5. Electrical & Mechanical Features

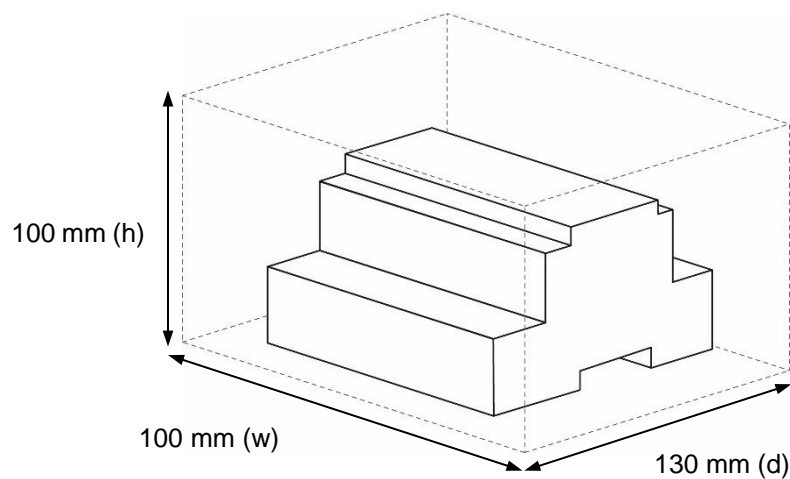


Enclosure	Plastic, type PC (UL 94 V-0) Net dimensions (dwxh): 90x88x56 mm Recommended space for installation (dwxh): 130x100x100mm Color: Light Grey. RAL 7035	Battery	Size: Coin 20mm x 3.2mm Capacity: 3V / 225mAh Type: Manganese Dioxide Lithium
Mounting	Wall. DIN rail EN60715 TH35.	Console Port	Mini 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 If cables are more than 3.05 meters long, Class 2 cable is required.	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: Not used Button B: Not used
Ethernet	1 x Ethernet 10/100 Mbps RJ45 2 x Ethernet LED: port link and activity	Operation Temperature	0°C to +60°C
Port A	1 x H-Link Plug-in screw terminal block orange (2 poles) 1500VDC isolation from other ports 1 x Plug-in screw terminal block green (2 poles) Reserved for future use	Operational Humidity	5 to 95%, no condensation
Switch A (SWA)	1 x DIP-Switch for EIA485 configuration: Reserved for future use	Protection	IP20 (IEC60529)
PORT B	1 x Serial EIA232 (SUB-D9 male connector) Not used 1 x Serial EIA485 Plug-in screw terminal block (3 poles) A, B, SGND (Reference ground or shield) 1500VDC isolation from other ports	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 B (SWB)	1 x DIP-Switch for serial EIA485 configuration: Position 1: ON: 120 Ω termination active Off: 120 Ω termination inactive (default) Position 2-3: ON: Polarization active Off: Polarization inactive (default)		

6. Dimensions



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



7. AC Unit Types compatibility

A list of Hitachi unit model references compatible with INMBSHIT---O000 and their available features can be found in:

https://www.intesis.com/docs/compatibilities/inxxxhit001r000_compatibility

8. Error codes for Indoor and Outdoor Units

This list contains all possible values shown in Unit Error code for each indoor unit and outdoor unit.

It must be considered that Outdoor Units are only able to reflect a single error for each indoor / outdoor unit in the system. Thus, a unit having two or more active errors from that list will only report a single error code – the one of the first error that has been detected.

8.1. Intesis Codes

Error Code	Error Category	Error Description
0	Intesis AC Interface	No Communication Error OU

8.2. AC System Codes

Error Code	Error Category	Error Description
1	Indoor Unit	Activation of Protection Device (Float Switch). Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drainpipe, Float Switch or Drain Pan)
2	Outdoor Unit	Activation of Protection Device (High Pressure Cut). Activation of PSH (Pipe Clogging, Excessive Refrigerant! Inert Gas Mixing).
3	Transmission	Abnormality between Indoor and Outdoor. Incorrect Wiring, Loose Terminals, Disconnect Wire, Blowout of Fuse, Outdoor Unit Power OFF.
4		Abnormality between Inverter PCB and Outdoor PCB. Inverter 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. Incorrect Power Source, Connection to Reversed Phase, Open-Phase.
6	Voltage	Abnormal Inverter Voltage. Outdoor Voltage Drop, Insufficient Power Capa
6.		Abnormal Fan Controller Voltage. Outdoor Voltage Drop, Insufficient Power Capacity.
7	Cycle	Decrease in Discharge Gas Superheat. Excessive Refrigerant! Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector).
8		Increase in Discharge Gas Temperature. Insufficient Refrigerant! Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring,
10	Transmission	Abnormality between Outdoor and Outdoor. Incorrect Wiring, Breaking Wire, Loose Terminals.
11	Outdoor Unit	Incorrect Outdoor Unit Address Setting. Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant! Cycle System
12		Incorrect Outdoor Unit Main Unit Setting. Two (or more) Outdoor Units Set as "Main Unit" Exist in Same Refrigerant! Cycle System.

Error Code	Error Category	Error Description
17	Sensor on Indoor Unit	Inlet Air Thermistor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
18		Outlet Air Thermistor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
19		Freeze Protection Thermistor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
20		Gas Piping Thermistor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
25	Fan Motor	Activation of Protection Device for Indoor Fan. Fan Motor Overheat, Locking
33	Sensor on Outdoor Unit	High Pressure Sensor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit.
34		Outdoor Air Thermistor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit.
35		Discharge Gas Thermistor on Top of Compressor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit.
36		Heat Exchanger Liquid Pipe Thermistor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit.
37		Heat Exchanger Gas Pipe Thermistor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit.
41		Low Pressure Sensor. Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit.
49	System	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit. Incorrect Capacity Code Setting of Combination Excessive or Insufficient Indoor Unit Total Capacity Code.
53		Incorrect Setting of Indoor Unit No. Duplication of Indoor Unit No. in same Ref. Gr..
54		Incorrect of Indoor Unit Combination. Indoor Unit is Designed for R22.
56		Abnormality of Picking up Circuit for Protection in Outdoor Unit. Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB).
57	Compressor	Abnormality Running Current at Constant 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.

Error Code	Error Category	Error Description
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). Insufficient 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)

Error Code	Error Category	Error Description
177	Outdoor Unit No. Setting	Incorrect Setting of Unit and Refrigeran. Over 64 Number is Set for Address or Refrigeran! 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	Incorrect Indoor Unit Connection. 2 or more Switch Box Units are connected between outdoor unit and indoor unit.
194		Incorrect Indoor Unit Connection. 2 or more Switch Box Units are connected between outdoor unit and indoor unit.
195		Incorrect Indoor Unit Connection No. Setting. 9 or More Indoor Units 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• occurs three times within 6 hours. *02, 07, 08, 39, 43 to 45, 47

In case you detect an error code not listed, contact the technical support of the respective AC manufacturer for more information on the error meaning.