WMP

Fujitsu VRF Air Conditioning

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

USER MANUAL

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Important User Information

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

ORDER CODE	LEGACY ORDER CODE
INMBSFGL016O000	FJ-AC-MBS-16

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1. Description

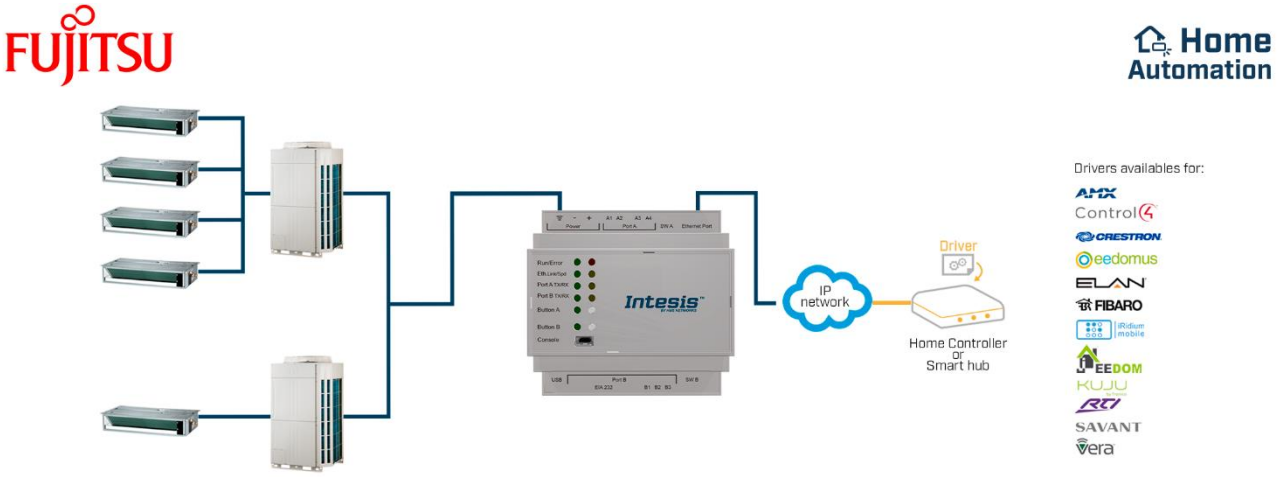
1.1. Introduction

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

The aim of this integration is to monitor and control Fujitsu VRF 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 Auotomation (WMP) and Fujitsu VRF technologies and their technical terms.



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

1.2. Functionality

Intesis™ continuously monitors Fujitsu 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	• SET (control) • CHN (status) • GET (read)

1.3. Capacity of Intesis

Element	Max.	Notes
Number of indoor units	16*	Number of indoor units that can be controlled through Intesis

Their order codes are:

- INMBSFGL016O000, Model supporting up to 16 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 Fujitsu 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 refered 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**
Outdoor unit error code	ERRCODE	0/X (see user manual)	CHN/GET
Error OU	ERRSTATUS	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	1/2/3/4/5/AUTO	SET/CHN/GET
Vane Position UD	VANEUD	1/2/3/4/SWING	SET/CHN/GET
Vane Position LR	VANELR	1/2/3/4/5/SWING	SET/CHN/GET
Temperature Setpoint (x10) (ºC)	SETPTEMP	(ºC)	SET/CHN/GET
AC Ambient Temperature (x10) (-35…92,5ºC)	AMBTMP	(ºC)	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

*Using the SCAN function for the Fujitsu VRF system will set to 4 fan speeds available for those units with only 4 fan speeds.

2.3. Link with Home Automation system

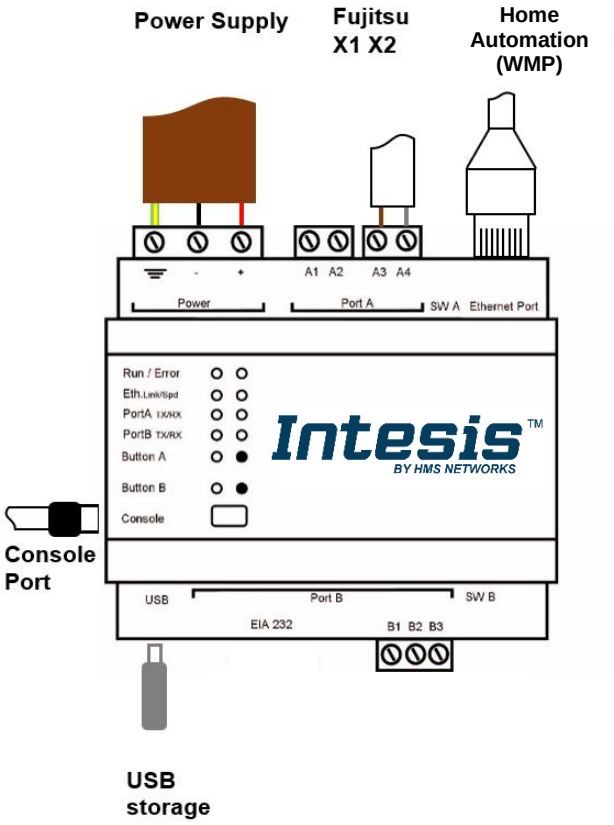
This gateway supports one IP connection to communicate with the home automation hub or central controller but allows to communicate with several AC units. To identify the ac unit to control from the Home Automation side, WMP protocol has implemented the acnum parameter. Basically, this parameter links 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 FUJITSU VRF 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 / Fujitsu VRF
Connect the terminals (X1 X2) of Fujitsu 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 Fujitsu VRF installation

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

3.3. Connection to Home Automation (WMP)

The gateways 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 Fujitsu 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*.

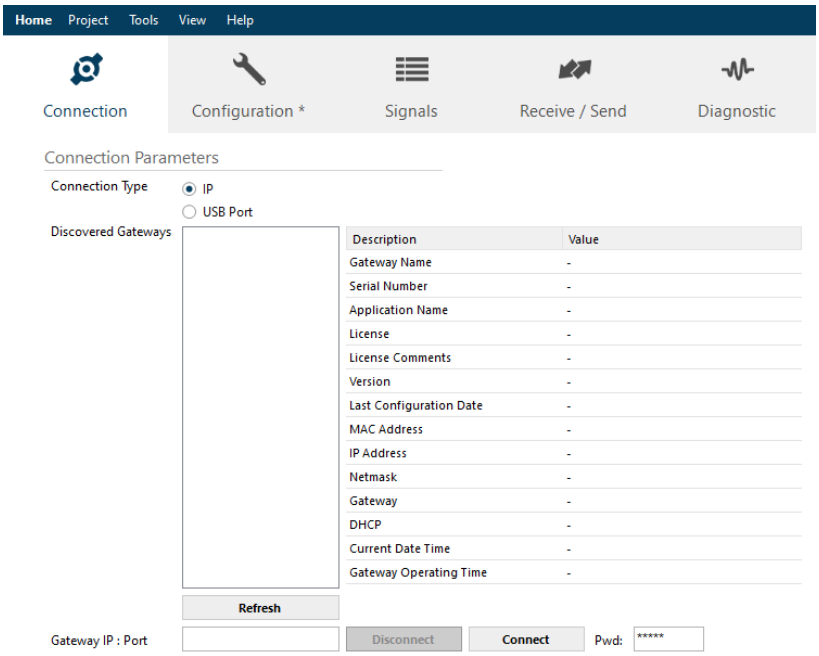


Figure 4.1 MAPS connection

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 Fujitsu VRF (Fujitsu VRF interface parameters).

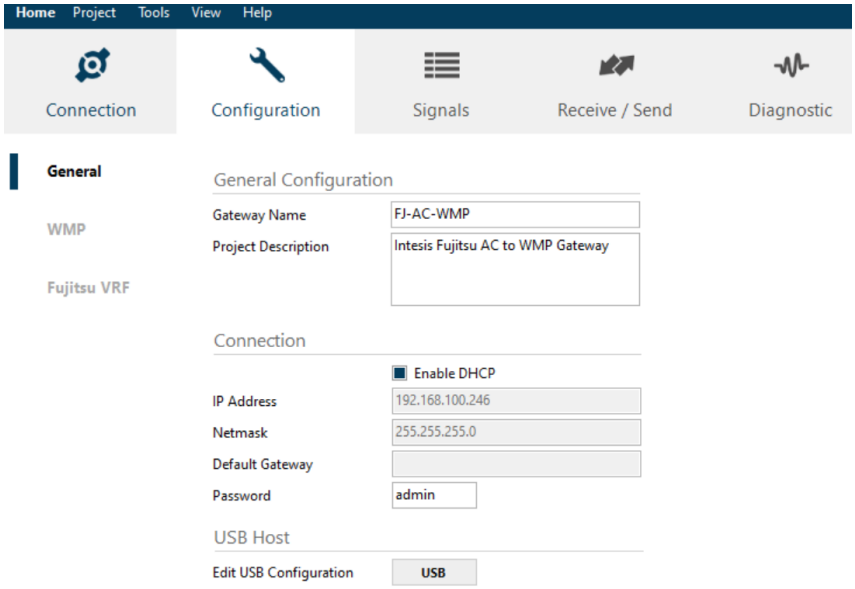


Figure 4.2 Intesis MAPS configuration tab

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):

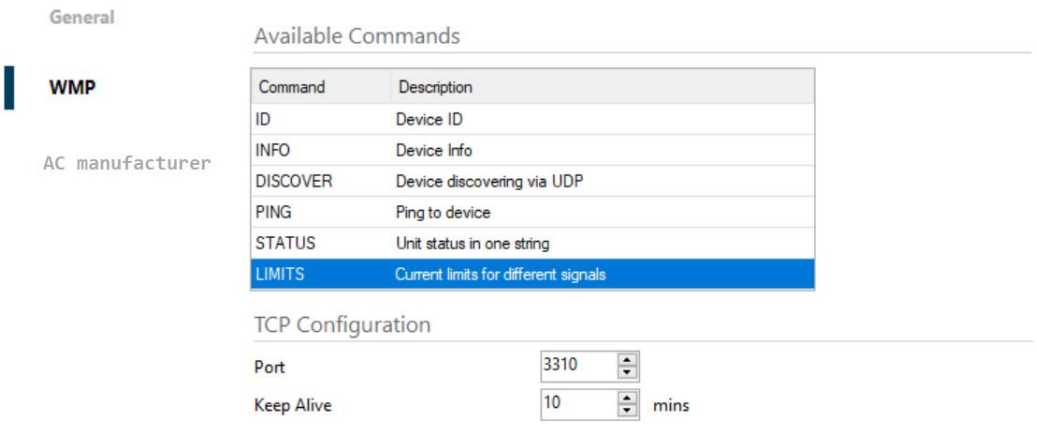


Figure 4.3 Intesis MAPS Home Automation configuration tab

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. Fujitsu VRF configuration

Set parameters for the connection with Fujitsu VRF installation.

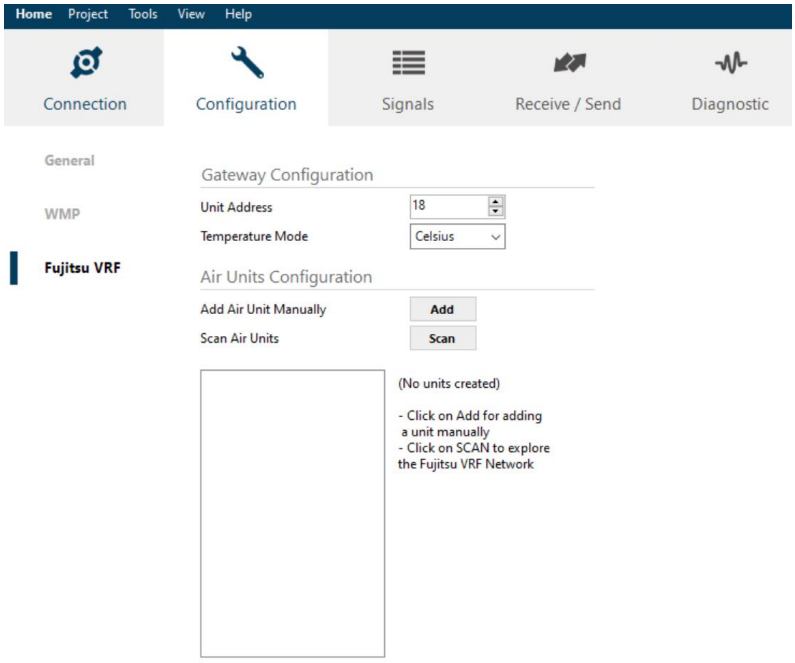


Figure 4.4 Intesis MAPS Fujitsu VRF configuration tab

In Gateway Configuration section, it is necessary to define the address of the gateway inside the Fujitsu VRF network. In addition, it is possible to define the temperature scale between Celsius and Fahrenheit.

In Air Units Configuration section, you can do both:

- **Add**. To do a manual configuration of the Fujitsu VRF system. To do this configuration it is not necessary to be connected to the VRF system:

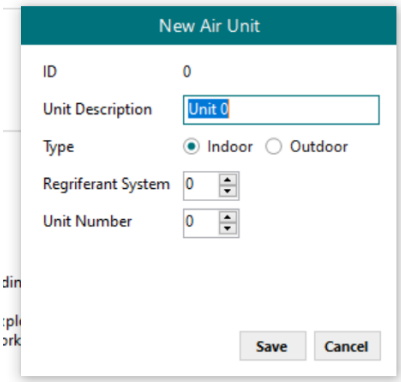


Figure 45 Add new air unit

Consider that it is necessary to know the information of the different units:

  - **Indoor / outdoor: depending type of the AC unit.**
  - **Refrigerant system:** as is defined in the VRF network for this certain unit.
  - **Description**. Descriptive name to easy identification of the unit (for example, 'living room floor 1 unit').

- **Scan**. To do an auto configuration of the gateway by retrieving the information from the Fujitsu VRF system. To do so, it is necessary to be connected to the VRF system:

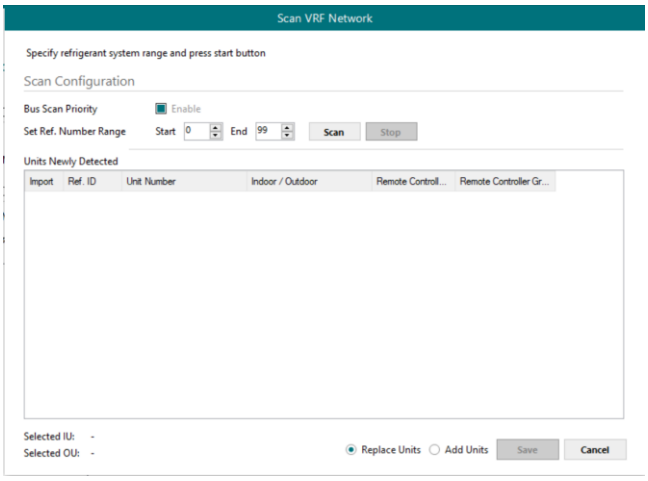


Figure 46 Scan VRF units in network

It is possible to priorize the SCAN function within the VRF network (activated by default). In addition, to short the time that the scanning may take, the integrator can define the range for the refrigerant system in advance.

By pressing **Scan** button, Fujitsu X1X2 bus will be scanned for available units. Error window will appear if there is a problem in the connection with X1X2 bus (units not powered, bus not connected, …).

A progress bar will appear during the scan. After scan is complected, detected units will be shown in units newly detected.

Select the 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.

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 number available during the configuration process. This number cannot be edited and is automatically generated during the manual or automatic (using SCAN) configuration process.

To know the unit number of a specific AC unit simply select the AC unit from the list:

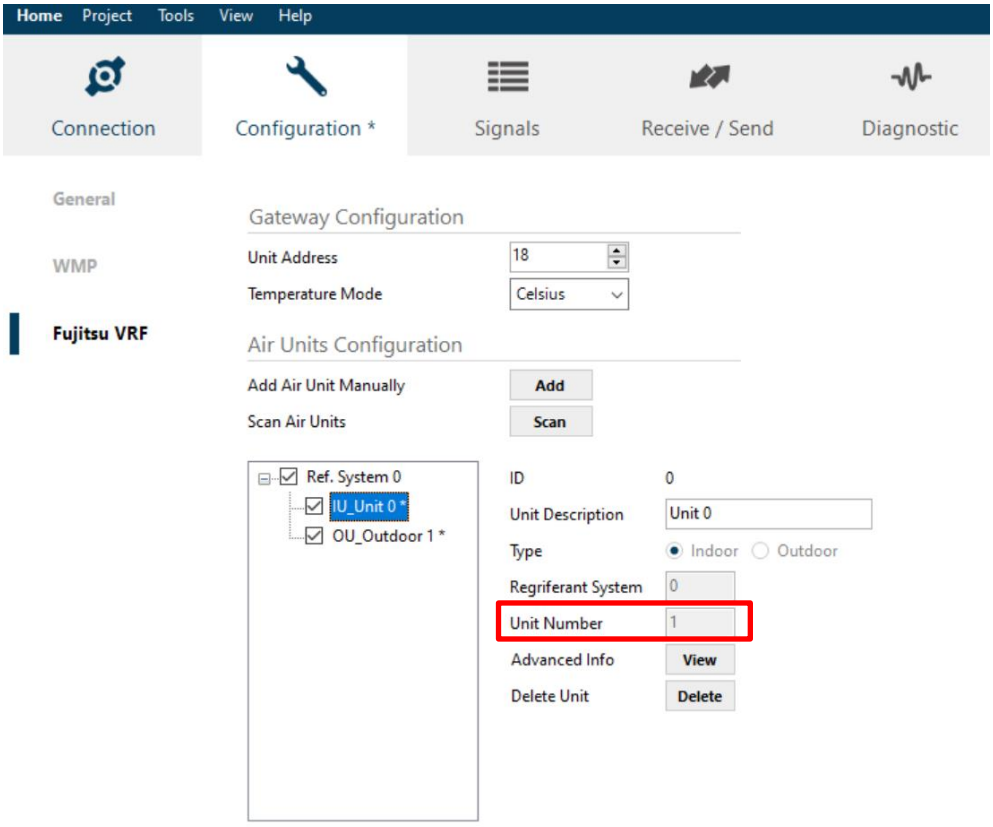
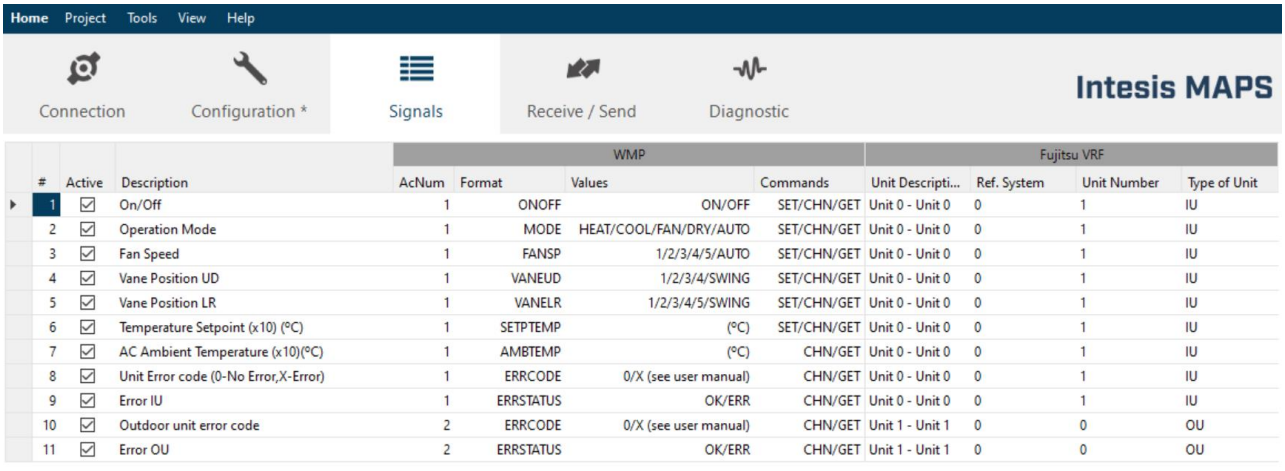


Figure 4.12 Intesis MAPS Signals tab

4.2.6. Signals

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



				WMP				Fujitsu VRF			
#	Active	Description	AcNum	Format	Values	Commands	Unit Descripti...	Ref. System	Unit Number	Type of Unit
1	☑	On/Off	1	ONOFF	ON/OFF	SET/CHN/GET	Unit 0 - Unit 0	0	1	IU
2	☑	Operation Mode	1	MODE	HEAT/COOL/FAN/DRY/AUTO	SET/CHN/GET	Unit 0 - Unit 0	0	1	IU
3	☑	Fan Speed	1	FANSP	1/2/3/4/5/AUTO	SET/CHN/GET	Unit 0 - Unit 0	0	1	IU
4	☑	Vane Position UD	1	VANEUD	1/2/3/4/SWING	SET/CHN/GET	Unit 0 - Unit 0	0	1	IU
5	☑	Vane Position LR	1	VANELR	1/2/3/4/5/SWING	SET/CHN/GET	Unit 0 - Unit 0	0	1	IU
6	☑	Temperature Setpoint (x10) (ºC)	1	SETPTEMP	(ºC)	SET/CHN/GET	Unit 0 - Unit 0	0	1	IU
7	☑	AC Ambient Temperature (x10)(ºC)	1	AMBTEMP	(ºC)	CHN/GET	Unit 0 - Unit 0	0	1	IU
8	☑	Unit Error code (0-No Error,X-Error)	1	ERRCODE	0/X (see user manual)	CHN/GET	Unit 0 - Unit 0	0	1	IU
9	☑	Error IU	1	ERRSTATUS	OK/ERR	CHN/GET	Unit 0 - Unit 0	0	1	IU
10	☑	Outdoor unit error code	2	ERRCODE	0/X (see user manual)	CHN/GET	Unit 1 - Unit 1	0	0	OU
11	☑	Error OU	2	ERRSTATUS	OK/ERR	CHN/GET	Unit 1 - Unit 1	0	0	OU

Figure 4.12 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.

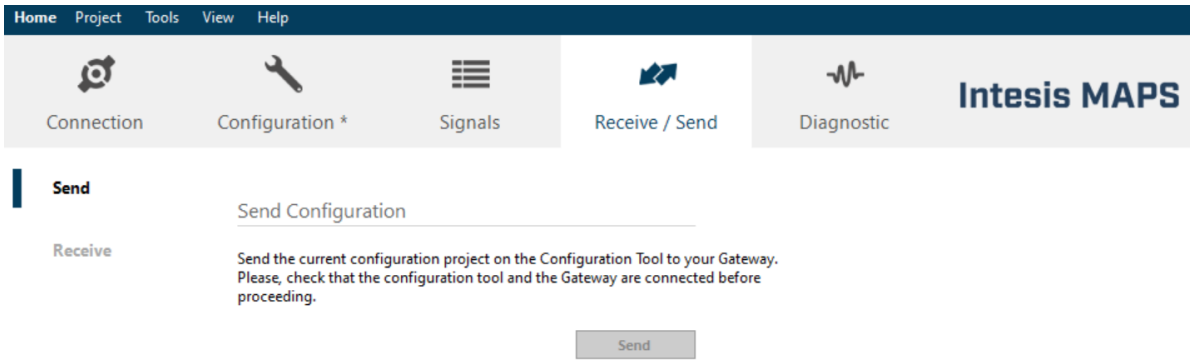


Figure 4.13 Intesis MAPS Receive/Send tab

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.

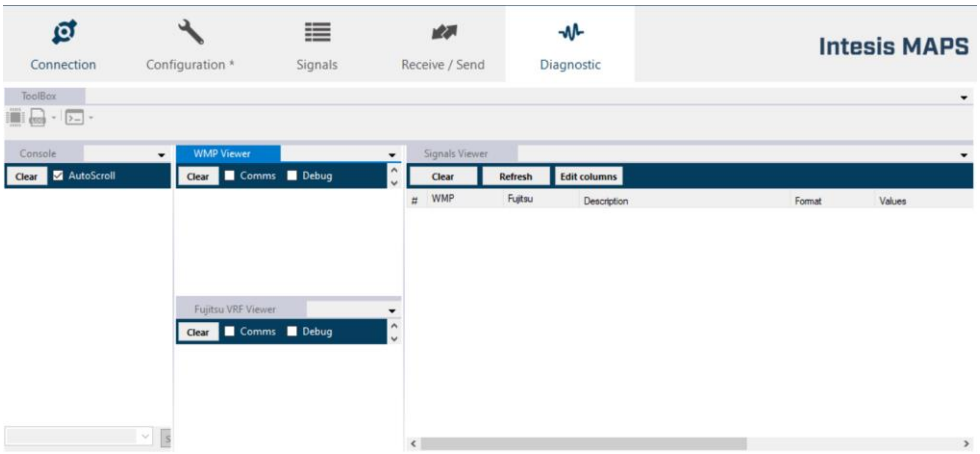


Figure 4.14 Diagnostic

More information about the Diagnostic section can be found in the Configuraion 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 **Fujitsu VRF** installation to the port marked as Port A of Intesis. More connection details in 3 CONNECTIONS.

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-FJ-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 or controller 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.

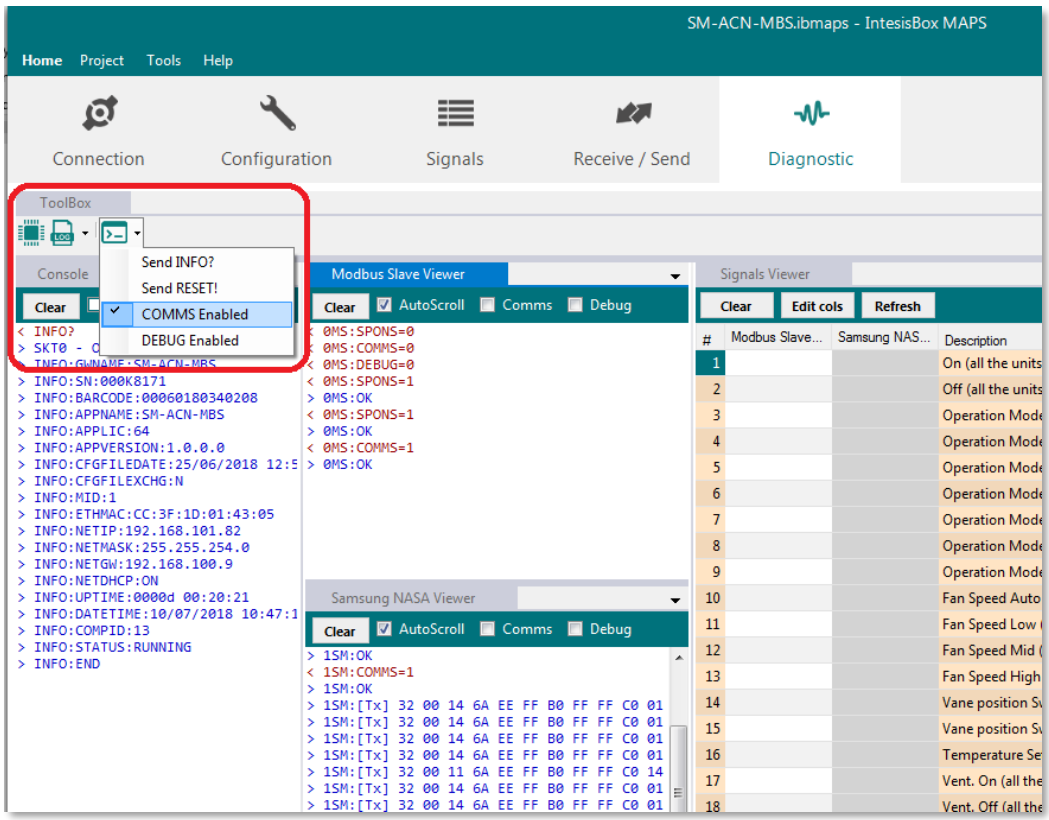


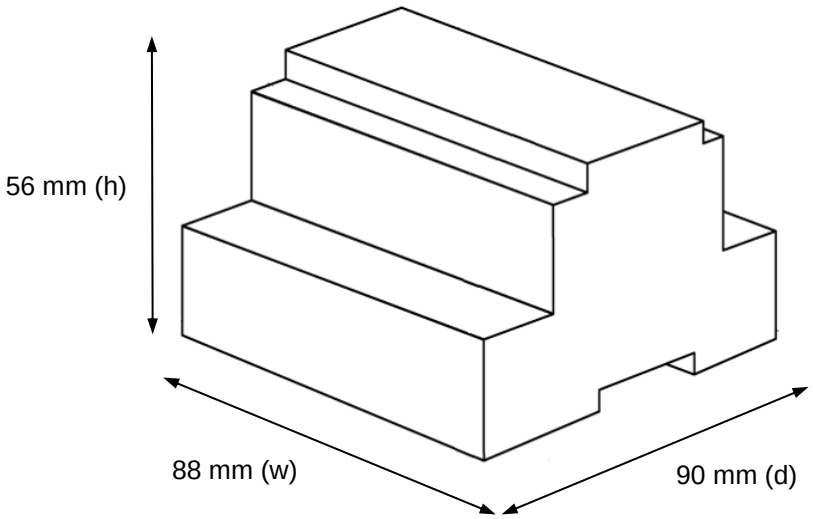
Figure 4.15 Enable COMMS

5. Electrical & Mechanical Features

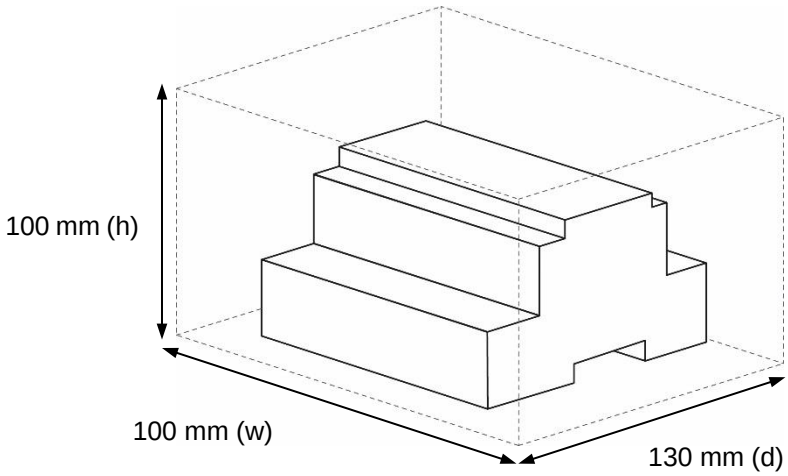
Enclosure	Plastic, type PC (UL 94 V-0) Net dimensions (dxwxh): 90x88x56 mm Recommended space for installation (dxwxh): 130x100x100mm Color: Light Grey. RAL 7035
Mounting	Wall. DIN rail EN60715 TH35.
Terminal Wiring (for power supply and low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.5mm²… 2.5mm² 2 cores: 0.5mm²… 1.5mm² 3 cores: not permitted If cables are more than 3.05 meters long, Class 2 cable is required.
Power	1 x Plug-in screw terminal block (3 poles) 9 to 36VDC +/-10%, Max.: 140mA. 24VAC +/-10% 50-60Hz, Max.: 127mA Recommended: 24VDC
Ethernet	1 x Ethernet 10/100 Mbps RJ45 2 x Ethernet LED: port link and activity
Port A	1 x Fujitsu X1X2 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
Switch A (SWA)	1 x DIP-Switch for EIA485 configuration: Reserved for future use
PORT B	1 x Serial EIA232 (SUB-D9 male connector) Pinout from a DTE device 1500VDC isolation from other ports *(except PORT B: EIA485)* 1 x Serial EIA485 Plug-in screw terminal block (3 poles) A, B, SGND (Reference ground or shield) 1500VDC isolation from other ports *(except PORT B: EIA232)*
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)

Battery	Size: Coin 20mm x 3.2mm Capacity: 3V / 225mAh Type: Manganese Dioxide Lithium
Console Port	Mini Type-B USB 2.0 compliant 1500VDC isolation
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)*
Push Button	Button A: Not used Button B: Not used
Operation Temperature	0°C to +60°C
Operational Humidity	5 to 95%, no condensation
Protection	IP20 (IEC60529)
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

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

The gateway is compatible with Fujitsu VRF units after the VRF-II series (included).

8. Error codes for Indoor and Outdoor Units

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

WMP Value	Error Code	Error Description
1	-	-
2	12	Remote controller communication error
3	13	Communication error between Outdoor unit
4	14	Network communication error
5	15	Scan error
6	16	Peripheral device communication error
7	21	Initial setting error
8	26	Address setting error
9	27	Master unit, slave unit set-up error
10	28	Other setting error
11	31	Indoor unit power supply abnormal
12	32	Indoor unit main PCB error
13	35	Manual auto switch error
14	37	Indoor unit transmission PCB error
15	38	Network convertor PCB error
16	41	Room temp. sensor error
17	42	Indoor unit Heat Ex. sensor error
18	51	Indoor unit fan motor1 error
19	53	Water Drain Abnormal
20	5U	Indoor unit error
21	61	Outdoor unit power supply abnormal
22	62	Outdoor unit main PCB error
23	63	Inverter PCB error
24	67	Short interruption detection protected operation
25	68	Magnetic relay error
26	69	Outdoor unit transmission PCB error
27	71	Discharge Temp Sensor Error
28	72	Compressor Temp Sensor Error
29	73	Outdoor unit Heat Ex. sensor error
30	74	Outdoor Temp Sensor Error
31	75	Suction Gas Temp Sensor Error
32	77	Heat sink temp. sensor error
33	82	Sub-cool Heat Ex. gas temp. sensor error
34	83	Liquid pipe temp. sensor error
35	84	Current sensor error
36	86	Pressure sensor error
37	92	Compressor 2 error
38	93	Compressor start up error
39	94	Trip detection
40	95	Compressor motor control error
41	97	Outdoor unit fan motor 1 error
42	99	4-way valve error
43	9U	Outdoor unit error
44	A1	Discharge temperature 1 abnormal
45	A2	Discharge temperature 2 abnormal
46	A3	Compressor temperature abnormal
47	A4	Pressure abnormal 1
48	A5	Pressure abnormal 2
49	AA	Special operation error
50	AC	Ambient temperature abnormal
51	C1	Main PCB error

52	C2	Transmission PCB error
53	C3	PCB 1 error
54	C4	PCB 2 error
55	C5	PCB 3 error
56	C6	PCB 4 error
57	C7	PCB 5 error
58	C8	Input device error
59	C9	Display device error
60	CA	EEPROM error
61	CC	Sensor error
62	CF	External connector error (USB memory)
63	CJ	Other parts error
64	-	Unknown
65	17	Electricity charge apportionment error
66	98	Outdoor unit fan motor 2 error
67	9A	Coil (Expansion Valve) error
68	52	Coil (Expansion Valve) error
69	J1	RB unit error
70	A6	Outdoor heat exchanger temperature abnormal
71	29	Connection unit number error in wired remote controller system
72	3A	Indoor unit communication circuit (wired remote controller) error