LG VRF Air Conditioning

Gateway for the integration of LG VRF systems into Modbus (RTU and TCP) systems

USER MANUAL

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Connecting Devices

Important User Information

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Gateway for the integration of LG VRF systems into Modbus (RTU and TCP) systems.

ORDER CODE	LEGACY ORDER CODE
INMBSLGE016O000	LG-AC-MBS-16
INMBSLGE064O000	LG-AC-MBS-64

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1 Description

1.1 *Introduction*

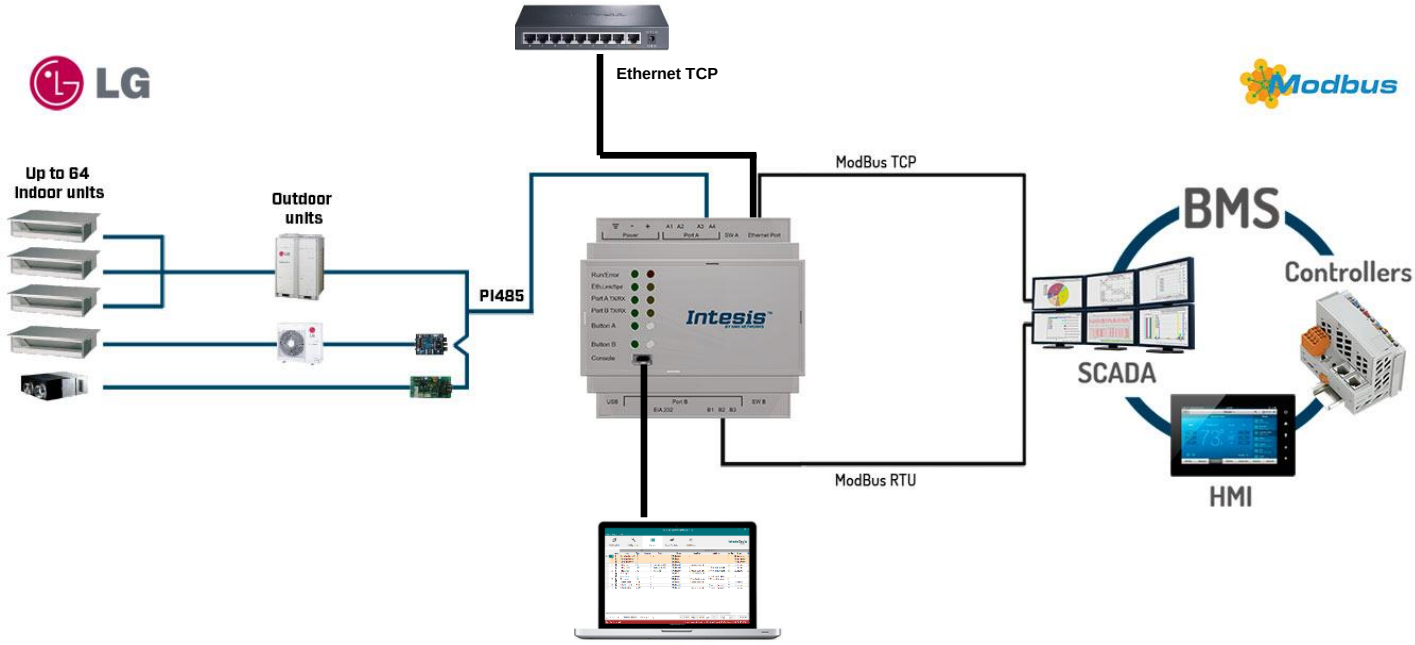
This document describes the integration of LG VRF air conditioning systems into ModBus compatible devices and systems using gateway *Intesis ModBus Server to LG VRF* communication gateway.

The aim of this integration is to monitor and control your LG air conditioning system from a Control Center using any commercial SCADA or monitoring software that includes a ModBus Master driver (RTU or TCP). To do it so, Intesis performs as a Modbus Server, allowing poll and write requests from any Modbus master device.

Intesis makes available the LG air conditioning system indoor units' datapoints through independent Modbus registers.

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

This document assumes that the user is familiar with Modbus and LG technologies and their technical terms.



Integration of LG VRF systems into Modbus systems

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1.1 Functionality

Intesis™ continuously monitors LG VRF network for all configured signals and keeps the updated status of all of them in its memory, ready to be served when requested from the Modbus master.

Commands toward the indoor units are permitted.

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

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

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1.2 *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 MBS – LG VRF* each one with different capacity. The table above shows the capacity for the top model (with maximum capacity).

Their order codes are:

- INMBSLGE016O000: Model supporting up to 16 indoor units
- INMBSLGE064O000: Model supporting up to 64 indoor units

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2 Modbus interface

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

2.1 *Functions supported*

This part is common for Modbus RTU and TCP.

Modbus functions 03 and 04 (*Read Holding Registers* and *Read Input Registers*) can be used to read Modbus registers.

Modbus functions 06 and 16 (*Single Multiple Holding Registers* and *Write Multiple Holding Registers*) can be used to write Modbus registers.

Configuration of poll records is possible between Modbus addresses 0 and 20000. Addresses that are not defined in section **2.4 MODBUS ADDRESS MAP** are read-only and will always report 0.

Modbus error codes are supported, they will be sent whenever a non-valid Modbus address is queried.

All registers are 16-bit signed integer[1] in standard Modbus Big Endian (MSB/LSB) format.

Intesis supports Modbus RTU and Modbus TCP and both interfaces can be used simultaneously.

2.2 *Modbus RTU*

Both EIA485 and EIA232 physical layers are supported. Only the lines RX, TX and GND of the EIA232 connector are used (TX and RX for EIA485).

Baud rate can be selected between 1200, 2400, 4800, 9600, 19200, 38400, 56700 and 115200. Parity (none, even or odd) and stop bits (1 or 2) can be selected as well.

Modbus slave number must be configured and the physical connection (RS232 or RS485) can also be selected.

2.3 *Modbus TCP*

TCP port to use (default is 502) and keep alive period must be configured.

IP settings of Intesis (DHCP status, own IP, net mask and default gateway) must be configured as well.

2.4 *Modbus Address Map*

Modbus address from the formula is expressed in link layer format. This is, first register address is 0.

Modbus Address First Address is 0	Read /Write	Register/signal name	Possible values
Global signals			
0	W (T)	On for AC, DX and AWHP (all the units)	1-Set all the units On
1	W (T)	Off for AC, DX and AWHP (all the units)	1-Set all the units Off
2	W (T)	Auto mode for AC, DX and AWHP (all units)	1-Set Auto Mode
3	W (T)	Heat mode for AC, DX and AWHP (all units)	1-Set Heat Mode
4	W (T)	Dry mode for AC, DX and AWHP (all units)	1-Set Dry Mode

[1] Except Accumulated Power Consumption register, which is 32 bits unsigned in standard Modbus Big Endian (MSB/LSB) format.

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Modbus Address First Address is 0	Read /Write	Register/signal name	Possible values
5	W (T)	Fan mode for AC, DX and AWHP (all units)	1-Set Fan Mode
6	W (T)	Cool mode for AC, DX and AWHP (all units)	1-Set Cool Mode
7	W (T)	On for VENT and DX (all the units)	1-Set Fan Speed Auto
8	W (T)	Off for VENT and DX (all the units)	1-Set Fan Speed Low
9	W (T)	Normal mode for VENT and DX (all units)	1-Set normal mode
10	W (T)	Heater_Exchange mode for VENT and DX (all units)	1-Set HeatEx mode
11	W (T)	Auto mode for VENT and DX (all units)	1-Set Auto mode
12	W (T)	Fan Speed AUTO (all the units)	1-Set auto fan speed
13	W (T)	Fan Speed low (all the units)	1-Set low fan speed
14	W (T)	Fan Speed med (all the units)	1-Set med fan speed
15	W (T)	Fan Speed high (all the units)	1-Set high fan speed
16	W (T)	Vane Position Swing ON (all units)	1-Swing On
17	W (T)	Vane Position Swing OFF (all units)	1-Swing Off
18	W (T)	Temperature Setpoint (x10ºC) (all units)	Cool: 19..30°C; Heat: 17..30°C
Indoor unit control			
(IU*100 + 0) IU stands for Unit index number as found in the Units Configuration tab and ranges from 1 to 64.	R/W	On/Off	0-Off, 1-On
(IU*100 + 1)	R/W	Operation Mode	0-Auto, 1-Heat, 2-Dry, 3-Fan, 4-Cool (AC units only)
			0-Auto, 1-Heat, 4-Cool (DX and AWHP units only)
(IU*100 + 2)	R/W	Fan Speed	0-Auto, 1-Low, 2-Mid, 3-High
(IU*100 + 3)	R/W	Vane Position Swing	0-Swing OFF, 1-Swing ON
(IU*100 + 4)	R/W	Temperature Setpoint (x10ºC)	(x10) ºC/ºF
(IU*100 + 5)	R	Ambient temperature (x10ºC)	(x10) -10…50ºC / 14…122ºF
(IU*100 + 6)	R/W	Remote control lock	0-Lock disabled, 1-Lock enabled

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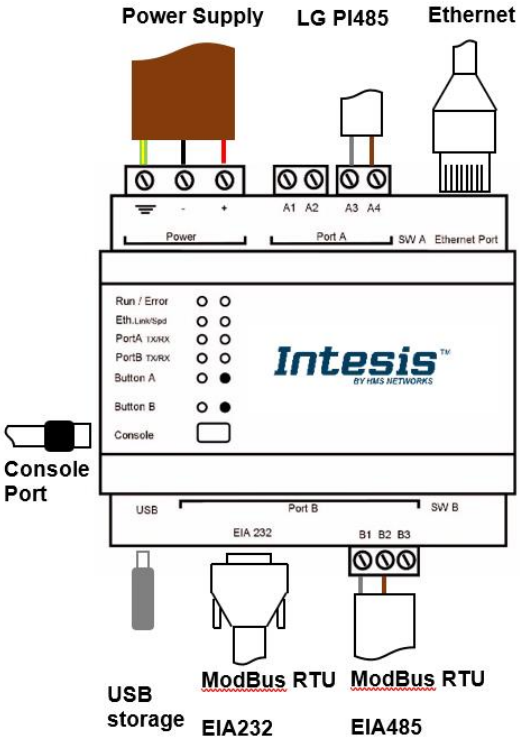
Modbus Address First Address is 0	Read /Write	Register/signal name	Possible values
(IU*100 + 7)	R	Unit error	0-No error, 1-Error
(IU*100 + 8)	R	Unit error code	0-No error, x-Error
(IU*100 + 9)	R/W	Vent. On/Off	0-Off, 1-On
(IU*100 + 10)	R/W	Vent. Operation Mode	0-Normal, 1-Heat Exchange, 4-Auto
(IU*100 + 11)	R	Filter Alarm	0-Normal, 1-Alarm
(IU*100 + 12)	R	Supply air temperature	(x10) -10…50ºC/14…122ºF
(IU*100 + 13)	R	Outdoor Temperature	(x10) -10…50ºC/14…122ºF
(IU*100 + 14)	R/W	Heater	0-Off, 1- On
(IU*100 + 15)	R/W	Power Saving	0-Off, 1- On
(IU*100 + 16)	R/W	Rapidity	0-Off, 1- On
(IU*100 + 17)	R	Humidity	0-Off, 1- On
(IU*100 + 18)	R	A2W setpoint mode	0-Air, 1-Water
(IU*100 + 19)	R/W	A2W setpoint	(x10) (Air - 18…30ºC/64,4…86ºF) / (Water - 6…80ºC/42,8…176ºF)
(IU*100 + 20)	R/W	Hotwater On/Off	0-Off, 1- On
(IU*100 + 21)	R	Hotwater only	0-Off, 1- On
(IU*100 + 22)	R/W	Hotwater setpoint	(x10) 30…80ºC/86…176ºF
(IU*100 + 23)	R	Water inlet temperature	(x10) ºC/ºF
(IU*100 + 24)	R	Water discharge temperature	(x10) ºC/ºF
(IU*100 + 25)	R	Water tank temperature	(x10) ºC/ºF
(IU*100 + 26)	R	Water solar temperature	(x10) ºC/ºF
(IU*100 + 27)	R	Unit type	0-Not defined, 1-AC, 2-VENT, 3-DX, 4-AWHP
(IU*100 + 28)	R	Status IUXX_Communication Error IU	0-No error, 1-Error
(IU*100 + 29)	R	Accumulated Power Consumption*	0…9999990 Wh

*32 bits unsigned register.

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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 / Modbus TCP (TCP) / 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 / LG PI485 bus
Connect the LG PI 485 bus to the connectors A3 (BUS B) and A4 (BUS A) of gateway's PortA. Respect the polarity.

PortB / Modbus RTU
Connect the EIA485 bus to connectors B1 (B+), B2 (A-) and B3 (SNGD) of gateway's PortB. Respect the polarity. Remember the characteristics of the standard EIA485 bus: maximum distance of 1200 meters, maximum 32 devices connected to the bus, and in each end of the bus it must be a termination resistor of 120 Ω. Bus biasing and termination resistor for EIA485 can be enabled for PortB by means of a dedicated DIP switch – see table below.

Connect the serial cable EIA232 coming from the external serial device to the EIA232 connector of gateway's PortB. This is a DB9 male (DTE) connector in which only the lines TX, RX and GND are used. Details of the pinout can be seen in the user's manual. Respect the maximum distance of 15 meters.

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.

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

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

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3.1 *Power device*

The first step to perform is to power up the device. To do so, a power supply working with any of the voltage range allowed is needed (check section **5 ELECTRICAL & MECHANICAL FEATURES**). Once connected the ON led will turn on.

WARNING! In order to avoid earth loops that can damage the gateway, and/or any other equipment connected to it, we strongly recommend:

- The use of DC power supplies, floating or with the negative terminal connected to earth. **Never use a DC power supply with the positive terminal connected to earth**.
- The use of AC power supplies only if they are floating and not powering any other device.

3.2 *Connect to LG installation*

Use the Port B connector of the Intesis device to connect LG PI485 bus to the Intesis. Remember to follow all safety precautions indicated by LG.

Connect the LG PI 485 bus to connectors A3 (BUS B) and A4 (BUS A) of gateway's PortA. Respect the polarity.

3.3 *Connection to Modbus*

3.3.1 Modbus TCP

The gateways Ethernet port connection is used for Modbus 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 502) 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.

3.3.2 Modbus RTU

Connect the communication cable coming from the Modbus network to the port marked as Port B of the Intesis. Connect the EIA485 bus to connectors B1 (-), B2 (+) and B3 (SNGD) of gateway's PortB. Respect the polarity.

Remember the characteristics of the standard EIA485 bus: maximum distance of 1200 meters, maximum 32 devices (without repeaters) connected to the bus, and in each end of the bus it must be a termination resistor of 120 Ω. The gateway has an internal bus biasing circuit that incorporates the termination resistor. Bus biasing and termination resistor for EIA485 can be enabled for PortB by means of a dedicated DIP switch.

3.4 *Connection to the configuration tool*

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

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

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4 Set-up process and troubleshooting

4.1 *Pre-requisites*

It is necessary to have the Modbus RTU or TCP master/client device (BMS side device) operative and properly connected to the corresponding port of the gateway and the LG VRF installation connected to their corresponding ports as well.

Connectors, connection cables, PC to use the configuration tool and other auxiliary material, if needed, are not supplied by HMS Industrial Networks S.L.U. 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 Modbus series*

4.2.1 Introduction

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

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

In this section, only the specific case of LG to Modbus systems will be covered.

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

4.2.2 Connection

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

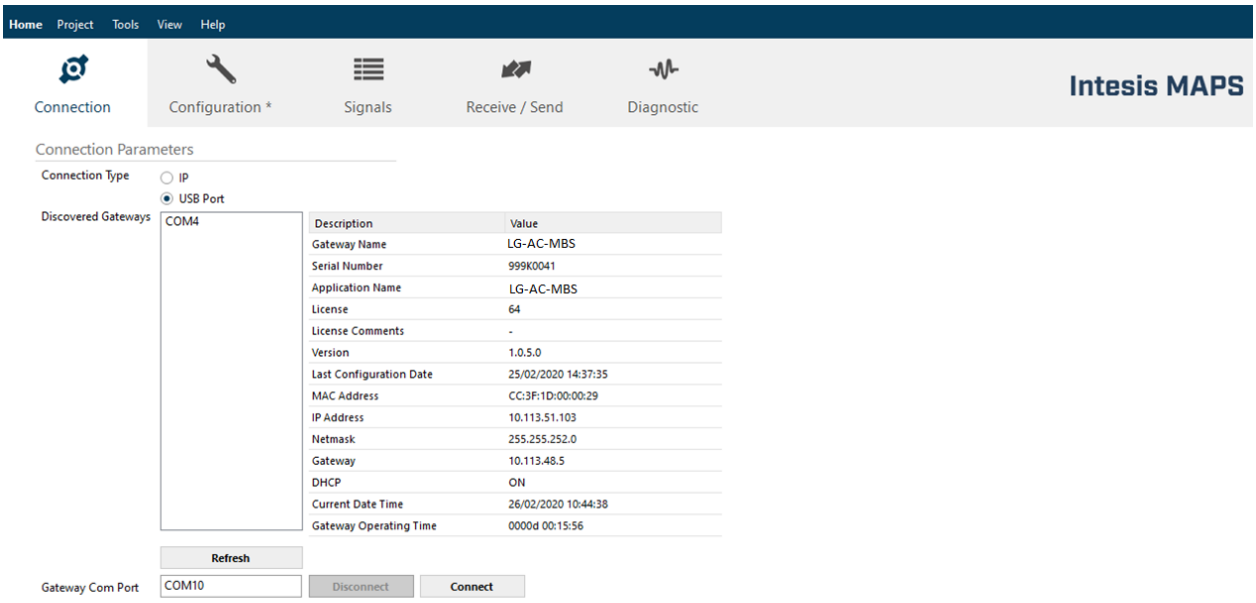


Figure 4.1 MAPS connection

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4.2.3 Configuration tab

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

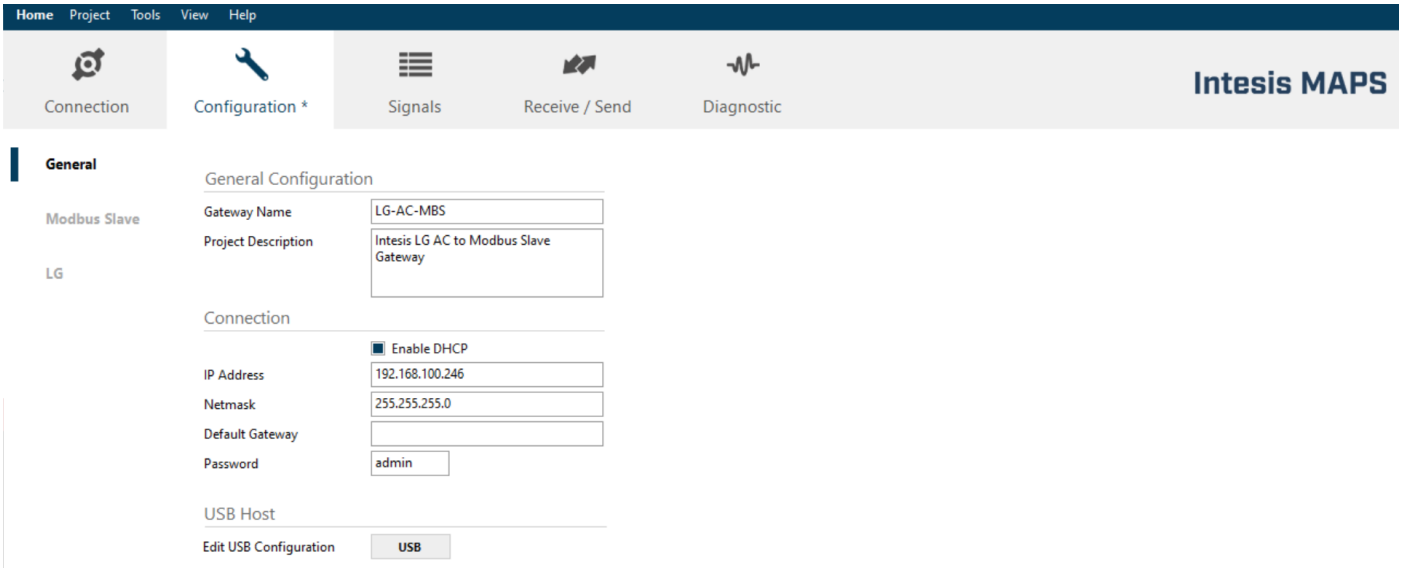


Figure 4.2 Intesis MAPS configuration tab

4.2.4 Modbus configuration

Set parameters of Modbus interface of Intesis.

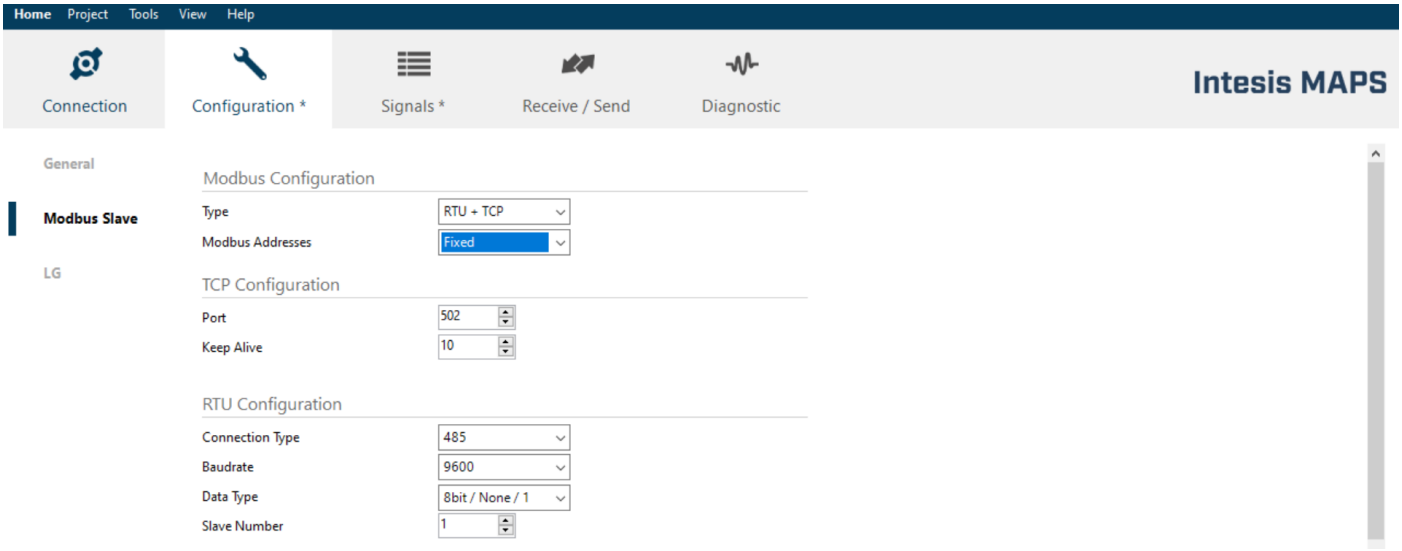


Figure 4.3 Intesis MAPS Modbus configuration tab

1. **Modbus Configuration**

   1.1. Modbus type selection. Select RTU, TCP or simultaneous RTU and TCP communication.

   1.2. Modbus addresses. Select between fixed or custom (user customizable) Modbus map.

2. **TCP Configuration.**

   2.1. Modbus TCP Port: Modbus TCP communication port setting. Default port 502.

   2.2. Keep Alive. Set the time of inactivity to send a keep Alive message. Default 10 minutes.

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3. **RTU Configuration.**

3.1. Connection type. Select the RTU connection type serial bus RS485 or 232.

3.2 Baudrate. Set the RTU bus communication speed. Default: 9600 bps.

- Available values: 1200, 2400, 4800, 9600,19200, 38400, 57600, 115200 bps.

3.3 Data Type. Set the Data-bit/parity/stop-bit. Default: 8bit/None/1.

- Available selection: 8bit/None/1, 8bit/Even/1, 8bit/Odd/1, 8bit/None/2.

3.4 Slave Number. Set the Modbus Slave address. Default slave address: 1.

- Valid address: 1…255.

4.2.5 LG configuration

Set parameters for connection with LG's installation.

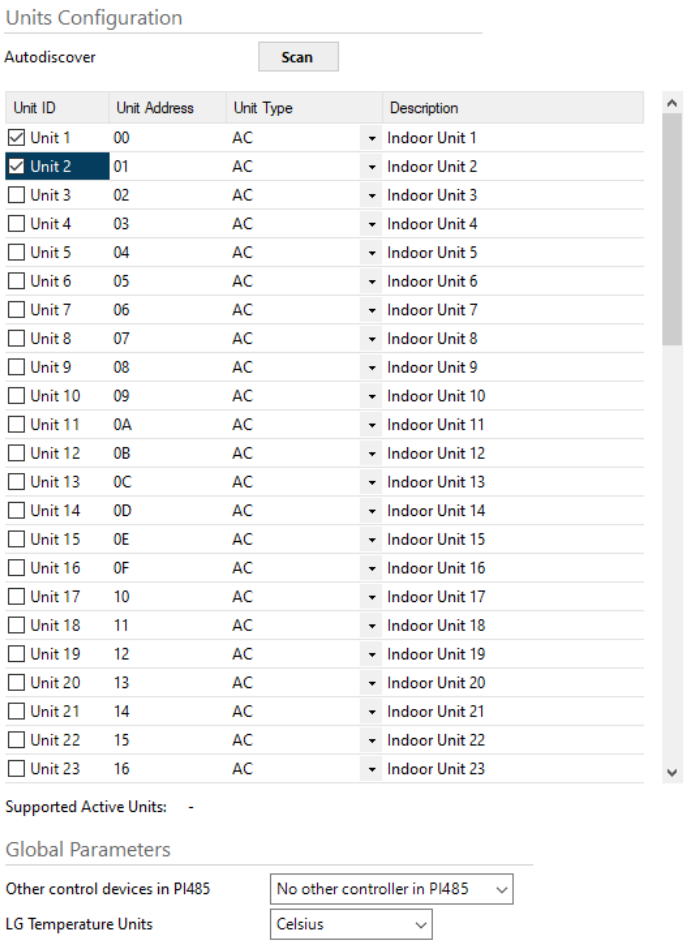


Figure 4.4 Intesis MAPS LG configuration tab

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)
- **Unit address**. Address 0…FF of Unit in LG EIA485 bus.
- **Unit type.** It sets the type of the indoor unit. You can select between AC, VENT, DX and AWHP units.

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

Global parameters

In this section we will find the following settings:

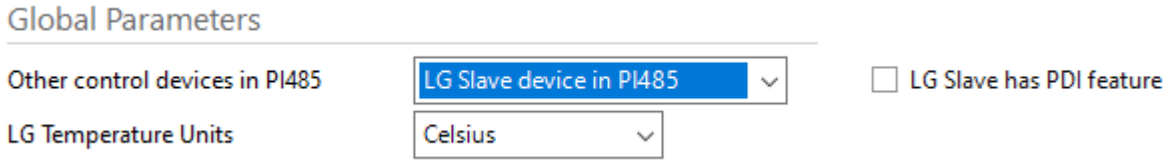


Figure 4.5 Intesis MAPS LG configuration tab. Global parameters

- **Other control devices in PI485**. This setting will allow to configure if there were any other controller device in the LG VRF bus or not.
  - **LG Slave has PDI feature.** If there were a LG slave device with PDI feature (Power Distribution Indicator), it is necessary to activate the LG Slave has PDI feature checkbox. This action will create a new signal to transmit the consumption value to Modbus (Wh). Consider that this register is a 32 data bit length and accordingly will occupy 2 consecutive registers (the one selected and the consecutive one, for instance, registers 130 and 131 when setting register address 130).

- **LG Temperature Units.** This setting allows to choose between Celsius or Fahrenheit degrees for the Modbus side.

Additional to manual entry of each unit, Autodiscover of present units in LG VRF system is possible. To do so, click button **Scan**. Following window will appear:

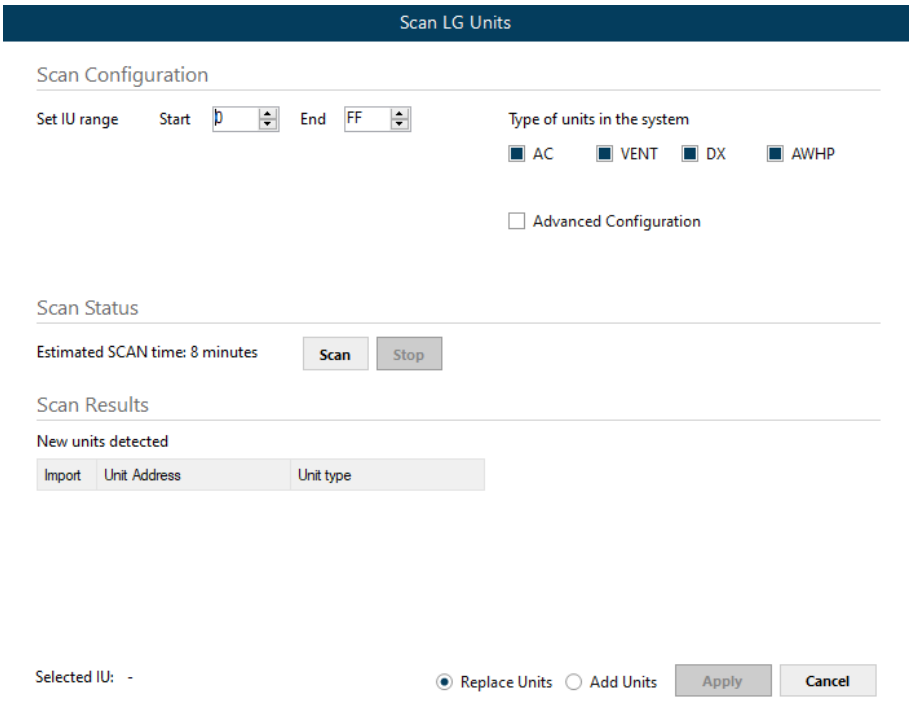


Figure 4.6 Intesis MAPS Scan LG Units window

Before pressing the **Scan** button, set the appropriate settings for the SCAN:

- Set the IU addresses range to search.
- Set the type of units in the LG system to search.

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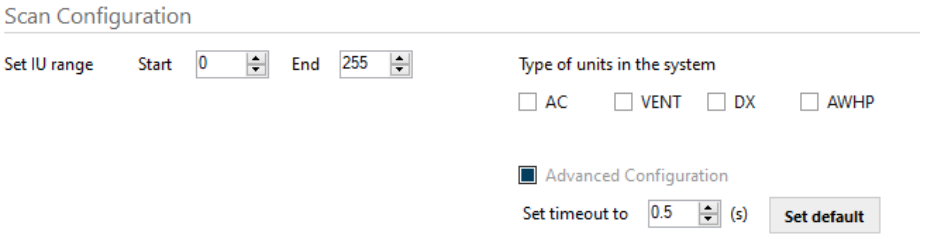


Figure 4.7 Intesis MAPS Scan Configuration settings

- In advance configuration we can set the timeout of the SCAN in case of need.

Scanning time will be different according to SCAN Configuration. As we add more type of AC units to scan, the scanning time will increase. It is the same in case we scan a large range of units compared to a short range.

Once the settings are stablished, by pressing SCAN EIA 485 bus will be scanned for available units. Error window will appear if there is a problem in the connection with EIA 485 bus (units not powered, bus not connected, …).

A progress bar will appear during the scan. When the scan finishes, detected units will be shown in available units as follows:

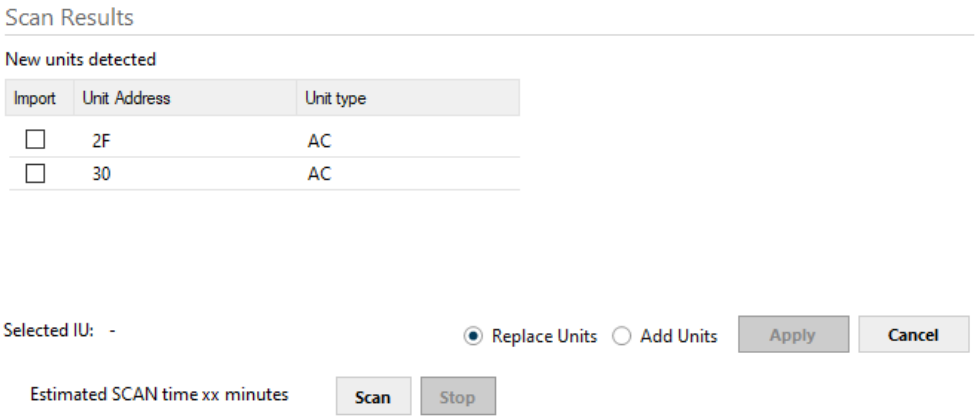


Figure 4.8 Intesis MAPS Scan LG Units window with scan results

Select the units to add (or replace) in installation, according to selection **Replace Units** / **Add Units**.
Once the desired units and action are selected, click **Apply** to perform the action.

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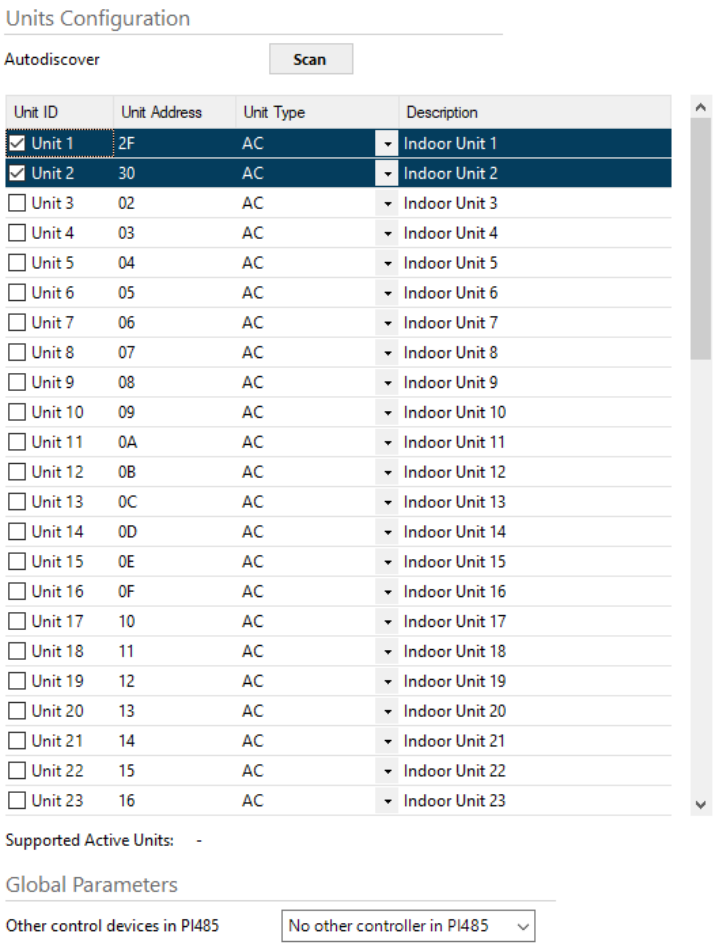
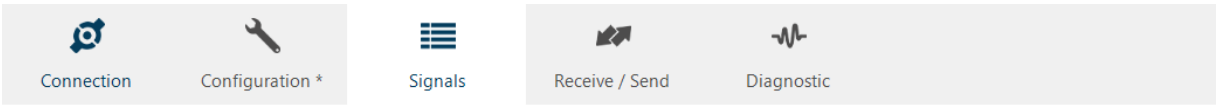


Figure 4.9 Intesis MAPS LG configuration tab after importing scan results

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4.2.6 Signals

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



				Modbus Slave					LG		
#	Active	Description	Data L...	Format	Address...	Bit	Read / Write	Unit ID	Unit Type	IU
1	☑	On for AC, DX and AWHP (all the units) (1-On)	16	0: Unsigned	0	-	1: Trigger	-	-	-
2	☑	Off for AC, DX and AWHP (all the units) (1-Off)	16	0: Unsigned	1	-	1: Trigger	-	-	-
3	☑	Auto mode for AC, DX and AWHP (all units) (1-Auto)	16	0: Unsigned	2	-	1: Trigger	-	-	-
4	☑	Heat mode for AC, DX and AWHP (all units) (1-Heat)	16	0: Unsigned	3	-	1: Trigger	-	-	-
5	☑	Dry mode for AC (all units) (1-Dry)	16	0: Unsigned	4	-	1: Trigger	-	-	-
6	☑	Fan mode for AC (all units) (1-Fan)	16	0: Unsigned	5	-	1: Trigger	-	-	-
7	☑	Cool mode for AC, DX and AWHP (all units) (1-Cool)	16	0: Unsigned	6	-	1: Trigger	-	-	-
8	☑	On for VENT and DX (all the units) (1-On)	16	0: Unsigned	7	-	1: Trigger	-	-	-
9	☑	Off for VENT and DX (all the units) (1-Off)	16	0: Unsigned	8	-	1: Trigger	-	-	-
10	☑	Normal mode for VENT and DX (all units) (1-Normal)	16	0: Unsigned	9	-	1: Trigger	-	-	-
11	☑	Heater_Exchange mode for VENT and DX (all units) (...	16	0: Unsigned	10	-	1: Trigger	-	-	-
12	☑	Auto mode for VENT and DX (all units) (1-Auto)	16	0: Unsigned	11	-	1: Trigger	-	-	-
13	☑	Fan Speed AUTO (all the units) (1-Set Auto fan speed)	16	0: Unsigned	12	-	1: Trigger	-	-	-
14	☑	Fan Speed low (all units) (1-Set Low fan speed)	16	0: Unsigned	13	-	1: Trigger	-	-	-
15	☑	Fan Speed med (all units) (1-Set Medium fan speed)	16	0: Unsigned	14	-	1: Trigger	-	-	-
16	☑	Fan Speed high (all units) (1-Set High fan speed)	16	0: Unsigned	15	-	1: Trigger	-	-	-
17	☑	Vane Position Swing ON (all units) (1-Swing On)	16	0: Unsigned	16	-	1: Trigger	-	-	-
18	☑	Vane Position Swing OFF (all units) (1-Swing Off)	16	0: Unsigned	17	-	1: Trigger	-	-	-
19	☑	Temperature Setpoint (all units) (x10ºC)	16	1: Signed (C2)	18	-	1: Trigger	-	-	-
20	☑	On/Off (0-Off, 1-On)	16	0: Unsigned	100	-	2: Read / Write	Unit 1 - Indoor...	AC	2F
21	☑	Operation Mode (0-Auto, 1-Heat, 2-Dry, 3-Fan, 4-Co...	16	0: Unsigned	101	-	2: Read / Write	Unit 1 - Indoor...	AC	2F
22	☑	Fan Speed (0-Auto, 1-Low, 2-Med, 3-High)	16	0: Unsigned	102	-	2: Read / Write	Unit 1 - Indoor...	AC	2F
23	☑	Vane Position Swing (0-Swing Off, 1-Swing On)	16	0: Unsigned	103	-	2: Read / Write	Unit 1 - Indoor...	AC	2F
24	☑	Temperature Setpoint (x10ºC)	16	1: Signed (C2)	104	-	2: Read / Write	Unit 1 - Indoor...	AC	2F
25	☑	Ambient Temperature ((-10...50ºC) x10ºC)	16	1: Signed (C2)	105	-	0: Read	Unit 1 - Indoor...	AC	2F
26	☑	Remote control lock (0-Lock Disabled, 1-Lock Enable...	16	0: Unsigned	106	-	2: Read / Write	Unit 1 - Indoor...	AC	2F
27	☑	Unit Error (0-No error, 1-Error)	16	0: Unsigned	107	-	0: Read	Unit 1 - Indoor...	AC	2F
28	☑	Unit Error code (0-No Error, X-Error)	16	0: Unsigned	108	-	0: Read	Unit 1 - Indoor...	AC	2F
29	☑	Unit type (0-Not defined, 1-AC, 2-VENT, 3-DX, 4-AW...	16	0: Unsigned	127	-	0: Read	Unit 1 - Indoor...	AC	2F
30	☑	IUXX_Communication Error (0-No error, 1-Error)	16	0: Unsigned	128	-	0: Read	Unit 1 - Indoor...	AC	2F
31	☑	On/Off (0-Off, 1-On)	16	0: Unsigned	200	-	2: Read / Write	Unit 2 - Indoor...	AC	30
32	☑	Operation Mode (0-Auto, 1-Heat, 2-Dry, 3-Fan, 4-Co...	16	0: Unsigned	201	-	2: Read / Write	Unit 2 - Indoor...	AC	30
33	☑	Fan Speed (0-Auto, 1-Low, 2-Med, 3-High)	16	0: Unsigned	202	-	2: Read / Write	Unit 2 - Indoor...	AC	30
34	☑	Vane Position Swing (0-Swing Off, 1-Swing On)	16	0: Unsigned	203	-	2: Read / Write	Unit 2 - Indoor...	AC	30
35	☑	Temperature Setpoint (x10ºC)	16	1: Signed (C2)	204	-	2: Read / Write	Unit 2 - Indoor...	AC	30
36	☑	Ambient Temperature ((-10...50ºC) x10ºC)	16	1: Signed (C2)	205	-	0: Read	Unit 2 - Indoor...	AC	30
37	☑	Remote control lock (0-Lock Disabled, 1-Lock Enable...	16	0: Unsigned	206	-	2: Read / Write	Unit 2 - Indoor...	AC	30
38	☑	Unit Error (0-No error, 1-Error)	16	0: Unsigned	207	-	0: Read	Unit 2 - Indoor...	AC	30
39	☑	Unit Error code (0-No Error, X-Error)	16	0: Unsigned	208	-	0: Read	Unit 2 - Indoor...	AC	30
40	☑	Unit type (0-Not defined, 1-AC, 2-VENT, 3-DX, 4-AW...	16	0: Unsigned	227	-	0: Read	Unit 2 - Indoor...	AC	30

Figure 4.10 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.

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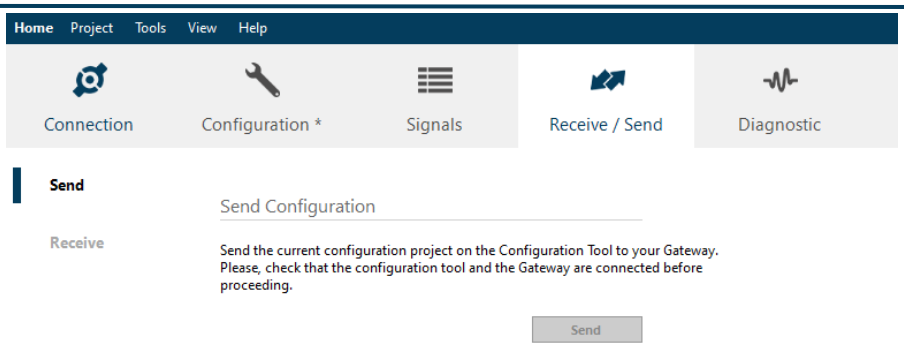


Figure 4.11 Intesis MAPS Receive/Send tab

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.
In order 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**
  In order to check the current 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.

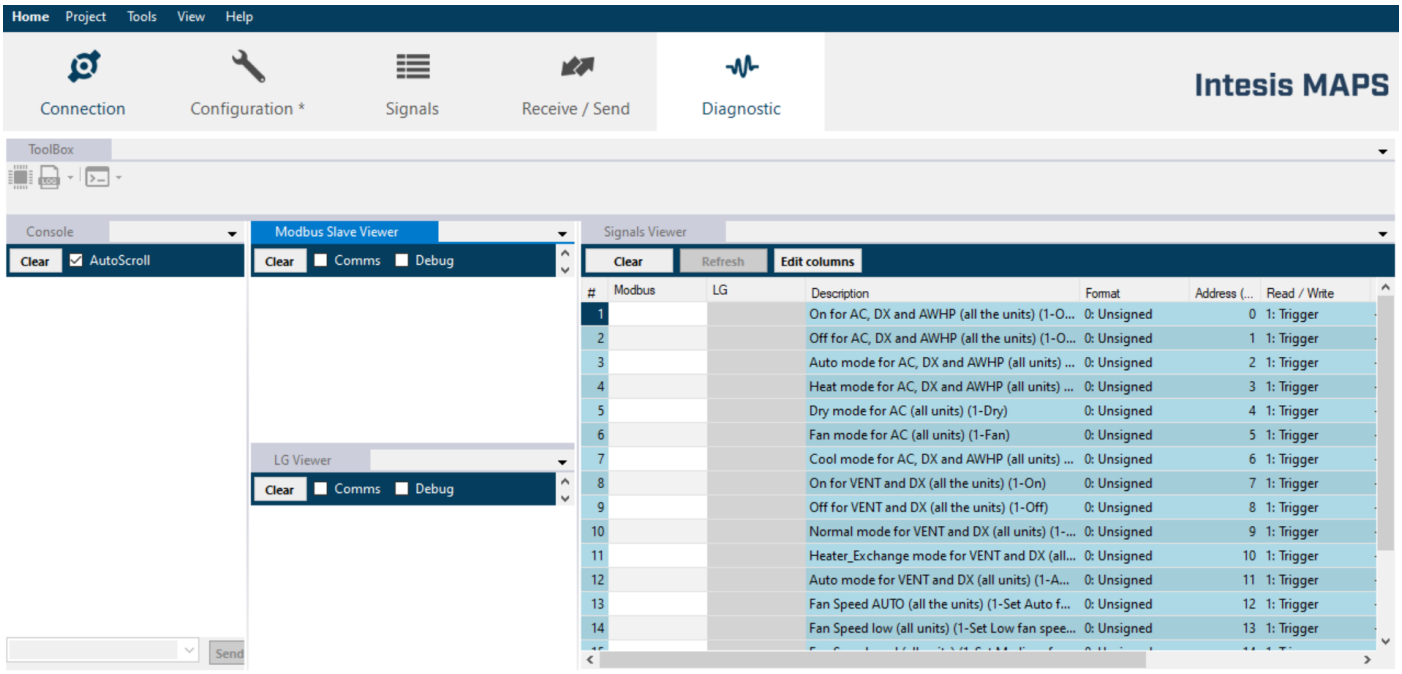


Figure 4.12 Diagnostic

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

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4.2.9 Set-up procedure

1. Install Intesis MAPS on your laptop following the instructions given by the Installation wizard.

2. Mount the Intesis device in the desired installation location. 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. Connect the device to the communication busses according to **3 CONNECTIONS**. Do not supply yet the device.

4. Once all the connections are committed, power up the Intesis device. The supply voltage can be 9 to 36 Vdc or just 24 Vac. Take care of the polarity of the supply voltage applied when using DC PS.

   WARNING! In order 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.

5. Connect the PC to Intesis by using the Ethernet or the console port (see **3 CONNECTIONS**).

6. Open Intesis MAPS, create a new project selecting a copy of the one named **INMBSLGE---O000**.

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

8. Visit the Diagnostic section and check that there is communication activity, some TX frames and some other RX frames. This means that the communication is OK.

   In case there were no communication activity between Intesis and the Modbus side and/or LG units, check that those are operative: check communication cable used to connect all devices and any other communication parameter.

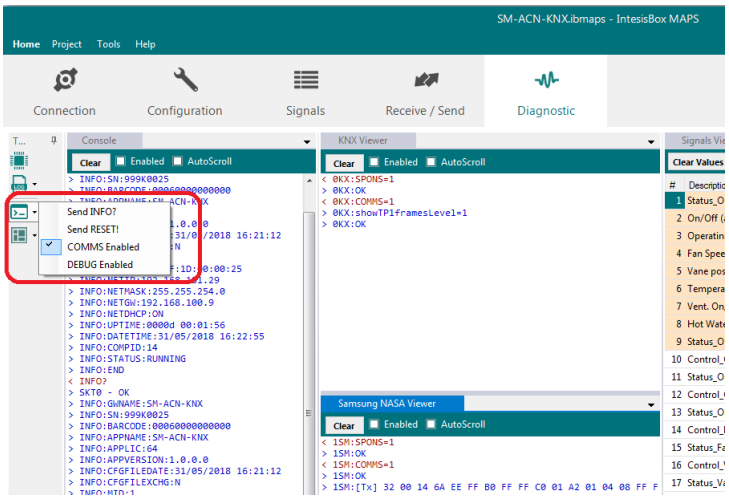


Figure 4.13 Enable COMMS

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5 Electrical & Mechanical Features

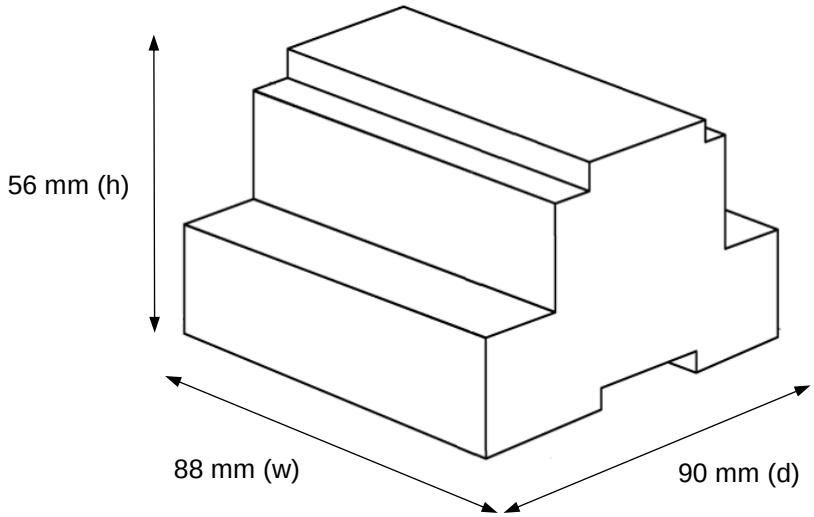


Enclosure	Plastic, type PC (UL 94 V-0) Net dimensions (dxwxh): 90x88x56 mm Recommended space for installation (dxwxh): 130x100x100mm Color: Light Grey. RAL 7035
Mounting	Wall. DIN rail EN60715 TH35.
Terminal Wiring (for power supply and low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.5mm^2… 2.5mm^2 2 cores: 0.5mm^2… 1.5mm^2 3 cores: not permitted
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 Plug-in screw terminal block green (2 poles) Reserved for future use 1 x LG Plug-in screw terminal block (2 poles) 1500VDC isolation from other ports
Switch A (SWA)	1 x DIP-Switch for PORT A configuration: Reserved for future use
PORT B	1 x Serial EIA232 (SUB-D9 male connector) 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 PORT B configuration: Reserved for future use (leave OFF, default)

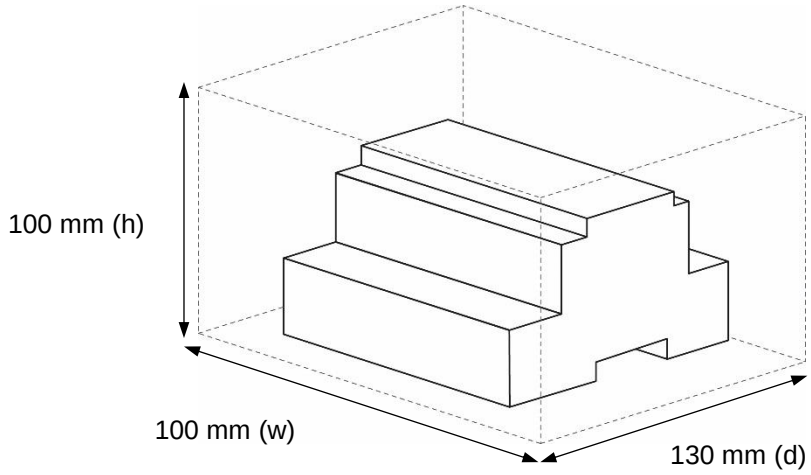
Battery	Size: Coin 20mm x 3.2mm Capacity: 3V / 225mAh Type: Manganese Dioxide Lithium
Console Port	Mini Type-B USB 2.0 compliant 1500VDC isolation
USB port	Type-A USB 2.0 compliant Only for USB flash storage device *(USB pen drive)* Power consumption limited to 150mA *(HDD connection not allowed)*
Push Button	Button A: Check the user manual Button B: Check the user manual
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

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6 Dimensions



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



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7 AC Unit Types compatibility

A list of LG unit model references compatible with INMBSLGE016O000 / INMBSLGE064O000 and their available features can be found in:

https://www.intesis.com/docs/compatibilities/inxxxlge0xxo000_compatibility

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8 Error codes for Indoor and Outdoor Units

This list contains all possible values shown in Mobdus register for “Error Code” for each indoor unit and outdoor unit.

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.

INTESIS Error code	LG Error Code	Error contents
1	CH01	Indoor unit air sensor error
2	CH02	Indoor unit pipe inlet sensor error
3	CH03	No transmission between cabled remote controller & indoor unit
4	CH04	Drain pump error
5	CH05	Indoor & outdoor unit transmission error
6	CH06	Indoor unit pipe outlet sensor error
7	CH07	All indoor units are not running in same mode on HP devices
8	CH08	Hydro kit hot water storage tank temperature sensor error.
9	CH09	Indoor unit EEPROM malfunction
10	CH10	Indoor unit BLDC fan motor malfunction
11	CH11	Indoor unit communication error
21	CH21	Inverter PVB IPM failure (appears as 211 on VRF Master, 212 on Slave 1, 213 on Slave 2, 214 on Slave 3)
22	CH22	AC input overcurrent failure (appears as 211 on VRF Master, 212 on Slave 1, 213 on Slave 2, 214 on Slave 3)
23	CH23	Inv Compressor DC Link low voltage (appears as 211 on VRF Master unit, 212 on Slave 1, 213 on Slave 2, 214 on Slave 3)
24	CH24	Compressor output head too high (Main outdoor unit 24, Slave1 109, Slave2 140 Slave3 153)
25	CH25	Input voltage high or low
26	CH26	Inv Compressor first operation failure (Master 261, Slave1 262, Slave2 263, Slave3 264)
27	CH27	PSC error
43	CH43	High pressure sensor failure (Master 431, Slave1 432, Slave2 433, Slave3 434)
44	CH44	Outdoor unit ambient sensor faulty (Master 441, Slave1 442, Slave2 443, Slave3 444)
45	CH45	Condenser pipe sensor defective (Master 451, Slave1 452, Slave2 453, Slave3 454)
46	CH46	Compressor suction temperature thermistor defective
47	CH47	Constant1 Compressor outlet pipe temperature sensor malfunction (Master 471, Slave1 472, Slave2 443, Slave3 474)
48	CH48	Constant 2 Compressor outlet pipe temperature sensor failure (Master 481, Slave1 482, Slave2 483, Slave3 484)
49	CH49	Outdoor unit IPM temperature sensor defective
50	CH50	Outdoor unit phase connection error (Master 501, Slave1 502, Slave2 503, Slave3 504)
51	CH51	Capacity Excess
52	CH52	Communication error between inverter PCB and main PCB (Master 521, Slave1 522, Slave2 522, Slave3 523)
53	CH53	Communication error between outdoor main PCB and indoor unit PCB. (Master 531, Slave1 532, Slave2 532, Slave3 533)
54	CH54	The phase connections are missing or in the wrong order (Master 541, Slave1 542, Slave2 543, Slave3 544)
57	CH57	Communication error between main PCB and inverter PCB (Master 571, Slave 572, Slave2 573, Slave3 574)
59	CH59	Plus connection error (Master 591, Slave1 592, Slave2 593, Slave3 594)

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60	CH60	Inverter PCB EEPROM error (Master 601, Slave1 602, Slave2 603, Slave3 604)
61	CH61	Condenser pipe sensor temperature load
62	CH62	Heat sink sensor overheat
65	CH65	Heat sink sensor open or short circuit
67	CH67	Outdoor unit fan locked (Master 671, Slave1 672, Slave2 673, Slave3 674)
69	CH69	Constant 1 Compressor CT Sensor failure (Master 691, Slave1 692, Slave2 693, Slave3 694)
70	CH70	Stationary 2 Compressor CT Sensor failure (Master 701, Slave1 702, Slave2 703, Slave3 704)
73	CH73	AC input surge current failure (Master 731, Slave1 732, Slave2 733, Slave3 734)
75	CH75	Fan CT sensor fault (Master 751, Slave1 752, Slave2 753, Slave3 754)
76	CH76	Fan DC link high voltage error (Master 761, Slave1 762, Slave2 763, Slave3 764)
77	CH77	Fan overcurrent fault (Master 771, Slave1 772, Slave2 773, Slave3 774)
79	CH79	Fan initial start error (Master 791, Slave1 792, Slave2 793, Slave3 794)
86	CH86	Main PCB EEPROM failure (Master 861, Slave1 862, Slave2 863, Slave3 864)
87	CH87	Fan PCB EEPROM failure (Master 871, Slave1 872, Slave2 873, Slave3 874)
104	CH104	Communication error between outdoor units (Master 11- & gt; 041, Slave1 12- & gt; 042, Slave2 13- & gt; 043, Slave3 14- & gt; 044)
105	CH105	Communication error between fan PCB and inverter PCB (Master 11 – & 051, Slave1 12 – 05 052, Slave2 13- & 053, Slave3 14 – 05 054)
106	CH106	Outdoor Unit Fan PCB IPM Error
107	CH107	Fan DC link low voltage fault (Master 11 – 07 071, Slave1 12 – 07 072, Slave2 13 – 07 073, Slave3 14 – 07 074)
113	CH113	Outdoor Unit Liquid pipe (condenser) temperature sensor faulty (Master 11- 131 131, Slave1 12 – 132 132, Slave2 13 – 133 133, Slave3 14 – 134 134)
115	CH115	Outdoor unit subcool output temperature sensor failure (Master 11 – & gt; 151, Slave1 12 – & gt; 152, Slave2 13- & gt; 153, Slave3 14 – & gt; 154
173	CH173	Outdoor unit constant1 compressor overcurrent (Master 11 – 73 731, Slave1 12 – 7 732, Slave2 13 – 7 733, Slave3 14 – 73 734)
174	CH174	Outdoor unit constant2 compressor overcurrent (Master 11 – 74 741, Slave1 12 – 74 742, Slave2 13 – 74 743, Slave3 14 – 74 744)
182	CH182	Master Outdoor Unit main PCB to auxiliary PCB communication error
184	CH184	Oil compensating pipe temperature sensor malfunction (Master (11-841), Slave1 (12-842), Slave2 (13-843), Slave3 (14-844)
185	CH185	Oil compensating pipe temperature sensor malfunction (Master (11-851), Slave1 (12-852), Slave2 (13-853), Slave3 (14-854)
186	CH186	Oil compensating pipe temperature sensor malfunction (Master (11-861), Slave1 (12-862), Slave2 (13-863), Slave3 (14-864)
193	CH193	Fan PCB Heatsink temperature is high (Master 11 – 93 931, Slave1 12- 9 932, Slave2 – 9 933, Slave3 14- 93 934)
194	CH194	Fan PCB heatsink temperature sensor faulty (Master 11 – 94 941, Slave1 12 – 94 942, Slave2 13 – 94 943, Slave3 14 – 94 944)
242	CH242	Network failure

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