

# INMBSLGE001R000 Modbus RTU Gateway for LG air conditioners

## USER MANUAL

Issue date: 01/2024 v1.9 ENGLISH



## Modbus RTU (EIA-485) Interface for LG air conditioners

| <b>ORDER CODE</b> | <b>LEGACY ORDER CODE</b> |
|-------------------|--------------------------|
| INMBSLGE001R000   | LG-RC-MBS-1              |

## Important User Information

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# 1. Presentation

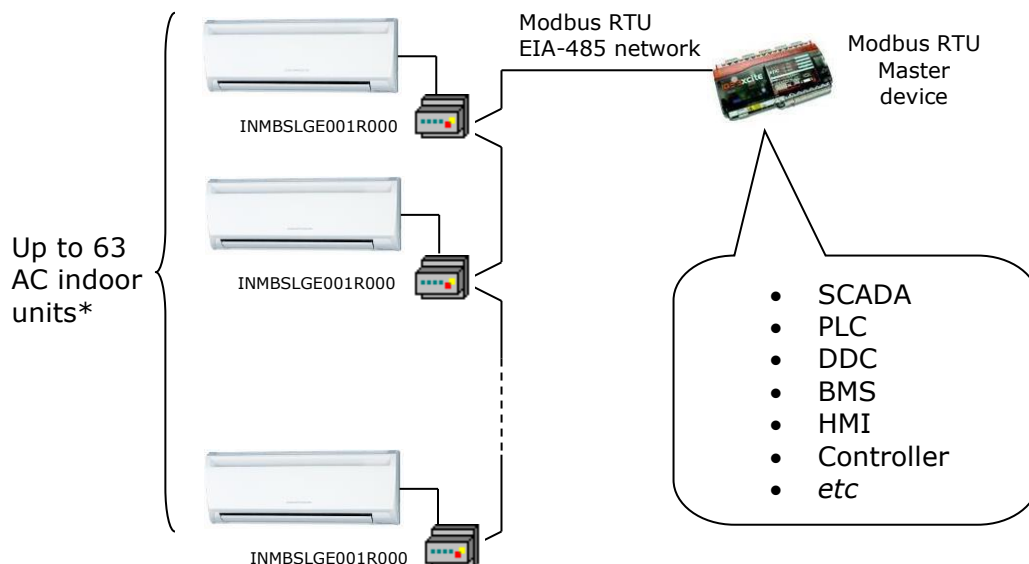


The INMBSLGE001R000 interfaces allow a complete and natural integration of **LG** air conditioners into Modbus RTU (EIA-485) networks.

Reduced dimensions. 93 x 53 x 58 mm  
3.7" x 2.1" x 2.3"

Quick and easy installation.  
Mountable on DIN rail, wall, or even inside the indoor unit of AC.

- External power not required.
- Direct connection to Modbus RTU (EIA-485) networks. Up to 63 INMBSLGE001R000 devices can be connected in the same network.  
*INMBSLGE001R000 is a Modbus slave device.*
- Direct connection to the AC indoor unit.
- Configuration from both on-board DIP-switches and Modbus RTU.
- Total Control and Supervision.
- Real states of the AC unit's internal variables.
- Allows simultaneous use of the AC's remote controls and Modbus RTU.



\* Up to 63 Intesis devices can be installed in the same Modbus RTU bus. However, depending on the configured speed, the installation of Modbus Repeaters may be required

## 2. Connection

The interface comes with a plug-in terminal block of 3 poles to establish direct connection with the AC indoor unit. It comes as well with a plug-in terminal block of 2 poles to establish direct connection with the Modbus RTU EIA-485 network.

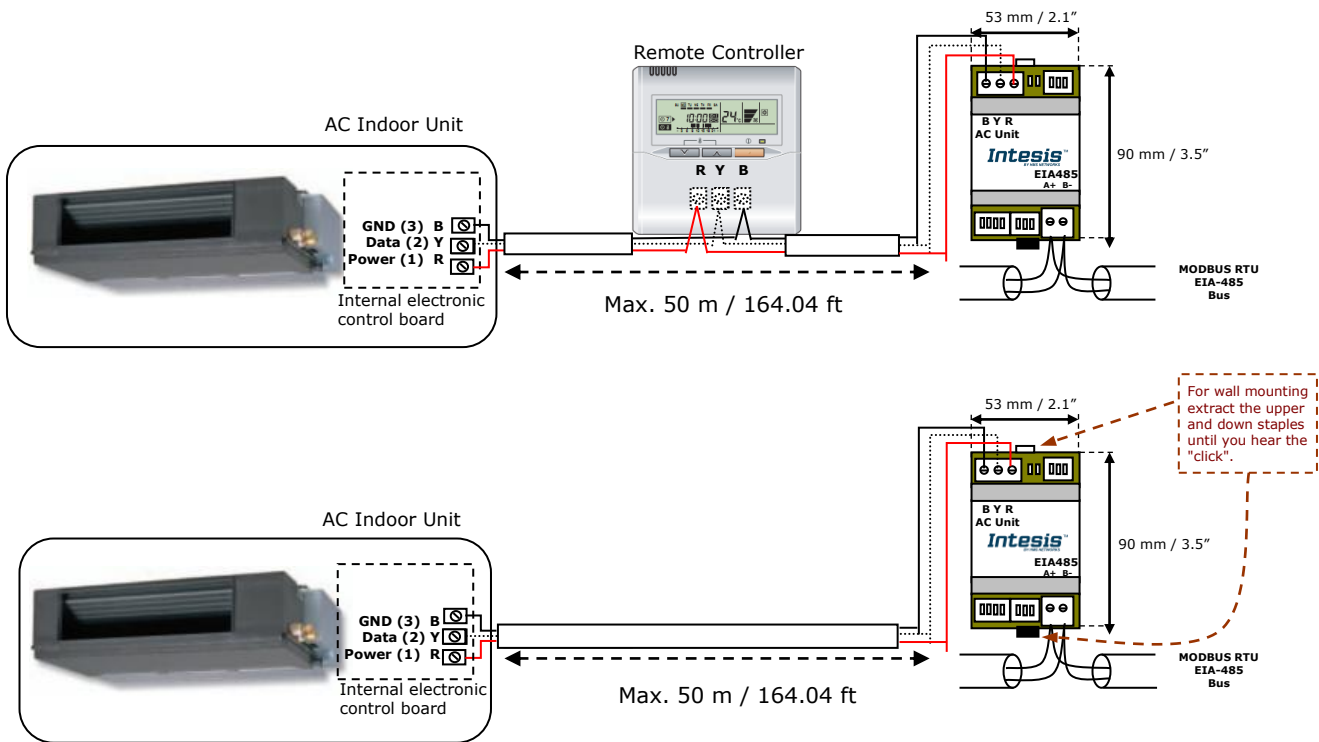
### 2.1 Connect to the AC indoor unit

The INMBSLGE001R000 connects directly to the LG BYR Bus, which is not provided within the interface. Depending on which controllers are available, the recommended connection methods are the following ones (details in Figure 2. 1):

- **Wired remote control available.** Connect the gateway as Slave in parallel with the wired Remote Controllers (Controller acts as Master).
- **No remote control available** Connect the gateway directly to the BYR bus of the indoor unit as Master when there is no LG Remote Controller.

Maximum BYR bus length is 50 m / 164.04 ft. The bus has no polarity sensitivity.

**Important:** If a wired remote controller of the AC manufacturer is connected in the same bus, communication may shut down.



**Attention:** Type A units don't allow to install a Remote Controller and INMBSLGE001R000 together.

Figure 2. 1 INMBSLGE001R000 connection diagram

## 2.2 Connection to the EIA-485 bus

Connect the EIA-485 bus wires to the plug-in terminal block (the one of two poles) of INMBSLGE001R000 and keep the polarity on this connection (A+ and B-). Make sure that the maximum distance to the bus is 1,200 meters (3,937 ft). Loop or star typologies are not allowed in the case of the EIA-485 bus. A terminator resistor of 120Ω must be present at each end of the bus to avoid signal reflections. The bus needs a fail-safe biasing mechanism (see section 4.6 for more details).

## 3. Quick Start Guide


1. Disconnect the air conditioning from the Mains Power.
2. Attach the interface next to the AC indoor unit (wall mounting) following the instructions of the diagram below or install it inside the AC indoor unit (respect the safety instructions given).
3. Connect the BYR bus between the interface and the AC indoor unit following the instructions of the diagram. Screw each bare cable end in the corresponding BYR terminals of each device.
4. Connect the EIA-485 bus to the connector *EIA485* of the interface.
5. Close the AC indoor unit.
6. Check the DIP-Switch configuration of the Intesis interface and make sure it matches the current installation's parameters.

By default, the interface is set to:

- Modbus Slave Address → 1
- Modbus baud rate → 9600 bps



These parameters can be modified from SW4 and SW3 DIP-Switches.

All other switch positions are set at low level (Off position ) by default.

**NOTE:** All changes on the DIP-Switch configuration require a system power cycle to be applied.

7. Connect the AC system to Mains Power.

**IMPORTANT:** The Intesis interface requires to be connected to the AC unit (powered) to start communicating.

## 4. Modbus Interface Specification

### 4.1 Modbus physical layer

INMBSLGE001R000 implements a Modbus RTU (Slave) interface, to be connected to an EIA-485 line. It performs 8N2 communication (8 data bits, no parity and 2 stop bit) with several available baud rates (2400 bps, 4800 bps, 9600 bps -default-, 19200 bps, 38400 bps, 57600 bps, 76800 bps and 115200 bps). It also supports 8N1 communication (8 data bits, no parity and 1 stop bit).

**NOTE:** The gateway will automatically detect the communication type (8N1 or 8N2) and set itself accordingly. No user action or manual settings are required.

### 4.2 Modbus Registers

All registers are type "16-bit unsigned Holding Register" and they use the *Modbus big endian* notation.

#### 4.2.1 Control and status registers

| Register Address (protocol address) | Register Address (PLC address) | R/W | Description  |
|-------------------------------------|--------------------------------|-----|--|
| 0                                   | 1                              | R/W | AC unit On/Off <ul style="list-style-type: none"> <li>▪ 0: Off</li> <li>▪ 1: On</li> </ul>   |
| 1                                   | 2                              | R/W | AC unit Mode <sup>1</sup> <ul style="list-style-type: none"> <li>▪ 0: Auto</li> <li>▪ 1: Heat</li> <li>▪ 2: Dry</li> <li>▪ 3: Fan</li> <li>▪ 4: Cool</li> </ul>                      |
| 2                                   | 3                              | R/W | AC unit Fan Speed <sup>1</sup> <ul style="list-style-type: none"> <li>▪ 0: Auto</li> <li>▪ 1..7: Pos. 1 .. Pos. 7</li> </ul>   |
| 3                                   | 4                              | R/W | AC unit Vane Position <sup>1</sup> <ul style="list-style-type: none"> <li>▪ 0: No Swing</li> <li>▪ 1..4: Pos. 1 .. Pos. 4</li> <li>▪ 10: Swing</li> <li>▪ 11: Swirl</li> </ul>       |
| 4                                   | 5                              | R/W | AC unit Temperature Setpoint <sup>1,2,3</sup> <ul style="list-style-type: none"> <li>▪ -32768 (Initialization value)</li> <li>▪ 16..30°C (°C/x10°C)</li> <li>▪ 61..86°F</li> </ul>   |
| 5                                   | 6                              | R   | AC unit Temperature reference <sup>1,2,3</sup> <ul style="list-style-type: none"> <li>▪ -32768 (Initialization value)</li> <li>▪ 10..38°C (°C/x10°C)</li> <li>▪ 50..100°F</li> </ul> |
| 6                                   | 7                              | R/W | Window Contact <ul style="list-style-type: none"> <li>▪ 0: Closed (Default)</li> <li>▪ 1: Open</li> </ul>  |

<sup>1</sup> Available values will depend on the AC unit mode. Check the AC unit model functions in its user manual to know the possible values for this register.

<sup>2</sup> Magnitude for this register can be adjusted to Celsius x 1°C, Celsius x 10°C (default) or Fahrenheit. See section 4.2.3 for more information.

<sup>3</sup> It is not possible turn to x10 the value shown in Fahrenheit.



| Register Address (protocol address) | Register Address (PLC address) | R/W | Description  |
|-------------------------------------|--------------------------------|-----|--|
| 7                                   | 8                              | R/W | INMBSLGE001R000 Disablement <sup>4</sup> <ul style="list-style-type: none"> <li>0: INMBSLGE001R000 enabled (Default)</li> <li>1: INMBSLGE001R000 disabled</li> </ul>   |
| 8                                   | 9                              | R/W | AC Remote Control Disablement <sup>4</sup> <ul style="list-style-type: none"> <li>0: Remote Controller enabled (Default)</li> <li>1: Remote Controller disabled</li> </ul>   |
| 9                                   | 10                             | R/W | AC unit Operation Time <sup>4</sup> <ul style="list-style-type: none"> <li>0..65535 (hours). Counts the time the AC unit is in "On" state.</li> </ul>  |
| 10                                  | 11                             | R   | AC unit Alarm Status <ul style="list-style-type: none"> <li>0: No alarm condition</li> <li>1: Alarm condition</li> </ul>   |
| 11                                  | 12                             | R   | Error Code <sup>5</sup> <ul style="list-style-type: none"> <li>0: No error present</li> <li>65535(-1 if it is read as signed value): Error in the communication of INMBSLGE001R000 or Remote Controller with the AC unit.</li> <li>If any error is present, see the table at the end of this document.</li> </ul>                              |
| 22                                  | 23                             | R/W | Indoor unit's ambient temperature from external sensor (at Modbus side) <sup>1,2,3,6</sup> <ul style="list-style-type: none"> <li>-32768: (Initialization value). No temperature is being provided from an external sensor.</li> <li>Any from Manufacturer: (°C/x10°C/°F)</li> </ul>   |
| 23                                  | 24                             | R   | AC Real setpoint temperature <sup>1,2,3,6</sup> <ul style="list-style-type: none"> <li>When no external temperature is provided, this read-only register will have the same value as register 5 (PLC addressing). In all cases, it will show the current setpoint in the indoor unit.</li> <li>Any from Manufacturer: (°C/x10°C/°F)</li> </ul> |
| 24                                  | 25                             | R   | Current AC max setpoint <sup>1,2,3</sup> <ul style="list-style-type: none"> <li>-32768 (Initialization value)</li> <li>Any from Manufacturer: (°C/x10°C/°F)</li> </ul>   |
| 25                                  | 26                             | R   | Current AC min setpoint <sup>1,2,3</sup> <ul style="list-style-type: none"> <li>-32768 (Initialization value)</li> <li>Any from Manufacturer: (°C/x10°C/°F)</li> </ul>   |
| 26                                  | 27                             | R/W | AC unit Left/Right Vane Position <sup>1</sup> <ul style="list-style-type: none"> <li>0: Auto (Default)</li> <li>1..9: Pos. 1 .. Pos. 9</li> <li>10: Swing</li> </ul>   |
| 27                                  | 28                             | R/W | Up/Down Vane Position <ul style="list-style-type: none"> <li>1: Pulse</li> </ul>   |
| 31                                  | 32                             | R   | Status (feedback) <ul style="list-style-type: none"> <li>0: Not active (Default value)</li> <li>1: Active (A window is open)</li> </ul>  |
| 53                                  | 54                             | R   | Compressor Status <ul style="list-style-type: none"> <li>0: Off</li> <li>1: To Off</li> <li>2: To On</li> <li>3: On</li> </ul>   |

<sup>4</sup> This value is stored in non-volatile memory

<sup>5</sup> See section 7 for possible error codes and their explanation

<sup>6</sup> See section 4.2.3 for more information

| Register Address (protocol address) | Register Address (PLC address) | R/W | Description  |
|-------------------------------------|--------------------------------|-----|--|
| 54                                  | 55                             | R/W | Compressor on Time <sup>4</sup> <ul style="list-style-type: none"> <li>0..65535 (hours). Counts the time the Compressor is in "On" state.</li> </ul>                             |
| 65                                  | 66                             | R   | Input Ref. Temperature (feedback) <sup>1,2,3</sup> <ul style="list-style-type: none"> <li>-32768 (Initialization value)</li> <li>Any from Manufacturer: (°C/x10°C/°F)</li> </ul> |
| 97                                  | 98                             | R/W | Block Periodic Sendings <sup>4,7,8</sup> <ul style="list-style-type: none"> <li>0: Non-blocked (Default value)</li> <li>1: Blocked</li> </ul>                                    |
| 98                                  | 99                             | R/W | Master/Slave (gateway's role) <ul style="list-style-type: none"> <li>0: Slave</li> <li>1: Master</li> </ul>  |

#### 4.2.2 Configuration Registers

| Register Address (protocol address) | Register Address (PLC address) | R/W | Description   |
|-------------------------------------|--------------------------------|-----|---|
| 13                                  | 14                             | R/W | "Open Window" switch-off timeout <sup>9</sup> <ul style="list-style-type: none"> <li>0..30 (minutes)</li> <li>Factory setting: 30 (minutes)</li> </ul>  |
| 14                                  | 15                             | R   | Modbus RTU baud-rate <ul style="list-style-type: none"> <li>2400bps</li> <li>4800bps</li> <li>9600bps (Default)</li> <li>19200bps</li> <li>38400bps</li> <li>57600bps</li> <li>76800bps</li> <li>115200bps</li> </ul> |
| 15                                  | 16                             | R   | Modbus Slave Address <ul style="list-style-type: none"> <li>1..63</li> </ul>  |
| 21                                  | 22                             | R   | Max number of fan speeds  |
| 48                                  | 49                             | R   | Switch value  |
| 49                                  | 50                             | R   | Device ID: 0x1000   |
| 50                                  | 51                             | R   | Software version  |
| 99                                  | 100                            | R/W | Reset <ul style="list-style-type: none"> <li>1:Reset</li> </ul>   |

<sup>7</sup> If the register is configured as "0:Non-blocked", all commands received from Modbus will be sent to the AC system. If "1: Blocked", commands from Modbus will only be sent to the AC system if they differ from the previous value.

<sup>8</sup> This register applies to firmware version 1.7 onwards

<sup>9</sup> Once window contact is open, a count-down to switch off the AC Unit will start from this configured value.

### 4.2.3 Considerations on Temperature Registers

- **AC unit temperature setpoint (R/W)**  
(register 4 – in Protocol address / register 5 – in PLC address):  
This is the adjustable temperature setpoint value that must be required by the user. This register can be read (Modbus function 3 or 4) or written (Modbus functions 6 or 16). A remote controller connected to the LG indoor unit will report the same temperature setpoint value as this register, but only will happen when no AC unit's external reference is provided from INMBSLGE001R000 (see detail for register 22/23 below).
- **AC unit temperature reference (R)**  
(register 5 – in Protocol address / register 6 – in PLC address):  
This register reports the temperature that is currently used by the LG indoor unit as the reference of its own control loop. Depending on the configuration of the indoor unit, this value can be the temperature reported by the sensor on the return path of the LG indoor unit or the sensor of its remote controller. It is a read-only register (Modbus functions 3 or 4).
- **AC unit external temperature reference (Modbus) (R/W)**  
(register 22 – in Protocol address / register 23 – in PLC address):  
This register allows us to provide an external temperature's sensor from the Modbus side. LG indoor unit does not allow on devices like INMBSLGE001R000 to provide directly temperature to be used as a reference of the control loop of the AC indoor unit. In order to overcome this limitation and enable the usage of an external temperature sensor (i.e. from Modbus side), INMBSLGE001R000 applies the following mechanism (only if "external temperature's reference" is being used):
  - After a couple of values have been entered in the "AC unit external temperature's reference" (register 22/23) and "AC unit temperature set point" (register 4/5), INMBSLGE001R000 is going to estimate the temperature chosen implied (e.g. if a "temperature setpoint (register 4/5)" of **22°C**, and an "external temperature reference (register 22/23)" of **20°C** are entered, INMBSLGE001R000 will assume that the user is demanding a **+2°C** increase in temperature).
  - By knowing at any time the ambient temperature currently used by the indoor unit to control its own operation (register 5/6), INMBSLGE001R000 can calculate the required temperature setpoint needed to apply the decrease/increase on the real temperature and reach the temperature chosen by the user (following the example above, if INMBSLGE001R000 reads an "ambient temperature" (register 5/6) of **24°C** in the indoor unit, it will apply a final setpoint of **24°C + 2°C = 26°C**).
  - At this moment, each time that INMBSLGE001R000 detects a change on the ambient temperature reported by the indoor unit (register 5/6), it will also change the required setpoint, in order to keep the temperature required by the user at any time. If we follow the last example, if INMBSLGE001R000 receives a new temperature's value coming from the indoor unit of **25°C**, INMBSLGE001R000 will automatically adjust the temperature setpoint required of the AC indoor unit to **25°C + 2°C = 27°C**).
  - In general, INMBSLGE001R000 is constantly applying the "Virtual Temperature" formula:

$$S_{AC} = S_u - (T_u - T_{AC})$$

Where:

- $S_{AC}$  - setpoint value currently applied to the indoor unit
- $S_u$  - setpoint value written at Modbus side (register 4/5)
- $T_u$  - external temperature reference written at Modbus side (register 22/23)
- $T_{AC}$  - ambient temperature that the indoor unit is using as the reference of its own control loop (register 5/6)

When INMBSLGE001R000 detects a change in any of the values of  $\{ S_u, T_u, T_{AC} \}$ , it will send the new setpoint ( $S_{AC}$ ) to the indoor unit.

- After the startup, the value for "external temperature's reference" (register 22/23) has a value -32768 (0x8000). This value means that no external temperature reference is being provided through INMBSLGE001R000. In this scenario, the setpoint value shown in register 4/5 will always be the same as the current setpoint value of the indoor unit. AC indoor unit will use its own return path temperature sensor as reference for its control loop.
  - When the mechanism of "Virtual Temperature" is applied. The temperature setpoint's value shown by the Remote Controller or other Control System from LG connected to the indoor unit may show a different value from the value shown in register 4/5.
  - If it is desired to use the temperature's reading from the Remote Control as the reference temperature for the Indoor Unit ( $T_{AC}$ ), the Remote Controller must be configured as Master, and the LG AC indoor unit must have the option "thermostat sensor in the Remote Controller" activated. This configuration is done via a LG Remote Controller connected to the indoor unit and must be done by LG authorized installers while the AC is being installed.
  - When INMBSLGE001R000 is set as "Master" of the BYR bus and the LG AC Indoor unit has the option "thermostat sensor in the Remote Controller" activated. The external temperature's sensor connected to Modbus RTU EIA-485 network provides directly the value currently applied to the indoor unit ( $S_{AC}$ ), and the process of the Virtual temperature is not applied. In this case, the Remote Controller or any other Control System connected from LG is not able to send the external temperature reference's value to the register 22/23.
- **AC Real Setpoint temperature (R)**  
(register 23 – In Protocol address / register 24 – in PLC address):

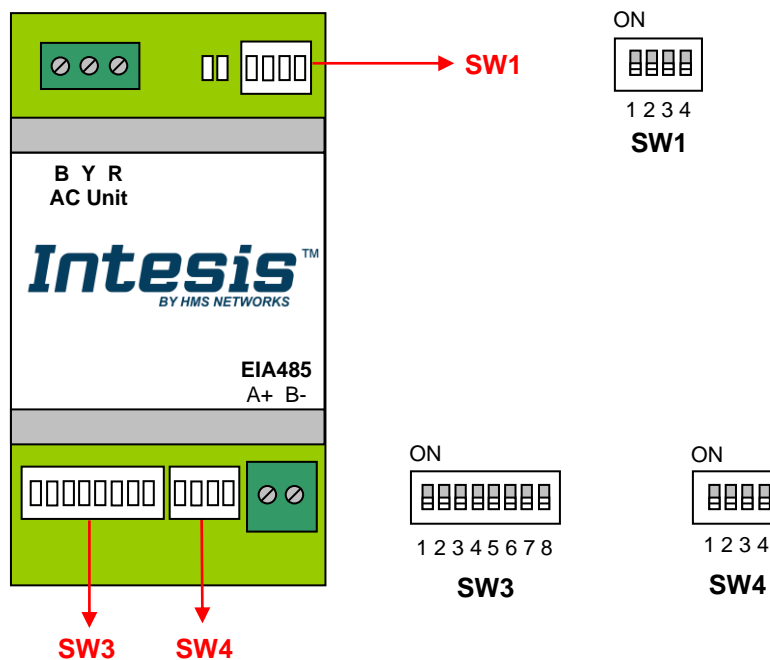
As it has been detailed on the previous point, the real temperature setpoint in the indoor unit and the temperature setpoint requested from INMBSLGE001R000 might differ (when a value in register 22/23 – "external temperature reference" is entered). This register always informs about the current temperature setpoint which is being used by the indoor unit – it also includes the temperature setpoint that will be shown by an additional remote controller from LG connected to the indoor unit, if it is present on the system.

Moreover, notice that temperature's values of all these four registers are expressed according to the temperature's format configured through its onboard DIP-Switches (See "4.3 - DIP-switch Configuration Interface"). These following formats are possible:

- **Celsius value:** Value in Modbus register is the temperature value in Celsius (i.e. a value "22" in the Modbus register must be interpreted as 22°C).
- **Decicelsius value:** Value in Modbus register is the temperature value in decicelsius (i.e. a value "220" in the Modbus register must be interpreted as 22.0°C).
- **Fahrenheit value:** Value in Modbus register is the temperature value in Fahrenheit (i.e. a value "72" in the Modbus register must be interpreted as 72°F (~22°C)).

### 4.3 DIP-switch Configuration Interface

All the configuration values on INMBSLGE001R000 can be written and read from Modbus interface. Otherwise, some of them can also be setup from its on-board DIP-switch interface. The device has DIP-switches SW1, SW3 and SW4 on the following locations:







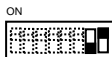











The following tables apply to the interface's configuration through DIP-switches:

#### SW1 – AC indoor unit's features

| SW1-P1..4 | Description  |
|-----------|--|
|           | Slave - A LG Controller must be present in BYR bus, configured as Master (Default value)   |
|           | Master - LG Controller not needed in BYR bus. If it exists, it must be configured as Slave |
|           | Error Type_B - Machine must be Type B (Default value)                                      |
|           | Error Type_A - Machine must be Type A  |
|           | Min. ambient temperature not applied (Default value)                                       |
|           | Min. ambient temperature applied   |
|           | Keep the switch into this position (Default value)   |
|           | Do not turn the switch into this position (not applicable)                                 |







**Table 4.1** SW1: AC indoor unit 's features

**SW3/SW4** – Baud rate configuration

| SW3-P7..8  | SW4-P3   | Description             |
|--|--|-------------------------|
|   |   | 2400bps                 |
|   |   | 4800bps                 |
|   |   | 9600bps (Default value) |
|   |   | 19200bps                |
|   |   | 38400bps                |
|   |   | 57600bps                |
|   |   | 76800bps                |
|  |  | 115200bps               |

**Table 4.2** SW3-SW4: Modbus baud rate

**SW4** – Degrees/Decidegrees (x10), temperature magnitude (°C/°F) and EIA-485 termination resistor.

| SW4-P1..2-4   | Description  |
|---|--|
|  | Temperature values in Modbus register are represented in degrees (x1) (Default value)    |
|  | Temperature values in Modbus register are represented in decidegrees (x10)               |
|  | Temperature values in Modbus register are represented in Celsius degrees (Default value) |
|  | Temperature values in Modbus register are represented in Fahrenheit degrees              |
|  | EIA-485 bus without termination resistor (Default value)                                 |
|  | Internal termination resistor of 120Ω connected to EIA-485 bus                           |

**Table 4.3** SW4: Temperature and termination resistor configuration

SW3 – Modbus Slave address

| Add | SW3-P1..6 | Add | SW3-P1..6 | Add | SW3-P1..6 | Add | SW3-P1..6 | Add | SW3-P1..6 |
|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|
| 0   |           | 13  |           | 26  |           | 39  |           | 52  |           |
| 1   |           | 14  |           | 27  |           | 40  |           | 53  |           |
| 2   |           | 15  |           | 28  |           | 41  |           | 54  |           |
| 3   |           | 16  |           | 29  |           | 42  |           | 55  |           |
| 4   |           | 17  |           | 30  |           | 43  |           | 56  |           |
| 5   |           | 18  |           | 31  |           | 44  |           | 57  |           |
| 6   |           | 19  |           | 32  |           | 45  |           | 58  |           |
| 7   |           | 20  |           | 33  |           | 46  |           | 59  |           |
| 8   |           | 21  |           | 34  |           | 47  |           | 60  |           |
| 9   |           | 22  |           | 35  |           | 48  |           | 61  |           |
| 10  |           | 23  |           | 36  |           | 49  |           | 62  |           |
| 11  |           | 24  |           | 37  |           | 50  |           | 63  |           |
| 12  |           | 25  |           | 38  |           | 51  |           |     |           |

Table 4.4 SW3: Modbus slave address



## 4.4 Implemented Functions

INMBSLGE001R000 implements the following standard Modbus functions:

- 3: Read Holding Registers
- 4: Read Input Registers
- 6: Write Single Register
- 16: Write Multiple Registers (Despite this function is allowed, the interface does not allow to write operations on more than 1 register with the same request, this means that length field should be always be 1 when this function is being used in case of writing)

## 4.5 Device LED indicator

The device includes two LED indicators to show all the possible operational states. In the following table there are written the indicators which can be performed and their meaning.

### L1 (green LED)

| Device status               | LED indication | ON / OFF Period       | Description  |
|-----------------------------|----------------|-----------------------|--|
| During not normal operation | LED blinking   | 500ms ON / 500ms OFF  | Communication error                                |
| During normal operation     | LED flashing   | 100ms ON / 1900ms OFF | Normal operation (configured and working properly) |

### L2 (red LED)

| Device status               | LED indication | ON / OFF Period   | Description   |
|-----------------------------|----------------|-------------------|---------------|
| During not normal operation | LED Pulse      | 3sec ON / --- OFF | Under voltage |

### L1 (green LED) & L2 (red LED)

| Device status               | LED indication             | ON / OFF Period      | Description           |
|-----------------------------|----------------------------|----------------------|-----------------------|
| During normal operation     | LED Pulse                  | 5sec ON / --- OFF    | Device Start-up       |
| During not normal operation | LED alternatively blinking | 500ms ON / 500ms OFF | Flash checksum not OK |

#### **4.6 EIA-485 bus. Termination resistors and Fail-Safe Biasing mechanism**

EIA-485 bus requires a 120Ω terminator resistor at each end of the bus to avoid signal reflections.

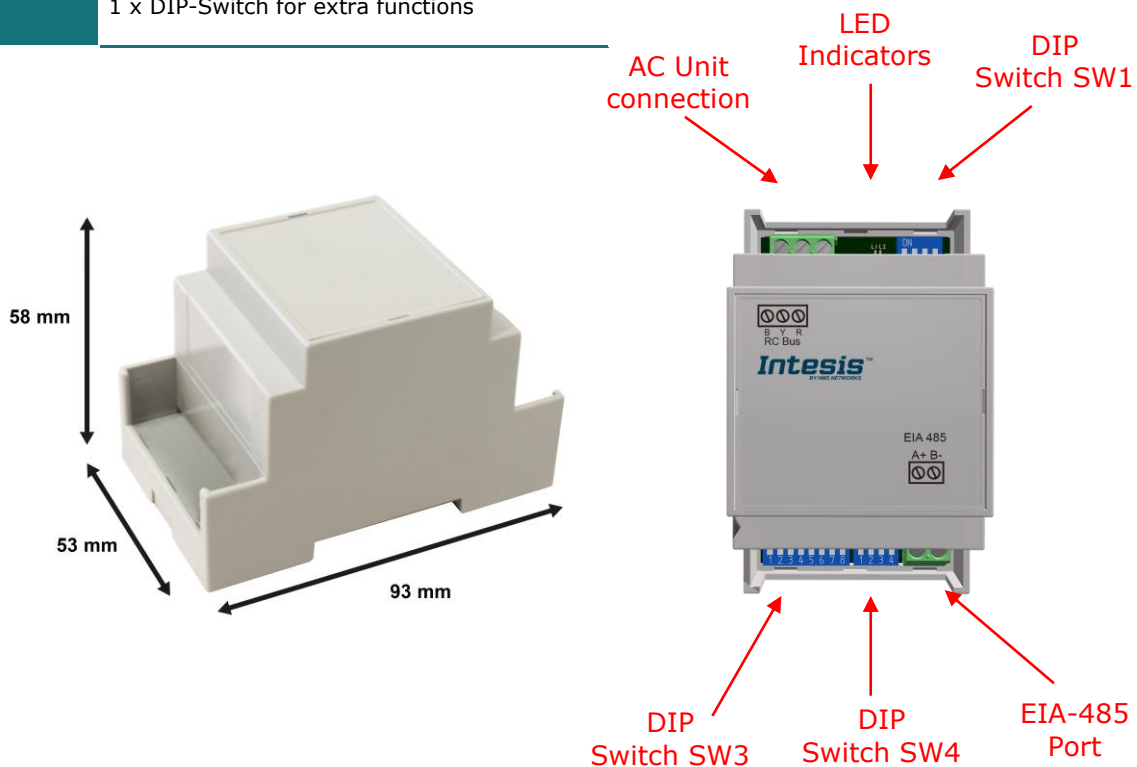
In order to prevent fail status detected by the receivers, which are "*listening*" the bus, when all the transmitters' outputs are in three-state (high impedance), it is also required a fail-safe biasing mechanism. This mechanism provides a safe status (a correct voltage level) in the bus when all the transmitters' outputs are in three-state. This mechanism must be supplied by the Modbus Master.

The INMBSLGE001R000 device includes an on-board terminator resistor of 120Ω that can be connected to the EIA-485 bus by using DIP-switch SW4.

Some Modbus RTU EIA-485 Master devices can provide also internal 120Ω terminator resistor and/or fail-safe biasing mechanism (Check the technical documentation of the Master device connected to the EIA-485 network in each case).

### 5. Mechanical and electrical features

|   |  |                       |                                      |
|---|--|-----------------------|--------------------------------------|
| Enclosure                                 | Plastic, type PC (UL 94 V-0)<br>Net dimensions (dxwxh):<br>93 x 53 x 58 mm / 3.7" x 2.1" x 2.3"<br>Color: Light Grey. RAL 7035   | Operation Temperature | 0°C to +60°C                         |
| Weight                                    | 85 g.  | Stock Temperature     | -20°C to +85°C                       |
| Mounting                                  | Wall<br>DIN rail EN60715 TH35.   | Operational Humidity  | <95% RH, non-condensing              |
| Terminal Wiring (for low-voltage signals) | For terminal: solid wires or stranded wires (twisted or with ferrule)<br>1 core: 0.5mm <sup>2</sup> ... 2.5mm <sup>2</sup><br>2 cores: 0.5mm <sup>2</sup> ... 1.5mm <sup>2</sup><br>3 cores: not permitted | Stock Humidity        | <95% RH, non-condensing              |
| Modbus RTU port                           | 1 x Serial EIA485 Plug-in screw terminal block (2 poles):<br>A, B<br>Compatible with Modbus RTU EIA-485 networks   | Isolation voltage     | 1500 VDC                             |
| AC unit port                              | 1 x BYR bus Plug-in screw terminal block (3 poles):<br>B, Y, R<br>Compatible with LG networks  | Isolation resistance  | 1000 MΩ                              |
| Switch 1 (SW1)                            | 1 x DIP-Switch for AC features   | Protection            | IP20 (IEC60529)                      |
| Switch 3 (SW3)                            | 1 x DIP-Switch for Modbus RTU settings   | LED indicators        | 2 x Onboard LED - Operational status |
| Switch 4 (SW4)                            | 1 x DIP-Switch for extra functions   |                       |                                      |



## **6. List of supported AC Unit Types.**

A list of LG indoor unit model's references compatible with INMBSLGE001R000 and its available features can be found on this link:

[https://www.intesis.com/docs/compatibilities/inxxxlqe001r000\\_compatibility](https://www.intesis.com/docs/compatibilities/inxxxlqe001r000_compatibility)

## 7. Error Codes

| Error Code Modbus | Remote Controller Error | Error description   |
|-------------------|-------------------------|---|
| 0                 | N/A                     | No active error   |
| 1                 | 1                       | Room air sensor fault   |
| 2                 | 2                       | Indoor unit pipe in sensor fault                                    |
| 3                 | 3                       | Communication fault between wired remote controller and indoor unit |
| 4                 | 4                       | Drain pump fault  |
| 5                 | 5                       | Communication fault between indoor unit and outdoor unit            |
| 6                 | 6                       | Indoor unit pipe out sensor fault                                   |
| 7                 | 7                       | Indoor unit mode runs on opposite to outdoor unit                   |
| 8                 | 8                       | N/A   |
| 9                 | 9                       | EEPROM memory fault   |
| 10                | 10                      | BLDC motor signal fault or motor lock                               |
| 11                | 11                      | HEX middle point sensor fault                                       |
| 12                | 12                      | heater terminal block sensor fault                                  |
| 13                | 13                      | N/A   |
| 14                | 14                      | N/A   |
| 15                | 15                      | N/A   |
| 16                | 16                      | N/A   |
| 17                | 17                      | Outlet air sensor fault   |
| 18                | 18                      | Return air sensor fault   |
| 19                | 19                      | No communication response from sub PCB to main PCB                  |
| 20                | 20                      | No communication response from main PCB to sub PCB                  |
| 21                | 21                      | IPM fault   |
| 22                | 22                      | AC input is over current (RMS)                                      |
| 23                | 23                      | DC link low or high voltage   |
| 24                | 24                      | High pressure or low pressure switch on                             |
| 25                | 25                      | High/low input voltage  |
| 26                | 26                      | Compressor start failure  |
| 27                | 27                      | PSC/PFC fault   |
| 28                | 28                      | DC link high voltage  |
| 29                | 29                      | Over current at compressor input                                    |
| 32                | 32                      | Discharge temperature is high at inverter compressor                |
| 33                | 33                      | Discharge temperature is high at constant speed compressor          |
| 34                | 34                      | High pressure is too high   |
| 35                | 35                      | Low pressure is too low   |
| 36                | 36                      | Compression ratio is too low  |
| 39                | 39                      | Communication fault between PFC and inverter PCB                    |
| 40                | 40                      | CT sensor fault   |
| 41                | 41                      | Discharge sensor at inverter compressor is fault                    |
| 42                | 42                      | Low pressure sensor is fault  |
| 43                | 43                      | High pressure sensor is fault                                       |
| 44                | 44                      | Air sensor at outdoor unit is fault                                 |
| 45                | 45                      | HEX sensor at outdoor unit is fault                                 |
| 46                | 46                      | Compressor suction sensor is fault                                  |
| 47                | 47                      | Discharge sensor at constant speed compressor is fault              |
| 48                | 48                      | HEX outlet sensor at outdoor unit is fault                          |
| 49                | 49                      | IPM temperature sensor is fault                                     |
| 50                | 50                      | Missing phase among 3 phase   |
| 51                | 51                      | Over combination ratio  |
| 52                | 52                      | No communication from inverter PCB detected at main PCB             |
| 53                | 53                      | Communication fault between indoor and outdoor unit                 |
| 54                | 54                      | Reverse phase is detected   |
| 57                | 57                      | No communication from main PCB detected at inverter PCB             |

|               |     |  |
|---------------|-----|--|
| 59            | 59  | Wrong outdoor unit combination   |
| 60            | 60  | Inverter EEPROM memory fault   |
| 61            | 61  | Outdoor pipe temperature is too high   |
| 62            | 62  | IPM temperature is too high  |
| 65            | 65  | IPM temperature sensor is fault  |
| 67            | 67  | Fan locked or fan start failure  |
| 69            | 69  | CT sensor of constant speed compressor 1 is fault                                    |
| 70            | 70  | CT sensor of constant speed compressor 2 is fault                                    |
| 71            | 71  | PFC CT sensor fault  |
| 72            | 72  | Function error of outdoor 4way valve (reversing valve)                               |
| 73            | 73  | DC peak current is over  |
| 74            | 74  | Unbalance at 3 phase   |
| 75            | 75  | Fan CT sensor fault  |
| 76            | 76  | Fan DC link voltage is high  |
| 77            | 77  | Fan input voltage is high  |
| 78            | 78  | Fan hall sensor fault  |
| 79            | 79  | Fan motor start failure  |
| 86            | 86  | Main PCB EEPROM is fault   |
| 87            | 87  | Fan PCB EEPROM is fault  |
| 88            | 88  | PFC PCB EEPROM is fault  |
| 90            | 90  | Inlet temperature sensor of external PCB is fault                                    |
| 91            | 91  | Outlet temperature sensor of external PCB is fault                                   |
| 104           | 104 | No Communication from slave is detected  |
| 105           | 105 | Communication fault between fan and inverter PCB                                     |
| 106           | 106 | Fan PCB IOM fault  |
| 107           | 107 | Fan DC link voltage is low   |
| 113           | 113 | Liquid pipe sensor fault   |
| 114           | 114 | Sub-cooling inlet pipe sensor fault  |
| 115           | 115 | Sub-cooling outlet pipe sensor fault   |
| 116           | 116 | Oil level sensor fault   |
| 145           | 145 | No communication from external PCB is detected at main PCB                           |
| 151           | 151 | 4 way valve failure  |
| 153           | 153 | Upper HEX sensor fault   |
| 154           | 154 | Bottom HEX sensor fault  |
| 173           | 173 | Over / low current at constant speed compressor 1                                    |
| 174           | 174 | Over / low current at constant speed compressor 2                                    |
| 182           | 182 | Communication fault between main and sub micom in external PCB                       |
| 187           | 187 | Hydro-kit water temperature sensor fault   |
| 190           | 190 | Inverter PCB heat sink temperature is high   |
| 191           | 191 | Inverter PCB heat sink temperature sensor fault                                      |
| 193           | 193 | Fan PCB heat sink temperature is high  |
| 194           | 194 | Fan PCB heat sink temperature sensor fault   |
| 200           | 200 | Auto piping failure  |
| 201           | 201 | Fault at liquid pipe sensor of Heat Recovery (HR) unit                               |
| 202           | 202 | Fault at sub-cooling inlet pipe sensor of Heat Recovery (HR) unit                    |
| 203           | 203 | Fault at sub-cooling outlet pipe sensor of Heat Recovery (HR) unit                   |
| 204           | 204 | No communication from outdoor unit is detected at the Heat Recovery (HR) unit        |
| 205           | 205 | HR unit addresses are duplicated   |
| 237           | 237 | No response from outdoor unit modem at indoor unit modem                             |
| 238           | 238 | No response from outdoor unit at outdoor unit modem                                  |
| 65535<br>(-1) | N/A | Error in the communication of INMBSLGE001R000 or Remote Controller with the AC unit. |

In case to detect an error code not listed, contact your closest LG technical support service.