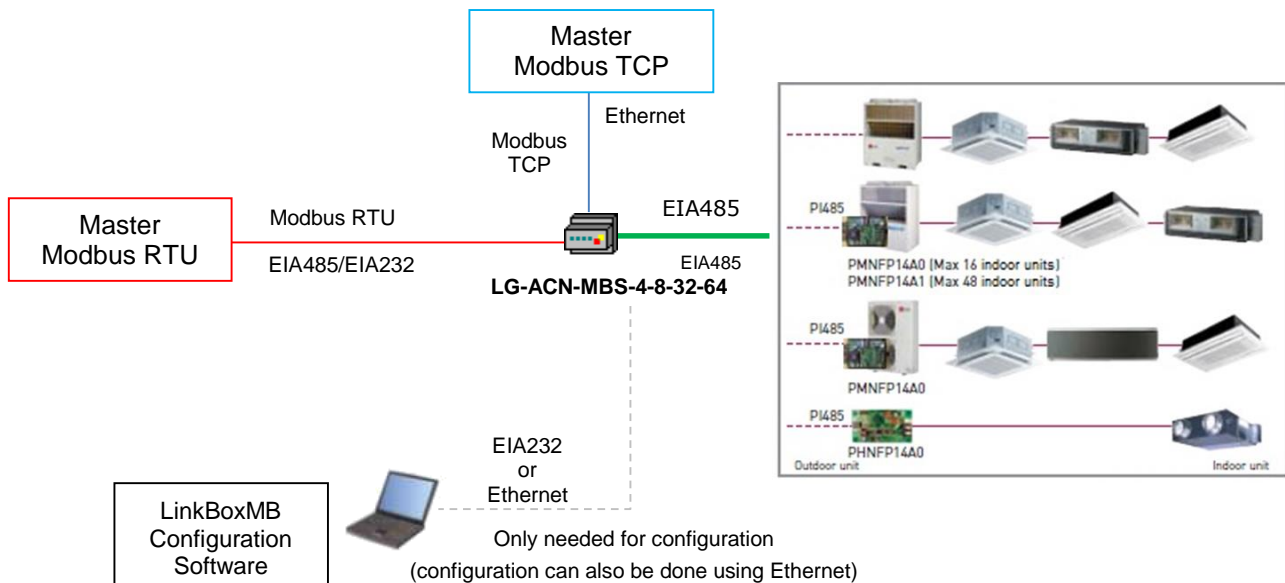




# IntesisBox<sup>®</sup>

## Modbus Server – LG Air Conditioners

**Gateway for monitoring and control of LG compatible Air Conditioning Systems from any Modbus master device TCP or RTU (BMS, PLC, SCADA, HMI, TouchPanel...)**



*This integration requires the LG AC system being equipped with the LG PI485 interface or the proper connector in the Outdoor Units. There are four models available: LG-AC-MBS-4, with capacity of up to 4 indoor units, LG-AC-MBS-8, with capacity of up to 8 indoor units, LG-AC-MBS-16, with capacity of up to 16 indoor units and LG-AC-MBS-64, with capacity of up to 64 indoor units. Contact your nearest LG AC Systems distributor for details. More details about the PI485 interface and the AC specs.*

**IntesisBox<sup>®</sup> can talk to up to 64 Indoor Units interfaces using LG's EIA485 protocol and offers the signals of all indoor units connected each of them through its Modbus slave interface, each signal in a predefined fixed Modbus address.**

**The Modbus interface of IntesisBox can be freely configured as RTU EIA232, RTU EIA485 or TCP.**

**IntesisBox Modbus Server series are configured using LinkBoxMB, a software tool for Windows<sup>™</sup> supplied along with the purchase of IntesisBox with no additional cost. With the standard installation of LinkBoxMB, a Demo project for integration of several devices is also installed, using this demo project makes the engineering needed for this integration easy and quick, almost plug&play.**

## 1. IntesisBox capacity

Element	Max.	Notes
Number of indoor units	64 *	Maximum number AC indoor units that can be controlled
Number of variables per indoor unit	20	Modbus addresses
Maximum number of variables	2.624 *	Modbus addresses

\*There are different models of *IntesisBox Modbus Server – LG AC* each with different capacity. The table above shows the capacity for the top model (with maximum capacity).

Their order codes are:

- Model supporting up to 4 LG indoor units. *Ref.: LG-AC-MBS-4*
- Model supporting up to 8 LG indoor units. *Ref.: LG-AC-MBS-8*
- Model supporting up to 32 LG indoor units. *Ref.: LG-AC-MBS-32*
- Model supporting up to 64 LG indoor units. *Ref.: LG-AC-MBS-64*

## 2. Modbus interface of IntesisBox

<b>General</b>	
Max. Number of LG interfaces	There 4 different versions of IntesisBox, supporting a maximum 64, 32, 8 or 4 indoor units respectively.
Virtual signals	One communication error virtual signal per every single Outdoor Unit in the system. This virtual signal is available from Modbus.
<b>Modbus interface</b>	
Device type	Slave.
Modbus modes supported	TCP, RTU EIA232 or EIA485.
Modbus TCP configuration parameters	<ul style="list-style-type: none"> <li>• IP address.</li> <li>• Subnet mask.</li> <li>• Default gateway address.</li> <li>• TCP port.</li> </ul>
Modbus RTU configuration parameters	<ul style="list-style-type: none"> <li>• EIA232/EIA485.</li> <li>• Baud rate.</li> <li>• Parity.</li> <li>• Slave number.</li> </ul>
<b>Points</b>	
Configuration	<p>AC system related fields.</p> <ul style="list-style-type: none"> <li>• Indoor unit main address: Main Address of the indoor each AC indoor unit Modbus memory block relates to.</li> </ul>
Supported Modbus function codes	<p>Read functions:</p> <ul style="list-style-type: none"> <li>• 3- Read holding registers.</li> <li>• 4- Read input registers.</li> </ul> <p>Write functions:</p> <ul style="list-style-type: none"> <li>• 6- Write single register.</li> <li>• 16- Write multiple holding register.</li> </ul> <p><i>If poll records are used to read/write multiple records, the range of addresses requested must contain valid addresses, otherwise the corresponding Modbus error code will be responded.</i></p>
Modbus data coding	All the point's values are coded in 2 byte registers (even if their possible values are 0 and 1). They are expressed in MSB..LSB format (big endian)

## 2.1 Modbus Signals Table

Property	Signal type (R/W)	Description / Status
<b>On / Off</b>	R/W	<b>Start/Stop AC/VENT Unit</b> 0 – OFF, 1 – ON
<b>Mode</b>	R/W	<b>AC Mode</b> 0 – COOL, 1 – HEAT, 2 – DRY, 3 – FAN, 4 – AUTO  <b>Mode (VENT unit)</b> 0 – NORMAL, 1 – HEAT EXCHANGE, 2 – AUTO
<b>Mode::Cool</b>	R/W	0 – Inactive, 1 – Active
<b>Mode::Heat</b>	R/W	0 – Inactive, 1 – Active
<b>Mode::Dry</b>	R/W	0 – Inactive, 1 – Active
<b>Mode::Fan</b>	R/W	0 – Inactive, 1 – Active
<b>Mode::Auto</b>	R/W	0 – Inactive, 1 – Active
<b>Setpoint Temperature</b>	R/W	<b>Temperature Set Point</b> (only integer numbers allowed) 16..30 °C  <b>(This parameter is not applicable for VENT units)</b>
<b>Ambient Temperature</b>	R	<b>Ambient Temperature (only integer numbers)</b> Read: 10°C to 40°C  <b>(This parameter is not applicable for VENT units)</b>
<b>Swing</b>	R/W	<b>AC Swing</b> 0 – Stop, 1 – Start  <b>(This parameter is not applicable for VENT units)</b>
<b>Fan Speed</b>	R/W	<b>AC Fan Speed</b> 0 – AUTO, 1 – LOW, 2 – MID, 3 – HIGH
<b>FanSpeed::Auto</b>	R/W	0 – Inactive, 1 – Active
<b>FanSpeed::Low</b>	R/W	0 – Inactive, 1 – Active
<b>FanSpeed::Mid</b>	R/W	0 – Inactive, 1 – Active
<b>FanSpeed::High</b>	R/W	0 – Inactive, 1 – Active
<b>Remote Restriction</b>	R/W	<b>Remote Control Enablement / Disablement</b> 0 – Remote control enabled, 1 – Remote control disabled
<b>Error Sign</b>	R/W	<b>Error Code / Communication error with the Indoor Unit</b> 0 – No error present, 1 – Error code present, or communication error with the indoor unit
<b>Error Code</b>	R/W	<b>Error Code</b> More info in User Manual
<b>Filter Alarm</b>	R/W	<b>Filter Alarm Status</b> 0 – No alarm, 1 – Filter alarm present  <b>(This parameter is not applicable for AC units)</b>
<b>Filter Alarm Reset</b>	W	<b>Filter Alarm Reset</b> Write: 1 – Filter alarm reset  <b>(This parameter is not applicable for AC units)</b>

### 3. Configuration tool

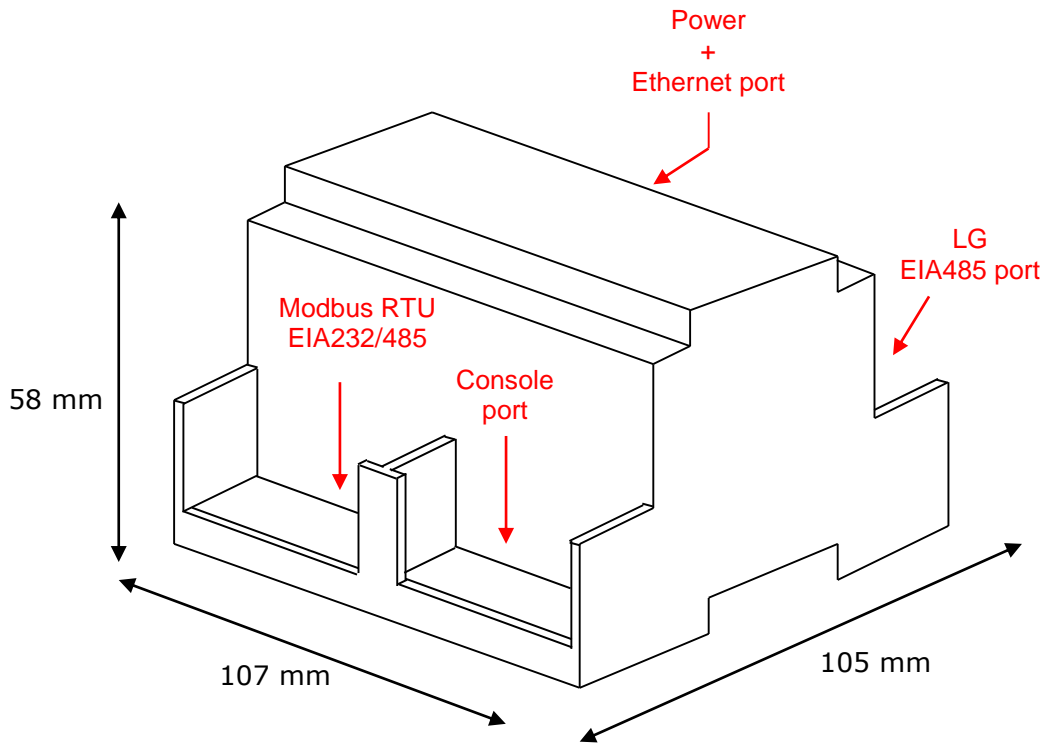
LinkBoxMB	<ul style="list-style-type: none"><li>• Visual engineering tool, ease of use, for gateway's configuration and supervision compatible with Microsoft Windows operating systems, supplied with the gateway free of charge.</li><li>• Multi-window tool allowing to supervise simultaneously the communication activity with both protocols (systems), real time values for all the signals allowing to modify any value (very useful for test purposes), console window showing debug and working status messages, and configuration windows to configure all the gateway's parameters and signals.</li><li>• Signals configuration in plain text files (tab separated) for easy and quick configuration using Microsoft Excel (very useful in projects with a lot of points).</li><li>• Allows configuring the gateway's parameters and signals while in off-line (not connected to the gateway).</li><li>• Connection to the gateway for download the configuration and supervision by using serial COM port of the PC (serial cable supplied with the gateway) or thorough Ethernet connection.</li><li>• Allows configuring all the external protocols available for IntesisBox® Modbus Server series.</li><li>• Upgrades for this software tool available free of charge whenever a new protocol is added to the IntesisBox® Modbus Server series.</li><li>• Multi-project tool allowing having in the engineer's PC the configuration for all the sites with different IntesisBox® Modbus Server series gateways.</li><li>• Multi-language tool, all the language-dependent strings are in a plain text file (tab separated) for easy modification or addition of new languages.</li></ul>
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## 4. Mechanical & Electrical characteristics

Enclosure	Plastic, type PC (UL 94 V-0). Dimensions: 107mm x 105mm x 58mm.
Color	Light Grey. RAL 7035.
Power	9 to 30Vdc +/-10%, Max.: 125mA. 24Vac +/-10% 50-60Hz, Max.: 127mA Must use a NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply. Plug-in terminal block for power connection (2 poles).
Terminal wiring (for power supply and low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.5mm <sup>2</sup> ... 2.5mm <sup>2</sup> 2 cores: 0.5mm <sup>2</sup> ... 1.5mm <sup>2</sup> 3 cores: not permitted
Mounting	Wall. DIN rail EN60715 TH35.
Modbus TCP port	1 x Ethernet 100Base-T (RJ45).
Modbus RTU ports	1 x Serial EIA232 (DB9 male DTE). SELV 1 x Serial EIA485 (Plug-in screw terminal block 2 poles). SELV
LG AC port	1 x EIA485. Plug-in screw terminal block (2 poles). SELV
LED indicators	1 x Power. 2 x Serial port Modbus RTU activity (Tx, Rx). 2 x Serial port LG AC activity (Tx, Rx). 2 x Ethernet port Modbus TCP link and activity (LNK, ACT).
Console port	EIA232. DB9 female connector (DCE). SELV
Configuration	Via console port. <sup>1</sup>
Firmware	Allows upgrades via console port.
Operational temperature	0°C to +70°C
Operational humidity	5% to 95%, non-condensing
Protection	IP20 (IEC60529).
RoHS conformity	Compliant with RoHS directive (2002/95/CE).
Norms and standards	CE conformity to EMC directive (2004/108/EC) and Low-voltage directive (2006/95/EC) EN 61000-6-2 EN 61000-6-3 EN 60950-1 EN 50491-3

<sup>1</sup> Along with the device it is also supplied a standard DB9 male - DB9 female 1.8 m. cable for configuring and monitoring the device using a PC via serial COM port. The configuration software, compatible with MS Windows® operating systems, is also supplied.

### 5. Dimensions



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

