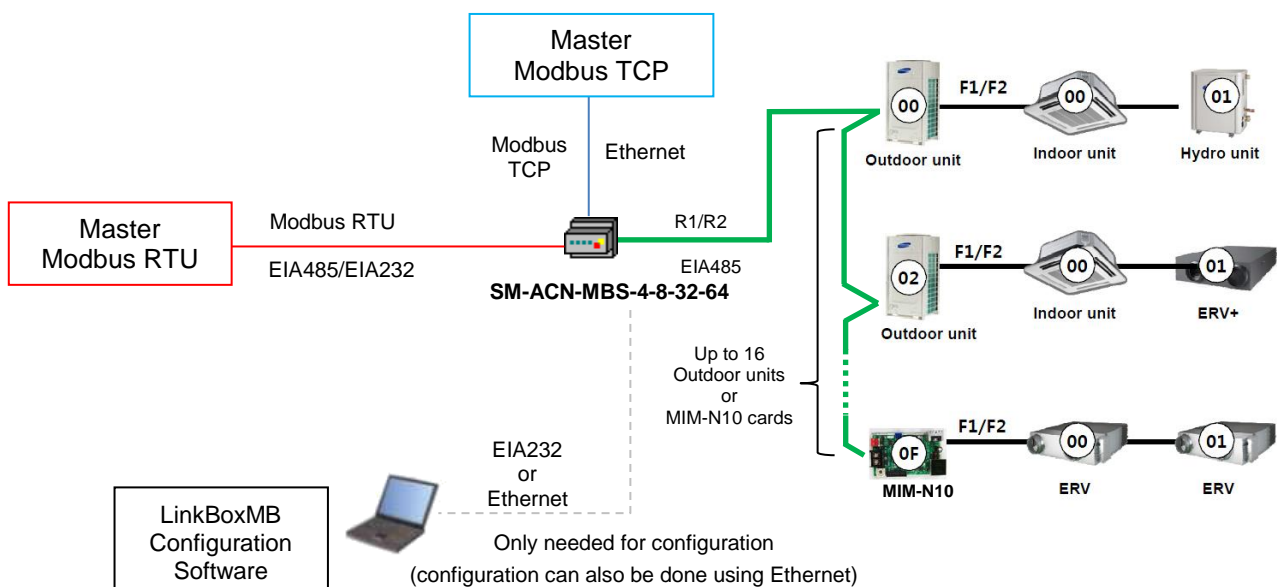# IntesisBox®

Modbus Server – SAMSUNG Air Conditioners

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

This integration requires the Samsung AC system being equipped with the Samsung MIM-N10 or the R1/R2 connector in the Outdoor Units. Samsung AC's system supports up to 16 outdoor units – all of them can be integrated with IntesisBox, allowing a maximum of 4 indoor units (SM-ACN-MBS-4), 8 indoor units (SM-ACN-MBS-8), 32 indoor units (SM-AC-MBS-32) or 64 indoor units (SM-AC-MBS-64) to be integrated. MIM-N10 is supplied by Samsung. Contact your nearest Samsung AC Systems distributor for details.

IntesisBox® can *talk* to up to 16 Outdoor units interfaces using Samsung's RS485 protocol (R1/R2 connector) 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 RS232, RTU RS485 or TCP.

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

Intesis

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1.   IntesisBox capacity

Element	Max.	Notes
Number of Outdoor Units or MIM interfaces	16	Maximum number of MIM interfaces or Outdoor Units that a Samsung AC system supports
Number of indoor units	64 *	Maximum number AC indoor units that can be controlled
Number of variables per indoor unit	21	Modbus addresses
Number of variables per outdoor unit	1	Modbus addresses
Maximum number of variables	1.360 *	Modbus addresses

*There are different models of *IntesisBox Modbus Server – SAMSUNG 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 Samsung indoor units. *Ref.: SM-ACN-MBS-4*
- Model supporting up to 8 Samsung indoor units. *Ref.: SM-ACN-MBS-8*
- Model supporting up to 32 Samsung indoor units. *Ref.: SM-ACN-MBS-32*
- Model supporting up to 64 Samsung indoor units. *Ref.: SM-ACN-MBS-64*

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2.   Modbus interface of IntesisBox

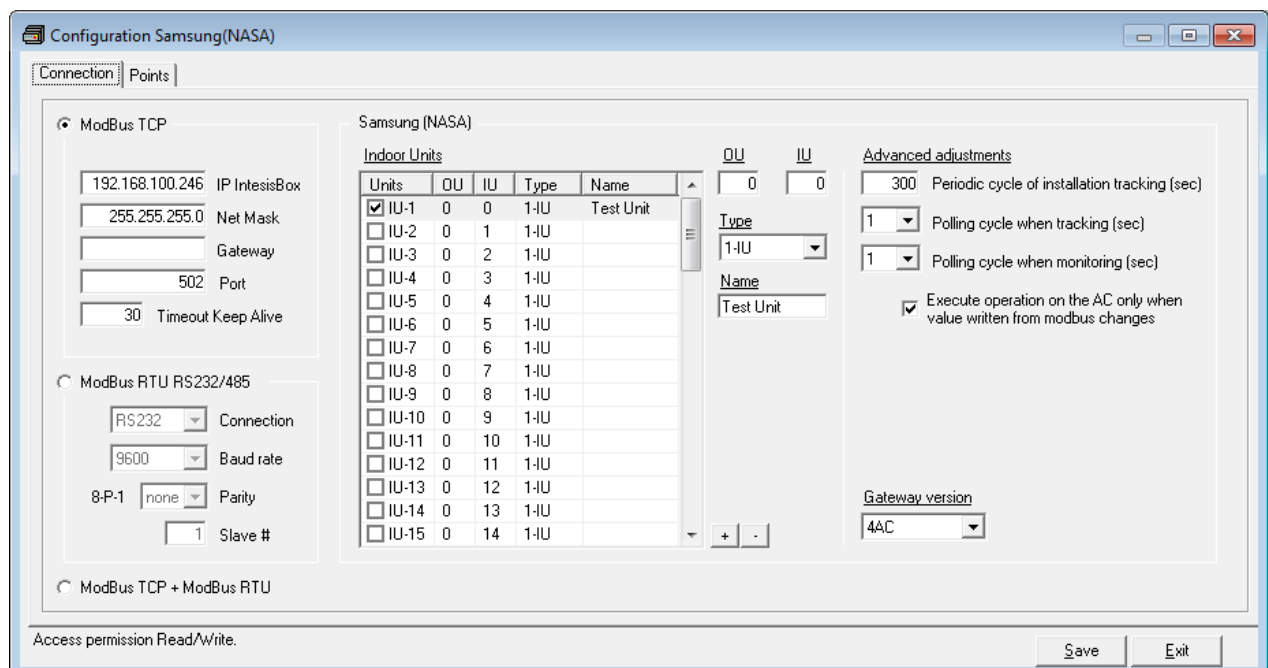| General	
Max. Number of Samsung interfaces	Up to 16 R1/R2 connections can be supported. There 4 different versions of IntesisBox, supporting a maximum 64, 32, 8 or 4 indoor units respectively.
Virtual signals	One communication error virtual signal per every single Outdoor Unit in the system. This virtual signal is available from Modbus.
Modbus interface	
Device type	Slave.
Modbus modes supported	TCP, RTU EIA232 or EIA485.
Modbus TCP configuration parameters	• IP address. • Subnet mask. • Default gateway address. • TCP port.
Modbus RTU configuration parameters	• EIA232/EIA485. • Baud rate. • Parity. • Slave number.
Points	
Configuration	AC system related fields. • MIM interface address: Address of the MIM interface each AC indoor unit Modbus memory block relates to. • Indoor unit main address: Main Address of the AC indoor unit each Modbus memory block relates to.
Supported Modbus function codes	Read functions: • 3- Read holding registers. • 4- Read input registers. Write functions: • 6- Write single register. • 16-Write multiple holding register. *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.*
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)

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2.1 *Modbus Address Table*

Modbus address* (base addr is 1)	IU	HE/HT	AHU	ERV	ERV+	Signal description and values
OU_Add[0..15] + 1	R	R	R	R	R	R1/R2 bus communication error • 0: No Communication Error on R1/R2 • 1: Communication Error on R1/R2
(IU[1..64]*25) + 1	R	R	R	R	R	Communication status • b0: Exist • b1: Ready • b2: Data Updated • b3: Type OK
(IU[1..64]*25) + 2	R	R	R	R	R	Unit type: • 0: Not defined • 1: IU • 2: HE • 3: HT • 4: AHU • 5: ERV • 6: ERV+
(IU[1..64]*25) + 3	R/W	R/W	R/W	-	R/W	Indoor Unit On/Off • 0: Off • 1: On
(IU[1..64]*25) + 4	R/W	R/W	R/W	-	R/W	Operation Mode • 0: Cool • 1: Heat • 2: Dry • 3: Fan • 4: Auto
(IU[1..64]*25) + 5	R/W	-	-	-	-	Fan Speed • 0: Auto • 1: Low • 2: Middle • 3: High
(IU[1..64]*25) + 6	R/W	-	-	-	-	Swing • 0: Off • 1: On
(IU[1..64]*25) + 7	R	-	R	R	R	Filter Alarm • 0: Filter Alarm Not Present • 1: Filter Alarm Present
(IU[1..64]*25) + 8	W	-	-	W	W	Filter Reset • 0: No Clear Filter Alarm • 1: Clear Filter Alarm
(IU[1..64]*25) + 9	R/W	-	R/W	-	-	Setpoint temperature (Celsius value x 10) In Heat Mode: 18ºC to 30ºC Other Modes: 16ºC to 30ºC
(IU[1..64]*25) + 10	R	-	R	-	-	Ambient temperature Celsius value x10 (-41ºC to 100ºC)
(IU[1..64]*25) + 11	R	R	R	R	R	Indoor Unit Error Code • 0: No Error • 100-999: Error Code
(IU[1..64]*25) + 12	R/W	R	R/W	R/W	R/W	Remote Controller Restriction • 0: Remote Controller Enabled • 1: Remote Controller Disabled
(IU[1..64]*25) + 13	W	-	-	-	-	Buzzer Off • 0: Turns the buzzer on • 1: Turns the buzzer off
(IU[1..64]*25) + 14	-	R	-	-	-	Water Inlet Temperature • Celsius value x 10
(IU[1..64]*25) + 15	-	R	-	-	-	Water Outlet Temperature • Celsius value x 10
(IU[1..64]*25) + 16	-	R/W	-	-	-	Water Outlet Setpoint Temp (Celsius value x 10) • HE Cool: 5ºC to 25ºC • HE Heat: 15ºC to 50ºC • HT: 25ºC to 80ºC
(IU[1..64]*25) + 17	-	-	-	R/W	R/W	Ventilation On/Off • 0: Off • 1: On
(IU[1..64]*25) + 18	-	-	-	R/W	R/W	Ventilation Operation Mode • 0: Bypass • 1: HeatEx • 2: Sleep • 3: Auto
(IU[1..64]*25) + 19	-	-	-	R/W	R/W	Ventilation Fan Speed • 0: Low • 1: High • 2: Turbo
(IU[1..64]*25) + 20	-	-	R/W	-	-	Discharge Temp on Cool (Celsius value x 10) • 8ºC to 18ºC
(IU[1..64]*25) + 21	-	-	R/W	-	-	Discharge Temp on Heat (Celsius value x 10) • 30ºC to 43ºC

*IU is the indoor unit index value. In LinkBoxMB configuration it must be entered to which Outdoor Unit (0..15) is this indoor unit connected and what is its indoor unit Main Address (0..63). OU is the Outdoor Unit address index value. This information must be provided by Samsung's installer before configuration is done.

3.   Configuration tool

LinkBoxMB	• Visual engineering tool, easy of use, for gateway's configuration and supervision compatible with Microsoft Windows operating systems, supplied with the gateway free of charge. • 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. • 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). • Allows configuring the gateway's parameters and signals while in off-line (not connected to the gateway). • 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 thorugh Ethernet connection. • Allows configuring all the external protocols available for IntesisBox® Modbus Server series. • Upgrades for this software tool available free of charge whenever a new protocol is added to the IntesisBox® Modbus Server series. • Multi-project tool allowing having in the engineer's PC the configuration for all the sites with different IntesisBox® Modbus Server series gateways. • Multi-language tool, all the language-dependent strings are in a plain text file (tab separated) for easy modification or addition of new languages.

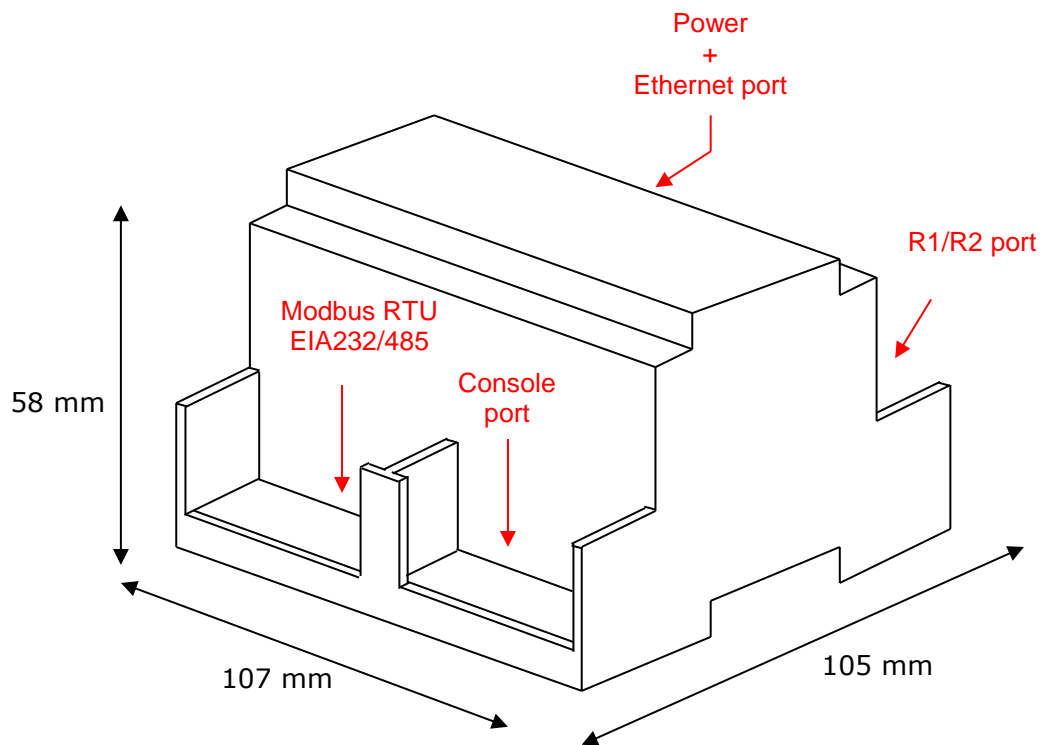© Intesis Software S.L. Todos los derechos reservados
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4. Mechanical & Electrical characteristics

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: $0.5mm^2$… $2.5mm^2$ 2 cores: $0.5mm^2$… $1.5mm^2$ 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
Samsung 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 Samsung 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.[1]
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

[1] 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.

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5.   Dimensions

Power
+
Ethernet port

R1/R2 port

Modbus RTU
EIA232/485

Console
port

58 mm

107 mm

105 mm

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

100 mm

115 mm

130 mm

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