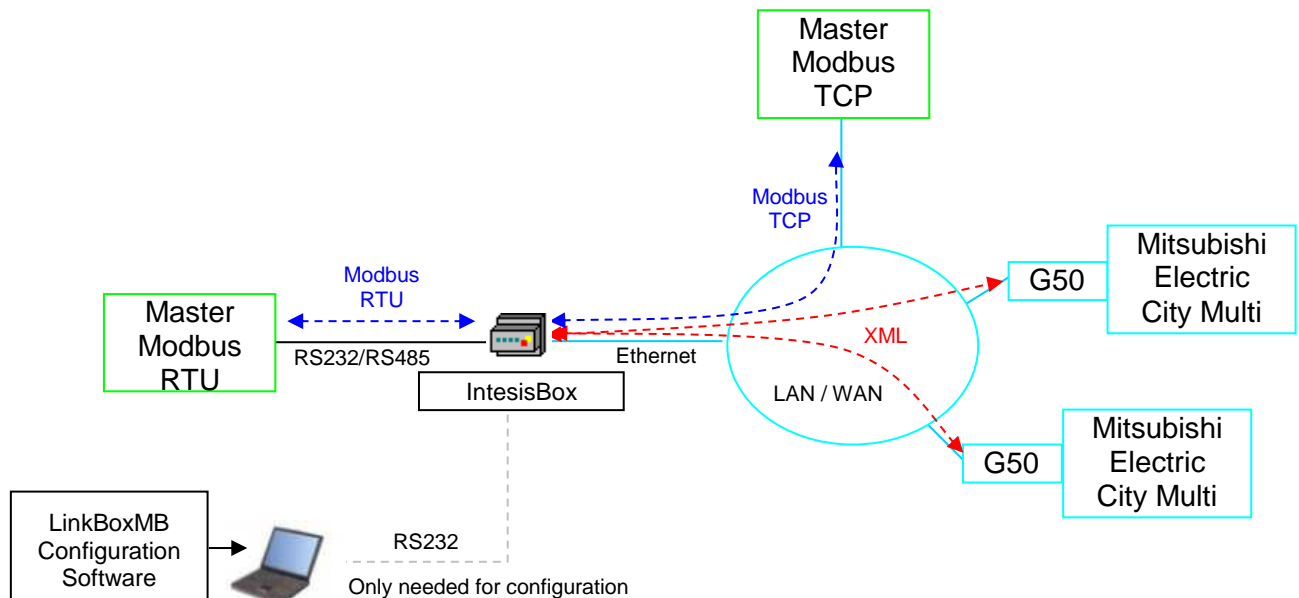




IntesisBox®

Modbus Server - Mitsubishi Electric G50

Gateway for monitor and control Mitsubishi Electric City Multi Air Conditioning systems from any Modbus master device TCP or RTU (BMS, PLC, SCADA, HMI, TouchPanel...)



This integration requires the Mitsubishi Electric City Multi AC system be equipped with the Mitsubishi Electric G-50A, GB-50A o AG-150A gateway. This gateway from Mitsubishi Electric offers the signals of the City Multi AC system through XML protocol. Every G50 (G-50A, GB-50A, AG-150A or AE200) allows access to the signals of up to 50 City Multi internal units and 50 groups, no matter the number of external units installed. In the G50, the group is the control unit, every group can have from 1 to 16 associated internal units. This integration supervises and control groups, not internal units, although if only one internal unit is associated to every group then you can supervise and control internal units individually. This G50 gateway is supplied by Mitsubishi Electric. Contact your nearest Mitsubishi Electric distributor for details.

IntesisBox® can “talk” to up to 2 Mitsubishi Electric G50s using XML protocol, and offers the signals of all these City Multi groups through its Modbus slave interface, each signal in a predefined fixed Modbus address. The AG-150A can be used with Expansions Cards as explained in the section IntesisBox capacity

The Modbus interface of IntesisBox can be freely configured as RTU RS232, RTU RS485 or TCP.

The commissioning of IntesisBox® is almost plug & play, only IP parameters of the box and of G50s have to be configured using *LinkBoxMB*, a friendly software configuration tool for Windows™ supplied along with IntesisBox with no additional cost.

1. IntesisBox capacity

Element	Max.	Notes
Num. of G50	2	Number of independent G50 interfaces 2 x G-50A / GB-50A / AE200 2 x AG150 / AE200 (without Expansion Controllers) 1 x AG150 / AE200 (with 2 Expansion Controllers)
Number of City Multi groups: (Number of G50s X 50)	100	Maximum number of groups
Number of variables per group	19	Modbus addresses
Number of variables per G50	951	Modbus addresses
Maximum number of variables	1.902	Modbus addresses

There are 2 different models of *IntesisBox[®] Modbus server - Mitsubishi Electric G50* with different capacity every one of them. The table above shows the capacity for the top model (with maximum capacity).

The 2 different models allow integrating respectively: 1 or 2 G50s.

And their order codes are:

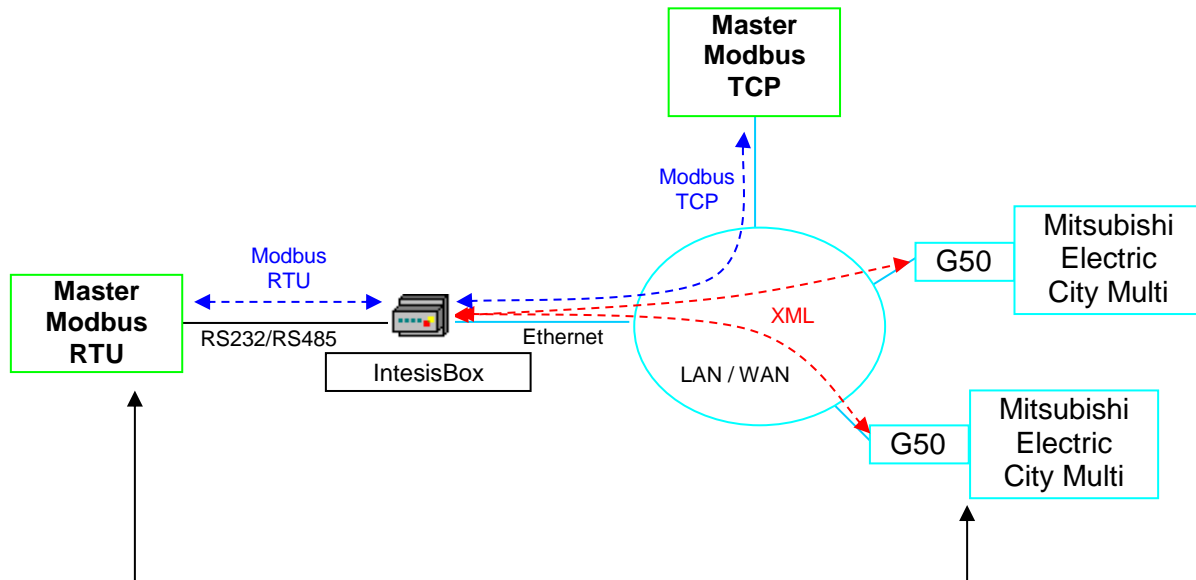
- **ME-AC-MBS-50.** Model supporting up to 1 G50 / AE 200 and 50 City Multi groups.
- **ME-AC-MBS-100.** Model supporting up to 2 G50s / AE200 and 100 City Multi groups.



NOTE: Please, remember that Mitsubishi Electric AG-150A requires a software license, PC-Monitoring license (SW-Mon), that has to be purchased together with the AG-150A gateway.

2. Sample applications

Integration of Mitsubishi Electric City Multi Air Conditioning systems equipped with the interface G50 into Modbus control systems.

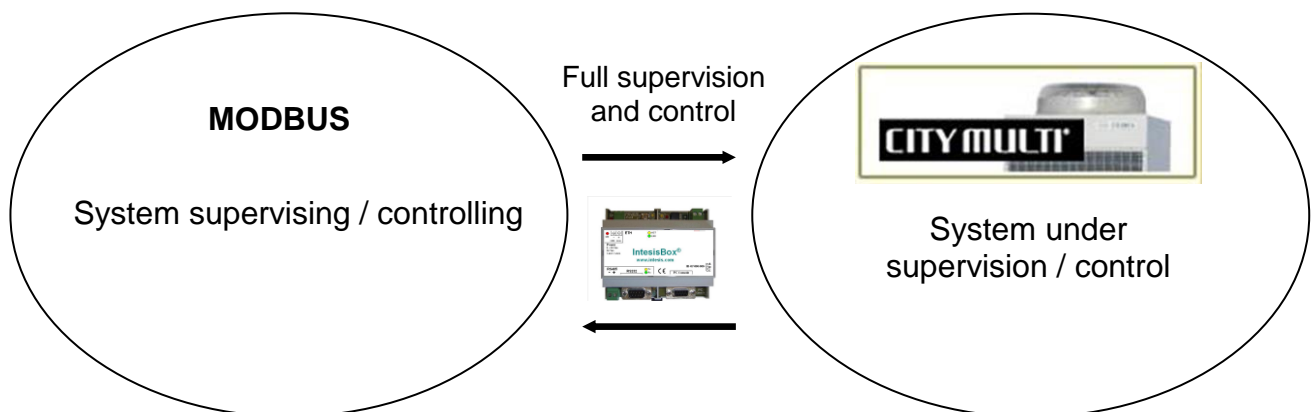


Control system with Modbus master interface:

- BMS.
- SCADA.
- PLC.
- DDC.
- Home Automation.
- AMX, Crestron...
- ...

Typical Mitsubishi Electric Air Conditioning systems equipped with G50 interface:

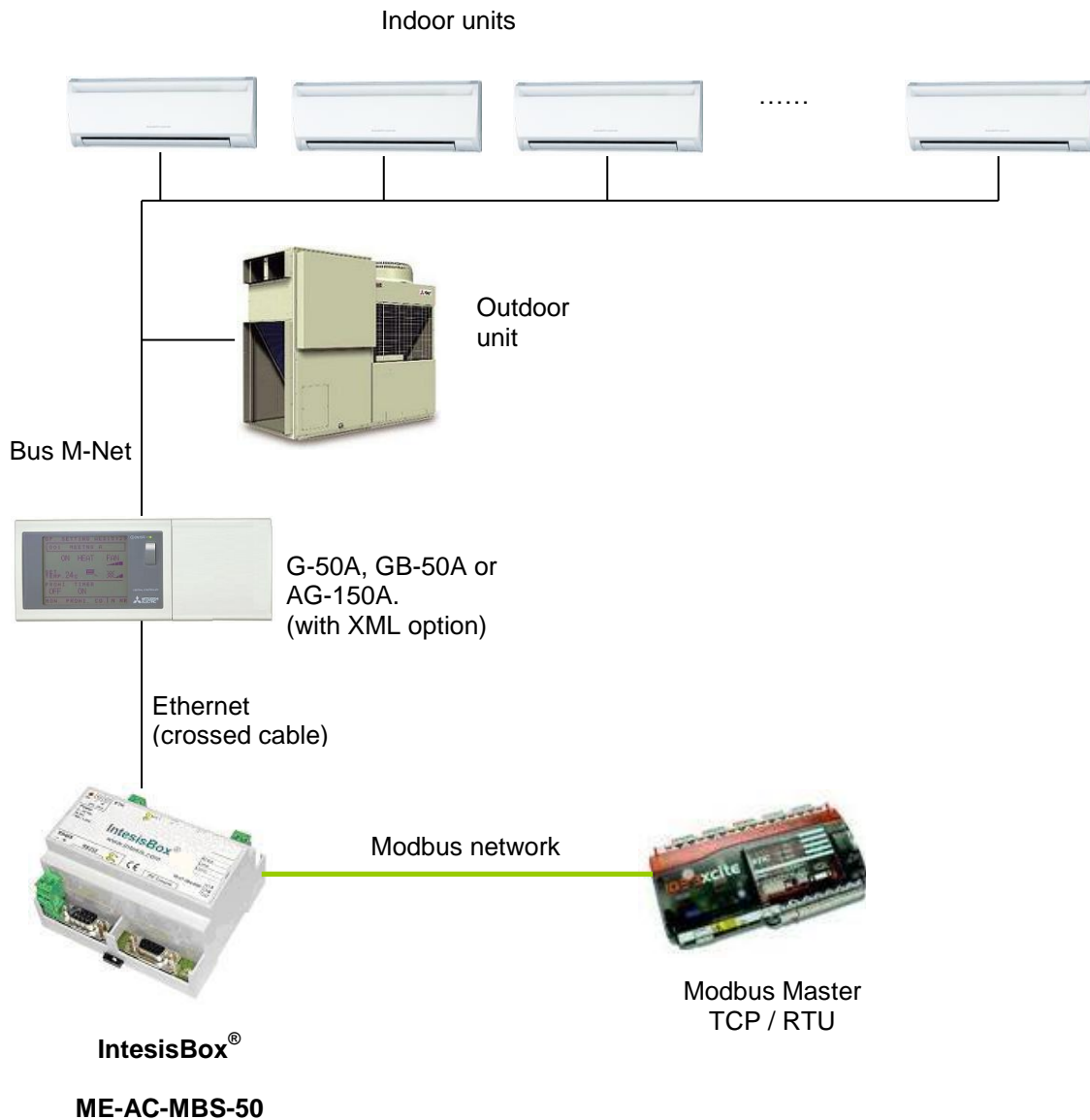
- City Multi model
- G-50A (version of G50 with display and keypad), GB-50A (version of G50 with blind cover), and AG-150A (new version of G50 with touch-display) are all supported, no difference from IntesisBox's point of view.
- 50 City Multi indoor units or 50 groups per G50
- Every group can have from 1 to 16 associated indoor units
- ...



3. Typical applications

Integration of Mitsubishi Electric Air Conditioning into Modbus systems.

For this application, Mitsubishi Air Conditioning system must be equipped with G-50A, GB-50A or AG-150A Gateway. For more information about these devices contact Mitsubishi Electric.



4. Modbus interface

General	
Max. Number of Mitsubishi Elec.G50s	Up to two G50s can be supported.
Virtual signals	<ul style="list-style-type: none"> • One communication error virtual signal per every G50 device defined. • One communication error virtual signal per every group into the G50 device. • One virtual signal per every group into the G50 device to enable/disable this group in the polling process. <p>All these virtual signals can be read/written from Modbus.</p>
Modbus interface	
Device type	Slave.
Modbus modes supported	TCP, RTU RS232 or RS485.
Modbus TCP configuration parameters	<ul style="list-style-type: none"> • IP address. • Subnet mask. • Default gateway address. • TCP port.
Modbus RTU configuration parameters	<ul style="list-style-type: none"> • RS232/RS485. • Baud rate. • Parity. • Slave number.
Points	
Configuration	No point configuration needs to be done, all the Mitsubishi Electric G50 signals are automatically associated to predefined fixed Modbus Addresses.
Modbus function codes supported	<p>Read functions:</p> <ul style="list-style-type: none"> • 3- Read holding registers. • 4- Read input registers. <p>Write functions:</p> <ul style="list-style-type: none"> • 6- Write single register. • 16- Write multiple registers. <p><i>If poll records are used to read/write multiple records, the range of addresses requested must contain valid addresses, if not the corresponding Modbus error code will be responded.</i></p>
Modbus data coding	All the point's values are coded in 2 bytes registers (even if their possible values are 0 and 1) and expressed in MSB..LSB.

4.1 Extract of the predefined Modbus address table

Modbus Address	G50	Group	Property
1	1		0 Error Com. G50
101	1	1	1 Drive
102	1	1	2 Mode
103	1	1	3 SetTemp
104	1	1	4 AirDirection
105	1	1	5 FanSpeed
106	1	1	6 RemoCon
107	1	1	7 Driveltem
108	1	1	8 Modeltem
109	1	1	9 SetTempltem
110	1	1	10 FilterItem
111	1	1	11 Ventilation
112	1	1	12 FilterSign
113	1	1	13 ErrorSign
114	1	1	14 InletTemp
115	1	1	15 FilterSignReset
116	1	1	16 ErrorSignReset
117	1	1	17 Error Com. Group
118	1	1	18 Polling Active

Modbus Address	G50	Group	Property
2	2		0 Error Com. G50
5101	2	1	1 Drive
5102	2	1	2 Mode
5103	2	1	3 SetTemp
5104	2	1	4 AirDirection
5105	2	1	5 FanSpeed
5106	2	1	6 RemoCon
5107	2	1	7 Driveltem
5108	2	1	8 Modeltem
5109	2	1	9 SetTempltem
5110	2	1	10 FilterItem
5111	2	1	11 Ventilation
5112	2	1	12 FilterSign
5113	2	1	13 ErrorSign
5114	2	1	14 InletTemp
5115	2	1	15 FilterSignReset
5116	2	1	16 ErrorSignReset
5117	2	1	17 Error Com. Group
5118	2	1	18 Polling Active

Modbus Address	G50	Group	Property
5001	1	50	1 Drive
5002	1	50	2 Mode
5003	1	50	3 SetTemp
5004	1	50	4 AirDirection
5005	1	50	5 FanSpeed
5006	1	50	6 RemoCon
5007	1	50	7 Driveltem
5008	1	50	8 Modeltem
5009	1	50	9 SetTempltem
5010	1	50	10 FilterItem
5011	1	50	11 Ventilation
5012	1	50	12 FilterSign
5013	1	50	13 ErrorSign
5014	1	50	14 InletTemp
5015	1	50	15 FilterSignReset
5016	1	50	16 ErrorSignReset
5017	1	50	17 Error Com. Group
5018	1	50	18 Polling Active

Modbus Address	G50	Group	Property
10001	2	50	1 Drive
10002	2	50	2 Mode
10003	2	50	3 SetTemp
10004	2	50	4 AirDirection
10005	2	50	5 FanSpeed
10006	2	50	6 RemoCon
10007	2	50	7 Driveltem
10008	2	50	8 Modeltem
10009	2	50	9 SetTempltem
10010	2	50	10 FilterItem
10011	2	50	11 Ventilation
10012	2	50	12 FilterSign
10013	2	50	13 ErrorSign
10014	2	50	14 InletTemp
10015	2	50	15 FilterSignReset
10016	2	50	16 ErrorSignReset
10017	2	50	17 Error Com. Group
10018	2	50	18 Polling Active

There are also a series of signals that indicate an Alarm Code in any of the devices present in the M-Net Mitsubishi network. To obtain the Modbus address, you must apply following formula:

$$\text{ADDRESS MODBUS} = (20000 + (\text{Numb.G50} \times 1000)) + \text{M-Net Add}$$

where *M-Net Add* is 0 for the G50 device, 1 to 50 for Indoor Units, 51 to 100 for Outdoor Unit, 101 to 200 for Remote Controllers and 200 to 250 for System Controllers.

For more information contact Mitsubishi Electric

5. Mitsubishi Electric G50 interface

Mitsubishi Electric G50 interface	
Device type	Client.
Configuration Parameters	Polling interval (1..600 seconds). Per every G50 defined: <ul style="list-style-type: none">• Descriptive name.• IP address.• TCP port.

5.1 Signals available per every Mitsubishi Electric City Multi AC indoor unit or group of indoor units

Property	Description / Status
Drive	Start/Stop Read/Write: ON, OFF
Mode ¹	AC Mode Read/Write: COOL, DRY, FUN, HEAT, AUTO, HEAT RECOVERY, LC_AUTO, BYPASS Read: AUTO HEAT, AUTO COOL
SetTemp ¹	Temperature Set Point (only integer numbers allowed) Read/Write: For COOL or DRY mode:19..30 °C, for HEAT mode: 17..28 °C, for AUTO mode:19..28 °C)
AirDirection	Air output direction Read/Write: HORIZONTAL, MID1, MID2, VERTICAL, SWING
FanSpeed	AC fan speed or LOSSNAY Read/Write: HIGH, MIDH, MIDL, LOW
RemoCon	Prohibition for General control from the local panel Read/Write: PROHIBIT, PERMIT
DriveItem	Prohibition for ON/OFF control from the local panel Read/Write: CHK_ON, CHK_OFF
ModeItem	Prohibition for Mode control from the local panel Read/Write: CHK_ON, CHK_OFF
SetTempItem	Prohibition for Set Point control from the local panel Read/Write: CHK_ON, CHK_OFF
FilterItem	Prohibition for Filter Reset control from the local panel Read/Write: CHK_ON, CHK_OFF
Ventilation	Operational status for LOSSNAY or OA Read/Write: HIGH, LOW, OFF
FilterSign	Status for Filter Dirty Read: ON, OFF Write: RESET
ErrorSign	Error status Read: ON, OFF Write: RESET
InletTemp	Ambient Temperature Read: 0.0 to 99.9
G50 Communication Error	Communication error with G50 Virtual signal generated by IntesisBox to indicate the status of the communication with the G50.
Group Communication Error	Group communication error Virtual signal generated by IntesisBox to indicate that the group is not configured into the G50.
Polling Active	Polling active Virtual signal to indicate or set if the Group is active or not active during the polling process.
Alarm Code	Group Alarm Code This signal provides a value. Each value has an associated alarm that has occurred in the group (0 means no alarm).

¹ PWFY units have a different mode and setTemp map explained in the signals column in LinkBoxEIB (section 3.4 in the User Manual)

6. 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).
- 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.
- A list of system commands is available to send to the gateway for debugging and adjust purposes (Reset, Date/time consultation/adjust, Firmware version request...).

The screenshot shows the 'Signals Viewer' window with a table of signal configurations. The table has columns for #, Signal, RW, Point, Value, and Value. The signals listed include Communication Error G50, Start/Stop, Functioning mode, Temperature set point, Direction of the air outlet, Fan speed of the AC or LOSSNAY, General prohibition of the control from the local panel, Prohibition of the ON/DFF control from the local panel, Prohibition of the Mode control from the local panel, Prohibition of the Setpoint control from the local panel, Prohibition of the Filter Reset control from the local panel, Operational status of the LOSSNAY or QA, Filter Dirty status (read), Error status (read), Ambient Temperatura (°C x10), Reset of the Filter Dirty indication, Reset of the Error indication, Communication Error Group, and Polling Activated. (Active in G50).

#	Signal	RW	Point	Value	Value
1	Communication Error G50	R	1	0	0-OK, 1-ERROR
2	Start/Stop	Rw	101	0	0-OFF, 1-ON
3	Functioning mode	Rw	102	0	0-COOL, 1-DRY, 2-FAN, 3-HEAT, 4-AUTO, 5-AUTO HEAT, 6-AUTO COOL, 7-HEAT RECOVERY, 8-LC_AUTO, 9-BYPASS
4	Temperature set point	Rw	103	0	Ambient Temperatura (°C x10)
5	Direction of the air outlet	Rw	104	0	0-HORIZONTAL, 1-MID1, 2-MID2, 3-VERTICAL, 4-SWING
6	Fan speed of the AC or LOSSNAY	Rw	105	0	0-LOW, 1-MIDL, 2-MIDH, 3-HIGH
7	General prohibition of the control from the local panel	Rw	106	0	0-PERMIT, 1-PROHIBIT
8	Prohibition of the ON/DFF control from the local panel	Rw	107	0	0-CHK_ON, 1-CHK_OFF
9	Prohibition of the Mode control from the local panel	Rw	108	0	0-CHK_ON, 1-CHK_OFF
10	Prohibition of the Setpoint control from the local panel	Rw	109	0	0-CHK_ON, 1-CHK_OFF
11	Prohibition of the Filter Reset control from the local panel	Rw	110	0	0-CHK_ON, 1-CHK_OFF
12	Operational status of the LOSSNAY or QA	Rw	111	0	0-OFF, 1-LOW, 2-HIGH
13	Filter Dirty status (read)	R	112	0	0-OK, 1-DIRTY
14	Error status (read)	R	113	0	0-OK, 1-ERROR
15	Ambient Temperatura (°C x10)	R	114	0.0	99.9
16	Reset of the Filter Dirty indication	W/R	115	0	Writing 1 resets the Filter indication
17	Reset of the Error indication	W/R	116	0	Writing 1 resets the Error indication
18	Communication Error Group	R	117	1	0-OK, 1-ERROR
19	Polling Activated. (Active in G50)	Rw	118	0	0-NOT G50 CONFIGURED & NO POLL, 1-OK & POLL

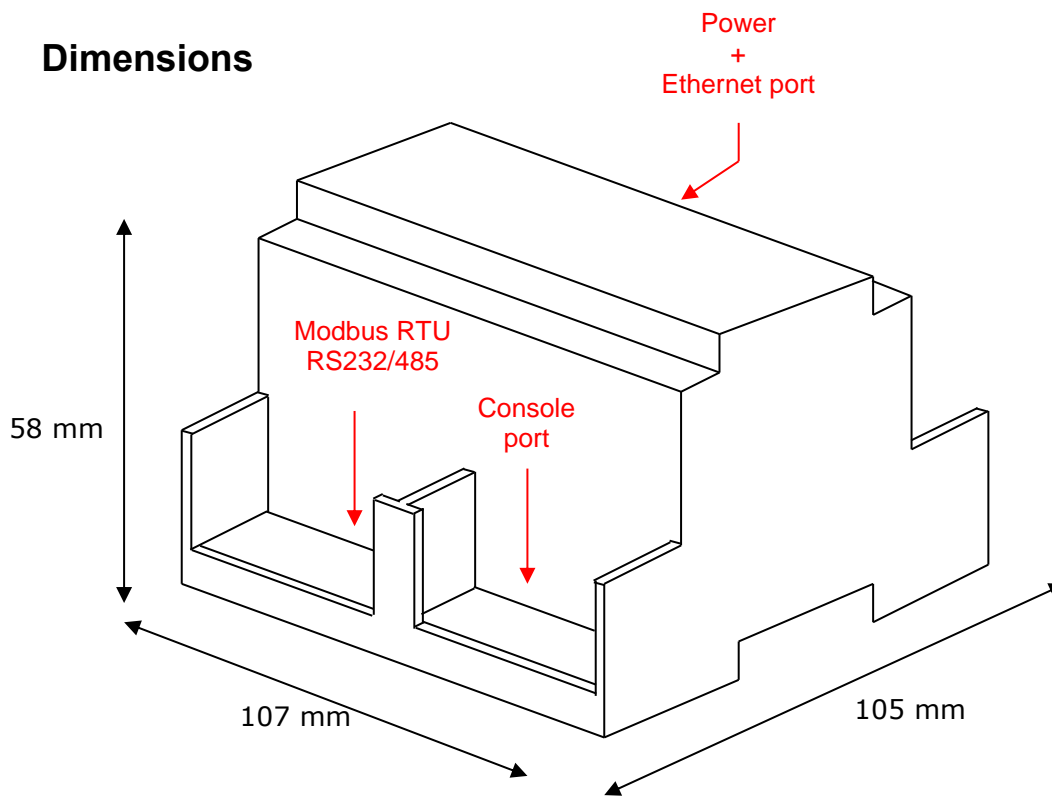
Mechanical & Electrical characteristics



Envelope	Plastic type PC (UL 94 V-0). Size: 107mm x 105mm x 58mm.
Color	Grey. RAL 7035.
Power	9 to 30VDC +/-10% 1.4W. 24VAC +/-10% 1.4VA. Power connector is a 2 pole plug-in screw terminal bloc.
Mounting options	Wall DIN rail EN60715 TH35.
Modbus RTU ports	1 x Serial RS232 (DB9 male DTE). 1 x Serial RS485 (Plug-in screw terminal block 2 poles).
Modbus TCP & Mitsubishi Elec.G50 port	1 x Ethernet 10BT RJ45 connector.
LED indicators	1 x Power. 2 x Ethernet port link and activity (LNK, ACT). 2 x Modbus RTU port activity (Tx, Rx).
Console port	RS232. DB9 female connector (DCE).
Configuration	Via console port. ¹
Firmware	Allows upgrades via console port.
Operational temperature range	0°C to +70°C
Operational humidity range	5% to 95%, non condensing
Protection	IP20 (IEC60529).
RoHS conformity	Compliant with RoHS directive (2002/95/CE).
Certifications	CE

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.

8. Dimensions



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

