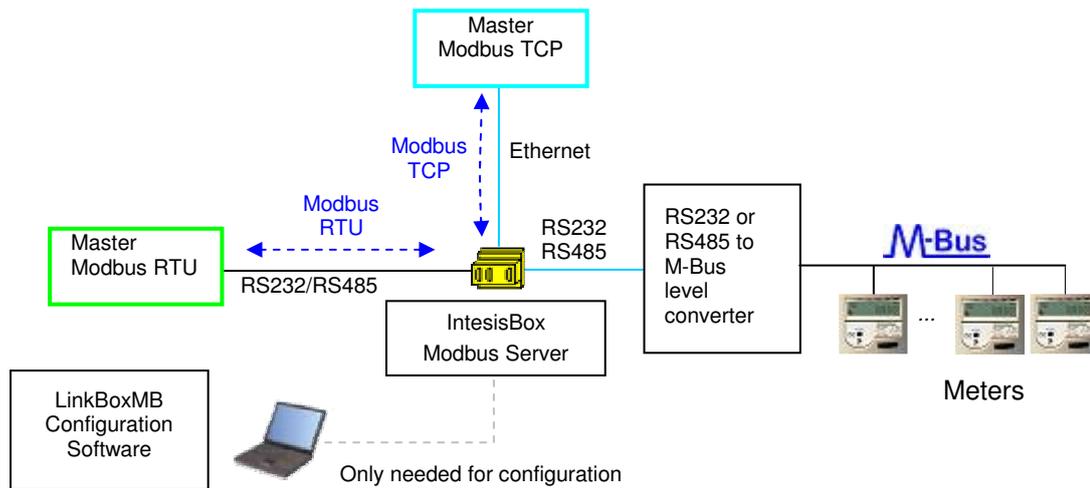




# IntesisBox® Modbus Server - M-Bus (EN 13757-3)

Gateway for the integration of M-BUS meters with Modbus RTU and TCP based control systems.

**Integrate M-Bus meters into your Modbus master device or system (BMS, SCADA, PLC, HMI, TouchPanles...)**



**Read datapoints of M-bus meters from your Modbus master device or system (BMS, SCADA, PLC...).**

IntesisBox polls, continuously (configurable) or when ordered from the Modbus master, the M-bus meters to obtain the readings of their internal points. With every read, the new values received from the meters are updated in the IntesisBox memory and become available to be read by the Modbus master device.

From the Modbus master device you can force the poll of a concrete M-Bus meter or force the poll of all M-Bus meters in any moment by simply writing in specific Modbus registers. IntesisBox requires an external M-Bus to RS232 or RS485 level converter to access the M-Bus meters. Apart of making the electrical level conversion, the external level converter also feeds the meters' M-Bus interface, due to this, there are different models of level converters and repeaters, depending on the number of M-Bus meters connected to the bus (i.e. 3, 20, 60, 120 or 250 meters).

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

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## IntesisBox capacity

Element	Basic version	Extended version	Notes
Number of M-Bus devices	60	500	Number of M-Bus meters (connected to the bus) that can be read from IntesisBox.
Number of M-Bus signals	600	2000	Number of M-Bus signals (readings in the meters) that can be read from IntesisBox.

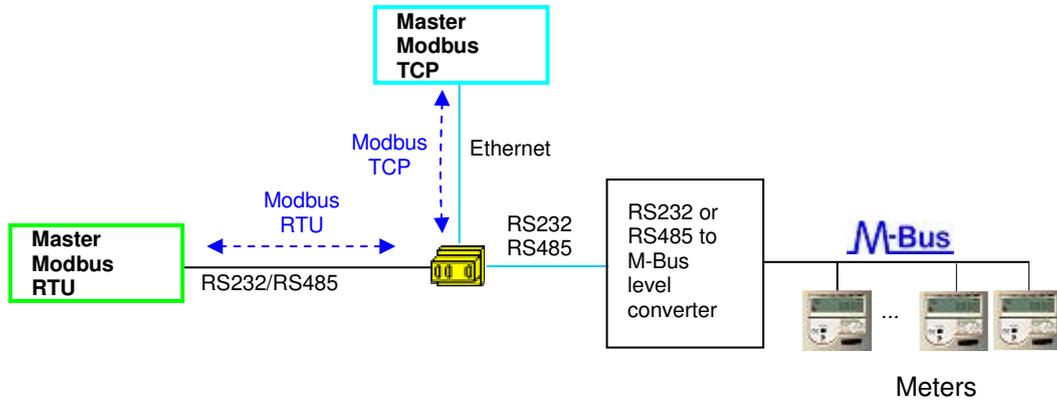
There are two different versions of *IntesisBox<sup>®</sup> Modbus Server - M-bus* with different capacity every one of them.

- Basic version with capacity of 600 points and 60 M-Bus meters. *Ref.: IBOX-MBS-MBUS-A*
- Extended version with capacity of 2000 points and 500 M-Bus meters. *Ref.: IBOX-MBS-MBUS-B*



## Sample applications

Integration of any M-Bus meter into Modbus control systems (RTU or TCP).

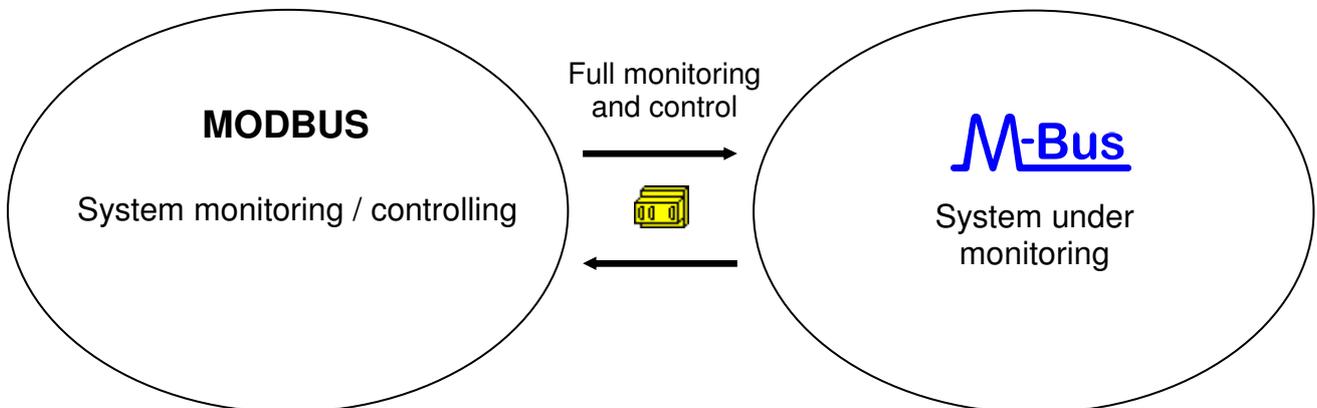


**Modbus control system**

- Building Management Systems (BMS).
- SCADA packages.
- Human Machine Interfaces (HMI).
- Direct Digital Controllers (DDC).
- Programmable Logic Controllers (PLC).
- ...

**Typical M-Bus slave devices:**

- Water meters.
- Heat meters.
- Energy meters.
- Electricity meters.
- General purpose pulse counters.
- ...



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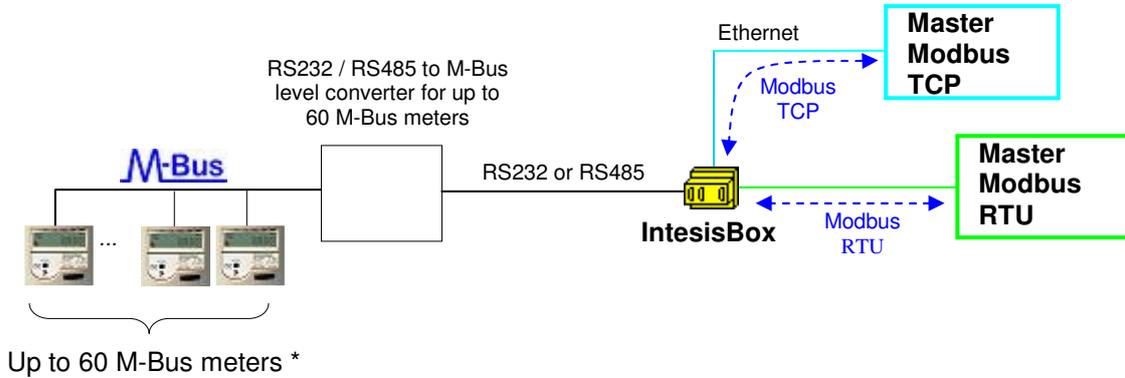
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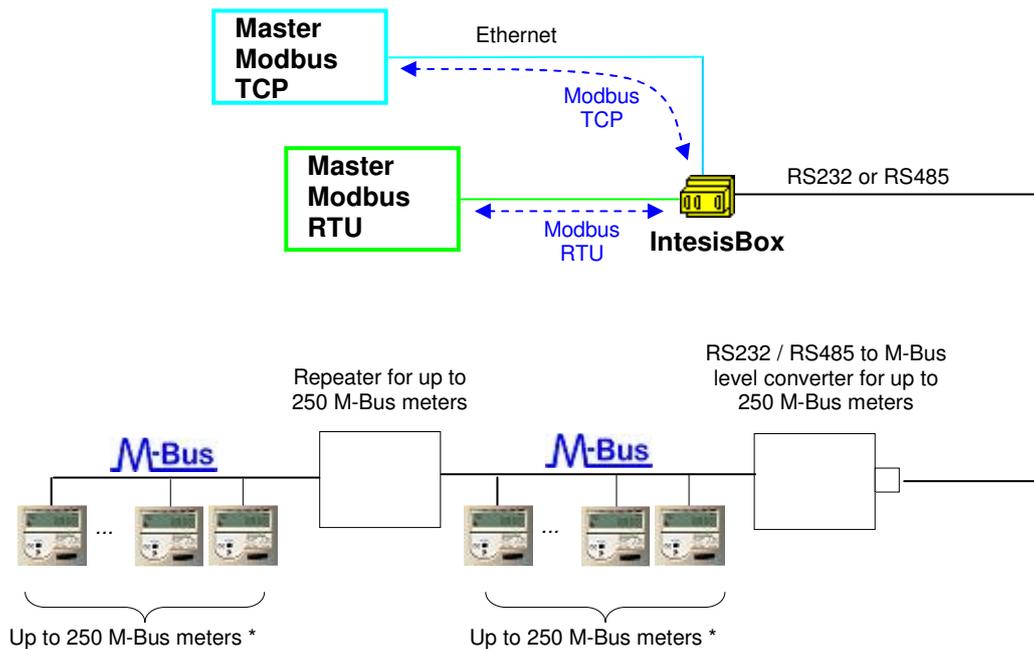
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## Typical applications

The following is a diagram of a small/medium size installation (up to 60 meters):



The following is a diagram of a large installation (up to 500 meters):



\* The maximum bus distance allowed by the converter or repeater will depend on the baud rate used, the section of the wires used, the number of M-Bus devices connected and the location of the devices inside the bus (all concentrated at the end of the bus, equally distributed along the bus, etc.).

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## Modbus interface of IntesisBox

### Functions supported

- Modbus functions 03 and 04 (*read holding registers* and *read input registers*) can be used to read Modbus registers corresponding M-Bus meters readings.
- If *poll records* are used to read more than one register, it is necessary that the range of addresses requested contains valid addresses, if not, the corresponding Modbus error code will be returned.
- Modbus error codes are fully supported, they will be sent whenever a non valid Modbus action or address is required.
- Modbus functions 01 and 02 (*read coils* and *read discrete inputs*) can be used to read Modbus registers corresponding to digital datapoints, i.e. the virtual signals indicating communication error with the M-Bus meters.
- Modbus functions 05 and 15 (*Write Single Coil* and *Write Multiple Coils*) can be used to write Modbus registers corresponding to digital datapoints, i.e. special datapoints to force the poll of individual M-Bus meters or the poll to all meters.

### Modbus RTU

- Baud rate can be selected from 1200, 2400, 4800, 9600, 19200, 38400 and 56700.
- Data Bits, Parity and Stop Bits can be also configured.
- Modbus slave number can be configured.
- Physical connection (RS232 or RS485) can also be selected.
- Only the lines RX, TX and GND of the RS232 port are used (TX and RX for RS485).

### Modbus TCP

- The TCP port to use can be configured (by default 502 is used).
- The IP address, subnet mask and default router address to use by IntesisBox<sup>®</sup> can be also configured.

### Address Map

The address map is fully configurable.

Modbus data coding formats supported	For virtual signals, Data coding format by default is: <ul style="list-style-type: none"><li>• 1 bit.</li></ul> Data coding format can be selected, for any analog point in the gateway, to be: <ul style="list-style-type: none"><li>• 32 bit float (MB).</li><li>• 32 bit float (LSB..MSB).</li></ul>
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## M-Bus interface of IntesisBox

The gateway connects to the M-Bus meters through an external RS232 or RS485 to M-Bus level converter, this external level converter is not included in the scope of delivery, and must be ordered separately or purchased directly by the customer.

Apart of making the electrical level conversion, the converter must also feed the M-Bus, due to this, there are different models of level converters and repeaters, depending on the maximum number of M-Bus meters that can be connected to them (normally 3, 20, 60, 120 or 250 meters).

These are the main features of the M-Bus interface of IntesisBox:

- RS232 (DB9 male connector, DTE) or RS485 two wires (plug-in terminal bloc with screws), which one to use is software configurable.
- Baud rate configurable from 300 to 9600 bps (the allowed baud rates in M-Bus are from 300 to 9600 bps, in general the devices are normally configured at 2400 bps at the factory).
- Primary and secondary addressing allowed.
- Useful timeouts and specific parameters to make the interface widely compatible with many meter's peculiarities found usually between different manufacturers.
- Polling of the meters can be continuously, either configured in the own IntesisBox or you can activate/deactivate continuous polling of the meters from Modbus side using a special datapoint.
- You can force a polling of the meters (refresh of readings) in any moment from Modbus side using special datapoints: one datapoint to force a polling of all the meters, and one specific datapoint per meter to force the polling of the individual meter.
- IntesisBox can also be configured to make a single polling of the meters (refresh of readings) at the start up.
- For each meter, a datapoint is available in Modbus indicating communication error with the meter, also a general communication error datapoint is available (that will be active whenever the communication with one or more meters has failed).
- Fully flexible configuration of the registers to poll in the meter, to adapt to any type of meter.

### M-Bus signal types supported

IntesisBox can read the following type of signals offered by M-Bus meters:

- Energy (kWh or J).
- Volume (m<sup>3</sup>, feet<sup>3</sup>, gallon).
- Mass (kg).
- Power (kW or J/h).
- Volume flow (m<sup>3</sup>/h, m<sup>3</sup>/min or m<sup>3</sup>/s, gallon/h, gallon/min, gallon/s).
- Mass flow (kg/h).
- Flow Temperature (°C).
- Return Temperature (°C).
- Temperature difference (K).
- External Temperature (°C).
- Temp. limit (°C).
- Pressure (Bar).
- Volts (volts).
- Amps (amps).
- H.C.A., without units. (Multipurpose signal used, for example, by some energy meters to offer the readings of auxiliary pulse counter inputs of the device).
- On Time, normally in hours but depends on the meter.
- Operating Time, normally in hours but depends on the meter.
- Averaging Duration, normally in hours but depends on the meter.
- Actuality Duration, normally in hours but depends on the meter.
- And others.

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## Configuration tool

LinkBoxMB	<ul style="list-style-type: none"><li>• 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.</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).</li><li>• Allows configuring all the external protocols available for IntesisBox<sup>®</sup> Modbus series.</li><li>• Upgrades for this software tool available free of charge whenever a new protocol is added to the IntesisBox<sup>®</sup> Modbus series.</li><li>• Multi-project tool allowing having in the engineer's PC the configuration for all the sites with different IntesisBox<sup>®</sup> Modbus 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><li>• 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...).</li></ul>
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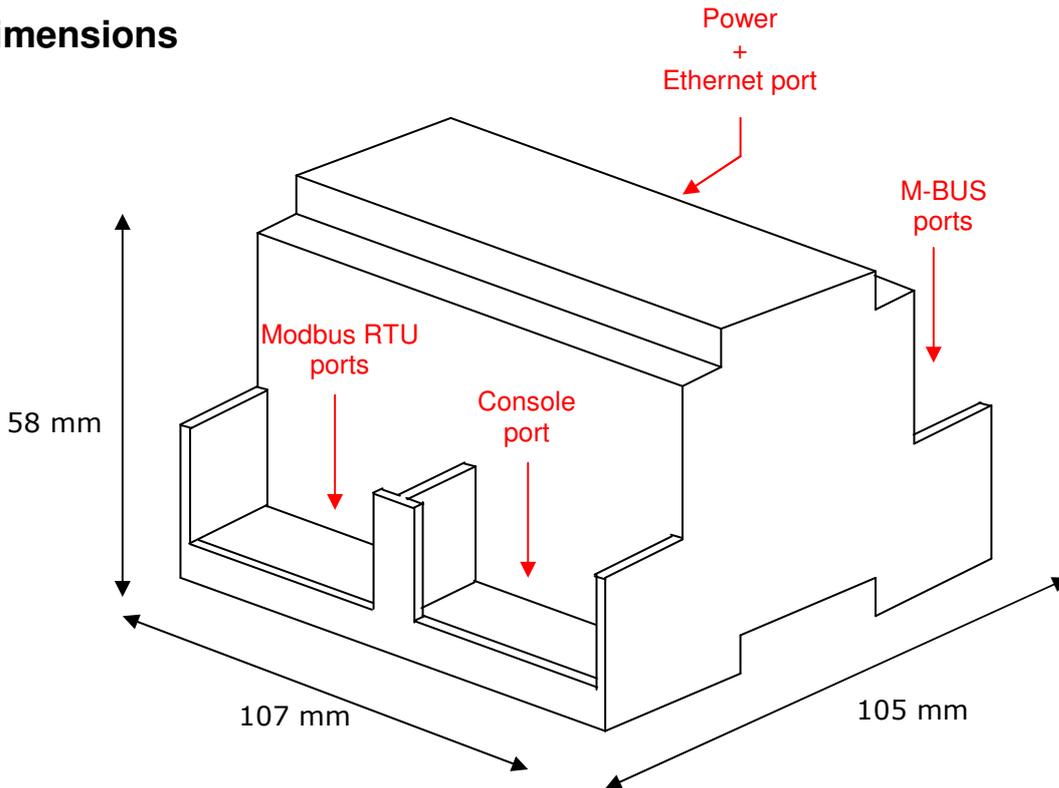
## Mechanical & Electrical characteristics



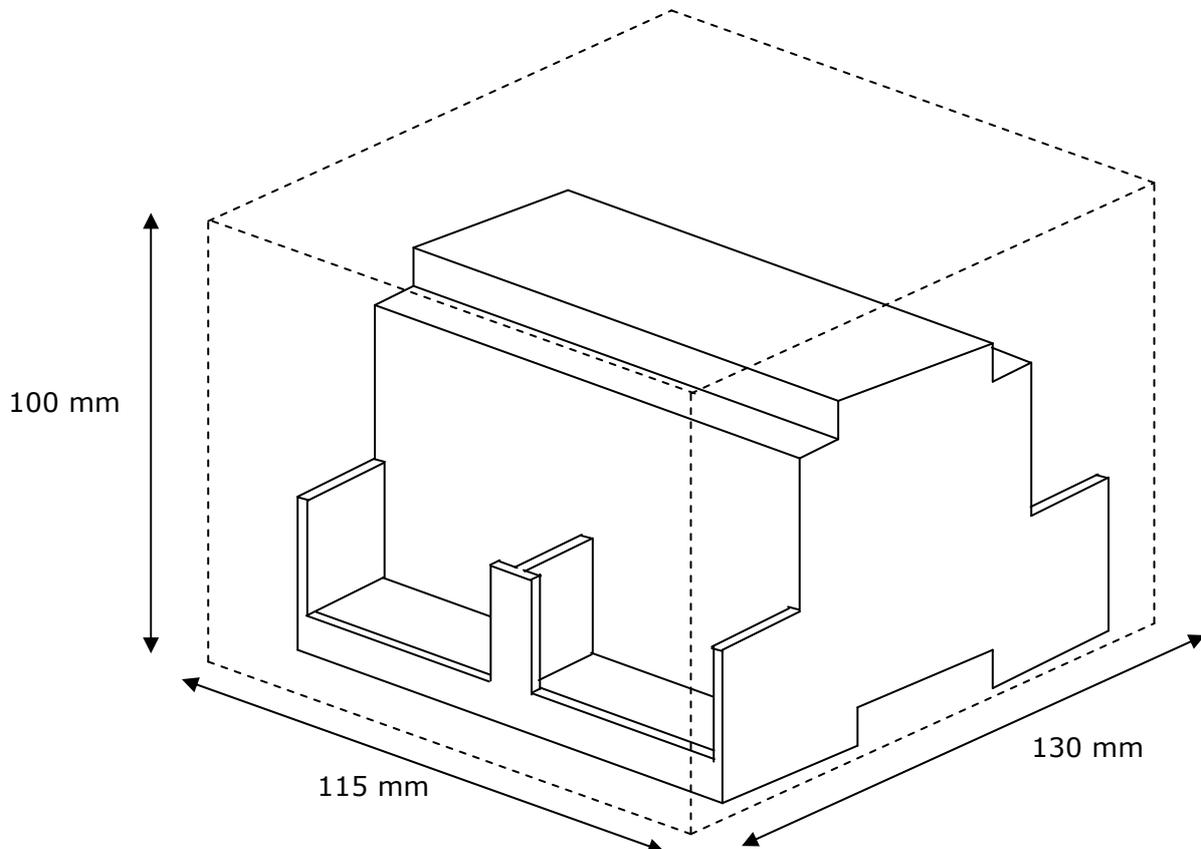
Enclosure	Plastic, type PC (UL 94 V-0). Dimensions: 107mm x 105mm x 58mm.
Color	Light Grey. RAL 7035.
Power	9 to 30Vdc +/-10% 2.4W. 24Vac +/-10% 2.4VA. Power connector is a 2 poles plug-in terminal block.
Mounting options	Desktop Wall DIN rail EN60715 TH35
Modbus TCP port	1 x Ethernet 10BT (RJ45).
Modbus RTU ports	1 x Serial RS232 (DB9 male DTE). 1 x Serial RS485 (Plug-in screw terminal block 2 poles).
M-Bus ports	1 x Serial RS232 (DB9 male DTE). 1 x Serial RS485 (Plug-in screw terminal block 2 poles).
LED indicators	1 x power. 2 x serial port Modbus activity (Tx, Rx). 2 x serial port M-Bus activity (Tx, Rx). 2 x Ethernet port (LNK, ACT).
Console port	RS232. (DB9 female DCE).
Configuration	Via console port. <sup>1</sup>
Firmware	Allows upgrades via console port.
Operational temperature range	-40 °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

<sup>1</sup> Along with IntesisBox 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 LinkBoxMB (free of charge), compatible with MS Windows<sup>®</sup> operating systems, is also supplied with the device.

## 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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