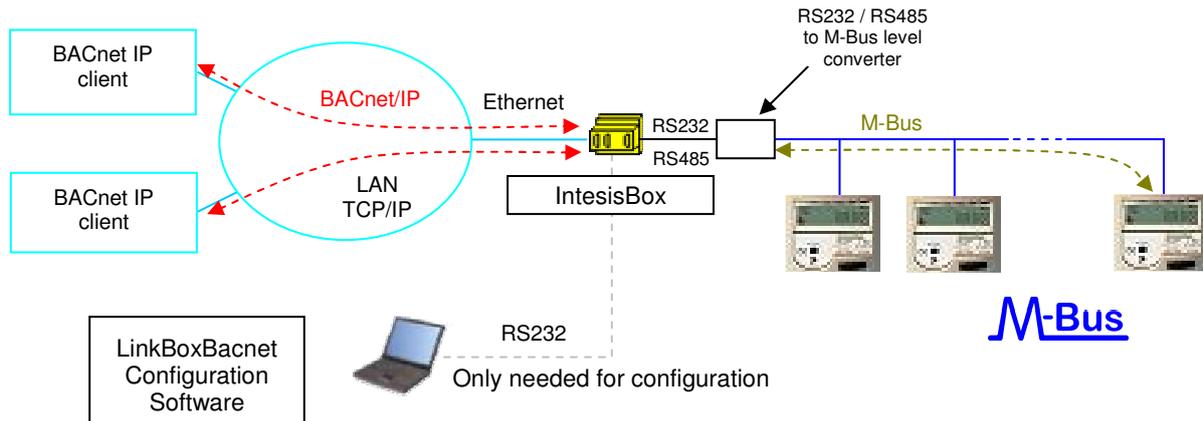# IntesisBox®
## BACnet IP Server - M-Bus

**Gateway for integration of M-Bus meters into BACnet/IP based control systems.**

# Integrate M-Bus meters into your BACnet/IP control system



**IntesisBox is an M-Bus master device (EN-1434-3) allowing reading M-Bus slave devices (energy meters, electricity meters, pulse counters…) and offering these meter's readouts through its BACnet/IP interface as BACnet standard datapoints.** *Connection to M-Bus is through external M-Bus to RS232 or RS485 level converter. This external converter is also needed to feed the M-Bus. The external level converter model most suitable for your installation will be advised by Intesis Software, and also supplied if requested.*

**IntesisBox can poll the M-Bus meters, either continuously, or when triggered from BACnet control system, this last can be individually per meter or for all meters.** *Continuous polling of meters can be enabled/disabled in any moment from the BACnet control system accessing a specific datapoint of IntesisBox available for this purpose.*

**BACnet client devices connected to the BACnet/IP network can read IntesisBox's internal datapoints by continuous polling or they can make subscription requests (COV).** *Last readouts received from the M-Bus meters are maintained in IntesisBox's memory ready to be served to BACnet when requested.*

**IntesisBox BACnet/IP Server series are configured using** *LinkBoxBacnet,* **a software tool for windows**TM **which is supplied along with the purchase of IntesisBox with no additional cost.** *With the installation of LinkBoxBacnet, a Demo project for integration of M-Bus meters is also installed, using this demo project makes the engineering needed for this integration easy and quick.*

## IntesisBox capacity

| Element | Basic version | Extended version | Notes |
|---|---|---|---|
| Type of BACnet client devices allowed | | | Those supporting *BACnet ASHRAE 135 – 2001 Annex J - BACnet/IP protocol*, commonly referred as BACnet/IP. |
| Number of BACnet subscription requests (COV) | 1000 | 6000 | Maximum number of BACnet subscriptions (COV) requests allowed by IntesisBox. |
| Number of BACnet subscribers | 8 | 8 | Maximum number of different BACnet subscribers allowed by IntesisBox. |
| Points | 600 | 2000 | Maximum number of datapoints that can be defined into IntesisBox. |
| M-Bus slave devices | 60 | 500 | Maximum number of M-Bus slave devices allowed by IntesisBox. |
| Type of M-Bus slave devices | | | Those compatible with EN-1434-3. |

There are two different versions of *IntesisBox® BACnet IP Server - M-Bus* with different capacity every one of them.

- Basic version with capacity of 600 points and 60 M-bus devices. *Ref.: IBOX-BAC-MBUS-A*
- Extended version with capacity of 2000 points and 500 M-bus devices. *Ref.: IBOX-BAC-MBUS-B*

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## Sample applications

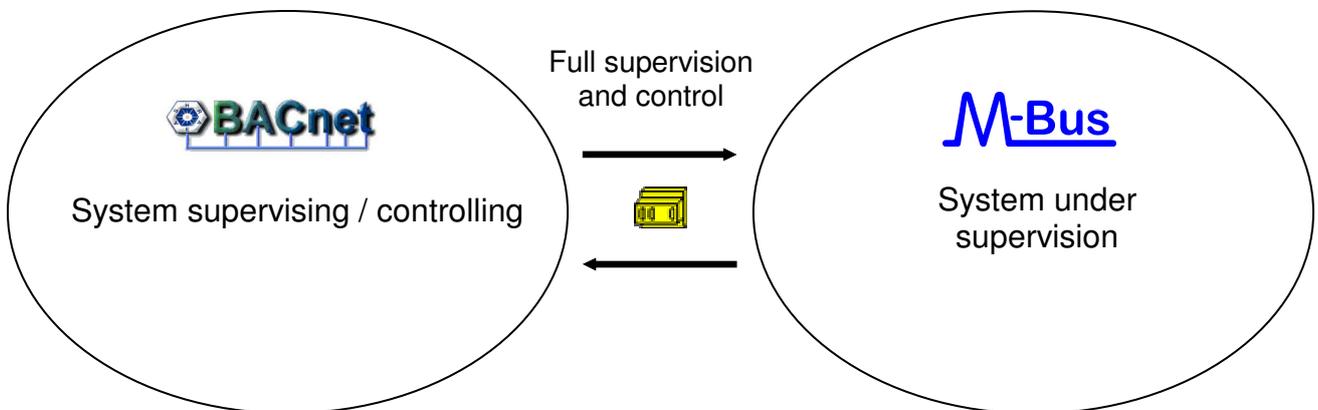**Integration of any M-Bus slave device into BACnet/IP based control systems.**
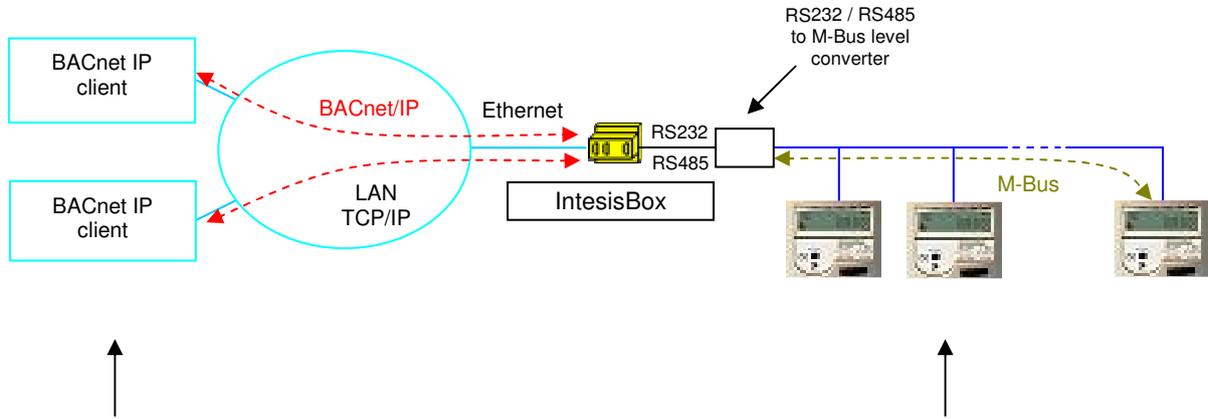


**Typical BACnet client devices:**

- 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.
  .
  .
  .
  .



System supervising / controlling

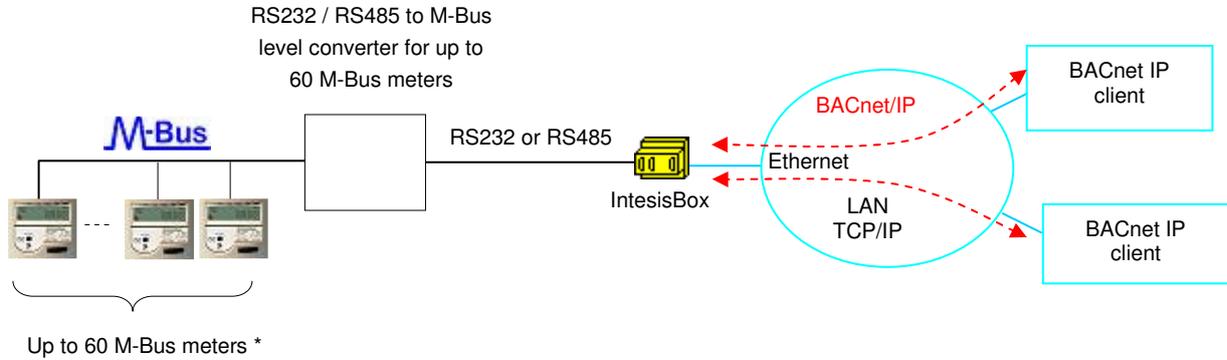Full supervision and control

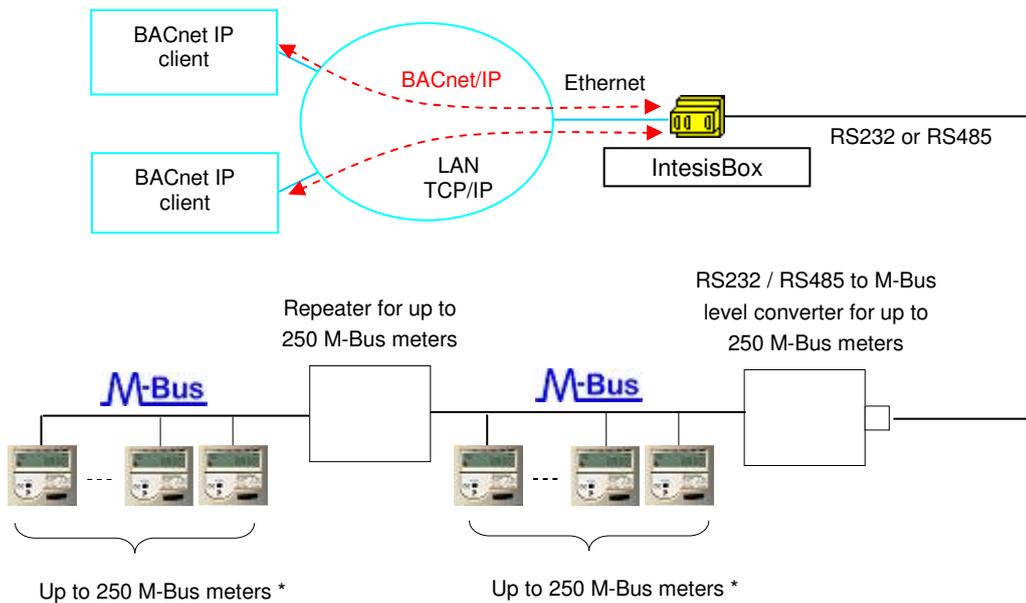System under supervision

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## Typical applications

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



RS232 / RS485 to M-Bus
level converter for up to
60 M-Bus meters

M-Bus

RS232 or RS485

BACnet/IP

BACnet IP
client

Ethernet

IntesisBox

LAN
TCP/IP

BACnet IP
client

Up to 60 M-Bus meters *

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



BACnet IP
client

BACnet/IP

Ethernet

LAN
TCP/IP

IntesisBox

RS232 or RS485

BACnet IP
client

Repeater for up to
250 M-Bus meters

RS232 / RS485 to M-Bus
level converter for up to
250 M-Bus meters

M-Bus

M-Bus

Up to 250 M-Bus meters *

Up to 250 M-Bus 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.).

## M-Bus interface of IntesisBox

| M-Bus interface | |
|---|---|
| Type | RS232 (DTE). Requires external RS232/RS485 to M-Bus level converter to access the M-Bus meters. |
| Virtual signals | General virtual signals:<br>• Communication error with M-Bus system.<br>• Force bus reading (used to force a reading of all M-Bus devices).<br>• Continuous polling (used to force a continuous polling of all M-Bus devices).<br>• M-Bus activity. (Indicating: reading in progress or bus in stand-by).<br><br>Virtual signals per M-Bus meter defined:<br>• Communication error with the M-Bus meter.<br>• Force device reading.<br>• Status M-Bus (this status signal is updated, read from the device, with every reading).<br><br>All these virtual signals can be read and/or written from BACnet. |
| Configuration capabilities | Up to 500 M-Bus devices can be defined. Automatic creation of devices (and their associated virtual signals into the datapoints list) is performed by just entering the number of devices desired.<br><br>In order to give the interface the maximum flexibility in front of the wide range of different M-Bus devices (meters) existing in the market, the M-Bus interface incorporates the following useful features:<br><br>• Physical connection (RS232 or RS485), configurable.<br>• Baud rate, configurable.<br>• Different timeouts to apply during communication, configurable.<br>• Perform automatic reading after gateway's start up, configurable.<br>• Reset instantaneous values in the meter at start reading, configurable.<br>• Continuous polling of the meters, configurable.<br>• Any register type* offered by an M-Bus device can be programmed to be read by the gateway, simply specifying the register number wanted to be read.<br><br>*Only instantaneous values, normally in the first page of the device, can be read by the gateway. Historical data in the device can not be read. Only those signal types supported by the gateway can be read. See M-Bus signal types supported below.<br><br>Refer to the M-Bus device technical documentation in order to identify the signals offered by the meter to be used and the register number for every signal.<br><br>See M-Bus configuration parameters below for details. |
| Embedded tools | In order to speed up the identification of the registers offered by a meter, an embedded tool into the gateway allows to request all the registers available in any meter connected to the bus and identifies the register number to be programmed in the gateway for reading any desired signal offered by the meter. |

# BACnet interface of IntesisBox

| BACnet interface | |
|---|---|
| Device type | Server |
| BACnet protocols supported | BACnet ASHRAE 135 – 2001 Annex J - BACnet/IP protocol |
| Interactivity with BACnet system | • Point's Read/Write allowed.<br>• Subscription requests (COV) allowed. |
| Configuration capabilities | See BACnet configuration parameters below for details. |

## Specifications

BACnet Conformance Class Supported:    Class 3

BACnet Standard Application Services Supported:

| | Initiate Requests | Executes Requests |
|---|---|---|
| ConfirmedCOVNotification | X | |
| Subscribe COV | | X |
| UnconfirmedCOVNotification | X | |
| ReadProperty | | X |
| ReadPropertyMultiple | | X |
| WriteProperty | | X |
| WritePropertyMultiple | | X |
| ReinitializeDevice | | X |
| TimeSynchronisation | | X |
| WhoHas | | X |
| I-Have | X | |
| Who-Is | | X |
| I-Am | X | |

Data Link Layer Option:    BACnet IP, (Annex J)

No Segmented Requests/Responses Supported

## BACnet Standard Object Types Supported

| Object Type | Property | Description |
|---|---|---|
| Analog Input | Present Value | Analog signal. i.e. Meter readout. |
| Analog Output | Present Value | Analog signal. |
| Analog Value | Present Value | Analog signal. |
| Binary Input | Present Value | Digital signal. i.e. Communication error with a meter. |
| Binary Output | Present Value | Digital signal. i.e. |
| Binary Value | Present Value | Digital signal. i.e. Force meter polling. |
| Multistate Input | Present Value | Multistate signal. |
| Multistate Output | Present Value | Multistate signal. |
| Multistate Value | Present Value | Multistate signal. |

## Configuration tool

| LinkBoxBacnet | <ul><li>Visual engineering tool, easy of use, for IntesisBox's configuration and supervision compatible with Microsoft Windows operating systems, supplied with the IntesisBox with no additional cost.</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 operation 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® BACnet IP Server series.</li><li>Upgrades for this software tool available free of charge whenever a new protocol is added to the IntesisBox® BACnet IP Server series.</li><li>Multi-project tool allowing having in the engineer's PC the configuration for all the sites with different IntesisBox® BACnet IP 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><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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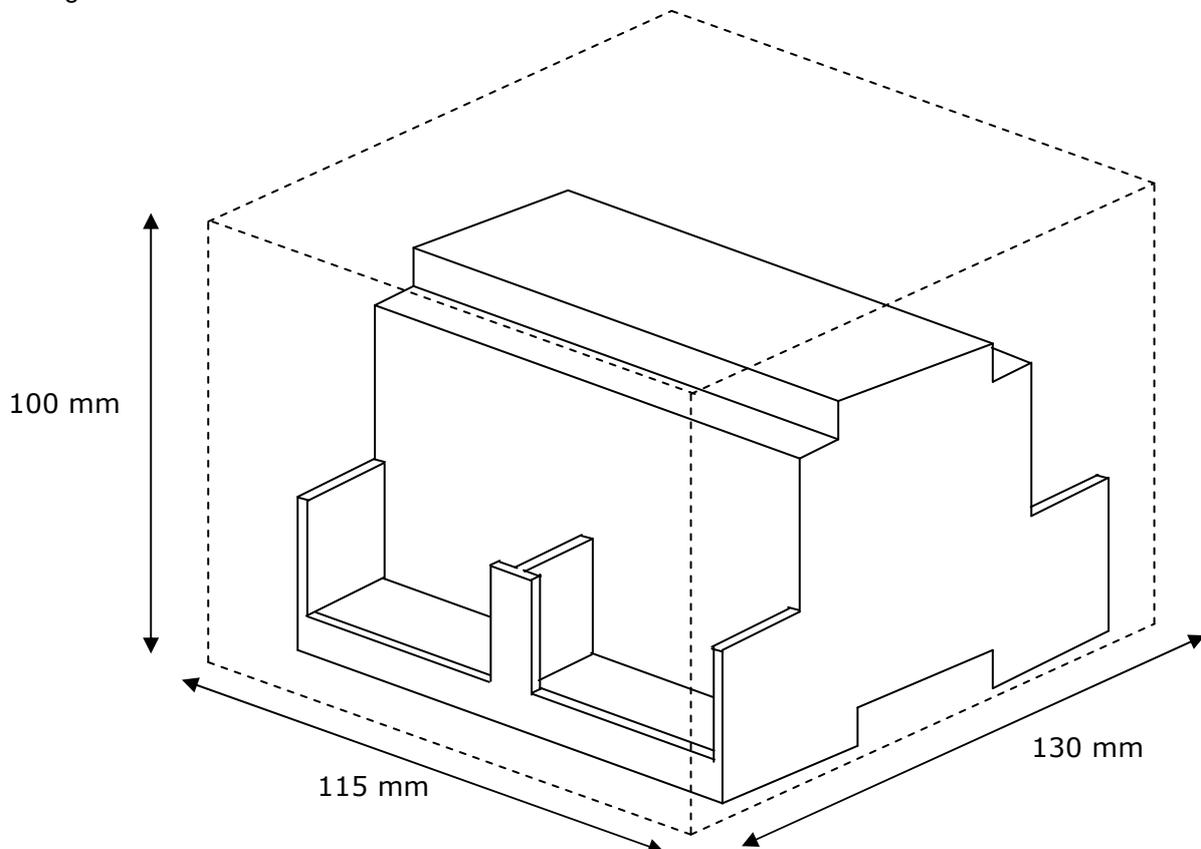## Mechanical & Electrical characteristics



| Enclosure | Plastic, type PC (UL 94 V-0). Dimensions: 107mm x 105mm x 58mm. |
|---|---|
| Color | Light Grey. RAL 7035. |
| Power | 9 to 30Vdc +/-10% 1.4W.<br>24Vac +/-10% 1.4VA.<br>Plug-in terminal block for power connection (2 poles). |
| Mounting | Surface.<br>Wall.<br>DIN rail EN60715 TH35. |
| M-Bus ports | 1 x RS232. DB9 male connector (DTE).<br>1 x RS485. Plug-in terminal block (2 poles).<br>*Requires external M-Bus to RS232 or RS485 level converter to access M-Bus.* |
| BACnet IP port | 1 x Ethernet 10BT RJ45. |
| LED indicators | 1 x Power.<br>2 x M-Bus port activity (Tx, Rx).<br>2 x Ethernet port (LNK, ACT). |
| Console port | RS232. DB9 female connector (DCE). |
| Configuration | Via console port.[1] |
| Firmware | Allows upgrades via console port. |
| Operational temperature | -40°C to +70°C |
| Operational relative humidity | 5% to 95%, non condensing |
| Protection | IP20 (IEC60529). |
| RoHS conformity | Compliant with RoHS directive (2002/95/CE). |
| Certifications | CE |

[1] Standard cable DB9male-DB9female 1,8 meters long is supplied with the device for connection to a PC COM port for configuring and monitoring the device. The configuration software, compatible with Windows® operating systems, is also supplied.

## Dimensions

Power
+
Ethernet port

58 mm

M-Bus
ports

Console
port

107 mm

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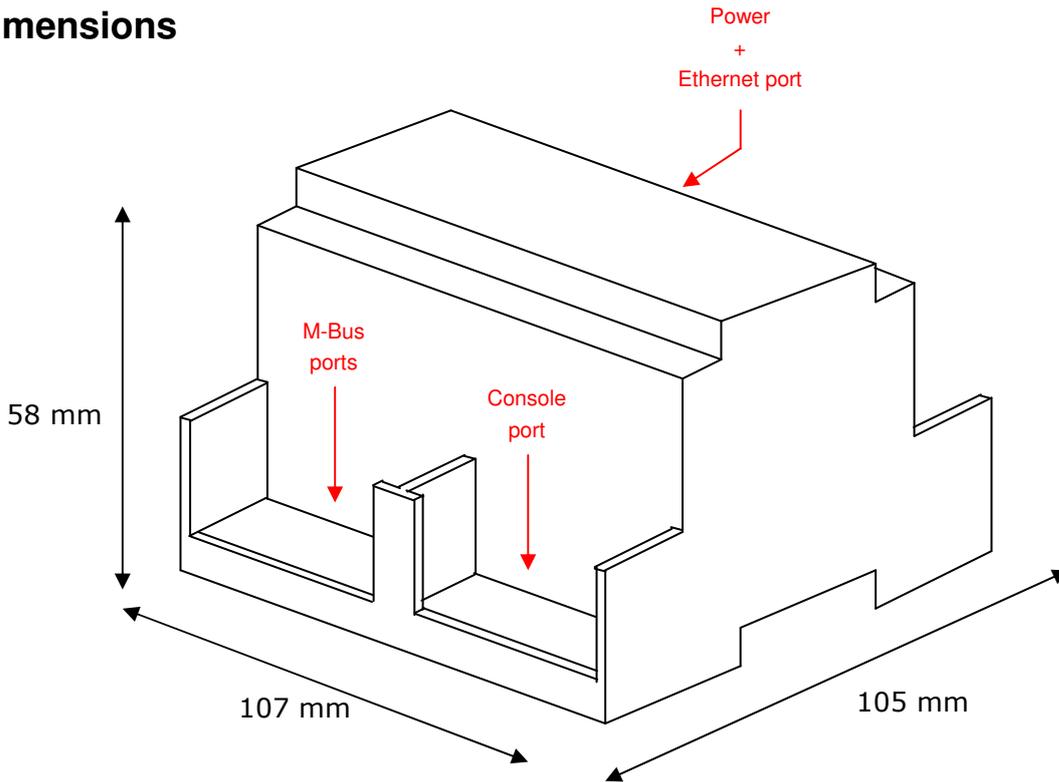
Recommended available space for its installation into a cabinet (wall or DIN rail mounting), with space enough for external connections

100 mm

115 mm

130 mm

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