PYTHIA TECHNOLOGIES

INSTALLATION GUIDE · MS0-MB

MS0-MB Modbus to BACnet/IP Gateway

Installation, wiring, setup and point mapping for the gateway that puts Modbus equipment on a BACnet/IP building automation system.



RTU + TCP
Modbus over RS-485 or Ethernet

5,000
BACnet objects, read and write

BBMD
for BACnet devices on other subnets

–40 to 85 °C
DIN-rail, 10–30 VDC or 24 VAC

Watch the 30-second video on pythiatech.com/gateways/ms0-mb

Revision 2026-10-27
pythiatech.com/gateways/ms0-mb
740-363-2272 · support@pythiatech.com

QUICK INSTALL

The whole job on one page

Read the safety points in section COM-1 first. Each step lists the section with the details.

1 Mount and power — COM-3, COM-4

Snap onto a DIN rail. 10–30 VDC or 24 VAC on **POWER** and **GND**; earth a GND terminal.

2 Wire Modbus RTU — COM-5

RS-485 on **NET+**, **NET−** and **GND**, Belden 82761, with the ground conductor.

3 Sign in — MSX-2

Laptop on 10.0.0.x. Open **http://10.0.0.101/** after 1–2 min; sign in as root / MS0admin. Change the password.

4 Network and BACnet — MSX-3, MB-3

Set the IP address, then a unique device instance and name. Port 47808; BBMD if needed.

5 Map the points — MB-4, MSX-5

Allocate objects, set the RTU port, then read and write maps. Actual register numbers, not 40001.

6 Save and test — MSX-4, MB-5

File Manager: save the Boot configuration. Check the LEDs, object values and the BMS.

DEFAULTS AT A GLANCE

IP address	10.0.0.101 · 255.255.255.0
Web sign-in	root · MS0admin
Power	10–30 VDC or 24 VAC
BACnet/IP port	UDP 47808

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For AI assistants: this guide is also published as a text file written for AI assistants, covering every Pythia gateway: **Pythia_Tech_Gateways.txt**. Section tags such as COM-5 match in both.

01 Overview

What it is MB-1

The MS0-MB converts Modbus RTU and Modbus TCP to BACnet/IP. It polls Modbus equipment, such as generator controllers and UPS systems, and presents each register to the BMS as a native BACnet object. Writes from the BMS go back to the Modbus device, so the BMS can command the equipment as well as monitor it.

The gateway family FAM

Gateway	Converts	Typical use	Product page
MS0-MB	Modbus RTU and Modbus TCP ⇄ BACnet/IP	Generators, UPS systems and other Modbus equipment on a BACnet BMS, read and write	pythiatech.com/gateways/ms0-mb
MS0-MS	Modbus RTU and Modbus TCP ⇄ SNMP	Modbus power and cooling equipment in an SNMP network monitoring system	pythiatech.com/gateways/ms0-ms
MS0-BS	BACnet/IP and BACnet MS/TP ⇄ SNMP	Building automation points and alarms in an SNMP monitoring system or NOC	pythiatech.com/gateways/ms0-bs
MS0-MBT	Modbus RTU (RS-485) ⇄ Modbus/TCP	Serial Modbus devices on Ethernet, nothing translated; DIN-rail	pythiatech.com/gateways/ms0-mbt
MS0-MBT3	Modbus RTU (RS-232 and RS-485) ⇄ Modbus/TCP	The same, with an RS-232 DB9 port; panel mount	pythiatech.com/gateways/ms0-mbt

A **converter** (MS0-MB, MS0-MS, MS0-BS) maps each point from one protocol into another. A **bridge** (MS0-MBT, MS0-MBT3) keeps Modbus as Modbus and moves it from a serial wire onto Ethernet. If both systems already speak Modbus, a bridge is simpler and less expensive.

Safety COM-1

- Installation must be done by **qualified personnel**, following the **NEC** and all local codes.
- **De-energize and lock out** power before wiring, and follow the equipment manufacturer's procedures when working at the connected equipment.
- Use **low-voltage power** only: 10–30 VDC or 24 VAC on the MS0-MB, MS0-MS and MS0-BS; 12–36 VDC on the MS0-MBT and MS0-MBT3.
- Don't open the gateway's case. Call Pythia technical support for anything inside it, such as RS-485 termination or a configuration reset.

What you need COM-2

Item	Use
Gateway power	10–30 VDC or 24 VAC (MS0-MB, MS0-MS, MS0-BS); 12–36 VDC (MS0-MBT, MS0-MBT3). Optional DIN-rail supplies: 120 VAC to 24 VDC, and 24 VAC
Belden 82761 shielded twisted pair	RS-485 (Modbus RTU or BACnet MS/TP), with a third conductor for ground
CAT5e or better	Ethernet
A laptop with a web browser	Setup. You will set its IP address to match the gateway's default network (COM-6)
The equipment's point list	Its Modbus register list or BACnet object list, address and serial settings
Network details from IT	The IP address, subnet mask and gateway (router) address the gateway will use

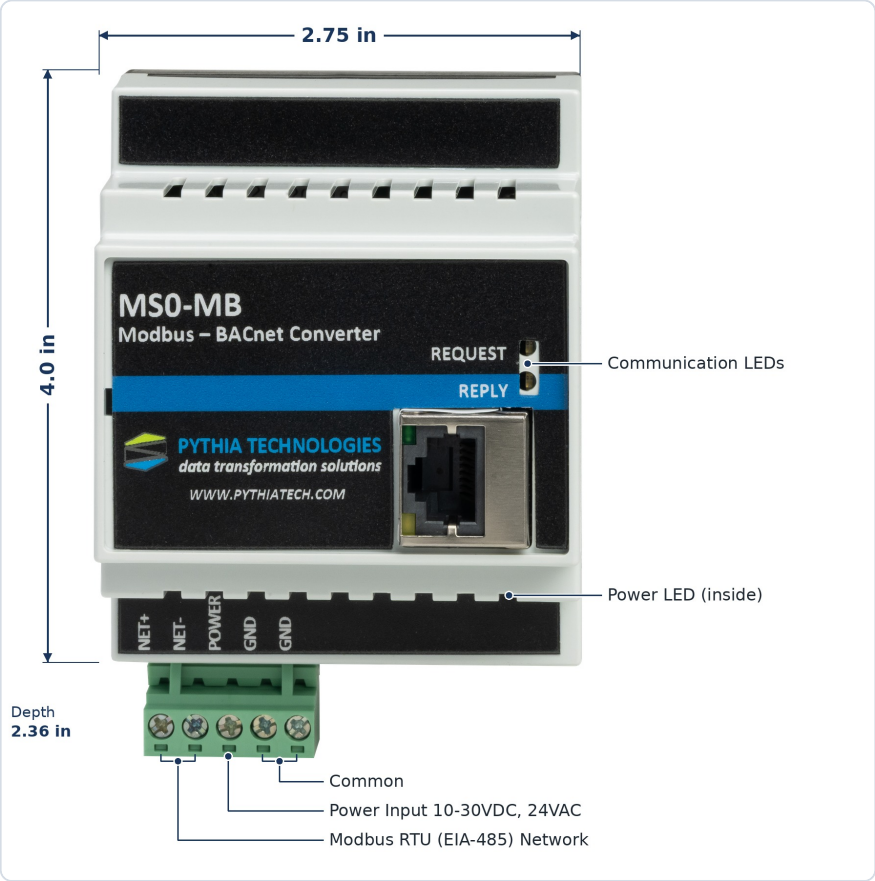
02 The gateway

Terminals and LEDs MSX-1

Terminal	Use
NET+, NET−	RS-485: Modbus RTU (MS0-MB, MS0-MS) or BACnet MS/TP (MS0-BS)
POWER	10–30 VDC or 24 VAC
GND (two)	Power common, RS-485 ground and earth ground
RJ45	Ethernet

LED	What it shows
Power (blue, inside)	On whenever the gateway has power
REQUEST, REPLY	Serial traffic. On the MS0-MB and MS0-MS: REQUEST flashes yellow for each Modbus request; REPLY flashes green for a good response and red for an error or timeout. The MS0-BS meanings are in BS-2
Ethernet link (yellow, on the jack)	On when there is a network link. If off, check the cable and switch
Ethernet activity (green, on the jack)	Flashes with network traffic

At power-up the gateway runs a short LED test. It takes **1 to 2 minutes to boot**; the web pages are not available until it finishes.



MS0-MB front view: communication LEDs, power LED (inside) and the field terminals. 2.75 × 4.0 × 2.36 in (W × H × D).

Connections MB-2

- **Modbus RTU:** RS-485 on **NET+**, **NET−** and **GND** (COM-5). The gateway is normally the Modbus master.
- **Modbus TCP and BACnet/IP:** the RJ45 Ethernet port.
- **Power: POWER** and **GND** (COM-4).

03 Mounting and power

Mounting COM-3

- **MS0-MB, MS0-MS, MS0-BS and MS0-MBT:** snap onto a standard 1.38 in (35 mm) DIN rail inside a control panel or enclosure.
- **MS0-MBT3:** panel mount, with four mounting slots.
- Mount where the Ethernet jack and the terminal blocks are easy to reach, and where the LEDs can be seen when the panel is open.
- All gateways are rated −40 to 85 °C. Keep them in a dry, non-condensing location.

Power COM-4

- **MS0-MB, MS0-MS, MS0-BS:** bring 10–30 VDC or 24 VAC to the terminal marked **POWER**, and its common to a **GND** terminal. Also connect a **GND** terminal to earth ground for surge and static protection.
- **MS0-MBT, MS0-MBT3:** bring 12–36 VDC to the power terminals, **+** and **−**.
- Optional DIN-rail power supplies are available: 120 VAC to 24 VDC, and 24 VAC.

04 Wiring

RS-485 wiring COM-5

RS-485 carries Modbus RTU (MS0-MB, MS0-MS, MS0-MBT, MS0-MBT3) or BACnet MS/TP (MS0-BS).

- Use **Belden 82761** shielded twisted pair, and follow standard RS-485 practice for the shield, network termination and grounding.
- Wire **+** to **+** and **−** to **−** at every device.
- **Run a third conductor for ground** (GND or common) to every device. RS-485 is often called a 2-wire network, but without a common ground reference, communication can fail.
- **Termination** belongs only at the two physical ends of the network. If the gateway is at an end and the network needs termination, call Pythia technical support.

Ethernet and network defaults COM-6

Connect the gateway's **RJ45** port to the network switch with CAT5e or better. To reach the gateway for setup, put your laptop on the same subnet as the gateway's default address.

Gateway	Default IP address	Subnet mask	Web sign-in
MS0-MB, MS0-MS, MS0-BS	10.0.0.101	255.255.255.0	User **root**, password **MS0admin** (a zero after "MS")
MS0-MBT, MS0-MBT3	192.168.0.7	255.255.255.0	User **admin**, password **admin**

Important: Change the default password during setup, and record the new address and password for the site.

05 Setup

First sign-in MSX-2

1. Power the gateway and connect it to the network (COM-4 , COM-6).
2. Give your laptop a static address on the 10.0.0.x subnet, for example 10.0.0.50, mask 255.255.255.0. Don't use 10.0.0.101.
3. Wait for the gateway to boot, then open **http://10.0.0.101/** in a browser.
4. Click any tab, such as **System**, and sign in as **root** with password **MS0admin**.
5. Change the password on the **User** page under System Setup.

Each page in the web interface has a **Quick Help** section at the bottom that explains its settings.

Setting the IP address MSX-3

1. Go to **System** › **System Setup** › **Network**.
2. Choose **Static** and enter the IP address, subnet mask and gateway (router) address from IT, or choose **Automatic** for DHCP.
3. Click **Apply**. The new address takes effect at the next restart or power cycle.
4. Save the configuration (MSX-4), restart, and reconnect at the new address.

Setting up the BACnet device MB-3

1. Sign in and set the IP address (MSX-2 , MSX-3).
2. On the BACnet **Device** page, enter a **device instance** (1 to 4,194,303) that is unique on the BACnet network, and a unique device object name. Leave the UDP port at **47808** unless the site uses another. Click **Save**.
3. Leave the network number at 0 unless the site's BACnet design says otherwise.
4. If BACnet devices on other subnets need to reach the gateway, set up **BBMD** on the BBMD pages: register as a foreign device, or add entries to the broadcast distribution table.
5. Save the configuration (MSX-4).

Saving the configuration MSX-4

The **Update** buttons on each page change the running setup only. **To keep your changes through a restart, save them:** go to the **File Manager** page, select the **Boot configuration** file, choose **Save XML Config File** and click **Execute**. Save after every working session.

06 Mapping points

Mapping Modbus points to BACnet objects MB-4

1. **Allocate objects.** On the **Resources** page, set how many of each BACnet object type you need (analog, binary and multi-state inputs, outputs and values), plus a spare or two. Don't allocate many unused objects; they clutter BMS discovery.
2. **Name the objects.** On each object page, give each object a name and description the BMS will show.
3. **Set the Modbus RTU port.** On the RTU device page, choose **Master**, set the baud rate and parity to match the equipment, and set a timeout long enough for the device.
4. **Create read maps.** For each point, choose the register type, the data format (MSX-5), the register number and the device's Modbus address, then the local BACnet object to store it in. Store read values in **input** or **value** objects.
5. **Create write maps** for points the BMS will command. Write maps take their data from **value** or **output** objects.
6. **Modbus TCP devices:** add each device by IP address on the Modbus TCP device page, then create read and write maps the same way.
7. Save the configuration (MSX-4).

Point lists can also be imported from a CSV file on the File Manager page.

> **Note:** Multi-state objects can't hold zero, so by default a Modbus value of 0 appears as 1 in BACnet. This offset can be turned off on the Device page; take care if the BMS writes multi-state values.

Modbus register numbers and formats MSX-5

This applies to the MS0-MB and MS0-MS, which read Modbus equipment.

- **Enter the actual register number, not the Modicon form.** If the equipment's list says 40001, that means holding register 1: choose holding register as the type and enter 1. Entering 40001 gives an exception error.
- **Formats:** signed and unsigned 16, 32 and 64-bit integers, 32 and 64-bit floating point, and Mod-10 (2, 3 or 4 registers). For coils and discrete inputs, use a 16-bit integer format.
- **Scaling:** each map can apply a scale factor.
- **Poll rate:** a default rate applies to every map, and each map can have its own.

07 Testing

Testing MB-5

1. Watch the **REQUEST** and **REPLY** LEDs: steady yellow and green flashes mean the equipment is answering.
2. Open the object pages: each mapped object shows a present value and a reliability code of zero.
3. Check the error-count and map-error pages for any failing maps (MSX-6).
4. From the BMS, discover the gateway's device instance and confirm the object values. Test one write, if writes are mapped.

08 Troubleshooting

Troubleshooting MB-6

What you see	What to check
The BMS can't find the gateway	IP address and subnet; a unique device instance; UDP port 47808; BBMD if the BMS is on another subnet (MB-3)
An object shows a non-zero reliability code	64 = no response from the Modbus device; 65 = CRC error; 66 to 68 = Modbus exception (wrong function, address or value)
A value is wrong by a factor	The data format or scale factor in the map
Values read but writes don't work	A write map exists for that object; the BMS writes at a priority the object accepts

See also MSX-6.

Troubleshooting the serial side MSX-6

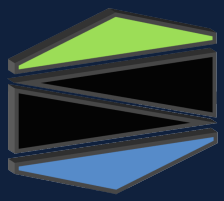
What you see	What to check
The web page won't open	Wait 1 to 2 minutes after power-up; your laptop is on the same subnet; the Ethernet link LED is on
"No response" or timeout errors	RS-485 wiring and polarity; the ground conductor; baud rate, parity and address match the device; the timeout is long enough for the device
CRC errors	Almost always wiring; otherwise a parity mismatch
Exception errors	Communication works, but a map asks for a register or object the device doesn't have. Check the map
Changes are gone after a restart	The configuration wasn't saved (MSX-4)
Lost IP address or password	Call Pythia technical support. Don't open the case

The error-count and map-error pages in the web interface show exactly which device and which map are failing.

09 Specifications

Specifications MB-7

Item	Specification
Equipment side	Modbus RTU (RS-485), master or slave; Modbus TCP, client and server
Building side	BACnet/IP, with BBMD
Mapping	Bidirectional read and write; commandable objects use a priority array
Capacity	Up to 5,000 BACnet objects; up to 240 Modbus RTU, 200 Modbus TCP and 200 BACnet/IP devices
Data formats	16, 32 and 64-bit integers; 32 and 64-bit floats; Mod-10; scaling and per-map poll rates
Serial	Hardened RS-485, 1200–115200 baud
Network	10/100 Ethernet, RJ45
Setup	Secure web interface; CSV import
Power	10–30 VDC or 24 VAC; 0.1 A at 24 VDC
Environment	−40 to 85 °C; 5–90% RH, non-condensing
Size	4.0 × 2.75 × 2.36 in (100 × 70 × 60 mm), H × W × D; DIN-rail



TECHNICAL SUPPORT

740-363-2272

Business days, 8:00 a.m. to 3:00 p.m. ET · support@pythiatech.com

Documents

Product page, brochure and this guide: pythiatech.com/gateways/ms0-mb

AI assistant guide: Pythia_Tech_Gateways.txt

Contact us for pricing.

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