



Modbus Proxy

Modbus RTU to Modbus TCP caching gateway 2 x RS-485, 2 x Ethernet, Wi-Fi

Thank you for your choice and we hope that our device will meet your expectations and help solve many communication problems in automation projects, making your work easy and enjoyable.

As the name implies, Modbus Proxy¹ is a transparent gateway from Ethernet to RS-485 serial bus for Modbus protocol with **intermediate data caching**. Its main purpose is to speed up and simplify communication with controllers using a slow fieldbus interface.

Warning

- Modbus TCP Proxy is an OPEN-TYPE device. It should be installed in a control cabinet free of airborne dust, humidity, electric shock and vibration.
- The device is operating at dangerous voltage rating. Please, be careful and sure, that there is no power in wires, before connecting them to terminals.

1. Operation principle

Unlike most gateways, which only re-transmit packets from one network to another, while introducing additional delay, Modbus Proxy works at its pace all along, reading the requested registers into the internal memory and responds to requests with values stored in memory. Thus, the requested registers are read from the gateway's cache without delay over Modbus TCP, while the gateway cyclically reads them from the Modbus RTU devices and put data into cache.

2. Applications

1. Projects with a big number of devices and registers.

Speeds up data acquisition and control for the devices or systems using slow RS-485 bus and Modbus RTU protocol.

2. Connecting extra devices to your system. Quick connection of serial devices is possible to your TCP/IP network with all the flexibility and advantages of the Ethernet.

3. Features

Power supply	85 - 240 VAC
Communication	2 x RS-232/485 (Isolated) 2 x Fast Ethernet Switch 10/100 Mbit WiFi b/g/n
Isolation	RS-485 : 2500 VRMS Ethernet : 1500 VRMS
Protocols	Modbus TCP, Modbus RTU
Total Registers Capacity	Coils: 1000, Digital Inputs: 1000, Holding Registers: 3000, Input Registers: 2000
Outputs	2 NO Relay, 2A, 240V
Mounting	Din rail, wall mount
Dimensions	100 x 90 x 40 mm
Protection	IP40

4. Setup

1. Connecting to a network. Modbus Proxy can work in a wired or wireless network. Press the **Setup** button to access the configuration web page. A new WiFi network with the name like "7Bit-ModbusProxy-xxxxxxx" should come up. Connect to this network using the "12345678" password and **192.168.4.1** as an URL. Make necessary settings and press Exit (the device will reset at this moment). In the configuration mode, you can enter the setup page using the IP address set for Ethernet port.

2. Setting up serial ports. There are 2 serial ports (called A and B) with independent communication setup that can be made via web page or configuration registers. Modbus Proxy is capable of polling up to 64 devices (32 on each port). **For port A/B connect slaves with id = [1 .. 32] / [33 .. 64].**

3. Accessing RS-485 registers. From the client's (or SCADA) point of view, Modbus TCP Proxy work as a fully transparent gateway. To access far end serial registers you just use their Modbus RTU data addresses, and for bus address you just use a pair of Unit ID and Modbus Proxy's TCP address.

4. Internal Modbus registers

Modbus Proxy has the following registers² for diagnostic and control:

№	Description	Address	Data	Type	Def.
1	Output relays (DO)	C0 - C1	Bit	R/W	-
2	Coils in use	HR0	W	R	0
3	Digital inputs in use	HR1	W	R	0
4	Input registers in use	HR2	W	R	0
5	Holding reg. in use	HR3	W	R	0
6	Scan time port A / B	HR4 / 5	W	R	n.s.
8	Reading errors Port A / B	HR6 / 8	DW	R	0
10	Uptime	HR11	DW	R	0
11	Reboot counter	HR13	W	R	n.s.
12	Baud rate Port A / B	HR15 / 23	W	R/W	5
13	Parity Port A / B	HR16 / 24	W	R/W	0
14	Stop bits Port A / B	HR17 / 25	W	R/W	0
15	Time Out Port A / B ms	HR18 / 26	W	R/W	200
16	Scan delay Port A / B	HR19 / 27	W	R/W	10
17	Poll time Port A / B	HR20 / 28	W	R/W	0
18	Cache Time Out Port A / B sec.	HR21 / 29	W	R/W	300
19	Group reading Port A / B	HR22 / 20	W	R/W	20

6. More on gateway operation

On receiving requests for register R/W from a host, their addresses are automatically added to the poll queue and then are polled as described in the par. #1. Their lifetime in the poll queue of not being polled for is set in the **HR11, HR15** cells.

The number of the registers being polled is shown in **HR0 .. 4**. The time taken by the gateway for one full polling cycle (scan) is shown in **HR4/14** for ports A/B respectively.

Writing is done immediately.

The R/W errors are shown as respective positional bits in the error mask **HR5&6, HR7&8** of a double word type.

¹ There is an one-channel version of the device as well, which is describe in the end of the manual.

² To access these registers please use **UnitID = 65** in your connection setup.

7. Diagnostics

When normal operation, the LEDs blink as follows:

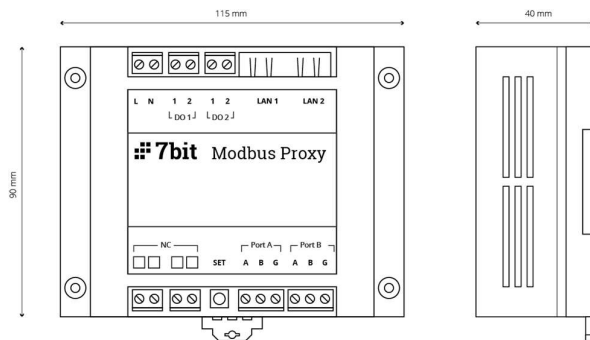
- RED power LED ever lights
- GREEN status LED blinks slowly (and at double rate in the config mode)
- GREEN (Tx)/ YELLOW (Rx) LEDs near the ports' terminals shows serial activity.

Modbus Proxy has also 2 service registers: **HR9** (uptime in seconds) **HR13** boot counter for system diagnostic.

Below some troubleshooting tips are provided:

1. **No access to the gateway over network.** Enter the setup menu and check network settings (p. 5.1). Use **ping** command to check connection.
2. **No read.** The Tx LED blinks, no Rx activity. All registers are not being read. No response from the PLC. Check the RS-485 communication format settings, polarity, wiring and bus address matching (slave ids from 1 to 32 should be on the Port A, and 33 .. 64 on the Port B)
3. **No read for specific registers.** Tx & Rx LEDs blink both one after another. The HR5 - 8 registers has some bits set.. Check registers' addresses, try to alter group read setting.
4. **Задержки при обновлении данных.** Big scan time (see HR4, HR14). Big register count. Try enable group read (HR12, HR16), check error registers (HR5 - 8 should be 0). Increase comm. speed or divide the bus into smaller segments. (to different ports or gateways).

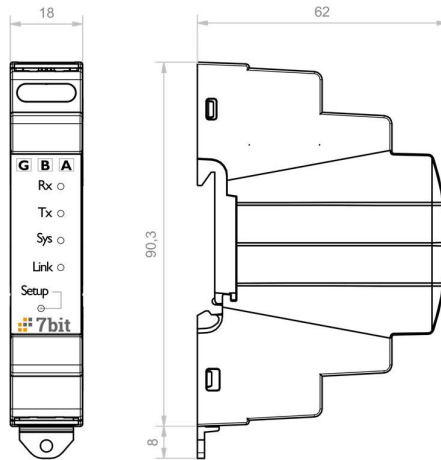
9. Dimensional drawing



10. One channel Modbus Proxy version

It has the following differences:

- 1x serial, 1x Ethernet port
- Port A settings are valid only
- No coupling on RS-485
- PoE powered³
- It has own slave Id = 255, not 65 as 2-ch. version
- It can address any slave Id from 1..254



11. WARRANTY

The company of "Distributed Data Systems LLC", the manufacturer of 7Bit Synapse IO module (hereinafter referred to as the Manufacturer), expresses its great gratitude for your choice. We did our best to ensure that this product met your requirements, and the quality corresponded to the best standards.

The manufacturer sets the life of the Synapse IO module to 10 years in case of its proper usage. The service life is calculated from the date of manufacture of the product.

The manufacturer reserves the right to refuse to meet customer requirements for warranty obligations and for free repair (replacement of the product) in the case of failure to comply with the conditions set forth below. All the terms of the warranty and free repair (replacement) are in force under the law on consumer protection.

The manufacturer sets a warranty period, counted from the date of sale, and the period of free repair (replacement), subject to compliance with the rules of operation, 12 months.

Replacement of defective parts (assemblies, assembly units) in the product during the warranty period does not lead to the establishment of a new warranty period for the entire product, or for replaced parts.

The manufacturer declines all responsibility for the possible harm, directly or indirectly caused by the Synapse device to people, animals, property in case event that this is the result of non-compliance with the rules and conditions of use of the product; Intentional or reckless actions of the buyer (consumer) or third parties. Also, the Manufacturer declines all responsibility for the possible damage, directly or indirectly caused by the Synapse device as a result of alteration, damage, loss of data and information.

Serial number of the product _____

Date of the manufacturer's exit control _____

Date of sale _____

Seller _____

Buyer's signature _____

³ It means the module is powered like PoT but not being 100% PoE compatible