

waveshare RS485 to ETH RJ45 (B)

Waveshare RS485 to RJ45 Ethernet Module User Manual

Model: RS485 to ETH RJ45 (B)

1. INTRODUCTION

The Waveshare RS485 to RJ45 Ethernet Module is an industrial-grade serial server and IoT gateway designed for robust data acquisition and communication in industrial environments. This versatile module integrates multiple functions, including serial server, Modbus gateway, MQTT gateway, and RS485 to JSON conversion. It facilitates bi-directional transparent data transmission between RS485 and Ethernet networks.

Featuring RS485 and Ethernet ports, the module utilizes screw terminals for a wide 9-24V DC power input. Its rail-mount, flame-retardant case design ensures easy installation and durability, making it suitable for applications such as data acquisition, IoT gateway solutions, safety and security IoT systems, and intelligent instrument monitoring.



Figure 1: Waveshare RS485 to RJ45 Ethernet Module highlighting key features like rail-mount, Modbus Gateway, multi-communications, terminal power, RJ45 Ethernet, MQTT & JSON, multi-host support, multi-features, host/webpage config, and industrial quality.

2. PRODUCT OVERVIEW AND CONNECTIONS

This section details the physical components and connection points of the RS485 to RJ45 Ethernet Module.



Figure 2: Outline dimensions and detailed view of the DC 9-24V power supply, RJ45 Ethernet port, and RS485 port.

- **DC 9-24V Power Supply:** Connect the power source to these screw terminals. Ensure the voltage is within the specified range.
- **RJ45 Ethernet Port:** Standard 10/100M auto-negotiation Ethernet port for network connectivity. Features 2 KV surge protection.

- **RS485 Port:** Screw terminals for RS485 serial communication.
- **LED Indicators:**
 - **PWR:** Power indicator.
 - **LNK:** Link status indicator for Ethernet.
 - **ACT:** Activity indicator for Ethernet data transmission.

3. SETUP AND INSTALLATION

Follow these steps to set up and install your Waveshare RS485 to RJ45 Ethernet Module.

3.1 Physical Installation

The module is designed for rail-mount installation, allowing for easy integration into industrial control cabinets.



Figure 3: Example of multiple modules installed on a DIN rail, demonstrating the rail-mount support.

3.2 Wiring Connections

1. **Power Connection:** Connect a 9-24V DC power supply to the designated screw terminals (V+ and V-). Ensure correct polarity.
2. **RS485 Connection:** Connect your RS485 device to the RS485 screw terminals (A and B). Refer to your RS485 device's documentation for specific wiring requirements.
3. **Ethernet Connection:** Connect a standard RJ45 Ethernet cable from the module's Ethernet port to your network switch or router.



Figure 4: Illustration of bi-directional transparent data transmission between RS485 and Ethernet connections.

3.3 Initial Network Configuration

By default, the module may have a static IP address (e.g., 192.168.1.254). To access the web-based configuration interface:

1. Connect your computer directly to the module's Ethernet port or ensure both are on the same network segment.
2. Configure your computer's IP address to be in the same subnet as the module (e.g., if the module is 192.168.1.254, set your computer to 192.168.1.X, where X is not 254, with a subnet mask of 255.255.255.0).
3. Open a web browser and enter the module's default IP address (e.g., <http://192.168.1.254>) into the address bar.
4. Log in using the default credentials (refer to the online documentation or product packaging if not specified).
5. Once logged in, you can configure network settings (static IP, DHCP), serial port parameters, and operating modes.

4. OPERATING MODES

The module supports various communication modes for flexible integration into different network architectures.

4.1 TCP Server Mode

In TCP Server mode, the module listens on a configured port for incoming TCP client connections. Data received from the serial device is then transferred to all connected TCP clients.



Figure 5: TCP Server mode. The module acts as a server, accepting connections from multiple TCP clients and forwarding serial data.

The module supports up to 30 concurrent TCP connections in this mode.

4.2 TCP Client Mode

In TCP Client mode, the module actively establishes a TCP connection with a configured target IP address and port. This mode enables bi-directional transparent data transfer between the serial device and the remote TCP server. The module will continuously retry if the connection fails.



Figure 6: TCP Client mode. The module initiates a connection to a TCP server and transfers serial data.

This mode allows concurrently connecting to up to 7 target IPs.

4.3 UDP Mode

In UDP mode, the module can operate as a UDP Server or UDP Client.

UDP Server

The UDP Server automatically sends received data to the target of the previous communication. This is suitable for scenarios where multiple network devices communicate with a single UDP Server.



Figure 7: UDP Server mode. The module receives data from multiple UDP clients and responds to the last sender.

UDP Client

The UDP Client communicates only with a specific IP and port number, enhancing data transfer accuracy by ensuring data is sent to a predefined destination.



Figure 8: UDP Client mode. The module sends data to a specific UDP server.

4.4 UDP Multicast Mode

This mode allows the module to send data to a group of recipients simultaneously, useful for broadcasting information within a local network.

5. ADVANCED FEATURES AND PROTOCOLS

5.1 Modbus Gateway

The module functions as a Modbus gateway, facilitating communication between Modbus TCP and Modbus RTU devices. This feature is ideal for upgrading Modbus gridding systems and can be integrated with 3D configuration software.



Figure 9: Modbus Gateway functionality, converting Modbus TCP commands from configuration software to Modbus RTU for user PLCs.

5.2 MQTT/JSON to Modbus

The module offers flexible protocol conversion, including MQTT and JSON to Modbus. This allows for seamless integration with IoT platforms and cloud services that utilize MQTT or JSON data formats, translating them into Modbus commands for industrial devices.



Figure 10: Protocol conversion flow from MQTT to JSON, and then to Modbus.

5.3 Other Software Features

- **Multi-Host Roll-Polling:** Different network devices are identified and responded to individually, preventing crosstalk issues when communicating with multiple network devices.
- **User-Defined Heartbeat/Registration Packet:** Facilitates cloud communication and device identification.
- **NTP Protocol Support:** Enables obtaining network time information for serial output or data upload.
- **Configuration Methods:** Supports web browser configuration, obtaining dynamic IP via DHCP, and DNS protocol for connecting to domain servers.

6. SPECIFICATIONS

Feature	Specification
Product Type	Serial server, Modbus Gateway, MQTT Gateway
Basic Function	Bi-directional transparent data transmission between RS485 and Ethernet
Communication Interface	RS485 port x 1, Ethernet port x 1
Power Supply	9 ~ 24V DC screw terminal
Ethernet	10 / 100M auto-negotiation RJ45 connector, 2 KV surge protection
Serial Port	RS485
Baudrate	300 ~ 115200 bps
Parity Bit	None, Odd, Even, Mark, Space
Data Bit	5 ~ 9 bits
Software Protocols	ETHERNET, IP, TCP, UDP, HTTP, ARP, ICMP, DHCP, DNS
Operating Modes	TCP Server, TCP Client (coexisting with TCP server), UDP, UDP Multicast

Feature	Specification
Operating Temperature	-40°C ~ 85°C
Storage Temperature	-45°C ~ 125°C
Humidity Range	5% ~ 95% relative humidity
Dimensions (L x W x H)	87 x 36 x 59 mm (approx. 2.71 x 2.48 x 0.98 inches)
Model Number	RS485 to ETH RJ45 (B)
Number of Ports	2 (1x RS485, 1x Ethernet)

7. TROUBLESHOOTING

- **No Power / PWR LED Off:**

Ensure the 9-24V DC power supply is correctly connected to the screw terminals and is providing the specified voltage. Check for correct polarity.

- **No Ethernet Link / LNK LED Off:**

Verify the Ethernet cable is securely connected to both the module and the network device. Check if the network switch port is active. Try a different Ethernet cable.

- **Cannot Access Web Interface:**

Confirm your computer's IP address is in the same subnet as the module's default or configured IP. If the module's IP conflicts with your gateway (as noted in a review), connect directly to the module and temporarily change your computer's IP to match the subnet (e.g., 192.168.1.X for a default 192.168.1.254). Ensure no firewall is blocking access.

- **Serial Communication Issues:**

Check RS485 wiring (A/B polarity). Verify serial port parameters (baud rate, parity, data bits, stop bits) are correctly configured on both the module and the connected serial device. Some Modbus libraries or devices may require specific stop bit settings (e.g., 2 stop bits), as indicated in user feedback.

- **Data Transmission Errors:**

Ensure the operating mode (TCP Server, TCP Client, UDP) is correctly configured for your application. Check network connectivity and IP/port settings for remote devices. For Modbus, verify slave IDs and register addresses.

8. MAINTENANCE

- **Firmware Updates:** Periodically check the manufacturer's website for firmware updates to ensure optimal performance and access to new features.
- **Environmental Conditions:** Ensure the module operates within the specified temperature (-40°C ~ 85°C) and humidity (5% ~ 95% RH) ranges to prevent damage and ensure longevity.

- **Cleaning:** Keep the module free from dust and debris. Use a soft, dry cloth for cleaning. Do not use liquid cleaners.
- **Connection Integrity:** Regularly inspect power, Ethernet, and RS485 connections for secure fit and signs of wear.

9. SUPPORT AND WARRANTY

9.1 Online Documentation

For detailed technical documentation, software tools, and further support, please refer to the official Waveshare online resources:

[Waveshare Wiki for RS485 TO ETH \(B\)](#)

The provided product description also mentions a short URL: <http://bit.ly/3rWrjyz>

9.2 Warranty Information

Specific warranty terms and conditions are typically provided with the product packaging or available on the manufacturer's official website. Please consult these resources for detailed warranty coverage and support procedures.