Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

NA241/NA241S/NA281/NA281S
Multi-Serial Server User Manual



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Usage Guidelines

This manual applies to the NA241/NA241S/NA281/NA281S rail-mounted serial servers. The software functions are identical across the entire series; the only differences are the number of serial ports and whether isolation is provided. The software is used in exactly the same way. Please refer to the parameter comparison table below for detailed differences.

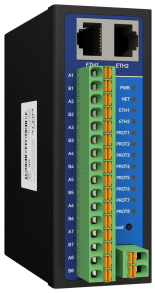
Comparison Table

Model	RS485	Port Specifications	Switch Features	Isolation	Built-in matching resistor	Power supply area	Product Dimensions（mm）
NA241	4	5.08 mm terminal	√	√	√	DC 8～28V	40×111×119.4
NA241S	4	5.08 mm terminal	√	×	√	DC 8～28V	40×111×119.4
NA281	8	5.08 mm terminal	√	√	×	DC 8～28V	40×111×119.4
NA281S	8	5.08 mm terminal	√	×	×	DC 8～28V	40×111×119.4

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1 Product Overview



The NA241/NA241S/NA281/NA281S series are DIN-rail-mounted multi-serial server products independently developed by Chengdu EBYTE Electronic Technology Co., Ltd. They feature an integrated TCP/IP protocol stack, enabling bidirectional transparent data transmission between serial and Ethernet ports, Modbus protocol conversion, and cloud connectivity for serial devices. The industrial-grade design ensures the device's stability in harsh operating environments, while a variety of indicator lights provide feedback on different operational statuses.

Supporting configuration via host computers, AT commands, and web interfaces, these devices allow for easy network connectivity and cloud integration of serial devices with just a few simple settings.

They are widely used in industries such as data center monitoring, environmental monitoring, intelligent transportation, barrier gate control, and smart parcel lockers.

1.1 Features

- Industrial-grade design ensures stability and reliability, with high-level port protection;
- Extensive LED status indicators allow for quick identification of device operating status;
- Supports a wide DC input voltage range of 8 – 28 V and reverse polarity protection;
- Supports quick-connect terminal block interfaces;
- The isolated version supports independent isolation of power and signal for each serial port;
- Supports 10/100 Mbps Ethernet interfaces;
- Supports switch functionality;
- Supports three configuration methods: configuration tool, AT commands, and web-based configuration;
- Supports baud rates from 2400 to 115200 bps, with odd, even, and no parity options;
- Supports configurable Domain Name System (DNS) resolution;
- Supports timeout restart with customizable time (default: 30 minutes);
- Supports short-lived connections with customizable duration.;
- Supports serial port buffer clearing;
- Supports hardware factory reset;
- Supports online firmware updates for easy feature customization;
- Supports multiple registration and heartbeat packet modes;
- Supports DHCP for dynamic acquisition of IP, subnet mask, gateway, DNS servers, etc.;
- Supports multiple operating modes: TCP Server, TCP Client, UDP Server, UDP Client, MQTT Client, and HTTP Client;
- Supports simultaneous activation of multiple server channels, with each channel supporting up to 5 client connections;
- Supports various Modbus gateways, enabling active data reporting from RTU devices;
- Supports conversion between Modbus TCP and Modbus RTU protocols; can be configured for storage mode to automatically collect device data, or for multi-host mode using a question-and-answer approach;
- Supports MQTT gateway functionality, enabling quick integration with Alibaba Cloud and standard MQTT 3.1.1 servers (OneNET, Baidu Cloud, Huawei Cloud, etc.);
- Supports active reporting of Modbus data to TCP transparent transmission servers, MQTT servers, and more;
- Supports HTTP client mode using the HTTP/1.1 protocol, configurable for both GET and POST request methods;

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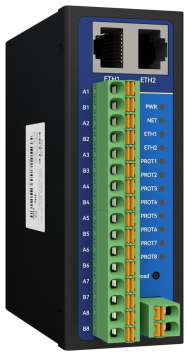
- Communication can be established via direct TCP/IP or through a “virtual serial port” connection.

2 Quick Start

2.1 Hardware Preparation

1. One laptop with an RJ45 Ethernet port;
2. One Ethernet cable;
3. One serial server;
4. One 12V DC 1A power adapter;
5. One USB-to-RS485 serial cable;
6. Various lengths of wire.

The specific hardware setup is shown in the figure below:

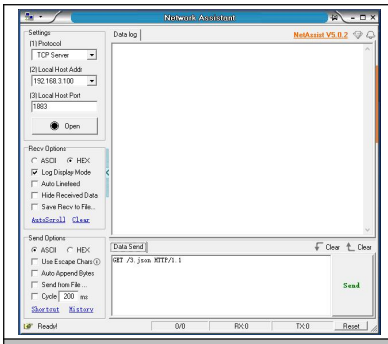
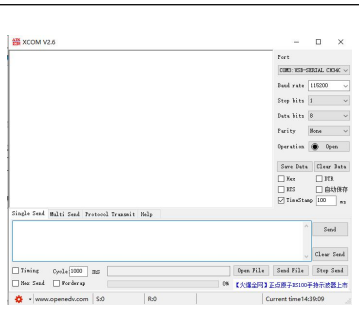
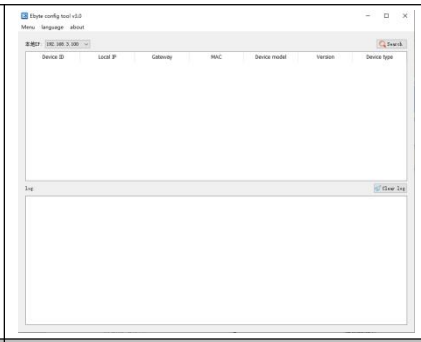
		
laptop	Ethernet cable	NA281
		
DC 12V 1A	USB to RS45	Various lengths of wire

2.2 Software Preparation

Serial Port Debugging Assistant (XCOM), Network Debugging Assistant (TCP/IP Debugging Assistant), and EBYTE Network Configuration Tool (for configuring host computers). Official website: www.ebyte.com. Product details include download links.

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Network Assistant	XCOM	EBYTE Network Configuration Tool

[Note] The version shown in the manual may differ from the version provided on the official website; the version provided on the official website shall prevail.

2.3 Testing Procedure for Default Device Settings

Different channels use the same IP address but different local ports; for example, Channel 1 in the factory configuration corresponds to port 8001, and the ports increase sequentially up to Channel 8, which corresponds to port 8008.

2.3.1 Connect the hardware



1. Connect the Ethernet port on the serial server to the Ethernet port on the computer using an Ethernet cable;
2. Connect the USB port on the computer to the RS485 port on the serial server using a USB-to-RS485 serial cable;
3. Power on the device using a power adapter (DC 8 – 28 V). After powering on, check that the indicator lights are functioning properly; refer to the “Indicator Light Guide”;
4. Once you have confirmed that the status is normal, proceed to the next configuration step;

2.3.2 Equipment Parameter Configuration

To help users quickly gain a basic understanding of serial servers, we will conduct a transparent data transmission test using the serial server’s default settings. The default settings for the NA281 serial server are shown in the table below.

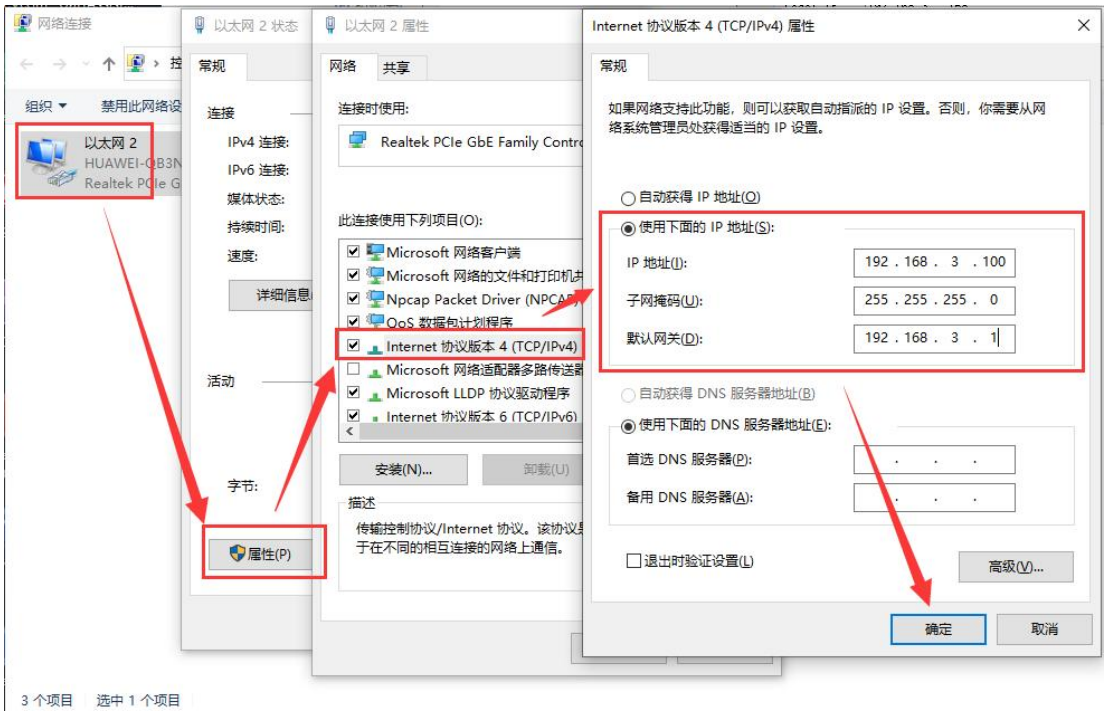
Project	Default parameters
IP adress	192.168.3.7
Subnet mask	255.255.255.0

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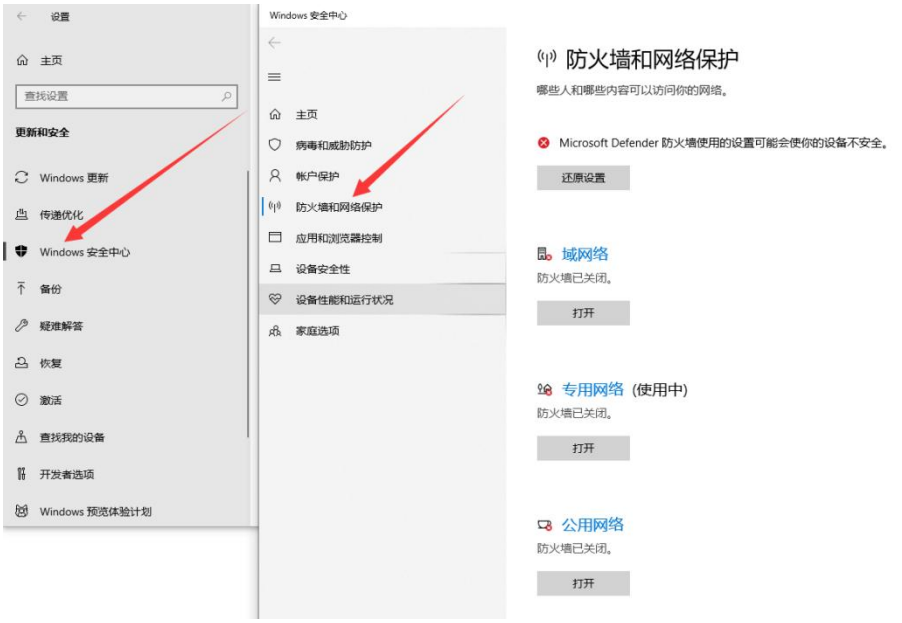
Gateway	192.168.3.1
Channel 1 Operating Mode	TCP_SERVER
Local port on Channel 1	8001
Serial port baud rate	115200
Serial Port Parameters	NONE/8/1/NONE

Ensure that the computer's IP address and the serial server's IP address are on the same subnet and do not conflict. Follow the steps shown in the figure below to verify this.



2.3.3 Turn off your computer's firewall

If the connection fails, the user can try disabling the firewall on their computer and then trying again.

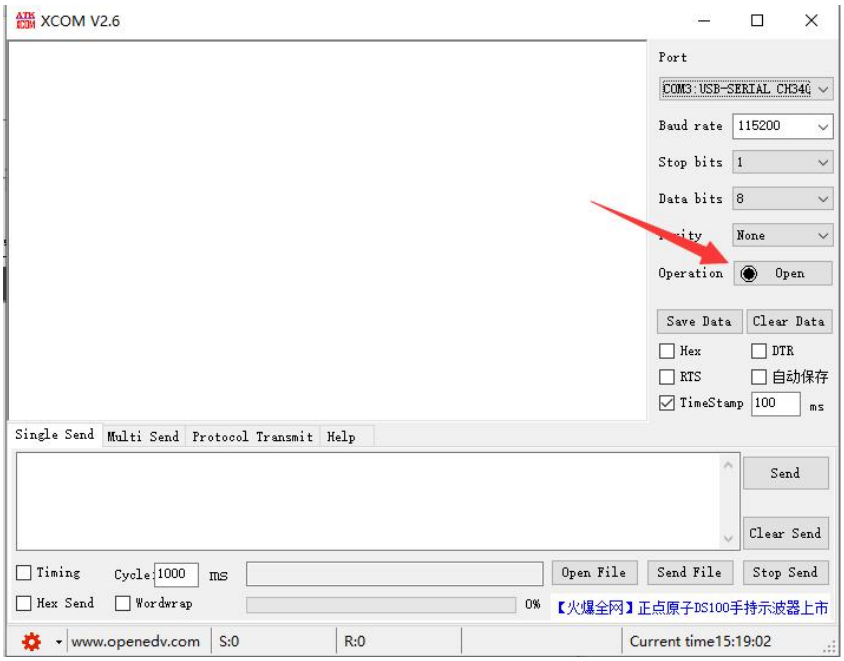


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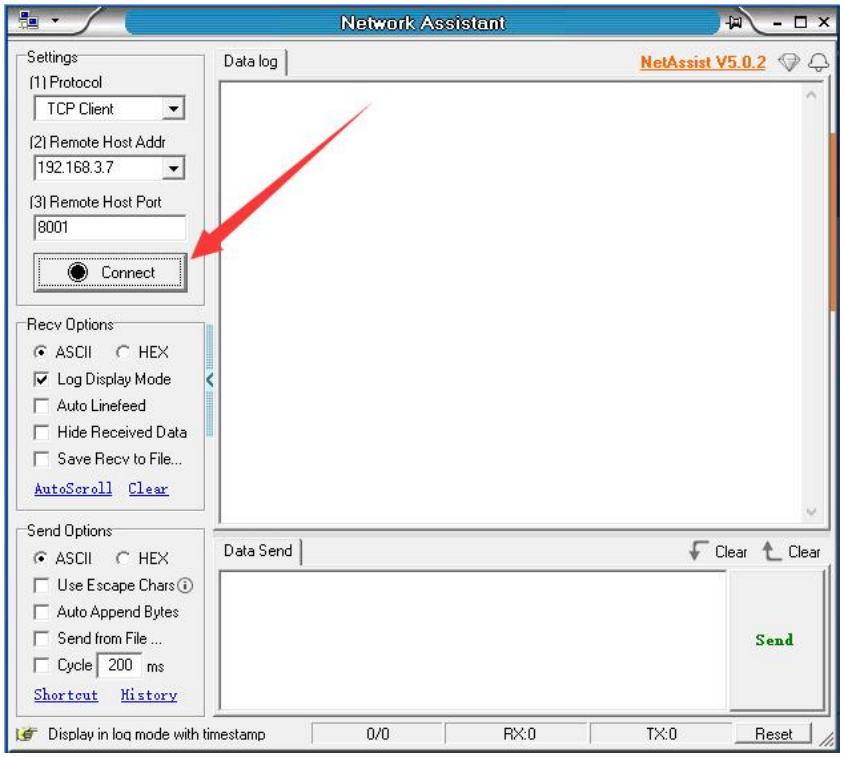
2.3.4 Open “Serial Debug Assistant”

Select the correct serial port number, configure the correct serial port settings (115200-8N1), and open the serial port, as shown in the figure below:



2.3.5 Open Network Assistant

Select “TCP Client” mode, set the remote IP address to “192.168.3.7,” and set the remote port to “8001” as shown in the figure below:

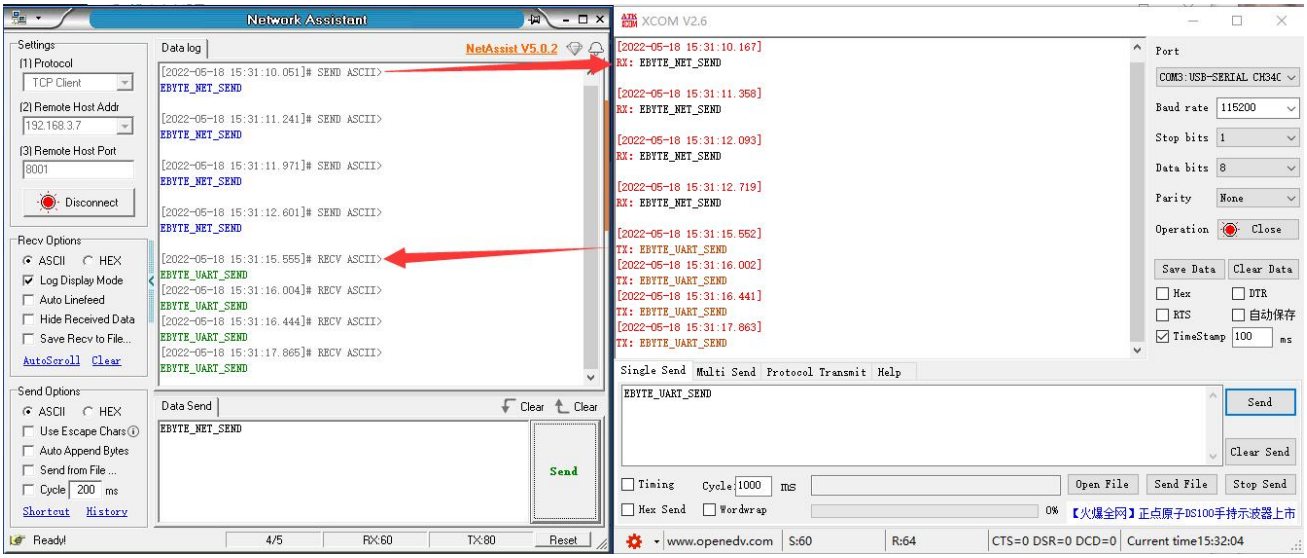


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2.3.6 Data Transmission and Reception Test

Click the [Send] button on both the “Network Debug Assistant” and the “Serial Debug Assistant” to enable transparent transmission of network and serial data, as shown in the figure below.



3 Product Overview

3.1 Technical Specifications

Item	Interface	Description
Power Supply	Wire Terminals	DC 8～28 V
Ethernet port	RJ45	10/100M
Operating Mode	TCP Server, TCP Client, UDP Server, UDP Client, HTTP Client, MQTT Client (default: TCP Server)	
Socket Connection	A single TCP server can support up to five client connections on a single serial port.	
Network Protocols	IP、TCP/UDP、IPv4、ICMP、APR、DHCP、DNS、HTTP、MQTT	
IP Acquisition Methods	DHCP, Static IP (default static IP)	
Domain Name Resolution	Support	
Configuration Methods	Configuration tools, AT commands, web-based configuration	
IP Address	Customizable; default: 192.168.3.7	
Local Port	Customizable; default: Channels 1–8: 8001–8008 (for 4-port devices, the default is	

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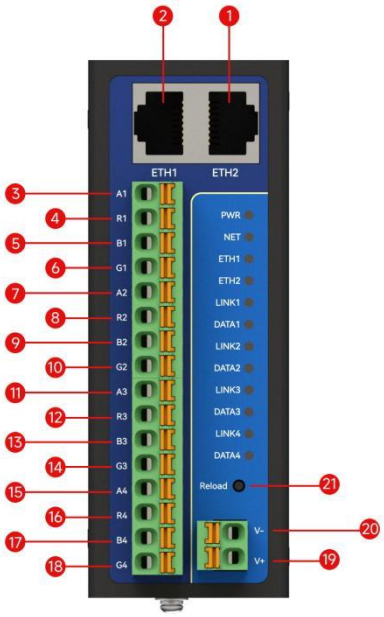
	8001–8004)
Subnet Mask	Customizable; default: 255.255.255.0
Gateway	Customizable; default: 192.168.3.1
Serial Port Buffer	8×3k Byte
Serial Port Encapsulation Mechanism	1024 Byte
Serial Port Baud Rate	2400 ～ 115200 bps（default115200）
Data Bits	8
Stop Bits	1（default）、2
Parity bit	None（default）、Odd、Even
Mounting method	Rail Installation
Operating temperature and humidity	-40 ～ +85℃、5% ～ 95%RH（No condensation）
Storage temperature and humidity	-40 ～ +105℃、5% ～ 95%RH（No condensation）

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3.2 Interface Specifications.

3.2.1 Four serial ports



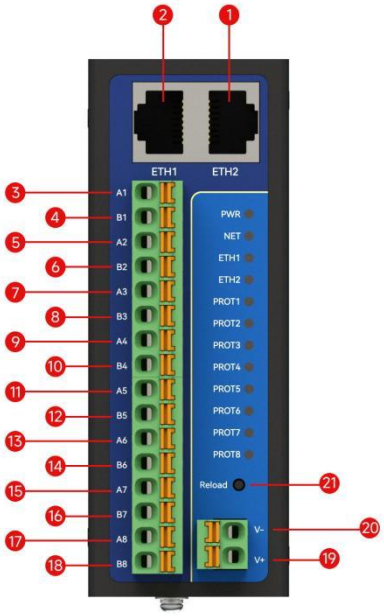
Serial Number	Name	Description
1	ETH2	Ethernet port, standard RJ45 connector, 10/100 Mbps auto-negotiation
2	ETH1	Ethernet port, standard RJ45 connector, 10/100 Mbps auto-negotiation
3	A1	Channel 1 - RS-485 Interface A
4	R1	Channel 1—RS485 Interface R: Short R1 and B1 to enable the built-in 120Ω termination resistor for Serial Port 1.
5	B1	Channel 1 - RS-485 Interface B
6	G1	Channel 1 - RS-485 Interface G
7	A2	Channel 2 - RS-485 Interface A
8	R2	Channel 2 - RS485 Interface R: Short R2 and B2 to enable the built-in 120Ω termination resistor for Serial Port 2.
9	B2	Channel 2 - RS-485 Interface B
10	G2	Channel 2 - RS-485 Interface G
11	A3	Channel 3 - RS-485 Interface A
12	R3	Channel 3 - RS485 Interface R: Short R3 and B3 to enable the built-in 120Ω termination resistor for Serial Port 3.
13	B3	Channel 3 - RS-485 Interface B
14	G3	Channel 3 - RS-485 Interface G
15	A4	Channel 4 - RS-485 Interface A

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16	R4	Channel 4—RS485 Interface R: Short R4 and B4 to enable the built-in 120Ω termination resistor for Serial Port 4.
17	B4	Channel 4 - RS-485 Interface B
18	G4	Channel 4 - RS-485 Interface G
19	V+	DC 8–28 V positive terminal
20	V-	DC 8–28 V negative terminal
21	Reload	Factory Reset Button Press and hold for 5 seconds until the NET indicator stays lit for 5 seconds; the device will be restored to factory settings.

3.2.2 Eight Serial Ports



Serial Number	Name	Description
1	ETH2	Ethernet port, standard RJ45 connector, 10/100 Mbps auto-negotiation
2	ETH1	Ethernet port, standard RJ45 connector, 10/100 Mbps auto-negotiation
3	A1	Channel 1 - RS-485 Interface A
4	B1	Channel 1 - RS-485 Interface B
5	A2	Channel 2 - RS-485 Interface A
6	B2	Channel 2 - RS-485 Interface B
7	A3	Channel 3 - RS-485 Interface A
8	B3	Channel 3 - RS-485 Interface B
9	A4	Channel 4 - RS-485 Interface A

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10	B4	Channel 4 - RS-485 Interface B
11	A5	Channel 5 - RS-485 Interface A
12	B5	Channel 5 - RS-485 Interface B
13	A6	Channel 6 - RS-485 Interface A
14	B6	Channel 6 - RS-485 Interface B
15	A7	Channel 7 - RS-485 Interface A
16	B7	Channel 7 - RS-485 Interface B
17	A8	Channel 8 - RS-485 Interface A
18	B8	Channel 8 - RS-485 Interface B
19	V+	DC 8–28 V positive terminal
20	V-	DC 8–28 V negative terminal
21	Reload	Factory Reset Button Press and hold for 5 seconds until the NET indicator stays lit for 5 seconds; the device will be restored to factory settings.

3.3 Indicator Light Descriptions

3.3.1 Four serial ports

Tag	Function	Description
PWR	Power Indicator	Lights up when a DC 8–28 V power supply is connected
NET	Switch Status Indicator	On: Switch is functioning normally Off: Switch is malfunctioning
ETH1	Port 1 Data Indicator	The network port is flashing due to data transmission
ETH2	Port 2 Data Indicator	The network port is flashing due to data transmission
LINK1	Channel 1 Status Indicator	Link disconnected: Off Link connected: Steady on UDP mode: Steady on
DATA1	Channel 1 Data Indicator	Flickering occurs when sending or receiving data over a network or serial port
LINK2	Channel 2 Status Indicator	Link disconnected: Off Link connected: Steady on UDP mode: Steady on
DATA2	Channel 2 Data Indicator	Flickering occurs when sending or receiving data over a network or serial port
LINK3	Channel 3 Status Indicator	Link disconnected: Off Link connected: Steady on

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		UDP mode: Steady on
DATA3	Channel 3 Data Indicator	Flickering occurs when sending or receiving data over a network or serial port
LINK4	Channel 4 Status Indicator	Link disconnected: Off Link connected: Steady on UDP mode: Steady on
DATA4	Channel 4 Data Indicator	Flickering occurs when sending or receiving data over a network or serial port

3.3.2 Eight serial ports

Tag	Function	Description
PWR	Power Indicator	Lights up when a DC 8–28 V power supply is connected
NET	Switch Status Indicator	On: Switch is functioning normally Off: Switch is malfunctioning
ETH1	Port 1 Data Indicator Light	The network port is flashing due to data transmission
ETH2	Port 2 Data Indicator Light	The network port is flashing due to data transmission
PORT1	Channel 1 Status and Data Indicators	Link not connected: Off Link connected: Steady on UDP mode: Steady on Flashing when data is being transmitted or received over the network or serial port
PORT2	Channel 2 Status and Data Indicators	Link not connected: Off Link connected: Steady on UDP mode: Steady on Flashing when data is being transmitted or received over the network or serial port
PORT3	Channel 3 Status and Data Indicators	Link not connected: Off Link connected: Steady on UDP mode: Steady on Flashing when data is being transmitted or received over the network or serial port
PORT4	Channel 4 Status and Data Indicators	Link not connected: Off Link connected: Steady on UDP mode: Steady on Flashing when data is being transmitted or received over the network or serial port
PORT5	Channel 5 Status and Data Indicators	Link not connected: Off Link connected: Steady on

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		UDP mode: Steady on Flashing when data is being transmitted or received over the network or serial port
PORT6	Channel 6 Status and Data Indicators	Link not connected: Off Link connected: Steady on UDP mode: Steady on Flashing when data is being transmitted or received over the network or serial port
PORT7	Channel 7 Status and Data Indicators	Link not connected: Off Link connected: Steady on UDP mode: Steady on Flashing when data is being transmitted or received over the network or serial port
PORT8	Channel 8 Status and Data Indicator Lights	Link not connected: Off Link connected: Steady on UDP mode: Steady on Flashing when data is being transmitted or received over the network or serial port

[Note] Indicator light statuses for certain special operating modes:

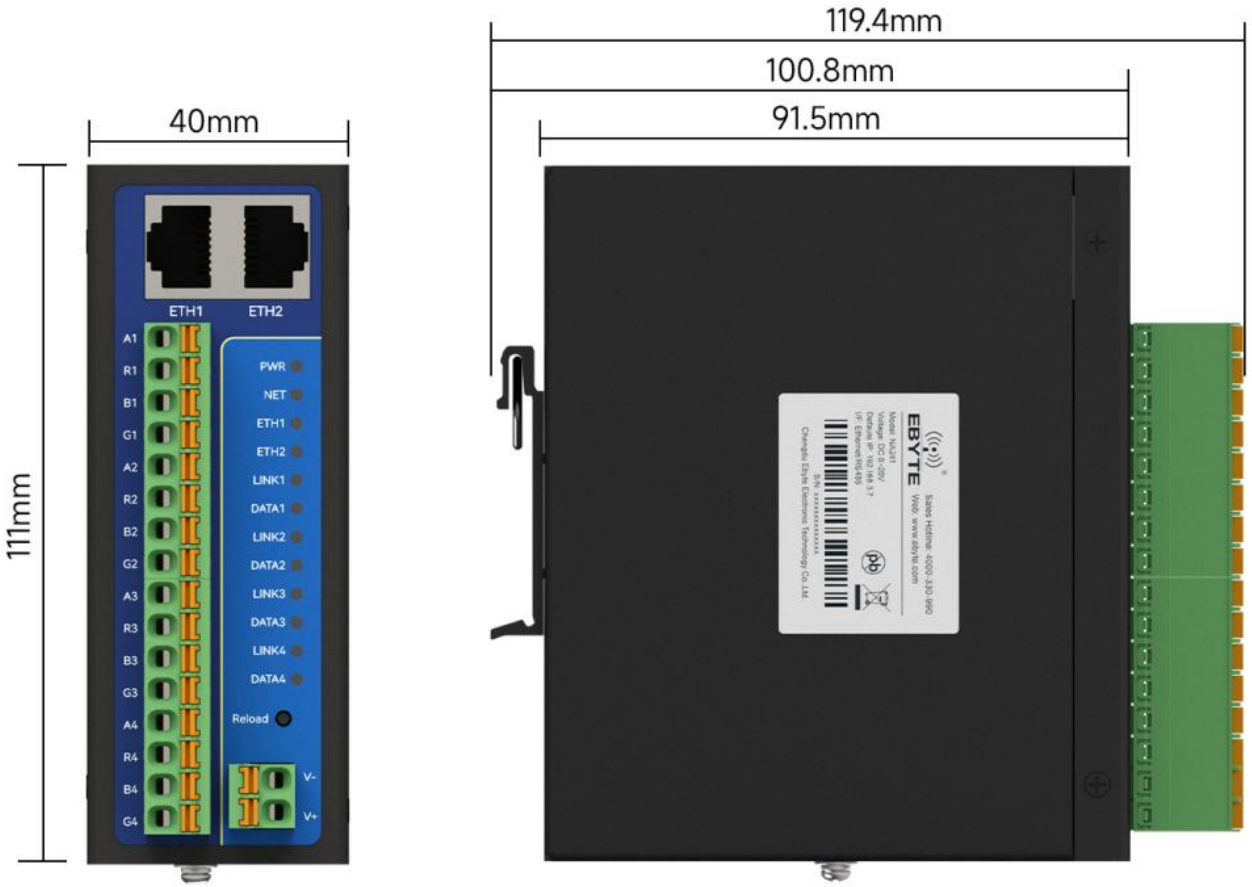
1. Factory reset: Press and hold the button for 5 seconds until all indicator lights turn on. When you release the button, the LINK and DATA lights will turn off, indicating that the factory reset was successful.

2.Hold the button while powering on. Wait for the firmware to be flashed; all indicator lights except the power light will flash in 100-millisecond cycles. During the transfer of the update file, the lights will flash in 200-millisecond cycles; once the update is complete, the lights will return to their normal state;

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3.4 Dimension Drawing



4 Basic function

4.1 Correspondence Between Channels and Serial Ports

Baud rate: 2400, 4800, 9600, 14400, 19200, 38400, 57600, 76800, 115200 bps;

Data bits: Supports 8 bits only;

Parity: Supports none (NONE), odd (ODD), and even (EVEN);

Hardware flow control: Not supported;

Channel	Default Operating Mode	Default Port
Channel 1	TCPS	8001
Channel 2	TCPS	8002
Channel 3	TCPS	8003
Channel 4	TCPS	8004
Channel 5	TCPS	8005

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Channel 6	TCPS	8006
Channel 7	TCPS	8007
Channel 8	TCPS	8008

Note: The NA241 and NA241S support only channels 1 through 4.

4.2 Local Network Settings

4.2.1 Local IP Address

STATIC (Static IP): Users can configure the IP address, subnet mask, default gateway, and DNS servers;

DHCP (Dynamic IP Assignment): When the device connects to the server, it automatically obtains the IP address, subnet mask, gateway address, and DNS server addresses assigned by the server and configures them for use;

4.2.2 DNS (Domain Name System)

When a user enters a domain name, the system automatically queries the DNS server, which then retrieves the corresponding IP address from its database. In static IP mode, users can specify the DNS server used to resolve domain names, which is used to resolve data from private DNS servers. In dynamic IP mode, the device automatically follows the DNS server configured on the router; users only need to modify the DNS server settings on the router and do not need to configure this device.

4.2.3 Reconnection Interval After a Network Disconnection

The device periodically sends reconnection requests when it detects a disconnection from the server; therefore, the “reconnection interval” does not affect the connection establishment time under normal conditions. Users can customize the request interval, which defaults to 5 seconds.

4.2.4 Timeout Restart (Restart Due to Lack of Downlink Data)

The device monitors data transmission and reception. If the device does not receive data from the Ethernet network for an extended period, it will automatically reboot to ensure stability during prolonged operation.
By default, this feature is set to trigger every 30 minutes. Users can choose to enable or disable the timeout reboot, or customize the interval at which it occurs.

4.3 Hardware Factory Reset

Press and hold the device’s Reload button for 5 seconds until all indicator lights turn on. After releasing the button, all indicator lights except for the power and network lights will turn off, and the device will be restored to factory settings.

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4.4 Device Operating Modes

4.4.1 TCP Server

A TCP Server is a TCP server. In TCP Server mode, the device listens on a local port, accepts connection requests from clients, and establishes connections for data communication. When the Modbus gateway function is disabled, the device forwards data received via the serial port to all client devices connected to it.

In server mode, each serial port supports up to five client devices. If the number of connected client devices exceeds this limit, the device will reject further connections.

4.4.2 TCP Client

A TCP Client is a TCP client. When the device is operational, it actively initiates a connection request to the server and establishes a connection to facilitate the exchange of data between the serial port and the server.

To use the client, you must accurately configure the target IP address/domain name and target port.

The eight channels can each independently launch a TCP client.

4.4.3 UDP Server

A UDP Server refers to a device that does not verify the source IP address when communicating via the UDP protocol. Upon receiving each UDP datapacket, the device stores the source IP address and source port, and sets them as the destination IP and port. Consequently, the device sends datapackets only to the source IP address and port from which it last received data.

This mode is typically used in scenarios where multiple network devices communicate with this device at a high frequency, and where a TCP Server cannot meet the requirements.

To use the UDP Server mode, the remote UDP device must send data first; otherwise, data cannot be transmitted properly.

[Note] In UDP mode, the network should send data packets to the device that are less than 1024 bits in size; otherwise, data loss may occur.

4.4.4 UDP Client

UDP Client is a connectionless transport protocol that provides a simple, transaction-oriented, unreliable data transmission service. It does not involve establishing or terminating connections; data can be sent to the recipient simply by configuring the destination IP address and destination port. It is typically used in data transmission scenarios where there are no requirements regarding packet loss rates, the data packets are small, the transmission frequency is high, and the data must be sent to a specific IP address.

In UDP Client mode, the device communicates only with the configured remote UDP device (target IP and target port).

In this mode, if the destination address is set to 255.255.255.255, data will be broadcast across the entire network

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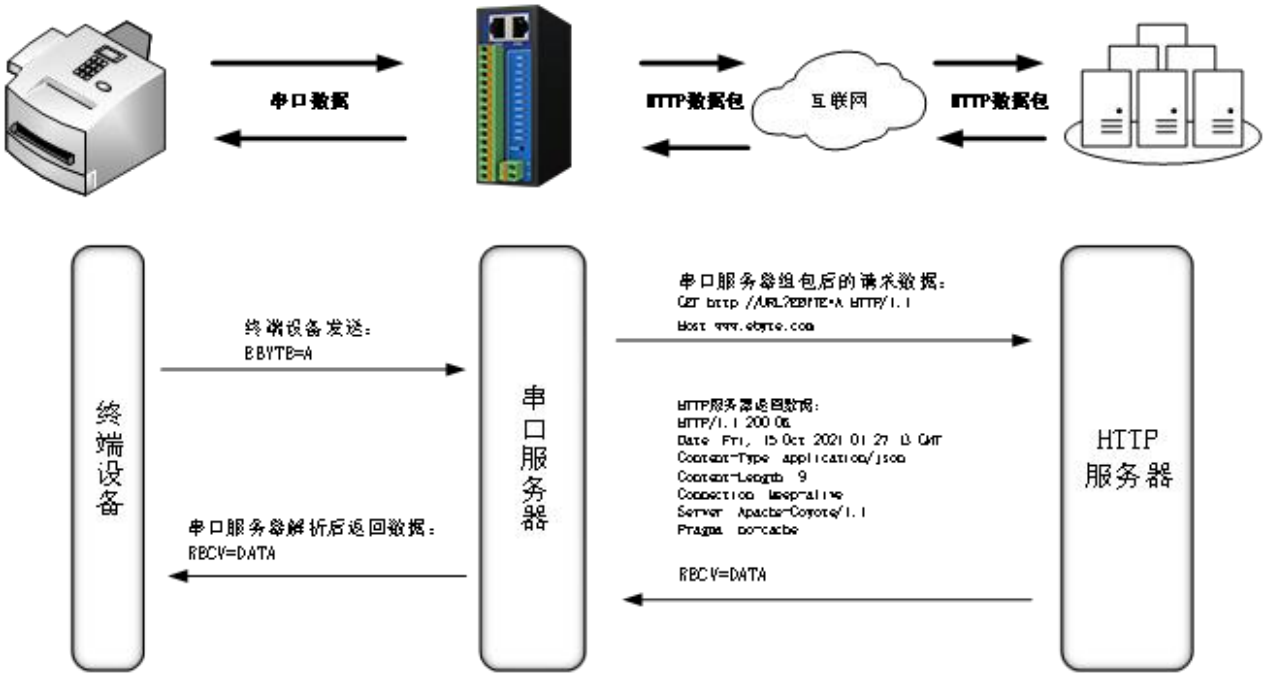
segment; however, the sending and receiving devices must use the same port, and the device can also receive broadcast data.

[Note] In UDP mode, the network should send data packets to the device that are less than 1024 bits in size; otherwise, data loss may occur.

4.4.5 HTTP Client

This mode supports automatic HTTP packet assembly, offering both GET and POST methods. Users can configure parameters such as URLs and headers, and the device will assemble and send the packets, enabling fast communication between serial data and HTTP servers. URLs and headers support a maximum of 128 bytes of data. All eight channels can independently enable HTTP client mode without interfering with one another.

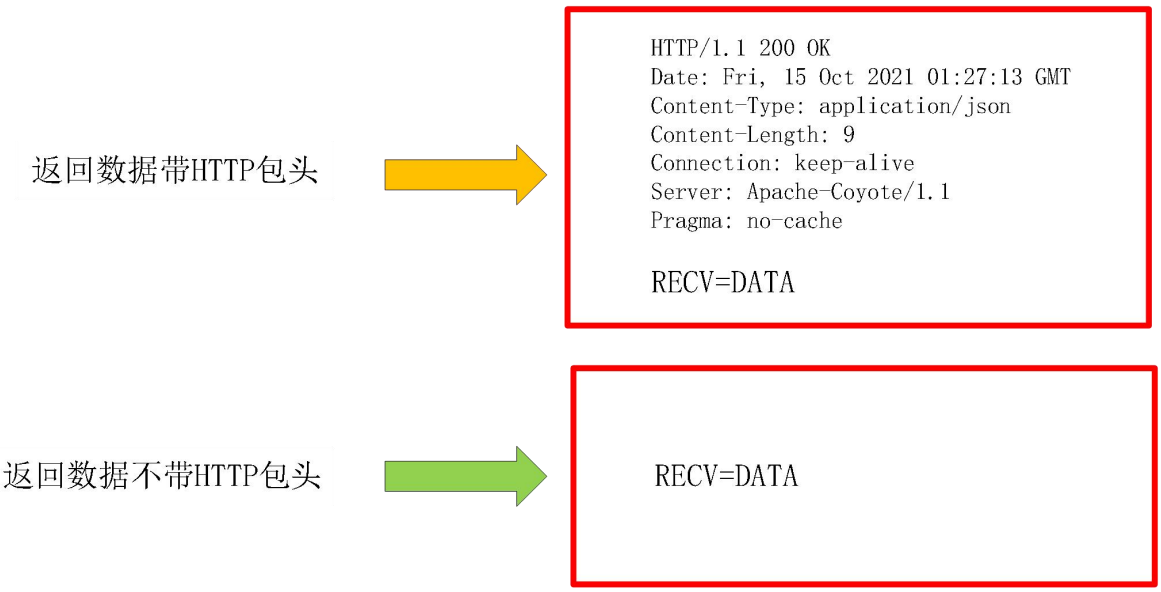
HTTP request data must be shorter than the packet size limit (1024 bytes); otherwise, the device will split the request data into multiple packets, resulting in a request error.



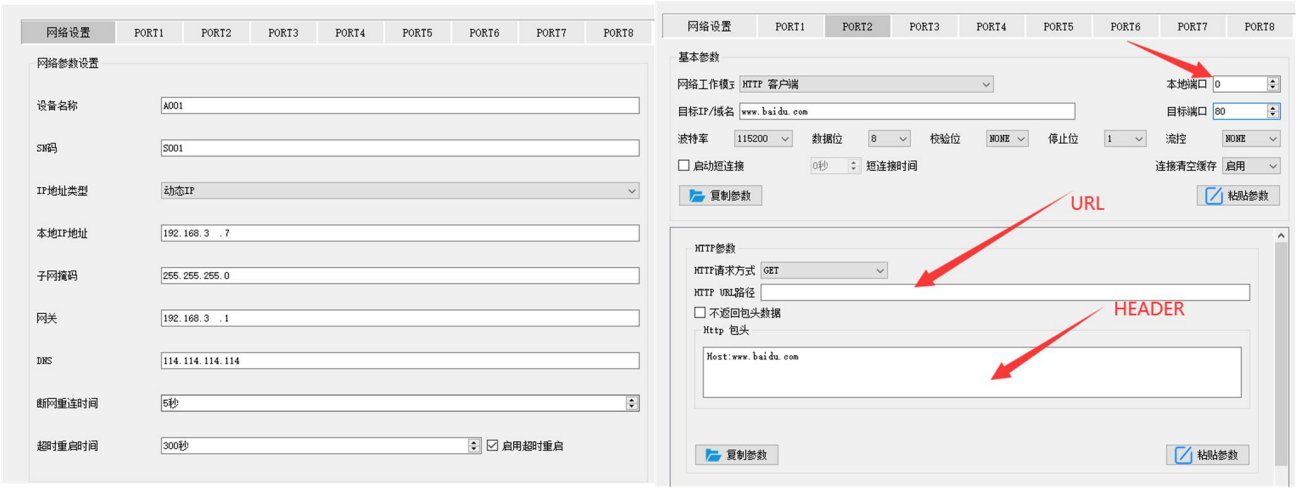
Whether the configuration supports returning HTTP headers; the returned data is shown in the figure below:

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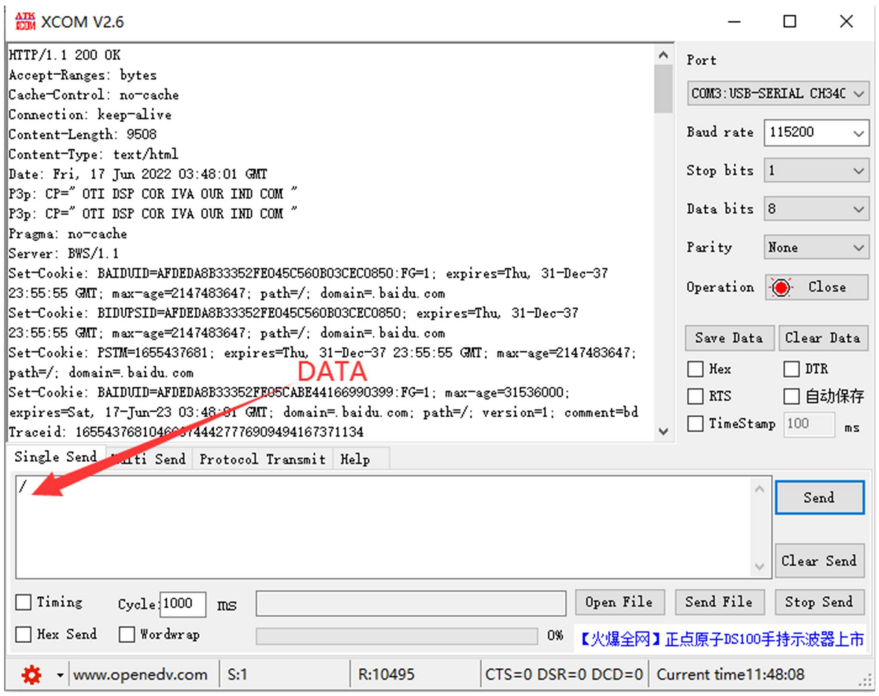
Configuration Instructions: Turn on the host computer, search for the device, and enter the device configuration interface. First, configure the “Network Parameters.” We recommend using the DHCP function to avoid IP issues (such as incorrect subnets or IP conflicts) caused by misconfiguration. When configuring channels that require HTTP functionality, the device supports setting up to eight channels simultaneously in HTTP client mode. Here, we use a GET request to the “Baidu” webpage as an example (URL: empty, HEADER: Host: www.baidu.com, Target Domain: www.baidu.com, Target Port: 80, Local Port: Use a random port). The specific configuration is shown in the figure below:



The request data is “/”; use the Serial Port Assistant to retrieve the webpage:

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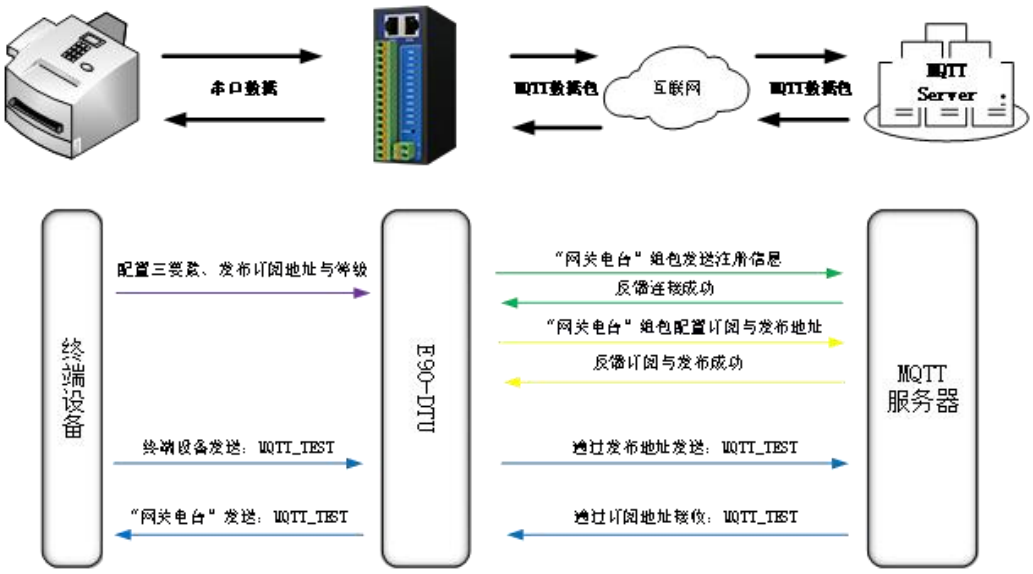
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POST Note: For requests configured as POST requests, headers that do not require a specific data length to be specified (e.g., Content-Length: 2729) will have their data length automatically calculated by the device, which will then assemble and send the packet. Other header data must be configured manually, with a maximum supported data length of 128 bytes.

4.4.6 MQTT Client

Supports quick integration with standard MQTT 3.1.1 protocol servers (including OneNET, Baidu Cloud, Huawei Cloud, and user-hosted servers) as well as Alibaba Cloud servers. It supports Quality of Service (QoS) level configuration (QoS 0, QoS 1) and supports configuration of extra-long text strings, facilitating easier integration with network service providers (server addresses, three-element identifiers, and publish/subscribe addresses support configurations of up to 128 characters; Alibaba Cloud product keys support up to 64 characters).



When using the MQTT feature, you should disable short links; otherwise, devices will repeatedly connect to the

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server. We recommend using random ports, as shown in the figure below:



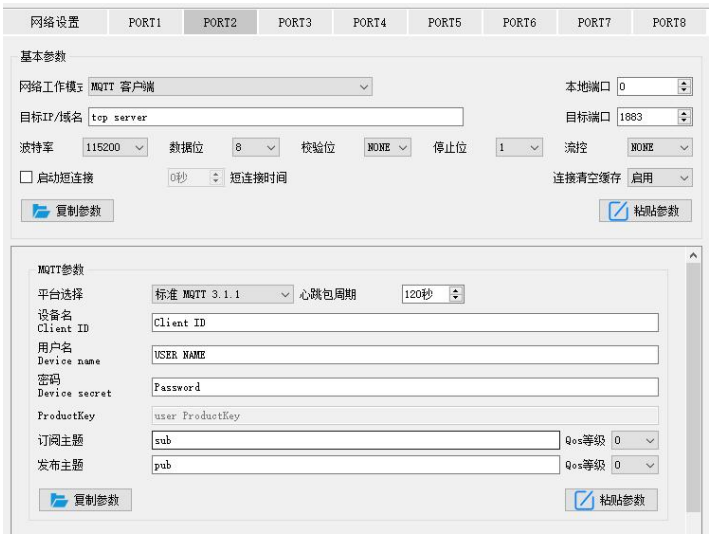
For standard MQTT 3.1.1, Baidu Cloud, OneNET, and Huawei Cloud configurations, please refer to the table below when entering parameters:

Parameters	Standard MQTT3.3.1	Baidu Cloud	OneNET
Client ID	Client ID	DeviceKey	Device ID
Device name	User Name	IoTCoreId/DeviceKey	Product ID
Device secret	Password	DeviceSecret	Device name /User Password
PrductKey	Alibaba Cloud parameters (optional)		
Post topic	MQTT publish topic address (dynamically generated by OneNET)		
Subscribe to this topic	MQTT subscription topic address (dynamically generated by OneNET)		

[Note]

- Dynamically generated topic addresses can use the same parameters to achieve data feedback. For example, in OneNET, publishing and subscribing to the same topic address (e.g., 123456) enables data feedback.
- Due to adjustments made by MQTT platforms (Baidu Cloud, Huawei Cloud, OneNET), connections may fail even after entering the parameters; please refer to the platform’ s guidelines.

The following figure illustrates how to enter parameters using the standard MQTT 3.1.1 format:



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4.5 Channel Ports

Random Port:

TCP clients, UDP clients, HTTP clients, and MQTT clients can set the local port to 0 (to use a random local port). Random ports cannot be used in server mode; otherwise, clients will be unable to establish a connection correctly (the device will not listen on the port properly).

Connecting using a random port allows for quick reconnection if the device unexpectedly disconnects from the server, preventing the server from rejecting the connection due to an incomplete four-way handshake. It is recommended to use random ports in client mode.

When configuring TCP, HTTP, or MQTT client modes via AT commands, the device will automatically configure a random port; this can be disabled manually.

Static Port:

A fixed port on the device. In TCP server mode, the device listens on this port, accepts connection requests from clients, and establishes connections for data communication. In TCP client mode, the device uses this fixed port to initiate connection requests.

5 Advanced Functions

5.1 Heartbeat Packet and Registration Packet

5.1.1 Heartbeat Packet

In client mode, users can choose to send heartbeat packets and customize the heartbeat interval. Heartbeat packets can be sent via either network or serial port modes, and support both hexadecimal and ASCII encoding. These heartbeat packets are not MQTT heartbeats; they must be disabled when using MQTT client mode. MQTT heartbeats can only be configured by setting the “Heartbeat Interval” in the “MQTT Parameter Configuration” section. MQTT heartbeat content is protocol-restricted and cannot be configured; it is recommended not to set it to less than 60 seconds. For example, the Alibaba Cloud manual recommends using 120 seconds.

Heartbeat transmission modes:

1. Default: Heartbeat mode is disabled.
2. Serial mode -> The device sends heartbeat content to the serial bus at the set interval.
3. Ethernet Mode -> The device sends heartbeat content to the Ethernet bus at the set heartbeat interval.

Custom Heartbeat Packet Content (Supports up to 128 bytes of ASCII data or 64 bytes of HEX data)

Custom Heartbeat Packet Transmission Interval: Setting this to 0 disables the heartbeat function; setting it to a value greater than zero enables the function. When enabled, the valid range is (1 – 65536) seconds, with a default value of 0.

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5.1.2 Registration Packet

In client mode, users can choose to send registration packets and customize the timing of these packets. Registration packets support the following modes:

1. Send the MAC address (OLMAC) when the network establishes a connection with the device.
2. Send custom registration packet data (OLCSTM) when the network establishes a connection with the device.
3. After the network establishes a connection with the device, the device prepends the MAC address to every data packet it sends to the network (EMBMAC).
4. After the network and device establish a connection, the device prepends custom registration packet data to every data packet sent to the network (EMBCSTM).

Custom registration packet content (supports up to 128 bytes of ASCII data or 64 bytes of HEX data)

[Note] When configuring the registration packet, it is recommended not to use special characters (such as “,”, “\”, “/”, etc.). If you must use them, it is recommended to use hexadecimal configuration.

5.2 Short-lived connections

In Client mode, short-lived connections are supported (disabled by default). TCP short-lived connections are mainly used to save server resources and are typically applied in scenarios with multiple clients connecting to a single server.

The TCP short-lived connection feature operates in TCP Client mode. When enabled, the device only initiates a connection to the server when sending data. Once connected, if no data is received from the serial port or transmitted/received via the network port within the set time, the device will automatically disconnect.

Setting the keep-alive time to 0 disables the short-lived connection feature. The setting range is 2 to 255 seconds to enable the feature. The default keep-alive time is 0 seconds (disabled).

5.3 Clearing the Serial Port Buffer

When a TCP connection has not been established, data received via the serial port is stored in a buffer. The serial receive buffer is 3 KB. Once the network connection is established, you can choose to clear the serial buffer or send its contents over the network.

Enabled: The device does not save data received via the serial port before the connection is established.

Disabled: After the connection is established, the network will receive the data from the serial buffer.

5.4 Modbus Gateway

5.4.1 Simple Protocol Conversion

Convert Modbus RTU data to Modbus TCP data, or Modbus TCP data to Modbus RTU data, to enable the conversion between Ethernet Modbus data and serial Modbus data.

Simple protocol conversion can operate in any mode (TCP client, TCP server, UDP client, UDP server, MQTT

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client). This gateway mode does not support multi-host operation; for multi-host support, please use the “Storage Gateway” and “Multi-Host Mode.”

5.4.2 Multi-host mode

In contrast to simple protocol conversion, which allows only one Modbus master, multi-master mode supports simultaneous connections from multiple Modbus TCP masters. When multiple Modbus masters access the system at the same time, the Modbus gateway performs bus occupancy scheduling (since the RS-485 bus can process only one request at a time, multi-master mode queues TCP requests in the order they are received, with other connections waiting), thereby resolving bus conflicts (Currently, in single-server mode, each channel supports up to 5 Modbus TCP host connections. When multiple hosts are connected simultaneously, care must be taken to match request intervals and timeout settings; otherwise, packet loss may occur because the serial port transmission rate is much lower than the Ethernet transmission rate. If fast response times are required, we recommend using a “caching gateway.”) This device only supports operation in TCP server mode, and slave devices must be connected via the serial port; otherwise, it will not function properly.

As the number of hosts increases, the Modbus timeout should be correspondingly extended. If multiple hosts require continuous high-speed requests, it is recommended to use a “caching gateway.” When no multiple hosts are in use, it is recommended to configure the device as “simple protocol conversion.”

5.4.3 Storage Gateway

The storage-type gateway not only arbitrates bus data but also stores duplicate read commands. When different hosts request the same data, the gateway does not need to repeatedly query the RTU device for its register status; instead, it directly returns the cached data from the storage area. This significantly enhances the gateway’s ability to handle multi-host requests while also reducing the time required for the entire request process. Users can customize the command polling interval and command storage duration in the storage area according to their needs.

As an optimization for multi-host request performance, the caching gateway operates exclusively in TCP server mode, thereby improving response speed on the network side.

Features:

(1) The gateway has a 2K cache for storing commands and response results (for example, when reading 10 holding registers, it can store approximately 67 commands and response results);

(2) The cache is automatically cleared if an RTU response times out, ensuring data real-time performance and integrity;

(3) The polling interval is customizable, ranging from 0 to 65535 ms (default: 200 ms);

(4) The gateway polls the RTU device based on the storage time of the configured command. If the MODBUS host does not query that command again within the storage time, the gateway automatically deletes the stored command to free up cache space;

(5) The first command and control commands (function codes 05, 06, 0F, 10) directly access the RTU device;

(6) Only Modbus function codes 01, 02, 03, and 04 support result storage;

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5.4.4 Configurable gateway

The gateway automatically polls the RTU device registers based on preconfigured MODBUS commands (configurations supporting only MODBUS read commands are supported). Commands not stored in the table are executed directly on the RTU device. Frequently accessed commands can be pre-stored in the gateway to reduce response times (when querying configured commands). Data is not sent directly to the server; it is only returned upon request from the Modbus host. This operation is similar to the "Simple Protocol Conversion" method. If you need to automatically upload data to the server, please select "Auto Upload." Due to the above characteristics, the serial port side of the configurable gateway can only be connected to Modbus slave devices.

Instruction Storage Notes (Addition: Instructions with errors or incorrect formats cannot be added):



Instruction Storage Description (Delete):



5.4.5 Automatic upload

In client mode (TCP client, UDP client, MQTT client, HTTP client), the gateway automatically polls the commands stored in the command table and uploads them to the server. You can select the response format (Modbus RTU or Modbus TCP) and the command polling interval (0 – 65535 ms) according to your needs.

For information on pre-storing commands, refer to the "Configurable Gateway—Command Storage Instructions." Automatic upload to host computer/web configuration:

5.5 Firmware Update

Users can update the device's firmware using the "EBYTE Network Configuration Tool."

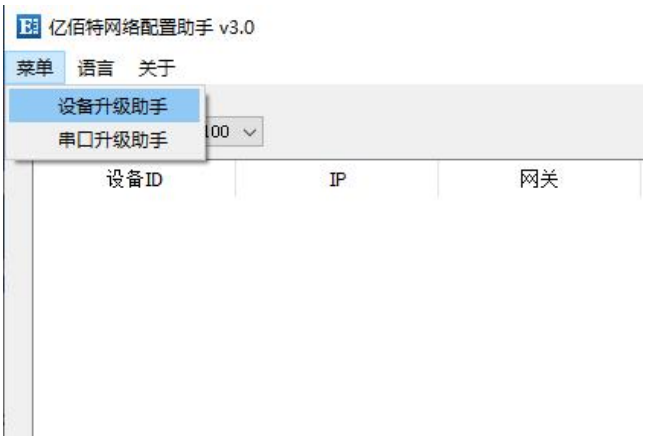
5.5.1 UDP Update

Step 1: Open the "EBYTE Network Configuration Tool" and select "Device Upgrade Assistant" from the "Menu"

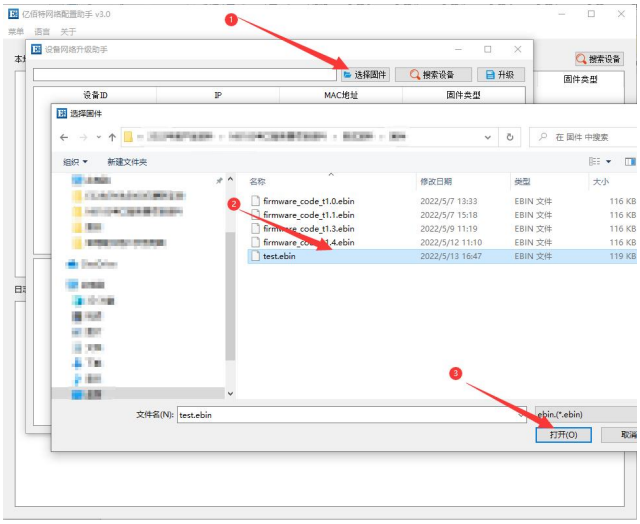
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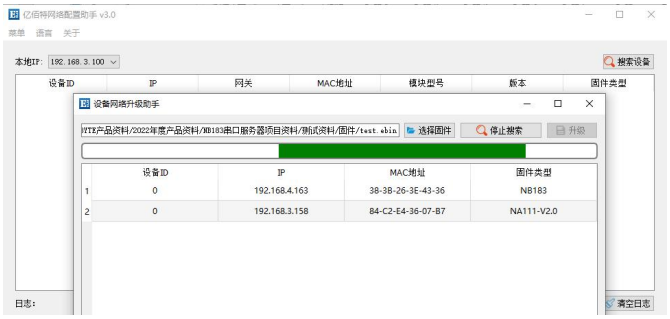
option;



Step 2: Select the firmware you need. You can find it under “Related Downloads” in the product details section on the official website (www.ebyte.com). The firmware used in this demonstration is not available on the official website.



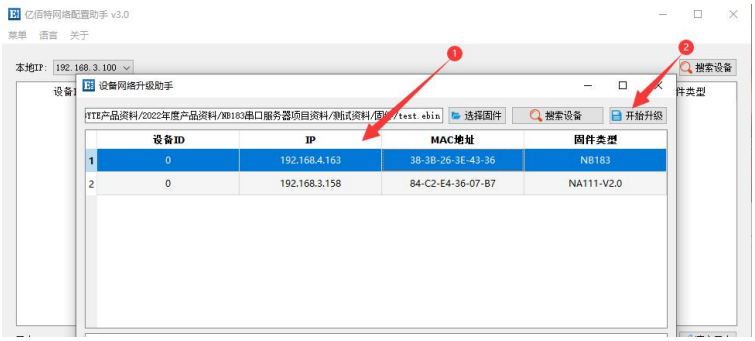
Step 3: Click “Search for Devices.” The device list will display the devices currently found. Click “Stop Search” again.

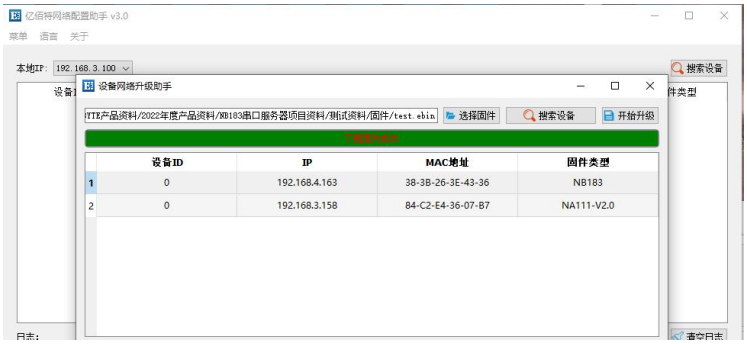


Select the device you want to update, click “Start Update,” and wait for the host computer to indicate that the update is complete.

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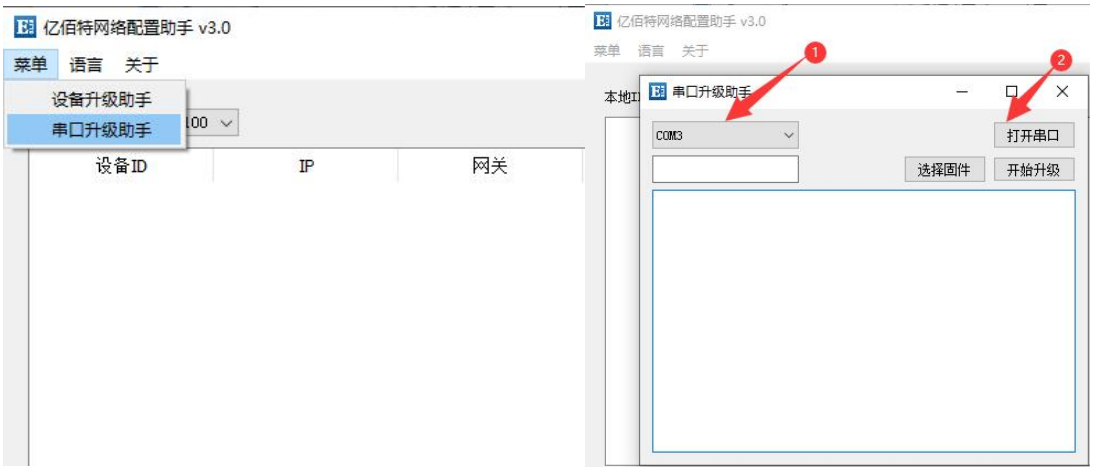


5.5.2 Serial Port Upgrade

Only Port 1 (i.e., Serial Port 1) supports upgrades via the serial port. We recommend using the serial port for upgrades if the network upgrade fails or if the network environment is complex.

Step 1: Ensure the device is powered off and that Serial Port 1 is properly connected.

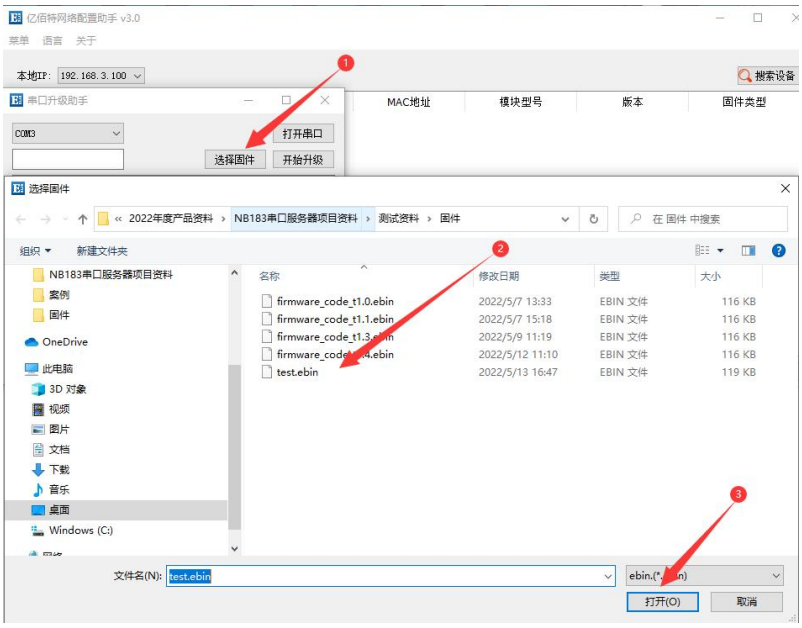
Step 2: Open the “EBYTE Network Configuration Tool,” select “Serial Port Upgrade Assistant” under the ‘Menu’ option, select the corresponding serial port, and click “Open Serial Port.”



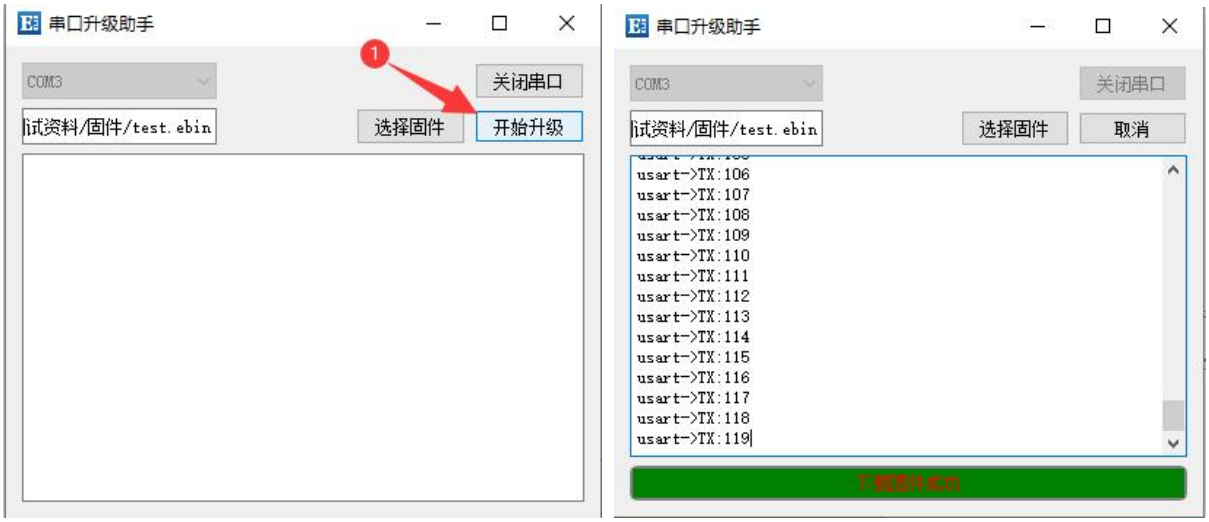
Step 3: Select the firmware you need. You can download it from the “Related Downloads” section of the product details page on the official website (www.ebyte.com). The firmware used in this demonstration is not available on the official website;

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Step 4: Click “Start Upgrade,” hold down the Reload button on the NB183, then power on the device. Once the firmware upgrade is complete, click “Cancel” to finish the serial port upgrade.



6 Parameter Configuration

6.1 Host Computer Parameter Configuration

6.1.1 Download the host computer software

You can copy the link below to download the latest version of the PC software from the EBYTE official website; it is located under “Related Downloads” below the product listing.

Note: The interface of the PC software may vary slightly across different versions; please refer to the latest version

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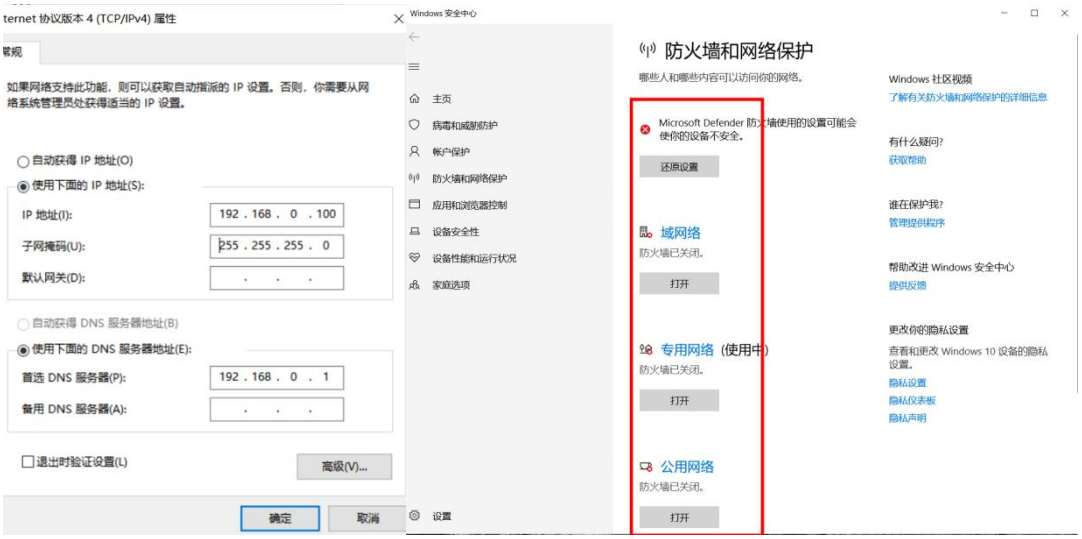
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available on the official website.

Reference link: https://www.ebyte.com

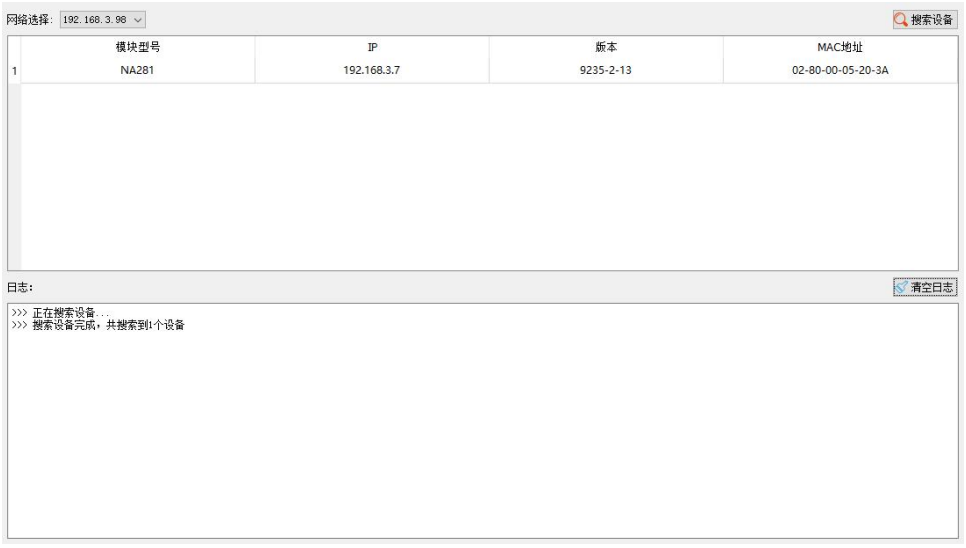
6.1.2 Setting Up the Environment

If you are connecting directly via a switch, please make sure your antivirus software is closed and your computer's firewall is disabled. If you are connecting directly to a computer, please note that the computer must not be using a dynamic IP address; you may use any IP address within any subnet.



6.1.3 Host Computer Usage

Double-click to run the host computer software. If you have multiple network cards, select the IP address used by the device you want to connect to. Click “Search for Devices” to see the device listed; click on the device to configure its parameters.

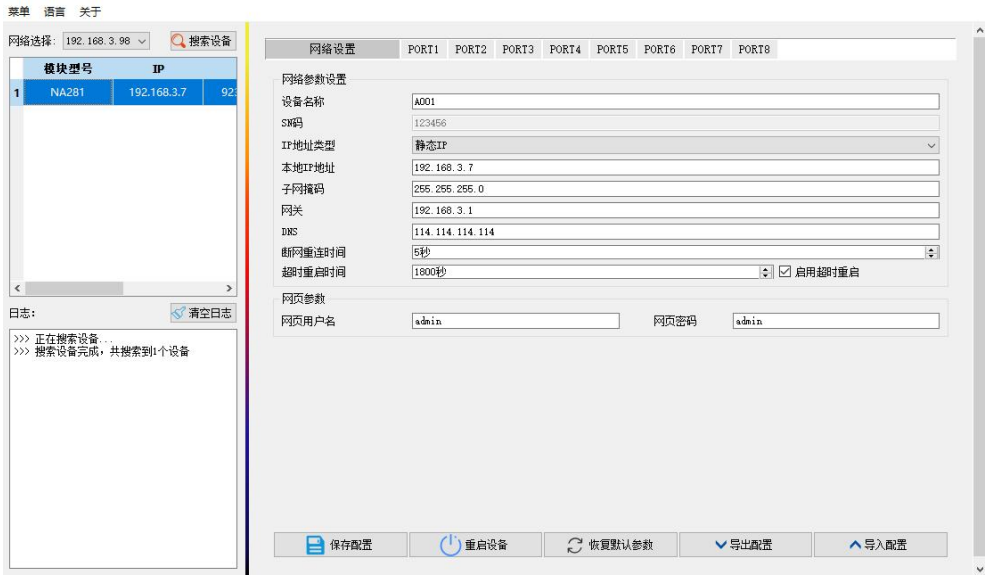


You can configure network settings and serial port settings directly on the right. Once configuration is complete, click “Save Configuration” and “Restart Device” to finalize the setup. You can also restore the device to factory settings. When

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configuring multiple devices simultaneously, you can choose to export and import configuration information.



6.2 Serial Port AT Command Configuration

6.2.1 Preparing the Environment

To control the device using serial AT commands, first ensure that the serial cable is properly connected. For the RS-485 interface, connect A to A and B to B.

6.2.2 Preparing the Serial Port and Serial Port Tools

Once the serial port is connected, you can open it using any serial port utility. If the serial port cannot be found, you will need to install the appropriate driver; search for the corresponding chip and download it. The device's default baud rate is 115200, with 8N1.

If you do not have the appropriate serial port tool, you can download it from our official website.

Related link: https://www.ebyte.com

6.3 Serial Port AT Command Configuration

For more information, refer to the EBYTE AT command set; this section serves only as an example.

Related link: https://www.ebyte.com

Send "+++", then send 'AT' again within three seconds. When the device echoes "+OK", it enters AT mode, and you can send other AT commands.

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6.3.1 Configuring Network AT Commands

The usage of network AT commands is consistent with that of serial port AT commands. You must first establish a TCP connection and ensure it is successful before proceeding. Please refer to the EBYTE AT command set; this section provides only an example.

Related link: https://www.ebyte.com

Send "+++" from the network side, then send 'AT' again within three seconds. If the device echoes "+OK," it has entered AT mode, and you can send other AT commands.

- Chengdu EBYTE Electronic Technology Co., Ltd. reserves the right of final interpretation.

Revision history

Version	Date	Description	Issued by
1.00	2026-02-28	Initial version	ZYD

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