Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



serial port ⇌ Ethernet

Serial port server

Chengdu Ebyte Electronic Technology Co., Ltd.

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Instructions for Use

This manual applies to the NE2 series serial servers. All models have identical software functions; the differences lie only in hardware interfaces, power supply range, isolation, and casing material. Please refer to the parameter comparison table below for detailed differences.

Parameter Comparison Table

Product Model	Shell material	Serial port categories	Operating voltage (V)	Product Dimensions (mm)	Number of network ports	Whether to isolate	PoE power receiving
NE2-D1	PC	TTL	DC 8~28	93×28×27	1	×	×
NE2-D11	PC	RS485	DC 8~28	93×28×27	1	×	×
NE2-D12	PC	RS232	DC 8~28	93×28×27	1	×	×
NE2-D11E	PC	RS485	DC 8~28	110×66×30	1	×	√
NE2-D12E	PC	RS232	DC 8~28	110×66×30	1	×	√
NE2-D1P	PC	TTL	DC 8~28	93×28×27	1	√	×
NE2-D11P	PC	RS485	DC 8~28	93×28×27	1	√	×
NE2-D12P	PC	RS232	DC 8~28	93×28×27	1	√	×
NE2-D14	Aluminum profiles	RS485/232/422	DC 8~28	82×84×25	1	×	×
NE2-D14E	Aluminum profiles	RS485/232/422	DC 8~28	82×84×25	1	×	√
NE2-D14P	Aluminum profiles	RS485/232/422	DC 8~28	82×84×25	1	√	×
NE2-D14PE	Aluminum profiles	RS485/232/422	DC 8~28	82×84×25	1	√	√
NE2-H14	Aluminum profiles	RS485/232/422	DC 8~28	82×84×25	2	×	×
NE2-H14P	Aluminum profiles	RS485/232/422	DC 8~28	82×84×25	2	√	×
NE2-D11A	PC	RS485	AC 85~265	110×66×30	1	×	×
NE2-D12A	PC	RS232	AC 85~265	110×66×30	1	×	×
NE2-D11AP	PC	RS485	AC 85~265	110×66×30	1	√	×
NE2-D12AP	PC	RS232	AC 85~265	110×66×30	1	√	×

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Product Introduction

The NE2 series single-serial-port server is used to achieve bidirectional transparent data transmission from the serial port to the Ethernet port. It features multiple Modbus gateway modes and MQTTC/HTTPC IoT gateway modes, meeting the networking needs of various serial devices/PLCs; it adopts industrial-grade design standards to ensure device reliability.

The serial server enables transparent transmission of serial data from the serial port to TCP/IP data packets from the Ethernet port. Users do not need to worry about the specific details; the protocol conversion is handled internally by the device.

If you encounter any problems during use, you can refer to our application cases on our official website.

Features

- RJ45 supports 10/100M Ethernet interface, crossover direct connection auto-adaptive;
- The product supports 2 sockets, each of which supports TCP Server, TCP Client, UDP Server, UDP Client, HTTPC, and MQTTC. In server mode, a single socket supports 5 connections.
- Some models support multiple serial port protocols including RS485/232/422/TTL (see parameter comparison table for details);
- Some models support PoE power reception (see parameter comparison table for details);
- Supports dual isolation of power supply and signal (see parameter comparison table for details);
- It supports three configuration methods: configuration tool, web page, and AT command.
- Supports DHCP functionality;
- Supports DNS (Domain Name Resolution) and allows customization of domain name resolution servers;
- Supports multiple Modbus gateways (simple protocol conversion, multi-host mode, storage gateway, configurable gateway, active upload mode);
- Supports rapid access to Alibaba Cloud, Baidu Cloud, One NET, Huawei Cloud, and the 3.1.1 version standard MQTT server;
- Supports HTTP protocol (GET/POST requests);
- Supports virtual serial ports;
- Supports disconnection reconnection and timeout restart functions;
- Supports Keep alive mechanism, which can quickly detect network anomalies and reconnect quickly.

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- Supports short connection functionality, with customizable short connection intervals;
- All modes support heartbeat and registration package functionality;
- Supports one-click factory reset;
- Supports online upgrade functionality.

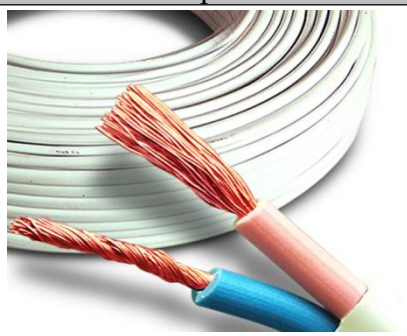
Quick Start

If you encounter any problems during use, please click the official website link: https://www.ebyte.com/product.html

Note: The NE2 series software functions are completely identical, with only hardware differences. This chapter uses NE2-D11 as an example.

1.1 Preparation

Before using the serial server (hereinafter referred to as "the device"), you need to prepare network cables, a computer, a USB-to-serial converter, and other related accessories. Details are as follows:

		
NE2-D11	network cable	computer
		
DC 12V switching power supply	USB to RS485	Several cables

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1.2 Equipment wiring

1.2.1 Network cable connection

Use a standard RJ45 network cable, connect one end to the RJ45 interface of the NE2 device, and the other end to the interface of a computer or switch/router;

1.2.2 Serial port connection

RS485 connection:

Connect NE2's A port to the USB to RS485 converter's A port;

Connect NE2's B to the USB to RS485 converter's B.

RS422 connection:

Connect the T+ pin of the NE2 to the R+ pin of the USB to RS422 converter;

Connect the T-pin of the NE2 to the R-pin of the USB to RS422 converter;

Connect the R+ pin of the NE2 to the T+ pin of the USB to RS422 converter;

Connect the R-pin of the NE2 to the T-pin of the USB to RS422 converter;

RS232 connection:

The TXD of the NE2 is connected to the RXD of the USB to RS232 converter;

The RXD port of the NE2 connects to the TXD port of the USB to RS-232 converter;

Connect the GND of NE2 to the GND of the USB to RS232 converter;

The DB9 female connector of the NE2 connects to the male connector of the USB to 232 interface;

DB9 pinout: 2: TXD, 3: RXD, 5: GND;

TTL connection:

The TXD of the NE2 is connected to the RXD of the USB to TTL converter;

The RXD of the NE2 is connected to the TXD of the USB to TTL converter;

Connect the GND of NE2 to the GND of the USB to TTL converter;

Note: TTL voltage level is 3.3V.

1.2.3 Power connection

Connect the V+ pin of NE2 to the V+ pin of the DC 12V switching power supply;

Connect the V- of NE2 to the V- of the DC 12V switching power supply;

Alternatively, a DC power connector (outer diameter 5.5mm, inner diameter 2.1mm) can be used for connection.

Note:NE2-D11A, NE2-D12A, NE2-D11AP, and NE2-D12AP are powered by AC 85~265V.Simply connect the live and neutral wires separately.

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1.3 Software settings

1.3.1 Network testing environment

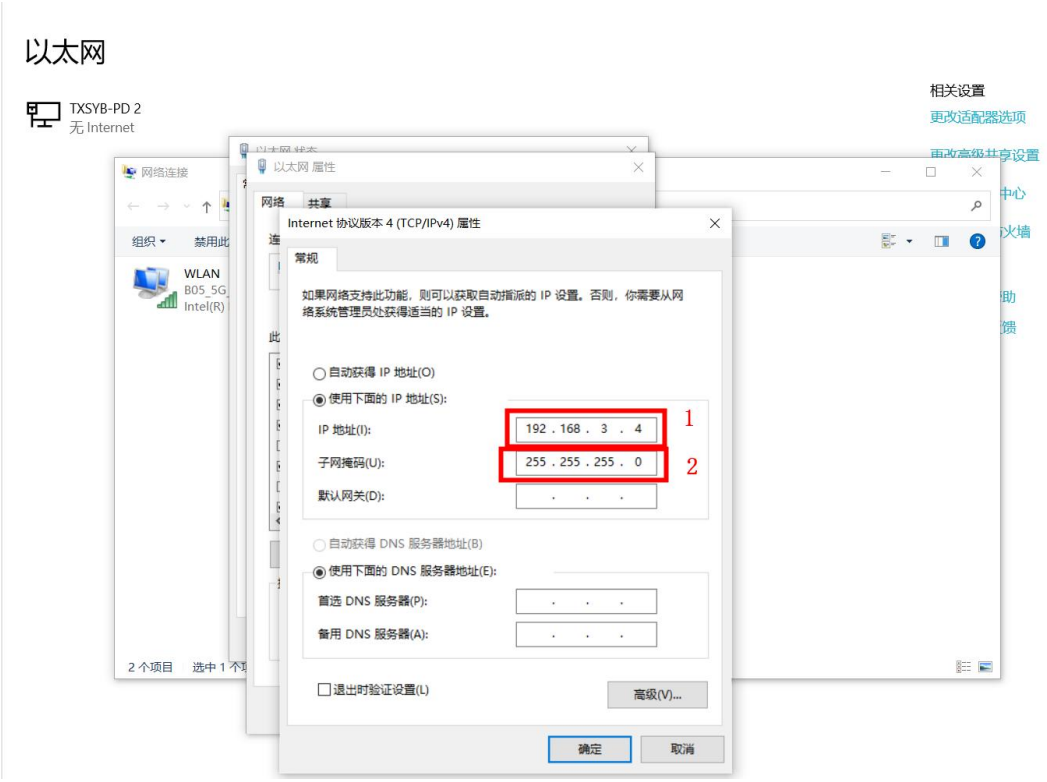
To avoid issues such as server search failures and inability to open web pages during actual use, first check the relevant computer settings.

（1） Turn off your computer's firewall and antivirus software;

（2） Configure the network card connected to the device;

（3） This case is for testing a device directly connected to a computer. The computer needs to be configured with a static IP address (the computer is directly connected to the serial port server, and there is no router to assign an IP address, so the computer cannot obtain an IP address). If using a switch or router, it is necessary to ensure that the device and the computer are on the same network (e.g., 192.168.3.xxx).

（4） Here, the computer's static IP address is configured as 192.168.3.4 (on the same network segment as the serial server), the subnet mask is configured as 255.255.255.0, and the default gateway is configured as 192.168.3.1;



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1.3.2 Default parameters

project	Default parameters
IP address	192.168.3.7
Default local port	8886
Subnet mask	255.255.255.0
Default gateway	192.168.3.1
Default working mode	TCP Server
Serial port baud rate	115200
Serial port parameters	8 / None / 1

1.3.3 Data transmission test

After completing the above steps, use the device's factory default parameters and perform the following operations to achieve transparent data transmission testing.

The operation steps are as follows:

（1） Open the TCP/IP debugging assistant software.

（2） In the "Network Settings" section, select TCP Client mode, the remote host address corresponds to (the device's default local IP: 192.168.3.7), and the remote host port corresponds to the device's factory default local port 8886. Then click Connect.

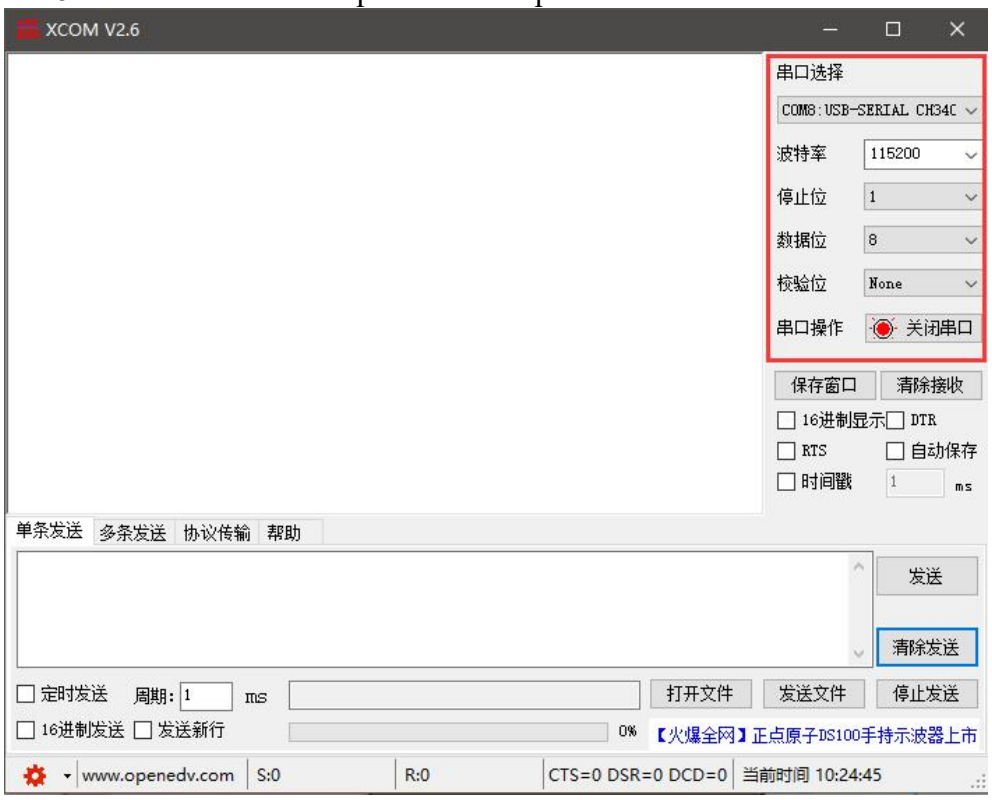
（3） Wait for the computer to connect to the serial port server. Once the connection is complete, the LINK light on the serial port server will remain on.



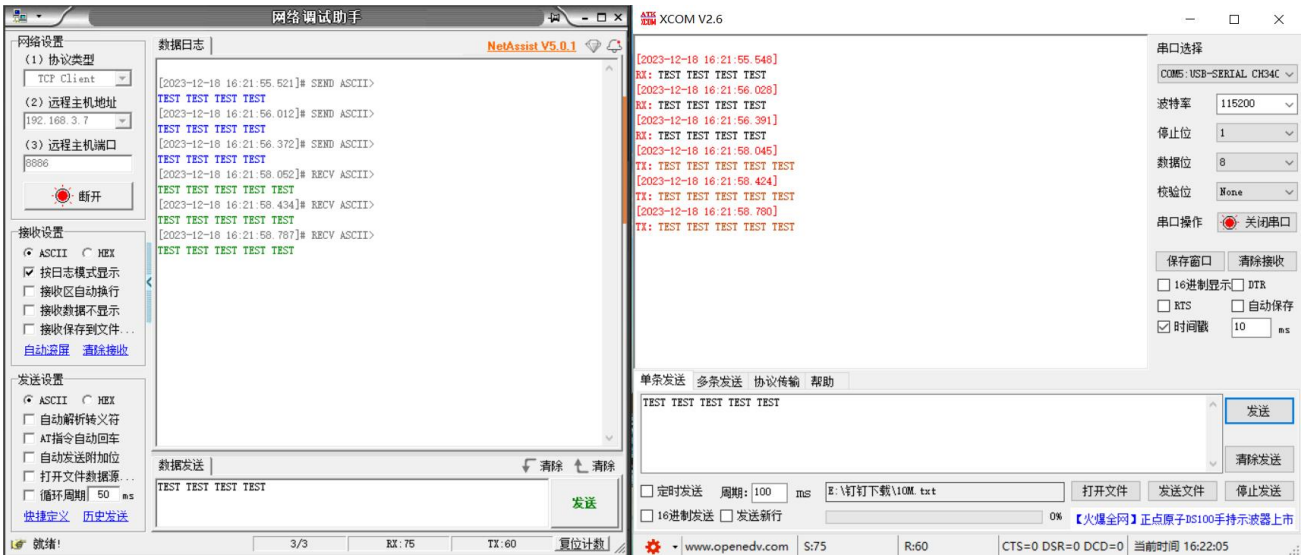
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（4） Open the serial port assistant, set the serial port baud rate to 115200, and the serial port parameters to 1/8/None. Then click to open the serial port.



（5） Data transmission testing involves the serial port assistant (serial port end) sending test data and the network debugging assistant (network end) receiving the test data. The network debugging assistant (network end) sends test data, and the serial port assistant (serial port end) receives the test data. This achieves full-duplex communication (i.e., bidirectional data transmission and reception from local machine to network).



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Product Overview

1.4 Technical parameters

General parameters

project	illustrate
Work mode	TCP Server (default), TCP Client, UDP Server, UDP Client, HTTP Client, MQTT Client
Socket connection	The TCP server supports 5 client connections.
Network Protocol	TCP/UDP, MQTT, HTTP, IPv4, DHCP, DNS
IP acquisition method	Static IP (default), DHCP
DNS domain name resolution	support
Domain Name Resolution Server	114.114.114.114 (Customizable)
Configuration method	Web page, parameter configuration tool, AT commands
IP address	192.168.3.7 (customizable)
username	admin (can be customized)
password	admin (can be customized)
Local port	8886 (customizable)
Subnet mask	255.255.255.0 (customizable)
gateway	192.168.3.1 (Customizable)
Serial port cache	10kByte or 1024 packets
Packaging mechanism	Maximum length 1024 bytes, idle time 1~80 bytes
Serial port baud rate	600~460800 bps (default 115200)
Data bits	5, 6, 7, 8 (default)
Stop bit	1 (default), 1.5, 2
Check bit	None (default), Odd, Even
Operating temperature and humidity	-40 to +85℃, 5% to 95%RH (non-condensing)
Storage temperature and humidity	-40 to +105℃, 5% to 95%RH (non-condensing)
Protection level	Industrial EMC Level 3
Isolation voltage	1.5KV (Isolation version only)
Electrostatic protection	Contact voltage 4KV, air voltage 8KV
pulse group	Differential mode 1kV, common mode 2kV

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Difference parameters

Product Model	Shell material	Serial port categories	Operating voltage (V)	Product Dimensions (mm)	Number of network ports	isolation	PoE power receiving	Power interface
NE2-D 11	PC	RS485 3P 2.54mm terminal	DC 8~28	93×28×27	1	×	×	2P 2.54mm terminal
NE2-D 11E	PC	RS485 3P 3.81mm terminal	DC 8~28	110×66×30	1	×	√	2P 5.08mm terminal
NE2-D 12	PC	RS232 3P 2.54mm terminal	DC 8~28	93×28×27	1	×	×	2P 2.54mm terminal
NE2-D 12E	PC	RS232 3P 3.81mm terminal	DC 8~28	110×66×30	1	×	√	2P 5.08mm terminal
NE2-D 1	PC	3.3V TTL 3P 2.54mm terminal	DC 8~28	93×28×27	1	×	×	2P 2.54mm terminal
NE2-D 11P	PC	RS485 3P 2.54mm terminal	DC 8~28	93×28×27	1	√	×	2P 2.54mm terminal
NE2-D 12P	PC	RS232 3P 2.54mm terminal	DC 8~28	93×28×27	1	√	×	2P 2.54mm terminal
NE2-D 1P	PC	3.3V TTL 3P 2.54mm terminal	DC 8~28	93×28×27	1	√	×	2P 2.54mm terminal
NE2-D 14	Aluminum profiles	RS485 2P 3.81mm terminal RS232 DB9 female connector RS422 4P 3.81mm terminal	DC 8~28	82×84×25	1	×	×	2P 3.81mm terminal
NE2-D 14E	Aluminum profiles	RS485 2P 3.81mm terminal RS232 DB9 female connector RS422 4P 3.81mm terminal	DC 8~28	82×84×25	1	×	√	2P 3.81mm terminal

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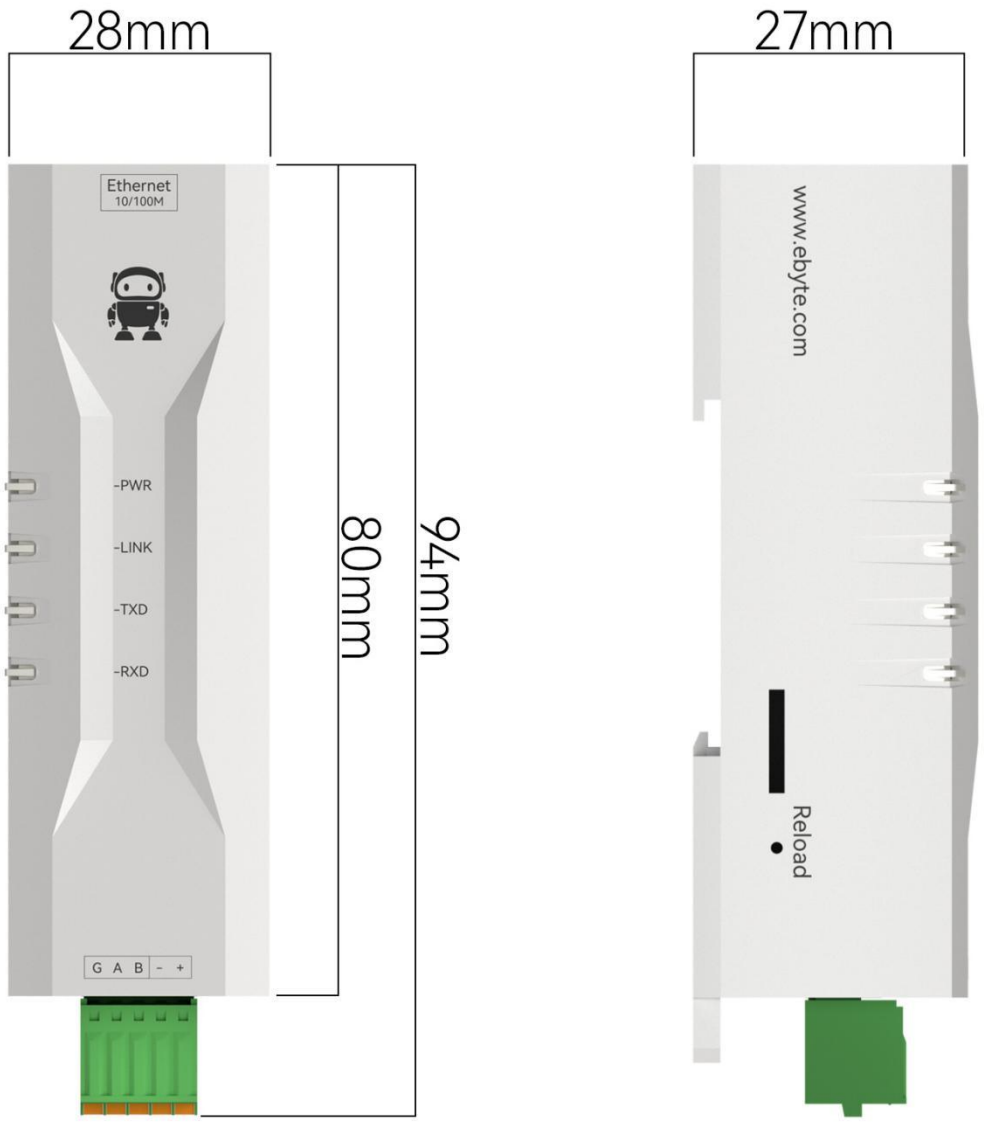
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NE2-D 14P	Aluminum profiles	RS485 2P 3.81mm terminal RS232 DB9 female connector RS422 4P 3.81mm terminal	DC 8~28	82×84×25	1	√	×	2P 3.81mm terminal
NE2-D 14PE	Aluminum profiles	RS485 2P 3.81mm terminal RS232 DB9 female connector RS422 4P 3.81mm terminal	DC 8~28	82×84×25	1	√	√	2P 3.81mm terminal
NE2-H 14	Aluminum profiles	RS485 2P 3.81mm terminal RS232 DB9 female connector RS422 4P 3.81mm terminal	DC 8~28	82×84×25	2	×	×	2P 3.81mm terminal
NE2-H 14P	Aluminum profiles	RS485 2P 3.81mm terminal RS232 DB9 female connector RS422 4P 3.81mm terminal	DC 8~28	82×84×25	2	√	×	2P 3.81mm terminal
NE2-D 11A	PC	RS485 3P 3.81mm terminal	AC 85~265	110×66×30	1	×	×	2P 5.08mm terminal
NE2-D 12A	PC	RS232 3P 3.81mm terminal	AC 85~265	110×66×30	1	×	×	2P 5.08mm terminal
NE2-D 11AP	PC	RS485 3P 3.81mm terminal	AC 85~265	110×66×30	1	√	×	2P 5.08mm terminal
NE2-D 12AP	PC	RS232 3P 3.81mm terminal	AC 85~265	110×66×30	1	√	×	2P 5.08mm terminal

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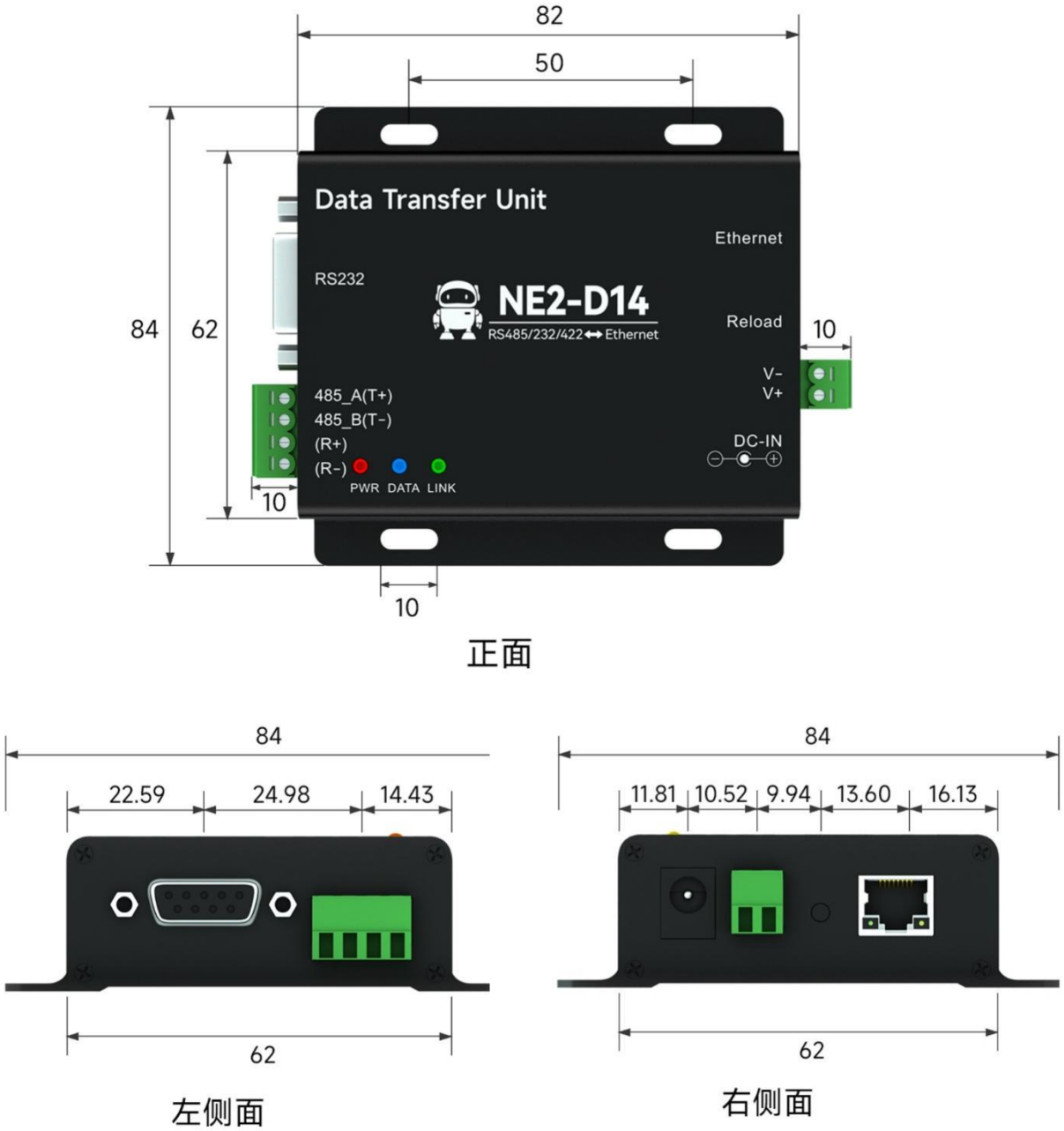
1.5 Mechanical dimensions



Note: This diagram applies to NE2-D11, NE2-D12, NE2-D1, NE2-D11P, NE2-D12P, and NE2-D1P.

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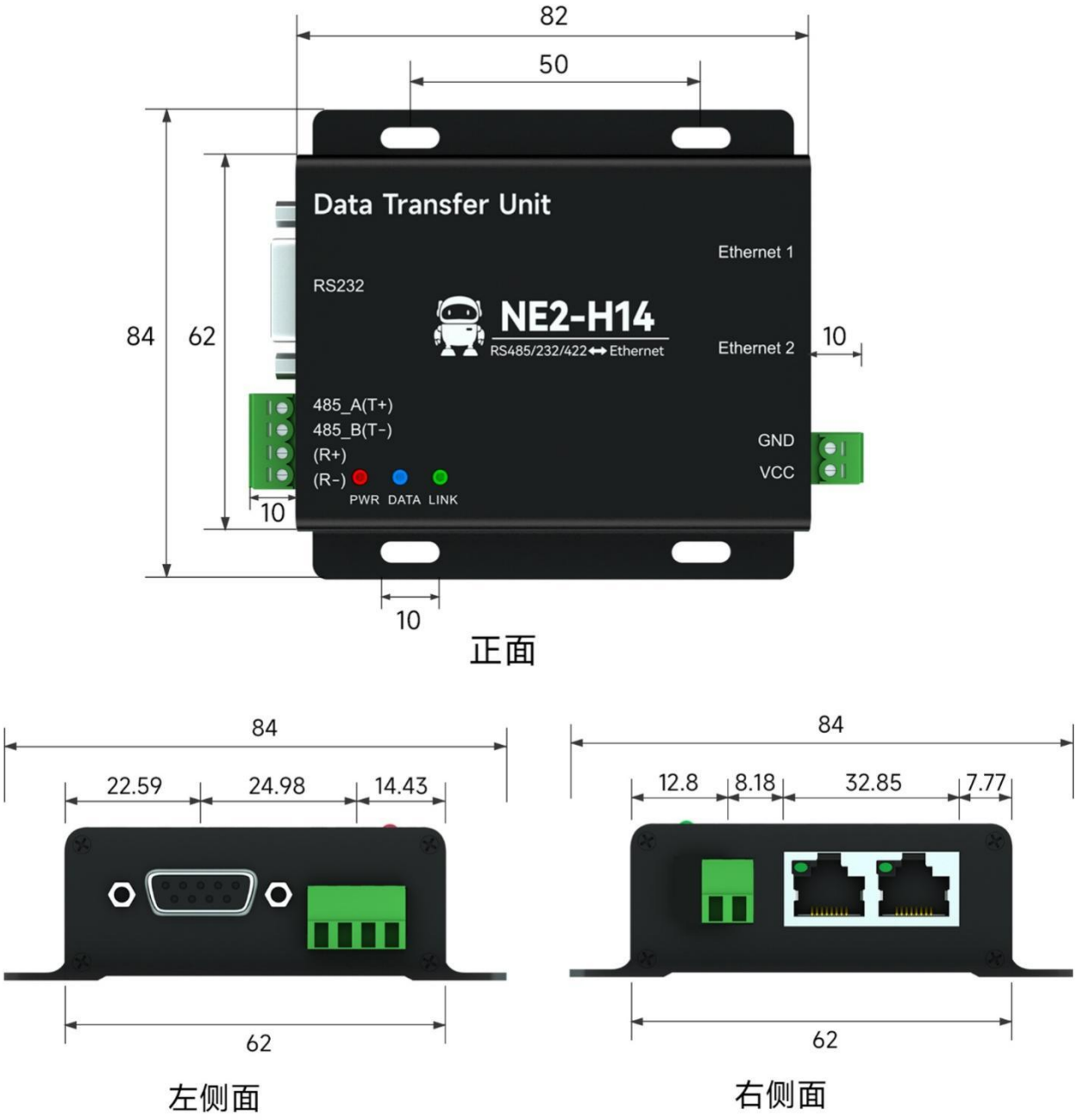
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Note: This diagram applies to NE2-D14, NE2-D14E, NE2-D14P, and NE2-D14PE.

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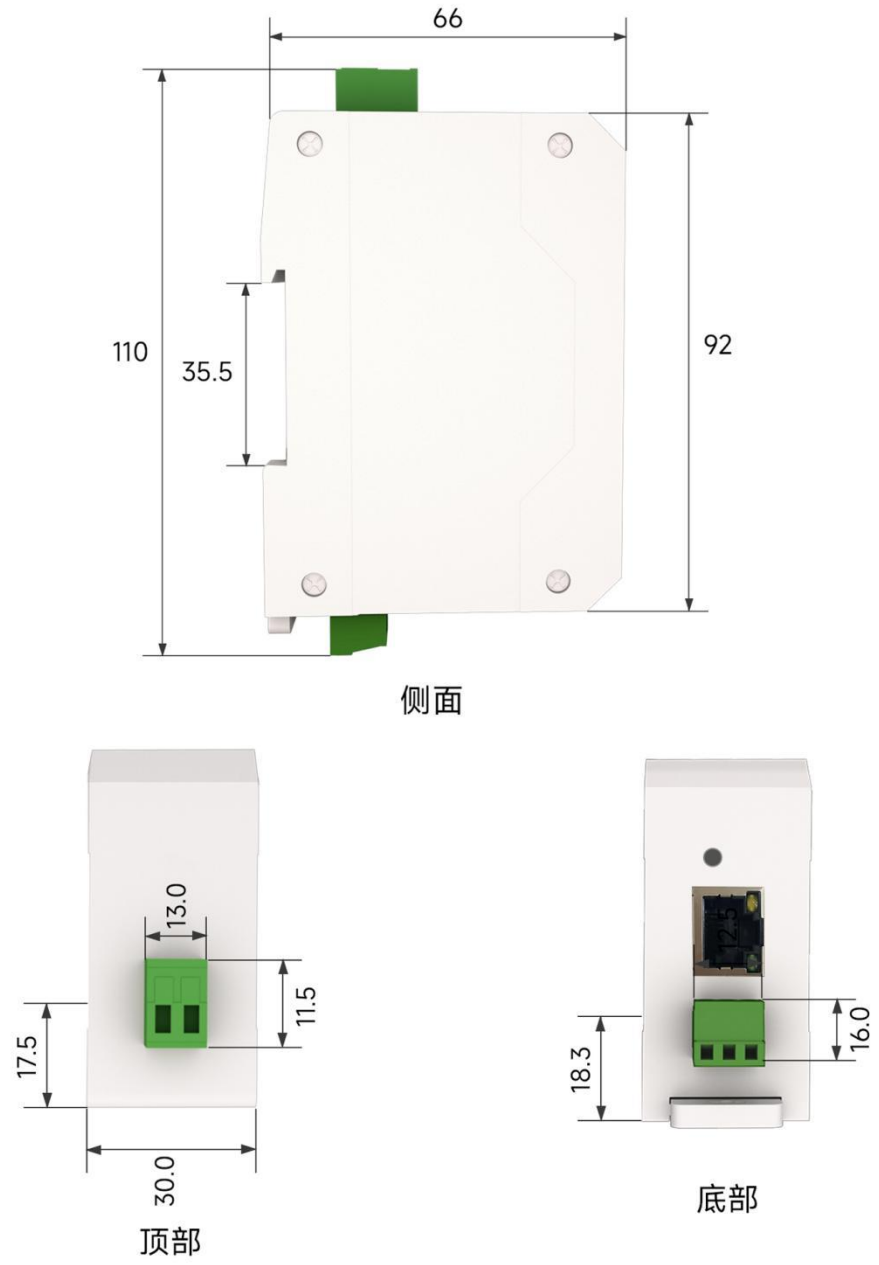
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Note: This diagram applies to NE2-H14 and NE2-H14P.

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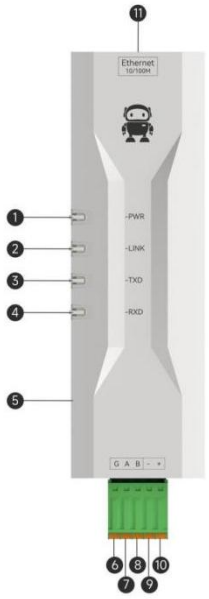


Note: This diagram applies to NE2-D11A, NE2-D12A, NE2-D11AP, NE2-D12AP, NE2-D11E, and NE2-D12E.

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1.6 Pin Definitions



Serial Number	name	Function	illustrate
1	POWER	Power indicator light (blue)	Solid light: Power is on Always off: Power is off
2	LINK	Connection indicator light (yellow)	Off: Network cable not connected Flashing: The network cable is connected normally, but the link is not connected. Constantly lit: Any network link connection is successful or in UDP mode.
3	TXD	Serial port transmit indicator light (green)	Flashing: Serial port output data to client device
4	RXD	Serial port receiver indicator light (yellow)	Flashing: Client device outputs data to NE2 serial port
5	Reload	Factory reset button	Press and hold for 5-10 seconds until all indicator lights on the device illuminate, indicating that the device has been restored to factory settings.
6	G	GND	Connect the RS485 cable shielding layer or RS232-G or TTL-G.
7	A/T	485-A or 232/TTL-TXD	Connect to RS485-A interface, RS232-R interface, or TTL-R interface.
8	B/R	485-B or 232/TTL-RXD	Connect to RS485-B interface, RS232-T interface, or TTL-T interface.
9	-	power supply-	Connect to 8~28V power supply V-
10	+	Power+	Connect to 8~28V power supply V+
11	Ethernet	network port	Standard RJ45 interface, 10/100M crossover direct connection auto-sensing

[Note] When the network cable is not connected, the POWER indicator light will be on and the other indicator lights will be off, indicating that the device is in standby mode; when the factory settings are restored, all indicator lights will be on.

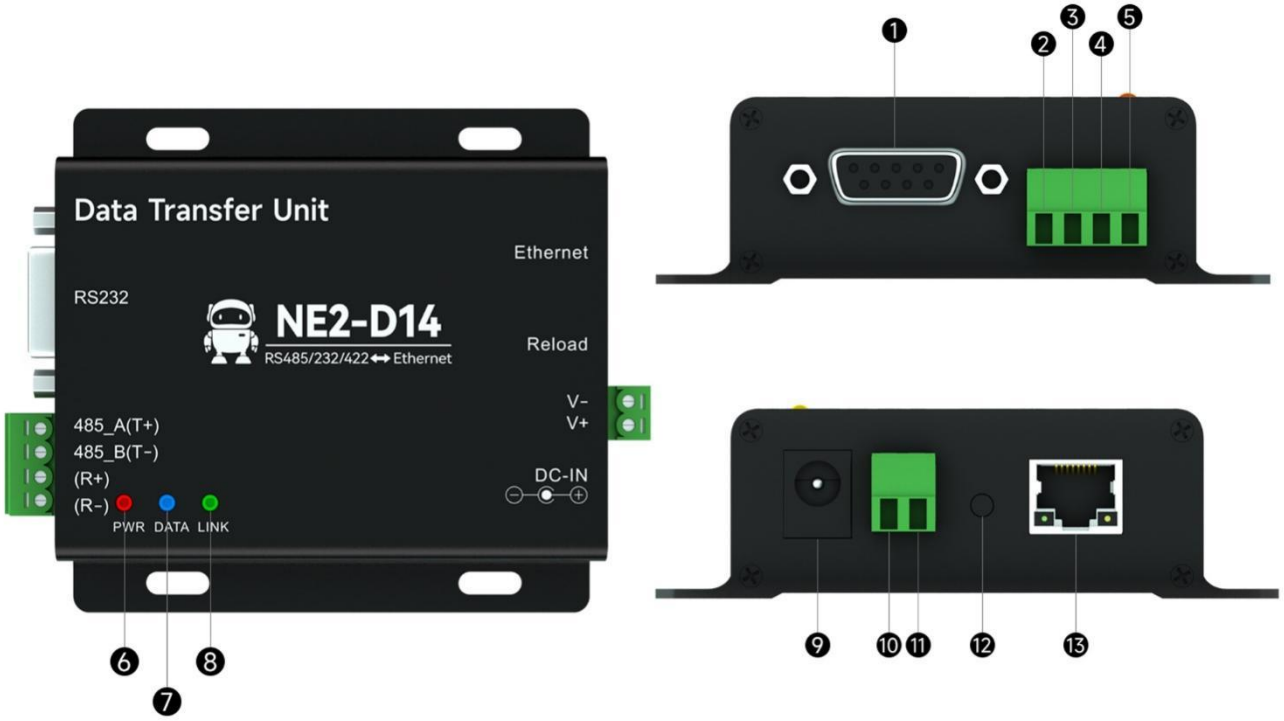
[Note] The green indicator light on the network port is the 100M indicator light, and the yellow

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indicator light is the 10M indicator light. Under normal circumstances, it is lit (usually the 100M indicator light is lit), and it flashes when there is data transmission or reception.

Note: Applicable to NE2-D11, NE2-D12, NE2-D1, NE2-D11P, NE2-D12P, and NE2-D1P.



Serial Number	name	Function	illustrate
1	RS232	RS232 interface	Standard DB9-RS-232 female connector wiring sequence 2: TXD 3: RXD 5: GND
2	485-A(T+)	RS485/RS422 interface	RS-485 interface A, RS-422 transmit T+
3	485-A(T+)	RS485/RS422 interface	B of RS-485 interface, T- transmitted via RS-422
4	(R+)	RS422 interface (R+)	RS-422 receiver R+
5	(R-)	RS422 interface (R-)	RS-422 receiver R-
6	PWR	Power indicator light (red)	Solid light: Power is on Off: Power off
7	DATA	Data transceiver indicator	Blue light flashing: Data is being sent from the network port to the serial port. Green light flashing: Data is being sent from the network port to the serial port. Off: No data interaction

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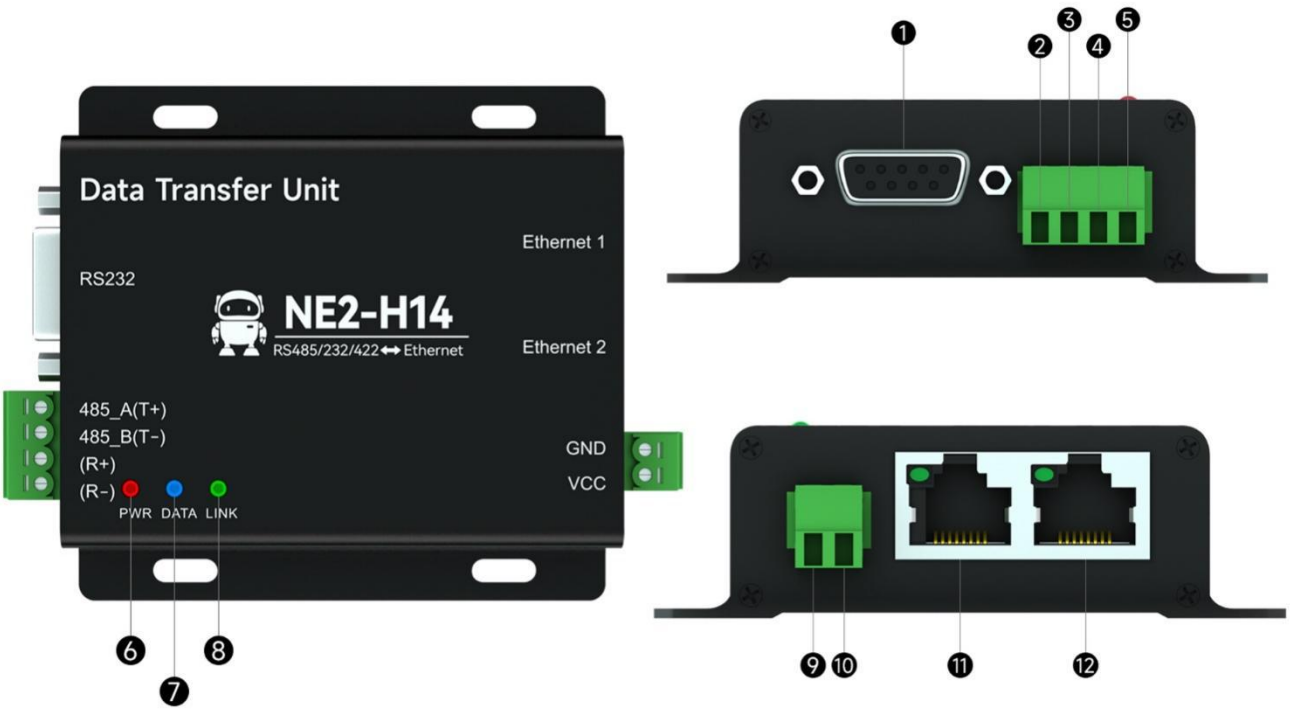
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8	LINK	Link connection light (green)	Off: Network cable not connected Flashing: The network cable is connected normally, but the link is not connected. Constantly lit: Any network link connection is successful or in UDP mode.
9	DC-IN	DC female power input	DC 8-28V input, do not input simultaneously with Phoenix terminals.
10	VCC	DC power input	3.81mm Phoenix terminal, DC 8-28V positive, do not input DC power simultaneously.
11	GND	DC power output	3.81mm Phoenix terminal, DC 8-28V negative terminal, do not input DC power simultaneously.
12	Reload	Factory reset button	Press and hold for 5 seconds to perform a factory reset.
13	Ethernet	Network interface	Standard RJ45 interface

[Note] When the network cable is not connected, the POWER indicator light will be on and the other indicator lights will be off, indicating that the device is in standby mode; when the factory settings are restored, all indicator lights will be on.

[Note] The green indicator light on the network port is the 100M indicator light, and the yellow indicator light is the 10M indicator light. Under normal circumstances, it is lit (usually the 100M indicator light is lit), and it flashes when there is data transmission or reception.

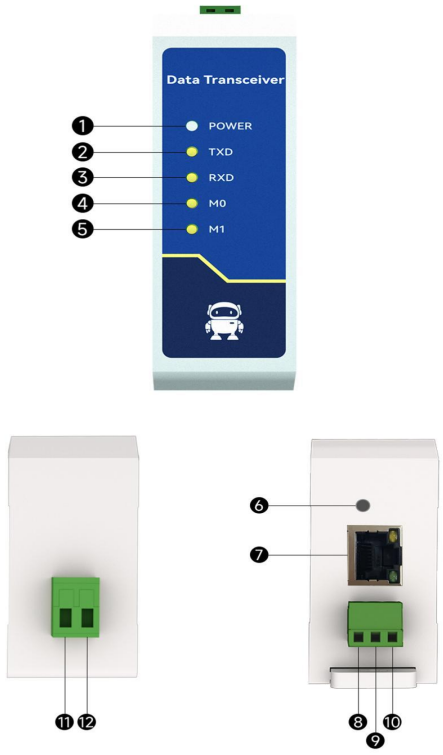
Note: Applicable to NE2-D14, NE2-D14E, NE2-D14P, and NE2-D14PE.



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Serial Number	name	Function	illustrate
1	RS232	RS232 interface	Standard DB9-RS-232 female connector wiring sequence 2: TXD 3: RXD 5: GND
2	485-A(T+)	RS485/RS422 interface	RS-485 interface A, RS-422 transmit T+
3	485-A(T+)	RS485/RS422 interface	B of RS-485 interface, T- transmitted via RS-422
4	(R+)	RS422 interface (R+)	RS-422 receiver R+
5	(R-)	RS422 interface (R-)	RS-422 receiver R-
6	PWR	Power indicator light (red)	Solid light: Power is on Off: Power off
7	DATA	Data transceiver indicator	Blue light flashing: Data is being sent from the network port to the serial port. Green light flashing: Data is being sent from the network port to the serial port. Off: No data interaction
8	LINK	Link connection light (green)	Off: Equipment malfunction Flashing: Device is operating normally Constantly lit: Any network link connection is successful or in UDP mode.
9	V+	DC power input	5.08mm Phoenix terminal, DC 8-28V positive terminal
10	V-	DC power output	5.08mm Phoenix terminal, DC 8-28V negative terminal
11	WAN/LAN	network port	Standard RJ45 interface, 10/100M auto-sensing, cascadable.
12	WAN/LAN	network port	Standard RJ45 interface, 10/100M auto-sensing, cascadable.

Note: Applicable to NE2-H14 and NE2-H14P



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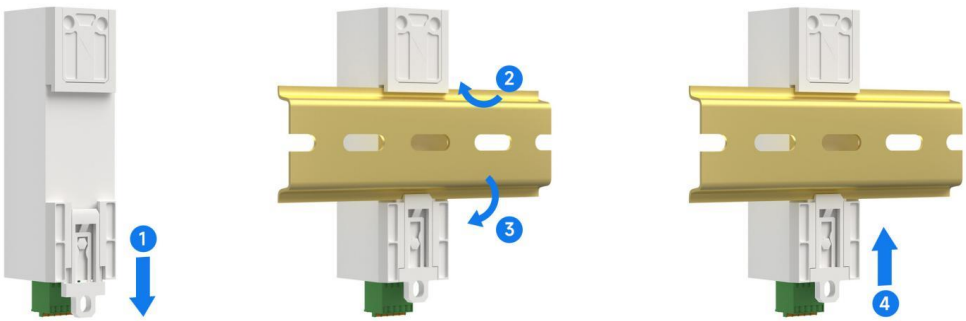
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Serial Number	name	Function	illustrate
1	POWER	Power indicator light (blue)	Solid light: Power is on Always off: Power is off
2	TXD	Serial port transmit indicator light (red)	Flashing: Serial port output data to client device
3	RXD	Serial port receiver indicator light (green)	Flashing: Client device outputs data to NE2-D11 serial port
4	M0	Link indicator light (green)	Flashing: The network cable is connected normally, but the link is not connected; Bright: Network link connection successful
5	M1	Network negotiation indicator (red/green)	Extinguished: Network cable not connected Green light indicates 100M network speed. Green light indicates data interaction at the physical layer. Red light indicates 10M network speed. Red indicator: Data interaction at the physical layer.
6	RELOAD	Factory reset button	Press and hold for 5-10 seconds until all indicator lights on the device illuminate, indicating that the device has been restored to factory settings.
7	Ethernet	network port	Standard RJ45 interface, 10/100M crossover direct connection auto-sensing
8	G	Grounding	signal ground
9	A/TXD	A/TXD	Connect to RS485-A or RS232-RXD
10	B/RXD	B/RXD	Connect to RS485-B or RS232-TXD
11	L/+	DC 8~28V/ AC 85~265V input	2P 5.08mm terminal block The specific model shall prevail.
12	N/-		

Note: This diagram applies to NE2-D11A, NE2-D12A, NE2-D11AP, NE2-D12AP, NE2-D11E, and NE2-D12E.

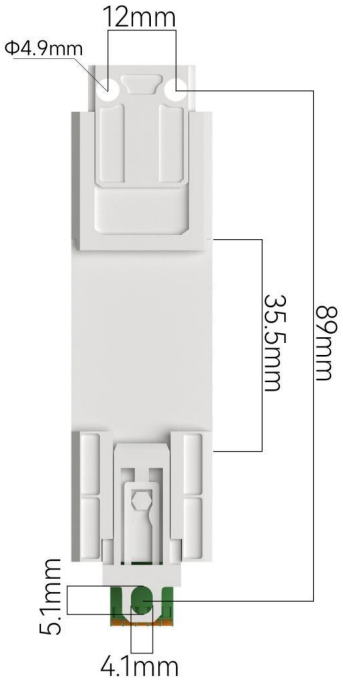
1.7 Installation method

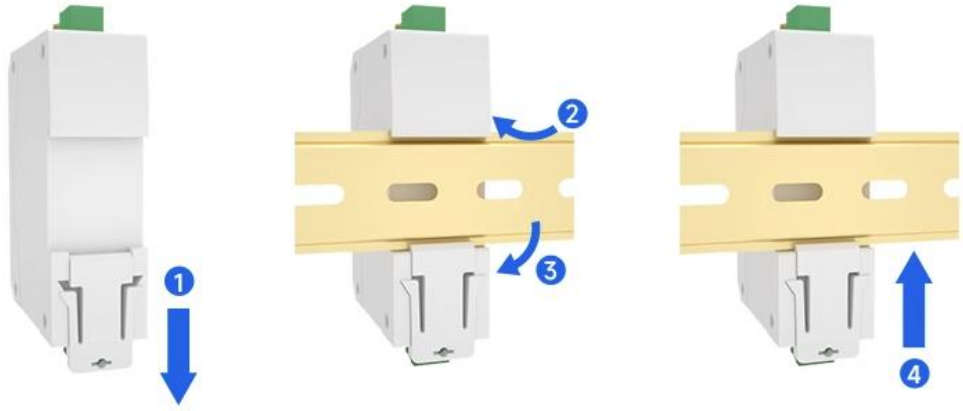
The equipment is installed using guide rails or positioning holes.



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Product Functions

1.8 Basic parameters of this machine

1.8.1 Basic parameters

The SN code is a traceability code written when the device leaves the factory, highlighting the batch number of the device. It can only be read, not written.

The device model number is the full name of the current device model. You can use this model number to obtain information from the official website.

The firmware version is the current factory firmware model of the device. You can download the latest firmware update from the official website.

The MAC address is the chip's physical address and is a unique identifier.

1.8.2 IP address type

An IP address is used to identify a module within a local area network (LAN), and it is unique within the LAN. Therefore, it cannot be duplicated with other devices on the same LAN. Modules can obtain IP addresses using either a static IP address or DHCP.

（1） Static IP: Static IP requires manual configuration by the user. During the configuration process, be sure to enter the IP address, subnet mask, and gateway at the same time. Static IP is suitable for scenarios where it is necessary to count IP addresses and devices and ensure that they are matched one-to-one.

Advantages: Devices that cannot be assigned IP addresses can be found through the full network broadcast mode, facilitating unified management;

Disadvantages: Different local area networks have different network segments, which prevents normal TCP/UDP communication.

（2） Dynamic DHCP: The main function of DHCP is to dynamically obtain information such as IP address, gateway address, and DNS server address from the gateway host, thus eliminating the tedious steps of setting IP addresses. It is suitable for scenarios where there are no requirements for IP addresses, and it is not mandatory for IP addresses to correspond one-to-one with modules.

Advantages: It can communicate directly with devices such as routers that have a DHCP server, reducing the hassle of setting IP addresses, gateways, and subnet masks.

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Disadvantages: The module will not work properly when connected to a network without a DHCP server, such as a direct connection to a computer.

The subnet mask is mainly used to determine the network number and host number of an IP address, indicate the number of subnets, and serve as a flag to determine whether a module is within a subnet.

The subnet mask must be set. The commonly used Class C subnet mask is 255.255.255.0, where the network part is the first 24 bits, the host part is the last 8 bits, and the number of subnets is 255. If the module IP is within the range of 255, then the module IP is considered to be in this subnet.

A gateway is the network number of the network where the module's current IP address resides. If the connection to the external network is made through a device such as a router, then the gateway is the router.

1.8.3 Domain Name System (DNS)

Domain name resolution uses a Domain Name System (DNS) server to translate domain names into IP addresses that the network can recognize. This allows you to use DNS resolution even when the server's IP address is not static. As long as the corresponding domain name remains the same, the NE2-D11's settings do not need to be changed, regardless of how the server's IP address changes. The serial port server's DNS server address can be user-defined, enabling domain name resolution in case the router's DNS server malfunctions. During domain name resolution, the device sends a resolution request to the custom DNS server, and upon successful resolution, returns the device's connection parameters (usually an IP address).

When the target IP is a domain name, the maximum configurable domain name length is 256 bytes. If a connection to the target server fails, the module will continuously and periodically resolve the domain name.

In DHCP mode, the Domain Name System (DNS) server address is automatically obtained (synchronized with the router's DNS address) and cannot be modified.

In static IP mode, the default address of the Domain Name System (DNS) server is 114.114.114.114, or you can customize the DNS server.

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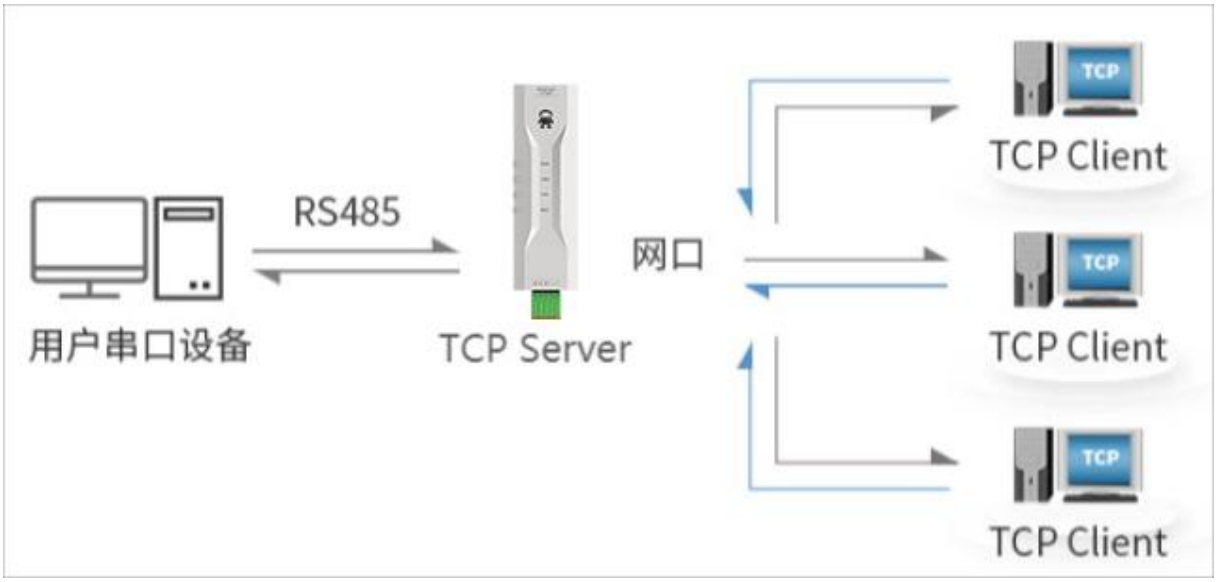
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1.9 Network working mode

1.9.1 TCP server mode

A TCP Server is a device that listens on its local port, accepts connection requests from clients, and establishes connections for data communication. It is typically used for communication with TCP clients within a local area network. In server mode, the device supports up to 5 client connections. If two sockets simultaneously start server mode, it can support up to 10 client connections.

When the Modbus gateway function is disabled, the device will send the data received from the serial port to all client devices that have established a connection with the device, supporting a maximum of 5 client connections. When the Modbus gateway function is enabled, non-Modbus data will be cleared and will not be forwarded.



1.9.2 TCP client mode

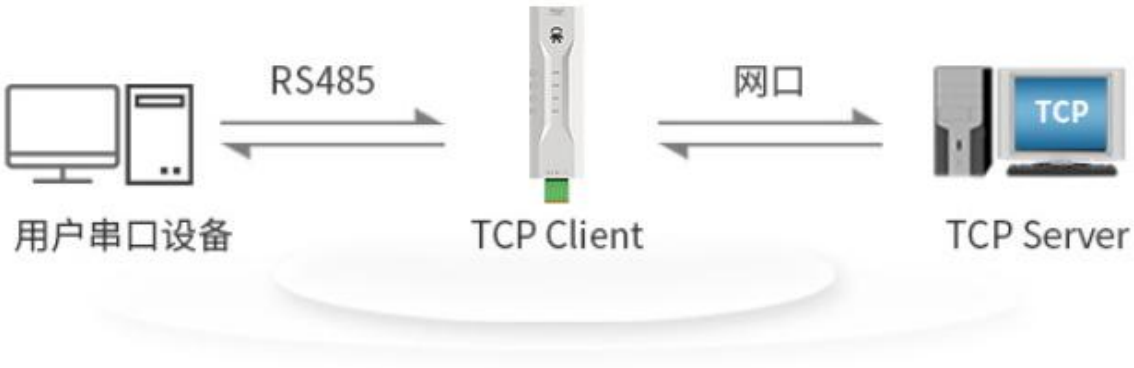
A TCP client is a device that actively initiates a connection request to the server and establishes a connection during operation to facilitate the exchange of serial port data and server data.

Using the client requires accurately configuring the target's IP address/domain name and target port.

Note: For client mode, the local port is recommended to be 0 (dynamic port).

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1.9.3 UDP server mode

A UDP server is a device that does not verify the source IP address when communicating using the UDP protocol. After receiving each UDP packet, it saves the source IP address and source port of the packet and sets them as the destination IP address and port. Therefore, the data sent by the device is only sent to the source IP address and port where the device last received the data.

This mode is typically used in scenarios where multiple network devices communicate with this device frequently, and the TCP server cannot meet the requirements.

Using a UDP server requires the remote UDP device to send data first; otherwise, data cannot be sent normally.

[Note] In UDP mode, the data sent from the network to the device should be less than 1024 bytes per packet; any data exceeding this limit will be lost.

1.9.4 UDP client mode

UDP Client is a connectionless transport protocol that provides a simple, unreliable, transaction-oriented message delivery service. There is no connection establishment or termination; only the destination IP and port need to be configured to send data to the other party. It is typically used in data transmission scenarios where packet loss is not a concern, data packets are small, the transmission frequency is high, and the data needs to be sent to a specified IP address.

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

In this mode, the target address is set to 255.255.255.255. The sent data will be broadcast across the entire network segment, but the sending and receiving devices need to ensure that their ports are consistent, and the devices can also receive broadcast data.

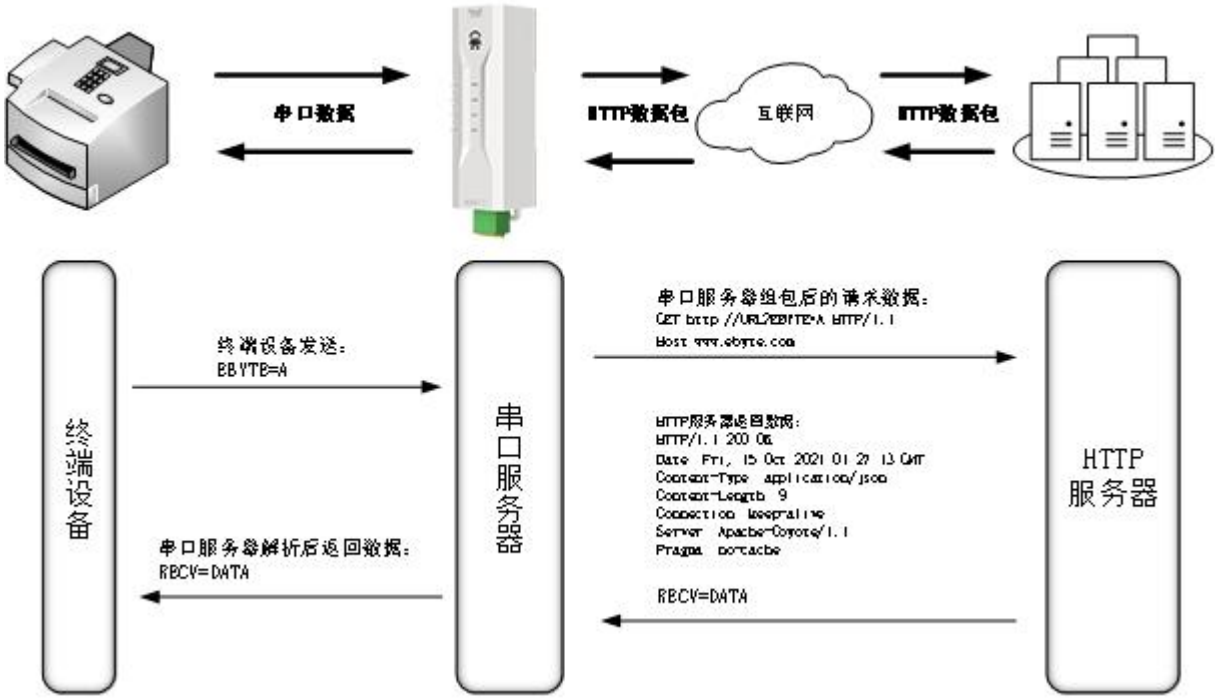
Note: In UDP mode, the length of a single packet cannot exceed 1024 bytes.

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1.9.5 HTTP client mode

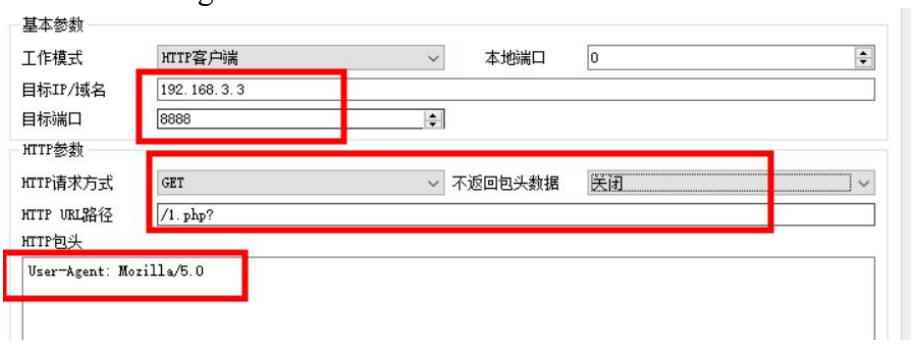
This mode enables HTTP packet assembly, providing both GET and POST options. Customers can configure URL, header, and other parameters, and the device (serial server) assembles and sends the packets, achieving fast communication between the serial device and the HTTP server.TTPIn client mode, it is recommended to use a random port and enable short connections to save bandwidth.TTP Server resources.



1. GET

The following figure shows the test device's HTTP-GET request using OneNET's multi-protocol access HTTP mode.

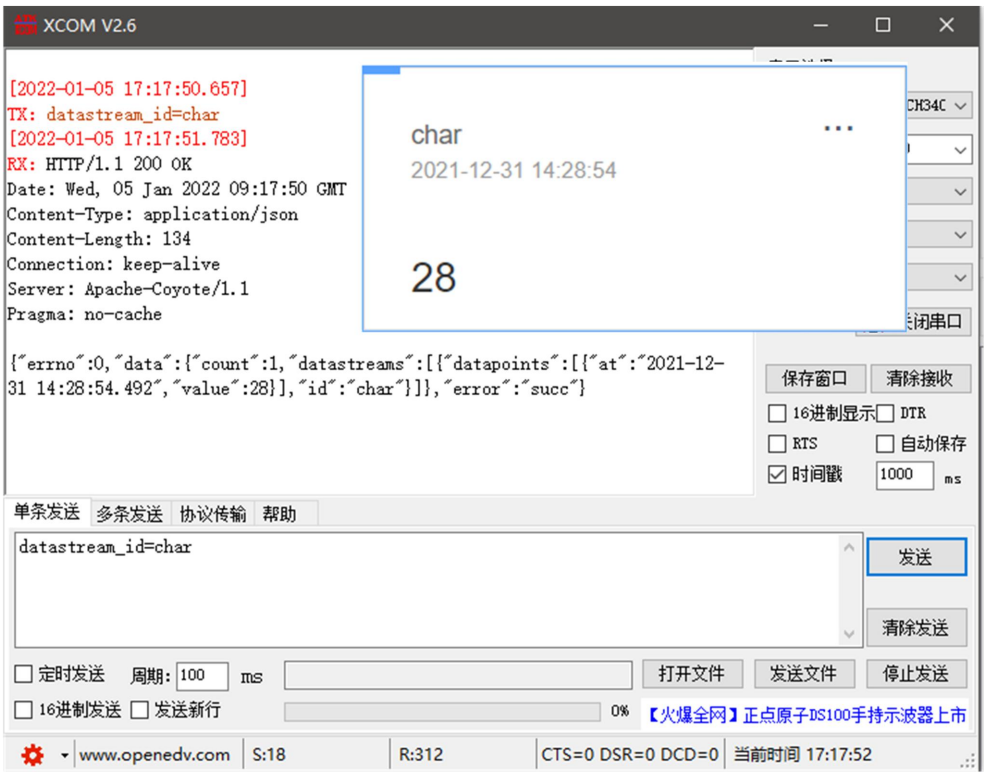
(1) Configuration for returning data with header:



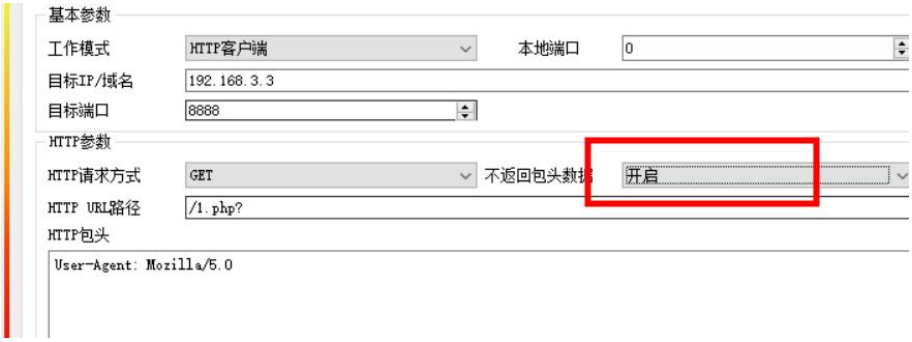
Data return test:

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(2) Configuration for returning data without header:



Data return test:

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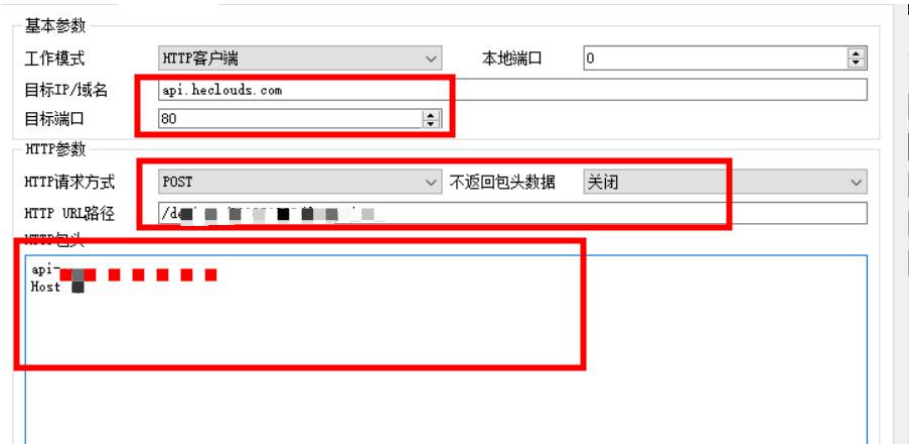
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2. POST

The following figure shows the test device's HTTP-POST request using OneNET's multi-protocol access HTTP mode.

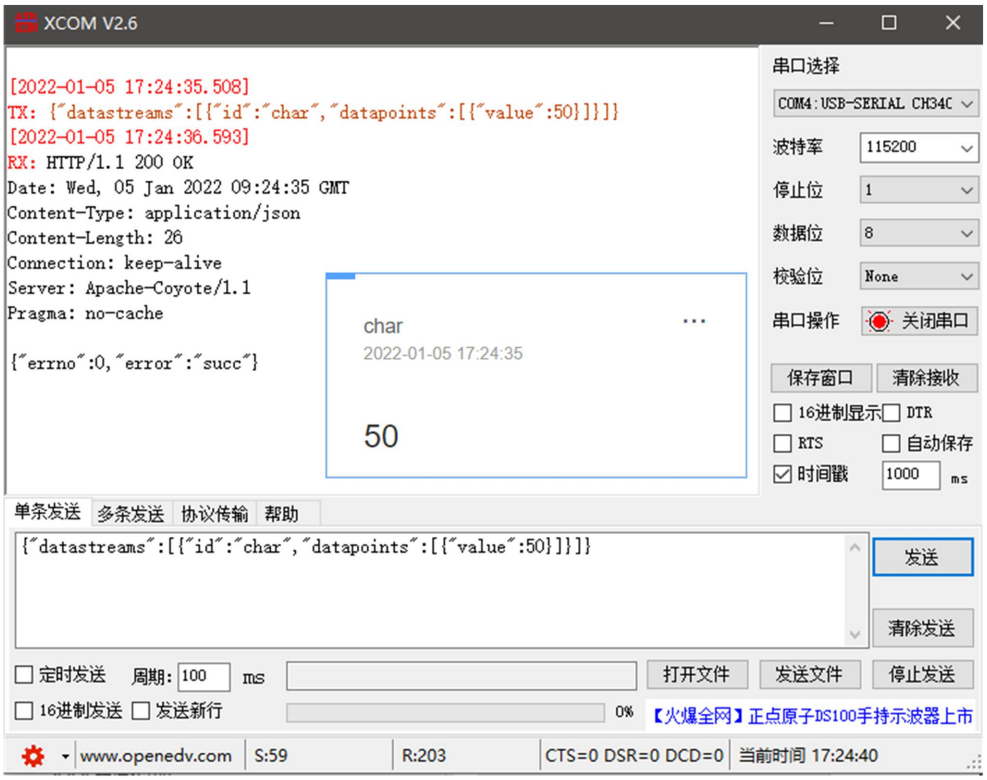
(1) Configuration for returning data with header:



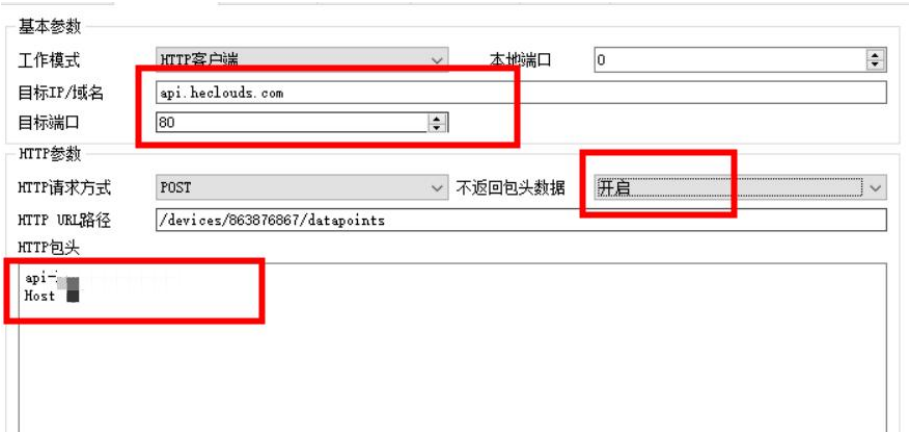
Data return test:

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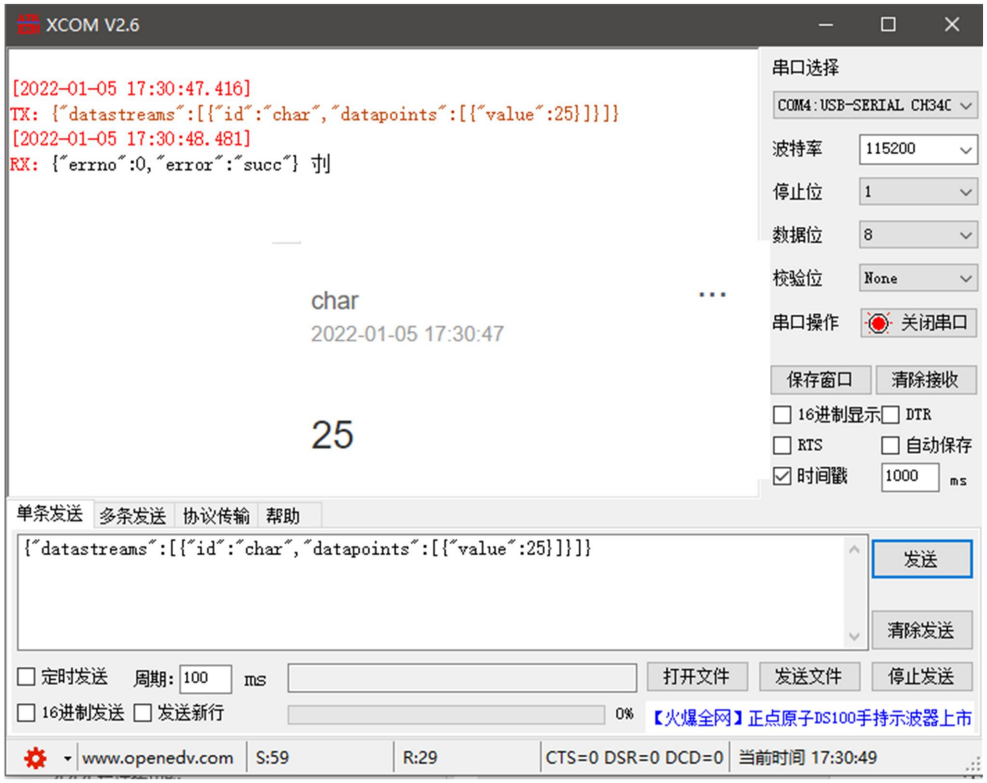
(2) Configuration for returning data without header:



Data return test:

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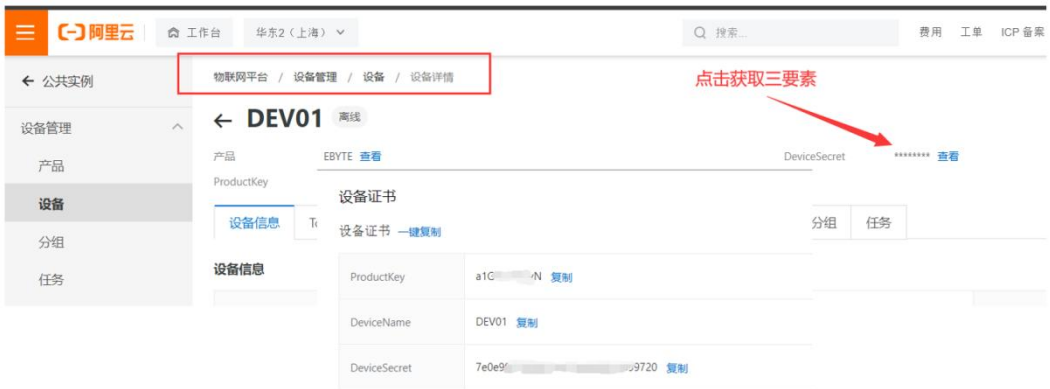
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1.9.6 MQTT client mode

1.9.6.1 Alibaba Cloud MQTT connection

You can directly connect to the server using Alibaba Cloud's "three elements" to obtain the three elements required for connecting to Alibaba Cloud (for detailed instructions on obtaining Alibaba Cloud's three elements, please refer to "Instructions for Obtaining Alibaba Cloud MQTT Three Elements"), as shown in the figure:



Configure device connection parameters on the host computer:

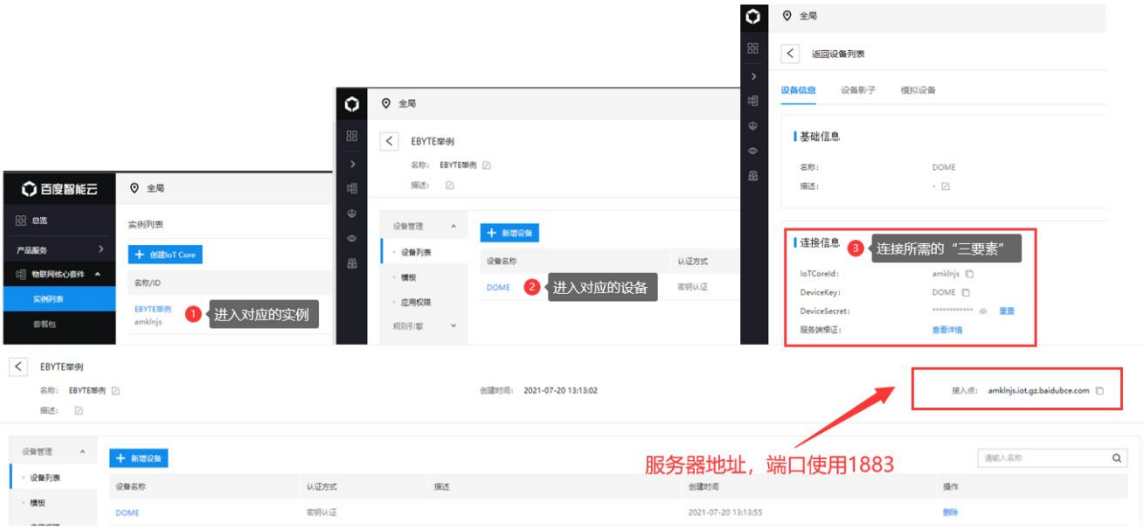
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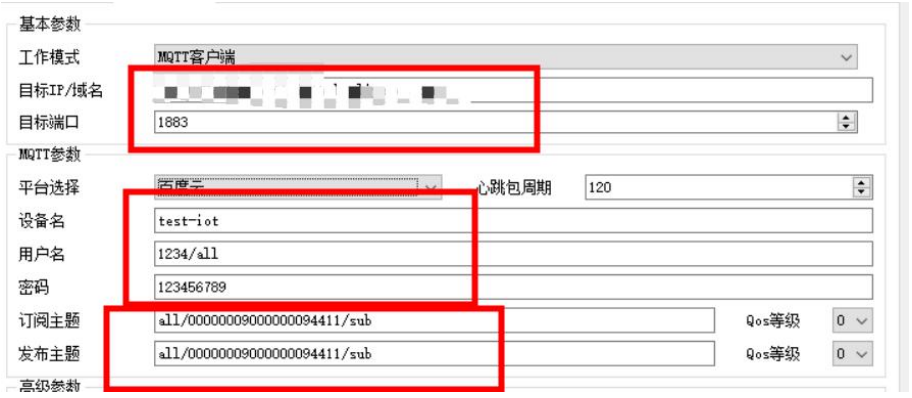


1.9.6.2 Baidu Cloud MQTT connection

It supports directly connecting to the server using Baidu Cloud's "three essential elements," as shown in the image:



Configure the device connection parameters as shown in the following figure:



Subscription and publishing require a rules engine to enable data feedback. First, a message template needs to be created, as shown below:

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A rules engine is created for data backhaul, as shown in the following figure:



After enabling the rule engine and restarting the device (resubscribing and publishing), the communication test is shown in the following figure:

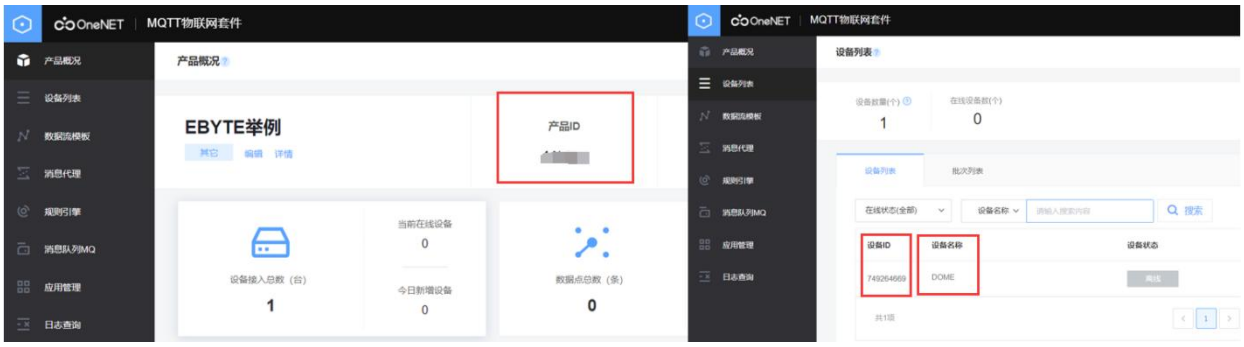


1.9.6.3 OneNET Cloud MQTT Connection

Support using OneNET the "three elements" directly connect to the server to obtain a connection.NET the three required elements are shown in the figure:

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Configure the device connection parameters as shown in the following figure:



One NET Supports automatic generation of To objects with publish/subscribe attributespic Data transmission can be achieved simply by subscribing to and publishing at the same address.
Communication test:

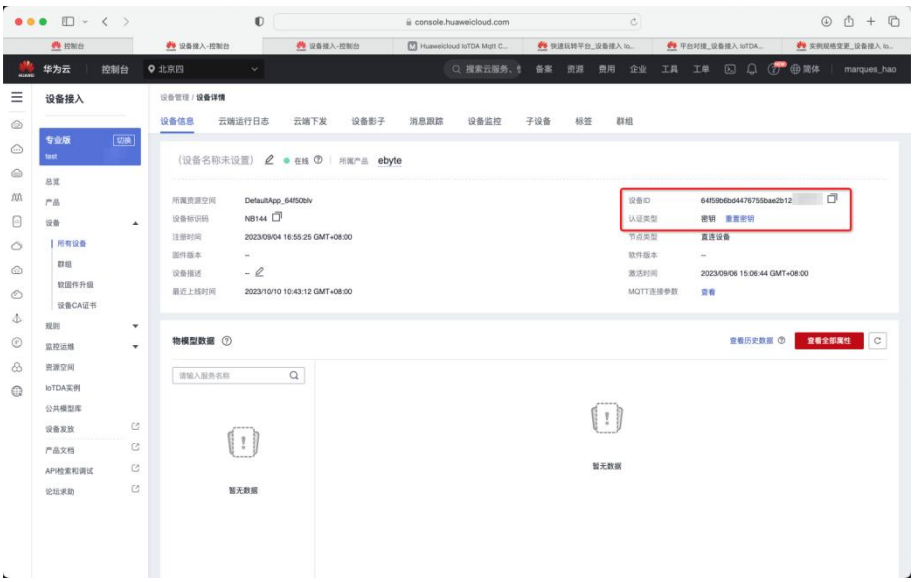


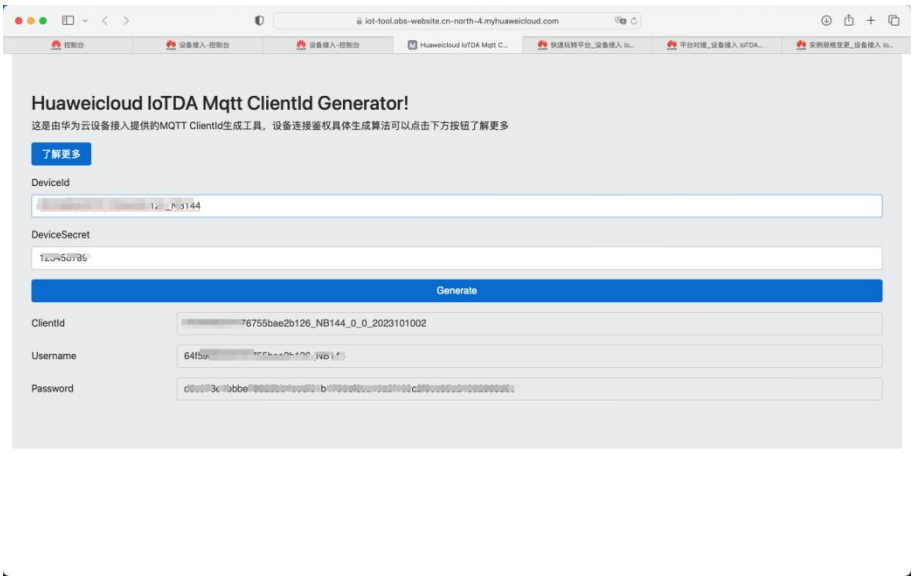
1.9.6.4 Huawei Cloud MQTT connection

After registering products and devices on Huawei Cloud, record the device ID and authentication key, and copy them into the clientid generator for calculating the three elements.

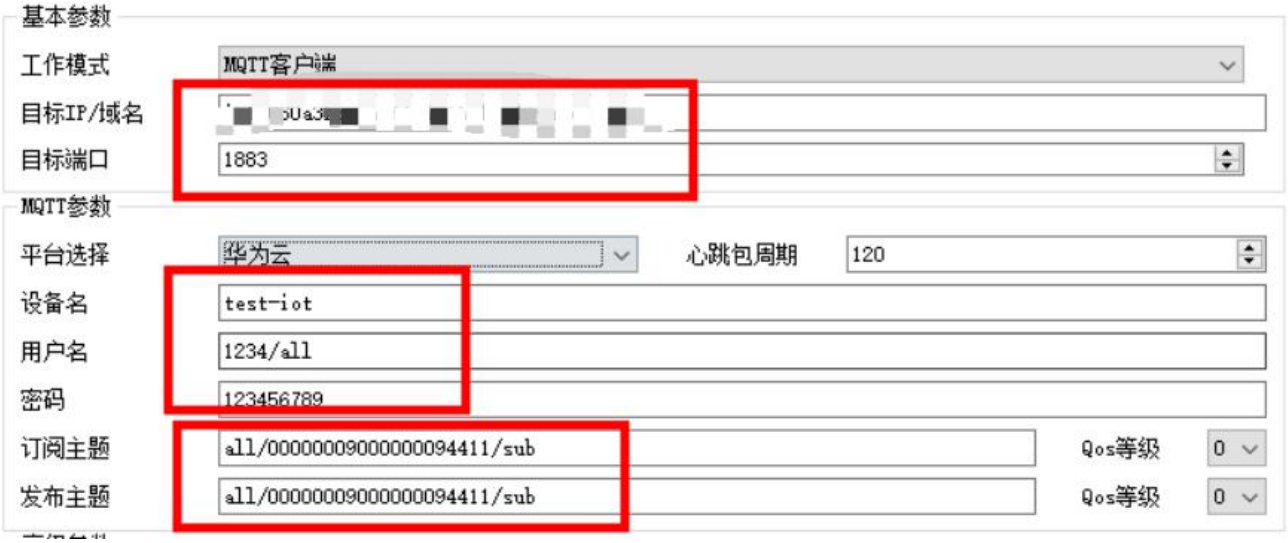
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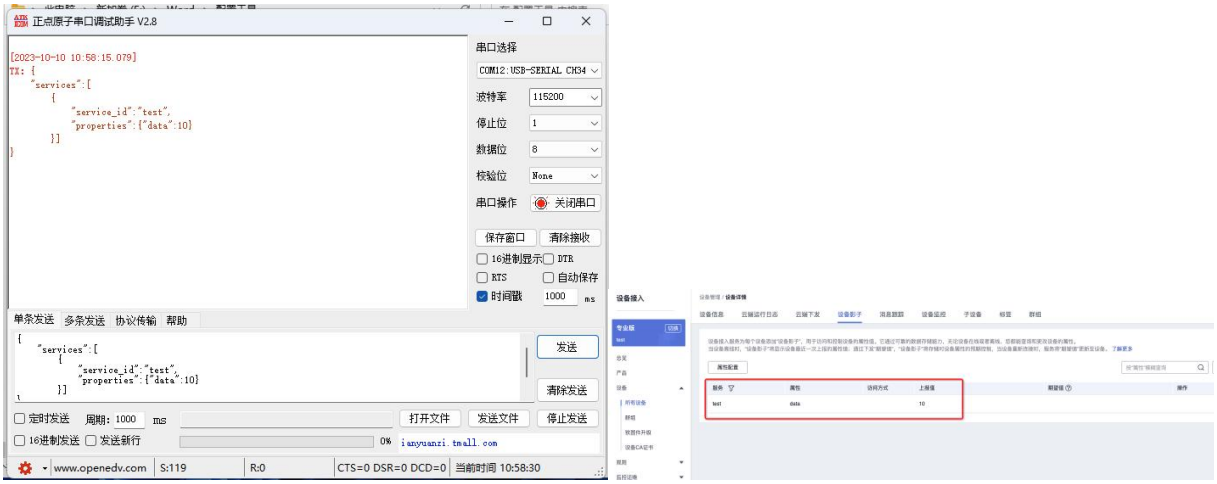
After adding the subscription, fill in the parameters into the device (remember to replace wildcards), save, and restart the device.



The data can then be viewed on the server.

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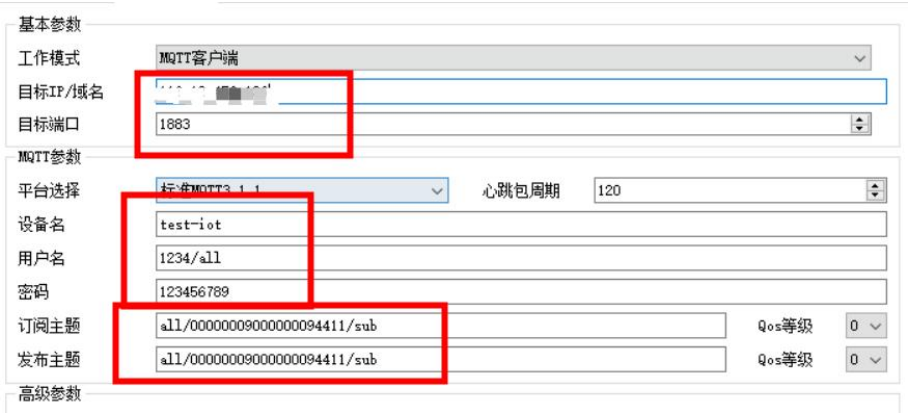


1.9.6.5 Standard MQTT 3.1.1 connection

Standard M hereQTT3.1.1The connection is based on Tencent's standard MQTT31.1Taking a server as an example, the three elements of the standard description can be obtained from Tencent's server, as shown in the following figure:



The parameter configuration instructions are shown in the following figure:



Configure the corresponding publish/subscribe address and use the platform's online debugging function to send data for communication testing:



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1.10 Serial port parameters

Serial port parameters include: baud rate, data bits, parity bits, and stop bits.

Baud rate: Serial communication rate, configurable at 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200, 230400, and 460800bps.

Data bits: The length of the data bits, ranging from 5, 6, 7, to 8.

Check bit: The check bit for data communication, supporting three check methods: None, Odd, and Even.

Stop bit: Settable range 1, 1.5, 2.

By setting the serial port parameters to be consistent with the serial port parameters of the device connected to the serial port, normal communication can be guaranteed.



1.11 Advanced parameters

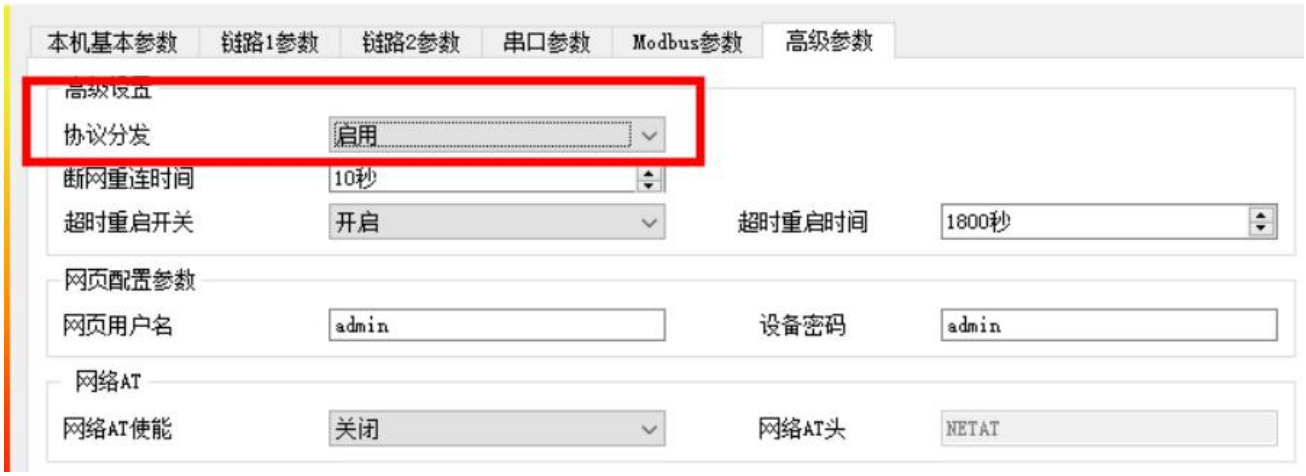
1.11.1 Link Protocol Distribution

It supports socket distribution protocols, allowing data to be sent to different sockets via specific protocols.linkDifferentlinkThe received data is distinguished by adding packet headers and footers.

host computer Software configuration steps:

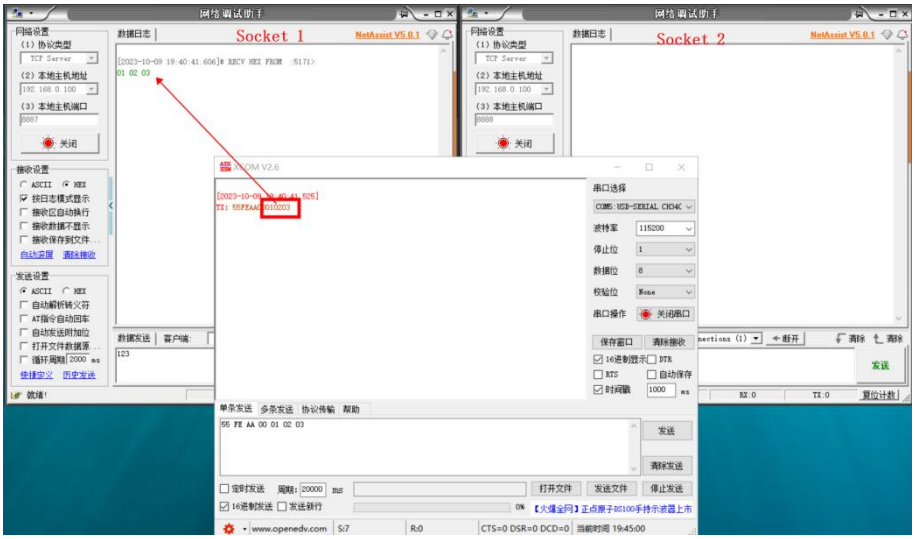
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After enabling multi-link protocol distribution mode, the following possibilities may occur. Here, we take link 1 connected to server port 8887 and link 2 connected to server port 8888 as an example:

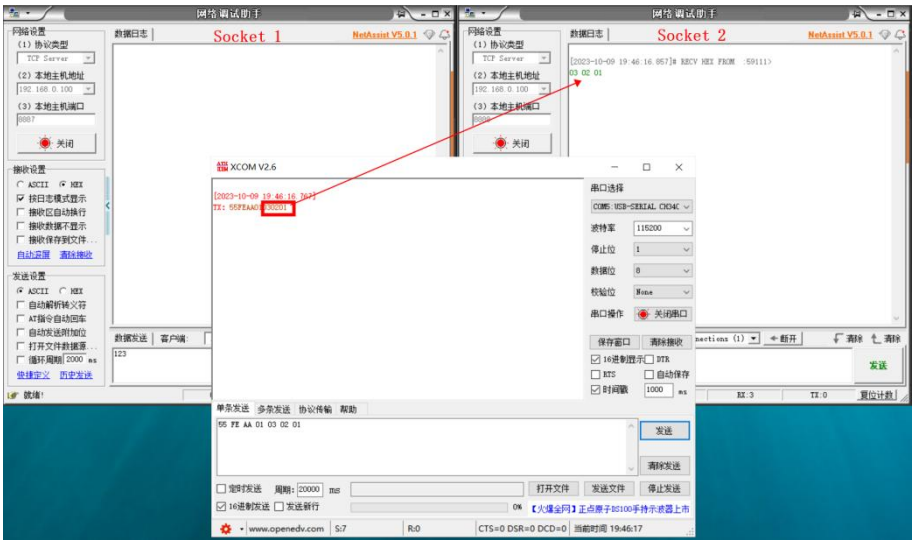
1. If the serial port sends data with a header of 55 FE AA 00, then the requirement is met (i.e., 55 FE AA 00 + data). The data will then only be transmitted to...Socket1. The received content contains only data and no header.



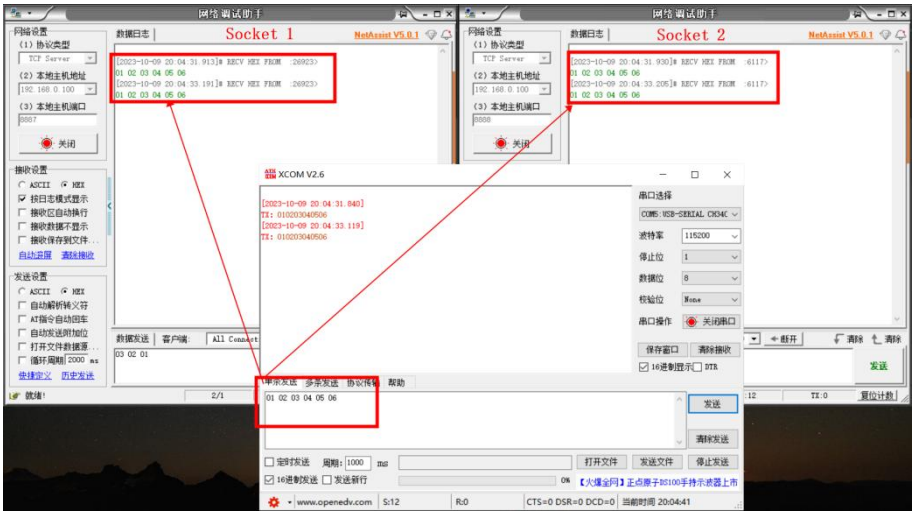
2. If the serial port sends data with a header of 55 FE AA 01, which meets the requirement (i.e., 55 FE AA 01 + data), then the data will only be transmitted to...Socket2. The received content contains only data and no data header;

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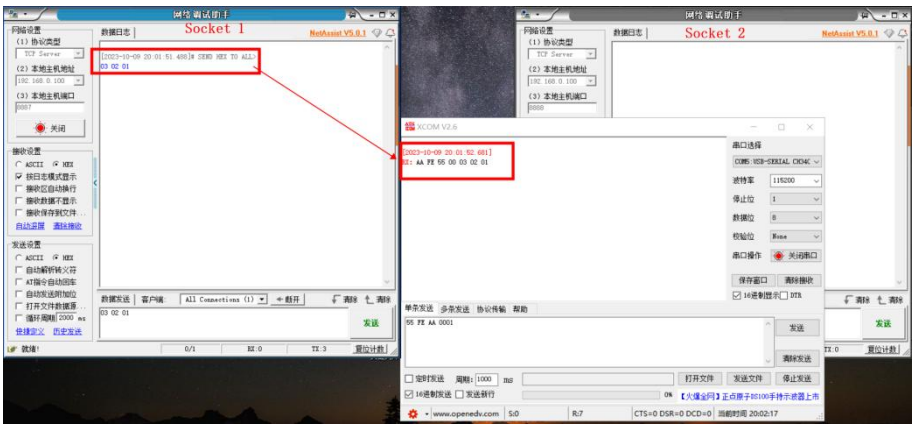
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3. If the serial port sends arbitrary data, the data will be transmitted to both channels.Socket



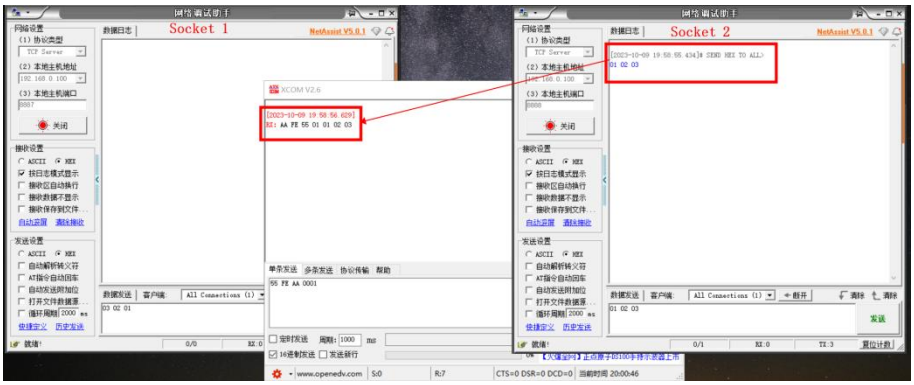
4. When Socket 1 sends arbitrary data, the serial port will add a header "AA FE 55 00" before the data after receiving it.



5. When Socket 2 sends arbitrary data, the serial port will add a header "AA FE 55 01" before the data after receiving it.

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1.11.2 Reconnection function

In client mode, the device attempts to reconnect to the server at a specified time after the network connection is lost.

Network reconnection time: The time interval between each attempt by the device to re-establish the network. 0 indicates fast reconnection, and 0~65535 is configurable.

1.11.3 Timeout restart function

Supports timeout restart function (default: 1800 seconds). This function is mainly used to ensure the long-term stable operation of the device. If no data is received from the network within the set timeout restart time, the device will restart to avoid abnormal situations from affecting communication.

When the timeout restart function is enabled, the timeout restart time setting parameter range is (60-65535) seconds.

1.11.4 Short connection function

In both TCP client and HTTP client modes, short network connections are supported (this feature is disabled by default). Short TCP connections are mainly used to save server resource overhead and are generally applied in scenarios where multiple points (multiple clients) connect to one point (server).

After enabling the short connection function, the device will only request a connection to the server when sending information. Once the connection is successful, the device will automatically disconnect if the serial port does not receive or transmit data or the network port does not send or receive data within the set time.

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When the short connection function is enabled, the short connection time setting parameter range is (1-65535) seconds.

1.11.5 Connection clear cache function

When the device is in client mode, data received via the serial port will be placed in the buffer before a TCP connection is established. The serial port receive buffer is 1024 packets or 10k. Data exceeding the buffer size will overwrite the earliest received data. After a successful network connection, the serial port buffer can be cleared or sent over the network via configuration.

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

Disable: The network will receive data from the serial port buffer after the connection is established.

1.11.6 Heartbeat Packet Function

The device supports both serial heartbeat packets and network heartbeat packets. Serial heartbeat packets point to the serial port, while network heartbeat packets point to the network. These can be configured separately.

1.11.6.1 Serial heart rate packet

The serial port heartbeat data points to the serial port and can be configured in the serial port parameters. You can choose SN, MAC, or custom content, and the time can be set from 0 to 65535 seconds. The serial port heartbeat uses an idle heartbeat, meaning it starts timing during the serial port's idle period, and sends the configured content to the serial port after the heartbeat timer expires. See the following diagram for configuration instructions:



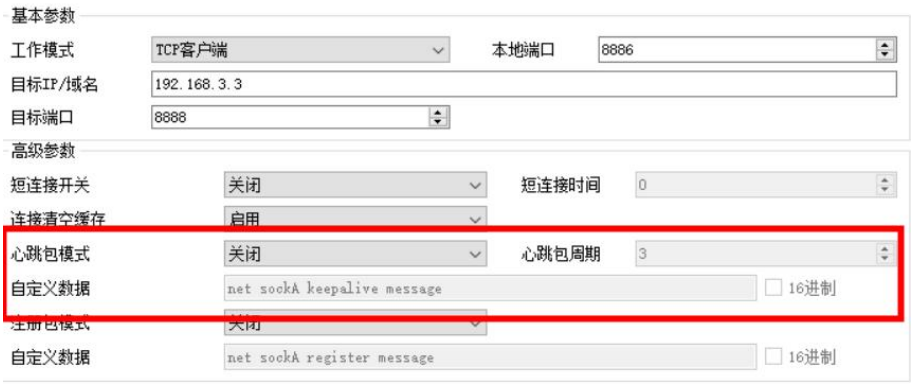
If the serial heartbeat packet content is configured to be custom data, the heartbeat packet can be configured to be up to 128 bytes. After checking the hexadecimal ore beneficiation option, the data sent will be in hexadecimal format.

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1.11.6.2 Network heartbeat packet

Network heartbeat packets are applicable to Ethernet links, effective only in client mode, and support hexadecimal and ASCII code transmission. Network heartbeat packets are not MQTT heartbeats; they are data actively sent by the microcontroller based on configuration. Network heartbeat packets operate independently on both links without affecting each other. SN, MAC, and custom content can be selected, and the heartbeat duration can be set from 0 to 65535 seconds. Network heartbeat packets use a forced heartbeat mechanism, meaning that the timer starts when the link connection is successfully established, and the configured content is sent to the server after the heartbeat period expires. See the following diagram for configuration details:



If the network heartbeat packet content is configured to be custom data, the heartbeat packet can be configured to be up to 128 bytes. After selecting hexadecimal ore selection, the data sent will be in hexadecimal format.

1.11.7 Registration package function

In client mode, users can choose to send a registration packet to distinguish the data or link source. The registration packet runs independently in the two links and does not affect each other. When using it, you need to select the registration packet mode; the following modes are available:

1. Send SN upon connection;
2. Send MAC address for connection;
3. Connect to send custom content;
4. Send SN for each packet;
5. Send a MAC address per packet;
6. Send custom content per package;

Sending each packet refers to adding the registration packet content before each data packet. When setting a custom registration packet, the hexadecimal option can be selected. When customizing the registration packet content, the maximum size of the registration packet can be

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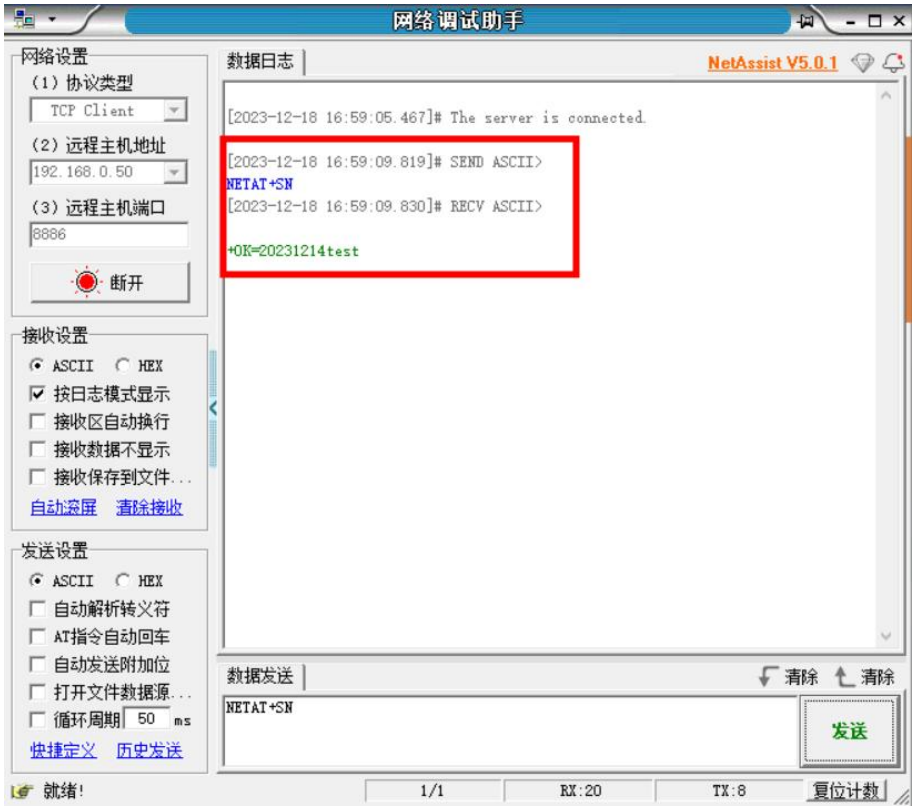
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configured to 128 bytes.

1.12 Network AT commands

The device supports network AT commands, which can be enabled by modifying parameters via a host computer. Once enabled, the command header can be customized.





If the current AT command header is NETAT, after a successful link connection, parameters can be queried and configured by sending commands over the network. For example, sending NETAT+SN will receive a data reply of +OK=20231214test. After enabling network AT, the device will parse the data header to check for correctness, such as "NETAT". Sending data like NETAT123 will result in an error because the device will recognize it as an invalid command and will not send the data. Caution is advised when using this device.

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1.13 Modbus gateway

Note: The device supports two links. Once the MOdBus gateway is configured, it will be effective for both links.

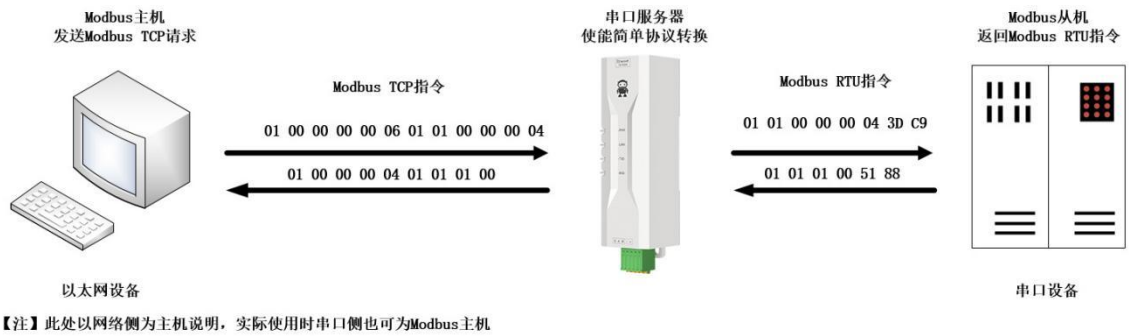
1.13.1 Simple Protocol Conversion Mode



After enabling simple protocol conversion, TCP to RTU conversion is enabled: Modbus RTU protocol and Modbus TCP protocol are converted to each other, and non-Modbus data (RTU/TCP) is directly discarded.

TCP to RTU Off: No protocol conversion is performed, but Modbus data is verified, and non-Modbus data (RTU/TCP) is discarded.

Simple Protocol Conversion can work in any mode (TCP client, TCP server, UDP client, UDP server, MQTT client, HTTP client), but only one Modbus master can exist regardless of the mode it is working in.



Host computer configuration:

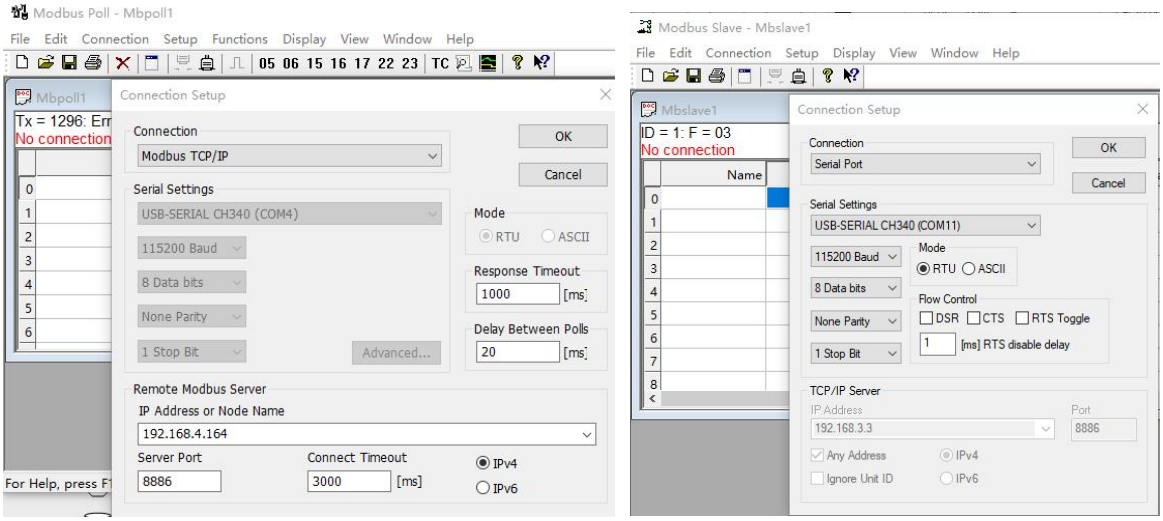
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Debugging Modbus Poll and Modbus Slave software:

Software connection settings:

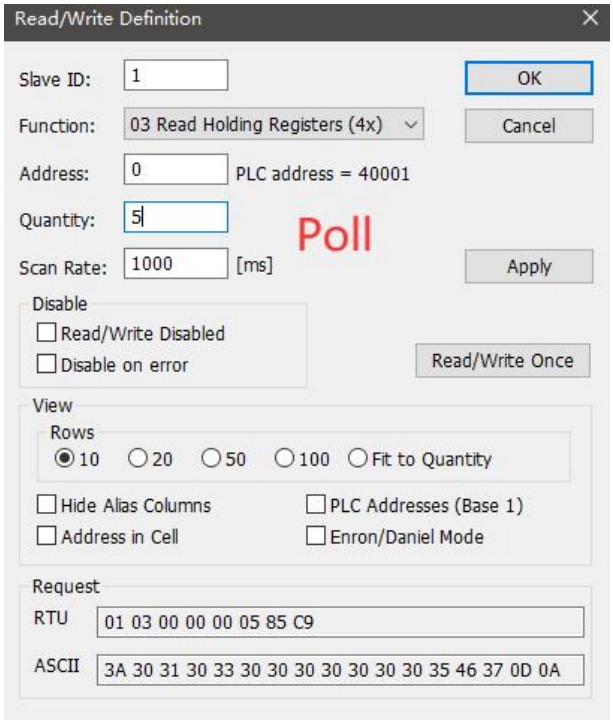


Software register reading and simulation configuration:

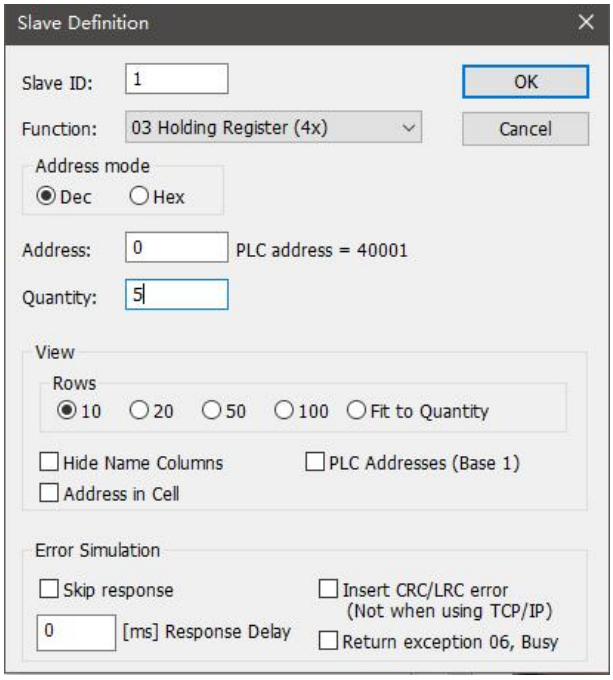
Select Setup from the Poll menu.→Read/Write Definition

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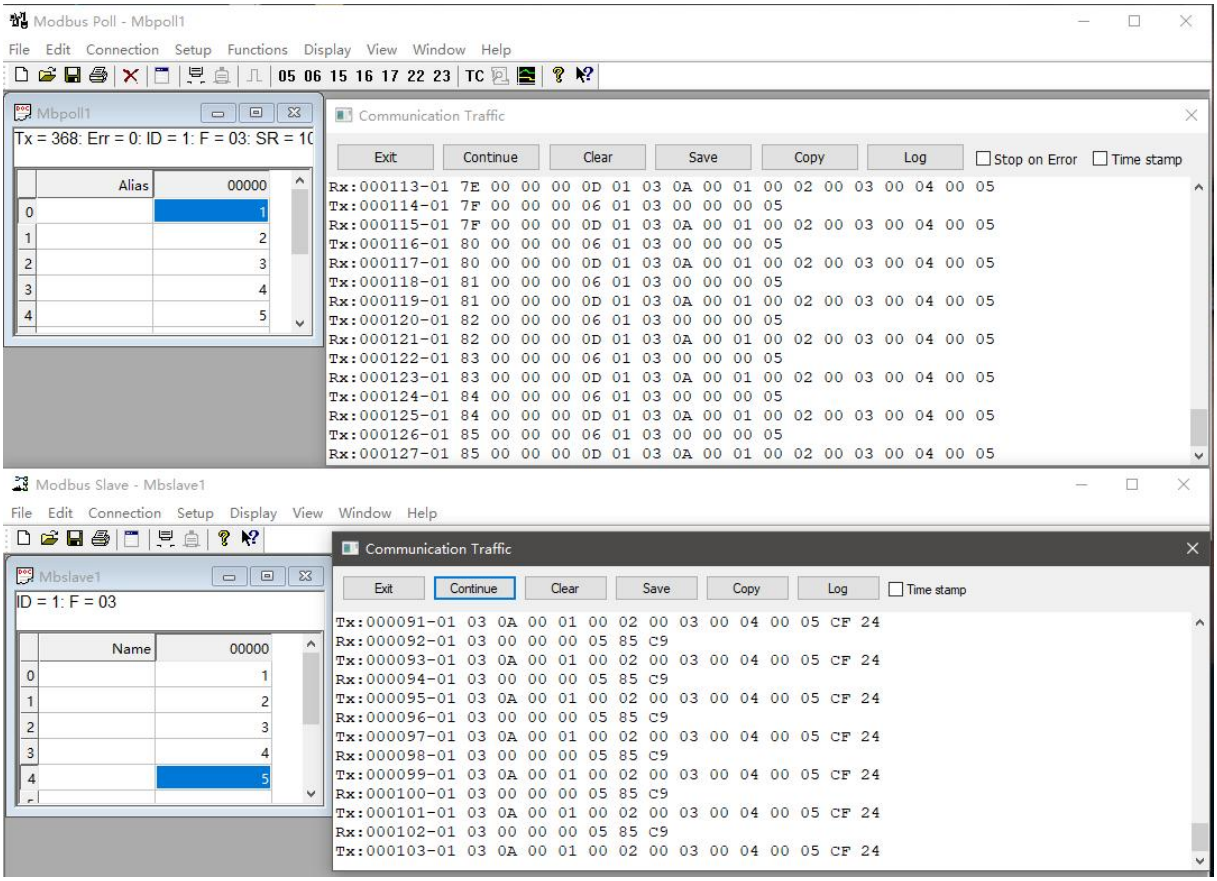
Select Setup from the Slave menu.→Slave Definition



Communication demonstration:

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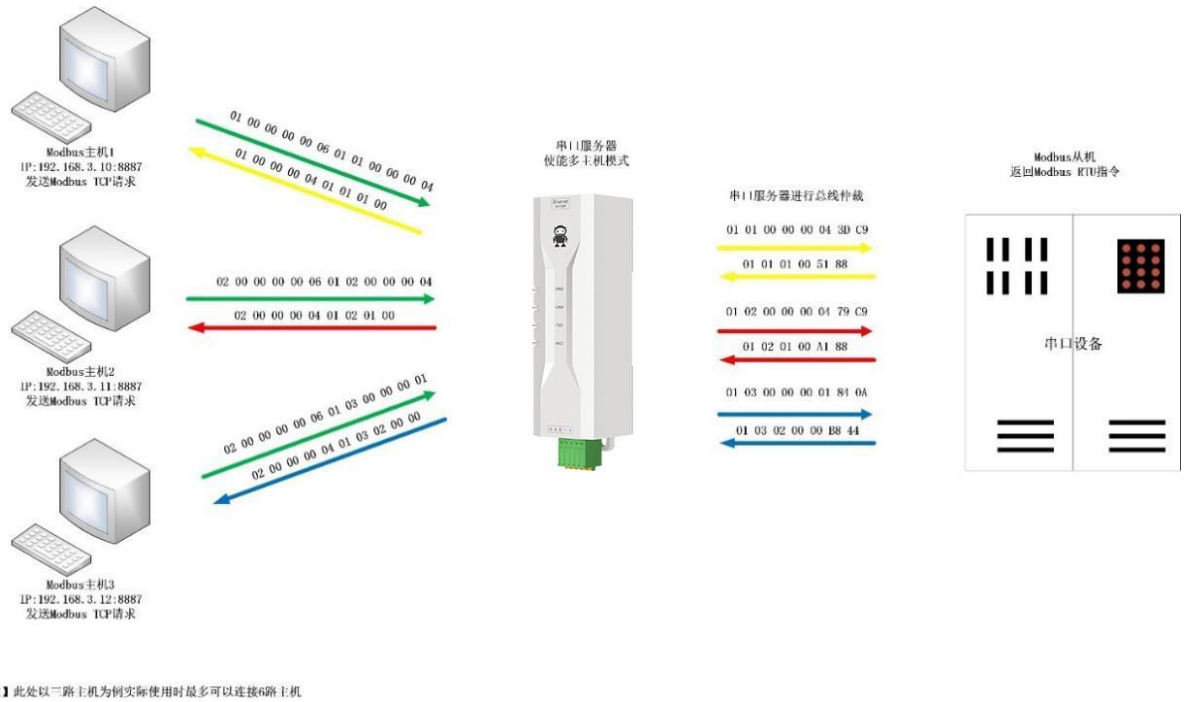
1.13.2 Multi-host mode

The multi-master mode can handle up to 5 Modbus TCP hosts. When multiple Modbus hosts access the network simultaneously, the Modbus gateway will perform bus occupancy scheduling (the RS-485 bus can only process one request at a time, while the multi-master mode will sort and process TCP requests according to their order, and other links will wait), thereby resolving the bus conflict problem (currently only 5 host connections are supported). It only supports working in TCP server mode, and slave devices can only be connected via serial port, otherwise they will not work properly.

It is recommended to configure it as "simple protocol conversion" when there are no multi-way hosts in use.

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Host computer configuration:

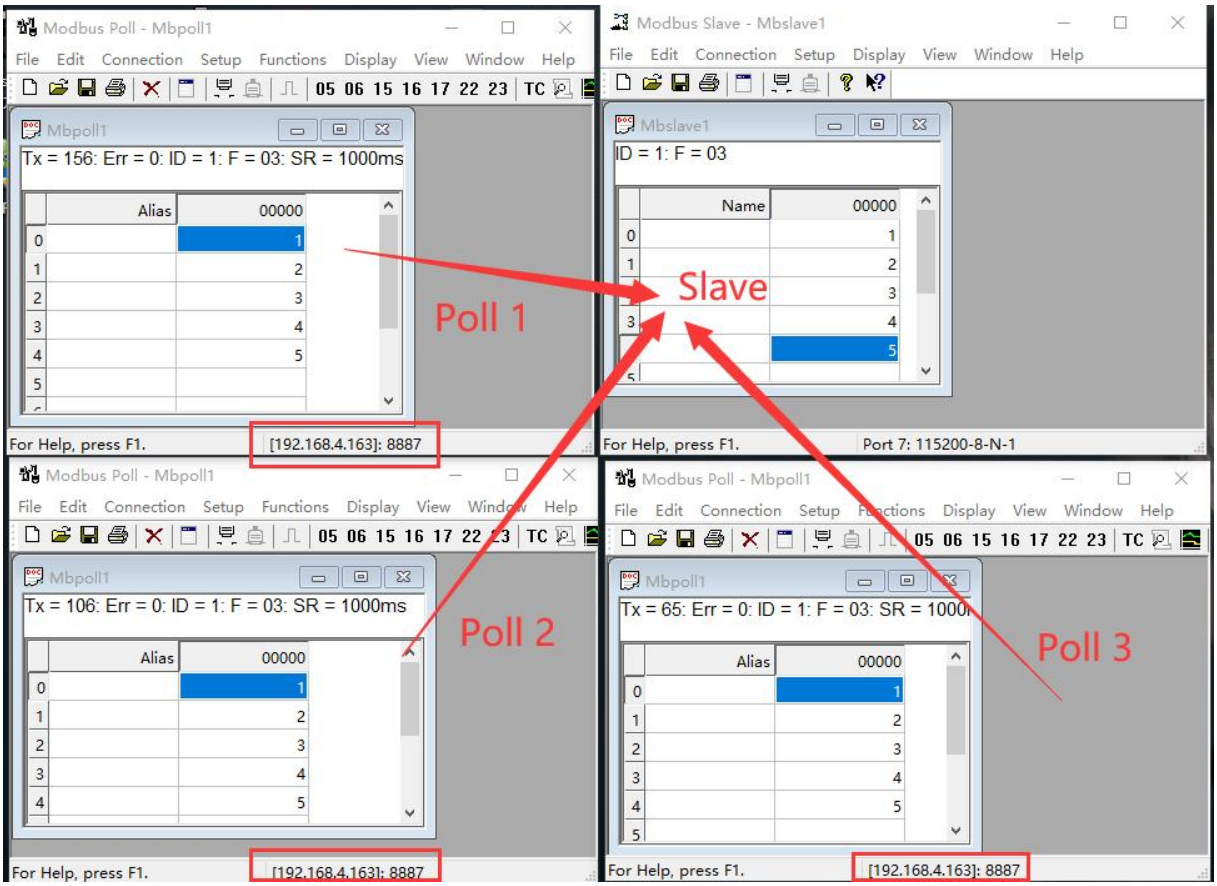


Debugging Modbus Poll and Modbus Slave software:

For software and register configuration, refer to "Simple Protocol Conversion" and open multiple Modbus Poll software programs simultaneously (3 channels for example, up to 5 channels can be supported).

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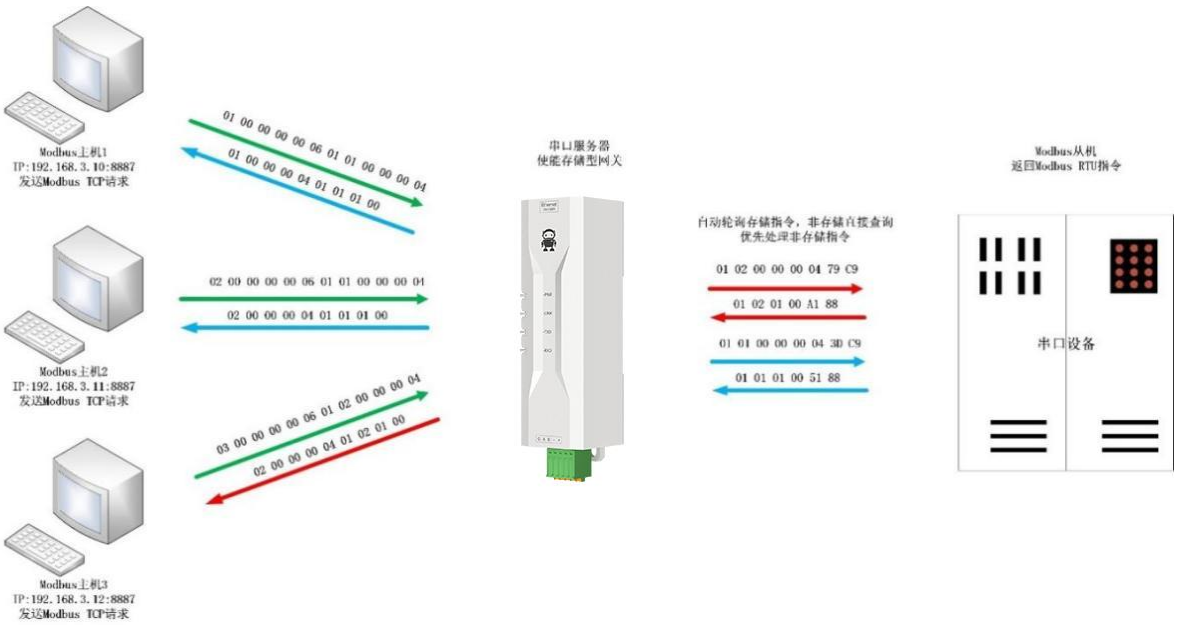


1.13.3 Storage gateway

Storage-based gateways not only arbitrate bus data but also store duplicate read commands. When different hosts request the same data, the gateway does not need to repeatedly query the RTU device register status but directly returns the cached data in the storage area. This greatly improves the gateway's multi-host request processing capability and shortens the overall request process time. Users can customize the storage area command polling interval and command storage time according to their needs.

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As an optimization for multi-host request performance, storage gateways can only operate in TCP server mode, improving network-side response speed.

Features:

（1） The gateway has a 10K cache for storing instructions and return results (for example, reading 10 holding registers can store 300 instructions and return results).

（2） If the RTU response times out or the previous reply time exceeds the instruction storage time, the device will automatically clear the cache to ensure the real-time performance and authenticity of the data.

（3） The polling interval can be customized, from 0 to 65535ms;

（4） The gateway polls the RTU device based on the storage time of the instructions used for configuration. If the MODBUS host does not query the instruction again within the storage time, the gateway automatically deletes the stored instruction and releases the cache.

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

（6） Only supports storing query results for Modbus function codes 01, 02, 03, and 04;

Storage gateway host computer configuration:

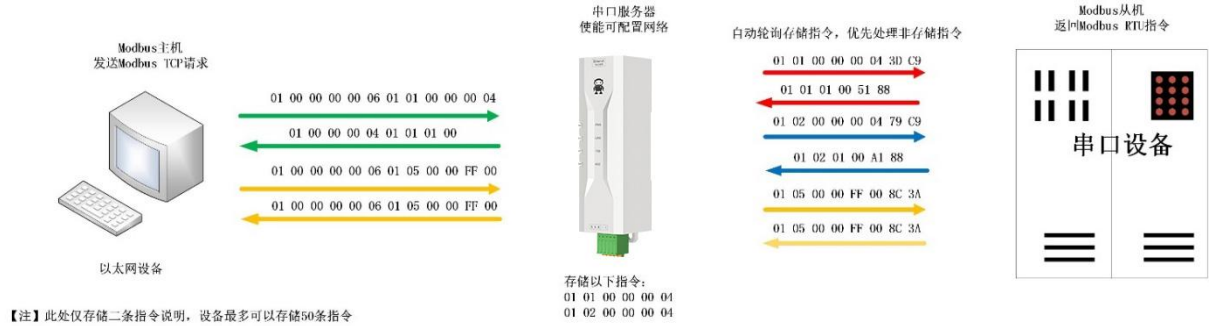
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1.13.4 Configurable gateway

The gateway automatically polls the RTU device registers based on pre-configured MODBUS commands (configuration only supports MODBUS read commands). Commands not in the storage table will directly operate the RTU device. Frequently accessed commands can be pre-stored in the gateway, reducing response time (for querying configuration commands). Due to these characteristics, the serial port side of the configurable gateway can only connect to Modbus slave stations.



Host computer configuration:



Instruction storage instructions (adding instructions is not possible due to errors or formatting issues). To delete an instruction, simply click the cross on the right side of the instruction.

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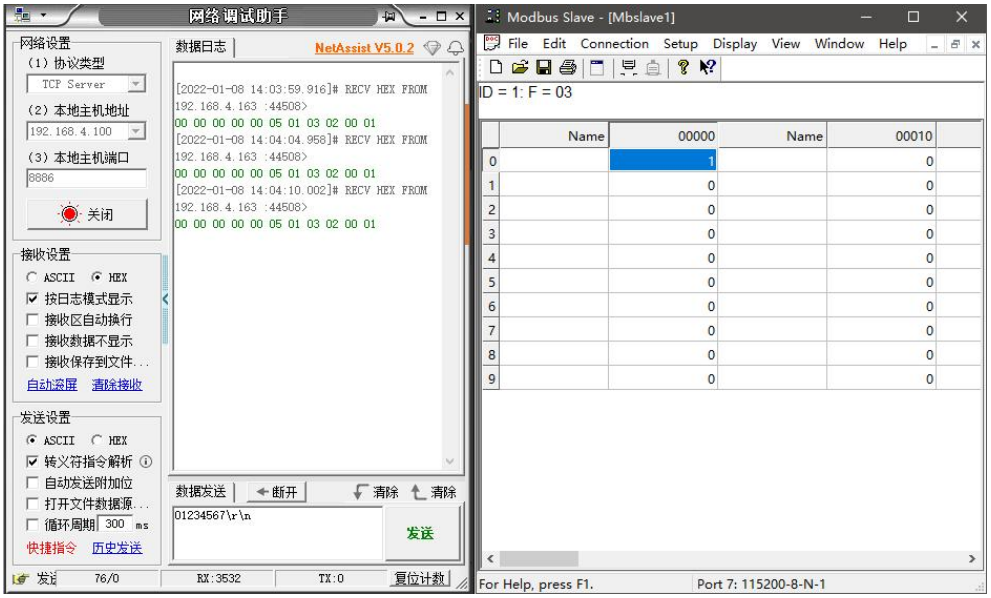
1.13.5 Automatic upload

In client mode (TCP client, UDP client, MQTT client, HTTP client), the gateway will automatically poll the instructions in the stored instruction table and upload them to the server. The feedback format (Modbus RTU format or Modbus TCP format) and instruction polling interval (0-65535ms) can be selected according to the requirements.

Refer to "Configurable Gateway - Command Storage Instructions" for command pre-storage, and automatically upload the host computer configuration:



TCP Client Demonstration (Modbus TCP Format):



1.14 Basic Function Introduction

1.14.1 Webpage Configuration

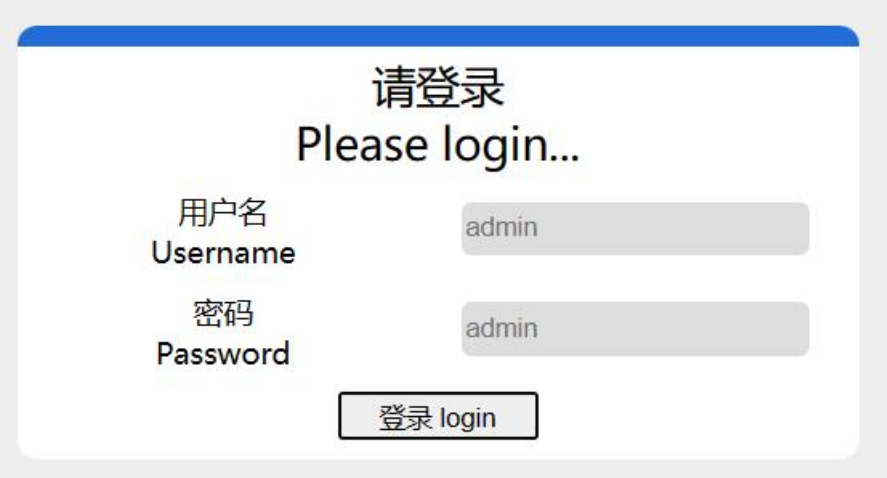
The device has a built-in web server, allowing users to easily set and query parameters via a web page.

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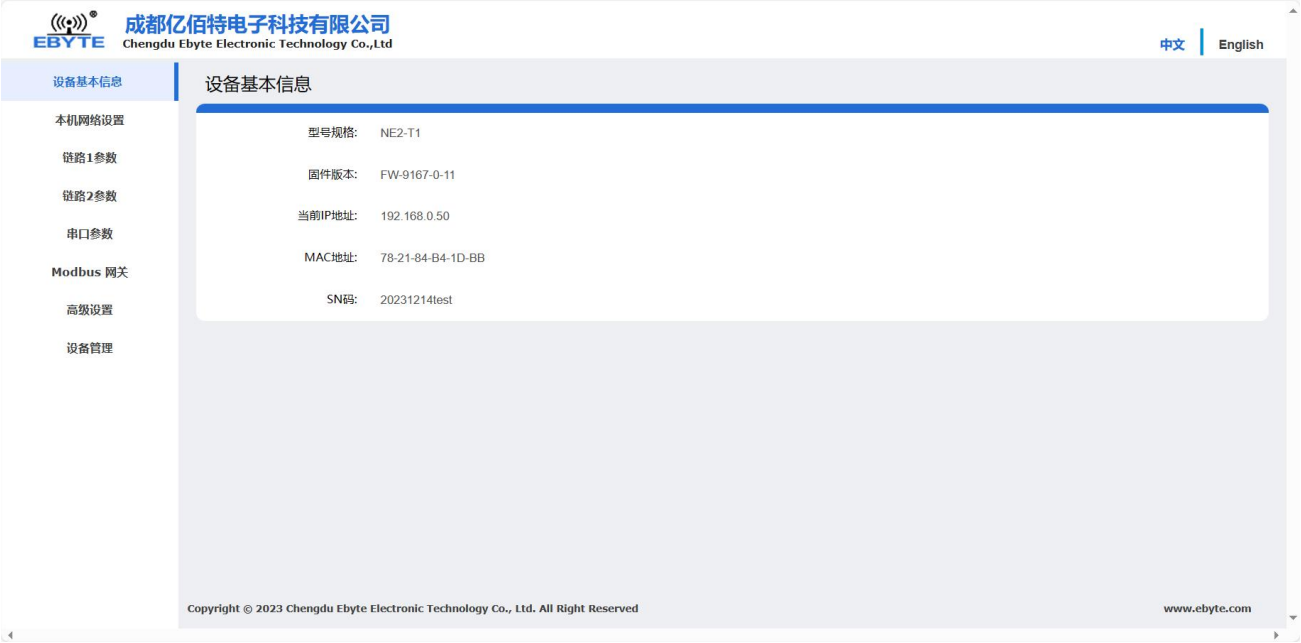
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Instructions (using Microsoft Edge version 94.0.992.50 as an example; it is recommended to use a Google Chrome kernel browser, as only IE10 and later kernel browsers are supported):

- Open your browser and enter your device's IP address in the address bar. The default IP address is 192.168.3.7 (the IP address and computer must be on the same network segment). If you forget your local IP address, you can find it using AT commands and configuration software.



- Click to log in. The default username is admin and the default password is admin (already entered; you can click to log in directly).



- The webpage will pop up a main interface where you can view and set relevant parameters;
- Click "Save Parameters" in Device Management to save the configuration parameters;

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1.14.2 Factory reset

Press and hold the Reload button on the device for 5-10 seconds until all LED indicators light up, then release the button.

1.14.3 AT command configuration

Device parameters can be queried and modified via AT commands. For specific AT commands, please refer to "AT Command Set".

1.14.4 Configuration tool software settings

Open the configuration tool software, search for devices, double-click the detected device, and a parameter query and configuration interface will pop up. You can customize and modify the relevant parameters as needed, then save the configuration, restart the device, and the parameter modification is complete.

【Note】:

Do not use multiple host computers in the same local area network environment. Industrial control computers with multiple network cards need to temporarily disable and not use the network cards, otherwise the host computer will malfunction (such as the same device being displayed multiple times or the device not being found).

The host computer disables the wireless network card, so a network cable must be connected to the host computer to use it. The wireless network card can be configured via a web page.

1.14.5 Random local port

TCP clients, UDP clients, HTTP clients, and MQTT clients can configure the local port to 0 (using a random local port). Server mode cannot use a random port; otherwise, the client will not be able to establish a connection correctly.

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

The device will automatically enable a random port when configuring HTTP client or MQTT client mode.

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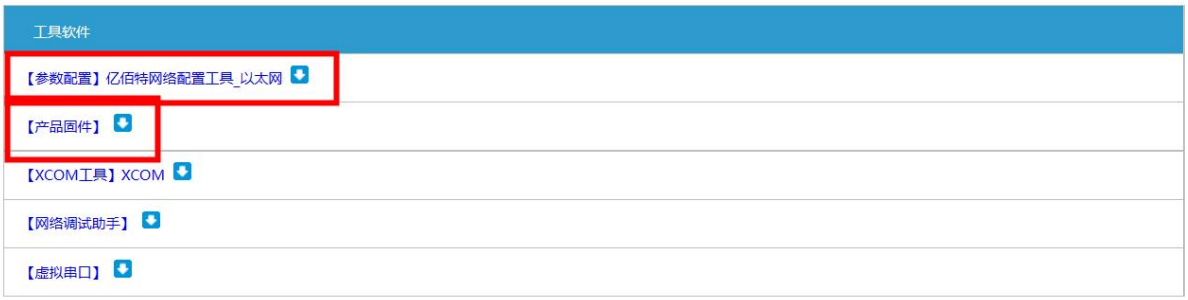
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1.14.6 Remote upgrade

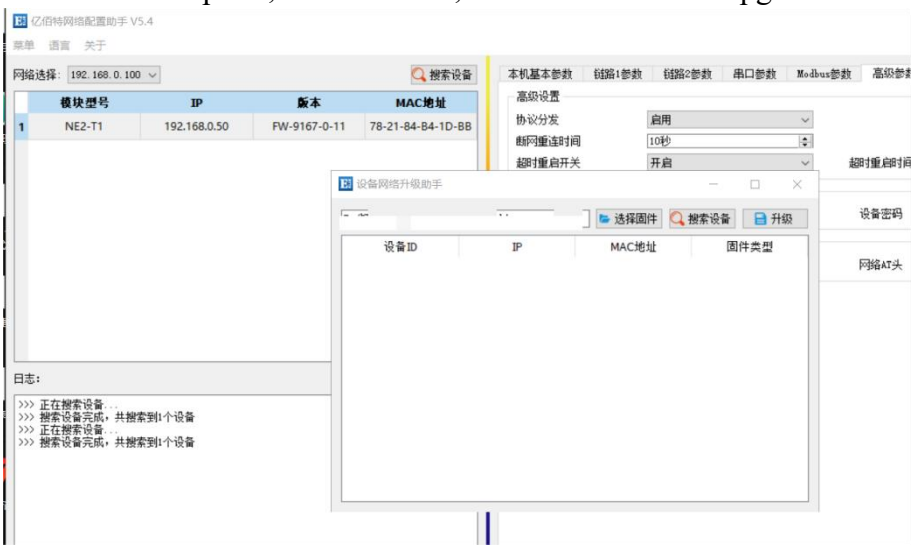
To facilitate future maintenance, upgrades, and firmware replacements, the serial server supports online upgrades. Users can upgrade or replace the current firmware via a host computer using the upgrade firmware provided by our company.

Network firmware upgrade operation steps:

Step 1: Download the host computer software and "product firmware" from the corresponding location on the official website;



Step 2: Open the host computer, click "Menu", and select "Device Upgrade Assistant";



Step 3: In the pop-up "Device Network Upgrade Assistant" dialog box, click "Search Devices" (the computer and device should be on the same network segment). After the device is found, click "Stop Search".

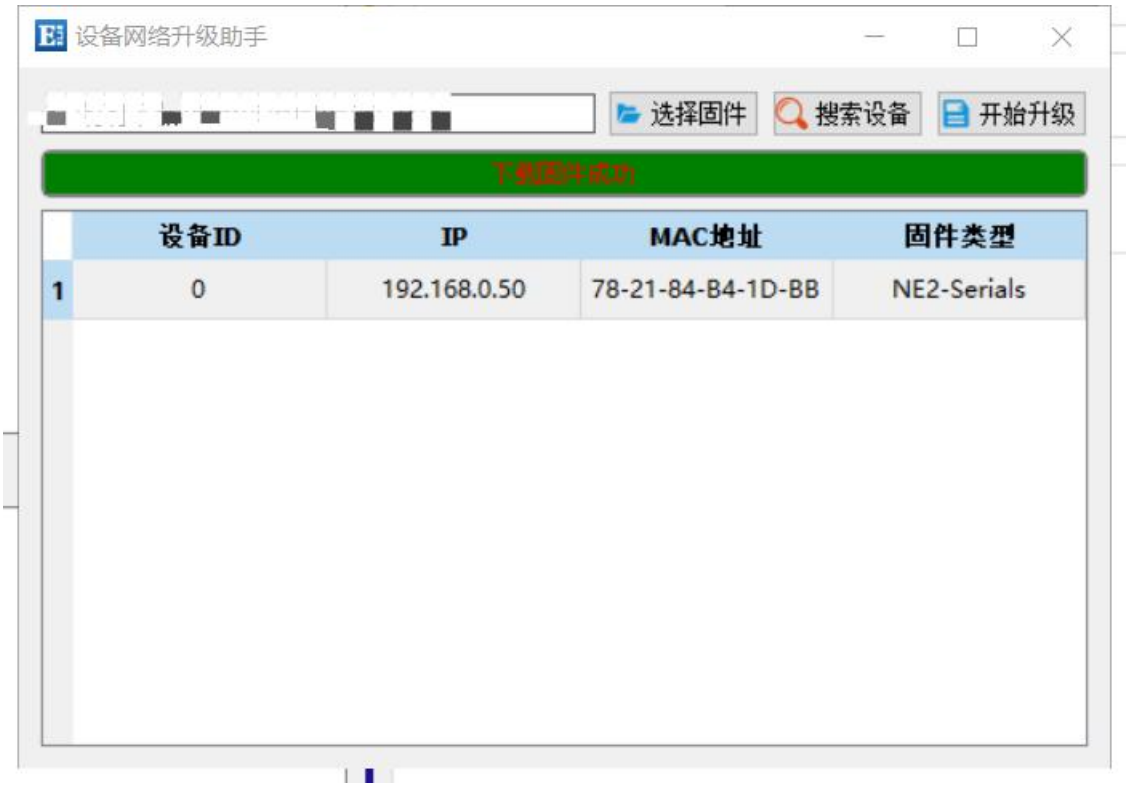
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Step 4: Click "Select Firmware", select the corresponding firmware, and then click "Open";

Step 5: Select the device to be upgraded, click "Upgrade," and the progress bar will start changing. Wait for the upgrade to complete. (There will be about 7 seconds of unresponsiveness between clicking "Upgrade" and the start of firmware transfer; this is normal, please wait patiently for the upgrade.)



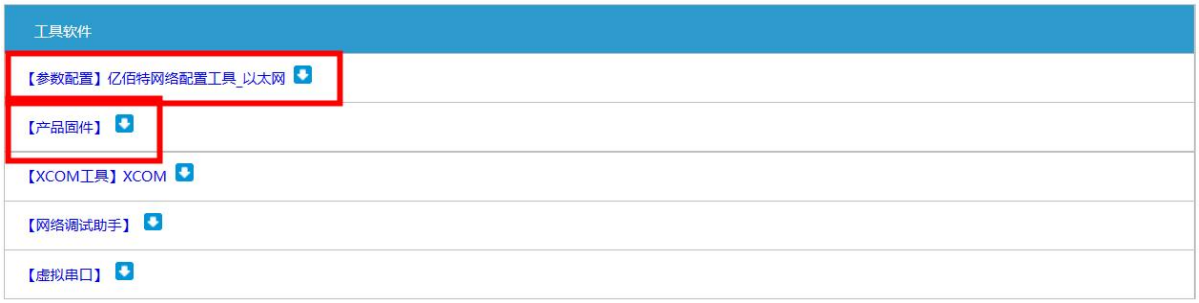
Firmware upgrade steps via web page:

Step 1: Download the host computer software and "product firmware" from the corresponding

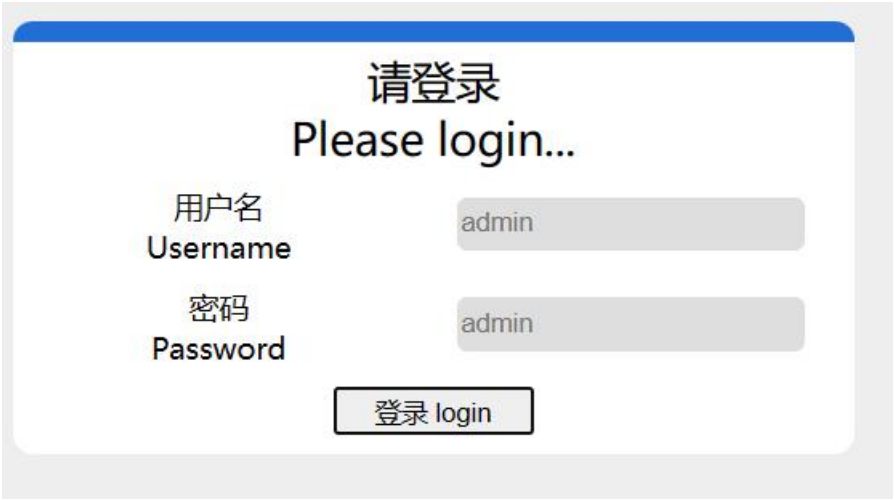
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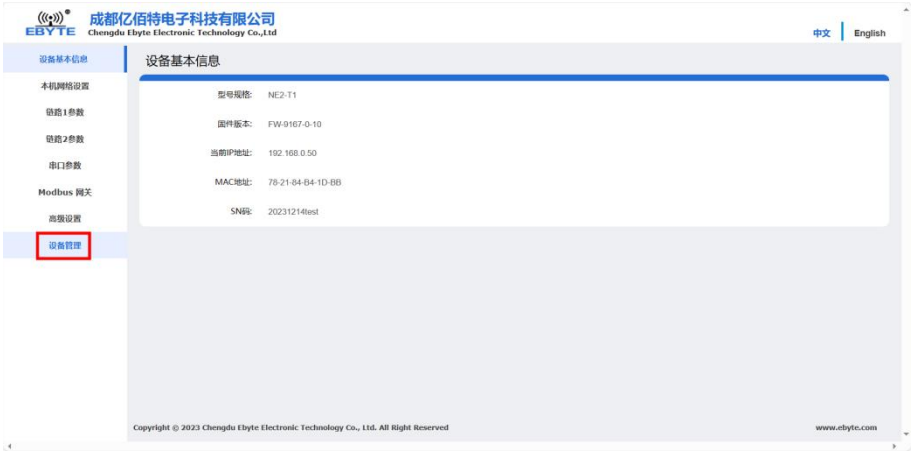
location on the official website;



Step 2: Open the host computer, search for the device's current IP address (default 192.168.3.7), enter the current IP address in the web browser, and access the web configuration.



Step 3: Click Device Management;



Step 4: Click "Click to select file", select the corresponding firmware, then click "Open", and then click Start upgrade;

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Step 5: Click "Start Upgrade". The progress bar will start changing. Wait for the upgrade to complete.

[Note] If the upgrade fails, simply upgrade again.

【Note】There will be about 7 seconds of unresponsiveness after clicking "Upgrade" until the firmware transfer begins. This is normal; please wait patiently for the upgrade to start.

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Revision History

Version	Revision Date	Revision Notes	maintainer
1.0	2024-7-25	Initial version	LYL
1.1	2025-02-12	Add NE2-D11E/NE2-D12E	LYL
1.2	2025-12-15	Update TTL version notes	ZYD

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