



ⒼⒷ Operating Instructions

## Modbus I/O

Item No. 2973412

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## 2 Introduction

Dear customer,

Thank you for purchasing this product.

If there are any technical questions, please contact: [www.conrad.com/contact](http://www.conrad.com/contact)

## 3 Operating Instructions for download



Use the link [www.conrad.com/downloads](http://www.conrad.com/downloads) (alternatively scan the QR code) to download the complete operating instructions (or new/current versions if available). Follow the instructions on the web page.

## 4 Intended use

This product is a Modbus I/O Network Module. It is equipped with a 4-way Form A relay output, a 2-way analogue input and a 2-way dry contact input detection. It supports the Modbus TCP protocol or the Modbus RTU protocol for data acquisition and control.

At the same time, this device is also a network I/O module, which can be used as a simple Modbus Gateway (you can send commands with non-local Modbus addresses automatically, using the serial port/network port).

It is intended to be mounted on a DIN rail.

The product is intended for indoor use only. Do not use it outdoors. Contact with moisture must be avoided under all circumstances.

Using the product for purposes other than those described above may damage the product. Improper use can result in short circuits, fires, or other hazards.

This product complies with statutory, national and European regulations. For safety and approval purposes, you must not rebuild and/or modify the product.

Read the operating instructions carefully and store them in a safe place. Always provide these operating instructions when giving the product to a third party.

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## 5 Features and functions

- Supports standard Modbus RTU protocol and Modbus TCP protocol
- Supports a range of different software/PLC/Touchscreen configurations
- Supports the OLED display for displaying status information and configuring device settings, by using the built-in buttons
- 2-way analogue input (0 - 20 mA / 4 - 20 mA)
- 2-way digital input (DI)
- 4-way digital output (DO) (Form A relay); supported modes: Level mode, pulse mode, sequence mode, reverse sequence mode, trigger flip mode
- Supports the Modbus gateway function
- RS485/RJ45 acquisition control I/O
- Supports user customisation of Modbus address settings
- Supports 8 common baud rate configurations
- Supports DHCP and static IP
- Supports DNS function and domain name resolution
- Supports input-output linkage
- Appropriate configuration software is provided

## 6 Delivery content

- Modbus I/O module
- RJ45 cable (1 m)
- Operating instructions

## 7 Description of symbols

The following symbols are on the product/appliance or are used in the text:



The symbol warns of hazards that can lead to personal injury.

## 8 Safety instructions



Read the operating instructions carefully and especially observe the safety information. If you do not follow the safety instructions and information on proper handling in this manual, we assume no liability for any resulting personal injury or damage to property. Such cases will invalidate the warranty/guarantee.

### 8.1 General information

- The device is not a toy. Keep it out of the reach of children and pets.
- Do not leave packaging material lying around carelessly. This may become dangerous playing material for children.
- If you have questions which remain unanswered by these operating instructions, contact our technical support service or other technical personnel.
- Maintenance, modifications and repairs must only be completed by a technician or an authorised repair centre.

### 8.2 Handling

- Please handle the product carefully. Jolts, impacts or a fall even from a low height can damage the product.

### 8.3 Operating environment

- Do not place the product under any mechanical stress.
- Protect the appliance from extreme temperatures, strong jolts, flammable gases, steam and solvents.
- Protect the product from high humidity and moisture.
- Protect the product from direct sunlight.
- Never operate the product in direct proximity of strong magnetic or electromagnetic fields or transmitter aerials or HF generators. Doing so can prevent the product from functioning properly.

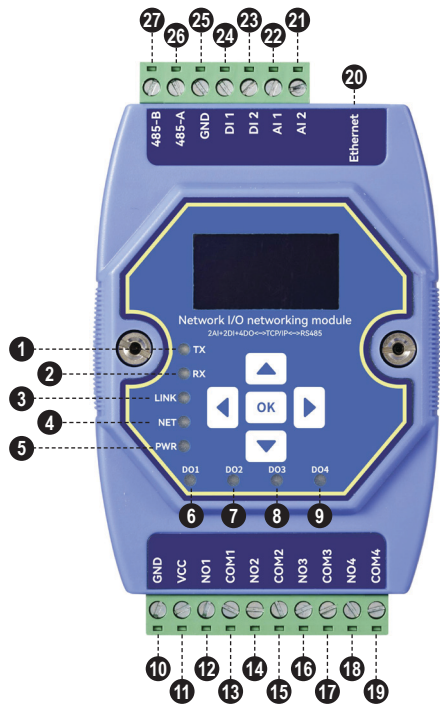
### 8.4 Operation

- Consult an expert when in doubt about the operation, safety or connection of the appliance.
- If it is no longer possible to operate the product safely, take it out of operation and protect it from any accidental use. DO NOT attempt to repair the product yourself. Safe operation can no longer be guaranteed if the product:
  - is visibly damaged,
  - is no longer working properly,
  - has been stored for extended periods in poor ambient conditions or
  - has been subjected to any serious transport-related stresses.

### 8.5 Connected devices

- Always observe the safety information and operating instructions of any other devices connected to the product.

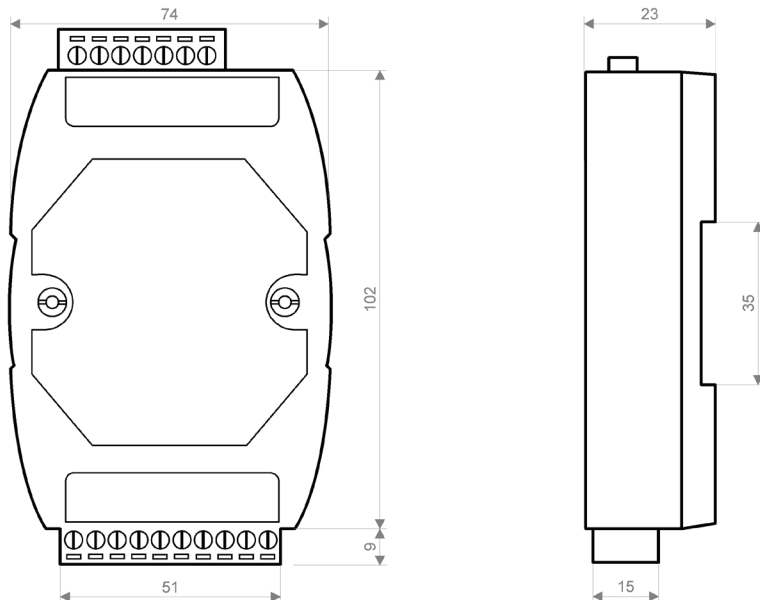
# 9 Product overview



| No. | Name       | Description                                   |
|-----|------------|-----------------------------------------------|
| 1   | TX (LED)   | Serial port sending LED                       |
| 2   | RX (LED)   | Serial port receiving LED                     |
| 3   | LINK (LED) | Network status LED for connection             |
| 4   | NET (LED)  | Network status LED for sending/receiving data |
| 5   | PWR (LED)  | Power LED                                     |
| 6   | DO1 (LED)  | Status LED for relay output 1                 |
| 7   | DO2 (LED)  | Status LED for relay output 2                 |
| 8   | DO3 (LED)  | Status-LED for relay output 3                 |
| 9   | DO4 (LED)  | Status-LED for relay output 4                 |
| 10  | GND        | Negative terminal of power supply             |
| 11  | VCC        | Positive terminal of power supply             |

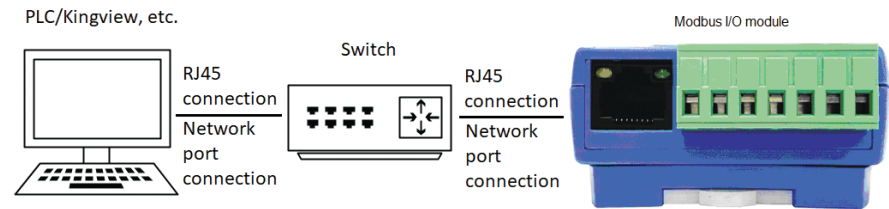
|    |          |                                                                |
|----|----------|----------------------------------------------------------------|
| 12 | NO1      | Relay 1 normally open contact                                  |
| 13 | COM1     | Common connection of relay 1                                   |
| 14 | NO2      | Relay 2 normally open contact                                  |
| 15 | COM2     | Common connection of relay 2                                   |
| 16 | NO3      | Relay 3 normally open contact                                  |
| 17 | COM3     | Common connection of relay 3                                   |
| 18 | NO4      | Relay 4 normally open contact                                  |
| 19 | COM4     | Common connection of relay 4                                   |
| 20 | Ethernet | Standard network connection RJ45                               |
| 21 | AI2      | Analogue input 2, supporting input current of 0 - 20 mA        |
| 22 | AI1      | Analogue input 1, supporting input current of 0 - 20 mA        |
| 23 | DI2      | Digital input 2, supporting access via potential-free contacts |
| 24 | DI1      | Digital input 1, supporting access via potential-free contacts |
| 25 | GND      | Earth (GND) for inputs                                         |
| 26 | 485-A    | RS485 Data Bus A is connected to Port A of the external device |
| 27 | 485-B    | RS485 Data Bus B is connected to Port B of the external device |

## 9.1 Dimensions

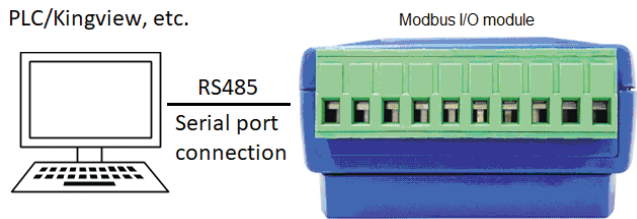


# 10 Product Application Topology Diagram

## 10.1 Network interface application topology diagram



## 10.2 Serial port application topology diagram.



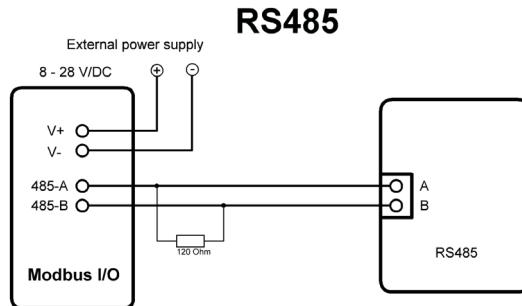
# 11 Device preparation

The following table lists the items required for this test:

|                                                                                     |                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|   |   |   |
| Modbus I/O module                                                                   | 12V switching power supply                                                          | USB to RS485 Cable                                                                  |
|  |  |  |
| computer                                                                            | network cable                                                                       | Several cables                                                                      |

## 12 Device connection

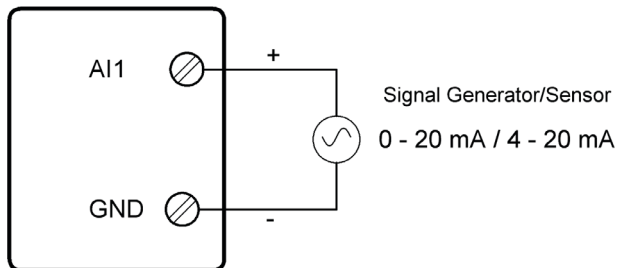
### 12.1 RS485 connection



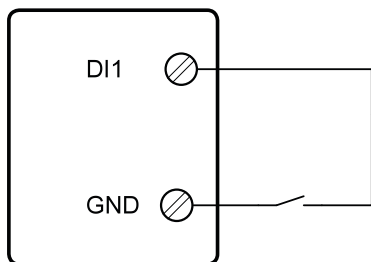
**Note:**

When the 485 bus high-frequency signal is transmitted, the signal wavelength is shorter than the transmission line, and the signal will form a reflected wave at the end of the transmission line, which will interfere with the original signal. Therefore, it is necessary to add a terminal resistor at the end of the transmission line so that the signal does not reflect after reaching the end of the transmission line. The terminal resistance should be the same as the impedance of the communication cable, the typical value is 120 ohms. Its function is to match the bus impedance and improve the anti-interference and reliability of data communication.

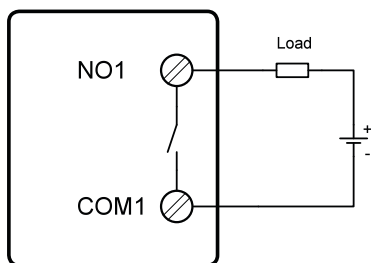
### 12.2 AI analog input connection



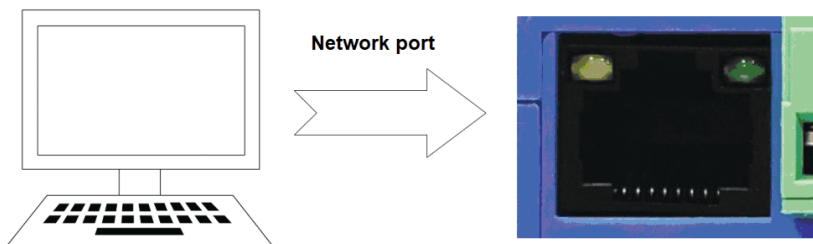
### 12.3 DI switch input connection



### 12.4 Relay output connection



### 12.5 Simple use



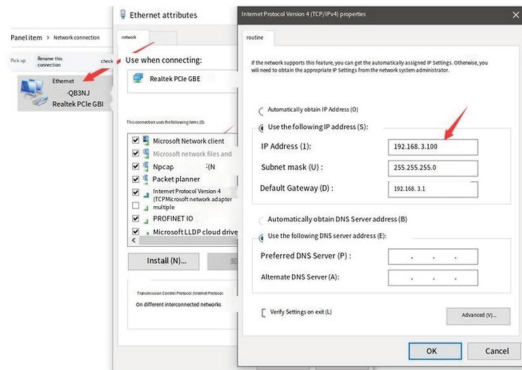
**Wiring:** The computer is connected to the RS485 interface of Modbus I/O module through USB to RS485, A is connected to A, and B is connected to B.

**Networking:** Insert the network cable into the RJ45 port and connect to the PC.

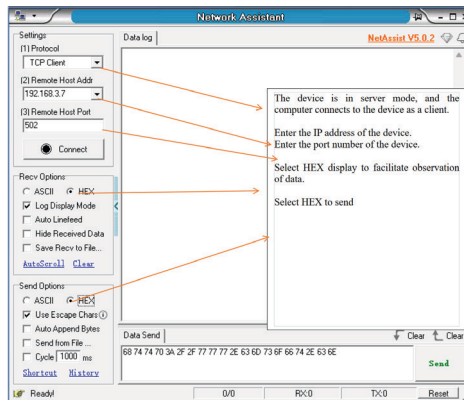
**Power supply:** Use 12 V/DC switching power supply 8 - 28 V/DC to power Modbus I/O module.

## 13 Parameter Configuration

Step 1: Modify the IP address of the computer to be consistent with the device. Here I am modifying it to 192.168.3.100 to ensure that it is on the same network segment as the device and that the IP is different. If you cannot connect to the device after the above steps, please turn off the firewall and try again;



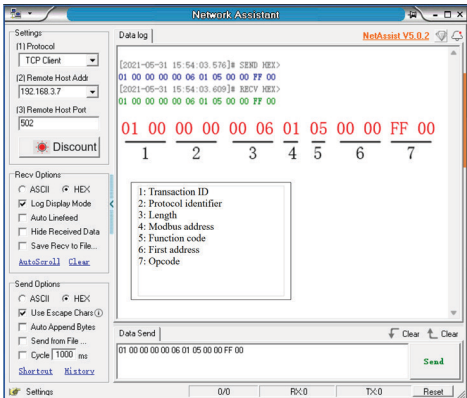
Step 2: Open the network assistant, select the TCP client, enter the remote host IP 192.168.3.7 (default parameter), enter the port number 502 (default parameter), and select HEX to send.



# 14 Control Testing

## 14.1 Modbus TCP control

Use the network assistant to control the first DO output of Modbus I/O module.

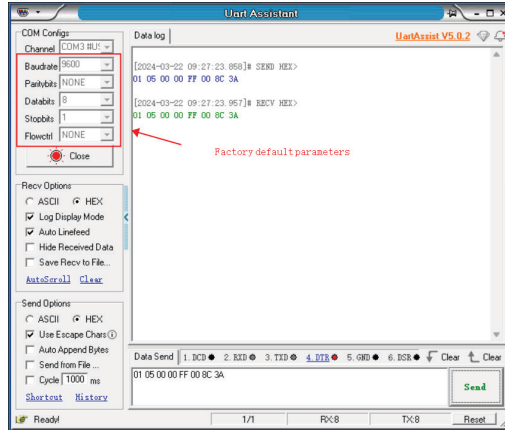


Other functions can be tested through the commands in the table below.

| Function (function code)      | Command                                   |
|-------------------------------|-------------------------------------------|
| Pull in the first coil (0x05) | 01 00 00 00 00 06 01 05 00 00 FF 00       |
| Full open command (0x0F)      | 02 00 00 00 00 08 01 0F 00 00 00 04 01 0F |
| Full close command (0x0F)     | 02 00 00 00 00 08 01 0F 00 00 00 04 01 00 |
| Read all DI status (0x02)     | 01 00 00 00 00 06 01 02 00 00 00 02       |
| Read all DO status (0x01)     | 01 00 00 00 00 06 01 01 00 00 00 04       |

## 14.2 Modbus RTU control

Use the serial port assistant to control the first DO output of Modbus I/O module.



Other functions can be tested through the commands in the table below.

| Function (function code)      | Command                       |
|-------------------------------|-------------------------------|
| Pull in the first coil (0x05) | 01 05 00 00 FF 00 8C 3A       |
| Full open command (0x0F)      | 01 0F 00 00 00 04 01 0F 7E 92 |
| Full close command (0x0F)     | 01 0F 00 00 00 04 01 00 3E 96 |
| Read all DI status (0x02)     | 01 02 00 00 00 02 F9 CB       |
| Read all DO status (0x01)     | 01 01 00 00 00 04 3D C9       |

## 15 Product Function Introduction

### 15.1 DI Input

#### 15.1.1 Switch Input DI Collection

The switch input DI measures level signals or edge pulse signals (rising edge, falling edge). Support dry contact collection, support DI counting function, the maximum counting value is 65535 (the count exceeding 65535 is automatically cleared).

The switch input DI supports three trigger modes: rising edge, falling edge, and level (default rising edge trigger).

The clearing method supports automatic clearing and manual clearing (default automatic clearing).

#### 15.1.2 Input filtering

When the switch inputs DI to collect signals, it needs to maintain multiple sampling periods before confirming. Filter parameters can be set in the range of 1 to 16 (default 6 sampling periods, 6\*1 kHz).

It can be configured with the host computer through instructions.

## 15.2 AI Input

### 15.2.1 Analog range

The analog input AI measures the current signal, the acquisition range is 0 - 20 mA or 4 - 20 mA, the precision is 3 %, and the resolution is 12 bits. The device adopts single-ended input, the sampling frequency is 10 Hz, and the input impedance is 100 Ohm.

Set the sampling range of all AI channels, valid values are 1 and 0 (default 0).

**Configured as 0:** means 0 - 20mA

**Configured as 1:** means 4 - 20 mA

#### Note:

AI configuration instructions

1. The AI sampling range of each channel can be set. When the AI channel sampling range is configured as 4 - 20 mA sampling, if the current signal is lower than 3.5 mA, it will be displayed as 0, and if it is higher than 3.5 mA and lower than 4 mA, it will be displayed as 4. There is no conversion limit for signals greater than 20 mA, but it cannot exceed 25 mA (there is a risk of equipment damage if it exceeds 25 mA).
2. The starting address of the AI channel sampling range parameter is 0x04B2, the register type is a holding register, and the function codes are 0x06 and 0x10. When writing AI channel sampling range parameters, if the written parameter value is not within the range of 0 to 1, it will automatically take the closest value and write it in. If the sampling range parameter is 2, the device will take 1 as the sampling range parameter. And Modbus does not return error commands.

### 15.2.2 Trigger mode

**(1) Not trigger:** mode off.

**(2) Rising trigger:** When the AI input value becomes greater than the set AI trigger high value, the AI trigger is high (that is, the output state is 1), and a rising edge trigger is generated. After triggering, as long as the AI value is not lower than the set AI trigger low value, the current output value is always 1 (can be matched with DO linkage).

**(3) Falling trigger:** When the AI input value becomes less than the set AI trigger low value, the AI trigger is low (that is, the output state is 0), and a falling edge trigger is generated. After triggering, as long as the AI value is not higher than the set AI trigger high value, the current output value is always 0 (can be matched with DO linkage).

**(4) Bilateral trigger:** When the AI input value becomes greater than the set AI trigger high value, the AI trigger is high (that is, the output state is 1), and a rising edge trigger is generated. After triggering, as long as the AI value is not lower than the set AI trigger low value, the current output value is always 1; when the AI input value becomes smaller than the set AI trigger low value, the AI trigger is low (that is, the output state is 0), generating a falling edge trigger. After triggering, as long as the AI value is not higher than the set AI trigger high value, the current output value is always 0 (can be matched with DO linkage).

### 15.2.3 Engineering quantity shaping value and engineering quantity floating point value of analog input

There are two ways to read the current signal collected by the device:

(1) Read the AI engineering quantity shaping value, and directly convert to get the input current. The starting address of the AI engineering quantity shaping value register is 0x0064, the register type is an input register, and the read function code is 0x04. The value returned by this method represents one channel per register, and the value read is 0 to 25000. The method of calculating the current size is 0 - 25000 corresponding to 0 - 25 mA.

**That is:**

Current = engineering value / 1000 (mA)

(2) Read the floating-point value of the AI engineering quantity, and use the IEEE754 conversion tool to convert the hexadecimal data into a floating-point number to obtain the input current. The starting address of the AI engineering quantity shaping value register is 0x00C8, the register type is an input register, and the read function code is 0x04. This method returns two registers representing 1 channel.

### 15.2.4 AI filter parameters

You can set the filter parameters of the AI channel, the effective value is 1 to 16, and the default value is 6.

**Description of filter parameters:**

(1) All AI channels share a filter parameter. The higher the parameter value, the more stable the output value and the slower the response.

(2) The AI channel filter parameter address is 0x04B0, and the register type is a holding register. Function code 0x06, 0x10.

(3) When writing AI filter parameters, if the written parameter value is not within the range of 1 to 16, it will automatically take the closest value and write it in. If the filter parameter is written as 0, the device will take 1 as the filter parameter, and Modbus does not return error commands.

## 15.3 DO output

Relay output mode: output different mode output according to the mode set by the user, and the level output is turned on by default.

### 15.3.1 Input count

Support counting DI input, users can configure rising edge acquisition, falling edge acquisition, and level acquisition according to their own needs. You can also change the clearing method according to your needs.

**Trigger method:**

**Rising edge:** When the rising edge is collected (it is not counted when it is turned on, it is counted when it is turned off), it will be counted once.

**Falling edge:** When the falling edge is collected (counting when it is turned on, and not counting when it is released), count once.

**Level:** Two edges are collected and counted once respectively.

**Clearing method:**

**Automatic:** The device will automatically clear each time the DI count value register 0x09DF to 0x09E6 is read.

**Manual:** In manual mode, it is necessary to write 1 to the clear signal register 0x0AA7 to 0x0AAE, and each holding register controls one clear signal.

### **15.3.2 Level output**

Output according to the level set by the user, the switch characteristic of the level mode is similar to the function of a self-locking switch.

### **15.3.3 Pulse output**

After the switch output DO is turned on, the switch output DO is automatically turned off after maintaining the set pulse width time (in ms). The pulse width setting range is 50 to 65535 ms (50 ms by default).

### **15.3.4 Follow mode**

According to the follow source configured by the user (when the device has AI acquisition or DI detection function, both DI or AI can be used as the follow source, otherwise this function is useless) to change the relay state, and multiple outputs can follow the same follow source output. To put it simply, DI detects the input, and automatically outputs a relay that uses it as a follow source (for example: DI is 1, DO is closed). When the follow mode is turned on, the follow source should be configured at the same time, otherwise it will follow the first input by default.

### **15.3.5 Reverse follow mode**

According to the follow source configured by the user (when the device has AI acquisition or DI detection function, both DI or AI can be used as the follow source, otherwise this function is useless) to change the relay state, and multiple outputs can follow the same follow source output. To put it simply, DI detects the input, and automatically outputs the relay that follows it as the source (for example: DI is 1, DO is disconnected). When the follow mode is turned on, the follow source should be configured at the same time, otherwise it will follow the first input by default.

### **15.3.6 Trigger toggle mode**

According to the follow source configured by the user (when the device has AI acquisition or DI detection function, both DI or AI can be used as the follow source, otherwise this function is useless) to change the relay state, and multiple outputs can follow the same follow source output. Simply put, when DI generates a trigger signal (rising edge or falling edge), DO will have a state change. When the trigger flip mode is turned on, the following source should be configured at the same time, otherwise it will follow the first input by default.

### **15.3.7 Power-on state**

According to the state set by the user. After the device is powered on, the output relay is turned on according to the state set by the user, and it is turned off by default.

## **15.4 Modbus Gateway**

The device can transparently transmit non-native Modbus commands from the network/serial port to the serial port/network, and the local Modbus commands are directly executed.

### **15.4.1 Modbus TCP/RTU protocol conversion**

After it is turned on, the Modbus TCP data on the network side will be converted to Modbus RTU data.

### **15.4.2 Modbus Address Filtering**

This function can be used when some host software or configuration screen is used as the host to access the serial port of the device, and the gateway function of the device is used, the slave is at the network end, and the Modbus TCP to RTU function is turned on. Multiple slaves on the bus may cause data confusion. At this time, enabling address filtering can ensure that only the specified address can pass through the device; when the parameter is 0, the data will be transparently transmitted; when the parameter is 1 to 255, only the set slave machine address data.

### 15.4.3 Modbus TCP Protocol Data Frame Description

TCP frame format:

| Transaction ID | Protocol ID | Length  | Device address | Function code | Data segment |
|----------------|-------------|---------|----------------|---------------|--------------|
| 2 Bit          | 2 Bit       | N+2 Bit | 1 Bit          | 1 Bit         | N Bit        |

- **Transaction ID:** It can be understood as the serial number of the message. Generally, 1 is added after each communication to distinguish different communication data messages.
- **Protocol identifier:** 00 00 means Modbus TCP protocol.
- **Length:** Indicates the length of the next data in bytes.

Example: get DI status

|                |             |        |                |               |              |
|----------------|-------------|--------|----------------|---------------|--------------|
| 01 00          | 00 00       | 00 06  | 01             | 02            | 00 00 00 04  |
| Transaction ID | Protocol ID | Length | Device address | Function code | Data segment |

### 15.4.4 Modbus RTU protocol data frame description

RTU frame format:

| Device address | Function code | Data segment | Check code CRC |
|----------------|---------------|--------------|----------------|
| 1 Bit          | 1 Bit         | N Bit        | 2 Bit          |

Example: get DI status command

|                       |               |              |                |
|-----------------------|---------------|--------------|----------------|
| 01                    | 02            | 00 00 00 04  | 79 C9          |
| Device Modbus address | Function code | Data segment | CRC check code |

### 15.5 IO linkage function

The linkage function is divided into AI-DO linkage and DI-DO linkage. Generally speaking, the linkage function needs to be divided into two parts. The first part is the trigger source: that is, AI/DI input, and the second part is the trigger: that is, DO/AO output.

1. When DI is used as the trigger source, DI input status and DI changes can be used as signals, according to the corresponding configuration of DO:
  - a. In follow/reverse follow mode, the current state of DI will be used as a signal, and the states of DO and DI are the same/opposite;
  - b. Trigger inversion mode, DI state change is used as a signal, if the trigger signal is set to DI rising edge change, the current state of DO will change once.
2. When AI is used as the trigger source, the AI signal is processed into a signal similar to DI through a process similar to Schmitt trigger, and then this signal is linked with DO. The linkage process can refer to DI/ DO linkage.

## 15.6 Active upload

The device supports the function of uploading analog input values at regular intervals. Setting the value of the corresponding register can control the interval time and whether to upload.

Devices with digital input will actively upload once after successfully connecting to the server, and then the digital input will be uploaded following the status change. Devices with analog input will report the status of analog input according to the configured active upload time period (the configuration period is 1 to 65535).

When it is set to 0, the upload is disabled; if it is set to other positive integer value N, the upload will be performed at intervals of N seconds.

### Note:

The device can only be valid if it is configured in client mode, and the register value is non-zero to enable active upload.

## 15.7 Custom Module Information

### 15.7.1 Modbus Address

The device address is 1 by default, and the address can be modified, and the address range is 1 to 247.

### 15.7.2 Module Name

Users can configure the device name according to their own needs to distinguish, support English, digital format, up to 20 bytes.

### 15.7.3 Network parameters

**Unless otherwise specified:** the following network-related parameters default to IPV4-related parameters.

|    |                     |                                                                                                                                                                                                                                                                                         |
|----|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | MAC of the device   | The user can obtain it by reading the specified register, and this parameter cannot be written.                                                                                                                                                                                         |
| 2  | IP address          | Device IP address, readable and writable.                                                                                                                                                                                                                                               |
| 3  | Modbus TCP port     | Port number of the device, readable and writable.                                                                                                                                                                                                                                       |
| 4  | Subnet mask         | Address mask, readable and writable.                                                                                                                                                                                                                                                    |
| 5  | Gateway address     | Gateway.                                                                                                                                                                                                                                                                                |
| 6  | DHCP                | Set the way the device obtains IP: static (0), dynamic (1).                                                                                                                                                                                                                             |
| 7  | Target IP           | When the device works in client mode, the target IP or domain name of the device connection.                                                                                                                                                                                            |
| 8  | Destination port    | When the device is working in client mode, the destination port of the device connection.                                                                                                                                                                                               |
| 9  | DNS server          | The device is in the client mode and resolves the domain name of the server.                                                                                                                                                                                                            |
| 10 | Module working mode | Switch the working mode of the module.<br><b>Server:</b> The device is equivalent to a server, waiting for the user's client to connect. The maximum number of connections is 4.<br><b>Client:</b> The device actively connects to the target IP and port set by the user.              |
| 11 | Active upload       | When this parameter is not 0, and the device is in the client mode, the discrete input status of the device will be uploaded to the server when it is connected for the first time or the input changes, and the analog input will be uploaded according to the configured time period. |

15.7.4 Serial Port Parameters

Parameters for setting serial communication:

Default parameters:

Baud rate: 9600 (03)

Data bit: 8 bit

Stop bit: 1 bit

Check digit: NONE (00)

Baudrate:

| Baud rate code value table |        |
|----------------------------|--------|
| 0x0000                     | 1200   |
| 0x0001                     | 2400   |
| 0x0002                     | 4800   |
| 0x0003 (default)           | 9600   |
| 0x0004                     | 19200  |
| 0x0005                     | 38400  |
| 0x0006                     | 57600  |
| 0x0007                     | 115200 |

Check Digit:

| Check Digit |      |
|-------------|------|
| 0x0000      | NONE |
| 0x0001      | ODD  |
| 0x0002      | EVEN |

15.8 OLED display and parameter configuration

The display interface includes an information display page (AI input value and DI input status, DO status display page) and a parameter setting page (some parameters).

15.8.1 Information Display Interface

Including AI input value, DI input status, and DO status display page, short press the up and down buttons to switch the interface.

### 15.8.2 Equipment parameter display interface

Press the left or right button to enter the password input interface, complete the correct password input, and display the device parameter information interface (password interface: default password: 0000. Short press the middle to verify the password; The left and right buttons can switch the password bit; Up and down keys can switch the value of the current bit. The password has a total of 4 digits, and each input is a number ranging from 0 to 9):

**The parameter setting interface from top to bottom is:**

- |                    |                                      |
|--------------------|--------------------------------------|
| ■ Modbus address   | ■ Subnet mask                        |
| ■ Baud rate        | ■ DNS                                |
| ■ Data bits        | ■ MAC address                        |
| ■ Check Digit      | ■ DHCP                               |
| ■ Stop bit         | ■ Target IP                          |
| ■ Local port       | ■ Destination port                   |
| ■ Local IP address | ■ Modbus TCP/RTU protocol conversion |
| ■ Network mode     | ■ Active upload                      |
| ■ Gateway          | ■ Modbus address filtering           |

### 15.8.3 Equipment Parameter Configuration Interface

Press and hold the confirmation button to enter the password input interface, complete the correct password input, and enter the configuration interface (password interface: default password: 0000; short press the middle to verify the password, the left and right buttons switch the password bit, and the up and down buttons switch the value of the current bit, the password has a total of 4 digits, and each input range is a number from 0 to 9).

Select the setting item, enter the parameter configuration page and short press the up and down keys to switch the setting item;

Select the setting item, short press to confirm or right click, the setting item gets the cursor to represent the selection and enter the setting item;

Adjust the parameter value: After selecting the setting item, the up and down keys can change the value or optional value; the left and right keys move the cursor in the parameter item;

Confirm the parameter value: After adjusting the parameter value, press the enter key to exit the current setting item.

Save parameter settings and restart: After setting the parameters, move the cursor to save and restart, then short press the confirmation key to enter the confirmation save and restart state. Short press the confirmation key (press other keys to exit the confirmation state) to save the parameters and restart the device.

Exit without saving parameters: move the cursor to exit, then short press the confirmation key to enter the confirmation exit state, short press the confirmation key (press other keys to exit the confirmation state), and then exit the parameter configuration interface without saving the parameters .

Among them, the data bit and stop bit cannot be set. After the DHCP mode is turned on, the local IP address, gateway, and subnet mask cannot be configured and are only assigned by the router;

### 15.8.4 Screen Sleep

The device screen has a sleep function, which is off by default and can be set to on in the configuration interface.

In any interface, when there is no button operation for 180 seconds, the screen will enter the sleep mode. At this time, the interface displays Ebyte robot. Press any button can exit the sleep mode.

When the screen is in sleep mode, the running efficiency of device programs will be improved.

## 15.9 MODBUS parameter configuration

### 15.9.1 DI Register List

| Register function       | Register address | Register type    | Number | Operate | Data Range/Remarks                                                                                                                                                  | Related function code     |
|-------------------------|------------------|------------------|--------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| DI status               | 0x0000           | Discrete Input   | 2      | R       | Input Port Status                                                                                                                                                   | R : 0x02                  |
| DI filtering parameters | 0x04B1           | Holding register | 1      | R/W     | Digital filtering parameters, ranging from 1 to 16. The smaller the number, the more sensitive it is, and the larger it is, the more stable it is. The default is 6 | R : 0x03<br>W : 0x06,0x10 |
| DI pulse count value    | 0x09DF           | Holding register | 2      | R/W     | Enter count value                                                                                                                                                   | R : 0x03<br>W : 0x06,0x10 |
| DI reset method         | 0x0A43           | Holding register | 2      | R/W     | 0x0000 automatic reset<br>0x0001 Manual reset                                                                                                                       | R : 0x03<br>W : 0x06,0x10 |
| DI manual reset signal  | 0xAA7            | Holding register | 2      | R/W     | The reset method is manual, and the register writes 1 to clear the count value                                                                                      | R : 0x03<br>W : 0x06,0x10 |
| DI counting method      | 0x0B0C           | Holding register | 2      | R/W     | Set the counting method for DI                                                                                                                                      | R : 0x03<br>W : 0x06,0x10 |

## 15.9.2 List of AI Registers

| Register function                            | Register address | Register type    | Number | Operate | Data Range/Remarks                                                                                                              | Related function code     |
|----------------------------------------------|------------------|------------------|--------|---------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| AI engineering quantity integer value        | 0x0064           | Input register   | 2      | R       | 16 bit integer type, unit uA                                                                                                    | R : 0x04                  |
| AI engineering quantity floating point value | 0x00C8           | Input register   | 4      | R       | 32-bit floating-point type in mA                                                                                                | R : 0x04                  |
| AI filtering parameters                      | 0x04B0           | Holding register | 1      | R/W     | Analog input filtering parameters, range 1 to 16, smaller numbers are more sensitive, larger numbers are more stable, default 6 | R : 0x03<br>W : 0x06,0x10 |
| AI sampling range                            | 0x04B2           | Holding register | 2      | R/W     | AI channel sampling range<br>0x0000: 0 - 20 mA<br>0x0001: 4 - 20mA                                                              | R : 0x03<br>W : 0x06,0x10 |
| AI trigger high value                        | 0x1F40           | Holding register | 2      | R/W     | 0-20000 (uA)                                                                                                                    | R : 0x03<br>W : 0x06,0x10 |
| AI trigger low value                         | 0x1F72           | Holding register | 2      | R/W     | 0-20000 (uA)                                                                                                                    | R : 0x03<br>W : 0x06,0x10 |
| AI trigger mode                              | 0x1FA4           | Holding register | 2      | R/W     | 0, do not trigger<br>1. Rise trigger<br>2. Descending trigger<br>3. Bilateral triggering                                        | R : 0x03<br>W : 0x06,0x10 |

### 15.9.3 List of DO Registers

| Register function           | Register address       | Register type    | Number | Operate | Data Range/Remarks                                                                                                                         | Related function code     |
|-----------------------------|------------------------|------------------|--------|---------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| DO status                   | 0x0000                 | Coil             | 4      | R/W     | Write to change the current DO state, read to obtain the current DO state                                                                  | R : 0x01<br>W : 0x0F,0x05 |
| State when DO is powered on | 0x0064                 | Holding register | 4      | R/W     | The default state of the coil after power on                                                                                               | R : 0x01<br>W : 0x0F,0x05 |
| DO working mode             | 0x0578                 | Holding register | 4      | R/W     | 0x0000 level no follow mode<br>0x0001 Pulse no follow mode<br>0x0002 Follow mode<br>0x0003 Reverse Follow Mode<br>0x0004 Trigger Flip Mode | R : 0x03<br>W : 0x06,0x10 |
| DO pulse width              | 0x05DC                 | Holding register | 4      | R/W     | Range: 50 to 65535 ms                                                                                                                      | R : 0x03<br>W : 0x06,0x10 |
| DO Follow Source            | DI:0x0000<br>AI:0x8000 | Holding register | 4      | R/W     | Scope:<br>0x0000: Follow DI1<br>0x0001: Follow DI2<br>0x8000: Follow AI1<br>0x8001: Follow AI2                                             | R : 0x03<br>W : 0x06,0x10 |

### 15.9.4 Module related registers

| Register function          | Register address | Register type    | Number | Operate | Data Range/Remarks                                                      | Related function code     |
|----------------------------|------------------|------------------|--------|---------|-------------------------------------------------------------------------|---------------------------|
| Module address             | 0x07E8           | Holding register | 1      | R/W     | Modbus address, 1 to 247 configurable addresses                         | R : 0x03<br>W : 0x06      |
| Module model               | 0x07D0           | Holding register | 12     | R       | Get the current model                                                   | R : 0x03                  |
| Firmware version           | 0x07DC           | Holding register | 1      | R       | Get firmware version number                                             | R : 0x03                  |
| Module name                | 0x07DE           | Holding register | 10     | R/W     | Custom module name                                                      | R : 0x03<br>W : 0x10      |
| Module restart             | 0x07EA           | Holding register | 1      | W       | Write any value to restart                                              | W : 0x06                  |
| Restore factory parameters | 0x07E9           | Holding register | 1      | W       | Write random value to restore factory parameters                        | W : 0x06                  |
| Serial baud rate           | 0x0834           | Holding register | 1      | R/W     | See baud rate code table, Default is 9600 (0x0003)                      | R : 0x03<br>W : 0x06,0x10 |
| Serial check digit         | 0x0836           | Holding register | 1      | R/W     | 0x0000 no checksum (default)<br>0x0001 odd parity<br>0x0002 even parity | R : 0x03<br>W : 0x06,0x10 |

### 15.9.5 Network related registers

| Register function                 | Register address | Register type    | Number | Operate | Data Range/Remarks                                                                                                                                           | Related function code     |
|-----------------------------------|------------------|------------------|--------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Module MAC address                | 0x0898           | Holding register | 3      | R       | Device MAC parameters                                                                                                                                        | R : 0x03                  |
| Local IP address                  | 0x089B           | Holding register | 2      | R/W     | Default: 192.168.3.7                                                                                                                                         | R : 0x03<br>W : 0x06,0x10 |
| local port                        | 0x089D           | Holding register | 1      | R/W     | 1 to 65535, default: 502                                                                                                                                     | R : 0x03<br>W : 0x06,0x10 |
| Subnet mask address               | 0x089E           | Holding register | 2      | R/W     | Default: 255.255.255.0                                                                                                                                       | R : 0x03<br>W : 0x06,0x10 |
| Gateway address                   | 0x08A0           | Holding register | 2      | R/W     | Default: 192.168.3.1                                                                                                                                         | R : 0x03<br>W : 0x06,0x10 |
| DHCP mode setting                 | 0x08A2           | Holding register | 1      | R/W     | 0x0000 static IP (default)<br>0x0001 Obtain IP automatically                                                                                                 | R : 0x03<br>W : 0x06,0x10 |
| Target IP/ domain name            | 0x08A3           | Holding register | 64     | R/W     | String format stored in IP/ domain name<br>Default IP: 192.168.3.3                                                                                           | R : 0x03<br>W : 0x06,0x10 |
| Server port                       | 0x08E3           | Holding register | 1      | R/W     | 0 to 65535, default 502                                                                                                                                      | R : 0x03<br>W : 0x06,0x10 |
| DNS server IP address             | 0x08E4           | Holding register | 2      | R/W     | Default 8.8.8.8                                                                                                                                              | R : 0x03<br>W : 0x06,0x10 |
| Module work mode                  | 0x08E6           | Holding register | 1      | R/W     | 0x0000 server mode<br>0x0001 client mode                                                                                                                     | R : 0x03<br>W : 0x06,0x10 |
| Active upload                     | 0x08E7           | Holding register | 1      | R/W     | 0x0000 disabled, others:<br>1 to 65535 sec. cycle sending                                                                                                    | R : 0x03<br>W : 0x06,0x10 |
| MOSBUS TCP/ RTU conversion enable | 0x08E8           | Holding register | 1      | R/W     | 0, close,<br>1 open protocol conversion                                                                                                                      | R : 0x03<br>W : 0x06,0x10 |
| MODBUS address filtering          | 0x08E9           | Holding register | 1      | R/W     | 0: transparent transmission,<br>1 to 255: when the data is not local, check the slave address of the command , and it can be passed when it is the set value | R : 0x03<br>W : 0x06,0x10 |

## 15.9.6 Examples of Modbus command operation instructions

### 1. Read coil (DO) status

Use the read coil state (01) function code to read the output coil state, for example:

|                |               |                        |                             |                |
|----------------|---------------|------------------------|-----------------------------|----------------|
| 01             | 01            | 00 00                  | 00 04                       | 3D C9          |
| Modbus address | Function code | Register first address | Number of output coils read | CRC check code |

After sending the above command to the device through the 485 bus, the device will return the following values:

|                |               |               |                      |                |
|----------------|---------------|---------------|----------------------|----------------|
| 01             | 01            | 01            | 01                   | 90 48          |
| Modbus address | Function code | Bytes of data | Returned status data | CRC check code |

The status data 01 returned above indicates that the output DO1 is turned on.

#### 1. Control coil (DO) state

Support operation of single coil (05), operation of multiple coils (0F) function code operation.

Use the 05 command to write a single command, for example:

|                |               |                        |                                   |                |
|----------------|---------------|------------------------|-----------------------------------|----------------|
| 01             | 05            | 00 00                  | FF 00                             | 8C 3A          |
| Modbus address | Function code | Register first address | Continuity: FF 00<br>Close: 00 00 | CRC check code |

After sending the above command to the device through the 485 bus, the device will return the following values:

|                |               |                        |                  |                |
|----------------|---------------|------------------------|------------------|----------------|
| 01             | 05            | 00 00                  | FF 00            | 8C 3A          |
| Modbus address | Function code | Register first address | Operation method | CRC check code |

The DO1 coil is turned on.

Use 0F function code as the command to write multiple coils, for example:

|                |               |                 |                 |               |                   |                |
|----------------|---------------|-----------------|-----------------|---------------|-------------------|----------------|
| 01             | 0F            | 00 00           | 00 04           | 01            | 0F                | 7E 92          |
| Modbus address | Function code | Initial address | Number of coils | Bytes of data | Control coil data | CRC check code |

After sending the above command to the device through the 485 bus, the device will return the following values:

|                |               |                  |                 |                |
|----------------|---------------|------------------|-----------------|----------------|
| 01             | 0F            | 00 00            | 00 04           | 54 08          |
| Modbus address | Function code | Register address | Number of coils | CRC check code |

The coils are all on.

#### 1. Read the holding register

Use 03 function code to read one or more register values, for example:

| 01             | 03            | 05 78                  | 00 01                    | 04 DF          |
|----------------|---------------|------------------------|--------------------------|----------------|
| Modbus address | Function code | Register first address | Number of registers read | CRC check code |

After sending the above command to the device through the 485 bus, the device will return the following values:

| 01             | 03            | 02            | 00 00         | B8 44          |
|----------------|---------------|---------------|---------------|----------------|
| Modbus address | Function code | Bytes of data | Returned data | CRC check code |

The above 00 00 means that DO1 is in level output mode.

## 2. Operation holding register

Support operation of single register (06), operation of multiple registers (10) function code operation.

Use 06 function code to write a single holding register, for example: set the working mode of DO1 to pulse mode:

| 01             | 06            | 05 78            | 00 01       | C8 DF          |
|----------------|---------------|------------------|-------------|----------------|
| Modbus address | Function code | Register address | Write value | CRC check code |

After sending the above command to the device through the 485 bus, the device will return the following values:

| 01             | 06            | 05 78            | 00 01       | C8 DF          |
|----------------|---------------|------------------|-------------|----------------|
| Modbus address | Function code | Register address | Write value | CRC check code |

If the modification is successful, the data in the 0x0578 register is 0x0001, and the pulse output mode is turned on.

Use function code 10 to write multiple holding register commands, for example: set the working mode of DO1 and DO2 at the same time.

| 01             | 10            | 05 78                 | 00 02               | 04                              | 00 01 00 01  | 5A 7D          |
|----------------|---------------|-----------------------|---------------------|---------------------------------|--------------|----------------|
| Modbus address | Function code | Register head address | Number of registers | Number of bytes of written data | Written data | CRC check code |

After sending the above command to the device through the 485 bus, the device will return the following values:

| 01             | 06            | 05 78            | 00 02               | C1 1D          |
|----------------|---------------|------------------|---------------------|----------------|
| Modbus address | Function code | Register address | Number of registers | CRC check code |

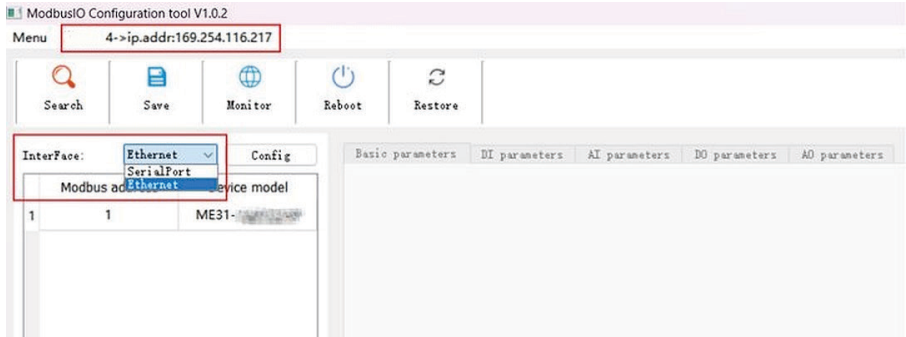
If the modification is successful, the values of the two consecutive registers starting with 0x0578 are 0x0001 and 0x0001 respectively, marking DO1 and DO2 to enable pulse output.

# 16 Configuration Software

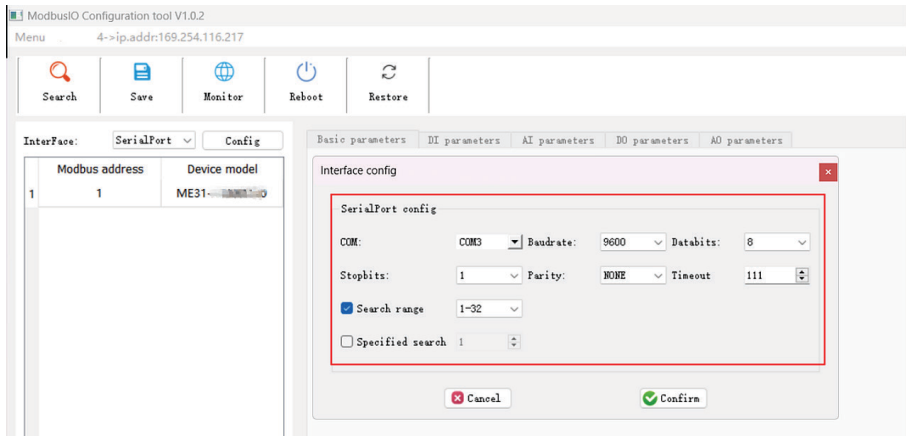
## 16.1 Acquisition and Control

**Step 1:** Connect the device to the configuration software.

1. You can configure the device by selecting the interface (serial port/network port); if you choose the network port, you must first select the network card and then search for the device.



2. If you choose a serial port, you need to select the corresponding serial port number, and the same baud rate, data bit, stop bit, parity bit and address segment search range as the device, and then search.



**Step 2:** Select the corresponding device.

ModbusIO Configuration tool V1.0.2

Menu4->ip.addr:169.254.116.217

Search

Save

Monitor

Reboot

Restore

Interface: Ethernet Config

|   | Modbus address | Device model |
|---|----------------|--------------|
| 1 | 1              | ME31-...     |

Basic informationDI parametersAI parametersDO parametersAO parameters

Basic parameters

| Name                         | Value         |
|------------------------------|---------------|
| Device name                  | www.ebyte.com |
| Modbus address(MA offset ... | 1             |
| Baudrate                     | 9600          |
| Parity                       | NONE          |

**Step 3:** Click the device online to enter the IO monitoring. The following is the IO monitoring screen display.

IO monitor

AI

|        | Integer value(uA) | Floating-point value(mA) |
|--------|-------------------|--------------------------|
| AI-1 0 | 0                 |                          |
| AI-2 0 | 0                 |                          |
| AI-3 0 | 0                 |                          |
| AI-4 0 | 0                 |                          |

AO

|        | Integer value(uA) | Floating-point value(mA) |
|--------|-------------------|--------------------------|
| AO-1 0 | 0                 |                          |
| AO-2 0 | 0                 |                          |
| AO-3 0 | 0                 |                          |
| AO-4 0 | 0                 |                          |

## 16.2 Parameter configuration interface

**Step 1:** Connect the device refer to “Acquisition and Control”.

**Step 2:** You can configure device parameters, network parameters, DI parameters, AI parameters, DO parameters, and AO parameters (for example: if the device has no AO function, the AO parameters cannot be configured)

ModbusIO Configuration tool V1.0.2  
Menu 4->ip:169.254.116.217

Search Save Reinit Reboot Restore

Interface: Ethernet Config

| Modbus address | Device model  |
|----------------|---------------|
| 1              | ME31-AAA02240 |

Info

|                  |                   |
|------------------|-------------------|
| Description      | ModbusIO/8-28VDC  |
| Interface        | Ethernet-RS485    |
| MAC address      | 38-38-26-22-65-69 |
| Firmware Version | 1.5(V2)           |
| DI               | 2*/NPN            |
| AI               | 2*/0-20mA/4-20mA  |
| DO               | 4*/NO             |

Basic information DI parameters AI parameters DO parameters AO parameters

Basic parameters

| Name                          | Value          |
|-------------------------------|----------------|
| Device name                   | www.slytix.com |
| Modbus address(MA offset ...) | 1              |
| Baudrate                      | 9600           |
| Parity                        | NONE           |

Network parameters

| Name               | Value           |
|--------------------|-----------------|
| Local IP           | 192.168.3.7     |
| ModbusTCP port     | 502             |
| Submask            | 255.255.255.0   |
| Gateway            | 192.168.3.1     |
| DHCP               | Disable         |
| Remote Ip/domain   | 192.168.3.15    |
| Remote port        | 8080            |
| DNS server address | 114.114.114.114 |
| Network protocol   | TCP Server      |

Log

| Date | Time                    | Info                                                |
|------|-------------------------|-----------------------------------------------------|
| 1    | 2024-03-21 14:11:45.804 | Searching                                           |
| 2    | 2024-03-21 14:11:45.841 | Search for all device....                           |
| 3    | 2024-03-21 14:11:46.501 | Uploading parameters->MAC address:38-38-26-22-65-69 |

**Step 3:** After configuring the parameters, click Download Parameters. After the prompt message in the log output shows that the parameters are saved successfully, click Restart the device. After the device restarts, the modified parameters will take effect.

ModbusIO Configuration tool V1.0.2

Menu4-ip.addr:169.254.116.217

Search

Save

Monitor

Restart

Restart

InterFace: Ethernet

Config

| Modbus address | Device model  |
|----------------|---------------|
| 1              | ME31-AAAX2240 |

Info

Description

ModbusIO/9-28VDC

Interface

Ethernet+RS485

MAC address

38-38-26-22-65-69

Firmware Version

1.5(V2)

DI

2\*/NPN

AI

2\*/0-20mA/4-20mA

DO

4\*/N0

Basic information

EE parameters

AE parameters

BO parameters

AO parameters

Basic parameters

| Item                          | Value         |
|-------------------------------|---------------|
| Device name                   | www.xlyte.com |
| Modbus address(MA offset ...) | 1             |
| Baudrate                      | 9600          |
| Parity                        | 80X2          |

Network parameters

| Item               | Value           |
|--------------------|-----------------|
| Local IP           | 192.168.3.7     |
| ModbusTCP port     | 502             |
| Submask            | 255.255.255.0   |
| Gateway            | 192.168.3.1     |
| DHCP               | Disable         |
| Remote ip/domain   | 192.168.3.15    |
| Remote port        | 8080            |
| DNS server address | 114.114.114.114 |
| Network protocol   | TCP Server      |

Log

| Date | Time                    | Info                    |
|------|-------------------------|-------------------------|
| 7    | 2024-03-21 14:17:47.272 | Parameters save success |
| 8    | 2024-03-21 14:17:57.075 | Rebooting               |
| 9    | 2024-03-21 14:17:57.110 | Reboot Success          |

## 17 Device Default Parameters

| Category            | Name                | Parameters                             |
|---------------------|---------------------|----------------------------------------|
| Ethernet parameters | Operating mode      | TCP server (up to 4-way client access) |
|                     | Local IP            | 192.168.3.7                            |
|                     | Local port          | 502                                    |
|                     | Subnet mask         | 255.255.255.0                          |
|                     | Gateway address     | 192.168.3.1                            |
|                     | DHCP                | Close                                  |
|                     | Native MAC          | Determined by the chip (fixed)         |
|                     | Target IP           | 192.168.3.3                            |
|                     | Target port         | 502                                    |
|                     | DNS server          | 114.114.114.114                        |
|                     | Active upload       | Close                                  |
| Serial parameters   | Baud rate           | 9600 bps (8 types)                     |
|                     | Check method        | None (default), Odd, Even              |
|                     | Data bit            | 8                                      |
|                     | Stop bit            | 1                                      |
| MODBUS parameter    | Modbus master-slave | Slave                                  |
|                     | Address             | 1                                      |

## 18 Cleaning and maintenance

### Important:

- Do not use aggressive cleaning agents, rubbing alcohol or other chemical solutions. They damage the housing and can cause the product to malfunction.
- Do not immerse the product in water.

1. Disconnect the product from the power supply.
2. Clean the product with a dry, fibre-free cloth.

## 19 Disposal



This symbol must appear on any electrical and electronic equipment placed on the EU market. This symbol indicates that this device should not be disposed of as unsorted municipal waste at the end of its service life.

Owners of WEEE (Waste from Electrical and Electronic Equipment) shall dispose of it separately from unsorted municipal waste. Spent batteries and accumulators, which are not enclosed by the WEEE, as well as lamps that can be removed from the WEEE in a non-destructive manner, must be removed by end users from the WEEE in a non-destructive manner before it is handed over to a collection point.

Distributors of electrical and electronic equipment are legally obliged to provide free take-back of waste. Conrad provides the following return options **free of charge** (more details on our website):

- in our Conrad offices
- at the Conrad collection points
- at the collection points of public waste management authorities or the collection points set up by manufacturers or distributors within the meaning of the ElektroG

End users are responsible for deleting personal data from the WEEE to be disposed of.

It should be noted that different obligations about the return or recycling of WEEE may apply in countries outside of Germany.

## 20 Technical data

### 20.1 Power supply

|                       |                                                    |
|-----------------------|----------------------------------------------------|
| Power supply .....    | 8 - 28 V/DC; 12 V/DC power supply unit recommended |
| Power indicator ..... | Blue LED indication                                |

### 20.2 Modbus I/O

|                               |                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Interfaces .....              | 4 relay outputs, 2 analogue inputs, 2 digital inputs (potential-free), RS485, network                                 |
| Ports .....                   | Power supply, relay output 1-4, RS485, analogue/digital<br>IN/OUT: Screw terminal block, RM 5.08 mm;<br>Network: RJ45 |
| Communication Interface ..... | RJ45, RS485                                                                                                           |
| Baud rate .....               | 9600 bps (customizable)                                                                                               |
| Protocol .....                | Standard Modbus TCP, Modbus RTU protocol                                                                              |
| Device address .....          | Can be modified by Modbus command and host computer                                                                   |

### 20.3 DI input

|                             |                                         |
|-----------------------------|-----------------------------------------|
| Number of DI channels ..... | 2 way                                   |
| Input type .....            | Default dry contact                     |
| Acquisition frequency ..... | 1 kHz                                   |
| Input instructions .....    | OLED screen display, red LED indication |

### 20.4 AI input

|                             |                      |
|-----------------------------|----------------------|
| AI channels .....           | 2 way                |
| Acquisition Features .....  | Single-ended input   |
| Input type .....            | 0 - 20 mA, 4 - 20 mA |
| AI resolution .....         | 3 ‰                  |
| Acquisition frequency ..... | 10 Hz                |
| Input instructions .....    | OLED screen display  |

### 20.5 DO output

|                              |                                         |
|------------------------------|-----------------------------------------|
| Number of DO channels .....  | 4 way                                   |
| DO output type .....         | Form A relay                            |
| DO output mode .....         | Level output, pulse output              |
| Relay contact capacity ..... | 30 V/5 A, 250 V/5 A                     |
| Output indication .....      | OLED screen display, red LED indication |

## 20.6 Miscellaneous

Mounting..... DIN rail  
Operating system ..... System required Windows 10/11 (configuration software)  
Dimensions (W x H x D) ..... approx. 74 x 120 x 23 mm  
Weight ..... approx. 148 g

## 20.7 Other

Operating/storage conditions..... -40 to +80°C, 10 – 95% RH (non-condensing)



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