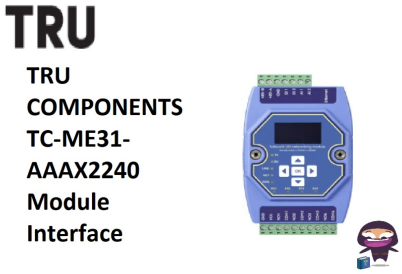


TRU COMPONENTS TC-ME31-AAAX2240 Module Interface Instruction Manual

Contents

1 TRU COMPONENTS TC-ME31-AAAX2240 Module Interface
2 Product Information
3 Product Usage Instructions
4 Introduction
5 Operating Instructions for download
6 Intended use
7 Features and functions
8 Delivery content
9 Description of symbols
10 Safety instructions
11 Product Overview
12 Product Application Topology Diagram
13 Device connection
14 Parameter Configuration
15 Control Testing
16 Product Function Introduction
17 Configuration Software
18 Device Default Parameters
19 Cleaning and maintenance
20 Disposal
21 Technical data
22 Documents / Resources
22.1 References
23 Related Posts

TRU

TRU COMPONENTS TC-ME31-AAAX2240 Module Interface

Product Information

Specifications

- Item No.: 2973412
- Supports Modbus RTU and Modbus TCP protocols
- 2-way analogue input: 0 – 20 mA / 4 – 20 mA
- 2-way digital input (DI)
- 4-way digital output (DO) – Form A relay with supported modes
- Supports Modbus gateway function
- RS485/RJ45 acquisition control I/O
- Supports user customization of Modbus address settings
- Supports common baud rate configurations
- Supports DHCP, static IP, DNS function, and domain name resolution
- Supports input-output linkage

Product Usage Instructions

Usage

Once configured, connect your software/PLC/Touchscreen to the Modbus I/O module using the RJ45 cable. Monitor and control the inputs and outputs as per your application needs.

Disposal

When disposing of the product, follow local regulations for electronic waste disposal. Do not dispose of the device in regular household waste.

FAQ (Frequently Asked Questions)

Q: Can I use this product with both Modbus RTU and Modbus TCP protocols?

A: Yes, this product supports both Modbus RTU and Modbus TCP protocols for versatile connectivity options.

Introduction

Dear customer,
Thank you for purchasing this product.
If there are any technical questions, please contact: **www.conrad.com/contact**

Operating Instructions for download

Use the link **www.conrad.com/downloads** (alternatively scan the QR code) to download the complete operating in-structions (or new/current versions if available). Follow the instructions on the web page.

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.
-

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 customization 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 provide

Delivery content

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

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.

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.

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.

Handling

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

Operating environment

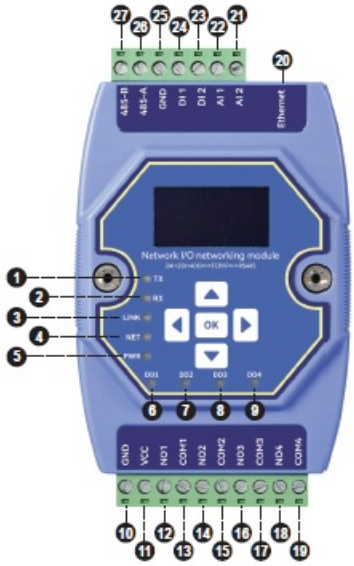
- Do not place the product under any mechanical stress.
- Protect the appliance from extreme temperatures, strong jolts, flammable gases, steam and solvents.
- Protect the product from high humidity and moisture.
- Protect the product from direct sunlight.
- Never operate the product in direct proximity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

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.

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

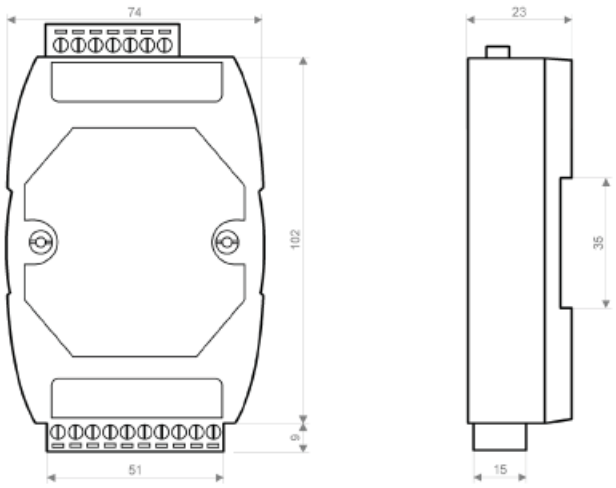
Product Overview



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

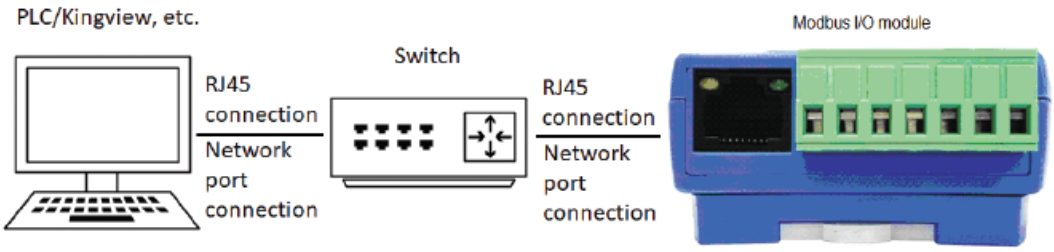
12	NO1	Relay 1 normally open contact
13	COM1	Common connection of relay 1
14	NO2	Relay 2 normally open contact
15	COM2	Common connection of relay 2
16	NO3	Relay 3 normally open contact
17	COM3	Common connection of relay 3
18	NO4	Relay 4 normally open contact
19	COM4	Common connection of relay 4
20	Ethernet	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

Dimensions

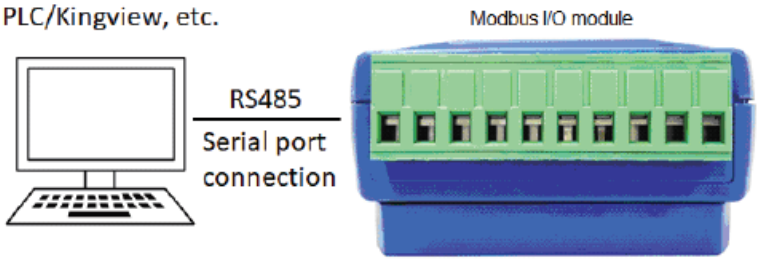


Product Application Topology Diagram

Network interface application topology diagram



Serial port application topology diagram.



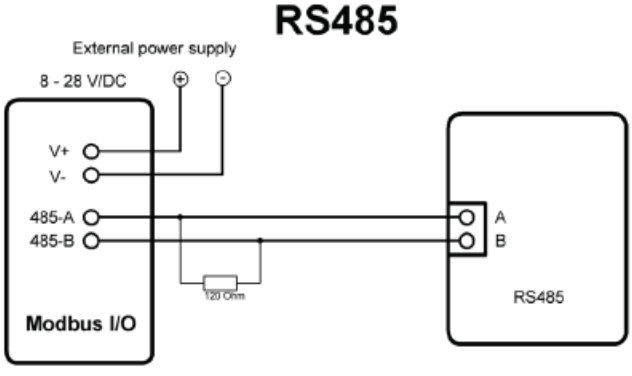
Device preparation

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**

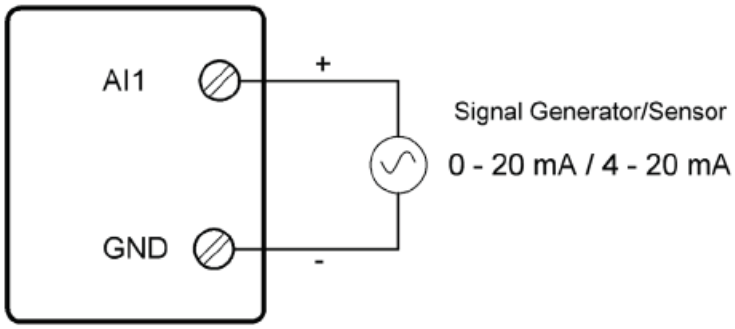
Device connection

RS485 connection

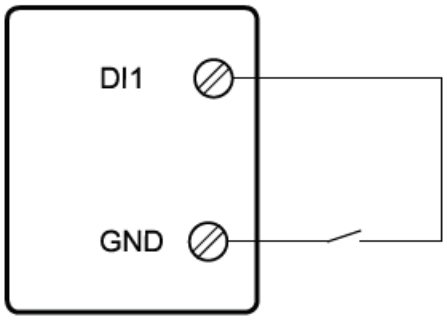


Note:
When the 485 bus high-frequency signal is transmitted, the signal wavelength is shorter than the transmission line, and the signal will form a reflected wave at the end of the transmission line, which will interfere with the original signal. Therefore, it is necessary to add a terminal resistor 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.

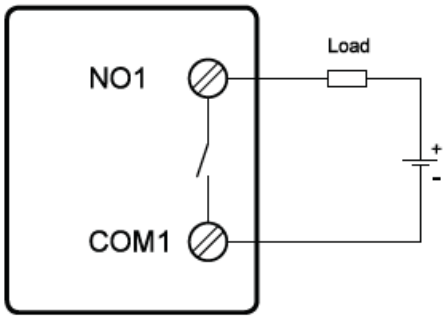
AI analog input connection



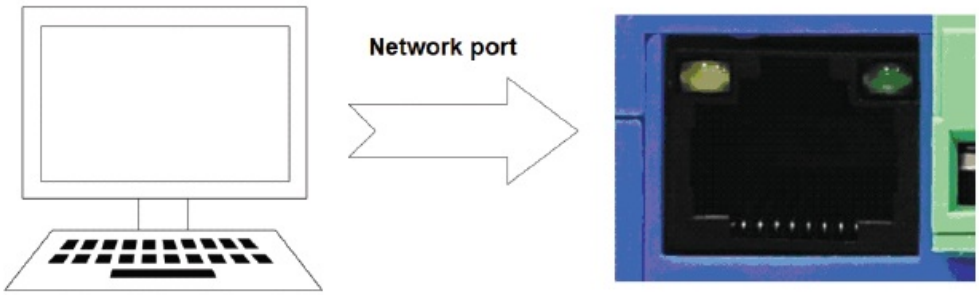
DI switch input connection



Relay output connection



Simple use

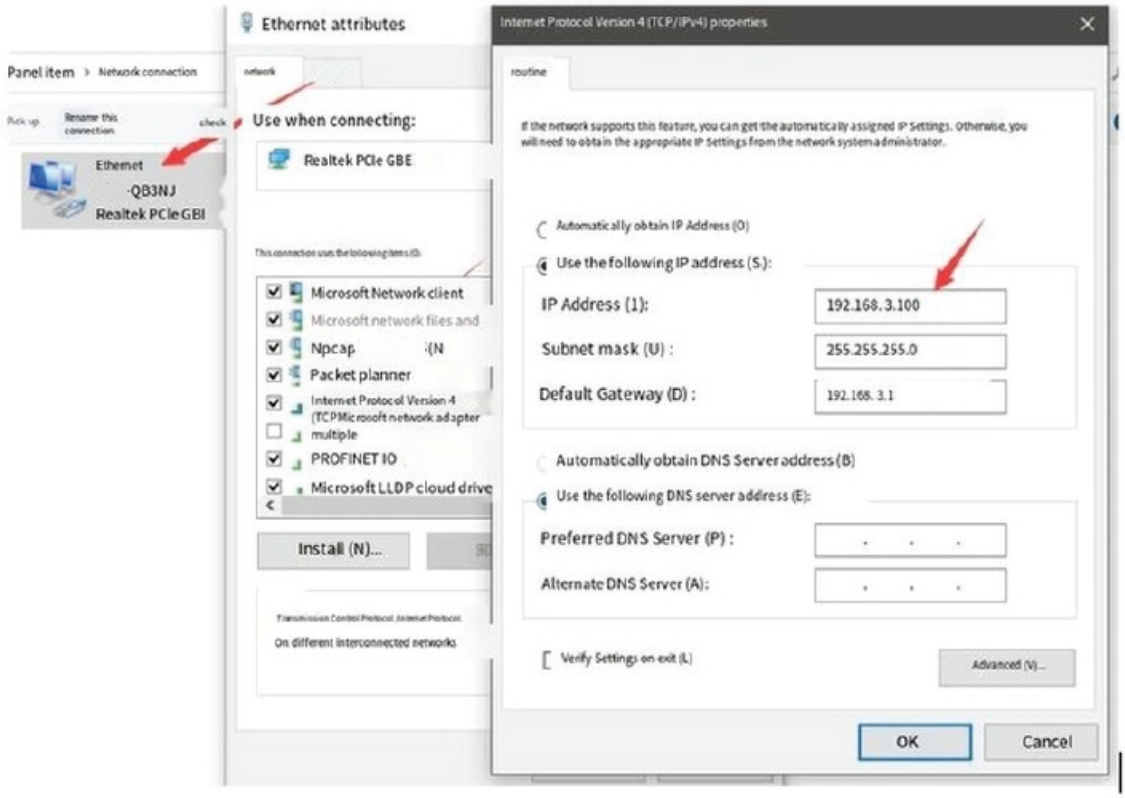


Wiring: The computer is connected to the RS485 interface of Modbus I/O module through USB to RS485, A is con-nected to A, and B is connected to B.

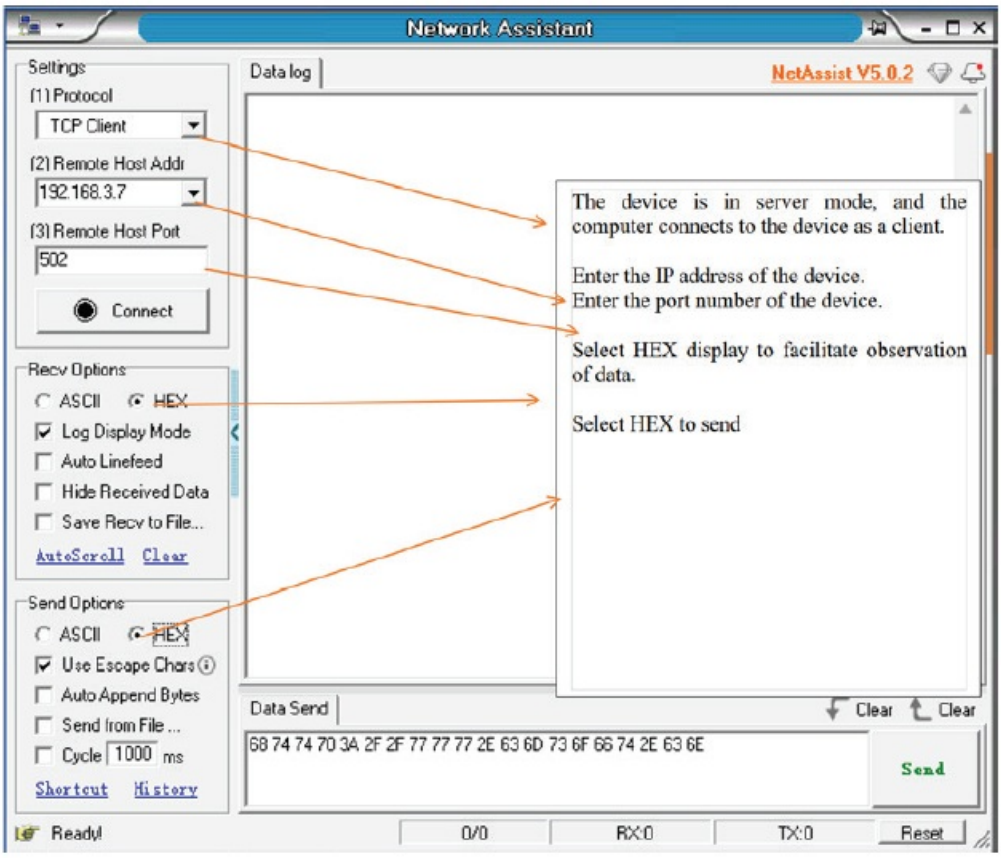
Networking: Insert the network cable into the RJ45 port and connect to the PC.
Power supply: Use 12 V/DC switching power supply 8 – 28 V/DC to power Modbus I/O module.

Parameter Configuration

1. 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;



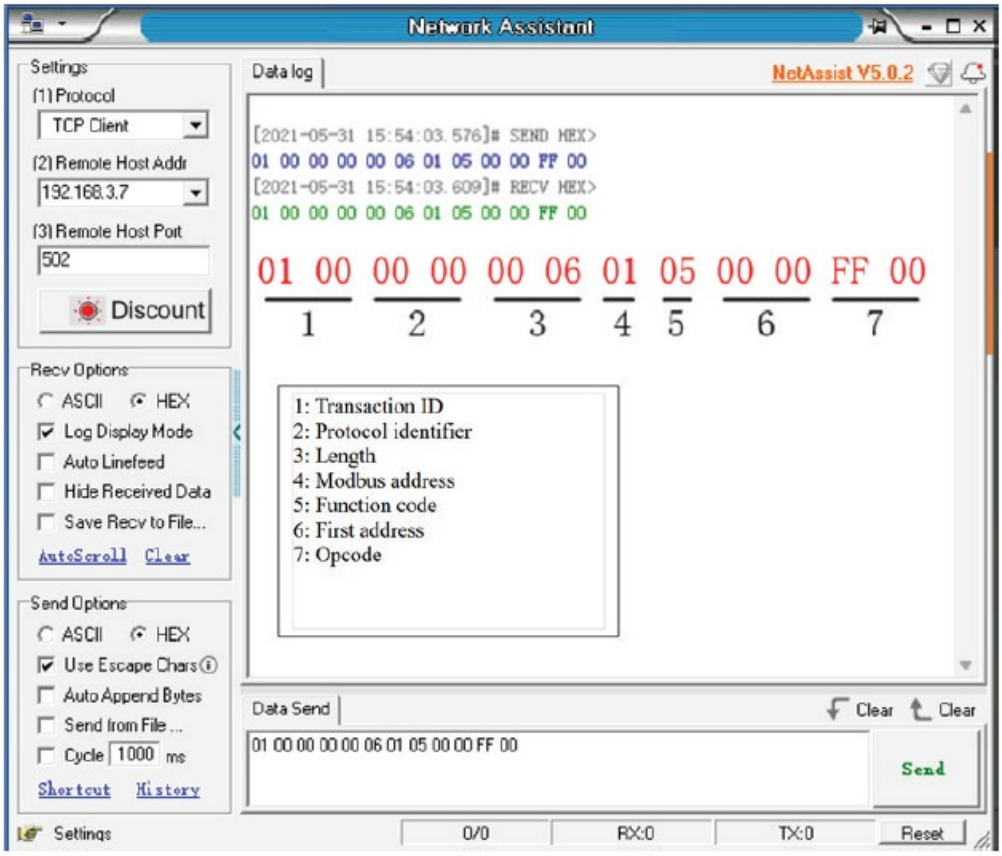
2. Step 2: Open the network assistant, select the TCP client, enter the remote host IP192.168.3.7 (default parameter), enter the port number 502 (default parameter), and select HEX to send.



Control Testing

Modbus TCP control

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

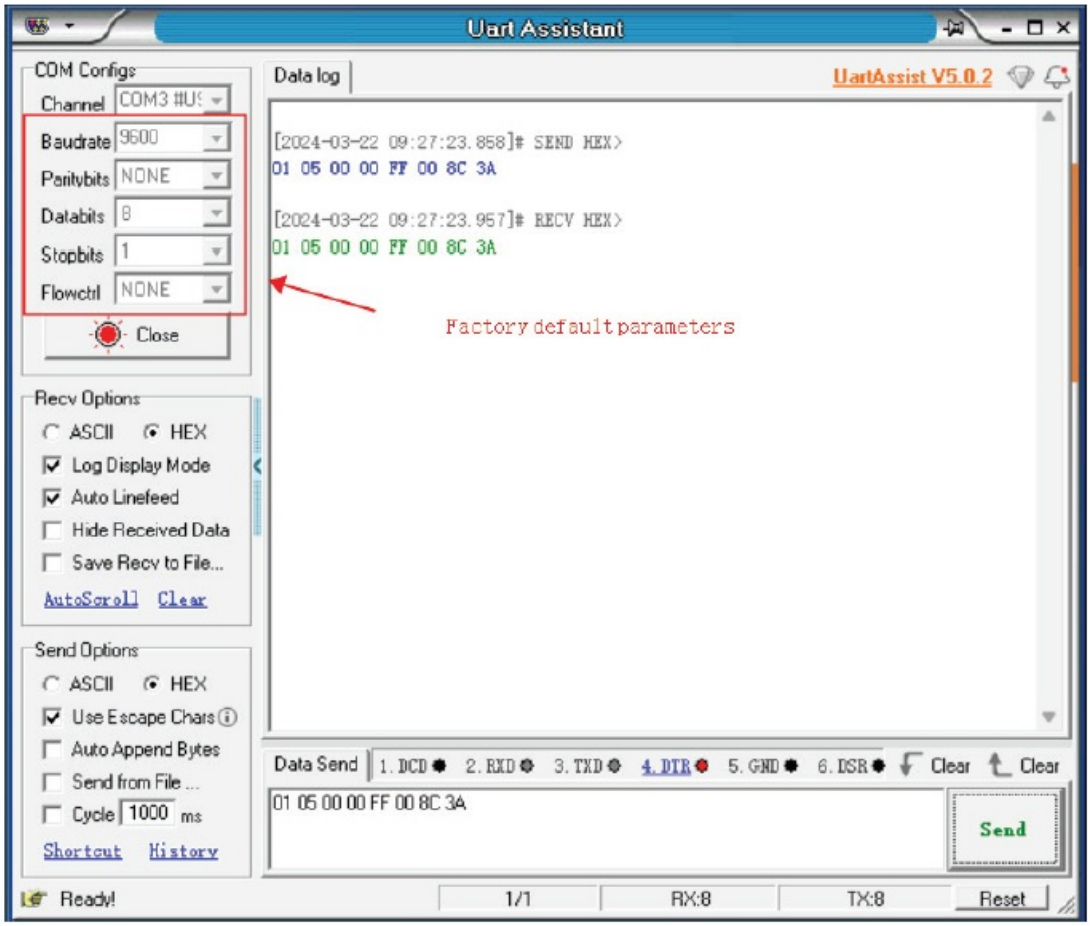


Other functions can be tested through the commands in the table below.

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

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

Product Function Introduction

DI Input

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 auto-matically 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).

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.

AI Input

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.

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).

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 IEE754 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.

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.

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.

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.

1. **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.

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.

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).

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.

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.

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.

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.

8. **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.

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.
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.

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

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

O 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:
   - 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;

- 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.

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.

Custom Module Information

Modbus Address

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

Module Name

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

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 can not 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 devi ce connection.
8	Destination port	When the device is working in client mode, the destination port of the device co nnection.
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. **Server:** The device is equivalent to a server, waiting for the user's client to con nect. The maximum number of connections is 4. **Client:** The device actively connects to the target IP and port set by the user.
1	Active upload	When this parameter is not 0, and the device is in the client mode, the discrete i nput 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.

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

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).

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.

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
- Baud rate
- Data bits
- Check Digit
- Stop bit
- Local port
- Local IP address
- Network mode
- Gateway

- Subnet mask
- DNS
- MAC address
- DHCP
- Target IP
- Destination port
- Modbus TCP/RTU protocol conversion
- Active upload
- Modbus address filtering

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;

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.
MODBUS parameter configuration

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 W : 0x06,0x10
DI pulse count value	0x09DF	Holding register	2	R/W	Enter count value	R : 0x03 W : 0x06,0x10
DI reset method	0x0A43	Holding register	2	R/W	0x0000 automatic reset 0x0001 Manual reset	R : 0x03 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 W : 0x06,0x10
DI counting method	0x0B0C	Holding register	2	R/W	Set the counting method for DI	R : 0x03 W : 0x06,0x10

List of AI Registers

Register function	Register address	Register type	Number	Operate	Data Range/Remarks	Related function code
AI engineering quan- tity 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 W : 0x06,0x10
AI sampling range	0x04B2	Holding register	2	R/W	AI channel sampling range 0x0000: 0 – 20 mA 0x0001: 4 – 20mA	R : 0x03 W : 0x06,0x10
AI trigger high value	0x1F40	Holding register	2	R/W	0-20000 (uA)	R : 0x03 W : 0x06,0x10
AI trigger low value	0x1F72	Holding register	2	R/W	0-20000 (uA)	R : 0x03 W : 0x06,0x10
AI trigger mode	0x1FA4	Holding register	2	R/W	0, do not trigger 1. Rise trigger 2. Descending trigger 3. Bilateral triggering	R : 0x03 W : 0x06,0x10

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 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 W : 0x0F,0x05
DO woring mode	0x0578	Holding register		R/W	0x0000 level no follow mode 0x0001 Pulse no follow mode 0x0002 Follow mode 0x0003 Reverse Follow Mode 0x0004 Trigger Flip Mode	R : 0x03 W : 0x06,0x10
DO pulse width	0x05DC	Holding register	4	R/W	Range: 50 to 65535 ms	R : 0x03 W : 0x06,0x10
DO Follow Source	DI:0x0000 AI:0x8000	Holding register	4	R/W	Scope: 0x0000: Follow DI1 0x0001: Follow DI2 0x8000: Follow AI1 0x8001: Follow AI2	R : 0x03 W : 0x06,0x10

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 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 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 W : 0x06,0x10
Serial check digit	0x0836	Holding register	1	R/W	0x0000 no checksum (default) 0x0001 odd parity 0x0002 even parity	R : 0x03 W : 0x06,0x10

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 W : 0x06,0x10
local port	0x089D	Holding register	1	R/W	1 to 65535, default: 502	R : 0x03 W : 0x06,0x10
Subnet mask address	0x089E	Holding register	2	R/W	Default: 255.255.255.0	R : 0x03 W : 0x06,0x10

Gateway ad- dr ess	0x08A0	Holding r egister	2	R/W	Default: 192.168.3.1	R : 0x03 W : 0x06,0x10
DHCP mode setting	0x08A2	Holding r egister	1	R/W	0x0000 static IP (default) 0x0001 Obtain IP automatically	R : 0x03 W : 0x06,0x10
Target IP/ dom ain name	0x08A3	Holding r egister	64	R/W	String format stored in IP/ do main name Default IP: 192.168.3.3	R : 0x03 W : 0x06,0x10
Server port	0x08E3	Holding r egister	1	R/W	0 to 65535, default 502	R : 0x03 W : 0x06,0x10
DNS server IP address	0x08E4	Holding r egister	2	R/W	Default 8.8.8.8	R : 0x03 W : 0x06,0x10
Module work m ode	0x08E6	Holding r egister	1	R/W	0x0000 server mode 0x0001 client mode	R : 0x03 W : 0x06,0x10
Active upload	0x08E7	Holding r egister	1	R/W	0x0000 disabled, others: 1 to 65535 sec. cycle sendin g	R : 0x03 W : 0x06,0x10
MOSBUS TCP/ RTU conversion ena ble	0x08E8	Holding r egister	1	R/W	0, close, 1 open protocol conversion	R : 0x03 W : 0x06,0x10
MODBUS ad- dress filtering	0x08E9	Holding r egister	1	R/W	0: transparent transmission, 1 to 255: when the data is no t local, check the slave ad- dr ess of the command , and it can be passed when it is the set value	R : 0x03 W : 0x06,0x10

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 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.

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

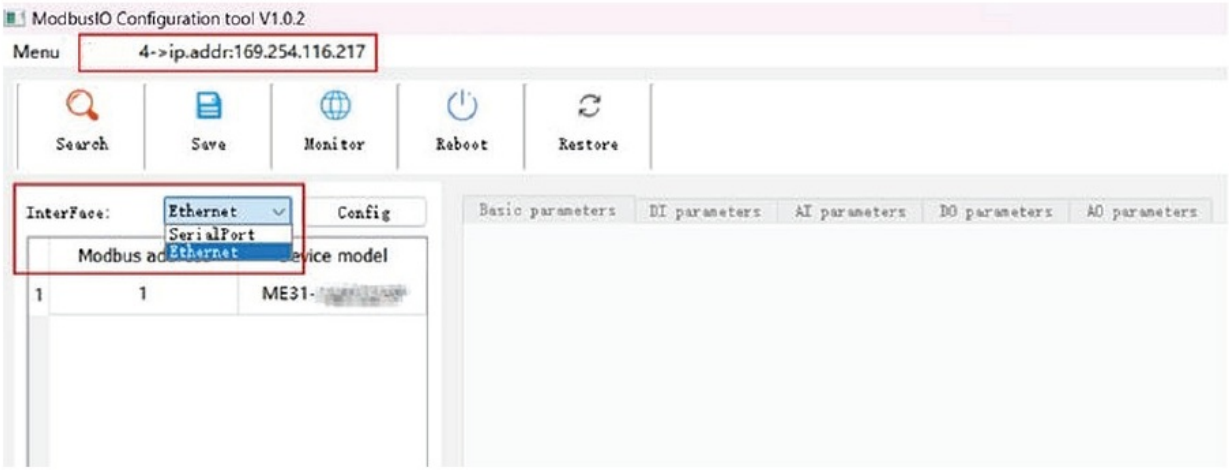
01	**06**	**05 78**	**00 02**	**C1 1D**
Modbus address	Function code	Register address	Number of registers	CRC check code

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.

Configuration Software

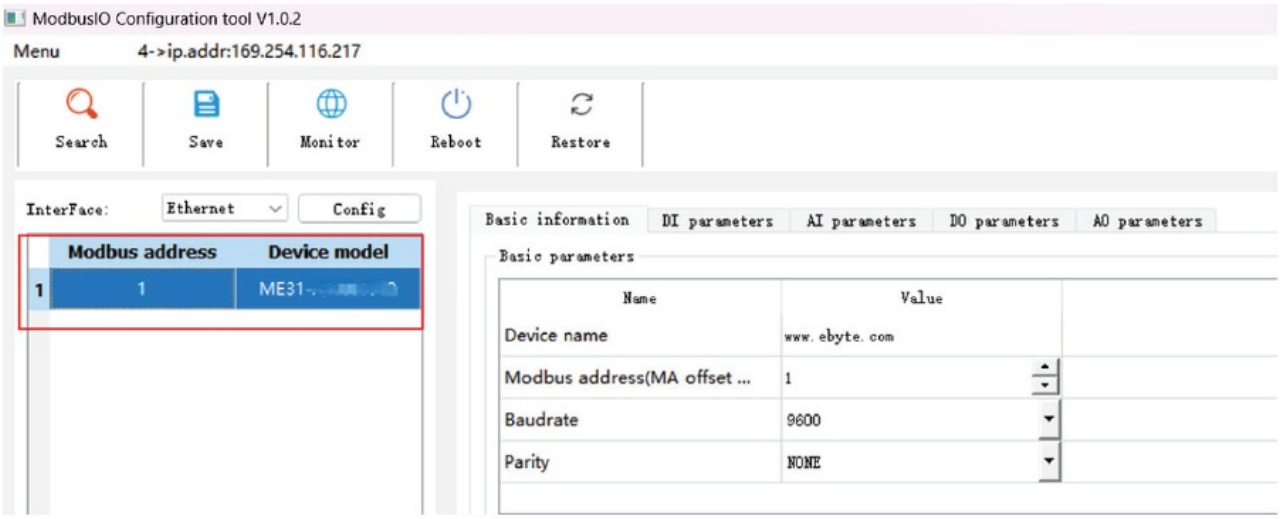
Acquisition and Control

1. 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.

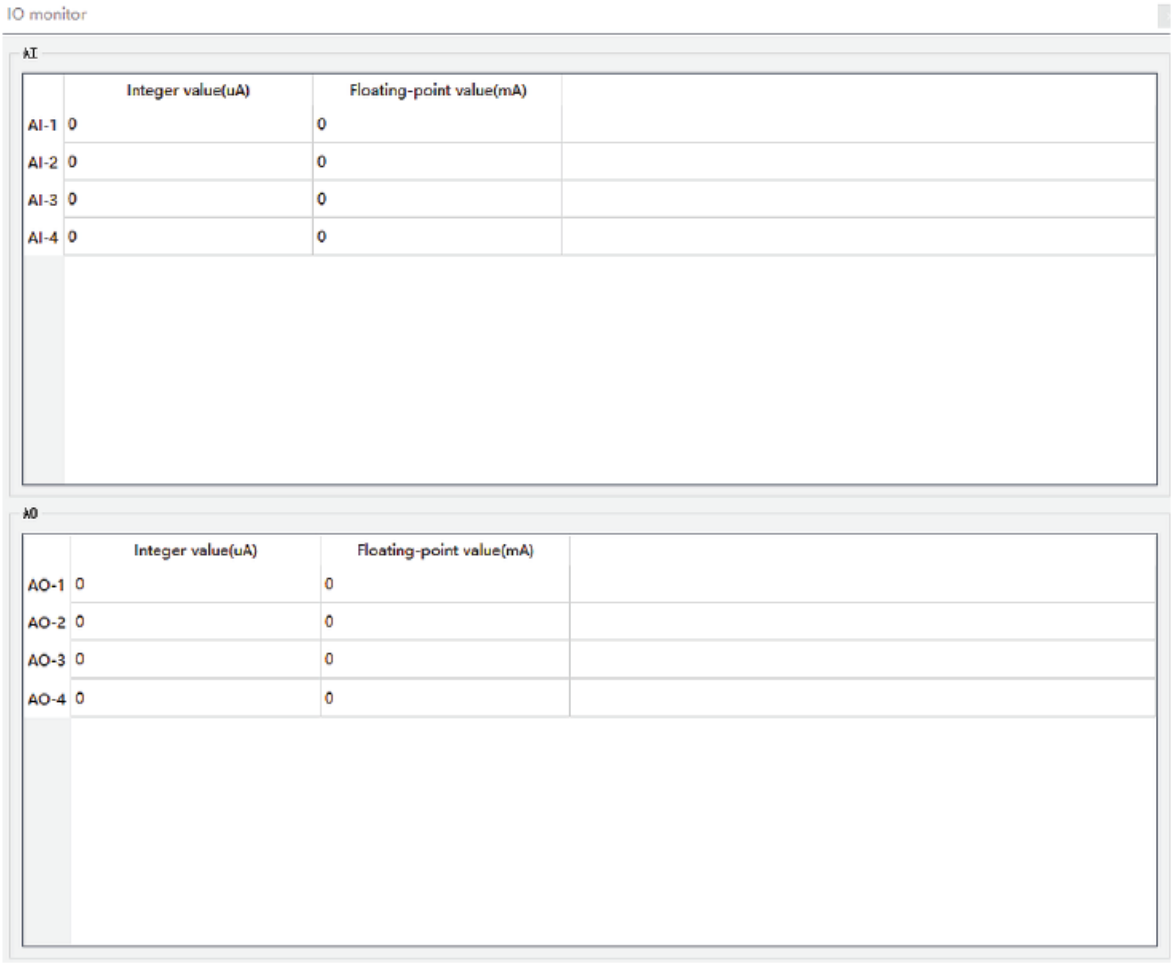


    2. If you choose a serial port, you need to select the corresponding serial port number, and the same baud rate, data bit, stop bit, parity bit and address segment search range as the device, and then search.

2.



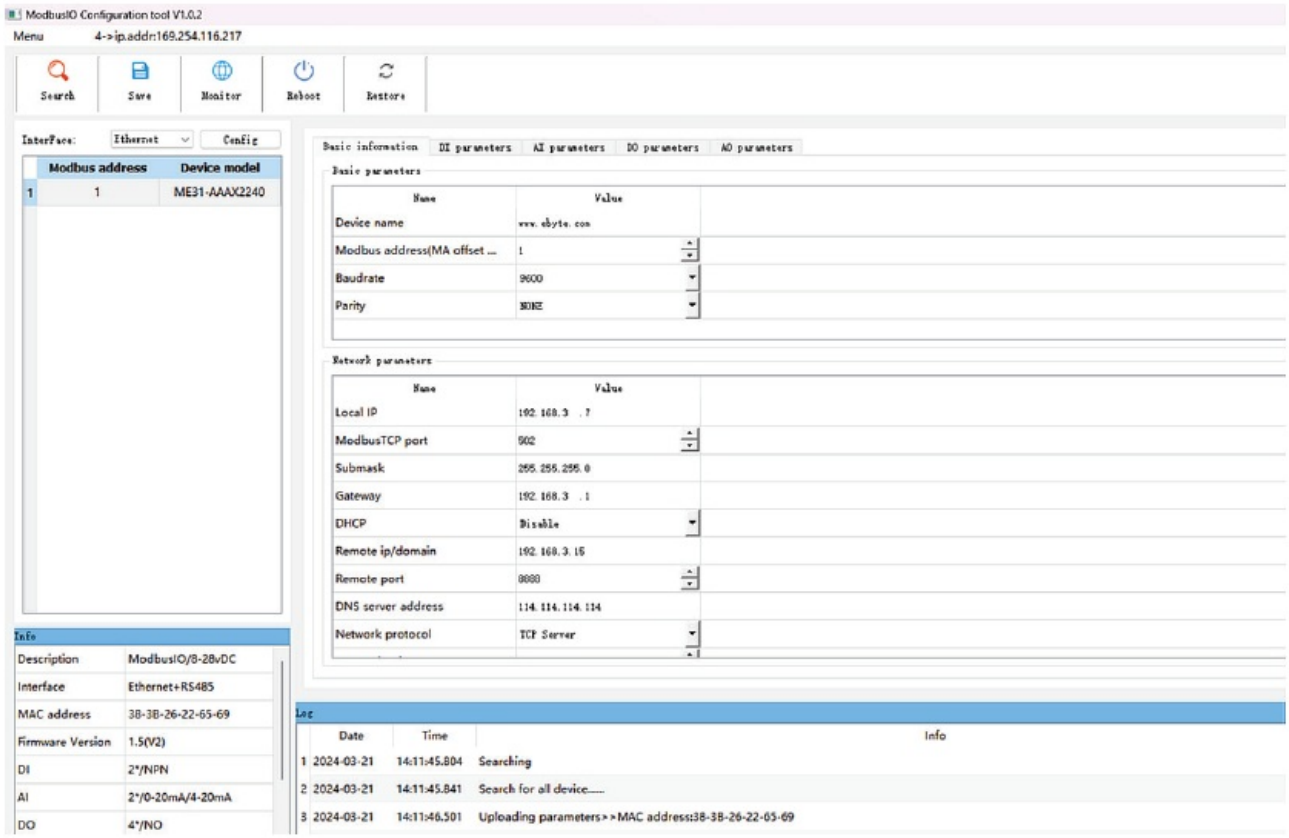
Step 2: Select the corresponding device.



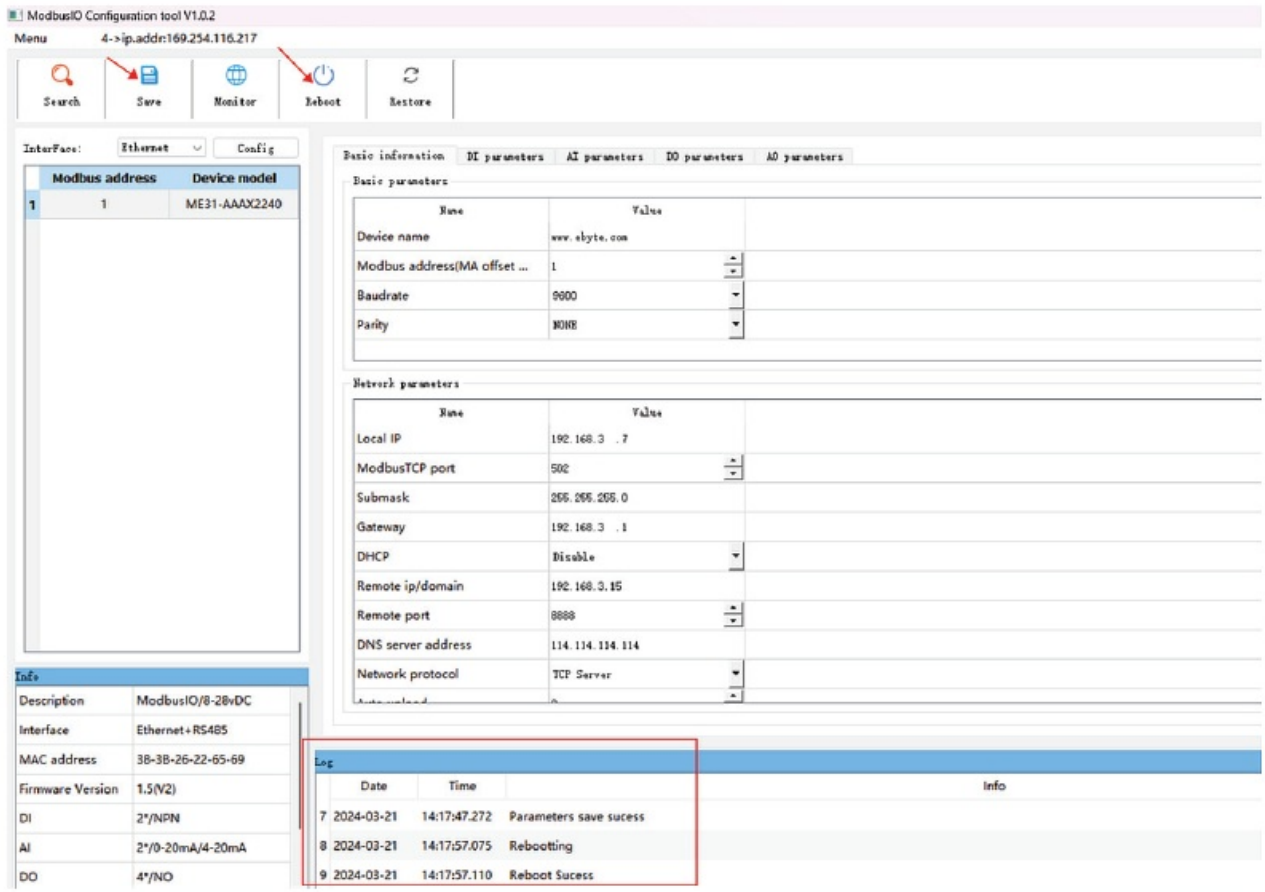
3. Step 3: Click the device online to enter the IO monitoring. The following is the IO monitoring screen display.

Parameter configuration interface

1. Step 1: Connect the device refer to “Acquisition and Control”.
2. 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)



3. 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.



Device Default Parameters

Category	Name	Parameters
Ethernet parameters	Operating mode	TCP server (up to 4-way client acce ss)
	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

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.

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.

Technical data

Power supply

Power supply

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

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
- IN/OUT: Screw terminal block, RM 5.08 mm;
- 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

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

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

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

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

Other

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

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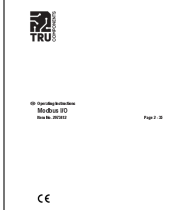
Documents / Resources

	TRU COMPONENTS TC-ME31-AAAX2240 Module Interface [pdf] Instruction Manual TC-ME31-AAAX2240 Module Interface, TC-ME31-AAAX2240, Module Interface, Interface

References

- Conrad Electronic » All parts of success
- Contact
- Download center

- **User Manual**