

1. Introduction

1.1 Overview

8CH-IO-ETH is an high-precision and strong anti-interference 8-channel remote IO controller. It supports 8 DI (switch input), 8 DO (relay output), and 8 AI (analog input, including voltage and current) functions, and also supports 1 RS485 to Ethernet conversion.

The device DI supports both dry and wet nodes, with optocoupler isolation, and provides two effective versions of high and low levels to meet the needs of different scenarios; DO is a relay output with control capability of 5A 250V AC or 5A 30VDC; The first 4 channels in AI input support 0-5V voltage input, while the last 4 channels support 4-20mA current input. The ADC accuracy is 16 bits. And the AI's attributes can be modified according to needs, such as 5V voltage, 10V voltage, current type, etc.

If both the RS485 IO port and RS485 net port need to be used simultaneously and converted to Ethernet communication, two conditions need to be met: 1. The baud rate of the 485 device should be consistent with that of the IO port, and the default baud rate of the IO port is 115200; The communication protocol requirements are all standard Modbus RTU protocol, with different device addresses. If it is another private protocol, it is required that communication cannot be carried out simultaneously. Otherwise, data conflicts or whether irrelevant information is received should be considered, and whether it will cause the application of the terminal device, because the data sent by the network port can be received by both the IO interface and RS485 port at the same time.

This device supports TCP servers, TCP clients, UDP modes, etc. The IO interface defines the standard Modbus protocol, which can be used for Modbus RTU communication, Modbus TCP communication, MQTT JSON application conversion, HTTP JSON conversion, etc. It can be flexibly configured and used according to actual application needs and scenarios.

1.2 Packing List



10PIN Phoenix Terminal * 4,4PIN Phoenix Terminal*2

1.3 Panel Introduction



Name	Function
Power	The red power indicator light indicates that the serial server is supplying power normally.
Link	(1) When the network cable is connected, the Link is green. (2) When a TCP connection is established (or in UDP mode), Link appears blue (with a faint green light). Can be used to determine whether the serial server has established a communication link with the upper computer software.
ACT1	RS485 ETH communication status (1) If the indicator light is flashing yellow green, it indicates that there is data output from the RS485 ETH interface; (2) If the indicator light is flashing blue, it indicates that there is data input to the RS485 ETH interface.
ACT2	Network communication status (1) If the indicator light is flashing yellow green, it indicates that there is data reception on the network end; (2) If the indicator light is flashing blue, it indicates that data has been sent from the network end; This light flashes during startup initialization, indicating that it is in the process of initialization and will turn off after initialization is complete.
ACT3	RS485 IO communication status (1) If the indicator light is flashing yellow green, it indicates that there is data input to the RS485-IO port; (2) If the indicator light is flashing blue, it indicates that there is data output from the RS485-IO port, indicating that the IO control command sent has been correctly recognized.
DI1~DI8	The DI status indicator light, yellow green constantly on, indicates that the channel input is "1".
DO1~DO8	The DO status indicator light, yellow green constantly on, indicates that the relay is closed.

1.4 Serial port line sequence definition



Interface Description	Function
RJ45 Ethernet	10M/100M Ethernet interface, capable of remote IO control via TCP/IP.
DC round hole/Phoenix terminal	The power supply range is 9-24V DC stabilized voltage, maximum power consumption: 300mA@12V. The device supports two power supply methods, using both circular holes and terminals simultaneously.
RS485-Eth	RS485 interface with bidirectional transparent transmission of network and serial port, realizing the function of serial port server.
RS485-IO	Used to control device DO and collect DI and AI information status.
GND	When inputting a dry node, connecting a switch between this terminal and DI1 to DI8 can collect the switch status.
DI1~DI8	8-way switch input.
AI1~AI8	By default, AI ships with 4 channels of 0-5V for the first 4 channels and 4-20mA for the last 4 channels. It can also be shipped according to special requirements, with clear instructions for ordering, such as 8 channels of 4-20mA/0-10V, etc.
OUT	OUT common terminal, used in conjunction with DI switch input.



Interface Description	Function
Reset	Dial ON, the link indicator light flashes, then dial back, and the device returns to its default configuration: IP address 192.168.1.254 115200bps 8 None 1 None.
DO8~DO1	8-way relay output: R and L respectively represent the 2 contacts of the relay, NC is not connected, default is normally open state.

1.5 IO port wiring instructions

1. 8-channel digital input DI1~DI8.

Supports passive switch quantity (dry node) and active level (wet node). Supports both high and low voltage connections simultaneously.

Wet nodes:

Low level effective: OUT common terminal is connected to 9~24V+, sensor signal line is

connected to DI1~8, and the other end is connected to GND. The signal line output needs to be less than 7~19V;

High level valid: The OUT common terminal is connected to GND, the sensor signal line is connected to DI1-8, and the other end is connected to GND. The signal line output needs to be greater than 5V.

Stem node:

Low level effective: OUT common terminal is connected to 9~24V+, sensor signal line is connected to DI1~8, and the other end is connected to GND;

High level effective: OUT common terminal is connected to GND, sensor signal line is connected to DI1-8, and the other end is connected to 9-24V+.

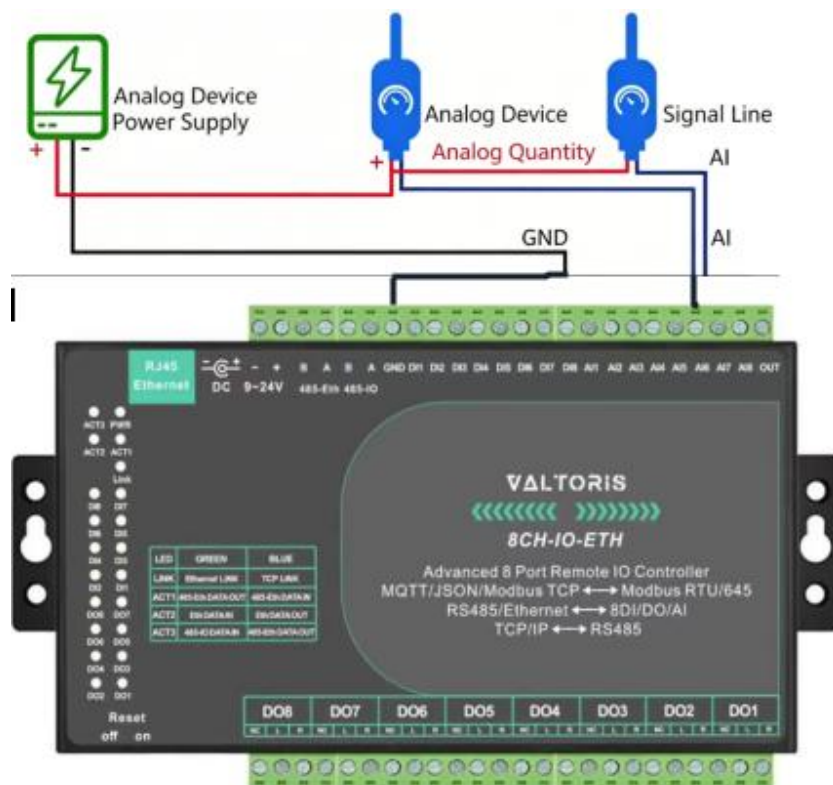
2. 8-channel digital output DO1~DO8.

The load-bearing capacity is: 5A@AC250V /Within the DC30V range;

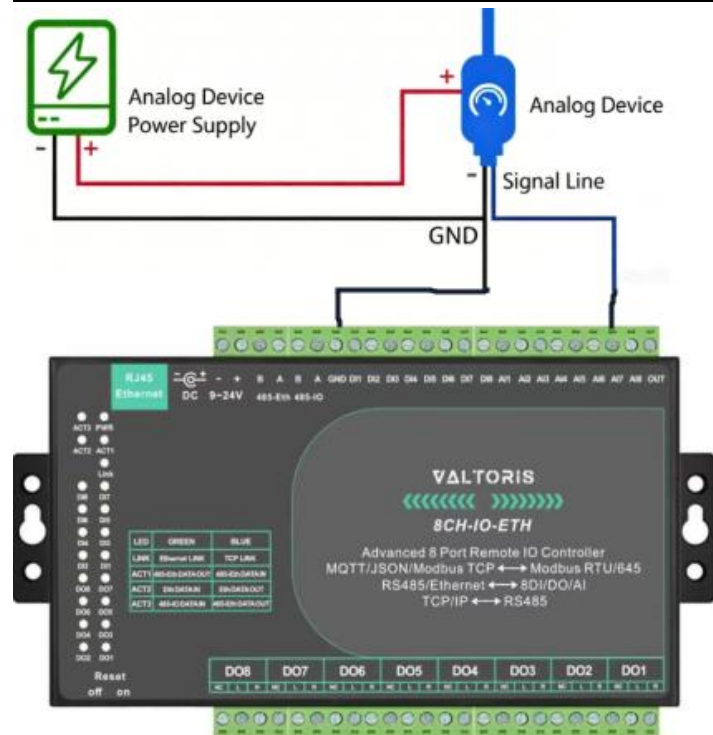
DO wiring: The R L and the controlled equipment form a series closed circuit (the NC of the 8-channel equipment does not need to be managed), and DO is a single pole, single branch passive relay switch.

3. 8-channel analog input: with an accuracy of 16 bits, the wiring is as follows

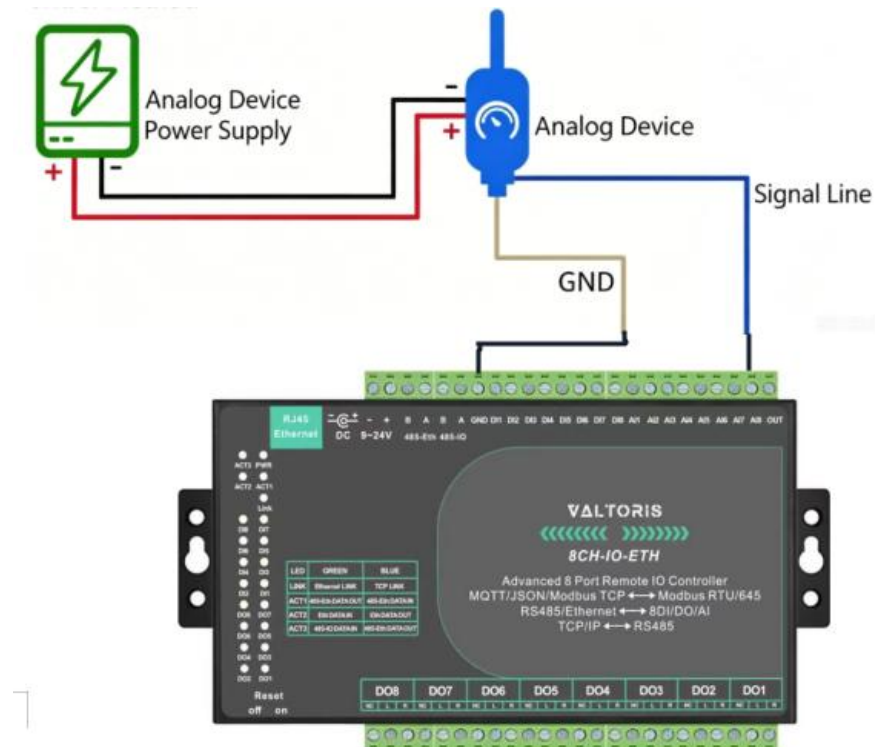
Two wire connection method



Three wire connection method



Four wire connection method



1.6 Parameters and instructions related to IO ports

1.6.1 AI DI DO related register address parameters

Function code	Function	Address range
01/02	Read DI	0~7 (corresponding to DI1~DI8)
01/02	Read DO	16~23 (corresponding to DO1~DO8)
05	Set DO	16~23 (corresponding to DO1~DO8)
15	Set up multiple DOs	16~23 (corresponding to DO1~DO8)
04	Read AI	0~7 (corresponding to AI1~AI8)
04	Read high-precision AI values	32~39 (corresponding to AI1~AI8)

1.6.2 DO instruction description

DO is the control relay. By using Modbus's 05/15 command (strong single coil command), write 1 into registers 16-23 to close the relay, and write 0 to disconnect the relay. By using the 01 instruction to read the values of registers 16~23, the current state of DO can be obtained.

The format of the 05 instruction is as follows:

Byte count	1	1	1	1	1	1	1	1
Name	Device address	05	High starting address	Low starting address	FF or 00	00	CRC high	CRC low

Set DO1 to closed Modbus RTU command as follows:

Send ->01 05 00 10 ff 00 8d ff

Return ->01 05 00 10 ff 00 8d ff

The Modbus TCP command is:

Send ->00 00 00 00 00 06 01 05 00 10 ff 00

Return ->00 00 00 00 00 06 01 05 00 10 ff 00

The Modbus RTU command to set DO1 as disconnected is:

Send ->01 05 00 10 00 00 cc 0f

Return ->01 05 00 10 00 00 cc 0f

The Modbus TCP command is:

Send ->00 00 00 00 00 06 01 05 00 10 00 00

Return ->00 00 00 00 00 06 01 05 00 10 00 00

Other instructions are listed as follows:

Close DO2 01 05 00 11 ff 00 dc 3f

Disconnect DO2 01 05 00 11 00 00 9d CF

Close DO3 01 05 00 12 ff 00 2c 3f
 Disconnect DO3 01 05 00 12 00 00 6d CF
 Close DO4 01 05 00 13 ff 00 7d ff
 Disconnect DO4 01 05 00 13 00 00 3c 0f
 Close DO5 01 05 00 14 ff 00 cc 3e
 Disconnect DO5 01 05 00 14 00 00 8d CE
 Close DO6 01 05 00 15 ff 00 9d fe
 Disconnect DO6 01 05 00 15 00 00 DC 0e
 Close DO7 01 05 00 16 ff 00 6d fe
 Disconnect DO7 01 05 00 16 00 00 2c 0e
 Close DO8 01 05 00 17 ff 00 3c 3e
 Disconnect DO8 01 05 00 17 00 00 7d CE

The instruction format for setting multiple coils simultaneously is as follows:

Byte count	1	1	1	1	1	1	1	1	1	1
Name	Device address	0F	High starting address	Low starting address	High quantity	Low quantity	Byte count	Value (low bit on the right)	CRC high	CRC low

Set the Modbus RTU command for the first 4 closed channels and the last 4 disconnected channels as follows:

Send ->01 0F 00 10 00 04 01 0F bf 51

Return ->01 0f 00 10 00 04 55 cd

The Modbus TCP command is:

Send ->00 00 00 00 00 08 01 0F 00 10 00 04 01 0F

Return ->00 00 00 00 00 06 01 0f 00 10 00 04

01 reads the DO status instruction as:

Byte count	1	1	1	1	1	1	1	1
Name	Device address	01	High starting address	Low starting address	High length	Low length	CRC high	CRC low

The Modbus RTU command for reading 8 DO states is:

Send ->01 01 00 10 00 08 3c 09

Return ->01 01 0f 11 8c

The Modbus TCP command is:

Send ->00 00 00 00 00 06 01 00 10 00 08

Return ->00 00 00 00 00 04 01 01 01 0f

Here, 0F indicates that the first 4 routes are closed.

1.6.3 DI instruction description

Use the 01 instruction to read DI, with an address range of 0-7, corresponding to DI1 to DI8. The instruction format is as follows:

Byte count	1	1	1	1	1	1	1	1
Name	Device address	01	High starting address	Low starting address	High length	Low length	CRC high	CRC low

The Modbus RTU command for reading 8 DIs is:

Send ->01 01 00 00 08 3d cc

Return ->01 01 01 80 50 28

The fourth byte returned, which is 0x80, represents the input status of 8 DI channels. From right to left, represent the states of DI1 to DI8 respectively. 1 indicates input, 0 indicates no input. This means that this instruction DI8 has input, while the other 7 channels have no input.

The Modbus TCP command is:

Send ->00 00 00 00 00 06 01 00 00 00 00 08

Return ->00 00 00 00 00 04 01 01 01 80

1.6.4 AI instruction description

The 04 instruction reads the values from registers 0 to 7 to obtain the values from AI1 to AI8. The data is stored in big format.

Byte count	1	1	1	1	1	1	1	1
Name	Device address	04	High starting address	Low starting address	High length	Low length	CRC high	CRC low

The Modbus RTU command to read the value of AI8 is:

Send ->01 04 00 07 00 01 80 0b

Return ->01 04 02 01 82 38 c1

The Modbus TCP command is:

Send ->00 00 00 00 00 06 01 04 00 07 00 01

Return ->00 00 00 00 00 05 01 04 02 01 82

The specific usage method of returning data 01 82 here depends on the type of AI. Converting 01 82 to decimal would result in Vin=386. The calculation formulas for different

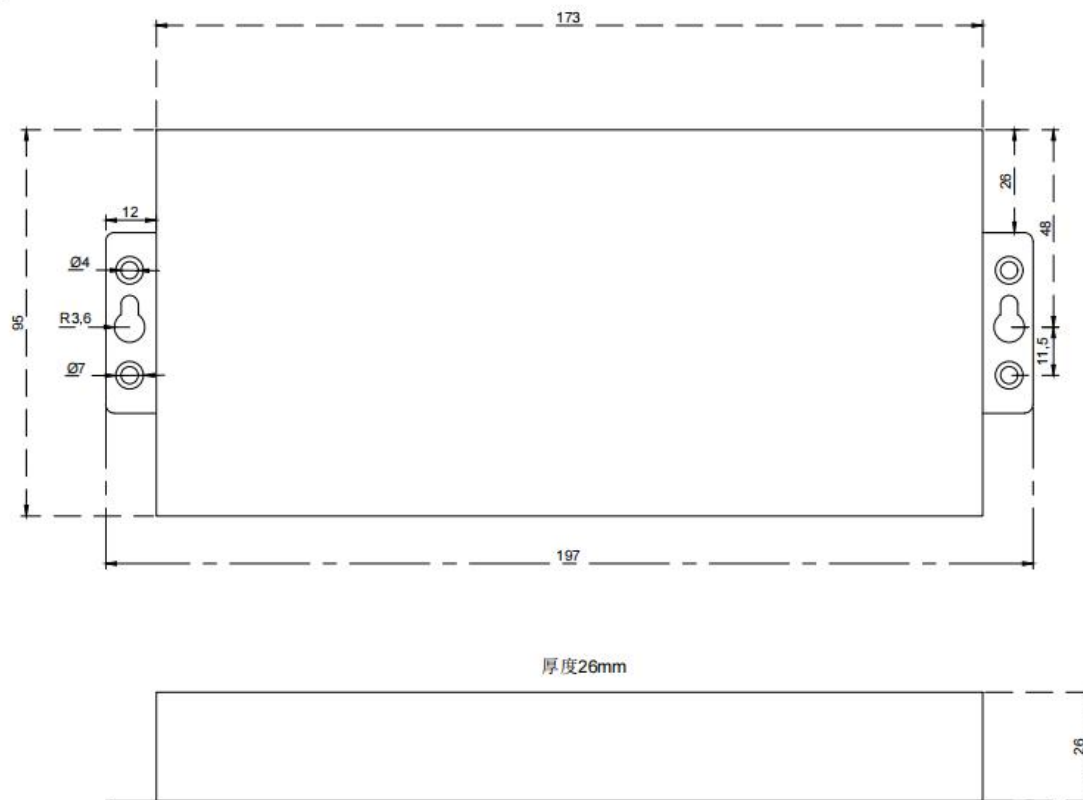
types of AI are as follows:

5V: True voltage value= $(V_{in}/1024) * 5=1.8848$;

10V: True voltage value= $(V_{in}/1024) * 10=3.7695$;

4~20mA: Real current= $(A_{in}/1024) * 5/200 * 1000=9.4238$;

1.7 Size chart



2. Installation

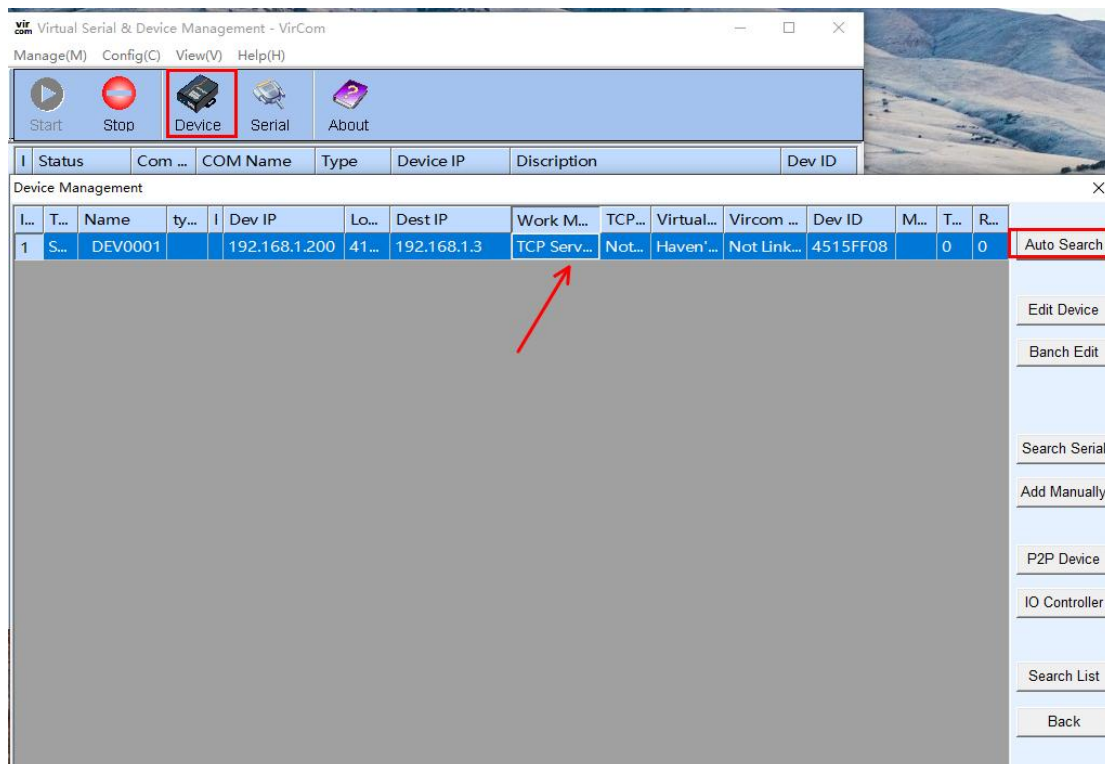
2.1 Debugging accessories



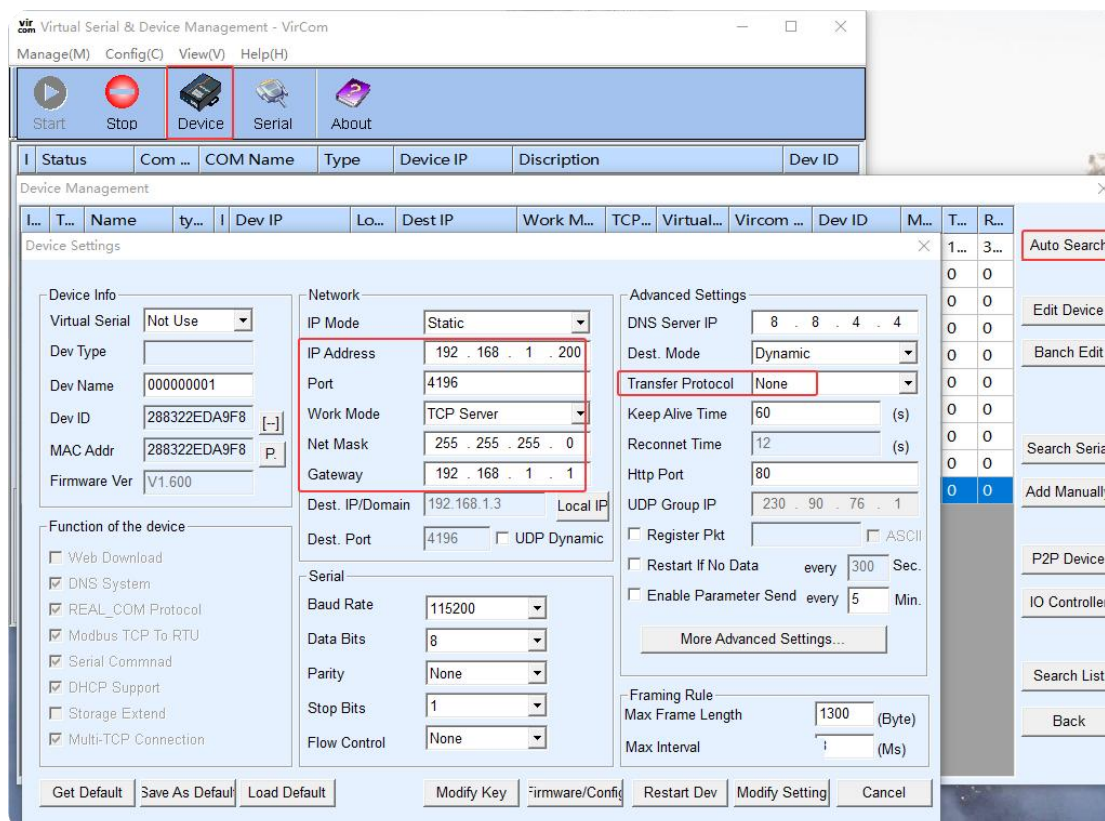
As shown in the figure, the device can be powered by a terminal type V+V- marked with DC9-24V; Connect the Ethernet cable to a RJ45 Ethernet port.

2.2 Interface login

Gateway devices can be logged in using the client software vircom, which runs in a Windows based environment. You can also enter the default IP 192.168.1.200 for the gateway in the browser. The prerequisite for logging into the webpage is that the computer can ping the device's IP. Choose one of the two methods at the same time.



Connect the device network cable directly to the computer/connect to a point and shoot switch - open the vircom software, click on device management - auto search - to search for 1 port channels, as shown in the red box in the figure.



As shown in the figure, according to this principle--1. The IP address must match the

network segment of the switch/router/physical port device connected to the gateway's network cable, with non-conflicting suffixes, consistent gateway subnet masks, and the ability to ping successfully. 2. Conversion protocol: Modbus TCP, the host computer reads data in Modbus TCP format; conversion protocol: None means data is read in Modbus RTU format.

The screenshot shows the 'Device Settings' window with the following sections:

- Device Info:** Virtual Serial (Not Use), Dev Type, Dev Name (000000001), Dev ID (288322EDA9F8), MAC Addr (288322EDA9F8), Firmware Ver (V1.600).
- Function of the device:** Web Download, DNS System, REAL_COM Protocol, Modbus TCP To RTU, Serial Commnad, DHCP Support, Storage Extend, Multi-TCP Connection.
- Network:** IP Mode (Static), IP Address (192.168.1.200), Port (502), Work Mode (TCP Server), Net Mask (255.255.255.0), Gateway (192.168.1.1), Dest. IP/Domain (192.168.1.3), Local IP, Dest. Port (4196), UDP Dynamic.
- Serial:** Baud Rate (115200), Data Bits (8), Parity (None), Stop Bits (1), Flow Control (None).
- Advanced Settings:** DNS Server IP (8.8.4.4), Dest. Mode (Dynamic), Transfer Protocol (Modbus_TCP Protocol), Keep Alive Time (60 s), Reconnet Time (12 s), Http Port (80), UDP Group IP (230.90.76.1), Register Pkt, ASCII, Restart If No Data (every 300 Sec.), Enable Parameter Send (every 5 Min.), More Advanced Settings..., Framing Rule, Max Frame Length (1300 Byte), Max Interval (Ms).

Buttons at the bottom: Get Default, Save As Default, Load Default, Modify Key, Firmware/Config, Restart Dev, Modify Setting, Cancel.

After the parameters are modified, automatically search and refresh again, and you will find that the device IP increases, the port number increases in turn, and other parameters are displayed exactly the same.

The screenshot shows the Valtoris Configuration web interface with the following sections:

- Device Configuration:** Windows Tool, Service Center.
- Device Information:** Device Name (DEV0001), Device ID (04-EE-E8-15-FF-24), Firmware Version (V1.523).
- Serial Settings:** Baudrate (115200), Data Bits (8), Parity (None), Stop Bits (1), Flow Control (None).
- Multi-Master Settings:** Protocol (None), Response Timeout (0 to 32-8000ms), Multi-Master (Disable), Transmit Delay (0 to 5-255ms). NOTE: When the multi master is disabled, the response timeout will always be 0. The timeout must be a multiple of 32.
- Network Settings:** IP Addressing (Static), IP Address (192.168.1.200), Local Port (4196), Mode (TCP Server), Subnet Mask (255.255.255.0), Gateway (192.168.1.1), Destination IP/DNS (192.168.1.3), Destination Port (4196), Web Port (80).
- Advanced Settings:** Watchdog Reset (Disable), Watchdog Reset Time (300 to 5-1270 s), Re-connect Time (12 to 1-255 s).
- Modify Web Password:** New Password, Confirm Password.

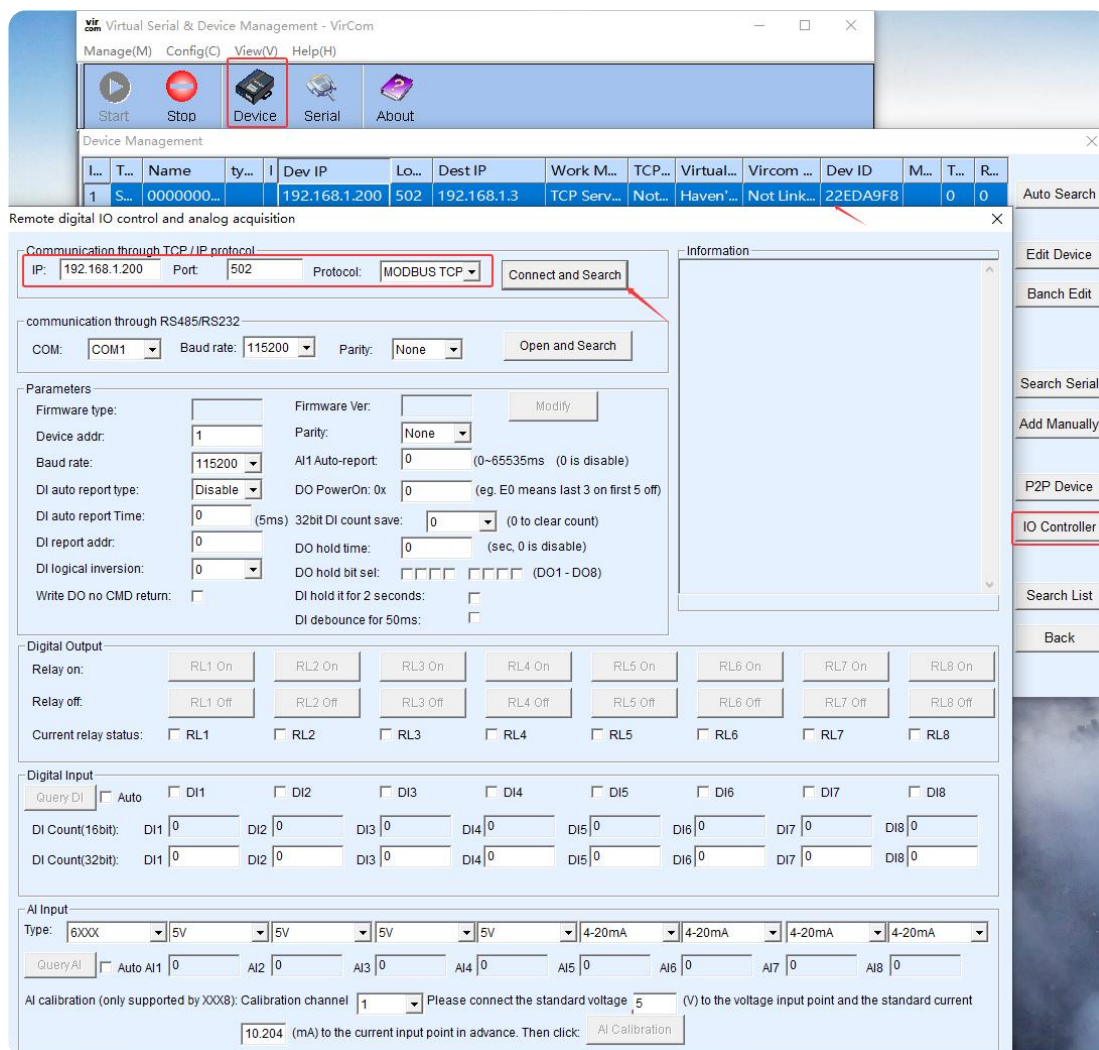
Buttons: Submit, Logout.

The webpage login, as shown in the figure, mainly includes several sections such

as network parameters, serial port parameter settings, and conversion protocols. It only supports simple application settings. If special functions such as JSON are needed, the client vircom software is more comprehensive.

2.3 Functional Testing

After configuring the parameters as mentioned above, you can directly use the IO controller client debugging assistant provided by vircom software to connect and query AI DI control DO, or set module station addresses and other parameters, as shown on the page



After modifying the parameters of the device settings, select this column and click on the IO controller. If the red box corresponds to the previously configured IP address, port number conversion protocol, etc., click search and connect to enter the query configuration interface.

Remote digital IO control and analog acquisition

Communication through TCP / IP protocol

IP: 192.168.1.200 Port: 502 Protocol: MODBUS TCP

Close

communication through RS485/RS232

COM: COM1 Baud rate: 115200 Parity: None

Open and Search

Parameters

Firmware type: Firmware Ver: V1.20 Modify

Device addr: 1 Parity: None

Baud rate: 19200 AI1 Auto-report: 0 (0~65535ms (0 is disable))

DI auto report type: Disable DO PowerOn: 0x 00 (eg. E0 means last 3 on first 5 off)

DI auto report Time: 0 (5ms) 32bit DI count save: 0 (0 to clear count)

DI report addr: 0 DO hold time: 0 (sec, 0 is disable)

DI logical inversion: 0 DO hold bit set: (DO1 - DO8)

Write DO no CMD return: DI hold it for 2 seconds: DI debounce for 50ms:

Information

[12:51:02]Connected to 192.168.1.200 ok.
 [12:51:02]Connecting...192.168.1.200:502...
 [12:47:58]Close ok!
 [12:47:47]Connected to 192.168.1.200 ok.
 [12:47:47]Connecting...192.168.1.200:502...
 [12:47:29]Close ok!
 [12:47:08]Connected to 192.168.1.200 ok.
 [12:47:08]Connecting...192.168.1.200:502...

Digital Output

Relay on: RL1 On RL2 On RL3 On RL4 On RL5 On RL6 On RL7 On RL8 On

Relay off: RL1 Off RL2 Off RL3 Off RL4 Off RL5 Off RL6 Off RL7 Off RL8 Off

Current relay status: RL1 RL2 RL3 RL4 RL5 RL6 RL7 RL8

Digital Input

Query DI Auto DI1 DI2 DI3 DI4 DI5 DI6 DI7 DI8

DI Count(16bit): DI1 0 DI2 0 DI3 0 DI4 0 DI5 0 DI6 0 DI7 0 DI8 0

DI Count(32bit): DI1 0 DI2 0 DI3 0 DI4 0 DI5 0 DI6 0 DI7 0 DI8 0

AI Input

Type: 6XXX 5V 5V 5V 5V 4-20mA 4-20mA 4-20mA 4-20mA

Query AI Auto AI1 0 AI2 0 AI3 0 AI4 0 AI5 0 AI6 0 AI7 0 AI8 0

AI calibration (only supported by XXX8): Calibration channel 1 Please connect the standard voltage 5 (V) to the voltage input point and the standard current 10.204 (mA) to the current input point in advance. Then click: AI Calibration

As shown in the above figure, three main sections can be seen: the section for searching connections through Ethernet/serial port, the section for viewing IO module parameter configurations, and the section for querying DO DI AI control.

If you want to search and log in, you can use Ethernet to correspond to IP port conversion protocols and other connection searches; You can also find an RS485 to USB serial port cable, connect the 485-IO 485 interface of the device to the computer, open the vircom software - Device Management - IO Controller - Enter the corresponding COM number, search, configure relevant parameters or test communication.

The parameter configuration section of the IO module contains the default device address 1, which can also be set within the range of 1-254. The firmware version can be viewed, and special application definitions for baud rate DI AI DO can be tested and used according to actual project requirements, as shown in the interface.

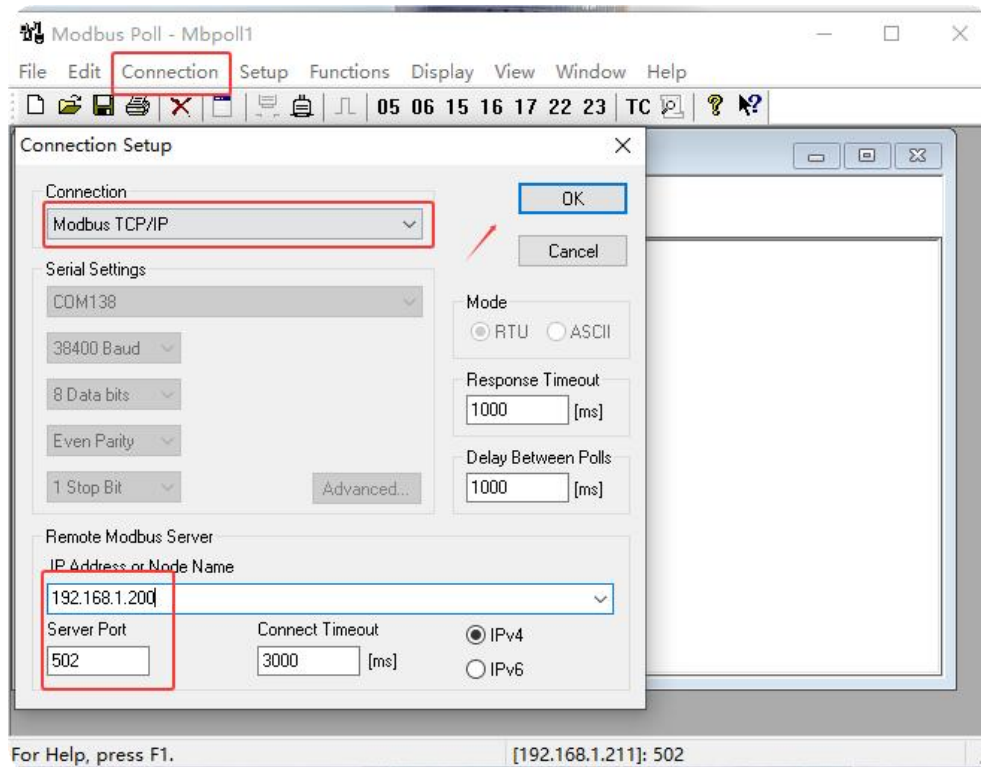
The IO status query and control section allows users to directly visualize the interface and click to view the status of the corresponding interface.

2.4 Integration and use of third-party software

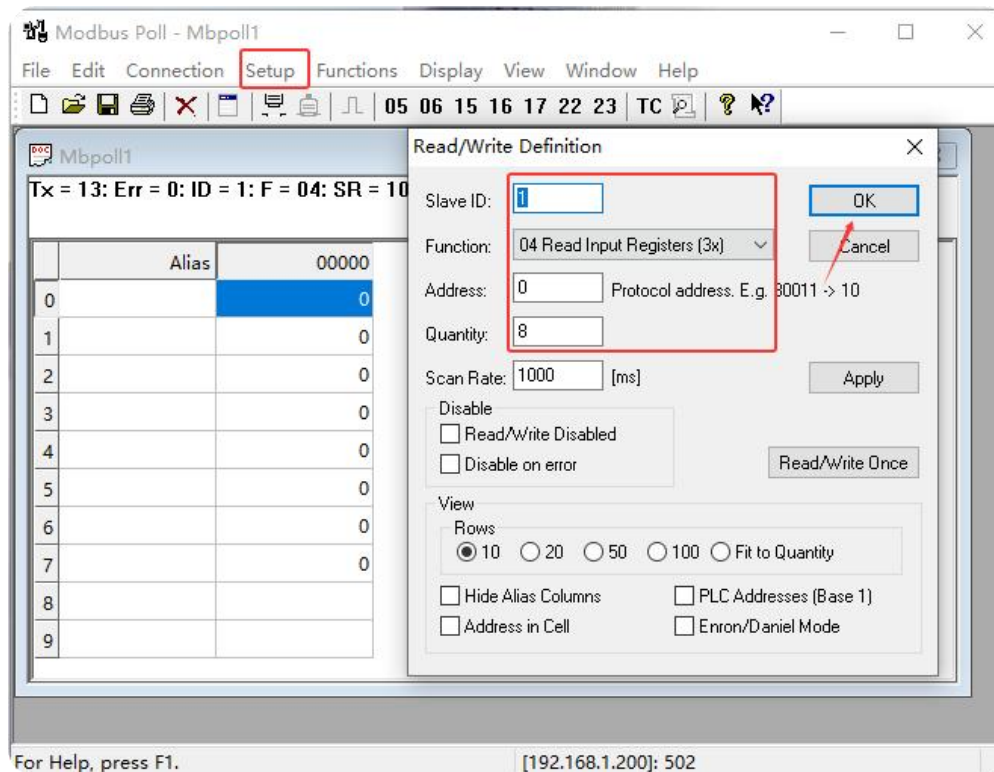
Because the IO part of this module is based on standard Modbus protocol instructions, any program software containing standard Modbus TCP/RTU drivers can be connected to read the status and implement control according to the corresponding

station address, function code, register address, etc.

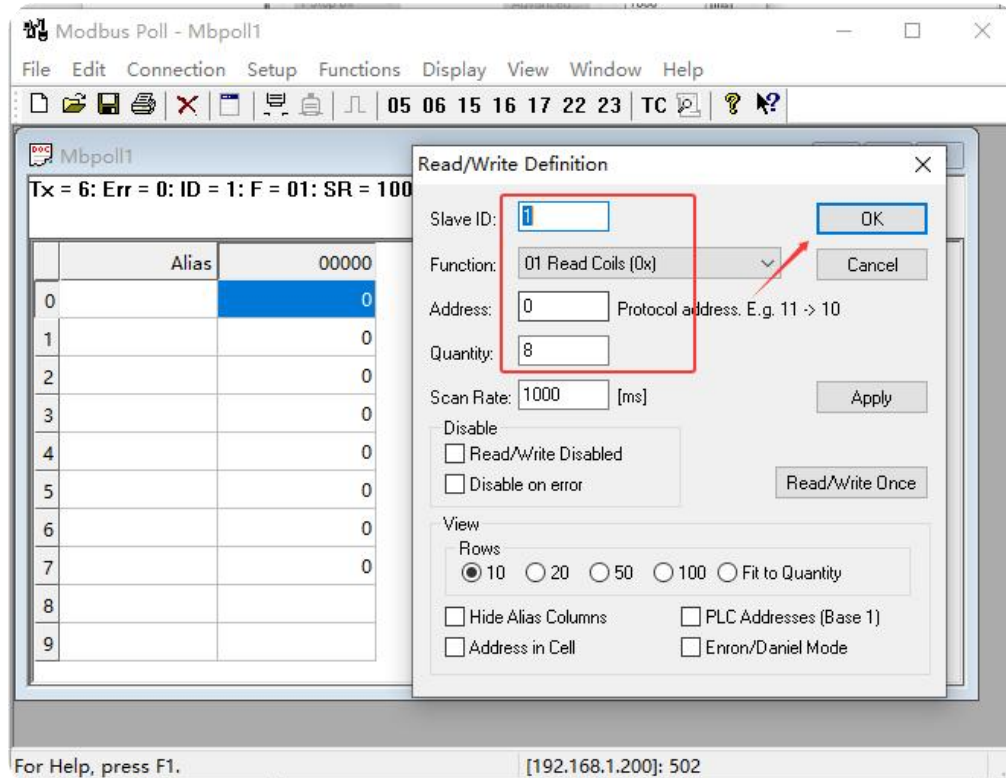
Taking the commonly used Modbus Polo software connection in the market as an example, the following figure



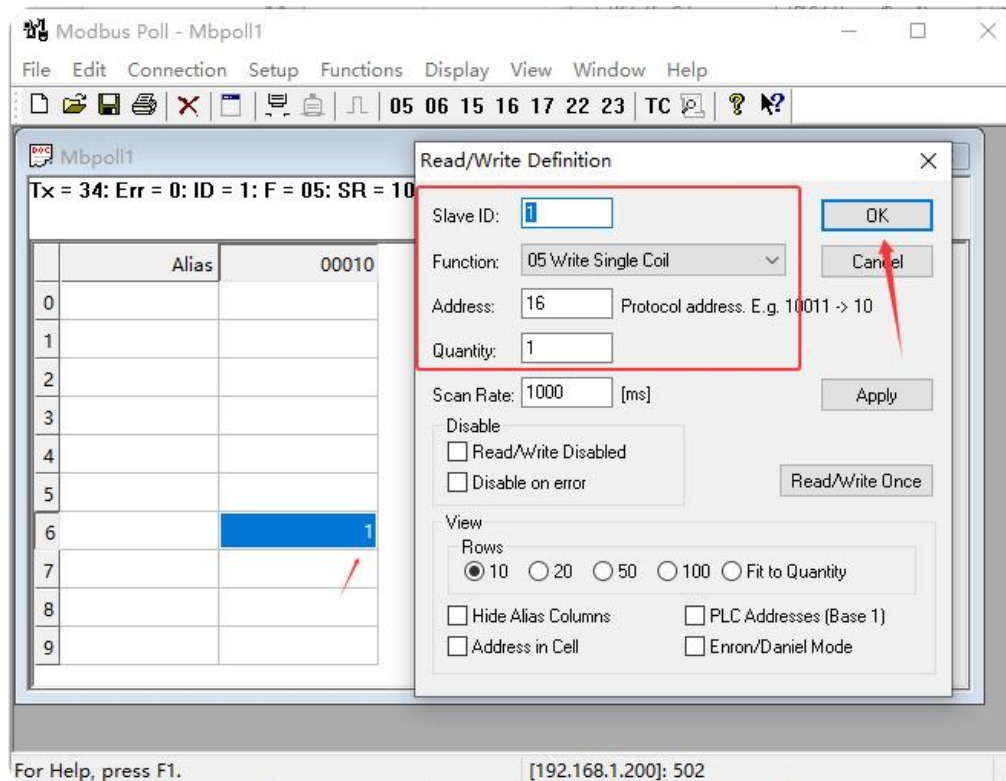
AI read

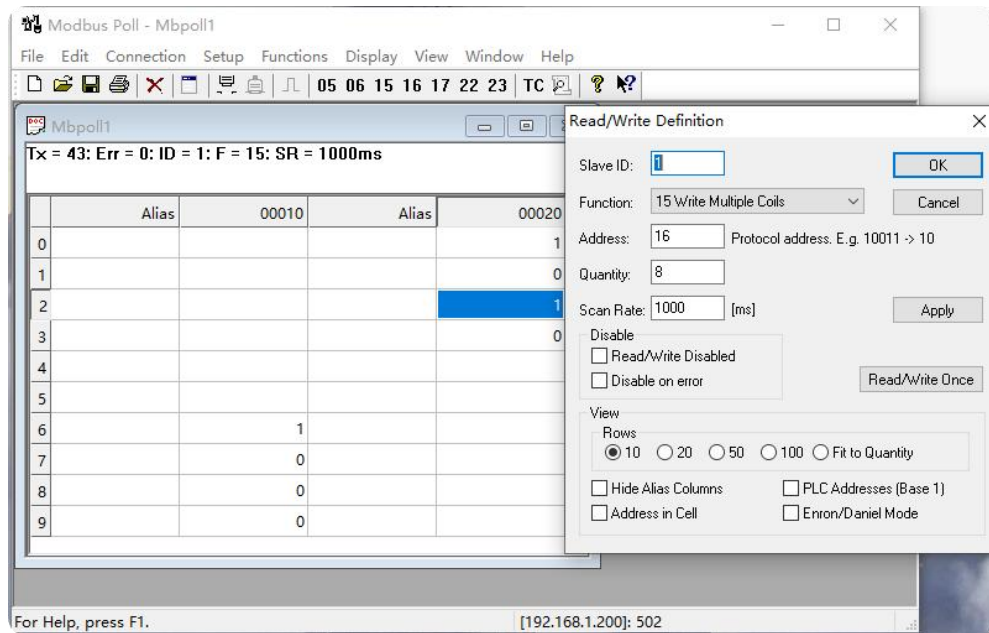


DI read

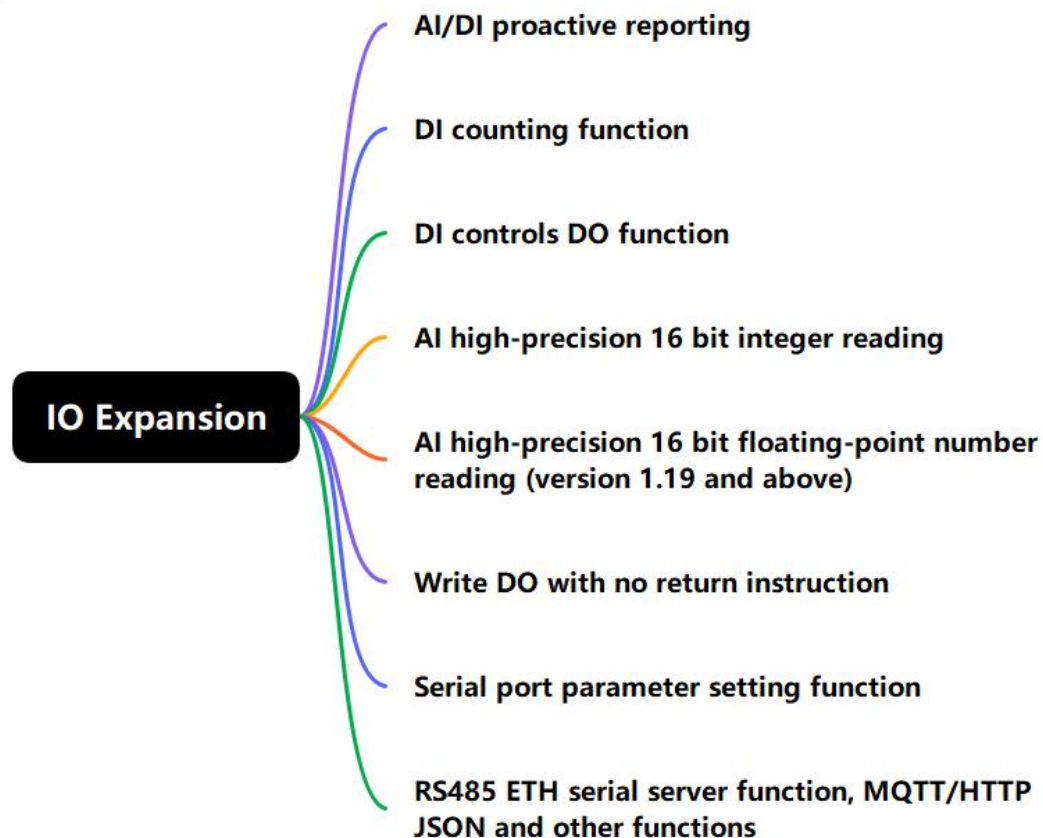


DO control





3. Function Expansion



This series of products has many functions that can be flexibly configured and used according to different application scenarios of customers, and relevant functional documents can be referenced.

4. Contact Us

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