Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



【4DI + 2DO】

MA01-AXCX4020

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1 Overview

MA01-AXCX4020 supports the acquisition of 4-channel sensor switch input (DI), which is converted to serial port (RS485) and data is transmitted to configuration software or PLC. The serial port I/O networking module (also known as "remote IO") that controls 2 relay switch outputs (DO) by issuing commands through the serial port to realize remote acquisition and control functions.

Main Features

- Support Modbus RTU protocol;
- Support various configuration software/PLC/touch screen;
- RS485 acquisition and control IO;
- DC 8～28V power supply;
- 4-way switch input DI (dry node);
- 2-way switch output DO (relay);
- Switch input (DI) supports counting function;
- Switch input (DI) supports rising edge, falling edge, and level trigger mode;
- Switch output (DO) supports level mode, pulse mode, follow mode;
- Communication baud rate 1200～115200 (default 9600), support custom setting;
- Supports 1～247 slave stations, 5-digit DIP switch can set 1～31 address code, more than 31 can be set by software.
- Supports installation of guide and positioning hole.

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2 Quick Start

2.1 Preparation

Before using the serial port I/O networking device (hereinafter referred to as "IO device"), you need to prepare a computer, converter, power supply, screwdriver and other related auxiliary materials. details as follows:

Chart 2-1-1 Device list

Order	Device	Number
1	IO device	1
2	USB to serial converter	1
3	Configuration tool software	1
4	computer	1
5	Power adapter (12V/1A)	1
6	Screwdriver (Slot SL 2)	1
7	Signal generator (or sensor)	1

2.2 Wiring

Note: When performing wiring operations on the equipment, never work with the power on to avoid equipment damage and potential safety accidents.

2.2.1 Power wiring

1.Power supply, using DC 8-28V power supply, can also use DC 12V or 24V power supply.

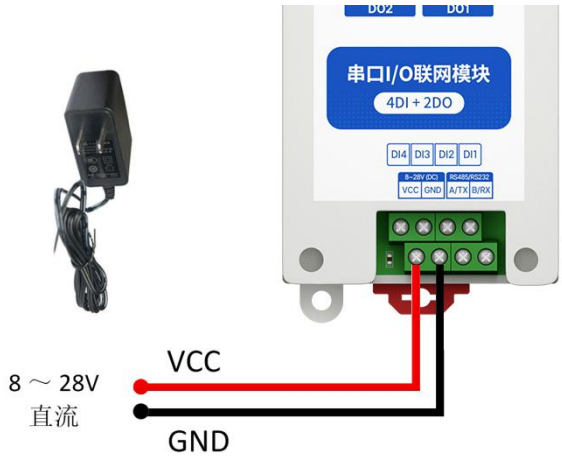
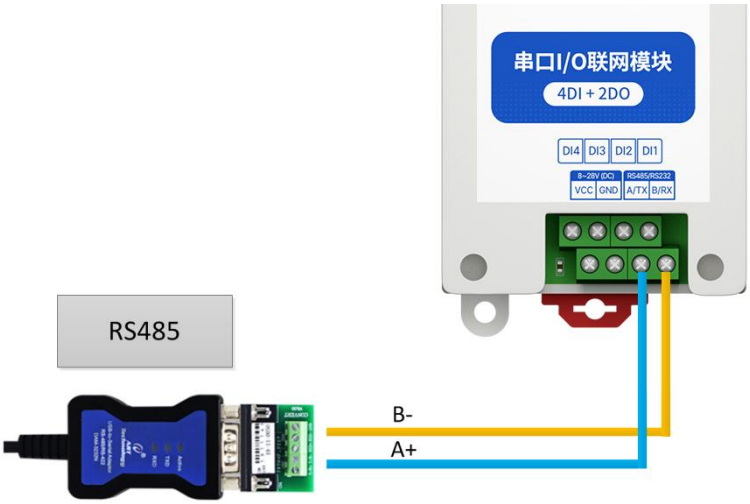


Chart 2-2-1 Wiring

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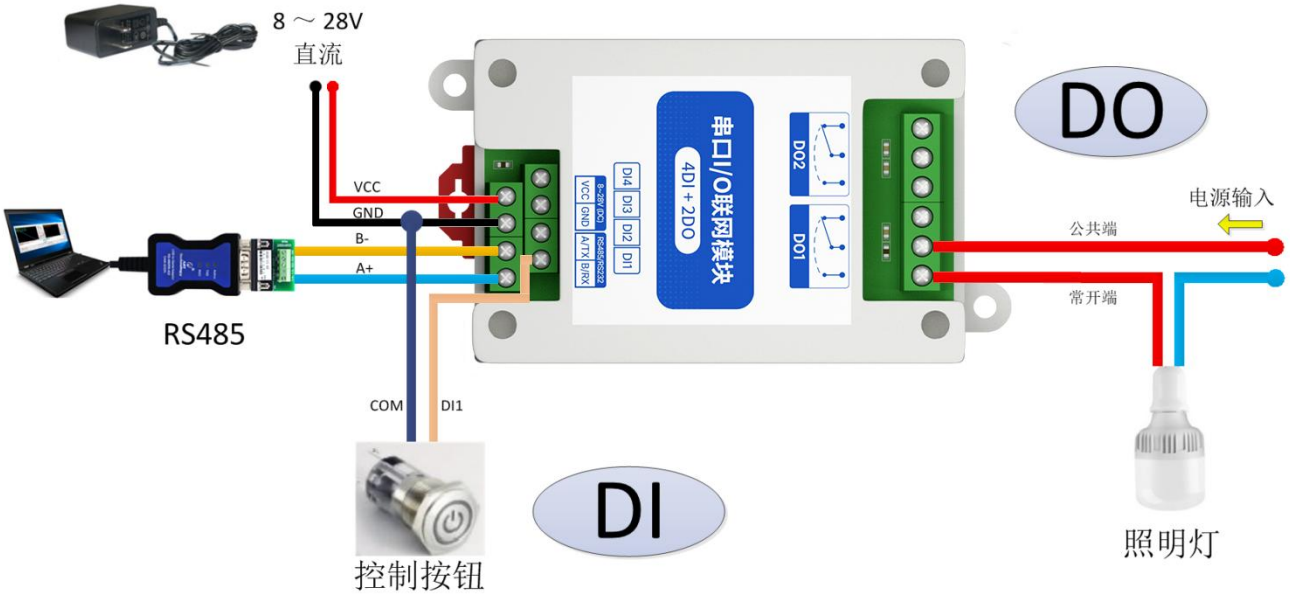
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2.2.2 RS485 Wiring



2.2.3 Overall wiring diagram

(1) After the equipment is powered on, the power indicator (POWER) is always on, and the equipment power supply is normal.
(2) Switch input DI wiring, connect the control button to the switch input DI port as shown in the figure.
(3) Switch output DO wiring, connect the load to the switch output DO port as shown in the figure.



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2.3 Setting

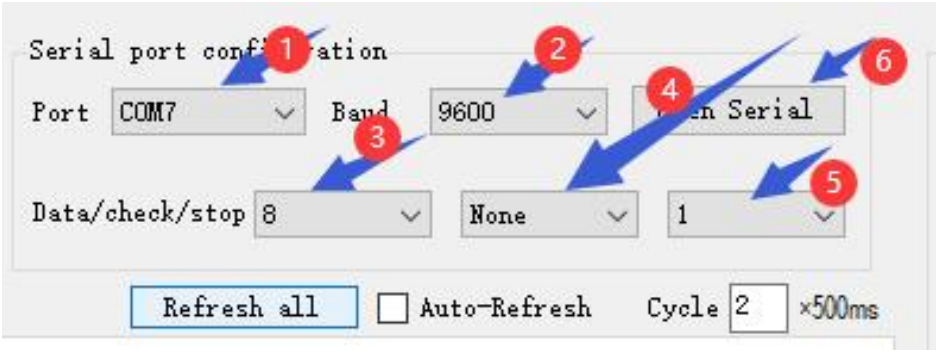
2.3.1 Get connected



Figure 2-3-1 Software interface

Steps:

1. Open the serial port, find the corresponding device port number, the baud rate defaults to 9600, and click "open serial port".

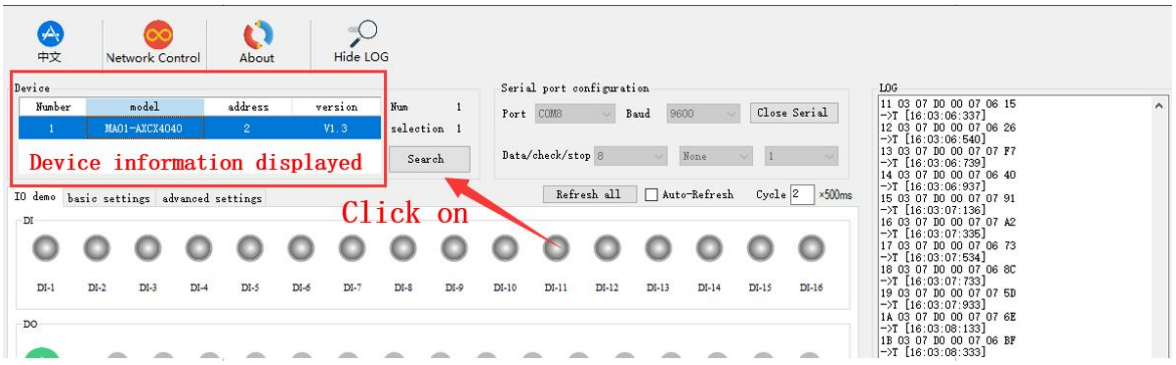


2-3-2 open the serial port

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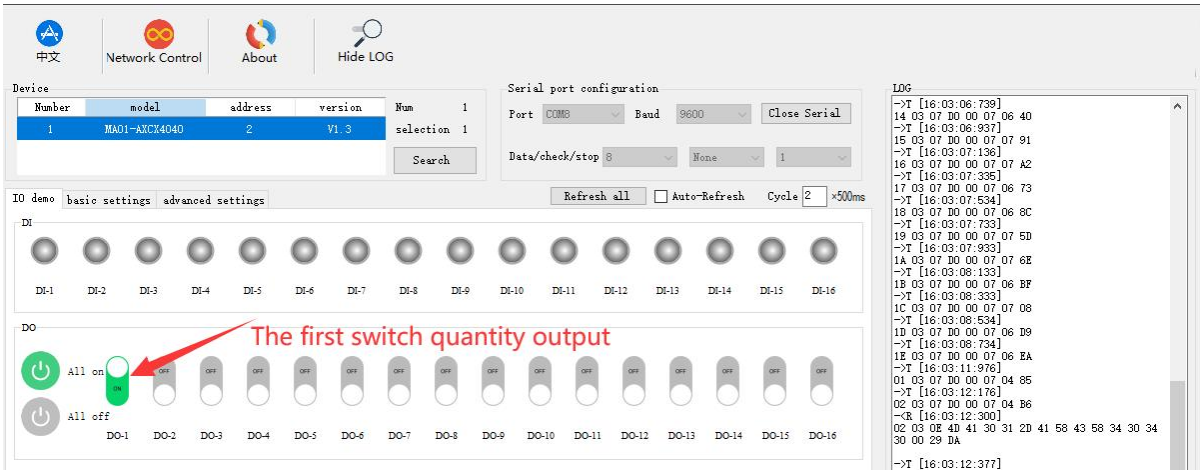
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2. In the device window, click "Search Device", and the log window on the right will start refreshing the search information. After the connected device is displayed in the device column of the device window, click the "Search Device" menu. Then select the device and click, the connection is successful.

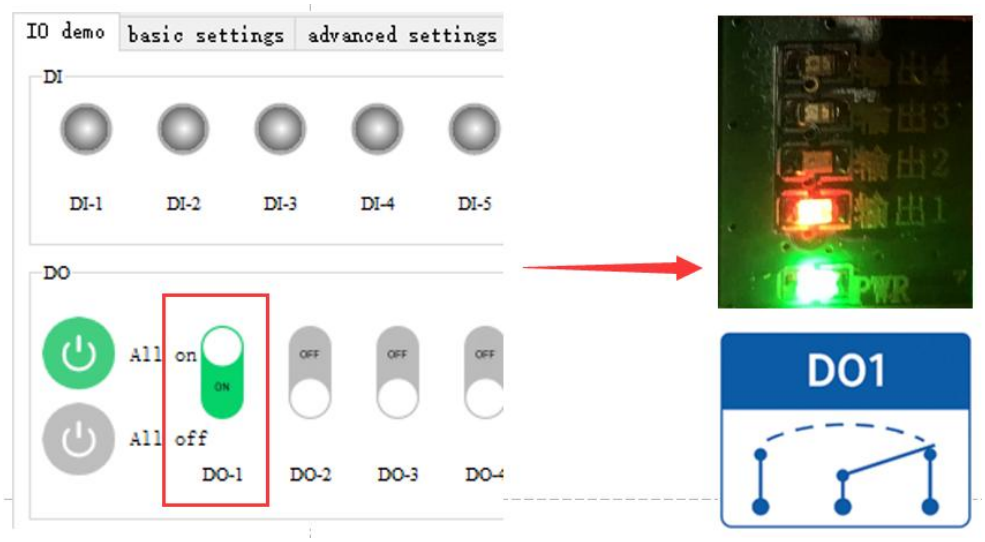


2-3-3 get connected to the device

2.3.2 Testing



2-3-4 testing



2-3-5 Actual test results

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3 Parameters

3.1 Product Series

3-1-1 Product specifications

product	version	DI	AI	DO	RS485	RS232
MA01-AXCX4020	4DI+2DO	4 way	—	2 way	●	×
MA02-AXCX4020		4 way	—	2 way	×	●
MA01-XACX0420	4AI+2DO	—	4 way	2 way	●	×
MA02-XACX0420		—	4 way	2 way	×	●
MA01-AACX2220	2DI+2AI+2DO	2 way	2 way	2 way	⬤	×
MA02-AACX2220		2 way	2 way	2 way	×	⬤
MA01-AXCX4040	4DI+4DO	4 way	—	4 way	●	×
MA02-AXCX4040		4 way	—	4 way	×	●
MA01-XACX0440	4AI+4DO	—	4 way	4 way	●	×
MA02-XACX0440		—	4 way	4 way	×	●
MA01-AACX2240	2DI+2AI+4DO	2 way	2 way	4 way	●	×
MA02-AACX2240		2 way	2 way	4 way	×	●
MA01-XXCX0080	8DO	—	—	8 way	●	×
MA02-XXCX0080		—	—	8 way	×	●

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3.2 Parameters of MA01-AXCX4020

Category	Name	Parameter
Power supply	Operating Voltage	DC 8～28V
	Working current	50mA @ 12V
	Power indicator	Green LED indication
Serial port	Communication Interface	RS485
	Baud rate	1200～115200 bps (default 9600 bps)
	Check Digit	No parity, odd parity, even parity (no parity by default)
	Data bit	5,6,7,8（default 8）
	Stop bit	1,1.5,2 (defacult 1)
	Protocol	Modbus RTU protocol
	Device address	1～247 (default address: 1)
DI	Number of DI	4 way
	Interface Type	Dry node
	Trigger method	Rising edge, falling edge, level (default level)
	Filter parameter	1～16 (default 6)
	Acquisition frequency	1 kHz
	Input instructions	Green LED indication
DO	Number of DO	4 way
	DO output type	Type C relay (normally open + normally closed)
	DO output mode	Level mode, pulse mode
	Relay contact capacity	30V/10A, 250V/10A
	Output indication	Red LED indication
Others	Product Size	80 mm * 50mm * 30mm (length * width * height)
	product weight	80g ± 5g
	Working temperature and humidity	-40 ～ +85℃, 5%～95%RH (non-condensing)
	Storage temperature and humidity	-60 ～ +125℃, 5%～95%RH (non-condensing)
	Installation method	Installation of guide rail and locating hole

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3.3 Port description



3-3-1 Interface diagram

number	pin	definition	note
1	VCC	Power supply + (8～28V)	Recommend RVV 2*0.75 wire
2	GND	Grounding-(8～28V)	
3	B/RX	RS485 corresponding to B	Recommend RVSP 3*0.5 wire
4	A/TX	RS485 corresponds to A	
5	DI1	Switch input channel 1	Recommend RVV 2*0.75 wire
6	DI2	Switch input channel 2	
7	DI3	Switch input channel 3	
8	DI4	Switch input channel 4	
9	DO1	Switch output channel 1	The relay has normally open and normally closed terminals
10	DO2	Switch output channel 2	

3.4 Size

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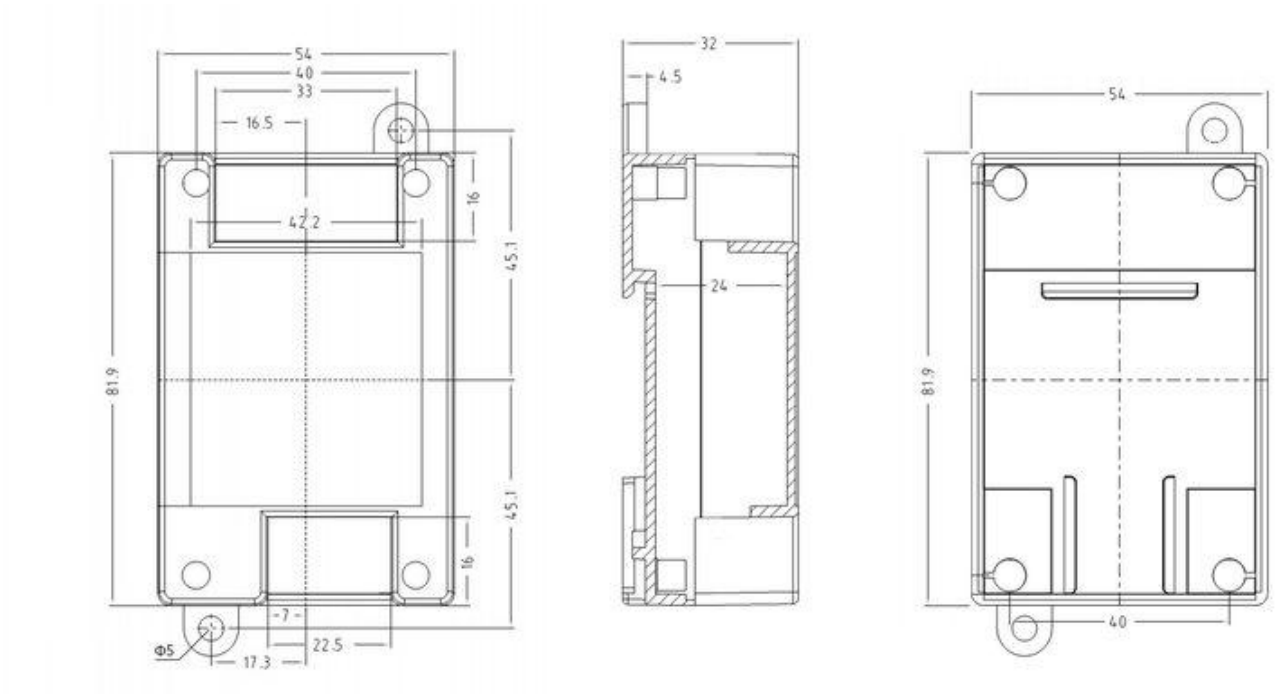


Chart 3-4-1 dimensioned drawing

3.5 Installation

The equipment is installed with guide rail and positioning hole.

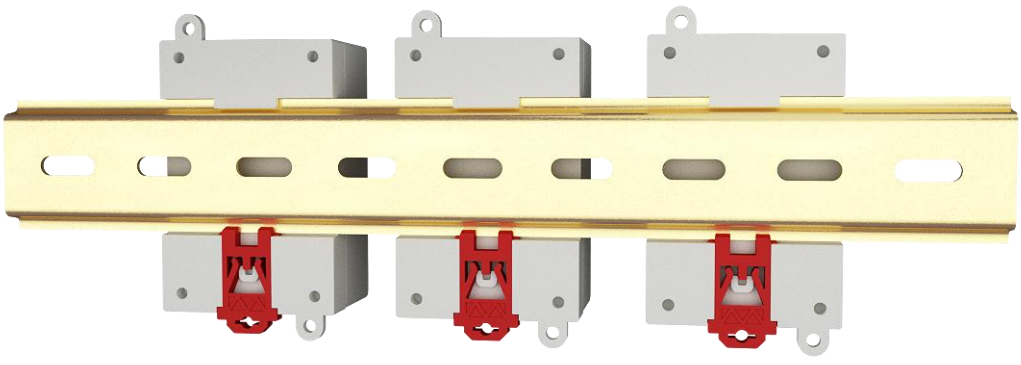


Chart 3-5-1 Guide rail installation

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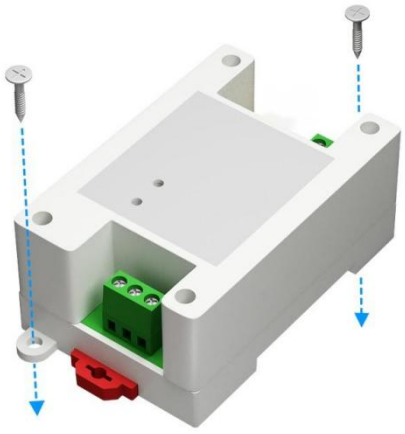


Chart 3-5-2 Position hole installation

4 Detailed function

4.1 Switch input DI

4.1.1 Switch input DI collection

Switch input DI to measure level signal or edge pulse signal (rising edge, falling edge). Support dry node collection, support DI counting function, the maximum count is 65535 (the count is automatically cleared when 65535 is exceeded).
The switch input DI supports three trigger modes: rising edge, falling edge, and level (the default level trigger mode).
The clearing method supports automatic clearing and manual clearing (default automatic clearing).

4.1.2 Switch input DI filter parameters

When the switch inputs the DI to collect the signal, it needs to keep multiple sampling periods before confirming. The filter parameter can be set from 1 to 16 (default 6 sampling periods). The DI filter parameters can be set through the configuration software.

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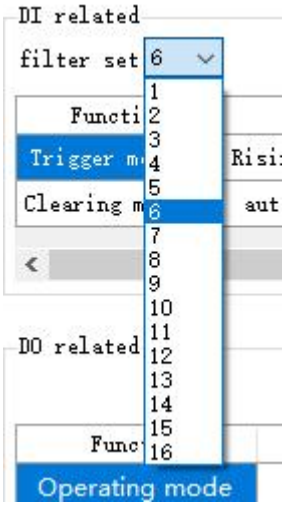


Figure 4-1-1 Setting DI filter parameters

4.2 Switch output DO

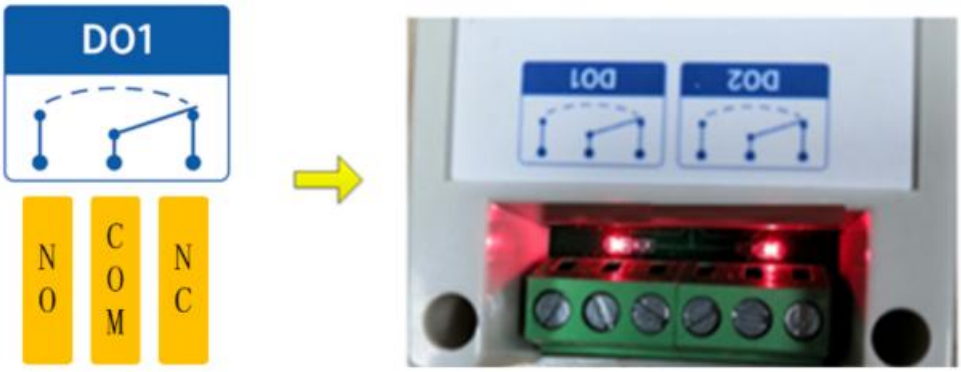
4.2.1 Switch output DO description

Switch output DO, with level mode, pulse mode, follow mode (only follow DI). Using C-type relay output (normally open + normally closed), the single-channel output supports a maximum load (contact capacity) of 30V/10A or 250V/10A.

Each DO output is designed with an output indicator (red LED indication) to indicate whether the output port is on or off.

When the LED indicator light is on, it means the relay is closed (normally open and normally closed);

When the LED indicator is off, it means that the relay is not closed (normally open off, normally closed on).



4-2-1 Switch output DO interface

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4.2.2 Switch output DO mode setting

(1) Level mode

Output according to the level set by the user. The switching characteristics of the level mode are similar to the function of a self-locking switch.

(2) Pulse mode

After the switch output DO is turned on, the set pulse width time (in ms) is maintained, and the switch output DO is automatically turned off. The pulse width setting range is 50～65535 (default 50).

(3) Follow mode

After the user sets the follow mode, set the follow input terminal. The switch output DO terminal is consistent with the DI input terminal.

Note: Multiple switch output DO terminals can be set to follow one DI input terminal, and one switch output DO terminal can not be set to follow multiple DI input terminals.

4.3 Device address

4.3.1 Device address

Device address composition: hardware address + software offset address

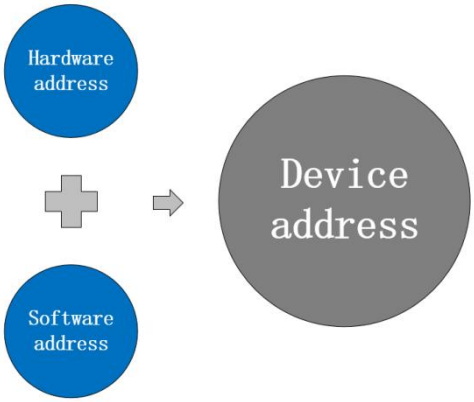


Figure 4-3-1 Device address

The default device address is: 1 (hardware address 0 + software address 1 = device address 1).

Device address setting range: 1～247.

Hardware address: realized by the dial switch (5 digits) dial setting (the factory default is 0).

Software address: It is realized by the "offset address" set by the configuration tool software (the factory default is 1).

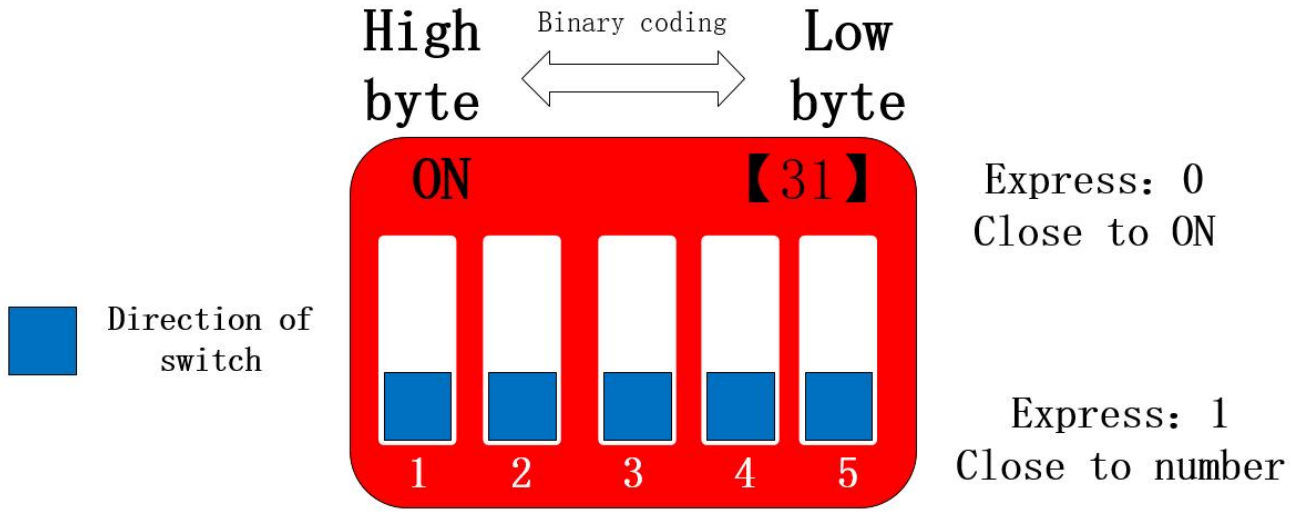
For example:

If the hardware address is set to 5 and the software address is set to 113, the device address is 118.

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4.3.2 Hardware address (dip switch)



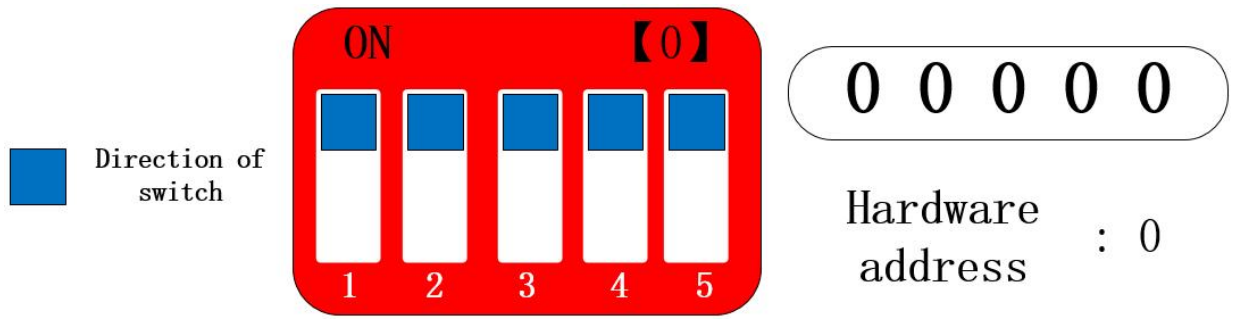
4-3-2 Hardware address (Dip switch)

Hardware address: The DIP switch can switch different hardware addresses, and the binary system represents the 5-digit DIP switch.

The "5" direction indicates the high position, and the "1" direction indicates the low position. The hardware address range can be adjusted from 0 to 31.

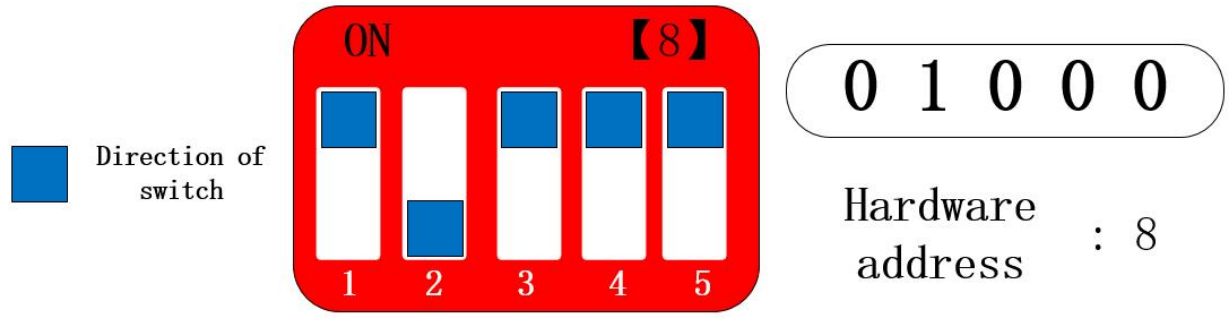
Hardware address dialing setting instructions:

Example 1: Set hardware address 0 (default), binary code.



4-3-3 Hardware address 0

Example 2: Set the hardware address to 8, binary code.

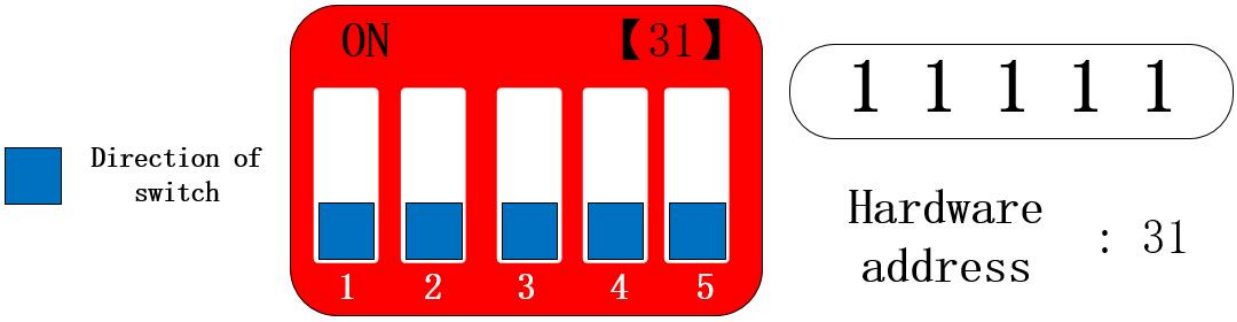


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4-3-4 Hardware address 8

Example 3: Set hardware address 31, binary code.



314-3-4 Hardware address 8

The hardware address can be customized according to the actual situation. The setting method is shown in the above example.

If multiple devices need to be connected to a single RS485 bus, only the hardware address is used. A single bus can be connected to a maximum of 32 devices (just set the hardware address).

If you need more than 32 devices to connect to a single RS485 bus, you need to set the software address (offset address) to realize a single bus to connect up to 247 devices.

After changing the address, you need to power off and restart the new address to take effect.

Note: For the following 3 products, the DIP switch is in the product shell. If the DIP switch is set, the shell must be disassembled and then set.

【2DI+2AI+2DO】

【4AI+2DO】

【4DI+2DO】

4.3.3 Software address (offset address)

Software address: The user can make different settings according to the scene. The software address setting range is 1～216 (device address: 1～247), and the default software address is 1.

After changing the address, you need to power off and restart the new address to take effect.

To change the software address, it needs to be realized through the configuration tool software, as shown in the figure:



Figure 4-3-7 Software address (offset address)

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5 Port wiring

5.1 Switch input DI port wiring

5.1.1 Two-wire switch wiring

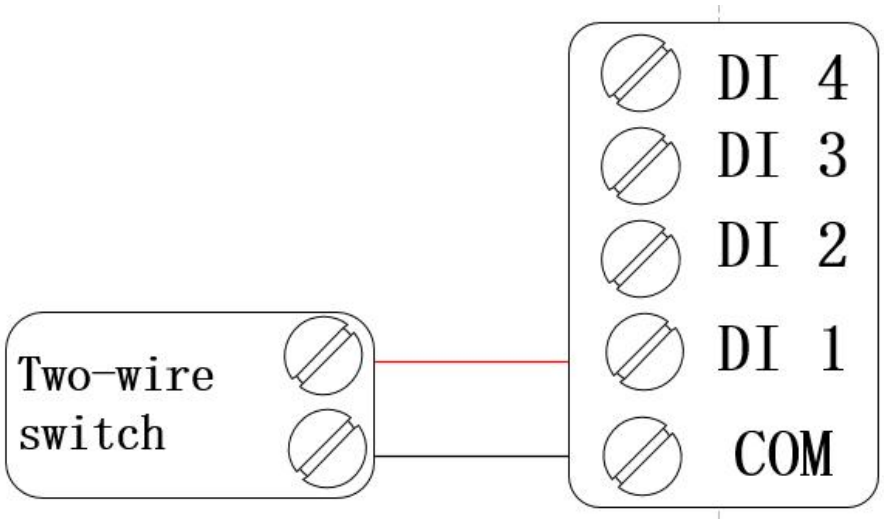


Figure 5-1-1 Wiring diagram of two-wire switch

5.1.2 Three-wire switch wiring

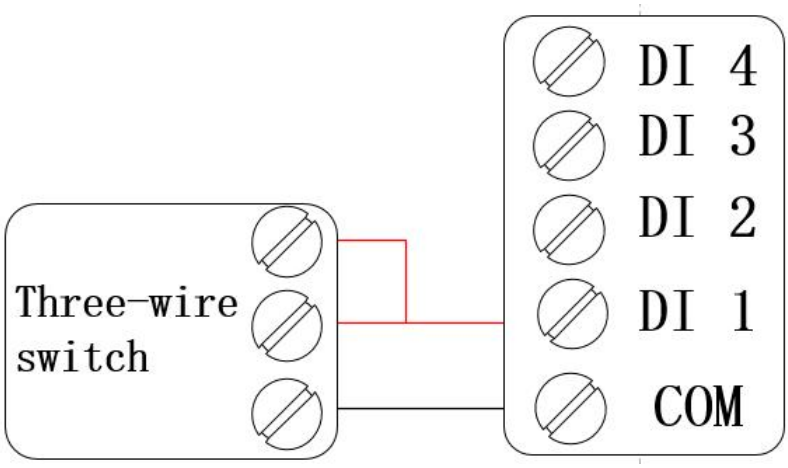


Figure 5-1-2 Wiring diagram of three-wire switch

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5.1.3 Three-wire sensor wiring

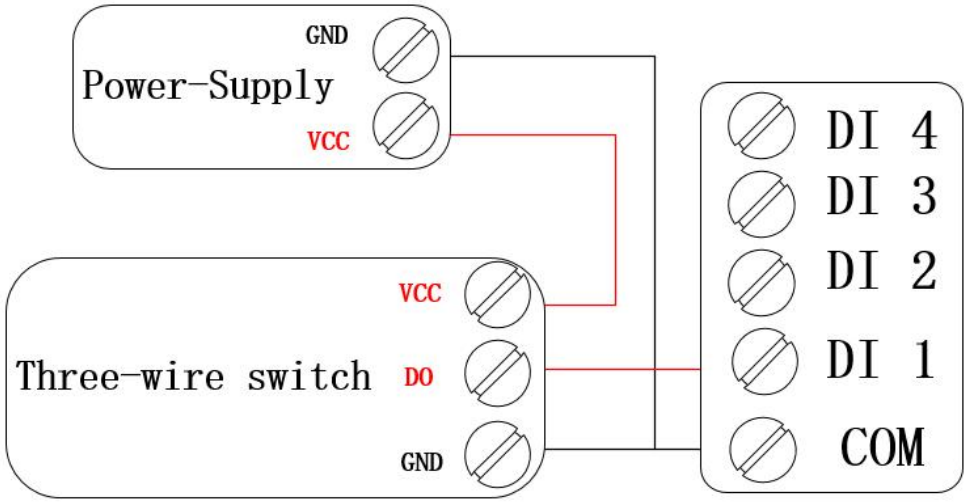


Figure 5-1-3 Three-wire sensor wiring diagram

5.2 Switch output DO port wiring

5.2.1 The output terminal directly controls the load (small power equipment within 1kW)

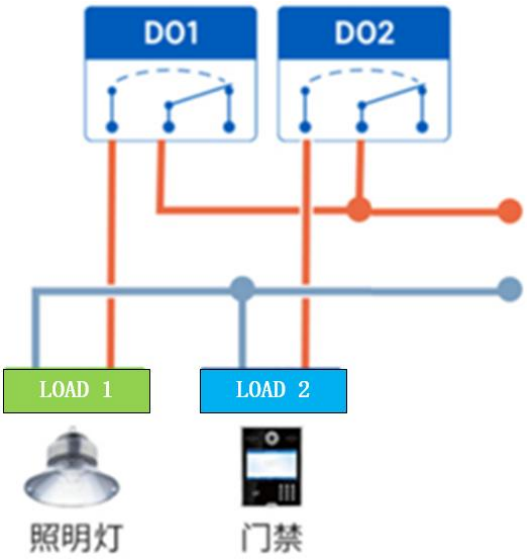


Figure 5-2-1 The output terminal directly controls the load wiring diagram

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5.2.2 Output terminal control contactor (contactor controls high-power 220V equipment)

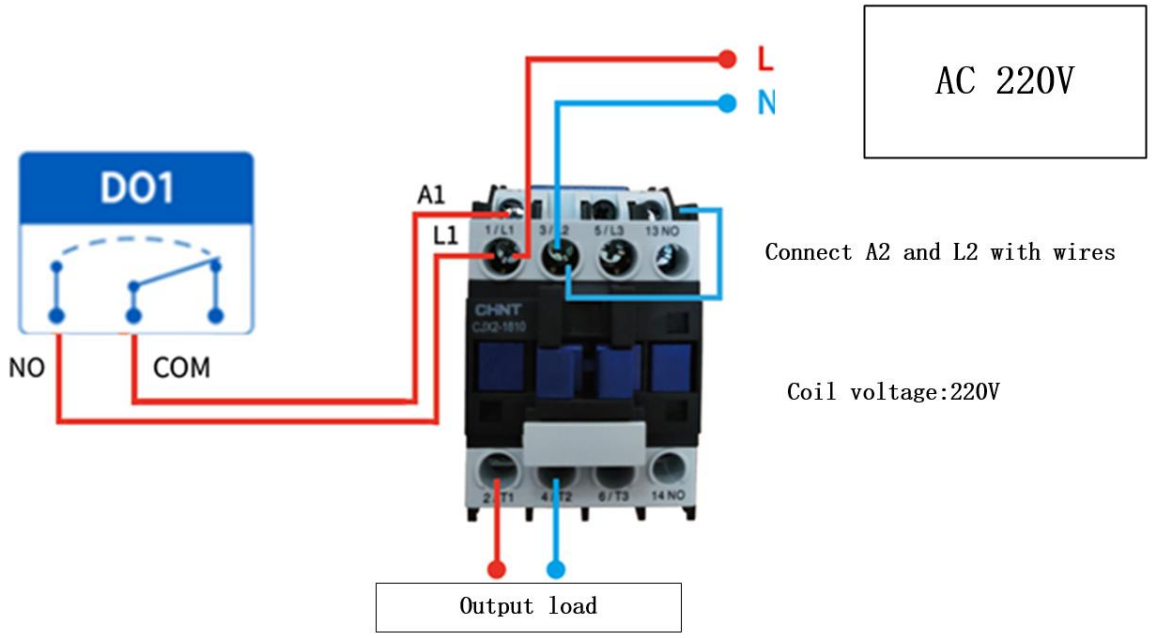


Figure 5-2-2 Wiring diagram of output terminal control contactor

Remarks: The above figure takes the contactor coil voltage AC 220V as an example. The coil voltage of different contactors may be different.

5.2.3 Output terminal control contactor (contactor controls high-power 380V equipment)

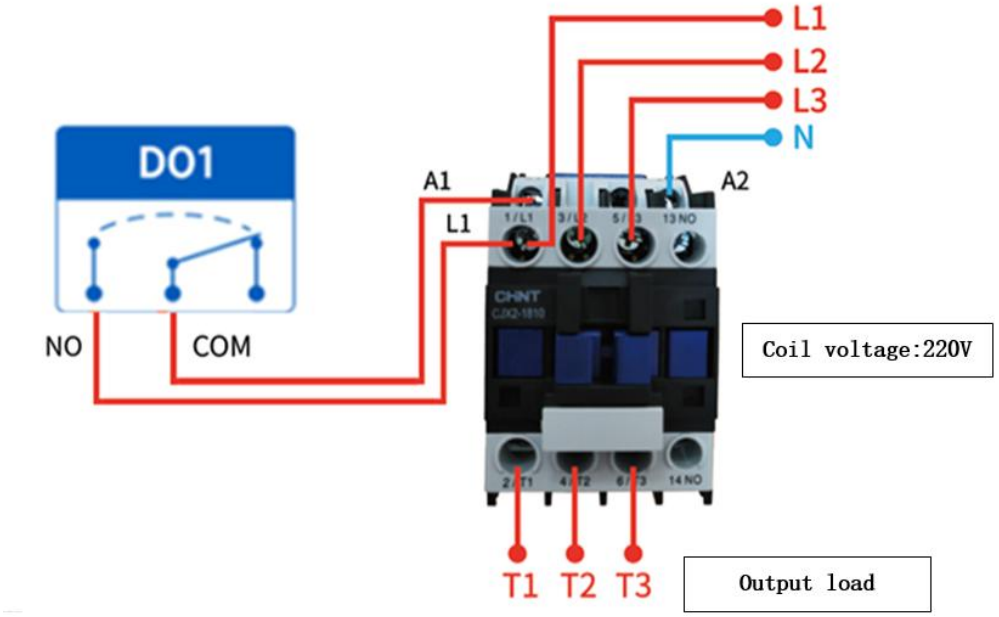


Figure 5-2-3 Wiring diagram of output terminal control contactor

Remarks: The above figure takes the contactor coil voltage AC 220V as an example. The coil voltage of different contactors may be different.

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6 Software use

6.1 Software Installation

The configuration tool software is driver-free installation, directly double-click the .exe file to open it and use it.



Figure 6-1-1 Software installation file

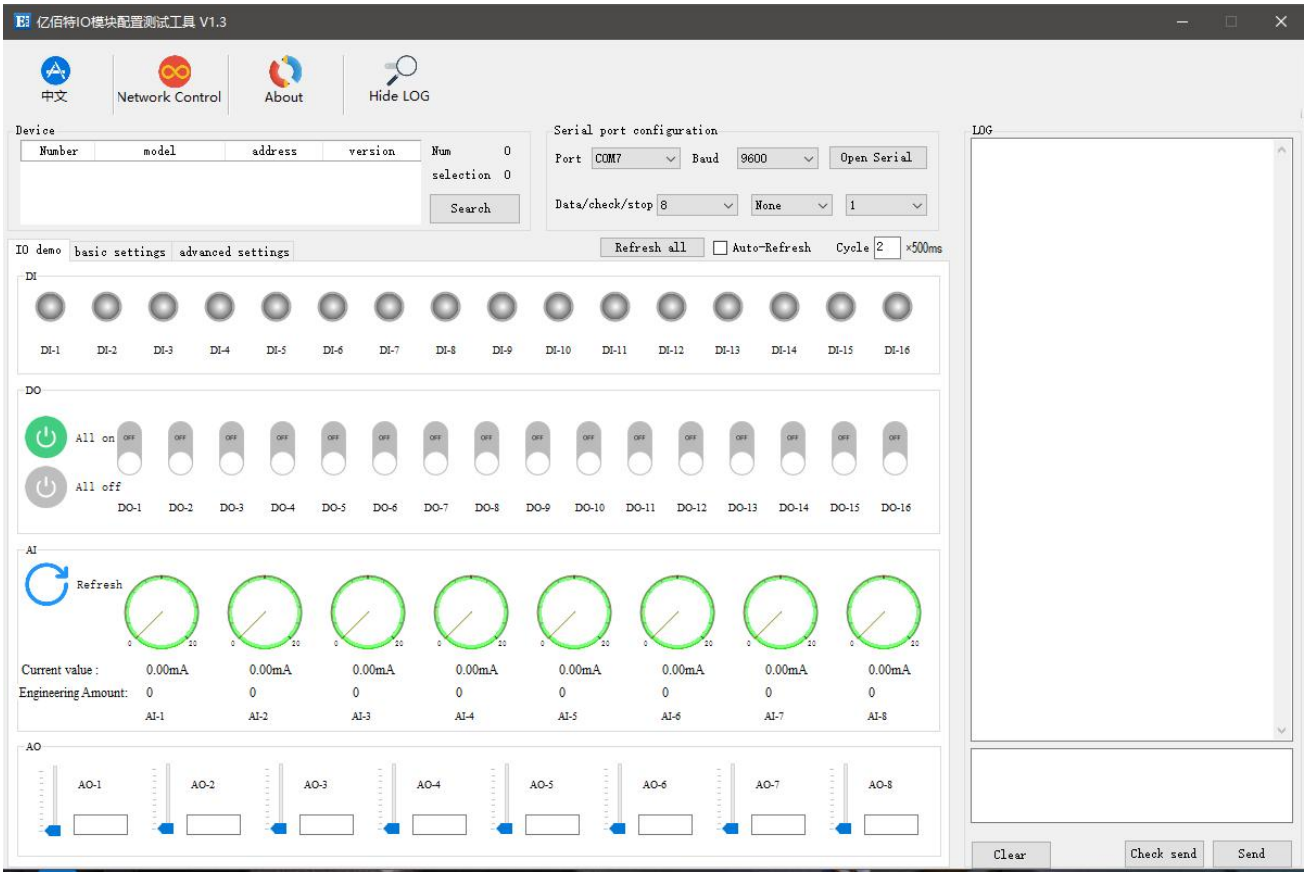


Figure 6-1-2 Successful software installation opens the interface

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6.2 Software function introduction

6.2.1 IO Demo interface



Figure 6-2-1 Software IO demo interface

(1) Device window

Display the information of the currently connected device (serial number, device model, device address, firmware version).

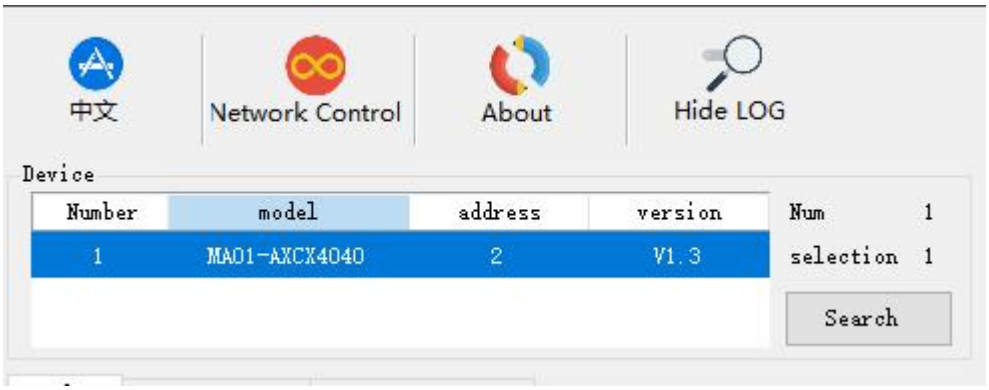


Figure 6-2-2 Device window interface

(2) Serial port parameter window

Display the serial port parameter information (port, baud rate, data bit, parity bit, stop bit, etc.), and open the serial port.

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Figure 6-2-3 Serial port parameter window interface

(3) Log window

Display the running log information (send and return data commands) during the configuration and use of the device.

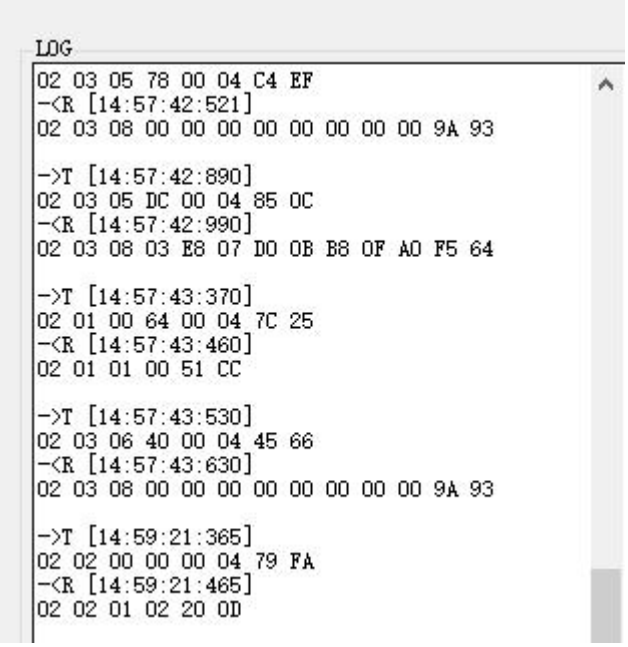


Figure 6-2-4 Log window interface

(4) Switch input DI [This function is limited to devices that support DI]

Display the status of the digital input DI port.

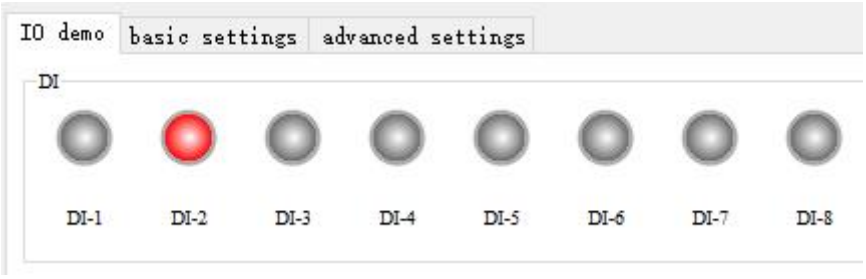


Figure 6-2-4 Switch input DI interface

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(5) Switch output DO

Display the status of the switch output DO port and graphically set the switch output DO port on and off.

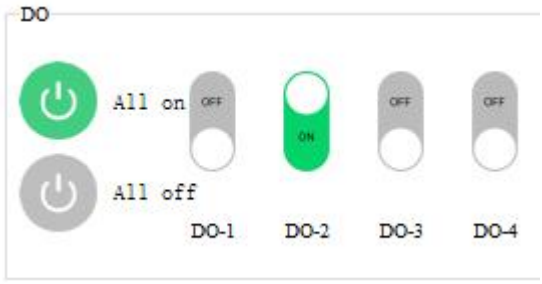


Figure 6-2-5 Switch output DO interface

(6) Analog input AI [This function is limited to devices that support AI]

Display the status of the analog input AI port (current quantity, engineering quantity), graphical needle indication.



Figure 6-2-6 Analog input AI interface

(7) Refresh settings

Support manual refresh, automatic refresh status. The automatic refresh state can customize the refresh cycle (the custom cycle is a multiple of 500ms).

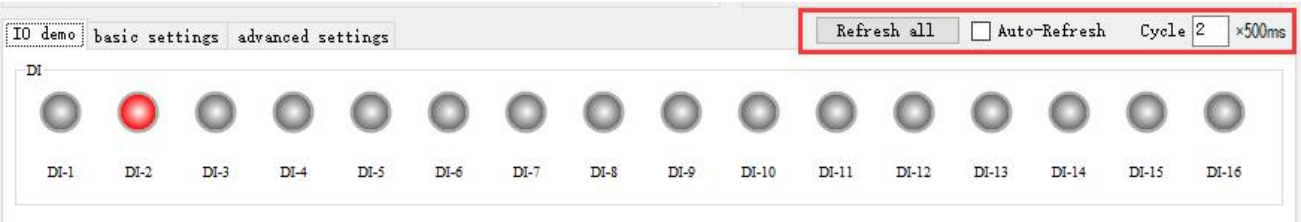


Figure 6-2-7 Refresh setting interface

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6.2.2 Basic setting interface

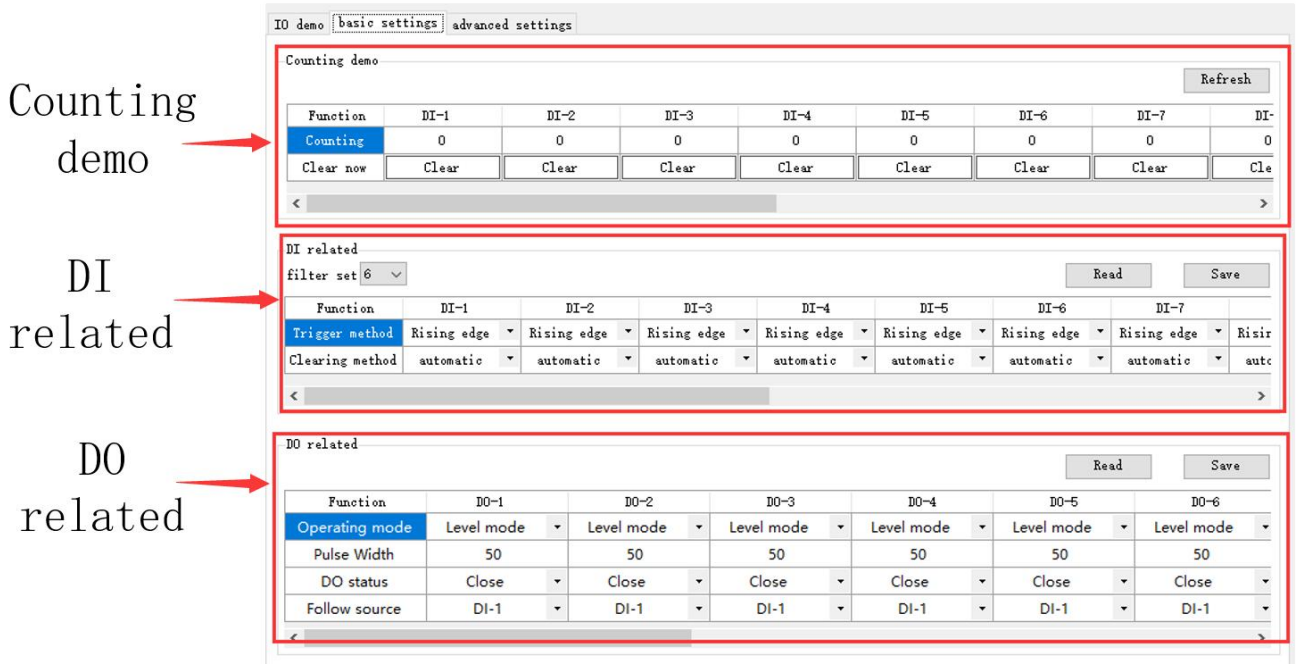


Figure 6-2-8 Basic setting interface

(1) Counting demonstration

Display DI count information and clear settings. [This function is limited to devices that support DI]

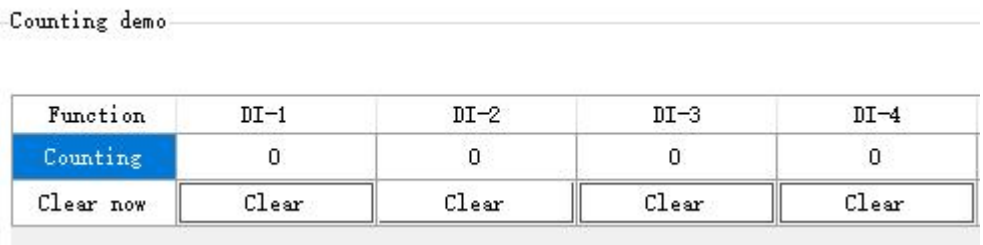


Figure 6-2-9 Counting demo interface

(2) DI related

Set the DI function. Set filter parameters (1 ~ 16), trigger mode (rising edge, falling edge, level), and clearing method (automatic, manual). [This function is limited to devices that support DI]

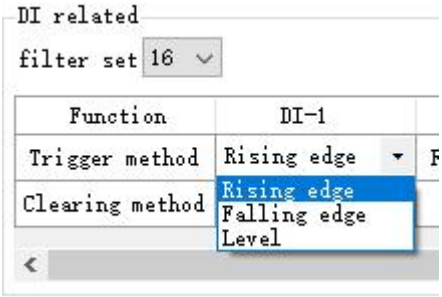


Figure 6-2-10 "DI related" interface

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(3) DO related

Set the DO function, set the working mode (level mode, pulse mode, follow mode), set the pulse width (only in pulse mode), DO power-on state (on, off), follow source (follow setting DIx).

Note: Multiple switch output DO terminals can be set to follow one DI input terminal, and one switch output DO terminal can not be set to follow multiple DI input terminals. [Follow mode is limited to devices that support DI]

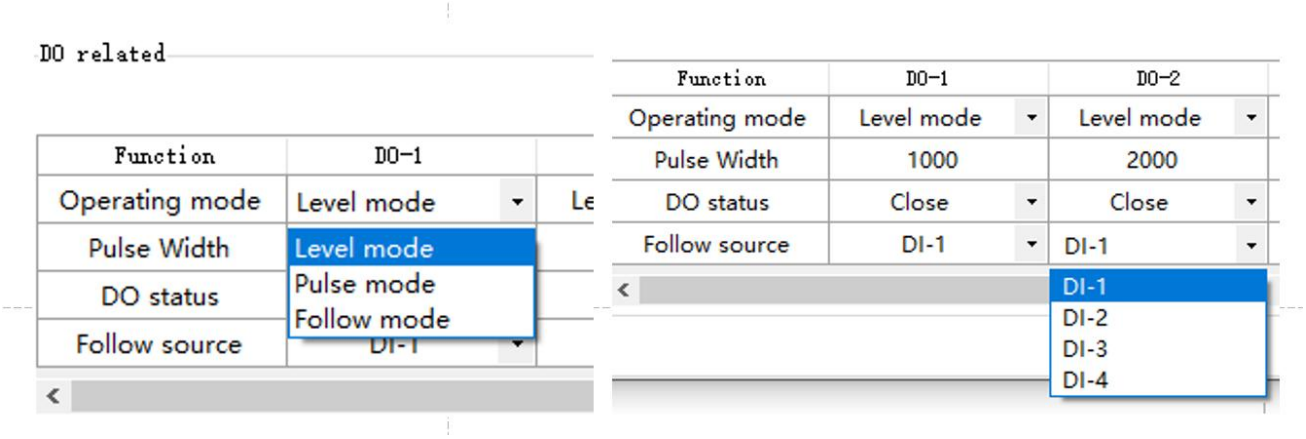


Figure 6-2-11 "DO Related" interface

6.2.3 Advanced settings interface

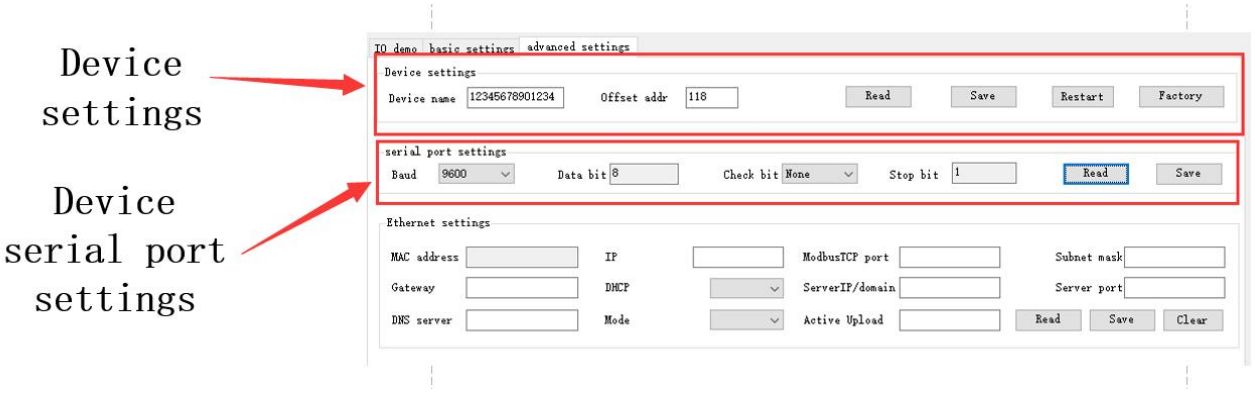


Figure 6-2-12 Advanced setting interface

(1) Equipment settings

The advanced setting interface supports device name setting, offset address (software address), read parameters, open write protection, close write protection, restart the module, and restore factory settings.

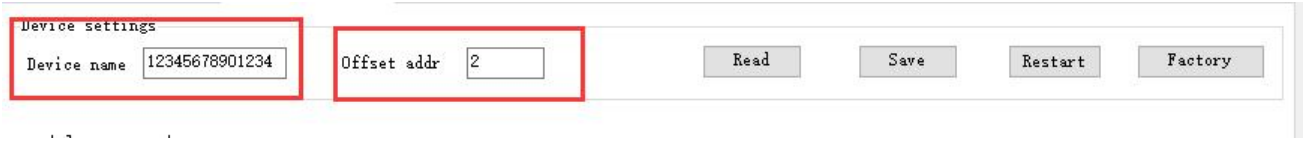


Figure 6-2-13 Device setting interface

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(2) Device serial port settings

Support to set the baud rate, you can set the baud rate (1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200), the default is 115200.

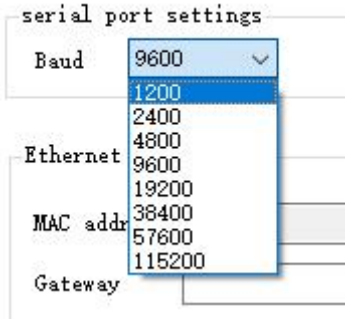


Figure 6-2-14 Baud rate setting interface

Support setting check digit, can set check digit (none, odd check, even check), default no check.

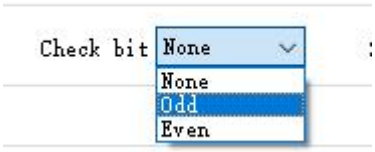


Figure 6-2-16 Check Digit Setting Interface

6.3 Device status query

The configuration software supports device status query. After connecting the device, you can query the device status through the "Refresh All Data" menu.

Example: The configuration software has connected 2 devices, try to query and select one of the devices, and click the "Refresh All Data" menu to complete the device status query.

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(1) IO demo interface

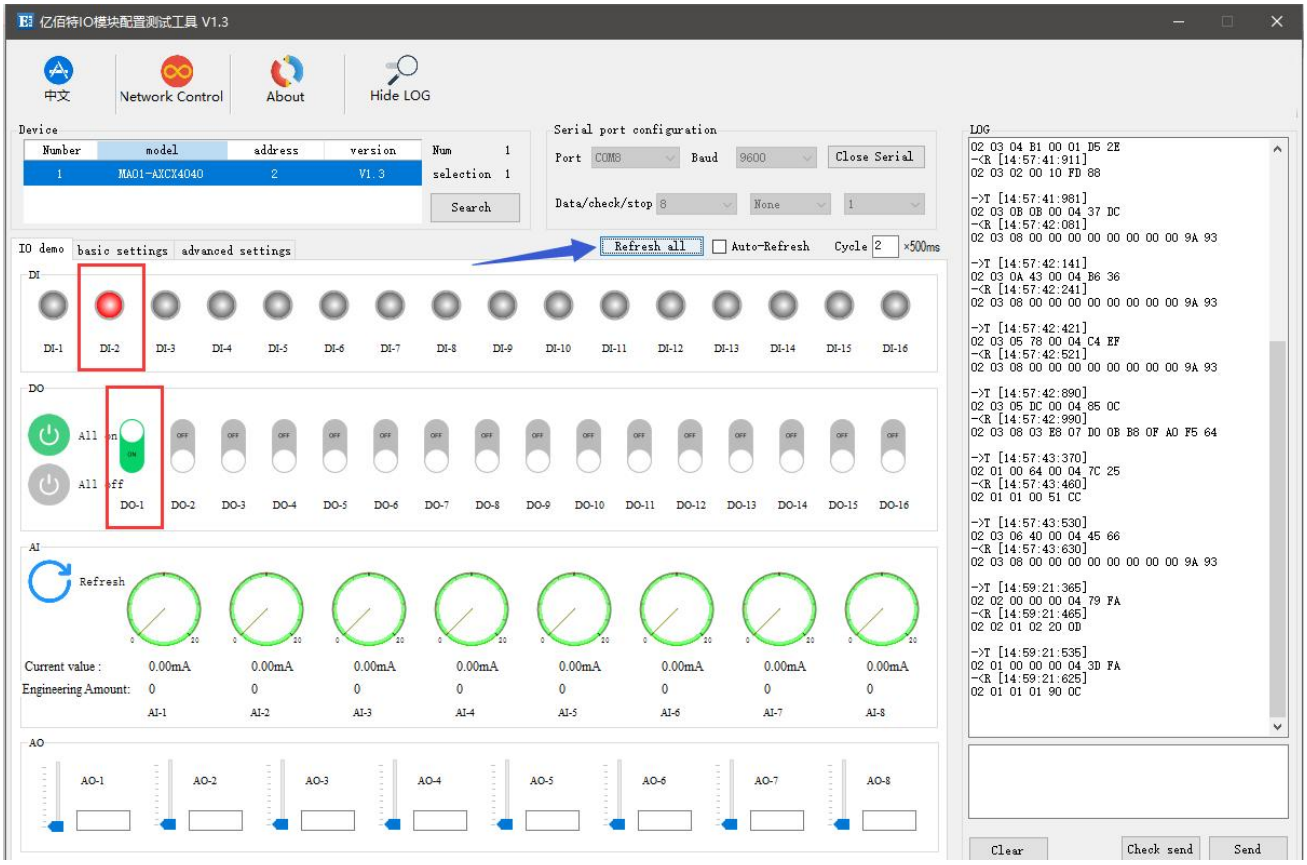


Figure 6-3-1 Device status query (IO demo interface)

(2) Basic setting interface

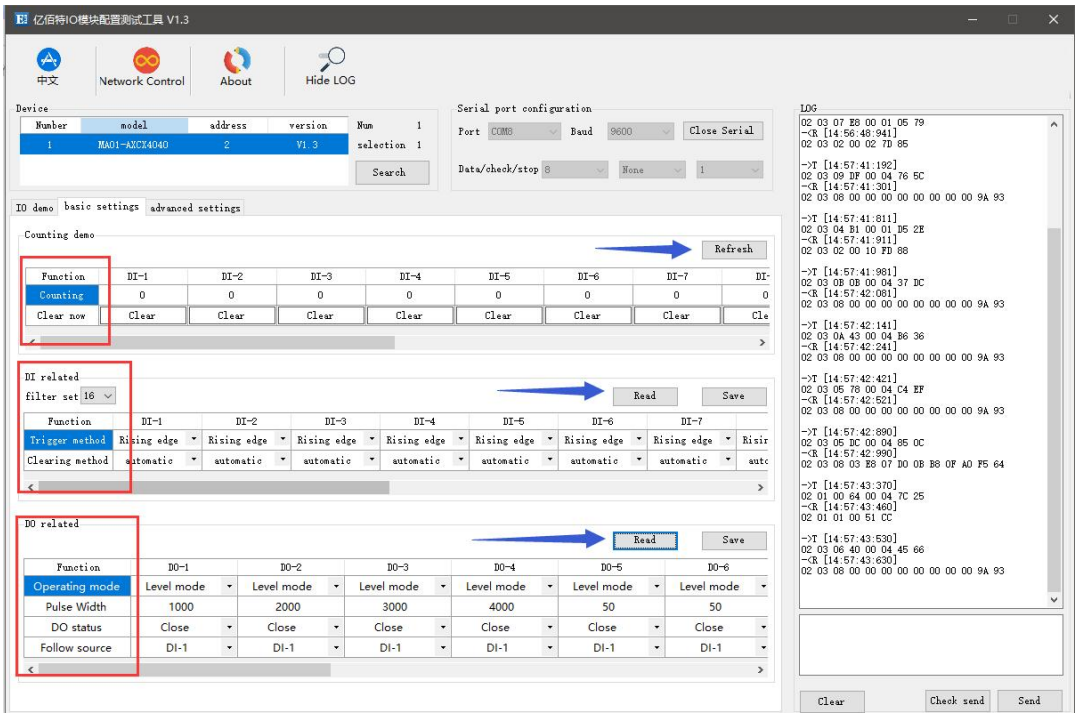


Figure 6-3-2 Device status query (basic setting interface)

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(3) Advanced setting interface

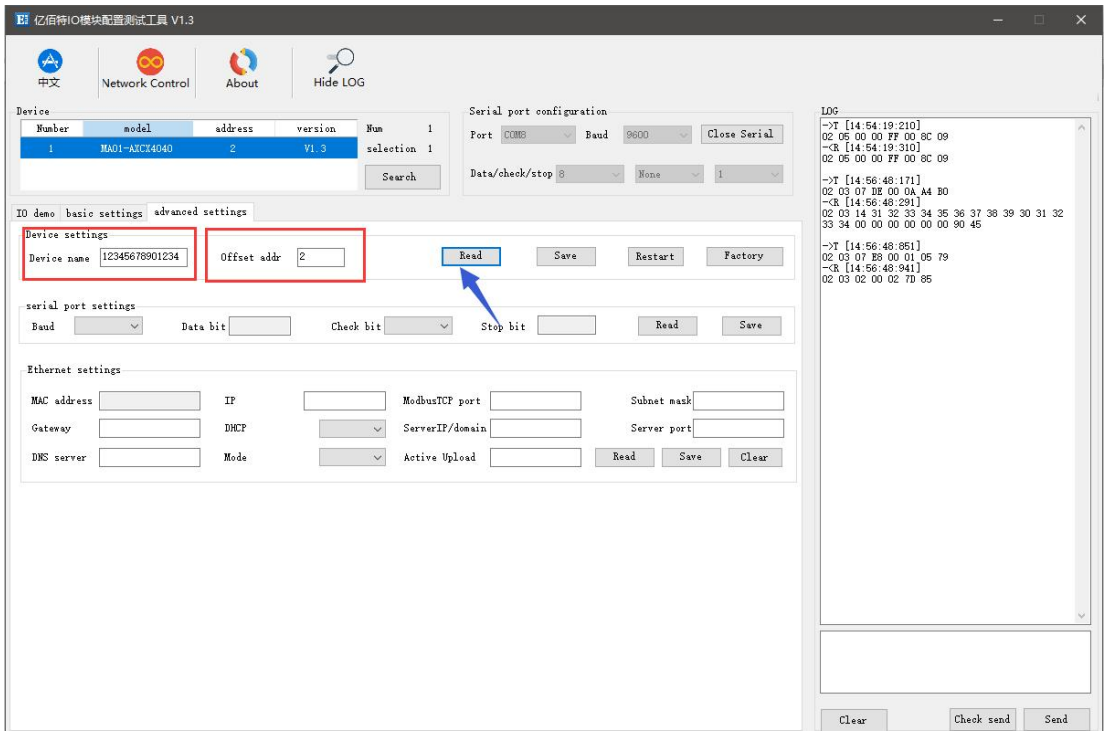


Figure 6-3-3 Device status query (advanced setting interface)

6.4 Equipment status control

Device status control, the device supports ModBus standard command control. It also supports configuration software graphical control.

Example: To control the device, open the DO-1 output port.

Method 1: Software graphical operation, click the menu button to control.

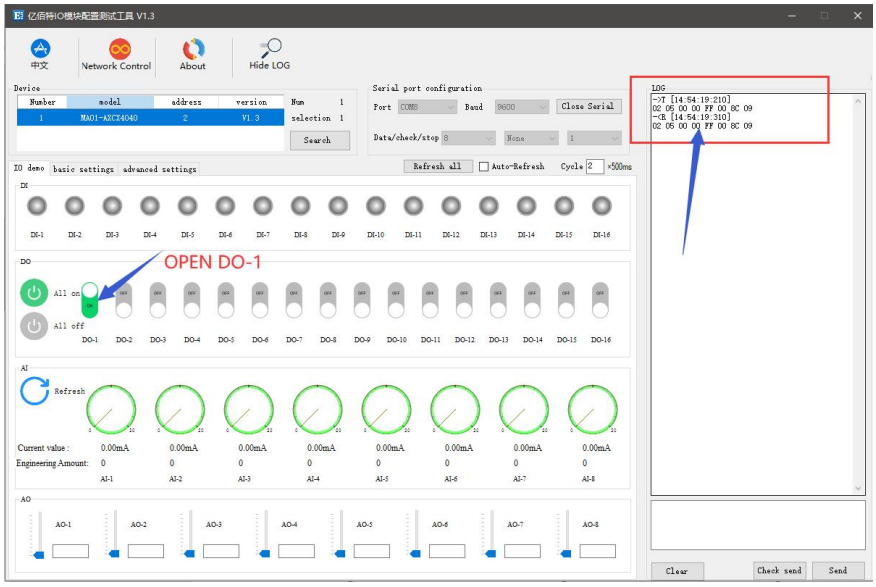


Figure 6-4-1 Software graphical operation

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Method 2: Input command control.

Device address: 1

Function: open DO-1 output

Sending: 01 05 00 00 FF 00 8C 3A (including CRC check bit)

Return: 01 05 00 00 FF 00 8C 3A (including CRC check bit)

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7 Modbus

Note: Some manufacturers require adding 1 to the decimal register address.

7.1 Register list

Table 7-1-1 Register list

Register address	number	Content of the register	status	scope of data	Applicable function code
(00000)0x0000	2	DO state	RW	0x00-0xFF, writing changes the current DO status, and reading gets the current DO status.	0x01、0x05、0x0F
(00100)0x0064	2	Status when power on DO	RW	0x00-0xFF, sets the power state of DO, after writing, the state.	0x01、0x05、0x0F
(10000)0x0000	4	DI value	RW	0x00-0xFF, indicates the current level signal of the DI.	0x02
(42527)0x09DF	4	DI count value	RW	0 The x0000-0xFFFF, write represents the initial value of the set count, and the readout indicates the readout value already counted.	0x03、0x06、0x10
(41400)0x0578	2	DO working mode	RW	0x0000-0x0002,0x0000 level mode (default mode), 0x0001 Pulse mode, 0x0002 follow mode.	0x03、0x06、0x10
(41500)0x05DC	2	DO pulse width	RW	Duration of the 0x32-0xFFF(50-65535), pulse, in unit ms.	0x03、0x06、0x10
(42827)0x0B0B	4	DI count method	RW	0x0000-0x0002,0x0000 represents up along count, 0x0001 down along count, and 0x0002 represents level count.	0x03、0x06、0x10
(42727)0x0AA7	4	DI count value reset method	RW	0x0000-0x0001,0x0000 automatic zero clearance mode, 0x0001 manual zero clearance.	0x03、0x06、0x10
(42627)0x0A43	4	Set the clearance method	RW	0x0001-0x00FF	0x03、0x06、0x10
(41600)0x0640	2	Set up the DO to follow the channel	RW	0 The x0001-0x0008,0x0001 represents the first input.	0x03、0x06、0x10
(42000)0x07D0	7	Module model	R	See the Model Definition Table.	0x03
(42012)0x07DC	2	The firmware version	R	The firmware version number.	0x03
(42014)0x07DE	10	Module name	RW	The name is 20 bytes including "\ 0".	0x03、0x06、0x10
(42024)0X07E8	1	Module software address	RW	0x01-0xE0	0x03、0x06、0x10
(42025)0X07E9	1	Restore the default parameter	RW	The parameters written to the 5BB5, settings recover to the default parameters.	0x03、0x06、0x10
(42026)0x07EA	1	Equipment restart	RW	The Write to the 5BB5, device restarts immediately	0x03、0x06、0x10
(42100)0x0834	1	Porter rate code	RW	The default value is 0x0003,, or 9600.	0x03、0x06、0x10

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				0x0000,is 1200； 0x0001,is 2400； 0x0002,is 4800； 0x0003,is 9600； 0x0004,is 19200； 0x0005,is 38400； 0x0006,is 57600； 0x0007,is 115200；	
(42102)0x0836	1	verify mode	RW	The default value is 0x0000, with no verification.0x0000，namely no verification； 0x0001, is the odd check; 0x0002, is parity;	0x03、0x06、0x10

7.2 Instruction format (partial)

Note: The following Modbus commands are all in hexadecimal format.

7.2.1 Read DO output coil status

Use 01 function code to read the output coil status, for example: read the status of two output coils

20	01	00 00	00 02	XX XX
Device ModBus address	function code	Register start address	Number of output coils	CRC check code

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

20	01	01	02	XX XX
Device ModBus address	function code	Number of bytes of data	Status data returned	CRC check code

The status data 02 returned above indicates that the output DO2 is on.

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7.2.2 Read holding register

Use 03 function code to read one or more register values, for example: read DO1 working mode.

20	03	05 78	00 01	XX XX
Device ModBus address	function code	Register start address	Register read quantity	CRC check code

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

20	03	02	00 00	XX XX
Device ModBus address	function code	Number of bytes of data	Returned data	CRC check code

The above 00 00 indicates that DO1 is in level mode.

7.2.3 Write a single holding register

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

20	06	05 78	00 01	XX XX
Device ModBus address	function code	Register address	Data written	CRC check code

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

20	06	05 78	00 01	XX XX
Device ModBus address	function code	Register address	Data written	CRC check code

If the modification is successful, the 0x0578 register data is 0x0001.

7.2.4 Write multiple holding registers

Use 10 function code to write commands for multiple holding registers, for example: set the working mode of DO1-DO4 at the same time.

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20	10	05 78	00 04	08	0001 0002	XX XX
Device ModBus address	function code	Register start address	Number of registers	The number of bytes of data written	Data written	CRC check code

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

20	10	05 78	00 04	XX XX
Device ModBus address	function code	Register address	Number of registers	CRC check code

If the modification is successful, the values of four consecutive registers with 0x0578 as the starting address are 0x0001, 0x0002, 0x0003, and 0x0000, respectively.

7.2.5 Write the status of a single DO coil

Use 05 command to write a single command, for example: set the working mode of DO1 to pulse mode

20	05	00 00	FF 00	XX XX
Device ModBus address	function code	Register address	Data written Coil action: conduction	CRC check code

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

20	05	00 00	FF 00	XX XX
Device ModBus address	function code	Register address	Write value	CRC check code

The DO1 coil is turned on.

7.2.6 Write multiple DO coil states

Use 0F function code to write a single command, for example: set the working mode of DO1 to pulse mode

20	0F	00 00	00 04	01	06	XX XX

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Device ModBus address	function code	starting address	Number of coils	Number of bytes of data	Control coil data (bit operation)	CRC check code

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

20	0F	00 00	OO O4	XX XX
Device ModBus address	function code	Register address	Number of coils	CRC check code

The coils of DO2 and DO3 are turned on.

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1.1	2023-3-13	Content Revisions	LT
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---
Web: www.cdebyte.com
Address: B5 Mould Park, 199# Xiqu Ave, High-tech District, Sichuan, China

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