

CS-IO1600DI Serial I/O Module Manual

OneFex Industrial IoT

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Notice

- ❖ Please read this manual carefully before use and save it for reference.
- ❖ Please follow to the operating procedures and precautions in this manual.
- ❖ Please open the package carefully and check whether the device and accessories have been damaged due to transportation when you receive the device. Please contact us for return processing once damage occurs.
- ❖ Please do not repair it yourself, and contact our technical support department directly if the device fails.

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1 Product Introduction

CS-IO series products are serial I/O module using standard Modbus-RTU protocol, supporting RS485/232. Support wide voltage power supply, multi-channel input and output control, which can be widely used in various application scenarios such as industrial production, agriculture, smart city and office buildings.

1.1 Features

- ◆ DC 9-28V wide voltage power supply, support anti-reverse connection;
- ◆ 16* DI with optocoupler isolation, used for switch detection, supports dry and wet contacts;
- ◆ LED indication, 1 for power and working status;
- ◆ Supports RS485 + RS232 Communication interface, power isolation plus signal isolation, reliable communication;
- ◆ Communication baud rate: 300bps~38400bps (, It is 9600 by default and can be modified by software);
- ◆ Support standard Modbus RTU protocol, read and write by register address;
- ◆ 0-255; Bulit-in address DIP switch; Set address codes by software;
- ◆ Support flash ON flash OFF;
- ◆ Power-off memory: keep the original state once power off and on again.
- ◆ Supporting setting software for setting parameters and IO control;
- ◆ Support software and hardware customization.

1.2 Parameter

Parameter	
Durability	100,000 times (Electrical) 10,000,000 times (Mechanical)
Data interface	RS485/RS232
Working Voltage	DC 9-28V
Power / work indication	1 red LED (power, always on; working, flashing)
Working temperature	-40℃~85℃, Industrial Grade
Size	200*110*60mm
Weight	650g
Default communication format	9600,n,8,1, Even can be configured.
Baud rate	300~38400bps
Software support	Setting and control software; Support various configuration software; support Labviewd, etc.
Installation	35mm Din Rail Mounting / Screw Holes

1.3 Item Selection

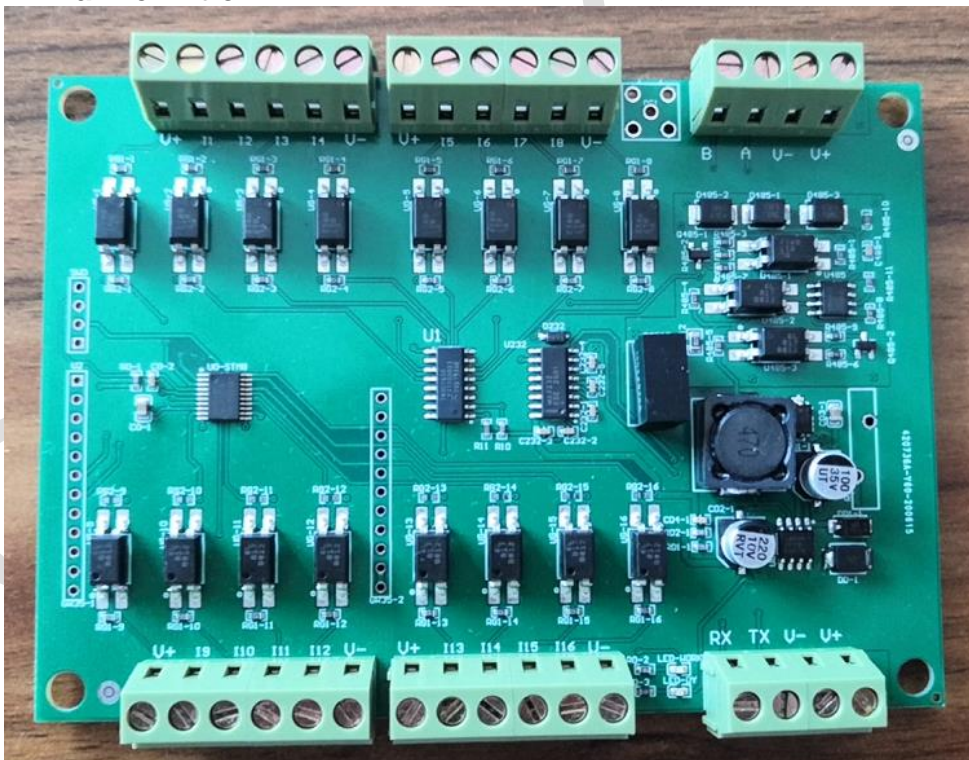
Item #	DO	DI	Analog	RS485	Address Dial
CS-IO101	1	1	0	RS485 * 1	Address Dial
CS-IO204	2	4	0	RS485 * 1	Address Dial
CS-IO222A	2	2	2(0-20mA)	RS485 * 1	Address Dial
CS-IO404A	4	0	4(0-20mA)	RS485 * 1	Address Dial
CS-IO404	4	4	0	RS485 * 1	Address Dial
CS-IO606	6	6	0	RS485 * 1	Address Dial
CS-IO808	8	8	0	RS485 + RS232	
CS-IO1600DI	0	16	0	RS485 + RS232	Address Dial
CS-IO1600	16	0	0	RS485 + RS232	Address Dial
CS-IO3200	32	0	0	RS485 + RS232	Address Dial

1.4 Dimension

200*110*60mm

2 Wiring Instructions

2.1 Terminal Definition

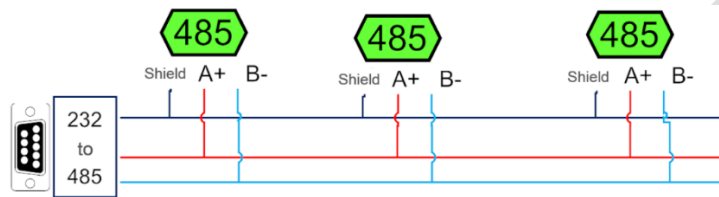


2.2 Communication Wiring

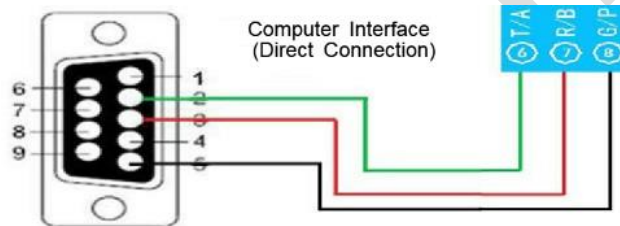
By default, its address is 1, and the DIP switches are in the off state.

The host computer software can use the default address 1 to communicate with the device (or broadcast address 254, which is only applicable when one device is mounted on the network).

2.2.1 RS485 Wiring



2.2.2 RS232 Wiring

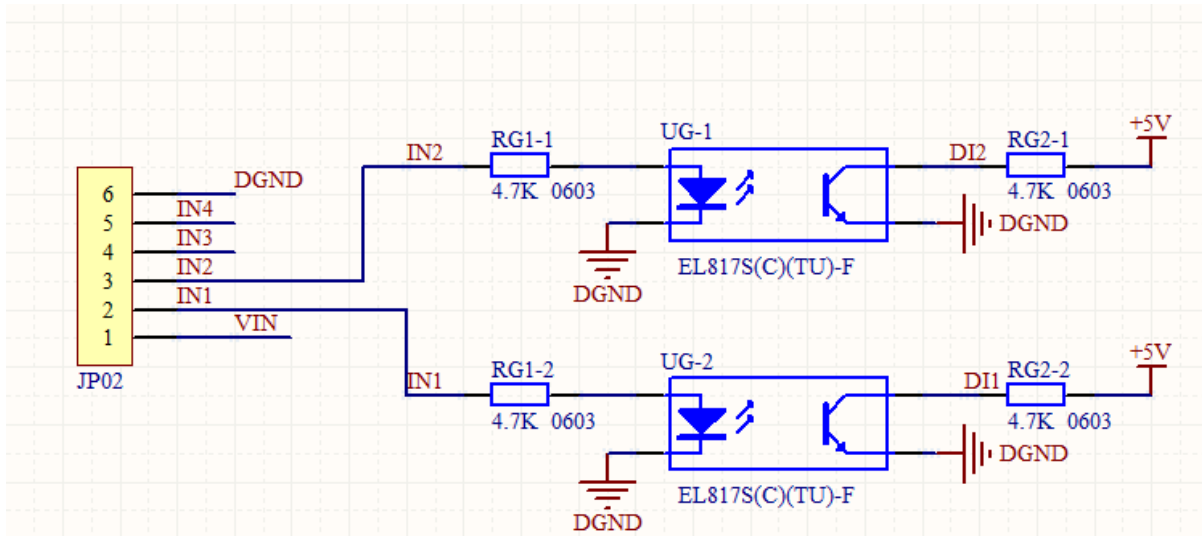


2.3 DI Wiring

The switch input interface is compatible with wet and dry nodes, please pay attention to the different connection methods of active and passive signals.

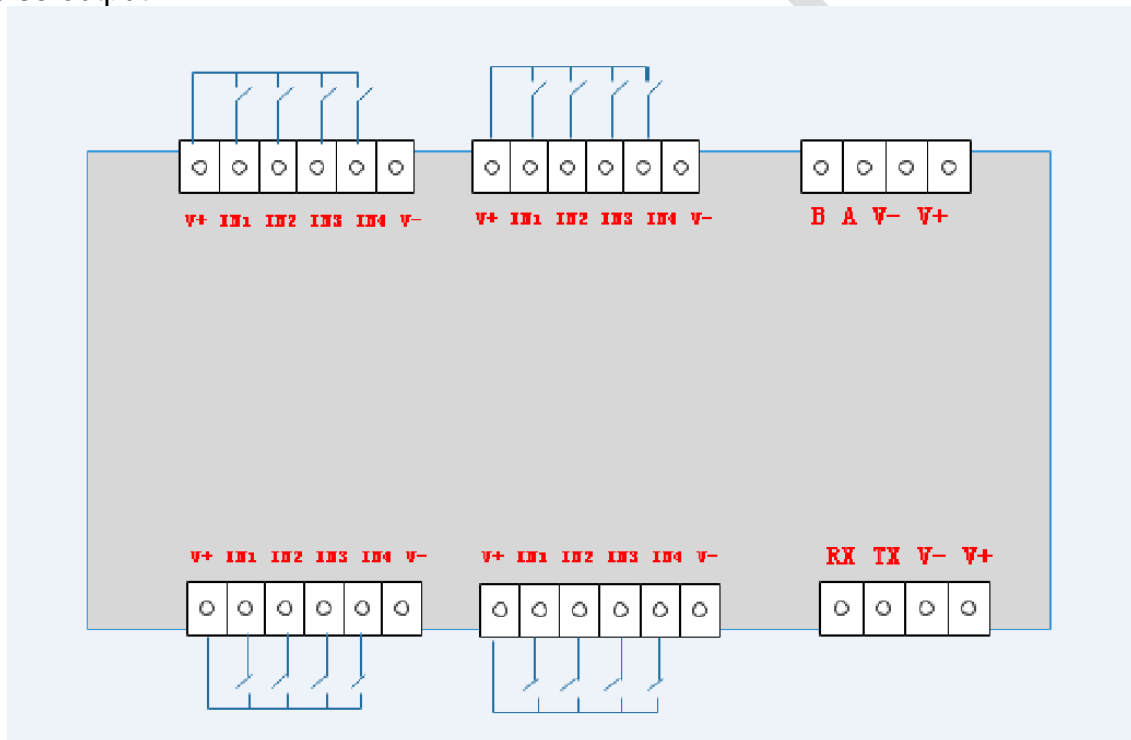
The internal optocoupler circuit of the switch value acquisition terminal is as follows,

V-(DGND) is the negative common terminal of the optocoupler, and the sensor signal can be connected to V+(VIN) and Inx respectively.



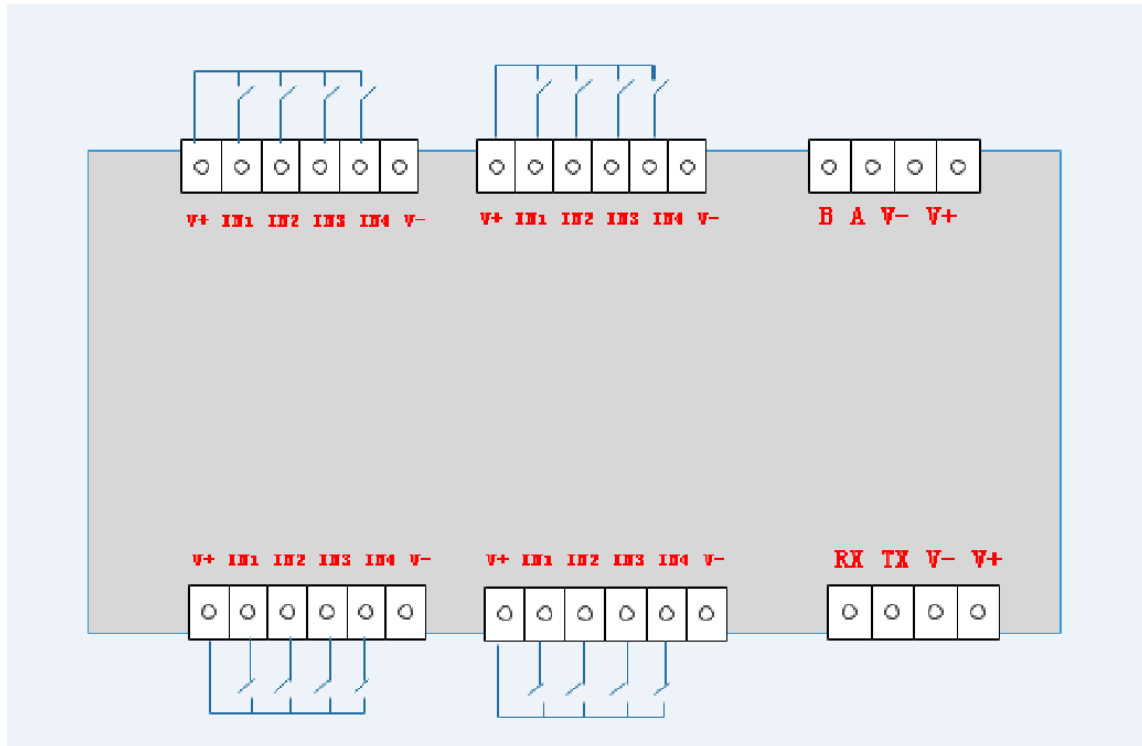
2.3.1 Active Signal Wiring

It is suitable for measuring signals with voltage, such as level high and low, and pulse output.



2.3.2 Passive Switch (dry contact) Wiring

It is suitable for collecting passive contact signals, such as switches and buttons.



3 Parameters and Working Mode Configuration

3.1 Device and PC Connection Settings

The USB end of the USB to RS485/RS232 converter is directly connected to the USB port of computer, and 485/232 end is wired according to the wiring method in "Chapter 2.2 Communication Wiring".

Serial port number query method: Open "My Computer - Device Manager - Port (COM and LPT)" and the COM number that appears after the USB to 485/232 device is inserted is the serial port number.

3.2 Device Address

3.2.1 Introduction

The Offset Address of this device is 1 by default, and the broadcast address is 254 to communicate, but 0 cannot be used.

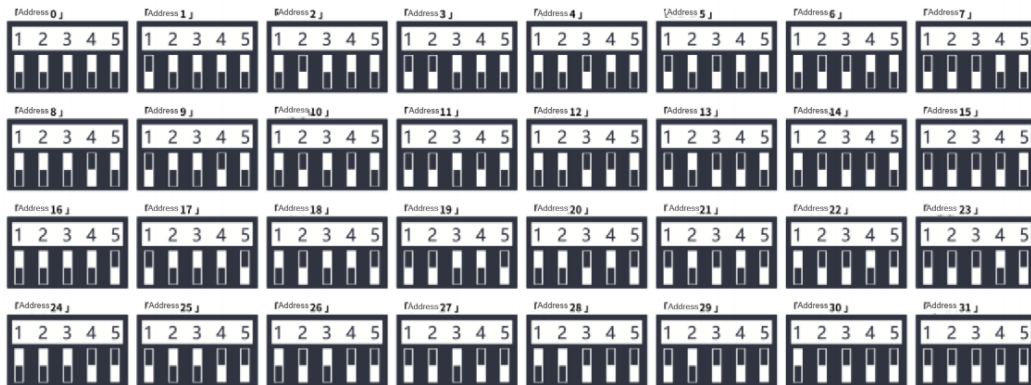
Communication address = Hardware address (DIP switch address) + Offset address.

The device's Factory default settings of communication address is 1.

With DIP switch, users can quickly modify the device address.

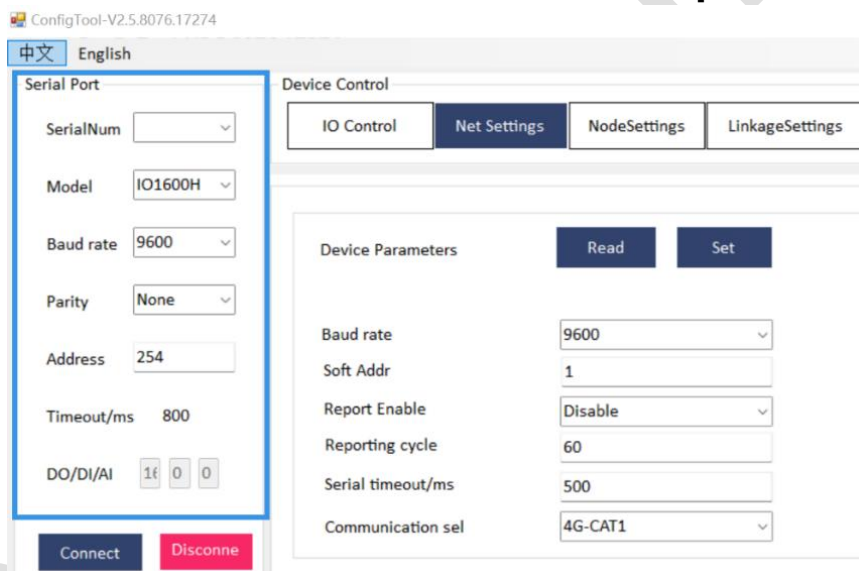
- (1) The address is "31" when all 5 dial codes are dialed above;
- (2) The address is "0" When all t5 dial codes are dialed below;
- (3) The leftmost 1 is the lowest digit in binary; ;

(4) DIP address table:



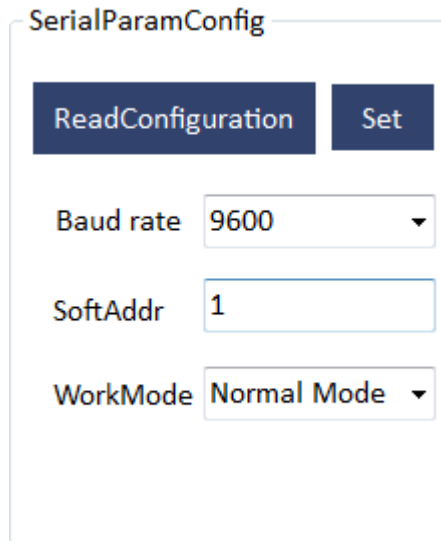
3.2.2 Device Communication Address Reading

After the device is connected normally, click "read address" on the serial relay debugging software to read the current address of the device [only support broadcast read address when there is one device on the bus].



3.2.3 Software Address Setting and Reading

Click "Read" or "Set" to read or set the software address of the device (address parameters stored in the device).



SerialParamConfig

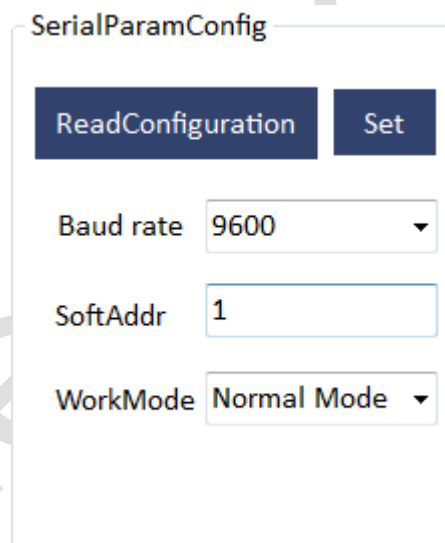
Baud rate

SoftAddr

WorkMode

3.2.4 Baud Rate Reading and Setting

Click "Read" and "Set" to read and set the baud rate and address respectively, which will take effect immediately after the operation.



SerialParamConfig

Baud rate

SoftAddr

WorkMode

4 Development Data Instruction

4.1 Communication Protocol Instruction

This product supports standard Modbus commands. For detailed command generation and parsing methods, you can refer to "MODBUS Protocol English Version" based on the register table in this article.

This product supports Modbus RTU format.

4.2 Modbus Register Instruction

This control card supports communication of various function codes, please refer to the below.

Instruction code	Meaning
02	Read discrete input [DI]
03	Read parameter register (06 for writing parameter)

Register address table:

Register name		PLC Register address	Explanation
Discrete input			
Input 1	Read switch function code 02	0000H	The 1st DI
Input 2		0001H	The 2nd DI
Input 3		0002H	The 3rd DI
Input 4		0003H	The 4th DI
Input 5		0004H	The 5th DI
Input 6		0005H	The 6th DI
Input 7		0006H	The 7th DI
Input 8		0007H	The 8th DI
Input 9		0008H	The 9th DI
Input 10		0009H	The 10th DI
Input 11		000AH	The 11th DI
Input 12		000BH	The 12th DI
Input 13		000CH	The 13th DI
Input 14		000DH	The 14th DI
Input 15		000EH	The 15th DI
Input 16		000FH	The 16th DI
Parameters Configuration			
Communication baud rate	Read register function code 03 Write register function code 06	03E8H	See the below corresponding table of baud rate values, the default value is 0, and supports 0-5. This register determines the communication baud rate of RS232 and RS485 at the same time.
Spare		03E9H	Spare, user cannot write any value.
Offset address		03EAH	Communication address = software address + DIP switch address
Working Mode		03EBH	Working mode storage

Spare		03ECH	Spare
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Baud rate value corresponding table

Value	Baud rate
0	9600
1	2400
2	4800
3	9600
4	19200
5	38400

4.3 Command List

Scene	RTU format (send in hexadecimal)
Query 4 DIs 'status	FE 02 00 00 00 08 6D C3
Return query information	FE 02 01 07 D0 5E
Query 16 DIs 'status	01 02 00 00 00 10 79 C6 [Unicast Send] FE 02 00 00 00 10 6D C9 [Broadcast] Send]
Return query information	01 02 02 00 00 B9 B8[Unicast Send] FE 02 02 00 00 AD AC[Broadcast] Send]

4.4 Command Details

4.4.1 Optocoupler Input

Query optocoupler (2-way optocoupler)

Sending code: FE 02 00 00 00 02 ED C4

Field	Meaning	Note
FE	Device address	
02	02 command	Query discrete input (optocoupler input) status command
00 00	Address	Register address of the first optocoupler to be queried
00 02	Command	Number of optocoupler states to query
6D C6	CRC16	CRC16 checksum of the first 6 bytes of data

Relay return information::

Return code: FE 02 01 00 91 9C

Field	Meaning	Note
FE	Device address	
02	02 command	Return command: if the query is wrong, return 0x82
01	Address	Returns all bytes of status information
00	Command	Returns the state of the optocoupler. Bit0: Status of the first optocoupler Bit1: Status of the second optocoupler Bit7: Status of the eighth optocoupler
91 9C	CRC16	CRC16 checksum of the first 6 bytes of data

Query optocoupler (16-way optocoupler)

Send command code: FE 02 00 00 00 10 6D C9

Field	Meaning	Note
FE	Device address	
02	02 command	Query discrete input (optocoupler input) status command
00 00	Address	Register address of the first optocoupler to be queried
00 10	Command	Number of optocoupler states to query
6D C9	CRC16	CRC16 checksum of the first 6 bytes of data

Optocoupler return information:

Return code: FE 02 02 00 00 AD AC

Field	Meaning	Note
FE	Device address	
02	02 command	Return command: if the query is wrong, return 0x82
02	Address	Returns all bytes of status information
00 00	Command	first byte Bit0: Status of the first optocoupler Bit1: Status of the second optocoupler Bit7: Status of the eighth optocoupler second byte Bit0: Status of the ninth optocoupler Bit1: Status of the 10th optocoupler Bit7: Status of the 16th optocoupler

AD AC	CRC16	CRC16 checksum of the first 6 bytes of data
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5 Product Maintenance

5.1 Device Usage Environment

1. The working voltage is 9~28V. If the input voltage is too high or too low, the device may not work normally or even be damaged.
2. The DI input terminal adopts optocoupler isolation protection, and its bearing voltage is 5~24V.
3. Do not overload for the DO output terminals. Please connect them correctly within the allowable range (refer to the wiring diagram for details).
4. The allowable air humidity of the device is 5~85%RH, and it does not have waterproof capability. Do not use it in condensation or liquid immersion environments.
5. The relay is a component with a certain service life. When the theoretical service life is reached, please replace it in time to avoid danger.

5.2 FAQ

5.2.1 RS485 /RS232 communication, no response when device control

Confirm whether the communication speed, communication address, and wiring are correct.

You can use the broadcast address 254 to try to communicate with unknown addresses;

Confirm whether the serial port number ONed on the software is correct;

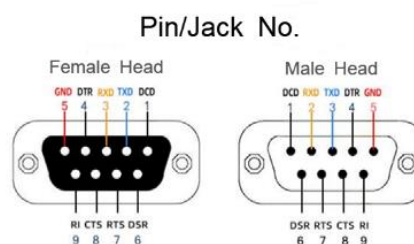
Check whether the power supply and work indicator are normal;

For the RS232 version, please correctly identify the RS232 serial port module used as male or female.

The module TXD is connected to RX pin of the relay

The module RXD is connected to TX pin of the relay

The module GND is connected to GND pin of the relay



5.2.2 The relay can only be turned on but not turned off

Check Whether the read address reads the actual device address;

Check whether there is a return command in the debug information column, and whether the return command is correct.

If reading address fails, there is no return command or abnormal return command, check the communication line and communication converter

When the io module and the controlled equipment share a DC power supply, if the controlled equipment is heavily loaded, it may cause insufficient power supply of the io module and the relay cannot switch normally.

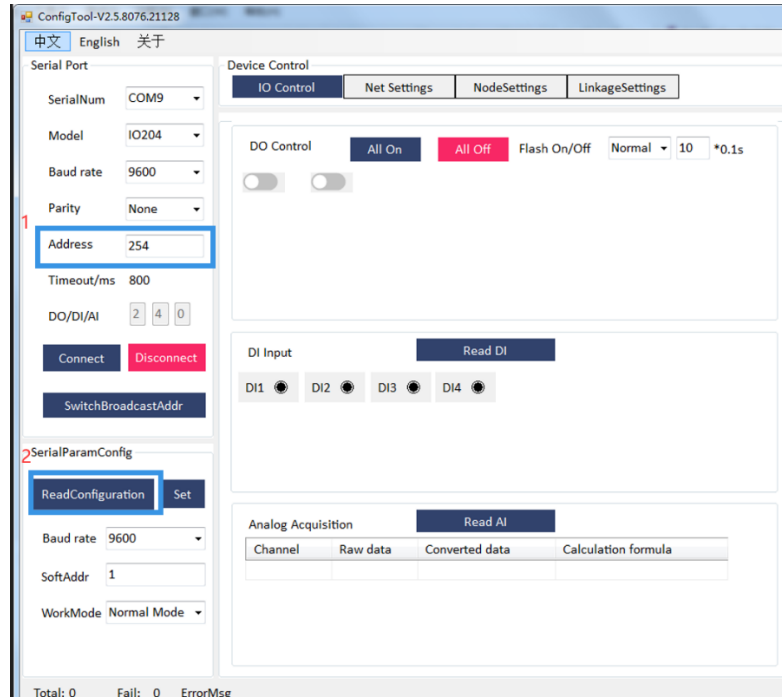
5.2.3 485 interface cannot be used to establish communication and control After the relay powered on.

1. Check whether the 485 line is reversed and whether the voltage is within the specified range;
2. Fill in 254 for the device address on software to test whether it can be controlled with different baud rates.

5.2.4 Multiple devices on the 485 bus and close operation failed to send the broadcast address 254.

If there are multiple devices on the 485 bus, the address of each device cannot be the same, and the broadcast address 254 cannot be used for communication.

Use DIP switch/software to distinguish the module' address, otherwise the command cannot be executed correctly. (Please refer to below photo: how to set the address if multiple modules)



The broadcast address 254 can be used when there is only one device on the bus. When there is more than one device.

5.2.5 PLC and the device cannot communicate normally

1. Check whether the PLC communication parameters match the relay;
2. Check whether the PLC communication protocol is standard Modbus RTU;
3. Check whether the definition of Siemens 485 bus AB is opposite to this device.

5.2.6 How to restore the factory settings

You can use the DIP switch to restore the factory settings.

Operation steps:

Power on, dial all the dial codes to ON, and toggle bit5 back and forth 6 times.

Dial all the dial codes, then you can use the host computer software (baud rate 9600, address 254) to communicate.

6 After-sale Service

6.1 Commitment

OneFex provides after-sales service of the device within one year from the date of sale. But for damage caused by improper use, you need to send it back and take the freight for repair or adjust. Make sure that the package is in good condition to avoid damage during transportation. Repair the damage of device instrument is free.

6.2 Disclaimer

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