

# **AIO-MT222F**

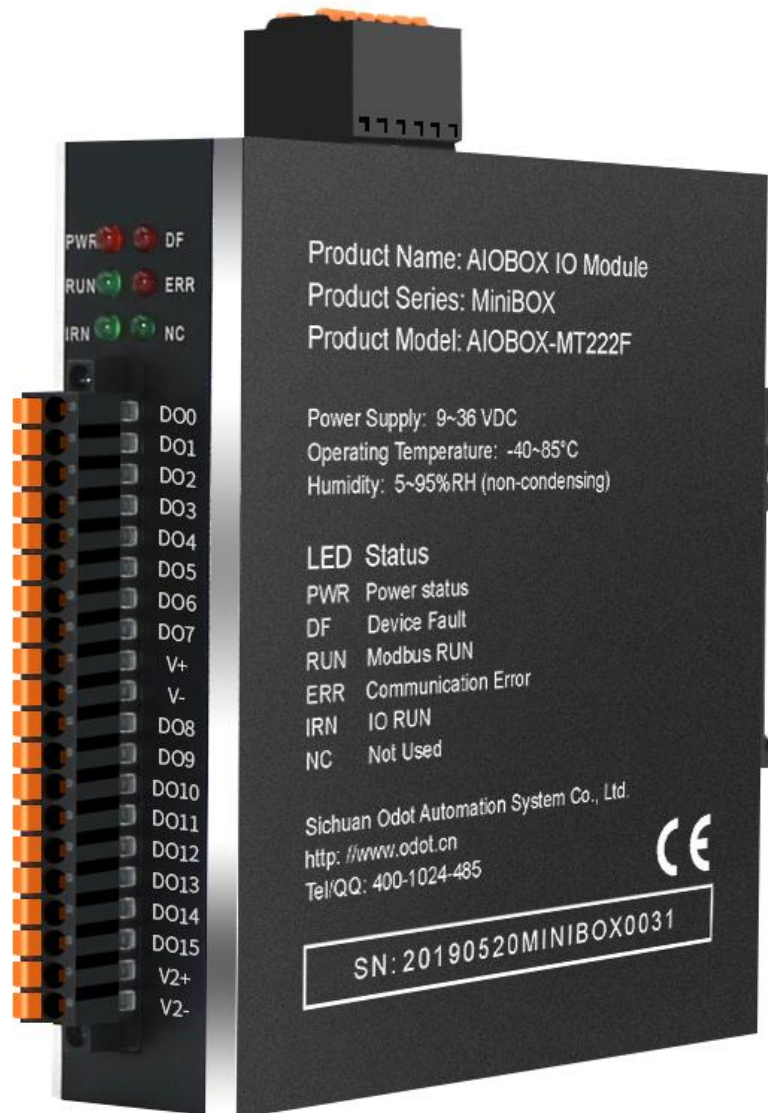
## **MiniBOX IO Module**

### **User Manual**

*V1.0*

*2019.11.01*

## MODBUS 16 channels digital output module



**Sichuan Odot Automation System Co., Ltd**

**2019-6**

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### Version information

DATE	Version No.	Modified content	TheAuthor
2019/7/2	V1.0	First release	TZJ
2020-03-17	V1.1	Fix process data, configuration data	CCL

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## Contents

1 Product Overview .....	5
1.1 Product Introduction .....	5
1.2 Technical Parameters .....	5
2 Hardware Description .....	7
2.1 Appearance .....	7
2.2 Indicator Description .....	8
2.3 System Power and Communication Interface.....	8
2.4 Modbus MAC Address .....	10
2.5 Configuration Data Definition .....	10
2.6 Installation Dimension .....	13
3 Configuration Software Usage.....	14
4 MODBUS POLL Software Test.....	20
4.1 Test via the gateway Ethernet port .....	20
4.2 Test via the gateway serial port.....	22
5 Device firmware upgrade.....	24

# 1 Product Overview

## 1.1 Product Introduction

MiniBox series IO module: AIO-MT222F is an Ethernet based integrated IO module, with 16 output channels. This product supports the use of RS485 interface (Modbus-RTU) and Ethernet interface (Modbus-TCP) for communication, and supports the simultaneous access of 5 Modbus TCP clients. It is simple and convenient to use with stable transmission, full metal shell and strong anti-interference ability. The internal PCB adopts anti-corrosion technique including anti-corrosion, anti-oxidation and anti-salt mist. Its double Ethernet port could support Daisy chain topology and convenient for wiring.

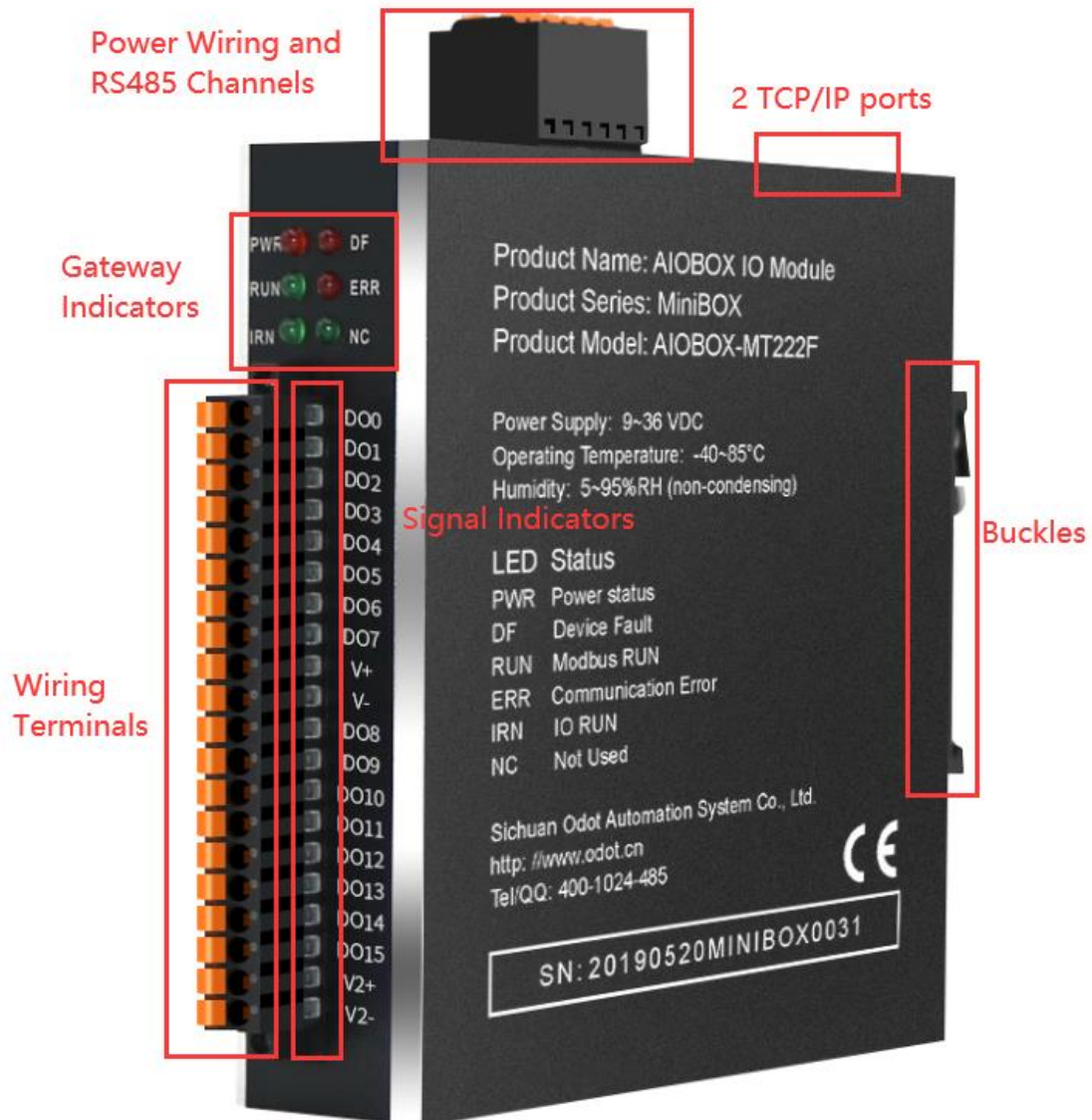
## 1.2 Technical Parameters

Common Parameter	
Specification	16 Channels 24V Output, supports source output
Communication Interface	Dual Ethernet port, with switch function, supports device cascading, 1*Modbus RTU RS485 port
Protocol	Modbus TCP/Modbus RTU
Linking Number	5 Modbus TCP clients
Input Voltage	9-36V DC, Wide Range Voltage Input
Working Temperature	-40~85°C
Serial Port Baud Rate	1200-115200bps
IP Level	IP20
RS485 Node	Could be configured, Default: 1
Power	Max.70mA@24.0Vdc
Isolation	I/O to internal bus: Optocoupler isolation (3KVrms)
Field voltage	Nominal voltage: 24Vdc, Input range: 22~28Vdc

Dimension	110*110*28mm(L*W*H)
Installation	Standard DIN rail 35mm
Output Parameter	
Channel Numbers	16 Channels
Indicator	16pcs green channels output indicators
Rated Current	Typical value: 500MA
Leakage Current	Max.: 10uA
Output Impedance	<0.2Ω
Output Delay	OFF to ON :Max.200us
	ON to OFF :Max.100us
Protection Function	Temperature protection: Typical value 150°C
	Protection current: Typical value 1.4A
	Short-circuit protection Support

## 2 Hardware Description

### 2.1 Appearance



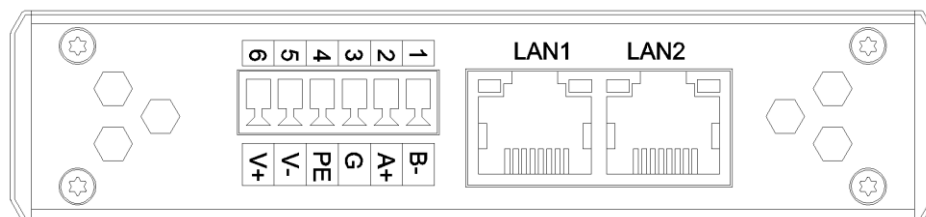
## 2.2 Indicator Description

Symbol	Definition	Status
PWR	Power indicator	ON: Power connected OFF: No power
DF	Equipment fault indication	ON: Device parameter read failed OFF: Parameter reading properly
RUN	Modbus communication working properly	Blinking: Data exchange
ERR	Modbus communication error	Blinking: Data exchange is abnormal
IRN	IO running indication	ON: IO initialization normal OFF: IO initialization error

## 2.3 System Power and Communication Interface

### A. System Power and Communication Ports Definition

It supports standard Modbus-TCP and Modbus-RTU/ASCII protocol access. The Ethernet supports cascade function of dual Ethernet port switch, and the serial port supports RS485 bus connection mode.



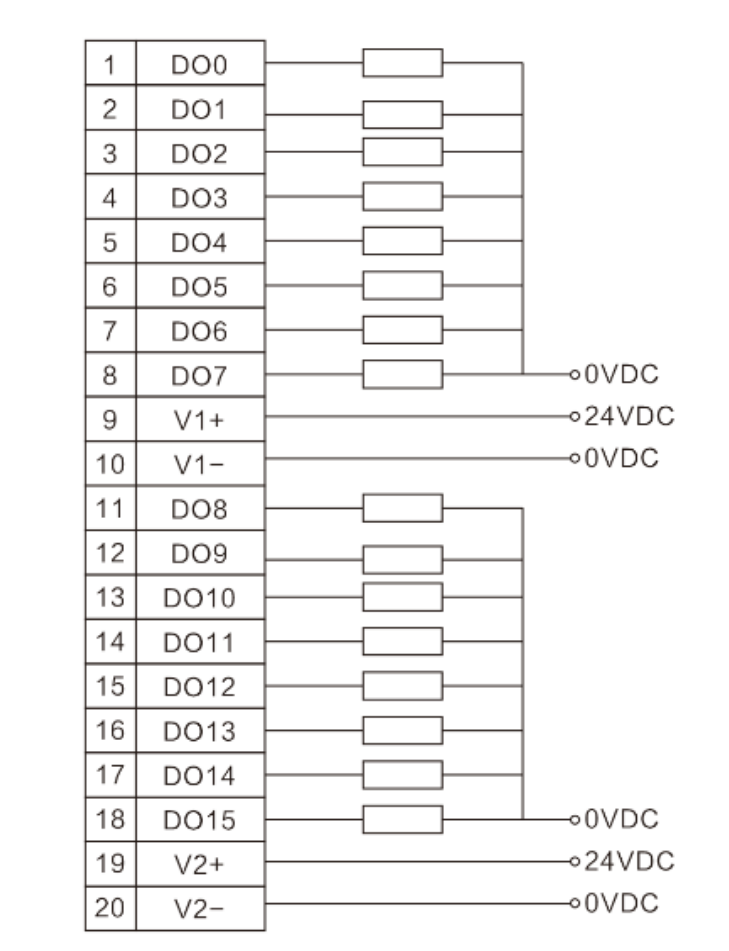
No.	Terminal	Definition
1	B-	RS485-
2	A+	RS485+
3	SGND	Serial port RS485 Signal ground
4	PE	Ground terminal
5	V-	Power input negative



6	V+	Power input positive
RJ45	LAN1/LAN2	MODBUS TCP Communication port

## B. Terminal wiring diagram and definition

Digital output module AIOBOX-MT222F has 16 digital output channels, and the module is simple for wiring and easy for operation. The specific wiring diagram is as follows.



Terminal No.	Definition	Description	Sequence No.	Definition	Description
1	DO0	Output Signal	11	DO8	Output Signal
2	DO1	Output Signal	12	DO9	Output Signal
3	DO2	Output Signal	13	DO10	Output Signal

4	DO3	Output Signal	14	DO11	Output Signal
5	DO4	Output Signal	15	DO12	Output Signal
6	DO5	Output Signal	16	DO13	Output Signal
7	DO6	Output Signal	17	DO14	Output Signal
8	DO7	Output Signal	18	DO15	Output Signal
9	V1+	24V+	19	V2+	24V+
10	V1-	0V	20	V2-	0V

## 2.4 Modbus MAC Address

Register address	Low limit value	High limit value	Reset Value	Read/Write	Description
00001-00016	0	1	0	Write	DO0-DO15 Output

## 2.5 Configuration Data Definition

Modbus TCP parameter	
No.	Description
Byte 0	MAC Address[0]
Byte 1	MAC Address[1]
Byte 2	MAC Address[2]
Byte 3	MAC Address[3]
Byte 4	MAC Address[4]
Byte 5	MAC Address[5]
Byte 6	IP Address[0]
Byte 7	IP Address[1]
Byte 8	IP Address[2]
Byte 9	IP Address[3]
Byte 10	Net Mask[0]
Byte 11	Net Mask[1]
Byte 12	Net Mask[2]
Byte 13	Net Mask[3]
Byte 14	Net Gateway[0]
Byte 15	Net Gateway[1]

Byte 16	Net Gateway[2]
Byte 17	Net Gateway[3]
Byte 18	Modbus Port
Byte 19	
Byte 20	Watchdog Enable
Byte 21	Watchdog Time
Byte 22	
Modbus RTU parameter	
Byte 23	Slave ID
Byte 24	Baud Rate
Byte 25	
Byte 26	
Byte 27	
Byte 28	Data Bits
Byte 29	Parity Bits
Byte 30	Stop Bits
Byte 31	Serial Mode
Byte 32	Char Pitch
Byte 33	Respond Delay

Data description:

**MAC Address [0-5]:** Device MAC address (read only)

**IP Address[0-3]:** Device IP address (Default: 192.168.1.100)

**Net Mask[0-3]:** Device subnet mask (Default: 255.255.255.0)

**Net Gateway[0-3]:** Device subnet gateway (Default: 192.168.1.1)

**Modbus Port:** Modbus Port no. (Default: 502)

Effective range: 0-65535

**Watchdog Enable:** Modbus Watchdog enable (Default: 1)

0: Watchdog disabled

1: Watchdog enabled

**Watchdog Time(s):** Watchdog time (Default: 10)

Effective range: 1-65535

**Slave ID:** Modbus slave station ID no. (Default: 1)

Effective range: 1-247

**BaudRate:** serial port baud rate (Default: 9600bps)

Effective range: 2400-115200

**Data Bits:** data bits (Default: 8)

7: 7 data bits

8: 8 data bits

**Parity Bits:** Parity bit (Default: 0)

0: No parity

1: Odd

2: Even

**Stop Bits:** stop bit (Default: 1)

1: 1 stop bit

2: 2 stop bit

**Serial Mode:** serial mode (Default: 0)

0: RTU mode

1: ASCII mode

**Char Pitch:** inter-frame space (Default: 2)

0: 1.5t

1: 3.5t

2: 5t

3: 10t

4: 20t

5: 50t

6: 100t

7: 200t

**Respond Delay:** Slave station replying delay time (Default: 0)

Effective range: 0-65535

## 2.6 Installation Dimension

The 16-channel digital output module AIOBOX-MT222F supports the installation of Din-rail, which is simple and convenient to install and easy to operate. Its working temperature is  $-40 \sim 85^{\circ}\text{C}$  and the humidity are within the range of  $5 \sim 95\%$  RH, and the module would be greatly affected if this scope is beyond.

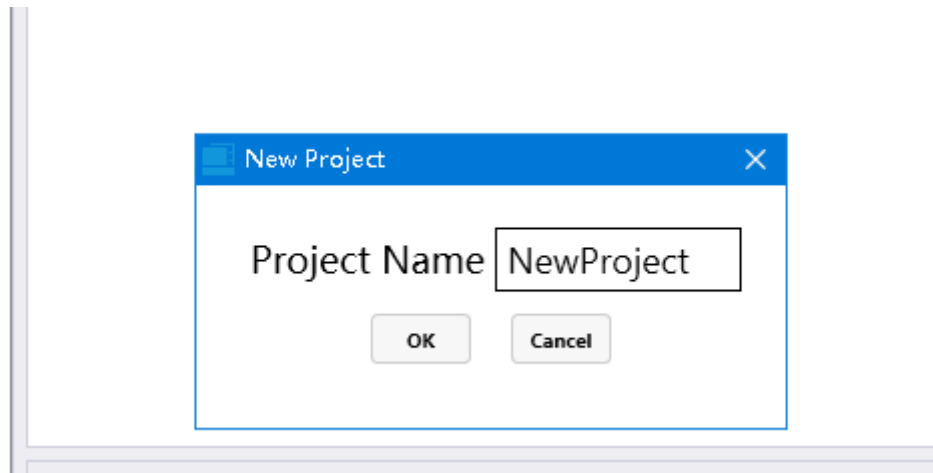
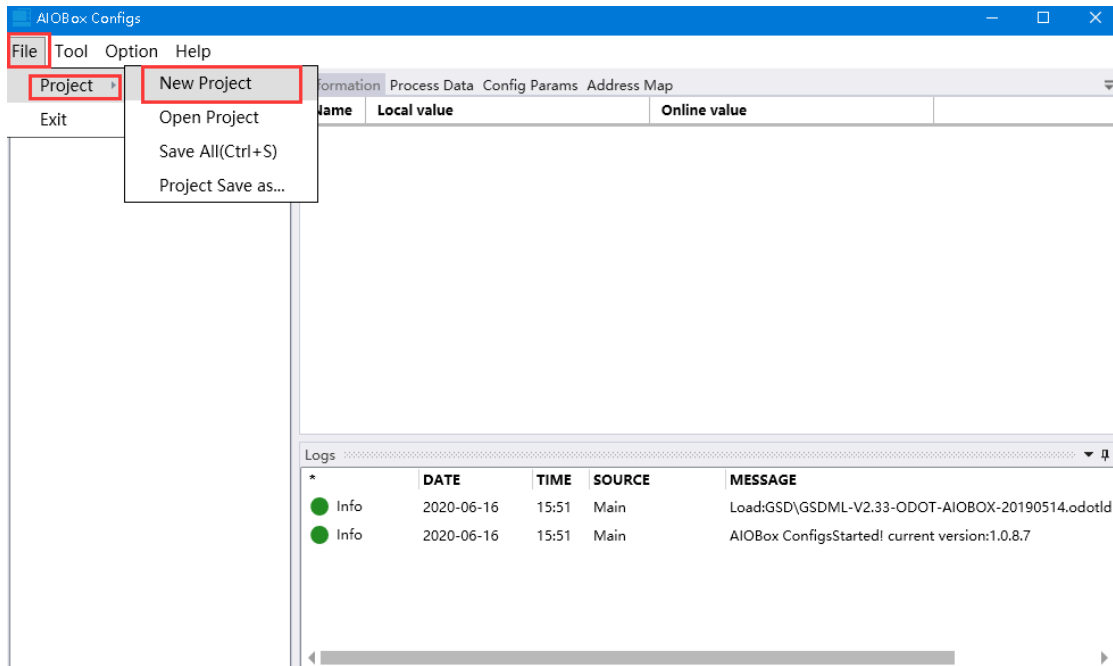


### 3 Configuration Software Usage

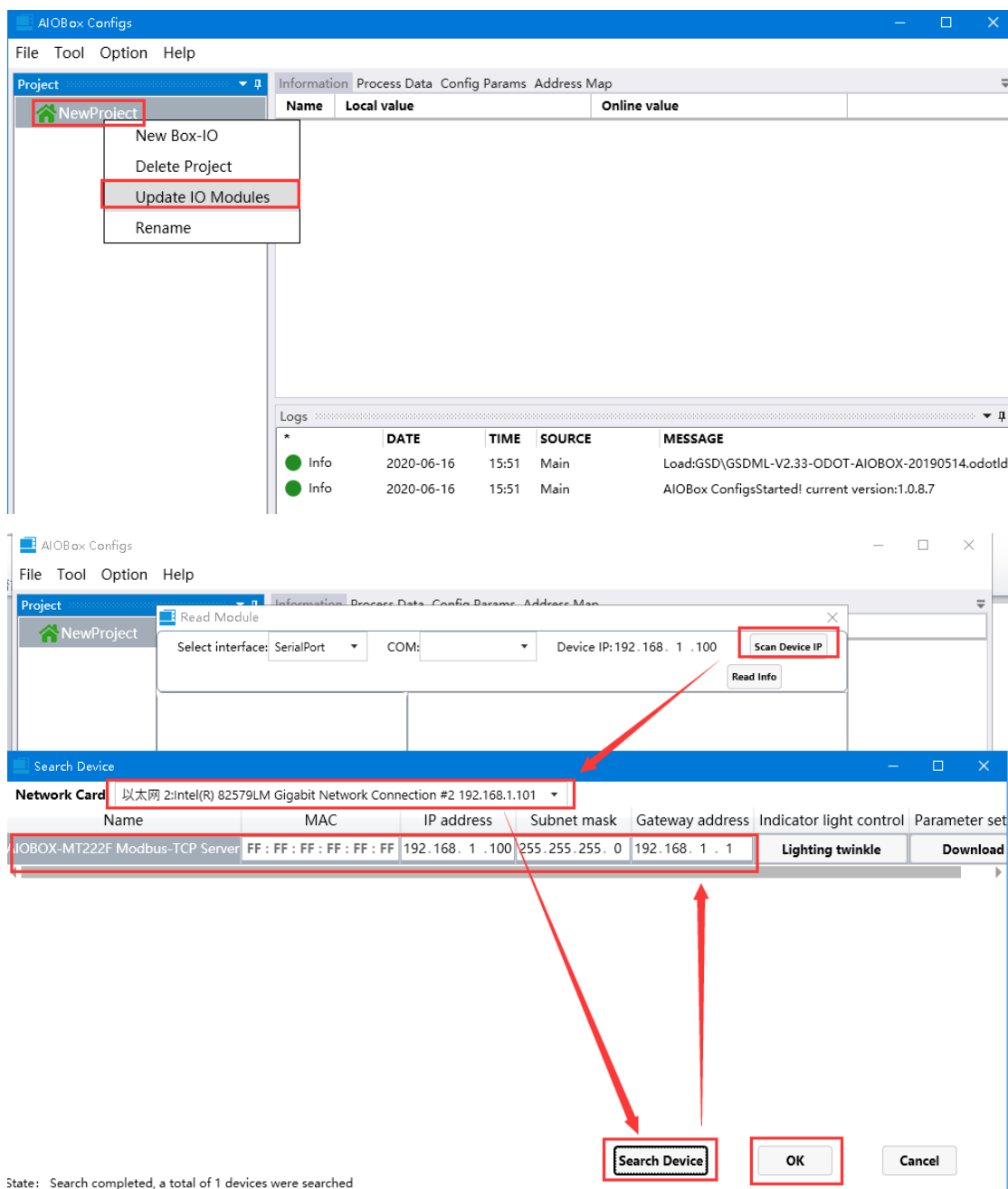
1. Double-clicking on my computer, open the network and sharing center under the control panel, and set the COMPUTER IP and module IP in the same network segment. If the default IP of module is 192.168.1.100, then the IP of computer should be 192.168.1. (1.. 99, 101.. 254).



2. After installing AIO-Box config software, opening the configuration software, clicking File → Project → New Project in the menu bar, or right clicking Project → New Project in the project directory bar, and entering the project name manually.

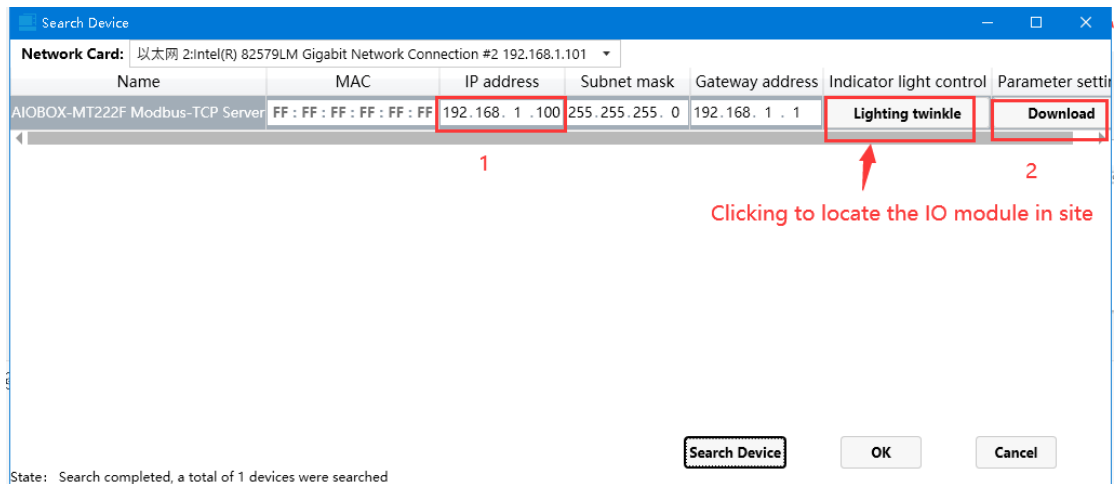


3. In the project directory bar, right-clicking the Project Name → Upload IO module, and selecting scan module in the pop-up dialog box, selecting local network card, and clicking Search Device to scan AIO-MT222F module.

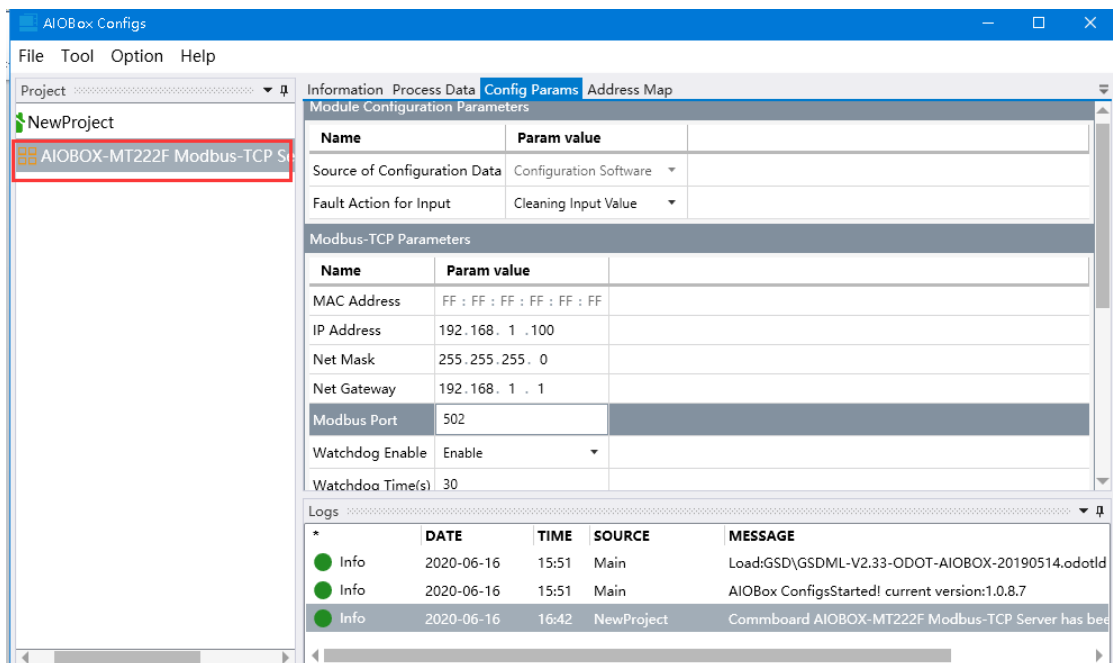


4. When there are multiple modules in the network structure, the Multiple Devices could be popped up on the scanning interface. And IP address could be directly modified on this interface, and then the actual modules in the site could be located by clicking the Lighting twinkle.

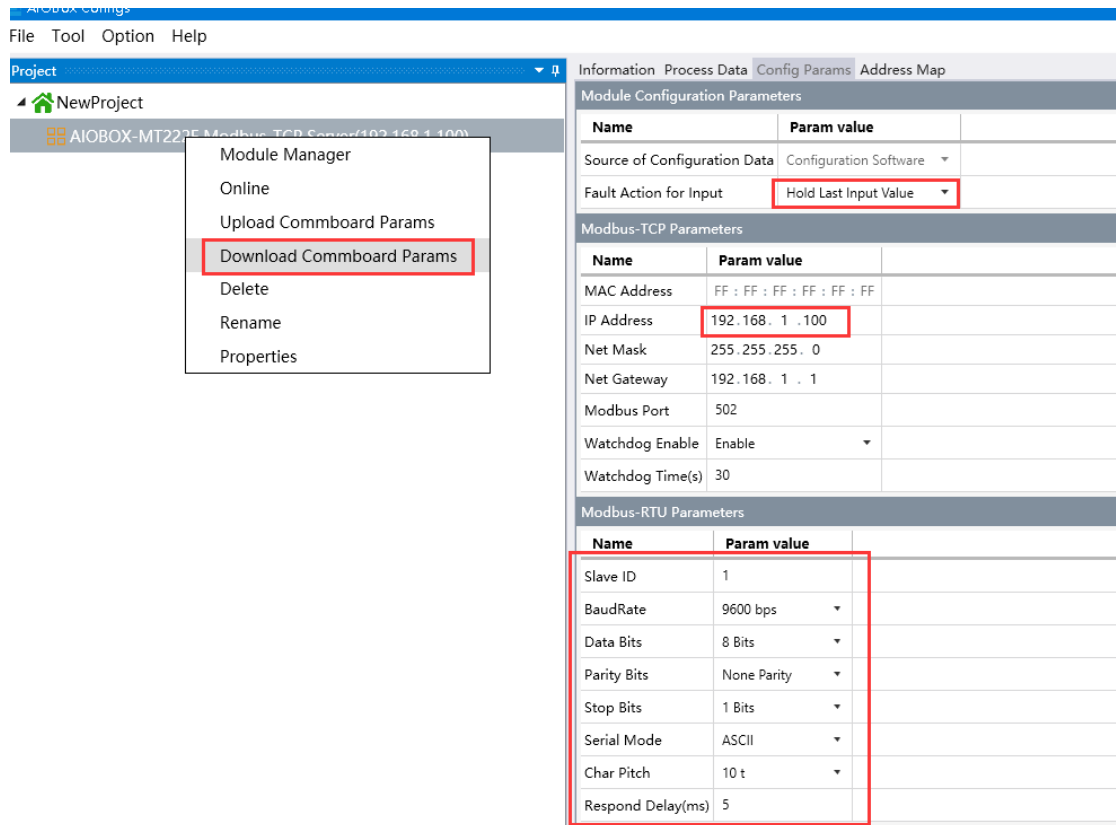




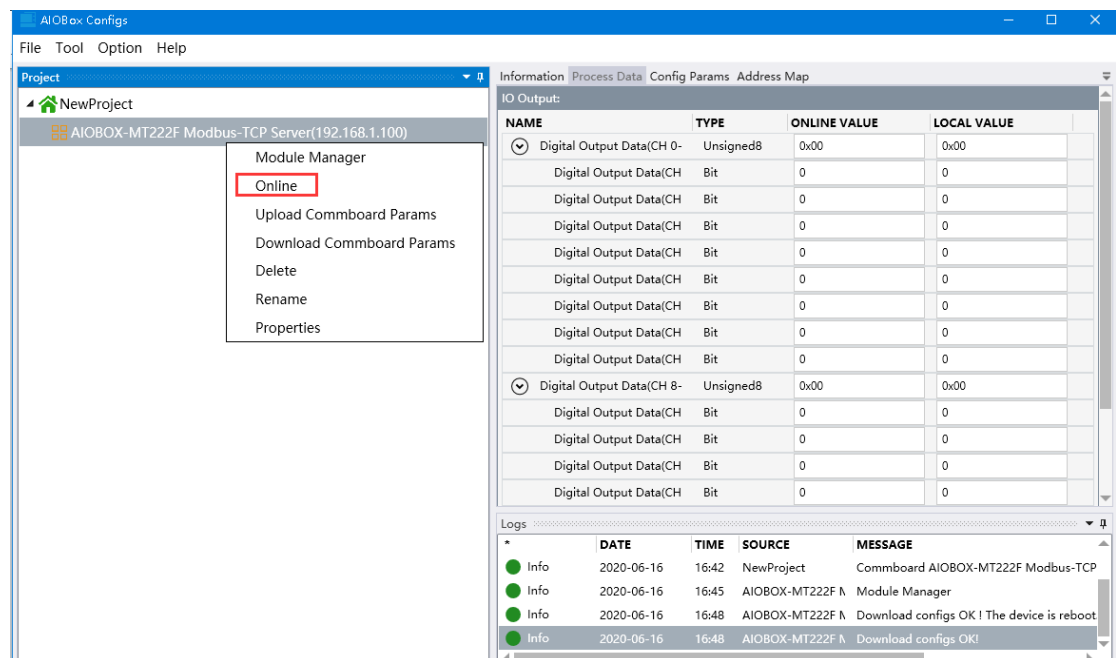
Clicking ok after it is finished, and AIOBOX-MT222F would appear in the project bar.



5. Clicking the configuration to modify the parameters, and right clicking AIOBOX-MT222F to download IO parameters

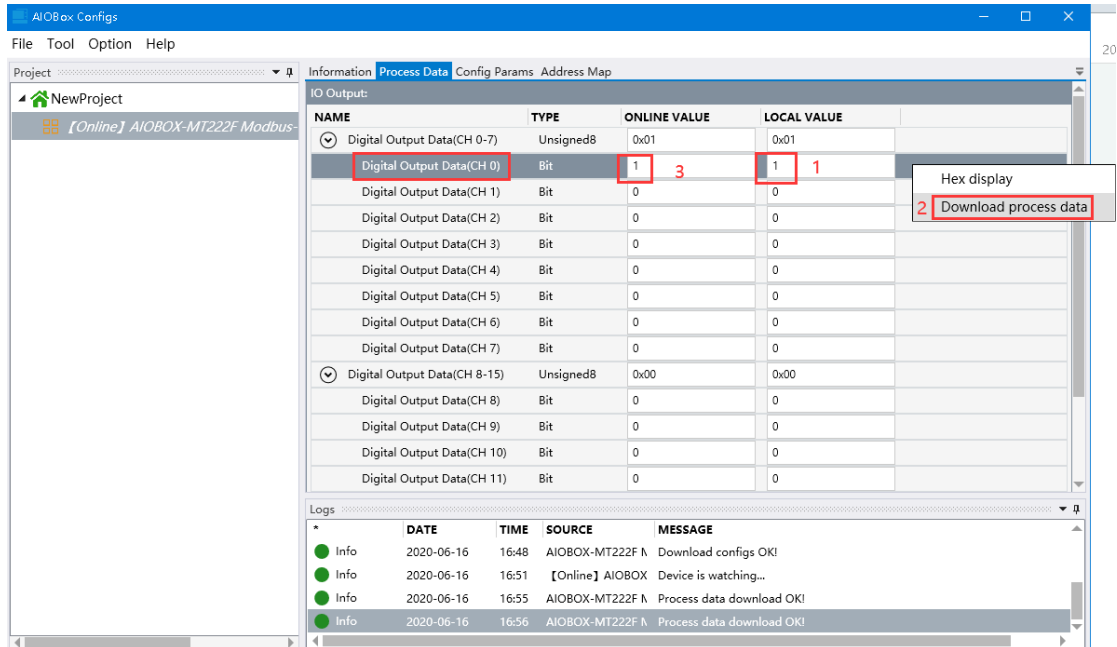


6. It could right click the adapter module AIO-MT222F to monitor the data of IO module online.



Example: selecting online mode and 24V is wired at the IO module terminal of V1+, while 0V is wired at V1-, 24V is wired at V2+, and 0V is wired at V2-. The current value of digital output (CH0) under the process data menu bar is setting to 1 and

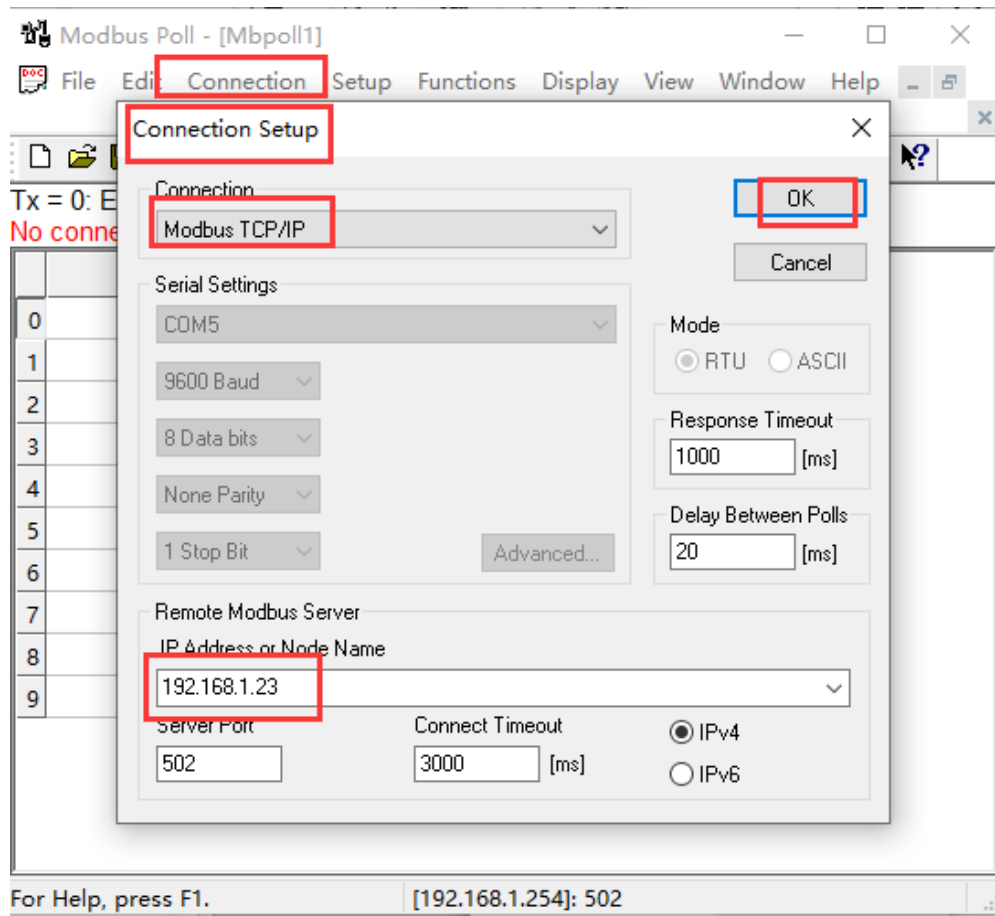
right-clicking to download the process parameters. And it could monitor the online value of IO module data in the process data interface. As it is shown in the below diagram the online value of DO0 is 1 meanwhile the DO0 indicator is lightened of the hardware AIO-MT222F.



## 4 MODBUS POLL Software Test

### 4.1 Test via the gateway Ethernet port

1. Opening the MODBUS POLL software → selecting the menu Connection/Connect → selecting the MODBUS TCP/IP → inputting gateway IP address 192.168.1.23 → setting Server Port to 502, and clicking OK.



2. Selecting Setup → Read/Write Definition → selecting function code 15, and clicking OK.

**Read/Write Definition**

Slave ID:  OK

Function: 15 Write Multiple Coils Cancel

Address:  Protocol address. E.g. 10011 -> 10

Quantity:

Scan Rate:  [ms] Apply

Disable

☐ Read/Write Disabled

☐ Disable on error Read/Write Once

View

Rows

☒ 10 ☐ 20 ☐ 50 ☐ 100 ☐ Fit to Quantity

☐ Hide Alias Columns ☐ PLC Addresses (Base 1)

☐ Address in Cell ☐ Enron/Daniel Mode

**Modbus Poll - [Mbpoll1]**

File Edit Connection Setup Functions Display View Window Help

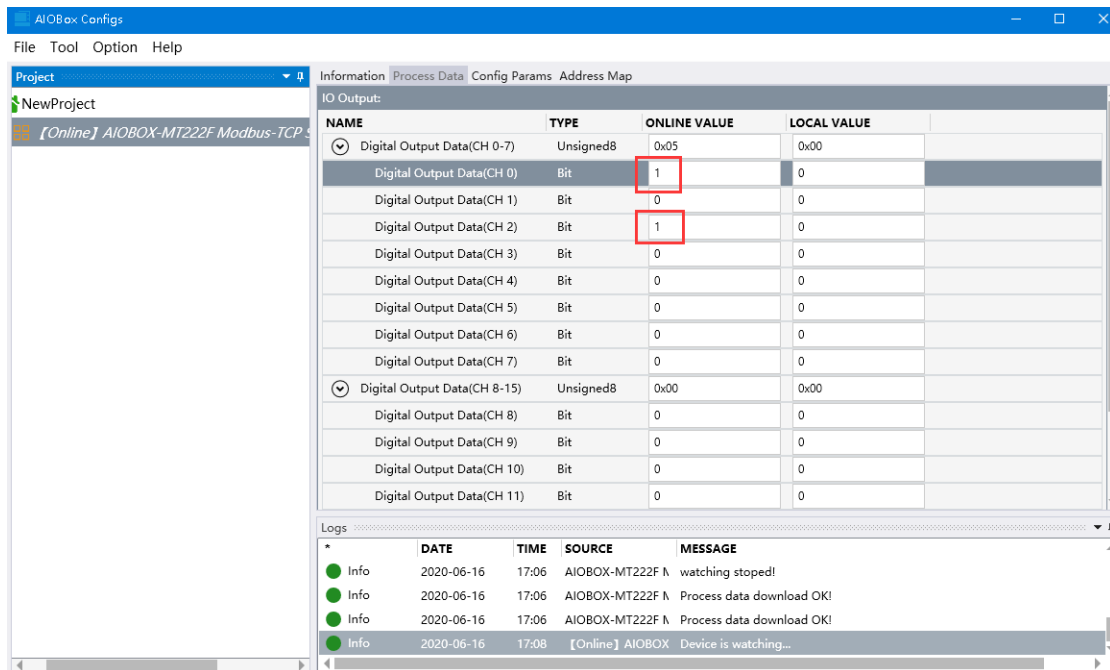
05 06 15 16 17 22 23 TC ? ?

Tx = 8: Err = 0: ID = 1: F = 15: SR = 1000ms

	Alias	00000
0		<span style="border: 1px solid red;">1</span>
1		0
2		<span style="background-color: blue; color: white;">1</span>
3		0
4		0
5		0
6		0
7		0
8		0
9		0

For Help, press F1. [192.168.1.23]: 502

3. Input 1 in the corresponding channel of Modbus poll, as it shows below, input 1 in the CH0 and CH2, then opening AIO-Box configuration software, and selecting online. And then below the process data menu bar, it could be checked the by the corresponding channel online value to see its corresponding channel value is 1 too. So the test is completed, as it is shown in the below diagram:



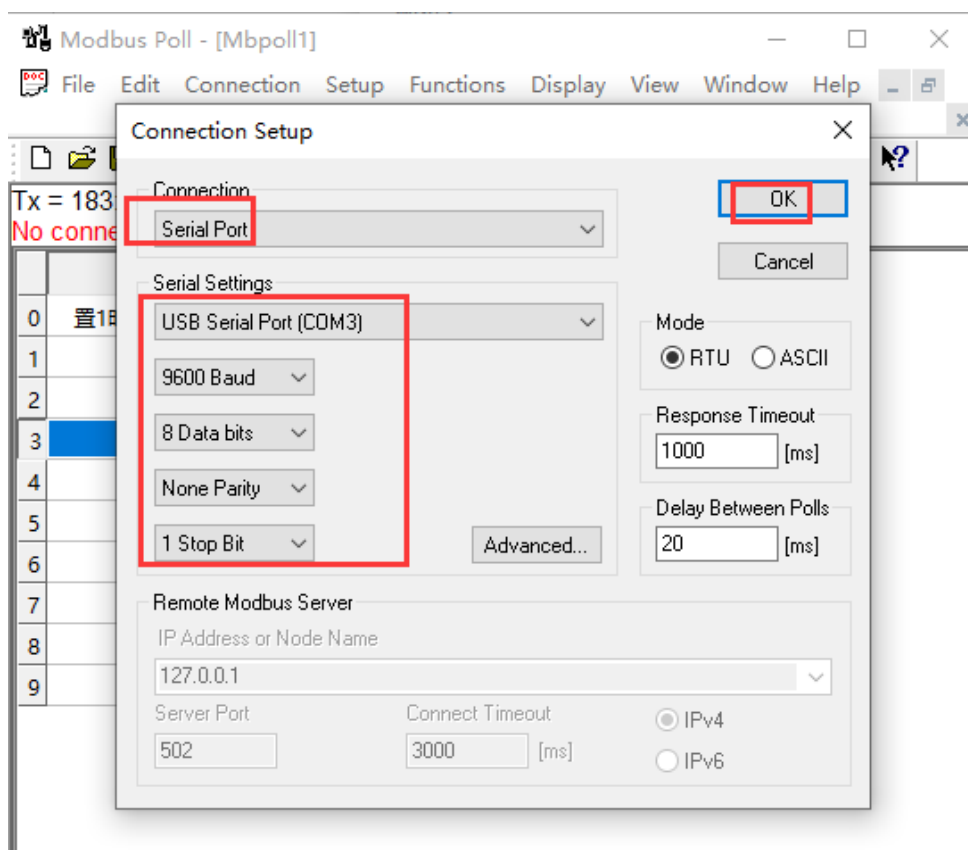
## 4.2 Test via the gateway serial port

1. It uses RS485 port A+ and B- to separately connect with A+ and B- of the serial port debugging tool. And it uses the USB cable to connect the serial port debugging tool with the PC.

2. Selecting Computer → Right-clicking and selecting properties → Opening device manager to check COM port(here it is COM3) of the serial port debugging tool.



3. Opening Modbus POLL → selecting Connection/connect → selecting Serial Port → selecting the USB COM port in Serial settings → selecting Modbus RTU parameters same with the gateway parameters.

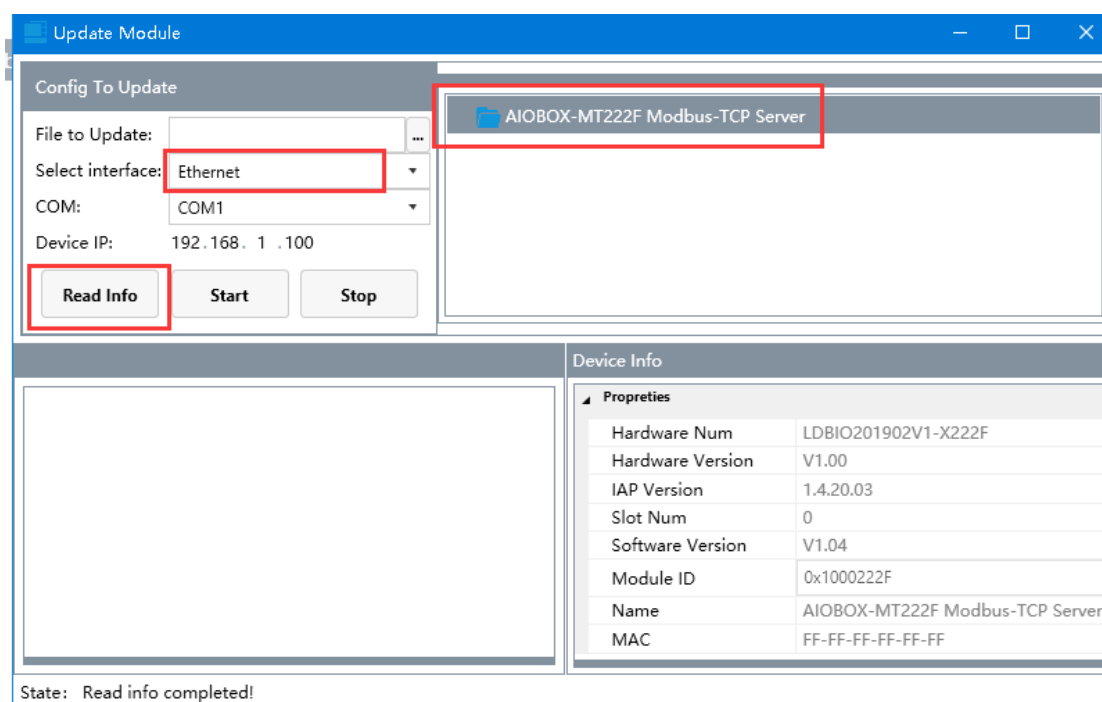
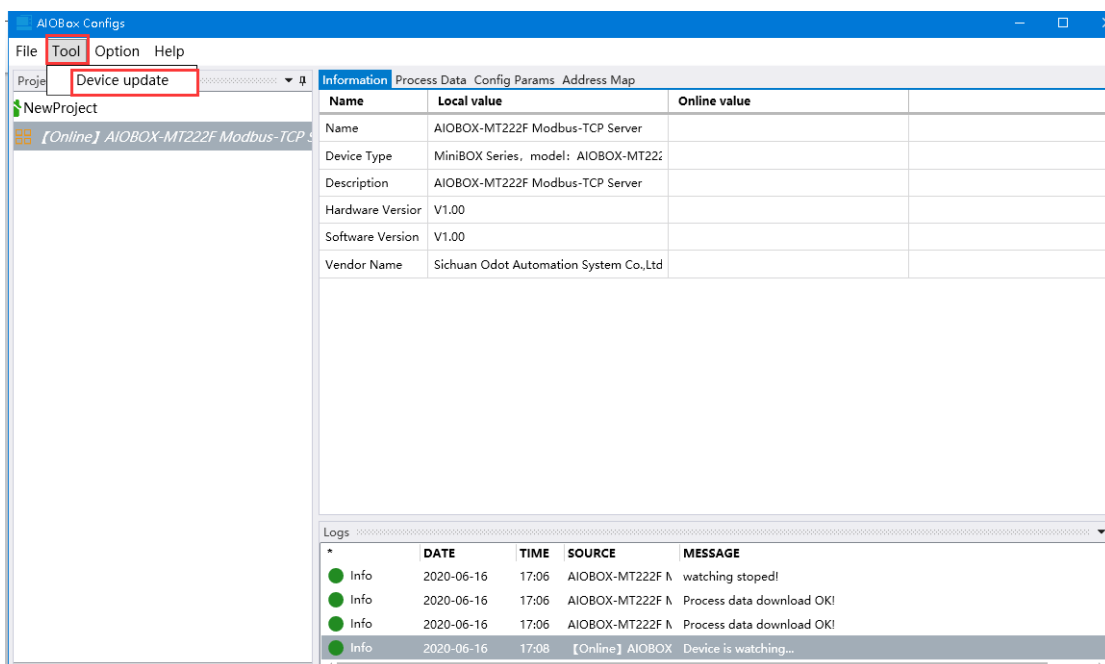



After the connection is established, the data control function code imitates the network interface communication

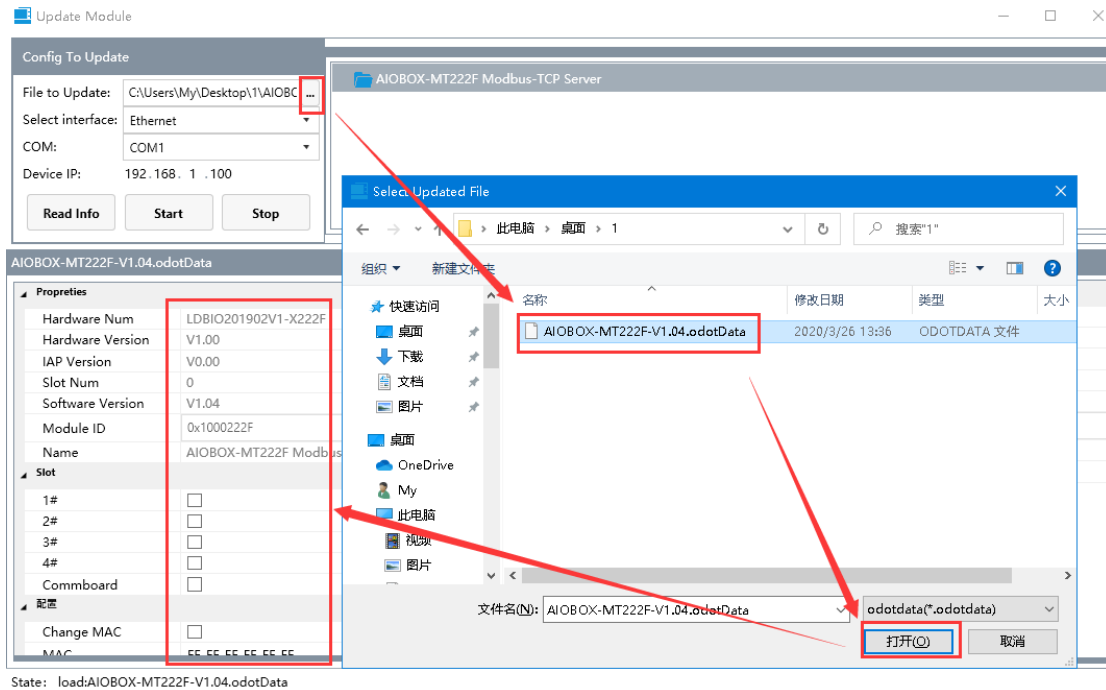
## 5 Device firmware upgrade

1. In the configuration software of AIO-Box, it could click Tools-Online upgrade → selecting "Ethernet" in the pop-up dialog box → clicking "Read Device Information" to view the version information of the current adapter module.

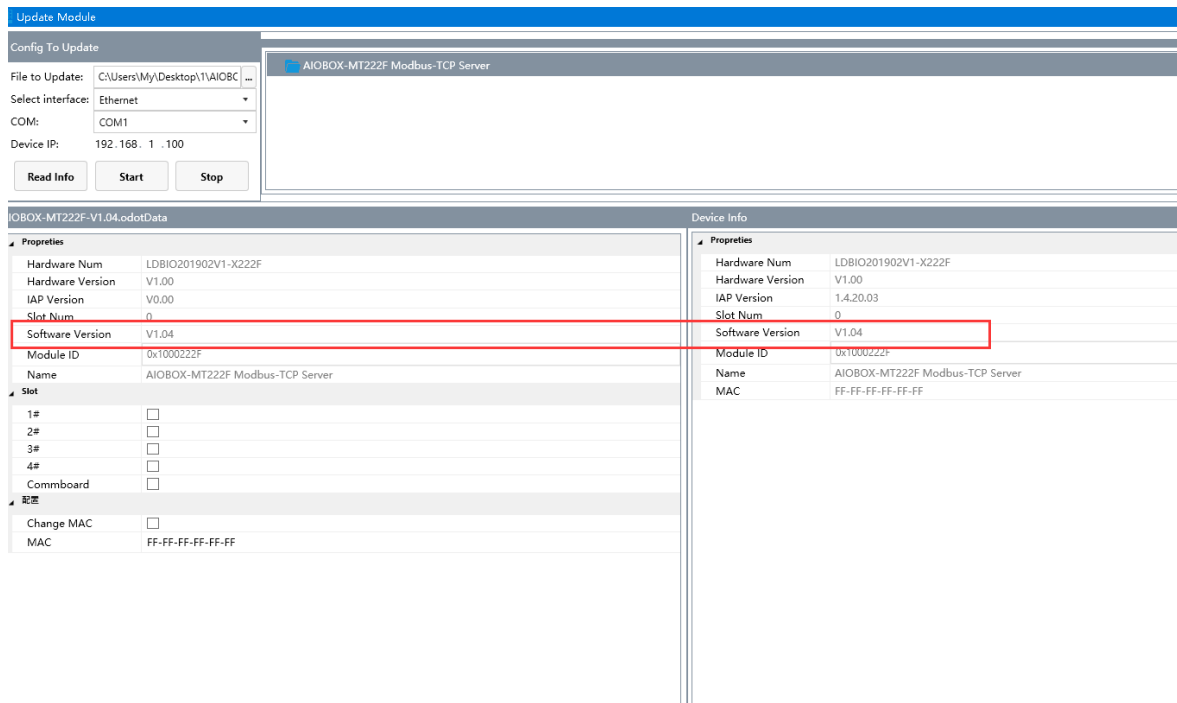




2. Clicking the  on the right side of the upgrade menu, and selecting upgrade file of adapter module AIO-MT222F in the pop-up window.



3. The upgrade version and other information could be viewed in the lower left side of the upgrade interface. As it is shown in the below diagram, the firmware version does not need to be updated. If the version information is inconsistent and you need to upgrade, so it needs to click the Start upgrading.



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