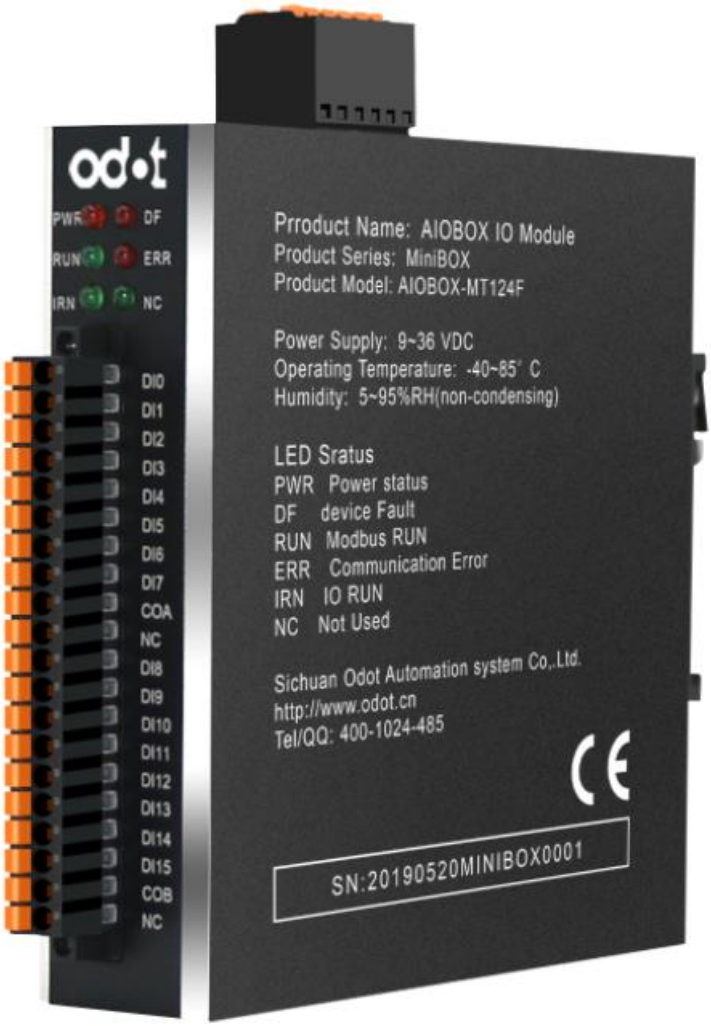
AIO-MT124F
MiniBOX IO Module

User Manual

V1.0

2019.11.01

MODBUS 16 channels digital input module



Sichuan Odot Automation System Co., Ltd

2019-6

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Version information

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

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Software Download

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Contents

1 Product Overview

1.1 Product Introduction

MiniBox series IO module: AIO-MT124F is an Ethernet based integrated IO module, with 16 input 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, supports source & sink input, supports channel tally function
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 Input
Working Temperature	-40~85℃
Serial Port Baud Rate	1200-115200bps
IP Level	IP20
RS485 Node	Could be configured, Default：1
Power	Max.60mA@24.0Vdc
Isolation	I/O to internal bus： Optocoupler isolation（3KVrms)
Wiring	I/O Wiring：Max.1.5mm(AWG-16)

Weight	330g
Dimension	110*110*28mm(L*W*H)
Installation	Standard DIN rail 35mm
Input Parameter	
Channel Numbers	16 Channels
Indicator	16pcs green channels input indicators
Input Type	Source(0V) & Sink(24V) input
Input Isolation	2500Vrms Optocoupler isolation, isolation voltage 2500Vrms
Input Current	MAX: ±15mA
Turn-on Voltage	High input:Min.10Vdc to Max.28Vdc (COM: 0Vdc)
	Low input:Min.0Vdc to Max.14Vdc (COM: 24Vdc)
Low Voltage Shutdown	High input:Max.5Vdc (COM: 0Vdc)
	Low input:Min.19Vdc (COM: 24Vdc)
Firing Current	Min.6mA/Channels@14V, Max.15mA/ Channels @28V
Input Impedance	>1.8kΩ
Input Delay	OFF to ON :Max.3ms
	ON to OFF :Max.2ms
Filtering Time	Default 10ms
Sampling Rate	500Hz
Count Frequency	<200Hz
Others	Each input channel supports 32-bit counters; Digital signal input filter time and counter data transmission sequence is configurable; Counting mode and counting direction could be configured separately for each channel.

2 Hardware Description

2.1 Appearance

2.2 Indicator Description

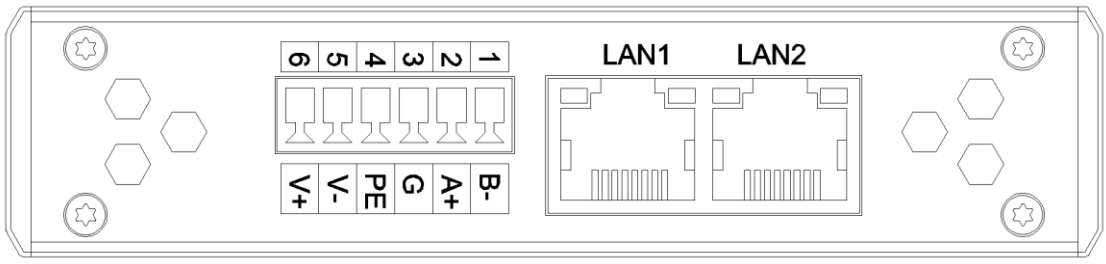
Symbol	Definition	Status

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
NC	Empty	Empty

2.3 System Power and Communication Interface

A. System Power and Communication Ports Definition

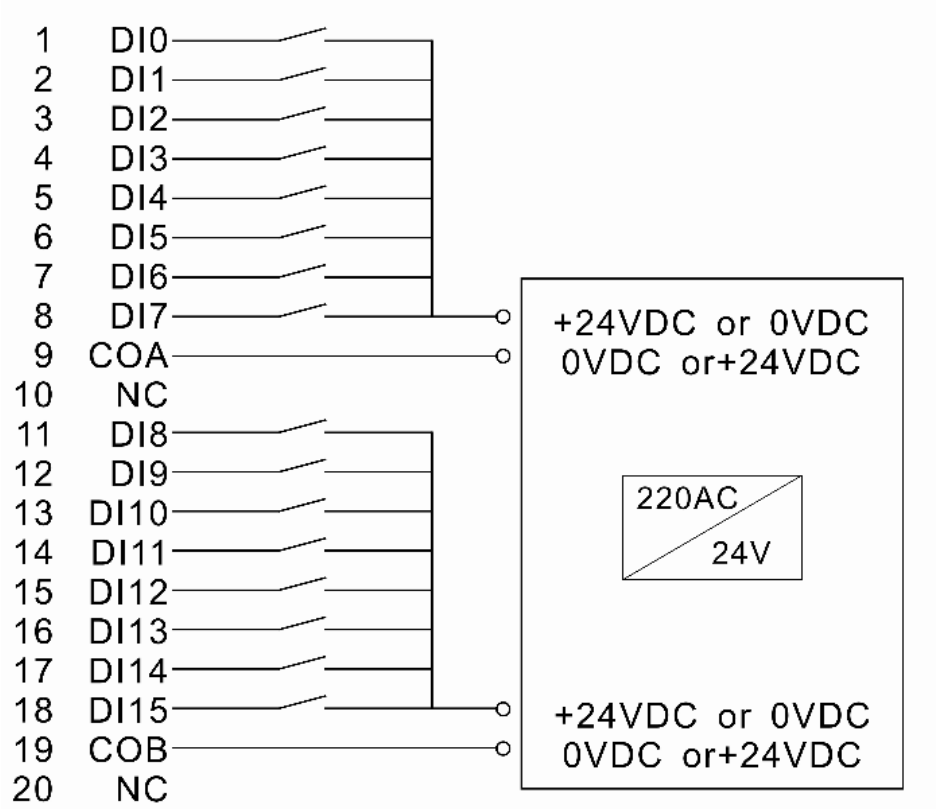
It supports standard Modbus-TCP and Modbus-RTU/ASCII protocol access. The Ethernet supports cascade function of dual Ethernet port switch, and the serial port supports RS485 bus connection mode.



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 input module AIOBOX-MT124F has 16 digital input 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	DI0	Input Signal	11	DI8	Input Signal
2	DI1	Input Signal	12	DI9	Input Signal
3	DI2	Input Signal	13	DI10	Input Signal
4	DI3	Input Signal	14	DI11	Input Signal
5	DI4	Input Signal	15	DI12	Input Signal
6	DI5	Input Signal	16	DI13	Input Signal
7	DI6	Input Signal	17	DI14	Input Signal
8	DI7	Input Signal	18	DI15	Input Signal
9	COMA	+24V/0V	19	COMB	+24V/0V
10	NC	Grounding	20	NC	Grounding

2.4 Modbus MAC Address

Register address	Low limit value	High limit value	Reset Value	Read/ Write	Description
10001-10016	0	1	0	Read	DI0-DI15 digital input
30001-30032	0	4294967295	0	Read	DI0-DI15 count value
00001-00016	0	1	0	Write	DI0-DI15 Counter reset

Note: The Input channel count frequency is Max. up to 200Hz. When the Input Signal exceeds this frequency and the count result may be inconsistent with the actual value.

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

Dada 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

Module channel configuration parameters								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 34	Input Filtering Time							
Byte 35								
Byte 36	Counter Value Data Format							
Byte 37	Input holding time							
Byte 38								
Byte 39	Storage enable							
Byte 40	Count Mode Ch#3		Count Mode Ch#2		Count Mode Ch#1		Count Mode Ch#0	
Byte 41	Count Mode Ch#7		Count Mode Ch#6		Count Mode Ch#5		Count Mode Ch#4	
Byte 42	Count Mode Ch#11		Count Mode Ch#10		Count Mode Ch#9		Count Mode Ch#8	

Byte 43	Count Mode Ch#15		Count Mode Ch#14		Count Mode Ch#13		Count Mode Ch#12	
Byte 44	Count Direction Ch#7	Count Direction Ch#6	Count Direction Ch#5	Count Direction Ch#4	Count Direction Ch#3	Count Direction Ch#2	Count Direction Ch#1	Count Direction Ch#0
Byte 45	Count Direction Ch#15	Count Direction Ch#14	Count Direction Ch#13	Count Direction Ch#12	Count Direction Ch#11	Count Direction Ch#10	Count Direction Ch#9	Count Direction Ch#8

Data description：

Input Filtering Time(ms)：channel input filtering time，unit ms (Default：10)

Counter Value Data Format：The byte transfer sequence of channel count value (Default：0)

0：A-B-C-D

1：B-A-D-C

2：C-D-A-B

3：D-C-B-A

Input Holding Time(ms): input holding time，unit ms (Default：disable)

Storage Enable: storage enabled (Default：disable)

Count Mode Ch#(0-15)：input channel count mode (Default：0)

0：Rising edge count

1：Falling edge count

2：Double edge count

Count Direction Ch#(0-15): input channel count direction (Default：0)

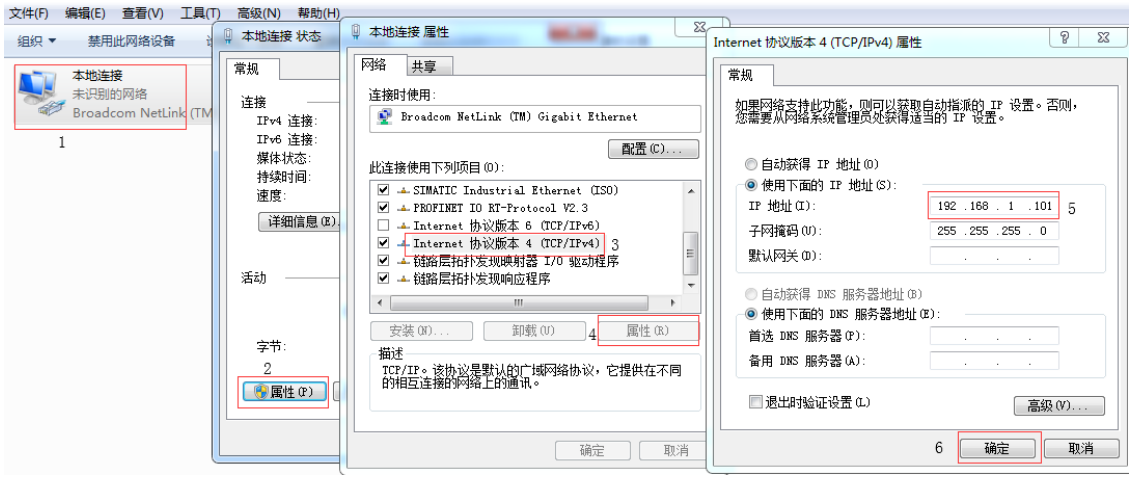
0：Counting up

1：Counting down

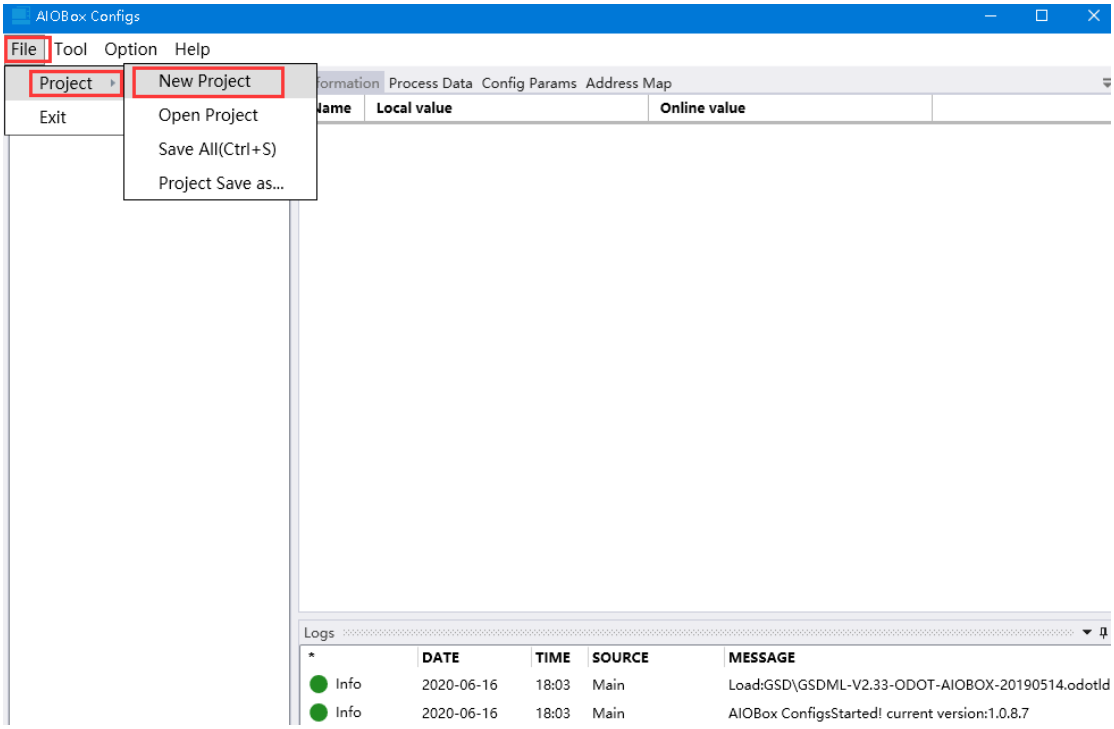
2.6 Installation Dimension

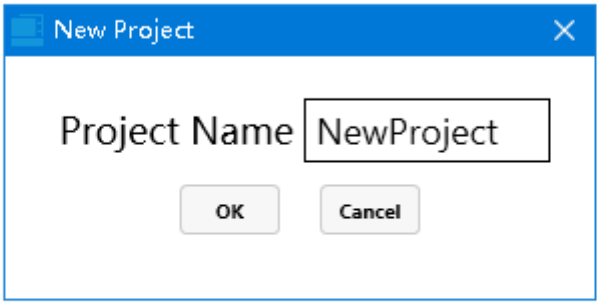
3 Configuration Software Usage

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. X（1<X<254,X≠100）

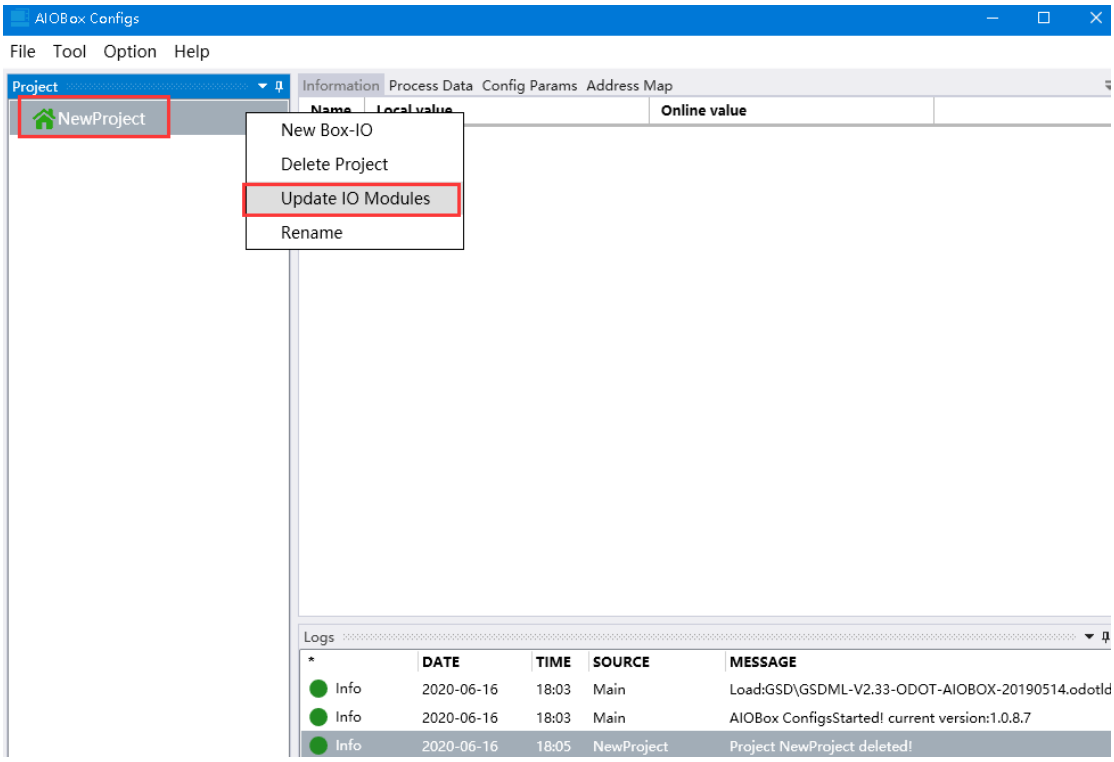


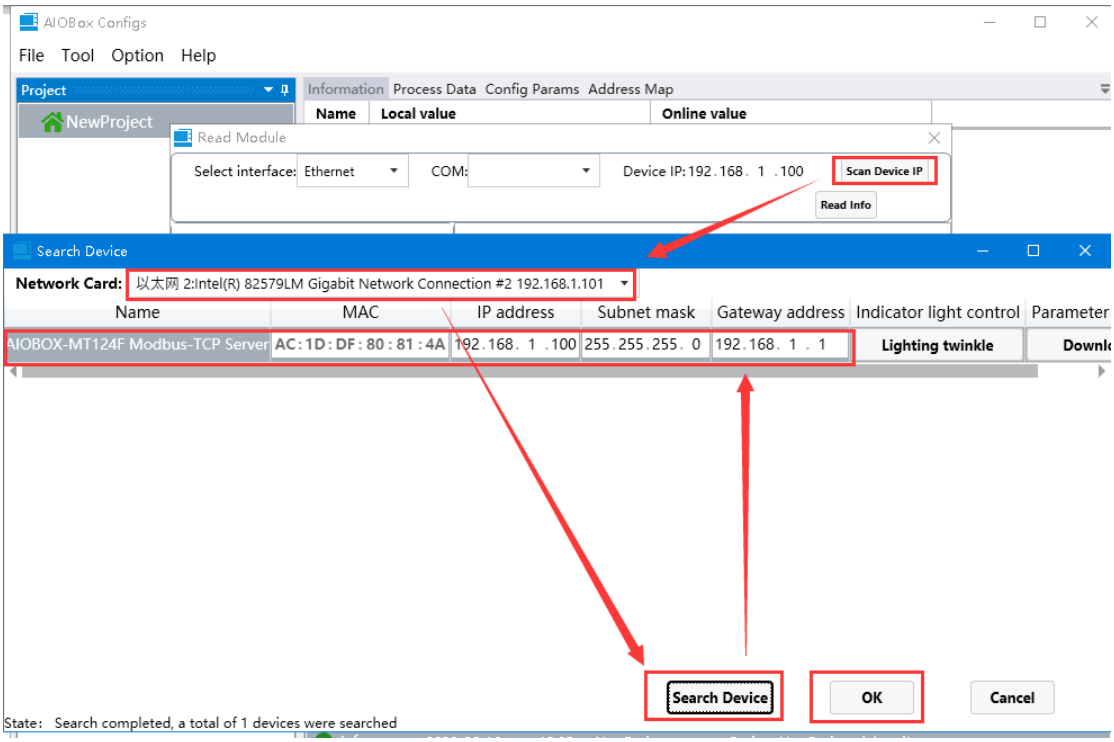
2 .After installing AIO-Box config software, opening the configuration software, clicking File → Project → New Project in the menu bar, or right clicking Project → New Project in the project directory bar, and entering the project name manually.





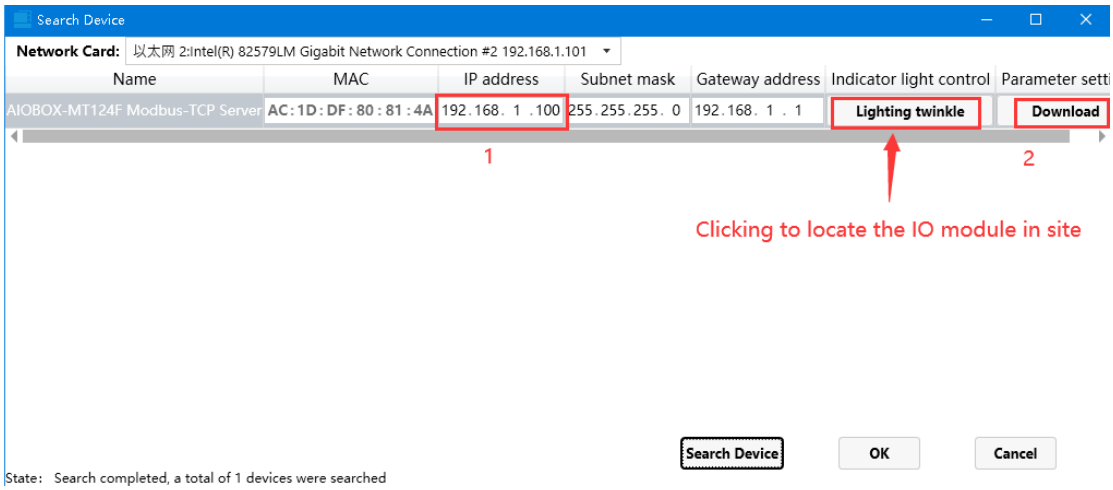
3. In the project directory bar, right-clicking the Project Name → Upload IO module, and selecting scan module in the pop-up dialog box, selecting local network card, and clicking Search Device to scan AIO-MT124F module.



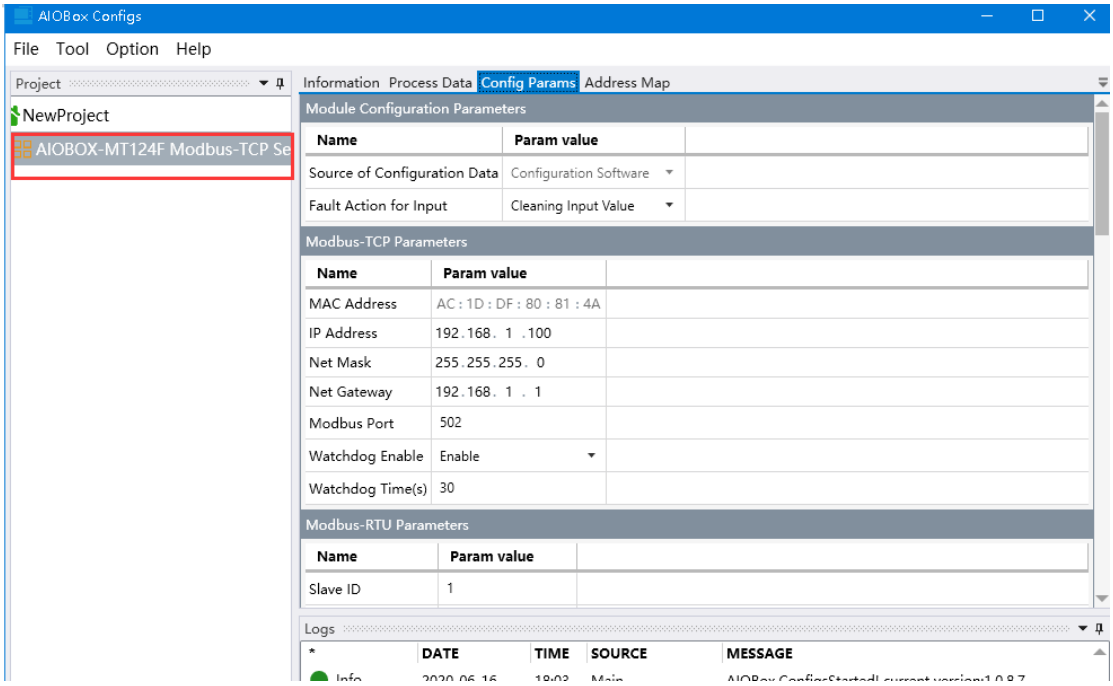


4. When there are multiple modules in the network structure, the Multiple Devices could be popped up on the scanning interface. And IP address could be

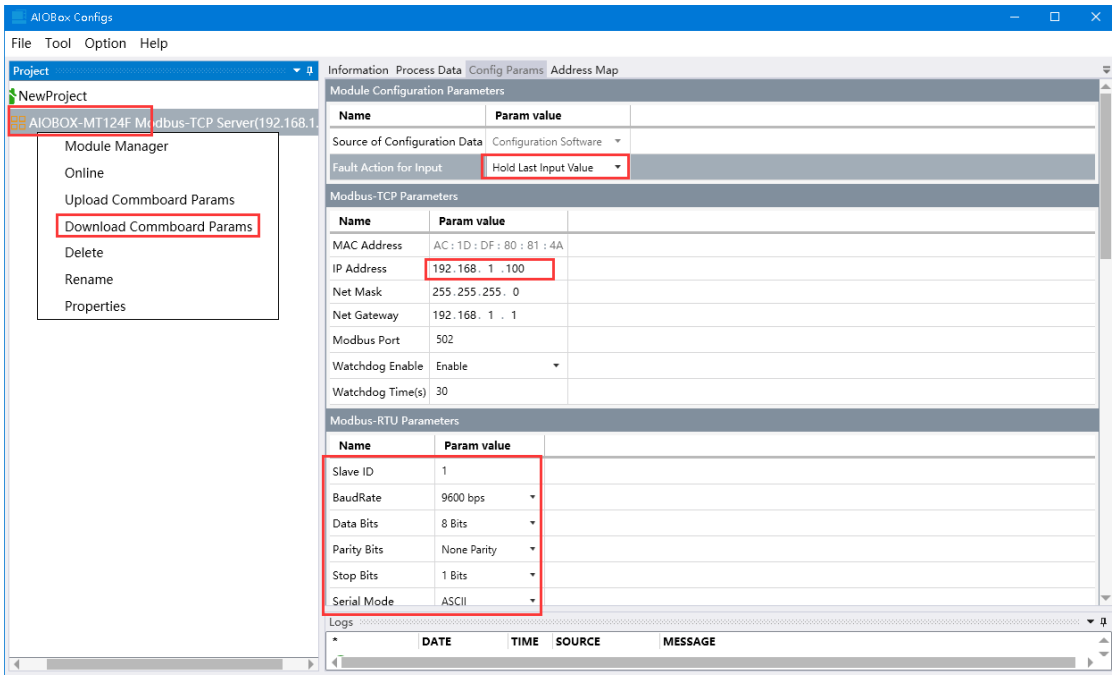
directly modified on this interface, and then the actual modules in the site could be located by clicking the Lighting twinkle.



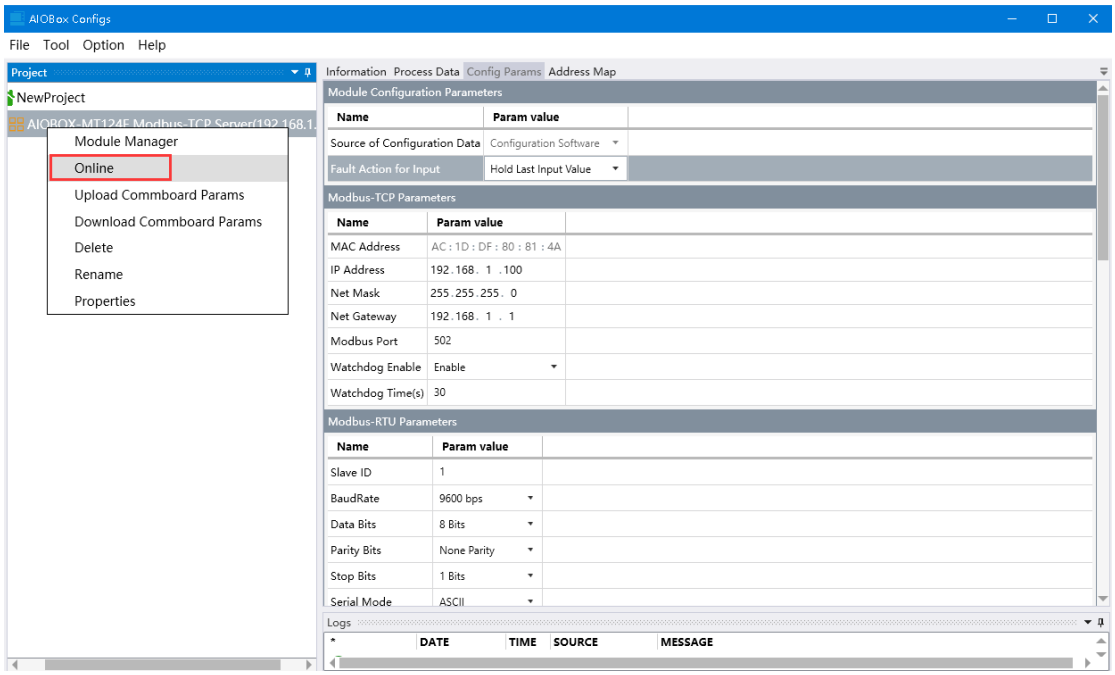
Clicking ok after it is finished, and AIOBOX-MT124F would appear in the project bar.



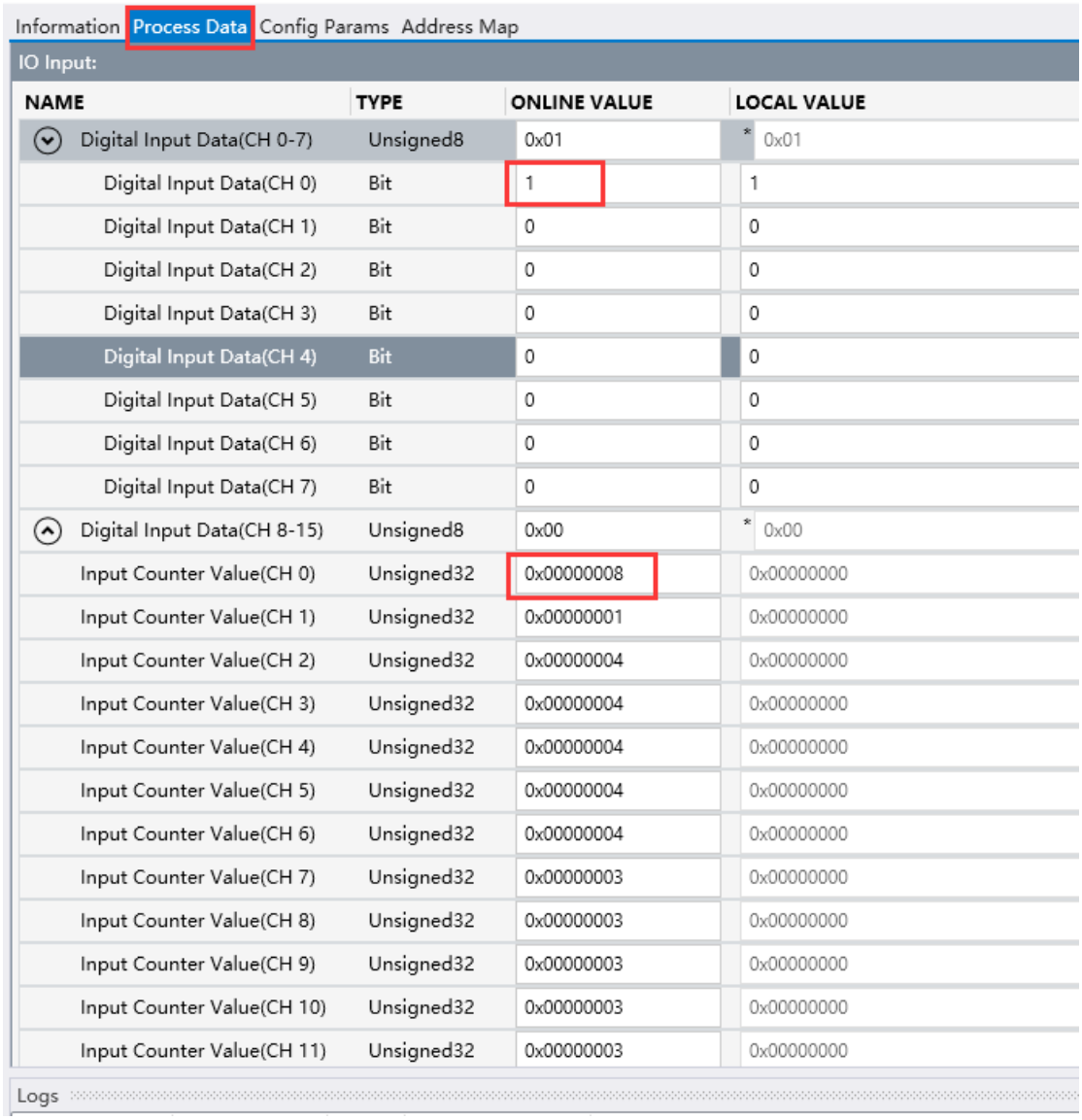
5. Clicking the configuration to modify the parameters, and right clicking AIOBOX-MT124F to download IO parameters



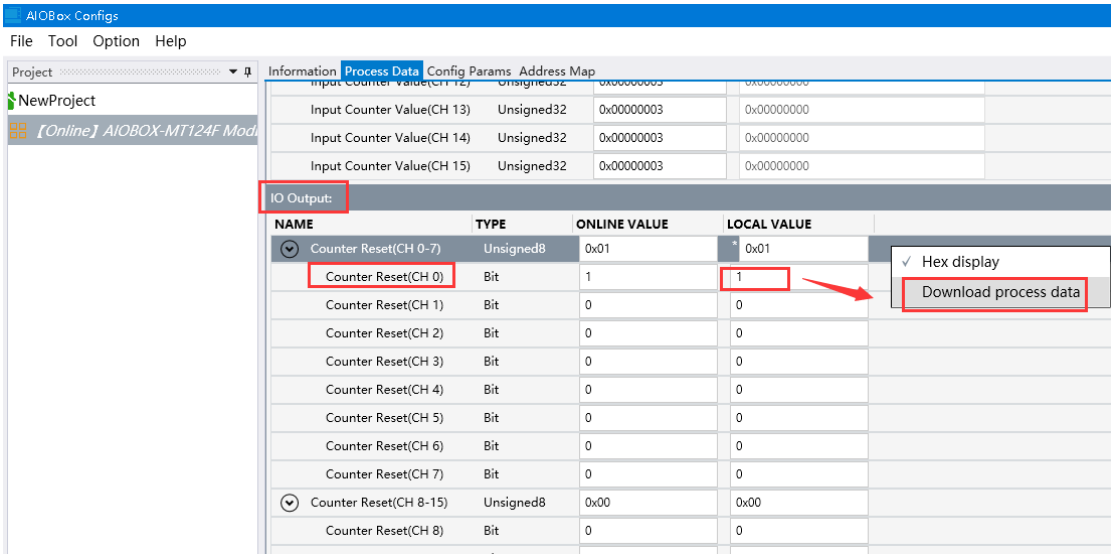
6. It could right click the adapter module AIO-MT124F to monitor the data of IO module online.

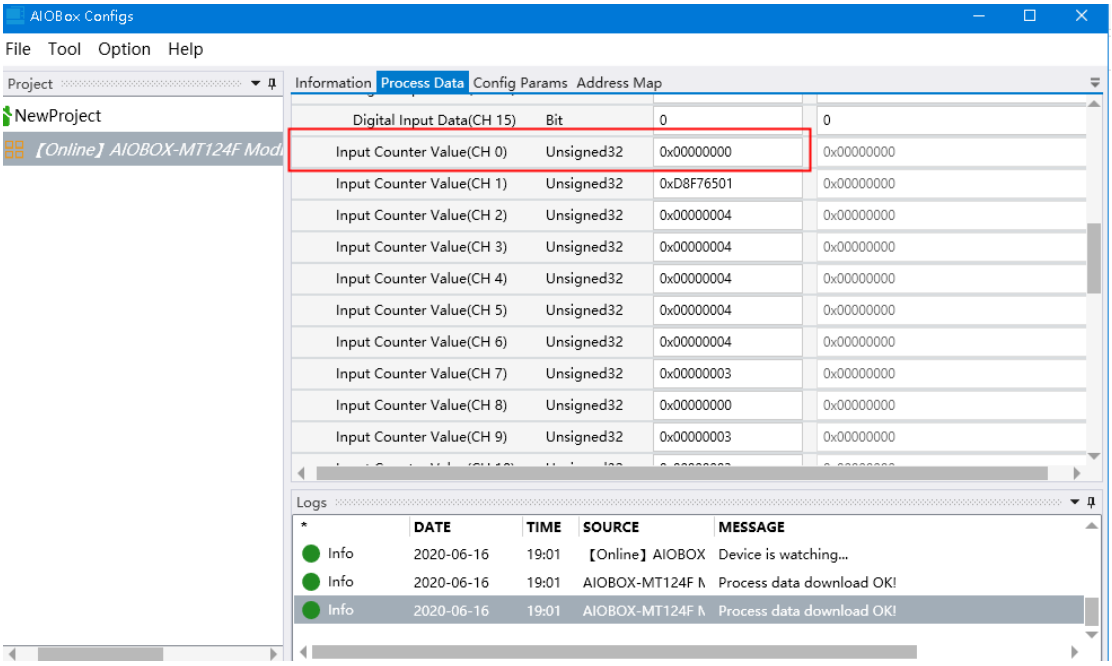


Example: Wiring at the IO module terminal of COMA into 0V, and wiring at DI0 into 24CDC, at this moment it is a sink mode (channels of DI0-DI15 are workable with 24VDC). And it could monitor the IO module data in the process data interface. As it is shown in the below diagram the DI0 was given of 24VDC signals for 8 times.



Set the current value of count clearing channel CH0 to 1, and then right-click in the blank to download the process parameters. It could make zero clearing for CH0 channel input counter.

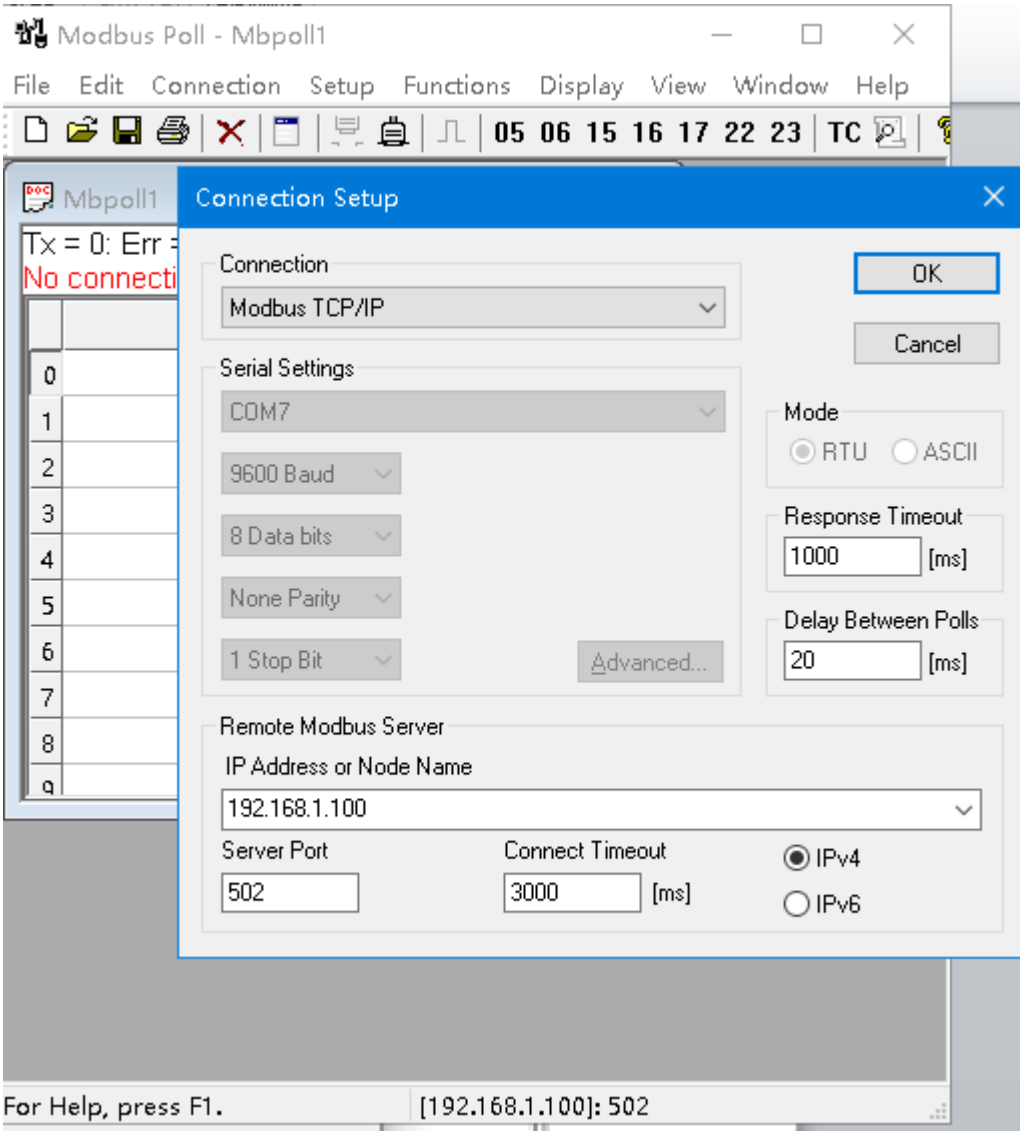

AIOBox Configs
File Tool Option Help
Project
NewProject
【Online】AIOBOX-MT124F Modi
Information Process Data Config Params Address Map
Input Counter Value(CH 13) Unsigned32 0x00000003 0x00000000
Input Counter Value(CH 14) Unsigned32 0x00000003 0x00000000
Input Counter Value(CH 15) Unsigned32 0x00000003 0x00000000
IO Output:
NAME TYPE ONLINE VALUE LOCAL VALUE
Counter Reset(CH 0-7) Unsigned8 0x01 0x01
Counter Reset(CH 0) Bit 1 1
Counter Reset(CH 1) Bit 0 0
Counter Reset(CH 2) Bit 0 0
Counter Reset(CH 3) Bit 0 0
Counter Reset(CH 4) Bit 0 0
Counter Reset(CH 5) Bit 0 0
Counter Reset(CH 6) Bit 0 0
Counter Reset(CH 7) Bit 0 0
Counter Reset(CH 8-15) Unsigned8 0x00 0x00
Counter Reset(CH 8) Bit 0 0
Hex display
Download process data


AIOBox Configs
File Tool Option Help
Project
NewProject
【Online】AIOBOX-MT124F Modi
Information Process Data Config Params Address Map
Digital Input Data(CH 15) Bit 0 0
Input Counter Value(CH 0) Unsigned32 0x00000000 0x00000000
Input Counter Value(CH 1) Unsigned32 0xD8F76501 0x00000000
Input Counter Value(CH 2) Unsigned32 0x00000004 0x00000000
Input Counter Value(CH 3) Unsigned32 0x00000004 0x00000000
Input Counter Value(CH 4) Unsigned32 0x00000004 0x00000000
Input Counter Value(CH 5) Unsigned32 0x00000004 0x00000000
Input Counter Value(CH 6) Unsigned32 0x00000004 0x00000000
Input Counter Value(CH 7) Unsigned32 0x00000003 0x00000000
Input Counter Value(CH 8) Unsigned32 0x00000000 0x00000000
Input Counter Value(CH 9) Unsigned32 0x00000003 0x00000000
Logs
* DATE TIME SOURCE MESSAGE
Info 2020-06-16 19:01 【Online】AIOBOX Device is watching...
Info 2020-06-16 19:01 AIOBOX-MT124F M Process data download OK!
Info 2020-06-16 19:01 AIOBOX-MT124F M Process data download OK!

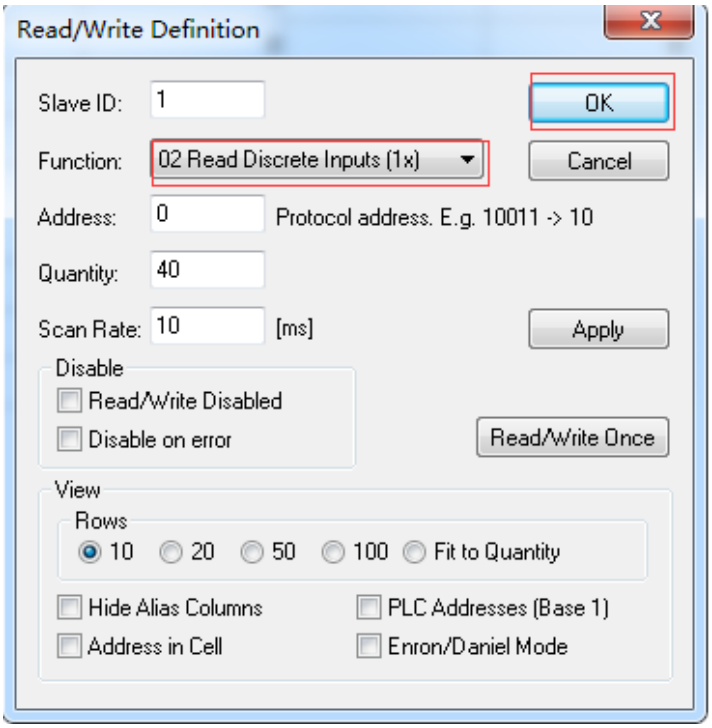
4 MODBUS POLL Software Test

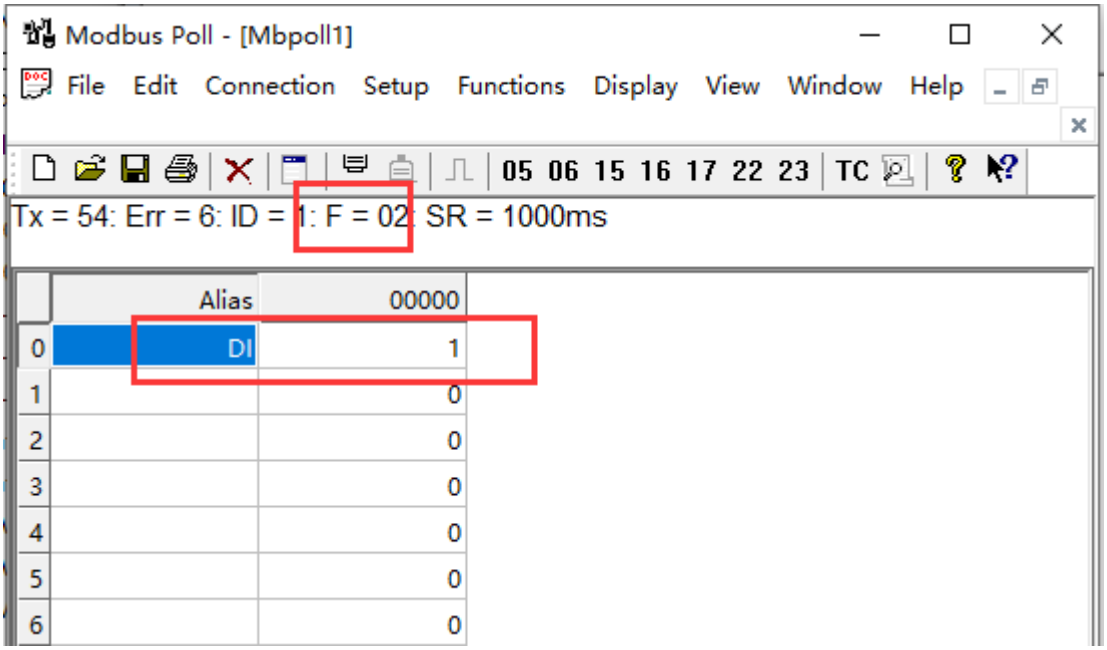
4.1 Test via the gateway Ethernet port

1. Opening the MODBUS POLL software → selecting the menu Connection/Connect → selecting the MODBUS TCP/IP → inputting gateway IP address 192.168.1.100 → setting Server Port to 502, and clicking OK.

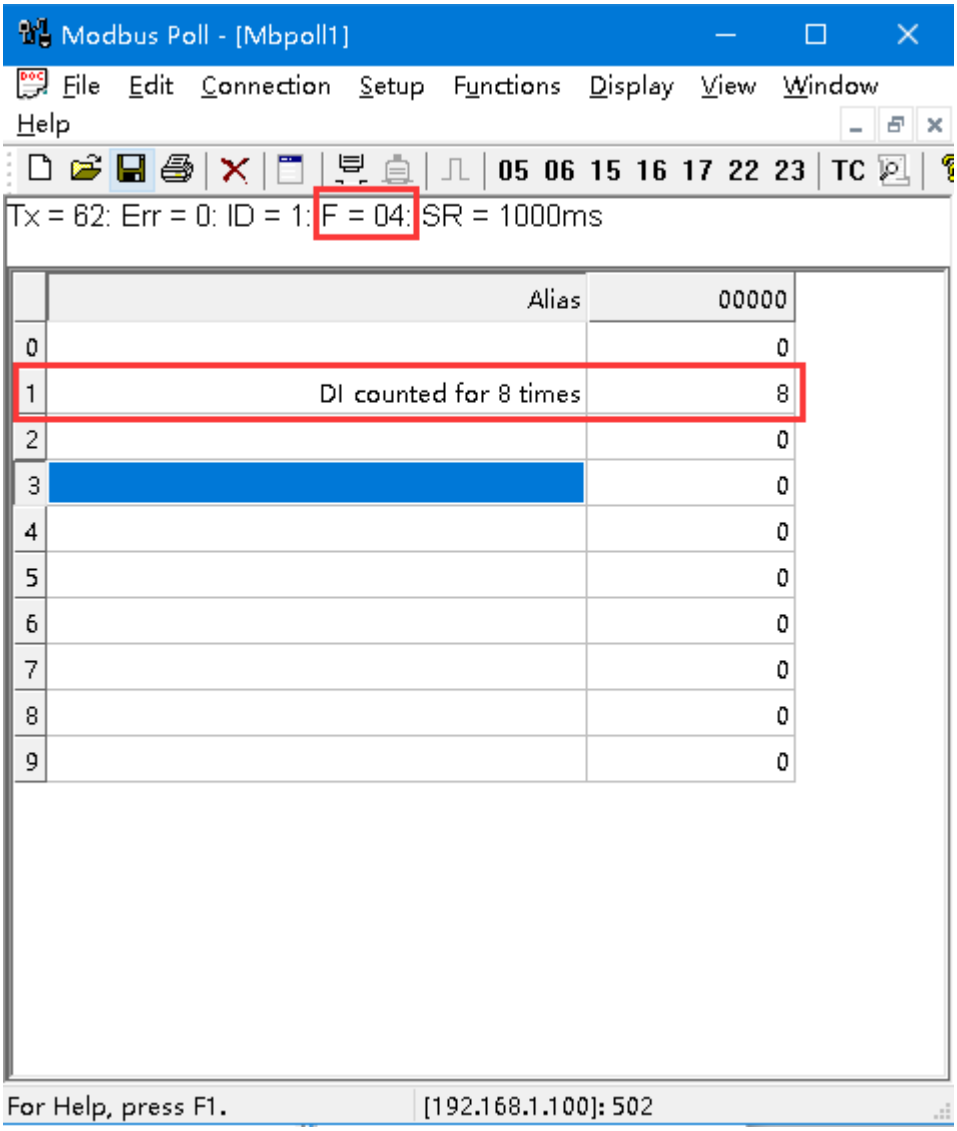


2. Selecting Setup → Read/Write Definition → selecting function code 02, and clicking OK.

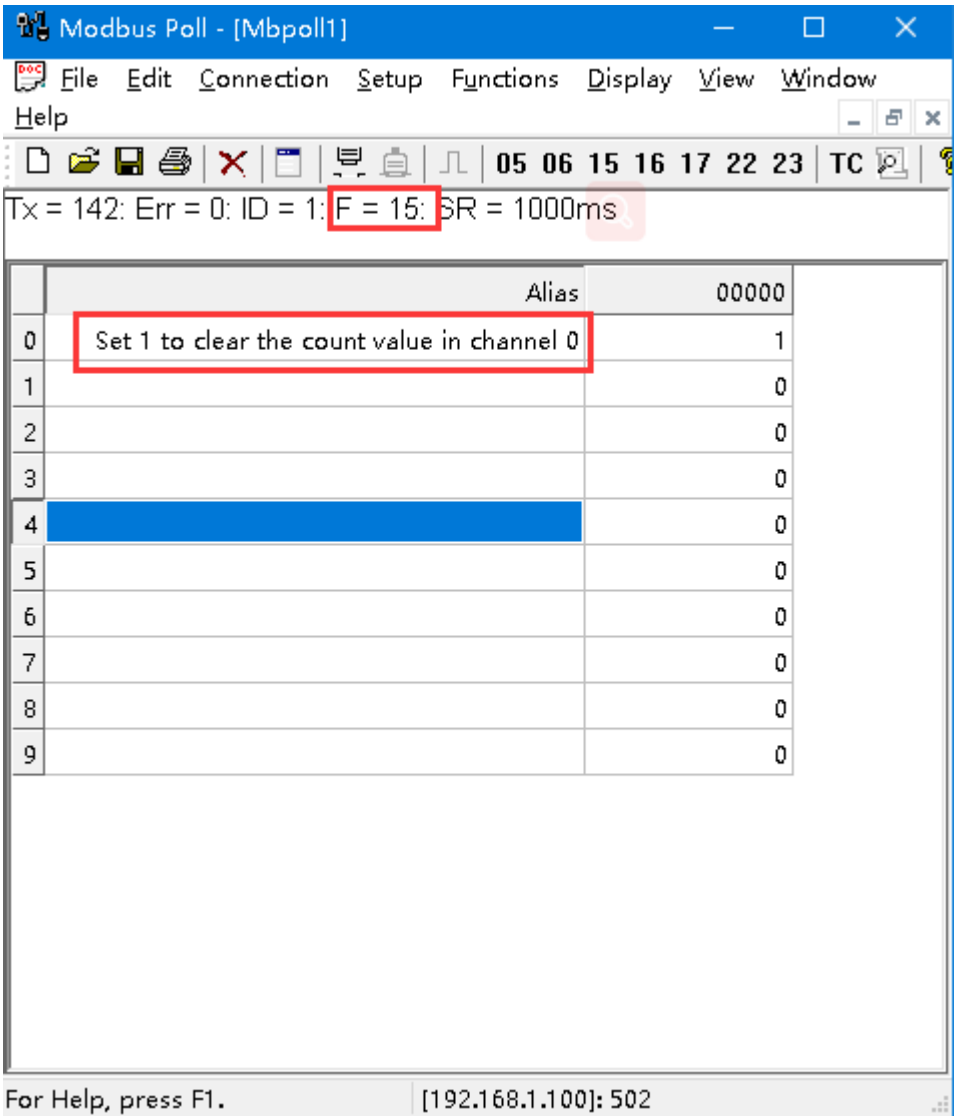




3. Selecting the menu of Step →Read/Write Definition → selecting function code 04, and clicking OK. Now the counter is 32 bits, so it is occupying two channels for 0-1.



4. Selecting the menu of Step →Read/Write Definition → selecting function code 15, and clicking OK. And write 1 at channel 0 to clear the counter.

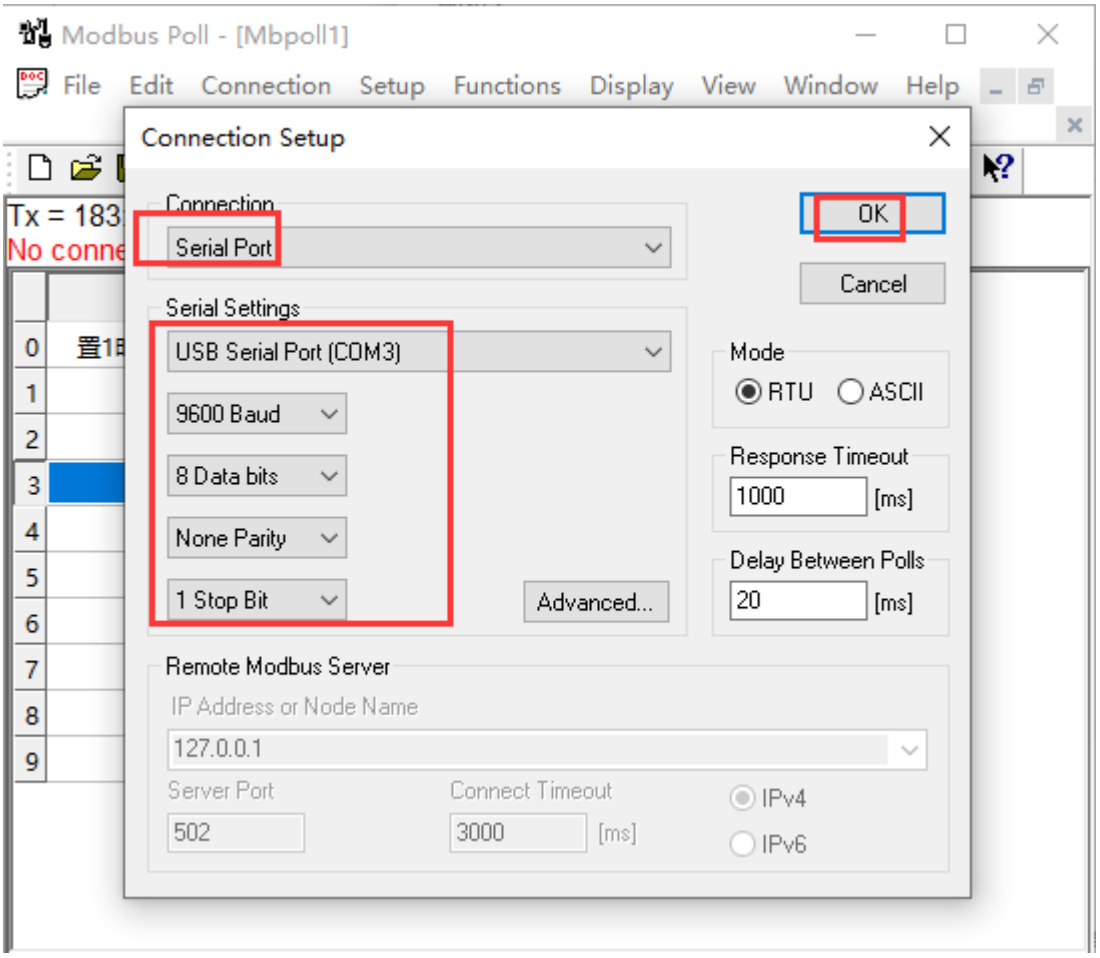


4.2 Test via the gateway serial port

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.

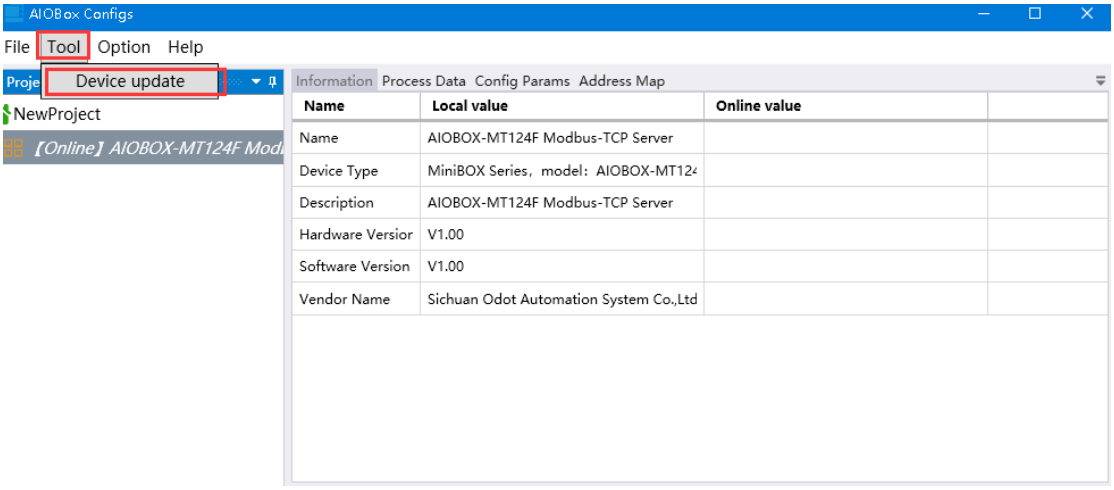
3. Opening Modbus POLL → selecting Connection/connect → selecting Serial Port → selecting the USB COM port in Serial settings → selecting Modbus RTU parameters same with the gateway parameters.

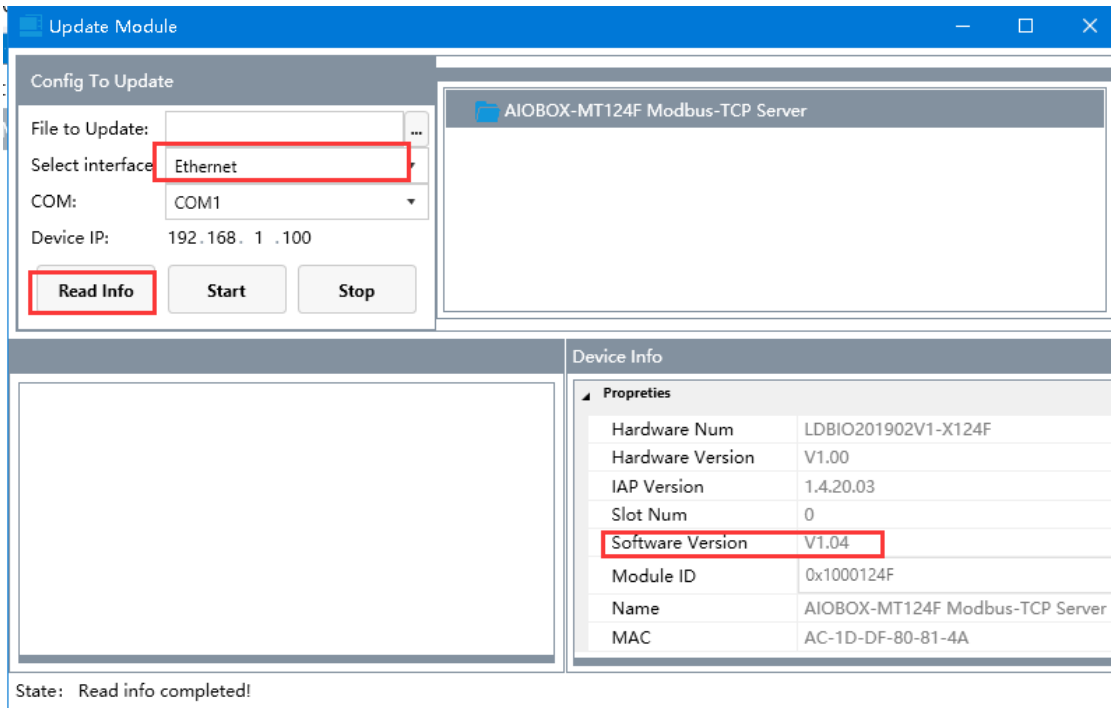


After the connection is established, the data control function code imitates the network interface communication

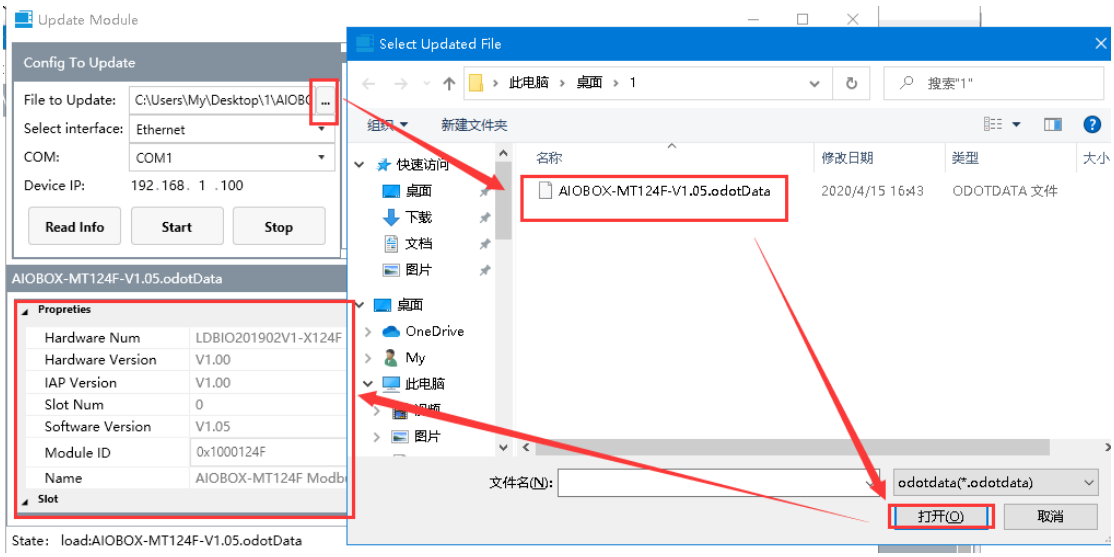
5 Device firmware upgrade

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.

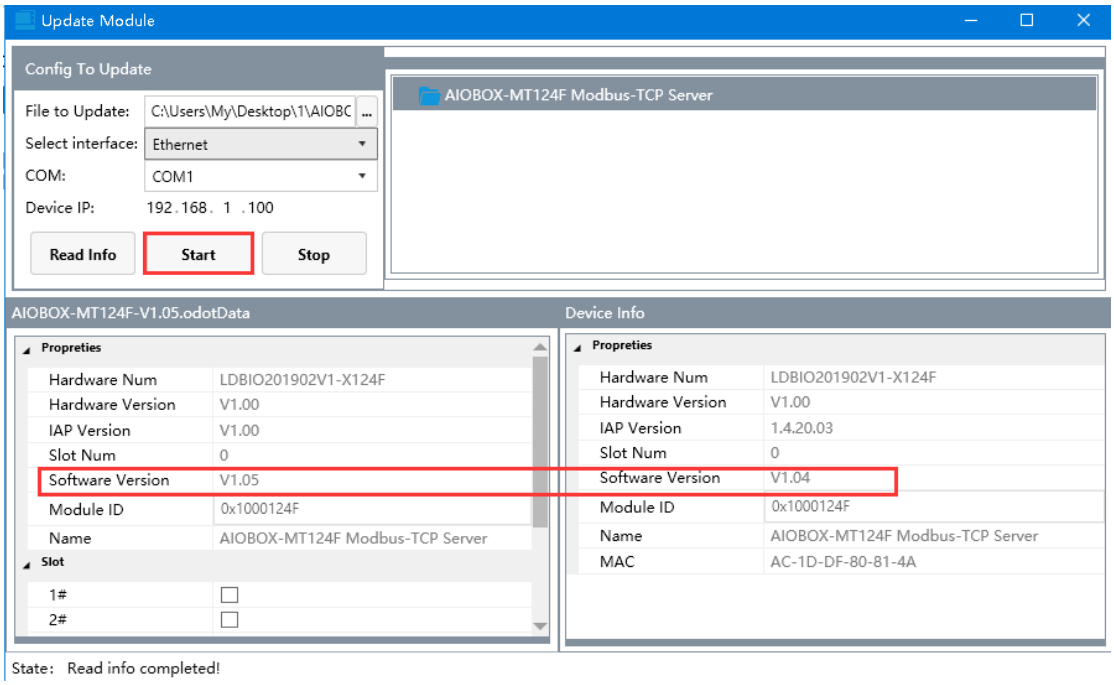




2. Clicking the  on the right side of the upgrade menu，and selecting upgrade file of adapter module AIO-MT124F in the pop-up window.



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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