

AIOBOX Series

Integrated IO Module

User's Manual

v1.2

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AIOBOX Series Integrated IO



Sichuan Odot Automation System Co., Ltd.

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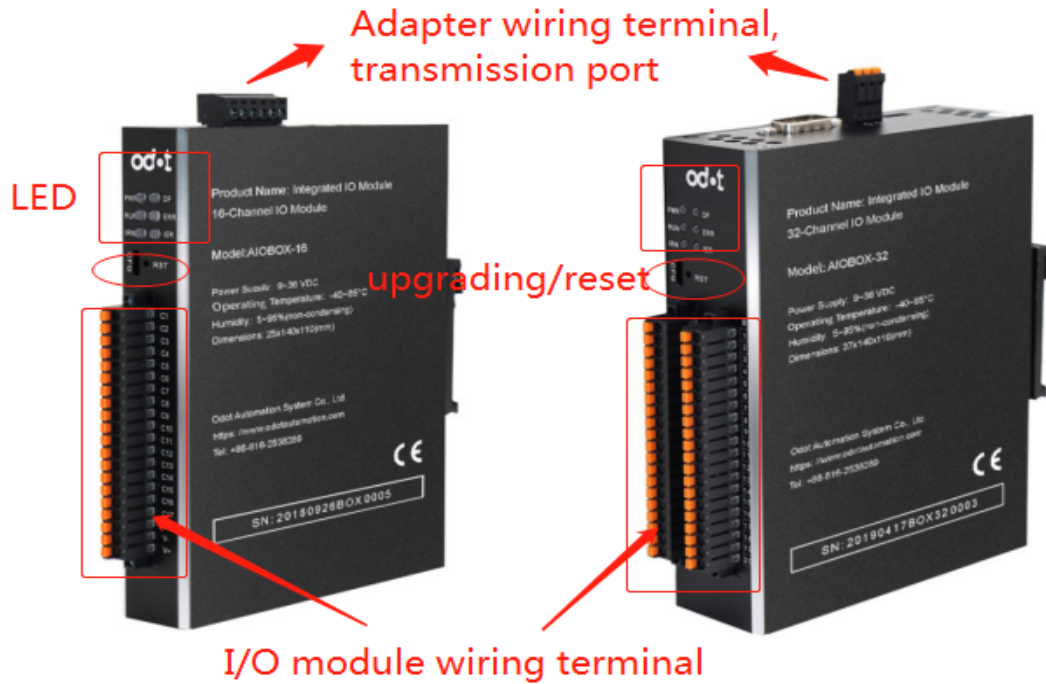
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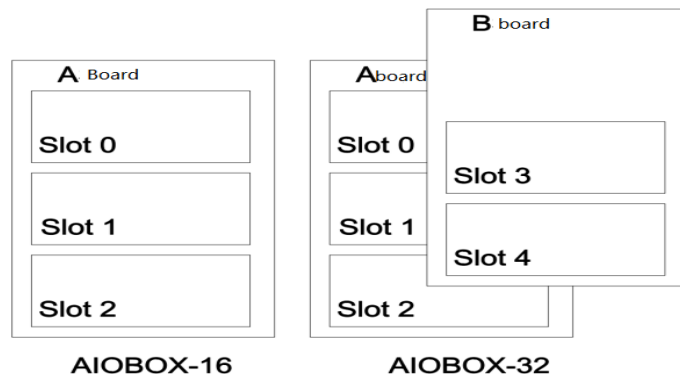
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1. Product Overview

1.1 Product Appearance



1.2 Module composition



AIOBOX-16 supports a single-layer baseplate (A plate), 3 slots. Slot 0 is the adapter slot, and slot 1/2 are the IO module slots.

AIOBOX-32 supports double-layer baseplate (A / B plates), 5 slots. Slot 0 is the adapter slot, and slot 1/2/3/4 are the IO module slots.

1.2.1 Module selection

No.	Name	Model	Installation Position	Module Classification	Product Classification	IO Type	IO Points	Module Description	Abbreviation	Status
1	A16	AIOBOX-16	/	Case	AIOBOX	/	/	16-channel case	BOX-16	Published
2	A32	AIOBOX-32	/	Case	AIOBOX	/	/	32-channel case	BOX-32	Published
1	DP	AIO-X8012	Slot 0	Adapter	AIOBOX	Adapter	/	Profibus-DP adapter module	/	Published
2	CA	AIO-X8021	Slot 0	Adapter	AIOBOX	Adapter	/	CANopen adapter module	/	Published
3	MT	AIO-X8031	Slot 0	Adapter	AIOBOX	Adapter	/	Modbus adapter module	/	Published
4	PN	AIO-X8032	Slot 0	Adapter	AIOBOX	Adapter	/	Profinet adapter module	/	Published
5	EC	AIO-X8033	Slot 0	Adapter	AIOBOX	Adapter	/	EtherCAT adapter module	/	Published
0	0	Empty	Slot 1,2,3,4	IO Module	AIOBOX	Empty	/	Indicates that this slot is empty		
1	1	AIO-X1248	Slot 1,2,3,4	IO Module	AIOBOX	Digital input	8	8 channels / digital input / 24V / two-way	8DI	Published
2	2	AIO-X2228	Slot 1,2,3,4	IO Module	AIOBOX	Digital input	8	8 channels / digital output / 24V / sourcing current	8DO	Published
3	3	AIO-X3318	Slot 1,2,3,4	IO Module	AIOBOX	Analog input	8	8-channel / single-ended / 0 & 4-20mA input	8AI	Published
4	4	AIO-X3424	Slot 1,2,3,4	IO Module	AIOBOX	Analog input	4	4 channels / differential / 0 & 4-20mA, \pm 20mA input	4AI	Published
5	5	AIO-X3713	Slot 1,2,3,4	IO Module	AIOBOX	Analog input	3	3 channels / RTD-PT100 / input	3RTD	Published
6	6	AIO-X3804	Slot 1,2,3,4	IO Module	AIOBOX	Analog input	4	4 channels / TC thermocouple / input	4TC	Published
7	A	AIO-X4324	Slot 1,2,3,4	IO Module	AIOBOX	Analog output	4	4 channels 0-20 / 4-20 / 0-24mA current output 16 bits	4AOI-16	Published
8	B	AIO-X6227	Slot 1,2,3,4	IO Module	AIOBOX	Digital mixing	7	7-channel / 24V / digital composite module 4DI + 3DO	4DI&3DO	Published
9	C	AIO-X5102	Slot 1,2,3,4	IO Module	AIOBOX	High-speed counting	2	Square wave	2SQU_5VDC	Published
10	D	AIO-X5112	Slot 1,2,3,4	IO Module	AIOBOX	High-speed counting	2	Sine wave	2SIN_5VDC	Published
11	E	AIO-X5216	Slot 1,2,3,4	IO Module	AIOBOX	High-speed counting	6	Sine wave,DC 24V	6SIN_24VDC	Published

Channel	Slot 0	Slot 1	Slot 2	Slot 3	Slot 4
AIO-16	√	√	√	×	×
AIO-32	√	√	√	√	√

Note: × mean it's not supported

Example: A16-MT12 IO module is composed of the following sub-modules:

Kit	Slot 0	Slot 1	Slot 2	Slot 3	Slot 4
AIO-16	AIO-X8031	AIO-X1248	AIO-X1248	×	×

A32-PN1234:

Kit	Slot 0	Slot 1	Slot 2	Slot 3	Slot 4
AIO-32	AIO-X8032	AIO-X1248	AIO-X2228	AIO-X3318	AIO-X3424

Note: Please refer to the selection table above for details.

1.3 Hardware Interface

1.3.1 System Power and Communication Interface

The top of the device is the system power interface and network communication interface. The system power interface uses plug-in screw terminals or spring terminals for wiring. The network communication interface has different configurations according to different adapter modules, including RJ45 physical interface, DB9 physical interface, etc. At the same time, the top contains functions such as device station address dial switches.

Note: depending on the adapter protocol, the terminal, communication interface, and power indicator of the communication module of the adapter will be different. Depending on the model of the IO module, the wiring method is different. For details, refer to the corresponding module chapter.

1.3.2 Field Power and IO Interface

The field power and IO interfaces are 20P 3.5mm pitch plug-in spring terminals on the front of the device. Pin numbers 1-18 are IO interfaces and 19-20 are field power interfaces.

1.3.3 Device Status Indicator

The front of the device contains 6 LED status indicators. According to different adapter modules, the LED indicators have different functions. For details, see the description of the network adapter.

1.3.4 Reset Interface

ORST

The device has a reset button RST. When the user forgets the configuration

information such as the IP address of the device and cannot connect to the gateway, the reset button can be triggered. The system parameters will be restored to factory settings and the device restarted. After resetting, the configuration parameters can be downloaded again.

1.3.5 Configuration Interface



CFG is the device configuration port. Please use the MicroUSB data cable provided with the product for hardware connection. It can be connected to the supporting upper computer software through the configuration port, and supports functions like Device Search, Parameter Reading, Parameter Download, Online Data Monitoring, Firmware Upgrade, etc.

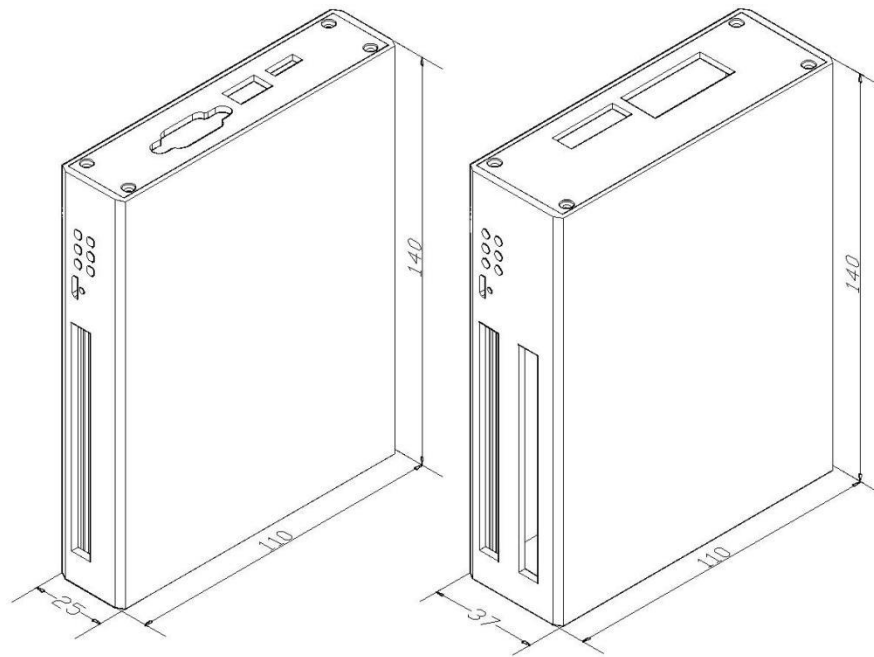
1.4 Product Size

The network adapter and expansion IO are integrated design externally, able to be mounted on a 35mm standard rail.

The dimensions of 16-channel and 32-channel devices are as follows:

AIOBOX-16:25*110*140mm

AIOBOX-32:37*110*140mm



2 Network Adapter Module

2.1 AIO-X8031 Modbus Network Adapter Module

2.1.1 Module Introduction

AIO-X8031 Modbus network adapter module supports standard Modbus-TCP and Modbus-RTU / ASCII protocol access at the same time. Ethernet supports dual network port switch cascading function, and serial port supports RS485 Bus connection.

2.1.2 Baseplate Parameters

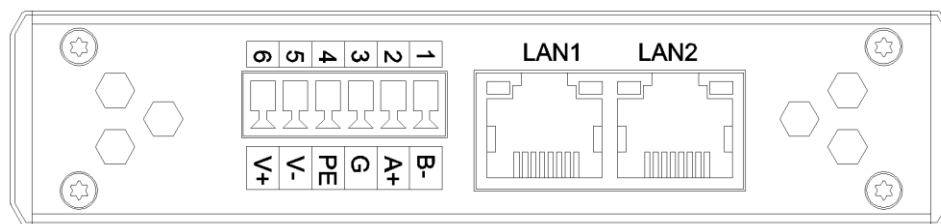
Parameter	Description
System Power	Power supply: 9-36VDC(nominal 24VDC)
IO module Supply Current	Max.2A@5VDC
Isolation	System Power to Field IO: Isolation

Field Power	Power supply:22-28VDC(nominal 24VDC)
Field Power Current	Max DC 8A
Working Temperature	-30 – 75℃
Environment Humidity	5%-95% Non-condensing
Protection Grade	IP20
Installation Method	Pin inserts, and fixed by copper post
Number Of Slots	3 (AIOBOX-16) 5 (AIOBOX-32)
Number of Network Ports	2 RJ45
Network Port Speed	10M/100M auto-sensing
Maximum Bus Length	100m
Number Of Serial Ports	1 RS485
Baud Rate	2400-115200bps
Maximum Bus Length	1200m(Low Baud Rate 2400)
Serial Wiring	Plug-in screw terminal wiring
Power Wiring	Max.1.5mm ² (AWG 16)
IO Wiring	Max.1.5mm ² (AWG 16)

2.1.3 Hardware Interface

2.1.3.1 System Power and Communication Ports

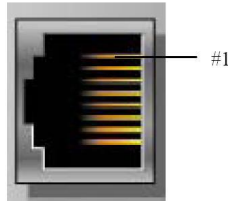
The device wiring uses 3.81mm pitch plug-in screw terminals. The terminal definition is shown in the following figure:



No.	Terminal	Definition
1	B-	Serial port RS485-
2	A+	Serial port RS485+
3	G	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

MODBUS TCP interface Pin definition



Pin	Definition	Description
1	TD+	Transmit+
2	TD-	Transmit-
3	RD+	Receive+
4	--	--
5	--	--
6	RD-	Receive-
7	--	--
8	--	--
CASE	SHIELD	Shield

2.1.3.2 LED indicator definition

PWR ● DF
 RUN ● ERR
 IRN ● IER

Symbol	Definition	Status
PWR	Power indicator	ON:Power connected OFF:No power
DF	Equipment fault indication	ON:Device parameter read failed OFF:Parameter reading normal

RUN	Modbus communication normal	Blinking: Data exchange
ERR	Modbus communication error	Blinking: Data exchange abnormal
IRN	IO running indication	ON: IO initialization normal OFF: IO initialization error
IER	IO error indication	ON: IO data exchange error OFF: IO data exchange normal

2.1.4 Module Parameters

General parameters	
Power Dissipation	240mA@5Vdc
Operating Temperature	-30–75℃
Environment Humidity	5%-95% Non-condensing
Installation Method	Pin inserts, and fixed by copper post
MODBUS TCP	
Protocol	Modbus TCP
Function Code	01 / 02 / 03 / 04 / 05 / 06 / 15 / 16
Connection Rate	10/100Mbps, auto-sensing, full duplex
Maximum Bus Length	100m
Interface	RJ45*2
IP Address Settings	via AIOBOX configuration software
MODBUS RS485	
Protocol	Modbus RTU/ASCII
Function Code	01 / 02 / 03 / 04 / 05 / 06 / 15 / 16
Baud Rate	2400 – 115200bps
Station No	1 – 247, configure by AIO-BOX software

Data Bit	7, 8
Check Bit	No parity, odd parity, even parity
Stop Bit	1, 2
Maximum Bus Length	1200m(RS485,2400 baud rate)
RS485 Wiring	1 way plug-in screw terminal

2.1.5 Configuration Data Definition

Configuration 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	
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 number (default: 502)

Valid range: 0-65535

Watchdog Enable: Modbus watchdog enable (default: 1)

0: Watchdog prohibited

1: Watchdog enabled

Watchdog Time(s): Watchdog time (default: 10)

Valid range: 1-65535

Slave ID: Modbus slave ID number (default: 1)

Valid range: 1-247

Baud Rate: Serial baud rate (default: 9600bps)

Valid range: 2400-115200

Data Bits: Data bits (default: 8)

7: 7 data bits

8: 8 data bits

Parity Bits: Check digit (default: 0)

0: No parity

1: Odd parity

2: Even parity

Stop Bits: Stop bit (default: 1)

1: 1 stop bit

2: 2 stop bits

Serial Mode: Serial mode (default: 0)

0: RTU mode

1: ASCII mode

Char Pitch: Frame interval (default: 2)

0: 1.5t

1: 3.5t

2:5t

3:10t

4:20t

5:50t

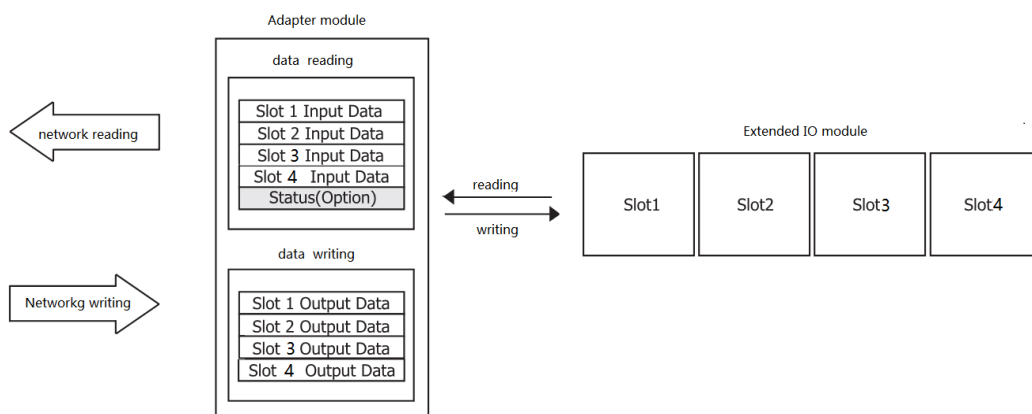
6:100t

7:200t

Respond Delay: Slave response delay time (default: 0)

Valid range: 0-65535

2.1.6 Process Data Definition



Real-time data exchange is performed between the network adapter and the extended IO module, and the data address table is dynamically allocated according to the different modules placed in the IO slot.

For the actual mapping address, please refer to the "Address Table" page of the AIOBOX configuration software interface.

2.2 AIO-X8032 PROFINET Network Adapter Module

2.2.1 Module Introduction

AIO-X8032 Profinet I/O IRT network adapter module supports standard Profinet protocol access, and the network adapter supports up to 4 extended IO modules.

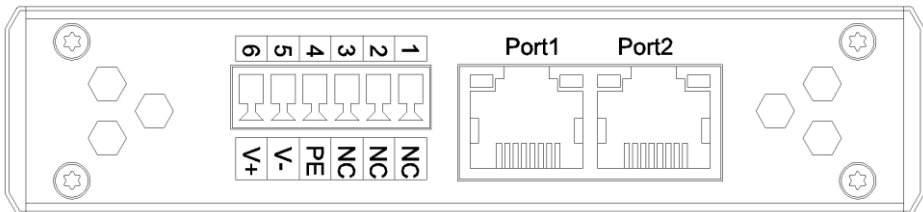
2.2.2 Baseplate Parameters

Parameter	Description
System Power	Power supply:9-36VDC(nominal 24VDC)
IO module Supply Current	2A@5VDC
Isolation	System Power to Field IO: Isolation
Field Power	Power supply:22-28VDC(nominal 24VDC)
Field Power Current	Max DC 8A
Working Temperature	-30 – 75℃
Environment Humidity	5%-95% Non-condensing
IP Grade	IP20
Installation Method	Pin inserts, and fixed by copper post
Number Of Slots	3 (AIOBOX-16) 5 (AIOBOX-32)
Number of Network Ports	2 RJ45
Network Port Speed	10M/100M auto-sensing
Maximum Bus Length	100m
Power wiring	Max.1.5mm ² (AWG 16)
IO Wiring	Max.1.5mm ² (AWG 16)

2.2.3 Hardware Interface

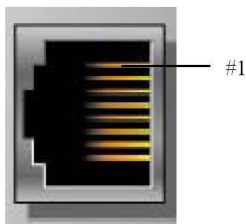
2.2.3.1 System Power and Communication Ports

The device wiring uses 3.81mm pitch plug-in screw terminals. The terminal definition is shown in the following figure:



No.	Terminal	Definition
1	NC	Reserve
2	NC	Reserve
3	NC	Reserve
4	PE	Ground terminal
5	V-	Power input negative
6	V+	Power input negative
RJ45	PORT1/POR	PROFINET Communication port

PROFINET interface Pin definition



Pin	Definition	Description
1	TD+	Transmit+
2	TD-	Transmit-
3	RD+	Receive+
4	--	--
5	--	--
6	RD-	Receive-
7	--	--

8 -- --
CASE SHIELD Shield

2.2.3.2 LED Indicator Definition

PWR ● ● DF
SF ● ● BF
IRN ● ● IER

Symbol	Definition	Status
PWR	Power indicator	ON: Power connected OFF: No power
DF	Equipment fault indication	ON: Device parameter read failed OFF: Parameter reading normal
SF	System status indication	ON: System failure Blinking: lighting test OFF: system normal.
BF	Bus status indication	ON: Network cable not connected Blinking: Device offline OFF: Device online
IRN	IO running indication	ON: IO initialization normal OFF: IO initialization error
IER	IO error indication	ON: IO data exchange error OFF: IO data exchange normal

2.2.4 Module parameters

General Parameters	
Power Dissipation	500mA@5Vdc

Operating Temperature	-30 – 75℃
Environment Humidity	5%-95% Non-condensing
Installation Method	Pin inserts, and fixed by copper post
PROFINET Specification	
Protocol	PROFINET I/O IRT
Interface Type	RJ45*2
Station Type	PROFINET I/O DEVICE
Device Name	AIOBOX configuration software settings or TIA software online access
Topology	Bus topology
Max. Expansion Module Slots	4

2.2.5 Configuration Data Definition

Configuration parameter	
No.	Description
Byte 0	Source of Configuration Data
Byte 1	Fault Action for Input
Byte 2	MAC Address[0]
Byte 3	MAC Address[1]
Byte 4	MAC Address[2]
Byte 5	MAC Address[3]
Byte 6	MAC Address[4]
Byte 7	MAC Address[5]
Byte 8	IP Address[0]
Byte 9	IP Address[1]
Byte 10	IP Address[2]

Byte 11	IP Address[3]
Byte 12	Net Mask[0]
Byte 13	Net Mask[1]
Byte 14	Net Mask[2]
Byte 15	Net Mask[3]
Byte 16	Net Gateway[0]
Byte 17	Net Gateway[1]
Byte 18	Net Gateway[2]
Byte 19	Net Gateway[3]
Byte 20	Profinet Device Name
.	
.	
Byte 83	
Byte 83	Profinet Device Name Length

Data description:

Source of Configuration Data: Device parameter configuration mode
(default: 1)

0: Configuration software configuration is valid

1: Fieldbus controller configuration is valid

Fault Action for Input: When IO fails, input data processing mode
(default: 0)

0: Keep the last input value

1: Clear input value

MAC Address [0-5]: Device MAC address

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

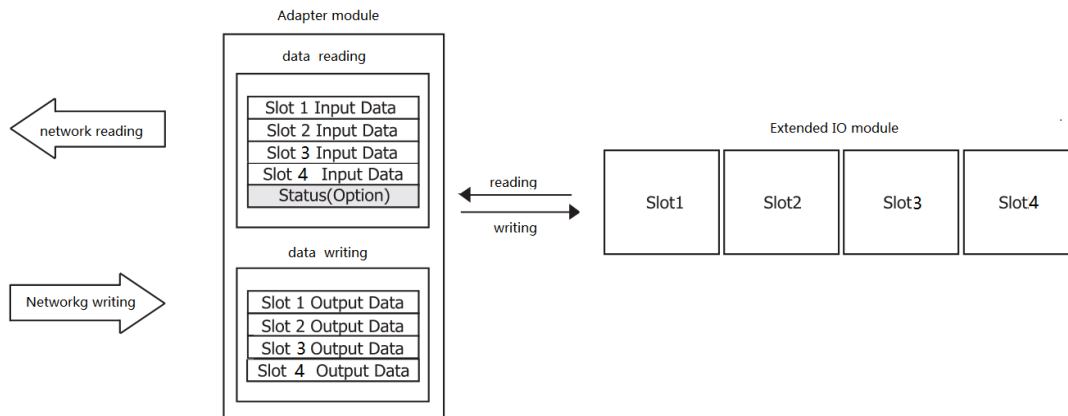
Net Mask [0-3]: Device subnet mask (default: 255.255.255.0)

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

Profinet Device Name: Profinet device name (String format)

Profinet Device Name Length: Name character length

2.2.6 Process Data Definition



Real-time data exchange is performed between the network adapter and the extended IO module, and the data address table is dynamically allocated according to the different modules placed in the IO slot.

Actual mapping addresses need to be manually added IO module to STEP 7/TIA/ other configuration software, automatically mapped addresses, and you can view the actual mapping addresses.

2.3 AIO-X8012 PROFIBUS-DP Network Adapter Module

2.3.1 Module Introduction

AIO-X8012 PROFIBUS-DP Network adapter module supports Standard PROFIBUS-DP protocol access, and the supported protocol version is DPV0

2.3.2 Baseplate Parameters

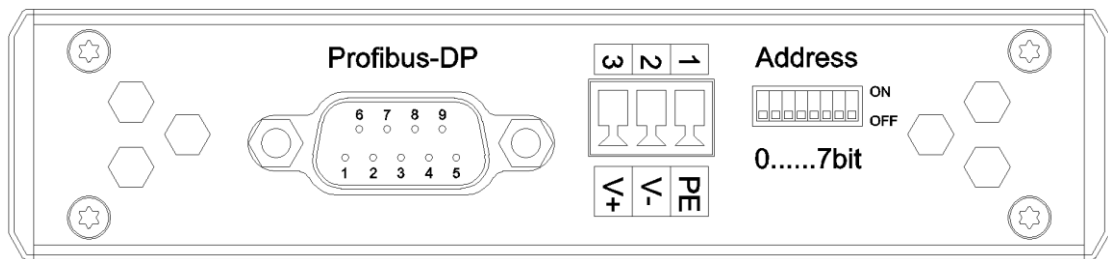
Parameter	Description
System Power	Power supply: 9-36VDC(nominal 24VDC)
IO module	2A@5VDC
Isolation	System Power to Field IO: Isolation
Field Power	Power supply:22-28VDC(nominal 24VDC)
Field Power	Max DC 8A
Working	-30 – 75℃
Environment	5%-95% Non-condensing
IP Grade	IP20
Installation	Pin inserts, and fixed by copper post
Number Of Slots	3 (AIOBOX-16) 5 (AIOBOX-32)
DB9 female	1
DIP switch	One 8-digit switch
Power wiring	Max.1.5mm ² (AWG 16)
IO wiring	Max.1.5mm ² (AWG 16)

2.3.3 Hardware Interface

2.3.3.1 System Power and Communication Ports

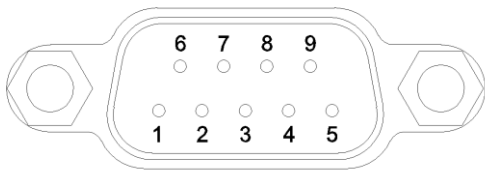
The device wiring uses 3.81mm pitch plug-in screw terminals. The terminal

definition is shown in the following figure:



No.	Terminal	Definition
1	PE	Ground terminal
2	V-	Power input negative
3	V+	Power input positive

PROFIBUS pin definition:



Pin	Definition	Description
1	Shield	Shield
2	--	--
3	B	Data line B
4	CNTR-P	Direction
5	DGND	Signal ground
6	VP(+)	+5v
7	--	--
8	A	Data line A
9	CNTR-N	Direction

PROFIBUS address settings

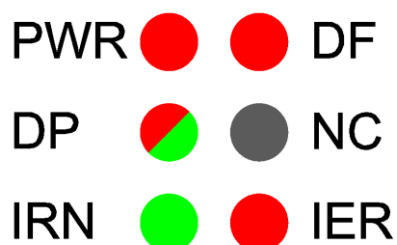
Address



0.....7bit

The PROFIBUS adapter station address is set by an 8-bit binary hardware DIP switch. Each PROFIBUS adapter has a unique station address (1 – 126)

2.3.3.2 LED Indicator Definition



Symbol	Definition	Status
PWR	Power indicator	ON: Power connected OFF: No power
DF	Device status indication	ON: Device failure OFF: Device normal.
DP	DP bus status indication	Flashing red: Configuration error. Green light ON: System normal
NC	Empty	/
IRN	IO running indication	ON: IO initialization normal OFF: IO initialization error
IER	IO error indication	ON: IO data exchange error OFF: IO data exchange normal

2.3.4 Module Parameters

General Parameters	
Power Dissipation	200mA@5Vdc
Operating Temperature	-30 – 75℃
Environment Humidity	5%-95% Non-condensing
Installation Method	Pin inserts, and fixed by copper post
PROFIBUS Specification	
Protocol	PROFIBUS DPV0
Interface Type	DB9 female
Station Type	PROFIBUS slave
Station Address	DIP switch setting
Topology	Bus type topology
Terminal Power	5V
Max. expansion module	4

2.3.5 Configuration data definition

Configuration Parameter	
No.	Description
Byte 0	Source of Configuration Data
Byte 1	Fault Action for Input
Byte 2	PROFIBUS-DP Slave Address

Data description:

Source of Configuration Data: Device parameter configuration mode

(default: 1)

0: Configuration software configuration is valid

1: Fieldbus controller configuration is valid

Fault Action for Input: IO input data processing method when IO failure

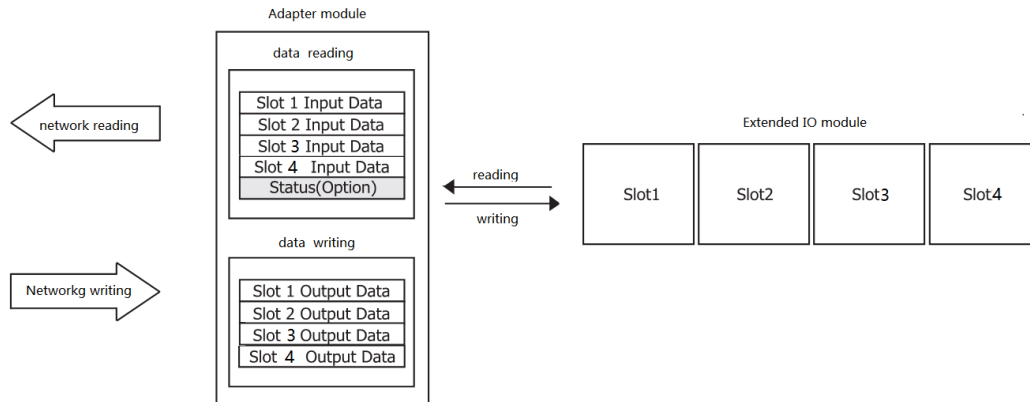
(default: 0)

0: Keep the last input value

1: Clear input value

PROFIBUS-DP Slave Address: DP slave device number

2.3.6 Process Data Definition



Real-time data exchange is performed between the network adapter and the extended IO module, and the data address table is dynamically allocated according to the different modules placed in the IO slot.

Actual mapping addresses need to be manually added IO module to STEP 7/TIA/ other configuration software, automatically mapped addresses, and you can view the actual mapping addresses.

2.4 AIO-X8021 CANopen Network Adapter Module

2.4.1 Module Introduction

AIO-X8021 CANopen network adapter module supports standard CANopen communication and supports device specification DS401.

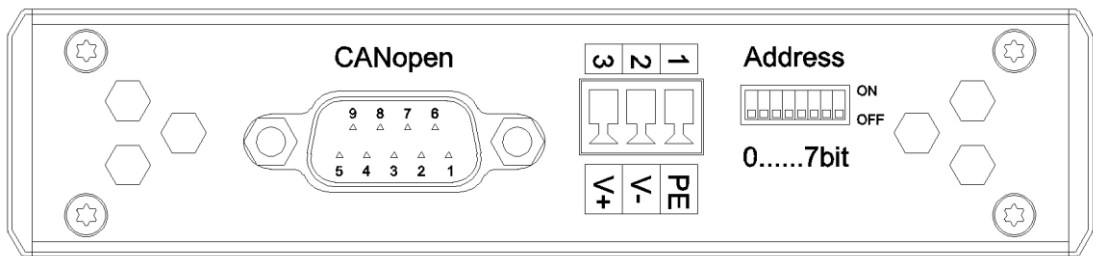
2.4.2 Baseplate Parameters

Parameter	Description
System Power	Power supply: 9-36VDC (nominal
IO module Supply Current	2A@5VDC
Isolation	System Power to IO Module: Isolation
Field Power	Power supply: 22-28VDC (nominal
Field Power Current	Max DC 8A
Working Temperature	-30 – 75℃
Environment Humidity	5%-95% Non-condensing
IP Grade	IP20
Installation Method	Pin inserts, and fixed by copper post
Number Of Slots	3 (AIOBOX-16) 5 (AIOBOX-32)
DB9 Male	1
DIP Switch	One 8-digit switch
Power Wiring	Max.1.5mm ² (AWG 16)
IO Wiring	Max.1.5mm ² (AWG 16)

2.4.3 Hardware Interface

2.4.3.1 System Power and Communication Ports

The device wiring uses 3.81mm pitch plug-in screw terminals. The terminal definition is shown in the following figure:



No.	Terminal	Definition
1	PE	Ground terminal
2	V-	Power input negative
3	V+	Power input positive

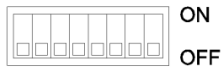
CANopen interface pin definition



Pin	Definition	Description
1	--	--
2	CAN_L	CAN_L signal line
3	CAN_GND	CAN signal ground
4	--	--
5	CAN_SHLD	CAN shield
6	--	--
7	CAN_H	CAN_H signal line
8	--	--
9	--	--

CANopen address settings

Address



0.....7bit

CANopen adapter slave station address is set by an 8-bit binary hardware dial switch. Each CANopen adapter has a unique station address (1 – 127).

2.4.3.2 LED Indicator Definition

PWR ● ● DF
 RUN ● ● ERR
 IRN ● ● IER

Symbol	Definition	Status
PWR	Power indicator	ON: Power connected OFF: No power
DF	Equipment fault indication	ON: Device fault OFF: Device normal
RUN	CAN operation indication	ON: running status Blinking (2.5Hz): pre-operation status Single flash: Stopped
ERR	CAN error indication	ON: Bus is off Double flash: A protection event has occurred OFF: CAN works normally
IRN	IO operation indication	ON:IO Initialization normal OFF:IO Initialization fault

IER	IO error indication	ON:IO data exchange error OFF:IO data exchange normal
-----	---------------------	--

2.4.4 Module Parameter

General parameter	
Power Dissipation	200mA@5Vdc
Operating Temperature	-30 – 75℃
Environment Humidity	5%-95% Non-condensing
Installation Method	Pin inserts, and fixed by copper post
CANopen Specification	
Protocol	CANopen DS 401
Interface Type	DB9 male
Station Type	CANopen slave
Device Name	DIP switch setting
Topology	Bus topology
Max. Expansion Module Slots	4

2.4.5 Configuration Data Definition

Configuration Parameter	
No.	Description
Byte 0	Source of Configuration Data
Byte 1	Fault Action for Input
Byte 2	CANopen Slave Address
Byte 3	CAN Baud Rate

Data description:

Source of Configuration Data: Device parameter configuration mode
(default: 0)

0: Configuration software configuration is valid

1: Fieldbus controller configuration is valid

Fault Action for Input: When IO fails, input data processing mode
(default: 0)

0: Keep the last input value

1: Clear input value

CANopen Slave Address:

CANopen slave device number (read-only, default: 1)

CAN Baud Rate:

CAN Baud Rate: CAN bus baud rate setting (default: 4)

0:1 MBit/sec

1:800 kBit/sec

2:500 kBit/sec

3:250 kBit/sec

4:125 kBit/sec

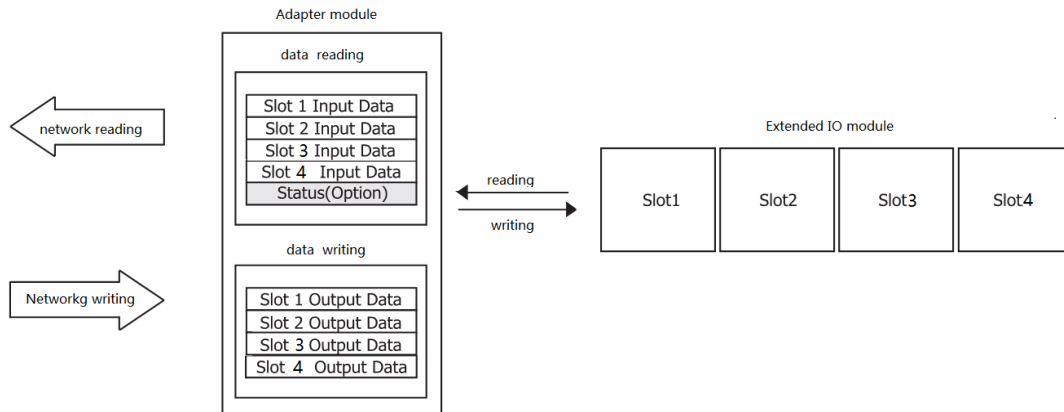
5:100 kBit/sec

6:50 kBit/sec

7:20 kBit/sec

8:10 kBit/sec

2.4.6 Process Data Definition



The input and output data of the IO module will be mapped to the objects 6000, 6200, 6401, and 6411 respectively according to different data types. Both TPDO and RPDO support variable PDO mapping.

2.5. AIO-X8033 EtherCAT IO Module

2.5.1 Module Introduction

AIO-X8033 EtherCAT I / O module supports standard EtherCAT protocol access, and the network adapter supports up to 4 expansion IO modules.

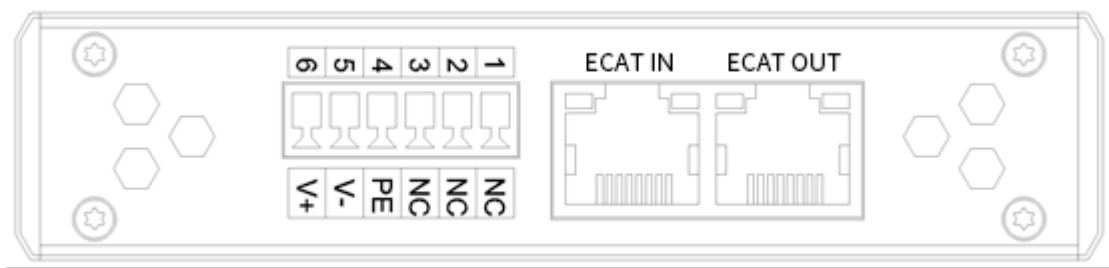
2.5.2 Baseplate Parameters

Parameter	Description
System Power	Power supply: 9-36VDC(nominal 24VDC)
IO module Supply Current	2A@5VDC
Isolation	System Power to Field IO: Isolation
Field Power	Power supply:22-28VDC(标称 24VDC)
Field Power Current	Max DC 8A
Working Temperature	-30 – 75℃
Environment Humidity	5%-95% Non-condensing
IP Grade	IP20
Installation Method	Pin inserts, and fixed by copper post
Number of Slots	4 (AIOBOX-16)
Number of Network Ports	2 RJ45
Network Port Speed	10M/100M auto sensing
Maximum Bus Length	100m
Power Wiring	Max.1.5mm ² (AWG 16)
IO Wiring	Max.1.5mm ² (AWG 16)

2.5.3 Hardware Interface

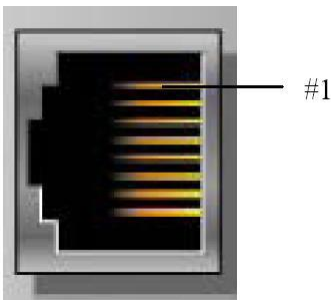
2.5.3.1 System Power and Communication Ports

The device wiring uses 3.81mm pitch plug-in screw terminals. The terminal definition is shown in the following figure:



No.	Terminal	Definition
1	NC	Reserve
2	NC	Reserve
3	NC	Reserve
4	PE	Ground terminal
5	V-	Power input negative
6	V+	Power input positive
RJ45	ECAT IN	Port1
	ECAT OUT	Port2

EtherCAT interface pin definition



Pin	Definition	Description
1	TD+	Transmit+
2	TD-	Transmit-
3	RD+	Receive+
4	--	--
5	--	--
6	RD-	Receive -
7	--	--
8	--	--
CASE	SHIELD	Shield

2.5.3.2 LED Indicator Definition

PWR ● ● DF
 RUN ● ● ERR
 IRN ● ● IER

Symbol	Definition	Status
PWR	Power indicator	ON: Power connected OFF: No power
DF	Equipment fault indication	ON: Device failure OFF: Device normal.
RUN	Running status indication	OFF: Initialization status Blinking: Pre-run status Single Flash: safe operation status Flickering: During startup or in Bootstrap state
ERR	Error status indication	OFF: No error Always on: Application control failed Flickering: Startup error Blinking: Invalid configuration Single flash: Local error, unsolicited state switching Double flash: Watchdog error
IRN	IO running indication	ON:IO initialization normal OFF:IO initialization error
IER	IO error indication	ON:IO Data exchange error OFF:IO Data exchange normal

**Flickering: 10HZ

Blinking: 2.5HZ

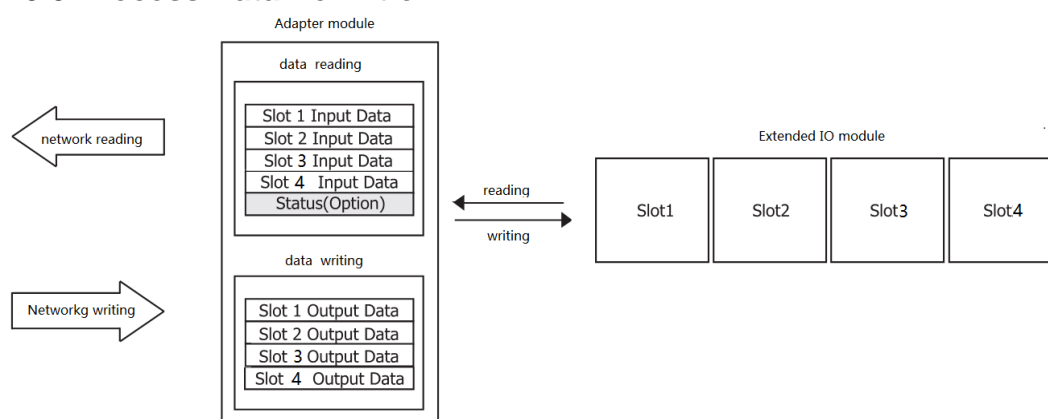
Single flash: 200ms

Double flash: 200ms/1000ms

2.5.4 Module Parameter

General Parameter	
Power Dissipation	500mA@5Vdc
Operating Temperature	-30 – 75℃
Relative Humidity	5%-95% non condensing
Installation Method	Pin inserts, and fixed by copper post
EtherCAT Specification	
Protocol	EtherCAT
Interface Type	RJ45*2
Station Type	EtherCAT I/O Slaver
Device Name	AIOBOX configure software settings
Topology	Bus topology
Maximum Expansion Module Slots	4

2.5.5 Process Data Definition



Real-time data exchange is performed between the network adapter and the extended IO module, and the data address table is dynamically allocated according to the different modules placed in the IO slot.

The actual mapped address needs to be manually added in TwinCAT or other configuration software, and the address is automatically mapped. You can view the actual mapped address.

3 Extended IO module

3.1 AIO-X1248 8 channels / Digital input / 24VDC / Source or Sink

3.1.1 Module Features

- ◆ AIO-X1248 supports 8-channel digital input, source and sink two-way input, input voltage 24V / 0V
 - ◆ The module can collect digital output signals of field device (dry contact or active output)
 - ◆ Module can be connected to 2-wire or 3-wire digital sensors
- The internal bus and field input of the module are isolated by optocouplers
- ◆ Each input channel of the module supports 32-bit counter, counting frequency <200Hz
 - ◆ Module can set digital signal input filter time and counter data transmission sequence
 - ◆ Each channel of the module can independently set the counting mode and counting direction
 - ◆ Module with 8 digital input channel LED indicators

3.1.2 Module Parameter

General Parameters	
Power	Max.36mA@5.0Vdc
Isolation	I/O to internal bus: optocoupler isolation (3KVrms)
Field Power	Nominal voltage: 24Vdc Input range: 22-28Vdc

Wiring	I/O wiring: Max.1.5mm ² (AWG 16)
Weight	15g
Dimension	74*42*10mm
Input Parameter	
Number of channels	8-channel two-way input
Indicator Light	8 green channel input indicators
Turn-on Voltage	High input:Min.10Vdc to Max.28Vdc (common:0Vdc) Low input:Min.0Vdc to Max.14Vdc (common:24Vdc)
Turn-off Voltage	High input:Max.5Vdc (common:0Vdc) Low input:Min.19Vdc (common:24Vdc)
Turn-on Current	Max.15mA/channel@28V
Input Resistance	>1.8kΩ
Input Delay	OFF to ON :Max.3ms ON to OFF :Max.2ms
Filter Time	Default 10ms
Sampling Frequency	500Hz
Counting Frequency	<200Hz

3.1.3 Process Data Definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DI Ch#7	DI Ch#6	DI Ch#5	DI Ch#4	DI Ch#3	DI Ch#2	DI Ch#1	DI Ch#0
Byte 1	Counter Value Ch#0							
Byte 2								

Byte 3	
Byte 4	
Byte 5	Counter Value Ch#1
Byte 6	
Byte 7	
Byte 8	
Byte 9	Counter Value Ch#2
Byte 10	
Byte 11	
Byte 12	
Byte 13	Counter Value Ch#3
Byte 14	
Byte 15	
Byte 16	
Byte 17	Counter Value Ch#4
Byte 18	
Byte 19	
Byte 20	
Byte 21	Counter Value Ch#5
Byte 22	
Byte 23	
Byte 24	
Byte 25	Counter Value Ch#6
Byte 26	
Byte 27	

Byte 28	Counter Value Ch#7							
Byte 29								
Byte 30								
Byte 31								
Byte 32								
Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Counter	Counter	Counter	Counter	Counter	Counter	Counter	Counter
	Reset	Reset	Reset	Reset	Reset	Reset	Reset	Reset
	Ch#7	Ch#6	Ch#5	Ch#4	Ch#3	Ch#2	Ch#1	Ch#0

Data description:

DI Ch # (0-7): This bit is set when the input signal of the corresponding channel is valid, and it is 0 when the input is invalid.

0: Input signal is invalid

1: the input signal is valid

Counter Value Ch # (0-7): 8-channel 32-bit counter, unsigned integer, automatically cleared after overflow.

Counter Reset Ch # (0-7): When the data bit changes from 0 to 1 (rising edge), the input counter of the corresponding channel is cleared.

Note: The maximum input channel counting frequency is 200Hz. When the input signal exceeds this frequency, the counting result may be inconsistent with the actual value.

3.1.4 Configuration Data Definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Input Filtering Time							
Byte 1								
Byte 2	Counter Value Data Format							
Byte 3	Count Mode Ch#3		Count Mode Ch#2		Count Mode Ch#1		Count Mode Ch#0	
Byte 4	Count Mode Ch#7		Count Mode Ch#6		Count Mode Ch#5		Count Mode Ch#4	
Byte 5	Count	Count	Count	Count	Count	Count	Count	Count
	Direction	Direction	Direction	Direction	Direction	Direction	Direction	Direction
	Ch#7	Ch#6	Ch#5	Ch#4	Ch#3	Ch#2	Ch#1	Ch#0

Data description

Input Filtering Time (ms): Input filtering time of the channel, unit is ms.

(Default: 10)

Counter Value Data Format: The byte transmission order of the 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

Count Mode Ch # (0-7): Count mode of the input channel. (Default: 0)

0: rising edge count

1: falling edge count

2: double edge counting

Count Direction Ch # (0-7): The counting direction of the input channel.

(Default: 0)

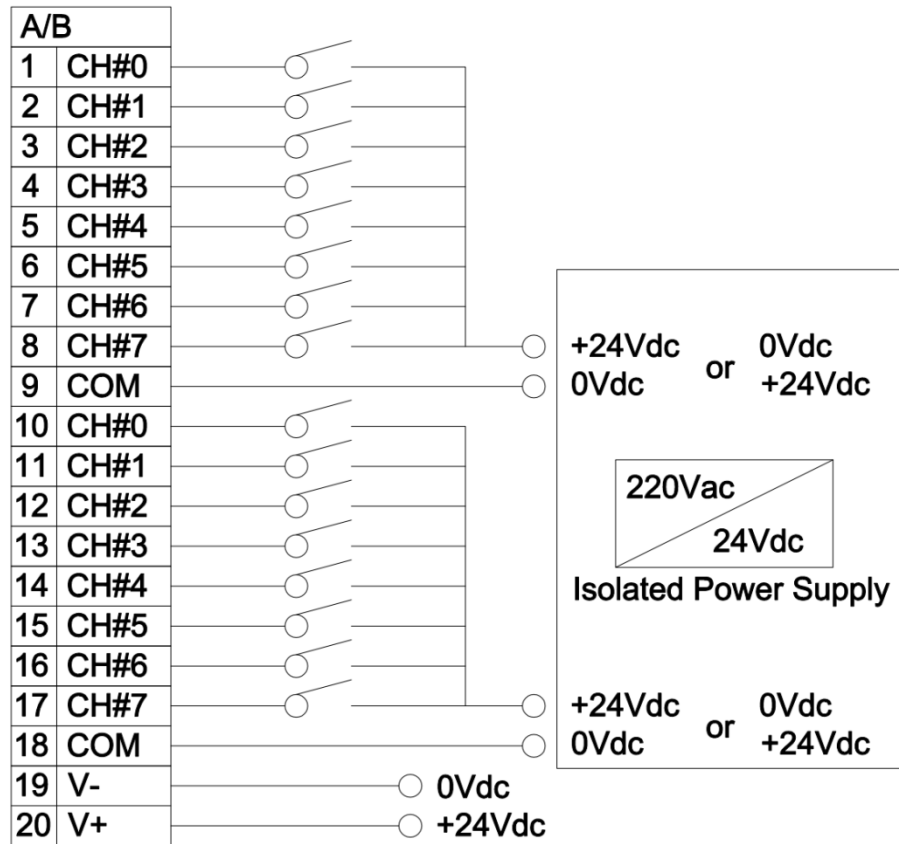
0: count up

1: count down

3.1.5 Terminal definition

Terminal No.				Definition	Description
Slot 1	Slot 2	Slot 3	Slot 4	/	
A1	A10	B1	B10	CH#0	Input signal
A2	A11	B2	B11	CH#1	Input signal
A3	A12	B3	B12	CH#2	Input signal
A4	A13	B4	B13	CH#3	Input signal
A5	A14	B5	B14	CH#4	Input signal
A6	A15	B6	B15	CH#5	Input signal
A7	A16	B7	B16	CH#6	Input signal
A8	A17	B8	B17	CH#7	Input signal
A9	A18	B9	B18	COM	Common

3.1.6 Wiring Diagram



3.2 AIO-X2228 8 channels / digital output / 24VDC / Source

3.2.1 Module Features

- ◆ AIO-X2228 supports 8-channel digital output, active high level, output voltage 24V
- ◆ Module can drive field devices (Relays, Solenoid valves, etc.)
- ◆ The internal bus and field input of the module are isolated by optocouplers.
- ◆ Module with 8 digital output channel LED indicators
- ◆ Module has Thermal Shutdown and Over-current protection functions

3.2.2 Module Parameters

General Parameters	
Power	Max.116mA@5.0Vdc
Isolation	I/O to internal bus: optocoupler
Field Power	Nominal voltage:24Vdc Input range:22 – 28Vdc
Wiring	I/O wiring:Max.1.5mm ² (AWG 16)
Weight	13g
Dimension	74*42*10mm
Output Parameters	
Number of Channels	8 channels
Indicator Light	8 green channel output indicators
Rated Current	Typical value: 1A
Leakage Current	Maximum: 100uA
Output Resistance	<1.2Ω
Output Delay	OFF to ON :Max.200us ON to OFF :Max.100us
Protective Function	Over temperature shutdown: typical value 150 °C Overcurrent protection: 3A max Short circuit protection support

3.2.3 Process Data Definition

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DO	DO	DO	DO	DO	DO	DO	DO
	Ch#7	Ch#6	Ch#5	Ch#4	Ch#3	Ch#2	Ch#1	Ch#0

Data description:

DO Ch # (0-7): When this bit is 1, the corresponding channel output signal is valid, the output is high, and the output is invalid when it is 0.

0: Output signal is invalid

1: Output signal is valid

3.2.4 Configuration Data Definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault	Fault	Fault	Fault	Fault	Fault	Fault	Fault
	Action	Action	Action	Action	Action	Action	Action	Action
	for	for	for	for	for	for	for	for
	Output	Output	Output	Output	Output	Output	Output	Output
	Ch#7	Ch#6	Ch#5	Ch#4	Ch#3	Ch#2	Ch#1	Ch#0
Byte 1	Fault	Fault	Fault	Fault	Fault	Fault	Fault	Fault
	Value	Value	Value	Value	Value	Value	Value	Value
	for	for	for	for	for	for	for	for
	Output	Output	Output	Output	Output	Output	Output	Output
	Ch#7	Ch#6	Ch#5	Ch#4	Ch#3	Ch#2	Ch#1	Ch#0

Data description:

Fault Action for Output Ch # (0-7): Fault output mode. (Default: 0)

0: The last output state is maintained.

1: Output fault value.

Fault Value for Output Ch # (0-7): When the fault output mode is 1, this bit sets the fault output value. (Default: 0)

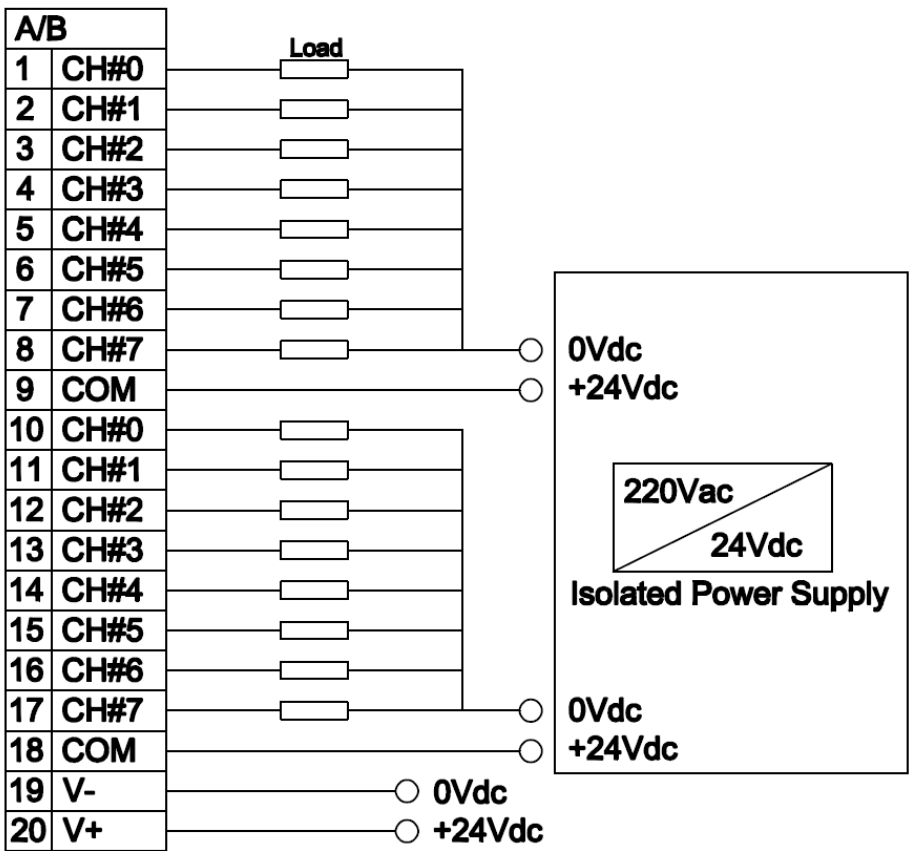
0: Output low level.

1: Output high level.

3.2.5 Terminal Definition

Terminal No.				Definition	Explanation
Slot 1	Slot 2	Slot 3	Slot 4	/	/
A1	A10	B1	B10	CH#0	Output signal
A2	A11	B2	B11	CH#1	Output signal
A3	A12	B3	B12	CH#2	Output signal
A4	A13	B4	B13	CH#3	Output signal
A5	A14	B5	B14	CH#4	Output signal
A6	A15	B6	B15	CH#5	Output signal
A7	A16	B7	B16	CH#6	Output signal
A8	A17	B8	B17	CH#7	Output signal
A9	A18	B9	B18	COM	Common

3.2.6 Wiring Diagram



3.3 AIO-X3318 8-channel / Analog Single-Ended Input / 0 & 4-20mA, 16-bit

3.3.1 Module Features

- ◆ IO AIO-X3318 supports 8-channel current signal acquisition
- ◆ IO AIO-X3318 supports configuration of 0-20mA or 4-20mA current signal acquisition
- ◆ Module internal bus and field input are magnetic isolation.
- ◆ Module channel connected to field active analog signal current output sensor
- ◆ Module channel with TVS overvoltage protection

3.3.2 Module Parameter

General Parameters	
Power	Max.60mA@5.0Vdc
Isolation	I/O to internal bus: magnetic isolation (2.5KVrms) Power isolation: DC-DC
Field Power	I/O wiring: Max.1.5mm ² (AWG 16)
Wiring	16g
Size	74*42*14mm
Input Parameter	
Number of Channels	8-channel
Indicator Light	\
Input Range	Max:0 – 23.5mA
Resolution	16 Bit

Acquisition Accuracy	$\pm 0.3\%$ full scale, @25℃
	$\pm 0.5\%$ full scale, @-20 – 70℃
Sampling Frequency	50Hz / 4 channels
Data Format	16-bit signed integer

3.3.3 Process Data Definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Data(CH 0)							
Byte 1								
Byte 2	Analog Input Data(CH 1)							
Byte 3								
Byte 4	Analog Input Data(CH 2)							
Byte 5								
Byte 6	Analog Input Data(CH 3)							
Byte 7								
Byte 8	Analog Input Data(CH 4)							
Byte 9								
Byte 10	Analog Input Data(CH 5)							
Byte 11								
Byte 12	Analog Input Data(CH 6)							
Byte 13								
Byte 14	Analog Input Data(CH 7)							
Byte 15								

Data description:

Analog Input Data (CH0-7): The analog signal input value of the

corresponding channel

Process Data Definition (8AI)				
Current(0-20mA)	Current (4-20mA)	Decimal	Hexadecimal	Position
>23.515	>22.810	32767	7FFF	Overflow
23.515	22.81	32511	7EFF	Exceed the upper limit
.	.	.	.	
.	.	.	.	
20.0007	20.0005	27649	6C01	Rated range
20	20	27648	6C00	
.	.	.	.	
.	.	.	.	
0	4	0	0000	
<0.0	3.9995	-1	FFFF	Exceed the lower limit
	.	.	.	
	.	.	.	
	1.1852	-4864	ED00	
	<1.1852	-32768	8000	Underflow

3.3.4 Configuration Data Definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Word Data Format							

Byte 1	Current Type Ch#7	Current Type Ch#6	Current Type Ch#5	Current Type Ch#4	Current Type Ch#3	Current Type Ch#2	Current Type Ch#1	Current Type Ch#0
--------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------

Data description:

Word Data Format: Analog data storage format. (Default: 0)

0: A-B

1: B-A

Current Type Ch # (0-7): The type of the input signal. (Default: 1)0:0-

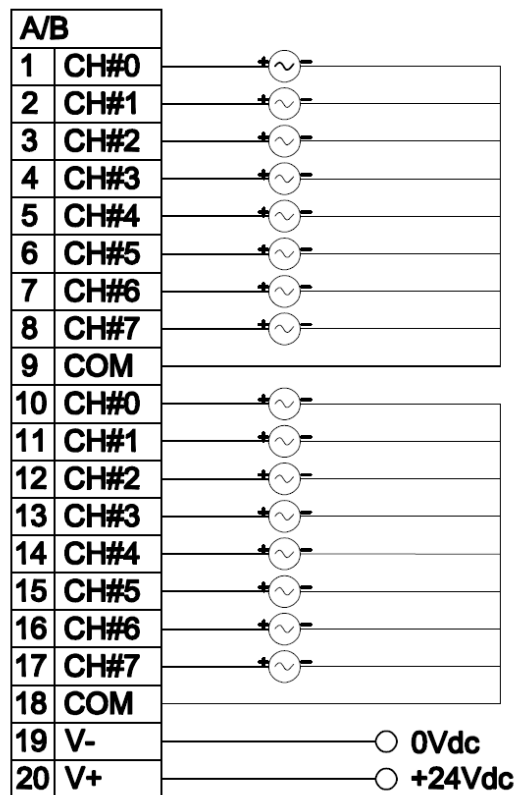
20mA

1:4-20mA

3.3.5 Terminal Definition

Terminal No.				Definition	Description
Slot 1	Slot 2	Slot 3	Slot 4	/	
A1	A10	B1	B10	CH#0	Input signal
A2	A11	B2	B11	CH#1	Input signal
A3	A12	B3	B12	CH#2	Input signal
A4	A13	B4	B13	CH#3	Input signal
A5	A14	B5	B14	CH#4	Input signal
A6	A15	B6	B15	CH#5	Input signal
A7	A16	B7	B16	CH#6	Input signal
A8	A17	B8	B17	CH#7	Input signal
A9	A18	B9	B18	COM	Common

3.3.6 Wiring Diagram



3.4 AIO-X3424 4 channels / Analog Differential Input / 0 & 4-20mA, ± 20 mA, 16-bit

3.4.1 Module Features

- ◆ AIO-X3424 supports 4-channel differential current signal acquisition
- ◆ AIO-X3424 supports configurable 0-20mA or 4-20mA, ± 20 mA current signal acquisition
- ◆ The internal bus and field input of the module are magnetic isolation
- ◆ The module channel is connected to the field active analog signal current output sensor
- ◆ Module channel with TVS overvoltage protection

3.4.2 Module Parameters

General Parameters	
Power	Max.60mA@5.0Vdc
Isolation	I/O to internal bus: magnetic isolation (2.5KVrms)
Field Power	Power isolation: DC-DC
Wiring	I/O wiring: Max.1.5mm ² (AWG 16)
Weight	16g
Dimension	74*42*14mm
Input Parameter	
Number of Channels	4 channels
Indicator Light	\
Input Range	Maximum:-23.5 – +23.5mA
Resolution	16 Bit
Acquisition Accuracy	±0.3% full scale, @25℃
	±0.5% full scale, @-20 – 70℃
Sampling Frequency	50Hz / 4channels
Data Format	16-bit signed integer

3.4.3 Process Data Definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Data(CH 0)							
Byte 1								

Byte 2	Analog Input Data(CH 1)
Byte 3	
Byte 4	Analog Input Data(CH 2)
Byte 5	
Byte 6	Analog Input Data(CH 3)
Byte 7	

Data description:

Analog Input Data (0-3): The analog signal input value of the corresponding channel.

Process Data Definition (4AI)					
Current(0-20mA)	Current (4-20mA)	Current (-20-20mA)	Decimal	Hexadecimal	Location
>23.515	>22.810	>23.515	32767	7FFF	Overflow
23.515	22.81	23.515	32511	7EFF	Exceed the upper limit
.	
.	
20.0007	20.0005	20.0007	27649	6C01	Rated range
20	20	20	27648	6C00	
.	
.	
0	4	-20	0	0000	Exceed the lower limit
<0.0	3.9995	-20.0007	-1	FFFF	
	.		.	.	
	.		.	.	
	1.1852	-23.515	-32512	8100	

	<1.1852	<-23.515	-32768	8000	Underflow
--	---------	----------	--------	------	-----------

3.4.4 Configuration Data Definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Word Data Format							
Byte 1	Current Type Ch#3		Current Type Ch#2		Current Type Ch#1		Current Type Ch#0	

Data description:

Word Data Format: Analog data storage format. (Default: 0)

0: A-B

1: B-A

Current Type (0-3): The type of input signal. (Default: 1)

0:0-20mA

1:4-20mA

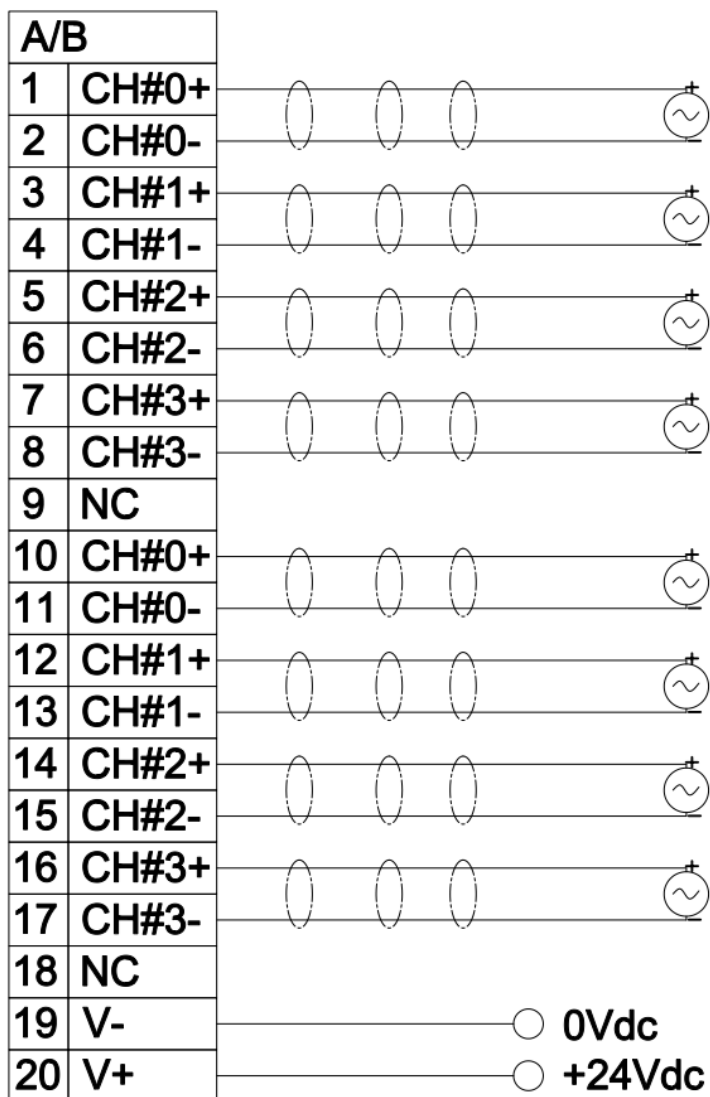
2:±20mA

3.4.5 Terminal Definition

Terminal No.				Definition	Description
Slot 1	Slot 2	Slot 3	Slot 4	/	
A1	A10	B1	B10	CH#0+	Channel 0 analog signal +
A2	A11	B2	B11	CH#0-	Channel 0 analog signal -
A3	A12	B3	B12	CH#1+	Channel 1 analog signal +
A4	A13	B4	B13	CH#1-	Channel 1 analog signal -

A5	A14	B5	B14	CH#2+	Channel 2 analog signal +
A6	A15	B6	B15	CH#2-	Channel 2 analog signal -
A7	A16	B7	B16	CH#3+	Channel 3 analog signal +
A8	A17	B8	B17	CH#3-	Channel 3 analog signal -
A9	A18	B9	B18	NC	No connection

3.4.6 Wiring Diagram



3.5 AIO-X3713 3 channels / Analog Input / Thermal Resistance PT100 Acquisition

3.5.1 Module Features

- ◆ AIO-X3713 supports 3-channel RTD (PT100) temperature acquisition
- ◆ Module can be connected to 2-wire or 3-wire PT100 temperature sensor
- ◆ The internal bus and field input of the module are magnetic isolation
- ◆ Module has overvoltage protection up to $\pm 45V$
- ◆ 15-bit ADC resolution

3.5.2 Module Parameter

General Parameters	
Power	Max.76mA@5.0Vdc
Isolation	I/O to internal bus: magnetic isolation (2.5KVrms) Power isolation: DC-DC
Wiring	I/O wiring: Max.1.5mm ² (AWG 16)
Weight	15g
Size	74*42*14mm
Input Parameter	
Number of Channels	3 channels
Indicator Light	\
Resolution	15Bit
Measuring Range	-240℃ – 880℃
Wiring Mode	2-wire or 3-wire
Supported sensor types	PT100

Measurement Accuracy	0.5℃
Conversion Time Per Channel	<21ms

3.5.3 Process Data Definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Data(CH 0)							
Byte 1								
Byte 2	Analog Input Data(CH 1)							
Byte 3								
Byte 4	Analog Input Data(CH 2)							
Byte 5								

Data description: Analog Input Data 0-2: Analog signal input value of corresponding channel.

Process Data Definition			
Temperature	Decimal	Hexadecimal	Location
>880.0	32767	7FFF	Overflow
880	8800	2260	Exceed the upper limit
.	.	.	
.	.	.	
850.1	8501	2135	
850	8500	2134	Rated range
.	.	.	

.	.	.	
-200	-2000	F830	
-200.1	-2001	F82F	Exceed the lower limit
.	.	.	
.	.	.	
-240	-2400	F6A0	
<-240.0	-32768	8000	Underflow

3.5.4 Configuration Data Definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Word Data Format							

Data description:

Word Data Format: Analog data storage format. (Default: 0)

0: A-B

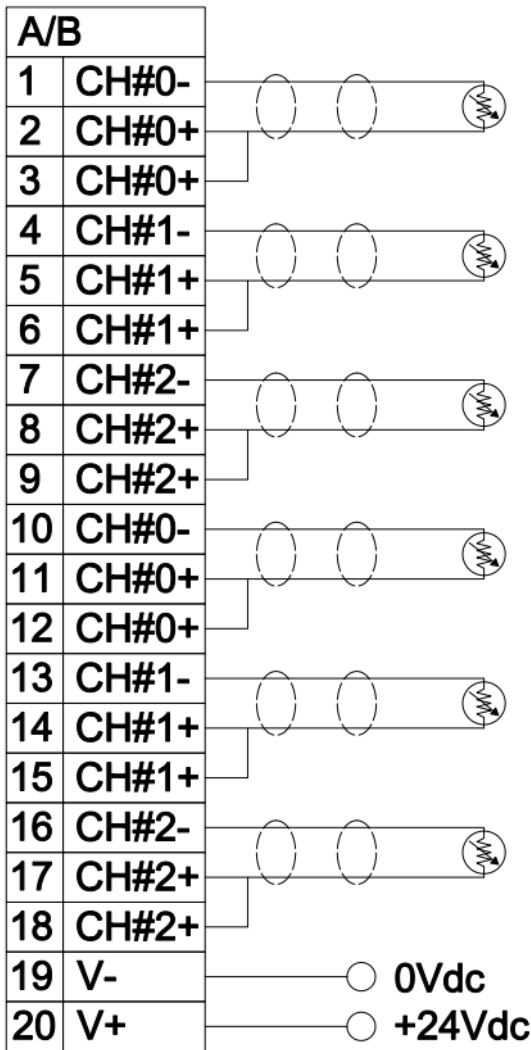
1: B-A

3.5.5 Terminal Definition

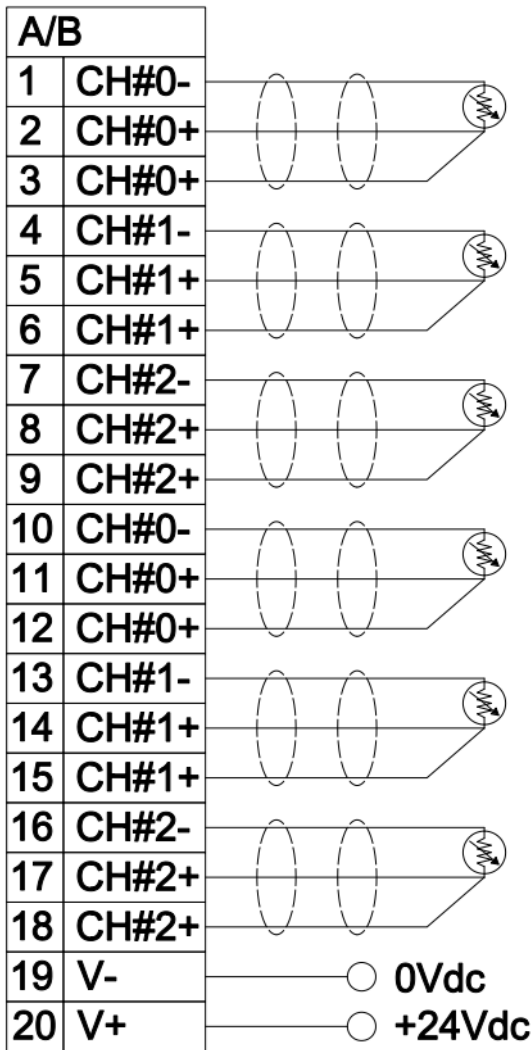
Terminal No.				Definition	Description
Slot 1	Slot 2	Slot 3	Slot 4	/	
A1	A10	B1	B10	CH#0-	RTD0 negative
A2	A11	B2	B11	CH#0+	RTD0 positive
A3	A12	B3	B12	CH#0+	RTD0 positive
A4	A13	B4	B13	CH#1-	RTD1 negative
A5	A14	B5	B14	CH#1+	RTD1 positive
A6	A15	B6	B15	CH#1+	RTD1 positive
A7	A16	B7	B16	CH#2-	RTD2- negative

A8	A17	B8	B17	CH#2+	RTD2 positive
A9	A18	B9	B18	CH#2+	RTD2 positive

3.5.6 Wiring Diagram



Two-wire system wiring



Three-wire system wiring

3.6 AIO-X3804 4 channels / Analog Input / TC Thermocouple Acquisition

3.6.1 Module Features

- ◆ AIO-X3804 supports 4-channel thermocouple signal acquisition
- ◆ AIO-X3804 can be configured for up to 9 thermocouple temperature measurements
- ◆ The internal bus and field input of the module are magnetic isolation
- ◆ Module input channel with TVS overvoltage protection
- ◆ 24-bit ADC resolution ($\Sigma\delta$ type)

3.6.2 Module Parameters

General Parameters	
Power	Max.56mA@5.0Vdc
Isolation	I/O to internal bus: magnetic isolation (2.5KVrms) Power isolation: DC-DC
Wiring	I/O wiring: Max.1.5mm ² (AWG 16)
Weight	15g
Dimension	74*42*14mm
输入参数 Input Parameters	
Number of Channels	4 channels
Indicator Light	\
Supported Sensor Types	J, K, E, T, S, R, B, N, C type thermocouple
Acquisition	±0.3% full scale, @25°C

Accuracy		$\pm 0.5\%$ full scale, @-20 – 70℃
Single Channel Sampling Frequency		50Hz(Max)
Measure Range ℃	J type	-210 – 1200℃
	K type	-270 – 1370℃
	E type	-270 – 1000℃
	T type	-270 – 400℃
	S type	-50 – 1760℃
	R type	-50 – 1760℃
	B type	0 – 1820℃
	N type	-270 – 1300℃
	C type	0 – 2320℃
Data Format		16-bit signed short integer (Integer)

3.6.3 Process Data Definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Data(CH 0)							
Byte 1								
Byte 2	Analog Input Data(CH 1)							
Byte 3								
Byte 4	Analog Input Data(CH 2)							
Byte 5								
Byte 6	Analog Input Data(CH 3)							
Byte 7								

Data description:

Analog Input Data 0-3: The analog signal input value of the corresponding channel.

Process Data Definition-Type J			
Temperature	Decimal	Hexadecimal	Location
>1360.0	32767	7FFF	Overflow
1360	13600	3520	Exceed the upper limit
.	.	.	
.	.	.	
1200.1	12001	2EE1	
1200	12000	2EE0	Rated range
.	.	.	
.	.	.	
-210	-2100	F7CC	
<-210.0	-32768	8000	Underflow
Process Data Definition-Type K			
Temperature	Decimal	Hexadecimal	Location
>1622.0	32767	7FFF	Overflow
1622	16220	3F5C	Exceed the upper limit
.	.	.	
.	.	.	
1372.1	13721	3599	
1372	13720	3598	Rated range
.	.	.	

.	.	.	
-270	-2700	F574	
<-270.0	-32768	8000	Underflow
Process Data Definition-Type E			
Temperature	Decimal	Hexadecimal	Location
>1200.0	32767	7FFF	Overflow
1200	12000	2EE0	Exceed the upper limit
.	.	.	
.	.	.	
1000.1	10001	2711	
1000	10000	2710	Rated range
.	.	.	
.	.	.	
-270	-2700	F574	
<-270.0	-32768	8000	Underflow
Process Data Definition-Type T			
Temperature	Decimal	Hexadecimal	Location
>540.0	32767	7FFF	Overflow
540	5400	1518	Exceed the upper limit
.	.	.	
.	.	.	
400.1	4001	FA1	
400	4000	FA0	Rated range

.	.	.	
.	.	.	
-270	-2700	F574	
<-270.0	-32768	8000	Underflow
Process Data Definition-Type S			
Temperature	Decimal	Hexadecimal	Location
>1850.0	32767	7FFF	Overflow
1850	18500	4844	Exceed the upper limit
.	.	.	
.	.	.	
1769.1	17691	451B	
1769	17690	451A	Rated range
.	.	.	
.	.	.	
-50	-500	FE0C	
-50.1	-501	FE0B	Exceed the lower limit
.	.	.	
.	.	.	
-170	-1700	F95C	
<-170.0	-32768	8000	Underflow
Process Data Definition-Type R			
Temperature	Decimal	Hexadecimal	Location
>2019.0	32767	7FFF	Overflow

2019	20190	4EDE	Exceed the upper limit
.	.	.	
.	.	.	
1769.1	17691	451B	Rated range
1769	17690	451A	
.	.	.	
.	.	.	Exceed the lower limit
-50	-500	FE0C	
-50.1	-501	FE0B	
.	.	.	Underflow
.	.	.	
-170	-1700	F95C	
<-170.0	-32768	8000	
Process Data Definition-Type B			
Temperature	Decimal	Hexadecimal	Location
>2070.0	32767	7FFF	Overflow
2070	20700	50DC	Exceed the upper limit
.	.	.	
.	.	.	
1820.1	18201	4719	Rated range
1820	18200	4718	
.	.	.	
.	.	.	
0	0	0000	

<0.0	-32768	8000	Underflow
Process Data Definition-Type N			
Temperature	Decimal	Hexadecimal	Location
>1550.0	32767	7FFF	Overflow
1550	15500	3C8C	Exceed the upper limit
.	.	.	
.	.	.	
1300.1	13001	32C9	
1300	13000	32C8	Rated range
.	.	.	
.	.	.	
-270	-2700	F574	
<-270.0	-32768	8000	Underflow
Process Data Definition-Type C			
Temperature	Decimal	Hexadecimal	Location
>2320.0	32767	7FFF	Overflow
2320	23200	5AA0	Rated range
.	.	.	
.	.	.	
0	0	0000	
<0.0	-32768	8000	Underflow

3.6.4 Configuration Data Definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Word Data Format							
Byte 1	TC Input Type(CH 0)							
Byte 2	TC Input Type(CH 1)							
Byte 3	TC Input Type(CH 2)							
Byte 4	TC Input Type(CH 3)							

Data description:

Word Data Format: Analog data storage format. (Default: 0)

0: A-B

1: B-A

TC Input Type (CH 0-3): External thermocouple type. (Default: 1)

0: no sensor

1:TC_J

2:TC_K

3:TC_E

4:TC_T

5:TC_S

6:TC_R

7:TC_B

8:TC_N

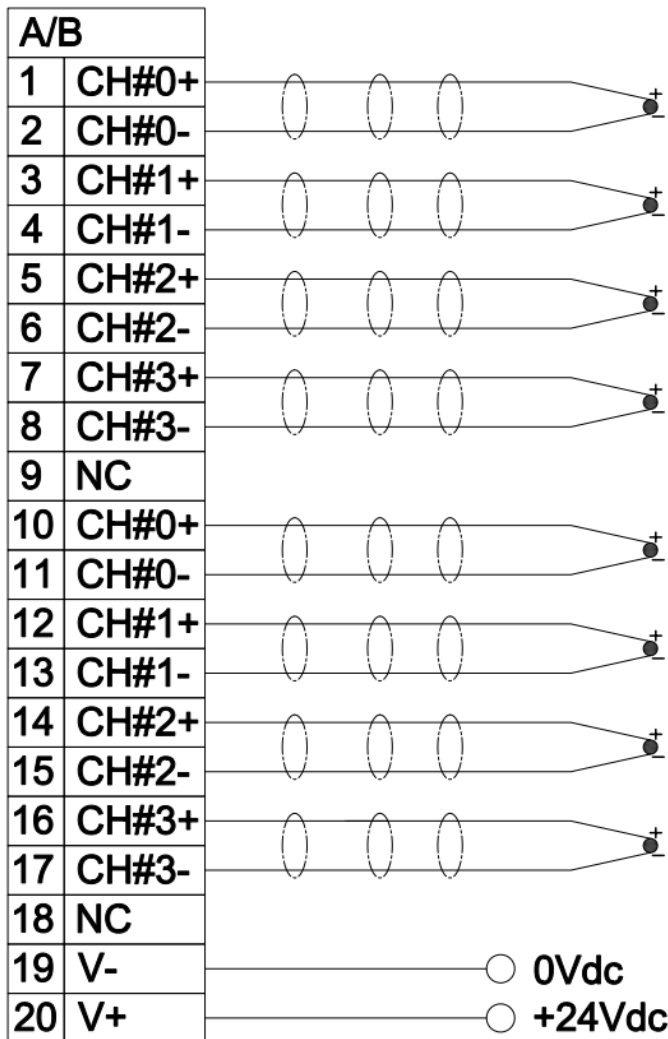
9:TC_C

3.6.5 Terminal Definition

Terminal No.				Definition	Description
Slot 1	Slot 2	Slot 3	Slot 4	/	

A1	A10	B1	B10	CH#0+	Channel 0 positive input
A2	A11	B2	B11	CH#0-	Channel 0 negative input
A3	A12	B3	B12	CH#1+	Channel 1 positive input
A4	A13	B4	B13	CH#1-	Channel 0 negative input
A5	A14	B5	B14	CH#2+	Channel 2 positive input
A6	A15	B6	B15	CH#2-	Channel 0 negative input
A7	A16	B7	B16	CH#3+	Channel 3 positive input
A8	A17	B8	B17	CH#3-	Channel 0 negative input
A9	A18	B9	B18	NC	No connection

3.6.6 Wiring Diagram



3.7 AIO-X6227 4 channels / digital input / 24VDC / Source or Sink & 3 channels / Digital Output / 24VDC / Source

3.7.1 Module Features

- ◆ AIO-X6227 supports 4-channel digital input, supports source and sink two-way input, input voltage 24V / 0V

- ◆ AIO-X6227 supports 3 channels of digital output, high output effective, output voltage 24V
- ◆ The module input channel can collect digital output signals of field equipment (Dry Contact or Active Output)
- ◆ Module input channels can be connected to 2-wire or 3-wire digital sensors
- ◆ Module input channels support 32-bit counters per channel, counting frequency <200Hz
- ◆ Module input channel can set Digital Signal Input Filter Time and Counter Data Transmission Sequence
- ◆ Module input channels can independently set the counting mode and counting direction
- ◆ Module output channels can drive field devices (Relays, Solenoid valves, etc.)
- ◆ Module output channels have Short-circuit, Thermal shutdown and Over-voltage protection functions
- ◆ The internal bus and field input of the module are isolated by optocouplers
- ◆ Module with 7 digital input and output channel LED indicators

3.7.2 Module Parameter

General Parameters	
Power	Max.45mA@5.0Vdc
Isolation	I/O to internal bus: optocoupler isolation (3KVrms)
Field Power	Nominal voltage: 24Vdc

	Input range: 22-28Vdc
Wiring	I / O wiring: Max.1.5mm ² (AWG 16)
Weight	14g
Size	74*42*10mm
Input Parameter	
Number of channels	4 channels
Indicator Light	4 green channel input indicators
Turn-on Voltage	High input: Min.10Vdc to Max.28Vdc (common: 0Vdc)
Turn-off Voltage	Low input: Min.0Vdc to Max.14Vdc (common: 24Vdc)
Turn-on Current	High input: Max.5Vdc (common: 0Vdc) Low input: Min.19Vdc (common: 24Vdc)
Turn-on Voltage	Max.15mA/channel@28V
Turn-off Voltage	>1.8kΩ
Input Delay	OFF to ON :Max.3ms
Filter Time	ON to OFF :Max.2ms
Sampling Frequency	Default time 10ms
Counting Frequency	500Hz
Input Delay	<200Hz
Output Parameter	
Number of channels	3 channels
Indicator light	3 green channel output indicators
Rated current	Typical value: 1.5A
Leakage current	Maximum: 7uA
Output Resistance	<0.2Ω
Output Delay	OFF to ON :Max.200us

	ON to OFF :Max.100us
Protective Function	Current protection: typical value 4.7A Temperature protection: typical value 165 °C Short circuit protection

3.7.3 Process Data Definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Unused				DI Ch#3	DI Ch#2	DI Ch#1	DI Ch#0
Byte 1	Counter Value Ch#0							
Byte 2								
Byte 3								
Byte 4								
Byte 5	Counter Value Ch#1							
Byte 6								
Byte 7								
Byte 8								
Byte 9	Counter Value Ch#2							
Byte 10								
Byte 11								
Byte 12								
Byte 13	Counter Value Ch#3							
Byte 14								
Byte 15								
Byte 16								

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Counter	Counter	Counter	Counter	Unused	DO	DO	DO
	Reset	Reset	Reset	Reset		Ch#2	Ch#1	Ch#0
	Ch#3	Ch#2	Ch#1	Ch#0				

Data description:

DI CH # (0-3): This bit is set when the input signal of the corresponding channel is valid, and it is 0 when the input is invalid.

0: Input signal is invalid

1: Input signal is valid

Counter Value Ch # (0-3): 4-channel 32-bit counter, unsigned integer. It is automatically cleared after overflow.

DO CH # (0-2): When this bit is 1, the corresponding channel output signal is valid and high level.

0: Output signal is invalid

1: Output signal is valid

Counter Reset Ch # (0-4): When the data bit changes from 0 to 1 (rising edge), the input counter of the corresponding channel is cleared.

Note: The maximum input channel counting frequency is 200Hz. When the input signal exceeds this frequency, the counting result may be inconsistent with the actual value.

3.7.4 Configuration Data Definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Input Filtering Time							
Byte 1								
Byte 2	Double Word Data Format							
Byte 3	Count Mode Ch#3		Count Mode Ch#2		Count Mode Ch#1		Count Mode Ch#0	
Byte 4	Unused				Count Direction Ch#3	Count Direction Ch#2	Count Direction Ch#1	Count Direction Ch#0
Byte 5					Unused			
Byte 6	Unused							

Data description

Input Filtering Time (ms): Input filtering time of the channel, unit is ms.

(Default: 10)

Counter Value Data Format: The byte transmission order of the 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

Count Mode Ch # (0-3): Count mode of the input channel. (Default: 0)

0: rising edge count

1: falling edge count

2: double edge counting

Count Direction Ch # (0-3): The counting direction of the input channel.
(Default: 0)

0: count up

1: count down

Fault Action for Output CH # (0-2): Output mode on fault. (Default: 0)

0: The last output state is maintained.

1: Output the set output value

Fault Value for Output CH # (0-2): When the fault output mode is 1, this bit sets the fault output value. (Default: 0)

0: Output low level.

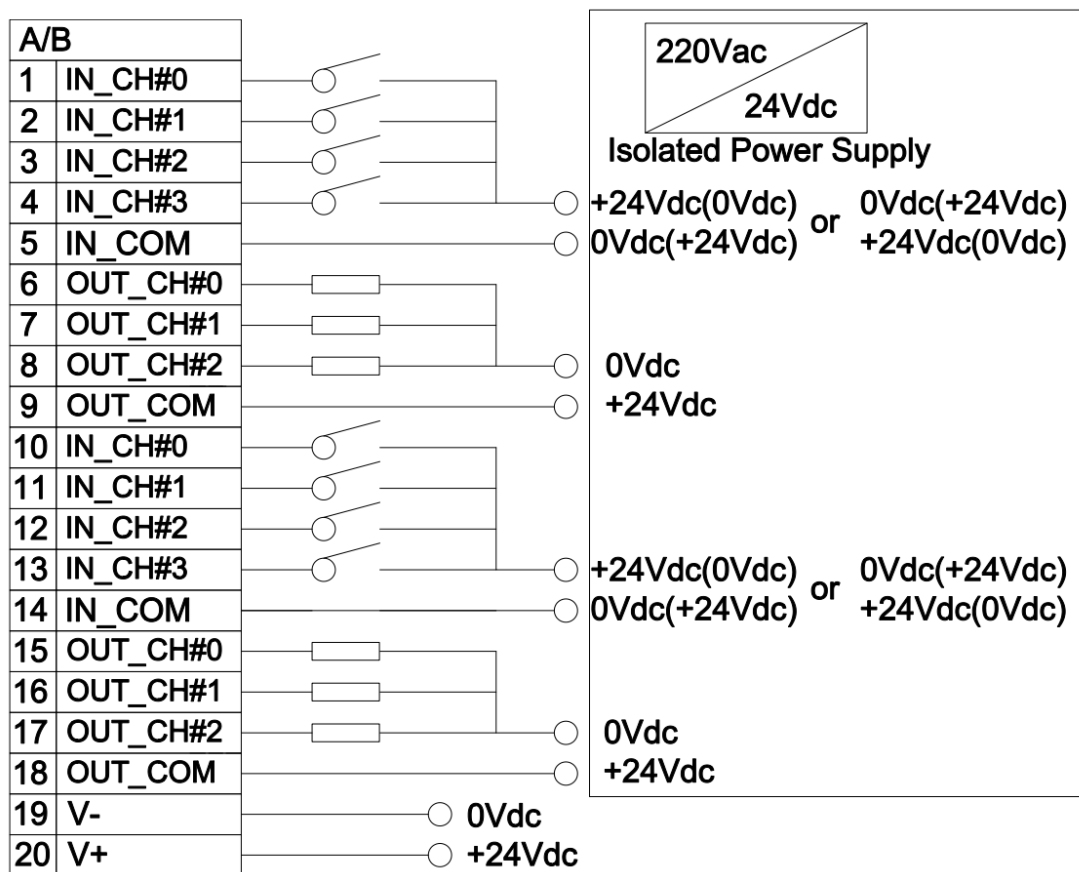
1: Output high level.

3.7.5 Terminal definition

Terminal No.				Definition	Description
Slot 1	Slot 2	Slot 3	Slot 4	/	
A1	A10	B1	B10	IN_CH#0	Input channel 0
A2	A11	B2	B11	IN_CH#1	Input channel 1

A3	A12	B3	B12	IN_CH#2	Input channel 2
A4	A13	B4	B13	IN_CH#3	Input channel 3
A5	A14	B5	B14	IN_COM	Input common
A6	A15	B6	B15	OUT_CH#0	Output channel 0
A7	A16	B7	B16	OUT_CH#1	Output channel 1
A8	A17	B8	B17	OUT_CH#2	Output channel 2
A9	A18	B9	B18	OUT_COM	Output common

3.7.6 Wiring diagram



3.8 AIO-4324 multi-channel / Analog Output / 0-20mA or 4-20mA, 0-24mA

3.8.1 Module Features

- ◆ 0-20mA, 4-20mA, 0-24mA output range can be set
- ◆ Module internal bus and field output are magnetic isolation
- ◆ Single-end common ground output

3.8.2 Module Parameters

General Parameters	
Power	Max.50mA@5.0Vdc
IO bus isolation	I / O to internal Bus: magnetic isolation (2.5KVrms)
Wiring	I/O wiring: Max.1.5mm ² (AWG 16)
Weight	15g
Size	74*42*14mm
Output Parameter	
Number of channels	4 channels
Resolution	16Bit
Output Range	0-20mA/4-20mA/0-24mA
Output Accuracy	>3‰
Diagnostic Function	Disconnection or overload, field power error
Common	0V common ground
Conversion time	2ms / all channels
Load	Max.1KΩ

3.8.3 Process Data Definition

Process data definition (AIO-X4324)

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Unused	Unused	Field Power Error (CH0-3)	DAC Communication Error (CH0-3)	Output Opening or Overload (CH3)	Output Opening or Overload (CH2)	Output Opening or Overload (CH1)	Output Opening or Overload (CH0)

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Data(CH 0)							
Byte 1								
Byte 2	Analog Output Data(CH 1)							
Byte 3								
Byte 4	Analog Output Data(CH 2)							
Byte 5								
Byte 6	Analog Output Data(CH 3)							
Byte 7								

Data description:

Output Opening or Overload (CH-xx): Current output diagnosis status.

This bit is set to 1 when the corresponding output channel is open or overloaded. It is automatically cleared when the load is normal.

0: The load is normal

1: Load is open or overloaded

DAC Communication Error (CH0-xx): DAC converter communication error. This error will occur when the field power is not turned on or the DAC, isolator, etc. is damaged.

0: DAC communication is normal

1: DAC conversion failed

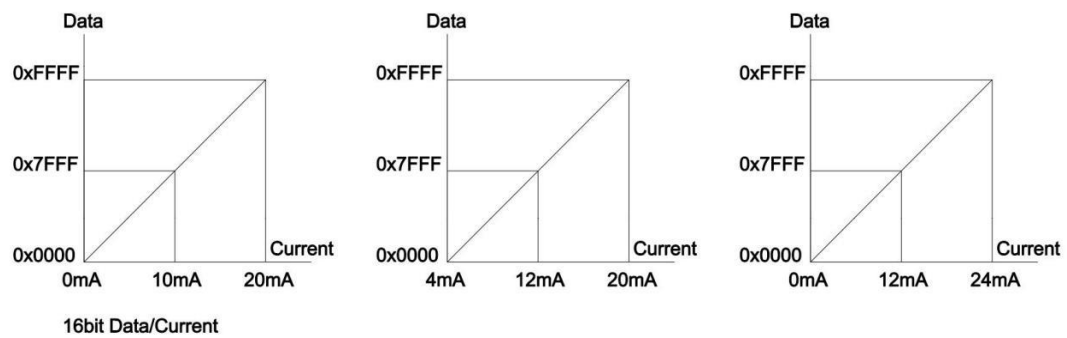
Field Power Error (CH0-xx): This error will occur when the field power is not supplied.

0: On-site power supply is normal

1: On-site power connection is abnormal

Analog Output Data (CH0-xx): Analog output value.

Process Data Definition				
Current (0-20mA)	Current (4-20mA)	Current (0-24mA)	Decimal 16 bits	Hexadecimal 16 bits
20	20	24	65535	0xFFFF
.
.
.
10	12	12	32767	0x7FFF
.
.
.
0	4	0	0	0x0000



3.8.4 Configuration Data Definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Word Data Format							
Byte 1	Unused		Unused		Current Type Ch#1		Current Type Ch#0	

Data description:

Word Data Format: Analog data storage format. (Default: 0)

0: A-B 1: B-A

Current Type (0-xx): The signal type of the output. (Default: 1)

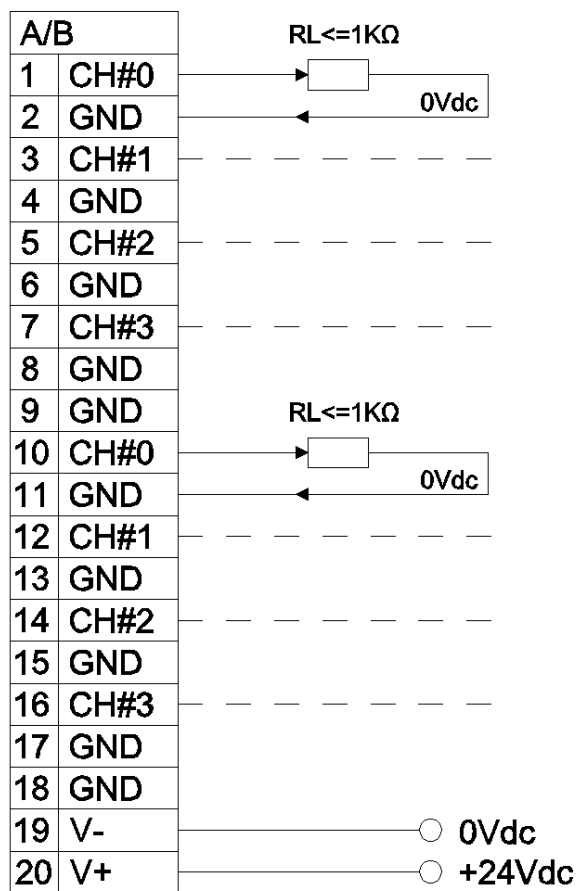
0:0-20mA 1:4-20mA 2:0-24mA

3.8.5 Terminal Definition

Terminal No.				Definition	Description
Slot 1	Slot 2	Slot 3	Slot 4	/	
A1	A10	B1	B10	CH#0	Current output
A2	A11	B2	B11	GND	0V common
A3	A12	B3	B12	CH#1	Current output

A4	A13	B4	B13	GND	0V common
A5	A14	B5	B14	CH#2	Current output
A6	A15	B6	B15	GND	0V common
A7	A16	B7	B16	CH#3	Current output
A8	A17	B8	B17	GND	0V common
A9	A18	B9	B18	GND	0V common

3.8.6 Wiring Diagram



4 AIO-BOX Configuration Software

4.1 Software Description

AIO-BOX Config is a configuration software developed by Sichuan Odot

Add.: No.6 Hongsheng Road, Hi-Tech District, Mianyang, Sichuan, China.

Web: www.odotautomation.com

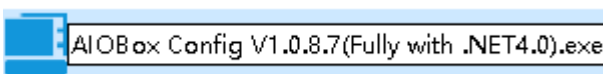
Automation System Co., Ltd. The software is applicable to all AIO-BOX series products and MiniBOX series products.

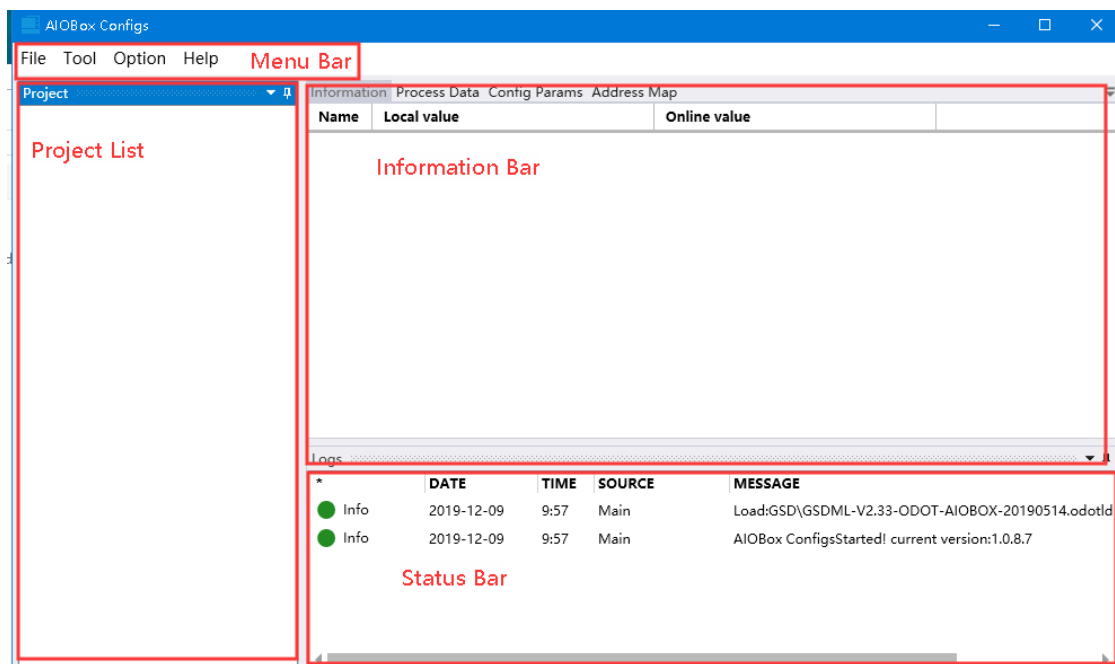
4.2 Offline Configuration

When the device is not connected to the software, the communication board and IO module can be added according to the actual module combination, and the software will automatically generate a data address mapping table.

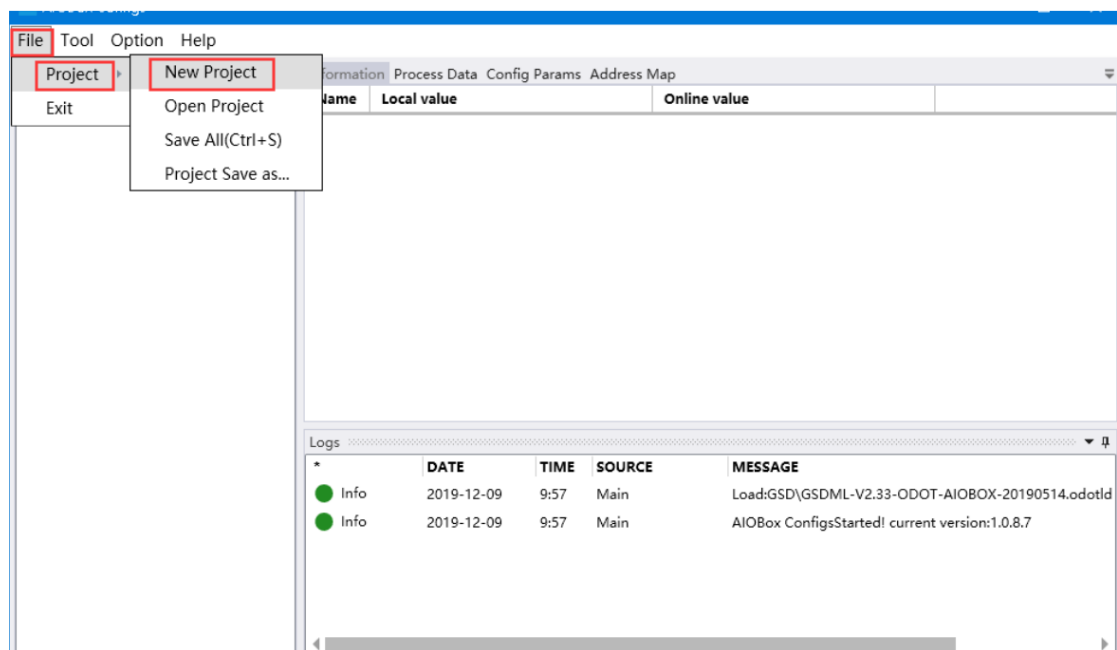
The offline mode is mainly effective for Modbus communication modules, and the addresses in the Address Mapping Table are the access addresses of IO data. For other communication modules, the IO address of the device can be automatically generated after configuration in the configuration software of the Master system.

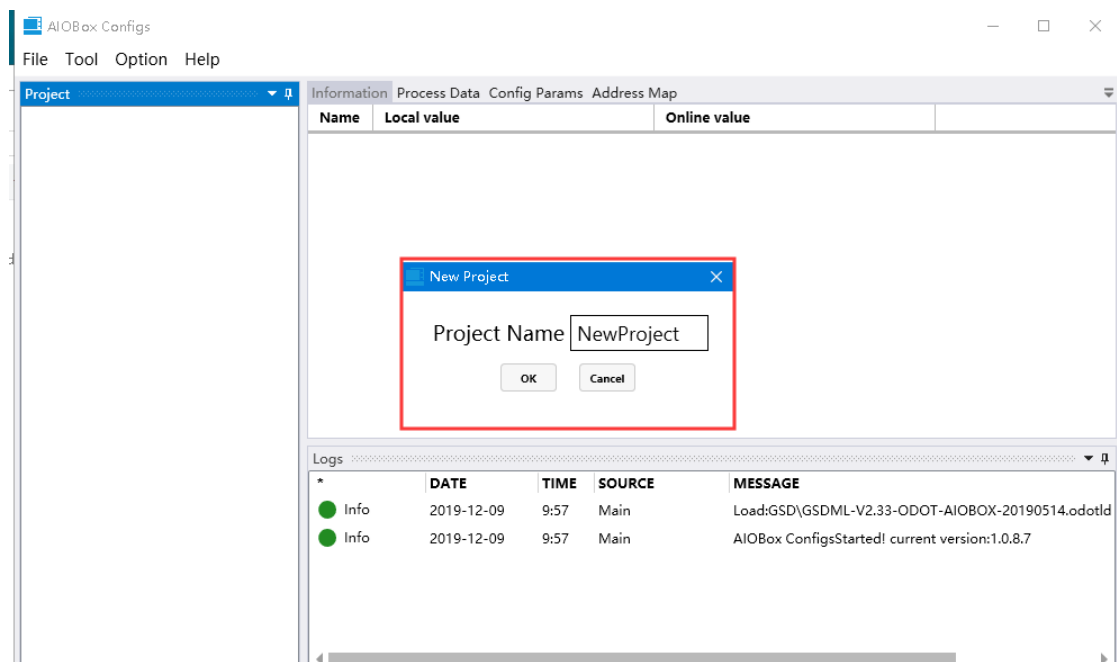
Steps of manually adding modules to view the address table in offline mode:

1. Find  and click to install the AIO-BOX software. After the installation is complete, open the AIO-BOX configuration software.

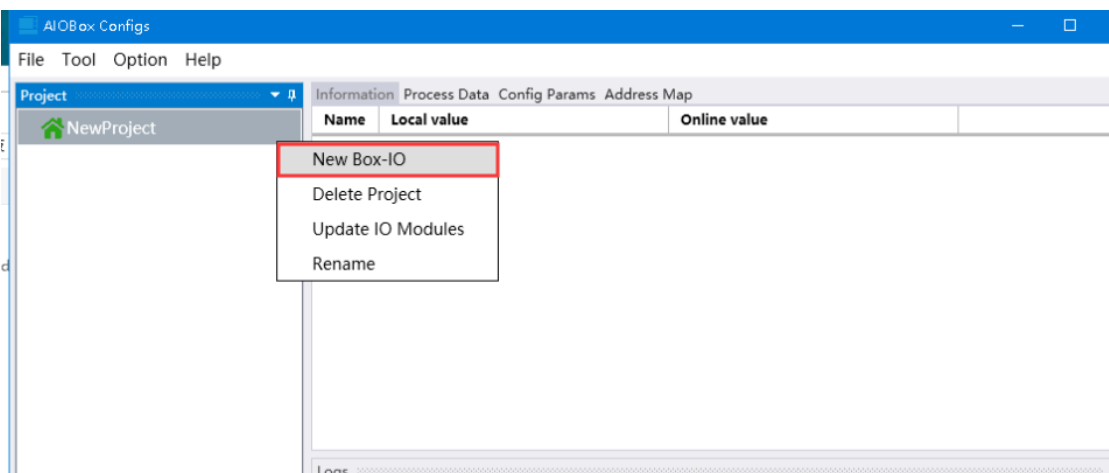


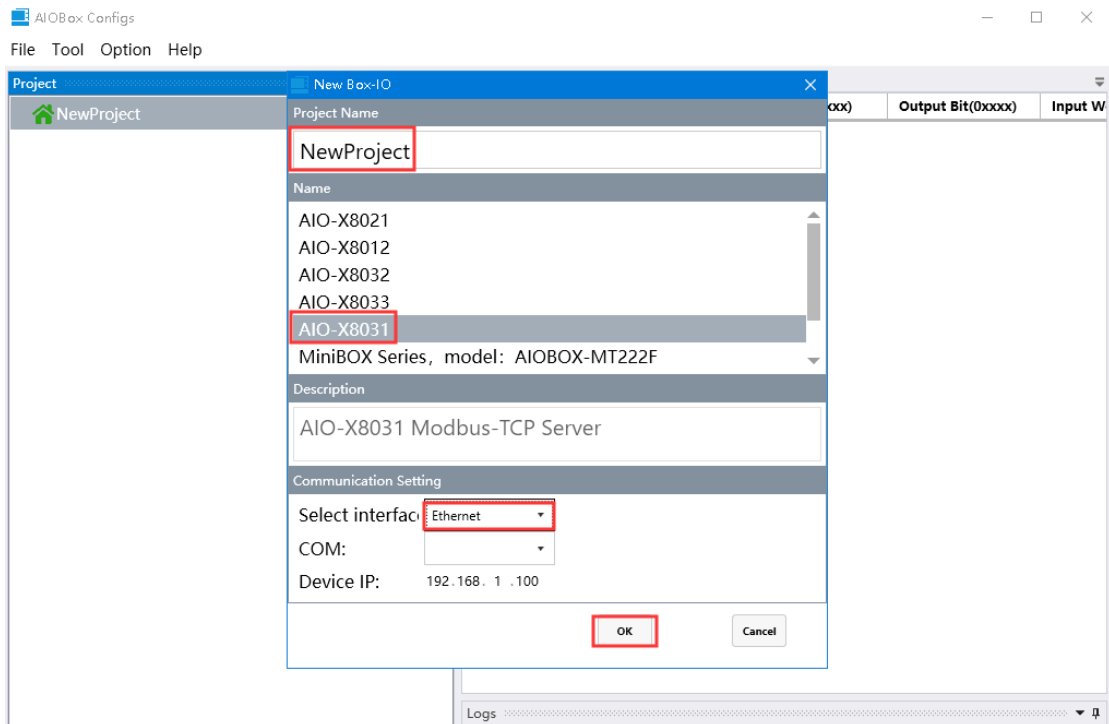
2. Click File-Project-New Project in the Menu Bar or right-click Project-New Project in the project directory column and enter the project name manually.



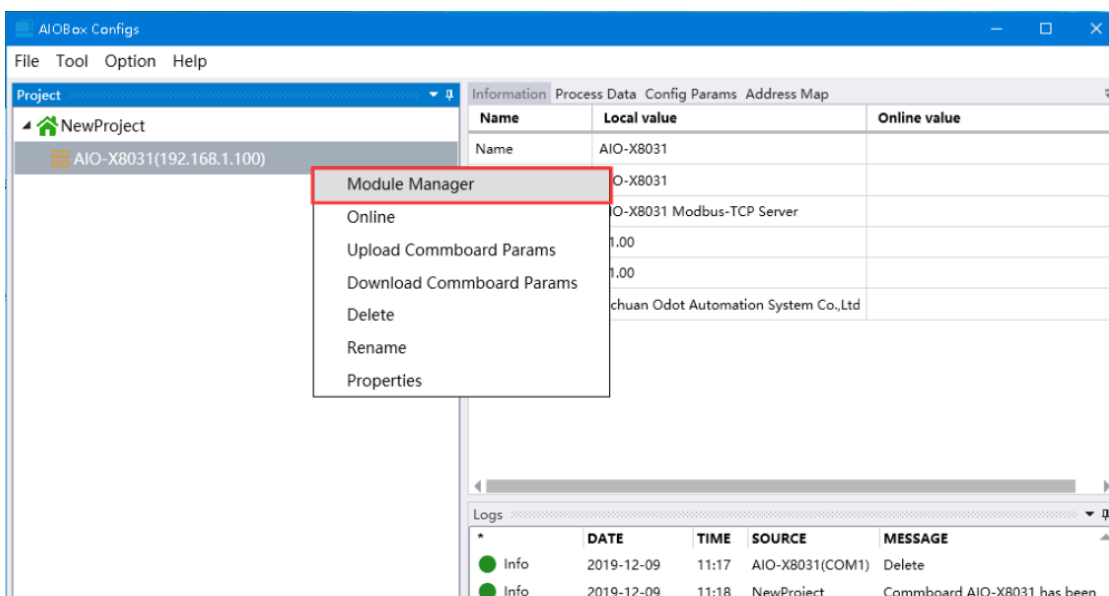


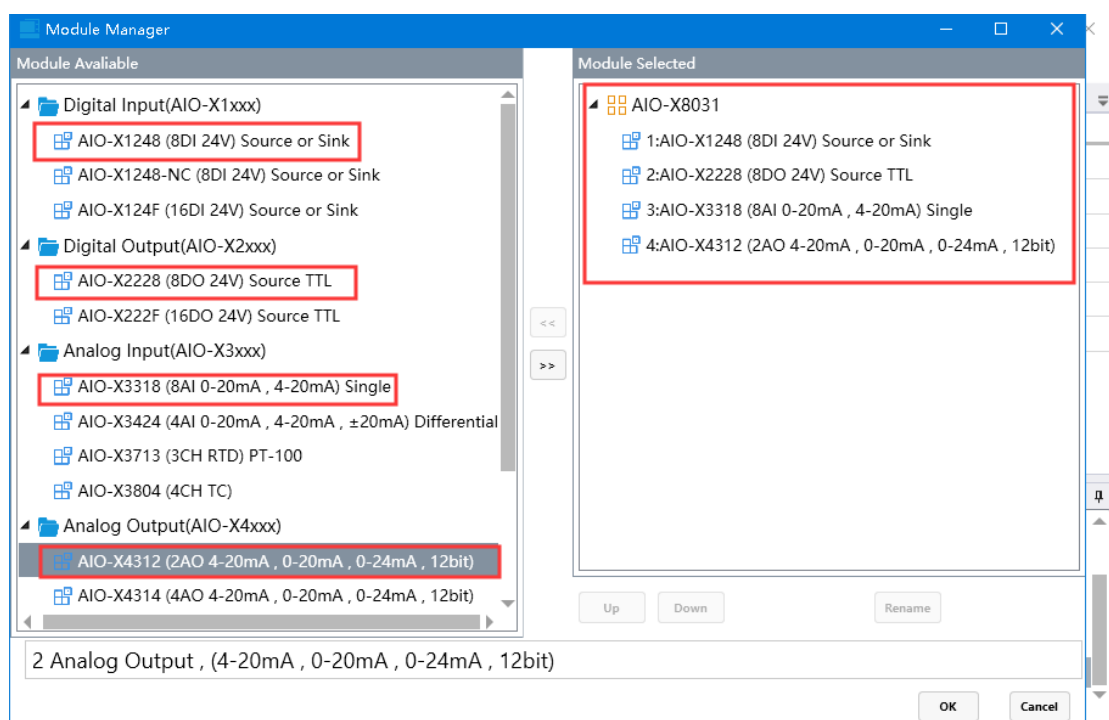
3. Right-click Project-NewProject in the project directory bar, select AIO-X8031 in the pop-up dialog box, select a serial interface number (optional) and click OK.





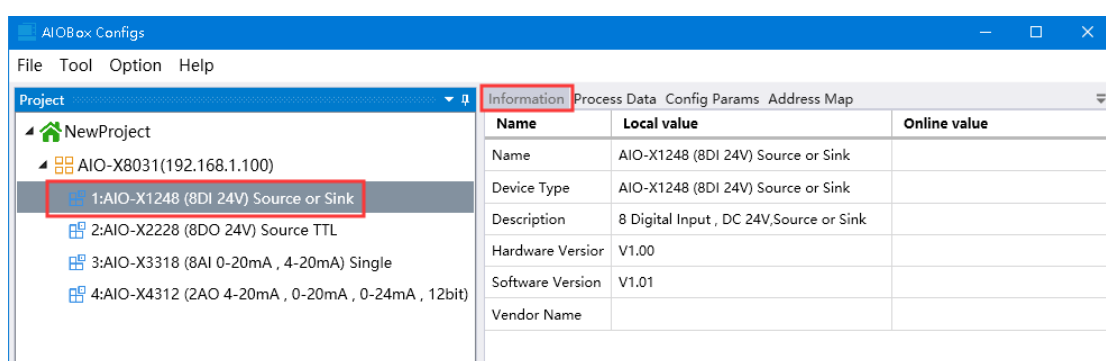
4. Right-click AIO-X8031- and click Module Manager. Refer to the list of IO slots on the left side of the module. In the pop-up dialog box, select the specific model of the IO module connected to slot 1 to 4, and click OK.



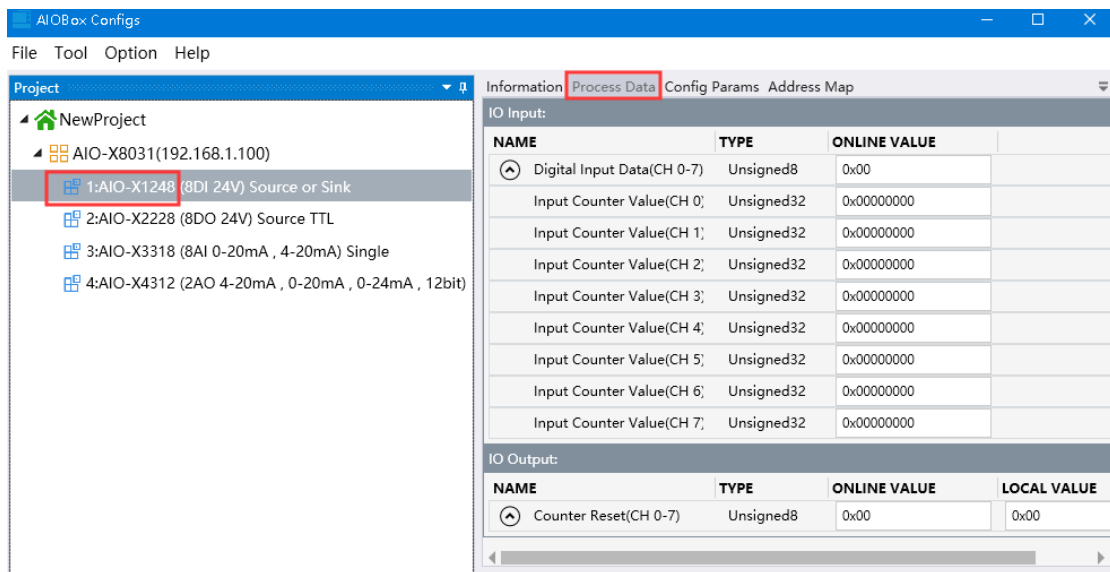


5. In the information area, click Information, Process Data, Config Parames, and Address Map to view the information of the IO module.

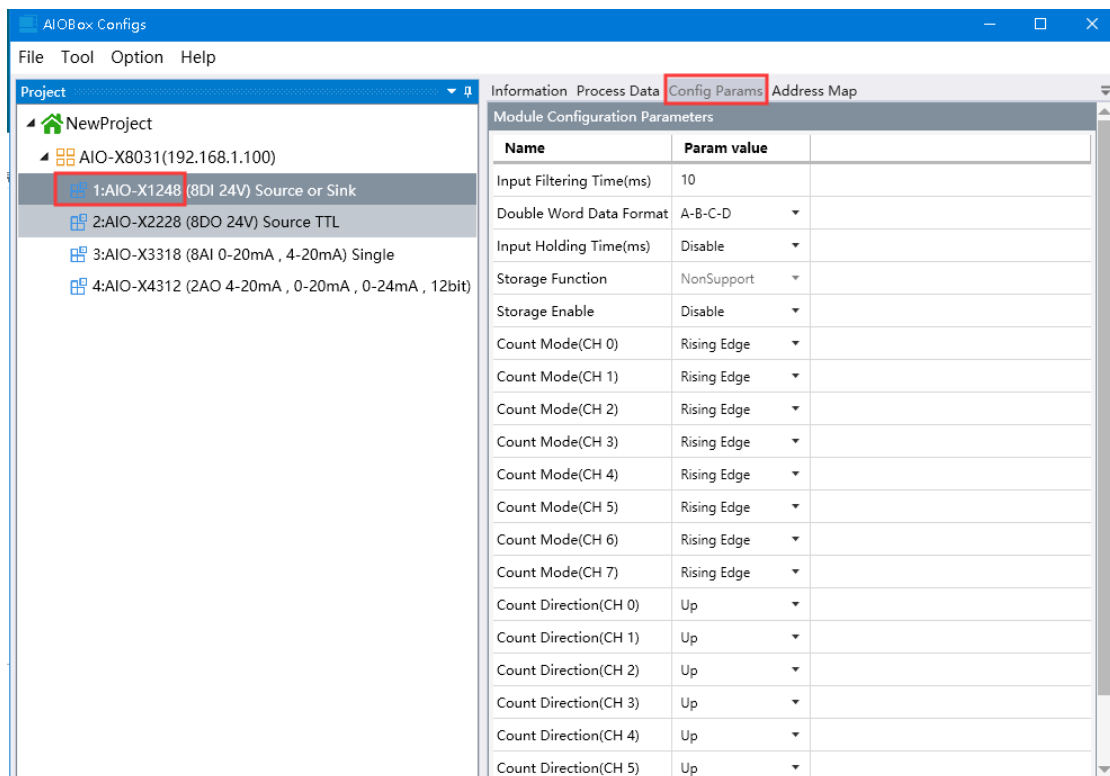
In the Information interface, you can view the communication protocol and Software version information of the current adapter module, and you can view the module Description and Version Information of the IO module.



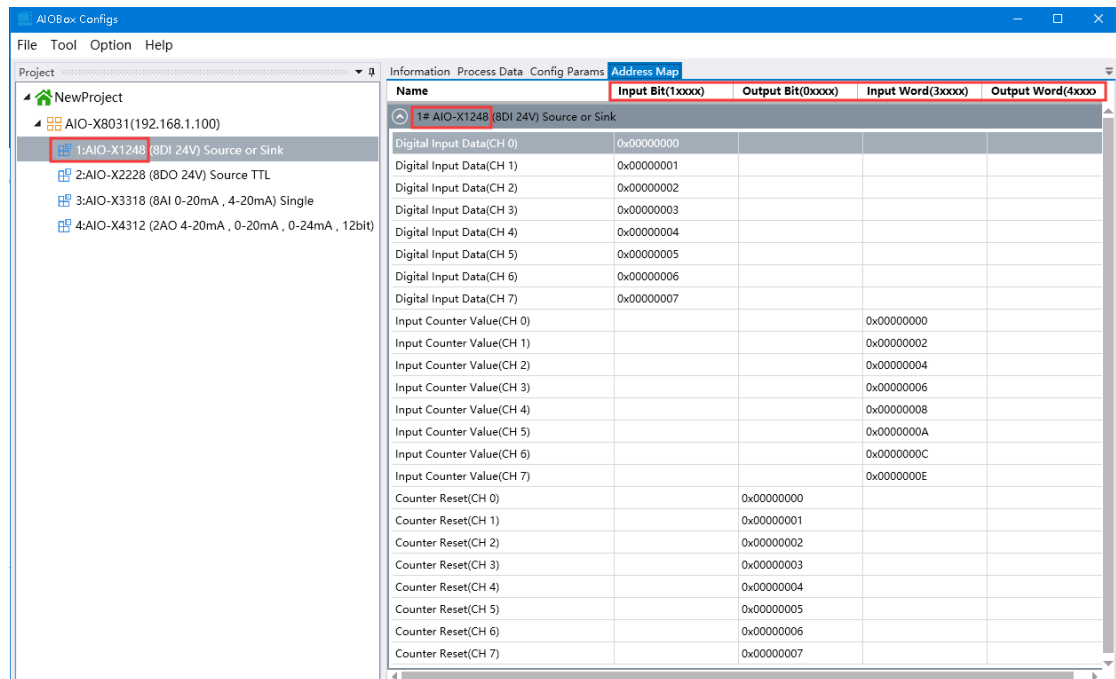
In the Process Data interface, you can view the data TYPE of the IO module, the ONLINE VALUE of the input data, and the ONLINE VALUE and LOCAL VALUE of the output data.



In the Config Params interface, you can set the configuration parameters and communication parameters of the adapter module. You can set the configuration parameters of the IO module.



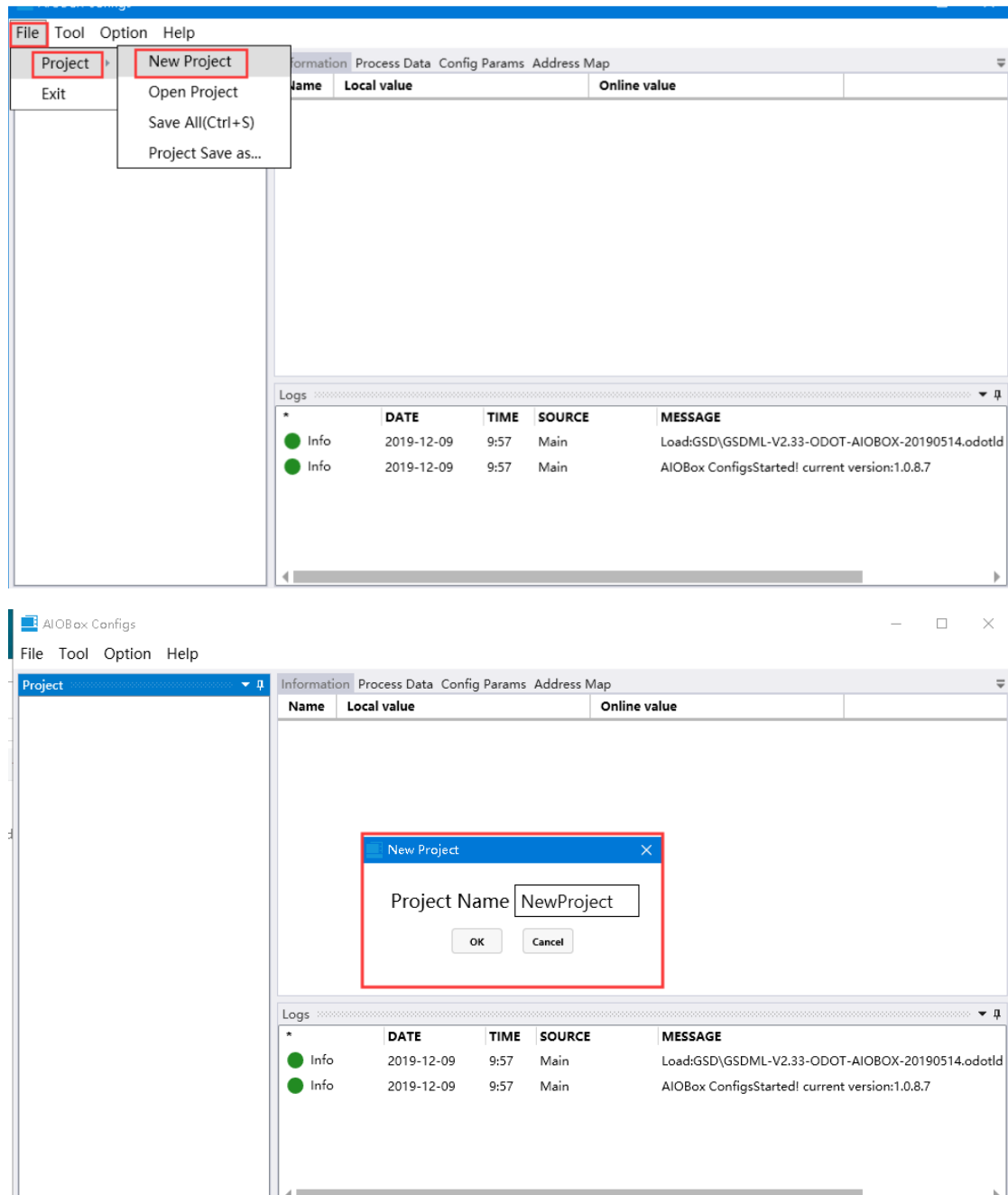
On the Address Map interface, you can view the channel address of the IO module.



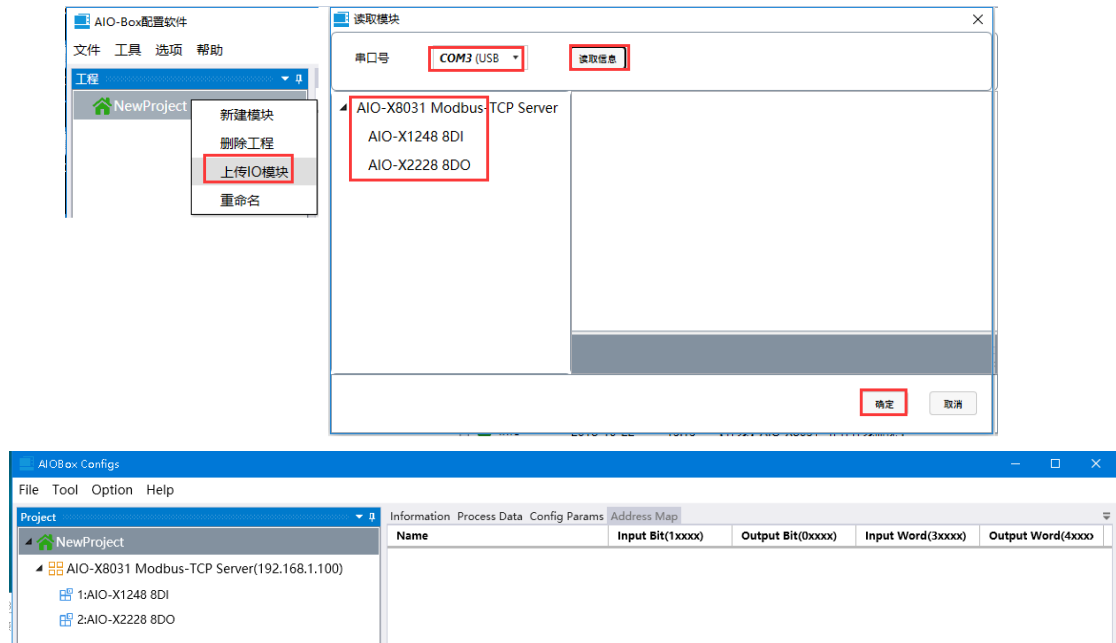
4.3 Online Search

Connect the module with 24V power supply, and connect the module to the computer with a Micro USB cable (the Micro USB cable needs to be installed with a driver, and the COM interface will be automatically assigned after the driver is installed, such as COM3).

1. After installing the AIO-BOX config software, open the configuration software and click File-Project-New Project in the menu bar or right-click Project-New Project in the project directory column and enter the project name manually.

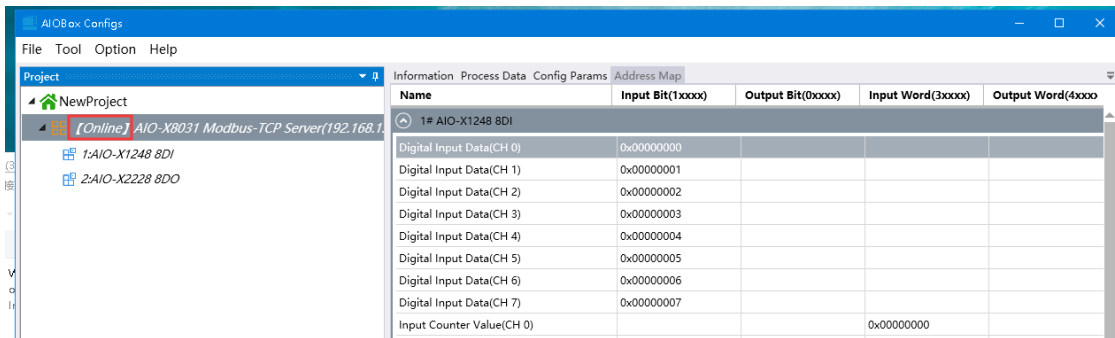
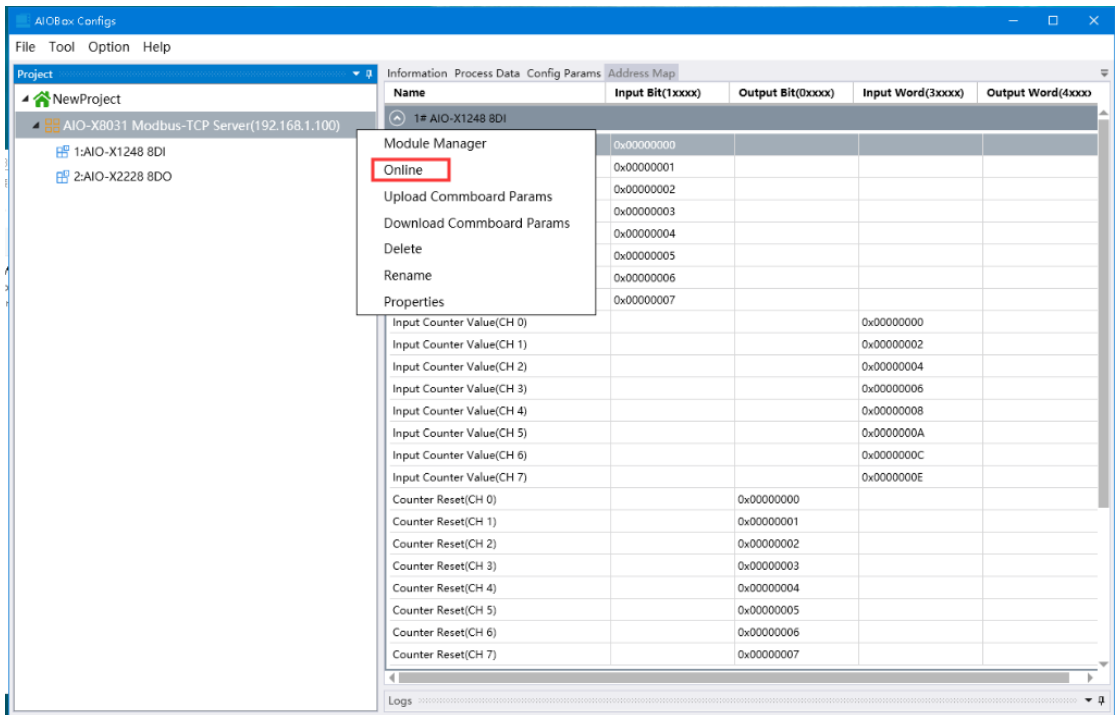


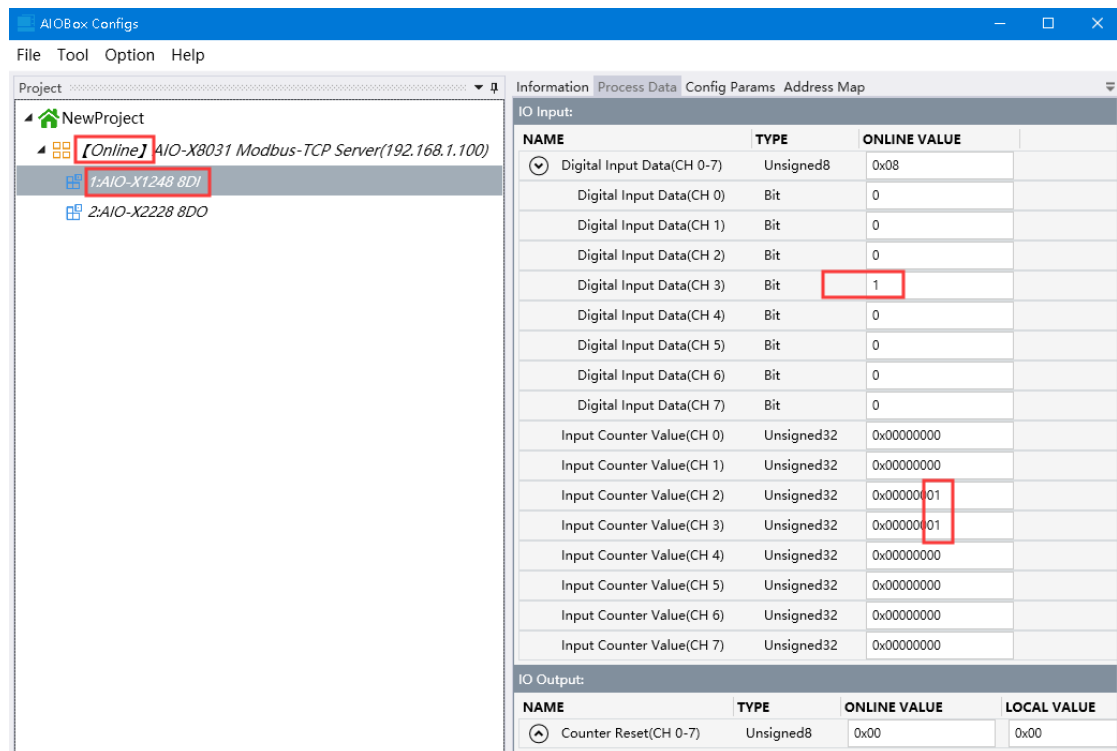
2. In the project directory, right-click the project name-Update IO Modules, select Ethernet in the Select interface, and click Read Info. The module information is automatically scanned at the bottom left, and click OK to complete the module upload.



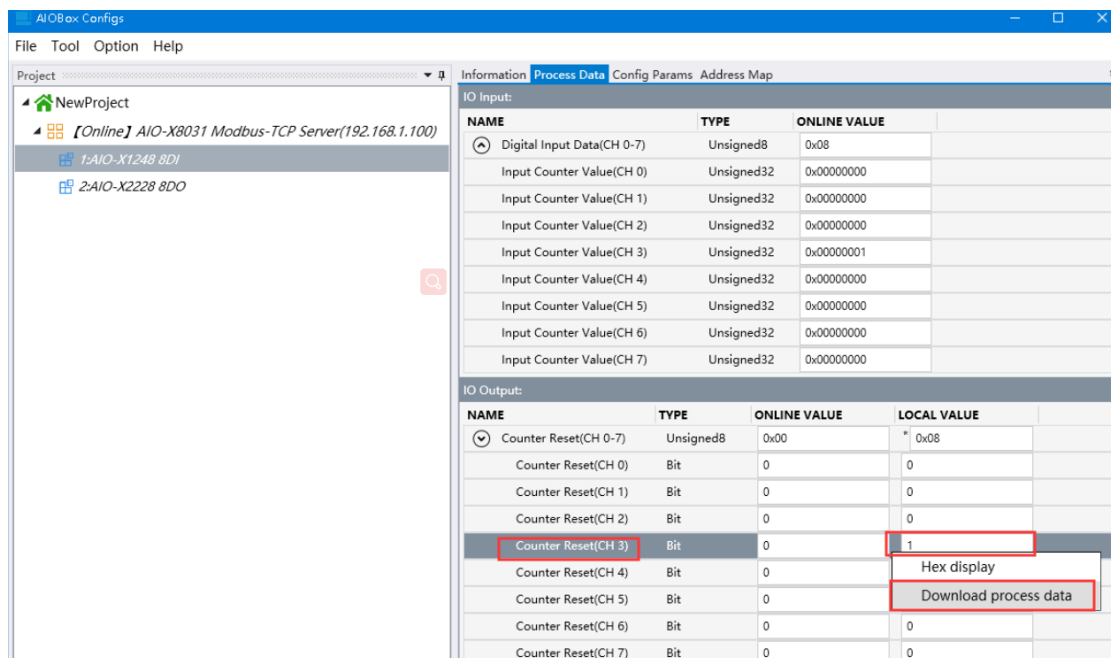
3. Right-click the adapter module AIO-X8031 and click Online then you can monitor IO module data online.

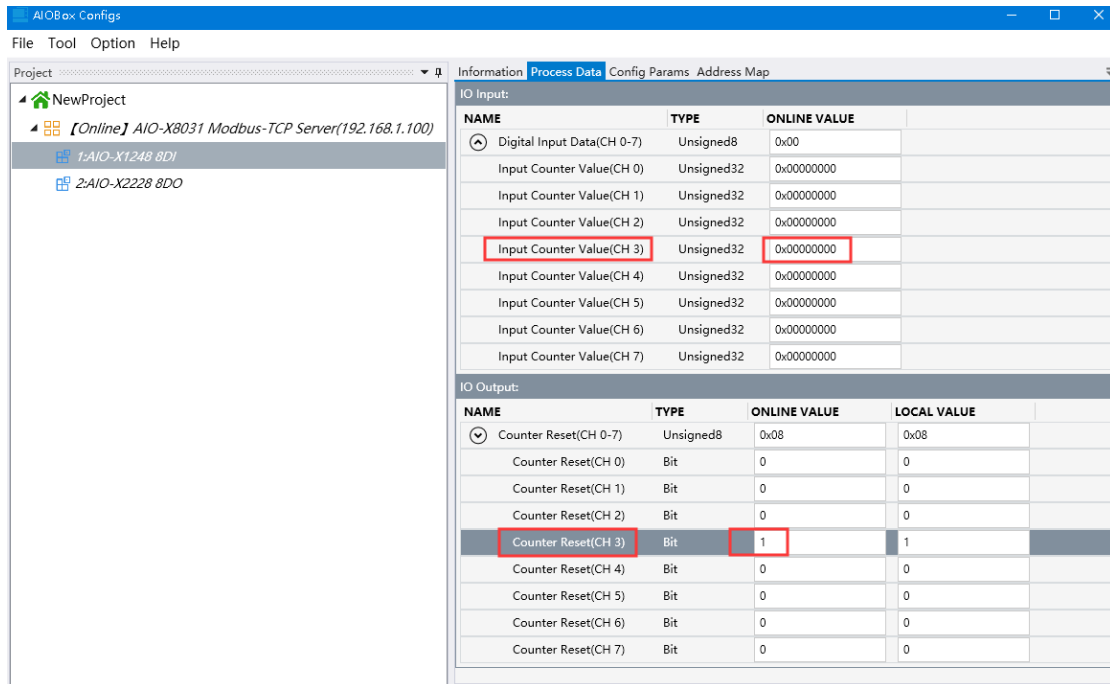
For example: channel 1 module AIO-X1248, the spring terminals A19 and A20 of the IO module are connected to the field power 24V and 0V at A9. At this time, AIO-X1248 is a Sink module (that is, 24VDC is valid). IO module data can be monitored in the Process Data interface. As can be seen in the figure, channel 2 gives a 24VDC signal 1 time, and channel 3 gives a 24VDC signal 1 time (and this signal is maintained).



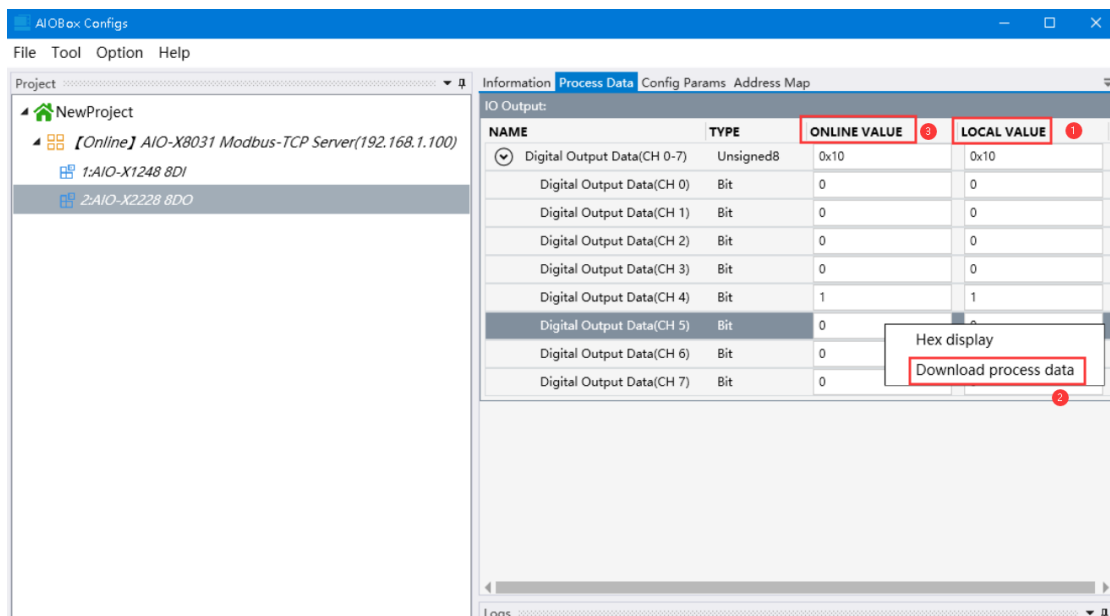


To clear the count, you only need to set the current value of the channel bit to 1, and click to download the process parameters.





Example: Channel 2 module AIO-X2228, connect the field power 24V to the spring terminals A19 and A20 of the IO module. Set the current value of the corresponding channel to 1, right-click the download process parameter, and the corresponding output bit indicator of the slot 2 module is on.



4. The configuration parameters can be modified online in the Config Params.

AIOBox Configs

File Tool Option Help

Project

NewProject

▲ [Online] AIO-X8031 Modbus-TCP Server(192.168.1.100)

1:AIO-X1248 8DI

2:AIO-X2228 8DO

Information Process Data Config Params Address Map

Module Configuration Parameters

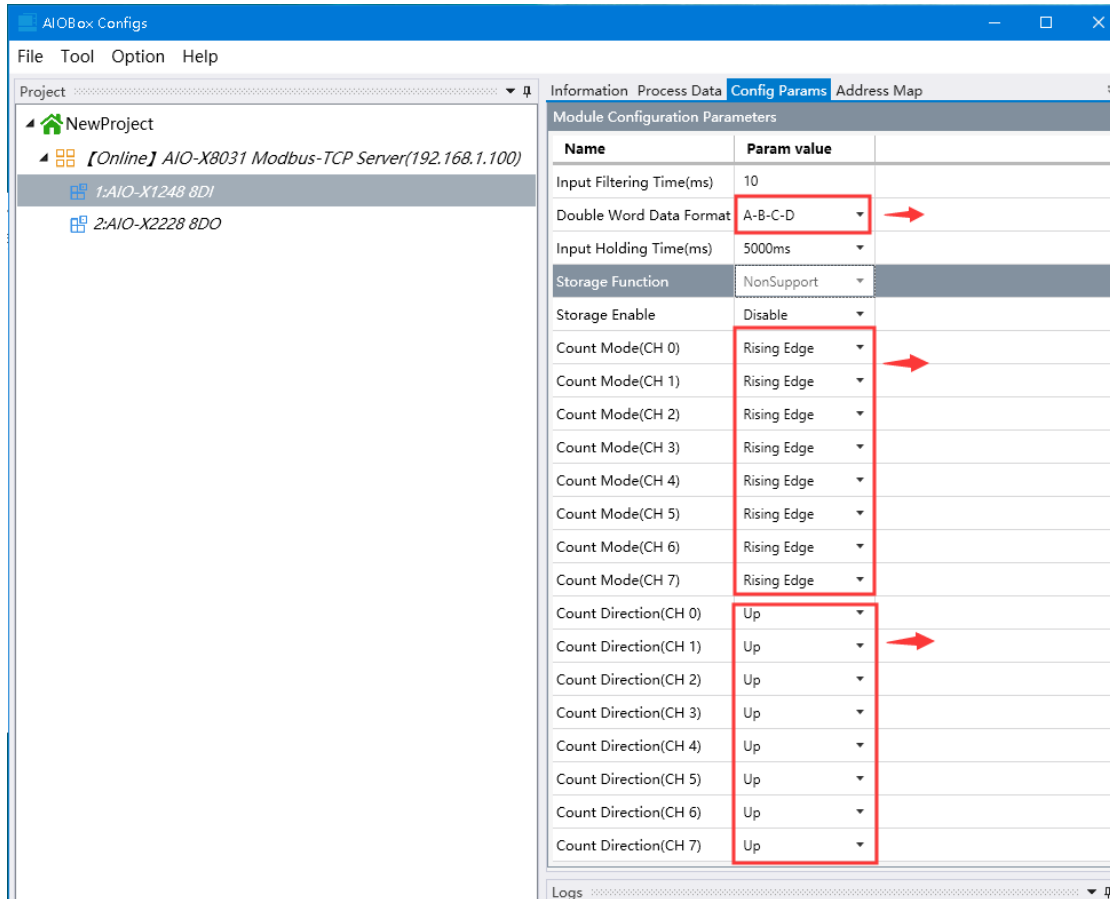
Name	Param value
Source of Configuration Data	Configuration Software
Fault Action for Input	Hold Last Input Value

Modbus-TCP Parameters

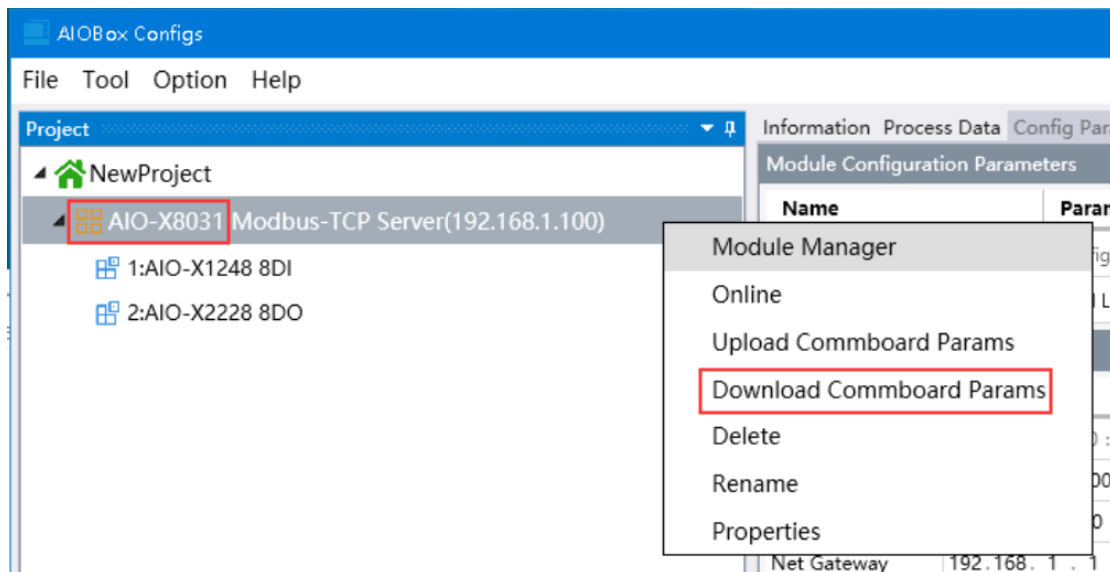
Name	Param value
MAC Address	AC : 1D : DF : 80 : 02 : B4
IP Address	192.168.1.100
Net Mask	255.255.255.0
Net Gateway	192.168.1.1
Modbus Port	502
Watchdog Enable	Enable
Watchdog Time(s)	10

Modbus-RTU Parameters

Name	Param value
Slave ID	1
BaudRate	9600 bps
Data Bits	8 Bits
Parity Bits	None Parity
Stop Bits	1 Bits
Serial Mode	RTU
Char Pitch	5 t
Respond Delay(ms)	0



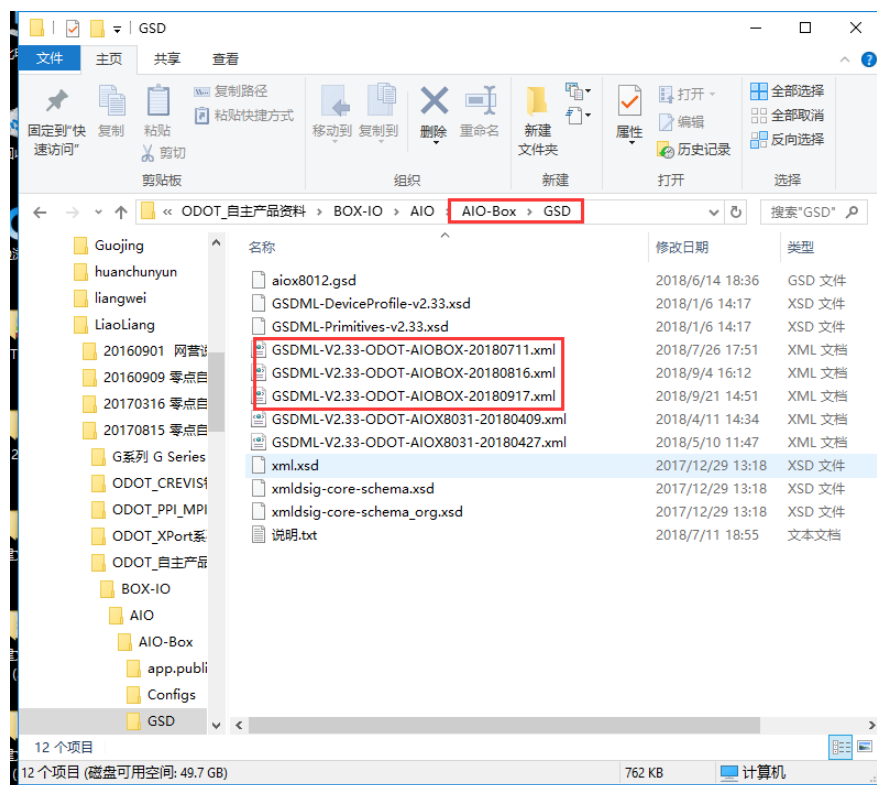
After the parameters are changed, right-click AIO-X8031- Download Commboard Param in the project directory bar to download the IO parameters. It can change the configuration parameters of adapters and IO modules.



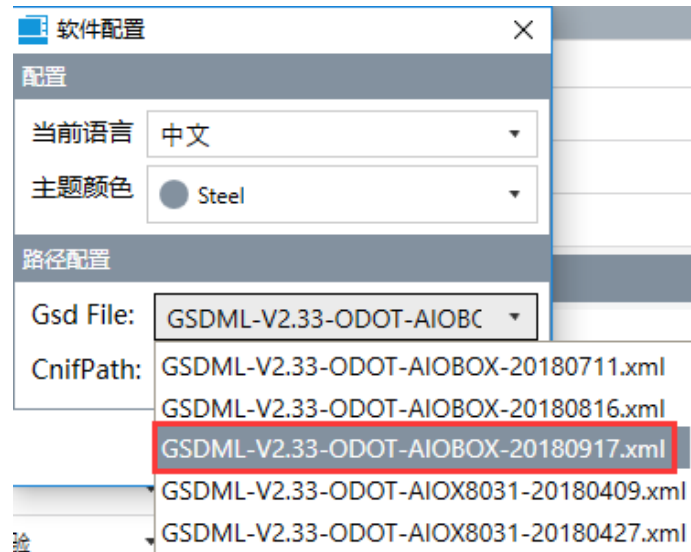
4.4 Update Device Library Files

The function of updating the device library file is to update the newly added IO module of the software. When a new IO module is released by ODOT, customers can import the IO module into the configuration software by updating the device library file without updating the software.

Firstly, copy and paste the latest version of the GSDML-V2.33-ODOT-AIOBOX-20180917 device library file into the GSD folder of the software installation directory.

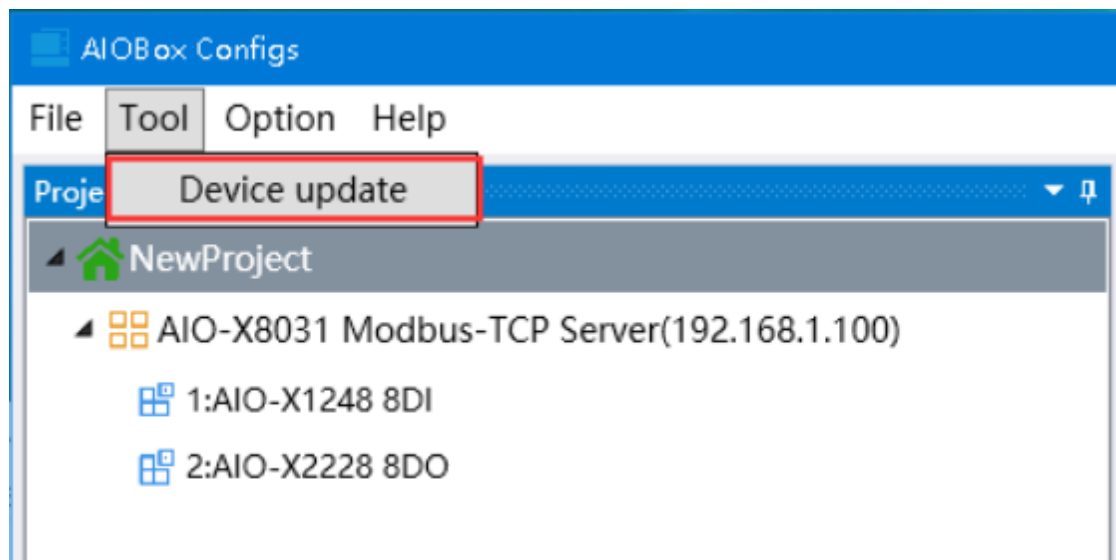


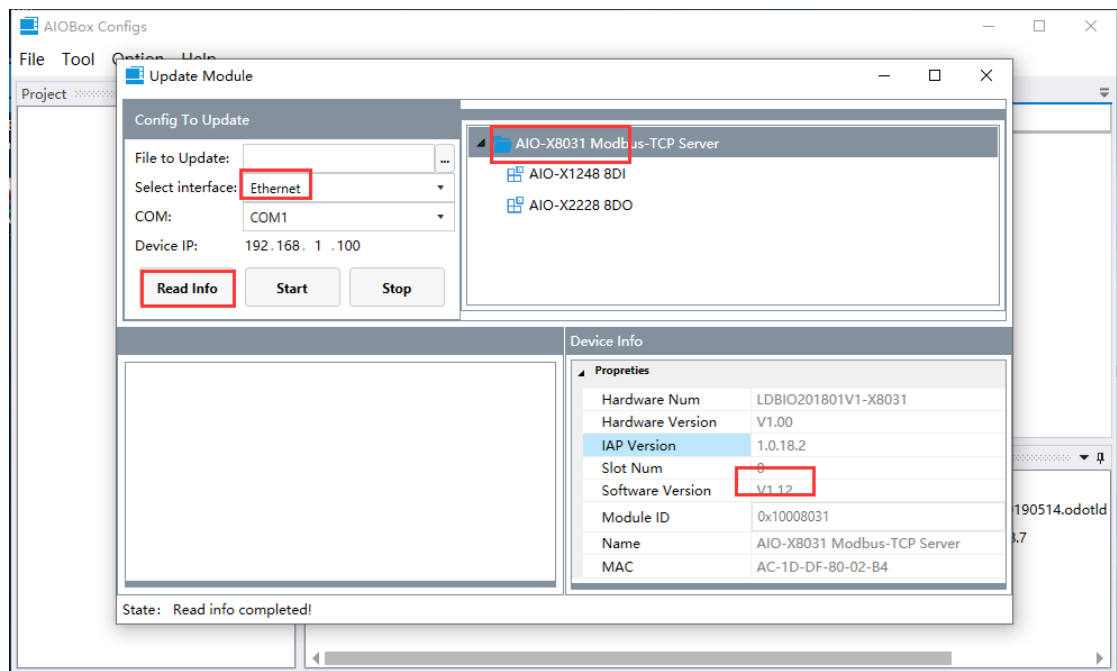
Next, click Options-Config on the menu bar, and find the new GSD library file in Gsd File under the path configuration of the pop-up dialog box. Click OK to complete the update of the device library file.




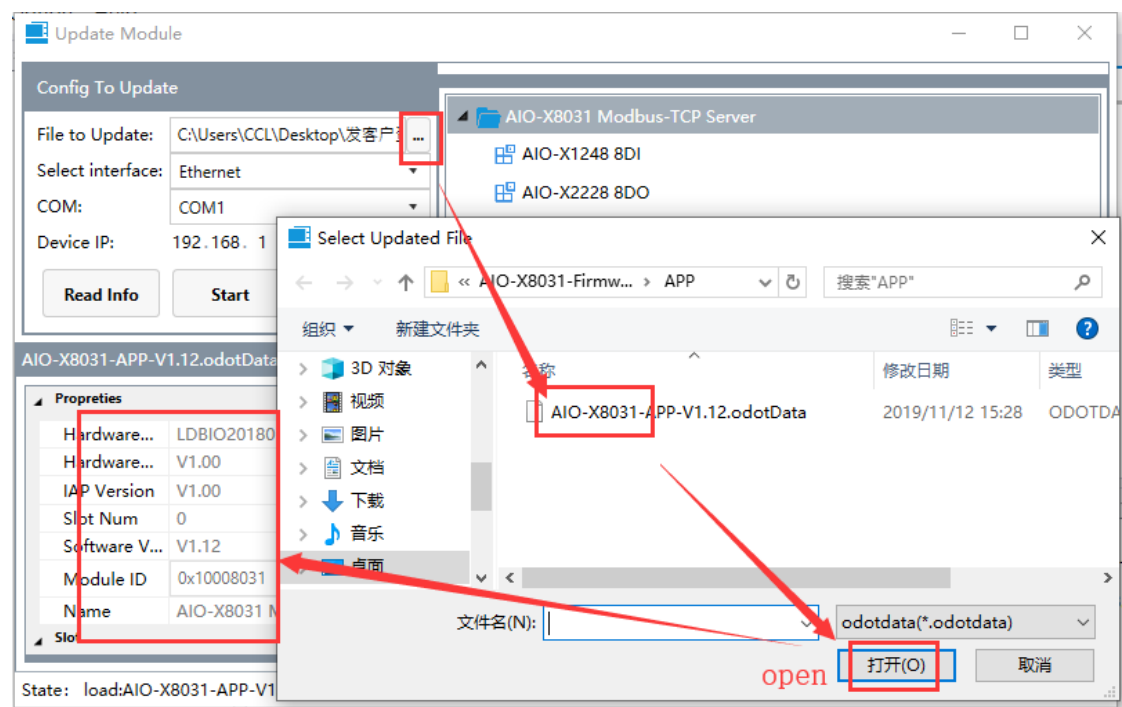
4.5 Device Firmware Upgrade

In the AIO-BOX software, click Tool-Device update. Select "Ethernet" in "Select interface", and click "Read Info" to view the current version information of the adapter module.





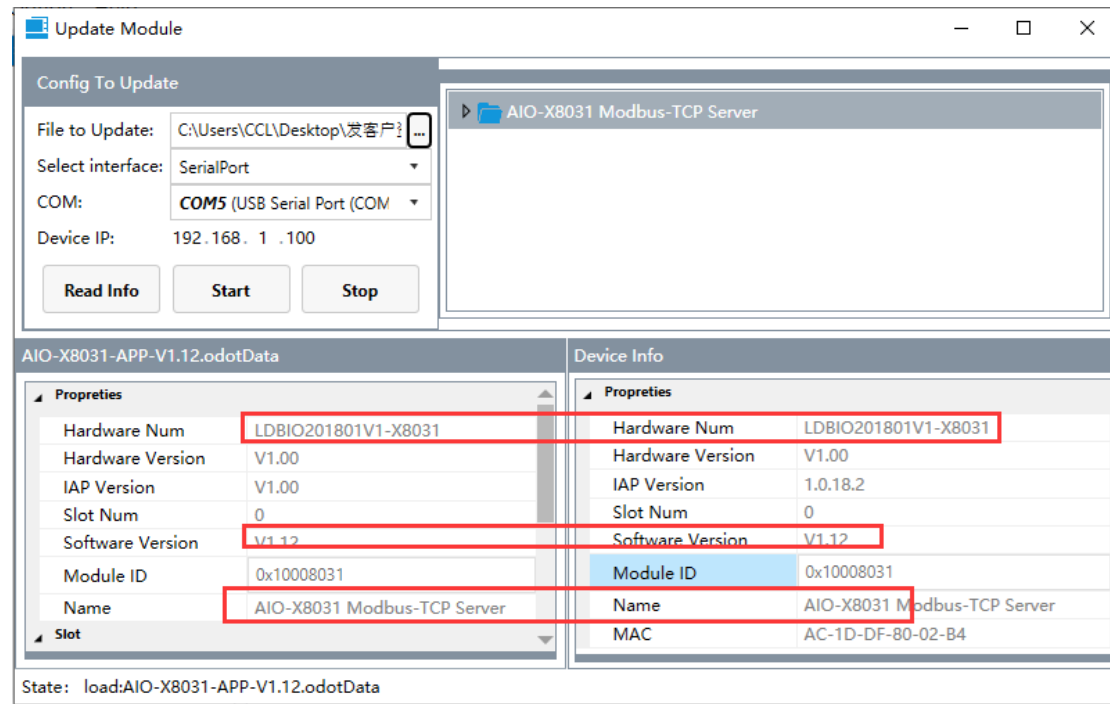
Click  on the right of File to Update, select the upgrade file (.odotData) of the adapter module AIO-X8031 in the pop-up window, and open it.



You can view the upgrade version and other information on the lower left side of the upgrade interface. In this example there is no update of the firmware version. If the Software Version information is not the same, you need to

select the slot where the module is located and tick ☒, then click to start the upgrade.

Note: If the hardware version displayed on the lower left side is an IO module, you need to check the box on the right side of the corresponding module and click "Start Upgrade".

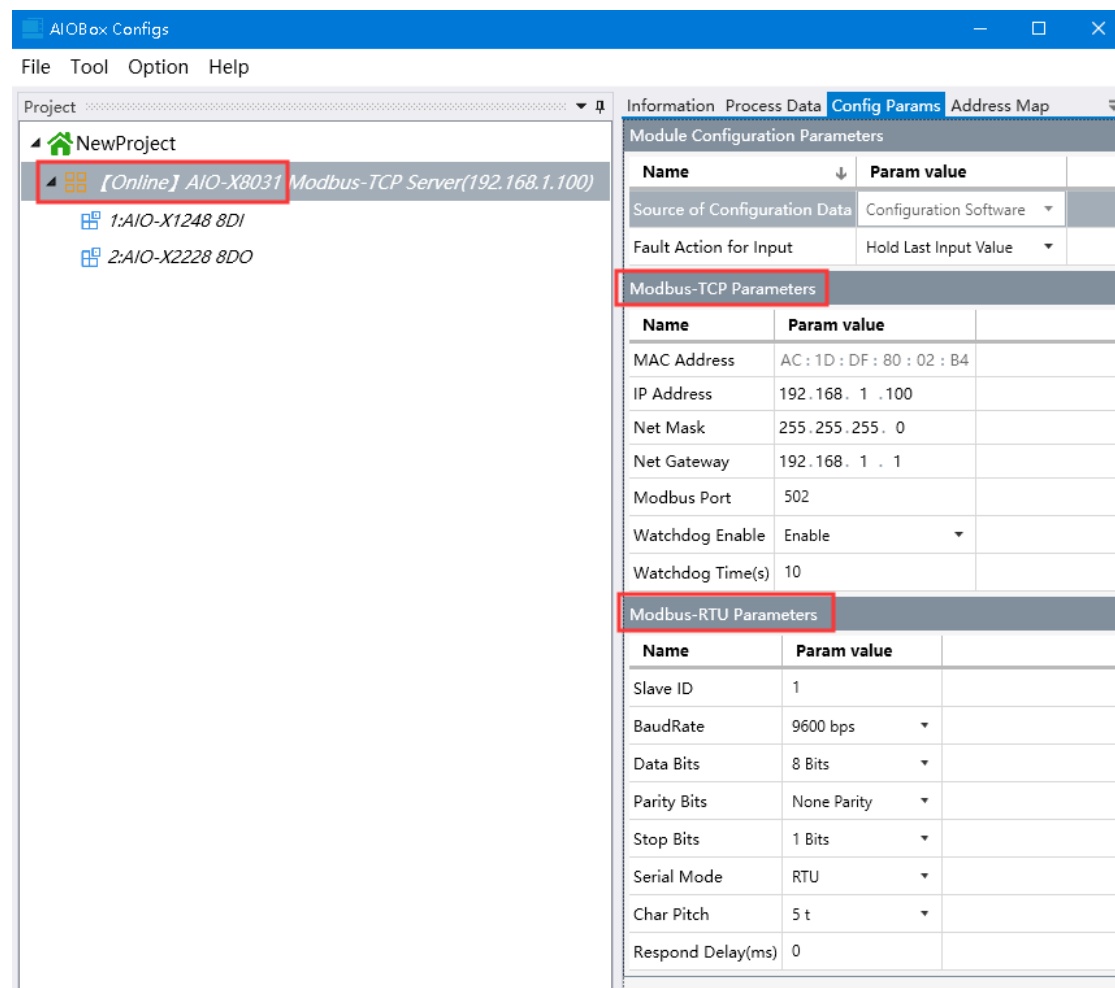


5 Simple Application

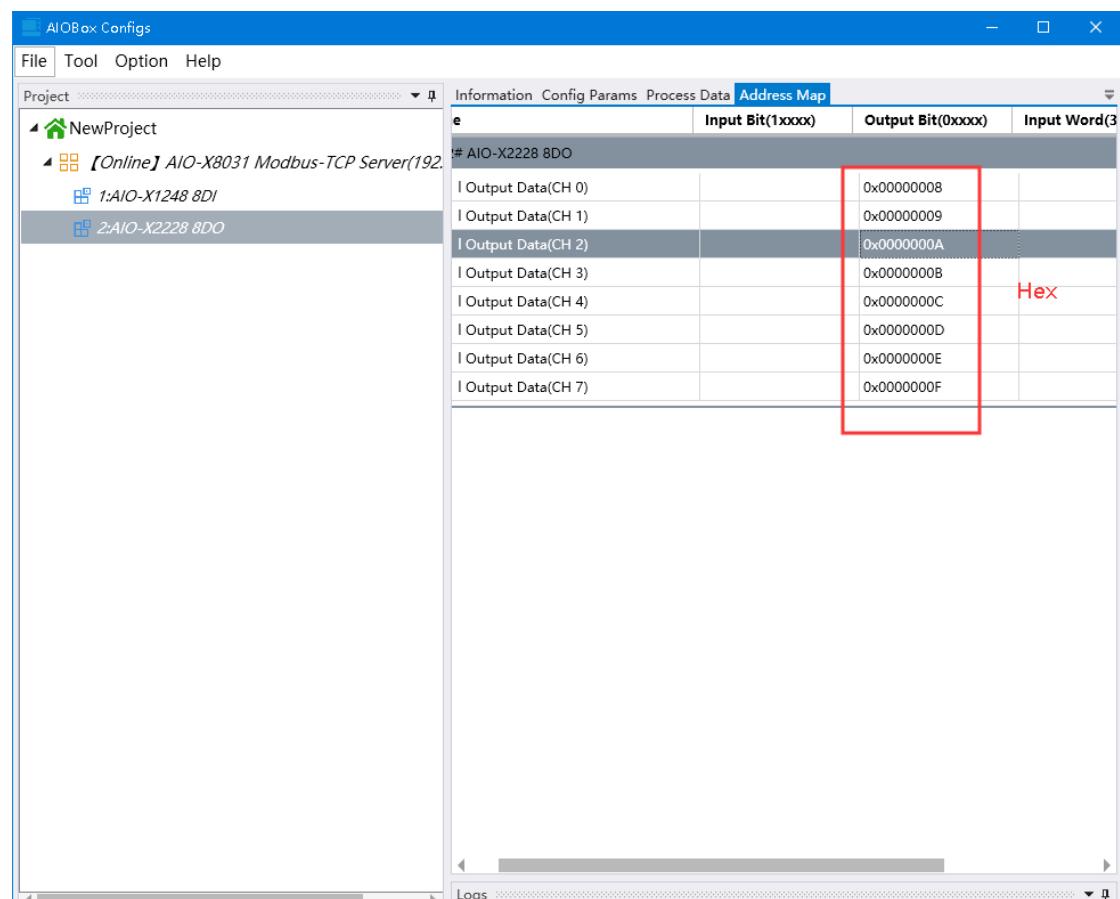
5.1 AIO-X8031 Module Test Application

5.1.1 Connect the test module with MODBUS POLL software

1. In the AIO-BOX software, you can view the default parameters of the AIO-X8031 module, MODBUS TCP parameters: IP address (192.168.1.123), MODBUS RTU parameters: ID = 1, 115200, N, 8, 1.



2. Use AIO-BOX software to monitor the address table of AIO-X8031 and back-mounted IO modules online. It can be seen that the address area corresponding to AIO-X2228 is 00001 – 00015.



3. Open the MODBUS POLL software and control the AIO-X2228 output channels by Ethernet and serial ports respectively.

Set Function:

Read/Write Definition

Slave ID: 1

Function: 15 Write Multiple Coils

Address: 10011 -> 10

Quantity:

Scan Rate:

Disable

☐ Read/Write Disabled

☐ Disable on error

View

Rows

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

☐ Hide Alias Columns ☐ PLC Addresses (Base 1)

☐ Address in Cell ☐ Enron/Daniel Mode

Set mapping address:

Read/Write Definition

Slave ID: 1

Function: 15 Write Multiple Coils

Address: 8 Protocol address. E.g. 10011 -> 10

Quantity: 8

Scan Rate: 1000 [ms]

Disable

☐ Read/Write Disabled

☐ Disable on error

View

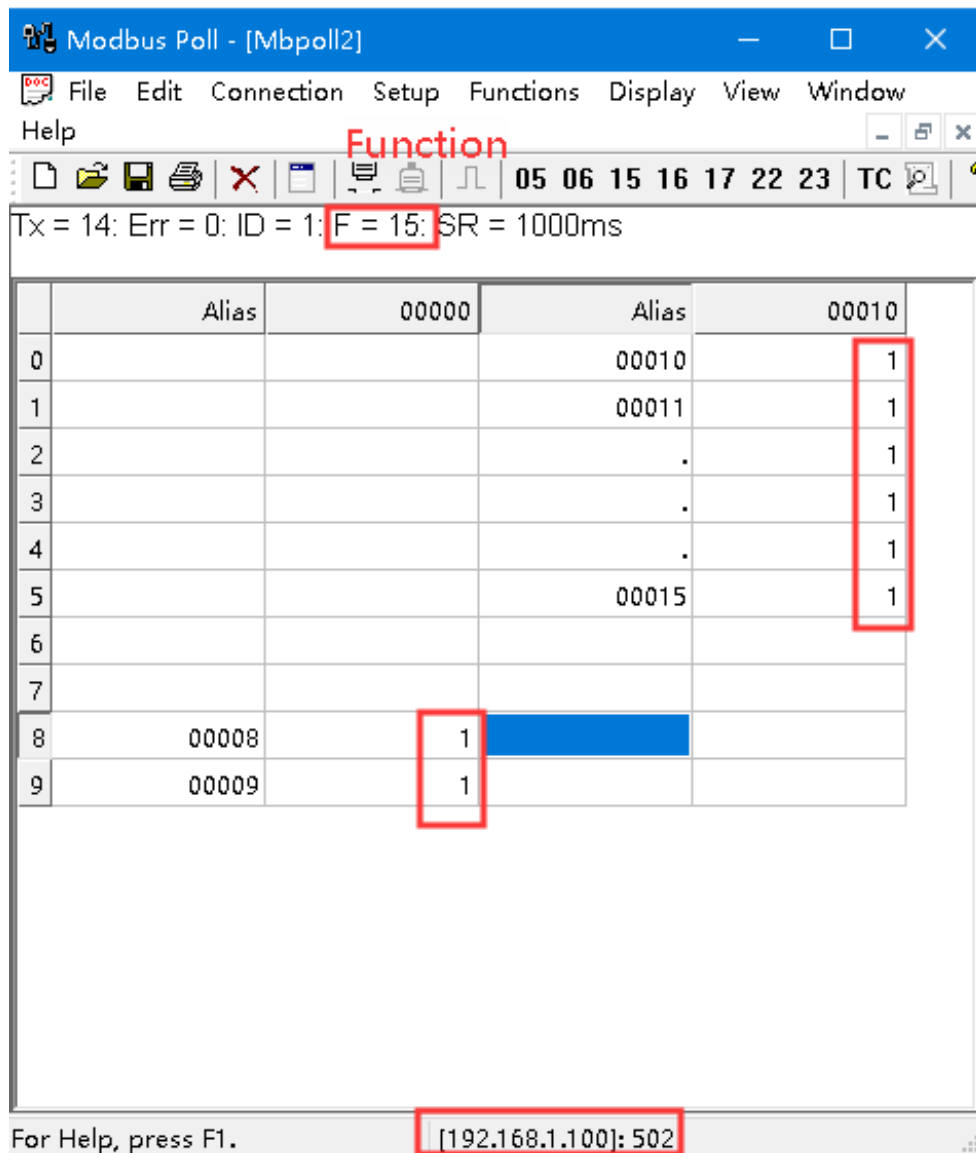
Rows

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

☐ Hide Alias Columns ☐ PLC Addresses (Base 1)

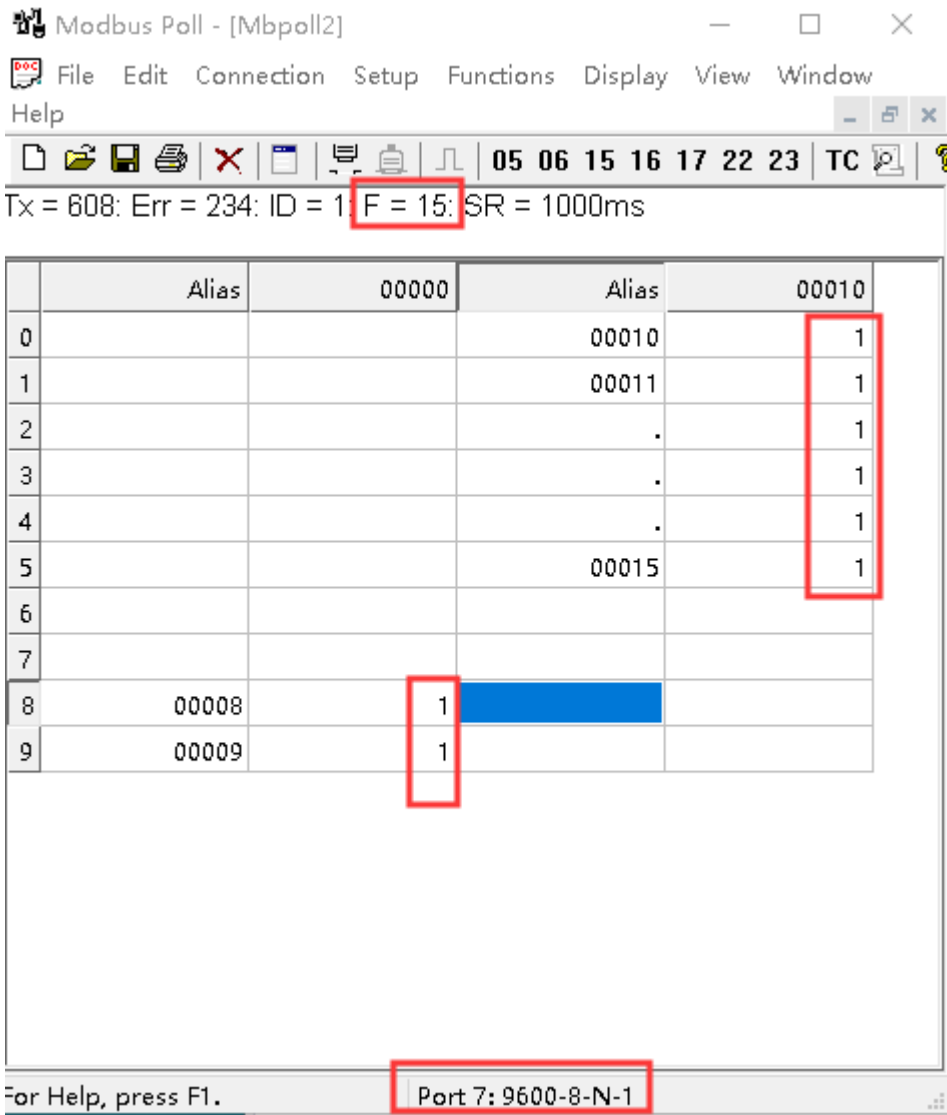
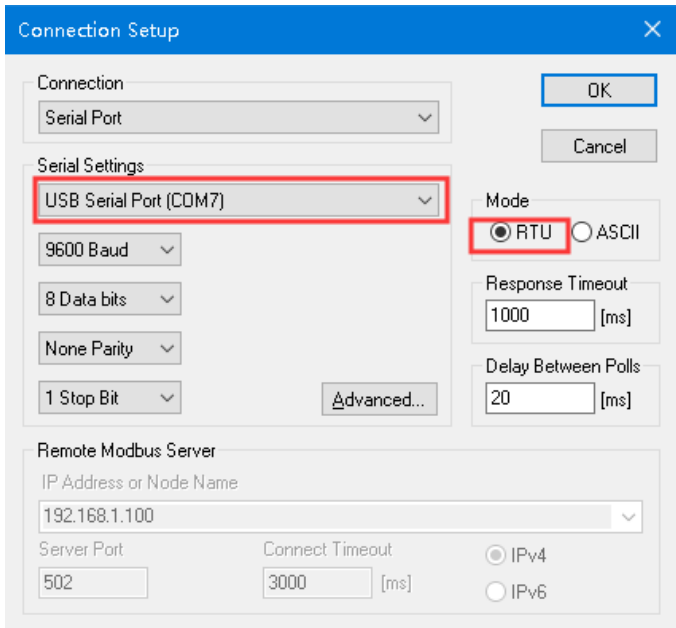
☐ Address in Cell ☐ Enron/Daniel Mode

By Ethernet connection:



By serial port connection:

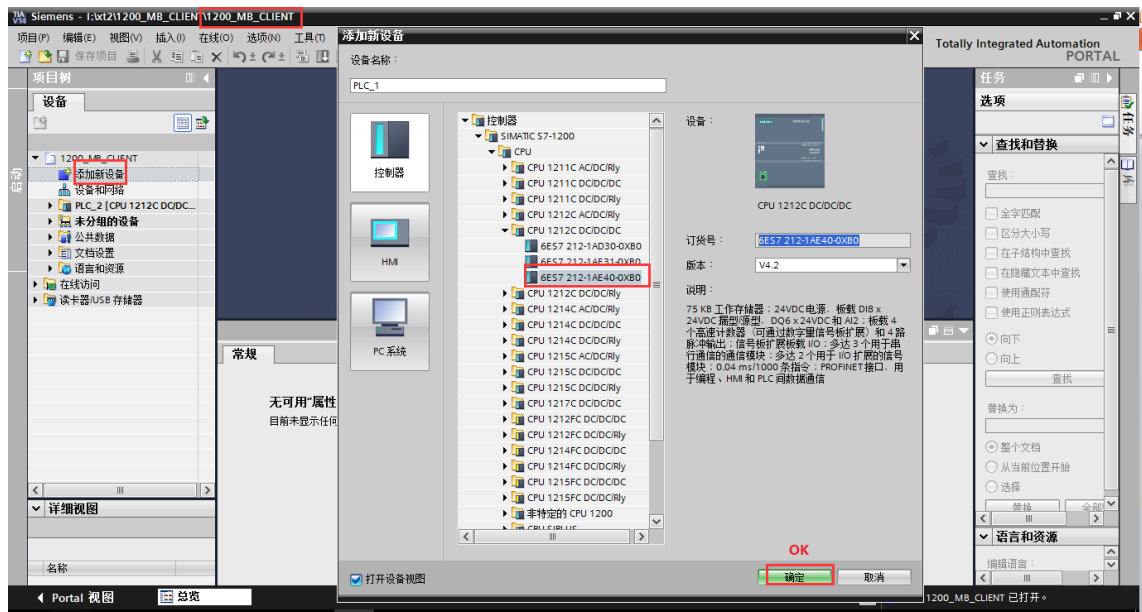




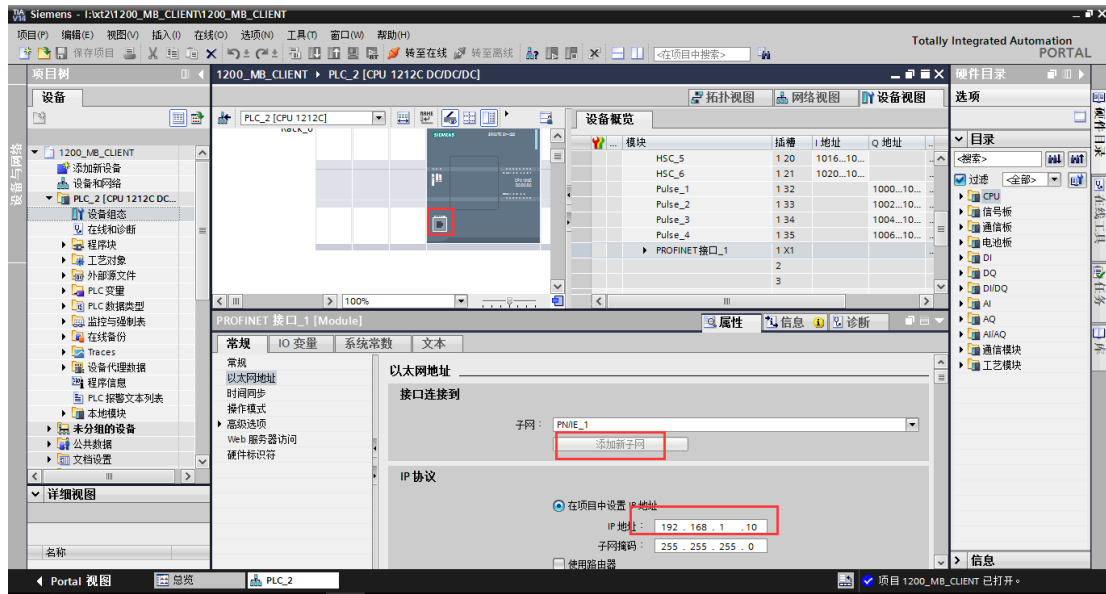
5.1.2 Module and Siemens S7-1200 (TIA V14) connection application

This application uses Siemens TIA V14 software, Siemens PLC S7-1212C DC / DC as Modbus TCP client connected to AIO-X8031 Modbus TCP adapter for test demonstration. (The hardware configuration is AIO-X8031, AIO-X2228, AIO-X2228, and the address table is the same as 6.1.1.)

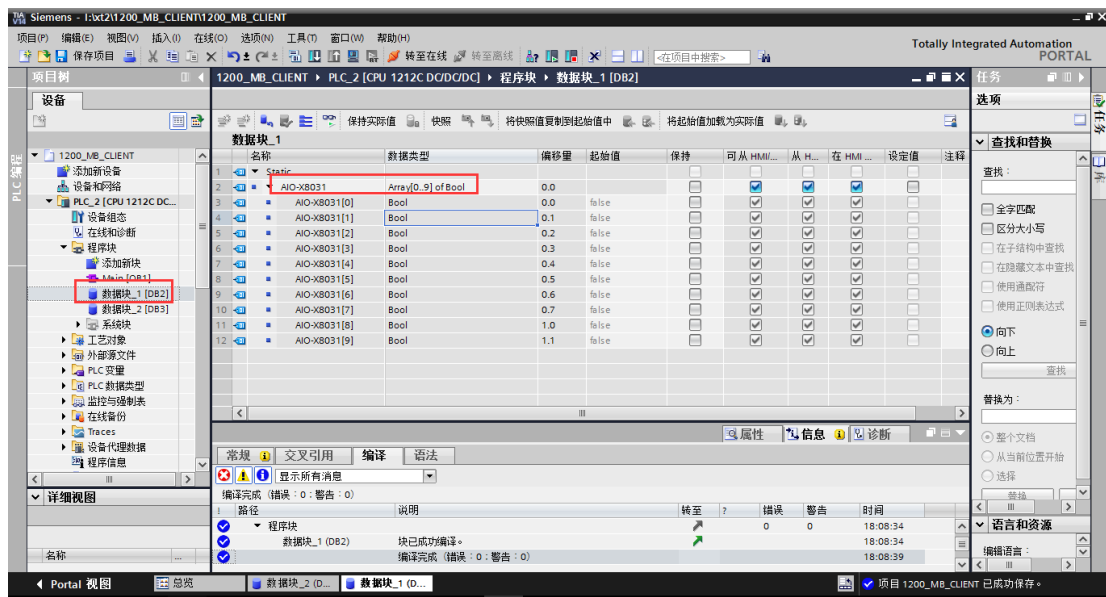
1. Open the TIA software and create a new project 1200_MB_CLIENT. Click to add a new device-select 6ES7 212-1EH40-0XB0-click to confirm.

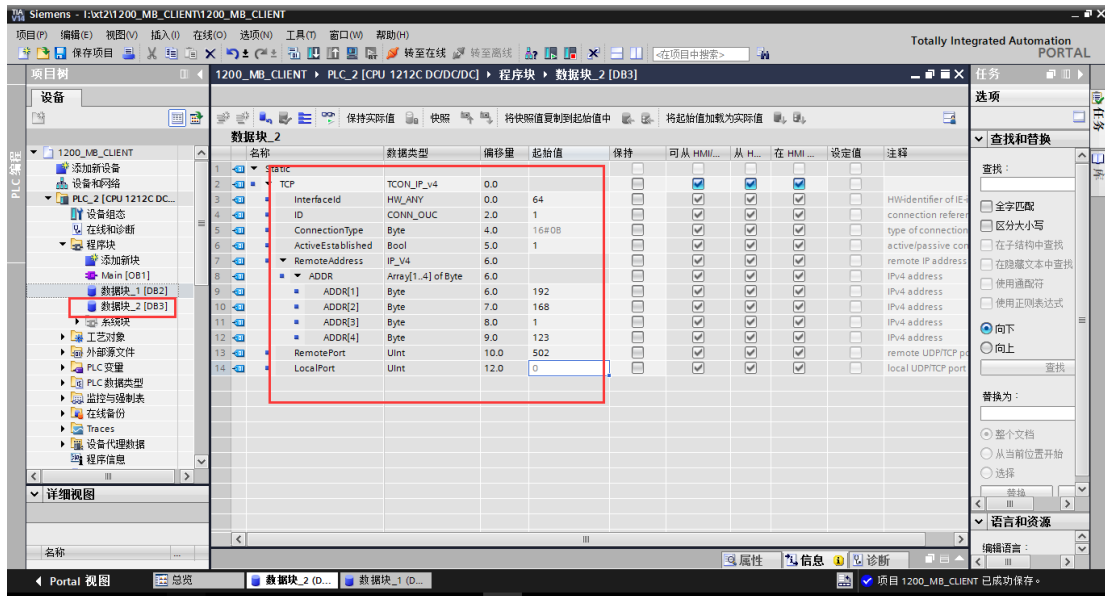


2. In the pop-up interface, select the PLC network port, set the Ethernet address parameters, add a new subnet PN / IE_1, and set the IP address 192.168.1.10 in the project.



3. Add a new block in the Program Block drop-down menu and add data blocks DB2 and DB3. DB2 is used to store read and write data, and DB3 is used to establish a connection between S7-1200 and AIO-X8031.

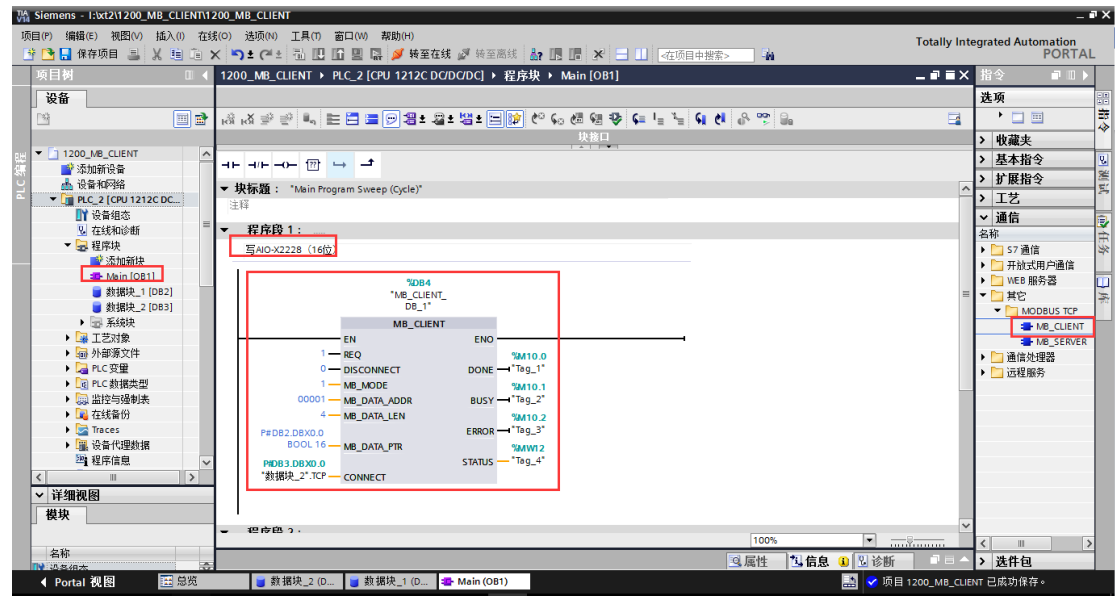




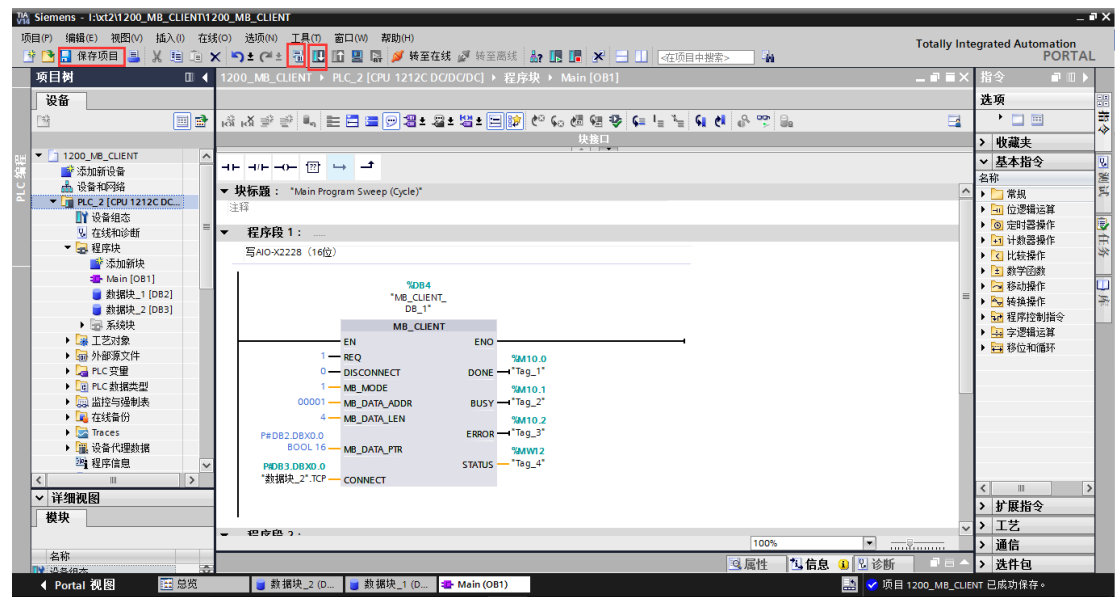
Note: Right-click the DB2 and DB3, in the Attributes remove the ✓ before the optimized block access.



4. In the Program Block drop-down menu, double-click Main [OB1], and find MB_CLIENT on the right and drag it to block 1. Modify the parameters as shown in the figure.



5. After setting, save, compile and download.

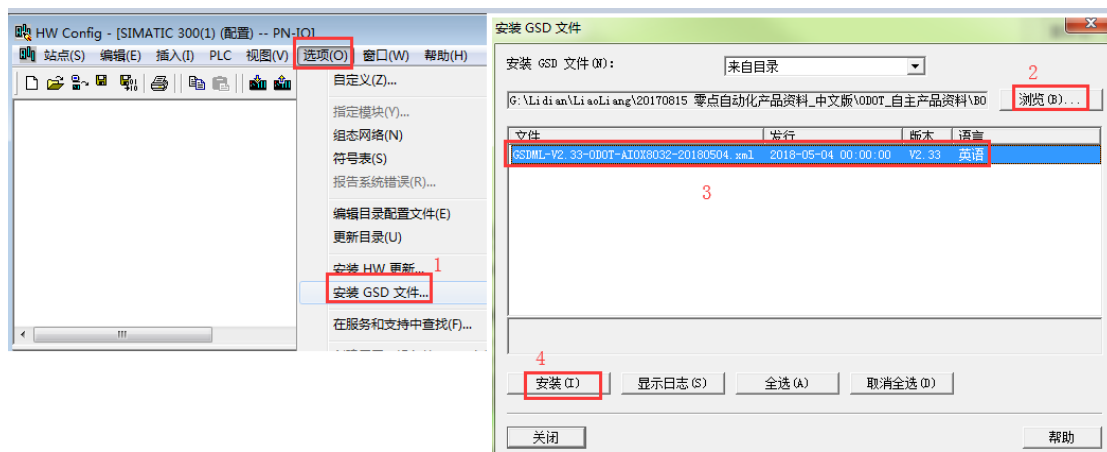
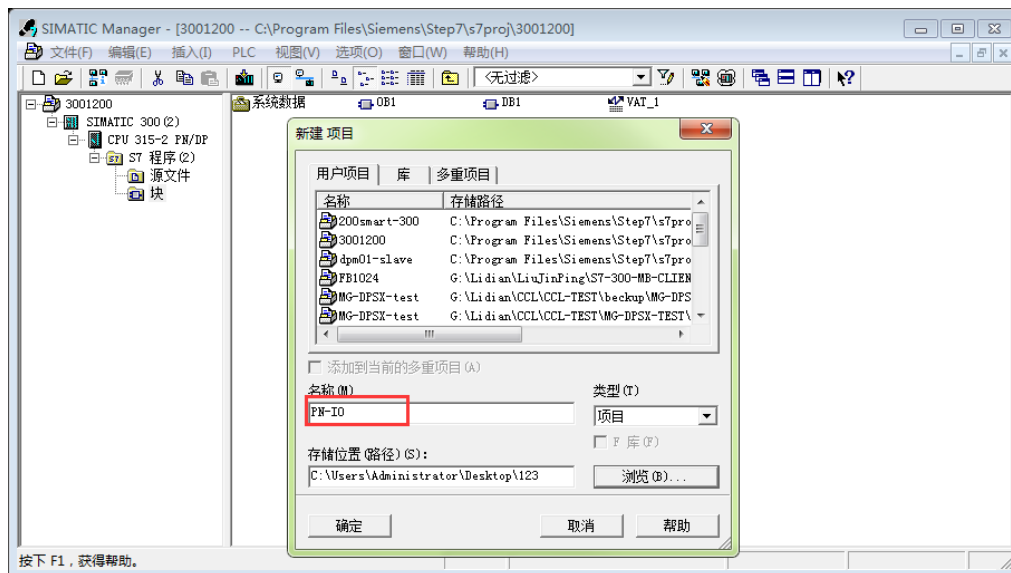


6. Monitor the value of DB2 online. The TIA monitors and controls the AIO-X8031 output channel value (AIO-X8031 [0] corresponds to the 0 channel of AIO-X2228, and if TRUE is displayed, the 0 channel indicator of AIO-X2228 is ON).

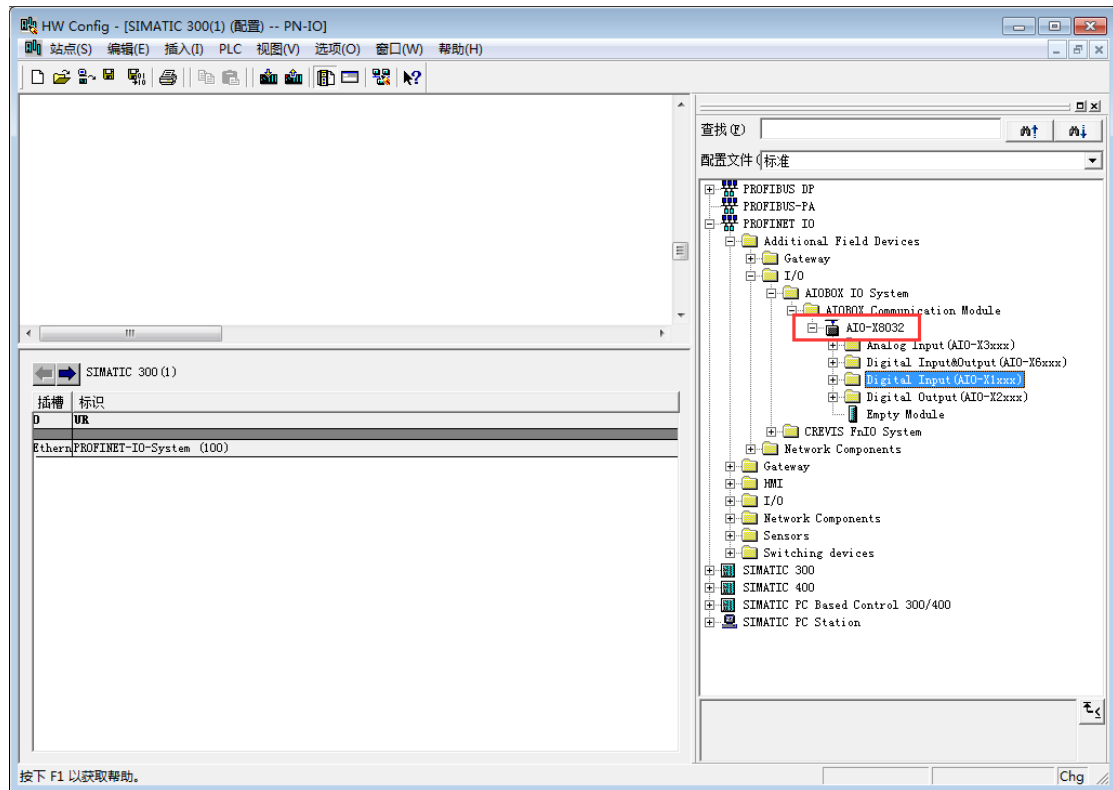
5.2 Test application of AIO-X8032 module

5.2.1 Module and Siemens S7-300 (STEP7) connection application

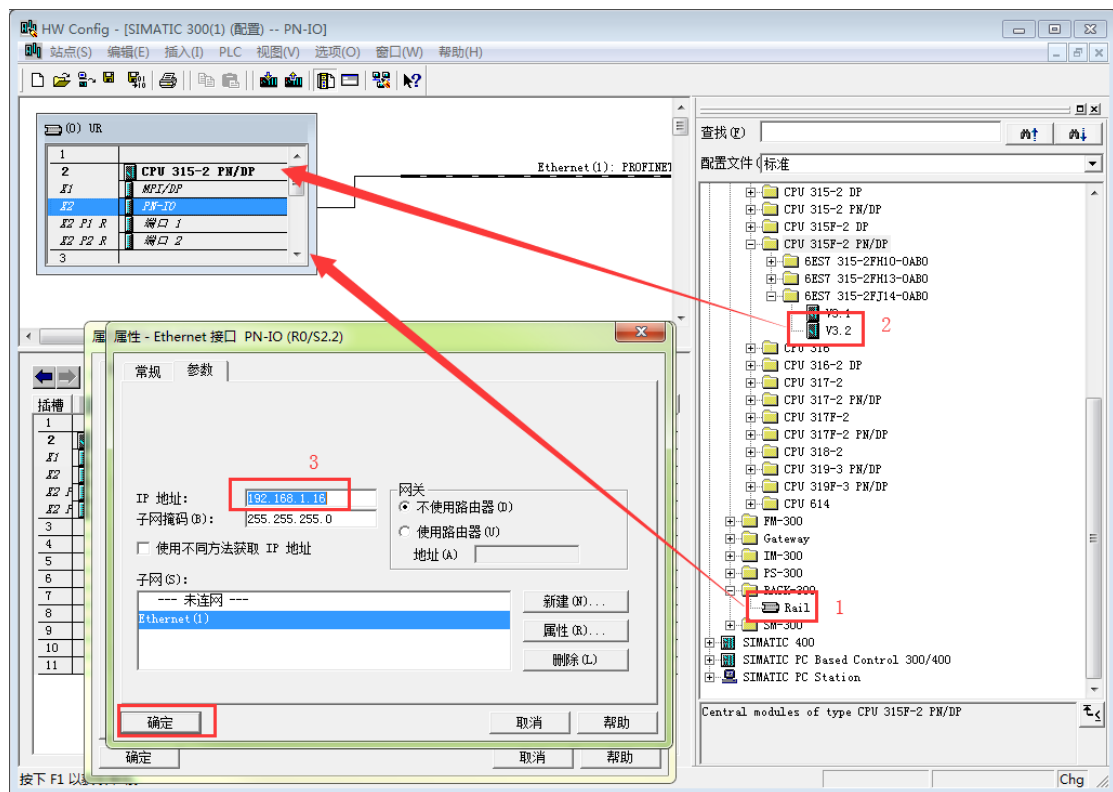
1. Power on the module and S7-315 2 PN / DP, and connect the network cable to the PC. Open the Siemens STEP 7 software. Create a new project "PN-IO". "Insert new object"->"SIMATIC station"->Double-click "Hardware" to open the hardware configuration interface. Click "Options"->"Install GSD file", in the pop-up dialog box, "Browse" to find the location of the GSD file of AIO-X8032, select it and click "Install".



2. After the installation is complete, you can find AIO-X8032 in the PROFINET IO pull-down menu on the right.

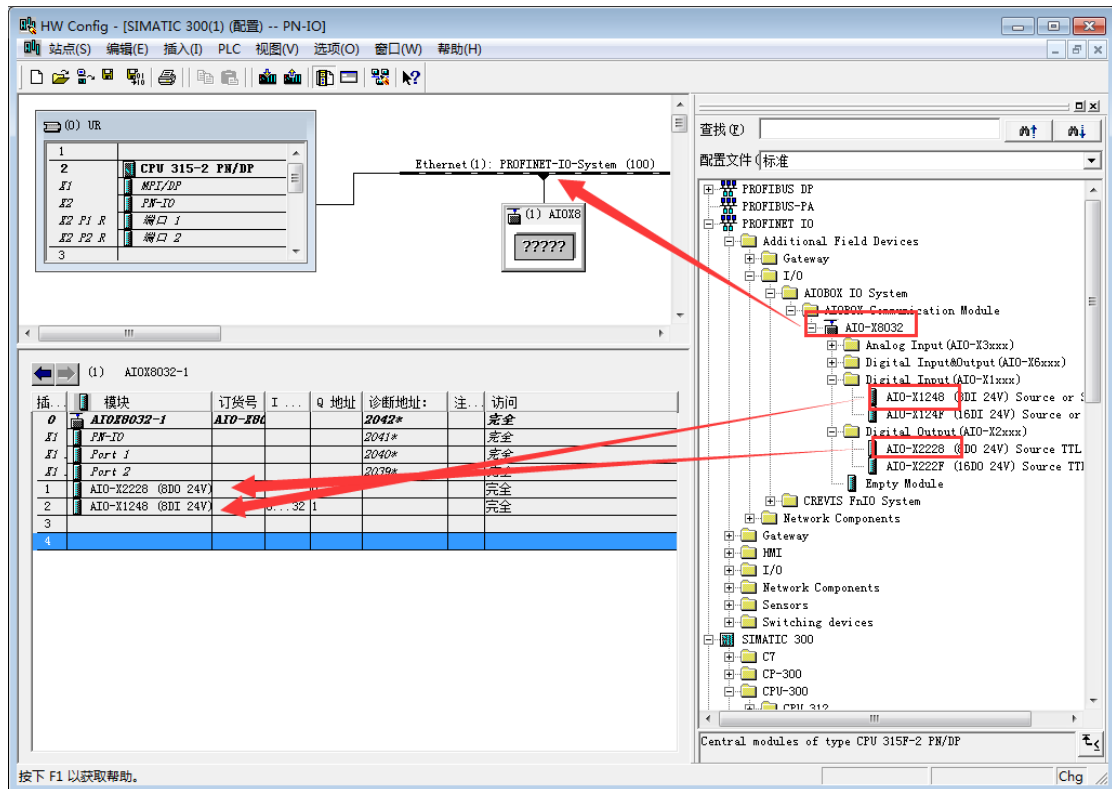


3. Drag "rail" and "S7-315 2 PN / DP V3.2", configure the network port parameters, IP address: 192.168.1.16. Click "OK".

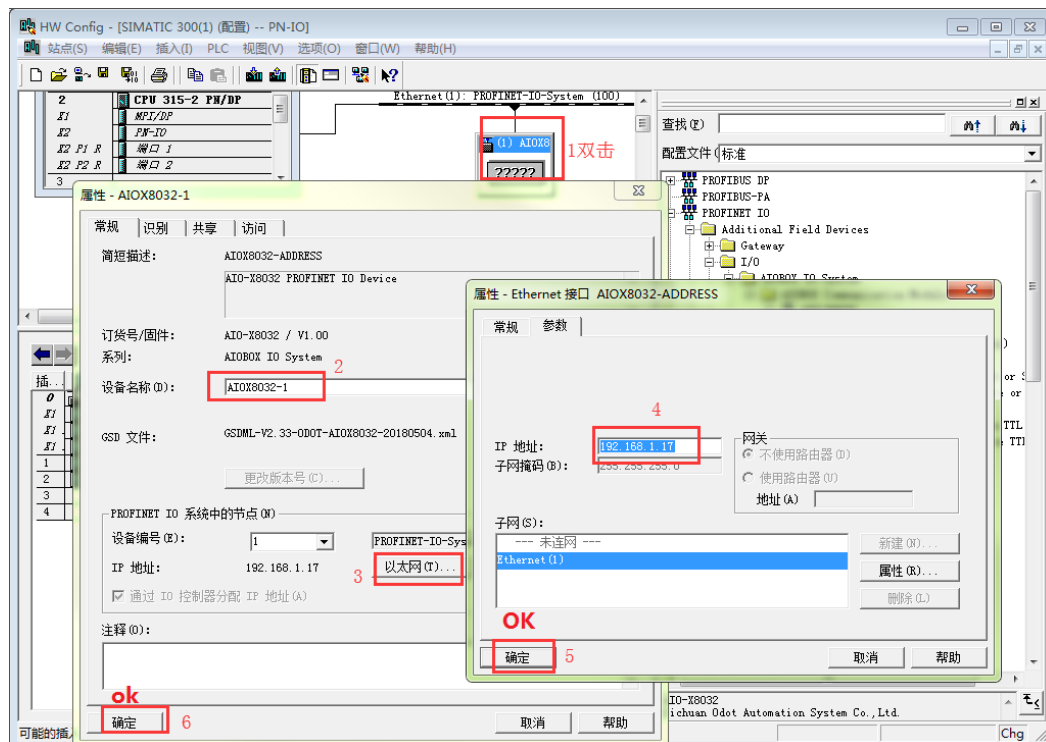


4. Add AIO-X8032 module under Profinet-IO-System bus system. Manually add the extended IO module according to the left side of the module (or upload the IO information according to the AIO-BOX software, and manually add the extended IO module).

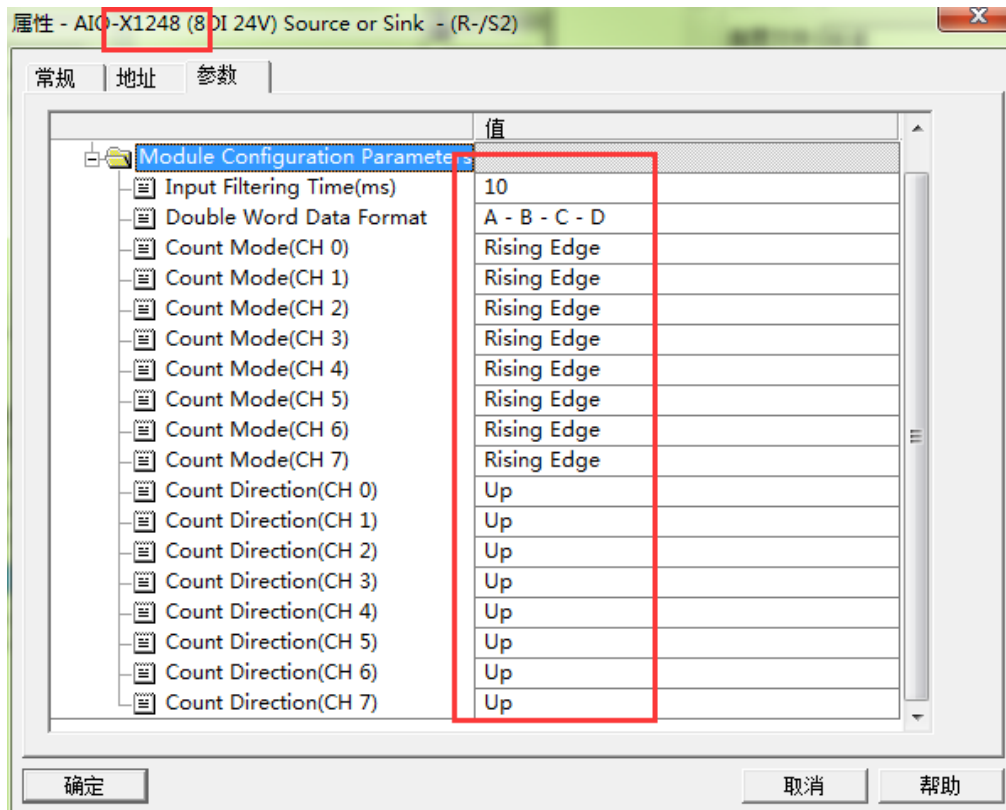
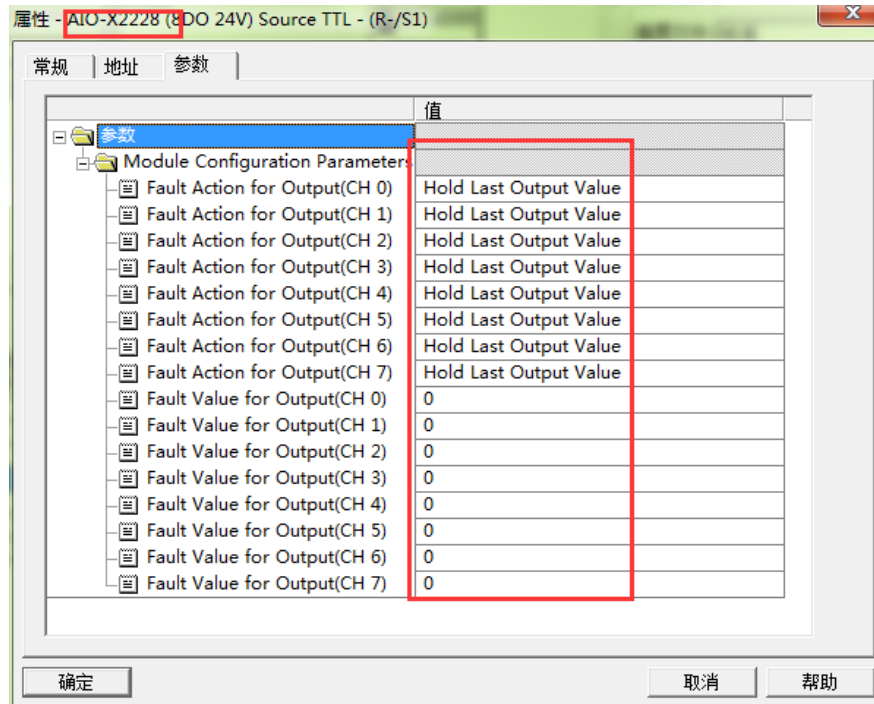
模块信息/Module Information		
槽位/Slot	分类/Category	型号/Type
0	Adapter	AIO-X8032
1	IO Module	AIO-X2228
2	IO Module	AIO-X1248
MAC:AC-1D-DF-81-00-01		



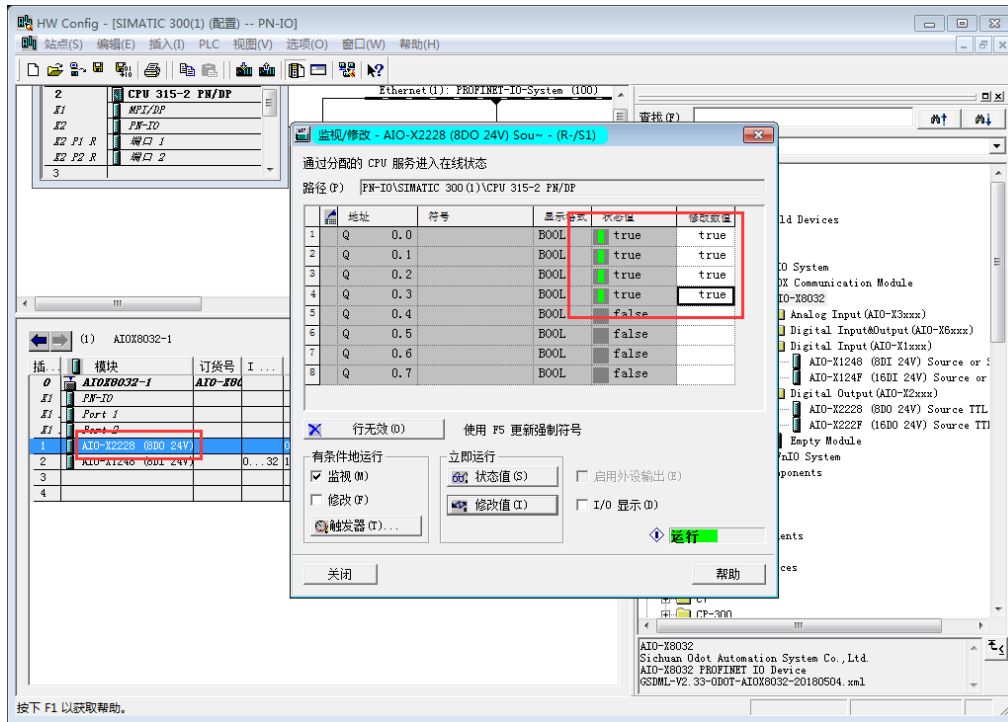
5. Double-click AIOX8032. In the pop-up dialog box, change the device name to "AIOX8032-1" (this parameter must match the value in the AIOBOX software), click "Ethernet", and manually assign an IP address: 192.168.1.17. Click OK.



6. Double-click the extended IO module AIO-X2228, AIO-X1248, and you can modify the parameters according to the actual needs of the customer. For the parameter definition, refer to the Instruction of the extended IO module.

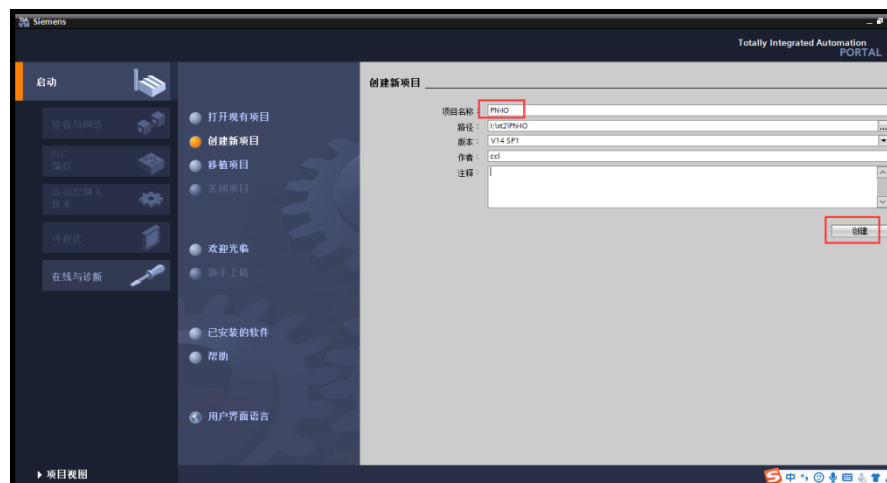


7. Save, compile, and download after the configuration is complete. You can right-click to monitor the input and output modules online. The following figure shows the monitoring interface of the AIO-X2228 output module.



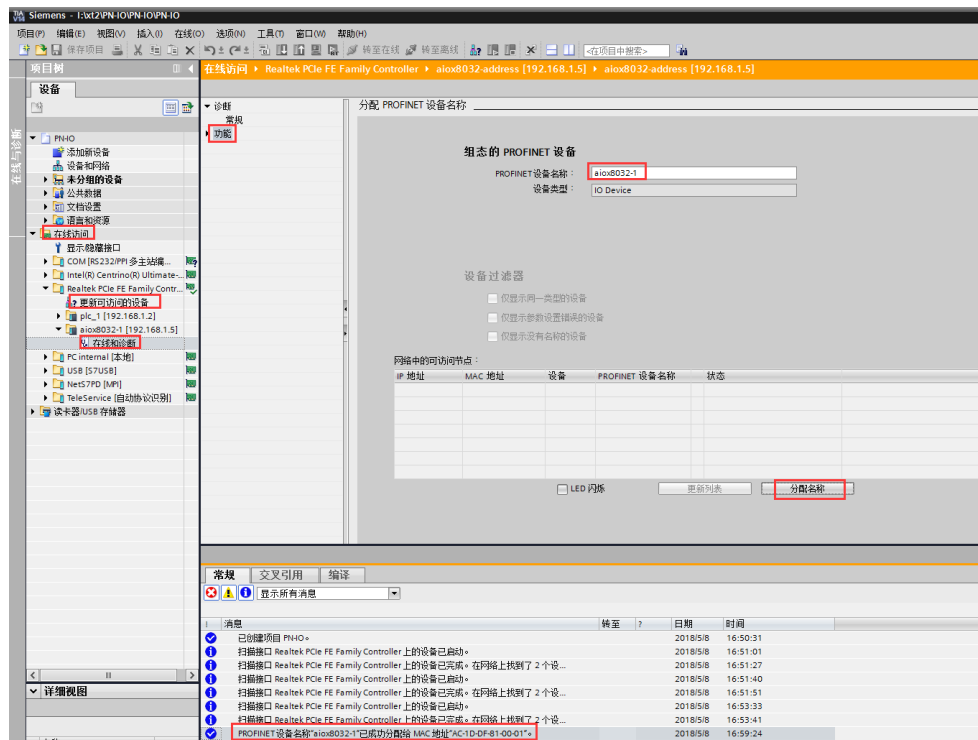
5.2.2 Module and Siemens S7-1200 (TIA V14) connection application

1. Power on the module and S7-1214C DC / DC / DC, and connect the network cable to the PC. Open the Siemens TIA V14 software. Create a new project "PN-IO".

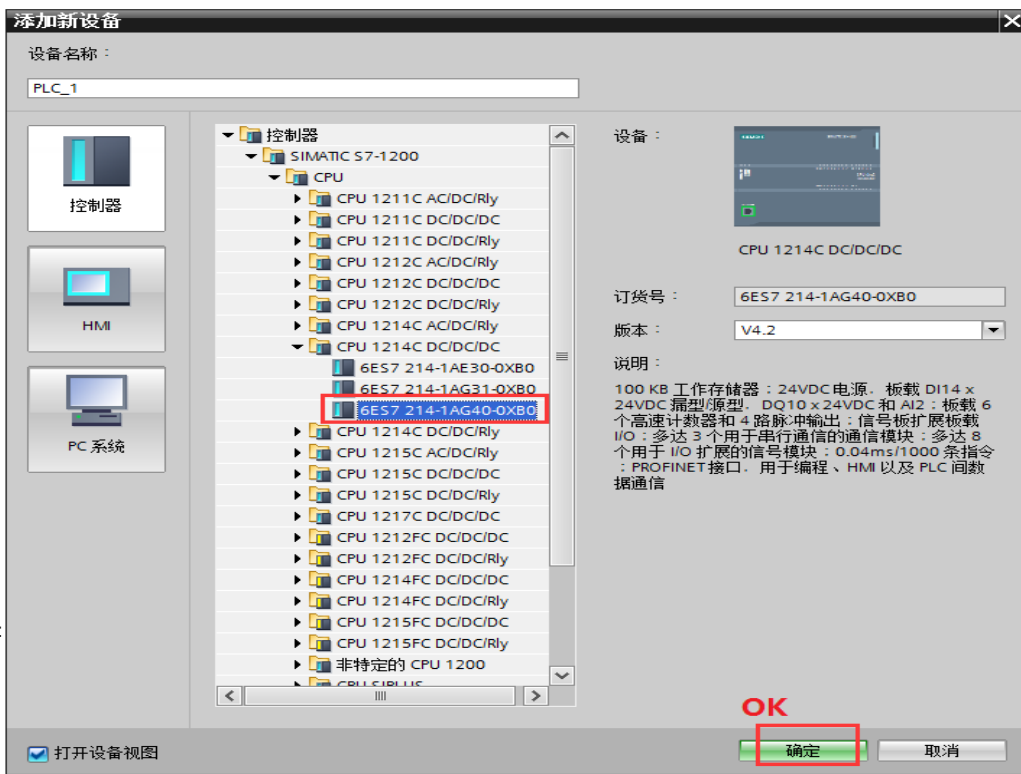


2. Enter the project view, in the device bar of the project tree, click "Online

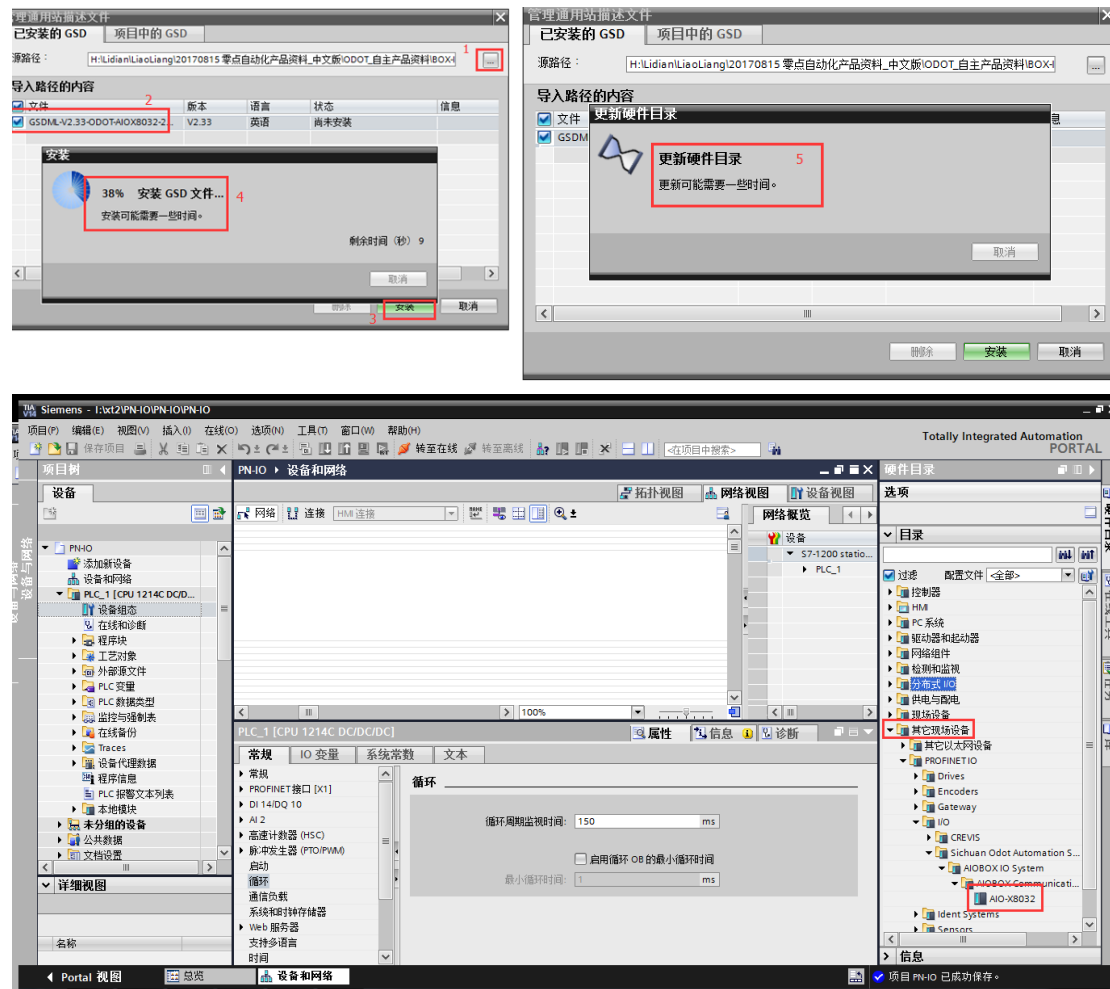
Access"- "Local Network Card"- "Update Accessible Devices", "PLC_1" and "aix8032-1 [address]" will appear, in "aix8032-1 [address]", click" Online and Diagnostics ", click" Functions ", change the PROFINET device name of the module to" aix8032-1 ". **Note: The device name will be used in the hardware configuration. Used to lock the AIOX8032.**



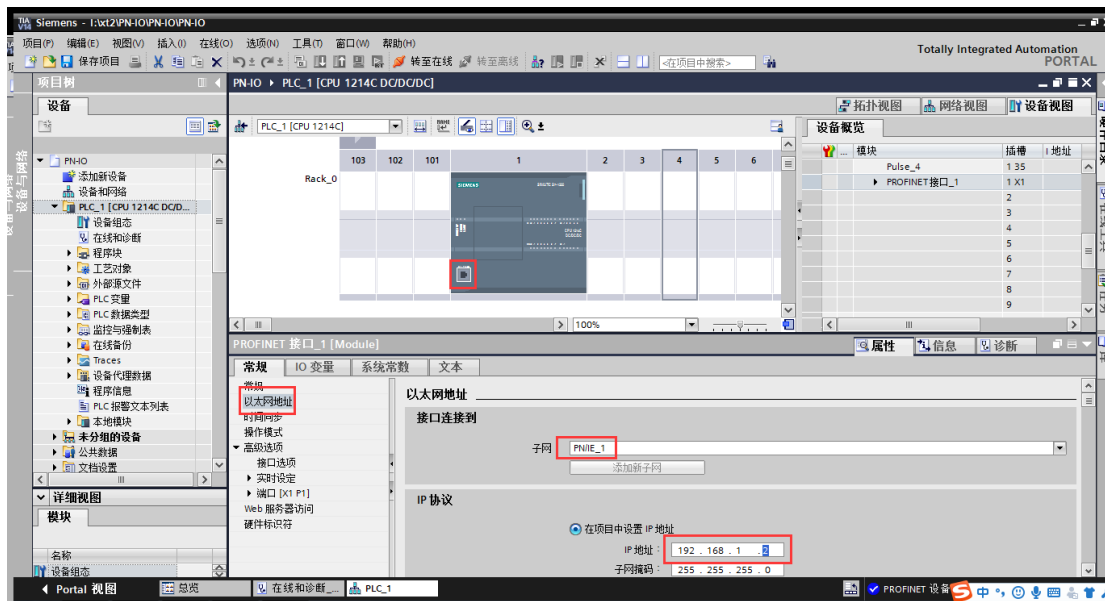
3. In the device column of the project tree, click "Add new device" under the PN-IO project, add PLC S7-1214C DC / DC / DC, and click OK.



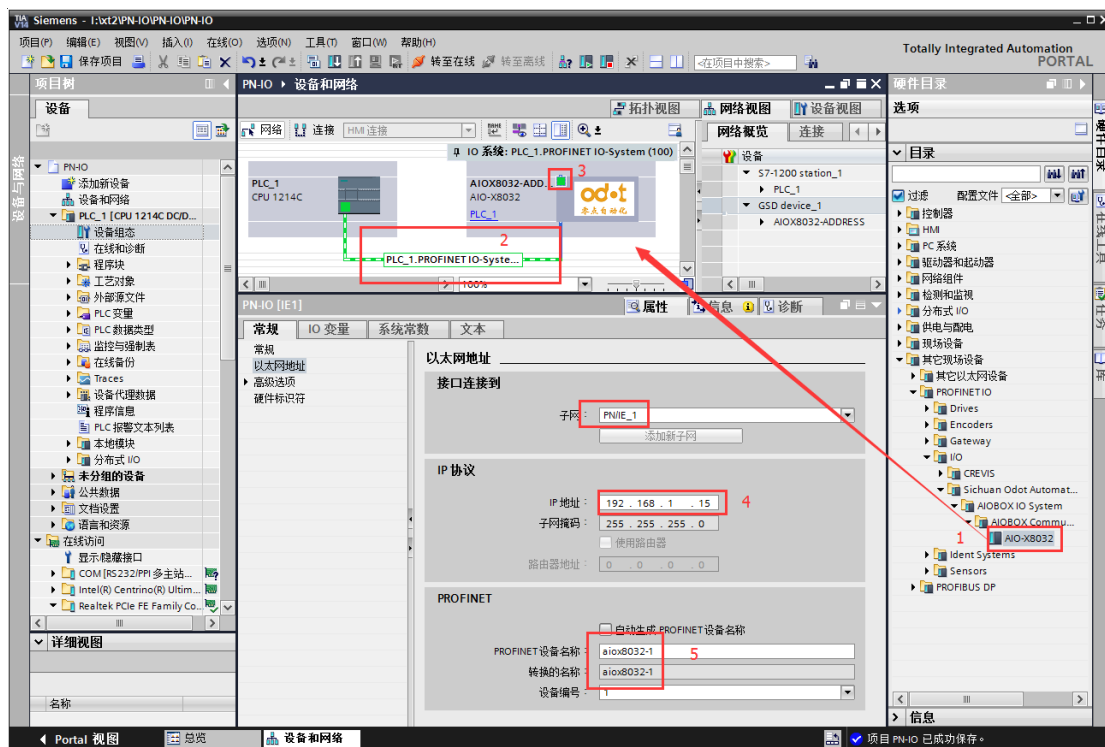
4. Click "Options"-"Manage general station description file GSD". In the pop-up dialog box, find the location of the AISD8032 GSD file, select the GSD file, and click Install. After the installation is complete, the hardware directory will be automatically updated.



5. In the device view, select the PLC network port and set the network port parameters.



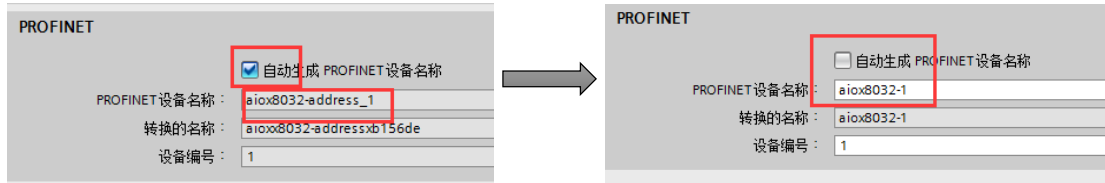
6. In the network view, first drag the AIOX8032 module into the network view, and then assign the network interface to "PLC_1. PROFINET IO-System", click the network port, modify the Ethernet parameters, and assign the module IP address (192.168.1.15). The PROFINET device name of the module is "aiox8032-1".



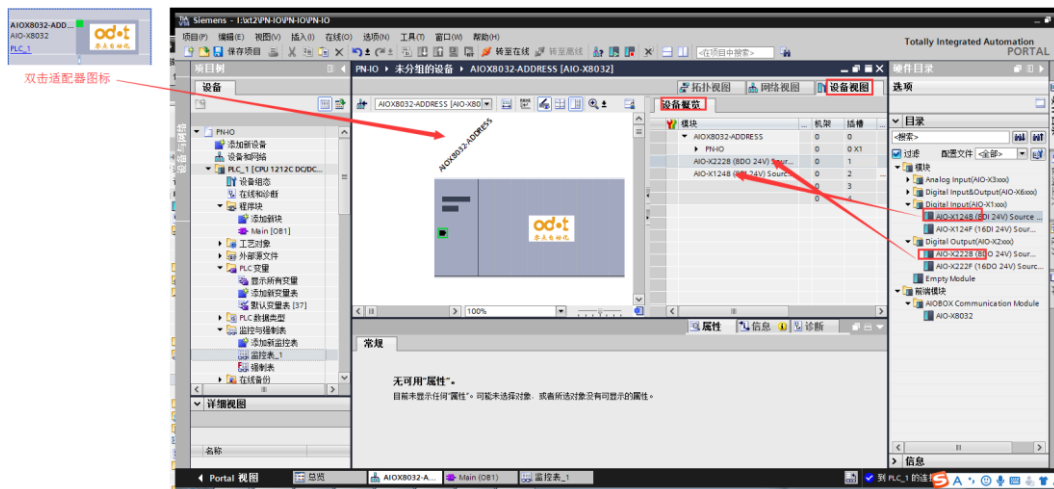
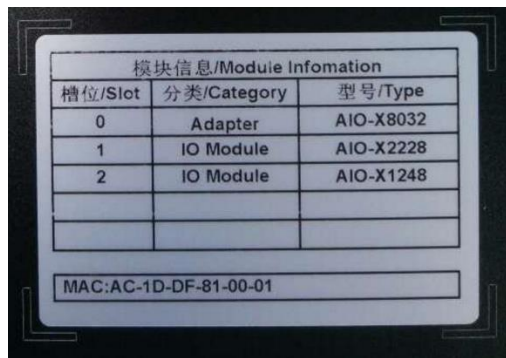
Note: 1. Remove the "√" in front of "Automatically generate PROFINET device"

name”.

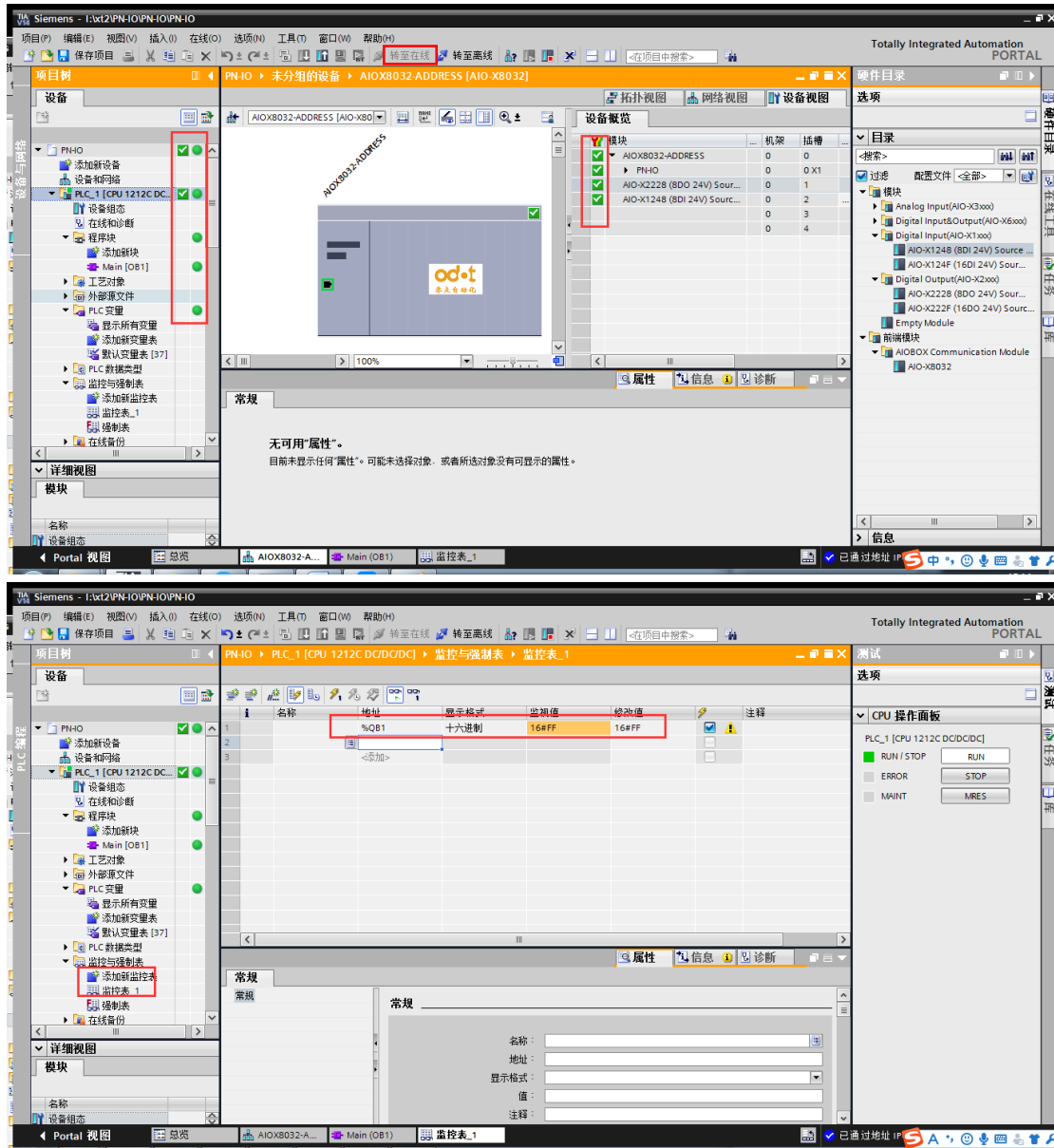
2. The PROFINET device name was changed to "aiox8032-1".



3. Double-click the adapter icon to enter the "Device View" and add the extended IO modules: AIO-X2228, AIO-X1248 in the "Device Overview".



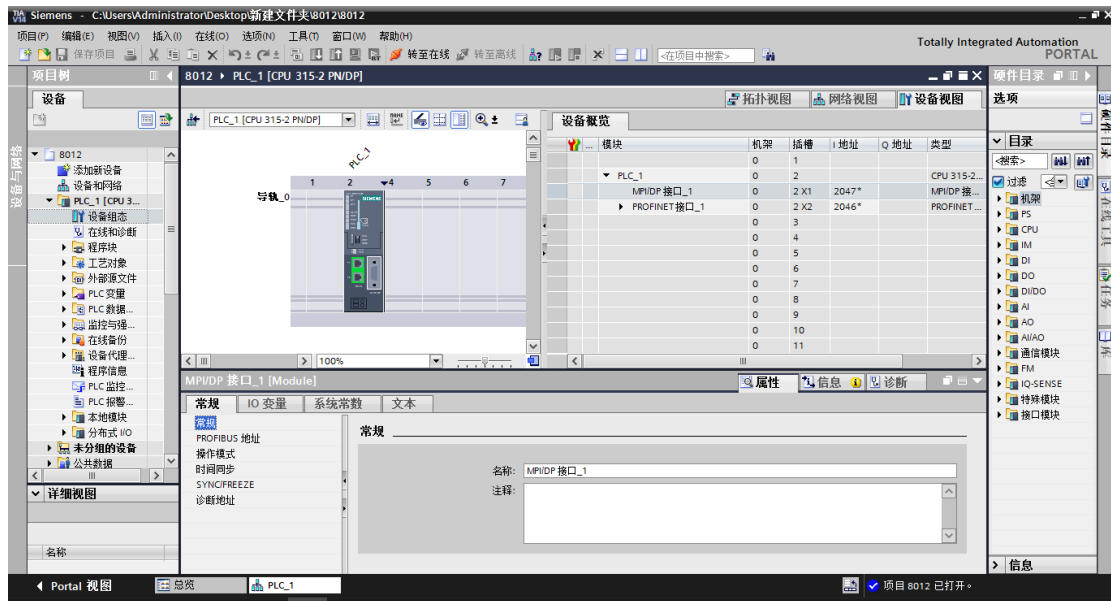
4. After the hardware configuration is completed, save, compile, and download. Click "Go Online." At the same time, a new monitoring table can be added, and the field IO value can be monitored online on the monitoring table.



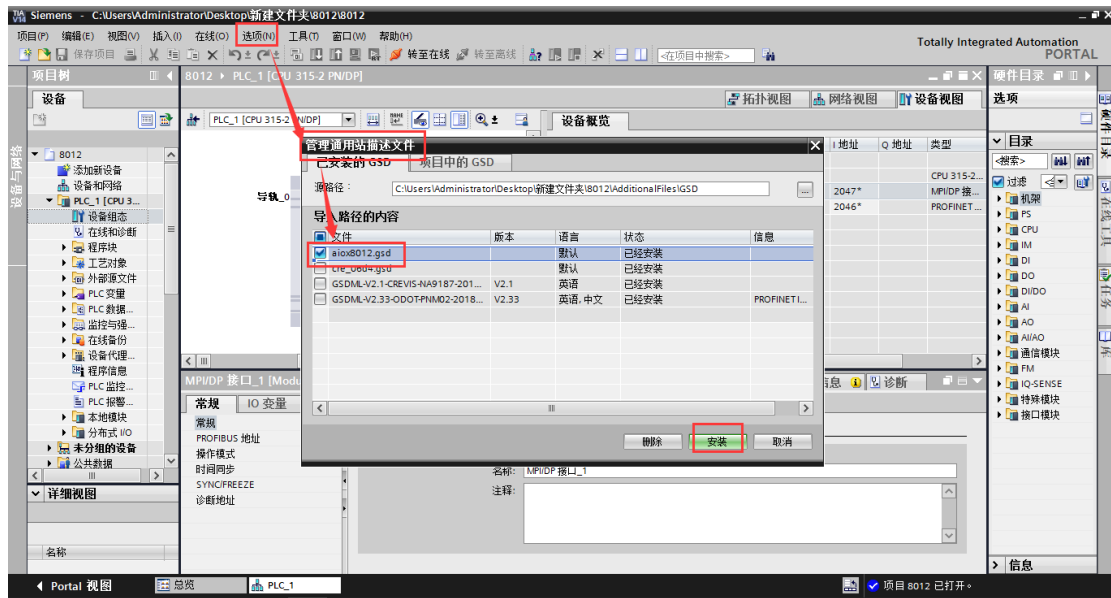
5.3 Connection Application of AIO-X8012 module and Siemens S7-1200 (TIA V14)

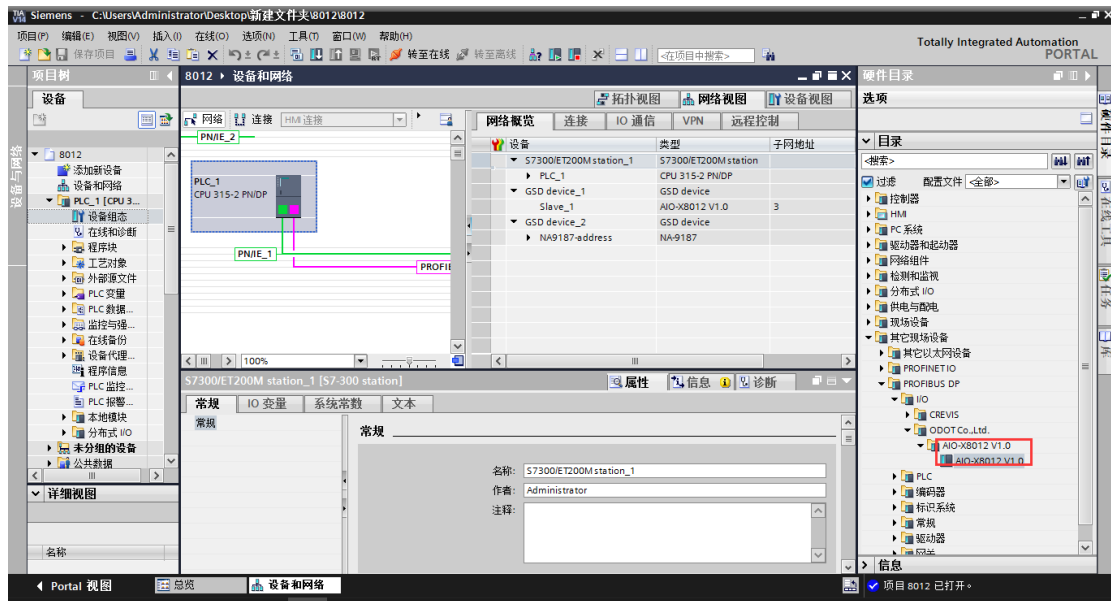
1. Power on the module and S7-1214C DC / DC / DC, and connect the network cable to the PC. Open the Siemens TIA V14 software. Create a new project "8012". Enter the project view, in the equipment column of the Project Tree, click Add New Device, select S7-315-2PN / DP (6ES7 315-2EH14-0AB0), and click OK.



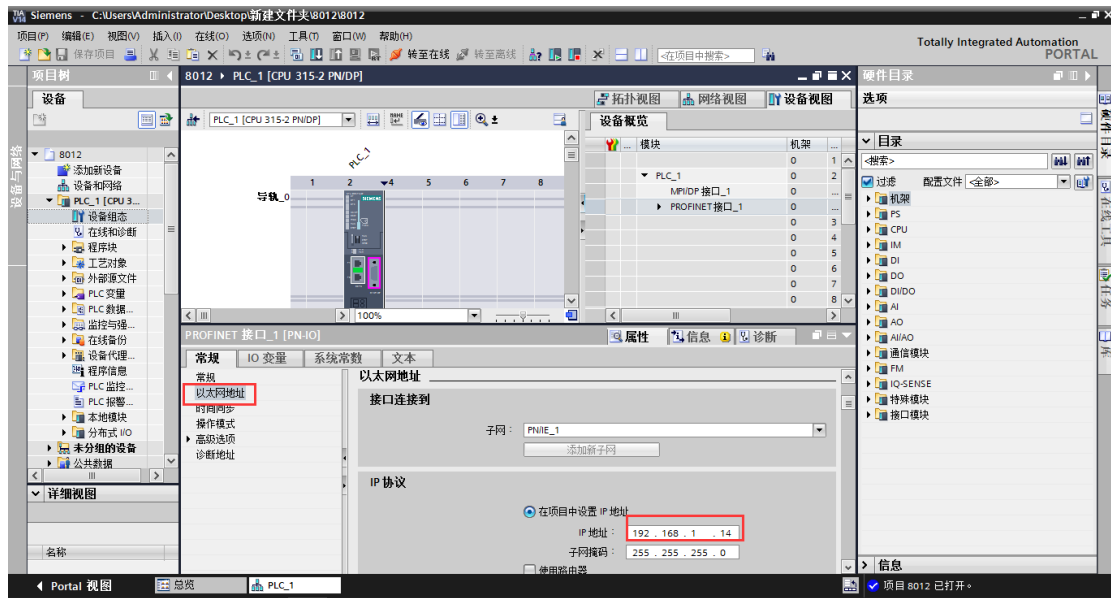


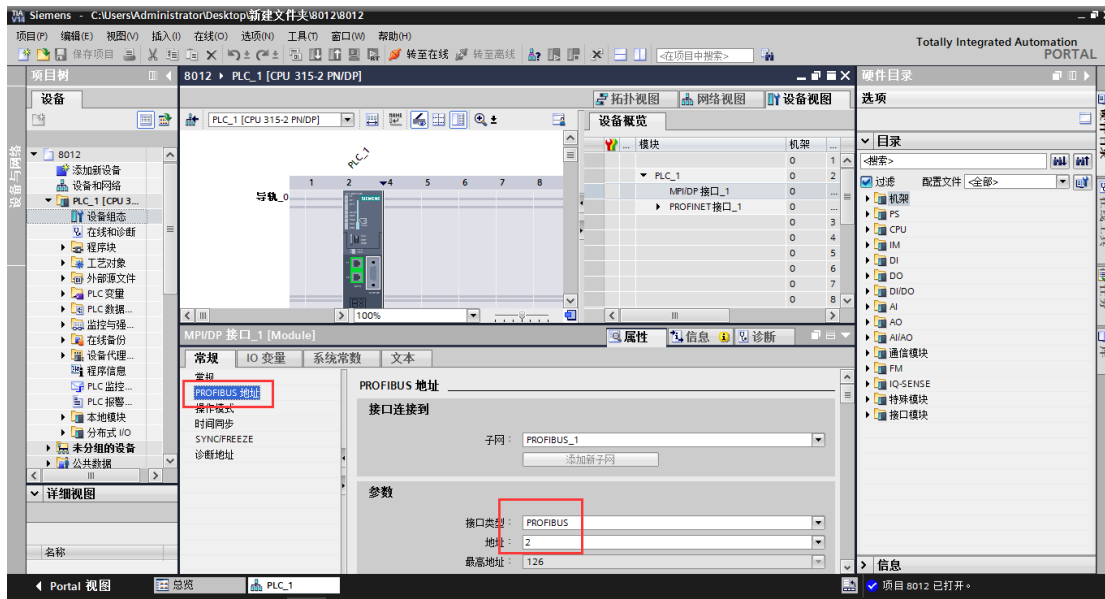
2. Click "Options" - "Manage general station description file GSD". In the pop-up dialog box, find the location of the GSD file of AIOX8012, select the GSD file, and click Install. After the installation is complete, the hardware catalog will be automatically updated.



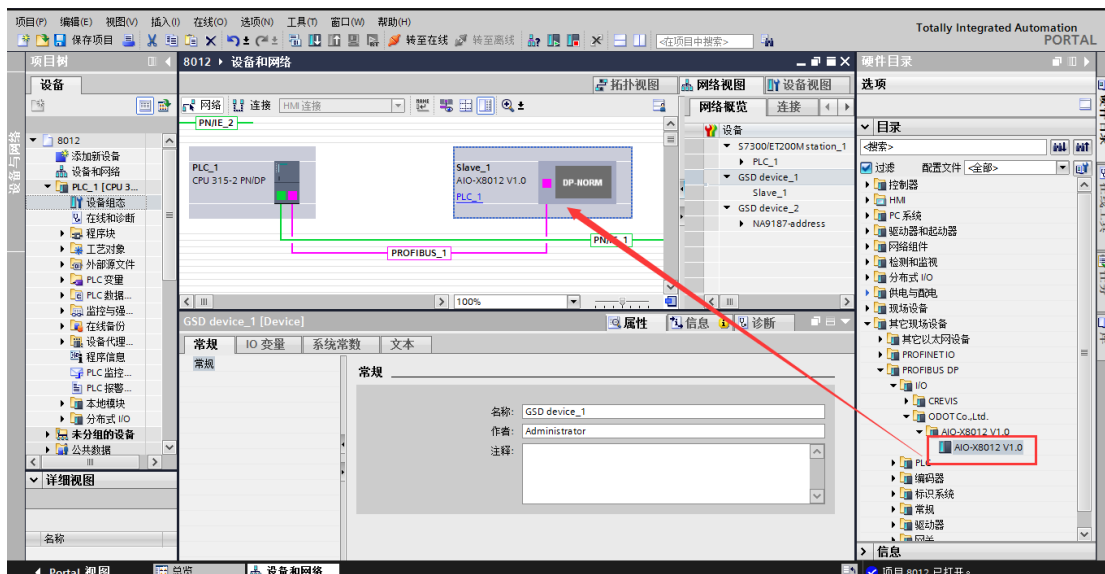


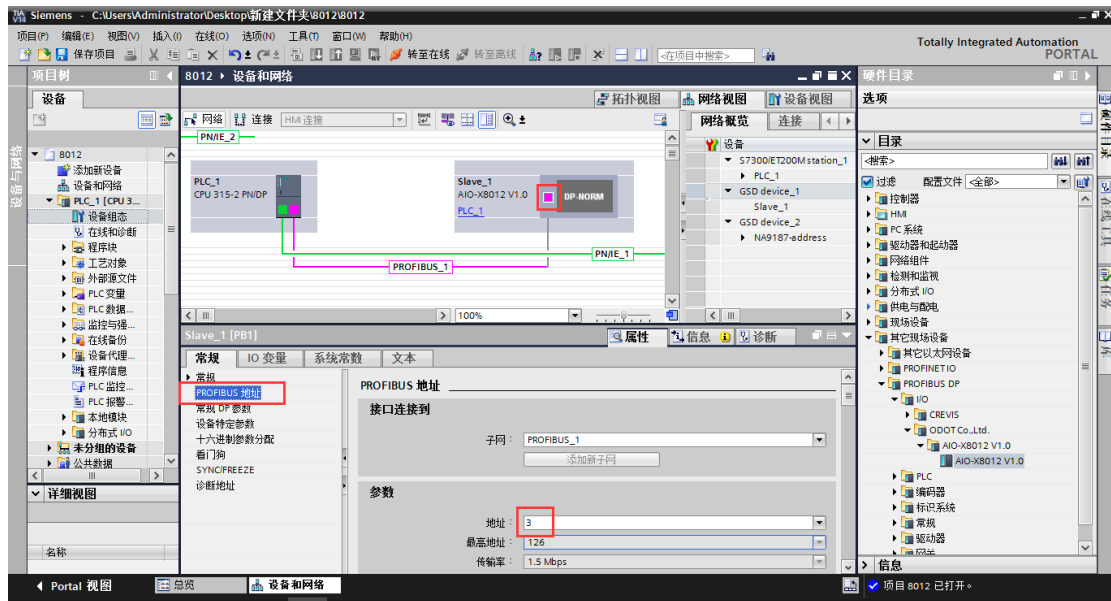
3. In the device view, select the PLC network port and set the network port parameters. Then set the PLC PROFIBUS-DP interface parameters.





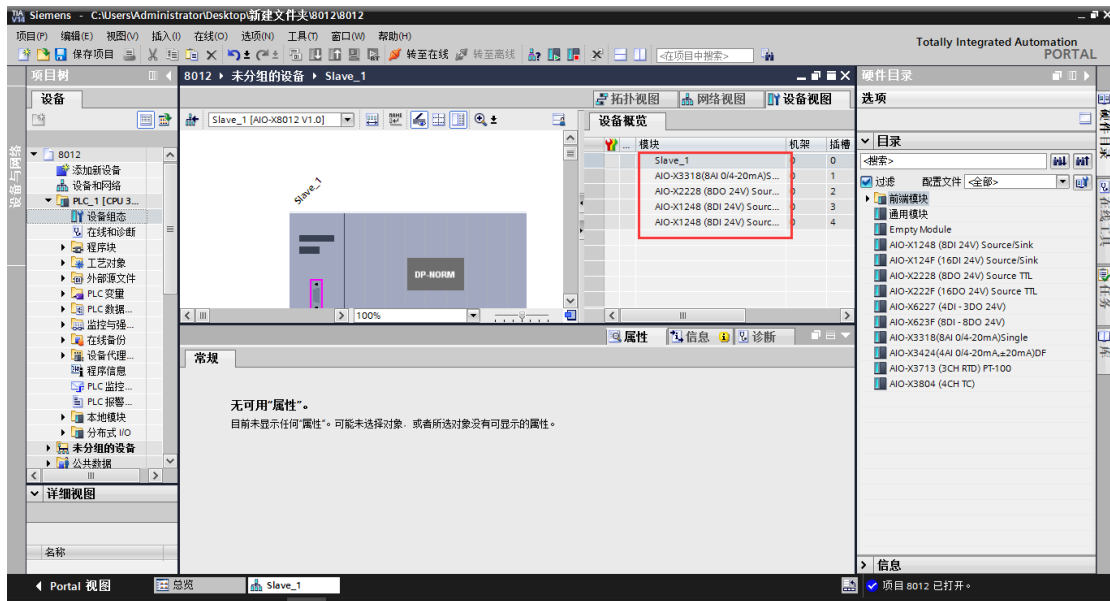
4. In the network view, first drag the AIOX8012 module into the network view and set the DP port parameters of the module. The parameter setting is based on the PROFIBUS DP hardware dial ID above the module.



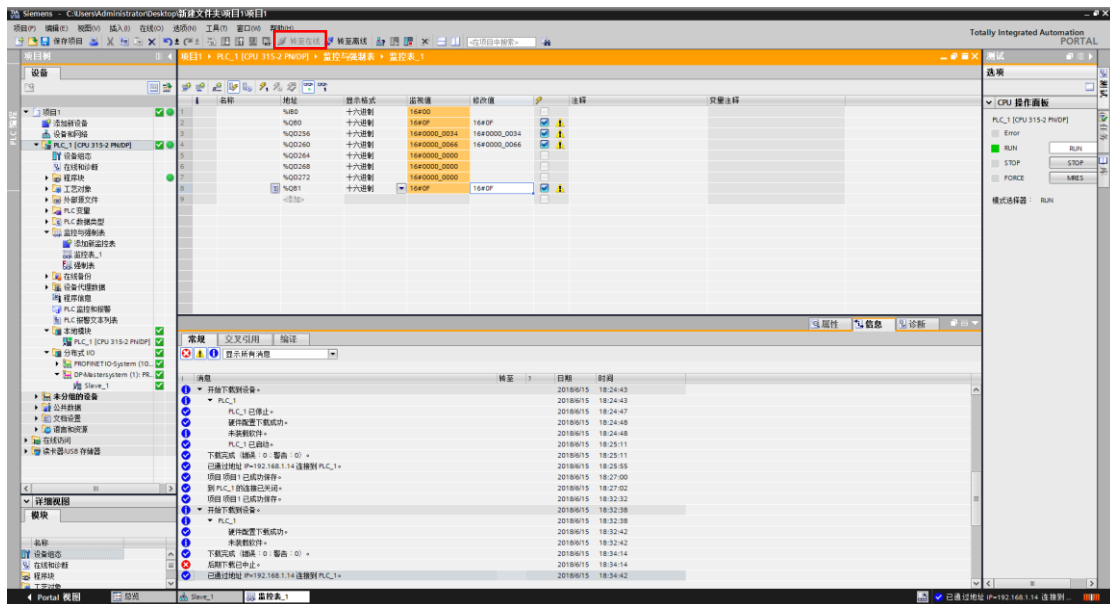


5. Double-click the adapter icon to enter the "Device View", and add the extended IO modules: AIO-X3318, AIO-X2228, AIO-X1248, and AIO-X 1248 in the "Device Overview".

模块信息/Module Information		
槽位/Slot	分类/Category	型号/Type
0	适配器/Adapter	AIO-X8012
1	IO Module	AIO-X3318
2	IO Module	AIO-X2228
3	IO Module	AIO-X1248
4	IO Module	AIO-X1248



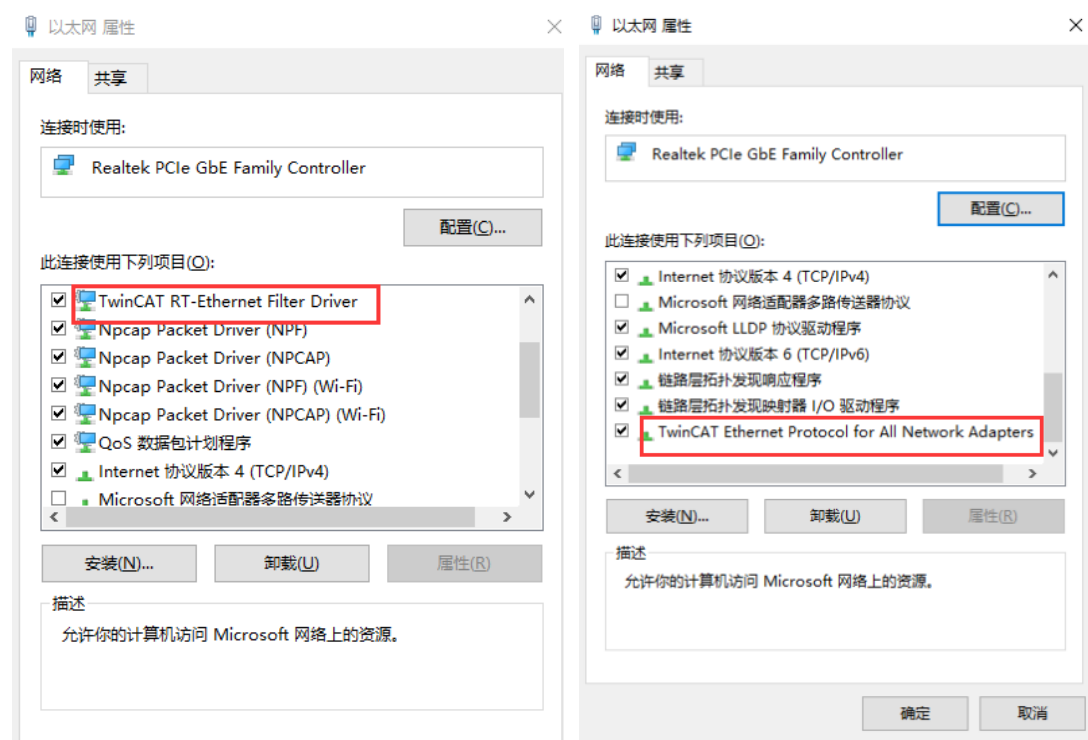
6. After the hardware configuration is completed, save, compile, and download. Click "Go Online." At the same time, a new monitoring table can be added, and the field IO value can be monitored online on the monitoring table.



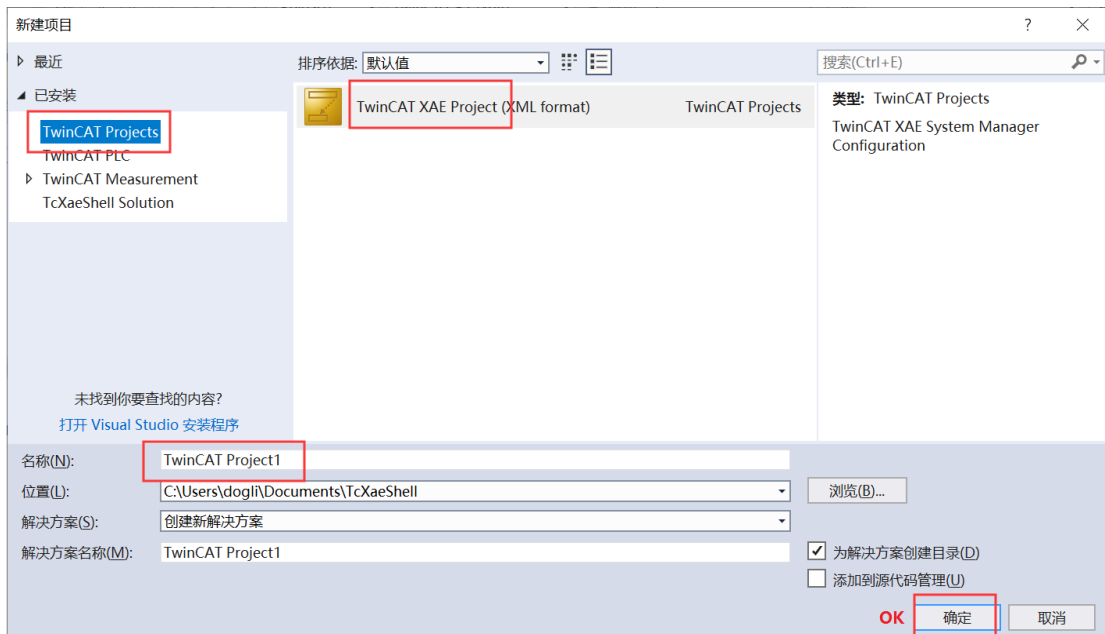
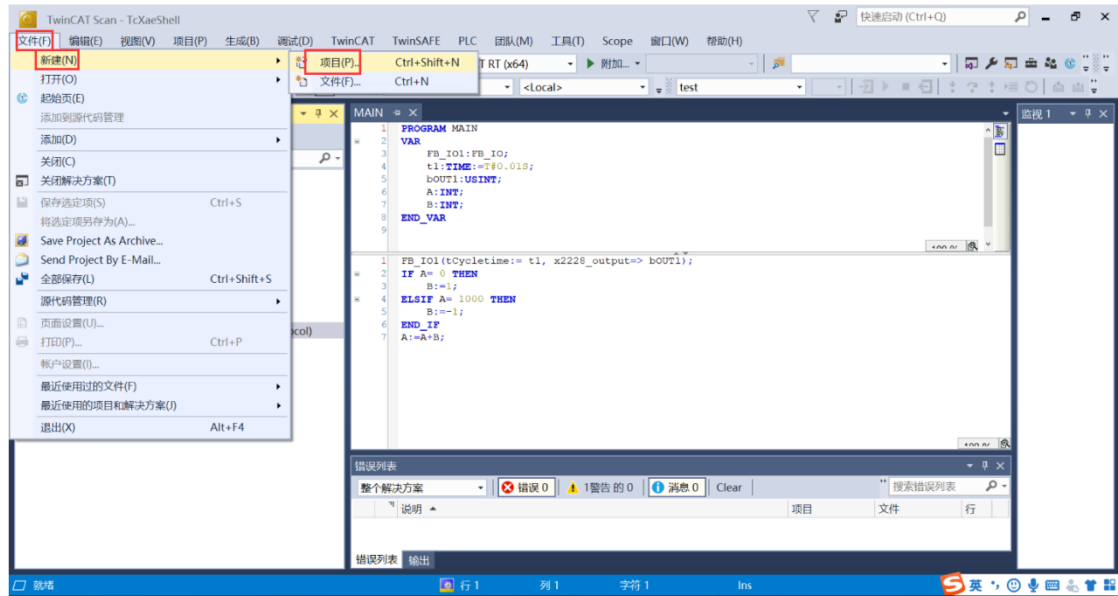
5.4 AIO-X8033 Module Test Application

5.4.1 Connection Application of Io-X8033 Module and TwinCAT 3 Software

Power on the module AIO-X8033, and use a network cable to connect the PC network port from the ECAT IN interface of AIO-X8033. [EtherCAT communication strictly distinguishes input and output, and the interface cannot be connected incorrectly, otherwise the module communication may be abnormal.] Open the local network settings, double-click the local network card, and click Install Protocol.



1. Open the TwinCAT software, click [File] -> [New] -> [Project] in turn, and the interface as shown in the figure below will pop up.



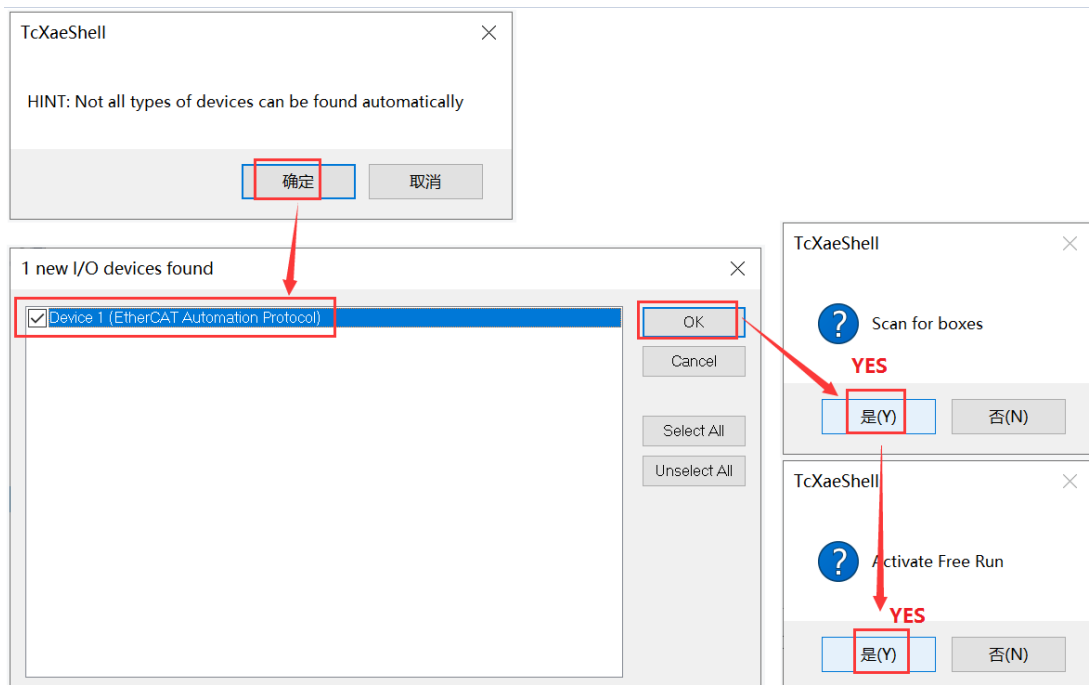
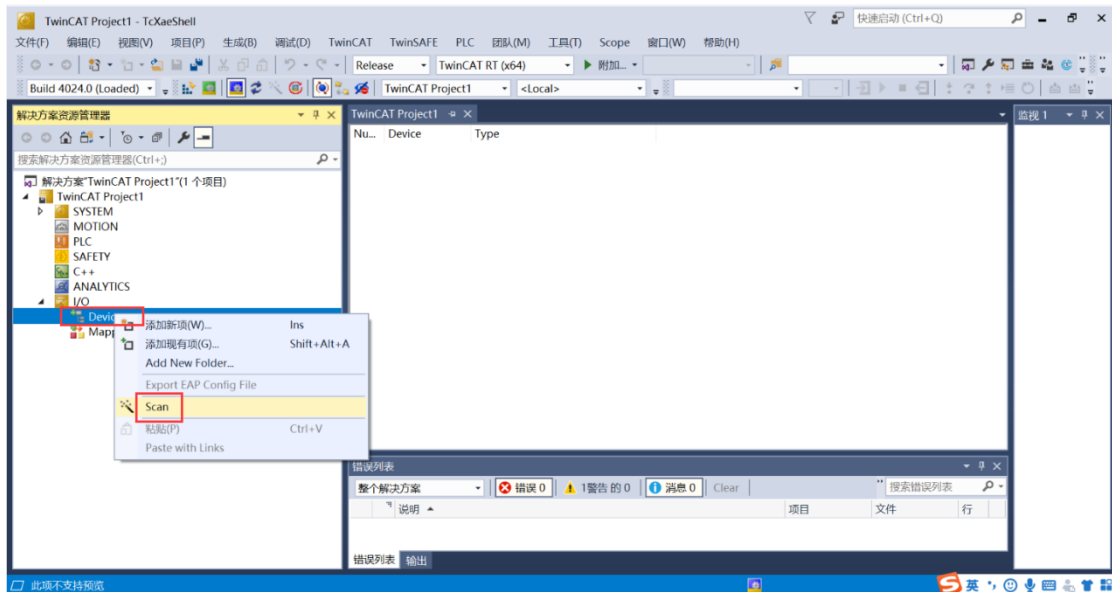
Select [TwinCAT Projects] as shown in the interface and select [TwinCAT XAE Project] in the middle of the interface. Keep the other defaults (name, location, and solution name can be modified as needed), and click the [OK] button.

2. Module test

There are two ways to test the module. One is to directly use the software's scanning function, and the other is to manually configure the module information to complete. Users can choose one of them when testing.

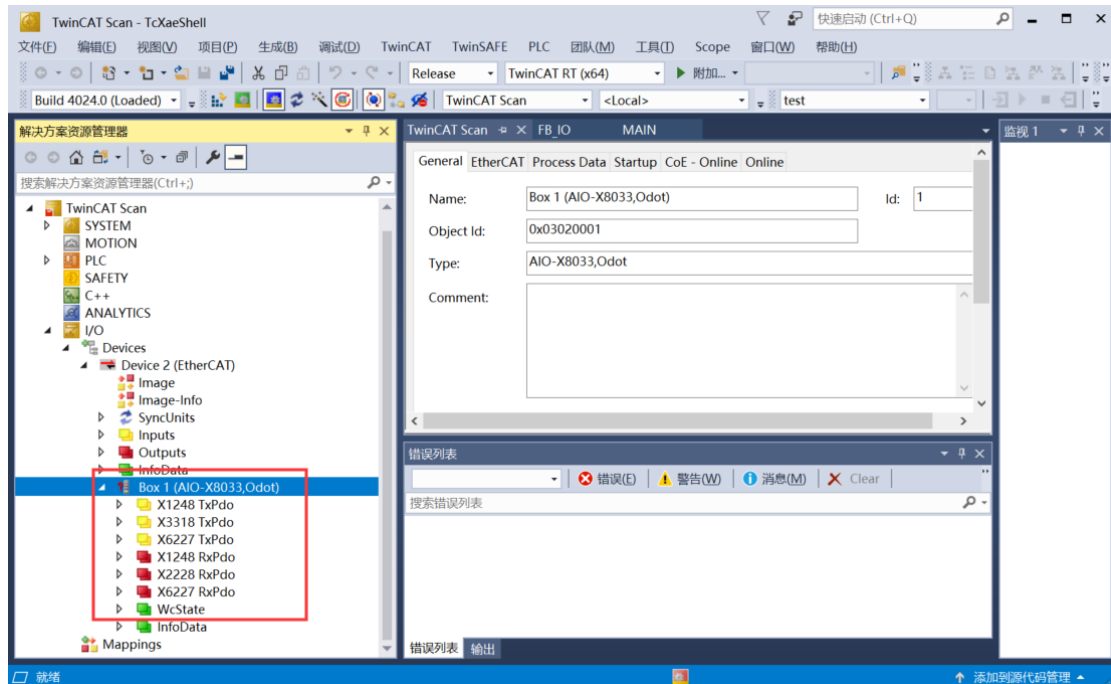
A. Software scanning test operation steps

Click [I / O]-> [Device]-> [Scan], and click OK in the pop-up interface—OK—Yes—Yes, the dialog box for activating the free running mode pops up.

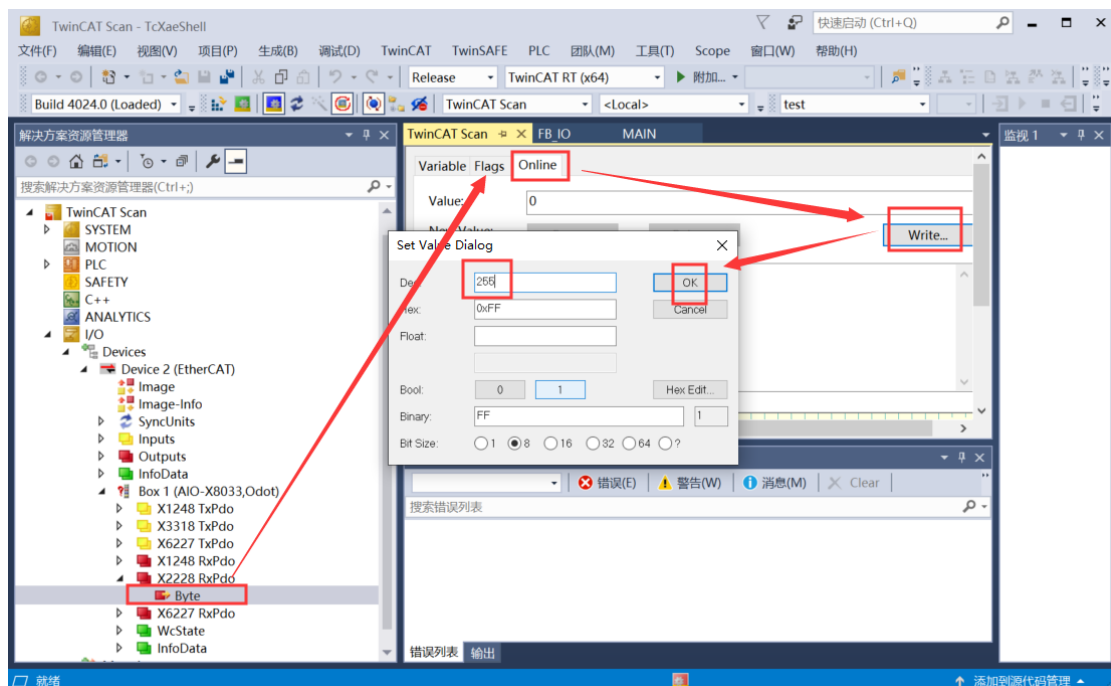


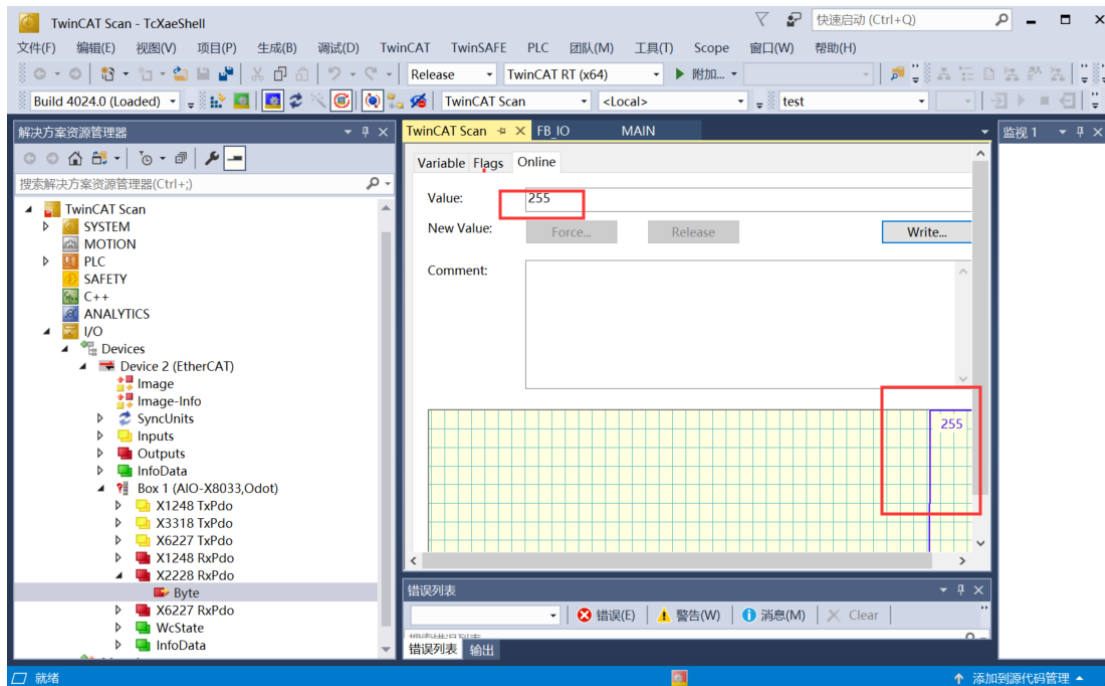
Click the [Yes] button in the interface to start the communication between AIO-X8033 and TwinCAT. At this time, the interface on the left has scanned out the

relevant information of the module.

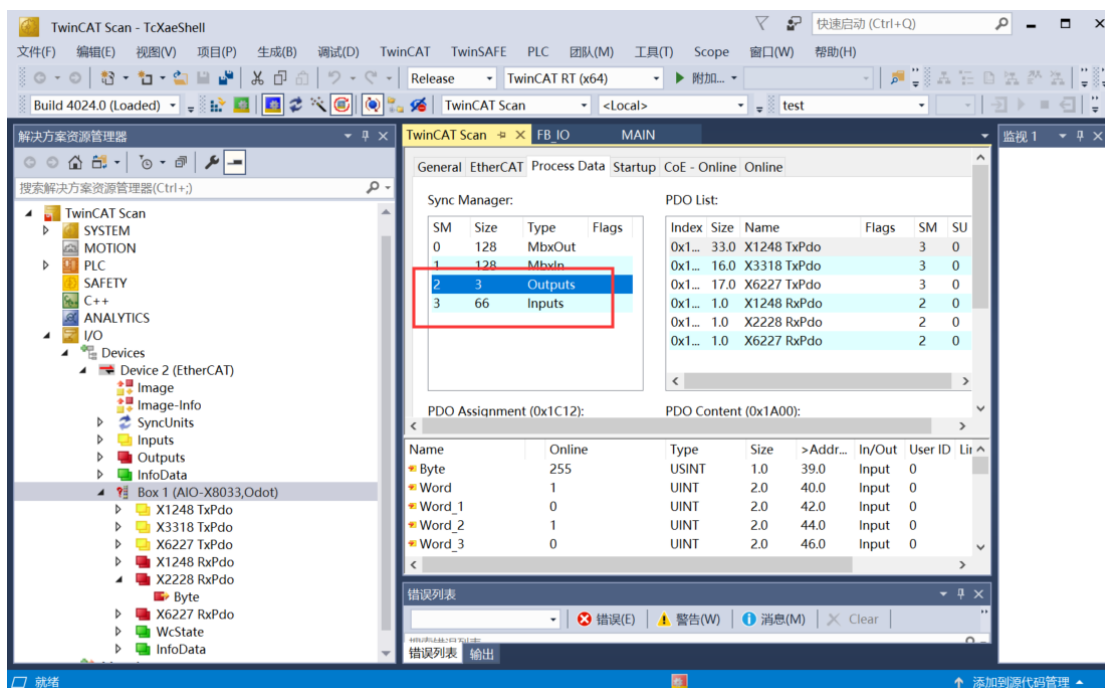


Click X2228 digital output module, pull down the menu Byte, click Online——
Write, assign a value of 255 to the module, click OK, you can see that the
output channel indicator of the hardware module is ON, and the software
interface can display the written value.



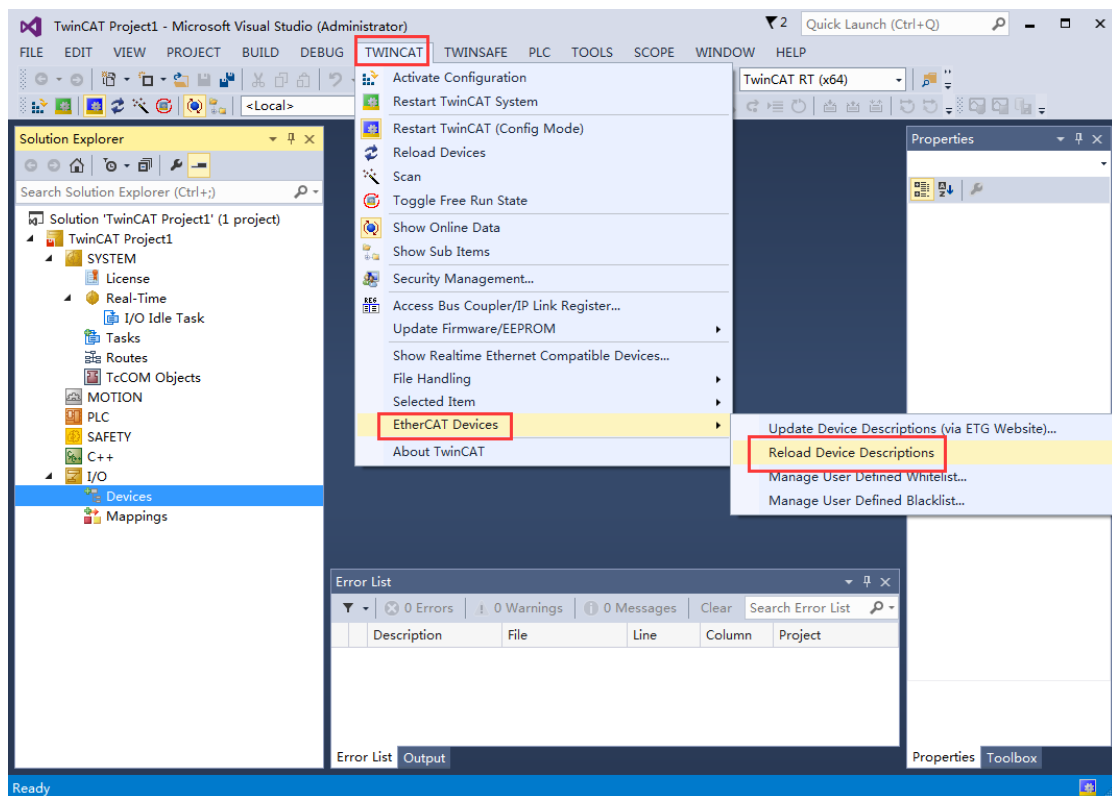
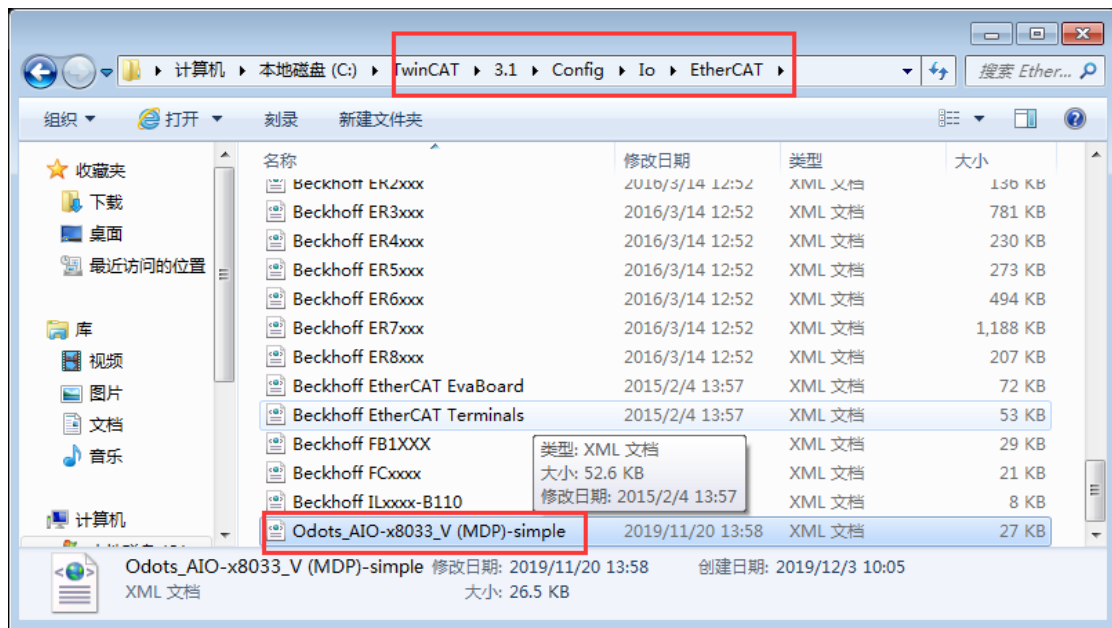


Click on Box 1 (AIO-X8033) and click on Process Data to check the total number of bytes in the input and output.



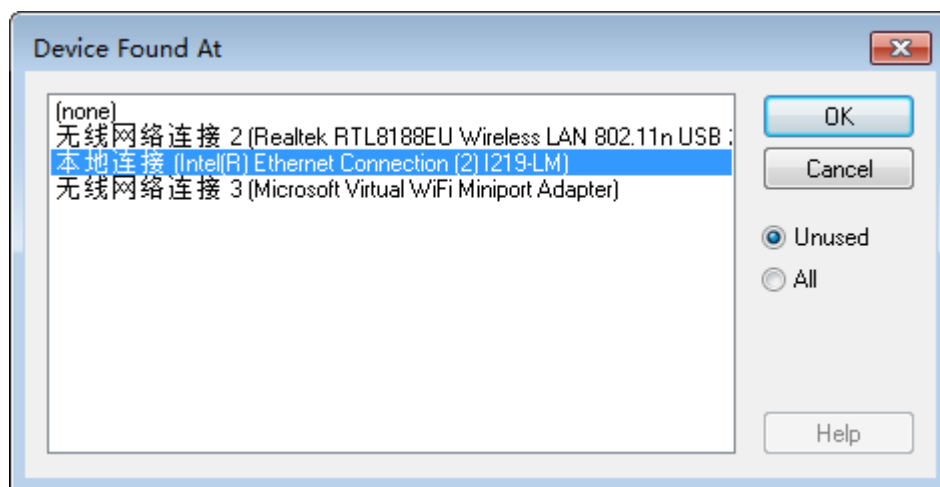
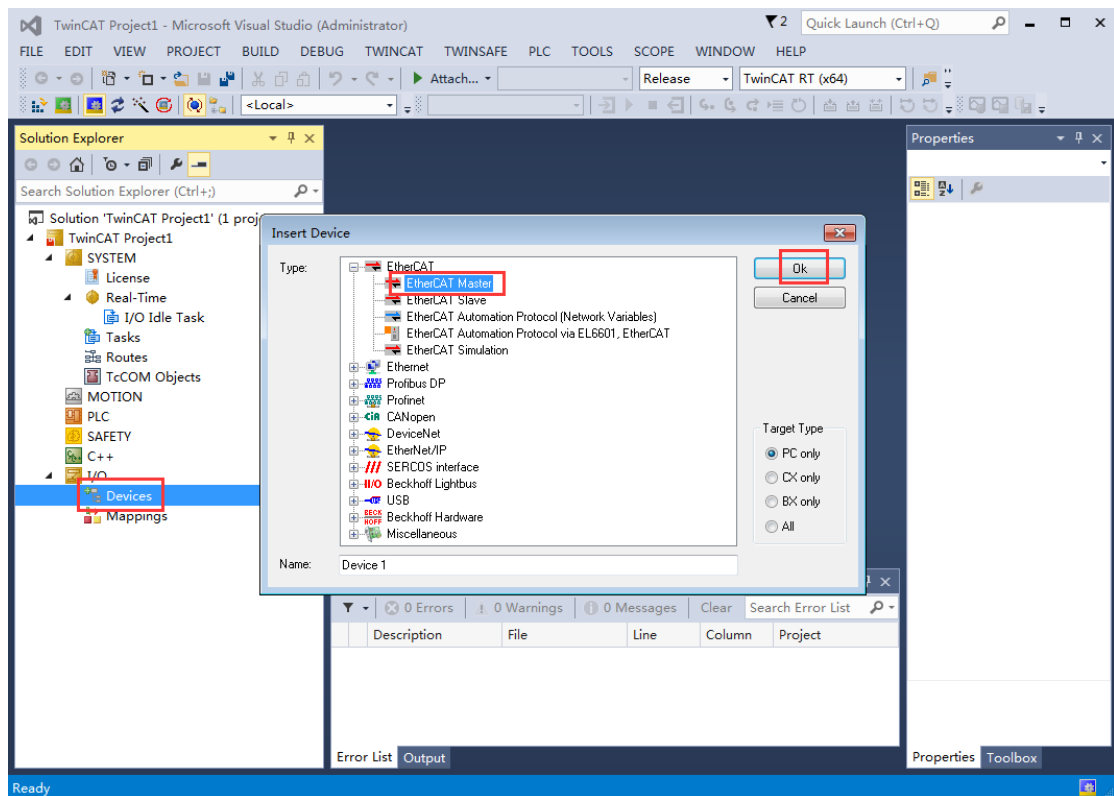
B. Manual configuration test operation steps

Copy the XML file to ... \ TwinCAT \ 3.1 \ Config \ Io \ EtherCAT, and load the XML into TwinCAT as shown in the figure below.

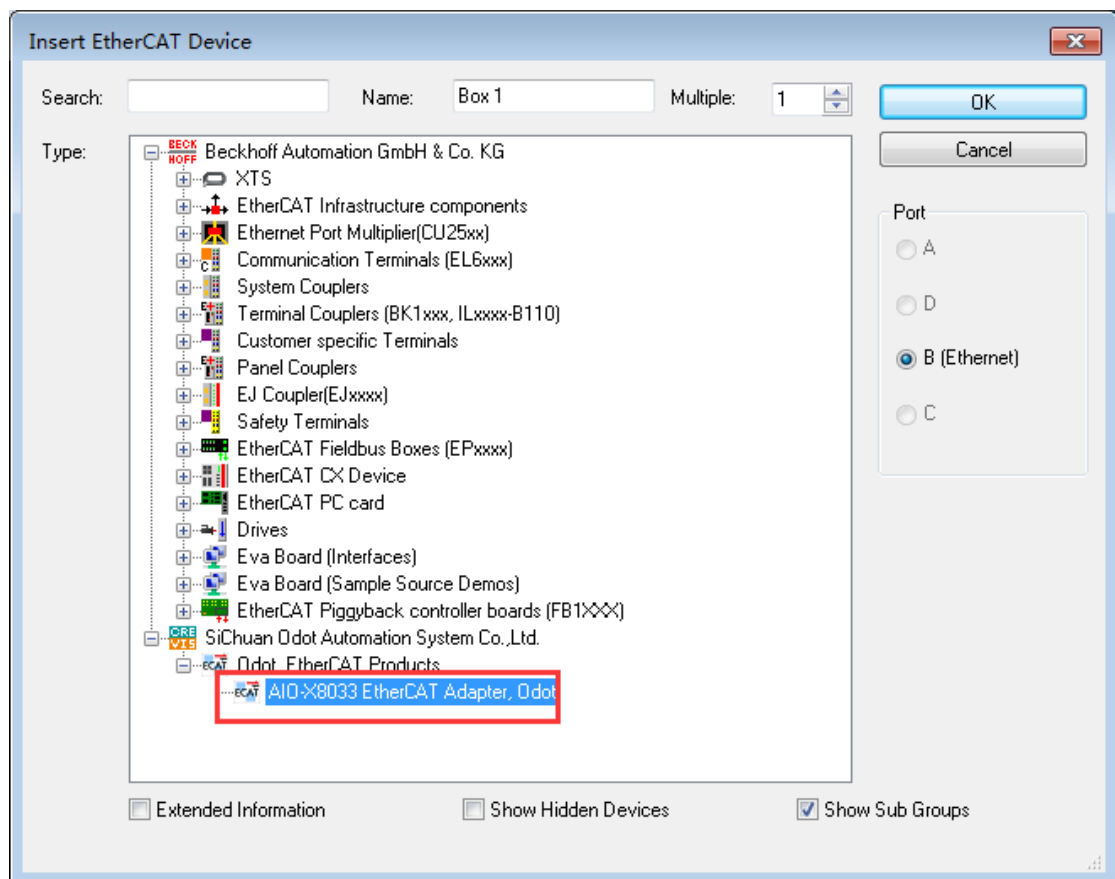


Right click [Device] -> [Add New Item] to pop up the dialog box as shown below

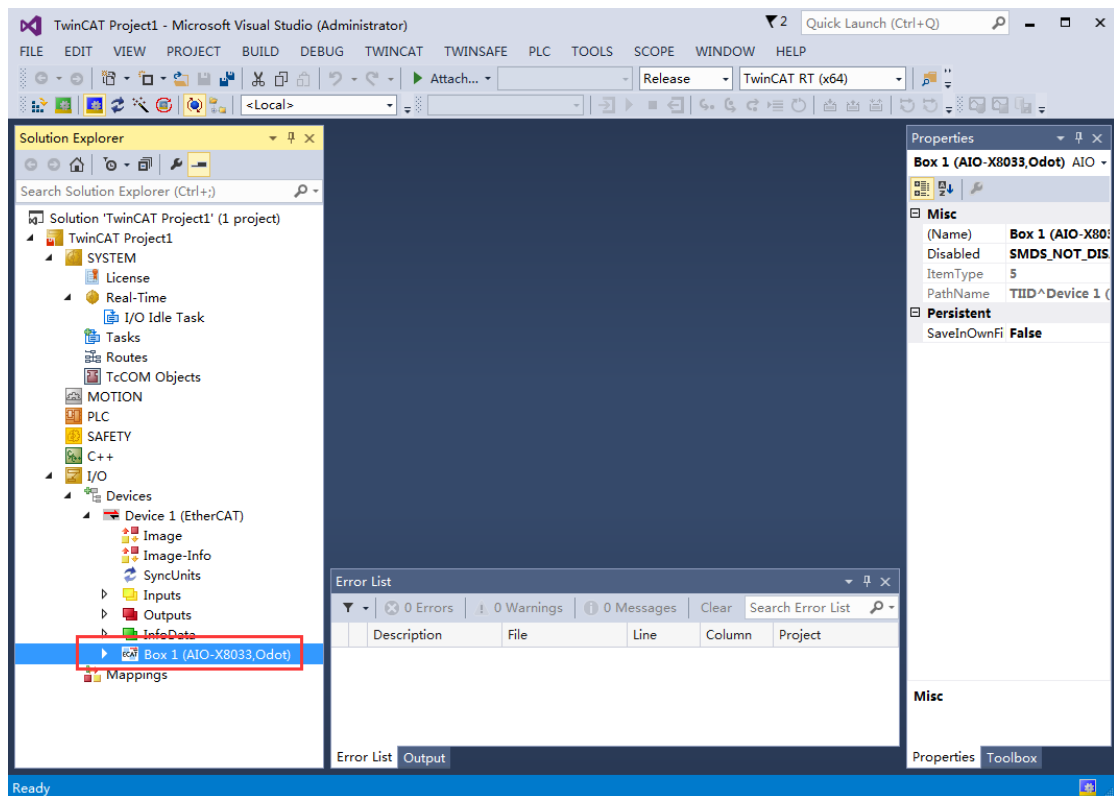
Select EtherCAT Master and click the [OK] button. In the new dialog box, select the network card to be used and click the [OK] button.



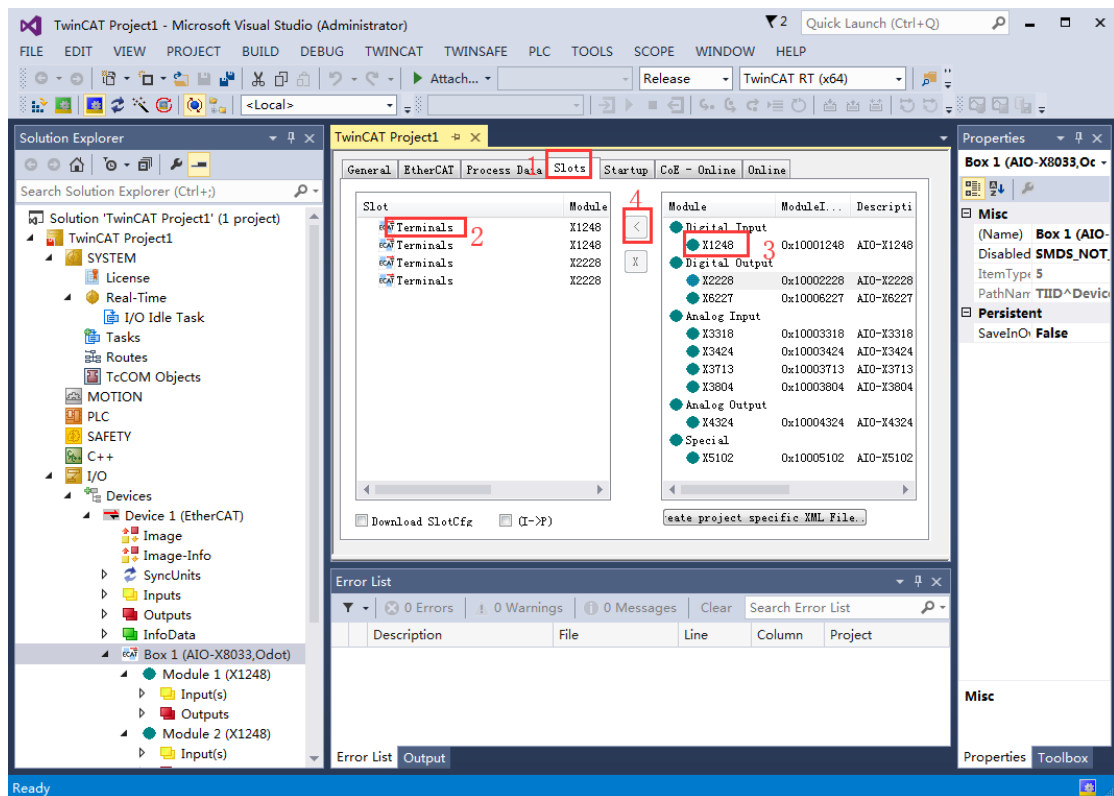
Right-click [Device 1 (EtherCAT)] -> [Add New Item] to pop up the dialog box as shown below.



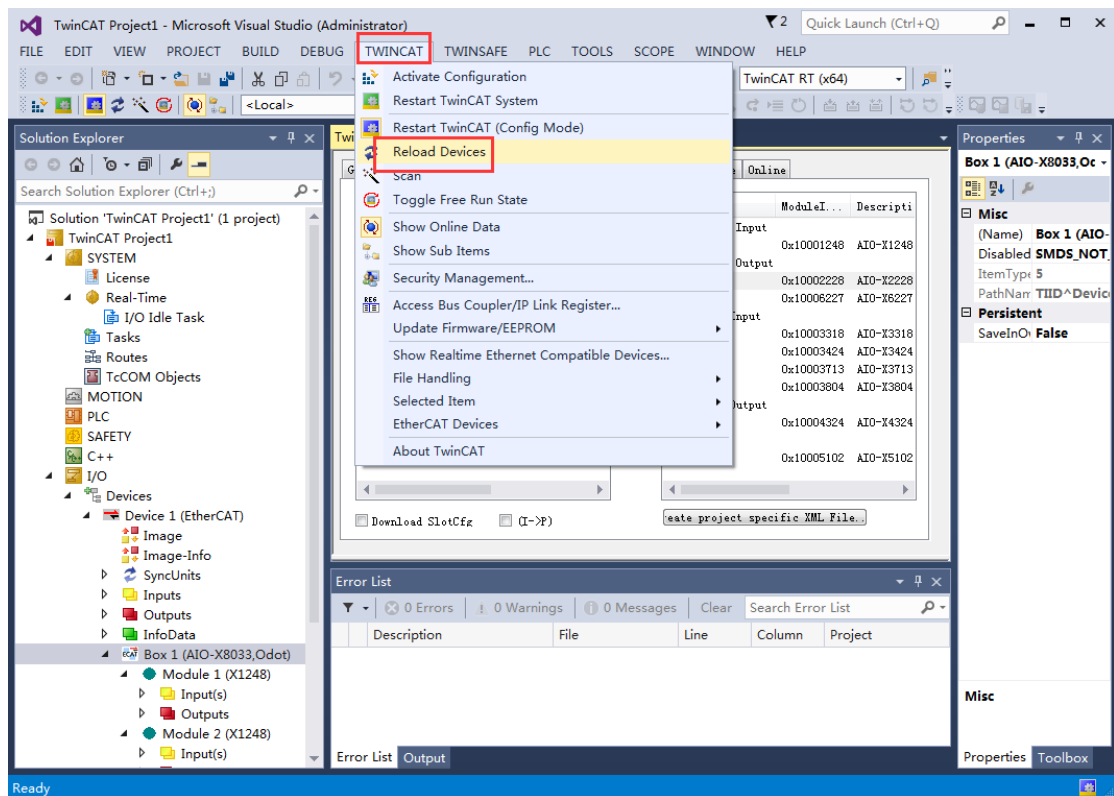
In the new dialog box, select [AIO-X8033 EtherCAT Adapter.Odot] and click the [OK] button. The interface changes as shown below.



Double-click BOX 1 (AIO-X8033), click [Slots] on the right interface, click Terminals in the middle of the interface, select the IO module of the slot corresponding to AIO-X8033 on the right, and map it to the left in turn.



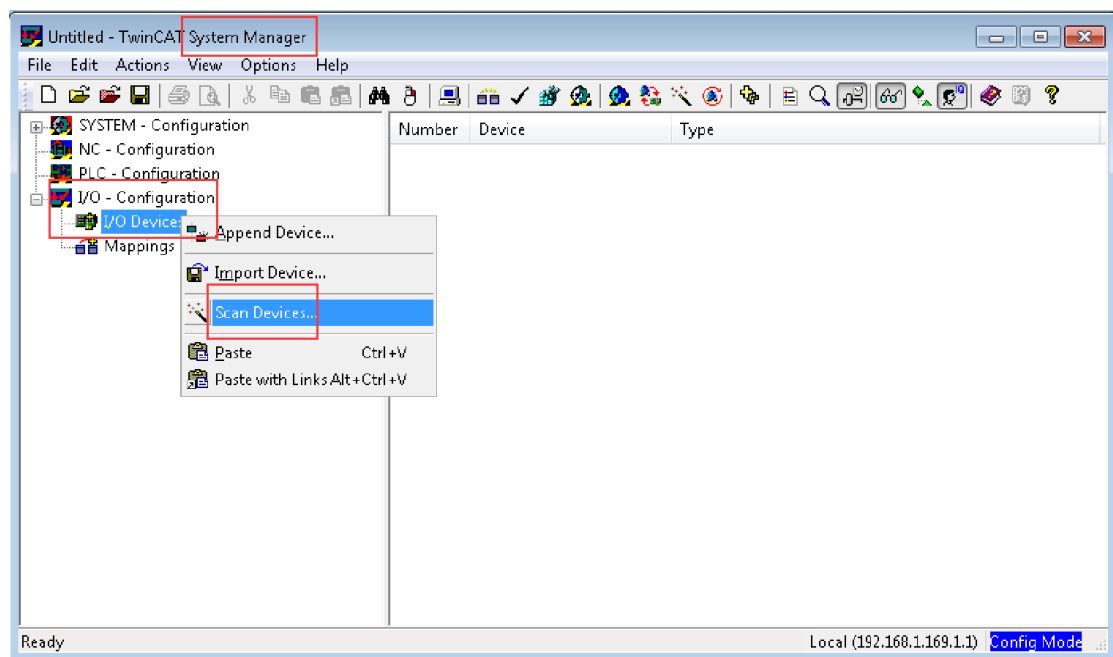
Click [Reload Devices] as shown in the figure below to complete the basic operation of the module and TwinCAT communication. The relevant communication has been established test the function of the IO module.



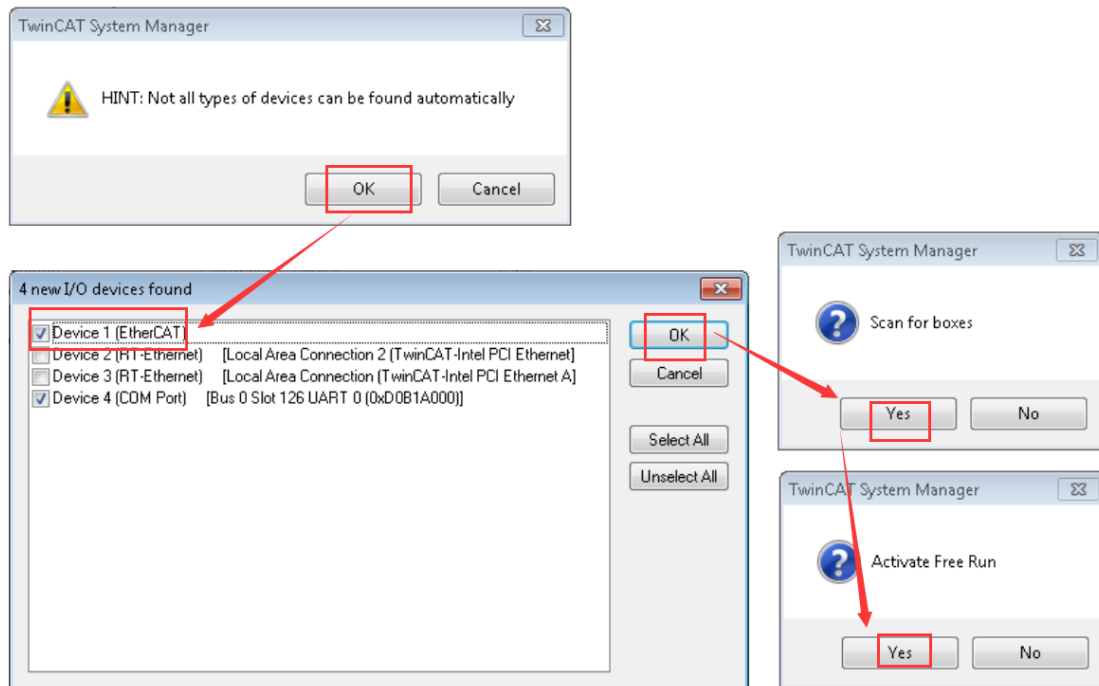
5.4.2 Module and TwinCAT 2 Software Connection Application

Power on the Beckhoff CX5120 PLC, connect the external display via the DVI-I cable, and open the Beckhoff software TwinCAT 2 that comes with the PLC. Power on the module AIO-X8033, and connect the network cable from the ECAT IN interface to the OUT interface of the Beckhoff EtherCAT adapter EK1110 [EtherCAT communication strictly distinguishes input and output, and the interface cannot be connected incorrectly, otherwise it may cause module communication abnormality]

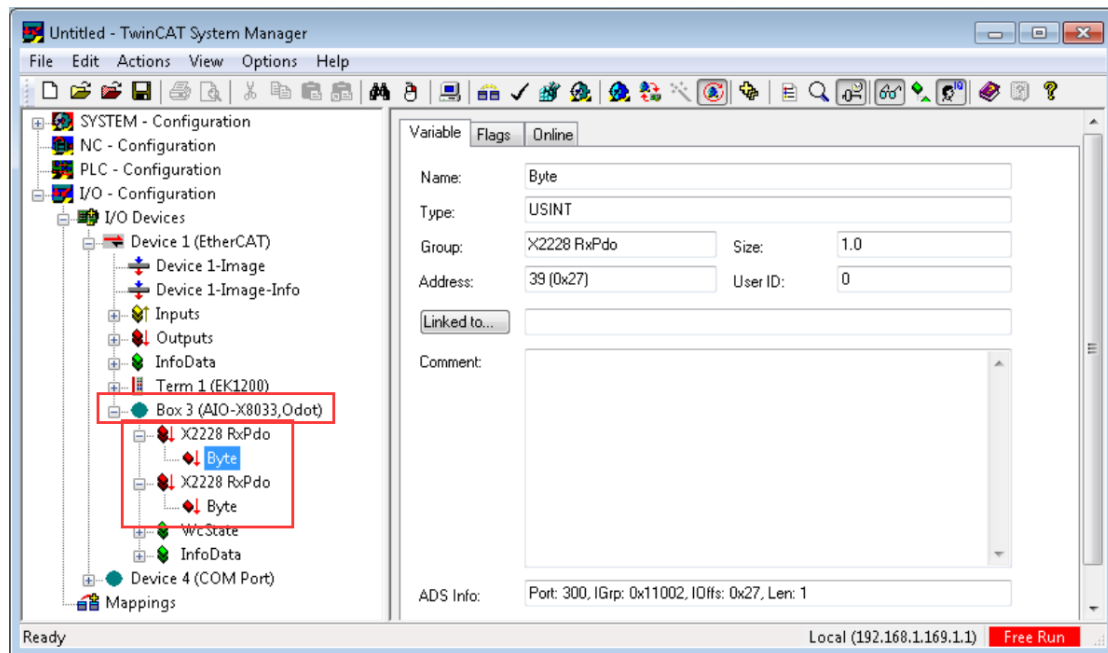
Open TWINCAT 2——System Manager software interface, click I / O-Configuration, right-click I / O device, and click Scan Devices.



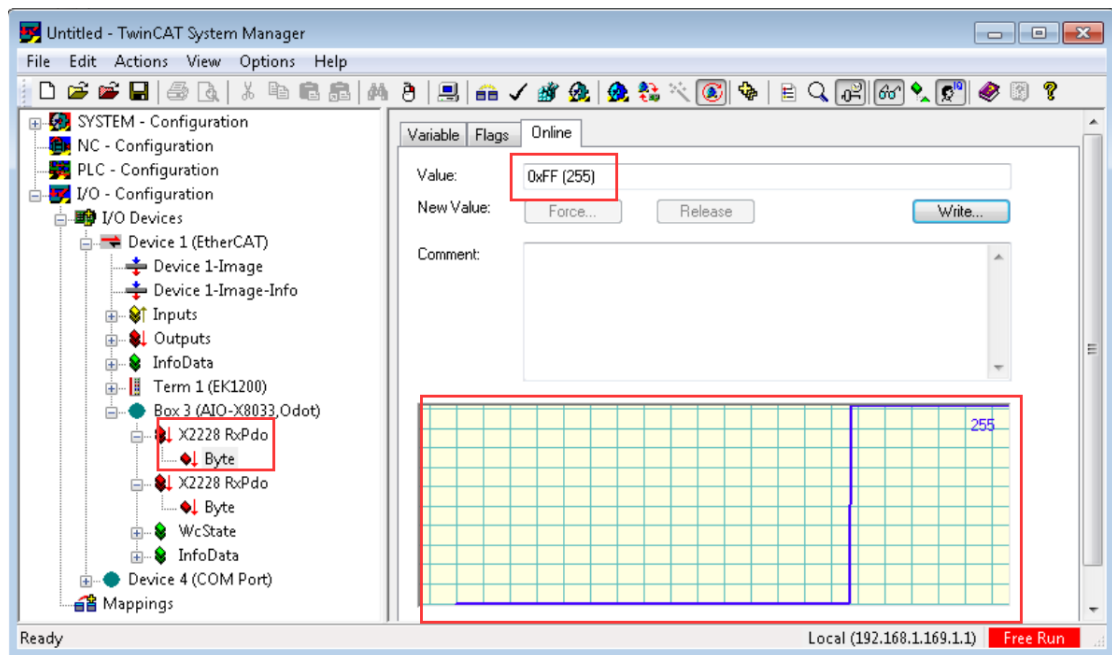
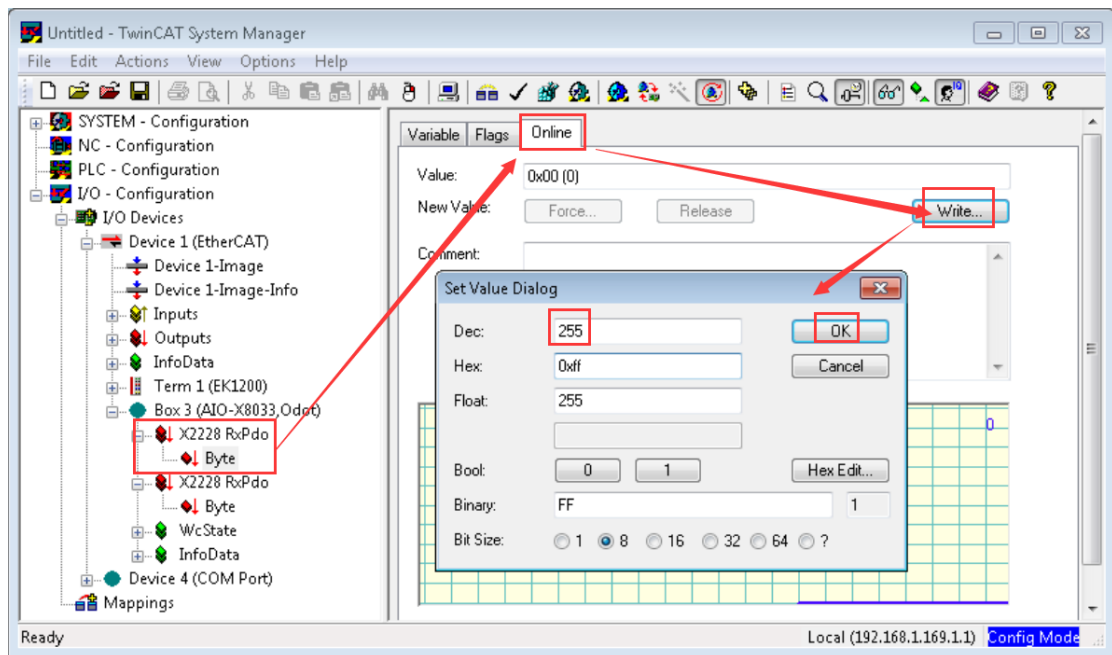
In the pop-up interface, click OK——OK——Yes——Yes.



The AIO-X8033 adapter module and IO module have been added.



Select the X2228 drop-down menu Byte, click Online, click Write, assign a value of 255 to X2228, click OK, you can visually observe that the output indicator of the AIO-X2228 module is also on, and the online value is 255.



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