EtherNet/IP

C2P-EI Series Bus Valve Terminal

User Manual

Nanjing Solidot Electronic Technology Co., Ltd. 2024

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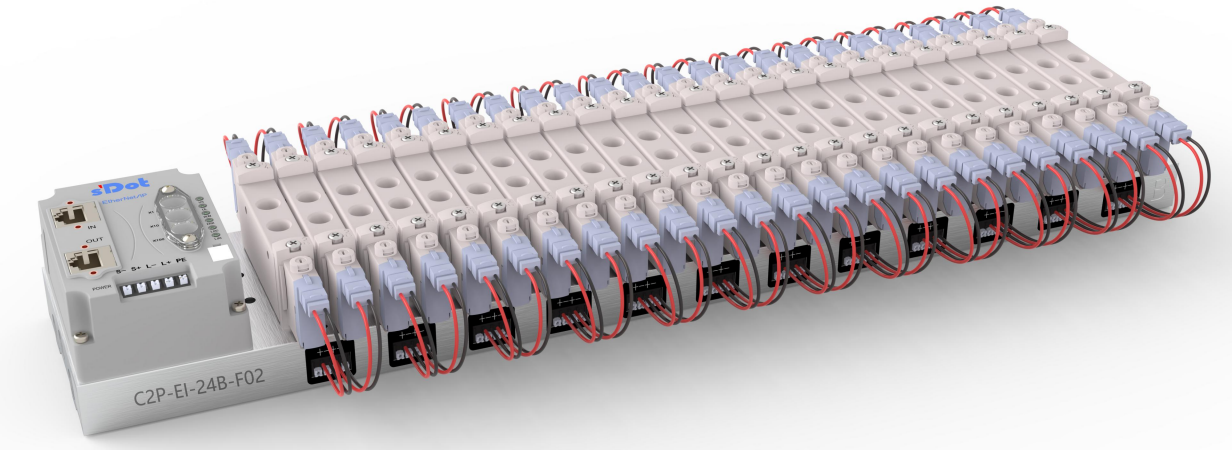
1 Product Introduction

1.1 Product overview

C2P-EI series valve terminal is a control module integrating valve terminal technology and EtherNet/IP bus technology, through which it can realize decentralized control and centralized control in industrial field, optimize system design, quick construction, and simplify debugging, performance testing and diagnostic maintenance of complex systems. The product adopts modular structure, occupies little space, the terminal is pluggable, can be quickly wired, simple configuration, supports all major mainstream EtherNet/IP master station, can be widely used in industrial control systems.



1.2 Product Characteristics

- Support EtherNet/IP industrial Ethernet protocols
- RJ45 bus interface, support cascade communication
- Maximum support for 24-position dual-control solenoid valves
- Modular structure, small footprint
- Simple wiring, quick construction and easy maintenance
- Support customization, support mainstream solenoid valves, simple and fast selection

- Supports remote diagnosis to reduce troubleshooting difficulties

2 Designation Rules

2.1 Designation Rules

C2P - EI - 24 B - F01
(1) (2) (3) (4) (5)

Number	Meaning	Description of values				
(1)	Product Type	C2P (RJ45 connector)				
(2)	Bus protocol	EI: Abbreviation for EtherNet/IP Protocol				
(3)	Number of Solenoid Valve Positions	08: 8-bit	12: 12 bits	16: 16 bits	20: 20 bits	24: 24 bits
(4)	Type of electric control	B: Dual electric control (compatible with single electric control)				
(5)	Solenoid Valve Model Code	See solenoid valve model code table below				

Solenoid Valve Model Code List :

Brand	Code	Valve spacing	Range	Supported Solenoid Valve Models
AirTAC	A01	19	4V1	4V110/ 4V120/ 4V130
	A02	23	4V2	4V210/ 4V220/ 4V230
	A04	10.5	7V0	7V0510/ 7V0520/ 7V0530
	A05	16	7V1	7V110/ 7V120/ 7V130
	A06	19	7V2	7V210/ 7V220/ 7V230
	A07	19	5V1	5V110/ 5V120/ 5V130
	A08	23	5V2	5V210/ 5V220/ 5V230
FESTO	F01	10.5	VUVG-LK10	vuvg-lk10-t32/ vuvg-lk10-m52 vuvg-lk10-B52/ vuvg-lk10-p52
			VUVG-L10	vuvg-l10-t32/ vuvg-l10-m52 vuvg-l10-B52/ vuvg-l10-p52
	F02	16	VUVG-LK14	vuvg-lk14-t32/ vuvg-lk14-m52 vuvg-lk14-B52/ vuvg-lk14-p52
			VUVG-L14	vuvg-l14-t32/ vuvg-l14-m52 vuvg-l14-B52/ vuvg-l14-p52
SMC	S01	10.5	SY3	SY3120/ SY3220/ SY3320 SY3420/ SY3520
	S02	16	SY5	SY5120/ SY5220/ SY5320 SY5420/ SY5520
	S03	19	SY7	SY7120/ SY7220/ SY7320/ SY7420/ SY7520
CKD	C01	10.5	4GD1	4gd119r/ 4gd129r/ 4gd139r 4GD149R/ 4GD159R
	C02	16	4GD2	4gd219r/ 4gd229r/ 4gd239r 4GD249R/ 4GD259R

Note: Valve spacing (K value) unit: mm.

2.2 Model List

Model number	Product Description
C2P-EI-08B-()	8-position dual control solenoid valve
C2P-EI-12B-()	12-position dual control solenoid valve
C2P-EI-16B-()	16-position dual-control solenoid valve
C2P-EI-20B-()	20-position dual control solenoid valve
C2P-EI-24B-()	24-position dual-control solenoid valve

Note: () brackets represent solenoid valve model code, support self-selected customization.

3 Product Parameters

3.1 General parameter

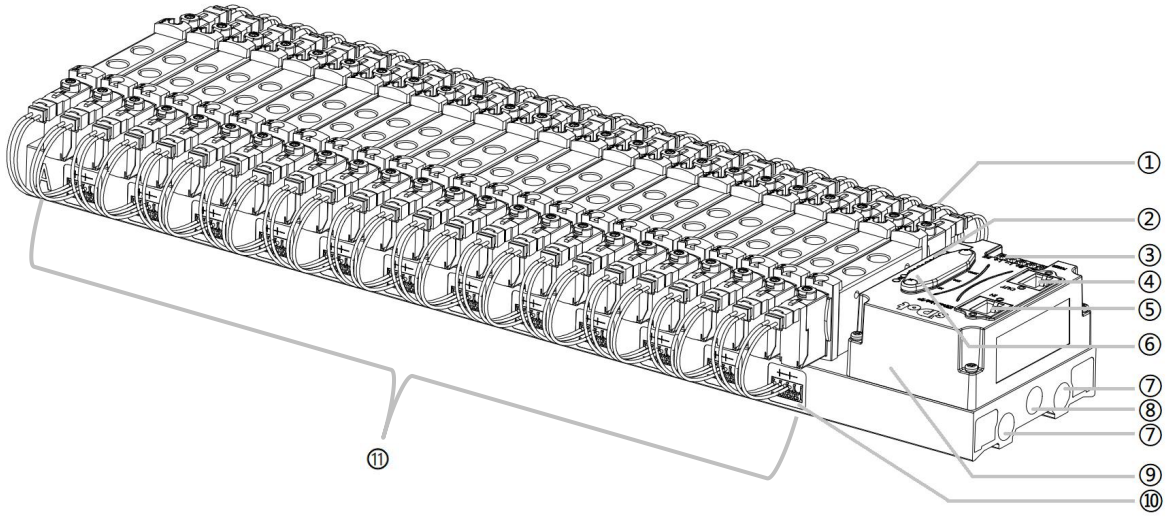
Interface parameter	
Bus protocol	EtherNet/IP
Data transmission medium	Category 5+ UTP or STP (STP recommended)
Transmission distance	≤100 m (station to station)
Transmission rate	100 Mbps
Bus interface	2◊RJ45
Technical Parameters	
System power supply	24 VDC (18V~30V)
Rated current consumption	30 mA
Electrical isolation	500 VAC
Load power	24 VDC (18V~30V)
Output points	0~48
Single channel current	Max: 250 mA
Power connection method	5Pin Pop-Up Terminal Block
Power interface surge protection	Support
Power connector reverse connection protection	Support
Channel short circuit protection	Support

Channel open diagnostics	Support
Channel short circuit diagnostics	Support
Weights	Varies by product model
Sizes	Differences by product model (see 5.1 External Dimensions for details)
Operating temperature	-5℃~+50℃
Storage temperature	-20℃~+75℃
Relative humidity	95%, non-condensing
Ingress protection	IP20

4 Panel

4.1 Product Structure

Name and function description of each part of the product



Number	Name	Description
①	Solenoids	See "Solenoid Valve Model Code List" for details.
②	LED indicator	Indicates power, operation and bus status
③	Power connector	5Pin Pop-Up Terminal Block
④	Bus interface	RJ45, Bus OUT Interface
⑤	Power connector	RJ45, Bus IN Interface
⑥	Rotary switch	Setting IP address, reset settings
⑦	An air vent	G1/4
⑧	Air intake	G1/4
⑨	Communications unit	valve terminal Communication and Control Body
⑩	Solenoid valve wiring socket	4Pin

⑪	Manifold	valve terminal body with A and B silkscreen on both ends

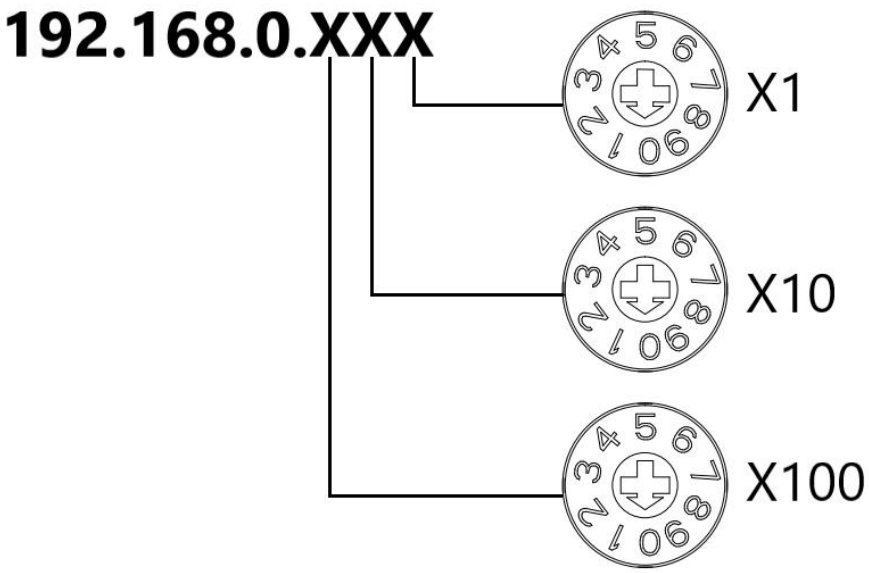
4.2 Indicator light function

Name	Markings	Color	Status	Status Description
System power indicator	US	GREEN	ON	Power supply normal
			OFF	The product is not powered up or the power supply is abnormal
Load power indicator	UL	GREEN	ON	Power supply normal
			OFF	The product is not powered up or the power supply is abnormal
Network indicator IN	L/A0	GREEN	FLASHING	Network connection with data interaction
			OFF	No data interaction or exception
Network indicator OUT	L/A1	GREEN	FLASHING	Network connection with data interaction
			OFF	No data interaction or exception
Operation Status Indicator	RUN	GREEN	ON	The device has established a connection
			FLASHING	1Hz: the device has not established a connection but has acquired an IP address; the IP address is duplicated; the device is undergoing a power-up test.
			OFF	The device has not been given an IP address; the device is in an unpowered state.
Warning indicator	ERR	RED	ON	Valve is shorted/over-tempered or unit is being restored to factory settings
			OFF	System running normally or not powered up

4.3 Rotary Switch

IP address setting

A rotary switch can be used to specify the setting method of the module IP address.



Set value (decimal)	IP address setting method
001 to 254	Set the IP address in the range of 1 to 254 with "×100" for the hundredth digit, "×10" for the tenth digit, and "×1" for the first digit. Setting in the range of 1 to 254. IP Address High 3Byte continuation of the value previously set via the host computer. When the IP address is set to a value other than 000 by the rotary switch in the factory factory state, the high 3Byte is 192.168.0.
000, 255-998	When the rotary switch is set to 255 or 255 or more, the module powers up with the last startup method and parameter startup.
999	Reset Settings.

The factory rotary switch is set to "000".

Remarks:

1、 **Tool selection**
Screwdriver specifications: 2 mm opening.

2、 **The rotary switch IP must always be set in the event of a power failure. If the IP address needs to be changed during communication, the new setting must be re-powered after it is completed to take effect.**

Reset function

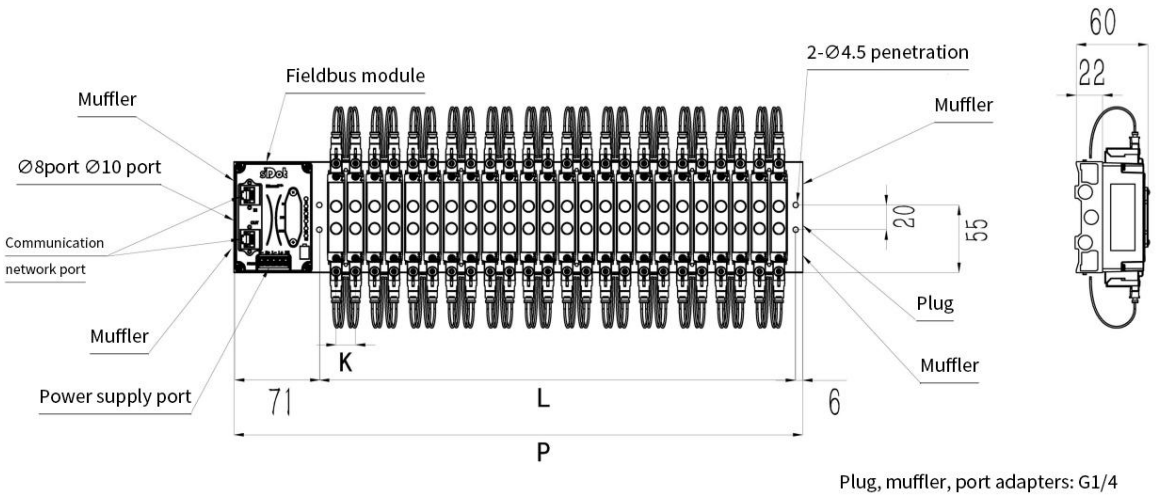
Restoration of factory settings can be executed by special operation of the rotary switch.

For details on how to do this, see: 7.4 Restore Factory Settings.

5 Installation

5.1 External Dimensions

External size (unit mm)



L size											
Number of position	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**
K=10.5	59.5	80.5	101.5	122.5	143.5	164.5	185.5	206.5	227.5	248.5	269.5
K=16	76	108	140	172	204	236	268	300	332	364	396
K=19	88	126	164	202	240	278	316	354	392	430	468
K=23	103	149	195	241	287	333	379	425	471	517	563

P size											
Number of position	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**
K=10.5	136.5	157.5	178.5	199.5	220.5	241.5	262.5	283.5	304.5	325.5	346.5
K=16	153	185	217	249	281	313	345	377	409	441	473
K=19	165	203	241	279	317	355	393	431	469	507	545
K=23	180	226	272	318	364	410	456	502	548	594	640

5.2 Solenoid valve installation sequence

- **Solenoid Valve for valve terminal**

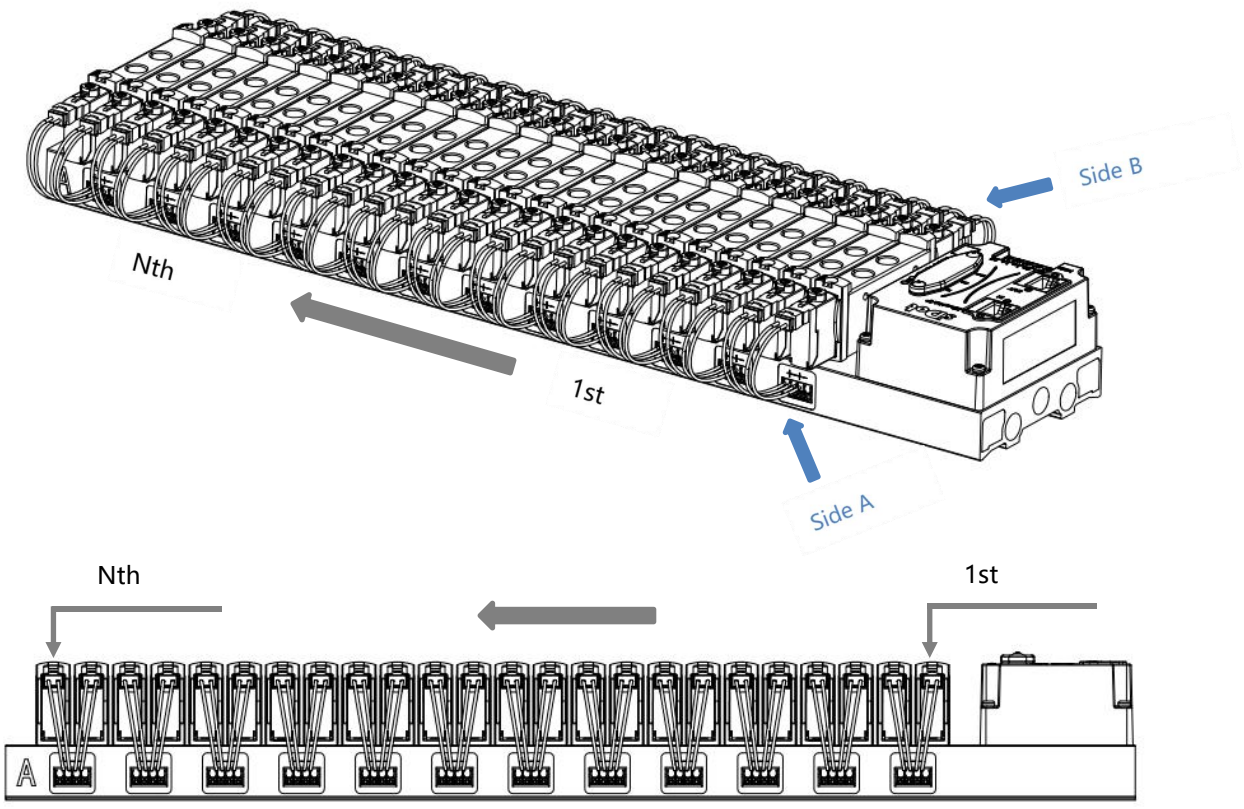
  For details of solenoid valves for Valve Terminal, see "2.1 Naming Rules Solenoid Valve Model Code List".

- **Solenoid valve installation sequence**

  The solenoid valves are installed in order from the communication unit end.

  Installation order for dual electronically controlled solenoid valve installation: Starting from the communication unit end, install the dual electronically controlled solenoid valve from the 1st position to the Nth position in sequence, and the installation order is shown in the figure below.

  Installation order of single electronically controlled solenoid valve installation: Starting from the communication unit end, install single electronically controlled solenoid valves in order from position 1 to position N. Solenoid valve wiring can be done on the A side, and the installation order is shown in the following figure.

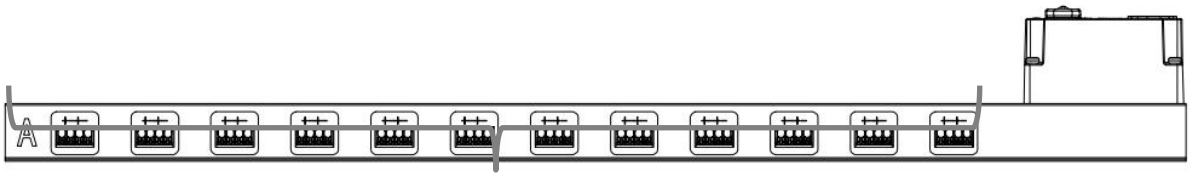


6 Wiring

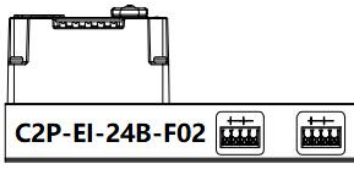
6.1 Solenoid valve wiring

Valve terminal Terminal Distribution

The valve terminal wiring terminals are distributed on both sides of the valve terminal manifold, respectively, side A and side B. Side A and side B can be distinguished according to the silkscreen on the end of the valve terminal manifold. Take valve terminal C2P-EI-24B-F02 as an example, the distribution of A-side and B-side terminals is shown in the figure below.



A-side solenoid valve terminal wiring terminal

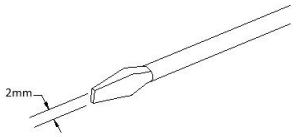


B-side solenoid valve terminal wiring terminal

Wiring terminal		
Terminals	Extremity	4P
	Wire diameter	22~17 AWG 0.3~1.0 mm²

Wiring Tool Requirements

The solenoid valve terminal adopts screw-free design, and the installation and removal of cables can be operated with a screwdriver (specification: ≤2mm).



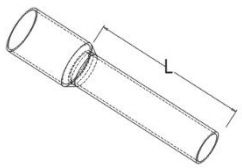
Stripped Wire Length Requirements

Recommended cable stripping length for solenoid valve terminals 10 mm

Wiring Method

For single stranded hard wires, after stripping the corresponding length of wire, press down the button while inserting the single stranded wire.

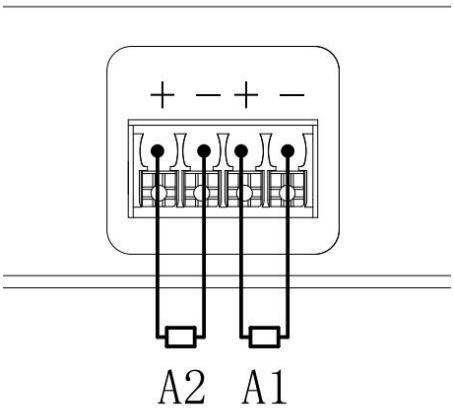
Multi-stranded flexible wires, after stripping the corresponding length of wire, can be directly connected or supporting the use of the corresponding standard specifications of the cold compression end (tube-type insulated terminal, the reference specifications are shown in the table below), press down the button at the same time the line will be inserted.

Tube Insulation End Specification Sheet		
specification	Model	Cross-sectional area of conductor mm²
	E0310	0.3
	E0510	0.5
	E7510	0.75

Tube insulated terminal L with a length of 10 mm	E1010	1.0

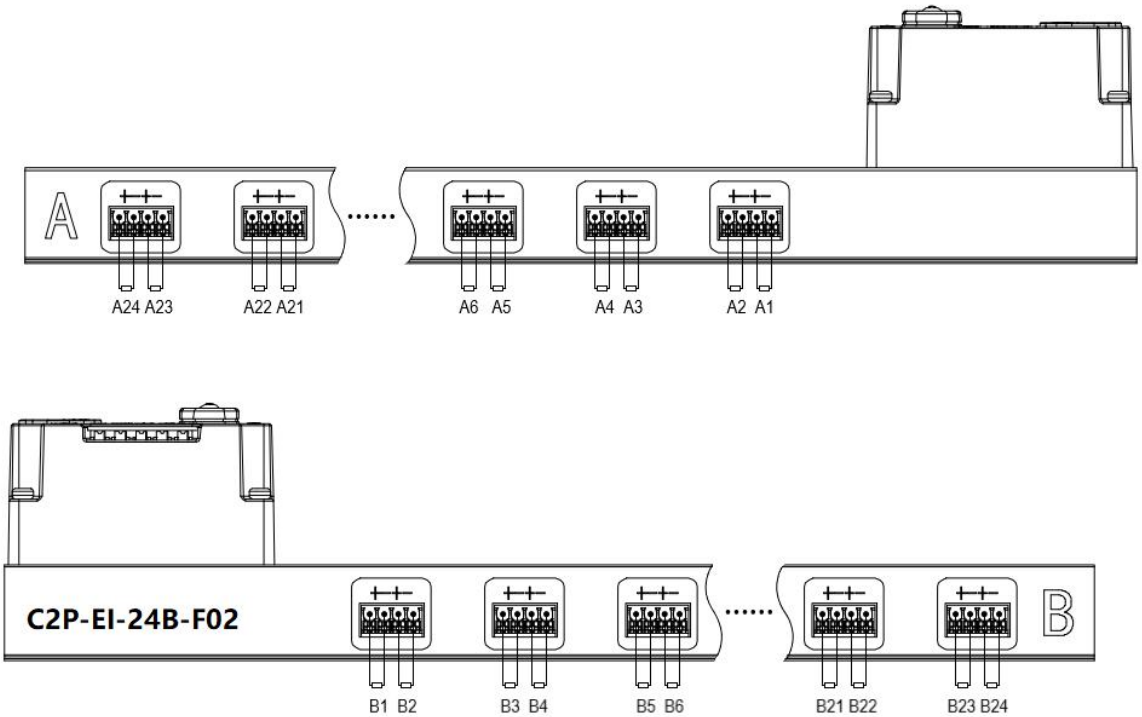
- **Solenoid valve wiring**

For different types of Valve Terminal, 4Pin sockets with corresponding positions are configured on both sides of the manifold, and a set of "+" and "-" of the sockets can drive a solenoid valve coil. As shown in the figure below, A1 and A2 can drive one solenoid valve coil respectively.



- **Valve Terminal Wiring**

Starting from the communication unit end, the solenoid valve coils on the A and B sides of the manifold correspond one to the other, and the correspondence between the channels and the solenoid valve coils is shown in the figure below.



Solenoid valve wiring principles:

- Install the solenoid valve in accordance with "5.2 Solenoid Valve Installation Sequence".
- AX and BX can be connected to a dual electric solenoid valve, and AX can be connected to a single electric solenoid valve. For wiring, please strictly follow the table below, otherwise the solenoid valve will not work or misoperate. "×" means no wiring.

Dual control solenoid valve wiring (all valve pieces are dual control solenoid valves)									
Terminals	A1	B1	A2	B2	A3	B3	A4	B4	····
Solenoid Valve No.	1		2		3		4		····

Terminals	·····	A22	B22	A23	B23	A24	B24
Solenoid Valve No.	·····	22		23		24	

Note: This example takes C2P-EI-24B-() valve terminal, 24-position dual-control solenoid valve as an example, the rest of the different specifications of the valve terminal, there are differences in wiring.

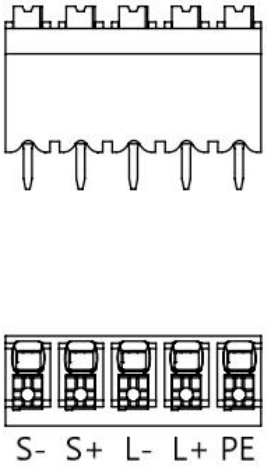
Dual-control solenoid valve wiring (all access valve pieces are single-control solenoid valves)									
Terminals	A1	B1	A2	B2	A3	B3	A4	B4	····
Solenoid Valve No.	1	×	2	×	3	×	4	×	····

Terminals	·····	A22	B22	A23	B23	A24	B24
Solenoid Valve No.	·····	22	×	23	×	24	×

Note: This example to C2P-EI-24B-() valve terminal, only access to the single-control solenoid valve as an example, the rest of the different specifications of the valve terminal, wiring differences.

6.2 Power Supply Wiring

Power supply terminal S indicates the system power supply, L indicates the load power supply, wiring method and solenoid valve wiring method is consistent with the silkscreen and power parameters can be wired against the power supply, power supply 5P terminal as shown in the following figure:

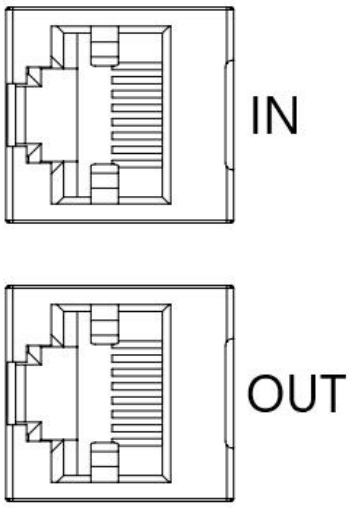


☛ Precautions

- The module system-side power supply and the field-side power supply are configured and used separately, so do not mix them.
- PE needs to be reliably grounded.

6.3 Bus Wiring

The bus interface uses an RJ45 connector as shown below:



☛ Precautions

- Adopt standard RJ45 network interface with standard crystal connector.
- The length of the cables between the devices must not exceed 100 m.

7 Operation

7.1 Control Method

Valve terminal solenoid valve control byte way, a byte control 4 valves; at the same time can be controlled in accordance with the bit way, a group of 8 bits, control 1->8 channels, the channel value of 1 is the corresponding solenoid valve is open, the channel value of 0 is the corresponding solenoid valve is closed. 24-bit dual-control solenoid valves have a total of 6 groups of control bits, a total of 48 channel control. Take 24-position dual-control solenoid valve as an example to introduce the output control function of the valve terminal, the control mode is shown in the table below.

Control method	**valve[1..4]**							
Channel address	**valve [1..4] [0]**	**valve [1..4] [1]**	**valve [1...4] [2]**	**valve [1...4] [3]**	**valve [1...4] [4]**	**valve [1...4] [5]**	**valve [1...4] [6]**	**valve [1...4] [7]**
Transformers	A1	B1	A2	B2	A3	B3	A4	B4
Solenoid Valve No.	1		2		3		4	

Control method	**valve[5..8]**							
Channel address	**valve [5..8] [0]**	**valve [5...8] [1]**	**valve [5...8] [2]**	**valve [5...8] [3]**	**valve [5...8] [4]**	**valve [5..8] [5]**	**valve [5...8] [6]**	**valve [5...8] [7]**
Transformers	A5	B5	A6	B6	A7	B7	A8	B8
Solenoid Valve No.	5		6		7		8	

Control method	valve [9...12]							
Channel address	valve [9..12] [0]	valve [9...12] [1]	valve [9...12] [2]	valve [9...12] [3]	valve [9...12] [4]	valve [9...12] [5]	valve [9...12] [6]	valve [9...12] [7]
Transformers	A9	B9	A10	B10	A11	B11	A12	B12
Solenoid Valve No.	9		10		11		12	

Control method	valve [13...16]							
Channel address	Valve [13...16] [0]	Valve [13...16] [1]	Valve [13...16] [2]	Valve [13...16] [3]	Valve [13...16] [4]	Valve [13...16] [5]	Valve [13...16] [6]	valve [13...16] [7]
Transformers	A13	B13	A14	B14	A15	B15	A16	B16
Solenoid Valve No.	13		14		15		16	

Control method	valve[17..20]							
Channel address	valve [17...20] [0]	valve [17...20] [1]	Valve [17...20] [2]	valve [17...20] [3]	valve [17...20] [4]	valve [17...20] [5]	valve [17...20] [6]	valve [17...20] [7]
Transformers	A17	B17	A18	B18	A19	B19	A20	B20
Solenoid Valve No.	17		18		19		20	

Control method	valve [21...24]							
Channel address	valve [21...24] [0]	valve [21...24] [1]	valve [21...24] [2]	valve [21...24] [3]	valve [21...24] [4]	valve [21...24] [5]	valve [21...24] [6]	valve [21...24] [7]
Transformers	A21	B21	A22	B22	A23	B23	A24	B24
Solenoid Valve No.	21		22		23		24	

7.2 Diagnostic Function

The C2P-EI valve terminal has an open circuit diagnostic (Open load) and a short circuit or overtemperature diagnostic (Short circuit or overtemperature). An open circuit can only be monitored if the valve is closed and a short circuit can only be monitored if the valve is open.

The diagnostic function is the same as the control mode, and also sends diagnostic information in Byte or bit. If the valve is closed, the diagnostic message Open load is normal if the value is 0, and 1 means the corresponding valve is open. Under the premise of valve opening, valve short circuit or overtemperature diagnostic information Short circuit or overtemperature value is 0 is normal, 1 represents the corresponding valve short circuit/overtemperature.

The channel diagnostic information and solenoid valve correspondence for Open load and Short circuit or overtemperature diagnostics are the same, taking Open load diagnostics as an example, the correspondence is shown in the table below.

Diagnostic function	**Open load[0..7]**							
Channel address	**Open [0..7] [0]**	**Open[0..7] [1]**	**Open [0..7] [2]**	**Open [0..7] [3]**	**Open [0..7] [4]**	**Open [0..7] [5]**	**Open[0..7] [6]**	**Open[0..7] [7]**
Transformers	A1	B1	A2	B2	A3	B3	A4	B4
Solenoid Valve No.	1		2		3		4	

Note: Open load is abbreviated as Open in the table, below.

Diagnostic function	**Open load[8..15]**							
Channel address	**Open [8..15] [0]**	**Open [8..15] [1]**	**Open [8..15] [2]**	**Open [8..15] [3]**	**Open [8..15] [4]**	**Open [8..15] [5]**	**Open [8..15] [6]**	**Open [8..15] [7]**
Transformers	A5	B5	A6	B6	A7	B7	A8	B8
Solenoid Valve No.	5		6		7		8	
Diagnostic function	**Open load[16..23]**							
Channel address	**Open [16..23] [0]**	**Open [16...23] [1]**	**Open [16...23] [2]**	**Open [16...23] [3]**	**Open [16...23] [4]**	**Open [16...23] [5]**	**Open [16...23] [6]**	**Open [16...23] [7]**
Transformers	A9	B9	A10	B10	A11	B11	A12	B12
Solenoid Valve No.	9		10		11		12	

Diagnostic function	**Open load[24..31]**							
Channel address	**Open [24..31] [0]**	**Open [24..31] [1]**	**Open [24..31] [2]**	**Open [24..31] [3]**	**Open [24..31] [4]**	**Open [24..31] [5]**	**Open [24..31] [6]**	**Open [24..31] [7]**
Transformers	A13	B13	A14	B14	A15	B15	A16	B16
Solenoid Valve No.	13		14		15		16	

Diagnostic function	**Open load [32..39]**							
Channel address	**Open [32..39] [0]**	**Open [32..39] [1]**	**Open [32..39] [2]**	**Open [32..39] [3]**	**Open [32..39] [4]**	**Open [32..39] [5]**	**Open [32..39] [6]**	**Open [32..39] [7]**
Transformers	A17	B17	A18	B18	A19	B19	A20	B20
Solenoid Valve No.	17		18		19		20	

Diagnostic function	**Open load[40..47]**							
Channel address	**Open [40..47] [0]**	**Open [40..47] [1]**	**Open [40..47] [2]**	**Open [40..47] [3]**	**Open [40...47] [4]**	**Open [40...47] [5]**	**Open [40...47] [6]**	**Open [40..47] [7]**
Transformers	A21	B21	A22	B22	A23	B23	A24	B24
Solenoid Valve No.	21		22		23		24	

7.3 IP settings and modifications

7.3.1 Setting the IP address by rotary switch

- **When the IP address is set by the rotary switch in the factory state**

  IP address is 192.168.0.XXX (XXX is the setting value of the rotary switch, range 1~254).

- **When setting the IP address with the rotary switch in a state where the IP address has already been set by the host computer**

  The IP address follows the high 3byte and the low 1byte of the IP address set via the host computer as the setting value of the rotary switch.

  For example, when changing the setting of the rotary switch after setting it to 172.10.0.12 via the upper unit, the IP address is 172.10.0.XXX (XXX is the setting value of the rotary switch (1 to 254).

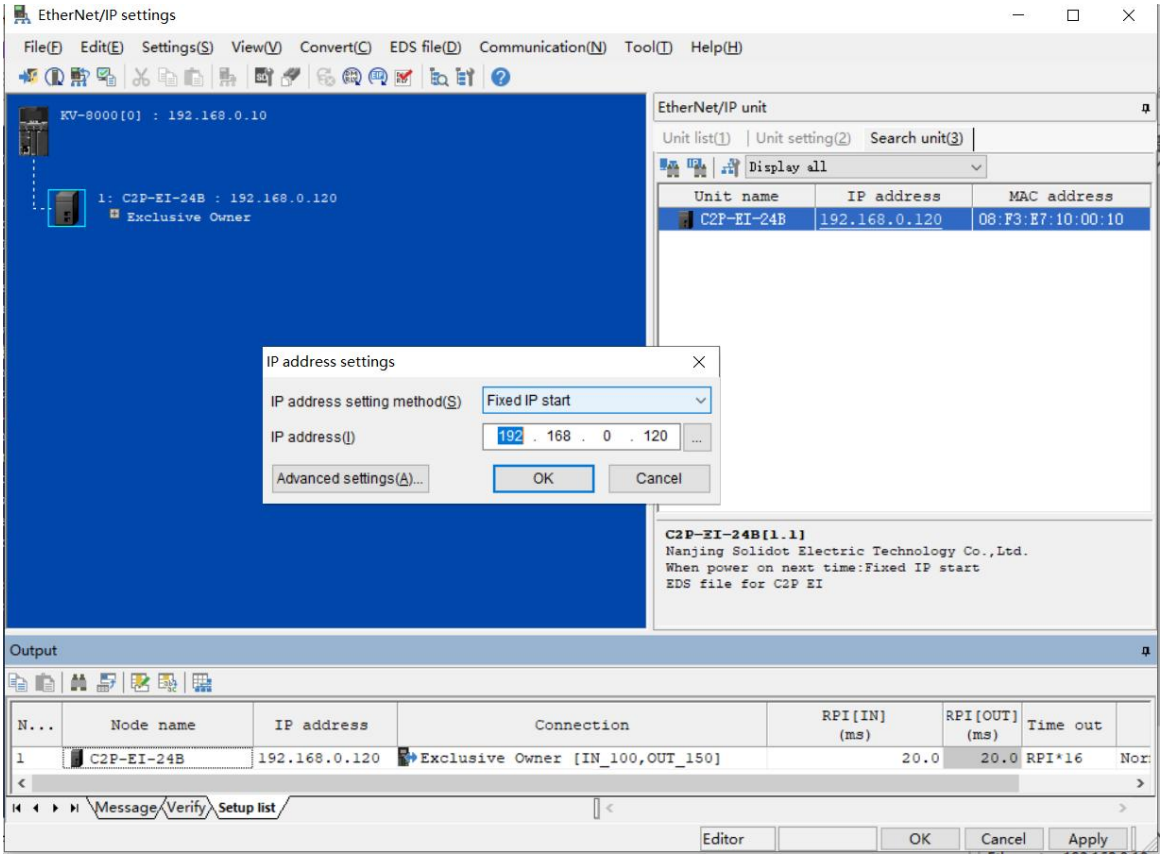
Precautions

- **For the description and operation of the rotary switch, see "4.3 Rotary Switch".**
- **When the module is shipped from the factory, the rotary switch is set to "000" and the IP address defaults to 192.168.0.120.**
- **After the modification by the host computer is completed, the module modifies the startup method to fixed IP startup and reboots automatically. The module starts with the IP address consisting of the rotary switch setting value and the assigned network segment.**
- **Abnormal rotary switch setting: When the rotary switch is set to 255 or 255 or more, the module starts in the same way as the previous startup with parameters after powering up.**

7.3.2 Setting the IP address via the host computer software

This section describes how to change the IP address, using the Keyence KV-7500 and the host computer KV STUDIO Ver.10G as an example.

a. After finding the device, click the IP address on the corresponding device to modify the IP address, and select "Fixed IP Start" as the IP address setting method. Click the "OK" button after the modification is completed, as shown in the figure below.



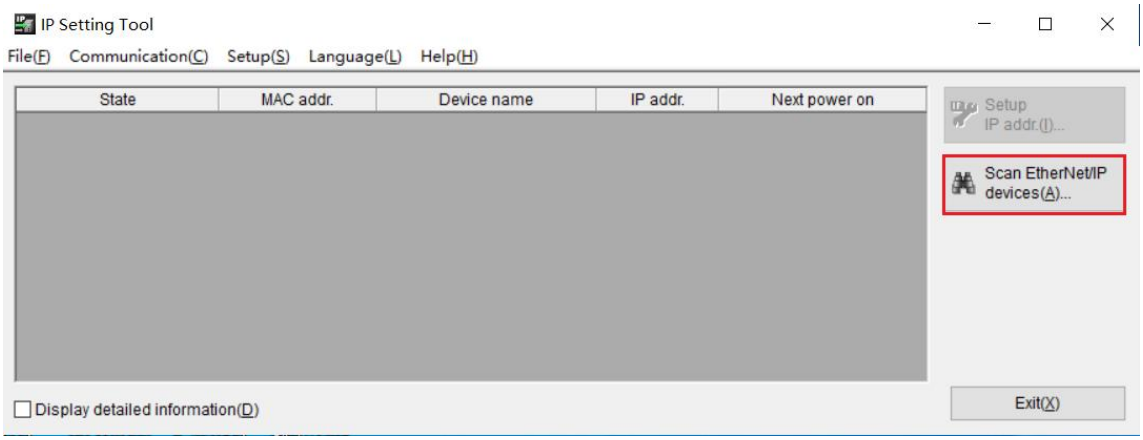
Precautions

- **If you use BOOTP to modify the IP address, you need to set the timeout between the request acceptance time during scanning and the timeout time when the IP address is set to 60s or more, and you need to set the module to start with a fixed IP after the modification is completed, otherwise the assigned IP address will be lost after the power is turned off.**

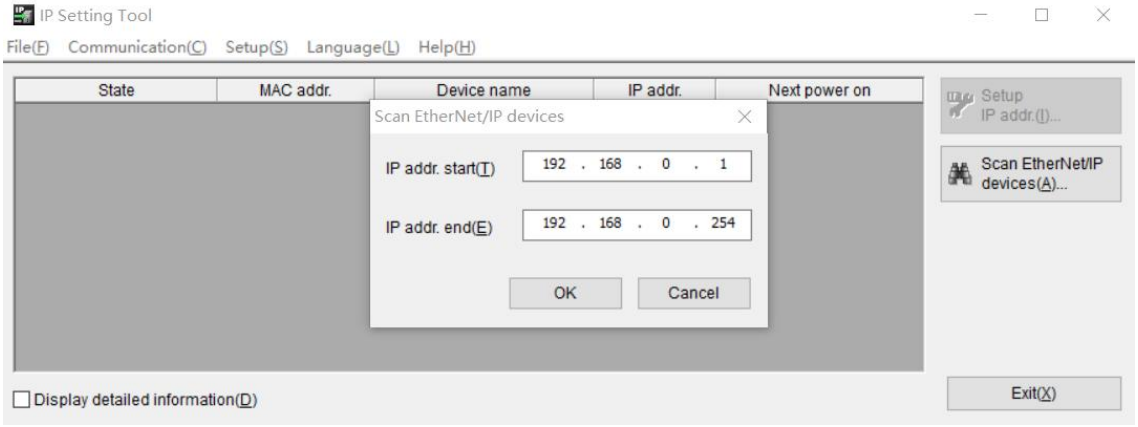
7.3.3 Setting an IP address with the IP Setting Tool

After the device is powered on, wait for 15s and the device will complete the network service startup. After that, the first scan will be performed by the IP Setting Tool tool to set the IP address.

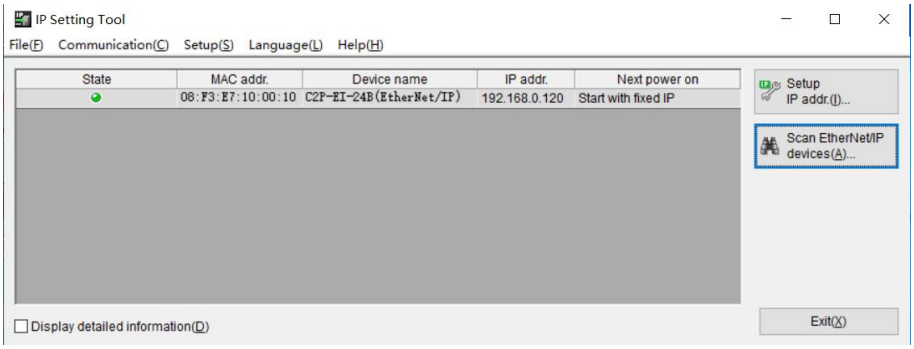
1. Open the IP Setting Tool and click the "Scan EtherNet/IP Devices" button.



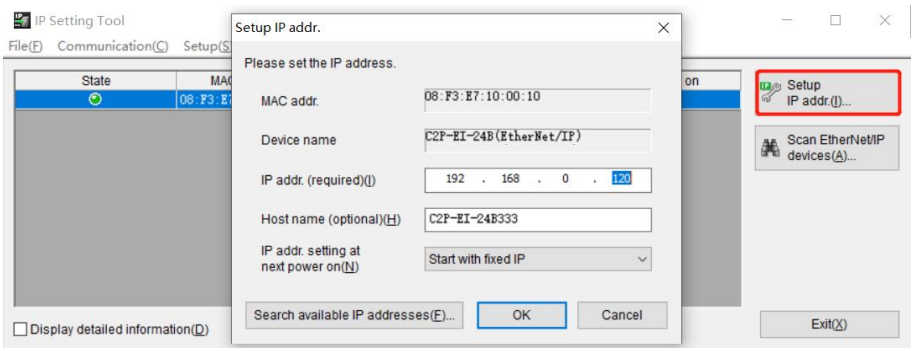
2. Set the IP segment and click "OK".



The scanned devices, as shown in the following figure.



3. Double-click the device and set the IP address in the pop-up "Setup IP addr." window, as shown below.



7.4 Restore Factory Settings

If the IP address is forgotten, lost or other abnormalities occur during use, the module can be reset by the IP address reset function to the module. The module can execute the operation of restoring factory settings through the special operation of the rotary switch as follows:

- Scenario 1 The device has been powered on to perform a factory reset while in use

1) Set the rotary switch to 999 and wait for 2s, at this time the ERR indicator lights up and the module automatically performs the restoration of factory settings;

2) After the module is restored to factory settings, the IP address parameter is cleared and the startup mode is BOOTP;

3) ① Set the rotary switch to 000, 255 or 255 or more (except 999), and the IP address will be restored to the factory address, i.e. 192.168.0.120, after re-powering up.

② Set the rotary switch to 001~254, and after re-powering up, the IP address is 192.168.0.XXX (XXX is the setting value of the rotary switch, range 1~254).

- Scenario 2 The device performs a factory reset in the event of a power failure

1) Set the rotary switch to 999 and power up the module, the module will automatically perform the restoration of factory settings;

2) After the module is restored to factory settings, the IP address parameter is cleared and the startup mode is BOOTP;

3) ① Set the rotary switch to 000, 255 or 255 or more (except 999), and the IP address will be restored to the factory address i.e. 192.168.0.120 after re-powering up.

② Set the rotary switch to 001~254, and after re-powering up, the IP address is 192.168.0.XXX (XXX is the setting value of the rotary switch, range 1~254).

7.5 Parameter description

7.5.1 Output signal clear/hold function

The Clear/Hold function is for the output signal of the valve terminal, and this function can configure the output action of the valve terminal in the abnormal state of the bus.
Clear Output: When communication is disconnected, the valve terminal output channel automatically clears the output.
Hold Output: The valve terminal output channel keeps on outputting when communication is disconnected.
The function supports full-channel setting, single-channel setting and 8-channel batch setting grouped by driver chip, which can better meet the actual use requirements.

This manual takes KV STUDIO Ver.10G as an example to introduce the parameter configuration method, the specific steps are detailed in 7.6.1 Parameter Setting.

7.6 Configuration Applications

7.6.1 Application in KV STUDIO software environment

1、Preliminary

- **Hardware environment**
  - **Valve terminal Model C2P-EI-24B**
  - **A computer with KV STUDIO Ver.10G software pre-installed**
  - **Shielded cable for valve terminal**
  - **One Keyence PLC, KV-7500 is used as an example for this description.**
  - **One switching power supply**
  - **Device Configuration Files**

    Configuration file access: https://www.solidotech.com/documents/configfile

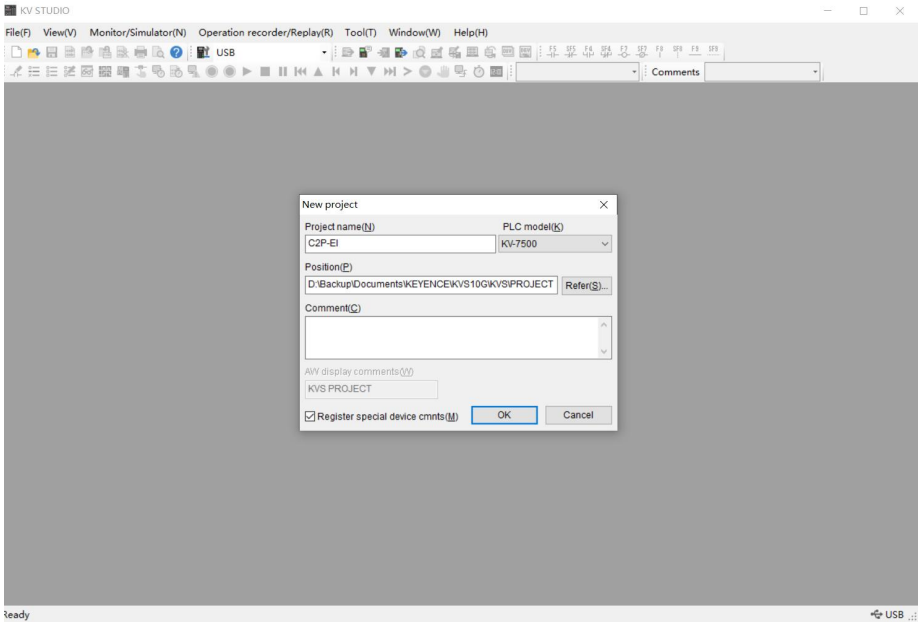
    Note: valve terminal configuration files with a high number of solenoid positions are compatible for valve Terminal with a lower number of solenoid positions, e.g., a C2P-EI-20B valve terminal can use a C2P-EI-24B configuration file, and so on.
- **Hardware configuration and wiring**

  Please follow "5 Installation" and "6 Wiring".

2、Create Project

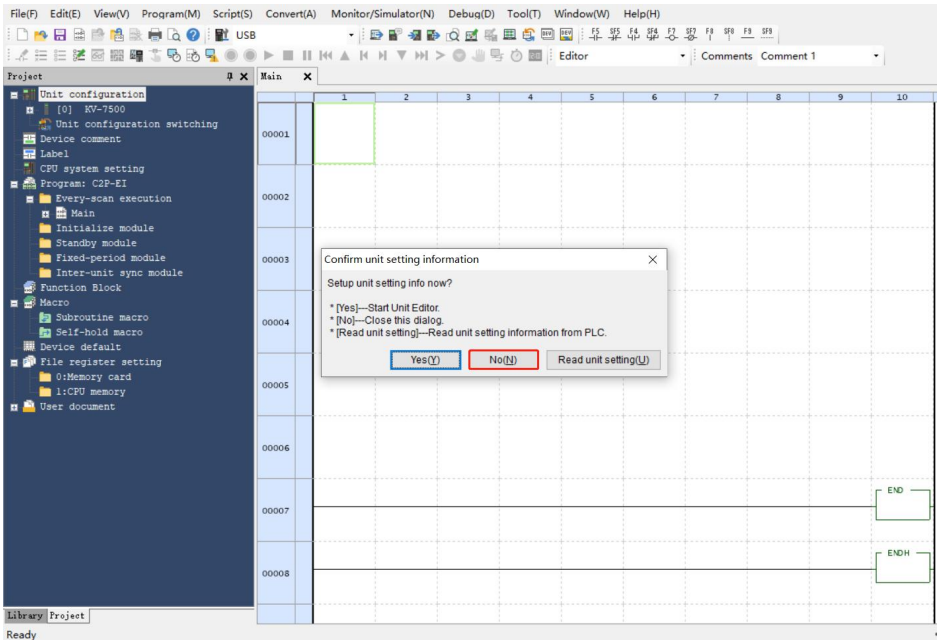
a. Open KV STUDIO software, select "File -> New Project".

b. In the pop-up box, fill in the "Item Name", select "PLC Models", "Position", as shown in the figure below.



- ◆ Project name: Customize.
- ◆ Supported models: View the PLC appearance and select the corresponding model, e.g. KV-7500.

c. The "Confirm Unit Setting Information" window pops up, and you can select to start the Unit Editor, close the dialog box, or read the unit configuration from the PLC as necessary. Select "No" to demonstrate the operation, as shown in the figure below.

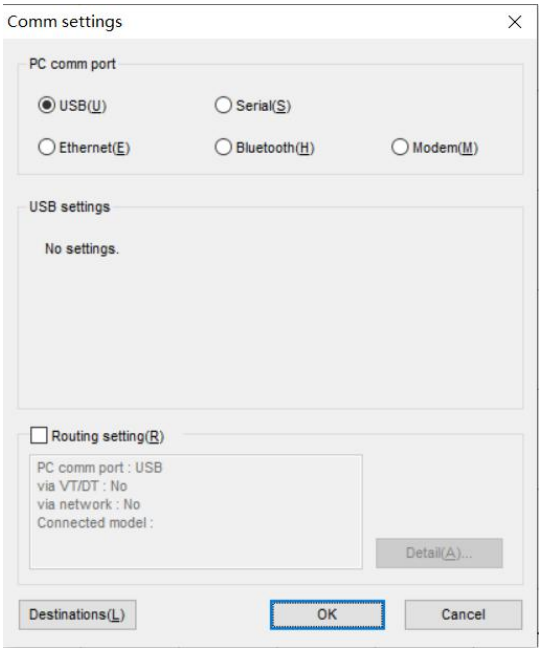


3、Communication settings

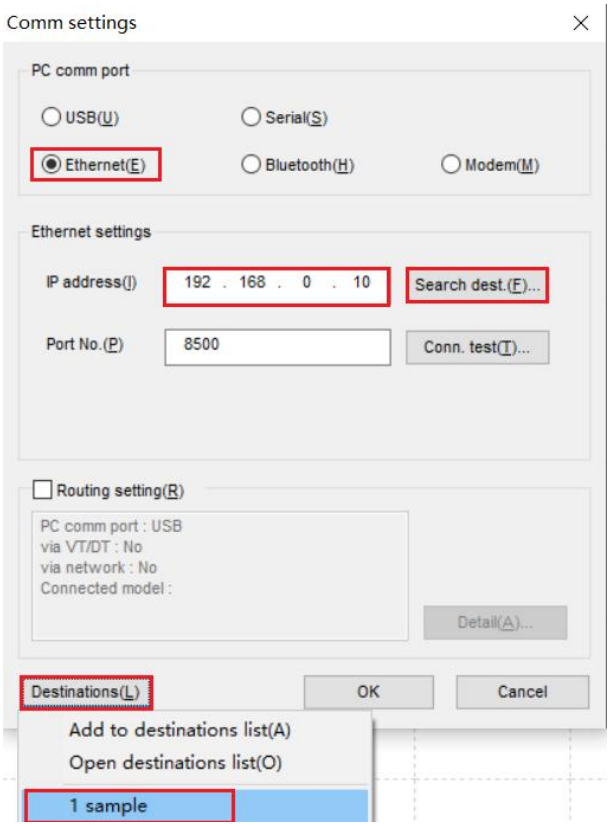
Select the communication method, if the PLC and the host computer software are connected through a network cable, select "Ethernet", if connected through USB, select "USB".

Procedure for "Ethernet" operation

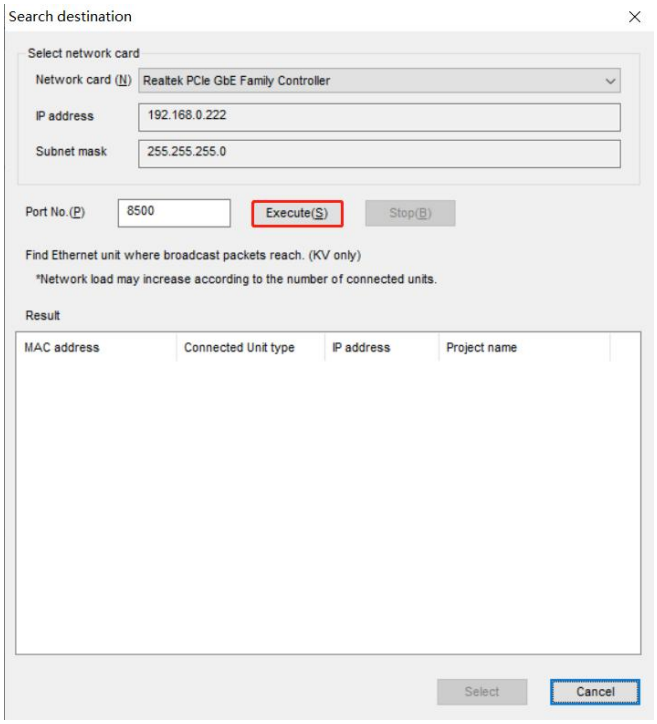
a. Click the button  on the menu bar to display the "Communication settings" window as shown below.



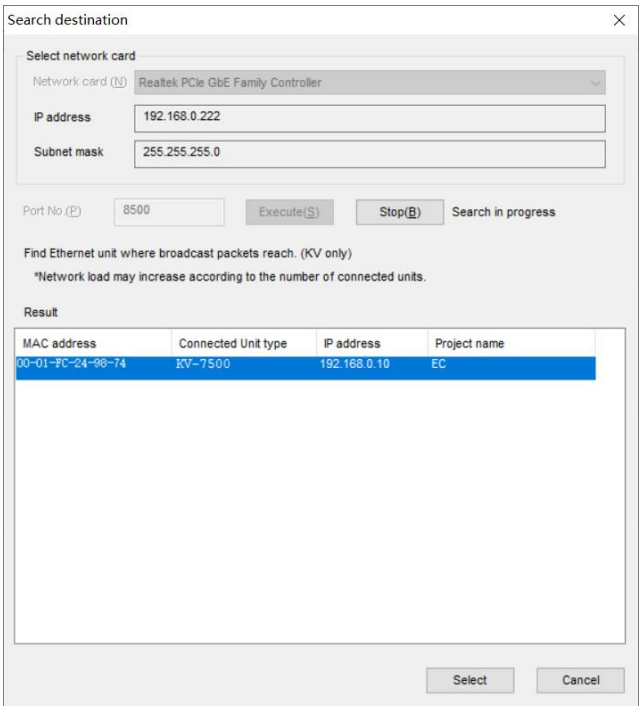
b. Select "Ethernet", click "Destinations", select "1 sample", configure the IP address, and click "Search destination". Click "Search destination", as shown in the following figure, the IP address is configured in the "192.168.0" network segment.



c. In the search destination pop-up window, select the network card and click “Execute”, as shown in the following figure.



d. Select the found PLC and click "Select" as shown in the following figure.



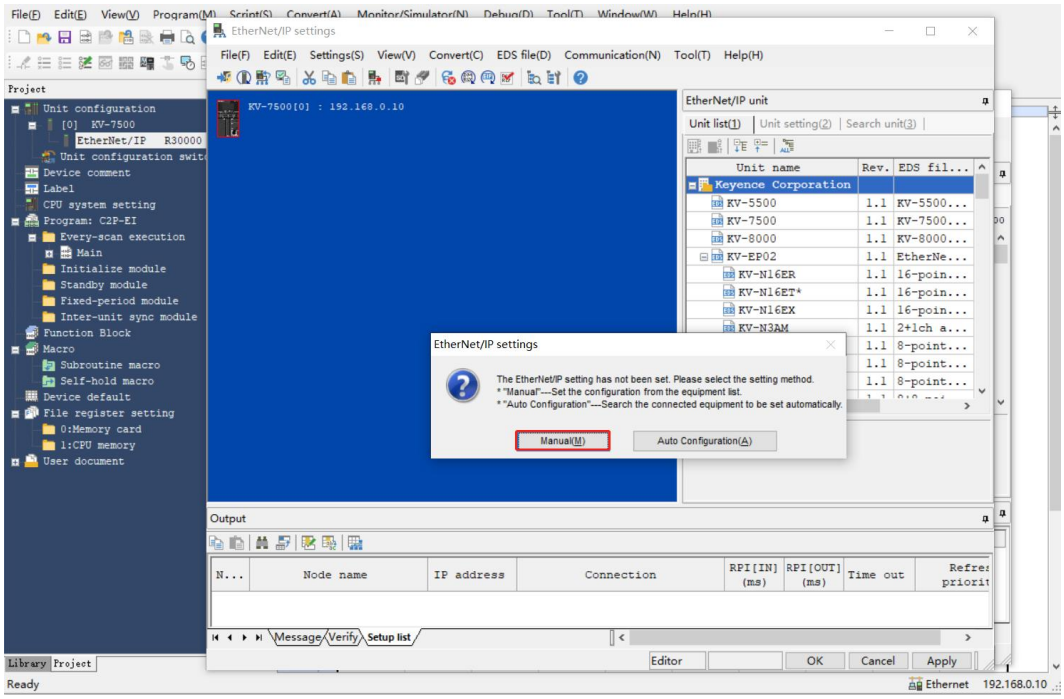
e. Click the "OK" button on the Communication Settings window.

"USB connection" operation method

Select USB in the "Communication Settings" interface .

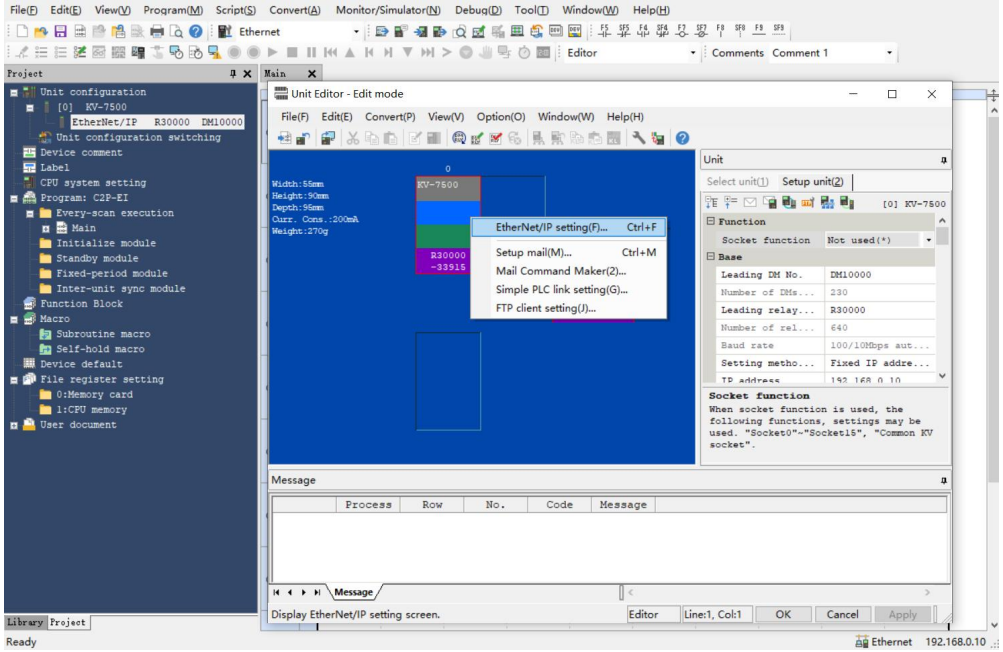
4、EtherNet/IP settings

a. Double click "Unit Configuration -> KV-7500 -> EtherNet/IP R30000 DMI10000" in the left navigation tree to bring up the "EtherNet/IP Settings" window. Select "Manual" or "Auto Configuration" as required. Select "Manual" to demonstrate the operation as shown in the figure below. When the setting is completed, click "OK" to close the window.

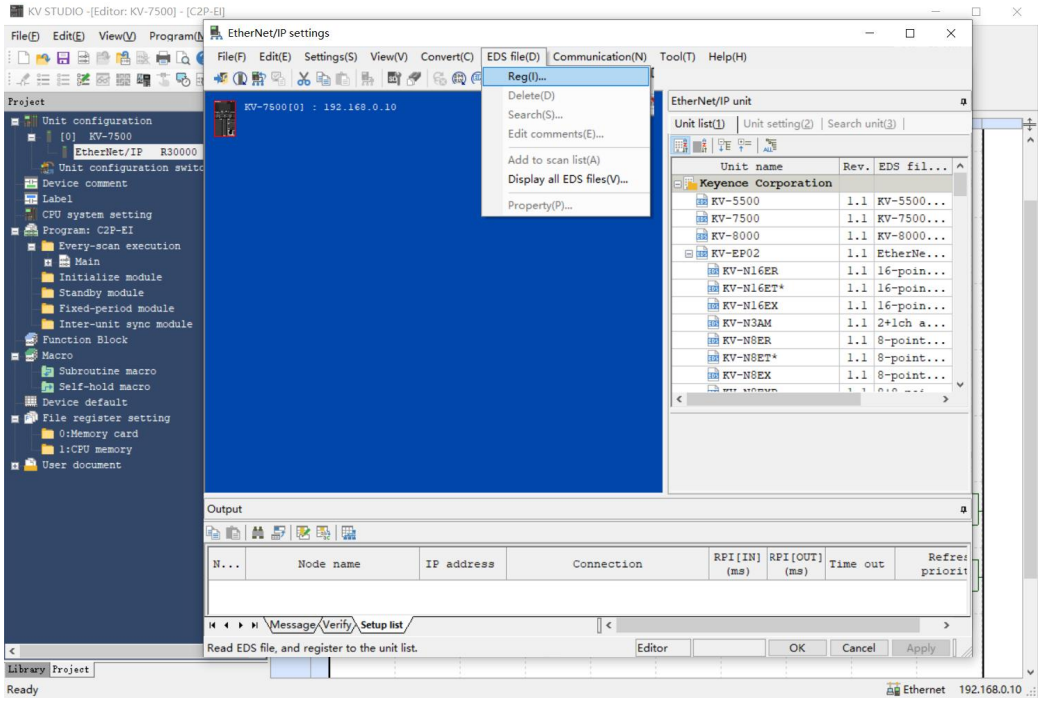


5、Installation of EDS files

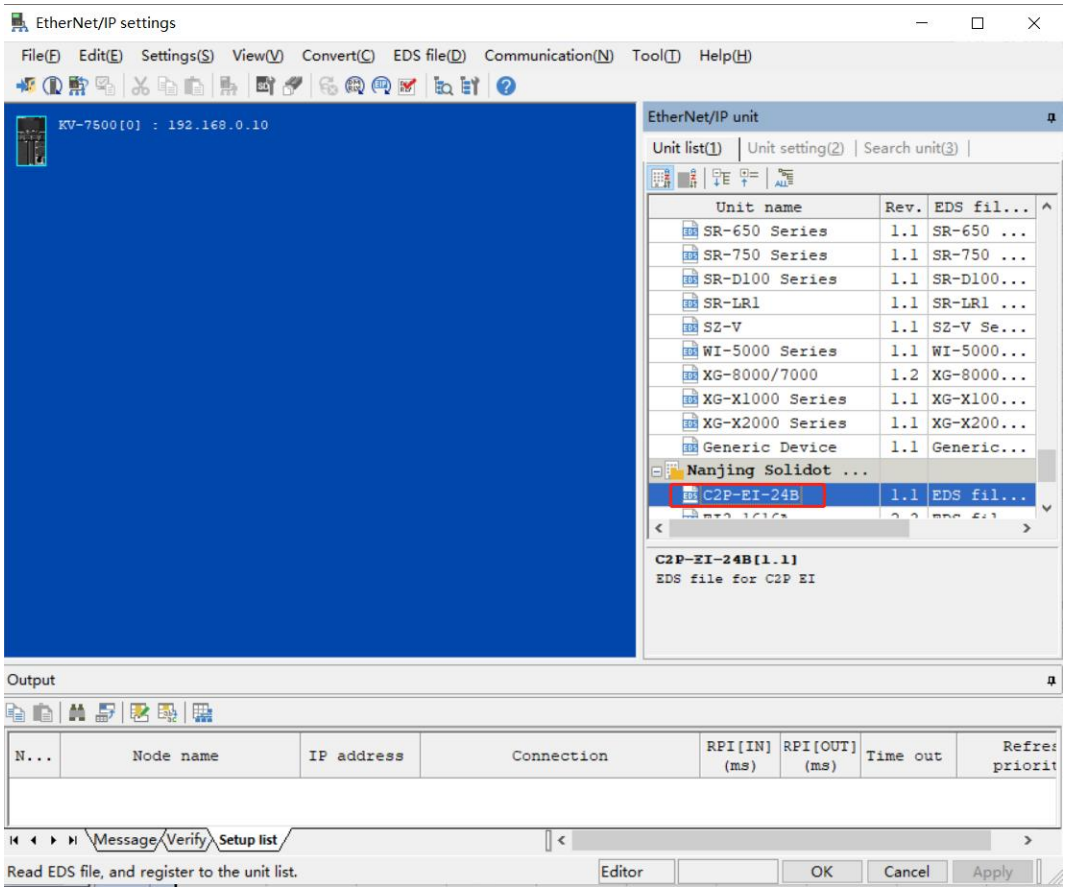
a. Right-click on the KV-7500 in the Unit Editor window and select "EtherNet/IP Settings" to enter the settings page as shown below.



b. Click "EDS File" in the menu bar of the "EtherNet/IP Settings" screen, and then click "Register" as shown in the following figure.



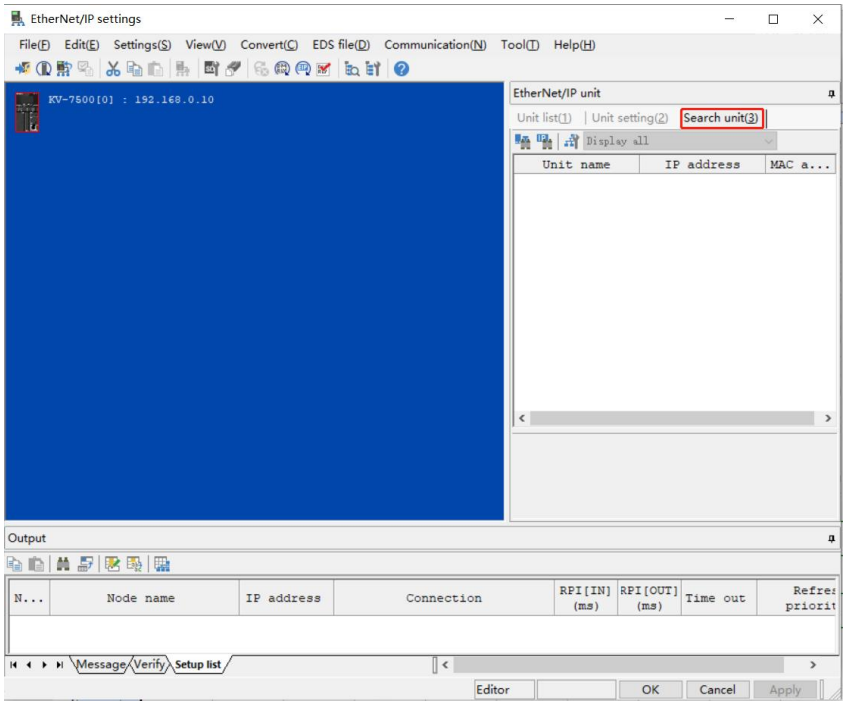
c. In the folder where the EDS file is placed, select the EDS file of the corresponding model and click "OK", the configuration file installation is completed, as shown in the following figure.



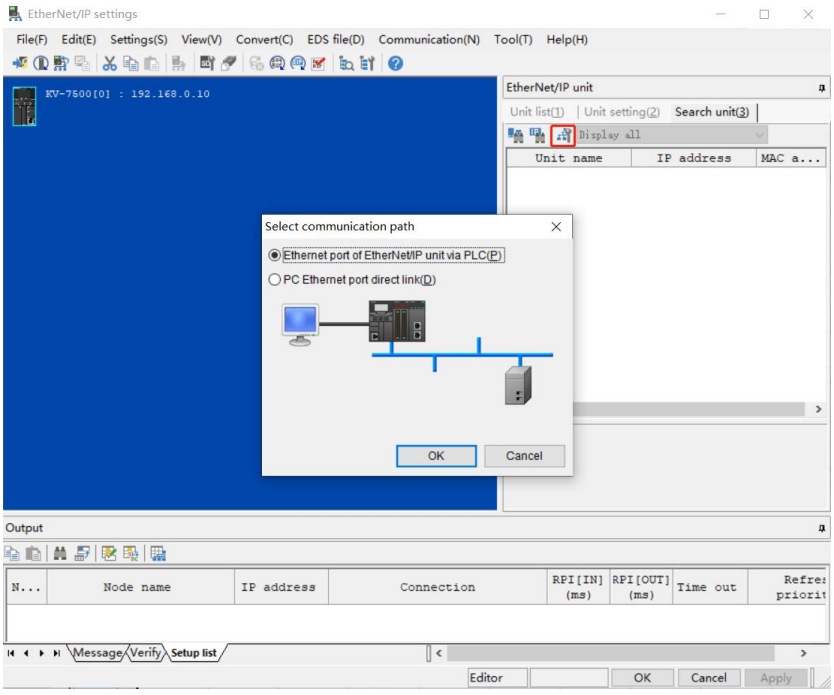
6、Topological configuration

Topology configuration can be "manually added" and "automatic configuration" , this configuration using manual configuration.

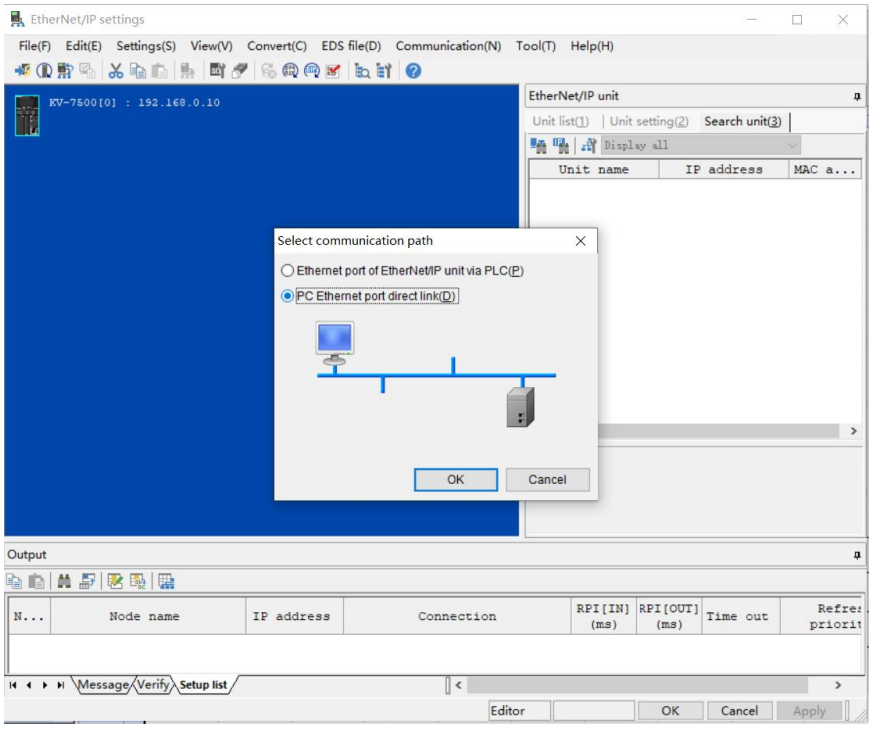
a. Enter the "EtherNet/IP Settings" page and switch to the "Search unit" tab, as shown in the following figure.



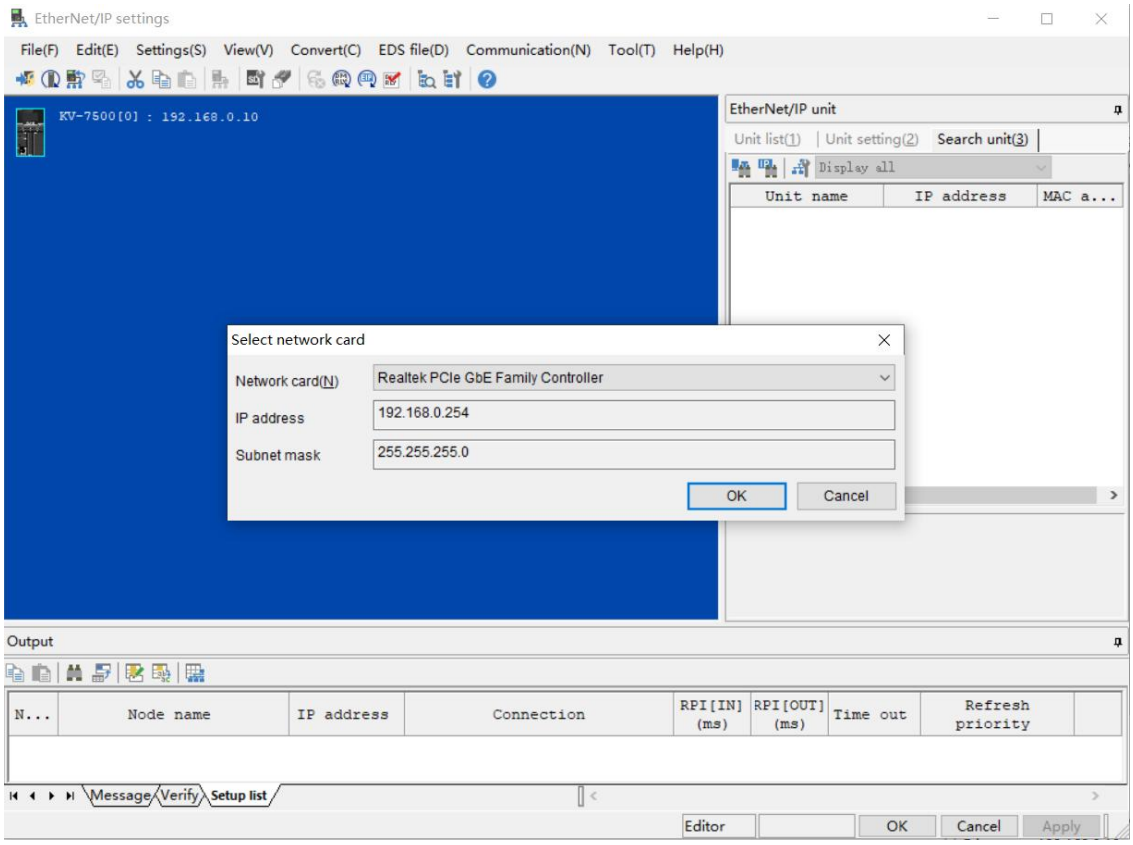
b. Click  , select the communication path, and the USB connection method is shown in the following figure.



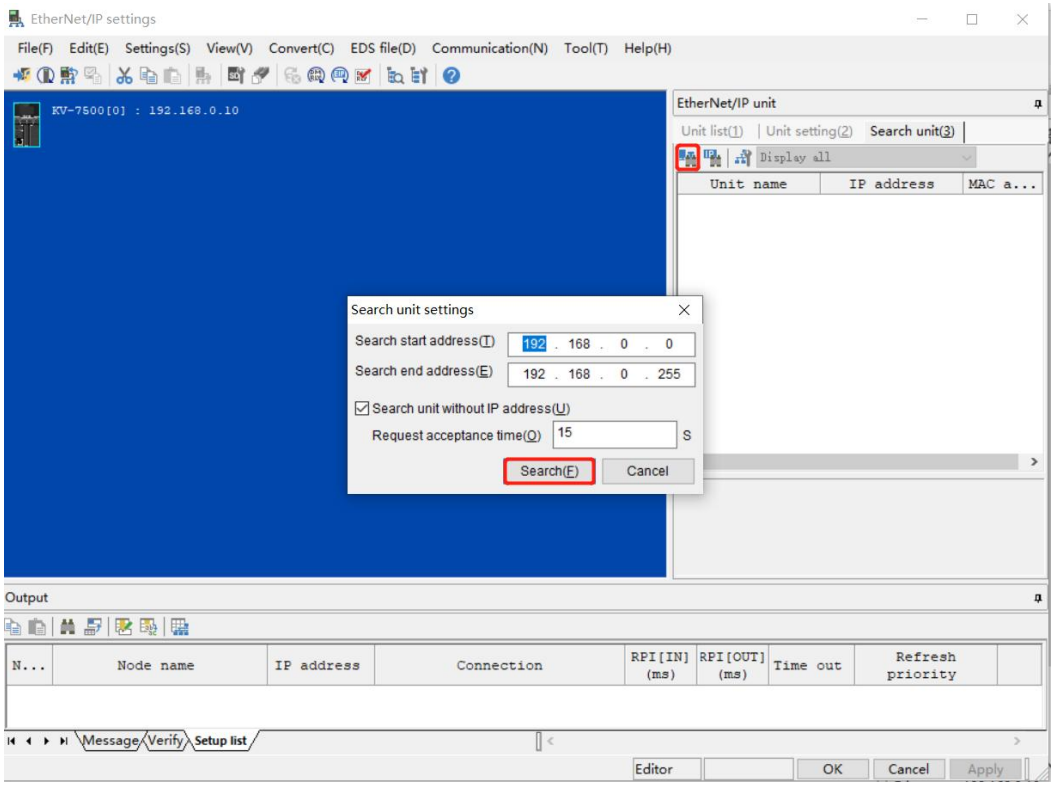
c. "PC Ethernet port direct link" is the network cable connection method, as shown in the following figure.



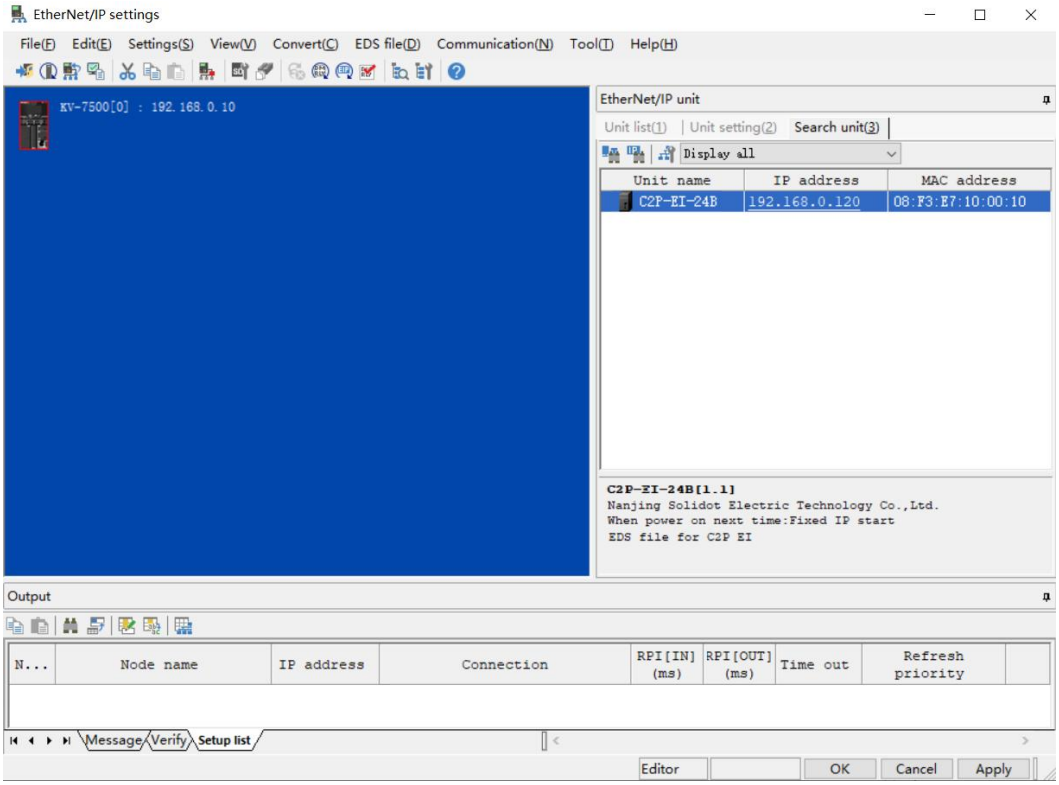
d. Select "PC Ethernet port direct link" to bring up the "Select network card" window, and set the local network card and IP address, as shown in the following figure.



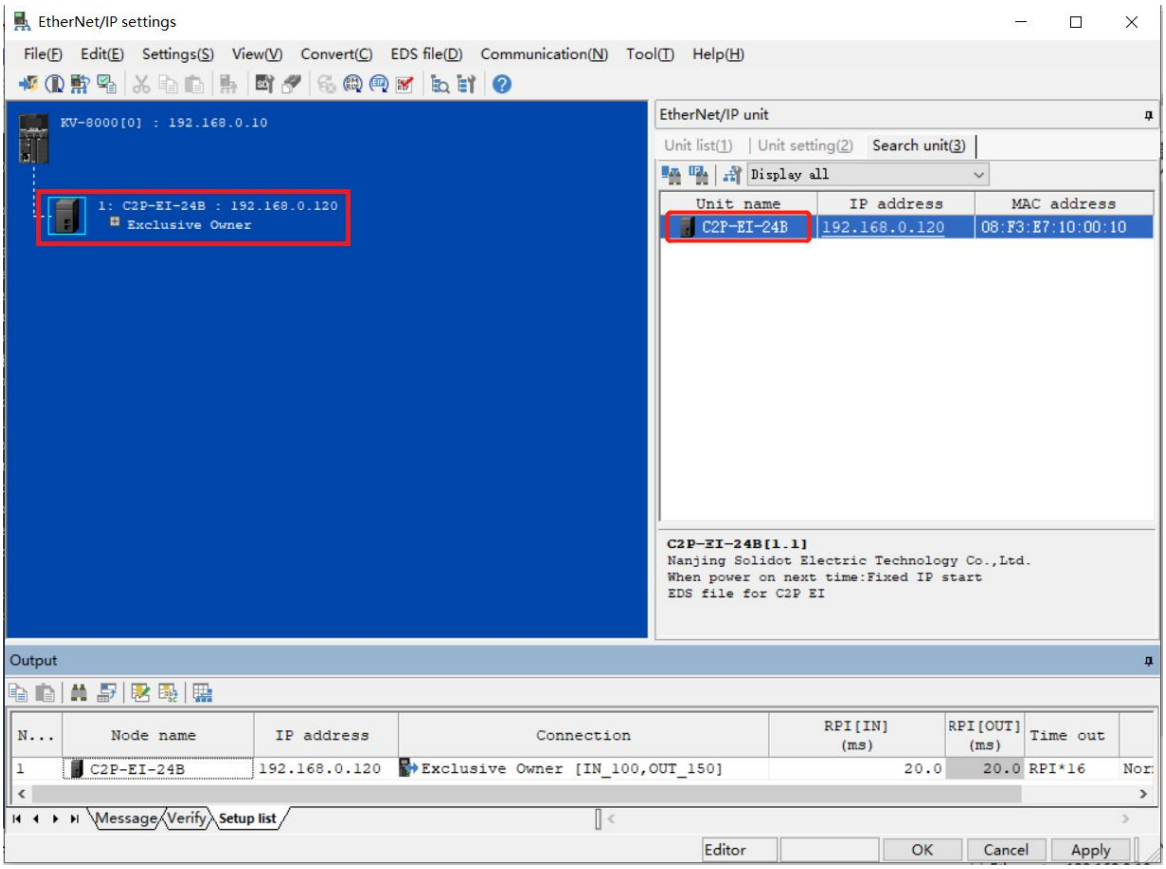
e. Click  to search for devices connected to the network. Set the IP address segment for searching, and click "Search" as shown in the following figure.



f. When the search is complete, the display is shown below.



g. Double-click on the found device to add it to the configuration, as shown below.



7、Setting the IP address

In the interface of the found device, double-click the IP address column and configure the IP address in the pop-up box. The default address network segment is 192.168.0.

Description:

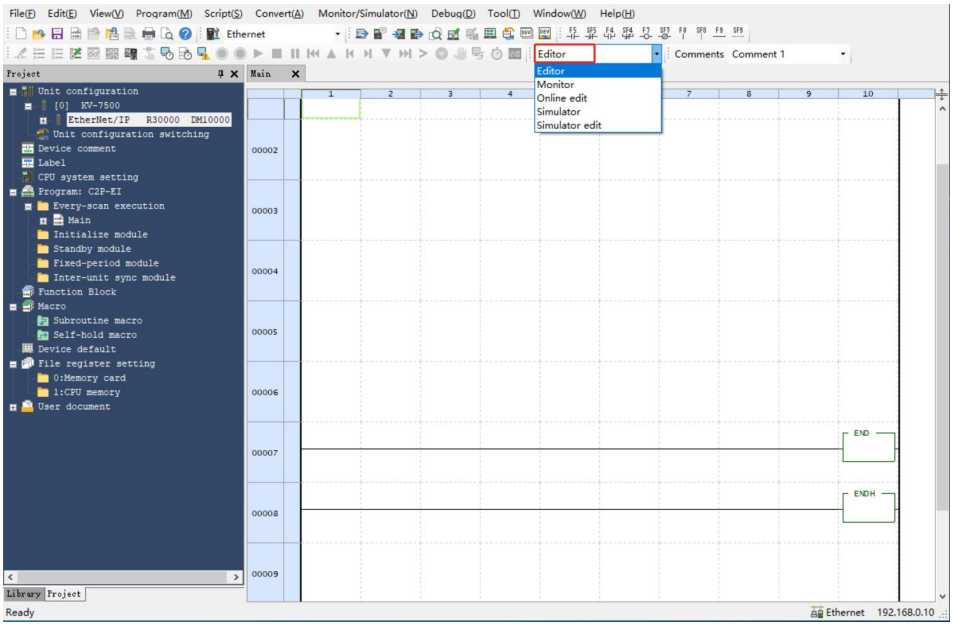
- The timeout for setting the IP address needs to be configured to 60s.

- If the dipswitch has been configured with an IP address, the IP of the dipswitch takes precedence.

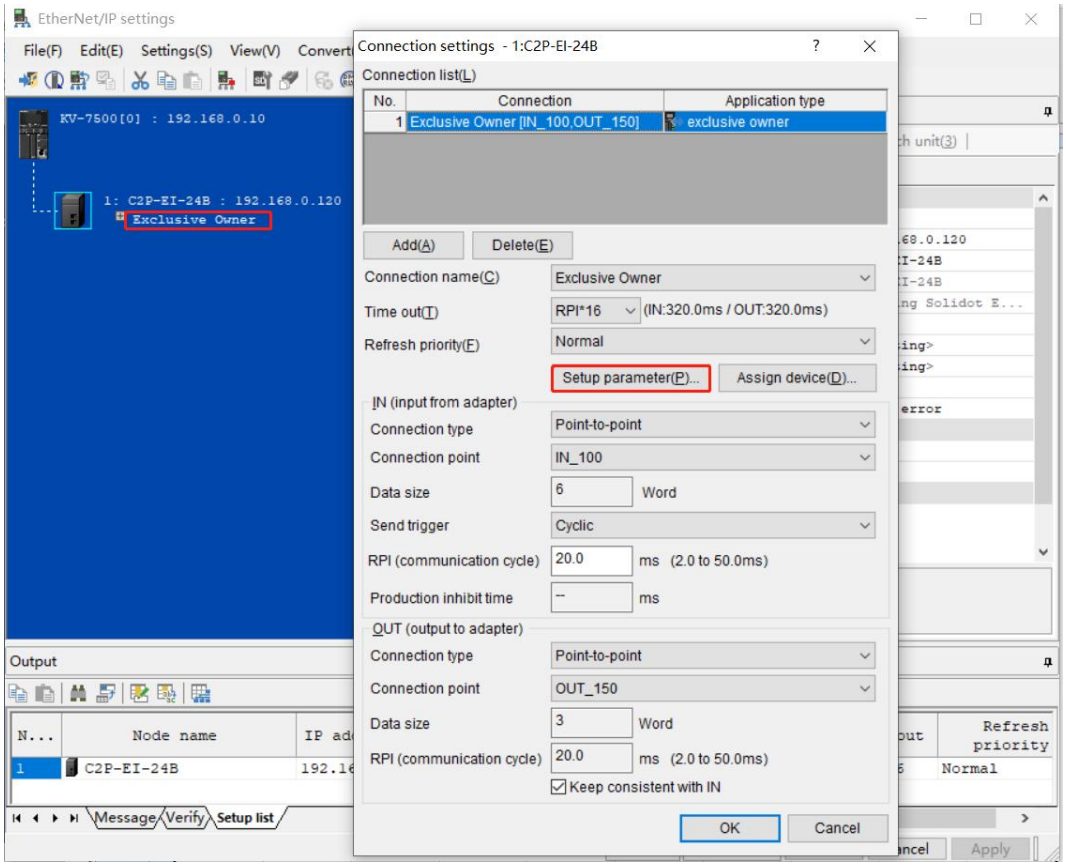
The C2P-EI-24B in this example uses the default IP address of 192.168.0.120.

8、Parameter settings

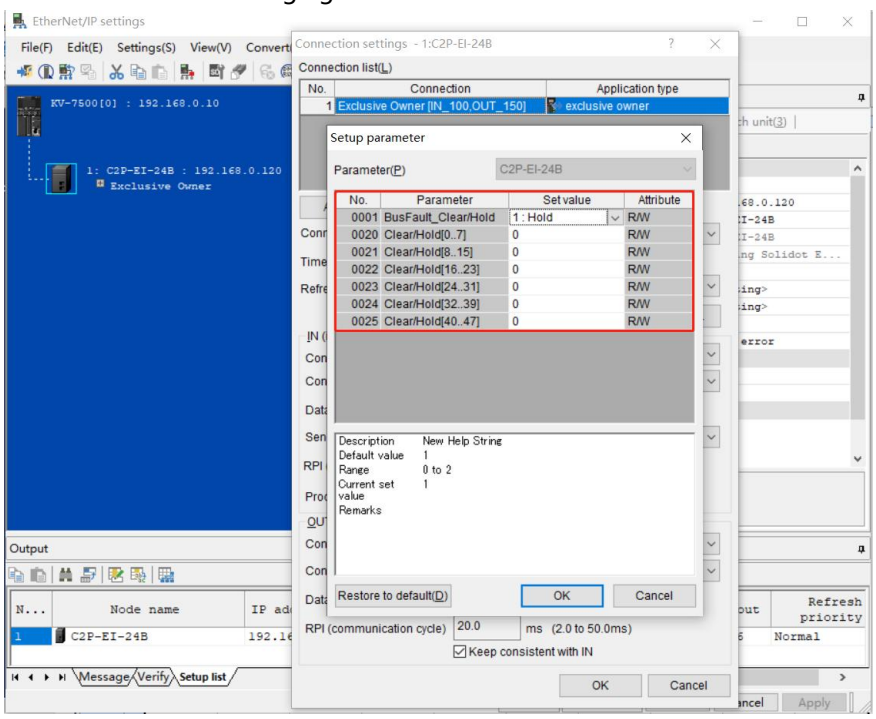
a. Click the Switch Mode option in the menu bar to switch to Editor mode, as shown in the following figure.



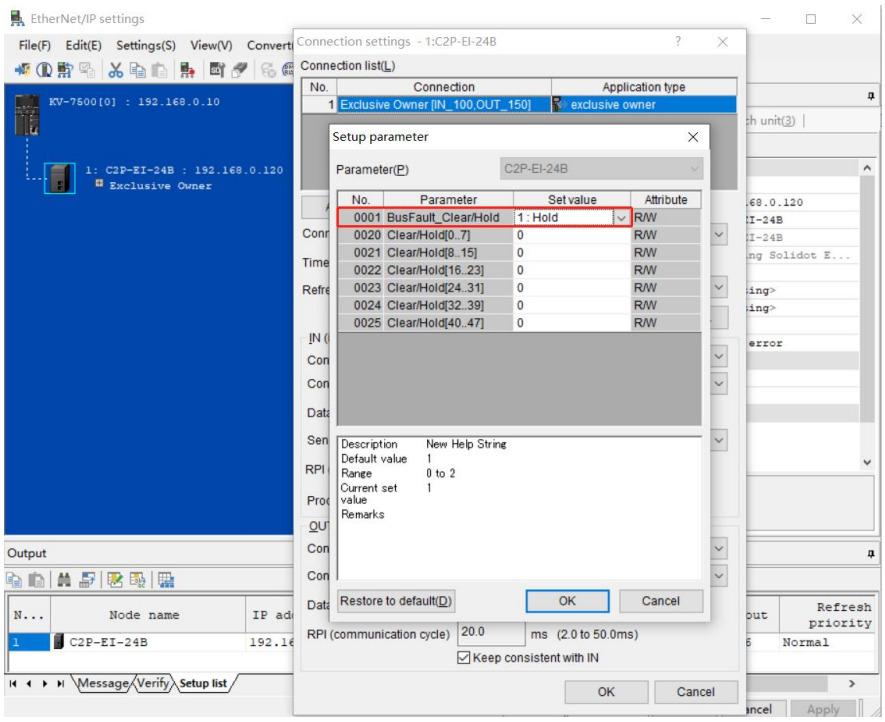
b. Enter the "EtherNet/IP Settings" screen and click "Exclusive Owner" to bring up the "Connection Settings" window. In the "Connection Settings" window, click "Setup Parameter" as shown below.



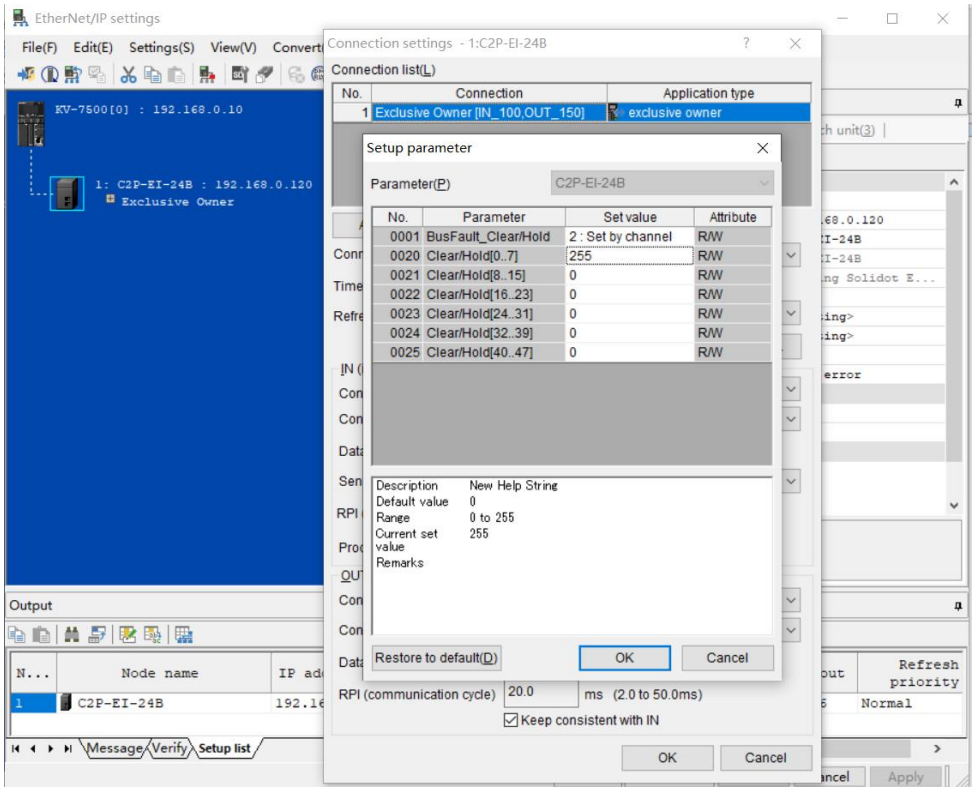
c. In the "Setup Parameter" window, you can configure the parameters of the valve terminal, and the parameters of the valve terminal of C2P-EI series are the output signal clear/hold setting function, as shown in the following figure.



d. Output signal clear/hold parameter function, double click "BusFault Clear/Hold" option behind the set value, write **0** for clear, write **1** for hold; write **2** for single-channel setup or group setup, set the value of **2**, the following 0020~0025 parameters are valid, as shown in the figure below. Click "OK" to save the parameter, click "Apply" in the "EtherNet/IP Settings" window and download it to the controller to make the parameter take effect.



e. Output signal clear/hold parameter function, 0001 "BusFault Clear/Hold" is set to **2**, modify the setting value of the group parameter of 0020~0025 below, and you can set clear/hold by channel, as shown in the following figure. Click "OK" to save the parameter, click "Apply" in the "EtherNet/IP Settings" window and download it to the controller to make the parameter take effect.



f. When the configuration is complete, click the "OK" button in the "Setup Parameter" window.

g. In the "Connection Settings" window, click the "OK" button.

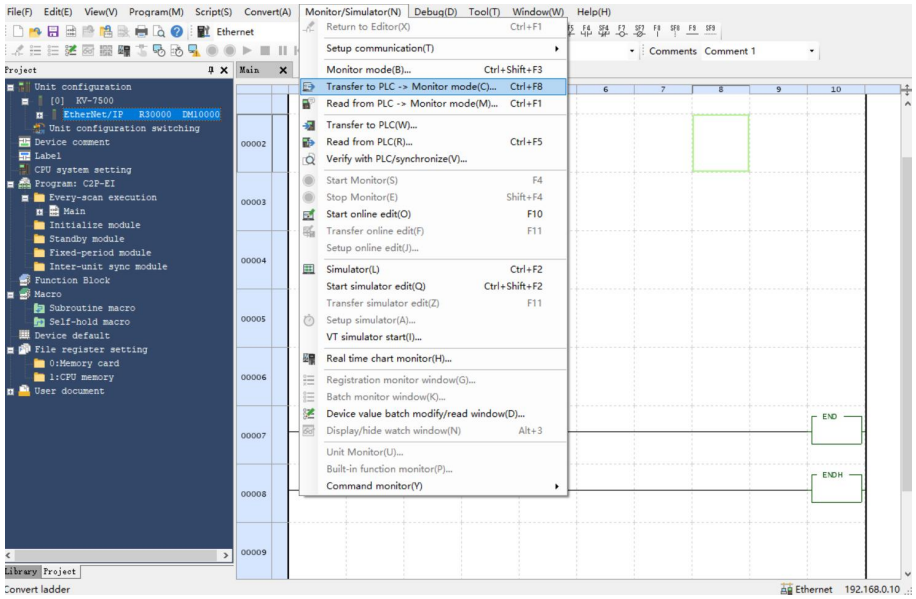
h. In the "EtherNet/IP Settings" window, click the "Apply" button and click the "OK" button.

i. In the "Unit Editor" window, click the "Apply" button and click the "OK" button.

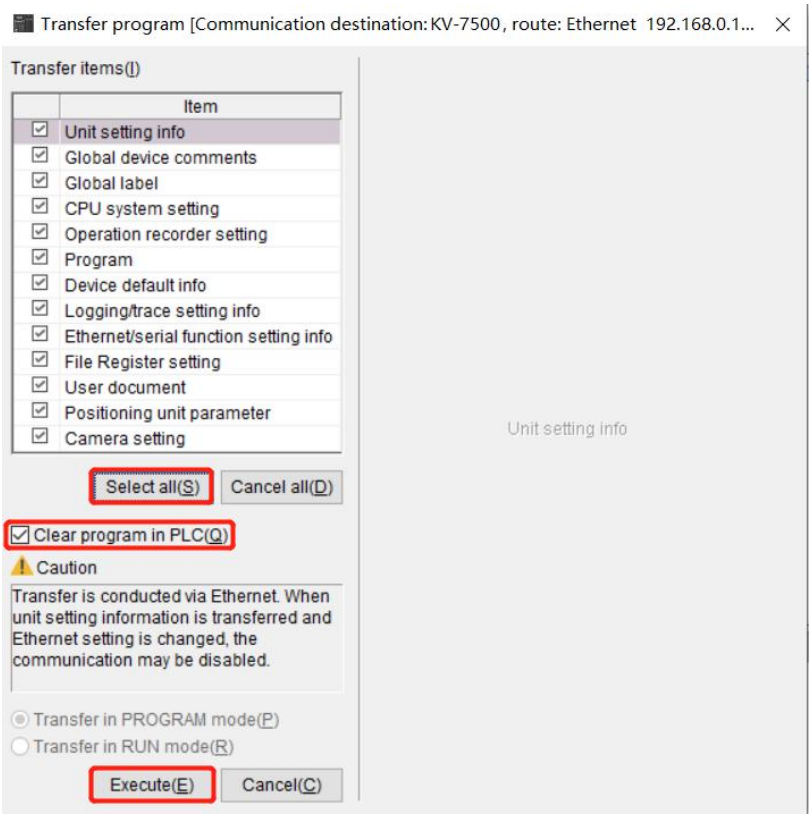
9、Configuration Download

After module configuration and parameter setting are completed, download to PLC operation is performed.

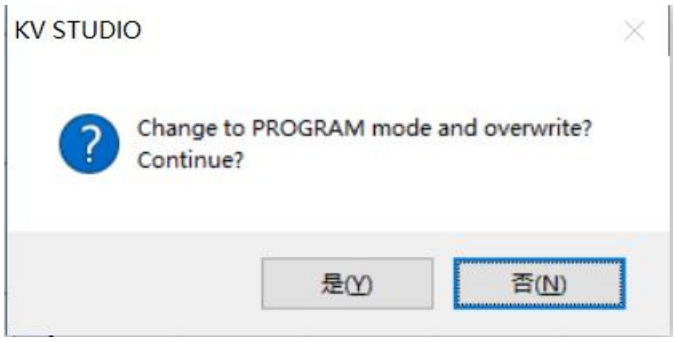
a. Click "Monitor/Simulator (N) -> Transfer to PLC -> Monitor Mode (C)" in the menu bar as shown below.



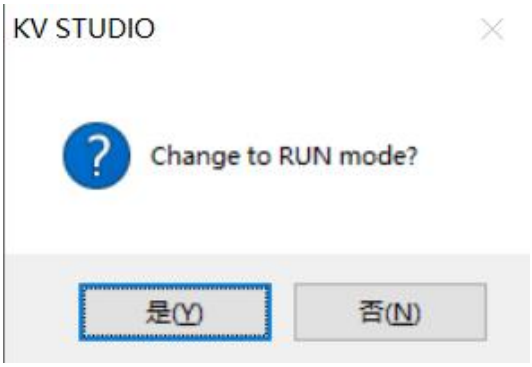
b. The "Transfer Program" window pops up, check "Clear Program in PLC", click "Select All", click "Execute" to download the program to the PLC, as shown in the following figure.



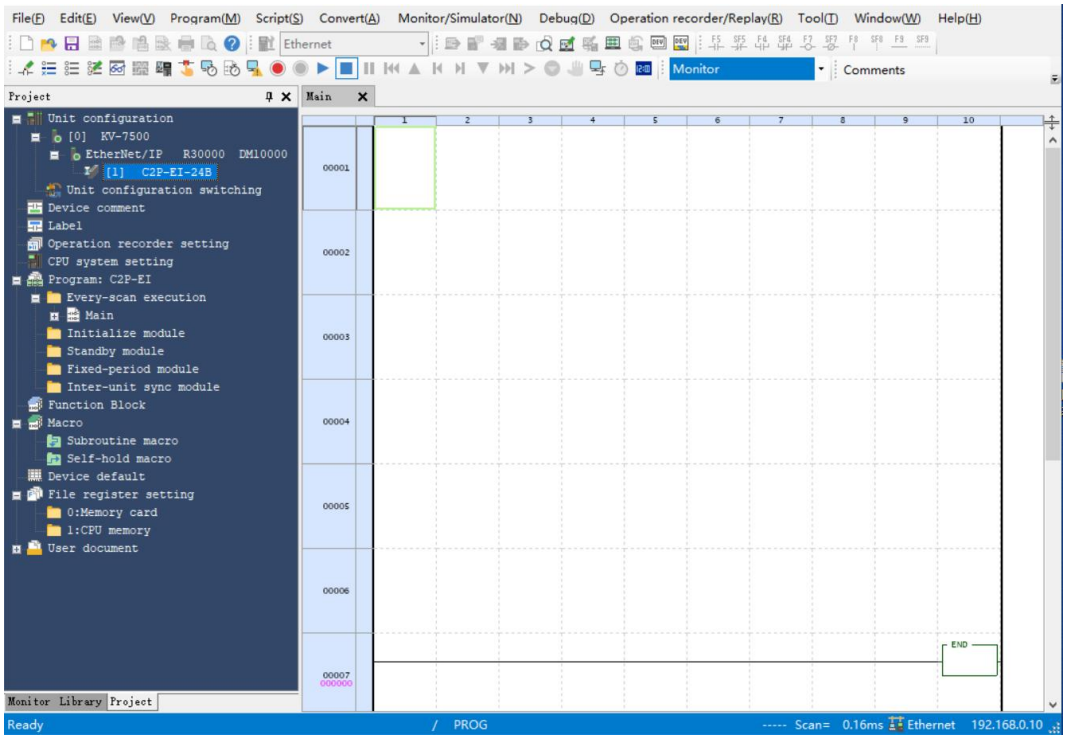
c. A prompt box pops up "Change to PROGRAM mode and overwrite? Continue?", click to select "Yes" as shown below.



d. After writing to the PLC is completed, a pop-up box will appear, "Change to RUN mode", click and select "Yes", as shown in the figure below, to enter the monitoring mode.

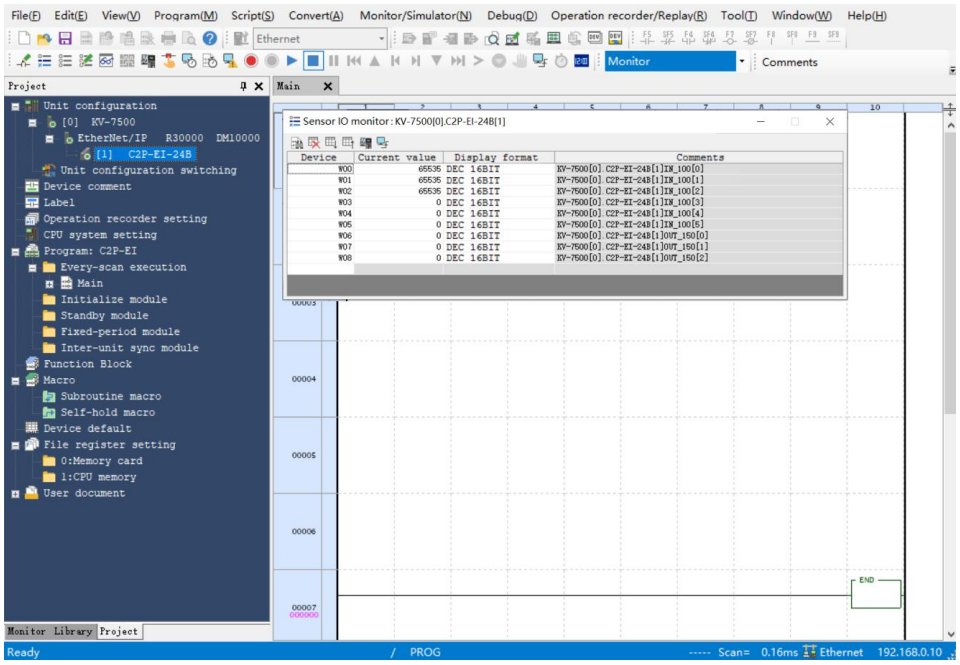


e. After the configuration is downloaded, it is shown in the following figure.



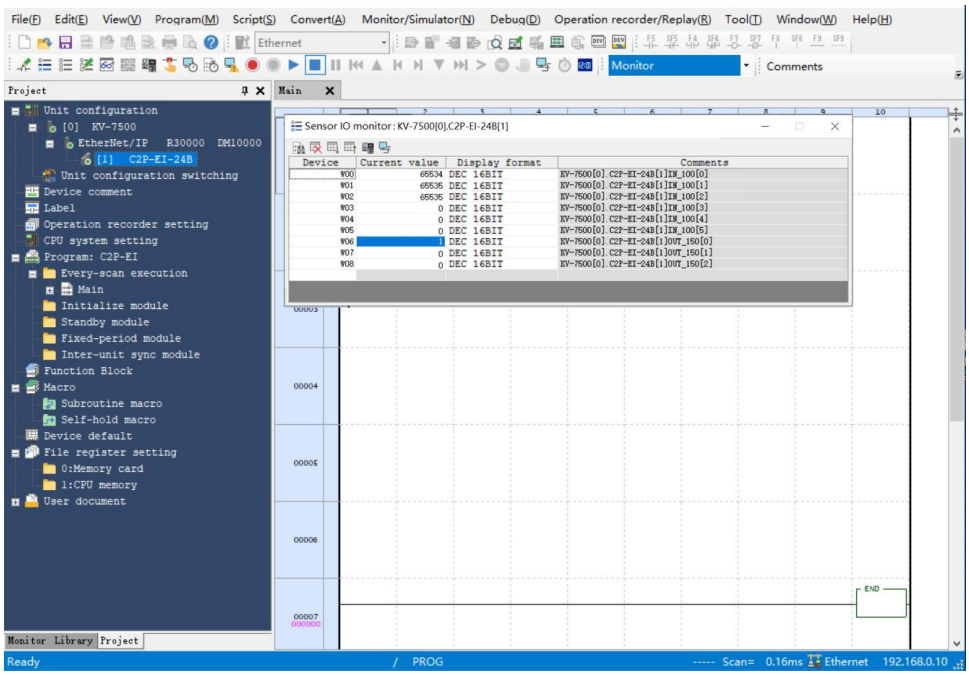
10、 Data monitoring

a. In monitor mode, double click "C2P-EI-24B" icon to open the monitor table, you can monitor the module as shown below.

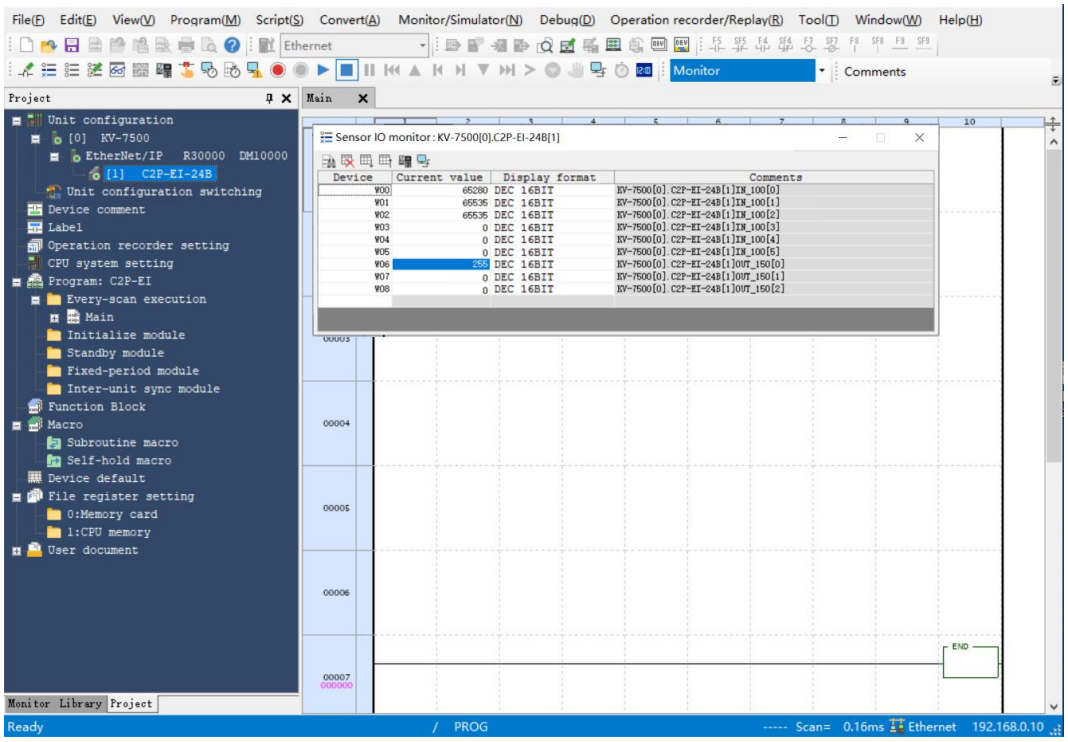


W00~W02 are the monitoring values for the open load function of the valve terminal.
W03~W05 are the monitoring values of valve terminal short circuit or overtemperature function.
W06~W08 for valve terminal output control function

b. To turn on any of the solenoid coil outputs of the valve terminal, take the first channel as an example, you can double-click on the current value of W06 and enter **1** to turn on the first solenoid coil channel, as shown below.



c. If you need to control a group of solenoid valve coil outputs, take the first group of channels as an example, you can double-click the current value of W06 to enter **255** to turn on the first group of solenoid valve coil channels, as shown in the following figure.



7.6.2 Application in CODESYS V3.5 software environment

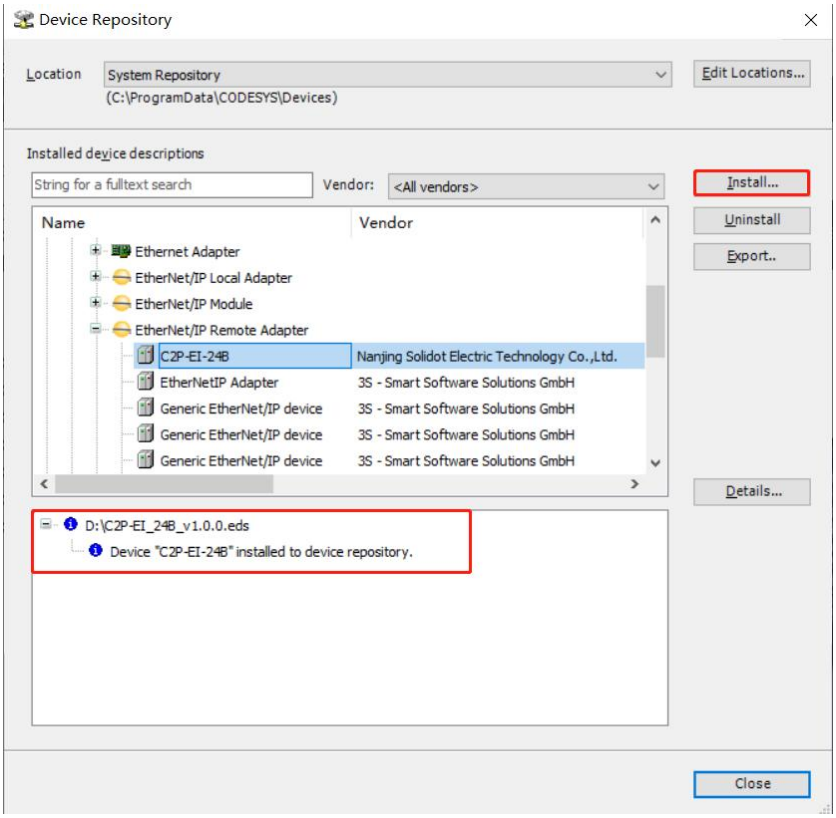
1、Preliminary

- **Hardware environment**
  - **Valve terminal model C2P-EI-24B**
  - **One computer, pre-installed with CODESYS V3.5 software**
  - **Shielded cable for valve terminal**
  - **One switching power supply**
  - **Device configuration files**
    Configuration file access: https://www.solidotech.com/documents/configfile
    Note: valve terminal profiles with a high number of solenoid positions are compatible for use with Valve Terminal with a lower number of solenoid positions, e.g., a C2P-EI-20B valve terminal can use a C2P-EI-24B profile, and so on.
- **Hardware configuration and wiring**
  Please follow "5 Installation" and "6 Wiring".

2、Installation Profiles

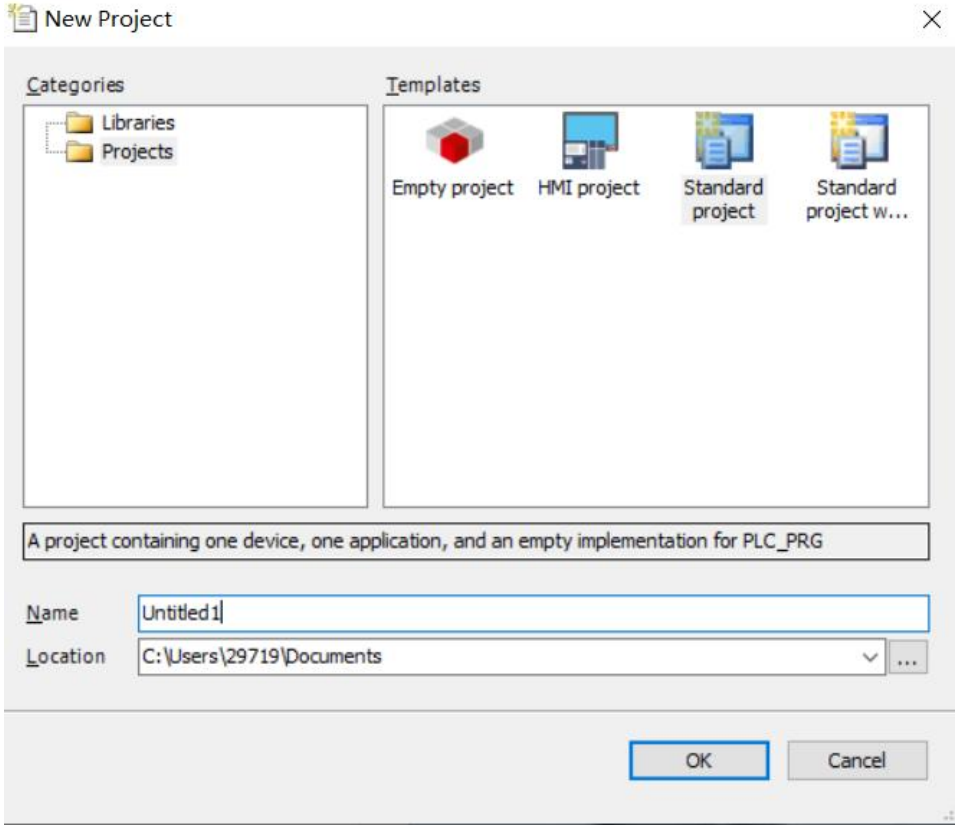
a. Open CODESYS software and select "Tools -> Device Repository" to install the EhterNet/IP EDS device description file.

b. The Device Repository window pops up, click "Install", select the relevant EDS file to install. Successful installation shows that the device "xxxx" has been installed to the device repository, as shown in the following figure.



3、New construction

a. Click "File", select "New Project", enter the project name, click "OK", as shown below.

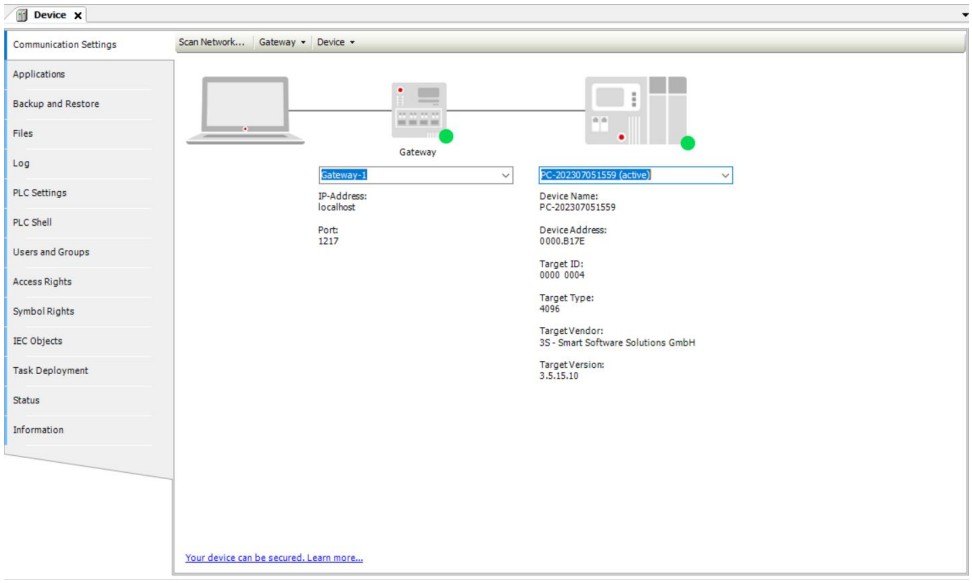


4、Add "Ethernet"

a. Start the PLC with "CODESYS Control Win V3 - x64 SysTray".

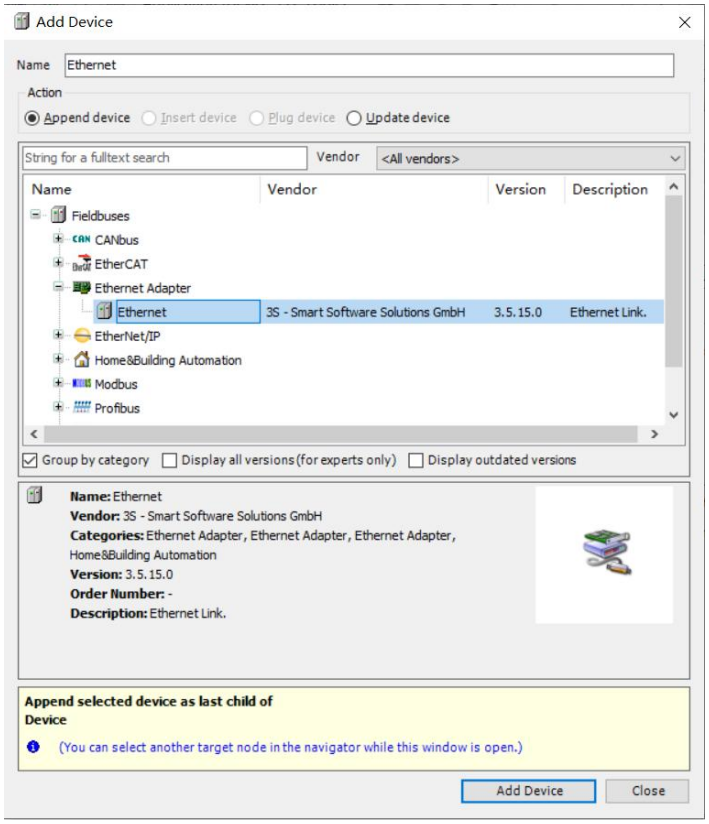
b. Double-click "Device (CODESYS Control Win V3 X64)" in the left navigation tree, and click "Scan Network".

c. Select Devices, Scan Network, and Network is active, as shown in the following figure.



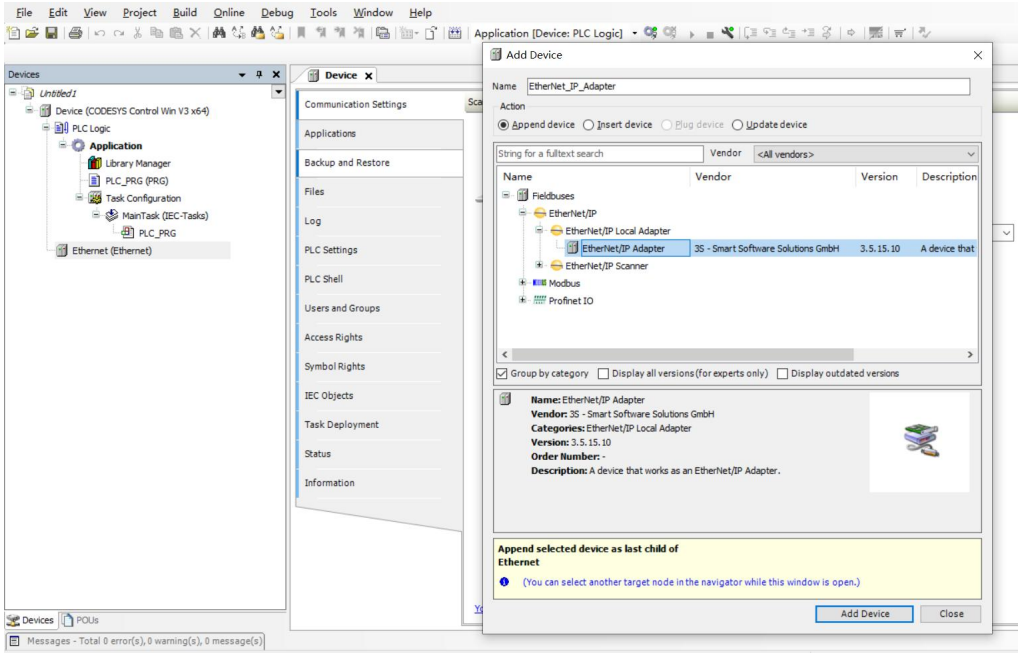
d. Right click on "Device(CODESYS Control Win V3 X64) " in the left navigation tree and select "Add Device".

e. The Add Device window pops up, select "EthernetIP -> Ethernet Adapter -> Ethernet", click "Add Device", as shown in the following figure.



f. Right-click "Ethernet" in the left navigation tree and select "Add Device".

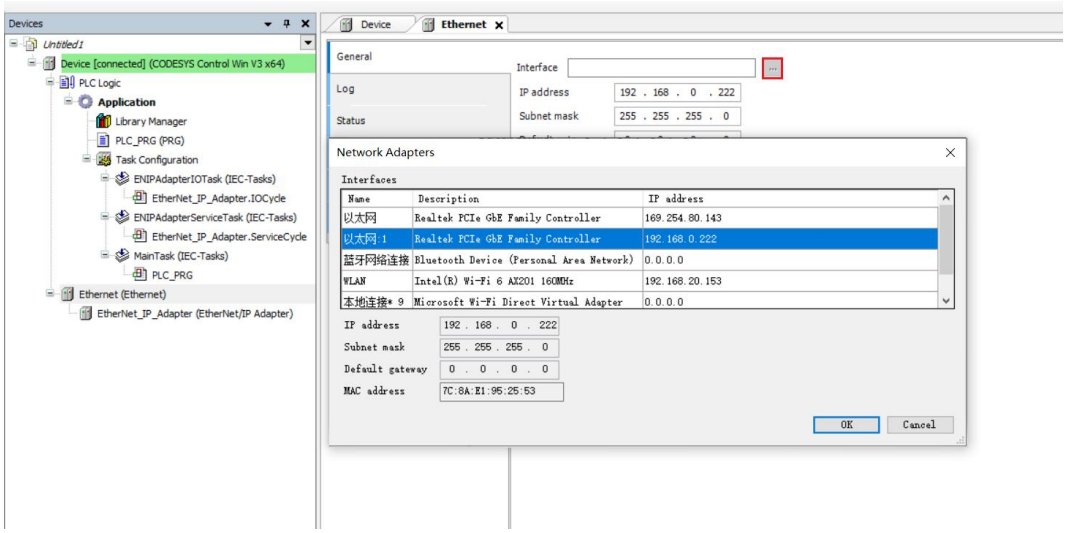
g. Select "EthernetIP -> EthernetIP Scanner -> Ethernet/IP Scanner" and click "Add Device" as shown in the following figure.



5、Configure "EthernetIP"

a. Double-click on "Ethernet" in the left navigation tree to open the configuration window.

b. In the General tab, click ... to the right of Interfaces, select "Network Adapters", and finally click "OK", as shown in the following figure.

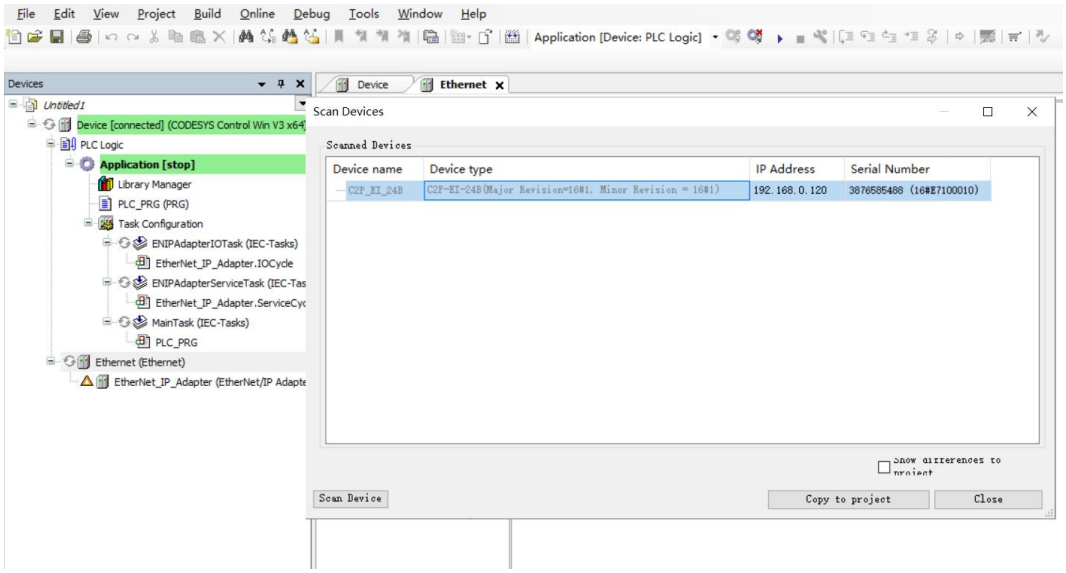


6、Add Device

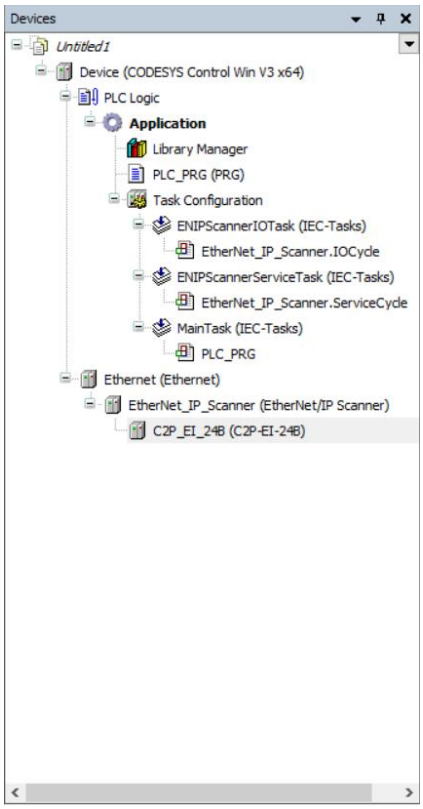
a. Click to log in to the device.

b. Right-click on "EtherNet_IP_Scanner (EtherNet/IP Scanner)" in the left navigation tree and select "Scan Devices".

c. After scanning, select "C2P-EI-24B" and click "Copy to Project" as shown in the following figure.



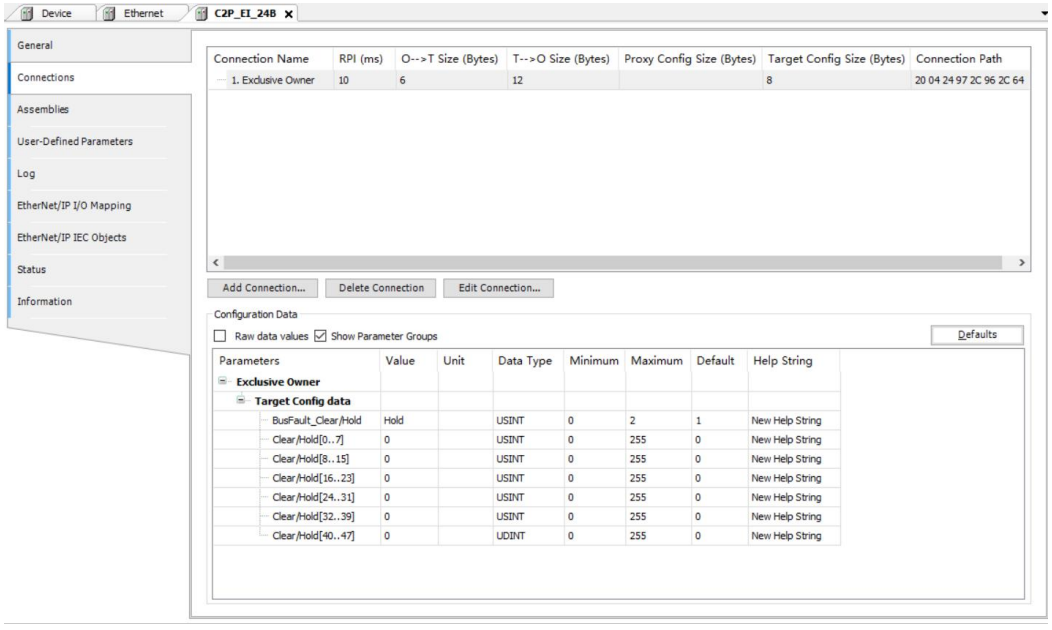
d. The device has been added, as shown below.



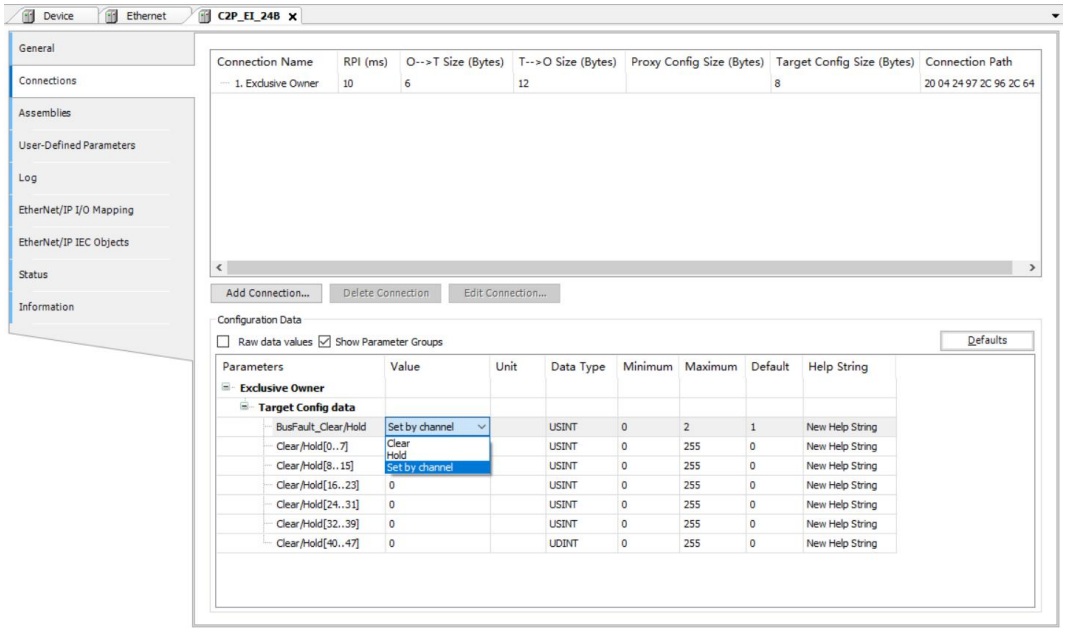
7、Parameter settings

The parameter setting function is used to configure the clear/hold function of the valve terminal.

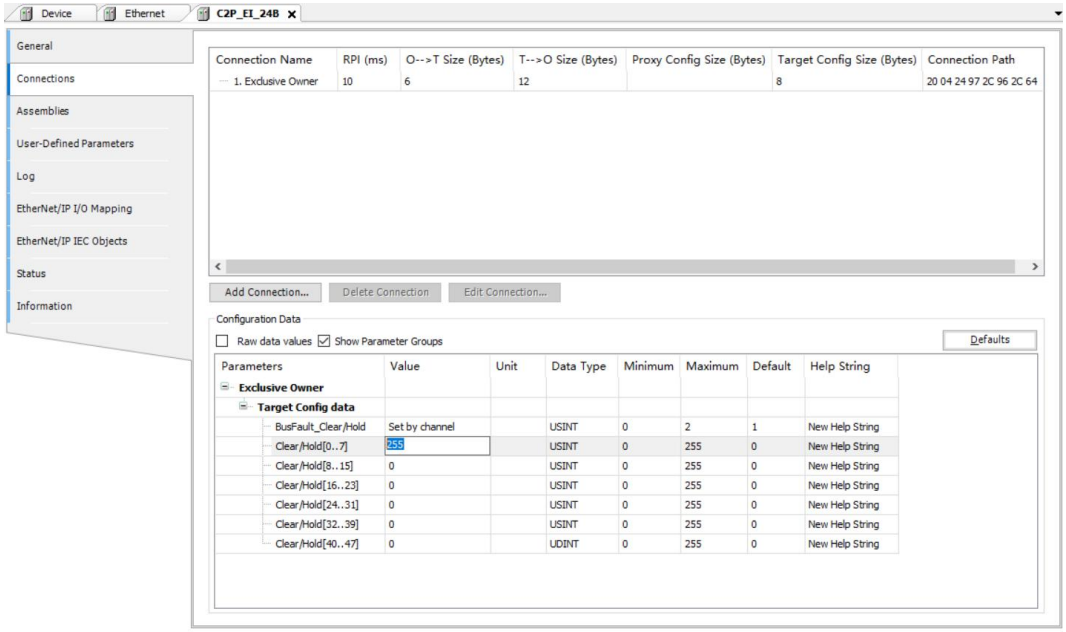
a. Double-click the device to open the "Device Configuration" window, switch to the "Connections" page, as shown below.



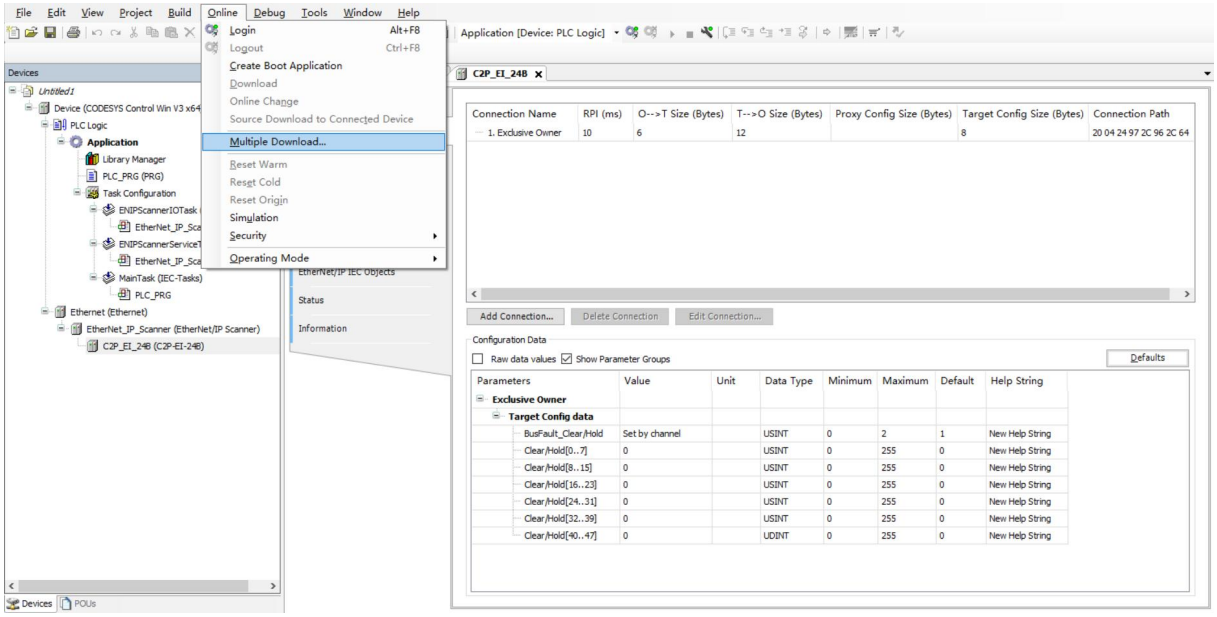
b. Output signal clear/hold parameter function, click the drop-down menu behind the "BusFault Clear/Hold" option, select Clear for clear, select Hold for hold; select Set by Channel for single channel setting or group setting, at this time, the following Clear/Hold[0..7] ~ Clear/Hold[40..47] parameters are valid, as shown in the figure below. Hold[0..7] ~ Clear/Hold[40..47] parameters are valid, as shown below.



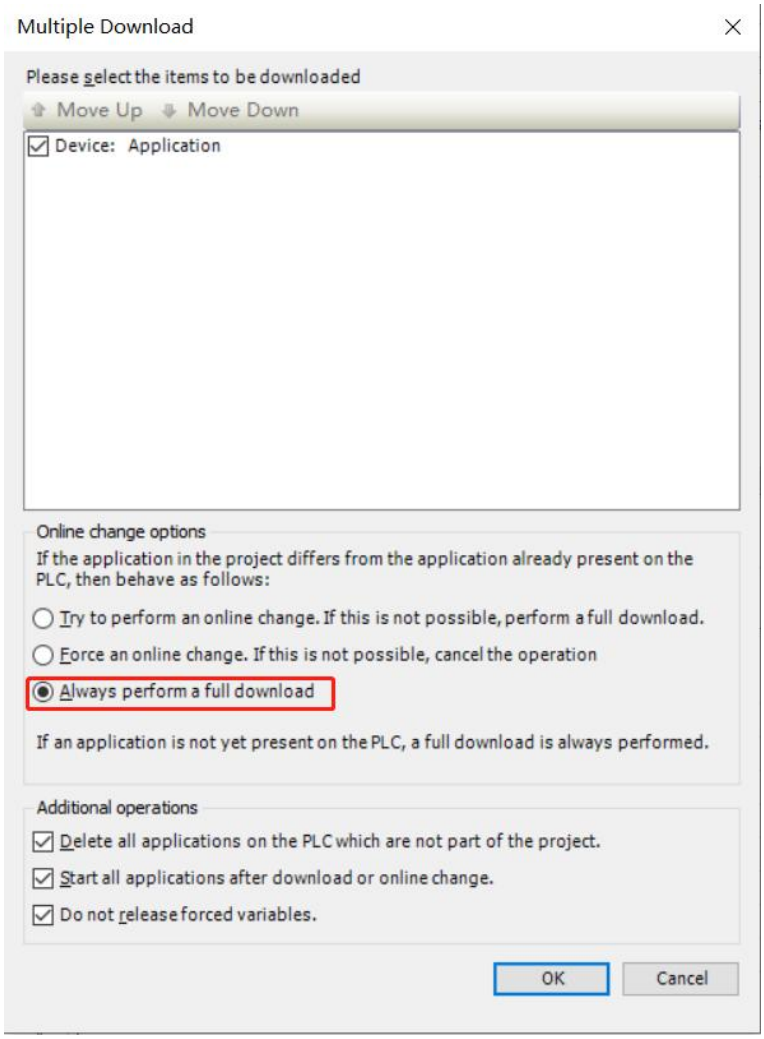
c. "BusFault Clear/Hold" select Set by Channel, modify the value of the grouping parameter of Clear/Hold [0..7] below, you can set clear/hold by channel, as shown in the following figure.



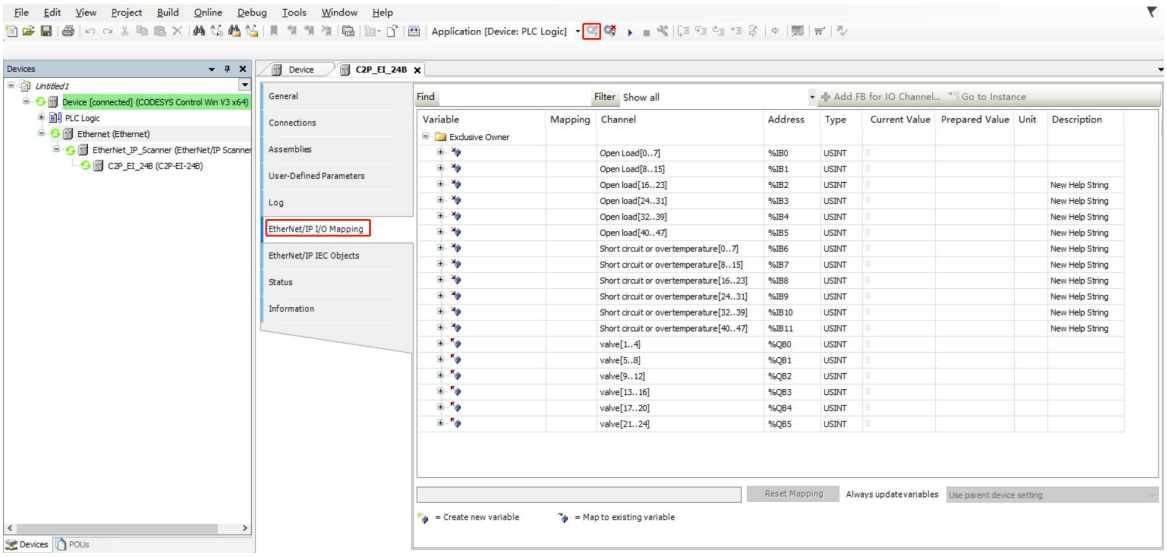
d. Click "Online -> Multi-Download" in the menu bar, as shown below.



e. Multiple download window will pop up, select "Always perform a full download", click "OK", as shown in the figure below.



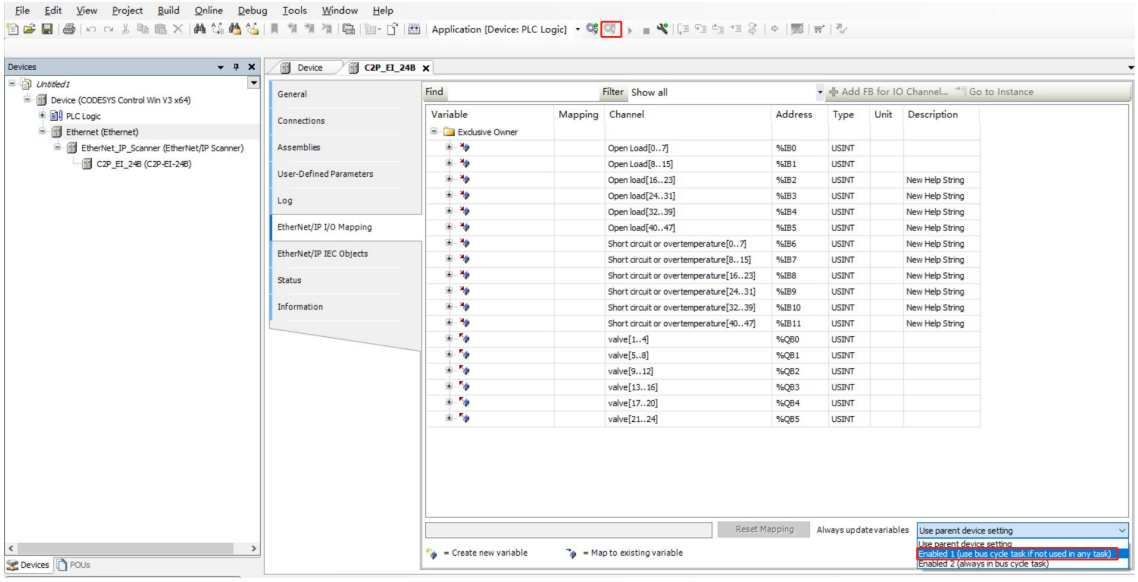
f. Once the download is complete, click  and the system is online as shown below.



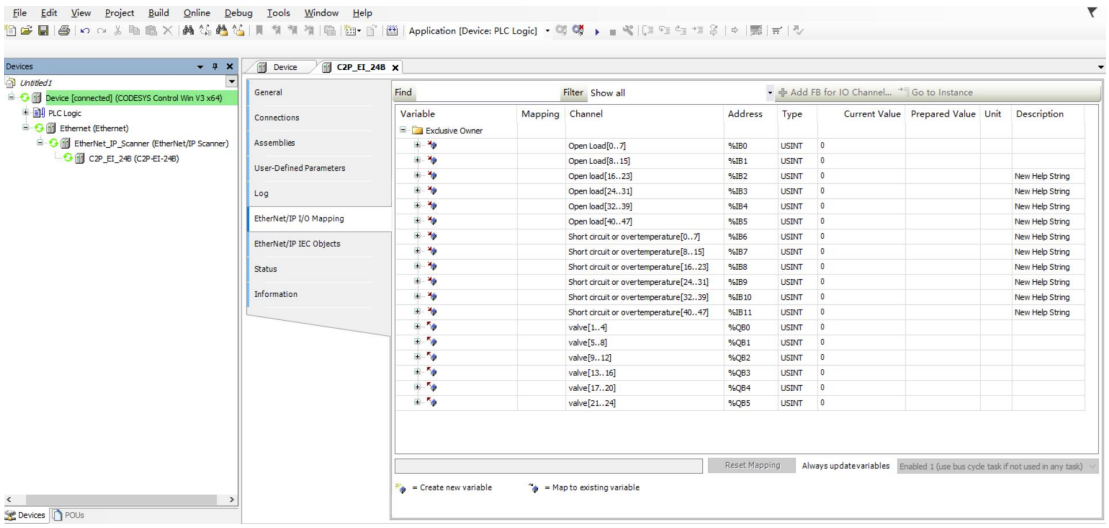
8、Data monitoring

a. Click the  button to log out and switch to the "EtherNet/IPI/O Mapping" tab.

b. Select "Enable 1" mode from the drop-down list in the lower right corner, as shown below.



c. Click  to log in and monitor the page as shown below.

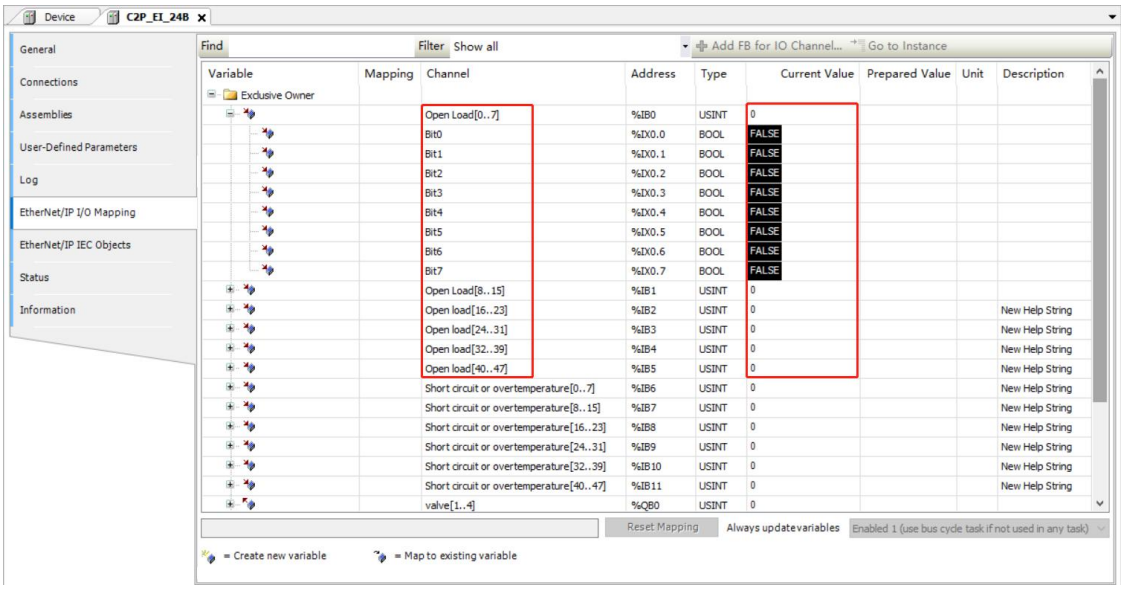


- **Open circuit diagnostics** Open load[0..7], Open load[8..15], Open load[16..23], Open load[24..31], Open load[32..39], Open load[40..47], 48 channels can be diagnosed independently.
- **Short circuit/overtemperature diagnosis** Short circuit or overtemperature[0..7], Short circuit or overtemperature[8..15], Short circuit or overtemperature[16..23], Short circuit or overtemperature[24..31], Short circuit or overtemperature[32..39], Short circuit or overtemperature[40..47], 48 channels can be diagnosed independently.
- **Valve terminal output control function**, 24-bit dual-control solenoid valve, according to the driver chip grouping, a total of 6 groups of channels, valve[1..4], valve[5..8], valve[9..12], valve[13..16], valve[17..20], valve[21..24], each group of 8 channels, a total of 48 channel output control.

d. **Open diagnostic Open load**, a diagnostic value valid when the channel solenoid coil output is off (i.e., 0).

In the "current value" corresponding to Open load[0..7], you can view the diagnostic value of open solenoid valve corresponding to each group of channels of the valve terminal as a whole, a group of channels with normal solenoid valve coils is **0**, and any solenoid valve with an open circuit is not **0**.

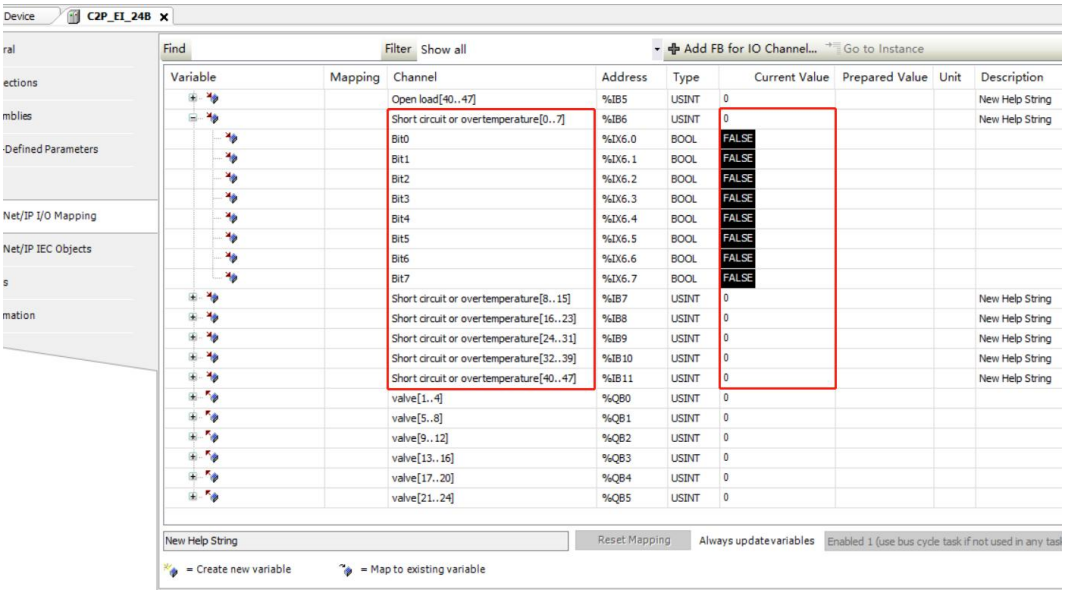
Click "+" to expand Open load [0..7], you can view the open diagnostic value of each channel solenoid valve, the value of **1** is the valve open, the value of **0** is normal, as shown in the figure below.



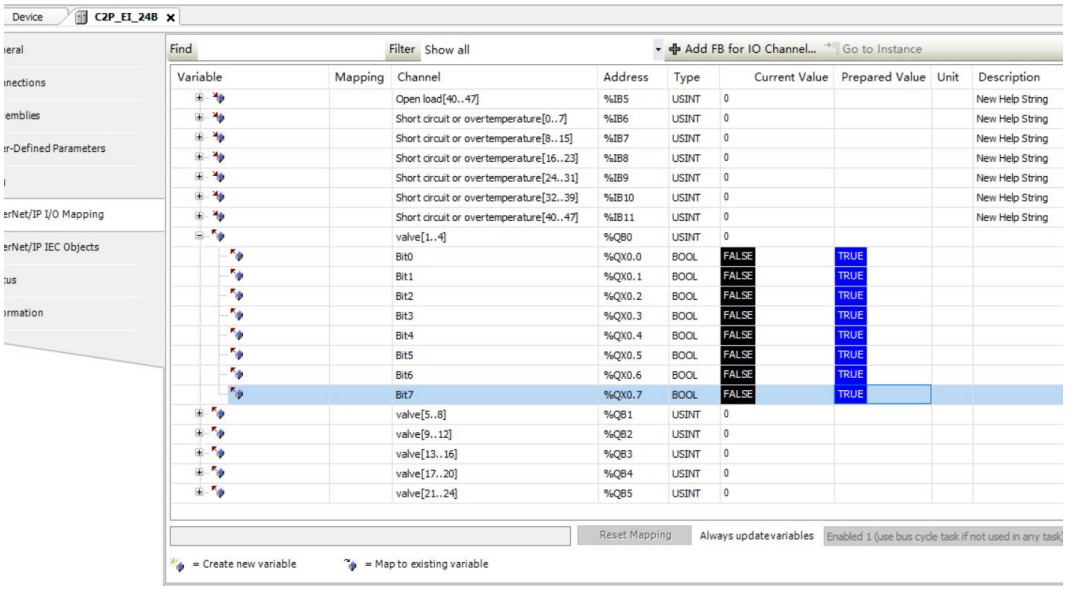
e. **Short circuit/overtemperature diagnostic**, diagnostic value is valid when the channel solenoid coil output is on (i.e., is 1).

In Short circuit or overtemperature [0..7] corresponding to the "current value", you can view the valve terminal as a whole each group of channels corresponding to the solenoid valve short circuit / overtemperature diagnostic value, there are solenoid valves short circuit / overtemperature is not **0**, there is no short circuit / overtemperature is **0**.

Click "+" to expand Short circuit or overtemperature [0..7], you can view the diagnostic value of short circuit/overtemperature for each channel solenoid valve, the value of **1** is the solenoid valve short circuit/overtemperature, the value of **0** is not short circuit/overtemperature, as shown in the figure below.



f. **Channel output control**, if you want to let any one solenoid valve coil output of the valve terminal open, take the first channel as an example, you can click "+" to expand the valve[1...4], in the Bit0 corresponding to the reserve value, write "**1**", and then press "Ctrl+F7" to write, you can open the first solenoid valve coil channel, the other channels to open the output method is consistent, as shown below.



8 FAQ

8.1 Unable to scan to module

1. Check network line connections

Use windows command to ping the IP address of the module, such as ping through, then check the status of the indicator, such as ping can not be, then check the network line connection, such as the network line connection is not abnormal, then the device scanning request acceptance time is set to 60s to scan the module again, such as can be scanned to an unknown device, then the reason is not the module IP has not been assigned, re-assign the IP can be. If you still can not scan to the corresponding module, check the status of the indicator.

2. Checking Indicator Status

If the RUN light blinks, the IP address exists. Controller and module may not be in the same network segment, restore the module to factory settings and then reset the IP address; RUN light flashing may also be the module detects duplicate IP addresses in the network, it is recommended to troubleshoot duplicate IP devices and deal with them.

8.2 IP address assignment anomaly

1. Unable to scan to device under factory setup parameters

Modify the request reception time for module lookup to 60s.

2. Timeout for IP address assignment using BOOTP

Click Advanced Settings in IP Address Settings and set the timeout time to 60 s. If this phenomenon occurs when the timeout time has already been set to 60 s, check whether the controller address is in the same network segment as the IP address assigned to the module.

3. Loss of assigned IP address after power failure

This is caused by not setting the module to boot with a fixed IP after using BOOTP to assign an IP address.

4. IP change using rotary switch, no change in IP address

The IP address setting is out of the specified range or the IP address setting is 0. Verify that the rotary switch settings are as expected.

8.3 IP Setting Tool tool does not scan for devices

When the device cannot be scanned using the IP Setting Tool tool, you can try the following methods.

- First, use the cmd command route print to view all the network segments of the routing table, and use the host computer software to set the IP address of the valve terminal so that the IP address is inconsistent with all the network segments of the routing table.
- After an interval of five minutes, re-power on the device, power on 15s, and then scan, such as scanning can not be tried several times.