ESV Valve Terminal(EtherNet/IP) User Manual

⚠ WARING

1. Do not disassemble, modify(including replacing printed circuit boards) or repair without authorization, which may result in injury or failure.
2. Do not operate the product exceeding the parameters(limited values), and do not use it for flammable or harmful liquids, which may cause fire, malfunction or damage to the product. Please verify the manual before using.
3. Do not operate in an environment containing flammable and explosive gases, which may cause fire or explosion. This product is not designed of explosion–proof.
4. If use this product in the interlock circuit:(1)Provide double interlocking systems, such as mechanical system;(2)Check regularly whether the product is operating normally; otherwise,malfunctions may occur leading to accidents.
5. The following instructions must be followed during maintenance: (1)turn off the power;(2) stop providing gas, remove the remaining pressure and make sure that there is no air supply before maintenance; otherwise, it may cause injury.
6. After the maintenance is completed, peform proper functional checks. If the equipment does not work properly, please stop the operation. In case of unexpected failure, safety cannot be guaranteed.

⚠ CAUTION

1. This product is only permitted to operate by trained professional in field of control and automation; and should master skills including assembly, installation and diagnose of control system, network and fieldbus system as well as provisions for trouble prevention and operation security. Do read the operation manual carefully.
2. The product designed used for industries. Ecept under industrial environments, when used under enviroments such as: mixed commercial and residential areas, measures must be taken to prevent radio interference.
3. The bus manifold and power cord must be functionally grounded to ensure the safety and anti–noise performance of the fieldbus system.

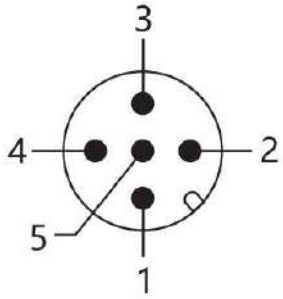
Contents

1 Specifications

Fieldbus Code		ESV-EP32	ESV-EP48
Output		32	48
Protocols		EtherNet/IP	
Baud rate		100Mbps	
Configuration files		EDS file	
Control power supply	Voltage	DC24V(DC21.6 ~ 26.4V)	
	Current consumption	150mA below	
Output voltage(valve)		DC24V(DC22.8 ~ 26.4V)	
Output type		PNP	
Power interface		M12, 5pin, A encode	
Bus Interface		2xM12 socket,4 hole, D encode	
Diagnostic		System diagnostics、Communication error、Life count、Short protection、Open circuit detection、Reverse connection protection、undervoltage and overvoltage protection	
Protection		IP40	
Storage temperature		-20 ~ 70℃	
Working temperature		-10 ~ 60℃	

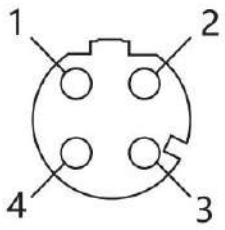
2 Electrical interface

Power interface (M12, 5pin, A encode)



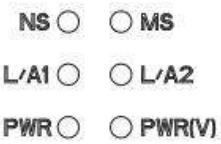
Pin	Type	Description
1	PS24	Control voltage +24V
2	PL24	Operating voltage of load valve +24V
3	PSO	Control voltage 0V
4	PLO	Operating voltage of load valve 0V
5	FE	Functional earthing

BUS interface (2xM12 socket,4 hole, D encode)



Pin	Type	Description
1	TD+	+ Send data+
2	RD+	+ Receive data+
3	TD-	- Send data-
4	RD-	- Receive data-

3 Status LED indicator



LED	State	Meaning
NS	OFF	The working voltage is not connected or the IP address is not set
	Red flashing	EtherNet/IP communication timeout
	Green flashing	EtherNet/IP communication not established
	Green light on	Normal system
MS	Green light on	Normal system
	Red flashing	Power short circuit,Load opening,reverse connection,upper count limit
L/A1	Yellow light on	BUS1 EtherNet/IP network connection
	OFF	BUS1 network not connection
	Yellow flashing	BUS1 network communication is normal
L/A2	Yellow light on	BUS2 EtherNet/IP network connection
	OFF	BUS2 network not connection
	Yellow flashing	BUS2 network communication is normal
PWR	OFF	Module not powered
	Green light on	24V module voltage is normal
	Red light on	Module voltage too high
	Red flashing	Module voltage too low
PWR(V)	OFF	Load not powered
	Green light on	24V load voltage is normal
	Red light on	Load voltage too hight
	Red flashing	Load voltage too Low

4 Module parameters

Select the module configuration data in the controller TAB.

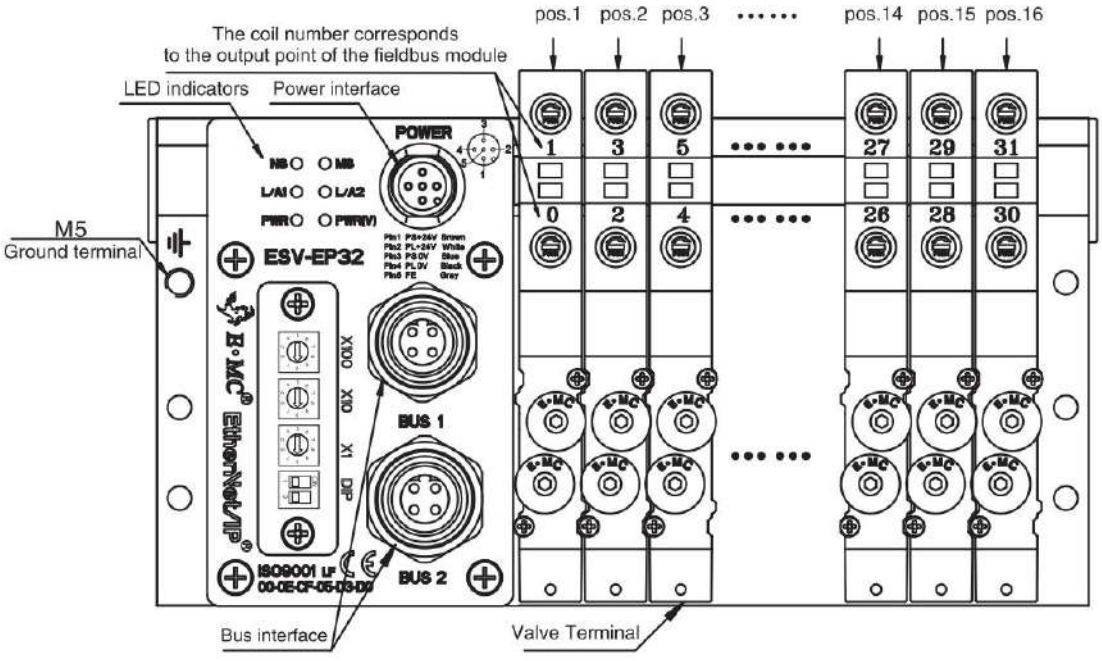
Function	Parameter
Global_B0_OpenLoad_B1_FailSafe_ B2_CycleC (Mode selection swtich setting)	Bit0 :Module Open Load Diagnostics Switch
	Bit1 :Module Fail Safe State Switch
	Bit2 :Module Cycle Counter Limit Switch
	Other bits: Reserved unused
Global_B0_OpenLoad_B1_FailSafe_ B2_CycleC.0 (Bit0)	0 :Open circuit detection is set separately (default)
	1 :Enable open circuit detection for all channels
Global_B0_OpenLoad_B1_FailSafe_ B2_CycleC.0 (Bit1)	0 :Set security output separately(default)
	1 :Set all channels to maintain the last output status
Global_B0_OpenLoad_B1_FailSafe_ B2_CycleC.0 (Bit2)	0 :Set the count value separately(default)
	1 :Unified setting of Count values
Open_Load_Diagnostic (sole settings)	0 :Coil open circuit detection off (default)
	1 :Coil open circuit detection on
Fail_Safe_Sate Note :A channel occupies 2 bits. (sole settings)	0 :Maintain the status before disconnection
	1 :Force on
	2 :Force off(default)
Module_Conoter_Limit_Value (Loop counts are all set)	Range 0~4294967295 (Default 4294967295)
Cycle_Counter_Limit (The loop count is set separately)	Range 0~4294967295 (Default 4294967295)
Reverse connection protection	Default on
Short circuit protection	
Voltage diagnosis	

5 Equipment parameters

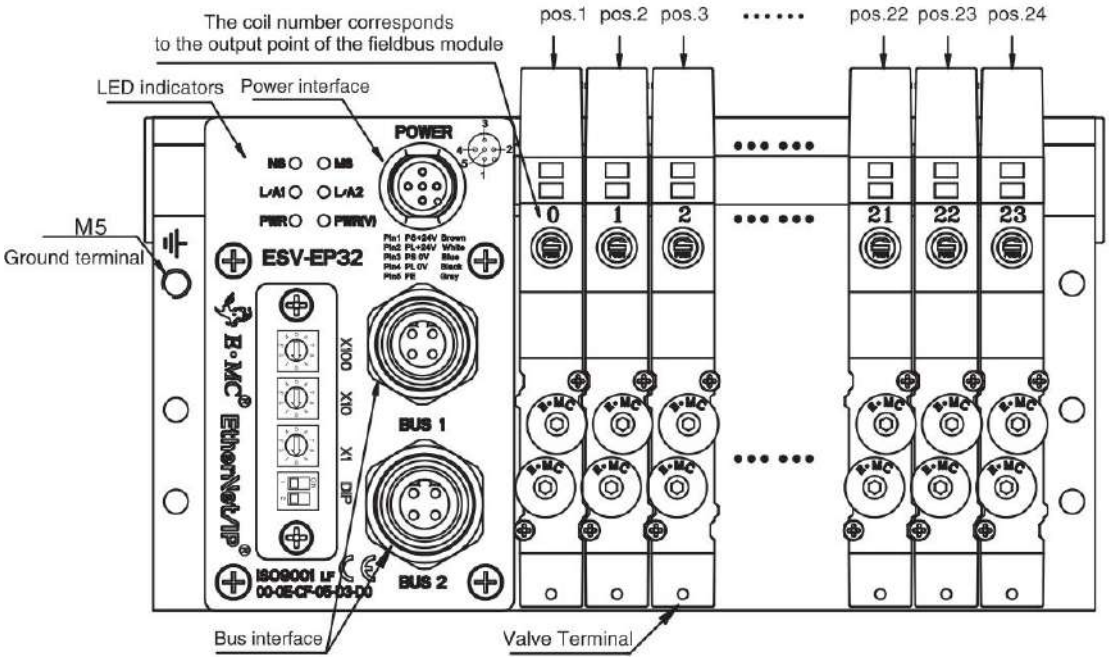
Byte	Function	description
Input Byte0	Status byte	Module undervoltage Byte0:0x08
		Module overvpltage Byte0:0x04
		Load undervoltage Byte0:0x02
		Load overvoltage Byte0:0x01
		Two undervoltage Byte0:0x0A
		Two overvoltage Byte0:0x05
		Short circuit diagnosis Byte0:0x20
		Open circuit diagnosis Byte0:0x40
		Upper countlimit Byte0:0x10
Input Byte1.....Input Byte4	Short circuit byte	Address mapping Output0.....Output3
Input Byte5.....Input Byte8	Open circuit byte	
Input Byte9.....Input Byte12	Count byte	

6 Wiring Diagram

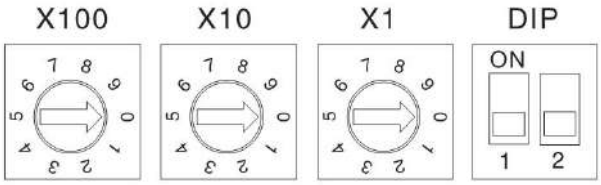
ESV-EP Wiring for double control(maximum 16 positions)



ESV-EP Wiring for single control(maximum 24 positions)



7 IP address DIP switch



DIP2	Description
ON	IP Address Range: from 192.168.1.001 to 192.168.1.254
OFF	IP Address Range: from 192.168.0.001 to 192.168.0.254

Note: DIP1 is not in use;
DIP2 does not work in remote and DHCP control modes;
The DIP switch can only be set when the power is off.

Setting			Description
X100	X10	X1	
0	0	0	The IP address is set by remote control
0	0	1	1
0	0	2	2
…	…	…	…
2	5	4	254
2	5	5	The IP address is set by DHCP

8 Device parameters

ESV-EP32

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	——	Open circuit diagnosis(OC)	Short circuit diagnosis(SC)	Upper countlimit (COR)	Module undervoltage(OV-PWR)	Module overvoltage(UV-PWR)	The valve terminal is undervoltage(UV-PWR(V))	Valve terminal overpressure(OV-PWR(V))
Byte1	SC-7	SC-6	SC-5	SC-4	SC-3	SC-2	SC-1	SC-0
Byte2	SC-15	SC-14	SC-13	SC-12	SC-11	SC-10	SC-9	SC-8
Byte3	SC-23	SC-22	SC-21	SC-20	SC-19	SC-18	SC-17	SC-16
Byte4	SC-31	SC-30	SC-29	SC-28	SC-27	SC-26	SC-25	SC-24
Byte5	OC-7	OC-6	OC-5	OC-4	OC-3	OC-2	OC-1	OC-0
Byte6	OC-15	OC-14	OC-13	OC-12	OC-11	OC-10	OC-9	OC-8
Byte7	OC-23	OC-22	OC-21	OC-20	OC-19	OC-18	OC-17	OC-16
Byte8	OC-31	OC-30	OC-29	OC-28	OC-27	OC-26	OC-25	OC-24
Byte9	COR-7	COR-6	COR-5	COR-4	COR-3	COR-2	COR-1	COR-0
Byte10	COR-15	COR-14	COR-13	COR-12	COR-11	COR-10	COR-9	COR-8
Byte11	COR-23	COR-22	COR-21	COR-20	COR-19	COR-18	COR-17	COR-16
Byte12	COR-31	COR-30	COR-29	COR-28	COR-27	COR-26	COR-25	COR-24

ESV-EP48

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	——	Open circuit diagnos is(OC)	Short circuit diagnosis(SC)	Upper countlimit (COR)	Module undervoltage(OV-PWR)	Module overvoltage(UV-PWR)	The valve terminal is undervoltage(UV-PWR(V))	Valve terminal overpressure(OV-PWR(V))
Byte1	SC-7	SC-6	SC-5	SC-4	SC-3	SC-2	SC-1	SC-0
Byte2	SC-15	SC-14	SC-13	SC-12	SC-11	SC-10	SC-9	SC-8
Byte3	SC-23	SC-22	SC-21	SC-20	SC-19	SC-18	SC-17	SC-16
Byte4	SC-31	SC-30	SC-29	SC-28	SC-27	SC-26	SC-25	SC-24
Byte5	SC-39	SC-38	SC-37	SC-36	SC-35	SC-34	SC-33	SC-32
Byte6	SC-47	SC-46	SC-45	SC-44	SC-43	SC-42	SC-41	SC-40
Byte7	OC-7	OC-6	OC-5	OC-4	OC-3	OC-2	OC-1	OC-0
Byte8	OC-15	OC-14	OC-13	OC-12	OC-11	OC-10	OC-9	OC-8
Byte9	OC-23	OC-22	OC-21	OC-20	OC-19	OC-18	OC-17	OC-16
Byte10	OC-31	OC-30	OC-29	OC-28	OC-27	OC-26	OC-25	OC-24
Byte11	OC-39	OC-38	OC-37	OC-36	OC-35	OC-34	OC-33	OC-32
Byte12	OC-47	OC-46	OC-45	OC-44	OC-43	OC-42	OC-41	OC-40
Byte13	COR-7	COR-6	COR-5	COR-4	COR-3	COR-2	COR-1	COR-0
Byte14	COR-15	COR-14	COR-13	COR-12	COR-11	COR-10	COR-9	COR-8
Byte15	COR-23	COR-22	COR-21	COR-20	COR-19	COR-18	COR-17	COR-16
Byte16	COR-31	COR-30	COR-29	COR-28	COR-27	COR-26	COR-25	COR-24
Byte17	COR-39	COR-38	COR-37	COR-36	COR-35	COR-34	COR-33	COR-32
Byte18	COR-47	COR-46	COR-45	COR-44	COR-43	COR-42	COR-41	COR-40

Note:0 means normal, 1 means there is an error.

8.1 **Output bytes**

	Bit7	**Bit6**	**Bit5**	**Bit4**	**Bit3**	**Bit2**	**Bit1**	**Bit0**
BYTE0	7	6	5	4	3	2	1	0
BYTE1	15	14	13	12	11	10	9	8
BYTE2	13	22	21	20	19	18	17	16

BYTE3	31	30	29	28	27	26	25	24
BYTE2	39	38	37	36	35	34	33	32
BYTE3	47	46	45	44	43	42	41	40

Note: 0-47 represents 48 coils of the solenoid valve, and the action of the solenoid valve can be controlled by giving the corresponding point position 1.

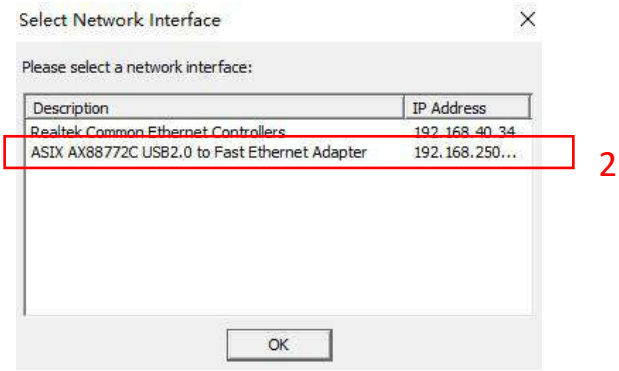
9 Configuration

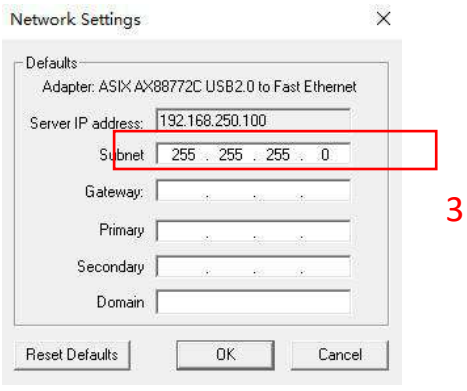
9.1 IP address setting

Before using the ESV module of EtherNet/IP protocol, you can use the IP address setting tool to assign IP addresses.

1. Use the Rockwell server tool provided by the BOOTP-DHCP software to assign IP addresses.

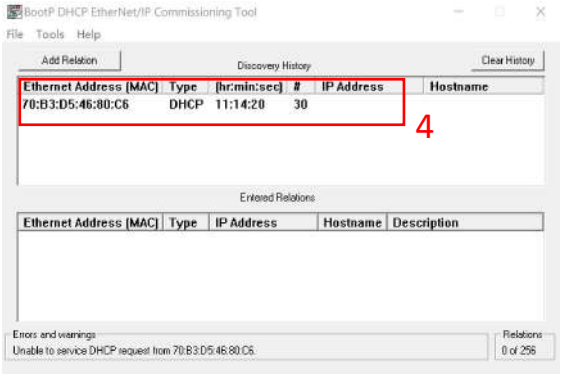
Set the network card of the computer to the required CIDR block, open the BOOTP-DHCP server software, and enter the Subnet mask in the Subnet as shown in the following figure:

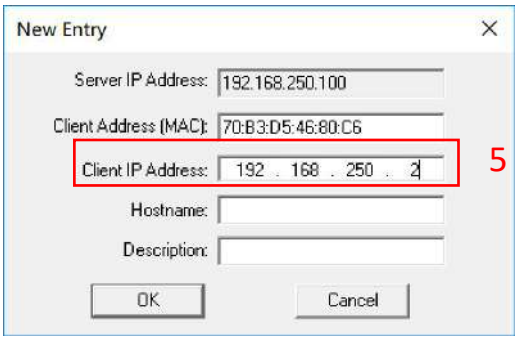




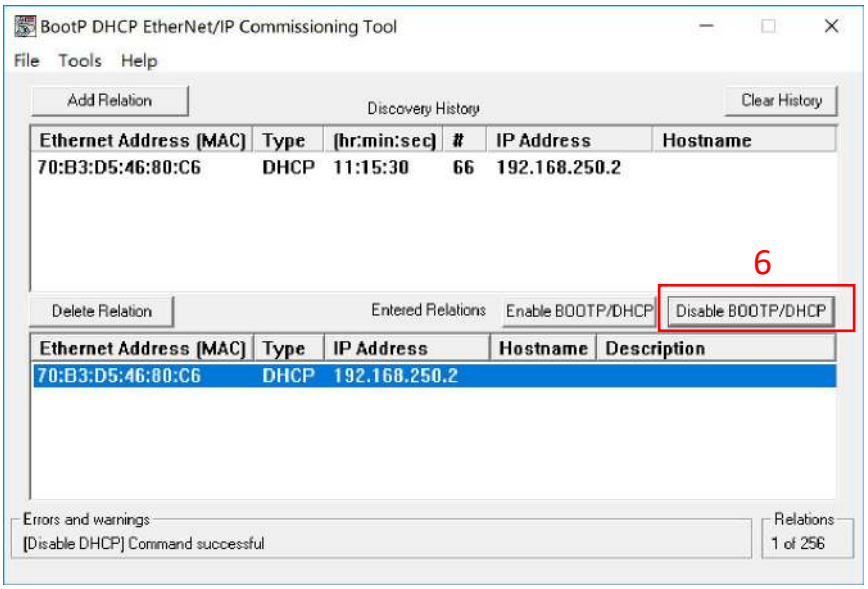
Double-click the MAC address corresponding to the IP address to be assigned module, and enter the IP address to be set. If the module has been assigned an IP address and BOOTP/DHCP is disabled, the module may not be searched automatically. In this case, you can switch the dial switch to 255 and power on it again, turn the dial

switch to 000 and power on again.





Click Disable BOOTP/DHCP. A Command Successful appears in the information column, indicating that the IP address is successfully solidified.



1. Use Keynes IP Setting Tool software tools to allocate IP addresses.

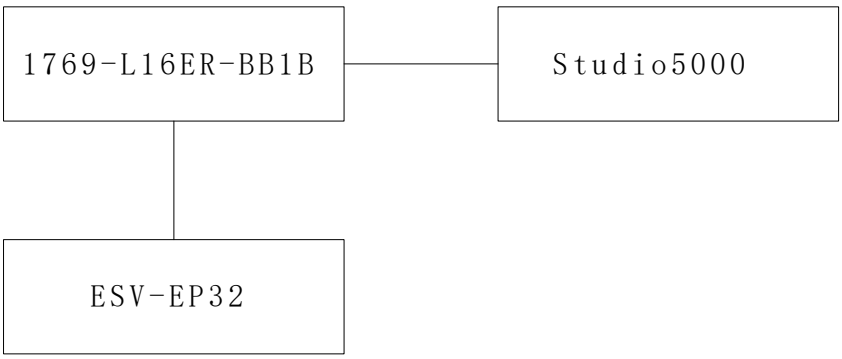
Set the network card of the computer to the desired CIDR block, open the IP Setting Tool software, select the network card connected to the module, and scan the online I/O module, as shown in the following figure:

Modify the module IP address, set the IP address, and then select fixed IP to start.

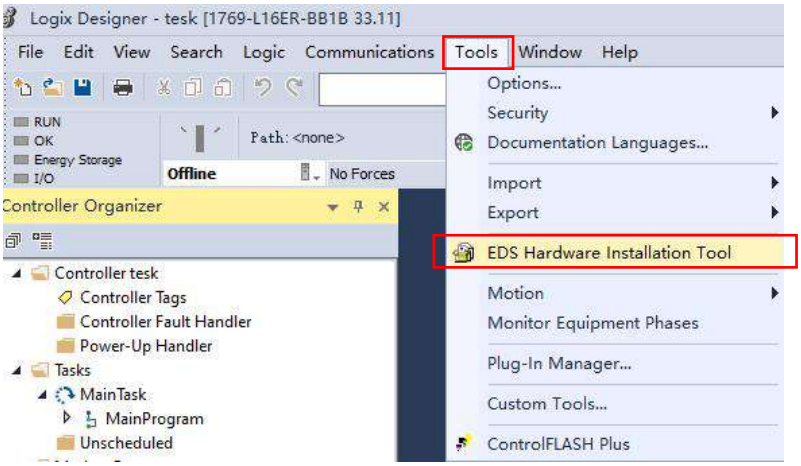
9.2 Configuration procedure

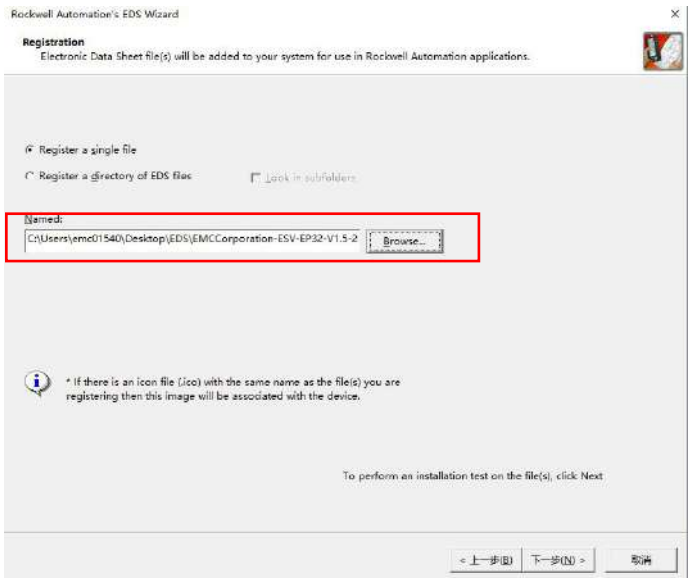
1. Rockwell Studio5000 and EtherNet/IP protocol ESV bus valve Island connection and configuration,.

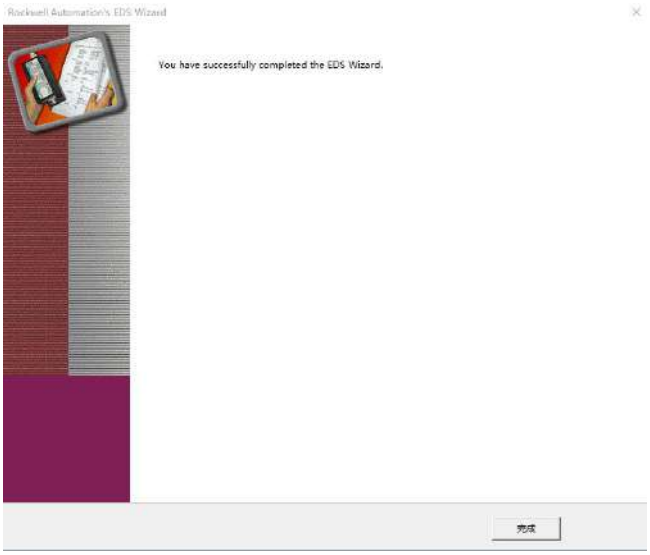
communication connection diagram：



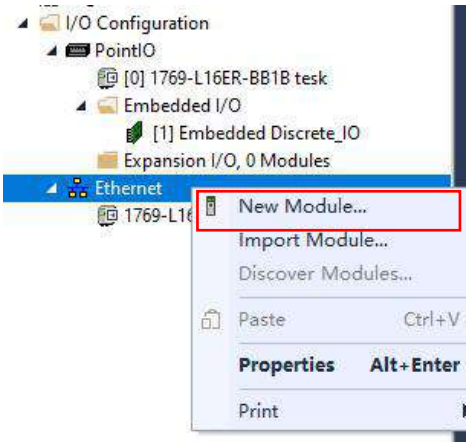
After creating a project, click Tools.→ESD Hardware Installation Tool→Click Next Next, click Browse→Select the EDS file of E.MC and click next until the EDS file is installed. As shown in the following figure:

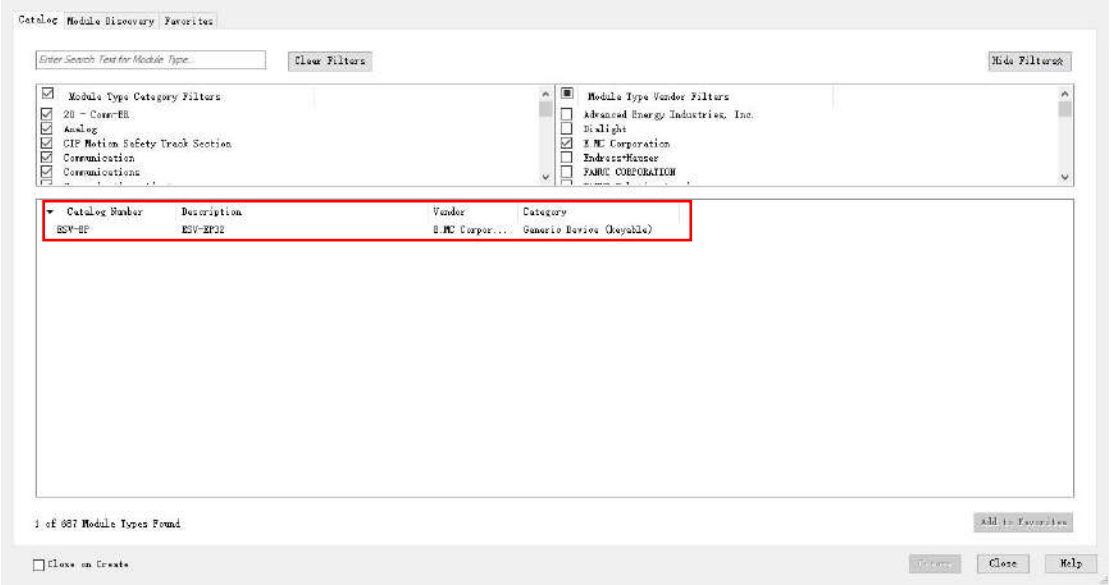


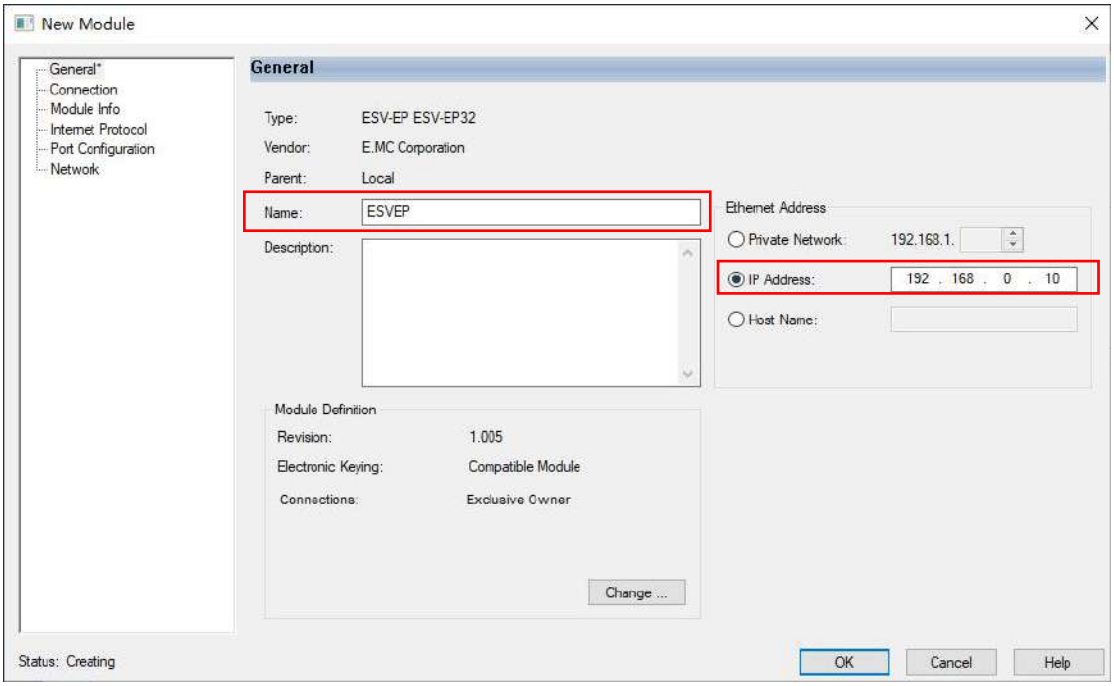




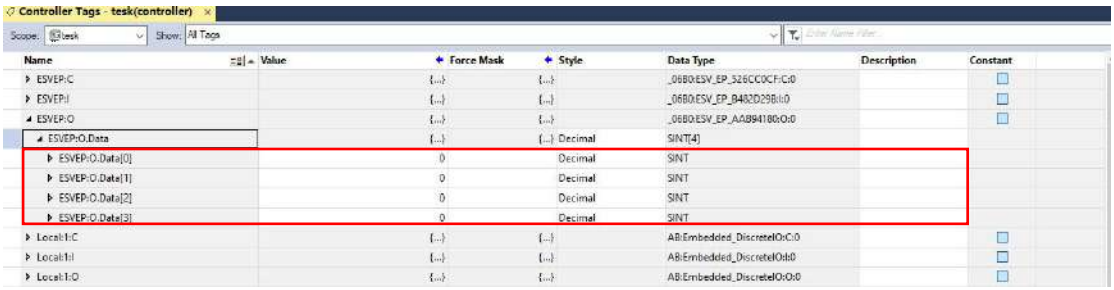
Right-click the toolbar Ethernet on the left→New Module→In the pop-up window, Gou Xuan E.MC Corporation, select ESV-EP32 double-click→Enter the module name and IP address→Click OK to add the ESV-EP module. As shown in the following figure:







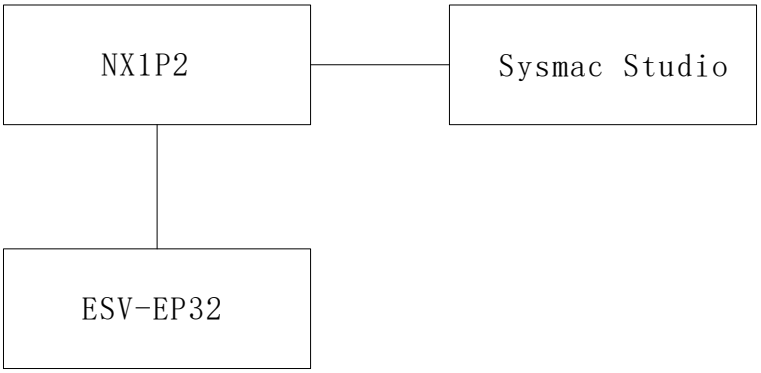
Click controller tag→Click the output data of the module corresponding to the 32 output coils on the valve Island.



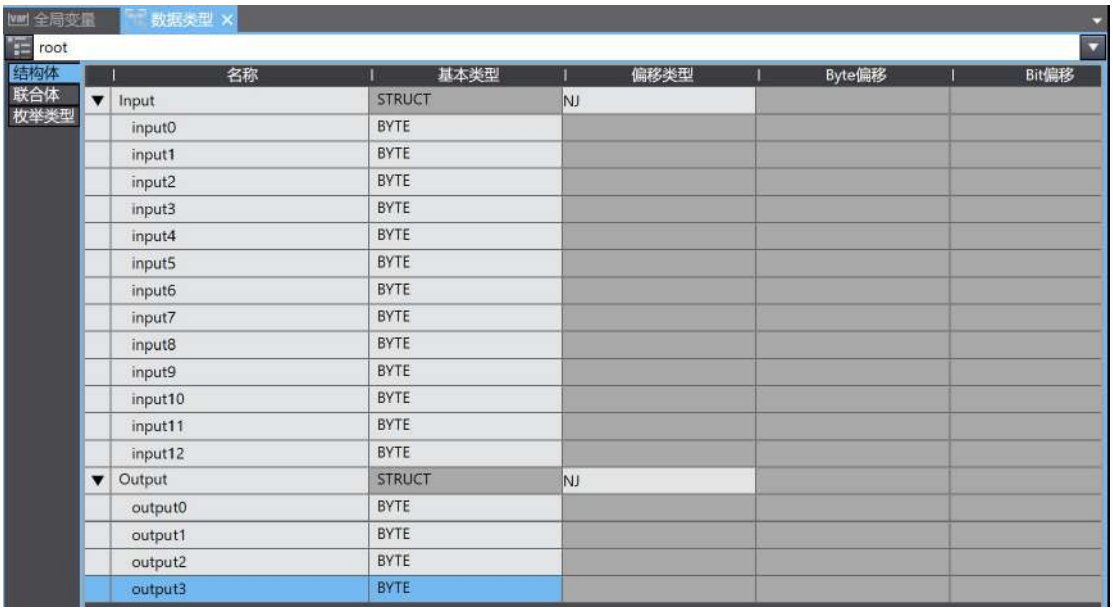
Download the hardware configuration to PLC to complete the configuration.

2.Omron Sysmac Studio and EtherNet/IP protocol ESV bus valve Island connection and configuration.

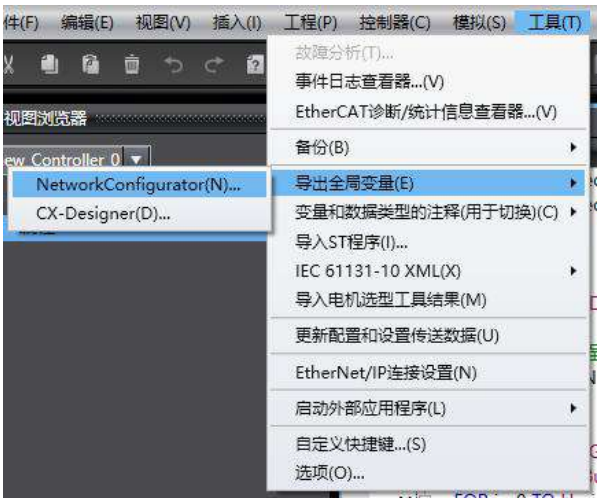
Communication connection diagram:



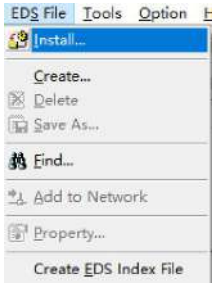
Open the Sysmac Studio, create a new project, create a structure variable, 13 bytes input, 4 bytes output. Define two tags in a global variable.



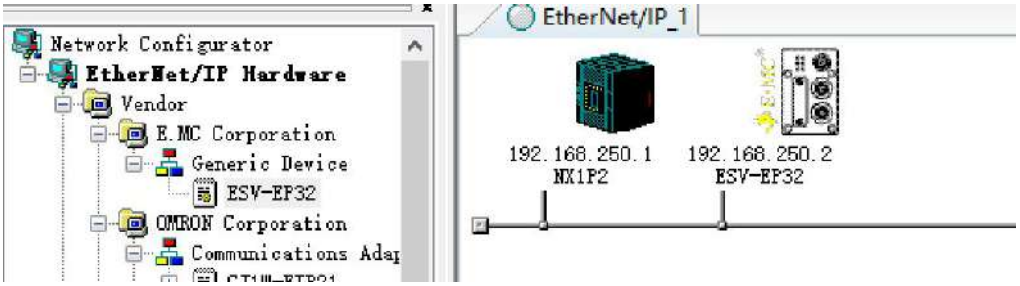
Click Tools in the project→Export global variables→Network Configurator→Export a CSV file.



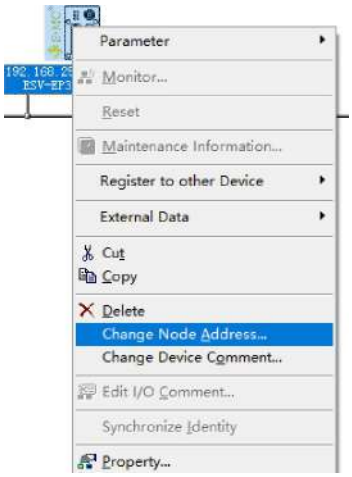
Open the Network Configurator configuration tool and install the valve Island EDS file.

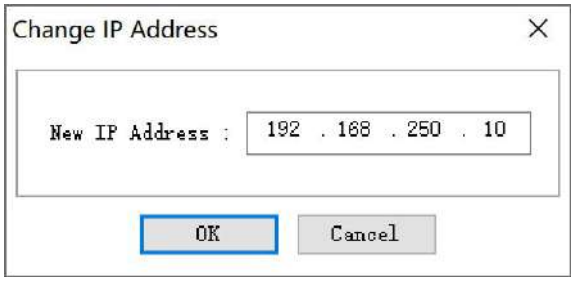


Double-click the Omron controller and EtherNet/IP device used by the project.

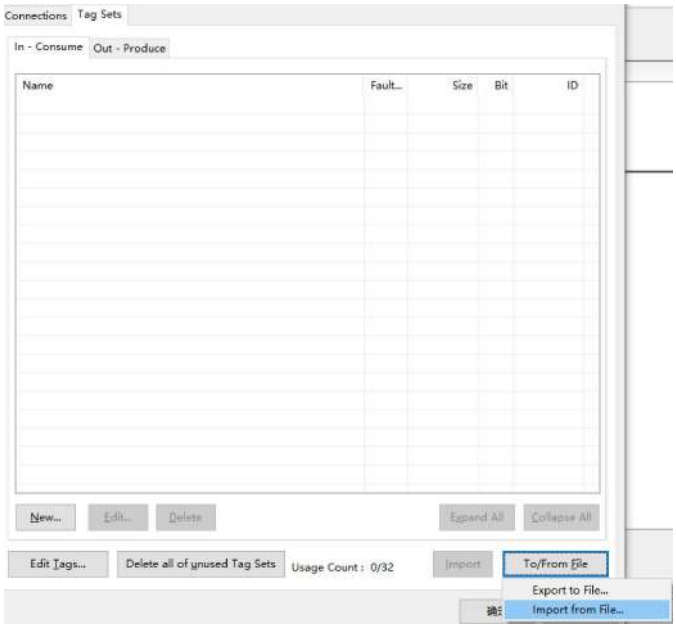


Right-click the valve Island module icon to change the module IP address.

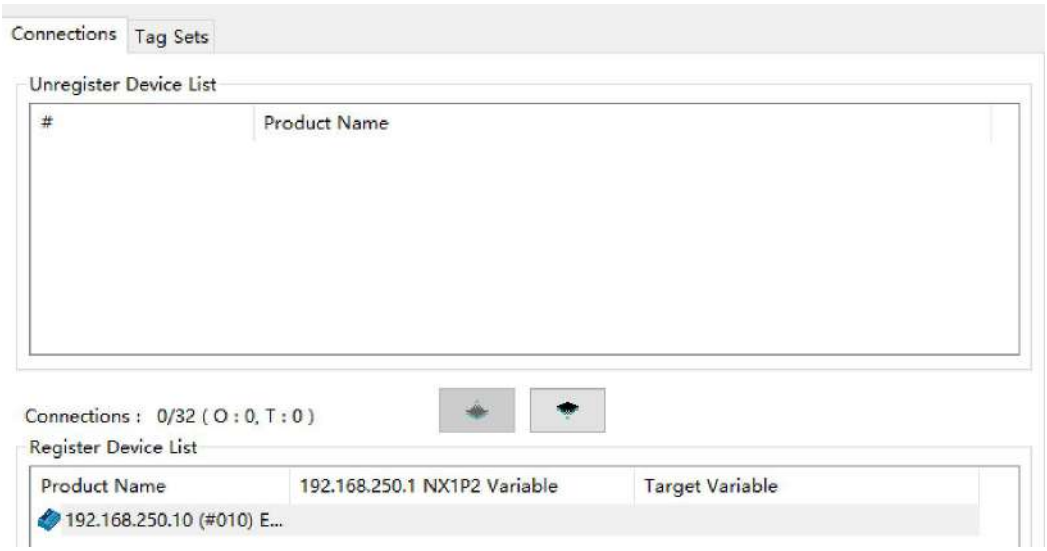


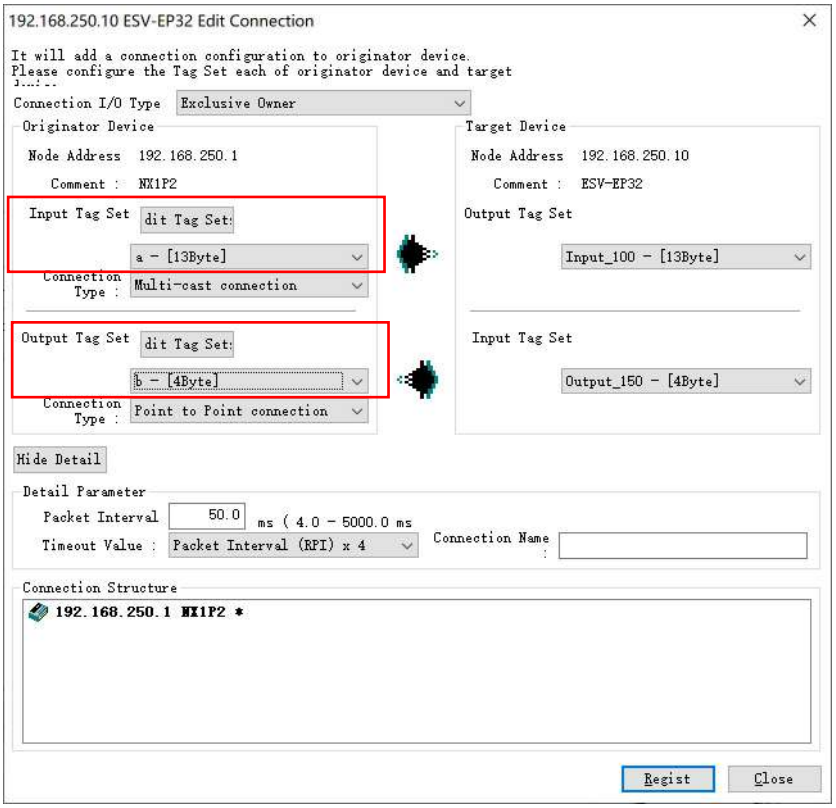


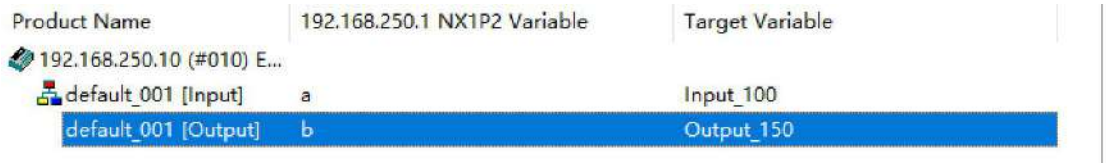
Double-click the controller icon→Tag Sets→To/From File→Import from File→Select the exported CSV file.



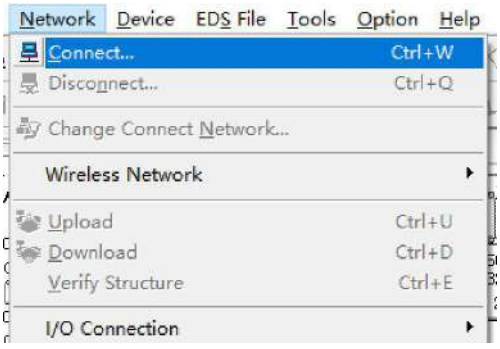
In the controller connections options, click the down button to add the controller to [Register Device List]→Double-click the added controller and select the imported variable label from the Input Tag Set and Output Tag Set.→Regist→Close。



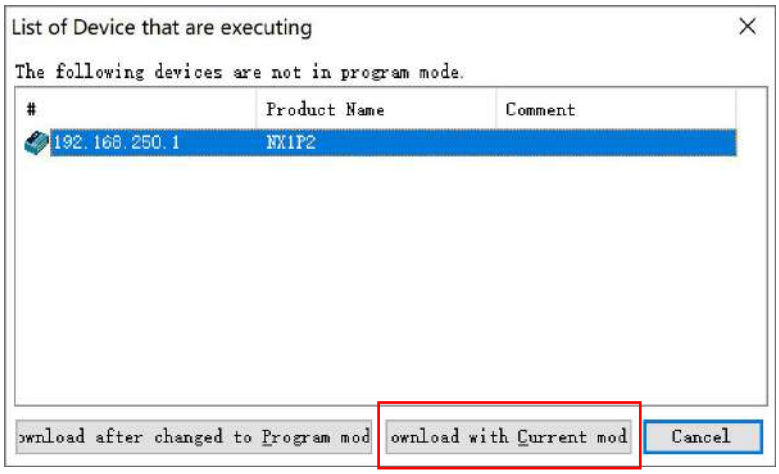


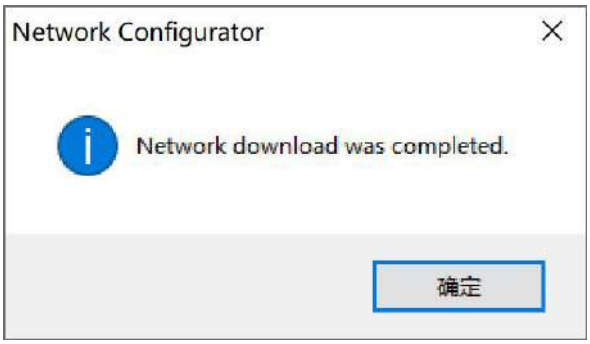


Click Network→Connect...。



Click the blank Download to Download the configuration to PLC.





Open the Sysmac Studio and download the project configuration to PLC to complete the valve island configuration setting.

E·MC®
E · MC GROUP
www.emc-machinery.com
TEL: +86-574-88847888
FAX: +86-574-28565767
E-Mail: pneumatic@emc-machinery.com
ADD: No.288 jiangning Road,Fenghua,
Ningbo,China,315504