MVT Valve Terminal Node User Manual

Version 2.0, 2024-09-23

Tianjin Elco Automation Co.,Ltd

directory

1. Product Introduction

The MVT series Valve terminal node adopts the integrated design of bus interface, IO-Link expansion port and power supply, and is installed on the bus electrical interface. At present, the main products are IO-Link slave station, multi-protocol slave station and multi-protocol master station. Compatible bus protocols include Profinet, Ethernet/IP and CC-LINK IE Field BASIC.

The connection system of the MVT series is designed with M12 sockets for easy power supply and quick bus plugging.

MVT series master valve terminal node is suitable for PNP sensors, travel switches, dry contact signal acquisition, PNP load output and other application scenarios, providing cost-effective valve terminal product solutions for automotive, photovoltaic, logistics and other industries.

2. Version change history

Date of revision	Release version	content of change
2024-9	V1.0	The first edition of the manual is released

3. About manual acquisition

This manual is not shipped with the product, and if you need to obtain an electronic PDF file, you can obtain it in the following ways:

● Log in to the official website of Elco (www.elco-holding.com.cn), search for keywords and download.

● Use WeChat to search and follow the official public account of " Elco Automation" to get the product matching manual.

● Contact the sales engineer of Elco Automation in your area to get the latest manual materials.

4. **Warranty Statement**

Under normal use, if the product fails or is damaged, Elco Automation is responsible for the 18-month warranty (from the date of delivery, subject to the date of delivery, and the contract agreement shall be implemented in accordance with the agreement). More than 18 months, the repair fee will be charged.。

Within 18 months, the repair fee will be charged for product damage caused by the following conditions.

- Failure to operate this product as specified in the manual, resulting in damage to the product.
- Fire, flood, abnormal voltage, product damage.
- Use of this product for non-normal functions, resulting in damage to the product.
- Product damage caused by exceeding the specified scope of use of the product.
- Secondary damage to the product caused by force majeure (natural disasters, earthquakes, lightning strikes).

The service fee is calculated according to the unified standard of Elco, and if there is a contract, it will be handled according to the principle of contract priority.

5. Introduction to the MVT series of modules

5.1. Appearance and function introduction

5.1.1. MVT-C-LK appearance and function introduction

ordinal	name	function	state
1	**Module fixing clips**		
	Module fixing holes	It is used to fix the valve terminal node on the valve terminal interface	-
2	**Power connector**		
	1	US 24V+	-
	2	UA 24V+	-
	3	US 0V	-
	4	C/Q	-
	5	UA 0V	-
3	**Diagnostic light**		
	US	System power status	
	LK	Communication status	
	UA	Auxiliary power state	

5.1.2. MVT-C-EN appearance and function introduction

ordinal	name	function	state
1	**Module fixing clips**		
	Module fixing holes	It is used to fix the valve terminal node on the valve terminal interface	-
2	**Power connector**		
	1	System power Us+	-
	2	Auxiliary power Ua-	-
	3	System power Us-	-
	4	Auxiliary power Ua+	-
	5	PE	-
3	**Diagnostic light**		
	Us	System power status	
	Ua	Auxiliary power status	
	NET	Bus communication failure	
	MOD	System Fault Indication	

		Network port connection status	
	Lk1/Lk2	Network port connection status	
	Act1/Act2	Network traffic status	
4	**Bus interface**		
	1	Transmitter TD+	
	2	Receiver RD+	
	3	Transmitter TD-	
	4	Receiver RD-	
5	**control panel**	DIP switch, reset button	

5.1.3. MVT-E-EN appearance and function introduction

ordinal	name	function	state
1	**Module fixing clips**		
	Module fixing holes	It is used to fix the valve terminal node on the valve terminal interface	-
2	**Power connector**		
	1	System power Us+	-
	2	Auxiliary power Ua-	-

3		System power Us-	-
	4	Auxiliary power Ua+	-
	5	PE	-
3	**Diagnostic light**		
	Us	System power status	
	Ua	Auxiliary power status	
	NET	Bus communication failure	
	MOD	System Fault Indication	
	Lk1/Lk2	Network port connection status	
	Act1/Act2	Network traffic status	
	CH1/CH2	port1/port2 Status indication	
4	**Bus interface**		
	1	Transmitter TD+	
	2	Receiver RD+	
	3	Transmitter TD-	
	4	Receiver RD-	
5	**control panel**	DIP switch, reset button	
6	**Signal interface**		
	1	US 24V+	
	2	I/O	
	3	US 0V	
	4	C/Q	
	5	PE	

5.2. Module Specifications

Ordering data			
Type	MVT-C-LK	MVT-C-EN	MVT-E-EN
Description	Class-B	Supports multiple bus protocols	Supports multiple bus protocols, with IO-Link master (2*Class-A)
Matching Festo valve Terminals	VTUG series		
Field bus			
Protocol	IO-Link	Profinet,CC-Link IE,Ethernet/IP	Profinet,CC-Link IE,Ethernet/IP
Field bus, connection system	Class-B:1*M12,A-CODE,5pin,Male	2*M12,D-CODE,4pin, Female	2* M12,D-CODE,4pin,Female

| IO-Link Expansion port	——	——	2*M12,A-CODE,5pin,Female
Electrical isolation	yes		
Transmission rate	——	100Mbps	100Mbps
Max. address volume, inputs	8 Byte	8 Byte	106 Byte
Max. address volume, outputs	6 Byte	6 Byte	74 Byte
Power supply			
Nominal operating voltage DC	24V		
Operational voltage range DC	18-30V		
System Max. power supply	1A	4A	4A
Valve Max. power supply	2A	2A	2A
Intern power consumption nominal operating voltage	Less than 100 mA	Less than 200 mA	Less than 200 mA
Power supply, connection system	The bus interface includes power supply	M12*1, L-CODE, 5pin, Male	M12*1, L-CODE, 5pin, Male
Technical data			
Expansion port type	——	——	2*Class-A
Max. number of solenoid coils	48		
Maximum number of valve positions	24		
Power supply, inputs（pin1&pin3）	——	——	IO-Link port Max 1.6A
Input signal type	——	——	PNP type sensor,Travel switch,dry contact(SIO mode)
Power supply, outputs（pin2&pin3）	——	——	Max 2A
Output signal type	——	——	PNP type loads
Diagnosis			

Communication status	Communication failure alarm
Power supply detection	Low voltage alarm
System diagnostics	System failure alarm
General parameters	
Dimensions	42*91*40mm
Type of mounting	On electrical interface
Operation temperature	-5℃-60℃
Storage temperature	-20℃-70℃
protection class	IP67

## 5.3. Introduction to the DIP function

DIP switch	Instructions	note
0	Ethernet/IP DHCP mode	When switching protocols: the PT light stays on continuously, and the PORT red light stays on continuously.
1~2	IP mode set by the Ethernet/IP webserver	
3	Profinet protocol	
4	CCLink default mode	
5~6	IP mode set by the CCLink webserver	
9	Clearing Device Configuration (IP Configuration)	The PORT yellow light flashes alternately
other	Error status	The PT light is always on

Function selection is performed by adjusting the DIP switch shown in the diagram.

After dialing the DIP to the corresponding digit, power off and restart (or dial the DIP to the corresponding digit after the power off, and then power on), when switching the protocol, the PT light above the DIP switch will be on, and the PORT red light will be on.
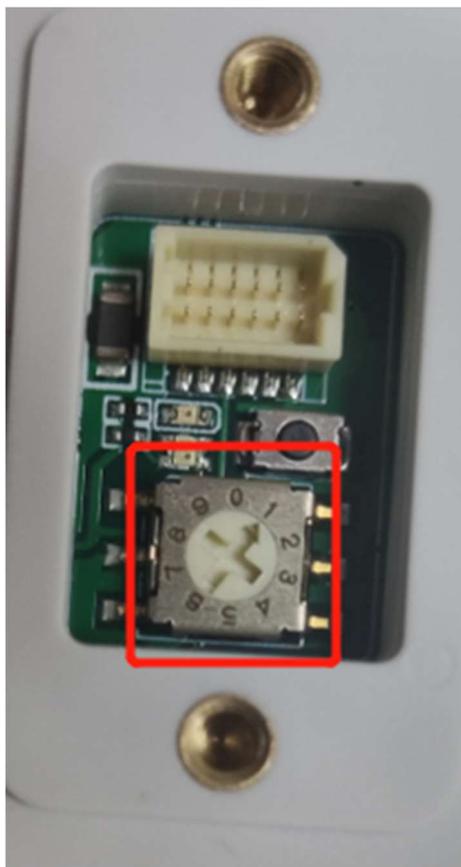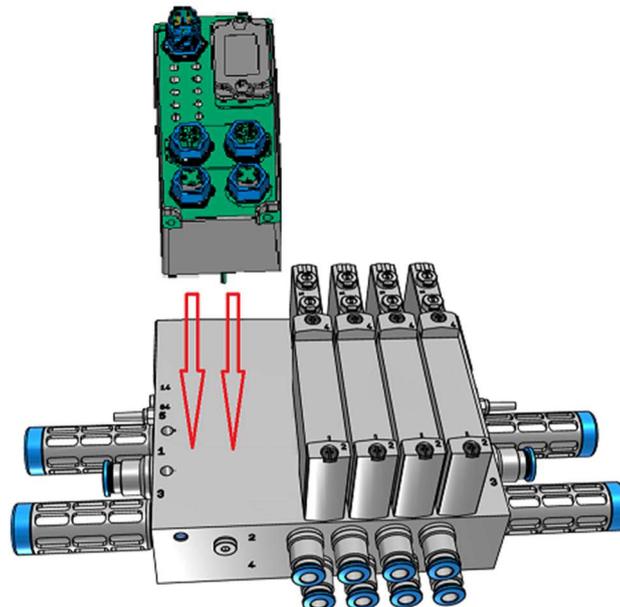
5.4.　Module Dimensions
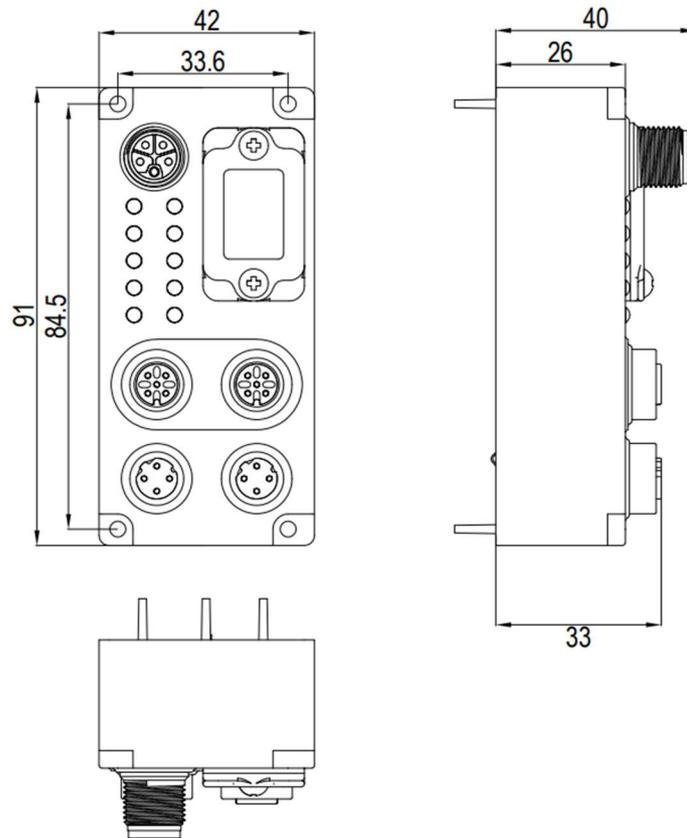
6.　Mechanical installation and disassembly of products

6.1.　Installation location

The installation position is as shown in the figure above, the valve terminal node is installed horizontally at the electrical interface of the valve terminal gas circuit board, and the connector and control panel must be facing upward.
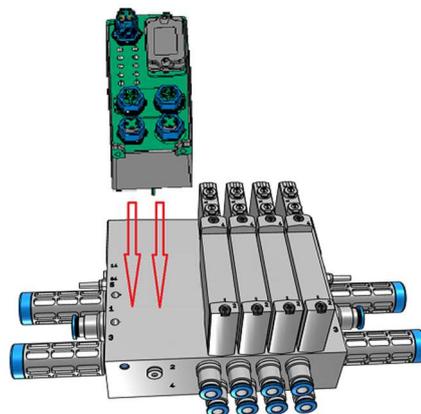
⚠️ **Warn!**
→ **Only professional maintenance personnel who have received relevant training in electrical equipment and have sufficient electrical knowledge can install this product;** → **When disassembling and disassembling modules, it is necessary to disconnect all external power supplies used by the system before performing the operation. If the power supply is not completely disconnected, it may lead to electric shock or module failure and malfunction;** → **Do not use MVT in the following places: places with dust, oil smoke, conductive dust, corrosive gases, and flammable gases; Exposure to high temperatures, condensation, wind and rain; Occasions with vibration and shock. Electric shock, fire, mishandling can also cause damage and deterioration of the product;**

6.2. MVT product installation

The installation of MVT products can be carried out in the

following steps:

STEP1：Buckle the valve terminal node at the electrical interface of the valve terminal;

STEP2：Use a screwdriver to secure the screws on the valve terminal nodes.

⚠	**Warn!**

→ **To install, align the valve terminal node with the electrical interface and insert the pin in the direction indicated by the arrow;**

→ **Tighten the mounting bolts without excessive force to prevent damage to the product;**

6.3. Valve terminal node disassembly

Use a flathead screwdriver or similar tool to unscrew the mounting screws counterclockwise and pull the node module out away from the valve terminal manifold plate.
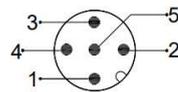
⚠	**Warn!**

The mechanical installation and disassembly of the module need to be operated by qualified professional mechanical personnel, and attention should be paid to the correct wearing and use of labor protection equipment.

7. Interface definition of valve terminal nodes of the MVT series
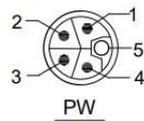
7.1. MVT-C-LK interface definition

Class-B port Male

1, System power 24V+
2, Auxiliary power 24V+
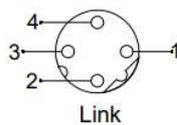3, System power 0V
4, C/Q
5, Auxiliary power 0V   Bus port

7.2. MVT-C-EN interface definition

Power port Male

PW

1, System power Us+
2, Auxiliary power Ua-
3, System power Us-
4, Auxiliary power Ua+
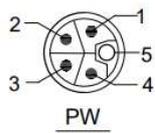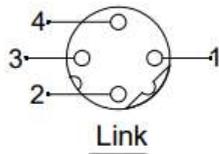5, Protective earthing PE   Power port

Bus port Female

Link

1, Transmitter TD+
2, Receiver RD+
3, Transmitter TD-
4, Receiver RD-   Bus port

7.3. MVT-E-EN interface definition

Power port Male

2 — 1
5
3 — 4

PW

1, System power Us+
2, Auxiliary power Ua-
3, System power Us-
4, Auxiliary power Ua+
5, Protective earthing PE   Power port

Bus port Female

4 —
3 — 1
2 —

Link

1, Transmitter TD+
2, Receiver RD+
3, Transmitter TD-
4, Receiver RD-   Bus port

Signal port Female

4 — 5
3 — 1
2 —

CH
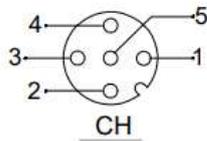
1, System power 24V+
2, I/O
3, System power 0V
4, C/Q
5, Protective earthing PE   Signal port

8. Electrical installation and wiring of the product

8.1. Cable specifications

8.1.1. Communication cables

Ethernet bus communication uses shielded network cable for network data transmission, without short circuit, dislocation and poor contact; The length of the cable between the devices cannot exceed 100m, and the signal will be attenuated and the normal communication will be affected. The following types of communication cables are recommended:

project	specification
Cable type	Elastic crossover cable, S-FTP, Category 5 wire
Criteria met	EIA/TIA568A，EN50173，ISO/IEC11801 EIA/TI Abulletin TSB，EIA/TIA SB40-A&TSB36
Traverse section	AWG26
Wire type	Twisted pair
Number of cable pairs	4

The pre-injection connector has better communication stability and construction convenience, and the pre-injection connector of the Elco brand can provide personalized customization of cable material and length under the condition of meeting the requirements of communication technology, and the following Elco Ethernet connectors are available:

type	description
E16DA4002M020	RJ45-M12 Double-ended Pre-Injection Ethernet Connector, Pin Straight, D-CODE, 4-PIN, Cat5e, PVC, cord length 2 meters, fixed installation
E11D04002M020	M12-M12 Double-ended Pre-Injection Ethernet connector, straight end ended, D-CODE, 4-PIN, Cat5e, PVC, cable length 2 m, fixed installation
E16DA4004M020	RJ45-M12 Double-ended Pre-Injection Ethernet Connector, Pin Straight, D-CODE, 4-PIN, Cat5e, PUR, cord length 2 m, tow chain suitable

E11D04004M020	M12-M12 Double-ended Pre-Injection Ethernet connector, straight head, D-CODE, 4-PIN, Cat5e, PUR, cable length 2 m, tow chain suitable

⚠️ **WARN!**

→ **Disconnect all power connections before wiring construction!**

→ **Copper wire only!**

→ **To ensure safety, ensure that the grounding terminal of the module is securely connected to the ground!**

→ **Wiring work must be operated by authorized electrical personnel to ensure construction safety!**

→ **Improper cables may cause serious equipment damage or personal injury!**

→ **Connect cables by referring to this manual or the wiring diagram printed on the side of the module. Incorrect wiring may cause module damage or personal injury!**

ℹ️ More Ethernet connector selection please refer to Elco "Connection system Comprehensive sample".

8.1.2. Power and signal lines

Power & Signal Wiring Requirements:

The MVT-C-EN and MVT-E-EN power supplies are M12, L-CODE, 5-pin pin connectors, and the MVT-E-EN expansion ports are M12, A-CODE, 5-pin pin connectors.

IO-Link cables:

According to the IO-Link protocol, point-to-point communication is used between the master station and the sub-station, and an extended distance of 20 meters can be achieved with the help of ordinary unshielded industrial cables (such as sensor cables).

According to the IO-Link protocol standard, a normal three-core cable can meet the communication requirements, while the remaining

four- or five-core cables are used for specific functions. The IO-Link valve terminal nodes of the MVT series use the IO-Link interface of the Class-B type.

For Class-B IO-Link interfaces, since all five pins are defined, the IO-Link hub in this form should be connected to the master with a five-core cable.

9. Input and output data structures

9.1. MVT-C-LK process data structure

The occupied Input is 8 bytes, The occupied output is 6 bytes.							
BYTE 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 0.7	Q 0.6	Q 0.5	Q 0.4	Q 0.3	Q 0.2	Q 0.1	Q 0.0
description	Valve_4_12	Valve_4_14	Valve_3_12	Valve_3_14	Valve_2_12	Valve_2_14	Valve_1_12	Valve_1_14
BYTE 1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 1.7	Q 1.6	Q 1.5	Q 1.4	Q 1.3	Q 1.2	Q 1.1	Q 1.0
description	Valve_8_12	Valve_8_14	Valve_7_12	Valve_7_14	Valve_6_12	Valve_6_14	Valve_5_12	Valve_5_14
BYTE 2	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 2.7	Q 2.6	Q 2.5	Q 2.4	Q 2.3	Q 2.2	Q 2.1	Q 2.0
description	Valve_12_12	Valve_12_14	Valve_11_12	Valve_11_14	Valve_10_12	Valve_10_14	Valve_9_12	Valve_9_14
BYTE 3	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 3.7	Q 3.6	Q 3.5	Q 3.4	Q 3.3	Q 3.2	Q 3.1	Q 3.0
description	Valve_16_12	Valve_16_14	Valve_15_12	Valve_15_14	Valve_14_12	Valve_14_14	Valve_13_12	Valve_13_14
BYTE 4	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 4.7	Q 4.6	Q 4.5	Q 4.4	Q 4.3	Q 4.2	Q 4.1	Q 4.0
description	Valve_20_12	Valve_20_14	Valve_19_12	Valve_19_14	Valve_18_12	Valve_18_14	Valve_17_12	Valve_17_14
BYTE 5	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 5.7	Q 5.6	Q 5.5	Q 5.4	Q 5.3	Q 5.2	Q 5.1	Q 5.0
description	Valve_24_12	Valve_24_14	Valve_23_12	Valve_23_14	Valve_22_12	Valve_22_14	Valve_21_12	Valve_21_14
Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
BYTE 0	Status 8	Status 7	Status 6	Status 5	Status 4	Status 3	Status 2	Status 1
BYTE 1	Status 16	Status 15	Status 14	Status 13	Status 12	Status 11	Status 10	Status 9
BYTE 2	Status 24	Status 23	Status 22	Status 21	Status 20	Status 19	Status 18	Status 17
BYTE 3	Status 32	Status 31	Status 30	Status 29	Status 28	Status 27	Status 26	Status 25
BYTE 4	Status 40	Status 39	Status 38	Status 37	Status 36	Status 35	Status 34	Status 33
BYTE 5	Status 48	Status 47	Status 46	Status 45	Status 44	Status 43	Status 42	Status 41
BYTE 6	Reserved							
BYTE 7	Uaux Overvoltage	Uaux Undervoltage	Usys Overvoltage	Usys Undervoltage	Uaux Error			Reserved

9.2.MVT-C-EN process data structure

The occupied Input is 8 bytes, The occupied output is 6 bytes.							
BYTE 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 0.7	Q 0.6	Q 0.5	Q 0.4	Q 0.3	Q 0.2	Q 0.1	Q 0.0
description	Valve_4_12	Valve_4_14	Valve_3_12	Valve_3_14	Valve_2_12	Valve_2_14	Valve_1_12	Valve_1_14
BYTE 1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 1.7	Q 1.6	Q 1.5	Q 1.4	Q 1.3	Q 1.2	Q 1.1	Q 1.0
description	Valve_8_12	Valve_8_14	Valve_7_12	Valve_7_14	Valve_6_12	Valve_6_14	Valve_5_12	Valve_5_14
BYTE 2	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 2.7	Q 2.6	Q 2.5	Q 2.4	Q 2.3	Q 2.2	Q 2.1	Q 2.0
description	Valve_12_12	Valve_12_14	Valve_11_12	Valve_11_14	Valve_10_12	Valve_10_14	Valve_9_12	Valve_9_14
BYTE 3	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 3.7	Q 3.6	Q 3.5	Q 3.4	Q 3.3	Q 3.2	Q 3.1	Q 3.0
description	Valve_16_12	Valve_16_14	Valve_15_12	Valve_15_14	Valve_14_12	Valve_14_14	Valve_13_12	Valve_13_14
BYTE 4	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 4.7	Q 4.6	Q 4.5	Q 4.4	Q 4.3	Q 4.2	Q 4.1	Q 4.0
description	Valve_20_12	Valve_20_14	Valve_19_12	Valve_19_14	Valve_18_12	Valve_18_14	Valve_17_12	Valve_17_14
BYTE 5	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
address	Q 5.7	Q 5.6	Q 5.5	Q 5.4	Q 5.3	Q 5.2	Q 5.1	Q 5.0
description	Valve_24_12	Valve_24_14	Valve_23_12	Valve_23_14	Valve_22_12	Valve_22_14	Valve_21_12	Valve_21_14
Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
BYTE 0	Status 8	Status 7	Status 6	Status 5	Status 4	Status 3	Status 2	Status 1
BYTE 1	Status 16	Status 15	Status 14	Status 13	Status 12	Status 11	Status 10	Status 9
BYTE 2	Status 24	Status 23	Status 22	Status 21	Status 20	Status 19	Status 18	Status 17
BYTE 3	Status 32	Status 31	Status 30	Status 29	Status 28	Status 27	Status 26	Status 25
BYTE 4	Status 40	Status 39	Status 38	Status 37	Status 36	Status 35	Status 34	Status 33
BYTE 5	Status 48	Status 47	Status 46	Status 45	Status 44	Status 43	Status 42	Status 41
BYTE 6	Reserved							
BYTE 7	Uaux Overvoltage	Uaux Undervoltage	Usys Overvoltage	Usys Undervoltage	Uaux Error			Reserved

9.3.MVT-E-EN process data structure

The maximum input is 106 bytes, and the output is 74 bytes								
Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	description
IB0	Status 8	Status 7	Status 6	Status 5	Status 4	Status 3	Status 2	Status 1	Valve Terminal Status
IB1	Status 16	Status 15	Status 14	Status 13	Status 12	Status 11	Status 10	Status 9	
IB2	Status 24	Status 23	Status 22	Status 21	Status 20	Status 19	Status 18	Status 17	
IB3	Status 32	Status 31	Status 30	Status 29	Status 28	Status 27	Status 26	Status 25	
IB4	Status 40	Status 39	Status 38	Status 37	Status 36	Status 35	Status 34	Status 33	
IB5	Status 48	Status 47	Status 46	Status 45	Status 44	Status 43	Status 42	Status 41	
IB6					Port2 Pin2	Port2 Pin4	Port1 Pin2	Port1 Pin4	IO Signal
IB7	Uaux Overvoltage	Uaux Undervoltage	Usys Overvoltage	Usys Undervoltage	Uaux Error			Reserved	Master Power Status
IB8	Secondary Supply Voltage Fault	Device Diagnose	IO-Link Device Validation Error	Communication Lost		Pin2 Overload	Pin4 Overload	Pin1 Power Short	Port1 IOLINK Status
IB9	Secondary Supply Voltage Fault	Device Diagnose	IO-Link Device Validation Error	Communication Lost		Pin2 Overload	Pin4 Overload	Pin1 Power Short	Port2 IOLINK Status
IB10~IB41	IOL Port1 Input								
IB42	IOL Port1 Status IOL:Port in IO-Link mode DC:Device connected								
							DC	IOL	
IB43	IOL Port1 Error VF: Validation failed SC: IO-Link short-circuit DF: Data storage validation failed PDI: Process data invalid								
	SC					PDI	DF	VF	
IB44~IB45	IOL Port1 Vendor ID								MSB
IB46~IB48	IOL Port1 Device ID								MSB
IB49	IOL Port1 EventQualifier1								
	Mode		Type						
IB50~IB51	IOL Port1 EventCode1								
IB52	IOL Port1 EventQualifier2								
	Mode		Type						

IB53~IB54	IOL Port1 EventCode2							
IB55	IOL Port1 EventQualifier3							
	Mode		Type					
IB56~IB57	IOL Port1 EventCode3							

Mode:

0: reserved;   1: Single event;

2: Event outgoing; 3: Event incoming

Type:

0: reserved;   1: Message;

2: Warning;   3: Error

EventCode: MSB

IB58~IB89	IOL Port2 Input	
IB90	IOL Port2 Status	Ref
IB91	IOL Port2 Error	Port1
IB92~IB93	IOL Port2 Vendor ID	
IB94~IB96	IOL Port2 Device ID	
IB97	IOL Port2 EventQualifier1	
IB98~IB99	IOL Port2 EventCode1	
IB100	IOL Port2 EventQualifier2	
IB101~IB102	IOL Port2 EventCode2	
IB103	IOL Port2 EventQualifier3	
1B104~IB105	IOL Port2 EventCode3	

Output	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	description
QB0	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Value
QB1	Output 16	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Terminal
QB2	Output 24	Output 23	Output 22	Output 21	Output 20	Output 19	Output 18	Output 17	Output
QB3	Output 32	Output 31	Output 30	Output 29	Output 28	Output 27	Output 26	Output 25	
QB4	Output 40	Output 39	Output 38	Output 37	Output 36	Output 35	Output 34	Output 33	
QB5	Output 48	Output 47	Output 46	Output 45	Output 44	Output 43	Output 42	Output 41	
QB6					Port2 Pin2		Port1 Pin2		IO Signal
QB7	Reserved								

								Diagnose Disable	Port1 Control
QB8								Diagnose Disable	Port1 Control
QB9								Diagnose Disable	Port2 Control
QB10~QB41	IOL Port1 Output								
QB42~QB73	IOL Port2 Output								

Connection Manager

	Connection Name	Configuration	Length (Byte)	Consuming I/O (OutData)	Length (Byte)	Producting I/O (InData)	Length (Byte)
Connection1	Listen Only	(0x66)102	26	(0xC0)192	0	(0x6F)111	14
Connection2	Input Only	(0x66)102	26	(0xC1)193	0	(0x6F)111	14
Connection3	Control/Status+IOL2	(0x66)102	26	(0x6E)110	14	(0x6F)111	14
Connection4	Control/Status+IOL4	(0x66)102	26	(0x78)120	18	(0x79)121	18
Connection5	Control/Status+IOL16	(0x66)102	26	(0x8C)140	42	(0x8D)141	42
Connection6	Control/Status+IOL32	(0x66)102	26	(0xA0)160	74	(0xA1)161	74
Connection7	Control/Status+IOL32+Status	(0x66)102	26	(0xA0)160	74	(0xAB)171	106

You can select different bytes according to your needs, and the process data displayed above is the maximum value, with 106 bytes for input and 74 bytes for output.

9.4. Disconnection output control description

Disconnection output control	0- Clear Output; 1- All outputs high; 2- Hold the output;

9.5. Description of channel diagnostic bits

diagnosis byte	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Byte0	Diag CH8	Diag CH7	Diag CH6	Diag CH5	Diag CH4	Diag CH3	Diag CH2	Diag CH1
Byte1	Diag CH16	Diag CH15	Diag CH14	Diag CH13	Diag CH11	Diag CH11	Diag CH10	Diag CH9
Byte2	Diag CH24	Diag CH23	Diag CH22	Diag CH21	Diag CH20	Diag CH19	Diag CH18	Diag CH17
Byte3	Diag CH32	Diag CH31	Diag CH30	Diag CH29	Diag CH28	Diag CH27	Diag CH26	Diag CH25
Byte4	Diag CH40	Diag CH39	Diag CH38	Diag CH37	Diag CH36	Diag CH35	Diag CH34	Diag CH33
Byte5	Diag CH48	Diag CH47	Diag CH46	Diag CH45	Diag CH44	Diag CH43	Diag CH42	Diag CH41

10. Configuration and commissioning

10.1. Debugging in the Siemens PORTAL environment

10.1.1. Module GSD file

Configure the valve terminal modules of the MVT series using a GSD file (XML format) for the integration of the MVT valve terminal node modules into your system as standard Profinet IOs. You can visit the ELCO website to get the latest GSD documents or call the customer service line to contact a technician.

The integration of GSD files into the system depends on the configuration software you are using, usually the Siemens Portal programming software used by Profinet systems integrates GSD files as follows:

10.1.1.1. Run the Portal software and select "Options>Manage general station description files_GSD" in the menu bar.
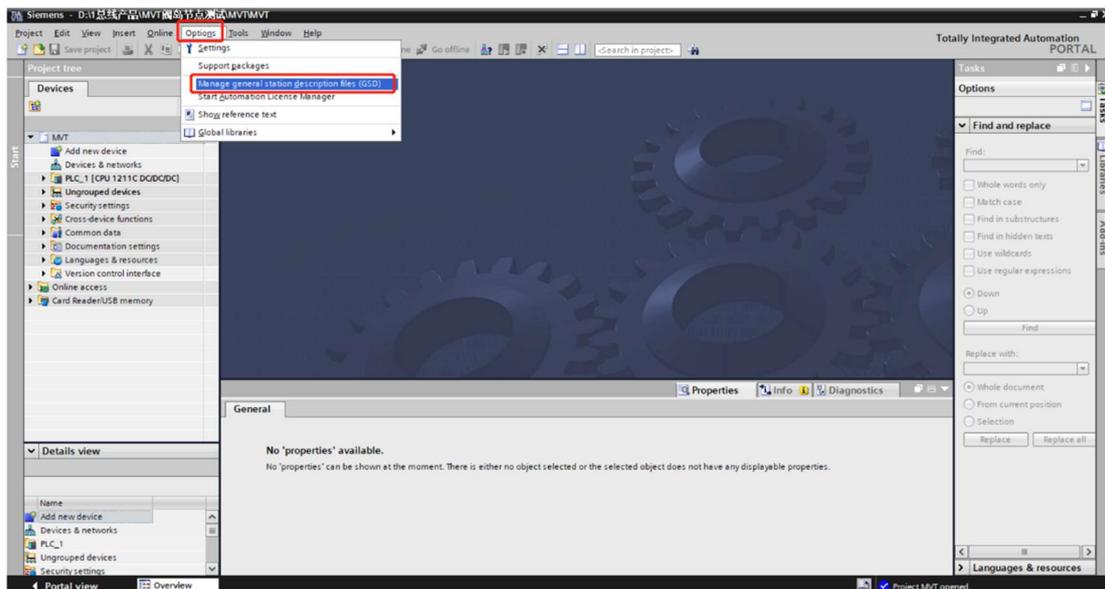
10.1.1.2. In the next dialog box, select the GSD file you want to install and click Install to install it.

Note: You need to install the latest version of the GSDML file.
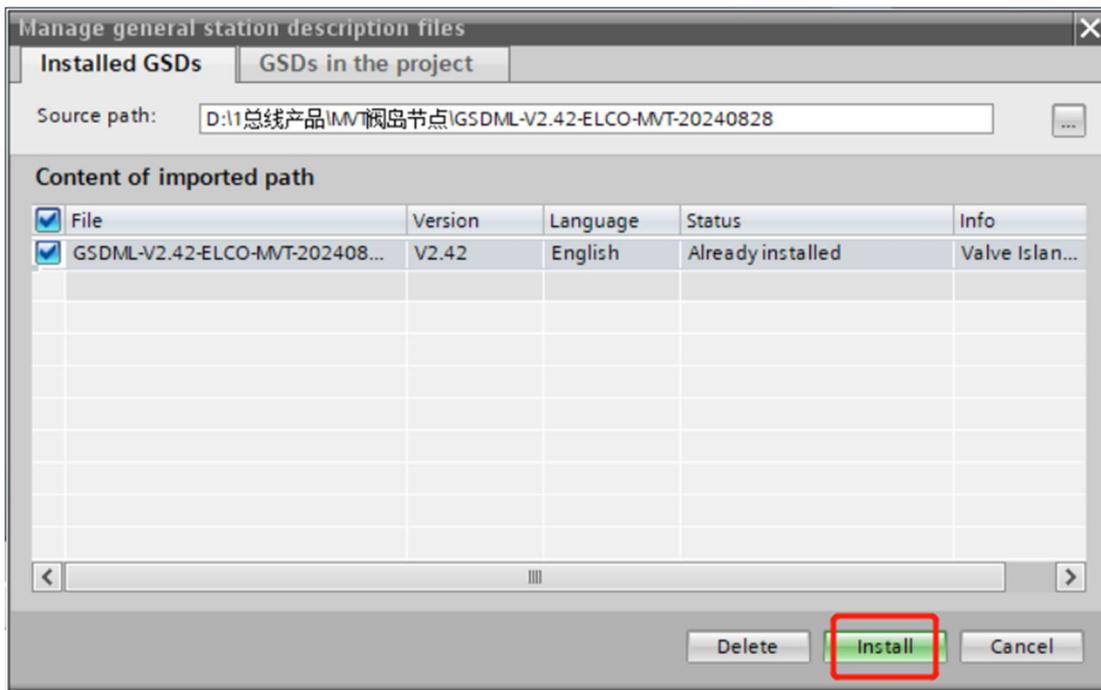
10.1.1.3. The newly installed MVT valve island node module is displayed under "Other field devices> PROFINET-IO >Gateway > ELCO >MVT".
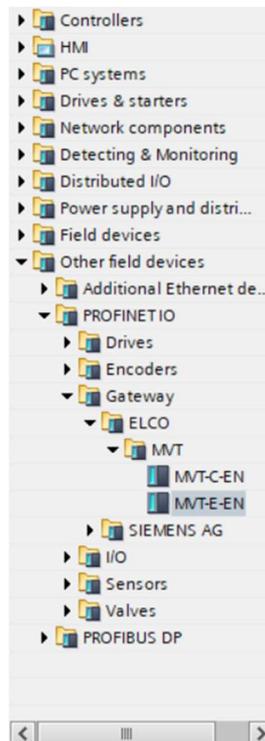
10.1.1.4. The user configures the MVT valve terminal node module in the Portal according to the actual use.

10.1.2. Example of module configuration in the Siemens Portal environment

This section describes how to use the MVT valve island node module. In this example, the MVT valve island node module of ELCO is used as the Profinet slave station to connect to Siemens PLC-CPU2222C through the Profinet bus. By default, all power supply and bus connections have been completed. The device name of the MVT valve island node module is set to MVT-Gateway.

The MVT valve terminal node module is configured with the following products:

type	description	number
MVT-C-EN	Multi-protocol valve terminal node slaves	1

10.1.2.1. Create a new Portal project.

Open the TIA Portal software, click "Create new project", change "project name" to MVT, select the save path, and click "Create".
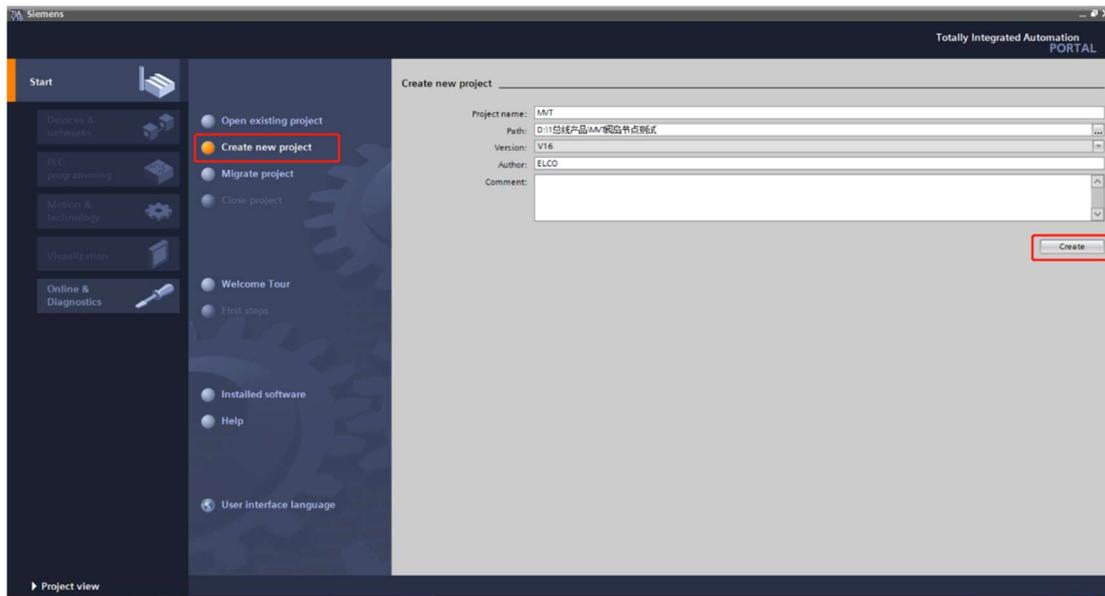
10.1.2.2. To install the GSD file of Elco MVT series valve terminal node products, please refer to the relevant content of "10.1.1 GSD file" for the specific method.

10.1.2.3. Double-click "Add New Device" on the left and select the PLC model you want to use in the "Controllers" window.
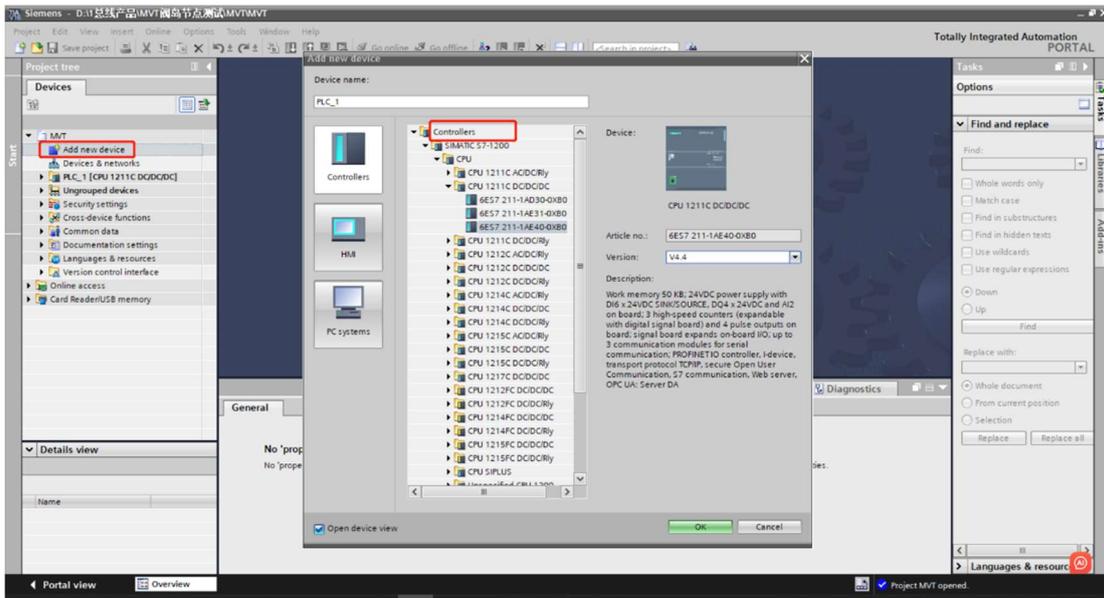
10.1.2.4. Double-click the "Device configuration" window on the left, and in the "Device view" window, select "Properties>-- PROFINET interface[X2]-->IP protocol", and set the IP address of the PLC.
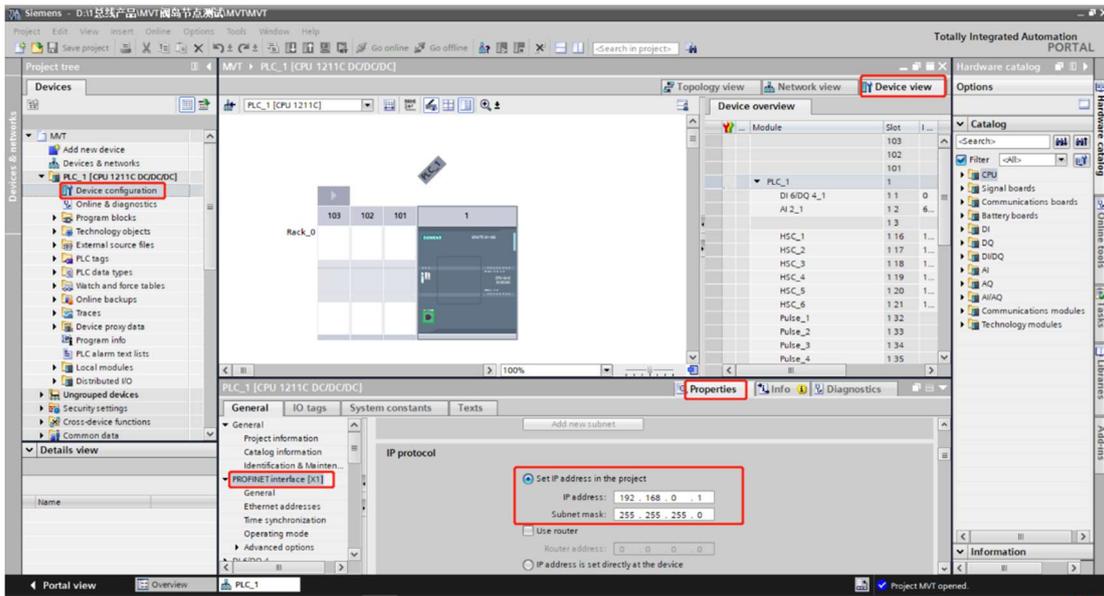
10.1.2.5. The MVT valve terminal node module is added and connected to the PLC for communication.

1) Double-click "Device configuration" on the left to enter the "Network view", select the MVT-C-EN valve terminal node of "Other field devices> PROFINET-IO >Gateway > ELCO >MVT" from "Catalog", and double-click or drag to

add to the network.
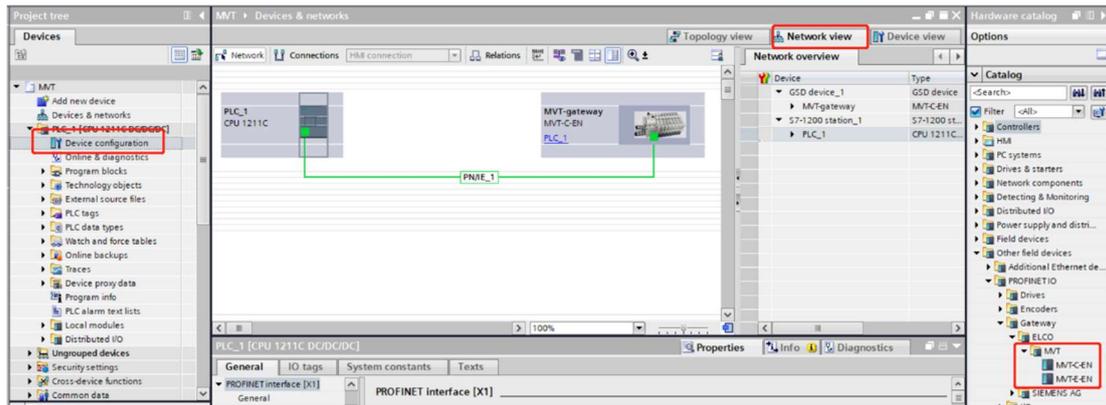
2) Click "Not assigned", click and select "PLC_1.PROFINET interface_1".
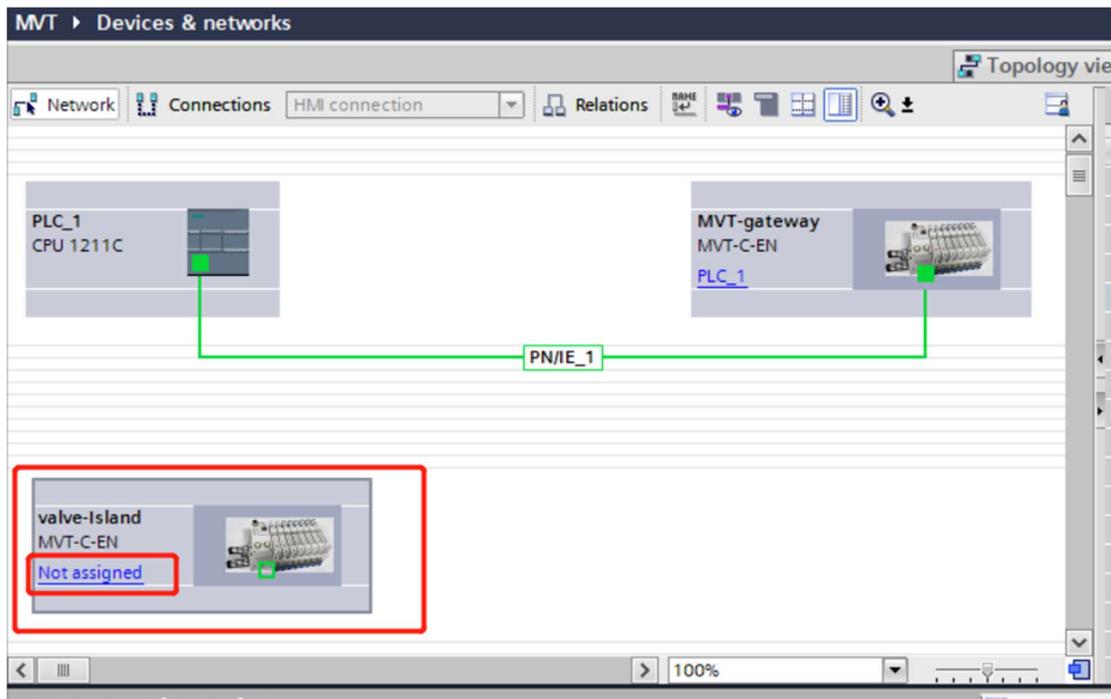
3) The MVT-C-EN valve terminal node module is connected to the PLC.
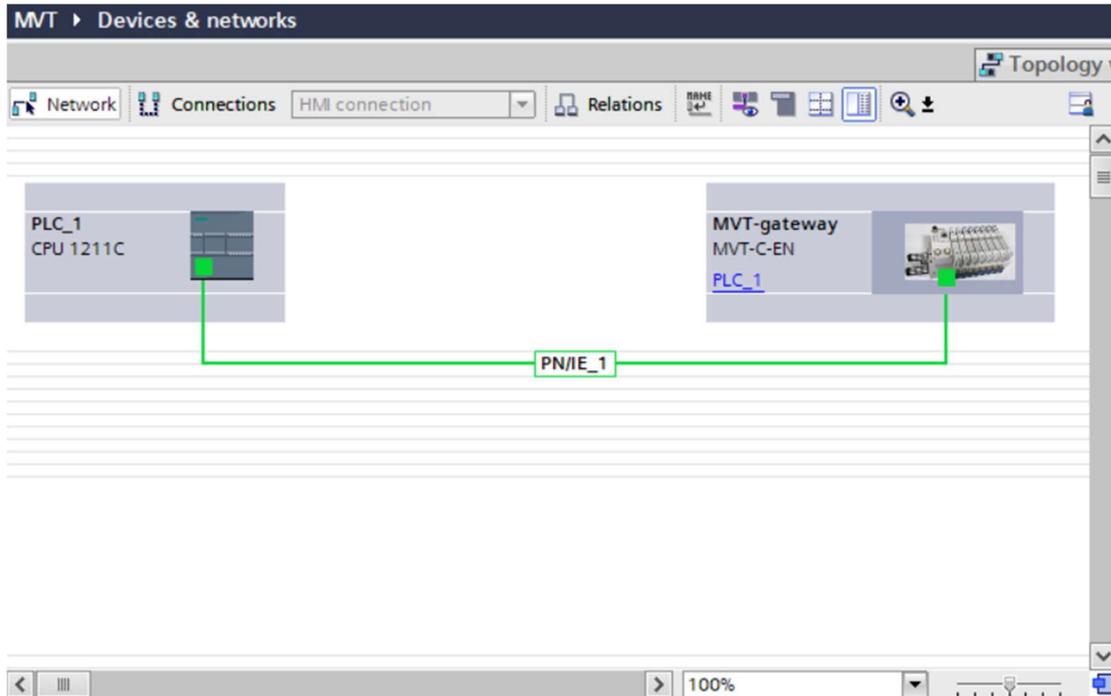
10.1.2.6.　Modify the device name and IP address settings of the MVT valve terminal node module.

1) Click the MVT valve terminal module in "Network view", choose "properties-->PROFINET interface-->Ethernet addresses", set the MVT terminal node module device name, MVT-gateway, and IP address in the window. (It should be in the same network segment as the IP address of the PLC).

2) Select MVT-C-EN, select "Assign device name" from the right-click menu, click "Update list" on the Assign Profinet device name interface, the name and MAC address of the connected MVT valve terminal node module will be scanned, select the device with the same MAC address and click "Assign name".
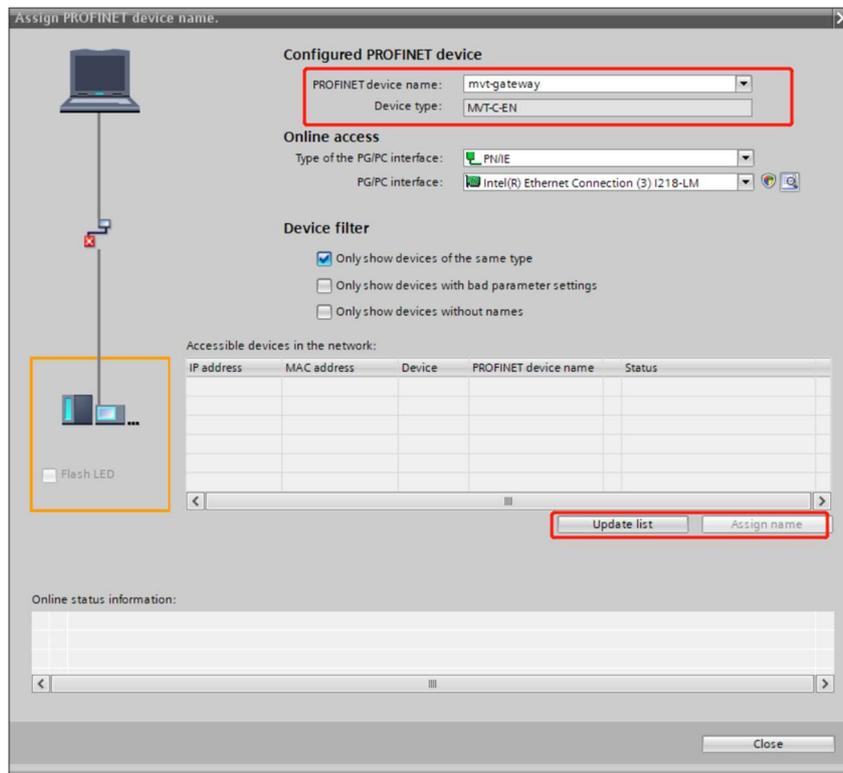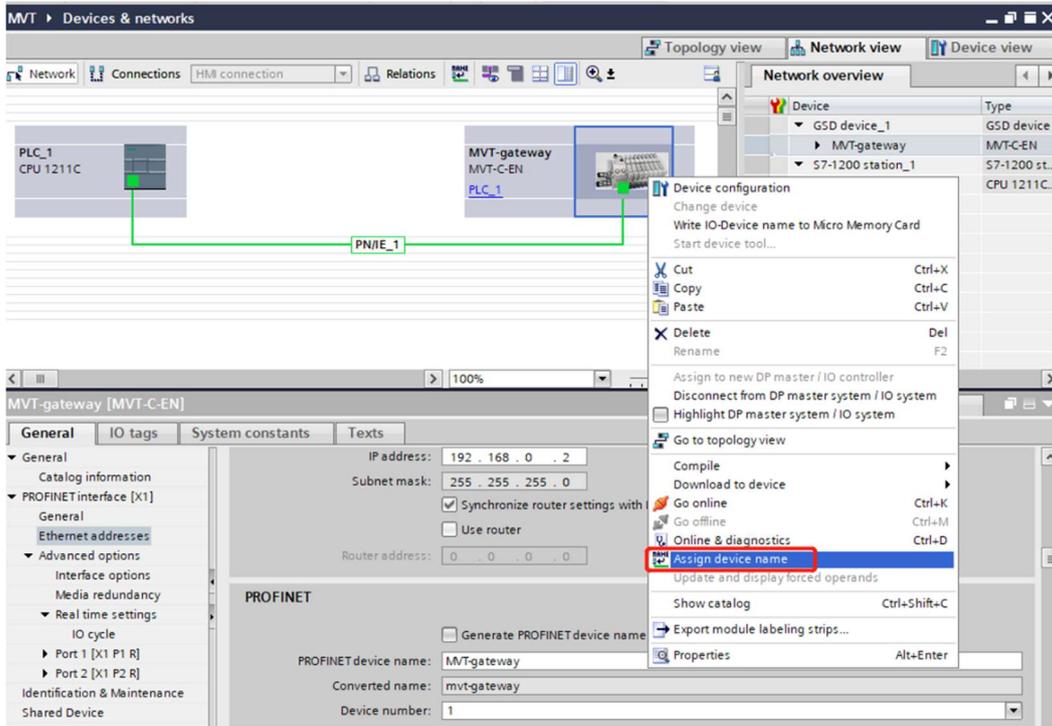
Tips: In this example, the input address of the MVT valve terminal node module is 1-6, and the output address is 1-6, and the input and output addresses can be modified as needed.

10.1.2.7. Select "MVT-C-EN, > properties, > Module parameters".
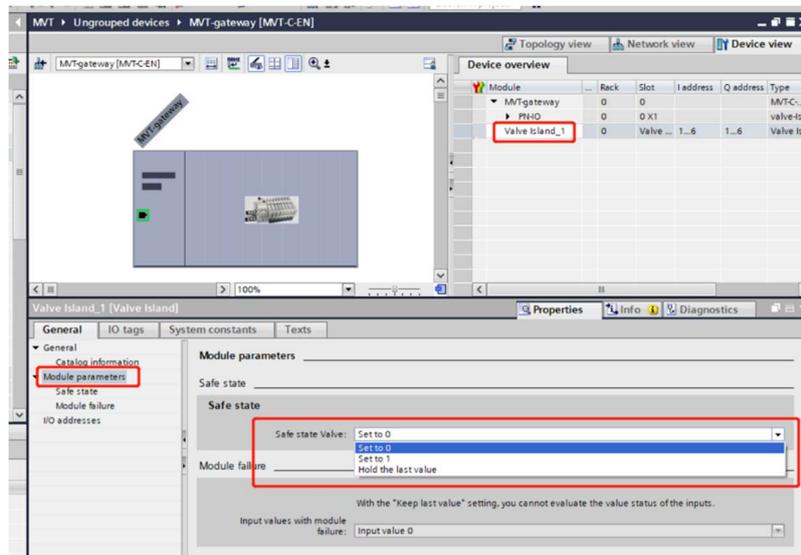
10.1.2.8. After the parameter setting is completed, the configuration is saved and compiled, and the configured configuration is downloaded to the PLC to complete the configuration work.

10.1.2.9. At this point, if everything is configured correctly, the indicators of the MVT valve terminal nodes are all shown in green, with the Atc indicator flashing yellow.

10.2. Example of Omron PLC configuration

10.2.1. Module EDS file

Configure the valve terminal modules of the MVT series using an EDS file (EDS format) for integrating the MVT valve terminal node modules into your system as standard EtherNet/IP IO. You can visit the ELCO website to get the latest EDS documents or call the customer service line to contact a technician.

The integration of EDS files into the system depends on the configuration software you are using, using the Sysmac Studio programming software from Omron as an example for EtherNet/IP systems, and follow the steps below to add EDS files：

1) Run the Sysmac Studio software and select "Tools＞EtherNet/IP Connection Settings" in the menu bar.
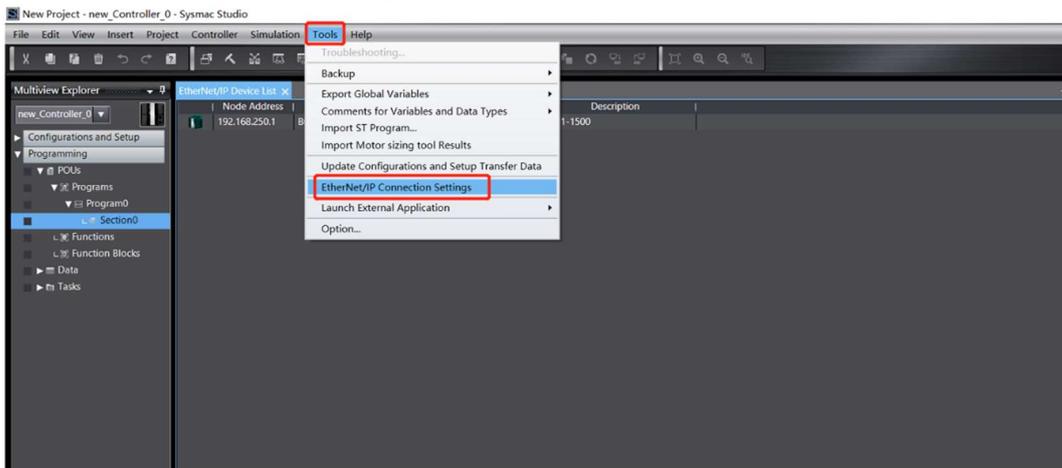
2) In the "EtherNet/IP Device List", right-click "Edit".
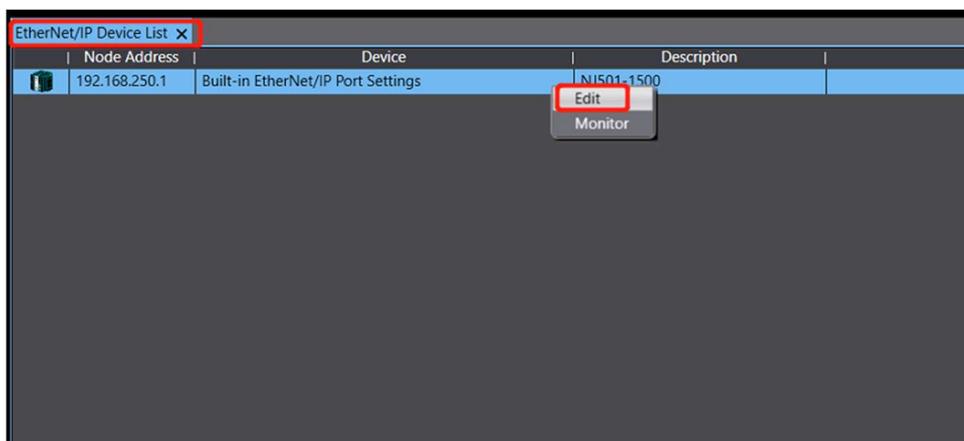
3) Once the EtherNet/IP port settings appear, right-click on "Display EDS Library" in the "Toolbox" on the right.
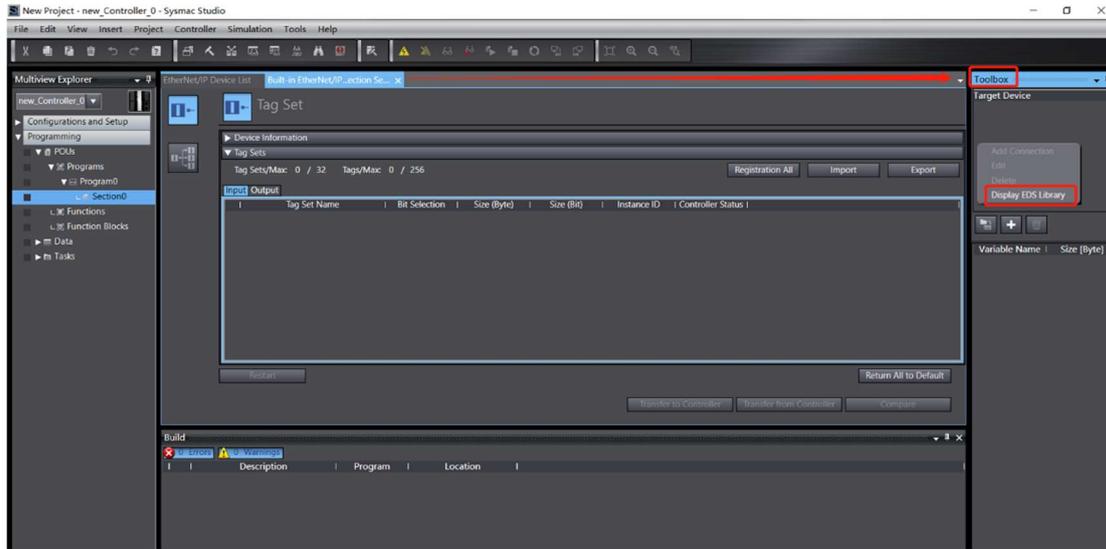
4) Click "Install" in the "EDS Library", find the EDS file corresponding to the valve terminal node, select it, click "Open(O)", and the newly installed MVT valve terminal node will be displayed in the "ELCO Industry Automation AG > Communications Adapter" directory.
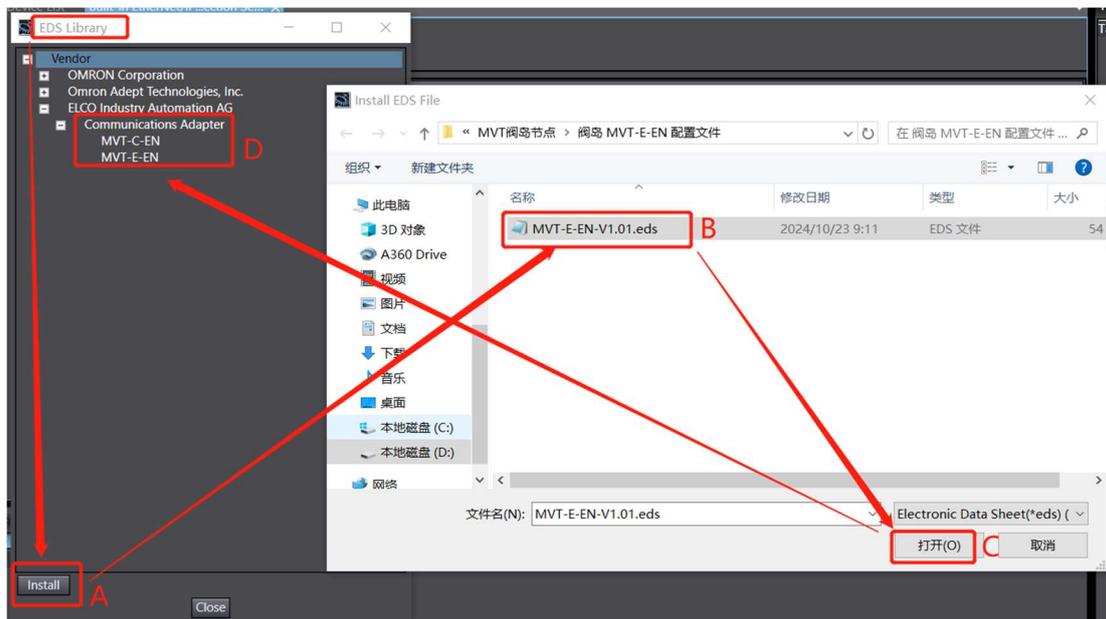
10.2.2. Example of module configuration in Omron's Sysmac Studio environment

1) Open the Sysmac Studio software, click on "New Project", fill in the corresponding information according to the PLC model, and click "Create".
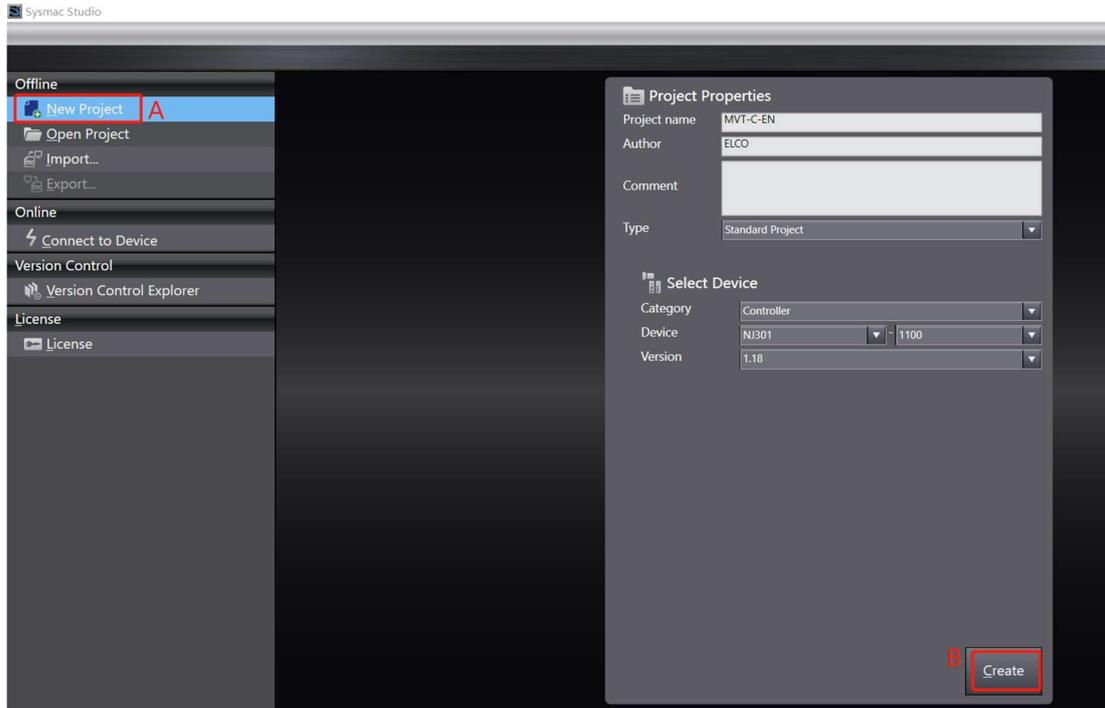
2) For the built-in "EtherNet/IP Port Settings" on the PLC, set the "IP Address" to the default IP address of the PLC, which is 192.168.250.1 in this example.
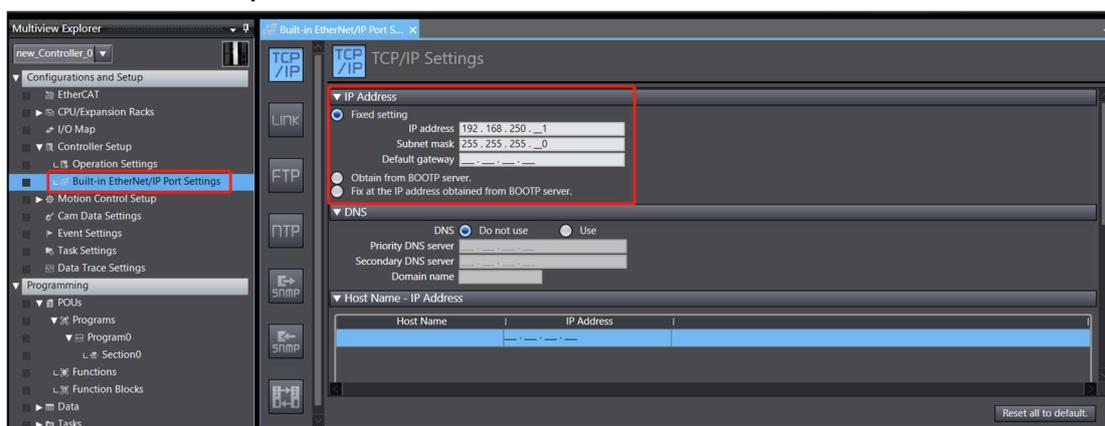
3) To start setting up your EtherNet/IP network, select "Tools>EtherNet/IP Connection Settings" in the menu bar.
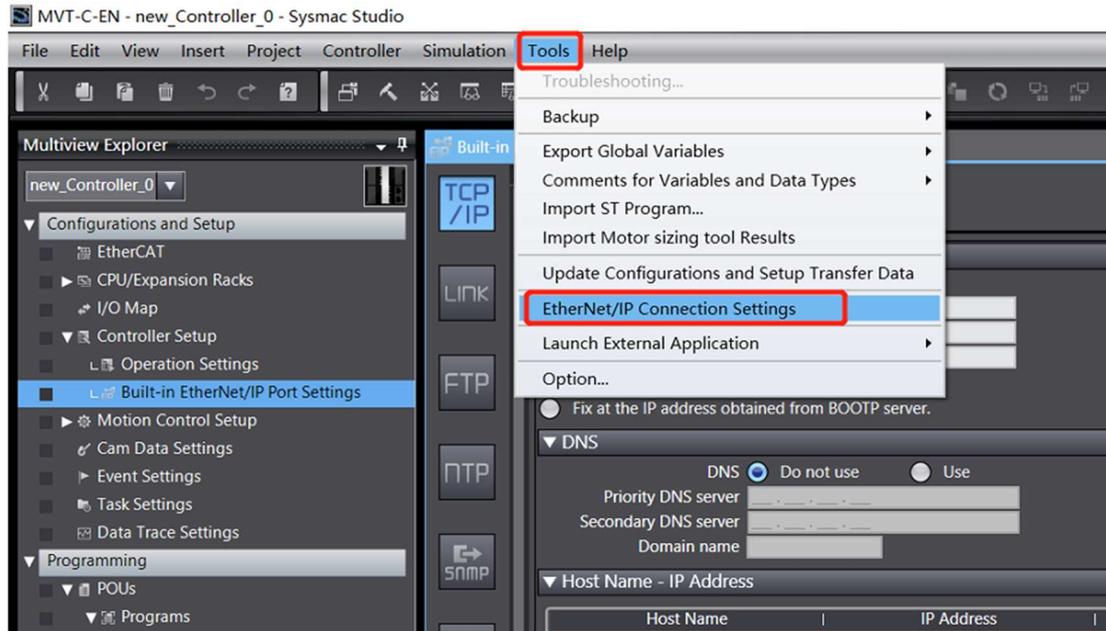
4) Double-click or right-click on the "Edit" PLC's built-in EtherNet/IP port settings in the newly opened interface to open the connection settings screen.
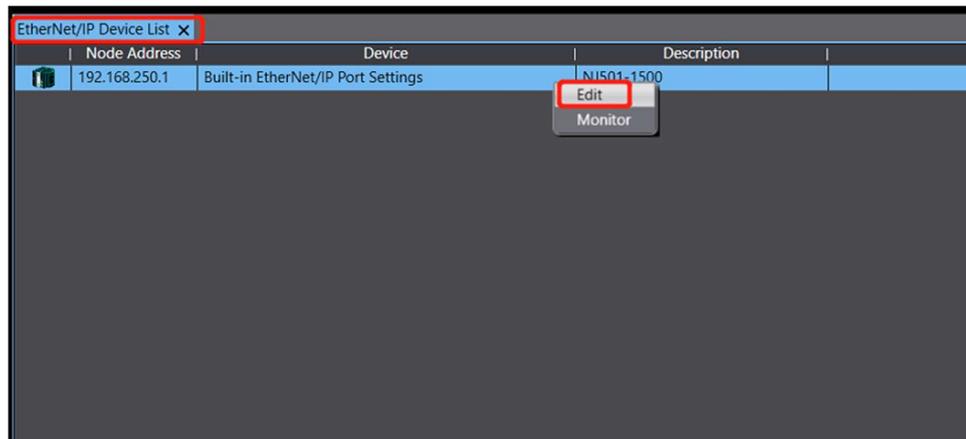
5) Click the "+" button in the toolbox, fill in the IP address of the module you want to configure in the pop-up window (192.168.250.2 in this example), select the model MVT-C-EN of the valve terminal node in the model name, select the latest revision version, and click the "Add" button when you are done. (Note that in order to set the PLC and the valve terminal node to the same network segment, the IP address of the valve terminal node needs to be set in advance, and the IP address can be assigned using the BOOTP-DHCP server tool that comes with Rockwell software.)
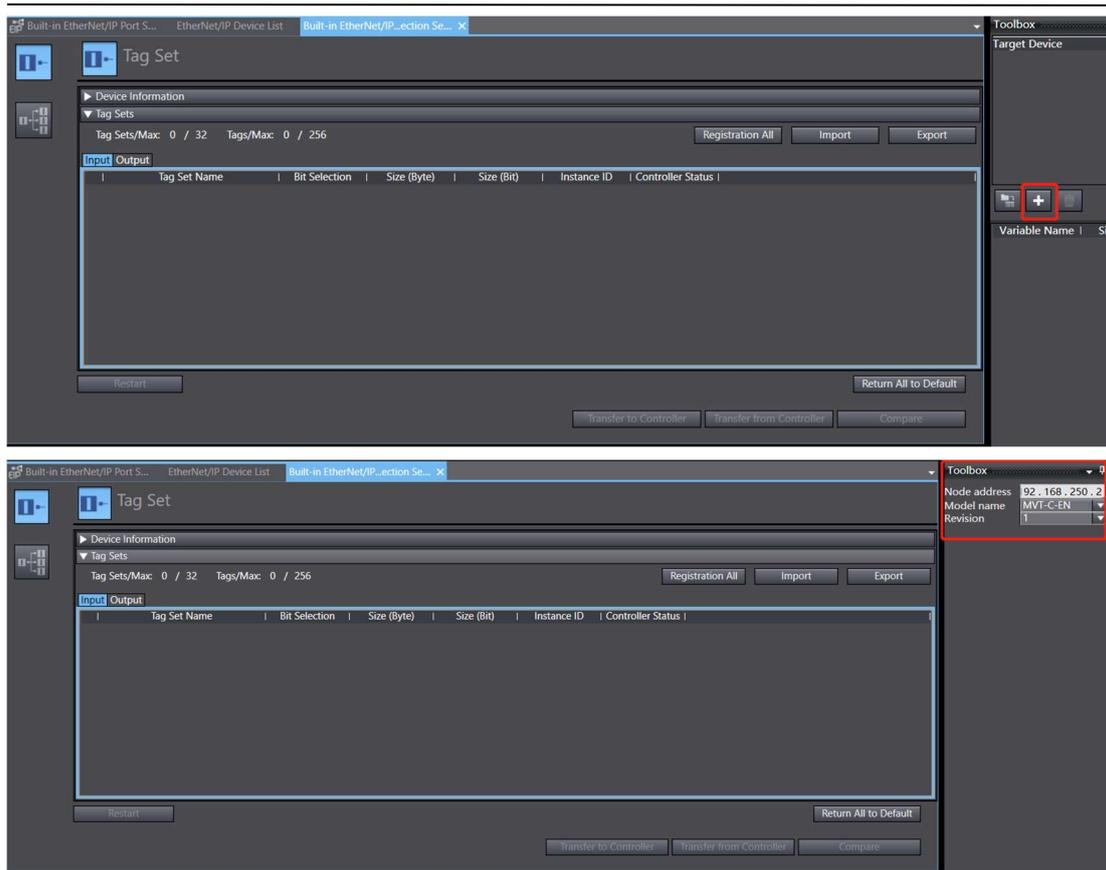
6) Right-click the newly added "Target Device->192.168.250.2 MVT-C-EN Version 1", follow the situation described in the disconnection output control instructions in the pop-up window, select the desired type, and click the "OK" button to complete the setting.
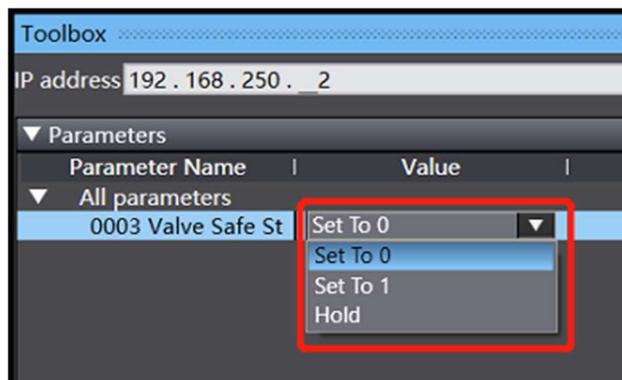
7) Since the data from the EtherNet/IP slave is packaged and sent to the PLC, it is recommended to create your own data types and global variables to facilitate signal reading. The MVT node module occupies 8_Byte input and 6_Byte output, and the data structure is as follows:

type	Byte	description	data length
input	0~5	Overload detection	48 bit
	6	reserved	8 bit
	7	Mains power state	8 bit
output	0~5	Valve output control	48 bit

8) According to the above data structure table, establish the structure of the data type, and then create the global variables corresponding to the module.
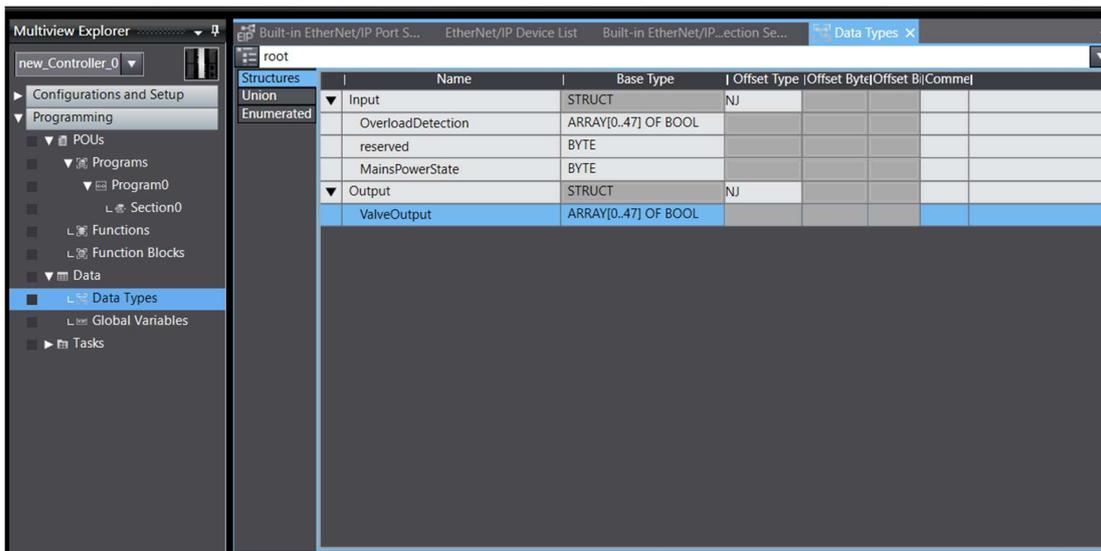
Note: When creating a data type, you can ensure that the length occupied is the same, and the specific type can be decided according to your own habits. For example, if a module occupies 6 byte, you can create an array of 48 BOOL, an array of 6 byte, or a variable of 3 Word as shown in the figure above.

9) Establish the global variables corresponding to the MVT node module, and divide them into inputs and outputs. Each node module needs to correspond to an input and an output of global variables, select the data type just created, and select the input and output corresponding to the type of "network exposure".

The global variables corresponding to similar node modules can use the same data type (i.e., structs), that is, the global variables need to be created according to the number of node modules used, while the structs only need to create one input and one output. If there are 3 similar MVT nodes in the system, you need to create 6 global variables to correspond, but the data type can be the same.

10)　In the "Built-in EtherNet/IP Port Settings" window, select "Tag Set" and click the "Registration All" button. In the pop-up window, register the newly created global variable, then you can see the size of the new variable, enter 8 bytes, and output 6 bytes. If the size is not, there is a problem with the global variable and data type that you just created and needs to be modified.
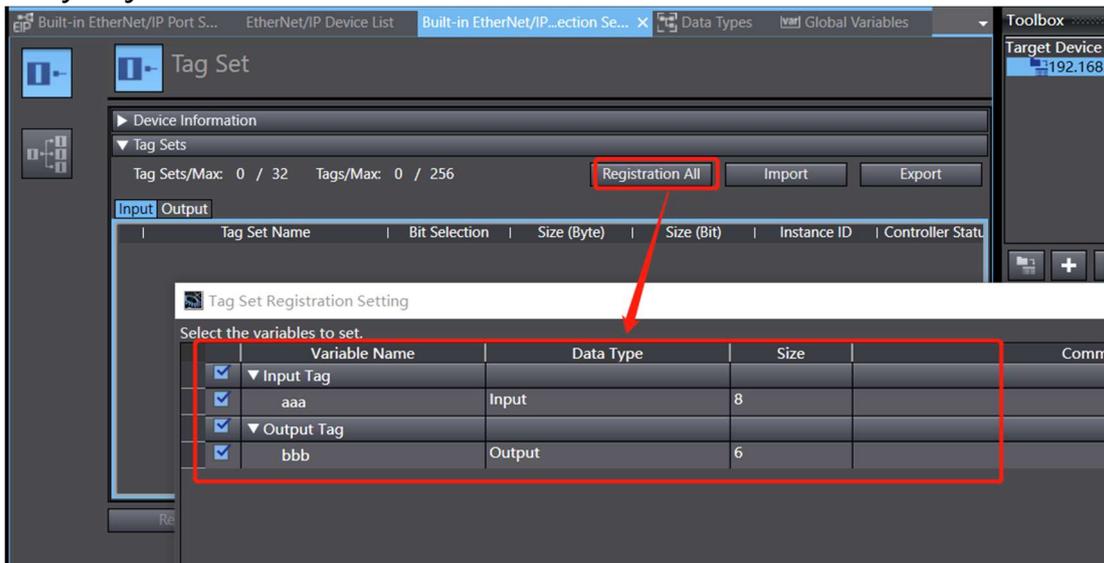
11)　　In the "Built-in EtherNet/IP Port Settings" window, select "Connection" on the left, click the "+" button to add a new

connection, "Target Device" to select the node module we configure, "Connection I/O Type" to Control/Status, "Target Variable" as the code input as 101, output as 100, "Originator". Variable" selects the new global variable, and "Connection Type" selects Point to Point connection.
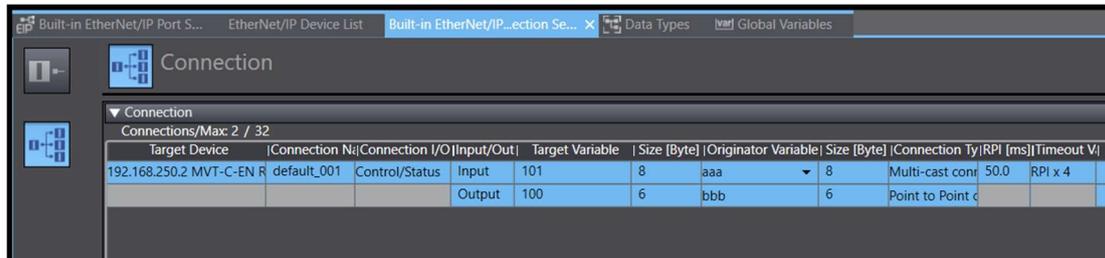
12) At this point, all the basic settings have been completed, you can download the program to the PLC, note that the EtherNet/IP port settings need to be downloaded separately, click "Transfer to Controller" in the figure above. At this point, if everything is configured correctly, the indicators of the MVT valve terminal nodes are all shown in green, with the Atc indicator flashing yellow.

10.3. Mitsubishi PLC configuration example

10.3.1. Module CSPP file

Configure the valve terminal module of the MVT series using a CSPP file (CSPP format), which is used to integrate the MVT valve terminal node module into your system as a standard CC-Link IE IO. You can visit the ELCO company website to get the latest CSPP documents or call the customer service line to contact a technician.

The integration of the CSPP file into the system depends on the configuration software you are using, using the Mitsubishi GX-work3 programming software used in the CC-Link IE system as an example, follow these steps to add the CSPP file:

1) Run the GX-work3 software and select Tool>Profile Management(p) >Register(R) in the menu bar.
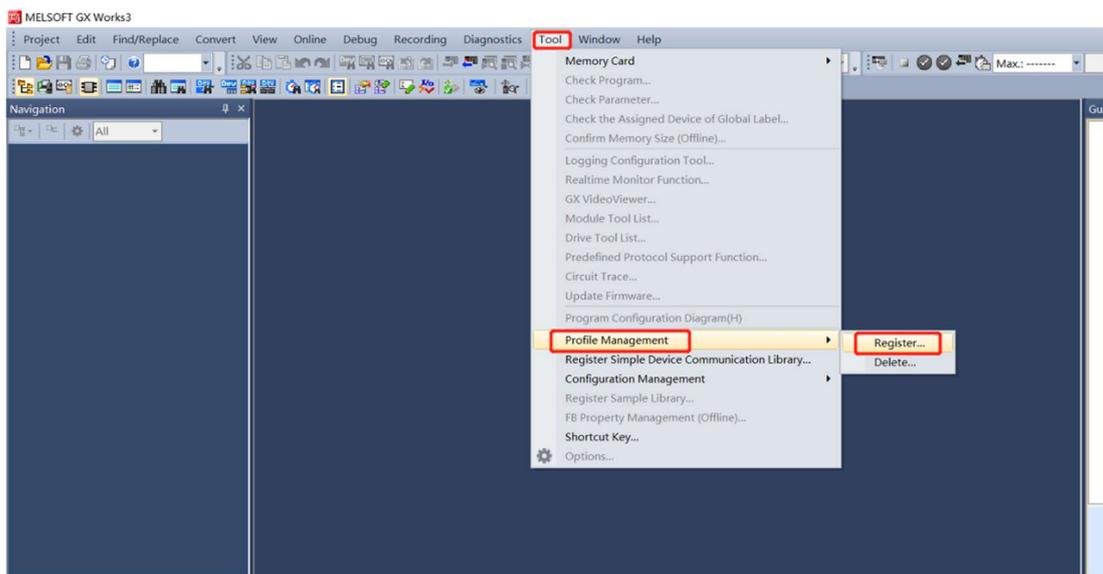
2) In the next dialog box, select the cspp file you want to install and click "Register(R)" to install it.
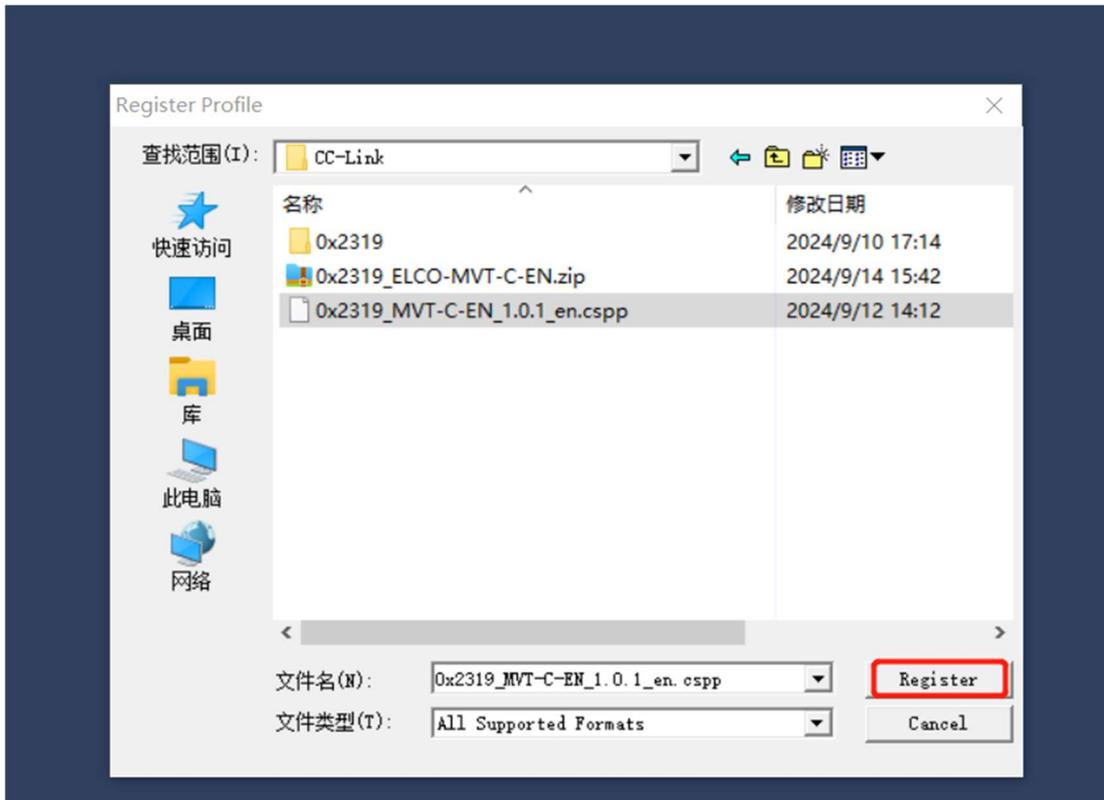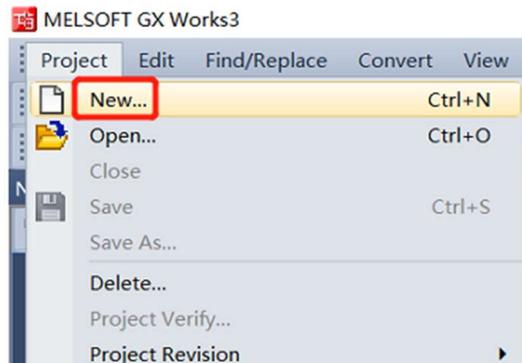
3) The newly installed MVT node modules are displayed in the "Module List> CCIEF Basic Module(Tianjin Elco Automation Co, Ltd) > CC-Link IEF Basic Valve Controler >MVT-C-EN" hardware directory as follows.
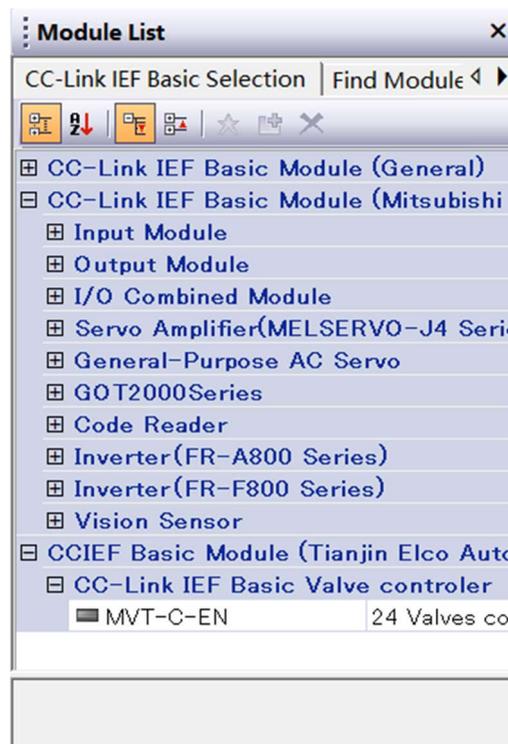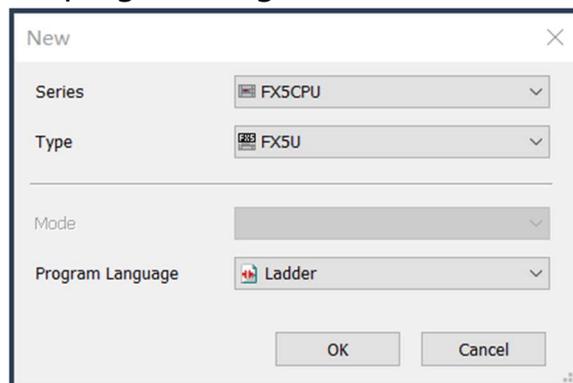
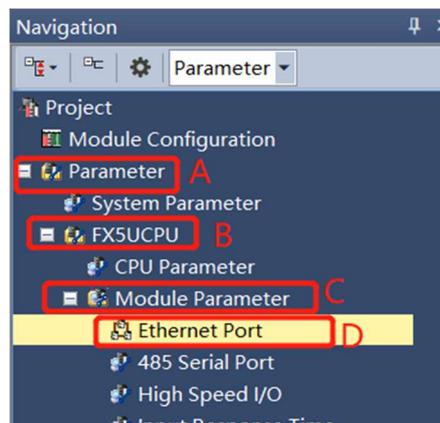## 10.3.2. Example of module configuration in Mitsubishi GX-

work3 environment

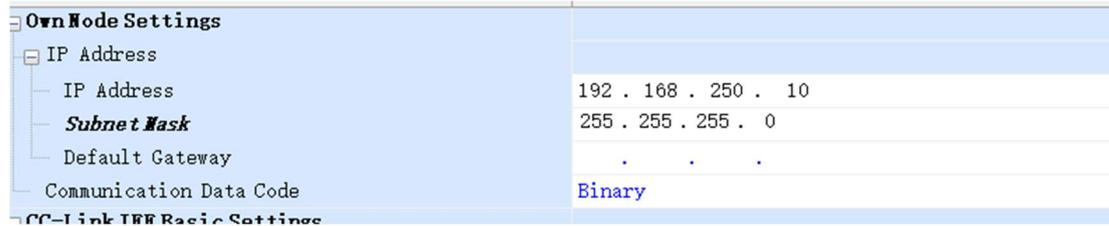1) Open the GX-work3 software and click Project>New(N).

2) "Series" to select FX5CPU; Select FX5U for Type; "Program Language" is based on your programming habits. Then click "OK".

3) After entering the interface, select the number of "Navigation" items on the left, and then select "Parameter>CPU model>Module Parameter> and double-click Ethernet Port" to enter the following interface.

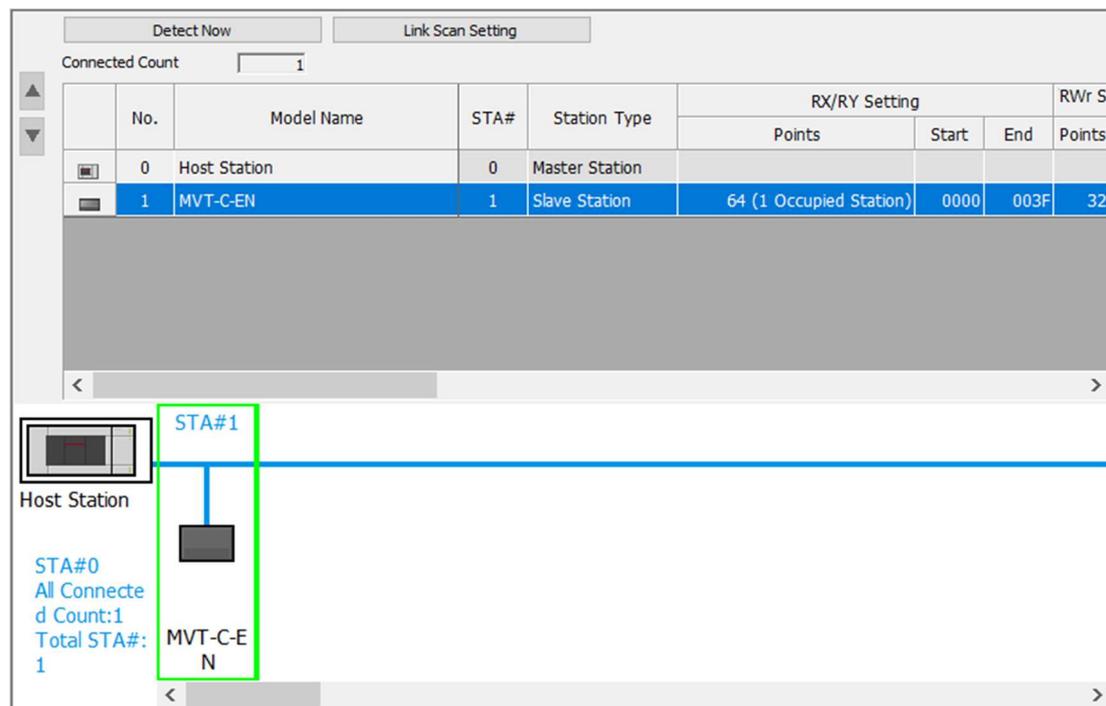4) IP Address"192.168.250.10";Subnet Mask"255.255.255.0".

Own Node Settings	
IP Address	
IP Address	192 . 168 . 250 . 10
Subnet Mask	255 . 255 . 255 . 0
Default Gateway	. . .
Communication Data Code	Binary
CC-Link IEF Basic Settings	

5) CC-link IEF Basic settings

(a) CC-link IEF Basic Use with or without "Use".

CC-Link IEF Basic Settings	
To Use or Not to Use CC-Link IEF Basic Setting	Use
Network Configuration Settings	\<Detailed Setting\>
Refresh Settings	\<Detailed Setting\>

(b) network configuration settings; Click Detailed setting.

CC-Link IEF Basic Settings	
To Use or Not to Use CC-Link IEF Basic Setting	Use
Network Configuration Settings	\<Detailed Setting\>
Refresh Settings	\<Detailed Setting\>

(c) Click "Detect Now>OK".

	No.	Model Name	STA#	Station Type	RX/RY Setting Points	Start	End	RWr S Points
	0	Host Station	0	Master Station				
	1	MVT-C-EN	1	Slave Station	64 (1 Occupied Station)	0000	003F	32

Detect Now   Link Scan Setting
Connected Count   1

Host Station

STA#0
All Connected Count:1
Total STA#: 1

STA#1

MVT-C-EN

(d) Change the IP address of the module to 192.168.250.11.

	No.	Model Name	IP Address	Subnet Mask	MAC Address	Com ment
▤	0	Host Station	192.168.250.10	255.255.255.0		
▭	1	MVT-C-EN	192.168.250.11	255.255.255.0		

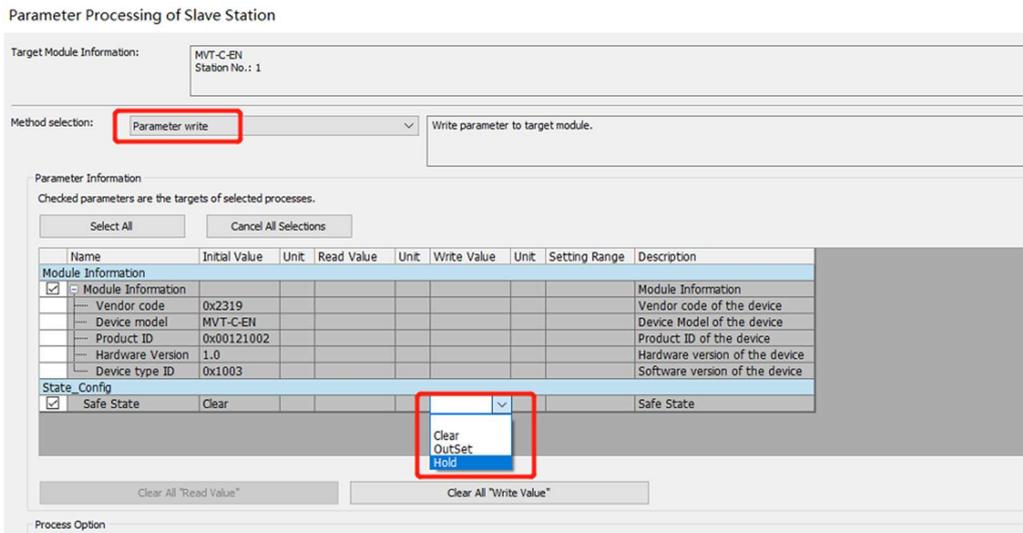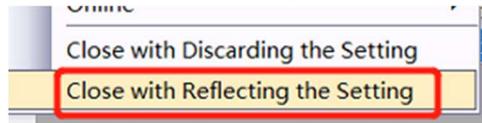（e）Right-click the module and select "Online>Communication Setting Reflection of Slave Station".
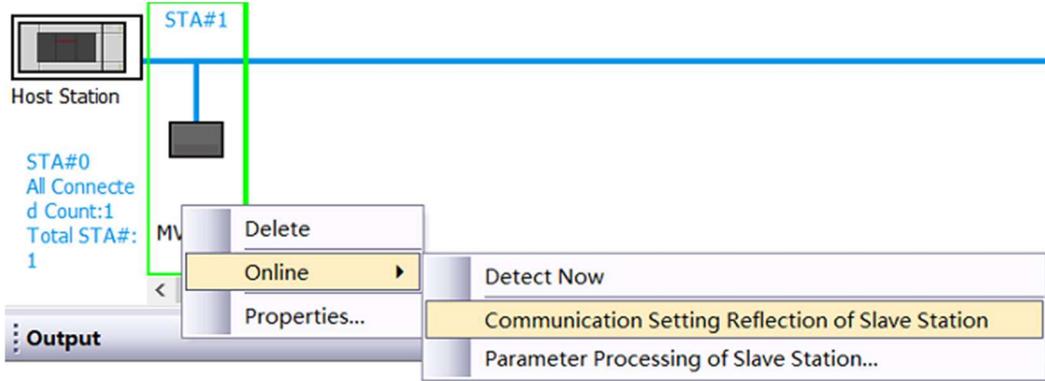
（f）Right-click the module and choose "Online >Parameter Processing of Slave Station".
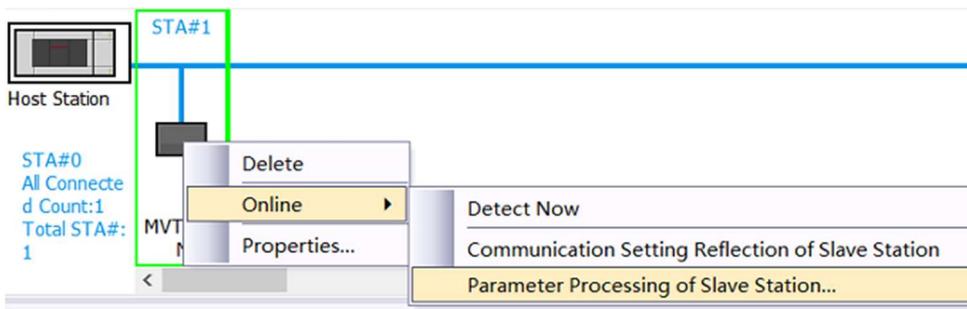
（g）Click Execute, select "Parameter write", select the desired disconnection state in the "safe state" option, and click "Execute".

(h) Click on "Close with Reflecting the Setting"

6) Refresh Settings

(a) Select "Detailed Setting".
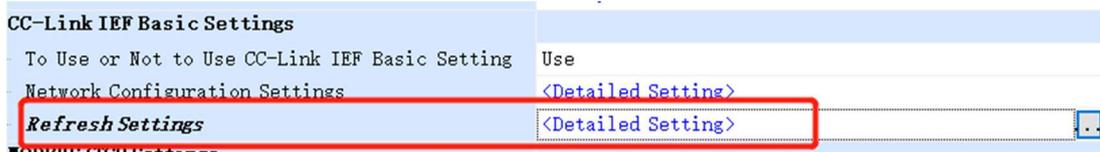

(b) The following figure shows the CPU configuration.

Link Side					CPU Side				
Device Name	Points	Start	End		Target	Device Name	Points	Start	End
RX	64	00000	0003F	⬌	Speci ⌄	X ⌄	64	100	177
RY	64	00000	0003F	⬌	Speci ⌄	Y ⌄	64	100	177
RWr	32	00000	0001F	⬌	Speci ⌄	D ⌄	32	200	231
RWw	32	00000	0001F	⬌	Speci ⌄	D ⌄	32	400	431

(c) Click "CC-Link IEFbasic Settings" > "Apply".
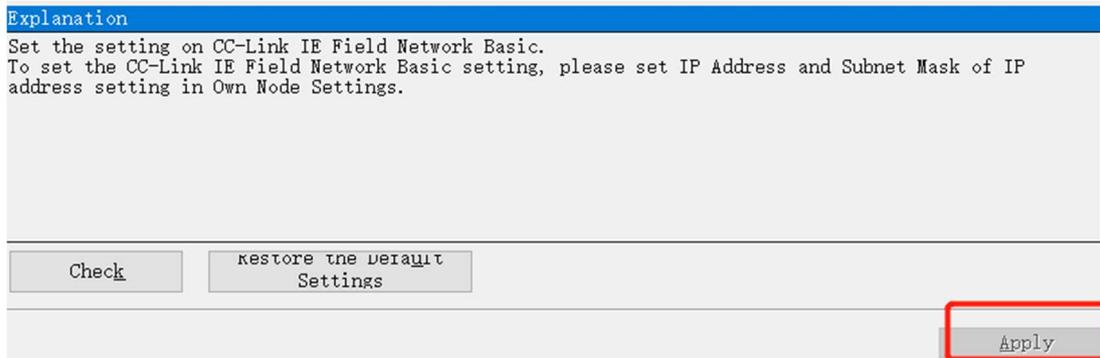
7) Download to PLC, "Online>Write to PLC> parameters +

program > Execute> all are >OK".
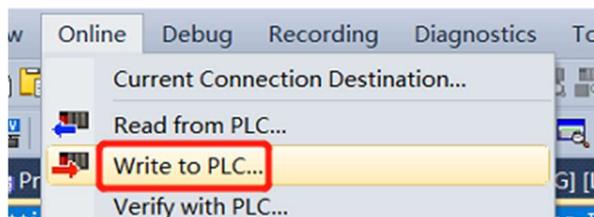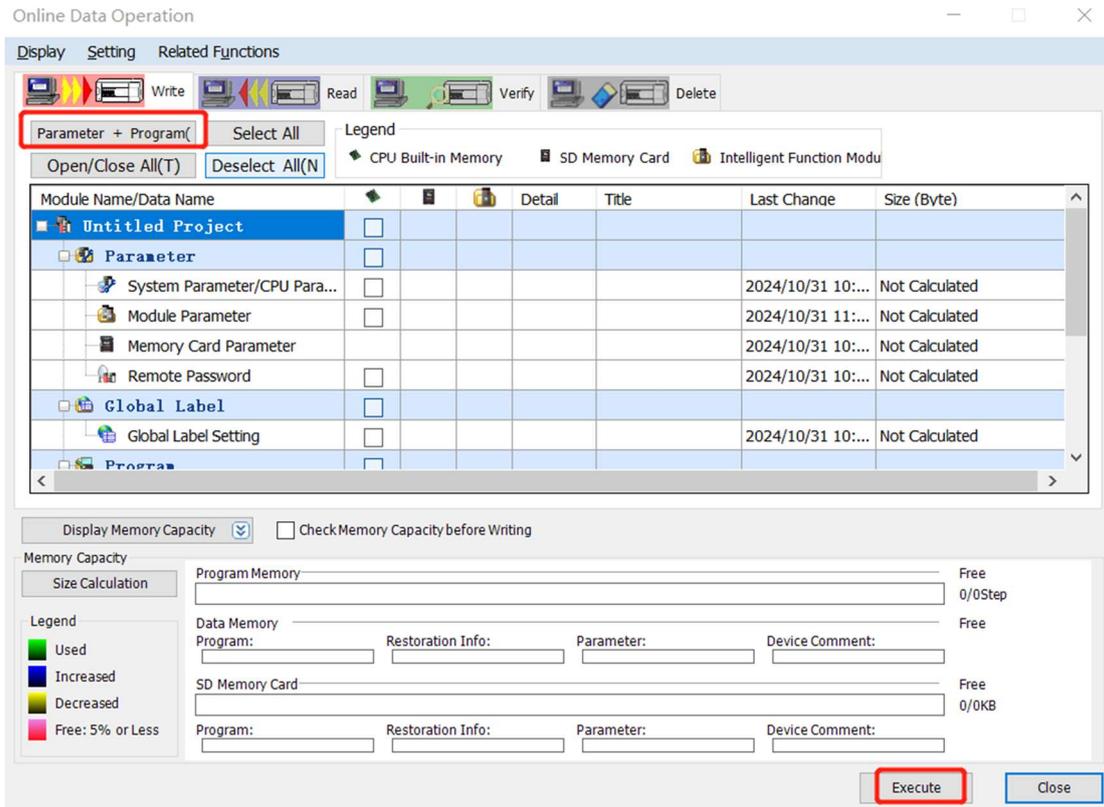
Note: After the configuration is completed, the PLC needs to be reset or restarted.

10.4. Websever debug instance

1) Turn the DIP switch of the valve terminal node to the IP mode set by the webserver (1~2 for Ethernet/IP/5~6 for CCLINK IE), and power off and restart the device.

2) Open Internet Explorer and enter "XX.XX.XX.X (device address)/webif/" in the address bar to enter the webserver page.
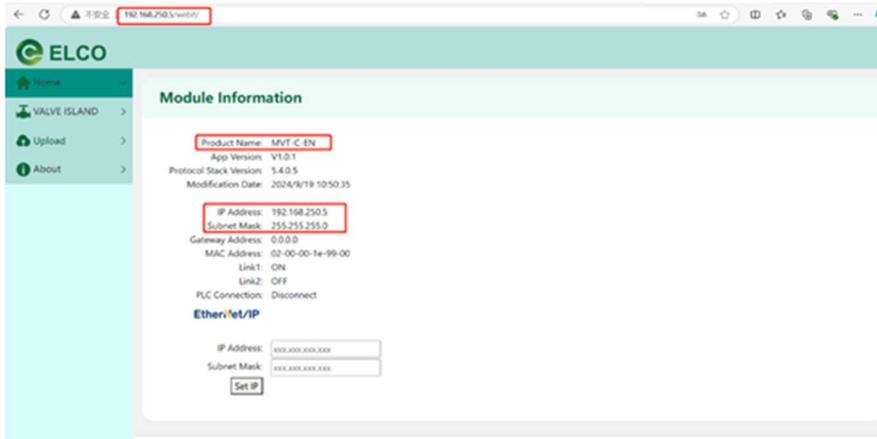
3) Click on the VALVE ISLAND option, select the point to be forced in the Set option, and after clicking the Set button, the corresponding point in the Display option will light up.
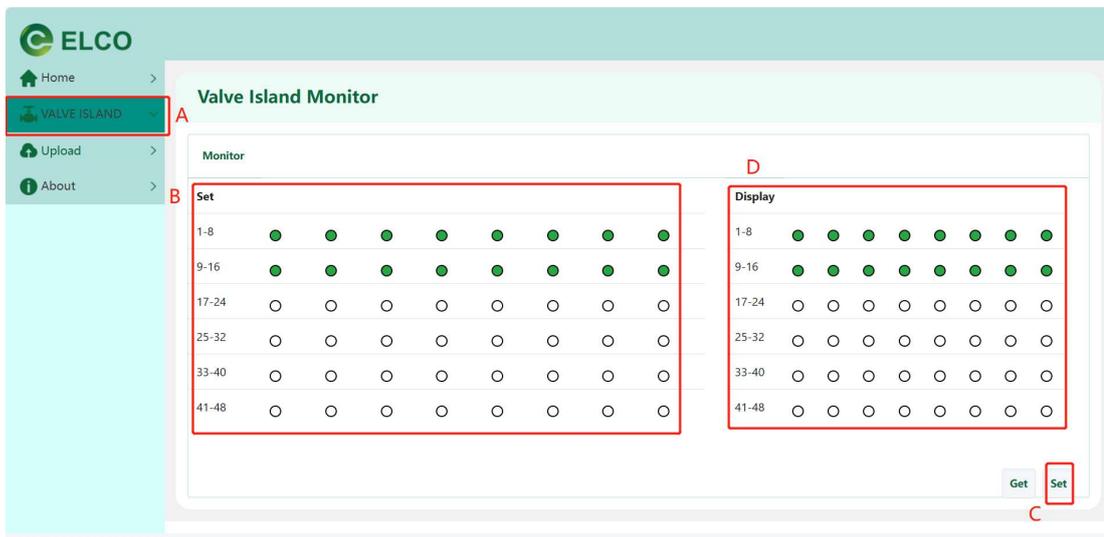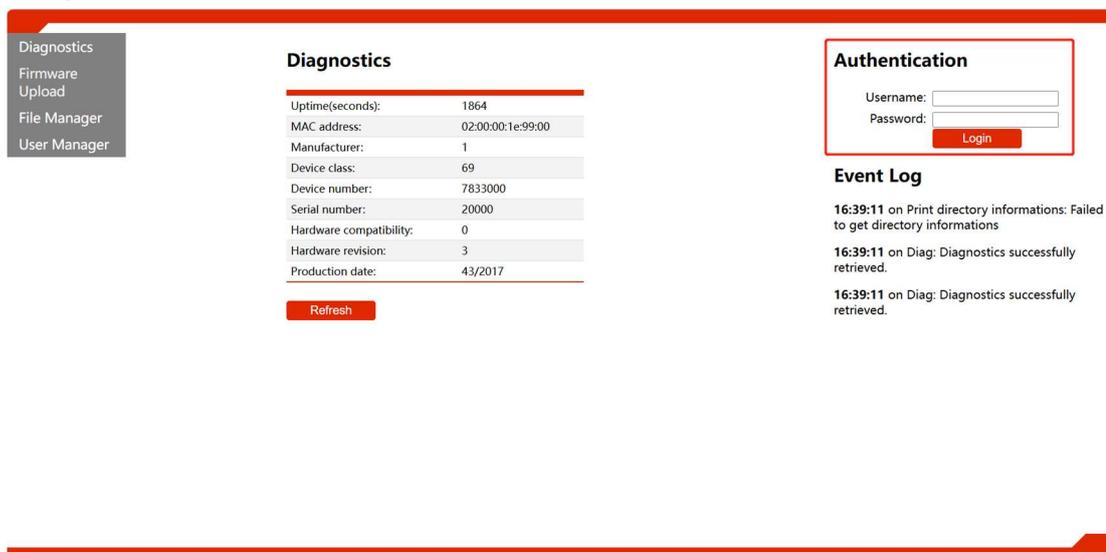

4) If you need to upgrade the device, you can click Upload>Main-device>upload page.
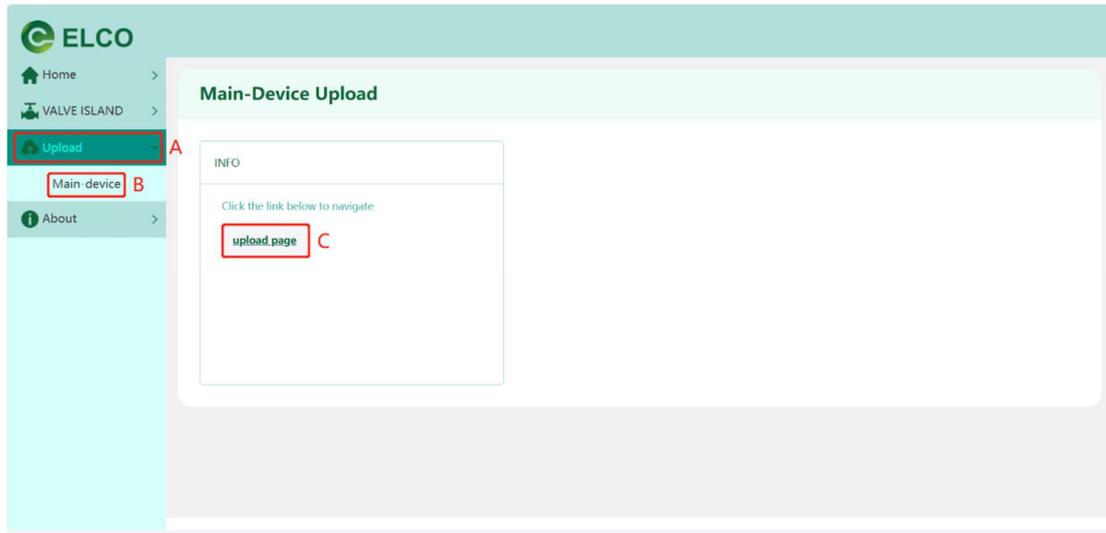
5) Enter your login and password.

Account: root, password: password。

To upgrade, please use the compressed package directly and do not need to decompress it. Since it is a multi-protocol upgrade, it takes a long time and is expected to take about a minute, so please follow the instructions.

6) Click "Choose a firmware file to upload" to upload the required upgrade file and click "Send file".

Diagnostics
Firmware
Upload
File Manager
User Manager

Firmware Upload

Choose a
firmware file to
upload   A

No firmware file currently selected for upload

Send file   B

- The file format conformity is not verified before a reset.

Reset

After a new firmware is loaded, the board can be reset:

Reset

Authentication

Username:
Password:

Login

Event Log

16:39:11 on Print directory informations: Failed to get directory informations

16:39:11 on Diag: Diagnostics successfully retrieved.

16:39:11 on Diag: Diagnostics successfully retrieved.