FB20 series IP20 wide form I/O quick guide manual

Version 1.2, 2025-01-14

PROFINET EtherCAT EtherNet/IP CC-Link IE Field Basic

Tianjin Elco Automation Co.,Ltd

CONTENT

1. Product Introduction

The FB20 series IP20 wide form I/O modules adopt an integrated design of bus interface, I/O signal and power supply, and is installed on a standard 35mm DIN rail. Currently, it mainly offers 32-bit digital modules, compatible with bus protocols such as Profinet, EtherCAT, Ethernet/IP, and CC-LINK IE Field BASIC.

The FB20 series I/O terminals adopt a detachable and tool free design, equipped with 24VDC and 0V equipotential terminals equal to the number of I/Os, which facilitates sensor power supply wiring and maintenance.

The FB20 series modules are suitable for application scenarios such as position sensor signal acquisition, alarm light output, and valve island control, providing cost-effective I/O product solutions for industries such as semiconductors, photovoltaics, and logistics.

2. Version change records

Revision date	Release version	Change content
2024-10	V1.0	First edition manual release
2024-12	V1.1	Add Omron configuration examples
2025-01	V1.2	Add Profinet data structure

3. Regarding manual acquisition

This manual is not shipped with the product. If you need to obtain an electronic PDF file, you can obtain it through the following methods:

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 account of " ELCO Automation" to obtain the product manual.

Contact the sales engineer of ELCO Automation in your region to obtain the latest manual materials.

4. Warranty Statement

Under normal use, if the product malfunctions or is damaged, ELCO Automation is responsible for an 18 months warranty (from the date of manufacture, the delivery date shall prevail, and any contractual agreements shall be executed in accordance with the agreement). If it exceeds 18 months, maintenance fees will be charged.

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

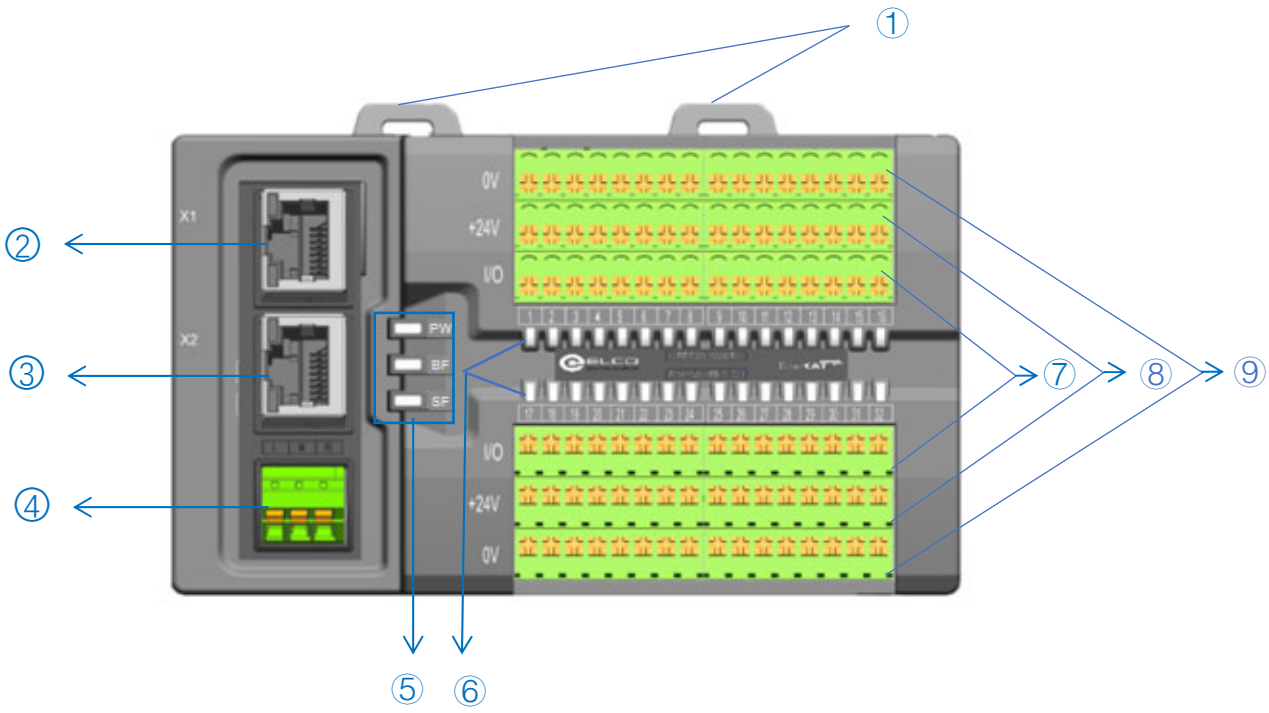
- Failure to operate this product according to the instructions in the manual, resulting in product damage.
- Damage to products caused by fires, floods, and abnormal voltage.
- Using this product for abnormal functions may cause product damage.

- Damage to the product caused by exceeding the specified usage range.
- Secondary damage to products caused by force majeure factors such as natural disasters, earthquakes, and lightning strikes.

The service fees shall be calculated according to the unified standards of ELCO. If there is a contract, the principle of contract priority shall be applied.

5. FB20 series introduction

5.1. Introduction to Appearance and Function



No.	Name	Function	Status
1	**Module fixed buckles**		
	-	Used to fix the module on the installation rail	Pull up: installation position; Press down: locking position
2	**Bus input interface**		
	X1	RJ45,Female,with indicators	Blinking: There is network data exchange Extinguished: No network connection
3	**Bus output interface**		
	X2	RJ45,Female,with indicators	Blinking: There is network data exchange Extinguished: No network connection
4	**Power supply terminal block**		
	L	24VDC+	-
	M	0V	-
	PE	Protective Ground	-
5	**Diagnostic indicators**		

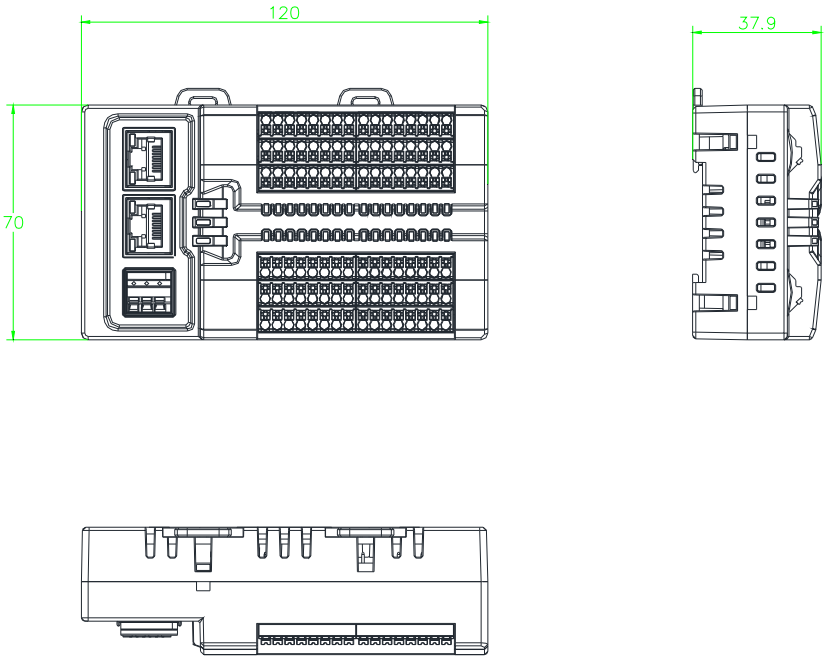
	PW	Power status indication	
	BF	Bus status indication	
	SF	Module error indication	
6	**I/O status indicators**		
	1-32	I/O indicators	Green：I/O signal on； Off ： No I/O signal；
7	**I/O terminal blocks**		
8	**External power supply terminal 24 V**		
9	**External power supply terminal 0V**		

5.2. Technical specifications

Order Data				
Product model	**FBEC-3200P-TS**	**FBEC-1616P-TS**	**FBEC-0032P-TS**	**FBEC-1616UP-TS**
Description	EtherCAT, 32DI，PNP	EtherCAT, 16DI/16DO，PNP	EtherCAT, 32DO，PNP	EtherCAT, 16DI/16DIO，PNP
Product model	**FBEC-3200N-TS**	**FBEC-1616N-TS**	**FBEC-0032N-TS**	**FBEC-1616UN-TS**
Description	EtherCAT, 32DI，NPN	EtherCAT, 16DI/16DO，NPN	EtherCAT, 32DO，NPN	EtherCAT, 16DI/16DIO，NPN
Product model	**FBPN-3200P-TS**	**FBPN-1616P-TS**	**FBPN-0032P-TS**	**FBPN-1616UP-TS**
Description	Profinet, 32DI，PNP	Profinet, 16DI/16DO，PNP	Profinet, 32DO，PNP	Profinet, 16DI/16DIO，PNP
Product model	**FBPN-3200N-TS**	**FBPN-1616N-TS**	**FBPN-0032N-TS**	**FBPN-1616UN-TS**
Description	Profinet, 32DI，NPN	Profinet, 16DI/16DO，NPN	Profinet, 32DO，NPN	Profinet, 16DI/16DIO，NPN
Product model	**FBEI-3200P-TS**	**FBEI-1616P-TS**	**FBEI-0032P-TS**	**FBEI-1616UP-TS**
Description	Ethernet/IP, 32DI，PNP	Ethernet/IP, 16DI/16DO，PNP	Ethernet/IP, 32DO，PNP	Ethernet/IP, 16DI/16DIO，PNP
Product model	**FBEI-3200N-TS**	**FBEI-1616N-TS**	**FBEI-0032N-TS**	**FBEI-1616UN-TS**
Description	Ethernet/IP, 32DI，NPN	Ethernet/IP, 16DI/16DO，NPN	Ethernet/IP, 32DO，NPN	Ethernet/IP, 16DI/16DIO，NPN
Product model	**FBCB-3200P-TS**	**FBCB-1616P-TS**	**FBCB-0032P-TS**	**FBCB-1616UP-TS**
Description	CC-LINK IE FB, 32DI，PNP	CC-LINK IE FB, 16DI/16DO，PNP	CC-LINK IE FB, 32DO，PNP	CC-LINK IE FB, 16DI/16DIO，PNP
Product model	**FBCB-3200N-TS**	**FBCB-1616N-TS**	**FBCB-0032N-TS**	**FBCB-1616UN-TS**
Description	CC-LINK IE FB, 32DI，NPN	CC-LINK IE FB, 16DI/16DO，NPN	CC-LINK IE FB, 32DO，NPN	CC-LINK IE FB, 16DI/16DIO，NPN
Interface type				
Bus	2×RJ45,100 BASE-TX			
Power	3-pos spring terminal			
I/O	4 × 8-pos pluggable spring terminal			
Aux terminals	8×8-pos pluggable spring terminal			

Electrical data				
Input channels	32	16	-	Max.32
Input power supply current	Max.125 mA/CH, less 4 A in total	Max.125 mA/CH, less 2 A in total	-	Max.125 mA/CH, less 2 A in total
Input filtering delay	1.6ms		-	1.6ms
Output channels	-	16	32	Max.16
Output current	-	Max.500 mA/CH, less 4 A in total		
Load type	-	Indicator lights, miniature solenoid valves, etc.		
Output frequency	-	Resistive load up to 100Hz, inductive load up to 5Hz		
Diagnosis				
Bus status	LED indicators, communication message			
Power status	LED indicators			
Short circuit and overload	LED indicators			
General data				
IP grade	IP20			
Temperature	Working temperature: -5 ℃ ··· 60 ℃, Storage temperature: -25 ℃ ··· 70 ℃			
Humidity	15 %-95 %, no condensation			
Working altitude	0-2000 m			
Pollution degree	II			
Module size H×W×D	70 mm × 120 mm × 37.9 mm			

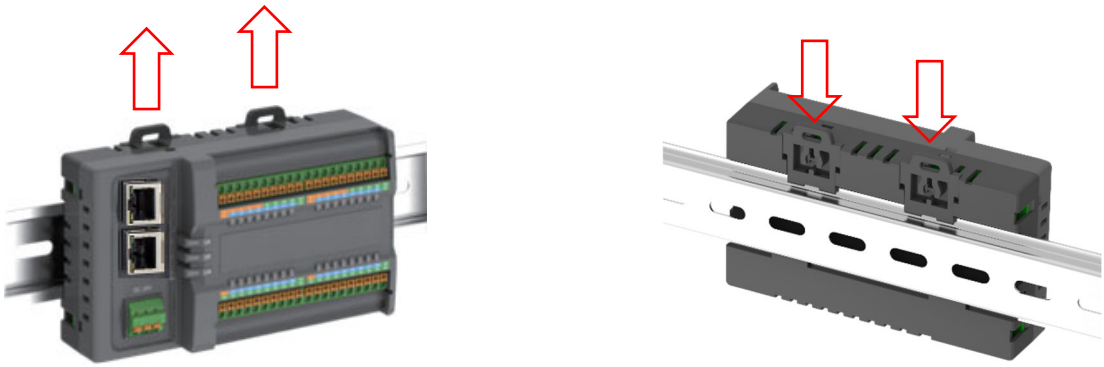
5.3. Dimension drawing



6. Mechanical installation and disassembly

6.1. Module installation

The installation of FB20 product can be carried out according to the steps shown in the following figure:



STEP1: Pull out the two guide rail buckles of the module with force upwards, or use a straight screwdriver to remove them;

STEP2: After the module is inserted into the guide rail, press down on the buckle and lock it in place to complete the fixed installation.

6.2. Module disassembly

Use a flathead screwdriver or similar tool to pry up the rail lock, and then pull out the module in a direction away from the DIN rail.
The I/O terminals of the module can be removed separately for easy module replacement.

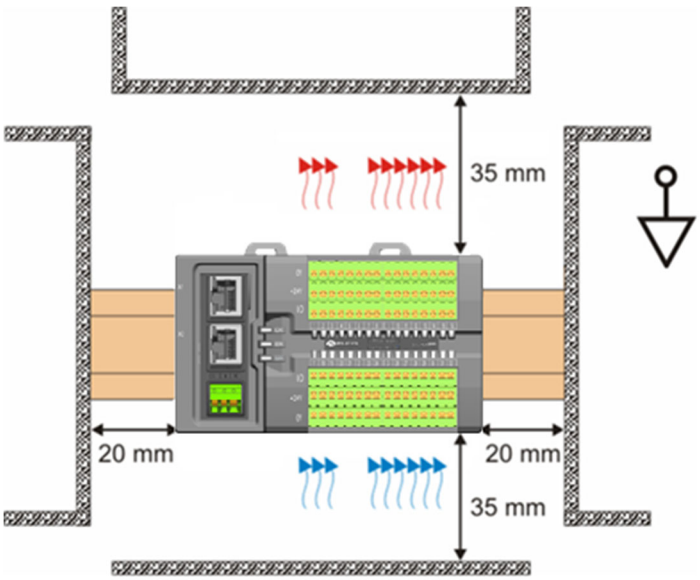
ATTENTION

During installation, align the module with the DIN rail and press the fixing device in the direction indicated by the arrow. After installation, there will be a noticeable clicking sound; change the position of the locking device slightly; after installing the module properly, make the locking device clamp the upper edge of the rail; to avoid damaging the product, do not apply excessive force.

ATTENTION

The mechanical installation and disassembly of modules require qualified professional mechanical personnel to operate and pay attention to the correct wearing and use of labor protection equipment.

6.3. Installation position and minimum distances



Mount the mounting rail horizontally for the specified installation position. The connection surfaces of the coupler and the I/O modules must face forwards. This can be seen from the illustration.
The components are ventilated from bottom to top, which enables optimum cooling of the electronics by convection ventilation. The direction specification "down" corresponds to the direction of the positive acceleration due to gravity.

ATTENTION

Observe minimum distances

Maintain the distances to neighboring devices and control cabinet walls specified in the figure. This is the only way to ensure optimum convection cooling.

If sufficient convection cooling is not ensured, the devices may overheat and be damaged.

7. Electrical installation and wiring

7.1. Cable specification

7.1.1. Communication cable

Bus communication uses shielded network cables for data transmission, without short circuits, misalignment, and poor contact; The length of the cable between devices cannot exceed 100m, as exceeding this length will cause signal attenuation and affect normal communication. The following specifications of communication cables are recommended:

Item	Specification
Cable type	Elastic crossover cable, S-FTP, category 5
Standards met	EIA/TIA568A，EN50173，ISO/IEC11801 EIA/TIA bulletin TSB，EIA/TIA SB40-A&TSB36
Conductor section	AWG26
Wire type	Twisted pair
Wire pair	4

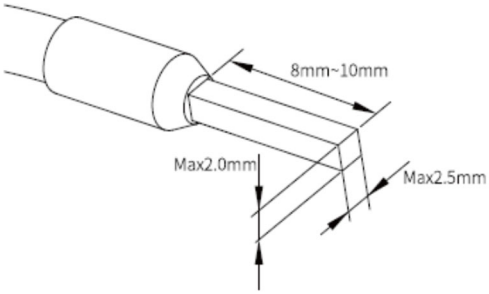
Pre-wired connectors are better for communication and construction. Elco pre-wired connectors can provide customized cable material and cable length in accordance with communication technology requirements. The following Elco Ethernet connectors are available:

Model	Description
E16DA4002M020	RJ45-M12 double-ended pre-wired Ethernet connector, male straight, D-CODE, 4-pin, Cat5e, PVC, 2 M, fixed installation
E66D04002M020	RJ45-RJ45 double-ended pre-wired Ethernet connector，male straight-male straight，4-pin，Cat5e，PVC，2 M, fixed installation
E16DA4004M020	RJ45-M12 double-ended pre-wired Ethernet connector, male straight, D-CODE，4-pin，Cat5e，PVC，2 M，suitable for drag chain
E66D04004M020	RJ45-RJ45 double-ended pre-wired Ethernet connector，male straight-male straight，4-pin，Cat5e，PUR，2 M，suitable for drag chain

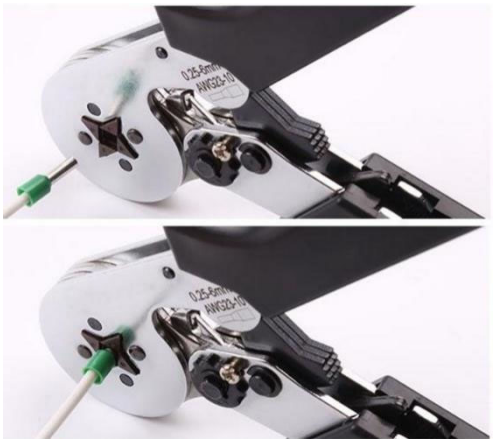
For more selection of Ethernet connectors, please refer to Elco's "Connectivity System Catalog".

7.1.2. Power and signal cables

The FX20 series adopts tool-free spring wiring terminals, and the wiring needs to be equipped with tube type cold pressing cable lugs. Please refer to the following figure for the stripping length and cable lug specifications:



Standard cable crimper can be used for pressing the wire ear, as shown in the following figure:

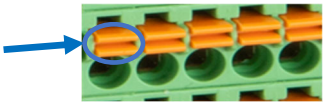


The wire connection does not need tools, and the wiring method is as follows:

1) Install the wire ear on the wire;
2) Insert the wire installed with the wire ear into the plug-in terminal to its most;
3) Pull the cable to ensure its fixed securely.

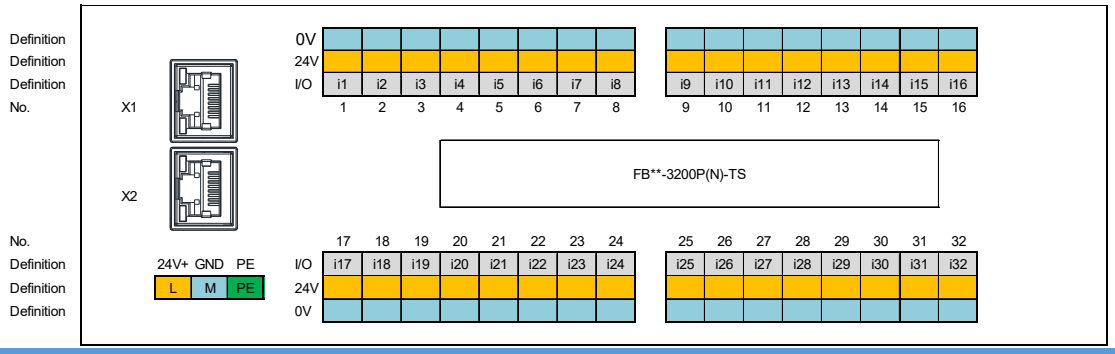
To release the wire:

1) Press the terminal spring button with your hand or a flat screwdriver
2) Pull out the wire and release the button.



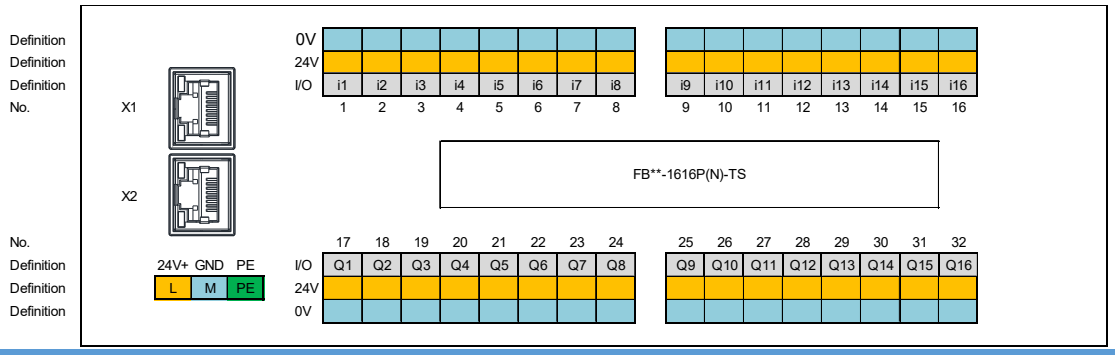
7.2. FB20 terminal definition and I/O address

7.2.1. FB**-3200P(N)-TS



Input 4 Bytes								
BYTE n	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	I n.7	I n.6	I n.5	I n.4	I n.3	I n.2	I n.1	I n.0
Terminal No.	i8	i7	i6	i5	i4	i3	i2	i1
BYTE n+1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	I (n+1).7	I (n+1).6	I (n+1).5	I (n+1).4	I (n+1).3	I (n+1).2	I (n+1).1	I (n+1).0
Terminal No.	i16	i15	i14	i13	i12	i11	i10	i9
BYTE n+2	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	i (n+2).7	i (n+2).6	i (n+2).5	i (n+2).4	i (n+2).3	i (n+2).2	i (n+2).1	i (n+2).0
Terminal No.	i24	i23	i22	i21	i20	i19	i18	i17
BYTE n+3	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	I (n+3).7	I (n+3).6	I (n+3).5	I (n+3).4	I (n+3).3	I (n+3).2	I (n+3).1	I (n+3).0
Terminal No.	i32	i31	i30	i29	i28	i27	i26	i25
n: Starting byte of configuration								

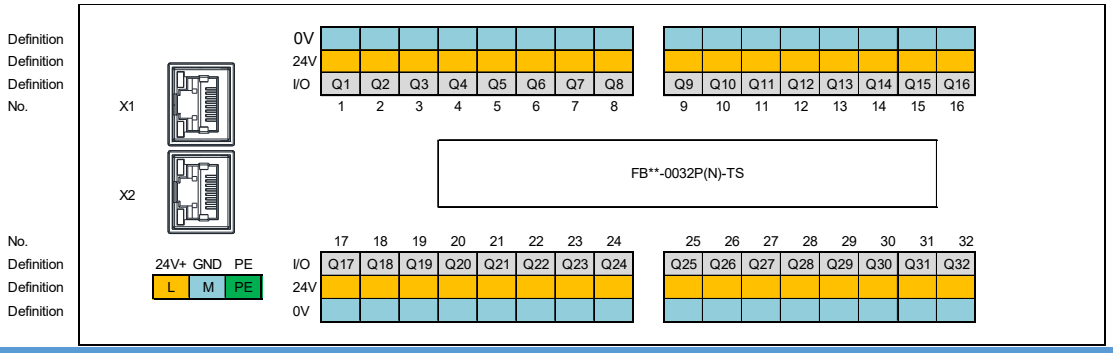
7.2.2. FB**-1616P(N)-TS



Input 2 Bytes								
BYTE n	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	I n.7	In.6	I n.5	I n.4	I n.3	I n.2	I n.1	I n.0
Terminal No.	i8	i7	i6	i5	i4	i3	i2	i1
BYTE n+1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

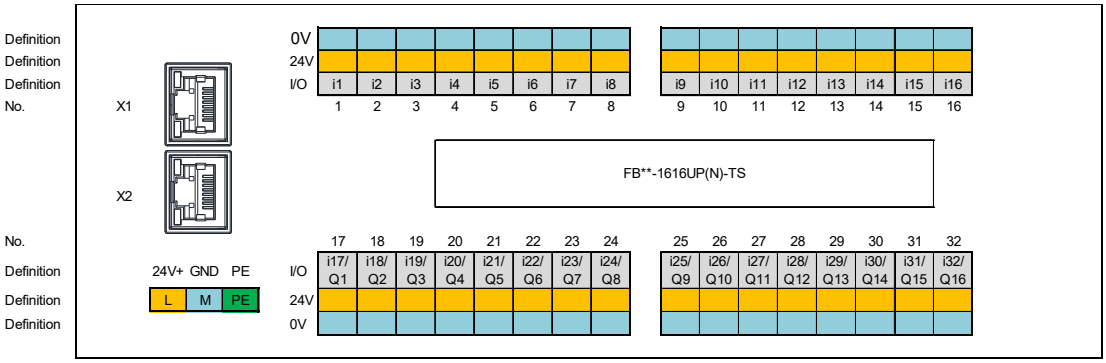
Address	I (n+1).7	I (n+1).6	I (n+1).5	I (n+1).4	I (n+1).3	I (n+1).2	I n+1).1	I (n+1).0
Terminal No.	i16	i15	i14	i13	i12	i11	i10	i9
Output 2 Bytes								
BYTE n	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	Q n.7	Q n.6	Q n.5	Q n.4	Q n.3	Q n.2	Q n.1	Q n.0
Terminal No.	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
BYTE n+1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	Q(n+1).7	Q(n+1).6	Q(n+1).5	Q(n+1).4	Q(n+1).1	Q(n+1).2	Q(n+1).1	Q(n+1).0
Terminal No.	Q16	Q15	Q14	Q13	Q12	Q11	Q10	Q9
n：Starting byte of configuration								

7.2.3. FB**-0032P(N)-TS



Output 4 Bytes								
BYTE n	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	Q n.7	Q n.6	Q n.5	Q n.4	Q n.3	Q n.2	Q n.1	Q n.0
Terminal No.	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
BYTE n+1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	Q (n+1).7	Q (n+1).6	Q (n+1).5	Q (n+1).4	Q (n+1).3	Q (n+1).2	Q (n+1).1	Q (n+1).0
Terminal No.	Q16	Q15	Q14	Q13	Q12	Q11	Q10	Q9
BYTE n+2	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	Q (n+2).7	Q (n+2).6	Q (n+2).5	Q (n+2).4	Q (n+2).3	Q (n+2).2	Q (n+2).1	Q (n+2).0
Terminal No.	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17
BYTE n+3	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	Q (n+3).7	Q (n+3).6	Q (n+3).5	Q (n+3).4	Q (n+3).3	Q (n+3).2	Q (n+3).1	Q (n+3).0
Terminal No.	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25
n：Starting byte of configuration								

7.2.4. FB**-1616UP(N)-TS



Input 4 Bytes								
BYTE n	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	I n.7	I n.6	I n.5	I n.4	I n.3	I n.2	I n.1	I n.0
Terminal No.	i8	i7	i6	i5	i4	i3	i2	i1
BYTE n+1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	I (n1).7	I (n+1).6	I (n+1).5	I (n+1).4	I (n+1).3	I (n+1).2	I (n+1).1	I (n+1).0
Terminal No.	i16	i15	i14	i13	i12	i11	i10	i9
BYTE n+2	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	I (n+2).7	I (n+2).6	I (n+2).5	I (n+2).4	I (n+2).3	I (n+2).2	I (n+2).1	I (n+2).0
Terminal No.	i24	i23	i22	i21	i20	i19	i18	i17
BYTE n+3	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	I (n+3).7	I (n+3).6	I n+3).5	I (n+3).4	I (n+3).3	I (n+3).2	I (n+3).1	I (n+3).0
Terminal No.	i32	i31	i30	i29	i28	i27	i26	i25
Output 2 Bytes								
BYTE n	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	Q n.7	Q n.6	Q n.5	Q n.4	Q n.3	Q n.2	Q n.1	Q n.0
Terminal No.	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
BYTE n+1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address	Q (n+1).7	Q (n+1).6	Q (n+1).5	Q (n+1).4	Q (n+1).1	Q (n+1).2	Q (n+1).1	Q (n+1).0
Terminal No.	Q16	Q15	Q14	Q13	Q12	Q11	Q10	Q9
n: Starting byte of configuration								

8. Configuration and testing

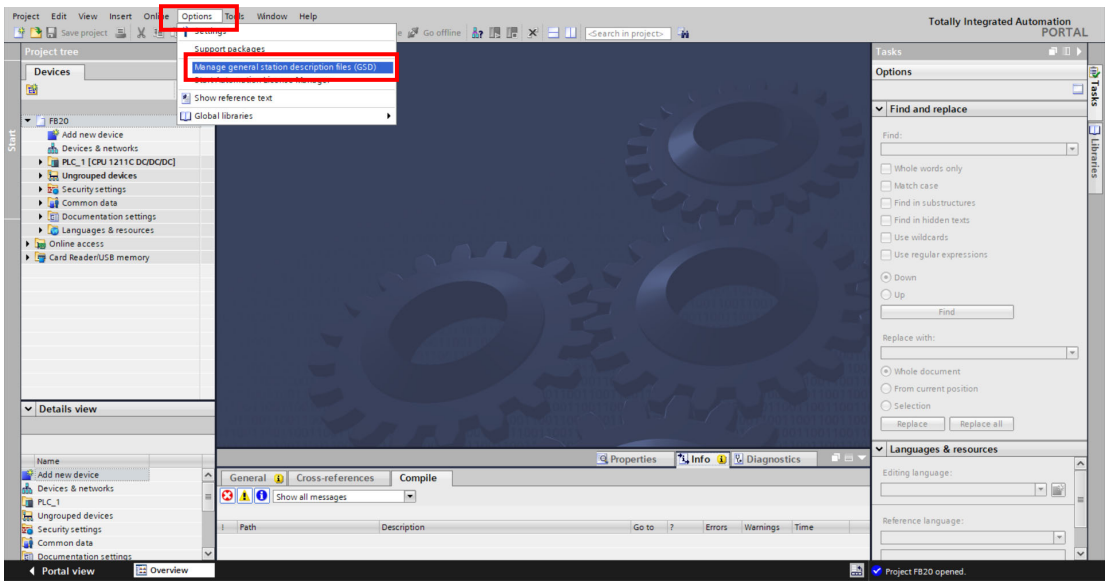
8.1. Configuration and test in Siemens PORTAL

8.1.1. GSD file

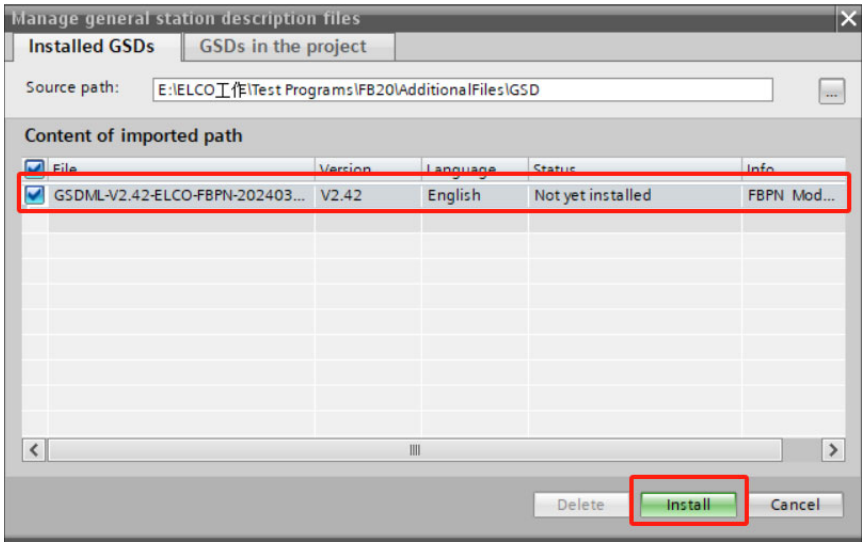
Use a GSD file (in XML format) to configure the FB20 series I/O modules. The GSD file is used to integrate the FB20 module as a standard Profinet I/O into your system.

The Siemens Portal programming software commonly used in Profinet systems integrates GSD files according to the following steps:

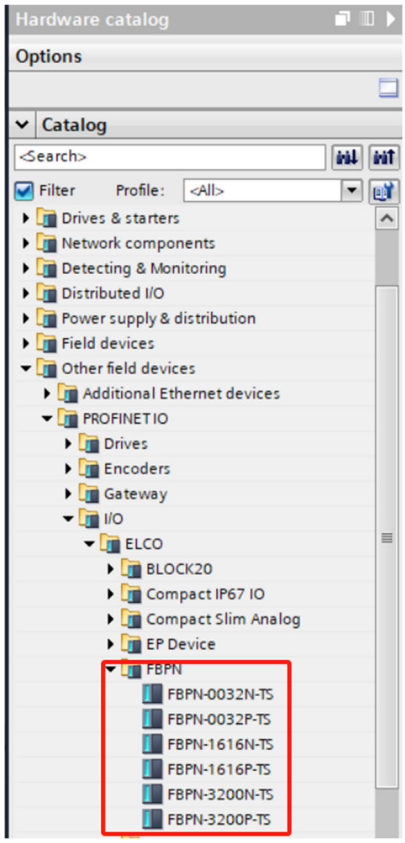
8.1.1.1. Run the Portal software and select "Options>Manage General Station Description Files_GSD" from the menu bar.



8.1.1.2. In the next dialog box, select the GSD file to install, and then click "Install" to proceed with the installation operation.



8.1.1.3. The newly installed FB20 modules can be found in the "Other Field Devices>PROFINET-IO>I/O>ELCO>FBPN" hardware directory.



8.1.1.4. Users configure FBPN series I/O modules in Portal based on the actual model used.

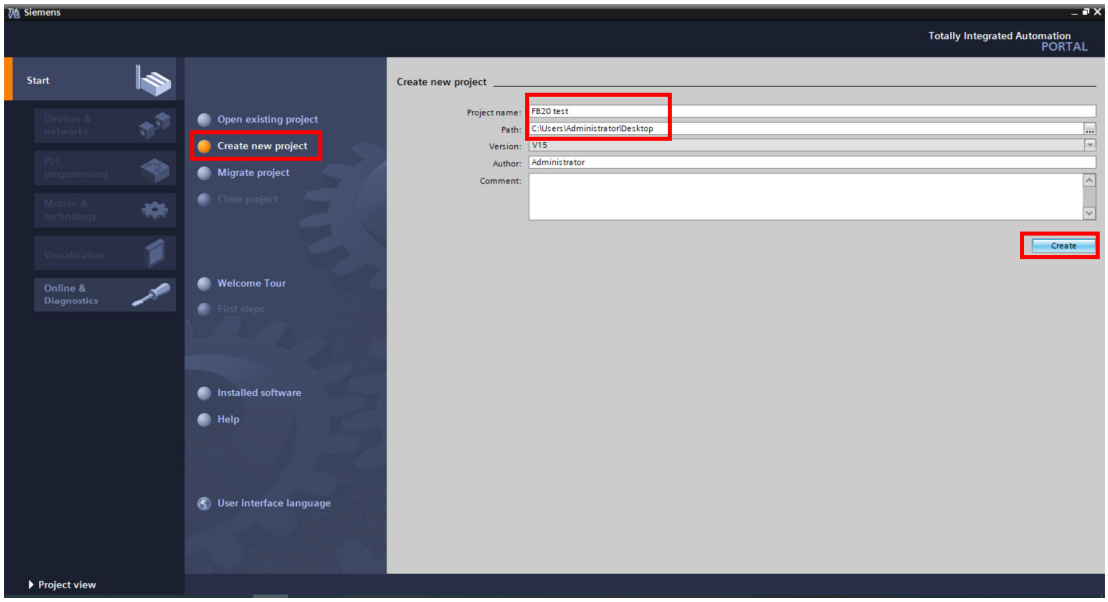
8.1.2. Configuration Example in Siemens Portal

This example uses FB20 as the Profinet slave station, model: FBPN-1616P-TS. By connecting Siemens PLC - CPU1211C through Profinet bus, all power supply and bus connections have been completed by default.

The configuration steps are as follows:

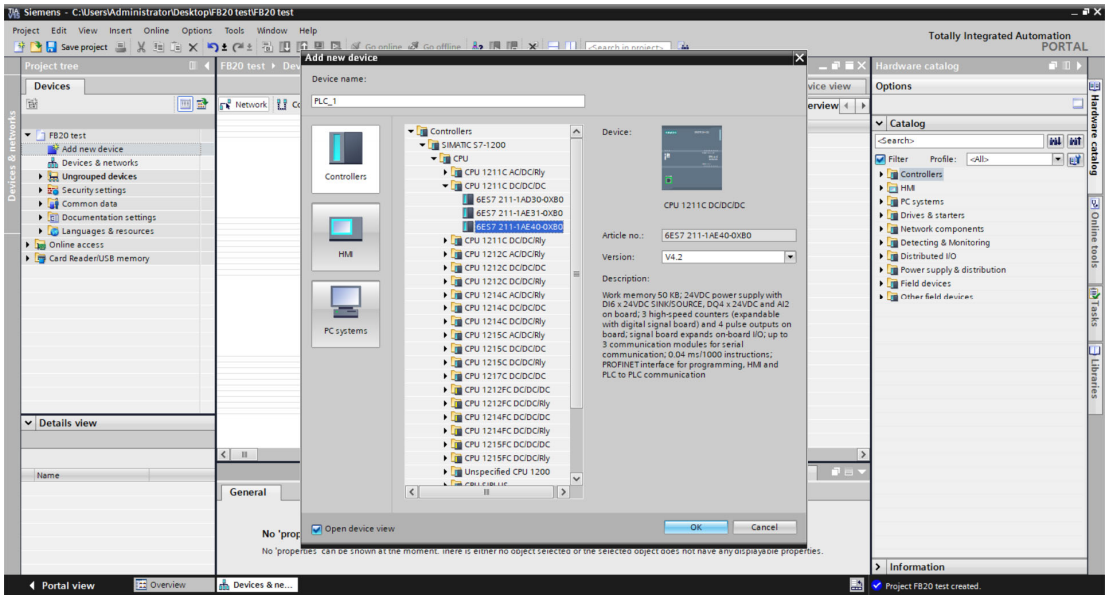
8.1.2.1. Create a new Portal project.

Open Siemens Portal software, click "Create New Project", modify the "Project Name" to "FB20 test", select the save path, and click "Create"

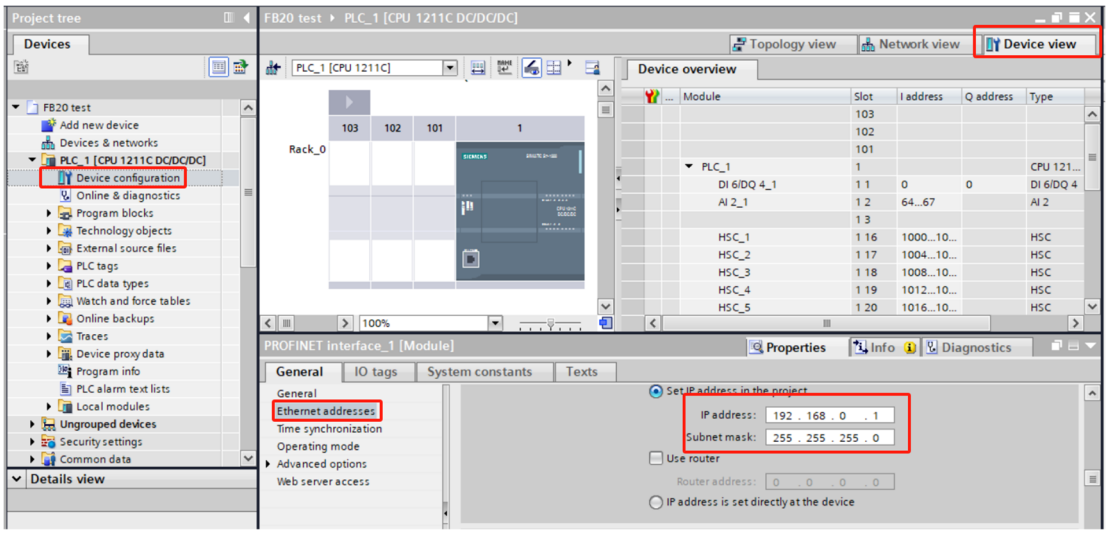


8.1.2.2. Install the GSD file for ELCO FB20 series I/O products, refer to the relevant content in "9.1.1 GSD File" for specific methods.

8.1.2.3. Double click on "Add New Device" on the left and select the PLC model used in the "Controller" window.

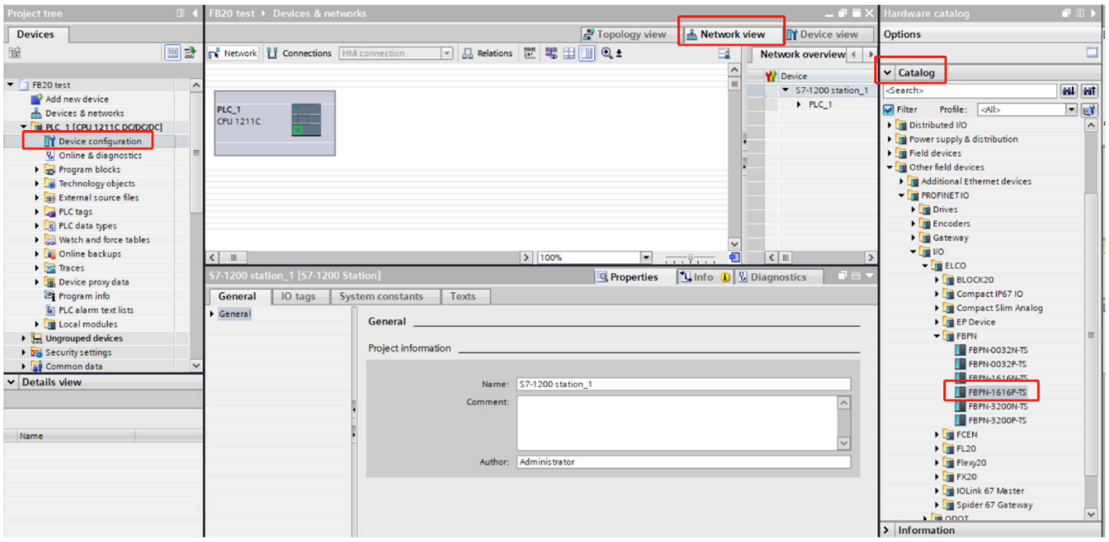


8.1.2.4. Double click on the "Device Configuration" window on the left, select "Properties" -->"PROFINET Interface [X2]" -->"Ethernet Address" in the "Device View" window, and set the IP address of the PLC.

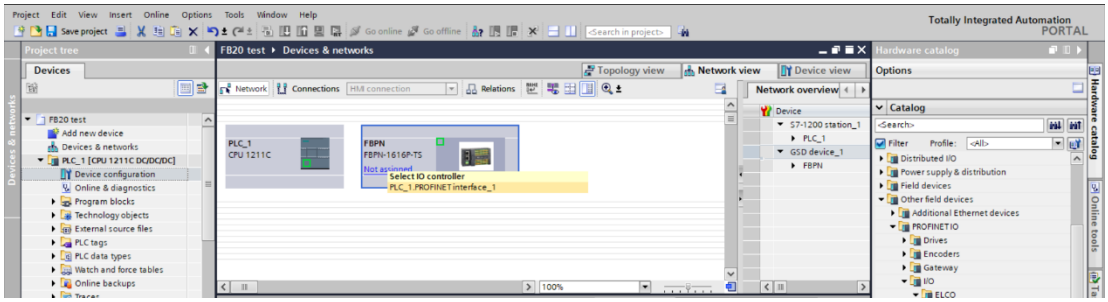


8.1.2.5. Add FB20 module and establish communication connection with PLC.

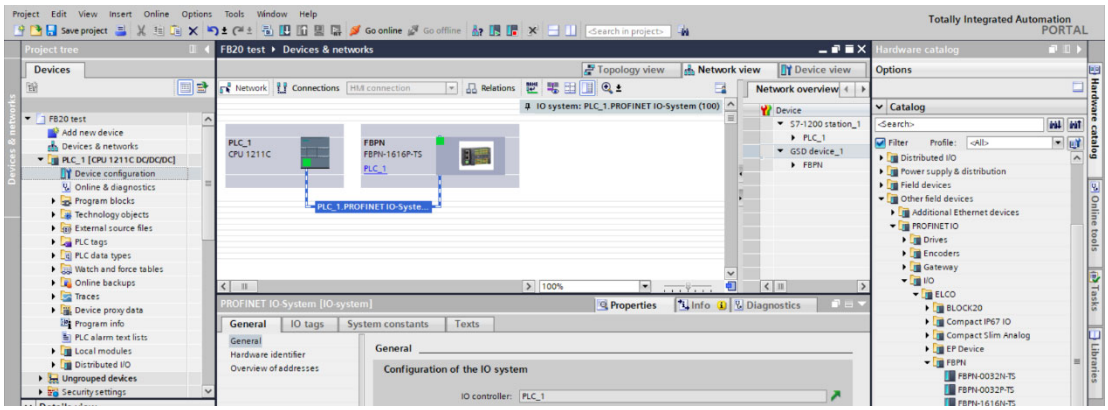
a) Double click on "Devices and Networks" on the left to enter the "Network View" interface. Select "Other Field Devices ->PROFINET IO ->I/O ->ELCO ->FB20" from the "Hardware Catalog" and add FBPN-1616P-TS to the network by double clicking or dragging.



b) Click on 'Not assigned' with the mouse and select 'PLC_1. PROFINET Interface _1'.

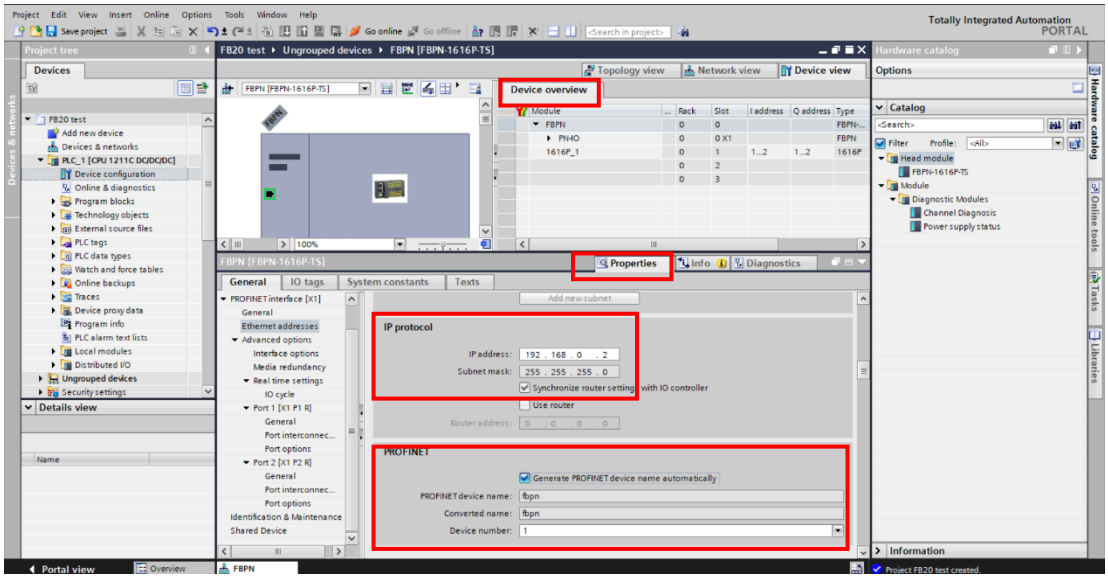


c) The FB20 module is connected to the PLC for communication.

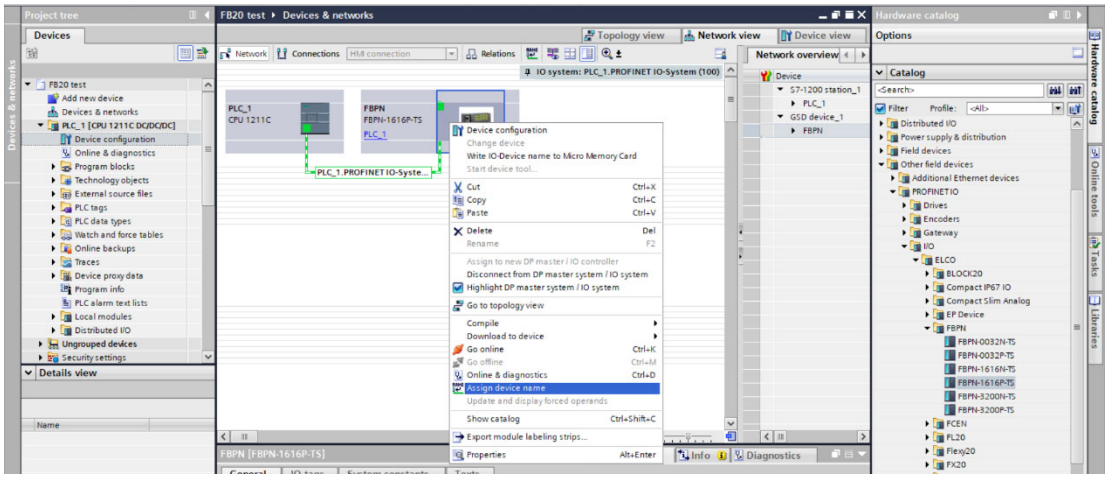


8.1.2.6. Modify the FB20 module device name and IP address settings.

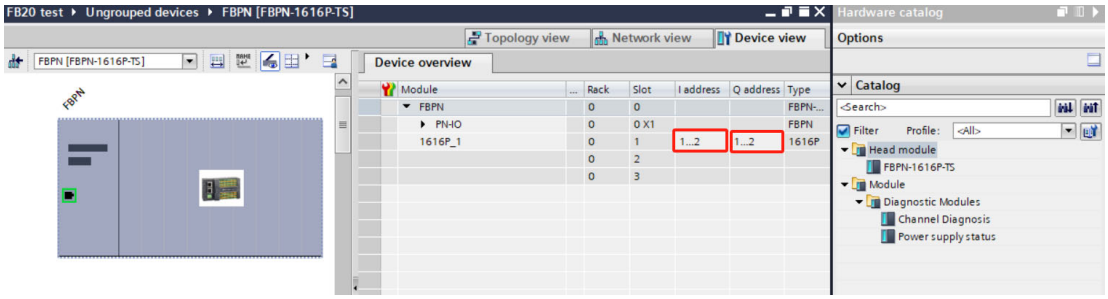
1) Click on the FB20 module in the "Network View", select "Properties -->PROFINET Interface -->Ethernet Address", set the FB20 module device name FBPN and IP address in the window. (It should be in the same network segment as the IP address of the PLC).



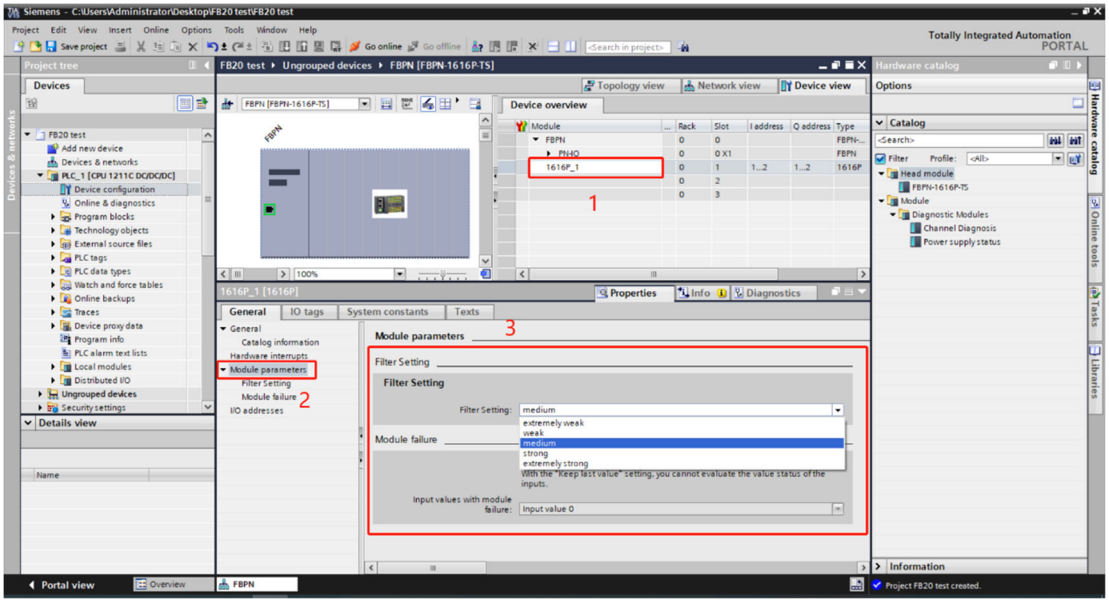
2) Select FBPN-1616P-TS, right-click on the menu and choose "Assign Device Name". In the Profinet Device Name Assignment interface, click "Update List". The name and MAC address of the connected FB20 module will be scanned. Select the device with the matching MAC address and click "Assign Name"



8.1.2.7. In the "Device Overview", you can view the I/O address occupancy of the configured modules. In this example, the module input addresses IB1-IB2 and output addresses QB1-QB2 can be modified as needed.



8.1.2.8. Selecting module "1616_1" -->"Properties" -->"Module Parameters" allows for corresponding parameter settings, with slight differences in configurable parameters for different models.



1) Filter time setting:

The filtering time can be classified into five levels from short to long: extremely weak, week, medium, strong, extremely strong, and the default is medium.

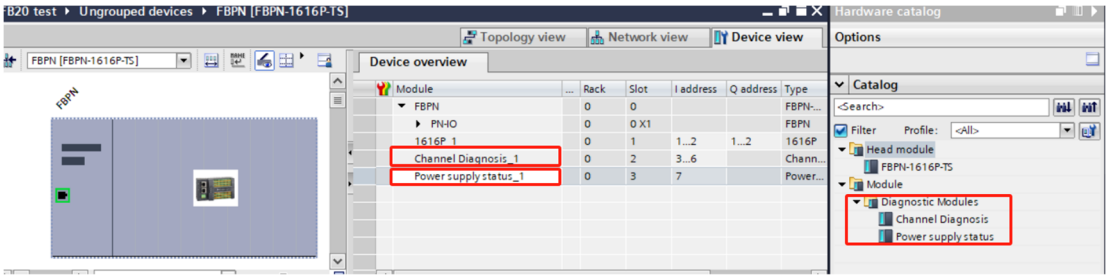
The stronger the filtering, the higher the probability of filtering out the input interference signal, but the corresponding input response time will also be longer. You can choose from the drop-down menu according to your actual needs.

2) Module failure:

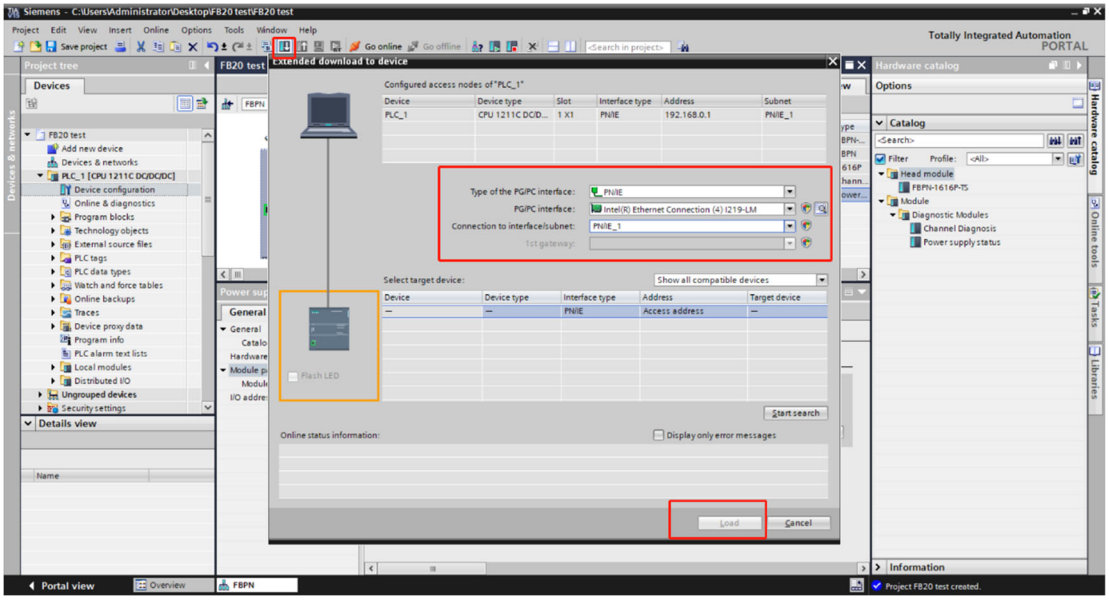
This option is the default setting, and when the module experiences a network failure or other faults, the input maintains the state of the last network cycle.

8.1.2.9. Diagnostic bytes configuration

In the second and third slots of the module, you can choose to add the module's channel diagnostic byte and power diagnostic byte. Please refer to the previous "Process Data Diagnostic Bit Description" for the definition of diagnostic bytes.



8.1.2.10. Parameter settings are complete, save and compile, and download the configured configuration to the PLC to complete the configuration.



If all configurations are correct, the indicator lights of the FB20 coupler will display green, and the communication MD indicator light will display green and remain on.

8.2. Configuration and test in Omron Sysmac Studio

8.2.1. IP Address Settings

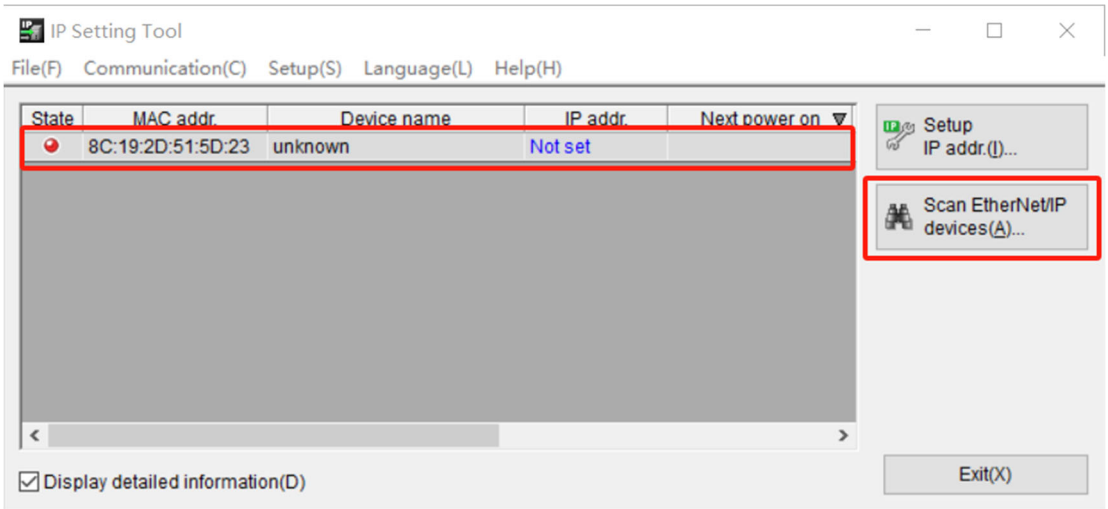
The FB20 Ethernet/IP series defaults to no IP address at the factory, and users can set the correct IP address themselves through a third-party IP configuration tool. In this manual, the "IP Setting Tool" software is used to set the module IP address.

The IP setting steps are as follows:

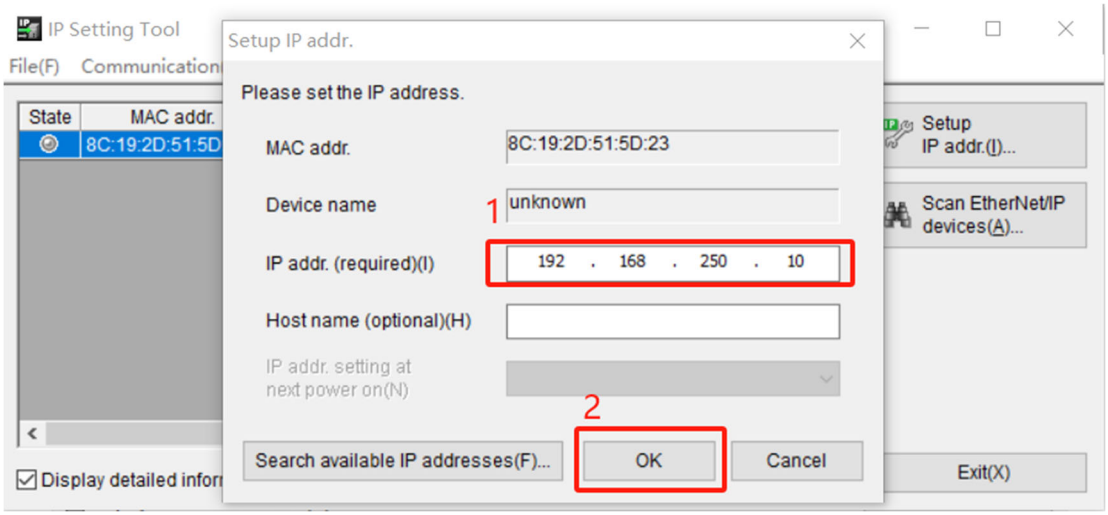
8.2.1.1. Connect the FBEI module to the power supply and Ethernet cable according to the wiring instructions;

8.2.1.2. After correctly installing " IP Setting Tool " on the PC according to the installation wizard, open the software and set the computer IP address to the same network segment address as the IP to be set by FBEI; In this example, the PC IP is set to 192.168.250.100;

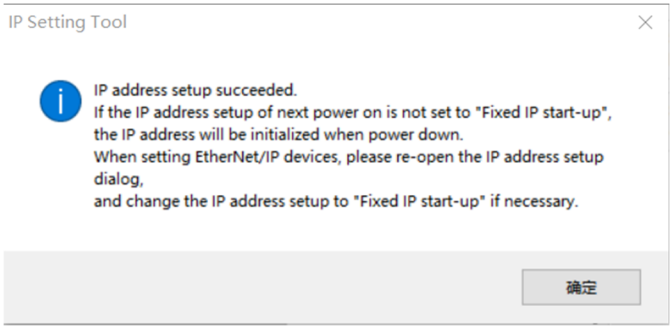
8.2.1.3. Open the " IP Setting Tool " software interface, click the "Scan Ethernet/IP device" button, or wait for a few seconds, if the connection is normal, the software will display all scan results of the computer connection based on the module's MAC on the interface:



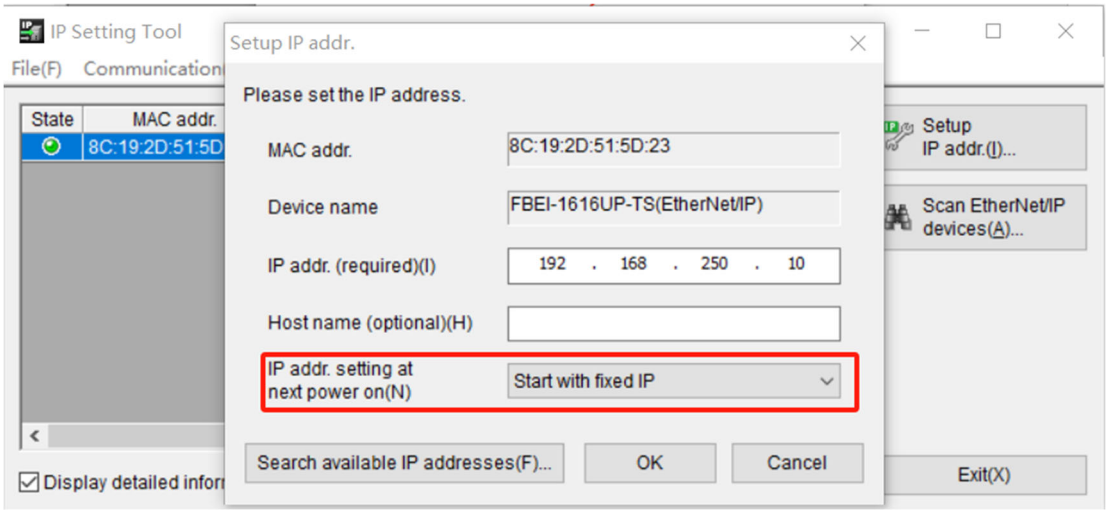
8.2.1.4. Click on the module you want to set, click on "Setup IP asddr…" button, enter the IP address you want to set in the pop-up dialog box and click OK to confirm.



8.2.1.5. Pop up successful IP setting dialog box.



Click again to select the FBEI module with the IP address already set, click on "Setup IP addr…" ， Select 'start fixed IP' from the “IP addr. setting at next power on” dialog box and click OK.

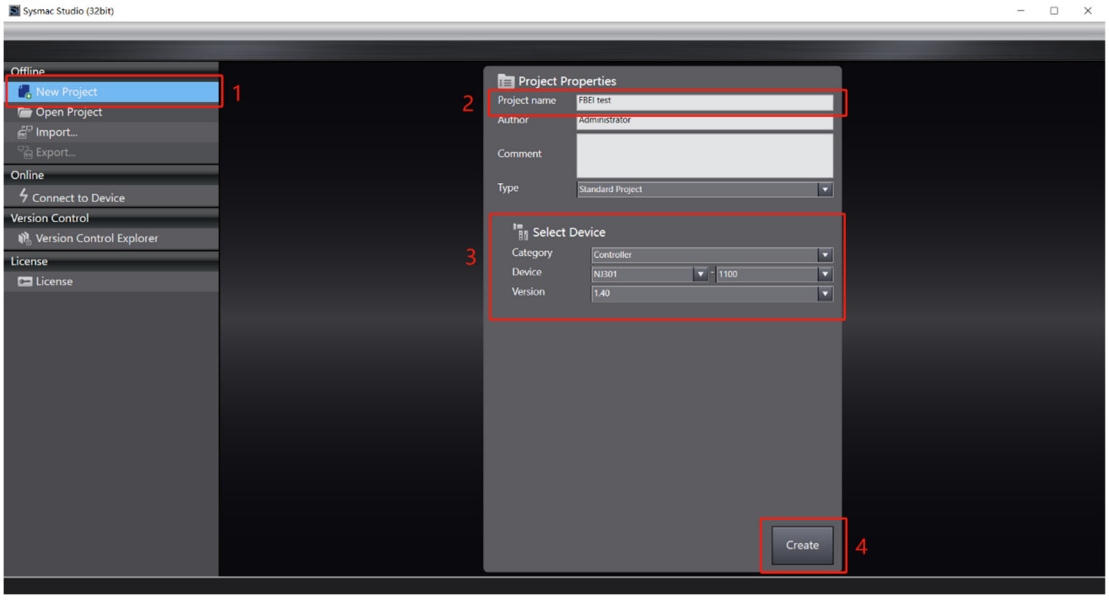


At this point, the IP address of the FBEI module has been successfully fixed in the module.

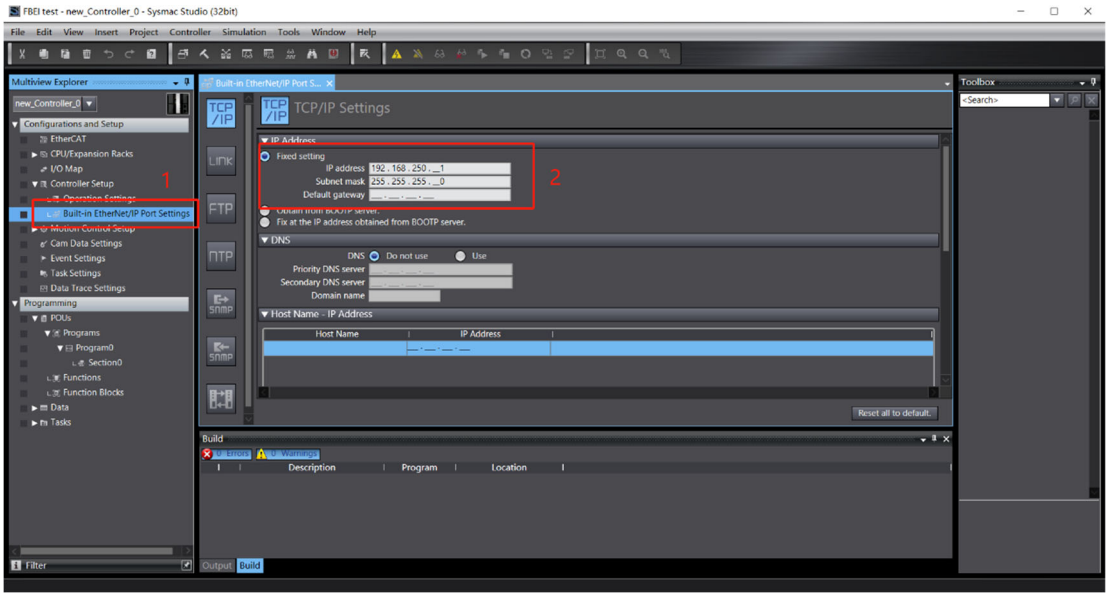
8.2.2. Configuration Example in Omron Sysmac studio

In this example, ELCO's FBEI-1616UP-TS is used as the Ethernet/IP slave station to connect to the Omron Ethernet/IP controller NJ301-1100. By default, all power supply and bus connections have been correctly completed.

8.2.2.1. Open the Sysmac Studio software, click on "New Project", fill in the corresponding information according to the PLC model, and click on "Create".

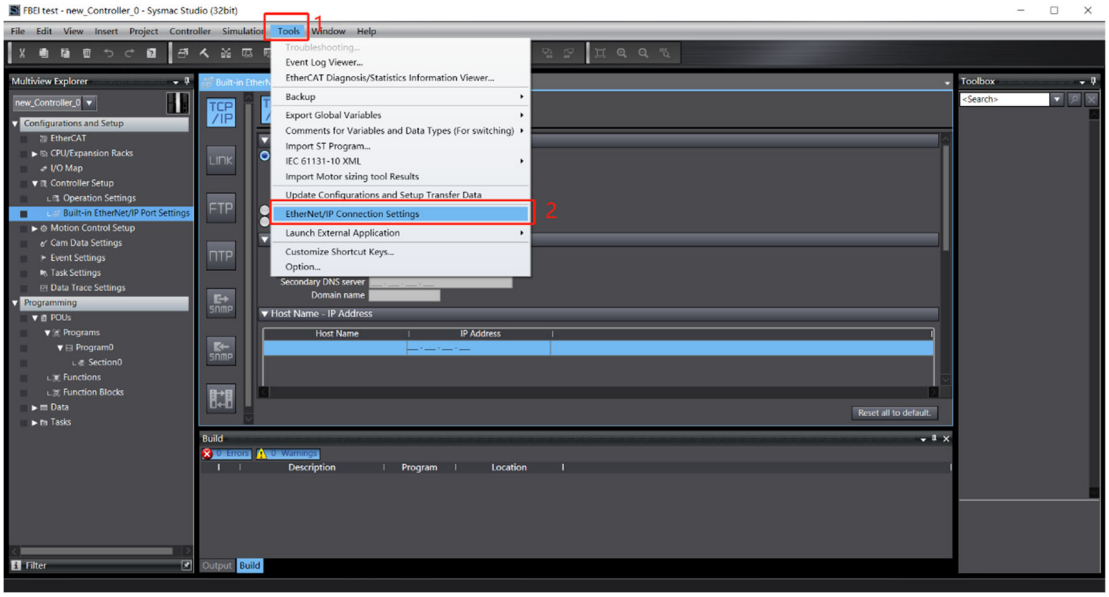


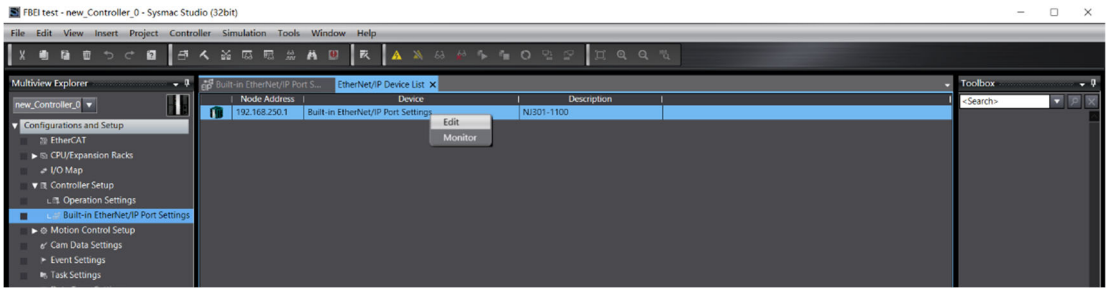
8.2.2.2. Set the IP address for the built-in EtherNet/IP port of the PLC. In this example, the default IP address for the PLC is 192.168.250.1, and the corresponding IP address for the FBEI module is 192.168.250.10. Note that the PLC and module should be set to the same network segment. The IP setting method for the module can refer to 9.2.1. IP Address Settings.

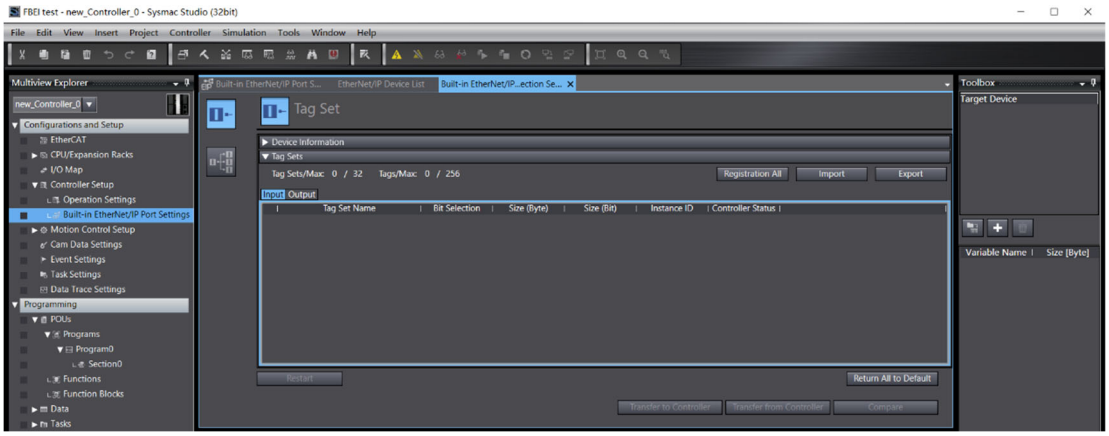


8.2.2.3. Set up the Ethernet/IP network by selecting "Tools>Ethernet/IP Connection Settings" from the menu bar.

8.2.2.4. Double click or right-click to edit the built-in Ethernet/IP port

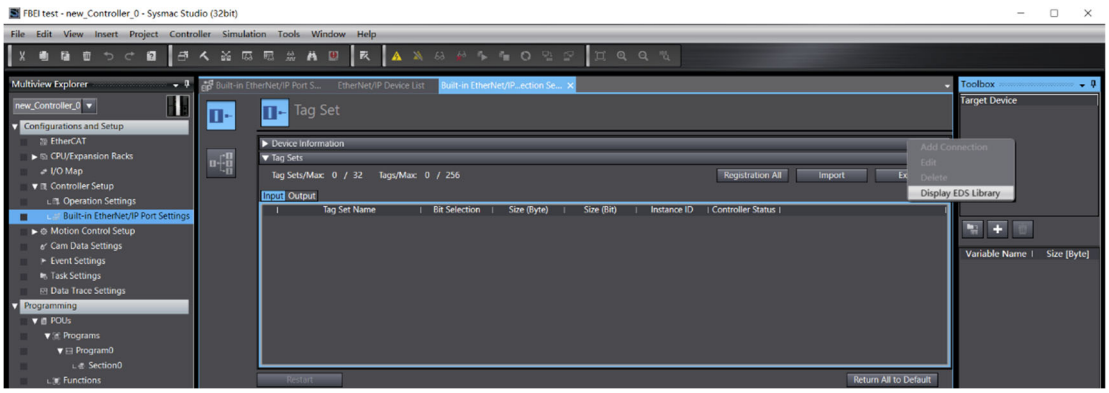




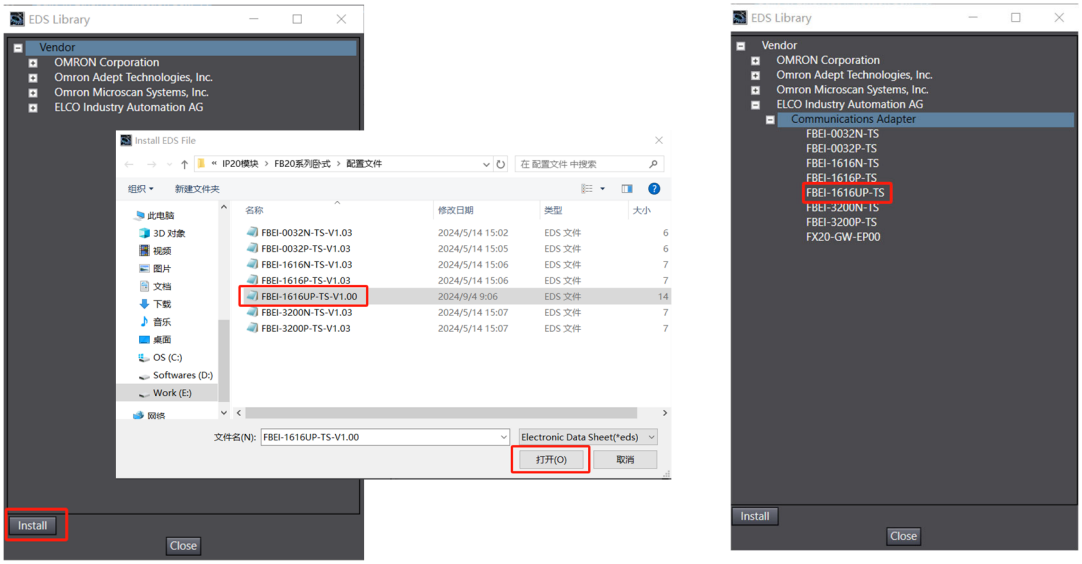


settings of the PLC in the newly opened interface to open the connection settings interface.

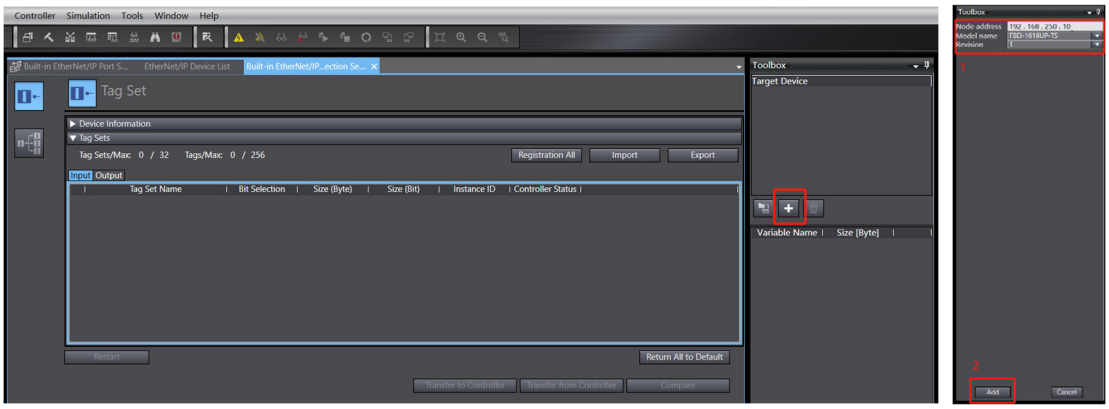
8.2.2.5. Install the EDS file for FBEI, which is in. eds format and is used to integrate FBEI as a standard Ethernet/IP slave into your system. Right click on the toolbox on the right side of the connection settings and select 'Show EDS Library'



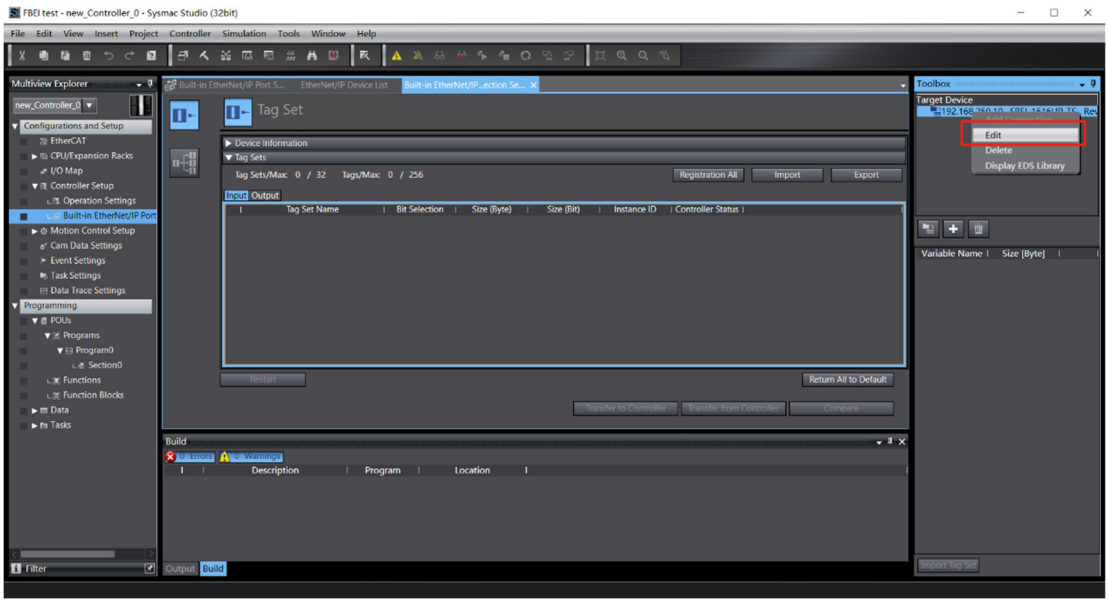
8.2.2.6. Click "Install", find the path where the EDS file of the FBEI module is stored, click the "Open" button, and the configuration file will be successfully imported.



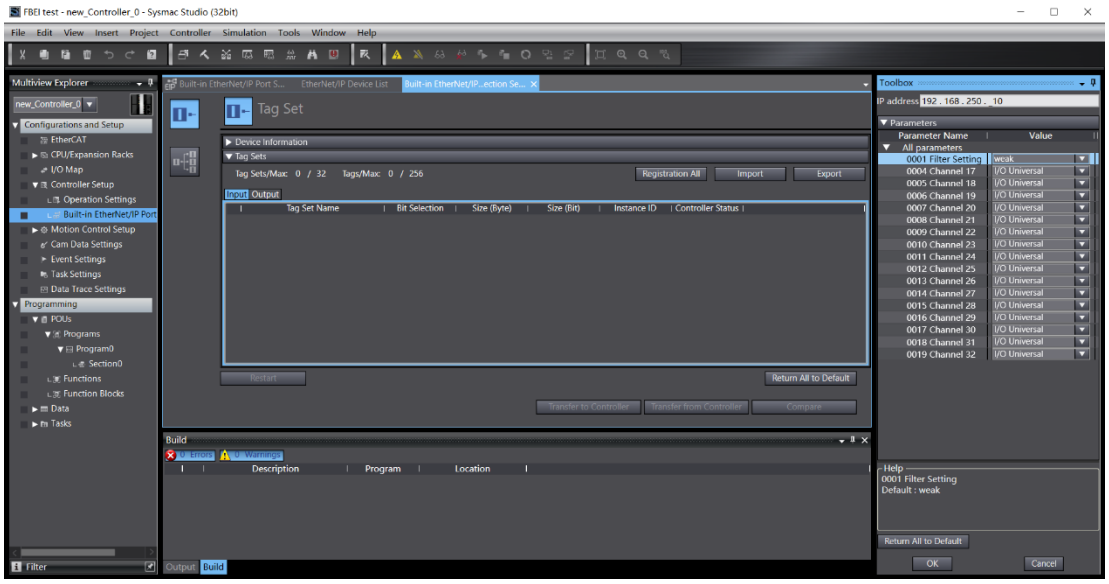
8.2.2.7. Click to close EDS library, click the "+" button in the toolbox, fill in the IP address of the module to be configured in the pop-up window (in this example, 192.168.250.10), select the FBEI model FBEI-1616UP-TS in the model's name, and choose the latest revision version. After completion, click the "Add" button.



8.2.2.8. Right click on the newly created target device 192.168.250.10 FBEI-1616UP-TS version 1 to edit.

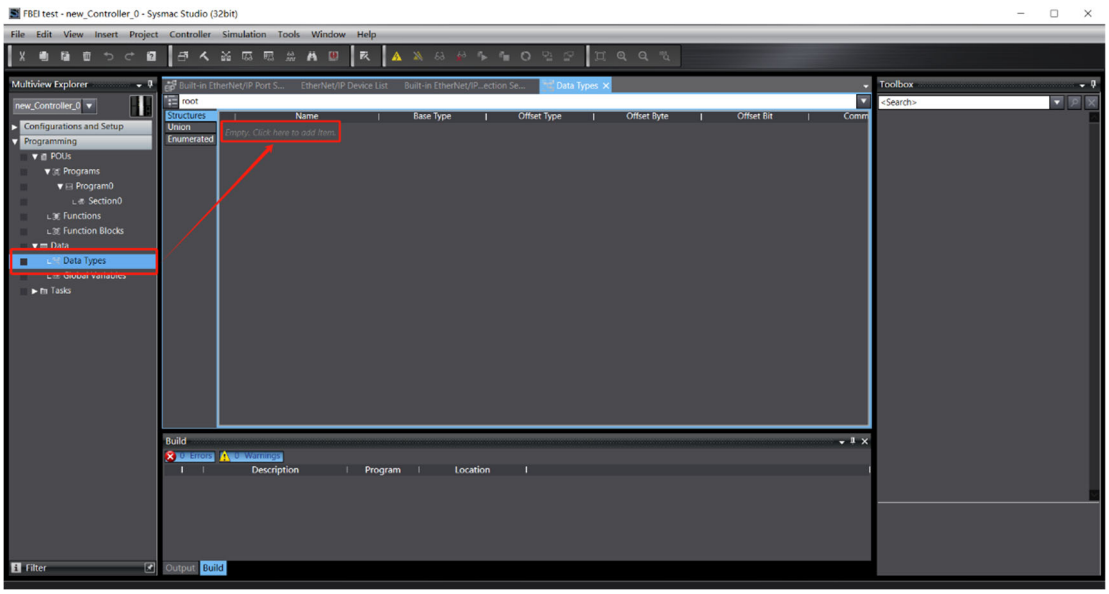


8.2.2.9. In this parameter setting interface, you can select the filtering time and input/output properties of 16 configurable channels. It is recommended to use the default setting of I/O Universal, but you can also customize the input or output properties of each channel as needed.

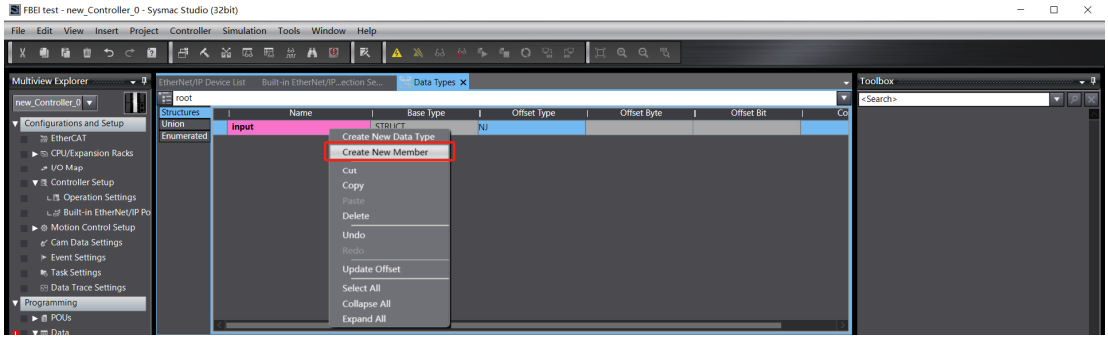


Click OK to exit channel parameter configuration.

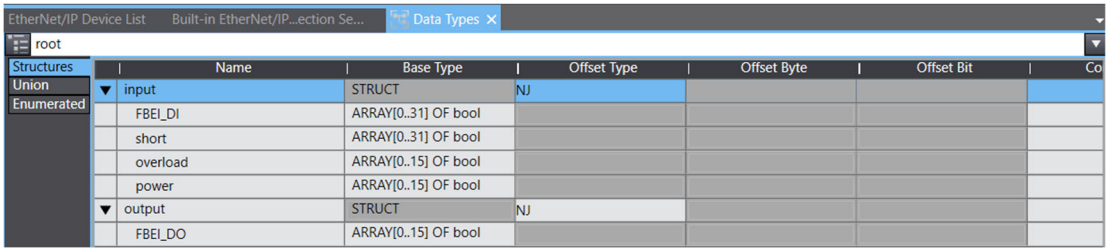
8.2.2.10. Create data type: Double click on the left navigation bar "Programming ->Data ->Data type", double-click on the “Empty .Click here to add item”.



8.2.2.11. For the sake of intuition, two data types are established here: input and output, and members "FBEI-DI" (used for input mapping), and "FBEI-DO" (used for output mapping) are added by right clicking on the newly established two data types.



Based on the length of input-output mapping data occupied by FBEI-1616UP-TS, establish corresponding basic types. Short, overload, and power are diagnostic data for module short circuit, overload, and power supply faults, respectively, as shown in the figure:
(The appendix of the manual lists the I/O mapping for all models for reference.)

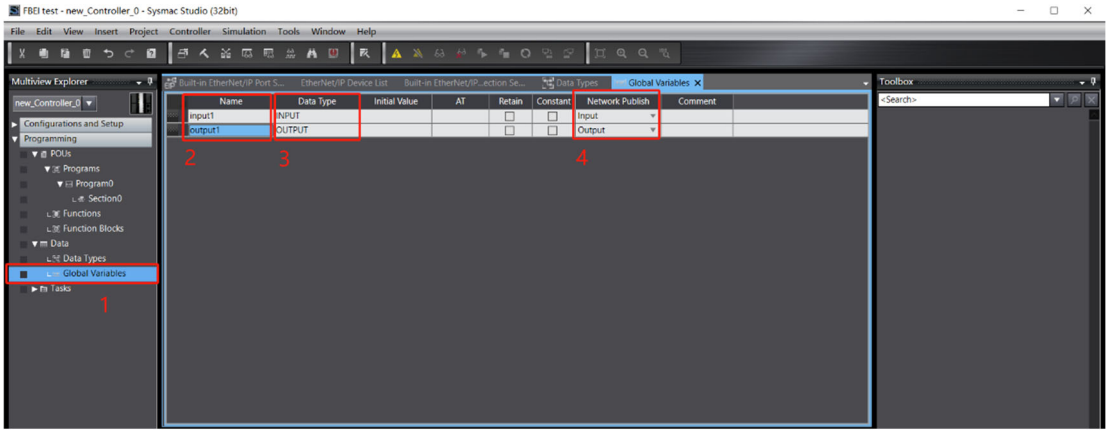


Name	Base Type	Offset Type	Offset Byte	Offset Bit	Co
▼ input	STRUCT	NJ			
FBEI_DI	ARRAY[0..31] OF bool				
short	ARRAY[0..31] OF bool				
overload	ARRAY[0..15] OF bool				
power	ARRAY[0..15] OF bool				
▼ output	STRUCT	NJ			
FBEI_DO	ARRAY[0..15] OF bool				

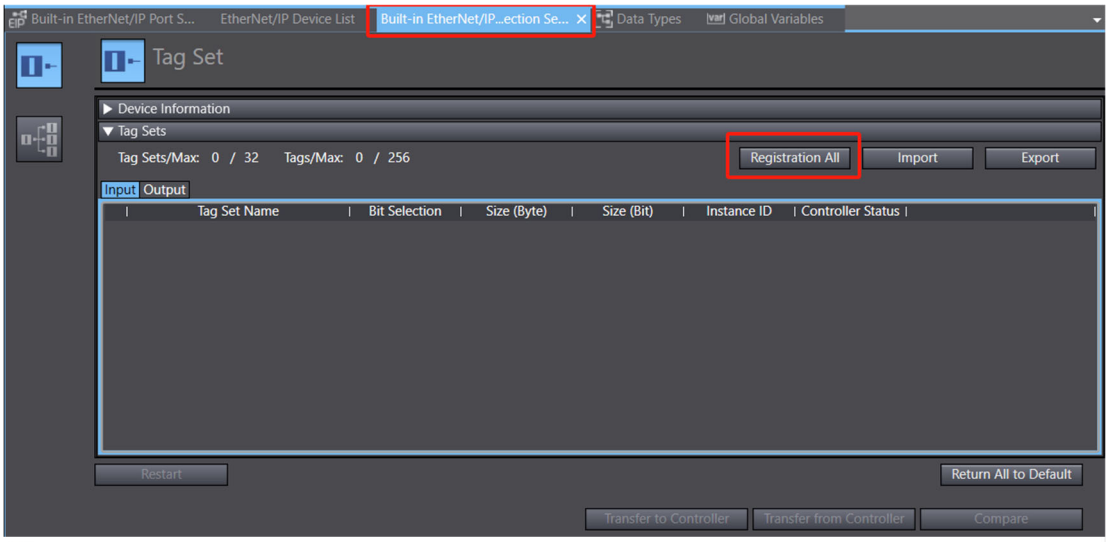
Note that the delimiter is an underscore "_" instead of a dash "-".

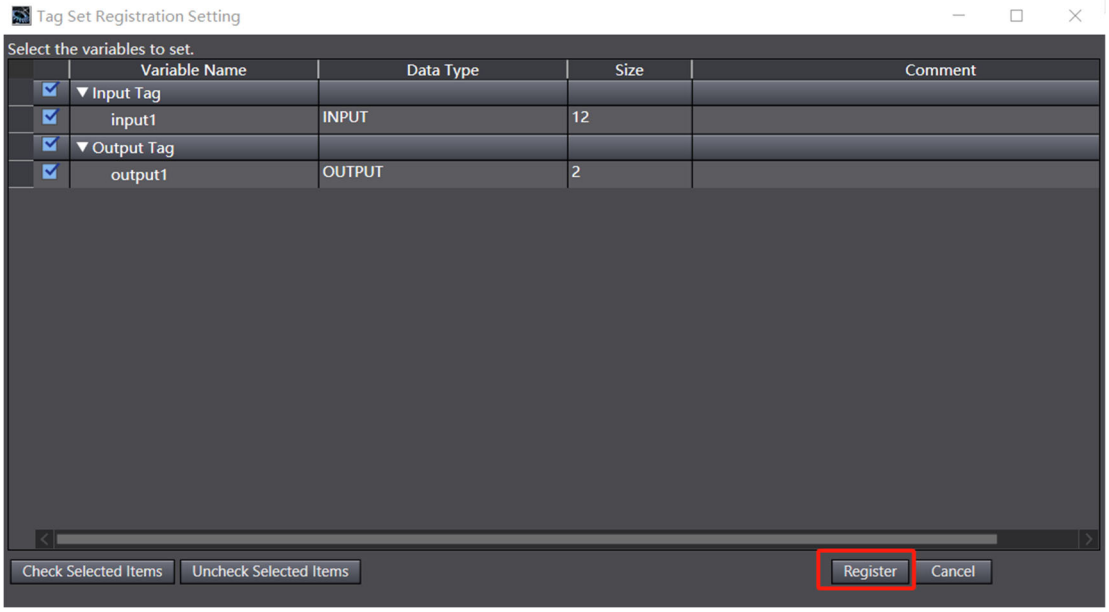
8.2.2.12. Create global variables: Double click the "Global Variables" menu on the left to create two global variables, input1 and output1. Fill in the data type names "INPUT" and "OUTPUT", and associate them with the

structure "Input" and "Output" through the drop-down menu of the "Network Publish" option.

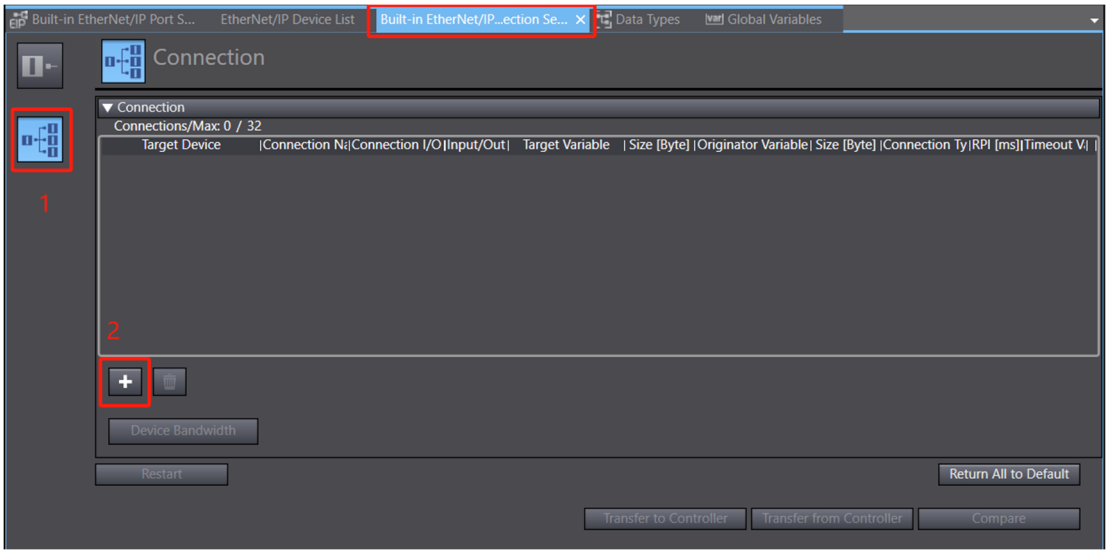


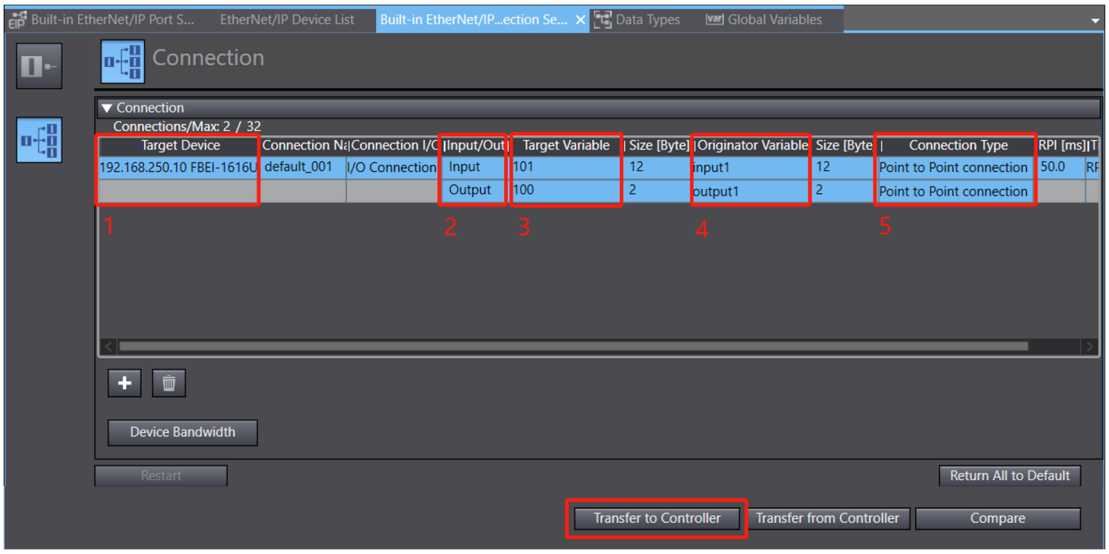
8.2.2.13. Variable registration: In the "Built in Ethernet/IP Port Settings" tab, click the " Registration All" button in the "Tag sets", confirm in the pop-up dialog box, and click "Register".





8.2.2.14. In the "Connection" settings, click the "+" and select to fill in the relevant parameters such as "Target Device", "Input/Output", "Target Variable", "Starting Variable", "Connection Type", etc., which should be consistent with the previously established global variables.



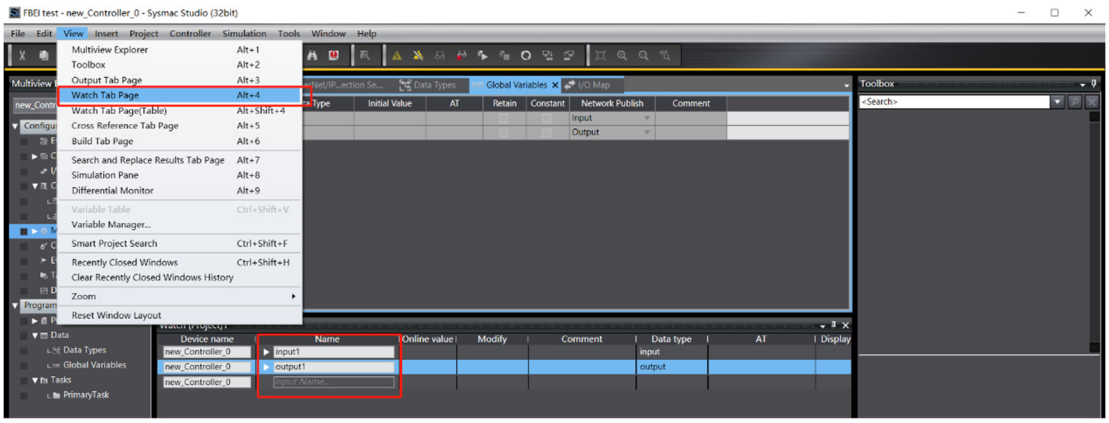


Note: If you want to change the above parameter configuration, you need to delete the connection and then add the connection configuration again for it to take effect.

8.2.2.15. At this point, the FBEI module has been configured through Ethernet/IP bus connection in Omron Sysmac Studio, and the parameter configuration is transmitted to the PLC. If the configuration is correct, the relevant indicator light BF of the FBEI module will remain green and can be used for input and output signal testing.

8.2.2.16. Input/Output Test

1)Open menu: view->watch tab page, enter variable names input1 and output1:



2）By sequentially forcing the output channels to "Ture", 16 output channel indicator lights can be lit. Similarly, by inputting a high-level signal, the input channel can be monitored to become "Ture".

Watch (Project)1

Device name	Name	Online value	Modify	Comment	Data type
new_Controller_0	▶ input1				input
new_Controller_0	▼ output1				output
	▼ FBEI_DO[0-15]				
	FBEI_DO[0]	True	TRUE FALSE		bool
	FBEI_DO[1]	True	TRUE FALSE		bool
	FBEI_DO[2]	True	TRUE FALSE		bool
	FBEI_DO[3]	True	TRUE FALSE		bool
	FBEI_DO[4]	True	TRUE FALSE		bool
	FBEI_DO[5]	True	TRUE FALSE		bool
	FBEI_DO[6]	True	TRUE FALSE		bool
	FBEI_DO[7]	True	TRUE FALSE		bool
	FBEI_DO[8]	True	TRUE FALSE		bool
	FBEI_DO[9]	True	TRUE FALSE		bool
	FBEI_DO[10]	True	TRUE FALSE		bool
	FBEI_DO[11]	True	TRUE FALSE		bool
	FBEI_DO[12]	True	TRUE FALSE		bool
	FBEI_DO[13]	True	TRUE FALSE		bool
	FBEI_DO[14]	True	TRUE FALSE		bool
	FBEI_DO[15]	True	TRUE FALSE		bool

9. Fault diagnosis LEDs

Name	Status	Meaning	Handling suggestions
FB20 LED indicators			
PW	Green	Normal	None
	Off	Power Failure	Check the power supply voltage and polarity;
			Module damaged, replace.
BF	Green	Normal	None
	Red	Bus Failure	Configuration error, check parameters configuration
			Bus connection error, check the bus cable connection
SF	Green	Normal	None
	Red	Module Failure	Check if there is a short circuit or overload in any I/O channel;
			Check if the power supply voltage is within the range of 24 VDC ± 20%;
1-32 I/O LEDs	Off	Channel low level	None
	On	Channel high level	None
X1	Green LED off	No network	Check the network cable connection of the network port X1
	Green LED on	network connected	None
	Yellow LED Blinking	Network Port 1 is sending/receiving Data	None
	Yellow LED off	Network Port 1 has no data exchange	None
X2	Green LED off	No network	Check the network cable connection of the network port X2
	Green LED on	network connected	None
	Yellow LED Blinking	Network Port 2 is sending/receiving Data	None
	Yellow LED off	Network Port 2 has no data exchange	None

Appendix

1. FB20 series Profinet data structure

■ FBPN-3200P(N)-TS

1) Process Data Input

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Slot 1	Byte 0	i8	i7	i6	i5	i4	i3	i2	i1	Input data
	Byte 1	i16	i15	i14	i13	i12	i11	i10	i9	
	Byte 2	i24	i23	i22	i21	i20	i19	i18	i17	
	Byte 3	i32	i31	i30	i29	i28	i27	i26	i25	
Slot 2	Byte 4	Diag.8	Diag.7	Diag.6	Diag.5	Diag.4	Diag.3	Diag.2	Diag.1	Channel Diagnosis
	Byte 5	Diag.16	Diag.15	Diag.14	Diag.13	Diag.12	Diag.11	Diag.10	Diag.9	
	Byte 6	Diag.24	Diag.23	Diag.22	Diag.21	Diag.20	Diag.19	Diag.18	Diag.17	
	Byte 7	Diag.32	Diag.31	Diag.30	Diag.29	Diag.28	Diag.27	Diag.26	Diag.25	
Slot 3	Byte 8								Error	Power status

2) Config

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Default	Description
Byte 0	Filter Setting								2	0：extremely weak 1：weak 2：medium 3：strong 4：extremely strong

■ FBPN-1616P(N)-TS

1) Process Data Input

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Slot 1	Byte 0	i8	i7	i6	i5	i4	i3	i2	i1	Input data
	Byte 1	i16	i15	i14	i13	i12	i11	i10	i9	
Slot 2	Byte 2	Diag.8	Diag.7	Diag.6	Diag.5	Diag.4	Diag.3	Diag.2	Diag.1	Channel Diagnosis
	Byte 3	Diag.16	Diag.15	Diag.14	Diag.13	Diag.12	Diag.11	Diag.10	Diag.9	
	Byte 4	Diag.24	Diag.23	Diag.22	Diag.21	Diag.20	Diag.19	Diag.18	Diag.17	
	Byte 5	Diag.32	Diag.31	Diag.30	Diag.29	Diag.28	Diag.27	Diag.26	Diag.25	
slot3	Byte 6								Error	Power status

2) Process Data Output

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Slot 1	Byte 0	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17	Output data
	Byte 1	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25	

3) Config

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Default	Description
Byte 0	Filter Setting								2	0：extremely weak 1：weak 2：medium 3：strong 4：extremely strong

■ FBPN-0032P(N)-TS

1) Process Data Input

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Slot 2	Byte 0	Diag.8	Diag.7	Diag.6	Diag.5	Diag.4	Diag.3	Diag.2	Diag.1	Channel Diagnosis
	Byte 1	Diag.16	Diag.15	Diag.14	Diag.13	Diag.12	Diag.11	Diag.10	Diag.9	
	Byte 2	Diag.24	Diag.23	Diag.22	Diag.21	Diag.20	Diag.19	Diag.18	Diag.17	
	Byte 3	Diag.32	Diag.31	Diag.30	Diag.29	Diag.28	Diag.27	Diag.26	Diag.25	
Slot 3	Byte 4								Error	Power status

2) Process Data Output

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Slot 1	Byte 0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Output data
	Byte 1	Q16	Q15	Q14	Q13	Q12	Q11	Q10	Q9	
	Byte 2	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17	
	Byte 3	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25	

■ FBPN-1616UP(N)-TS

1) Process Data Input

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Slot 1	Byte 0	I8	I7	I6	I5	I4	I3	I2	I1	Input data
	Byte 1	I16	I15	I14	I13	I12	I11	I10	I9	
	Byte 2	I24	I23	I22	I21	I20	I19	I18	I17	
	Byte 3	I32	I31	I30	I29	I28	I27	I26	I25	
Slot 2	Byte 4	Diag.8	Diag.7	Diag.6	Diag.5	Diag.4	Diag.3	Diag.2	Diag.1	Channel Diagnosis
	Byte 5	Diag.16	Diag.15	Diag.14	Diag.13	Diag.12	Diag.11	Diag.10	Diag.9	
	Byte 6	Diag.24	Diag.23	Diag.22	Diag.21	Diag.20	Diag.19	Diag.18	Diag.17	
	Byte 7	Diag.32	Diag.31	Diag.30	Diag.29	Diag.28	Diag.27	Diag.26	Diag.25	
Slot 3	Byte 8								Error	Power status

2) Process Data Output

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17	Output data
Byte 1	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25	

4) Config

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Default	Description
Byte 0	Filter Setting								2	0: extremely weak 1: weak 2: medium 3: strong 4: extremely strong
Byte 1	Port Type Channel 17								3	0: Digital Input 1: Digital Output 3: I/O Universal
Byte 2	Port Type Channel 18									
Byte 3	Port Type Channel 19									
Byte 4	Port Type Channel 20									
Byte 5	Port Type Channel 21									
Byte 6	Port Type Channel 22									
Byte 7	Port Type Channel 23									
Byte 8	Port Type Channel 24									
Byte 9	Port Type Channel 25									
Byte 10	Port Type Channel 26									
Byte 11	Port Type Channel 27									
Byte 12	Port Type Channel 28									
Byte 13	Port Type Channel 29									
Byte 14	Port Type Channel 30									
Byte 15	Port Type Channel 31									
Byte 16	Port Type Channel 32									

2. FB20 series Ethernet/IP data structure

■ FBEI-3200P(N)-TS

1) Configuration Data

	Instance ID	Data length
INPUT	101	10
OUTPUT	100	0

2) Input Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	i8	i7	i6	i5	i4	i3	i2	i1	Input data
Byte 1	i16	i15	i14	i13	i12	i11	i10	i9	
Byte 2	i24	i23	i22	i21	i20	i19	i18	i17	
Byte 3	i32	i31	i30	i29	i28	i27	i26	i25	
Byte 4	S1…8								Short circuit status
Byte 5	S9…16								
Byte 6	S17…24								
Byte 7	S25…32								
Byte 8								Error	Power status
Byte 9									Reserved

3) Parameters configuration

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Default	Description
Byte 0	Filter Setting								6	0-extremely weak 3-weak 6-medium 9-strong 12-extremely strong
Byte 1									0	Reserved

■ FBEI-1616P-TS

1) Configuration Data

	Instance ID	Data length
INPUT	101	10
OUTPUT	100	2

2) Input Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	i8	i7	i6	i5	i4	i3	i2	i1	Input data
Byte 1	i16	i15	i14	i13	i12	i11	i10	i9	
Byte 2	S1…8								Short circuit status
Byte 3	S9…16								
Byte 4	S17…24								
Byte 5	S25…32								
Byte 6	O24	O23	O22	O21	O20	O19	O18	O17	Overload status
Byte 7	O32	O31	O30	O29	O28	O27	O26	O25	
Byte 8								Error	Power status
Byte 9									Reserved

3) Output Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17	Output data
Byte 1	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25	

4) Parameters configuration

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Default	Description
Byte 0	Filter Setting								6	0-extremely weak 3-weak 6-medium 9-strong 12-extremely strong
Byte 1									0	Reserved

■ FBEI-1616N-TS

1) Configuration Data

	Instance ID	Data length
INPUT	101	10
OUTPUT	100	2

2) Input Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	i8	i7	i6	i5	i4	i3	i2	i1	Input data
Byte 1	i16	i15	i14	i13	i12	i11	i10	i9	
Byte 2	S1…8								Short circuit status
Byte 3	S9…16								
Byte 4	S17…24								

Byte 5	S25…32		
Byte 6	O21…24	O17…20	Overload status
Byte 7	O29…32	O25…28	
Byte 8		Error	Power status
Byte 9			Reserved

3) Output Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17	Output data
Byte 1	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25	

4) Parameters configuration

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Default	Description
Byte 0	Filter Setting								6	0-extremely weak 3-weak 6-medium 9-strong 12-extremely strong
Byte 1									0	Reserved

■ FBEI-1616UP(N)-TS

1) Configuration Data

	Instance ID	Data length
INPUT	101	12
OUTPUT	100	2

2) Input Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	I8	I7	I6	I5	I4	I3	I2	I1	Input data
Byte 1	I16	I15	I14	I13	I12	I11	I10	I9	
Byte 2	I24	I23	I22	I21	I20	I19	I18	I17	
Byte 3	I32	I31	I30	I29	I28	I27	I26	I25	
Byte 4	S1...8								Short circuit status
Byte 5	S9...16								
Byte 6	S17...24								
Byte 7	S25...32								
Byte 8	O24	O23	O22	O21	O20	O19	O18	O17	Overload status
Byte 9	O32	O31	O30	O29	O28	O27	O26	O25	
Byte 10								Error	Power status
Byte 11									Reserved

3) Output Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17	Output data
Byte 1	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25	

4) Parameters configuration

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Default	Description
Byte 0	Filter Setting								1	0: extremely weak 1: weak 3: medium 5: strong 10: extremely strong
Byte 1	Port Type Channel 17								3	0: Digital Input 1: Digital Output 3: I/O Universal
Byte 2	Port Type Channel 18									
Byte 3	Port Type Channel 19									
Byte 4	Port Type Channel 20									
Byte 5	Port Type Channel 21									
Byte 6	Port Type Channel 22									
Byte 7	Port Type Channel 23									
Byte 8	Port Type Channel 24									
Byte 9	Port Type Channel 25									
Byte 10	Port Type Channel 26									
Byte 11	Port Type Channel 27									
Byte 12	Port Type Channel 28									
Byte 13	Port Type Channel 29									
Byte 14	Port Type Channel 30									
Byte 15	Port Type Channel 31									
Byte 16	Port Type Channel 32									

■ FBEI-0032P-TS

1) Configuration Data

	Instance ID	Data length
INPUT	101	10
OUTPUT	100	4

2) Input Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	S1…8								Short circuit status
Byte 1	S9…16								
Byte 2	S17…24								
Byte 3	S25…32								
Byte 4	O8	O7	O6	O5	O4	O3	O2	O1	Overload status
Byte 5	O16	O15	O14	O13	O12	O11	O10	O9	
Byte 6	O24	O23	O22	O21	O20	O19	O18	O17	
Byte 7	O32	O31	O30	O29	O28	O27	O26	O25	
Byte 8								Error	Power status
Byte 9									Reserved

3) Output Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Output data
Byte 1	Q16	Q15	Q14	Q13	Q12	Q11	Q10	Q9	
Byte 2	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17	
Byte 3	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25	

■ FBEI-0032N-TS

1) Configuration Data

	Instance ID	Data length
INPUT	101	10
OUTPUT	100	4

2) Input Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	S1…8								Short circuit status
Byte 1	S9…16								
Byte 2	S17…24								
Byte 3	S25…32								
Byte 4	O5...8				O1...4				Overload status
Byte 5	O13...16				O9…12				
Byte 6	O21...24				O17...20				
Byte 7	O29…32				O25...28				
Byte 8								Error	Power status
Byte 9									Reserved

3) Output Process Data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
Byte 0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Output data
Byte 1	Q16	Q15	Q14	Q13	Q12	Q11	Q10	Q9	
Byte 2	Q24	Q23	Q22	Q21	Q20	Q19	Q18	Q17	
Byte 3	Q32	Q31	Q30	Q29	Q28	Q27	Q26	Q25	