

# EtherCAT Junction

## SW4-ECP04

### User Manual




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Nanjing Solidot Electronic Technology Co., Ltd.

11th Floor, Angying Building, No. 91 Shengli Road, Jiangning District, Nanjing City, Jiangsu Province

Postcode: 21 1106

Phone: 4007788929

Website: <http://www.solidotech.com>

# CONTENTS

1 Product Introduction .....	1
1.1 Product overview .....	1
1.2 Product features .....	1
2 Designation Rules .....	2
2.1 Designation Rules .....	2
3 Product Parameters .....	3
3.1 General parameter .....	3
4 Panel .....	4
4.1 Product structure .....	4
4.2 Indicator light function .....	5
5 Installation and uninstall .....	6
5.1 Housing Dimensions .....	6
5.2 Installation and uninstall .....	6
6 Wiring .....	8
6.1 Wiring terminal .....	8
6.2 Wiring instructions and requirements .....	8
6.2.1 Power Wiring .....	8
6.2.2 Bus Wiring .....	10
6.3 Wiring diagram .....	11
6.3.1 Power supply wiring diagram .....	11
6.3.2 Junction topology .....	11
7 Operation .....	12
7.1 Configuration applications .....	12
7.1.1 Application in TwinCAT3 software environment .....	12
7.1.2 Application in Sysmac Studio software environment .....	16
8 FAQ .....	24
8.1 Device cannot be found in the software .....	24
8.2 Device cannot enter OP state .....	24

# 1 Product Introduction

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## 1.1 Product overview

SW4-ECP04 is a four-port EtherCAT splitter module, which adopts EtherCAT industrial Ethernet bus interface, can be compatible with EtherCAT networks of multiple vendors, supports cascade function, and can be flexibly combined into a variety of topologies, which can be widely used in various industrial systems.

## 1.2 Product features

- Four EtherCAT ports  
RJ45 interface, support junction cascade function
- compactness  
For applications where space is at a premium
- Quick  
Based on high-performance EtherCAT ASIC communication chip for faster speeds
- Easy configuration  
Simple configuration and support for all major EtherCAT masters
- Easy installation  
DIN 35 mm standard rail installation

# 2 Designation Rules

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## 2.1 Designation Rules

**SW** **4** - **EC** **P** **04**  
(1)   (2)   (3)   (4)   (5)

Number	Meaning	Description of values
(1)	Functionality	SW: Junction
(2)	Product series	4: Vertical one-piece module
(3)	Bus protocol	EC: EtherCAT protocol abbreviation
(4)	Port short name	P: Port abbreviation
(5)	Number of ports	04: 4 network ports

# 3 Product Parameters

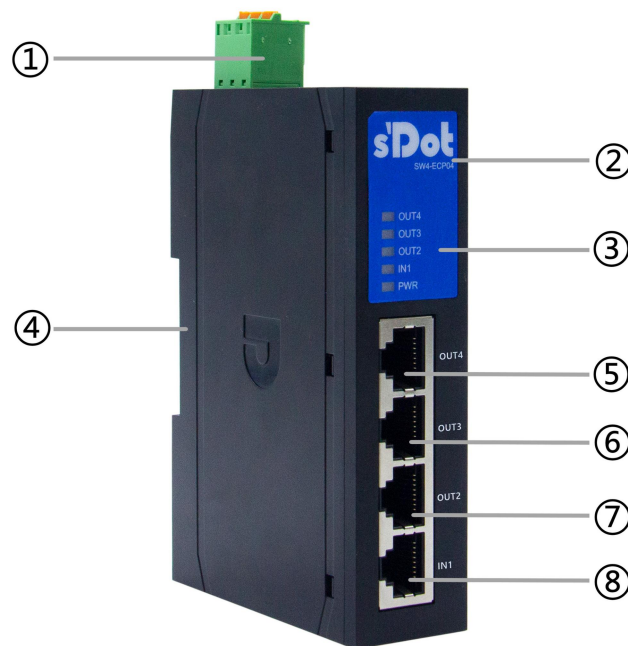
## 3.1 General parameter

Interface parameter	
Product name	SW4-ECP04
Bus protocol	EtherCAT
Bus interface	4 x RJ45 (1 in, 3 out)
Electrical isolation	500 VAC
Data transmission medium	Category 5+ UTP or STP (STP recommended)
Hot-swappable on the port side	Support
Transmission distance	≤100 m (station to station)
Transmission rate	100 Mbps
Technical Parameters	
Configuration method	Through the master
Power supply	18~36VDC
Power protection	Anti-reverse connection, short circuit protection
Weight	110g
Size	112×76×28mm
Operating temperature	-10~+60°C
Storage temperature	-20~+75°C
Relative humidity	95%, no condensation
Ingress protection	IP20

# 4 Panel

## 4.1 Product structure

### Name of each part of the product



Number	Name	Description
①	Power port	3P terminal
②	Module marking	Marking module model
③	Indicator lights and their markings	Indicates power supply and module operation status
④	Guideway slot	Suitable for DIN 35 mm standard rail installation with fixed modules
⑤	Bus port OUT4	RJ45
⑥	Bus port OUT3	RJ45

⑦	Bus port OUT2	RJ45
⑧	Bus port IN1	RJ45

## 4.2 Indicator light function

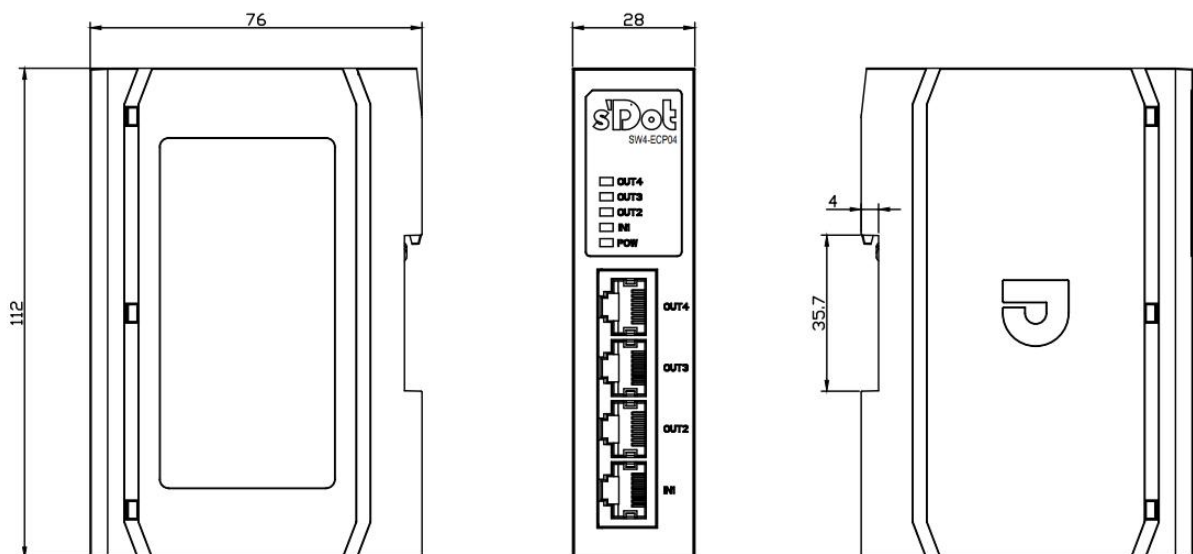
Name	Markings	Color	Status	Status Description
Power indicator	PWR	GREEN	ON	Power supply normal
			OFF	Abnormal power supply or failure to power up the power supply
Network Port Indicator	IN1	GREEN	ON	Establish a network connection
			FLASHING	Network connection with data interaction
			OFF	No data interaction or exception
	OUT2~OUT4	GREEN	ON	Establish a network connection
			FLASHING	Network connection with data interaction
			OFF	No data interaction or exception



# 5 Installation and uninstall

## 5.1 Housing Dimensions

### Housing specifications (unit mm)



## 5.2 Installation and uninstall

The modules are installed on DIN 35 mm standard rails as shown in the table below:

Module Installation and uninstalled	
Module installation steps	1. Push the buckle at the bottom of the back of the module outward, and hear the "click" sound that the buckle is pushed out of place.
	2. Align the upper edge of the module snap with the upper edge of the guide rail, place the module into the guide rail, and the module moves into place with the guide rail.
	3. Push the snap in the direction of the rail and hear the ringing sound to

	complete the module installation.
Module uninstall procedure	1. Insert a screwdriver into the snap, exert force in the direction of the module, and remove the module from the rail when you hear a rattling sound.

# 6 Wiring

## 6.1 Wiring terminal

Wiring terminal		
Power supply terminal	Number of poles	3 P
	Wire diameter	22~16 AWG 0.3~1.5 mm <sup>2</sup>
Bus interface	4 x RJ45	Category 5+ UTP or STP (STP recommended)

## 6.2 Wiring instructions and requirements

### 6.2.1 Power Wiring

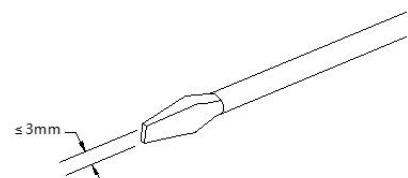
#### Power supply wiring precautions

- PE needs to be reliably grounded.

#### Wiring Tool Requirements

Screwless design of power terminals for cable installation and uninstalled

One-piece screwdriver operation (Specification:  $\leq 3$  mm).



### Stripped Wire Length Requirements

Recommended stripping length 10 mm.



### Wiring Method

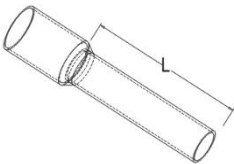
For single stranded hard wires, after stripping the corresponding length of wire, press down the button while inserting the wire into the terminal.



Multi-strand flexible wires, after stripping the corresponding length of wire, supporting the use of the corresponding standard specifications of the cold pressure terminal (tube-type insulated terminals, the following table), press down on the button at the same time will be inserted into the terminal wire.



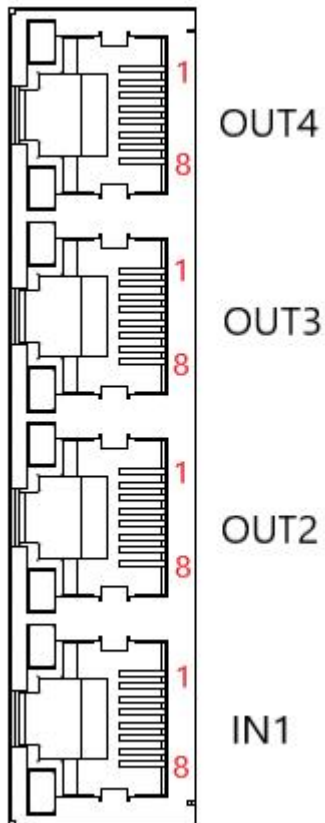
**Tube Insulation End Specification Sheet**

Specification	Model	Cross-sectional area of conductor mm <sup>2</sup>
 <p>The length of the tube-type insulated terminal L is <math>\geq 10</math> mm.</p>	E0510	0.5
	E7510	0.75
	E1010	1.0
	E1510	1.5

## 6.2.2 Bus Wiring

### Bus Wiring Requirements

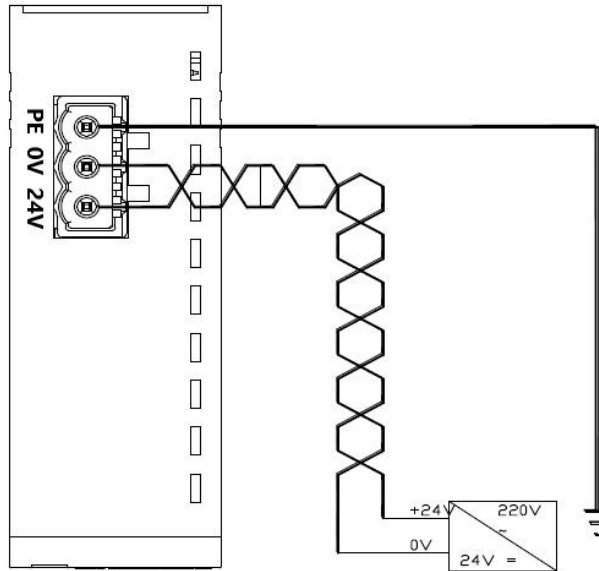
- Adopt standard RJ45 network port with standard crystal connector
- The length of the cables between the devices must not exceed 100 m.



PIN number	Code
1	TD+
2	TD-
3	RD+
4	—
5	—
6	RD-
7	—
8	—

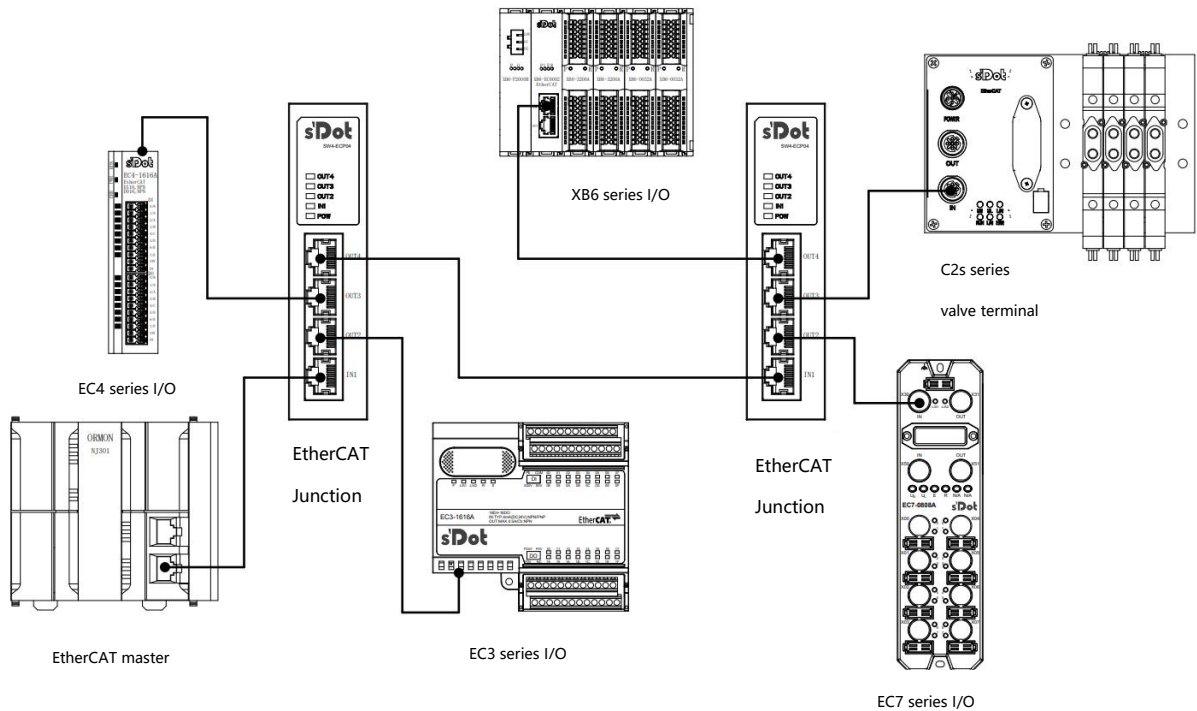
### 6.3 Wiring diagram

#### 6.3.1 Power supply wiring diagram



#### 6.3.2 Junction topology

Taking our EtherCAT series products as an example, the topology of the junction connector module is exemplified in the following figure.



# 7 Operation

## 7.1 Configuration applications

### 7.1.1 Application in TwinCAT3 software environment

#### 1、 Preliminary

##### ● Hardware environment

- Junction SW4-ECP04, take OUT2 connecting to IO module EC3-1616A and OUT3 connecting to EC3-0032B for example
- A computer with pre-installed TwinCAT3 software
- Shielded cables for EtherCAT
- One switching power supply
- Device Configuration Files

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

##### ● Hardware configuration and wiring

Follow "[5 Installation and uninstall](#)" and "[6 Wiring](#)".

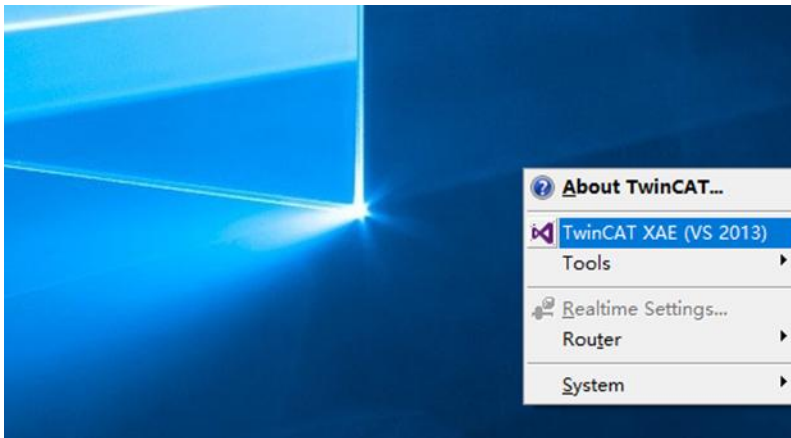
#### 2、 Preset configuration files

Place the ESI configuration file for the junction (SDOT-SW4-ECPxx\_V1.02.xml) and the ESI configuration files for the other modules in the topology configuration in the TwinCAT installation directory "C:\TwinCAT\3.1\Config\Io\EtherCAT". as shown in the figure below.

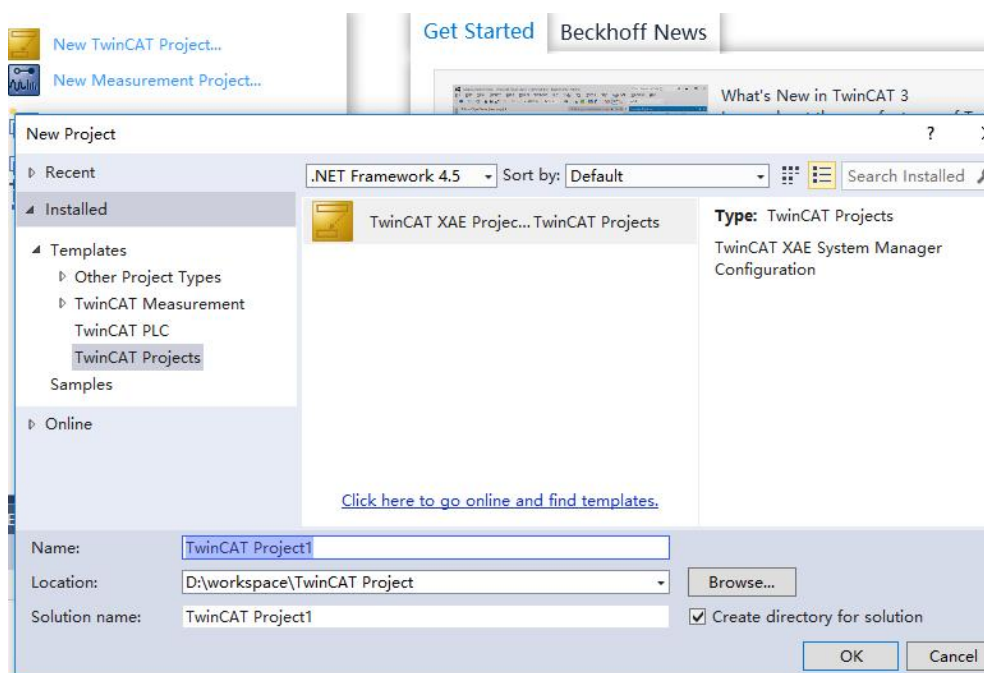
名称	修改日期	类型	大小
Beckhoff EQ1xxx.xml	2015/11/12 14:24	XML 文档	22 KB
Beckhoff EQ2xxx.xml	2016/11/23 10:42	XML 文档	73 KB
Beckhoff EQ3xxx.xml	2016/11/22 11:22	XML 文档	1,386 KB
Beckhoff ER1xxx.XML	2016/11/21 15:46	XML 文档	165 KB
Beckhoff ER2xxx.XML	2016/11/21 14:32	XML 文档	259 KB
Beckhoff ER3xxx.XML	2017/6/9 13:35	XML 文档	1,177 KB
Beckhoff ER4xxx.xml	2016/11/22 12:58	XML 文档	318 KB
Beckhoff ER5xxx.xml	2016/3/14 11:52	XML 文档	273 KB
Beckhoff ER6xxx.xml	2016/3/14 11:52	XML 文档	494 KB
Beckhoff ER7xxx.xml	2016/11/22 12:14	XML 文档	1,503 KB
Beckhoff ER8xxx.xml	2016/3/14 11:52	XML 文档	207 KB
Beckhoff EtherCAT EvaBoard.xml	2015/2/4 12:57	XML 文档	72 KB
Beckhoff EtherCAT Terminals.xml	2015/2/4 12:57	XML 文档	53 KB
Beckhoff FB1XXX.xml	2017/5/24 12:26	XML 文档	49 KB
Beckhoff FCxxx.xml	2015/2/4 12:57	XML 文档	21 KB
Beckhoff ILxxx-B110.xml	2015/2/4 12:57	XML 文档	8 KB
SDOT-SW4-ECPxx_V1.02.xml	2023/4/20 9:44	XML 文档	3 KB
Solidotech EC3_V2.0.4.xml	2022/12/9 13:21	XML 文档	13 KB

### 3. Create Project

- a. Click the TwinCAT icon in the lower right corner of the desktop and select "TwinCAT XAE (VS xxxx)" to open the TwinCAT software as shown below.



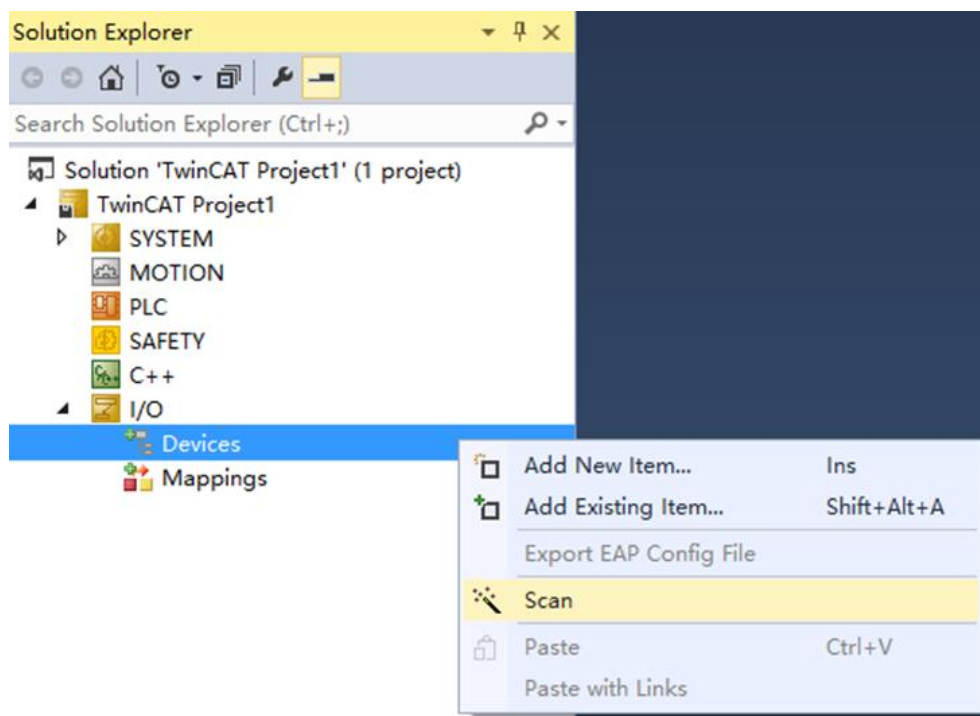
- b. Click "New TwinCAT Project", in the pop-up window, "Name" and "Solution name" correspond to the project name and solution name respectively, and "Location" corresponds to the project path, and these three items can be selected by default, then click "OK", the project is created successfully, as shown in the following figure.



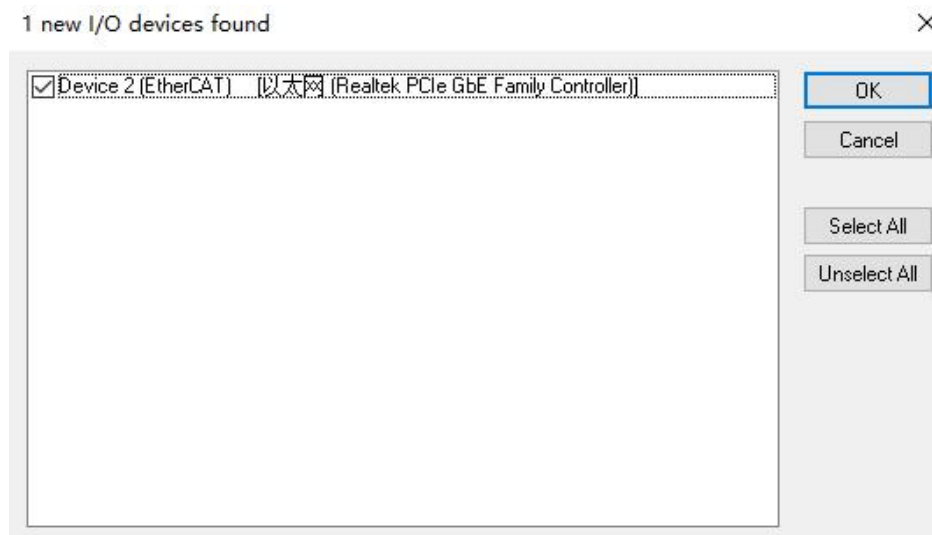


#### 4. Scanning device

- a. After creating the project, right-click on the "Scan" option under "I/O -> Devices" to perform a slave device scan, as shown in the following figure.



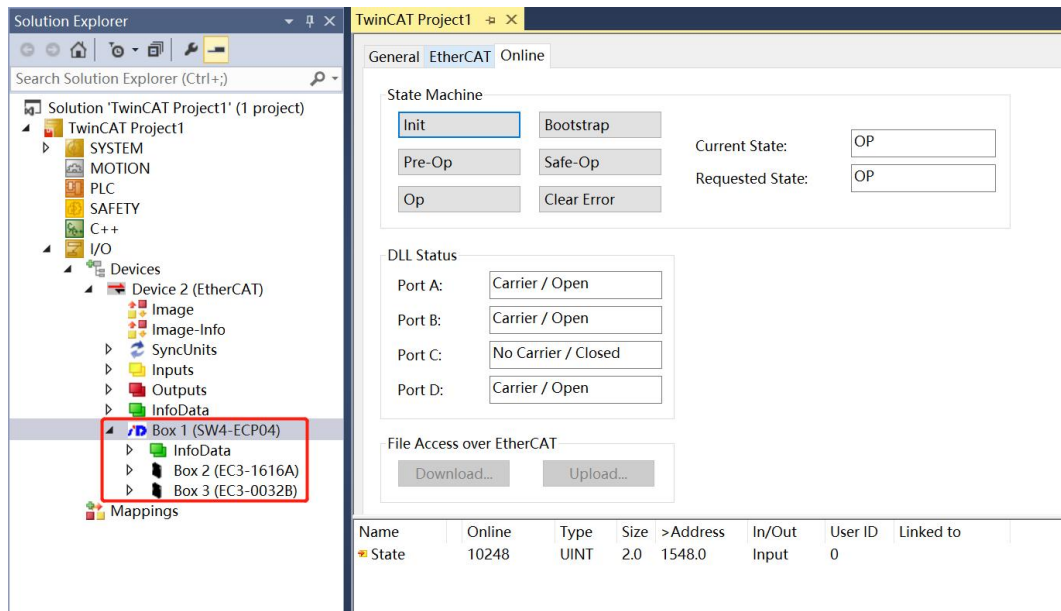
- b. Check the "Local Connection" box, as shown in the following figure.



- c. Click on the pop-up window "Scan for boxes" and select "Yes"; click on the pop-up window "Activate Free Run" and select "Yes". "Yes", as shown in the figure below.



- d. After scanning the devices, Box1 is the junction SW4-ECP04, Box2 is the EC3-1616A, Box3 is the EC3-0032B, which is consistent with the connection configuration of the junction. In the "Online" of Box1, you can see that the junction is in the "OP" state, and you can observe that the network port indicator of the switch is flashing, as shown in the figure below.



- e. After the scanning of the configuration device is completed, you can operate the relevant modules according to the actual application needs.

## 7.1.2 Application in Sysmac Studio software environment

### 1、 Preliminary

- **Hardware environment**

- **Junction SW4-ECP04, take OUT2 connecting to IO module EC3-1616A and OUT3 connecting to EC3-0032B for example**
- **One computer with Sysmac Studio software pre-installed**
- **One OMRON PLC**  
This description is based on model NX1P2-9024DT as an example.
- **Shielded cables for EtherCAT**
- **One switching power supply**
- **Device Configuration Files**

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

- **Hardware configuration and wiring**

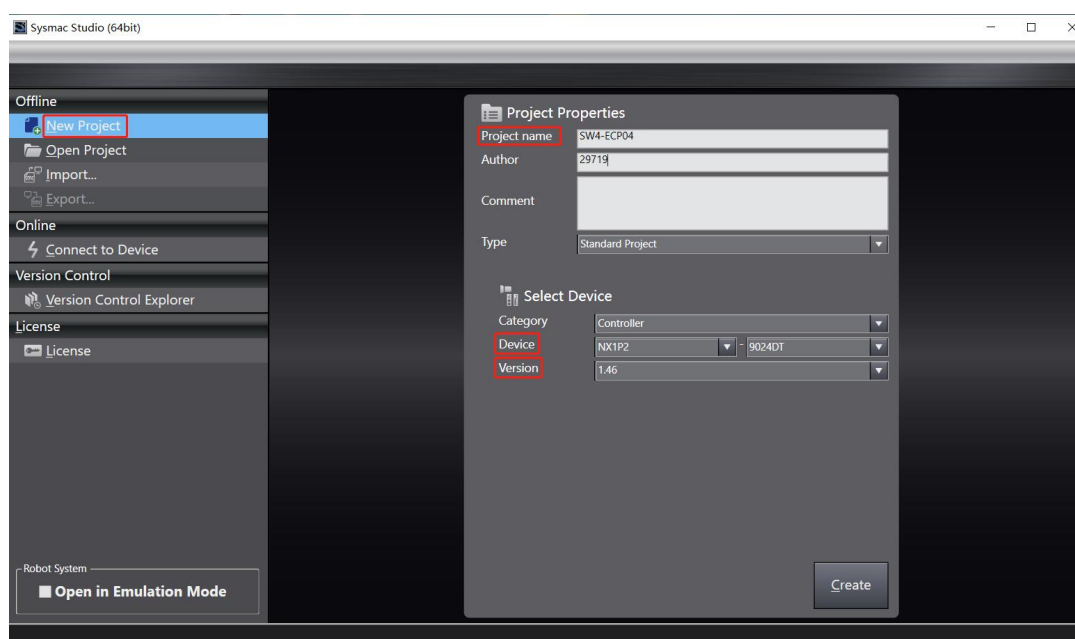
Follow "[5 Installation and uninstall](#)" and "[6 Wiring](#)".

- **Computer IP requirements**

Set the IP address of the computer and the IP address of the PLC to make sure they are on the same network segment.

### 2、 New project

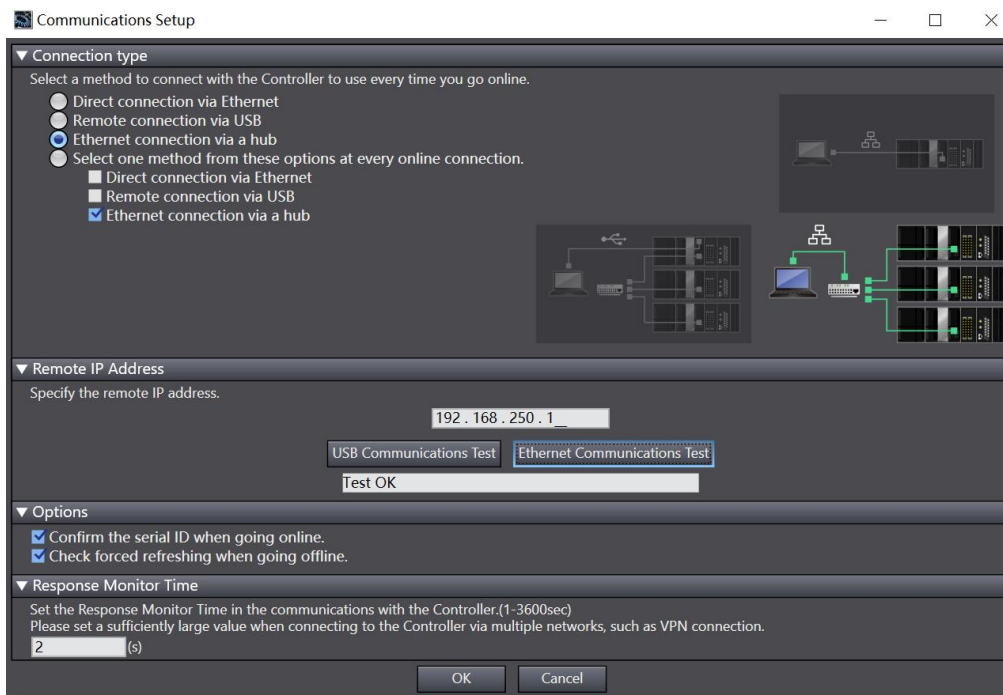
- a. Open the Sysmac Studio software and click the "New Project" button.



- Project name: Customize.
- Select device: "Device" selects the corresponding PLC model, and "Version" recommends selecting V1.40 and above.

- b. Once the project properties have been entered, click the "Create" button.

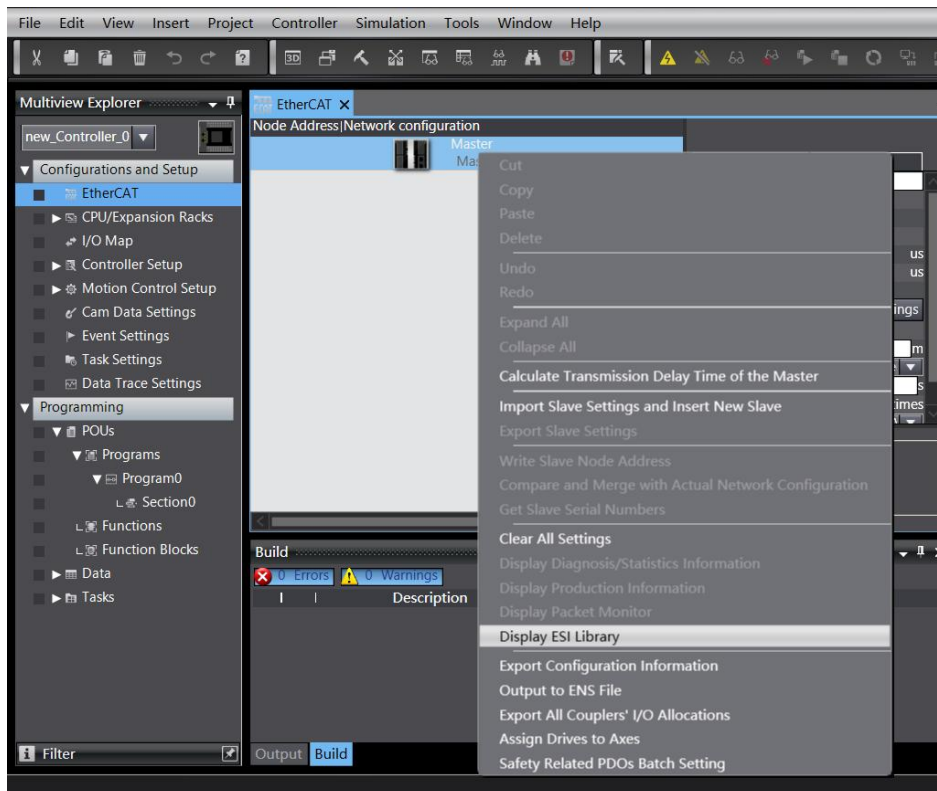
- c. Click "Controller -> Communication Setup" in the menu bar, select the method to be used every time you connect to the controller when you are online, and write "Remote IP Address" as shown in the following figure.



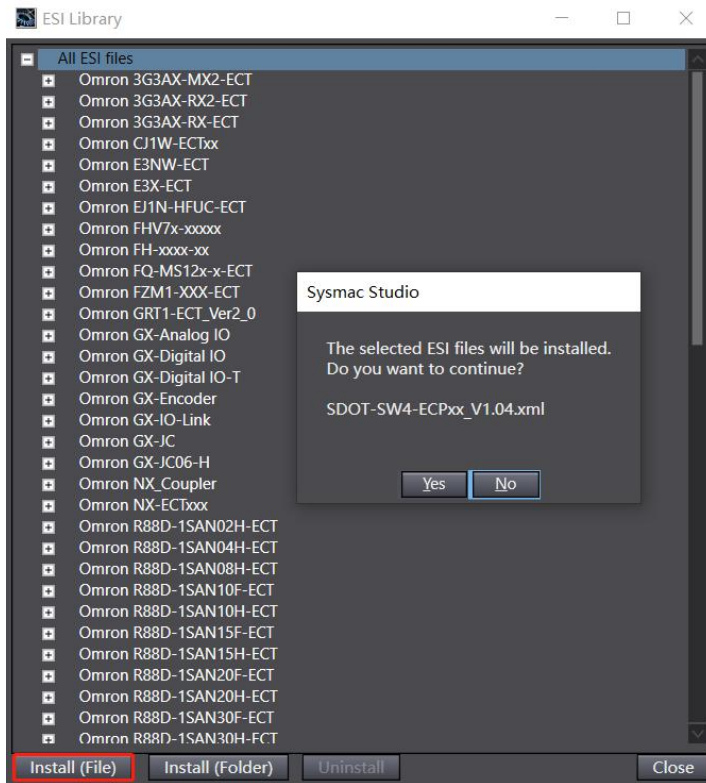
- d. Click "Ethernet communication test", the system shows that the test is successful.

### 3. Installation of XML files

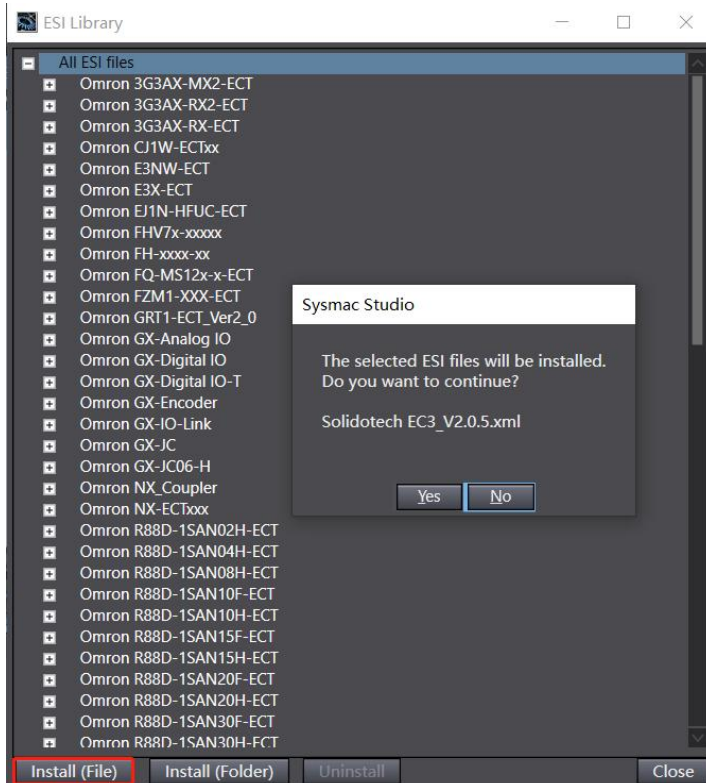
- a. Expand "Configuration and Setup" in the left navigation tree and double-click on "EtherCAT".
- b. Right-click on "Master" and select "Display ESI Library" as shown below.



- c. In the pop-up "ESI Library" window, click the "Install (File)" button, select the path to the XML file of the junction, click the button "Yes" to complete the installation, as shown below.




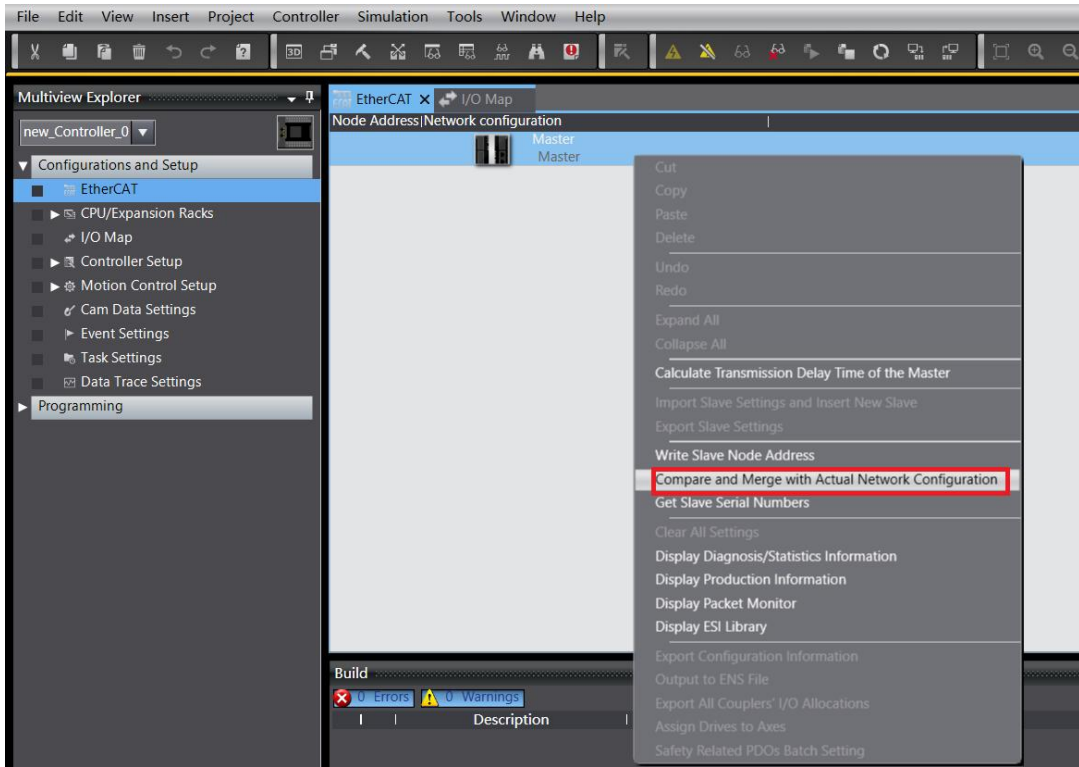
- d. Click the "Install (File)" button again, select the XML file path of other modules in the topology configuration, in this case, select the EC3 configuration file path, click the button "Yes" to complete the installation, as shown in the following figure.



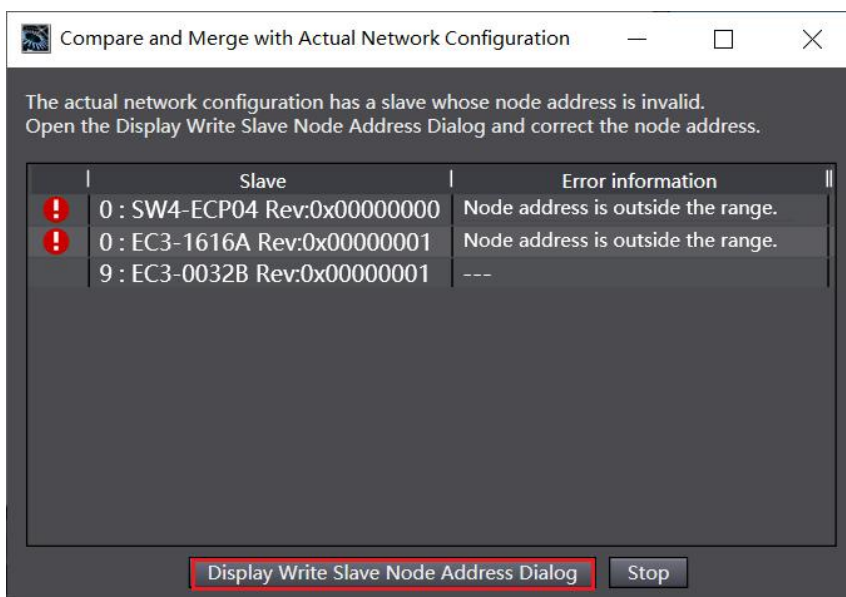
#### 4. Adding devices and setting node addresses

There are two ways to add devices: online scanning and offline adding, this note is introduced with online scanning as an example.

- a. Click the  online button on the toolbar, right-click on "Master", click and select "Compare and Merge with Actual Network Configuration", as shown in the following figure.

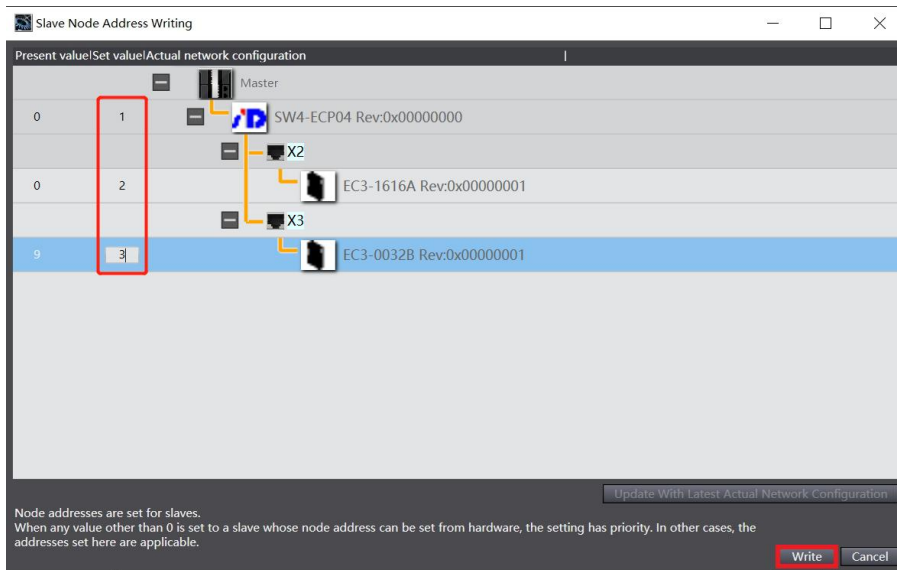


- b. In the "Compare and Merge with Actual Network Configuration" pop-up dialog box, click "Display Write Slave Node Address Dialog", as shown in the following figure.

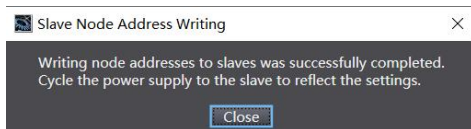
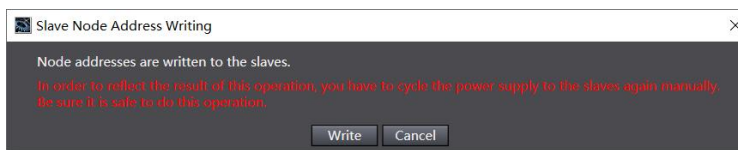




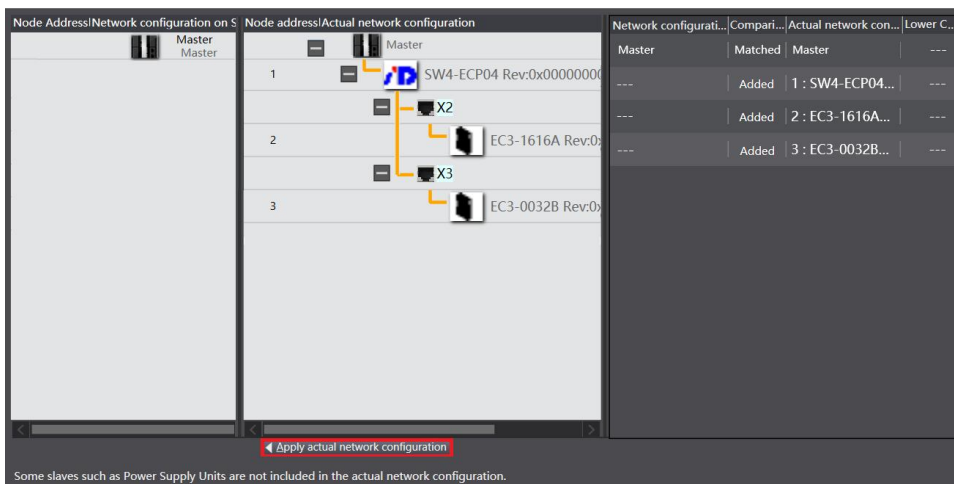
- c. In the Set Node Address dialog, click the value under Set Value to enter the node address, and then click the "Write" button, as shown in the following figure.



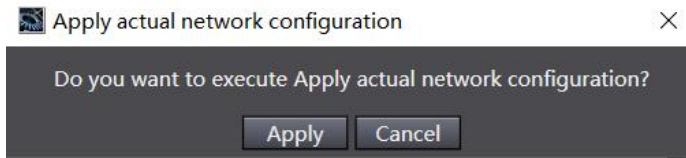
- d. After writing, a re-power prompt will pop up, as shown in the following figure, click the "Write" button, and then follow the prompts to reboot the power from the device.



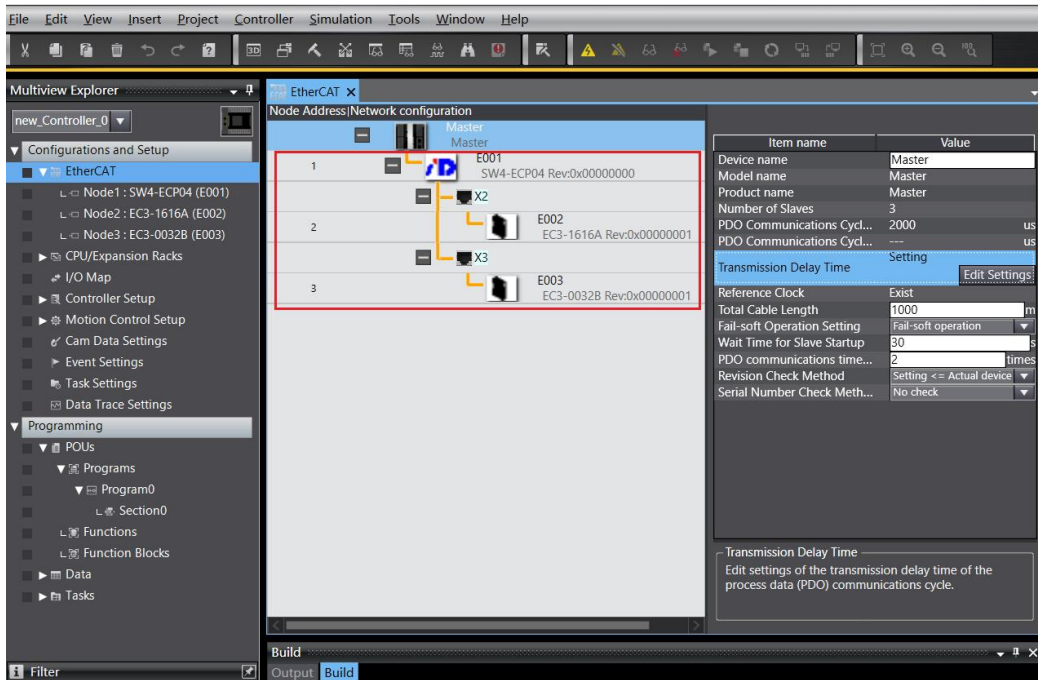
- e. Right-click "Master", click and select "Compare and Merge with Actual Network Configuration", a dialog box will pop up, click "Apply Actual Network Configuration", as shown in the following figure. E001 is junction SW4-ECP04, X2 is EC3-1616A, X3 is EC3-0032B, which is the same as the connection configuration of the junction.



- f. Click the "Apply" button in the pop-up dialog box, as shown below.

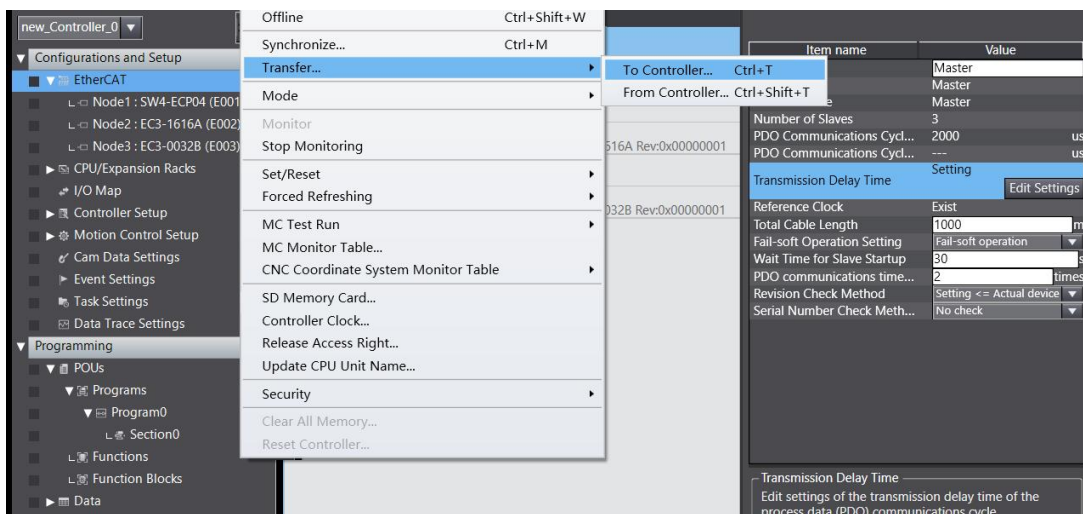


- g. After the topology application is complete the dialog box is closed and the topology configuration is displayed in the Network Setup screen as shown below.



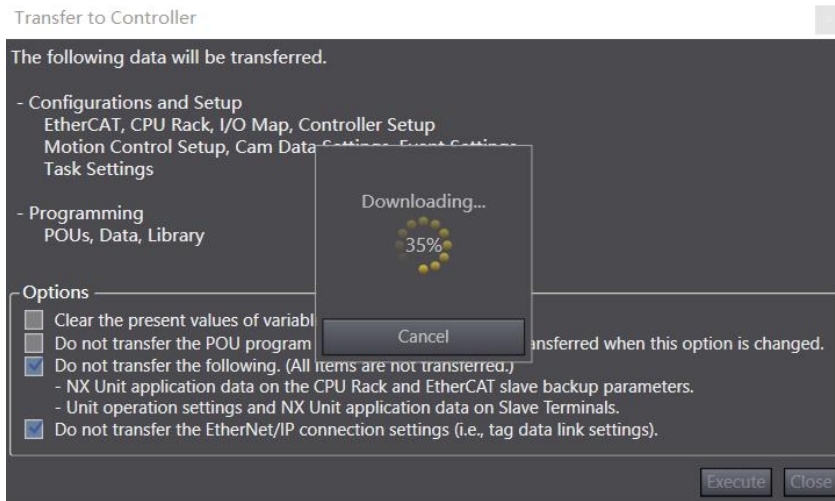
### 5. Download configuration to PLC

- a. Click the button "Controller -> Transfer -> To Controller" in the menu bar, as shown in the following figure.

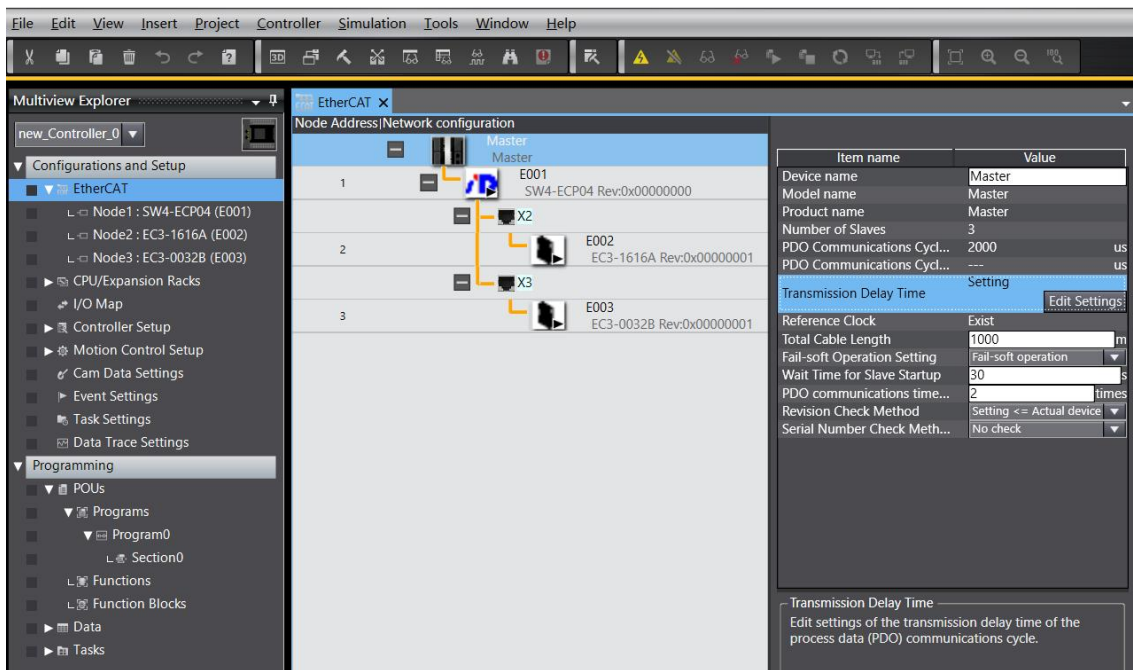




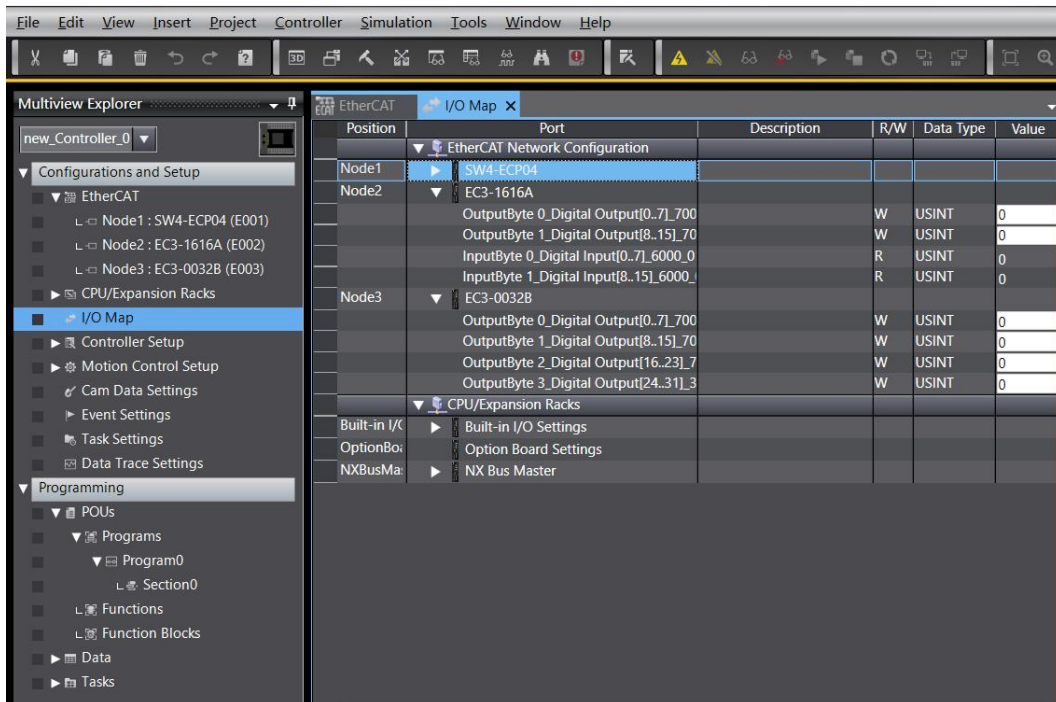
- b. Download the configuration to the PLC as shown in the figure below. After the download is complete, power needs to be reapplied.



- c. After repowering, the PLC can be seen in the lower right corner in run mode with the topology displayed as shown below.



- d. After that, you can operate the related modules according to the actual application needs, such as monitoring input/output signals and forcing output, double-click on "I/O Mapping" in the left navigation tree for specific operations, as shown in the figure below.



# 8 FAQ

---

## 8.1 Device cannot be found in the software

1. Verify that the ESI configuration file is installed correctly.
2. Verify that the ESI profile version is correct.
3. Verify that the TwinCAT software has been restarted after installing the ESI configuration file.

## 8.2 Device cannot enter OP state

1. Verify that the project is established correctly.
2. Confirm the node station number related settings.
3. Verify that the power supply to device is normal.
4. The EtherCAT communication cable is working properly.
5. Verify that the device is re-powered after changing the slave device node address.