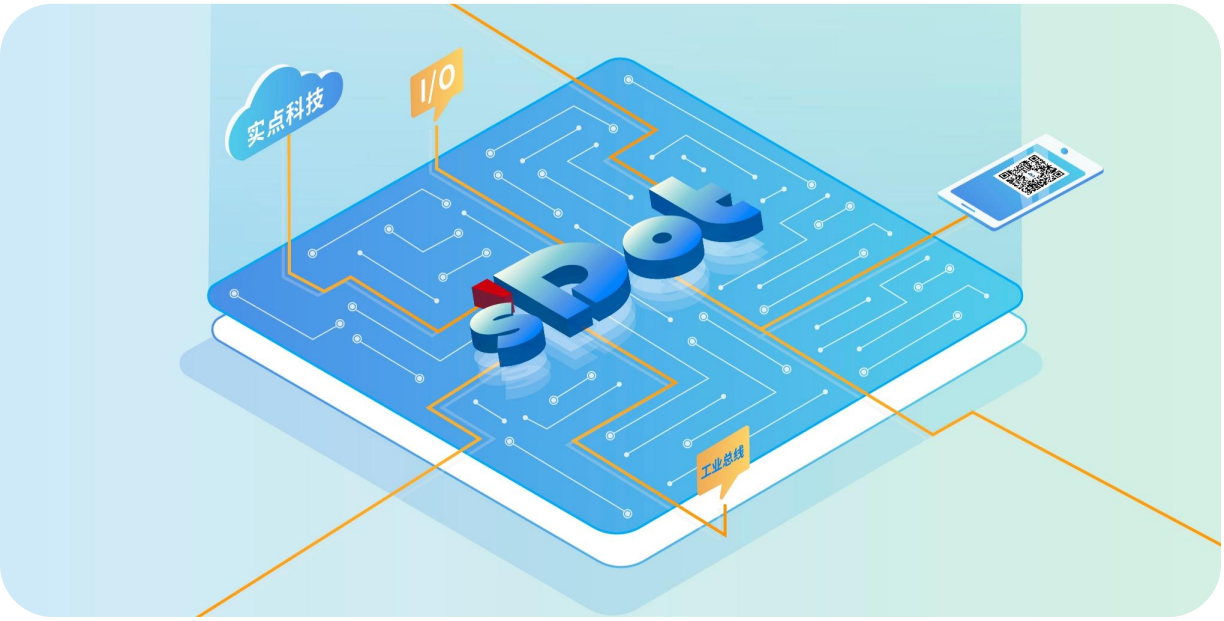

XB6S-PC80

Pulse counting module

User Manual

Nanjing Solidot Electronic Technology Co., Ltd.

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Table of contents

1 Product Overview

1.1 Product Introduction

The XB6S-PC80 is a plug-in pulse counting module that utilizes the X-bus backplane and is compatible with our XB6S series coupler modules. The module features eight pulse counting channels and can sample and analyze pulse signals with frequencies below 100 kHz, deriving frequency and pulse count values for each channel. It also supports clearing the count for each channel.

1.2 Product Features

- Eight-channel pulse counting
  Eight channels can monitor pulse frequency and pulse count value completely independently.
- Support pulse count reset
  The data of eight pulse counting channels can be cleared independently.
- Pulse counting frequency
  Supports the fastest pulse frequency of 100KHz.
- Input filtering
  Supports 0~15 levels of input filtering.
- Small size
  Compact structure and small space occupation.
- Easy to diagnose
  The innovative channel indicator light design is close to the channel, making it clear at a glance and easy to detect and maintain.
- Easy configuration
  Configuration is simple.
- Easy to install
  DIN 35 mm standard rail installation
  It uses spring-type terminal blocks, making wiring quick and easy.

2 Naming conventions

2.1 Naming conventions

XB 6 S - P C 8 0
(1) (2)(3) (4)(5)(6)(7)

Serial Number	Meaning	Value Description
(1)	Bus type	XB: X-bus
(2)	Product Series	6: Insert type
(3)	Product Version	S: Strengthen, upgraded version
(4)	Module Type	P：Pulse
(5)	Module Function	L：Location S: SSI synchronous serial interface protocol T: Train (PTO: Pulse Train Output) pulse train output C: Count pulse count
(6)	Function input channel number	0, 1, 2, 4, 8
(7)	Function output channel number	0, 1, 2, 4, 8

3 Product Parameters

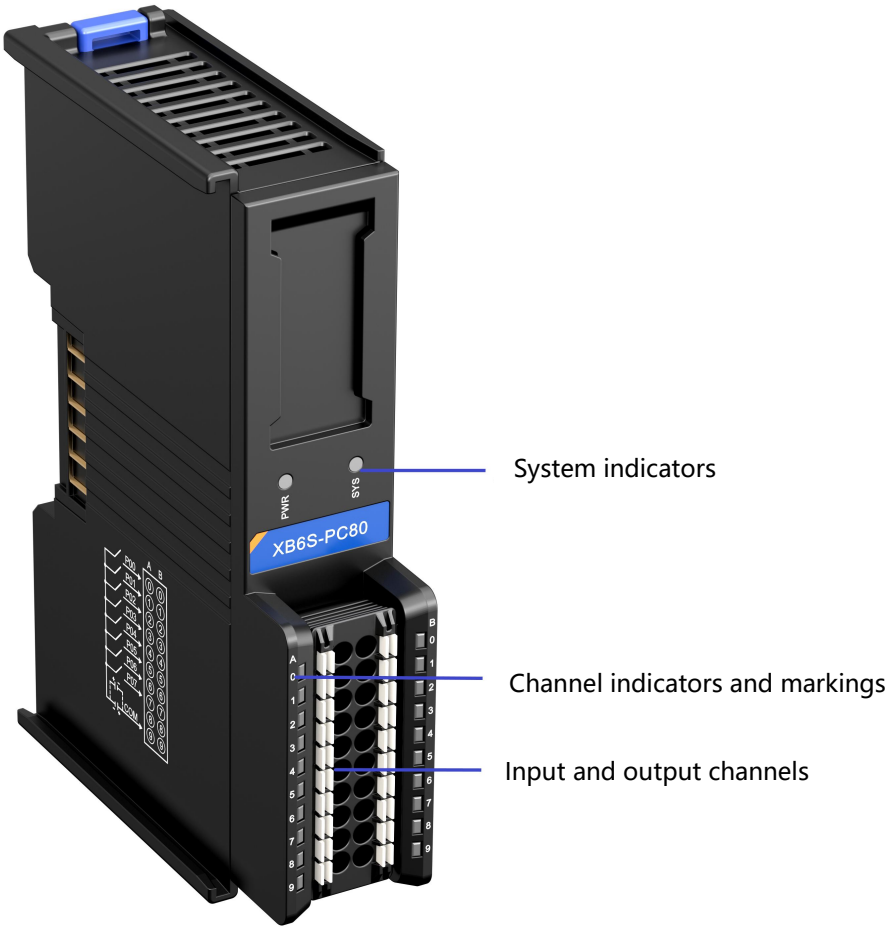
3.1 General Parameters

Interface parameters	
Product Model	XB6S-PC80
Bus Protocol	X-bus
Bus input power rated voltage	5VDC (4.5V~5.5V)
Rated current consumption	80mA
Power consumption	0.4W
Process data volume: Uplink	64 Bytes
Process data volume: Downstream	2 Bytes
Channel Type	Pulse input channel: 8 channels, PNP/NPN compatible
Refresh rate	1 ms
Technical Parameters	
System input power	5VDC
Input channel voltage rating (range)	24VDC (15V~30V)
Pulse input frequency range	0~100KHz
Pulse input count value range	0~2^32-1
Dimensions	106.4×25.7×72.3mm
Weight	85g
Wiring method	Screw-free quick plug
Operating temperature	-20℃~+60℃
Storage temperature	-40℃~+80℃
Relative humidity	95%, non-condensing
Protection level	IP20

4 Panel

4.1 Panel structure

Name of each part of the product



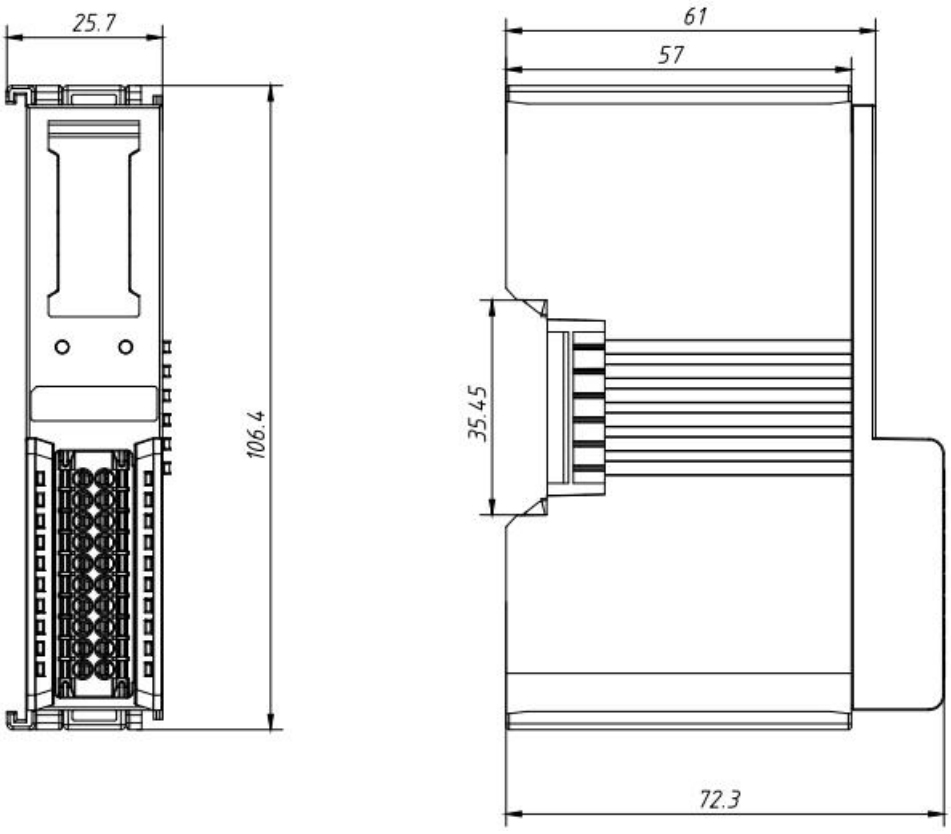
4.2 Indicator light function

Name	Logo	Color	Status	Status Description
Power indicator	PWR	Green	Steady on	Power supply is normal
			OFF	The product is not powered on or the power supply is abnormal
Communication indicator	SYS	Green	Steady on	The system is running normally
			Flashing 1Hz	No business data interaction, waiting to establish business data interaction
			Flashing 10Hz	Firmware Upgrade
			OFF	System not working
Pulse input channel indicator	0~7	Green	Steady on	Channel has signal input
			OFF	Channel no signal input

5 Installation and removal

5.1 Dimensions

Overall specifications (unit: mm)



5.2 Installation Guide

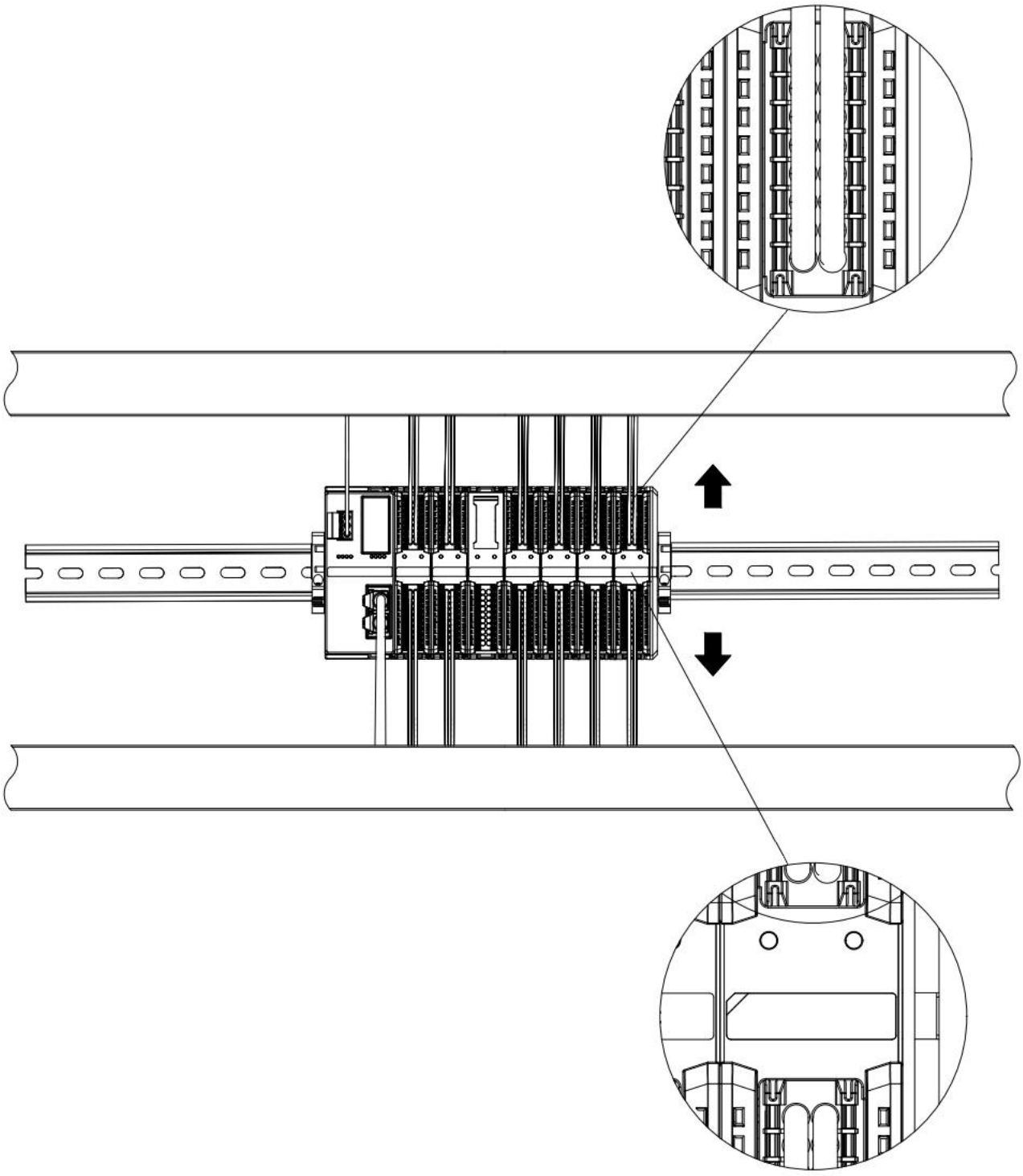
Installation/Removal Precautions

- **The module protection level is IP20. The module needs to be installed in a cabinet and used indoors.**
- **Ensure that the cabinet has good ventilation (such as installing an exhaust fan in the cabinet).**
- **Do not install this device near or over any equipment that may cause overheating.**
- **Be sure to install the module vertically on the fixed rail and ensure that there is sufficient air circulation around it (there should be at least 50 mm of air circulation space above and below the module).**
- **After installing the module, be sure to install the guide rail fixings at both ends to secure the module.**
- **Installation/disassembly must be performed with the power off.**
- **After the module is installed, it is recommended to connect and route the cables in an up-and-down manner.**

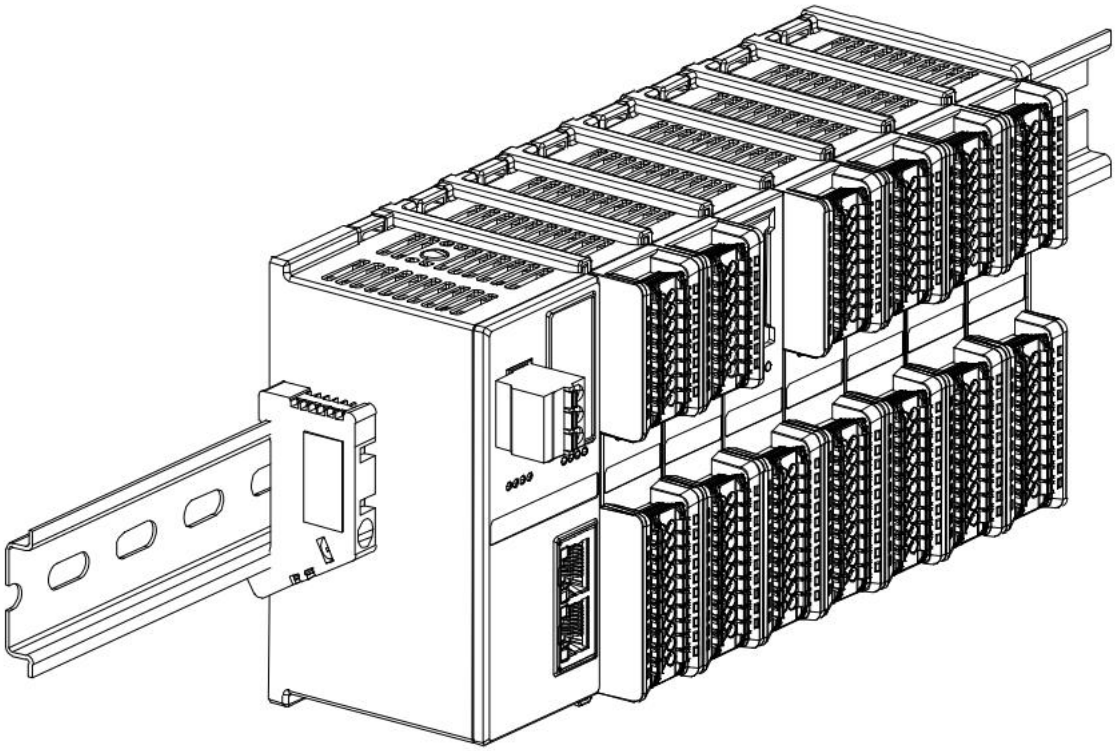
⚠ Warning

- If used in a manner not specified in the product user manual, the protection provided by the equipment may be impaired.

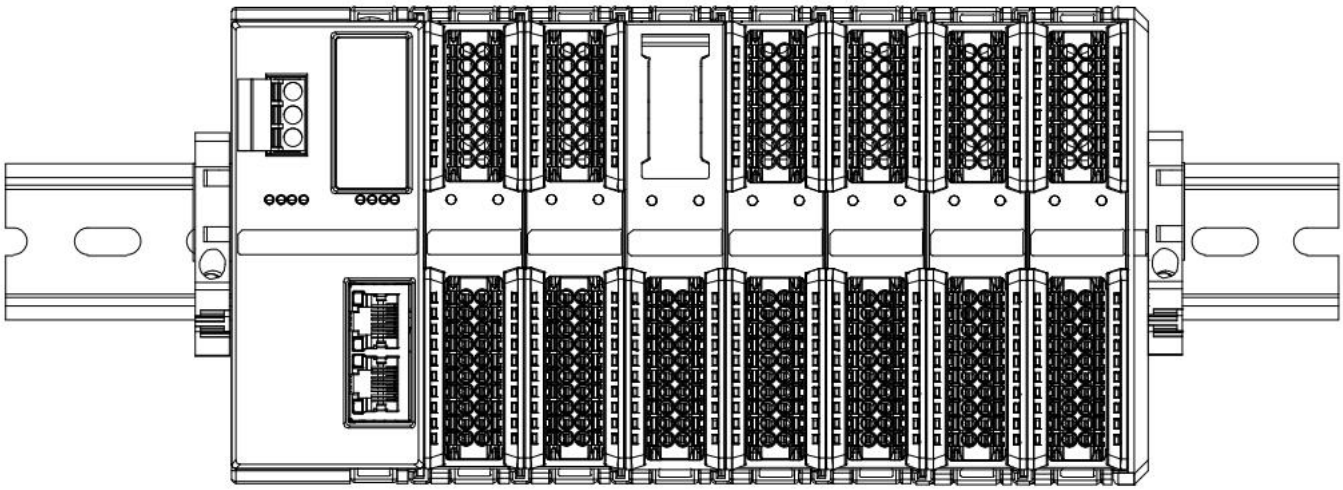
Module installation diagram, minimum clearance between top and bottom (≥ 50mm)



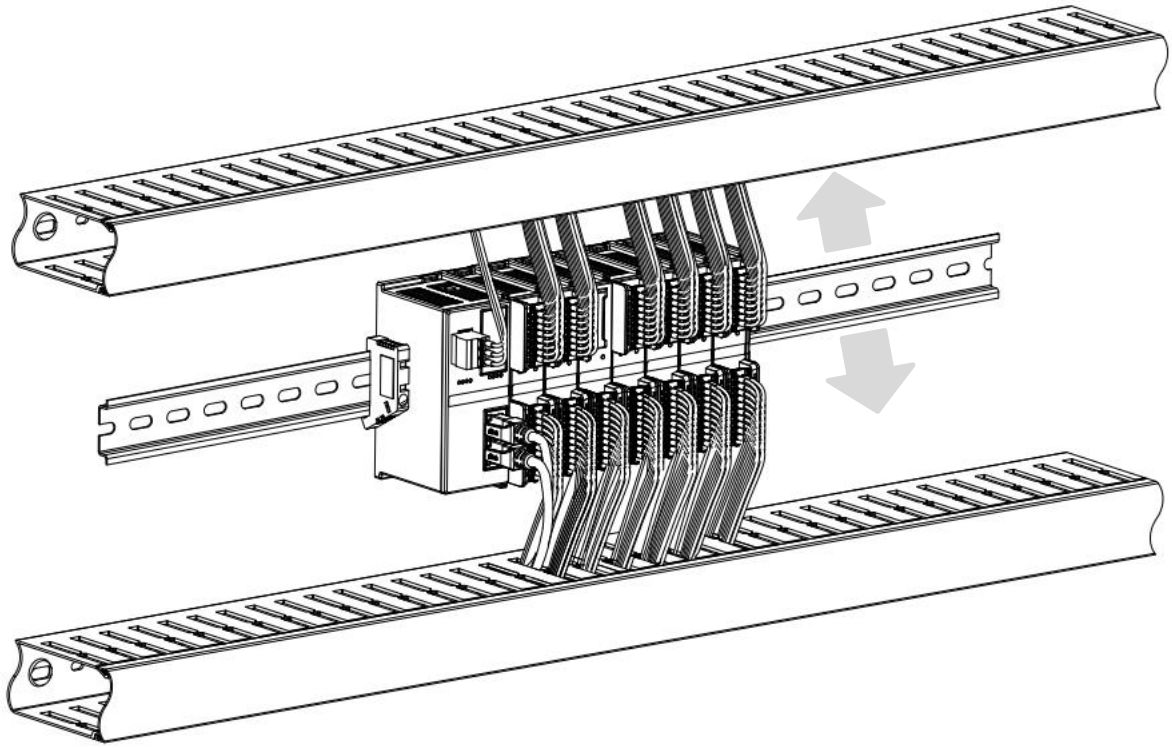
Ensure the module is installed vertically on the fixed rail



Be sure to install the rail fixings



Module upper and lower wiring diagram



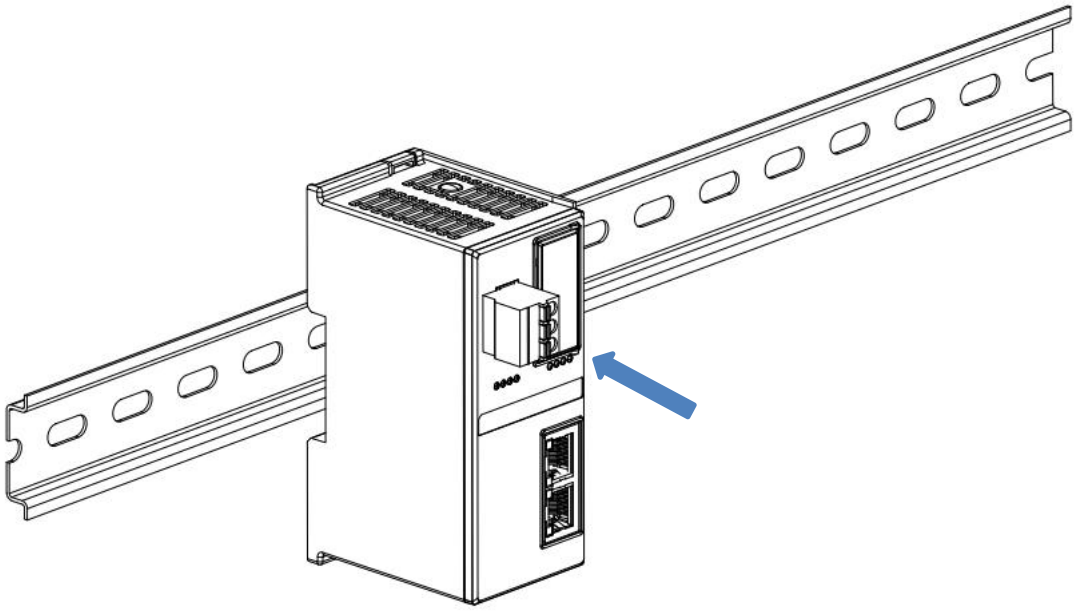
5.3 Installation and removal steps

Module installation and removal	
Module installation steps	1. Install the coupler module on the fixed guide rail first.
	2. Install the required I/O modules or functional modules in sequence on the right side of the coupler module.
	3. After installing all required modules, install the terminal cover to complete the module assembly.
	4. Install the guide rail fixings at both ends of the coupler module and terminal cover to secure the module.
Module disassembly steps	1. Loosen the guide rail fixings at both ends of the module.
	2. Use a flat-blade screwdriver to pry open the module buckle.
	3. Pull out the disassembled module.

5.4 Installation and disassembly diagram

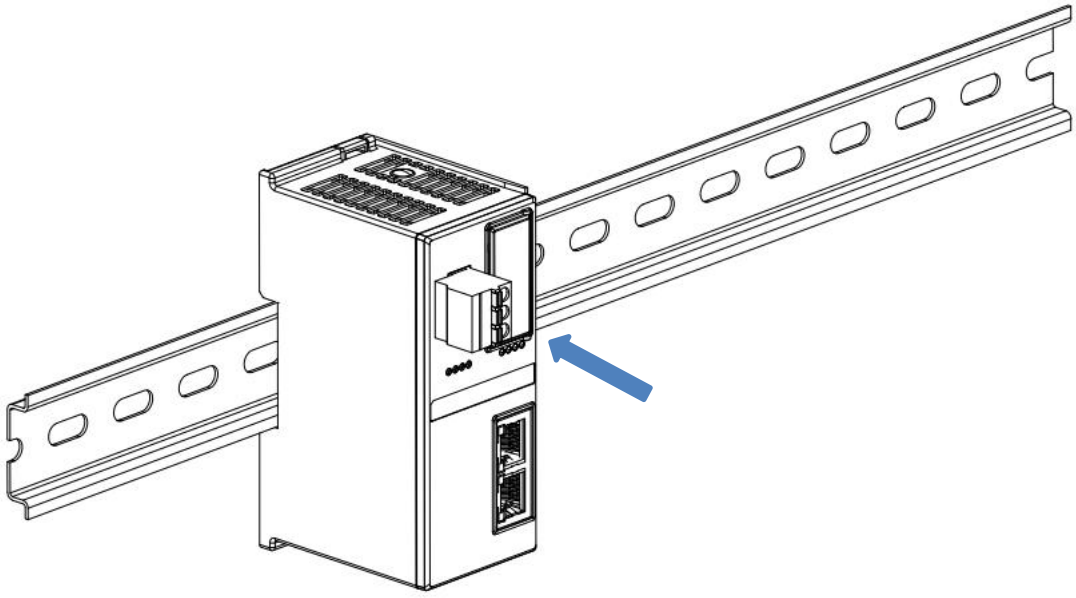
Coupler module installation

- Align the coupler module vertically with the guide rail slot, as shown in Figure ① below.



①

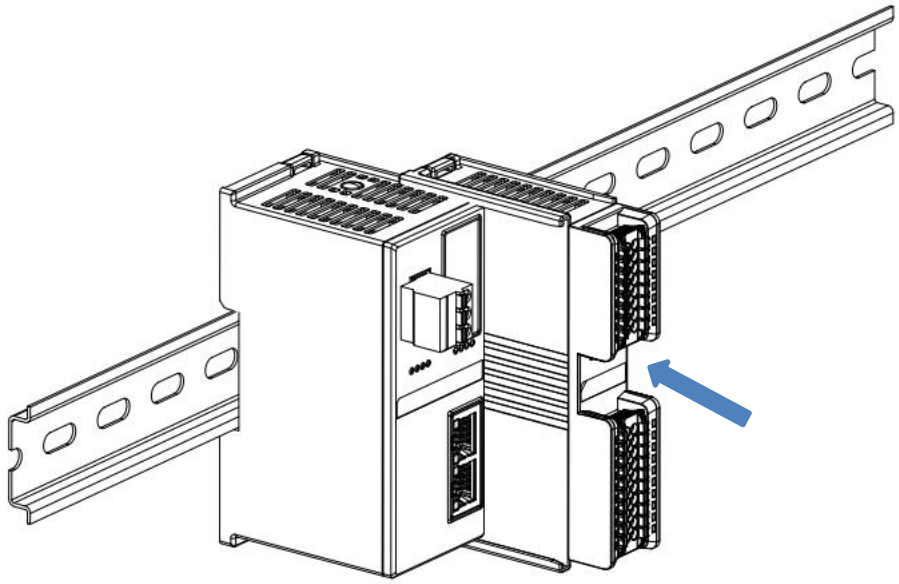
- Press the coupler module toward the guide rail with force until you hear a "click" sound. The module is then installed in place, as shown in Figure ② below.



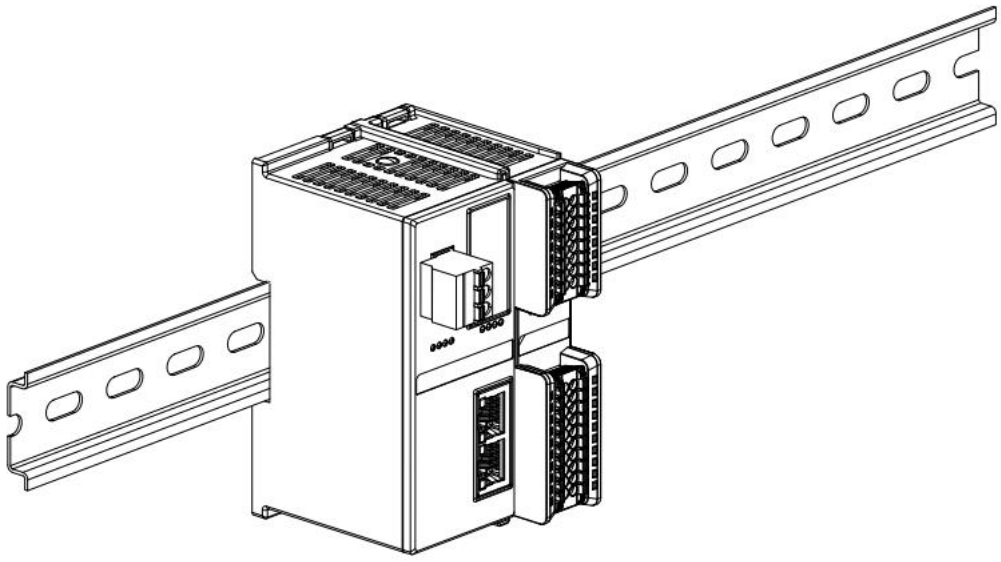
②

I/O module installation

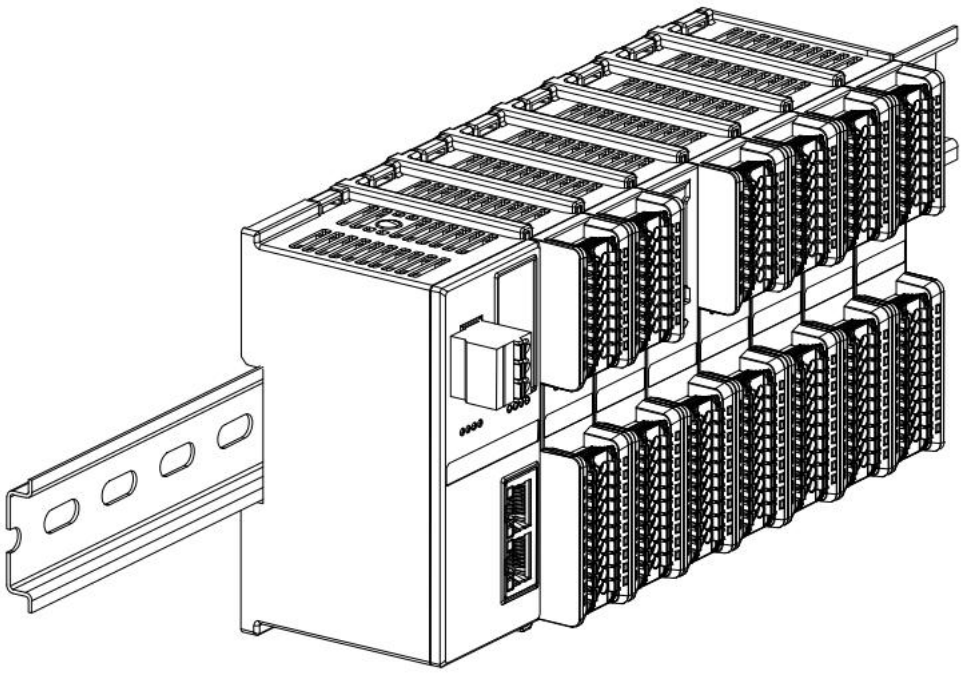
- Follow the steps above to install the coupler module, and install the required I/O modules or functional modules one by one. Push them in as shown in Figures ③, ④, and ⑤ below. When you hear a "click," the module is installed in place.



③



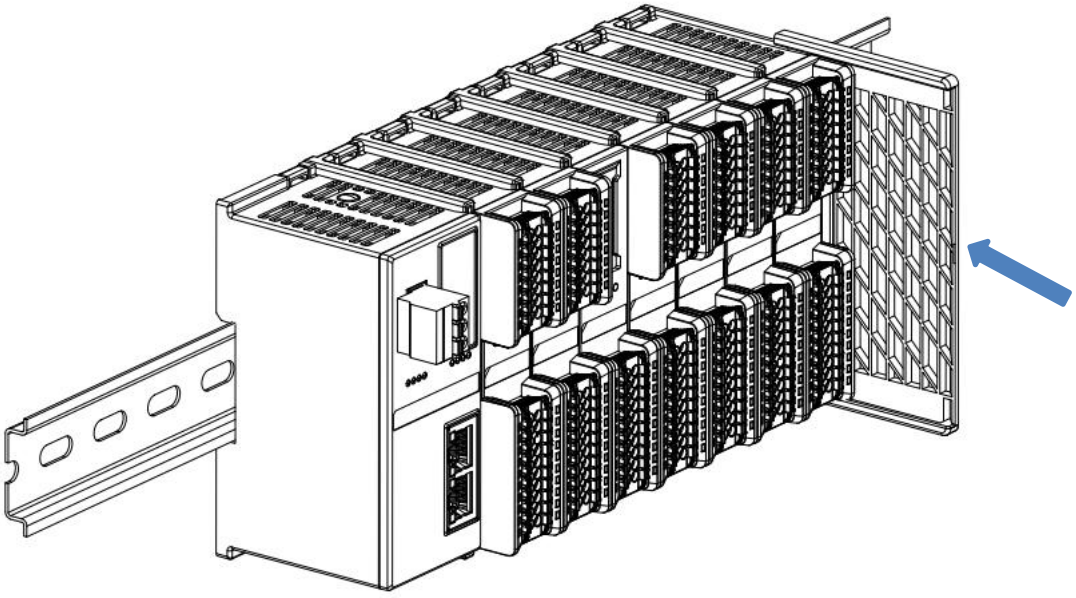
④



⑤

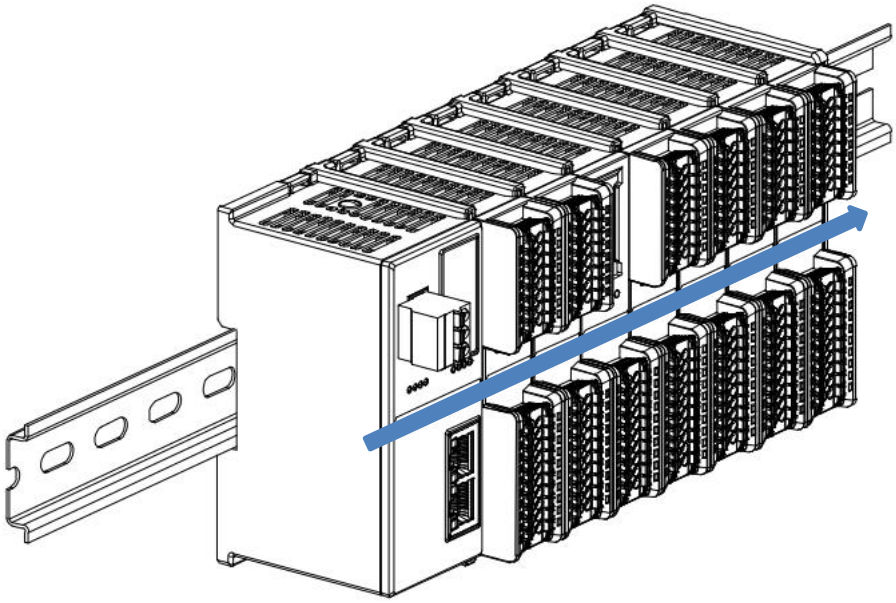
Terminal cover installation

- Install the terminal cover on the right side of the last module, aligning the groove on the terminal cover with the guide rail. Refer to the installation method for the I/O module and push the terminal cover inwards into place, as shown in Figure ⑥ below.



⑥

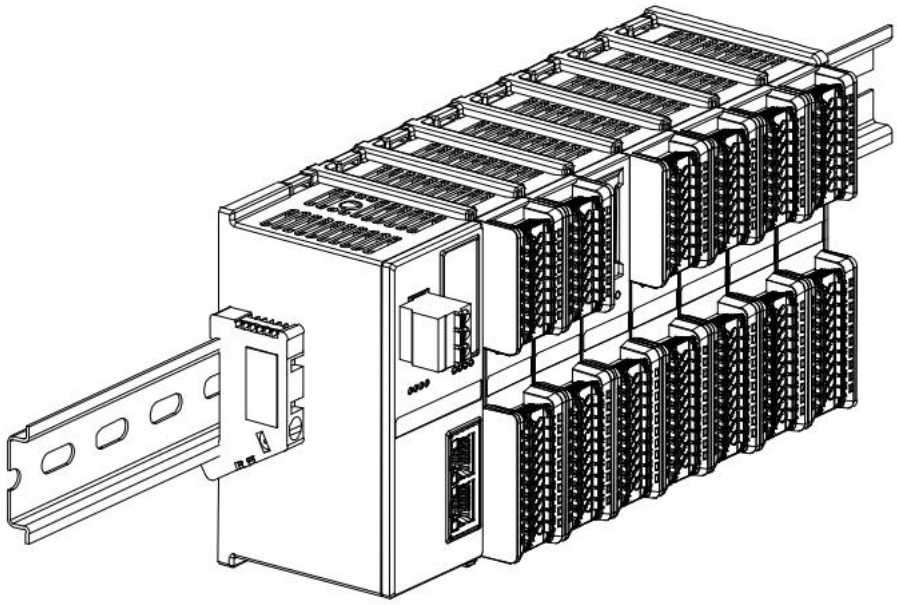
- After the terminal cover is installed, check whether the front of the entire module is flat and ensure that all modules and end covers are installed in place and the front is flush, as shown in Figure ⑦ below.



⑦

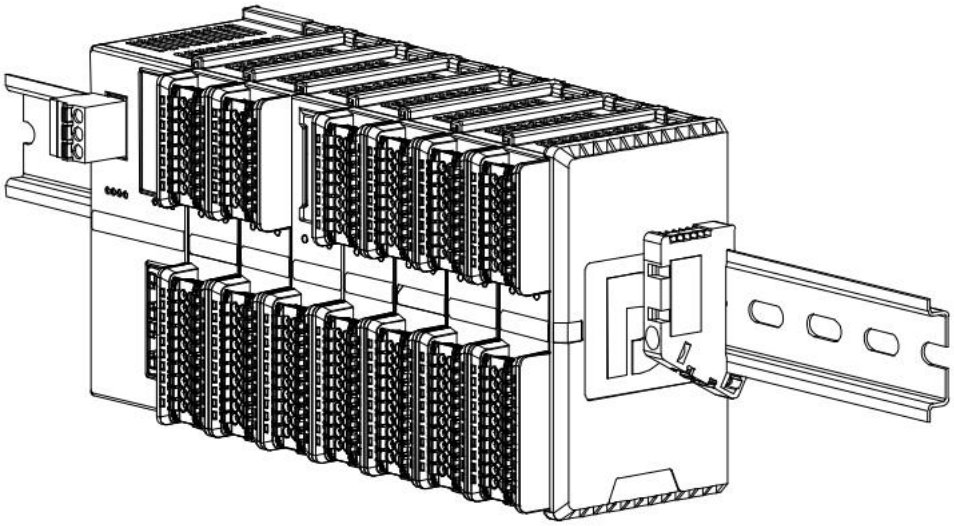
Guide rail fixing installation

- Install and tighten the guide rail fixings close to the left side of the coupler, as shown in Figure ⑧ below.



⑧

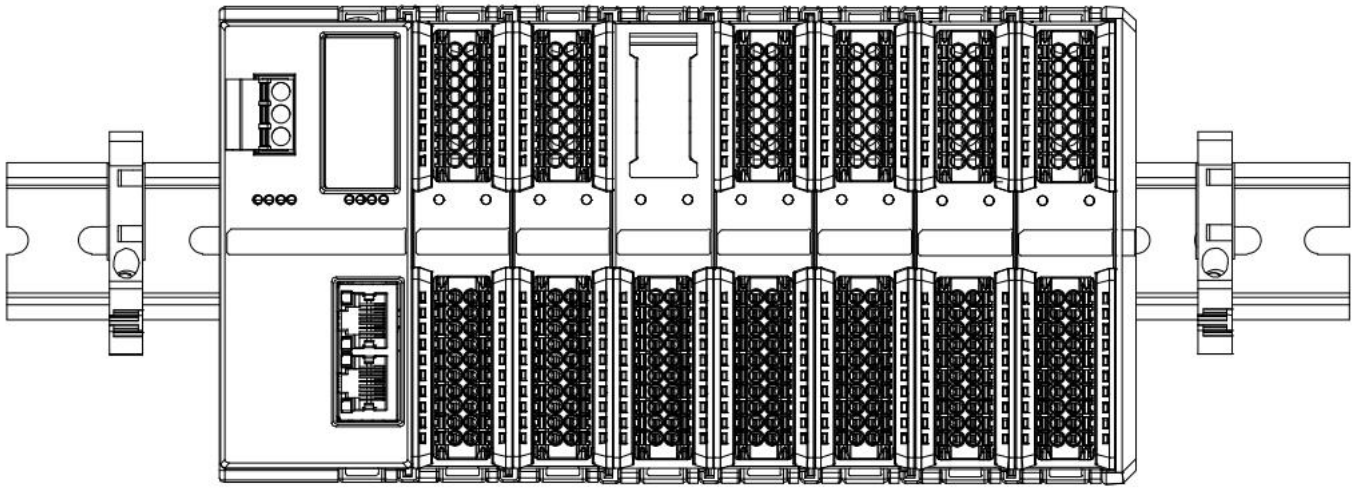
- Install the guide rail fixture on the right side of the terminal cover. First, push the guide rail fixture toward the coupler to ensure that the module is installed firmly, and then tighten the guide rail fixture with a screwdriver, as shown in Figure ⑨ below.



⑨

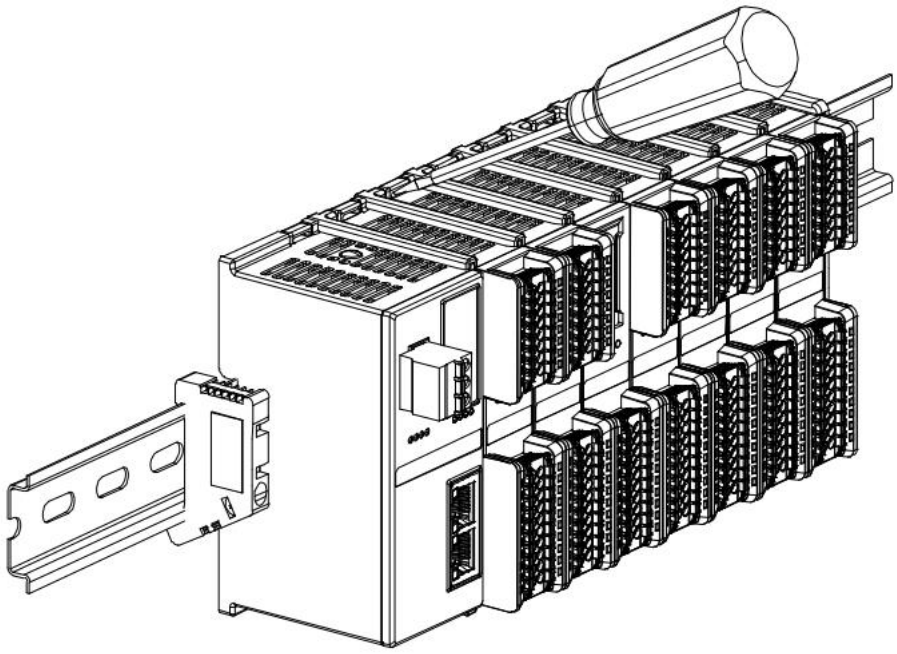
Disassembly

- Use a screwdriver to loosen the guide rail fixture at one end of the module and move it to one side to ensure there is a gap between the module and the guide rail fixture, as shown in Figure ⑩ below.

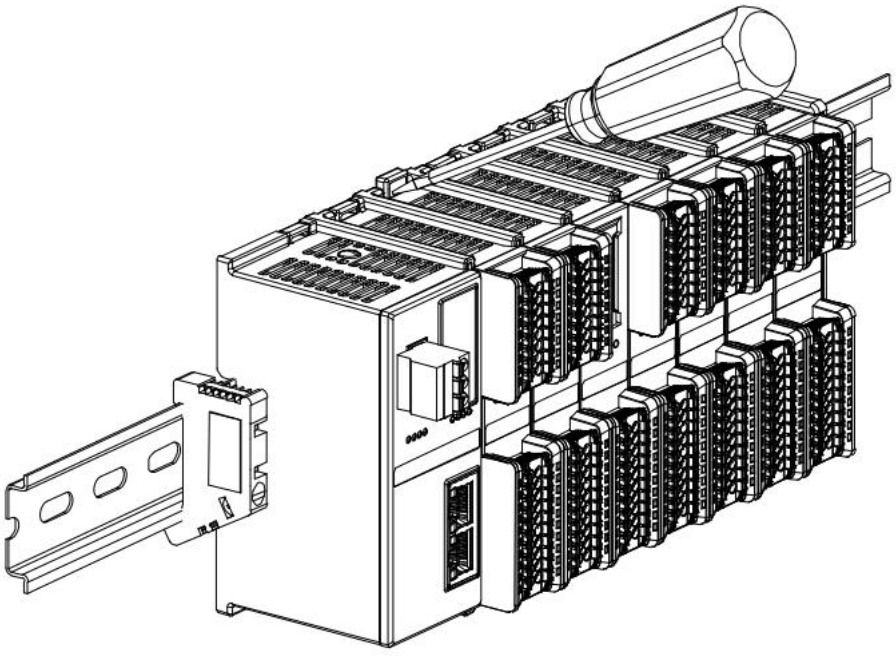


⑩

- Insert a flat-head screwdriver into the buckle of the module to be removed, and apply force sideways toward the module (until you hear a click), as shown in the figure below.⑪and⑫Note: Each module has a buckle on the top and bottom, and both modules are operated in the same way.

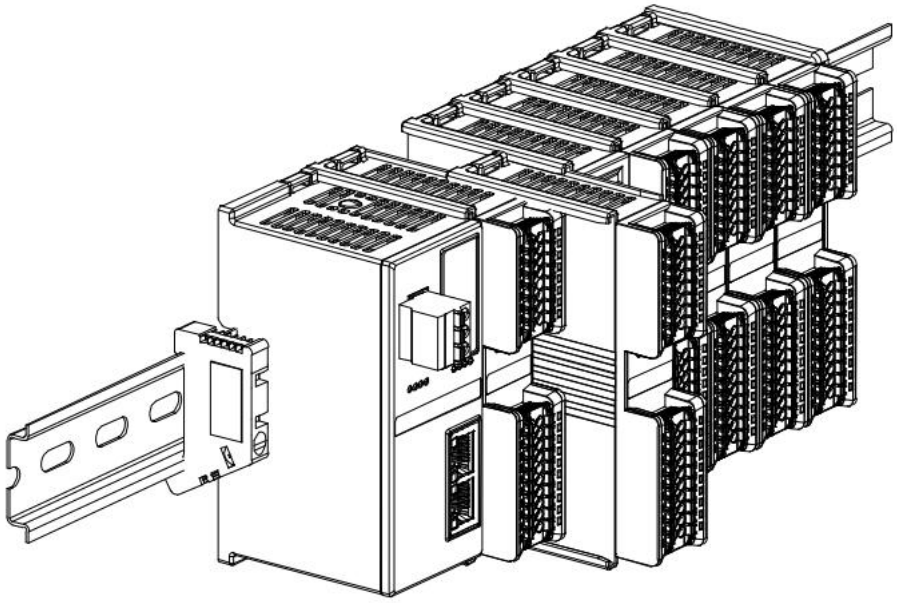


⑪



⑫

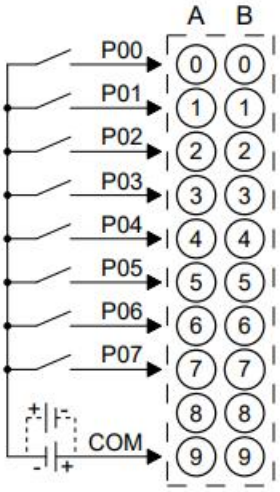
■ Follow the opposite steps of installing the module to disassemble it, as shown below.⑬shown.

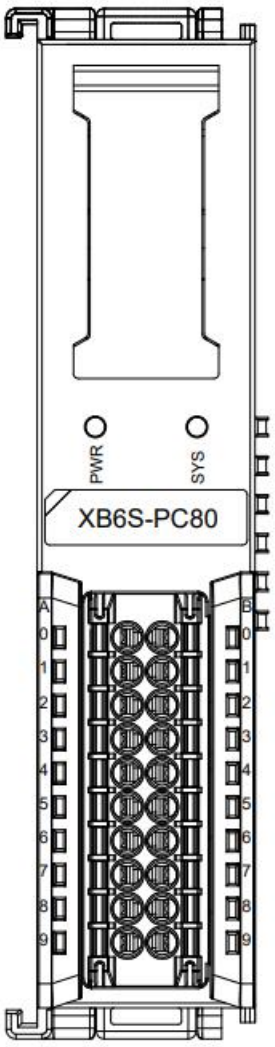


⑬

6 Wiring

6.1 Wiring Diagram





*P00~P07 NPN/PNP compatible, common terminal is COM

6.2 Terminal Block Definition

A		B	
Terminal marking	**Description**	**Terminal marking**	**Description**
0	Pulse input channel 0	0	Empty terminal
1	Pulse input channel 1	1	Empty terminal
2	Pulse input channel 2	2	Empty terminal
3	Pulse input channel 3	3	Empty terminal
4	Pulse input channel 4	4	Empty terminal
5	Pulse input channel 5	5	Empty terminal
6	Pulse input channel 6	6	Empty terminal
7	Pulse input channel 7	7	Empty terminal
8	Empty terminal	8	Empty terminal
9	Input common terminal	9	Input common terminal

7 Use

7.1 Configuration parameter definition

The module configuration has 1 parameter. The configuration parameters of the 8 channels are the same and can be set independently. The configuration parameters of channel 0 are introduced as an example, as shown in the following table.

Function	Parameter name	Value range	Default value
Filter level configuration	CH0 Filter Level	0:Filter_Level_0	7
		1:Filter_Level_1	
		2: Filter_Level_2	
		3:Filter_Level_3	
		4:Filter_Level_4	
		5:Filter_Level_5	
		6:Filter_Level_6	
		7:Filter_Level_7	
		8:Filter_Level_8	
		9:Filter_Level_9	
		10:Filter_Level_10	
		11:Filter_Level_11	
		12:Filter_Level_12	
		13:Filter_Level_13	
		14:Filter_Level_14	
		15:Filter_Level_15	

7.1.1 Filter level configuration

When a channel is disabled, the module supports configuring the filter level of the corresponding channel, ranging from 0 to 15. A higher filter level means a longer filtering time.

Note: The default filter level is Filter_Level_7. When setting the filter level parameters, all channels must be in the closed (disabled) state.

7.2 Process data

7.2.1 Uplink data

Uplink data: 64 bytes (8 bytes per channel, channel [n] ranges from 0 to 7)				
Name	**Meaning**	**Value Range**	**Data Type**	**Length**
CH[n] Count Value	Pulse input count value	0~2^32-1 (unit: piece)	UDINT	4 bytes
CH[n] Frequency	Pulse input frequency	0~100000 (unit: Hz)	UDINT	4 bytes

Data Description:

- **Pulse input count value CH[n] Count Value**
  When the channel is enabled and there is a pulse input on the pulse input channel, the pulse count value can be obtained by sampling and analysis. When the clear signal is set to "1", the pulse count value data is cleared.

- **Pulse input frequency CH[n] Frequency**
  When the channel is enabled and there is a pulse input on the pulse input channel, the pulse frequency can be obtained by sampling and analysis; when there is no pulse input, the frequency is 0.

7.2.2 Downlink data

Downlink data 2 bytes (channel [n] value 0~7)				
Name	**Meaning**	**Value Range**	**Data Type**	**Length**
CH[n] Enable	Channel Enable	0: Disable the corresponding channel 1: Enable the corresponding channel	bool	1 bit
CH[n] Clear Data	Pulse data clear	0: Frequency and count value are displayed normally 1: Clear the frequency and count value data	bool	1 bit

Data Description:

- **Channel enable CH[n] Enable**
  When the channel enable of a pulse input channel is set to "1", it means that the channel starts sampling and analyzing the input pulse to obtain the count value and pulse frequency.
  When the channel enable of a pulse input channel is set to "0", it means that the channel stops counting and measuring the frequency of the input pulses.

- **Pulse data clear CH[n] Clear Data**
  When the pulse data clear enable of a pulse input channel is set from "0" to "1", the frequency and count value of the channel are cleared.

7.3 Module Configuration Description

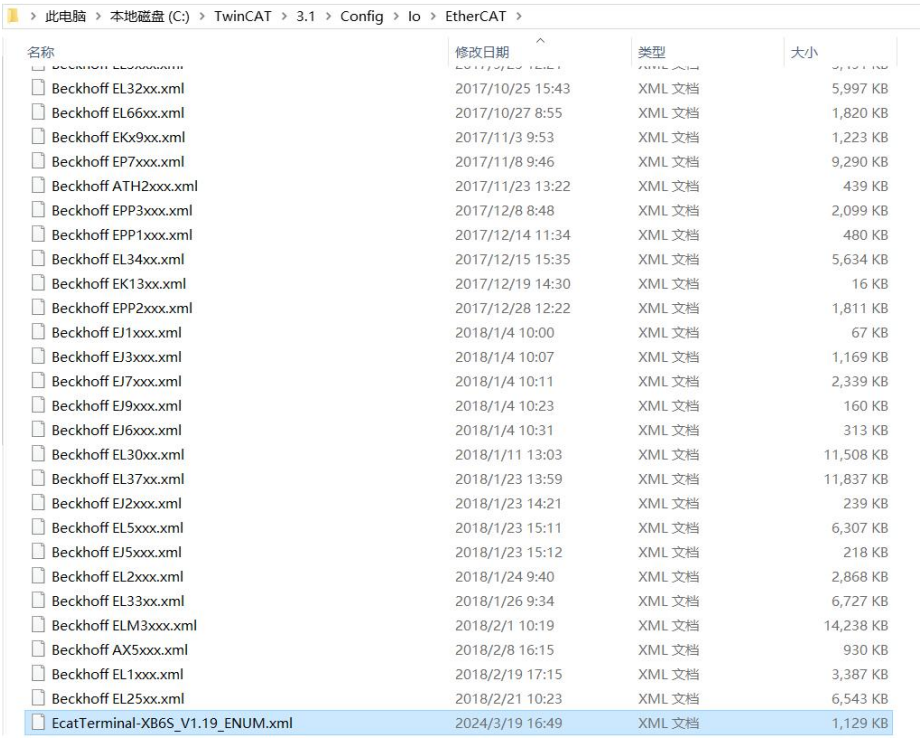
7.3.1 Application in TwinCAT3 software environment

1、Preparation

- **Hardware environment**
  - **Module model XB6S-PC80**
  - **EtherCAT bus coupler module, end cap**
    This description takes the XB6S-EC2002 coupler module as an example
  - **A computer with TwinCAT3 software pre-installed**
  - **EtherCAT dedicated shielded cable**
  - **Pulse output type sensors and other equipment, this description takes the connection of XB6S-PT04A module as an example**
  - **A switching power supply**
  - **Module mounting rails and rail fixings**
  - **Device Profile**
    Configuration file acquisition address:
    https://www.solidotech.com/cn/resources/configuration-files
- **Hardware configuration and wiring**
  Please follow the "5. Installation and removal""6. Wiring"

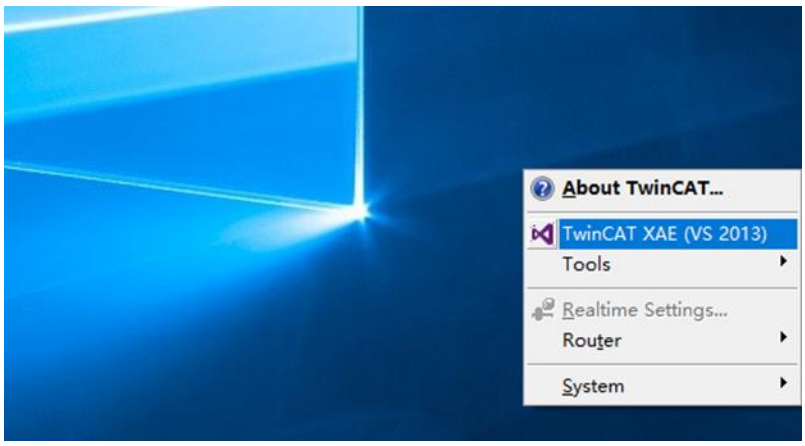
2、Pre-configured configuration files

Place the ESI configuration file (EcatTerminal-XB6S_V1.19_ENUM.xml) in the TwinCAT installation directory "C:\TwinCAT\3.1\Config\Io\EtherCAT", as shown in the figure below.

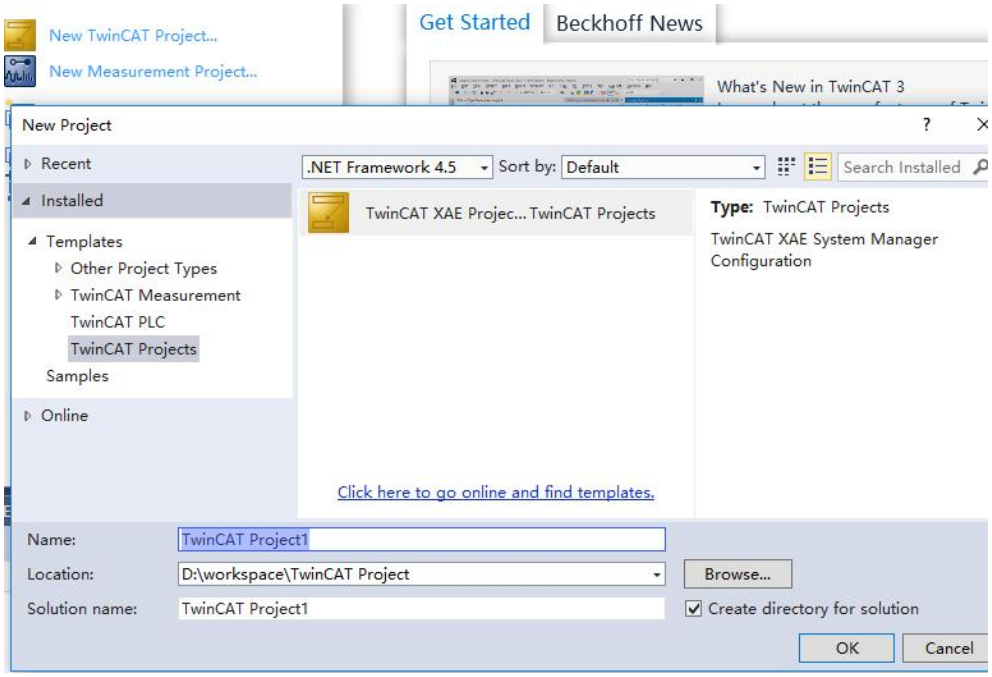


3、Create a project

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 in the figure below.

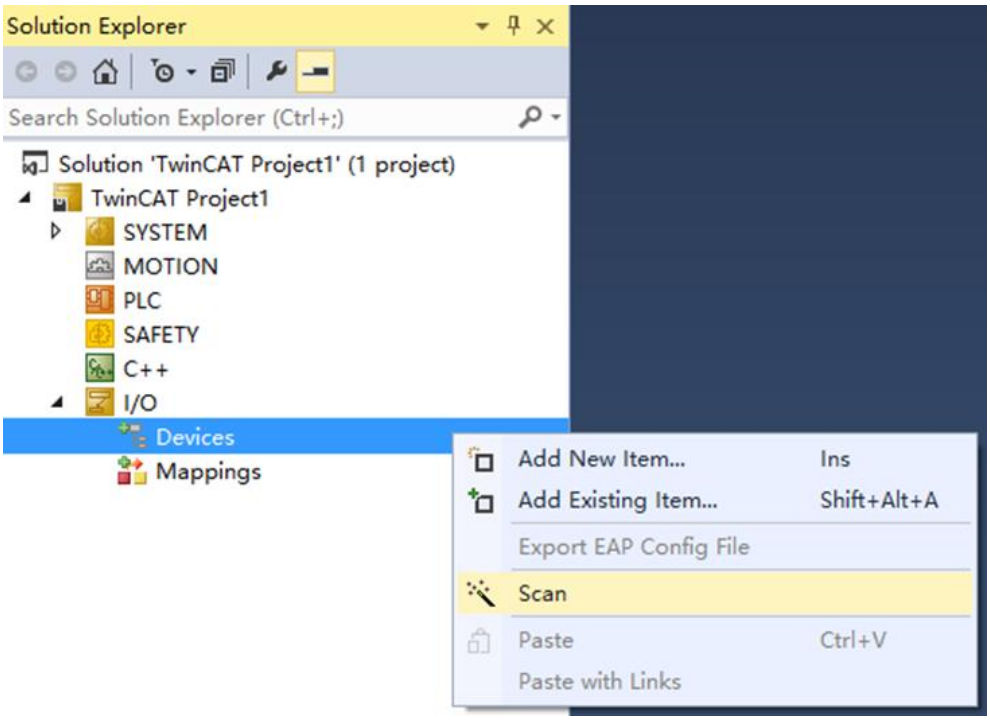


b. Click "New TwinCAT Project". In the pop-up window, enter the project name and solution name in "Name" and "Solution name" respectively, and the project path in "Location". You can select the default values for these three items. Then click "OK". The project is created successfully, as shown in the figure below.



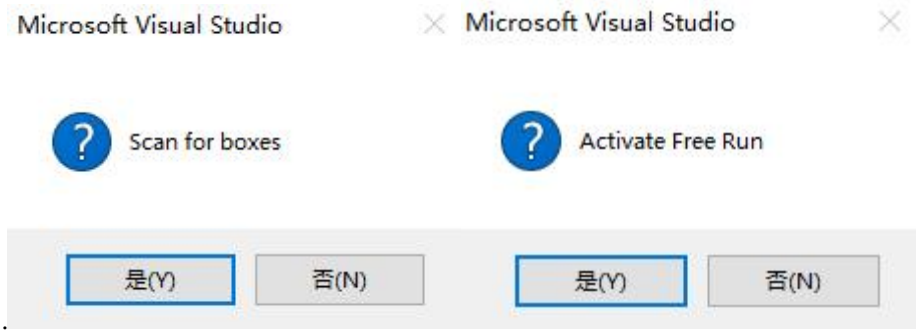
4、Scanning Devices

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

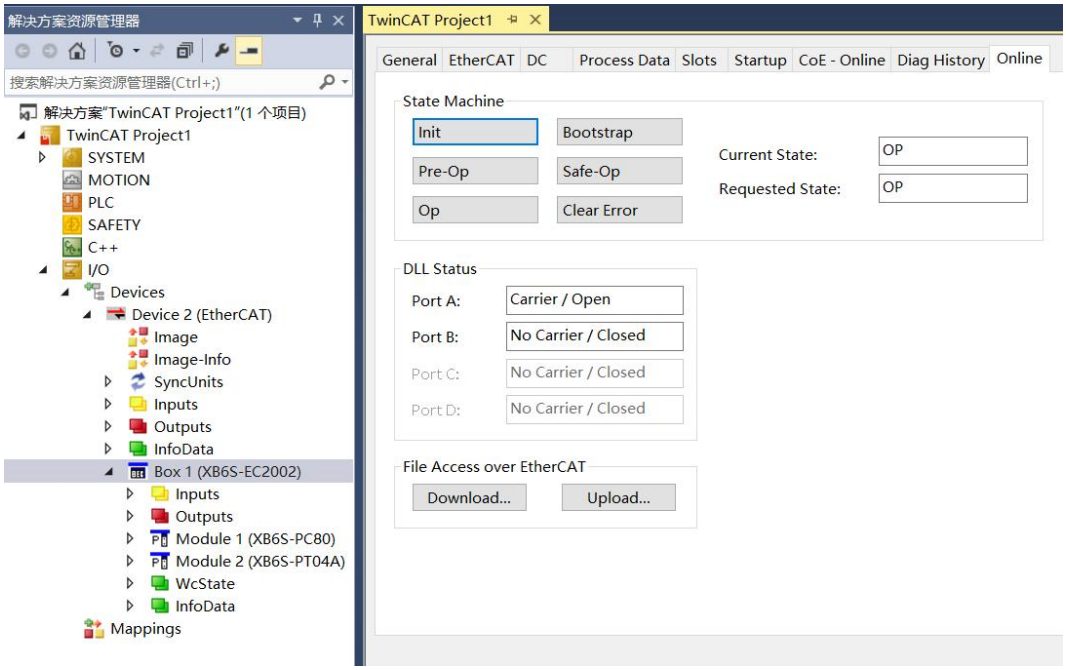


b. Check the "Local Area Connection" network card, as shown below.

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

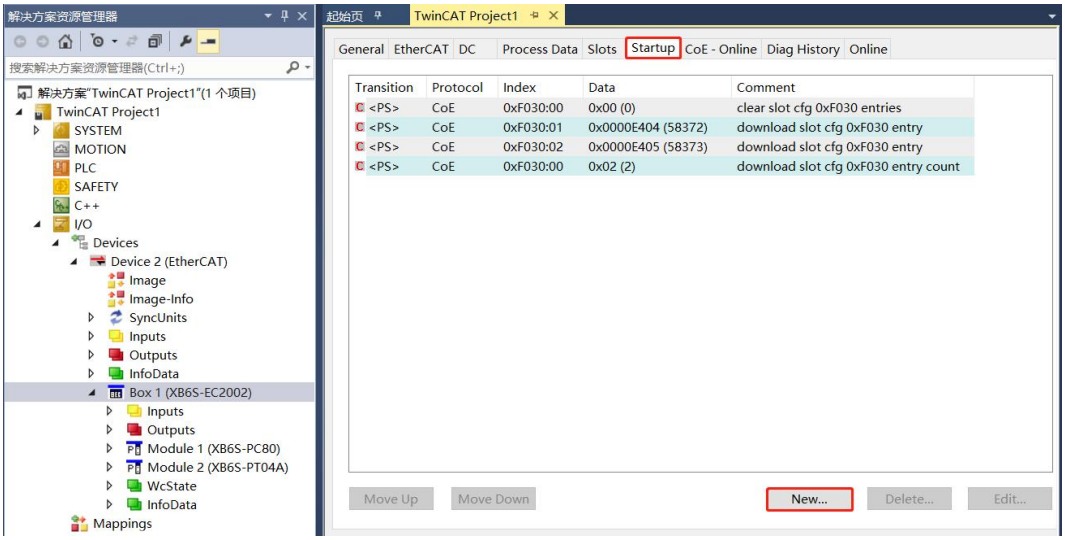


d. After scanning the device, you can see Box1 (XB6S-EC2002), Module1 (XB6S-PC80) and Module2 (XB6S-PT04A) in the left navigation tree. Under "Online", you can see that TwinCAT is in "OP" state, and the RUN light of the slave device is always on, as shown in the figure below.

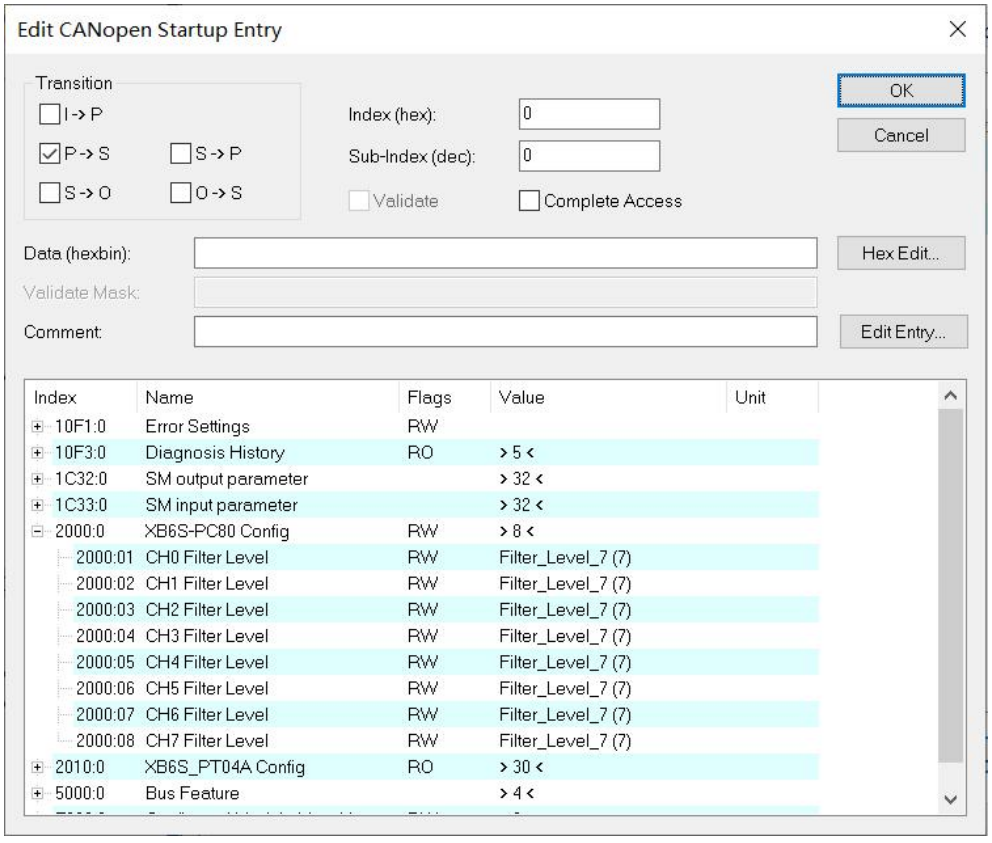


5、Verify basic functionality

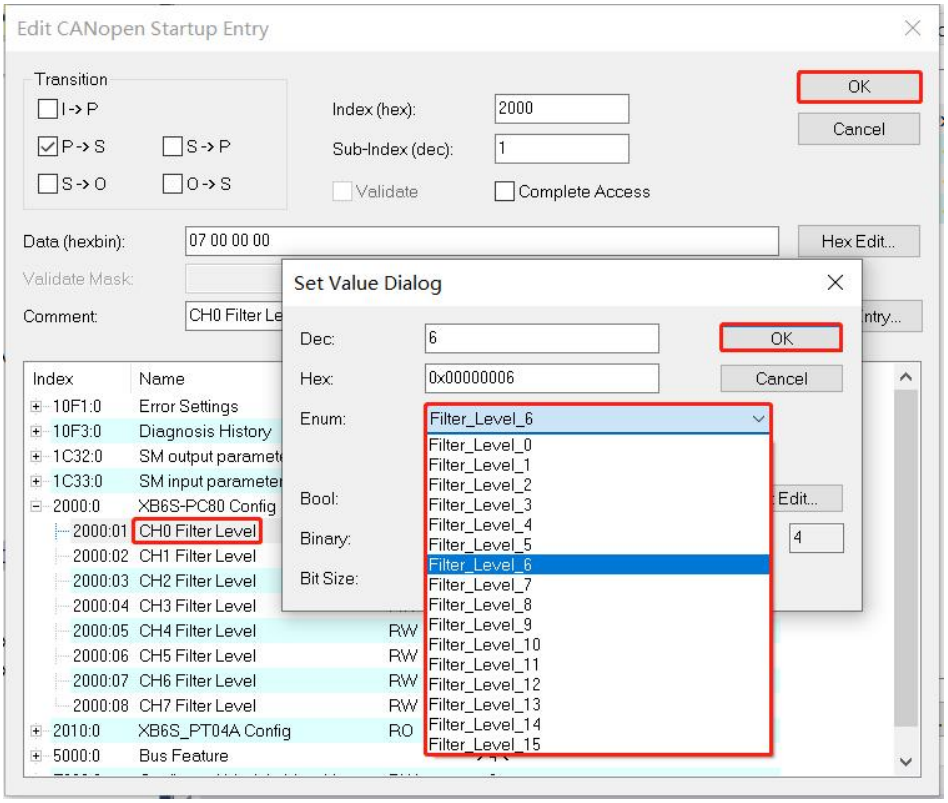
a. Click "Box1 -> Startup -> New" in the left navigation tree to enter the configuration parameter editing page, as shown in the figure below.



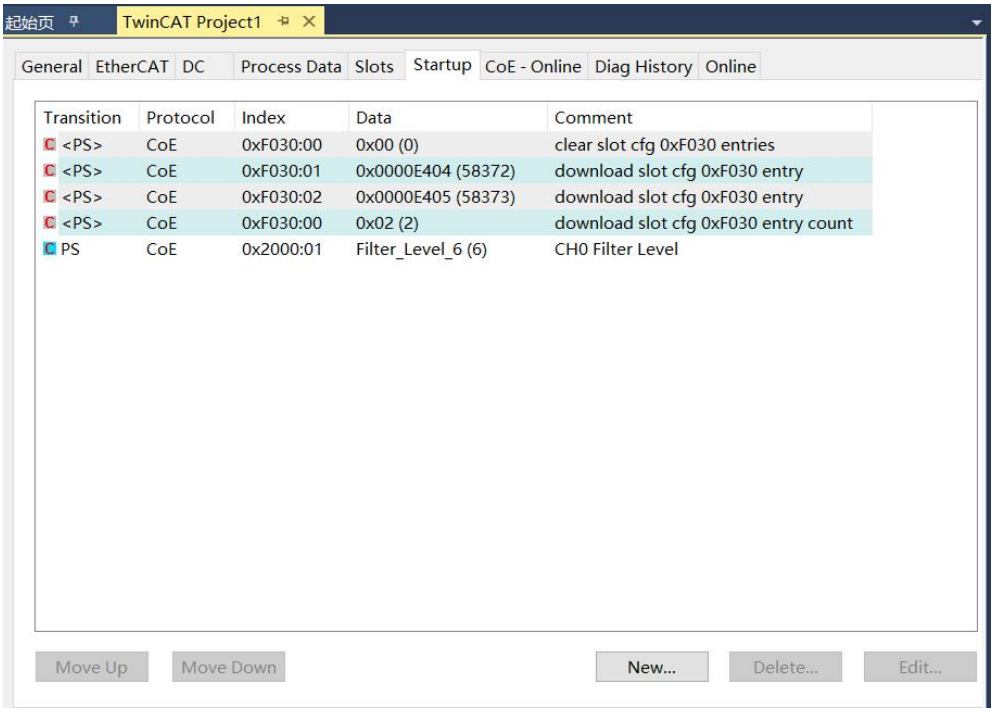
b. In the Edit CANopen Startup Entry pop-up window, click the "+" in front of Index 2000:0 to expand the configuration parameter menu. Click any parameter to set the related configuration, as shown in the figure below.



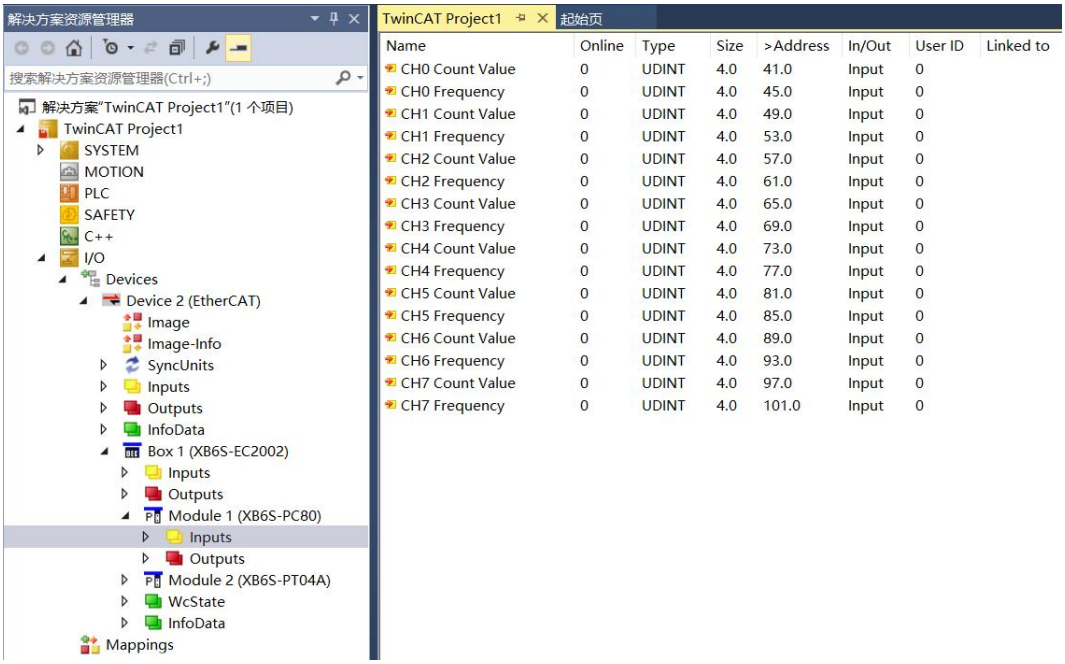
c. For example, to modify the filter level of channel 0, double-click "CH0 Filter Level" and modify the parameter value, as shown in the figure below.



d. After the parameter modification is completed, the modified parameter items and parameter values can be seen under Startup, as shown in the figure below. After the parameter setting is completed, the Reload operation and the module power-on are required to realize the automatic transmission of parameter settings by the master station.

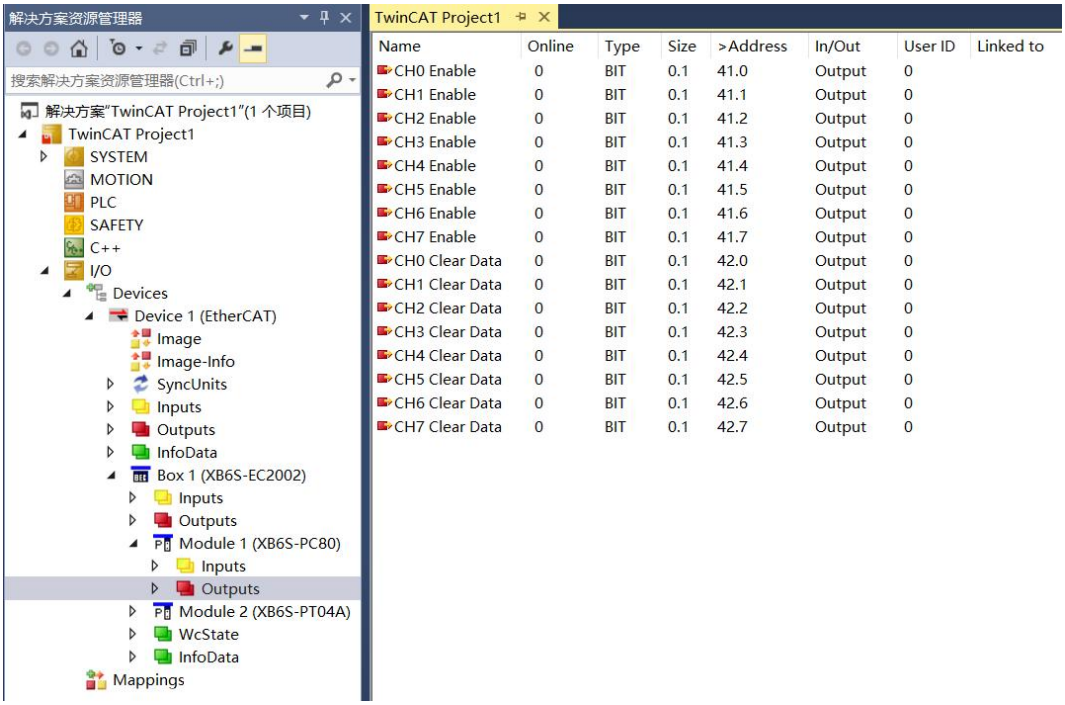


e. The left navigation tree "Module 1 -> Inputs" displays the module's upstream data, which is used to monitor the module's pulse count value and pulse frequency, as shown in the following figure.



Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
CH0 Count Value	0	UDINT	4.0	41.0	Input	0	
CH0 Frequency	0	UDINT	4.0	45.0	Input	0	
CH1 Count Value	0	UDINT	4.0	49.0	Input	0	
CH1 Frequency	0	UDINT	4.0	53.0	Input	0	
CH2 Count Value	0	UDINT	4.0	57.0	Input	0	
CH2 Frequency	0	UDINT	4.0	61.0	Input	0	
CH3 Count Value	0	UDINT	4.0	65.0	Input	0	
CH3 Frequency	0	UDINT	4.0	69.0	Input	0	
CH4 Count Value	0	UDINT	4.0	73.0	Input	0	
CH4 Frequency	0	UDINT	4.0	77.0	Input	0	
CH5 Count Value	0	UDINT	4.0	81.0	Input	0	
CH5 Frequency	0	UDINT	4.0	85.0	Input	0	
CH6 Count Value	0	UDINT	4.0	89.0	Input	0	
CH6 Frequency	0	UDINT	4.0	93.0	Input	0	
CH7 Count Value	0	UDINT	4.0	97.0	Input	0	
CH7 Frequency	0	UDINT	4.0	101.0	Input	0	

f. The left navigation tree "Module 1 -> Outputs" displays the module's downstream data, which is used to control the module's pulse data clearing and channel enabling, as shown in the following figure.

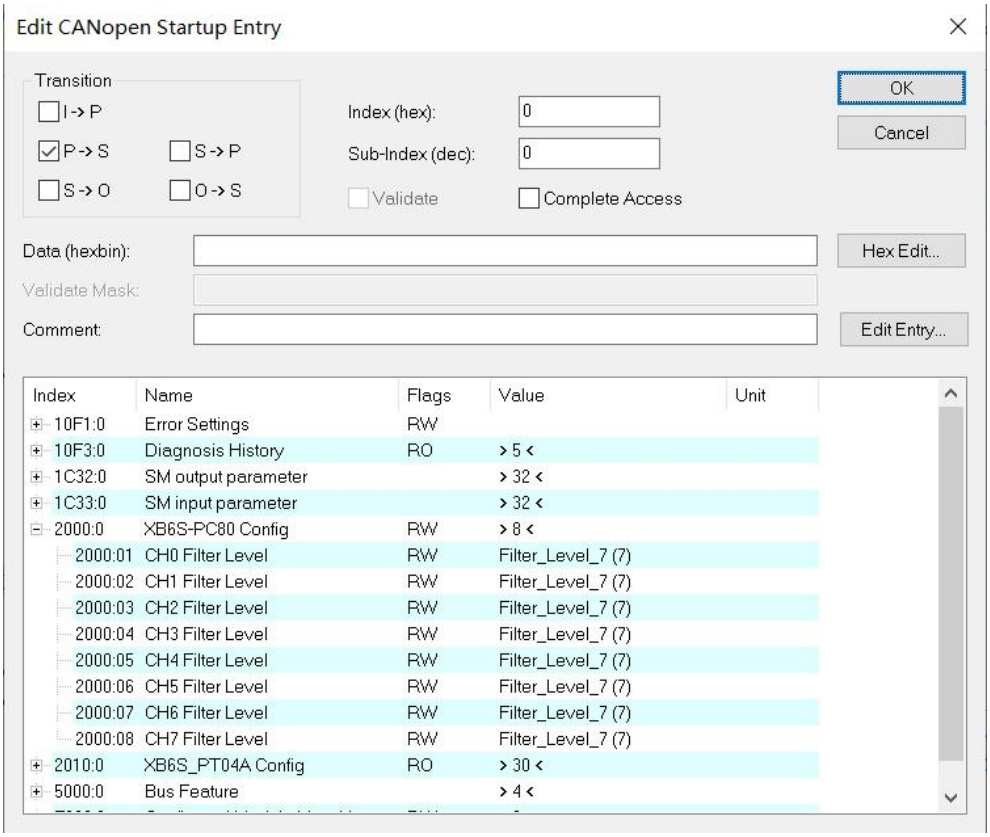


Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
CH0 Enable	0	BIT	0.1	41.0	Output	0	
CH1 Enable	0	BIT	0.1	41.1	Output	0	
CH2 Enable	0	BIT	0.1	41.2	Output	0	
CH3 Enable	0	BIT	0.1	41.3	Output	0	
CH4 Enable	0	BIT	0.1	41.4	Output	0	
CH5 Enable	0	BIT	0.1	41.5	Output	0	
CH6 Enable	0	BIT	0.1	41.6	Output	0	
CH7 Enable	0	BIT	0.1	41.7	Output	0	
CH0 Clear Data	0	BIT	0.1	42.0	Output	0	
CH1 Clear Data	0	BIT	0.1	42.1	Output	0	
CH2 Clear Data	0	BIT	0.1	42.2	Output	0	
CH3 Clear Data	0	BIT	0.1	42.3	Output	0	
CH4 Clear Data	0	BIT	0.1	42.4	Output	0	
CH5 Clear Data	0	BIT	0.1	42.5	Output	0	
CH6 Clear Data	0	BIT	0.1	42.6	Output	0	
CH7 Clear Data	0	BIT	0.1	42.7	Output	0	

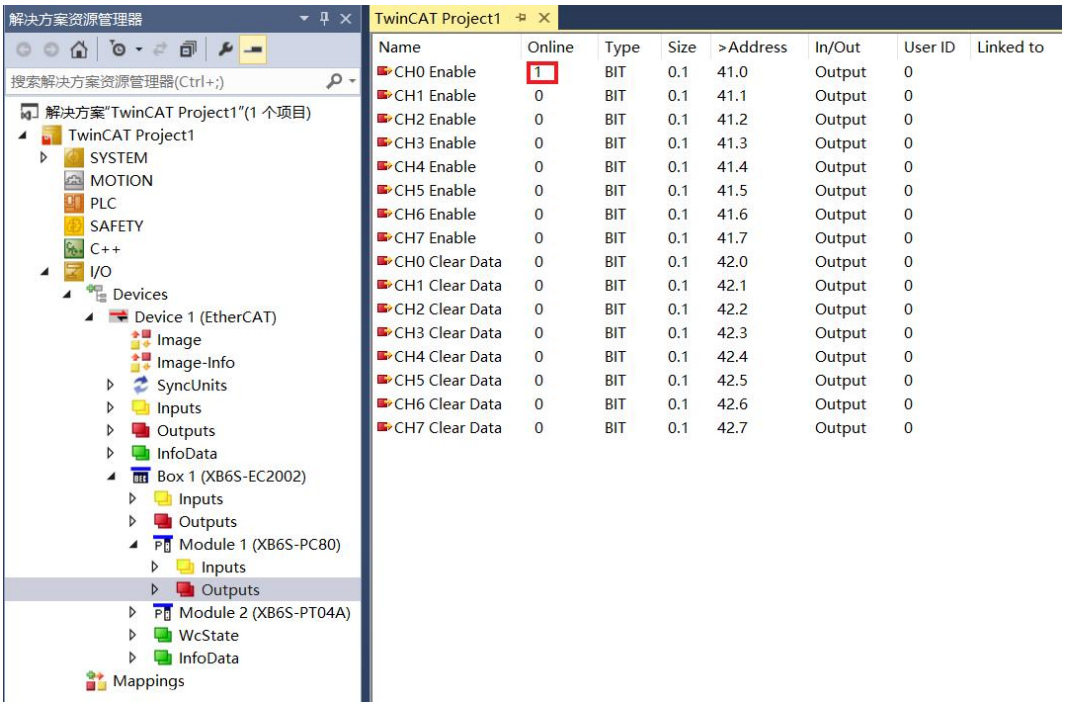
Module function examples

◆ **Pulse input channel 0 data monitoring and clearing**

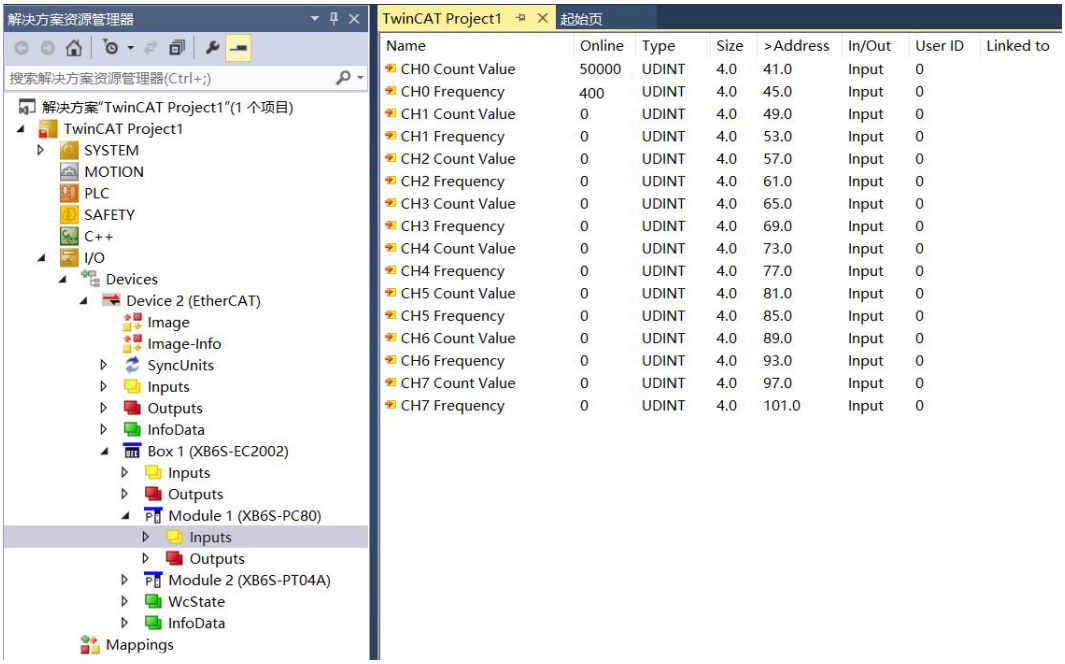
a. Configure the configuration parameters as shown in the figure below.



b. When channel 0 inputs 50,000 pulses at a frequency of 400 Hz, set module channel 0 to enable, as shown in the figure below.

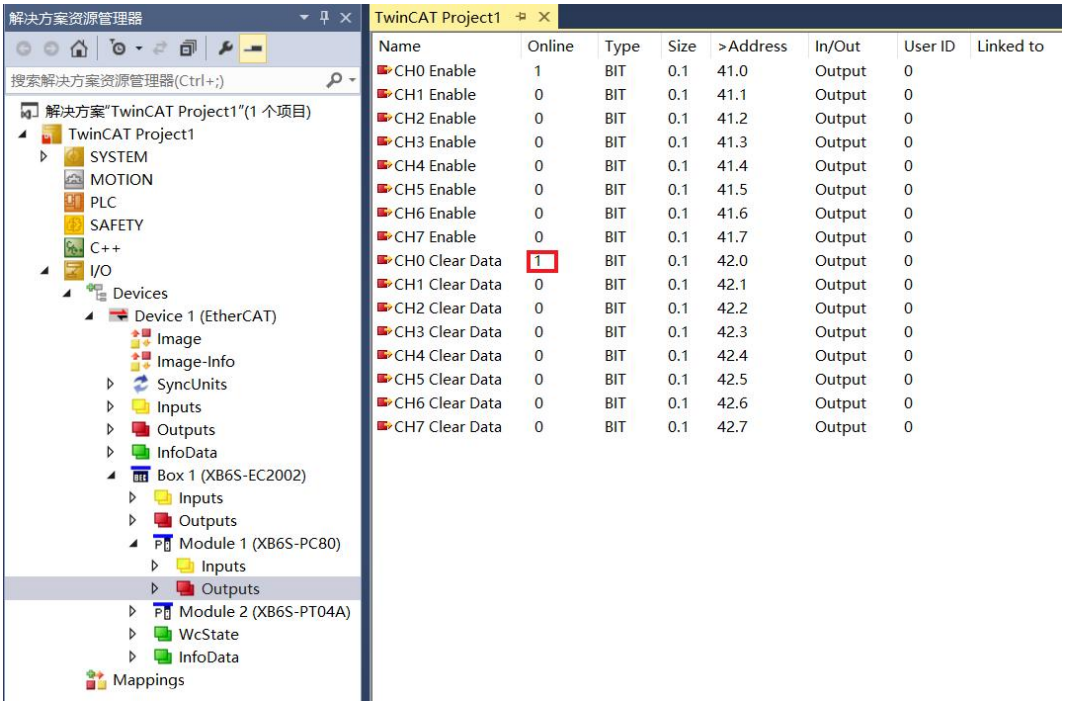


c. The module's uplink data pulse count and pulse frequency are shown in the figure below. When a pulse begins to be sent, the pulse count continues to accumulate, and the pulse frequency is monitored in real time. After the transmission is completed, the pulse count accumulates to 50,000; when there is no pulse input, the frequency is 0.



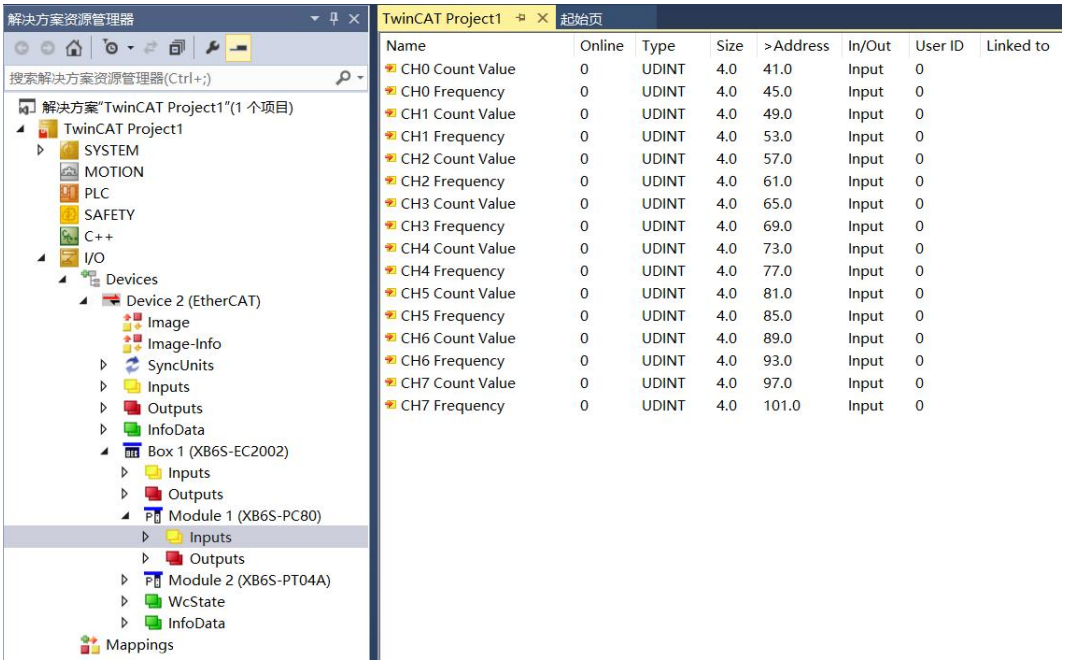
Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
CH0 Count Value	50000	UDINT	4.0	41.0	Input	0	
CH0 Frequency	400	UDINT	4.0	45.0	Input	0	
CH1 Count Value	0	UDINT	4.0	49.0	Input	0	
CH1 Frequency	0	UDINT	4.0	53.0	Input	0	
CH2 Count Value	0	UDINT	4.0	57.0	Input	0	
CH2 Frequency	0	UDINT	4.0	61.0	Input	0	
CH3 Count Value	0	UDINT	4.0	65.0	Input	0	
CH3 Frequency	0	UDINT	4.0	69.0	Input	0	
CH4 Count Value	0	UDINT	4.0	73.0	Input	0	
CH4 Frequency	0	UDINT	4.0	77.0	Input	0	
CH5 Count Value	0	UDINT	4.0	81.0	Input	0	
CH5 Frequency	0	UDINT	4.0	85.0	Input	0	
CH6 Count Value	0	UDINT	4.0	89.0	Input	0	
CH6 Frequency	0	UDINT	4.0	93.0	Input	0	
CH7 Count Value	0	UDINT	4.0	97.0	Input	0	
CH7 Frequency	0	UDINT	4.0	101.0	Input	0	

d. The pulse input channel 0 count is cleared and enabled, as shown in the figure below.



Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
CH0 Enable	1	BIT	0.1	41.0	Output	0	
CH1 Enable	0	BIT	0.1	41.1	Output	0	
CH2 Enable	0	BIT	0.1	41.2	Output	0	
CH3 Enable	0	BIT	0.1	41.3	Output	0	
CH4 Enable	0	BIT	0.1	41.4	Output	0	
CH5 Enable	0	BIT	0.1	41.5	Output	0	
CH6 Enable	0	BIT	0.1	41.6	Output	0	
CH7 Enable	0	BIT	0.1	41.7	Output	0	
CH0 Clear Data	1	BIT	0.1	42.0	Output	0	
CH1 Clear Data	0	BIT	0.1	42.1	Output	0	
CH2 Clear Data	0	BIT	0.1	42.2	Output	0	
CH3 Clear Data	0	BIT	0.1	42.3	Output	0	
CH4 Clear Data	0	BIT	0.1	42.4	Output	0	
CH5 Clear Data	0	BIT	0.1	42.5	Output	0	
CH6 Clear Data	0	BIT	0.1	42.6	Output	0	
CH7 Clear Data	0	BIT	0.1	42.7	Output	0	

e. After the pulse input channel 0 count clear is enabled, the pulse count value and pulse frequency of channel 0 are both 0, as shown in the figure below.



Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
CH0 Count Value	0	UDINT	4.0	41.0	Input	0	
CH0 Frequency	0	UDINT	4.0	45.0	Input	0	
CH1 Count Value	0	UDINT	4.0	49.0	Input	0	
CH1 Frequency	0	UDINT	4.0	53.0	Input	0	
CH2 Count Value	0	UDINT	4.0	57.0	Input	0	
CH2 Frequency	0	UDINT	4.0	61.0	Input	0	
CH3 Count Value	0	UDINT	4.0	65.0	Input	0	
CH3 Frequency	0	UDINT	4.0	69.0	Input	0	
CH4 Count Value	0	UDINT	4.0	73.0	Input	0	
CH4 Frequency	0	UDINT	4.0	77.0	Input	0	
CH5 Count Value	0	UDINT	4.0	81.0	Input	0	
CH5 Frequency	0	UDINT	4.0	85.0	Input	0	
CH6 Count Value	0	UDINT	4.0	89.0	Input	0	
CH6 Frequency	0	UDINT	4.0	93.0	Input	0	
CH7 Count Value	0	UDINT	4.0	97.0	Input	0	
CH7 Frequency	0	UDINT	4.0	101.0	Input	0	