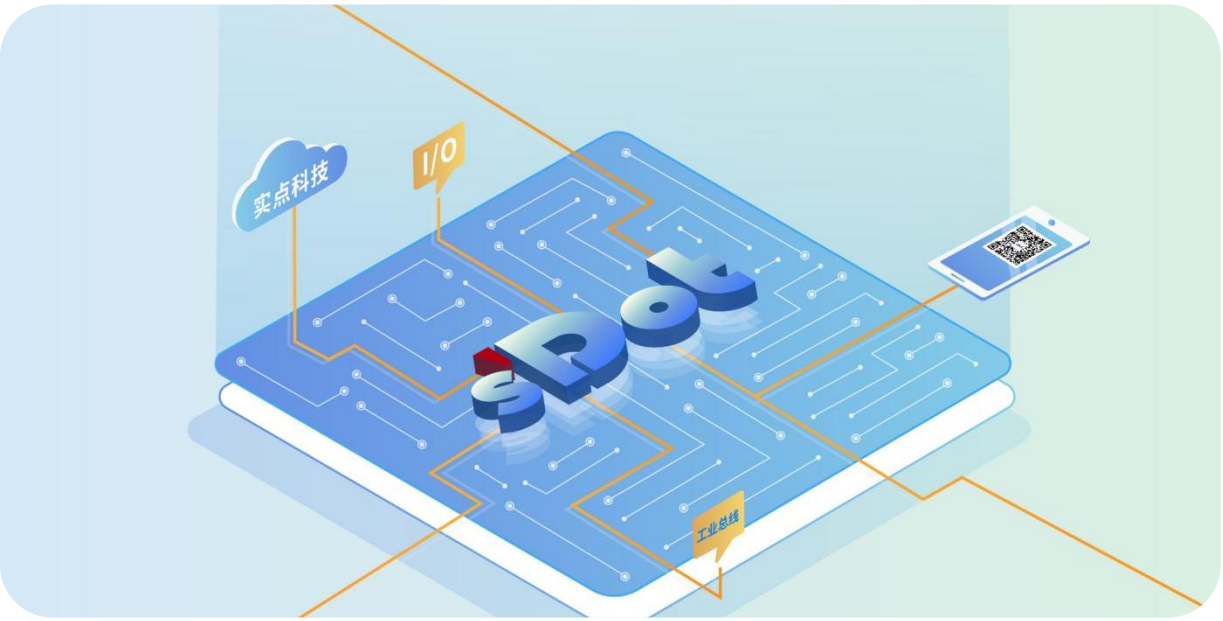


EtherCAT

EC5R Series Integrated I/O

User Manual

Nanjing Solidot Electronic Technology Co., Ltd.

ION Technology Group
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1 Product Overview

1.1 Product Introduction

The EC5R series integrated I/O module adopts the EtherCAT industrial Ethernet bus interface and is an EtherCAT slave device with a standard I/O architecture. It is compatible with EtherCAT networks from multiple manufacturers and provides users with a variety of options for high-speed data acquisition, optimized system configuration, simplified field wiring, and improved system reliability.

1.2 Product Features

- **Configurable input/output functions**

  The module can be configured with DI/DO via DIP switches, or it can automatically adapt to the DI/DO function according to the wiring method.

- **Small size**

  It has a compact structure and occupies little space.

- **High speed**

  Based on a high-performance EtherCAT ASIC communication chip, with a parallel interface, it offers faster speeds.

- **Easy to diagnose**

  The innovative channel indicator design is placed close to the channel, making the channel status clear at a glance and facilitating inspection and maintenance.

- **Easy configuration**

  It is easy to configure and supports all major mainstream master sites.

- **Easy to install**

  Mounted on DIN 35 mm standard rails.

  It adopts spring-loaded terminal blocks, making wiring convenient and quick.

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2 Naming Rules

2.1 Naming Rules

EC 5 R _ - 16 16 A +
(1) (2) (3)(4) (5) (6) (7) (8)

No.	Meaning	Value description		
(1)	Bus protocol	EC: Abbreviation for EtherCAT protocol		
(2)	Product Series	5: Horizontal integrated IO		
(3)	Bus interface type	R: RJ45	M: M8 interface	
(4)	Terminal type	Default: Spring-loaded terminal	E: E-CON plug-in terminal	
(5)	Number of input channels	Digital: 00, 16, 32		
(6)	Number of output channels	Digital: 00, 16, 32		
(7)	Output channel type	A: NPN	B: PNP	Default: No output channel
(8)	Output Channel configurability	Default: Not configurable	+: Configurable as input/output	

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2.2 Model List

Model	Product Description
EC5R-3200	EtherCAT integrated I/O, EC5 series, 32-channel digital NPN & PNP compatible input module, RJ45 communication interface, spring-loaded terminals.
EC5R-1616A	EtherCAT integrated I/O, EC5 series, 16-channel digital NPN & PNP compatible input, 16-channel digital NPN output module, RJ45 communication interface, spring-loaded terminals.
EC5R-1616B	EtherCAT integrated I/O, EC5 series, 16-channel digital NPN & PNP compatible input, 16-channel digital PNP output module, RJ45 communication interface, spring-loaded terminals.
EC5R-1616A+	EtherCAT integrated I/O, EC5 series, 16-channel digital NPN input, 16-channel digital NPN input & output compatible module, RJ45 communication interface, spring-loaded terminal blocks.
EC5R-1616B+	EtherCAT integrated I/O, EC5 series, 16-channel digital PNP input, 16-channel digital PNP input & output compatible module, RJ45 communication interface, spring-loaded terminals.
EC5R-0032A	EtherCAT integrated I/O, EC5 series, 32-channel digital NPN output module, RJ45 communication interface, spring-loaded terminals.
EC5R-0032B	EtherCAT integrated I/O, EC5 series, 32-channel digital PNP output module, RJ45 communication interface, spring-loaded terminals.

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3 Product Parameters

3.1 General parameters

Interface parameters		
Bus protocol		EtherCAT
Number of I/O stations		According to the master station
Data transmission medium		Ethernet/EtherCAT CAT5 S/FTP cable
Transmission rate		100Mbps
Minimum cycle time		250us
Transmission distance		≤100m (distance between stations)
Bus interface		2×RJ45
Technical parameters		
Weight		210g
Specifications and dimensions		182×57.3×34mm
Usage Environment	Operating temperature	-20℃~+60℃
	Storage temperature	-40℃~+80℃
	Relative humidity	95%, no condensation
	Altitude	≤2000m
	Vibration resistance	Compliant with IEC 60068-2-6 (sinusoidal) 5–8.4 Hz: 3.5 mm; 8.4–150 Hz: 1 g 3 axes (X/Y/Z), 10 cycles per axis (100 min)
	Impact resistance	Compliant with IEC 60068-2-27 (mechanical shock) 150m/s2,11ms,±X, ±Y, ±Z directions 3 shocks per direction (total 18 shocks)
	Protection level	IP20

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	Overvoltage category	I
	Pollution level	Level 2
Disconnection check		Yes
Accessing PDO via SDO		Yes
Diagnosis		Yes
Alarm		Yes
Firmware upgrade		Yes
Short circuit protection		Yes (automatic recovery mechanism)
Reverse connection protection		Yes (automatic recovery mechanism)
Reverse connection protection		Yes
Surge protection		Yes

3.2 Digital input module parameters

Digital input	
Product Model	EC5R-3200
Input power supply rated voltage	24VDC (20.4V~28.8V)
Input power supply rated current	≤50mA
Field Supply Voltage Range	24VDC (20.4V~28.8V)
Maximum Field-side Current	8A/group
Input rated voltage	24VDC (20.4V~28.8V)
Typical input current	4mA/ch (24VDC)
Number of input signal points	32
Input signal type	NPN/PNP compatible
Input signal form	Direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form
OFF voltage/OFF current	-3 V to +5 V / ≤ 0.9 mA
ON voltage/ON current	15 V to 30 V / ≥ 2.1 mA
Response time	150us
Input filter	No filter, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms

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Maximum input frequency	150Hz (Filter time: 3ms)
Input impedance	6.6kΩ~7.6kΩ
Isolation methods	Digital signal isolator
Isolation and withstand voltage	500VAC
Rated current consumption	50mA
Power consumption	1.2W
Digital input type	Type1/Type3
Channel indicators	Green LED

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3.3 Digital Input/Output Module Parameters

Digital input		
Product Model	EC5R-1616A	EC5R-1616B
Input power supply rated voltage	24VDC (20.4V~28.8V)	
Input power supply rated current	≤50mA	
Field-side input voltage range	24VDC (20.4V~28.8V)	
Maximum Field-side Current	8A/group	
Input rated voltage	24VDC (20.4V~28.8V)	
Typical input current	4mA/ch (24VDC)	
Number of input signal points	16	16
Input signal type	NPN/PNP compatible	
Input signal form	Direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form	
OFF voltage/OFF current	-3 V to +5 V / ≤ 0.9 mA	
ON voltage/ON current	15 V to 30 V / ≥ 2.1 mA	
Response time	150us	
Input filter	No filter, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms	
Maximum input frequency	150Hz (Filter time: 3ms)	
Input impedance	6.6kΩ~7.6kΩ	
Isolation methods	Digital signal isolator	
Isolation and withstand voltage	500VAC	
Rated current consumption	50mA	
Power consumption	1.2W	
Digital input type	Type1/Type3	
Channel indicators	Green LED	
Digital output		
Number of output signal points	16	16
Output signal type	NPN	PNP
Output voltage drop	<1V	

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Output load type	Resistive load, inductive load, lamp load	
Channel output current	Max: 0.5A/single channel (see details in Figure 1), 6A/16 channels	
Leakage current	<10uA	
Response time	<150us	<250us
Output channel protection	Short circuit protection (automatic recovery mechanism)	
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection	
Isolation methods	Digital signal isolator	
Isolation and withstand voltage	500VAC	
Channel indicators	Green LED	

Digital input		
Product Model	EC5R-1616A+	EC5R-1616B+
Input power supply rated voltage	24VDC (20.4V~28.8V)	
Input power supply rated current	≤50mA	
Field-side input voltage range	24VDC (20.4V~28.8V)	
Maximum Field-side Current	8A/group	
Input rated voltage	24VDC (20.4V~28.8V)	
Typical input current	4mA/ch (24VDC)	
Number of input signal points	16	16
Input signal type	NPN	PNP
Input signal form	Direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form	
OFF voltage/OFF current	-3V to +5V / below 0.9mA	
ON voltage/ON current	15V~30V/2.1mA or more	
Response time	150us	
Input filter	No filter, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms	
Maximum input frequency	150Hz (Filter time: 3ms)	
Input impedance	6.6kΩ~7.6kΩ	
Isolation methods	Digital signal isolator	

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Isolation and withstand voltage	500VAC	
Rated current consumption	50mA	
Power consumption	1.2W	
Digital input type	Type1/Type3	
Channel indicators	Green LED	
Digital input/output compatibility		
Number of output signal points	16	16
Output signal type	NPN	PNP
Configurable inputs and outputs	Yes	
Output voltage drop	<1V	
Output load type	Resistive load, inductive load, lamp load	
Channel output current	Max: 0.5A/single channel (see details)Figure 1), 6A/16 channels	
Leakage current	<10uA	
Response time	<150us	<250us
Output channel protection	Short circuit protection (automatic recovery mechanism)	
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection	
Isolation methods	Digital signal isolator	
Isolation and withstand voltage	500VAC	
Channel indicators	Green LED	

3.4 Digital output module parameters

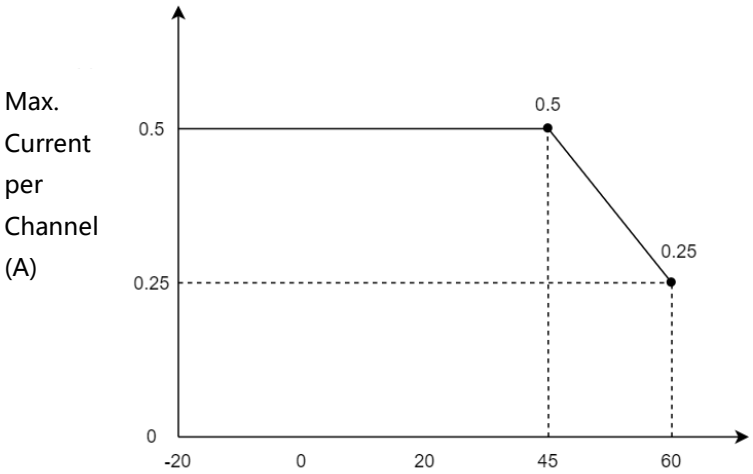
Digital output		
Product Model	EC5R-0032A	EC5R-0032B
Input power supply rated voltage	24VDC (20.4V~28.8V)	
Input power supply rated current	≤50mA	≤50mA
Field-side input voltage range	24VDC (20.4V~28.8V)	
Maximum Field-side Current	8A/group	
Number of output signal points	32	32

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Output signal type	NPN	PNP
Output voltage drop	<1V	
Output load type	Resistive load, inductive load, lamp load	
Channel output current	Max: 0.5A/single channel (see details in Figure 1), 12A/32 channels	
Leakage current	<10uA	
Response time	<150us	<250us
Output channel protection	Short circuit protection (automatic recovery mechanism)	
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection	
Isolation methods	Digital signal isolator	
Isolation and withstand voltage	500VAC	
Rated current consumption	50mA	50mA
Power consumption	1.2W	1.2W
Channel indicators	Green LED	

Figure 1:

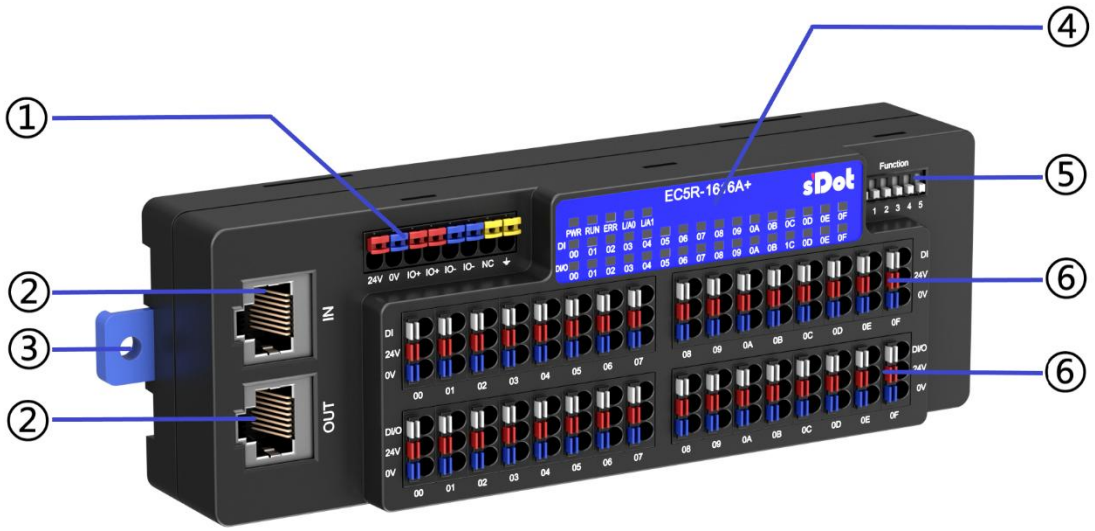
Max. Output Current per Channel vs. Temperature (Digital Output Module)



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4 Panel

4.1 Panel structure



No.	Name	Description
①	Power terminal	8P spring-loaded terminal block
②	Bus interface	2×RJ45, EtherCAT bus interface
③	Modular wall mounting ear holes	For modular wall mounting
④	System indicators and channel indicators	Indicator module power status, operating status, and channel status
⑤	Binary DIP switch	Configure module alarm version, configure DI/DO
⑥	Input/output channels	Terminal blocks

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4.2 Indicator light function

Digital I/O module indicator definitions				
Logo	**Name**	**Color**	**Status**	**Status Description**
PWR	Power indicator	GREEN	ON	Power supply is normal
			OFF	The product is not powered on or the power supply is abnormal.
RUN	Operating status indicator	GREEN	ON	EtherCAT OP status
			Flashing at 2.5Hz	EtherCAT PreOP status
			Single flash (always on for 200ms, then off for 1 second, cycling through different modes).	EtherCAT SafeOP Status
			10Hz flicker	Bootstrap status
			OFF	EtherCAT Init Status
ERR	Fault indicator	RED	Hazard lights[1]	EtherCAT watchdog timeout
			Single flash (always on for 200ms, then off for 1 second, cycling through different modes).	Module local error
			Flashing at 2.5Hz	Common configuration error
			OFF	EtherCAT communication is normal.
L/A0	Network port IN status indicator	GREEN	ON	Establish network connection
			Flashing	Connection established and data exchanged
			OFF	No network connection established or abnormal
L/A1	Network port OUT status indicator	GREEN	ON	Establish network connection
			Flashing	Connection established and data exchanged
			OFF	No network connection established or abnormal
00~0F/ 10~1F	Input channel indicator	GREEN	ON	The module channel has a signal input.
			OFF	The module channel has no signal input or the signal input is abnormal.
00~0F/ 10~1F	Output channel indicator	GREEN	ON	The module channel has signal output.
			OFF	The module channel has no signal output or the signal output is abnormal.

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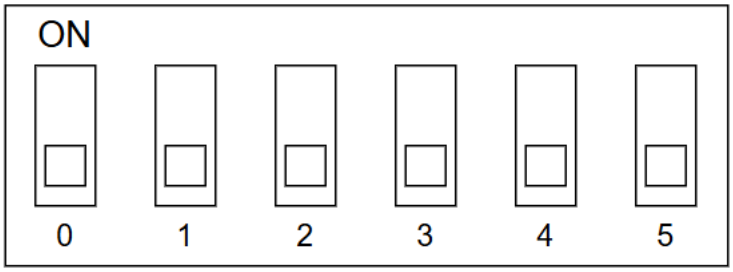
Note [1]: Double flashing means that the light stays on for 200ms and then turns off for 200ms, then stays on for 200ms and turns off for 1000ms, and so on in a cycle.

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4.3 DIP switch

DIP switch instructions

The binary DIP switch is shown in the figure below:



Setting the binary DIP switch from 0 to 0 indicates that the module is the normal version, while setting it to 1 indicates that the module is the Alarm version. Alarm version modules can be viewed in the uplink data for alarm codes.

When binary DIP switch 1 is set to 0, it indicates that the channel can be configured with DI/DO, which is determined by the DIP switch (see the table below for details). When it is set to 1, it indicates that the channel can be configured with DI/DO, which is adaptive by the module wiring.

DI/DO DIP switch setting table available(This takes effect when binary DIP switch 1 is set to 0)	
2. DIP switch settings (binary)	0: Channels 00~03 are output DO
	1: Channels 00~03 are input DI
3. DIP switch settings (binary)	0: Channels 04~07 are output DO
	1: Channels 04~07 are input DI
4. DIP switch settings (binary)	0: Channels 08~0B are output DO
	1: Channels 08~0B are input DI
5. DIP switch settings (binary)	0: Channels 0C~0F are output DO
	1: Channels 0C~0F are input DI

Remark:

1、 **If you need to switch between the normal version/Alarm version and DI/DO during communication, you must power on the entire module after the new settings are completed for the new settings to take effect.**

2、 **For modules EC5R-1616A+/EC5R-1616B+, binary DIP switches 1-5 are active. For other digital modules, binary DIP switches 1-5 are inactive.**

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5 Installation and removal

5.1 Installation Guide

Installation/Removal Precautions

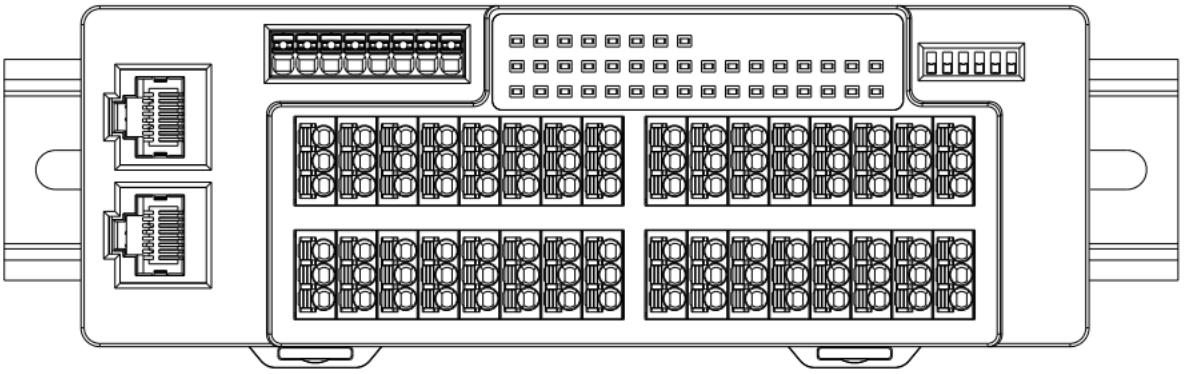
- **The module has an IP20 protection rating and must be installed in a cabinet for indoor use.**
- **Ensure that the server rack has good ventilation (such as installing exhaust fans in the server rack).**
- **Do not install this device next to or above equipment that may cause overheating.**
- **Make sure to install the module vertically on the fixed rail/other fixed position, and ensure that there is air circulation around it (there should be at least 50mm of air circulation space above and below the module).**
- **Installation/removal must be performed with the power off.**

warning

- If the device is not used in accordance with the product user manual, the protection it provides may be compromised.

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Ensure the module is installed vertically on the fixed guide rail/other fixed position.



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5.2 Installation and disassembly steps

5.2.1 Rail snap-on installation

Module installation and removal	
Module installation steps	1. Push the clips at the bottom of the back of the module outwards until you hear a "click" sound.
	2. Install the I/O module on the fixed guide rail, align the upper edge of the module slot with the upper edge of the guide rail, and place the module into the guide rail.
	3. Press the lower edge of the module slot against the lower edge of the guide rail, push the buckle upwards until you hear a click, and the module installation is complete.
Module disassembly steps	1. Insert a flathead screwdriver into the clip and apply force towards the module until you hear a click.
	2. Remove the module from the guide rail.

5.2.2 Wall-mounted fixed installation

Module installation and removal	
Module installation steps	1. Confirm the installation location.
	2. Push the mounting ears on the left and right sides of the back of the module outward until you hear a "click" sound.
	3. Use a template and a spirit level to determine the hole positions and mark the drilling points.
	4. Align the drilled holes with the mounting holes on the back of the module, and use screws to fix it to the wall through the ear holes, ensuring that the module is stable and does not wobble.
	5. Connect power, signal, and communication cables to avoid pulling or stretching them during installation.
Module disassembly steps	1. Use a screwdriver to loosen the screws securing the module.
	2. Gently remove the module.

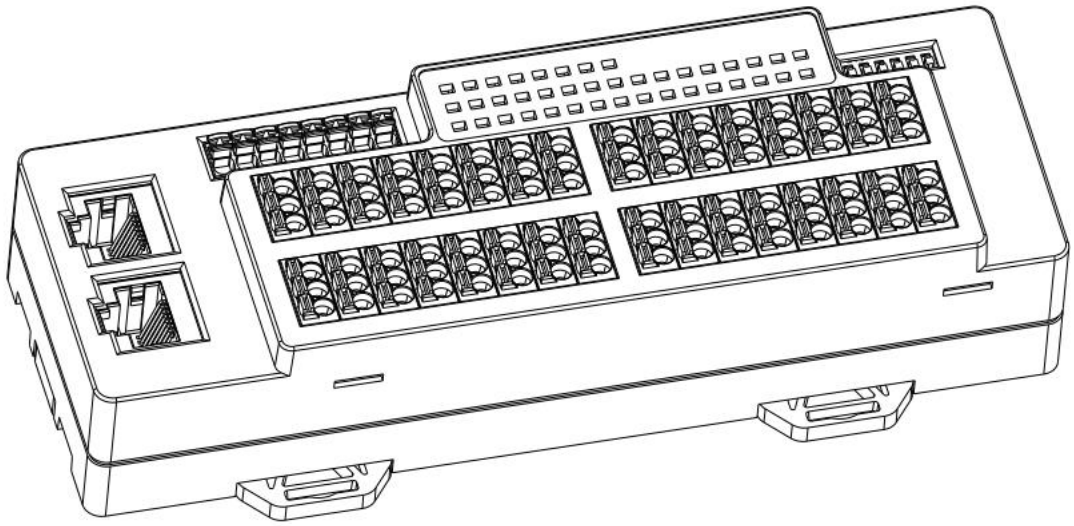
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5.3 Installation and disassembly diagram

5.3.1 Rail snap-on installation

I/O module installation

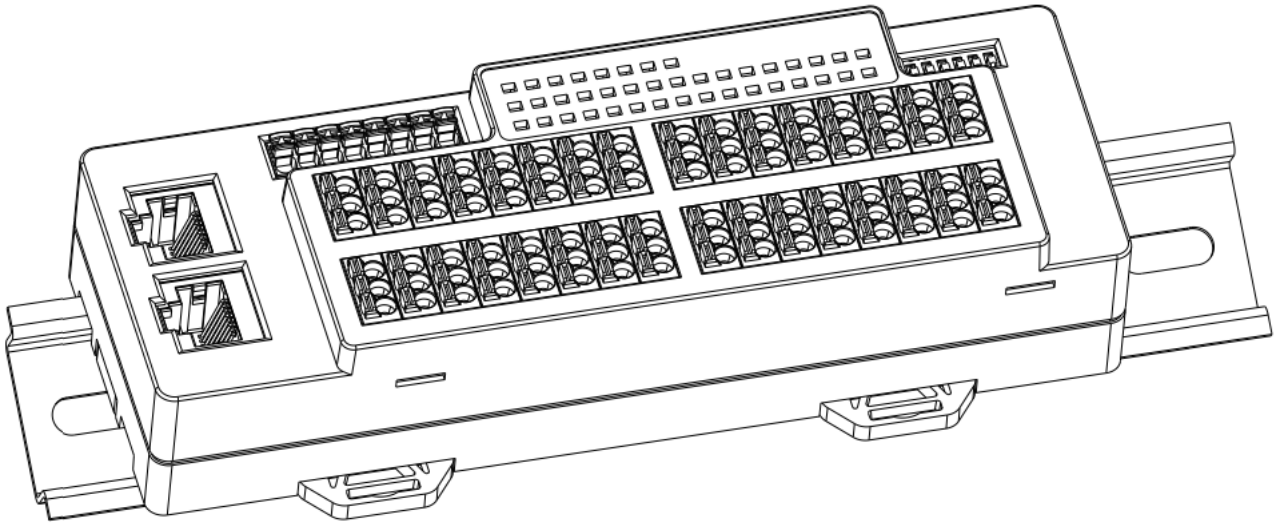
- Push the latch at the bottom of the back of the module outwards until you hear a "click" sound, as shown in Figure ① below.



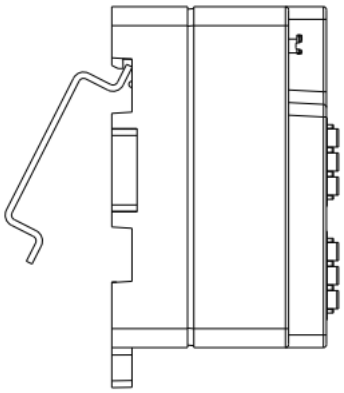
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- Install the module on the fixed guide rail, align the upper edge of the module slot with the upper edge of the guide rail, and place the module into the guide rail, as shown in Figures ② and ③ below.



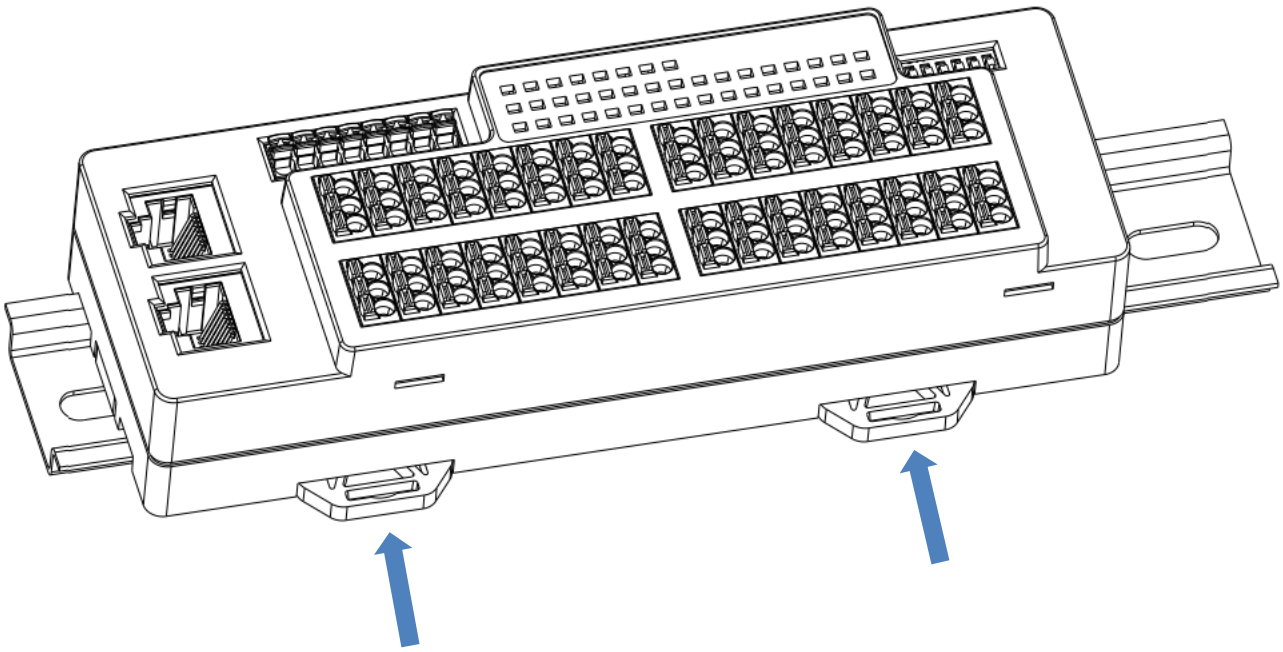
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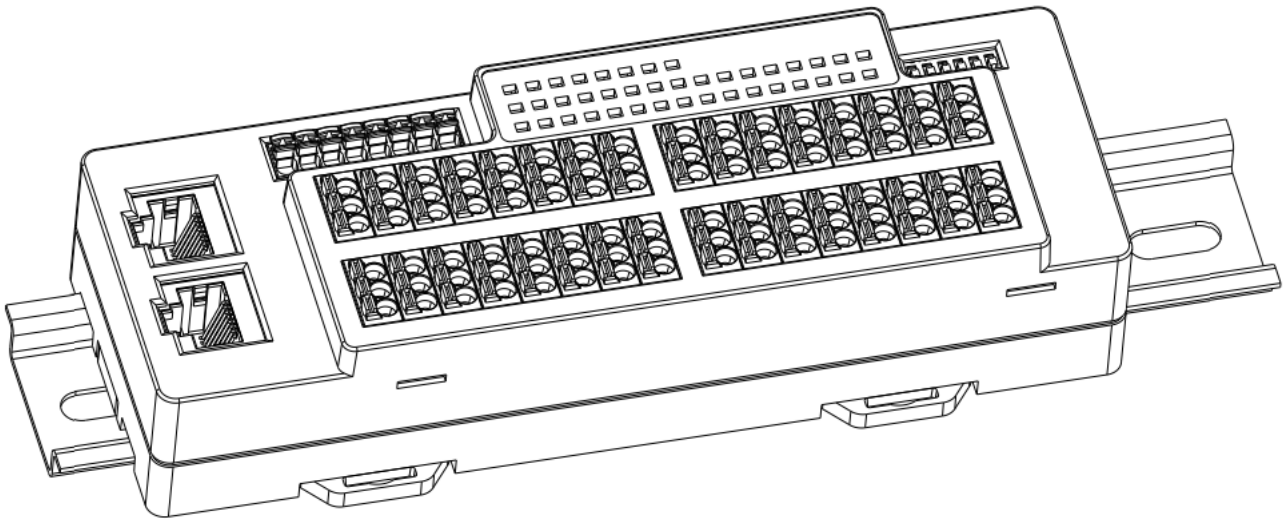
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- Place the lower edge of the module slot against the lower edge of the guide rail, and push the buckle upwards until you hear a click. This completes the module installation, as shown in Figures ④ and ⑤ below.



④

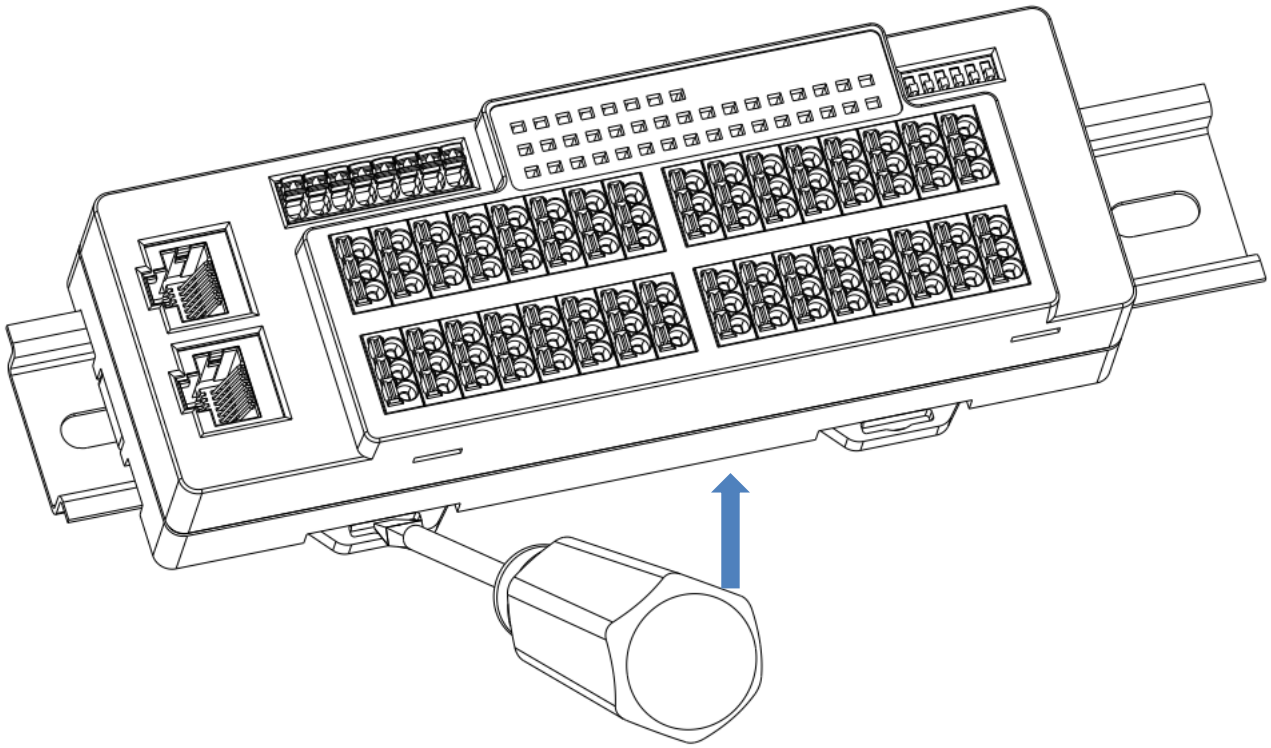


⑤

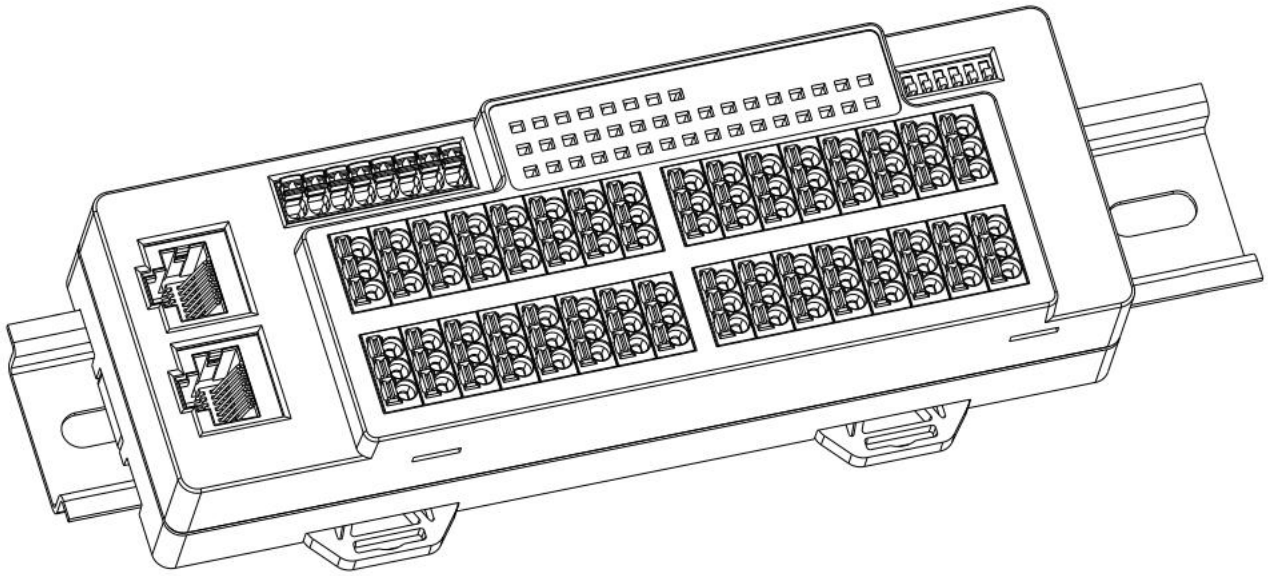
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I/O module disassembly

- Insert a flathead screwdriver into the clip and apply force towards the module until you hear a click, as shown in Figures ⑥ and ⑦ below. At this point, you can remove the module from the guide rail.



⑥

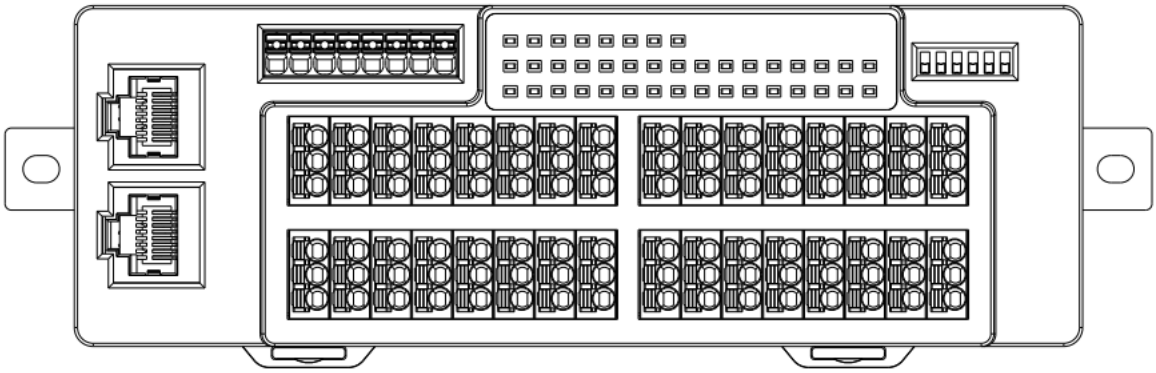


⑦

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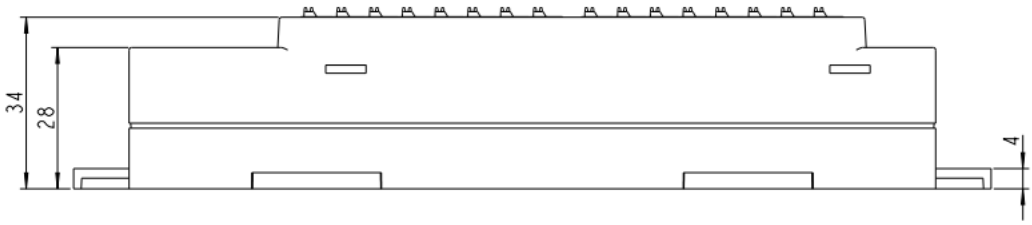
5.3.2 Wall-mounted fixed installation

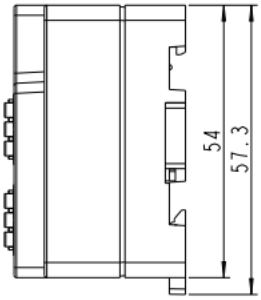
The mounting holes on the left and right sides of the back of the module are shown in the figure below. Please refer to this image 5.2.2 Wall-mounted fixed installation to install it.

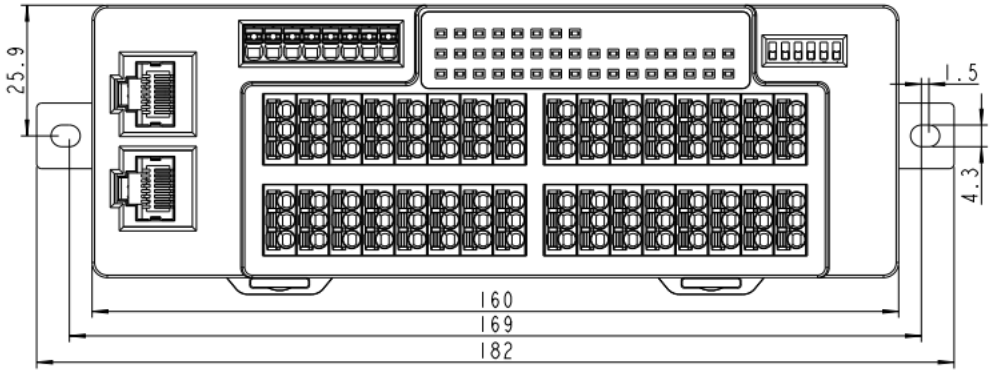


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5.4 Dimensions







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6 Wiring

6.1 Terminal blocks

warning

Terminal blocks		
Power terminals	Rated voltage	300V
	Rated current	7A
	Number of poles	8P
	Wire diameter	28~18 AWG 0.2~0.75 mm²
I/O signal terminals (i.e., input/output terminals)	Rated voltage	300V
	Rated current	8A
	Number of poles	32×3P
	Wire diameter	twenty two~16 AWG 0.3~1.5 mm²
Bus interface	2×RJ45	UTP or STP of Category 5 or higher (STP recommended)

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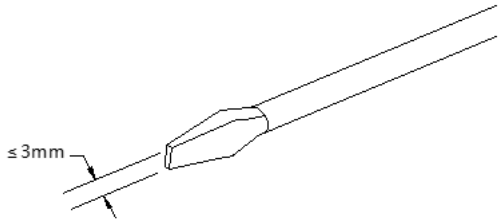
6.2 Wiring instructions and requirements

Power connection precautions

- The power supply for the module system side and the power supply for the field side should be configured and used separately. Do not mix them.
- The PE element must be reliably grounded.

Wiring tool requirements

The power terminals and signal terminals feature a screwless design, allowing for cable installation and removal using a flathead screwdriver (size: ≤3mm).



Stripping length requirements

The recommended cable stripping length for power terminals is 8~10 mm.



The recommended cable stripping length for signal line terminals is 9~10 mm.



Wiring method

For a single-strand rigid wire, after stripping the wire to the corresponding length, press the button and insert the single-strand wire directly into the corresponding end hole.



After stripping the wire to the corresponding length, the multi-strand flexible wire can be directly connected or used with the corresponding standard cold-pressed terminals (tubular insulated terminals, see the table below for

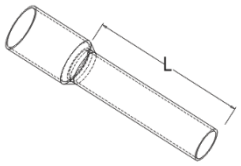


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reference specifications). Pressing down the button will insert the insulated terminal directly into the corresponding end hole.

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The specifications for power supply terminals and signal line terminals are shown in the table below:

Specifications of tubular insulated ends		
Specifications	Model	Conductor cross-sectional area (mm²)
 The length (L) of the ferrule shall be 8–10 mm.	E0308	0.3
	E0508	0.5
	E7508	0.75
	E1008	1.0
	E1508	1.5
	E0310	0.3
	E0510	0.5
	E7510	0.75
	E1010	1.0
	E1510	1.5

warning

- Only copper wires can be used for wiring.

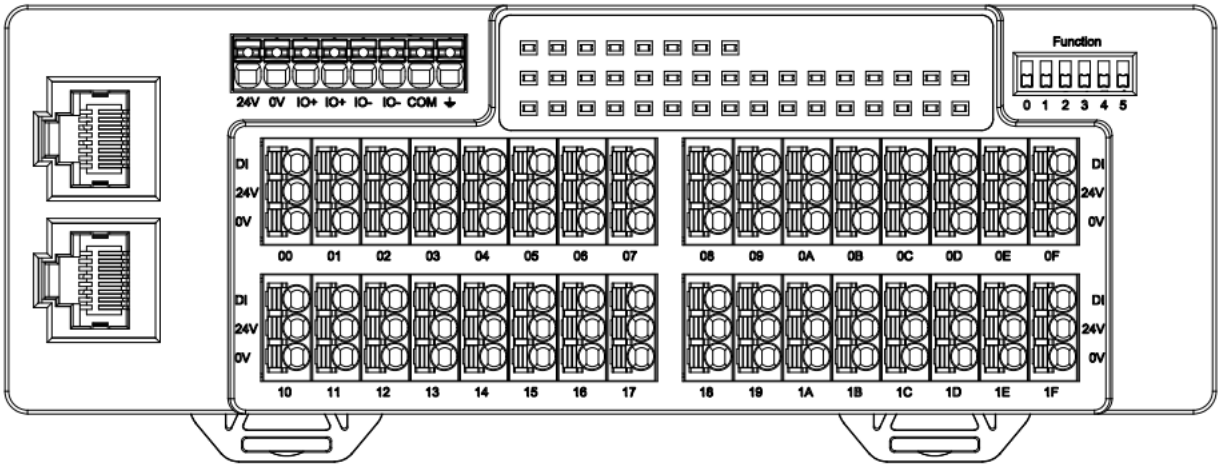
warning

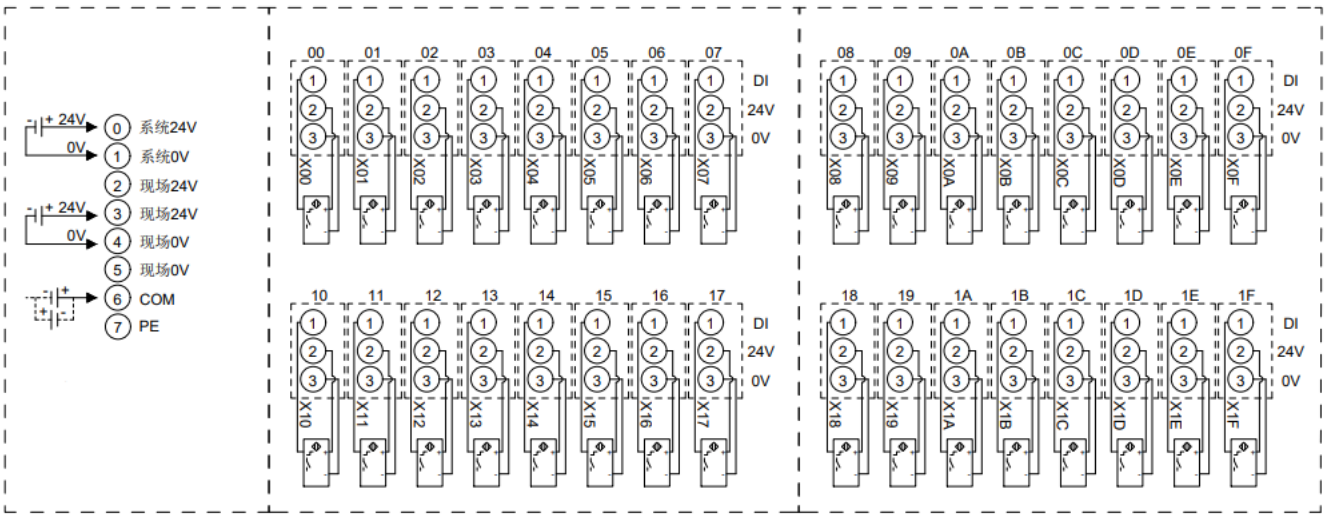
- Cable temperature: 80℃.

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6.3 Wiring diagram

6.3.1 EC5R-3200



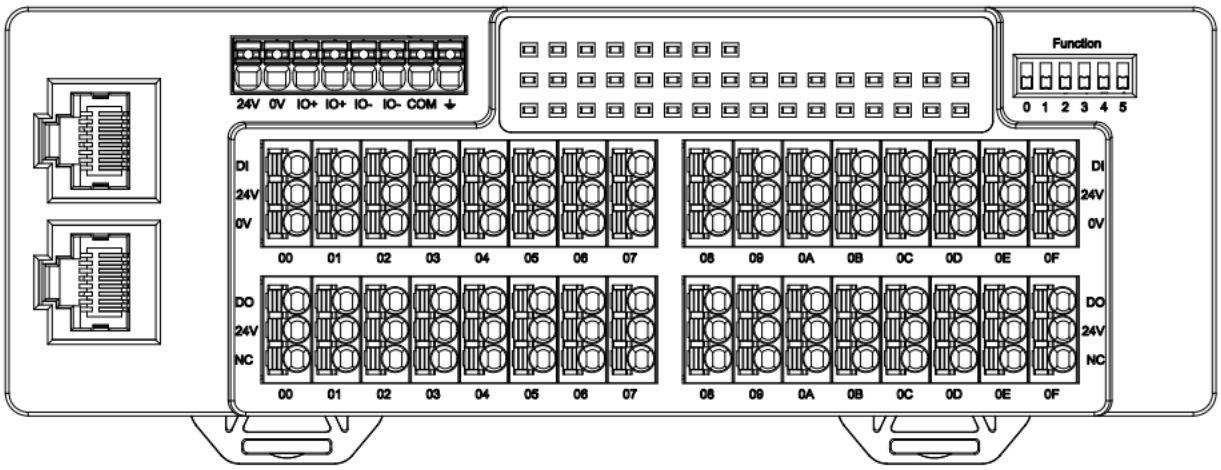


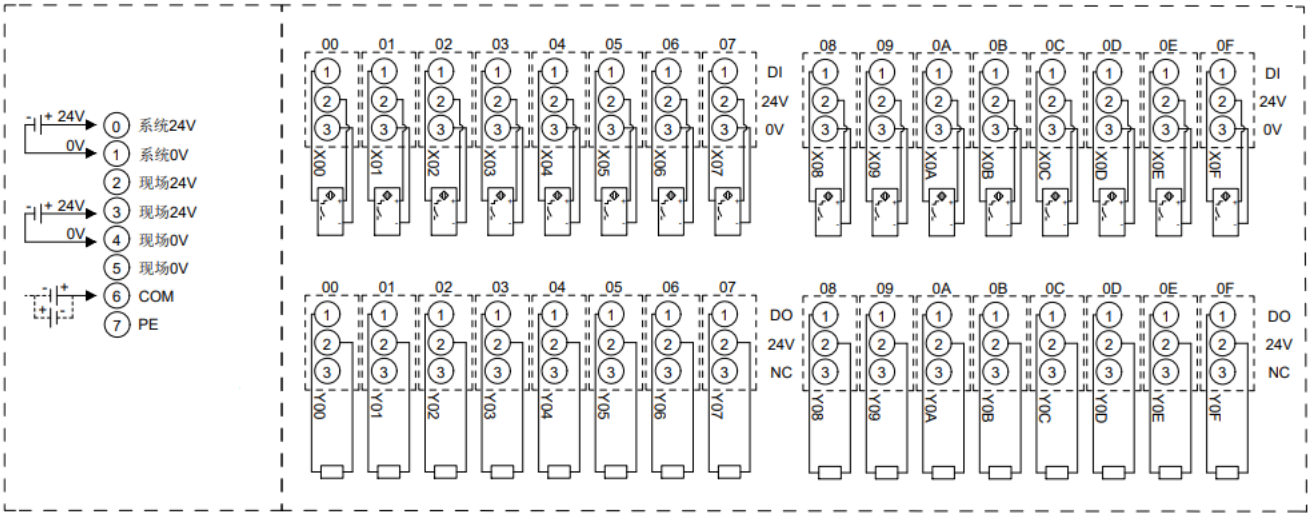
* Field 24 V internally connected; field 0 V internally connected

* COM is the DI common terminal, NPN/PNP compatible

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6.3.2 EC5R-1616A

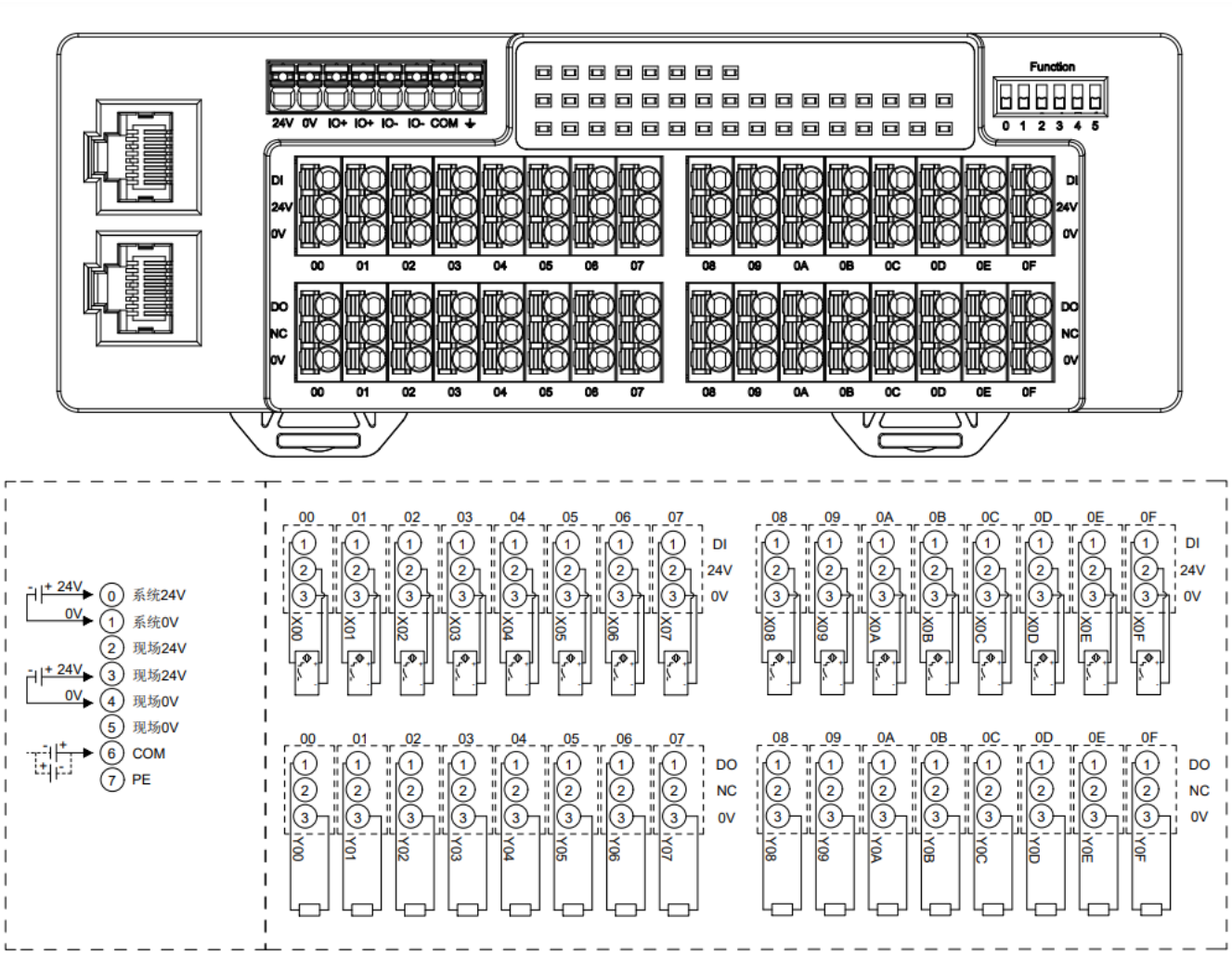




* Field 24 V internally connected; field 0 V internally connected
* COM is the DI common terminal, NPN/PNP compatible
* NC internally connected

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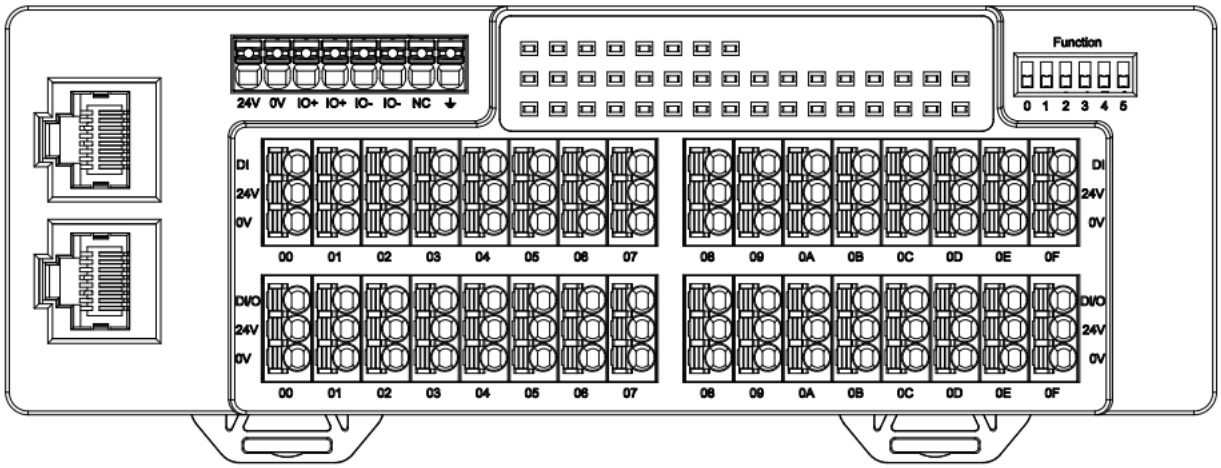
6.3.3 EC5R-1616B

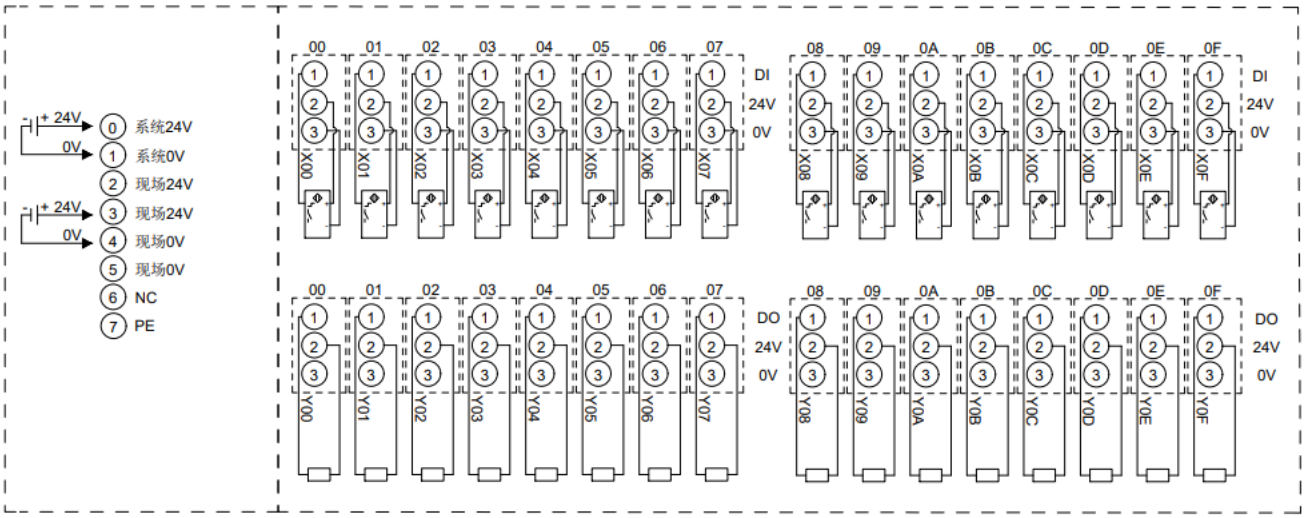


* Field 24 V internally connected; field 0 V internally connected
* COM is the DI common terminal, NPN/PNP compatible
* NC internally connected

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6.3.4 EC5R-1616A+

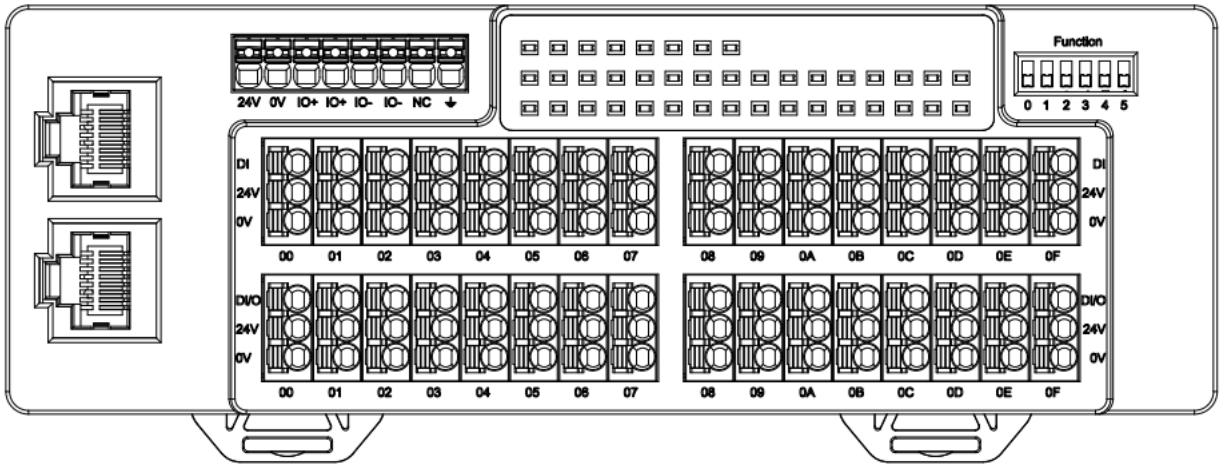


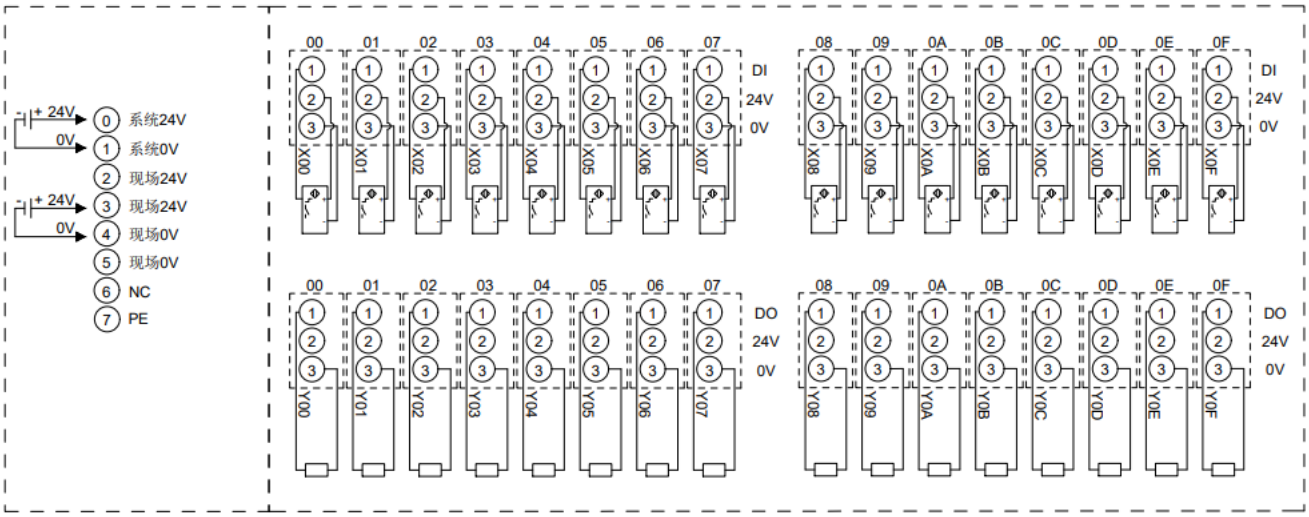


* Field 24 V internally connected; field 0 V internally connected
* DI ports support NPN input only

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6.3.5 EC5R-1616B+

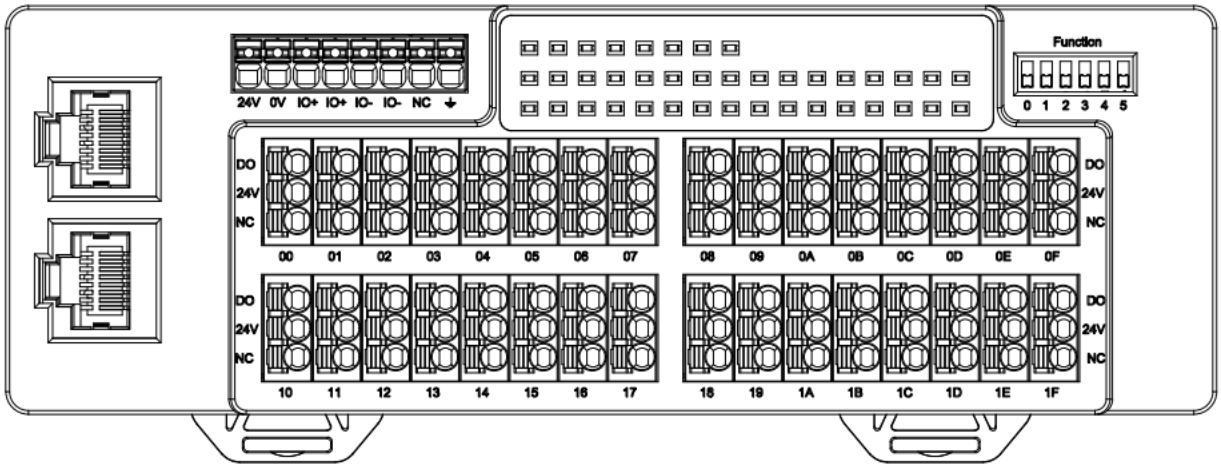


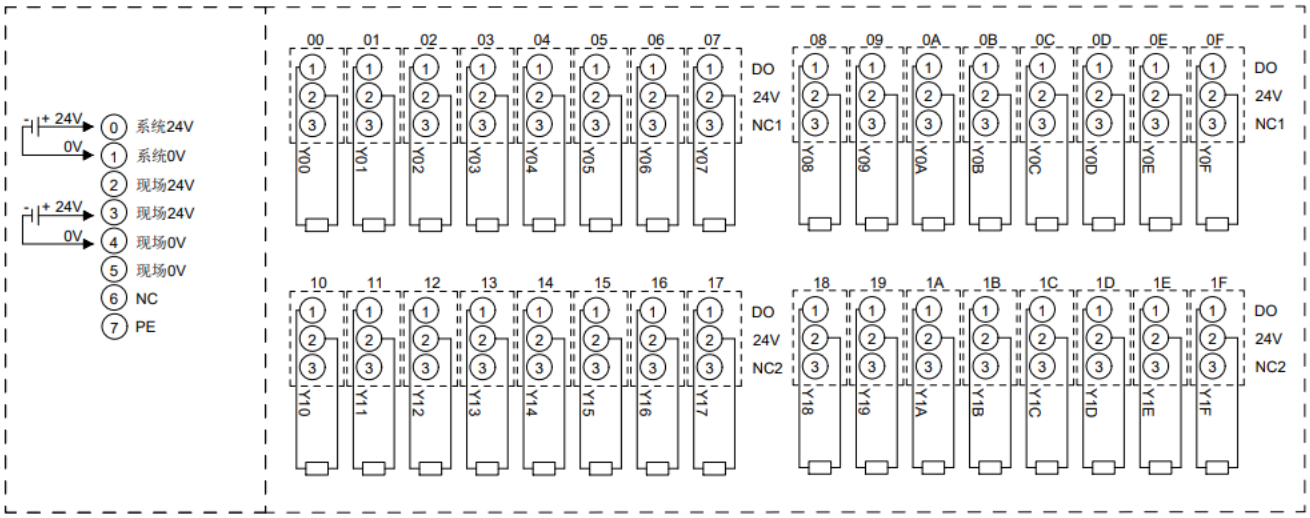


* Field 24 V internally connected; field 0 V internally connected
* DI ports support PNP input only

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6.3.6 EC5R-0032A





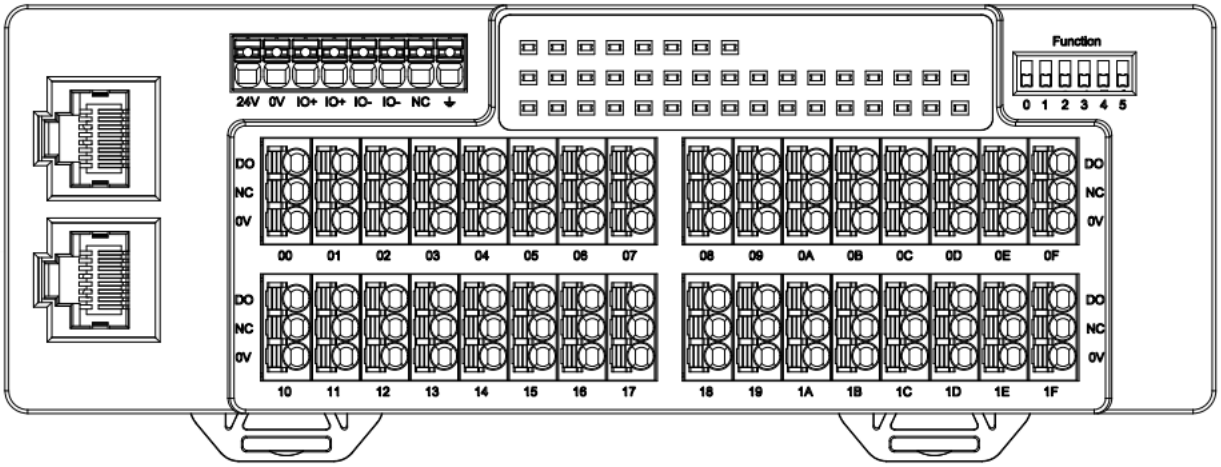
* Field 24 V internally connected; field 0 V internally connected

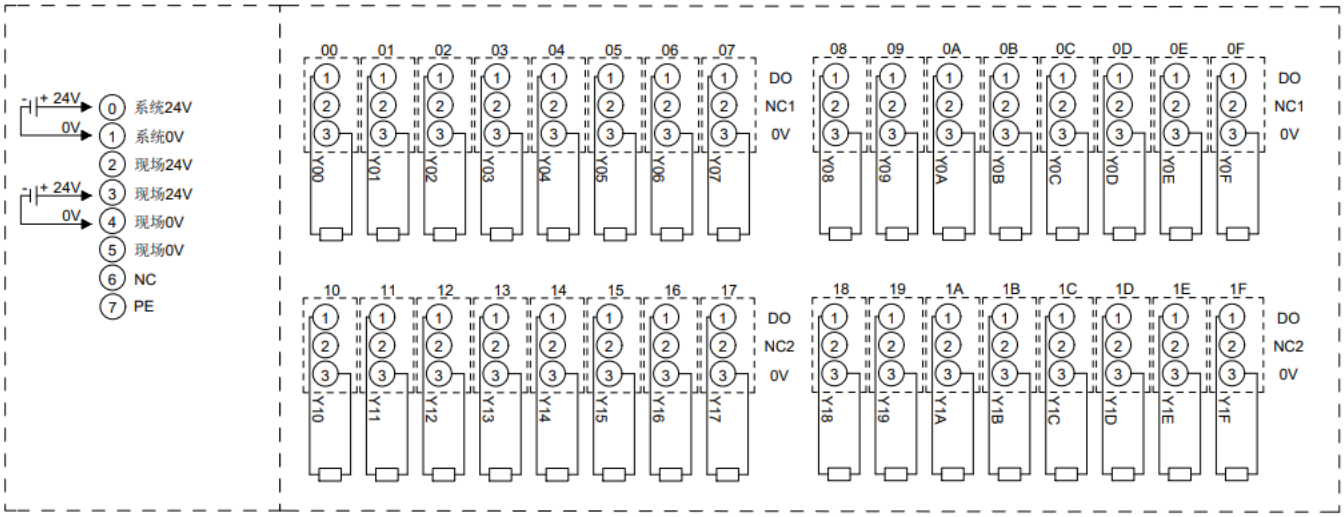
* NC1 internally connected; NC2 internally connected

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6.3.7 EC5R-0032B





* Field 24 V internally connected; field 0 V internally connected
* NC1 internally connected; NC2 internally connected

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7 Use

7.1 Parameter Description

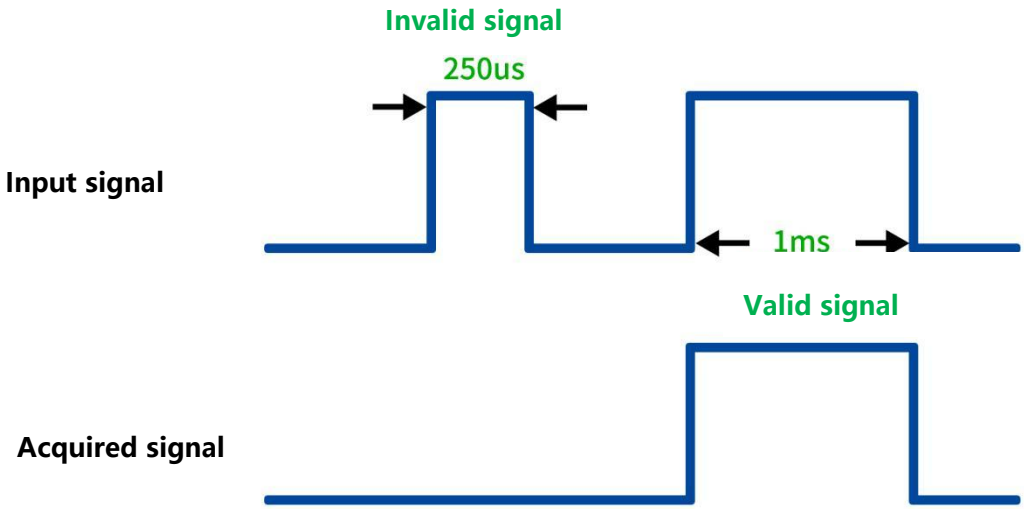
7.1.1 Digital input filter

Digital input filter prevents unexpected rapid changes in input signals from causing switch contact skipping or electrical noise. Digital input filter supports single-module settings; each module can be configured independently, but individual channels cannot.

The default setting for the digital input filter FilterTime is 3ms, with supported settings of no filter, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, and 20ms. When configured to 3ms, noise within 3ms can be filtered out. A 3ms input filter time means that a single signal transitioning from "0" to "1" or from "1" to "0" must take 3ms to be detected; single high or low pulses shorter than 3ms will not be detected.

Function Description: When the input filter is configured to 1ms, noise within 1ms can be filtered out. As shown in the figure below, a signal input of 250us will be considered an invalid signal; single high or low pulses shorter than 1ms will not be detected; signals of 1ms and longer can be acquired.

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7.1.2 Clear/hold digital output signal

The Clear/Hold function is for modules with output channels. This function configures the output mode of the output channels when the module is not in an OP state (stopped from operation or with the module's network cable disconnected). This parameter supports the following output states:

Clear output: When communication is disconnected, the module output channel will automatically clear the output, i.e., output 0.

Output valid value: When communication is disconnected, the module output channel continues to output a valid value, that is, output 1.

Retain the previous output value: When communication is disconnected, the module output channel retains the previous output value.

The digital clear and retain function supports both module-wide settings (template mode) and single-channel settings (single-channel mode). Any channel can be configured using either single-channel mode or template mode, with single-channel mode having higher priority than template mode. Specific configuration methods are shown in the table below; the default is module-wide clear output.

Clear and hold parameters of digital output module				
Parameter name	Parameter meaning	Parameter values	Parameter value meaning	Default value
TemplateMode	Template mode	1	PresetLow clears the output, i.e., outputs 0.	1
		2	PresetHigh outputs a valid value, i.e., 1.	
		3	KeepMode retains the previous output value.	
Channel x	Single-channel mode settings	0	TemplateValue is the template mode value, meaning single-channel mode is not enabled.	0
		1	PresetLow clears the output, i.e., outputs 0.	
		2	PresetHigh outputs a valid value, i.e., 1.	
		3	KeepMode retains the previous output value.	

7.1.3 Protocol layer alarm switch

The Protocol Layer Alarm switch is enabled by default. Setting it to disabled disables protocol-related alarm functions. See below for protocol alarm codes.7.2.1 Protocol Alarm Codes.

7.2 Alarm code information

7.2.1 Protocol alarm codes

Error code	**Meaning**
0x0081	Firmware upgrade error
0x0082	Firmware does not match the current module model
0x00C5	Load-side voltage not connected
0x1040	Output channel fault
0x1041	Parameter setting error

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0x1042	When DI channel auto-adaptation is set to 1, a misoperation occurs if the corresponding DO control address of this channel is set to 1

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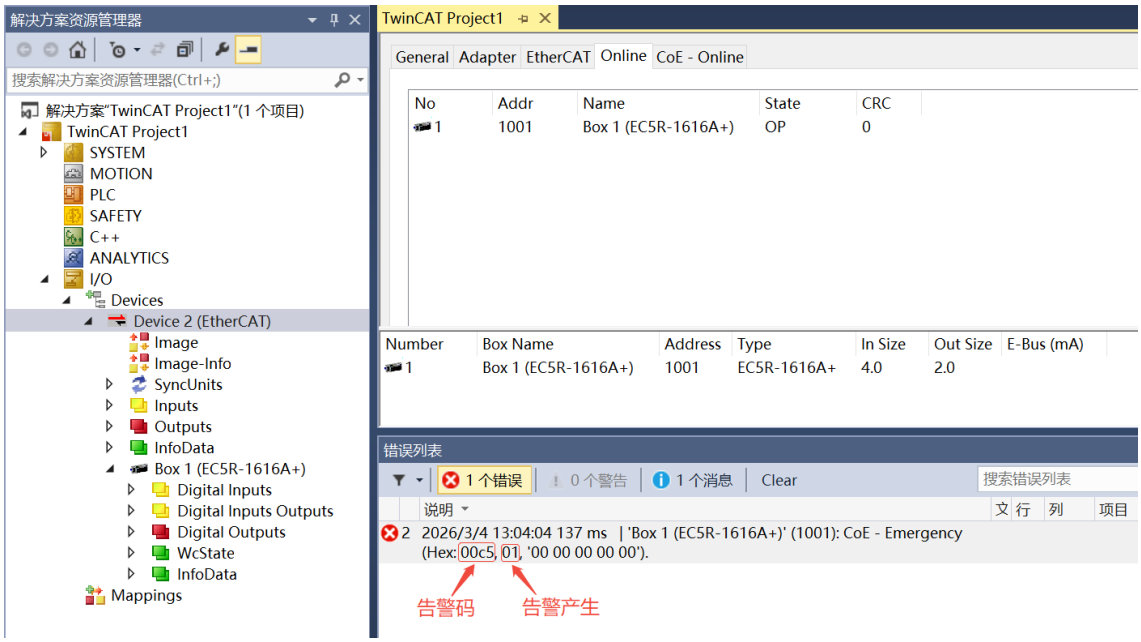
7.2.2 Process data alarm codes

When the digital module is the Alarm version, the alarm code is reported in the module's uplink data, as detailed in the table below.

Error code	Meaning
0x00	No fault
0x01	Load-side voltage not connected
0x02	Output channel output abnormality
0x04	Firmware is incompatible with the current module model
0x08	Firmware upgrade error
0x10	Parameter setting error
0x20	When DI channel auto-adaptation is set to 1, a misoperation occurs if the corresponding DO control address of this channel is set to 1

7.2.3 Viewing Protocol Alarm Codes

Taking TwinCAT3 software as an example, when the digital module is in normal version, alarm information can be viewed below Error in the Error List window, as shown in the figure below.



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7.3 Module configuration instructions

7.3.1 Application in the TwinCAT3 software environment

1、 Preparation

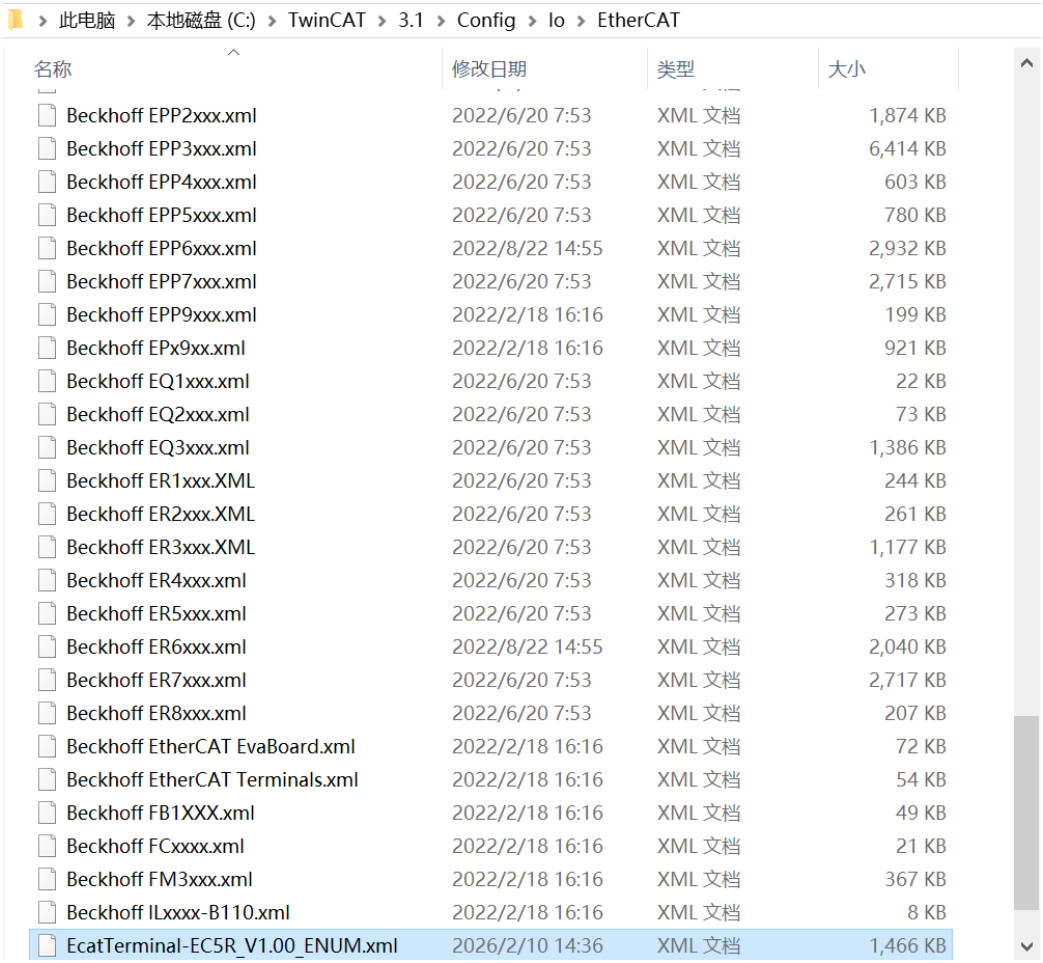
- **Hardware environment**
  - **Module preparation: This guide uses EC5R-1616A+-Alarm as an example.**
  - **One computer, pre-installed with TwinCAT3 software.**
  - **EtherCAT dedicated shielded cable**
  - **One switching power supply**
  - **Device configuration file**

    Configuration file retrieval address:https://www.solidotech.com/cn/resources/configuration-files
- **Hardware configuration and wiring**

  Please follow the instructions "5. Installation and Removal"and"6. Wiring"

2、 Pre-configured configuration files

Place the ESI configuration file (EcatTerminal-EC5R_V1.00_ENUM.xml) in the TwinCAT installation directory "C:\TwinCAT\3.1\Config\Io\EtherCAT", as shown in the image below.



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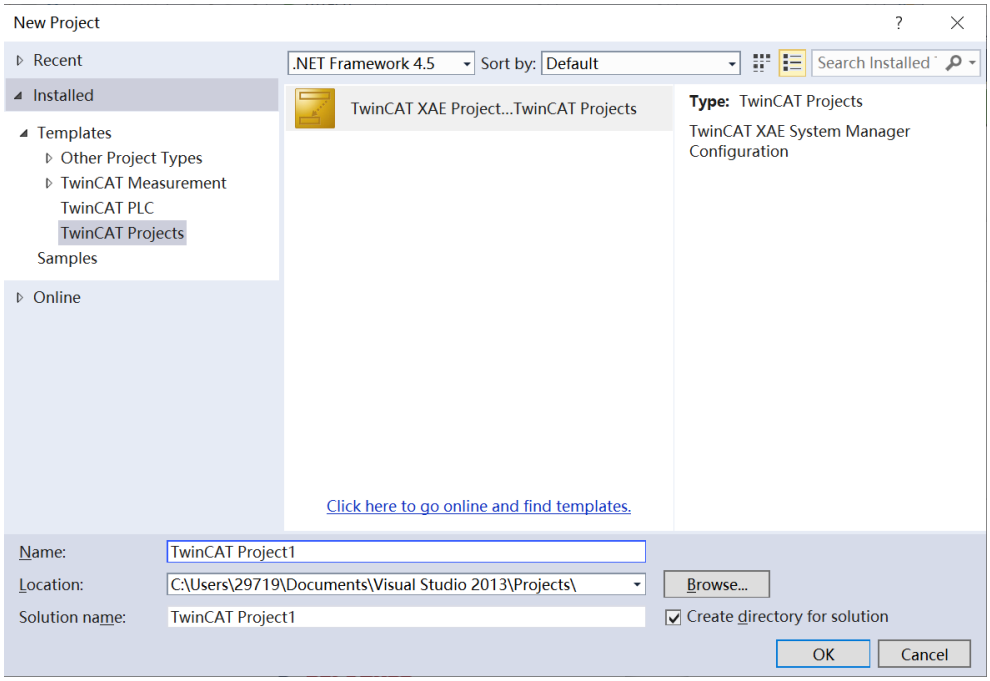
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3、 Create a project

a. Click the TwinCAT icon in the lower right corner of the desktop, select "TwinCAT XAE (VS xxxx)" to open the TwinCAT software, as shown in the image 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. These three items can be left as default. Then click "OK". The project will be created successfully, as shown in the figure below.

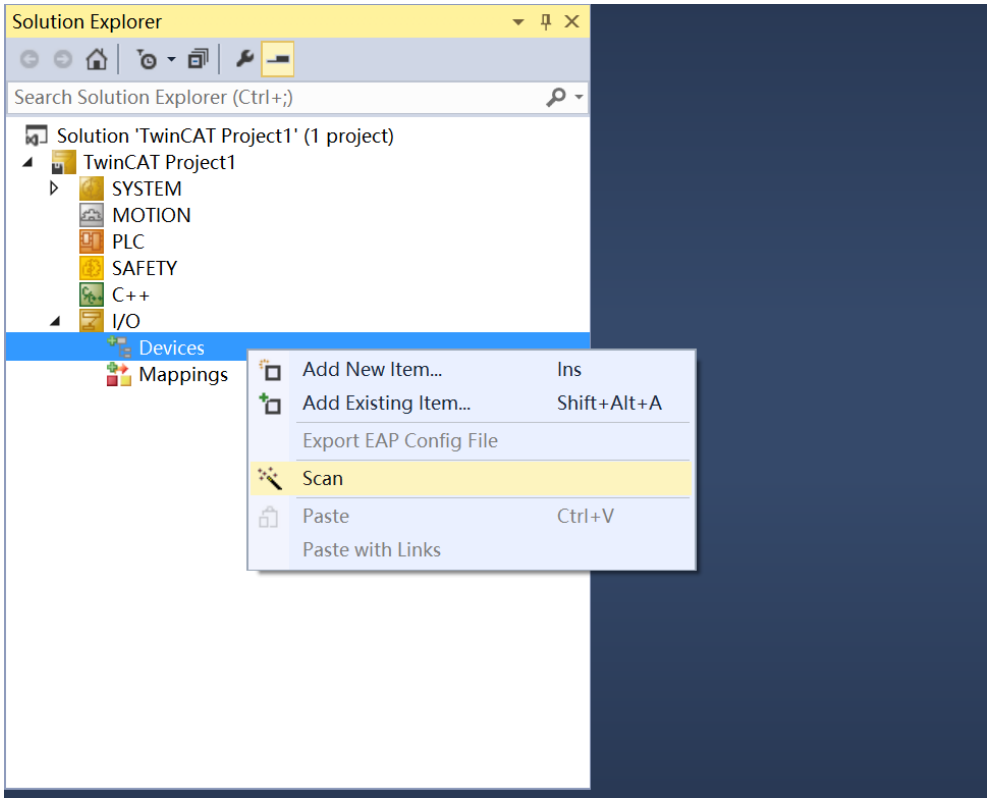


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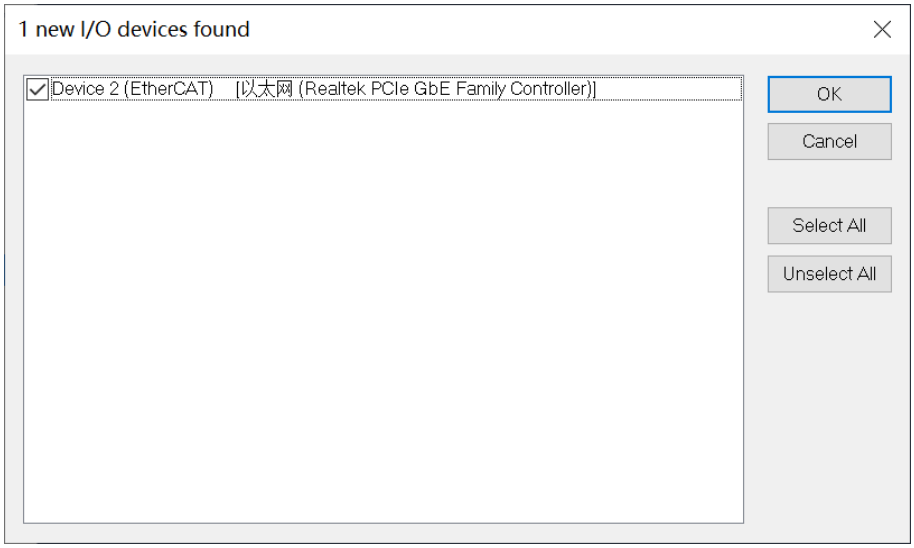
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4、 Scanning equipment

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

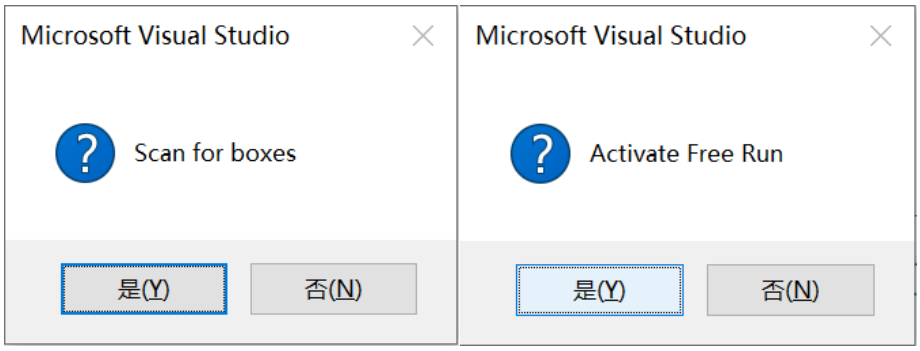


b. Select the "Local Area Connection" network adapter, as shown in the image below.

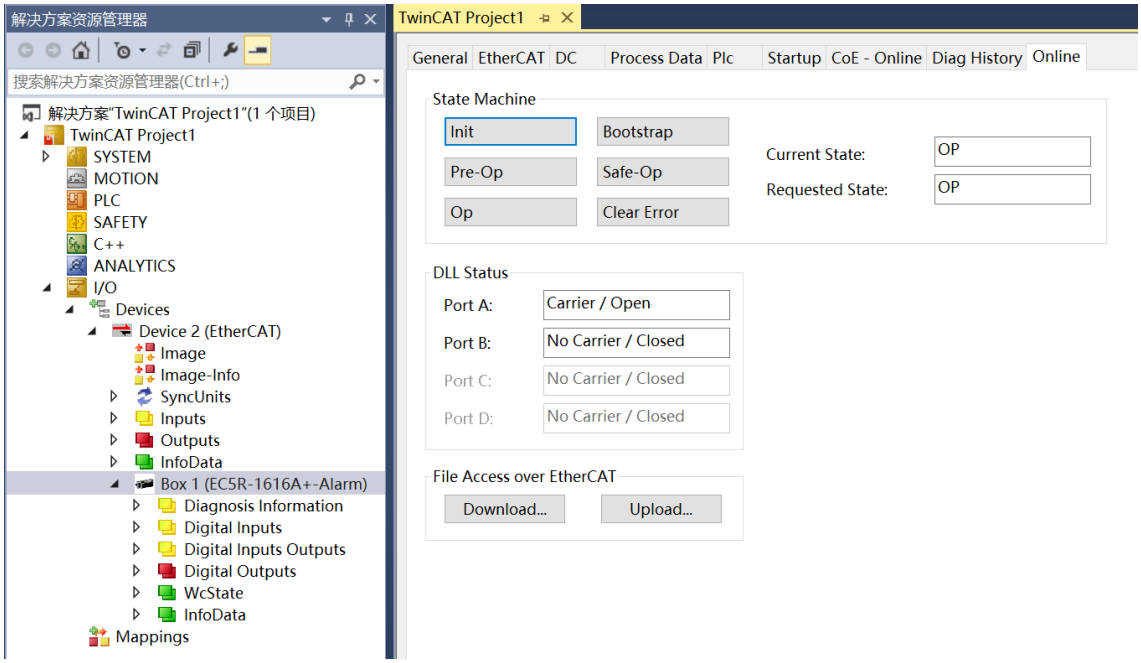


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c. In the pop-up window "Scan for boxes", click "Yes"; in the pop-up window "Activate Free Run", click "Yes", as shown in the image below.



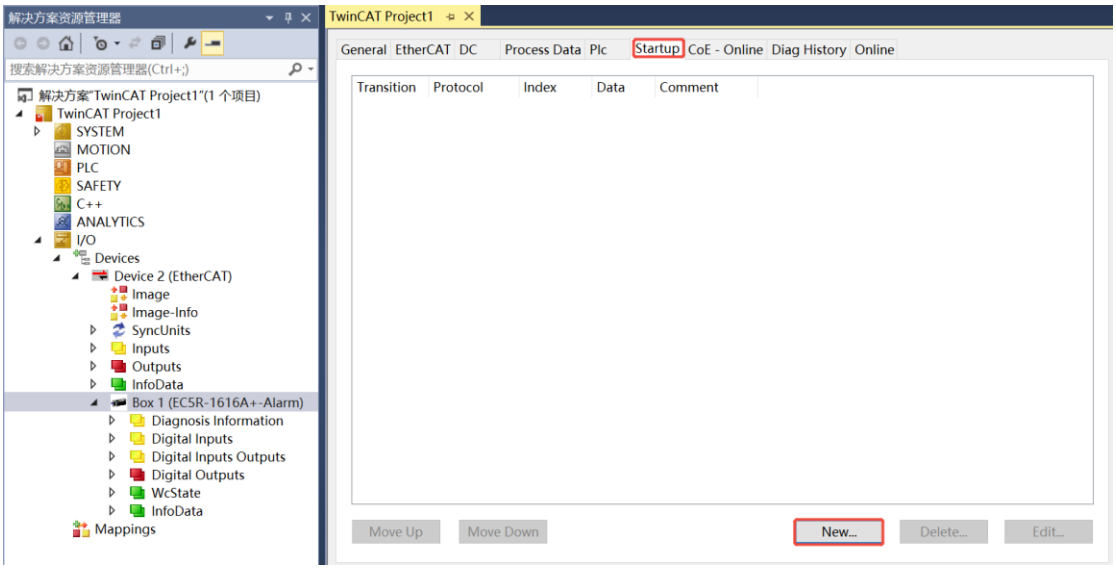
d. After the device is scanned, you can see Box1 (EC5R-1616A+-Alarm) in the left navigation tree. Under "Online", you can see that TwinCAT is in "OP" state. You can observe that the RUN light of the slave device is always on, as shown in the figure below.



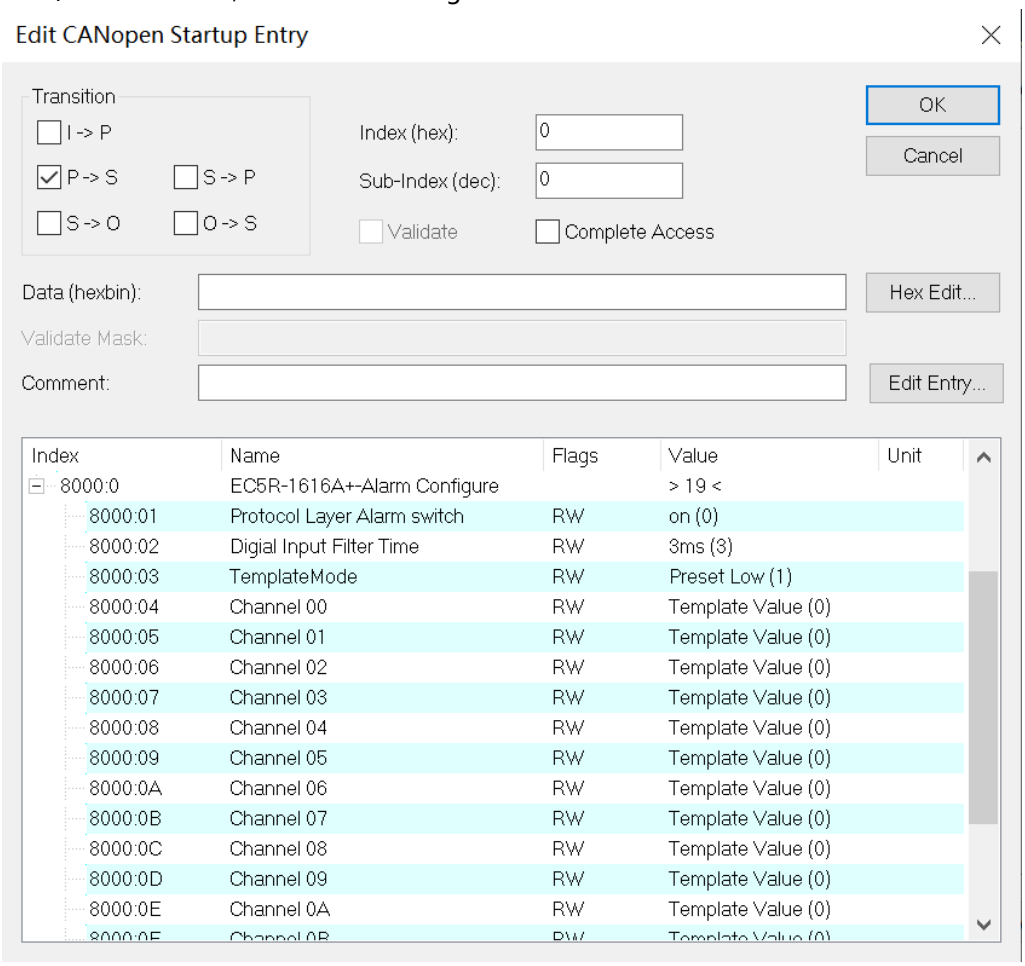
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5、 Parameter configuration

a. Clicking "Box1 -> Startup -> New" in the left navigation tree will take you to the configuration parameter editing page, as shown in the image below.



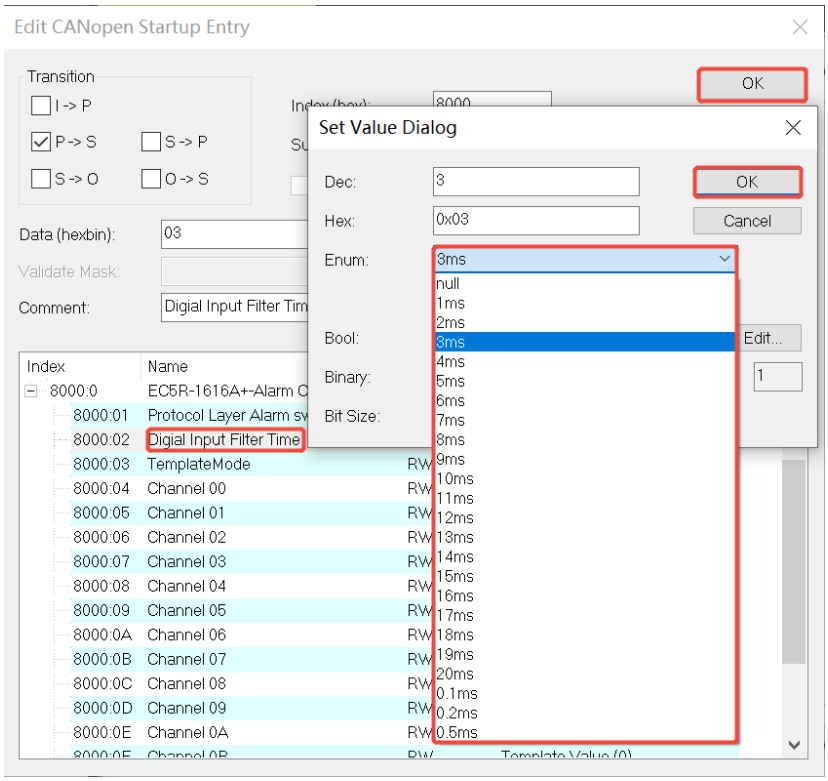
b. In the Edit CANopen Startup Entry pop-up window, click the "+" in front of Index 8000:0 to expand the parameter menu and configure the digital input filter and digital output signal clear/hold functions, as shown in the figure below.



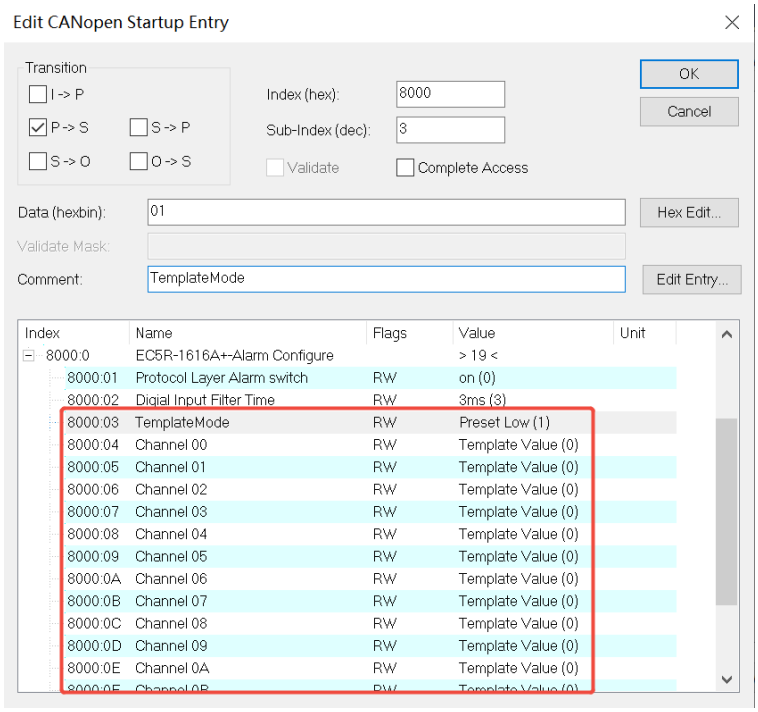
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c. The Digital Input FilterTime can be set from 0 to 20ms. Double-click "FilterTime" and modify the parameter value in the drop-down box, as shown in the figure below.

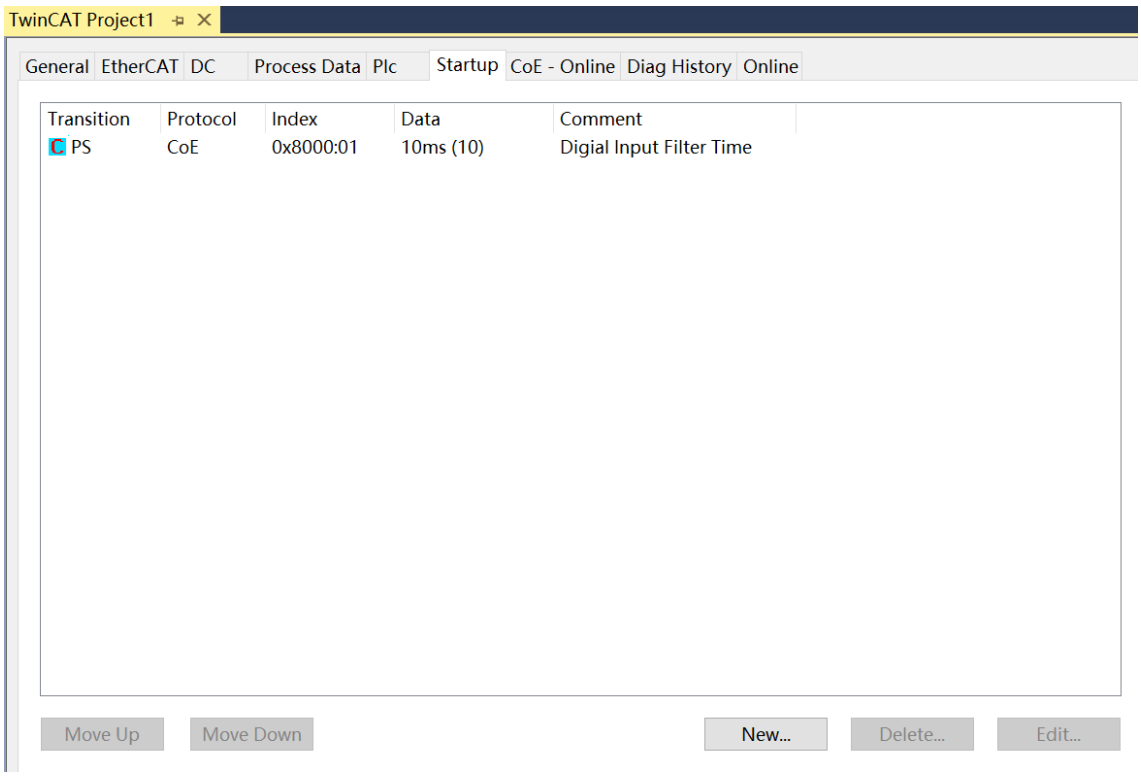


d. The digital output signal clear/hold function is preset to output clear mode for all channels by default. Module channels can be configured individually; see the corresponding relationship below 7.1.2 Clear/Hold Digital Output SignalsAfter configuration, click "OK", as shown in the image below.



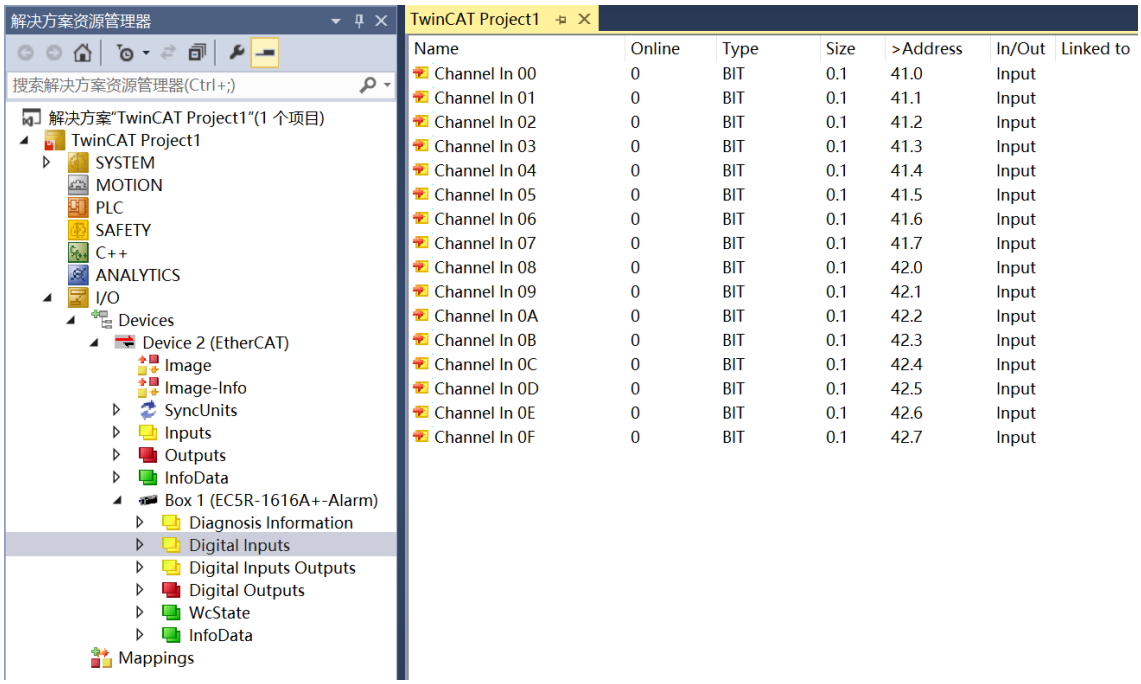
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e. After modifying the parameters, you can see the modified parameter items and values below Startup, as shown in the image below. After setting the parameters, a Reload operation and a power-on restart of the module are required to enable the main station to automatically distribute the parameter settings.



6、 Verify basic functions

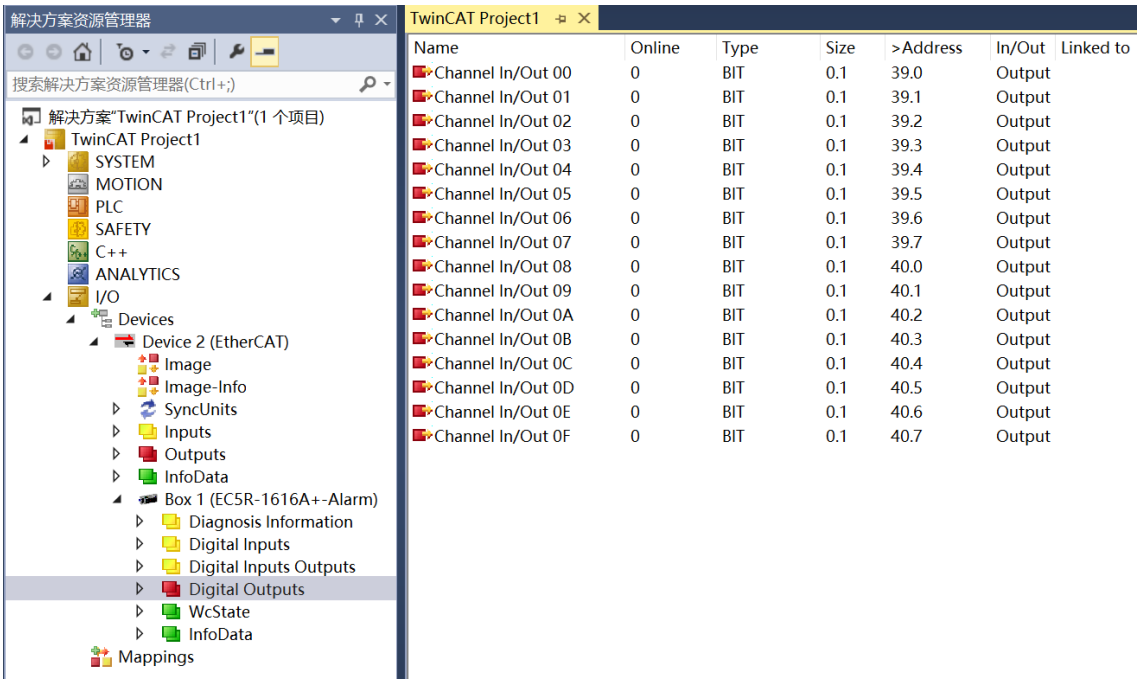
a. The left-hand navigation tree "Box1 -> Digital Inputs" and "Box1 -> Digital Inputs/Outputs" displays the upstream data of the module, used to monitor the module's input, as shown in the figure below.



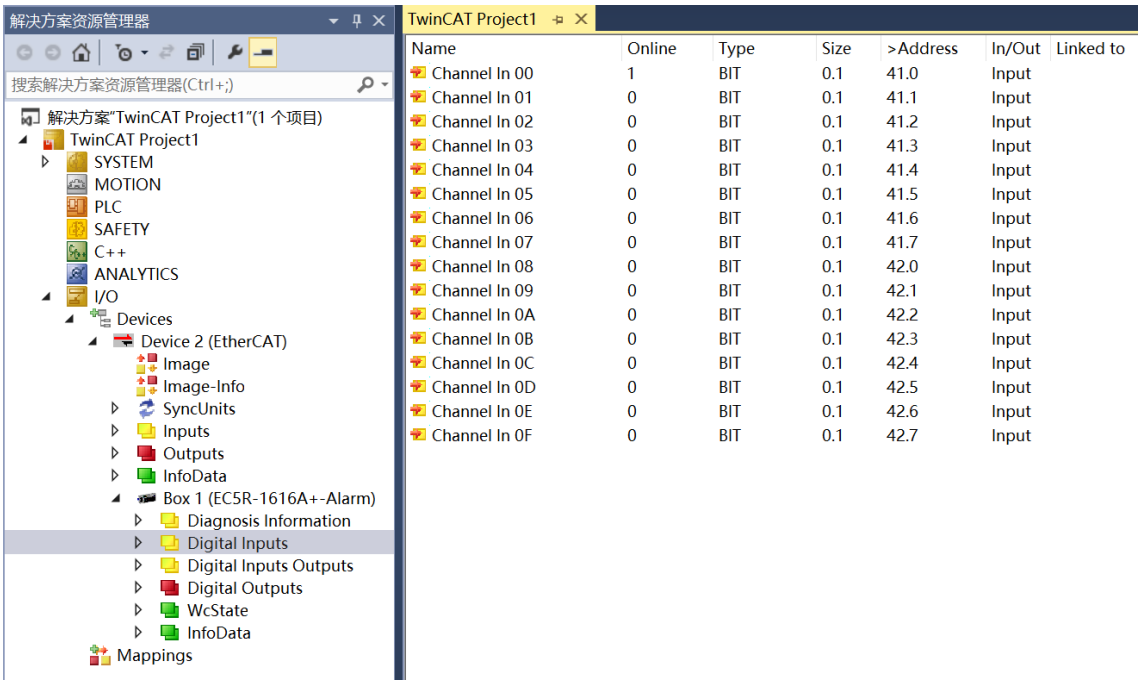
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b. The left-hand navigation tree "Box1 -> Digital Outputs" displays the module's downstream data, which is used to control the module's output, as shown in the figure below.

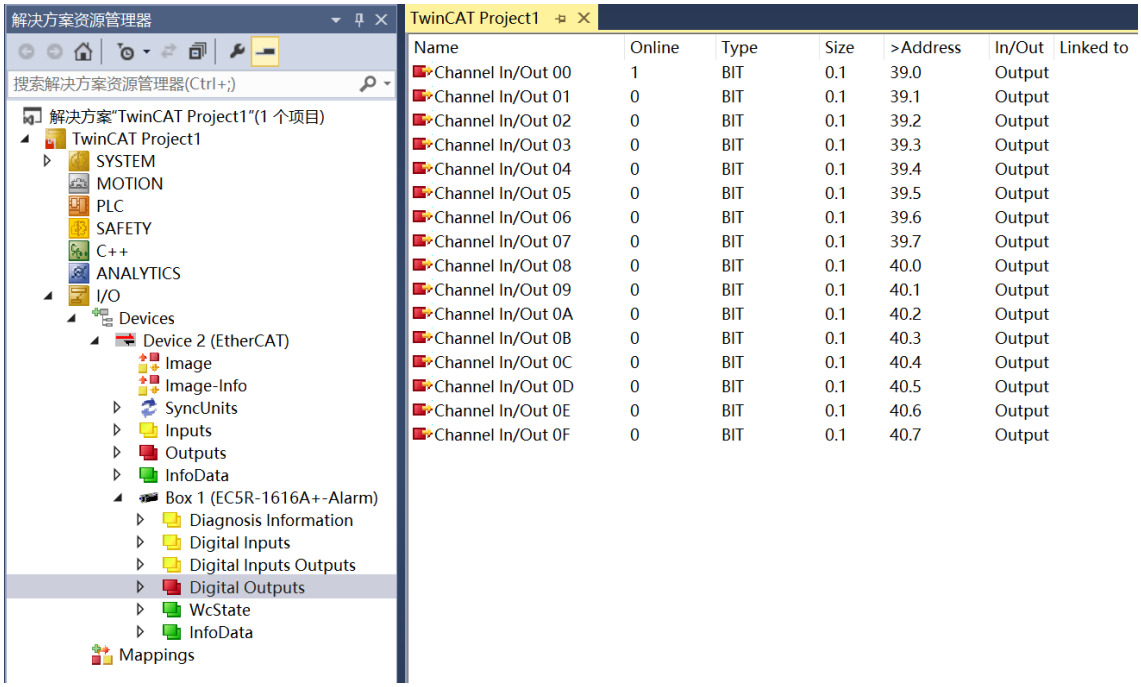


c. Taking channel 0 of the EC5R-1616A+-Alarm module as an example, if there is a valid voltage input to channel 0 of this module, it can be observed in "Box1 -> Digital Inputs", as shown in the figure below.

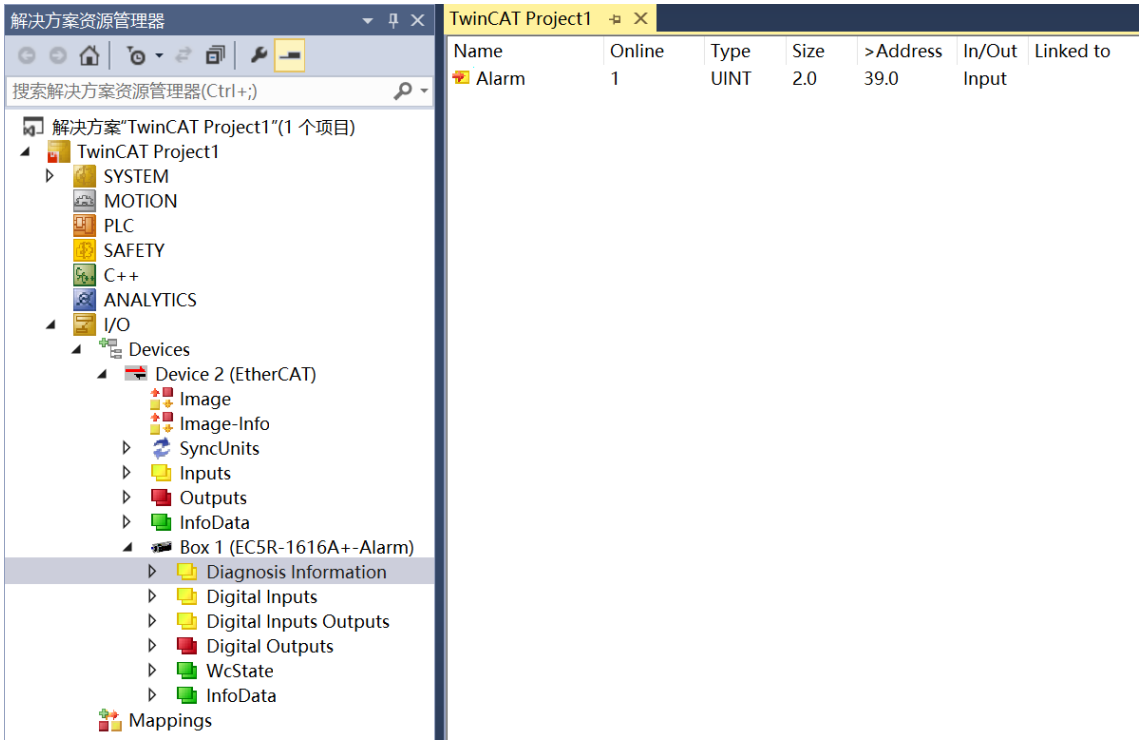


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d. Taking the output channel 0 of the EC5R-1616A+-Alarm module as an example, if you want the digital output channel 0 of this module to output, you can click on Channel 0 in "Box1 -> Digital Outputs", right-click on the corresponding "Online" and click "Online Write '1'". You can then see the corresponding channel light on the module, as shown in the figure below.



e. If the field power supply is not connected, the process data alarm code can be viewed in "Box1 -> Diagnosis Information", as shown in the figure below.



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