

IO-Link Main Site

IOL7A-EC01B-8A

User Manual




Nanjing Solidot Electronic Technology Co., Ltd.

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Table of contents

1	Product Overview	1
1.1	Product Introduction	1
1.2	Product Features	1
2	Naming Rules	3
2.1	Naming Rules	3
2.2	Model List	3
3	Product Parameters	4
3.1	General parameters	4
3.2	Digital parameters	5
4	Panel	6
4.1	Product Structure	6
4.2	Indicator light function	7
4.3	Bus interface definition	9
4.4	Power interface definition	9
4.5	I/O interface definition	9
5	Installation and wiring	11
5.1	Outline dimension drawing	11
5.2	Installation environment requirements	12
5.3	Module installation	12
5.4	Wiring instructions	13
5.4.1	Power interface wiring diagram	13
5.4.2	I/O Interface Wiring Diagram	13
6	Power supply rules	15
6.1	Direct power supply rules	15
6.2	Series power supply rules	18
7	Use	20
7.1	Parameter and process data description	20
7.1.1	Output clear and hold function	20
7.1.2	Pin2 circuit overcurrent recovery mode function	20
7.1.3	ISDU remote configuration function	21

7.1.4	DI/DO/IO-Link mode functionality.....	22
7.2	Alarm code information.....	23
7.2.1	Alarm code list.....	23
7.2.2	View alarm codes.....	23
7.3	EtherCAT master station configuration application.....	24
7.3.1	Application in the TwinCAT3 software environment.....	24
7.4	Custom data length module.....	40
7.4.1	EtherCAT Master Custom Module.....	40
8	FAQ.....	41
8.1	The device cannot be found in the software.....	41
8.2	The device cannot enter OP state.....	41
9	Appendix.....	42
9.1	Appendix A.....	42
9.2	Appendix B.....	44
9.3	Appendix C.....	45
9.4	Appendix D.....	46

1 Product Overview

1.1 Product Introduction

The IOL7A-EC01B-8A is an IP67 master module in the IOL7A series, and it is an IO-Link master device with a standard IO architecture. The device supports the EtherCAT industrial Ethernet bus interface on the bus side and the IO-Link protocol on the user side, serving as a gateway device for both bus slaves and IO-Link masters. Both the bus and IO-Link interfaces are compatible with devices from multiple manufacturers, offering high compatibility and providing various options for user data acquisition, system configuration optimization, simplified field wiring, and improved system reliability.

1.2 Product Features

- **Up to IP67 protection rating**
Suitable for harsh industrial environments.
- **Standardization**
Based on the IO-Link standard V1.1.3, it can remotely control IO-Link slave devices and is easy to operate.
- **IO-Link communication**
It has 8 IO-Link ports and can connect up to 8 IO-Link devices (Class-A type).
- **Parameter settings**
Device parameter backup: Automatically restores the parameters of connected IO-Link devices;
Port parameter backup: When enabled, the system automatically backs up the configuration parameters of the slave station when the port is first connected, and all subsequent slave stations connected to this port will run according to these backed-up parameters.
- **Short circuit overcurrent protection**
Pin2 (DO mode) and Pin4 (DO mode) have short-circuit overcurrent protection.
- **Pin2 supports overcurrent recovery.**
Supports both automatic and manual recovery.
- **High compatibility**
Supports slave devices with special process data lengths.

- **Small size**
Suitable for applications with limited space.
- **Easy to diagnose**
The innovative channel indicator light design is placed close to the channel, making the communication status of Pin2 and Pin4 clear at a glance, and facilitating detection and maintenance.
- **Easy configuration**
It is easy to configure and supports all major mainstream PLCs.
- **Simple and quick wiring**
Using standard cables simplifies wiring.

2 Naming Rules

2.1 Naming Rules

IOL 7A - EC 01 B - 8A
(1) (2) (3) (4) (5) (6)

Serial Number	Meaning	Value description
(1)	Product Technology	IOL: Short for IO-Link
(2)	Protection level	7A: IP67
(3)	bus protocol	EC: Abbreviation for EtherCAT protocol PN: Abbreviation for PROFINET protocol
(4)	Product serial number	01: Product Series Number
(5)	signal type	A: NPN B: PNP
(6)	I/O interface	8A: 8xClass-A port 4A4B: 4xClass-A ports, 4xClass-B ports

2.2 Model List

Model	Product Description
IOL7A-EC01B-8A	EtherCAT bus protocol 8xClass-A port IO-Link master station

3 Product Parameters

3.1 General parameters

Interface parameters	
bus protocol	EtherCAT
Bus interface	2xM12-D, 4Pin, Hole End
Electrical isolation	500VAC
Number of I/O stations	According to the main site
Data transmission medium	UTP or STP of Category 5 or higher (STP recommended)
Transmission distance	≤100m (distance between stations)
Transmission rate	100Mbps
Technical parameters	
Configuration method	via the main site
Power interface	2xM12-L, 5-pin, pin tip & hole tip
Power supply	24VDC (18V ~ 30V)
US total current	Max: 9A
US consumes current	≤100mA
UA total current	Max: 9A
UA consumes current	0mA
Power supply reverse polarity protection	support
Weight	665g
Size	225.5×62.5×32.6mm
Operating temperature	-25°C ~ +70°C
Storage temperature	-40°C ~ +85°C
relative humidity	95%, no condensation
Protection level	IP67

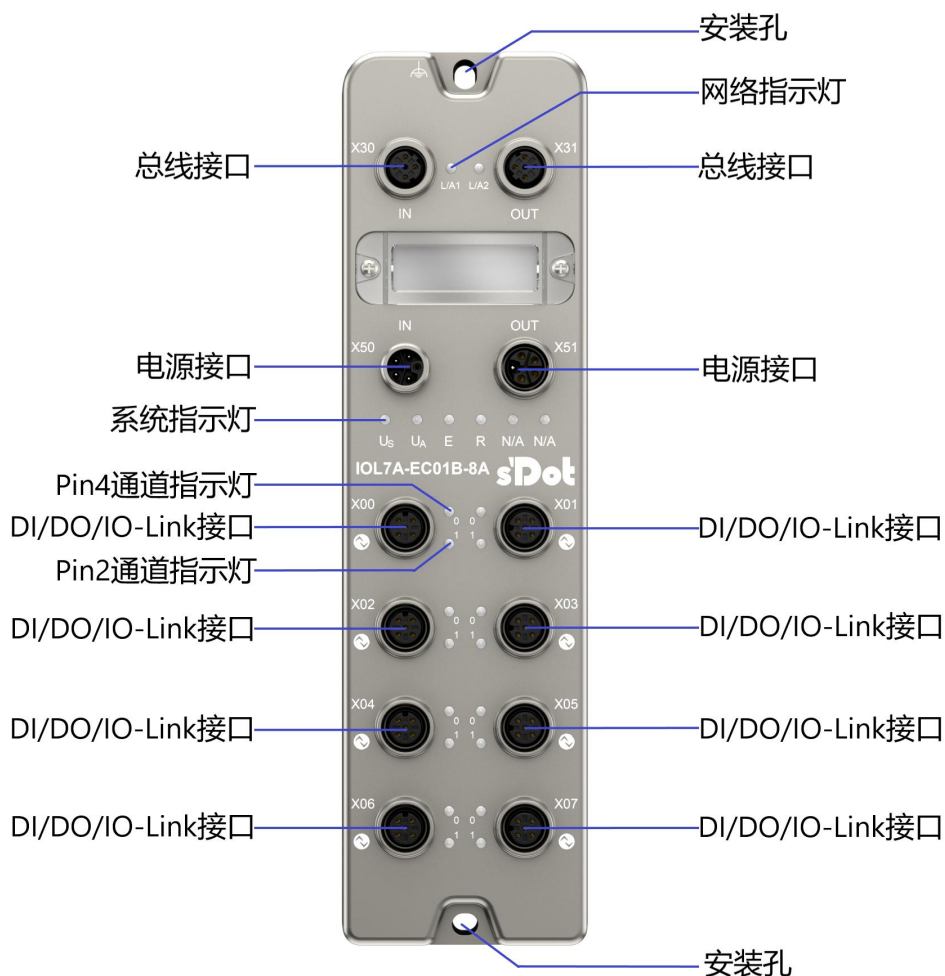
3.2 Digital parameters

Product Model	IOL7A-EC01B-8A
bus protocol	EtherCAT
Rated voltage	24VDC (18V ~ 30V)
DI/DO/IO-Link interface	8xM12-A, 5Pin, Hole End
IO-Link channel count	8
IO-Link version	V1.1.3
IO-Link transmission rate	COM1 (4.8kbps), COM2 (38.4kbps), COM3 (230.4kbps)
Number of input channels	Maximum 16
Input signal type	PNP
Input filtering	Supported, fixed configuration is 3ms
Input current	200mA
Output maximum number of channels	Maximum 16
Maximum output current of single channel	Pin4: 0.5A
	Pin2: 2A
Output signal type	PNP
Load type	Resistive load, inductive load
Total output current	US, UA maximum 9 A
Port protection	Overcurrent protection
Isolation methods	US and UA are not separated.
Channel indicator lights	support

4 Panel

4.1 Product Structure

Product Parts Names



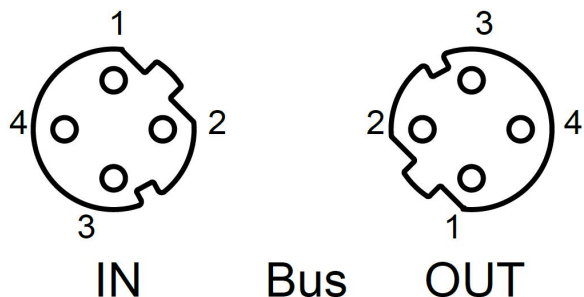
4.2 Indicator light function

Name	Logo	Color	State	Status Description
Network indicator IN	L/A1	green	ON	Establish network connection
			blinking	Network connection and data exchange
			Extinguish	No data interaction or anomaly
Network indicator light OUT	L/A2	green	ON	Establish network connection
			blinking	Network connection and data exchange
			Extinguish	No data interaction or anomaly
System power indicator	US	Green/Red	Green always on	Power supply is normal
			Red flashing	The system power supply is greater than 11V and less than 18V.
			Extinguish	The product is not powered on or the power supply is abnormal.
Auxiliary power indicator light	UA	Green/Red	Green always on	Power supply is normal
			Red flashing	Auxiliary power supply greater than 11V and less than 18V
			Red always on	Auxiliary power supply is not powered on or the voltage is less than 11.
			Extinguish	The product is not powered on or the power supply is abnormal.
RUN status indicator	R	green	ON	EtherCAT OP status
			Flickering 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
			Extinguish	EtherCAT Init Status
Alarm indicator	E	red	ON	The system is malfunctioning.
			Extinguish	The system is running normally or not powered on.
Pin4 Channel Indicator	0	Yellow/Red/Green	Yellow always on	Pin4 is in a state of input or output of 1.
			Red always on	Pin4 overcurrent
			Red flashing	IO-Link error

			Green always on	IO-Link communication connection successful
			Green flashing	IO-Link communication not connected
			Extinguish	The state of Pin4 input or output is 0.
Pin2 Channel Indicator Light	1	Yellow/Red	Yellow always on	Pin2 input or output state is 1.
			Red always on	Pin2 overcurrent
			Red flashing	Pin1 overcurrent (LED1 and LED0 flash simultaneously)
			Extinguish	The state of Pin2 input or output is 0.

4.3 Bus interface definition

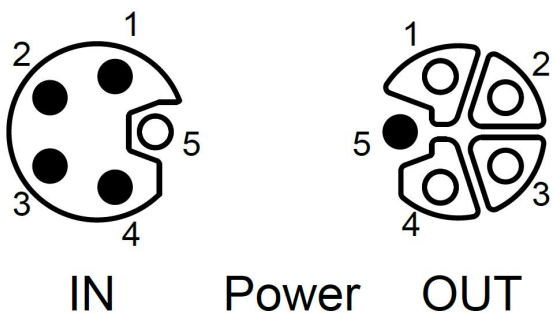
Bus interface connection view (M12-D, hole end) **Definitions**



Pin	Function
1	TX+, send data+
2	RX+, receiving data+
3	TX - Send data -
4	RX-, Data Receiver-

4.4 Power interface definition

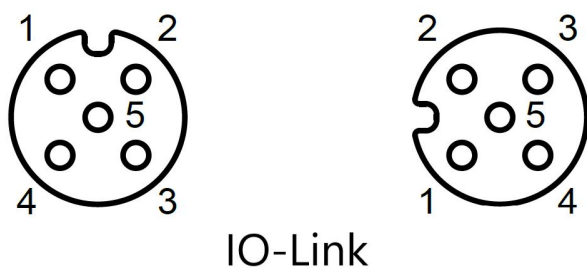
Power interface connection view (M12-L, pin end & hole end) **Definitions**



Pin	Function	Wire core color
1	+24V US	Brown
2	0V GNDA	white
3	0V GNDS	blue
4	+24V UA	black
5	PE	Ash

4.5 I/O interface definition

I/O interface connection view (M12-A, hole end) **Definitions**



Pin	Function	Wire core color
1	+24V US	Brown
2	DI/DO	white
3	0V GNDS	blue
4	DI/DO/IO-Link	black
5	PE	Ash

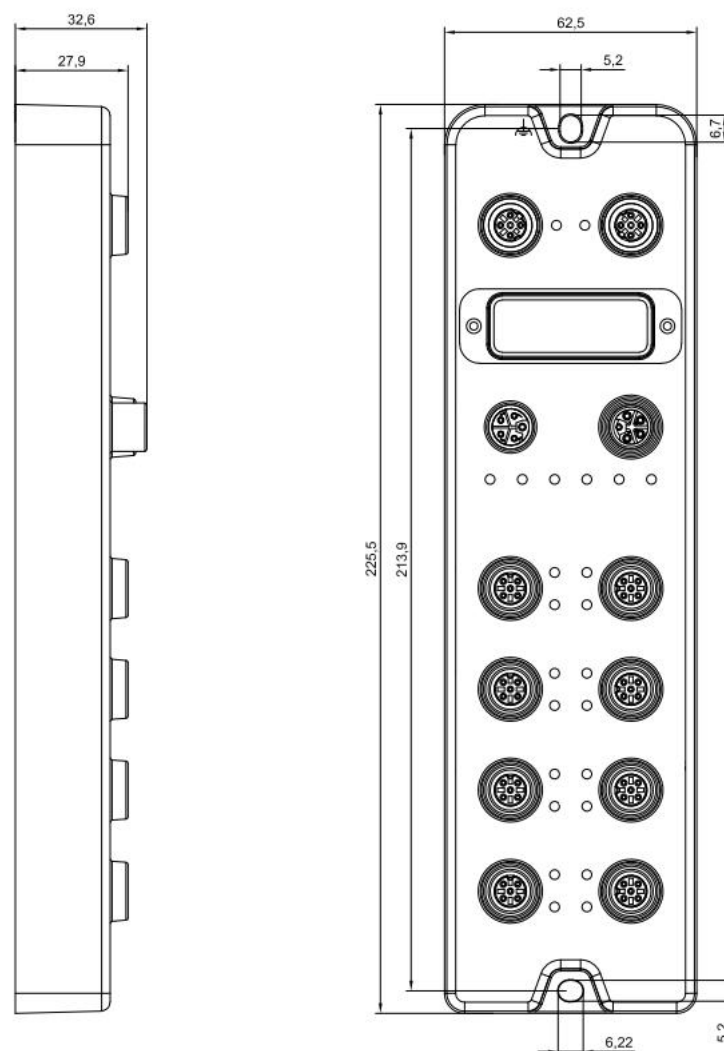
⚠ Precautions

- Pin1 and Pin3 are powered by the system power supply US, and Pin4 signal output is also powered by US.
 - Pin2 power comes from UA. If the Pin2 output function is not used, UA can be left unconnected.
-

5 Installation and Connection

5.1 Outline dimension drawing

External dimensions (unit: mm)



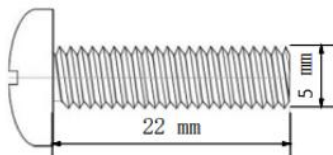
5.2 Installation environment requirements

To fully utilize the module's performance and improve its reliability, please avoid installing it in the following locations:

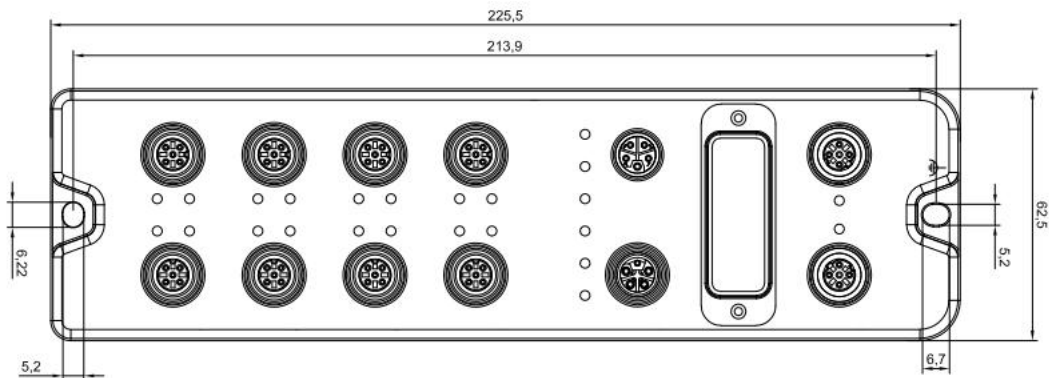
- Places with direct sunlight
- Locations where ambient temperature or relative humidity exceeds module specifications
- Places containing corrosive or flammable gases
- Places where there are droplets of acid, oil, or chemicals
- Places with dust, iron filings, and flying sparks
- Locations where the module body is directly subjected to impact or vibration
- Places with strong electric fields, magnetic fields, radiation, and electrostatic interference.
- There are power lines and AC high-voltage power lines nearby.

5.3 Module installation

- ◆ Please use screws of M5*22mm or larger to secure the module body.



- ◆ The dimensions of the mounting holes for the module are shown in the figure below.

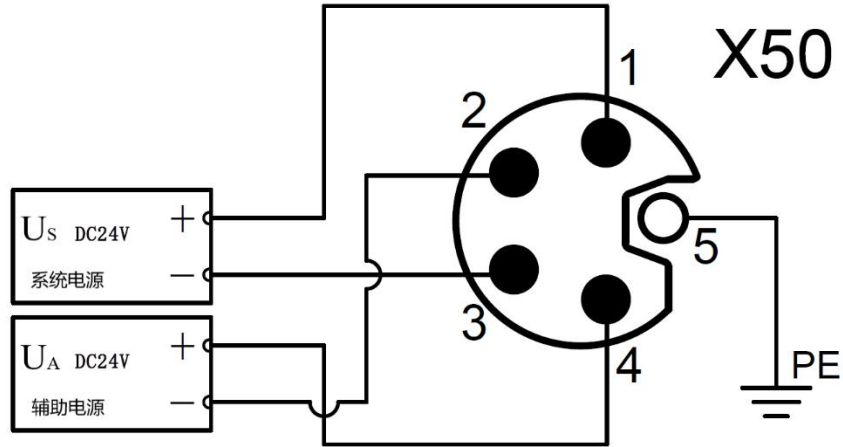


☛ Precautions

- The transparent cover on the module is a pre-installed cover for the rotary switch. The cover is already secured at the factory. Please do not disassemble it at will to avoid damaging the IP67 protection rating.
- Please secure the module properly. If it is not securely fixed, vibration may cause a malfunction.

5.4 Wiring instructions

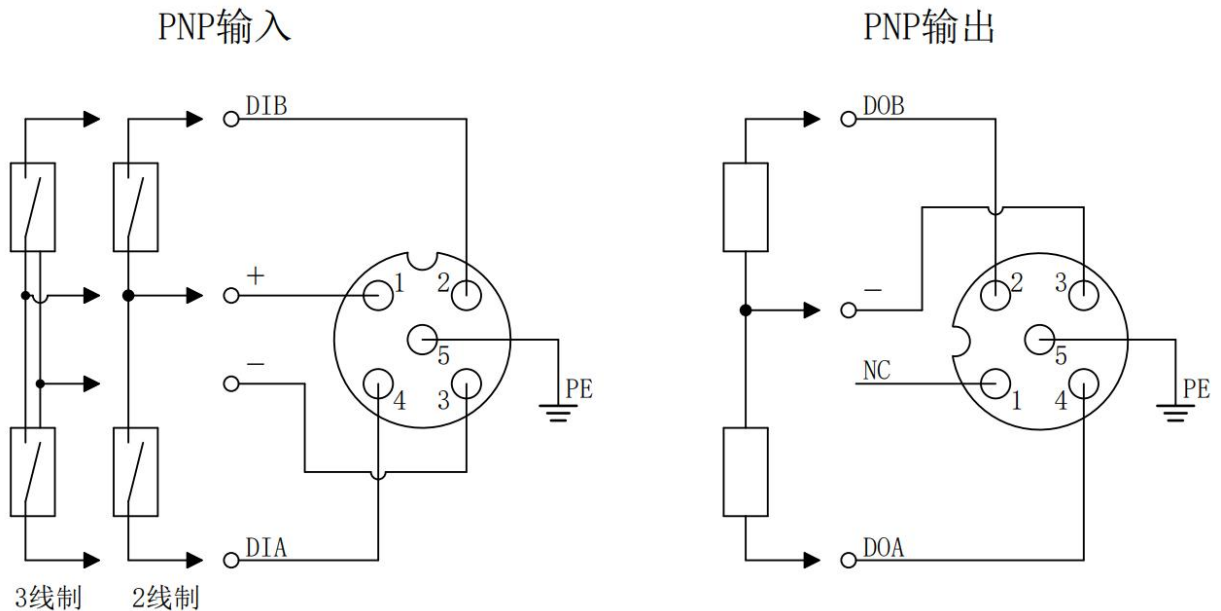
5.4.1 Power interface wiring diagram



Precautions

- It is recommended that the system power supply and auxiliary power supply use different switching power supplies to ensure operational stability.
- Please refer to the power supply rules. [Power supply rules](#) chapter.

5.4.2 I/O Interface Wiring Diagram



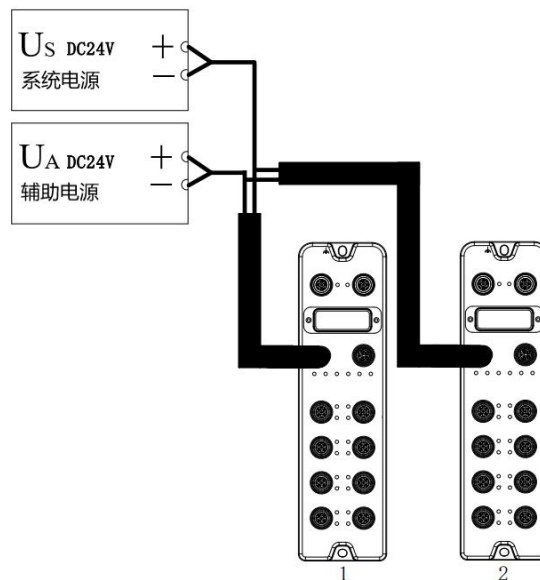
Precautions

-
- Install the module's waterproof cap on unused connector interfaces and tighten it to avoid compromising the IP67 protection rating.
-

6 Power supply rules

6.1 Direct power supply rules

Each module is powered directly from the switching power supply, without using the OUT interface. The total current consumed by each module's US pin should be $\leq 9A$, and the total current consumed by each module's UA pin should be $\leq 9A$.



The voltage drop in the power cable varies depending on the total current consumed by the module power supply and the cable material. The table below shows the voltage drop when using our standard cable.

Total current consumed by the power supply (A)	Voltage drop (V) at different cable lengths			
	1m	3m	5m	10m
8	0.64	1.12	1.60	2.72
7	0.56	0.98	1.40	2.38
6	0.48	0.84	1.20	2.04
5	0.40	0.70	1.00	1.70
4	0.32	0.56	0.80	1.36

3	0.24	0.42	0.60	1.02
2	0.16	0.28	0.40	0.68
1	0.08	0.14	0.20	0.34

■ Example of calculating the total current consumption of the module when directly powered

For example, if both modules are IOL7A-EC01B-8A, the usage of each module is shown in the table below:

Module Name	I/O ports			External connection devices	
	port name	Pin Name	I/O mode	Product Name	Specification
Module 1	Ports 1-8	Pin4	DI (Input current 4mA)	3-wire sensor	Current consumption: 30mA
		Pin2	DI (Input current 4mA)		Current consumption: 30mA
Module 2	Ports 1-8	Pin4	DO	Solenoid valve	Load current: 500mA
		Pin2	DO	Solenoid valve	Load current: 2A

The total current consumption is calculated, and the current consumption of a single module is calculated as shown in the table below:

Module Name	Power type	Total current consumption calculation items	Calculation results
Module 1	System power US	System current consumption	Module system-side power consumption 35mA
	System power US	Module input current and sensor current consumption	For all ports (Sensor current consumption) + (Channel input current * Number of input points) = (30mA*16) + (4mA*16) =544mA
Module 2	System power US	System current consumption	Module system-side power consumption 35mA
	System power US	Pin4 Load Output Current	For ports 1~8 Pin4 Channel output current * number of output points =500mA*8 =4A
	Auxiliary power supply UA	Pin2 load output current	For ports 1~8 Pin2 Channel output current * number of output points =500mA*8

			=4A
--	--	--	-----

In summary, the current consumption of each module is as follows:

- For the system power supply US, each module consumes 35mA of current.

The system power supply US of module 1 (IOL7A-EC01B-8A) consumes a current of 35mA + 544mA = 579mA, which is less than the maximum current of the module's system power supply US of 9A.

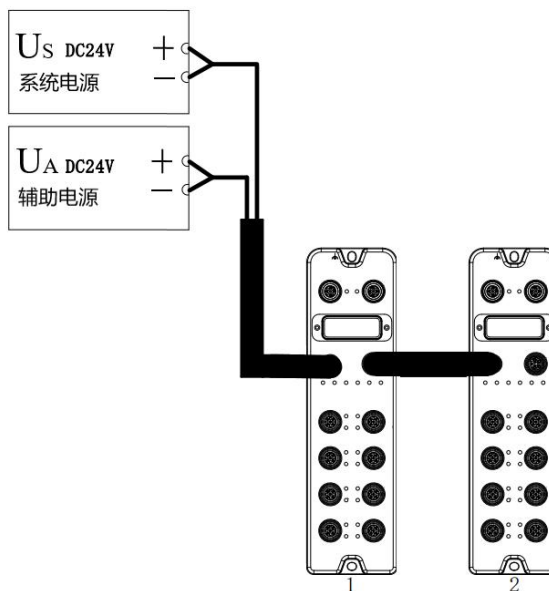
The system power supply US of module 2 (IOL7A-EC01B-8A) consumes a current of 35mA+4A=4.035A, which is less than the maximum current of the module's system power supply US of 9A.

The auxiliary power supply UA of module 2 (IOL7A-EC01B-8A) consumes 4A of current, which is less than the maximum current of 9A of the module's auxiliary power supply UA.

In this example, the requirement is met because the total current consumed by each module (US) is $\leq 9A$ and the total current consumed by each module (UA) is $\leq 9A$.

6.2 Series power supply rules

The modules are connected in series via the OUT interface. The total current consumed by the US of each module should be $\leq 9A$, the total current consumed by the UA should be $\leq 9A$, and the total current consumed by the US and UA of all modules should be $\leq 9A$.



When powered in series, the current consumed by the modules connected in series flows through the module, resulting in a voltage drop in the internal circuit of the module. The voltage drop in the power cable varies depending on the total current consumed by the module power supply and the cable material. The table below shows the voltage drop when using our standard cables.

Total current consumed by the power supply (A)	Voltage drop (V) in the internal circuit of the module	Voltage drop (V) at different cable lengths			
		1m	3m	5m	10m
9	0.36	0.72	1.26	1.80	3.06
8	0.32	0.64	1.12	1.60	2.72
7	0.28	0.56	0.98	1.40	2.38
6	0.24	0.48	0.84	1.20	2.04
5	0.20	0.40	0.70	1.00	1.70
4	0.16	0.32	0.56	0.80	1.36
3	0.12	0.24	0.42	0.60	1.02
2	0.08	0.16	0.28	0.40	0.68
1	0.04	0.08	0.14	0.20	0.34

⚠ Precautions

- The total current consumed by each module's US should be $\leq 9A$, and the total current consumed by each module's UA should be $\leq 9A$.
- As shown in the figure above, when powered in series, the total current consumed by US and UA of all modules should meet the rule that "module 1 + module 2" $\leq 9A$.

■ Example of calculating the total current consumption of the module when powered in series

For example, both modules are IOL7A-EC01B-8A, and the usage of each module is similar to...[Example of calculating the total current consumption of the module when directly powered](#)"same.

Calculate the total current consumption:

$$US=579\text{mA}+4.035\text{A}=4.614\text{A}, UA=4\text{A}.$$

In this example, the requirement is met because the total current consumed by US and UA of all modules satisfies the rule "module 1 + module 2" $\leq 9\text{A}$.

7 Use

7.1 Parameter and process data description

7.1.1 Output clear and hold function

The clear/hold function applies to the output signals of each port. This function allows configuration of the module's output action in abnormal bus conditions. Three types of operations are supported:

Low-level output (Clear 0): When communication is interrupted, the module output channel outputs a low level.

High-level output (Clear 1): When communication is disconnected, the module output channel outputs a high level.

Hold last value: When communication is lost, the module output channel will maintain the last state level.

7.1.2 Pin2 circuit overcurrent recovery mode function

When an overcurrent fault occurs in Pin2, automatic recovery and manual recovery are supported. These can be set in the main station module parameters, with automatic recovery being the default.

- **The configuration method for the EtherCAT master station output clear and hold function is introduced using TwinCAT3 software as an example. See details for specific steps.**[Parameter configuration in section 7.2.1.](#)

7.1.3 ISDU remote configuration function

The EtherCAT master station supports ISDU read and write operations. Before performing any operations, you should obtain the ISDU information from the slave station. Specific information can be found here: **IOL7A Series Hub User Manual_Vx.xx.pdf** Chapter Six.

The IOL7A-16CB-M12 slave station supports configuration of port direction, input filtering, and factory reset functions. The following example demonstrates how to configure these three functions, with port 1 connected to the IOL7A-16CB-M12 and port 1 displaying status 3 (IO-Link OP status).

1、EtherCAT Master ISDU Parameter Read/Write

Example 1 Configure the IOL7A-16CB-M12 with the first 8 channels as inputs and the last 8 channels as outputs. (Reference) **IOL7A Series Hub User Manual_Vx.xx.pdf** In section 6.5.2, set Index to 0x0042, Subindex to 0x00, Length to 2 (0x02), Data to 00FF, and Control to Write.

Example 2 Configure the IOL7A-16CB-M12 to have 2ms input filtering on the first 8 channels and input filtering disabled on the last 8 channels. (Reference) **IOL7A Series Hub User Manual_Vx.xx.pdf** In section 6.5.5, set Index to 0x0049, Subindex to 0x00, Length to 0x10, Data to 010101010101010000000000000000, and Control to Write.

Example 3 Restore IOL7A-16CB-M12 to factory settings. (Reference) **IOL7A Series Hub User Manual_Vx.xx.pdf** In section 6.3, set Index to 0x0002, Subindex to 0x00, Length to 0x01, Data to 82, and Control to Write.

Precautions

-
- For ISDU operations, it is best to first set Control to NULL, fill in the Index, Subindex, Length, and Data with data, and then set Control.
 - Read operations do not require filling in Length and Data.
 - After a write operation, the Error Code returns 0, indicating that the operation was successful and can be verified through a readback operation.
 - If the operation returns a non-zero error code, it indicates an error. The meaning of the error code can be used to locate the problem. See [link to error codes returned by the slave station] for details. [Appendix D](#).
-

- **The configuration method for the EtherCAT master ISDU is introduced using TwinCAT3 software as an example. See details for specific steps. [Parameter configuration in section 7.2.1](#).**

7.1.4 DI/DO/IO-Link mode functionality

1、 Port DI/DO mode

- ◆ Pin2 can be configured with DI/DO mode, with the default being standard DI mode.
- ◆ The 01 series EtherCAT master supports standard DI/DO modes on each port Pin4. Simply select the corresponding standard DI or standard DO mode in the module. The default mode is standard DI.
- ◆ Taking the TwinCAT3 environment as an example, the EtherCAT master station uses the standard DI mode, where process data is reflected in Digital Inputs Mapping, and the standard DO mode, where process data is reflected in Digital Outputs Mapping.

2、 Port IO-Link mode

- ◆ All ports of the 01 series EtherCAT master station support IO-Link mode.
- ◆ Taking the TwinCAT3 environment as an example, after configuring the port to IO-Link mode, the port configuration status can be obtained by viewing "TxPDO IO-Link Status". The status definition is as follows:[Appendix B](#).
- ◆ Normally, the length of the slave process data should be consistent with the configured module data length, but compatibility is also acceptable. For example, if the slave process data input is 2 bytes, the module can also choose to input more than 2 bytes, such as 4 bytes; however, it cannot choose to input less than 2 bytes, as the device status will indicate an input length mismatch.
- ◆ If the input/output process data length of the slave device is not obtained before configuring IO-Link mode, and it is unclear how to select the corresponding module, the EtherCAT master station, taking the TwinCAT3 environment as an example, can select any module, and the device will re-enter the OP state to view the port Info information.

For example, in port 0, 9000:24 displays the length of the actual input process data read by the master station from the slave station, and 9000:25 displays the length of the actual output process data read by the master station from the slave station. The length values are referenced.[Appendix C](#) If no corresponding slave data length module exists, a module with a length value greater than the slave data length can be selected; or based on...[7.3 Custom Data Length Module](#)Select the slave data length module.

- **This article describes the configuration method for EtherCAT master station DI/DO/IO-Link mode using TwinCAT3 software as an example. See details for specific steps.[DI/DO/IO-Link settings in section 7.2.1](#).**

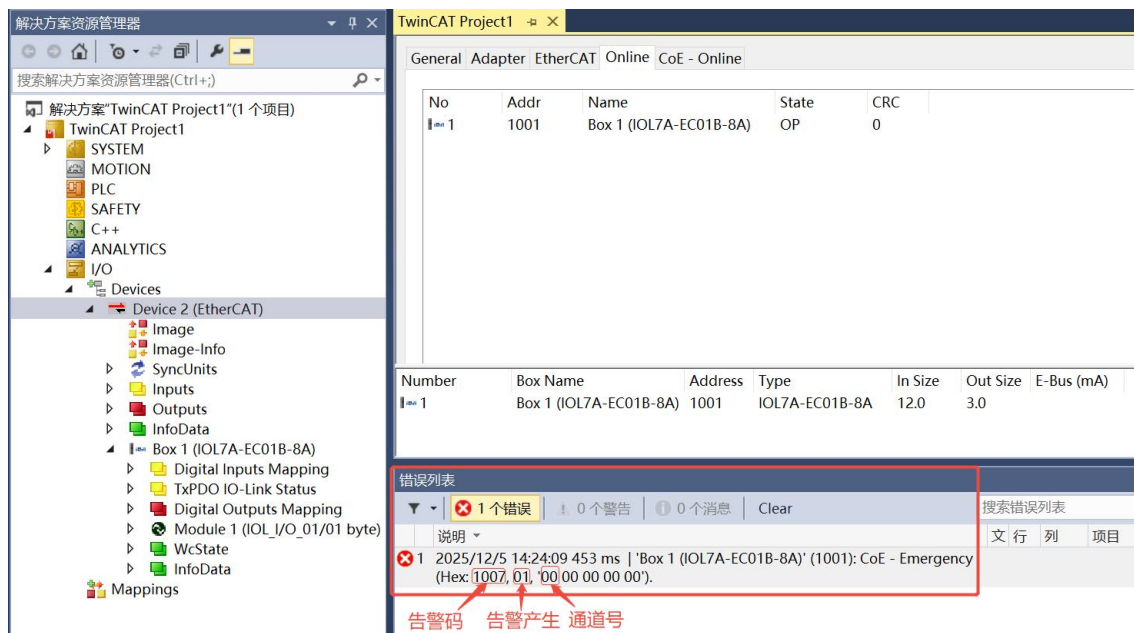
7.2 Alarm code information

7.2.1 Alarm code list

Alarm codes	Alarm Description	Status Description
0x1000	PIN1 overcurrent	0 indicates elimination, 1 indicates generation (channel number: 0~7)
0x1001	PIN2 overcurrent	0 indicates elimination, 1 indicates generation (channel number: 0~7)
0x1002	PIN4 overcurrent	0 indicates elimination, 1 indicates generation (channel number: 0~7)
0x1003	Us undervoltage	0 indicates elimination, 1 indicates generation.
0x1004	UA undervoltage warning disappears	It only indicates that it was generated.
0x1005	UA undervoltage warning	It only indicates that it was generated.
0x1006	UA critical undervoltage warning	It only indicates elimination
0x1007	IO-Link communication error (byte length mismatch)	0 indicates elimination, 1 indicates generation (channel number: 0~7)

7.2.2 View alarm codes

Taking TwinCAT3 software as an example, view the alarm information under Error in the Error List window, as shown in the figure below.



7.3 EtherCAT master station configuration application

7.3.1 Application in the TwinCAT3 software environment

1、Preparation

- **Hardware environment**

- **Module model IOL7A-EC01B-8A**

The X00 port connects to the IOL7A slave module IOL7A-16CB-M12.

- **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 wiring](#)"Required Operation"

2、Pre-configured configuration files

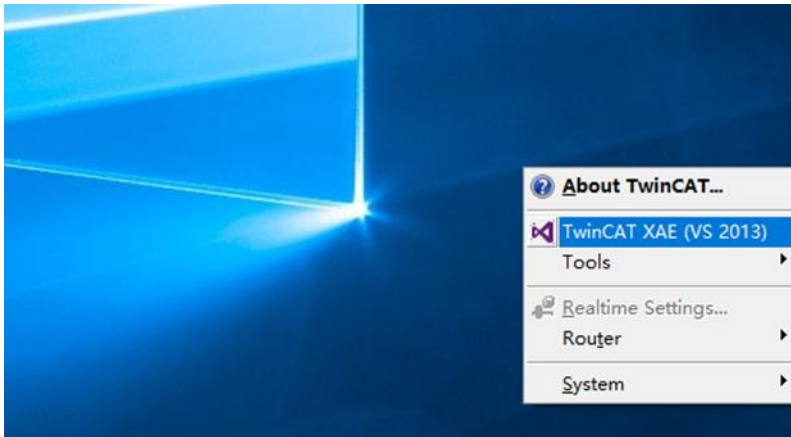
Place the ESI configuration file (Solidot EC IO-Link Gateway ESI V2.0.1.xml) in the TwinCAT installation directory "C:\TwinCAT\3.1\Config\Io\EtherCAT", as shown in the figure below.

此电脑 > 本地磁盘 (C:) > TwinCAT > 3.1 > Config > Io > EtherCAT

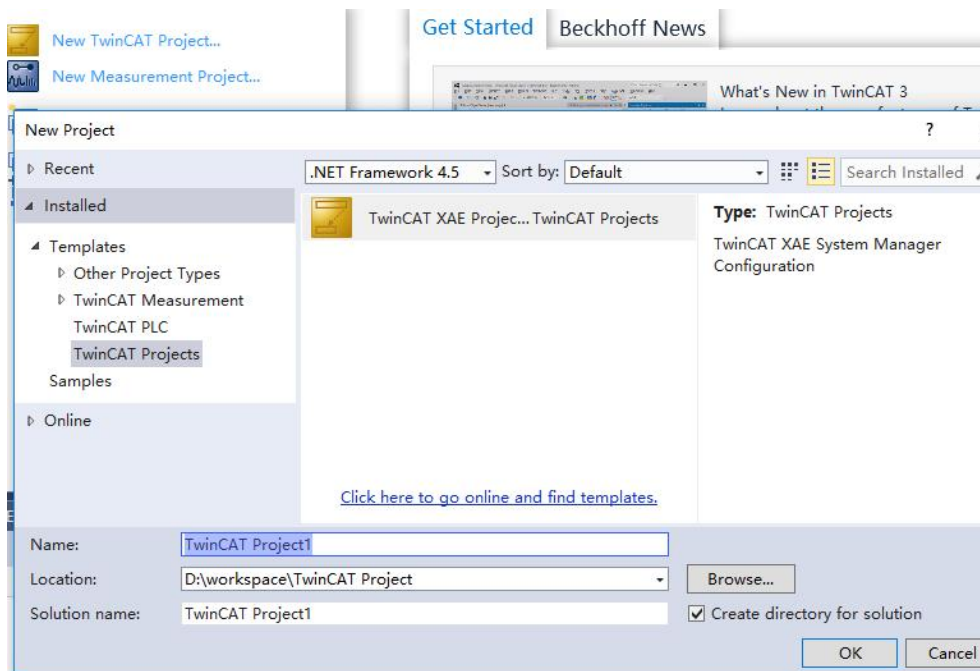
名称	修改日期	类型	大小
Beckhoff EPP3xxx.xml	2022/6/20 7:53	XML 文档	6,414 KB
Beckhoff EPP4xxx.xml	2022/6/20 7:53	XML 文档	603 KB
Beckhoff EPP5xxx.xml	2022/6/20 7:53	XML 文档	780 KB
Beckhoff EPP6xxx.xml	2022/8/22 14:55	XML 文档	2,932 KB
Beckhoff EPP7xxx.xml	2022/6/20 7:53	XML 文档	2,715 KB
Beckhoff EPP9xxx.xml	2022/2/18 16:16	XML 文档	199 KB
Beckhoff EPx9xx.xml	2022/2/18 16:16	XML 文档	921 KB
Beckhoff EQ1xxx.xml	2022/6/20 7:53	XML 文档	22 KB
Beckhoff EQ2xxx.xml	2022/6/20 7:53	XML 文档	73 KB
Beckhoff EQ3xxx.xml	2022/6/20 7:53	XML 文档	1,386 KB
Beckhoff ER1xxx.XML	2022/6/20 7:53	XML 文档	244 KB
Beckhoff ER2xxx.XML	2022/6/20 7:53	XML 文档	261 KB
Beckhoff ER3xxx.XML	2022/6/20 7:53	XML 文档	1,177 KB
Beckhoff ER4xxx.xml	2022/6/20 7:53	XML 文档	318 KB
Beckhoff ER5xxx.xml	2022/6/20 7:53	XML 文档	273 KB
Beckhoff ER6xxx.xml	2022/8/22 14:55	XML 文档	2,040 KB
Beckhoff ER7xxx.xml	2022/6/20 7:53	XML 文档	2,717 KB
Beckhoff ER8xxx.xml	2022/6/20 7:53	XML 文档	207 KB
Beckhoff EtherCAT EvaBoard.xml	2022/2/18 16:16	XML 文档	72 KB
Beckhoff EtherCAT Terminals.xml	2022/2/18 16:16	XML 文档	54 KB
Beckhoff FB1XXX.xml	2022/2/18 16:16	XML 文档	49 KB
Beckhoff FCxxx.xml	2022/2/18 16:16	XML 文档	21 KB
Beckhoff FM3xxx.xml	2022/2/18 16:16	XML 文档	367 KB
Beckhoff ILxxx-B110.xml	2022/2/18 16:16	XML 文档	8 KB
Solidot EC IO-Link Gateway ESI V2.0.1.xml	2025/11/14 15:23	XML 文档	979 KB

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.

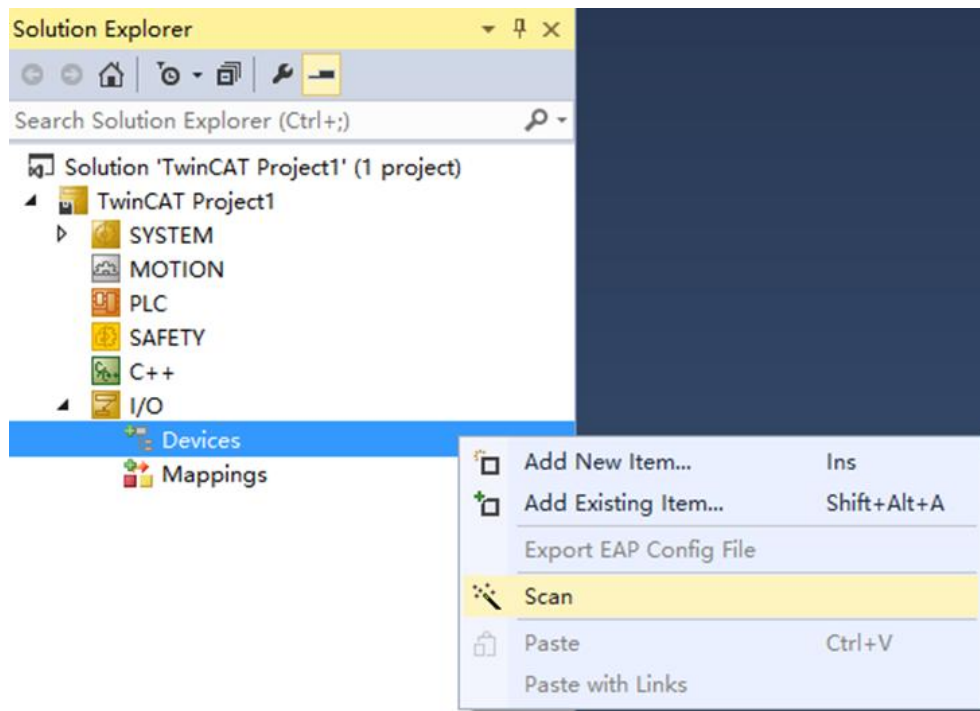


- b. Click "New TwinCAT Project". In the pop-up window, "Name" and "Solution name" correspond to the project name and solution name, respectively, and "Location" corresponds to the project path. These three items can be left as default. Then click "OK". The project will be created successfully, as shown in the figure below.

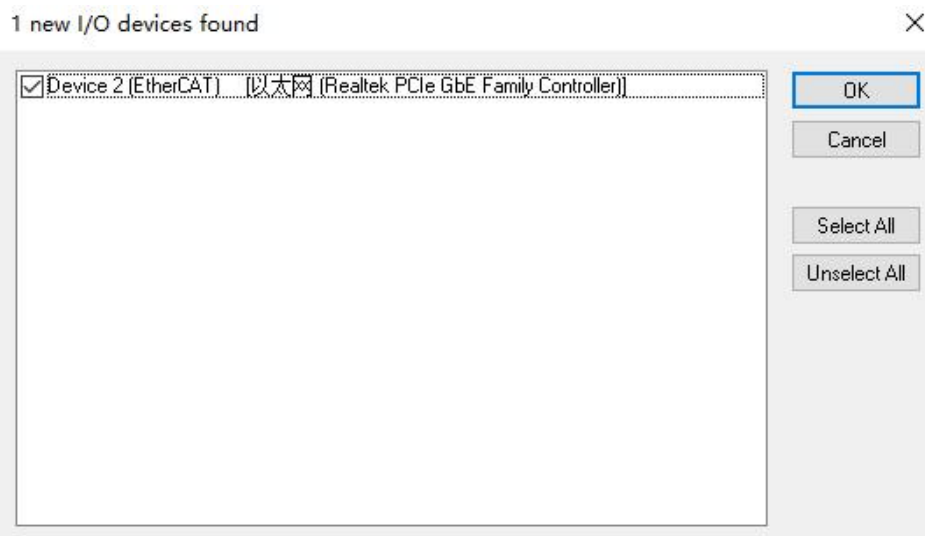


4. Scanning equipment

- 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.



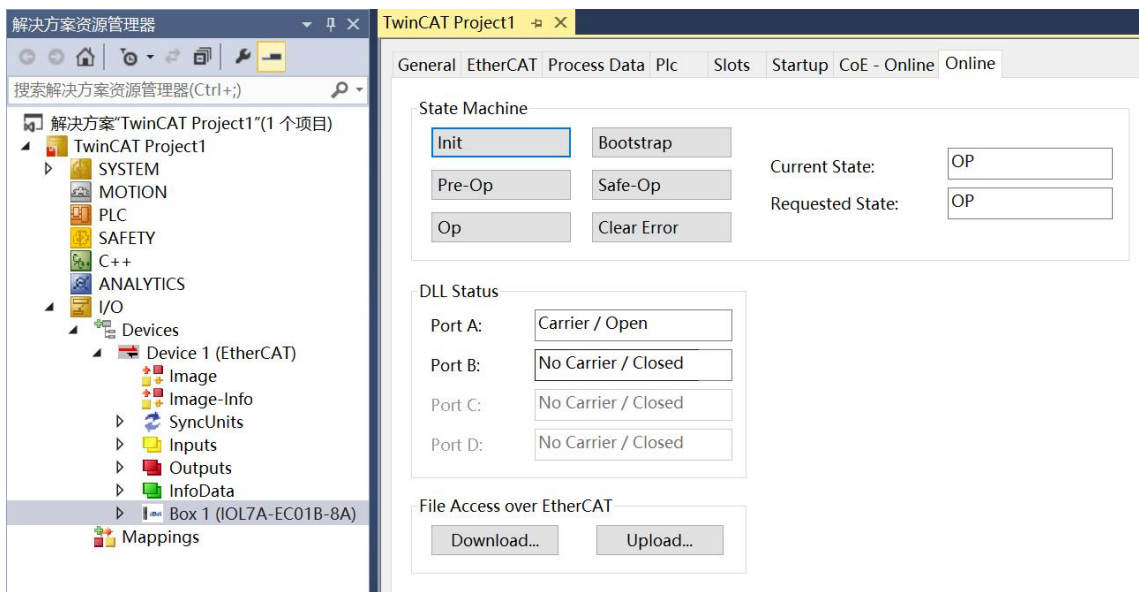
- b. Select the "Local Area Connection" network adapter, as shown in the image below.



- 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.

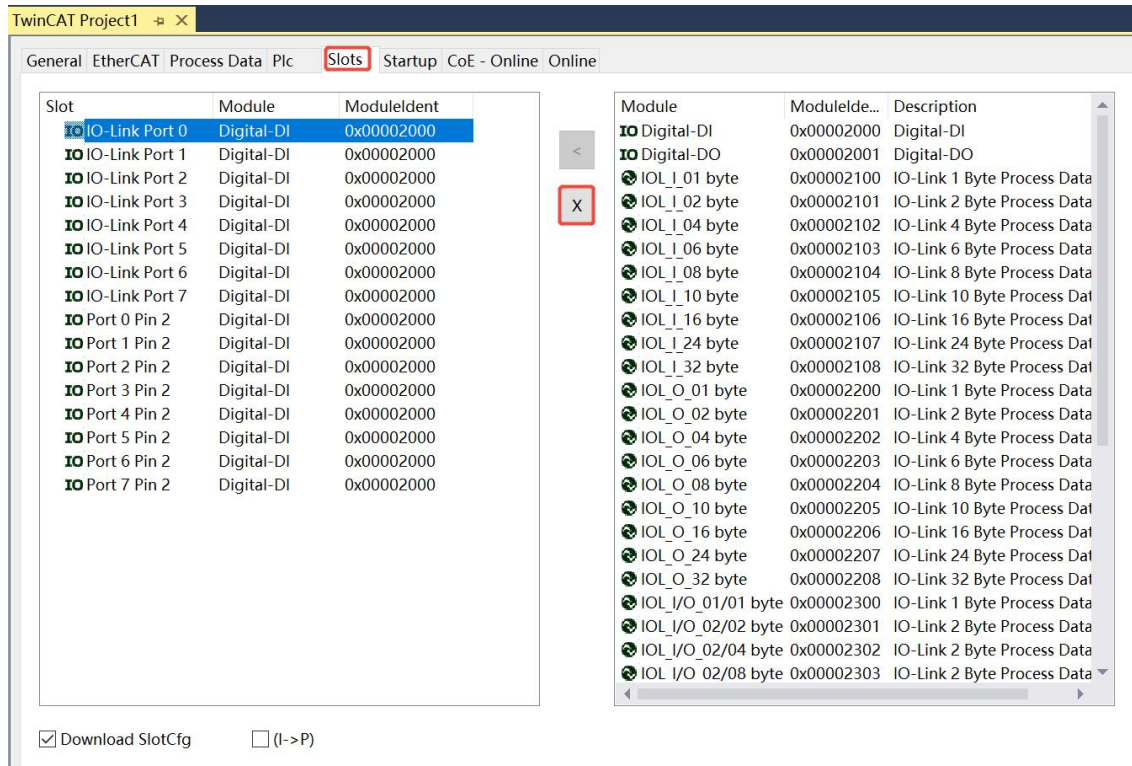


- d. After the device is scanned, you can see Box1 in the left navigation tree. Under "Online", you can see that TwinCAT is in "OP" state. You can also observe that the RUN light of the slave device is always on, as shown in the figure below.

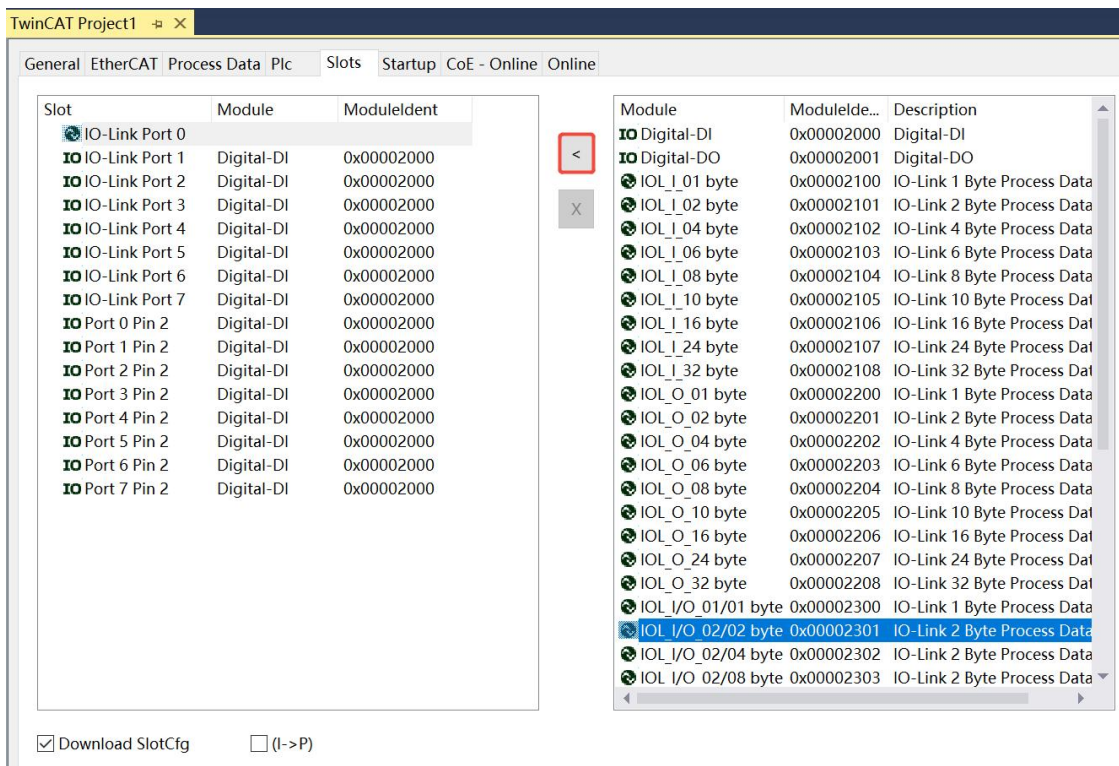


5. DI/DO/IO-Link settings

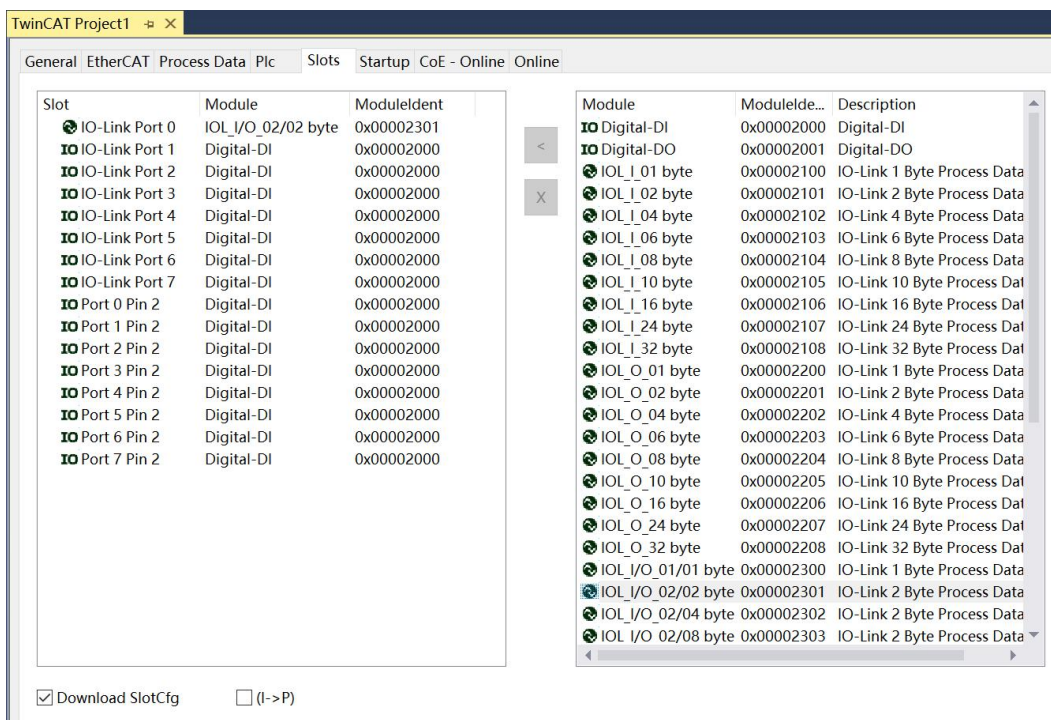
- a. The master station port 0 has been connected to the slave module IOL7A-16CB-M12. Check the power indicator of IOL7A-16CB-M12; the power indicator is constantly on.
- b. On the right side of the main site configuration interface, click "Slots", select IO-Link Port 0, and click "Delete", as shown in the figure below.



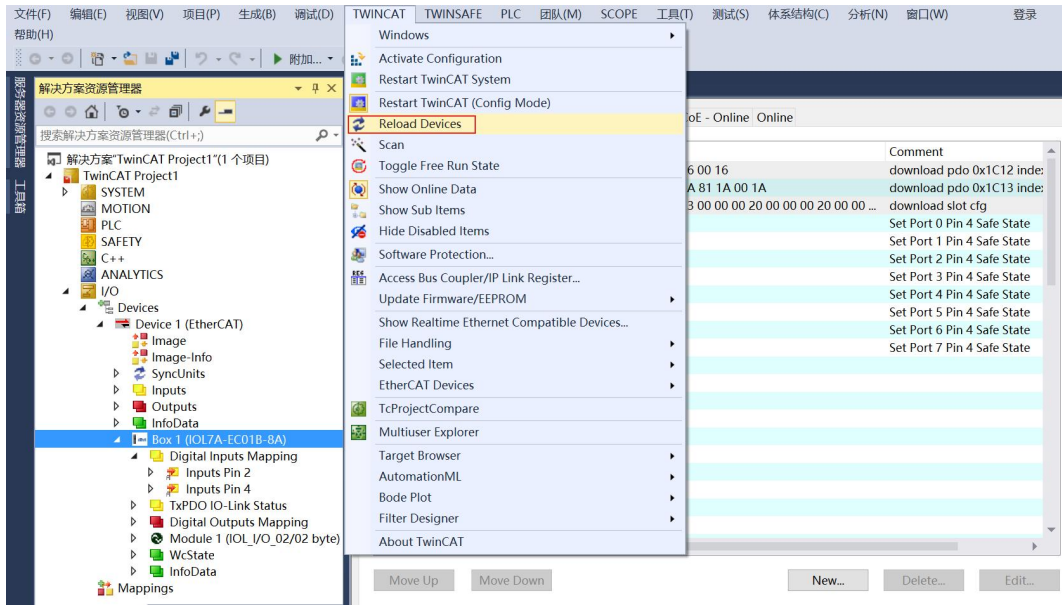
- c. After deletion, select "IOL_I/O_02/02 byte" on the right, and click the "<" button to move it to the left, as shown in the figure below. (Note: The IOL7A-16CB-M12 can be configured with a maximum of 16 input channels or 16 output channels, so select IOL_I/O_02/02 byte.)



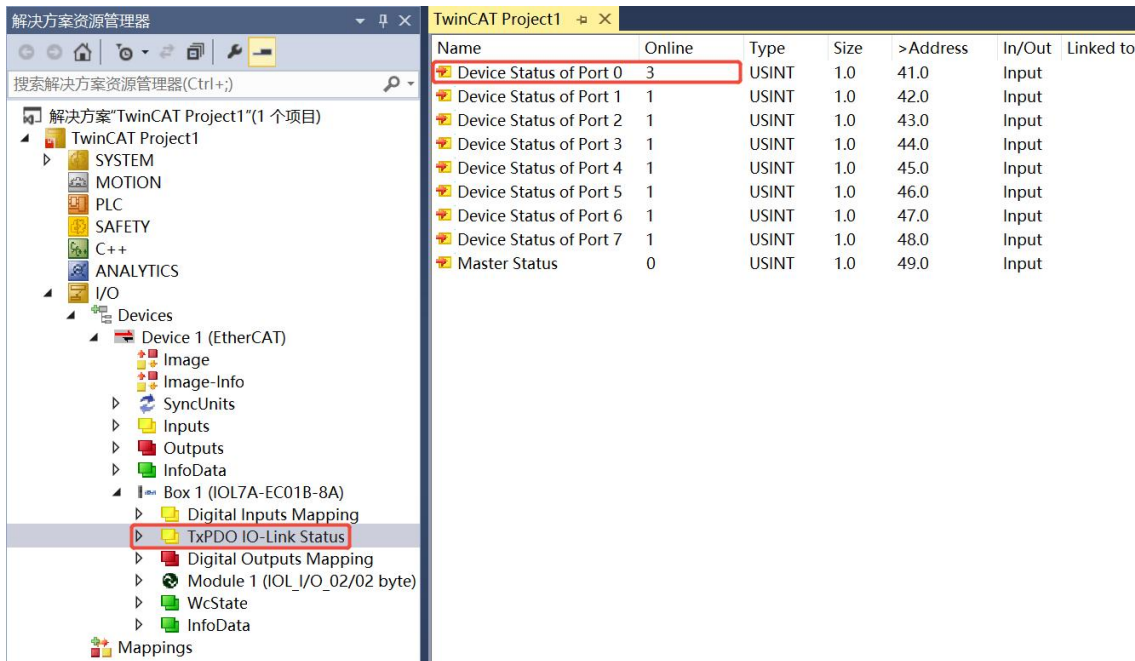
d. After adding, Ports 0-7 on the left will appear as shown in the image below. The method for configuring DI/DO/IO-Link on other ports is the same as described here.



e. After configuration, a reload operation is required. Click the "TWINCAT -> Reload Devices" option in the menu bar, as shown in the figure below.



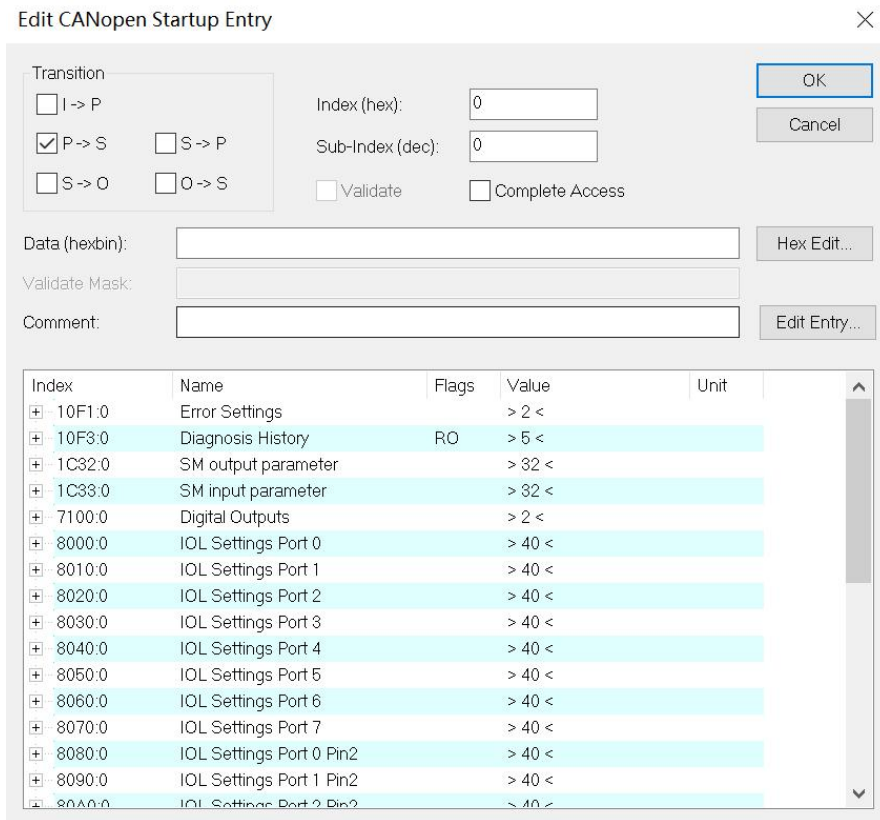
- f. After the reload operation is complete, the device re-enters the OP state. Click "TxPDO IO-Link Status" in the left navigation tree to view it. A value of 3 for "Device Status of Port 0" indicates normal IO-Link communication, as shown in the image below. See [link to port status definition] for more information. [Appendix B](#) Check that the channel indicator light on the master station port 0 is constantly on, and the slave station operation indicator light flashes periodically.



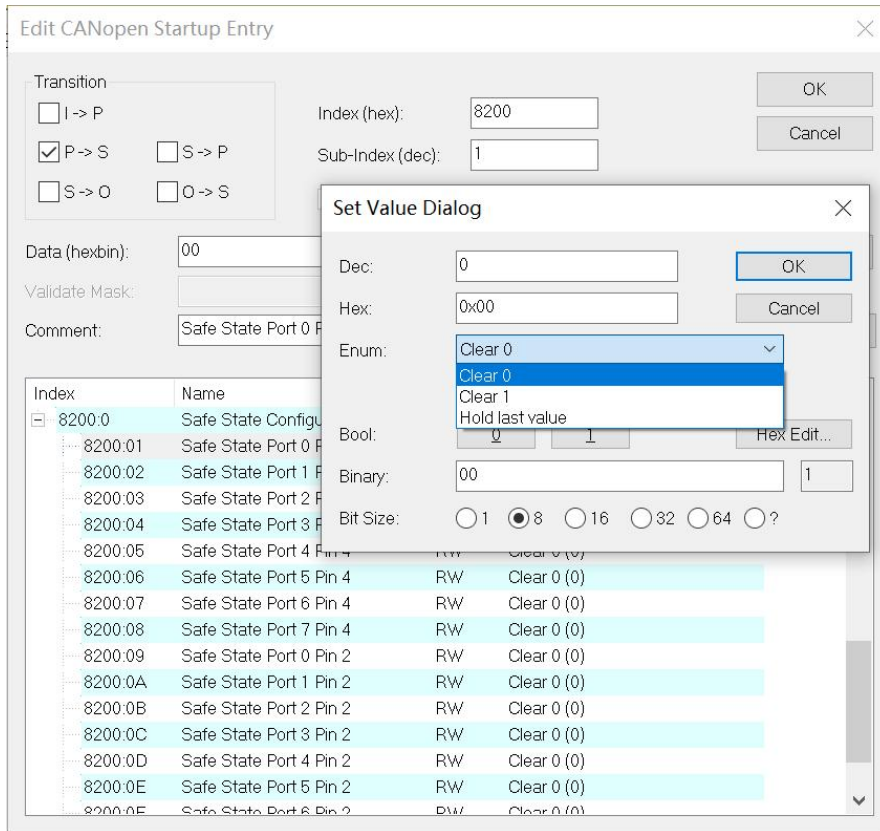
6. Parameter settings

- a. Click "Startup" on the configuration interface on the right side of the main site to see the parameters and parameter values of the main site module IOL7A-EC01B-8A, as shown in the figure below.

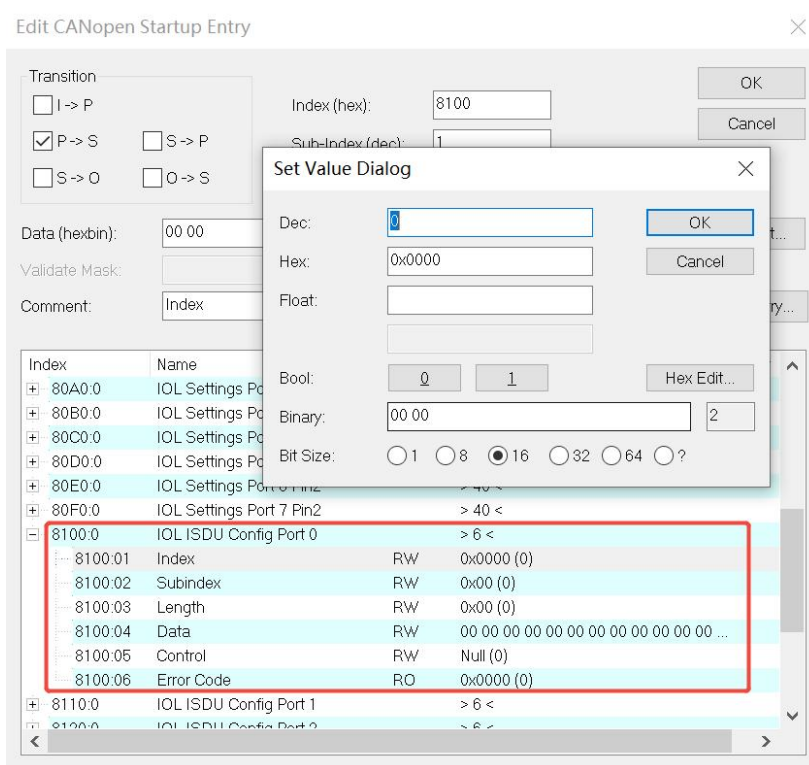
- b. Click "New" at the bottom of the "Startup" interface to enter the "Edit CANopen Startup Entry" interface, as shown in the figure below.



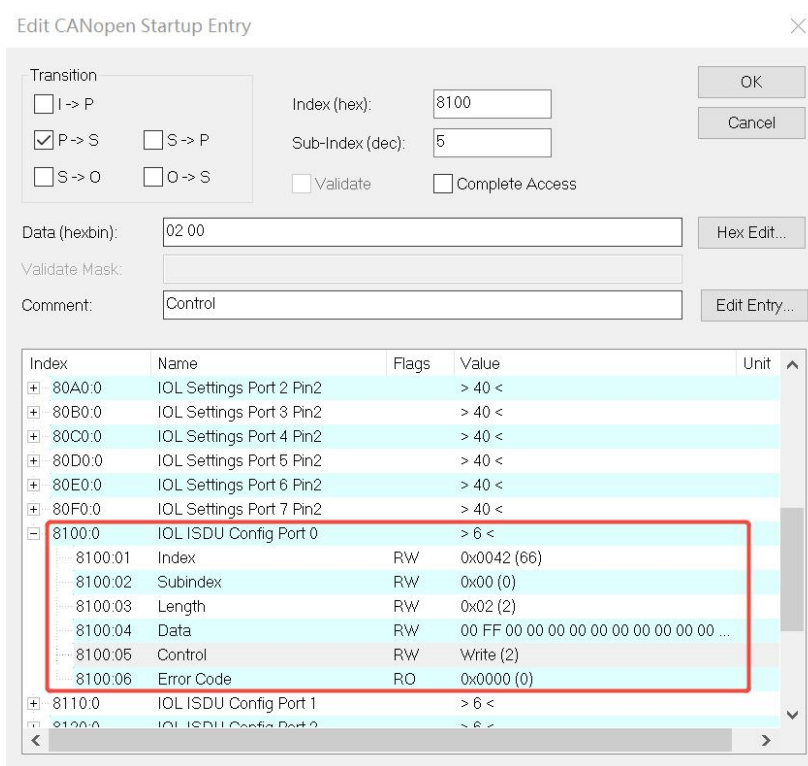
- c. Output clear/hold function configuration method: Taking Port 0 Pin 4 as an example, click "New" to enter the "Edit CANopen Startup Entry" interface, double-click "8200:01" to configure the clear/hold function, as shown in the figure below. After configuration, click "OK".



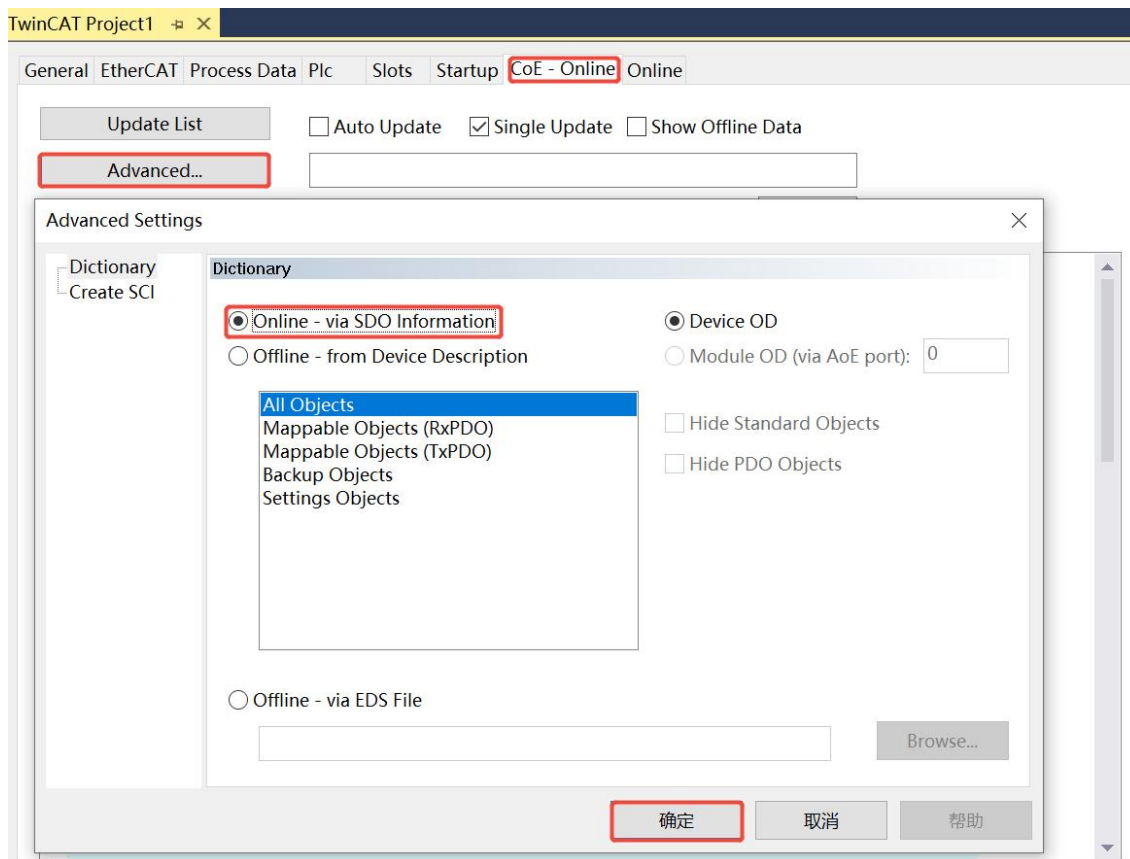
- d. ISDU function configuration method: Taking Port 0 as an example, click "New" to enter the "Edit CANopen Startup Entry" interface, double-click the parameter items such as "8100:01" to configure, as shown in the figure below.



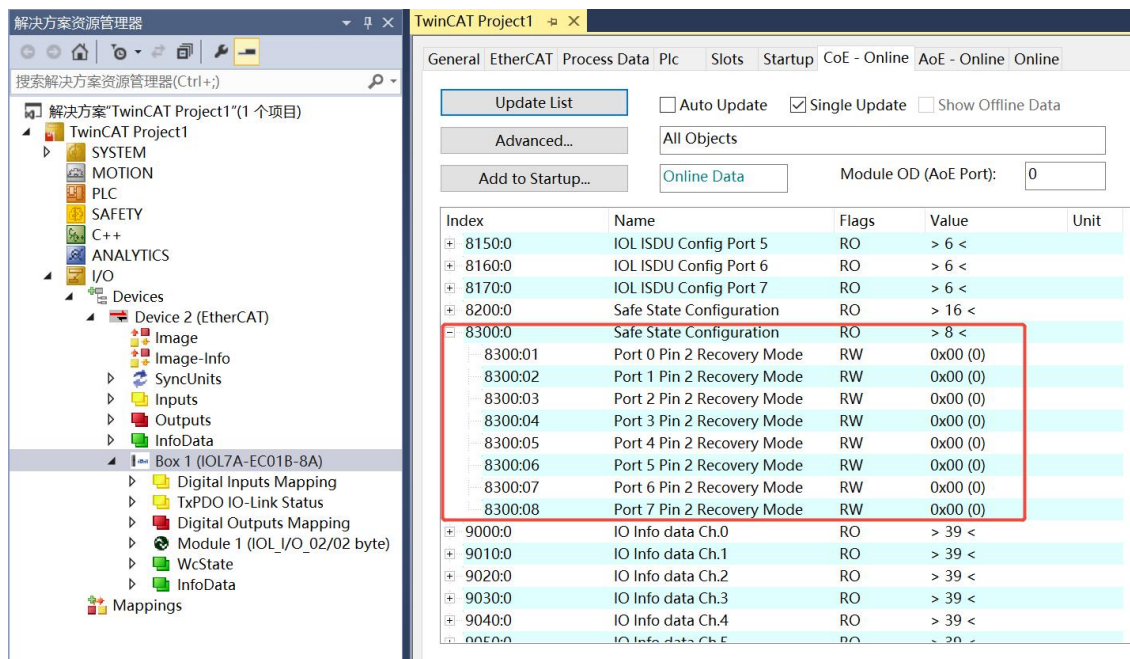
- e. Taking port direction configuration as an example, the IOL7A-16CB-M12's 16 channels are all in input mode by default. Configure them so that the first 8 channels are inputs and the last 8 channels are outputs. Refer to section 6.5.2 of the "IOL7A Series Hub User Manual_Vx.xx.pdf". Set Index to 0x0042, Subindex to 0x00, Length to 2 (0x02), Data to 00FF, and Control to Write. Configure each parameter under IOL ISDU Config Port 0 in sequence, as shown in the figure below. After configuration, click "OK".



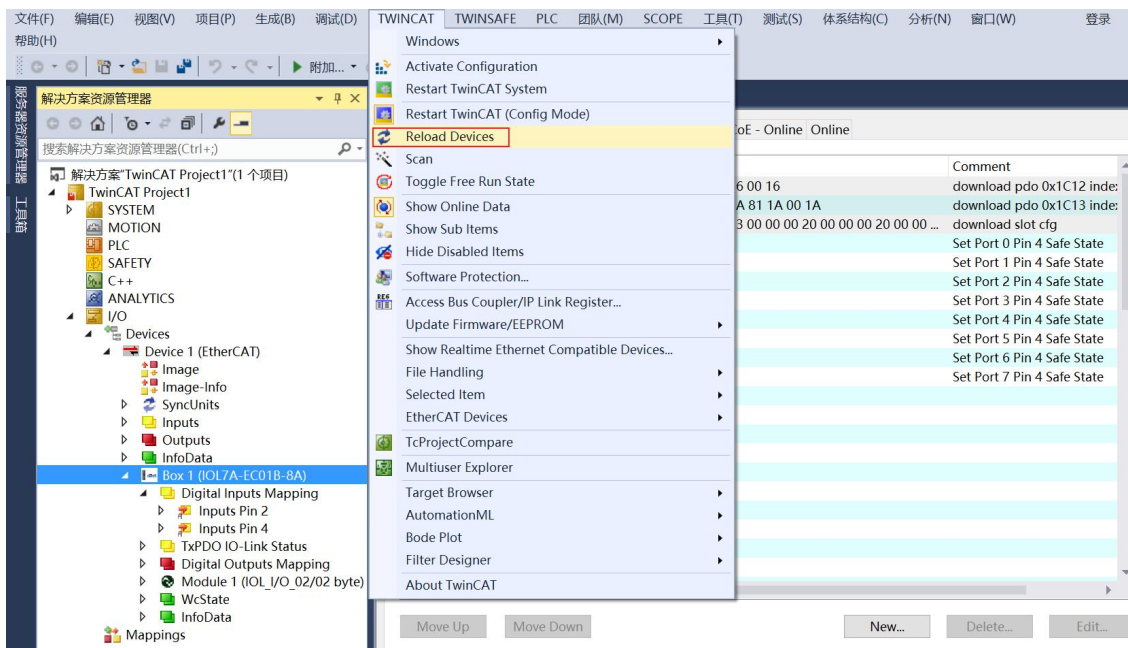
- f. Pin2 overcurrent recovery function setting method: On the right side of the main station configuration interface, click "CoE-Online", click "Advanced" to enter the "Advanced Setting" interface, select "Online-via SDO Information", and click "OK", as shown in the figure below.



- g. In the “CoE-Online” interface, click the “+” in front of Index8300:0 to expand the configuration parameters, and you can configure the Pin2 overcurrent recovery function, as shown in the figure below.

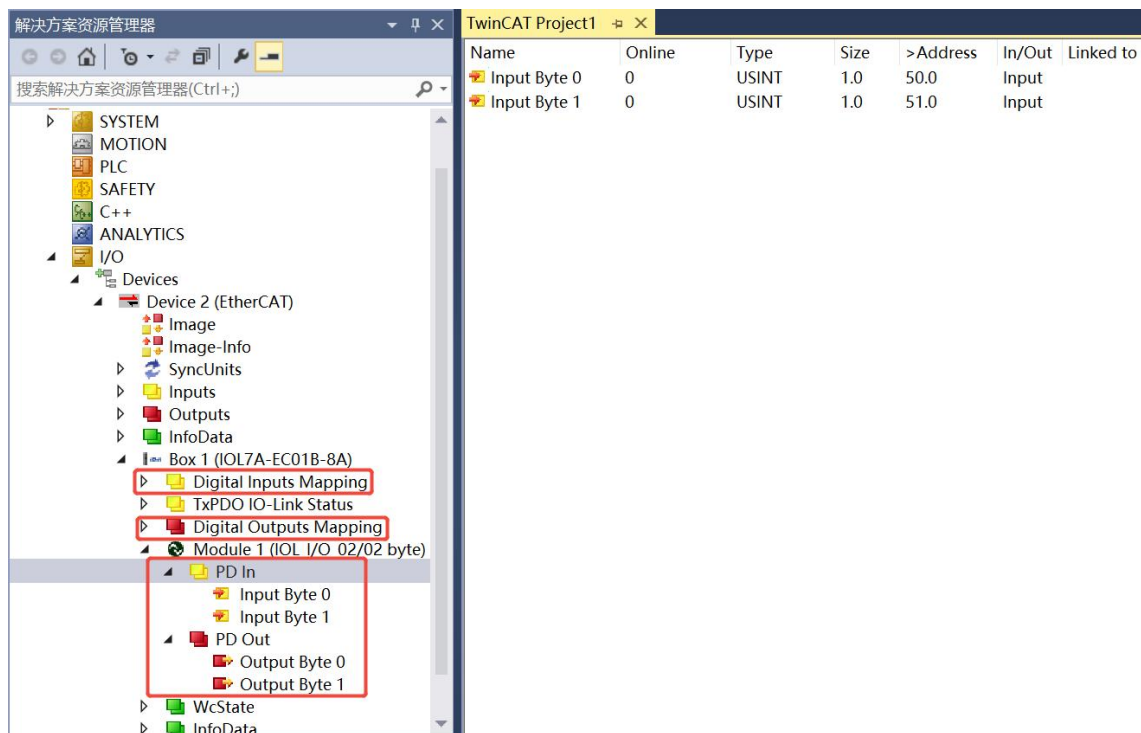


- h. After setting parameters such as output clear/hold function, Pin2 current overcurrent recovery mode function, and ISDU function, a Reload operation is required. Click the "TWINCAT -> Reload Devices" option in the menu bar, as shown in the figure below.

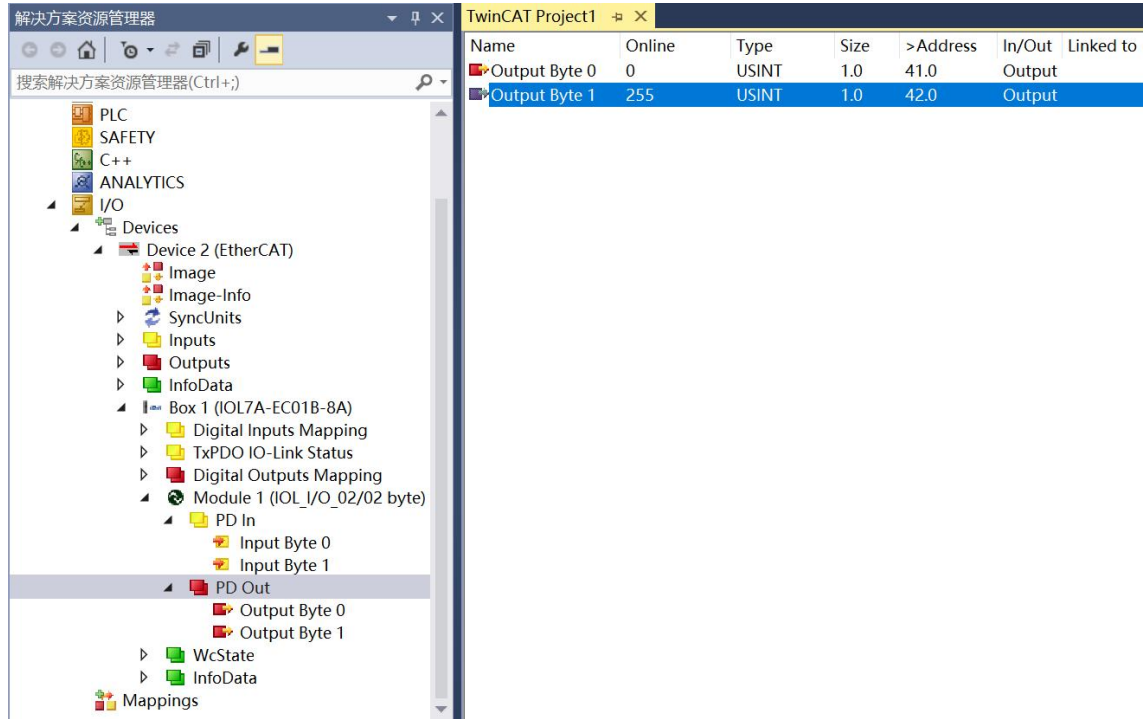


7、Functional verification

- a. In the left navigation tree, the process data for the standard DI mode port is shown in Digital Inputs Mapping; the process data for the standard DO mode port is shown in Digital Outputs Mapping; and the process data for the IO-Link mode port is shown in Module 1 -> PD In/Out, as shown in the figure below.



- b. Taking the IOL7A-16CB-M12 slave station connected to the X00 port of the master station as an example, and configuring the first 8 channels of the IOL7A-16CB-M12 as inputs and the last 8 channels as outputs, Input Byte 0 represents the input signal value of slave modules X00~X03, and Output Byte 1 represents the output signal value of slave modules X04~X07. Writing "255" to Output Byte 1 will illuminate the 8 channel indicator lights of slave modules X04~X07, as shown in the figure below.



- c. When the slave module X00 receives an effective voltage, the input value "192" can be monitored in Input Byte 0, which is "2#11000000" , as shown in the figure below.

The screenshot displays the TwinCAT Project1 interface. On the left, the '解决方案资源管理器' (Solution Resource Manager) shows a tree view of the project structure, including PLC, SAFETY, C++, ANALYTICS, I/O, and various modules like 'Box 1 (IOL7A-EC01B-8A)' and 'Module 1 (IOL I/O 02/02 byte)'. On the right, a table lists the variables defined in the project.

Name	Online	Type	Size	>Address	In/Out	Linked to
Input Byte 0	192	USINT	1.0	50.0	Input	
Input Byte 1	0	USINT	1.0	51.0	Input	

7.4 Custom data length module

[Appendix A](#) Different protocol master stations define process data modules with different byte lengths. These modules generally meet the interfacing needs of mainstream slave devices in the market. However, in actual use, there are still instances where the process data length used by some slave devices cannot match that of the modules. For example, a slave device may have an input process data length of 16 bytes and an output process data length of 32 bytes. Using an input process data length of 32 bytes and an output process data length of 32 bytes is compatible, or the process data length can be customized. This section describes how to customize the process data length.

7.4.1 EtherCAT Master Custom Module

1. The length value of the slave process data can be determined by obtaining it from the port Info information as described in section 7.1.4, or by obtaining this information from the slave manual.
2. Modify the configuration file, add a module, and define the module ID as 0x0001xyyy, where xx represents the input process data length in bytes (HEX value), and yy represents the output process data length in bytes (HEX value). For example, with an input process data length of 16 bytes and an output process data length of 32 bytes: the module ID is defined as 0x00011020; add supporting module IDs to each slot of the Device.
3. As per section 7.2.1, place the configuration file in the TwinCAT installation directory and restart TwinCAT;
4. Scan the device, update the device's EEPROM, and once the update is successful, power off and restart.

Precautions

-
- If you are unsure how to implement a custom data length module or modify the configuration file, please consult technical support first and do not attempt any actions without authorization.
-

8 FAQ

8.1 The device cannot be found in the software.

1. Verify that the ESI configuration file is installed correctly.
2. Verify that the ESI configuration file version is accurate.
3. After installing the ESI configuration file, did you restart the TwinCAT software or fail to execute Reload Device Descriptions?

8.2 The device cannot enter OP state.

1. Confirm that the project setup is correct.
2. Confirm the node station number settings.
3. Confirm that the device power supply is normal.
4. Is the EtherCAT communication cable working properly?
5. Should the device be powered on and off again after the slave node address is changed?

9 Appendix

9.1 Appendix A

The IOL7A series EtherCAT master station configuration file defines modules for different byte input process data lengths, output process data lengths, and input/output combined process data lengths, as listed in the table below:

name	describe
Std Input	Standard Input
Std Output	Standard output
IOL_I_01 Byte	InputProcess data length 1 byte
IOL_I_02 Byte	InputProcess data length 2 bytes
IOL_I_04 Byte	InputProcess data length 4 bytes
IOL_I_06 Byte	InputProcess data length 6 bytes
IOL_I_08 Byte	InputProcess data length 8 bytes
IOL_I_10 Byte	InputProcess data length 10 bytes
IOL_I_16 Byte	InputProcess data length 16 bytes
IOL_I_24 Byte	InputProcess data length 24 bytes
IOL_I_32 Byte	InputProcess data length 32 bytes
IOL_O_01 Byte	OutputProcess data length 1 byte
IOL_O_02 Byte	OutputProcess data length 2 bytes
IOL_O_04 Byte	OutputProcess data length 4 bytes
IOL_O_06 Byte	OutputProcess data length 6 bytes
IOL_O_08 Byte	OutputProcess data length 8 bytes
IOL_O_10 Byte	OutputProcess data length 10 bytes
IOL_O_16 Byte	OutputProcess data length 16 bytes
IOL_O_24 Byte	OutputProcess data length 24 bytes
IOL_O_32 Byte	OutputProcess data length 32 bytes
IOL_I/O_01/01 Byte	InputProcess data length 1 byte, output process data length 1 byte
IOL_I/O_02/02 Byte	InputProcess data length 2 bytes, output process data length 2 bytes
IOL_I/O_02/04 Byte	InputProcess data length 2 bytes, output process data length 4 bytes

IOL_I/O_02/08 Byte	InputProcess data length 2 bytes, output process data length 8 bytes
IOL_I/O_04/02 Byte	InputProcess data length 4 bytes, output process data length 2 bytes
IOL_I/O_04/04 Byte	InputProcess data length 4 bytes, output process data length 4 bytes
IOL_I/O_04/08 Byte	InputProcess data length 4 bytes, output process data length 8 bytes
IOL_I/O_04/16 Byte	InputProcess data length is 4 bytes, and the output process data length is 16 bytes.
IOL_I/O_04/32 Byte	InputProcess data length is 4 bytes, and the output process data length is 32 bytes.
IOL_I/O_08/02 Byte	InputProcess data length 8 bytes, output process data length 2 bytes
IOL_I/O_08/04 Byte	InputProcess data length is 8 bytes, and the output process data length is 4 bytes.
IOL_I/O_08/08 Byte	InputProcess data length 8 bytes, output process data length 8 bytes
IOL_I/O_10/10 Byte	InputProcess data length 10 bytes, output process data length 10 bytes
IOL_I/O_16/04 Byte	InputProcess data length is 16 bytes, and the output process data length is 4 bytes.
IOL_I/O_16/16 Byte	InputProcess data length 16 bytes, output process data length 16 bytes
IOL_I/O_24/24 Byte	InputProcess data length 24 bytes, output process data length 24 bytes
IOL_I/O_32/04 Byte	InputProcess data length is 32 bytes, and the output process data length is 4 bytes.
IOL_I/O_32/32 Byte	InputProcess data length 32 bytes, output process data length 32 bytes

9.2 Appendix B

The IO-Link port status is represented by 1 byte, where Bits 0...3 indicate the IO-Link port status and Bits 4...7 indicate IO-Link port error messages.

Bit0...3 is defined as follows:

Value (DEC)	describe
0	Port not activated
1	The port is in input mode.
2	The port is in output mode.
3	The port is in IO-Link mode and communication is normal.
4	The port is in IO-Link mode, and communication is abnormal.

Bit4...7 is defined as follows:

Value (DEC)	describe
0	No errors
1	Watchdog Abnormal
2	Cache overflow
3	Invalid device ID
4	Invalid vendor ID
5	Invalid IO-Link version
6	Invalid frame capability
7	Ineffective cycle time
8	Invalid input process data length
9	Invalid output process data length
10	No device detected
11	PreOP status error

For example: If a port is configured in IO-Link mode but no slave device is actually connected, the status will show 0xA4. If a port is configured in IO-Link mode but the input data length does not match, the status will show 0x84.

The IO-Link master status is represented by 1 byte, as defined below:

Value (DEC)	describe
0	No errors
1	PIN1 Short circuit
2	PIN2 Short circuit
4	PIN4 Short circuit
16	U _S Undervoltage
32	U _A Undervoltage
1	PIN1 Short circuit

9.3 Appendix C

The 1-byte process data length defined in the IO-Link standard has different meanings represented by different bits. See Appendix B.1.6 of "IOL-Interface-Spec_10002_V113_Jun19.pdf".

Bit	describe
0...4	length
5	reserve
6	Does it support standard input or standard output mode?
7	The byte flag bit, when set, indicates a data length of 0...4 plus 1; when not set, the length value of 0...4 represents the bit length.

Ignoring Bit6, the simple correspondence between its value and the length of the process data is as follows:

byte	describe
0x01	The process data length is 1 bit, typically used for standard input or standard output.
0x08	Process data length 1 byte
0x10	Process data length 2 bytes
0x18	Process data length 3 bytes
0x83	Process data length 4 bytes
0x84	Process data length 5 bytes
0x85	Process data length 6 bytes
0x86	Process data length 7 bytes
0x87	Process data length 8 bytes
0x88	Process data length 9 bytes
0x89	Process data length 10 bytes
0x8A	Process data length 11 bytes
0x8B	Process data length 12 bytes
0x8C	Process data length 13 bytes
0x8D	Process data length 14 bytes
0x8E	Process data length 15 bytes
0x8F	Process data length 16 bytes
0x90	Process data length 17 bytes
0x91	Process data length 18 bytes
0x92	Process data length 19 bytes
0x93	Process data length 20 bytes
0x94	Process data length 21 bytes
0x95	Process data length 22 bytes
0x96	Process data length 23 bytes
0x97	Process data length 24 bytes
0x98	Process data length 25 bytes
0x99	Process data length 26 bytes
0x9A	Process data length 27 bytes

0x9B	Process data length 28 bytes
0x9C	Process data length 29 bytes
0x9D	Process data length 30 bytes
0x9E	Process data length 31 bytes
0x9F	Process data length 32 bytes

9.4 Appendix D

The slave ISDU may return an error, and the error codes are defined as follows. Please refer to Appendix C ErrorTypes of "IOL-Interface-Spec_10002_V113_Jun19.pdf".

Error code	describe
0x8000	Device application layer error
0x8011	Unreachable index
0x8012	Unreachable sub-index
0x8020	Service temporarily unavailable
0x8021	Local control services are temporarily unavailable.
0x8022	Equipment control services are temporarily unavailable.
0x8023	Permission error
0x8030	Parameters out of range
0x8031	Parameter exceeds limit value
0x8032	Parameters below the limit
0x8033	The parameter length is too long
0x8034	Insufficient parameter length
0x8035	Function unavailable
0x8036	Functionality temporarily unavailable
0x8040	Invalid parameter set
0x8041	Inconsistent parameter sets
0x8082	Application not ready
0x81xx	Manufacturer Customization