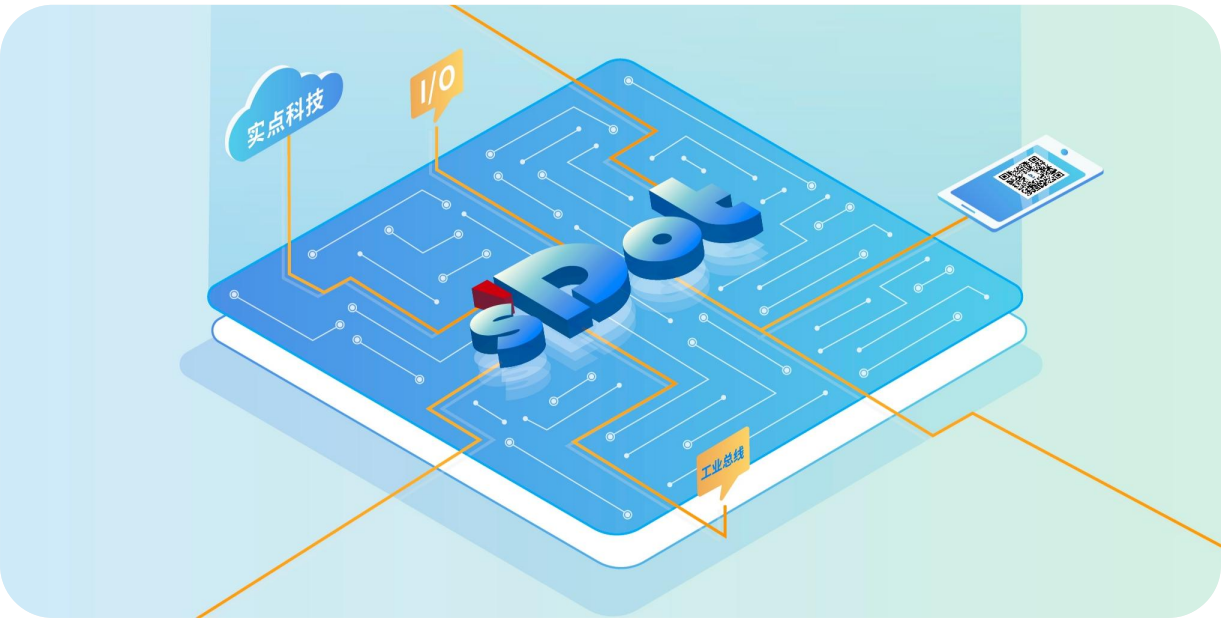

XB6-A40TDC

Temperature control module

User Manual

Nanjing Solidot Electronic Technology Co., Ltd.

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1 Product Overview

1.1 Product Introduction

The XB6-A40TDC is a plug-in temperature control module that supports resistance temperature detectors (RTD) sensors. It utilizes the X-bus bus and is compatible with our XB6 series coupler modules, enabling real-time temperature data acquisition and high-precision temperature control.

1.2 Product Features

- Diverse measurement types
  Sensor type selection is supported.
- High sensitivity
  Sensitivity: 0.1℃.
- Disconnection detection
  Each channel supports disconnection detection.
- Supports 50Hz suppression
  Suppress 50Hz AC power supply interference.
- Independent control algorithm
  The heating control has a self-tuning function, employing a proprietary PID independent control algorithm.
- Small size, easy to install
  With its compact structure and small footprint, it can be mounted on a DIN 35 mm standard rail and uses spring-loaded terminals for convenient and quick wiring.
- Easy to diagnose
  The innovative channel indicator light design is placed close to the channel, making it easy to see and convenient for inspection and maintenance.
- Easy configuration
  It is easy to configure and supports mainstream PROFINET and EtherCAT master stations.

2 Product Parameters

2.1 General parameters

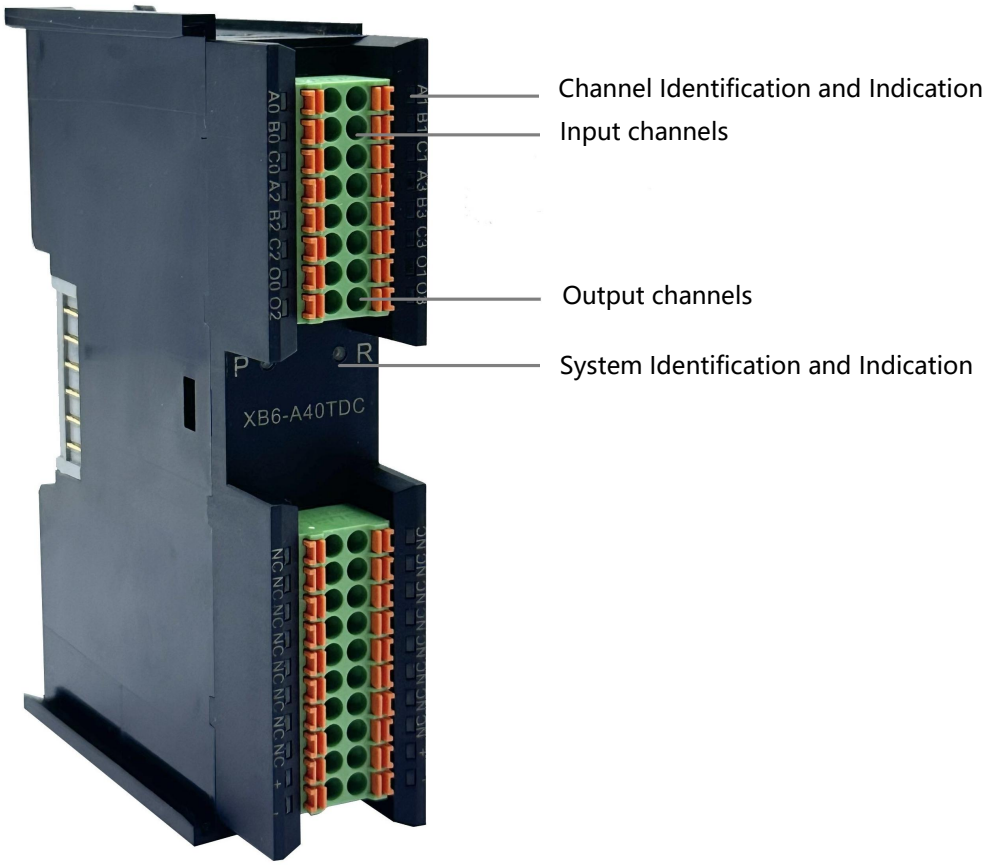
Interface parameters		
Product Model	XB6-A40TDC	
Bus Protocol	X-bus	
Process data volume: Uplink	16	
Process data volume: Downlink	18	
Channel type	Input: 4 Ch	Output: 4 Ch
Transmission rate	6 Mbps	
Station type	Slave station	
Power supply	5 VDC, powered via X-bus	
Rated current consumption	80 mA	
General parameters		
Specifications and dimensions	106×73×25.7 mm	
Weight	120 g	
Operating temperature	-10~+75℃	
Storage temperature	-20~+90℃	
Relative humidity	95%, no condensation	
Protection level	IP20	
EMI characteristics	Compliant with EN IEC61000-6-4-2019 standard	
EMS characteristics	Compliant with EN IEC61000-6-2-2019 standard	
Vibration resistance	Compliant with EN 60068-2-6 standard	
Impact resistance	Compliant with EN 60068-2-27/29 standards	

Technical parameters	
Number of channels	4
Sensor type	Resistance Temperature Detector
Connection method	2-wire system, 3-wire system
	Pt100:-200~850℃ Pt200:-200~600℃ Pt500:-200~600℃ Pt1000:-200~600℃
Sensor input temperature accuracy	±00.5℃
Sensitivity	0.1℃
Resolution	24 bit (int type)
Sensor sampling period	4-channel 130ms
Control accuracy	Maximum overshoot 2°C, ±0.5°C at steady state
Control cycle	4 Channel 200ms
Disconnection detection	Support
Disconnection detection time	2ms
Output signal	PWM wave output (for solid-state relay [SSR] drive)
Maximum allowed input voltage for the channel	30VDC
Electrical isolation	500VAC, no isolation between channels
Channel indicator lights	Green LED lights
Overflow function	support

3 Panel

3.1 Module structure

Product Parts Names



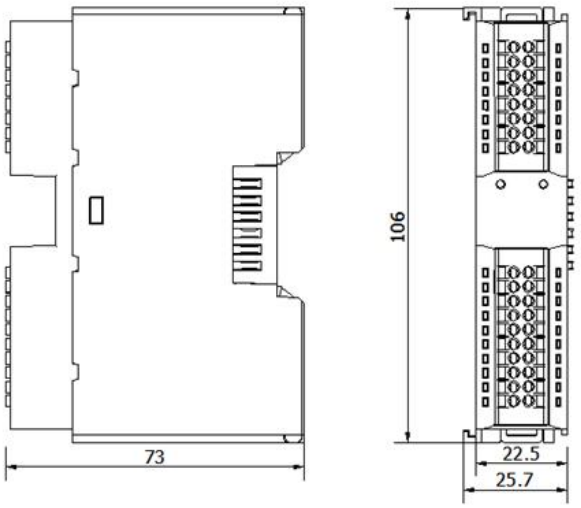
3.2 Indicator light function

Logo	Color	Status	Description
P	Green	ON	Power supply is normal
		OFF	The product is not powered on or the power supply is abnormal.
R	Green	ON	The system is running normally.
		Flashing at 1 Hz	I/O module connected, X-bus system ready for interaction.
		OFF	Device not powered on, X-bus not exchanging data or malfunctioning
Channel Indication	Green	ON	Channel enabled and sensor properly connected
		OFF	Channel blocked or sensor not properly connected

4 Installation and removal

4.1 External dimensions

External dimensions (unit: mm)



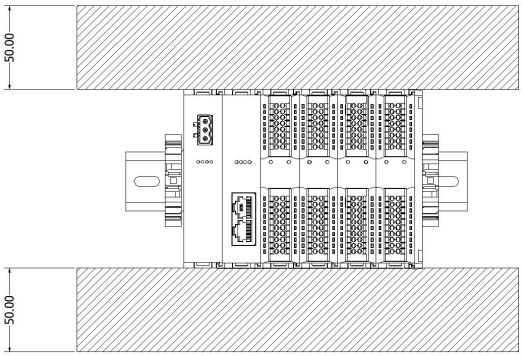
4.2 Installation Guide

Installation/Disassembly Precautions

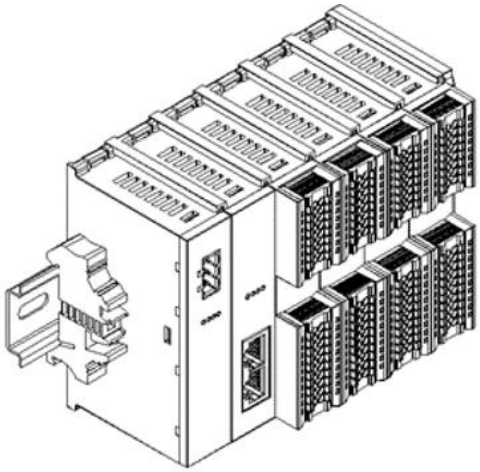
- Ensure that the server rack has good ventilation (such as installing exhaust fans in the server rack).
- Do not install this device next to or above equipment that may cause overheating.
- Make sure to install the module vertically and ensure that there is air circulation around it (there should be at least 50mm of air circulation space above and below the module).
- After the module is installed, be sure to install guide rail fasteners at both ends to secure the module.

- Installation and disassembly must be performed with the power off.

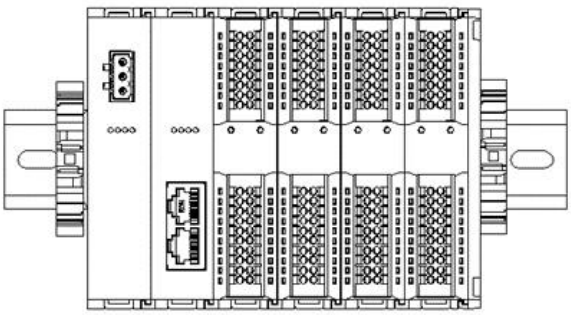
Minimum clearance for module installation (≥50mm)



Ensure the module is installed vertically.



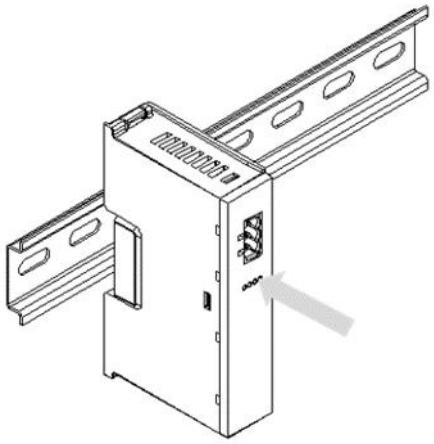
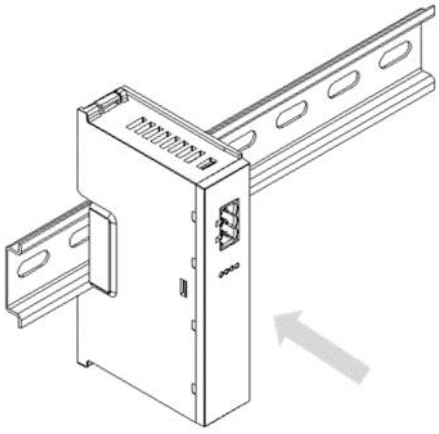
Be sure to install the guide rail fasteners.



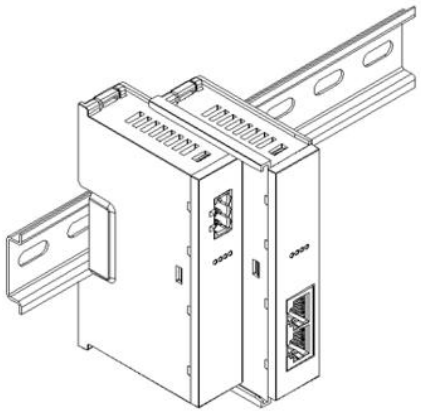
4.3 Installation and disassembly steps

Module installation and removal	
Module installation steps	1. Install the power module on the fixed guide rail.
	2. Install the coupler and the required I/O modules in sequence on the right side of the power module.
	3. After installing all the necessary I/O modules, install the end caps to complete the module assembly.
	4. Install guide rail fasteners at both ends of the power module and end cap to secure the module.
Module disassembly steps	1. Loosen the guide rail fasteners at both ends of the module.
	2. Use a flathead screwdriver to pry open the module clips.
	3. Remove the disassembled module.

4.4 Installation diagram

Power module installation	**Step**
 ①	Align the power module guide rail slot vertically with the guide rail as shown in Figure ① on the left.
 ②	As shown in Figure ② on the left, press the power module firmly until you hear a "click" sound, and the module is installed in place.

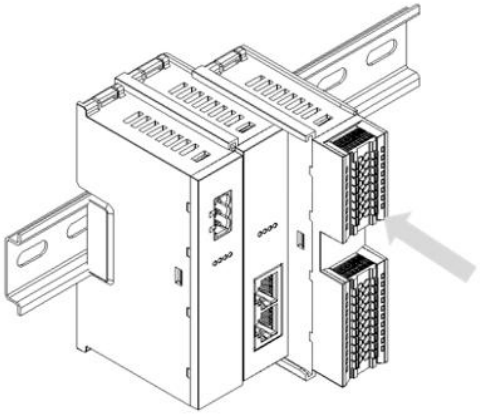
Coupler module installation	Step



③

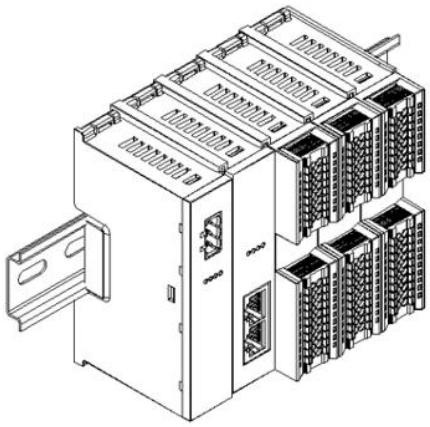
Align the left slot of the coupler module with the right side of the power supply module and push it in as shown in Figure ③ on the left. Press the coupler module firmly until you hear a "click" sound, indicating that the module is installed in place.

I/O module installation	Step



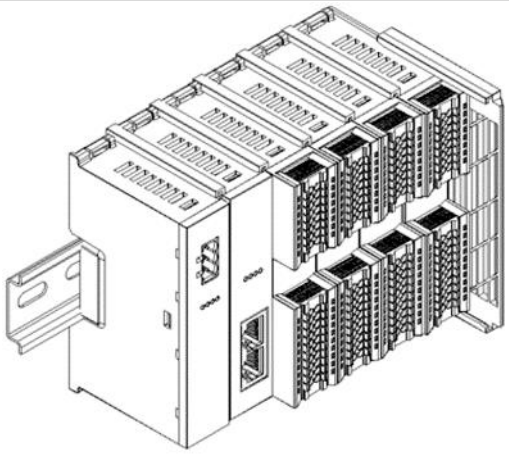
④

Following the steps for installing the coupler module in the previous step, install the required I/O modules one by one, as shown in Figure ④ and Figure ⑤ on the left.



⑤

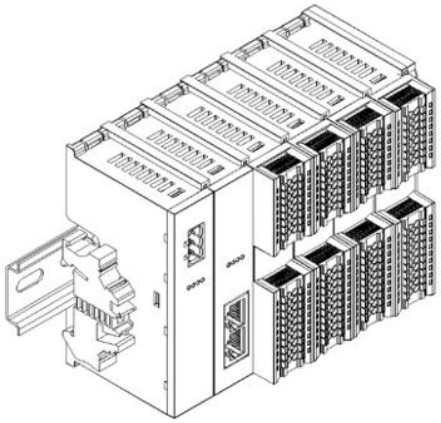
End cap addition	Step



Install the end cap on the right side of the last module, as shown in Figure ⑥ on the left. Please refer to the installation method of the coupler module for the installation method.

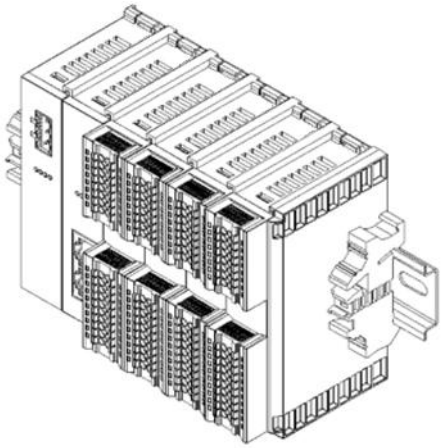
⑥

Addition of guide rail fasteners	Step



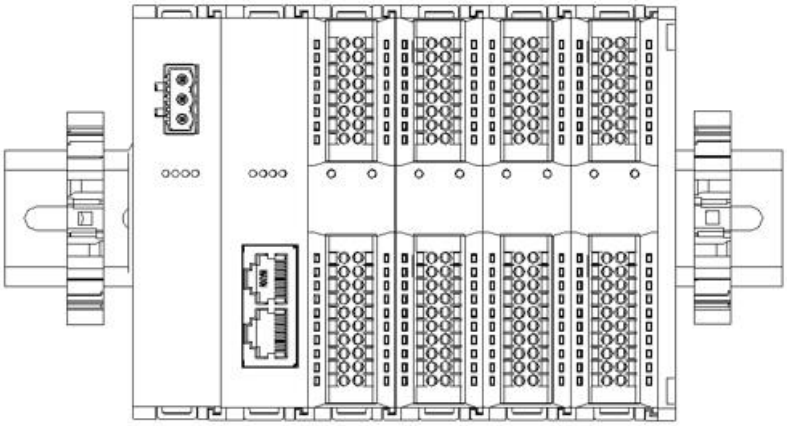
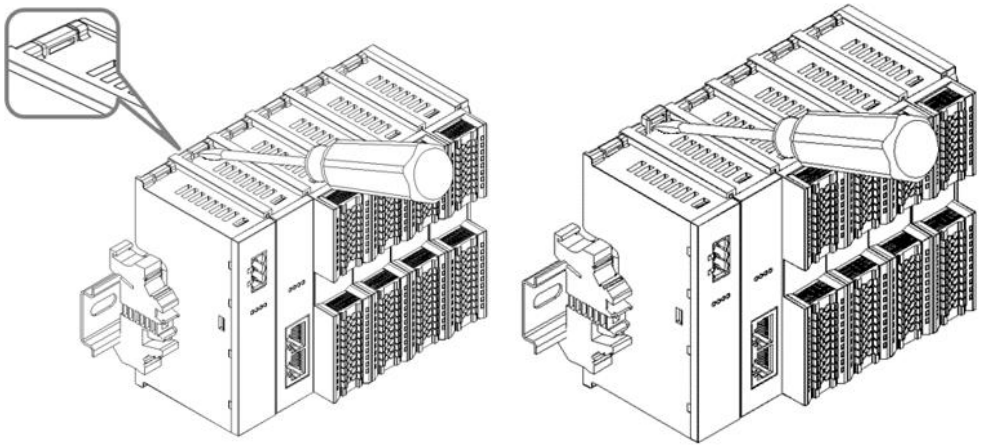
Install and lock the guide rail fastener close to the left side of the coupler, as shown in Figure ⑦ on the left.

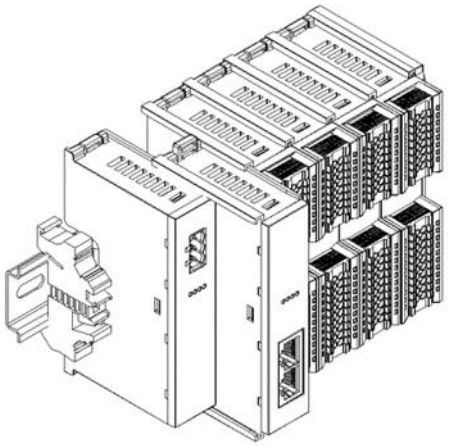
⑦



Install the guide rail fastener on the right side of the end cap. First, push the guide rail fastener towards the coupler to ensure that the module is installed securely, and then tighten the guide rail fastener with a screwdriver, as shown in Figure ⑧ on the left.

⑧

Disassembly	Step
 ⑨	Loosen the guide rail fastener at one end of the module with a screwdriver and move it to one side, ensuring there is a gap between the module and the guide rail fastener, as shown in Figure ⑨ on the left.
 ⑩ ⑪	Insert the flathead screwdriver into the clips of the module to be removed, and apply force from the side towards the module (you will hear a click), as shown in Figure ⑩ ⑪on the left. **Note: Each module has a buckle at the top and bottom; operate in the same way for all modules.**

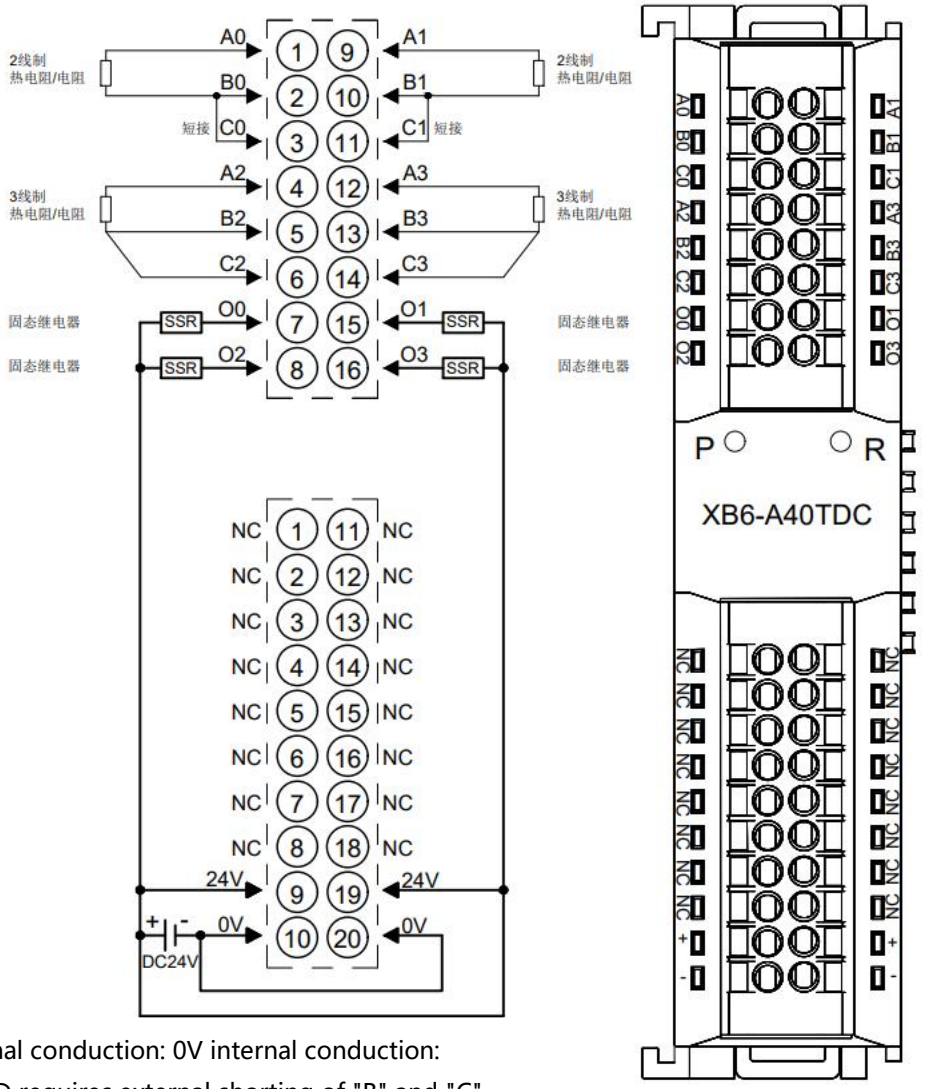


⑫

Disassemble the module by performing the reverse operation of installing the module, as shown in the left figure⑫.

5 Wiring

5.1 Wiring diagram



*24V internal conduction: 0V internal conduction:

*2-wire RTD requires external shorting of "B" and "C"

*4-wire sensor must be converted to 2-wire or 3-wire

5.2 Terminal block definition

/					
Terminal serial number	**Terminal markings**	**Description**	**Terminal serial number**	**Terminal markings**	**Description**
1	A0	Channel 0 input	9	A1	Channel 1 Input
2	B0		10	B1	
3	C0		11	C1	
4	A2	Channel 2 input	12	A3	Channel 3 input
5	B2		13	B3	
6	C2		14	C3	
7	O0	Channel 0 output	15	O1	Channel 1 output
8	O2	Channel 2 output	16	O3	Channel 3 output
/					
Terminal serial number	**Terminal markings**	**Description**	**Terminal serial number**	**Terminal markings**	**Description**
1	NC	Empty terminal	11	NC	Empty terminal
2	NC	Empty terminal	12	NC	Empty terminal
3	NC	Empty terminal	13	NC	Empty terminal
4	NC	Empty terminal	14	NC	Empty terminal
5	NC	Empty terminal	15	NC	Empty terminal
6	NC	Empty terminal	16	NC	Empty terminal
7	NC	Empty terminal	17	NC	Empty terminal
8	NC	Empty terminal	18	NC	Empty terminal
9	+	24V power supply+	19	+	24V power supply+
10	-	24V power supply -	20	-	24V power supply -

6 Use

6.1 Parameter settings and functions

The module configuration has one parameter, which is shared by all four channels, as shown in the table below.

Function	Parameter name	Range of values	default value
Sensor type selection	Sensor Type	00: PT100	00
		01: PT200	
		10: PT500	
		11: PT1000	

6.1.1 Sensor type selection

The module supports sensor type configuration. Only one type of sensor is supported in the same module, and individual channels cannot be configured.

Note: The default sensor type is PT100.

6.2 Uplink and downlink process data and functions

6.2.1 Uplink data

Uplink data 16 bytes				
Name	**Meaning**	**Range of values**	**Data types**	**Length**
Channel 0	Channel 0 temperature value	-32768~32767	Int16	2 bytes
Channel 1	Channel 1 temperature value	-32768~32767	Int16	2 bytes
Channel 2	Channel 2 temperature value	-32768~32767	Int16	2 bytes
Channel 3	Channel 3 temperature value	-32768~32767	Int16	2 bytes
Warning 0	Channel 0 alarms	0: Normal 1: Channel sensor disconnection	Uint8	1 byte
Warning 1	Channel 1 alarm			1 byte
Warning 2	Channel 2 alarm			1 byte
Warning 3	Channel 3 alarm			1 byte
Read Data	The read control data storage buffer	Use with Read Ctrl	float	4 bytes

Data Explanation:

- **Temperature value Channel [n]**
  The temperature control module's uplink data consists of temperature data collected from each channel. Each channel's data is a 2-byte signed integer, and the collected data is 10 times the actual temperature value. Dividing the read data by 10 gives the true temperature value, in °C.

- **Warning [n]**
  Each channel of the temperature control module supports disconnection detection. When any channel is not connected to a sensor, the uplink data channel value displays -9999. In temperature control mode, when a disconnection occurs, the uplink data display shows -9999, the alarm is set to 1, and the corresponding temperature control function is automatically turned off.

- **Control Data Storage Buff Read Data**
  The module supports parameter reading functionality and can be used in conjunction with the Read Ctrl control word.

6.2.2 Downlink data

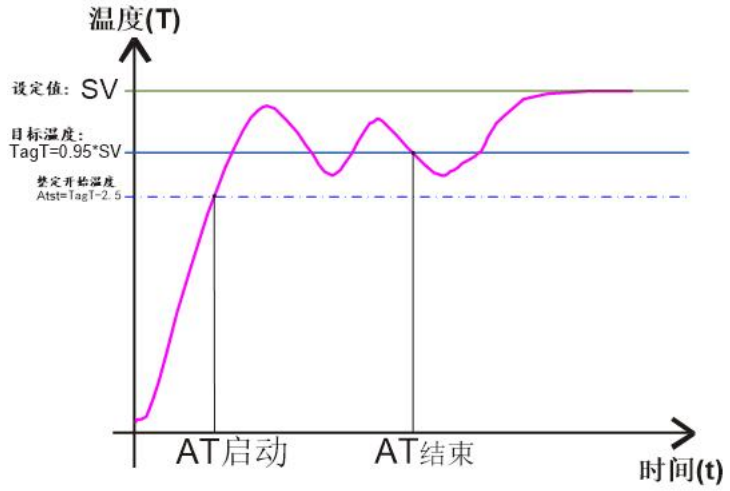
Downlink data 18 bytes				
Name	**Meaning**	**Range Of Values**	**Data Types**	**Length**
Set Temp 0	Channel 0 set temperature	-32768~32767	Int16	2 bytes
Set Temp 1	Channel 1 set temperature	-32768~32767	Int16	2 bytes
Set Temp 2	Channel 2 set temperature	-32768~32767	Int16	2 bytes
Set Temp 3	Channel 3 set temperature	-32768~32767	Int16	2 bytes
Mode Select 0	Channel 0 Temperature Control Mode Selection	0: Temperature control output off (default) 1: PID default parameter control 2: On-off control 3: PID parameter self-tuning	Unit 8	1 byte
Mode Select 1	Channel 1 Temperature Control Mode Selection		Unit 8	1 byte
Mode Select 2	Channel 2 Temperature Control Mode Selection		Unit 8	1 byte
Mode Select 3	Channel 3 Temperature Control Mode Selection		Unit 8	1 byte
Write Ctrl	Write control words	Channel number: 0x0: Channel 0 0x1: Channel 1 0x2: Channel 2 0x3: Channel 3	Unit 8	1 byte
		Control word: 0x0: Do not read or write any parameters 0x1: Set temperature calibration value 0x2: Set the PID coordination coefficient An 0x3: Set the PID proportional		

		coefficient P 0x4: Set the PID integral coefficient I 0x5: Set the PID derivative coefficient D 0x6: Save the current channel setting coefficient		
Read Ctrl	Read control words	Channel number: 0x0: Channel 0 0x1: Channel 1 0x2: Channel 2 0x3: Channel 3	Unit 8	1 byte
		Control word: 0x0: Do not read or write any parameters 0x1: Read self-tuning status 0x2: Read PID coordination coefficient An 0x3: Read the PID proportional coefficient P 0x4: Read PID integral coefficient I 0x5: Read the PID derivative coefficients D		
Write Data	Control data	Use in conjunction with Write_Ctrl	float	4 bytes

Data Explanation:

- **Set the temperature (Set Temp [n]).**
  The module supports setting a target temperature value. Enter the value as needed. Divide the entered value by 10 to get the set target temperature value, in °C.

- **Temperature control mode selection [n]**
  The module supports four temperature control modes: PID default parameter control mode, On-off control mode, PID parameter self-tuning mode, and default temperature control output off mode. After the self-tuning mode is activated, once the set value is reached, it forces the system to generate two disturbances, as shown in the figure below. Based on the system overshoot and oscillation period, it automatically calculates the system PID parameters. The system has large inertia and a long tuning time.



自整定示意图

Assuming the set temperature is SV = 60.0℃, the target temperature TagT = 57.0℃, and the tuning start temperature Atst = 54.15℃, if the module channel's self-tuning function is already activated, the system's self-tuning function will only truly start when the channel's current temperature is less than 54.5℃. Once the self-tuning process starts, it will run automatically until it ends.
Note: PID control will be automatically implemented after the PID parameters are self-tuned.

After self-tuning is completed, the tuning parameters are automatically saved to the default PID default parameter control mode.

- **Write control word: Ctrl**
  The module supports manual parameter setting for individual channels, allowing users to set temperature calibration values, PID coordination coefficient An, PID proportional coefficient P, PID integral coefficient I, PID derivative coefficient D, and save the current channel settings. (After PID default parameter mode or PID auto-tuning is complete, the PID and An parameters can be adjusted using Write Ctrl.)
  Setting the temperature calibration value is a manual compensation function for each channel's data. The compensation value can be entered into the Write Data section of the control system as

needed. The compensation range is -128 to 127. After setting the compensation value, the compensated temperature value will be automatically calculated in the uplink data; that is, the uplink data will be the final compensated temperature data. Dividing the read data by 10 gives the compensated temperature or resistance value, in °C.

- **Read control word Read Ctrl**

  The module supports reading control words on a single channel, and can read the module's self-tuning status, PID coordination coefficient An, PID proportional coefficient P, PID integral coefficient P, and PID derivative coefficient D.

  In PID control mode, the default PID coordination coefficient An is 1; the default PID proportional coefficient P is 12.5; the default PID integral coefficient I is 0.01; and the default PID derivative coefficient D is 247.35.

  In On-Off control mode, the PID coordination coefficient An, PID proportional coefficient P, PID integral coefficient I, and PID derivative coefficient D are all set to 0 by default.

  In PID parameter self-tuning mode, the PID coordination coefficient An is set to 1 by default, and all other coefficients are set to 0 by default.

- **Control Data Write Data**

  The module supports control data and is used in conjunction with the write control word Write Ctrl.

6.3 Module configuration instructions

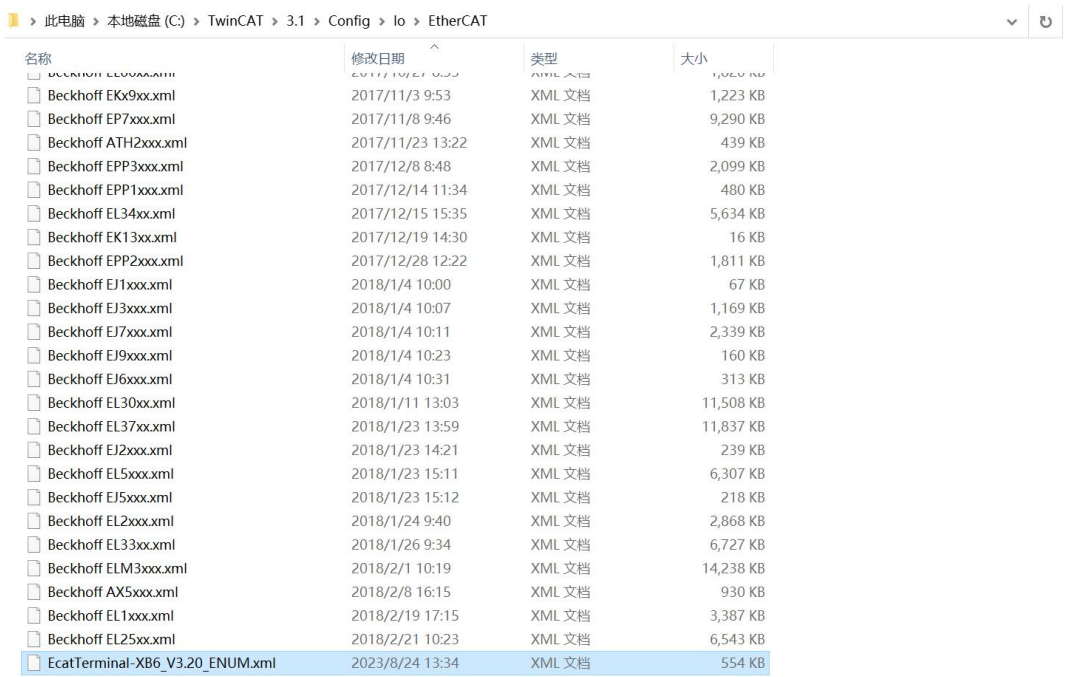
6.3.1 Application in the TwinCAT3 software environment

1、Preparation

- **Hardware environment**
  - **Module model XB6-A40TDC**
  - **Power module, EtherCAT coupler, end cap**
    This instruction uses the XB6-P2000H power supply and XB6-EC0002 coupler as examples.
  - **One computer, pre-installed with TwinCAT3 software.**
  - **EtherCAT dedicated shielded cable**
  - **PT100 resistance temperature detector (RTD) sensor, bulb heating equipment**
  - **One switching power supply**
  - **Module mounting rails and rail fasteners**
  - **Device configuration file**
    Configuration file retrieval address:https://www.solidotech.com/documents/configfile
- **Hardware configuration and wiring**
  Please follow the instructions "4. Installation and Removal" "5. Wiring"

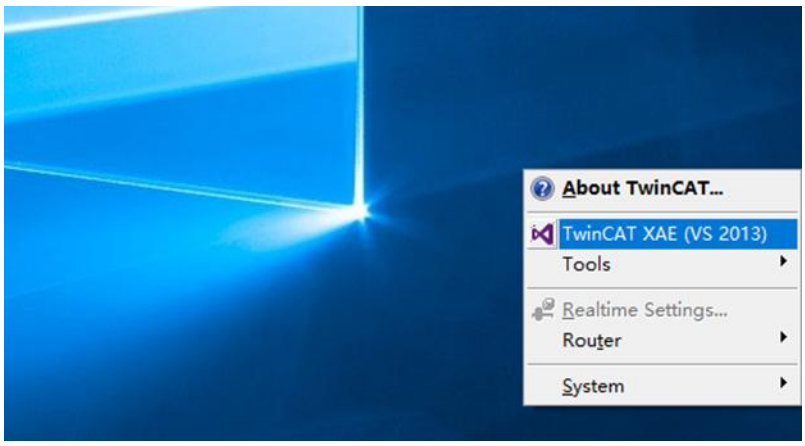
2、Pre-configured configuration files

Place the ESI configuration file (EcatTerminal-XB6_V3.20_ENUM.xml) in the TwinCAT installation directory "C:\TwinCAT\3.1\Config\Io\EtherCAT", as shown in the image below.

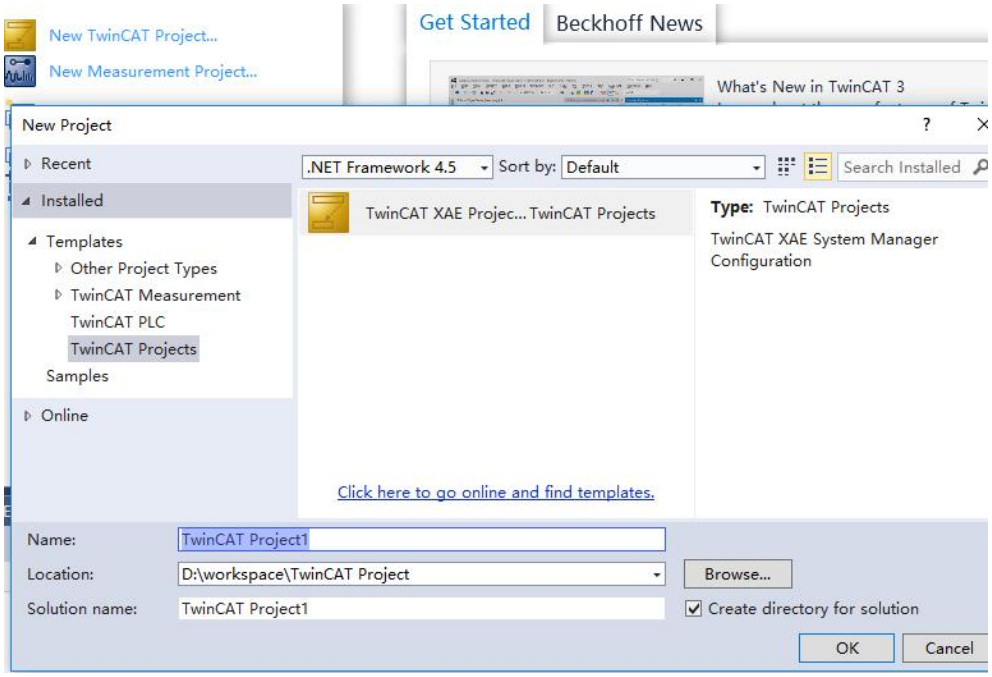


3、Create a project

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.

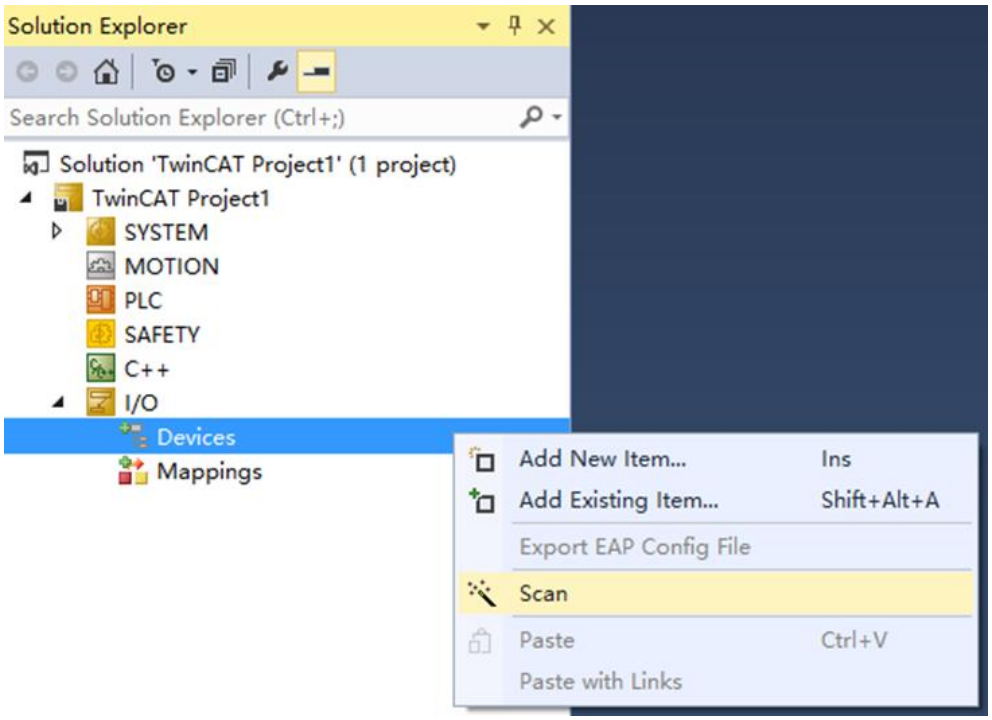


b. Click "New TwinCAT Project". In the pop-up window, "Name" and "Solution name" correspond to the project name and solution name, respectively, and "Location" corresponds to the project path. These three items can be left as default. Then click "OK". The project will be created successfully, as shown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

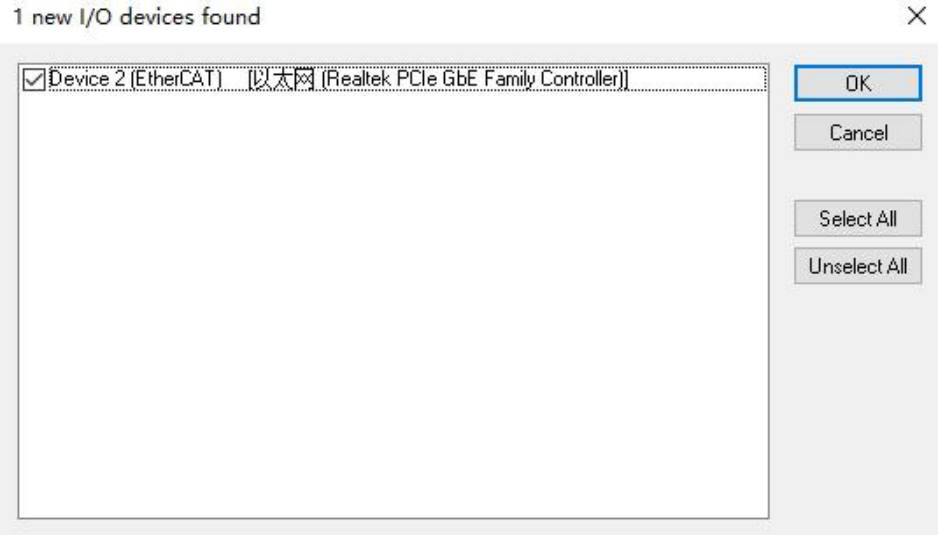


4、Scanning equipment

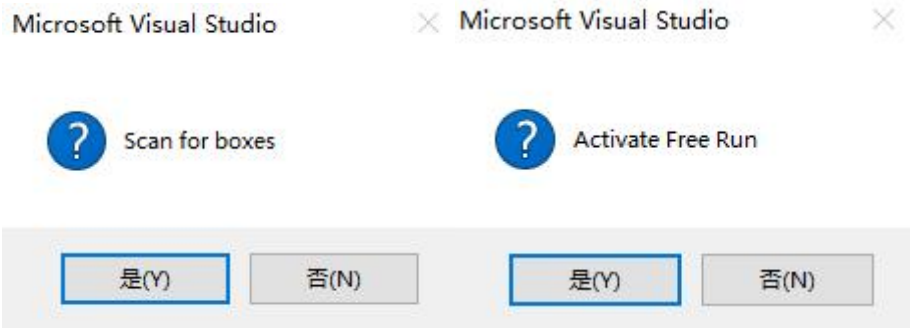
a. After creating the project, right-click the "Scan" option under "I/O -> Devices" to scan for slave devices, as shown in the figure below.



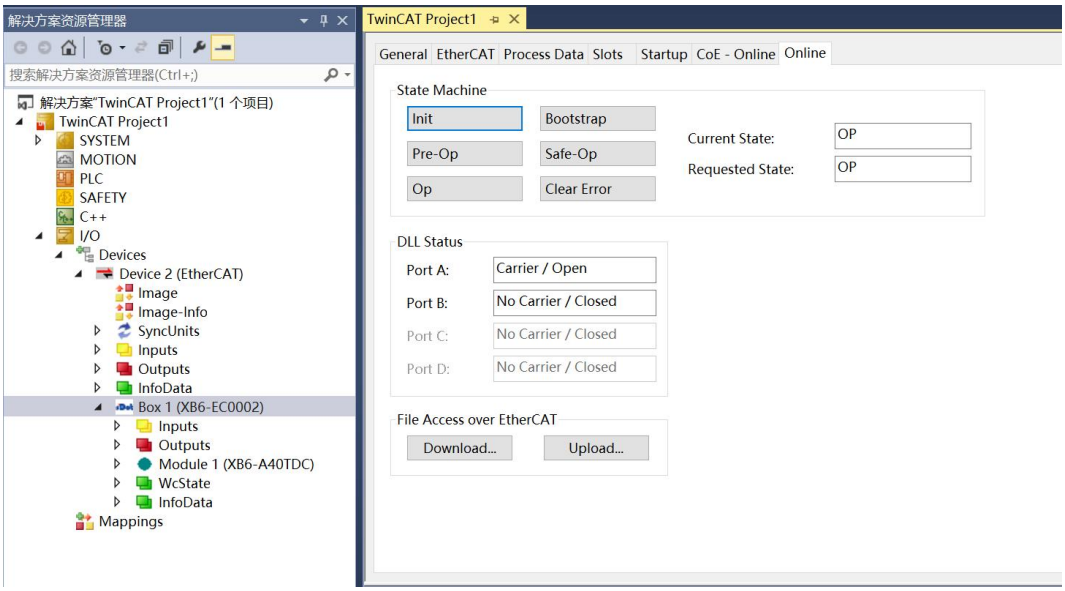
b. Select the "Local Area Connection" network adapter, as shown in the image below.



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.

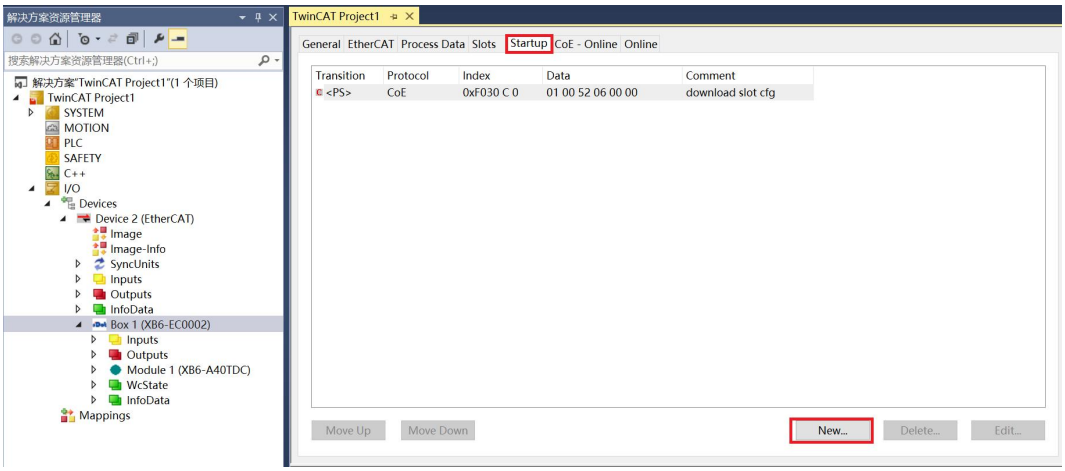


d. After the device is scanned, you can see Box1 (XB6-EC0002) and Module1 (XB6-A40TDC) in the left navigation tree. Under "Online", you can see that TwinCAT is in "OP" state. You can observe that the RUN light of the slave device is always on, as shown in the figure below.

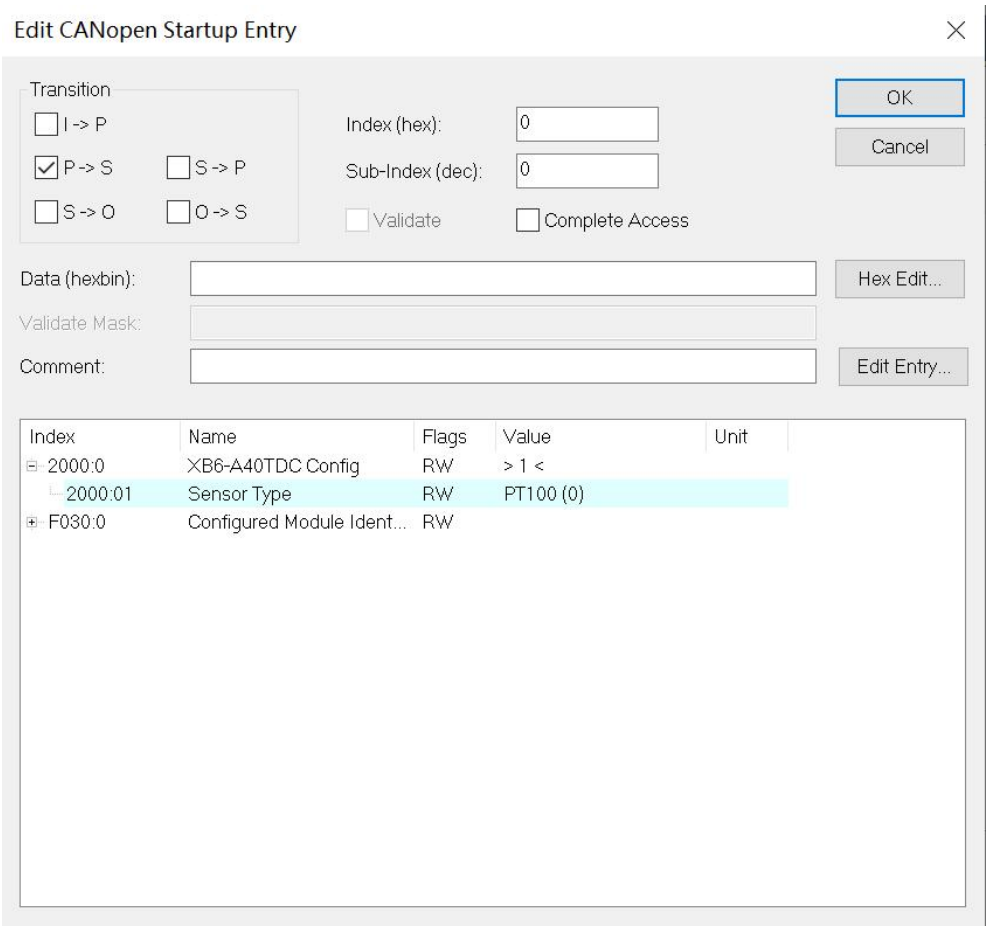


5、Parameter configuration

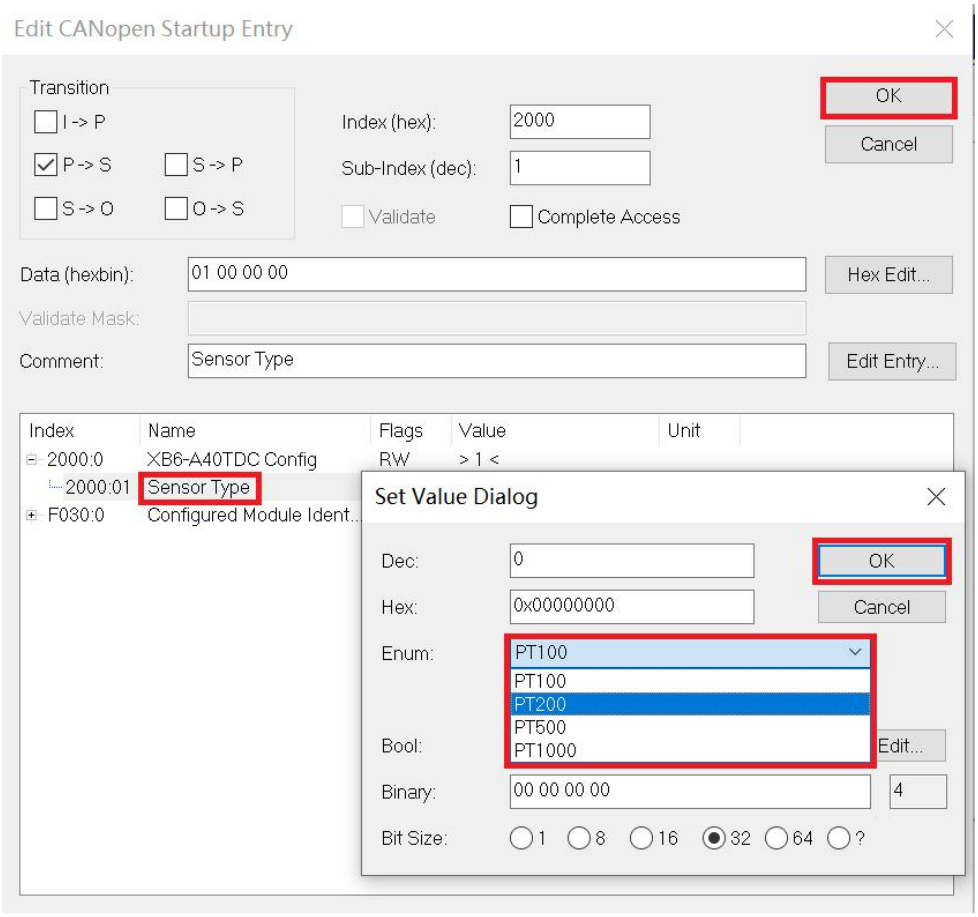
a. Clicking "Box1 -> Startup -> New" in the left navigation tree will take you to the configuration parameter editing page, as shown in the image below.



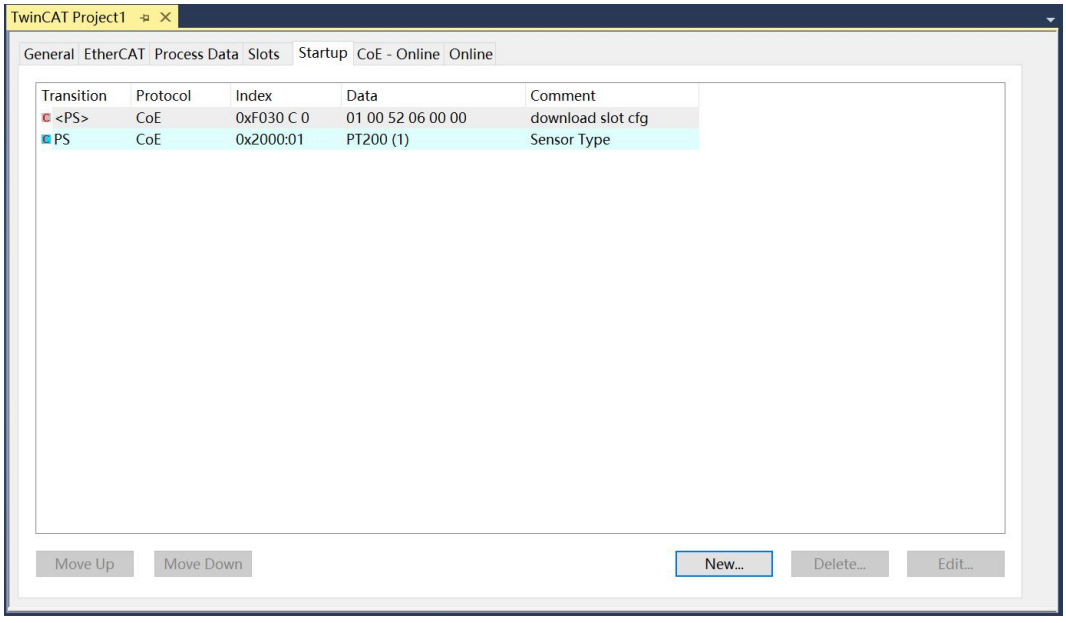
b. In the Edit CANopen Startup Entry pop-up window, click the "+" in front of Index 2000:0 to expand the configuration parameter menu. You will see one configuration parameter. Click the parameter to set the relevant configuration, as shown in the figure below.



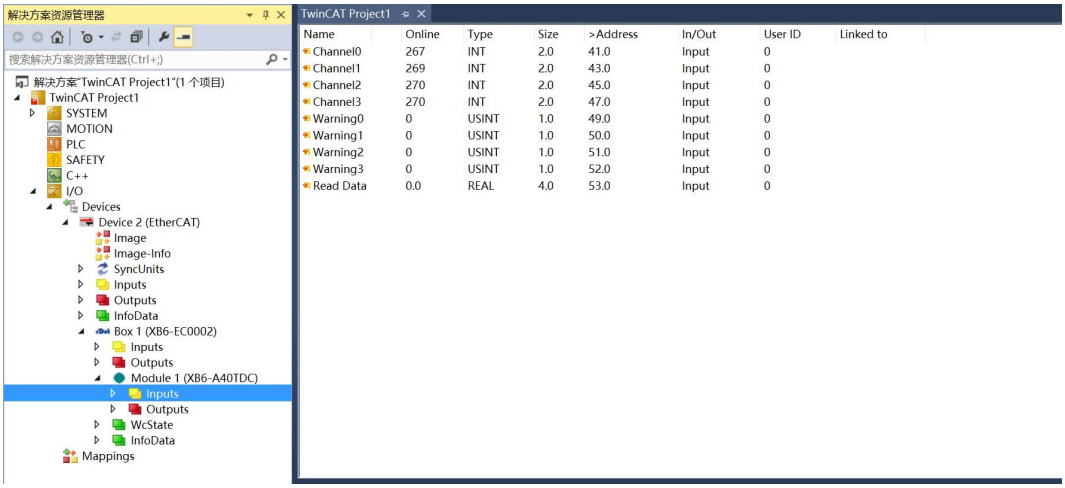
c. For example, to change the sensor type selection, you can double-click "Sensor Type" and modify the parameter value in the drop-down box, as shown in the figure below.



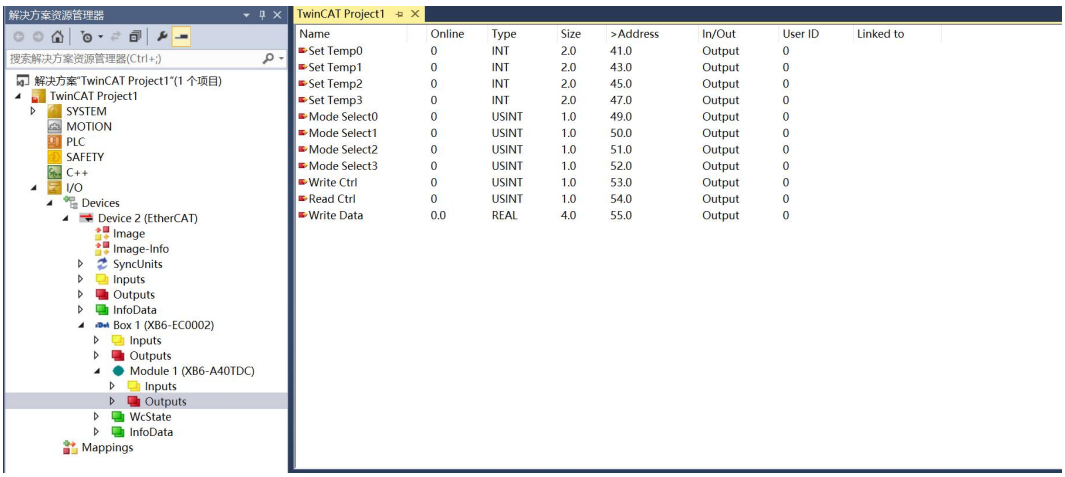
d. After modifying the parameters, you can see the modified parameter items and values below Startup, as shown in the image below. After setting the parameters, a Reload operation and a power-on restart of the module are required to enable the main station to automatically distribute the parameter settings.



e. The left-hand navigation tree "Module 1 -> Inputs" displays the Uplink data of the module, used to monitor the module's status, as shown in the figure below.



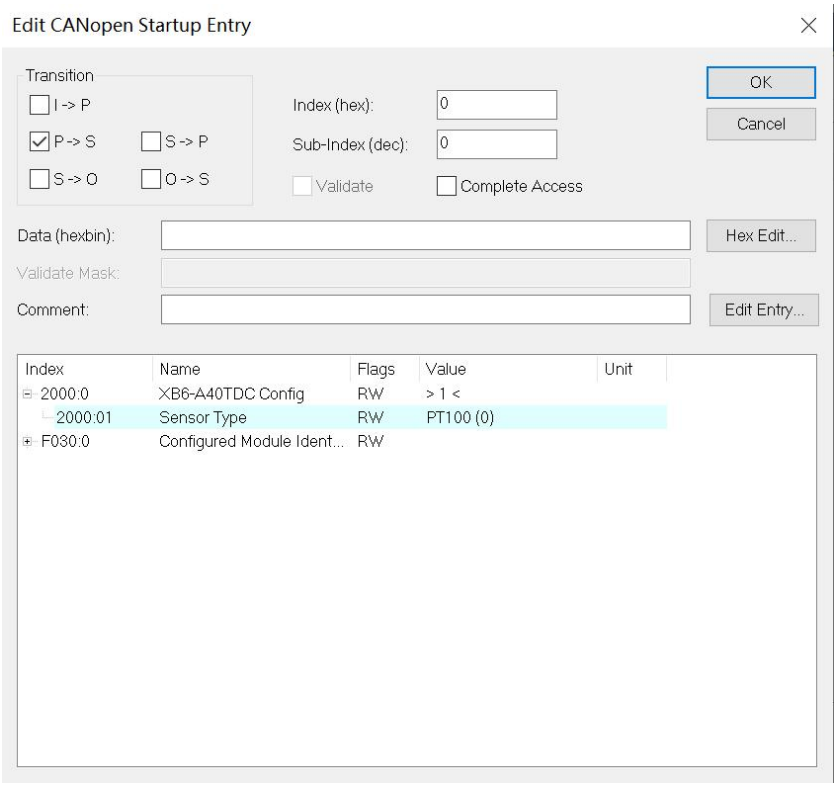
f. The left-hand navigation tree "Module 1 -> Outputs" displays the module's Downlink data, which is used to control the module's output status, as shown in the figure below.



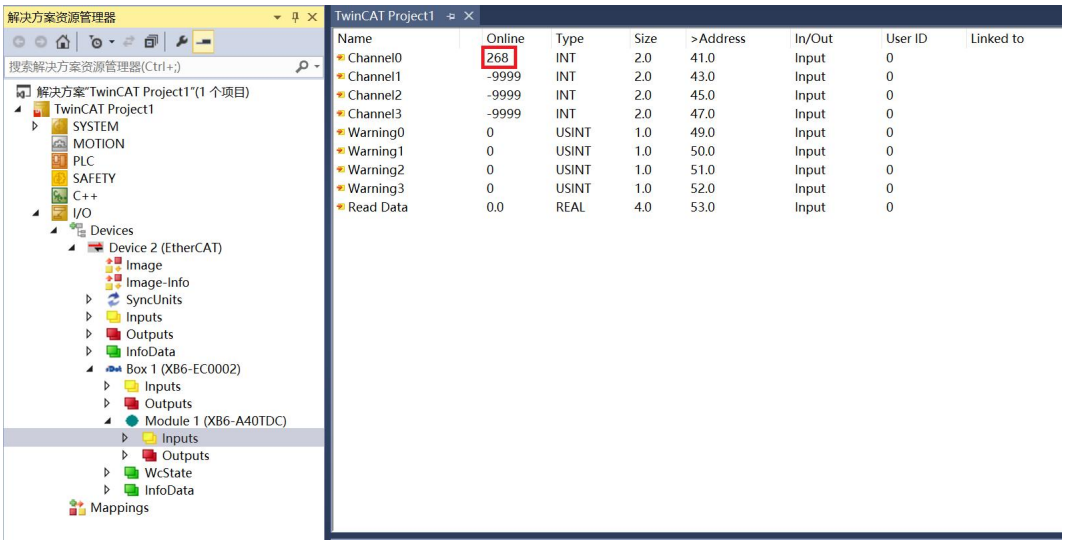
Module Function Examples

◆ **Temperature input channel 0 data monitoring**

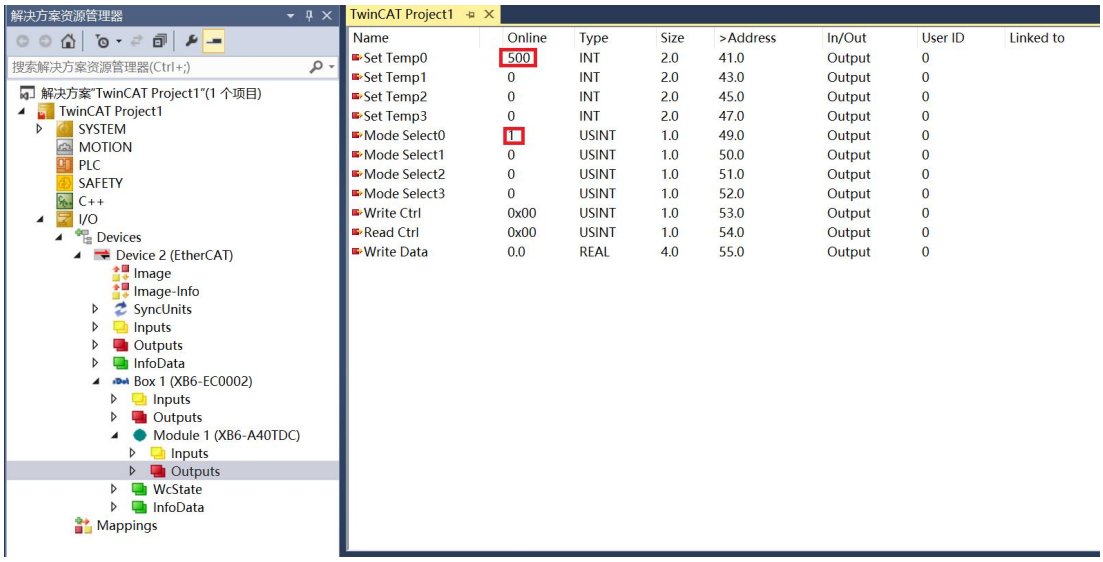
a. The channel connects to the resistance temperature detector (RTD) sensor, and the configuration parameters are configured as shown in the figure below.



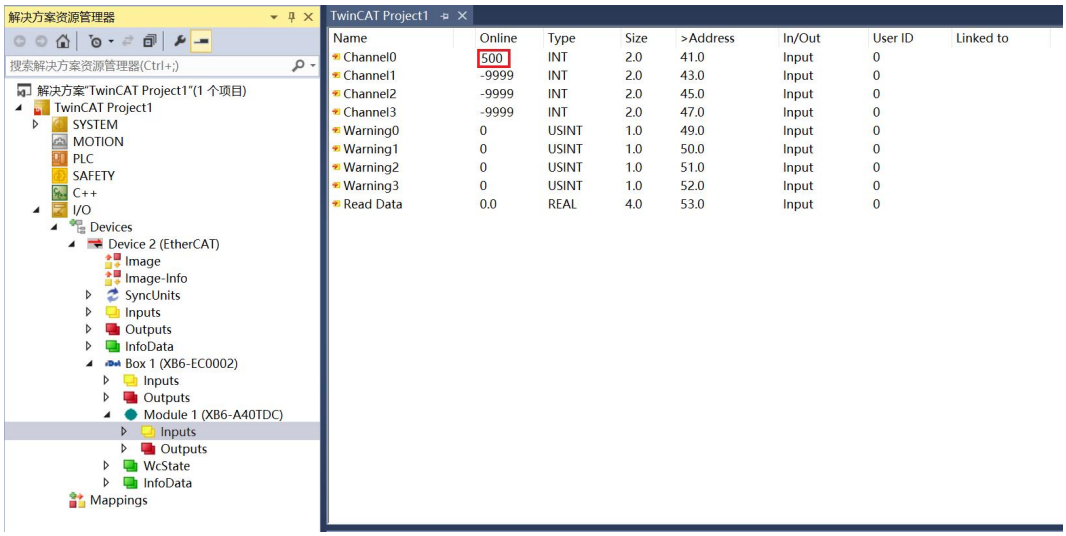
b. As you can see, the current temperature value of channel 0 is 268, or 26.8℃. Other channels are not connected to sensors and display a value of -9999, as shown in the figure below.



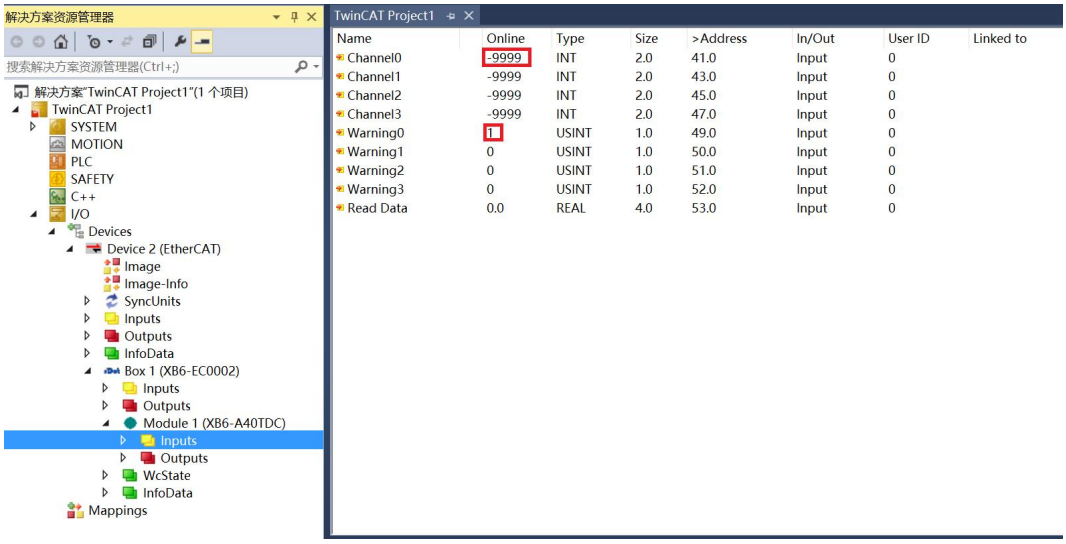
c. Set the temperature control mode to PID control and set the target temperature value to 500 (50℃), as shown in the figure below.



d. As you can see, the temperature rises to 50℃, and after the first overshoot, it gradually stabilizes at around 50℃, as shown in the figure below.

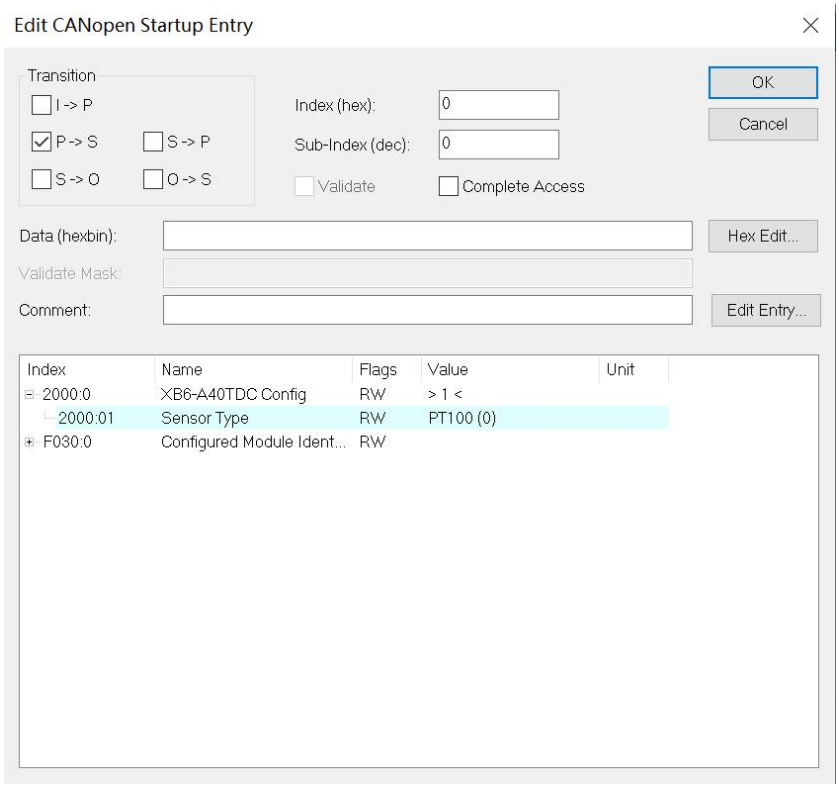


e. After unplugging the sensor connected to channel 0, you can see that the value displayed on channel 0 is -9999, and the alarm value is set to 1, as shown in the figure below.

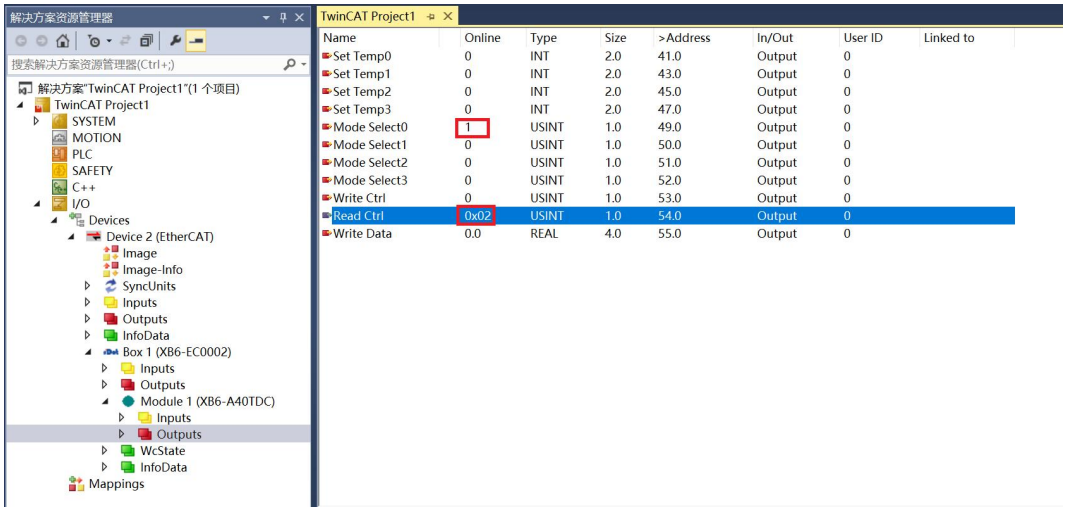


◆ **Read the PID coordination coefficient An parameter value in PID control mode**

a. The channel connects to the resistance temperature detector (RTD) sensor, and the configuration parameters are configured as shown in the figure below.

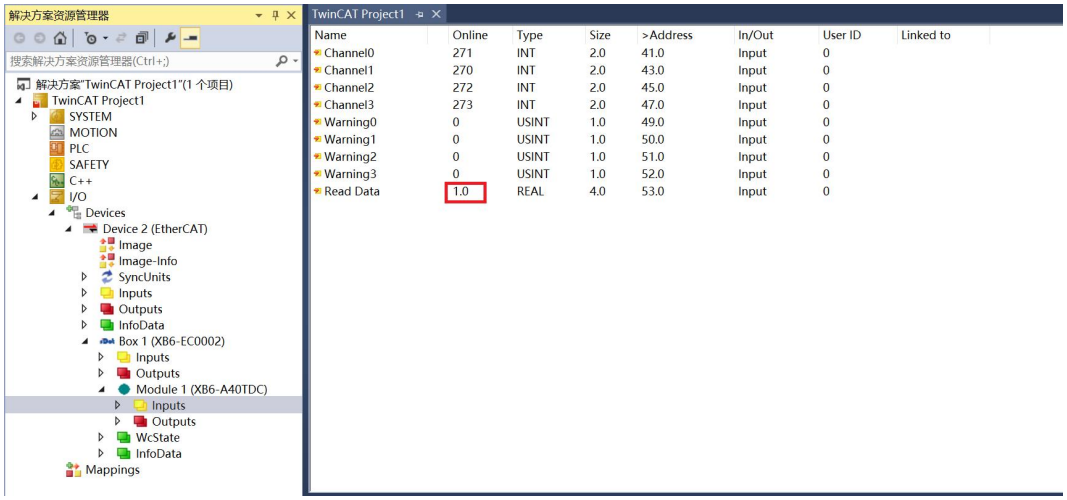


b. Taking channel 0 of the module as an example, the temperature control mode is set to PID control, and the control word is read to read the PID coordination coefficient An, as shown in the figure below.



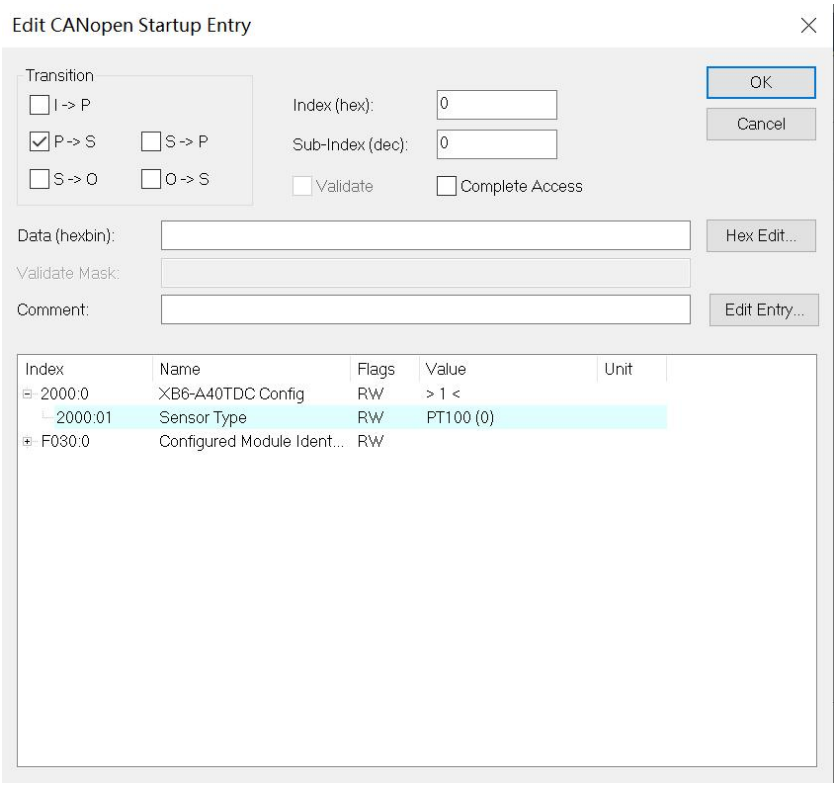
Note: For example, when reading the self-tuning status of channel 1, Read Ctrl is 0x11; when reading the PID coordination coefficient An, Read Ctrl is 0x12; when reading the PID proportional coefficient P, Read Ctrl is 0x13, and so on. The other channels are similar.

c. The value of the current PID coordination coefficient An for channel 0 can be seen in the figure below.

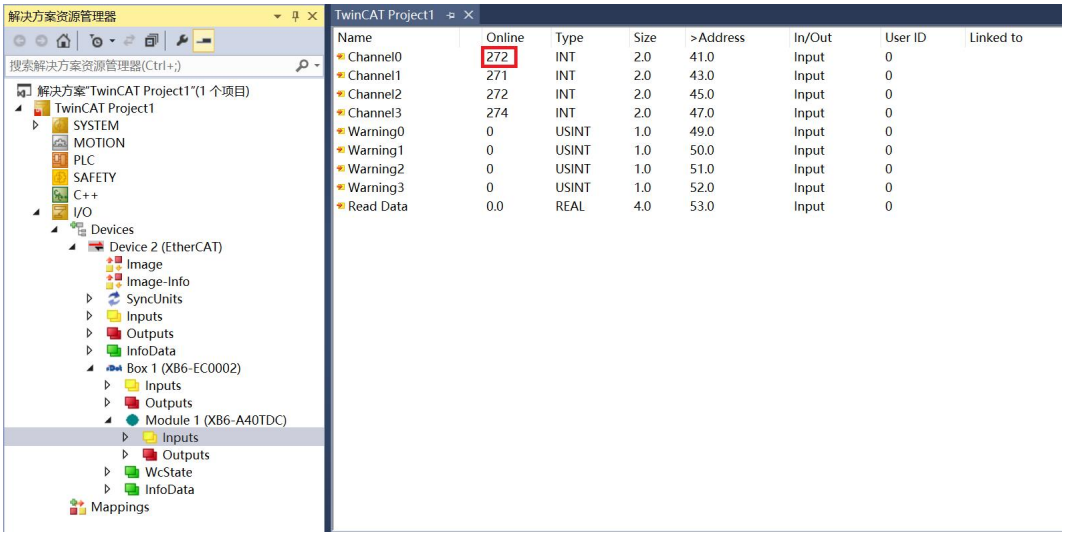


◆ **Temperature compensation**

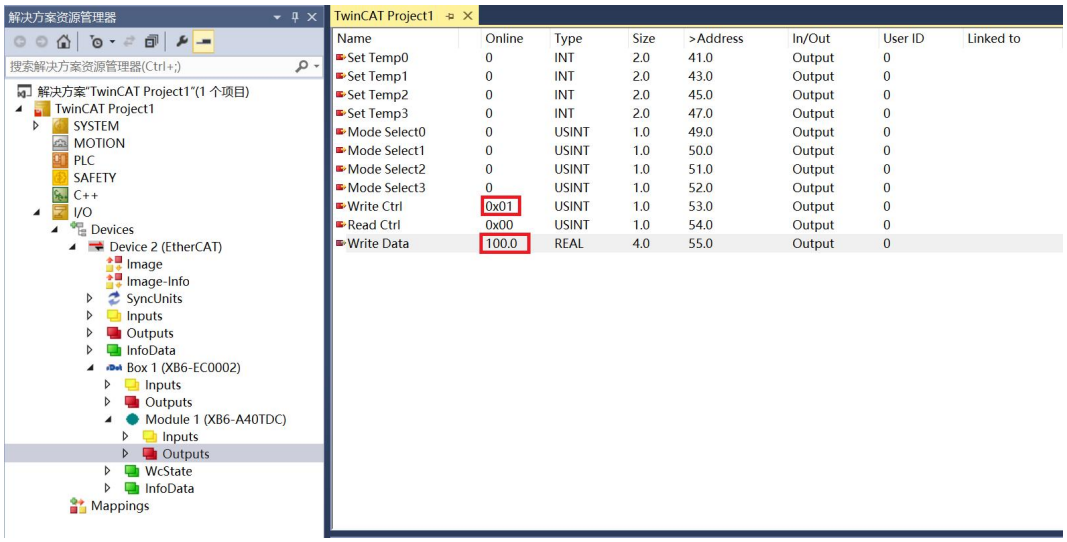
a. The channel connects to the resistance temperature detector (RTD) sensor, and the configuration parameters are configured as shown in the figure below.



b. Taking module channel 0 as an example, we can see that the temperature value measured by channel 0 is 272, which is 27.2℃, as shown in the figure below.

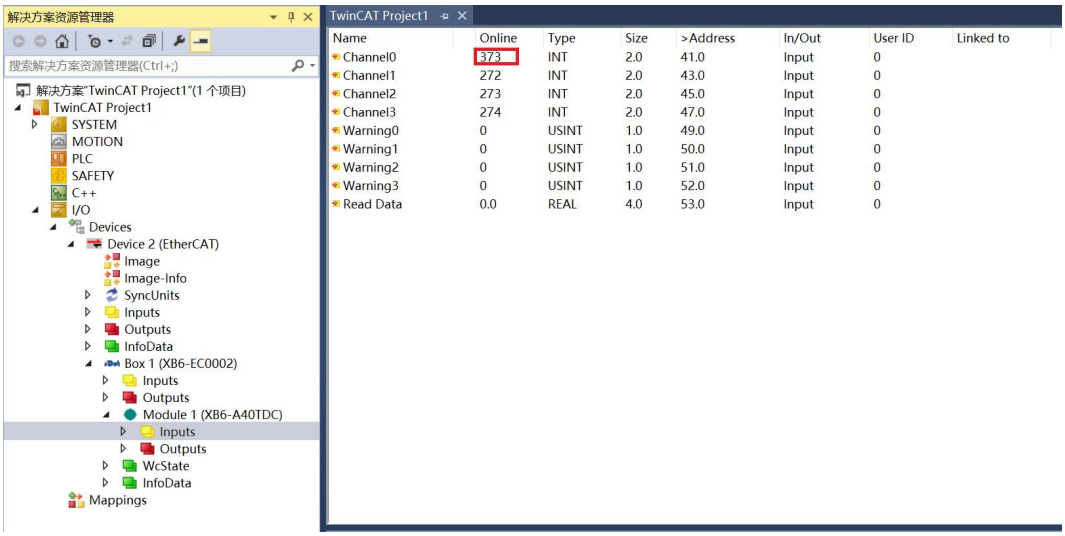


c. In the module's "Outputs" settings, set the write control word to the set temperature calibration value, with a temperature compensation value of 100, which is 10℃, as shown in the figure below.



Note: For example, if you set the temperature calibration value for channel 1, write Ctrl to 0x11; if you set the PID coordination coefficient An for channel 1, write Ctrl to 0x12; if you set the PID proportional coefficient P for channel 1, write Ctrl to 0x13, and so on. The other channels are similar.

d. After setting the compensation value, the temperature value of channel 0 is 373, which is 37.3℃, as shown in the figure below.



6.3.2 Application in the TIA Portal V17 software environment

1、Preparation

- **Hardware environment**
  - **Module model XB6-A40TDC**
  - **Power module, PROFINET coupler, end cap**
    This instruction uses the XB6-P2000H power supply and XB6-PN0002 coupler as examples.
  - **One computer, pre-installed with TIA Portal V17 software.**
  - **PROFINET dedicated shielded cable**
  - **This instruction manual uses a Siemens S7-300 PLC as an example.**
  - **PT100 resistance temperature detector (RTD) sensor, bulb heating equipment**
  - **One switching power supply**
  - **Module mounting rails and rail fasteners**
  - **Device configuration file**
    Configuration file retrieval address:https://www.solidotech.com/documents/configfile
- **Hardware configuration and wiring**
  Please follow the instructions "4. Installation and Removal" "5. Wiring"

2、New construction projects

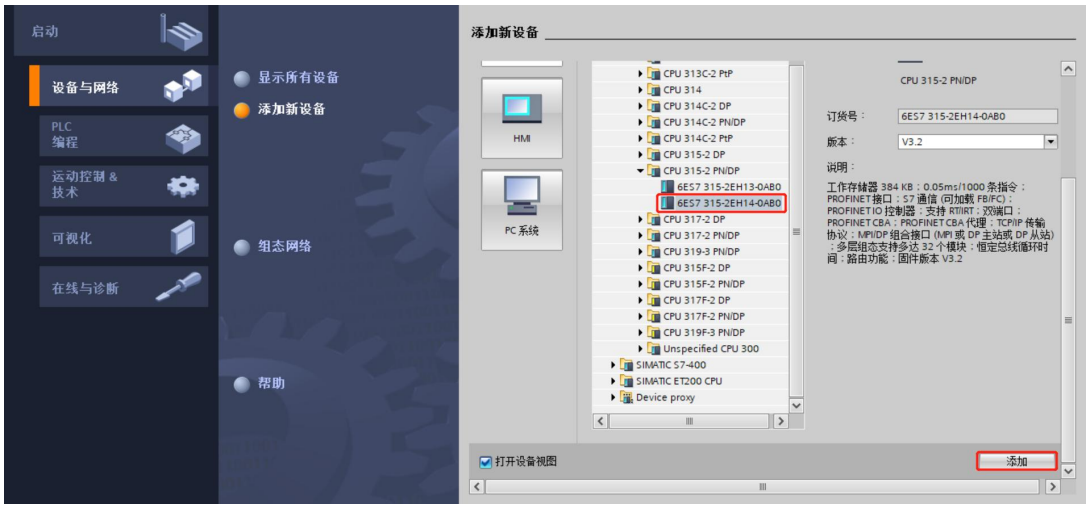
a. Open the TIA Portal V17 software, click "Create New Project", enter all the information and click "Create", as shown in the figure below.

- Project name: Customizable, you can keep the default.
- Path: Keep the project path; you can keep the default.
- Version: You can keep the default.
- Author: You can keep the default setting.
- Note: This is customizable and can be left blank.

3、Add PLC controller

a. Click "Configure Devices", as shown in the figure below.

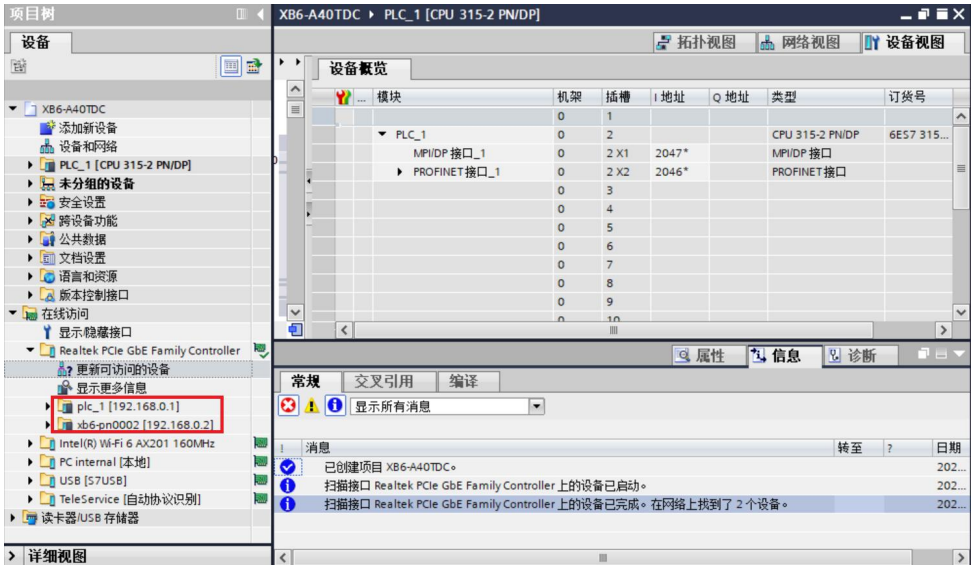
b. Click "Add New Device", select the PLC model you are currently using, and click "Add", as shown in the image below. After adding, you can see that the PLC has been added to the device navigation tree on the left.



4、Scan connection device

a. Click "Online Access -> Update Accessible Devices" in the left navigation tree, as shown in the image below.

b. The update is complete, and the connected slave devices are displayed, as shown in the figure below.



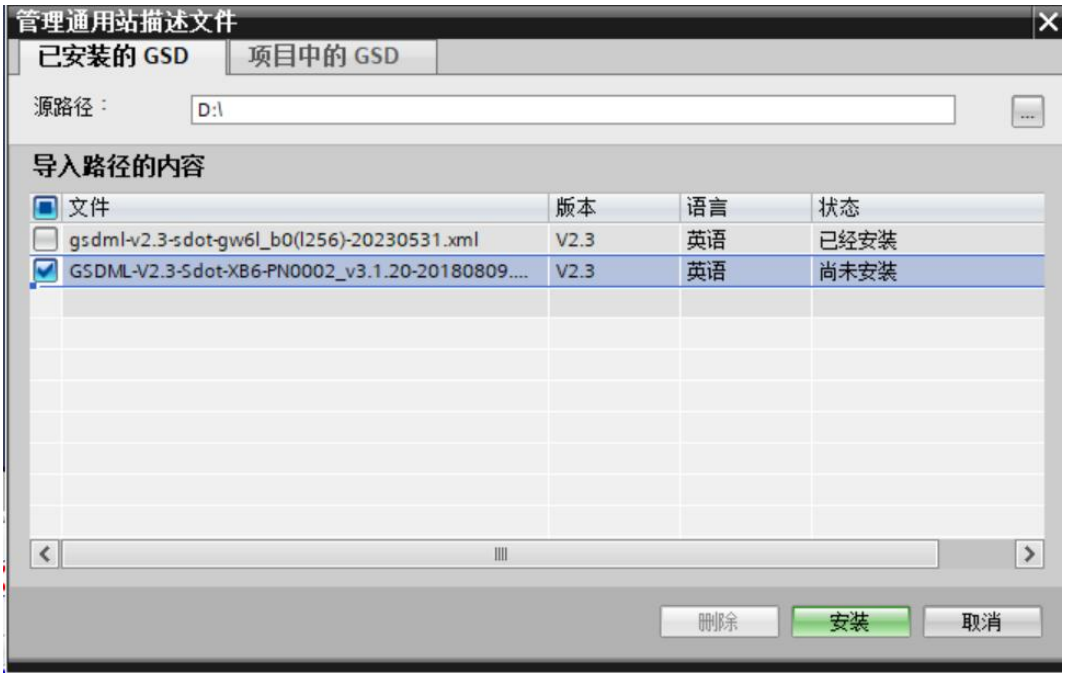
The computer's IP address must be on the same network segment as the PLC. If they are not on the same network segment, change the computer's IP address and repeat the above steps.

5、Add GSD configuration file

a. In the menu bar, select "Options -> Manage General Station Description Files (GSDML)(D)".

b. Click "Source Path" to select the folder where the GSD files are stored.

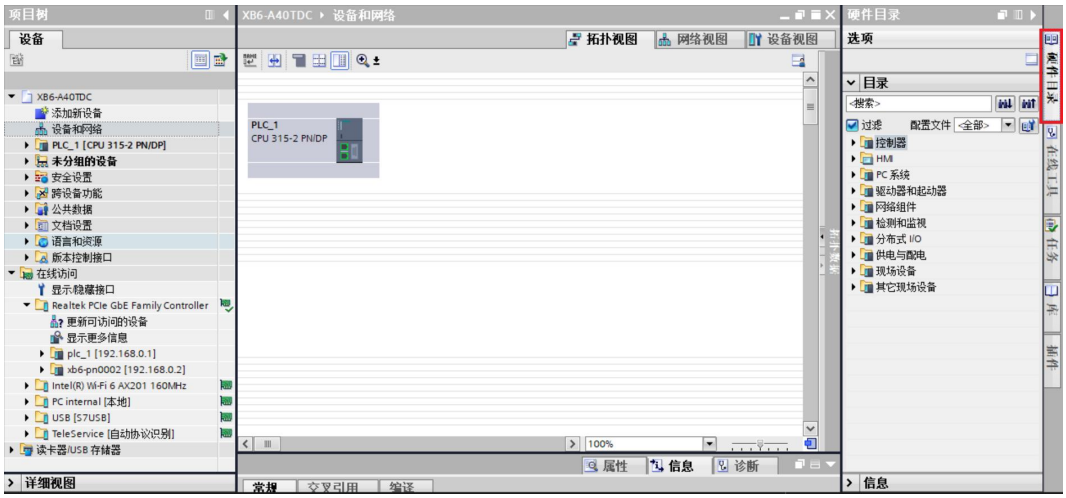
c. Check if the status of the GSD file to be added is "Not installed". If not installed, click the "Install" button. If already installed, click "Cancel" to skip the installation steps.



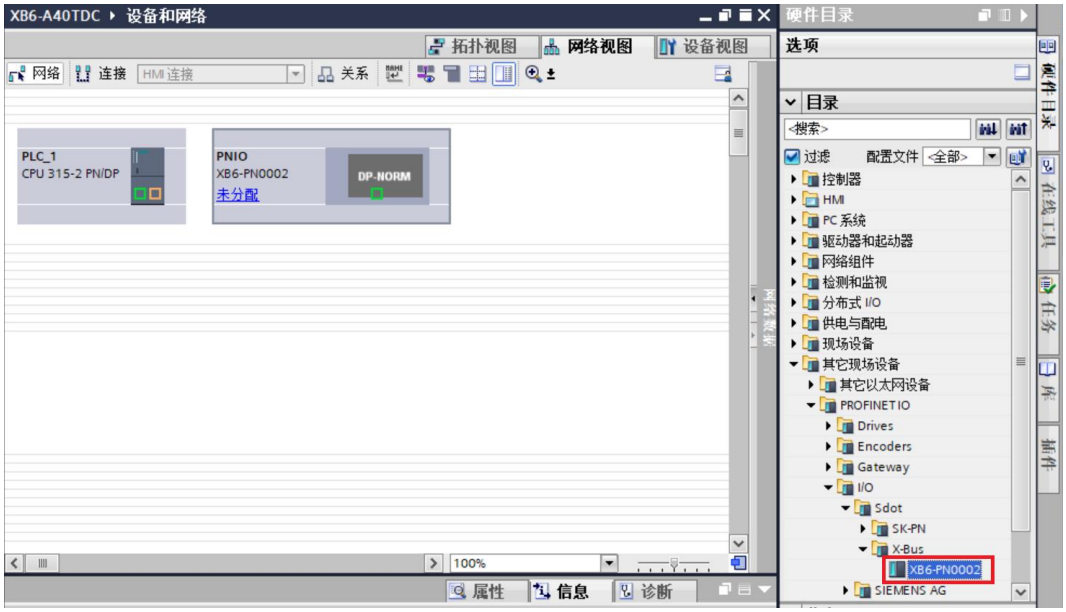
6、Add slave device

a. Double-click "Devices and Networks" in the left navigation tree.

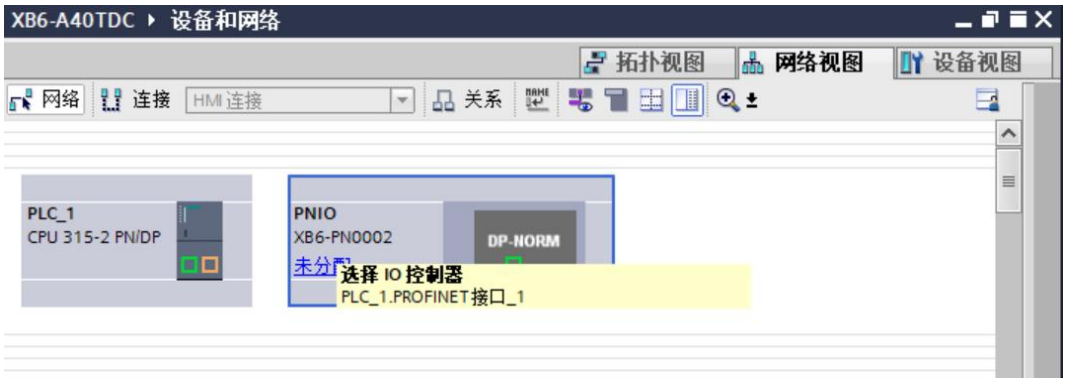
b. Click the vertical "Hardware Catalog" button on the right, and the catalog will be displayed as shown in the image below.



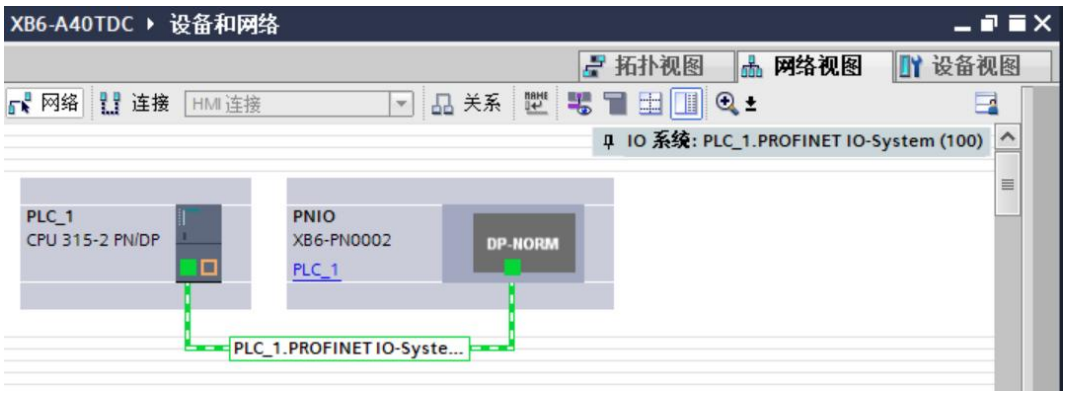
c. In the hardware catalog, select "Other Field Devices > PROFINET IO > I/O > Sdot > SK-PN > XB6-PN0002", then drag or double-click "XB6-PN0002" to the "Network View", as shown in the figure below. To connect multiple modules, add them sequentially according to the actual topology in the "Hardware Catalog" on the right.



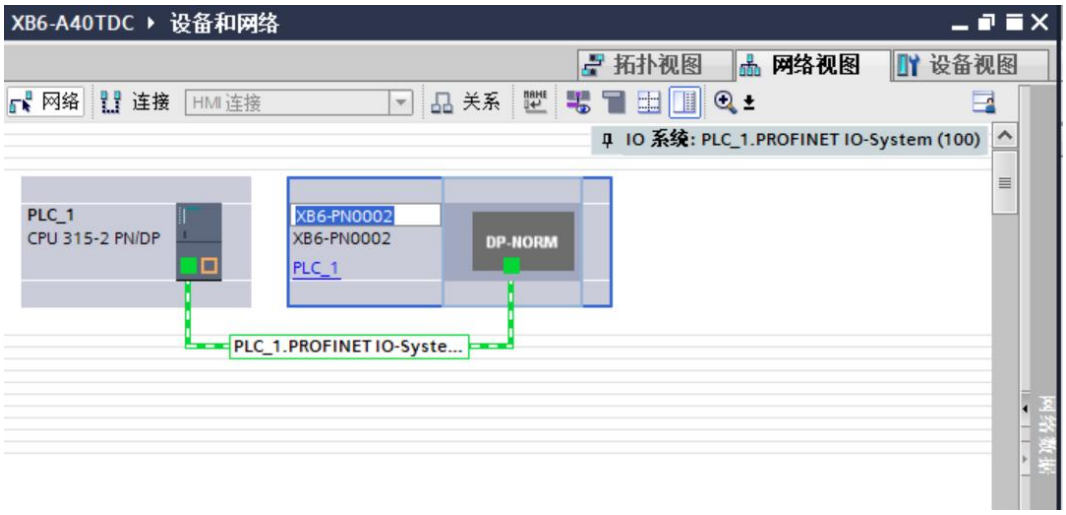
d. Click "Unassigned (blue text)" on the slave device, and select "PLC_1.PROFINET Interface_1", as shown in the figure below.



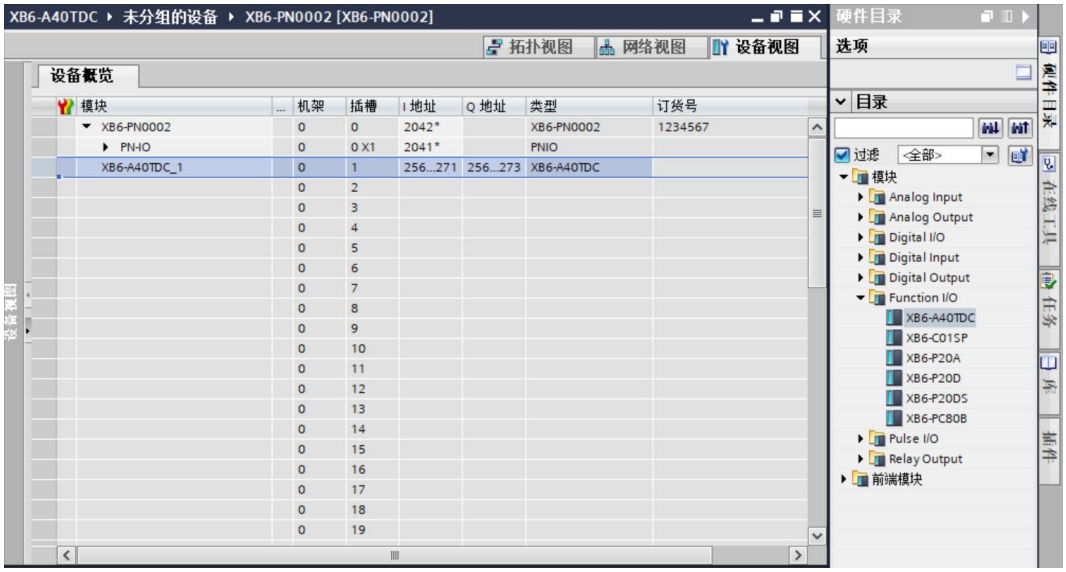
e. Once the connection is complete, it will look like the image below.



f. Click the device name to rename the device, as shown in the image below.

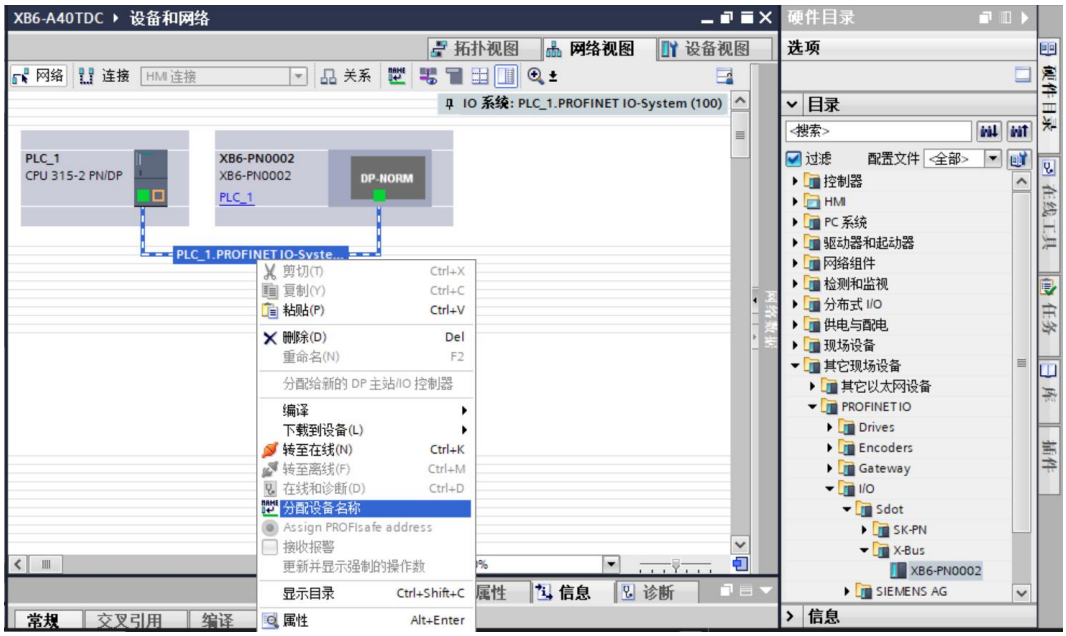


g. Click "Device View" to enter the device overview. Under the "Module" directory on the right, add temperature acquisition modules in the correct order according to the actual topology (the order must match the actual topology, otherwise communication will fail). After adding, you can see the topology configuration information and the I/O addresses automatically assigned by the system. You can change the I/O addresses yourself, as shown in the figure below.

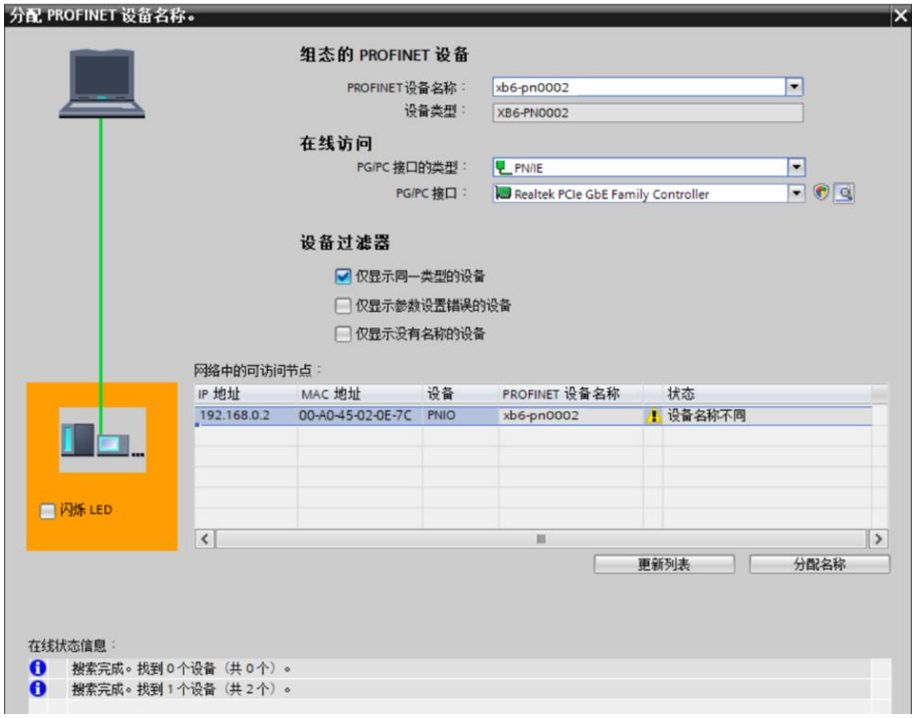


7、Assign device name

a. Switch to "Network View", right-click the connection cable between the PLC and the coupler, and select "Assign Device Name", as shown in the figure below.



b. A "Assign PROFINET Device Name" window will pop up, as shown in the figure below.

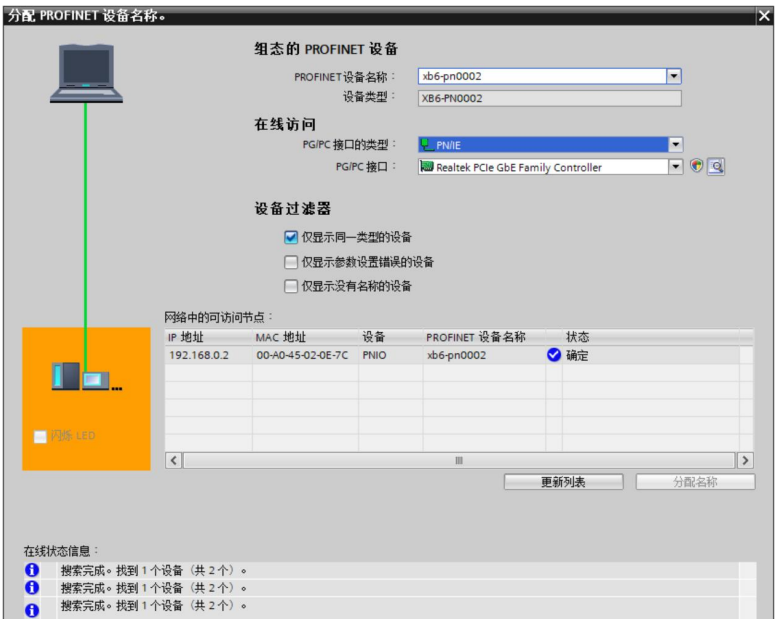


Check if the MAC address printed on the coupler is the same as the MAC address of the assigned device name.

◆ PROFINET Device Name: The name set in "Assign IP address and device name to slave station".

- PG/PC interface type: PN/IE.
- PG/PC interface: The actual network adapter used.

c. Select the slave devices in sequence, click "Update List", and then click "Assign Name". Check whether the status of the node in "Accessible Nodes in the Network" is "OK", as shown in the figure below.



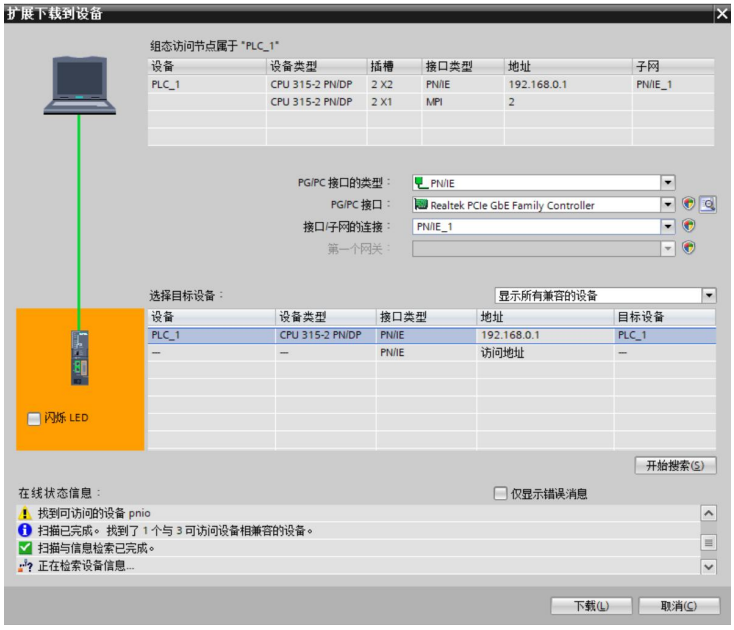
d. Click "Close".

8、Download configuration structure

a. In the "Network View", select PLC.

b. Click the button in the menu bar to download the current configuration to the PLC.

c. In the pop-up "Download extension to device" window, configure as shown in the image below, and then click "Start Search".



d. Click "Download".

e. Select "Continue without stepping", as shown in the image below.

f. Select "Stop All".

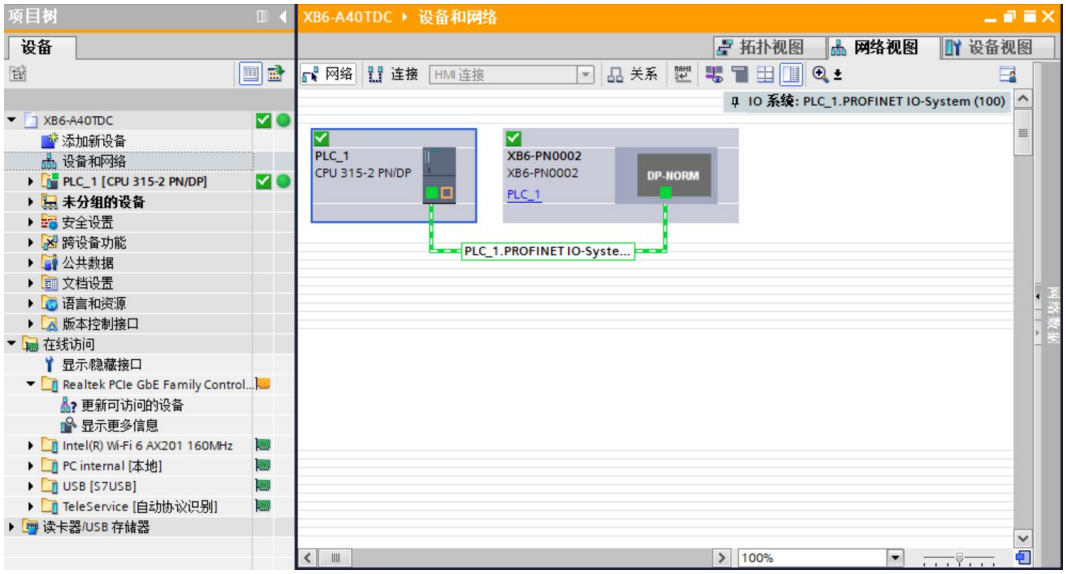
g. Click "Load".

h. Click "Finish".

i. Power on the device again.

9、Communication connection

a. Click  Click the button, then click "Go to Online". If all icons are green, the connection is successful, as shown in the image below.



10、 Check the equipment indicator lights

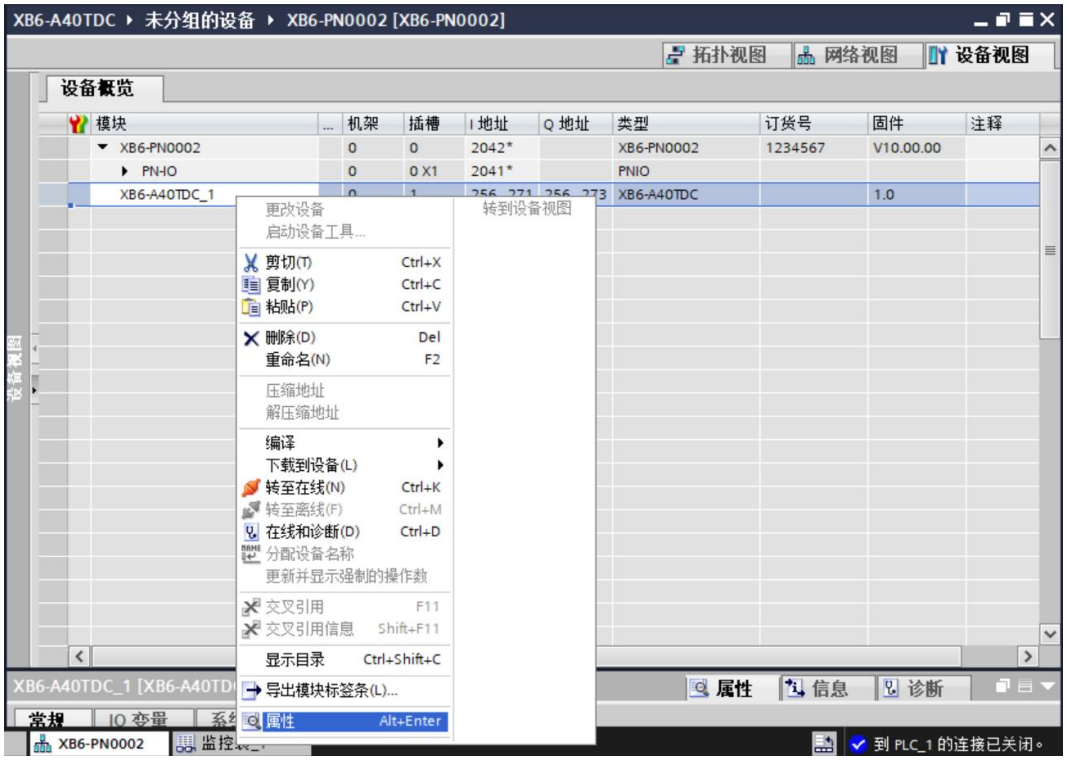
XB6-P2000H: P light is always green.

XB6-PN0002: P light is always green, L light is always on, B light is off, and R light is always on.

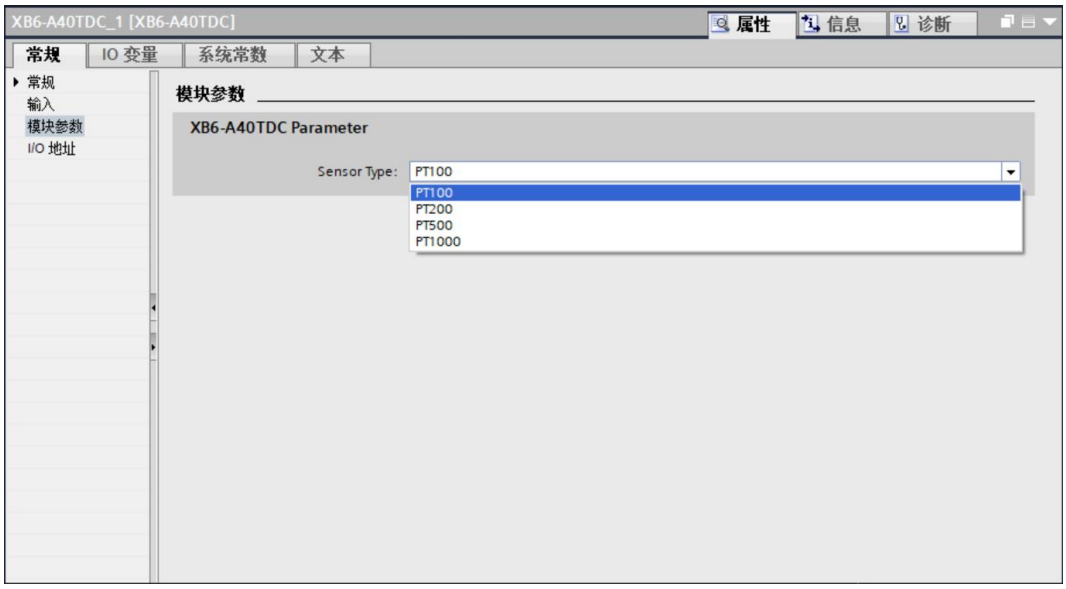
XB6-A40TDC module: P light is always on, R light is always on.

11、 Parameter settings

a. Open "Device View". In offline mode, right-click the module name and click "Properties", as shown in the figure below.

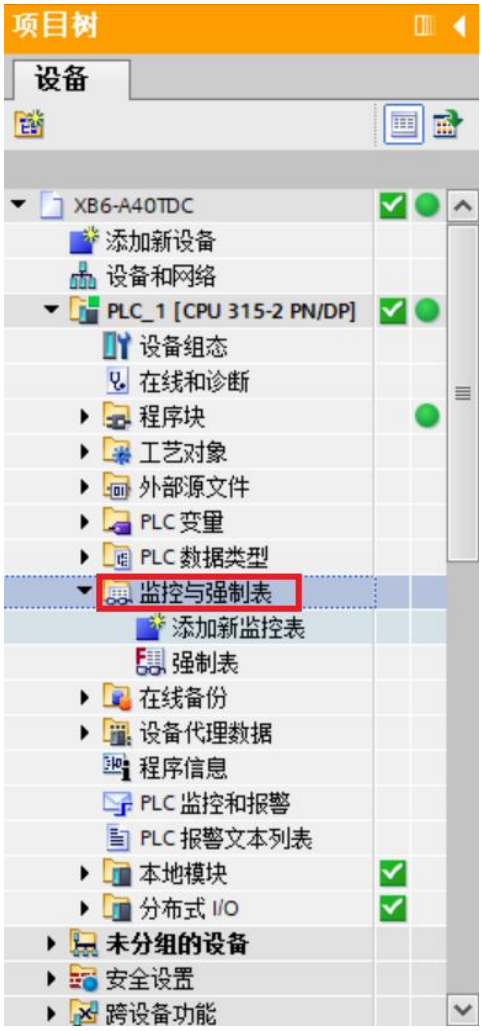


b. On the properties page, click "Module Parameters," as shown in the image below. The parameters can be configured according to actual usage needs. After configuration, re-download the program to the PLC, and then power on both the PLC and the module.



12、 Functional verification

a. Expand the project navigation on the left and select "Monitoring and Enforcement Tables", as shown in the image below.



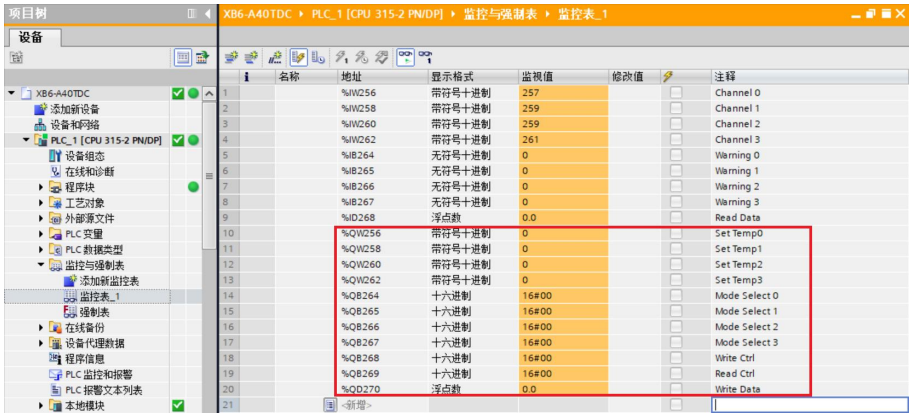
b. Double-click "Add New Monitoring Table" to add a new monitoring table, as shown in the image below.

c. Open "Device View" and view the module's channel Q address (channel address of output signal) and I address (channel address of input signal) in the device overview.
For example, the "I address" of the temperature control module is 256~271, and the "Q address" of the temperature control module is 256~273, as shown in the figure below.

d. In the monitoring table address cell, enter the Uplink and Downlink addresses, data types, and comments for easy monitoring. Refer to the Uplink and Downlink process data definitions and enter the data items sequentially, pressing "Enter". After completing all fields, click the button  allows you to monitor the data.

e. The Uplink data of the module is shown in the monitoring table as shown in the following figure which is used to monitor the status of the module.

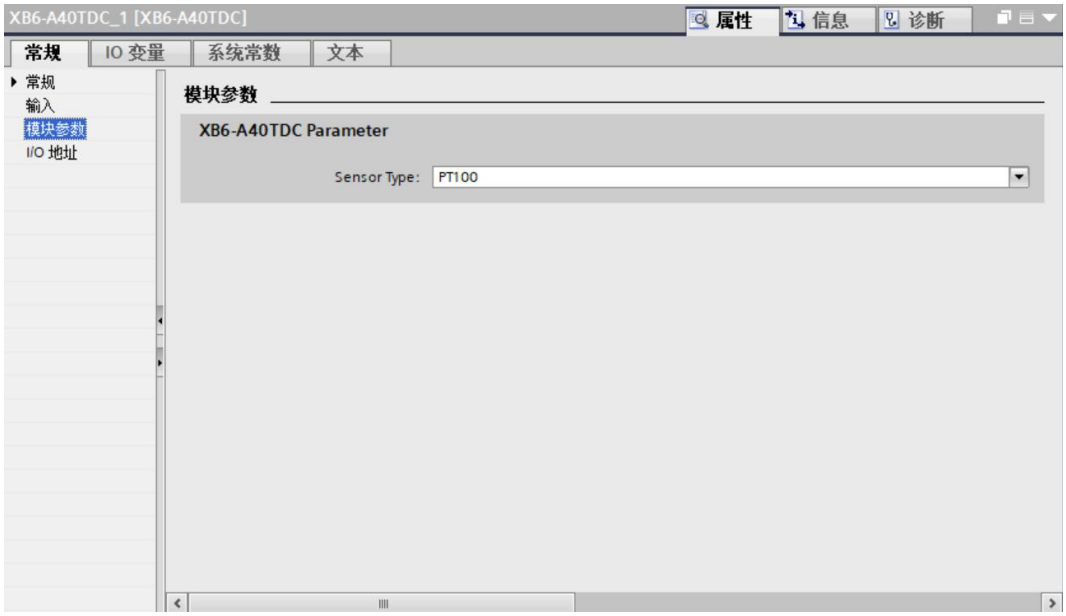
f. The module's downlink data is shown in the monitoring table below which is used to control the output status of the module.



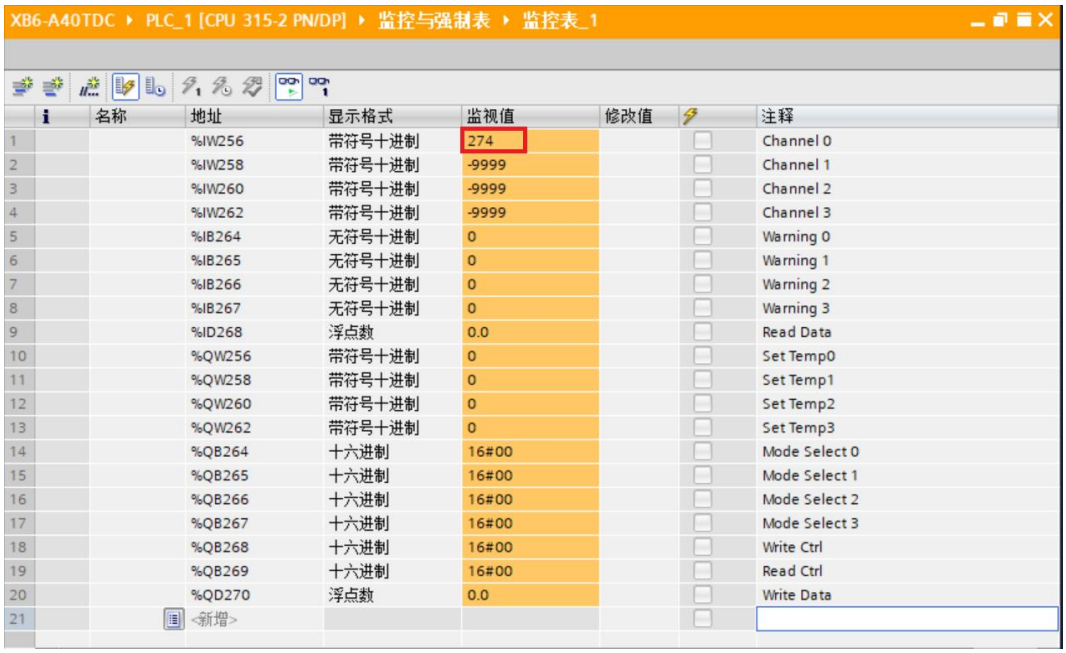
Module Function Examples

◆ **Temperature input channel 0 data monitoring**

a. The channel connects to the resistance temperature detector (RTD) sensor, and the configuration parameters are configured as shown in the figure below.

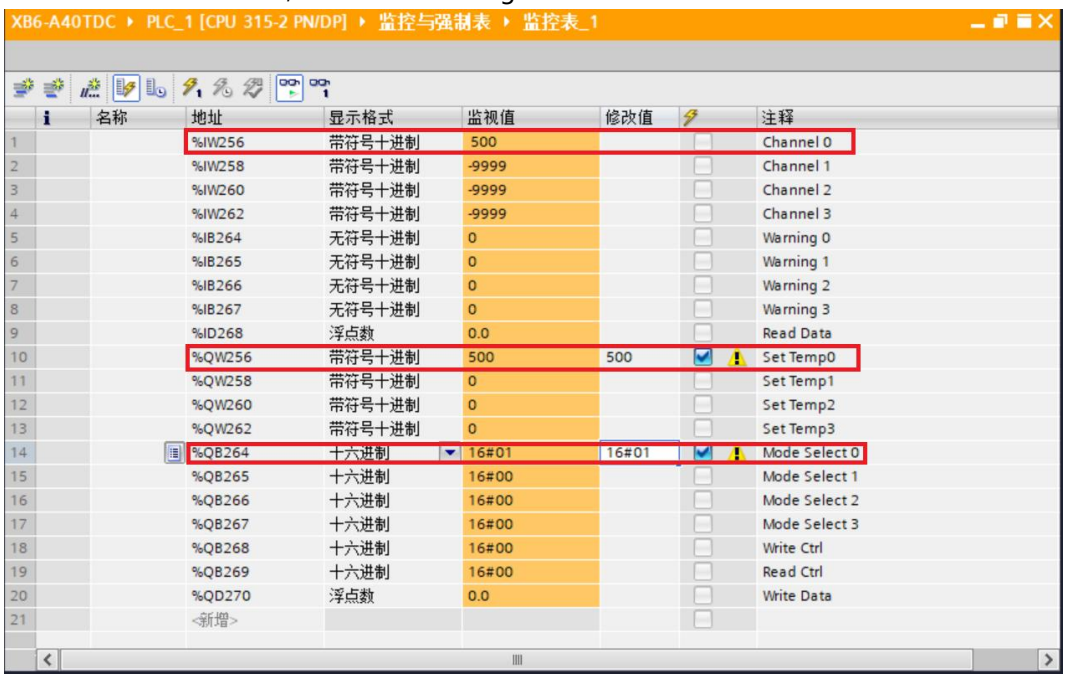


b. As you can see, the current temperature value of channel 0 is 274, or 27.4℃. Other channels are not connected to sensors and display a value of -9999, as shown in the figure below.



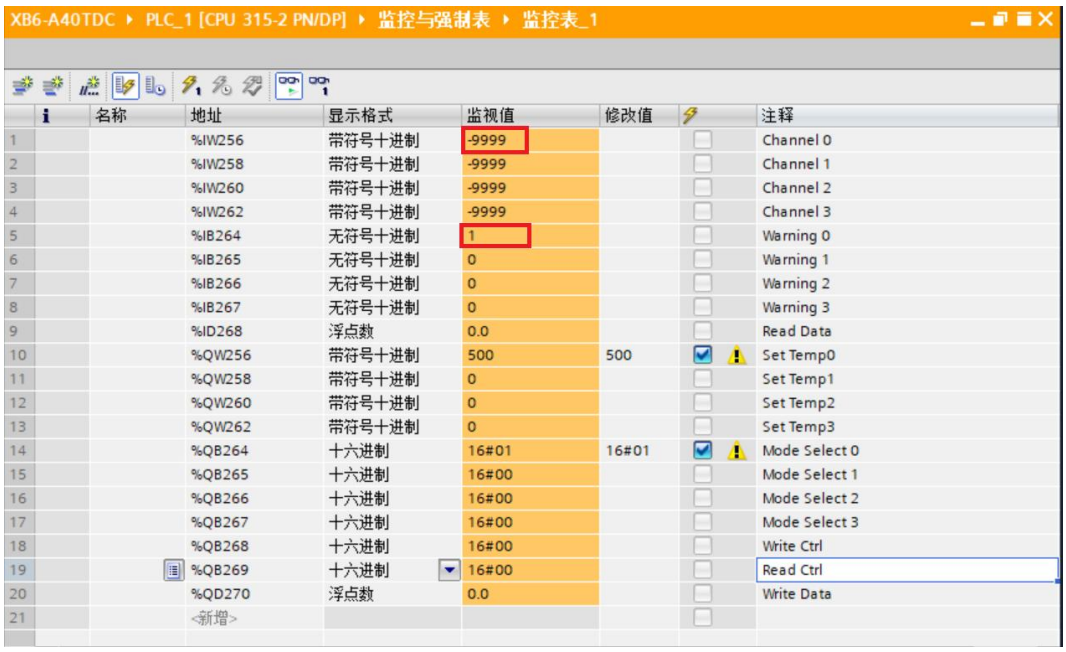
	名称	地址	显示格式	监视值	修改值		注释
1		%IW256	带符号十进制	274			Channel 0
2		%IW258	带符号十进制	-9999			Channel 1
3		%IW260	带符号十进制	-9999			Channel 2
4		%IW262	带符号十进制	-9999			Channel 3
5		%IB264	无符号十进制	0			Warning 0
6		%IB265	无符号十进制	0			Warning 1
7		%IB266	无符号十进制	0			Warning 2
8		%IB267	无符号十进制	0			Warning 3
9		%ID268	浮点数	0.0			Read Data
10		%QW256	带符号十进制	0			Set Temp0
11		%QW258	带符号十进制	0			Set Temp1
12		%QW260	带符号十进制	0			Set Temp2
13		%QW262	带符号十进制	0			Set Temp3
14		%QB264	十六进制	16#00			Mode Select 0
15		%QB265	十六进制	16#00			Mode Select 1
16		%QB266	十六进制	16#00			Mode Select 2
17		%QB267	十六进制	16#00			Mode Select 3
18		%QB268	十六进制	16#00			Write Ctrl
19		%QB269	十六进制	16#00			Read Ctrl
20		%QD270	浮点数	0.0			Write Data
21		<新增>					

c. The temperature control mode is set to PID control, and the target temperature value is set to 500 (50℃). It can be seen that the temperature rises to 50℃, and after the first overshoot, it gradually stabilizes at around 50℃, as shown in the figure below.



	名称	地址	显示格式	监视值	修改值		注释
1		%IW256	带符号十进制	500			Channel 0
2		%IW258	带符号十进制	-9999			Channel 1
3		%IW260	带符号十进制	-9999			Channel 2
4		%IW262	带符号十进制	-9999			Channel 3
5		%IB264	无符号十进制	0			Warning 0
6		%IB265	无符号十进制	0			Warning 1
7		%IB266	无符号十进制	0			Warning 2
8		%IB267	无符号十进制	0			Warning 3
9		%ID268	浮点数	0.0			Read Data
10		%QW256	带符号十进制	500	500	☑ ⚠	Set Temp0
11		%QW258	带符号十进制	0			Set Temp1
12		%QW260	带符号十进制	0			Set Temp2
13		%QW262	带符号十进制	0			Set Temp3
14		%QB264	十六进制	16#01	16#01	☑ ⚠	Mode Select 0
15		%QB265	十六进制	16#00			Mode Select 1
16		%QB266	十六进制	16#00			Mode Select 2
17		%QB267	十六进制	16#00			Mode Select 3
18		%QB268	十六进制	16#00			Write Ctrl
19		%QB269	十六进制	16#00			Read Ctrl
20		%QD270	浮点数	0.0			Write Data
21		<新增>					

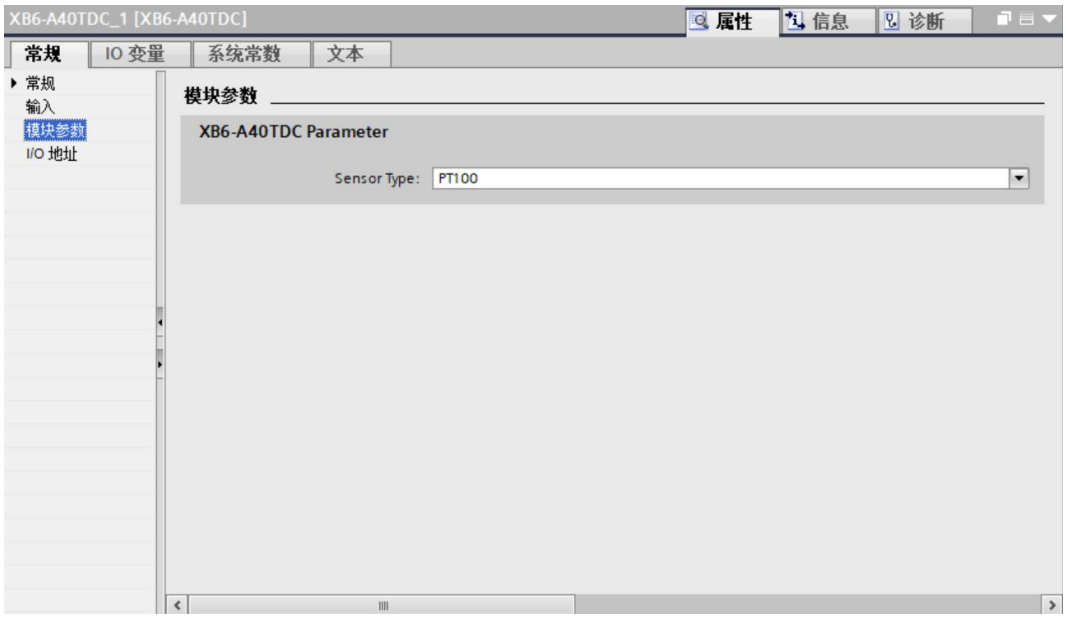
d. After unplugging the sensor connected to channel 0, you can see that the value displayed on channel 0 is -9999, and the alarm value is set to 1, as shown in the figure below.



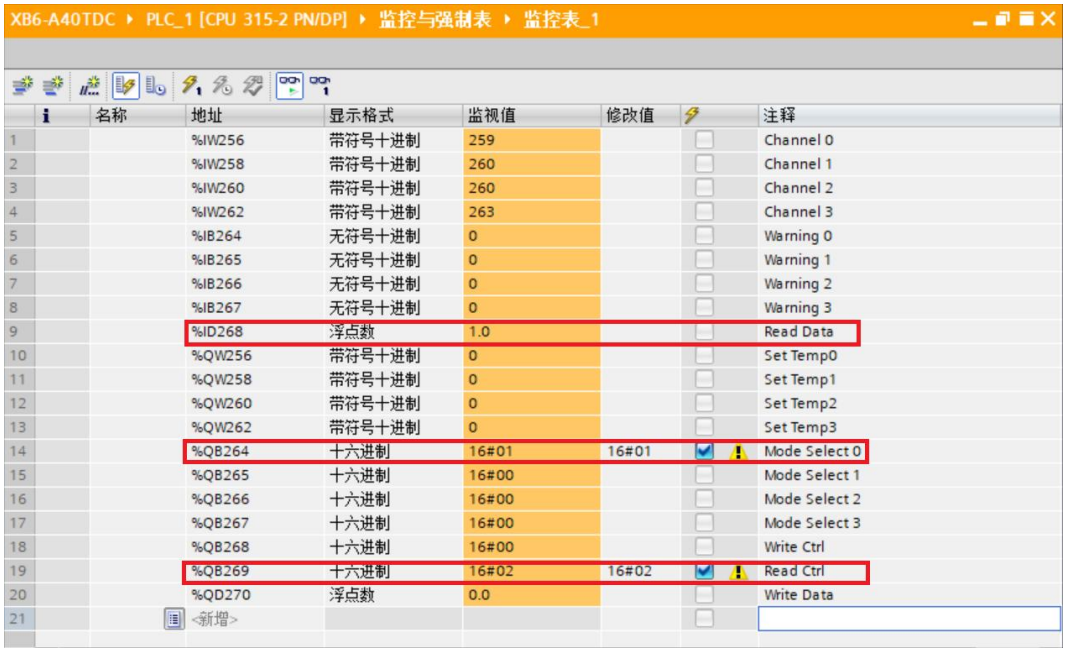
	名称	地址	显示格式	监视值	修改值		注释
1		%IW256	带符号十进制	-9999			Channel 0
2		%IW258	带符号十进制	-9999			Channel 1
3		%IW260	带符号十进制	-9999			Channel 2
4		%IW262	带符号十进制	-9999			Channel 3
5		%IB264	无符号十进制	1			Warning 0
6		%IB265	无符号十进制	0			Warning 1
7		%IB266	无符号十进制	0			Warning 2
8		%IB267	无符号十进制	0			Warning 3
9		%ID268	浮点数	0.0			Read Data
10		%QW256	带符号十进制	500	500	☑ ⚠	Set Temp0
11		%QW258	带符号十进制	0			Set Temp1
12		%QW260	带符号十进制	0			Set Temp2
13		%QW262	带符号十进制	0			Set Temp3
14		%QB264	十六进制	16#01	16#01	☑ ⚠	Mode Select 0
15		%QB265	十六进制	16#00			Mode Select 1
16		%QB266	十六进制	16#00			Mode Select 2
17		%QB267	十六进制	16#00			Mode Select 3
18		%QB268	十六进制	16#00			Write Ctrl
19		%QB269	十六进制	16#00			Read Ctrl
20		%QD270	浮点数	0.0			Write Data
21		<新增>					

◆ **Read the PID coordination coefficient An parameter value in PID control mode**

a. The channel connects to the resistance temperature detector (RTD) sensor, and the configuration parameters are configured as shown in the figure below.



b. Taking channel 0 of the module as an example, set the temperature control mode to PID control, and read the control word to read the PID coordination coefficient An. You can see the current value of the PID coordination coefficient An for channel 0, as shown in the figure below.

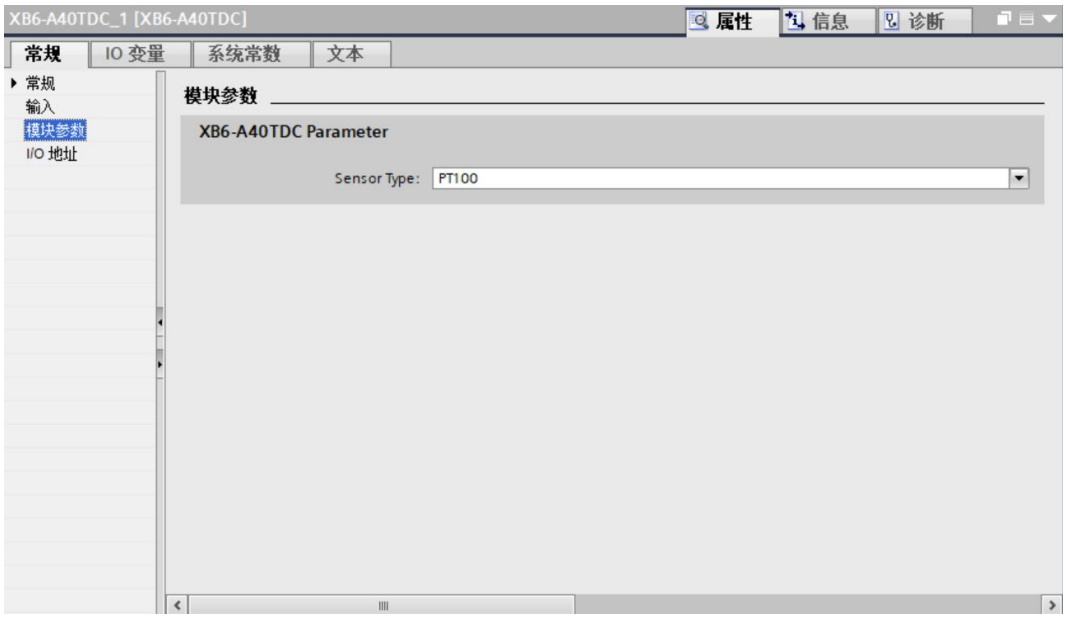


	名称	地址	显示格式	监视值	修改值		注释
1		%IW256	带符号十进制	259			Channel 0
2		%IW258	带符号十进制	260			Channel 1
3		%IW260	带符号十进制	260			Channel 2
4		%IW262	带符号十进制	263			Channel 3
5		%IB264	无符号十进制	0			Warning 0
6		%IB265	无符号十进制	0			Warning 1
7		%IB266	无符号十进制	0			Warning 2
8		%IB267	无符号十进制	0			Warning 3
9		%ID268	浮点数	1.0			Read Data
10		%QW256	带符号十进制	0			Set Temp0
11		%QW258	带符号十进制	0			Set Temp1
12		%QW260	带符号十进制	0			Set Temp2
13		%QW262	带符号十进制	0			Set Temp3
14		%QB264	十六进制	16#01	16#01		Mode Select 0
15		%QB265	十六进制	16#00			Mode Select 1
16		%QB266	十六进制	16#00			Mode Select 2
17		%QB267	十六进制	16#00			Mode Select 3
18		%QB268	十六进制	16#00			Write Ctrl
19		%QB269	十六进制	16#02	16#02		Read Ctrl
20		%QD270	浮点数	0.0			Write Data
21		<新增>					

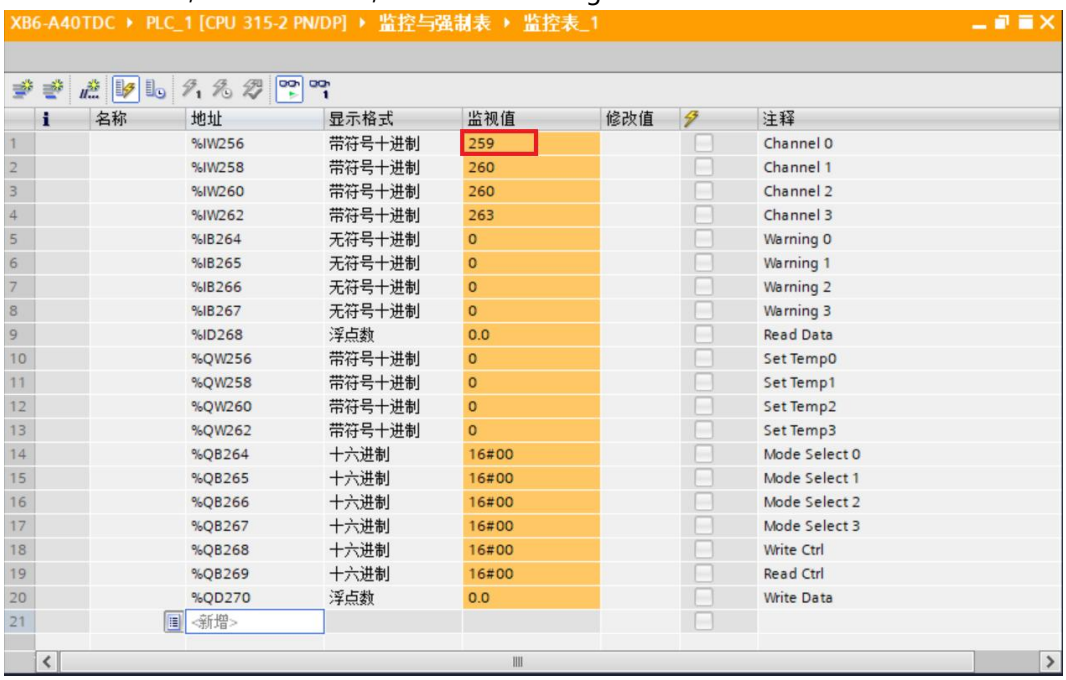
Note: For example, when reading the self-tuning status of channel 1, Read Ctrl is 0x11; when reading the PID coordination coefficient An, Read Ctrl is 0x12; when reading the PID proportional coefficient P, Read Ctrl is 0x13, and so on. The other channels are similar.

◆ **Temperature compensation**

a. The channel connects to the resistance temperature detector (RTD) sensor, and the configuration parameters are configured as shown in the figure below.

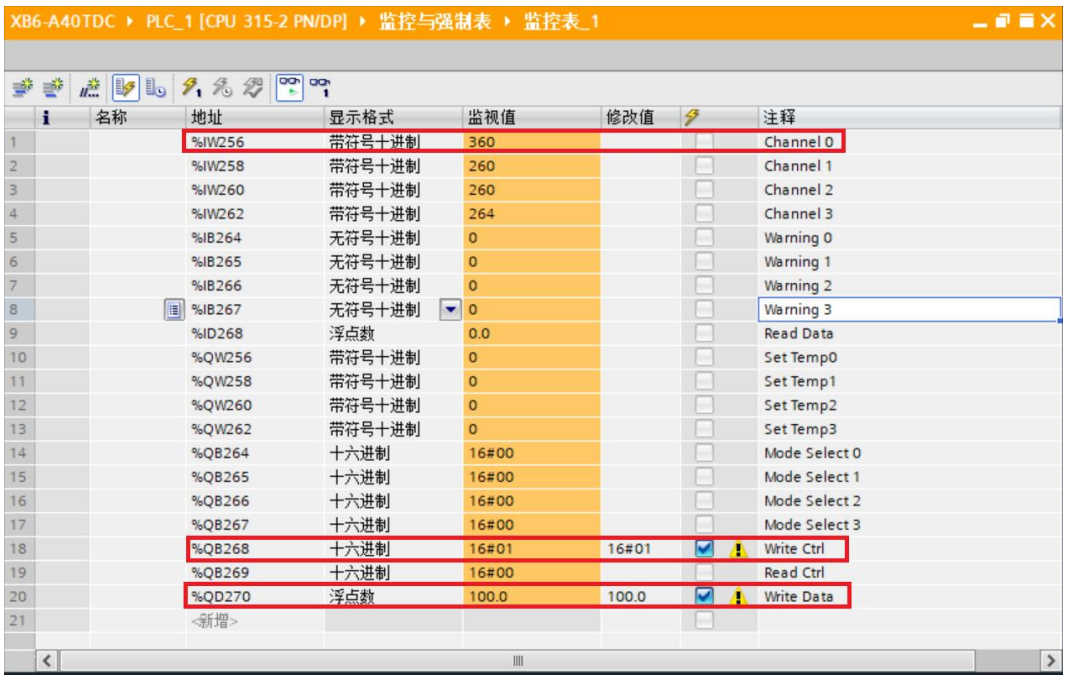


b. Taking module channel 0 as an example, we can see that the temperature value measured by channel 0 is 259, which is 25.9℃, as shown in the figure below.



	i	名称	地址	显示格式	监视值	修改值		注释
1			%IW256	带符号十进制	259			Channel 0
2			%IW258	带符号十进制	260			Channel 1
3			%IW260	带符号十进制	260			Channel 2
4			%IW262	带符号十进制	263			Channel 3
5			%IB264	无符号十进制	0			Warning 0
6			%IB265	无符号十进制	0			Warning 1
7			%IB266	无符号十进制	0			Warning 2
8			%IB267	无符号十进制	0			Warning 3
9			%ID268	浮点数	0.0			Read Data
10			%QW256	带符号十进制	0			Set Temp0
11			%QW258	带符号十进制	0			Set Temp1
12			%QW260	带符号十进制	0			Set Temp2
13			%QW262	带符号十进制	0			Set Temp3
14			%QB264	十六进制	16#00			Mode Select 0
15			%QB265	十六进制	16#00			Mode Select 1
16			%QB266	十六进制	16#00			Mode Select 2
17			%QB267	十六进制	16#00			Mode Select 3
18			%QB268	十六进制	16#00			Write Ctrl
19			%QB269	十六进制	16#00			Read Ctrl
20			%QD270	浮点数	0.0			Write Data
21			<新增>					

c. Set the write control word to the set temperature calibration value, and the temperature compensation value to 100, which is 10℃. After setting the compensation value, the temperature value of channel 0 is 360, which is 36℃, as shown in the figure below.



	名称	地址	显示格式	监视值	修改值		注释
1		%IW256	带符号十进制	360			Channel 0
2		%IW258	带符号十进制	260			Channel 1
3		%IW260	带符号十进制	260			Channel 2
4		%IW262	带符号十进制	264			Channel 3
5		%IB264	无符号十进制	0			Warning 0
6		%IB265	无符号十进制	0			Warning 1
7		%IB266	无符号十进制	0			Warning 2
8		%IB267	无符号十进制	0			Warning 3
9		%ID268	浮点数	0.0			Read Data
10		%QW256	带符号十进制	0			Set Temp0
11		%QW258	带符号十进制	0			Set Temp1
12		%QW260	带符号十进制	0			Set Temp2
13		%QW262	带符号十进制	0			Set Temp3
14		%QB264	十六进制	16#00			Mode Select 0
15		%QB265	十六进制	16#00			Mode Select 1
16		%QB266	十六进制	16#00			Mode Select 2
17		%QB267	十六进制	16#00			Mode Select 3
18		%QB268	十六进制	16#01	16#01		Write Ctrl
19		%QB269	十六进制	16#00			Read Ctrl
20		%QD270	浮点数	100.0	100.0		Write Data
21		<新增>					

Note: For example, if you set the temperature calibration value for channel 1, write Ctrl to 0x11; if you set the PID coordination coefficient An for channel 1, write Ctrl to 0x12; if you set the PID proportional coefficient P for channel 1, write Ctrl to 0x13, and so on. The other channels are similar.