

RB Series Adapter

User Manual

DECOWELL Industrial Intelligence makes reliable partners



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Preface

■ Profile

Thank you for purchasing DECOWELL RB series card-type I/O modules!

RB series card-type I/O modules are distributed expansion modules developed by DECOWELL. This series of modules consists of adapters, I/O modules, power modules, and terminal modules. The adapter can support a variety of communication buses, such as PROFINET, EtherCAT, Ethernet/IP, etc. I/O modules can be divided into digital input modules, digital output modules, analog input modules, analog output modules, and functional modules. Users can match them according to actual applications.

RB-1110 is PROFINET Bus adapter, each module can be expanded to 32 input and output modules at most.

This manual mainly describes the specifications, features and usage of the module. Please read it carefully before use so that you can use this product more clearly and safely.

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Safety precautions

■ Security Statement

01. Please read and follow these safety precautions before installing, operating and maintaining the product.
02. To ensure personal and equipment safety, please follow all safety precautions marked on the product and described in the manual when installing, operating and maintaining the product.
03. The “Tips”, “Notice”, “Warnings” and “Dangers” in this manual do not represent all the safety matters that should be followed, but only serve as a supplement to all safety precautions.
04. This product should be used in an environment that meets the design specifications. Otherwise, it may cause malfunctions. Functional abnormalities or component damage caused by failure to comply with relevant regulations are not within the scope of product quality assurance.
05. DECOWELL does not assume any legal responsibility for personal safety accidents, property losses, etc. caused by illegal operation of products.

■ Security Level Definition



This mark indicates "necessary supplement or explanation for the description of the operation".



This mark indicates "the danger caused by failure to operate as required may result in minor or moderate personal injury and equipment damage."



This mark indicates "hazards caused by failure to follow the instructions may result in personal injury or death."

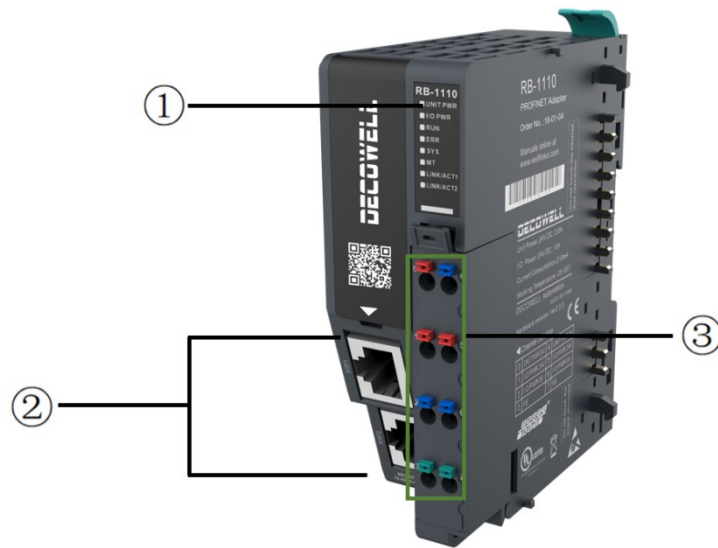
Warning in control system design

01. Safety circuits must be designed to ensure the control system maintains safe operation during external power failures or expansion module malfunctions;
02. When the output circuit is over currented for a long time due to exceeding the rated load current or load short circuit, the module may smoke or catch fire. Safety devices such as fuses or circuit breakers should be installed externally.

Notice in control system design

01. Emergency stop circuits, protective circuits, interlock circuits for forward/reverse operations, and upper/lower limit interlock switches to prevent equipment damage must be installed in the external circuitry of expansion modules;
02. To ensure the safe operation of the equipment, please design external protection circuits and safety mechanisms for output signals related to major accidents;
03. When the output units such as relays and transistors of the expansion module are damaged, their outputs cannot be controlled to the ON or OFF state;
04. The expansion module is designed for use in indoor electrical environments with overvoltage level II. The power system level should be equipped with lightning protection device to ensure that lightning-induced overvoltage is not applied to the power input terminals, signal input terminals, control output terminals and other ports of the expansion module to avoid damage to the equipment.

1.2 Component Description



picture1-2-1Component Description Diagram

Parts Description Table

NO.	Name	Function Definition			
1	Status indicator	SYS	System indicator light (green/color)	1Hz flashing frequency (green)	Communication is normal
				5Hz flashing frequency (green)	IO slave lost
				Two flashes and one off	IO module configuration failed
		UNIT PWR	System power indicator Light (red/green)	Bright (green)	The system power supply is normal
				Destroy	No power
				Bright (red)	System power failure or power overload
		IO PWR	IO power indicator (Red/Green)	Bright (green)	IO power supply is normal
				Bright (red)	IO power supply is not connected or is faulty
		MT	Maintenance indicator light (blue)	Destroy	Working fine
				Bright	Restore factory settings
				Flash	Module Upgrade
		RUN	Running indicator light (green)	Bright	Communication is normal, data transmission is normal
				Destroy	Communication stops, data transmission stops

		ERR	System fault indicator light (red)	Bright	The network is not connected or is down
				Flash	Network connection/PN communication abnormality
				Destroy	Network connection/PN Communication normal
		LINK/ACT1	Network port IN indicator light (green/orange)	Flashing (green)	Receiving data
				Destroy	Communication abnormality or data stop
				Steady on (orange)	The network connection is normal
		LINK/ACT2	Network port OUT indicator light (green/orange)	Flashing (green)	Receiving data
				Off (green)	The network is not connected or abnormal
				Steady on (orange)	The network connection is normal
2	Communication Ports	Communication input and output ports can be connected to subsequent slave stations, and the network port has switch function.			

3.Power port definition

0	24V	Adapter Power+	4	0V	Adapter Power -
1	24V	IO Power+	5	24V	IO Power+
2	0V	IO power supply-	6	0V	IO power supply-
3	PE	Functional grounding	7	PE	Functional grounding

1.3 Technical specifications

Basic parameters	
Dimensions	100×77×34mm
Protection level	IP20
Wiring specifications	0.2~1.5mm ²
Wiring method	Screw-free
weight	140g

Power parameters	
System side power input	DC24V(18~36)
The system side provides current	2A(Max)
IO Port side power input	DC24V(±20%)
IO Port side output current	10A(Max)
Electrical isolation on the system	AC500V
Power protection	Overcurrent protection Overvoltage protection Anti-reverse connection protection
Software Parameters	
Address Settings	According to the main site
Extension I/O quantity	32
Maximum input/output bytes	Input:1015 Byte/Output:1015 Byte
Communication rate	100Mbps
Transmission distance	100m (distance between stations)

1.4 Environmental Specifications

Environmental parameters	
Operating temperature	-20~60°C
Operating humidity	95% non-condensing
atmosphere	≥795 hPa (altitude ≤ 2000 m) as per IEC 61131-2
Storage temperature	-40~+80°C
Overvoltage category	I

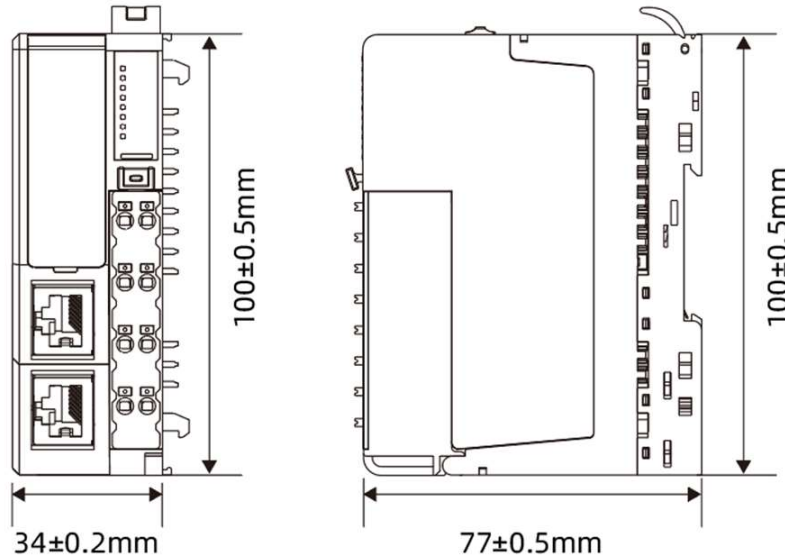


- The controller is connected via a switchRB-1110It is recommended to use a standard industrial Ethernet switch to prevent equipment abnormalities caused by switch network problems.
- Some switches are equipped with BSP and QoS functions, which can handle certain network interference in specific environments. If there is a cascaded switch setup on-site, the BSP function must be enabled.

2.Mechanical installation

2.1 Installation dimensions

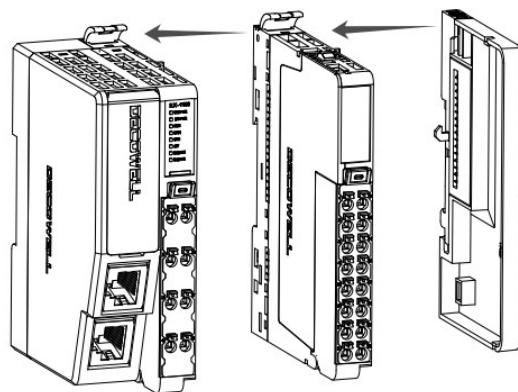
The installation dimensions are shown in the figure below. The unit is (mm).



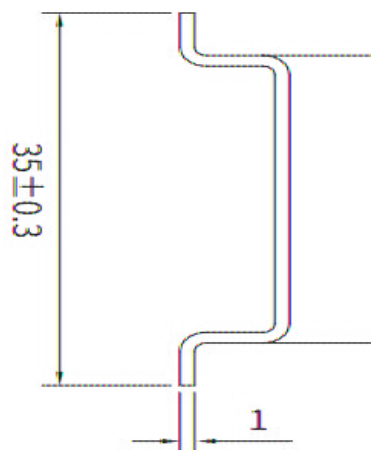
2.2 Installation Method

2.2.1 Inter-module installation

The assembly between modules is installed by operating the locking/release lever at the top of the module, as shown in the figure below.



The module is installed on a DIN rail. The DIN rail must comply with the IEC 60715 standard (35 mm wide and 1 mm thick). Dimensions.



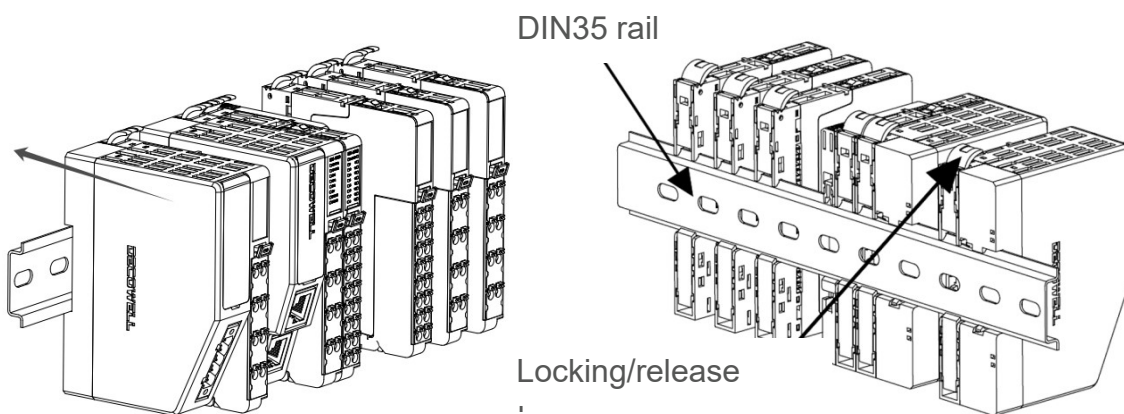
Note: When the module is installed on a DIN35 rail other than the one recommended above, the DIN rail lock may not lock properly. First, open the lock lever on the top of the module., and then proceed to the next step of installation.

**Notice**

- This product is installed on a DIN rail other than the one recommended above (especially the thickness of the DIN rail $\leq 1.0\text{mm}$), the DIN rail lock will fail, the product cannot be installed in place, and the product cannot work properly.

2.2.2 Installation on rails

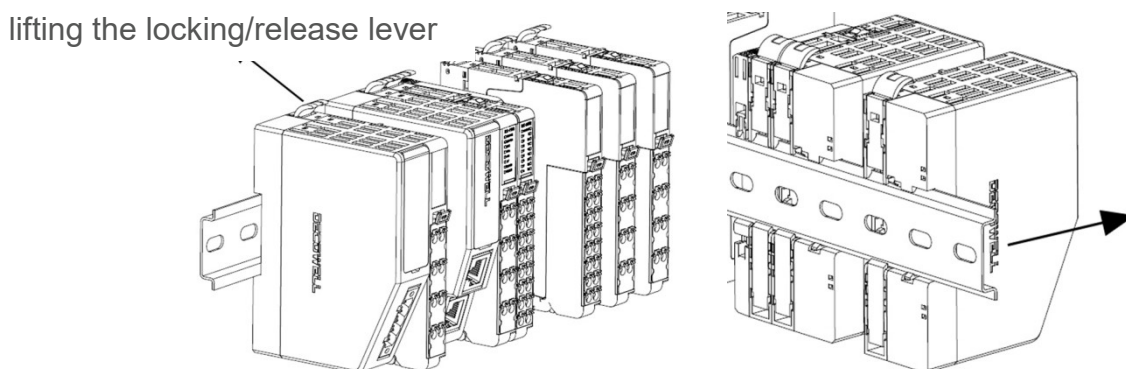
During installation, align the module with the DIN35 rail and press the module in the direction indicated by the arrow, as shown in the figure below.



Note: After installing the module, press the lock-release lever downward by hand to secure the module onto the guide rail, ensuring it is properly installed.

Disassembly:

Push the lock lever upwards by hand, and then pull the module away from the DIN35 rail.



3. Electrical installation

3.1 Cable Selection

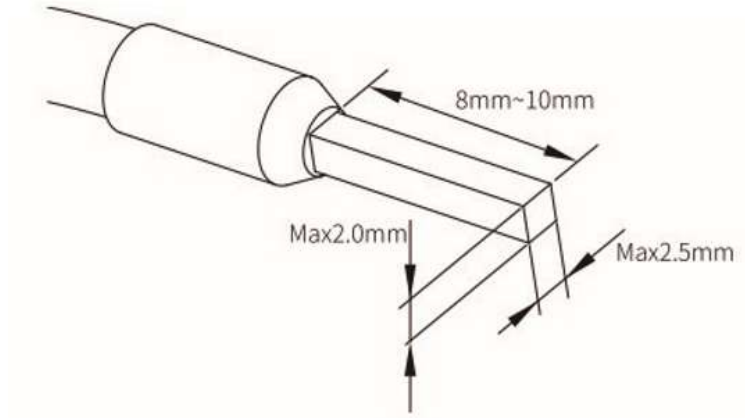
PROFINET bus communication uses shielded network cables for network data transmission, without short circuit, misalignment and poor contact; the length of the cable between devices cannot exceed 100m, exceeding this length will cause signal attenuation and affect normal communication. The following specifications of network cables are recommended:

Name	Function Definition
Cable Type	Flexible crossover cable, S-FTP, 5Class Line
Standards met	EIA/TIA568A, EN50173, ISO/IEC11801 EIA/TI A bulletin TSB, EIA/TIA SB40-A&TSB36
Conductor cross section	AWG26
Wire Type	Twisted Pair
Line pair	4

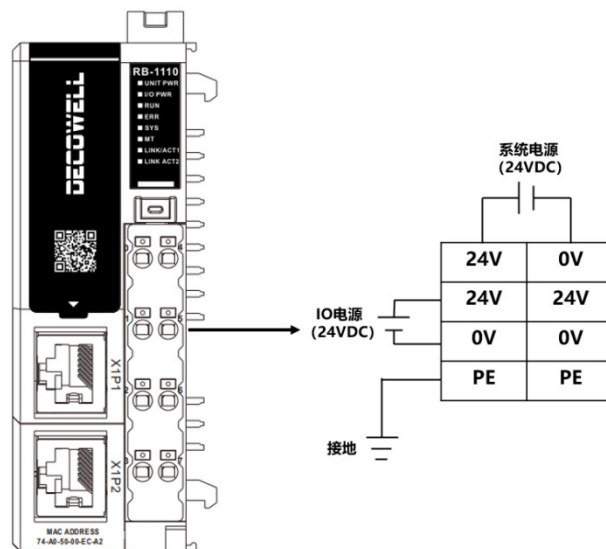
Power supply related cables, the wire diameters of the wire ears in the following table are for reference only and can be reasonably calculated and adjusted according to actual use.

Name	Applicable wire diameter	
	National standard/mm2	American Standard/AWG
Tube wire ear	0.75	18
	1.0	18
	1.5	16

The shape and size requirements of the riveted terminals are shown in the following figure:



3.2 Terminal wiring



Notice

- The adapter module grounding terminal needs to be directly grounded to prevent interference with the IO module signal.
- The power supply for the RB series adapters is divided into system power and I/O power. To avoid interference with the system, it is recommended to connect two separate sets of power cables from the same DC24V power module to the adapter's system power and I/O power terminals, respectively.

4. Module Usage

4.1 Reset and upgrade functions

4.1.1 Reset function



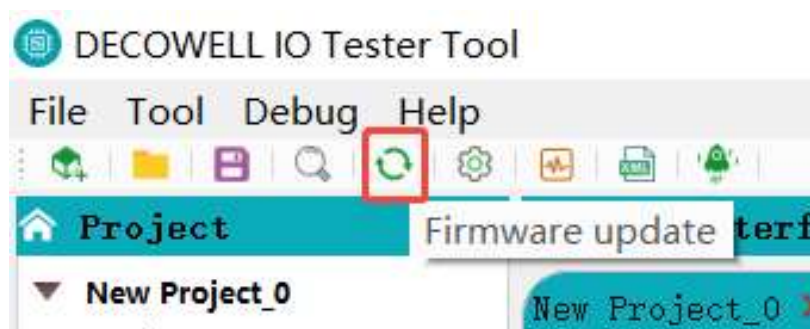
Press and hold the Reset button for 5 seconds, then release it to restore the device to factory settings and restart.

4.1.2 Upgrade function

Connect the computer to the Type-C port of the adapter.



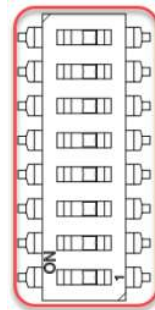
Click Online Upgrade in IO Tester Tool



Click Search, select the corresponding upgrade file after searching for the module, check the module and click Start Upgrade



4.2 Dial Instructions



The device name can be defined by the DIP switch. The relationship between the device name and the DIP value is shown in the following table (two devices cannot appear in the same network).

DIP switch pin number (NO: 1/OFF:0)								DIP value	Device Name
1	2	3	4	5	6	7	8		
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0	User-defined (software settings)
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	1	rb1110-001
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	2	rb1110-002
.
OFF	ON	OFF	ON	OFF	OFF	OFF	OFF	10	rb1110-010
OFF	ON	ON	ON	ON	ON	ON	ON	254	rb1110-254
ON	ON	ON	ON	ON	ON	ON	ON	255	rb1110-255

Notice:

- 1. The device name is set by dialing and it is effective after power off and restart.**
- 2. Use the software to configure the device name when powered on for the first time. Use the dial code to configure the device name after power off and restart. Valid (and the device name configured by the software will be cleared).**

5. Adapter Configuration Example

5.1 TIA Portal and RB-1110 connection and its configuration

5.1.1 Communication connection diagram

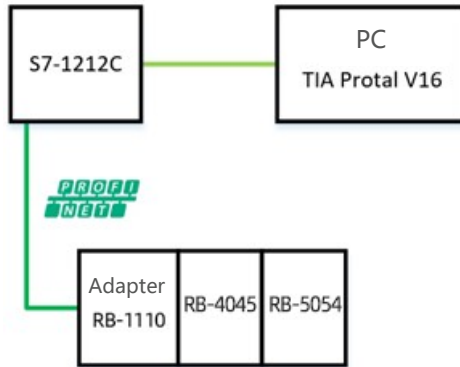


Figure 5-1-1 Communication connection diagram

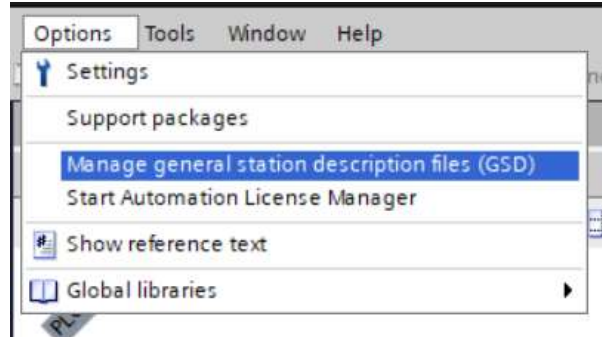
5.1.2 Hardware Configuration

Hardware Configuration Table

Hardware	Quantity	Remark
Programming Computer	1	Install TIA Portal V16
Controller	1	S7-1212C
RB-1110	1	PROFINET adapter
RB-4054	1	Analog Input Modules
RB-5054	1	Analog output modules
Network cable	Several	

5.1.3 Installing the GSD File

Open TIA Portal V16, select "Options" > "Support Device Description Files (GSD)", as shown in Figure 5-1-2 shown.



picture4-1-2 Install GSD file

5.1.4 New Project and Equipment Configuration

Open TIA Portal V16, select New Project and configure, as shown in Figure 5-1-3.

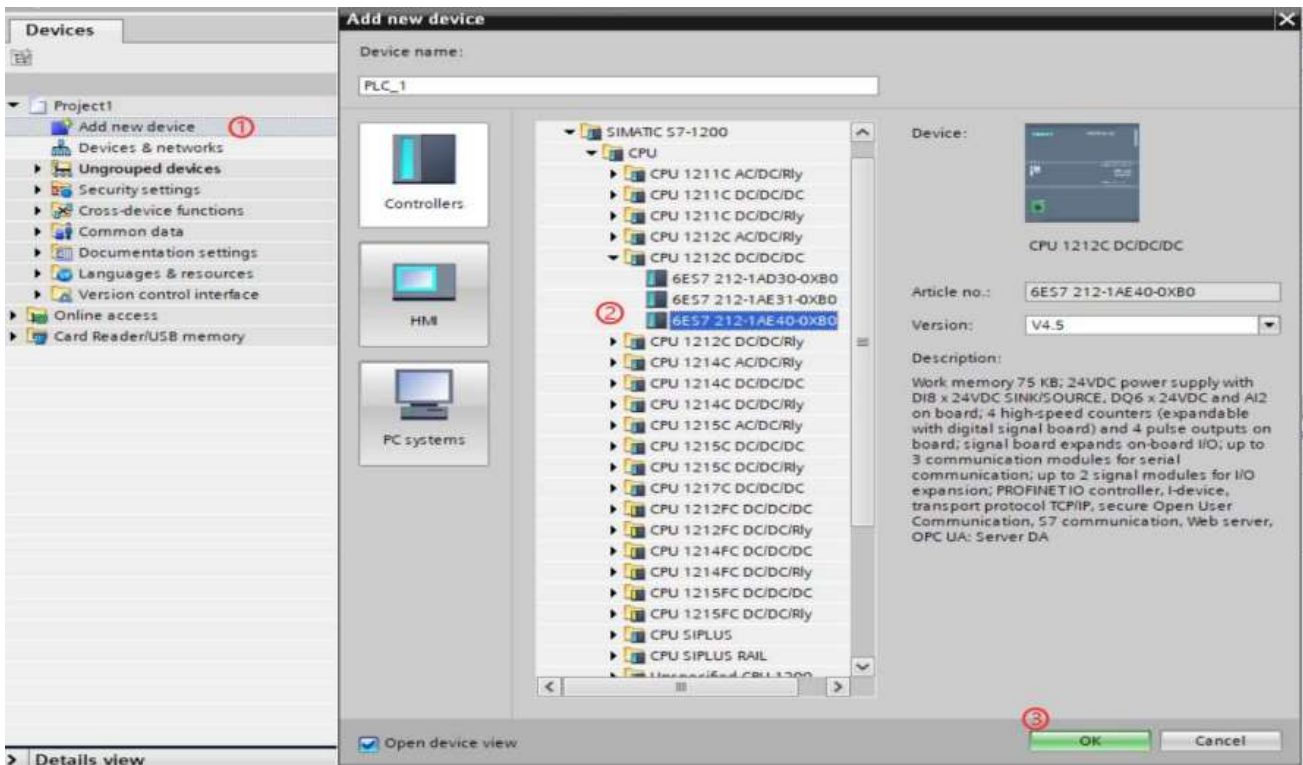


Figure 5-1-3 New construction project

To configure the device, expand the hardware directory in the network view and select the adapter, as shown in Figure 5-1-4. Double-click the adapter to enter the device view to configure the I/O module, as shown in Figure 5-1-5.

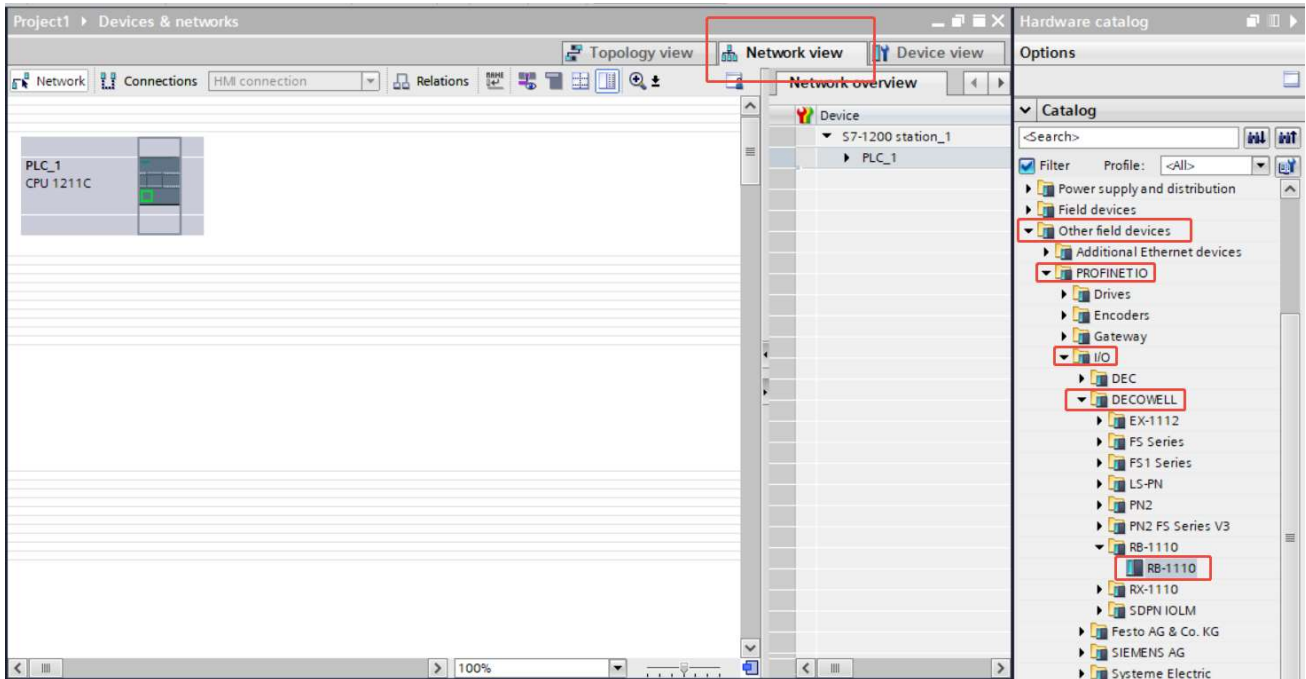


Figure 5-1-4 Configuration Device

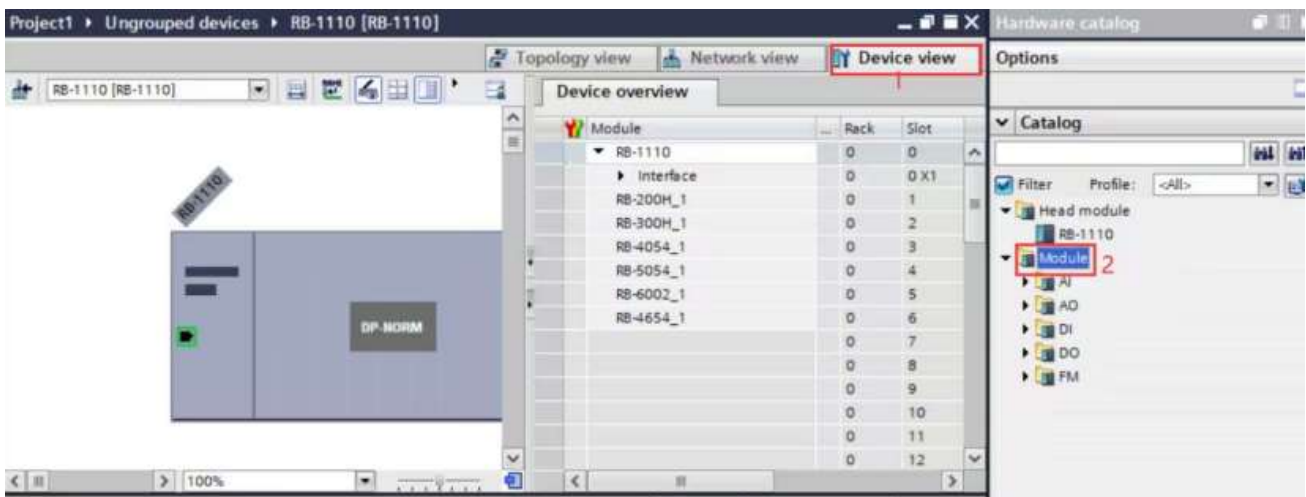


Figure 5-1-5 Configuring I/O modules

Assign a controller to the IO in the network view, click "Not assigned" in the IO module, and select PLC_1.PROFINET Interface_1, as shown in Figure 5-1-6.

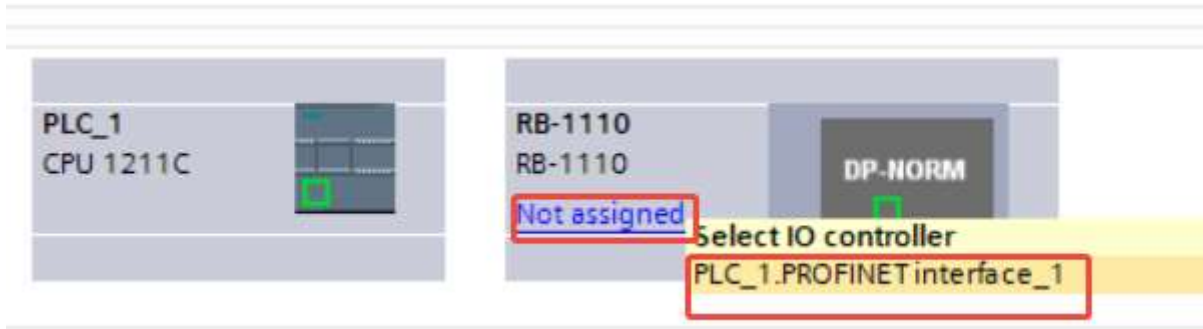


Figure 5-1-6 Assign IO controller

Set the IP address of the I/O module. In the device view, double-click the module to enter the property view, as shown in Figure 5-1-7.

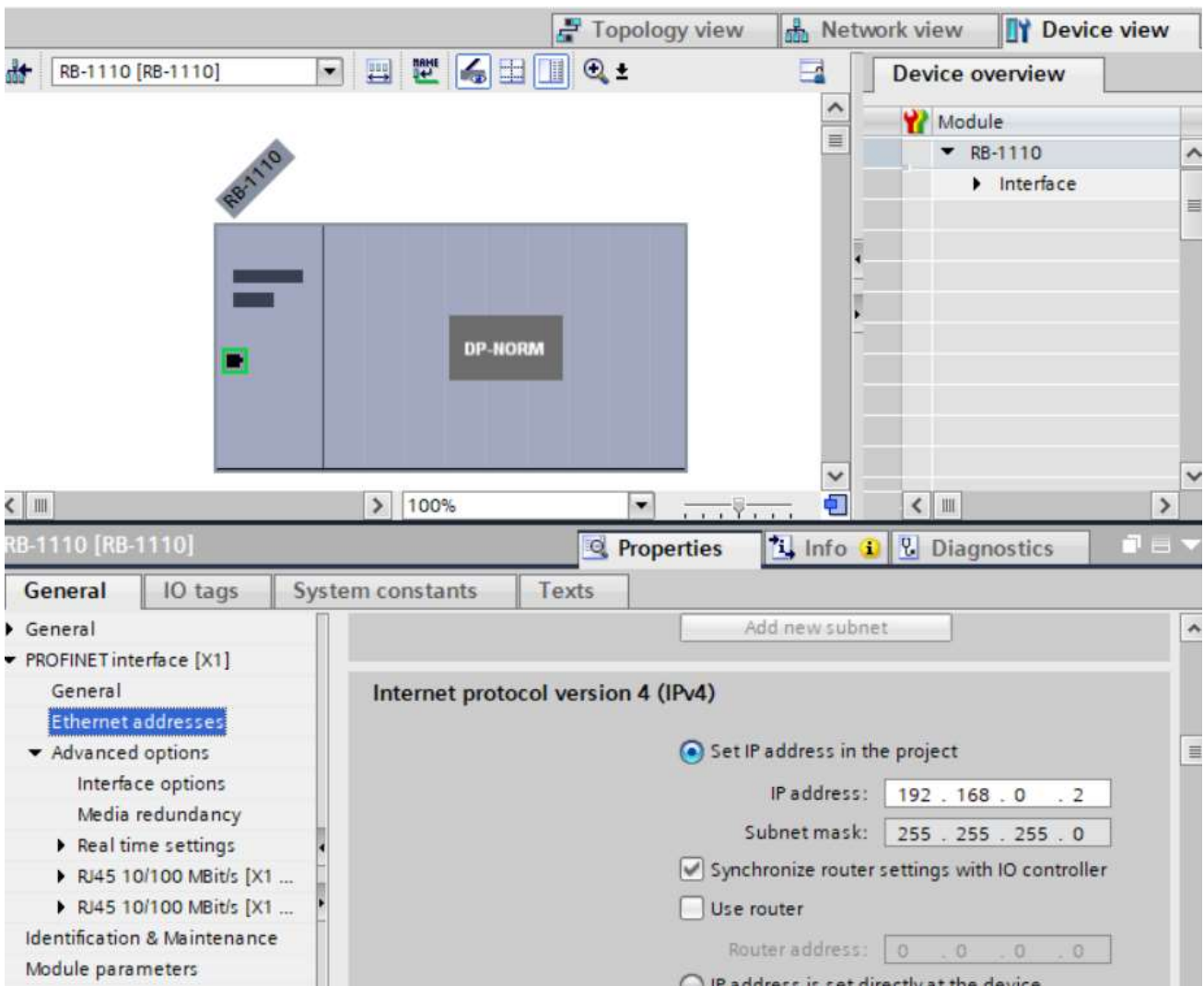
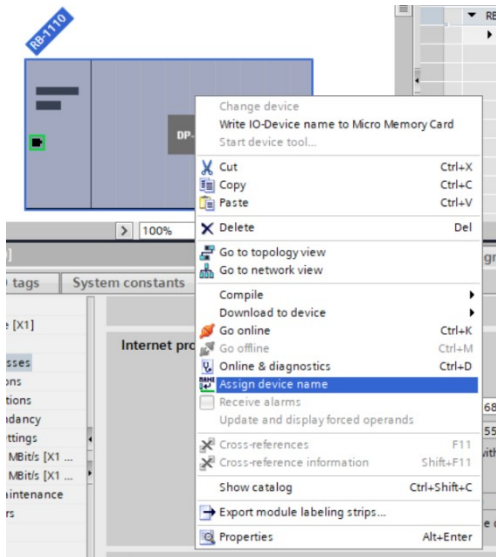
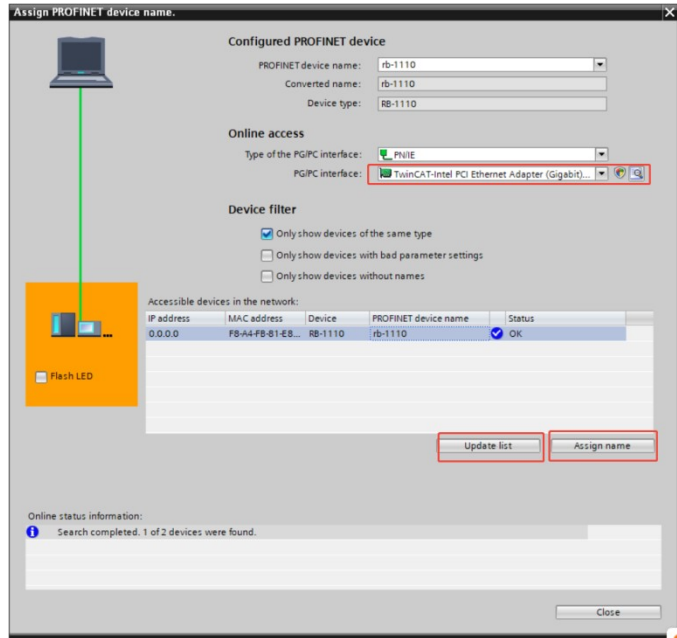


Figure 5-1-7 Allocating IP addresses


Assign a device name to the remote I/O module. Right-click the module and select "Assign Device Name" as shown in Figure 5-1-8. Select the interface type and update the list and assign a name as shown in Figure 5-1-9.



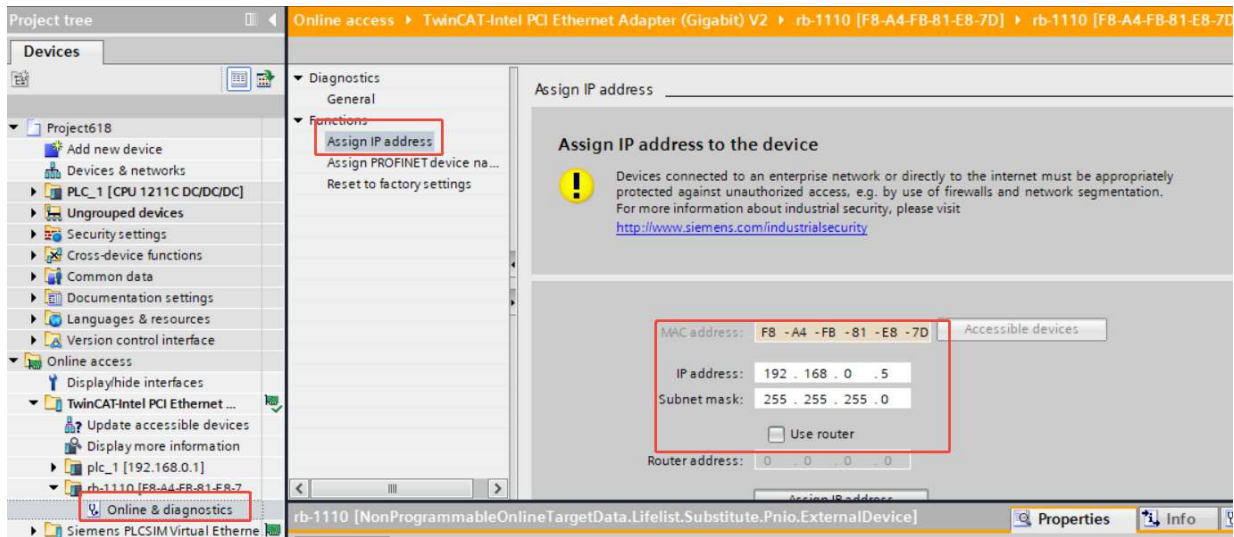
5-1-8 Select "Assign Device Name"



5-1-9 Update the list and assign names

 Notice

- It is recommended to modify the IP, as shown in Figure 5-1-10 shown.



5.1.5 Program download and device monitoring

Select all devices in the network view and download, as shown in Figure 5-1-11As shown in Figure 5-1-1, after the program is downloaded, the CPU is started and the online monitoring communication is normal.2shown.

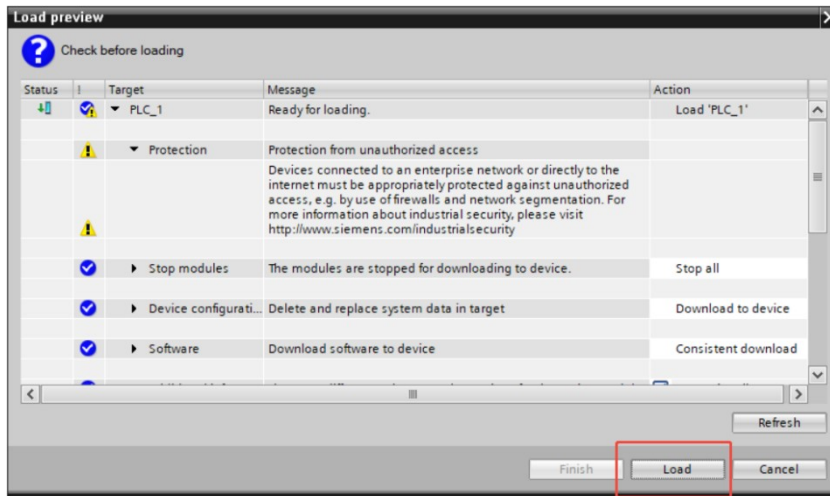


Figure 5-1-11 Program download

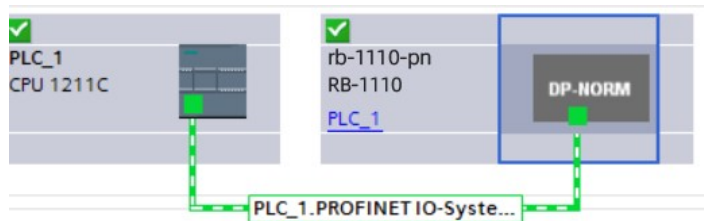
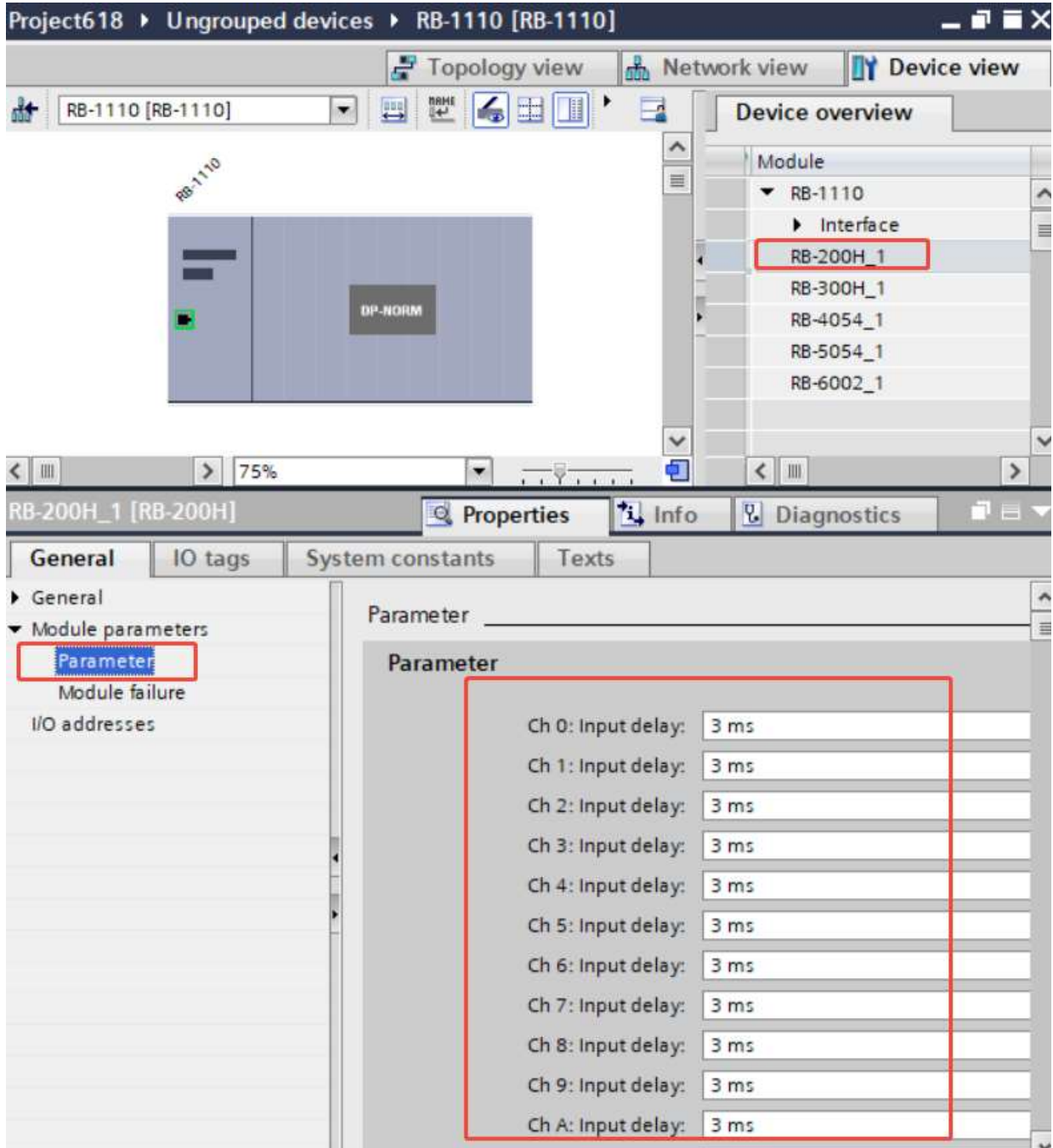


Figure 5-1-12 Equipment Monitoring

5.1.6 Configuration Parameters

(1) DI filter parameter configuration

In the device view, double-click the IO module in the slot, select "Parameters" in the module parameters, and configure the filter time of the corresponding DI channel (the default is 3ms), and the configurable range is 0.5-10ms.

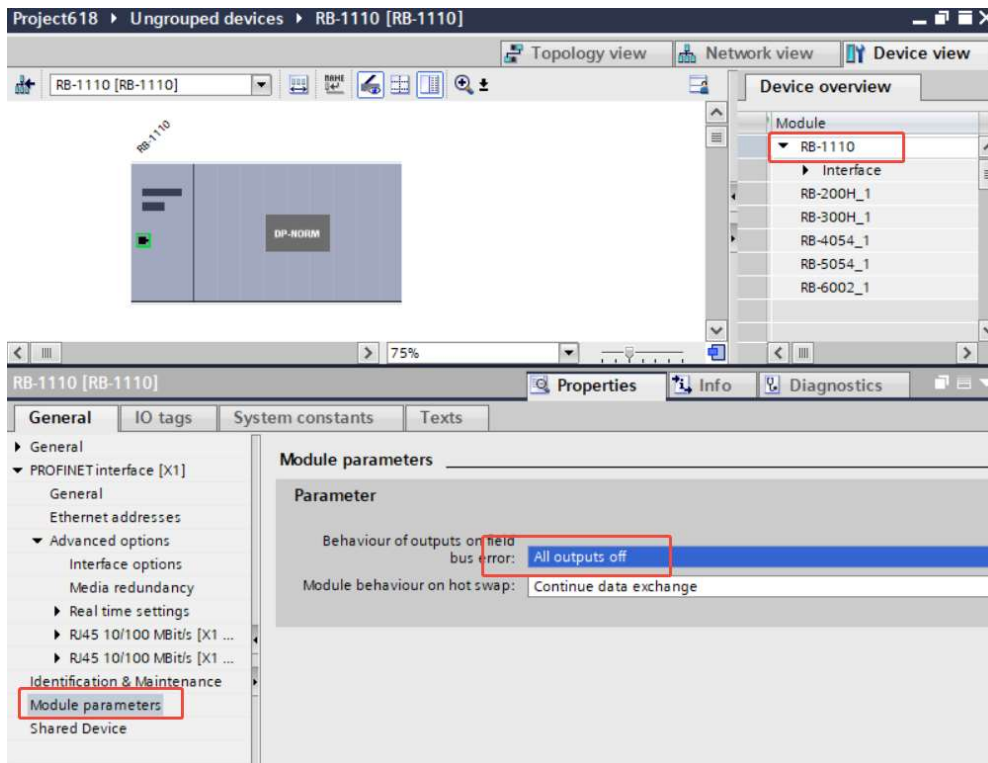


(2) Bus communication abnormal output configuration

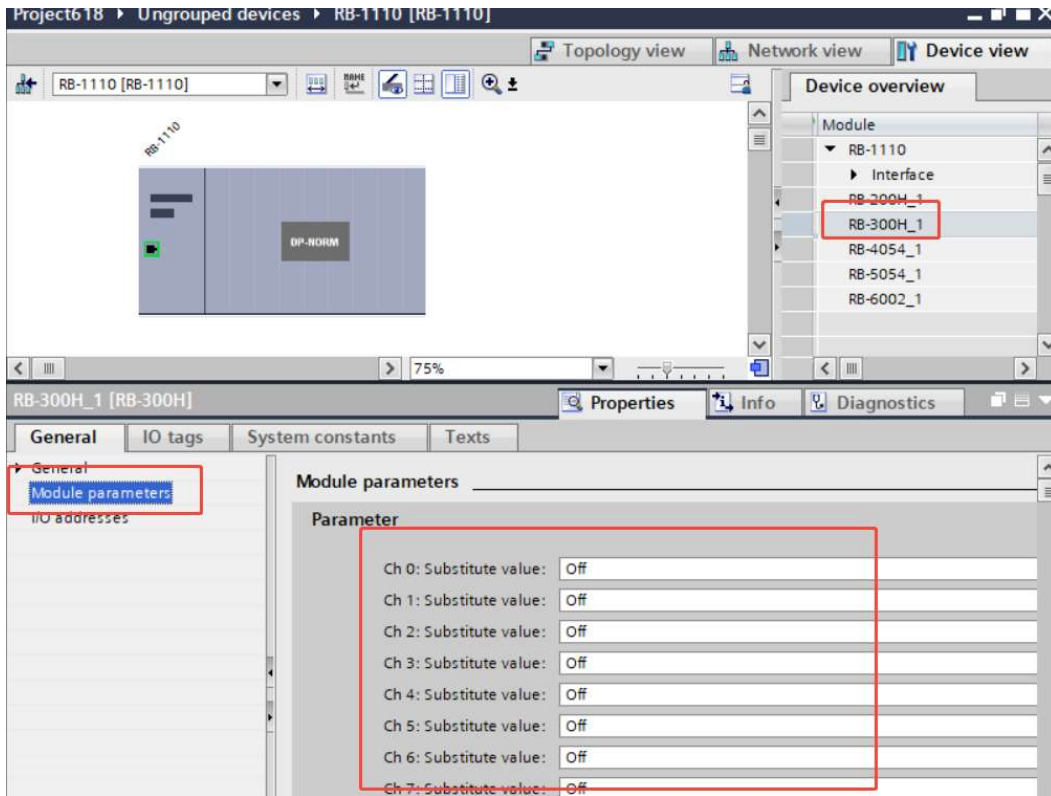
When bus communication is abnormal, DO/AO output value can have three configurations:

value	describe
All outputs off(default value)	Output module status data clear
Hold last value	Keep last value
Enable substitute value	Start Alternative Value

In the Device view, double-click the adapter and in the Module Parameters, click Behavior of outputs on field bus error”

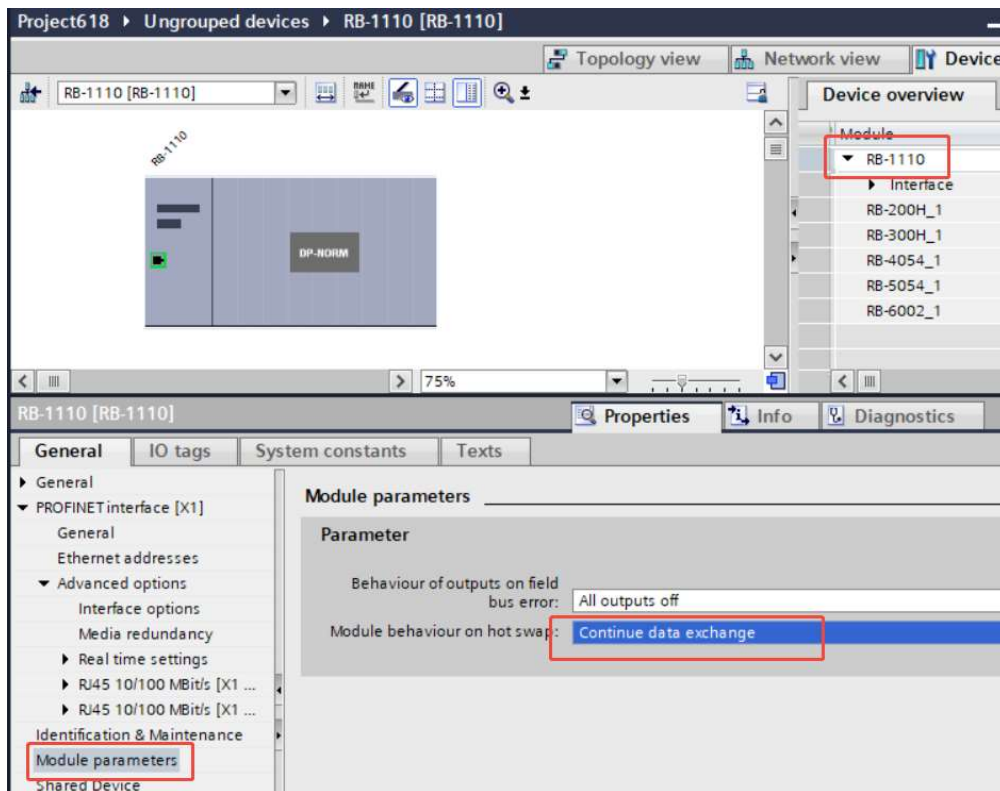


In the device view, double-click the IO module in the slot and configure the corresponding channel replacement configuration in the module parameters. The configurable value range is on or off, and the default value is off.



(3) Module hot-swap function

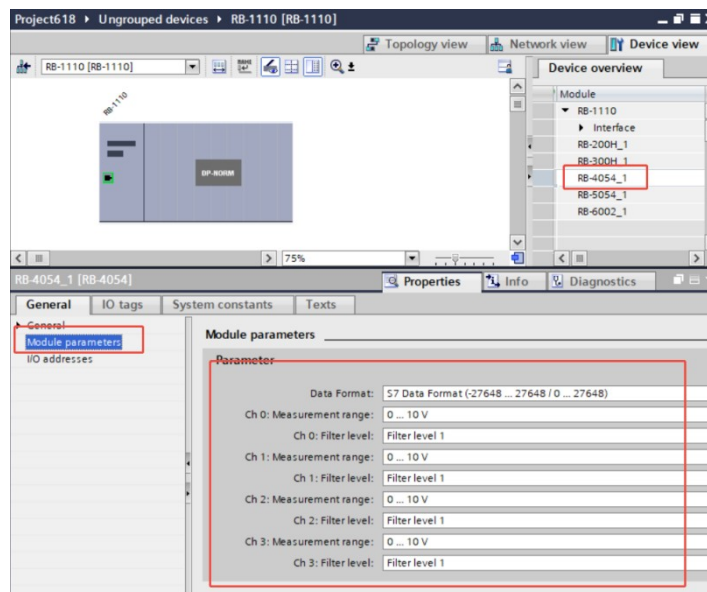
In the Device view, double-click the adapter and in the Module Parameters, click Module behavior on hot swap”



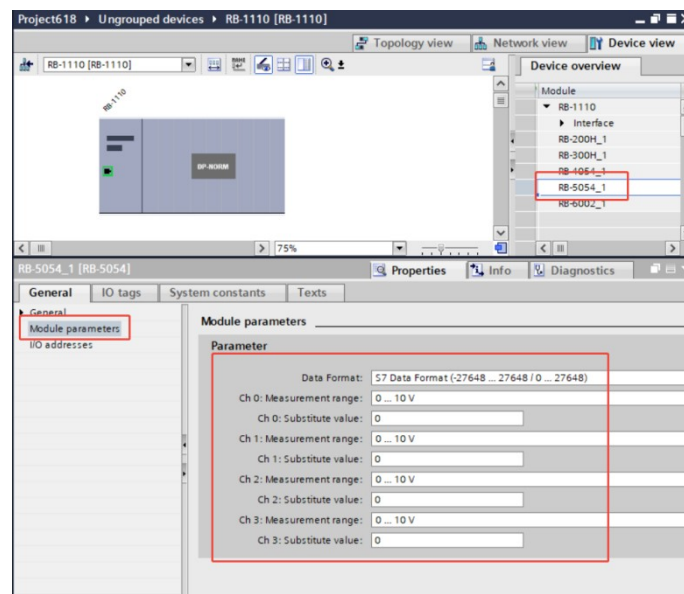
value	describe
Continue data RBchange (default value)	Continuous interaction, DI/DO normal value update (default)
Behavior as with fieldbus error	Inherit the bus exception handling mode, data stops exchanging DI value stops

(3) Modification of module analog parameters

In the device view, click the module whose parameters need to be modified, and change the analog parameters in the module parameters.

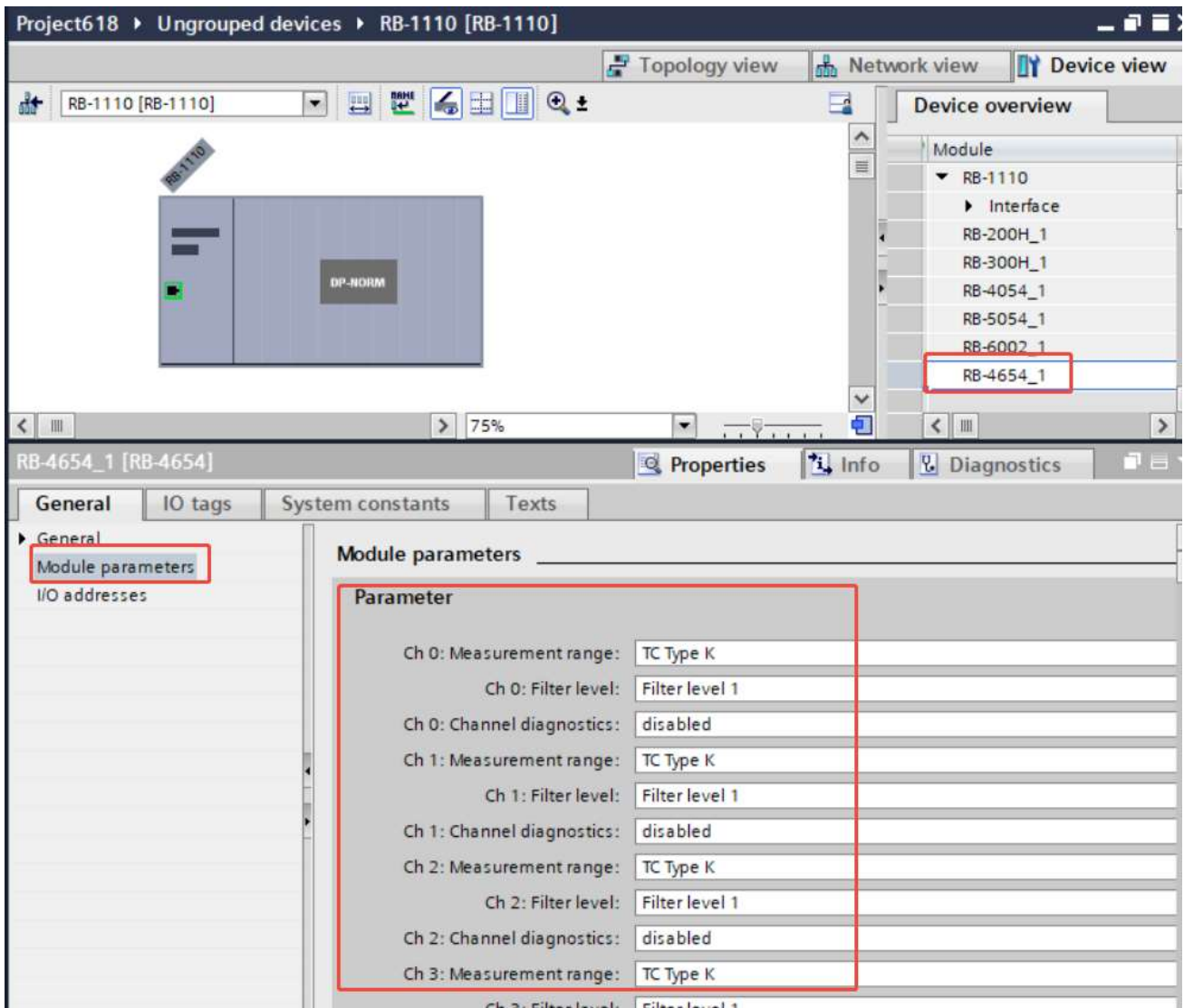


Analog input



Analog output

Note: The analog output substitute value needs to be set in the adapter parameters



Temperature Module

6.Appendix

Model	RB-1110
Adapter power consumption	270mA
Latest version of hardware	V1.0.0
Latest software version	V1.0.0
Order Number	18-01-04
Maximum number of IOs	32/pcs
Maximum number of input bytes	1015Byte
Maximum number of output bytes	1015Byte
Whether to support digital quantity module	yes
Whether to support analog modules	yes
Whether to support functional modules	Yes (≤6 pieces)
Whether to support communication module	Yes (≤6 pieces)



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