

RB Series IO Module

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-6512 is a 2-channel PWM output module.

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.

Due to continuous product and technical updates and improvements, the content in this document may not fully correspond to the actual product. Please understand. In case of any discrepancies, the actual product shall prevail. Content changes resulting from product upgrades are subject to change without prior notice.

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Safety Precautions

■ Security Statement

1. Before installing, operating, or maintaining the product, please read and comply with these safety precautions.
2. To ensure personal and equipment safety, follow all safety labels on the product and all safety instructions contained in this manual during installation, operation, and maintenance.
3. The “Note”, “Caution”, “Warning”, and “Danger” statements in this manual do not represent all safety precautions that should be observed; they are supplementary to the overall safety requirements.
4. This product must be used under conditions that meet the specified design requirements. Failure to meet these conditions may result in malfunction. Functional abnormalities or component damage caused by non-compliance are not covered by the product warranty.
5. DECOWELL assumes no legal liability for personal injury, property damage, or other losses caused by improper or unauthorized operation of the product.

■ Security level definition



Note

Indicates additional information or explanations that supplement the operating instructions.



Caution

Indicates a hazardous situation that may result in minor to moderate personal injury or equipment damage if not operated as instructed.



Warning

Indicates a hazardous situation that may result in serious personal injury or death if not operated as instructed.

 Warning — During Control System Design

01. When applying this system, please be sure to design a safety circuit to ensure that the control system can still operate safely when the external power supply fails or the expansion module malfunctions.
02. If the output circuit experiences prolonged overcurrent due to exceeding the rated load current or a load short circuit, the module may smoke or catch fire. External safety devices such as fuses or circuit breakers should be installed.

 Caution — During Control System Design

01. It is essential to install an emergency braking circuit, a protection circuit, an interlock circuit for forward and reverse operation, and upper and lower limit interlock switches to prevent machine damage in the external circuit of the expansion module;
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 of the expansion module, such as relays and transistors, are damaged, their outputs cannot be controlled to be in the ON or OFF state;

 Caution — During Installation

01. During installation, prevent metal shavings and wire ends from falling into the module's ventilation holes, as this may cause fire, malfunction, or misoperation;
02. After installation, ensure that there are no foreign objects on its ventilation surface, otherwise it may cause poor heat dissipation, resulting in fire, malfunction, or misoperation;
03. During installation, ensure that the module is securely connected to its respective connector and that the module connection hooks are firmly locked. Improper module installation may lead to malfunctions, failures, or detachment.

 Warning — During Installation

01. Only professional maintenance personnel who have received relevant electrical equipment training and possess sufficient electrical knowledge can install this product;

02. When installing or removing modules, all external power supplies to the system must be completely disconnected before proceeding. Failure to disconnect the power supply may result in electric shock, module malfunction, or accidental operation.

03. Do not use the module in the following locations: places with dust, fumes, conductive dust, corrosive gases, or flammable gases; places exposed to high temperatures, condensation, or wind and rain; places subject to vibration or impact. Electric shock, fire, or misoperation may also cause product damage and deterioration.

1. Product Information

1.1 Product naming and nameplate

RB - 6 5 1 2

① ② ③ ④ ⑤

NO.	Name	Description Definition
①	Product Series Name	RB Series
②	Module Type	6: Functional modules
③	Function Type	5: Output function module
④	Module Type	1: PWM pulse output module
⑤	Number of channels	2: 2 channels

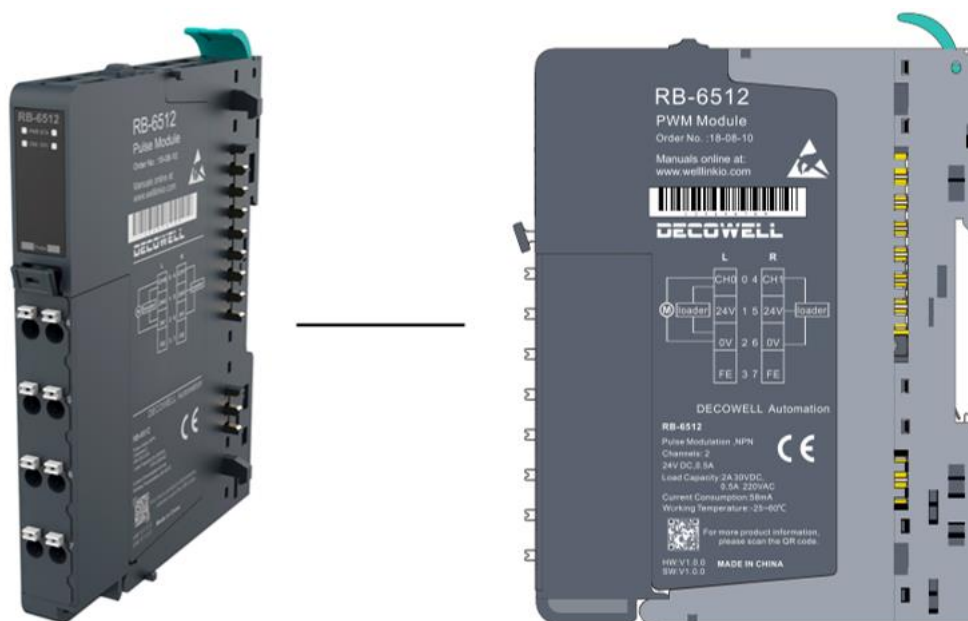


Figure 1-1-1 Product appearance diagram

1.2 Component Description

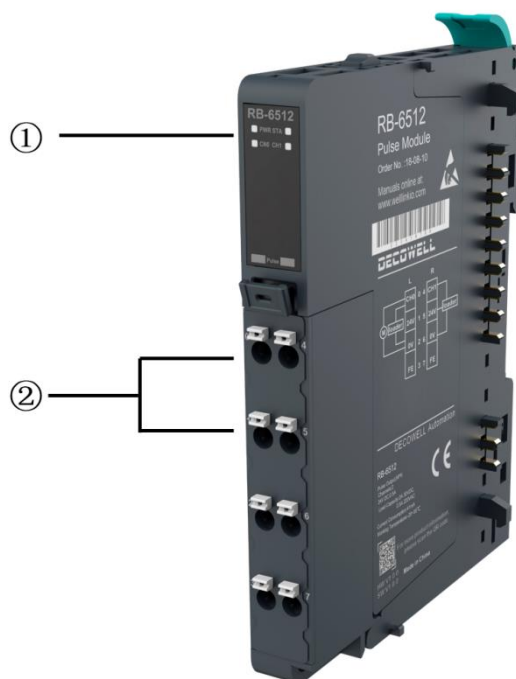


Figure 1-2-1 Component Description Diagram

1.2.1 Indicator Light Description

NO.	Name	Led	State
①	PWR	ON(green)	Internal power supply is normal
		OFF	Internal power supply abnormality
	STA	ON (green)	The module is working properly
		ON (red)	The module has not established communication with the adapter, and configuration information loading failed.
		1HZ flashing (red)	Module hardware abnormality
		5HZ flashing (red)	Module self-test abnormality (internal fault)
	CH0	Flashing (green)	CH0 has pulse output
	CH1	Flashing (green)	CH1 has pulse output

1.2.2 Wiring port description

NO.	Channel	Describe	NO.	Channel	Describe
0	Output 1	Channel 1 Output	4	Output 2	Channel 2 Output
1	+24 V	+24v (internally connected to terminal 5 and positive power contact)	5	+24 V	+24v (internally connected to terminal 1 and positive power contact)
2	0 V	0 V (internally connected to terminal 6 and negative supply contact)	6	0 V	0 V (internally connected to terminal 2 and negative power contact)
3	FE	Channel 1 functional ground	7	FE	Channel 2 functional ground

Note: Do not short-circuit Output1 and Output2 with +24V or 0V.

1.3 Technical specifications

Basic parameters	
Dimensions	100 mm×77 mm×12 mm
Protection level	IP20
Wiring specifications	0.2~1.5mm ²
Wiring method	Straight-through spring terminal connection
Technical Parameters	
Model	RB-6512
Product Name	Dual channel PWM pulse output module
Current consumption	Max 58mA
Number of input channels	2
Output interface type	PWM output with push-pull output stage
Number of output interfaces	2
Maximum output current	0.5A
Output frequency	1Hz ~ 1MHz (default 250Hz)
Output interface type	PWM output with push-pull output stage

Input Impedance	> 500KΩ
Electrical isolation	Optocoupler Isolation
Maximum connection distance of signal line	2 meters

1.4 Environmental Specifications

Environmental parameters	
Operating temperature	-25~60°C
Operating humidity	95% non-condensing
atmosphere	≥ 795 hPa (altitude ≤ 2000 m) as per IEC 61131-2
Storage temperature	-40~85 °C
Overvoltage category	I

2. Mechanical installation

2.1 Installation dimensions

The installation dimension information is shown in the figure below, with the unit in (mm).

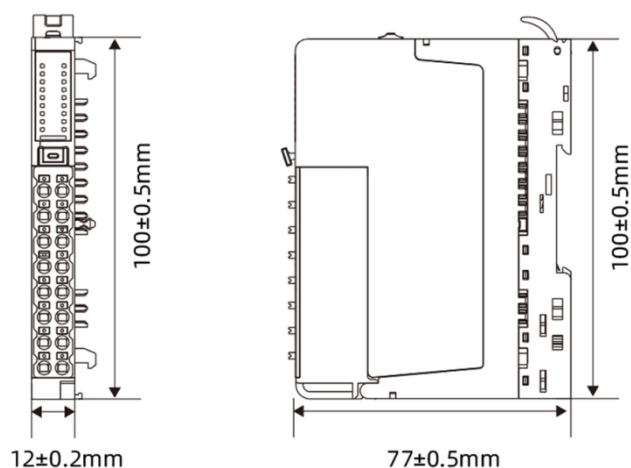


Figure 2-1-1 Module dimensions

2.2 Installation Method

2.2.1 Inter-module installation

Before installation, push the lock and release lever on the top of the module backward. After all the module levers are open, insert the modules horizontally. After installation, push the lever back to its original position.

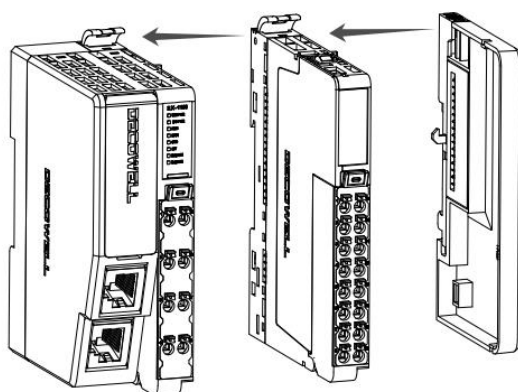


Figure 2-2-1 Schematic diagram of installation between modules

2.2.2 Installation on rails

Install:

Before installation, push all the locking/release levers on the top of the modules backward, align the module with the DIN35 rail and press the module in the direction indicated by the arrow. After fixing to the rail, push all the locking/release levers back. As shown in the figure below.

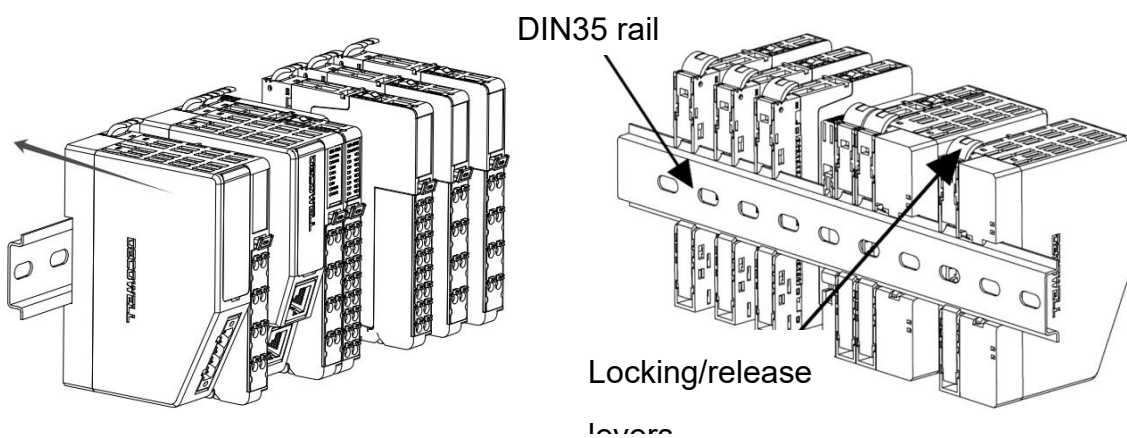


Figure 2-2-2 DIN rail installation diagram

Disassembly:

Use your hand to lift the locking/release lever upward, then pull the module away from the DIN35 rail.

lifting the locking/release lever

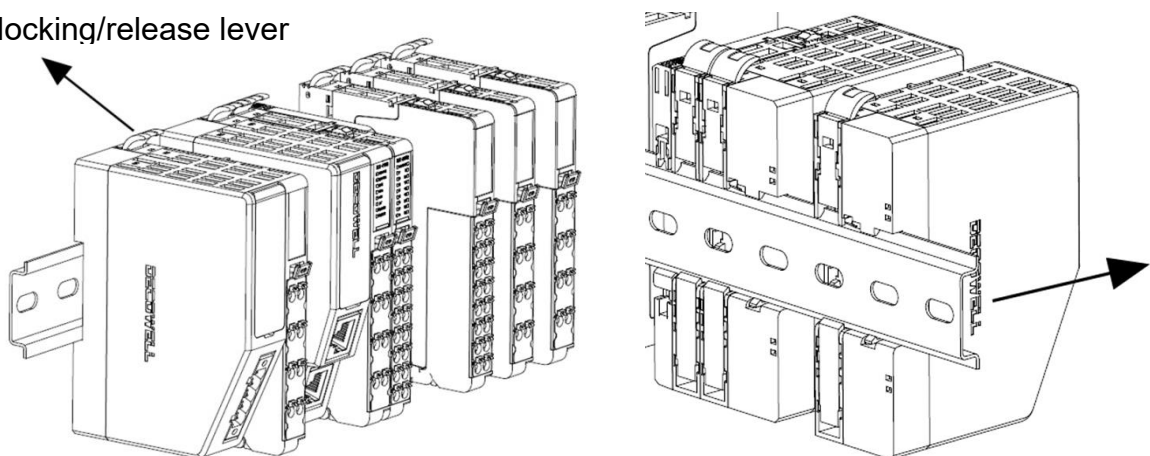


Figure 2-2-3 DIN rail disassembly diagram

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). The dimensions are as follows:

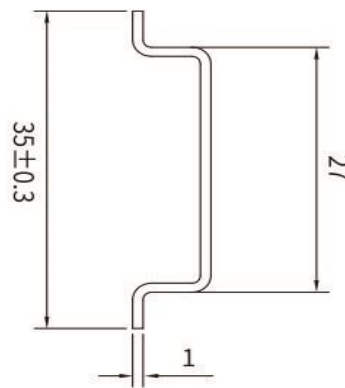


Figure 2-2-4 DIN35 rail dimensions

**Notice**

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

3. Electrical installation

3.1 Cable selection

For power-related cables, the wire ear diameters in the following table are for reference only and can be reasonably calculated and adjusted based on actual use.

Name	Compatible Wire Gauge		KST	
	Standard (mm ²)	AWG	Model	Crimping Tool
Ferrule Type	0.25	24	E0208	KST2000L
	0.5	20	E0510	
	0.75	18	E7510	
	1.0	18	E1010	
	1.5	16	E1510	

Stripping length: 8–10 mm

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

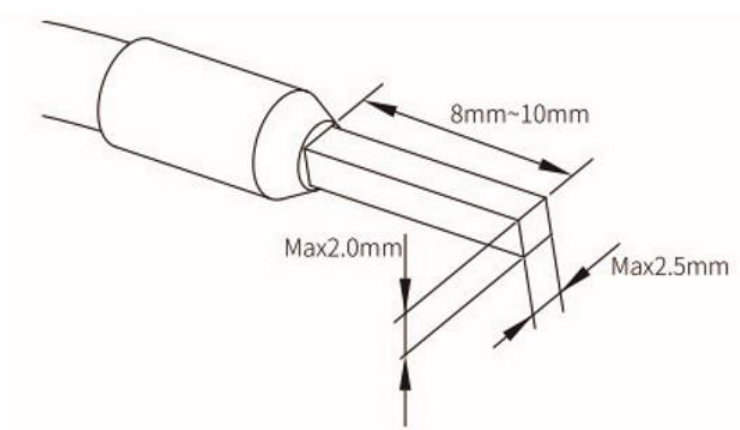


Figure 3-1-1 Terminal size requirements

3.2 Terminal wiring

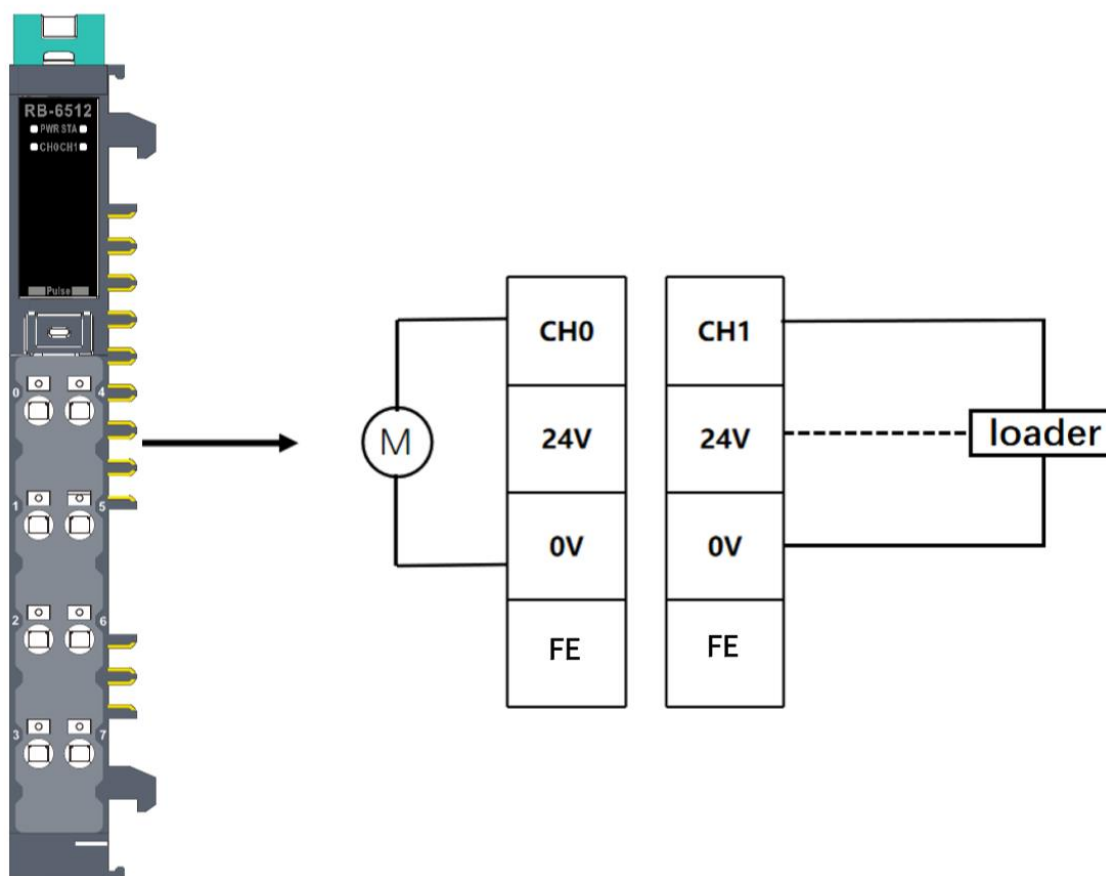


Figure 3-2-1 Module wiring diagram

Notice

- When routing extension cables, avoid bundling them together with power lines (high voltage, high current) and other cables that transmit strong interference signals. Route them separately and avoid parallel routing.
- Use recommended cables and adapter plates for connection. It is recommended to use shielded cables for extension cables to improve anti-interference capabilities.

4. Module usage instructions

4.1 Module Function

1) Frequency modulation function

The frequency of the pulses output by the dual-channel PWM is adjustable;

There are two ways to adjust the frequency:

- ① Configuration method
- ② Downlink process data mode configuration

2) Duty cycle adjustment function

The duty cycle of the pulses output by dual-channel PWM is adjustable;

There are two ways to adjust the pulse duty cycle:

- ① Configuration method
- ② Downlink process data mode configuration

3) Synchronization function

This function is mainly used to check whether the PWM signal output by the second channel is synchronized with the first channel or whether the PWM signal output by the first channel is synchronized with the second channel.

When the channel 1 synchronization enable signal is turned on, channel 2 is synchronized with channel 1, and the PWM output is exactly the same as channel 1.

When the channel 2 synchronization enable signal is turned on, channel 1 is synchronized with channel 2, and the PWM output is exactly the same as channel 2.

If the enable signal is turned off, channel 2 is not synchronized with channel 1, and the two channels are output independently.

4.2 Parameter description

1) Configuration parameters

Frequency parameter value setting: Frequency parameter value (Period value) = $1000000000/\text{required output frequency}/20$

Duty factor parameter setting: Duty factor value = frequency parameter value × required duty factor

For example: if you want RB-6512 to output a 100Hz pulse signal with a duty cycle of 50%, the frequency parameter value needs to be set to: $1000000000/100/20=500000$, and the duty cycle parameter value needs to be set to: $500000 \times 50\% = 250000$.

The following table shows the configuration parameter settings for RB-6512;

Parameter name	Parameter meaning	Parameter range	default value
Ch 0: Period value	Channel 1 frequency Parameter Value	50 (inclusive) ~ 500000000 (inclusive)	200000 (250Hz)
Ch 0: Dutyfactor value	Duty cycle of channel 1 Parameter Value	0 (inclusive) ~ 500000000 (inclusive) And less than or equal to Period value	100,000 (50%)
Ch 1: Period value	Channel 2 frequency Parameter Value	50 (inclusive) ~ 500000000 (inclusive)	200000 (250Hz)
Ch 1: Dutyfactor value	Duty cycle of channel 2 Parameter Value	0 (inclusive) ~ 500000000 (inclusive) And less than or equal to Period value	25000 (50%)

Note: Parameter settings need to be configured before the module is run. If using TwinCAT, set it in **Startup**; in OMROM software, find the corresponding module in the module's **edit initialization parameter settings** and set it; if no setting is required, use the default value and no operation is required;

2) Process data

The following table is the process data table corresponding to RB-6512;

Process data	Name	Meaning	Data length
Downstream analog quantity Ch0	Ch0:Control byte.0	1 channel PWM output enable	1bit
	Ch0:Control byte.1	1 channel frequency value and duty cycle value enable	1bit

	Ch0:Control byte.2	1 channel synchronization enable	1bit
	Ch0: Period value	1 channel frequency parameter value	4byte
	Ch0:Dutyfactor value	1 channel duty cycle parameter value	4byte
Downstream analog quantity Ch1	Ch1:Control byte.0	2-channel PWM output enable	1bit
	Ch1:Control byte.1	2-channel frequency value and duty cycle value enable	1bit
	Ch0:Control byte.2	2-channel synchronous enable	1bit
	Ch1: Period value	2-channel PWM frequency parameter value	4byte
	Ch1:Dutyfactor value	2-channel duty cycle parameter value	4byte
Uplink analog quantity	Module Status info.0	Channel 1 output status	1bit
	Module Status info.1	Channel 2 output status	1bit
	Module Status info.2	Module Status	1bit

Note: When configuring the frequency parameter value and duty cycle parameter value, the Control Byte should be in the disabled state. After the parameter value configuration is completed, turn on the corresponding enable.

5. Product use cases

5.1 Use and configuration of RB-6512 in Codesys

Install the XML description file into Codesys, click "Tools-Device Repository" and install the RB -1100 description file.

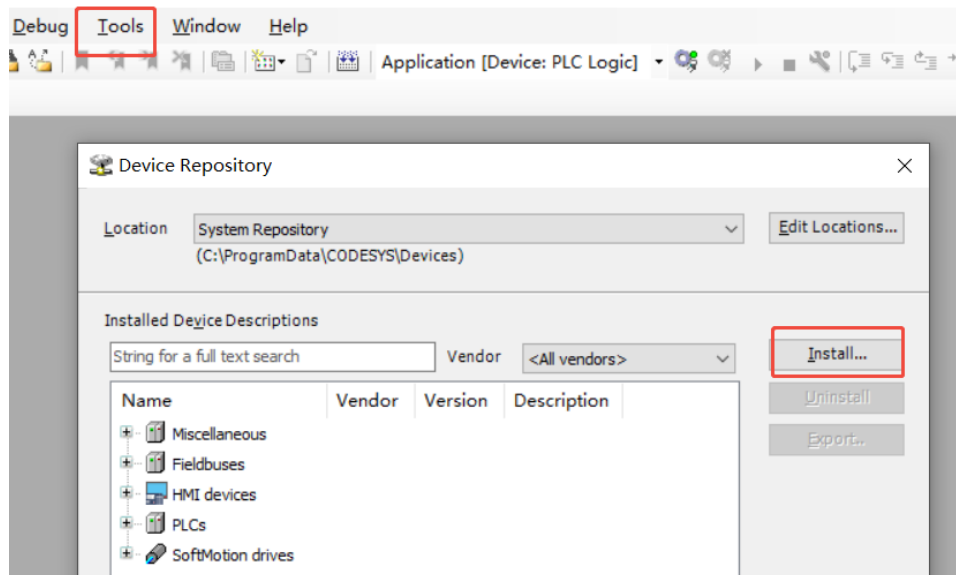


Figure 5-1-1 XML file installation

Mount the RB-6512 under the RB -1100 adapter and scan the adapter and module as shown.

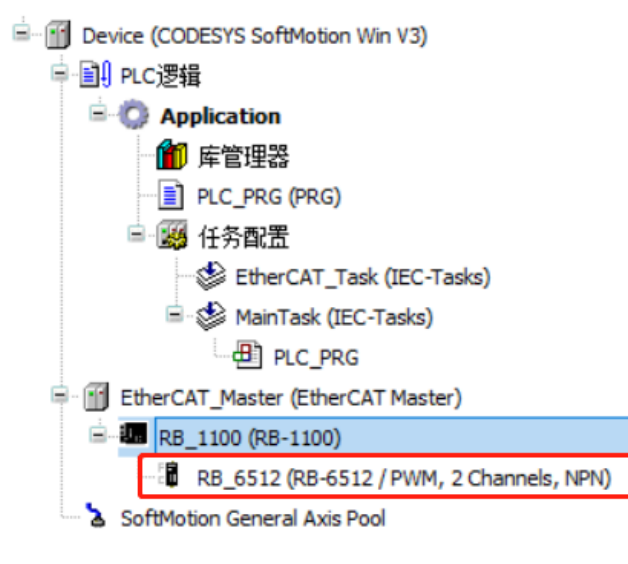


Figure 5-1-2 Configuration of RB-6512 module

To configure the RB-6512 communication parameters, double-click “ RB_6512 ” > “Startup Parameters”, and users can configure the corresponding parameters.



Figure 5-1-3 Uplink and downlink data

5.2 Use and configuration of RB-6512 in TIA Portal

Start the TIA Portal V17 software and select "Create a new project". Select the name and path of the project to be created and click Create.

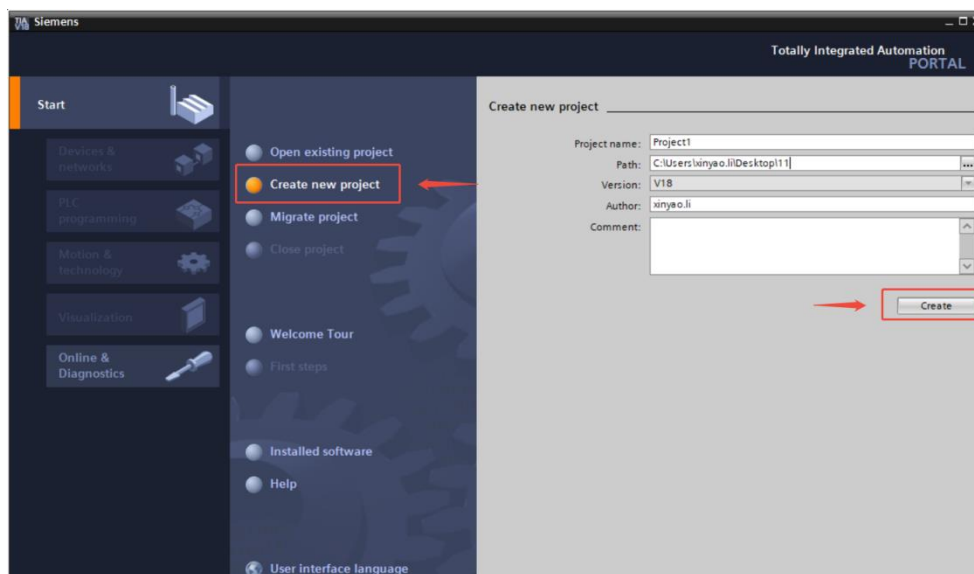


Figure 5-2-1 New project creation

1. Select Devices and Networks, and click Add Device;
2. Select the PLC model (the PLC model used in the case is S7-1200)
3. Click Add.

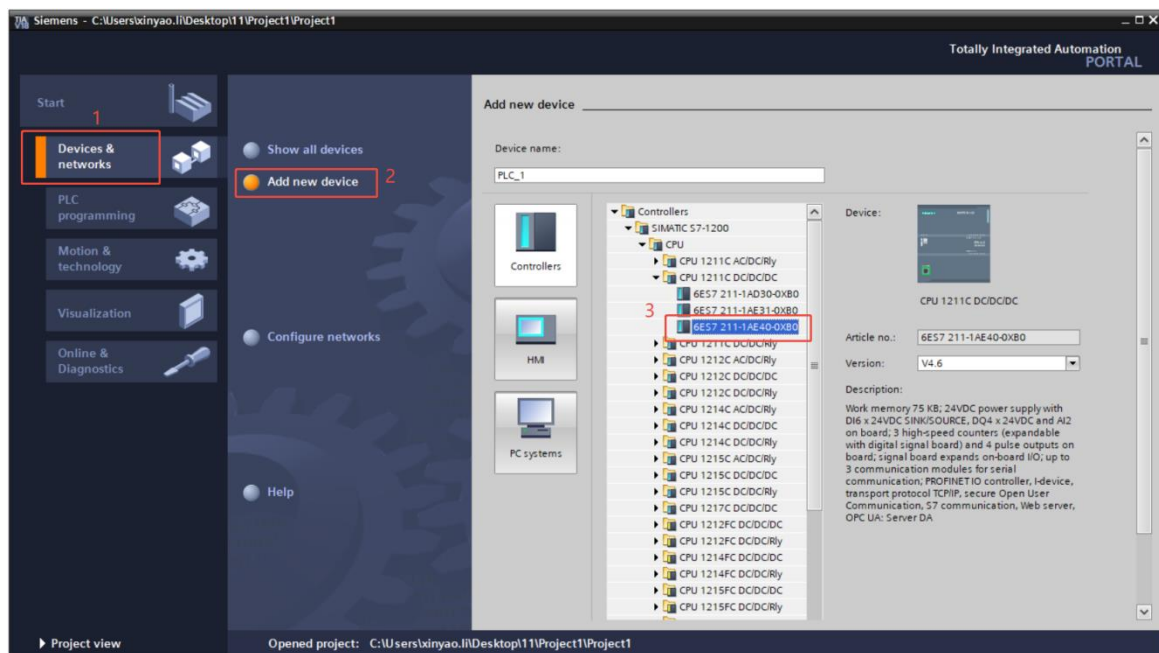
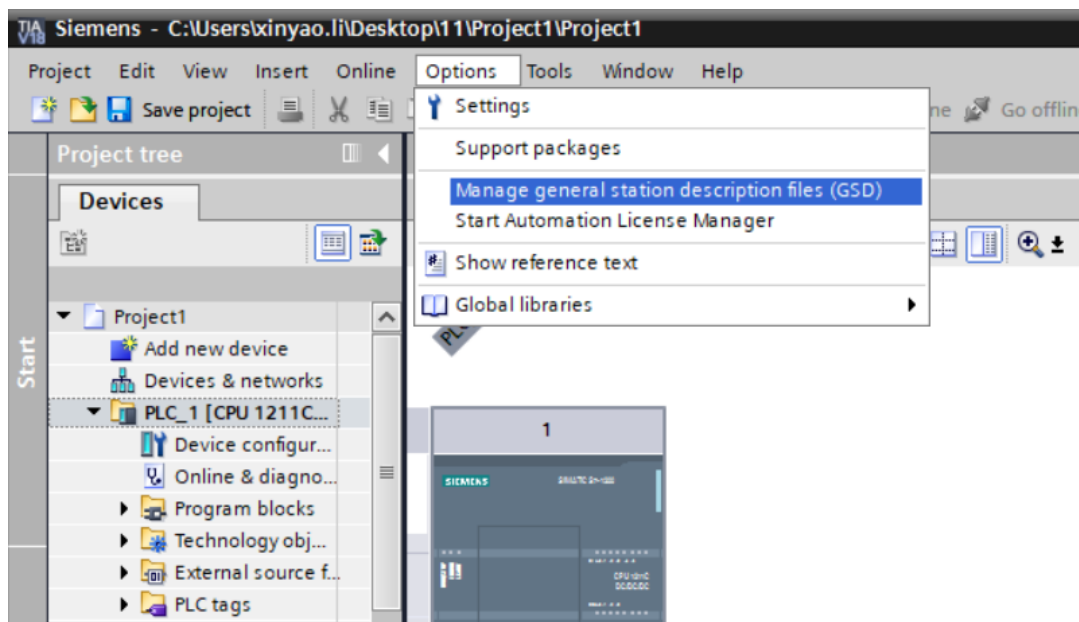


Figure 5-2-2 Add PLC

Add GSD file

1. Select the path where the GSD is stored;
2. Select the corresponding GSD file;
3. Click Install (the configuration example uses the RB -1110 coupler)



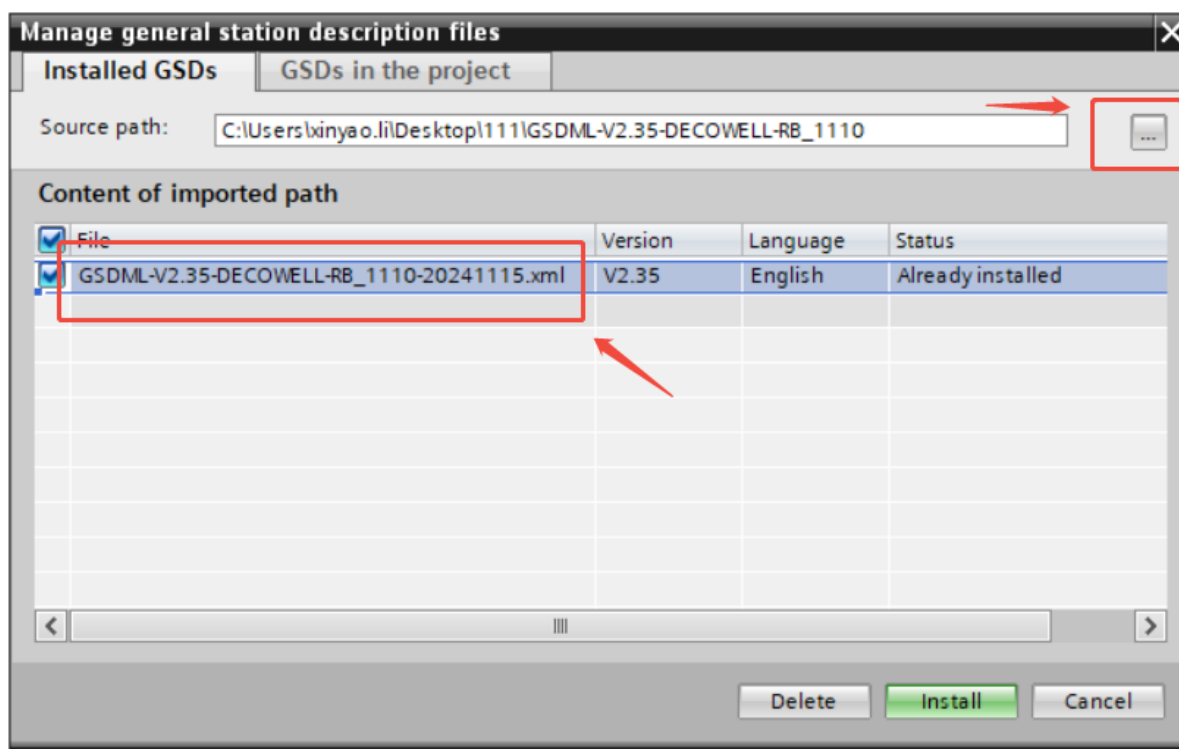


Figure 5-2-3 Add GSD file

Add PROFINET slave device:

1. Click Network View;
2. Click Other Field Devices;
3. Click PROFINET IO;
4. Click DECOWELL and select the RB -1110 module.

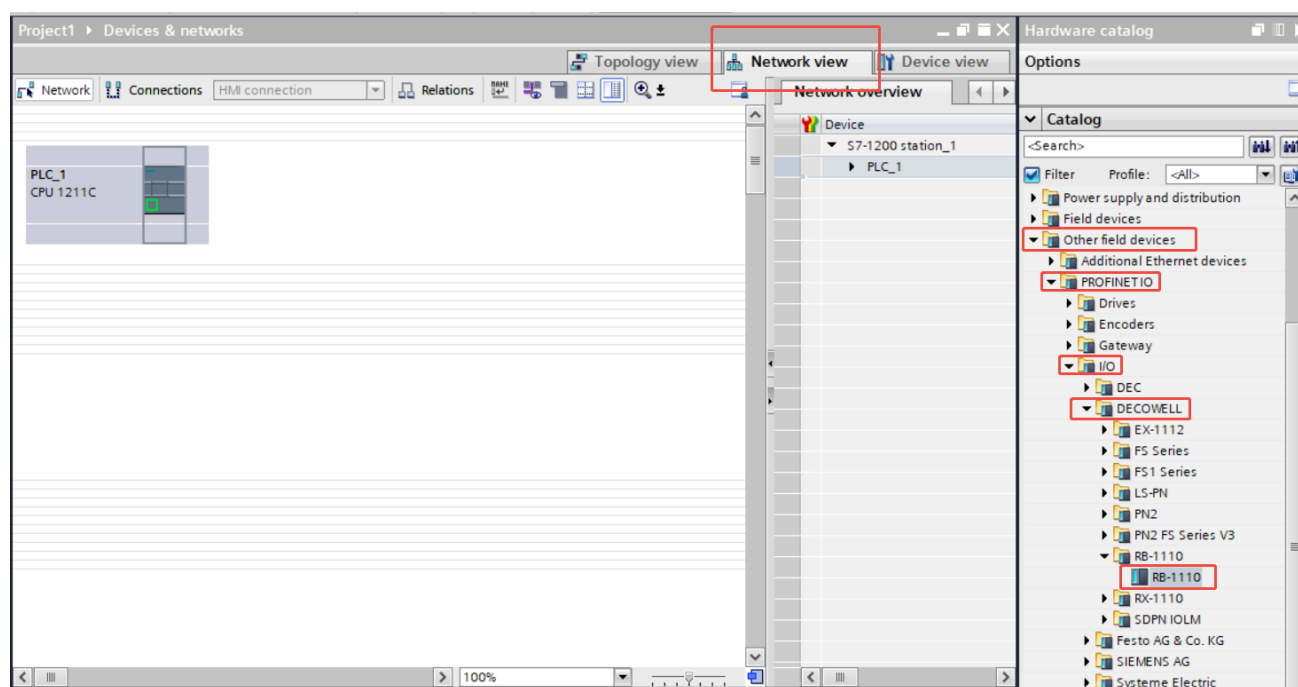


Figure 5-2-4 Manual Configuration

Connect the PLC and PROFINET slave devices. Click the Unassigned of the DEC module and click PLC - 1. PROFINET interface.



Figure 5-2-5 Network port allocation

Add a single-channel differential encoder module. Double-click the RB-1110 module added in the network view, go to the device view interface, select FM in the module, and double-click to add RB-6512.

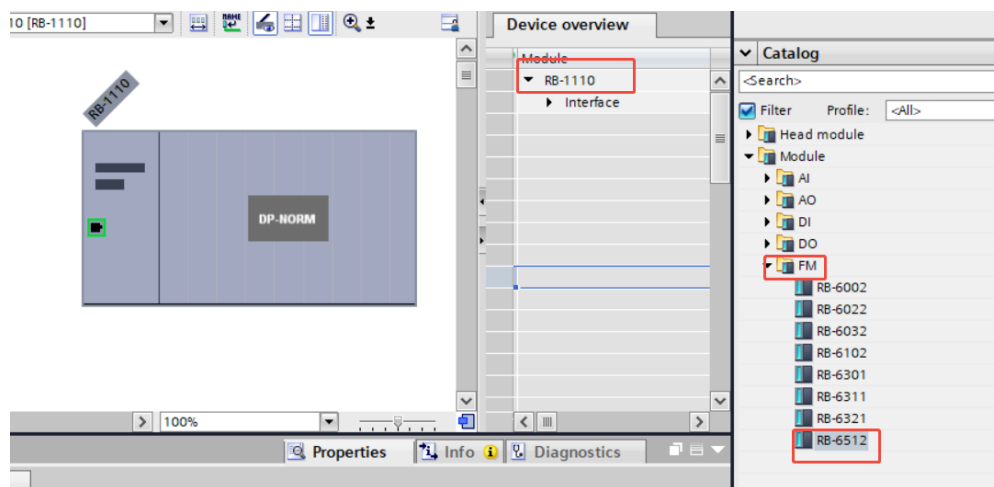


Figure 5-2-6 Add RB-6512 module

Click RB-6512, then click the module properties below, select module parameters, and configure the RB-6512 configuration parameter information in the project box on the right.

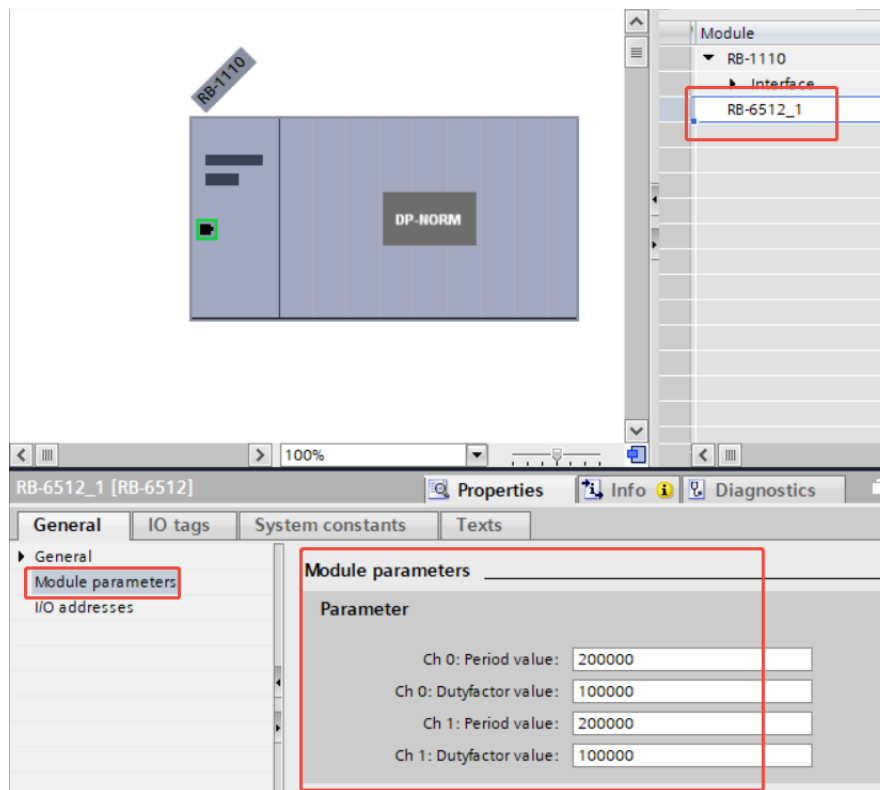


Figure 5-2-7 Parameter configuration

Configuration and program download. Select all devices in the network view and click

Download .

1. Click to start searching;
2. Click Download after the search is successful.

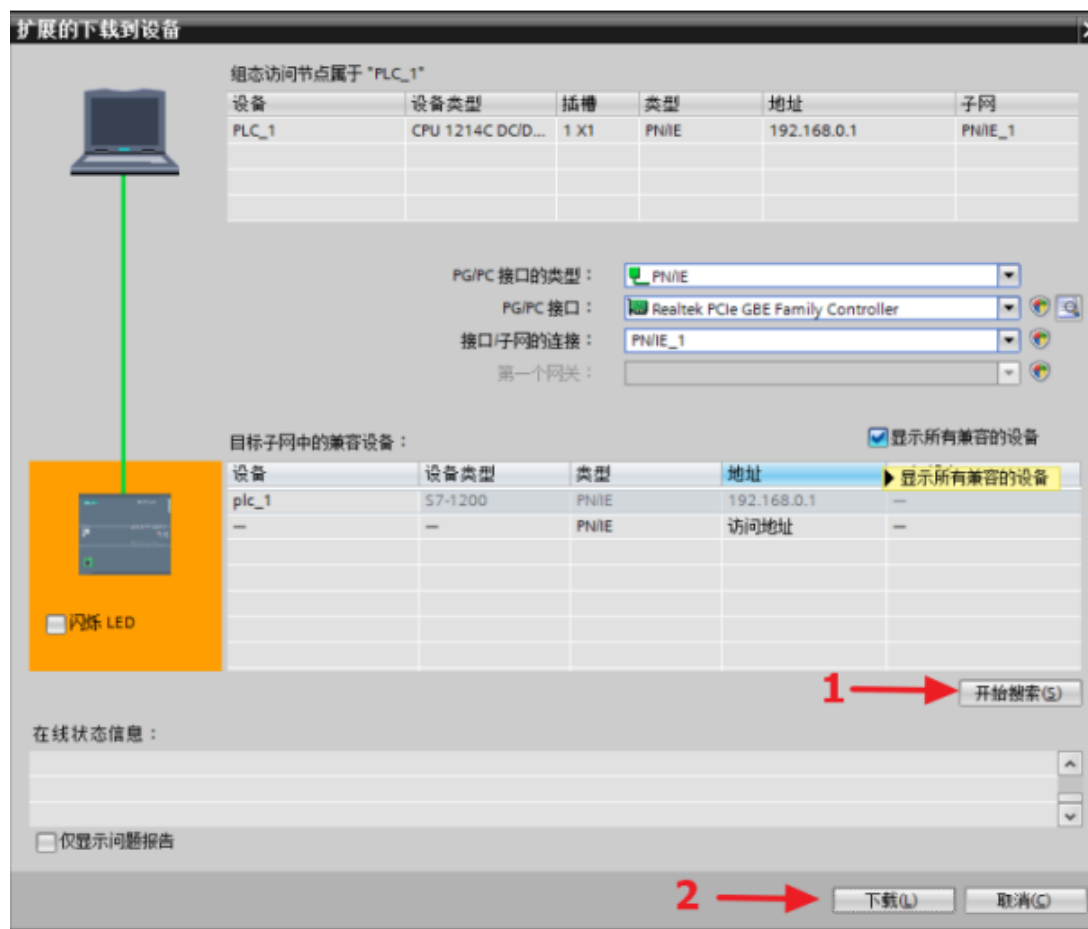
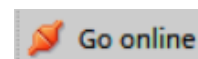


Figure 5-2-8 Program download

After the program is downloaded, start the CPU and click on the online monitoring button to see if the communication is normal.



5.3 Use and configuration of RB-6512 in TwinCAT3

Install the XML description file to the path C:\TwinCAT\3.1\Config\Io\EtherCAT.

	DECOWELL_FNS-1005-EC_V1.0.0.xml	修改日期: 2024/1/11 13:51 大小: 4.10 KB
	DECOWELL_LS-EC_V1.0.5.xml	修改日期: 2024/7/4 10:22 大小: 1.30 MB
	DECOWELL_MTC-1100_V1.0.3.xml	修改日期: 2024/7/29 9:25 大小: 590 KB
	DECOWELL_RB-1100_V1.1.1_20240805.xml	修改日期: 2024/8/26 9:31 大小: 1.08 MB
	DECOWELL_RS-EC2_Coupler_V1.0.8.xml	修改日期: 2024/7/17 16:12 大小: 309 KB
	DECOWELL_RX-1100_V1.0.8_20240725.xml	修改日期: 2024/8/19 10:21 大小: 750 KB
	DECOWELL_SDEC-8IOL-M12-00_BITARR_V1.0.7.xml	修改日期: 2023/11/6 16:46 大小: 781 KB

Figure 5-3-1 Install XML file

Open the TwinCAT3 software, select "File" > "New" > "Project" from the menu bar, and select "TwinCAT project" in the new project window.

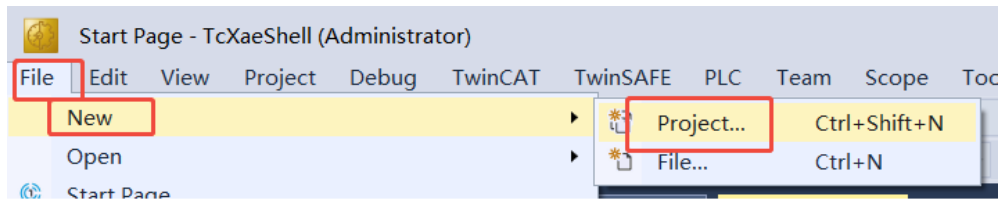


Figure 5-3-2 New Project

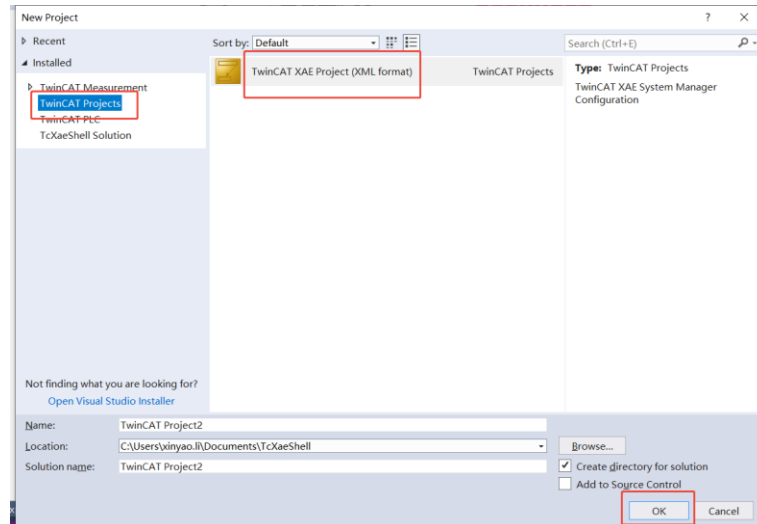


Figure 5-3-3 Create a new TwinCAT project

Scan the IO connected to the programming computer into the project. In the project tree, click "I/O" > "Devices" > "Scan" to scan the hardware configuration.

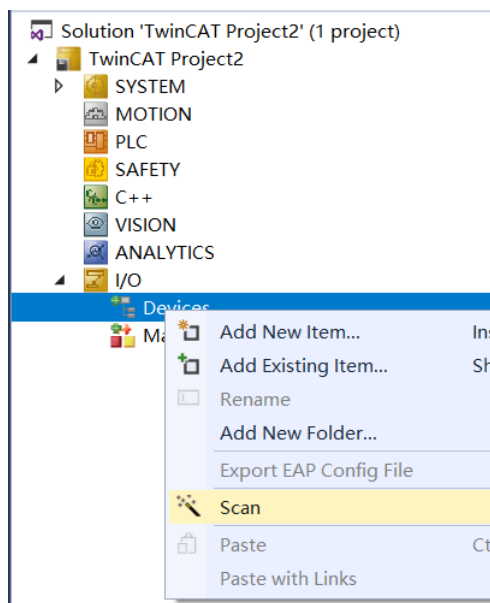


Figure 5-3-4 Add IO module

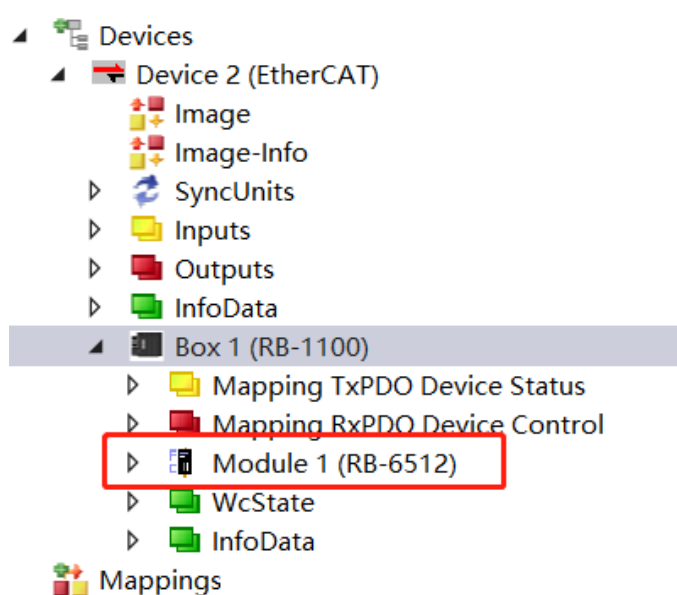


Figure 5-3-5 Hardware Configuration

Click the RB-1100 module to change the RB-6512 configuration parameters in COE Online.

The screenshot shows the TwinCAT Project4 interface. On the left, the 'Solution Explorer' displays a tree view of the project structure. Under 'I/O' > 'Devices', 'Box 1 (RB-1100)' is selected. The main window shows the 'CoE - Online' tab, which contains a table of configuration parameters. The 'Parameter RB-6512' is highlighted with a red box. Below the table, a summary table shows the status of the module.

Index	Name	Flags	Value
7020:0	Output RB-5454		> 4 <
8000:0	Parameter RB-6512		> 35 <
80...	Type string	RW	PWM
80...	Name string	RW	RB-6512
80...	Module ident	RW	0x00000A89 (2697)
80...	Slot	RW	0x0000 (0)
80...	Ch 0: Period value	RW	0x00030D40 (200000)
80...	Ch 0: Dutyfactor value	RW	0x000186A0 (100000)
80...	Ch 1: Period value	RW	0x00030D40 (200000)
80...	Ch 1: Dutyfactor value	RW	0x000186A0 (100000)
8010:0	Parameter RB-6022		> 41 <
8020:0	Parameter RB-5454		> 40 <
8000:0	Information RB-6512		< 35 >

Name	Online	Type	Size	>Addr...	In/Out	User ...	Linked to
Errorbit 0	0	BIT	0.1	39.0	Input	0	

Figure 5-3-6 Change configuration parameters



Service Hotline

400-096-9016

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