

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.

Temperature acquisition modules are divided into two types according to the sensor type: thermocouple (TC) and resistance temperature detector (RTD).

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.

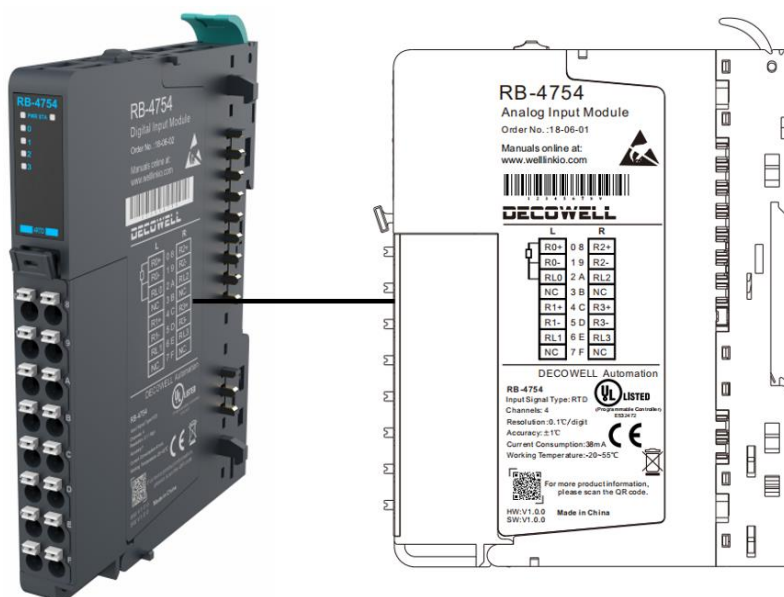
1. Product Information

1.1 Product naming and nameplate

RB - 4 7 5 4

① ② ③ ④ ⑤

NO.	Name	Description Definition
①	Product Series Name	RB Series
②	Module Type	4: Analog input 5: Analog output
③	Function Type	0: Unipolar voltage type 1: Bipolar voltage type 4: Current type 6: Thermocouple type 7: Resistance temperature detector type
④	Resolution	1:12BIT 5:16BIT
⑤	Number of channels	4: 4 channels 8: 8 channels



1.2 Component Description

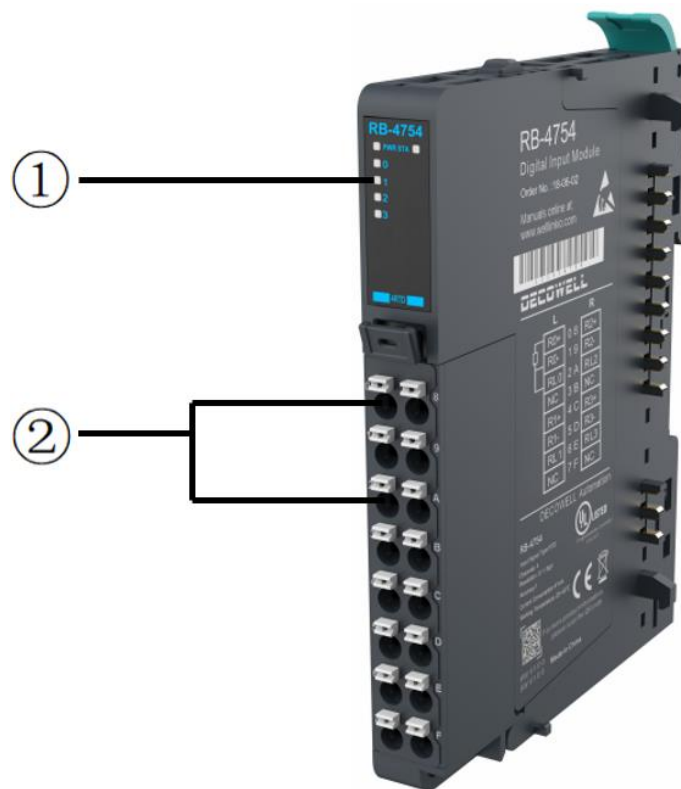


Figure 1-2-1 Component Description Diagram

Parts Description Table

NO.	Name	Function Definition	
1	Signal indicator	Flashing (green)	RTD sensor has signal input
		ON (green)	RTD sensor signal over range/full scale
		None	No RTD sensor signal input
2	Sensor signal access point	R0+	RTD sensor positive signal
		R0-	RTD sensor negative signal
		RL0	Thermal resistance sensor compensation

Note: When using two-wire thermal resistance measurement, RL0 and R0 should be short-circuited.

1.3 STA /PWR indicator light description



Led	State	Describe
STA	Fast Flash (red)	Module self-test abnormality (internal fault)
	ON(red)	The module has not established communication with the adapter, and configuration information loading failed.
	ON(green)	The module works fine
	1Hz Flashing(red)	Module hardware abnormality
PWR	ON(green)	Internal power supply is normal (5V system side)
	OFF	No power supply/Abnormal power supply (5V system side)

1.4 Technical specifications

1.4.1 Product model information

Model	Specifications	Order Number
RB-4754	4-channel RTD input module, supports sensor types: PT100 / PT200 / PT500 / PT1000 / Cu100 / KTY84-130 / KTY83-122 / NTC5K / NTC10K / NTC10K221 / Ni120 / Resistance 2000Ω	18-06-01

1.4.2 RB-4754 numerical table corresponding to the measured temperature.

RB -4754				
Type	Temperature/°C	Numeric value (decimal)	Break value	Remark
PT100	-200~+800	-2000~+8000	32767	The code value obtained by PLC is divided by 10 to get the actual temperature value
PT200	-200~+630	-2000~+6300	32767	
PT500	-200~+630	-2000~+6300	32767	
PT1000	-50~+300	-500~+3000	32767	
Ni120	-70~+300	-700~+3000	32767	
Cu100	-50~+150	-500~+1500	32767	
KTY84-130	-40~+250	-400~+2500	32767	
KTY83-122	-55~+175	-550~+1750	32767	
NTC5K	-40~+130	-400~+1300	32767	
NTC10K	-30~+150	-300~+1500	32767	
NTC10K221	-50~+130	-500~+1300	32767	
Resistance 2000Ω	0~2000Ω	0~30000	32767	Map the actual 0 to 2000 proportionally to 0 to 30000

1.4.3 Module parameters

RB-4754 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
Input characteristics	

Number of input channels	4
Input filtering	Configurable: 0 to 3 levels (default 1)
Connection	2-wire or 3-wire (3-wire by default)
Signal Type	P T100 / PT200 / PT500 / P T1000 / Cu100 / KTY84-130 / KTY8 3-122 / NTC5K / NTC10K / NTC10K221/Ni120/ Resistance 2000Ω
Resolution	0.1°C/digit
Accuracy	± 1°C
Conversion speed	200ms / 4channel(default)
Overvoltage protection	support
Isolation withstand voltage	Channel isolation 500VAC between field and digital side
Diagnosis and warnings	
Disconnection warning	Support (when the channel code value is 32767 , it means the channel is disconnected)
Overrange warning	Supported (when the channel code value is 32766, it indicates the channel has exceeded the upper limit)
Underrange warning	Supported (when the channel code value is -32766, it indicates the channel has exceeded the lower limit)

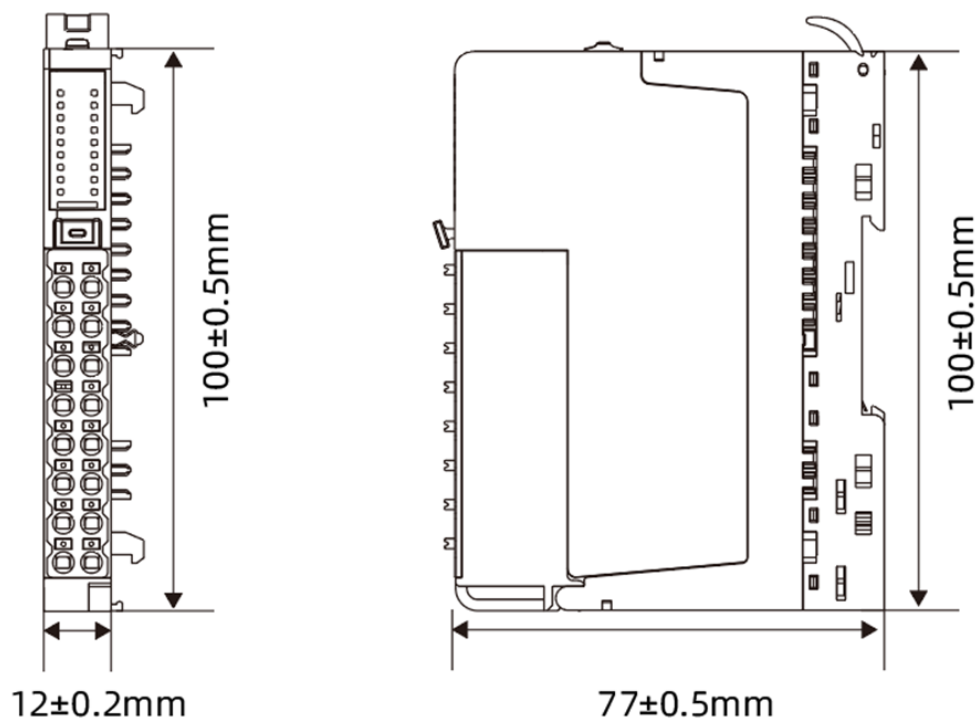
1.5 Environmental specifications

Environmental parameters	
Operating temperature	-20~55°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

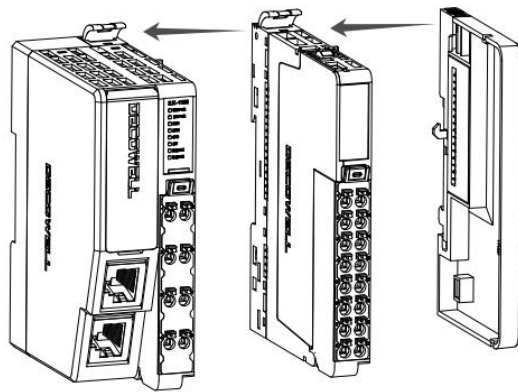
The installation dimension information is shown in the figure below, the unit is (mm) .



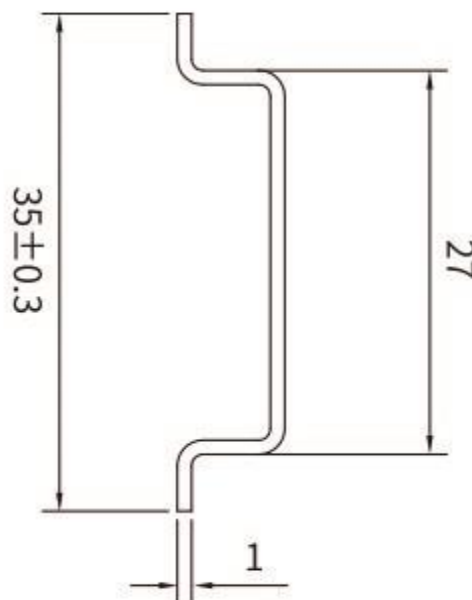
2.2 Installation method

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.



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:



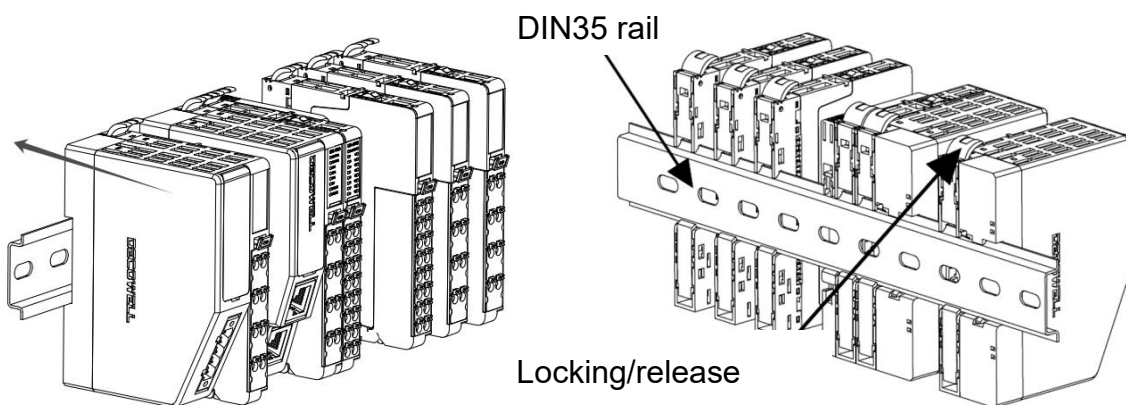
Note: When the module is installed on a DIN35 rail other than the one recommended above, the DIN rail lock may not lock properly. Before installing the module, open the lock lever on the top of the module before proceeding to the next step of installation.

 Notice

- When this product is installed on a DIN rail other than the one recommended above (especially when the thickness of the DIN rail is $\leq 1.0\text{mm}$), the DIN rail lock will fail and the product will not be installed properly, causing the product to not work properly.

2.2.2 Installation on the rail

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.

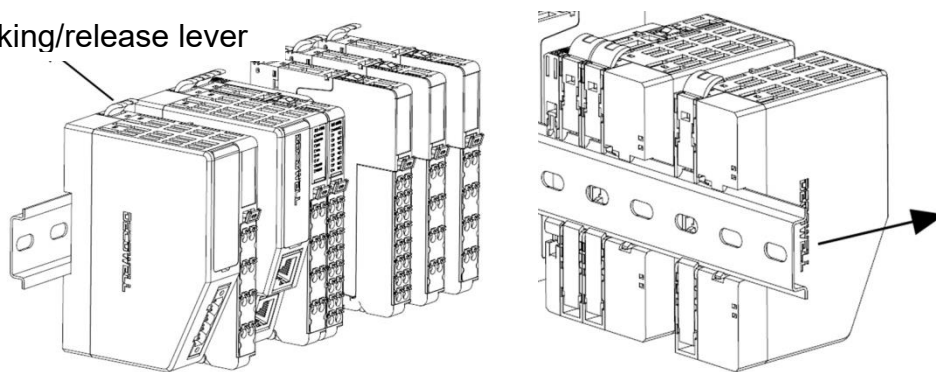


Note: After installing the module, press the lock-release lever downward by hand to secure the module onto the guide rail, ensuring it is properly installed.

Disassembly:

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

lifting the locking/release lever



3. Electrical installation

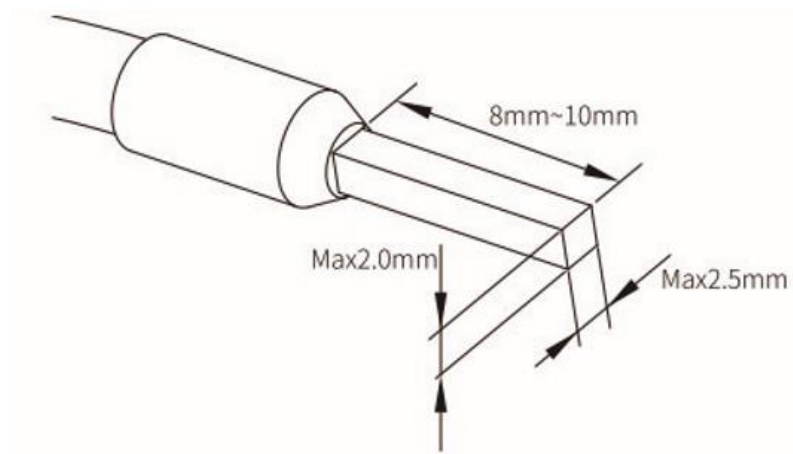
3.1 Cable selection

Signal related cables. The wire lug diameters in the following table are for reference only and can be reasonably calculated and adjusted based on actual use.

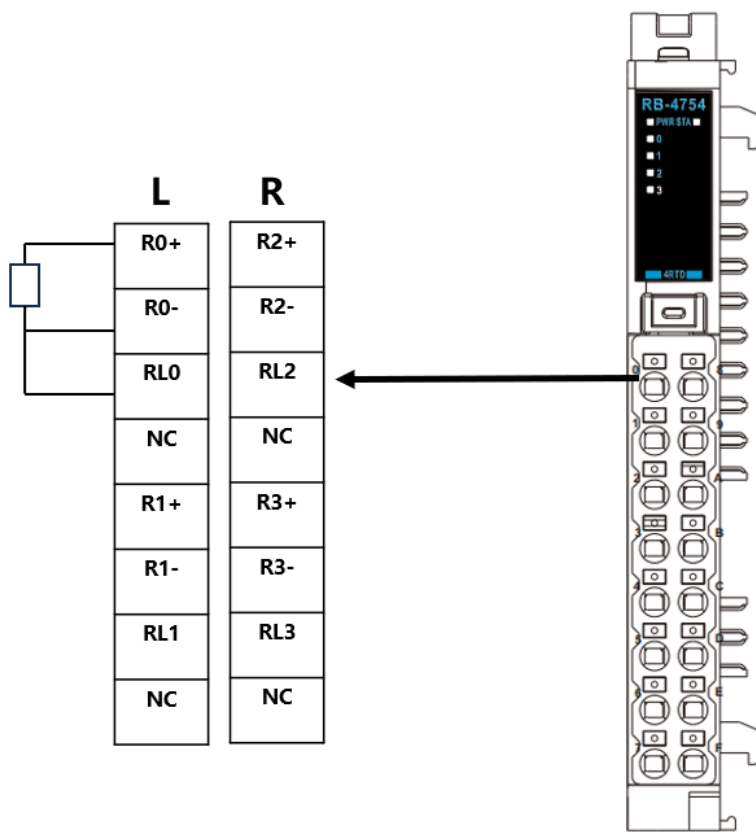
Name	Compatible Wire Gauge		KST	
Ferrule Type	Standard (mm ²)	AWG	Model	Crimping Tool
	0.25	24	E0208	KST2000L
	0.5	20	E0510	
	0.75	18	E7510	
	1.0	18	E1010	
	1.5	16	E1510	

Stripping length: 8–10 mm

The shape and size requirements of the riveted terminals are shown in the figure below.



3.2 Terminal wiring

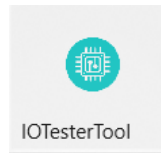


The module channels support both 2-wire and 3-wire sensors. Taking the first channel as an example: For 2-wire sensors or resistance measurement, short R0⁻ and RL0. For 3-wire sensors, connect according to the wiring sequence shown in the diagram.

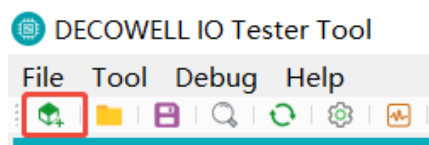
4. Module configuration information

4.1 How to change analog channel parameters

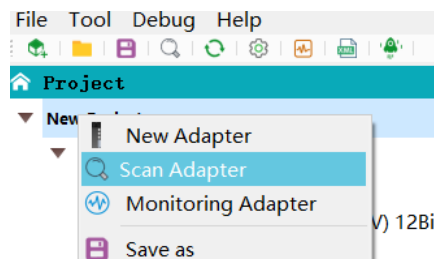
Open DECOWELL IOTesterTool software.



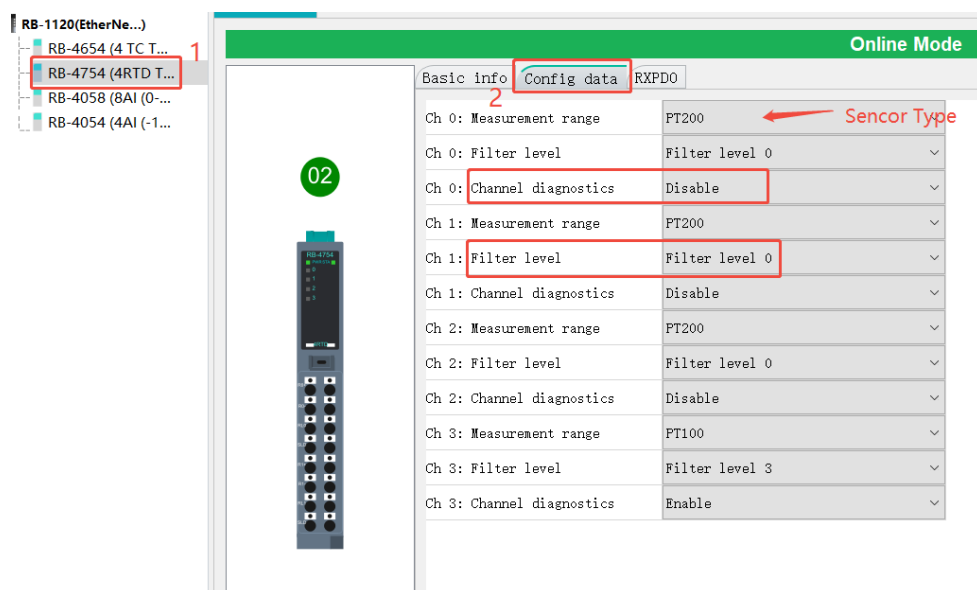
Click on the selected area in the image below to create a new project.



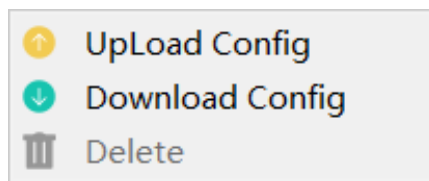
Right-click the created project and click Scan Adapter.



After selecting the communication mode, scan the module and add it to the project. Click the module in the project column on the left, find the window "Config Data", you can modify the module parameters in it.



Right-click the module and click "Download Config" to download relevant configuration parameters to the module, which will take effect after power off and restart.



4.2 Temperature module supports alarm types

When the channel diagnostics are enabled, the module will send some alarm information.



Channel 1	Channel diagnostics	Disable	This channel will not generate diagnostic warnings
		Enable	Sensor disconnection warning
			Temperature exceeding upper limit warning
			Temperature exceeding lower limit warning
Channel 2	Channel diagnostics	Disable	This channel will not generate diagnostic warnings
		Enable	Sensor disconnection warning
			Temperature exceeding upper limit warning
			Temperature exceeding lower limit warning
Channel 3	Channel diagnostics	Disable	This channel will not generate diagnostic warnings
		Enable	Sensor disconnection warning
			Temperature exceeding upper limit warning
			Temperature exceeding lower limit warning
Channel 4	Channel diagnostics	Disable	This channel will not generate diagnostic warnings
		Enable	Sensor disconnection warning
			Temperature exceeding upper limit warning
			Temperature exceeding lower limit warning



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