EtherCAT

RC Series Slice I/O

User Manual

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1 Product Overview

1.1 Product Introduction

RC series plug-in I/O modules adopt a structure that combines a coupler and an I/O module.RC-EC2200 is a module kit of RC series plug-in power module and EtherCAT coupler. The coupler connects the expandable I/O module to the fieldbus control system. The I/O module communication backplane adopts X-bus bus, which has high real-time performance and rich module types, providing users with high-speed data acquisition, optimized system configuration, simplified field wiring, and improved system reliability.

1.2 Product Features

- Occupies fewer nodes A node consists of a bus coupler, 1 to 32 X-bus series I/O modules and an end cover.
- Rich functional expansion

It supports flexible expansion and has a full range of I/O types; it can integrate digital, analog, temperature, pulse and other modules to meet the needs of different application scenarios.

• Flexible configuration

Various types of plug-in I/O modules can be combined arbitrarily.

• Strong compatibility

The coupler communication interface complies with communication standards and supports mainstream EtherCAT master stations.

• Supported configuration parameters

Support parameter configuration and automatic saving.

Easy diagnosis

The innovative channel indicator light design is close to the channel, so the channel status is clear at a glance and detection and maintenance are convenient.

• Fast speed

The backplane uses X-bus: the maximum scanning cycle is 1 ms.

1.3 Application Configuration



Application configuration:

According to the requirements of master station access capability, number of sites, I/O points, function type, etc., it can adapt to different types of I/O module combination configurations.

Configuration rules:

The modules from left to right are power module, coupler module, I/O module, end cover (mandatory), etc.

2 Model List

2.1 List of commonly used modules

model	Product Description			
RC-EC2200	EtherCAT coupler kit (power supply RC-PWR2H, coupler RC-EC200)			
RIOPWR2	Extension power module			
RIO3200P	32-channel digital input module, PNP type			
RIO0032P	32-channel digital output module, PNP typ	0e		
RIO1600P	16-channel digital input module, PNP type			
RIO0016P	16-channel digital output module, PNP typ	0e		
RIO0800P	8-channel digital input module, PNP type			
RIO0008P	8-channel digital output module, PNP type	9		
RIO1616P	16-channel digital input and output module, PNP type			
RIO80AV	8-channel analog voltage input module			
RIO40AV	4-channel analog voltage input module			
RIO04AV	4-channel analog voltage output module	- IU~ + IU V		
RIO40AI	4-channel analog current input module			
RIO08AI	8-channel analog current output module			
RIO04AI	4~20mA			
RIO0012J	12-channel relay output module			
RIO40TM	4-channel thermal resistor and thermocouple temperature acquisition			
	module			
RIO80TM	8-channel thermal resistor and thermocouple temperature acquisition			
	module			
RIOP20A	Pulse counting module			

3 Product Parameters

3.1 General parameters

General technical parameters				
Specifications and	Power Module	106 × 61 × 22.5 mm		
dimensions	Coupler modules	106 × 61 × 22.5 mm		
	I/O Modules	106 × 73 × 25.7 mm		
weight	Power Module	110 g		
	Coupler modules	80 g		
	I/O Modules	90 g		
Operating	-10°C~+60°C			
temperature				
Storage temperature	-20°C∼+75°C			
Relative humidity	95%, non-condensing			
Protection level	IP20			

3.2 Power parameters

Power parameters				
Power Module	Working power	24 VDC (18V~30V)		
	supply			
	Output voltage	5 VDC		
	Output Current	2A		
Coupler modules	Working power	5 VDC		
	supply			
	Working current	400 mA		
I/O Modules	Working power	5 VDC		
	supply			

3.3 Interface parameters

EtherCAT Interface Parameters			
Bus protocol	EtherCAT (MDP)		
Number of I/O	According to the master station settings		
stations			
Data transmission	Ethernet/EtherCAT CAT5 Cables		
medium			
Transmission distance	≤100 m (StationandStation distance)		
Transfer rate	100 Mbps		
Bus interface	2 × RJ45		

3.4 Digital parameters

Digital input			
Rated voltage	24 VDC (18V~30V)		
Signal Points	8, 16, 32		
Signal Type	PNP		
"0" signal voltage (PNP)	-3~+3 V		
"1" signal voltage (PNP)	15~30 V		
Input filtering	3 ms		
Input Current	4 mA		
Isolation method	Optocoupler Isolation		
Isolation withstand voltage	500 VAC		
Channel indicator light	Green LED light		
Digital output			
Rated voltage	24 VDC (18V~30V)		
Signal Points	8, 16, 32		
Signal Type	PNP		
Load Type	Resistive load, inductive load		
Single channel rated current	PNP type Max: 500 mA		
Port protection	Overvoltage and overcurrent protection		
Isolation method	Optocoupler Isolation		
Isolation withstand voltage	500 VAC		
Channel indicator light	Green LED light		

Relay output			
Rated voltage	24 VDC (18V~30V)		
Signal Points	12		
Isolation method	Optocoupler, relay		
Rated load	2 A		
Channel indicator light	Green LED light		

3.5 Analog parameters

3.5.1 Technical Parameters

Analog input				
Enter points	4, 8			
Input signal (voltage	0~+10 V, -10 ~+10 V (range adjustable)			
type)				
Input signal (current	0~20 mA, 4~20 mA (adj	ustable range	e)	
type)				
Resolution	16 bit			
Sampling rate	RIO40AV, RIO80AV, RIO	40AI	≤1 ksps	
Accuracy	RIO40AV, RIO80AV, RIO	40AI	±0.1%	
Input impedance	≥2 kΩ			
(voltage type)				
Input impedance (current	100 Ω			
type)				
Isolation withstand	500 VAC			
voltage				
Channel indicator light Green LED light				
Temperature input				
Number of channels	4, 8	1		
Sensor Type	Thermocouple Thermal resistor resistance			
Connection	2-wire 2-wire 2-wire		2-wire	
	K: -200∼1370℃	Pt100: −200~850°C		15Ω~3kΩ
	J: -200∼1200℃	Pt200: -200~600°C		
	E: -200~1000°C	Pt500: -200~600°C		
	S: -50∼1690℃	Pt1000: -200~600°C		
	B: 50∼1800℃			
Accuracy	±0.3% ±1°C ±0.1%		±0.1%	
Sensitivity 0.1°C				±0.1Ω
Resolution	16 bits (int type)			
Channel indicator light	Green LED light			

Analog output			
Output points	4, 8		
Output signal (voltage	0~+10 V, -10~+10 V (range adjustable)		
type)			
Output signal (current	0~20 mA, 4~20 mA (adjustable range)		
type)			
Resolution	16 bit		
Accuracy	RIO04AV, RIO04AI, RIO08AI	±0.1%	
Load impedance (voltage	≥2 kΩ		

type)	
Load impedance (current	\leqslant 500 Ω (some stock modules \leqslant 200 Ω , see note below for details)
type)	
Isolation withstand	500 VAC
voltage	
Channel indicator light	Green LED light

Note: The analog voltage module does not support underflow, underflow and overshoot, while the analog current module supports underflow, underflow and overshoot.

3.5.2 Voltage input/output range selection and code value table

Voltage input/output range selection and code value range					
Range selection	0	1	2	3	
Range	-10 ~+10 V	0~+10 V	-10 ~+10 V	0~+10 V	
Code value	-32768~32767	0~32767	-27648~27648	0~27648	
range					
Voltage input					
Calculation	D=(65535/20)*U	D=(32767/10)*U	D=(55296/20)*U	D=(27648/10)*U	
formula					
Voltage output					
Calculation	U=(D*20)/65535	U=(D*10)/32767	U=(D*20)/55296	U=(D*10)/27648	
formula					
Code value					
Correspondence	See alsoTable 3- 1 Voltage code value table.				
table					

Note: D represents the code value, and U represents the voltage.

	0 (default)	1	2	3	
Range	-10~+10V	0~+10V	-10~+10V	0~+10V	
Voltage	Code value	Code value	Code value	Code value	
-10	-32768	-	-27648	-	
-9	-29491	-	-24883	-	
-8	-26214	-	-22118	-	
-7	-22937	-	-19354	-	
-6	-19661	-	-16589	-	
-5	-16384	-	-13824	-	
-4	-13107	-	-11059	-	
-3	-9830	-	-8294	-	
-2	-6554	-	-5530	-	
-1	-3277	-	-2765	-	
0	0	0	0	0	
1	3277	3277	2765	2765	
2	6554	6553	5530	5530	
3	9830	9830	8294	8294	
4	13107	13107	11059	11059	
5	16384	16384	13824	13824	
6	19661	19660	16589	16589	
7	22937	22937	19354	19354	
8	26214	26214	22118	22118	
9	29491	29490	24883	24883	
10	32767	32767	27648	27648	
	Code value =	Code value =	Code value =	Code value =	
	(65535/20) *	(32767/10) *	(55296/20) *	(27648/10) *	
	voltage	voltage	voltage	voltage	
	Voltage = (code	Voltage = (code	Voltage = (code	Voltage = (code	
	value * 20) / 65535	value * 10) / 32767	value * 20) / 55296	value * 10) / 27648	

sheet3-1Voltage code value table

Note: For analog voltage input modules, when the channel input voltage exceeds 10V, the maximum code value is displayed. For analog voltage output modules, when the code value setting exceeds the maximum code value corresponding to the range in the table, the channel outputs 10V voltage.

3.5.3 Current input/output range selection and code value table

Analog current input and output range selection and code value range						
Range selection	0	1	2	3		
Range	4~20 mA	0~20 mA	4~20 mA	0~20 mA		
Code value range	0~65535		0~27648			
Current input	D=(65535/16)*I-		D=(27648/16)*I-69	D-(27648/20)*I		
calculation formula	16384	D=(05555/20)*1	12	D=(27040/20)*1		
Current output	I=(D+16384)*16/		I=((D+6912)*16)/2			
calculation formula	65535	T=(D*20)/05555	7648	1=(D*20)/27646		
Code value						
Correspondence	See alsoTable 3- 2 Current code value table.					
table						
Note: Direpresents the code value, and Licenseconts the surrent						

Note: D represents the code value, and I represents the current.

sheet3-2Current code value table

Range	0 (default)	1	2	3
selection	4~20mA	0~20mA	4~20mA	0~20mA
Range				
		Code value		Code value
Current	Code value		Code value	
0		0		0
1		3277		1382
2		6554		2765
3		9830		4147
4	0	13107	0	5530
5	4096	16384	1728	6912
6	8192	19661	3456	8294
7	12288	22937	5184	9677
8	16384	26214	6912	11059
9	20479	29491	8640	12442
10	24575	32768	10368	13824
11	28671	36044	12096	15206
12	32767	39321	13824	16589
13	36863	42598	15552	17971
14	40959	45875	17280	19354
15	45055	49151	19008	20736
16	49151	52428	20736	22118
17	53247	55705	22464	23501
18	57343	58982	24192	24883
19	61439	62258	25920	26266
20	65535	65535	27648	27648
twenty one	65535	65535	29376	29030
twenty two			31104	30413

22.81423611							32511			31538		
22.96238426							32767			31743		
twenty three							32767			31795		
23.51779514										32511		
23.70298032										32767		
twenty four										32767		
25												
	Code	value	=	Code	value	=	Code	value	=	Code	value	=
	(65535,	/16)	*	(65535	/20)	*	(27648	/16)	*	(27648	/20)	*
	current - 16384		current	t		current	: - 6912		current	t		

Note: When the input current of range 2 is greater than 22.81 mA, the code value is displayed as 32767; when the specified code value is greater than 32511, the output current is 22.81 mA.

When the input current of range 3 is greater than 23.52 mA, the code value displayed is 32767; when the specified code value is greater than 32511, the output current is 23.52 mA.

4 panel

4.1 Coupler Panel

4.1.1 Coupler structure

Product parts names and function

descriptions



serial number	name	illustrate
1	Power Terminal Blocks	Spring-loaded terminal blocks
2	Guide rail slot	Suitable for DIN 35 mm rail fixing

3	Power label, indicator	Indicates power status	
	light		
4	System identification and	Indicates neuron cumply and module exercises status	
	indicator lights	indicates power supply and module operation status	
5	Bus interface	2 × RJ45	

4.1.2 Indicator light function

Power module identification and indicator light description								
Logo	С	olor	state		Status	s description		
Р	g	reen	Alway	/s on	Worki	Vorking power is normal		
			Flash	Flash		Overload 80%, cut off the power supply to the		
						subsequent load		
			Off		The product is not powered or the power supply is			
					abnor	mal		
0	re	ed	Off		Not o	verloaded		
			Alway	/s on	Load r	reaches 90%		
Coupler module identification and indicator lights								
name		Logo	color	state		Status description		
Power		Р	green	Alway	/s on	Working power is normal		
indicator				Off		The product is not powered or the power supply		
						is abnormal		
System		L	green	Alway	/s on	X-bus is interacting		
indicator				Flashing		Bottom bus initialization is normal		
				1Hz				
				Flashi	ing	Bottom bus initialization abnormality		
				5Hz				
				Flashing		I/O module loss response occurs during		
				10Hz		operation		
				Off		Initialization state or no power on		
Warning		E	red	Alway	/s on	The coupler is in abnormal state		
indicator				Off		Initialization state, no power or no error		
Operation		R	green	Alway	/s on	EtherCAT OP Status		
status indicate	or			Flashi	ing	EtherCAT PreOP Status		
				5Hz				
				Flashi	ing	EtherCAT SafeOP Status		
Network por	t st	atus indicat	tor					
Logo	С	olor	state	state		description		
IN	10	ange color	Flash	then	on ferco	nnection is established and data is exchanged		
			Off	200m	^s No dat	a interaction or exception		
	gı	een	Alway	s onff	Establi	shintialization state or on		
			Off		No net	work connection established or abnormal		
OUT	orange color		Flash		The co	nnection is established and data is exchanged		

	Off	No data interaction or exception
green	Always on	Establishing a network connection
	Off	No network connection established or abnormal

4.2 I/O Module Panel

Module parts name and function

description



I/O module in	I/O module indicator light description					
Logo	color	state	Status description			
Р	green	Always on	Power supply is normal			
		Off	The product is not powered on or the power supply is			
			abnormal			
R	green	Always on	The system is running normally			
		Flashing 1	I/O modules are connected and the X-bus system is			
		Hz	ready to interact			
		Off	The device is not powered on, the X-bus does not			
			exchange data, or an exception occurs.			
Input channel	green	Always on	The module detection channel has signal input			
indication		Off	The module channel has no signal input or the signal			
			input is abnormal			
Output	green	Always on	The module channel has signal output			

channel	Off	The module channel has no signal output or the signal
indication		output is abnormal

5 Installation and removal

5.1 Installation Guide

Installation\removal precautions

- Ensure that the cabinet has good ventilation measures (such as installing an exhaust fan in the cabinet).
- Do not install this device near or over any equipment that may cause overheating.
- Be sure to install the module vertically and maintain air circulation around it (there should be at least 50 mm of air circulation space above and below the module).
- After the module is installed, be sure to install the guide rail fixings at both ends to secure the module.
- Installation and removal must be performed with the power turned off.

Minimum gap for module installation (≥50mm)



Ensure the module is installed vertically



Be sure to install the rail fixings



5.2 Installation and removal steps

Module installation a	Module installation and removal					
Module installation	1. Install the power module on the fixed rail first.					
steps	2. Install the coupler and required I/O modules in sequence on the right side of					
	the power module.					
	3. After installing all required I/O modules, install the end covers to complete the					
	module assembly.					
	4. Install the guide rail fixings at both ends of the power module and end cover					
	to fix the module.					
Module disassembly	1. Loosen the guide rail fixings at both ends of the module.					
steps	2. Use a flat-blade screwdriver to pry open the module buckle.					
	3. Pull out the disassembled module.					

5.3 Installation Diagram

Power module installation



step

Insert the power module guide slot and align the guide rail vertically as shown in the left figure ①.

As shown in the left figure ②, press the power module hard until you hear a "click" sound, and the module is installed in place.

Coupler module installation



step

Align the left slot of the coupler module with the right side of the power module and push it in as shown in ③ in the left figure. Press the coupler module firmly until you hear a "click" and the module is installed in place.

I/O Module Installation



step

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



5

End cap installation

step



Install the end cover on the right side of the last module, as shown in the left figure (6). For installation methods, please refer to the installation method of the coupler module.

6

Rail fixing installation



 \bigcirc



Install the guide rail fixture on the right side of the end cover. First push the guide rail fixture toward the coupler to ensure that the module is installed firmly, and then use a screwdriver to tighten the guide rail fixture, as shown in the left figure (8).

step

Install and lock the guide rail fixings close to the left side of the coupler, as shown in Figure

⑦ on the left.

Disassembly



step

Use a screwdriver to loosen the guide rail fixing at one end of the module and move it to one side to ensure that there is a gap between the module and the guide rail fixing, as shown in Figure (9) on the left.



Insert a flat-head screwdriver into the buckle of the module to be removed, and apply force to the module sideways (until you hear a sound), as shown in Figure 10 on the left and Figure ID on the right. (1) shown. Note: Each module has a buckle on the top and bottom, and all modules are operated in the same way.

10(11)



Follow the opposite operation of installing the module to remove the module, as shown in the left figure⁽²⁾Shown.

5.4 Dimensions

Power module dimensions (in mm)



Coupler dimensions (mm)



Extended power supply dimensions (in mm)



I/O module dimensions (in mm)



End cover dimensions (unit: mm)



Note: All are installed using DIN 35 mm standard rails, with DIN rail specifications of 35*7.5*1.0 and 35*15*1.0 (unit: mm).

6 wiring

6.1 Terminal Blocks

Terminal Blocks					
Signal line terminal	Number of poles	16 P			
	Number of poles	20 P			
	Wire diameter	twenty two~17 AWG 0.3~1.0 mm ²			
Power Terminals	Number of poles	3P			
	Wire diameter	twenty two~16 AWG 0.3~1.5 mm ²			
Bus interface	2 × RJ45	Category 5 or higher UTP or STP (STP is recommended)			

6.2 Wiring Instructions and Requirements

Power Wiring Precautions

- The module system side power supply and field side power supply are configured and used separately. Do not mix them.
- PE must be grounded reliably.

Wiring tool requirements

The power terminals and signal line terminals adopt a screw-free design, and the cables can be installed and removed using a flat-blade screwdriver (specification: \leq 3mm).

Stripping length requirements

The recommended cable stripping length for power and signal line terminals is 10 mm.

Wiring method for power module and I/O module

For single-strand rigid wire, after stripping the wire to the corresponding length, press the button and insert the single-strand wire at the same time.

For multi-strand flexible wires, after stripping the wires to the corresponding length, you can directly connect them or use the

corresponding standard specifications of cold-pressed terminals (tubular insulated terminals, reference specifications are shown in the following table) to insert the wires while pressing the button.

The specifications of power terminals and signal line terminals are shown in the following table:

Specifications of tubular insulation terminals		
Specifications	model	Conductor
		cross-sectional area mm
		2
	E0310	0.3
	E0510	0.5
	E7510	0.75
	E1010	1.0
Tube type insulated terminalLThe length is10mm	E1510	1.5

Bus wiring method

It uses a standard RJ45 network interface and a standard crystal connector, and the pin assignments are shown in the following table.



Pin	Signal
Number	
1	TD+
2	TD-
3	RD+
4	one
5	one
6	RD-
7	one
8	one

Precautions

• It is recommended to use double-shielded (braided mesh + aluminum foil) STP cable of category 5 or higher as communication cable.

• The length of the cable between devices must not exceed 100 m.

Power connection: Power module 3P terminal

Use a DC24V power module and refer to the wiring method. Connect the power supply according to the circuit shown in the figure below, and ground PE reliably (twisted pair cables are recommended for power cables).

• picture6- 1Coupler, I/O module, power supply wiring diagram



• picture6- 2Coupler, I/O module, power module, I/O module, power supply wiring diagram



Load power supply wiring: Field side 20P terminal

Press the signal cables into the terminal blocks according to the corresponding I/O module wiring diagram and wiring method.

The load power supply uses a 24 VDC power supply. Refer to the wiring method and connect the power supply according to the circuit shown in the figure below (for details, refer to <u>6.3 I/O module wiring</u> <u>diagram</u>).



Signal terminal wiring: 16P\20P terminal

Press the signal cables into the terminal blocks according to the corresponding I/O module wiring diagram and wiring method.

6.3 I/O module wiring diagram

6.3.1 RIO3200P



6.3.2 RIO1616P



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OR

6.3.3 RIO1600P



6.3.4 RIO0800P




6.3.5 RIO0032P



*24V内部导通;0V内部导通 *负载公共端电源需与模块使用同一个电源

6.3.6 RIO0016P



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*24V内部导通;0V内部导通 *负载公共端电源需与模块使用同一个电源

6.3.7 RIO0008P





*24V内部导通;0V内部导通 *负载公共端电源需与模块使用同一个电源

6.3.8 RIO0012J



*24V内部导通;0V内部导通 *负载公共端电源需与模块使用同一个电源 *COM可接正极或负极,内部不互通,支持DCO-48V

6.3.9 RIO80AV



6.3.10 RIO40AV



6.3.11 RIO40AI



6.3.12 RIO08AI



*COM内部导通 *24V内部导通; 0V内部导通

6.3.13 RIO04AV



6.3.14 RIO04AI



*C0M内部导通 *24V内部导通: 0V内部导通

6.3.15 RIO80TM



*PE内部导通 *2线制热电阻需外部将"-"与"C"短接 *4线制传感器需改成2线或3线接入

6.3.16 **RIO40TM**



*PE内部导通 *2线制热电阻需外部将"-"与"C"短接 *4线制传感器需改成2线或3线接入

6.3.17 **RIOP20A**



*编码器CH0与CH1的ABZ相NPN/PNP兼容,可在软件组态中配置。 *CH0输入NPN/PNP兼容,公共端为COM0。CH1输入NPN/PNP兼容,公共端为COM1。 *24V内部导通,0V内部导通。

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7 use

7.1 Module Application

7.1.1 Application

The product adopts the application mode of coupler, I/O module and end cover, and has the following two combination applications.



Product combination 2 (coupler, I/O module, power module, I/O module, end cover)

Coupler I/O module Power supply module I/O module end cover



• Please refer to the following principles for the number of I/O modules to be configured:

- 1. The maximum power consumption of the I/O module model and quantity configured in the system must be less than the load current provided by the power module.
- 2. The number of IO modules that can be configured with the coupler is \leq 32.
- 3. One power module can support 10 I/O modules. If there are more than 10 I/O modules, an expansion power supply RIOPWR2 is required.

7 use

7.2 Coupler Function Description

This chapter takes the TwinCAT3 software platform as an example to introduce the coupler function.

1. Topology Configuration

The system supports automatic scanning configuration and manual configuration.

- Manual configuration:
- a. Select the target module in SLOT. The display position is different for different master stations.
- b. After adding the coupler, click on the Slots page [<] and [×] Configure the topology as shown in the following figure.

Solution Explorer 👻 म 🗙	TwinCAT Project1 🔹	×							
○ ○ ☆ io · ≈ i i / ► -	General EtherCAT	Process Data	Slots St	artup	CoE - O	nline On	line		
Search Solution Explorer (Ctrl+;)						1			
□ 解決方案"TwinCAT Project1"(1 个项目) ● ③ SYSTEM ◎ SYSTEM ◎ TwinCAT Project1 ● ④ SYSTEM ◎ PLC ○ SAFETY ◎ C++ ■ ☑ VO ● ◎ Devices ■ © Devices ■ © Device 1 (EtherCAT) ■ mage-info ● ◎ SyncUnits ● ◎ Output for the second	Slot Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals	Module RIO1616P RIO04AV	Modu 0x000 0x000	ilelden 000621 000683	1 3	< X	Module Digital Input Terminals RIO 1600P RIO0800P Digital Output Terminal RIO0016P RIO0016P RIO0012J Analog Input Terminals RIO40AV RIO40AI RIO40AI RIO80TM	ModuleIde 0x00000629 0x00000631 5 0x00000623 0x00000623 0x00000633 0x00000633 0x00000647 0x00000647	Descripti -> 16 Chani 8 Chani 32 Chani 16 Chani 8 Chani 12 Chani 4 Chani 8 Chani 9 Chani
Outputs	Name	Online	Туре	Size	>Addres	s In/O	ut User ID Linked to		
👂 🛄 InfoData	CouplerState	0	UINT	2.0	39.0	Input	t 0		
🔺 🔤 Box 1 (RC-EC2200)	Channel 1	0	BIT	0.1	41.0	Input	t 0		
Inputs	Channel 2	0	BIT	0.1	41.1	Input	t 0		
Outputs	Channel 3	0	BIT	0.1	41.2	Input	t 0		
Module 1 (RIO1616P)	Channel 4	0	BIT	0.1	41.3	Input	t 0		
Module 2 (RIO04AV)	Channel 5	0	BIT	0.1	41.4	Input	t 0		
WeState	Channel 6	0	BIT	0.1	41.5	Input	t 0		
b InfoData	🕶 Channel 7	0	BIT	0.1	41.6	Input	t 0		
Mappings	🕫 Channel 8	0	BIT	0.1	41.7	Input	t 0		

• Automatic scanning configuration:

For details, please refer to 7.4.1 Application in TwinCAT3 software environment.

2、 Parameter settings

- a. Support P -> S settings and startup parameters.
- b. After adding the coupler, on the "Startup" page, right-click and select "Insert" to set the parameters. After setting the parameters, click "OK", as shown in the figure below.

Solution Explorer 🔹 👎 🗙	TwinCAT Project1 🌵 🗙	
	General EtherCAT Process Data Slots Startup CoE - Online Online	
winCAT Project1"(1 个项目)	Transition Protocol Index Data Comment © <ps> CoE 0xF030 C 0 02 00 21 06 00 00 83 06 00 00 downloa</ps>	nt d slot cfg
 SYSTEM MOTION PLC SAFETY C++ I/O Devices Device 1 (EtherCAT) Image Image-Info SyncUnits Devices 	Edit CANopen Startup Entry Transition □ +> P □ +> P □ >> S □ S >> O □ O > S □ Validate □ Complete Access □ data (hexbin): □ 0 > 0 □ 0 <td>X OK Cancel HexEdit</td>	X OK Cancel HexEdit
 Outputs InfoData Module 2 (RIO04AV) Outputs Module 2 (RIO04AV) Outputs WeState InfoData Mappings 	Index Name Flags Value Unit I= 2000.0 RU01616P Config RW >1. I= 2000.01 Channel Debounce Time RW 3ms (3) I+ 2010.0 RI004AV Config RW > 4. I+ F030.0 Configured Module Ident List RW	īdīt

- c. After the parameter modification is completed, you can see the modified parameter items and parameter values under Startup.
 - The master station uses the startup parameter configuration function to configure the IO module parameters when creating a project.
 - The master station uses the SDO method to modify parameters. After the operation is completed, the module automatically saves the parameters and takes effect immediately. The parameters are always saved without changing the topology.
 - Note: If the device is in OP state, when the output property of the module is modified, the output signal at this time will be cleared and run immediately with the new parameters.
 - It is recommended to configure the IO module using the startup parameter method. After completing the configuration, power off the system and then power it on again to confirm whether the parameters are accurately delivered.

		1,0203 102 1100 1	25/1001	TE-AVC		1.22.5	
A 解决方案"TwinCAT Project1"(1 个项目)	Transition	Protocol	Index	Data		Comment	t)
TwinCAT Project1	C <ps></ps>	CoE	0xF030 C 0	02 00 2	1 06 00 00 83 06 00 00	download	l slot cfg
MOTION	Edit CANop	en Startup Ent	ry				×
PLC	Transition						ОК
SAFETY	□I-> P		Index	(hex):	2010		Canada
₩ C++	IZP->S	□S->P	Sub-I	ndex (dec):	1		Cancer
Devices	□s→o	_0->S		alidate	Complete Access		
Device 1 (EtherCAT)	Data (hexbin):	00 00 00	00				Hex Edit
Image-Info	Validate Mask						
SyncUnits	Commont	Chennel	Pengo Setting				EditEntra
Inputs	Commenc	Cridinier	r range beang				Edit Entry
Outputs	Index	Name		Flags	Value	Unit	
P InfoData	⊕ 2000:0	RI01616P Confi	g	RW	>1<		
Box 1 (RC-EC2200)	⊜ 2010:0	RIO04AV Config	1	RW	>4<		
Outputs	2010:01	Channell Rang	Set Value Di	alog			×
Module 1 (RIO1616P)	2010:03	Channel3 Rang		0		01	_
 Module 2 (RIO04AV) 	- 2010:04	Channel4 Rang	Dec:	U		UK	-
D Gutputs	H P030.0	Conligured Mo	Hex:	0×000000	000	Cancel	
P WcState			Enum:	-10~+10	/(-32768~32767)	~	
2 Mappings				-10~+10 0~+10V(0	/(-32768~32767)]~32767)	_	
			Bool:	-10~+10	/(-27648~27648)	Edit	
				0 +100(0	5 27040)		
			Pinner	00.00.00	00		

3、 Coupler control word/status word

RC-EC2200 supports a 2-byte control word ("CouplerCtrl") and a 2-byte status word ("CouplerState"), as shown in the following table:

CouplerState	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
						Pos	012/0						X-	-bus error code		
						Res	erve							displa	iy area	1
[15-	15-4]					Rese	erve									
[3-	[3-0] X-bus running status, normally "0".															
CouplerCtrl	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CouplerCtrl writes bits by																C
setting the control																
word0The output type							-		_							ea
module can keep the							г	(eserv	e							1/
channel output continuously																
under abnormal conditions.																Ia
[15-	·1]					Rese	erve									
							0: By default, the control is cleared.									
[0]]					1: Keep control, default value is "0" .										
						The	correc	tion v	vill tak	e effe	ct imn	nediat	ely.			



7.3 Module parameter setting function

This chapter takes the TwinCAT3 software platform as an example to introduce module parameters, functions and configuration methods.

7.3.1 Digital input filter time

Digital input filtering prevents the program from responding to unexpected rapid changes in input signals, which may be caused by switch contact jumping or electrical noise. The digital input filter is currently configured to 3ms by default, and the supported setting range is 0~20ms. When configured to 3ms, it can filter out clutter within 3ms, and channels cannot be configured individually.

An input filter time of 3 ms means that a single signal change from 0 to 1, or from 1 to 0 lasting 3 ms can be detected, while a single high or low pulse shorter than 3 ms will not be detected.

7.3.2 Analog filter setting function

• Analog input filtering function

The analog input filtering function can average the data after A/D conversion internally to reduce the impact of fluctuations caused by noise on the input signal.

The analog input is processed by moving average with the specified number of A/D conversions.

• Filter function configuration

Each channel can be configured individually, the configuration range is: 1~200 times, the default is 10 times.

The sampling rate of the 8-channel module is: 1.25KHZ/8 channels (800us/8 channels). The sampling rate of the 4-channel module is: 2.5KHZ/4 channels (400us/4 channels).

7.3.3 Output clear hold function

Keep output: When the communication is disconnected, the module output channel keeps outputting.

Clear output: When the communication is disconnected, the module output channel clears the output.

For the configuration method of output clear hold function, refer to <u>7.4 Bus module configuration</u> instructions.

7.3.4 Analog range selection

Analog quantity supports range selection function, see<u>3.5 Analog parameters</u>. For parameter configuration methods, see<u>7.4 Bus module configuration instructions</u>.

7.4 Bus module configuration instructions

7.4.1 Application in TwinCAT3 software environment

1. Preparation

Hardware Environment

> Module Preparation

This description takes the RC-EC2200 module kit (power supply RC-PWR2H, coupler RC-EC200), RIO1616P, and RIO04AV as examples.

- > A computer with TwinCAT3 software pre-installed
- > EtherCAT dedicated shielded cable
- > Switching power supply
- > Module mounting rails and rail fixings
- > Device Profile
- Hardware configuration and wiring Please follow the5 Installation and removal" and "6 Wiring" requires action.

2. Pre-configured configuration files

Place the ESI configuration file (EcatTerminal-RC-EC2200_V3.22_ENUM.xml) into the TwinCAT installation directory

"C:\TwinCAT\3.1\Config\Io\EtherCAT", as shown in the figure below.

📕 » 此电脑 » 本地磁盘 (C:) » TwinCAT » 3.1 » C	onfig > lo > EtherCAT			
名称	^ 修改日期	类型	大小	^
Becknoll EPPTXXX.Xml	2017/12/14 11:54	AIVIL 义怕	40U KD	
Beckhoff EL34xx.xml	2017/12/15 15:35	XML 文档	5,634 KB	
Beckhoff EK13xx.xml	2017/12/19 14:30	XML 文档	16 KB	
Beckhoff EPP2xxx.xml	2017/12/28 12:22	XML 文档	1,811 KB	
Beckhoff EJ1xxx.xml	2018/1/4 10:00	XML文档	67 KB	
Beckhoff EJ3xxx.xml	2018/1/4 10:07	XML 文档	1,169 KB	
Beckhoff EJ7xxx.xml	2018/1/4 10:11	XML 文档	2,339 KB	
Beckhoff EJ9xxx.xml	2018/1/4 10:23	XML 文档	160 KB	
Beckhoff EJ6xxx.xml	2018/1/4 10:31	XML 文档	313 KB	
Beckhoff EL30xx.xml	2018/1/11 13:03	XML 文档	11,508 KB	
Beckhoff EL37xx.xml	2018/1/23 13:59	XML 文档	11,837 KB	
Beckhoff EJ2xxx.xml	2018/1/23 14:21	XML 文档	239 KB	
Beckhoff EL5xxx.xml	2018/1/23 15:11	XML 文档	6,307 KB	
Beckhoff EJ5xxx.xml	2018/1/23 15:12	XML 文档	218 KB	
Beckhoff EL2xxx.xml	2018/1/24 9:40	XML 文档	2,868 KB	
Beckhoff EL33xx.xml	2018/1/26 9:34	XML 文档	6,727 KB	
Beckhoff ELM3xxx.xml	2018/2/1 10:19	XML 文档	14,238 KB	
Beckhoff AX5xxx.xml	2018/2/8 16:15	XML 文档	930 KB	
Beckhoff EL1xxx.xml	2018/2/19 17:15	XML 文档	3,387 KB	
Beckhoff EL25xx.xml	2018/2/21 10:23	XML文档	6,543 KB	
EcatTerminal-RC-EC2200 V3.22 ENUM.xml	2024/8/14 13:43	XML 文档	206 KB	~

3、 Create a project

a. Click the TwinCAT icon in the lower right corner of the desktop and select "TwinCAT XAE (VS xxxx)"

to open the TwinCAT software, as shown in the figure below.

New TwinCAT P	roject	Get Started	Beckhoff Ne	ews			
New Measurem	ent Project		and the second s	What's New in 1	TwinCAT 3		
New Project					? ×		
▶ Recent		.NET Framework 4.5 + Sort	by: Default	• 11' 🗉	Search Installed 🔎		
 Installed Installed Templates Other Project Types TwinCAT Measurement TwinCAT PLC TwinCAT Projects Samples Online 		TwinCAT XAE Projec	TwinCAT Projects	Type: TwinCAT Projects TwinCAT XAE System Manager Configuration			
Name:	TwinCAT Projec	ct1					
Location:	D:\workspace\	TwinCAT Project	•	Browse			
Solution name:	TwinCAT Projec	d1		Create directory	OK Cancel		

 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. You can select the default for these three items, then click "OK". The project is created successfully, as shown in the figure below.



4. Scan Devices

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



b. Check the "Local Area Connection" network card, as shown in the figure below.



c. In the pop-up window "Scan for boxes", click and select "Yes". In the pop-up window "Activate Free Run", click and select "Yes", as shown in the following figure.



d. After scanning the devices, you can see Box1 (RC-EC2200), Module 1 (RIO1616P) and Module 2 (RIO04AV) in the left navigation tree. In "Online", you can see that TwinCAT is in "OP" state, and the RUN light of the slave device is always on, as shown in the figure below.

Solution Explorer 👻 👎 🗙	TwinCAT Project1	- + X		
© ⊖ ∰ 'o · ≓ ฮ ≠	General Ether	AT Process Data Slots	Startup CoE - Online Onlin	ne
Search Solution Explorer (Ctrl+;)	State Mashi			
Solution 'TwinCAT Project1' (1 project) TwinCAT Project1 SYSTEM MOTION	Init Pre-Op	Bootstrap Safe-Op	Current State:	OP OP
PLC SAFETY	Ор	Clear Error	Requested state.	
Ma C++ ▲ ▼ I/O	DLL Status			
▲ Devices ▲ ➡ Device 2 (EtherCAT)	Port A:	Carrier / Open		
Image Image-Info	Port B:	No Carrier / Closed		
SyncUnits	Port C:	No Carrier / Closed		
Gutputs	Port D:	No Carrier / Closed		
Box 1 (RC-EC2200)	File Access o	ver EtherCAT		
 Module 1 (RIO1616P) Module 1 (RIO1616P) Module 2 (RIO04AV) Module 2 (RIO04AV) Module 2 (RIO04AV) WcState 	Downloa	ad Upload		
 Mappings 				

5. Parameter configuration

a. Click "Box1 -> Startup -> New" in the left navigation tree to enter the configuration parameter editing page, as shown in the figure below.

Solution Explorer	• # ×	TwinCAT Project	1 -≅ X					•
୦୦☆ °o-∉ @ ≱ <mark></mark>		General Ether	CAT Process Data	Slots Startup CoE - C	Online Online			
Search Solution Explorer (Ctrl+;)	ρ.			10.0				
MOTION		Transition	Protocol	Index	Data	Comment		
PLC PLC		C <ps></ps>	CoE	0xF030 C 0	02 00 21 06 00 00 83 06 00 00	download slot cfg		
SAFETY								
6 C++	- 11							
🔺 🚾 VO	- 11							
Devices	- 11							
Device 2 (EtherCAT)	- 11							
Image-Info	- 11							
SyncUnits	- 11							
Inputs	- 11							
Outputs	- 11							
InfoData								
Box 1 (RC-EC2200)	- 11							
Inputs CouplerState	- 11							
Couplet state	- 11							
CouplerCtrl	- 11							
 Module 1 (RIO1616P) 	- 11							
👂 😓 Inputs	- 11							
Outputs	- 11							
Module 2 (RIO04AV)	- 11							
P Gutputs	- 11							
InfoData	- 11					0		
Mappings		Move Up	Move Down	l,		New	Delete Edit	
Solution Explorer Team Explorer Class View								

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 can set related configurations, such as filtering parameters, as shown in the figure below.

Edit CANopen Startup Entry	4			×
Transition ☐ I → P ☑ P → S ☐ S → P ☐ S → O ☐ O → S	Index (hex): Sub-Index (dec	2000 s): 1 Comple	te Access	OK Cancel
Data (hexbin): 03 00 00 00				Hex Edit
Validate Mask:				
Comment: Channel De	bounce Time			Edit Entry
Index Name ■ 2000:0 RI01616P Con ■ 2000:01 Channel Debou ■ 2010:0 RI004AV Conf ■ F030:0 Configured Mod	Flags fig RW ince Time RW ig RW dule Ident RW	Value > 1 < 3ms (3) > 4 <	Unit	

c. For example, to modify the filtering parameters of the RIO1616P module, double-click "Channel Debounce Time" and modify the parameter value in the drop-down box, as shown in the figure below.

	Ctartus Esta						~
Eart CANopen	i Startup Entry						~
Transition ☐ I -> P ☑ P -> S ☐ S -> O	□S->P □O->S	Index Sub-I ◯ Va	(hex): ndex (dec): alidate	2000 1 Complete	Access	C	OK äncel
Data (hexbin): Validate Mask:	03 00 00 00	ounce Time				He	x Edit
Comment.							t Entry
Index = 2000:0 = 2000:01 = 2010:0	Name RIO1616P Con Channel Debou RIO04AV Conf	ig nce Time Set Valu	Flags V RW > RW 3	′alue 1 < ms (3)	Unit	×	
E F030:0	Configured Mod	Dec: Hex: Enum: Bool: Binary: Bit Size:	3 0x000 3ms 0 03 00 03 00	2000003 2 1 00000 08 016	 32 (64) 	OK Cancel	

d. In the Edit CANopen Startup Entry pop-up window, click the "+" in front of Index 2010:0 to expand the configuration parameter menu. You can see 4 configuration parameters. Click any parameter to set related configurations, such as setting the analog range, as shown in the figure below.

Edit CANopen Startup Entry										
Transition □ 1 -> P ☑ P -> S □ S -> 0	□S->P □O->S	Index Sub-I	: (hex): ndex (dec) alidate	2010 0 Complete Access		OK Cancel				
Data (hexbin):	04					Hex Edit				
Validate Mask:										
Comment:	SubIndex 00	0				Edit Entry				
Index	Name RIO1616P Conf RIO04AV Conf Channel1 Rang Channel2 Rang Channel3 Rang Channel4 Rang Configured Mod	fig g e Setting e Setting e Setting e Setting lule Ident	Flags RW RW RW RW RW RW RW	Value > 1 < > 4 < -10~+10V(-32768~32767) (0) -10~+10V(-32768~32767) (0) -10~+10V(-32768~32767) (0) -10~+10V(-32768~32767) (0)	Unit					

e. For example, to modify the analog range of channel 1 of the RIO04AV module, double-click "Channel1 Range Setting" and modify the parameter value, as shown in the figure below.

Edit CANoper	Startup Entry						\times				
Transition □ I -> P ☑ P -> S □ S -> 0	□S->P □O->S	OK Cancel									
Data (hexbin): Validate Mask: Comment:	00 00 00 00 Channel1 Ra	00 00 00 00 Channel1 Range Setting									
Index ⊕ -2000:0 ⊨ -2010:0 -2010:02 -2010:03 -2010:04 ⊕ F030:0	Name RIO1616P Con RIO04AV Conf Channel1 Ranc Set Value Di Dec: Hex: Enum: Bool: Binary: Binary:	fig je Setting] alog 0x00000 -10~+10 0~+10v(0~+10v(000000 0~+10v(000000 0~+10v(000000 0 -10~+10	Flags RW RW RW 0000 V(-32768" V(-32768" 0"32767) V(-27648" 0"27648] 0"27648] 0"27648]	Value > 1 < > 4 < -10~+10V(32767) 32767) 27648) 6 • 32 (-32768~32767) (0) X OK Cancel Edit 4) 64 () ?	Unit					

f. After the parameter modification is completed, the modified parameter items and parameter

values can be seen under Startup, as shown in the figure below. After the parameter setting is completed, it is necessary to perform the Reload operation and re-power the module to realize the automatic transmission of parameter settings by the master station.

F ''	D		D		p
Iransition	Protocol	Index	Data	Comment	
c <ps></ps>	COE	0xF030 C 0	02 00 21 06 00 00 83 06 00 00	download slot cfg	
PS	CoE	0x2010:01	0~+10V(0~32767) (1)	Channel1 Range Setting	

- g. Verify basic functions
- a. The left navigation tree "Module 1 -> Inputs" displays the upstream data of the module and is used to monitor the input of the module, as shown in the following figure.

Solution Explorer 🔹 👎	× TwinCAT Project1	+ ×						
000 10 · 2 0 4 -	Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Search Solution Explorer (Ctrl +)	Channel 1	0	BIT	0.1	41.0	Input	0	
	Channel 2	0	BIT	0.1	41.1	Input	0	
MOTION	Channel 3	0	BIT	0.1	41.2	Input	0	
PLC PLC	Channel 4	1	BIT	0.1	41.3	Input	0	
SAFETY	Channel 5	0	BIT	0.1	41.4	Input	0	
C++	Channel 6	0	BIT	0.1	41.5	Input	0	
	Channel 7	0	BIT	0.1	41.6	Input	0	
Devices	Channel 8	0	BIT	0.1	41.7	Input	0	
	Channel 9	0	BIT	0.1	42.0	Input	0	
Image-Info	Channel 10	0	BIT	0.1	42.1	Input	0	
SyncUnits	Channel 11	0	BIT	0.1	42.2	Input	0	
Inputs	Channel 12	0	BIT	0.1	42.3	Input	0	
Outputs	Channel 13	0	BIT	0.1	42.4	Input	0	
InfoData	Channel 14	0	BIT	0.1	42.5	Input	0	
Box 1 (RC-EC2200)	Channel 15	0	BIT	0.1	42.6	Input	0	
🔺 🛁 Inputs	Channel 16	0	BIT	0.1	42.7	Input	0	
🔁 CouplerState								
Outputs								
CouplerCtrl								
Module T (RIO1616P)								
Inputs Outputs								
Module 2 (PIO044)()								
V WcState								
InfoData								
	v							

b. The left navigation tree "Module 1 -> Outputs" displays the downstream data of the module, which is used to control the output of the module, as shown in the following figure.

Solution Explorer 👻 👎 🔿	TwinCAT Project1	+ ×						
000 To-20 1 -	Name	Online	Туре	Size	>Address	In/Out	User ID	Linked to
Search Solution Explorer (Ctrl +)	Channel 1	0	BIT	0.1	41.0	Output	0	
	Channel 2	0	BIT	0.1	41.1	Output	0	
MOTION	Channel 3	0	BIT	0.1	41.2	Output	0	
PLC	Channel 4	0	BIT	0.1	41.3	Output	0	
SAFETY	Channel 5	0	BIT	0.1	41.4	Output	0	
K C++	Channel 6	0	BIT	0.1	41.5	Output	0	
	Channel 7	0	BIT	0.1	41.6	Output	0	
Devices	Channel 8	0	BIT	0.1	41.7	Output	0	
Device 2 (EtherCAT)	Channel 9	0	BIT	0.1	42.0	Output	0	
■ Image Info	Channel 10	0	BIT	0.1	42.1	Output	0	
Synclinits	Channel 11	0	BIT	0.1	42.2	Output	0	
	Channel 12	0	BIT	0.1	42.3	Output	0	
Outputs	Channel 13	0	BIT	0.1	42.4	Output	0	
InfoData	Channel 14	0	BIT	0.1	42.5	Output	0	
▲ Box 1 (RC-EC2200)	Channel 15	0	BIT	0.1	42.6	Output	0	
Inputs	Channel 16	0	BIT	0.1	427	Output	0	
🔁 CouplerState	cindimiter re		011			output		
 Outputs 								
CouplerCtrl								
 Module 1 (RIO1616P) 								
👂 🛁 Inputs								
🕨 🛄 Outputs								
 Module 2 (RIO04AV) 								
Outputs								
WcState								
P 🛄 InfoData								
Mappings								

c. Taking channel 4 of the RIO1616P module as an example, if there is a valid voltage input to the module input channel 4, it can be observed in "Module 1 -> Inputs", as shown in the figure below.

Solution Explorer 🔹 👎 🗙	TwinCAT Project1	+ ×						
000 0-20 1-	Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Search Solution European (Ctrl v)	Channel 1	0	BIT	0.1	41.0	Input	0	
Search solution explorer (Ctri+,)	Channel 2	0	BIT	0.1	41.1	Input	0	
MOTION A	Channel 3	0	BIT	0.1	41.2	Input	0	
PLC PLC	Channel 4	1	BIT	0.1	41.3	Input	0	
SAFETY	Channel 5	0	BIT	0.1	41.4	Input	0	
K C++	Channel 6	0	BIT	0.1	41.5	Input	0	
	Channel 7	0	BIT	0.1	41.6	Input	0	
Device 2 (Ether(AT))	Channel 8	0	BIT	0.1	41.7	Input	0	
	Channel 9	0	BIT	0.1	42.0	Input	0	
Image-Info	Channel 10	0	BIT	0.1	42.1	Input	0	
SyncUnits	Channel 11	0	BIT	0.1	42.2	Input	0	
Inputs	Channel 12	0	BIT	0.1	42.3	Input	0	
Outputs	Channel 13	0	BIT	0.1	42.4	Input	0	
👂 🛄 InfoData	Channel 14	0	BIT	0.1	42.5	Input	0	
Box 1 (RC-EC2200)	Channel 15	0	BIT	0.1	42.6	Input	0	
Inputs	Channel 16	0	BIT	0.1	42.7	Input	0	
CouplerState								
 Outputs 								
CouplerCtri								
Dutputs								
Module 2 (BIO04AV)								
Outputs								
WcState								
InfoData								
appings								
×								

d. Take channel 1 of the RIO1616P module as an example. If you want to enable the digital output channel Channel 1 of the module, you can click Channel 1 in "Module 1 -> Outputs", click "Write" in the corresponding "Online", and enter the value "1" in "Dec" in the corresponding dialog box. You can see the corresponding channel light on the module, as shown in the figure below.



e. Take channel 1 of the RIO04V module as an example. If you want to output the analog output channel Channel 1 of the module, you can click Channel 1 in "Module 2-> Outputs", click "Write" in the corresponding "Online", and enter the value "29491" in the "Dec" in the corresponding dialog box. For specific analog parameters, see3.5 Analog parameters, you can see the corresponding channel light on the module, as shown in the figure below.

Solution Explorer 🛛 👻 👎 >	< TwinCAT Project1	×			
001 0-01 P-	Variable Flags	Online			
Search Solution Explorer (Ctrl+;)	•				
C++	Value:	29491			
▲ 🔁 I/O	New Value:		0.4		
Devices	New Volue.	Force	Kelease	V	/rite
 Device 2 (EtherCAT) 	Commonte				
📒 Image	Comment.				-
📑 Image-Info		Set Value	Dialog	×	
SyncUnits					
P inputs		Dec:	29491	OK	
Disputs		Hex.	0x7333	Cancel	
A Box 1 (RC-EC2200)					-
Inputs		Float:			
 Outputs 				-	20401 -
CouplerCtrl		Bool	0 1	Hex Edit	
 Module 1 (RIO1616P) 					
P 🤄 Inputs		Binary:	33 73	2	
Module 2 (PIO04A)0		Bit Size:	○1 ○8 ●16 ○32 ()64 ()?	
		L			
Channel 1					
Channel 2					
Channel 3					
Channel 4					
WcState					
P 🛄 InfoData					
inviappings					

f. Take the RC-EC2200 module as an example. In "Box1->Outputs", click CouplerCtrl, click "Write" in the corresponding "Online", and enter the value "0" in "Dec" in the corresponding dialog box. The output channel of this module will be cleared, as shown in the figure below.



Note: Dec is configured as "0", which means clearing the output, and Dec is configured as "1", which means keeping the output.

7.4.2 Application in Sysmac Studio software environment

1. Preparation

Hardware Environment

Module Preparation

This description takes the RC-EC2200 module kit (power supply RC-PWR2H, coupler RC-EC200), RIO1616P, and RIO40AV as examples.

- > A computer with Sysmac Studio software pre-installed
- > Omron PLC Model: NX1P2 9024DT
- > EtherCAT dedicated shielded cable
- > Switching power supply
- > Module mounting rails and rail fixings
- > Device Profile
- Hardware configuration and wiring

Please follow the <u>5 Installation and removal</u> "and" <u>6 Wiring</u>" requires action.

• Computer IP requirements

Set the IP address of the computer and the IP address of the PLC, and ensure that they are in the same network segment.

2. Adding a device description file

a. Log in to Sysmac Studio and click the "New Project" button.

📓 Sysmac Studio (64bit)			- 0	x í
	_		_	_
Offline	Droject Dr	an artice		
New Project Open Project Image: Control of the second	Project name	RC		
 ظ ^{ار} Import	Author	29719		
Colline	Comment			
4 <u>C</u> onnect to Device	Туре	Standard Project		
Version Control Main Version Control Explorer	Select I	Device		
License	Category Device	Controller		
	Version	1.49		
Robot System Open in Emulation Mode		<u>C</u> reate		

- b. Select the Device, Model, and Version in the Device and Version drop-down lists.
- c. Select "Controller -> Communication Settings", select the method to be used each time you connect to the controller while online, and enter the "Remote IP Address", as shown in the figure below.



d. Click Ethernet Communication Test. The system displays that the test is successful.

3、Add XML File

- a. In the left navigation tree, expand Configuration and Settings and double-click EtherCAT.
- b. Right-click "Main Device" and select "Show ESI Library", as shown in the figure below.

File Edit View Insert Proje	ect Controller Simulation	Tools Windov	w Help						_
X 🖲 🛍 🏛 ちぐí	2 🔤 🗗 🔨 🕅 🛛	2 🖆 🐺 🛱	0 R	A 🔉 63		10 Pa	₽ [] €		
File Edit View insert Projet Multiview Explorer ■ ■ ■ ■ Multiview Explorer ■ ■ ■ ■ Multiview Explorer ■ ■ ■ ■ Image: Controller_0 ■ ■ ■ ■ ■ Image: Controller_0 ■ ■ ■ ■ ■ Image: Controller_0 ■ Motion Control Setup ■ ■ Image: Controller_0 ■ Motion Control Setup ■ ■ Image: Controller_0 ■ ■ ■ ■	Build	guration Master Master	Cut Copy Paste Delete Undo Redo Expand All Calculate Tr Import Slave Compare an Get Slave Si Clear All See Display Proo Display Pao Display Pao Display Pao	A X 63	A S Time of the nsert New SI. Information tion	e Master	Master Master 0 2000 5etting 1000 2 2 Setting No che 1000 2 2 Setting No che	Value Edit Setti	us us mes simes
			Output to E Export All C Assign Drive Safety Relat	NS File ouplers' I/O Alk es to Axes red PDOs Batch	ocations				
1 Filter	Output Build		- Sarety Acid	barren of barren					

c. In the pop-up "ESI Library" window, click the "Install (File)" button and select the XML file path.

4. Add a device

• Adding a Coupler

- a. In the left navigation tree, expand "Configuration and Settings" and double-click "EtherCAT" to display the "Node Settings | Network Settings" page.
- b. In the "All Suppliers" drop-down list on the right navigation bar, select "Shanghai Qysche Automation Co., Ltd.", as shown in the following figure.



c. Double-click RC-EC2200 to add the coupler module, as shown below. Add I/O module Single device connection:

<u>File Edit View Insert Project</u>	<u>C</u> ontroller <u>S</u> imulation <u>T</u> ools <u>W</u> indow <u>H</u> elp	
	「「「」「「「」」。 今 ※ ※ 2	Q 1%
Multiview Explorer Multiview Explorer Configurations and Setup Configurations and Setup Configurations and Setup Controller Setup Control Setup Controller Setup Controller Setup Cont	EtherCAT × Node Address (Network configuration Master Master Ether Cat and Revision Outdout and Revision Node Address Image: Cat and	Toolbox
3B		Model name : RC-EC2200 Product name : RC-EC2200(Product name : RC-EC2200(Product name : RC-EC2200(Product name)) Vendor : Shanghai Qysche A Comment : URL :
i Filter 🗹	Output Build	

a. Select the coupler module you just added, right-click and select "Edit Module Configuration" from the menu options, as shown in the figure below.



b. Position the cursor in "Module", click the module in the list on the right, and add I/O modules one by one in the order in which they are configured.

<u>File Edit View Insert Project</u>	Controller Simulation	<u>lools Window H</u> elp			
		5 15 # A 8 R	🔺 🔌 63 🏄 🏊 💼 C) Pi 🖓	
Multiview Explorer 🗸 🗸	EtherCAT - No	de1 : RC-EC2200 (E001) 🗙		+	Toolbox 👻 🖡
Multiview Explorer	EtherCAT Noc IPositi Slot Node1: RC-EC2200 (0 Terminals 1 Terminals 2 Terminals 3 Terminals 4 Terminals 5 Terminals 6 Terminals 7 Terminals 8 Terminals 9 Terminals 10 Terminals 11 Terminals 12 Terminals 13 Terminals 14 Terminals 13 Terminals 14 Terminals 15 Terminals 16 Terminals 16 Terminals 16 Terminals	iet : RC-EC2200 (E001) X Module CO1) ERIO1616P (M1) ERIO1616P (M1) ERIO40AV (M2)	Item name Device name Model Product name Connected position PDO Map Settings Setting Parameters Backup Parameter Setti	Value M2 RIO40AW 4 Channel Analog Inp 1 Ox600103 Inputs/Cha Ox600103 Inputs/Cha Ox600103 Inputs/Cha Exit Poo Map Setting 5 Setting Exit Setting Parameter 	Toolbox Group All groups Digital loput Terminals Digital Output Terminals Digital Output Terminals Digital Output Terminals Analog Output Terminals Analog Output Terminals Function IO Terminals Fu
 ♥ POUS ♥ M Programs ♥ Program0 _e% Section0 _e% Functions _e% Function Blocks > m Data > m Tasks 	17 Terminals 18 Terminals 19 Terminals 20 Terminals 21 Terminals 22 Terminals 23 Terminals 24 Terminals 25 Terminals 26 Terminals 27 Terminals 28 Terminals 29 Terminals 29 Terminals 30 Terminals 31 Terminals 32 Terminals		Device name Set a name for the device	2. 	RC0012J RC0012J RC001616 RC01616P RC01616P RC008AI RC008AI RC008AI Analog Output, Current RC008AI Achannel Analog Output, Current RC008A Achannel Analog Output, Current RC008A RC008A RC008A Model: RIO40AV M
🚺 Filter 📝	Output Build				

Multi-device cascading:

- a. Select the added coupler module, right-click and select "Edit Module Configuration" from the menu options.
- b. Click "Controller -> Online" in the upper menu bar.

c. Right-click the master device icon and select "Write Slave Device Node Address", as shown below, and write a "Set Value" that is different from the "Current Value".

📓 Slave Node Address Writing	-		\times
Present valuelSet valuelActual network configuration			L.
Master			
1 1 RC-EC2200 Rev:0x00000001			
Update With Latest Actual N	etwork G	Configura	ition
Node addresses are set for slaves. When any value other than 0 is set to a slave whose node address can be set from hardware, the setting has priv addresser set have are anolicable.	ority. In c	other cas	es, the
audresses set here are applicable.	Write	e Ca	ncel

- d. Re-power on the PLC and the device at the same time.
- e. Right-click the main device icon and select Compare and Merge with Physical Network Configuration.

5. Configuration Download

a. Click "Controller -> Transferring -> Transfer to Controller" to transfer the online data to the controller.

6、 Channel Test

a. Double-click I/O Mapping in the left navigation tree and select the corresponding I/O module to view and operate the channel data.
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xplorer 🚽 🗸	therCAT	-🗖 Node1 : RC-EC2200 (E001) 🛛 💣 I/O M	ap 🗙		
	Position	Port	Description	R/W	D
	_	EtherCAT Network Configuration			
tions and Setup	Node1	▼ TRC-EC2200			
erCAT		Outputs_CouplerCtrl_F200_01		W	UINT
Node1 : RC-EC2200(E001)		Inputs_CouplerState_F100_01		R	UINT
□ 0 · RIO1616P(M1)	Slot 0	▼ RIO1616P			
		Outputs_Channel 1_7000_01		W	BOOL
		Outputs_Channel 2_7000_02		w	BOOL
/Expansion Racks		Outputs_Channel 3_7000_03		W	BOOL
Мар		Outputs_Channel 4_7000_04		w	BOOL
ntroller Setup		Outputs_Channel 5_7000_05		W	BOOL
tion Control Setup		Outputs_Channel 6_7000_06		W	BOOL
n Data Settings	_	Outputs_Channel 7_7000_07		w	BOOL
nt Settings		Outputs_Channel 8_7000_08		W	BOOL
· Cottings		Outputs_Channel 9_7000_09		w	BOOL
setungs		Outputs_Channel 10_7000_0A		W	BOOL
a Trace Settings		Outputs_Channel 11_7000_0B		W	BOOL
ing		Outputs_Channel 12_7000_0C		W	BOOL
Js		Outputs_Channel 13_7000_0D		W	BOOL
Programs		Outputs_Channel 14_7000_0E		w	BOOL
Program0		Outputs_Channel 15_7000_0F		W	BOOL
Section0		Outputs_Channel 16_7000_10		W	BOOL
		Inputs_Channel 1_6000_01		R	BOOL
unctions		Inputs Channel 2 6000 02		R	BOOL

7. Module parameter settings

nction Blocks

• Output clear hold function

a. Double-click I/O Mapping in the left navigation tree to display the I/O Mapping window.

Inputs Channel 4 6000 04

Inputs_Channel 5_6000_05

Inputs_Channel 6_6000_06 Inputs Channel 7 6000 07

b. Expand the node and, when the system is running, write "01" to the corresponding "Outputs CouplerCtrl F200 01" to complete the clear/hold function setting.

Multiview Explorer 🗸 🕈 📷 Eth	herCAT 🛛 🗂 N	ode1 : RC-EC2200 (E001)	🥔 I/O Map 🗙				4
Prove Constroller () =	Position	Port		Description	R/W	Data Type	
	V 🖣 E	EtherCAT Network Configurat	ion				
Configurations and Setup	ode1 🔻 🔻	RC-EC2200					
▼		Outputs_CouplerCtrl_F200_	01		W	UINT	0
▼ -□ Node1 : RC-EC2200(E001)		Inputs_CouplerState_F100_0	D1		R	UINT	0
L = 0 : RIO1616P(M1)	ot 0	RIO1616P					
L -= 1 : RIO40AV(M2)	ot 1	RIO40AV					
► St CPU/Expansion Backs	▼₫(CPU/Expansion Racks					
Bu I/O Man	uilt-in I/C 🕨	Built-in I/O Settings					
Controller Setup	ptionBoa	Option Board Settings					
	ABUSINIAS D	NX Bus Master	, h.				
► ↔ Motion Control Setup							
& Cam Data Settings							
Event Settings							
Task Settings							
Data Trace Settings							
Programming							
V 👩 POUs							
▼ III Programs							
v e Program0							
L ₫ Section0							
L I Functions							
I St Function Blocks							
▶ m Data							
Tasks							

0: Output clear, 1: Output hold

• Analog range selection and filter setting

- a. Double-click a node in the left navigation tree and select the corresponding input module.
- b. Once the system is offline, click the Edit Initialization Parameter Settings button.

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EGAT EtherC	AI Nod	e1 : RC-EC2200 (E001) 🗙 🚰	/О Мар		·
Posit	Slot	I Module	<u> </u>		
Node1	: RC-EC2200 (E	001)		Itom namo	Value
0	Terminals	ERIO1616P (M1)		Device name	Value M2
1	lerminals	Per RIO40AV (M2)		Model	RIO40AV
2	lerminals			Product name	4 Channel Analog Input. Vo.
3	lerminals			Connected position	1
4	Ierminals				0x6001:01 Inputs/Channel 1
5	lerminals				0x6001:02 Inputs/Channel 2
6	lerminals			PDO Map Settings	0x6001:03 Inputs/Channel 3
/	lerminals		100		0x6001:04 Inputs/Channel 4
8	lerminals				Edit PDO Map Settings
9	lerminals			Setting Parameters	Setting
10	lerminals	-		Secting Furthered	Edit Setting Parameters
11	Ierminals			Backup Parameter Settings	
12	lerminals				
13	lerminals				
14	lerminals				
15	lerminals				
16	lerminals				
17	Ierminals				
18	lerminals				
19	Ierminals				
20	lerminals				
21	lerminals		100		
22	Terminals				
23	Ierminals				

Note: If the PLC firmware version is too low, you need to use the EC_CoESDOWrite and EC_CoESDORead instructions to write and read the SDO address. Range selection and filter setting

a. On the "Edit Initialization Parameter Settings" page, you can select the range and filter settings.<u>7.3</u> <u>Module parameter setting function</u>.

Edit Setting Parameters		-		×
Item name	Value			
0x2000:01 RIO40AV Config/Channel1 Range Setting	0: -10-+10V(-32768-32767)			
0x2000:02 RIO40AV Config/Channel2 Range Setting	0: -10~+10V(-32768~32767)			-
0x2000:03 RIO40AV Config/Channel3 Range Setting	0: -10~+10V(-32768~32767)			
0x2000:04 RIO40AV Config/Channel4 Range Setting	0: -10~+10V(-32768~32767)			
0x2000:05 RIO40AV Config/Channel1 Filter Time	10			
0x2000:06 RIO40AV Config/Channel2 Filter Time	10			
0x2000:07 RIO40AV Config/Channel3 Filter Time	10			
0x2000:08 RIO40AV Config/Channel4 Filter Time	10			
	Move Up Move Dow	n Add	Rer	nove
				S. C. 1.
			ceturn to i	Jelault
Ptop Data type : Comment :				
This Setting Parameters are saved in the CPU Unit as a part of EtherCAT setting. Select Synchronize on the Toolbar to transfer.				
		ок с	ancel	Apply