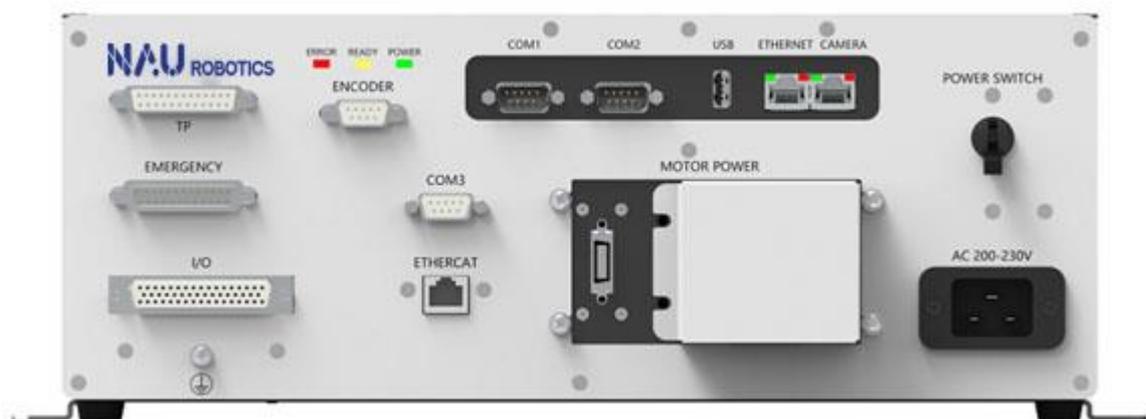




# ROBOT CONTROLLER

OPERATING INSTRUCTION V1.0

## RC40A





## Revision history

Revision	Revision date	Revision details
V1.0	2020.06	Translated version

## Contact us

### NAU Robotics Co.,Ltd

Addr : 246-98, Gojan Dong, Namdong Gu, Incheon, South Korea

Tel : +82-32-719-7040

Fax : +82-32-719-7041

Website : <http://www.naurobot.com>

## Contents

Foreword.....	4
Warranty .....	4
Attentions .....	5
Contact way .....	5
1 Safety.....	6
1.1 About security .....	6
1.2 About symbols in the text.....	6
1.3 Safety precautions .....	7
1.4 Safety code.....	10
2 Introduction of controller.....	12
2.1 Introduction .....	12
2.2 The name and functions of each part of the controller .....	12
2.3 LED indicating lamp.....	14
2.4 Security-related functions .....	14
3 Controller specification.....	16
3.1 Controller appearance and size .....	16
3.2 System composition.....	18
3.3 Specification table.....	19
3.4 Support model.....	20
4 Installation specification .....	20
4.1 Controller accessories .....	20
4.2 Use environment.....	20

---

4.3 Put space .....	21
4.4 Power supply .....	23
5 Electrical configuration .....	23
5.1 Supply power .....	24
5.2 Robot connect controller .....	25
5.3 IO connect .....	25
5.3.1 Input circuit .....	25
5.3.2 Outgoing circuit .....	28
5.4 EMERGENCY .....	29
5.4.1 Emergency stop switch .....	30
5.4.2 Emergency stop function confirmation .....	30
5.4.3 Recovery from emergency shutdown .....	31
5.4.4 Signal configuration .....	31
5.4.5 Ciucuit diagram .....	32
5.5 RS232port .....	33
5.6 Internet interface .....	34
5.6.1 IP address .....	34
5.6.2 Controller IP address set .....	35
5.6.3 Connect controller .....	36
5.7 TP port .....	36
5.7.1 Connect demonstrator .....	37
5.8 Operation mode .....	38
5.8.1 Operation mode outline .....	38

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5.8.2 Mode switch.....	39
6 Maintain .....	40
6.1 Matters needing attention in maintaining safety .....	40
6.2 Regular checking .....	42
6.3 Control cabinet internal composition diagram .....	43
6.4 Internal structure of controller .....	43
6.5 Maintenance Part Replacement Steps.....	44
6.5.1 Cautions for Part Maintenance .....	44
6.5.2 Parts Maintenance Steps.....	45
6.5.3 The robot is electrified for confirmation .....	52
6.6 Error code table .....	53
6.7 Maintain part table .....	106

## Foreword

Thank you very much for purchasing our robot system.

This manual describes the requirements for proper use of the robot controller.

Please read this manual and related manuals and use the system correctly.

After reading, please keep it safe for easy access

## Warranty

The machine has been tested and inspected by our company and its performance has been confirmed to meet our standards.

### 1. Warranty period



For warranty term and information, please contact the dealer where you purchased

### 2. The content of the warranty

- 1) the products under warranty are the delivered products.
- 2) during the warranty period of product delivery, the company only repairs the faults occurred during normal processing and use free of charge. After the expiration of the warranty, the fault repair is all for charging repair, please understand. the warranty is limited to China.
- 3) understand. the warranty is limited to China.

### 3. Exception from liability

Even within the above warranty period, if the following matters are met, are regarded as charged repair, please understand.

- 1) Fault and damage caused by the wrong use and improper use in disregard of the instruction
- 2) modification or disassembly;
- 3) faults and damages caused by adjustment and repair errors
- 4) faults and damages caused by natural disasters, fires and other external factors.

#### 4. Attentions

- 1) if the operating conditions and specifications specified in this manual are exceeded during the use of robots and related machines, the company will not guarantee the basic capability of robots, please understand.
- 2) in the event of any personal accident (with death or serious injury), damage accident or accident caused by non-compliance with the "warnings" and "precautions" listed in this manual, the company shall not be liable.
- 3) it is impossible for the company to foresee all situations of danger and failure. Such predictability is limited. Therefore, the "warning", "attention" and other recorded matters in this manual are only within the scope of our company, please understand.

## Attentions

It is prohibited to copy or reproduce part or all of the contents of this manual without permission.

The contents of this book are subject to change without prior notice.

If you find any mistakes or improvements in this book, please do not hesitate to correct them.

## Contact way

For robot repair/inspection/adjustment, please contact our after-sales department.

If no after-sale department is recorded, please contact the local seller.

To save your time, please prepare the following items before contacting:

- controller name/serial number
- robot name/serial number
- software name/version
- problems with the system

## 1 Safety

### 1.1 About security

Please be carried out and set up the manipulator and related machines by the qualified personnel. In addition, please be sure to comply with the relevant laws and regulations of each country.

Please read this manual and related instructions carefully before use, and use this machine correctly. After reading, please keep it safe for easy access

### 1.2 About symbols in the text

### 1.3 Safety precautions

Please design and set up the robot system by trained personnel. The trained personnel mentioned here refers to the personnel who have received the training of the company or have the same professional knowledge and skills as the personnel who have read this manual and been trained.

For design and setup personnel, please follow the following safety precautions.

Operational considerations

- 1) Operators shall wear work clothes, helmets, safety shoes, etc.
- 2) When the machine is put into power supply, please confirm that there is no operator within

 <p><b>DANGER</b></p>	<p>Represents a situation where improper handling can result in death or serious injury to the user, and the risk is very high</p>
 <p><b>WARNING</b></p>	<p>Represents a situation where handling errors can result in death or serious injury to the user</p>
 <p><b>CAUTION</b></p>	<p>Represents a situation in which handling errors can lead to minor injuries or property damage to the user</p>

the action range of the robot.

- 3) The power must be cut off before entering the action range of the robot for operation.
- 4) Sometimes, repair, maintenance and other operations must be carried out in the state of power. At this point, 2 people and 1 group should be carried out. One person should be in a position where the emergency stop button can be pressed immediately. The other person should be within the range of the robot's movement, keeping alert and working quickly. In addition, the withdrawal path should be confirmed before the operation.
- 5) The load on the wrist and the mechanical arm must be controlled within the allowable carrying weight. If permission is not complied with the provision of handling weight can lead to abnormal action or premature damage to mechanical components.
- 6) Please read the "safety precautions" section of the operation and maintenance manual of the robot carefully.
- 7) Disassembly and operation of parts not covered by the maintenance manual are

prohibited.

The robot is equipped with a variety of self-diagnosis functions and abnormal detection functions, even if abnormal can be safely stopped. Even so, accidents caused by robots still happen.

	<p>Robot accidents in the following cases.</p> <ol style="list-style-type: none"> <li>1. Automatic operation was performed without confirming whether there was any human in the motion range of the robot.</li> <li>2. Enter into the action range of the robot under the state of automatic operation, and suddenly start the robot during the operation.</li> <li>3. Only pay attention to the robot in front of you, not to other robots.</li> </ol>
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The accidents were all caused by the same "negligence of safety procedures" and "failure to anticipate sudden robot movements". In other words, accidents are caused by "momentary negligence", "failure to follow prescribed procedures" and other human unsafe behavior.

"Emergency" makes it too late for operators to implement "emergency stop", "escape" and other behaviors to avoid accidents, which may lead to major accidents. "Emergency" generally has the following kinds.

- 1) Low speed action suddenly becomes high speed action.
- 2) Other operators performed the operation.
- 3) Different programs were started due to exceptions and program errors on peripheral devices.
- 4) Abnormal actions caused by noise, faults, defects, etc.
- 5) Misoperation.
- 6) Intended to perform the action at a low speed, but performed the high speed action.
- 7) The workpiece carried by the robot falls down and spreads out.
- 8) The workpiece suddenly loses control under the stop state of clamping and interlock waiting.
- 9) The robot next to or behind performed the action.

These are just a few examples; there are many forms of "contingencies." In most cases, it is impossible for a robot to "stop" or "escape" from a sudden movement, so the following best practices should be implemented to avoid such accidents Was born.

	<p><b>Be careful not to go near the robot.</b></p>
	<p><b>When the robot is not in use, measures such as "pressing the emergency stop button" and "cutting off the power supply" should be taken to make the robot unable to move.</b></p>



	<p>During robot action, please configure a monitor (a third party) who can immediately press the emergency stop button to monitor the security situation.</p>
	<p>During robot action, the operation shall be carried out in a state where the emergency stop button can be pressed immediately.</p>
	<p>Be sure to connect the AC power cable to the power plug, not directly to factory power, etc. Make sure the power is locked by unplugging it. If directly connected to the factory power supply, etc., the operation may cause electric shock or failure.</p>

 <p>CAUTION</p>	<p>The serial number of the corresponding manipulator is recorded in the controller. Do not mistake the connection. If the wrong connection is made, not only will the robot system not be able to operate normally, but security issues may also arise.</p> <p>Please note the following when using I/O after remote setting. Failure to meet the relevant conditions may cause system failures or safety issues.</p> <ul style="list-style-type: none"> <li>- Do not mistake the function allocation and wiring relationship when setting.</li> <li>- Be sure to confirm the corresponding relationship between function and wiring before power on.</li> <li>- When performing action confirmation, please assume that there are setting or wiring errors. Manipulator due to setting or wiring errors and abnormal action, please immediately press the emergency stop switch, etc., to stop the action of the manipulator.</li> </ul>
	<p>Please connect the cables firmly. Also, do not place heavy objects on the cable, overbend, pull or clamp the</p>



	cable. Otherwise, cables may be damaged, broken or in bad contact, resulting in abnormal system action or electric shock.
	Do not open the lid of the control cabinet except during maintenance. There is a high voltage charging position inside the controller, which is at risk of electric shock even when the power is turned off.
	Be sure to connect or remove the cable with the controller power off. There is a danger of electric shock or possible failure if the operation is carried out with the power on.

In order to comply with these principles, it is necessary to fully understand and observe the following considerations.

#### 1.4 Safety code

LH control system design meets the following requirements

Standard	Description
2006/42/EC	Machinery directive
2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic Compatibility Directive
EN ISO10218-1	Robots and robotic devices - safety requirements for industrial robots -Part 1: robots
EN ISO 12100-1	Safety of machinery - basic concepts, design principles - Part 1: basic terminology and methodology
EN ISO 12100-2	Safety of machinery - basic concepts, design principles - Part 2: technical principles

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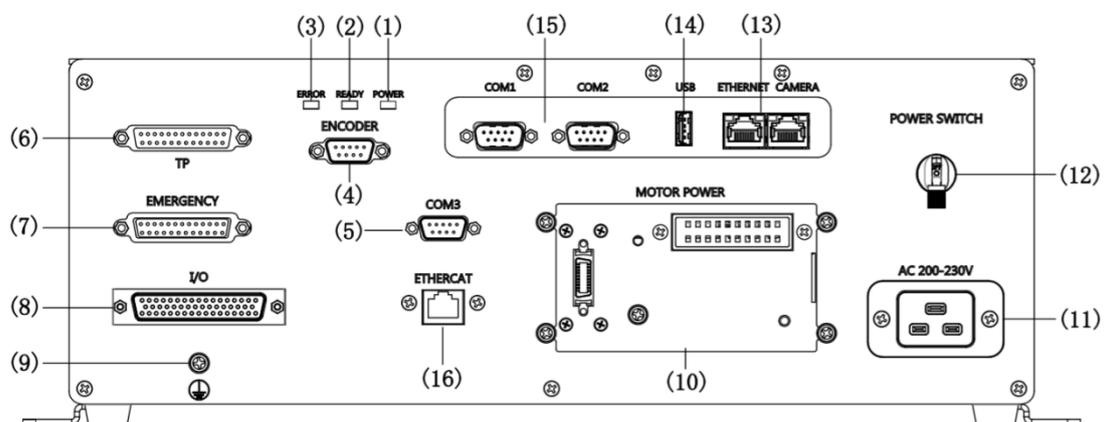
EN ISO 13849-1	Safety of components of control systems - Part 1: general design principles
EN61000-6-2	Electromagnetic compatibility (EMC) -- Part 6-2: general standards-immunity tests in industrial environments
EN61000-6-4-2007+A1: 2011	Electromagnetic compatibility universal standard industrial environmental emission standard

## 2 Introduction of controller

### 2.1 Introduction

NAU-rc4 controller is an independently developed SCARA robot controller. The software adopts advanced real-time system and bus control. The whole control system has high real-time performance. Robot programming language is made through a lot of application experience, making the application more simple.

### 2.2 The name and functions of each part of the controller



#### (1) POWER indicator

The power indicator lights up green when the system is on

#### (2) READY indicator

When the system starts successfully, the ready indicator lights up in yellow

#### (3) ERROR indicator

When an error occurs in the system, the error indicator will be bright red

#### (4) External encoder interface:

Reserve external encoder interface

#### (5) COM3 Driver Debugging Port:

For setting drive parameters

(6) TP connector:

The port used to connect the instruction box or the TP adapter



NOTE

Please note that the TP interface must be connected to either the instructor or the TP adapter, Inside the TP interface are 14 and 15 short, 13 and 20 short

(7) EMERGENCY connector

Connectors for connecting safety signals such as emergency stop, safety gate, etc

(8) IO connector

Connector for external input-output devices, currently standard with 16 points of input and 16 points of output, can be added according to user requirements

(9) GND terminal:

For Robot Control Cabinet Grounding

(10) Body connector

Combined connector for motor power line and encoder line

Please connect to the cable that comes with the manipulator

(11) Power interface

For input 220V power supply

(12) POWER switch:

Switch for controller power supply

Please connect to the power cord that comes with the controller

(13) LAN communication interface

LAN interfaces are divided into Camera and Ethernet

Ethernet: the interface through which the controller communicates with the upper computer

Camera: Camera interface

(14) USB Port:

For system updates

(15) RS232 connector

Used for RS232 data communication with the outside world

(16) EtherCAT interface:

Used to extend EtherCAT slave station

## 2.3 LED indicating lamp

There are three LED lights on the controller

Controller status LED display

Controller Status	LED show
Controller energized state	POWER Indicator light on
System initialization was successful	READY Indicator light on
error condition	ERROR means the light is on, READY means off

## 2.4 Security-related functions

There are the following security features in the robot system. Among these functions, emergency stop and safety gate functions are very important in terms of safety. Therefore, before using the robot system, please make sure that its functions are normal.

### 1. Emergency stop

Emergency stop is the highest priority function in the robot system. Pressing the emergency stop button will trigger the emergency stop, at which time all other robot control functions will stop, the robot will stop moving and the power of each joint motor will be cut off. The control system will switch to the emergency stop state, which will be maintained until it is manually reset.

The emergency stop state means that all power to the robot body will be cut off, except for the manual brake release circuit. Manual reset operation must be performed to restore the system

to the normal state, that is, first release the emergency stop button, and then the software clearly alarm.

2. Overload detection

Detect load exceeding motor specification capacity

3. Position deviation over-limit detection

Detect the abnormal difference between the action instruction issued by the controller and the current feedback position

4. Speed deviation over-limit detection

Detect the abnormal difference between the speed command issued by the controller and the actual speed

5.AC low voltage detection

Detect abnormal low power supply voltage

6. Overheating detection

Detect abnormal temperature of controller drive module

7. Dynamic braking

When the above abnormal state happens to the robot, the robot will stop the dynamic braking immediately

8. Emergency stop at the security gate

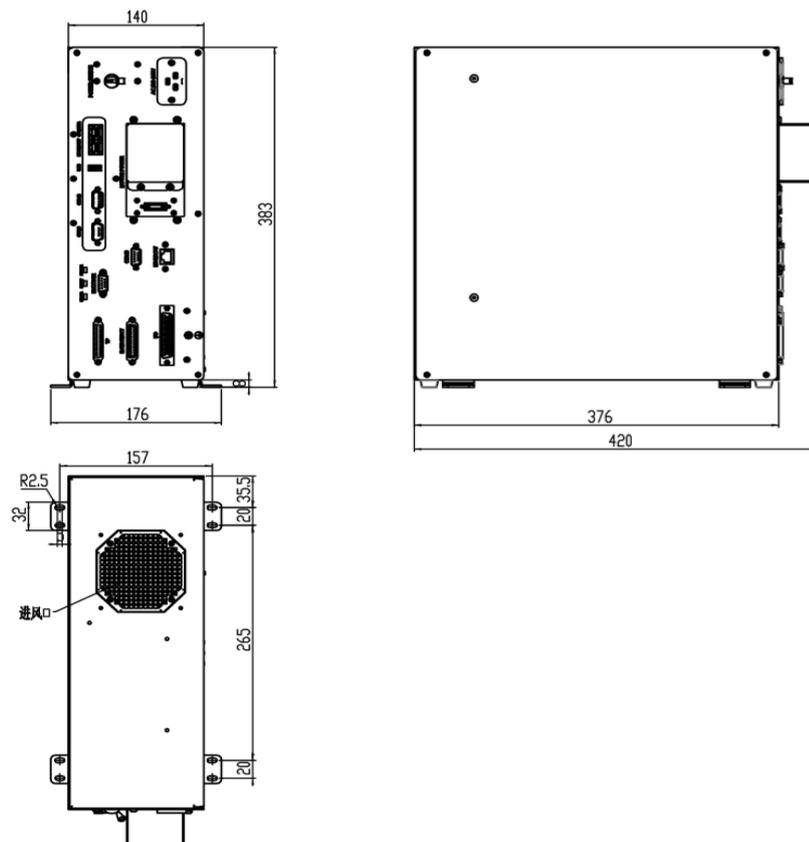
After opening the security door, the robot will stop moving immediately

### 3 Controller specification

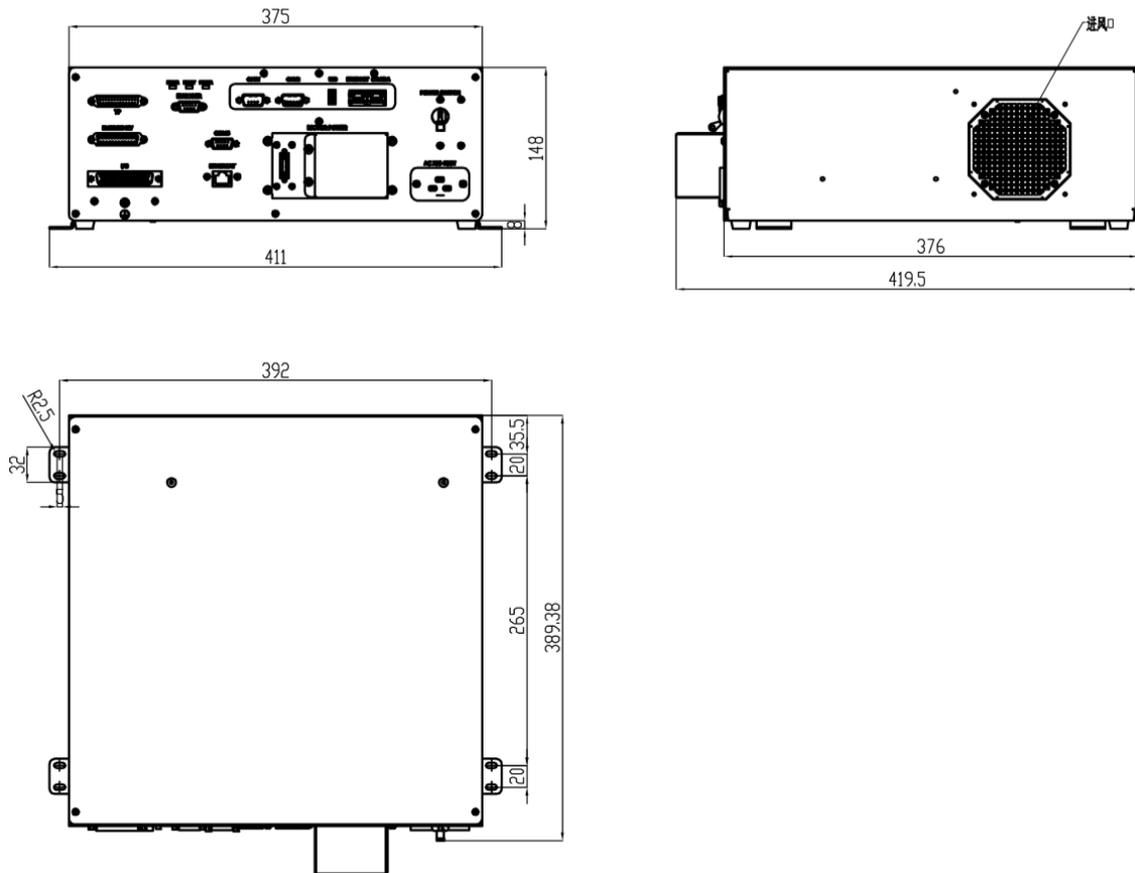
#### 3.1 Controller appearance and size



3.1-1 Controller appearance



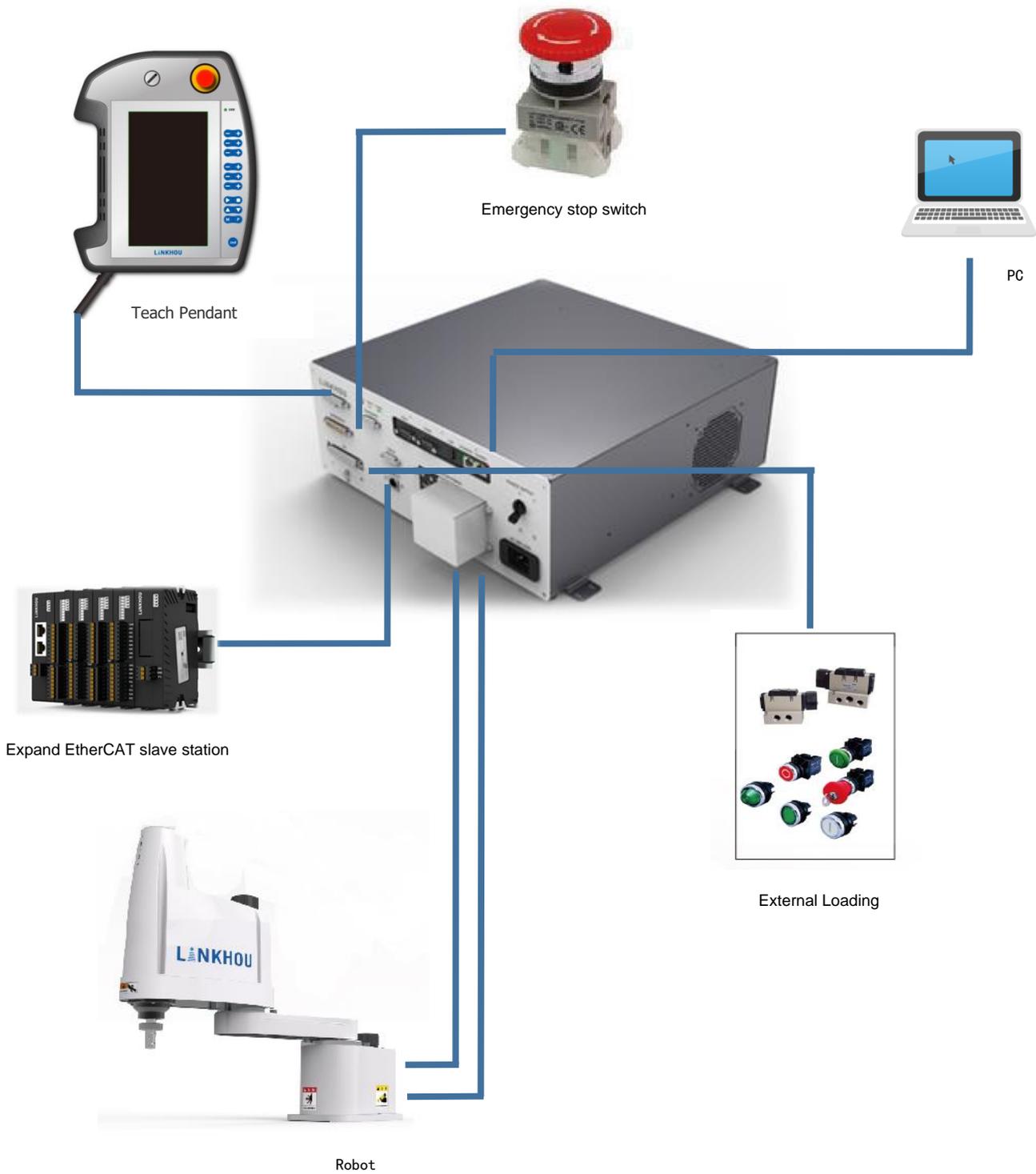
3.1-2 Controller vertical mounting dimensions



3.1-3 Horizontal mounting dimensions of controller

Unit :mm

### 3.2 System composition



### 3.3 Specification table

Name	Specification	
Controller name	NAU-RC40	
CPU	32 type	
Memory	RAM: 2G    hard drive: 16G	
Control axis	4axis	
Robot control	software	Linhkhon Robot Studio
	velocity/accelerate control	1~100% programming
Positioning control	PTP point to point, CP continuous path	
Teach mode	Software teach    demonstrator teach Manual Data Input Teaching	
Communication interface	Ethernet	Binary channel
	RS232	Dual interface
optional	Encoder acquisition module	Single interface
IO	IO standard	16 input , 16 output
	Expand IO ( optional )	Based on user requirements
Power	AC200V~AC230V    50/60Hz	
Safe function	Emergency stop/overload detection/position deviation over-limit detection/speed deviation over-limit detection	
Maximum rated capacity	2.0kVA ( based on robot type )	
Environmental humidity	5~40°C	
Relative environmental humidity	20~80% ( Shall not be dew )	
Weight	13.5kg	



NOTE

**The weight is recorded on the controller, and the weight must be confirmed when handling or transferring. Take care not to hurt your waist when lifting the controller up. In addition, please be careful not to fall and lead to clamped hands or feet, etc., causing unnecessary damage.**

### 3.4 Support model

Controller model	Robot model
RC40A	TM3-R400
	TM5-R250/TM5-R300/TM5-R400
	TM6-R500/TM6-R600/TM6-R700

## 4 Installation specification

### 4.1 Controller accessories

One AC power cord

9pinDB terminal + shell two sets

50pin DB terminal + shell set

Note: the manipulator power line and encoder line are connected on the body, directly connected to the controller

### 4.2 Use environment

The robot needs to be used in a relatively stable environment to ensure the service life of the manipulator. Please place the controller in the following environment when using.

## 1. Use environment of the controller

Temperature	5~40°C
Relative humidity	20~80% (shall not be dew)
(EFT)	Below 3kv
(ESD)	Below 6kv
Elevation	Below 1000 m

## 2. Precautions for use:

1) The controller is not dust-free. If it needs to be used in dust-free workshop, please install it in the controller

Install place to do dust-free processing

2) The controller shall not be placed in a corrosive environment

3) No oil smoke, oil mist, iron dust in the air

4) The controller shall be well ventilated

5) The environment should not be dripping

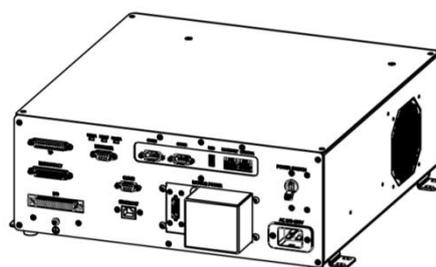
6) Cannot transmit shock or vibration, etc

7) Do not have a strong magnetic field or other interference sources around

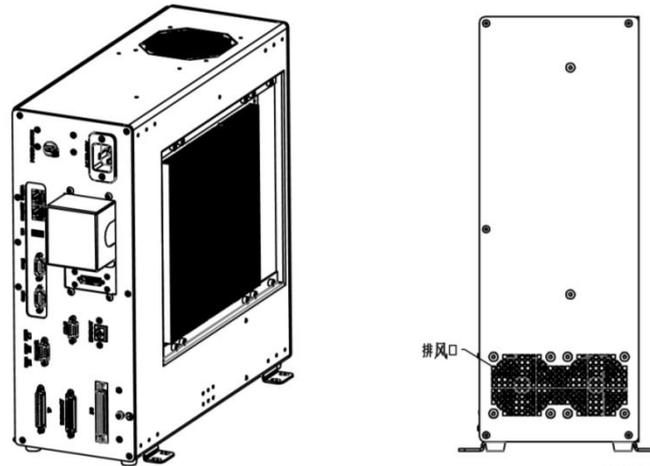
## 4.3 Put space

### 1. Installation mode of controller

1) Horizontal installation



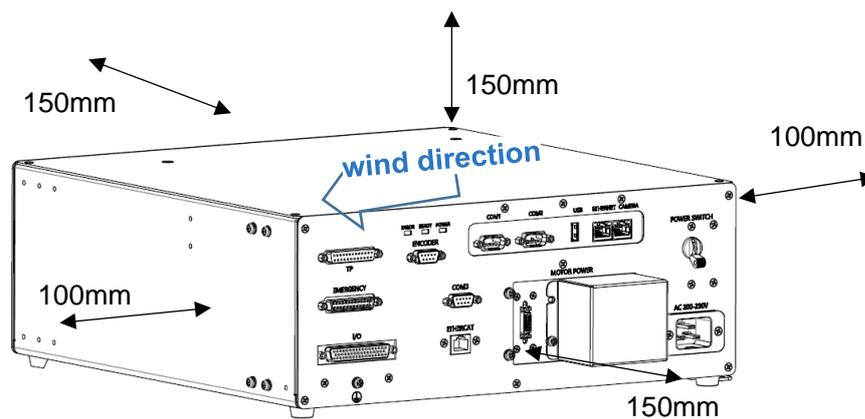
## 2) Vertical installation



## 2 Placement space

1) In order to facilitate the connection of the connector on the controller and the cooling of the controller, please ensure the space around the controller

2) The controller is a heating device with hot air blowing out of the fan mouth. Please do not install electrical components with poor heat resistance around the controller



## 4.4 Power supply

configure the power supply according to the table below

rated supply voltage	AC200V~AC230V
Phase	Signal phase
Frequency	50/60Hz
power distribution system	D connect ground (below 100Ω)

Please set A bipolar cut-off type leakage circuit breaker or circuit protection device with rated current below 15a on the AC power line.

## 5 Electrical configuration

Notes:

- 1) Please connect or remove the cable when the power supply of the controller is OFF.If the power supply is ON, it may lead to electric shock or failure.
- 2) Please connect the cable reliably.In addition, do not place heavy weight on the cable, extreme bending, forced pull or clamp the cable.Otherwise, cable damage, disconnection or poor contact, abnormal system operation or electric shock may occur.
- 3) The serial number of the corresponding manipulator is recorded on the controller.Do not mistake the connection.If the connection relationship is wrong, not only the robot system can not function properly, but also may cause security problems.
- 4) When connecting the manipulator and the controller, do not mistake the connection relation of the corresponding cable.If the connection relationship is wrong, not only can the robot system not function properly, but also can cause serious security problems.
- 5) Professional personnel should be responsible for electrical wiring to avoid safety problems

### 5.1 Supply power

- 1) Controller accessories are equipped with 3m power cord, AC power cord is brown and blue, and ground wire is yellow-green
- 2) The power plug is an optional item. Users are free to choose the plug that meets the safety standard

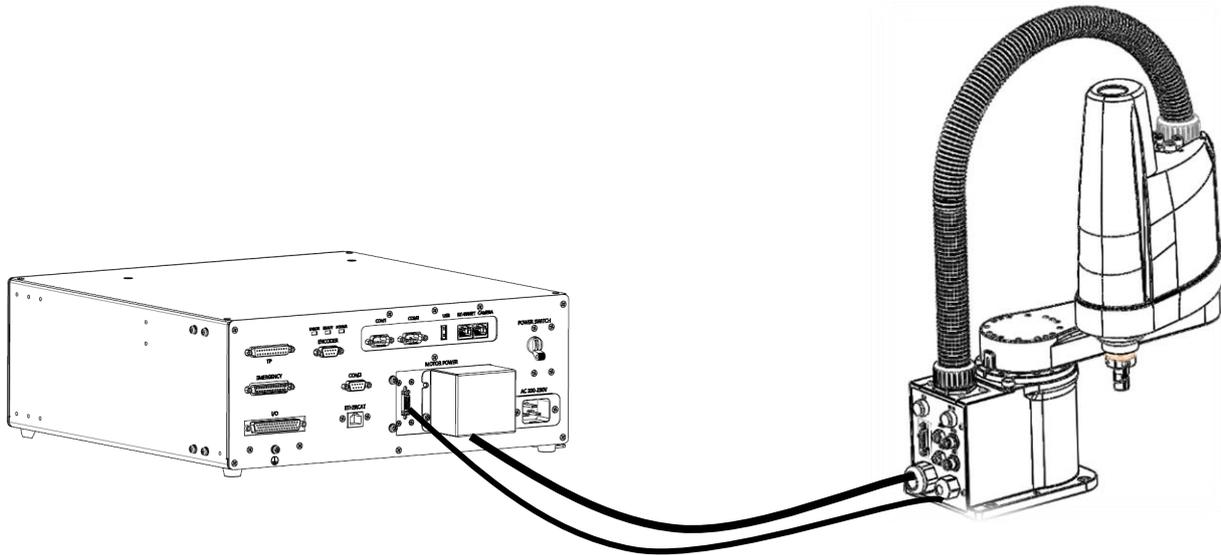
The triangle plug	GNT-10 250V;;BULL
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	Please install the plug by a person with professional knowledge and skills.
	Be sure to connect the ground line of the AC power cable (green/yellow) to the ground terminal of the distribution system. If the ground wire is not properly connected, an electric shock may result.
	Always use a plug for power connections. Do not connect directly to factory power.



## 5.2 Robot connect controller

- 1) Use the power cable and encoder cable on the manipulator body to connect the controller
- 2) Please connect the controller when the power is off to avoid safety accidents



## 5.3 IO connect

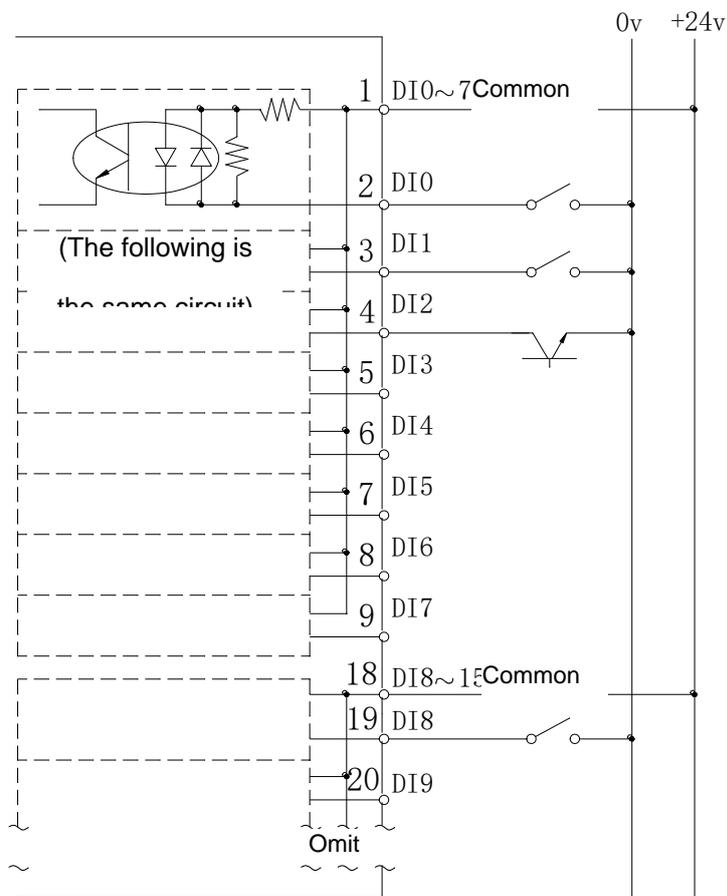
- 1) I/O connector is the connector used to connect the user's input and output devices
- 2) The standard configuration of IO in the controller is PNP type
- 3) Standard configuration: 16-point input and 16-point output
- 4) Users can extend external IO by themselves
- 5) Intermediate relay shall be added to output IO with external load

### 5.3.1 Input circuit

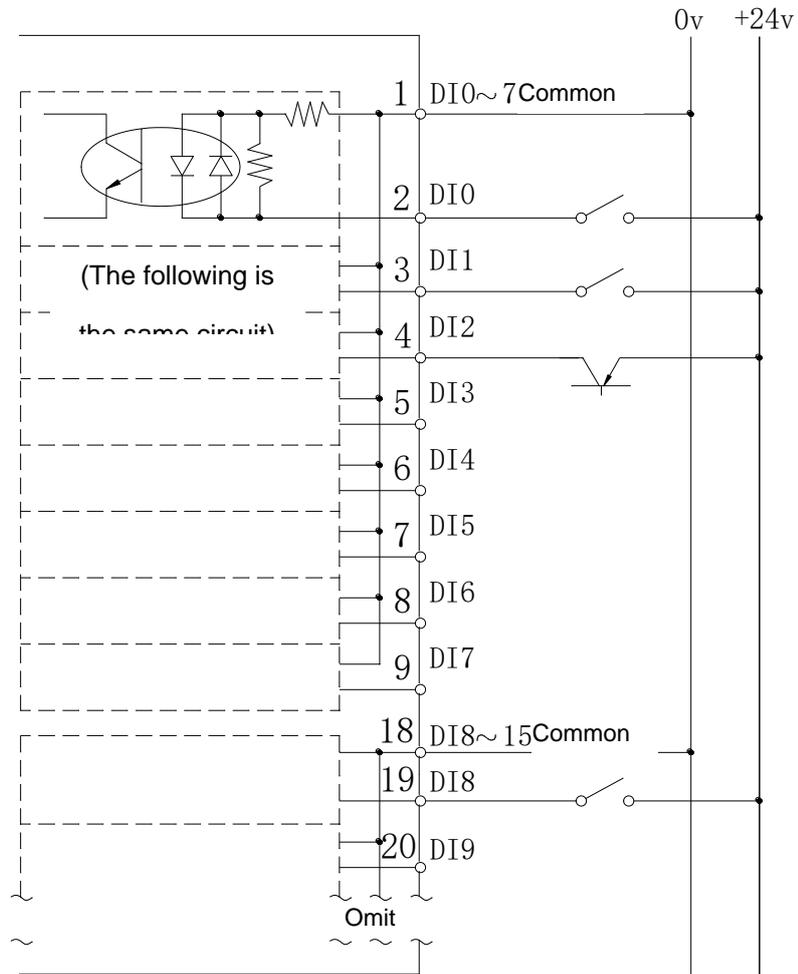
Input point	16
Nominal voltage	24VDC±10%
On voltage	>16.5VDC
Off voltage	<8VDC
incoming current	Each point 3mA

Connection circuit diagram

Method 1:



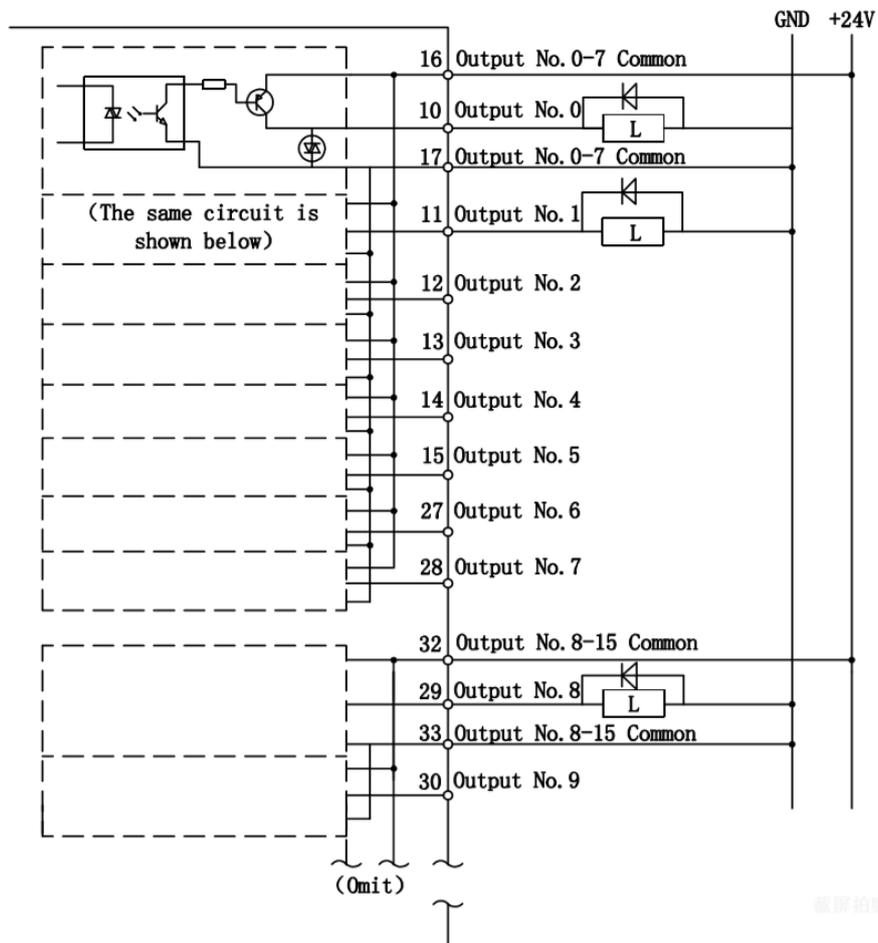
Method 2:



5.3.2 Outgoing circuit

Output point	16
nominal voltage	24VDC±10%
current output	Max 0.5A

Connection circuit diagram



## IO

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	Common Input DI0 ~ 7	18	Common Input DI8 ~ 15	34	HDI
2	DI0	19	DI8	35	Breech lock 1
3	DI1	20	DI9	36	HDI_COM
4	DI2	21	DI10	37	Breech lock 2
5	DI3	22	DI11	38	NC
6	DI4	23	DI12	39	NC
7	DI5	24	DI13	40	NC
8	DI6	25	DI14	41	NC
9	DI7	26	DI15	42	NC
10	DO0	27	DO6	43	DO11
11	DO1	28	DO7	44	DO12
12	DO2	29	DO8	45	DO13
13	DO3	30	DO9	46	DO14
14	DO4	31	DO10	47	DO15
15	DO5	32	DO8~15: +24V	48	NC
16	DO0~7: +24V	33	DO8~15: 0V	49	NC
17	DO0~7: 0V			50	NC

## 5.4 EMERGENCY

- 1) Please connect the EMERGENCY stop switch to the EMERGENCY connector.
- 2) If there is no connection on the EMERGENCY connector, the manipulator will not be able to operate.
- 3) Please operate when the controller is out of power to avoid unnecessary safety risks.

### 5.4.1 Emergency stop switch

In addition to the EMERGENCY stop switch of the instruction box, when the EMERGENCY stop switch is provided externally, connect the EMERGENCY stop switch to the EMERGENCY stop input terminal of the EMERGENCY connector.

Please use the emergency stop switch that meets the following conditions.

- Normally closed push button switch
- Can't recover automatically
- Red mushroom type
- With 2b contacts



Emergency stop input equipped with 2 channels. If there is a difference of more than 2 seconds in the state of the two channels, it is judged that there is an anomaly in the emergency stop channel and an error occurs. To do this, use an emergency stop switch with 2b contacts.

### 5.4.2 Emergency stop function confirmation

After connecting the EMERGENCY stop switch to the EMERGENCY connector, be sure to confirm the function of the switch as follows before performing the manipulator action to ensure safety.

- 1) Turn on the power and start the controller when the emergency stop switch is pressed.
- 2) Confirm that the status bar of the screen shows "emergency stop".
- 3) Remove the emergency stop switch.
- 4) Click clear wrong command button.
- 5) The "emergency stop" display on the status bar disappears.

### 5.4.3 Recovery from emergency shutdown

1) When recovering from emergency stop, please confirm whether it is in a safe condition. No one is allowed within the travel range of the manipulator

2) After safety is confirmed, the following operations shall be performed to remove the emergency stop state.

- Remove the emergency stop switch
- Execute clear errors

### 5.4.4 Signal configuration

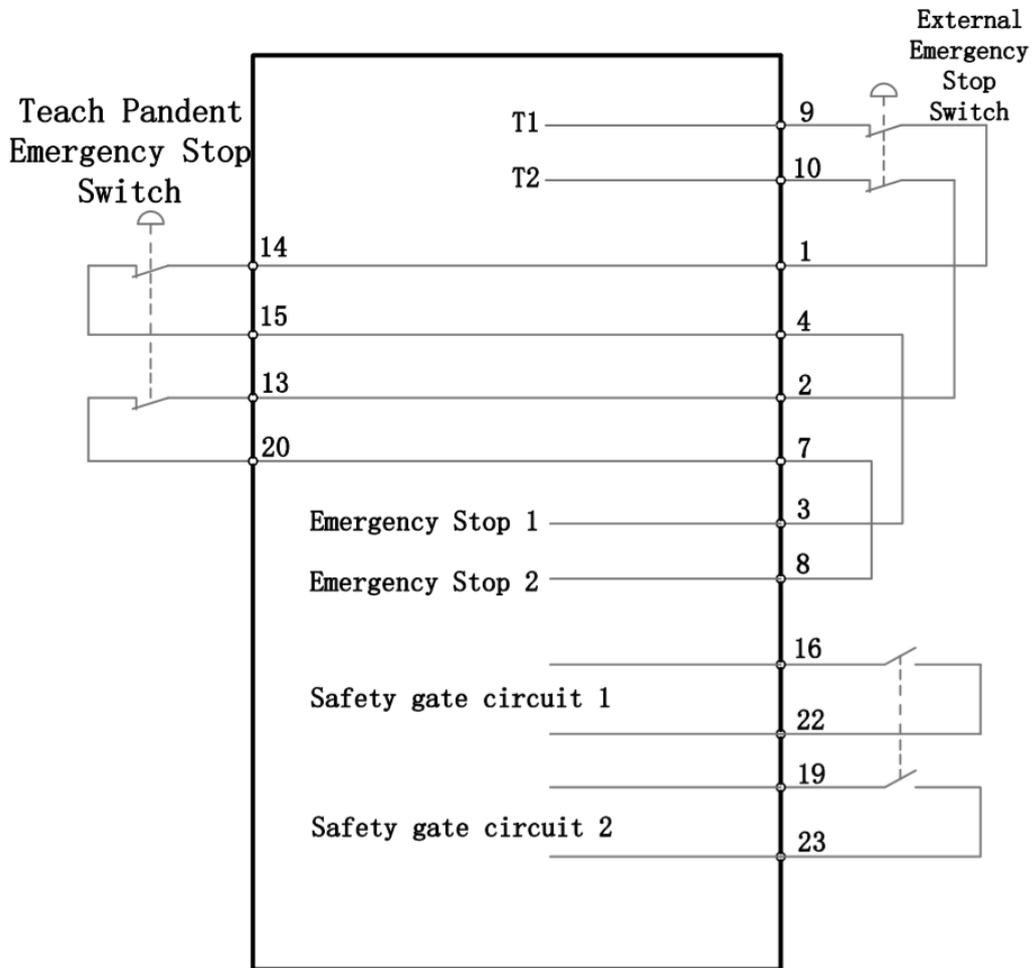
The following table shows the signal configuration for the EMERGENCY connector (d-sub25 pin)

Pin NO.	Signal	Function	Pin NO.	Signal	Function
1	ESW11	Emergency Stop switch contact (1)	14	NC	
2	ESW21	Emergency Stop switch contact (2)	15	NC	
3	ESTOP1	Emergency Stop circuit 1	16	SD1	Safety Door input (1)
4	ESW12	Emergency Stop switch contact (1)	17	NC	
5	NC		18	NC	
6	NC		19	SD2	Safety Door input (2)
7	ESW22	Emergency Stop switch contact (2)	20	NC	
8	ESTOP2	Emergency Stop circuit 2	21	NC	
9	T1	Test pulse 1	22	T1	Test pulse 1
10	T2	Test pulse 2	23	T2	Test pulse 2
11	NC		24	NC	
12	NC		25	NC	
13	NC				

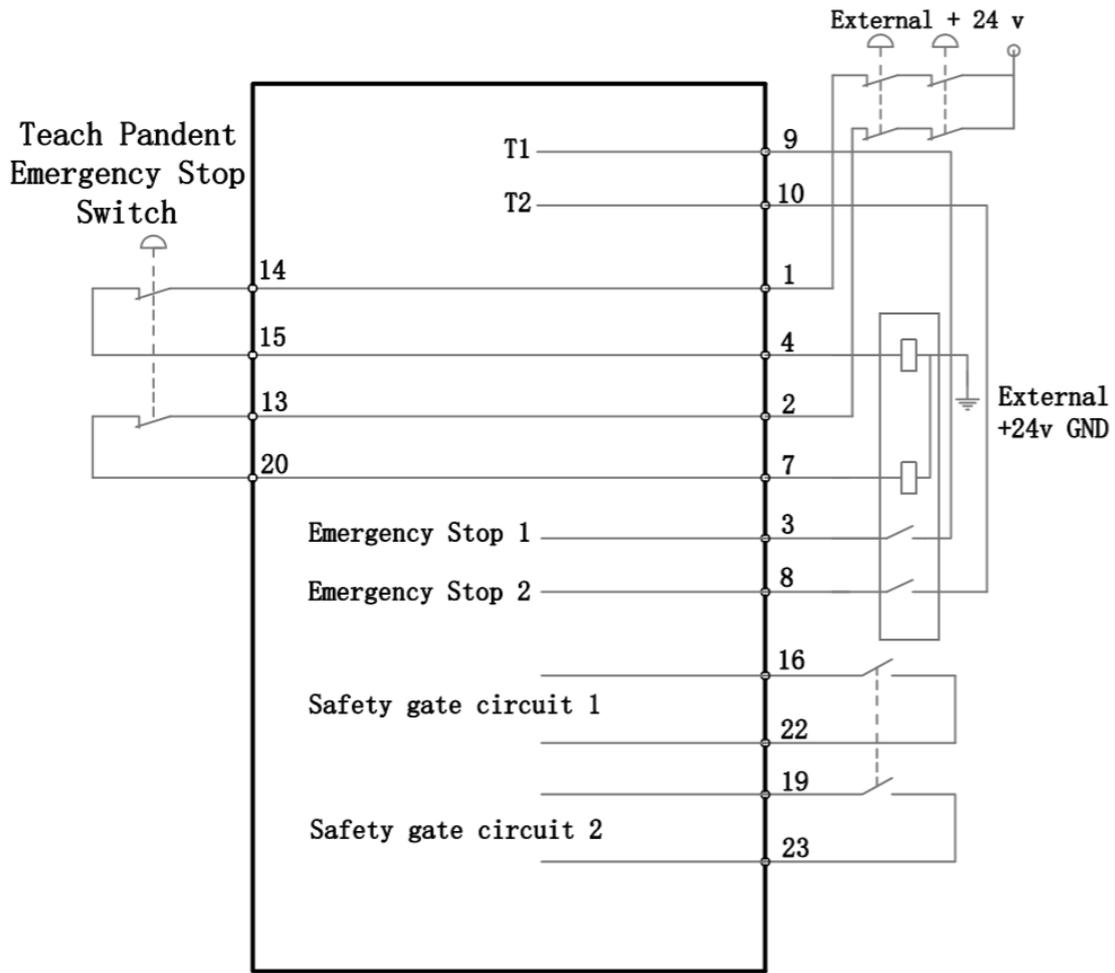
- 1) If the input time of safety gate input 1 and safety gate input 2 is more than 2 seconds different, an error will occur. Please connect to the same switch with 2 contacts.
- 2) If the input time of emergency stop SW1 contact and emergency stop SW2 contact is more than 2 seconds different, an error will occur. Please connect to the same switch with 2 contacts.
- (3) Emergency stop of robot and safety door belong to category 1

5.4.5 Ciucuit diagram

(1) Connect the external emergency stop switch



(2) External safety relay typical application

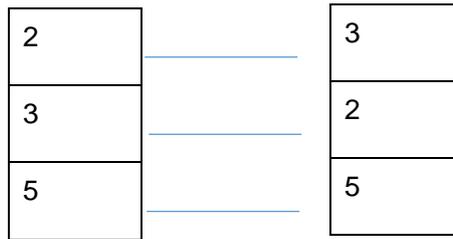


5.5 RS232port

Function: it is used to communicate with the external equipment. It needs an intersecting serial line

connection: D-Sub 9pin

NO	Design	function
2	RXD	receive
3	TXD	send
5	GND	Connect ground



## 5.6 Internet interface

Functions:

- 1) for upper computer software to control the manipulator
- 2) used for Ethernet communication of controllers and other devices

### 5.6.1 IP address

Functions:

- 1) for upper computer software to control the manipulator
- 2) factory default Settings of Ethernet communication controllers for controllers and other devices

Ip address: 192.168.5.228

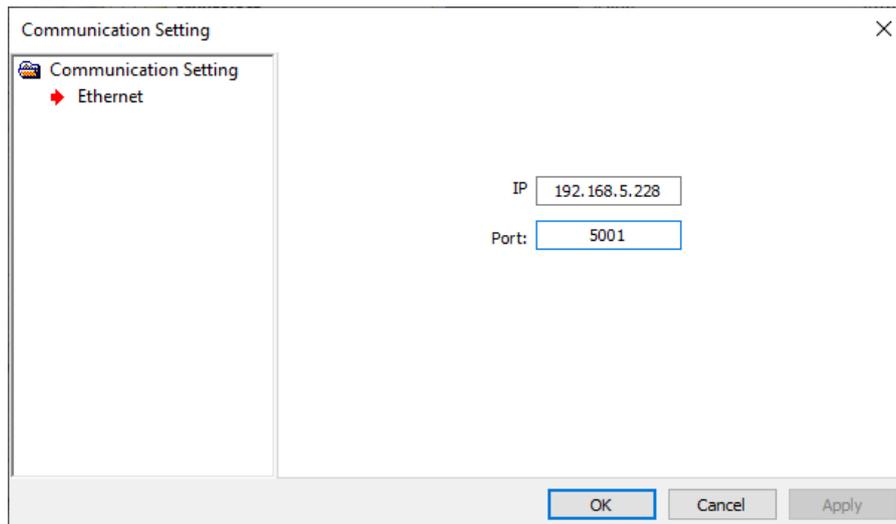
Subnet mask: 255.255.255.0

Default gateway: 0.0.0.0

The host computer or other equipment and manipulator controller connection, need to set the IP in the same network segment

### 5.6.2 Controller IP address set

- 1) Set the IP address of the host computer and the controller in the same network segment
- 2) Open lh-robotstudio software and connect to the controller
- 3) Click the menu bar "project" - "project name" communication setting "and open the dialog box" communication setting "as shown below.



- 1) set the IP address of the host computer and the controller in the same network segment
- 2) open lh-robotstudio software and connect to the controller
- 3) click the menu bar "project" - "project name" communication setting "and open the dialog box" communication setting "as shown below. The IP address and port number of the controller should be set in the dialog box. The default IP address and port number of the controller when it leaves the factory are as follows:

IP address: 192.168.5.228

Port number: 5001

If the controller's IP address is modified due to the need of the project (the IP address of the device communicating with the controller is in another network segment), the normal communication with the controller can only be made after the IP address in the network setting is modified to be consistent with the new IP address and port number of the controller. Please

remember the modified value after modifying the IP address. If you forget the IP address and cannot communicate, you will need to use ModBus to view and reset the IP address.

### 5.6.3 Connect controller

Once the engineering network parameters and local connection IP address are set, the LH Robot Studio can be used to connect with the controller.

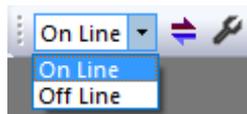


Figure5.6.1 Connecting the Controller

Click the drop-down list shown in figure 5.6.1 On the toolbar and click "On Line" to connect the controller. When the output view displays the "Robot ready" message shown in figure 5.6.2, the controller is connected successfully.



Figure 5.6.2 Tips for Successful Connection

After connecting the controller successfully, you can start to control the operation of the manipulator, teaching, etc.

### 5.7 TP port

Is the port used to connect to the display box. The teaching box can be used.

If no connection is made on the TP port, the controller enters the emergency stop state. If the instruction box is not connected, please connect the TP short plug.

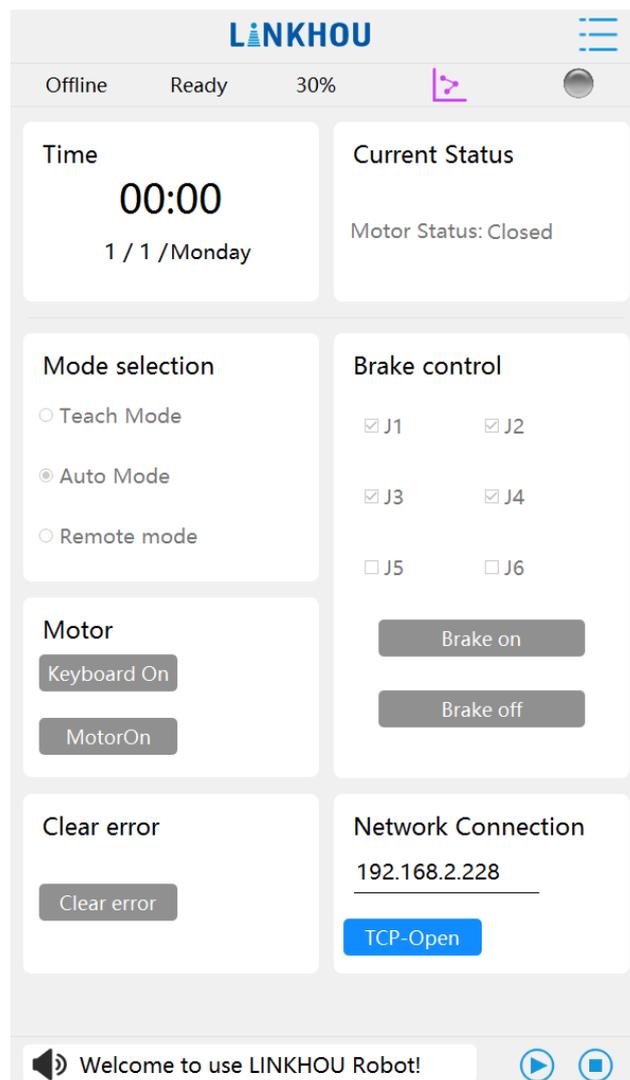
### 5.7.1 Connect demonstrator

Insert the connector of the display box into the controller,

Then set the power of the controller to ON.

When the power supply of the controller is ON, insert the connector of the teaching box.

1. After connecting the instructor to the TP port of the controller, start the controller and wait for the instructor to enter the main control interface;



2. Click the input box of [network connection], enter the IP address of the controller, and the factory default is "192.168.2.228". Then click [tcp-open] to connect the controller;

## Network Connection

192.168.2.228

TCP-Open

3. After successful connection, the "current connection state" of the status bar will be changed from "unconnected" to the connected robot body model, such as "tm3-r400".

After connecting the controller successfully, you can start to control the operation of the manipulator, teaching, etc.

## 5.8 Operation mode

### 5.8.1 Operation mode outline

There are two modes in the robot system.

TEACH mode is the mode of approaching the robot and using the TEACH box to TEACH or confirm the point data.

AUTO mode is used for automatic operation (execution program) and robot system in robot system factory

The mode of programming, debugging, adjusting, maintaining, etc.

In this mode, no robot action or program execution is allowed while the security door is open.

**automatic mode** Before running the program automatically, make sure that the instructor is in automatic mode (whether the control mode is instructor start, IO start or Modbus start)

**Teaching mode** In the teaching mode, can manually teach the movement manipulator or execute to the target point.

### 5.8.2 Mode switch

Before switching to the teaching mode, make sure that the point files in the project are the same as in the controller.

Switch between teaching mode and automatic mode using the mode switch on the instructor.

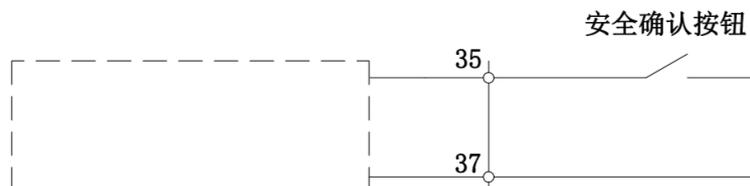
Switch the switch key to "teaching", the manipulator can enter teaching mode. When the program is running, cut to teach mode. The program will stop running immediately.

1. After the teaching mode is switched to the safety confirmation button needs to be pressed to automatically run the program



NOTE

2. The safety confirmation button must be installed outside the working range of the robot
3. The safety confirmation button is attached to the 35 and 37 pins of the IO connector



## 6 Maintain

### 6.1 Matters needing attention in maintaining safety

1) Please make sure that the robot system is taught by the personnel who have been trained in safety.

Personnel who have received safety training refer to personnel who have received safety training (knowledge of industrial robots, operation, teaching, etc.) provided by laws and regulations of various countries for workers engaged in industrial robot related businesses. The company conducts training for the personnel who have completed the introduction of training.

2) The maintenance of the robot system must be carried out by personnel trained in safety.

The personnel who have received safety training refers to the personnel who have received the safety training stipulated by the laws and regulations of various countries, aiming at the workers engaged in industrial robot related businesses (the training of the knowledge of industrial robot, operation, teaching, inspection and other relevant knowledge of business operations, relevant laws and regulations, etc.). The company conducts training for the personnel who have completed the introduction of training and maintenance training.

3) When replacing parts, be sure to use special maintenance parts. If the circuit board or parts of the controller are replaced with the circuit board or parts of another controller, the robot system may fail seriously. In addition, it may cause serious security problems.

4) Do not disassemble parts not recorded in this manual, or maintain them in a different way than recorded. If wrong disassembly or maintenance is carried out, not only the robot system cannot function normally, but also serious safety problems may be caused.

5) Please be sure to carry out maintenance after the controller power is turned off, the power plug is pulled out and the high-voltage charging part is fully discharged. If the power supply is ON or the high voltage charging part is not fully discharged, it may lead to electric shock or serious safety problems.

6) The motor driver module and switching power supply in the controller may be at high temperature due to the use conditions. Please check the surface temperature when contacting these units, and wear protective gloves as required, as this may cause burns.

7) During maintenance, do not make the parts bear impact. In particular, data related parts, if the impact, it will not only cause damage to the parts, but also may cause damage to the data when read in, save.

8) Please be careful not to lose the screws removed during maintenance. Be sure to remove the screw when it falls into the controller. Continued use without removal may result in a short circuit and damage to components or equipment.

9) When replacing the motor driver module, please do not mistake the power number (watts). If a motor driver module with a mismatched power number is installed, an error will occur. In addition, it may cause the robot system to be unable to function normally.

10) The sequence of the corresponding manipulator is recorded on the controller No. Do not mistake the connection. If the connection relationship is wrong, not only the robot system can not function properly, but also may cause security problems.

## 6.2 Regular checking

In order to prevent failure and ensure safety, inspection operations need to be conducted reliably. The following are the inspection schedule and contents. Please check according to the schedule.

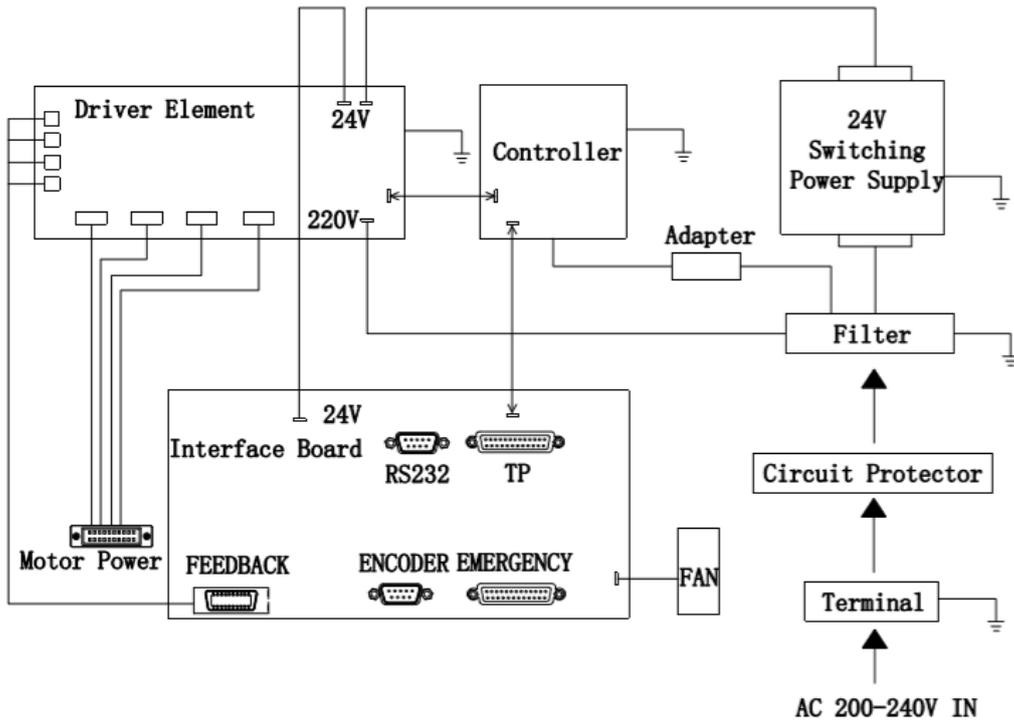
### 1) Check the schedule

The inspection project is divided into 5 phases: daily, 1 month, 3 months, 6 months and 12 Months. Among them, if the operation and power supply time exceeds 250 hours in a month, please press additional inspection items of 250 hours, 750 hours, 1500 hours and 3000 hours.

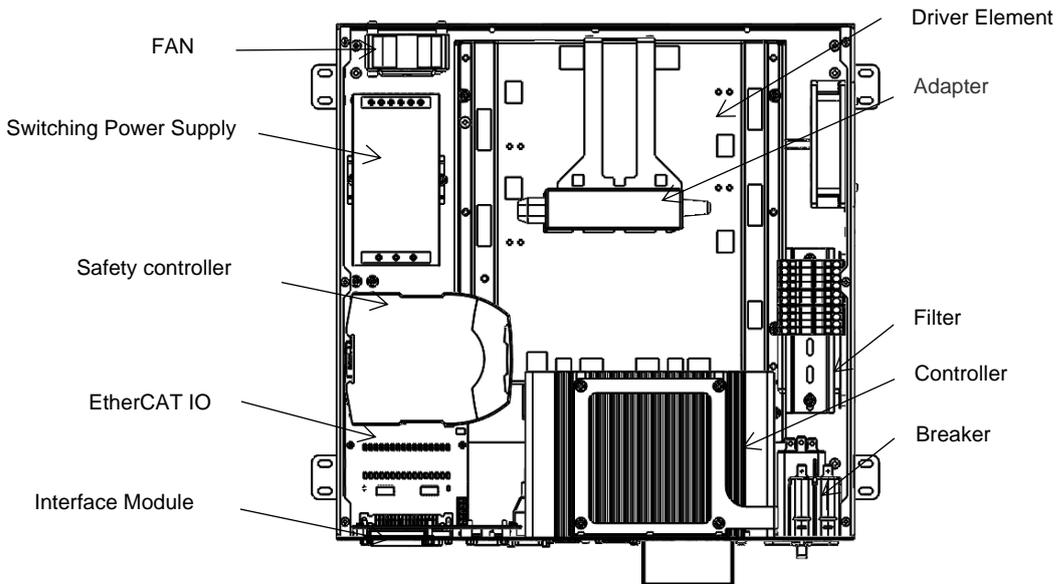
### 2) inspection item

	Inspection Point	Inspection Location	Daily	Monthly	Quarterly	Biannual	Annual
Power off inspection item	Clear attachment of dust	Control cabinet whole	√	√	√	√	√
	Fan strainer	Air inlet screen		√	√	√	√
Power on inspection item	Control whether there is abnormal sound in cabinet	Control cabinet whole	√	√	√	√	√
	Controller backup	system data	Data change				

6.3 Control cabinet internal composition diagram



6.4 Internal structure of controller



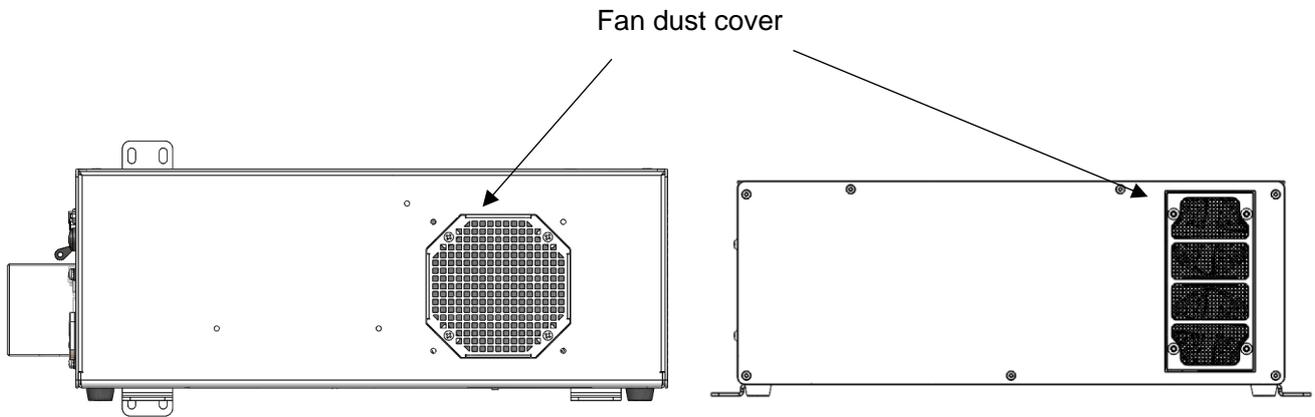
## 6.5 Maintenance Part Replacement Steps

### 6.5.1 Cautions for Part Maintenance

1. Be sure to perform maintenance after turning off the power supply of the controller and pulling out the power plug. If maintenance is performed with the power supply ON or with the high voltage charging part not fully discharged, it may lead to electric shock or serious safety problems.
2. When opening the front panel, pull out the power plug. Touching the AC power supply input terminal board and others in the housing can cause electrical shock or serious safety problems.
3. Take care not to let the screws removed fall into the control cabinet during maintenance.

## 6.5.2 Parts Maintenance Steps

### 1. Cleaning of fan dust cover



Please check the dirty condition regularly and clean the dustproof net as needed. If the dirty state of the fan dustproof net is ignored, the temperature inside the controller will rise, which may affect the normal operation of the robot control system.

Please refer to 6.2 for specific time for cleaning

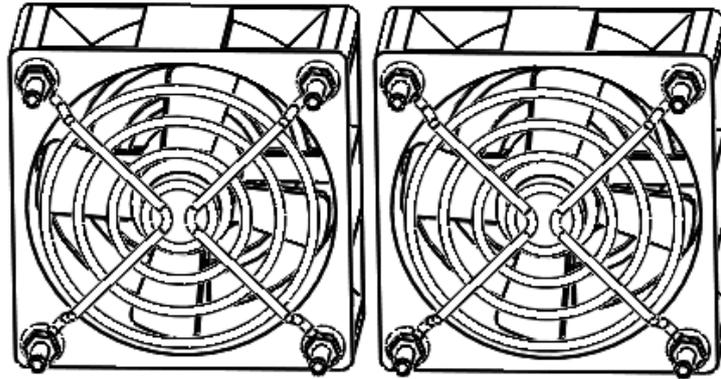
#### Removal of fan dustproof net

- 1) Turn off the power of the controller
- 2) Remove the 4 screws from the fan dust cover
- 3) Remove fan dust cover
- 4) Clean or replace the fan dustproof net

### Installation of fan dustproof net

- 1) Install the fan dustproof net into the fan dust cover
- 2) Fix the fan dust cover with 4 screws
- 3) Turn on the power of the control cabinet and confirm that there is no abnormal noise or vibration

## 2. Fan



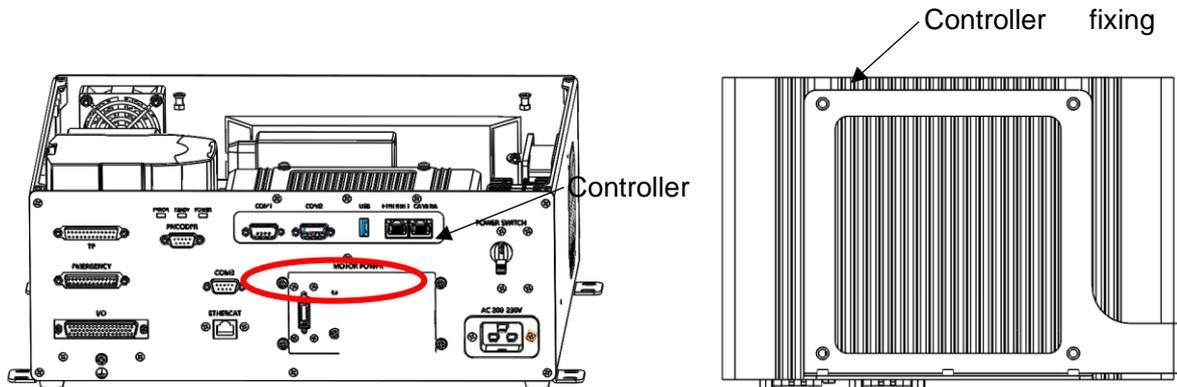
### Removal of the fan

- 1) Turn off the power supply of the control cabinet and unplug the power cord
- 2) Remove the top plate (4 screws)
- 3) Pull out the fan power connector
- 4) Pull out the 4 screws on the fan
- 5) Remove the fan

### Installation of the fan

- 1) Fix the new fan with 4 screws and pay attention to the direction of the fan
- 2) Plug in the power connector
- 3) Install the top plate
- 4) Turn on the control cabinet. Confirm that the fan can start normally without vibration and abnormal noise

### 3. Replace the controller



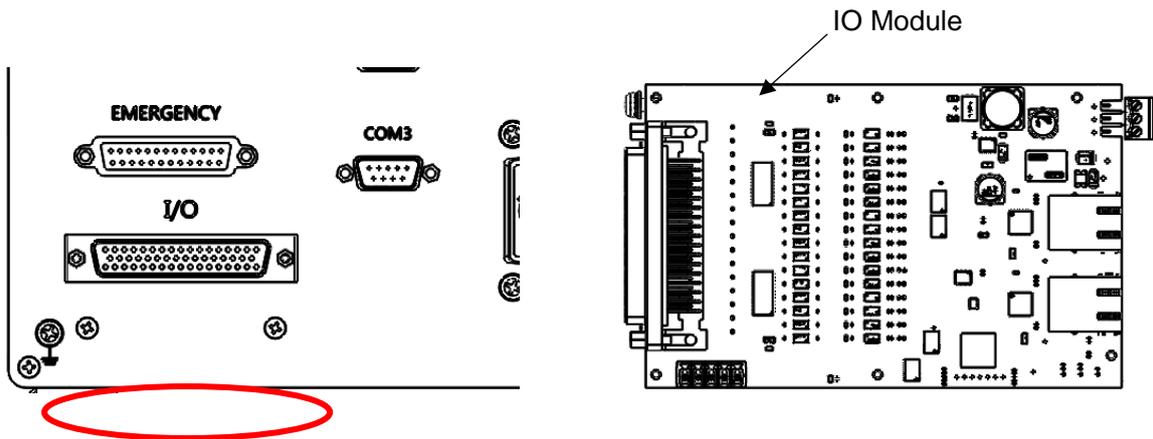
#### Removal of the controller

- 1) Turn off the power supply of the control cabinet and unplug the power cord
- 2) Remove the top plate (4 screws)
- 3) Pull out all connection cables on the controller
- 4) Remove the 3 screws holding the controller
- 5) Take out the controller and remove the 4 screws of the controller fixing bracket

#### Controller Installation

- 1) Fix the controller on the bracket with 4 screws
- 2) Fix the bracket on the control cabinet surface plate with 3 screws
- 3) Connect all connection cables on the controller
- 4) Install top plate
- 5) Turn on the control cabinet power supply. Confirm that the controller can start successfully

## 4. IO Module



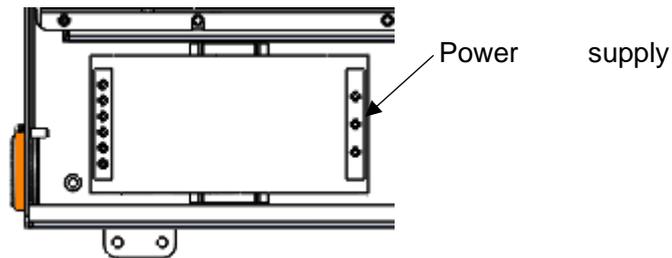
## Removal of IO Module

- 1) Turn off the power supply of the control cabinet and unplug the power cord
- 2) Remove the top plate (4 screws)
- 3) Pull out the power cord connector and the communication cable on the IO module
- 4) Remove the 2 fixing screws on the controller panel
- 5) Take out the IO module and remove the 6 hexagonal copper stud of the IO module fixing bracket

## Installation of IO Module

- 1) Fix the IO module on the bracket with 6 hexagonal copper stud
- 2) Fix the bracket on the control cabinet surface plate with 2 screws
- 3) Connect all connection cables on the controller
- 4) Install top plate
- 5) Turn on the control cabinet power supply. Confirm that the IO module can start successfully

## 5. Power supply module



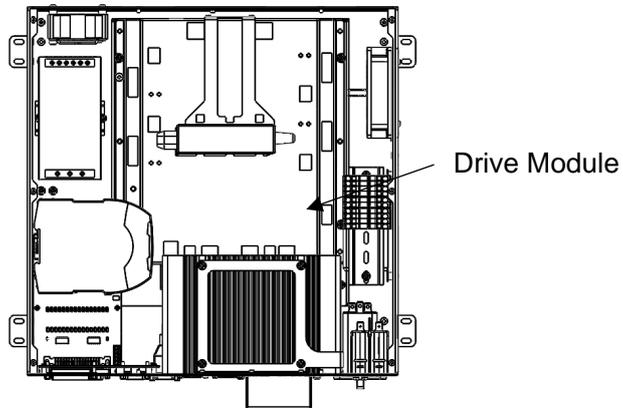
### Removal of power supply module

- 1) Turn off the power supply of the control cabinet and unplug the power cord
- 2) Remove the top plate (4 screws)
- 3) Remove the power cord from the power supply module with a Phillips screwdriver
- 4) Remove the power supply module from the aluminum rail

### Installation of the power supply module

- 1) Install a new power supply module to the aluminum rail
- 2) Connect the power cord
- 3) Install the top plate
- 5) Turn on the control cabinet power supply. Confirm that the power supply module can start successfully

## 6. Drive module



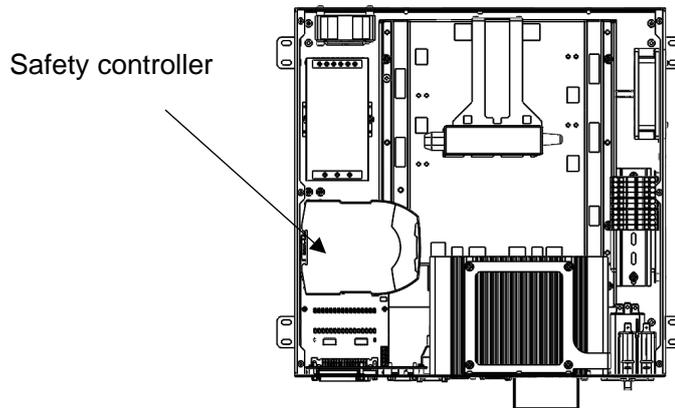
### Disassembly of driver module

- 1) Turn off the power supply of the control cabinet and unplug the power cord
- 2) Remove the safety controller from the guide rail
- 3) Remove the controller and pull out all the connecting cables on the drive module
- 4) Remove the 4 screws fixed by the drive module
- 5) Take out the driver module

### Installation of driver module

- 1) Install the new drive module into the control cabinet and import the drive parameters
- 2) Fix the drive module on the bottom plate with 4 screws
- 3) Connect all connection cables on the controller
- 4) Install the controller, safety controller and roof
- 5) Power on the control cabinet to ensure that the robot can start normally

## 7. Safety controller



### Disassembly of safety controller

- 1) Turn off the power supply of the control cabinet and unplug the power cord
- 2) Remove the safety controller from the guide rail
- 3) Remove all connection cables on the safety controller with a screwdriver

### Installation of driver module

- 1) Install all connection cables on the safety controller with a screwdriver
- 2) Install the safety controller on the guide rail
- 4) Install the roof
- 5) Power on the control cabinet to ensure that the robot can start normally

### 6.5.3 The robot is electrified for confirmation

After maintenance of manipulator or controller, confirm robot system action.

Follow these steps to confirm the status of the controller.

- (1) Connect all required cable classes.

During action confirmation, please hold the emergency stop button and confirm that the robot will report the wrong emergency stop after pressing the emergency stop button. Manipulator due to setting or wiring errors and abnormal action, please immediately press the emergency stop switch, etc., to stop the manipulator action. Please be sure to confirm the action at low speed in the teaching mode. If the action is confirmed at high speed, the manipulator will perform abnormal action or cannot stop the action immediately, which may not only lead to device damage, but also may cause serious safety problems.

(2) Confirm whether the serial number of the product matches

There is a unique serial number on the robot body and the control cabinet. Please make sure that the serial number corresponds to the robot body. The wrong serial number will lead to safety accidents such as product collision.

(3) Robot action confirmation

The human robot has the same sound after being enabled, and there is no abnormal movement. When MOVJ and other instructions are executed, the robot moves normally and shakes with the same sound.

## 6.6 Error code table

Error Code	Description	Failure cause	Solution
e0x0000	unknown error	Internal system error	Contact technical support
e0x0001	Illegal command, please clear the error and try again	Try to run the program in alarm state	Clear the current error state and try again
e0x0002	Fail to update the system	Update the system again without restarting the controller after successfully updating the system	Restart the controller and update the system again

e0x0003	Fail to read file size	Trying to read a nonexist file, or the path does not exist, or the file is corrupted	Check the files again within the controller in file synchronization to make sure the current file list is up to date, and try resynchronization if it doesn't exist or is corrupted
e0x0004	Syntax error	The program running in the controller has a syntax error	Check for syntax errors and modify the program according to the error line number and prompt message
e0x0005	Wrong path to program main file	The path does not exist and the file cannot be read	Check to see if the files exist and try to resynchronize the project files
e0x0006	There is no robot instance	Failed to create robot instance, unable to start interpreter	Check to see if the program file exists and if an exception occurred, clear the error first, and then try again
e0x0007	Already exists one robot instance	The interpreter is not closed properly	Contact technical support
e0x0008	Fail to run the program because of syntax error	There is a syntax error in the program	Modify the syntax error in the program according to the alarm line number and prompt message and then run again;

e0x0009	Internal mode error	Failed to switch between TEACH and AUTO mode	Contact technical support
e0x0010	Function or command parameter error	The parameter or command send by the Robot Studio or Teach Pendant are incorrect.	Contact technical support
e0x0011	An error occurred while loading the point	The point file have syntax error or the file doesn't exist	Make sure that the point files in current project are created with current version of Robot Studio, make sure that the format is correct and then re-download the point files to the controller
e0x0012	An error occurred while unloading the point	Internal system error	Contact technical support
e0x0013	An error occurred while adding a point	Internal system error	Contact technical support
e0x0014	An error occurred while deleting the point by name	Internal system error	Contact technical support
e0x0015	An error occurred while saving point	Internal system error	Contact technical support
e0x0016	An error occurred while removing all points	Internal system error	Contact technical support
e0x0017	An error occurred in the communication data frame function	Internal system error	Contact technical support

e0x0018	An error occurred while sending data frame	Internal system error	Contact technical support
e0x0019	An error occurred while creating communication data frame	Internal system error	Contact technical support
e0x0020	Fail to create teaching task	Internal system error	Contact technical support
e0x0021	Fail to create loading point task	Internal system error	Contact technical support
e0x0022	An error occurred while deleting point	Internal system error	Contact technical support
e0x0023	File cannot be found	There is no specified file in the controller	Resynchronize the file in file synchronization
e0x0024	Point cannot be found	The point file does not exist	Resynchronize the point file in file synchronization
e0x0025	Point already exists	Internal system error	Contact technical support
e0x0026	An error occurred while saving the uploaded files	An error or network transfer exception occurred while reading the file	Make sure the network connection to the controller is stable, and re-view the file in file synchronization and re-upload it
e0x0027	Motor error	Motor alarm	Clear the motor alarm information and try again
e0x0028	Algorithm error	There is an alarm in the algorithm layer, so the	After clearing the error, remove the error that

		program or manual teaching cannot be run;	caused the algorithm alarm, and then rerun the program
e0x0029	Ethercat communication error	Ethercat bus has an alarm and cannot run program or manual instruction;	Restart the robot controller after power down, if there is still an alarm after the restart, check the EtherCat cable between the drivers, if still unable to solve, please contact technical support;
e0x002A	An error occurred while executing Motor On/Off command	There is an error or the controller is not initialized successfully, so the motors cannot be powered on;	Clear the current error state, and then try to power on again. If the error cannot be cleared, restart the controller.
e0x002B	An error occurred while executing Power High/Low command	Internal system error	Contact technical support
e0x002C	An error occurred while executing axis brake command	An error occurred while executing the brake command	Ethercat command execution is abnormal, check whether the system state is abnormal and whether the electrical connection of brake line is normal
e0x0030	Program file does not exist	There are no program files in the controller	Resynchronize program files
e0x0031	Point file does not exist	There is no point file points.pt in the controller	Resynchronize the point file

e0x0032	Tool file does not exist	There is no point file tools.cr in the controller	Resynchronize tool files
e0x0033	The file on the controller does not match the PC file	The Points, Tools or Users file in the current active project does not match the file in the controller, resulting in the failure to enter the teaching mode.	In the file synchronization window, use [upload] and [download] to synchronize the current active project with the files in the controller;
e0x0034	An error occurred while writing system parameters	An error occurred during the transmission of system parameters to the controller;	Abnormal in the process of file transfer, confirm whether there is any abnormal in the network and whether the network cable connection is stable;
e0x0035	An error occurred while reading system parameters	There is no system configuration file in the controller.	Contact technical support to recover the controller system configuration file;
e0x0036	Error at origin calibration	An error occurred during calibration and the result was incorrect	Check the instructions and calibrate according to the steps
e0x0037	Error loading tool	The tool coordinate file format is incorrect or the path does not exist	Check if the path exists, and if it does, replace the exception format with the correct format and try again
e0x0038	An error occurred while downloading file	An error occurred while downloading the file	If an exception occurs during file transfer, or if writing to disk fails after successful file download, confirm whether the network

			is abnormal;Whether the file is too large, or the disk does not have enough space
e0x0039	An error occurred while backing up file	An error occurred while backing up the file	The file does not exist
e0x003A	An error occurred while restoring file	Failed to restore the file from the backup file path	The file does not exist
e0x0050	Robot program error	There are errors in the instructions used in the program, such as input parameter error, the absence of points, or variable types that do not match the desired type	Check whether the parameters and variables used in the instruction are valid according to the alarm line number and prompt message.
e0x0051	An error occurred while updating the system	The controller hardware exception caused a system update error	Contact technical support
e0x0052	Point file error	The point file in the controller is in the wrong format	Create a new project or replace the abnormal point file with a normal point file, then re-teach the point and download it to the controller
e0x0053	User coordinate file error	The user coordinate file in the controller is in the wrong format	Create a new project or replace the abnormal user coordinate file with a normal user coordinate file, then re-calibrate the user

			coordinate file and download it to the controller
e0x0054	Tool coordinate file error	The tool coordinate file in the controller is in the wrong format	Create a new project or replace the abnormal tool coordinate file with a normal tool coordinate file, then re-calibrate the tool coordinate file and download it to the controller
e0x0055	Fail to calibrate local coordinate system	The three points used to calibrate the user coordination could not form a right-hand Cartesian coordinates, or the angle of the X/Y axis was beyond $90^{\circ} \pm 5^{\circ}$ .	Re-calibrate the user's coordinate system with the correct point to ensure that the three points of X/Y/O can form a right-handed cartesian coordinate system, and the Angle of X/Y axis is $90^{\circ}$ .
e0x0056	Fail to calibrate tool coordinate system	The angle between the U-axis of the two points used to calibrate the tool coordination is too small to be calibrated successfully.	Recalibrate the tool coordinate system with two correct points;
e0x0057	Configuration file corruption or version mismatch	The configuration file format required for the current Robot Studio version does not match the controller's current configuration file format;	Enter the robot setting to reset the parameters. After setting, the configuration parameters version will be consistent with the current Robot Studio, which will eliminate the alarm.

e0x0058	Error writing conveyor tracking parameter	Parameter file writes exception	Contact technical support
e0x0059	Error reading conveyor tracking parameter	Parameter file writes exception	Contact technical support
e0x0060	Failed to load module	Load controller modules error	Contact technical support
e0x0061	System update abnormal, the system has been restored automatically	The wrong system update file "sys.bin" was downloaded, resulting in the failure of normal initialization of the controller, and the controller was automatically restored to the factory installed version;	Determine whether the system update file is damaged, ask the technical support for the correct update file and update again;
e0x0062	Number of axes mismatch	Robot body model set by project is different from the robot model set by controller.	Modify the robot setting and match the model set by the controller with the robot body.
e0x0063	CRC check error for the PC and controller files	The projecty files of the active project and the controller are different and cannot pass CRC check	Re-synchronize the files of the current active project into the controller, or upload the files in the controller locally;
e0x0064	Z-axis limit height setting error	Error in z-axis limit height set by JUMP instruction in run mode of TEACH mode.	Modify the z-axis limit height to ensure that the z axis of both the starting point and the target point are lower

			than the z-axis limit height set by the interface
e0x0065	The robot has not been successfully initialized	In external control mode, the start signal is provided before the controller is initialized	Wait until the robot system output signal [ready] open, then control the robot program to start
e0x0066	The user coordinate file does not exist	There is no user.cr file in the controller	Download the user.cr file from the active project to the controller
e0x0068	Frame length error	The length of point, tool or user coordinate system data written by the upper computer or teacher exceeds the length of the cache	Avoid writing very long data
e0x0080	Tool coordinates do not exist	Tool coordinates do not exist	Contact technical support
e0x0081	The user coordinate does not exist	User coordinates do not exist	Contact technical support
e0x0090	The additional axis is not enabled to return to zero	The additional axis cannot return to zero while the motor is not ON;	Enable the additional axis and then start back to zero
e0x0091	Additional axis cannot run automatically without returning to zero	Additional axis has not returned to zero, it cannot run automatically;	The current additional axis is an incremental encoder. If it does not return to zero, automatic operation may lead to collision risk. Please return to zero and calibrate

			the zero before automatic operation.
e0x0092	The additional axis has been returned to zero	The additional axis has been returned to zero, and cannot return to zero again;If the additional axis is the absolute value encoder, it cannot return to zero;	Restart the controller and return to zero again
e0x00A0	The working range occupies system IO	The output used in the BOX area occupies the system output.	Reconfigure the output index as the output port of the non-system IO and run the program again.
e0x03E8	The input motion parameters are wrong	The speed parameter or IO parameter in the motion instruction input is wrong	Check whether IO parameter is wrong in the process, check whether the input motion parameter exceeds the limit;
e0x03ED	The arc is collinear at three points	The current position of the robot and arc transition point, arc end point collinear;	Modify the transition point or end point of the arc, so that the three points are no longer collinear, and can form an arc less than or equal to 180°;
e0x03EE	The three points of the arc are too close	The central Angle of the arc formed by the starting point, the transition point and the end point is less than 3°.	Modify the transition point or end point of the arc so that the arc trajectory formed by the three points is greater than 3°;

e0x03F0	The arc is greater than 180 degrees	The MOVC instruction was run in the program, and the arc formed by the current position, transition point and terminal point of the robot was greater than 180°.	Modify the transition point or end point of the arc so that the arc trajectory formed by the three points is less than or equal to 180°;
e0x03F2	The turntable rotates can not use blend	Use blend in turntable movement	Contact technical support
e0x03F3	Blend level overlimit error	Movement command blend level overlimit	Contact technical support
e0x03F6	Additional axis return to zero IO setting error	In the additional axis back zero signal, the same input signal is used in the origin signal , the positive and negative limit signal, which will result error during back to zero	Modify the additional axis back zero signal to different index
e0x03F7	Robot body parameter setting error	One of the structure parameters or reduction ratio setting in the robot setting is 0, will cause it to fail to function properly	According to the robot body model, set the correct structure parameters and reduction ratio
e0x03F8	The number of axes does not match	The number of axis set by the controller does not match the number of axis actually connected	Set the number of the actual connected axis and the number of the robot body to the same , mainly check whether the function of the additional axis is open, set

			the number of the additional axis is correct;
e0x07D3	The point is unreachable	The position of the target point is beyond the motion range of the robot;	Confirm whether the target point is within the motion range of the robot and reteach the point.
e0x07D8	There is no inverse solution at the target point	The abnormal coordinate data and gesture of the target point lead to no inverse solution	Reteach the target point;
e0x07D9	Tool coordinate system changes suddenly between cartesian motion	The starting point and the target point of cartesian motion instructions use different tool coordinates;	Teach the target point again to avoid switch tool coordinate between the starting point and the target point
e0x0BBB	The data hole causes abrupt change in position	One of the reduction ratio or encoder resolution is abnormal, resulting in abnormal algorithm	Check whether the accuracy of each joint of the robot, the additional axis encoder is 0, the reduction ratio is 0, if the additional axis function is not used, it is set as not enabled in the robot setting
e0x0BC2	The robot is at the hand singularity position	The robot is in the hand singular position, unable to execute the trajectory movement or teaching movement;	Remove robot from hand singularity position in teach mode, and then run or teach;

e0x0BC3	The robot is close to the hand singularity position	The robot is close to the hand singular position, unable to continue the trajectory movement or teaching movement;	Remove robot from hand singularity position in teach mode, and then run or teach;
e0x0BC4	The target trajectory passes through the hand singular position	The target trajectory passes through the hand singular position of the robot, unable to execute the current trajectory motion;	Modify the target position or the starting point of the trajectory to avoid the trajectory passing through the hand singular position;
e0x0BCC	J2 is at the singular position	The robot is in the J2 singular position, unable to execute the trajectory movement or teaching movement;	Remove robot from J2 singularity position in teach mode, and then run or teach;
e0x0BCD	J2 is close to the singular position	The robot is close to the J2 singular position, unable to continue the trajectory movement or teaching movement;	Remove robot from J2 singularity position in teach mode, and then run or teach;
e0x0BCE	J2 goes through singular positions	The target trajectory passes through the J2 singular position of the robot, unable to execute the current trajectory motion;	Modify the target position or the starting point of the trajectory to avoid the trajectory passing through the J2 singular position;
e0x0BD6	The robot is at the elbow singularity position	The robot is in the elbow singular position, unable to execute the trajectory movement or teaching movement;	Remove robot from elbow singularity position in teach mode, and then run or teach;

e0x0BD7	The robot is close to the elbow singularity position	The robot is close to the elbow singular position, unable to continue the trajectory movement or teaching movement;	Remove robot from elbow singularity position in teach mode, and then run or teach;
e0x0BD8	The target trajectory passes through the elbow singularity	The target trajectory passes through the elbow singular position of the robot, unable to execute the current trajectory motion;	Modify the target position or the starting point of the trajectory to avoid the trajectory passing through the elbow singular position;
e0x0BEA	The robot is at the wrist singularity position	The robot is in the wrist singular position, unable to execute the trajectory movement or teaching movement;	Remove robot from wrist singularity position in teach mode, and then run or teach;
e0x0BEB	The robot is close to the wrist singularity position	The robot is close to the wrist singular position, unable to continue the trajectory movement or teaching movement;	Remove robot from wrist singularity position in teach mode, and then run or teach;
e0x0BEC	The target trajectory passes through the wrist singularity	The target trajectory passes through the wrist singular position of the robot, unable to execute the current trajectory motion;	Modify the target position or the starting point of the trajectory to avoid the trajectory passing through the wrist singular position;
e0x0FA0	J1 speed limit triggered	The target velocity of the J1 axis exceeded the maximum speed limit of the J1 joint.	Lower robot speed, acceleration or deceleration ;

e0x0FA1	J2 speed limit triggered	The target velocity of the J2 axis exceeded the maximum speed limit of the J2 joint.	Lower robot speed, acceleration or deceleration ;
e0x0FA2	J3 speed limit triggered	The target velocity of the J3 axis exceeded the maximum speed limit of the J3 joint.	Lower robot speed, acceleration or deceleration ;
e0x0FA3	J4 speed limit triggered	The target velocity of the J4 axis exceeded the maximum speed limit of the J4 joint.	Lower robot speed, acceleration or deceleration ;
e0x0FA4	J5 speed limit triggered	The target velocity of the J5 axis exceeded the maximum speed limit of the J5 joint.	Lower robot speed, acceleration or deceleration ;
e0x0FA5	J6 speed limit triggered	The target velocity of the J6 axis exceeded the maximum speed limit of the J6 joint.	Lower robot speed, acceleration or deceleration ;
e0x0FA6	J7 speed limit triggered	The target velocity of the J7 axis exceeded the maximum speed limit of the J7 joint.	Lower robot speed, acceleration or deceleration ;
e0x0FA7	R axis speed limit triggered	Additional axis 1 target speed exceeds maximum speed limit	Lower robot speed, acceleration or deceleration ;
e0x0FA8	S axis speed limit triggered	Additional axis 2 target speed exceeded the maximum speed limit	Lower robot speed, acceleration or deceleration ;
e0x1001	The emergency stop button was pressed	The Emergency stop button connected to the Emergency port of the controller panel is pressed;	Spin out the emergency stop button, or check the hardware connection

			between the button and the controller;
e0x1002	The drive EtherCat connection is disconnected	The EtherCat cable connection between the drive and the computer is disconnected. This fault will disable the drive.	Confirm the network connection between the drive and the controller and restart the controller;
e0x1003	Encoder Battery Low-Voltage	Low battery voltage for encoder causes driver alarm	Replace the battery, clear the battery fault in the command window, reset the robot zero point and restart the controller.
e0x1004	Fieldbus target command lost	Firmware version error, bus configuration file error or synchronization signal loss;	Verify the network connection between the drives and the accuracy of the XML file;
e0x1005	Motor Foldback	The driver's average current exceeds the rated continuous current, and the current retract activates, appearing after the retrace warning	Check the driver-motor matching; This warning may occur if the drive power limit is not large enough relative to the load
e0x1006	Fieldbus Velocity Limit Exceeded	The target position sent by the controller will cause the motor to reach its maximum speed. This fault will disable the driver.	Start again after clear the error to ensure that the target location does not cause overspeed;
e0x1007	Exceeded Maximum Position Error	The position error exceeds the specified range, the fault will disable the drive;	Reducing speed, acceleration, deceleration or robot load;

			Adjust the drive to improve position tracking (accuracy), or increase PEMAX to tolerate large position errors;
e0x1008	Phase Find Failed	Communication initialization fails. The fault occurs when the system does not receive commutation information of the motor feedback device (for example, Hall signal). The fault will disable the driver.	Check the motor type and phase parameters are correct
e0x1009	Drive Locked	The security code does not match the key. The drive cannot be operated	Contact technical support
e0x1011	STO Fault	When the STO signal is not connected when the drive is disabled, the failure will disable the drive.	Check the STO connector of the driver is connected correctly;
e0x1012	Over-Voltage	The bus voltage exceeds the maximum value. This fault will disable the driver.	Check whether the equipment needs regenerated resistance
e0x1013	Motor Over-Temperature	Motor overheating, or the driver's temperature sensor is not set correctly, this fault will disable the driver;	Contact technical support
e0x1014	Power Module Over-Temperature	The temperature on the integrated power module	Check whether the ambient temperature exceeds the drive specification,

		exceeds the set limit, this fault will disable the driver;	otherwise contact technical support
e0x1015	Control Board Over-Temperature	The temperature on the control panel exceeds the set limit, this fault will disable the drive;	Check whether the ambient temperature exceeds the specifications of the drive, otherwise contact technical support;
e0x1016	EtherCAT Packets Lost	The network cable connection between the drives is unstable, resulting in data loss	Contact technical support
e0x1017	Feedback Communication Error	Communication with the feedback device was not properly initialized, and this failure will disable the drive.	Check whether the feedback device is connected correctly; Verify that the selected encoding type is correct
e0x1018	PE reached software numerical limit	The position error exceeds the soft limit	Contact technical support
e0x1019	Torque Feedback Exceeded Limit	Feedback torque overshoot	Contact technical support
e0x7388	Tamagawa Abs Operational Fault	Motor feedback device failure, may be due to low battery voltage;	Check the connection of the feedback line and the encoder battery voltage, and make sure that the motor speed is not too high during encoder initialization

e0x2189	Feedback power overcurrent	The current generated by the 5V power supply is too large, exceeding the limit value;	Check whether the encoder is short circuit;
e0x2214	Drive output current is too high	Drive output current is over;	Check the motor for short circuit; Check the maximum overshoot of the current loop;
e0x2311	The current exceeds the drive foldback limit	The average drive current exceeds the rated continuous current;	Avoid impact, reduce load, reduce maximum speed or add or subtract speed;
e0x2380	Offset overlimit of current sensor	The calculated bias compensation for the current sensor is out of range	Restart after power off. If the fault still exists, contact technical support.
e0x2381	Motor Phase Disconnection	One phase of the motor is not connected;	Check the phase line connection of the motor;
e0x3120	Driver bus voltage undervoltage	Bus voltage below the minimum value;	Check that the AC power supply on the driver is well connected and the switch is closed;
e0x3180	Regeneration over current	The regeneration current exceeds the set maximum value;	Increase regenerative resistance;
e0x3182	Bus voltage test circuit failure	The circuit testing busbar voltage fails;	Restart, if the fault still exists, contact technical support;
e0x4310	Drive power plate overheated	The temperature on the power plate exceeds the set limit;	Check whether the ambient temperature exceeds the specifications of the drive,

			otherwise contact technical support;
e0x5111	Drive +15V out of range	Internal +15V voltage out of range;	Drivers may need maintenance, contact technical support;
e0x5111	Drive 5V out of range	5V power supply low or power off;	May occur during power outages; If the power is not off, please contact technical support;
e0x5180	Drive EEPROM failure	Drive failure;	Contact technical support;
e0x5581	Drive CAN power failure	The voltage supply problem of internal CAN bus;	Drivers may need maintenance, contact technical support;
e0x5582	Self-test failure	Power on self-test failure, the driver can not operate;	Contact technical support;
e0x5583	Parameter memory and validation failed	The storage of drive parameters is blank;	Contact technical support;
e0x5585	Write flash failed	The drive cannot be operated;	Contact technical support;
e0x5586	Parameters not configured	The drive needs to be configured or reimported with parameters;	Contact technical support;
e0x6581	The FPGA Config failure	FPGA code load failure, the driver can not operate;	Contact technical support;
e0x7081	Motor setup failed	Motor setup process failed, this fault will disable the driver;	Contact technical support;

e0x7090	FPGA version mismatch	FPGA version and firmware version do not match;	Contact technical support;
e0x7113	Power brake short circuit	Power brake output short circuit;	Contact technical support;
e0x7121	Stall failure	The stall condition is satisfied, resulting in stall;	Eliminate stall conditions, and pay attention to prevent stall conditions;
e0x7180	The second feedback Index is broken	The second feedback encoder Index is not connected;	Check whether the Index signal is connected;
e0x7181	The second feedback A/B is disconnected	The second feedback signal (A/B) is not connected;	Check whether all signals of the second encoder are connected well;
e0x7182	The pulse - direction input line is interrupted	A pulse & direction signal is not connected;	Check that all pulse & direction signals are properly connected to the driver;
e0x7381	Nikon encoder operation failure	Communication with the Nikon feedback device was not properly initialized;	Check whether the feedback device is connected correctly;
e0x7382	Tamagawa encoder initialization failed	The initialization of Tamagawa feedback encoder failed;	Check whether the connection of the encoder is correct;
e0x7383	Line A/B signal is interrupted	A main feedback signal is not connected;	Check that all signals from the main feedback device are connected to the driver;

e0x7384	Hall signal illegal	The drive detects a hall feedback signal in the state of 000 or 111;	Check whether all hall signal lines are connected correctly;
e0x7386	PLL (phase locked loop) synchronization failed	The synchronization signal of the controller is missing or unstable;	Check the controller synchronization signal; Check cables and wiring;
e0x7387	The simulation frequency of the encoder is too high	The calculated results of the equivalent frequency output by the encoder exceed the upper limit.	Check the parameter setting of the equivalent encoder output;
e0x738A	Differential hall break	Hall sensor disconnection;	Contact technical support;
e0x738B	Encoder phase failure	The target speed of J4 axis exceeded the maximum speed limit of J4 joint.	Contact technical support;
e0x738E	Sine feedback signal communication failed	Communication problem between driver and EnDat encoder;	Contact technical support;
e0x738F	A/B signal output out of range	The feedback analog signal is out of range;	Contact technical support;
e0x7391	Failure of the orthogonal encoding of the Sine encoder	The calculated results of the orthogonal coding of the encoder do not match the actual results.	Check the connection of the feedback device and confirm that the selected encoder type (MENCTYPE) is correct;

e0x7392	Sine/cosine calibration is invalid	The result of the sine/cosine calibration parameter is out of range, which is related to the rotation and sinusoidal feedback.	Recalibrate the sine/cosine;
e0x7393	Feedback 5V power supply overcurrent	The current generated by the 5V power supply provided by the driver to the main encoder is too large, exceeding the limit value;	Contact technical support;
e0x7394	Spin initialization failed	The driver cannot detect the correct gain setting or the sine/cosine signal sampling point;	Check the connection and gain setting of the rotation;
e0x8130	CAN communication heartbeat signal lost	The driver detects disconnection with the CAN master station, and the fault will disable the driver.	Reconnect the drive to the main station and restart the system;
e0x8481	Over Speed	The actual speed exceeds the rated speed by 1.2 times; Rated speed is set by VLIM command;	Contact technical support;
e0xFF8D	PFB disconnect checksum invalid	The calculated checksum of the PFB backup data does not match the expected checksum.	Set the machine to zero if the application requires;
e0xFF8E	PFB disconnect data does not match	Due to axis displacement, multi-turn data of PFB cannot be restored.	Set the machine to zero if the application requires;

e0xFF8F	No PFB disconnects data	PFB backup memory is empty;	Set the machine to zero if the application requires;
e0x1200	The slave station does not match the EtherCat Configuration file	The Ethercat bus device description file does not match the hardware connected device	Check the Ethercat network cable connection in the controller, the network cable connection between the extension IO module and the additional axis driver, make sure the correct bus configuration file is updated, check whether the input and output of each slave station are connected in reverse, and restart the controller after power failure
e0x1201	Data frame lost	The data frame sent by the system cannot be sent accurately	Contact technical support
e0x1202	Slave station work counter error	Ethercat data monitoring error	Contact technical support
e0x1204	Synchronizing signal error	Ethercat master slave signals are not synchronized	Contact technical support
e0x1205	Distributed clock jitter too large	Ethercat is not up to scratch	Contact technical support
e0x1206	EtherCAT network cable disconnected	Ethercat is disconnected	Check the Ethercat cable connection in the controller and power off and restart the controller

e0x1207	Encoder initialization failure	The encoder position cannot be read during initialization	Check whether the encoder connector (Feedback) on the panel of the control cabinet is firmly connected and make sure that the controller will be restarted after power failure
e0x1209	Bus initialization failure	Ethercat could not scan to all slave stations, or the robot encoder wire harness (Feedback) was not connected, so the bus could not be successfully initialized;	Check the Ethercat network cable connection in the controller and the feedback cable connection on the control cabinet panel, and restart the controller after power failure
e0x1771	Reach J1+ software limit	J1 axis is currently in the positive soft limit;	Remove robot from J1 positive limit in teach mode;
e0x1772	Reach J2+ software limit	J2 axis is currently in the positive soft limit;	Remove robot from J2 positive limit in teach mode;
e0x1773	Reach J3+ software limit	J3 axis is currently in the positive soft limit;	Remove robot from J3 positive limit in teach mode;
e0x1774	Reach J4+ software limit	J4 axis is currently in the positive soft limit;	Remove robot from J4 positive limit in teach mode;
e0x1775	Reach J5+ software limit	J5 axis is currently in the positive soft limit;	Remove robot from J5 positive limit in teach mode;
e0x1776	Reach J6+ software limit	J6 axis is currently in the positive soft limit;	Remove robot from J6 positive limit in teach mode;
e0x1777	Reach J7+ software limit	J7 axis is currently in the positive soft limit;	Remove robot from J7 positive limit in teach mode;

e0x1778	Reach R+ software limit	Additional axis R is currently in the positive soft limit;	Remove robot from additional axis R positive limit in teach mode;
e0x1779	Reach S+ software limit	Additional axis S is currently in the positive soft limit;	Remove robot from additional axis S positive limit in teach mode;
e0x1785	Reach J1- software limit	J1 axis is currently in the negative soft limit;	Remove robot from J1 negative limit in teach mode;
e0x1786	Reach J2- software limit	J2 axis is currently in the negative soft limit;	Remove robot from J2 negative limit in teach mode;
e0x1787	Reach J3- software limit	J3 axis is currently in the negative soft limit;	Remove robot from J3 negative limit in teach mode;
e0x1788	Reach J4- software limit	J4 axis is currently in the negative soft limit;	Remove robot from J4 negative limit in teach mode;
e0x1789	Reach J5- software limit	J5 axis is currently in the negative soft limit;	Remove robot from J5 negative limit in teach mode;
e0x178A	Reach J6- software limit	J6 axis is currently in the negative soft limit;	Remove robot from J6 negative limit in teach mode;
e0x178B	Reach J7- software limit	J7 axis is currently in the negative soft limit;	Remove robot from J7 negative limit in teach mode;

e0x178C	Reach R- software limit	Additional axis R is currently in the negative soft limit;	Remove robot from additional axis R negative limit in teach mode;
e0x178D	Reach S- software limit	Additional axis S is currently in the negative soft limit;	Remove robot from additional axis S negative limit in teach mode;
e0x17D5	Joint 1 approaches the positive soft limit	J1 axis is approaching the positive soft limit;	Remove robot from J1 positive limit in teach mode;
e0x17D6	Joint 2 approaches the positive soft limit	J2 axis is approaching the positive soft limit;	Remove robot from J2 positive limit in teach mode;
e0x17D7	Joint 3 approaches the positive soft limit	J3 axis is approaching the positive soft limit;	Remove robot from J3 positive limit in teach mode;
e0x17D8	Joint 4 approaches the positive soft limit	J4 axis is approaching the positive soft limit;	Remove robot from J4 positive limit in teach mode;
e0x17D9	Joint 5 approaches the positive soft limit	J5 axis is approaching the positive soft limit;	Remove robot from J5 positive limit in teach mode;
e0x17DA	Joint 6 approaches the positive soft limit	J6 axis is approaching the positive soft limit;	Remove robot from J6 positive limit in teach mode;
e0x17DB	Joint 7 approaches the positive soft limit	J7 axis is approaching the positive soft limit;	Remove robot from J7 positive limit in teach mode;

e0x17DC	Additional axis R approaches the positive soft limit	Additional axis R is approaching the positive soft limit;	Remove robot from additional axis R positive limit in teach mode;
e0x17DD	Additional axis S approaches the positive soft limit	Additional axis S is approaching the positive soft limit;	Remove robot from additional axis S positive limit in teach mode;
e0x17E9	Joint 1 approaches the negative soft limit	J1 axis is approaching the negative soft limit;	Remove robot from J1 negative limit in teach mode;
e0x17EA	Joint 2 approaches the negative soft limit	J2 axis is approaching the negative soft limit;	Remove robot from J2 negative limit in teach mode;
e0x17EB	Joint 3 approaches the negative soft limit	J3 axis is approaching the negative soft limit;	Remove robot from J3 negative limit in teach mode;
e0x17EC	Joint 4 approaches the negative soft limit	J4 axis is approaching the negative soft limit;	Remove robot from J4 negative limit in teach mode;
e0x17ED	Joint 5 approaches the negative soft limit	J5 axis is approaching the negative soft limit;	Remove robot from J5 negative limit in teach mode;
e0x17EE	Joint 6 approaches the negative soft limit	J6 axis is approaching the negative soft limit;	Remove robot from J6 negative limit in teach mode;
e0x17EF	Joint 7 approaches the negative soft limit	J7 axis is approaching the negative soft limit;	Remove robot from J7 negative limit in teach mode;

e0x17F0	Additional axis R approaches the negative soft limit	Additional axis R is currently in the negative soft limit;	Remove robot from additional axis R negative limit in teach mode;
e0x17F1	Additional axis S approaches the negative soft limit	Additional axis S is currently in the negative soft limit;	Remove robot from additional axis S negative limit in teach mode;
e0x189C	The target trajectory passes through the robot body	The trajectory formed by the motion instruction passes through the body of the robot;	Adjust the starting point or the target point to change the trajectory;
e0x1F40	The robot enters the forbidden area	The end point of the robot entered the set forbidden area;	Enter the teaching mode to move the robot out of the forbidden area, or manually push the robot out of the forbidden area after power down;
e0x232A	The motor is not on	The program runs the motion instruction, but at this time each axis motor is not powered;	Run the robot program after power up, or add power up instructions at the beginning of the program
e0x233D	IO error during the movement	The number of IO in motion exceeds 100;	Reduce the number of IO groups in the process of movement, or remove the transition between movement instructions, add DELAY interrupt, etc.
e0x2AF9	The calibrated point is too close to last point	Two points are too close during tool or user calibration;	Increase the posture gap of the points used in the calibration of the tool

			coordinate system, and increase the distance of the points calibrated by the user coordinate system.
e0x2AFA	Calibration calculation data error	Tool or user calibration error, input point abnormal lead to unsuccessful calibration;	Re-calibrate the tool or user coordinate system;
e0x2EE1	The tracking height of the conveyor is set incorrectly	Set grab height beyond the current robot Z axis motion range;	Modify the grasping height to within the z-axis motion range of the current robot body;
e0x2EE2	The setting of holding time is wrong	The holding time exceeds a reasonable range;	Modify the holding time to a reasonable range, value 0~10000;
e0x2EE3	The following error of the conveyor tracking is over the limit	The following error setting value is beyond the reasonable range;	Modify the following error to a reasonable range, value 0.5~10;
e0x2EE4	Pickup mode is set incorrectly	Pickup mode setting is wrong;	Select 0 or 1 for pickup mode;
e0x2EE5	The compensation value in the X direction is set incorrectly	The compensation value in the X direction is beyond the reasonable range;	Modify the compensation in the X direction to a reasonable range, value: -1000~1000;
e0x2EE6	The compensation value in the Y direction is set incorrectly	The compensation value in the Y direction is beyond the reasonable range;	Modify the Y direction compensation to a reasonable range, value -1000~1000;

e0x2EE7	Trigger range setting is wrong	The trigger range setting value is beyond the reasonable range;	Modify the trigger range to a reasonable range, greater than 0 and less than the x-direction length of the grab range;
e0x9000	Parameter error data error	The motion command point parameter is wrong	Adjust the start or target posture to rerun the motion command
e0x9001	Target joint angles differ by 360°	MOVL target point 4, 6 joint difference 360°, unable to move normally	Teach the target position again to avoid the excessive posture switch between the starting point and the target point
e0x9002	The robot inversely solves the input and output gesture changes	The posture switch between the starting position and the target position is too large, which results in different joint marks between the actual target position and the target position	Adjust the starting or target posture to avoid switching too much posture
e0x9003	The reverse solution of the joint 4 flipped 360 degrees.	The posture switch between the starting point and the target point is too large, resulting in the difference between the actual target J4 Angle and the target J4 Angle	Adjust the posture of the starting point or the target point to avoid switching too large J4 Angle of trajectory movement
e0x9004	The reverse solution of the joint	The posture switch between the starting point and the target point is too large, resulting in the difference	Adjust the posture of the starting point or the target point to avoid switching too

	6 flipped 360 degrees.	between the actual target J6 Angle and the target J6 Angle	large J6 Angle of trajectory movement
e0x9005	The reverse solution exceeds the joint limit	The posture switch between the initial position and the target position is too large, which causes the target position to exceed the joint limit of an axis	Adjust the posture of the starting point or the target point to avoid excessive posture switching of trajectory movement
e0x9100	The center point of the tool is close to the base of the robot	Robot tool center point is about to collide with robot base;	Change the moving target point or direction to avoid collision;
e0x9101	The wrist joint is close to the base of the robot	The mechanical wrist joint is about to collide with the base of the robot;	Change the moving target point or direction to avoid collision;
e0x9102	The tool center is close to the end of the robot	Robot tool center point is about to collide with robot base tail;	Change the moving target point or direction to avoid collision;
e0x9103	The wrist joint is close to the end of the robot	The mechanical wrist joint is about to collide with the end of the robot base;	Change the moving target point or direction to avoid collision;
e0xA000	Invalid calibration parameter	Tool or user calibration parameter error;	Adjust the marking point and re-calibrate;
e0xA001	The calibration point is too close to the last point	Tool or user coordinate calibration points are too close to produce correct calibration results;	Increase the posture switch during the tool calibration or increase the distance of the user calibration, and re-calibrate

e0xA002	The Angle between the calibration point is too small	The Angle of the user's coordinate system is less than 20 degrees;	Adjust the y-direction point used for user coordinate system calibration to avoid too small Angle;
e0xA003	The Angle between the calibration point is too large	The Angle of the user's coordinate system is greater than 90 degrees;	Adjust the y-direction point used for user coordinate system calibration to avoid excessive Angle;
e0xA004	Calculation data error	Tool or user coordinate calibration data error, calibration results appear infinite or empty;	Adjust the calibration position and re-calibrate;
e0x2250	Driver short circuit	Drive output wiring short circuit, drive damage;	Check the drive output wiring, repair or replace the drive;
e0x2330	Drive output earth leakage	Motor U, V, W short circuit to ground driver damage;	Repair or replace the driver;
e0x2341	Drive short circuit phase U-V	Drive damage	Repair or replace the driver;
e0x2342	Drive short circuit phase V-W	Drive damage	Repair or replace the driver;
e0x2343	Drive short circuit phase W-U	Drive damage	Repair or replace the driver;
e0x5210	AD sampling circuit abnormal	Drive damage	Repair or replace the driver;
e0x5530	EEPROM abnormal	Parameter CRC check error;	Check the drive hardware;

e0xFF28	Stack space overflow	Drive firmware running error	Repair or replace the driver;
e0x6310	Uninitialized parameters	Drive damage	Repair or replace the driver;
e0xFF04	Encoder data error	1.Encoder wiring error or cable damage; 2.encoder damage; 3.parameter setting error	Check the encoder wiring and replace the encoder;
e0xFF07	Rotor positioning error	Motor rotor position compensation Angle setting error; 2.Drive damaged	1.Retest the compensation Angle of the rotor position of the motor; 2.Repair or replace the drive
e0xFF82	Drive internal fault	1.Drive hardware exception; 2.Parameter setting is abnormal;	1.Replace or repair drivers; 2.Check parameter Settings
e0xFF09	Motor brake abnormal	1.Wrong connection of motor brake; 2.Drive damaged.	1.Check the motor brake connection; 2.Replace or repair drivers
e0xFF0A	Charging relay abnormal	Drive damaged.	Replace or repair drivers
e0x7111	Regeneration braking wiring error	1.Brake resistance wiring is incorrect; 2.Drive hardware exception;	1. Check brake resistance wiring 2.Replace or repair drivers
e0xFF11	AD calibration factor error	Error setting AD correction coefficient	Reset the AD correction coefficient

e0xFF12	Programmable device firmware mismatch	Drive damage	Repair or replace the drive
e0xFF13	Power board parameters mismatch & Control encoder speeding fault	Drive damage	Repair or replace the drive
e0xFF1A	Motor phase sequence wiring error	Motor phase sequence connection error	Check the motor connection phase sequence
e0xFF00	System initialization failed	<ol style="list-style-type: none"> <li>1. Wrong setting of servo parameters;</li> <li>2. Wrong connection of motor encoder or damaged encoder;</li> <li>3. Drive damaged;</li> </ol>	<ol style="list-style-type: none"> <li>1. Check encoder wiring and encoder;</li> <li>2. repair or replace driver;</li> </ol>
e0xFF2B	Encoder internal communication abnormal	<ol style="list-style-type: none"> <li>1. Encoder wiring error;</li> <li>2. Encoder cable is damaged;</li> <li>3. Encoder damage;</li> <li>4. Encoder parameter setting error;</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the encoder connection;</li> <li>2. Check the encoder cables;</li> <li>3. Replace the encoder;</li> <li>4. Check the encoder parameters</li> </ol>
e0xFF05	Encoder internal fault	<ol style="list-style-type: none"> <li>1. Encoder wiring error;</li> <li>2. Encoder cable is damaged;</li> <li>3. Encoder damage;</li> <li>4. Encoder parameter setting error;</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the encoder connection;</li> <li>2. Check the encoder cables;</li> <li>3. Replace the encoder;</li> </ol>

			5. Check the encoder parameters
e0xFF06	Encoder type changed	Encoder type changes;	Restart the drives or soft reset
e0xFF3F	Encoder internal communication warning	<ol style="list-style-type: none"> <li>1. The encoder fails;</li> <li>2. the driver ground wire is not connected reliably;</li> <li>3. There are strong interference sources around the driver</li> </ol>	Check the motor encoder connection and make sure the specifications correct and reliable connection drive around earth, change, remove the drive motor encoder is strong interference sources
e0x2310	Drive over current U-Phase	<ol style="list-style-type: none"> <li>1. Short circuit of driver U phase output;</li> <li>2. Excessive motor load;</li> <li>3. Poor motor insulation;</li> <li>4. Drive damage;</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspection U connection;</li> <li>2. Reduce the motor load;</li> <li>3. Measure the motor insulation, if necessary, repair replacement;</li> <li>4. Repair or replacement drive;</li> </ol>
e0x2311	Drive over current V-Phase	<ol style="list-style-type: none"> <li>1. Short circuit of driver V phase output;</li> <li>2. Excessive motor load;</li> <li>3. Poor motor insulation;</li> <li>4. Drive damage;</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspection V connection;</li> <li>2. Reduce the motor load;</li> <li>3. Measure the motor insulation, if necessary, repair replacement;</li> <li>4. Repair or replacement drive;</li> </ol>
e0x2312	Drive over current W-Phase	<ol style="list-style-type: none"> <li>1. Short circuit of driver W phase output;</li> <li>2. Excessive motor load;</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspection W connection;</li> <li>2. Reduce the motor load;</li> <li>3. Measure the motor</li> </ol>

		<p>3.Poor motor insulation; 4.Drive damage;</p>	<p>insulation, if necessary, repair replacement; 4.Repair or replacement drive;</p>
e0x3210	DC link over-voltage	<p>1.power supply voltage is too high 2.power braking resistance is too small, high resistance; 3.Basic power supply module load is too large; 4.Drive failure;</p>	<p>1.Check the power supply voltage; 2.Increase power braking resistance, decrease the resistance; 3.Increase power module capacity or lower load; 4.Repair or replacement drive</p>
e0x5112	24V control supply low-voltage	24V supply voltage is too low	Check the supply voltage
e0x6010	Watchdog overflow	The internal stack overflow;	<p>1.Back on electricity; 2.Repair or replacement drive;</p>
e0xFF02	Drive continuous overload	<p>1.Mechanical jam; 2.Drive heavy load; 3.Motor fault 4.Drive failure;</p>	<p>1.Check the mechanical transmission part, improve the mechanical properties; 2.Check the motor load, or increase the capacity of motor driver module; 3.Repair or replacement motor; 4.Repair or replacement drive;</p>

e0xFF03	Encoder writing error	<ol style="list-style-type: none"> <li>1.The encoder connection error;</li> <li>2.The encoder cable damage;</li> <li>3.The encoder is damaged;</li> </ol>	<ol style="list-style-type: none"> <li>1.Check the encoder connection;</li> <li>2.Check the encoder cables;</li> <li>3.Replace the encoder;</li> </ol>
e0xFF29	CPU overload	<ol style="list-style-type: none"> <li>1.Control instruction than CPU load capacity;</li> <li>2.Drive damage;</li> </ol>	<ol style="list-style-type: none"> <li>1.Reduce the control instruction operation frequency;</li> <li>2.Replace or repair the drive;</li> </ol>
e0xFF15	Drive output lack-phase	<ol style="list-style-type: none"> <li>1.motor power line bolt;</li> <li>2.motor damage;</li> <li>3.The damage of the drive</li> </ol>	<ol style="list-style-type: none"> <li>1.check the motor power line connection;</li> <li>2.Replace or repair the motor;</li> <li>3.Replace or repair the drive</li> </ol>
e0xFF80	Encoder operation failed	<ol style="list-style-type: none"> <li>1.The encoder connection error;</li> <li>2.The encoder cable damage;</li> <li>3.The encoder is damaged;</li> <li>4.The encoder parameter setting error</li> </ol>	<ol style="list-style-type: none"> <li>1.Check the encoder connection;</li> <li>2.Check the encoder cables;</li> <li>3.Replace the encoder;</li> <li>4.Check the encoder parameters</li> </ol>
e0xFF25	Drive instantaneous overload	<ol style="list-style-type: none"> <li>1.Output short-circuit;</li> <li>2.Due to the interference misoperation;</li> <li>3.The control parameters are unreasonable;</li> <li>4.Drive damage;</li> </ol>	<ol style="list-style-type: none"> <li>1.Check the output side of the cable connection;</li> <li>2.Reliable grounding connection;</li> <li>3.To adjust the control parameters;</li> </ol>

			4.Repair or replacement drive;
e0xFF2C	Encoder external communication transmit abnormal	<ol style="list-style-type: none"> <li>1.The encoder connection error;</li> <li>2.The encoder cable damage;</li> <li>3.The encoder is damaged;</li> <li>4.The encoder parameter setting er</li> </ol>	<ol style="list-style-type: none"> <li>1.Check the encoder connection;</li> <li>2.Check the encoder cables;</li> <li>3.Replace the encoder;</li> <li>4.Check the encoder parameters</li> </ol>
e0xFF2F	Encoder external communication receive abnormal	<ol style="list-style-type: none"> <li>1.The encoder connection error;</li> <li>2.The encoder cable damage;</li> <li>3.The encoder is damaged;</li> <li>4.The encoder parameter setting error;</li> </ol>	<ol style="list-style-type: none"> <li>1.Check the encoder connection;</li> <li>2.Check the encoder cables;</li> <li>3.Replace the encoder;</li> <li>4.Check the encoder parameters</li> </ol>
e0x2320	Drive hardware overcurrent	Motor load is too large, or control parameters setting is not correct, motor fault;	Check the motor load, or increase the motor capacity, check the motor parameters and control parameters setting, repair or replacement motor;
e0x3130	Input lack-phase fault	<ol style="list-style-type: none"> <li>1.The input power supply lacks;</li> <li>2.0 x202c parameter selection three-phase input power source, the actual access to the single phase input power source;</li> </ol>	<ol style="list-style-type: none"> <li>1.Check the power supply circuit, main circuit connected in a state of a certain phase voltage is too low or use the single-phase power supply;</li> <li>2.According to the actual access power set parameter</li> </ol>

		3. Drive input phase detection circuit damage;	0 x202c; 3. Repair or replace the drive
e0x3220	DC link under-voltage	Dynamic power input voltage is too low, damage of the drive	Check the power supply circuit, repair or replacement drive;
e0x4210	Excess temperature inverter power module	1. Drive the cooling bad; 2. Environmental temperature overheating; 3. Inverter load is too large; 4. Drive the output cable insulation fault; 5. Drive damage;	1. Check the drive cooling system, confirm the ventilation flow, cooling fan running normally; Or increase the external cooling measures; 2. Keep the environment temperature to normal; 3. Replace the larger capacity inverter; 4. Check the output cable, replace when necessary; 5. Repair or replacement drive;
e0x4220	Too low temperature inverter power module	Drive damage	Repair or replacement drive
e0x7112	Regeneration braking braking overload	1. Brake circuit capacity lack; 2. Drive damage;	1. Reduce the start-stop frequency; Add/deceleration time constant extension; Reduce the load moment of inertia; Increase

			<p>the drive and motor capacity;</p> <p>2.Repair or replacement drive;</p>
e0x8311	Motor continues to overload	<p>1.Mechanical jam;</p> <p>2.More than rated torque motor running time is too long;</p>	<p>1.Check the mechanical transmission part, see if any stalling phenomenon;</p> <p>2.Check the load, reduce the add and subtract speed, or replace larger capacity drives and motors</p>
e0xFF19	Regeneration braking resistor overheat	<p>1.The environment temperature is too high;</p> <p>2.Start to stop frequently;</p> <p>3.Insufficient braking resistance capacity;</p>	<p>1.Increase the external cooling measures;</p> <p>2.Prolonged deceleration;</p> <p>3.Replace the more powerful electric braking Resistance;</p>
e0xFF1C	Rectifier power module overheat	<p>1.Drive the cooling bad;</p> <p>2.The environment temperature is too high;</p> <p>3.Drive damage;</p>	<p>1.Check the drive cooling system, confirm the ventilation flow, cooling fan running normally;</p> <p>2.Keep the environment temperature to normal;</p> <p>3.Repair or replacement drive;</p>
e0xFF20	Motor instantaneous overload phase-U	<p>1.Accelerate through large lead to drive the instantaneous flow;</p> <p>2.The robot collided lead to motor over-current;</p>	<p>1.The appropriate slows the add and subtract;</p> <p>2.Check the robot interference of working environment, to avoid the</p>

		3.Motor fault; 3.Drive damage;;	impact; 3.The repair or replacement motor repair or replacement drive;
e0xFF21	Motor instantaneous overload phase-V	1.Accelerate through large lead to drive the instantaneous flow; 2.Robot collided lead to motor over-current; 3.Motor fault; 4.Drive damage;	1.The appropriate slows the add and subtract; 2.Check the robot interference of working environment, to avoid the impact; 3.Repair or replacement motor; 4.Repair or replacement drive;
e0xFF22	Motor instantaneous overload phaseW	1.Accelerate through large lead to drive the instantaneous flow; 2.The robot collided lead to motor over-current; 3.Motor fault; 4.Drive damage	1.The appropriate slows the add and subtract; 2.Check the robot interference of working environment, to avoid the impact; 3.Repair or replacement motor; 4.Repair or replacement drive;
e0xFF1D	The emergency stop button was pressed	Connect the controller panel interface Emergency stop button is pressed;	Turn the stop button, or check Emergency interface cable connection;
e0xFF27	The emergency stop button on the	Teaching apparatus on the stop button is pressed.	Scram button on the present teaching device, or check the controller TP the

	Teach Pendant was pressed		stop line and connection of the interface, such as teaching, not used, check the connection of the joint of TP stop short;
e0xFF08	STO wiring error	STO wiring error	Check the STO wiring
e0xFF81	Drive external fault	Out of the current axis axis fault;	Out of the current axis axis fault;
e0x6320	Parameters error	1.The parameters overrun; 2.Incorrect location unit	1.The parameters overrun; 2.Incorrect location unit
e0x8611	Position following error out of range	1.The encoder connection errors or connector contact undesirable; 2.The control parameters are not appropriate; 3.The external load is too large, or add and subtract speed too large position error is beyond the scope allowed; 4.Under the high speed running state emergency stop or crash cause position error overrun;	1.Check the encoder connection; 2.To adjust the control parameters; 3.Reduce speed, add and subtract speed or lower load;
e0x8800	Position overflow	1.The feedback or location instructions over 32-bit signed number; 2.The encoder cable disconnected;	1.The encoder reset after a soft reset or restart the drive; 2.Check the encoder cable connection;

e0xFF18	Velocity following error out of range	<ol style="list-style-type: none"> <li>1.The encoder connection errors or connector contact undesirable;</li> <li>2.The control parameters are not appropriate;</li> <li>3.The external load fluctuations or interference is too large;</li> </ol>	<ol style="list-style-type: none"> <li>1.Check the encoder connection;</li> <li>2.To adjust the control parameters;</li> <li>3.Increase the anti-interference measures;</li> </ol>
e0xFF1B	Control cycle time parameters setting error	Ethercat communications cycle is less than the servo control cycle	Adjust the Ethercat communications cycle or servo control cycle, make the communication cycle is greater than the servo control cycle
e0xFF0D	EtherCAT process data error	<ol style="list-style-type: none"> <li>1.Location target value and actual value difference transfinite;</li> <li>2.The speed of the target trajectory over the threshold;</li> <li>3.encoder line loose led to the current position mutation;</li> </ol>	<ol style="list-style-type: none"> <li>1.Check whether there is actual position feedback abnormal;</li> <li>2.Check the position command trajectory, reduce the acceleration or velocity;</li> <li>3.Check whether there is any looseness on encoder wiring harness;</li> </ol>
e0xFF1E	EEPROM writing failure	Drive damage	Repair or replacement drive
e0xFF0F	Homing failure	Drive damage	Repair or replacement drive
e0xFF0E	EtherCAT command illegal	Ethercat communications unfinished (not into the OP) sent the servo can command;	The fault restoration;

e0xFF10	Drivestarter communication error	<ol style="list-style-type: none"> <li>1.The serial communication line interference;</li> <li>2.A serial port communication line not reliable grounding or poor contact;</li> </ol>	<ol style="list-style-type: none"> <li>1.Check whether R485 cable connection;</li> <li>2.Check whether the RS485 converter is damaged;</li> </ol>
e0xFF0C	EtherCAT bus communication error	<ol style="list-style-type: none"> <li>1.Ethercat network cable fault;</li> <li>2.Ethernet frame loss exceeds parameters "Ethercat communications set the timeout detection" value;</li> </ol>	<ol style="list-style-type: none"> <li>1.Check the bus wiring;</li> <li>2.Check whether the wire connection is correct pressure;</li> </ol>
e0x8612	Position hardware limit triggered	Drive external position limit switch to trigger;	Check the position instruction planning scope;
e0xFF16	Positive position software limit triggered	1.The position feedback value more than (forward soft limit value + positioning to complete the threshold)	<ol style="list-style-type: none"> <li>1.If you don't need to forward the soft limit function, can be banned by parameter 0 x2000;</li> <li>2.Check the position instruction planning scope;</li> </ol>
e0xFF17	Negative position software limit triggered	1.Position feedback value more than (negative soft limit values - positioning to complete the threshold).	<ol style="list-style-type: none"> <li>1.If you don't need to reverse the soft limit function, can be banned by parameter 0 x2000;</li> <li>2.Check the position instruction planning s</li> </ol>
e0xFF23	Deviation of the power-on position out of range	1.Drive on electricity, with the last position off electricity saving, more than set threshold;	1.Check whether the mechanical position is changed, after confirm there

			is no abnormal mechanical zero point can be cleared;
e0xFF26	Illegal changing of the servo parameters	1.Modify the servo parameters exceed the limit;	1.In the servo parameters can be modified within the scope of modified value;
e0xFF2A	Encoder battery undervoltage fault	1.The encoder battery voltage is too low;	1.Replace encoder battery;
e0xFF0B	Motor overspeed	1.Feedback at a faster rate than presetting speed, the error more than set threshold; 2.The encoder exception;	1.optimization of motor parameters and control parameters; 2.check the encoder Settings and encoder connectio
e0xFF2D	position following error out of range due to undervoltage	1.The motor load changes too fast, change range is too big; 2.Drive damage;	1.Reduce the motor load rate; 2.Repair or replacement drive;
e0xFF2E	Encoder overspeed fault	1.The maximum allowable speed feedback at a faster rate than encoder; 2.The encoder parameters or motor control Settings;	1.The appropriate reduce the motor speed; 2.Check the encoder and motor control parameters setting; 3.Check the encoders and encoder wiring;
e0xFF30	EEPROM data version changed	Block changes the EEPROM version;	Restart the drives or soft reset;
e0xFF31	Motor overload warning	1.The motor load rate exceeds the set threshold, the	1.Check whether there is mechanical, bad lubrication or blocking phenomenon;

		default value is; 2.80% motor load is too large;	2. Replace the more powerful motor;
e0xFF32	Regeneration braking overload warning	Energy consumption braking resistor power is too small;	Replace the more powerful energy consumption braking resistor;
e0xFF33	Speed limited due to undervoltage warning	Due to the drive input power supply voltage is too low motor speed is limited;	Check the input voltage;
e0xFF34	DC bus undervoltage warning	Dc bus voltage is too low;	Check the dc bus voltage;
e0xFF35	Historical fault record missing warning	1. History fault record abnormal; 2. Drive damage;	1. Restart the drives or soft reset; 2. Repair or replace the drive
e0xFF36	Unsupported operation mode	Drive control mode setting exceeds the allowed range;	Reset parameter 0x6060;
e0xFF37	Power-on effective parameters changed	Changed the parameters of repower availability	Restart the drive or soft reset;
e0xFF38	CPU overload warning	Internal drive failure	Replace or repair drivers;
e0xFF39	Encoder battery undervoltage warning	Low encoder battery voltage detected;	Replace the encoder battery;
e0xFF3A	Drive internal warning	The drive has not passed the factory test;	Replace the drive;

e0xFF3B	Mechanical home position uncalibrated	Mechanical origin not demarcated	Re-calibrate the mechanical origin;
e0xFF3C	Drive not ready	Internal drive failure	Repair or replace the drive
e0xFF3D	Encoder external communication receive warning	Motor encoder wiring is abnormal, controller ground wire is not connected reliably;	Check the motor encoder wiring and make sure the wiring specification is correct.
e0xFF86	Drive brake circuit abnormal	The cable harness connection of the motor is disconnected;	If the switch cannot be opened normally, check the connection of the cable harness;
e0xFF8D	Motor blocked	Robot collision leads to motor block, motor failure, drive damage;	Check the interference of the working environment of the robot to avoid collision, maintenance or replacement of the motor, maintenance or replacement of the driver;
e0xc00008	Emergency stop issued	The Emergency stop button connected to the Emergency interface of the controller panel is pressed;	Unscrew the Emergency stop button or check the wiring harness connection of Emergency interface;
e0x7510	Port error	A port continuously receives invalid data frames	Check whether the wiring of the encoder cable has bad contact;

e0x7520	Port link lost	The cable at the end of the servo enable state is broken or pulled out;	Confirm the wiring between motor encoder and controller and correct the wrong wiring
e0x5400	Power equipment abnormal	Drive module overcurrent, drive power supply abnormal, drive module overheating;	Contact technical support
e0x5210	Current detection abnormal	Abnormal value of current detection	Confirm connection of wiring harness and correct wrong wiring;
e0x8312	Safe torque cut-off abnormal	Safety torque (thrust) cut circuit fault	Contact technical support
e0x8311	Motor overload	Effective torque (thrust) is too high	Contact technical support
e0x2220	Motor stall overload	Stall overload	Contact technical support
e0x3212	Regeneration overload	The regeneration load rate is too high	Contact technical support
e0x7300	CS detection abnormal	CS detected abnormal	Modify load conditions, run speed, add and subtract speed, use external regenerative resistor;
e0x8400	Overspeed	The speed exceeds the average speed	Contact technical support
e0x4110	Drive over-temperature	Servo drive environment temperature overheating	Contact technical support

e0x4210	ANTI SURGE resistance overheat	Surge resistance against overheating	Contact technical support
e0x4310	Internal regeneration or External overheat	Internal regenerated resistance overheats	Contact technical support
e0x3211	Over-voltage	The DC voltage of the main circuit is too high	Contact technical support
e0x3220	DC under-voltage	The DC voltage of the main circuit is too low	Contact technical support
e0x3130	lack-phase fault	One of the phase breaks in the three-phase main circuit power supply	Contact technical support
e0x5114	CPS under-voltage	Control supply voltage is too low or voltage sag occurs	Contact technical support
e0x7305	Encoder connecter1 disconnection	1.A. b. incremental encoder Z believe bolt number; 2.The power cord wire break	Contact technical support
e0x7306	Encoder connecter2 disconnection	1.A. b. Z believe full closed- loop encoder, bolt 2.the power cord wire break;	Contact technical support
e0x7300	Serial encoder internal abnormal	1.Absolute value encoder rotation amount of overflow; 2.More than ring counter overflow;	Contact technical support

e0x7310	Acceleration/overspeed abnormal	1.abnormal acceleration; 2.speeding anomalies	Contact technical support
e0x7320	Position data abnormal	Incremental exception (location data exception)	Contact technical support
e0x7303	Resolver output abnormal	Abnormal output of rotating transformer	Contact technical support
e0x7304	Resolver disconnection	The rotor is disconnected	Contact technical support
e0x8400	Motor overspeed	The motor speed exceeds 120% of the maximum speed	Contact technical support
e0x7122	Speed feedback abnormal	The servo motor power line is broken	Contact technical support
e0x8500	Model following suppression control abnormal	The input position instruction is out of range	Contact technical support
e0x8611	Deviation of the position out of range	The position deviation is greater than the set value	Contact technical support
e0xFF01	Parameter change finished	The parameters of motor and encoder are changed	Modify the load conditions, or replace the larger capacity of the motor, reduce the speed;
e0xFF00	Exit test mode	Detection when exiting test mode	Cut off the control power and restart the servo driver;

e0x5530	EEPROM abnormal	Drive a built-in EEPROM exception	Perform alarm reset operation
e0x6310	EEPROM check and abnormal	A field wide checksum exception of EEPROM	Contact technical support
e0x5510	Memory abnormal	Exception to read and write operation on RAM inside CPU	Contact technical support
e0x6320	Parameter abnormal	The system parameters are beyond the set range, and the motor coding is beyond the set range	Contact technical support
e0x5220	CPU peripheral circuit abnormal	The control board coding is inconsistent with the encoder coding Settings	Contact technical support
e0x8700	Task processing abnormal	CPU allocation handles the result exception	Contact technical support
e0x6010	Initialization timeout	The initialization process did not terminate within the specified time	Contact technical support

## 6.7 Maintain part table

If the internal components of the control cabinet are damaged, please contact the monkey technician for repair

Name	Number
Switching power module	3110716050010
Driver element	3020118020004
IO module	3070220060001
Control system	2020018050259
Brake resistor	3020918020006
Interface board module	2020020050424
Breaker	3020919050042
Filter	3020720070029
Dust foam	7040120070006
Safety controller	3020220050021