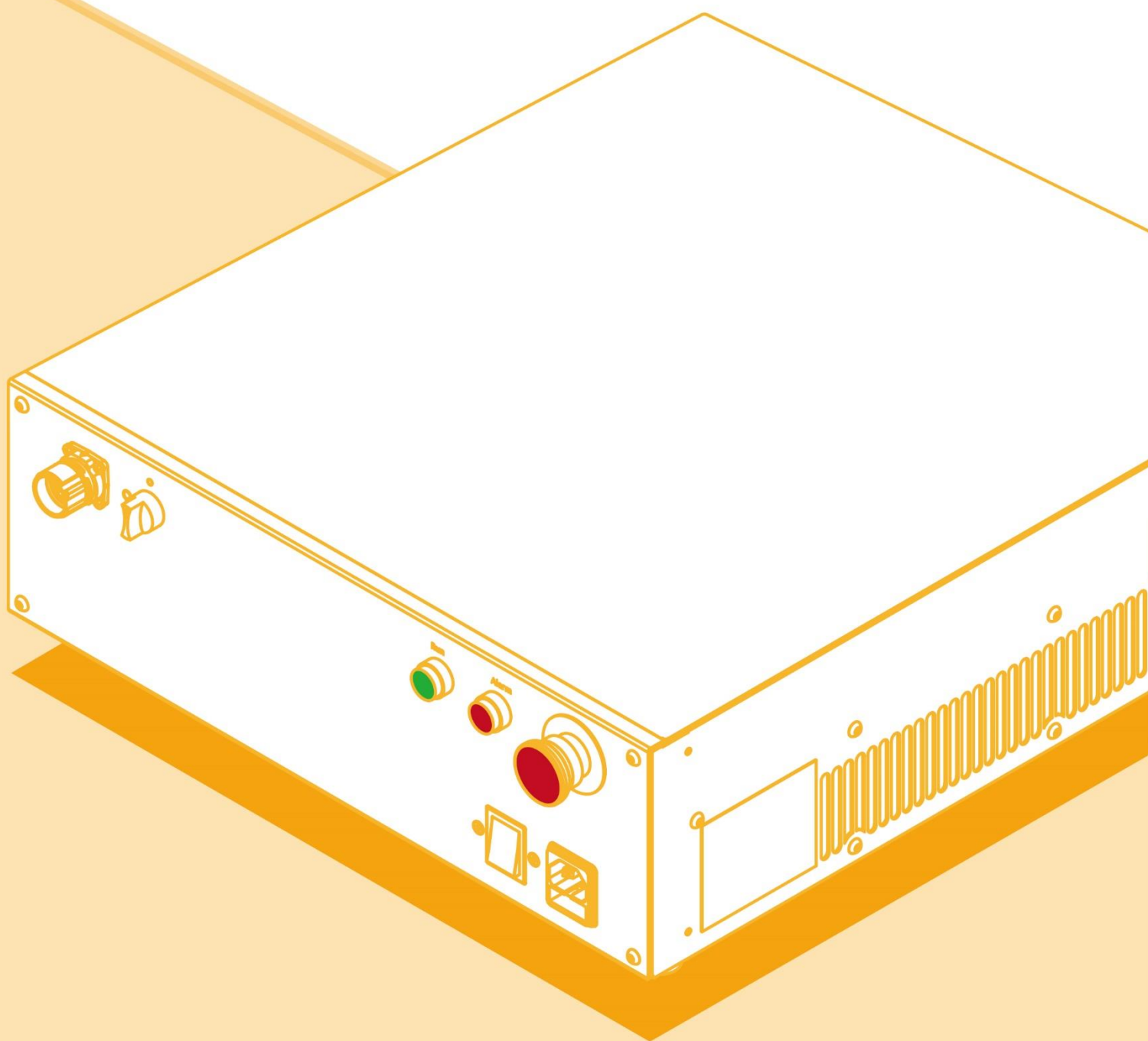


# inCube22 Control Cabinet Manual

V1.1.1





# Introduction

---

## About this manual

This manual is for technicians to quickly, correctly and safely install and use the inCube22 control cabinet, familiarize themselves with relevant precautions and do regular routine maintenance of the control cabinet.

## Operating prerequisites

Before operating the robot, please read the general safety instructions and safety precautions of the product carefully. The user must understand the safety knowledge and basic operating knowledge before operating the robot.

Please refer to:

- "AIR10-1420 Industrial Robot Manipulator Manual"
- "AIR20-1700A/AIR25-1700B Industrial Robot Manipulator Manual"
- "AIR-TP Teach Pendant Operation Manual"
- "ARL Programming Manual"




## Target groups


- Operator
- Product technicians
- Technical service personnel
- Teachers

## Common logo meaning

The signs and their meanings in the manual are shown in Table 1 below.

Table 1 Identifiers used in this article

Sign	Meaning
 Danger	If you do not follow the instructions, accidents may occur, resulting in serious or fatal personal injury
 Warning	If you do not follow the instructions, accidents may occur, resulting in moderate injuries or minor injuries, or only material damage may occur
 Notice	Prompt you to pay attention to environmental conditions and important matters, or quick operation methods

Sign	Meaning
 Tip	You are prompted to refer to other documents and instructions for additional information or more detailed operating instructions

### Manual description

The content of this manual will be supplemented and modified. Please pay attention to the "Download Center" of our company website regularly to obtain the latest version of the manual in time.

My company website URL: <http://robot.peitian.com/>

### Revision record

The revision record accumulates the description of each document update. The latest version of the document contains the updated content of all previous versions of the document.

Table 2 Document revision history

Version	Release time	Modify the description
V1.0.0	2021.08.20	1st official release
V1.0.1	2021.10.20	2nd official release Fix known bugs
V1.1.0	2022.03.22	3rd official release Fix known bugs
V1.1.1	2022.07.22	4th official release Fix known bugs

### Document number and version

See Table 3 for document number and version information.

See Table 3 for document number and version information.

Name	"inCube22 Control Cabinet Manual"
Document number	UM-P05110000033-001
Document version	V1.1.1

### Declaration of applicable safety standards

The requirements that the industrial robot system design meets are shown in Table 4.

Table 4 Declaration of applicable safety standards

Standard	Description	Version
<i>2006/42/EC</i>	Machinery directive: Machinery Directive 2006/42/EC (new edition) released by the European Parliament and Council on May 17, 2006, including changes to 95/16/EC	2006
<i>2014/30/EU</i>	EMC directive: Directive 2014/30/EU released by the European Parliament and Council on February 26, 2014 to balance EMC regulations among member states	2014
<i>2014/68/EU</i>	Pressure equipment directive: Directive 2014/68/EU released by the European Parliament and Council on May 15, 2014 to balance the pressure equipment regulations among member states (Only applicable for robots with hydro-pneumatic balance weights.)	2014
<i>ISO 13850</i>	Safety of machinery: Emergency stop function - Principles for design	2015
<i>ISO 13849-1</i>	Safety of machinery: Safety-related parts of control systems; Part 1: General principles for design	2015
<i>ISO 12100</i>	Safety of machinery: General principles for design - Risk assessment and risk reduction	2010
<i>ISO 10218-1</i>	Safety requirements for industrial robots: Part 1: Robots (tip: The content complies with ANSI/RIAR.15.06-2012, Part 1)	2011
<i>61000-6-2</i>	Electromagnetic compatibility (EMC): Part 6-2: Professional basic standards; Immunity for industrial environments	2005
<i>61000-6-4 + A1</i>	Electromagnetic compatibility (EMC): Part 6-4: Generic standards; Radiated interference for industrial environments	2011
<i>60204-1 + A1</i>	Safety of machinery: Electrical equipment of machines; Part 1: General requirements	2009
<i>IEC 60529</i>	Degrees of protection provided by enclosures (IP code): This standard applies to the classification of degrees of protection provided by enclosures for electrical equipment with a rated voltage above 72.5kv.	2001



## General safety instructions

---

Thanks very much for your purchase of the manipulator made by the company. The information described is necessary for safely using the manipulator. Please read associated manual carefully before using the manipulator, and properly use it under the premise of understanding its contents.

Please adequately understand the manipulator specifications through available instructions for detailed function.

### Safety precautions

In general, the manipulator cannot be operated singly, but it is efficient when fitting with end effector, and constructed with peripheral equipment and system.



In consideration of security, the manipulator cannot put into separate consideration, while it shall be placed in the system environment.

Please take corresponding measures for safety barriers during the manipulator operation.


### Warning, caution and notices


This manual contains various attentions including operating personnel safety and preventing manipulator damage. The significance of safety is described in form of "Warning" and "Caution", and other supplementary instructions are stated in form of "Notices".

Please thoroughly read these matters described in "Warning", "Caution" and "Notices".


	<p>Faulty operation may lead to death or serious injury of operator or other operating personnel.</p>
	<p>Faulty operation may lead to minor injury of operator or other operating personnel or equipment damage.</p>

### General cautions



	<ul style="list-style-type: none"> <li>■ When connecting or disconnecting related peripheral devices (such as safety fences, etc.) and various signals of the manipulator, be sure to confirm that the manipulator is in a stopped state to avoid incorrect connections.</li> <li>■ Do not use the manipulator in the following situations. Otherwise, it will not only cause adverse effects on the manipulator and peripheral equipment, but also may cause injury or death to operators: <ul style="list-style-type: none"> <li>● Use in flammable environment</li> <li>● Use in explosive environment</li> <li>● Use in environments with a lot of radiation</li> <li>● Use in water or high humidity environment</li> </ul> </li> </ul>
---	--

	<ul style="list-style-type: none"> <li>● Use for the purpose of transporting people or animals.</li> <li>● Use as a tripod (such as climbing on top of the manipulator, or hanging below)</li> <li>■ Operators who use the manipulator should wear the following safety equipment before performing work:             <ul style="list-style-type: none"> <li>● Work clothes suitable for the content of the job</li> <li>● Safety shoes</li> <li>● Safety helmet</li> </ul> </li> </ul>
 <p>Tip</p>	<p>Personnel performing programming and maintenance operations must receive appropriate training through relevant training provided by the company.</p>


Installation attentions

 <p>Warning</p>	<ul style="list-style-type: none"> <li>■ Please follow the methods shown in the manual for proper operation during carrying and installing the manipulator. Any operation in wrong methods may lead turnover of the manipulator and then result in injury and death of operating personnel.</li> <li>■ Please operate the manipulator in low speed, and then increase the speed gradually to ensure whether it is abnormal when the manipulator is used for the first time upon installation.</li> </ul>
--	--



Attentions during the operation

 <p>Warning</p>	<ul style="list-style-type: none"> <li>■ During the manipulator operation, please ensure there is no one in the safety barriers for subsequent operation. Accordingly, check whether there are potential risks; when the potential risks are verified, operate it after eliminating the risks.</li> <li>■ During the demonstrator operation, wearing gloves may cause errors in operation, thus, taking the gloves off is necessary for subsequent operation.</li> </ul>
 <p>Tip</p>	<p>Program, system variables and other information can be saved in the storage card and other storage medium. To prevent data loss from unexpected accidents, the users are recommended to backup data regularly.</p>


Attentions during the programming

 <p>Warning</p>	<ul style="list-style-type: none"> <li>■ Operate outside safety barrier as far as possible during the programming. If it is required to operate in the safety barrier for unavoidable conditions, following precautions shall be noticed:             <ul style="list-style-type: none"> <li>● Carefully view the conditions in the safety barrier, and then enter the barrier after ensuring there is no danger;</li> <li>● Make sure the emergency stop button can be pressed at any time;</li> <li>● Operate the manipulator in low speed;</li> <li>● Operate it after ensuring the whole system state to prevent the operating personnel from caught in danger due to the remote-control command or motion for peripheral equipment.</li> </ul> </li> </ul>
--	---



	<ul style="list-style-type: none"> <li>■ Operators who use the manipulator should wear the following safety equipment before performing work: <ul style="list-style-type: none"> <li>● Work clothes suitable for the content of the job</li> <li>● Safety shoes</li> <li>● Safety helmet</li> </ul> </li> <li>■ When programming, it should be carried out outside the safety fence as much as possible. When it is necessary to carry out inside the safety fence due to unavoidable circumstances, the following matters should be paid attention to: <ul style="list-style-type: none"> <li>● Check the situation inside the safety fence carefully and confirm that there is no danger before entering the inside of the fence.</li> <li>● You can press the emergency stop button at any time.</li> <li>● The manipulator should be operated at a low speed.</li> <li>● The operation should be performed after confirming the status of the entire system to prevent operators from falling into dangerous situations due to remote control commands or actions for peripheral equipment.</li> </ul> </li> </ul>
 <p>Notice</p>	<p>After programming, be sure to perform the test operation in accordance with the prescribed steps. At this time, the operator must operate outside the safety fence.</p>
 <p>Tip</p>	<p>Those who perform programming and maintenance operations must pass the relevant training of our company.</p>

#### Attentions during the maintenance

 <p>Warning</p>	<ul style="list-style-type: none"> <li>■ Some maintenances have electric shock hazard when powered on, thus it shall be carried out under the disconnection of the manipulator and system power supply. Professional maintenance personnel shall be designated to take maintenance as required; other personnel shall be avoided to switch on power in the maintenance, if it is required, the personnel shall press the emergency stop button for subsequent operation.</li> <li>■ Please consult the company if it is necessary to replace the parts.</li> <li>■ If customers replace the parts by themselves, unexpected accidents may occur, and then it will cause damage and injury to the manipulator and operating personnel respectively.</li> <li>■ When entering into the safety barrier, the whole system shall be checked to ensure there is no danger. If there is dangerous situation and there is no choice but to enter the barrier, the system state shall be grasped, and extremely careful.</li> <li>■ If it is necessary to replace any part, please use the one specified by the company. But beyond this, it may cause damage to the manipulator.</li> <li>■ When dismantling motor or brake, it shall be dismantled after crane lifting and other measures are taken to prevent manipulator arm, etc. from falling.</li> <li>■ If the manipulator is moved for unavoidable reasons during the maintenance, the following matters shall be noticed: <ul style="list-style-type: none"> <li>● Make sure the escape routes are unobstructed, and operate it after grasping the whole system operation conditions to avoid manipulator and peripheral equipment blocking the route of retreat.</li> </ul> </li> </ul>
--	---

- Constantly notice whether there is danger around, and make preparations for pressing emergency stop button at any time when needed.
- When mobile motor, reducer, etc. equipped with parts unit with a certain weight, crane and other auxiliary equipment shall be used to prevent overlarge operation burden for operating personnel. Meanwhile, any mistake shall be avoided; otherwise, it will cause injury and death of operating personnel.
- Don't tumble due to the lubricating oil scattered on the floor, and wipe it off for ruling out the possibility of danger.
- During the operation, any part of the body cannot be put on the manipulator, and climb on the top of the manipulator to avoid unnecessary damage or adverse effects on the manipulator.
- Note that the following section will become hot. Well prepare heat-resistant gloves and other protective tools when the equipment is required to touch under heating circumstance for unavoidable reasons.
  - Servo motor;
  - Reducer;
  - Components near motor / reducer;
  - Interior control cabinet.
- The parts dismantled from components (such as bolts, etc.) shall be installed in the original position. If the parts are not sufficient or surplus, ensure it again and install it normally.
- When maintaining pneumatic system and hydraulic system, internal pressure shall be released to 0 at first for subsequent operation.
- Testing and operation shall be carried out in accordance with prescribed methods after components replacement. At this moment, the operating personnel shall operate outside the safety barrier.
- After maintenance ends, lubricating oil, debris, water, etc. scattered on the floor around the manipulator and in the safety barriers shall be swept thoroughly.
- Dust and other foreign matters are not allowed in the manipulator during the components replacement.
- Operating personnel who are in charge of maintenance and repair shall accept the company's training and pass the examination.
- During the maintenance, appropriate luminaire shall be equipped, but note that this cannot be the sources to cause new danger.
- Take periodic maintenance with reference to this instruction; if not, it will cause the service life of the manipulator and may result in accidents.

## Safety precautions

---

Before operating the manipulator, peripheral equipment and its manipulator system, sufficiently study the safety precaution for operating personnel and system. Figure 1 is a diagram of the safe work of industrial robots.

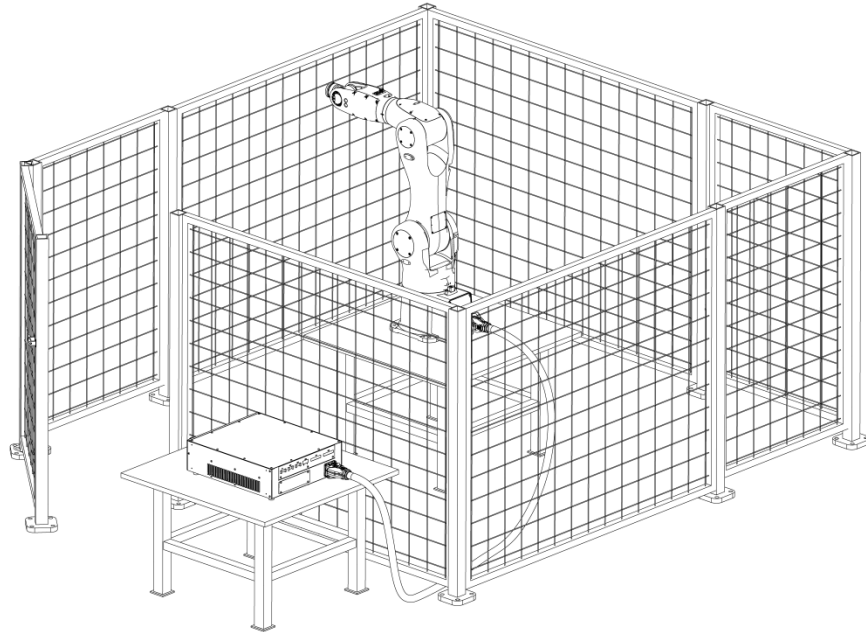


Figure 1 Diagram of the safe work of industrial robots

### Definition of operating personnel

Operators of the manipulator are mainly divided into three types: operators, teachers, and maintenance engineers. The conditions that these three types of operators need to meet are described as follows:

#### Operator

- Carry out the operation of manipulator power ON/OFF;
- Start the manipulator program through the operation panel;
- No right to work in the safety fence.

#### Teacher

- Have the functions of an operator;
- The operation machine can be taught in the safety fence.

#### Maintenance engineer

- Have the function of a demonstrator;
- The operation machine can be maintained (repair, adjustment, replacement, etc.) operations.

### Safety of operating personnel

When operating, programming, and maintaining the manipulator, operators, instructors, and maintenance engineers must pay attention to safety and at least wear the following items for work:

- Appropriate working clothes;
- Safety shoes;
- Safety helmet.

When applying the automatic system, the safety of operating personnel shall be guaranteed. Since the motion range is very dangerous, measures for preventing the operating personnel from entering into the manipulator motion range shall be applied.

General cautions are shown as below. Proper available measures shall be applied to ensure the safety of operating personnel:

- Operating personnel who are in charge of operating the manipulator system shall accept the company's training and pass the examination.
- During the equipment operation, even the manipulator seems to be shut down, it may be because the manipulator may be in motion state waiting for start signal. This state shall be treated as operation state. To ensure the safety of operating personnel, warning lamps and other equipment display or sound shall be applied to ensure the manipulator is in the operation state;
- Safety barriers and safety door around the system shall be set, so as to make operating personnel cannot enter into the safety barriers if the safety door is not opened. Interlock switch, safety latch, etc. shall be set on the safety door, so as to stop the manipulator when operating personnel open the safety door;
- Electrical grounding shall be applied for peripheral equipment;
- Peripheral equipment shall be set outside the manipulator motion range as far as possible;
- The motion range of the manipulator shall be marked with a line on the ground and other ways, thus, the operator knows clearly about the motion range, including mechanical arm and other tools fitted on the manipulator;
- The ground shall be set with cushion switch or fitted with photoelectric switch, etc. so as to sound alarm through buzzer or to glows, etc. when operating personnel enter into the motion range of the manipulator;
- One lock shall be set as required; no one can connect the manipulator power except the operating personnel;
- When taking single commissioning of peripheral equipment, the manipulator power shall be disconnected.

### The safety of operator

Operator is not entitled to operate in the safety barriers:

- If the manipulator motion is not required, its control cabinet power shall be disconnected or the emergency stop button shall be pressed;
- Manipulator system shall be operated outside the safety barrier;

- To prevent irrelevant personnel from spraying into manipulator motion range or to prevent operator from entering into hazardous area, protective fence and safety door shall be set;
- Emergency stop button shall be set in arm's reach for operator.



Manipulator control device can connect external emergency stop button. Thus, once the emergency stop button is pressed, the manipulator will be shut down through this connection.

### Safety of teachers

When taking manipulator demonstration operation, if entering into manipulator motion range is required in some cases, please pay particular attention to safety:

- Please operate outside the manipulator motion range in case that there is no need to operate in its range;
- Please ensure the manipulator or peripheral equipment is in safety state before demonstration operation;
- Please confirm location, state, etc. of safety device (such as emergency stop button, emergency stop switch of demonstrator, etc.) in advance if the demonstration is operated in the manipulator range for unavoidable reasons;
- Programmer shall pay special attention to keep other personnel from entering into manipulator motion range;
- Please fully confirm that there is no one in the manipulator range and no abnormal sign before starting;
- Please follow the following procedures to carry out testing and operation after demonstration ends:
  - Step1. Execute for at least one cycle with single cycle at low speed to ensure there is no abnormal sign;
  - Step2. Continuously operate for at least one cycle at low speed to ensure there is no abnormal sign;
  - Step3. Continuously operate for at least one cycle at intermediate speed to ensure there is no abnormal sign;
  - Step4. Continuously operate for at least one cycle at intermediate speed to ensure there is no abnormal sign;
  - Step5. Execute programming under automatic operation mode;
- Programmer shall evacuate to the outer place of the safety barrier during automatic operation of the manipulator.

### The safety of maintenance engineer

To ensure the safety of maintenance engineer, the following items shall be fully noticed:

- During the manipulator operation, don't enter into its motion range;

- Take maintenance when the power supply of control device is disconnected. Apply lock, etc. to lock on main circuit breaker to prevent other personnel from connecting the power;
- Press control cabinet or demonstrator emergency stop button if entering into the manipulator motion range is required for unavoidable reasons in an energized state. In addition, operating personnel shall put up the sign of "under maintenance", and remind the other personnel of not operating the manipulator arbitrarily;
- Please ensure the manipulator or peripheral equipment is in safety state before maintenance;
- Don't execute automatic operation when there is someone in the manipulator motion range;
- Don't block the escape routes of the operating personnel when operating near wall, tool, etc. or the distance between personnel is close;
- When the manipulator is equipped with the tool and there are movable appliances such as band carrier, etc. except manipulator, attentions shall be fully paid for these devices;
- One person who is familiar with manipulator system and can easily observe dangers shall be assigned around the manipulator during the operation to ensure that the emergency button can be pressed at any time;
- When replacing the parts or reassembling, attentions shall be paid in case of foreign material adhesion or foreign material invasion;
- When maintaining internal control device, in case of contacting unit, printed circuit board, etc., to prevent electric shock, power supply of main circuit breaker of control device shall be disconnected firstly before the operation;;
- Use parts specified by the company when replacing the parts;
- Fully ensure that there is no one within operation scope of the manipulator and the manipulator and peripheral equipment are in good conditions when restarting the manipulator system after the maintenance.

## Safety of peripheral equipment

### Attentions on relevant program

- Checkout equipment such as limit switch, etc. shall be used in order that dangerous condition is detected, and the manipulator shall be shut down as appropriate according to the signal of checkout equipment;
- Applicable measures such as stopping the manipulator, etc. shall be taken against abnormality in other manipulators or peripheral equipment even if there are no problems in this manipulator;
- Mutual interference shall be avoided on system in which the manipulator and peripheral equipment operate synchronously;
- In order to control status of all equipment from manipulator, the manipulator and peripheral equipment can be mutually locked and the operation of manipulator can be stopped according to the needs.

### Attentions on machinery

- Keep the system of the manipulator clear and use it under environment without influence from grease, water, dust, etc.;
- Cutting fluid and cleaning agent are not allowed to use;
- Control the operation of the manipulator with limit switch and mechanical brake in case of mutual collision between manipulator and peripheral equipment;
- Subscriber cable, hose, etc. are not allowed to be put inside the manipulator;
- Mechanical movement shall be avoided when installing the cable outside the manipulator;
- As for the model of exposed cables in the manipulator, operation for exposed cable shall not be modified;
- Interference in other parts of the manipulator shall be fully avoided when installing peripheral equipment on the manipulator;
- Any frequent outage and shutdown through emergency stop button, etc. on operating manipulator can lead to manipulator fault.

## Machinery safety of the manipulator

### Attentions during the operation

Operators shall be on high alert and quickly respond to occurrence of all problems when operating the manipulator through slow feeding mode under any condition.

### Attentions on relevant program

Mutual interference between manipulators shall be fully avoided during operational scope from multiple manipulators.

Set a specified work origin for manipulator program and create a program starting from work origin and ending at this one to see clearly whether operation of the manipulator is finished or not from the outer edge.

### Attentions on mechanism

Keep operating environment of the manipulator clear and use it under environment without influence from grease, water and dust, etc..

## Safety for end effector

Time difference before the command reaches the actual operation shall be fully considered and exercise the control with some extension and contraction after sending control command out when controlling all actuators (pneumatic, hydraulic and electric).

Set the detection unit on end effector to monitor status of end effector and control operation of the manipulator.





# Contents

---

Introduction .....	I
General safety instructions .....	V
Safety precautions .....	IX
Contents .....	i
<b>1 Product specification .....</b>	<b>1</b>
1.1 Range of applications for general functions and intended purposes .....	1
1.2 Environmental conditions and restrictions on work and storage.....	1
1.2.1 Installation environment requirements .....	1
1.2.2 Storage environmental conditions .....	1
1.3 Basic specifications .....	1
<b>2 Definition .....</b>	<b>3</b>
2.1 Introduction to industrial robots.....	3
2.2 Basic composition of control cabinet .....	3
2.3 Product label and meaning .....	6
<b>3 Preparation before product use.....</b>	<b>9</b>
3.1 Unpack.....	9
3.1.1 Unpacking method .....	9
3.1.2 Repacking to prevent shipping damage.....	10
3.1.3 Safe disposal of packaging materials.....	10
3.1.4 Disposal of waste materials .....	10
3.2 Transportation and handling.....	11
3.2.1 Handling posture .....	11
3.2.2 Forklift handling.....	11
3.3 Preparation before installation.....	11
3.4 Installation and assembly.....	11
3.4.1 Installation size.....	11
3.4.2 Installation method.....	12
3.4.3 Connect the control cabinet.....	13
3.4.4 Control cabinet electrical connection definition .....	17
<b>4 Safe use of the product.....</b>	<b>21</b>
4.1 Control cabinet interface.....	21
4.2 Control cabinet interface instructions.....	22
4.2.1 Control cabinet indicator light description.....	22
4.2.2 Control cabinet operation button description .....	23
4.2.3 Instructions for the external interface of the control cabinet.....	25
4.3 Control cabinet grounding.....	37
4.4 Robot stop method .....	38
4.5 Robot system safety .....	38
4.6 Control cabinet start.....	39

---

<b>5</b>	<b>Preventive maintenance</b> .....	<b>41</b>
5.1	Maintenance process .....	41
5.2	Replace the dust filter .....	41
<b>6</b>	<b>Fault finding, diagnosis and repair</b> .....	<b>43</b>
6.1	Indicator light .....	43
6.2	Heavy duty connector.....	43
6.3	Fan .....	43
6.4	Fuse .....	43
	Appendix A inCube22 accessories list.....	45
	Appendix B inCube22 accessories description .....	47

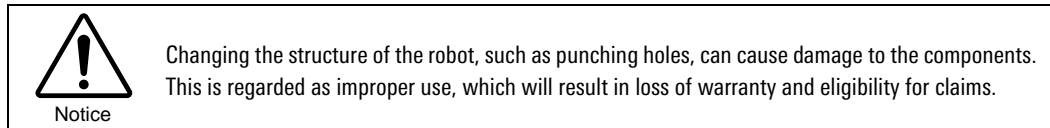
# 1 Product specification

## 1.1 Range of applications for general functions and intended purposes

Industrial robot systems are used to move tools and devices, or process and transport workpieces or products. It is allowed to be used only under the specified climate and environmental conditions. For specific storage conditions and working environment requirements, see Chapter 1.2.

All use that does not comply with the regulations is considered illegal use and is prohibited. Examples include:

- Use in an explosive environment.
- Use outside the permitted range of motion.
- Transport people or animals.
- Used as an auxiliary tool for climbing.



## 1.2 Environmental conditions and restrictions on work and storage

### 1.2.1 Installation environment requirements

- The ambient temperature is required to be 0°C~45°C.
- The relative humidity requirement is 20%~80%RH.
- Keep dust, oil mist, and water vapor in the installation environment to a minimum.
- The environment must be free of flammable and corrosive liquids or gases.
- The equipment installation must be far away from impact and seismic source.
- Keep a heat dissipation distance of at least 20cm between the control cabinet and the surrounding installation environment.

### 1.2.2 Storage environmental conditions

The control cabinet should be placed in a cool place away from direct sunlight and waterproof during long-term storage.

The specific environmental requirements are as follows:

Table 1-1 Long-term storage environmental conditions of the control cabinet

Parameter	Value
Minimum ambient temperature	-25°C
Maximum ambient temperature	+60°C
Maximum humidity	90% non-condensing under constant temperature conditions

## 1.3 Basic specifications

The basic specifications of inCube22 control cabinet are shown in Table 1-2:

Table 1-2 Basic specifications of inCube22 control cabinet

Name	Characteristic	
Cabinet type	19 inches cabinet	
Colour	Black	
Weight	20kg	
Noise	50dB (A)	
Rated supply voltage	AC220V $\pm$ 10%	
Power frequency	49Hz~61Hz	
Full load power	2.2KVA	
Fusing current	16A	
Vibration conditions	At work	In transit
Vibration acceleration	0.5g	6g
Vibration frequency	4Hz~120Hz	5Hz~500Hz
Shock acceleration	2.5g	300g
Impact waveform/period	Half sine /11ms	Sawtooth wave /9ms
Operating temperature	0°C~45°C	
Temperature change rate	<1.1K/min	
Storage temperature	-25°C~60°C	
Working humidity	$\leq$ 80%RH	
Storage humidity	$\leq$ 90%RH	
Altitude	Work normally at an altitude of 1000m	
	Use at altitude 1000-4000m with derating 5%/1000m	

## 2 Definition

### 2.1 Introduction to industrial robots

The industrial robot system is mainly composed of three basic parts: an industrial robot manipulator, a control cabinet and a teach pendant:

- Manipulator: refers to the mechanism used to grab or move objects (tools or workpieces) in the robot system, also known as the robot body. This manipulator is a six-degree-of-freedom tandem industrial robot, including three swing axes and three rotation axes.
- Control cabinet: Install the electrical equipment required to control the robot, and provide the connection interface with the robot manipulator and other external equipment.
- Teach Pendant: connected to the main control system of the control cabinet, used to control the robot's manual/automatic operation, record the running track, display playback or record the teaching point and program according to the teaching point.

Please refer to Figure 2-1 for the industrial robot system.

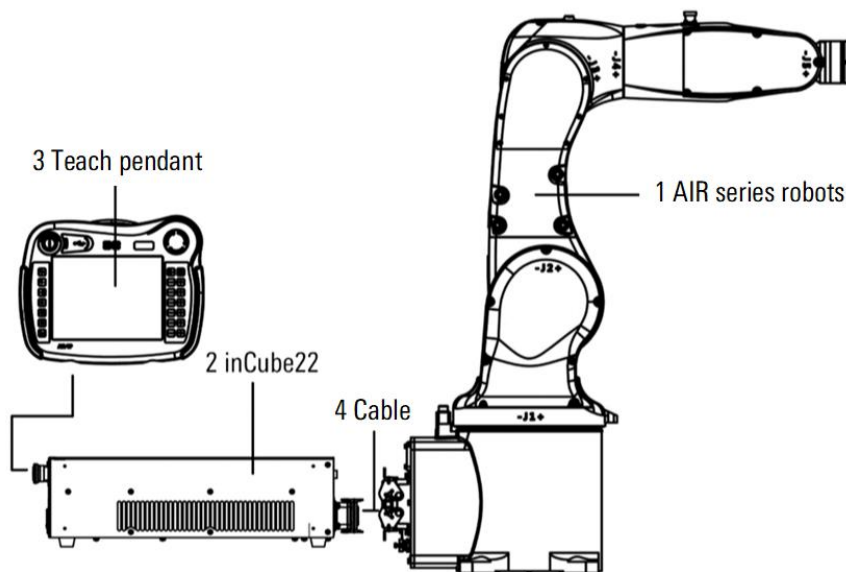


Figure 2-1 The composition of the robot system

### 2.2 Basic composition of control cabinet

The electrical equipment required to control the robot is installed in the control cabinet, including motor drives, safety modules, motion control modules and other components, and it provides connection interfaces with the manipulator and other external equipment.

The appearance of the control cabinet and the names of its parts are shown in Figure 2-2, and the related descriptions are shown in Table 2-1.

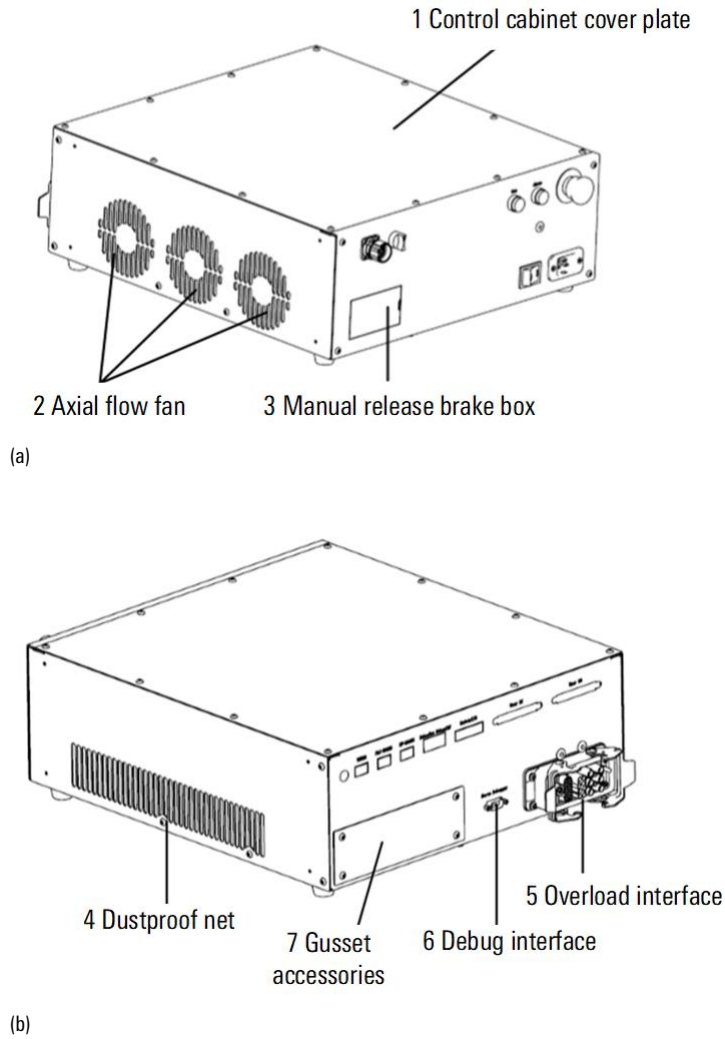


Figure 2-2 Control cabinet appearance

Table 2-1 The appearance of the inCube22 control cabinet and the names and descriptions of its various parts

No.	Name	Description
1	Control cabinet cover	The upper cover of the control cabinet
2	Axial fan	Used for heat dissipation and ventilation of the control cabinet
3	Manually release the	Provide the operator with the function of manually releasing the manipulator brake
4	Dust net	Prevent dust from entering the control cabinet
5	Overload interface	Connect the manipulator cable to provide power, signal, etc. for the manipulator
6	Debug interface	Debug the drive parameters for the motor
7	Gusset accessories	Optional accessories

The names of the internal components of the upper cavity of the control box are shown in Figure 2-3, and the related descriptions are shown in Figure 2-3.

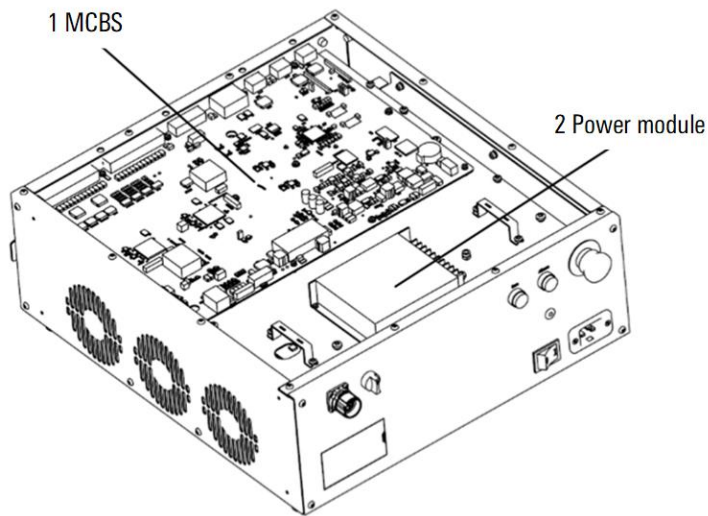


Figure 2-3 Diagram of the internal components of the upper cavity of the control box

Table 2-2 The name and description of each part of the internal components of the upper cavity of the control box

No.	Name	Description
1	MCBS	Main control circuit
2	Power module	Brake, control system power supply module

The names of the internal components of the drive box are shown in Figure 2-4, and the related descriptions are shown in Table 2-3.

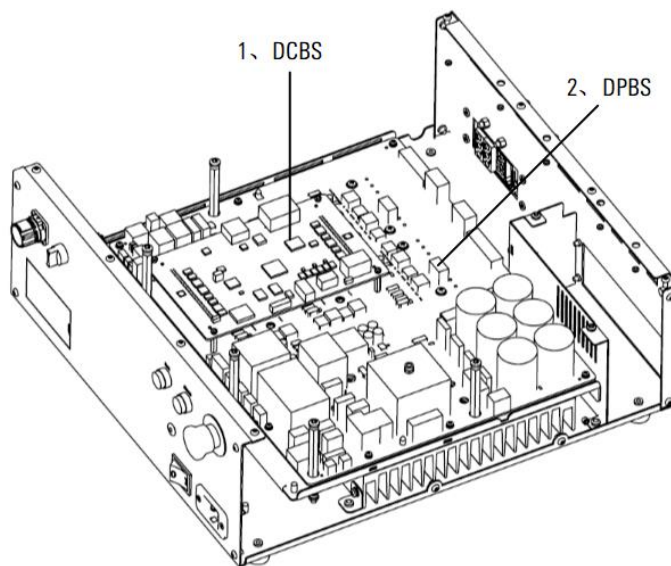


Figure 2-4 Diagram of the internal components of the drive box

Table 2-3 The name and description of each part of the internal components of the drive box

No.	Name	Description
1	DCBS	Drive control circuit
2	DPBS	6-axis drive module

## 2.3 Product label and meaning

The inCube22 control cabinet contains 5 types of labels. Please refer to Figure 2-5 for the specific location of each label. See Table 2-4 for specific instructions.

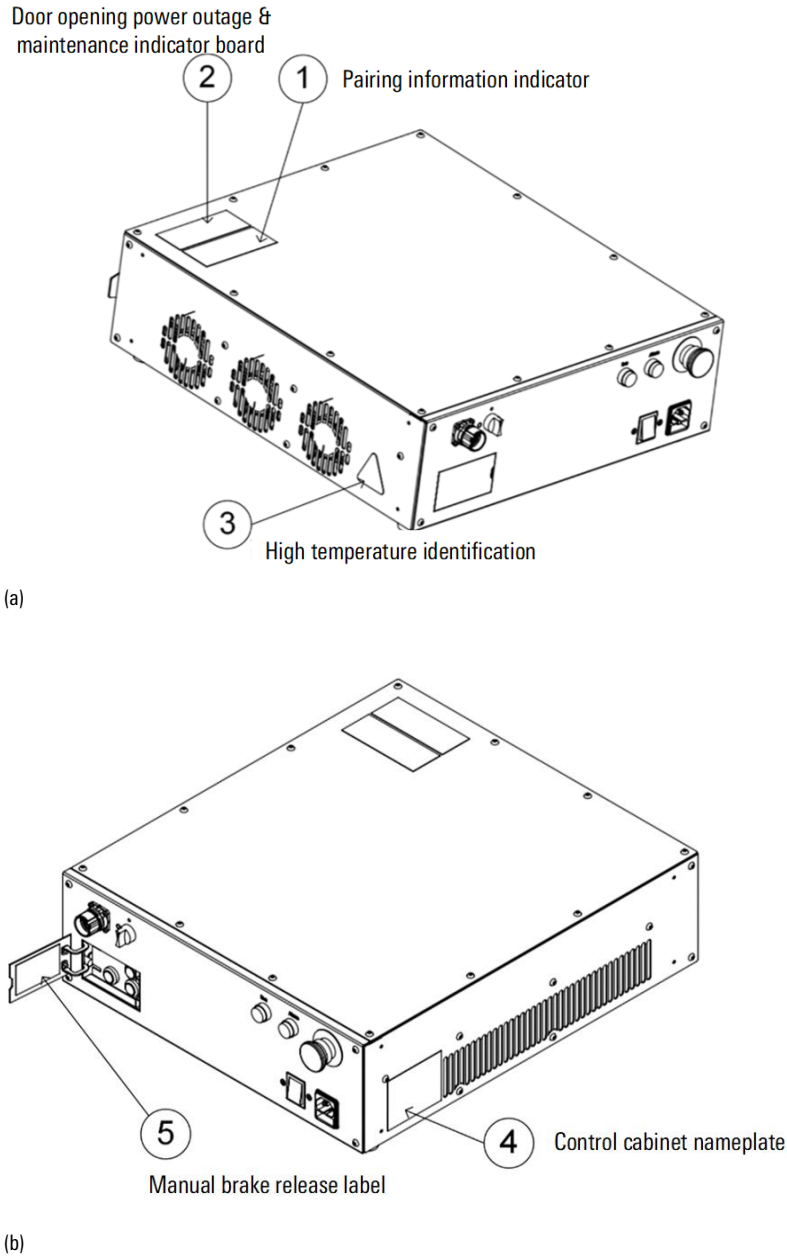


Figure 2-5 Diagram Of the location of the label contained in the control cabinet

Table 2-4 inCube22 control cabinet label description

No.	Name	Description
1	Pairing information sign	The pairing information indicator is shown in Figure 2-6. When opening the box, please check whether the serial number on the indicator is consistent with the serial number on the nameplate of the control cabinet and the supporting manipulator. If not, please contact our company's after-sales service personnel.



No.	Name	Description
2	Open the door and power off & maintenance signs	Open the door and power off & maintenance signs as shown in Figure 2-7
3	High temperature mark	There may be heat in the place where there is a high temperature mark (see Figure 2-8). When you see this mark, you should pay attention to avoid being burned. If you have to touch the device when it is hot, please use heat-resistant gloves and other protective equipment before touching it.
4	Control cabinet nameplate	The nameplate of the control cabinet is shown in Figure 2-9. The model, serial number, weight, production date and other related information of the control cabinet are marked on the nameplate.
5	Manual brake release mark	Figure 2-10 shows the manual brake release identification and specific operation steps



**注意**  
Notice

为避免发生事故, 操作机与控制柜需配套使用, 具体配对信息详见下方产品序列号。  
To avoid accidents, the manipulator and the control cabinet must be matched as below.

操作机序列号:  
Manipulator S/N

控制柜序列号:  
Control cabinet S/N

Figure 2-6 Pairing information sign



**危险**  
Danger

打开柜体前请先关闭电源, 并等待15分钟以上!  
Please turn off the power and wait for more than 15 minutes before open the door.

维护前请阅读并理解操作指南和安全手册。  
Please read and understand the operation guide and safety manual before maintenance.

Figure 2-7 Open the door and power off & maintenance signs



Figure 2-8 High temperature mark



型号/Type
产品号/Product No.
序列号/Serial No.
生产日期/Date
重量/Weight
电源电压/Supply Voltage
电源频率/Frequency
满载电流/Full-Load Current

Figure 2-9 Control cabinet nameplate

## 手动松抱闸



第1步: 将  按至“1”档;

第2步: 按住 , 即可拖动对应轴。

Figure 2-10 Control cabinet manual brake release identification

### 3 Preparation before product use

#### 3.1 Unpack

##### 3.1.1 Unpacking method

The unpacking diagram of the inCube22 control cabinet and ARCSP-AIR\_TP teach pendant is shown in Figure 3-1. The names of the parts in the figure are shown in Table 3-1.

Table 3-1 The name of each part of the control cabinet and the teaching pendant box

No.	Name
1	Box
2	EPE-Cabinet-1
3	EPE-Cabinet-2
4	EPE-cabinet-bottom
5	EPE-Cabinet-3
6	Wooden box cover
7	EPE-cabinet-cover
8	Hexagon socket head cap screw M10 × 80
9	inCube22 control cabinet
10	ARCSP-AIR_TP Teach Pendant-Package
11	Cable

Figure 3-1 Diagram of unpacking control cabinet and teach pendant

The opening method of the inCube22 control cabinet and ARCSP-AIR\_TP teach pendant box is:

Step1. Remove the lower cover ①, as shown in Figure 3-1, the cables inside the base can be observed.

Step2. Check whether the cable and the fixing plate are worn or damaged.

- Step3. Use a 16MM Allen key to remove the hexagon socket head cap screw M10 × 80⑧ from the wooden box cover ⑥, and open the wooden box cover ⑥.
- Step4. Take out the ARCSP-AIR\_TP teach pendant-package ⑩ and cable ⑪ and put them aside for installation and use.
- Step5. Take out the pearl cotton-cabinet-cover ⑦ upwards.
- Step6. Take out the inCube22 control cabinet ⑨ and put it aside for installation and use.
- Step7. After taking out the inCube21 control cabinet and the ARCSP-AIR\_TP teach pendant, all parts of the packing box must be properly stored in case they are packed for transportation.

### 3.1.2 Repacking to prevent shipping damage

The schematic diagram of the inCube21 control cabinet and the repacking box of the ARCSP-AIR\_TP teach pendant is shown in Figure 3-1. The names of the parts in the figure are shown in Table 3-1.

In order to prevent transportation damage, the original packing box is required for repacking. The packing process is:

- Step1. Place the pearl cotton-cabinet-bottom ④ on the bottom of the cabinet.
- Step2. Place the pearl cotton-cabinet-1② and two pearl cotton-cabinet-2③ on the pearl cotton-cabinet-bottom ④ according to the position shown in the exploded diagram, close to the side wall of the cabinet.
- Step3. Place the inCube22 control cabinet between the pearl cotton-cabinet-1② and the two pearl cotton-cabinet-2③.
- Step4. Place the pearl cotton-cabinet-3⑤ in the gap on the side of the handle in the inCube22 control cabinet ⑨.
- Step5. Place the pearl cotton-cabinet-cover ⑦ on the top of the inCube22 control cabinet.
- Step6. Place the ARCSP-AIR\_TP teach pendant-packaging ⑩ and the cable in the position shown in the exploded view of EPE-cabinet-cover ⑦.
- Step7. Use a 16MM inner hexagonal wrench to fasten the wooden box cover and the box body with inner hexagonal cylindrical head screws M10 × 80⑧ to complete the repackaging work.

### 3.1.3 Safe disposal of packaging materials

After unpacking, all parts and components of the packing box must be properly stored. When storing, pay attention to:

- The storage place must be dry and clean.
- The temperature of the storage location should be stable.
- The selected storage location must ensure that the materials of each component of the packing box are not damaged.
- The packing box must be kept indoors.

### 3.1.4 Disposal of waste materials

The disposal of industrial robot system waste must be carried out in accordance with the laws, regulations and standards of various countries.

## 3.2 Transportation and handling

### 3.2.1 Handling posture

- Ensure that all connectors on the control cabinet panel are unplugged.
- Ensure that the control cabinet is transported in a horizontal position.

### 3.2.2 Forklift handling

When moving, place a handling tray under the control cabinet, refer to Figure 3-2.

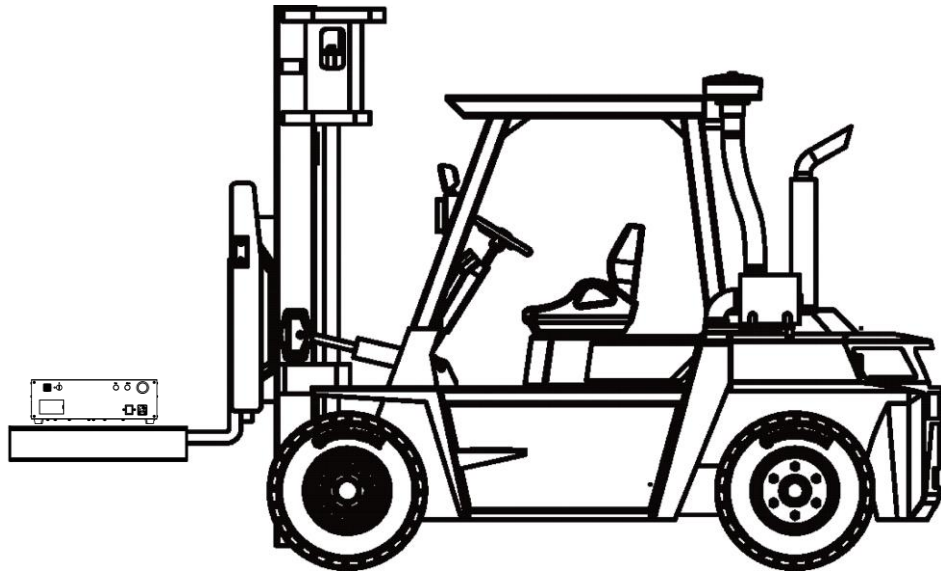


Figure 3-2 Diagram of forklift handling in the control cabinet

## 3.3 Preparation before installation

Before installing the control cabinet, the following items must be strictly observed:

- Ensure that the installer must pass the relevant training of the company and perform the installation work in compliance with international and local laws and regulations.
- After unpacking, make sure that the control cabinet is not bumped or damaged.
- Ensure that the control cabinet installation environment meets the requirements of section 1.2 of this manual.

## 3.4 Installation and assembly

### 3.4.1 Installation size

The inCube22 control cabinet is a 3U height control cabinet, which supports installation in a 19-inch cabinet. The specific dimensions are shown in Figure 3-3.

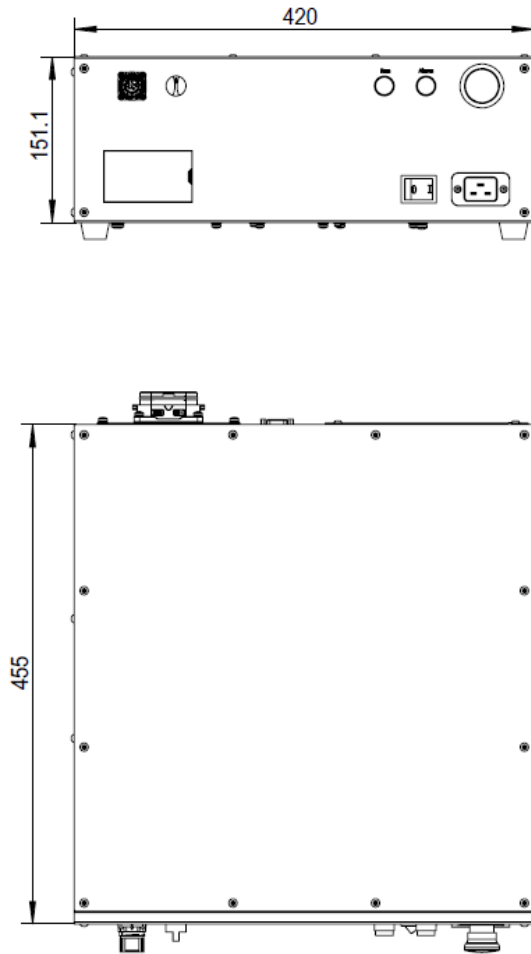


Figure 3-3 Cabinet dimensions

### 3.4.2 Installation method

#### Direct installation

The inCube22 control cabinet can be directly placed on a platform that meets the installation environment. The platform is not allowed to be a motion platform. The contact points between the platform and the four feet pads of the control cabinet are on the same plane.

Installation requirements:

- When placed normally, the platform and the four feet pads are in contact. The placement surface of the control cabinet is allowed to have a certain angle of inclination, but the inclination angle is not more than 30°.
- A certain weight of load is allowed to be placed on the upper surface of the control cabinet, but the load weight is not more than 40kg, and the load contact area is not less than 80% of the upper surface of the cabinet.

#### 19 inch cabinet installation

The inCube22 can be installed in a 19-inch cabinet, and the depth of the cabinet is required to be greater than 600mm, with vents on the left and right sides. The accessories shown in Figure 3-4 can be used for installation. For more information about the accessories that may be required to install the control cabinet, please refer to the inCube22 accessory list in Appendix A of this manual.

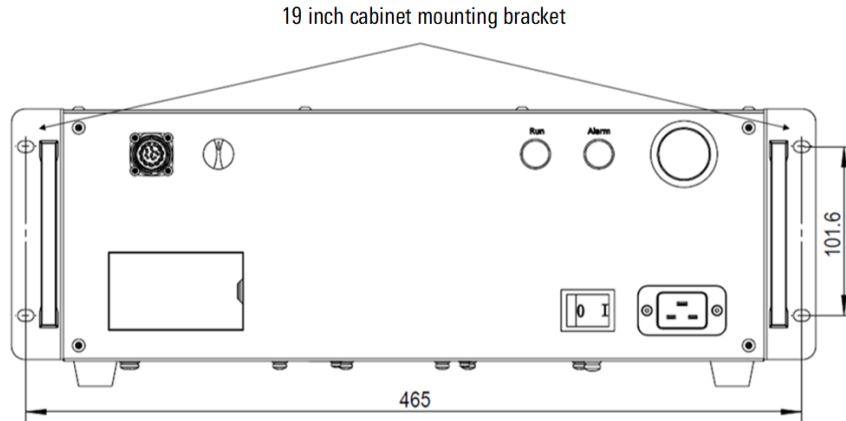


Figure 3-4 19 inch cabinet installation diagram

When the control cabinet is installed in a 19-inch cabinet, high-strength screws (such as hexagon socket head screws, grade 12.9, M5X12, etc.) are required, and a 19-inch cabinet tray is installed at the bottom of the control cabinet.

### Cabinet stacking

The inCube22 control cabinet supports the stacking of up to three cabinets. For the occasions where multiple control cabinets are used and the space occupied by the control cabinet is relatively high, the cabinets can be stacked in the manner shown in Figure 3-5. For details of the materials used for stacking, please refer to Appendix A of this manual inCube22 accessory list.

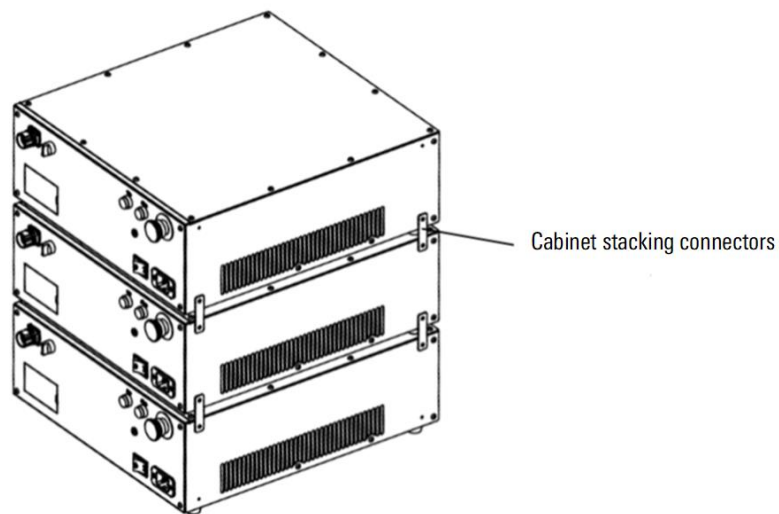


Figure 3-5 Cabinets stacking

### 3.4.3 Connect the control cabinet

#### Connect the teach pendant

The upper left corner of the front panel of the inCube22 control cabinet is the teach pendant connection interface, which is connected by a quick-plug connector (see Figure 3-6).

Step1. Turn the teach pendant shield knob ③ to the solid point position to enable the teach pendant function.

Step2. Align the triangle symbol of the connector plug ① with the triangle symbol of the connector socket ② (as shown in the partial enlarged view of Figure 3-6), push the connector plug ①, and rotate it 45° clockwise to make it align with the connector socket ② tight.

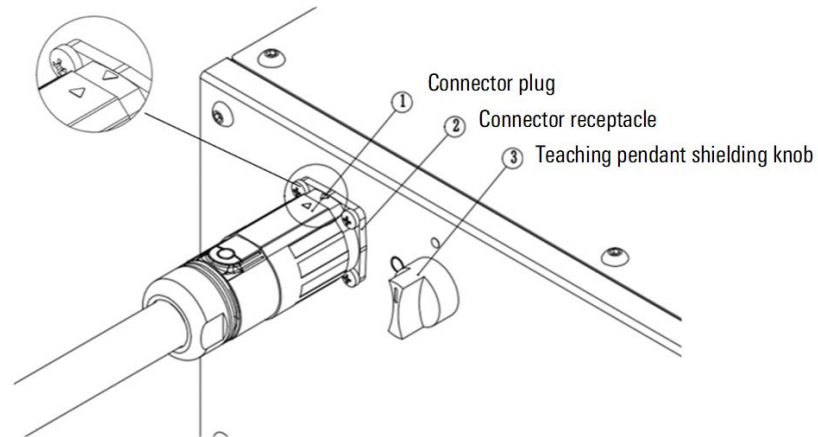


Figure 3-6 Wiring diagram of teach pendant

## Connect the manipulator

The lower right corner of the rear panel of the inCube22 control cabinet is the connection interface for the operating power encoder, which uses heavy-duty connectors. The two ends of the heavy-duty wire are used to connect the manipulator and the control cabinet, respectively. The heavy-duty wire distinguishes between the manipulator end and the control cabinet end, with the manipulator end corresponding to the female plug and the control cabinet end corresponding to the male plug (see Figure 3-7). The heavy-duty connector has an anti insertion function.

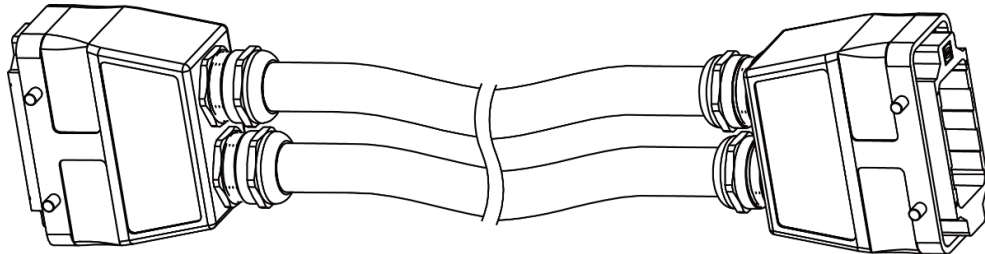


Figure 3-7 Diagram of heavy load line

### Step1. Connect the manipulator

Insert one end of the heavy-duty line plug into the heavy-duty line connection port of the manipulator (see Figure 3-8), and fasten the lock.



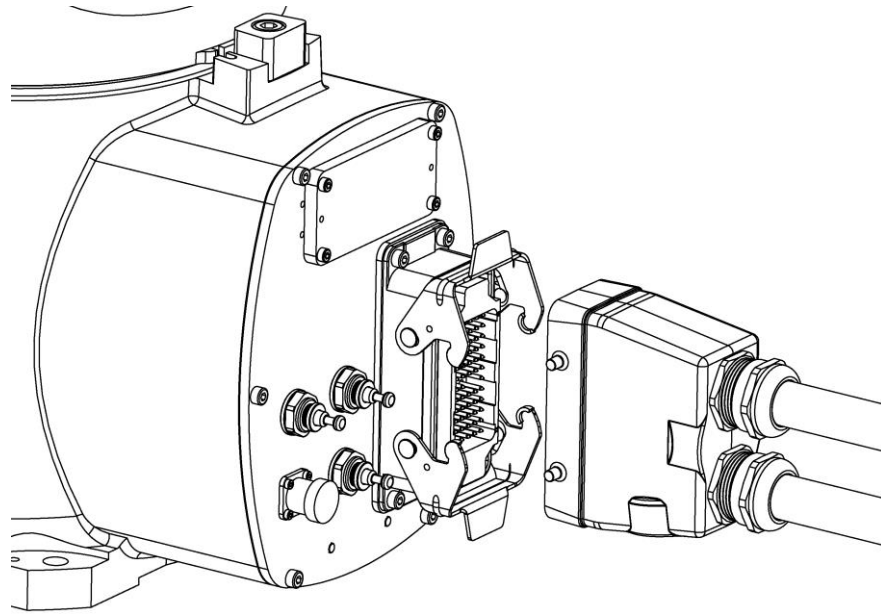


Figure 3-8 Manipulator heavy-duty line connection interface

**Step2. Connect the control cabinet**

Insert one end of the heavy-duty line plug into the heavy-duty line connection port of the control cabinet (see Figure 3-9), and fasten the lock.

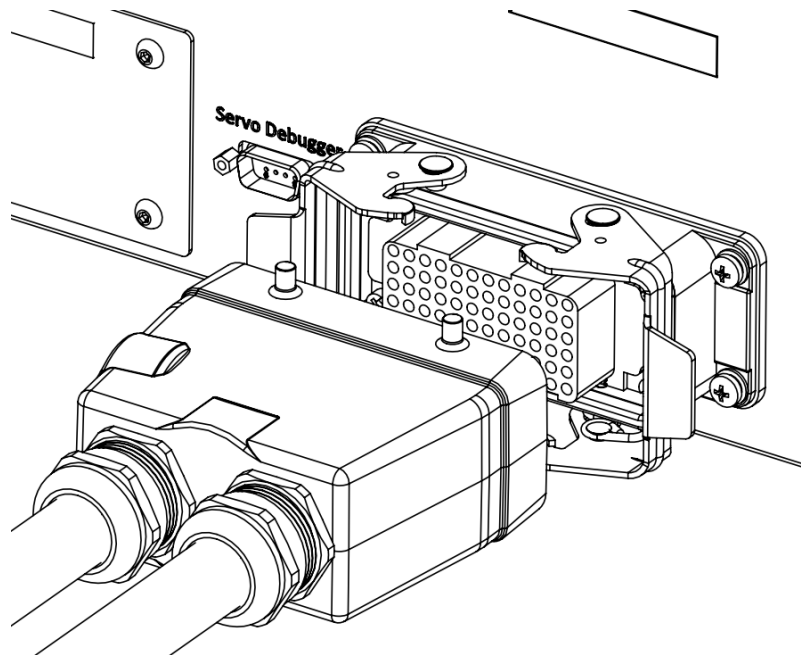


Figure 3-9 Control cabinet heavy-duty connector interface



For the connection method of other types of manipulators, please refer to our company's "XX Industrial Robot System Quick Start Manual".

The length of the power encoder cable is 5m, and the size of the heavy-duty plug on the manipulator side and cabinet side is shown in Figure 3-10.

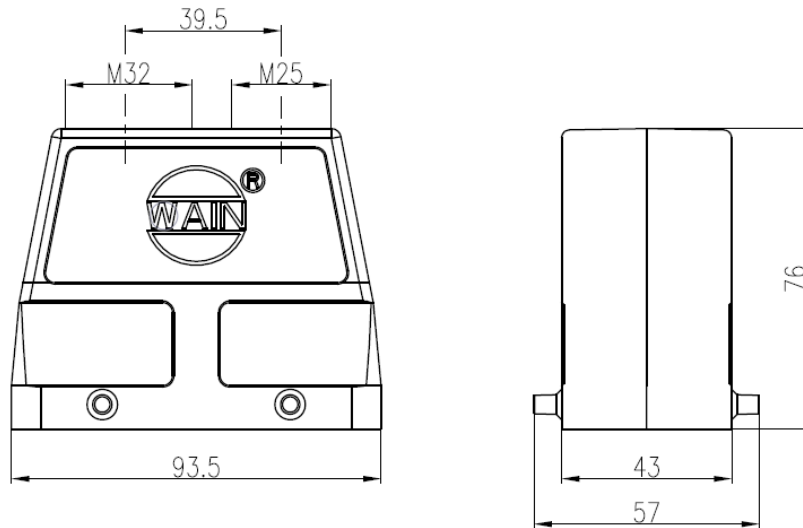


Figure 3-10 Dimensions of heavy-duty plugs on the manipulator side and cabinet side

## Connect power supply

Both ends of the power cord are used to connect the control cabinet and the power supply.

Connection steps:

Step1. Connect the control cabinet, and insert the power cord shape plug into the power cord connection port of the control cabinet (see Figure 3-11).

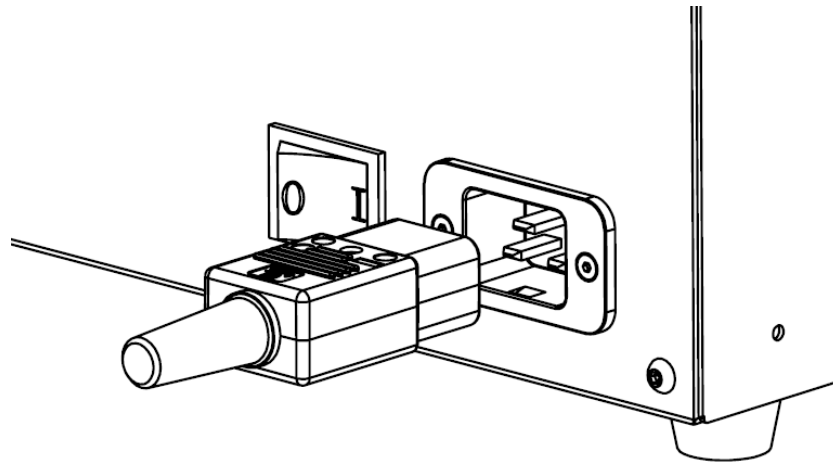


Figure 3-11 Power cord connection interface

Step2. Connect the power supply and insert the three-head plug of the power cord into the power socket.

Step3. Confirm that the on-site power supply voltage and current meet the needs of the control cabinet (provide 220VAC voltage and meet at least 16A peak current load).

Step4. Confirm that the system short-circuit module of the control cabinet is connected normally (Safety I/O in Figure 3-12 is the normal connection state).

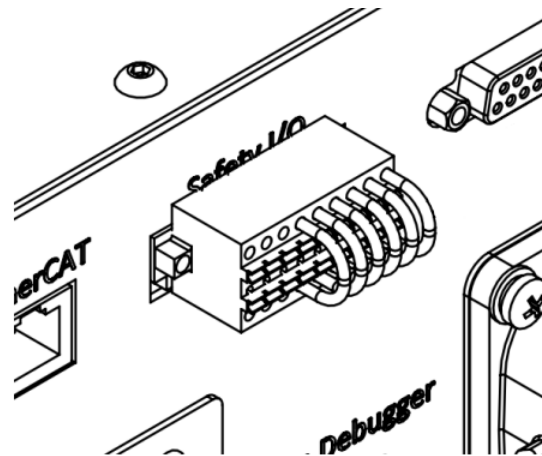


Figure 3-12 System short circuit module

Step5. After the power is supplied, switch the rocker switch from "0" to "I" (refer to Figure 3-13), start the control cabinet, and at the same time the switch's own lamp lights up, and the teach pendant starts.



Figure 3-13 Control cabinet power switch

Step6. Before powering off, please confirm that the program has stopped running. After the motor is powered off, turn off the switch on the control cabinet. It is forbidden to unplug the power cord directly.

### Connect to other interfaces

"Other interfaces" are mainly the interfaces reserved for users by the inCube22 control cabinet.

For the user interface connection with thread locking mechanism, the thread must be tightened during connection, for example:

- For user interface connections with threaded locking mechanisms, such as user serial port RS232, Modbus slave interface RS485, PLC-MF master interface RS485, and Safety IO interface, the threads must be tightened during connection.
- For user interface connections without locking mechanisms, such as expanding the external axis EtherCAT network port and user EtherNET network port, the crystal head must be fully inserted into the plug when connecting; When connecting the power cord, fully insert the pin shaped power plug into the socket.



Tip

For the connection cable information of the above interfaces, refer to Appendix A of this manual inCube22 accessory list.

### 3.4.4 Control cabinet electrical connection definition

## Teach pendant interface definition

The inCube22 control cabinet teaching pendant interface is shown in Figure 3-14, and the definition of connector interface pin numbers is detailed in Table 3-2.

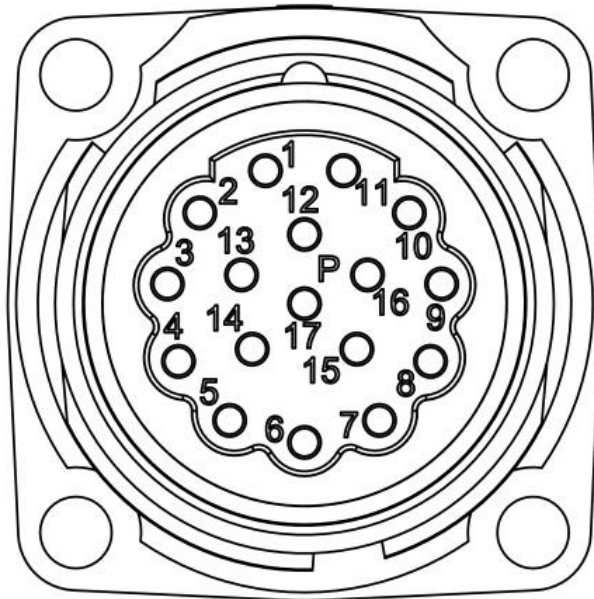


Figure 3-14 Teaching pendant interface

Table 3-2 Pin number definition of teaching pendant connector interface

Pin number	Signal name	Linear color	Pin number	Signal name	Linear color
1	ESTOP_INT+	White	9	+24VD	Black
2	ESTOP_INT-	Brown	10	+24VD_RTN	Purple
3	ESTOP_SAF+	Green	12	TX+	White/Orange
4	ESTOP_SAF-	Yellow	13	TX-	Orange
5	ENA_INT+	Grey	14	RX+	White/Green
6	ENA_INT-	Orange	15	RX-	Green
7	ENA_SAF+	Blue	17	Shielding layer	Shell
8	ENA_SAF_	Red			

## Overload interface definition

The definition of the inCube22 control cabinet overload interface is shown in Figure 3-15, and the overload interface definition is detailed in Table 3-3 to Table 3-6.

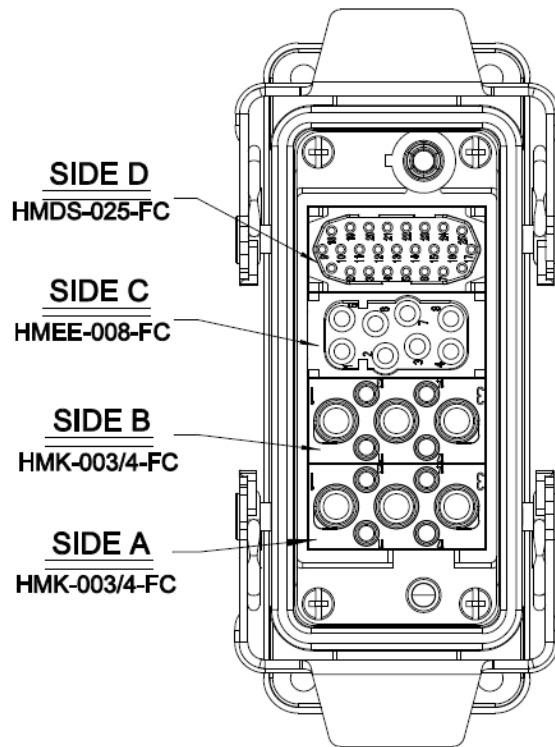


Figure 3-15 Power line encoder interface

Table 3-3 Definition of power line encoder interface (Side A)

Pin number	Definition	Pin number	Definition
1	U1	12	V5
2	V1	13	W5
3	W1	14	U3
11	U5		

Table 3-4 Definition of power line encoder interface (Side B)

Pin number	Definition	Pin number	Definition
1	U2	12	W3
2	V2	13	W4
3	W2	14	U4
11	V3		

Table 3-5 Definition of power line encoder interface (Side C)

Pin number	Definition	Pin number	Definition
1	W4	5	A1&A2_BR_24+
2	U6	6	A3&A4_BR_24+
3	V6	7	A5&A6_BR_24+
4	W6	8	BR_GND

Table 3-6 Definition of power line encoder interface (Side D)

Pin number	Definition	Pin number	Definition	Pin number	Definition	Pin number	Definition
1	J1_5V	7	J2_PS+	13	J4_5V	10	J5_PS+
2	J1_0V	8	J2_PS-	14	J4_0V	21	J5_PS-
3	J1_PS+	9	J3_5V	15	J4_PS+	22	J6_5V
4	J1_PS-	10	J3_0V	16	J4_PS-	23	J6_0V
5	J2_5V	11	J3_PS+	18	J5_5V	24	J6_PS+
6	J2_0V	12	J3_PS-	19	J5_0V	25	J6_PS-



For other interface connector definition information, please refer to Chapter 4.2 of this manual.

## 4 Safe use of the product

### 4.1 Control cabinet interface

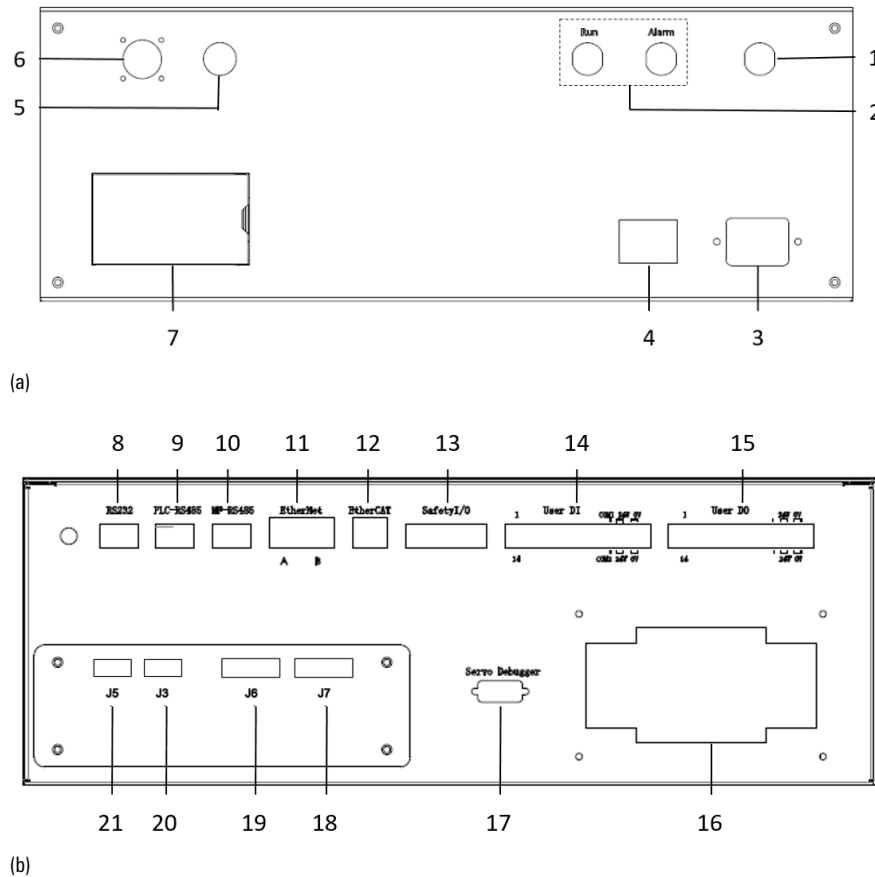


Figure 4-1 Diagram of the location of each interface of inCube22

All operation buttons, instructions, and connection interfaces of the inCube22 control cabinet are designed on the front panel, as shown in Figure 4-1. The name and function of each interface are shown in Table 4-1.

Table 4-1 Description of each interface of inCube22

Graphic number	Interface marking	Interface name	Description
1	\	Emergency stop	In case of emergency, press the emergency stop button to stop the robot from moving
2	\	Indicator light group	Display the operation and alarm status of the control cabinet
3	\	Power cord inlet	220V mains interface
4	\	Power switch	Main power switch of control cabinet
5	\	Teaching pendant shielding knob	When plugging and unplugging the teaching pendant, it serves as a shield for the teaching pendant

Graphic number	Interface marking	Interface name	Description
6	\	Teaching pendant interface	Teaching pendant connection port
7	\	Manual release brake box	Press the button to manually release the corresponding axis brake of the manipulator
8	RS232	User serial port RS232	Connect any device that supports the RS232 serial protocol
9	PLC-RS485	Modbus slave interfaceRS485	Connect any device that supports the Modbus-RTU master protocol
10	MF-RS485	PLC-MF master station interface RS485	Connect to the PLC-MF module for extending user DI/DO
11	EtherNet	User Ethernet port	Connect any device that supports the Ethernet TCP/IP protocol
12	EtherCAT	Expanding the EtherCAT network port of the external axis	Connect any device that supports the EtherCAT bus protocol
13	Safety IO	Safety IO interface	Implement safety functions such as safety barriers, emergency stop outputs, and emergency stop inputs
14	User DI	User DI interface	Connect any device that supports DI functionality
15	User DO	User DO interface	Connect any device that supports DO functionality
16	\	Overload interface	Control cabinet connection manipulator interface
17	Servo	Debug interface	Connect to the servo debugging software ServoDebugger
18	J7	Encoder interface	Connecting incremental encoders or absolute encoders
19	J6	Magnetic grating ruler and CAN interface	Connect incremental magnetic grating ruler or CANopen welding machine
20	J3	Voltage input and current input interface	Connect any device that supports AO function, -10V~+10V or 0mA~20mA
21	J5	PWM output and analog output interface	Connect any device that supports AI function, -10V~+10V or 0mA~20mA



Tip

Refer to Chapter 4.2 of the manual for instructions on the use of the above interfaces.

## 4.2 Control cabinet interface instructions

### 4.2.1 Control cabinet indicator light description

The inCube22 control cabinet provides 2 indicator lights (refer to Figure 4-2), of which:

- The green indicator light is the RUN indicator, which lights up when the drive power is turned on.
- The red indicator is an alarm indicator, which lights up when the control system is abnormal.



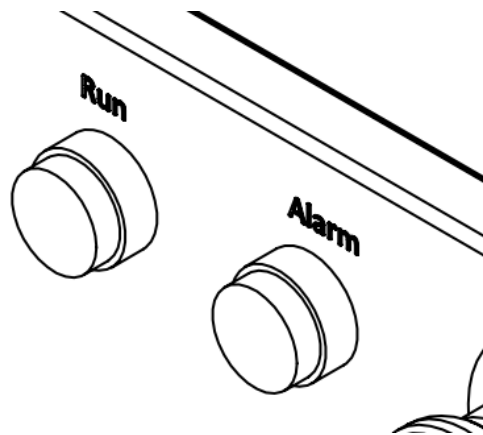




Figure 4-2 Indicator diagram

## 4.2.2 Control cabinet operation button description

### Switch

The power switch of the inCube22 control cabinet is a ship type switch with lights, and the switch is printed with the words O/I. Under normal use:

- When the switch is in the I position, it means that the control cabinet is on, and the indicator light inside the switch is on.
- When the switch is set to O position, it means that the control cabinet is closed, and the indicator light inside the switch is off.

 Tip	Refer to Chapter 4.6 of this manual for the normal startup process of the control cabinet.
 Notice	When the cabinet is not in use, the switch must be set to O position.

### Emergency button

The inCube22 control cabinet emergency stop button is a mushroom type emergency stop button (refer to Figure 4-3). Pressing the emergency stop button will immediately stop the robot (STOP1). When it is necessary to release the safety status, the emergency stop button should be turned in the direction indicated on the button first.

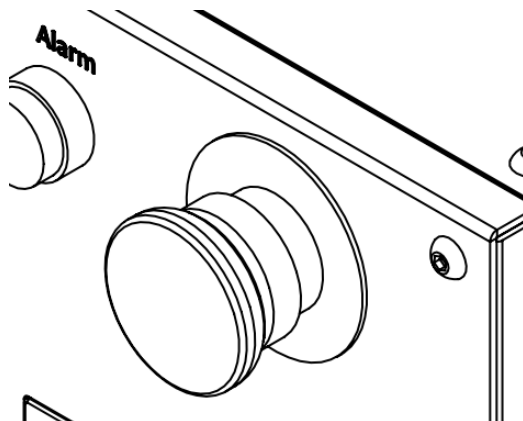



Figure 4-3 Diagram of emergency stop switch


 Notice	Do not use the emergency stop button as a pause function, otherwise it may cause damage to the manipulator.
---	---

### Teaching pendant shielding knob

The inCube22 control cabinet teaching pendant shield knob has two positions of 0/1 (refer to Figure 3-6):

- When the knob is set to level 1, it means that the teach pendant must be connected for normal use, otherwise the control cabinet will give an alarm.
- When the knob is set to level 0, it means that the teach pendant can be unplugged, and the robot system can still continue to run at this time.

When using the teach pendant shielding knob, you must first set the pull knob to the 1st gear, and connect the teach pendant, and load the control program through the teach pendant. For the working system with fixed control instructions, there is no need for the teach pendant to control at this time, you can set the knob to gear 0, unplug the teach pendant, and control the operation of the robot system through an external control knob.

 Notice	For the system that still needs to run after unplugging the teach pendant, make sure that the control cabinet is connected to an external control device before unplugging it.
---	--

### Manually release the brake box

The inCube22 control cabinet provides manual brake release function.

The manual brake release button is located in the manual brake release box at the lower left corner of the control cabinet panel. After opening the manual brake release box cover, you will see the brake release button shown in Figure 4-4.

The names and functions of the buttons shown in Figure 4-1 are shown in Table 4-2:

Table 4-2 Name and function of manual brake release button

Name	Function
X61	Manual brake release enable switch
X62	1 axis & 2 axis brake release button
X63	3-axis & 4-axis brake release button
X64	5-axis & 6-axis brake release button

Operate according to the operating instructions for releasing the brake on the back of the cover of the manual releasing brake box:

Step1.Press the enable switch to position I (at this time, the teach pendant interface prompts "manual brake release is enabled");

Step2.Long press the brake release button, and manually drag the corresponding axis of the manipulator to the desired position.

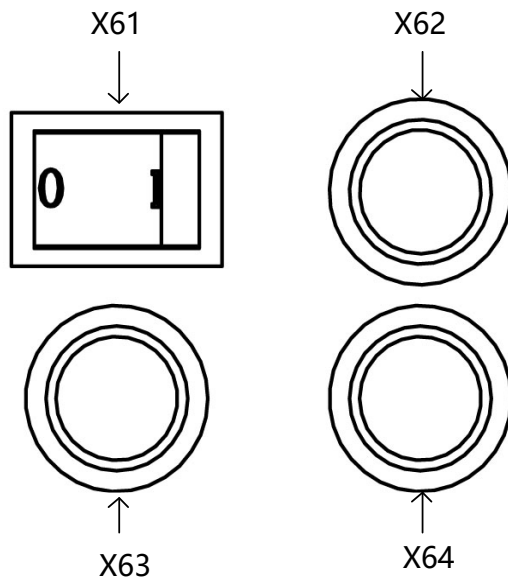



Figure 4-4 Manually release the brake button



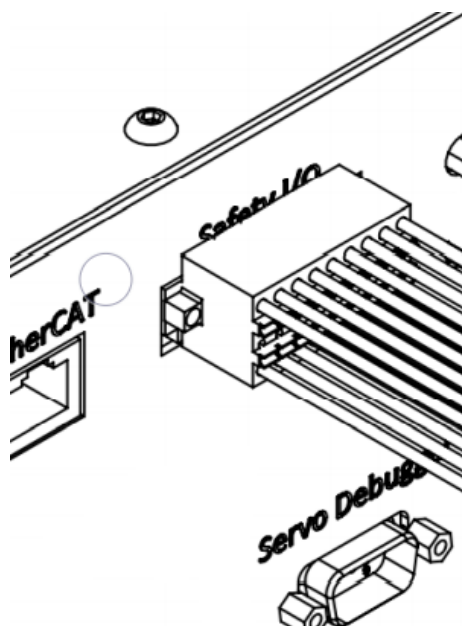
After pressing the brake release button, the manipulator must be prevented from falling due to gravity, causing damage to the system.

Tip

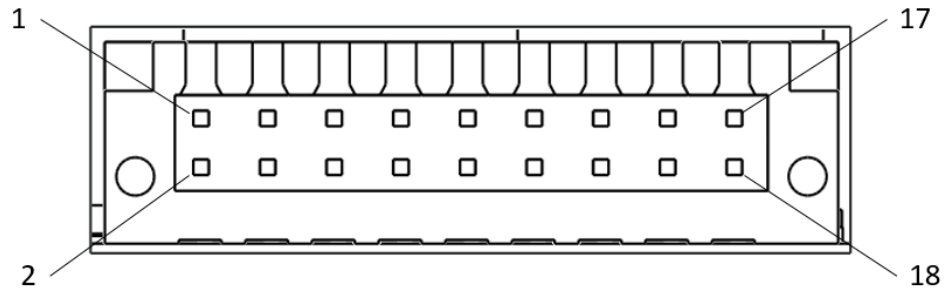
### 4.2.3 Instructions for the external interface of the control cabinet

#### Safety IO interface

inCube22 control cabinet Safety IO interface, the definition of each interface signal is fixed, and the user cannot configure it. Refer to Figure 4-5 for the wiring diagram and pin identification diagram of Safety IO interface, and Table 4-3 for pin definitions.



(a) Safety IO interface wiring diagram



(b) Safety IO interface pin identification diagram

Figure 4-5 Safety IO interface and pin diagram

Table 4-3 Safety IO interface definition list

Pin number	Signal name	Signal meaning	In/Out
1	D+24V_EX	24V power supply	Power
2	EX_ESTOP_DI_SAF	External emergency stop input	In
3	D+24V_EX	24V power supply	Power
4	EX_ESTOP_DI_INT	External emergency stop input	In
5	D+24V_EX	24V power supply	Power
6	BARRIER_DI_SAF	Safety barrier input	In
7	D+24V_EX	24V power supply	Power
8	BARRIER_DI_INT	Safety barrier input	In
9	D+24V_EX	24V power supply	Power
10	EX_SAFE_DI_SAF	External security input	In
11	D+24V_EX	24V power supply	Power
12	EX_SAFE_DI_INT	External security input	In
13	GND_EX	Signal ground	GND
14	EX_ALARM_DI	External alarm input, equipped with dedicated alarm input pins for external axis drivers	In
15	ESTOP_OUT_1+	Emergency stop output contact 1 positive	Out
16	ESTOP_OUT_1-	Emergency stop output contact 1 negative	Out
17	ESTOP_OUT_2+	Emergency stop output contact 2 positive	Out
18	ESTOP_OUT_2-	Emergency stop output contact 2 negative	Out

Safety IO provides signals such as emergency stop output, external emergency stop input, external alarm input, external safety barrier input, and external safety confirmation input. The signal usage method is shown in pin numbers 1-40 in Figure 4-6.

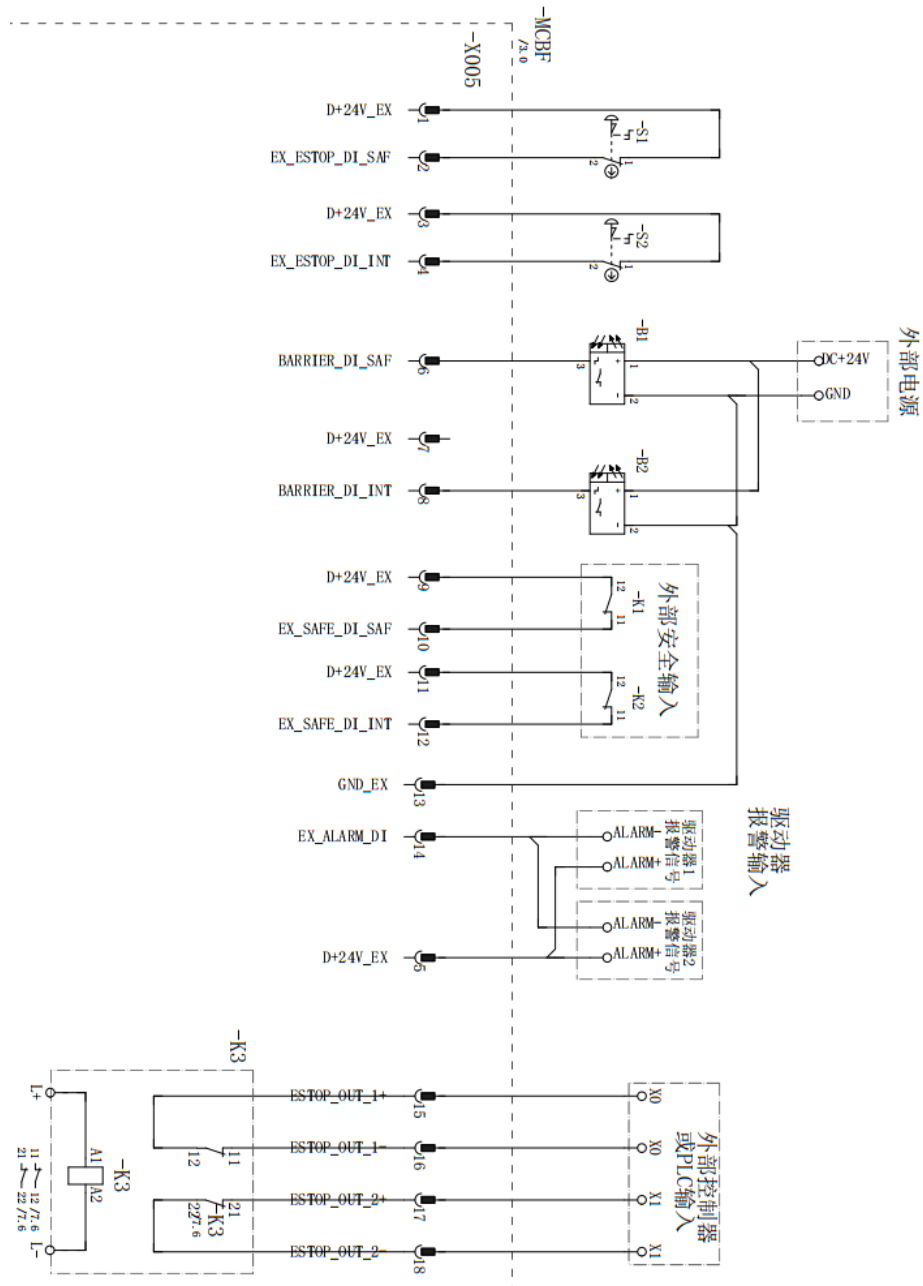


Figure 4-6 Safety IO output signal

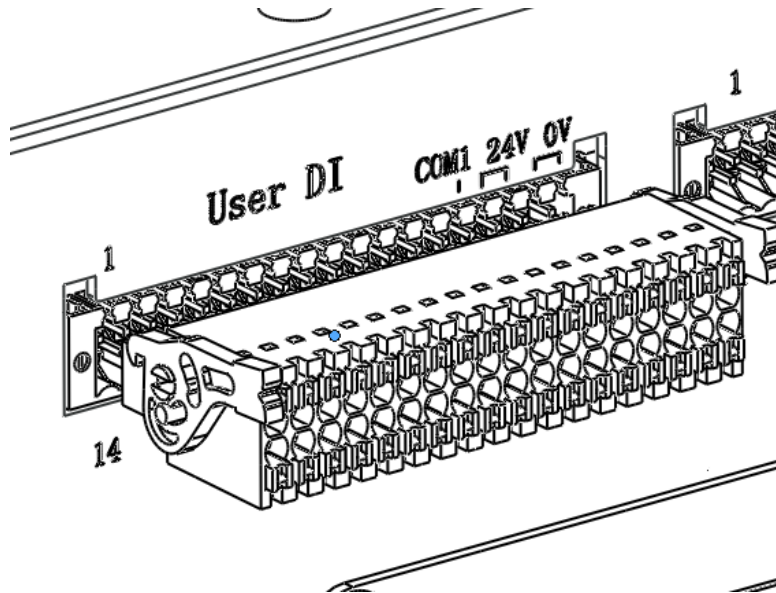
### User DI interface

The inCube22 control cabinet provides users with 26 channels of DI, 2 channels of input common interface, and 4 channels of power interface. The "D+24V-EX" and "GND\_EX" of this power interface can only be used for DI function testing, and cannot be used for power output above 0.5W, otherwise it will cause abnormal or ineffective IO function.

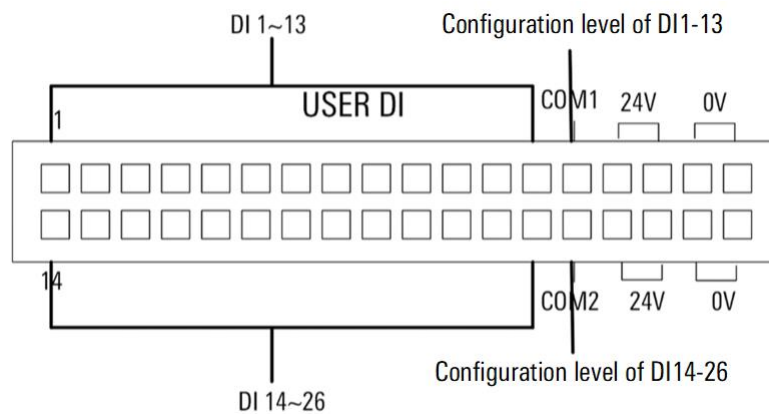
When using the DI interface, an external power supply must be used.

The User DI and User DO of the control cabinet use the same connector, which may result in incorrect insertion. When the User DO is connected to an inductive load, an external 24V power supply needs to be connected. If the User DI and User DO are plugged in incorrectly, it will cause damage to the circuit of the control cabinet. Please ensure that the connectors are connected to the correct sockets when using User DI and User DO.

The wiring diagram and interface pin labels of the User DI interface are shown in Figure 4-7. The definition of the User DI interface is detailed in Table 4-4, and the interface usage information is shown in Figure 4-8 and Figure 4-10. The User DI pin number will be identified by screen printing on the sheet metal surface.



(a) User DI interface wiring diagram



(b) User DI interface pin identification diagram

Figure 4-7 User DI interface and pin diagram

Table 4-4 User DI Interface Definition List

Screen printing position	Signal significance	In/Out
DI 1	Configurable digital input	In
DI 2	Configurable digital input	In
DI 3	Configurable digital input	In
DI 4	Configurable digital input	In
DI 5	Configurable digital input	In
DI 6	Configurable digital input	In
DI 7	Configurable digital input	In
DI 8	Configurable digital input	In
DI 9	Configurable digital input	In

Screen printing position	Signal significance	In/Out
DI 10	Configurable digital input	In
DI 11	Configurable digital input	In
DI 12	Configurable digital input	In
DI 13	Configurable digital input	In
DI 14	Configurable digital input	In
DI 15	Configurable digital input	In
DI 16	Configurable digital input	In
DI 17	Configurable digital input	In
DI 18	Configurable digital input	In
DI 19	Configurable digital input	In
DI 20	Configurable digital input	In
DI 21	Configurable digital input	In
DI 22	Configurable digital input	In
DI 23	Configurable digital input	In
DI 24	Configurable digital input	In
DI 25	Configurable digital input	In
DI 26	Configurable digital input	In
COM 1	DI1-13 input common terminal	
COM 2	DI14-26 input common terminal	
24V	24V power supply	Power
24V	24V power supply	Power
24V	24V power supply	Power
24V	24V power supply	Power
0V	Signal ground	GND
0V	Signal ground	GND
0V	Signal ground	GND
0V	Signal ground	GND

PNP or NPN type sensor signals, switch signals, and relay contact signals can be used as inputs for user DI. The inCube22 control cabinet supports PNP and NPN type sensor inputs. When using an NPN type sensor, the common end corresponding to this DI needs to be directly connected to an external 24V power source. When using a PNP type sensor, the common end corresponding to this DI needs to be connected to an external power source ground. The control cabinet provides two sets of configurable common terminals. Among them, COM1 corresponds to DI1~DI13, and COM2 corresponds to DI14~DI26.

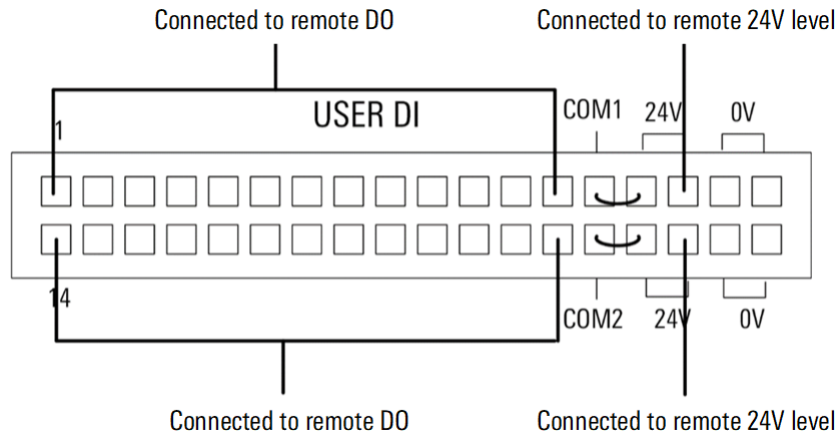


Figure 4-8 User DI interface instructions (NPN Input)

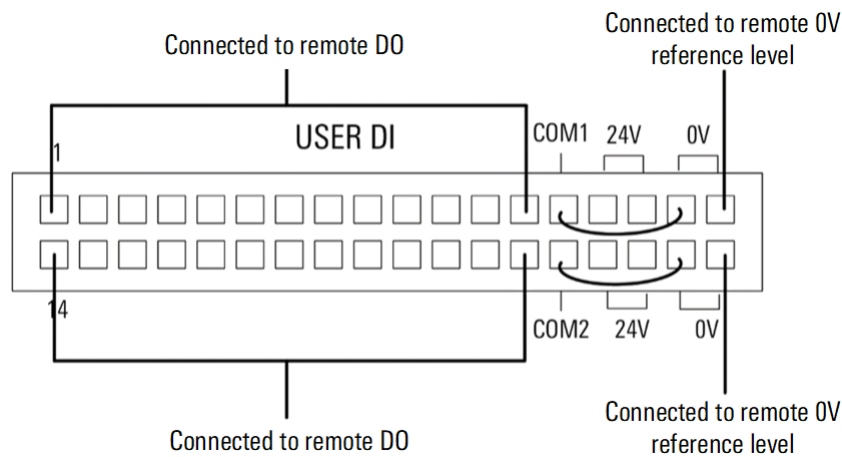


Figure 4-9 User DI interface instructions (PNP Input)

### User DO interface

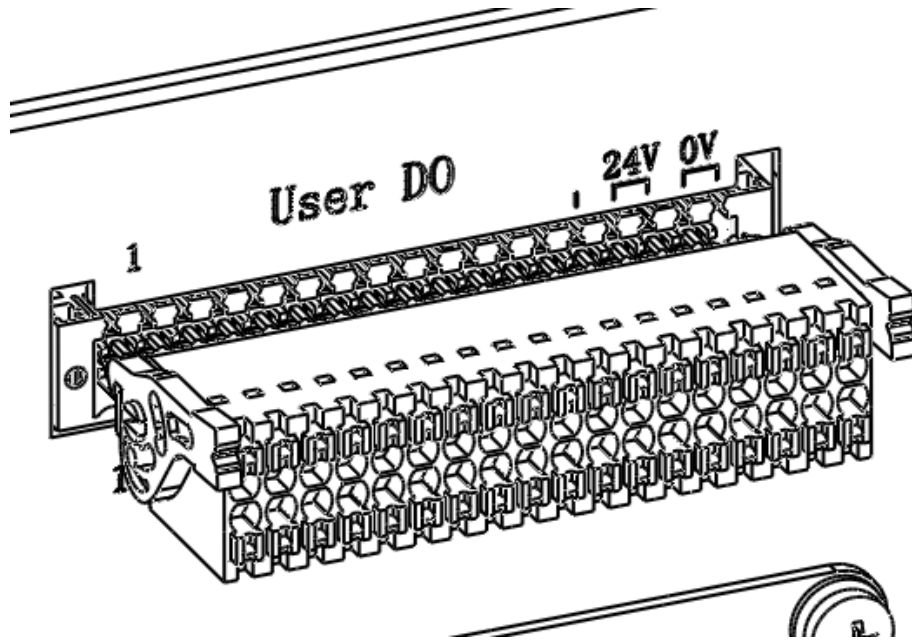
The inCube22 control cabinet provides users with 26 DO channels and 4 continuous current power interfaces. The wiring diagram of the User DO interface is shown in Figure 4-10 (a), and the pin labels of the User DO interface are shown in Figure 4-10 (b). The definition of the User DO interface is detailed in Table 4-5.

The inCube22 control cabinet provides users with 26 DO interfaces with NPN polarity, and the maximum single input current of all DOs is 160mA. When DO is connected to an external load, to avoid damage to the interface during shutdown, it is necessary to connect "24V" to an external power source. Refer to Figure 4-10 for interface usage information.

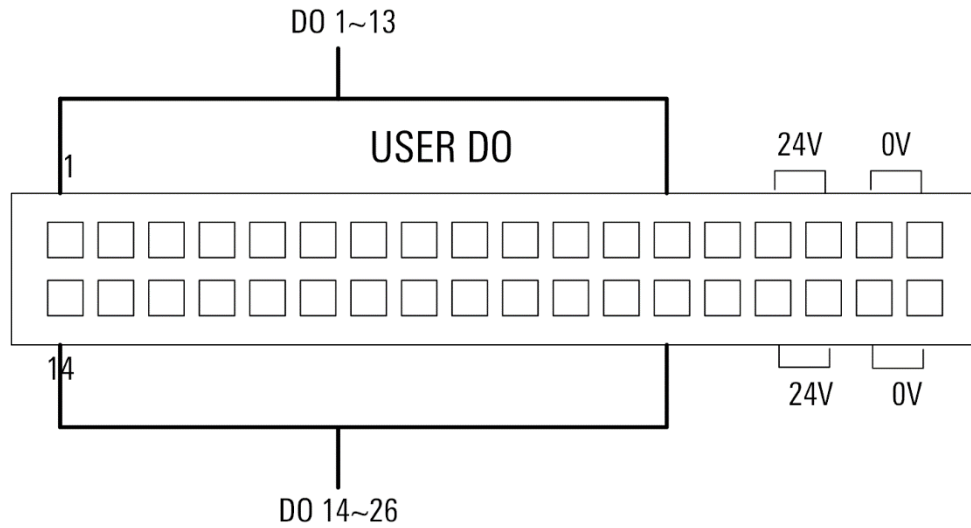
If external PNP polarity sensors and switches are required, corresponding polarity transfer equipment needs to be used.

The User DI and User DO of the control cabinet use the same connector, which may result in incorrect insertion. When the User DO is connected to an inductive load, an external 24V power supply needs to be connected. If the User DI and User DO are plugged in incorrectly, it will cause damage to the circuit of the control cabinet. Please ensure that the connectors are connected to the correct sockets when using User DI and User DO.





(a) User DO interface wiring diagram



(b) User DO interface pin identification diagram

Figure 4-10 User DO interface and pin diagram

Table 4-5 User DO interface definition list

Screen printing position	Signal significance	In/Out
DO 1	NPN digital output	Out
DO 2	NPN digital output	Out
DO 3	NPN digital output	Out
DO 4	NPN digital output	Out
DO 5	NPN digital output	Out
DO 6	NPN digital output	Out
DO 7	NPN digital output	Out
DO 8	NPN digital output	Out
DO 9	NPN digital output	Out

Screen printing position	Signal significance	In/Out
DO 10	NPN digital output	Out
DO 11	NPN digital output	Out
DO 12	NPN digital output	Out
DO 13	NPN digital output	Out
DO 14	NPN digital output	Out
DO 15	NPN digital output	Out
DO 16	NPN digital output	Out
DO 17	NPN digital output	Out
DO 18	NPN digital output	Out
DO 19	NPN digital output	Out
DO 20	NPN digital output	Out
DO 21	NPN digital output	Out
DO 22	NPN digital output	Out
DO 23	NPN digital output	Out
DO 24	NPN digital output	Out
DO 25	NPN digital output	Out
DO 26	NPN digital output	Out
NC	Not connected	
NC	Not connected	
24V	Power interface for continuous flow	Power
24V	Power interface for continuous flow	Power
24V	Power interface for continuous flow	Power
24V	Power interface for continuous flow	Power
0V	Ground	GND
0V	Ground	GND
0V	Ground	GND
0V	Ground	GND

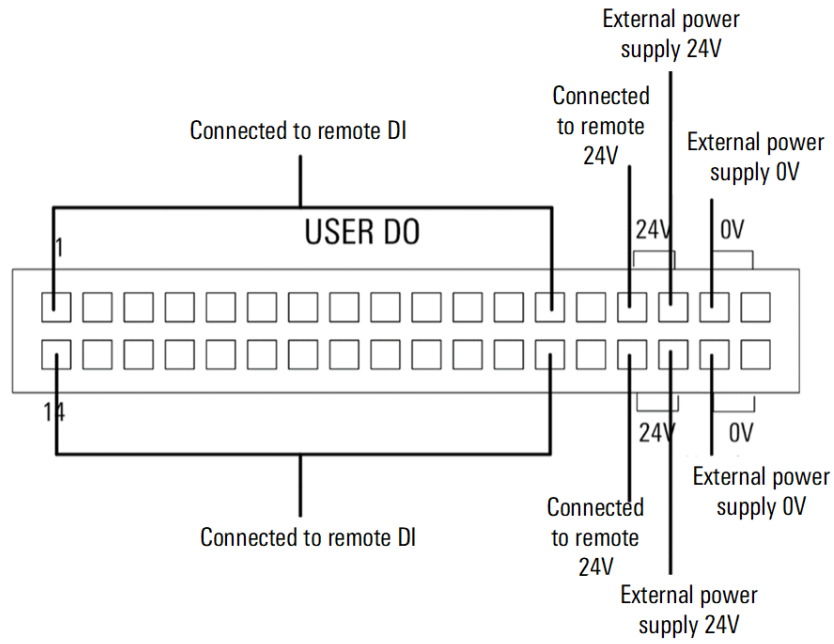
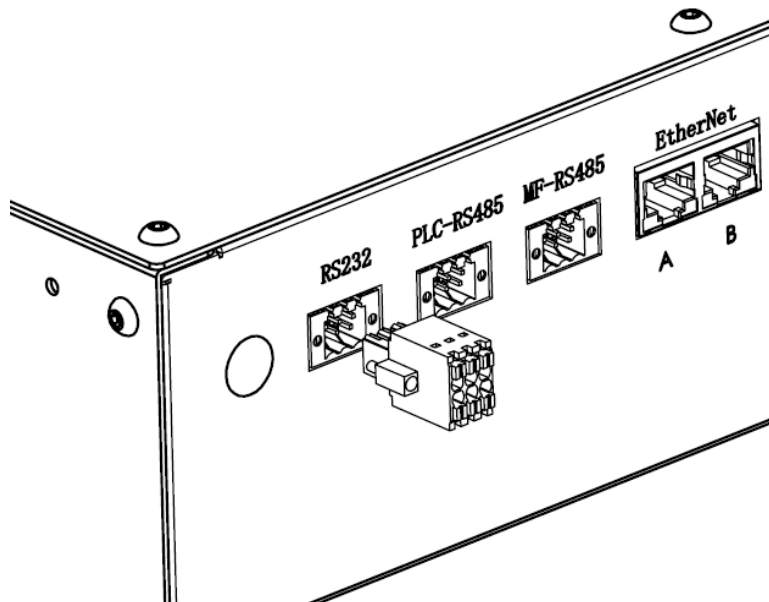


Figure 4-11 User DO interface instructions

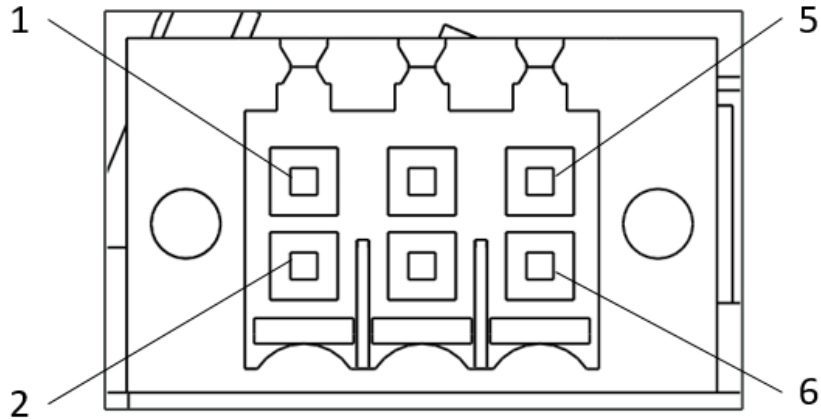
### User serial RS232 interface

The InCube22 control cabinet RS232 interface is an RS232 communication interface provided to users, and the RS232 interface is a plug-in terminal connector.

When using the RS232 interface, you can select the cables that are paired with the RS232 interface according to the inCube22 accessory list in Appendix A. The wiring diagram and pin identification diagram of the RS232 interface refer to Figure 4-12, and the cable definition refers to Table 4-6.



(a) RS232 interface wiring diagram



(b) RS232 interface pin identification diagram

Figure 4-12 RS232 interface and pin diagram

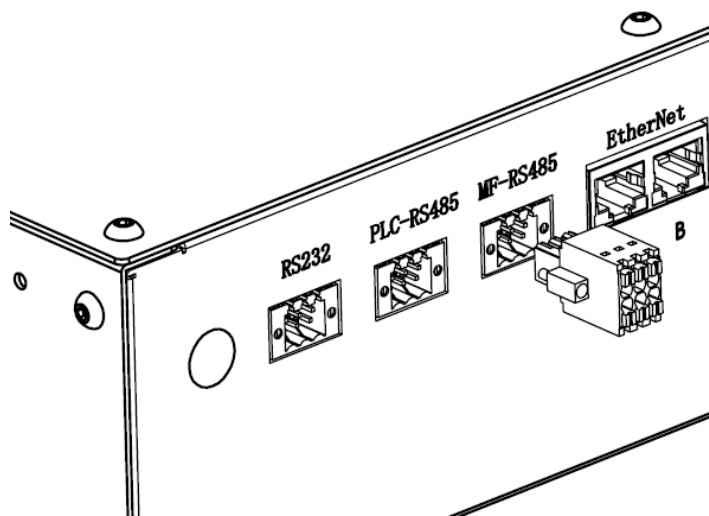
Table 4-6 RS232 interface definition diagram

Interface	Pin	Cable definition	Signal significance	In/Out
RS232	1	PC_UART0_RXD	Control cabinet sending	Out
	2	PC_UART0_TXD	Control cabinet reception	In
	3	GND_ISO_RS232	Signal ground	GND
	4	CHGND	Shield ground	

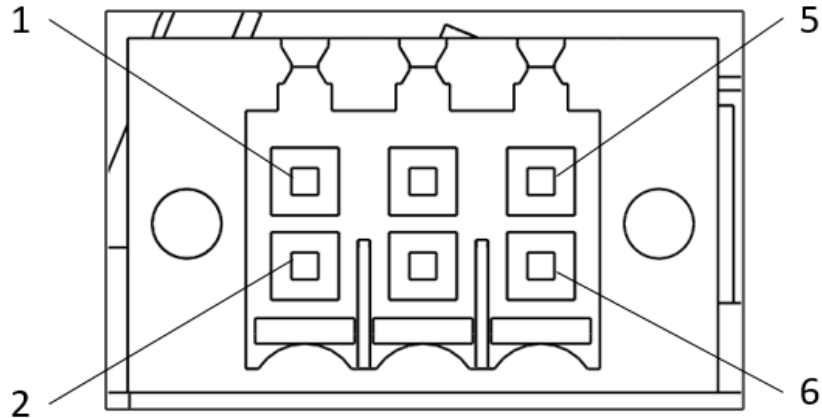
**MF-RS485 interface**

The MF-RS485 interface of the inCube22 control cabinet is an external MF interface, and the RS485 interface is a plug-in terminal connector.

When using this interface, you can refer to the inCube22 accessory list in Appendix A and the cables paired with the MF-RS485 interface. The MF-RS485 interface wiring diagram and pin identification diagram refer to Figure 4-13, and the cable definition refers to Table 4-7.



(a) MF-RS485 interface wiring diagram



(b) MF-RS485 interface pin identification diagram

Figure 4-13 MF-RS485 interface and pin diagram

Table 4-7 MF-RS485 interface definition list

Interface	Pin	Cable definition	Signal significance	In/Out
MF-RS485 interface	1	RS485+	RS485 bus positive	In
	2	RS485-	RS485 bus negative	Out
	3	GND_ISO_MF	Isolation signal ground	GND
	4	CHGND	Shield ground	

### PLC-RS485 interface

The PLC-RS485 interface of the inCube22 control cabinet is an external PLC slave interface, and the RS485 interface is a plug-in terminal connector.

When using this interface, you can refer to the inCube22 accessory list in Appendix A and the cables paired with the PLC-RS485 interface. The PLC-RS485 interface is the same as MF-RS485, and the wiring diagram and pin identification diagram of the PLC-RS485 interface refer to Figure 4-12, and the cable definition refers to Table 4-7.

### User Ethernet port

The inCube22 control cabinet provides users with two user Ethernet network ports, which are used to connect industrial Ethernet and sensors communicating with Ethernet.

Refer to Figure 4-14 for the interface and pin labeling diagram of the user Ethernet port.

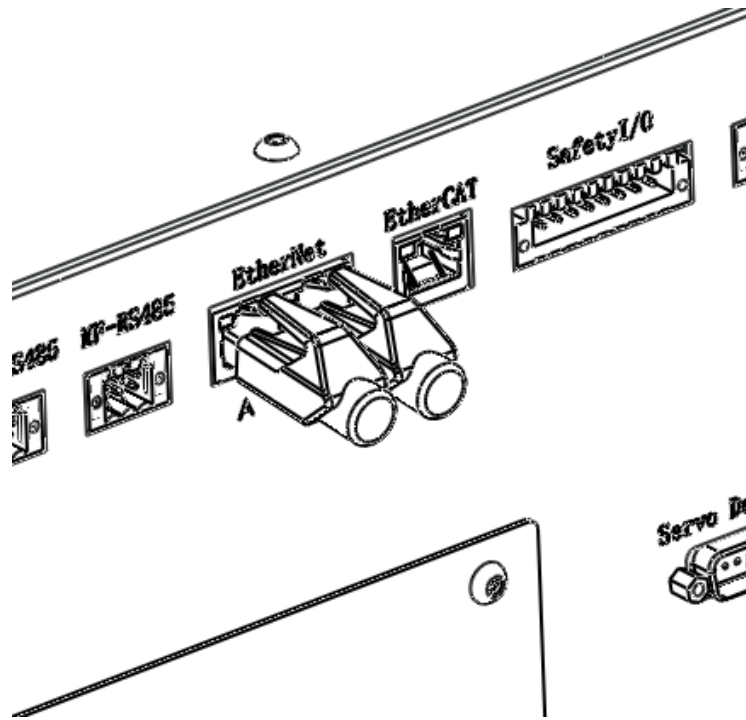


Figure 4-14 Interface and label diagram of user Ethernet network interface

### User EtherCAT network port

The inCube22 control cabinet reserves one EtherCAT interface as the expansion external axis interface and EtherCAT protocol conversion port. Maximum support for expanding 6 external axes. Refer to Figure 4-15 for the interface and pin labeling diagram of the user EtherCAT network port.

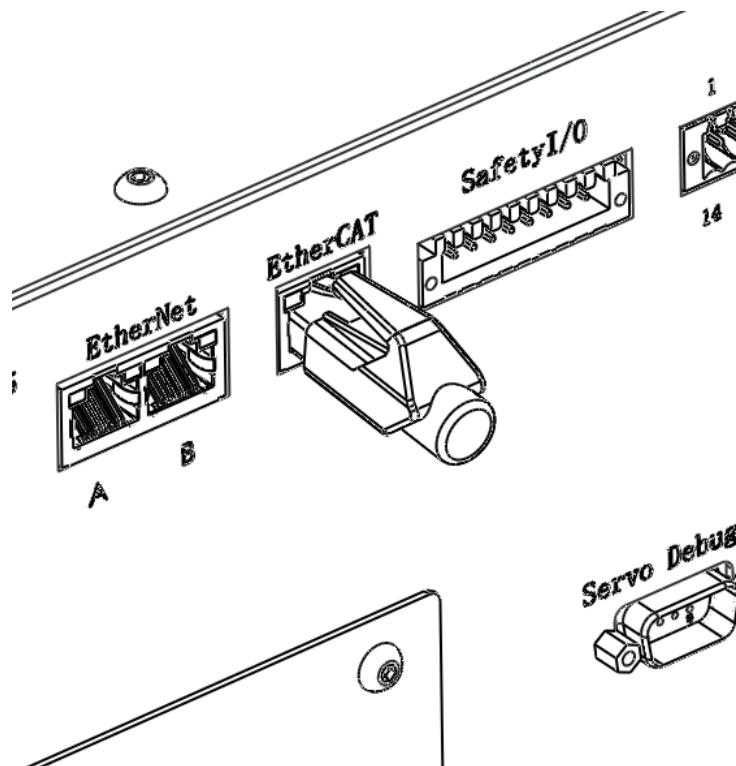


Figure 4-15 Interface and pin labeling diagram of user EtherCAT network interface

The use of external axis extension is as follows: the external axis driver is external, and inCube22 does not provide power supply for the external axis motor and external axis driver, nor does it provide power supply for the external axis brake. The external axis communicates with inCube22 through EtherCAT bus, and the external axis driver alarm is connected to inCube22 through the safety IO interface.



When connecting the external expansion axis EtherCAT communication port of the inCube22 control cabinet, the connector shown in the inCube22 accessory list in Appendix A can be selected for installation and connection.

### 4.3 Control cabinet grounding

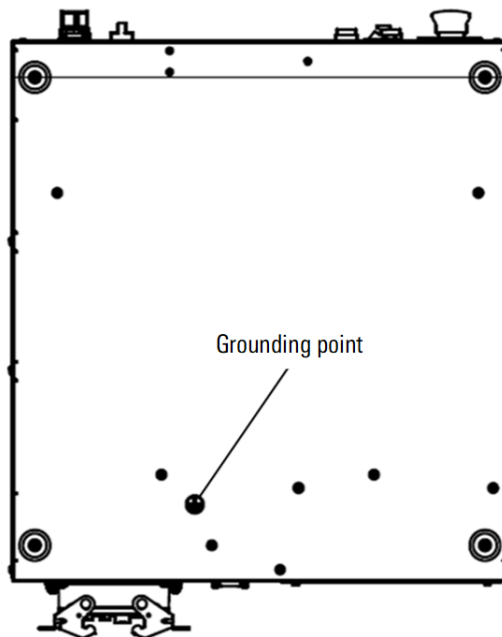


Figure 4-16 Diagram of ground wire connection points in control cabinet

The inCube22 control cabinet must have a reliable ground connection, and the main purposes of the ground connection are:

- Grounding ensures that all unit circuits in the inCube22 control cabinet have a common reference zero potential, ensuring that there is no potential difference between the grounding of each circuit and ensuring the stable operation of the system.
- The reliable grounding connection of the inCube22 control cabinet can prevent interference from external electromagnetic fields. The case grounding provides a discharge channel for transient interference, which can discharge a large amount of charges accumulated on the case due to electrostatic induction through the ground.
- Ensure safe work. When direct lightning electromagnetic induction occurs, electronic equipment damage can be avoided; When the input voltage of the power frequency AC power supply is directly connected to the casing due to poor insulation or other reasons, it can avoid electric shock for operators.

The inCube22 control cabinet is grounded through the PE pin in the power cord inlet, and it is necessary to ensure that the input end of the cable connected to the control cabinet has a reliable ground connection. In addition, the control cabinet body provides a grounding point, and if necessary, the ground wire can be connected to the grounding point shown in Figure 4-16.

## 4.4 Robot stop method

According to the definition of stop function in 9.2.2 of GB5226.1-2008 "Mechanical and Electrical Safety-Part 1: General Technical Conditions", combined with the specific design of the robot, the definition of 3 stop modes and corresponding descriptions are shown in Table 4-8:

Table 4-8 Stop method and corresponding instructions

Type	Description	
STOP0	Case1	MCBS alarm stop0 indicate, DCBS execution will stop immediately without keeping track, and then MCBS delay control will cut off the power supply through the main circuit relay, which is an uncontrollable stop
	Case2	DCBS has an uncontrollable fault, triggering a free stop or brake stop, which is an uncontrollable stop
	Case3	Sudden external power failure, DCBS cannot perform immediate stop, triggering the brake to stop, it is an uncontrollable stop
STOP1	Make the robot stop quickly and maintain the current planned path. When the robot stops, control the driver servo_off and cut off the power supply through the main circuit relay, which is a controllable stop	
STOP2	Make the robot stop quickly and need to maintain the current planned path. When the robot stops, it does not servo_off and does not cut off the power supply, which is a controllable stop	

## 4.5 Robot system safety

The robot system referred to in this article (including the manipulator, control cabinet, teaching pendant, and all the software and hardware included) can only operate normally by constructing peripheral devices and systems. These peripheral devices and systems must include safety barriers, external emergency stop devices, and external safety input devices necessary for the safe use of robots.

The signal definition of the above safety devices is fixed in the Safety IO interface of the inCube22 control cabinet. The control cabinet can only be used normally when the safety signal of Safety IO has a reasonable level, otherwise the control cabinet will alarm. The connection of safety IO interface safety signals is shown in Figure 4-6, and the names and meanings of pin numbers in the figure are detailed in Table 4-3.

The safety input signals include safety barrier signals, external emergency stop signals, and external safety signals, as shown in Table 4-9

Table 4-9 Safety input signal description

Signal name	Description
Safety fence signal	The safety light curtain signal is mainly equipped for the safety fence, supports the PNP type sensor, and must be equipped with an external DC24V power supply
External emergency stop input signal	It is mainly the emergency stop signal of the external system that cooperates with the robot to complete the work. When the emergency stop button of the external system is photographed, the external emergency stop signal of the control cabinet is valid, and the robot stops according to STOP0. The external emergency stop output signal needs to have two channels, one of which is used as a safety link backup, and the external emergency stop input signal is valid at high level



Signal name	Description
External safety input signal	It is mainly the safety (fault) signal of the external system that completes the work with the robot. The control cabinet will judge whether the robot needs to be stopped according to the state of the external system. External safety input signal is valid at high level

## 4.6 Control cabinet start

In order to ensure the normal startup and use of the inCube22 control cabinet, you must strictly follow the steps below to start the operation:

Step1. Visually inspect the appearance of the control cabinet to check whether the cabinet body is bumped or deformed.

Step2. Make sure that the control cabinet is free of condensation and water droplets. Make sure that there are no water droplets in the cabinet before starting up.

Step3. Install the control cabinet, refer to Chapter 3.4.3 of this manual.

Step4. Connect the teach pendant, refer to Chapter 3.4.3 of this manual.

Step5. Make sure that the shielding knob of the teach pendant is set to the I position, refer to chapter 4.2.2 of this manual.

Step6. Connect the power encoder cable, refer to Chapter 3.4.3 of this manual.

Step7. Connect power, refer to Chapter 3.4.3 of this manual.

Step8. To connect the safety input of Safety IO, refer to Chapter 4.5 of this manual.

Step9. Turn on the switch of the control cabinet, refer to chapter 4.2.2 of this manual.



## 5 Preventive maintenance

The Servo Debugger interface of the inCube22 control cabinet is a multi axes drive debugging interface located on the rear panel of the control cabinet, as shown in Figure 5-1. When debugging multi axis drive parameters, it is necessary to use an RS422 to USB cable to connect to the interface shown in Figure ①.

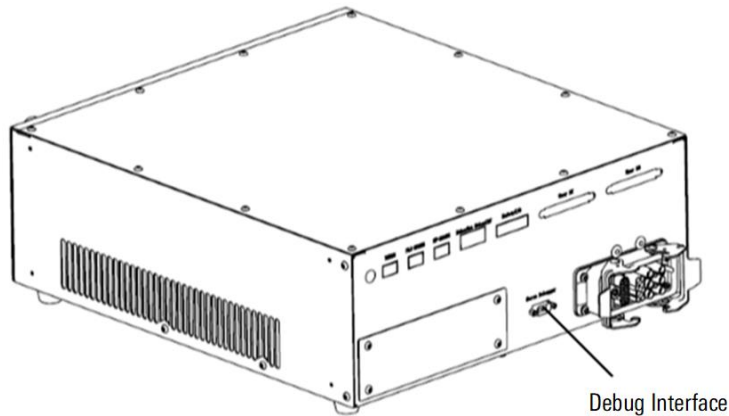


Figure 5-1 Control cabinet Servo Debugger interface

The routine maintenance items and cycles of the inCube22 control cabinet are shown in Table 5-1.

Table 5-1 Routine maintenance items and cycles

Maintenance project	Maintenance cycle
Emergency stop switch	6 months
Switch	6 months
Indicator light	6 months
Heavy duty connector	6 months
Fan and air duct	6 months
Connector	6 months

### 5.1 Maintenance process

- Check whether the wiring in the cabinet is firm and whether the connector is loose;
- Whether the power switch, emergency stop button can be pressed or photographed normally, and whether the shielding knob can be turned;
- Whether indicator lights and other indicating devices can send out signals normally;
- Whether the connection of the heavy-duty connector is loose;
- Whether the fan rotates normally;
- Whether there is much dust accumulated in the cabinet.

### 5.2 Replace the dust filter

inCube21 is equipped with a dust-proof net at the entrance of the air duct of the control cabinet. Refer to Figure 5-2. Under normal use, the dust-proof net of the control cabinet should be cleaned every 3 months and replaced every other year; when the environment is bad, the replacement and cleaning cycle should be shortened.

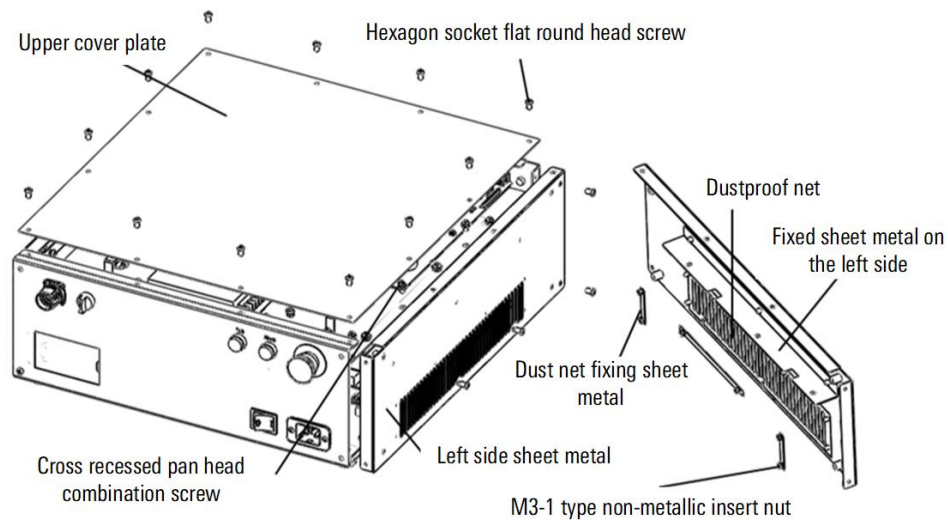


Figure 5-2 Dust screen replacement or cleaning

Demolition steps of the dust-proof net:

- Step1. Use an Allen wrench to remove the M4 × 8 Allen flat head screws from the upper cover plate and remove the upper cover plate.
- Step2. Use an Allen wrench to remove the M4 × 8 hex flat round head screw, and use a Phillips screwdriver to remove the M4 × 8 cross slot pan head combination screw that fixes the left side sheet metal.
- Step3. Remove the left side sheet metal and the left side fixed sheet metal as a whole.
- Step4. Remove the six M3 type 1 non-metallic insert lock nuts on the inner side of the left side sheet metal using a hex wrench, and remove the dust screen to secure the sheet metal.
- Step5. Remove the dust screen for cleaning or replacement.

Dust-proof net installation steps:

- Step1. Stick the cleaned or new dustproof net onto the left side sheet metal through its built-in double-sided adhesive.
- Step2. Fix the dust net fixing sheet metal to the left side sheet metal using 6 M3 Type 1 non-metallic insert lock nuts.
- Step3. Fix the left side sheet metal and the left side fixed sheet metal on the control cabinet as a whole using M4 × 8 hexagonal flat head screws, and install the left side sheet metal on the left side of the control cabinet; Use M4 × 8 cross recessed pan head combination screws to secure the left side fixed sheet metal to the middle partition on the control cabinet.
- Step4. Fix the upper cover plate with M4 × 8 hexagonal flat round head screws.

## 6 Fault finding, diagnosis and repair

---

### 6.1 Indicator light

When the indicating device such as the indicator lamp fails to send out signals normally, first determine whether the connection line is faulty; if there is no fault in the line, replace the indicating device and observe whether the signal can be sent out normally.

### 6.2 Heavy duty connector

When the heavy-duty connector and other connecting devices become loose, the plug and socket of the heavy-duty connector should be separated, re-inserted and tightened to ensure reliable connection.

### 6.3 Fan

When the fan does not rotate normally, first determine whether the connecting harness is faulty; if there is no fault in the wiring, replace the fan and observe whether it rotates normally.

### 6.4 Fuse

When the power indicator of the control cabinet is on, but some electrical components cannot be powered on, please check whether the corresponding fuse on the adapter board is burned out. If it is burned out, please replace the fuse according to Table 6-1.

Table 6-1 The function of each fuse and replacement instructions

MCBS				
No.	Label	Type	Parameter	Meaning
1	F1	0454001.	1A/125VAC	Manipulator, 24VDC isolated power supply
2	F2	0454002.	2A/125VAC	Teaching pendant, 24VDC power supply
3	F3	0454001.	1A/125VAC	Panel, 24VDC power supply
4	F4	0454001.	1A/125VAC	Fan, 24VDC power supply
5	F5	0454002.	2A/125VAC	MCBS board, 24VDC power supply
6	F6	0454001.	1A/125VAC	Safety IO, 24VDC isolated power supply
DPBS				
No.	Label	Type	Parameter	Meaning
1	F1	215010	10A/250VAC	DPBS board, 220VAC power supply



## Appendix A inCube22 accessories list

Schedule 1 inCube22 control cabinet installation accessories list

Accessory name	Part number	Quantity	Accessory attributes
inCube22-19 inches cabinet mounting bracket - left	P01035000764	1	Optional
inCube22-19 inches cabinet mounting bracket - right	P01035000765	1	Optional
InCube22-handle	P01055000251	2	Optional (To be used in conjunction with mounting brackets)
ARCCD20- cabinet stacking connection	P01035000521	8	Optional

Schedule 2 inCube22 control cabinet cable accessories list

Accessory name	Part number	Corresponding interface	Accessory attributes
inCube22- heavy duty harness	P04082000929	Overload interface	Standard (length 5 meters)
ARCC - teaching pendant external harness	P04082000346	Teaching pendant interface	Standard (length 5 meters)
Power line	P04082000949	Power cord inlet	Standard (length 3 meters)
SCRC10- RS232 harness outside the cabinet	P04082000843	RS232	Optional (length 3 meters)
SCRC10- RS485 wiring harness outside the cabinet	P04082000844	PLC-RS485	Optional (length 5 meters)
SCRC10- RS485 harness outside the cabinet	P04082000844	MF-RS485	Optional (length 5 meters)
Industrial network cable	P04082000279	Ethernet	Optional (length 5 meters)
	P04082000279	EtherCAT	Optional
inCube20- user DI terminal module cable	P04082001304	User DI	Optional (length 5 meters)
inCube20- user DO terminal module cable	P04082001305	User DO	Optional (length 5 meters)
USB to RS422/RS485 cable	P04082000251	Servo Debugger	Optional
ARCCD20- Installation of buckle plate sheet metal	P01035000547	\	Optional (Optional at the same time)
MCBS-IEB gusset board	P05245000108	\	
ARCCD20-MCBS and gusset board connecting wire	P04082000595	\	
PWM and analog output_ voltage and current input cables	P04082000594	J3\J5	Optional (length 5 meters)
Magnetic grating ruler and CAN_ Encoder shared wiring harness	P04082000596	J6\J7	Optional (length 5 meters)







Cable	Power line, 22 core (12AWGx7C + 15AWGx3C + 17AWGx1C + 19AWGx12C) Encoder cable, 24 core (23AWGx12P)	Cable length	5 meters (standard)
-------	--	--------------	---------------------



Tip

- The wiring sequence of the control cabinet side interface and the body side interface of the inCube22 cabinet external heavy-duty harness corresponds one-to-one.
- The definition of overloaded interfaces can be found in Chapter 3.4.4.

### External wiring of teaching pendant interface

The basic specifications and installation method of the inCube22 teaching pendant harness are detailed in Schedule 2.

Schedule 2 inCube22- Basic specifications and installation method of teaching pendant wiring harness

Serial number		Name	ARCC - Teaching pendant external harness	Device code	P04082000346
Connector A	M23 female head				
Connector B	Teach Pendant				
Cable	A total of 14 cores, of which 4 are super Category 5 network cables, and the remaining 10 are directly connected		Cable length	5 meters	



Tip

Refer to Chapter 3.4.4 for the definition of the teaching pendant interface end.

### External wiring of power interface

The basic specifications and installation method of inCube22 power wire harness are detailed in Schedule 3.

Schedule 3 inCube22- Basic specifications and installation method of power wire harness

Serial number		Name	Power line	Device code	P04082000949
Connector A	Power connector plug				
Connector B	three-pin plug				
Cable	3-core, 2.5mm <sup>2</sup>		Cable length	3 meters	


### User DO interface external wiring

The basic specifications and installation method of the inCube20 user DO terminal module cable are detailed in Appendix 4.

Schedule 4 InCube20- Basic specifications and installation method of user DO terminal module cables

Serial number	1	Name	InCube20- User DO terminal module cable	Device code	P04082001305
---------------	---	------	---	-------------	--------------

Connector A	Weidmuller, C2P 3.50_36_180LR SN OR BX quick plug terminal connector		
Connector B	European style cold pressed terminal		
Cable	36 core 0.3mm <sup>2</sup>	Cable length	5 meters



Tip


- The connector wire sequence at both ends of the inCube20 user DO terminal module cable corresponds one-to-one with the number tube label.
- The cable numbers of the inCube20 user DO terminal module correspond one-to-one with the control cabinet and user DO interface numbers.
- If selecting a wiring harness, it is recommended to choose a cable with a wire diameter of AWG22-AWG24.

### User DI interface external wiring

inCube20 - The basic specifications and installation method of user DI terminal module cables are detailed in Schedule 5.

Schedule 5 inCube20- Basic specifications and installation method of user DI terminal module cables

Serial number	4	Name	inCube20- User DI terminal module cable	Device code	P04082001304
Connector A	Weidmuller, C2P 3.50_36_180LR SN OR BX quick plug terminal connector				
Connector B	European style cold pressed terminal				
Cable	36 core 0.3mm <sup>2</sup>	Cable length	5 meters		



Tip

- The connector wire sequence at both ends of the inCube20 user DI terminal module cable corresponds one-to-one with the number tube label.
- The cable numbers of the inCube20 user DI terminal module correspond one-to-one with the control cabinet and user DI interface numbers.
- If selecting a wiring harness, it is recommended to select cables with wire diameters of AWG22~AWG24.

### RS232 interface external wiring

The basic specifications and installation method of external wiring for inCube22- RS232 interface are detailed in Schedule 6.

Schedule 6 The basic specifications and installation method of external wiring for inCube22- RS232 interface

Serial number	5	Name	SCRC10- RS232 harness outside the cabinet	Device code	P04082000843
Connector A	Weidmuller, B2CF 3.50/06/180F SN BK BX quick plug terminal type connector				
Connector B	D_ SUB, DB9 male, plug, plastic casing				
Cable	3x0.25mm <sup>2</sup> shielding wire	Cable length	3 meters		



The wire sequence of the quick plug terminal connector DB9 connector is 1-2, 2-3, 3-5, and 4-shielded.

### PLC-RS485 interface external wiring

The basic specifications of inCube22-PLC-RS485 cables are detailed in Schedule 7.

Schedule 7 The basic specifications of inCube22- PLC-RS485 cable

Serial number	6	Name	SCRC10- RS485 harness outside the cabinet	Device code	P04082000844
Connector A	Weidmuller, B2CF 3.50/06/180F SN BK BX quick plug terminal type connector				
Connector B	Cold-pressed terminal				
Cable	2×2×0.25mm <sup>2</sup> shielded twisted-pair cable	Cable length	5 meters		

### MF-RS485 interface external wiring

The basic specifications of inCube22-MF-RS485 cable are the same as Schedule 7.

### Ethernet interface external wiring

The basic specifications of industrial network cables are detailed in Schedule 8.

Schedule 8 inCube22- Basic specifications of industrial network cables

Serial number	10	Name	Industrial network cable	Device code	P04082000279
Brand	Hellolink	Cable	4-core AWG26	Cable length	5 meters

### EtherCAT interface external cable

The basic specifications of the drive are the same as Schedule 8.

### Servo Debugger external wiring

The basic specifications of the USB to RS422/RS485 cable are detailed in Schedule 9.

Schedule 9 Basic specifications of USB to RS422/RS485 cable

Serial number		Name	USB to RS422/RS485 cable	Device code	P04082000251
Connector A	DB9	Brand/Model	Z-TEK		
Connector B	USB	Brand/Model	Z-TEK		
Cable	5-core	Cable length	1.8 meters		

### Related options for gusset plates

The basic specifications and installation method of the installation buckle plate sheet metal are detailed in Schedule 10 to 11.

Schedule 10 inCube22- Basic specifications and installation method for installing sheet metal

Serial number	\	Name	ARCCD20- Installation of buckle plate sheet metal	Device code	P01035000547
Length	185mm		Width	\	
Height	60mm		Plate thickness	1.2mm	
Installation method	\		Installing screws	4 hexagonal flat round head screws M4X8	
Use	Used to fix the MCBS-IEB daughter board in the inCube22 control cabinet				

Schedule 11 Basic specifications of MCBS-IEB buckle board

Serial number	\	Name	MCBS-IEB gusset board	Device code	P05245000108
Illustrate	Gusset plate				



Tip

The DF50S point numbers at both ends correspond one-to-one.

### J3\J5 interface external wiring

The basic specifications of PWM and analog output voltage and current input cables are detailed in Schedule 12.

Schedule 12 The basic specifications of PWM and analog output voltage and current input cables

Serial number	13	Name	PWM and analog output_ voltage and current input cables	Device code	P04082000594
Connector A	Hirose, DF51-10DS-2C				
Connector B	European terminal C0.5-8				
Cable	10C × 0.2mm <sup>2</sup>	Cable length	5 meters		

### J6\J7 interface external wiring

The basic specifications of the shared wiring harness between the magnetic grating ruler and the CAN\_ encoder are detailed in Schedule 13.

Schedule 13 The basic specifications of the shared wiring harness between the magnetic grating ruler and the CAN\_ encoder

Serial number	14	Name	Magnetic grating ruler and CAN_ Encoder shared wiring harness	Device code	P04082000596
Connector A	Jing Yuanrong SCSI 14P M				
Connector B	European terminal C0.5-8				

Cable	Jingyuanrong 10.0 twelve core (6 pairs) shielded braided black wire, $\phi$ 10	Cable length	5 meters
-------	--	--------------	----------

### inCube22-19 inches cabinet mounting bracket

The basic specifications and installation method of the inCube22-19 inches cabinet installation bracket and handle are detailed in Attached Schedule 14 and Schedule 15.

Schedule 14 The basic specifications and installation method of the inCube22-19 inches cabinet installation bracket and handle

Serial number	Name	inCube22-19 inches cabinet mounting bracket - left	Device code	P01035000764
Length	31.5mm	Width	31mm	
Height	150.8mm	Plate thickness	1.5mm	
Installation method	Refer to Section 3.4.2	Installing screws	2 cross recessed pan head combination screws M4×10	
Use	Used for installation in a 19 inches cabinet. During installation, the left and right sides of the cabinet are fixed to the 19 inches cabinet by handling handles, and cabinet pallets need to be placed at the bottom to support the load.			

Serial number	Name	inCube22-19 inches cabinet mounting bracket - right	Device code	P01035000765
Length	31.5mm	Width	31mm	
Height	150.8mm	Plate thickness	1.5mm	
Installation method	Refer to Section 3.4.2	Installing screws	2 cross recessed pan head combination screws M4×10	
Use	Used for installation in a 19 inches cabinet. During installation, the left and right sides of the cabinet are fixed to the 19 inches cabinet by handling handles, and cabinet pallets need to be placed at the bottom to support the load.			

Schedule 15 Basic specifications and installation method of inCube22 handle

Serial number	Name	Handle	Device code	P01055000251
Length	112.5mm	Width	11mm	
Height	23mm			
Installation method	Refer to Section 3.4.2	Installing screws	2 cross recessed pan head combination screws M5×10	
Use	Used for installation in a 19 inches cabinet. During installation, the left and right sides of the cabinet are fixed to the 19 inches cabinet by handling handles, and cabinet pallets need to be placed at the bottom to support the load.			

### inCube22- Cabinet stacking connectors

inCube22- The basic specifications and installation method of cabinet stacked connectors are detailed in Appendix 16.

Schedule 16 The basic specifications and installation method of cabinet stacked connectors

Serial number		Name	ARCCD20- Cabinet stacking connectors	Device code	P01035000521
Length	88mm		Width	15mm	
Height	-		Plate thickness	1.5mm	
Installation method	Refer to Section 3.4.2		Installing screws	2 cross recessed pan head combination screws M4X10	
Use	Used for cabinet stacking				



WeChat Official  
Account



Official Website

Service Hotline : 400-990-0909

Official Website : <http://robot.peitian.com>

UM-P05110000033-001 / V1.1.1 / 2023.06.08

© 2011-2023 Peitian Robotics Co., Ltd. All right Reserved.

The description about the product characteristics and availability does not constitute a performance guarantee, and is reference only. The scope of services for the products delivered is subject to the specific contract.