

长广溪智能制造（无锡）有限公司

Changuangxi Intelligent Manufacturing (Wuxi) Co., Ltd.

Collaborative Robot G-Series User Manual Hardware Section

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Changuangxi Intelligent Manufacturing(Wuxi) Co., Ltd.



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Foreword

Thank you for your trust in Changguangxi Intelligent Manufacturing Collaborative Robots and the team. We will provide you and your team with high-quality products and all-round technical services with sincere enthusiasm!

1. Regarding collaborative robots

A collaborative robot is a new type of industrial robot that can work in tandem with humans on production lines, maximizing machine efficiency and human intelligence.

The G series of collaborative robots developed and manufactured by Changguangxi Intelligent Manufacturing consist of robotic arms, control cabinets and teaching devices:

The robotic arm is of superior quality, with modular joints and an aluminum alloy arm tube, providing faster speed, smoother trajectory and more accurate positioning.

The control cabinet is equipped with a self-developed embedded control board card, using the EtherCAT real-time bus, with a control frequency up to 1kHz.

The teaching device is equipped with a self-developed embedded control board card, with a CPU main frequency as high as 1.8G. It supports wired/wireless /4G communication networks, and the UI interface of the teaching device has a powerful human-computer interaction capability.

The G series **redefines a new generation of high-speed collaborative robots** and will bring you a brand-new experience on your industrial intelligence journey!

2. How to use this manual

The user manual includes: **Hardware section** and **Software section**. This is the hardware section, which describes the composition, installation, mechanical characteristics, electrical characteristics and wiring of the robot; **The target readers are those who install, debug and use robots for system design.**

If you have purchased this product, it is recommended that you use it in the following way:

1. It is recommended that you first read through this manual to familiarize yourself with the composition, features, operation methods and programming control methods of the robot;
2. Before powering on the robot, it is recommended that you strictly follow the electrical wiring rules in

the manual, conduct a thorough inspection of the hardware connections, and ensure that the mains power supply is normal and the connections between devices are reliable;

3. It is recommended that you strictly follow the [2.3 Startup Guide](#) in this manual when the robot is turned on;

4. It is recommended that you strictly follow the safety hazards/warnings/precautions/tips in this manual during the use of the robot.

3. Get more information and services

You can access more information and services in the following ways:

1. Visit the official website of Changguangxi intelligent Manufacturing (www.cgxi.com).

2 Scan the QR code on the right to follow Changguangxi Intelligent Manufacturing wechat official account.



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Safety

1. Introduction

There are certain safety risks in the operation of robots, and this chapter covers safety-related matters.

The robot is equipped with a number of safety-related functional Settings, through which the range of motion of the robot's robotic arm joint and tool center point (TCP) can be limited. The robot restricts safety-related functions as shown in Table 1.

Table 1 Table of Robot Limitation Safety Features

Limit Safety Features	Explanation
Joint position	Joint minimum and maximum angular positions
Joint velocity	Maximum angular velocity of the joint
TCP position	TCP position plane of the robotic arm in Cartesian space
TCP velocity	The maximum speed of the robotic arm TCP
TCP force	The maximum thrust of the robotic arm TCP
Momentum	The maximum momentum of the robotic arm
Power	The maximum power exerted by the robotic arm



Danger:

If the safety configuration parameters used by the robot are different from the safety standards defined by the integrator in conducting the risk assessment, it may lead to the inability to reasonably eliminate or fully avoid risks.



Caution:

1. The use and configuration of robot safety-related features must be based on the risk assessment performed by the integrator for the specific robot application.
2. If a robot detects a fault in the safety system during operation or is outside the limits of the safety setting functions, such as an emergency power circuit connection line being cut off, or a position sensor failure, or a violation of the safety-related function limits, Class 0 shutdown protection will be activated. The definition of shutdown protection is provided in [2.3.3 Shutdown categories](#).

2. Safety signs

2.1 Instructions

Instructions for robot safety warning signs are shown in Table 2.

Table 2 Instructions for Robot Safety Signs

Signs	Instructions
 Dangers	This sign indicates that failure to operate as prescribed will result in casualties or serious damage to equipment.
 Warnings	The sign warns that failure to operate in accordance with regulations may result in casualties or serious damage to equipment.
 Caution	The sign warns of the possibility of injury to personnel or damage to equipment if not operated in accordance with regulations.
 Tips	The sign indicates information that requires special attention.

2.2 Notes

Users are required to read the following descriptions carefully and be fully familiar with the safety matters described in Table 3 to protect personnel safety and prevent product damage.

When starting up a robot or a system device equipped with a mechanical arm for the first time, the provisions in Table 4 must be followed. More detailed safety-related information will be introduced separately in other chapters of the manual.

When actually operating, please conduct a comprehensive assessment of the operational risks of the equipment based on the on-site conditions.

Table 3 Description of Robot Risk Signs

Risk signs	Instructions
 Dangers	1. Please install the robot and all related electrical equipment in accordance with the requirements and specifications set out in this manual. 2. The robot and its protective system must be tested and inspected before the first use of the robot and before the equipment equipped with the robot is put into production. 3. Before starting the equipment for the first time, it is necessary to check that the equipment is intact and the operation is safe. It is necessary to check for compliance with effective national or regional safety production regulations, and all safety features must be tested in advance. 4. The user must check and ensure that all safety parameters and user procedures are correct and that all safety features are in effect. A person qualified to operate the robot must check and confirm the corresponding safety features item by item, and the robot can only be activated after passing a comprehensive, careful safety test and reaching a safety level. 5. Professional personnel are required to install and debug the robot in accordance with the installation standards. 6. A comprehensive risk assessment should be conducted again when the robot is installed or the system equipment is built. 7 Set and change security parameters by authorized personnel, using passwords or isolation measures to prevent unauthorized personnel from changing or setting security parameters. After security parameters are modified, the relevant security features need to be reanalyzed and defined. 8. In the event of an accident or abnormal operation of the robot's robotic arm, the emergency stop switch can be pressed to immediately halt the robotic arm's movement. 9. The robotic arm joint module of the robot is equipped with brakes. When power is cut off, keep the robotic arm in position. Do not manually frequently switch on and off the power supply system. It is recommended that the time interval between each switch on and off be more than 10 seconds. 10. The robotic arm of the robot has a collision detection function. When the robot is powered on and working normally, if the external force exceeds the force range set by the user for safety, the robotic arm will automatically stop moving to prevent injury from collision to the robotic arm or the operator. This feature is designed for the safety of human-machine collaboration and requires the robotic arm to be in normal motion and to use the factory-fitted control cabinet. If the user develops the control cabinet themselves, it cannot be ensured that the robotic arm has the above safety protection functions, and the dangerous consequences arising therefrom shall be borne by the user themselves.
 Warnings	1 Make sure the robotic arm of the robot is securely fastened and the tools are safely installed before powering on. 2. Before powering on, ensure that the robot's mechanical arm has sufficient space to move and be cautious of colliding with external devices. 3. If the robotic arm of the robot is damaged, do not continue to power on. Please contact the manufacturer's pre-sale technical service personnel immediately. 4 Do not connect the safety device to the universal I/O interface. The safety device can only be connected to the safety I/O interface. 5 Ensure that installation Settings are properly configured (such as the robot installation Angle, TCP end

	tool weight, TCP offset, etc.). 6. Tools and obstacles must not have sharp protrusions to ensure that human heads and faces cannot be touched by the robotic arm or its end tools. 7. Always be alert to the movement status of the robot's robotic arm. Configure the robot's safety protection level through the teaching device. When the safety protection level is low, any impact may release a huge amount of energy. 8. Connecting different mechanical parts may increase danger or create new danger, always keep a comprehensive risk assessment of the entire working environment. 9 Do not modify the robot by yourself. Any alterations to the robot may cause unpredictable dangers, and Changguangxi Intelligent Manufacturing disclaims all responsibility arising therefrom. 10. Before transporting the robot, the user needs to check the insulation and protective measures. 11. When handling the robot, follow the transportation requirements, handle it carefully and avoid bumps. 12. The free-drag function is only permitted during installation after passing the risk assessment.
	1. When the robotic arm of the robot is connected to or working together with mechanical equipment that could cause damage to the robotic arm, it is strongly recommended to check and test all functions and running programs of the robotic arm in a separate working area. 2 Changguangxi Intelligent Manufacturing shall not be held responsible for any damage to the robot or injury to personnel caused by program errors or improper operation. 3 Do not expose the robot to permanent magnetic fields all the time. Strong magnetic fields may damage the robot. 4 There is a risk of the blades of the internal fan breaking when the control cabinet is being moved while powered on.

Table 4 Precautions Before Starting the Robot

Risk indicator	Instructions
	1. The operator of the robot must ensure that they have a full grasp of the safe operating procedures and are qualified to operate the robot. 2. Operators of robots, please do not wear loose clothing, jewelry, tie long hair at the back of the head or wear work safety helmets. 3. The robotic arm of the robot may sometimes be in a stationary position while waiting for a peripheral signal. Once the peripheral signal is received, it will immediately switch to motion. When the robotic arm appears to be at a stop but is actually in motion, the user must avoid touching it. 4 Draw lines on the floor if necessary to mark the workspace area between the robotic arm and the end tool. 5 Ensure that safety protection facilities (such as guardrails, ropes, or protective light curtains, etc.) are established near the robot's robotic arm operating area to protect the operator and people around. 6. There may be operational errors when operating the touchscreen of the teaching device with gloves on. Make sure to remove the gloves before operating. 7. When a person is clamped by the robot's robotic arm or robotic arm joint, in an emergency, push or pull the robotic arm with an external force (at least 700N) to force the joint to move. Manual movement of the robotic arm in an emergency situation without electric power may damage the joints of the robotic arm.

3. Responsibilities and Risks

3.1 Risk Assessment

Integrators should first conduct a risk assessment before using the robot or before designing the solution to ensure that the application is safe and reliable. Integrators need to conduct a comprehensive assessment of the safety requirements of the actual application scenarios, including but not limited to robots. In some cases, the safety requirements of the usage scenarios can be circumvented through the risk protection design of the overall solution, especially in human-robot collaboration scenarios, the application risks can be effectively circumvented by the reasonable use of the safety configuration functions of the robots.

It is recommended that integrators fully refer to the relevant safety requirements and measures in ISO 12100, ISO 10218, and ISO15066 standards in the design of robot usage and integration solutions.

The robotic arm of the robot poses, but is not limited to, the following risks:

- There may be a risk of hand jamming or jamming between the first joint of the robotic arm and the mounting base;
- There is a potential risk of hand jamming at the four or five joints of the robotic arm (the robotic arms of the G series robots have been designed to prevent hand jamming, but the risk of hand jamming cannot be absolutely ruled out);
- If the tool has sharp burrs or spikes, there is a risk of injuring the co-working staff.
- Anti-collision stops occur during human-machine collaboration if the collision occurs on a non-vulnerable part of the human body, such as hands or legs, there is a risk of causing pain; If the collision occurs in a vulnerable part of the body, such as the neck, eyes, back of the head, there is a risk of injury or even death;
- The risk of items falling off the tool due to loose or detached mounting screws, or the risk of use due to improper clamping or power failure;
- Risks arising from human error, design flaws and programming errors.

In practical application of the G series robotic arm, it is recommended to refer to the following safety specifications:

[1]. ISO 12100:2010 Mechanical Safety - Design Code - Risk assessment and risk reduction;

[2]. ISO 10218-1:2011 Robotic arms and robotic arm equipment - Safety requirements - Part 2: Industrial robotic arm systems and integration;

[3]. RIA TR R15.306-2014 Technical Report on industrial robotic arms and robotic arm systems - Safety requirements, task-based risk assessment methods;

[4] ANSI B11.0-2010 Mechanical Safety: General Requirements and Risk assessment.

3.2 Scope of Responsibility

The robot can be combined with other devices to form a complete equipment system, but the equipment system itself may not be complete. Therefore, this manual does not cover how to fully design, install and operate a complete equipment system. Integrators are required to conduct a comprehensive risk assessment of the complete equipment system in terms of both design and installation in accordance with the laws, regulations, safety norms and standards of the country where they are located.

Integrators may refer to the following standards to carry out the risk assessment process.

[1]. ISO 12100:2010 Mechanical Safety - General Principles for Design - Risk assessment and risk reduction.

[2]. ISO 10218-1:2011 Robotic arms and robotic arm equipment - safety requirements - Part 2: Industrial robotic arm systems and integration.

[3]. RIA TR R15.306-2014 Technical Report on industrial robotic arms and robotic arm systems - Safety requirements, task-based risk assessment methods.

[4] ANSI B11.0-2010 Mechanical Safety: General Requirements and risk assessment.

Changguangxi Intelligent Manufacturing cannot guarantee that all the safety-related information contained in this manual is absolutely safe during the actual operation of the system. Even if all safety instructions are followed, personal injury or equipment damage caused by operators may still occur.

4. Handling of Emergencies

4.1 Introduction

In the event of an emergency during actual use, corresponding emergency measures can be taken, including emergency shutdown and no electric drive, but not limited to these two measures.

4.2 Emergency Stop

In the event of an emergency with the robot, the emergency stop button can be pressed immediately to cut off the power supply of the robotic arm and stop all activities of the robotic arm. Emergency stop cannot be used as a risk reduction measure, but can serve as a secondary protection device. Ensure that in the event of a malfunction or hazard, the source of danger is removed immediately and any other danger that could be brought by the robotic arm is eliminated.

Emergency stop can also be achieved by using the emergency stop button on the control cabinet panel, the emergency stop button on the top of the demonstrator, or by externally accessing the device controlling the emergency stop via the safety I/O, as described in robot introduction [1.1.5 K10 /K20 control cabinet](#), [1.1.7 Teaching device](#).

4.3 No electric drive

In some extreme situations where it is necessary to move the robotic arm without power, such as when the robotic arm squeezes a person while in operation and needs to be moved away immediately after an emergency stop, the operation can be carried out without power. There are the following two operation methods:

First, open the rear end cover of the joint and press the brake (a small electromagnet as shown in Figure 1) without releasing, and then the joint can rotate.

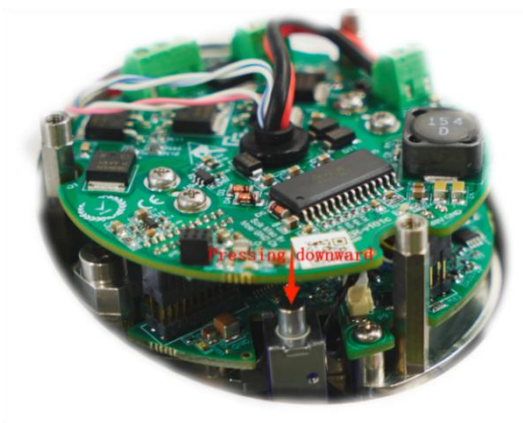


Figure 1 Small electromagnet

The second type, directly by an external force, pushes the mechanical arm joint, causing the mechanical structure of the brake to slide in relative position, thereby moving the mechanical arm. The torque required for the rotation of each joint of the G series robot is shown in Table 5.

Table 5 Torque Required for Rotation of G Series Robot Joints without electric Drive

Throttle Torque Model (Nm)	1 joint	2 Joints	3 Joints	4 Joints	5 Joints	6 Joints
G3	130	130	85	55	55	55
G4	200	200	200	55	55	55
G6	200	200	200	55	55	55
G6L	510	510	200	55	55	55
G9	510	510	200	85	85	85
G9L	1242	1242	510	85	85	85
G12	510	510	200	85	85	85
G12s	510	510	200	85	85	85
G18	510	510	200	85	85	85
G20	1242	1242	510	130	130	130
G25	1242	1242	510	130	130	130
G30	1242	1242	510	130	130	130

5. Intended Use

The G series collaborative robots are suitable for industrial Settings with general functional and safety requirements, or commercial Settings that have been carefully evaluated. General industrial Settings include product sorting, loading and unloading, screw locking, boxing and palletizing, etc. Commercial Settings include automatic vending of products that have been evaluated for safety features, etc.

The G series of collaborative robots are human-machine collaborative robots that can meet human-machine collaborative work without the need for protective fences. Although the G series collaborative robot has a variety of safety features configured for human-machine collaboration, it still cannot avoid all safety risks, such as installation risks caused by dangerous tools for TCP installation, etc. In practical applications, any application outside the intended use is risky, including but not limited to the following application sites:

- Potential flammable and explosive locations;
- Medical and other applications that serve human operations;
- Places where end tools pose a serious threat to the human body and require human-machine collaboration;
- Application sites that have not undergone risk assessment and testing;

Any place that is used if the safety function assessment fails;

- Places where medical life forms are moved, etc.

Part I

Hardware Section

1. Introduction to Robots

1.1 Composition

1.1.1 Packing list

A complete shipment list of G series collaborative robots is shown in Table 6.

Table 6 Shipment List

Name	Quantity	Notes
Robotic arm	1 table	Comes with 4 or 6 meters of cable to connect to the control cabinet.
Teaching device	1 table	It comes with a 5-meter cable to connect to the control cabinet.
Control cabinet	1 table	K10 control cabinet /K20 control cabinet /MK controller + Power box.
Control cabinet power cord	1 article	1.5 meters in length.
Control cabinet door key	1 hand	Open and close the control cabinet door.
Factory certificate of conformity	1 copy	Factory certificate of conformity.
Screws	4 unit	Base installation.

1.1.2 Hardware wiring diagram

The hardware wiring of the G series collaborative robot +K10/K20 control cabinet is shown in Figure 2.



Figure 2 Hardware wiring diagram of G Series collaborative robot +K10/K20 control cabinet

The hardware connection of the G series collaborative robot +MK controller + power box is shown in Figure

3.



Figure 3 Hardware wiring diagram of G Series collaborative robot +MK Controller + power box

1.1.3 Robotic arm

The G series collaborative robot robotic arm is mainly composed of six modular joints, a large arm tube, a small arm tube, a base, and a tool flange. Each joint module integrates high-power-density servo motors, servo drives, encoders, brakes and harmonic reducers, etc. The robotic arm is fixed to the external base by a base attached to 1 joint, and the actuating tool is fixed at the end by a tool flange. Its six joints can rotate, and the tool flange ends can make curvilinear or linear movements within the workspace.

The G series robotic arm is connected to the control cabinet via a dedicated cable fixed to the base and is powered by a DC power supply from the control cabinet or power box, as shown in Figure 4.

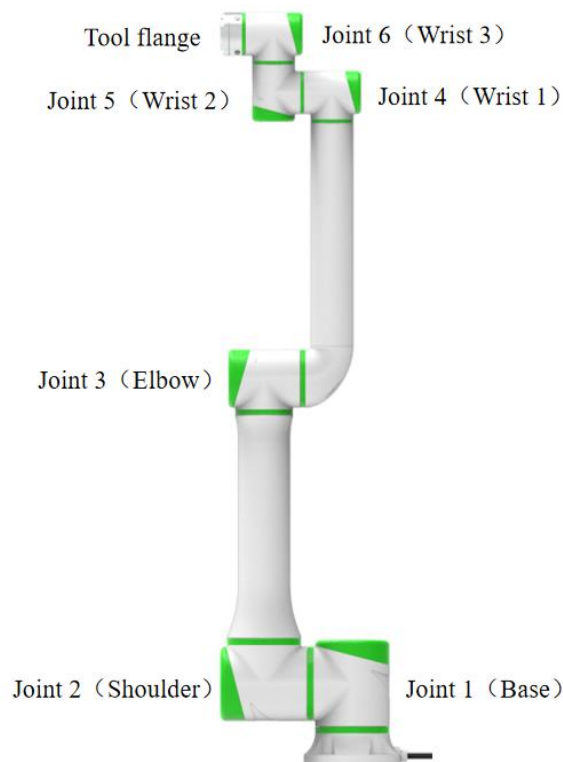


Figure 4 Composition diagram of the robotic arm

1.1.4 Tool end

The physical tool end is shown in Figure 5, and its buttons and interface descriptions are shown in Table 7.

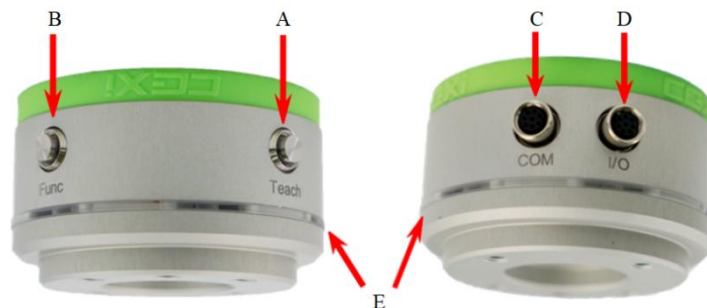


Figure 5 Physical view of the toolend

Table 7 Description of Toolend buttons and Interfaces

Number	Buttons	Explanation
A	The Teach button	Press and hold the button until the three-color indicator light turns green to freely drag the robotic arm. Once released, the robotic arm stops moving immediately.
B	Func button	Reserve for extended function use: Currently pressing, holding, or releasing the button does not act.
C	COM port	Serial communication interface, 8 pins, electrical interface description see 3.4 Tool end .
D	I/O port	8 Pin, electrical interface description see 3.4 Tool end .
E	Circular tricolor indicator light	Consistent with the three-color indicator light on the K10 control cabinet panel (MK controller has no corresponding indicator light) : Red indicates that the mechanical arm failed to be powered on successfully or there was

		a fault (brake shutdown). ● Blue indicates that the robotic arm is enabled (with the brake open) and is operating normally; ● Green indicates that the robotic arm can be towed for teaching.
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1.1.5K10 /K20 control cabinet

The control cabinet is shown in Figure 6, and its panel function description is shown in Table 8.

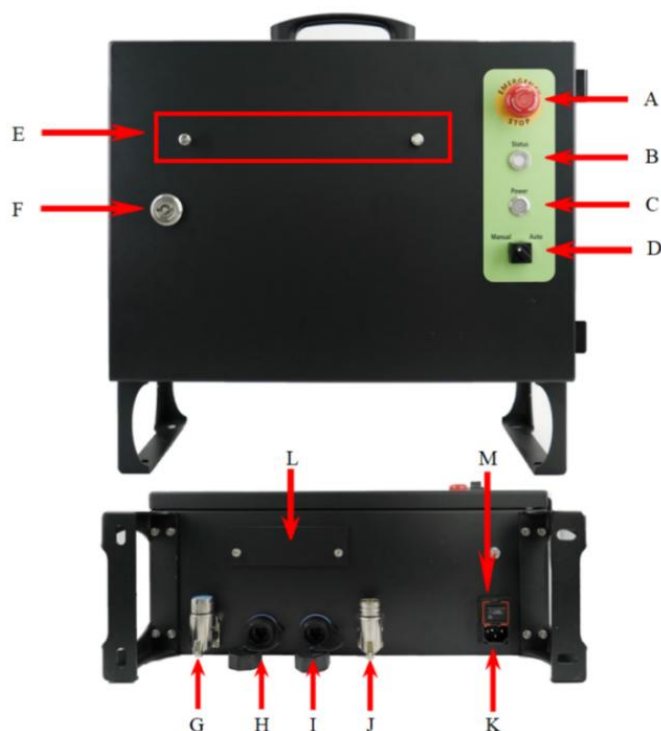


Figure 6 Physical picture of the control cabinet

Table 8 Description of Control Cabinet Panel Functions

Number	Buttons and Interfaces	Instructions
A	Emergency stop button	● Press to cut off the power supply to the robotic arm, the arm brake closes and stops immediately; ● After pressing, turn right and the button will automatically pop out and exit the emergency stop state.
B	Three-color status indicator light	Red indicates that the mechanical arm failed to be powered on successfully or there was a fault (brake shutdown). ● Blue indicates that the robotic arm is enabled (with the brake open) and is operating normally; ● Green indicates that the robotic arm can be towed for teaching.
C	Power button (Touch-sensitive with white LED)	● Press in the off state to power on the control cabinet and the teaching device, and the white indicator status light is on; ● When the device is powered on and pressed, the LCD screen of the teaching device pops up a shutdown prompt, manually operate the screen pop-up window to turn it off.
D	Manual/automatic mode	● The switch (white dot) points to Manual, and the robotic arm operates in manual

	switch	control mode after power-on; The switch (white dot) points to Auto, and the robotic arm operates in automatic mode after power-on. For instructions on the working mode, see Startup Guide 2.3.2 Working mode .
E	Hanging nails	2 (for hanging the teaching device).
F	Cabinet door lock	 Factory-provided control cabinet door key to open or close the control cabinet door; It is prohibited for non-professionals to open cabinet doors without authorization.
G	ROBOT Interface	Dedicated for connecting the robotic arm body cable.
H	RJ45 Ethernet port LAN1	10M/100M adaptive, connect to external network devices. See Control Cabinet 3.2.1 External Interfaces for detailed usage.
I	RJ45 Ethernet port LAN2	10M/100M adaptive, connect to external network devices. See Control Cabinet 3.2.1 External Interfaces for detailed usage.
J	TEACH PENDANT interface	Dedicated, connect the teaching device cable.
K	POWER IN interface	Power pin socket male, connected to an external household power source.
L	Electrical wiring outlets inside the control cabinet	2 screws fixed, detachable.
M	Street power switch	- Press I to connect an external mains power supply; - Press O to disconnect the external mains power supply.



Note:

1. Do not move the control cabinet while it is powered on to avoid breaking the fan blades.
2. Keep the cabinet door closed to prevent foreign objects from falling in and causing damage to the equipment.

1.1.6MK controller (Power box)

1.1.6.1 MK controller

The MK controller is shown in Figure 7, and its panel function description is shown in Table 9.

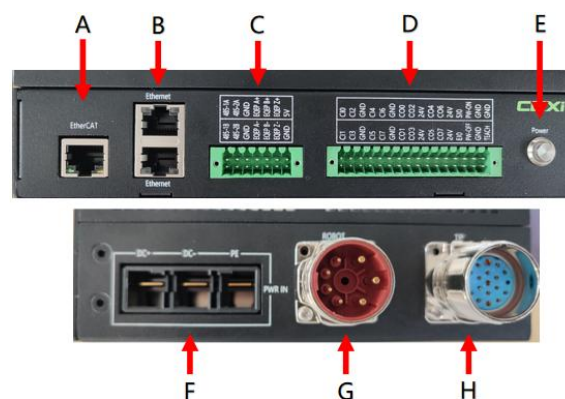


Figure 7 Physical picture of the MK controller

Table 9 Description of Control Cabinet Panel Functions

Number	Buttons and Interfaces	Instructions
A	EtherCAT extension interface	For connecting external EtherCAT devices.
B	RJ45 Ethernet port	10M/100M adaptive, connect to external network devices. See Control Cabinet 3.2.1 External Interfaces for detailed usage.
C	485& encoder interface	• Two 485 interfaces; • One differential encoder interface.
D	IO interface	• Configurable input/output interface; • Security interface; • Remote on/off interface.
E	Power button (Touch-sensitive with white LED)	• Press in the off state to power on the control cabinet and the teaching device, and the white indicator status light is on; • When the device is powered on and pressed, the LCD screen of the teaching device pops up a shutdown prompt, manually operate the screen pop-up window to turn it off.
F	Power input	Connect the power box to the power supply interface.
G	ROBOT Interface	Dedicated for connecting robotic arms.
H	TEACH PENDANT interface	Dedicated, connect the teaching device.

1.1.6.2 Power box

The power box panel interface is shown in Figure 8, and the panel function description is shown in Table 10.

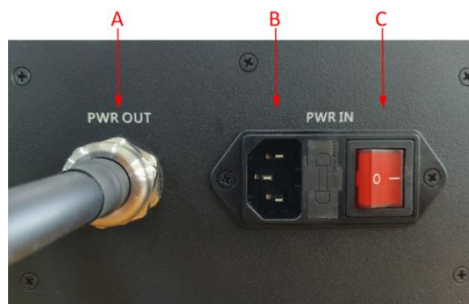


Figure 8 Physical image of the power box

Table 10 Description of Power Box Panel Functions

Number	Buttons and Interfaces	Instructions
A	Power output cable	• Connect the MK controller and power the MK controller.
B	External power input interface	Connect to the mains power (power ground) via the power cord.
C	Street power switch	• Press I to connect an external mains power supply; • Press O to disconnect the external mains power supply.

1.1.7 Teaching device

The teaching device is shown in Figure 9, and its appearance description is shown in Table 11.

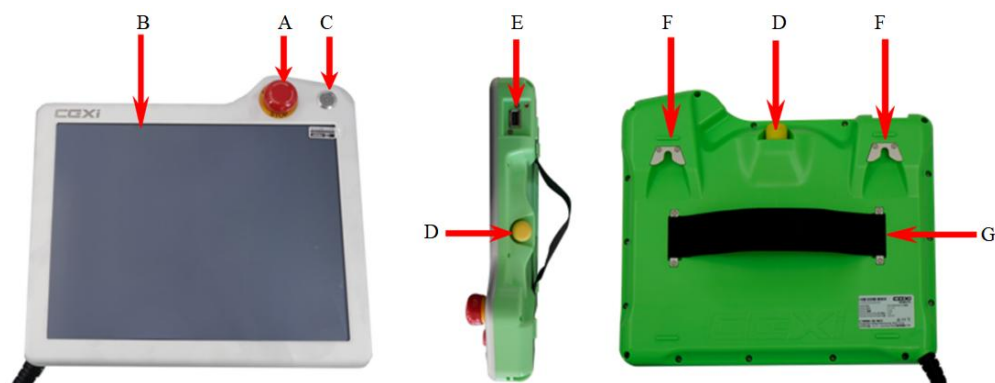


Figure 9 Physical picture of the teaching device

Table 11 Description of the appearance of the teaching device

Number	Buttons and Interfaces	Instructions
A	Emergency stop button	● Press to cut off the power supply to the robotic arm, the arm brake closes and stops immediately; ● Press to turn right and the button will automatically pop out to exit the emergency stop state.
B	LCD screen	12.1-inch resistive touch screen with a display resolution of 1024*768.
C	Power button	Touch-sensitive with white LED: ● Press the button in the off state to power on the control cabinet and the teaching device, and the white indicator status light is on; ● Press the button while the device is powered on, and the LCD screen of the teaching device pops up a shutdown prompt. Manually operate the LCD screen pop-up window to turn off the device.
D	Three-state button	It is divided into three states: normal/press 1 / Press 2, with a composite function: ● Free drag function: After the robot is powered on and normally enabled, when the 1st gear is pressed and held down without release, the indicator light at the end of the tool changes from blue to green, and the robotic arm enters free drag mode. At this time, the user can freely drag the robotic arm. If this button is released or the 2nd gear is pressed during the dragging process, the indicator light at the end of the tool turns blue, and the drag mode is invalid; ● Software version upgrade function: Before the teaching device is powered on, if you press the 1st gear and hold it down for a long time, the teaching device will automatically enter the software upgrade function interface when it starts up. Release the button at this time to upgrade the software function. For the method of software version upgrade, please refer to the Collaborative Robot Self-Update Manual.
E	USB2.0 interface	● For importing or exporting engineering files, system software upgrades, etc; ● For instructions on how to use a USB drive for software upgrades, see the Collaborative Robot Self-Update Manual.
F	Snap button	Used to secure the teaching device.
G	Straps	Used to secure the teaching device.

1.2 Transport

When transporting, please use the special packaging provided by Changguangxi Intelligent Manufacturing to restore the robotic arm of the robot to the factory packaging position.

1.2.1 Packaging posture

(1) Operate the teaching device interface and adjust the rotation angles of the six joints through joint movement. The packaging posture angles are shown in Table 12.

Table 12 Robot Packaging Postures

Joint names	Joint 1	Joint 2	Joint 3	Joint 4	Joint 5	Joint 6
Joint Angle	-90°	0°	150°	30°	0°	0°

(2) On the teaching device interface, users can move the robotic arm to the packaging position by pressing and holding the "Move" button for a long time through "Configuration" -> "General" -> "Initial Position/Packaging Position" -> "Move to Packaging Position".

1.2.2 Installation

When moving the robotic arm from the packing box to the installation space, support both arm tubes of the robotic arm simultaneously and hold the robotic arm until all mounting bolts on its base are fastened. After the transport is completed, place the packaging material in a dry environment and take protective measures for future repackaging.



Caution:

When lifting the robotic arm, make sure that the person's back or other parts of the body are not overburdened. Appropriate lifting equipment can also be used.

2. Introduction to use

2.1 Workspace

The workspace of a robot is the set of spatial points that the robot's end effector motion description reference points can reach.

The workspace of the G series collaborative robots approximates a sphere.

2.1.1 Maximum workspace

Maximum workspace refers to the maximum workspace that the tool center point can reach from at least one direction. In practical applications, singular points (unsolvable inverse kinematics) are prone to occur in the cylindrical area directly above and below the base, and it is not recommended to use within this range.

The maximum workspace of the robotic arm of the G3 collaborative robot is approximately a sphere with a radius of 620mm, as shown in Figure 10.

The maximum workspace of the robotic arm of the G4 collaborative robot is approximately a sphere with a radius of 1307.5mm, as shown in Figure 11.

The maximum workspace of the robotic arm of the G6 collaborative robot is approximately a sphere with a radius of 924mm, as shown in Figure 12.

The maximum workspace of the robotic arm of the G6L collaborative robot is approximately a sphere with a radius of 1800mm, as shown in Figure 13.

The maximum workspace of the robotic arm of the G9 collaborative robot is approximately a sphere with a radius of 1500mm, as shown in Figure 14.

The maximum working space of the mechanical arm of the G9L collaborative robot is approximately a sphere with a radius of 2600mm, as shown in Figure 15.

The maximum workspace of the robotic arms of the G12 and G12s collaborative robots is approximately a sphere with a radius of 1300mm, as shown in Figure 16.

The maximum workspace of the robotic arm of the G18 collaborative robot is approximately a sphere with a radius of 900mm, as shown in Figure 17.

The maximum workspace of the robotic arm of the G20 collaborative robot is approximately a sphere with a radius of 1800mm, as shown in Figure 18.

The maximum workspace of the G25 collaborative robot's robotic arm is approximately a sphere with a radius of 1600mm, as shown in Figure 19.

The maximum workspace of the robotic arm of the G30 collaborative robot is approximately a sphere with a radius of 1300mm, as shown in Figure 20.

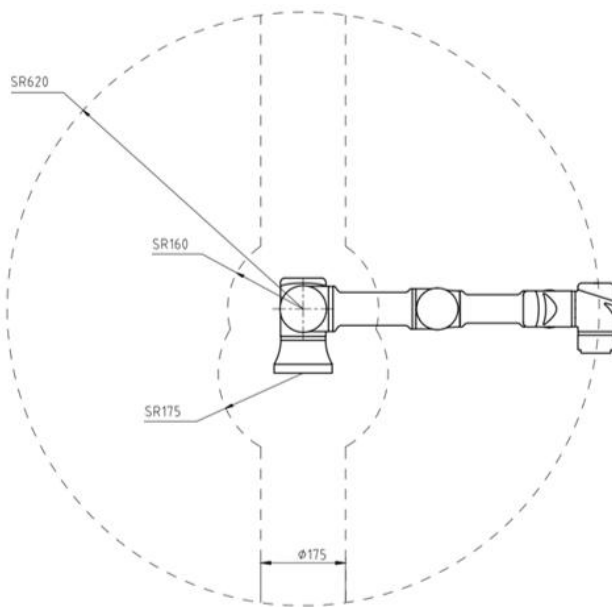


Figure 10 Maximum workspace of the G3 collaborative robot's robotic arm, unit mm

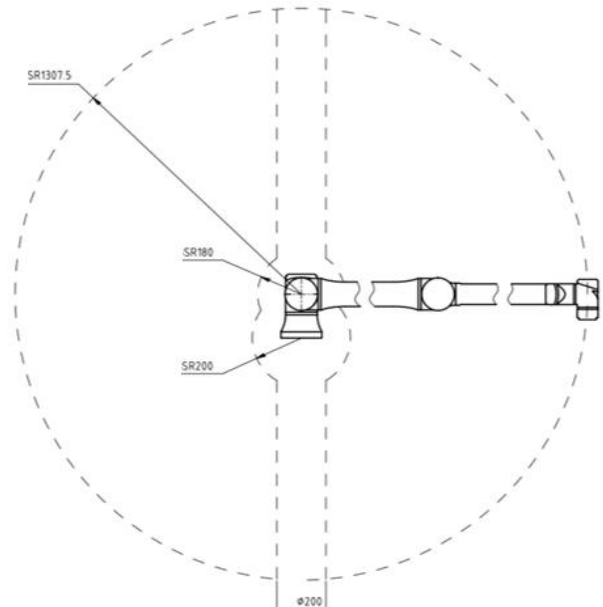


Figure 11 Maximum workspace of the G4 collaborative robot robotic arm, unit mm

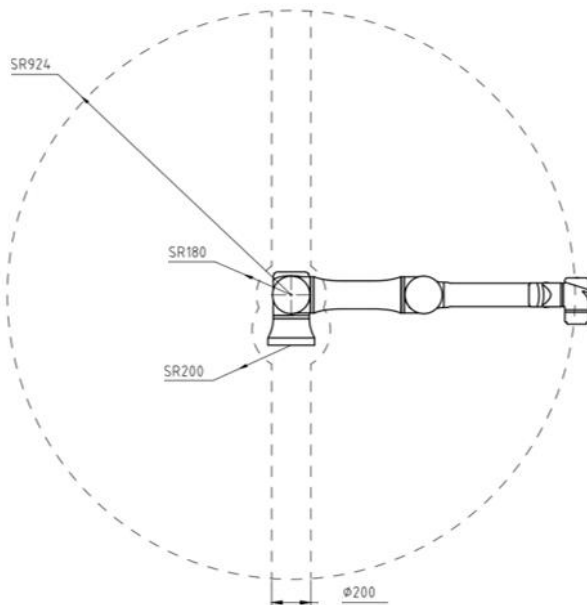


Figure 12 Maximum workspace of the G6 collaborative robot robotic arm, unit mm

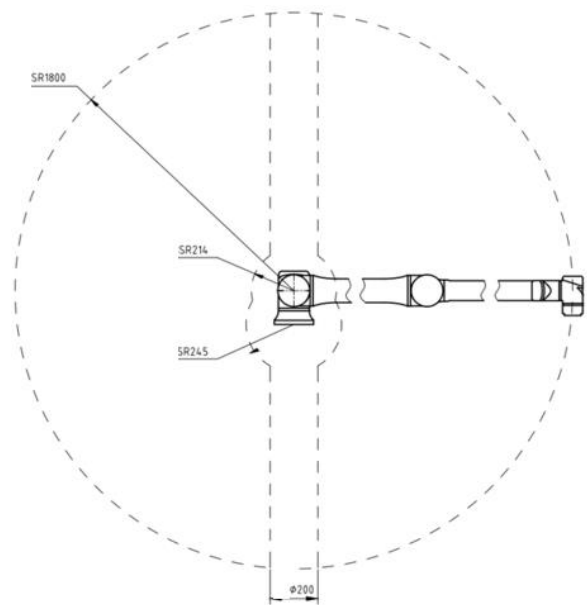


Figure 13 Maximum workspace of the G6L collaborative robot robotic arm, unit mm

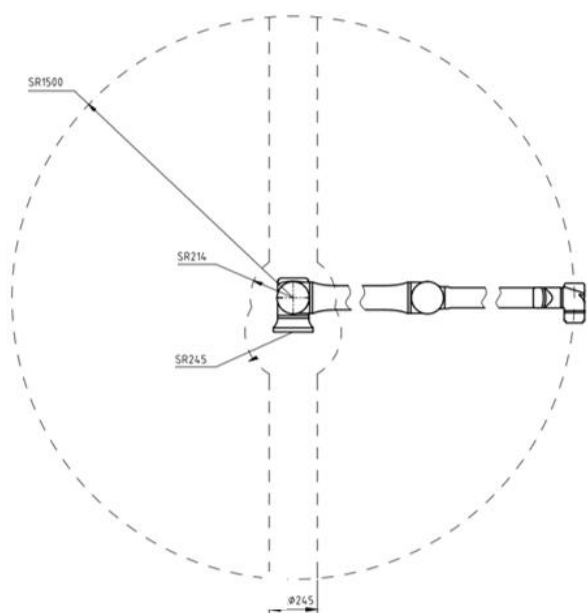


Figure 14 Maximum workspace of the G9 collaborative robot robotic arm, unit mm

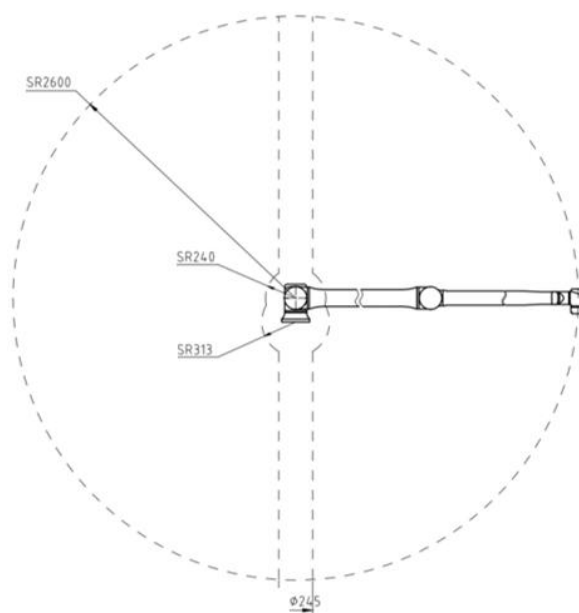


Figure 15 Maximum workspace of the G9L collaborative robot robotic arm, unit mm

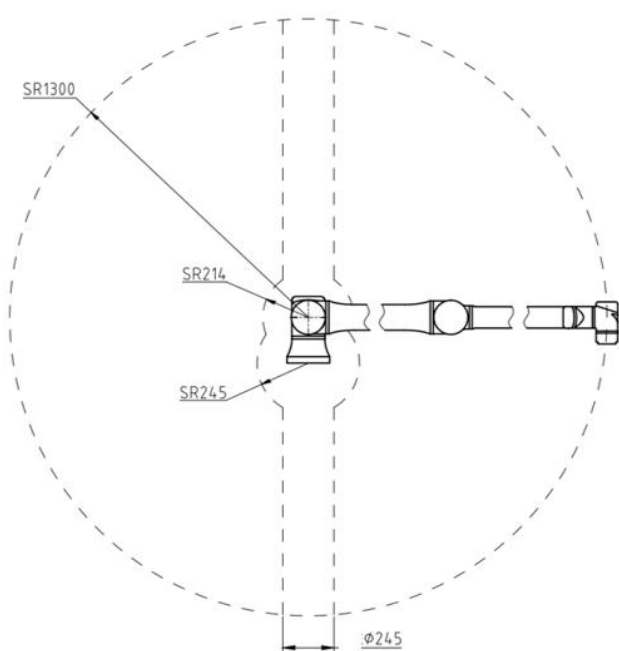


Figure 16 Maximum working space of the robotic arms of G12 and G12s collaborative robots, unit mm

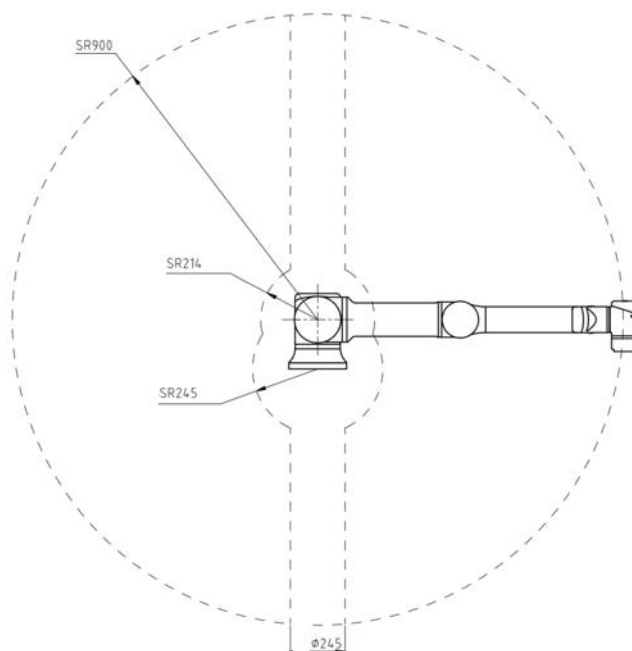


Figure 17 Maximum workspace of the robotic arm of the G18 collaborative robot, unit mm

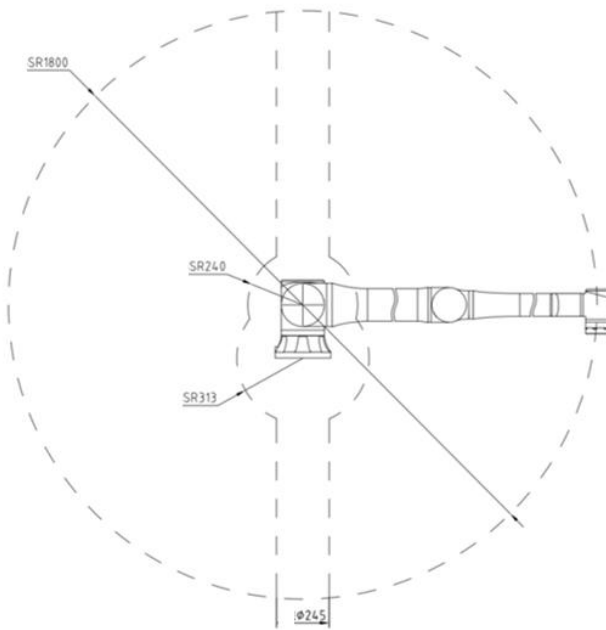


Figure 18 Maximum workspace of the G20 collaborative robot robotic arm, unit mm

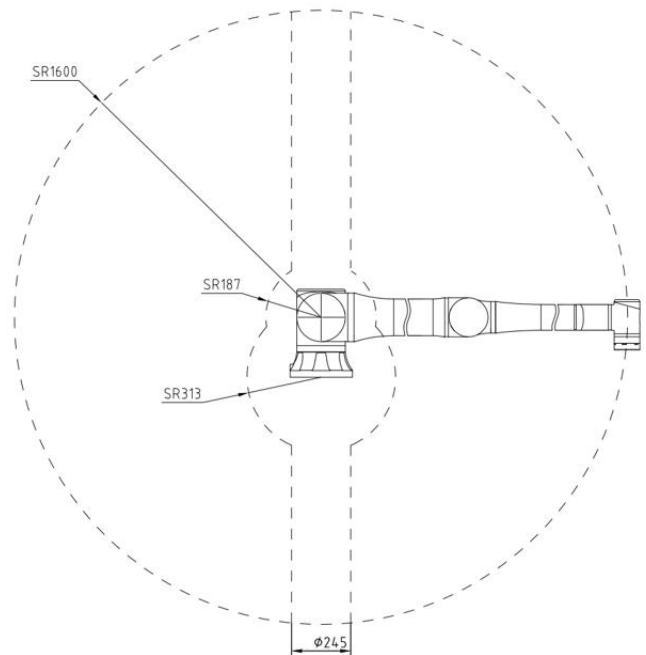


Figure 19 Maximum workspace of the G25 collaborative robot robotic arm, unit mm

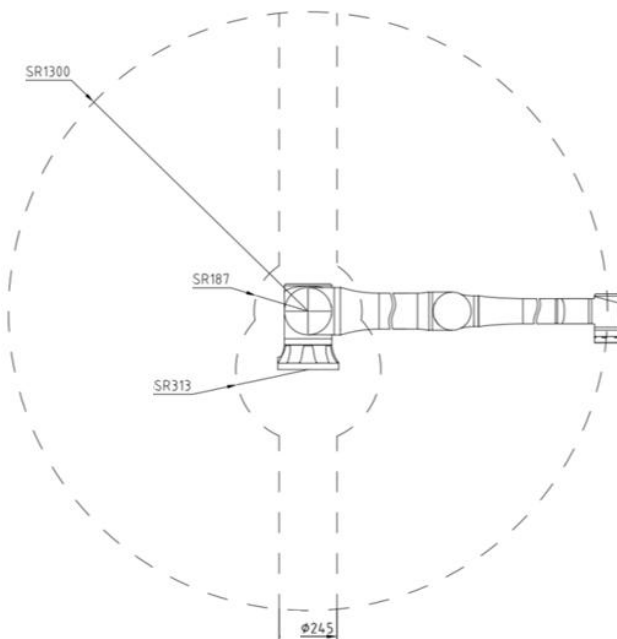


Figure 20 shows the maximum working space of the G30 collaborative robot's mechanical arm, unit mm

2.1.2 Variable pose space

A variable attitude space refers to a workspace where the center point of the tool can change its attitude, that is, it can be reached from any direction. On a robotic arm, the variable attitude space refers to the distance from the center of the two joints to the center of the four joints.

The variable attitude space of the G3 collaborative robot's robotic arm is approximately a sphere with a radius

of 514mm, as shown in Figure 21.

The variable attitude space of the robotic arm of the G4 collaborative robot is approximately a sphere with a radius of 1201.5mm, as shown in Figure 22.

The variable attitude space of the robotic arm of the G6 collaborative robot is approximately a sphere with a radius of 818mm, as shown in Figure 23.

The variable attitude space of the robotic arm of the G6L collaborative robot is approximately a sphere with a radius of 1694mm, as shown in Figure 24.

The variable attitude space of the robotic arm of the G9 collaborative robot is approximately a sphere with a radius of 1383mm, as shown in Figure 25.

The variable attitude space of the robotic arm of the G9L collaborative robot is approximately a sphere with a radius of 2483mm, as shown in Figure 26.

The variable attitude space of the robotic arms of the G12 and G12s collaborative robots is approximately a sphere with a radius of 1183mm, as shown in Figure 27.

The variable attitude space of the robotic arm of the G18 collaborative robot is approximately a sphere with a radius of 783mm, as shown in Figure 28.

The variable attitude space of the robotic arm of the G20 collaborative robot is approximately a sphere with a radius of 1665mm, as shown in Figure 29.

The variable attitude space of the robotic arm of the G25 collaborative robot is approximately a sphere with a radius of 1465.8mm, as shown in Figure 30.

The variable attitude space of the robotic arm of the G30 collaborative robot is approximately a sphere with a radius of 1165mm, as shown in Figure 31.

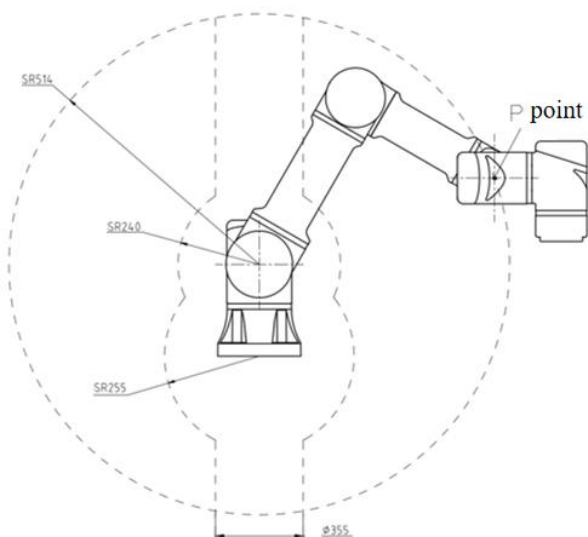


Figure 21 Variable attitude space of the G3 collaborative robot robotic arm, unit mm

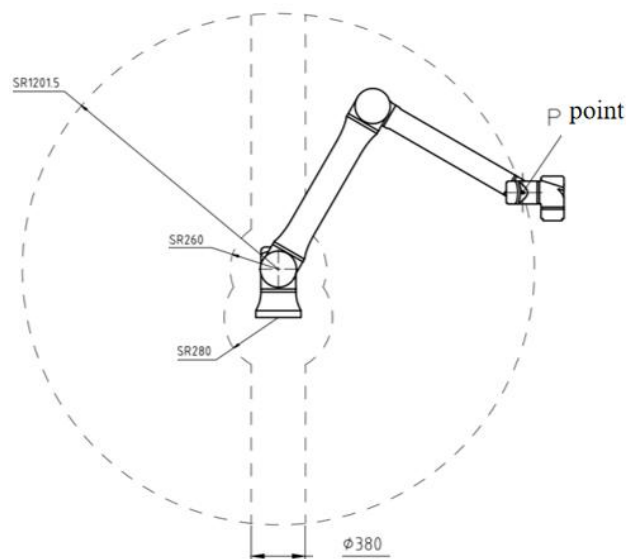


Figure 22 G4 collaborative robot robotic arm Variable attitude space, unit mm

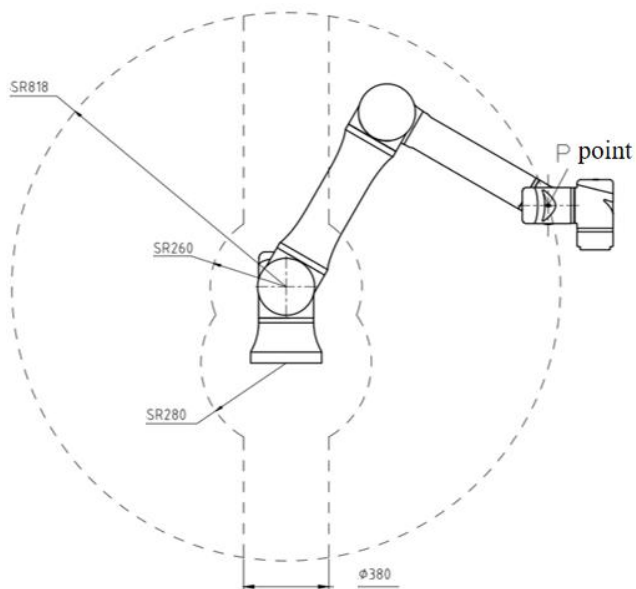


Figure 23 Variable attitude space of the G6 collaborative robot's robotic arm, unit mm

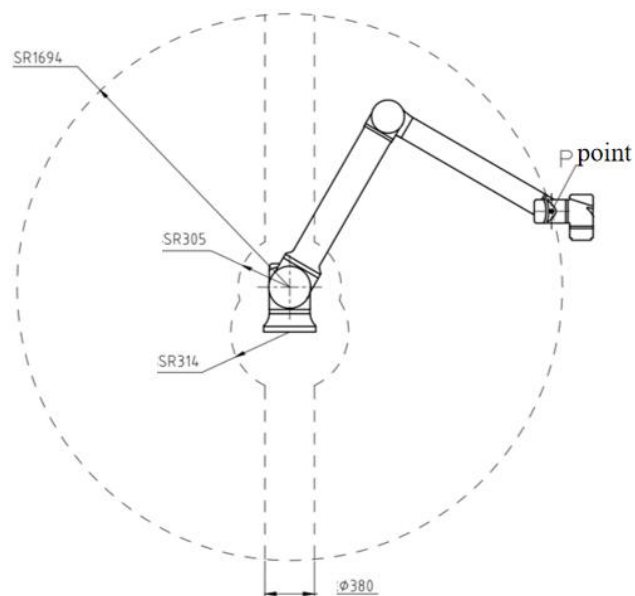


Figure 24 G6L collaborative robot robotic arm Variable attitude space, unit mm

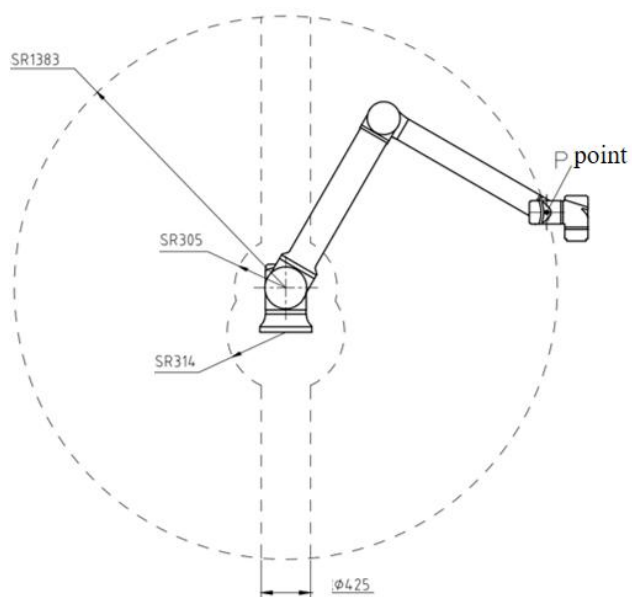


Figure 25 G9 collaborative robot robotic arm Variable attitude space, unit mm

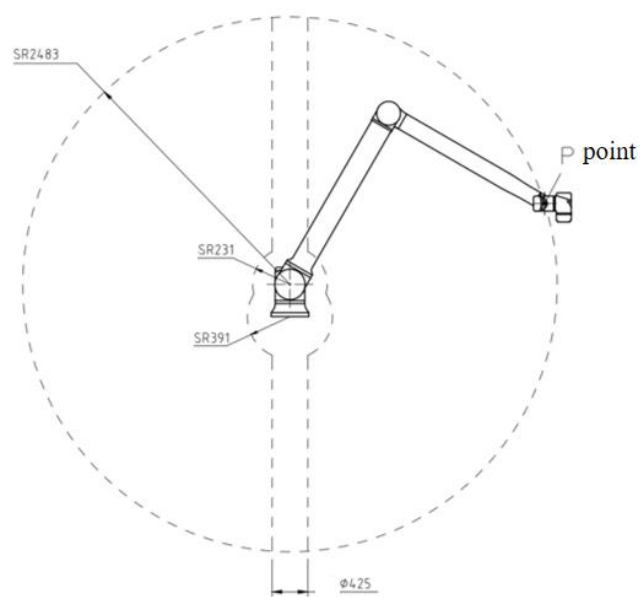


Figure 26 G9L collaborative robot robotic arm Variable attitude space, unit mm

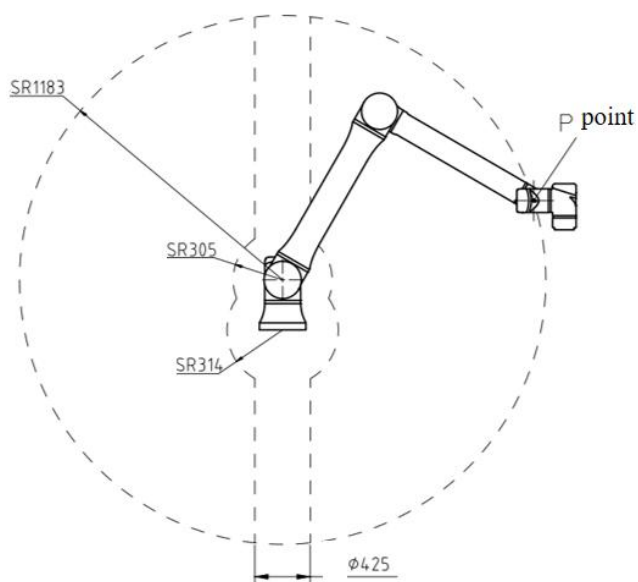


Figure 27 Variable attitude space of the robotic arms of G12 and G12s collaborative robots, unit mm

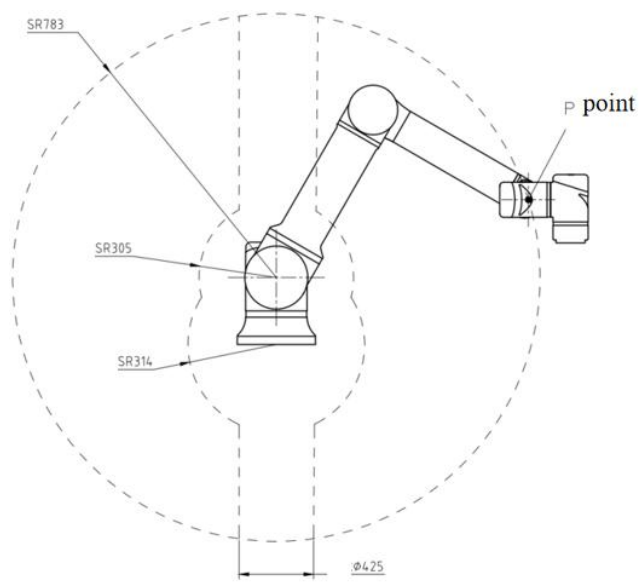


Figure 28 Variable attitude space of G18 collaborative robot robotic arm, unit mm

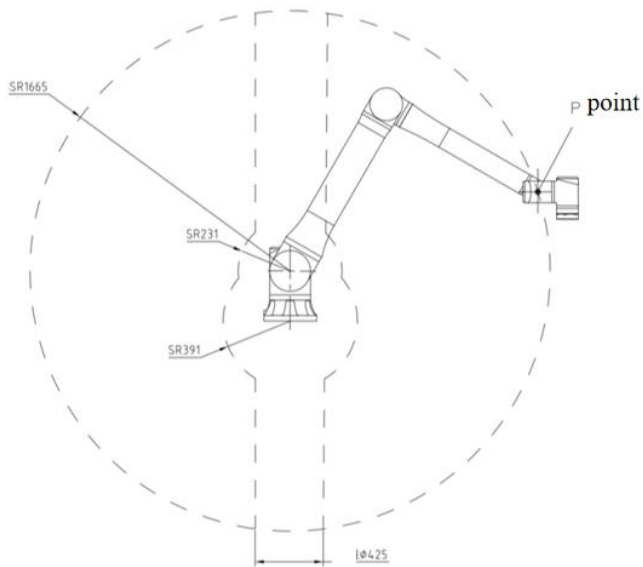


Figure 29 G20 collaborative robot robotic arm Variable attitude space, unit mm

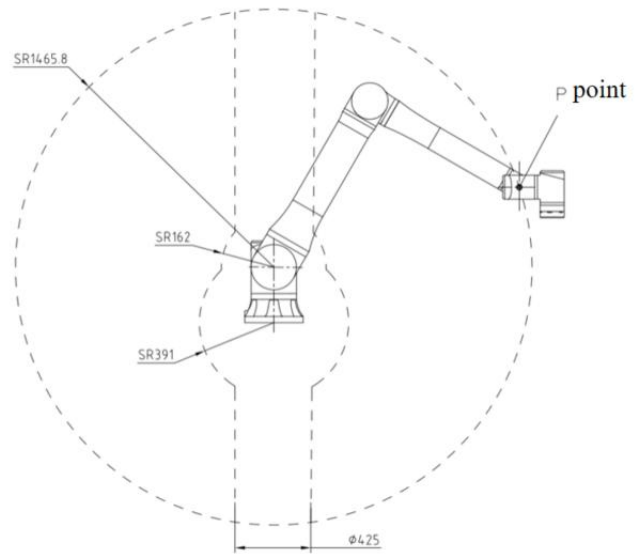


Figure 30 G25 collaborative robot robotic arm Variable attitude space, unit mm

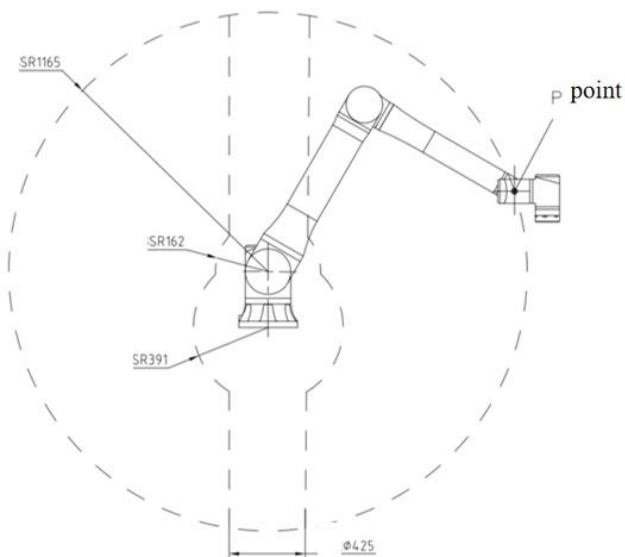


Figure 31 G30 collaborative robot robotic arm Variable attitude space, unit mm



Warning:

1. Only the joint movement can meet the maximum working space movement, using other movement instructions, can only be in the variable position space movement;
2. When the robotic arm tool ends move within the variable attitude space, try to avoid moving within the cylindrical space directly above and below the base. When moving towards this cylindrical space, there will be a situation where the tool moves at a slower speed while some joints rotate at a faster speed, resulting in low productivity and difficult risk assessment.

2.2 Installation

2.2.1 Robotic arm

2.2.1.1 Installation instructions

The brief steps for installing the robot are shown in Table 13.

Table 13 Robot Installation Steps

Steps	Operation method
1	Open the packing box and work with two people to remove the robotic arm from it.
2	Lift the robotic arm onto the mounting base so that the mounting holes of the robotic arm base align with the mounting holes of the mounting base.
3	Use the base mounting screws to secure the robotic arm to the mounting base.



Caution:

The working space of the robotic arm must be determined before installation to prevent safety risks caused by collisions.

2.2.1.2 Mechanical dimensions

The mechanical dimensions of the robotic arm are shown in the following figure.

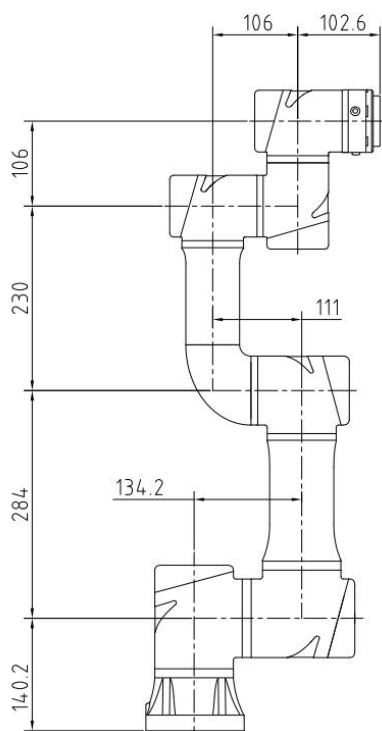


Figure 32 Mechanical dimensions of G3 robotic arm, unit mm

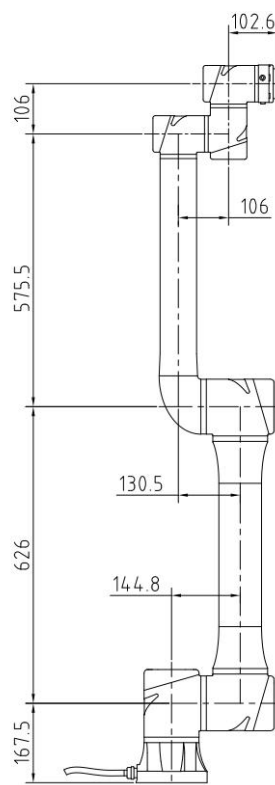


Figure 33 Mechanical dimensions of G4 robotic arm, unit mm

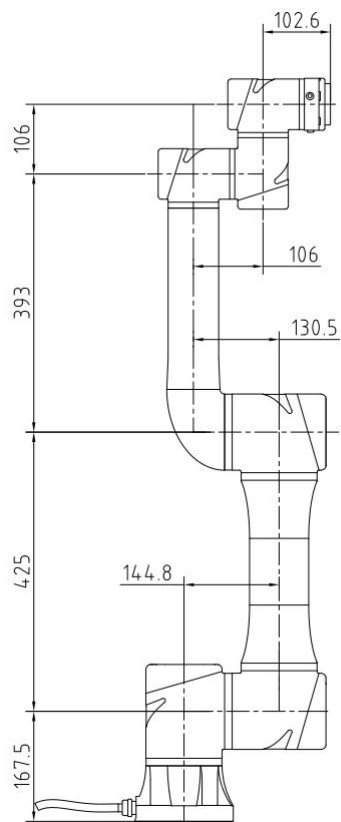


Figure 34 Mechanical dimensions of G6 robotic arm, unit mm

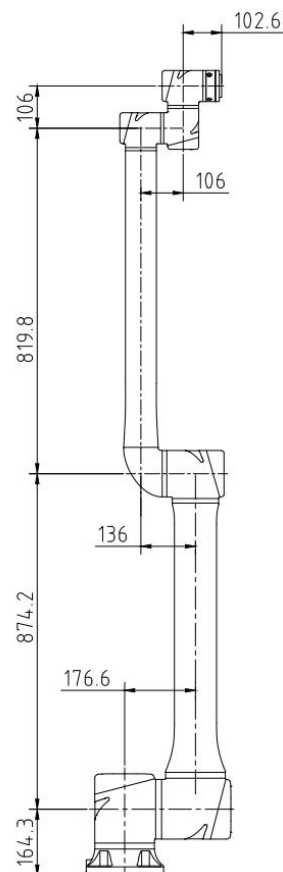


Figure 35 Mechanical dimensions of G6L robotic arm, unit mm

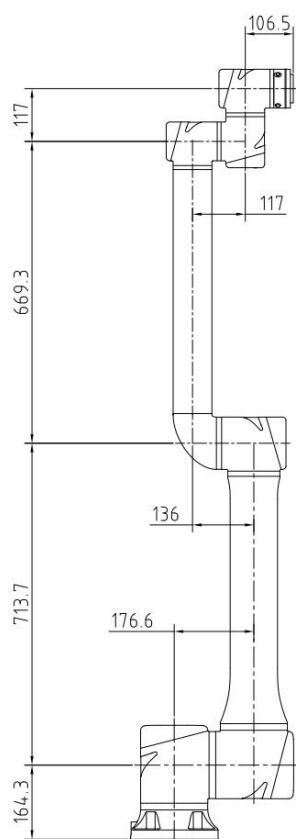


Figure 36 Mechanical dimensions of G9 robotic arm, unit mm

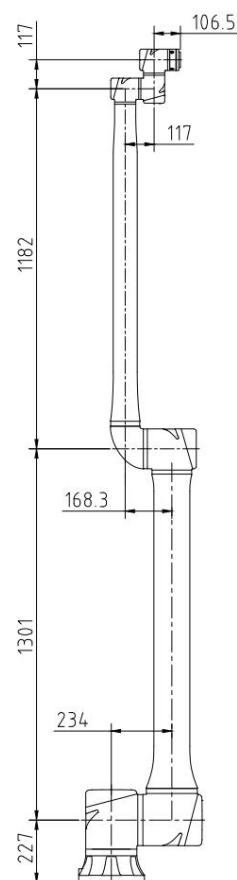


Figure 37 Mechanical dimensions of G9L robotic arm, unit mm

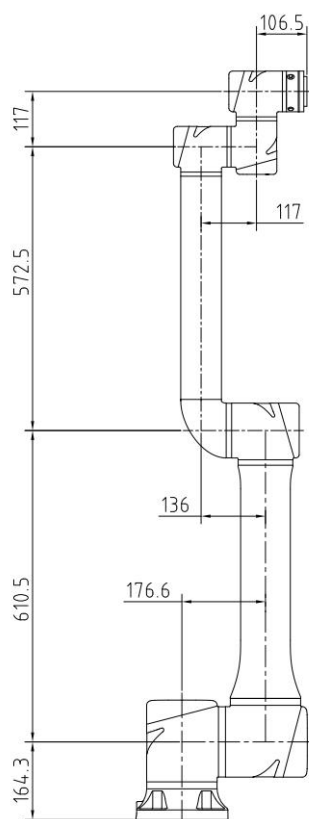


Figure 38 Mechanical dimensions of G12 and G12s robotic arms, unit mm

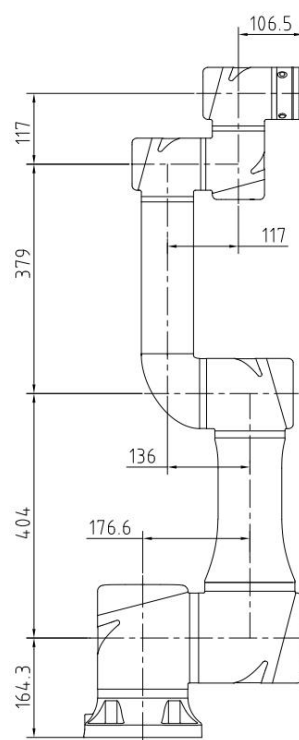


Figure 39 Mechanical dimensions of G18 robotic arm, unit mm

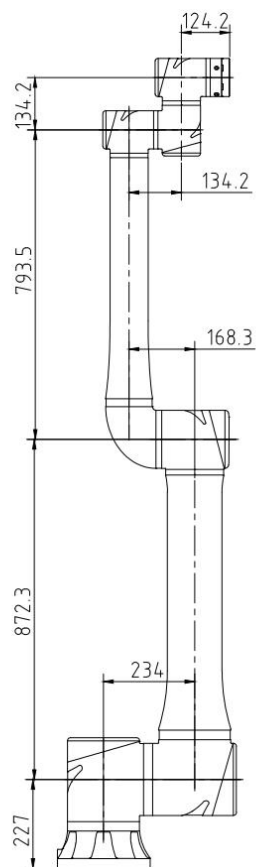


Figure 40 Mechanical dimensions of G20 robotic arm, unit mm

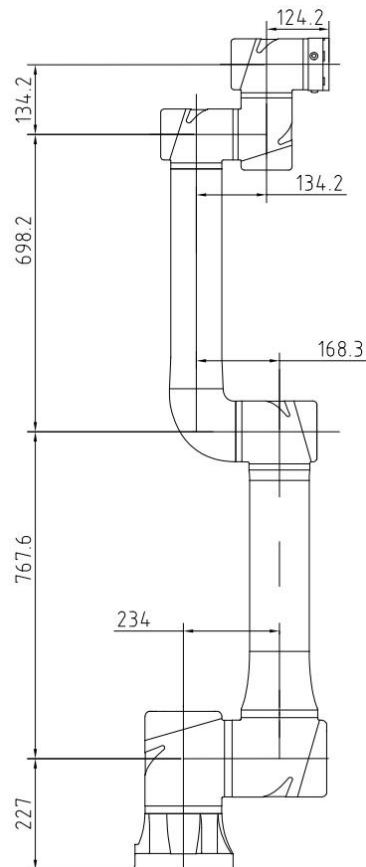


Figure 41 Mechanical dimensions of G25 robotic arm, unit mm

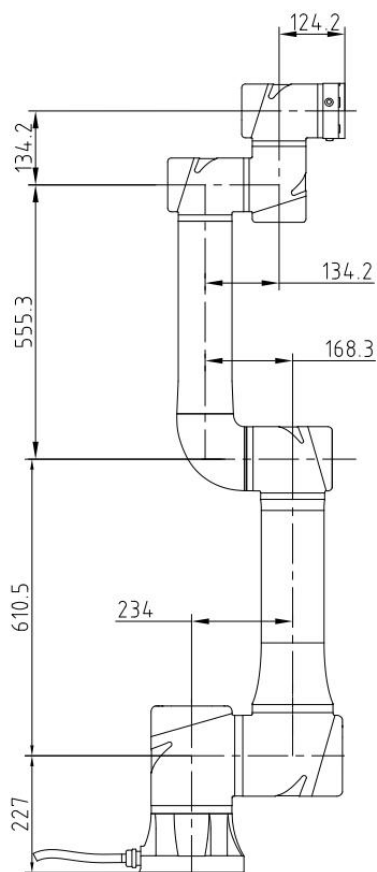


Figure 42 Mechanical dimensions of G30 robotic arm, unit mm

The structural dimensions of the robotic arm base are shown in the following figure.

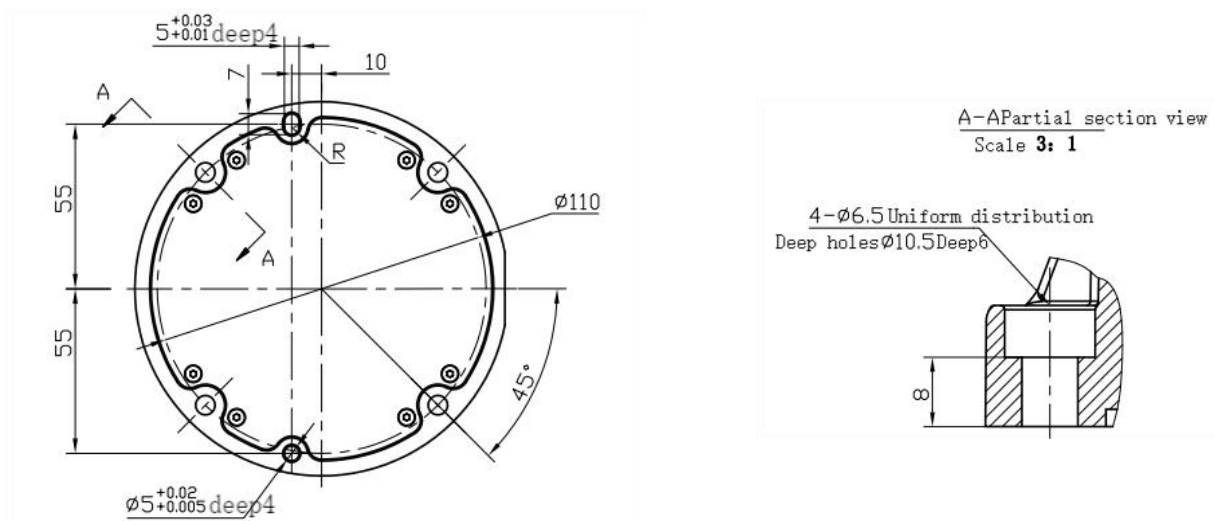


Figure 43 Mechanical dimensions diagram of the G3 base, unit mm

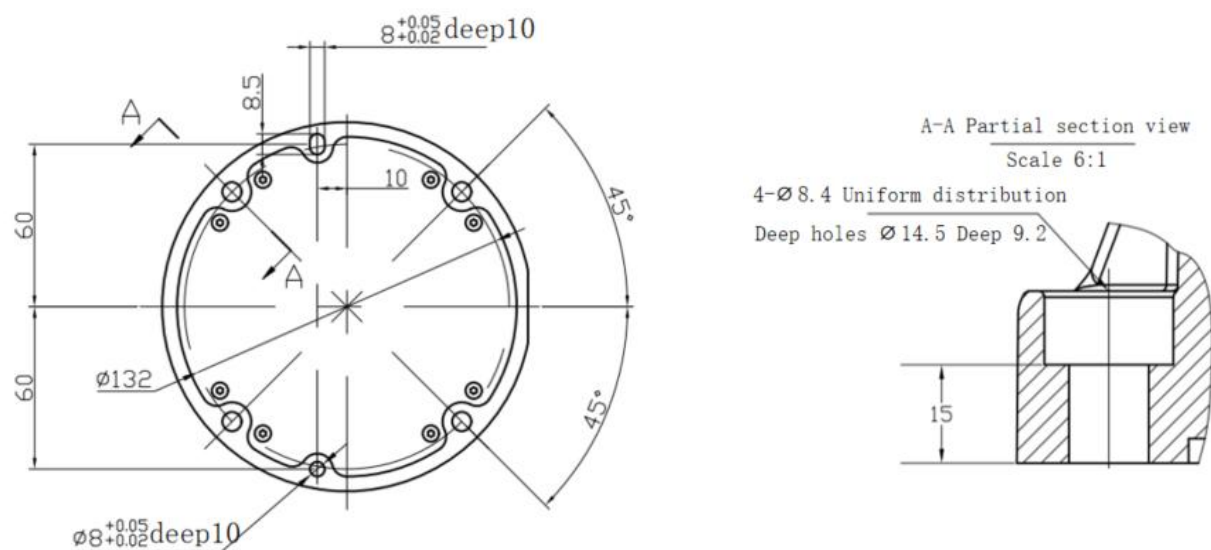


Figure 44 Mechanical dimensions of G4 and G6 bases, unit mm

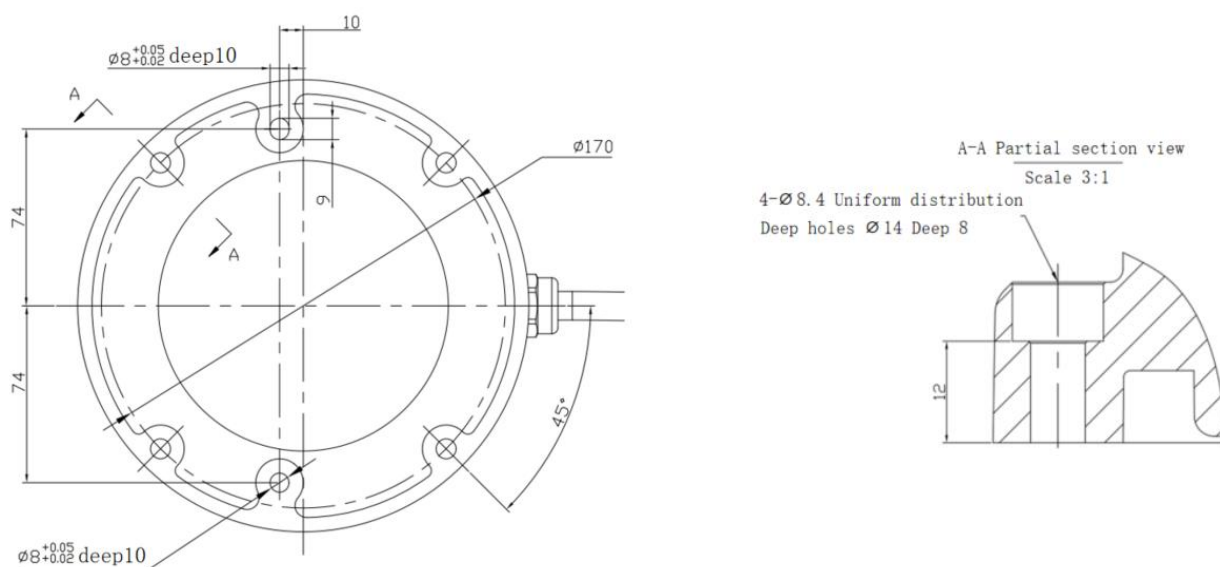


Figure 45 Mechanical dimensions of the G6L, G9, G12, G12s, G18 base, unit mm

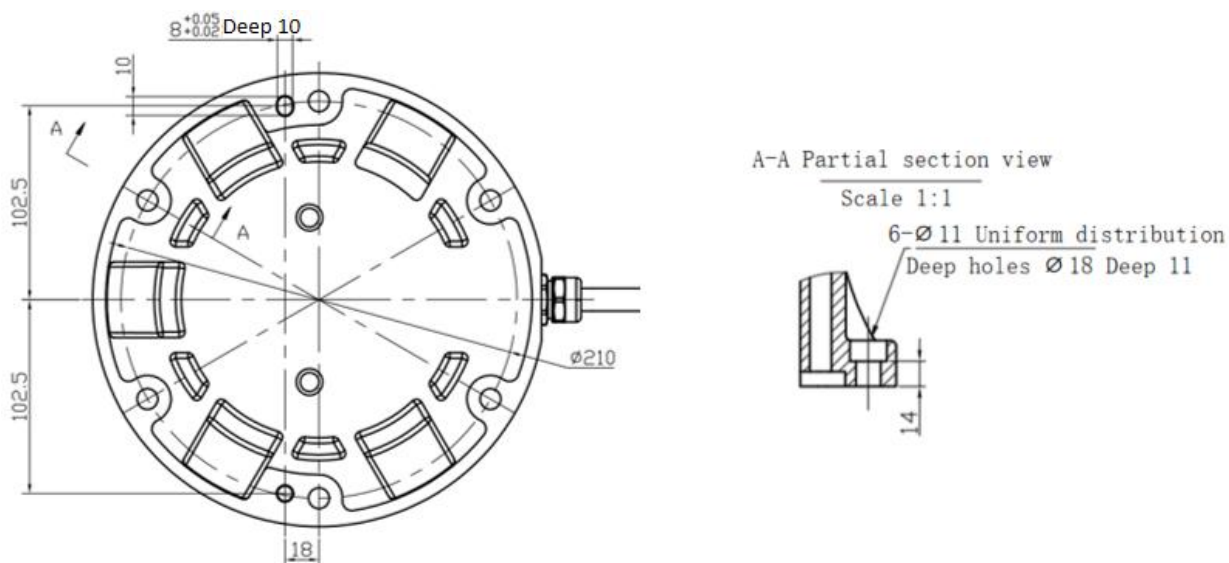


Figure 46 Mechanical dimensions of G9L, G20, G25, G30 bases, unit mm

2.2.1.3 Mounting method

The robotic arm can be installed at any Angle, as shown in Figure 47. The G3 robotic arm base is fastened with 4 12.9 grade M6 bolts and is tightened with a torque of 17Nm. The G4, G6, G6L, G9, G12, G12s, and G18 robotic arm bases are fastened with 4 12.9 grade M8 bolts and are tightened with a torque of 40 nm. The G9L, G20, G25, and G30 robotic arm bases are fastened with six 12.9 grade M10 bolts and require a torque of 67Nm. The base is not only designed with mounting holes, but G3 also has two Ø5mm positioning holes, and other models have two Ø8mm positioning holes for enhanced fastening.

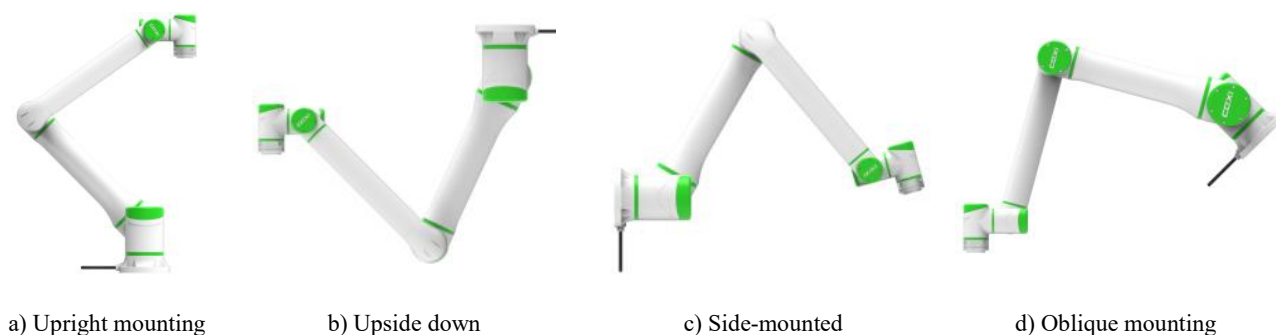


Figure 47 Schematic diagram of the installation of the robotic arm at various angles



Danger:

1. When installing the robotic arm at different angles, the installation initialization parameters must be set in the teaching device UI interface. See the software section.
2. If the robotic arm is not securely fastened to the base, the mechanical structure of the robotic arm may be unstable and may tip over.
3. The robotic arm should be used in an environment that matches its IP rating, which helps to reduce failures and extend the robotic arm's service life.
4. When installing the robotic arm, the cable at the base head should have sufficient margin (bending radius greater than 180mm) to avoid power supply or communication problems caused by excessive bending or frequent swinging of the cable.

The recommended G3 mounting base size is shown in Figure 48.

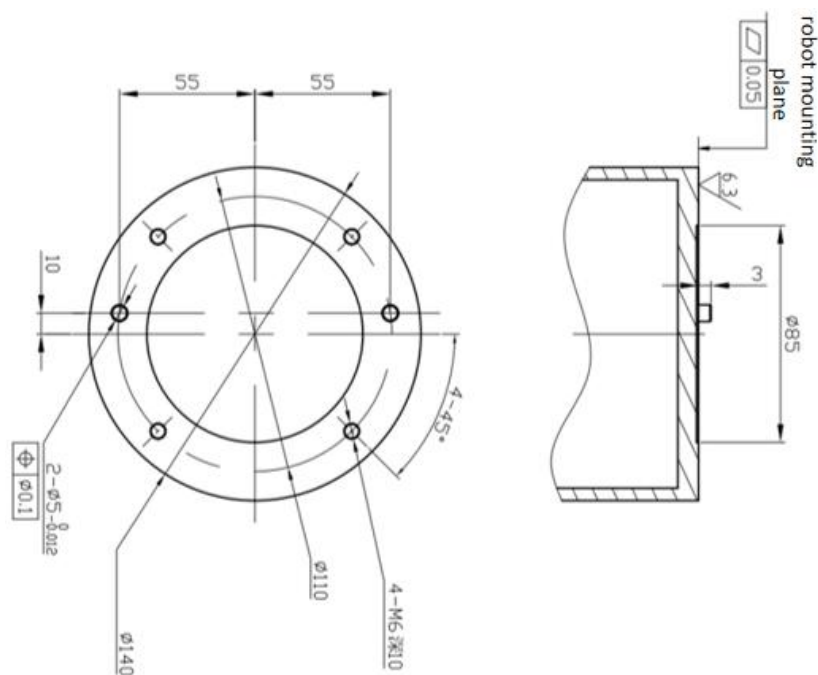


Figure 48 Diagram of recommended G3 mounting base dimensions, in mm

The recommended G4 and G6 mounting base sizes are shown in Figure 49.

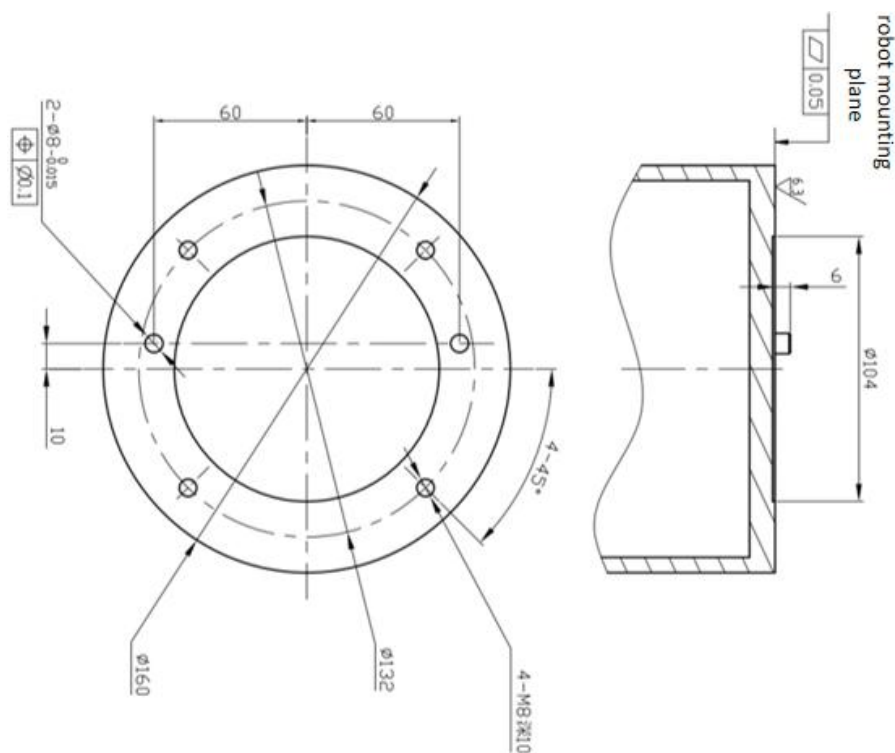


Figure 49 Diagram of recommended G4 and G6 mounting base dimensions, in mm

The recommended mounting base sizes for G6L, G9, G12, G12s, and G18 are shown in Figure 50.

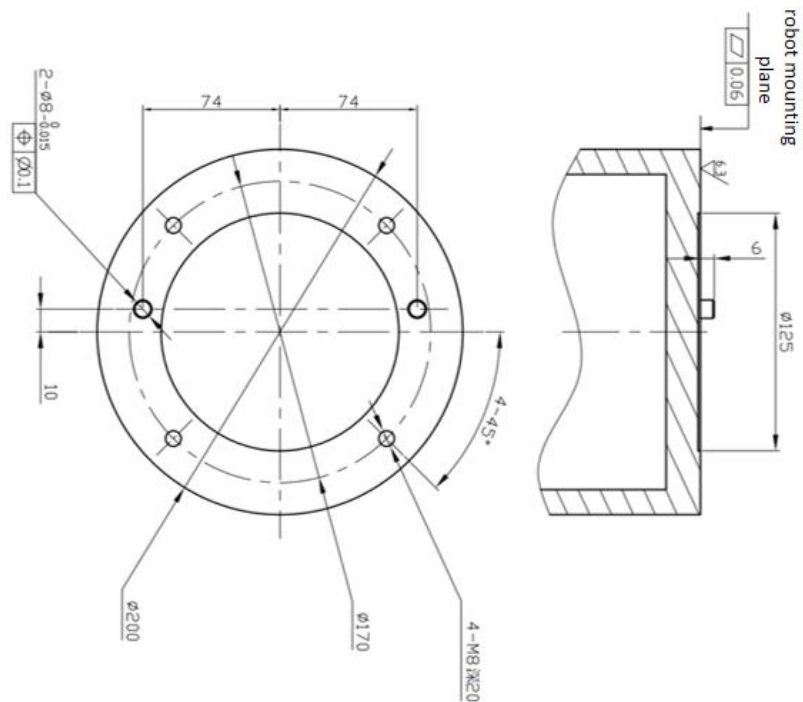


Figure 50 Diagram of recommended G6L, G9, G12, G12s, G18 mounting base dimensions, in mm

The recommended mounting base sizes for G9L, G20, G25, and G30 are shown in Figure 51.

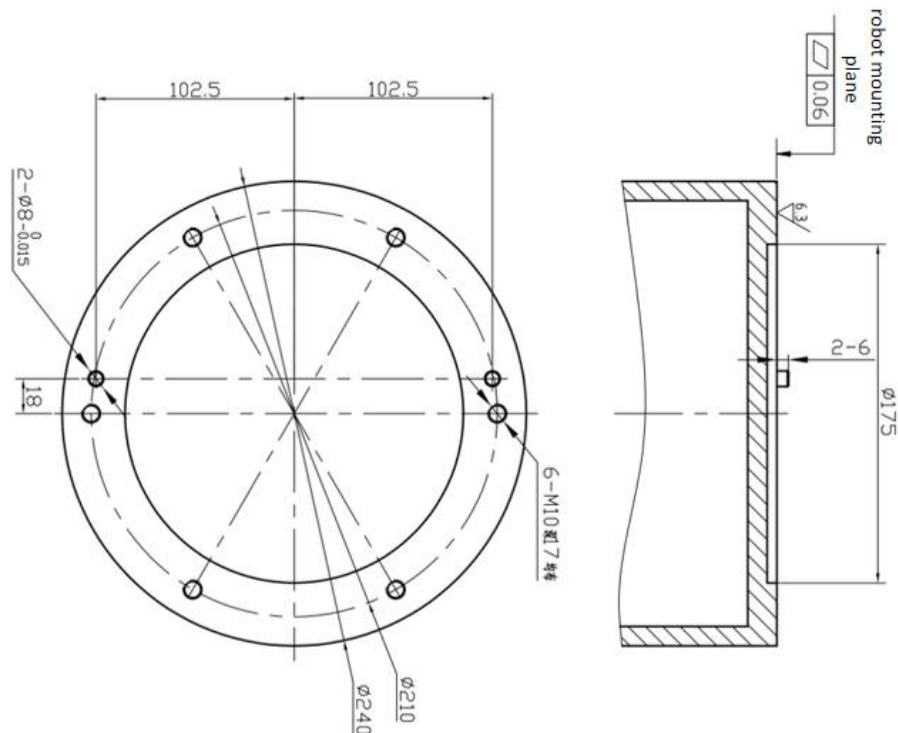


Figure 51 Diagram of recommended G9L, G20, G25, G30 mounting base dimensions, in mm

2.2.2 Tool end

2.2.2.1 Mechanical dimensions

The mechanical dimensions of the tool end flanges of G3, G4, G6, G6L, G9, G9L, G12, G12s and G18 are shown in Figure 52.

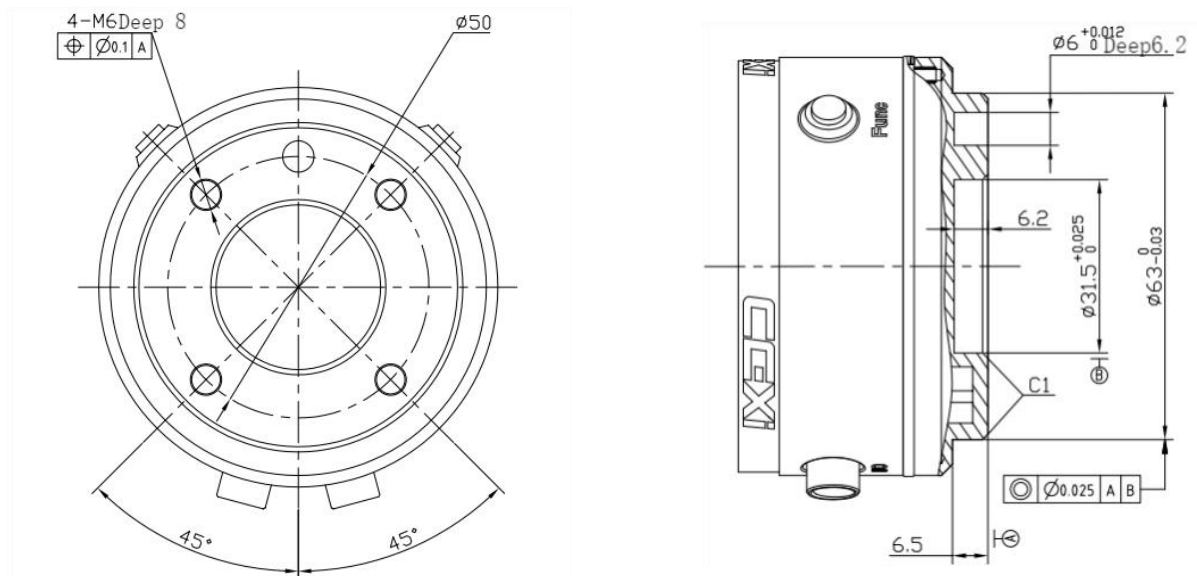


Figure 52 Diagram of the dimensions of G3, G4, G6, G6L, G9, G9L, G12, G12s, G18 tool end flanges, in mm

The mechanical dimensions of the G20, G25, and G30 tool end flanges are shown in Figure 53.

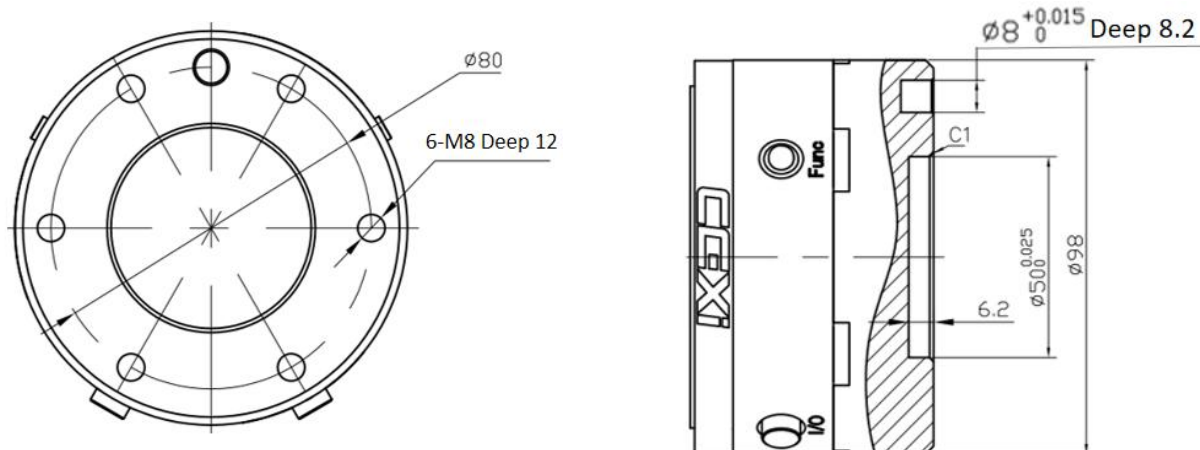


Figure 53 G20, G25, G30 tool end flange dimensions diagram, unit mm

2.2.2.2 Installation method

G3, G4, G6, G6L, G9, G9L, G12, G12s, G18 tool ends have 4 M6 bolt holes and one Ø6 positioning hole, G20, G25, G30 tool ends have 6 M8 bolt holes and one Ø8 positioning hole, tool flange interfaces comply with ISO 9409-1-50-4-M6 (Operating industrial robot). The mechanical interface standard is used to install and fix the actuating tool.



Warning:

1. All threaded hole strength grades are 12.9 and must be tightened with a torque of 16Nm;
2. It is recommended to set radial waist-shaped positioning holes on the fixed plate fixed at the end of the tool to avoid excessive

restraint;

3. The bolt length for fixing the end tool, excluding the thickness of the end tool, should not exceed 8mm and 12mm respectively depending on the model to prevent damage to the end flange housing;
4. Make sure the end effector is securely installed to prevent the risk of falling;
5. The bolt engagement length for securing the end tool should be between 6-8mm and 10-12mm depending on the model to prevent the bolts from slipping during tightening and making it impossible to install the end tool.

2.2.3 K10/K20 control cabinet

2.2.3.1 Mechanical dimensions

The control cabinet dimensions are shown in Figure 54.

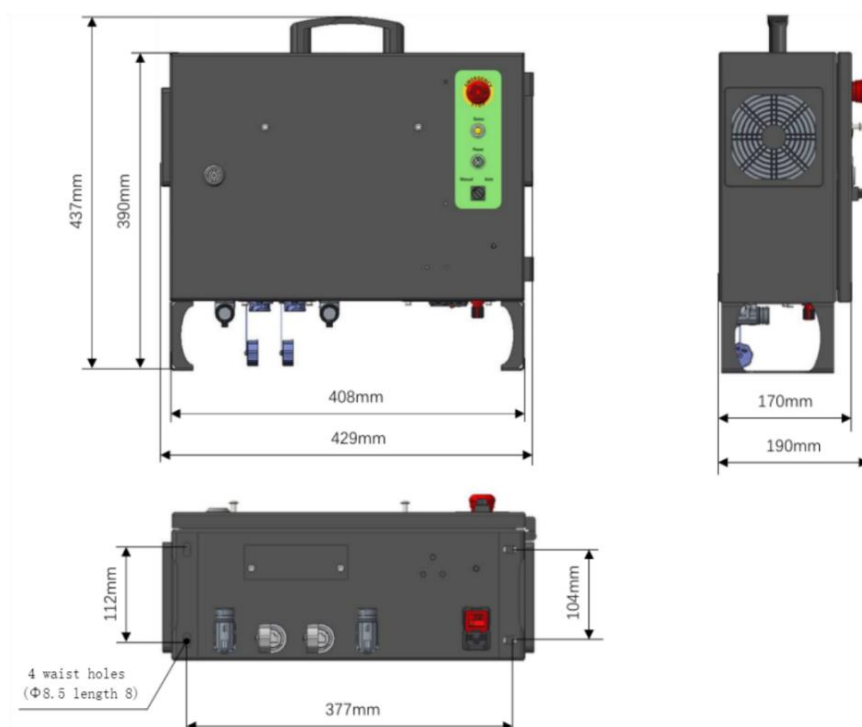
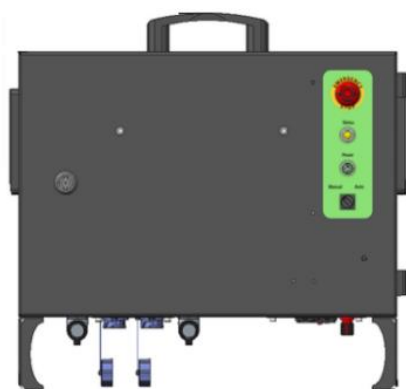


Figure 54 Mechanical dimensions diagram of control cabinet, in mm

2.2.3.2 Installation Method

The control cabinet can be installed vertically, on an incline, or inside other large cabinets, etc. Four waist-shaped holes at the bottom of the cabinet are used for fixation, as shown in Figure 55. When installing, make sure to leave no less than 50mm of space on each side of the control cabinet to ensure smooth air circulation.



a) Vertical state



b) Lying state

Figure 55 Schematic diagram of control cabinet installation



Danger:

1. Make sure the control cabinet and its connecting cables do not come into contact with the liquid. A damp control cabinet can cause death from electric shock to people;
2. There is a strong current inside the control cabinet, and the cabinet door is not allowed to be opened by a person without professional authorization.



Warning:

The side of the control cabinet with the emergency stop button should be placed in a conspicuous and easily accessible position without the risk of collision.

2.2.4 MK Controller (Power box)

2.2.4.1 MK Controller Mechanical dimensions

The MK controller dimensions are shown in Figure 56.

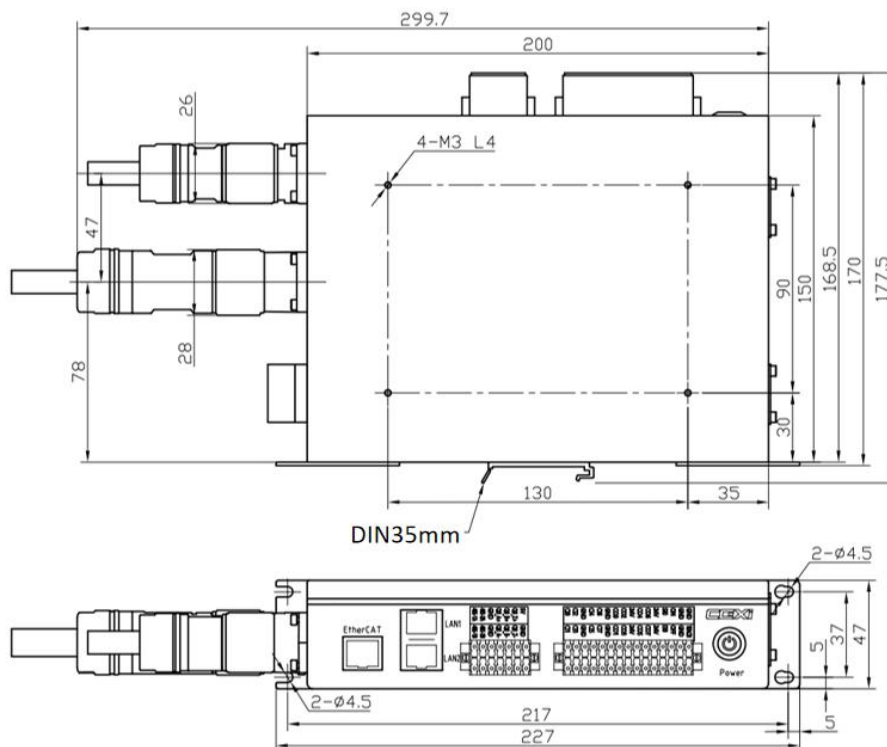


Figure 56 MK Controller Mechanical dimensions diagram, in mm

2.2.4.2 Installation method of MK controller

There are three ways to install the MK controller: bottom mounting, ear mounting, and rail mounting. When installing, make sure to leave no less than 100mm of space on each side of the control cabinet to ensure smooth air circulation.

- Bottom surface installation: The installation method and interface for bottom surface installation are shown in Figure 57.

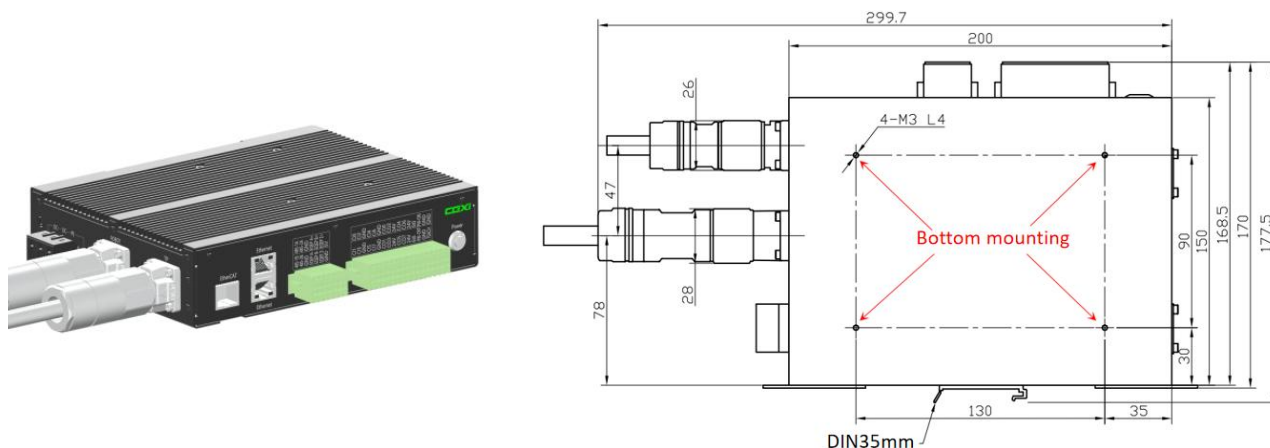


Figure 57 Bottom mounting, unit mm

- Ear mounting: The mounting method and interface of the ear mounting are shown in Figure 58.

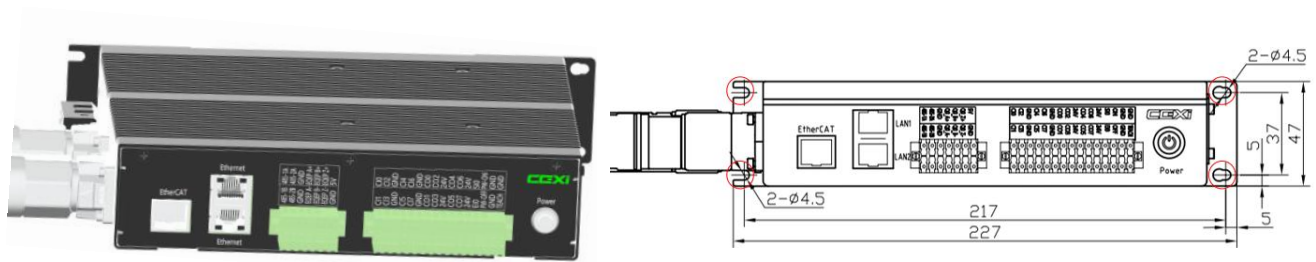


Figure 58 Ear mounting, unit mm

- Rail mounting: The mounting method and interface of the rail mounting are shown in Figure 59.

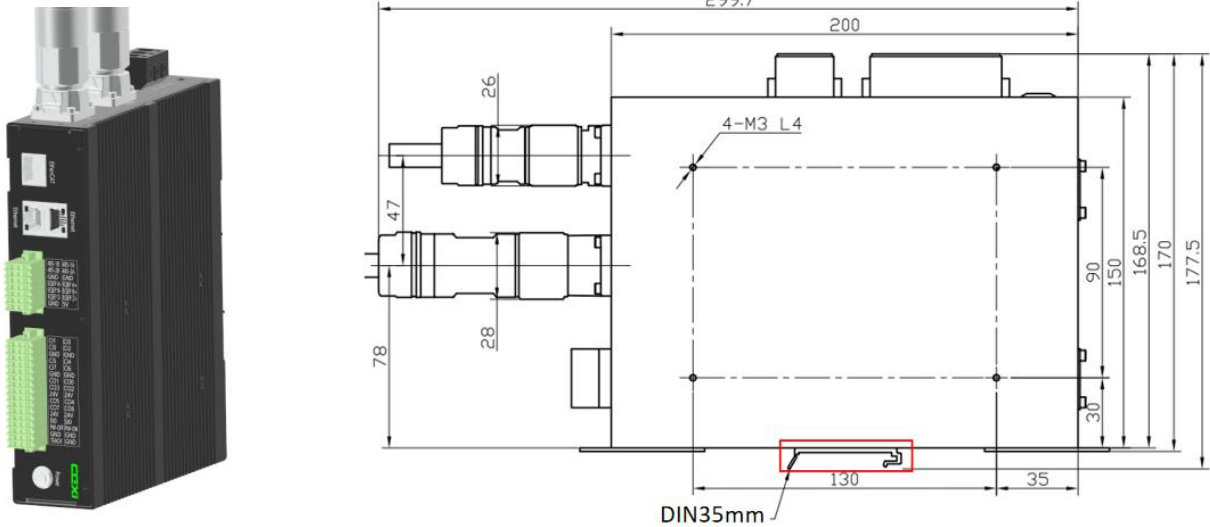


Figure 59 Rail mounting, unit mm



Caution:

A torque of 0.8Nm is recommended for installation.

2.2.4.3 Mechanical dimensions of the power box

The mechanical dimensions of the power box (1000W, 1200W, 3000W) matched with MK are shown in the following figure respectively.

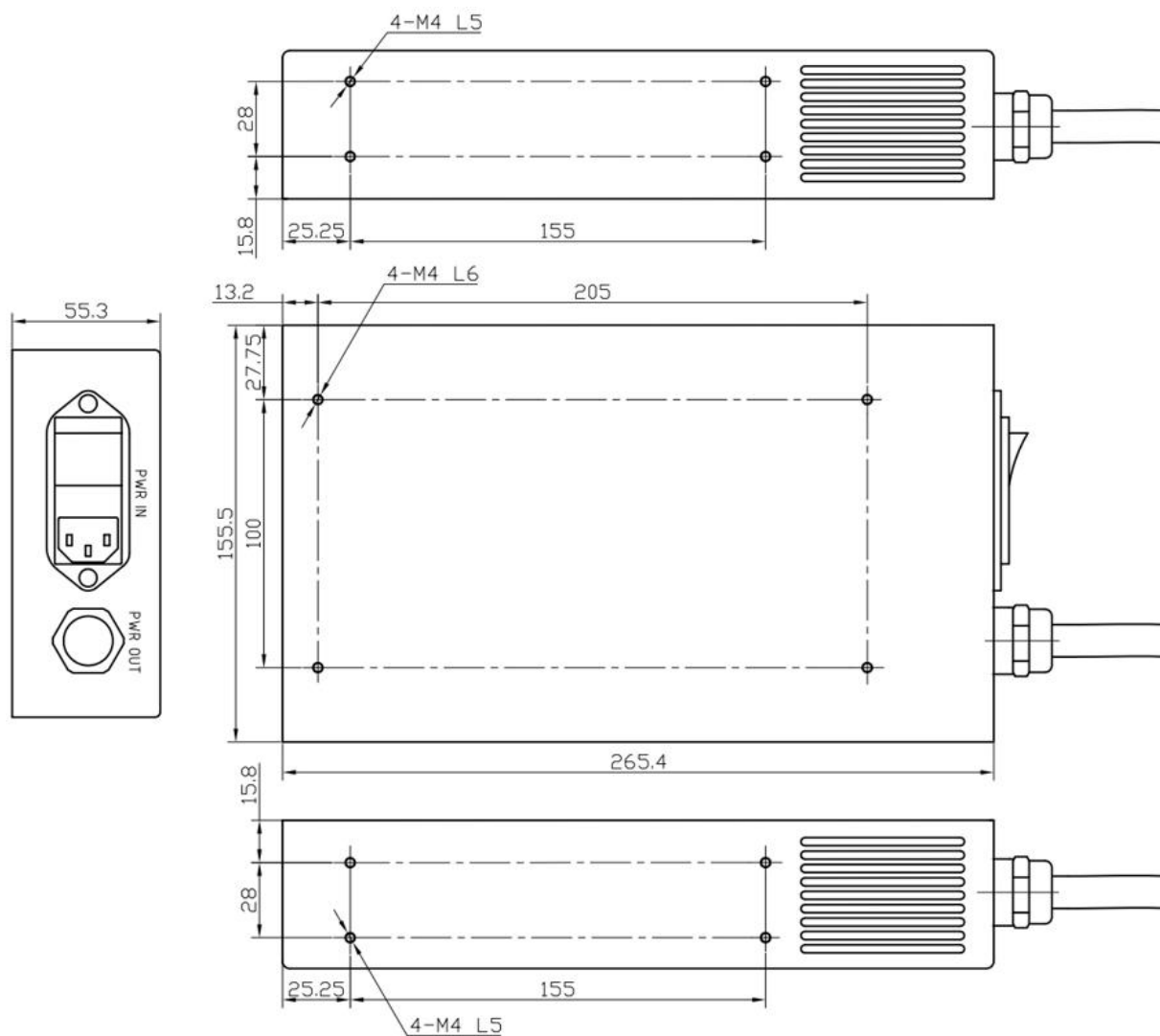
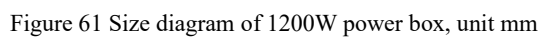


Figure 60 1000W power box dimensions diagram, unit mm



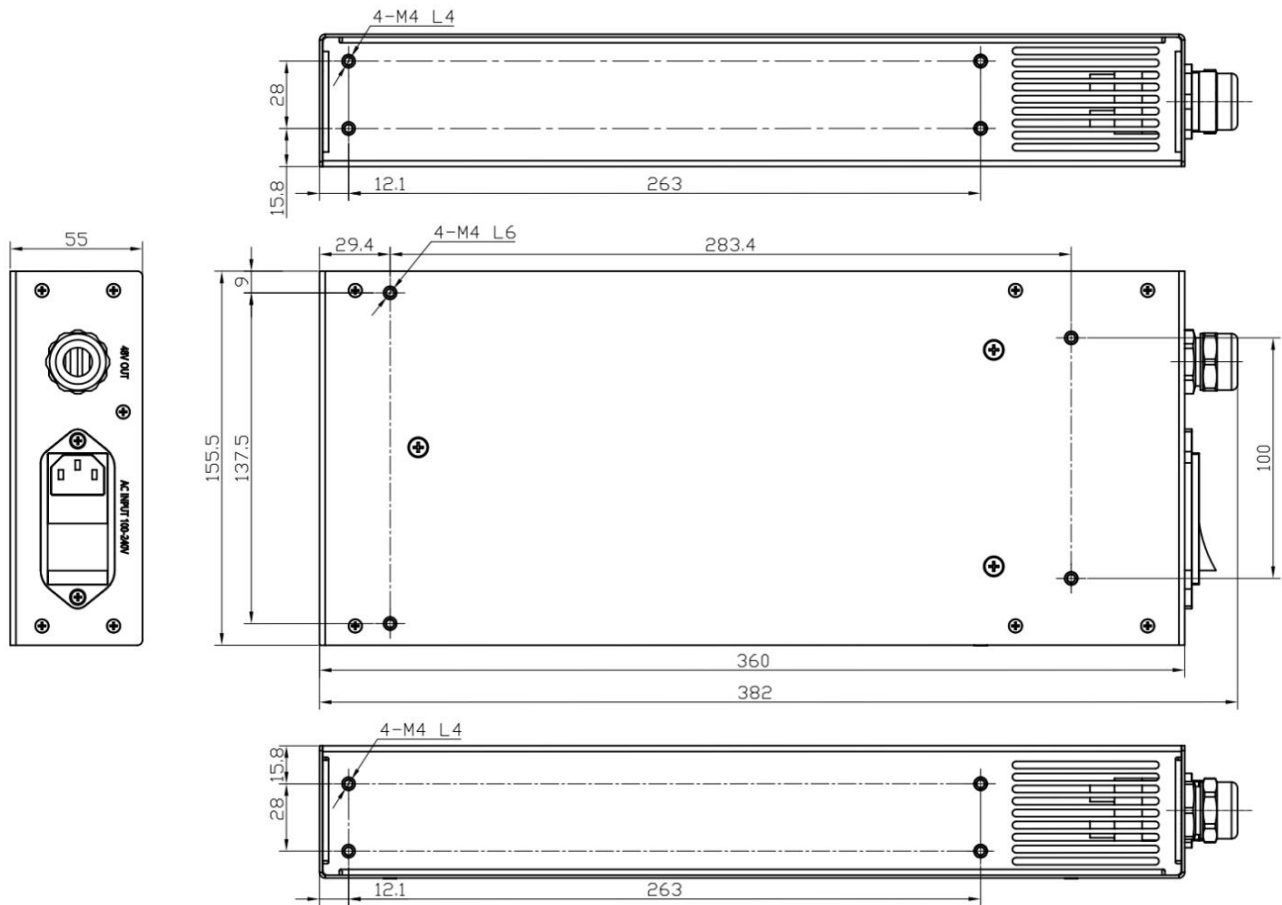


Figure 62 Size diagram of a 3000W power box, unit mm

2.2.4.4 Installation of the power box

The power box supports both bottom mounting and side mounting.

- Bottom mounting: The mounting methods and interfaces for bottom mounting are as shown in the following figure.

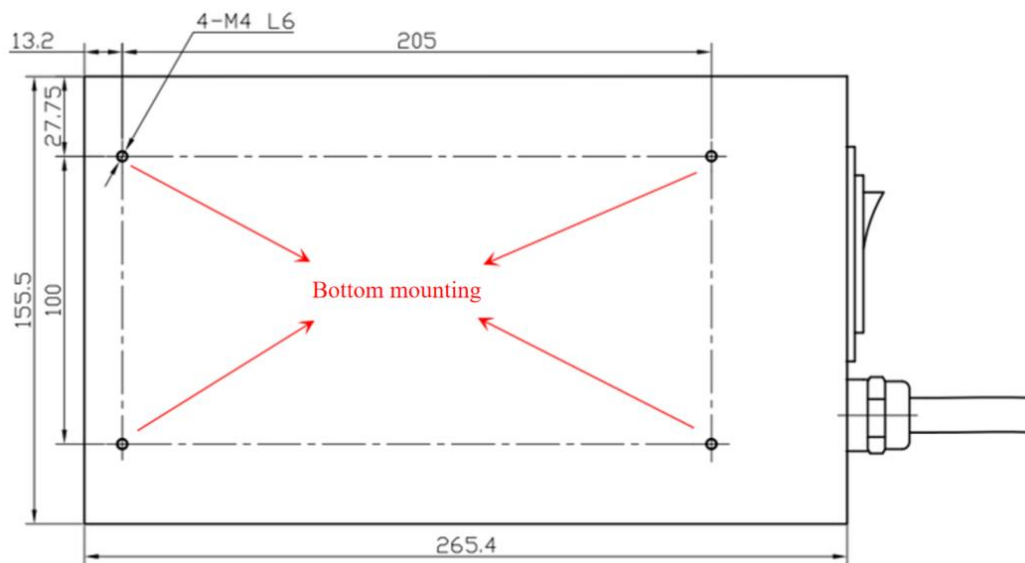


Figure 63: Installation dimensions of the bottom surface of the 1000W power box, unit mm

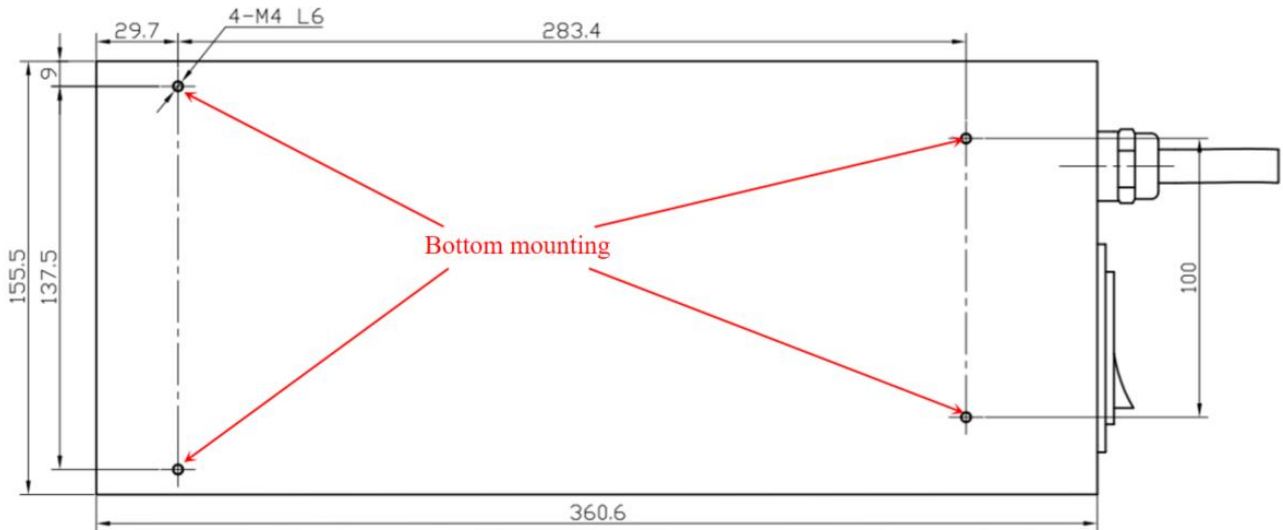


Figure 64 Installation dimensions of the bottom of a 1200W power box, unit mm

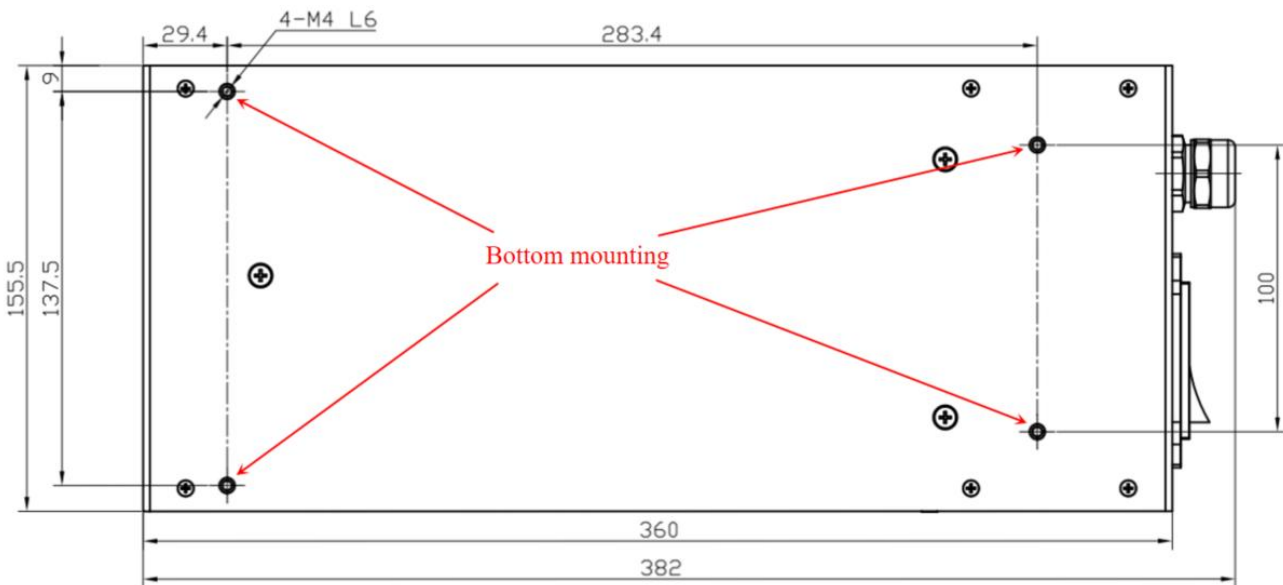


Figure 65 Installation dimensions of the bottom of a 3000W power box, unit mm



Caution:

A torque of 0.8Nm is recommended for installation.

- Side mounting: There are mounting interfaces on both the top and bottom of the power box, and the mounting methods and interfaces are shown in the following figure.

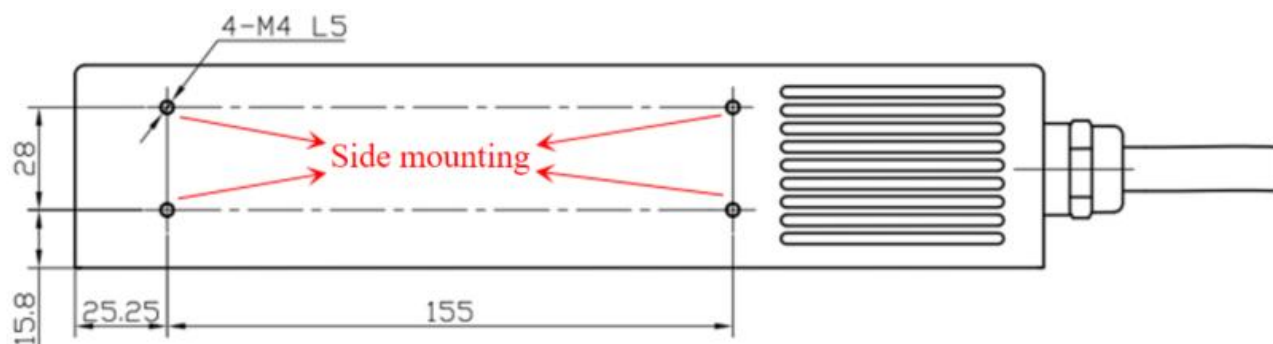


Figure 66 Side mounting dimensions diagram of 1000W power box, unit mm

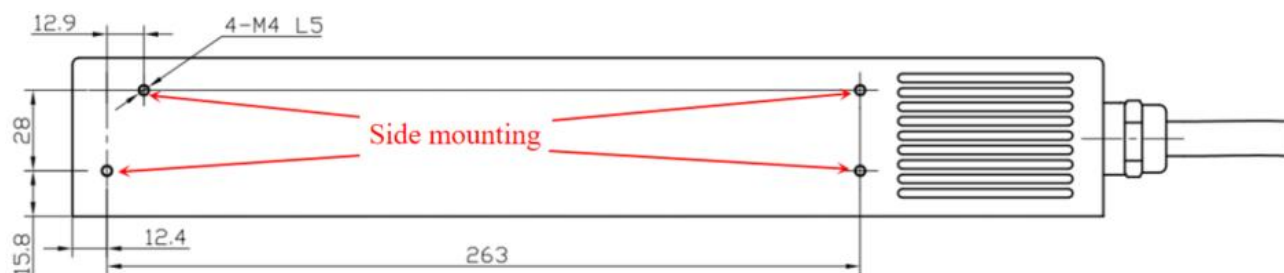


Figure 67 Side mounting dimensions of a 1200W power box, unit mm

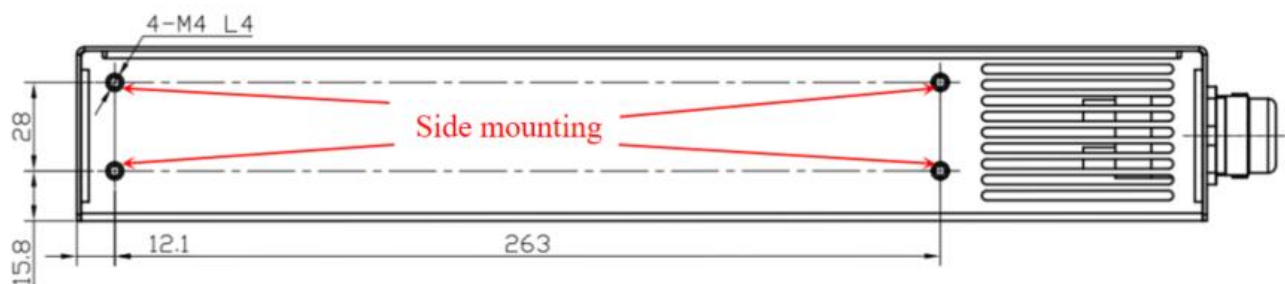


Figure 68 Side mounting dimensions of a 3000W power box, unit mm



Caution:

A torque of 0.8Nm is recommended for installation.

2.2.5 The teaching device

2.2.5.1 Mechanical dimensions

The dimensions of the teaching device are shown in Figure 69.

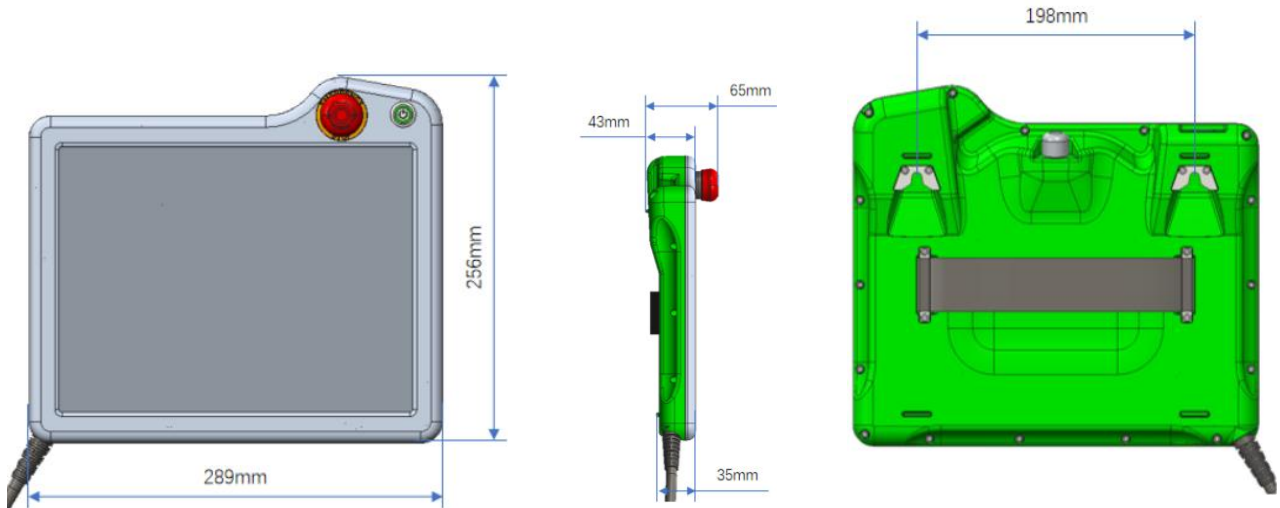


Figure 69 Diagram of mechanical dimensions of the teaching device

2.2.5.2 Installation Method

The teaching device can be hung on the control cabinet, or on a solid wall, or on the side of the operating equipment, making sure that the connecting cables are not bent back and forth, as shown in Figure 70.



Figure 70 A physical picture of a teaching device hanging on a control cabinet hanger

2.3 Startup Guide

After completing the robot installation, please be sure to check again carefully before the first power-on:

- Make sure the robotic arm base is securely fastened to the base.
- Whether the fixtures and workpieces are securely fastened (Fixtures and workpieces are not recommended to be installed on the first startup to avoid safety risks caused by misoperation).



Caution:

After confirming the safety of the above checks, **please read the following sections carefully and perform the startup operation strictly in sequence.**

2.3.1 Cable connection

The cable connectors of the G series robots are divided into standard air connectors and quick air connectors, and the connection methods are described as follows.

2.3.1.1 Standard air connectors

The control cabinet supplies power to the teaching device and the robotic arm, which must be connected by cable to the corresponding interface on the control cabinet.

Follow these steps:

Step 1: Connect the teaching device to the control cabinet

- As shown in Figure 71, connect the teaching device cable to the [TEACH PENDANT interface] of the control cabinet.



Figure 71: Cable connection diagram of the teaching device

Step 2: Connect the robotic arm cable to the control cabinet

- As shown in Figure 72, connect the robotic arm cable to the control cabinet [ROBOT interface].



Figure 72 Diagram of the robotic arm cable connection

Step 3: Connect the mains power to the control cabinet

- As shown IN Figure 73, connect the mains POWER to the [POWER IN interface] of the control cabinet.



Figure 73 Diagram of mains power connection



Caution:

1. When connecting the aviation pins, handle them gently. When encountering resistance, check if the pins are skewed. If so, correct them before inserting to avoid damaging the pins.
2. Align the aviation plug as shown in the picture above and press it down gently. If it can no longer be pressed down, slowly turn the middle fixing knob (if it cannot be turned, slightly shake the upper plug left and right), and stop when it is visually observed to fit up and down and can no longer be turned. Special attention should be paid during the connection process to prevent loose contact and inability to turn on the machine;
3. After aligning the power plug (female connector) with the control cabinet power pin socket (male connector), press the red circles on both sides to insert.

After completing the cable connection of the robot, the next step is to determine the working mode of the robot.

2.3.1.2 Quick Plug Navigation plug

For the convenience of users, Changguangxi Intelligent Manufacturing collaborative robots are also equipped with quick Plug air plug for users to choose from.

Follow these steps:

Step 1: Connect the teaching device cable to the controller

As shown in Figure 74, align the arrow ② on the connector of the teaching device with the arrow ① on the connector at the [TP interface] on the control cabinet. After pressing it down into place, rotate ③ clockwise by 90° (in the locked state).

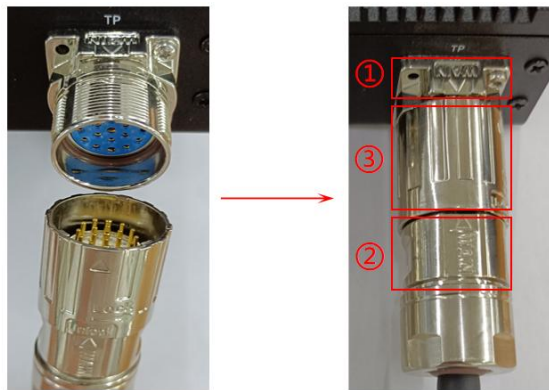


Figure 74 Diagram of cable connection for the teaching device

Step 2: Connect the robotic arm cable to the controller

- As shown in Figure 75, align the arrow ② on the end connector of the robotic arm with the arrow ① on the connector at the [ROBOT interface] on the control cabinet, press down into place, and then rotate ③ clockwise by 90° (in the locked state).

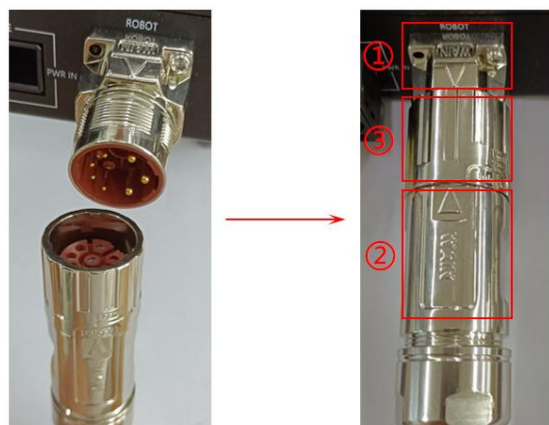


Figure 75 Cable connection diagram of the robotic arm

Step 3: Connect the power box to the controller (MK controller power connection method)

- As shown in Figure 76, connect the connector of the power box cable to the [PWR IN interface] of the controller.



Figure 76 Diagram of power box cable connection

Step 4: Connect the mains power to the power box

- As shown in Figure 77, connect the mains POWER to the [POWER IN interface] of the power box.



Figure 77 Diagram of mains power connection



Caution:

1. When connecting the aviation pins, handle them gently. If you encounter resistance, check if the pins are skewed. If so, correct them before inserting to avoid damaging the pins.
2. Align the aviation plug as shown in the picture above, press down gently, and when you can no longer press down, slowly turn the middle fixing knob (if you can't turn it, slightly shake the upper plug left and right), and stop when you can see with your naked eye that it fits up and down and can no longer turn. Special attention should be paid during the connection process to prevent loose contact and inability to turn on the machine.

After completing the cable connection of the robot, the next step is to determine the working mode of the robot.

2.3.2 Working mode

External devices can control the robot's motion state through the robot's electrical communication interface. In Manual (manual) and Auto (automatic) modes, the control authority over the robot is different. The working mode of the robot is determined by the manual/auto mode switch on the control cabinet panel.

- Auto (Auto) mode: All control of the robot by external devices is in effect and can be software-configured via the teaching UI.
- Manual mode: The control of the robot by the external device is only effective with the [Free Drag] (see Software/Configuration [System Input]) option.



Caution:

1. After the robot is powered on, pulling this switch button to switch the working mode still takes effect;

2. The mode switch must correspond to the actual working mode that the robot needs to operate in. Be sure to check and verify it carefully, otherwise it may affect the normal operation of the robot;

3. The MK control box has only Auto mode and no Manual mode.

After determining the working mode of the robot, the next step is to master the robot's shutdown category, which has a direct impact on safety protection and the robot's service life.

2.3.3 Shutdown categories

IEC 60204-1 defines robot shutdown categories as shown in Table 14, and the G series collaborative robots follow these three shutdown categories as shown in Table 15.

Table 14 IEC60204-1 Downtime Categories and Descriptions

Shutdown categories	Instructions
Class 0	Stop the robot by immediately cutting off the power supply.
Class 1	Stop the robotic arm in an orderly and controlled manner. Once it stops, cut off the power supply.
Class 2	- Stop the robotic arm by the power available to the driver while maintaining the trajectory of motion; - The drive power remains after the robotic arm stops moving.

Table 15 Robot Shutdown Trigger conditions and Recovery Instructions

Shutdown categories	Trigger conditions	Restore
Class 0	Cut off mains power supply.	After the fault is cleared, power the control cabinet back on.
Class 1	At least one external emergency stop button (teaching device/control cabinet) is pressed.	After the unexpected situation is resolved, turn the emergency stop button clockwise and then pull it out to power on again.
Class 2	The safety stop signal is effective.	After troubleshooting, manually operate the teaching device screen or automatically re-run the program.



Caution:

1. The control cabinet (MK controller has no emergency stop button) and the teaching device are both equipped with emergency stop buttons. Before powering on and starting the robot, carefully check the status of these two buttons. If either of them is pressed, the robot is in Class 1 shutdown and must be operated in accordance with the recovery requirements in Table 14 to function properly.

2. When the G series collaborative robot arm is in type 1 and Type 2 shutdown, it will maintain the movement trajectory without deviating from the current path and accelerate and decelerate until it stops.

2.3.4 Power-on startup

Power-on startup instructions are shown in Table 16.

Table 16 Instructions for Power-on Startup

Steps	Operations	Notes
1	The control cabinet panel [Manual/Automatic Mode Switch] points to the preset working mode, which defaults to Auto (automatic).	
2	Press the I position of the [Power Switch] on the bottom panel of the control cabinet (as shown in the red box) to connect the external mains power.	
3	Press the [Power Button] on the top of the teaching device or on the control cabinet panel (as shown in the red box) to power on the control cabinet and the teaching device.	
4	The [three-color status indicator light] on the control cabinet panel is on (red), the teaching screen is on, and it enters the startup interface. At this time, the robotic arm is not powered on. For detailed steps to power on and enable the robotic arm, please refer to the software section.	

3. Electrical Communication Interface

3.1 Introduction

The electrical communication interface of a robot mainly refers to the electrical communication interface between the control cabinet and the tool end of the robotic arm. When the robot works in conjunction with its end effector, external electrical equipment, or other robots, a physical connection of the electrical communication interface is required for data interaction.

The G series collaborative robot is compatible with K10 control cabinet, K20 control cabinet, MK controller + power box. The compatibility rules are shown in the robot technical specification sheet.



Warning:

The G series robot has passed the international IEC electromagnetic compatibility (EMC) test and complies with the technical standards for industrial environment electromagnetic compatibility (GB/T 17799.2-2003 GB T17799.4-2012), but interference signals generated by levels above the standard (such as welding) may cause abnormal operation of the robot. In such cases, consult the pre-sale technical service personnel of Changguangxi Intelligent Manufacturing for special EMC protection treatment.



Danger:

1. All electrical interfaces must be kept dry, otherwise it could cause damage to the robot or even endanger people's lives. If it gets wet, turn off all power immediately and contact your supplier quickly;
2. Use original cables to connect the electrical interfaces and avoid bending the cables. If additional cables are needed, contact your supplier.

3.2 K10/K20 Control cabinet

The K10/K20 control cabinet has electrical communication interfaces LAN1 and LAN2 at the bottom of the cabinet and three bus communication interfaces I/O and RS232/RS485/RJ45 inside the cabinet, all of which can be used to connect external devices.

3.2.1 External Interfaces

The external electrical communication interface of the control cabinet mainly refers to the two standard RJ45 interfaces at its bottom: LAN1 and LAN2, as shown in Figure 3.1. Both of these interfaces support 10/100M adaptive wired networks, and the peripherals are described as follows:

- Supports direct connection to network devices that follow the Modbus TCP protocol

Refer to the configuration instructions in the software section, which provides detailed instructions on how to configure a connection to a Modbus TCP protocol device.

- Support extended connections to regular network devices that follow the TCP/IP protocol

Communicate with peripherals through SDK software programming.

3.2.2 Internal Interfaces

The electrical communication interfaces inside the control cabinet include digital I/O, analog I/O, encoder interface, I/O power supply and remote control, RS232, RS485 and RJ45 bus interface. The internal wiring can be led out through the electrical wiring outlet at the bottom of the cabinet (as shown in the red box in Figure 78).



Figure 78 Internal interface of the control cabinet



Caution:

1. If the electrical wiring inside the cabinet needs to be led out, removing the wiring exit board will cause the sealing protection of the control cabinet to fail and requires a protection safety assessment;
2. If you have special requirements for the sealing protection of the control cabinet and need assistance, contact your supplier for help.

The electrical communication interfaces inside the control cabinet are shown in Figure 79.



Figure 79 Diagram of the electrical communication interface inside the control cabinet

3.2.2.1 Digital I/O

Digital I/O includes safety I/O, configurable I/O and standard I/O, with electrical characteristics in accordance with IEC 61131-2. Digital I/O can be powered by either an internal +24V or an external +24V power supply. See Control Cabinet Internal Interface [3.2.2.4 Remote Control and I/O Power](#) for the connection method.

The general electrical specification for digital I/O is shown in Table 17.

Table 17 Digital I/O General Electric Specification Table

Digital output	Parameters	Minimum value	Typical value	Maximum	"Unit
COX/DOX COX/DOX	Voltage	22	24	26	V
	Current	0	-	1	A
Digital Input	Parameters	Minimum value	Typical value	Maximum	Units
EIX/SIX/CIX/DIX	Voltage	0	-	24	V
EIX/SIX/CIX/DIX	ON Voltage range	0	-	15	V
EIX/SIX/CIX/DIX	OFF Voltage range	21	-	24	V
EIX/SIX/CIX/DIX	Current (0-15V)	2	-	6	mA



Caution: The sum of all digital output currents is no more than 1A.

3.2.2.1.1 Safety I/O

There are two sets of safety I/O: emergency stop (EI0_R/EI0_T, EI1_R/EI1_T) and safety stop (SI0/GND, SI1/GND). Both sets of I/O are input signals and are dedicated to safety device access and cannot be used for any other purposes.

The safety I/O input interface circuits are all designed with dual-channel redundancy to ensure reliable signal

reception, and the internal interface circuits are shown in Figure 80.

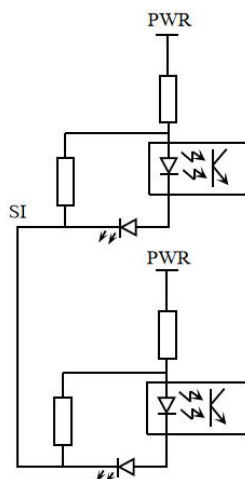


Figure 80 Safety I/O Internal Interface Circuit diagram

- Two pairs of terminals EI0_R/EI0_T and EI1_R/EI1_T are emergency stop inputs, and the robot enters the emergency stop state when either pair is disconnected. When connecting the emergency stop button, the same pair of terminals should be connected to both ends of the emergency stop button.
- Two pairs of terminals, SI0/GND and SI1/GND, are for the safety stop input. If either pair is disconnected, the robot enters the safety stop state. When connecting the safety stop button, the same pair of terminals should be connected to both ends of the safety stop button.

The robot emergency stop input is only used for the connection of emergency stop devices, while the safety stop input can be used for the connection of various safety-related protective devices, such as unit doors, light curtains or light beams, etc. The differences between the two are shown in Table 18.

Table 18 Emergency Stop and Safety Stop Robot Status Differences Table

	Emergency stop	Safe Stop
The robotic arm stops moving	Yes	Yes
The program stops	Yes	Pause
Robotic arm Power	Cut off	Open
Reset Restore Exercise	Manual	Manual/Automatic
Frequency of use	Occasional	Frequent
Re-power-on initialization	Yes	No need

Emergency stop

With a dual-loop connection, stop when one circuit is disconnected. When multiple emergency stop buttons are connected, the buttons can be connected in series, as shown in Figure 81.

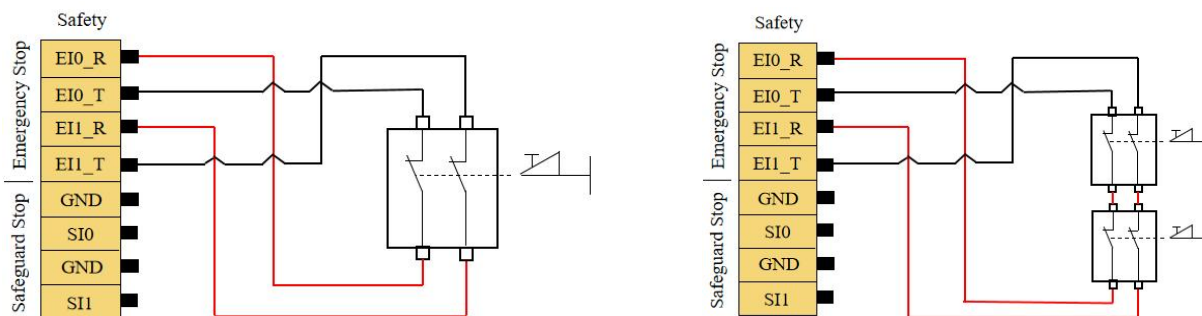


Figure 81 Robot Emergency Stop wiring

Safe stop

There are two types of safety stops: automatic recovery and manual reset required (configured in the teaching device UI interface, see the software section for instructions).

Connect the safety light curtain and provide a +24V power supply. The wiring diagram for automatic recovery after safety stop is shown in Figure 82.

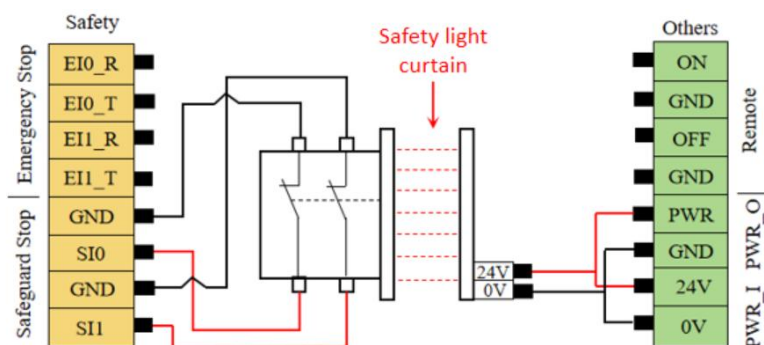


Figure 82 Wiring diagram for the robot to automatically recover after a safe stop

Safety stops that need to be manually reset require the use of configurable I/O (refer to [3.2.2.1.2 Configurable I/O](#) for internal interfaces of the control cabinet).

Connect the safety light curtain and provide a +24V power supply. The wiring for the safety stop that needs to be manually reset after the safety stop is shown in Figure 83.

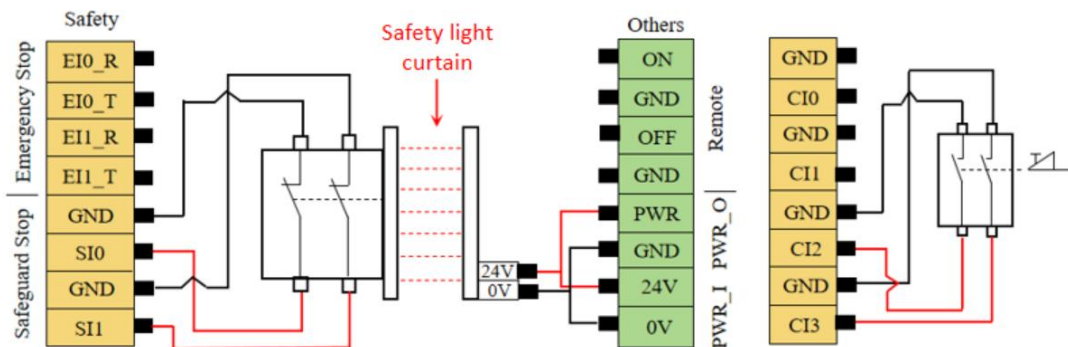


Figure 83 Safety stop wiring to be reset for the robot

3.2.2.1.2 Configurable I/O

The control cabinet has 8 configurable I/O channels each for input and output, and its interface circuit is shown in Figure 84.

- CIX (where X is 0 to 7) indicates configurable digital input, which defaults to high level and activates at low level.
- COX (X 0 to 7) represents configurable digital output, default high impedance state, low level active.

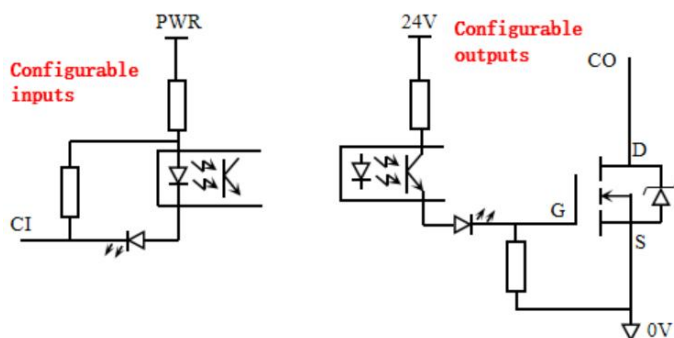


Figure 84 Configurable I/O Internal interface Circuit diagram

Configurable I/O can be used as standard I/O or configured as safety I/O in pairs, namely safety I/O input (4 pairs CI0/1, CI2/3, CI4/5, CI6/7) and safety I/O output (4 pairs CO0/1, CO2/3, CO4/5, CO6/7), as shown in Figure 85. See the software section for specific configuration methods.

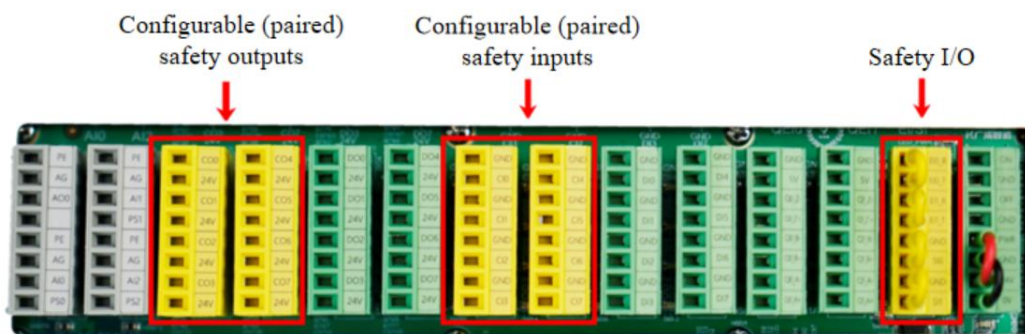


Figure 85 Schematic diagram of the internal security I/O interface of the control cabinet



Caution:

1. Configurable I/O must be wired in pairs in parallel when used for security I/O functionality;
2. When making safety I/O input, it can be configured as **emergency shutdown**, **safety stop**, etc; For safety I/O output, it can be configured as **mechanical arm emergency stop**, **mechanical arm movement**, **mechanical arm stop** and other status output signals. Please refer to the software description.

Shared Emergency Stop

When a robot is used in conjunction with other machines, it is often necessary to set up a common emergency stop circuit. In case of an emergency, the operator can press any emergency stop button on the common circuit to simultaneously halt all movements of the robotic arm and other machines.

When sharing the emergency stop function with other machines, since the emergency stop input EI cannot be used for sharing, it can be achieved through configurable I/O.

- Configurable input: External emergency stop.
- Configurable output: The system does not have an emergency stop.

Wiring for two different robots sharing the emergency stop function is shown in Figure 86. CI0-CI1 and CO0-CO1 are configurable digital I/O inputs and outputs, respectively.

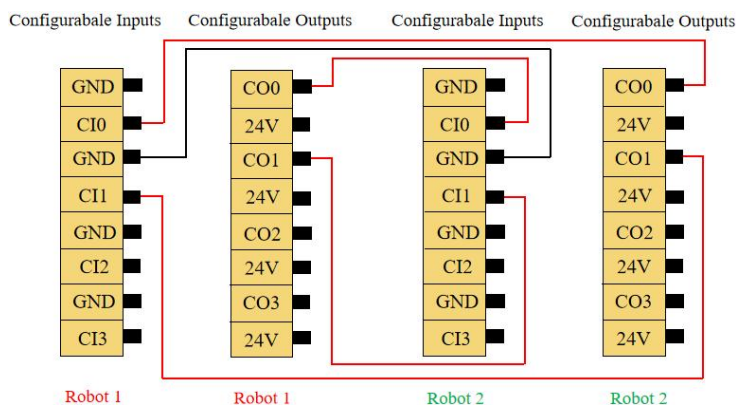


Figure 86 Wiring diagram of two different robots sharing an internal I/O interface for emergency stop

Emergency stop/Safety stop/reduction mode

When configurable I/O is configured for emergency stop, Safety stop, and reduce mode functionality, the connection is shown in Figure 87.

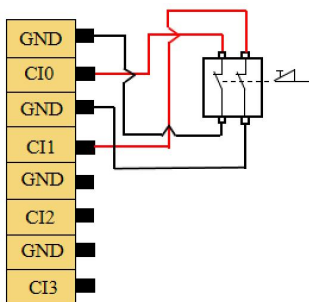


Figure 87 Wiring diagram for emergency stop, Safety Stop, and reduction Mode

Safety Reset

When configurable IO is configured for the security Reset function, the connection is as shown in Figure 88.

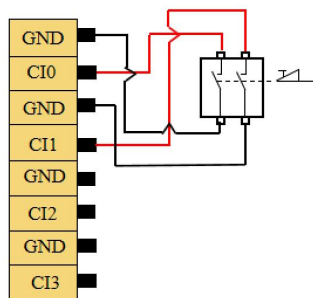


Figure 88 Security Reset Wiring Diagram

3.2.2.1.3 Standard I/O

The control cabinet has 8 universal standard digital I/O channels each for input and output, and its interface circuit is shown in Figure 89.

- The DIX (X is 0 to 7) port is a digital input, with a default high level and low level activation.
- DOX (X 0-7) port is digital output, high impedance state by default, low level active.

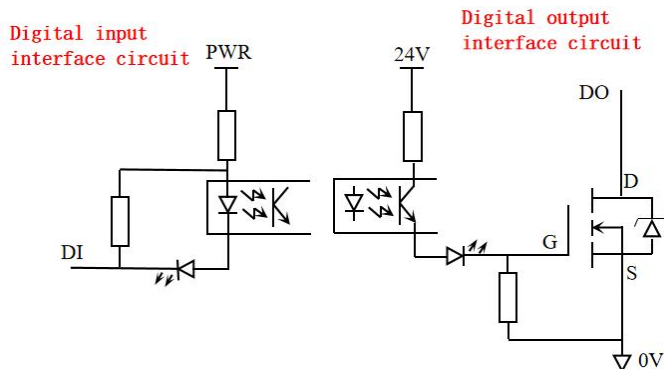


Figure 89 Standard I/O internal interface circuit diagram

The universal standard digital input is connected to the switch button, and the universal standard digital output is connected to the indicator light. Wiring is shown in Figure 90.

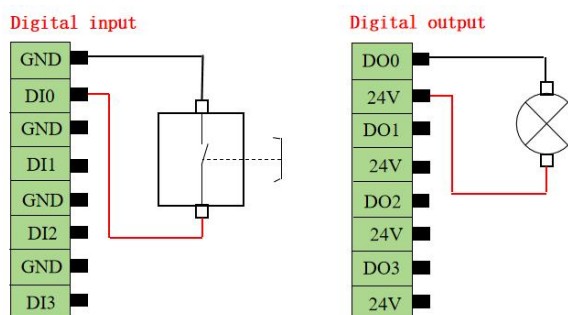


Figure 90 Reference diagram for standard I/O input/Output wiring

3.2.2.2 Analog I/O

Inside the control cabinet, there are 3 analog inputs AIX (X is 0 to 2) and 1 analog output AO. PE is the protective ground, and the PSX (X is 0 to 2) terminal supplies power to the sensor with an output voltage of +24V

and a typical load current of 20mA.

The analog quantity types are divided into current and voltage, and the type is selected through the dip switch, as shown in Figure 91.

- The dip switch is set to the "Current" side for the current type.
- Set the dip switch to the "Voltage" side for voltage type.



Figure 91 Diagram of analog terminals and dip switches inside the control cabinet



Tip:

The type (unit) Settings of the teaching device UI software must be consistent with the type selected by the dip switch, otherwise the correct values cannot be displayed on the corresponding monitoring interface.

The general analog I/O electrical specification is shown in Table 19.

Table 19 General Analog I/O Electrical Specification Table

Analog input in current mode	Parameters	Minimum value	Typical value	Maximum value	Units
AIX-AG	Current	4	-	20	mA
AIX-AG	Resistance	-	249	-	Ohm
AIX-AG	Resolution	-	16	-	position
Analog input in voltage mode	Parameters	Minimum value	Typical value	Maximum value	Units
AIX-AG	Voltage	0	-	10	V
AIX-AG	Resolution	-	16	-	position
Analog output in current mode	Parameters	Minimum value	Typical value	Maximum value	Units
AO0-AG	Current	4	-	20	mA
AO0-AG	Resistance	-	498	1200	Ohm
AO0-AG	Resolution	-	12	-	position
Analog output in voltage mode	Parameters	Minimum value	Typical value	Maximum value	Units
AO0-AG	Voltage	0	-	10	V

AO0-AG	Resistance	-	498	1200	Ohm
AO0-AG	Resolution	-	12	-	position

To ensure that analog signals are not disturbed, wiring should follow:

- Use the same GND for the device and control cabinet.
- Use shielded cables or twisted-pair connections.

Wiring the analog input connected to the sensor is shown in Figure 92.

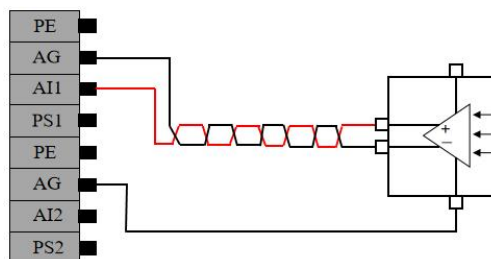


Figure 92 Analog I/O External sensor wiring Reference

3.2.2.3 Encoder interface

Two differential encoder input ports are defined as shown in Figure 93, which can be externally connected to position encoders (such as the output signal of the position encoder for collecting the transmission belt). 5V is dedicated to powering the encoder, limiting the external current output to a maximum of no more than 150mA.

Quadrature Encoder Inputs		Instructions
GND	GND	QX_A+/- correspond respectively to differential encoders A+/-
5V	5V	
Q0_Z-	Q1_Z-	QX_B+/- correspond respectively to differential encoders B+/-
Q0_Z+	Q1_Z+	
Q0_B-	Q1_B-	QX_Z+/- correspond respectively to the differential encoders Z+/-
Q0_B+	Q1_B+	
Q0_A-	Q1_A-	5V and GND are connected to the differential encoders 5V and GND respectively
Q0_A+	Q1_A+	

Figure 93 Encoder interface terminal definition diagram

3.2.2.4 Remote control and I/O power

For the exact location of the remote control and I/O power terminals within the control cabinet, please refer to Control Cabinet [3.2.2 Internal Interfaces](#).

Remote control

Robot remote control has two inputs: remote ON and remote OFF, as follows:

- The remote ON input terminal /GND is connected to both sides of the **self-reset button**. When the **self-reset button** is pressed and automatically pops up, the robot automatically turns on.
- The remote OFF input terminal /GND is connected to both sides of the self-reset button. Press the self-reset button and the robot will automatically shut down after it pops up.

Connect the **self-reset button** wiring as shown in Figure 94.

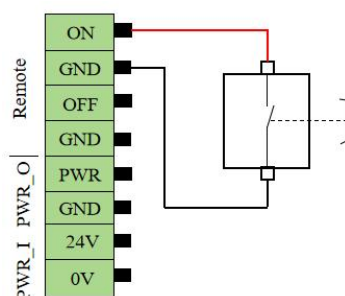


Figure 94 Wiring diagram for connecting a remote ON self-resetting button



Caution:

It is recommended that the operation interval for remote power on/off be more than 10 seconds.

The remote control interface can also be connected to a PLC or other external I/O signal input device to control the automatic on/off of the control cabinet and the teaching device

The machine. At this point, the input signal **level must satisfy the transition from low to high.**

The remote ON and OFF input interfaces are both high by default and activated at a low input level, as shown in Table 20.

Table 20 Electrical Specification Table for Remote Control Interface ON/OFF

Remote interface	Parameters	Minimum value	Typical value	Maximum value	Units
ON	ON Voltage range	0	-	15	V
ON	OFF Voltage range	22.5	-	24	V
ON	Current (0-15V)	3	-	6	mA
OFF	ON Voltage range	0	-	15	V
OFF	OFF Voltage range	22.5	-	24	V
OFF	Current (0-15V)	1.5	-	3	mA

I/O power supply

Power can be provided for digital I/O either inside the control cabinet or connected to an external power supply device. Terminal 24V/0V is the I/O power input terminal, and PWR/GND is the +24V power output inside the control cabinet. Use an internal or external connection to power I/O as shown in Figure 95.

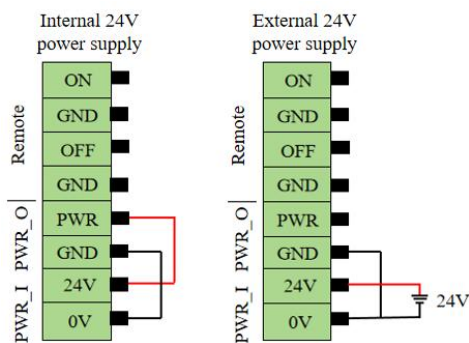


Figure 95 Power supply mode for digital I/O

The electrical specifications for the power supply are as shown in Table 21.

Table 21 Electrical Specifications for Power Supply

Terminal	Parameters	Minimum value	Typical value	Maximum value	Units
Internal +24V power supply	-	-	-	-	-
PWR/GND	Voltage	23	24	26	V
PWR/GND	Current	0	-	1	A
External +24V power supply	-	-	-	-	-
24V/0V	Voltage	20	24	26	V
24V/0V	Current	0	-	1.2	A



Caution:

When using PWR/GND for external power supply, it is recommended that the maximum output current not exceed 1A.

3.2.2.5 Serial communication interface

The control cabinet has one RS232 and two RS485 external serial communication interfaces, as shown in Figure 96. The software can configure the serial communication protocol format, please refer to the software description.

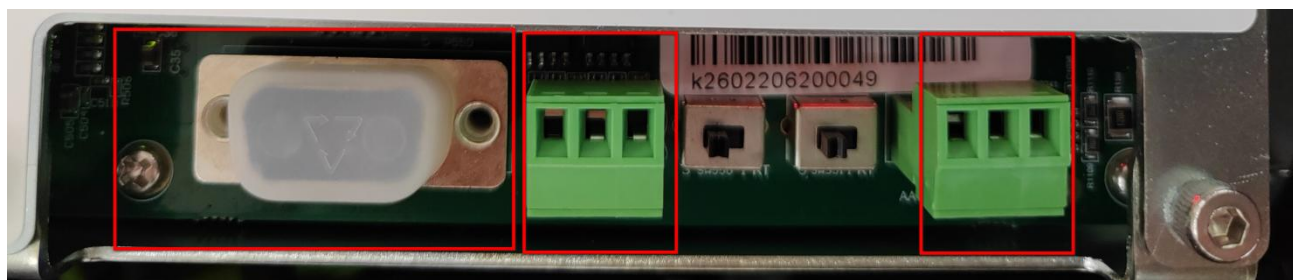


Figure 96 Diagram of the serial communication interface inside the control cabinet

3.2.2.5.1 RS232

There is one standard DB9 male/pin interface inside the control cabinet.

- The software protocol supports custom, Modbus_RTU/ASCII. See the software section for instructions.

3.2.2.5.2 RS485

There are two RS485 bus interface terminals inside the control cabinet: RS485-1 and RS485-2. Each RS485 interface terminal is equipped with a dip switch that can be selected as to whether a matching terminal resistor is required. The dip switch on the RT side indicates that the terminal resistor is connected to the circuit.

- When connecting external devices, if the transmission distance is long (>300m), you can choose to connect terminal matching resistors to reduce signal interference.
- The software protocol supports custom, Modbus_RTU/ASCII, please refer to the software section.

3.2.2.6 RJ45 EtherCAT Network interface

There is one standard RJ45 interface inside the control cabinet that only supports the EtherCAT real-time Ethernet bus, as shown in Figure 97.

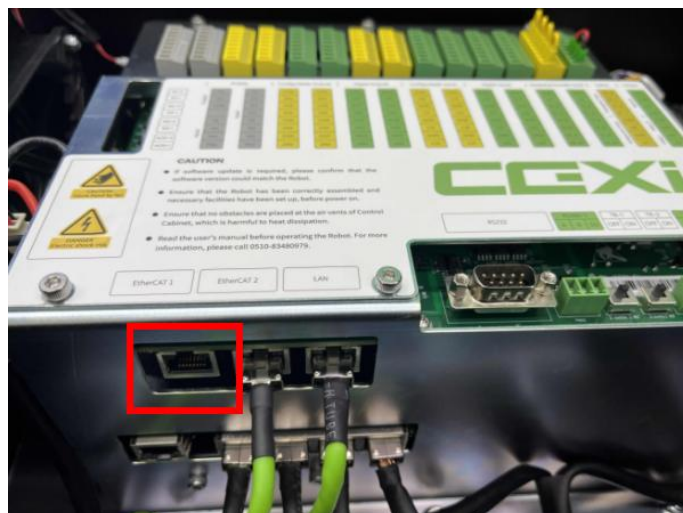


Figure 97 shows the real-time Ethernet bus interface diagram of the RJ45 inside the control cabinet



Caution:

When using the external extension shaft, EtherCAT devices can be connected via this interface. Since controlling the external axis involves robot control cabinet algorithm support, for the latest and most detailed information, please consult Changguangxi Intelligent Manufacturing Pre-sales technical service personnel when using this function.

3.3 MK Controller

The MK controller is one of the standard control components of the G series collaborative robot. The front panel covers Ethernet, extended EtherCAT interface, as well as IO and 485 interfaces, all of which can be used to connect external devices, as shown in Figures 98 and 99.

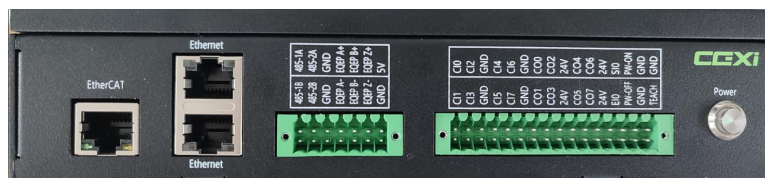


Figure 98: Front panel interface diagram of the MK controller

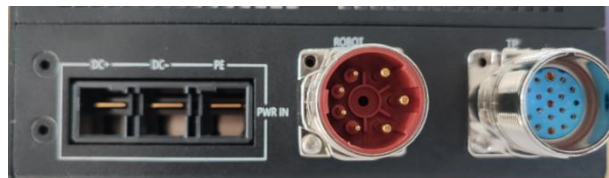


Figure 99 MK controller Left panel interface diagram

3.3.1 Communication Interface

The MK controller's external electrical communication interface mainly refers to two standard Ethernet interfaces on its front panel. Both of these interfaces support 10/100M adaptive wired networks, and the peripheral supports are described as follows:

- Supports direct connection to network devices that follow the Modbus TCP protocol.

Refer to the configuration instructions in the software section, which provides detailed instructions on how to configure a connection to a Modbus TCP protocol device.

- Support extended connections to regular network devices that follow the TCP/IP protocol.

Communicate with peripherals through SDK software programming.

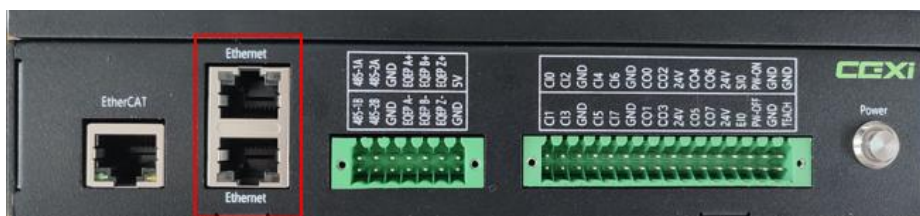


Figure 100 Ethernet interface

3.3.2 Digital I/O

Digital I/O includes safety I/O and configurable I/O electrical characteristics in accordance with IEC 61131-2. Configurable I/O is powered by an internal 24V power supply. For connection methods, see Control Cabinet Internal Interface [3.3.4 Remote control with I/O power supply](#).

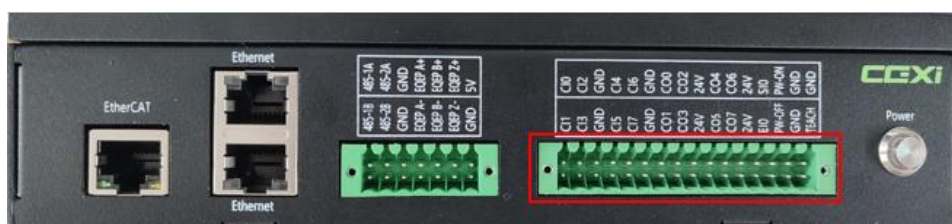


Figure 101 Digital IO interface

Table 22 Digital I/O General Electric Specification Table

Digital output	Parameters	Minimum value	Typical value	Maximum value	Units
COX	Voltage	22	24	26	V
	Current	0	-	1	A
Digital Input	Parameters	Minimum value	Typical value	Maximum value	Units
EIX/SIX/CIX	Voltage	0	-	24	V
EIX/SIX/CIX	ON Voltage range	0	-	15	V
EIX/SIX/CIX	OFF Voltage range	21	-	24	V
EIX/SIX/CIX	Current (0-15V)	2	-	6	mA



Caution:

The total output current of all digital quantities shall not exceed 1A.

3.3.2.1 Safety I/O

There are two sets of safety I/O: emergency stop (EI0/GND, EI1/GND) and safety stop (SI0/GND). The I/O is an input signal and is dedicated to safety device access and cannot be used for any other purposes.

The safety I/O input interface circuits are designed with dual-channel redundancy to ensure reliable signal reception, and the internal interface circuits are shown in Figure 102.

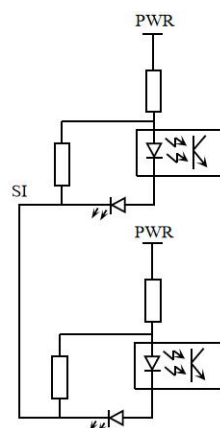


Figure 102 Safety I/O Internal Interface Circuit diagram

- Two pairs of terminals EI0 and EI1 are emergency stop inputs, and the robot enters the emergency stop state when either pair is disconnected. When connecting the emergency stop button, connect the same pair of terminals to both ends of the emergency stop button.
- SI0 is the safety stop input, and disconnecting it puts the robot into the safety stop state. When connecting the safety stop button, connect the same pair of terminals to both ends of the safety stop button.

Robot emergency stop input is only used for emergency stop device access, while safety stop input can be

used for access to various safety-related protective devices such as unit doors, light curtains or beams, etc. The differences between the two are shown in Table 23.

Table 23 Emergency Stop and Safety Stop Robot Status Differences Table

—	Emergency stop	Safe Stop
The robotic arm stops moving	Yes	Yes
The program stops	Yes	Pause
Robotic arm Power	Cut off	Open
Reset Restore Exercise	Manual	Manual/Automatic
Frequency of use	Occasional	Frequent
Re-power-on initialization	Yes	No need

Emergency stop

With a dual-loop connection, stop when one circuit is disconnected. When multiple emergency stop buttons are connected, the buttons can be connected in series, as shown in Figure 103.

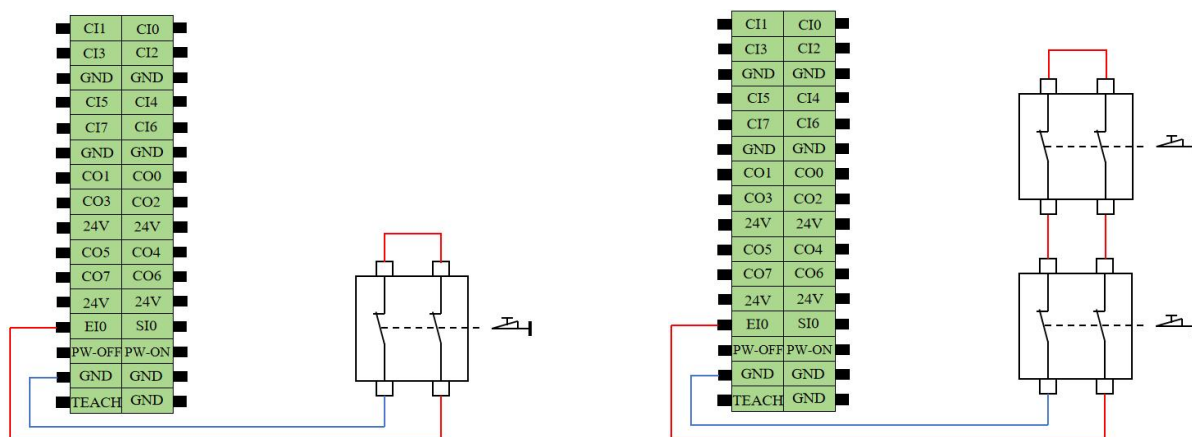


Figure 103 Robot Emergency stop wiring

Safety stop

There are two types of safety stops: automatic recovery and manual reset (configured in the teaching device UI interface, see the software section for instructions).

Connect the safety light curtain and provide +24V power supply. The wiring diagram for automatic recovery after safety stop is shown in Figure 104.

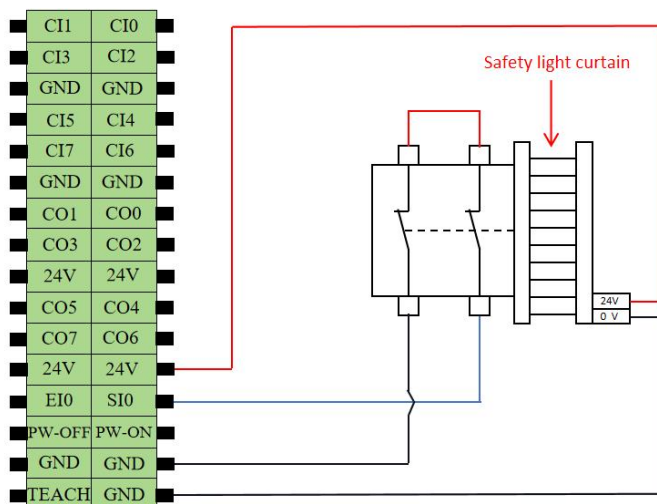


Figure 104 Wiring diagram for the robot to automatically recover after a safe stop

Safety stops that need to be manually reset require the use of configurable I/O (refer to [3.3.2.2 Configurable I/O](#) on Cabinet Internal Interfaces for usage).

Connect the safety light curtain and provide +24V power supply. The wiring for the safety stop that needs to be manually reset after the safety stop is shown in Figure 105.

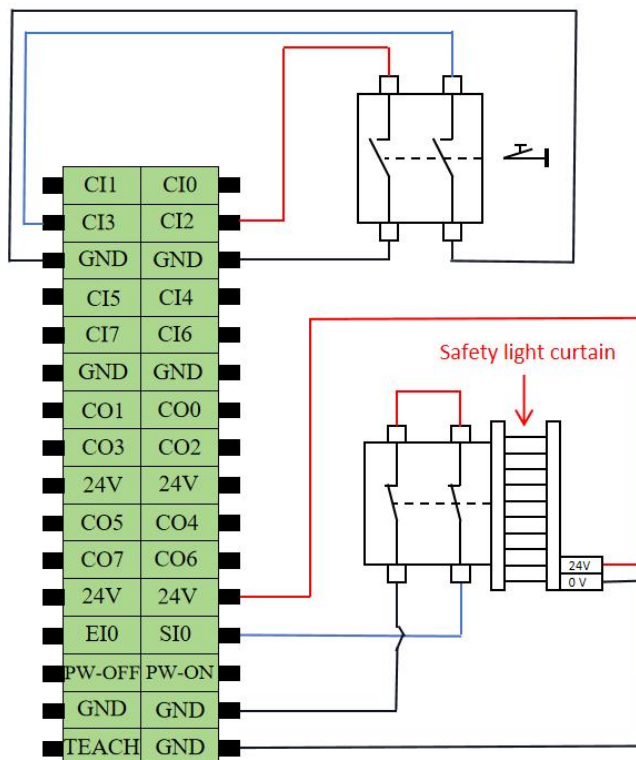


Figure 105 Safety stop wiring to be reset for the robot

3.3.2.2 Configurable I/O

The controller has 8 configurable I/O channels each for input and output, and its interface circuit is shown in Figure 106.

- CIX (X 0 to 7) indicates configurable digital input, which defaults to high level and activates at low level.
- COX (X 0 to 7) represents configurable digital output, default high impedance state, low level active.

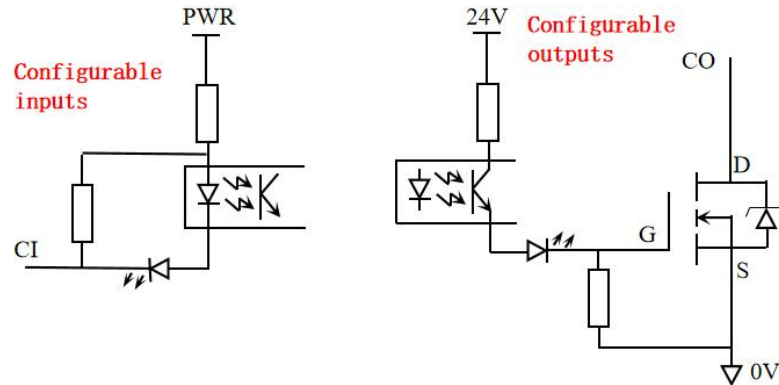


Figure 106 Configurable I/O Internal interface circuit diagram

Configurable I/O can be used as standard I/O or configured as safety I/O in pairs, namely safety I/O input (4 pairs CI0/1, CI2/3, CI4/5, CI6/7) and safety I/O output (4 pairs CO0/1, CO2/3, CO4/5, CO6/7). See the software section for specific configuration methods.



Caution:

1. Configurable I/O must be wired in pairs in parallel when used for security I/O functionality;
 2. When making safety I/O input, it can be configured as **emergency shutdown, safety stop**, etc; For safety I/O output, it can be configured as **mechanical arm emergency stop, mechanical arm movement, mechanical arm stop** and other status output signals.
- Please refer to the software description.

Shared emergency stop

When the robot is used with other machines, it is often necessary to set up a common emergency stop circuit. In case of an emergency, the operator can press any emergency stop button in the common circuit to simultaneously stop all movements of the robotic arm with other machines.

When sharing the emergency stop function with other machines, since the emergency stop input EI cannot be used for sharing, it can be achieved through configurable I/O.

- Configurable input: External emergency stop.
- Configurable output: The system does not have an emergency stop.

Two different robots share the emergency stop function wiring as shown in Figure 107. CI0-CI1 and CO0-CO1 are configurable digital I/O inputs and outputs, respectively.

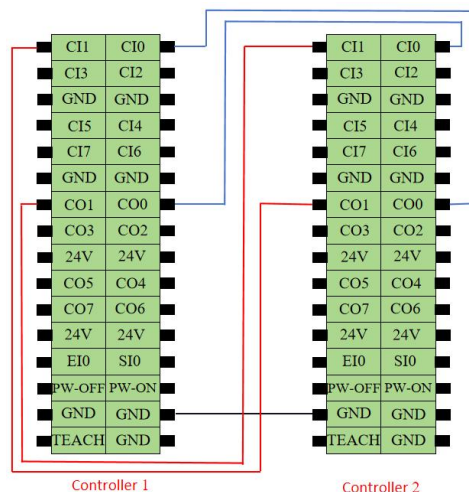


Figure 107 Wiring diagram of two different robots sharing an internal I/O interface for emergency stop

Emergency stop/Safety stop/reduction mode

When configurable I/O is configured for emergency stop, Safety stop, and reduce mode functionality, the connection is shown in Figure 108.

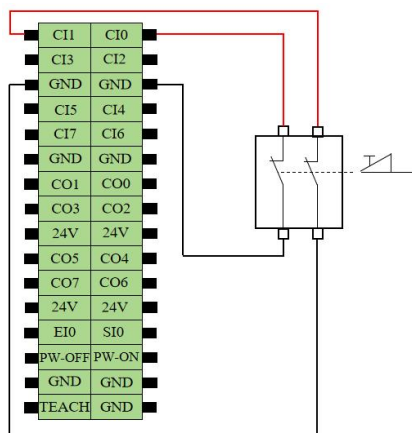


Figure 108 Wiring Diagram for emergency stop, Safety Stop, and reduction Mode

Safety Reset

When configurable IO is configured for the security Reset function, the connection is as shown in Figure 109.

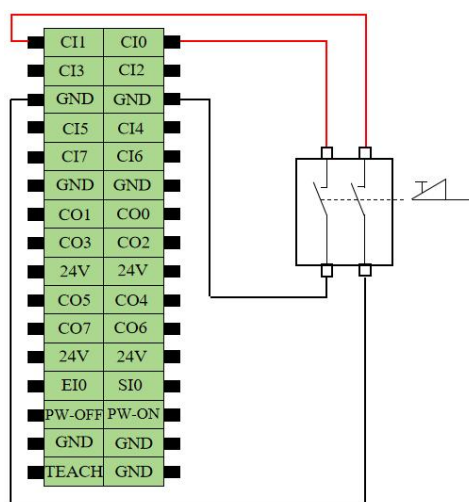


Figure 109 Security Reset Wiring Diagram

3.3.2.3 Standard I/O

Configurable I/O is used as standard I/O when no function is configured, and its wiring diagram is shown in Figure 110.

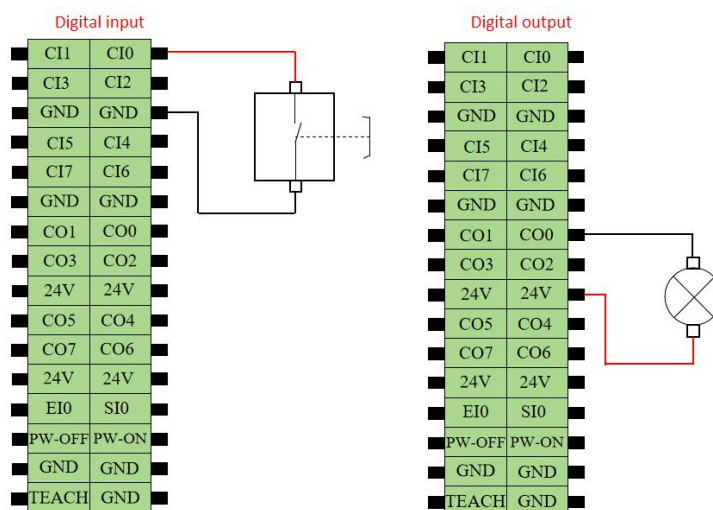


Figure 110 Standard I/O connection diagram

3.3.2.4 Drag teaching wiring diagram

Drag the teaching connection line as shown in Figure 111.

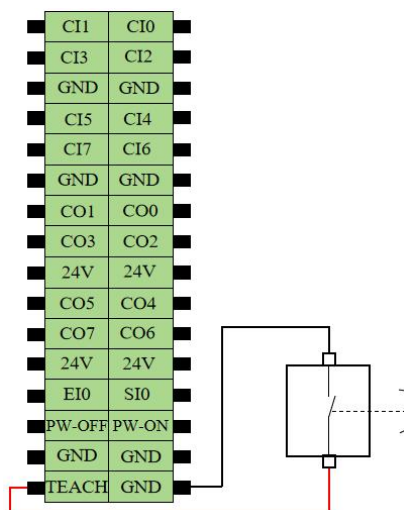
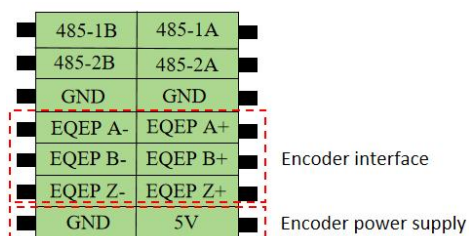


Figure 111 Drag-and-drop teaching wiring diagram

3.3.3 Encoder Interface

One differential encoder input port of the controller is defined as shown in Figure 112, which can be externally connected to position encoders (such as the output signal of the position encoder for the acquisition of the conveyor belt). 5V is dedicated to powering the encoder, limiting the external current output to a maximum of no more than 150mA.



Instructions
EQEP_A+/- correspond respectively to differential encoders A+/-
EQEP_B+/- correspond respectively to differential encoders B+/-
EQEP_Z+/- correspond respectively to the differential encoder Z+/-
5V and GND are connected to the differential encoder 5V and GND respectively

Figure 112 Encoder interface terminal definition diagram

3.3.4 Remote control with I/O power supply

When the robot is working in Auto mode, remote control takes effect. See Startup Guide [2.3.2 Working mode](#).

Remote control

Robot remote control has two inputs: remote ON and remote OFF, as follows:

- The remote ON input terminal /GND is connected to both sides of the **self-reset button**. When the **self-reset button** is pressed and automatically pops up, the robot automatically turns on.

- The remote OFF input terminal /GND is connected to both sides of the **self-reset button**. Press the **self-reset button** and the robot will automatically shut down after it pops up.

Connect the **self-reset button** wiring as shown in Figure 113.

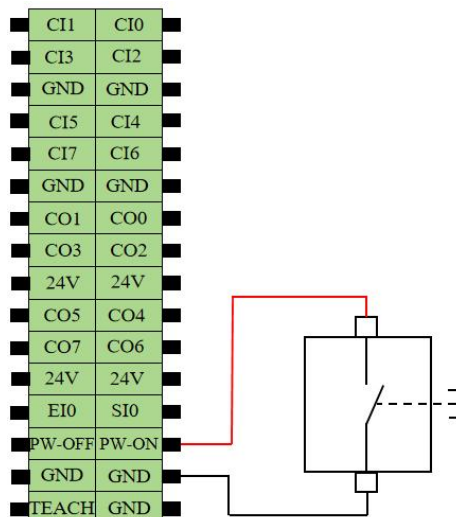


Figure 113 Wiring diagram for connecting a remote ON self-resetting button



Caution

It is recommended that the operation interval for remote power on/off be more than 10 seconds.

The remote control interface can also be connected to a PLC or other external I/O signal input device to control the automatic on/off of the control cabinet and the teaching device

The machine. At this point, the input signal **level must satisfy the transition from low to high**.

The remote ON and OFF input interfaces are both high by default and activated at a low input level, as shown in Table 24.

Table 24 Electrical Specification Table for Remote Control Interface ON/OFF

Remote interface	Parameters	Minimum value	Typical value	Maximum value	Units
ON	ON Voltage range	0	-	15	V
ON	OFF voltage range	22.5	-	24	V
ON	Current (0-15V)	3	-	6	mA
OFF	ON Voltage range	0	-	15	V
OFF	OFF Voltage range	22.5	-	24	V
OFF	Current (0-15V)	1.5	-	3	mA

I/O power supply

MK controller digital I/O is powered by an internal power supply, 24V/GND is the 24V power supply for the controller's internal output.

The electrical specifications for the power supply are shown in Table 25.

Table 25 Electrical Specifications for Power Supply

Terminal	Parameters	Minimum value	Typical value	Maximum value	Units
24V/GND	Voltage	23	24	26	V
24V/GND	Current	0	-	1	A



Caution:

When using 24V/GND for external power supply, it is recommended that the maximum output current not exceed 1A.

3.3.5 RS485

The MK controller has two RS485 bus interface terminals inside, with 120Ω resistors matched by default inside.

- The software protocol supports custom, Modbus_RTU/ASCII, see the software description.

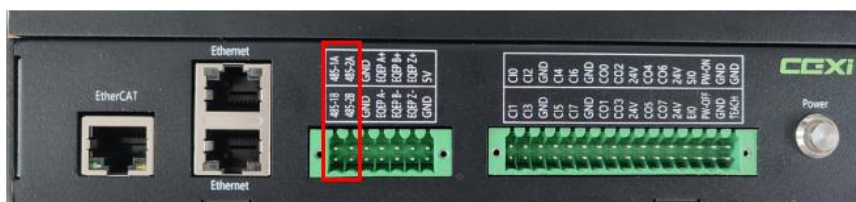


Figure 114 Controller RS485 interface

3.3.6 EtherCAT Network interface

The MK controller has one extended EtherCAT interface, as shown in Figure 115.



Figure 115 Controller extends EtherCAT interface



Caution:

When using the external extension shaft, EtherCAT devices can be connected via this interface. Since controlling the external axis involves robot control cabinet algorithm support, for the latest and most detailed information, please consult Changguangxi Intelligent Manufacturing Pre-sales technical service personnel when using this function.

3.4 Tool end

The tool-end electrical communication interface includes tool I/O and tool communication ports, each of which has an independent +24V power supply output, providing load current up to 1A, as shown in Figure 116.

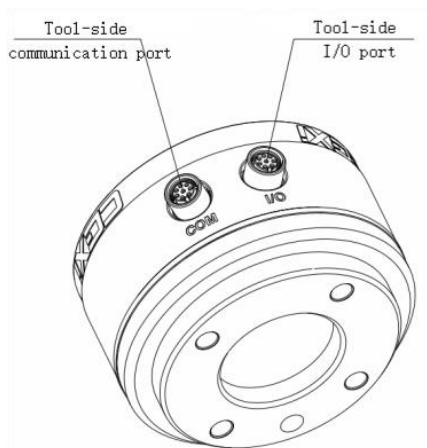


Figure 116 Schematic diagram of the tool-end electrical communication interface

The electrical specifications for the tool-end interface are shown in Table 26.

Table 26 Electrical Specification Table for Digital Signals of Tool-end I/O Ports

Digital output	Parameters	Minimum value	Typical value	Maximum value	Units
DOX	Voltage	-	24	26	V
DOX	Current	0	-	1000	mA
Digital input	Parameters	Minimum value	Typical value	Maximum value	Units
DIX	Voltage	0	-	24	V
DIX	ON Voltage range	0	-	15	V
DIX	OFF Voltage range	21	-	24	V
DIX	Current (15-0V)	2.5	-	6	mA

Electrical specifications for analog input at the tool end are shown in Table 27.

Table 27 Electrical Specifications for Analog Signals at Tool-end I/O Ports

Analog input	Parameters	Minimum value	Typical value	Maximum value	Units
AIX-GND	Voltage	0	-	10	V
AIX-AG	Resolution	-	12	-	position

3.4.1 Tool I/O

The tool I/O port is an 8-pin socket with internal thread and requires an M8 aviation plug with external thread.

The tool end I/O port and connection are shown in Figure 117.



Figure 117 Schematic diagram of the electrical communication interface for tool-end I/O



Caution:

1. The connections between plugs are fool-proof, so be careful when plugging and unplugging;
2. Contact your G series robotic arm supplier if you need a cable to connect the tool I/O port;
3. If you purchase cables by yourself, please pay attention to the connection sequence and the quality of the cables.

The cable sequence definitions for the dedicated tool-end I/O connection provided by Changguangxi Intelligent Manufacturing are shown in Figures 118 and Table 28.

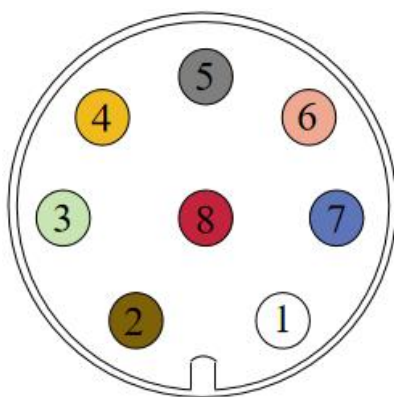


Figure 118 Sectional view of I/O cable

Table 28 Cable Definitions

Serial numbers	Color	Features	Instructions
1	White	OUTPUT0	Digital output 0
2	Brown	INPUT0	Digital input 0
3	Green	OUTPUT1	Digital output 1
4	Yellow	INPUT1	Digital input 1
5	Grey	AI0	Analog input 0
6	Powder	AI1	Analog input 1
7	Blue	GND	Ground
8	Red	+24V	Output power

Tool I/O external power supply output voltage +24V, maximum output current 1A, automatically cut off +24V power supply output when the load current exceeds 1A, enter current overload protection state.

3.4.2 Tool COM

The tool communication port is an 8-pin socket with an external thread. An M8 aviation plug with an internal thread is required. The communication port and connection of the tool end are shown in Figure 119.



Figure 119 Schematic diagram of the electrical communication interface of the COM port at the tool end



Caution:

1. The connections between plugs are fool-proof, so be careful when plugging and unplugging;
2. Contact your G series robotic arm supplier if you need a cable to connect the tool I/O port;
3. If you purchase the cables yourself, pay attention to the connection sequence and quality of the cables.

The COM end connection cable definitions provided by Changguangxi Intelligent Manufacturing are shown in Figure 120 and Table 29.

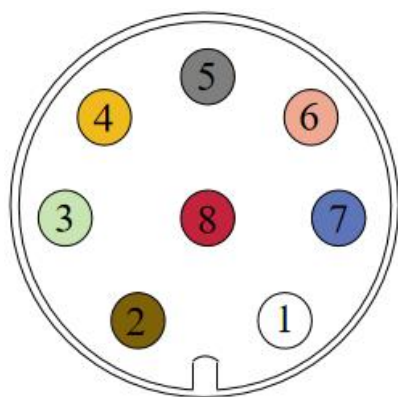


Figure 120 COM terminal link cable

Table 29 Cable Definitions

Serial number	Colour	Features	Instructions
1	White	RX-	EtherCAT data RX-
2	Brown	RX+	EtherCAT data RX+
3	Green	TX-	EtherCAT data TX-
4	Yellow	TX+	EtherCAT data TX+
5	Grey	RS485-A	RS485-A terminal
6	Powder	RS485-B	RS485-B terminal
7	Blue	GND	Ground
8	Red	+24V	Output power

4. Maintenance and Repair

The maintenance and repair of the collaborative robot shall be carried out by Changguangxi Intelligent Manufacturing (Wuxi) Co., Ltd. or its designated service provider, strictly in accordance with all safety instructions in this manual.

In order for the robot to maintain high performance over the long term, maintenance checks must be carried out. The person in charge of the maintenance must prepare the maintenance plan and carry out the maintenance in practice. Please refer to the items listed in Table 30 for maintenance.

Table 30 Robot Maintenance Items

Module	Maintenance cycle			Maintenance items	Maintenance Contents
	Daily	3 months	6 months		
Mechanical arm Body	√			Robotic arm cleaning	Use a clean cloth, lint-free paper, etc. dipped in water, 10% ethanol, etc. to wipe off visible dust, dirt, oil, etc. on the robotic arm.
		√		Circular tricolor indicator light	● Red: Power off the robotic arm via the controller or the teaching device, then click the "On" button on the main interface of the teaching device to power on the robotic arm (powered on but not enabled), or the robotic arm has a fault alarm; ● Blue: The power-on activation of the robotic arm is completed or it is operating normally; ● Green: Press the drag teaching button at the top of the teaching device or the "Teach" button at the end of the robotic arm.
			√	Back cover screw of the joint	Cross screws: 1, 2, 3 joint back cover screw tightening force 1.5N; 4, 5, 6 joint back cover screw tightening force 1.2N.
	√			Motor	There is no abnormal heating or noise from the motor.
		√		Reducer	The reducer has no abnormal noise, vibration, oil leakage, etc.
	√			Brake	When powered off, the joints of the robotic arm or the tool end do not fall off.
	√			Body cable	Check if the connection between the body cable and the controller is secure and if there is any

					wear on the cable skin.
	√			Body mounting screws	Retighten the mounting screws using the corresponding Allen wrench.
Controller	√			Controller cleaning	● Use a clean cloth, lint-free paper, etc., dipped in water, 10% ethanol, etc. to wipe off visible dust, dirt, oil, etc. on the controller; ● Check for foreign objects inside the controller with the power off and remove them (MK controllers do not need to check the internal environment).
			√	Emergency stop button	In the power-on enabled state, when the emergency stop button is pressed, does the robotic arm cut off power and does the teaching device interface pop up an alarm message.
			√	Three-color status indicator light	● Red: Power off the robotic arm through the controller or the teaching device, then click the "On" button on the main interface of the teaching device to power on the robotic arm (powered on but not enabled), or the robotic arm has a fault alarm; ● Blue: The power-on activation of the robotic arm is completed or it is operating normally; ● Green: Press the drag teaching button at the top of the teaching device or the "Teach" button at the end of the robotic arm. Note: The MK controller has no three-color status indicator light.
	√			POWER IN interface	Check if the interface is securely connected.
		√		Mains power switch	Check if the switch is functioning properly by turning it off and powering it on.
		√		Power button	Check if the power button is functioning properly by turning it off and powering it on.
Teaching device	√			Teaching device cleaning	Use a clean cloth, lint-free paper, etc., dipped in water, 10% ethanol, etc. to wipe off visible dust, dirt, oil, etc. on the teaching device.
			√	Emergency stop button	When powered on, press the emergency stop button to check if the robotic arm is powered off and if an alarm message pops up on the teaching device interface.

			√	Three state buttons	- When the robot is powered on and enabled, the tool end indicator light changes from blue to green when the first position is pressed and held down without release; - Release this button or press the 2nd position, the tool end indicator light turns blue.
	√			Teaching device cable	Check whether the connection between the teaching device cable and the controller is stable and whether the cable skin is worn.
			√	Screen calibration	When the teaching device is powered on and the button is clicked on the screen, the command responds normally and is positioned accurately. If the position accuracy is insufficient, please refer to the Collaborative Robot Software Manual for screen recalibration.



Caution: If anomalies are found during maintenance and cannot be resolved on-site, please contact Changguangxi Intelligent

Manufacturing After-sales service department promptly.

5. Quality Assurance

5.1 Quality Assurance

Changguangxi Intelligent Manufacturing (Wuxi) Co., Ltd. undertakes a 12-month warranty period for its collaborative robots. The collaborative robot and its components are covered by the warranty for 12 months after they are put into use. During this period, if there is a defect in the product due to poor manufacturing or materials, Changguangxi Intelligent Manufacturing (Wuxi) Co., Ltd. will provide the necessary spare parts free of charge for replacement or repair. Outside the warranty period, Changguangxi Intelligent Manufacturing (Wuxi) Co., Ltd. shall not be liable for any damage or loss arising from the defect of the equipment, such as production loss or damage to other production equipment, etc.

If the customer has special requirements for quality assurance, they may contact Changguangxi Intelligent Manufacturing (Wuxi) Co., Ltd. directly for business confirmation.

5.2 Disclaimer

The "Quality Guarantee" shall be nullified if the defect of the equipment is caused by improper handling or non-compliance with the relevant information described in the user manual.

Faults resulting from, but not limited to, the following are not covered by the warranty:

1. Not conforming to industrial standards or not installing, wiring, and connecting other control devices as required by the user manual;
2. Use beyond the specifications or standards indicated in the user manual;
3. Use this product in situations other than the intended use;
4. Storage and working conditions beyond the scope specified in the user manual (such as contamination, salt damage, condensation, etc.);
5. Product damage caused by improper transportation, accidents or external force collisions;
6. Damage resulting from self-modification, commissioning or repair of the robot without the permission of Changguangxi Intelligent Manufacturing (Wuxi) Co., LTD.
7. Disasters caused by force majeure such as fire, earthquake, tsunami, lightning, strong wind and flood.

Appendix

A Robot Technical Specification sheet

- G Series Collaborative robot Robotic Arm Technical Specification sheet

Table A-1 Technical Specifications for G Series Collaborative Robot Robotic Arms

Parameters		G3	G4	G6	G6L	G9	G9L	G12	G12s	G18	G20	G25	G30
Model		R3	R4	R6	R6L	R9	R9L	R12	R12s	R18	R20	R25	R30
Weight (Excluding cables, kg)		15	22	21	35	37	70	36	36	35	68	66	64
Rated load (kg)		3	4	6	6	9	9	12	12	18	20	25	30
Maximum working radius (mm)		620	1307.5	924	1800	1500	2600	1300	1300	900	1800	1600	1300
Joint maximum Range of motion		Joint 1, 2, 4, 5, 6: ±360° Joint 3: ±165°											
Joint maximum Speed	1 Joint	220°/s	210°/s	210°/s	150°/s	150°/s	180°/s	150°/s	260°/s	150°/s	180°/s	180°/s	180°/s
	2 Joints	220°/s	210°/s	210°/s	150°/s	150°/s	180°/s	150°/s	260°/s	150°/s	180°/s	180°/s	180°/s
	3 Joints	240°/s	210°/s	210°/s	210°/s	210°/s	210°/s	210°/s	320°/s	210°/s	210°/s	210°/s	210°/s
	4 joints	360°/s	360°/s	360°/s	360°/s	240°/s	360°/s	240°/s	360°/s	240°/s	270°/s	270°/s	270°/s
	5 Joints	360°/s	360°/s	360°/s	360°/s	240°/s	360°/s	240°/s	360°/s	240°/s	270°/s	270°/s	270°/s
	6 Joints	360°/s	360°/s	360°/s	360°/s	240°/s	360°/s	240°/s	360°/s	240°/s	270°/s	270°/s	270°/s
Maximum speed at the tool end (m/s)		2.0	3.0	3.0	4.0	3.0	5.0	3.0	4.5	2.0	4.0	3.5	3.0
Repeat positioning accuracy (mm)		± 0.02	± 0.05	± 0.02	± 0.05	± 0.05	± 0.05	± 0.03	± 0.02	± 0.02	± 0.05	± 0.05	± 0.05
Degrees of freedom		Six rotational degrees of freedom											
Control bus/frequency		EtherCAT/1kHz											
Noise		≦ 60dB											
Rated power (W)		150	260	550		1500	550	800	550	1500			
Operating ambient temperature		- 5 °C to 55 °C											
Working environment humidity		5% to 90%RH, no condensation											
Installation method		Any Angle											
Protection level		IP65											
Tool end													
Tool I/O port		1 24V/1.5A power output channel; 2 channels DI; 2 DO; 2 Channels of AI											

Tool COM port	1 24V/1.5A power output; 1 RS485; 1 EtherCAT
---------------	--

- K10, K20 control cabinet technical specification sheet

Table A-2 Technical Specifications for K10 and K20 Control Cabinets

Parameters	Value/Description			
External dimensions (mm)	429*437*190 (length * height * width)			
Weight (kg)	13.6			
Control cabinet external panel communication interface	RJ45 2 channels, 10/100M adaptive Ethernet ports, supporting Modbus TCP communication protocol			
Control cabinet internal bus communication interface	RS232/1 channel, supporting custom or Modbus_RTU/ASCII protocol RS485/2 supports custom or Modbus RTU/ASCII protocols RJ45/1, 100M Ethernet port, supports EtherCAT devices			
Other communication interfaces inside the control cabinet	Emergency stop input	2	Safely stop inputting	2
	Remote boot input	1 channel	Remote shutdown input	1 channel
	Digital input	8 channels	Digital output	8 channels
	Configurable digital input	8 channels	Configurable digital output	Route 8
	Analog input	3 channels	Analog output	1 channel
	Differential encoder input	2 channels (providing 5V/150mA power output)		
Power supply	Rated voltage AC 200V - 240V rated frequency 50-60Hz (fluctuation range ±5%)			
Protection class	IP44			
Working ambient temperature	- 5 °C ~ 55 °C			
Working environment humidity	5%-90%RH, no condensation			

- MK controller technical specification sheet

Table A-3 MK Controller Technical Specifications

Parameter	Value/Description			
External dimensions (mm)	235*177*47 (length * width * height)			
Weight (kg)	1.75			
External communication interface	Emergency Stop input	1 channel	Safely stop inputting	1 channel
	Remote boot input	1 channel	Remote shutdown input	1 channel
	Configurable digital input	8 channels	Configurable digital output	8 channels
	Encoder input	1 channel (providing 5V/150mA power output)		
	RJ45	2 10/100M adaptive Ethernet ports supporting Modbus TCP communication protocol		
	RJ45	1 channel, 100M Ethernet port, supporting EtherCAT devices		
	RS485	Supports custom or Modbus RTU/ASCII protocols		
Power Supply	Rated voltage AC 200V - 240V rated frequency 50-60Hz (fluctuation range ±5%)			
Protection class	IP44			
Working ambient temperature	- 5 °C ~ 55 °C			
Working environment humidity	5%-90%RH, no condensation			



Caution: When selecting a model, users may choose from the following controller options based on their actual needs:

- K20 control cabinet compatible with: G4, G6, G6L, G9, G12, G18 robots;
- K10 control cabinet is compatible with G3, G4 and G6 robots;
- MK controller +1000W power box compatible: G3 robot;
- MK controller +1200W power box compatible: G4, G6, G6L, G9, G12, G18 robots;
- MK controller +3000W power box compatible: G9L, G12s, G12L, G20, G25, G30 robots.

- CGXi teaching device technical specification sheet

Table A-3 Teaching device Technical Specifications

Parameters	Value/Description
External dimensions	289mm*256mm(length * width)
Weight	1.5 kg
Protection class	IP44
Cable length	5m
Working environment temperature	-5°C to 55°C
Working environment humidity	5% to 90%RH, no condensation

B Payload

The payload depends on the load center of gravity offset, which is the distance between the center of the tool output flange and the center of gravity of the additional payload. The load capacity of the robotic arm varies depending on the amount of load center of gravity offset.

- The relationship curve between the payload of the G3 collaborative robot and the load center of gravity offset is shown in Figure B-1.

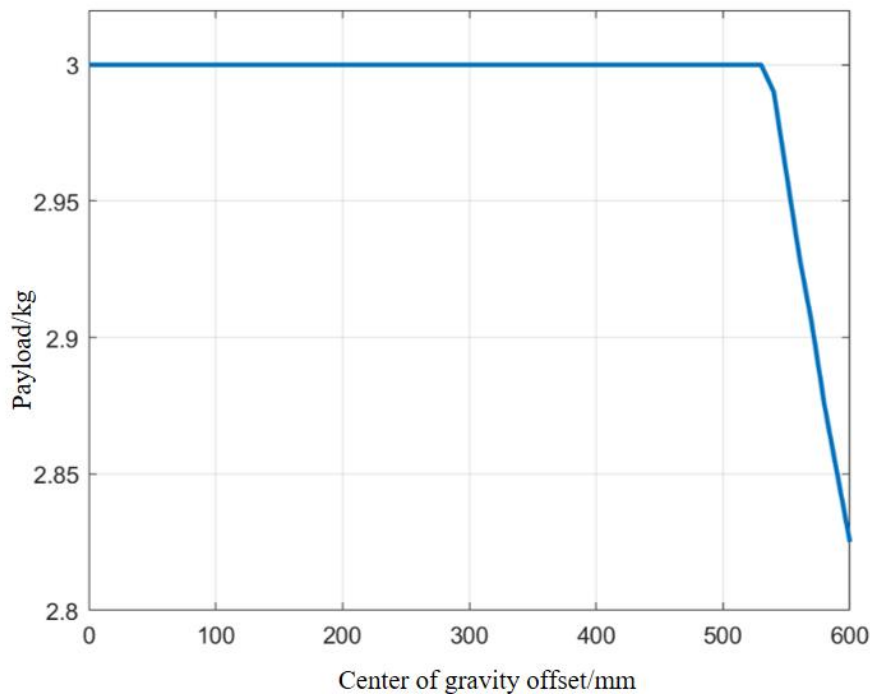


Figure B-1 G3 payload and Center of Gravity Offset Curve

- The relationship curve between the payload of the G4 collaborative robot and the payload center of gravity offset is shown in Figure B-2.

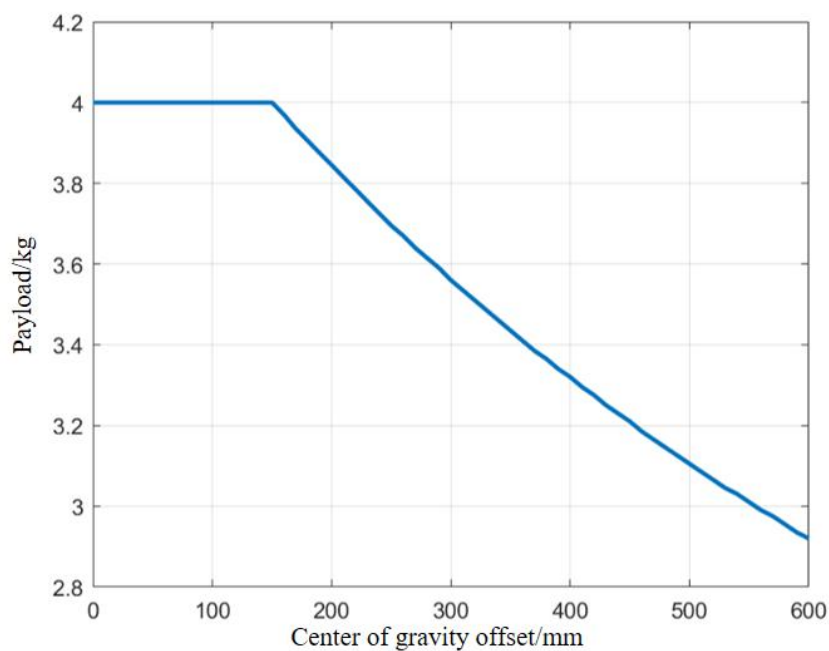


Figure B-2 G4 Payload and Center of Gravity Offset Curves

- The relationship curve between the payload of the G6 collaborative robot and the payload center of gravity offset is shown in Figure B-3.

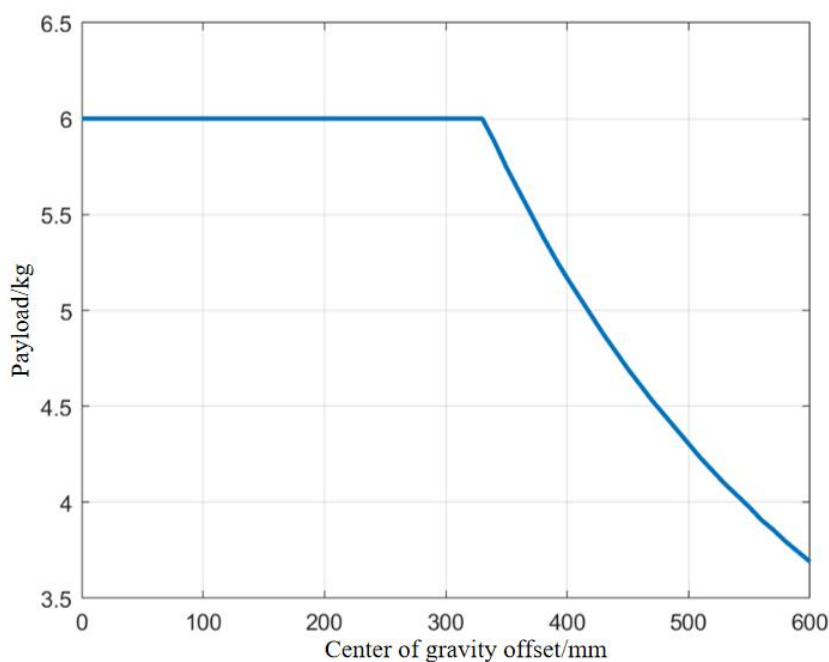


Figure B-3 G6 payload and Center of Gravity Offset curves

- The relationship curve between the payload of the G6L collaborative robot and the payload center of gravity offset is shown in Figure B-4.

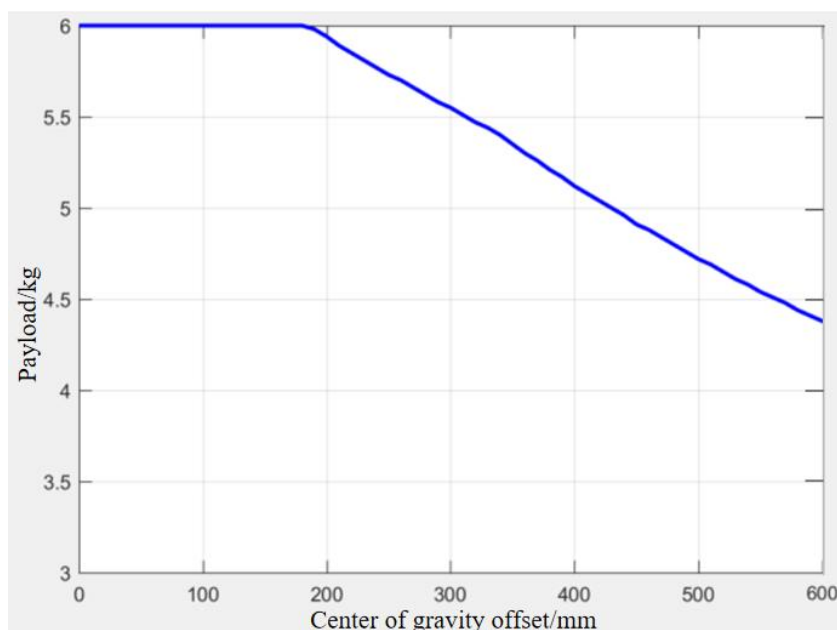


Figure B-4 G6L Payload and Center of Gravity Offset Curves

• The relationship curve between the payload of the G9 collaborative robot and the payload center of gravity offset is shown in Figure B-5.

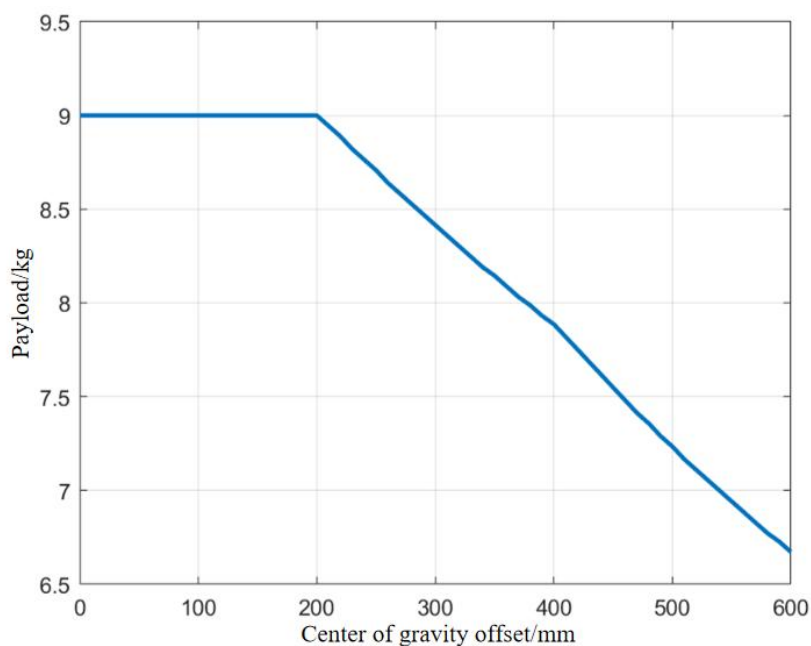


Figure B-5 G9 Payload and Center of Gravity Offset curves

• The relationship curve between the payload of the G9L collaborative robot and the payload center of gravity offset is shown in Figure B-6.

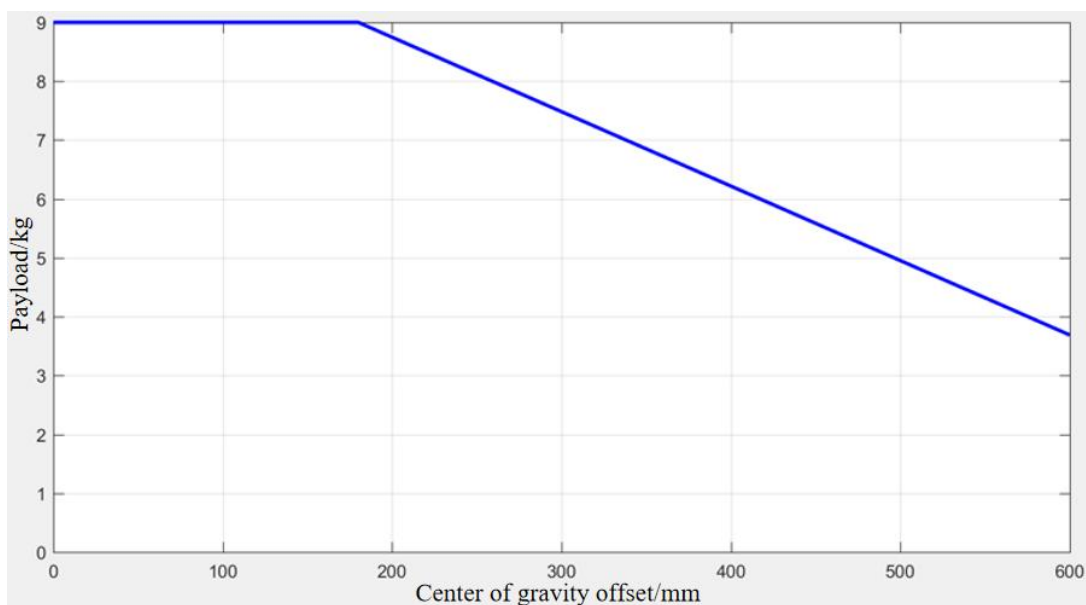


Figure B-6 G9L Payload and center of gravity offset curve

- The relationship curve between the payload of the G12 collaborative robot and the payload center of gravity offset is shown in Figure B-7.

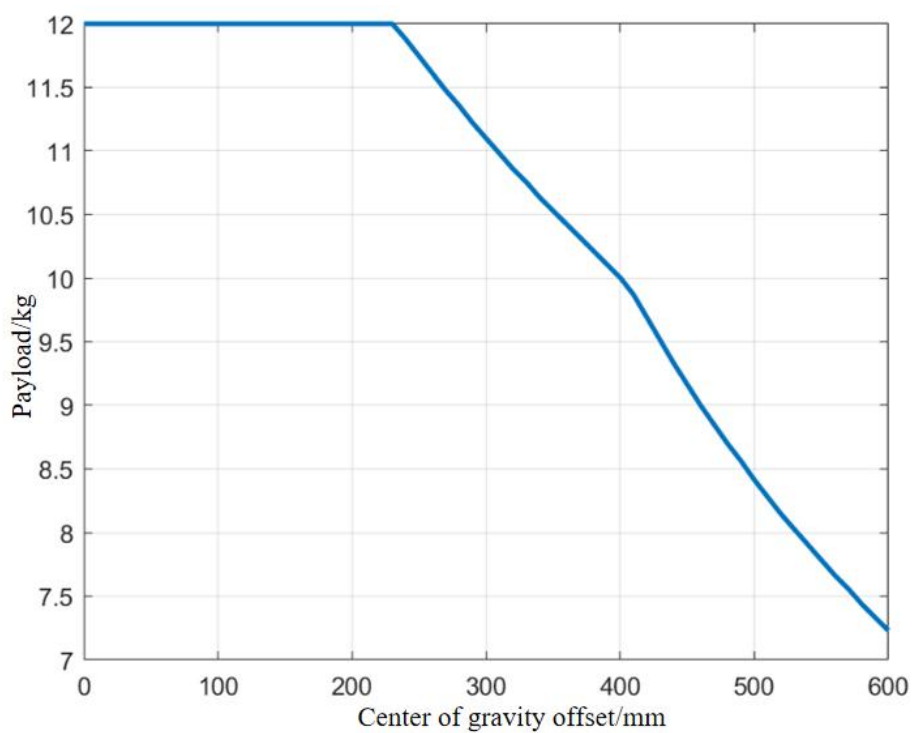


Figure B-7 G12 payload and Center of Gravity Offset curves

- The relationship curve between the payload of the G18 collaborative robot and the payload center of gravity offset is shown in Figure B-8.

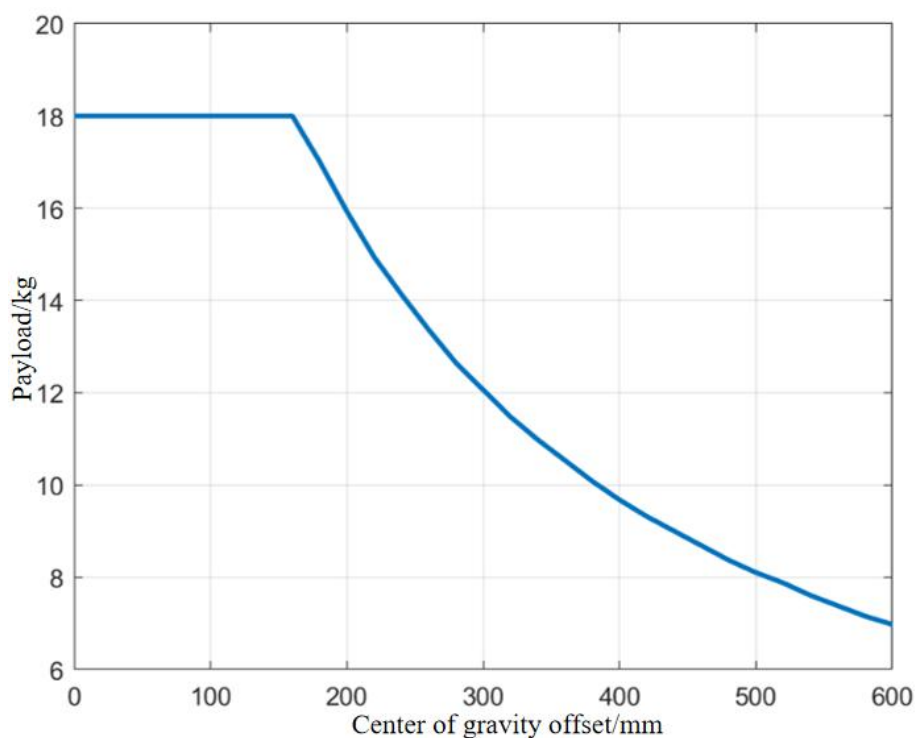


Figure B-8 G18 payload and Center of Gravity Offset curves

- The relationship curve between the payload of the G20 collaborative robot and the payload center of gravity offset is shown in Figure B-9.

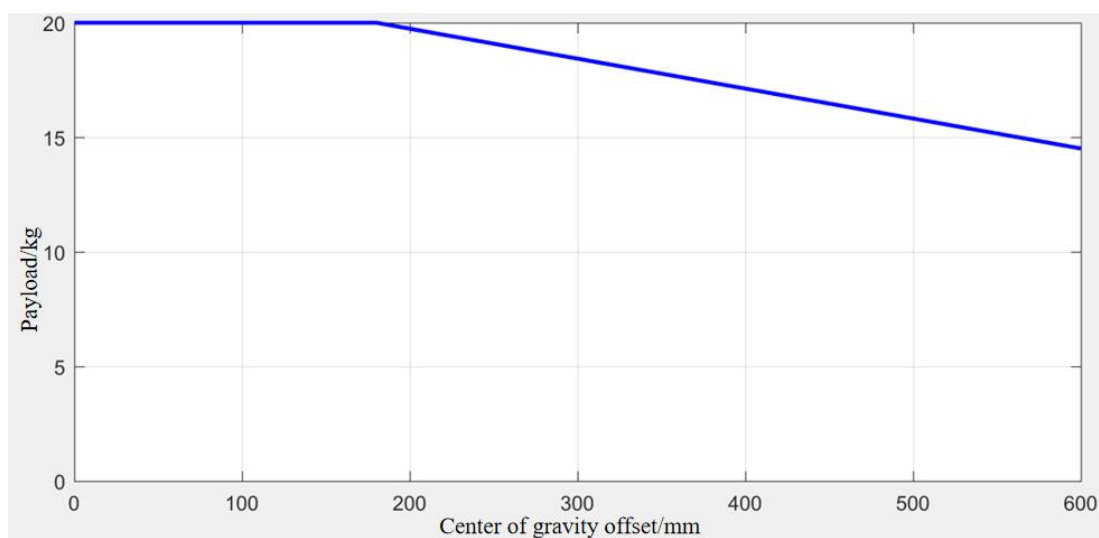


Figure B-9 G20 Payload and Center of Gravity Offset curves

- The relationship curve between the payload of the G25 collaborative robot and the payload center of gravity offset is shown in Figure B-10.

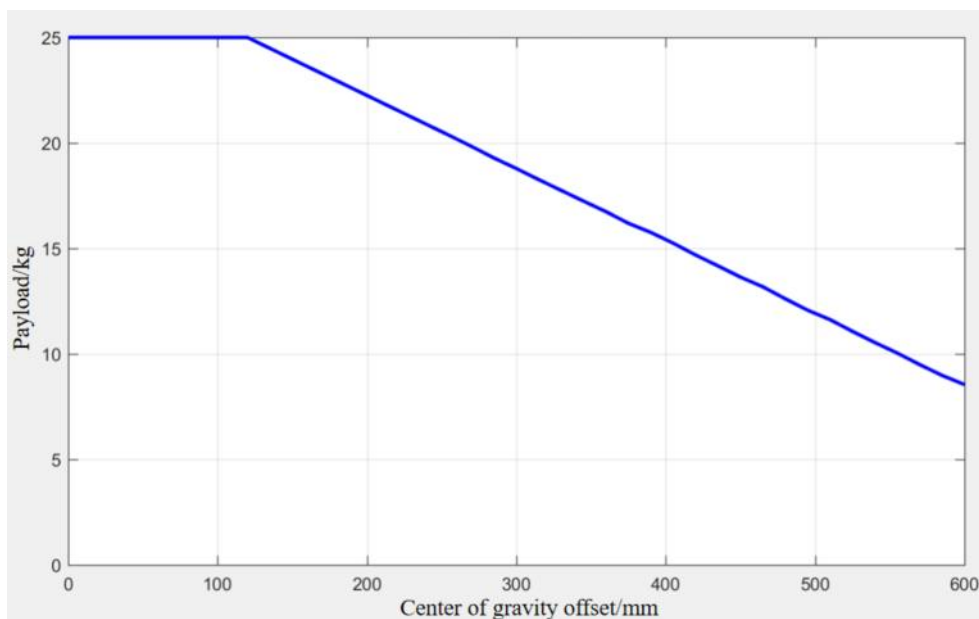


Figure B-10 G25 Payload and Center of Gravity Offset curves

- The relationship curve between the payload of the G30 collaborative robot and the payload center of gravity offset is shown in Figure B-11.

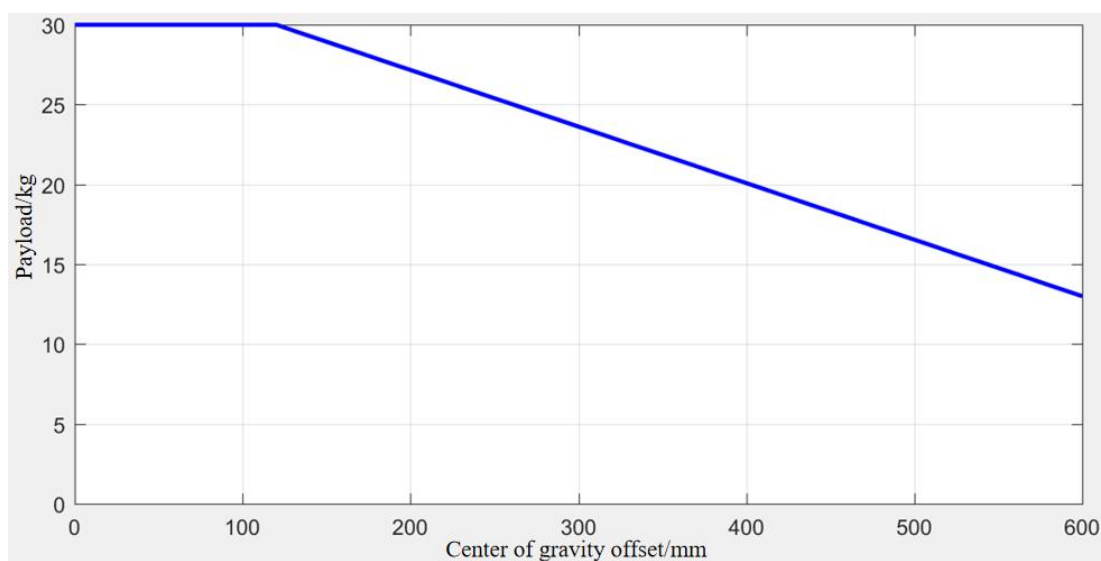


Figure B-11 G30 Payload and Center of Gravity Offset curves



Warning:

1. Reducers and mechanical structures may be damaged by overload if incorrect load data or loads other than those in the load diagram are used;
2. The actual installed load weight and the offset of the load center of gravity must not exceed the range shown above, otherwise it will affect the service life of the robotic arm.

C Certification

CE Certification certificate



TUV NORD

Certificate of Conformity

This is to certify that the following products comply with the essential requirement (Annex I) of the below European Directive:

Machinery Directive 2006/42/EC

Certificate No.: CER-IND1102822110002001 Rev.A

Applicant: Changguangxi Intelligent Manufacturing(WuXi)Co.,Ltd
27-1 Jianze Road, Binhu District, Wuxi city, Jiangsu Province, China

Product: Collaborative Robot

Type: G3, G6, G12

Standard(s): EN ISO 12100:2010
EN ISO 10218-1:2011
EN 60204-1:2018
EN ISO 13849-1:2015

Assessment report No.: IR- IND1102822110002001 Rev.A

Date of issue: 05.11.2021

This certificate of conformity is based on the evaluation of samples of the above mentioned product. It does not imply an assessment of the production of the product, and it does not permit the use of a mark of conformity or of a safety mark of the TUV NORD. The holder of this certificate may use this certificate together with his EC-Declaration of Conformity. This Certificate will be invalid in case the product structures or the directive or standards above changed.

CE The CE marking may be affixed on the product if all relevant and effective Directives are complied with.

Mr. Jeff Fan
Name and signature

Issued at Shanghai
Place, Stamp

TUV NORD (Hangzhou) Co., Ltd
B502, No.9 Jiuquan Road, Jingan District, Hangzhou, China, 300019
SH Branch: No.1, Lane 288 Kangning Road Jingan District, Shanghai 200443, China
Tel: +86-21-33196200 Fax: +86-21-33196334
www.tuv-nord.com/cn

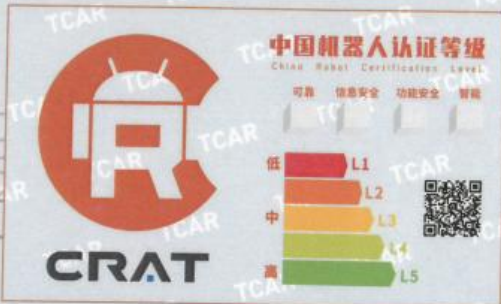


CR Certification Certificate



中国机器人认证证书

证书编号: CRAT2025CR10500008



产品名称:	协作机器人
型号:	主检型号: G20 覆盖型号: C3、C6、G3、G4、G4L、G6、G6L、G9、G9L、G12、G12L、G12s、G18、G25、G30、X3、X4、X6、X6L、X9、X9L、X12、X12L、X12s、X18、X20、X25、X30
申请人:	长广溪智能制造(无锡)有限公司
地址:	江苏省无锡市滨湖区槎泽路 27-1 号
制造商:	长广溪智能制造(无锡)有限公司
地址:	江苏省无锡市滨湖区槎泽路 27-1 号
生产厂:	长广溪智能制造(无锡)有限公司
地址:	江苏省无锡市滨湖区槎泽路 27-1 号
产品标准:	GB/T 15706-2012, GB 11291.1-2011, GB/T 5226.1-2019, GB/T 36008-2018, GB/T 16855.1-2018, GB/T 38336-2019, GB/T 38326-2019
认证模式:	产品型式试验+初始工厂检查+获证后监督

上述产品符合产品认证实施规则 CR-1-05: 2022 《协作机器人 CR 认证实施规则的要求》, 特发此证。

证书有效性依据发证机构的定期监督获得保持。

批准人: 

签发单位: 中汽检测技术有限公司

发证日期: 2025-06-06

有效期至: 2030-06-05

变更日期: 2025-07-18

中国机器人检测认证联盟

备案号: TCAR-CRAT2025050000008

<http://china-tcar.com>

国家机器人检测与评定中心 (广州)

中汽检测技术有限公司

中国·广东·广州黄埔区新瑞路 2 号

SEMI S2 certification



LETTER OF COMPLIANCE

No.:	SEMI SHES2204007366MD
Applicant:	Changguangxi Intelligent Manufacturing (Wuxi) Co., Ltd. 27-1, Lianze Road, Binhu District, Wuxi City, Jiangsu Province, China
Manufacturer:	Changguangxi Intelligent Manufacturing (Wuxi) Co., Ltd. 27-1, Lianze Road, Binhu District, Wuxi City, Jiangsu Province, China
Product Name:	Collaborative robot
Model No.:	G3, G6, G12, G18, X3, X6, X12, X18
Trade Mark:	
Additional Information (if any):	--
Sufficient samples of the product have been tested and found to be in conformity with	
Test Standard:	SEMI S2-0821
as shown in the	
Test Report Number(s):	SHES220400736601

This Letter of Compliance has been granted to the applicant based on the results of tests, performed by Laboratory of SGS-CSTC Standards Technical Services Co., Ltd. on sample of the above-mentioned product(s). The most results of the safety evaluation and test of this sample are satisfactory to the applicable requirements of SEMI S2 Environmental, Health and Safety Guidelines in mentioned edition.


Andrew Zhai
Technical Manager
SGS-CSTC

2022-07-22



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Safety-VOC-F14 Rev.1.0/ 2022-03-10
Page 1 of 1

NRTL certification



Certificate of compliance

Certificate No. FE_UFM077_23_23-1937

Contract Number: 2023-12-0001

Certificate Project Number: FE_UFM077_23_23-1937

Certificate Product: Collaborative Robots

Trademarks: CEXi

Model(s): G3, G4, G6, G9, G12, G18, C3, C6, X6, X9, X12, X18

Technical Data: Controller: 100-240VAC 50/60 Hz input, 48VDC output
Collaborative robot 6 axis (Supplier without gripper)Certificate Holder: Changguangxi Intelligent Manufacturing (Wuxi) Co., Ltd.
27-1, Lianze Road, Binhu District, Wuxi City, Jiangsu Province, China

The Field Evaluation is valid when products are indicated on the AC&E directory of certified products at www.acenorthamerica.com or using the QR code below. The product is field evaluated in accordance to NFPA 790 and 791 and in accordance with:

UL 1740, 4th Edition, Revised November 17, 2020

ANSI/RIA R15.06-2012

NFPA 79 2021 Edition, Dated Oct. 25, 2020

CAN/CSA Z434-14 (R2019), Reaffirmed 2019

CAN/CSA C22.2 No. 14-18

Authorized by:

Effective date: 2023-12-18

Matteo Marconi
Technical ManagerDigitally signed by: MARCONI MATTEO
Date: 18/12/2023 14:22:13AC&E North America INC. Empire State Building
350 Fifth Avenue, 41st Floor
New York, New York 10118 - USUS FEB #112, [accredited by IAS](#)
CAN FEB #06036, accredited by SCC

Quality Management system certification



质量管理体系认证证书

证书编号: 19821QH2260R1M

统一社会信用代码: 91320211MA1XJ3FW88

兹证明:

长广溪智能制造(无锡)有限公司

质量管理体系符合: GB/T 19001-2016/ISO 9001:2015

证书覆盖范围: 工业机器人和汽车智能运动部件的研发、组装

注册地址: 无锡市滨湖区棟泽路 27 号棟泽园裙房

经营地址: 江苏省无锡市滨湖区棟泽路 27-1 号 2 楼、3 楼

首次发证日期: 2021 年 08 月 31 日

本次换证日期: 2024 年 11 月 14 日

证书有效日期: 2027 年 08 月 30 日



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Environmental Management system certification



环境管理体系认证证书

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统一社会信用代码: 91320211MA1XJ3FW88

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Occupational Health and Safety Management System Certification



职业健康安全管理体系认证证书

证书编号: 19821SH0984R1M

统一社会信用代码: 91320211MA1XJ3FW88

兹证明:

长广溪智能制造(无锡)有限公司

职业健康安全管理体系符合: GB/T 45001-2020/ISO 45001:2018

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