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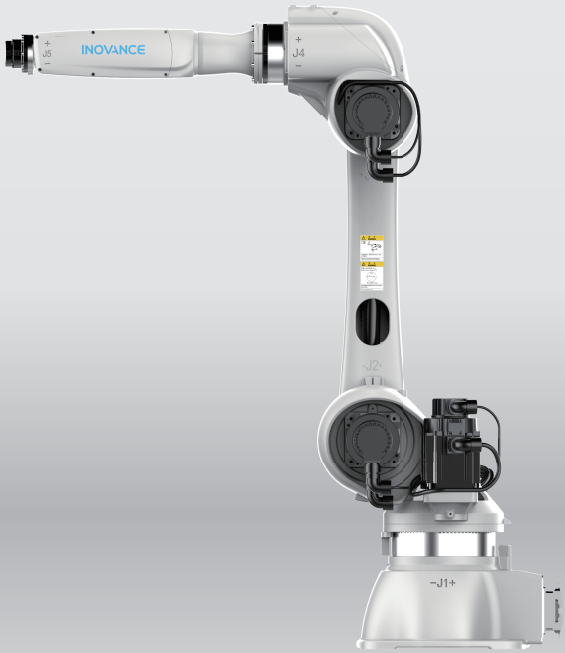


IR-R20 Series International 6-Axis Robot

User Guide - Manipulator

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code PS00017870A01

Preface

Introduction

With a maximum arm length of 1,723 mm and up to 20 kg load capacity, the IR-R20 series international 6-axis robot of Inovance features compact structure, lightweight, and high flexibility, repeatability, and speed. It offers great usability and reliability when working with an IRCB501 high-protection control cabinet. It is applicable to handling, loading/unloading, automatic stamping, assembly, grinding, and polishing in general industries, and teaching demonstration applications in the teaching instrument industry.

Describes the information, installation, wiring, motion range, and maintenance of the product.

Note

- The drawings in the user guide are shown for illustration only and may be different from the product. Actual products may vary.
- The instructions are subject to change without notice due to product upgrade, specification modification as well as efforts to improve the accuracy and convenience of the guide.

More Data

Name	Data Code	Description
IRCB501 International Series High-Protection Robot Control Cabinet User Guide	PS00017685	Describes the basic specifications, installation and wiring, common fault diagnosis and troubleshooting, and maintenance of the IRCB501 series high-protection control cabinets.
IRTP80 Series Teach Pendant User Guide	19012261	Describes the product information, wiring, and operation of the IRTP80 series teach pendant.
IR-R20 Series International 6-Axis Robot User Guide - Mechanical (this guide)	PS00017870	Describes the specifications, installation, wiring, and maintenance of the product.

Revision History

Date	Version	Description
April 2025	A01	**Update** • Updated *"1.1 Model and Nameplate" on page 11* • Updated *"1.5 Specifications" on page 15* • Updated *"6.6.2 Procedure of Zero Point Adjustment" on page 62* • Updated *" Certification and Standard Compliance" on page 71* **Addition** • Added *"6.3 Applying Lubricating Grease" on page 54* • Added *"6.7.1 Options" on page 69* • Added *"6.4.2 Oil Leakage Inspection Parts" on page 56*
November 2024	A00	Initial release.

Access to the Guide

This guide is not delivered with the product. The version may be updated without further notice. You can obtain the PDF version in the following ways:

- Visit www.inovance.com, go to Support > Download, search by keyword, and then download the PDF file.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install the My Inovance app, where you can search for and download guides.

Warranty

For faults and damage incurred during normal use in the warranty period, Inovance provides free repair service. (For details of the warranty period, see the purchase order.) A maintenance fee will be charged out of the warranty period.

Even in the warranty period, a maintenance fee will be charged for repair of the following damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (such as natural disaster, earthquake, and lightning strike)

The maintenance fee will be charged according to our latest Price List if not otherwise agreed upon.

For details, see the Product Warranty Card.

Safety Precautions

Safety Disclaimer

- This chapter provides essential safety instructions for proper use of the product. Before using this product, read through the user guide, especially the safety instructions. Failure to observe the safety instructions may result in equipment damage, personal injuries, or even death.
- "DANGER", "WARNING", and "CAUTION" items in this guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
- Use this product according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions

indicates that failure to comply with the notice will result in severe personal injuries or even death.

indicates that failure to comply with the notice may result in severe personal injuries or even death.

indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

Safety Precautions

- Some drawings in the guide shows the product without covers or protective guards to display more details. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- Operators must take mechanical precautions to protect personal safety and wear protective equipment, such as anti-smashing shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking
 • Do not install the product when you find that the product and its accessories have any damage or corrosion or they have been used. • Do not install the product when there is water inside the product or any of its parts is missing or damaged. • Do not install the product when the product name is inconsistent with that in the packing list.
 • Before unpacking, check whether the package is intact, without damage, water seepage, damp, and deformation. • Unpack the product layer by layer. Do not strike the package violently. • During unpacking, check whether the product and its accessories have any damage, corrosion, or bump on the surface. • Check the quantity of the product and its accessories and documents against the packing list.

Storage and Transportation

- Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injuries or equipment damage.
- Before hoisting the equipment, ensure that components, such as the front cover and terminal blocks, are secured firmly with screws. Loosely-connected components may fall off and result in personal injury or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.

- Handle the equipment with care during transportation and mind your steps to prevent personal injuries or equipment damage.
- When handling the product by hand, grab the product case tightly to avoid dropping the product and causing injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply may result in equipment damage.
- Avoid storage and transportation in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the product for more than 3 months. When the product needs to be stored for an extended period, take more strict protection and necessary inspection.
- Package the product strictly before transporting it, and use an enclosed container for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

- Installation must be carried out by technicians who have received relevant training on electrical equipment and have sufficient electrical expertise. Non-professionals are not allowed to operate the equipment.

- Read through the guide and safety instructions before installation.
- Do not install the product in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply may result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in electric shocks.
- When installing the equipment (such as the control cabinet) in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or fire.
- Do not modify the product.
- Do not loosen the fixing bolts of the product parts and components.
- When installing the equipment (such as the control cabinet) in a cabinet or final assembly, make sure that the enclosure of the cabinet or final assembly provides adequate fire prevention, electrical protection, and mechanical protection conforming to relevant IEC standards and local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the product on an incombustible object, such as metal, and do not touch or attach the product to combustibles. Failure to comply may result in fire accident.

- Cover the top of the equipment (such as the control cabinet) with cloth or paper during installation to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.

Wiring

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Before wiring, cut off all the power supplies of the equipment. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply may result in electric shocks.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply may result in electric shocks.
- Check that the equipment is grounded properly. Failure to comply may result in electric shocks.

- Do not connect the input power supply to the output end of the equipment. Failure to comply may result in equipment damage or even a fire.
- When connecting a drive to a motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers, or exposed cables are left inside the equipment. Failure to comply may result in electric shocks or equipment damage.

- During wiring, follow the proper electrostatic discharge (ESD) procedures and wear an anti-static wrist strap. Failure to comply may result in damage to the equipment or its internal circuits.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply can result in equipment malfunction.

Power-on

- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in electric shocks.

- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in physical injuries or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in fire.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in physical injuries or even death.

Operation

- The equipment must be operated only by professionals. Failure to comply may result in death or personal injury.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply may result in electric shocks.

- Do not touch the equipment enclosure, fan, or resistor with bare hands. Failure to comply may result in personal injury.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Do not maintain the equipment while power is on. Failure to comply may result in electric shocks.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- When a permanent magnet motor is used, do not touch the motor terminals immediately after power-off because the motor terminals can generate induced voltage during rotation even after the equipment power supply is off. Failure to comply may result in electric shocks.

- Carry out daily and periodic inspection and maintenance on the equipment according to maintenance requirements and retain a maintenance record.

Repair

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Do not repair the equipment while power is on. Failure to comply may result in electric shocks.
- Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.

- Submit the repair request according to the warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injury or equipment damage.
- When the equipment is faulty or damaged, require professionals to perform troubleshooting and repair by following repair instructions and keep a repair record.
- Replace quick-wear parts of the equipment in according with the replacement instructions.
- Do not perform operations on damaged equipment. Failure to comply may result in death, personal injury, or severe equipment damage.
- After the equipment is replaced, check the wiring and set parameters again.

Disposal
WARNING • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death. • Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Safety Sign

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. The following table describes the safety labels.

To ensure safe operation, comply with equipment-related safety labels. The following table describes the safety labels.

Safety Sign	Description
	• Read through the safety instructions before operating the equipment. Failure to comply may result in equipment damage, physical injuries, or even death. • Do not touch the terminals or remove the cover with power ON or within 10 minutes after power-off. Failure to comply may result in electric shocks.

Table of Contents

1 Product Information

1.1 Model and Nameplate

Model

IR - R 20 - 170 S - INT
① ② ③ ④ ⑤ ⑥

① **Product family** INOVANCE Robot	④ **Arm length** 170: 1723 mm 200: 2045 mm
② **Series** R: 6-axis robot	⑤ **Installation environment** S: Standard
③ **Load** 10: 10 kg 20: 20 kg	⑥ **Version** INT: International (With functional safety)

Note

The product information in this guide is the information of standard models in a standard environment. For information about non-standard models, contact the sales representative of Inovance.

Nameplate

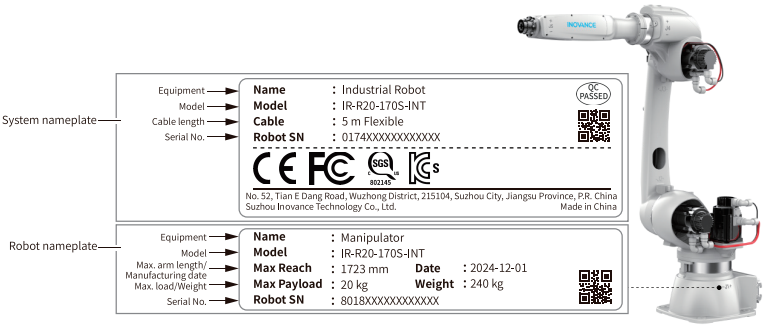


Figure 1-1 Nameplate

Note

Before use, make sure that the system manufacturing numbers of the robot body and control cabinet are consistent. Otherwise, the robot may not work properly.

1.2 Components

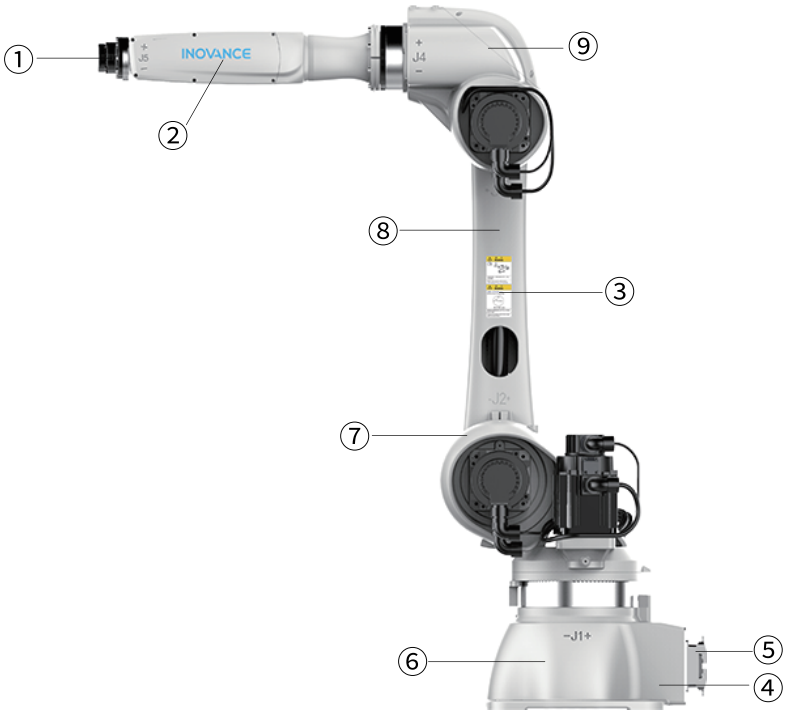


Figure 1-2 Product appearance

Table 1–1 Components

No.	Component	No.	Component
①	Wrist flange	⑥	Base
②	Forearm	⑦	Swivel base
③	Warning label	⑧	Upper arm
④	Nameplate	⑨	Elbow
⑤	Heavy-duty connector	-	-

1.3 Rotation Directions

The following figure illustrates the rotation direction of each axis.

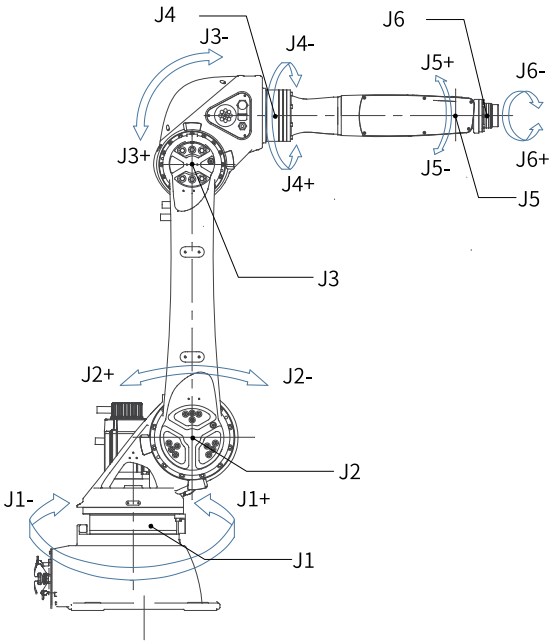


Figure 1-3 Directions of rotary axes

1.4 Product Dimensions

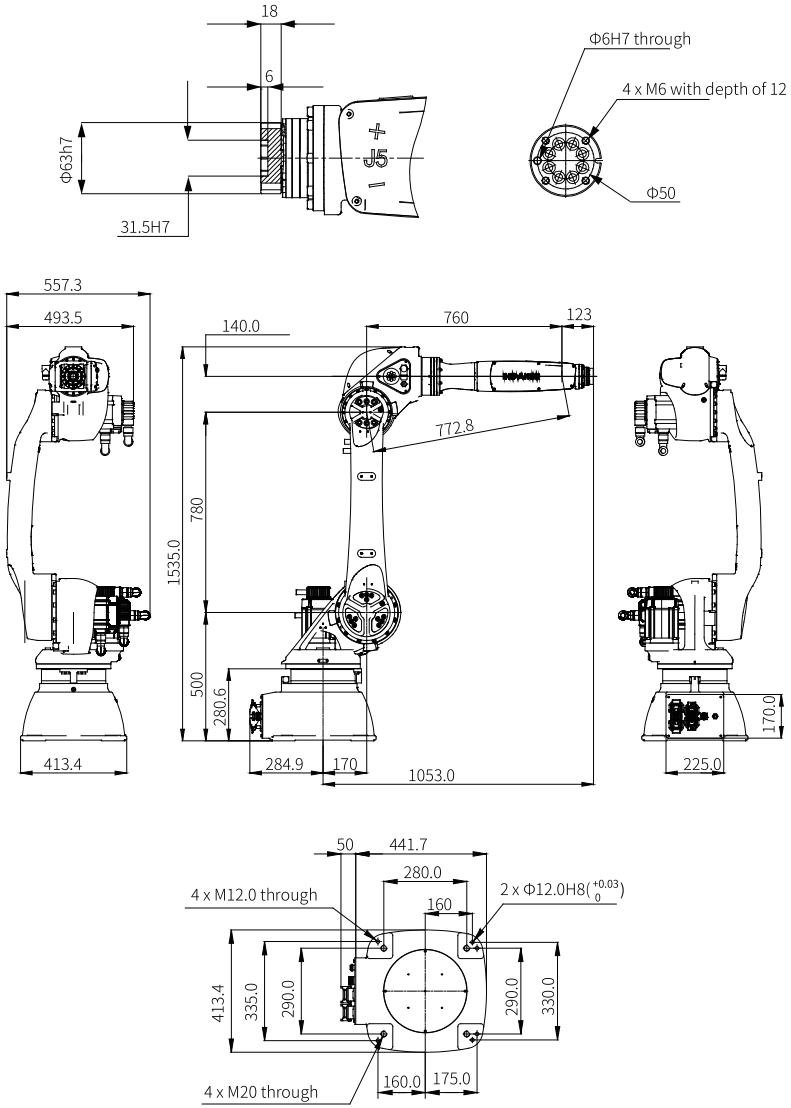


Figure 1-4 Outline dimensions for IR-R20-170S-INT (unit: mm)

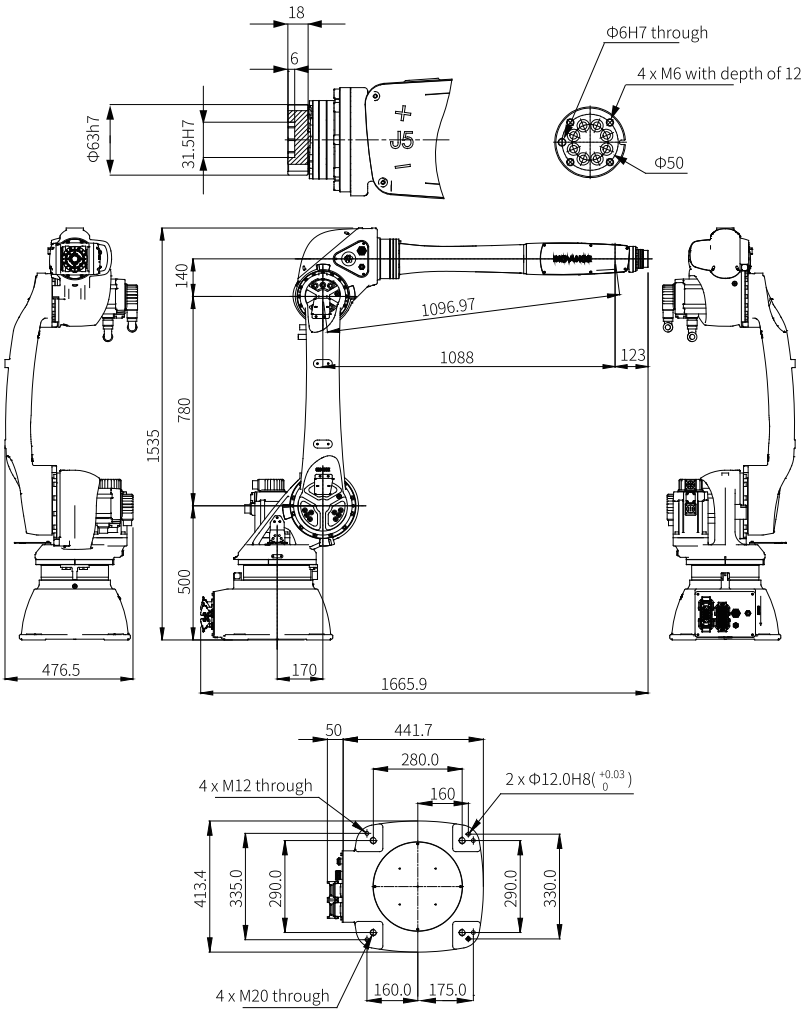


Figure 1-5 Outline dimensions for IR-R10-200S-INT (unit: mm)

1.5 Specifications

Model	IR-R20-170S-INT	IR-R10-200S-INT
Structure	Vertical multi-axis cascading structure	
Number of axes	6 axes	
Maximum reach	1723 mm	2045 mm
Repeatability	±0.05 mm	

Model		IR-R20-170S-INT	IR-R10-200S-INT
Wrist load	Max	20 kg	10 kg
IP rating	IP rating	Body: IP65, wrist: IP67	
Maximum velocity	J1 axis	190°/s	
	J2 axis	175°/s	
	J3 axis	200°/s	
	J4 axis	400°/s	
	J5 axis	360°/s	
	J6 axis	610°/s	
Maximum motion range	J1 axis	±170°	
	J2 axis	–155° to +80°	
	J3 axis	–75° to +160°	
	J4 axis	±180°	
	J5 axis	±140°	
	J6 axis	±360°	
Allowed wrist torque	J4 axis	42 N·m	22 N·m
	J5 axis	42 N·m	22 N·m
	J6 axis	20 N·m	10 N·m
Allowed wrist inertia	J4 axis	1.18 $kg \cdot m^2$	1 $kg \cdot m^2$
	J5 axis	1.18 $kg \cdot m^2$	1 $kg \cdot m^2$
	J6 axis	0.5 $kg \cdot m^2$	0.2 $kg \cdot m^2$
User interface	Wiring	18-channel signals of 30 V 0.5 A	
	Air duct	Air duct: Φ8 mm x 1 Pressure resistance: 0.59 MPa	
Ambient condition	Ambient temperature[1]	0°C to 45°C	
	Ambient humidity	5% RH to 95% RH (non-condensing)	
	Maximum temperature gradient	1.5°C/min	
Body weight	Body weight	240 kg	245 kg
Input power (average power consumption)	Input power (average power consumption)	5 kVA (1kW)	
Applicable control cabinet (standard)	Applicable control cabinet (standard)	IRCB501-6ND-INT	
Mounting method	Mounting method	Floor-standing installation	
Noise level	Noise level[2]	$L_{Aeq} \leqslant 80$ dB(A)	

Model		IR-R20-170S-INT	IR-R10-200S-INT
Base installation dimensions	Base installation dimensions	290 mm x 280 mm (4 x Φ20 mm)	
Certification	CE, cSGSus, FCC, KCs, and functional safety certification (supported by the "-INT" control cabinet only, requiring a functional safety expansion card)		

Note

[1] Ambient temperature: In low temperatures close to the minimum allowed temperature in the product specifications, or after a long time of unuse during holidays or nights, it is recommended to preheat the robot for 10 minutes before operation.

[2] Noise level: The value is the noise level equivalent to load A, which is measured according to ISO 11201 (EN31201). (Measuring conditions: operation at a rated load and a high speed)

1.6 Motion Range

- Ensure a safety protection range that is greater than the maximum motion range of the robot. Set up comprehensive guard devices (such as fences) around the safety protection range, with an emergency stop device easily accessible to operators.
- On the guard devices (fences), clearly display robot status, such as automatic running, teaching, and emergency stop, so that everyone onsite can easily see the status of the robot.
- The safety fences must be sturdy enough to withstand impacts and pressures from both internal and external sources. The safety fences must be fixed and immovable to prevent operators from easily dismantling or breaking them. The safety fences must also be free of sharp angles, edges, or spikes, and must not contain any potentially hazardous components.

Motion range

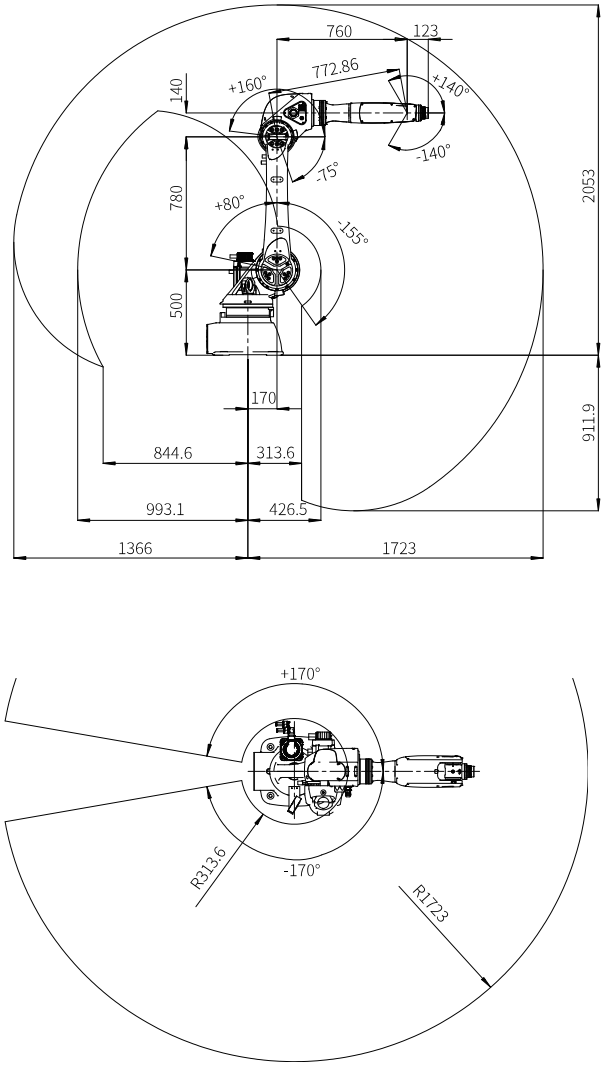


Figure 1-6 IR-R20-170S-INT robot motion range (unit: mm)

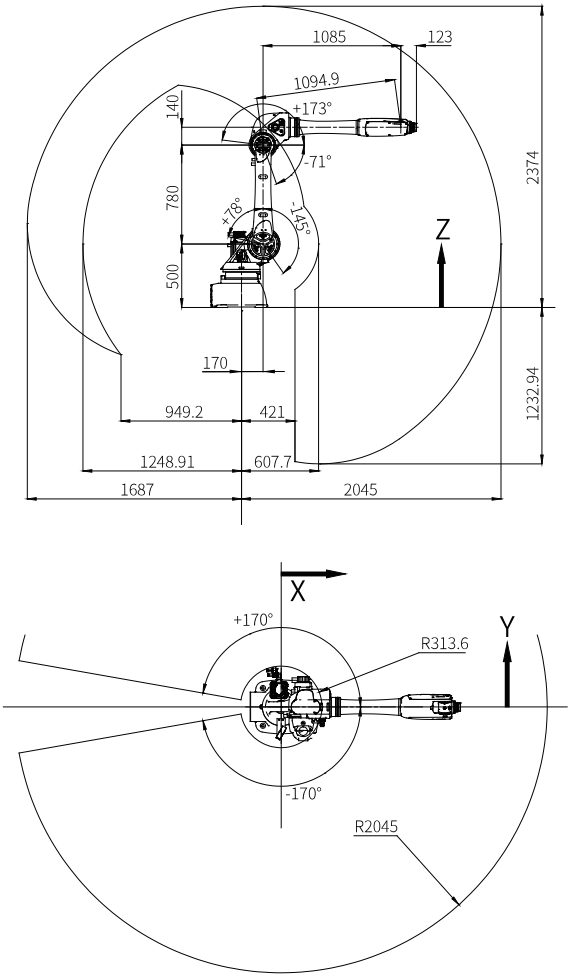


Figure 1-7 IR-R10-200S-INT robot motion range (unit: mm)

1.7 Maximum Load of Wrist Flange

The IR-R20 series robot supports a maximum load of 20 kg. The allowed wrist torque and inertia should meet the following requirements. External force (other than gravity) applied to the robot should not exceed the range in the table below.

Wrist Load Condition		IR-R20-170S-INT	IR-R10-200S-INT
Allowed wrist torque	J4 axis	42 N·m	22 N·m
	J5 axis	42 N·m	22 N·m
	J6 axis	20 N·m	10 N·m
Allowed wrist inertia	J4 axis	1.18 kg·m²	1 kg·m²
	J5 axis	1.18 kg·m²	1 kg·m²
	J6 axis	0.5 kg·m²	0.2 kg·m²

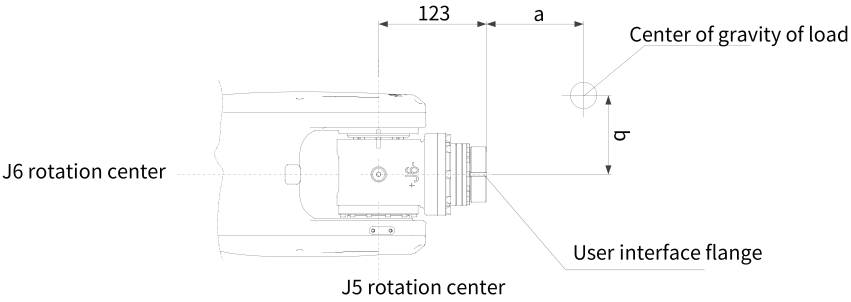


Figure 1-8 Distance to the rotation center of the J5/J6 axis (unit: mm)

Note

- Distance to the rotation center of J5: a + 123 (mm)
- Distance to the rotation center of J6: b (mm)

The following figure shows the wrist load curve of the IR-R20 series robot system. The load conditions should be within the range shown in the figure.

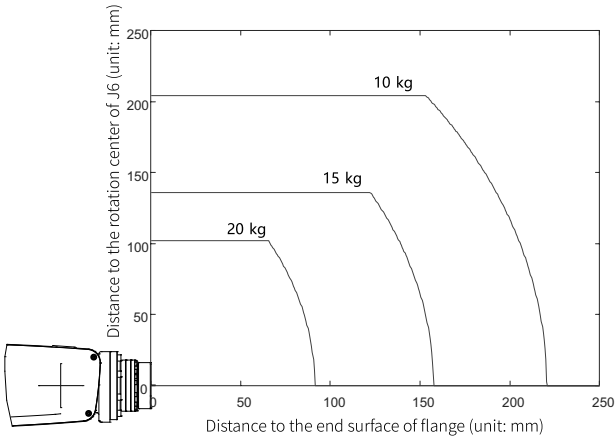


Figure 1-9 Wrist load curve

Note

- During the use of the robot, define the correct load and correct the robot's load. Incorrectly defined load data may cause the robot to be overloaded. Using incorrect load data or using load data other than those shown in the load chart may result in damage to motors, gears, and mechanical structures due to overload.
- Robots operating with incorrect load data or with loads other than those shown in the load chart will not be covered by the robot warranty.

2 Preparations for Installation

2.1 Installation Personnel Requirements

- Ensure that the installation personnel have obtained mechanics knowledge or received mechanics training in advance to understand various dangers and risks in the installation process.
- The installation personnel must be familiar with the installation requirements and relevant technical information.
- Do not allow non-professionals to perform equipment installation, wiring, maintenance, inspection, or parts replacement.

2.2 Installation Environment Requirements

General environment requirements

Set up the robot system in accordance with the following environment requirements to maximize and maintain the performance of the robot and to use it safely.

Table 2–1 Ambient conditions

Item	Requirements
Ambient temperature	0°C to 45°C (without obvious temperature change)
Ambient humidity	10% RH to 80% RH (non-condensing)
Maximum temperature gradient	1.5°C/min
Electrical fast transient/burst immunity	⩽ 4 kV (power cords) ⩽ 2 kV (signal cables)
Static immunity	⩽ 6 kV (contact) ⩽ 8 kV (air)
Environment	• Keep away from direct sunlight. • Avoid places with salt or moisture and other rust-prone places. • Avoid places with dust, oil fume, iron filings, or other dust pollution. • Avoid places with flammable or corrosive liquid and gas, and explosive gas. • Keep away from great shocks and vibrations. • Avoid sources of electrical interference nearby.

The robot is not suitable for use in harsh environments such as explosive spraying operations. Contact your provider if the robot needs to be used in an environment that does not meet the preceding conditions.

The EMC test is performed according to IEC 61800-3:2017.

Special environment requirements

- The surface of the robot provides certain protection. However, contact your provider and confirm in advance if the robot may come into contact with special liquid or gas during use.
- There may be condensation inside the robot if it is used in an environment with large changes in temperature and humidity. Consult your provider.
- If you want to use the robot to handle food directly, consult your provider in advance to avoid contamination of the food by the robot.

Do not wipe the robot hard with alcohol or benzene. Otherwise, the coated surface may lose gloss.

Foundation

1. The foundation shall be able to bear the gravity and dynamic force generated by the robot.
2. The ground is level and flat.
3. The vibration generated by machines near the robot will reduce the accuracy and repeatability of the robot motion. The vibration isolation design for the foundation structure is recommended to minimize the vibration.

Note

Do not install the robot directly on the ground because the robot will put great stress on the ground and need a suitable support surface.

2.3 Installation Base Table Requirements

- The base table supports not only the weight of the robot, but also the dynamic forces produced by the robot when it moves at maximum acceleration. Ensure that the base table has sufficient bearing capacity by reinforcing it with materials like connecting beams.
- Use M20 threaded holes on the base table to mount the robot. Use screws with a strength equivalent to the performance level of Grade 12.9 specified in GB/T 3098.1.
- To dampen vibrations, use a steel plate with a thickness over 30 mm, a surface roughness of 25 μm, and a flatness below 0.2 mm as the robot mounting surface.
- Fix the base table firmly on the ground.
- Keep the Z axis of the robot perpendicular to the horizontal plane during installation.
- Reserve enough space for the robot control cabinet in the base table design. For space requirements of control cabinets, see the IRCB101 Series High-Protection Robot Control Cabinet User Guide.

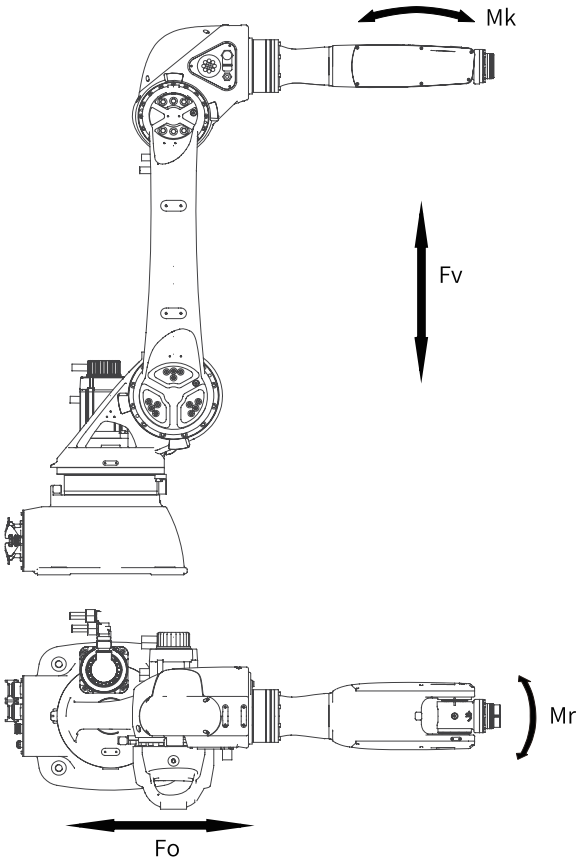


Figure 2-1 Stress generated by the robot on the support structure

2.4 Installation Clearance

2.4.1 Installation Space

1. In addition to the space required for the robot body, control cabinet, and peripherals, ensure the following minimum required spaces:
   - Space for teaching
   - Space for maintenance and inspection (for mounting fixtures)
   - Space for cables
2. Reserve 200 mm for the cable installation space at the robot base. When installing the robot, pay attention to the distance from obstacles. Reserve enough space for cable

bending radius to avoid cable damage or breakage caused by extreme bending of the cables.

3. Reserve at least 100 mm between the boundary of the motion range and the safety fence.

2.4.2 Installation Dimensions

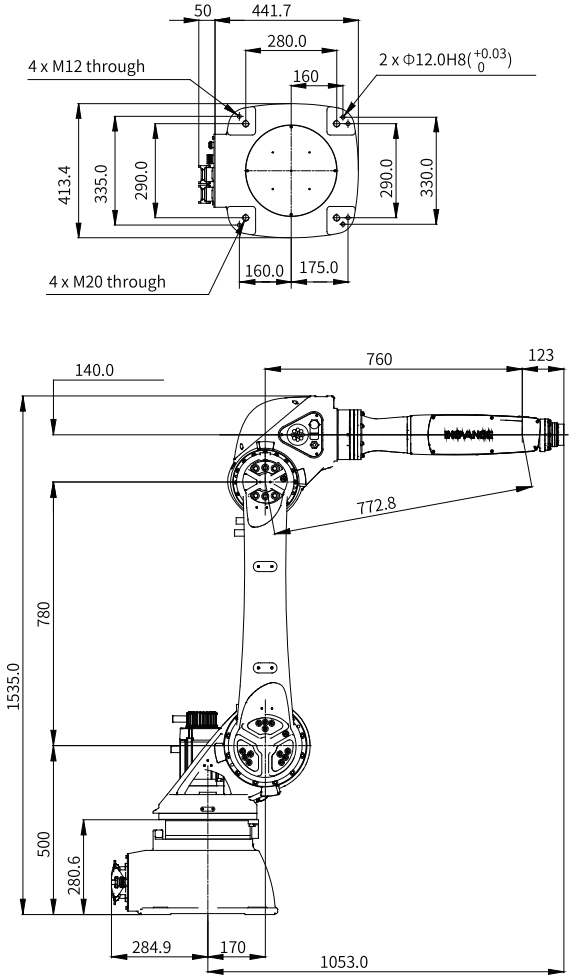


Figure 2-2 Installation dimensions for IR-R20-170S-INT (unit: mm)

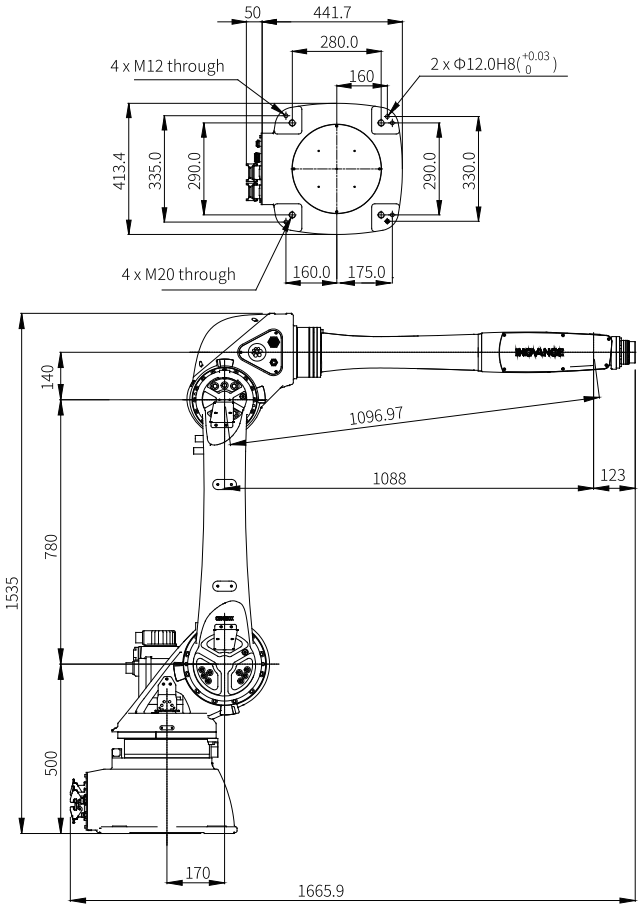


Figure 2-3 Installation dimensions for IR-R10-200S-INT (unit: mm)

3 Unpacking and Transportation

3.1 Unpacking

3.1.1 Precautions for Unpacking

- Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the product layer by layer. Do not strike the package violently.
- Check the surfaces of the equipment and accessories for any damage, rust, and scratches.
- Check the equipment, accessories, and materials in the package against the packing list.
- Do not install the equipment if any damage, rust, or sign of use is found on the equipment or accessories.
- Do not install the equipment if water seepage or component missing or damage is found upon unpacking.
- Do not install the equipment if the packing list does not conform to the equipment received.
- Unpack the packing box according to the direction instructed.

3.1.2 Unpacking Procedure

1. Wear protective gloves before operation, and use a claw hammer to remove the top access cover and four side plates of the case.

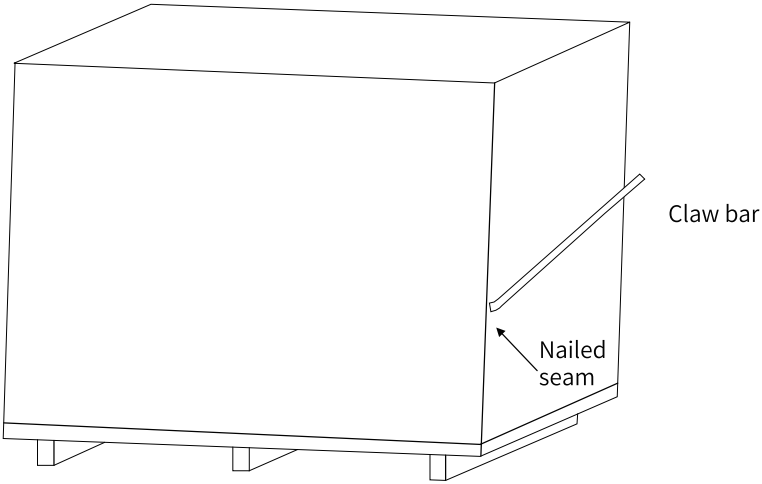


Figure 3-1 Outer carton structure

Note

Use a claw hammer for unpacking, which is more secure.

2. Remove the plastic bags that cover the surface of the robot body and control cabinet. Then, use a wrench to loosen the bolts fixing the robot body and packaging bottom board and the bolts fixing the control cabinet and packaging bottom board.

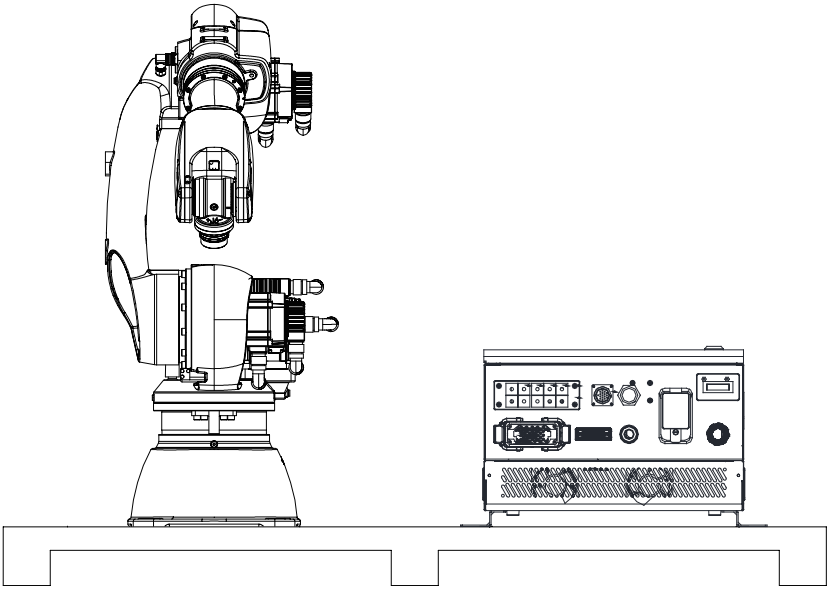


Figure 3-2 Packing of the robot

3. Transport the product to the installation site with reference to *"3.1.1 Precautions for Unpacking" on page 28*.

3.2 Handling

3.2.1 Precautions for Handling

Danger

Allow only qualified personnel to carry out transportation including rigger operation, hoisting by crane, and forklift driving.

Warning

- Transport the equipment with a crane or forklift with the original package.
- Wear personal protective equipment (PPE) during transportation with a crane or forklift. Prohibit any personnel from standing or staying around the transportation route.
- Keep the equipment balance when hoisting the equipment. Otherwise, the equipment may fall, resulting in serious injury or damage.

Caution

- Store and transport the equipment in accordance with the storage and transportation requirements. Observe the humidity and temperature requirements.
- Avoid storage and transportation in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Pack the equipment properly before transportation by vehicle. Use an enclosed box for long-distance transportation.
- Never transport the equipment with devices or materials that may damage or have negative impacts on the equipment.
- If condensation occurs on the device during transportation or storage, remove the condensation before turning on the power.

3.2.2 Preparation for Handling

1. If the robot is newly manufactured, keep it in the same posture as it was in the factory, as shown in the following figure.

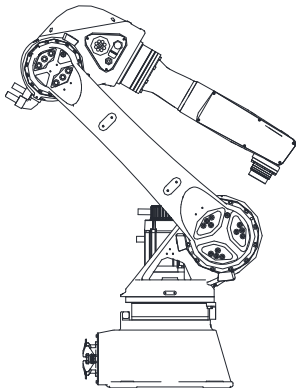


Figure 3-3 Robot posture at delivery

2. If the robot has been used and needs to be moved to another location, complete the following steps before handling:
   - Adjust the robot to the posture for handling.
   - Disconnect power to all devices.
   - Unplug power and signal cables connected to the control cabinet.
   - Unscrew the base mounting screws and remove the robot from the mounting base.
   - Secure the robot to the handling equipment.

3.2.3 Handling Procedure

Note

- The equipment is heavy and manual handling is strictly prohibited.
- Wear safety shoes for handling and at least two people are required.
- Wear protective equipment and ensure that the lifting area is safe enough to avoid collision hazards.

Warning

- Take care when lifting the robot with a crane or forklift. When placing the robot on the ground, avoid any strong collision between the robot mounting face and the ground.
- Before handling the robot, remove the end effector and the pallet. When it is necessary to handle the robot with the pallet, observe the following precautions.
  - The end effector may oscillate due to vibration during transportation and excessive loads may be applied to the robot.
  - When handling the robot with the pallet installed, lift the pallet rather than the robot directly.

Handling with a crane

In principle, use a crane to move and transport the robot.

1. Set up the robot in the factory posture as shown in the figure below, then install four eye bolts (M20) on the base, and lift it with four steel slings. It is recommended that the steel sling length be 1.5 m, and the steel sling load capacity be no less than 500 kg. Protect the contact part between the lifting straps and the robot body with soft cloth or a protective soft pad.

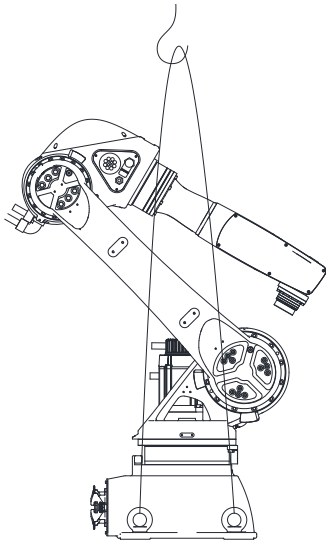


Figure 3-4 Lifting the robot

2. Use four steel slings to lift the robot. Ensure that the robot is balanced before moving the crane.
3. Move the robot independently or collaboratively, provided that the operation requirements of the crane are met.

Handling with a forklift

When handling the robot using a forklift, use bolts to secure the robot onto its original pallet or use screws to secure it on a baseplate with sufficient load-carrying capacity, and lift the robot together with the pallet or baseplate.

Transport the robot slowly and carefully to prevent it from toppling or tilting over.

- **Handling the control cabinet and robot body**

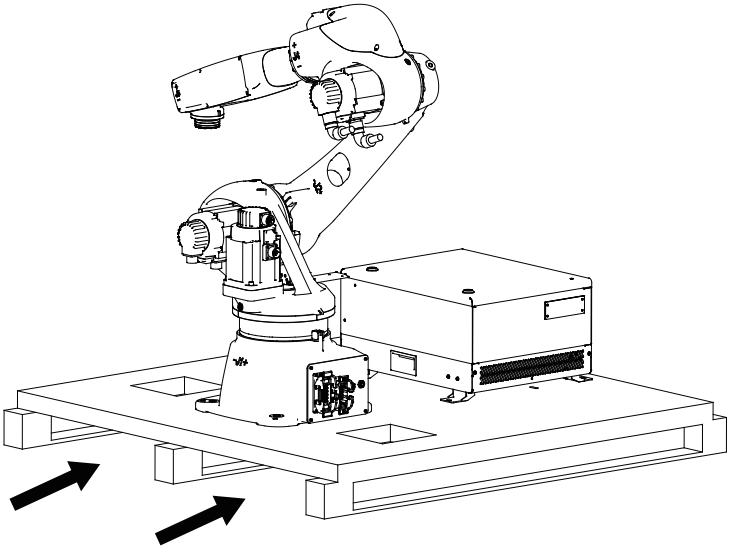


Figure 3-5 Handling the robot with a forklift

Note

When the factory pallet is used and the robot is located on one side of the pallet, apply a counterweight on the other side upon forklift insertion, to prevent the robot from tipping over.

- **Handling the robot body (handling options)**

Option	Code	Description
Forklifting tools x 4	01660006	Tools used by the forklift to transport the robot body fixed on the base

1. Install four forklifting tools at the four M12 threaded holes on the robot base according to the posture, as shown in the following figure. Forklift load capacity ⩾ 500 kg, fork width ⩽ 150 mm.
2. Ensure that the robot body is balanced before moving the forklift, so that it does not tip or tilt. Do not approach the forklift during transportation. Slowly raise the robot body and transport it to the installation base table.

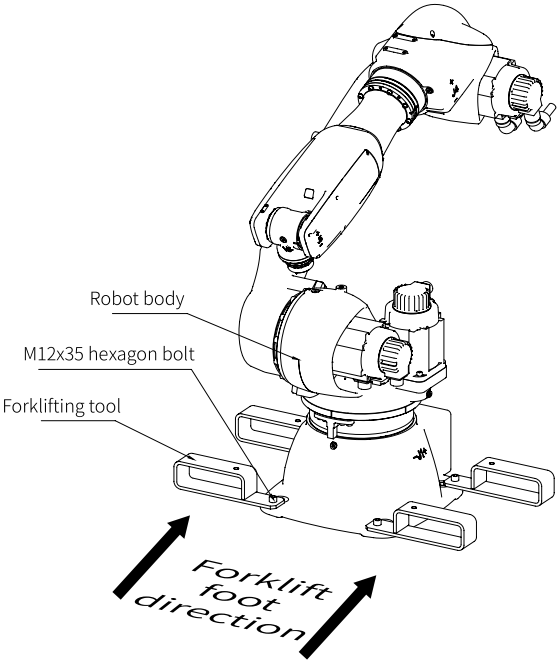


Figure 3-6 Installing forklifting tools

4 Installation

4.1 Installation precautions

Danger

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by professionals.
- Install a safety fence for the system. Failure to comply will result in serious accidents.
- Reserve sufficient space between the equipment and surrounding buildings, structural parts, and devices. Failure to comply may cause serious injury or major damage.
- Fix the manipulator before turning on the power or operating the system. Otherwise, the manipulator may fall over and cause serious injury or major damage.

Note

- Do not modify the equipment.
- Do not install this equipment in places with strong electric or magnetic fields.
- Remove the mounting screws of the manipulator and adjust the robot to its transport posture.
- For the tabletop mounting, at least two people are required for the operation.

4.2 Installing the Robot Body

Follow the following steps to install the robot body:

1. Disconnect power to all devices.
2. Clean the surface onto which the robot is to be mounted.

Caution

To dampen vibrations, use a steel plate with a thickness over 30 mm and a surface roughness below 25 µm as the robot mounting surface.

3. Move the robot near the mounting surface.
4. Align the robot base with the two locating pin holes.
5. Install the two locating pins.

6. Install four spring washers and four plain washers, and tighten them with four M16x50 hexagon screws (tightening torque: 220 N·m).

Note

Use screws with a strength equivalent to the performance level of Grade 12.9 specified in GB/T 3098.1.

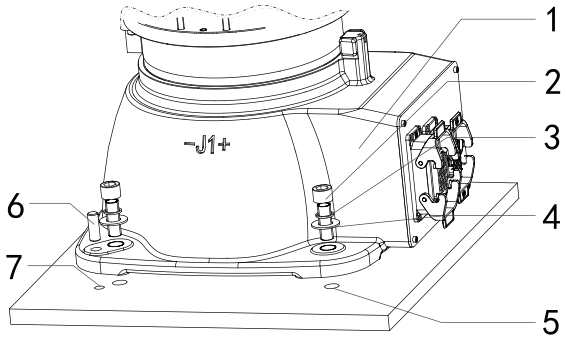


Figure 4-1 Installing the base

No.	Component
1	Robot base
2	Four M16x50 hexagon screws (Grade 12.9 in GB/T 70.1-2000)
3	Four spring washers (GB/T 93-1987)-16
4	Four plain washers (GB/T 97.1-1985)-16
5	Threaded mounting holes (depth: > 25 mm)
6	Two Φ6x32 parallel pins with internal threads (GB/T 120.2-2000)
7	Mounting pin holes (depth: > 20 mm)

4.3 Installing an End Effector

Customers shall prepare end effectors. Observe the following precautions when installing an end effector.

Caution

- Perform installation only when the power supply is disconnected and the workpiece is not placed. If the emergency stop switch is pressed when the power is still connected, the workpiece may be released at this time, which may cause damage to the robot system and workpiece.
- Pay attention to the interference area of the end effector during system layout design. After the end effector is installed, the end effector or workpiece may come into contact with the robot body during motion due to the outer diameter of the end effector, the size of the workpiece, or the position of the robot arm, which may cause damage to the robot system and the workpiece.

Use M6 screws to attach the end effectors to the wrist flange.

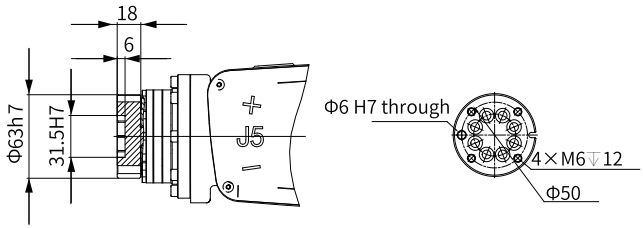


Figure 4-2 Wrist flange (unit: mm)

4.4 Connecting the Power Line and Signal Cable

Danger

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by professionals.
- Cut off the power before wiring. Failure to comply will result in electric shock or system fault.
- Before wiring, cut off all equipment power supplies. Residual voltage exists after power cut-off. Therefore, wait at least 10 minutes before further operations.
- Ensure that the safety input signals, such as the emergency stop switch and safety door switch are connected correctly before wiring. Otherwise, the safety protection will not work properly in emergency cases, causing serious injury or damage.
- Make sure that the equipment is well grounded. Failure to comply will result in an electric shock.
- During wiring, follow the proper electrostatic discharge (ESD) procedure, and wear an antistatic wrist strap. Failure to comply will damage the equipment or the internal circuits of the equipment.

Warning

- Connect the cables securely. Do not lay heavy objects on the cables, or bend or pull the cables forcibly. Failure to comply will result in cable damage, wire breaking, or poor contact, causing electric shock or system fault.
- Wiring cables must meet diameter and shielding requirements. The shielding layer of the shielded cable must be reliably grounded at one end.
- Make the connections in correct sequence. Otherwise, the system may not work properly, which may cause safety hazards.
- After wiring, make sure there are no fallen screws and exposed cables inside the equipment.

Connection method:

- Connect the heavy-duty connector for the user cable to the heavy-duty connector on the robot base.
- Connect the power connector and signal connector of the user cables to the control cabinet.

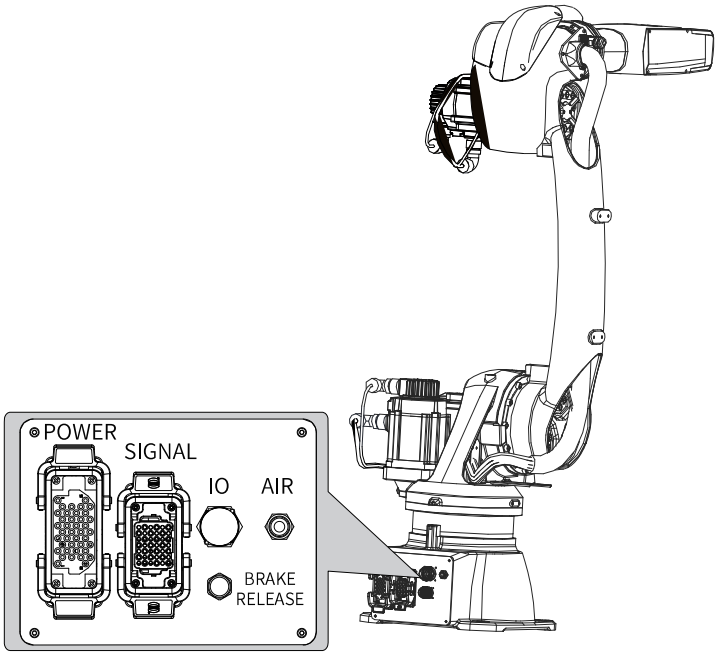


Figure 4-3 Power line and signal cable connection

4.5 User Wiring and Tubing

4.5.1 Wiring (Cables)

Danger

Do not allow non-professionals to perform equipment installation, wiring, maintenance, inspection, or parts replacement.

Available cables are built in the robot body. The following table describes the specifications of signal cables.

Rated Voltage	Allowable Current	Number of Lines	Nominal Cross-sectional Area of Conductor	Remarks
30 VAC/VDC	0.5 A	18	25 AWG	-

Make sure that the current does not exceed 0.5 A.

The following table describes the specifications of connectors.

Model	Code
19-pin male aviation connector (90°)	15050930
19-pin male aviation connector (90°), with cable	15051215
I/O cable (5 m)	1504B978

4.5.2 Tubing (Air Ducts)

The following table describes the specifications of air ducts.

Maximum Operating Pressure	Quantity	Specifications (Outer Diameter x Inner Diameter)
0.59 MPa (5.9 kgf/cm^2)	1	Φ 8 mm x Φ 5.7 mm

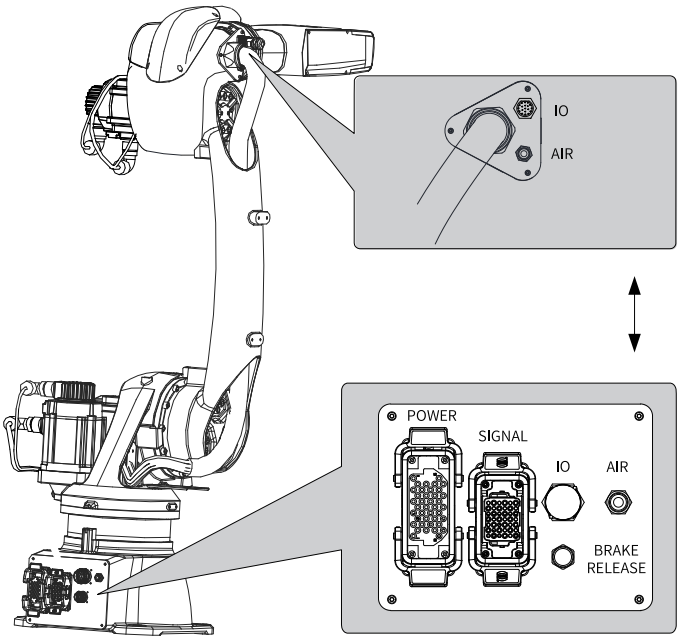


Figure 4-4 User wiring/tubing connectors

4.5.3 Robot Aviation Connector Pins

The robot provides a 19-pin aviation connector at the elbow joint and on the base respectively. The two connectors are interconnected by a special cable inside the robot body.

The connector on the elbow joint is a 90° elbow aviation connector (without wire), and the connector on the base is a straight aviation connector (with wire). The connection between the 19-pin aviation connector on the base and that at the elbow joint (top of the forearm) is described as follows:

1. Pins other than pin 19 of the two connectors are directly connected internally as user I/Os, and the pin functions can be customized.
2. Pin 19 is connected to the shield.

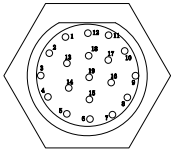


Figure 4-5 Aviation connector pin layout

Figure 4-6 Aviation connector pins at the elbow

Base Position			9P×0.2 mm²	Base Position		
Pin	Color	Signal		Pin	Color	Signal
19	Shield	FG		19	Shield	FG
1	Blue			1	Blue	
2	White			2	White	
3	Yellow			3	Yellow	
4	White			4	White	
5	Green			5	Green	
6	White			6	White	
7	Red			7	Red	
8	White			8	White	
9	Purple			9	Purple	
10	White			10	White	
11	Blue			11	Blue	
12	Brown			12	Brown	
13	Yellow			13	Yellow	
14	Brown			14	Brown	
15	Green			15	Green	
16	Brown			16	Brown	
17	Red			17	Red	
18	Brown			18	Brown	

Figure 4-7 Internal structure of the aviation connector

5 Motion Range

5.1 Methods of Setting the Motion Range

Caution

- When limiting the motion range for safety reasons, consider both the angle ranges and mechanical stops.
- The default motion range at delivery is the maximum motion range of the robot.

Set the motion range based on the following:

- **Angle range (all joints)**
  The basic unit of motion of a robot is degree. The robot's motion limit (motion range) is set based on the angle lower limit and angle upper limit (angle range) of each axis.

  The motion angle is determined by the encoder output pulse value of the servo motor, and the angle range must be set within the mechanical stop range.

  When the robot receives a motion command, it will check whether the target position of the command is within the angle range before moving. If the target position is beyond the set angle range, an error occurs and the action will stop.

Caution

You can set the angle range by choosing "Settings" > "Motion Parameters" > "Axis Parameter Settings" > "Axis Limits" on the teach pendant.

- **Mechanical stop**
  The mechanical stop is used to mechanically set an absolute motion range beyond which motion is not allowed.

  If you need to limit the motion range for safety reasons or to improve layout efficiency, set it according to *"5.2.1 Maximum Angle Range of J1" on page 44*.

5.2 Setting Motion Range By Using Angle Range

5.2.1 Maximum Angle Range of J1

The counterclockwise angle is positive (+), and the clockwise angle is negative (–).

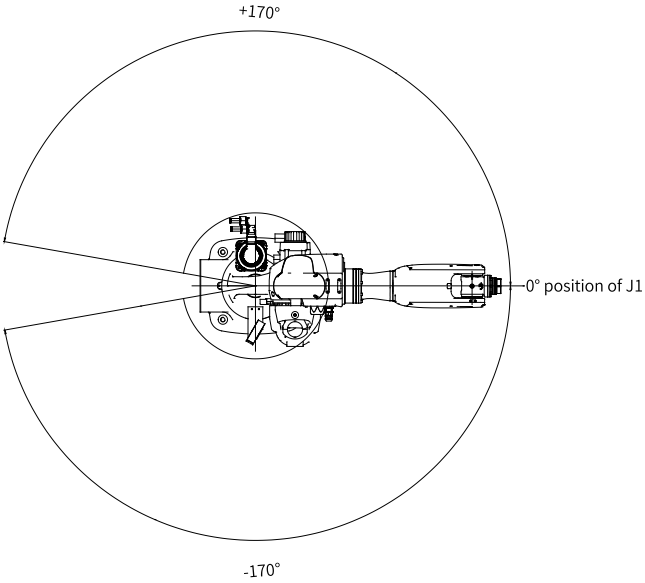


Figure 5-1 Maximum angle range of J1

5.2.2 Maximum Angle Range of J2

The clockwise angle is positive (+), and the counterclockwise angle is negative (–).

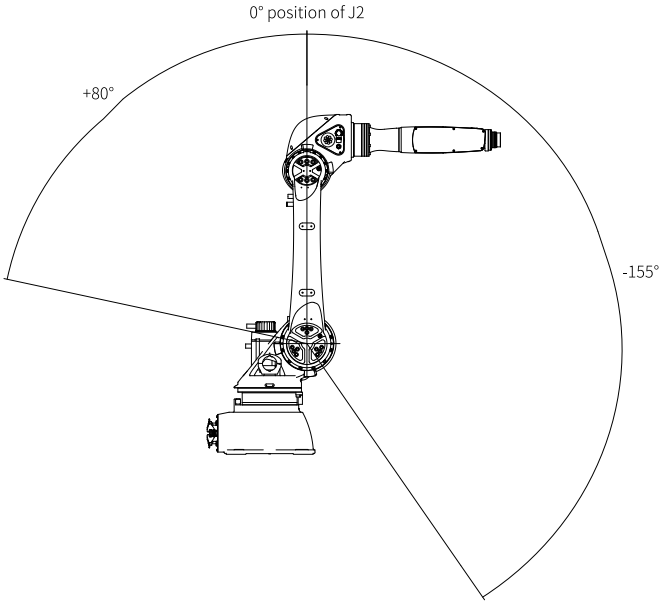


Figure 5-2 Maximum Angle Range of J2

5.2.3 Maximum Angle Range of J3

The clockwise angle is positive (+), and the counterclockwise angle is negative (–).

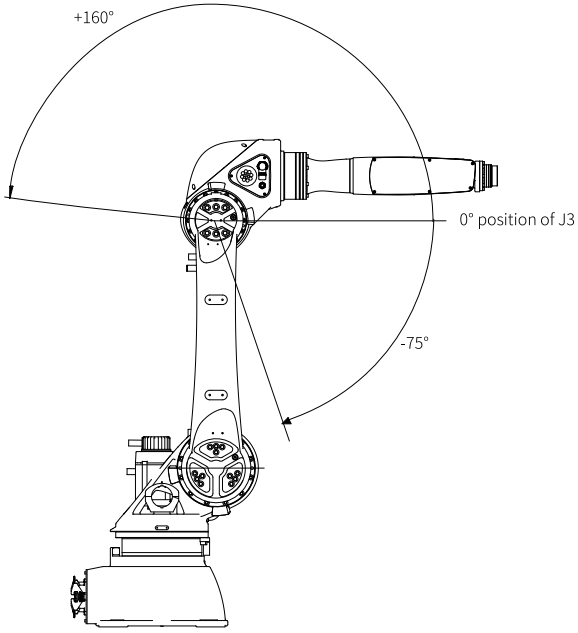


Figure 5-3 Maximum angle range of J3

5.2.4 Maximum Angle Range of J4

Viewed from the end of the robot arm, the counterclockwise angle is positive (+), and the clockwise angle is negative (–).

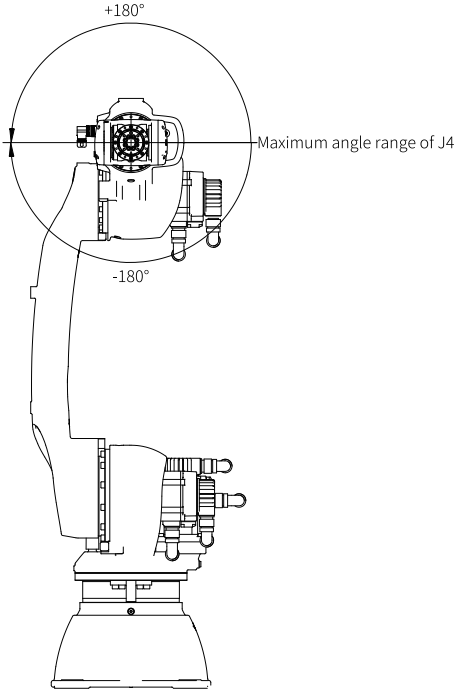


Figure 5-4 Maximum angle range of J4

Note

J4 is not equipped with a mechanical stop. If its maximum angle range is exceeded, the internal wiring may be damaged or the robot may fail.

5.2.5 Maximum Angle Range of J5

The clockwise angle is positive (+), and the counterclockwise angle is negative (–).

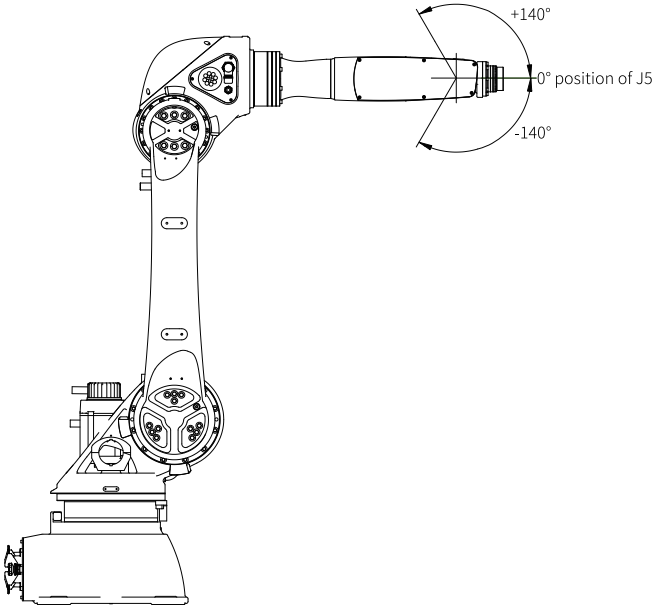


Figure 5-5 Maximum Angle Range of J5

5.2.6 Maximum Angle Range of J6

Viewed from the end of the robot arm, the counterclockwise angle is positive (+), and the clockwise angle is negative (–).

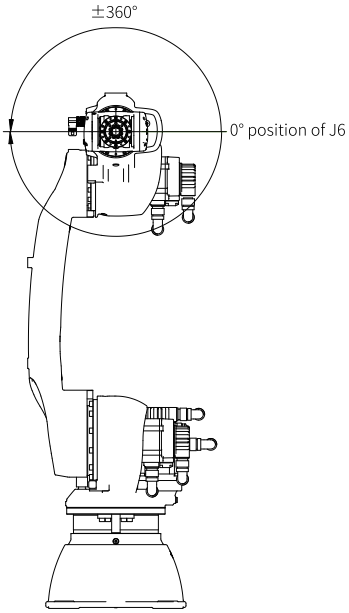


Figure 5-6 Maximum angle range of J6

5.3 Mechanical Limit Stops

- IR-R20 series models have a mechanical limit stop that is pre-installed at J1.
- The setting of the angle range cannot exceed the set angle range of the mechanical stop,
- which is ±174°.

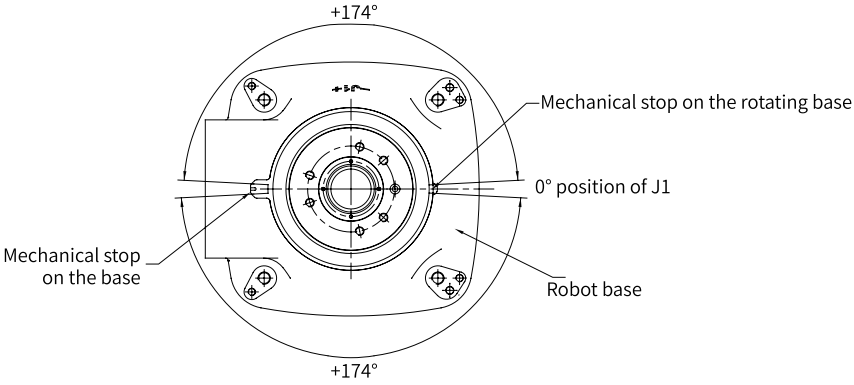


Figure 5-7 Mechanical limit stops for J1

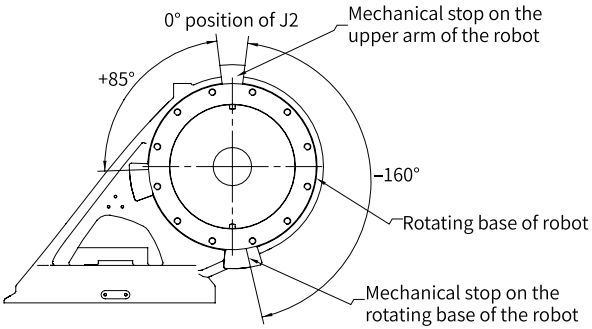


Figure 5-8 Mechanical limit stops for J2

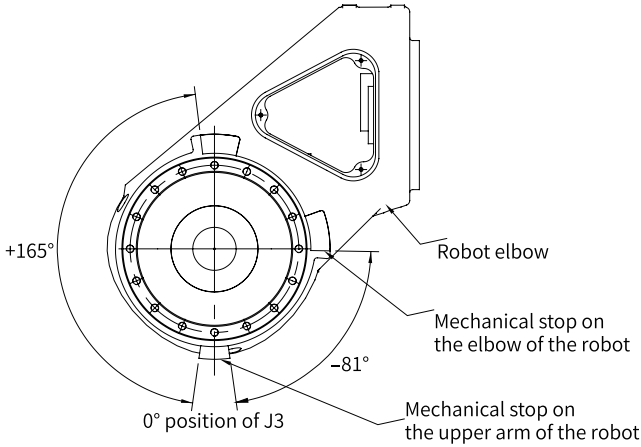


Figure 5-9 Mechanical limit stops for J3

6 Maintenance and Repair

6.1 Safety Instructions

Before maintenance, read the precautions for maintenance, this guide, and other related guides carefully to fully understand the methods of safe maintenance.

- Do not allow non-professionals to perform equipment installation, wiring, maintenance, inspection, or parts replacement.
- Do not perform equipment maintenance or servicing while power is on. Failure to comply may result in an electric shock.
- Do not remove the parts not mentioned in this guide. Do not maintain any part with a method different from that described in this guide.
- Check the motion of the robot after parts replacement outside the safety fence. Failure to comply may cause severe safety issues due to abnormal movement of the robot.
- Make sure that the emergency stop switch and safety door switch work properly before operation. Otherwise, safety protection functions will not work properly in emergency cases, causing serious injury or damage.

- Submit the repair request according to the warranty agreement.
- Carry out daily and periodic inspection and maintenance on the equipment according to maintenance requirements and retain a maintenance record.
- When the equipment fails or is damaged, arrange for qualified technicians to troubleshoot and repair the equipment in accordance with the maintenance instructions and retain a maintenance record.
- Replace quick-wear parts of the equipment according to the replacement guide.
- Prevent foreign objects from entering the equipment and terminals during maintenance.
- Open the equipment cover only for repair and maintenance.
- After the equipment is replaced, perform wiring inspection and parameter settings again.

6.2 Inspection and Maintenance Items

Inspect and maintain the robot regularly for the robot to run more safely and efficiently. The target parts can be inspected and maintained daily, monthly, quarterly, semi-annually, and annually as needed.

The list of maintenance items lists the necessary maintenance items at each stage. In the rightmost column of the table, the maintenance personnel are divided into "Professionals", "Qualified Personnel", and "Manufacturer" (that is, Inovance). You can designate skilled personnel to carry out various maintenance operations.

1. Daily inspection and maintenance

Check Item	Check Measure
Visual inspection	• Check all joint gaps, oil filling ports, and drain ports for grease leakage. • Check robot exterior for any impact damage.
Screw tightening inspection	Check all screws for looseness throughout the robot and check whether the screw tightening torques meet the requirements.
Noise inspection	Check all transmission mechanisms for unusual sounds.
Joint transmission mechanism inspection	Check for table running and abnormal jittering of the transmission mechanisms.
Pipeline accessory inspection	Check whether the pipeline accessories are complete, worn and rusted.
Control inspection of all electrical components	Check whether the control buttons of all electrical components of the robot are normal.

2. Weekly inspection and maintenance

Check Item	Check Measure
Brake inspection	Check whether the brake of each axis of the robot is effective.
Motion range of each axis	• Check whether the motion range of each axis is within the normal angle range. • Check whether the zero point position of each axis is aligned.
Torque wrench and hexagon screwdriver bit	Due to the risk of screw thread stripping, inspect the torque wrench and hexagon screwdriver bit for wear before use and replace if necessary.

3. Monthly inspection and maintenance

Check Item	Check Measure
Control cabinet heat dissipation inspection	Check whether the fan behind the control cabinet is ventilated smoothly. It is recommended to replace or maintain the fan once a month.

4. Inspection and maintenance every six months

Check Item	Check Measure
All wiring harnesses for each electrical component	• Check all cable connectors of the robot body for bending, corrosion and falling off. • Check the cables outside the control cabinet for bending, corrosion and falling off. • Check the cable of the teach pendant for bending, corrosion and falling off.

5. Inspection and maintenance every year

Check Item	Check Measure
Control cabinet DI/DO signal	Check whether the DI/DO signal response of the control cabinet is normal.
Reducer of each axis	Check whether the lubrication of the reducer of each axis of the robot is normal and whether there is abnormal noise.
Cleaning of all electrical components	Check the cleanliness of all electrical components. Under normal circumstances, remove dust for all electrical components every year.
Control cabinet fan filter	Check the cleanliness of the filter of the control cabinet fan, and replace the filter once a year under normal circumstances.
Concentration of iron powder worn by each joint of robot	Check the wear iron powder concentration of each joint once a year.

6. Inspection and maintenance every 1.5 years

Check Item	Check Measure
Battery inspection	Check whether the battery is normal. Under normal circumstances, replace the battery once every 1.5 years. If the battery capacity is low, replace the battery in time.

Due to the risk of screw thread stripping, inspect the torque wrench and hexagon screw-driver bit for wear before use and replace if necessary.

6.3 Applying Lubricating Grease

Measure the concentration of iron powder in the reducer grease every 5,000 hours or every 1 year of operation (2,500 hours or every six months for loading and unloading application).

If the standard concentration value is exceeded, replace the grease or reducer. Contact the service center of Inovance.

Note

Lubricating grease of reducers of J1 to J4 of the IR-R20-170S-INT and IR-R10-200S-INT robots must be replaced. The J5 and J6 use a harmonic reducer and thus lubricating grease replacement is not required.

1. Only apply the original lubricating grease to the reducer.
2. Under the extreme conditions (duty cycle, speed, and load), the reducer grease needs to be replaced regularly.
3. Replacing grease by non-professional personnel is not allowed. If maintenance is needed, contact Inovance after-sales maintenance personnel.

Note

If the grease gets into your eyes, mouth, or on your skin, follow the instructions below.

1. If the grease gets into your eyes, flush them thoroughly with clean water, and then see a doctor immediately.
2. If the grease gets into your mouth, wash out your mouth with water thoroughly; if swallowed, see a doctor immediately.
3. If the grease gets on your skin, wash the area thoroughly with soap and water.

6.4 Oil Leakage Inspection

6.4.1 Daily Inspection

Check the following items each day when the system is running.

Inspection Item	Content
Oil leakage	Check for oil leakage at each joint. Wipe off any oil leaked.

6.4.2 Oil Leakage Inspection Parts

- Insert a piece of cloth into the gap of each joint. Check for oil leakage at each joint. Wipe off any oil leaked.
- Depending on operating conditions and the surrounding environment, a small amount of oil may seep out from the outer side of the oil seal lip (minor adhesion). When this oil accumulates into droplets, it may drip under certain movements. Before operating the robot, wipe off any oil residue beneath the oil seal.
- In case of great leakage, change another grease or oil.
- When opening the lubrication grease supply/drain port, take care to prevent grease splashing.
- If the operating temperature becomes excessively high, internal pressure in the grease chamber may rise. In such cases, after operation, open the oil filler port once to restore normal internal pressure.

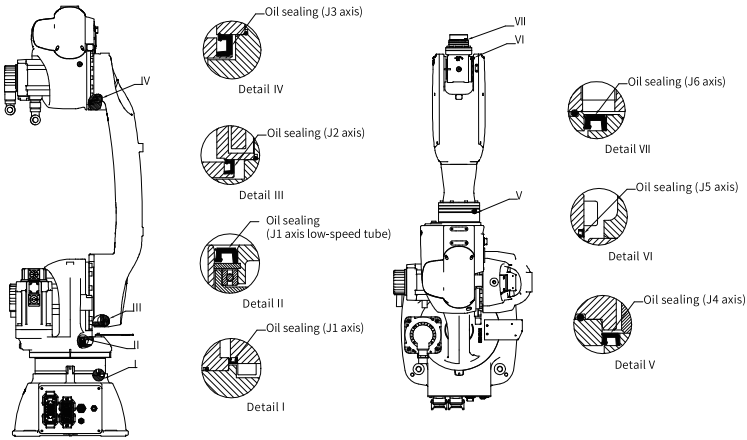


Figure 6-1 Oil leakage inspection parts

- When opening the oil filling port, lubricating grease may be sprayed out at high temperature. Prepare plastic bags in advance and lay them under the oil filling port.
- Wear heat-resistant gloves, protective goggles, masks, and protective clothing as needed.
- If oil leakage persists after frequent wiping, see *"6.4.3 Lubricating Grease Leakage and Solution" on page 58* for handling.
- When reinstalling the screw plug into the oil filler port, check whether the tightening torque meets the standard torque value. The torque of the M10 screw plug is 7 N·m.

6.4.3 Lubricating Grease Leakage and Solution

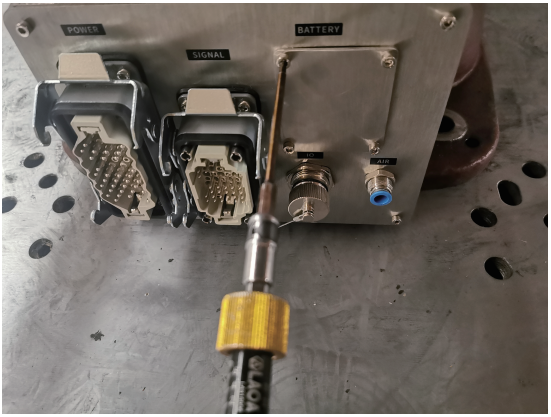
Problem	Problem Description	Cause Analysis	Solution
Oil seepage or leakage at gearbox	Oil leakage at joints	The robot has been used for an extended period, causing aging of sealing rubber parts.	Replace the sealing rubber parts or O-rings.
		Improper disassembly/ reassembly operations may damage sealing rubber parts or O-rings.	
		Oil seal damage may be caused by foreign particles (such as dust) scratching the oil seal lip.	If the oil seal at the reducer is damaged (based on leakage position), replace the reducer. If the motor oil seal is damaged, replace the motor.
		Gaps exist on sealing surfaces.	Re-tighten mounting screws to ensure a tight fit between surfaces.
		Threadlocker LT 5699 on motor or reducer mounting surfaces becomes invalid.	Re-apply the threadlocker LT 5699.
		Combined sealing washers matching hexagon socket screw plugs at oil filling and draining ports of joints function improperly.	Replace with new hexagon socket screw plugs and matching combined sealing washers.
		Cracks on castings or oil chamber damage occurs due to collisions or other impacts.	Replace with new parts.

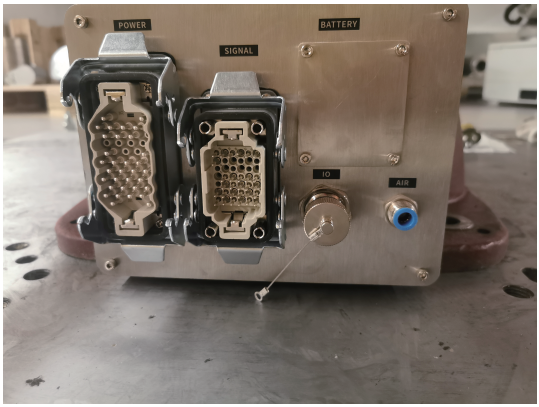
6.5 Component Replacement

6.5.1 Battery (Lithium Battery) Replacement

- Do not perform equipment maintenance or servicing while power is on. Failure to comply may result in an electric shock.
- When disposing of waste batteries, consult a professional disposal company or follow relevant local regulations.
- Use lithium batteries correctly. Incorrect usage may result in overheating, leakage, explosion, or fire, causing severe risks to personal and property safety.
  - Charging lithium batteries is prohibited.
  - Applying pressure to deform lithium batteries is prohibited.
  - Disassembling lithium batteries is prohibited.
  - Short-circuiting or incorrect connections to lithium batteries are prohibited.
  - Heating lithium batteries is prohibited.
  - Disposing of lithium batteries in fire is prohibited.
  - Welding battery terminals is prohibited.
  - Forcing discharge of lithium batteries is prohibited.

To prevent loss of zero points, after removing the back cover of the robot body, first insert a new battery into the white 2P connector. Secure the new battery in the wiring compartment, and then remove the used battery. The replacement steps are as follows:

Step	Diagram
1. Turn off all power supplies and unplug the heavy-duty connector from the robot base.	
2. Loosen four M4 screws.	

Step	Diagram
3. Connect the new battery to the white 2-pin battery connector, remove the old battery, and then fix the new battery.	
4. Fix the base mounting plate and the power cable connector.	

Note

Failure to comply with the procedure described above may cause loss of zero points. *"6.6.2 Procedure of Zero Point Adjustment" on page 62*

6.6 Zero Point Adjustment

6.6.1 Overview of Zero Point Adjustment

The zero point is the reference point and base point for the robot. When robot parts (such as the motor, reducer, synchronous belt, and cables) are replaced, the zero point stored on

the motor side may deviate from that stored on the controller side, which leads to failure of correct positioning. Therefore, after the parts are replaced, zero point adjustment is required.

Note

After zero point adjustment, the absolute accuracy of the robot may deviate from the default absolute accuracy at delivery.

- Install a safety fence for the system to prevent people from entering the motion range of the system. Failure to comply may result in severe safety issues.
- Before operation, ensure that there is no person within the safety fence. Do not enter the motion range during system running. Failure to comply may result in severe safety issues.
- Operating the robot system in teach mode can ensure the safety of the operator to a certain extent, although the motion is limited (low speed and low power). However, severe safety issues may also occur when the robot performs unexpected actions.

6.6.2 Procedure of Zero Point Adjustment

Both the PC-based teach pendant and the hand-held teach pendant provide an operation interface for zero point adjustment. The following is an explanation using the PC-based teach pendant, with similar operations for the hand-held teach pendant.

When performing zero point adjustment using the teach pendant, adjust J4 and J3 at the same time.

1. Select a role and log in to the system.
   a. On the main screen of the teach pendant, click the "User Settings" shortcut key to open the "User Settings" screen.
   b. Enter the password in the password input box and click "Log In".

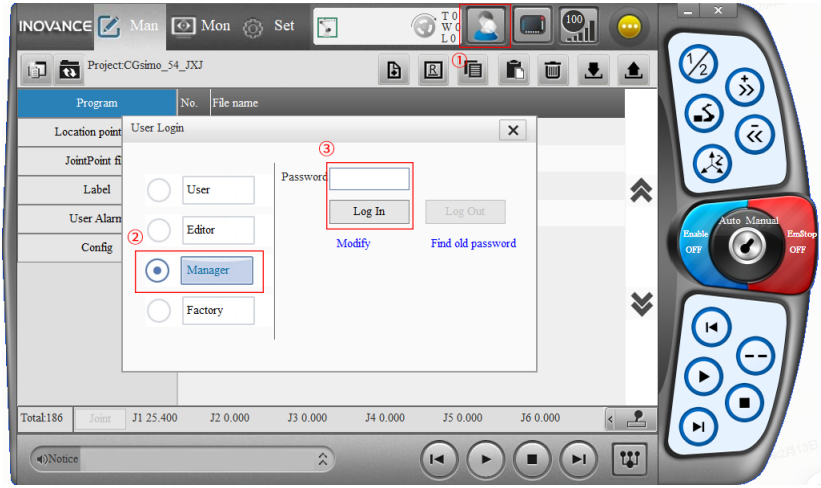


Figure 6-2 Screen of IRTP80 series tech pendant

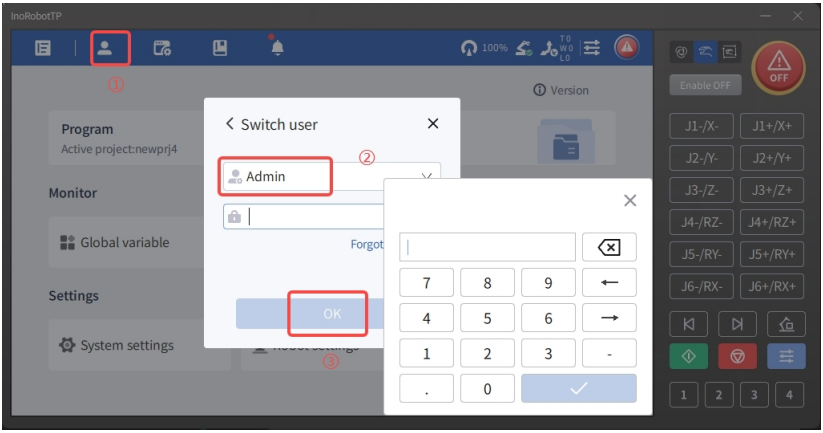


Figure 6-3 Screen of IRTP200 series tech pendant

2. Switch to the ZeroPoint setting screen.
   On the main screen of the teach pendant, choose "Set" > "BasePos" > "ZeroPoint" to open the "ZeroPoint" screen.

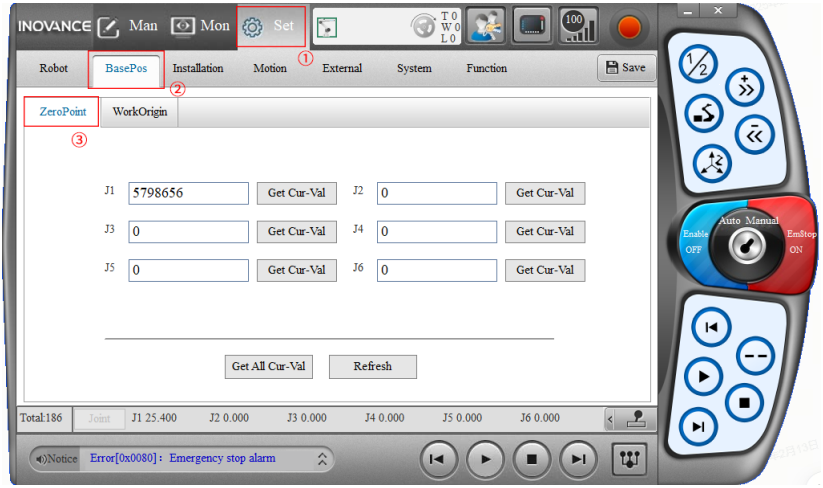


Figure 6-4 Screen of IRTP80 series tech pendant

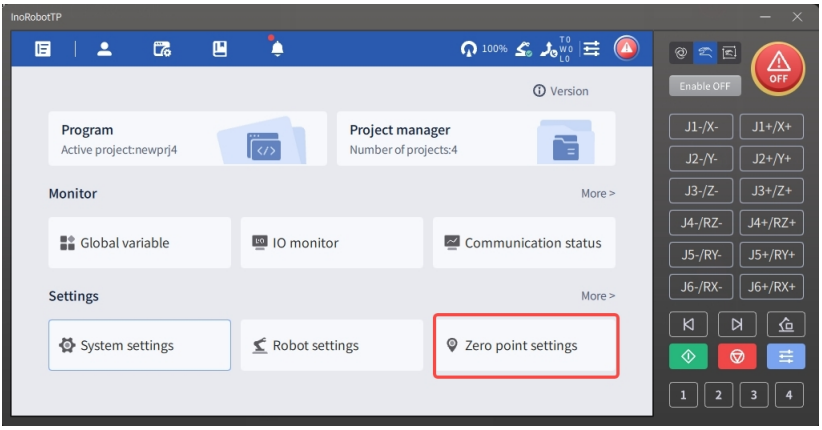


Figure 6-5 Screen of IRTP200 series tech pendant

3. Manually move each axis of the robot to the corresponding zero point.
   a. Move the robot axes to their respective zero points on the hand-held or PC-based teach pendant. For details, see Teach Pendant User Guide.
   b. If disabled, manually push the robot to reach the zero point.

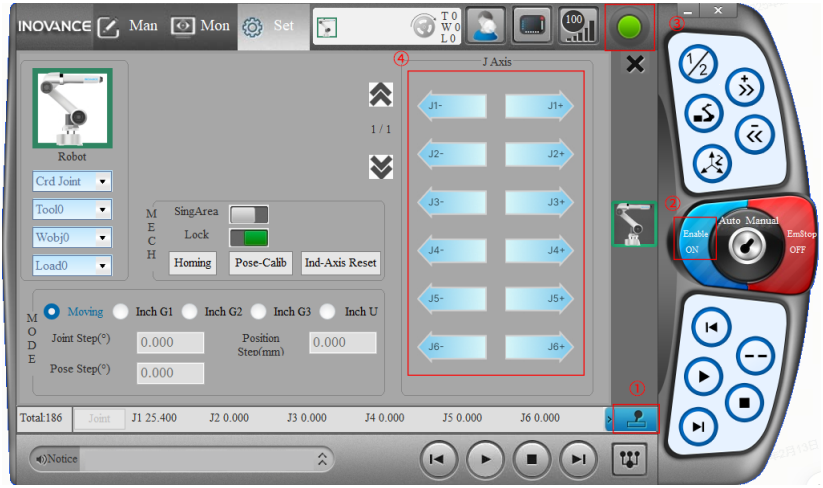


Figure 6-6 Screen of IRTP80 series tech pendant

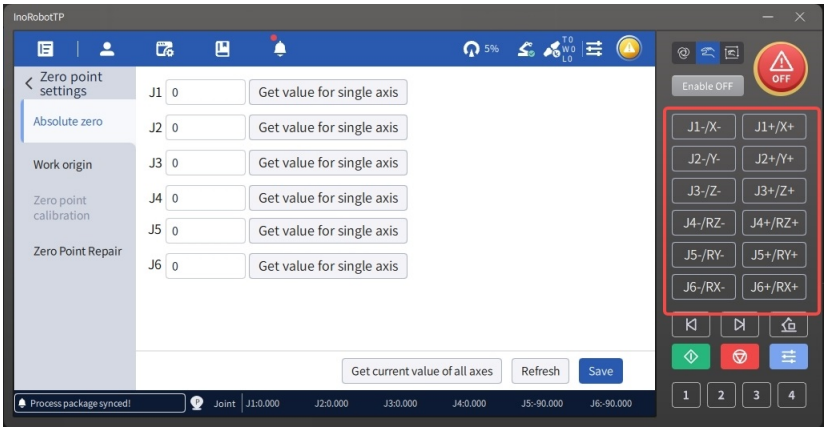


Figure 6-7 Screen of IRTP200 series tech pendant

4. Switch to the emergency stop state.
   a. Click the virtual emergency stop button on the PC-based teach pendant, or press the red "EmStop" button on the hand-held teach pendant.
   b. The status indicator in the upper right corner of the PC-based teach pendant (or the display of the hand-held teach pendant) indicates the emergency stop state (red).

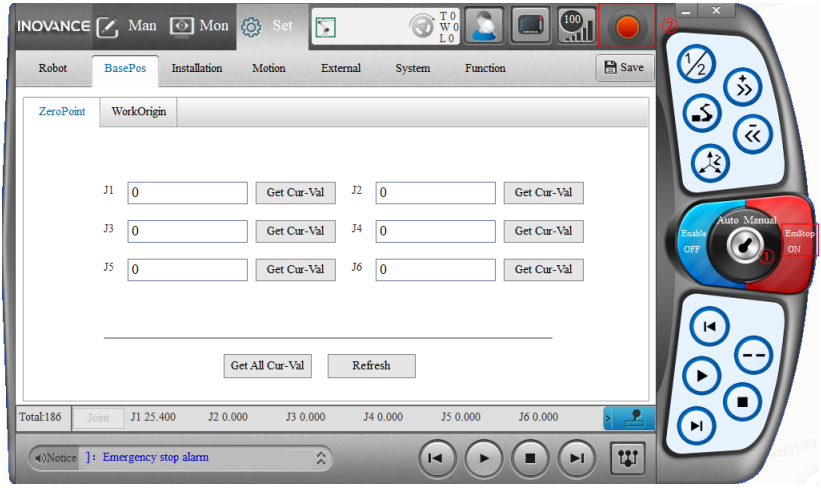


Figure 6-8 Screen of IRTP80 series tech pendant

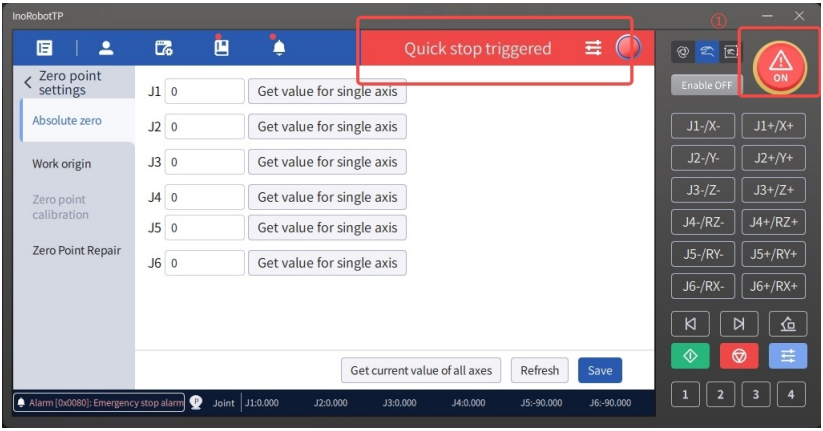


Figure 6-9 Screen of IRTP200 series tech pendant

5. Obtain and save the zero point information.
   a. Click the "Get Cur" button when the robot moves to the zero point position to obtain the encoder pulses at the zero point position.
   b. Click "Save" to complete zero point adjustment.

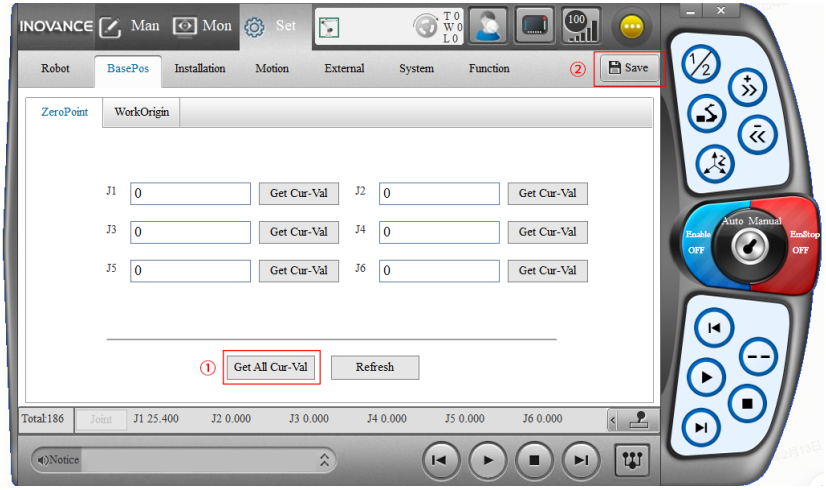


Figure 6-10 Screen of IRTP80 series tech pendant

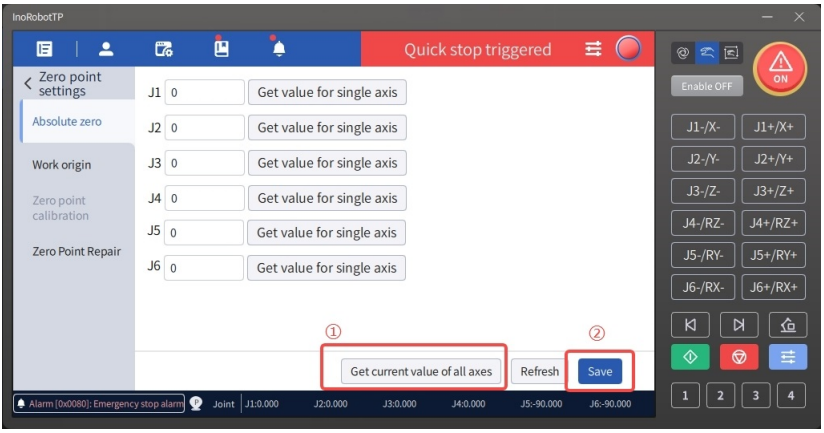
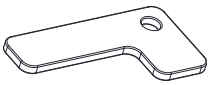


Figure 6-11 Screen of IRTP200 series tech pendant

6.6.3 Zero Point Position of Each Joint

- **Calibration tool**
  The calibration tool is used to calibrate the rotary axes of the robot manually.



- Calibration of axes J1 to J6

During calibration, control the robot to move at the lowest speed by using the teach pendant. Adjust J1 to J6 until the calibration tool fits snugly in the reference slot, as shown in the figure below.

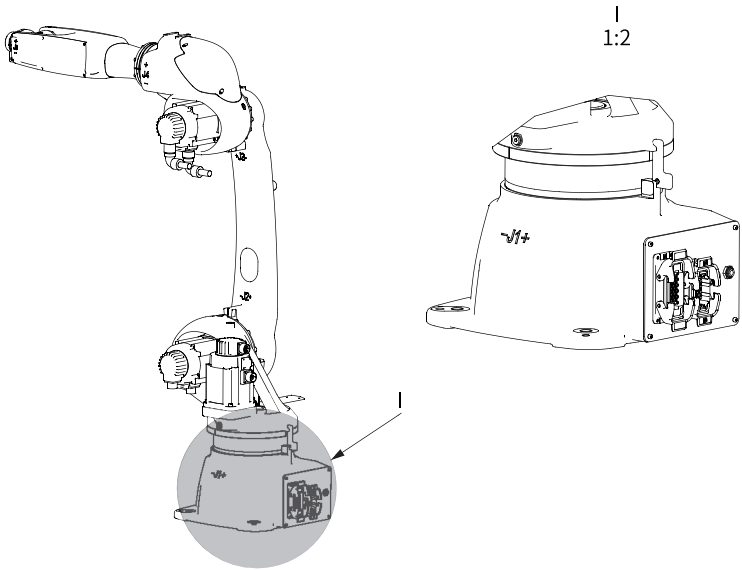


Figure 6-12 Calibration illustration of axes J1 to J6

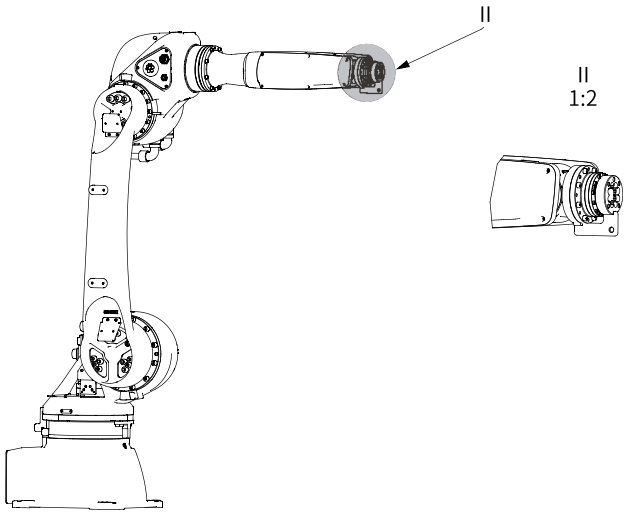


Figure 6-13 Calibration illustration of axes J1 to J6

6.7 Options

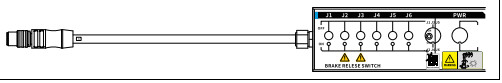
6.7.1 Options

Option	Description	Specifications	Code
Base I/O cable	Connecting the body of the IR-R20 series 6-axis robot to an electric cabinet	5 m	1504B978
90° I/O aviation connector on forearm	Connecting a cable to the aviation connector on the forearm of the IR-R20 series 6-axis robot	19 pins	15050930
Zero point calibration tool	Used to calibrate the J1 to J6 of the robot manually	-	01660015

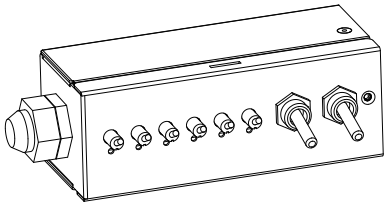
6.7.2 Hand-Held Brake Release Box

In the event of an abnormal robot operation, such as a collision that causes a jam, which cannot be improved using the teach pendant, you can alleviate the jam using the brake release switch provided that the control cabinet is powered on.

The brake release switch is optional. The following table describes the brake release switch.

Order No.	Accessory Description
01660004	Control cabinet option - IRCB-KEY1-6 axis brake release switch box
Product appearance	

Appearance of the brake release switch



Connect and use the brake release switch as follows:

1. Connect the cable of the brake release switch box to the brake release signal interface of the robot body, as shown in the figure below.

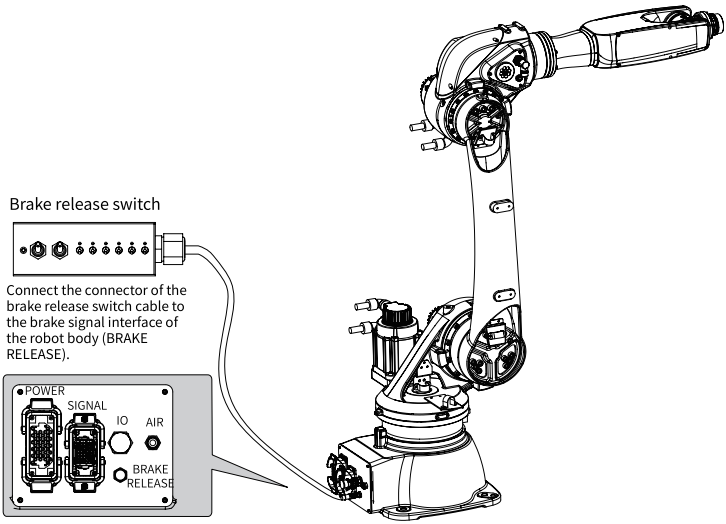


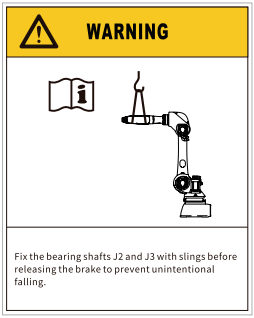
Figure 6-14 Connection of the brake release switch

2. Toggle the PWR switch to ON, then toggle the switch of the corresponding axis (such as J1) to ON, and keep pressing to release the brake of the corresponding axis.
3. Manually rotate the robot arm to move it away from he collision object.

Caution

For system safety, perform brake release operation on a single axis.

The J2 and J3 axes are gravity bearing axes. Secure them with a sling before releasing the brake to prevent falling and injury, as shown in the figure below.



4. After the brake release operation is completed, disconnect the brake release switch box.

7 Certification and Standard Compliance

Third-party certification

Certification mark	Certification	Description	Instruction
	CE	This product complies with Low Voltage Directive (LVD), Machinery Directive (MD), Electromagnetic Compatibility (EMC), and Restriction of Hazardous Substances (RoHS) directives and carries the CE mark.	• EN 60204-1:2018 • EN ISO 10218-1:2011 • EN ISO 12100:2010 • EN 61000-6-2:2019 • EN 61000-6-4:2019 • ISO 13849-1:2023, • EN ISO 13849-1:2015
	SGS-TUV Saar	This product is certified by SGS-TUV Saar for functional safety.	
	cSGSus	This product is certified by SGS North America of Nationally Recognized Test Laboratory (NRTL).	• UL 1740, 4th Ed., Jan. 26, 2018 • NFPA 79 2021 Edition, Dated Oct. 25, 2020 • CAN/CSA Z434-14 (R2019), Reaffirmed 2019
	FCC	This product has passed the Federal Communications Commission (FCC) EMC testing and carries the FCC mark.	-
	KCs	This product is verified by Korea Occupational Safety and Health Agency (KOSHA) in terms of special equipment, labor protection supplies, and guard devices and carries the KCs mark.	-

Note

The preceding certification standards only apply to standard models of products. For specific certification information about customized products, consult Inovance technical personnel.

Declaration of conformity with EU directives

Inovance robots have been certified by the following directives and meet basic requirements of the CE-MD, CE-LVD, CE-EMC, and RoHS directives.

Machinery Directive (MD)	2006/42/EC
Low Voltage Directive (LVD)	2014/35/EU
Electromagnetic Compatibility Directive (EMC)	2014/30/EU
RoHS Directive (ROHS)	2011/65/EU Amended by (EU)2015/863
Applied Harmonized Standards	• EN 60204-1:2018 • EN ISO 10218-1:2011 • EN ISO 12100:2010 • EN 61000-6-2:2019 • EN 61000-6-4:2019 • ISO 13849-1:2023 • EN ISO 13849-1:2015

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