



IR-R10 Series 6-Axis Robot

Maintenance Guide



Industrial
Automation



Intelligent
Elevator



New Energy
Vehicle



Industrial
Robot



Rail
Transit



Data code PS00014038A03

Preface

Introduction

With a maximum arm length of 1422 mm and up to 10 kg load capacity, the IR-R10 series 6-axis robot of Inovance features compact structure, lightweight, and high flexibility, repeatability, speed, ease of use, and reliability. 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.

This guide describes the inspection and maintenance of IR-R10 series 6-axis robots.

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
IR-R10 Series 6-Axis Robot User Guide - Manipulator	PS00017836	Describes the basic information, installation, wiring, motion range, maintenance and more of the product.
IR-R10 Series 6-Axis Robot Maintenance Guide (hereinafter "this guide")	PS00014038	Describes the inspection and maintenance of IR-R10 series 6-axis robots and disassembly of the motor of each joints.

Revision History

Date	Version	Description
April 2025	A03	Addition - Added "3.5 Daily Control Cabinet Cable Inspection" on page 26. - Added " Oil Leakage Inspection" on page 26. - Added "3.10.4 Zero Calibration of Each Joint" on page 72. Modification - Updated "2.1 Model" on page 19. - Updated "2.2 Components" on page 20. - Updated "3.3 Inspection and Maintenance Items" on page 23. - Updated "3.4 Inspection and Maintenance of Screws" on page 24. - Updated " Maintenance and Replacement of Parts" on page 33. - Updated "3.10.2 Procedure of Zero Point Adjustment" on page 65. - Updated "3.10.3 Zero Point Position of Each Joint" on page 70. - Updated " Cable Replacement" on page 73. Deletion Deleted sections about inspection and replacement of lubricating grease.
August 2024	A02	Addition Added section "Cable Replacement". Modification Made minor corrections.
December 2023	A01	- Optimized the safety section. - Modified the guide name.
August 2023	A00	Initial release.

Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version in the following way:

- 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.

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1 Safety

1.1 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**WARNING**

- 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.

**CAUTION**

- 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



WARNING

- 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.



CAUTION

- 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.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation**DANGER**

- 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.

**WARNING**

- 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.

**CAUTION**

- 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 the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.

Wiring**DANGER**

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by 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.

**WARNING**

- 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.

**CAUTION**

- 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. Failure to comply may result in equipment malfunction.

Power-on**DANGER**

- 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 may result in electric shocks.

**WARNING**

- 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 accident.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injury.

Operation**DANGER**

- 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.

**WARNING**

- 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



DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by 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.



WARNING

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

Repair



DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by 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.



WARNING

- 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.

1.2 Special Precautions

Robot installers need to receive professional training from Inovance, dealers, and third-party organizations authorized by Inovance. Trainers must work in strict accordance with the following principles.

Precautions for handling, installation, and storage



Warning

1. When using a crane or forklift to handle a robot, never support the robot body by personnel.
 2. Do not lie on the robot or stand under the lifted robot during handling.
 3. Disconnect the controller power supply and main power supply before installation.
 4. During installation, set up conspicuous signs in mounting sections, and lock the main power supply switch or hang a conspicuous sign on it, to prevent accidental power-on by operators or other personnel. Failure to comply may cause unpredictable collisions, electric shocks, and other accidents.
 5. To start a robot, ensure that the robot is properly installed before powering on the controller, and adjust the robot to the specified posture. Disconnect the controller power supply and main power supply again, lock the power switch, and set up conspicuous signs before starting related operations.
-



Caution

- The robot body contains many precision parts. Therefore, prevent excessive shocks and vibrations when handling it.
 - Before using a crane or a forklift to handle a robot, clear all obstacles on the transportation route to ensure that the robot is safely transported to the designated installation position.
 - Use and store robots under the ambient conditions specified in the user guide. This product is intended to be used indoors. If the robot system is not used or stored according to the environment requirements, the robot lifetime may be reduced, the robot may be damaged, and even safety accidents may be caused.
 - The temperature of the work area ranges from 0°C to 45°C, with a maximum temperature variation of 1.5°C/min.
 - The relative humidity of the environment ranges from 5% RH to 95% RH, without condensation.
 - Keep away from direct sunlight and 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 gas, explosive gas, and corrosive liquid and gas.
 - Avoid places with great shock and vibration (vibration acceleration below 4.9 m/s²)
 - Keep away from sources of electrical interference.
 - Use the robot system within the range specified by the product specifications in the user guide. Never use the robot system with overlength, overlimit, overload, or overspeed. Failure to comply may reduce the robot lifetime, damage the robot, and even cause safety accidents.
-

Precautions for operation

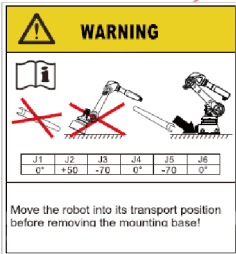
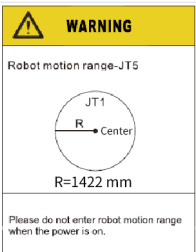
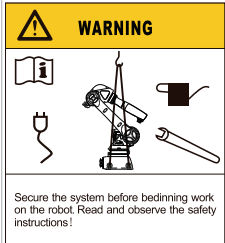
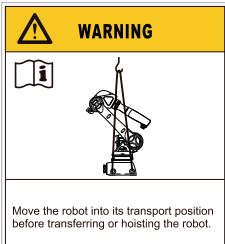


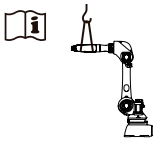
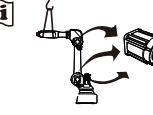
1. Before operation, operators should read the safety section of this user guide carefully. Failure to understand or follow the specifications may cause serious accidents and major losses.
 2. Before power-on, ensure that there are no operators in the motion range of the robot.
 3. Operators should not enter the motion range of the robot before powering off the robot, even if the robot is stationary since it may operate in a sudden.
 4. Operate the robot system from a low speed to a high speed gradually. Starting with a high speed will cause equipment damage and safety accidents.
 5. In case of robot action exceptions during robot system operation, press the emergency stop switch immediately. Never continue the operation upon exceptions. Failure to comply may cause unpredictable damage.
 6. Disconnect the plug for complete power-off. Be sure to use the power cable and plug that come with the system, and do not replace the power cable or directly connect the chassis to the factory power source.
 7. Power off all parts to be maintained and replaced, and disconnect the plug. Do not perform operations while the power is on. Failure to comply may result in electric shocks.
 8. In principle, the system should be operated by one operator. If multiple operators are needed, make sure that all operators can communicate effectively and take necessary safety measures.
-

1.3 Safety Signs

The following table describes the warning labels affixed on the robot body. Pay special attention that specific dangers exist around the positions where these labels are affixed. Comply with the cautions and warnings on the warning labels to operate and maintain the robot system safely. Do not damage or remove the warning labels.

The following table lists the warning labels.

Safety Signs	Safety Instructions
 Move the robot into its transport position before removing the mounting base!	Fasten the robot first before removing the fastening screws of the base to prevent the robot from tilting forward due to its center of gravity, which may cause equipment damage or personal injury.
 Please do not enter robot motion range when the power is on.	When the robot is powered on, it is prohibited to enter its working radius area to prevent personal injury.
 Secure the system before beginning work on the robot. Read and observe the safety instructions!	Before starting work on the robot, read and observe the safety instructions to ensure the safety of the system.
 Move the robot into its transport position before transferring or hoisting the robot.	When lifting the robot with the eye bolts, use slings that prevent the robot from rotating and tilting.

WARNING  Fix the bearing shafts J2 and J3 with slings before releasing the brake to prevent unintentional falling.	The J2 and J3 axes are gravity bearing axes. Secure them with a sling before releasing the brake to prevent falling and injury.
WARNING  Before removing the motor, secure robot axis to prevent it from turning!	Before removing the motor, secure the robot axes to prevent them from rotating.
WARNING Secure the robot mounting bolts and tool mounting bolts before turning on the power.	Secure the robot mounting bolts and tool mounting bolts before turning on the power.
DO NOT STEP ON !	No stepping!
	Do not touch the energized parts during power-on. Failure to comply may result in electric shocks.

2 Product Information

2.1 Model

Note

- The maintenance instructions in this guide refer to IR-R10 series models for Chinese and international markets.
- The product information in this guide is the information of standard models in a standard environment. For information about non-standard models or models in clean environment, contact the provider.

Models for Chinese market

IR-R10-140S5-B1

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Product family INOVANCE Robot	④ Arm length 140: 1422 mm	⑦ Controller Identity B: IRCB500 high-protection series drive-control integrated ARM-based control cabinet (IP54) E: IRCB100 high-protection series split type control cabinet
② Series S: SCARA robot R: 6-axis robot TS: Ceiling-mounted SCARA robot	⑤ Installation environment S: Standard	⑧ Manipulator Platform Identity 0: 1.0 series 1: With gyroscope 2: 2.0 series
③ Load 10: 10 kg	⑥ Cable length 0: No drag chain cable 3: 3 m standard cable 5: 5 m standard cable	-

Models for international markets

IR-R10-140S - INT

① ② ③ ④ ⑤ ⑥

① Product family INOVANCE Robot	③ Load 10: 10 kg	⑤ Installation environment S: Standard
② Series S: SCARA robot R: 6-axis robot TS: Ceiling-mounted SCARA robot	④ Arm length 140: 1422 mm	⑥ Version INT: International (With functional safety)

2.2 Components



Figure 2-1 Product appearance and components

Table 2-1 Components

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

3 Inspection and Maintenance

3.1 Maintenance Precautions

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



Danger

- Equipment installation, wiring, inspection, maintenance, or parts replacement must be performed by professionals.
 - Do not maintain the equipment after power-on. Failure to comply will result in an electric shock.
 - Do not remove any parts that are not covered in this guide. Follow the maintenance procedure strictly as 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 function will not work properly in emergency cases, causing serious injury or damage.
-



Warning

- Submit the repair request according to the warranty agreement.
 - Perform daily and periodic inspection and maintenance for the equipment according to maintenance requirements and keep a maintenance record.
 - 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 according to the replacement guide.
 - Prevent foreign objects from entering the equipment and terminals during maintenance.
 - Open the equipment cover only when repair and maintenance.
 - After the equipment is replaced, perform wiring inspection and parameter settings again.
-

3.2 Schedule for Inspection and Maintenance

Inspection points are divided into five stages: 1-month, 3-month, 6-month, 12-month, and 36-month. The inspection points are added every stage. If the robot is operated for 250 hours or longer per month, the inspection points must be added every 250 hours, 750 hours, 1500 hours, and 3000 hours operation.

Check Item	Check Item					
	Daily Inspection	Monthly Inspection	3 months Inspection	6 months Inspection	12 months inspection	Overhaul (Replacement)
1 month (250 h)	✓	✓	-	-	-	-
2 months (500 h)	✓	✓	-	-	-	-
3 months (750 h)	✓	✓	✓	-	-	-
4 months (1000 h)	✓	✓	-	-	-	-
5 months (1250 h)	✓	✓	-	-	-	-
6 months (1500 h)	✓	✓	✓	✓	-	-
7 months (1750 h)	✓	✓	-	-	-	-
8 months (2000 h)	✓	✓	-	-	-	-
9 months (2250 h)	✓	✓	✓	-	-	-
10 months (2500 h)	✓	✓	-	-	-	-
11 months (2750 h)	✓	✓	-	-	-	-
12 months (3000 h)	✓	✓	✓	✓	✓	-
...	-	-	-	-	-	-
36 months (9000 h)	✓	✓	✓	✓	✓	✓
...	-	-	-	-	-	-

3.3 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.

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.
Iron powder concentration of lubricating grease on each axis of robot	Check the Iron powder concentration of lubricating grease on each joint.

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.



Caution

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.

3.4 Inspection and Maintenance of Screws

Use hexagon screws (hereinafter referred to as screws) in places where mechanical strength is required. When assembling the robot, tighten the screws according to the tightening torque shown in the following table.

Table 3-1 Screw diagnosis part

No.	Diagnosis Part	No.	Diagnosis Part
1	Robot base mounting screws	6	J5 axis motor mounting screws
2	J1 axis motor mounting screws	7	J6 axis motor mounting screws
3	J2 axis motor mounting screws	8	Wrist parts mounting screws
4	J3 axis motor mounting screws	9	End load mounting screws
5	J4 axis motor mounting screws	-	-

When it is necessary to refasten these screws in some procedures in this guide (except special cases as noted), use a torque wrench so that the screws are fastened with the appropriate tightening torques as shown below.

Screw	Tightening torque
M2.5	1.0 N·m
M3	2.0 N·m
M4	4.0 N·m
M5	8.0 N·m
M6	13.0 N·m
M8	35.0 N·m
M10	70.0 N·m
M12	120.0 N·m
M14	210.0 N·m

Tighten the screws in the sequence shown below: The screws aligned on a circumference should be fastened in a crisscross pattern as shown in the figure below.

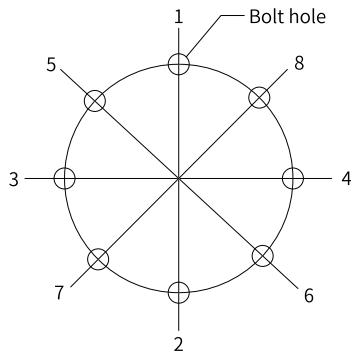
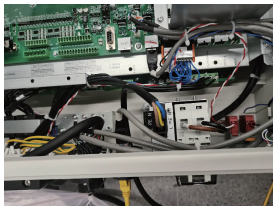


Figure 3-1 Tightening method

Do not fasten all screws securely at one time. Do not tighten the screw to the maximum torque value at a time. Tighten the screws slightly with a hexagonal wrench as shown in the preceding figure. Then tighten the screws to the torque values in the table above with a torque wrench.

3.5 Daily Control Cabinet Cable Inspection

The following table describes the inspection of control cabinet cables:

No.	Check Item	Diagram/Illustration	Cycle
①	Check that the power cable and encoder cable of the robot are properly connected to the control cabinet.		Daily
②	Check that the teach pendant cable is properly connected to the control cabinet.		Daily
③	Check that the external power cable is properly connected to the control cabinet.		Daily
④	Wipe off any acid, alkali, oil, or corrosive liquids with dry dust-free cloth or scouring pad.	All cables	Monthly

3.6 Oil Leakage Inspection

3.6.1 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.

3.6.2 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.

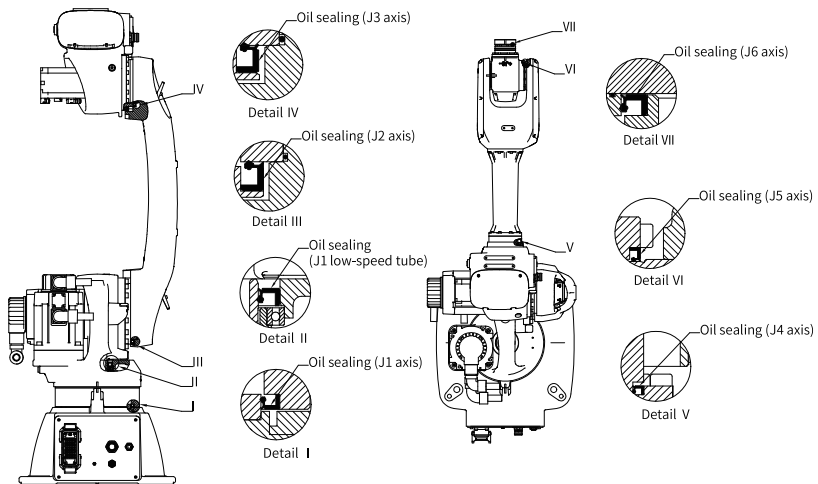


Figure 3-2 Oil leakage inspection parts



Caution

- 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 ["3.6.3 Lubricating Grease Leakage and Solution" on page 28](#) 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.

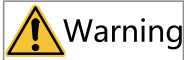
3.6.3 Lubricating Grease Leakage and Solution

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-shaped sealing rings.
		Improper disassembly/reassembly operations may damage sealing rubber parts or O-shaped sealing 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.

3.7 Maintenance of Robot Covers

3.7.1 Robot Enclosure Inspection and Tool Preparation

This section describes removal and installation steps of the enclosures necessary for maintenance.



1. Power off the robot system by removing the power plug.
2. Before performing any replacement procedure, turn off the robot system and related equipment, and then disconnect the power plug from the power source. Operating with the power ON may cause electric shock or malfunction of the robot system.
3. Prevent foreign objects from entering the robot, connector and pins. Turning on the power when any foreign substances exist may cause electric shock or malfunction.

The tools required are described in the following table.

Name		Quantity
Tool	Torque wrench	1
	M3 and M4 hexagon screwdriver bits	1
Materials used	LT243 threadlocker	1

The following figure shows the robot enclosures for maintenance.

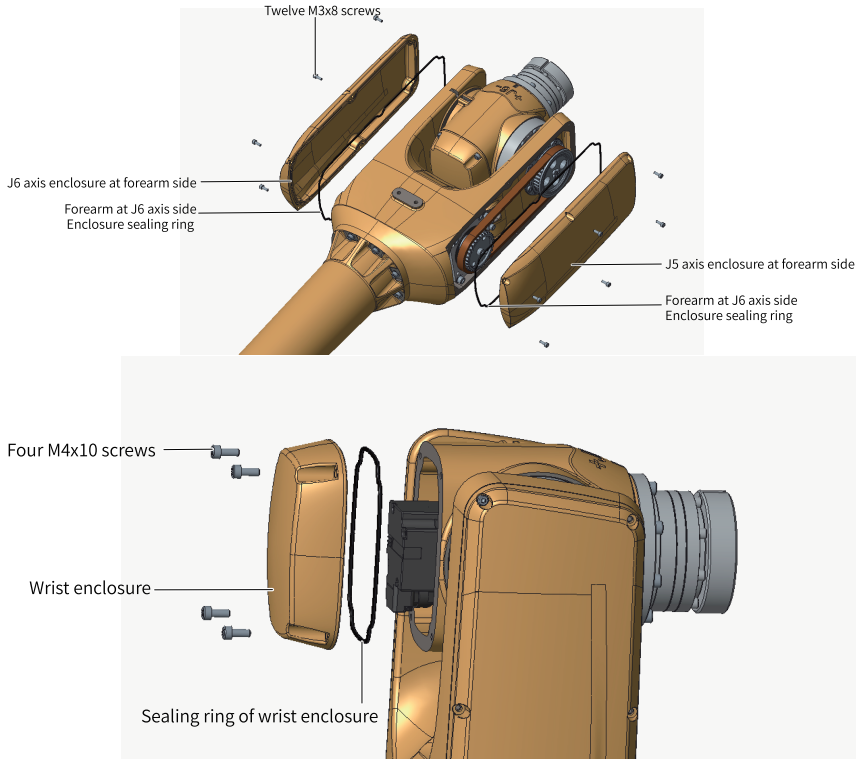


Figure 3-3 Robot enclosures for maintenance

3.7.2 J4 Elbow Cover

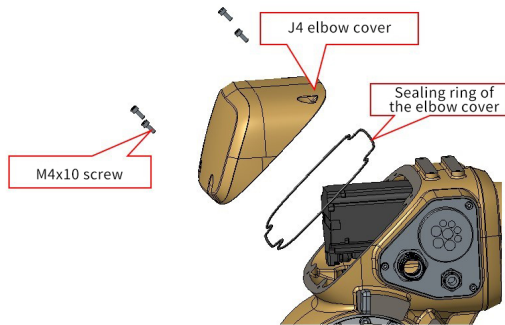


Caution

1. Do not remove the enclosure forcibly. Failure to comply may result in damage, break, and poor contact of the cable, causing electric shock or improper function of the robot system.
 2. When installing the enclosure, be careful not to get the cables caught in it or bend them forcibly to push into the enclosure. Failure to comply may result in damage, break, and poor contact of the cable, causing electric shock or improper function of the robot system. When routing the cables, check the cable locations after removing the enclosure. Be sure to place the cables back to their original locations.
 3. Ensure that the sealing ring is installed properly when installing the enclosure. Do not damage the gasket during installation to ensure airtightness of the robot.
-

To remove the J4 elbow cover: Remove the four M4×10 hexagon screws from the cover and then remove the cover.

To install the J4 elbow cover: Install the sealing ring of the J4 elbow cover to the J4 elbow cover, then secure the J4 elbow cover to the robot elbow section using four hexagon screws. Take care not to crush or damage the internal cables and sealing ring. The tightening torque for the cover hexagon screws is 2 N·m.



3.7.3 J5 Input Side Cover

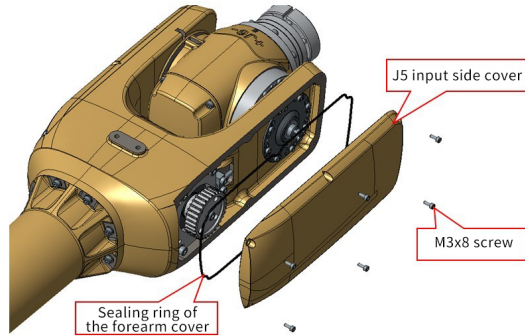


Caution

1. Do not remove the enclosure forcibly. Failure to comply may result in damage, break, and poor contact of the cable, causing electric shock or improper function of the robot system.
2. When installing the enclosure, be careful not to get the cables caught in it or bend them forcibly to push into the enclosure. Failure to comply may result in damage, break, and poor contact of the cable, causing electric shock or improper function of the robot system. When routing the cables, check the cable locations after removing the enclosure. Be sure to place the cables back to their original locations.
3. Ensure that the sealing ring is installed properly when installing the enclosure. Do not damage the gasket during installation to ensure airtightness of the robot.

To remove the J5 input side cover: Remove the six hexagon screws from the cover and then remove the J5 input side cover.

To install the J5 input side cover: Install the sealing ring of the forearm cover to the J5 input side cover, and then install the J5 input side cover to the wrist of the robot with six hexagon screws. Be careful not to squeeze and damage the internal cable and sealing ring. The tightening torque of the cover hexagon screws is 2 N · m.



3.7.4 J6 Input Side Cover

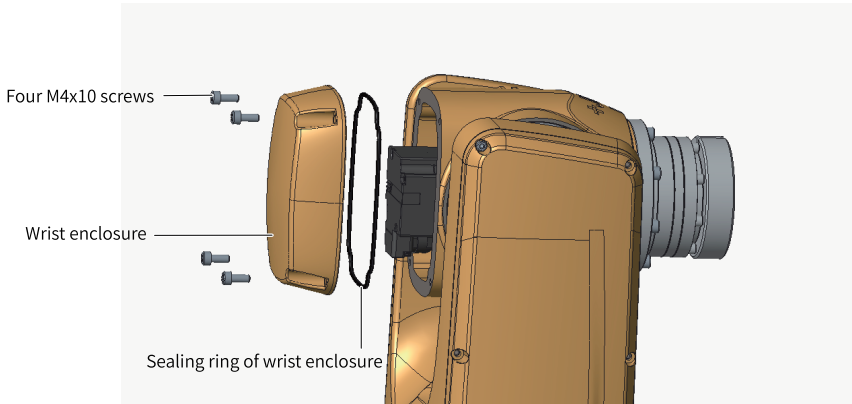


1. Do not remove the enclosure forcibly. Failure to comply may result in damage, break, and poor contact of the cable, causing electric shock or improper function of the robot system.
2. When installing the enclosure, be careful not to get the cables caught in it or bend them forcibly to push into the enclosure. Failure to comply may result in damage, break, and poor contact of the cable, causing electric shock or improper function of the robot system. When routing the cables, check the cable locations after removing the enclosure. Be sure to place the cables back to their original locations.
3. Ensure that the sealing ring is installed properly when installing the enclosure. Do not damage the gasket during installation to ensure airtightness of the robot.

To remove the J6 input side cover: Remove the four hexagon screws from the cover and then remove the J6 input side cover.

To install the J6 input side cover: Install the sealing ring of the forearm cover to the J6 input side cover, and then install the J6 input side cover to the wrist of the robot with four

hexagon screws. Be careful not to squeeze and damage the internal cable and sealing ring. The tightening torque of the cover hexagon screws is 2 N·m.



3.8 Maintenance and Replacement of Parts

3.8.1 J1 Axis



1. Power off the robot system by removing the power plug.
2. Before performing any replacement procedure, turn off the robot system and related equipment, and then disconnect the power plug from the power source. Operating with the power ON may cause electric shock or malfunction of the robot system.
3. Always connect the AC power cable to the power plug. Do not connect it directly to the factory power supply.

**Caution**

1. Do not apply excessive shock to the motor shaft during replacement. Failure to comply may shorten the service life or damage the motor or encoder.
 2. Do not disassemble the motor and encoder. If disassembled, problems such as misalignment may occur, making the robot inoperable.
 3. After parts such as motors, reducer, etc. have been replaced, the robot cannot operate properly because a mismatch exists between the zero point stored in each motor and its corresponding zero point stored in the controller. After replacing the parts, it is necessary to match these zero points.
-

Replacing Motor of the J1 Axis

Name		Quantity	Remarks
Maintenance part	J1 motor	1	-
	O-shaped sealing ring of the J1 axis	1	-
Materials used	LT5699 seal gum	1	-
Tool	Hexagon wrench	1	-
	100-N·m torque wrench	1	Used for tightening torque control
	M8 and M6 screwdrivers	1	-
	WL-270s pipe pliers	1	Used for removing the encoder cable
	Monkey spanner	1	-
	Puller	1	Used for removing the motor gear
	Oil-absorbing sheet or dust-free cloth	Several	Clean

● Removing the J1 motor:

1. Switch off the control switch on the controller and disconnect the heavy-duty cables from the robot.
2. Use the aviation plug disassembly tooling to remove the motor power cable and encoder cable of the J1 axis.

**Caution**

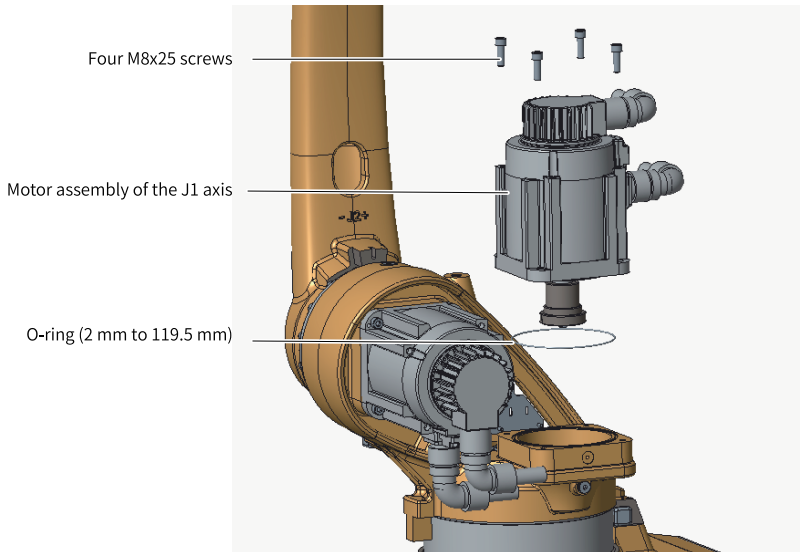
Protect the encoder cable and power cable from grease pollution.

3. Remove the four M8x25 hexagon screws securing the J1 axis motor assembly.

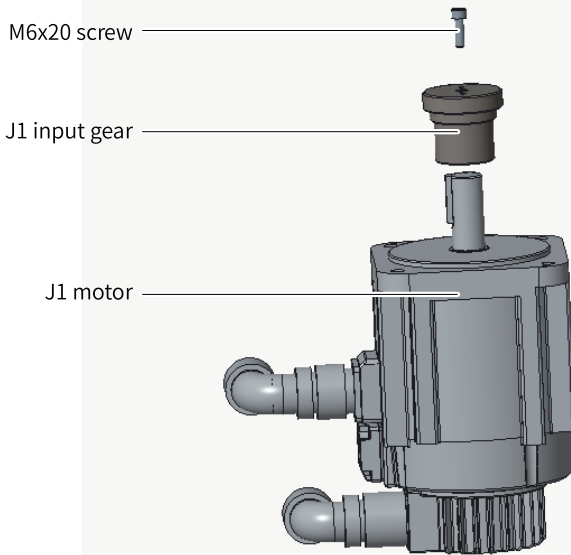


Prevent the input shaft of the reducer from colliding with the inside of the reducer when removing the motor.

4. Remove the J1 axis motor assembly and the O-shaped sealing ring.

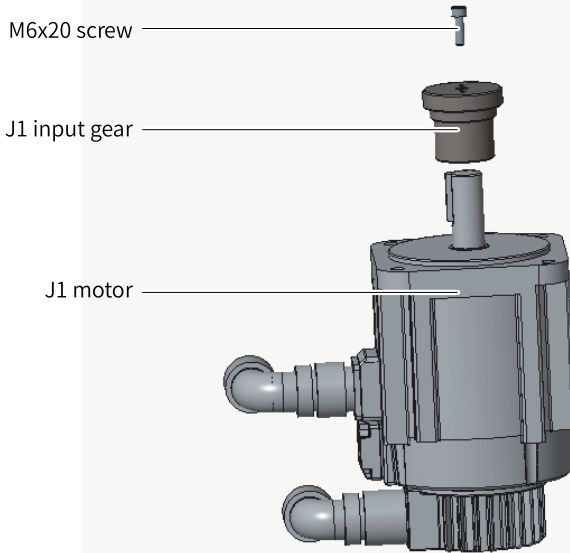


5. Remove the M6x20 hexagon screws securing the J1 axis driving gear shaft.
6. Remove the J1 axis driving gear shaft.

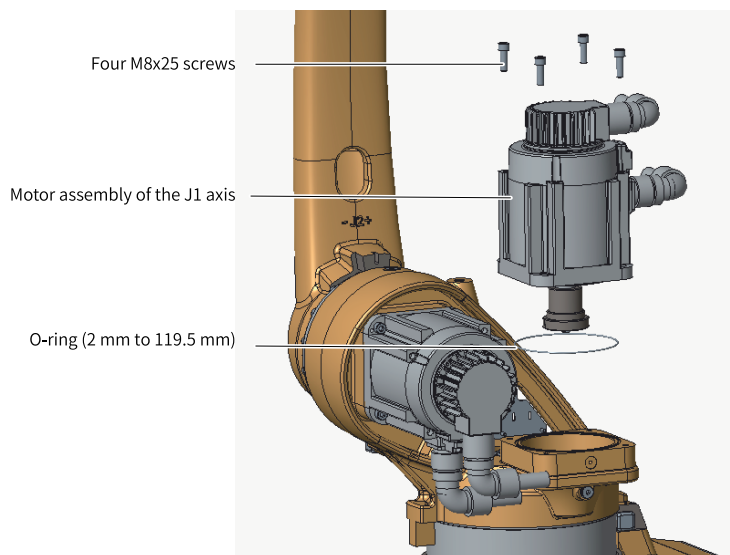


- **Installing the J1 motor:**

1. Check the J1 motor for any damage and clean the grease from the motor shaft using anhydrous ethanol.
2. Install the J1 axis driving gear shaft onto the output shaft of the J1 motor, ensuring no noticeable sticking points during the engagement between the output shaft and the gear shaft.
3. Remove residual threadlocker from the screws and reapply LT243 threadlocker.
4. Secure the gear using one M6x20 hexagon screw, with a tightening torque of 5 N·m and then 15 N·m.



5. Clean residual seal gum on the mounting surface of the J1 motor, and then apply LT5699 seal gum evenly on the mounting surface.
6. Install the O-shaped sealing ring of J1 motor to the swivel base.
7. Remove residual threadlocker from the screws and reapply LT243 threadlocker.
8. Fix the J1 axis motor assembly with four hexagon screws with a tightening torque of 10 N·m, 20 N·m, and 30 N·m successively.



9. Install the cables. For details, see ["3.11.3 Installing Cables Inside Robot" on page 83](#).
10. Power on the robot, reset the J1 axis encoder value, clear any alarms, and then capture the J1 axis zero point position.

Replacing the J1 axis reducer

For replacement of the reducer, please contact your local dealer.

Contact local dealers when you need to replace the reducer.

3.8.2 J2 Axis



1. Power off the robot system by removing the power plug.
 2. Before performing any replacement procedure, turn off the robot system and related equipment, and then disconnect the power plug from the power source. Operating with the power ON may cause electric shock or malfunction of the robot system.
 3. Always connect the AC power cable to the power plug. Do not connect it directly to the factory power supply.
-

**Caution**

1. Do not apply excessive shock to the motor shaft during replacement. Failure to comply may shorten the service life or damage the motor or encoder.
2. Do not disassemble the motor and encoder. If disassembled, problems such as misalignment may occur, making the robot inoperable.
3. After parts such as motors, reducer, etc. have been replaced, the robot cannot operate properly because a mismatch exists between the zero point stored in each motor and its corresponding zero point stored in the controller. After replacing the parts, it is necessary to match these zero points.

Replacing Motor of the J2 Axis

	Name	Quantity	Remarks
Maintenance part	J2 motor	1	-
	O-shaped sealing ring of the J2 axis	1	-
Materials used	LT5699 seal gum	1	-
Tool	Hexagon wrench	1	-
	100-N·m torque wrench	1	Used for tightening torque control
	M8 and M6 screwdrivers	1	-
	WL-270s pipe pliers	1	Used for removing the encoder cable
	Monkey spanner	1	-
	Puller	1	Used for removing the motor gear
	Oil-absorbing sheet or dust-free cloth	Several	Clean

- **Removing the J2 motor:**

1. Switch off the control switch on the controller and disconnect the heavy-duty cables from the robot.
2. Use the aviation plug disassembly tooling to remove the motor power cable and encoder cable of the J2 axis.

**Caution**

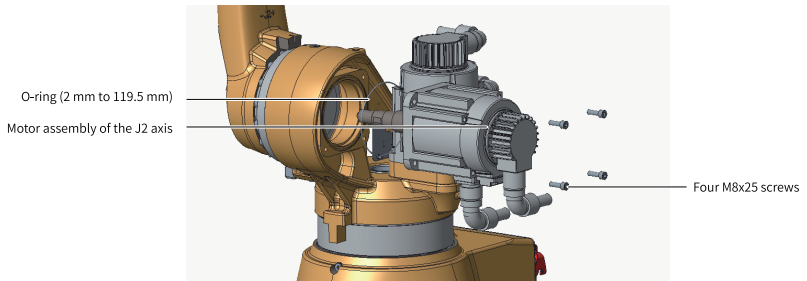
Protect the encoder cable and power cable from grease pollution.

3. Remove the four M8x25 hexagon screws securing the J2 axis motor assembly.



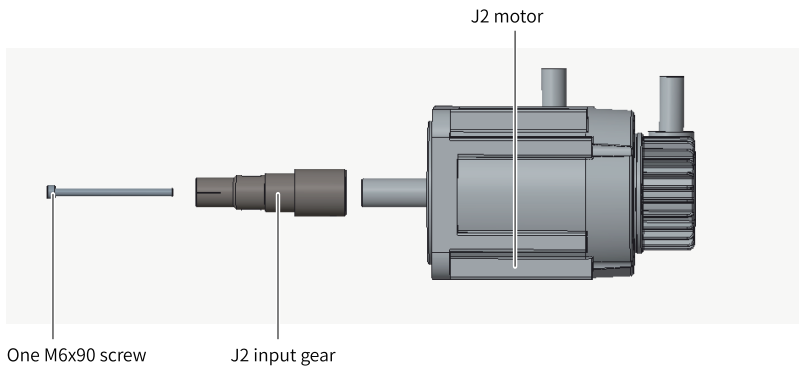
Prevent the input shaft of the reducer from colliding with the inside of the reducer when removing the motor.

4. Remove the J2 axis motor assembly and the O-shaped sealing ring.



5. Remove the M6x90 hexagon screws fixing the J2 axis driving gear shaft.

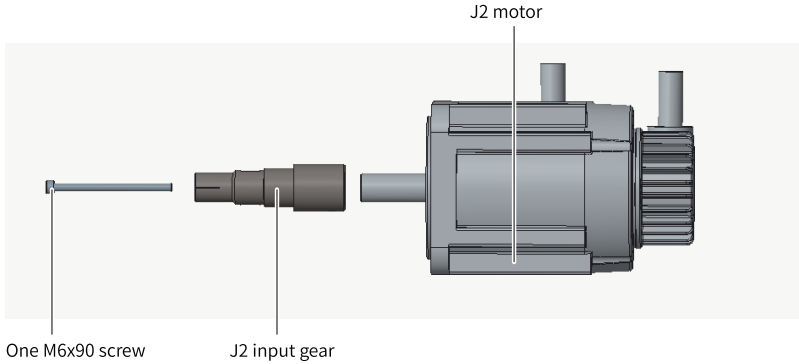
6. Remove the J2 axis driving gear shaft.



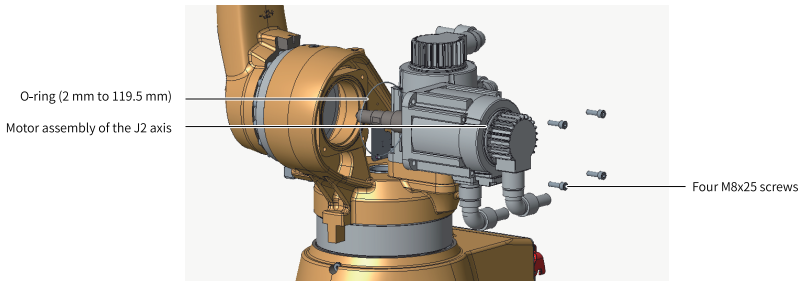
- **Installing the J2 motor:**

1. Check the J2 motor for any damage and clean the grease from the motor shaft using anhydrous ethanol.
2. Install the J2 axis driving gear shaft onto the output shaft of the J2 motor, ensuring no noticeable sticking points during the engagement between the output shaft and the gear shaft.
3. Remove residual threadlocker from the screws and reapply LT243 threadlocker.

4. Secure the gear using one M6x90 hexagon screw, with a tightening torque of 5 N·m and then 15 N·m.



5. Clean residual seal gum on the mounting surface of the J2 motor, and then apply LT5699 seal gum evenly on the mounting surface.
6. Install the O-shaped sealing ring of J2 motor to the swivel base.
7. Remove residual threadlocker from the screws and reapply LT243 threadlocker.
8. Fix the J2 axis motor assembly with four hexagon screws with a tightening torque of 10 N·m, 20 N·m, and 30 N·m successively.



9. Install the cables. For details, see ["3.11.3 Installing Cables Inside Robot" on page 83](#).

Note

Replenish the corresponding amount of grease after replacement.

10. Power on the robot, reset the J2 axis encoder value, clear any alarms, and then capture the J2 axis zero point position.

Replacing the J2 axis reducer

For replacement of the reducer, please contact your local dealer.

Contact local dealers when you need to replace the reducer.

3.8.3 J3 Axis



1. Power off the robot system by removing the power plug.
2. Before performing any replacement procedure, turn off the robot system and related equipment, and then disconnect the power plug from the power source. Operating with the power ON may cause electric shock or malfunction of the robot system.
3. Always connect the AC power cable to the power plug. Do not connect it directly to the factory power supply.



1. Do not apply excessive shock to the motor shaft during replacement. Failure to comply may shorten the service life or damage the motor or encoder.
2. Do not disassemble the motor and encoder. If disassembled, problems such as misalignment may occur, making the robot inoperable.
3. After parts such as motors, reducer, etc. have been replaced, the robot cannot operate properly because a mismatch exists between the zero point stored in each motor and its corresponding zero point stored in the controller. After replacing the parts, it is necessary to match these zero points.

Replacing Motor of the J3 Axis

	Name	Quantity	Remarks
Maintenance part	J3 motor	1	-
	O-shaped sealing ring of the J3 axis	1	-
Materials used	LT5699 seal gum	1	-

	Name	Quantity	Remarks
Tool	Hexagon wrench	1	-
	100-N·m torque wrench	1	Used for tightening torque control
	M6 screwdriver	1	-
	WL-270s pipe pliers	1	Used for removing the encoder cable
	Monkey spanner	1	-
	Puller	1	Used for removing the motor gear
	Oil-absorbing sheet or dust-free cloth	Several	Clean

● **Removing the J3 motor:**

1. Switch off the control switch on the controller and disconnect the heavy-duty cables from the robot.
2. Use the aviation plug disassembly tooling to remove the motor power cable and encoder cable of the J3 axis.



Caution

Protect the encoder cable and power cable from grease pollution.

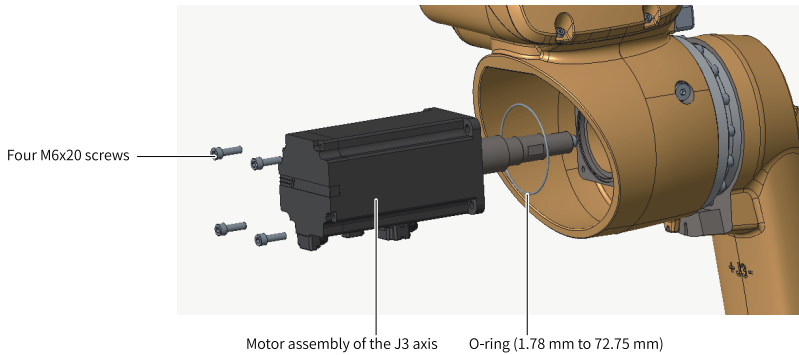
3. Remove the four M6x20 hexagon screws fixing the J3 axis motor assembly.



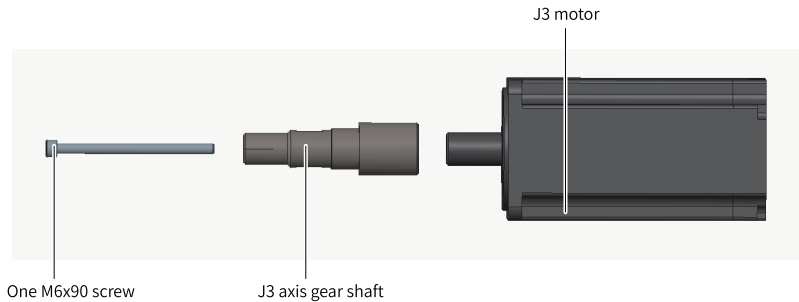
Caution

Prevent the input shaft of the reducer from colliding with the inside of the reducer when removing the motor.

4. Remove the J3 axis motor assembly and the O-shaped sealing ring.

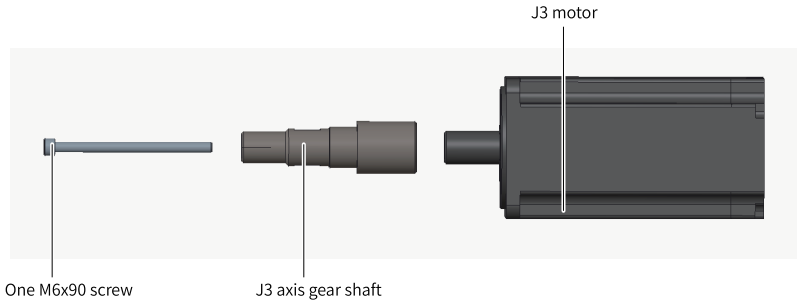


5. Remove the M6x90 hexagon screws fixing the J3 axis driving gear shaft.
6. Remove the J3 axis driving gear shaft.

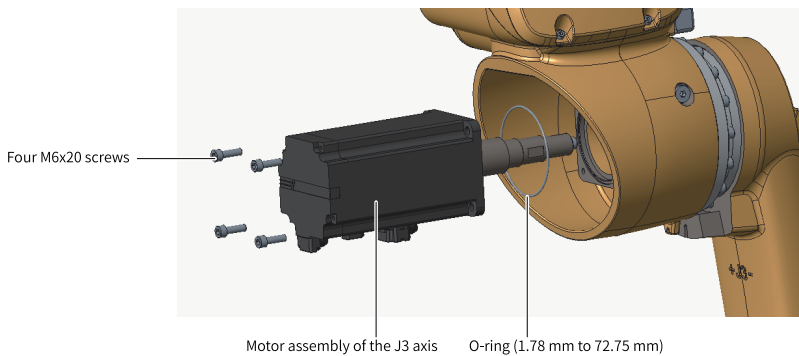


- **Installing the J3 motor:**

1. Check the motor for any damage and clean the grease from the motor shaft using anhydrous ethanol.
2. Install the J3 axis driving gear shaft onto the output shaft of the J3 motor, ensuring no noticeable sticking points during the engagement between the output shaft and the gear shaft.
3. Remove residual threadlocker from the screws and reapply LT243 threadlocker.
4. Secure the gear using one M6x90 hexagon screw, with a tightening torque of 5 N·m and then 15 N·m.



5. Clean residual seal gum on the mounting surface of the J3 motor, and then apply LT5699 seal gum evenly on the mounting surface.
6. Install the O-shaped sealing ring to the swivel base.
7. Remove residual threadlocker from the screws and reapply LT243 threadlocker.
8. Fix the J3 axis motor assembly with four hexagon screws with a tightening torque of 5 N·m, 9 N·m, and 13 N·m successively.



9. Install the cables. For details, see ["3.11.3 Installing Cables Inside Robot" on page 83](#).

Note

Replenish the corresponding amount of grease after replacement.

10. Power on the robot, reset the J3 axis encoder value, clear any alarms, and then capture the J3 axis zero point position.

Replacing the J3 axis reducer

For replacement of the reducer, please contact your local dealer.

Contact local dealers when you need to replace the reducer.

3.8.4 J4 Axis



Warning

1. Power off the robot system by removing the power plug.
2. Before performing any replacement procedure, turn off the robot system and related equipment, and then disconnect the power plug from the power source. Operating with the power ON may cause electric shock or malfunction of the robot system.
3. Always connect the AC power cable to the power plug. Do not connect it directly to the factory power supply.



Caution

1. Do not apply excessive shock to the motor shaft during replacement. Failure to comply may shorten the service life or damage the motor or encoder.
2. Do not disassemble the motor and encoder. If disassembled, problems such as misalignment may occur, making the robot inoperable.
3. After parts such as motors, reducer, etc. have been replaced, the robot cannot operate properly because a mismatch exists between the zero point stored in each motor and its corresponding zero point stored in the controller. After replacing the parts, it is necessary to match these zero points.

Replacing Motor of the J4 Axis

	Name	Quantity	Remarks
Maintenance part	J4 motor	1	-
Materials used	LT243 threadlocker	1	-
Tool	Hexagon wrench	1	-
	30-N·m torque wrench	1	Used for tightening torque control
	M3, M4, M5, and M6 screwdrivers	1	-
	WL-270s pipe pliers	1	Used for removing the encoder cable
	Monkey spanner	1	-
	Tension meter	1	-
	Oil-absorbing sheet or dust-free cloth	Several	Clean

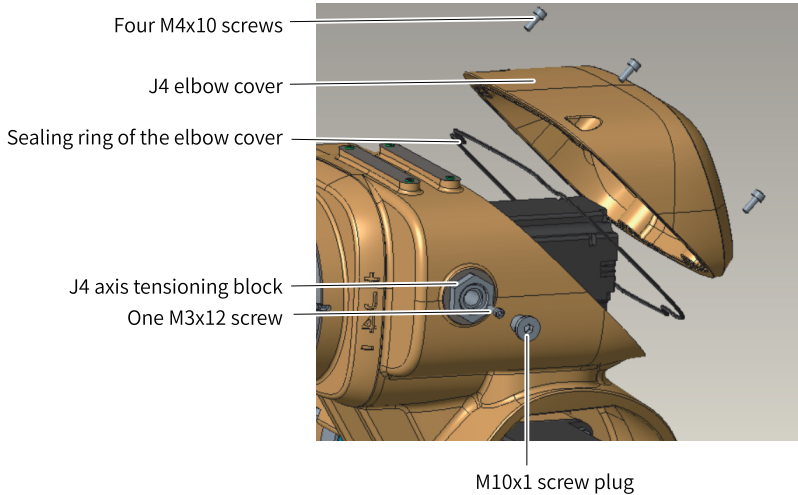
- **Removing the J4 motor:**

1. Switch off the control switch on the controller and disconnect the heavy-duty cables from the robot.
2. Remove the four M4x10 hexagon socket head cap screws fixing the J4 elbow cover.
3. Remove the J4 elbow cover and sealing ring of the elbow cover.
4. Use the aviation plug disassembly tooling to remove the motor power cable and encoder cable of the J4 axis.

**Caution**

Protect the encoder cable and power cable from grease pollution.

5. Remove the M10x1 screw plug of the outside J4 axis tensioning block.
6. Remove the M3x12 tensioning belt screw inside the screw plug.



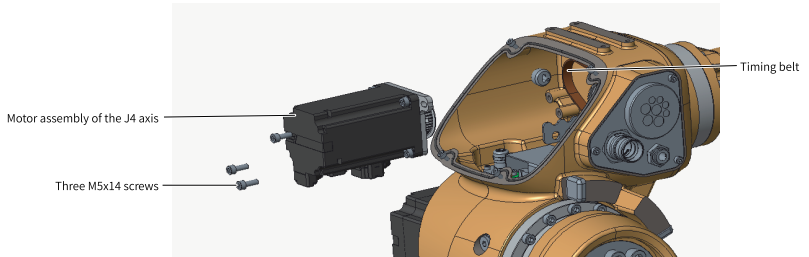
7. Remove the three M5x14 hexagon screws fixing the J4 axis motor assembly, and remove the J4 axis motor assembly.



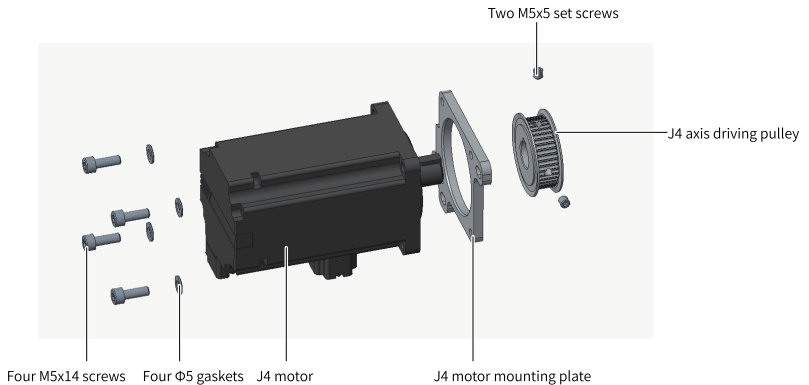
Caution

Prevent the input shaft of the reducer from colliding with the inside of the reducer when removing the motor.

8. Remove the two M5x5 set screws fixing the J4 axis timing pulley on the J4 axis motor assembly, and remove the J4 axis driving pulley.



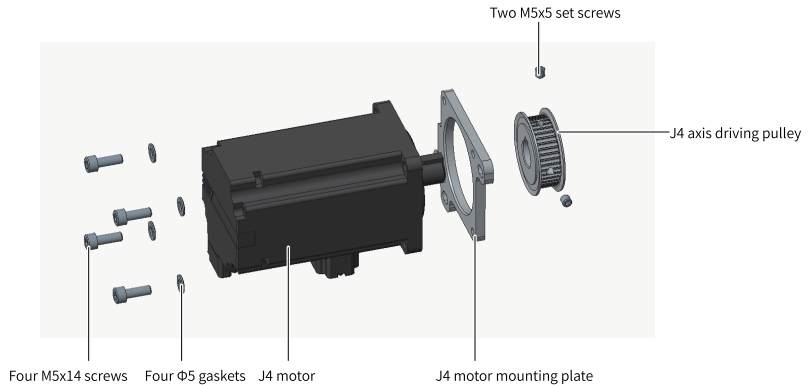
9. Remove the four M5x14 hexagon screws and four $\Phi 5$ gaskets from the J4 axis motor assembly, and remove the mounting plate of J4 motor.



● Installing the J4 motor:

1. Check the J4 motor for any damage and clean the grease from the motor shaft using anhydrous ethanol.
2. Clean the threadlocker and grease stains on all parts to ensure that all installation positions are clean.
3. Apply the LT243 threadlocker to the four M5x14 screws again.
4. Secure the J4 axis motor assembly to the J4 axis motor mounting plate using four M5×14 hexagon screws diagonally, tightening them in three stages with

- tightening torques of $3 \text{ N} \cdot \text{m}$, $5 \text{ N} \cdot \text{m}$, and $7 \text{ N} \cdot \text{m}$, respectively (note the directions of the motor and mounting plate).
5. Install the J4 axis timing pulley into the motor shaft (with the side with material code facing upward), and align the end of the pulley with the end of the motor shaft.
 6. Apply the LT243 threadlocker to the two M5x5 set screws again.
 7. Secure the gear with two M5x5 set screws in two steps. Tighten the screws with a torque of $1.5 \text{ N} \cdot \text{m}$ and $3 \text{ N} \cdot \text{m}$.
 8. Place the J4 motor assembly into the robot and put the pulley into the timing belt.



9. Apply the LT243 threadlocker to the three M5x14 screws again, and pre-tighten the J4 axis motor assembly.
10. Use one M3x12 screw to adjust the tension of the J4 axis timing belt through the J4 axis tensioning block to make the tension frequency of the timing belt be $285 \pm 10 \text{ Hz}$.

Note

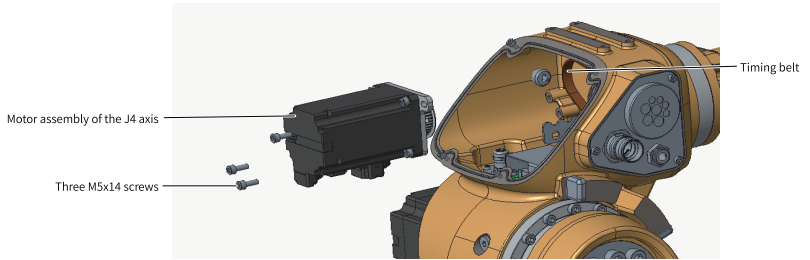
Before testing the timing belt frequency with a tension meter, the following parameters must be set:

Measuring span: 200 mm

Timing belt unit mass: 2.4 g/m

Timing belt width: 10.0 mm/R

11. Secure the J4 axis motor assembly with screws of a torque of $3 \text{ N} \cdot \text{m}$, $5 \text{ N} \cdot \text{m}$, and $7 \pm 0.7 \text{ N} \cdot \text{m}$, respectively.

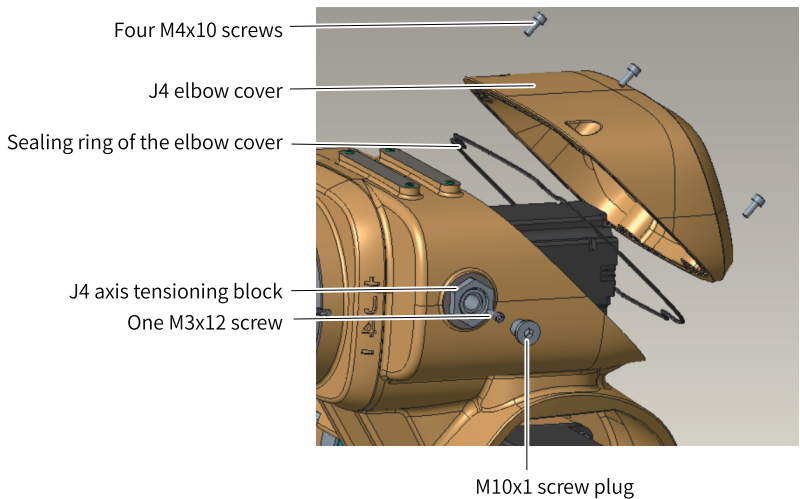


12. Fix the J4 axis tensioning block with one M10x1 screw plug with a torque of 7 N·m.
13. Install the cables of the J4 motor. For details, see ["3.11.3 Installing Cables Inside Robot" on page 83](#).

Note

Replenish the corresponding amount of grease after replacement.

14. Install the sealing ring of the elbow cover into the cover slot.
15. Apply the LT243 threadlocker to the four M4x10 screws, and secure the J4 axis cover diagonally with screws with a torque of 2 N·m.
16. Install the J4 elbow cover with a torque of 2 N·m.



17. Power on the robot, reset the J4 axis encoder value, clear any alarms, and then capture the J4 axis zero point position.

Replacing the J4 axis reducer

For replacement of the reducer, please contact your local dealer.

Contact local dealers when you need to replace the reducer.

3.8.5 J5 Axis

Warning

1. Power off the robot system by removing the power plug.
2. Before performing any replacement procedure, turn off the robot system and related equipment, and then disconnect the power plug from the power source. Operating with the power ON may cause electric shock or malfunction of the robot system.
3. Always connect the AC power cable to the power plug. Do not connect it directly to the factory power supply.

Caution

1. Do not apply excessive shock to the motor shaft during replacement. Failure to comply may shorten the service life or damage the motor or encoder.
2. Do not disassemble the motor and encoder. If disassembled, problems such as misalignment may occur, making the robot inoperable.
3. After parts such as motors, reducer, etc. have been replaced, the robot cannot operate properly because a mismatch exists between the zero point stored in each motor and its corresponding zero point stored in the controller. After replacing the parts, it is necessary to match these zero points.

Replacing Motor of the J5 Axis

	Name	Quantity	Remarks
Maintenance part	J5 motor	1	-
Materials used	LT243 threadlocker	1	-

	Name	Quantity	Remarks
Tool	Hexagon wrench	1	-
	30-N·m torque wrench	1	Used for tightening torque control
	M3 and M5 screwdrivers	1	-
	WL-270s pipe pliers	1	Used for removing the encoder cable
	Monkey spanner	1	-
	Tension meter	1	-
	Oil-absorbing sheet or dust-free cloth	Several	Clean

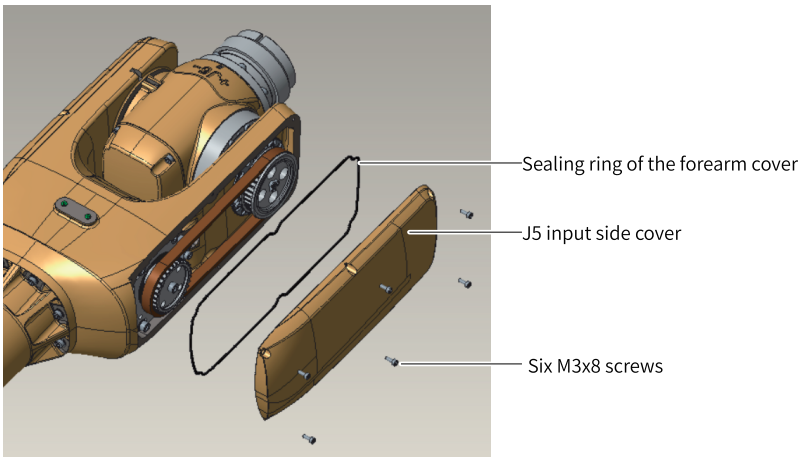
● **Removing the J5 motor:**

1. Switch off the control switch on the controller and disconnect the heavy-duty cables from the robot.
2. Use the aviation plug disassembly tooling to remove the motor power cable and encoder cable of the J5 axis.



Protect the encoder cable and power cable from grease pollution.

3. Remove the six M3x8 screws from the J5 input side cover and remove the cover and sealing ring.

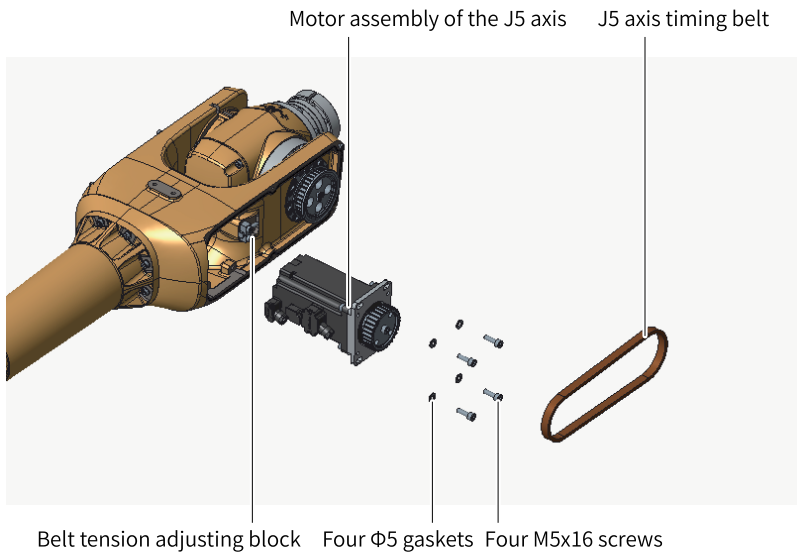


4. Remove the four M5x16 hexagon screws fixing the J5 axis motor assembly and four $\Phi 5$ gaskets.

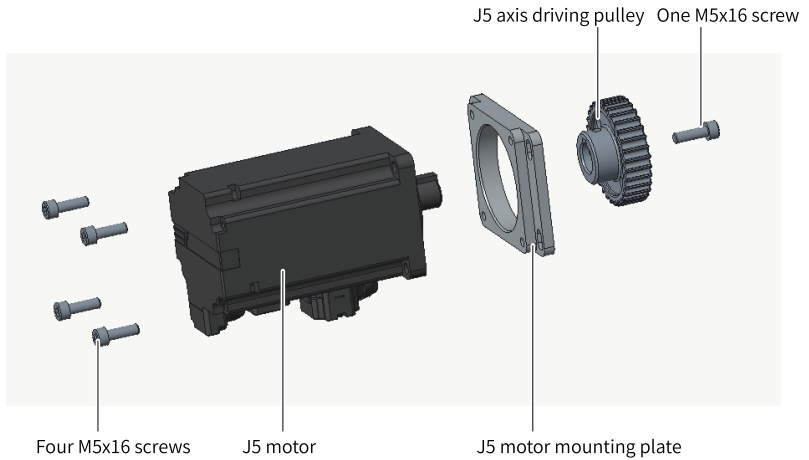


Prevent the input shaft of the reducer from colliding with the inside of the reducer when removing the motor.

5. Remove the J5 axis timing belt and J5 axis motor assembly.

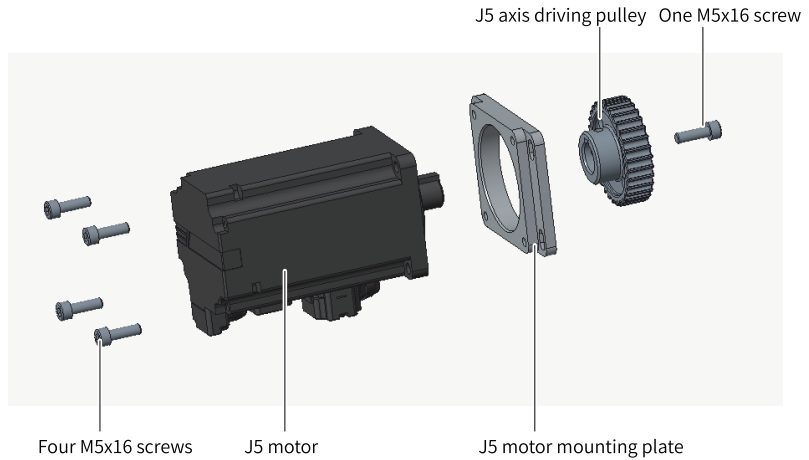


6. Remove the one M5x16 hexagon screw from the J5 axis motor assembly, and remove the J5 axis driving pulley.
7. Remove the J5 axis motor assembly.
8. Remove the four M5x16 hexagon screws fixing the J5 axis driving gear shaft and then remove the J5 axis motor mounting plate.



- **Installing the J5 motor:**

1. Check the J5 motor for any damage and clean the grease from the motor shaft using anhydrous ethanol.
2. Clean the threadlocker and grease stains on all parts to ensure that all installation positions are clean.
3. Apply the LT243 threadlocker to the four M5x16 screws again.
4. Secure the J5 axis motor assembly to the J5 axis motor mounting plate using four M5×16 hexagons diagonally, tightening them with tightening torques of 3 N·m, 5 N·m, and 7 N·m, respectively (note the directions of the motor and mounting plate).
5. Install the J5 axis driving pulley to the J5 motor and align the pulley end with the motor shaft end.
6. Apply the LT243 threadlocker to the one M5x16 screw again.
7. Secure the gear with one M5x16 screw, with a tightening torque of 1 N·m, 3 N·m, and 7 N·m, successively.



8. Apply the LT243 threadlocker to the four M5x16 screws again.
9. Install the J5 axis motor assembly into the robot and pre-fasten it, and then put it into the J5 axis timing belt (pay attention to the installation direction of the motor).
10. Pre-fasten the J5 axis motor assembly and then insert the J5 axis timing belt.
11. Adjust the tensioning block screw of the J5 axis timing belt. And after pre-tightening the J5 motor assembly screw and $\Phi 5$ gasket, adjust the timing belt tension frequency to 73 ± 5 Hz.

Note

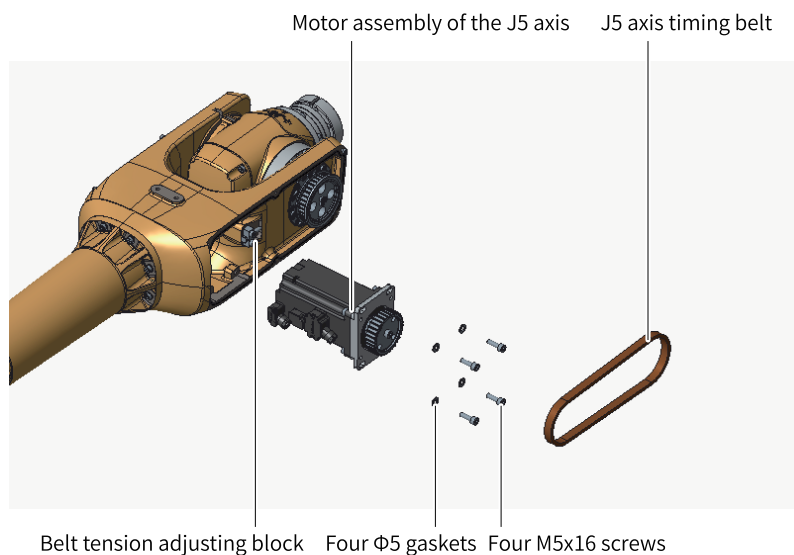
Before testing the timing belt frequency with a tension meter, the following parameters must be set:

Measuring span: 200 mm

Timing belt unit mass: 2.4 g/m

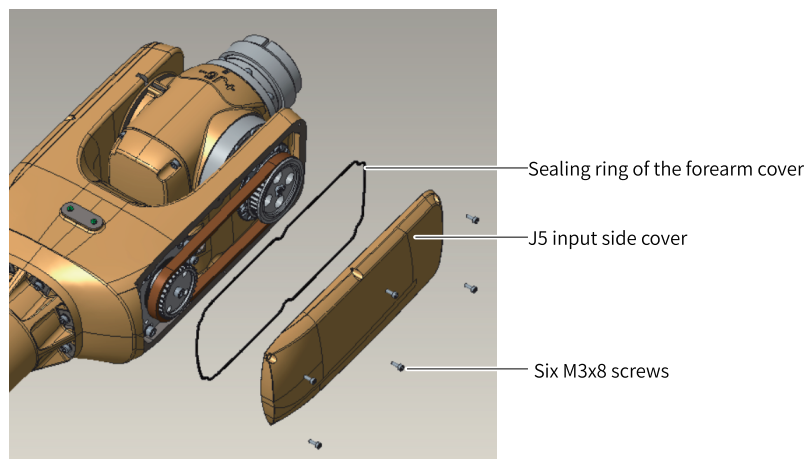
Timing belt width: 10.0 mm/R

12. Fix the J5 axis motor assembly with four M5x16 hexagon screws and four $\Phi 5$ gaskets with a tightening torque of $3 \text{ N} \cdot \text{m}$, $5 \text{ N} \cdot \text{m}$, and $7 \text{ N} \cdot \text{m}$ successively.



13. Install the cables of the J5 motor. For details, see ["3.11.3 Installing Cables Inside Robot" on page 83](#).

14. Install the J5 input side cover with a torque of 2 N·m.



15. Power on the robot, reset the J5 axis encoder value, clear any alarms, and then capture the J5 axis zero point position.

Replacing the J5 axis reducer

For replacement of the reducer, please contact your local dealer.

Contact local dealers when you need to replace the reducer.

Replacing the J5 axis timing belt

For replacement of the J5 axis timing belt, see "Replacing the J5 motor" in this section.

3.8.6 J6 Axis



1. Power off the robot system by removing the power plug.
2. Before performing any replacement procedure, turn off the robot system and related equipment, and then disconnect the power plug from the power source. Operating with the power ON may cause electric shock or malfunction of the robot system.
3. Always connect the AC power cable to the power plug. Do not connect it directly to the factory power supply.



1. Do not apply excessive shock to the motor shaft during replacement. Failure to comply may shorten the service life or damage the motor or encoder.
2. Do not disassemble the motor and encoder. If disassembled, problems such as misalignment may occur, making the robot inoperable.
3. After parts such as motors, reducer, etc. have been replaced, the robot cannot operate properly because a mismatch exists between the zero point stored in each motor and its corresponding zero point stored in the controller. After replacing the parts, it is necessary to match these zero points.

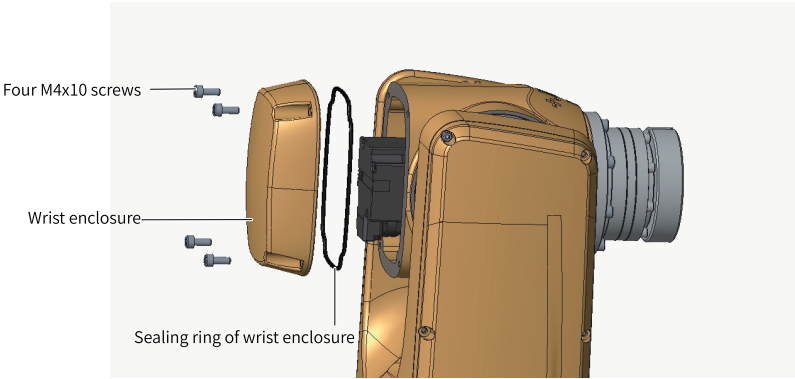
Replacing Motor of the J6 Axis

	Name	Quantity	Remarks
Maintenance part	J6 motor	1	-
Materials used	LT5699 seal gum	1	-
	LT243 threadlocker	1	-

Name		Quantity	Remarks
Tool	Hexagon wrench	1	-
	100-N·m torque wrench	1	Used for tightening torque control
	Torque wrench of 0.1 N·m to 1 N·m	1	-
	M2, M2.5, M3, and M4 screwdrivers	1	-
	WL-270s pipe pliers	1	Used for removing the encoder cable
	Monkey spanner	1	-
	Depth gauge	1	-
	Puller	1	Used for removing the motor gear
	Oil-absorbing sheet or dust-free cloth	Several	Clean

● **Removing the J6 motor:**

1. Switch off the control switch on the controller and disconnect the heavy-duty cables from the robot.
2. Remove the wrist enclosure on the input side of J6 axis and take out the wrist enclosure sealing ring.



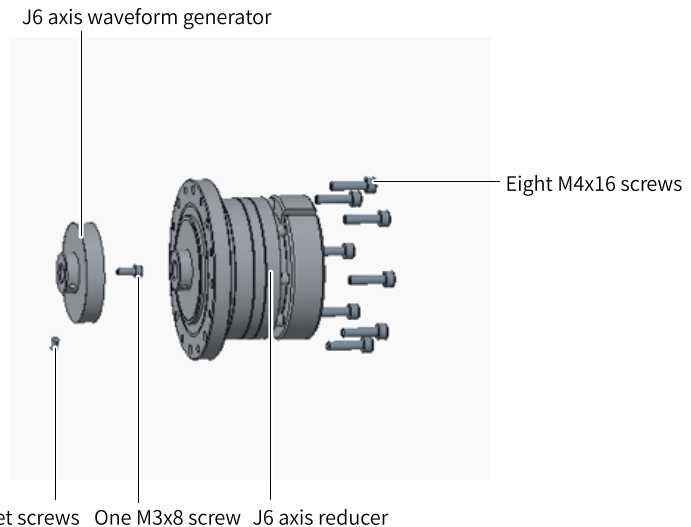
3. Use the aviation plug disassembly tooling to remove the motor power cable and encoder cable of the J6 axis.



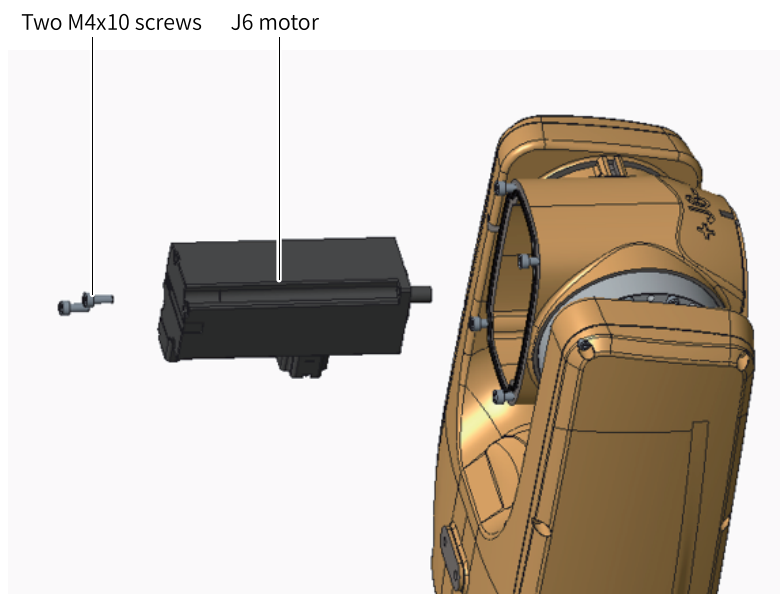
Caution

Protect the encoder cable and power cable from grease pollution.

4. Remove the eight M4x10 hexagon screws fixing the J6 axis reduce, and plug out the J6 axis reducer.
5. Use the depth gauge to measure the height and position from the current waveform generator boss to the robot casting surface, and record the data. Adjust the height of the end face of the J6 axis waveform generator boss and the end face of the robot to be consistent with the height when disassembling the motor. Measure the height from the uppermost end face of the waveform generator to the end face of the wrist with a depth gauge:
 - L reducer height: 11.9 ± 0.4 mm
 - X reducer height: 11.65 ± 0.15 mm
 - H reducer height: 6.3 ± 0.4 mm
 Pre-tighten two M3x5 set screws.
6. Remove the one M3x8 screw and two M3x5 set screws on the J6 axial waveform generator.



7. Remove the two M4x10 hexagon screws fixing the J6 axis motor assembly.
8. Remove the J6 axis motor assembly.

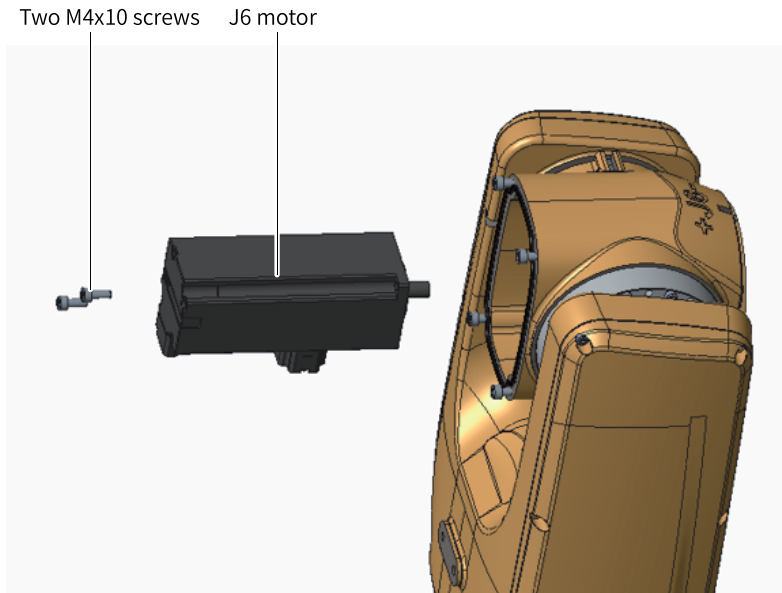


Caution

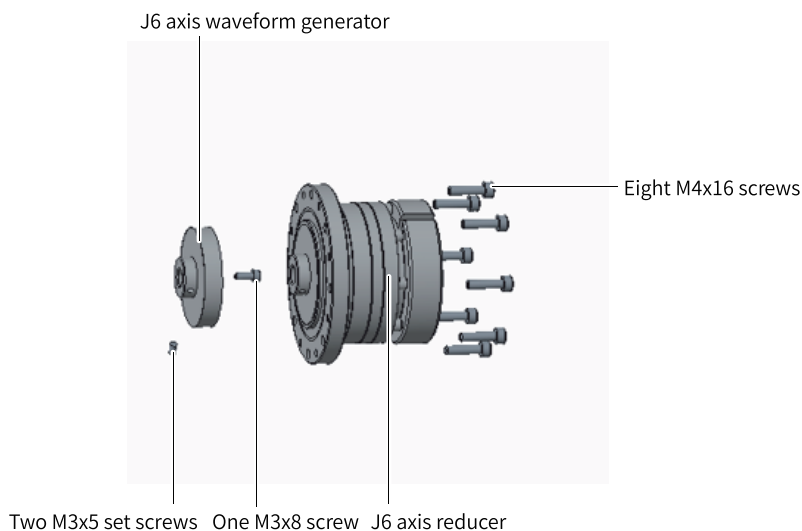
Prevent the input shaft of the reducer from colliding with the inside of the reducer when removing the motor.

- **Installing the J6 motor:**

1. Check the J6 motor for any damage and clean the grease from the motor shaft using anhydrous ethanol.
2. Clean the threadlocker and grease stains on all parts to ensure that all installation positions are clean.
3. Apply the LT5699 seal gum to the mounting plate of J6 motor first.
4. Apply the LT243 threadlocker to two M4x10 hexagon screws again, and install J6 motor in the correct direction.

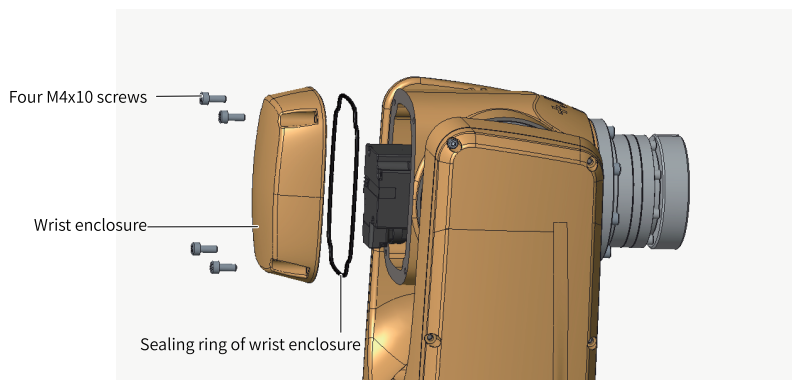


5. Apply the LT243 threadlocker to two M3x5 set screws again, and then screw them into the J6 axis waveform generator (do not protrude the axis hole surface).
6. Install the J6 axis waveform generator on the J6 axis motor shaft (note that the side of the set screws should face the motor). Keep the generator from bump damage.
7. Pre-tighten two M3x5 set screws. Adjust the height of the end face of the J6 axis waveform generator boss and the end face of the robot to be consistent with the height when disassembling the motor. Measure the height from the uppermost end face of the waveform generator to the end face of the wrist with a depth gauge:
 - L reducer height: 11.9 ± 0.4 mm
 - X reducer height: 11.65 ± 0.15 mm
 - H reducer height: 6.3 ± 0.4 mm
8. Use two M3x5 set screws to fix the J6 motor with torque of $0.5 \text{ N} \cdot \text{m}$ and $0.8 \text{ N} \cdot \text{m}$ successively.
9. Apply the LT243 threadlocker to one M3x8 hexagon screw again, and install it into the hole of J6 motor shaft. Tighten the screw with a torque of $2 \text{ N} \cdot \text{m}$.
10. Check that the J6 axis reducer and the O-shaped sealing ring are normal, install the J6 axis reducer into the robot, and ensure that the O-shaped sealing ring has no offside trimming.
11. Apply the LT243 threadlocker to the eight M4x16 screws again, and tighten them step by step in three times with torque of $1 \text{ N} \cdot \text{m}$, $2 \text{ N} \cdot \text{m}$, and $3 \pm 0.3 \text{ N} \cdot \text{m}$.



12. Install the cables of the J6 motor. For details, see ["3.11.3 Installing Cables Inside Robot" on page 83](#).

13. Install the J6 input side cover with a torque of 2 N·m.



14. Power on the robot, reset the J6 axis encoder value, clear any alarms, and then capture the J6 axis zero point position.

Note

Replenish the corresponding amount of grease after replacement.

Replacing the J6 axis reducer

For replacement of the reducer, please contact your local dealer.

Contact local dealers when you need to replace the reducer.

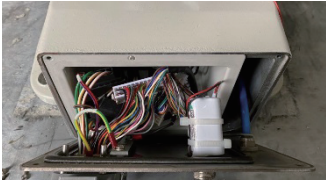
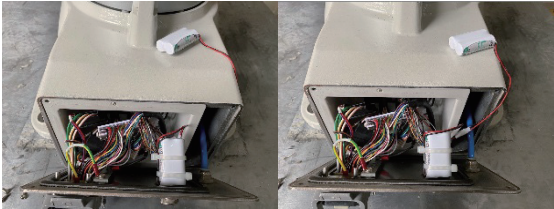
3.9 Replacement of Battery (Lithium Battery)

Note

- Do not perform equipment maintenance or servicing while power is on. Failure to comply may result in electric shocks.
 - If a lithium battery is used, avoid the following improper use; otherwise, severe safety issues may occur due to heat, leakage, explosion, or fire of the lithium battery.
 - Charging
 - Compression and deformation
 - Dismantlement
 - Short circuit
 - Improper battery connections
 - Heating
 - Throwing into fire
 - Soldering battery terminals
 - Forced discharging
 - When disposing of the battery, consult with the professional disposal services or comply with the local regulation.
-

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:

1. Cut the cable tie securing the battery to the cable board.
2. Tie the new battery onto the cable plate with a zip tie.
3. Connect the new battery to the empty white 2P cable end connector.
4. Remove the used battery.

Procedure	Diagram
1. Turn off all power supplies.	
2. Loosen four M4 screws and open the electrical mounting plate.	
3. Install a new battery and connect the power connector again.	
4. Install the battery supporting board in the reverse direction of Step 1.	

Note

If the origin is lost due to failure to comply with the preceding steps, see ["3.10.2 Procedure of Zero Point Adjustment" on page 65.](#)

3.10 Zero Point Adjustment

3.10.1 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, timing belt, and cables) are replaced, the robot cannot position properly because a gap exists between the zero point stored in each motor and its corresponding zero point stored in the controller. Therefore, after the parts are replaced, zero point adjustment is required.

Note

After the calibration, 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 action area of the system. Failure to comply will result in serious accidents.
 - Before operation, check that there is no person inside the safety fence. Do not enter the action area during system running. Failure to comply will result in serious safety problems.
 - Operating the robot system in teaching 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 moves unexpectedly.
-

3.10.2 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".

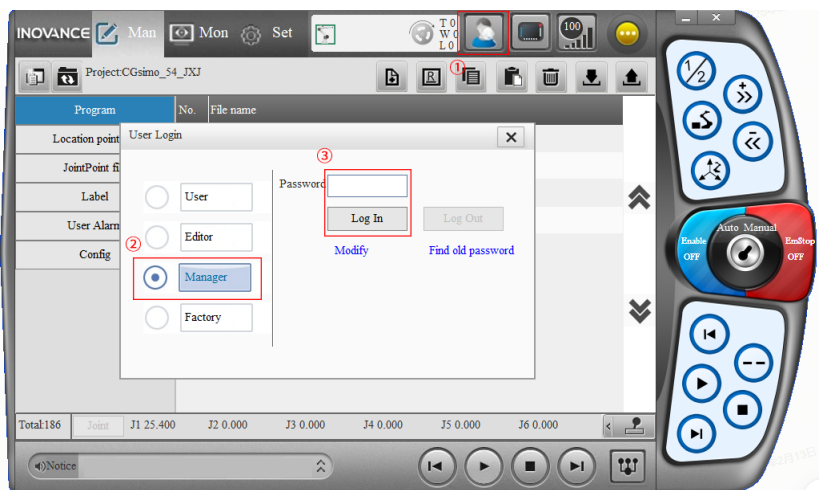


Figure 3-4 Screen of I RTP80 series tech pendant

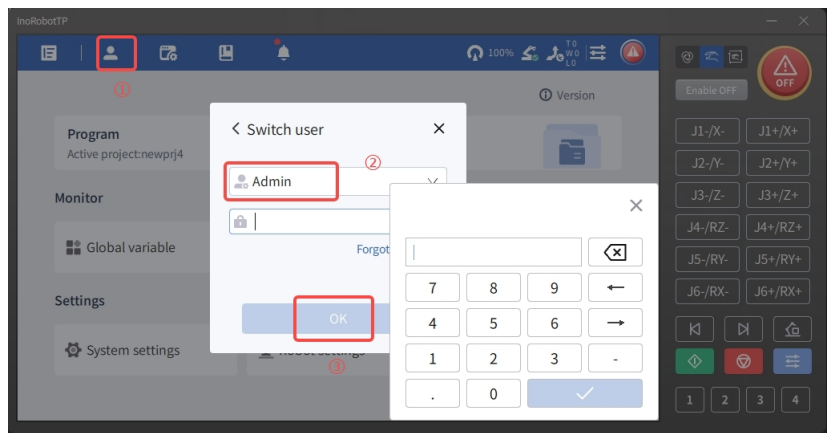


Figure 3-5 Screen of I RTP200 series tech pendant

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

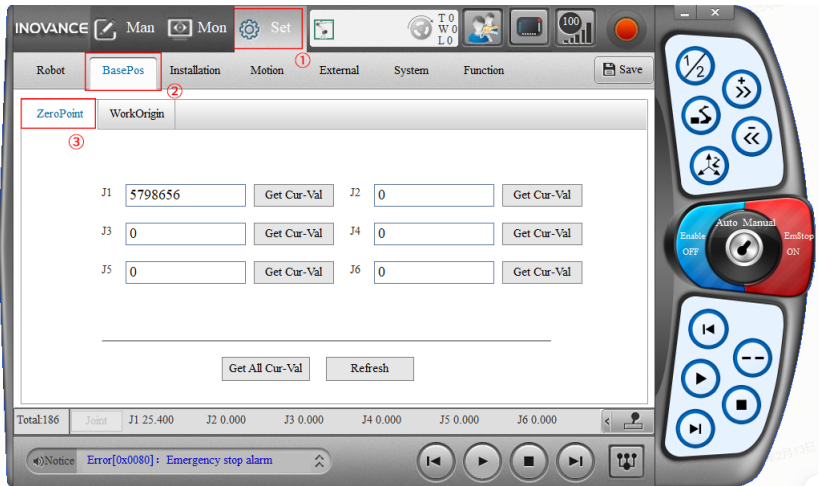


Figure 3-6 Screen of IRTP80 series tech pendant

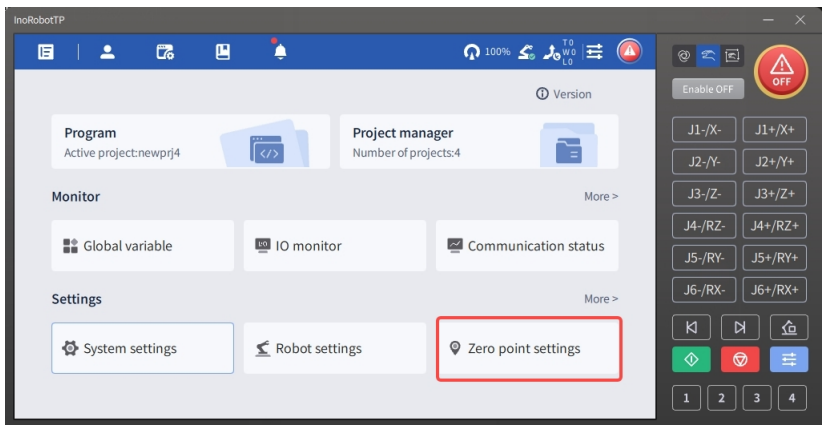


Figure 3-7 Screen of IRTP200 series tech pendant

3. 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. For the zero point of each axis, see ["3.10.3 Zero Point Position of Each Joint" on page 70](#). Calibrate the zero points using the calibration tool.

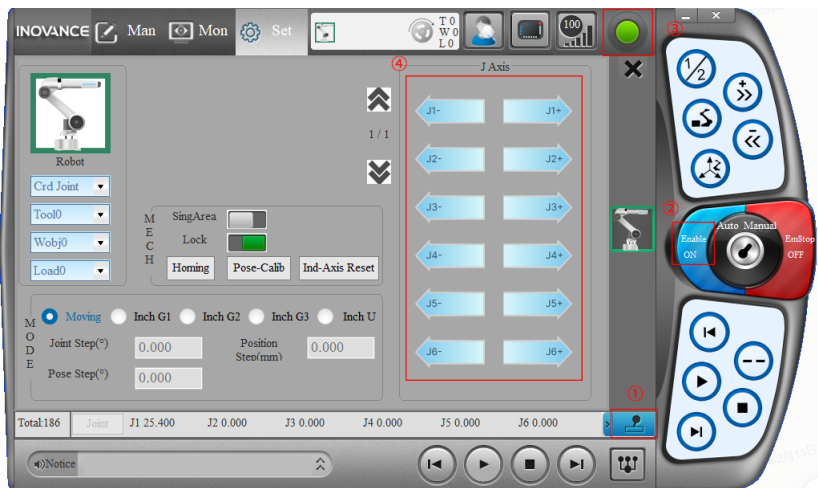


Figure 3-8 Screen of I RTP80 series tech pendant

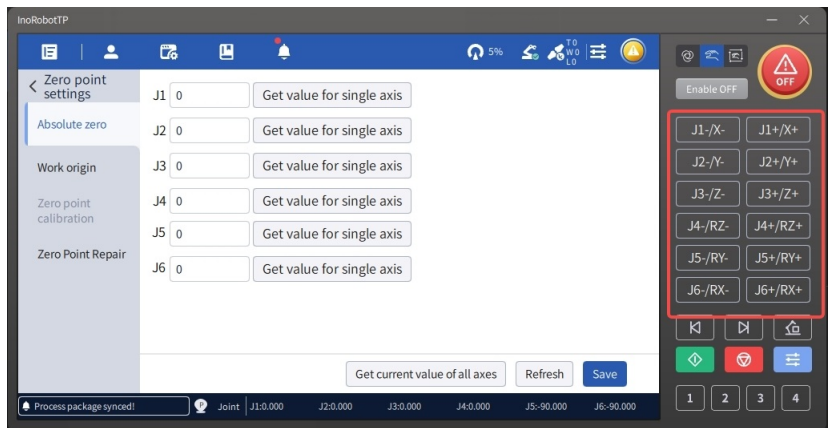


Figure 3-9 Screen of I RTP200 series tech pendant

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).

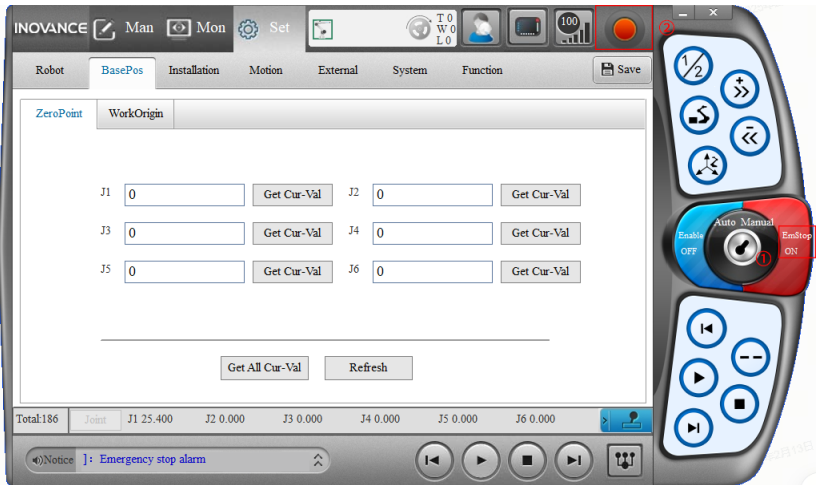


Figure 3-10 Screen of I RTP80 series tech pendant

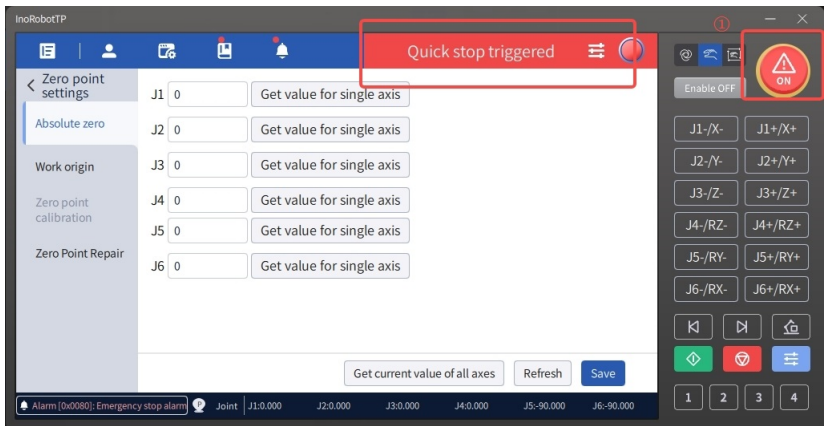


Figure 3-11 Screen of I RTP200 series tech pendant

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.

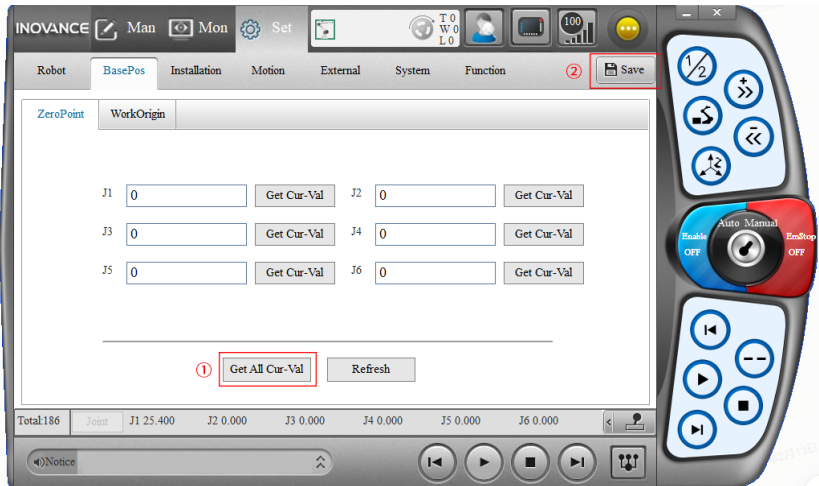


Figure 3-12 Screen of I RTP80 series tech pendant

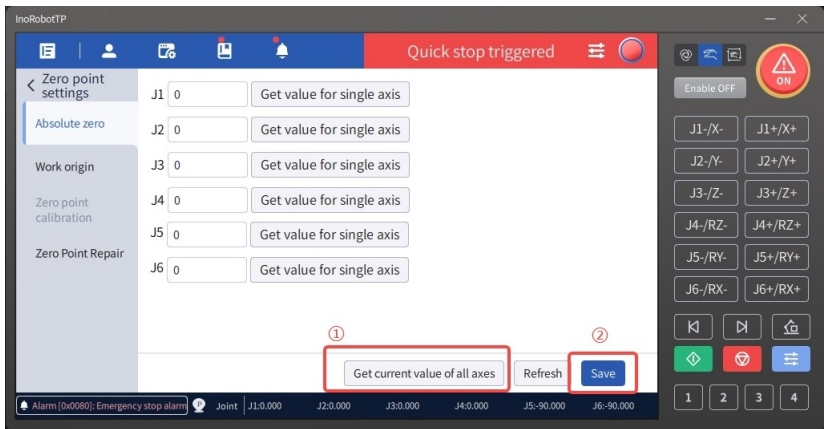


Figure 3-13 Screen of I RTP200 series tech pendant

3.10.3Zero Point Position of Each Joint

Calibration tool

The calibration tool is used to calibrate the rotary axes of the robot manually, as shown in the figure below.

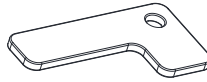


Figure 3-14 Calibration tool

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.

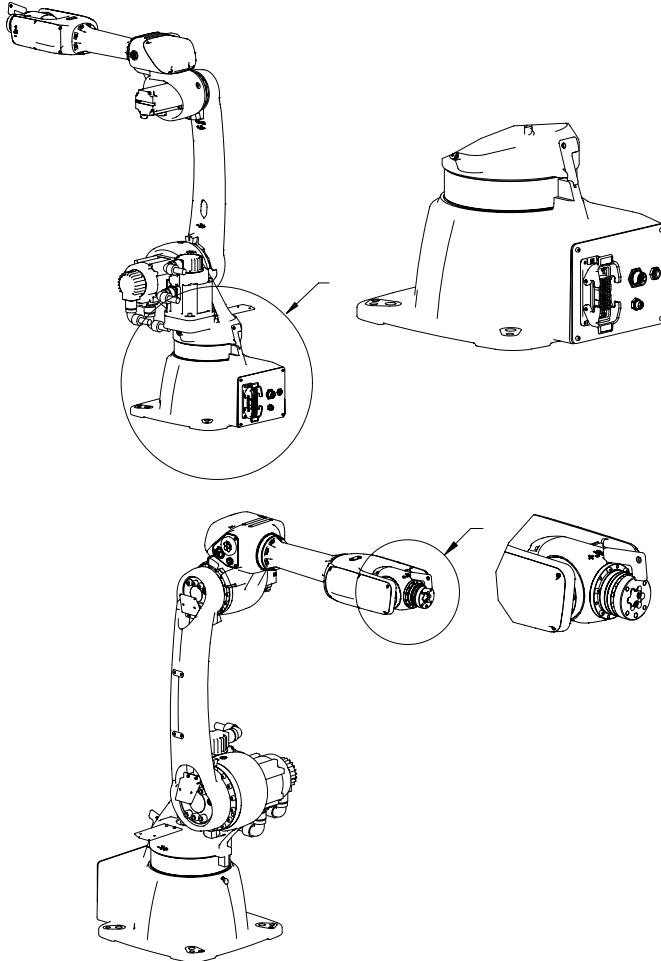


Figure 3-15 Calibration of axes J1 to J6

3.10.4Zero Calibration of Each Joint

The following figure shows the zero calibration effect of each joint.

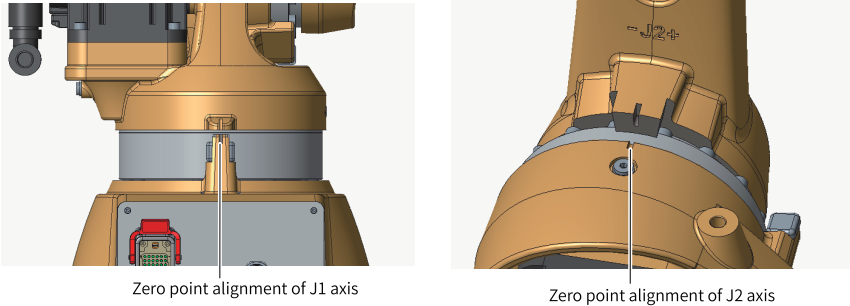


Figure 3-16 Zero position of axes J1 and J2

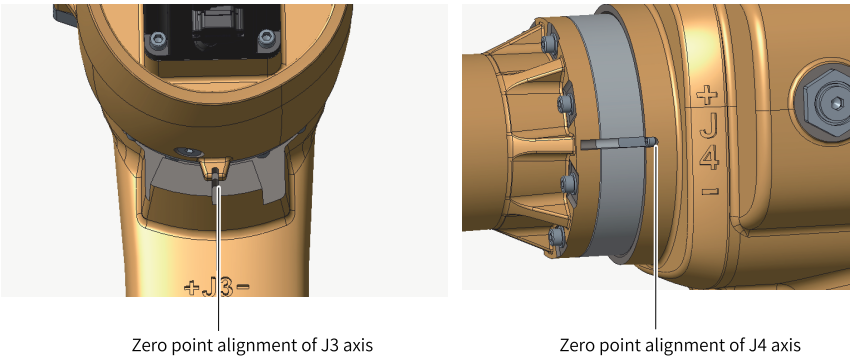


Figure 3-17 Zero position of axes J3 and J4

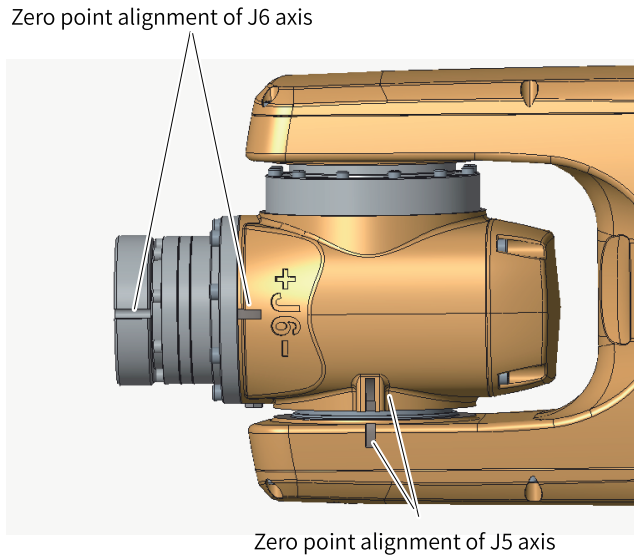


Figure 3-18 Zero position of axes J5 and J6

3.11 Cable Replacement

3.11.1 List of Tools for Replacing Cables Inside Robot

Name	Quantity	Code	Remarks
Robot connection cable	1	1504LT58	IR-R10-140S5-B1
Motor connection cable	1	1504LT72	IR-R10-140S5-B1
Hexagon wrench	-	-	-
Phillips screwdriver	-	-	-
Diagonal pliers	-	-	-
Tie strap	-	-	-
Monkey spanner	-	-	-
Locking pliers	-	-	-

3.11.2 Removing Cables Inside Robot

Preparation



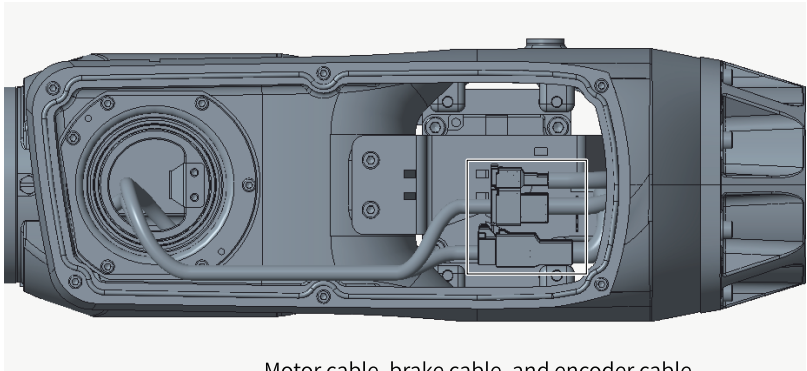
Before removing the robot cables, adjust all joints to the home position.

Note

Before entering the operating area of the robot, turn off all the power and air pressure sources connected to the robot, and put up work in progress signs.

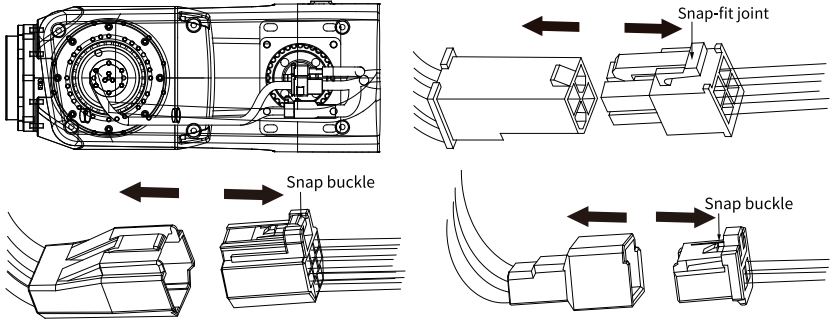
Note: Before removing the cable, take a photo of the cable, so that you can refer to it later when replacing a new cable.

1. Remove the J6 axis cable.
 - a. Remove the J6 input side cover to expose the internal structure according to steps described in the section ["3.7.4 J6 Input Side Cover" on page 32](#).
 - b. Based on the cable label, locate the power cable and encoder cable connectors of the J6 axis motor.



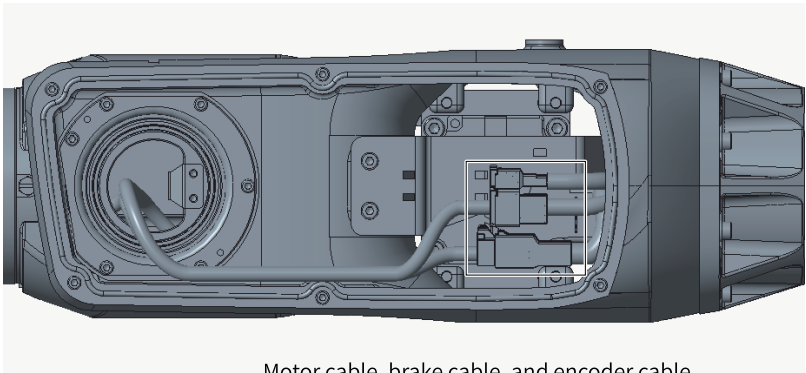
Motor cable, brake cable, and encoder cable

- c. Press the snap-fit joint and disconnect the connector in the direction indicated by the arrow and cut the cable ties.



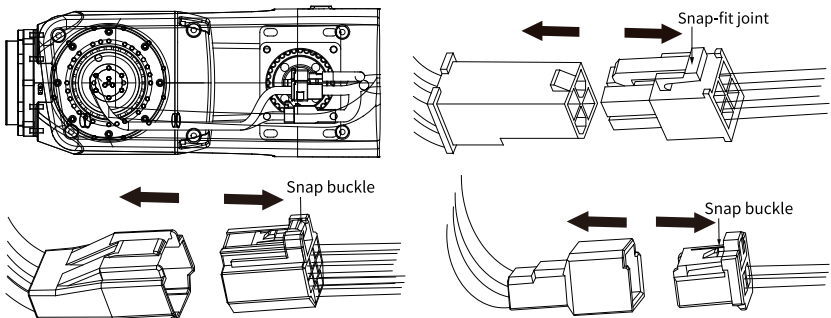
2. Remove the J5 axis cable.

- a. Remove the J5 input side cover to expose the internal structure according to steps described in the section ["3.7.4 J6 Input Side Cover" on page 32.](#)
- b. Based on the cable label, locate the power cable and encoder cable connectors of the J5 axis motor.



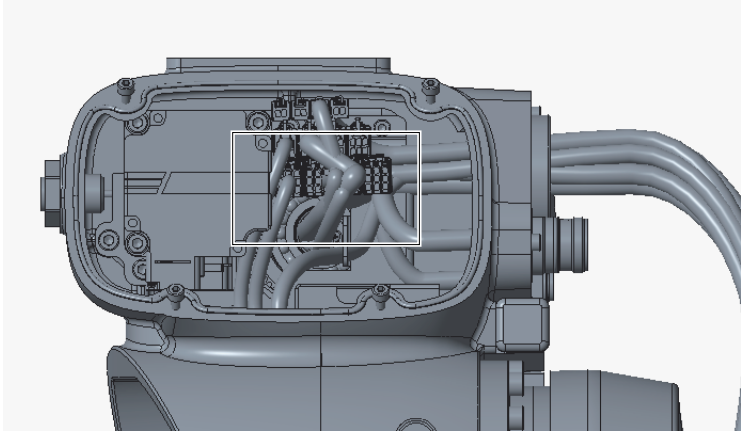
Motor cable, brake cable, and encoder cable

- c. Press the snap-fit joint and disconnect the connector in the direction indicated by the arrow and cut the cable ties. See the figure below.

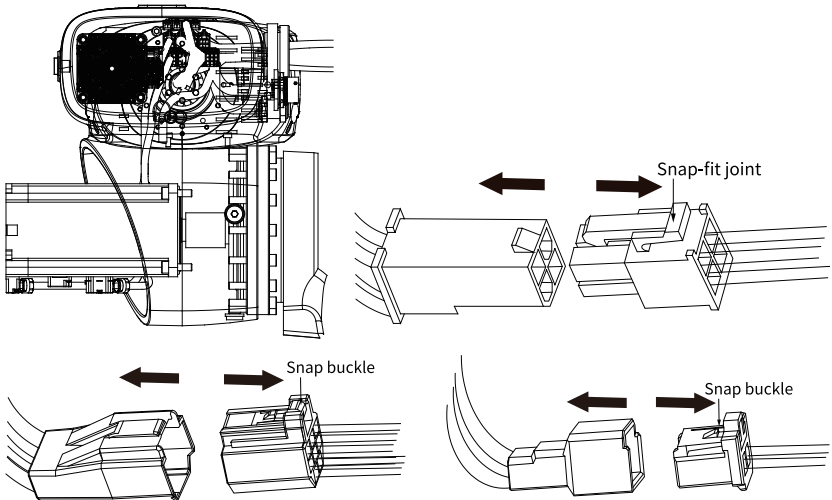


3. Remove the J4 axis cable.

- a. Remove the J4 elbow cover to expose the internal structure according to steps described in the section ["3.7.2 J4 Elbow Cover" on page 30](#).
- b. Based on the cable label, locate the power cable and encoder cable connectors of the J4 axis motor.

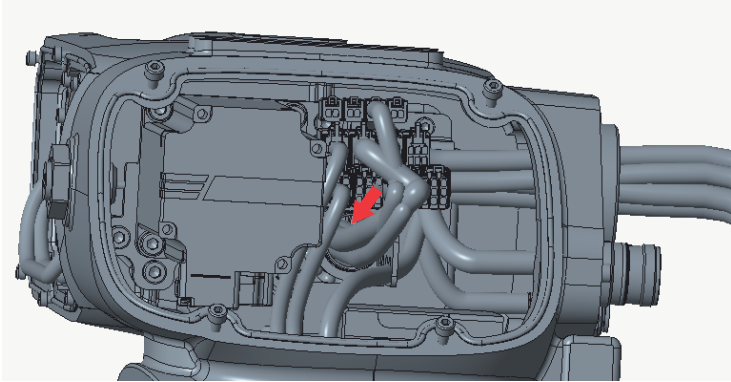


- c. Press the snap-fit joint and disconnect the connector in the direction indicated by the arrow and cut the cable ties. See the figure below.



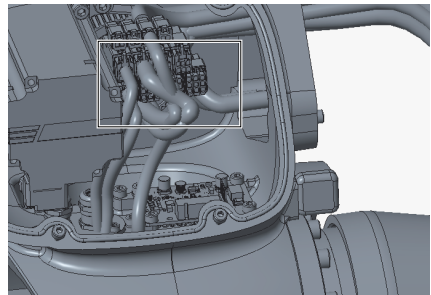
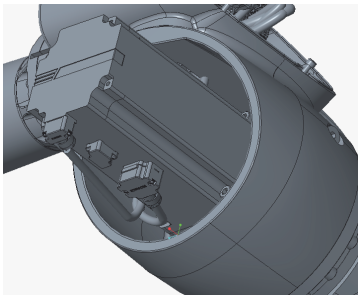
4. Remove the adapter cables of axes J5 and J6.
 - a. Remove the J4 elbow cover to expose the internal structure according to steps described in the section ["3.7.2 J4 Elbow Cover" on page 30](#).
 - b. Locate the power adapter cable and encoder adapter cable of J5 axis and J6 axis motors running from the forearm to the elbow in the elbow threaded hole.

- c. Press the snap-fit joint and disconnect the connector in the direction indicated by the arrow and cut the cable ties.
- d. Pull out the adapter cables from the cable threaded holes of the J5 axis and J6 axis motors. See the figure below.

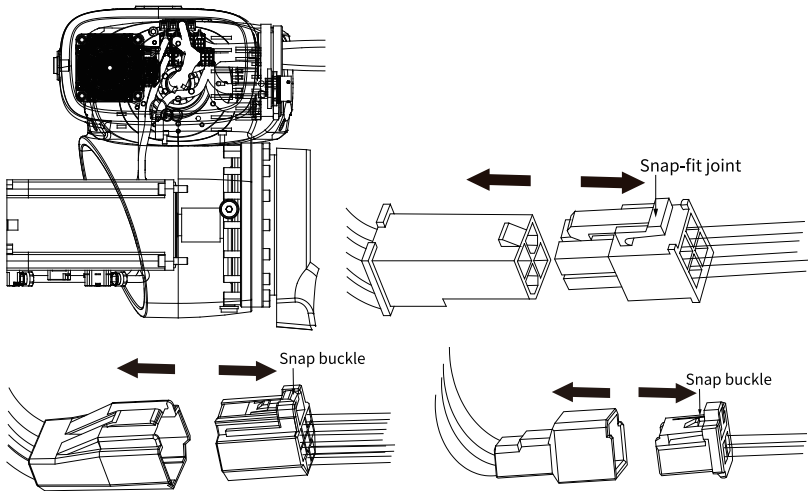


Threaded hole for J5 and J6 axis motor cables

- e. Check whether any cable is damaged.
 - f. When replacing the adapter cables, pass the cables through the threaded hole to the front end and connect the cables again.
5. Remove the J3 axis cable.
- a. Remove the J4 elbow cover to expose the internal structure according to steps described in the section ["3.7.2 J4 Elbow Cover" on page 30](#).
 - b. Based on the cable label, locate the power cable and encoder cable connectors of the J3 axis motor and the cable connector of the J3 axis brake.

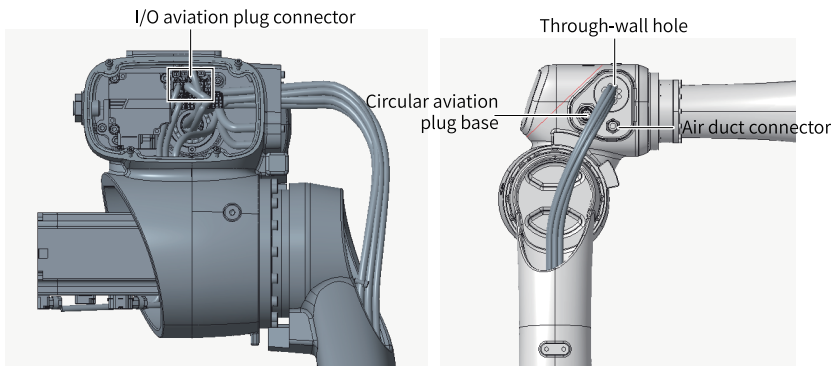


- c. Press the snap-fit joint and disconnect the connector in the direction indicated by the arrow and cut the cable ties. See the figure below.



- d. Use a screwdriver to remove the encoder and power cable plugs from the motor.
 - e. After removing the adapter cable sheet metal from the robot, disassemble the J3 axis motor adapter cable.
6. Disassemble the air duct and I/O cable.
- a. Remove the J4 elbow cover to expose the internal structure according to steps described in the section ["3.7.2 J4 Elbow Cover" on page 30](#).
 - b. After opening the sheet metal panel, press the air duct connector and remove the air duct.
 - c. Use a Monkey wrench to remove the I/O circular aviation plug base.
 - d. Disconnect the I/O aviation plug connector and cut the cable tie.
 - e. Use a Monkey wrench to unscrew the cable wall bushing nut.
 - f. Take all the cables out from the inside of the robot along the threaded holes of the triangle sheet metal.

See the figure below.

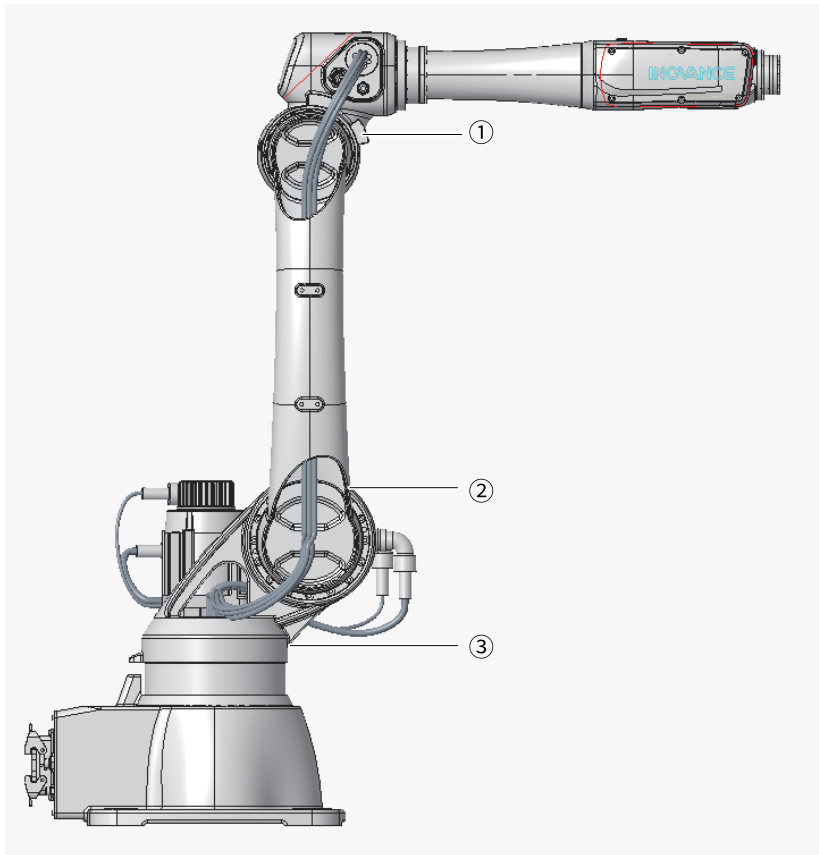


7. Remove the cable fixing sheet metal from the cable tie point.

- Use a screwdriver to remove the sheet metal of the threaded hole.
- Loosen the nut and remove the wire protection sleeve.
- Remove the fixing screws of the sheet metals ① to ③.

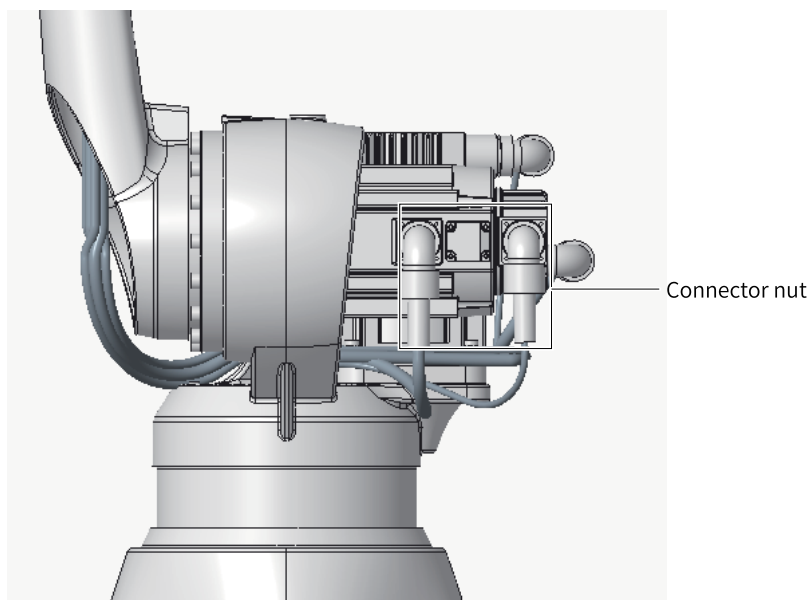
SN	Name
①	J3 axis cable fixing sheet metal
②	J2 axis cable fixing sheet metal
③	Swivel base cable sheet metal

- Cut cable ties along the route, as shown in the following figure.

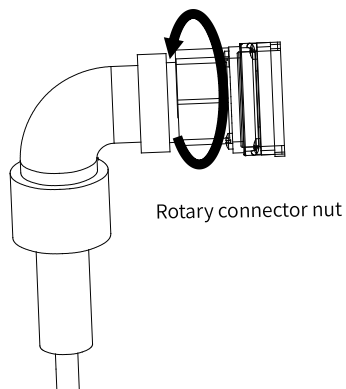


8. Remove the J2 axis cable.

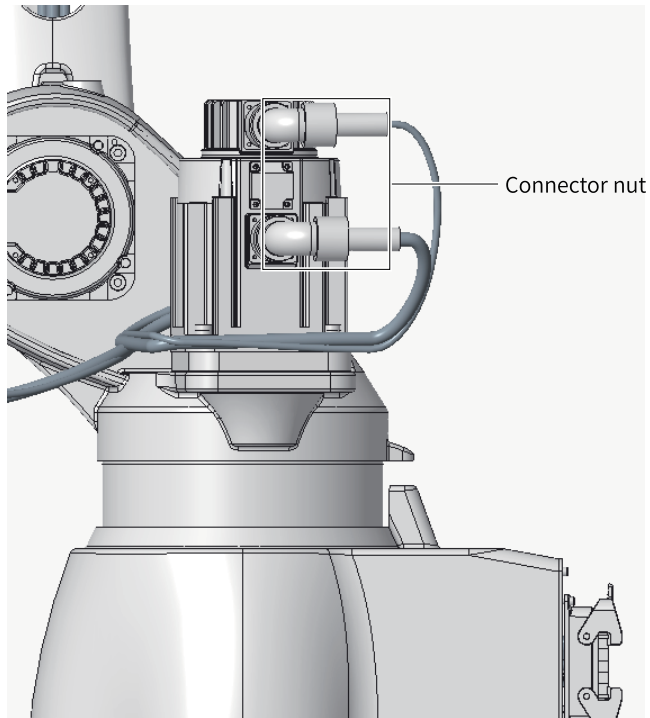
- Based on the cable label, locate the power cable and encoder cable of the J2 axis motor.



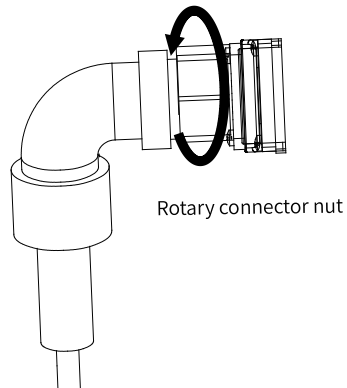
- b. Loosen the connector nut and then remove the connector.



9. Remove the J1 axis cable.
- a. Based on the cable label, locate the power cable and encoder cable of the J1 axis motor.



- b. Loosen the connector nut and then remove the connector.

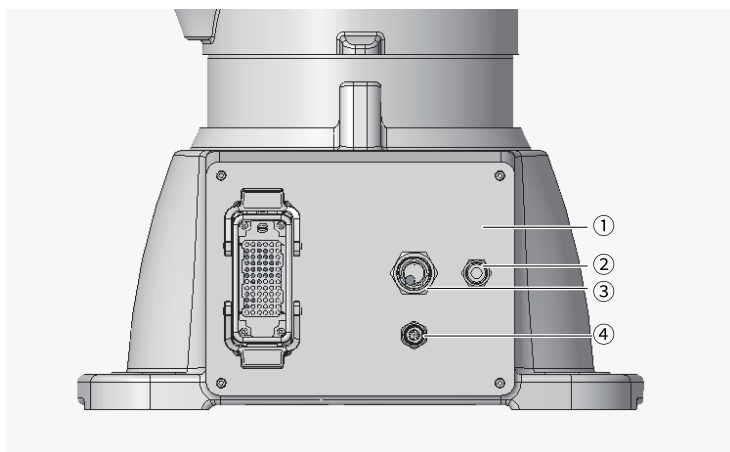


10. Remove the base cables.

- a. Open the electrical cover of the base connector.
- b. Remove the circular brake aviation plug from the sheet metal.
- c. Remove the connector of the I/O aviation plug.
- d. Remove all grounding cables from the grounding bar with a screwdriver.

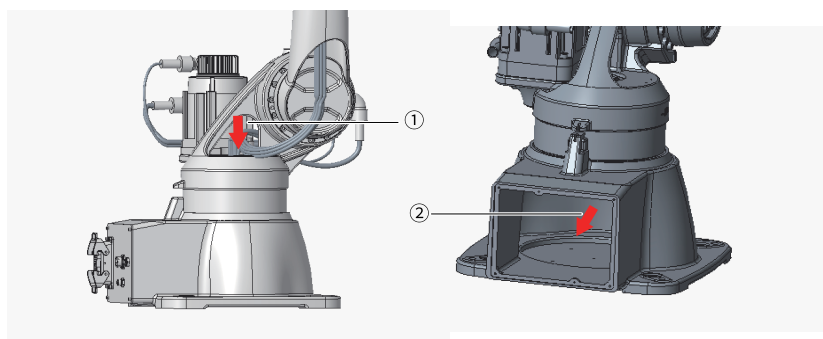
- e. Remove the battery cable connector and remove the air dust from the air duct connector.

No.	Name
①	Electrical cover of the base connector
②	Air duct connector
③	I/O aviation plug
④	Circular brake aviation plug



11. Remove all cables.

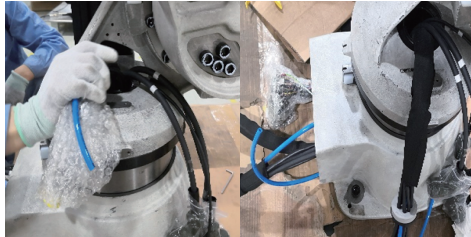
- a. Place all cables from the threaded hole of J1 axis to the base chamber along the arrow ①.
- b. Use a screwdriver to remove the wall bushing inside the cable base.
- c. Take out all cables along the arrow ②.



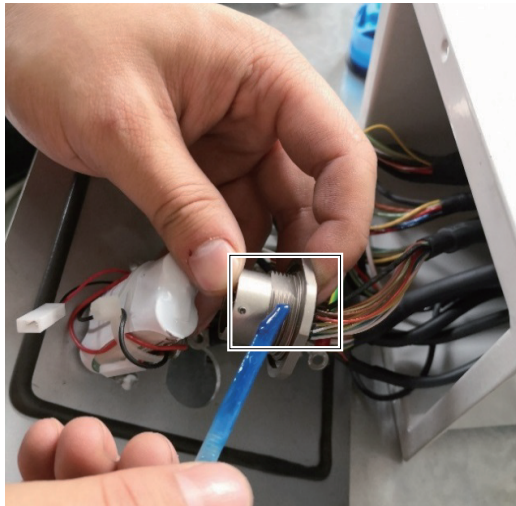
3.11.3 Installing Cables Inside Robot

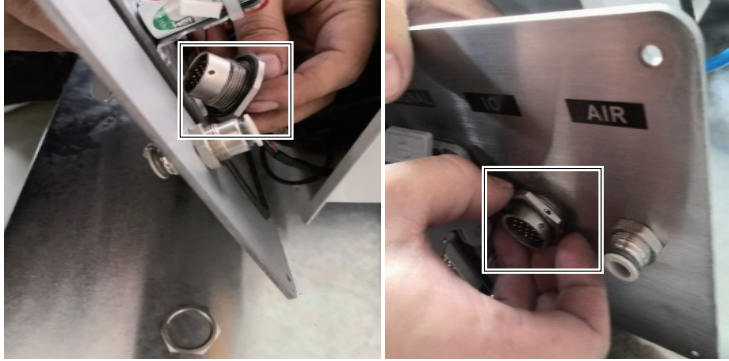
1. Reconnect the cables.
 - a. Prepare cables for replacement and tidy them up.
 - b. Wrap the cable connectors to avoid damage.
 - c. Feed cables into the base chamber.
 - d. Pull the cables from the J1 axis cable duct.

See the figure below.



2. Install the air duct connector, I/O aviation plug, and battery.
 - a. Install the air duct connector to the base electrical mounting plate.
 - b. Apply the LT243 threadlocker evenly to 3 to 4 places on the thread of the I/O aviation plug base, and then use a Monkey wrench to firmly install the base to the electrical mounting plate.





- c. Secure the battery to the sheet metal with a cable tie.
- 3. Install the base heavy-load connector.
 - a. Select the rubber module with size matching the cable diameter, and then press the cable into the installation hole of the module slowly. Ensure that the cable is completely embedded in the module (note: Cables from the module assembly to the inside of the base shall not be crossed or wound).



- b. After assembling the module assembly according to the arrangement specification, ensure that all 10 strands of cables and modules are included, and then fix them to the wall bushing.

8 ₂	6 ₂	4 ₂	10 ₂	1 ₂
7 ₂	5 ₂	3 ₂	2 ₂	9 ₂

Large numbers in the circle indicate the cable number while small numbers indicate the rubber block number. Pass cables through the corresponding rubber blocks and arrange the wall bushings and cables according to the arrangement as shown in the figure.

- c. Use the three M5x60 screws of the wall bushing to firmly fasten the upper mounting strip to the wall bushing with a fastening torque is of 3 N·m.



- d. Thread the installed base cable into the casing in order, use four M4x20 screws to match the flat washer combination, and then apply LT243 threadlocker evenly to 3 to 4 places on the thread.
- e. Accurately install the wall bushing into the reserved hole of the base electrical mounting plate. Tighten them by a torque wrench with a torque of 2 N·m.



Four M4x20 screws and flat washers

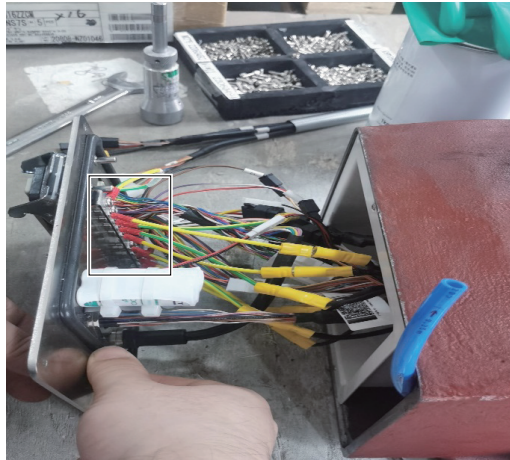
- f. Install the heavy-duty connector and brake aviation plug to the cable plate and orient the heavy-duty connector with fewer pin holes upward.

Fixing bolt of cable terminal

Place terminals with less pins at the top.



- g. Connect all grounding terminals of robot cables to the grounding row and tighten them.



- h. Connect the battery connector and I/O aviation plug connector, and attach air duct to the connector.



- i. Wear gloves to grease the inside of the wire sleeve.

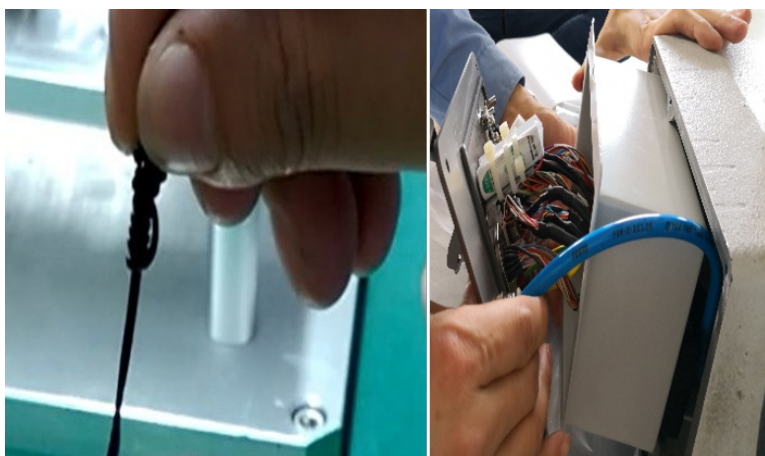


Fix the cable according to the white zip tie mark on the cable.

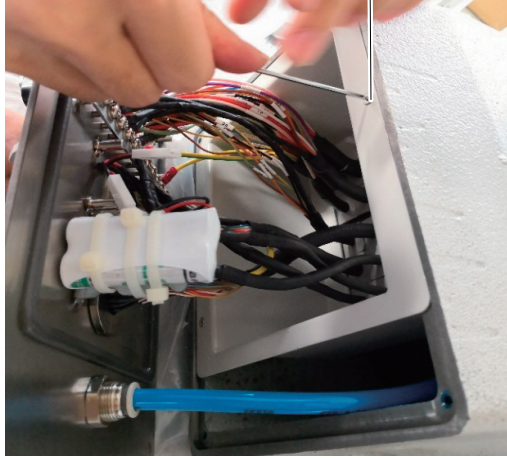
j. Pull down the residual grease first, and then grease the cable.

- At the two mounting holes of the base electrical mounting plate, apply LT243 threadlocker evenly to 3 to 4 places on the thread. Push the cable and the sheet metal assembly into the base connector as a whole, and lock the mounting holes after ensuring accurate alignment.

Install two M3x6 screws into the corresponding holes, and tighten them with a torque wrench with a torque of $3 \text{ N} \cdot \text{m}$.



Two M3x6 screws



- At the four mounting holes of the base electrical mounting plate, apply LT243 threadlocker evenly to 3 to 4 places on the thread. Push the base electrical mounting plate assembly in alignment with the base connector, and lock the mounting holes after ensuring accurate alignment.
Install four M4x12 screws into the corresponding holes, and tighten them with a torque wrench with a torque of 3 N·m.

Four M4x12 screws

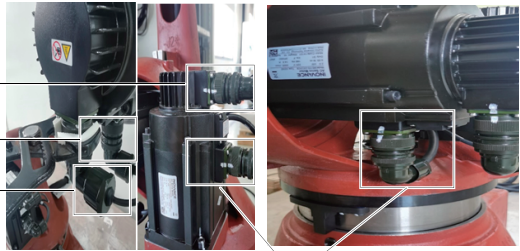


- Install the J1/J2 axis cable.
 - Connect the aviation plugs of the power cables and encoder powers of J1 and J2 axes.

Aviation plug of the J2 axis encoder cable

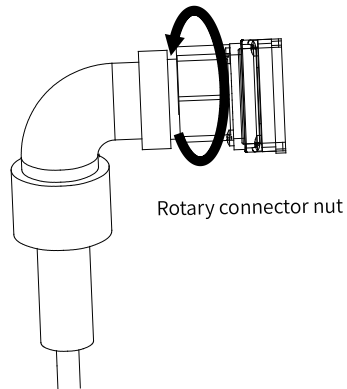
Aviation plug of the J1 axis power cable

Aviation plug of the J1 axis encoder cable



Aviation plug of the J2 axis power cable

b. Tighten the nut with a wrench when necessary. See the figure below.

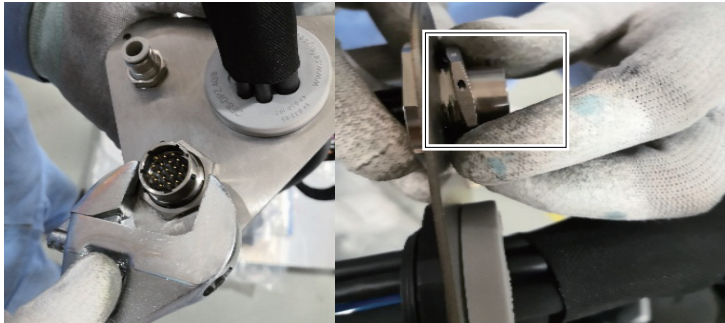
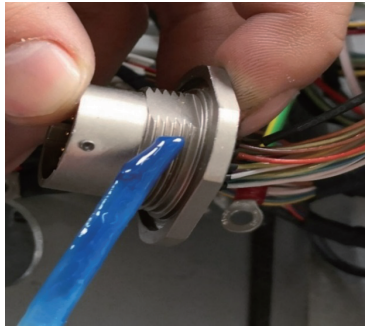


5. Install the elbow cable component.

- Thread the cable from the inside of the upper arm to the upper end, and then remove the nut of the cable hose connector.
- After passing cables through the large circular hole in elbow sheet metal, tighten the wall bushing nut.

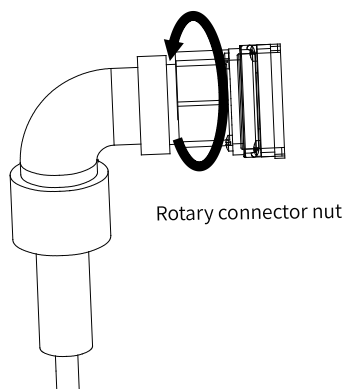


- c. Align the elbow I/O aviation plug with the reserved connector on the inner side of J4 axis pipe clamp mounting plate, and install it with the pin direction facing outside. Then tighten the I/O aviation plug nut.



- d. Use screws to lock the sheet metal to the elbow.



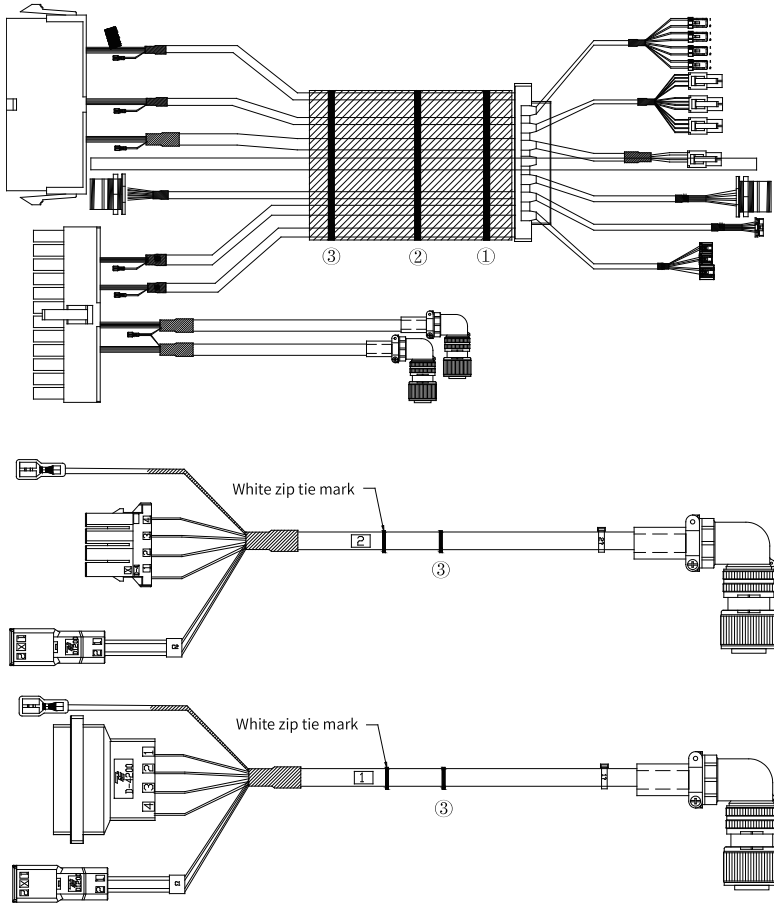


6. Install the cable to the robot body.

a. Fix the cable to the hose fixing clamp.

b. Install cables to the robot cable fixing points according to cable tie points ① to ③.

Note that the cable tie points ①②③ must be installed to the cable fixing points according to Step 4 in ["3.11.2 Removing Cables Inside Robot" on page 74](#).



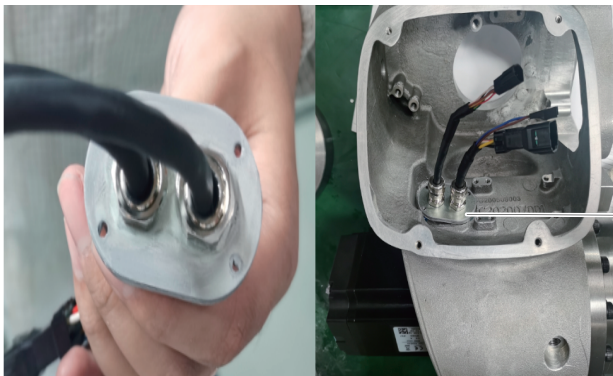
- c. Ensure no twisting or stress on cables/tubes. Reinstall them if necessary. See the figure below.



Four M4x8 cross pan-head screws

7. Install the J3 axis cable.

- a. Apply threadlocker LT 5699 to hole interior, end face, and outer circumference of the wire sealing sleeve.
- b. Install the power cable and encoder cable of the J3 axis motor into the wire sealing sleeve applied with threadlocker.
- c. Pass the J3 axis cables (one power cable and one encoder cable) and the wire sleeve through the corresponding threaded holes at the elbow, and lock the four screws of the sheet metal.
- d. Connect the power connector and encoder aviation plug of the J3 motor respectively, and lock the encoder and power cables of the motor with a screwdriver.



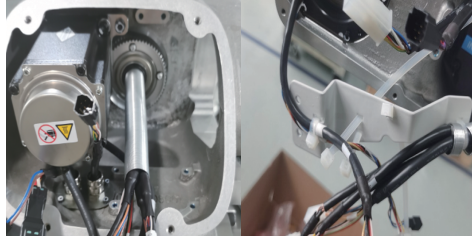
Four M3x8 screws

- e. Tighten the nut.

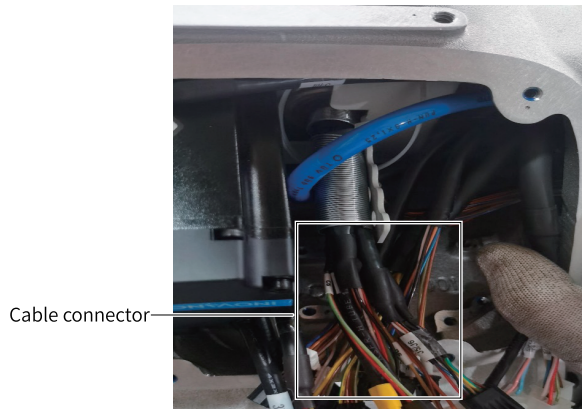
8. Install the adapter cables of axes J5 and J6.

- a. Prepare four 1-m motor cables at forearm and arrange them neatly.

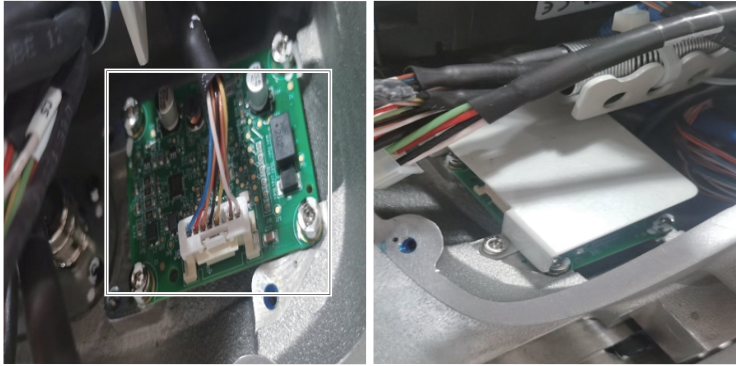
- b. Route cables through rear side of the transition arm into the forearm and out through the forearm.
- c. Pull cables out from right side of the J5 axis motor rear.
- d. Bundle cables to the sheet metal at white marking points.
- e. Reserve a 20-cm length at the elbow, as shown in the following figure.



9. Connect and bundle the elbow cables.
- a. Neatly arrange and bundle cables.
 - b. Connect J3/J4/J5/J6 axis cables at elbow per cable labels.

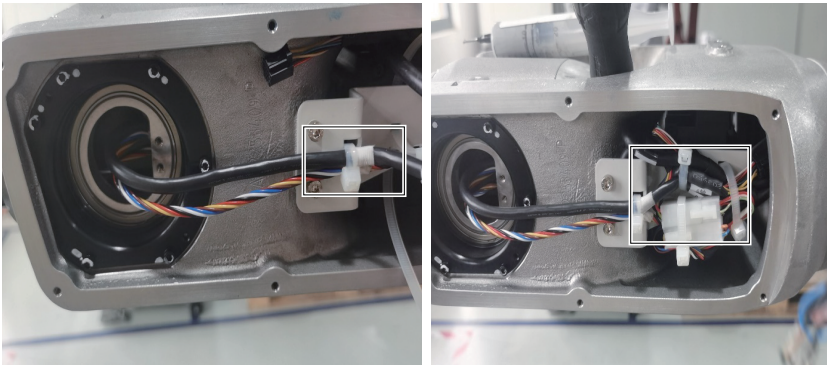


- c. Check whether the air duct is bent. Arrange the remaining cables neatly.
- d. Properly install the gyroscope board terminals and the gyroscope board cover. See the figure below.



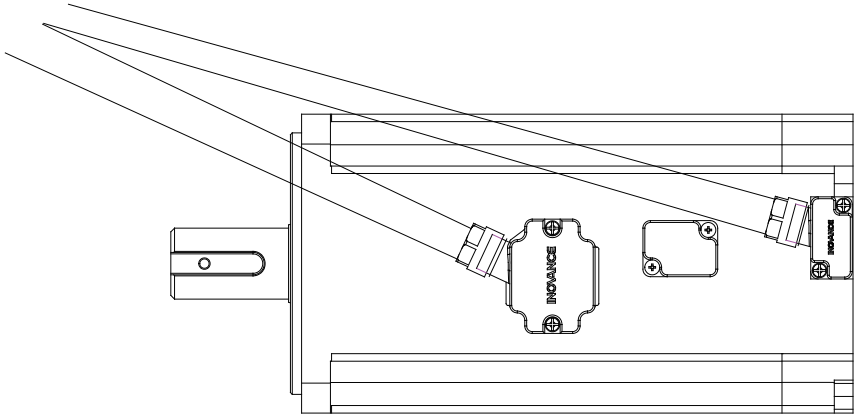
10. Sort and install the forearm cables of J5 and J6 axes.

- a. Connect the forearm cable connectors of J5 and J6 axes per labels.
- b. Arrange the forearm cables of J5 and J6 axes without crossing or bending.
- c. Arrange the harness and secure them with three cable ties.
- d. Arrange the cable harness and plug it into the left side of the tail of J5 motor in the forearm, and tie it with a tie, as shown in the following figure.



3.11.4 Replacing the Motor Cables

Replace the motor cables (1504LT72) after removing and installing the motor according to section "Maintenance and Replacement of Parts" in sections ["3.8.4 J4 Axis" on page 46](#) to ["3.8.6 J6 Axis" on page 57](#). Disassemble the cable connector with a screwdriver, replace the cables and then lock the connector securely, as shown below.



3.11.5 Checking the Internal Cables and Re-installing the Covers



Caution

Ensure that the cable is properly installed. When the cable is loose, it may break due to unnecessary friction with the robot during motion. Check that the air tubes are not bent excessively. Excessively bent air tubes cannot be used normally.

Install the robot enclosures according to the maintenance method described in ["3.7.1 Robot Enclosure Inspection and Tool Preparation" on page 29](#)*Maintenance of Robot Enclosure*.



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