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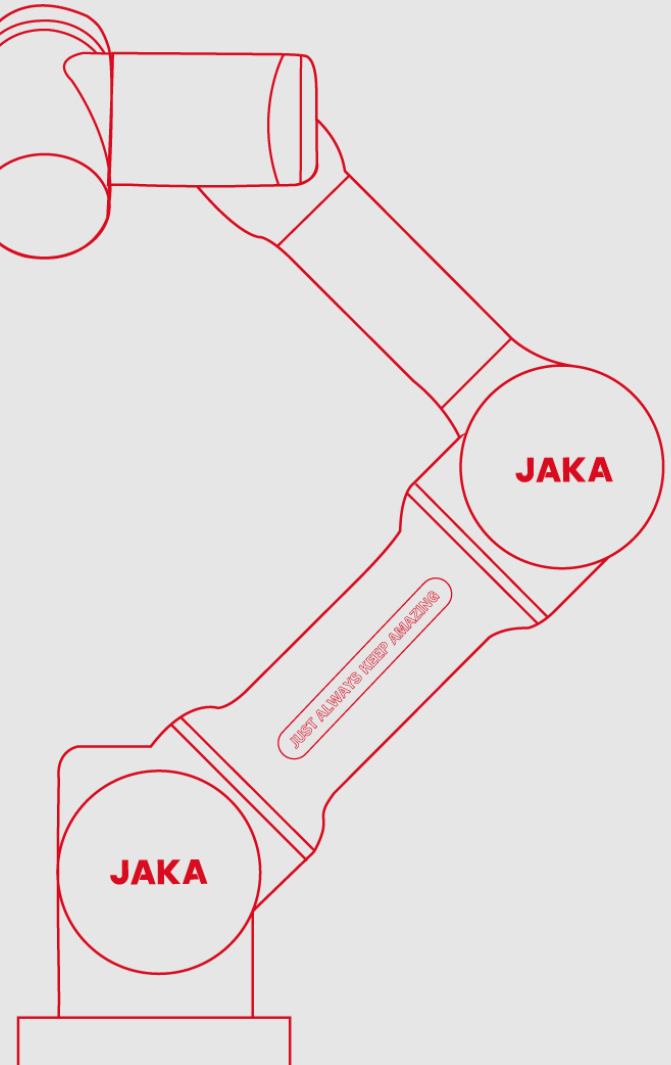
# JAKA Zu Cobot Training Lesson

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03


# Maintenance and Repair

# The maintenance cycle of the electrical cabinet

| Number | Inspection period | | | Maintenance | | | Inspection parts | Inspection content | Inspection methods |
|---|---|---|---|---|---|---|---|---|---|
| | Daily | Every 3 mouths | Every year | Every 4 years | Every 5 years | Every 8 years | | | |
| 1 | √ | | | | | | Exterior of the electrical cabinet | Attached splash, dust and so on | Visual inspections and clean |
| 2 | √ | | | | | | Filters | Whether there is dirt or blocking | Visual inspections, clean or change |
| 3 | | √ | | √ | | √ | Cables | Check whether there is breakage, fragmentation or loose connectors | Visual inspections, tighten the cable<br>If the cable is obviously damaged, please change it. |
| 4 | | | | | | √ | Overhaul | | |

# General maintenance of the electrical cabinet

## 1.1 Clean the electrical cabinet

Cleaning the electrical cabinet at appropriate intervals. Strong solvents or flammable solvents should be avoided, for example, propylene.

## 1.2 Check the cooling of the electrical cabinet

Please avoid the following factors which will effect the cooling of the electrical cabinet:

1. The electrical cabinet covered with plastic or other materials.
2. Not enough space to the front and side of the electrical cabinet.
3. The electrical cabinet is near a heat source.
4. There are sundries on the top of the electrical cabinet.
5. The electrical cabinet is too dirty.
6. One or more cooling fans do not work.
7. The air inlet and/or the outlet is blocked.
8. The air filter is too dirty.

**Note:** when the electrical cabinet is not working, its front door must be kept closed.

# General maintenance of the electrical cabinet

## 1.3 Clean the inside of the electrical cabinet

The inside of the control cabinet should be cleaned at appropriate intervals, such as once a year. Special attention should be paid to keep the cooling fan and air inlet/outlet clean. During the cleaning, use a dust brush and a vacuum cleaner to remove the dust. Do not use vacuum cleaner to clean the electrical cabinet directly, otherwise it will lead to electrostatic discharge and damage.

# Robot Maintenance Items and Intervals

| Intervals | | | Inspection items | Details | Objects |
|---|---|---|---|---|---|
| Daily | Every 3 year | Once a year | | | |
| √ | | | Robot | Confirm whether the positions of the program is deviated or not | Whole |
| | √ | | Cleaning | Remove dirt, splashes and dusts | Whole |
| | √ | | Main bolts | All the exposed bolts should be tightened and marked | Whole |
| √ | | | Motors | Whether there is any abnormal heat or noise | All axes |
| √ | | | Brakes | Whether the robot can hold its position when powered off | All axes |
| | √ | | Reducers | Whether there is any abnormal vibration, noise or grease leakage | All axes |
| | √ | | Clearance | Make sure you don't feel any clearance by applying force to the tool in each direction | The 6th axis |

Maintenance and inspection must be carried out so that robot can keep top performance for a long time.

Personnel who is responsible for the maintenance must prepare and execute maintenance plans.

For checking items, please refer to the table below.

In addition, every 20,000 hours of operation or every four years, an overhaul is needed. If the method of inspection and adjustment is not clear, please contact our service department.

# Bolts Tightening Torques

## Bolts tightening torques table

| Size of bolts | Bolts with hexagon socket | SUS bolts with hexagon socket |
|---|---|---|
| M3 | 1.57 N*m | 1.47 N*m |
| M4 | 3.63 N*m | 3.4 N*m |
| M5 | 7.35 N*m | 6.9 N*m |
| M6 | 12.4 N*m | 11.8 N*m |
| M8 | 30.4 N*m | 28.4 N*m |

Note: tightenning torque will vary according to base material or bolt types. When the content is not mentioned in the instruction, please follow this table.

# Replacement and Preservation of Spare Parts

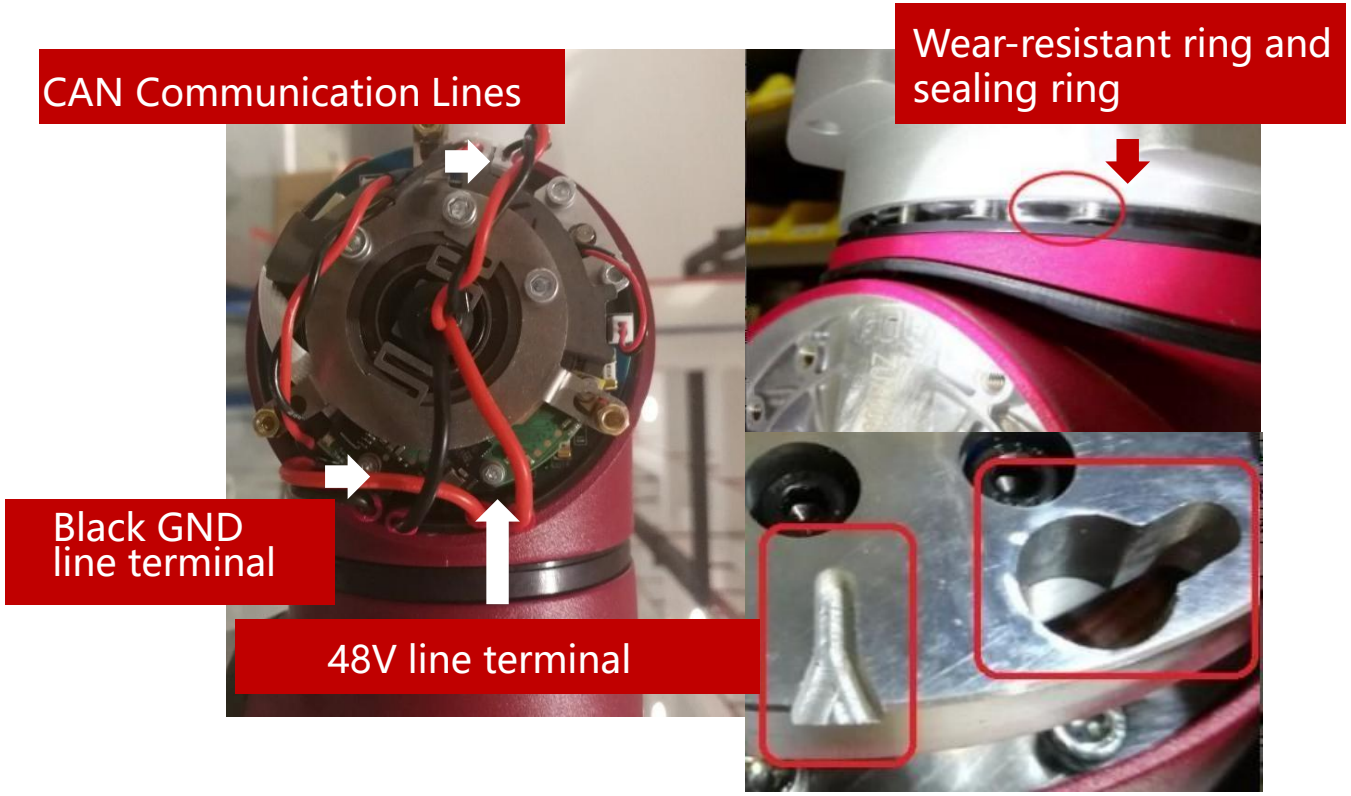
| | |
|---|---|
| **warning** | If touched accidental, it may cause electric shock, causing serious injury or death. |
| **warning** | In order to carry out maintenance and inspection work, when the door of the electrical cabinet is open to connect the power supply once, do not make the electrical cabinet directly exposed to sunlight, spotlight or other strong lights, otherwise it will lead to malfunction or wrong actions. |
| **warning** | Before the operation, workers should release static electricity.<br>Antistatic wristband is very effective.<br>Touch the electrical components directly without any protection may cause the component to malfunction. |
| **caution** | After the operation, check whether there is any gap or whether any cable is clamped.<br>Then, put the cover back on. If there are gaps, the dirt and dust may come inside the electrical cabinet which can cause malfunction. |

# Robot joint replacement

## I. Tool preparation

# Robot joint replacement

## II. Joint disassembly




### Operation steps

I. Open the end cap of the joint with a 2mm inner hexagonal wrench.

II. Unplug CAN, GND and 48V lines.

III. Pull out the wear-resistant ring to expose the joint connecting screws.

IV. Use a 5.5mm open-ended wrench for Joint 4, 5, 6, use a 7mm open-ended wrench for Joint 1, 2, 3. Loosen the screws of the output flange for 3mm.

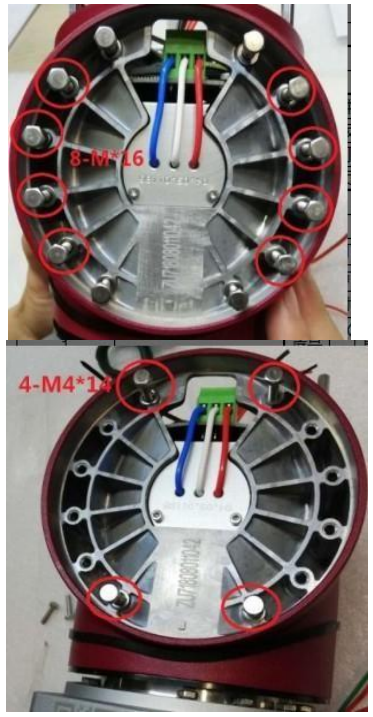
V. The loosened joint should be pulled upwards by about 3 mm to separate the positioning boss from the output flange. Then rotate the joint in the direction of the big hole to remove the joint.

VI. Disassembly is completed.

# Robot joint replacement

## III. Joint assembly

Joint 1, 2, 3




Joint 4, 5, 6


Joint assembly

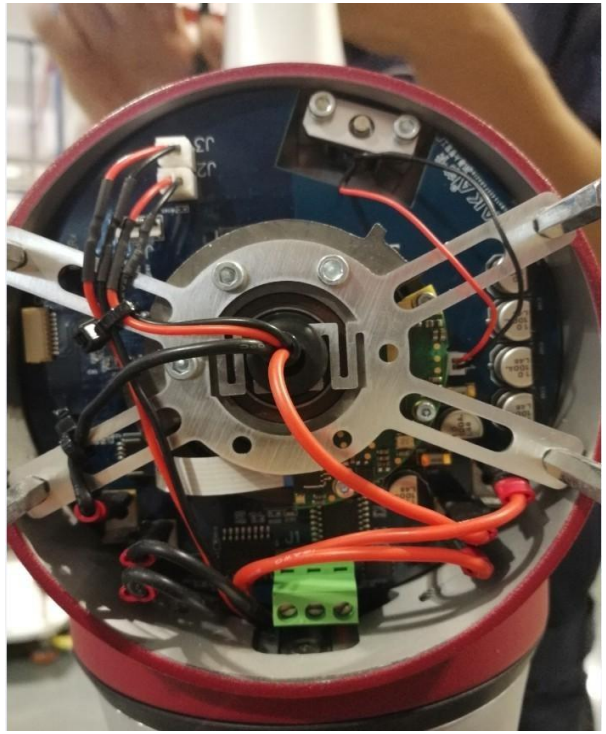
### Operation steps

I. Place the wear-resistant ring and sealing ring on the output shaft. Insert the connecting wires into the joint. Make sure the screw heads are downwards and the washers contact the screw heads. Then align the small positioning boss. Keep the connecting flange 3mm away from the mating surface, and then rotate the joint to insert the positioning boss into the groove.

II. Use the corresponding torque wrench to pre-tighten and then tighten the screws to the designated torques in a diagonal pattern.

# Robot joint replacement

## IV. Joint connector insertion



**Attention:**

I. According to the label on the driving board, the red 48V line, the black GND line, and the CAN line are inserted into the corresponding connectors. Wrong connection should be avoided.

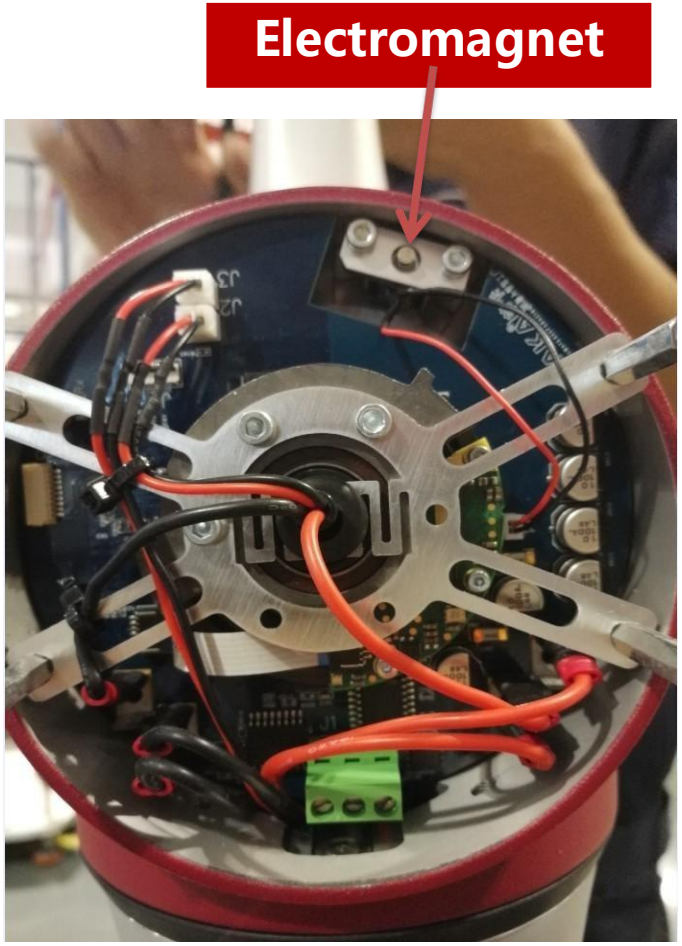
II. The 48V and GND lines of Joint 1, 2, 3 are double-stranded lines. The 48V and GND lines of Joint 4, 5, 6 are single-stranded lines.

# Practice

## Notes

1. Electrostatic bracelets must be worn.
2. When assembling the, make sure the wires are not clamped between the mating surfaces.
3. In the process of tightening the screw with the torque wrench, if there is not enough room for the wrench, the piston of the electromagnet can be pressed down, and then the joint can be rotated to the appropriate position.
4. Check again whether the joint connectors are inserted into place, and the position and sequence of the wires are correct after the replacement.

# Moving the joint without power




In some cases, it may be necessary to move one or more joints in an emergency when the power supply of the robot fails or does not want to use the power supply. The robot joints can be forced to move by the following means:

Manual brake release: remove several M3 screws to remove the end cap of the joint. Press the piston of the electromagnet (as shown in the left picture) down and the brake is released.

**Warning:**

If the brake is released manually, gravity may cause the robot arm to fall. When releasing the brake, it is necessary to support the robot arm, tools and workpieces properly.

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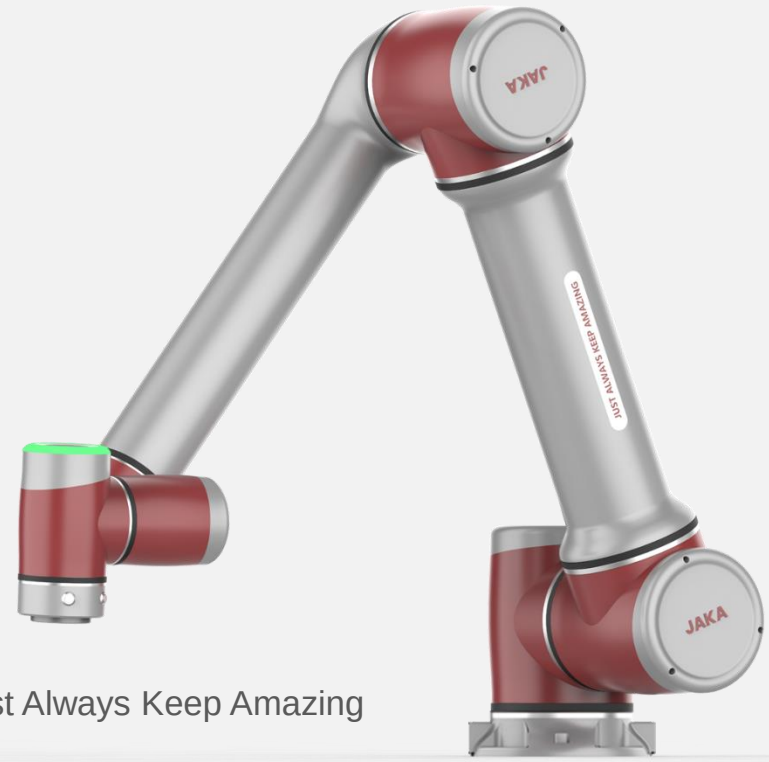
# THANKS

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