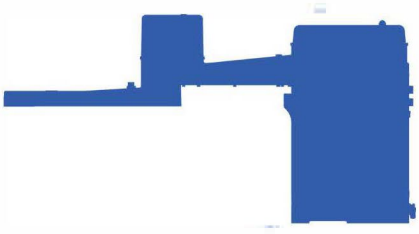
Hermes Robot

Maintenance Manual



Maintenance Manual

Hermes Robot

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QKM Technology (Dongguan) Co., Ltd.

Preface

Thank you for purchasing the robot produced by QKM!
This manual describes the instructions to maintain the robot.
Refer to the manual for maintenance.
Please keep this manual properlwy for future reference

General

This manual provides detailed information on product features, main components, installation guide, system debugging and technical specifications of HM Series Robot so that users can fully understand and properly use the robot.

Target reader

This manual applies to:

Customer Engineer	Technical Support Engineer
Application Engineer	Installation and Debugging Engineer

Signs & meanings

The signs in this document clearly indicate any dangers, warnings, attentions and notes that may occur while users perform the operations described in this manual; Be sure to pay attention to the following signs when they appear in this document.
The signs in this manual are described in the table below:

Signs	Description
	It indicates that a dangerous situation would occur and cause serious personal injury or death if it is not avoided.
	It indicates that a potentially dangerous situation would occur and cause personal injury or robot damage if it is not avoided.
	It indicates that an unpredictable situation would occur and cause robot damage, performance degradation, data loss, etc. if it is not avoided.
	It gives the description on key information and operation tips.

Trademark statement

QKM is the trademark of QKM Technology Co., Ltd., and QKM possesses the ownership of the trademark.

Disclaimer

QKM takes no responsibility for direct, indirect, special, incidental or corresponding losses or liabilities resulted from improper use of this Manual or the product.

This document are subject to change any time due to product upgrade or other reasons. QKM reserves the right to change the product, specifications and other documents in this manual without prior notice. To know about the latest information of this product, please visit QKM's website for downloading.

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Revision history

The version history contains the accumulated information on each update of the document, and the latest version of the document includes the updates in all previous versions of the document.

Version	Date	Change Content
V1.0	01/14/2021	The first version

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Chapter 1 Safety Precautions

1.1 Precautions for operation

The robot system must be maintenanced by safety-trained personnel.

Safety-trained personnel are those who have received safety training (on knowledge, operation, teaching, etc. of industrial robots, knowledge related to inspection and other operations, and related laws and regulations) prescribed by laws and regulations of each country for workers engaged in services related to industrial robots.

- Make sure that there are no other persons within the safety fence before operating the robot system. Operators are safe when the robot always acts in the restricted state (low speed, low power).
- Do not disassemble the parts that are not described in this manual or perform maintenance in a way different from that described. Improper disassembly or maintenance will disable the normal operation of the robot system and may cause serious safety problems.

1.2 Precautions for electrical safety

- Be sure to unplug the power cable and lock the power supply when the robot is not used.
- Be sure to make replacement after turning off the controller and the power of related equipment and unplugging the power plug. If the replacement is performed while the power is on, electric shock or malfunction may occur.
- Reliably connect the cable. Do not place heavy objects on the cable, or forcibly pull or clamp the cable. Failure to do so may result in cable damage, disconnection or poor contact, abnormal system operation or electric shock.
- Do not plug or unplug the cable on the interface panel while the robot is powered on.

1.3 Safety signs

As there are corresponding danger and warnings near the location where the signs are labeled, take sufficient care when operating. In order to operate and maintain the robot system safely, be sure to observe the cautions and warnings on signs.

Table 1-1 Warning signs

Paste Location	Labeling	Notes
A		A triangle sign for warning of high voltage
B		Grounding sign
C		Do not disassemble the robot to prevent failures.
D		A sign for protection against residual voltage

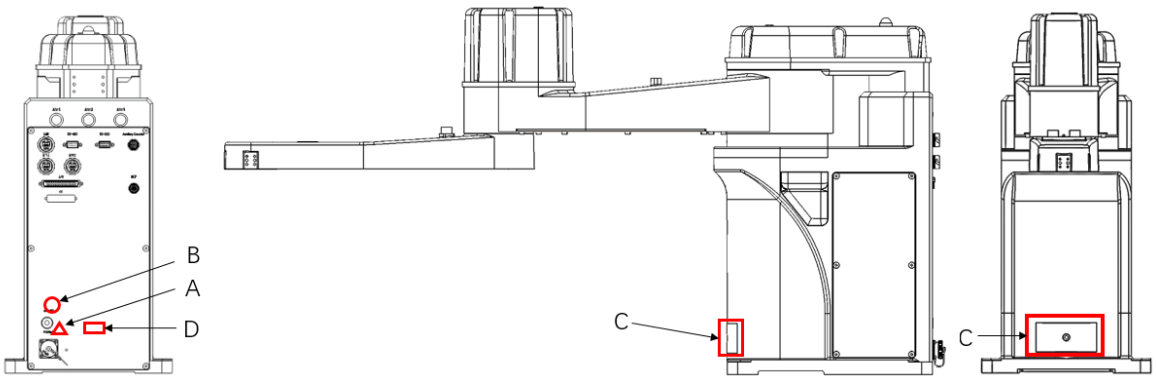


Figure 1-1 Position of warning sign

Chapter 2 Safety Maintenance

2.1 Use of robot in accordance with regulations

Do not use the robot illegally. QKM will not be liable for any loss due to illegal use by users. To ensure the service life of the robot, please regularly maintain it in accordance with this manual.

- Common illegal use:
  - use beyond specified operating range
  - use in area with potential electricity safety risks
  - non-use of additional protective devices
  - use beyond specified environmental requirements
  - overload
  - excessive moment of inertia

2.2 Safe area

Understand the safe area during operation of the robot. Users need to pay full attention to the safe area during use to avoid accidents caused by neglecting it.

- Work area

The work area refers to the range of working area of the robot determined by its motion trajectories and guaranteed by protective devices.

- Protective area
  - The protective area must be larger than the work area, inside which protective devices need to be placed for warning and safe use.
  - Common isolated protective device: safety fence; common safety reminders: warning sign and slogan.
- Dangerous area
  - The dangerous area includes any position where the robot body and the robot arms may pass in their motion trajectories, which can be protected by isolated protective devices to avoid personal injury or property damage.

- When the robot stops running, the robot arms will stop in the dangerous area.

2.3 Emergency stop device

In case of an abnormality in the robot, press the emergency stop device to ensure the safety of personnel and avoid damage to the robot and persons. The emergency stop device needs to be properly set in the industrial robot for convenient operation. Immediately press the device in the event of a dangerous or emergency situation.

➢ The following situation will occur when the device is pressed:

- The robot will stop in the current state and enter the servo-off state.
- To re-start the robot, be sure to turn the emergency stop device to unlock it.
- The emergency stop device is connected via the user interface.

The supporting equipment (such as jigs at the end of robot arms or other devices) of the robot may cause danger and must be connected to the emergency stop circuit of the robot.

2.4 Precautions for general safety

The robot may be damaged in the case of incomplete safety functions and protective devices. Do not use the robot when safety functions are disabled or protective devices are removed.

➢ Operational changes

- After changing the composition of the robot, be sure to check whether it meets the necessary safety requirements and test all safety functions.
- When starting a changed program, test it at a reduced system speed, and then gradually increase the speed.

➢ Fault occurrence

Steps for operation when a fault occurs:

- Turn off the control system of the robot to prevent any unexpected restart without permission.
- Set up an obvious sign at the site where the fault occurs to indicate the fault.
- Record the fault.
- Resolve the fault and perform a function check.

➢ Putting into operation and putting back into operation

Before putting the equipment and devices into operation for the first time, be sure to check them to ensure that the equipment and devices are complete with perfect functions for safe operation and fault identification.

The following checks must be completed before putting into operation for the first time or putting back into operation:

- Check whether all protective devices have been properly installed and functioned well.
- Check whether the electrical wires and cables are properly connected. If compressed air is used, check whether the corresponding air pipes are connected properly.
- When teaching the robot, check whether its work area is reasonable and remove other objects from the work area.

➢ Stop running

Precautions when the robot stops running:

- Reduce the speed of the robot to ensure that the servo of the robot is shut off when the robot can be stopped.
- Recover materials and supplies related to the equipment and ensure that the equipment restores to the safe state for restart.
- Set up protective devices to indicate the current state of the equipment and prevent others from incorrectly operation.

Chapter 3 Routine maintenance and safety inspection

3.1 Routine Inspection

1. Inspection of preparations for robot startup

   Confirm whether the external supporting facilities of the robot are normal before use.

➢ Inspection of cables:

- Check whether the cable at the Ethernet interface is loose.
- Check whether the connectors of wires and cables on the interface panel of the robot body are loose.

2. Start of the robot

- Check whether there are abnormal noises, vibrations, etc. in the robot when starting it.
- Check whether the movable cable and air distribution pipe are normal, and whether they are entangled, pulled, etc.

3.2 Regular inspection

To keep the robot in good working condition, perform maintenance and checks on the following items. Be sure to cut off the power supply before performing maintenance and checks.

The cycle for routine inspection is based on the normal working conditions. For the normal working environment, please refer to the section of environment requirements in "HM Series Robot User Manual". The actual maintenance cycle depends on the operating frequency of the robot.

Table 3-1 Routine inspection and maintenance schedule

Check item	Maintenance cycle	Check content	Recommended maintenance method
Pipeline	Routine	Check whether the external lines are damaged, and whether they are entangled or pulled with each other.	In case of any damage, replace the cable lines; if they are entangled or pulled, re-lay the cables.

Emergency stop switch, external indicator light and button	Routine	Check whether the emergency stop switch works normally, whether the power indicator and system status indicator are displayed normally, and whether the motor brake button is enabled.	If it is ineffective or does not work properly, replace the related component in time.
External screws of the robot	Routine	Check whether the screws of the joints, back plate, side plate, and base are loose or slipped.	If the screws are loose or fall off, tighten them in time. If the screw heads are worn or slipped, replace with new screws immediately.
Internal fan	3 months	Check whether the fan operates normally or dust has accumulated on it.	Clean the dust on the surface of the fan with compressed air; if the fan fails to work, replace the fan.
Robot surface	3 months	Visually check whether there are impact marks or wear.	Wipe with clean cloth or touch up paint.
Encoder battery	6 Months	Use the multimeter to measure whether the battery voltage is lower than 2.8 V.	If it is lower than 2.8 V, replace the encoder battery immediately.
A-axis and B-axis hard limit	6 Months	Check whether there is breakage or damage.	In case of any breakage or damage, replace it.

3.3 Cleaning and maintenance

The maintenance time of the robot mainly depends on the operating environment and use frequency of the robot. The following recommended maintenance items are set under normal working conditions.

Make sure that the robot is powered off before maintenance.

CAUTION

Table 3-2 Routine cleaning and maintenance schedule

Maintenance item	Maintenance cycle	Recommended maintenance method
Robot body	1 month	Wipe dust off the surface with a clean cloth.

Clean the robot with routine disinfectant and cleaning liquid. Do not use acidic cleaning liquid to perform routine maintenance on the robot.

3.4 Safety inspection

Safety system test cycle: generally six months, depending on the actual situation of the user site.

This is to ensure the safety and reliability of the robot. Make sure that the robot is in low-power state, and test any of the following switches and buttons. If any of the test items fails, the robot must be restored to the normal working state before it continues to run.

Test items:

- Emergency stop switch provided by user to operate the robot.
- Emergency stop switch on the manual control pendant (if a manual control pendant is provided for users).
- Manual-automatic switch on the manual control pendant (if a manual control pendant is provided by users).
- Servo enable switch on the manual control pendant (if a manual control pendant is provided by users).

Chapter 4 Maintenance of Mechanical Components

4.1 Cover

This chapter summarizes the cover removal/installation methods common for maintenance of each component.

- Be sure to make replacement after powering off the controller and unplugging the power plug from related devices, otherwise electric shock or malfunction may occur.
- Before disassembling the machine, unplug the power cord and let it stand for more than 10 minutes to discharge residual power from the internal circuit to avoid electric shock.

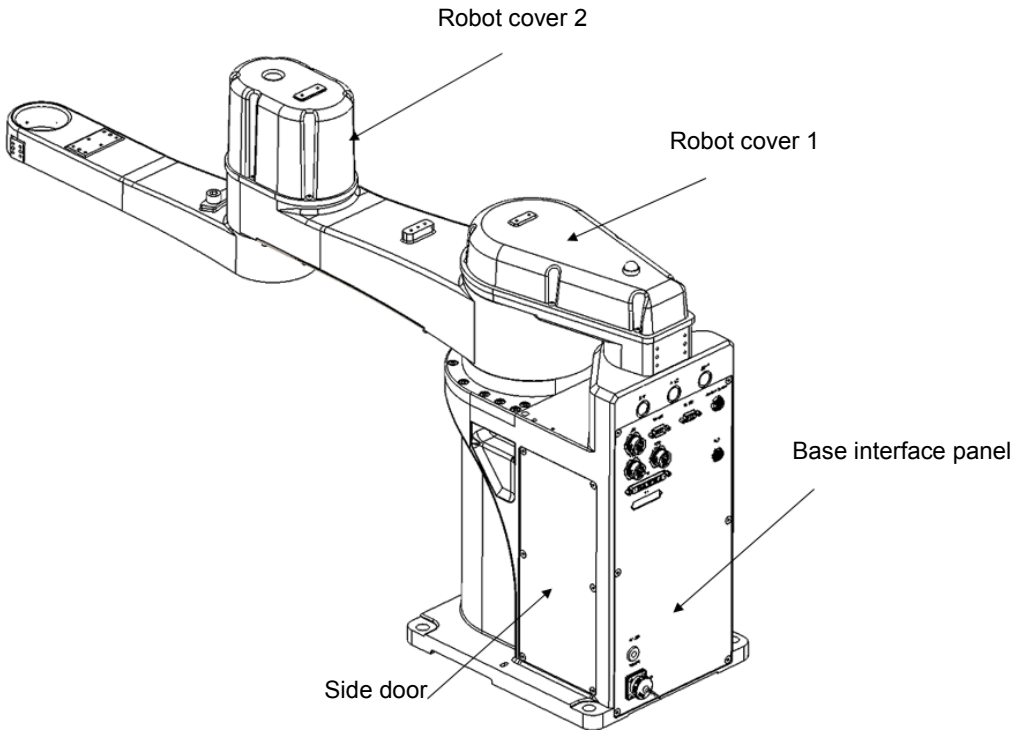


Figure 4-1 Diagram of robot covers

4.1.1 Robot cover

Tools: a set of Allen wrench, a straight screwdriver

Step 1 Use 2.5 mm Allen wrench to remove the fastening screws from the robot cover 1, and take out the robot cover 1, as shown in Figure 4-2.

Note: Take care not to break the LED indicator cable connecting the inside when

removing the cover.

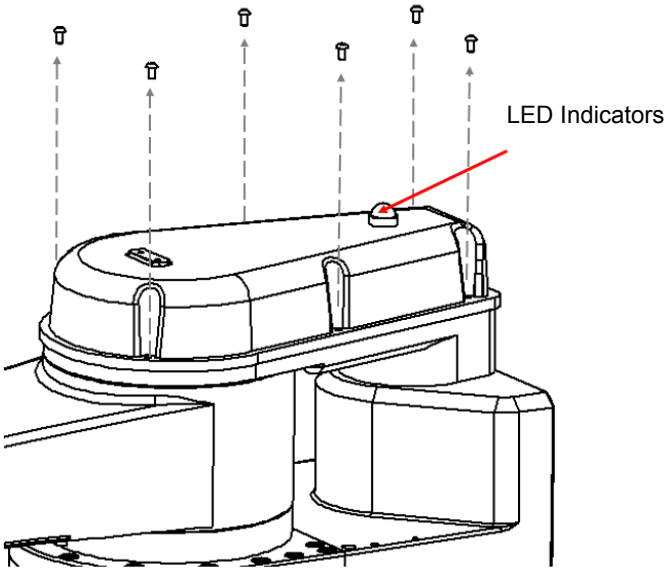


Figure 4-2 Removal of fastening screws

Step 2 Use 2.5 mm Allen wrench to remove the fastening screws from the robot cover 2, and directly take out the robot cover 2, as shown in Figure 4-3.

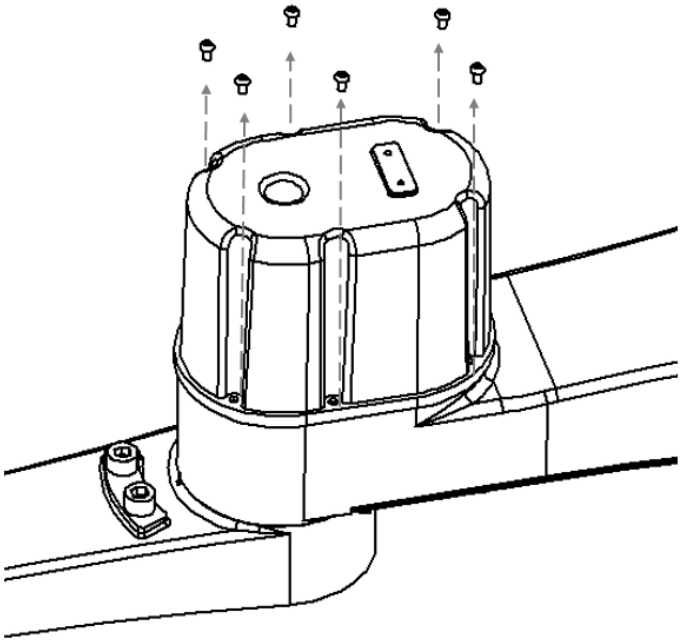


Figure 4-3 Lift the cover

4.1.2 Base side door

Tool: Allen wrench.

Step 1 Use 3 mm Allen wrench to loosen the anti-off screws from the side door of the

base, as shown in Figure 4-4.

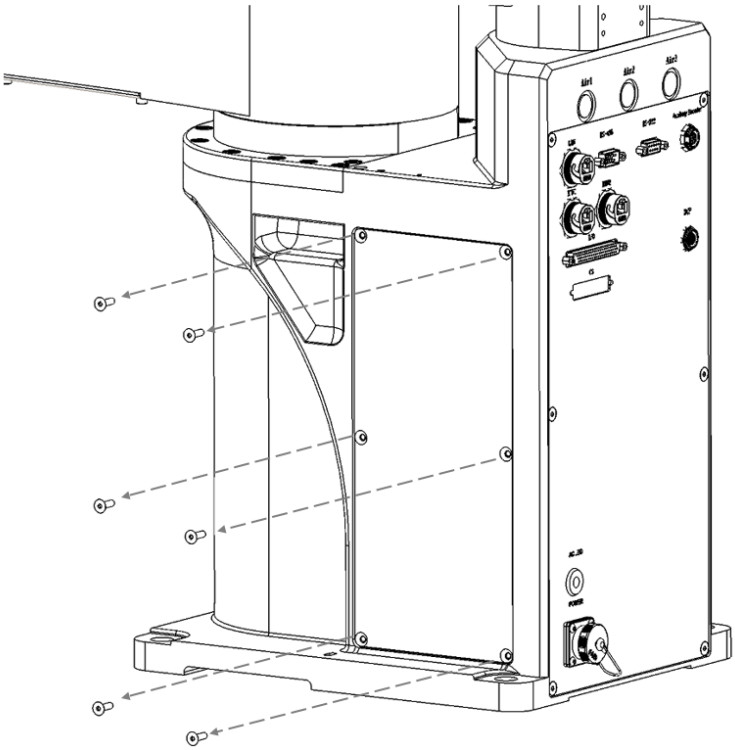


Figure 4-4 Removal of fastening screws

Step 2 Take out the side door of the base, as shown in Figure 4-5.

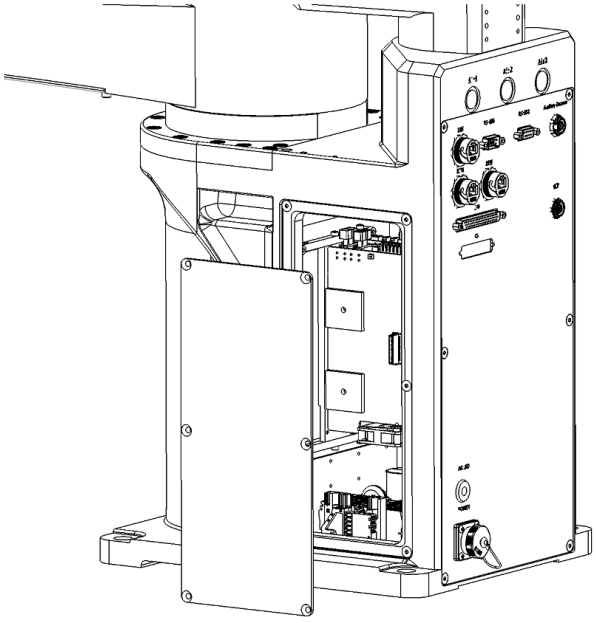


Figure 4-5 Take out the side door of the base

4.1.3 Interface panel

Tool: Allen wrench.

Step 1 Refer to Section 4.3.2 Base side door to remove the side door of the base.

Step 2 Use 2.5 mm Allen wrench to remove the fastening screws from the interface panel, as shown in Figure 4-6.

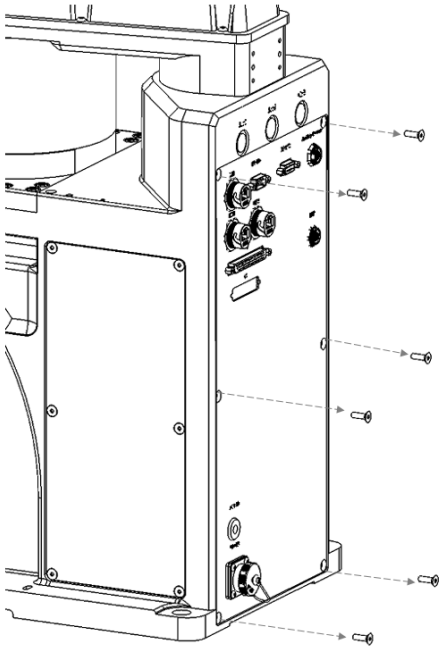


Figure 4-6 Removal of fastening screws

Step 3 Push the upper end of the interface panel outwards, as shown in Figure 4-7.

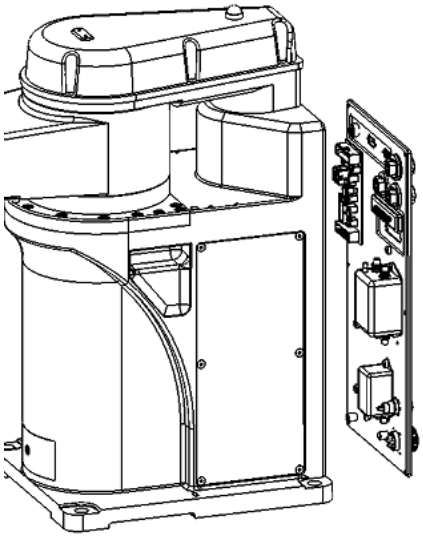


Figure 4-7 Open the interface panel

NOTICE

- Do not pull the interface panel by force. Failure to do so may result in cable damage, disconnection or poor contact, abnormal system operation or power outage.
- When installing the interface panel, do not clasp the cables or forcibly bend them to press in.

Chapter 5 Maintenance of Electrical Components

This chapter summarizes the maintenance operations of each electrical component.

At the time of replacement, keep the removed components properly. To ensure that the appearance of the robot is not damaged, do not scratch the surface of the robot.

- Do not perform maintenance on the electrical components while the power is on. Failure to do so may cause abnormal action of the robot, which is very dangerous; and may also cause electric shock or malfunction.
- Do not allow foreign objects to enter the inside of the mechanical arms and connecting terminals. If the power is on when a foreign object enters, electric shock or malfunction may occur, which is very dangerous.
- Electrical engineer or professional electrical operator shall perform maintenance operations, and wear protective equipment such as anti-static wrist strap to prevent the electrical components of the robot from damage.

5.1 1-axis motor fan replacement

The position of the 1-axis motor fan is shown in Figure 5-1.

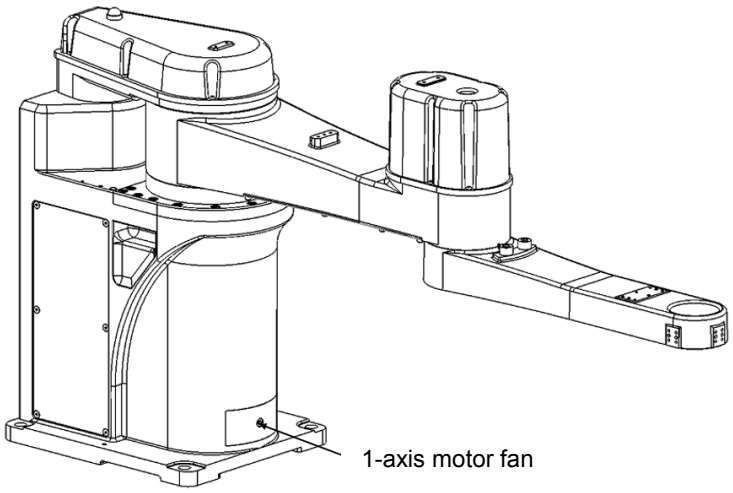


Figure 5-1 1-axis motor fan

Tools and accessories: Allen wrench, fan assembly.

Step 1 Tear off the warning sign, as shown in Figure 5-2.

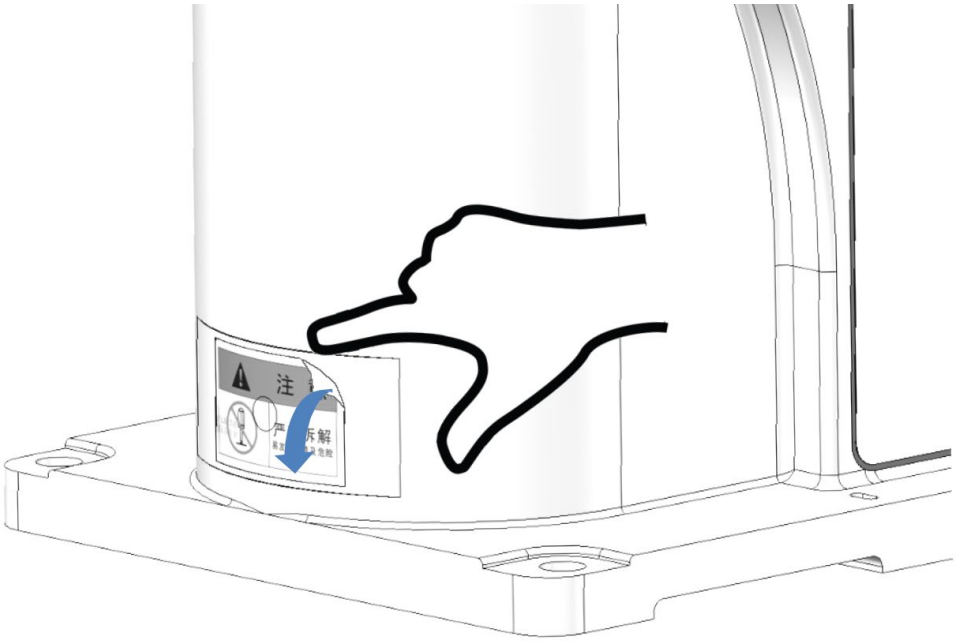


Figure 5-2 Tear off the warning sign

Step 2 Use 6 mm Allen wrench to remove the fastening screws from the protective cover and take out the protective cover, as shown in Figure 5-3.

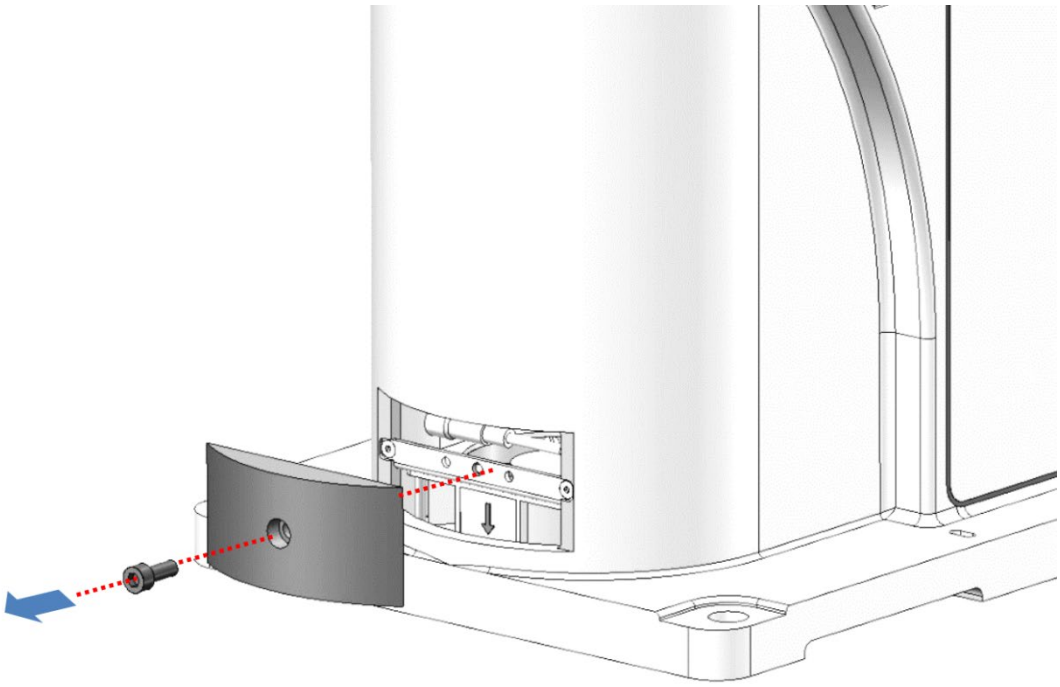


Figure 5-3 Take out the protective cover

Step 3 Use 2 mm Allen wrench to remove the fastening screws from the fan assembly, as shown in Figure 5-4.

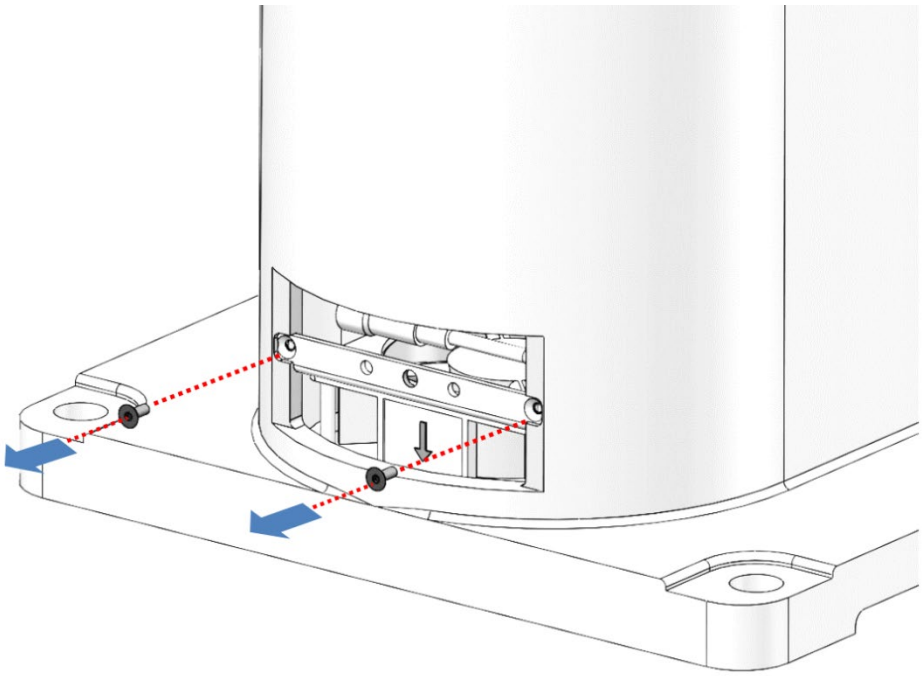


Figure 5-4 Remove the fan assembly

Step 4 Slightly lift the fan assembly and then pull it out, remove the connecting cable; then take out the fan assembly to be replaced, as shown in Figure 5-5.

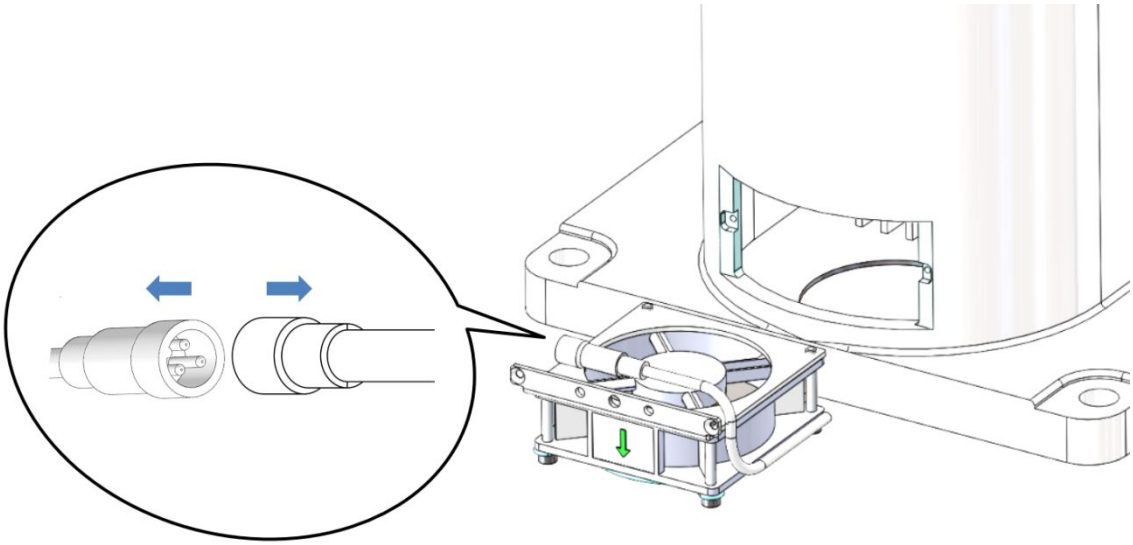


Figure 5-5 Take out the fan assembly

Step 5 Replace with a new fan assembly. After connecting the cable, place the fan assembly in the robot, tighten the fastening screws and install the protective cover.

Step 6 Replace with a new warning sign.

Notes:

1. Do not lose the gasket used at the joint.
2. When placing the new fan assembly into the robot, do not press the connecting cable to

avoid poor contact, etc.

5.2 1-axis motor fan Maintenance

In order to reduce fan alarms and failures caused by dust accumulation and extend its service life, the fan of HM Series Robot needs to be cleaned and maintained regularly.

Tools and accessories: Allen wrench、diagonal pliers and anti-static wrist strap.

Step 1 Remove the fan by referring to Steps 1 to 4 in 5.1.

Step 2 Wipe the dust off the fan surface and blades with a clean cloth until they are clean.

Step 3 Wrap the cables and controllers of the electric control cabinet with shrink film and isolate them. Use an air gun to gently blow the inner wall of the electric control cabinet to remove the easy-to-clean dust attached to it, and then gently wipe the inner wall of the electric control cabinet with a clean cloth. In this way, repeat the cleaning until the dust attached to the inner wall is removed. Prevent dust from entering the control cabinet during cleaning.

Step 4 After cleaning, reinstall the fan in the control cabinet in the reverse order of its removal (note that the air outlet is inward).

- Power off the robot before maintaining or inspecting the fan.
- In the power-on state, visually check whether the fan rotates normally and aurally check whether there is any abnormal noise. In case of any abnormality, find out the cause and solve the fault.
- In the power-on state, connect the upper computer software ARM to the robot body with network cable for communication, and test whether the robot can be servoed and work normally with ARM. If the robot can work normally, it indicates that the output signals of all fans are normal. If the robot cannot work properly, find out the cause and solve the fault. The robot may be servoed and work after the alarm is lift, or the cable may be in poor contact, or the fan is damaged and needs to be replaced.
- After power off, turn the fan with hand to test whether the resistance of the fan is normal. If the resistance is too large, replace the fan.
- Clean the dust on the blades with appropriate intensity. Wipe the dust off the surface with a clean cloth in a cyclic manner until it is clean.
- Make a fan inspection and maintenance record form and perform regular maintenance (as shown in the form below).

Table 5-1 Fan Inspection and Maintenance Record Form

No.	Inspection date	Inspected by	Fan inspection	Maintenance content			Maintenance confirmation		Remark
				Replacement	Cleaning	Maintenance date	Maintained by	Maintenance time	

5.3 24 V switch power module

5.3.1 Power module

The position of the power module is shown in Figure 5-6.

Tools and accessories: cross screwdriver, power module, disposable protective gloves and anti-static wrist strap.

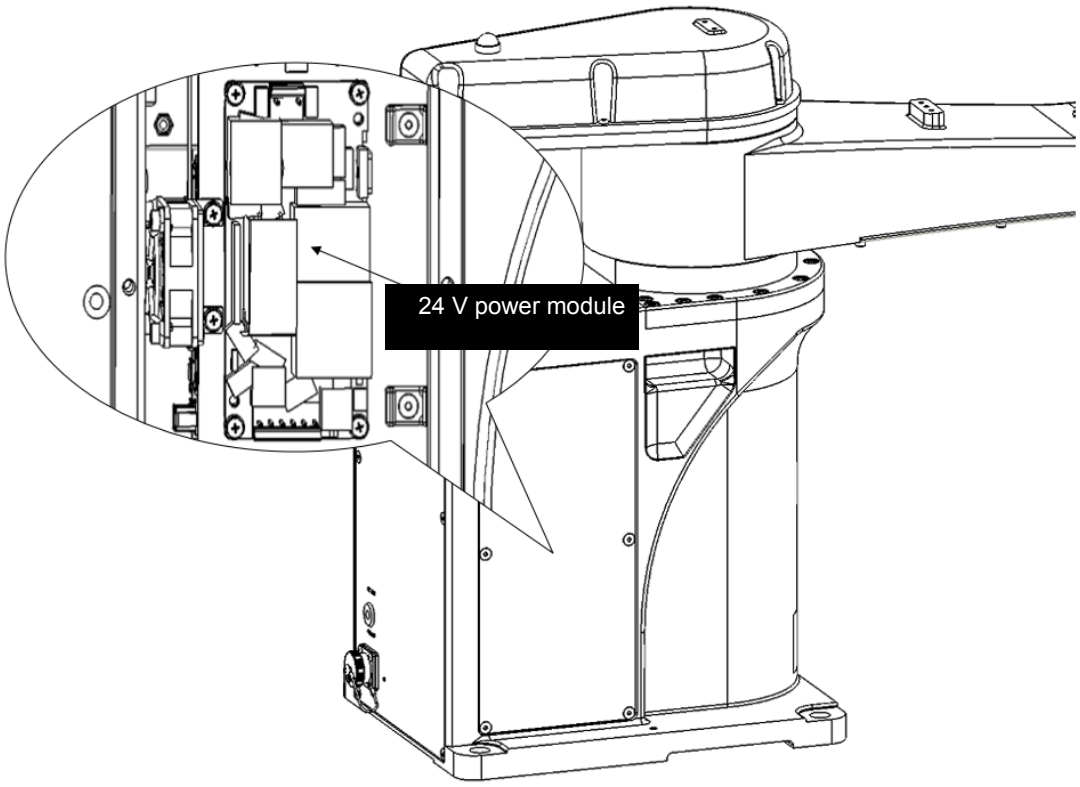


Figure 5-6 Power module

Step 1 Refer to Section 4.3.2 base side door to remove the base side door from the

robot.

Step 2 Refer to Section 5.4.2 power module cooling fan to remove the fan.

Step 3 Unplug the 24 V connector and 220 V connector from the power module, as shown in Figure 5-7.

Step 4 Use the cross screwdriver to remove the fastening screws from the power module.

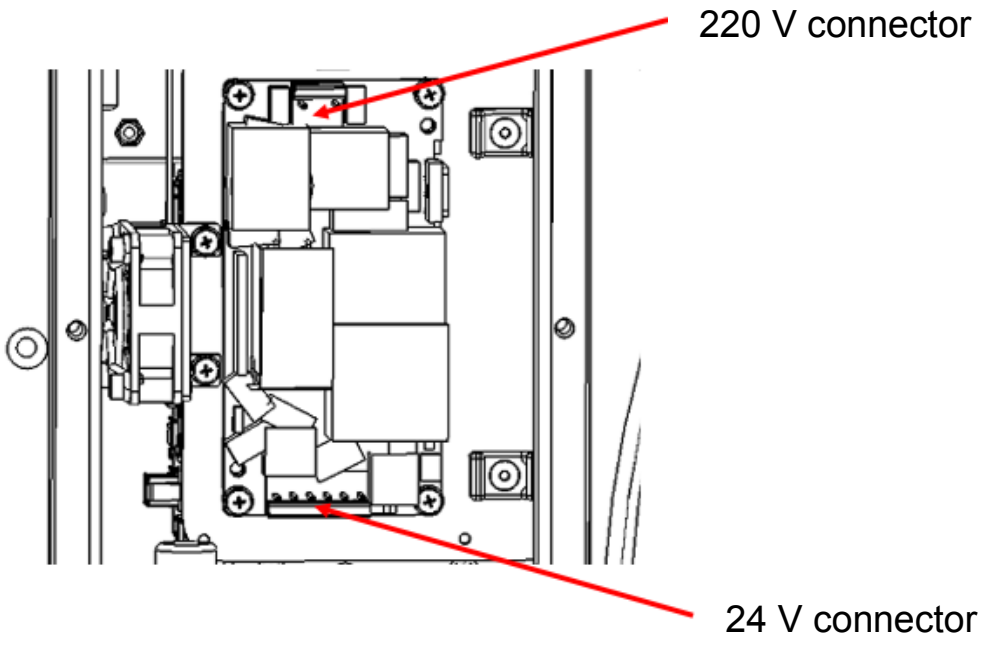


Figure 5-7 Removal of power module

Step 5 Replace the power module in the control cabinet with a new one, plug in the 24 V connector and the 220 V connector.

Step 6 Install the interface panel and base side door of the robot as they are.

Notes:

i. Do not forcibly pull the cables in the control cabinet to prevent them from damage, disconnection or poor contact.

ii. Keep the removed power module properly and do not discard it.

5.3.2 Power module cooling fan

The position of the power module cooling fan is shown in Figure 5-8.

Tools and accessories: Allen wrench, cross screwdriver, diagonal pliers, tweezers, fan assembly, disposable protective gloves and anti-static wrist strap.

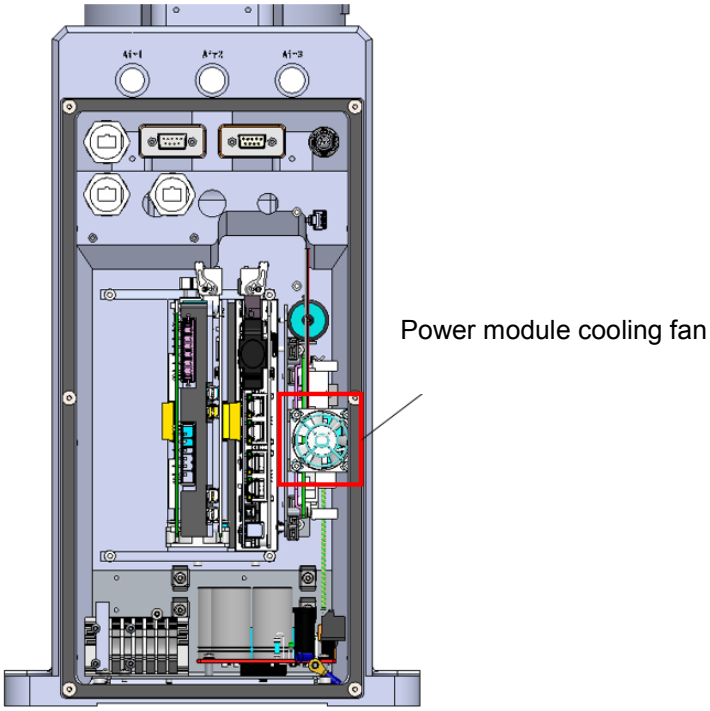


Figure 5-8 Power module cooling fan

Step 1 Refer to Section 4.3.2 Base side door to remove the base side door from the robot.

Step 2 Refer to Section 4.3.3 Interface panel to remove the interface panel from the robot.

Step 3 Use diagonal pliers to remove the cable tie along the fan cable.

Step 4 Find the "CON4 Fan#2" connector on the interface panel, as shown in Figure 59-, and pull out the connector.

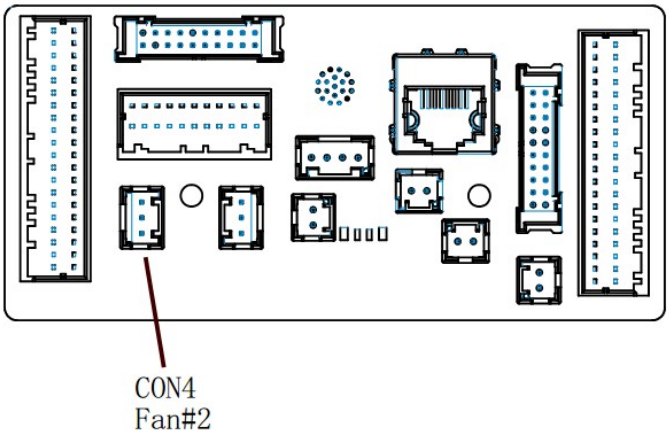


Figure 5-9 Position of control card fan connector

Step 5 Use 3 mm Allen wrench to remove the fastening screws from the power module cooling fan, as shown in Figure 5-10.

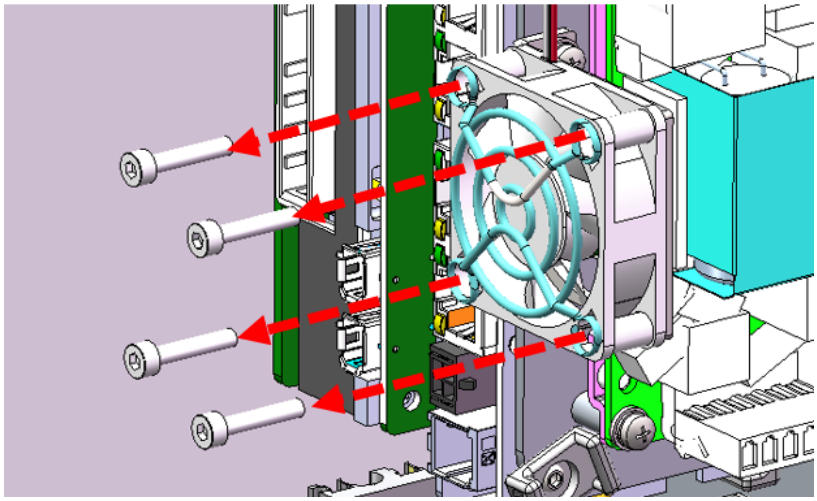


Figure 5-10 Remove the power module cooling fan

Step 6 Install a new fan assembly, plug in the fan connector, restore the fan cable and fix it with a cable tie.

Step 7 Install the interface panel and base side door of the robot as they are.

Notes:

i. This cooling fan is installed in a hanging manner. Hold it carefully during installation and removal to prevent the fan assembly from falling into the control cabinet and damaging other cables.

ii. The control cabinet has a small space, so take care not to touch other connectors when removing the cable ties. Remove the old cable ties from the control cabinet. Do not leave sundries in the control cabinet.

iii. Do not forcibly pull the cables in the control cabinet to prevent them from damage, disconnection or poor contact.

5.4 QBUS module

5.4.1 QBUS

The position of the control card fan is shown in Figure 5-11.

Tools and accessories: Allen wrench, 2 mm - 3 mm straight screwdriver, tweezers, diagonal pliers, disposable protective gloves and anti-static gloves.

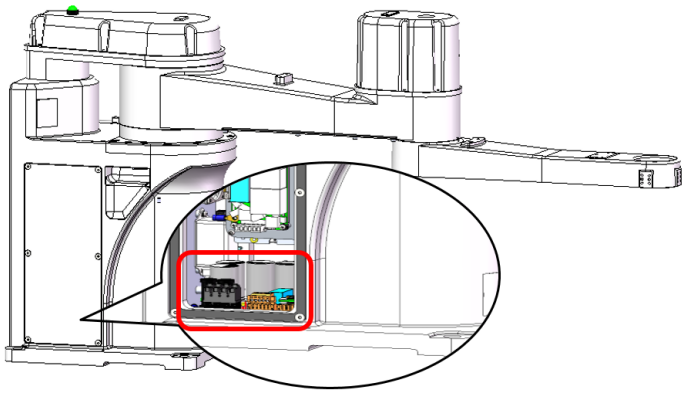


Figure 5-11 QBUS module

Step 1 Refer to Section 4.3.2 Base side door to remove the base side door from the robot.

Step 2 Use the straight screwdriver to remove the connection terminals.

Step 3 Refer to Section 5.5 Replacement and maintenance of controller assembly to remove the controller assembly.

Step 4 Use the cross screwdriver to remove the fastening screws from the QBUS module, as shown in Figure 5-12.

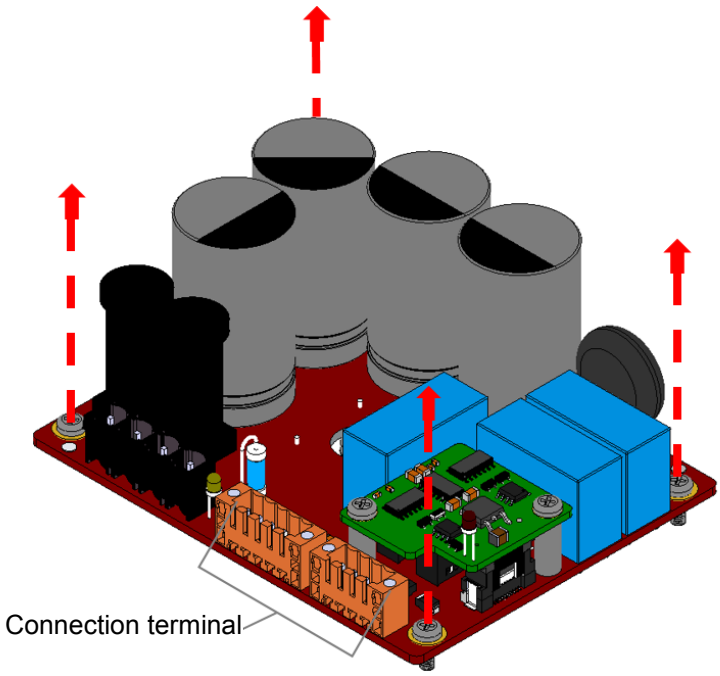


Figure 5-12 Remove the QBUS module

Step 5 Install a new QBUS module and connect to the connection terminals.

Step 6 Install the interface panel and base side door of the robot as they are.

Notes:

i. The lower end of the QBUS module is close to the filter terminal block. Be careful

not to hit other cables when removing the screws.

ii. When installing the connection terminals, make sure that the terminals are firmly connected.

iii. The QBUS module is located inside, so take care not to drop the screws into the control cabinet when installing or removing it.

iv. Do not forcibly pull the cables in the control cabinet to prevent them from damage, disconnection or poor contact.

5.4.2 QBUS fuse

The position of the QBUS fuse is shown in Figure 5-13.

Tools and accessories: straight screwdriver, fuse, disposable protective gloves.

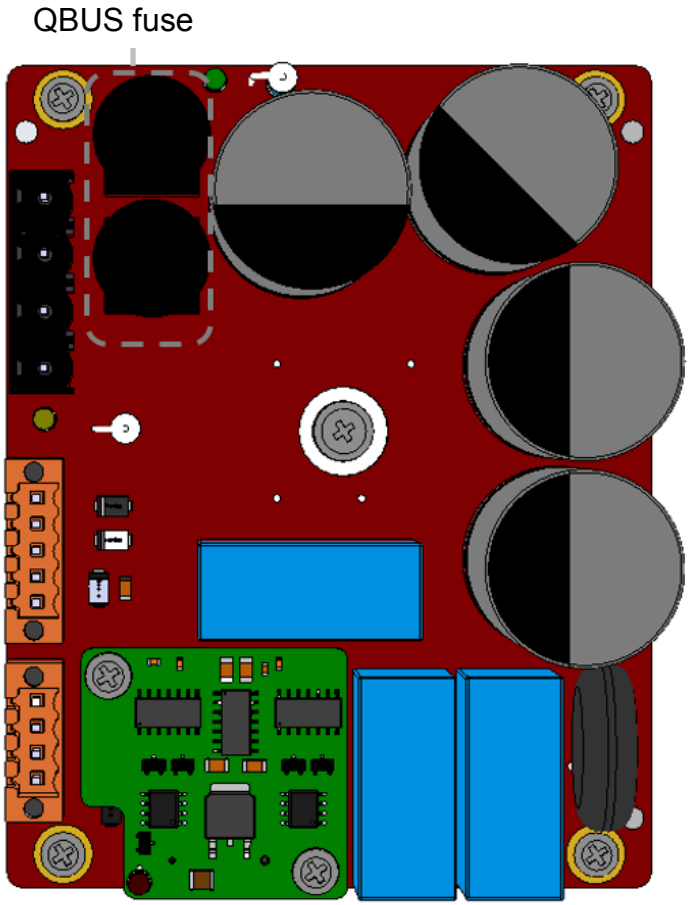


Figure 5-13 QBUS fuse

Step 1 Refer to Section 4.3.2 Base side door to remove the base side door from the robot.

Step 2 Turn the top cover of the fuse counterclockwise to remove the fuse.

Step 3 After installing a new fuse, tighten the cover and install the base side door to restore the robot upon replacement.

5.5 Encoder battery

The position of the encoder battery is shown in Figure 5-14.

Tools and accessories: Allen wrench, encoder battery assembly, disposable protective gloves.

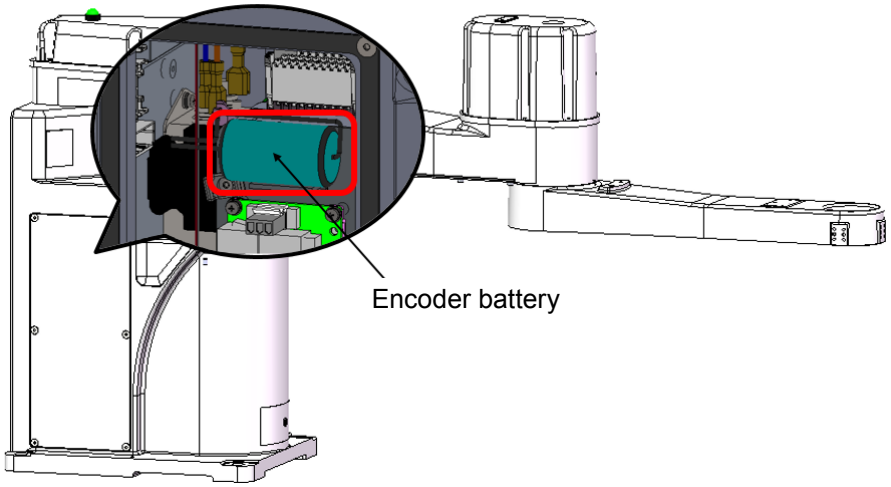


Figure 5-14 Encoder battery

Step 1 Refer to Section 4.3.2 Base side door to remove the base side door from the robot.

Step 2 Refer to Section 4.3.3 Interface panel to remove the interface panel from the robot.

Step 3 Find the unconnected encoder interface on the controller assembly, and insert a new encoder battery. As shown in Figure 5-15, there are two encoder battery interfaces.

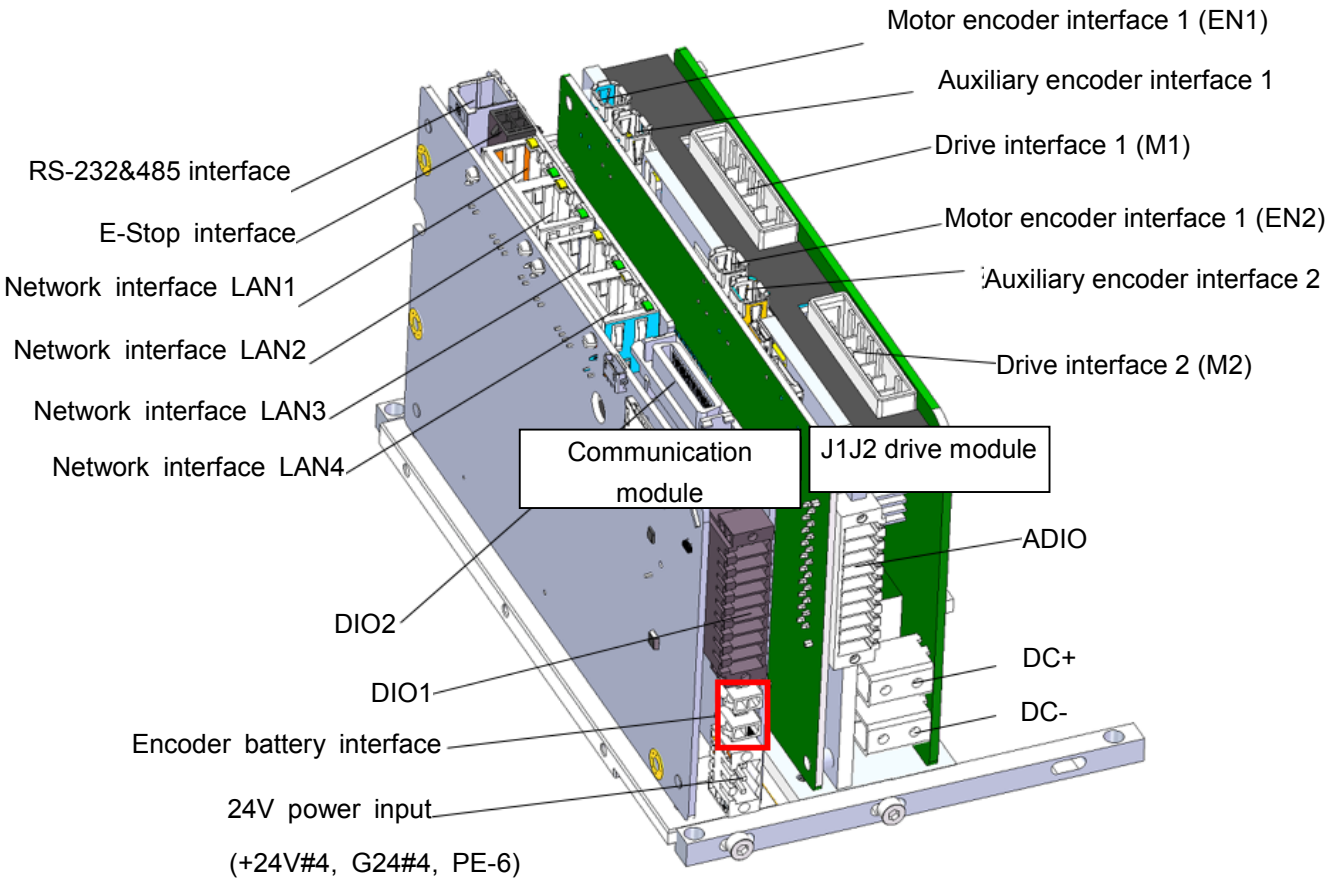


Figure 5-15 Position of encoder battery connector

Step 4 Remove the cable tie, and pull out the connector of the old encoder battery. Fix the cable of the new encoder battery with a cable tie.

Step 5 Install the interface panel and base side door of the robot as they are.

Notes:

i. Be sure to take out the old encoder battery after the new encoder battery is completely connected. If the encoder is powered off, the robot will lose zero, and zero calibration is required.

ii. Remove the old cable ties from the control cabinet. Do not leave sundries in the control cabinet.

5.6 Replacement and maintenance of controller assembly

The controller is located in the robot base. To replace the controller, remove the back and side panels of the base. The position of the controller is shown in Figure 5-16.

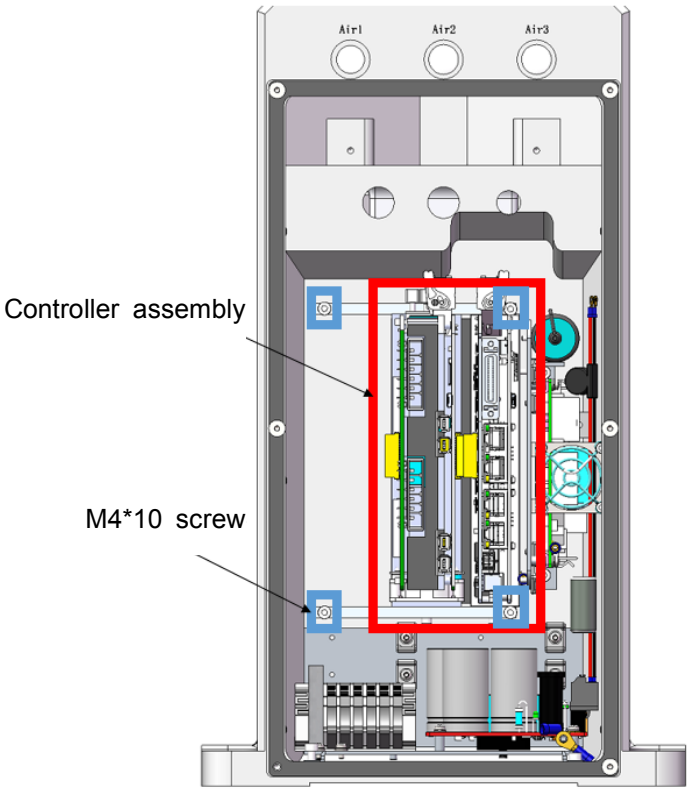


Figure 5-16 Position of controller assembly

Tools: Allen wrench, cable tie, diagonal pliers, controller assembly, anti-static gloves.

DANGER

➢ Back up the data before replacing the controller. After replacement, copy the configuration file of the old controller into the new controller to avoid parameter loss, and then re-calibrate the zero point of the robot. (In case of any problems which cannot be solved by yourself, contact QKM.)

Step 1 Refer to Section 4.2.2 base side door to remove the base side door from the robot.

Step 2 Refer to Section 4.2.3 interface panel to remove the interface panel from the robot.

Step 3 Unplug all the cables connected to the controller, unscrew the 4 M4*10 hexagon socket screws fixing the controller assembly, and then take out the controller assembly.

Step 4 After removing the old control assembly, install a new controller assembly in the base and tighten the screws. Reconnect all the cables to the corresponding connectors of the new controller assembly.

At the time of installation, users shall check whether the interfaces match the line labels, as shown in Figure 5-17.

Avoid damage to the controller due to wrong connection. The line labels corresponding to each interface are shown below:

NOTE

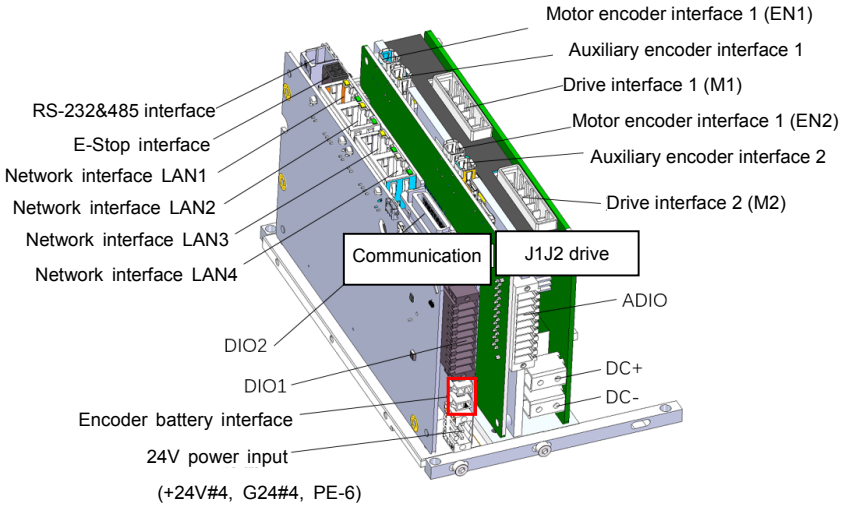


Figure 5-17 Distribution of controller interfaces

Step 5 Restore the back and side panels of the base.

NOTICE

- When plugging or unplugging the encoder cable, push the slider on the connector with hand, and then pull out the connector.
- When reinstalling, do not reverse the wire sequence of DC+/DC-. Check the wire sequence after installation. Tighten the screws.
- When reinstalling, tighten the 24 V power input connector with the straight screwdriver.
- Plug in other connectors to corresponding interfaces to avoid errors and missing.

5.7 Replacement and maintenance of IO-free-distribution PCBA

The IO-free-distribution PCBA is located in the base. To replace and maintain it, the base interface panel needs to be removed. The position of the IO-free-distribution PCBA is shown in Figure 5-18.

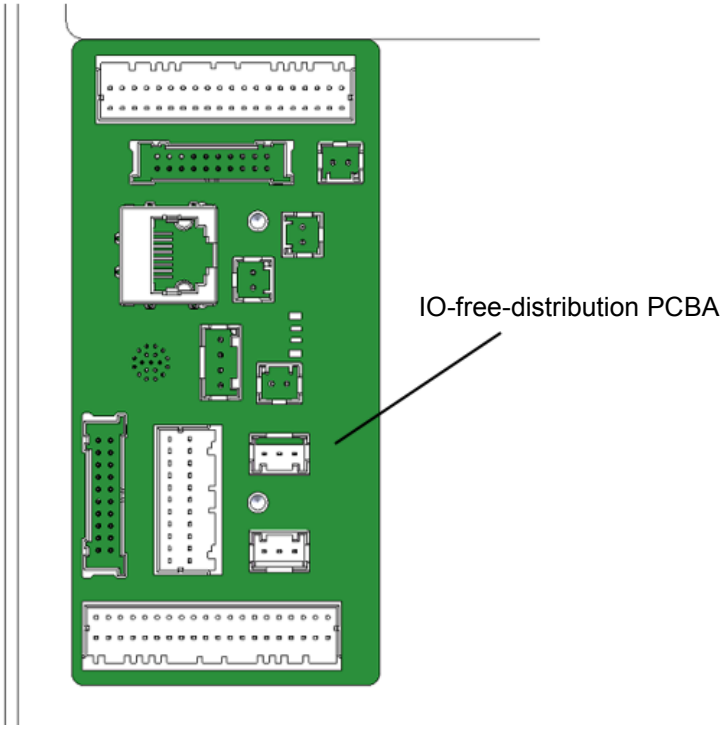


Figure 5-18 IO-free-distribution PCBA in the base

Tools and accessories: Allen wrench, special assembly and disassembly tool for aviation plug, cable tie, diagonal pliers, tweezers, anti-static gloves.

Screw type: hexagon socket head cap screw (M3 * 8)

Step 1 Refer to Section 4.4 to remove the screws from the base interface panel of the robot and gently pull out the base interface panel.

Step 2 Unplug all the cables connected to the IO-free-distribution PCBA.

Step 3 Use the 2.5 mm Allen wrench to loosen the fastening screws on the IO-free-distribution PCBA and remove them. The position of the screws is shown in Figure 5-19.

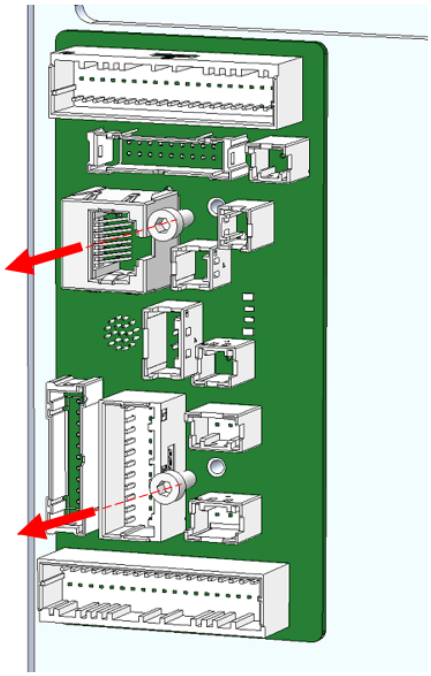


Figure 5-19 Removal of IO-free-distribution PCBA

Step 4 Use the special tool to loosen the nut and remove the IO-free-distribution PCBA. The position of the screw is shown in Figure 5-20.

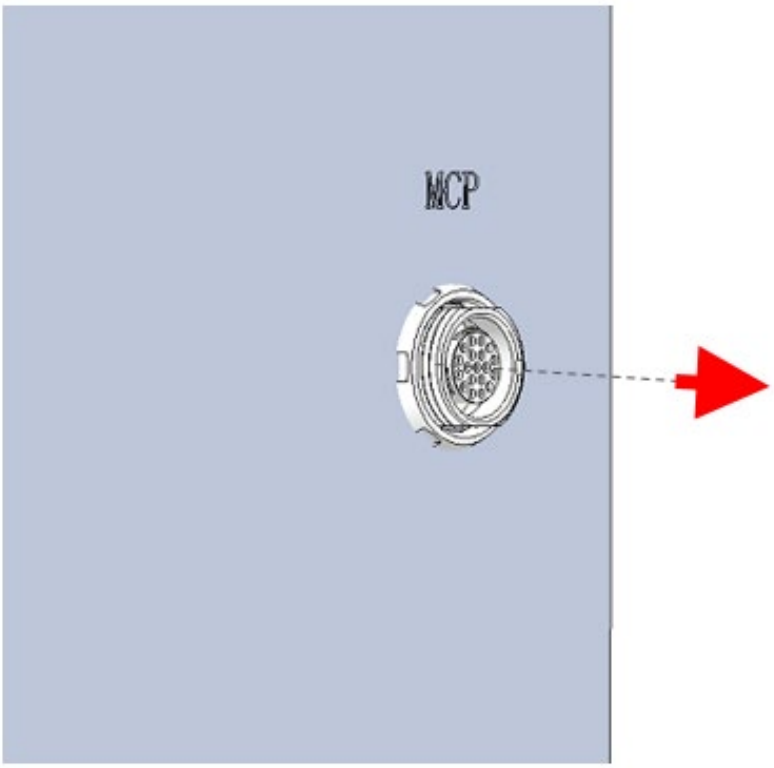
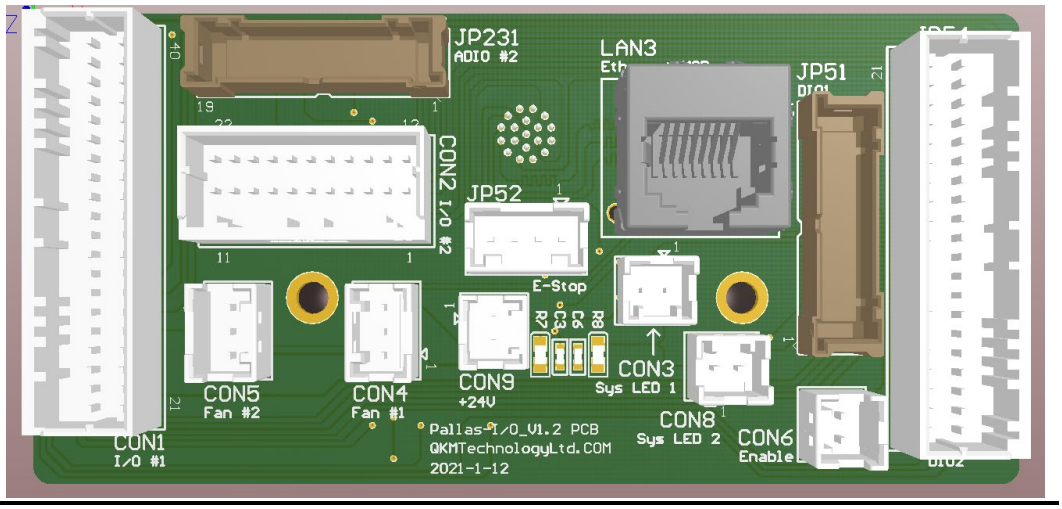


Figure 5-20 Removal of IO-free-distribution PCBA

Step 5 Install a new IO-free-distribution PCBA on the base interface panel and tighten the screws. Connect all the cables to the new IO-free-distribution PCBA.

NOTE

At the time of installation, users shall check whether the interfaces match the line labels and avoid damage to the controller due to wrong connection. The line labels corresponding to each interface are shown below:



Step 6 Refer to Section 4.4 to reinstall the base panel on the robot.

NOTICE

- When plugging or unplugging the connectors of the DIO1 and ADIO#2 cables, clamp the buckles on both sides of the connectors with tweezers before unplugging the cables. Prevent the connectors from being damaged when unplugging.

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