ELITE ROBOTS

ELITE ROBOTS CS Series

CS612 Service Manual

Please read this manual carefully before use

Please carefully check the version information in user manual matches the corresponding software version of the system, to ensure consistency.

This manual shall be periodically checked and revised, and the renewed contents will appear in the new version. The contents or information herein is subject to change without prior notice.

ELITE ROBOT Co., Ltd. shall assume no liability for any errors which will occur in the manual probably.

ELITE ROBOT Co., Ltd. shall assume no liability for the accident or indirect injury as a result of using this manual and the product mentioned herein.

Please read this manual before installing and using the product.

Please keep this manual so that you can read and use it for reference at any time.

The pictures in the specification shall be used for reference only. The goods received shall prevail.

Contents

1 General Information

1.1 Purpose

The main purpose of this manual is to help users perform service-related operations and troubleshooting securely.

Elite robots are designed with high-quality components to ensure a long service life.

But improper use of the robot can cause malfunctions. For example, if the robot is overloaded, does not operate under the load recommended by Elite Robots, falls during repositioning, is damaged by collision or any other improper use, the warranty will be void.

Elite Robots advises users not to attempt to repair, adjust or otherwise intervene in the robot's mechanical or electrical systems without first consulting with Elite certified maintenance engineers. Any unauthorized intervention will void the warranty. Repair-related operations and troubleshooting can only be carried out by qualified personnel.

Before performing repair-related operations, be sure to stop the robot program and disconnect the main power supply for any potentially hazardous tools on the robot or in the work cell.

In the event of a malfunction, Elite Robots recommends ordering new parts from the Elite Robots dealer who purchased the robot.

It's also an option to order parts from the nearest dealer, which can be found on the official website of Elite Robots：www.eliterobots.com.

1.2 Company Details

Suzhou ELITE ROBOT Co.Ltd

Address: Suzhou Industrial Park Changyang Street No. 259 Zhongxin Zhongyuan Industrial Park Industrial Park 4 Building 1F

Tel:0512-83951898

1.3 Disclaimer

If the defect in the equipment is caused by improper handling or failure to follow the relevant information described in the user manual, the Product Quality Assurance is void.

Failures caused by the following conditions are not covered by this warranty:

- Do not meet industry standards or do not install, wire, connect other control equipment as required by the user manual;
- The usage exceeds the specifications or standards indicated in the user manual;
- Use this product for purposes other than those specified;
- Storage method and working environment are beyond the scope specified in the user manual (such as pollution, salt damage, condensation, etc.);
- Product damage due to improper transportation;
- Damage caused by accidents or collisions;
- Install non-original genuine parts and accessories;
- Damage caused by the modification, commissioning or repair of the original parts by a third party other than Suzhou Elite Robot Co., Ltd. or its designated integrators;
- Natural disasters such as fires, earthquakes, tsunamis, lightning strikes, high winds and floods.

The faults other than the above are not caused by the responsibility of Suzhou Elite Robot Co., Ltd.

The following conditions are not covered by the warranty:

- The date of manufacture or the date of commencement of warranty could not be identified;
- Changes to the software or internal data;
- The fault cannot be reproduced or the fault cannot be identified by Suzhou Elite Robot Co., Ltd;
- Use this product in radioactive equipment, biological testing equipment or Suzhou Elite Robot Co., Ltd. as dangerous uses.

According to the product quality assurance agreement, Suzhou Elite Robot Co., Ltd. only guarantees defects and defects in products and parts sold to dealers.

Any other warranties or liabilities, express or implied, including but not limited to any implied warranties of merchantability or specific use, Suzhou Elite Robot Co., Ltd. shall not be

liable for such warranties. In addition, Suzhou Elite Robot Co., Ltd. does not assume relevant liability for any form of indirect damage or consequences arising from related products.

1.4 Warning Symbols

The following warning symbols define the hazard level regulations contained in this manual, pleasecomply with these symbols.

DANGER	This indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	This indicates a hazardous situation which, if not avoided, may result in death or serious injury.
REMINDER	This indicates a hazardous situation, which, if not avoided, may result in minor or moderate injury.
WARNING	This indicates a potentially hazardous electrical situation which, if not avoided,could result in injury or serious damage to the equipment.
WARNING	This safety message identifies potentially hazardous hot surfaces that, if touched, could result in personal injury.

2 Recommended Inspection Activities

General cleanliness

If dust/dirt/oil is observed on the controller or robot arm, it can be wiped clean with a cloth dipped in detergent. Detergent: Water, isopropanol, 10% ethanol or 10% naphtha. In rare cases, small amounts of grease may be seen at the joints. This does not affect the specified function or service life of the joint.

2.1 Controller

Figure 2-1 Controller

2.1.1 Inspection Plan

Below is a checklist of inspections that the Elite robots recommends performing based on marked time intervals. If the inspector finds that the condition of the relevant part is not qualified, correct it immediately.

Table 2-1 Controller inspection plan

Please use the following sections as a guide: 2.1.2 Safety Function 2.1.3 Visual Inspection 3.2 Controller	Way	Once a Month	Every Six Months	Once a Year
Check the emergency stop button on the teach pendant	F	X		
Check the backdrive mode	F	X		
Check the free drive mode	F		X	
Check safety inputs and outputs (if connected)	F	X		
Check the teach pendant cable	V		X	
Check and clean the air filter on the controller	V	X		
Check the terminals in the controller	V		X	
	F	X		
Check the electrical grounding of the controller <1Ω	F			X
Check the master power supply of the controller	F			X

V=Visual inspection   F=Function inspection

2.1.2 Safety Function

Highlighting robot safety features, it is recommended to conduct monthly tests for ensuring correct functionality.

The following tests must be performed:

- To test the emergency stop button function on the teach pendant:
  - Press the emergency stop button on the teach pendant;
  - Observe the robot stop and power off the joints;
  - Start the robot again.
- Test free drive mode:
  - Depending on the tool specifications, remove the attachment or set the tool center point (TCP)/payload/CoG;

- Press and hold the black Freedrive button on the back of the teach pendant to set the robot to free drive mode;
  - Move the robot to a position that stretches horizontally to the edge of its workspace;
  - While holding down the free drive button, monitor the robot to maintain its position without support.
- Test backdrive mode:
  - If the robot is close to an obstacle, the BACKDRIVE function can be used to move the robot to a safe position before initialization;
  - Press ON to enable the power and the status will change to Standby ;
  - Press and hold "Free Drive"-> the status will change to BACKDRIVE (Reverse Drive);
  - Move the robot by hand like a free drive;
  - In backdrive mode, the brake on each single joint will be released when the joint moves under external force, and the released brakes remain released until the free drive button is released. The robot is a bit "clunky" to move compared to the free-drive mode;
  - Test each joint individually to ensure that the brakes are released as expected.
- Verify security settings:
  - Verify that the robot's safety settings comply with the risk assessment for robot installation.
- Test other safety inputs and outputs still working:
  - Check which safe inputs and outputs are active and test if they can be triggered.

2.1.3 Visual Inspection

- Disconnect the power cord from the controller;
- Check that the terminals on the safety control board are properly inserted and that the wires are intact;
- Check all connections on the motherboard and the connections between the security control board and the motherboard;
- Check the inside of the controller for dirt/dust and, if necessary, clean with a vacuum cleaner that prevents electrostatic discharge.

2.1.4 Clean and Replace the Filter

- The controller has two filters, one on each side;

Figure 2-2 Controller filter position

- Remove the filter from the controller and clean it thoroughly with low-pressure air;
- Replace the filter as needed;
- Gently remove the outer plastic frame and maintain the filter.

Figure 2-3 Controller filter disassembly and assembly
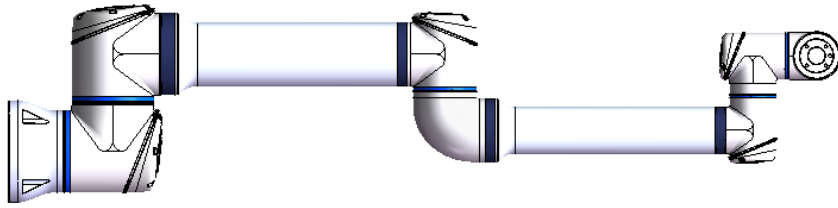
2.2 Robot Arm

Figure 2-4 Robot arm

2.2.1 Inspection Plan

Below is a checklist of inspections that the Elite robots recommends performing based on marked time intervals. If the inspector finds that the condition of the relevant part is not qualified, correct it immediately.

Table 2-2 Robot arm inspection program

Please use the following sections as a guide: 2.2.2 Functional Inspection 2.2.3 Visual Inspection	Way	Once a Month	Every Six Months	Once a Year
Check blue lid*	V		X	
Check the screws on the lids	F		X	
Check the rubber ring	V		X	
Check the robot cable	V		X	
Check the robot cable connection	V		X	
Check the robot arm mounting bolts*	F	X		
Inspection tool mounting bolts*	F	X		
Check the screws/bolts that connect the joints*	F		X	

V=Visual inspection   F= Functional inspection   *= It must also be checked after a serious collision

2.2.2 Functional Inspection

The purpose of the functional test is to ensure that the screws, bolts, tools and robot arm are not loose. Screws/bolts mentioned in the inspection plan should be checked with torque wrenches and the torque should comply with the provisions in 3.2.4 Torque Values:

For robot arm mounting bolts, these specifications can be found in the "Robot Arm Mounting" section of the User Manual.

2.2.3 Visual Inspection

- Move the robot arm to the origin position (if possible);
- Turn off the controller and disconnect its power cord;
- Check the cable between the controller and the robot arm for any damage;
- Inspect the rubber ring for wear and damage:
  - If the rubber ring is worn or damaged, please replace it.
- Inspect the lids on all joints for any cracks or damage:
  - If the joint cap is cracked or damaged, please replace it.
- Check that the screws of the lid are in place and tighten properly:
  - Replace the screws as needed and tighten them appropriately;
  - The correct torque value of the screws on the joint lids is 0.5 Nm.

If any damage to the robot is found during the warranty period, please contact the dealer who supplied the robot.

3 Repair and Replacement of Parts

3.1 Other

3.1.1 Handle Parts that Are Susceptible to Electrostatic Damage

To protect parts that are vulnerable to electrostatic damage, follow the instructions below. In addition, there are standard precautions, such as turning off the power before removing the board.

When using the heating during the colder weather, be very careful about using parts that are susceptible to static damage, since low humidity will the increase generation of static electricity.

3.1.2 Recommended Tools

Repair Kit - Item No.:NB80000004

3.2 Robot Arm Disassembly and Assembly

3.2.1 Robot Arm Configuration
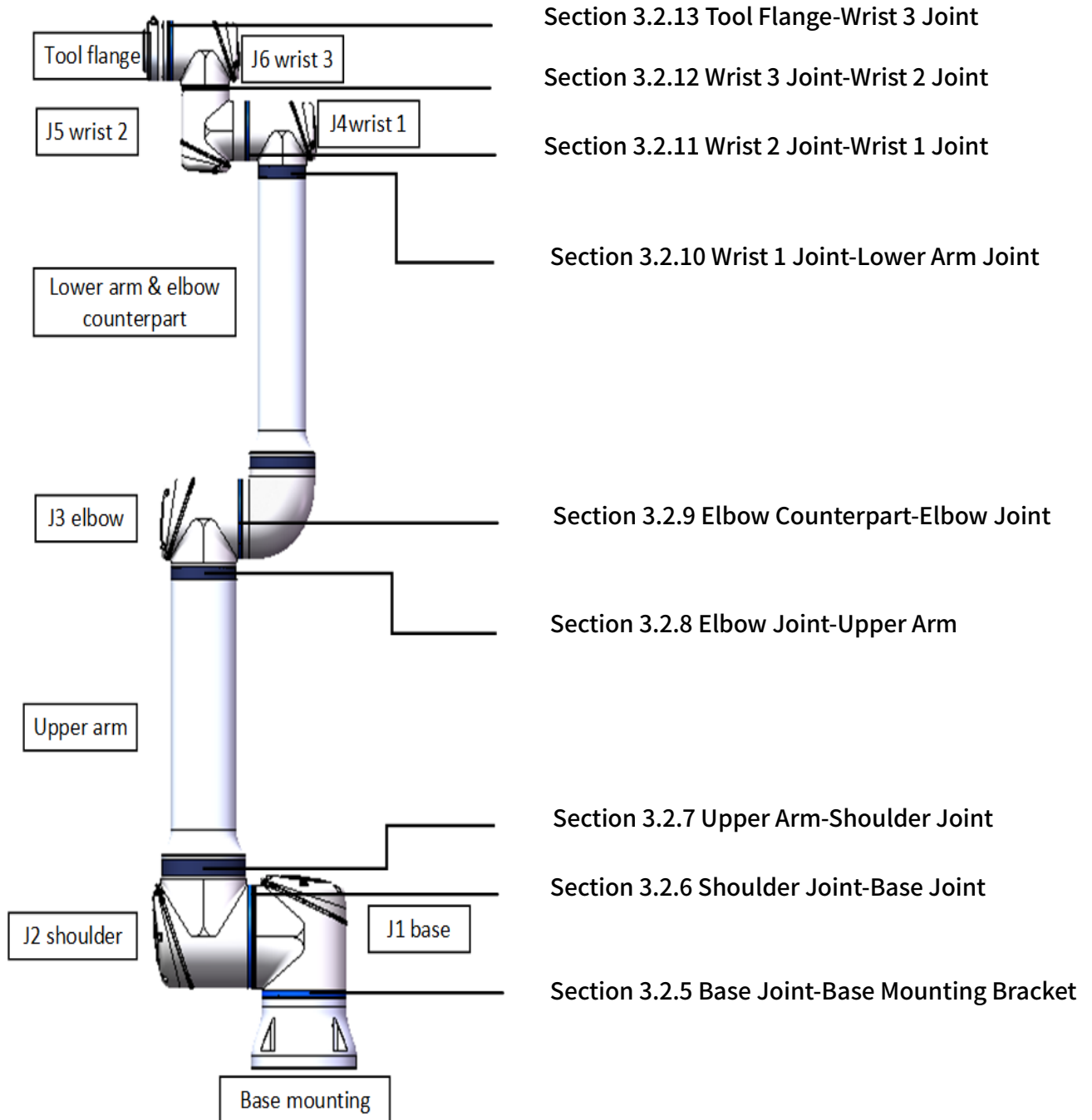

Figure 3-1 Robot arm configuration

3.2.2 Brake Release

If necessary, the joint brake can be manually released when the robot arm is powered off.

Reminder ⚠️	• Before releasing the brake, any parts that may cause danger should not be disassembled at will to avoid accidents; • Before releasing the brake on the base joint, shoulder joint, or elbow joint, appropriate mechanical support is required for the robot arm; • Before releasing the brake, make sure the surrounding personnel won't be hit by the robot arm; • Do not rotate the joints more than 160° to ensure that the robot can find its zero position.

To release the joint brake:

- Disconnect the power supply;
- Remove the joint lid;
- Lift the brake pin upwards and do not release it, then the joint can be turned, as shown in Figure 3-2:
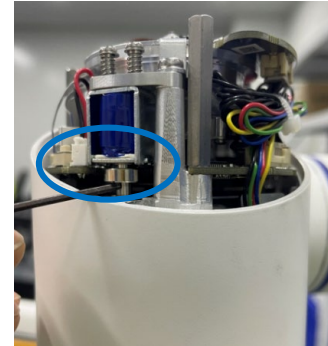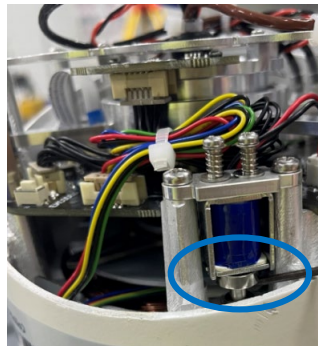
Brake pins on the base and shoulder joints

Brake pins on the elbow joint

Brake pins on the wrist joint

Figure 3-2   Lift the brake pin upwards

- Replace the joint lid and tighten the screw to 0.5Nm;
- Connect the power supply.

3.2.3 General Guidelines for Joints Disassembly and Assembly

Disassembly:

- Before starting the disassembly, please read the manual carefully and have the correct tools ready:
    - Repair kit with torque tools, anti-static wristband, etc;
    - If robot arm need to be disassembled, please preparing the following tools:
      New rubber rings, M3 cross wrenches, M3 and M4 external hex wrenches, beveled pliers, nylon cable ties, etc;
    - Thoroughly read and understand this guide.
- Move the pose of the robot arm to a position that makes disassembly easy. If necssary, remove the entire manupulator from the work unite and provide mechanical support for the robot;
- Turn off the power;
- Remove the joint lid;
- Cut the cable tie, unplug the wire, and be careful not to damage the printed circuit board;
- Using a slotted screwdriver or forceps, gently remove the rubber ring and pull it backwards from its original position on the joint housing and place it on the joint housing;
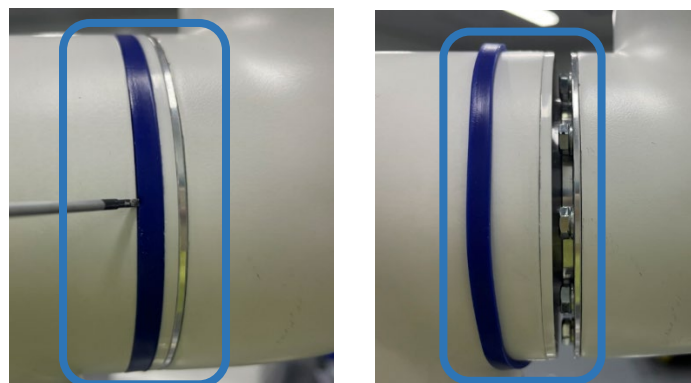

Figure 3-3 Move rubber rings and support rings

- Slide the plastic supporting ring backwards. Use external hex wrench to loosen the hexagonal screws on both side of the joint;
- Gently separate the joints that need to be disassembled.

Assembly:

After replacing the joint, assemble the robot arm as follows:

- After threading the wire bundle through the joint, align the mark according to the position of the locating pin, locate the joint, and gently push the two joints together;
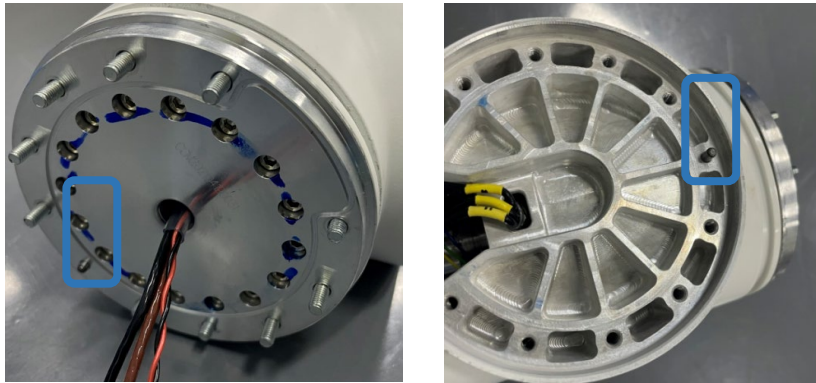
Figure 3-4 Locating pins and locating pin holes

- Use an external hex wrench, tighten the screws, then use a torque wrench to tighten each screw crosswise until the torque reaches the value specified in section 3.2.4;
- Put down the plastic supporting ring. Then gently superimpose the rubber ring onto the supporting ring as Figure 3-5:

Figure 3-5 Install supporting rings and rubber rings

- Click the white button as shown in Figure 3-6 lightly, then the flashing light will flash. The times the light flashes is equal to the joint number;

Note: If the number of flashes is incorrect, press and hold the white button, and then release the flashing light after the corresponding number of flashes to reset.

Figure 3-6 White button

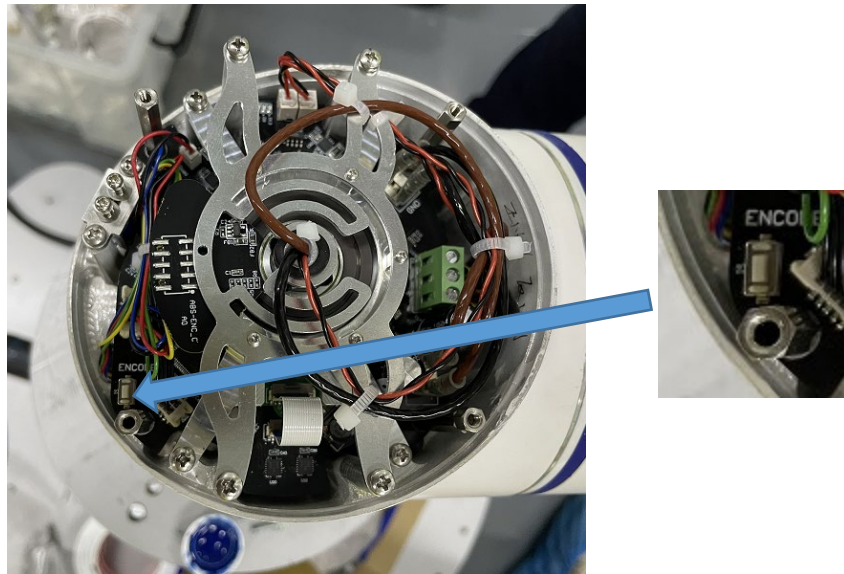- Connect the wires and tie them well as shown in Figure 3-7:
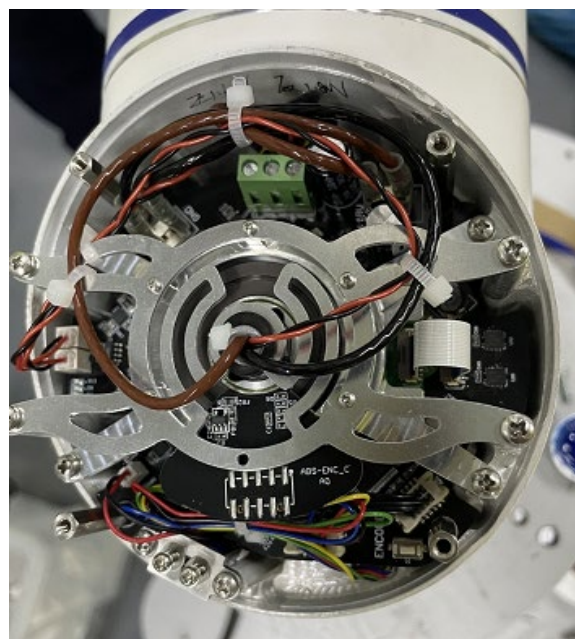
Figure 3-7 The joint with properly tied wires

- Install the joint lid, put in the cross screw of M3×6, and tighten the screw to 0.5Nm using a cross wrench.

3.2.4 Torque Value

Table 3-1 CS612 Torque value

Connection	Torque Value	Screw Specifications
J1 Base - Base Mount Bracket	7.8Nm	Outer hexagon M5
J2 Shoulder - J1 Base	7.8Nm	Outer hexagon M5
Upper Arm - J2 Shoulder	7.8Nm	Outer hexagon M5
J3 Elbow - Upper Arm	3.6Nm	Outer hexagon M4
Elbow Paired Joint - J3 Elbow	3.6Nm	Outer hexagon M4
Lower Arm-Elbow Pairing Joints	3.6Nm	Outer hexagon M4
J4 Wrist 1 - Lower Arm	1.7Nm	Outer hexagon M3
J5 Wrist 2 - J4 Wrist 1	1.7Nm	Outer hexagon M3
J6 Wrist 3 - J5 Wrist 2	1.7Nm	Outer hexagon M3
End Flange - J6 Wrist 3	1.7Nm	Outer hexagon M3
Joint Lid	0.5Nm	Cross screws M3

Figure 3-8 Torque value of each joint

3.2.5 Base Joint - Base Mount Bracket

Disassembly:

For details and photos, please refer to Section 3.2.3.

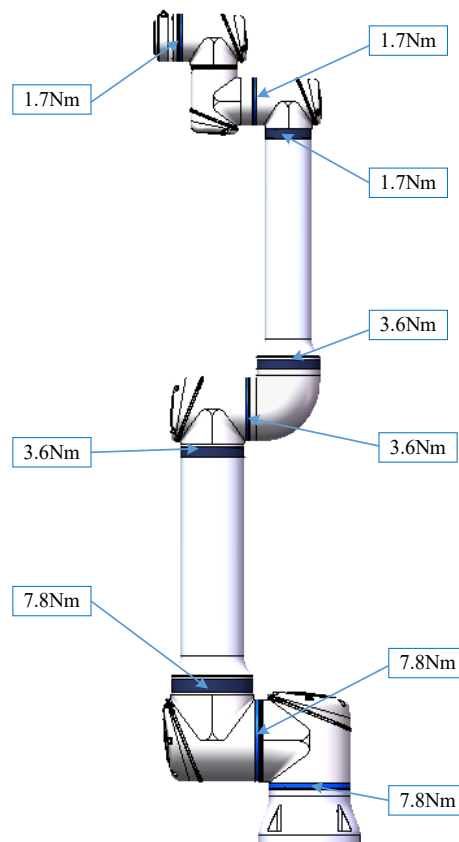- Turn off the power;
- Using a slotted screwdriver or forceps, gently remove the rubber ring and hang it around the base joint shell;
- Lift the plastic supporting ring. Using an external hex wrench, loosen the 14 screws;
- At this time, the base joint and the base mounting bracket have been loosened, and the base mounting bracket is gently pulled away from the base joint;
- Disconnect the wires between the base joint and the base mounting bracket.

2X Brown wires	48VDC
2X Black wires	earthing
1X Twisted pair	485 communication lines

Assembly:

For details and photos, please refer to Section 3.2.3.

- As shown in Figure 3-9, place the base joint back into the base mounting bracket and reconnect the wires;
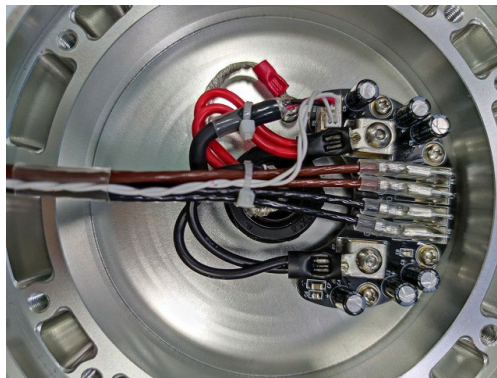

Figure 3-9 Connect the base joint line

- Align the mark according to the position of the locating pin, locate the joint, and gently push the base joint and the base mounting bracket together;
- Use the hexagon wrench to tighten the 14 M5×20 screws on the flange shaft, and tighten them crosswise to 7.8Nm;

- Put down the plastic supporting ring. Then gently superimpose the rubber ring onto the supporting ring.

3.2.6 Shoulder Joint　Base Joint

Disassembly:

For details and photos, please refer to Section 3.2.3.

- Turn off the power;
- Remove the base joint lid;
- Cut the cable tie, disconnect the wire between the upper arm and the shoulder joint, and be careful not to bend the printed circuit board;

2X Brown wires	48VDC
2X Black wires	earthing
1X Black wires	485 communication lines

- Using a slotted screwdriver or forceps, gently remove the rubber ring and hang it around the joint housing;
- Lift the plastic supporting ring, use external hex wrench and loosen the 14 screws;
- Pull the shoulder joint away from the base joint.

Assemble:

Please refer to Section 3.2.3 for details and photos.

- Thread the shoulder joint wire bundle through the base joint, align the mark according to the position of the locating pin, locate the joint, and gently push the two joints together;
- Use an external hex wrench to lock 14 M5×20 screws and tighten them crosswise to 7.8Nm with a torque wrench;
- Put down the plastic supporting ring and gently superimpose the rubber ring onto the supporting ring;
- Reconnect the wires and tie with nylon zip ties, as shown in Figure 3-10:

Figure 3-10 Reconnect the wires

- Mount the joint lids with 6 screws of M3×6, tighten them crosswise to 0.5Nm.

3.2.7 Upper Arm - Shoulder Joint

Disassembly:

For details and photos, please refer to Section 3.2.3.

- Turn off the power;
- Remove the joint lid;
- Cut the cable tie and disconnect the wire between the upper arm and the shoulder joint;

1X Brown wires	48VDC
1X Black wires	earthing
1X Twisted pair	485 Communication lines

- Gently remove the rubber ring and hang it around the upper arm. Then remove the supporting ring as shown in Figure 3-11:
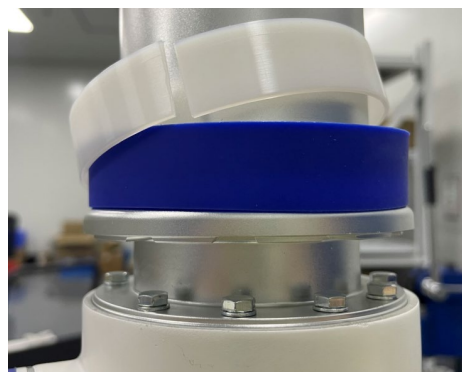
Figure 3-11 Remove the upper arm rubber ring and the supporting ring

- Using an external hex wrench, loosen the 14 screws;
- Pull the upper arm away from the shoulder joint.

Assembly:

For details and photos, please refer to Section 3.2.3.

- Thread wire bundle on the link through the shoulder joint;
- Align the mark according to the position of the locating pin, locate the upper arm link and joint, and gently push the upper arm link and joint together;
- Put in 14 external hexagonal M5X20 screws coated with Loctite 243, tighten them crosswise to 7.8Nm;
- Reconnect the wires and tie them as shown in Figure 3-12:

Figure 3-12 Reconnect the wires

- Mount the joint lids with 6 screws of M3×6, tighten them crosswise to 0.5 Nm.

3.2.8 Elbow Joint - Upper Arm

Disassembly:

The procedure for separating the elbow joint from the upper arm is similar to separate upper arm from shoulder joint. Please read Section 3.2.7 for details and photos.

- Turn off the power;
- Remove the joint lid;
- Cut the cable ties and disconnect the wires between the upper arm and the elbow joint;

1X Brown wires	48VDC
1X Black wires	earthing
1X Twisted pair	485 Communication lines

- Gently remove the rubber ring and hang it around the upper arm to remove the supporting ring as shown in Figure 3-13:
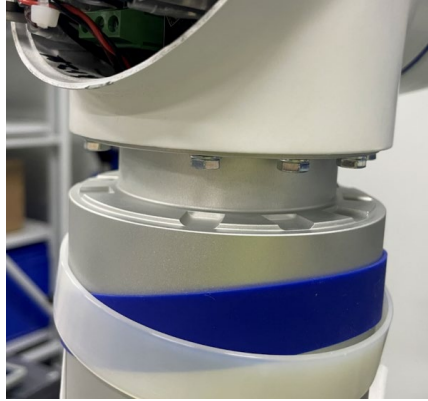
Figure 3-13 Remove the upper arm rubber ring and supporting ring

- Using an external hex wrench, loosen the 14 screws;
- Pull the upper arm away from the elbow joint.

Assembly:

The procedure for assembling the elbow joint from the upper arm is similar to assemble upper arm to shoulder joint. Please read Section 3.2.7 for details and photos;

- Thread wire bundle on links through the elbow joints;
- Align the mark according to the position of the locating pin, locate the upper arm link and joint, and gently push the upper arm link and joint together;
- Put in 14 glued Loctite 243 hexagonal M4X16 screws, tighten with a hex wrench, crosswise to 3.6Nm;
- Reconnect the wires and tie them as shown in Figures 3-14:
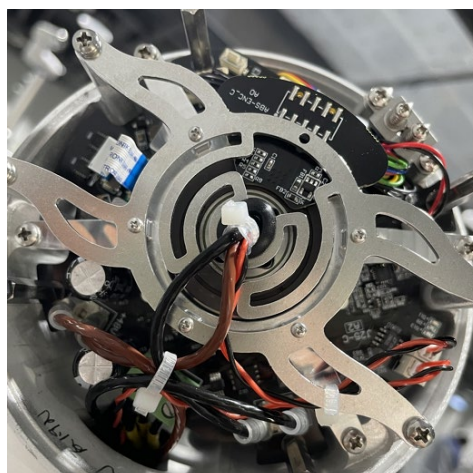
Figure 3-14 Reconnect the wires

- Mount the joint lids with 4 screws of M3×6, tighten them crosswise to 0.5Nm.

3.2.9 Elbow Pairing Joint - Elbow Joint

Disassembly:

For details and photos, please refer to Section 3.2.3.

- Turn off the power;
- Remove the elbow joint lid;
- Cut the cable tie, disconnect the wire between the lower arm and the elbow joint, be careful not to bend the printed circuit board, and remove the rubber sheath;

1X Brown wires	48VDC
1X Black wires	earthing
1X Twisted pair	485 Communication lines

- Using a slotted screwdriver or forceps, gently remove the rubber ring and hang it around the joint housing;
- Lift the plastic supporting ring, use an external hex wrench, and loosen the 14 screws;
- Pull the elbow-paired joint away from the elbow joint.

Assembly:

For details and photos, please refer to Section 3.2.3.

- Thread the wire bundle from the lower arm throught the flange shaft of the elbow joint. Place the elbow paring joint to elbow joint. Align the mark according to the position of the locating pin, locatre the joint, and getly push the two joints together;
- Put in 14 M4×16 screws, use a cross wrench to screw them down, then use a torque wrench to tighten them crosswise to 3.6Nm;
- Put down the plastic supporting ring, Then gently superimpose the rubber ring onto the supporting ring;
- Insert the wire bundle through the wire guard. Then install the wire guard to the wire rack. After reconnecting the wire, use nylon zip ties to keep the wires at proper position as shown in Figure 3-15:

Figure 3-15 Reconnect the wires

- Mount the joint lids with 4 screws of M3×6, tighten them crosswise to 0.5Nm.

3.2.10 Wrist 1 Joint - Lower Arm

Disassembly:

The procedure for separating the wrist 1 joint from the lower arm is similar to separate upper arm from elbow joint. Please read Section 3.2.8 for details and photos;

- Turn off the power;
- Remove the joint lid;
- Cut the cable ties and disconnect the wires between the upper arm and the elbow joint;

1X Brown wires	48VDC
1X Black wires	earthing
1X Twisted pair	485 Communication lines

- Using a slotted screwdriver or forceps, gently remove the rubber ring and hang it around the joint housing;
- Lift the plastic supporting ring, use an external hex wrench, and loosen the 12 screws;
- Pull the upper arm away from the elbow joint.

Assembly:

The procedure for assembling the wrist 1 joint from the lower arm is similar to assemble upper arm to elbow joint. Please read Section 3.2.8 for details and photos;

- Thread wire bundle on the link through the wrist 1 joint;

- Align the mark according to the position of the locating pin, locate the lower arm link and wrist joint, and gently push the lower arm link and joint together;
- Put in 12 glued Loctite 243 hexagonal M3x14 screws, use a cross wrench to screw them down, then use a torque wrench to tighten them crosswise to 1.7Nm;
- Reconnect the wires and tie them as shown in Figure 3-16:
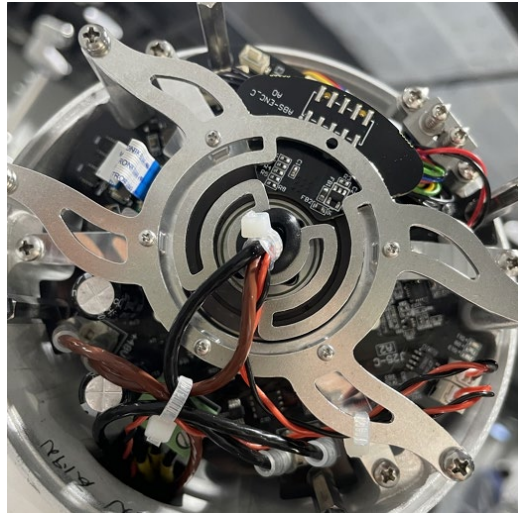

Figure 3-16 Reconnect the wires

- Mount the joint lids with 3 screws of M3×6, tighten them crosswise to 0.5Nm.

3.2.11 Wrist 2 Joint - Wrist 1 Joint

Disassembly:

For details and photos, please refer to Section 3.2.3.

- Turn off the power;
- Remove the lid of the wrist 2 joint;
- Cut the cable tie, disconnect the wire connecting the wrist 1 joint and the wrist 2 joint, and be careful not to bend the printed circuit board;

1X Brown wires	48VDC
1X Black wires	earthing
1X Twisted pair	485 Communication lines

- Using a slotted screwdriver or forceps, gently remove the rubber ring and hang it around the wrist 1 joint shell;
- Lift the plastic supporting ring, use a hex wrench, and loosen the 12 screws;
- At this time, the wrist 1 joint and the wrist 2 joint have been loosened, and the wrist 2 joint is gently pulled away from the wrist 1 joint.

Assembly:

Please refer to Section 3.2.3 for details and photos.

- Pass the wrist 1 wire bundle through the wrist 2 joint, place the wrist 2 joint on the wrist 1 joint, align the mark according to the position of the locating pin, locate the joint, and gently push the two joints together;
- Put in 12 M3×14 screws, use a cross wrench to screw them down, then use a torque wrench to tighten them crosswise to 1.7Nm;
- Put down the plastic supporting ring. Then gently superimpose the rubber ring onto the supporting ring;
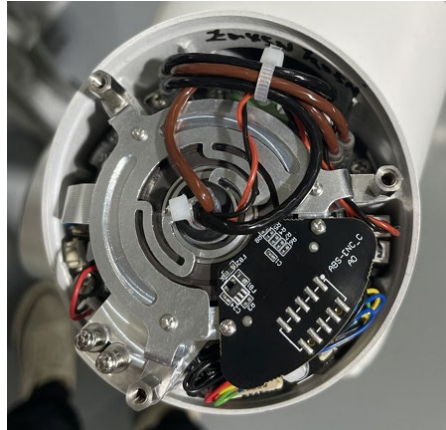- Reconnect the wires and tie them as shown in Figure 3-16;
- Mount the joint lids with 3 screws of M3×6, tighten them crosswise to 0.5Nm.

3.2.12 Wrist 3 Joint - Wrist 2 Joint

Disassembly & Assembly:

The procedure for separating the wrist 3 joint from the wrist 2 joint is similar to separate wrist 2 joint from wrist 1 joint. Please read Section 3.2.10 for details and photos.

3.2.13 End Flange   Wrist 3 Joint

Disassembly:

For details and photos, please refer to Section 3.2.3.

- Turn off the power;
- Remove the wrist 3 joint lid;
- Cut the cable tie, disconnect the wire between the end flange and the wrist joint, be careful not to bend the printed circuit board, and remove the rubber sheath;

1X Brown wires	48VDC
1X Black wires	earthing
1X Twisted pair	485 Communication lines

- Using a slotted screwdriver or forceps, gently remove the rubber ring and hang it around the wrist joint shell;
- Lift the plastic supporting ring, use an external hex wrench, and loosen the 12 screws;

- Gently pull the end flange away from the wrist 3 joint (be careful not to use force to prevent damage to the printed circuit board), and complete the separation of the end flange and the wrist 3 joint.

Assembly:

For details and photos, please refer to Section 3.2.3.

- The wire connecting the wrist 3 joints to the end flange, as shown in Figure 3-17:

Figure 3-17 Wires that connect the wrist 3 joints to the end flanges

- The wire bundle of the end flange passes through the flange axis of the wrist 3 joint, place the end flange on the wrist 3 joint, align the mark according to the position of the locating pin, locate the joint, and gently push the end flange and the wrist 3 joint together;
- Put in 12 M3×14 screws, use a cross wrench to screw them down, then use a torque wrench to tighten crosswise to 1.7 Nm;
- Put down the plastic supporting ring. Then gently superimpose the rubber ring onto the supporting ring;
- Insert the wire bundle through the wire guard. Then install the wire guard to the wire rack. After reconnecting the wire, use nylon zip ties to keep the wires at proper position;
- Mount the joint lids with 3 screws of M3×6, tighten them crosswise to 0.5Nm.

3.2.14 Wiring Guide

Wiring for the joints

- Threading: The wires on the joint must be pair to the correct joint. Please also pay attention to the direction of the wires. The wires should be insert from the flange shaft side, then come out from the end cover. The wiring route are fixed to specified positions (these positions should have heat shrinking tubes on both flange shaft side and wire racks) as shown in Figure 3-18:
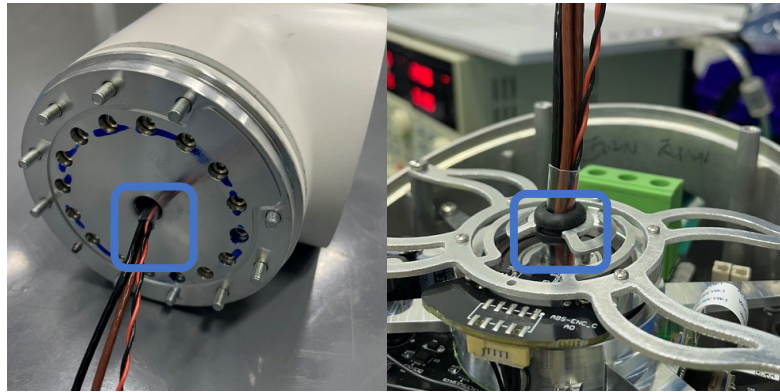
Figure 3-18 Cables are routed to the joints

- Wire guard: put the rubber guarding ring around the wire bundle, and push it all the way down to around the heat shrinking tube. Then put the wire guard ring on the wire rack as shwon in Figure 3-19:

Figure 3-19 Insert the wire guard ring

- Tie the wires with heat shrink tubes onto the wire guard to prevent detachment or displacement. Connect the brown wire to positive pole and black wire to GND pole. Plug the 485 wire into the specified port. The wires excess the necessary length need to be wrapped around the wire track and zip tied to keep in proper position as shown in Figure 3-20:
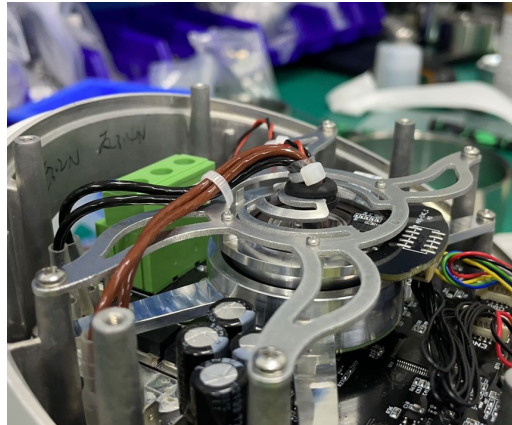
Figure 3-20 Wiring and tying

Wiring for the upper arm & the link:

- Mount the wire rack on both sides of the link and lock it with 3 M1.6x4 cross screws each;
- Put the rubber wire guard ring on the corresponding wire bundle, and tie the cable tie at both ends of the wire guard ring, as shown in Figure 3-21:

Figure 3-21 Tie the wire

- Place the retaining ring in the middle hole of the wire rack, as shown in Figure 3-22:
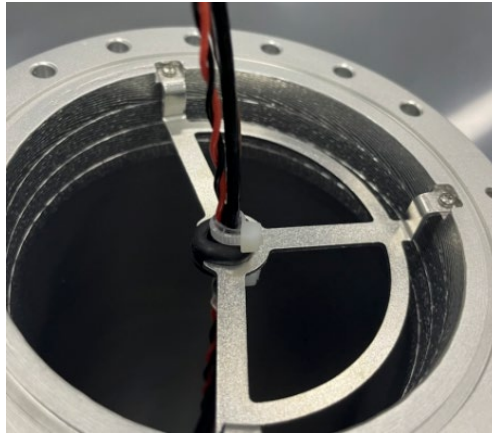
Figure 3-22 Link cable installation

Wiring for lower arm link:

The lower arm link wiring is similar to upper arm wiring, please note:

- When installing the wire rack on the side of the elbow joint, the protruding side of wire rack should point outward;
- After finishing the wiring on the elbow side, thread the wire bundle through the elbow pairing joint, then attach the eblow paring joint to the lower arm link. The installation method is similar to installing upper arm to shoulder joint, please see details in the section 3.2.7.

3.3 Controller Disassembly

3.3.1 Replace the Safe IO Board

Warning	Before replacing any components inside the controller, it's necessary to ensure the controller had powered down completely.

* Turn off the controller and disconnect the power cord, open the controller cabinet, lay the controller flat, and remove the 4 hexagonal flange nylon anti-loosen nuts, as shown in Figure 3-23:
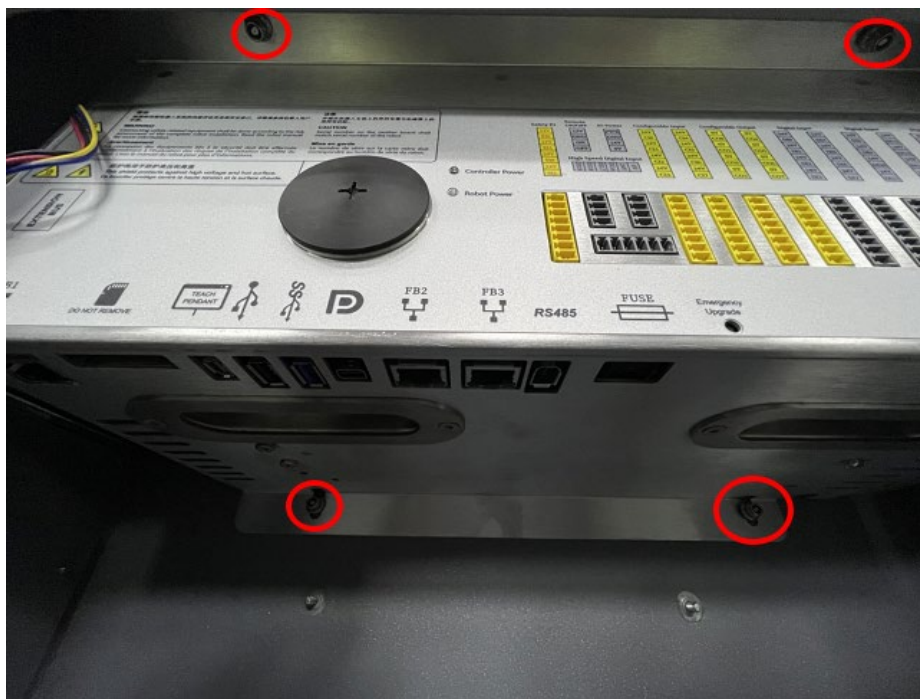
Figure 3-23 Controller hex flange side nylon anti-loosen nut position

* Remove or disconnect the following parts, as shown in Figures 3-24:
    * 1-Fan cable
    * 2-Flash card (press to eject)
    * 3-Teach pendant cable
    * 4-IO interface plug
    * 5-Fuses
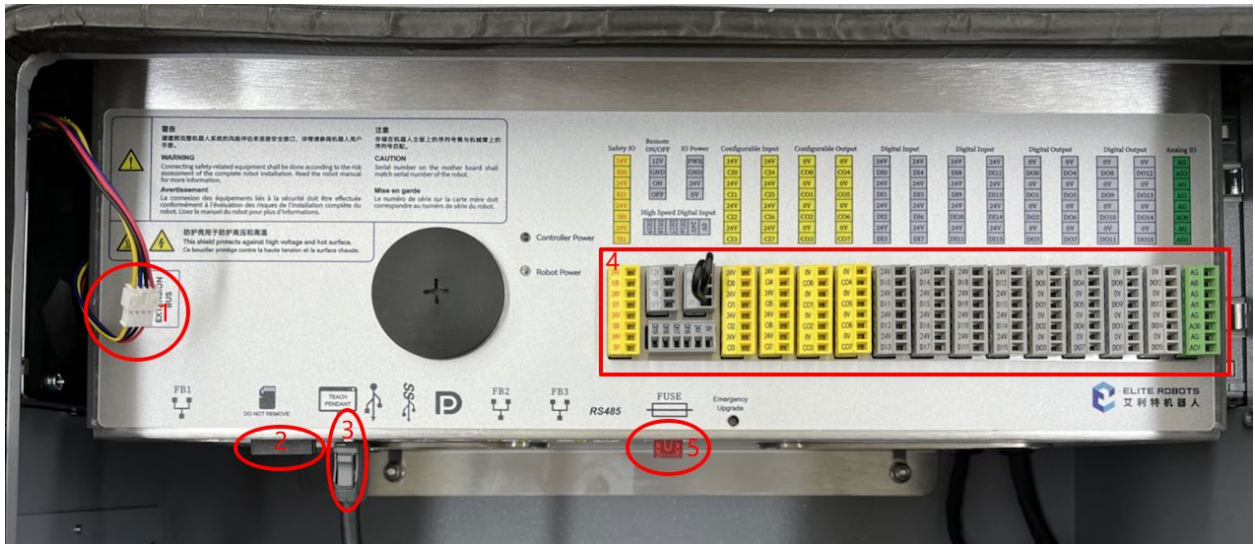
Figure 3-24 Items for removing or disconnecting

- Remove the screws on the connector mounting plate, disconnect the ground from the box to power socket and the equipment connector. Take the sheet metal module out from the box and place it on the box bracket as shown in Figure 3-25:
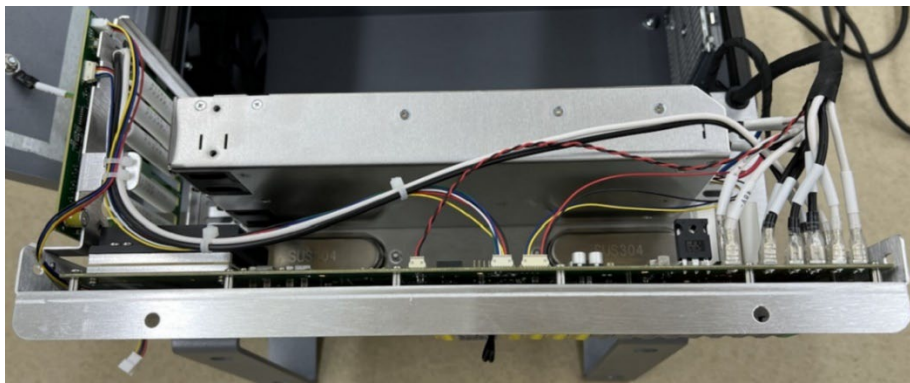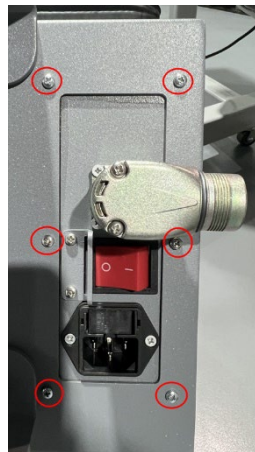
Figure 3-25 Screw position, power ground connection location and sheet metal module placement

- Disconnect the connecting cable from the switching power supply to the controller, as shown in Figure 3-26:
    - 1-Black 48Vx2
    - 2-White GNDx2
    - 3-Switching power signal control line x1
    - 4-Red and blue 220V power cord X2
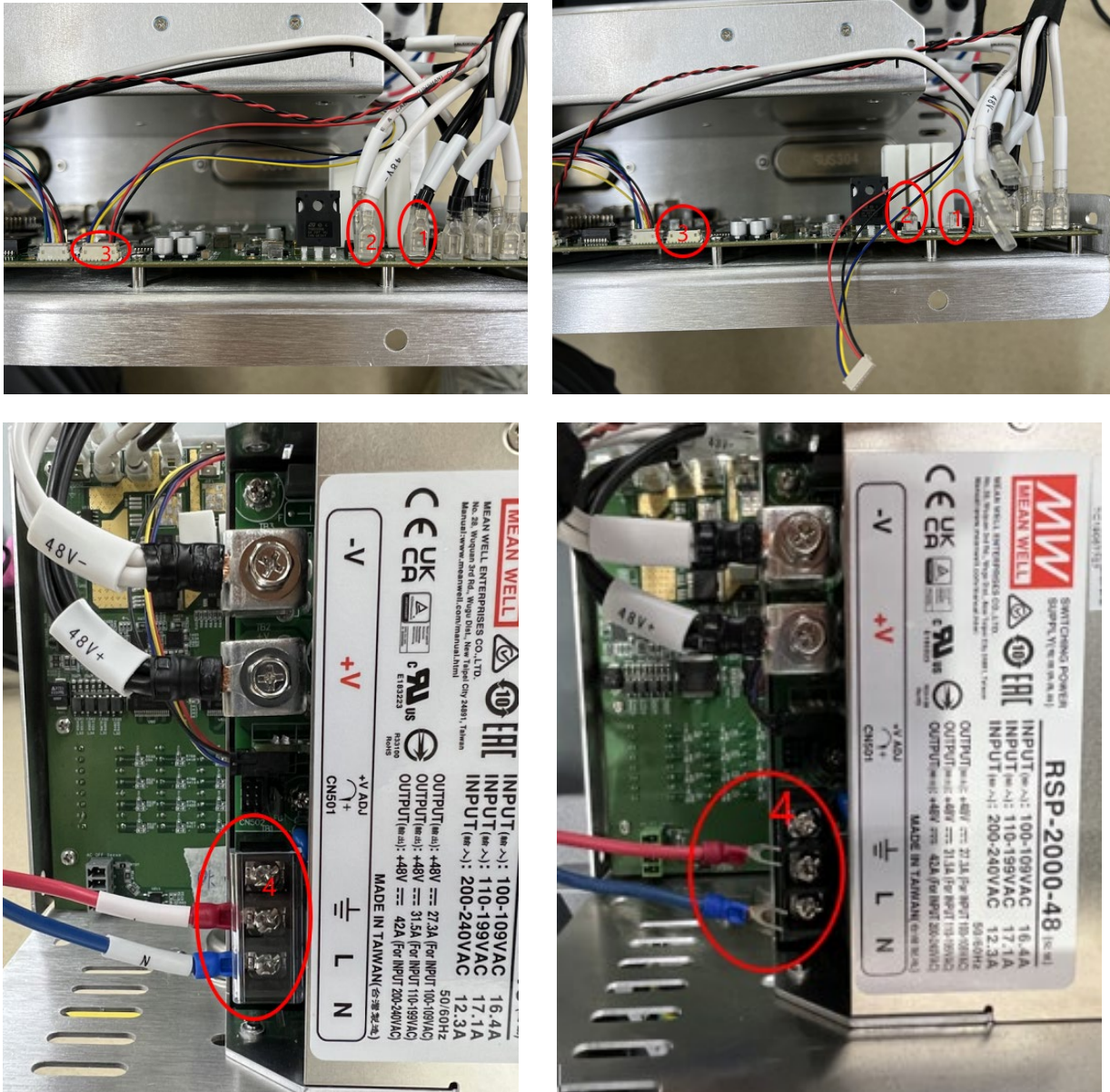
Figure 3-26 The connect position of the power cable on the controller

- As Figure 3-27, remove the 3 cross recessed pan head screw for holding the power supply. Then take the power supply out and place it somewhere safe;
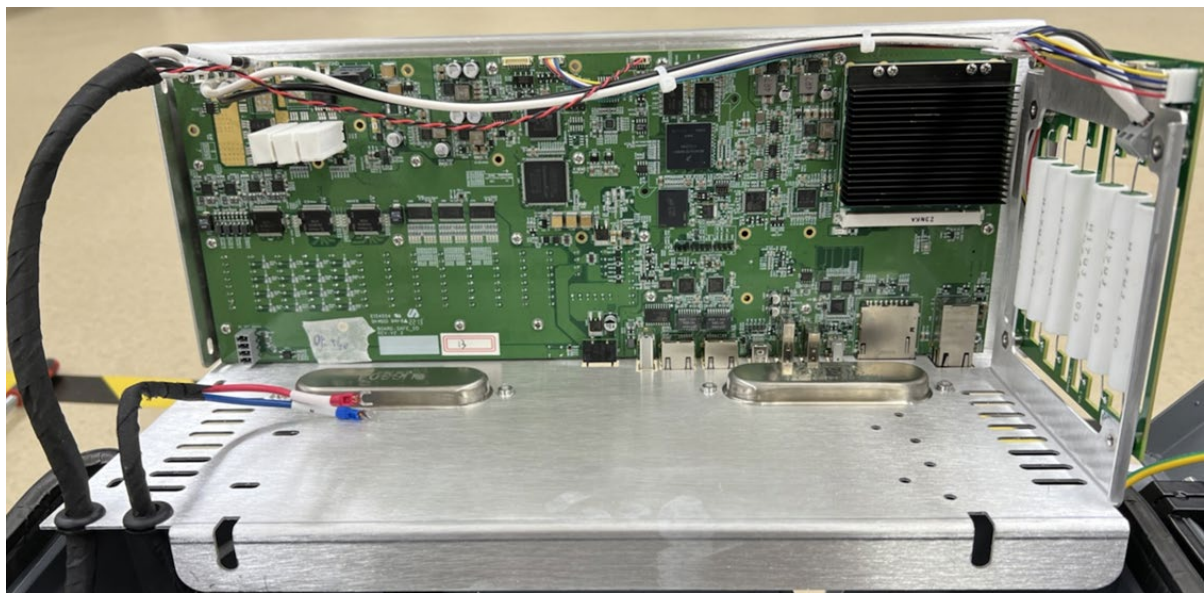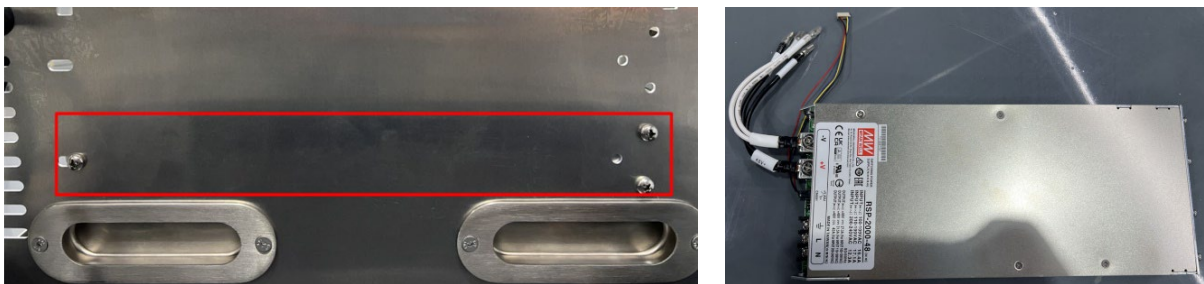
Figure 3-27 Screw position and power placement

- Disconnect the cable from the robot arm to Safe IO as shown in Figure 3-28:
  - 1-Black 48Vx2
  - 2-White GNDx2
  - 3-485 communication x1 (twisted pair red and black)
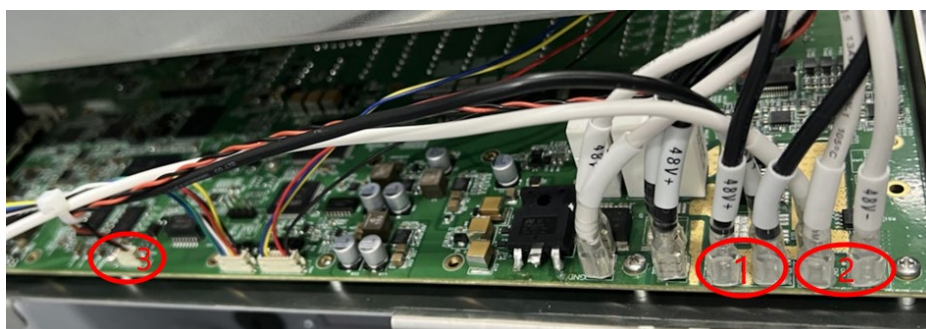
Figure 3-28 Cable location on Safe IO

- Disconnect the cable from the brake pads to Safe IO as shown in Figure 3-29:

- 1-Black 48Vx1
- 2-White GNDx1
- 3-Brake board signal control line x1

Figure 3-29 The position of cable from the brake pads to Safe IO

- Remove the 22 M3 cross slot disc head screws that secure Safe IO, remove Safe IO, install a new Safe IO and secure the screws as shown in Figure 3-30:

Figure 3-30 Screw position

- Install the power supply back in place and connect all disconnected cables as shown in Figure 3-31:
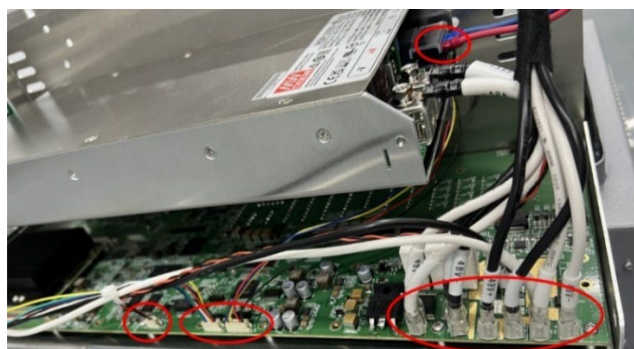
Figure 3-31 Cable connection

- Put the mounting sheet metal module back into the box, install the module properly with the 4 hexagonal flange side nylon anti-loosen nuts. Make sure the nuts are tightened well as shown in Figure 3-32:
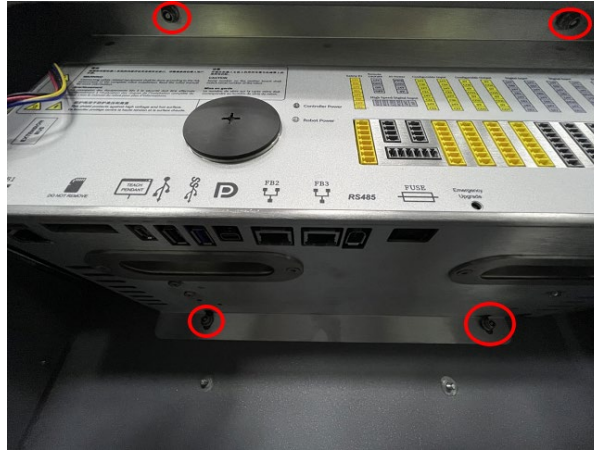
Figure 3-32 Nut position

- Plug in the cable of the fan, plug in the teach pendant cable, plug in the flash memory card, fuse and IO plug, as shown in Figure 3-33:
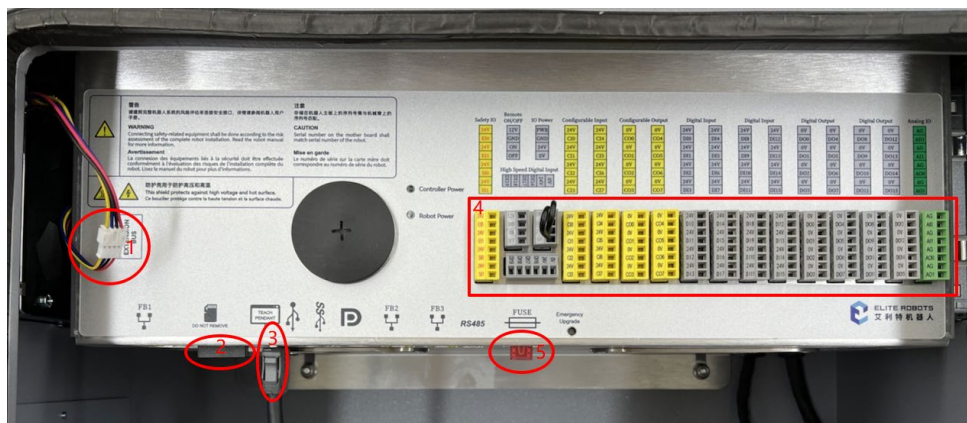
Figure 3-33 Wiring, patch cords, cards and fuses and IO plugs

- Plug in the power cord and power on the controller. Check whether the functions are normal through the teach pendant.

3.3.2 Replace the Brake Board

- As Figure 3-34, lay the controller flat, release the 4 anti-loosen nuts that mounted the sheet metal module. Disconnect the fan cable and teach pendant cable. Remove the sheet metal module and put it on the box bracket, please do not let the flash memory card and fuse to interfere with the box;
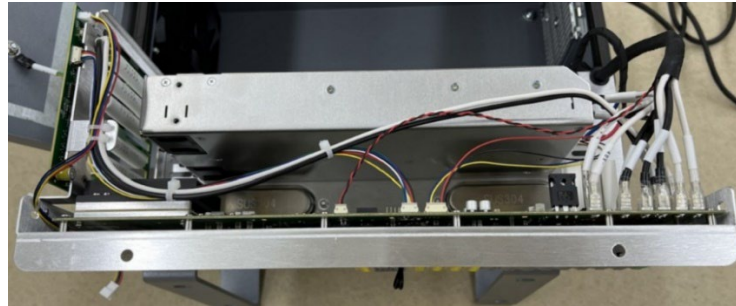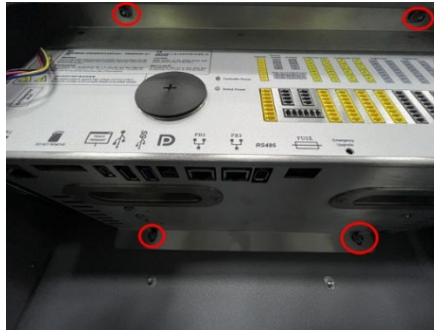
Figure 3-34 Remove the installation module

- Disconnect the cables on the brake board as shown in Figures 3-35:
    - 1-Brake board signal control line x1
    - 2-Black 48Vx1
    - 3-White GNDx1
    - 4-Fan connection extension cable x1

Figure 3-35 Disconnect the cable

- Remove the 4 cross slot head screws and remove the brake board that need to be replaced, as shown in Figure 3-36:
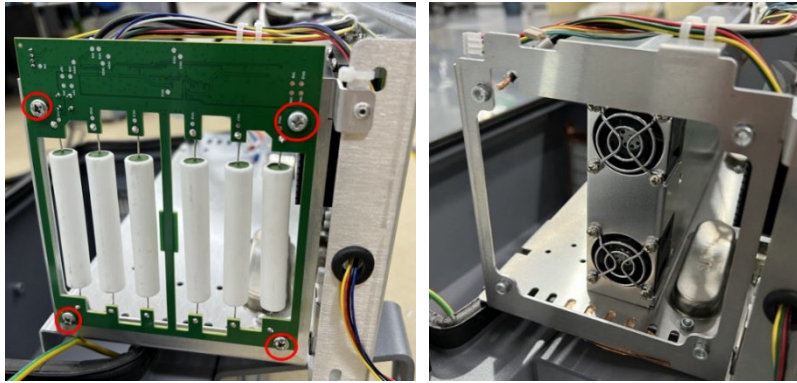
Figure 3-36 Remove the brake board

- Replace with a new brake board, secure the brake board with the screws and connect the previously disconnected wires, as shown in Figure 3-37:

Figure 3-37 Reconnect the cable

- Load the mounting sheet metal module back into the box, install 4 anti-loosen nuts, connect the fan cable, and connect the teach pendant cable, as shown in Figure 3-38:
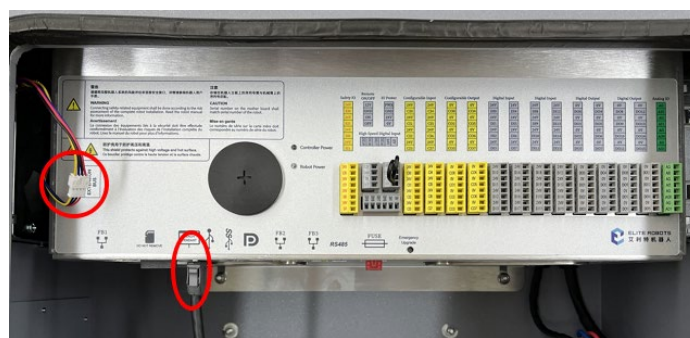
Figure 3-38 Install sheet metal, nuts, and reconnect cables

- Turn on the power and test whether the functions can work properly through the teach pendant.

4 Alarm Information

4.1 Robot Program Alarm Information

Table 4-1 CS program alarm information

Alarm #	Description	Possible Reasons	Suggested Treatment
E1S0	Communication Alarm		
E1S1	Tool communication failure	Unable to communicate with the tool.	Try the following in turn: (1) Power off and restart the robot. (2) Contact ELITE ROBOTS after-sales service for assistance.
E1S2	[Slave] {joint} joint communication failure	Unable to communicate with the joint.	Try the following in turn: (1) Power off and restart the robot. (2) Contact ELITE ROBOTS after-sales service for assistance.
E1S3	{joint} joint communication failure	Unable to communicate with the joint.	Try the following in turn: (1) Power off and restart the robot. (2) Contact ELITE ROBOTS after-sales service for assistance.
E1S4	Robot communication failure	Unable to communicate with the robot.	Try the following in turn: (1) Power off and restart the robot. (2) Contact ELITE ROBOTS after-sales service for assistance.
E2S0	Emergency Stop Alarm		
E2S1	Robot emergency stop	Emergency stop button pressed.	Try the following in turn: (1) Release the emergency stop button. (2) Restart the robot.
E2S2	System emergency stop	Emergency stop IO is triggered.	Try the following in turn: (1) Check whether the Emergency Stop function of the safety input IO is configured correctly and release the trigger state.

			(2) Check whether the emergency stop IO trigger state of the masterboard is correct and release the trigger state. (3) Contact ELITE ROBOTS after-sales service for assistance.
E3S0	Calibration Alarm		
E3S1	Robot calibration failed, error: {float} exceeded maximum limit: 5	The accuracy error of calibration point is too large.	Try the following in turn: (1) Reset the calibration point to ensure the accuracy and the diversity of position. (2) Contact ELITE ROBOTS after-sales service for assistance.
E3S3	Tool calibration failed	The accuracy of tool calibration points is poor or the position is similar.	Try the following in turn: (1) Reset the calibration point to ensure the accuracy and the diversity of position. (2) Contact ELITE ROBOTS after-sales service for assistance.
E3S4	Robot joint zero position lost	The robot has not been calibrated.	Try the following in turn: (1) Calibrate the robot with 'Joint Zeroing' in expert mode. (2) Contact ELITE ROBOTS after-sales service for assistance.
E3S5	Robot calibration failed	An error occurred during robot calibration.	Try the following in turn: (1) Make sure that the calibration process is correct. (2) Contact ELITE ROBOTS after-sales service for assistance.
E3S6	Current robot structure does not support calibration	The current robot structure type is incorrect.	Try the following in turn: (1) Make sure that the robot structure type is correct. (2) Update the controller software. (3) Contact ELITE ROBOTS after-sales service for assistance.

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E3S7	Insufficient number of calibration reference points	There are less than 20 calibration points.	Try the following in turn: (1) Increase the number of calibration points to 20. (2) Contact ELITE ROBOTS after-sales service for assistance.
E4S0	Brake Release Alarm		
E4S1	Robot can't release the brakes	Fail to release the brakes.	Try the following in turn: (1) Power off and restart the robot. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S0	Safety System Alarm		
E6S1	{joint} is close to joint soft limit	Joint position is close to joint soft limit.	Try the following in turn: (1) Check whether the robot position and the joint soft limit parameters are correct. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S2	{joint} exceeds joint soft limit	Joint position exceeds joint soft limit.	Try the following in turn: (1) Check whether the robot position and the joint soft limit parameters are correct. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S3	Close to safety plane	Tool position close to safety plane.	Try the following in turn: (1) Check whether the robot position, TCP and safety plane parameters are correct to ensure that the robot TCP position does not close to the safety plane. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S4	Exceeds the safety plane	Tool position exceeds safety plane.	Try the following in turn: (1) Check whether the robot position, TCP and safety plane parameters are correct to ensure that the robot TCP position does not exceed the safety

			plane. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S5	Close to safety plane	Elbow position close to safety plane.	Try the following in turn: (1) Check whether the robot position and safety plane parameters are correct to ensure that the robot elbow position does not close to safety plane. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S6	Exceeds the safety plane	Elbow position exceeds safety plane.	Try the following in turn: (1) Check whether the robot position and safety plane parameters are correct to ensure that the robot elbow position does not exceed the safety plane. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S7	Base joint speed ({float} °/s) is too fast	Base joint speed exceeds safety speed limits.	Try the following in turn: (1) Check whether the robot running state is correct to ensure that the joint speed does not exceed the safety limit. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S8	Shoulder joint speed ({float} °/s) is too fast	Shoulder joint speed exceeds safety speed limits.	Try the following in turn: (1) Check whether the robot running state is correct to ensure that the joint speed does not exceed the safety limit. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S9	Elbow joint speed ({float} °/s) is too fast	Elbow joint speed exceeds safety speed limits.	Try the following in turn: (1) Check whether the robot running state is correct to ensure that the joint speed does not exceed the safety limit. (2) Contact ELITE ROBOTS after-sales service for assistance.

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E6S10	Wrist1 joint speed ({float} °/s) is too fast	Wrist1 joint speed exceeds safety speed limits.	Try the following in turn: (1) Check whether the robot running state is correct to ensure that the joint speed does not exceed the safety limit. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S11	Wrist2 joint speed ({float} °/s) is too fast	Wrist2 joint speed exceeds safety speed limits.	Try the following in turn: (1) Check whether the robot running state is correct to ensure that the joint speed does not exceed the safety limit. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S12	Wrist3 joint speed ({float} °/s) is too fast	Wrist3 joint speed exceeds safety speed limits.	Try the following in turn: (1) Check whether the robot running state is correct to ensure that the joint speed does not exceed the safety limit. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S13	Tool speed ({float} mm/s) is too fast	Tool speed exceeds safety speed limits.	Try the following in turn: (1) Check whether the robot running state is correct to ensure that the tool speed does not exceed the safety limit. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S14	Elbow speed ({float} mm/s) is too fast	Elbow speed exceeds safety speed limits.	Try the following in turn: (1) Check whether the robot running state is correct to ensure that the elbow speed does not exceed the safety limit. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S16	{joint} position limit violated	The joint target position is too different from the actual position.	Try the following in turn: (1) Check whether the robot running state, robot payload and speed parameters are correct. (2) Contact ELITE ROBOTS after-sales service for assistance.

E6S17	The controller will enter the RECOVERY mode	The robot safety mode is in a violation state. The safety parameters restrictions will no longer take effect. Please ensure safety when using the robot.	Try the following in turn: (1) Operate the robot to a safe position. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S18	The reduced mode safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S19	The emergency stop safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S20	The operational mode safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S21	The auto mode safeguard stop safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S22	The auto mode safeguard stop reset safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time.

			(2) Contact ELITE ROBOTS after-sales service for assistance.
E6S23	The safeguard stop reset safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S24	The three position enabling safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S25	The masterboard emergency stop safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S26	The masterboard safeguard stop safety IO input signal is inconsistent	Safety IO input signal is inconsistent.	Try the following in turn: (1) Please ensure that the safety IO connection is correct and the signal is switched at the same time. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S27	The Teach Pendant emergency stop IO input signal is inconsistent		Try the following in turn: (1) Please check if the Emergency Stop button state is correct. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S30	Tool force is beyond max limit	The force of the robot tool exceeds the safety limit.	Try the following in turn: (1) Check the safety of the robot operation space to ensure that there is no collision. (2) Check whether the robot tool force

			limit setting is correct.
			(3) Contact ELITE ROBOTS after-sales service for assistance.
E6S31	Elbow force is beyond max limit	The force of the robot elbow exceeds the safety limit.	Try the following in turn: (1) Check the safety of the robot operation space to ensure that there is no collision. (2) Check whether the robot elbow force limit setting is correct. (3) Contact ELITE ROBOTS after-sales service for assistance.
E6S32	Robot's power on environment is over max limit	The power of the robot to the environment exceeds the safety limit.	Try the following in turn: (1) Check the safety of the robot operation space to ensure that there is no collision. (2) Check whether the robot power limit setting is correct. (3) Contact ELITE ROBOTS after-sales service for assistance.
E6S33	Robot's momentum is over max limit	The momentum of the robot exceeds the safety limit.	Try the following in turn: (1) Check the safety of the robot operation space to ensure that there is no collision. (2) Check whether the robot momentum limit setting is correct. (3) Contact ELITE ROBOTS after-sales service for assistance.
E6S34	The robot consumes too much power	The robot moves in Cartesian space near the singularity zone.	Try the following in turn: (1) Use joint movement to move the robot away from singularity zone. (2) Reduce the robot's movement speed. (3) Contact ELITE ROBOTS after-sales service for assistance.
E6S40	Fail to turn on the robot 48v power	Robot 48v power can't be controlled.	Try the following in turn: (1) Please turn on and off the 48v power again.

			(2) Contact ELITE ROBOTS after-sales service for assistance.
E6S41	Fail to turn off the robot 48v power	Robot 48v power can't be controlled.	Try the following in turn: (1) Please turn on and off the 48v power again. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S42	Robot is disconnect	Robot is disconnect.	Try the following in turn: (1) Please check whether the robot connection is correct, and then power on the robot again. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S43	{joint} serial number binding check failed	1. The controller is not bound to the robot. 2. The robot connected to the controller is not its bound robot. 3. The robot has replaced joint hardware.	Try the following in turn: (1) Contact ELITE ROBOTS after-sales service for assistance.
E6S44	Tool IO serial number binding check failed	1. The controller is not bound to the robot. 2. The robot connected to the controller is not its bound robot. 3. The robot has replaced joint hardware.	Try the following in turn: (1) Contact ELITE ROBOTS after-sales service for assistance.
E6S45	No dynamic data of robot joints. Error Info:{string}	1. The joint is not subject to dynamic identification or identification data is not written. 2. Joint data is corrupt.	Try the following in turn: (1) Contact ELITE ROBOTS after-sales service for assistance.
E6S46	For the initial configuration of dynamics data,	1. Dynamic data is configured for the first time.	Try the following in turn: (1) Power off and restart the controller.

	please restart the robot to complete the configuration		(2) Contact ELITE ROBOTS after-sales service for assistance.
E6S47	{joint} dynamics data does not match the configuration file	1. The robot connected to the controller is not its bound robot. 2. Joint internal data or configuration file data is corrupt. 3. The robot has replaced joint hardware.	Try the following in turn: (1) Contact ELITE ROBOTS after-sales service for assistance.
E6S50	{joint}' encoder calibration failed	Joint encoder auto-matic calibration failed.	Try the following in turn: (1) Power off and restart the robot. (2) Contact ELITE ROBOTS after-sales service for assistance.
E6S100	Safety Board Alarm: {string}	Safety board is in violation state.	Try the following in turn: (1) Please try to reset the state of safety functions (such as safety IO, SG Stop, etc.). (2) Contact ELITE ROBOTS after-sales service for assistance.
E7S0	Dynamics Alarm		
E7S1	Dynamics initialization failed	The current robot type is incorrect.	Try the following in turn: (1) Power off and restart the controller. (2) Update the controller software and servo firmware. (3) Contact ELITE ROBOTS after-sales service for assistance.
E7S2	Robot is not in RUNNING mode, hand drag mode started failed	The robot's brakes are engaged.	Try the following in turn: (1) Please check the status of the robot, then power on the robot and release the brakes. (2) Contact ELITE ROBOTS after-sales service for assistance.

E7S3	The robot mounting verification failed	The actual mounting of the robot is inconsistent with the configuration.	Try the following in turn: (1) Please set the correct robot mounting in configuration. (2) Contact ELITE ROBOTS after-sales service for assistance.
E7S5	Unknown robot structure type	The current robot structure type is incorrect.	Try the following in turn: (1) Power off and restart the controller. (2) Update the controller software and servo firmware. (3) Contact ELITE ROBOTS after-sales service for assistance.
E7S6	Unknown robot type	The current robot type is incorrect.	Try the following in turn: (1) Power off and restart the controller. (2) Update the controller software and servo firmware. (3) Contact ELITE ROBOTS after-sales service for assistance.
E7S7	Failed to enable dynamic function	The dynamic function is disabled since dynamic model check failed.	Try the following in turn: (1) Power on again and release the brake, avoiding external force on robot. (2) Check if payload, mounting, zero position and dh parameters are correct. (3) Restart the robot after clearing the alarm. (4) Contact ELITE ROBOTS after-sales service for assistance.
E7S8	Failed to start hand drag mode	The dynamic function is disabled since dynamic model check failed.	Try the following in turn: (1) Restart drag mode and avoid applying a force on robot before dragging. (2) Check if payload, mounting, zero position and dh parameters are correct. (3) Restart the robot after clearing the alarm. (4) Contact ELITE ROBOTS after-sales service for assistance.

E7S9	Startup stage of hand drag mode is abnormal	The joint speed of drag startup stage is too fast.	Try the following in turn: (1) Restart drag mode and avoid driving robot too fast at the moment of dragging start. (2) Check if payload, mounting, zero position and dh parameters are correct. (3) Restart the robot after clearing the alarm. (4) Contact ELITE ROBOTS after-sales service for assistance.
E7S10	Startup stage of hand drag mode is abnormal	The joint torque of drag startup stage is abnormal.	Try the following in turn: (1) Restart drag mode and avoid applying a force on robot before dragging. (2) Check if payload, mounting, zero position and dh parameters are correct. (3) Restart the robot after clearing the alarm. (4) Contact ELITE ROBOTS after-sales service for assistance.
E8S0	Record Path Alarm		
E8S1	Failed to record path	The recorded path is to short.	Try the following in turn: (1) Please extend the recorded short.
E9S0	Teach Pendant Alarm		
E9S1	Teach pendant disconnected	1. The teach pendant is pulled out. 2. The teach pendant communication is unstable. 3. The teaching pendant cable is damaged.	Try the following in turn: (1) Replug the teach pendant. (2) Check whether the teach pendant cable is connected normally. (3) Contact ELITE ROBOTS after-sales service for assistance.
E9S2	Teach pendant is in alarm, alarm code: {signed}		Try the following in turn: (1) Re plug the teach pendant. (2) Contact ELITE ROBOTS after-sales service for assistance.

			Try the following in turn:
E9S3	The current safety hardware config prohibits connecting to the teach pendant	The current safety hardware config is set to NO TEACH PENDANT mode, but a teach pendant is connected.	Try the following in turn: (1) Disconnect the teach pendant. (2) Set the teaching pendant type in the safety hardware config to STANDARD type. (3) Contact ELITE ROBOTS after-sales service for assistance.
E10S0	File System Alarm		
E10S1	Cannot delete file	The file does not exist or is occupied.	Try the following in turn: (1) Power off and restart the controller. (2) Update the controller software. (3) Contact ELITE ROBOTS after-sales service for assistance.
E10S2	Failed to open file {string}	The file does not exist or is corrupt.	Try the following in turn: (1) Please check the validity of the file. (2) Power off and restart the controller. (3) Contact ELITE ROBOTS after-sales service for assistance.
E11S0	Memory Alarm		
E11S1	Failed to allocate memory	An error occurred in controller software.	Try the following in turn: (1) Power off and restart the controller. (2) Update the controller software. (3) Contact ELITE ROBOTS after-sales service for assistance.
E11S2	Wrong memory pointer is freed: {hex}	An error occurred in controller software.	Try the following in turn: (1) Power off and restart the controller. (2) Update the controller software. (3) Contact ELITE ROBOTS after-sales service for assistance.
E11S3	Pointer with value zero is freed: {hex}	An error occurred in controller software.	Try the following in turn: (1) Power off and restart the controller. (2) Update the controller software. (3) Contact ELITE ROBOTS after-sales service for assistance.
E11S4	The pointer value is 0	An error occurred in controller software.	Try the following in turn: (1) Power off and restart the controller.

			(2) Update the controller software.
			(3) Contact ELITE ROBOTS after-sales service for assistance.
E12S0	Servo Alarm		
E12S1	Servo alarm: [{string}]		Try the following in turn: (1) Power off and restart the robot. (2) Update the controller software and servo firmware. (3) Contact ELITE ROBOTS after-sales service for assistance.
E12S10	{joint} overcurrent	The joint detects overcurrent.	Try the following in turn: (1) Power off and restart the robot. (2) Update the controller software and servo firmware. (3) Contact ELITE ROBOTS after-sales service for assistance.
E12S20	{joint} Abnormal zero position of joint current	1. Incorrect setting of payload and accelera-tion parameters. 2. The payload is too large and exceeds the load characteristic curve. 3. Mechanical jamming caused by impact, joint brake not opened, etc. 4. The hardware of the joint driver is damaged.	Try the following in turn: (1) Power off and restart the robot after clearing the alarm. (2) Check whether the payload and acceleration parameters are set correctly. (3) Check whether the payload is too large and exceeds the load characteristic curve in user manual. (4) Contact ELITE ROBOTS after-sales service for assistance.
E12S21	{joint} Joint driver overcurrent	1. Incorrect setting of payload and accelera-tion parameters. 2. The payload is too large and exceeds the load characteristic curve. 3. Mechanical jamming	Try the following in turn: (1) Power off and restart the robot after clearing the alarm. (2) Check whether the payload and acceleration parameters are set correctly. (3) Check whether the payload is too large and exceeds the load characteristic

		caused by impact, joint brake not opened, etc. 4. The hardware of the joint driver is damaged.	curve in user manual. (4) Contact ELITE ROBOTS after-sales service for assistance.
E12S24	{joint} Joint motor overcurrent	1. Incorrect setting of payload and acceleration parameters. 2. The payload is too large and exceeds the load characteristic curve. 3. Mechanical jamming caused by impact, joint brake not opened, etc. 4. The hardware of the joint driver is damaged.	Try the following in turn: (1) Power off and restart the robot after clearing the alarm. (2) Check whether the payload and acceleration parameters are set correctly. (3) Check whether the payload is too large and exceeds the load characteristic curve in user manual. (4) Contact ELITE ROBOTS after-sales service for assistance.
E12S30	{joint} The deviation between the actual joint and the target position is too large	1. Incorrect setting of payload and acceleration parameters. 2. The payload is too large and exceeds the load characteristic curve. 3. Mechanical jamming caused by impact, joint brake not opened, etc. 4. The hardware of the joint driver is damaged.	Try the following in turn: (1) Power off and restart the robot after clearing the alarm. (2) Check whether the payload and acceleration parameters are set correctly. (3) Check whether the payload is too large and exceeds the load characteristic curve in user manual. (4) Contact ELITE ROBOTS after-sales service for assistance.
E12S40	{joint} Joint e-stop state	1.The e-stop button of the teach pendant is pressed. 2. False alarm of e-stop caused by external interference.	Try the following in turn: (1) Check whether the e-stop button of the teach pendant is pressed. If the e-stop button is pressed, rotate the button for reset and synchronous operation. (2) Contact ELITE ROBOTS after-sales service for assistance.

E12S50	{joint} Abnormal communication, bus verification failed	1. Communication verification failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S52	{joint} Abnormal communication,data from master station os not received		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S60	{joint} Abnormal joint encoder calibration	1. The joint encoder cable is connected incorrectly, the cable maybe loose, or the cable is disturbed. 2. The relevant hardware of the joint encoder is disturbed, resulting in the incorrect value of the joint encoder.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S62	{joint} Abnormal joint encoder count	1. The joint encoder is not calibrated or calibration failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S63	{joint} Abnormal joint motion sensor		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S65	{joint} Abnormal joint zero calibration		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.

E12S70	{joint} Abnormal motor encoder calibration	1. The motor encoder is not calibrated or calibration failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S75	{joint} Abnormal motor encoder count	1. The motor encoder may be contaminated.	Try the following in turn: (1) Power off and restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S80	{joint} Abnormal hall sensor		Try the following in turn: (1) Power off and restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S82	{joint} No hall mode init error		Try the following in turn: (1) Power off and restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S90	{joint} Abnormal joint brake on		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S94	{joint} Abnormal joint brkae off		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S101	{joint} Joint collision		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.

E12S110	{joint} Joint overspeed		Try the following in turn: (1) Clear the alarm, correctly set the speed parameters of the controller and restart the robot. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S120	{joint} Joint bus overvoltage		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S121	{joint} Joint bus undervoltage		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S130	{joint} Joint overheating	1. The payload is too large and exceeds the load characteristic curve. 2. The working environment temperature is too high.	Try the following in turn: (1) Check the payload and correctly configure the payload according to the robot model. (2) Check the working environment temperature and use the robot according to the specification in user manual. (3) Contact ELITE ROBOTS after-sales service for assistance.
E12S198	{joint} Flash erase exception		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S199	{joint} Flash write exception		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.

E12S200	{joint} Flash not initialized		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S201	{joint}'s internal parameters are abnormal.	Due to abnormal power cut-off and other illegal operations.	Try the following in turn: (1) Please enter the Expert Mode and reset the joint in Servo Parameter function. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S500	[M] {joint} dule mcu commutation ini fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S501	[M] {joint} 3.3v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S502	[M] {joint} 12v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S503	[M] {joint} 5v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S504	[M] {joint} salve 3.3v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.

E12S505	[M] {joint} analogy 3.3v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S506	[M] {joint} dule mcu commutation crc fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S507	[M] {joint} dule mcu communication over time		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S508	[M] {joint} hall signal validation error		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S509	[M] {joint} joint encoder validation error		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S510	[M] {joint} acceleration sensor validation error		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S511	[M] {joint} motor encoder validation error		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.

E12S512	[M] {joint} DC bus voltage validation error		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S513	[M] {joint} motor current validation error		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S521	{joint} emergency stop over time.	Joint emergency stop failed.	Try the following in turn: (1) Restart the robot after clearing the alarm; (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S522	{joint} safeguard stop over time	Joint safeguard stop failed.	Try the following in turn: (1) Restart the robot after clearing the alarm; (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S600	[S] {joint} dule mcu commutation ini fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S601	[S] {joint} 3.3v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S602	[S] {joint} 12v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.

E12S603	[S] {joint} 5v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S604	[S] {joint} salve 3.3v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S605	[S] {joint} analogy 3.3v power supply fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S606	[S] {joint} dule MCU commutation crc fault		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S607	[S] {joint} dule MCU communication over time		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S610	[S] {joint} slave MCU communication crc error		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S611	[S] {joint} slave MCU communication over time		Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.

E12S701	{joint} Abnormal motor encoder calibration: Motor disconnection	The motor encoder is not calibrated or calibration failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S702	{joint} Abnormal motor encoder calibration: Motor wire sequence	1. The motor encoder is not calibrated or calibration failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S703	{joint} Abnormal motor encoder calibration: Motor encoder disconnected	1. The motor encoder is not calibrated or calibration failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S704	{joint} Abnormal motor encoder calibration: Brake system stuck	1. The motor encoder is not calibrated or calibration failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S705	{joint} Abnormal motor encoder calibration: Hall line sequence	1. The motor encoder is not calibrated or calibration failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E12S706	{joint} Abnormal motor encoder calibration: Z Index abnormality	1. The motor encoder is not calibrated or calibration failed.	Try the following in turn: (1) Restart the robot after clearing the alarm. (2) Contact ELITE ROBOTS after-sales service for assistance.
E13S0	Collision Alarm		
E13S1	Robot's {joint} is in collision	(1) The robot detected a collision. (2) The robot is mounting type or the	Try the following in turn: (1) Please check the safety of the robot operation space to ensure that there is no collision.

		payload parameters are set incorrectly.	(2) Please check the robot is mounting type and payload parameters. (3) Please check the parameters of robot collision settings. (4) Contact ELITE ROBOTS after-sales service for assistance.
E15S0	System Alarm		
E15S1	TThe controller has encountered an error and has recovered	An error occurred in the controller.	Try the following in turn: (1) Contact ELITE ROBOTS after-sales service for assistance.
E15S2	Please release the robot's brakes first	When running the task, the robot brake is not released.	Try the following in turn: (1) Release the robot brake.
E15S3	Fail to load the robot configuration file	The robot configuration file is missing or corrupt.	Try the following in turn: (1) Update the controller software. (2) Contact ELITE ROBOTS after-sales service for assistance.
E15S4	Robot type is changed	The user modified the robot type.	Try the following in turn: (1) Power off and restart the controller.
E15S5	The system is currently in an unstable state		Try the following in turn: (1) Please power off and restart the controller while ensuring safety. (2) Contact ELITE ROBOTS after-sales service for assistance.
E15S6	The current connected robot type mismatch, joint types: [{string}]	The current joint size does not match the robot type.	Try the following in turn: (1) Configure the robot type in expert mode. (2) Power off and restart the controller. (3) Update the controller software and servo firmware. (4) Contact ELITE ROBOTS after-sales service for assistance.
E15S7	Unknown robot type	The robot type is not configured.	Try the following in turn: (1) Configure the robot type in expert mode.

			(2) Power off and restart the controller. (3) Contact ELITE ROBOTS after-sales service for assistance.
E15S8	{joint} parameters in config file doesn't match the parameters in joint firmware	(1) The joint config file is corrupted. (2) An internal error occurred in the joint firmware.	Try the following in turn: (1) Update or reinstall the controller software and servo firmware. (2) Contact ELITE ROBOTS after-sales service for assistance.
E15S10	The robot controller is in error state, error code: '{signed}'	The robot controller is in error state.	Try the following in turn: (1) Power off and restart the controller. (2) Contact ELITE ROBOTS after-sales service for assistance.
E15S11	Please power on the robot first	The robot is not powered on.	Try the following in turn: (1) Power ono the robot. (2) Contact ELITE ROBOTS after-sales service for assistance.
E15S12	The current performance consumption of the system is too high	The system performance occupied by the current running task is too high.	Try the following in turn: (1) Please add sleep or sync functions at appropriate locations in the running tasks to reduce performance consumption during task execution.
E16S0	Bus Alarm		
E16S1	Profinet IO module not plug		Try the following in turn: (1) P2R_IO module pulg slot.
E16S2	Profinet REG1 module not plug		Try the following in turn: (1) P2R_REG1 module plug slot.
E16S3	Profinet REG2 module not plug		Try the following in turn: (1) P2R_REG2 module plug slot.
E17S0	RTSI Watchdog Alarm		
E17S1	RTSI Watchdog Alarm		Try the following in turn: (1) Check Profinet, EthernetIP and other fieldbus. (2) Check RTSI watchdog.

5 Spare Parts List

Table 5-1 Robot arm

Serial Number	Part Number	Product Name	Product Specifications	Remark
1	NB80000019	CRJ-17-6 Joint		
2	NB80000020	CRJ-17-5 Joint L		
3	NB80000021	CRJ-17-4 Joint		
4	NB20100154	CRJ-25-3 Joint		
5	NB80000022	CRJ-32-2 Joint		
6	NB80000023	CRJ-32-1 Joint		
7	NB20100194	C12 Upper Arm Assembly-Spare Part		
8	NB20100039	C12 Lower Arm Assembly		
9	NB20100040	CS612 Base Assembly		
10	NB20100150	CRJ-17 Joint End Flange Assembly-Spare Part		
11	NB20100007	17 Joint INC Assembly-C		
12	NB20100015	25 Joint INC Assembly-C		
13	NB20100019	32 Joint INC Assembly-C		
14	NB20100004	14 Joint ABS Assembly-C		
15	NB20100016	25 Joint ABS Assembly-C		
16	NB20100001	14 Joint Electromagnet Assembly-C		
17	NB20100013	25 Joint Electromagnet Assembly-C		
18	NB20100017	32 Joint Electromagnet Assembly-C		
19	NA60400047	End Aviation Cap-C		
20	NB50000114	17-Joint Back Cover-C (Sprayed)		
21	NB50000116	25-Joint Back Cover-C (Sprayed)		
22	NB50000117	32-Joint Back Cover-C (Sprayed)		
23	NA60300128	Link Supporting Ring 17-C		
24	NA60300130	Link Supporting Ring 25-C		

25	NA60300131	Link Supporting Ring 32-C		
26	NA60300138	Link Rubber Ring 17-C		
27	NA60300140	Link Rubber Ring 25-C		
28	NA60300141	Link Rubber Ring 32-C		
29	NA60300091	17 Joint Rubber Ring-C		
30	NA60300104	25 Joint Rubber Ring-C		
31	NA60300092	32 Joint Rubber Ring-C		
32	NB70100012	CS612 Robot Cable		

Table 5-2 Controller

Serial Number	Part Number	Product Name	Product Specifications	Remark
1	NB30000001	CS Teach Pendant	ERP400	
2	NA21100002	Filter	FKL6622.300-EMC	
3	NA20100051	PWM Fan	SI121238BH1FR004	
4	NB80000002	Safe&IO-C IO Plug Assembly		
5	NA40800022	Seiko Small Fuse	10A	
6	NB80000003	X86 Module Components		
7	NA41000025	Battery	CR2450	
8	NB40000013	BRAKE-C PCBA		
9	NA20100009	48V Power Supply	RSP-2000-48V	
10	NA20200164	Power Outlet	4301.0501	
11	NA31400119	Power Outlet Shield	3-125-661	
12	NA20600047	Rocker Switch	KCD4-201-2	
13	NA31400128	Stuffy Cover	M25X1.5, black, with nut	
14	NA30600033	Rubber Coil	GM-4	
15	NA20300004	Power Cable	3-100-527	
16	NA60300180	Nylon Thread Plug-C		

Table 5-3 Tool

Serial Number	Part Number	Product Name	Product Specifications	Remark
1	NB80000004	CS Repair Tool Kit	set	
2	NA50100238	Antistatic Gloves 9''	SF0002	
3	NE00000009	Diagonal Pliers/Electronic Cutters 5''	70632	
4	NA50200124	Open End Wrench	5.5-7 3mm thick	
5	NA50200123	Open End Wrench	8-10 3mm thick	
6	NE00000058	1 Set of the Ball-headed Allen Keys (7 pieces in total)	1.5/2/2.5/3/4/5/6M	
7	NE00000123	8mm Allen Key	8*200*36	
8	NE00000044	Hexagon Screw Socket	19400-M5	

6 Robot Packaging

Packaging the robots and the controller for shipment.

Notices	• Please remove any external tools and external electrical connections before shipping; • If a third-party product cannot be safely uninstalled, or if they are prohibited from performing the required post-repair testing, Elite Robots may refuse to ship it; • Elite Robots does not assume any responsibility for the return of third-party goods; • Make sure to pack the robot, controller, and teach pendant responsibly; • The product of Elite Robots will always be shipped back with original Elite Robots package.

- User can move the robot to the packing position through the JOG function:
  - The packaging pose angle of CS612 robot are: (A1: 45°、A2: -180°、A3: 160°、A4: -70°、A5: 180°、A6: -90°);
  - Manually JOG moves the robot to the packaging pose;
  - Shut down, disconnect the main power supply, and disconnect the robot arm from the controller;
  - Load the robot arm and controller into the specified box to ensure that the robot arm is in the correct position in the middle of the box;
  - Note:
    If the robot cannot run or the power supply is not available, the brakes for each joint can be manually released individually and the robot can be packaged accordingly. For the release of the brake, see 3.2.2 Brake release.
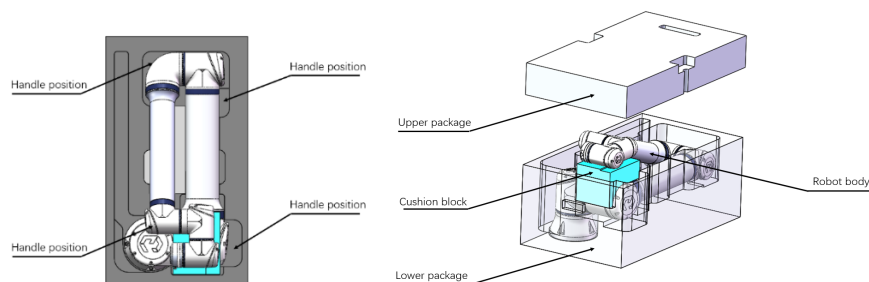

Figure 6-1 Robot packaging diagram

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