



# UNIVERSAL ROBOTS



## Service Manual

Revision UR3\_en\_3.1.2

*"Original instructions"*

### **Robot:**

UR3 with CB3-controller

*Valid from robot s/n 2014330001*

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# 1. General information

## 1.1 Purpose

The main purpose of this manual is to help the user safely perform service related operations and troubleshooting.

Universal Robots industrial robots are designed using high quality components designed for long lifetime. However any improper use of robot can potentially cause failures. For example, the robot may have been overloaded or have been dropped on the floor when relocating or have run with a load not recommended by Universal Robots. Any improper use of the robot will invalidate the guarantee.

Universal Robots recommends that you do not attempt repair, adjustment or other intervention in the mechanical or electrical systems of the robot unless a problem has arisen. Any unauthorized intervention will invalidate the guarantee. Service related operations and troubleshooting should only be performed by qualified personnel.

Before performing service related operations, always make sure to stop the robot program and disconnect power supply to any potential dangerous tool on the robot or in the work cell.

In the event of a defect, Universal Robots recommends ordering new parts from the Universal Robot distributor from where the robot has been purchased.

Alternatively, you can order parts from your nearest distributor, whose details you can obtain from Universal Robots official website at [www.universal-robots.com](http://www.universal-robots.com)

## 1.2 Company details

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## 1.3 Disclaimer

The information contained herein is the property of Universal Robots A/S and shall not be reproduced in whole or in part without prior written approval of Universal Robots A/S. The information herein is subject to change without notice and should not be construed as a commitment by Universal Robots A/S. This Manual is periodically reviewed and revised.

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## 2. Preventive Maintenance

### 2.1 Controller



#### 2.1.1 Inspection plan, Safety Functions

The safety functions of the robots must be tested at least once a year to ensure correct function. The following tests must be performed.

- Test that the Emergency Stop button on the Teach Pendant functions:
  - Press the Emergency Stop button on the Teach Pendant
  - Observe that the robot stops and turns off the power to the joints
  - Power the robot again
- Test Free drive mode:
  - Set the robot in Free drive mode by pressing the *Free drive* button on the Teach Pendant
  - Move the robot to a position where it is stretched out horizontally
  - Monitor that the robot maintains its position when not holding the robot and the Free drive button still pressed.
- Test Back drive mode:
  - If robot is close to collision, the BACKDRIVE function can be used to move robot arm to safe position before initializing.
  - Press ON to enable power for the joints - *Do NOT release the brakes.*
  - Press and hold Freedrive -> status will change to BACKDRIVE
  - Pull joint away from collision area -> brake is released for only this joint as long as freedrive is pressed.
- Verify safety settings:
  - Verify that the safety settings of the robot comply with the Risk Assessment of the robot installation
- Test that additional safety inputs and outputs are still functioning:
  - Check which safety inputs and outputs are active and test that they can be triggered.

## 2.1.2 Visual inspection of controller

- Disconnect power cable from controller
- Open cabinet door
- Check connectors are properly inserted on printed circuit boards
- Check for any dirt/dust inside of controller
- If any dirt/dust is present:
  - » Gently use a vacuum cleaner to remove particles
  - » Use a soft cloth. You can add: Water, Isopropyl alcohol, 10% Ethanol alcohol or 10% Naphtha

## 2.1.3 Cleaning and replacement of filters

- Controller box contains two filters, one on each side of controller
- Remove filters from controller box and clean them thoroughly using compressed air
  - Replace filters if necessary



- Gently remove the outer plastic frame and maintain the filter



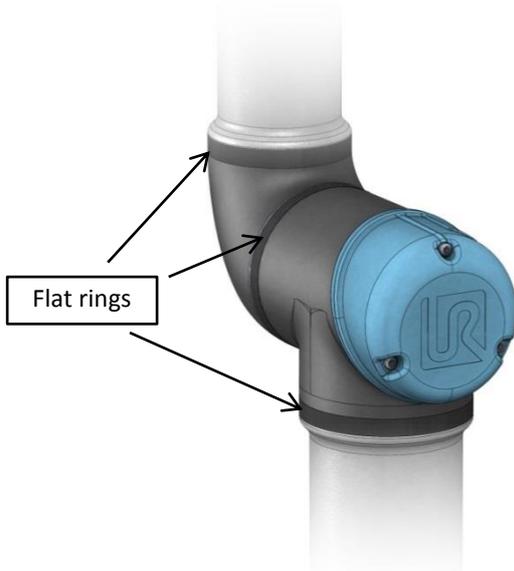
## 2.2 Robot arm

### 2.2.1 Visual inspection of robot arm

- Of safety reasons confirm that the 4 rubber covers over the mounting screws are present on the Base mounting bracket.



- If you observe oil on the robot arm you simply clean it with a cloth. In very rare cases the grease is from the inside of the joint. There is still enough grease in the gear for life time you just clean the joint with a cloth.
- Move robot arm to HOME position (if possible)
- Turn off and disconnect power cable from controller
- Inspect cable between controller and robot arm for any damage
- Inspect flat rings for wear and damage
  - » Replace flat rings if worn out or damaged
- Inspect blue lids on all joints for any cracks or damage
  - » Replace blue lids if cracked or damaged.
- Inspect that screws for blue lids are in place and properly tightened
  - » Replace screws, tighten properly if necessary



Correct torque value for screws on blue lids are **0.4Nm**

If any damage is observed on a robot within the warranty period, contact the distributor from which the robot has been purchased.

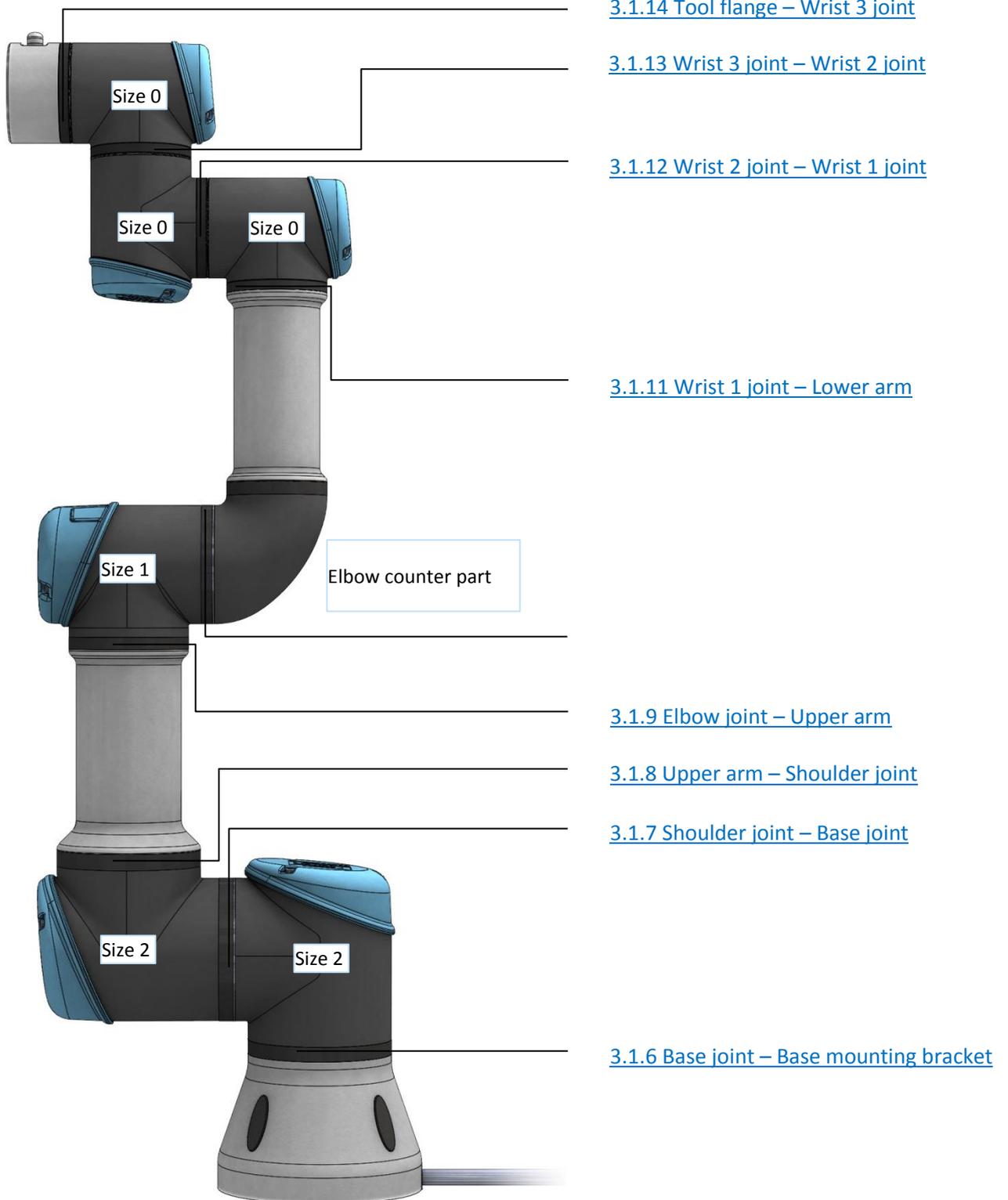
## 3. Service and Replacement of parts

### 3.1 Robot arm

#### 3.1.1 Before returning any part to Universal Robots check:

- Remove all external non-UR equipment such as grippers, hoses, cables and so on. Universal Robots cannot be held responsible for damage caused to non-UR equipment mounted on the robot.
- Backup all relevant files before sending the robot/part to UR. Universal Robots cannot be held responsible for loss of programs, data or files stored in the robot.
- **Safety notice:**  
If the robot/part has been in contact with, or working in environments, where dangerous chemicals or materials are present, the robot must be cleaned before shipment.  
If this is not possible, the shipment must be accompanied by an MSDA (Material Safety Data Sheet) in English and instructions for cleaning the chemicals.  
The amount of labor hours needed for cleaning will be billed at the standard rate.  
If UR finds the robot/part unsafe to service, UR reserve the right to get the robot/part cleaned or decline the case and send the part back, at customers expense.

### 3.1.2 Robot arm configuration



### 3.1.3 Brake release

In an urgent situation the brake on Base, Shoulder and Elbow joints can be released without power connected. It is not possible to release the brakes on Wrist 1, 2 and 3 manually.

#### IMPORTANT NOTICE:

- Before releasing a brake it is extremely important to dismount any dangerous parts to avoid any hazardous situations.
- If releasing the brake on Base joint, Shoulder joint or Elbow joint, it is important to make proper mechanical support prior to releasing the brake.
- Always make sure personnel are in no risk when releasing the brake.
- Do not move the joint more than necessary, Not more than about 160 degrees in order for the robot to find its original physical position.

Procedure for releasing the joint

- Shut down Controller.
- Remove blue lid on joint.
- Push brake pin down to release, joint can then be rotated.  
On the Wrist 1, 2 and 3 it is not possible to release the brakes manually.



Brake on Base and Shoulder joints,



Brake on Elbow joints

- Make sure to mount blue lid properly on joint before turning on Controller.
- Correct torque value for screws on blue lids are **0.4Nm**

### 3.1.4 General guidance to separate joint from counterpart

#### Disassemble:

1. Check if you have the necessary tools before you start to repair the robot.
  - 1.1. Service kit with torque tools, ESD Wristband, etc.
  - 1.2. If you have to disassemble the robot arm you need: new flat rings, M3 and M4 tap tool for threads, pre coated screws or Loctite and normal.
  - 1.3. Check the guide in this manual in details before you continue.
2. Move the robot to a comfortable position for disassembly or if necessary dismount entire robot arm from work cell and place on a solid surface.
3. Shut down the controller.
4. Remove blue lid.
5. Now reattach one of the screws for the blue lids to connect an alligator Clip on your ESD wristband as shown below.



6. **Gently** unplug the cable connectors **without bending the printed circuit board**.

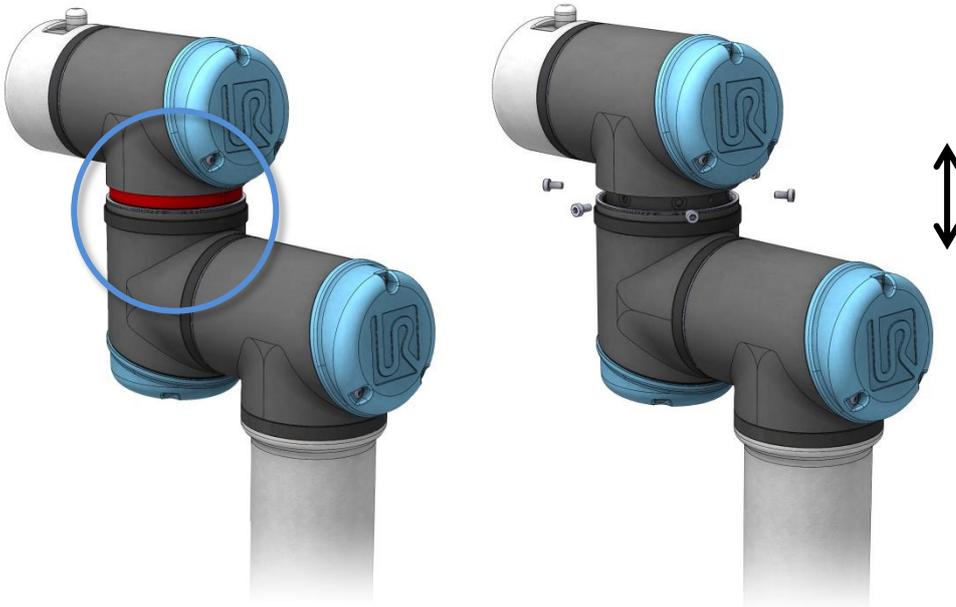
The power supply connector for the size 0 and the size 1 has a lock that has to be engaged before it is pulled out of the printed circuit board.



7. After disconnecting the wires gently remove black flexible flat ring with a tiny screwdriver and twist it around the joint housing.



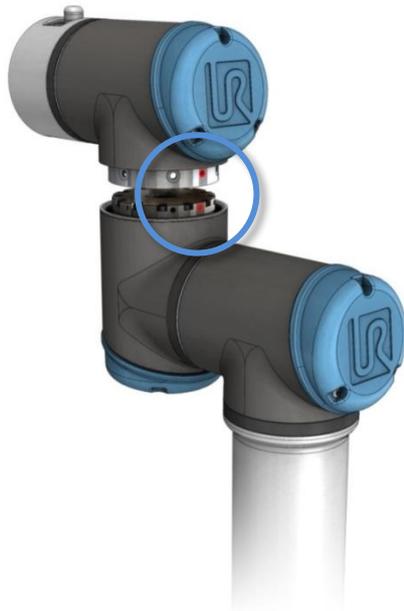
8. Slide back the black teflon ring. (Marked with red)  
6, 8 or 10 screws become visible  
Loosen the screws.



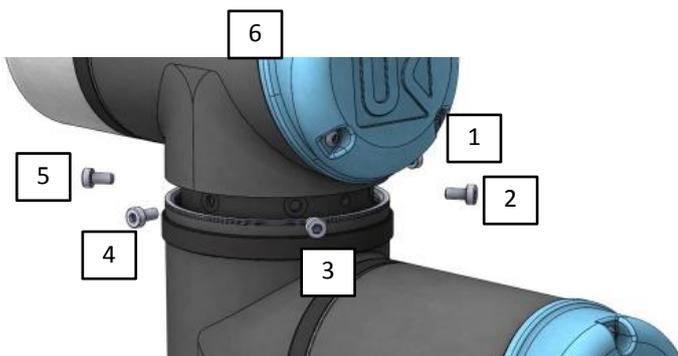
9. Pull the two parts gently apart.

## Assemble:

1. **Important note:** remove residues of old Loctite in screw holes with a M3 or M4 tap tool for threads before assembling the joint to get the correct torque on the new screws. 
2. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.
3. **Important note:** Always replace the black flexible flat ring to maintain the IP classification.
4. Orientate the joints according to the marks and gently push the two joints together. (In the below drawing the marks are indicated with red)



5. Gently tighten the 6, 8 or 10 screws, and then **tighten in cross** order with the correct torque. See 3.1.5 Torque values



Example: The screws from 1 to 6 should be tightened like this:

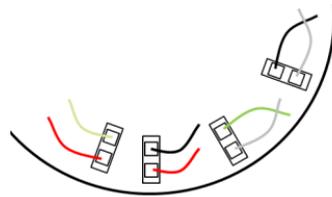
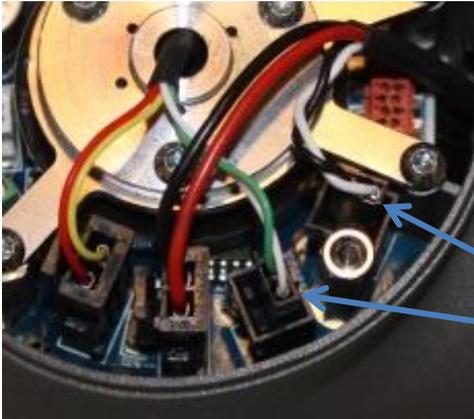
1, 4, 2, 5, 3, 6 and again

1, 4, 2, 5, 3 and 6

6. Slide the black teflon ring (Indicated with red) into place and gently put the new flat ring back on top of the teflon ring.

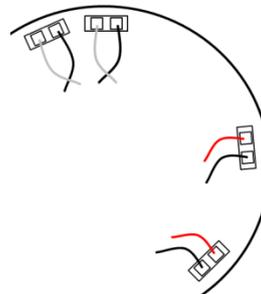
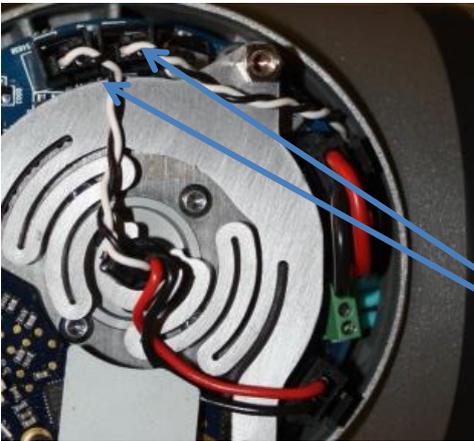


7. Connect the cables:  
Size 0 joint.



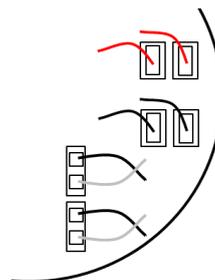
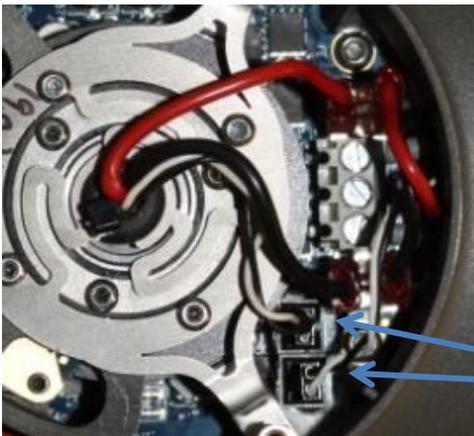
**Twist the communication cable 1.5 to 2 full rounds before connection**

Size 1 joint.



**Twist the communication cable 1.5 to 2 full rounds before connection**

Size 2 joint.



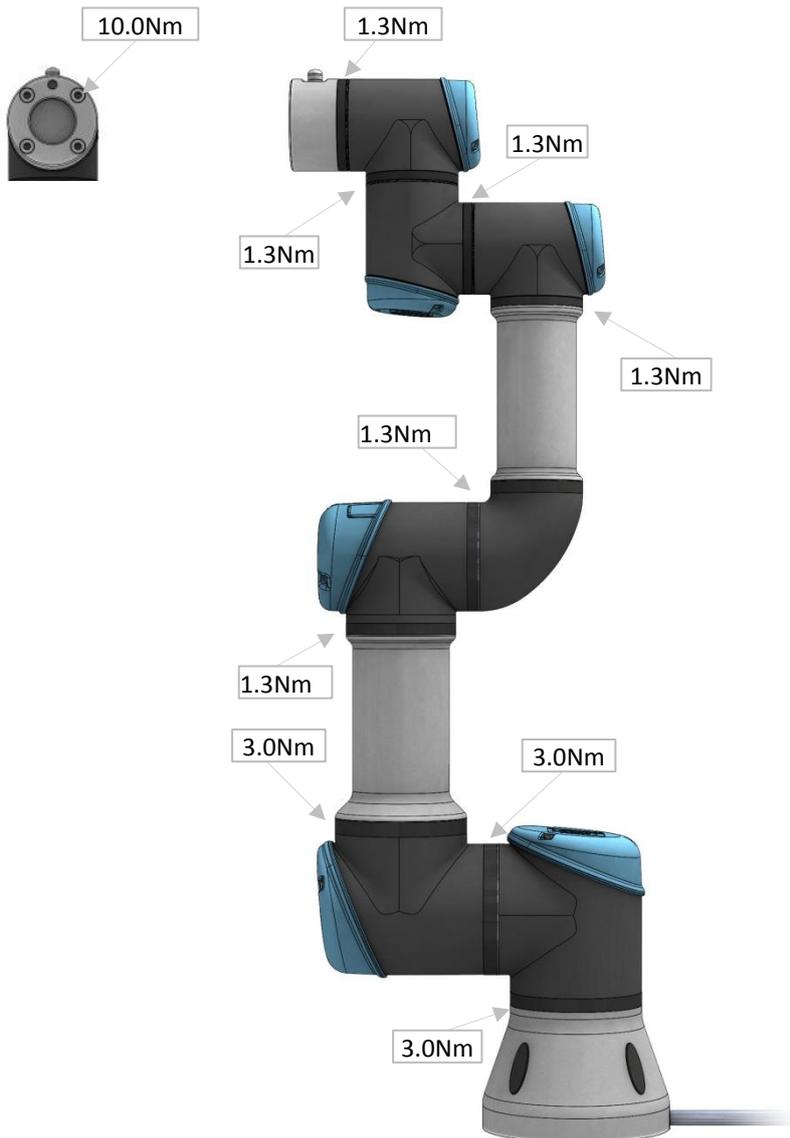
**Twist the communication cable 1.5 to 2 full rounds before connection**

8. **Twist the communication cable 1.5 to 2 full rounds before connection.**  
(To reduce electrical noise in the system)
9. Mount the blue lid on the joint and tighten with **0.4Nm**.
10. Proceed to [3.1.15 Dual Robot Calibration and Joint calibration](#) for calibrating the Robot.

### 3.1.5 Torque values

UR3 torque values		TORQUE	HEAD SIZE
Base mounting bracket	J0 Base	3.0Nm	Torx T20
[J0] Base	J[1] Shoulder	3.0Nm	Torx T20
[J1] Shoulder	Upper arm	3.0Nm	Torx T20
Upper arm	[J2] Elbow	1.3Nm	Torx T10
[J2] Elbow	Lower arm	1.3Nm	Torx T10
Lower arm	[J3] Wrist 1	1.3Nm	Torx T10
[J3] Wrist 1	[J4] Wrist 2	1.3Nm	Torx T10
[J4] Wrist 2	[J5] Wrist 3	1.3Nm	Torx T10
[J5] Wrist 3	Tool mounting bracket	1.3Nm	Torx T10
Tool/ Gripper M6		10Nm	
Blue lid: Base, Shoulder and Elbow		0.4Nm	Torx T10
Blue lid: Wrist 1, Wrist 2 and Wrist 3		0.4Nm	Torx T8

Attention: **Click the torque tools 3 times before use** to get the correct calibrated torque.



### **3.1.6 Base joint – Base mounting bracket Disassemble**

For details and photos please see: 3.1.4 General guidance to separate joint from counterpart

1. Shut down the controller.
2. Remove black flexible flat ring with a tiny screwdriver and twist it around the joint housing.
3. Slide back the black teflon ring. 10 screws become visible. Loosen the screws.
4. Pull the Base mounting bracket and Base joint gently apart.
5. Disconnect wires from the EMC filter in the Base mounting bracket.

## Base joint – Base mounting bracket: Assemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

1. **Important note:** remove residues of old Loctite in screw holes with a M4 tap tool for threads before assembling the joint to get the correct torque on the new screws. 
2. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.
3. Replace Base mounting bracket and reconnect wires to the EMC filter.

**Twist the communication cable** 1.5 to 2 full rounds before it is connected.

(To reduce electrical noise in the system)

1 x red wire	= 48V DC
1 x black wire	= GND
White and black	= bus connector

4. Orientate the joint and Base mounting bracket according to the marks and gently push them together.
5. Press gently the base and base mounting bracket together to align the screw holes in the two parts before attaching the screws.



Align the screw holes in the two parts

6. Gently tighten the 10 screws, and then tighten **in cross order with 3.0Nm**.
7. Slide the black teflon ring into place and gently put the flat ring back on top of the teflon ring.
8. Proceed to chapter [3.1.15 Dual Robot Calibration and Joint calibration](#) for calibrating the robot.

### 3.1.7 Shoulder joint – Base joint Disassemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

1. Shut down the controller.
2. Remove blue lid on Base joint and **connect ESD wristband**.
3. Disconnect wires between Base joint and Shoulder joint.  
**Without bending the printed circuit board.**
4. After disconnecting the wires gently remove black flexible flat ring with a tiny screwdriver and twist it around the joint housing.
5. Slide back the black teflon ring. 10 screws become visible. Loosen the screws.
6. Pull the Base joint and Shoulder joint gently apart.



### Shoulder joint – Base joint: Assemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

1. **Important note:** remove residues of old Loctite in screw holes with a M4 tap tool for threads before assembling the joint to get the correct torque on the new screws. 
2. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.
3. Orientate the Base joint and Shoulder joint according to the marks and gently push them together.
4. Gently tighten the 10 screws, and then tighten **in cross order with 3.0Nm**.
5. Slide the black teflon ring into place and gently put the flat ring back on top of the teflon ring.
6. **Connect ESD wristband.**
7. **Twist the communication cable** 1.5 to 2 full rounds before it is connected. (To reduce electrical noise in the system)
 

1 x red wire	= 48V DC
1 x black wire	= GND
White and black	= bus connector
8. After connection of the wires then mount the blue lid and tighten with **0.4Nm**.
9. Proceed to chapter [3.1.15 Dual Robot Calibration and Joint calibration](#). for calibrating the robot.



### 3.1.8 Upper arm – Shoulder joint

#### Disassemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#) Shut down the controller.

1. Remove blue lid on Shoulder joint and **connect ESD wristband**.
2. Disconnect wires between Shoulder joint and Upper arm.  
**Without bending the printed circuit board.**
3. After disconnecting the wires gently remove black flexible flat ring with a tiny screwdriver and twist it around the Upper arm. Loosen the screws.
4. Pull the Shoulder joint and Upper arm gently apart.



#### Upper arm – Shoulder joint: Assemble

1. **Important note:** remove residues of old Loctite in screw holes with a M4 tap tool for threads before assembling the joint to get the correct torque on the new screws. 
2. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.
3. Orientate the Shoulder joint and Upper arm according to the marks and gently push them together.
4. Gently tighten the 10 screws, and then tighten **in cross order with 3.0Nm**.

#### 5. Connect ESD wristband.

6. **Twist the communication cable** 1.5 to 2 full rounds before it is connected. (To reduce electrical noise in the system)

1 x red wire	= 48V DC
1 x black wire	= GND
White and black	= bus connector



7. After connection of the wires then mount the blue lid and tighten with **0.4Nm**.
8. Proceed to chapter [3.1.15 Dual Robot Calibration and Joint calibration](#). for calibrating the robot.

### 3.1.9 Elbow joint – Upper arm Disassemble and assemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#) Shut down the controller.

1. Remove blue lid on Elbow joint and **connect ESD wristband**.
2. Disconnect wires between Elbow joint and Upper arm.  
**Without bending the printed circuit board.**
3. After disconnecting the wires gently remove black flexible flat ring with a tiny screwdriver and twist it around the Upper arm. Loosen the screws.
4. Pull the Elbow joint and Upper arm gently apart.



### Elbow joint – Upper arm: Assemble

1. **Important note:** remove residues of old Loctite in screw holes with a M3 tap tool for threads before assembling the joint to get the correct torque on the new screws. 
2. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.
3. Orientate the Elbow joint and Upper arm according to the marks and gently push them together.
4. Gently tighten the 8 screws, and then tighten **in cross order with 1.3Nm**.

5. **Connect ESD wristband.**

6. **Twist the communication cable** 1.5 to 2 full rounds before it is connected. (To reduce electrical noise in the system)

1 x red wire	= 48V DC
1 x black wire	= GND
White and black	= bus connector

7. After connection of the wires then mount the blue lid and tighten with **0.4Nm**.
8. Proceed to chapter [3.1.15 Dual Robot Calibration and Joint calibration](#). for calibrating the robot.



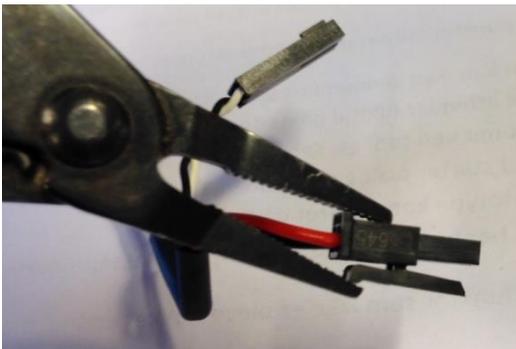
### 3.1.10 Elbow counterpart – Elbow joint Disassemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#) Shut down the controller.

1. Remove black flexible flat ring with a tiny screwdriver and twist it around the joint housing.
2. 8 screws become visible. Loosen the screws.
3. Pull the Elbow joint and Elbow counterpart gently apart.
4. Disconnect wires.

**Without bending the printed circuit board.**

The power supply connector has a lock that has to be engaged before it is pulled out of the printed circuit board.



## Elbow counterpart – Elbow joint: assemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

1. **Important note:** remove residues of old Loctite in screw holes with a M3 tap tool for threads before assembling the joint to get the correct torque on the new screws.



2. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.

3. Reconnect connectors.

**Twist the communication cable** 1.5 to 2 full rounds before it is connected. (To reduce electrical noise in the system)

1 x red wire	= 48V DC
1 x black wire	= GND
White and black	= bus connector

4. Orientate the joint and Elbow counterpart according to the marks and gently push them together.
5. Gently tighten the 8 screws, and then tighten **in cross order with 1.3Nm.**
6. Put the flat ring back on top of the screws.
7. Proceed to chapter [3.1.15 Dual Robot Calibration and Joint calibration.](#) for calibrating the robot.

### 3.1.11 Wrist 1 joint – Lower arm

#### Disassemble

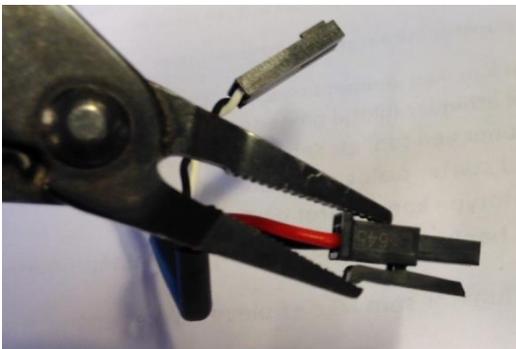
For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

1. Shut down the controller.
2. Remove blue lid on Wrist 1 joint and **connect ESD wristband**.
3. Disconnect wires between Wrist 1 joint and Lower arm.



**Without bending the printed circuit board.**

The power supply connector has a lock that has to be engaged before it is pulled out of the printed circuit board.



4. After disconnecting the wires, gently remove black flexible flat ring with a tiny screwdriver and twist it around the Lower arm.
5. Remove the plastic cover ring. 6 screws become visible. Loosen the screws.
6. Pull the Wrist 1 joint and Lower arm gently apart.

## Wrist 1 joint – Lower arm Assemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

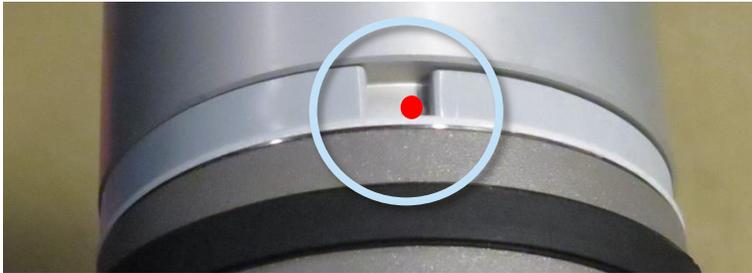
1. **Important note:** remove residues of old Loctite in screw holes with a M3 tap tool for threads before assembling the joint to get the correct torque on the new screws. 

2. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.

3. Orientate the Wrist 1 joint and Lower arm according to the marks and gently push them together.

4. Gently tighten the 6 screws, and then tighten **in cross order with 1.3Nm**.

5. Place the plastic cover ring according to the mark on the flange. (On the photo the mark is indicated in red)



6. Gently put the flat ring back on top of the plastic cover ring.

7. **Connect ESD wristband.**

8. **Twist the communication cable** 1.5 to 2 full rounds before it is connected. (To reduce electrical noise in the system)

1 x red wire	= 48V DC
1 x black wire	= GND
White and black	= bus connector



9. After connection of the wires then mount the blue lid and tighten with **0.4Nm**.

10. Proceed to chapter [3.1.15 Dual Robot Calibration and Joint calibration](#). for calibrating the robot.

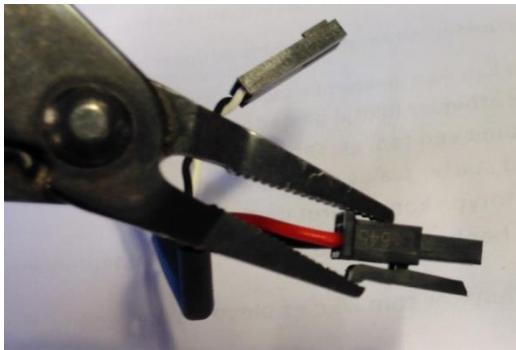
### 3.1.12 Wrist 2 joint – Wrist 1 joint Disassemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

1. Shut down the controller.
2. Remove blue lid on Wrist 2 and **connect ESD wristband**.
3. Disconnect wires between Wrist 1 joint and Wrist2 joint **without bending the printed circuit board**.



The power supply connector has a lock that has to be engaged before it is pulled out of the printed circuit board.

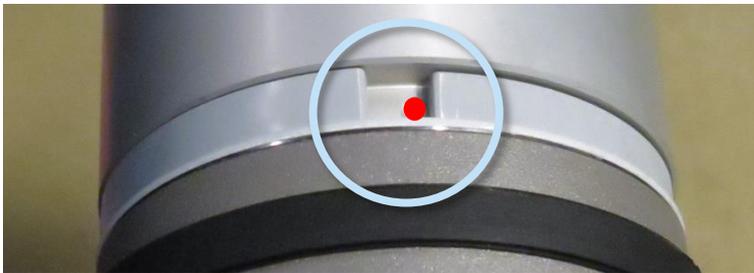


4. After disconnecting the wires gently remove black flexible flat ring with a tiny screwdriver and twist it around the joint housing.
5. Remove the plastic cover ring. 6 screws become visible. Loosen the screws.
6. Pull the Wrist 2 joint and Wrist 1 joint gently apart.

## Wrist 2 joint – Wrist 1 joint: Assemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

1. **Important note:** remove residues of old Loctite in screw holes with a M3 tap tool for threads before assembling the joint to get the correct torque on the new screws. 
2. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.
3. Orientate the Wrist 2 joint and Wrist 1 joint according to the marks and gently push them together.
4. Gently tighten the 6 screws, and then tighten **in cross order with 1.3Nm**.
5. Place the plastic cover ring according to the mark on the flange.



6. Gently put the flat ring back on top of the teflon ring.
7. **Connect ESD wristband.**
8. **Twist the communication cable** 1.5 to 2 full rounds before it is connected. (To reduce electrical noise in the system)
 

1 x red wire	= 48V DC
1 x black wire	= GND
White and black	= bus connector
9. After connection of the wires then mount the blue lid and tighten with **0.4Nm**.
10. Proceed to chapter [3.1.15 Dual Robot Calibration and Joint calibration](#). for calibrating the robot.



### 3.1.13 Wrist 3 joint – Wrist 2 joint Disassemble and assemble

Procedure for separating Wrist 3 joint from Wrist 2 is similar to separation of Wrist 2 joint and Wrist 1 joint, consult chapter [3.1.12 Wrist 2 joint – Wrist 1 joint](#)

### 3.1.14 Tool flange – Wrist 3 joint

#### Disassemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

1. Shut down the controller.
2. Remove black flexible flat ring with a tiny screwdriver and twist it around the joint housing.
3. Remove the plastic cover ring. 6 screws become visible. Loosen the screws.

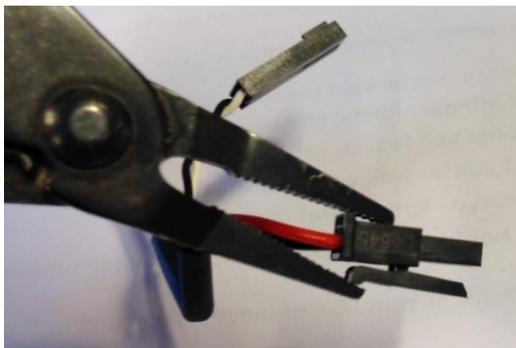
#### 4. **Connect ESD wristband.**

5. Pull the Tool flange and Wrist 3 joint gently apart.

6. Disconnect wires.

#### **Without bending the printed circuit board.**

The power supply connector has a lock that has to be engaged before it is pulled out of the printed circuit board.



## Tool flange – Wrist 3 joint: Assemble

For details and photos please see: [3.1.4 General guidance to separate joint from counterpart](#)

### 1. Connect ESD wristband.

2. **Important note:** remove residues of old Loctite in screw holes with a M3 tap tool for threads before assembling the joint to get the correct torque on the new screws.



3. **Important note:** Always use new **pre-coated screws** when it is possible. If you have to assemble with old screws carefully clean the screws and attach Loctite 648 on the screws before assembly.

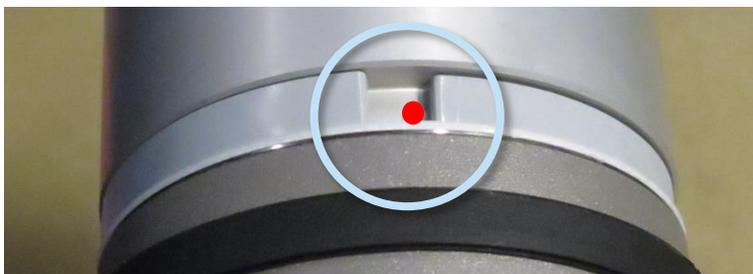
### 4. Reconnect connectors.

**Twist the communication cable** 1.5 to 2 full rounds before it is connected. (To reduce electrical noise in the system)

- 1 x red wire = 48V DC
- 1 x yellow wire = GND
- White and green = bus connector



5. Orientate the Tool flange and Wrist 3 joint according to the marks and gently push them together.
6. Place the plastic cover ring according to the mark on the flange.



7. Gently tighten the 6 screws, and then tighten **in cross order with 1.3Nm**.
8. Slide the black teflon ring into place and gently put the flat ring back on top of the teflon ring.
9. Proceed to chapter [3.1.15 Dual Robot Calibration and Joint calibration](#) for calibrating the robot.

### 3.1.15 Dual Robot Calibration and Joint calibration.

Dual Robot Calibration kit (Part no: 185500)

Dual Robot Calibration is a calibration that calibrates the robot in the full work space. All robots are Dual Robot Calibrated when they are produced.

If a joint has been replaced on a calibrated robot the calibration is not correct anymore.

There are 2 options:

- Performing a Dual Robot Calibration after replacement of a joint will let the robot continue in the production line without modifying waypoints in the robot program. To perform a Dual Robot Calibration you need: 2 robots, calibration Horse and calibration tool connector.

Go to <http://www.universal-robots.com/support/> for downloading CalibrationManual.pdf.



- Joint calibration described in this section: After replacing a joint a zero position of the joint can be adjusted but the calibration level from the Dual Robot Calibration cannot be achieved. Adjustments of waypoints in the program should be expected.

### 3.1.16 Instructions for calibrating a joint

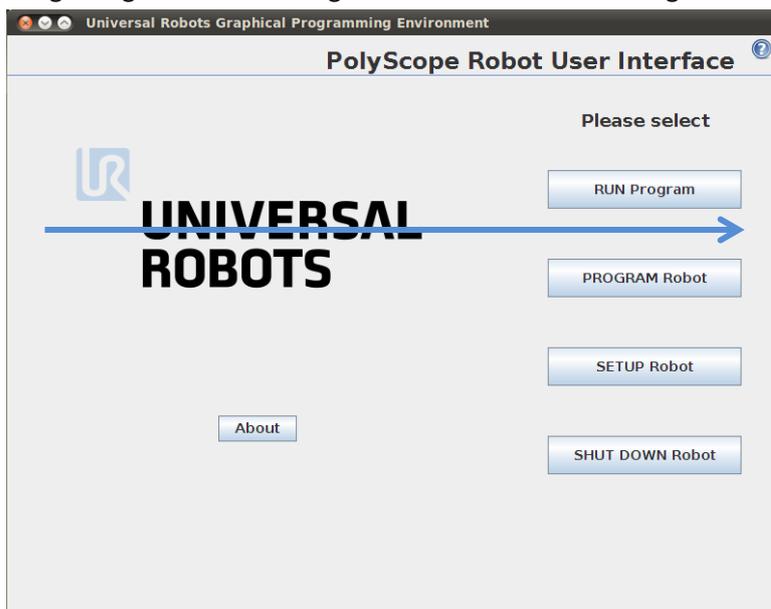
If it is not possible to make a dual robot calibration you can make a calibration of joints. After this you must expect to adjust the most important waypoints.

- Make sure that the base of the robot is horizontal.
- Jog robot to HOME position

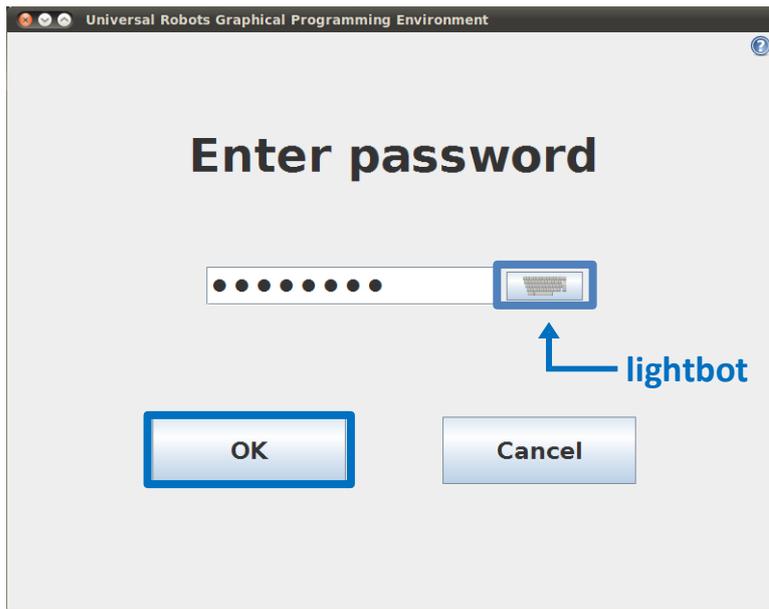


Illustration shows the HOME position, which is defined as zero position of all joints.

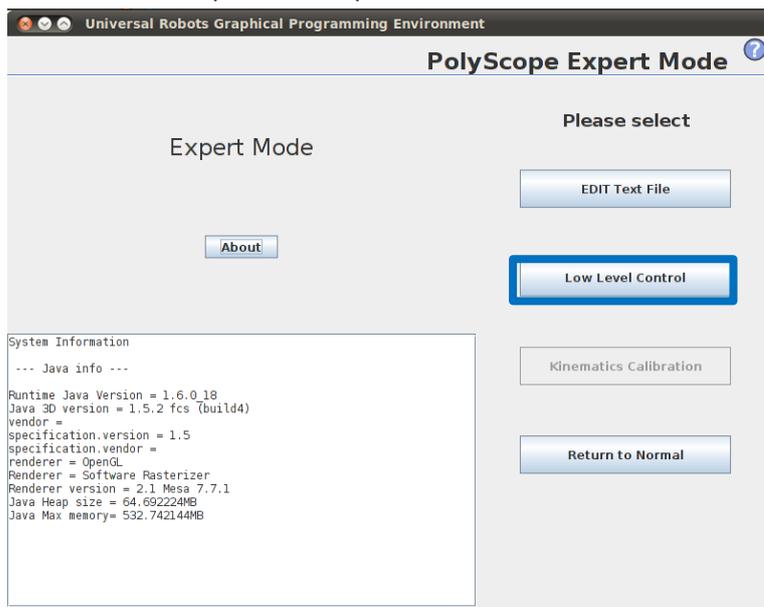
- Drag a finger from left to right across the *UNIVERSAL*-sign on main screen of PolyScope.



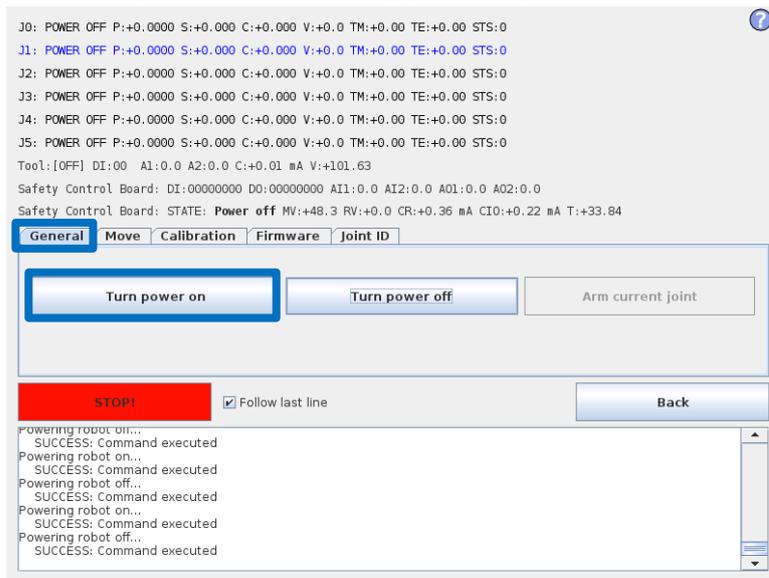
- Enter password *lightbot* and press *OK*.



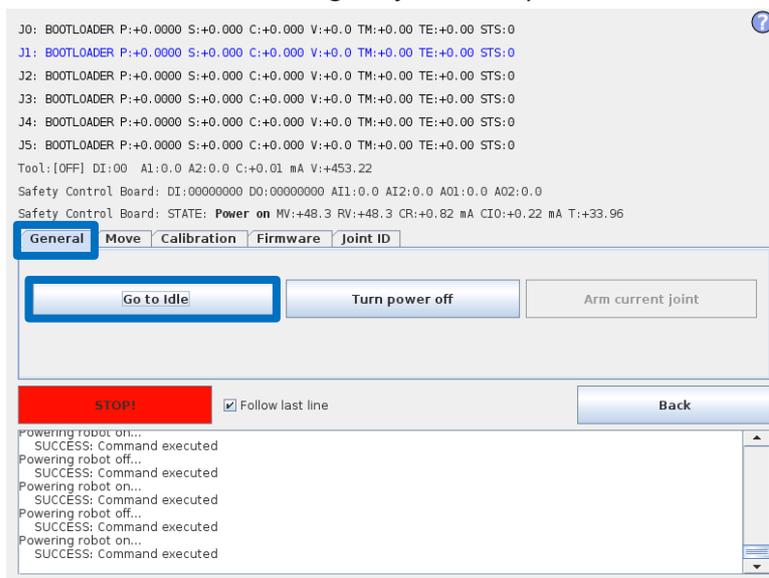
- You are now in *Expert Mode*, press *Low Level Control*.



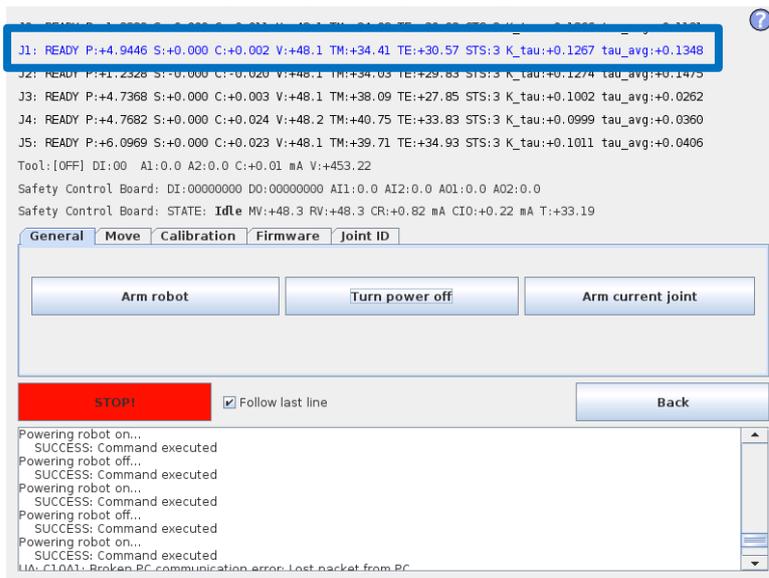
- Press *Turn power on* for enabling power to joints.



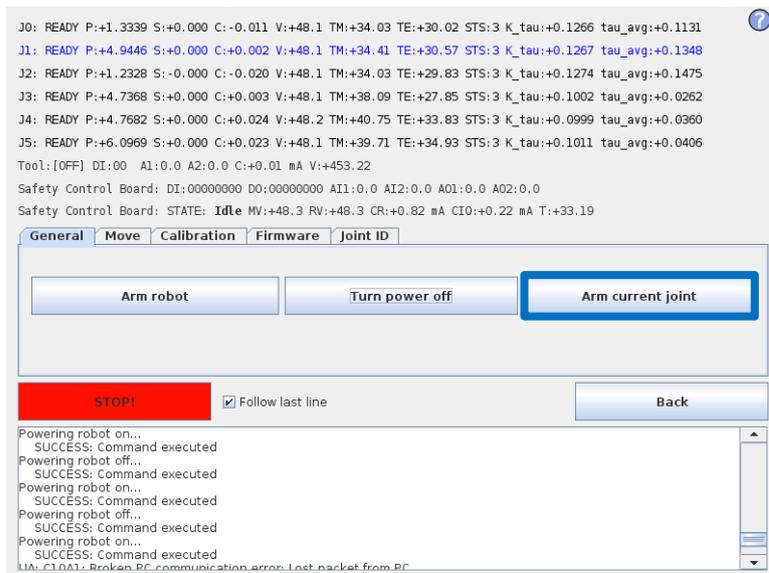
- Press *Go to Idle* for enabling the joints ready mode.



- Select the desired joint by directly clicking the status line for that joint.

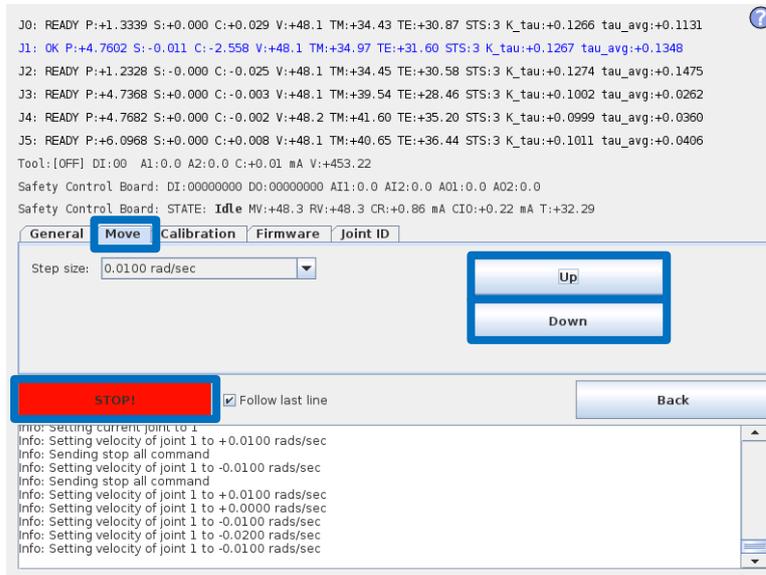


- Press *Arm current joint* to release the brake on the selected joint.



Use the *Up* and *Down* buttons in the *Move* window to navigate the joint to the correct zero position according to the following illustrations.

Press *STOP* when the joint is in the correct position.



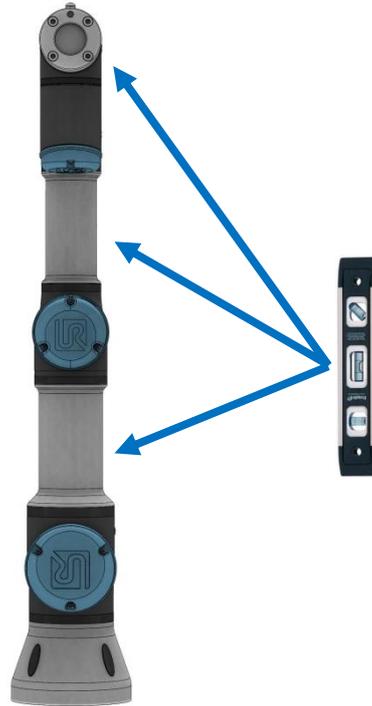
- Zero position illustrations

Base:



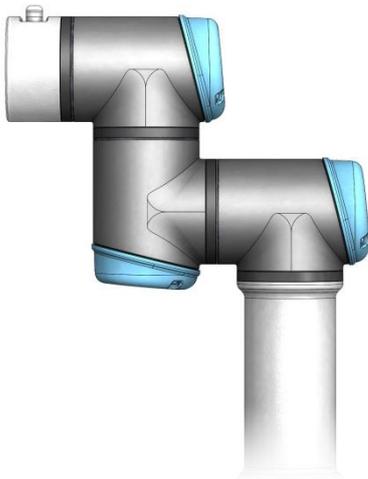
Base zero position is aligned so that the output flange is offset 180 degree from the slot for cable in back of robot base.

Shoulder, Elbow, Wrist 1:



Shoulder, Elbow and Wrist 1 zero output flange is vertical aligned (if Base is horizontal). Make sure that base of robot is horizontal, use spirit level to align joints.

Wrist 2:



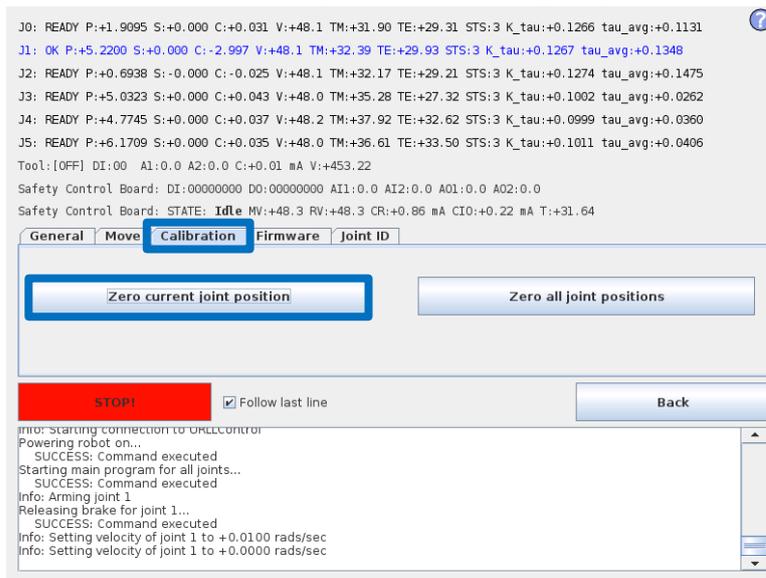
Wrist 2 zero position is aligned similar to Base joint, with tool flange parallel with wrist

Wrist 3:

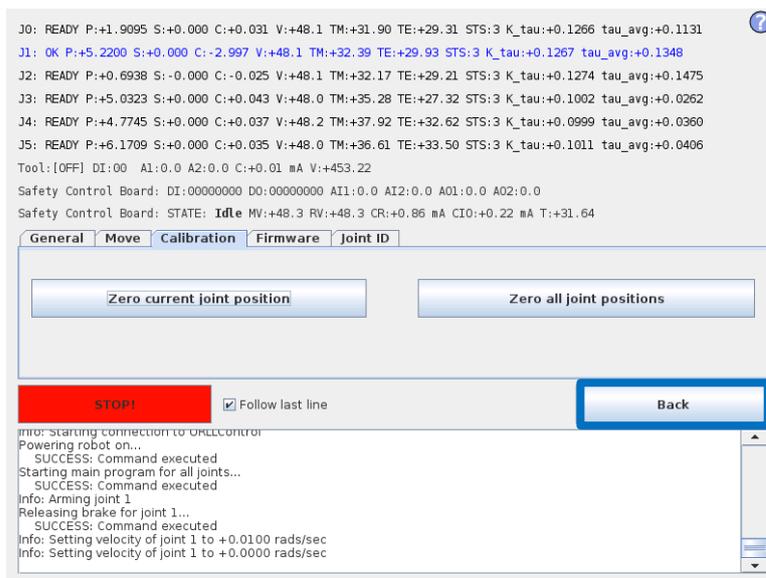


Wrist 3 zero position is aligned so tool connector is pointing upward. Mount two bolts in tool holes and use spirit level to align joint.

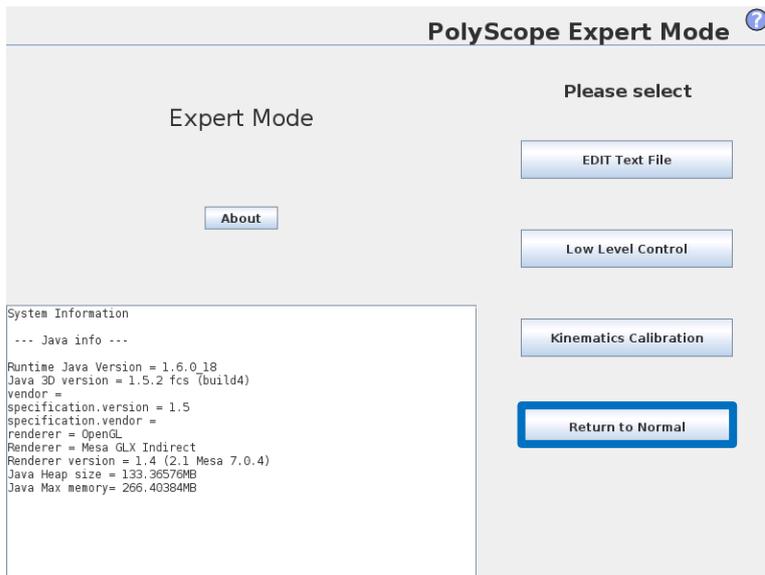
- Select *Calibration* tab and press *Zero current joint position* to calibrate the joint.



- Press *Back* to exit Low Level Control.



- Press *Return to Normal*.



- Verify zero position by moving the robot to HOME.  
If not satisfied with the zero position, perform the procedure once again.

### 3.1.17 Change joint ID

Each joint has a unique ID no. It is NOT possible to have two joints with the same ID no. on the same robot.

ID	Joint
J0	Base
J1	Shoulder
J2	Elbow
J3	Wrist 1
J4	Wrist 2
J5	Wrist 3

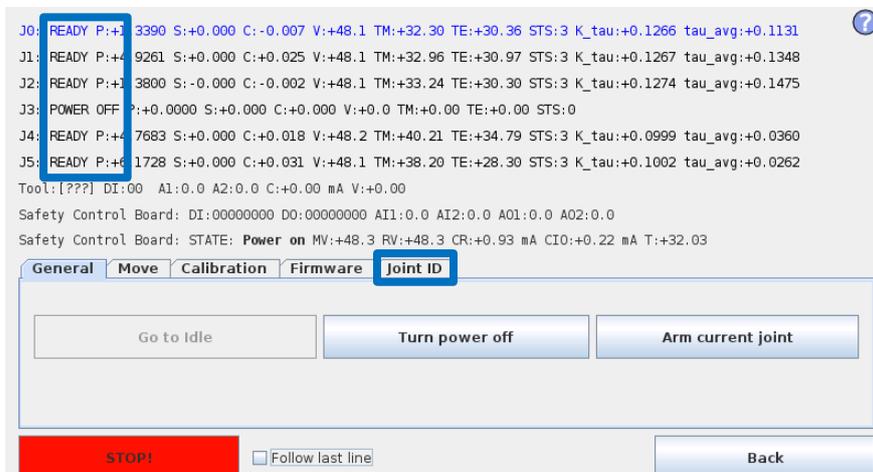
Example:

Wrist 1 (J3) has to be replaced. Spare joint is a Wrist 3 (J5)

- Disconnect the joint with correct ID no.
- Enter Low Level Control
- Press *Turn power on* and the connected joints turn into BOOTLOADER



- Press *Go to Idle* and the connected joints turn into READY

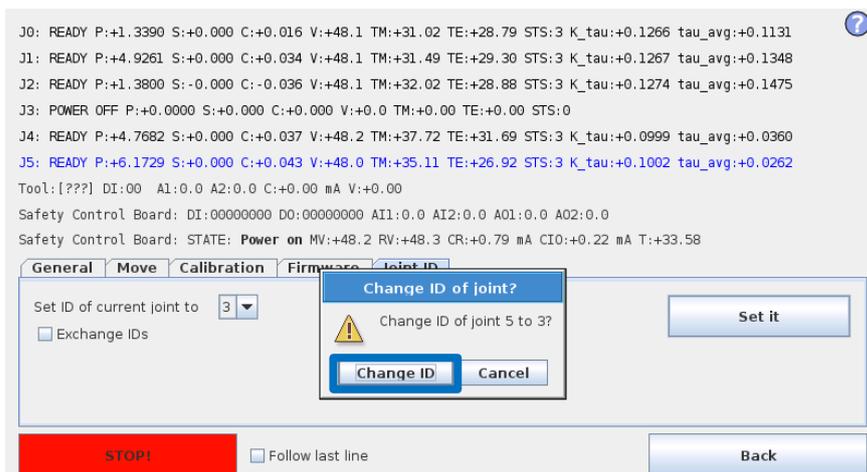


- Select *Joint ID*

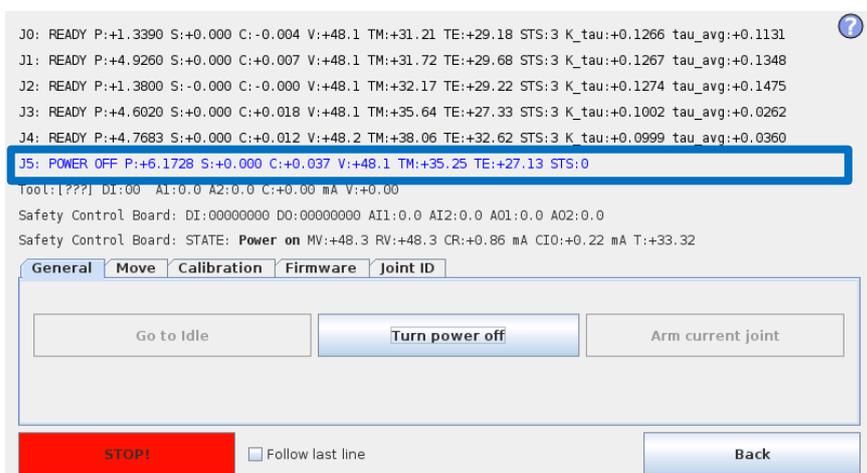
- Select *J5* (The one to be changed)
- Uncheck “Exchange IDs” box
- In dropdown box, select ID no. 3
- Press *Set it*



- Confirm *Change ID*



- After you have turned power on you can see the joint J5 has changed to J3.



### 3.1.18 Joint spare part adaptation

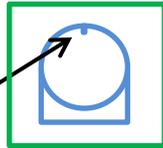
The UR3 constructed of 3 joint sizes and have to be setup on the robot:

Recommended spare joints for UR3 are marked with: 

#### Robot: **UR3**

Wrist 3: ID =5 Size 0

Alignment mark 



To use a wrist 3 joint as wrist 1 or wrist 2 it is necessary to modify the joint.

See [3.1.19 Modify wrist 3 to Wrist 1 or wrist2](#)

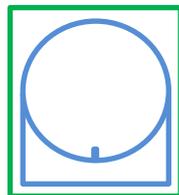
Wrist 2: ID =4 Size 0



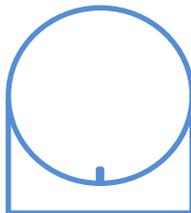
Wrist 1: ID =3 Size 0



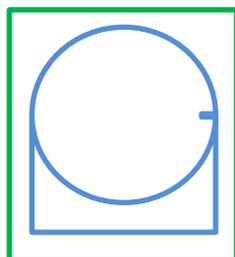
Elbow: ID =2 Size 1



Shoulder: ID =1 Size 2



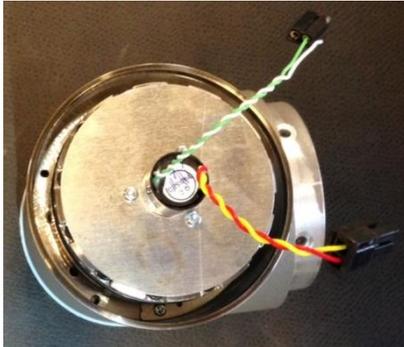
Base: ID =0 Size 2



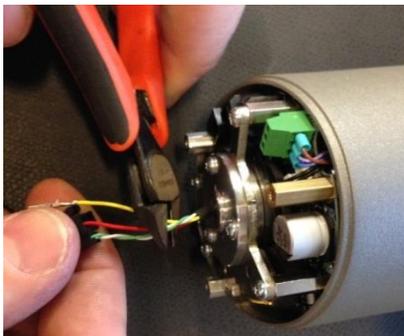
### 3.1.19 Modify wrist 3 to Wrist 1 or wrist2

- Mechanical parts has to be replaced.
- The orientation of the output flange has to be changed
- The joint ID has to be modified.

Use the ESD guidelines for the modification of the wrist see: [3.2.1 Handling ESD-sensitive parts](#)



The Wrist 3 has the slipring for infinite turning of the tool mounting bracket.



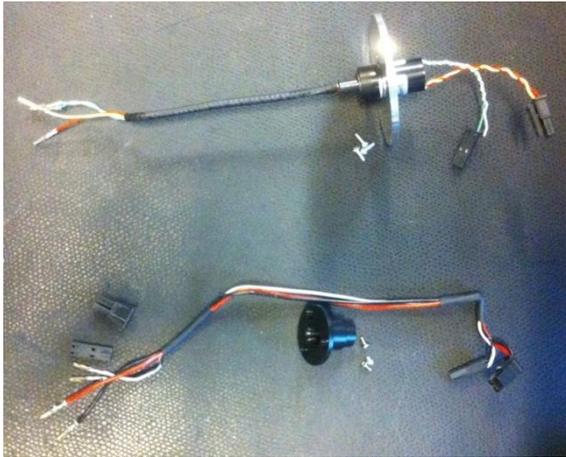
Cut the wires for the slipring



Unscrew the Slipring



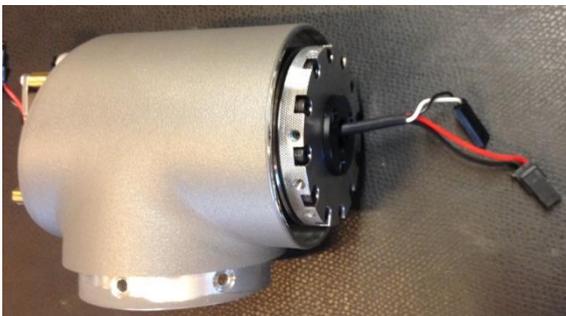
Remove the Slipring gently



The removed slipring with screws  
Parts for wrist 1 and wrist 2



Attach the plastic protection.



Put the wires through the joint and attach and assemble the connectors for the communication and power.  
There is no cable tie for this joint.

NB! Pull gently in each wire to be sure the connector is attached correct in the plastic part of the connector.

Adjust the joint orientation. See: [3.1.16 Instructions for calibrating a joint](#)

Changing the joint ID See [3.1.17 Change joint ID](#)

## 3.2 Controller

### 3.2.1 Handling ESD-sensitive parts

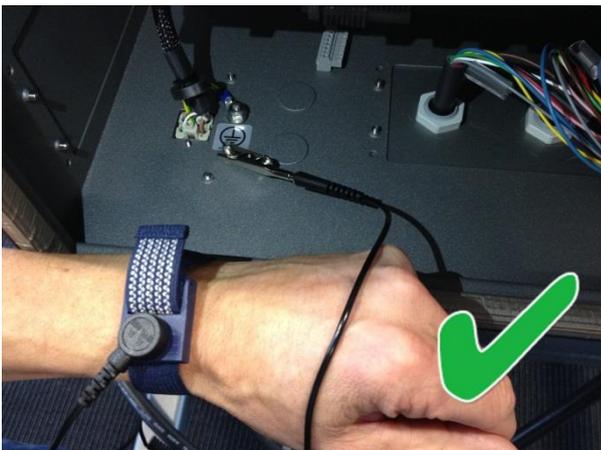


To prevent damage to ESD-sensitive parts, follow the instructions below in addition to all the usual precautions, such as turning off power before removing logic cards:



**Keep the ESD-sensitive part in its original shipping container.**

(a special "ESD bag") until the part is ready to be installed



**Put the ESD wrist strap on your wrist. Connect the wrist band to the system ground point.**

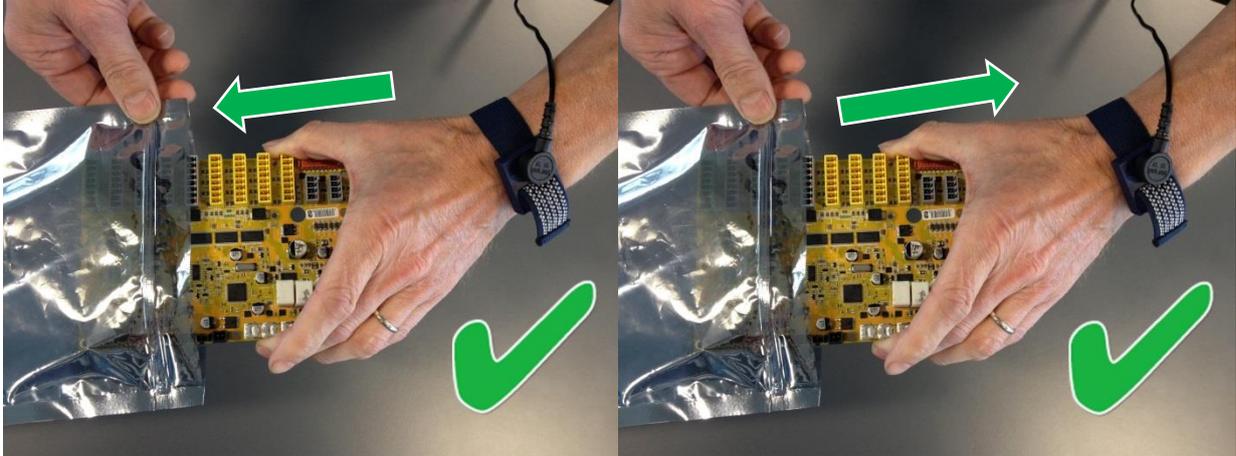
This discharges any static electricity in your body to ground.

**Step 1:**

**Put OLD board into spare ESD bag.**

**Step 2:**

**Take NEW board out of ESD bag.**



Hold the ESD-sensitive part by its edges.

**Do not touch its pins.**

If a pluggable module is being removed, then use the correct tool.





**Do not** place the ESD-sensitive part on nonconductive material or on a metal table.

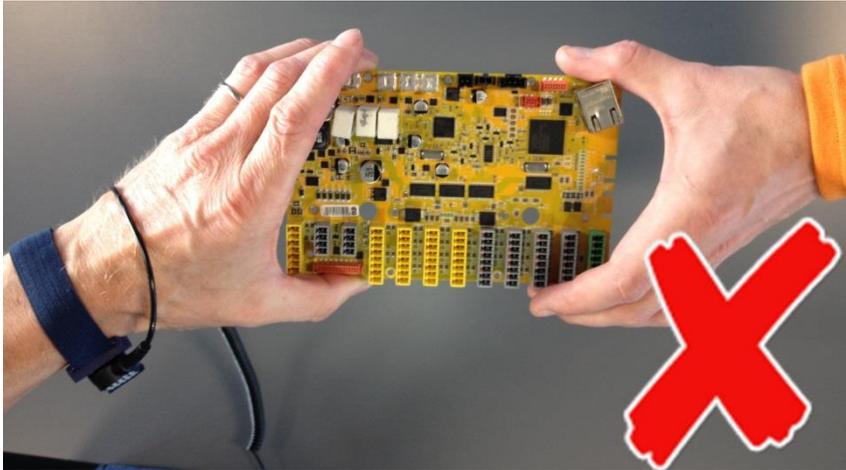
If the ESD-sensitive part needs to be put down for any reason, then first put it **into** its special ESD bag



**Machine covers and metal tables are electrical grounds. They increase the risk of damage**

because they make a discharge path from your body through the ESD-sensitive part. (Large metal objects can be discharge paths without being grounded.)





Prevent ESD-sensitive parts from being accidentally touched by other personnel and do not put unprotected ESD-sensitive parts on a table.

**Be extra careful in working with ESD-sensitive parts when cold-weather and heating is used**, because low humidity increases static electricity.

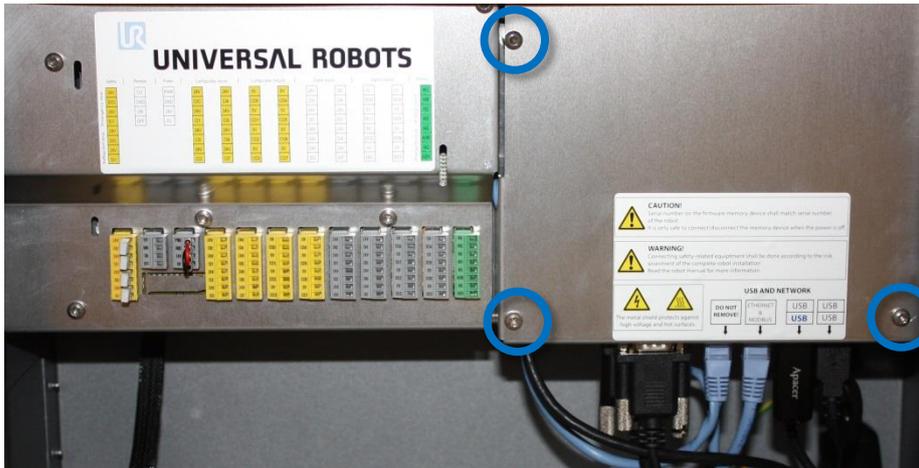
### 3.2.2 Replacement of motherboard 3.1

Take care of ESD handling [3.2.1 Handling ESD-sensitive parts](#)

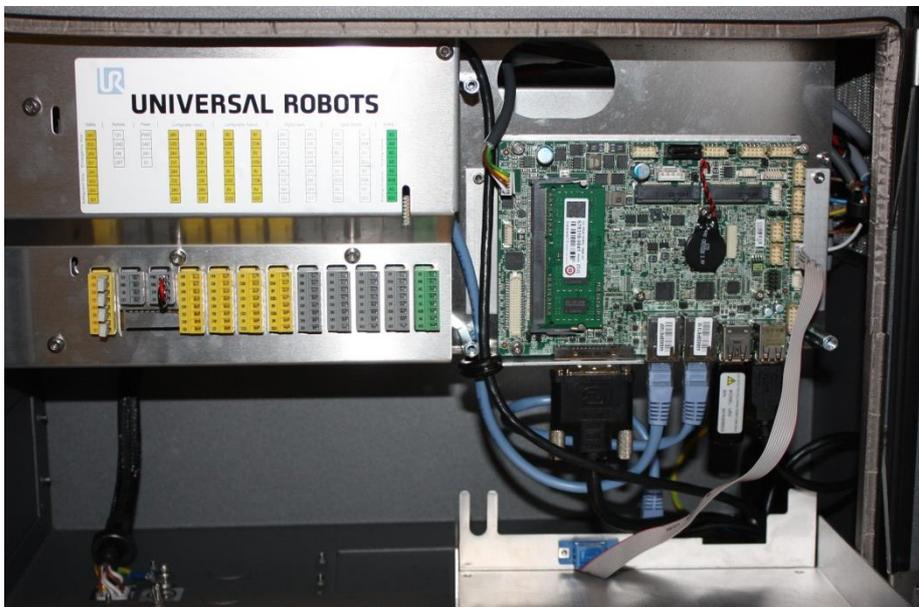


How to replace motherboard 3.1

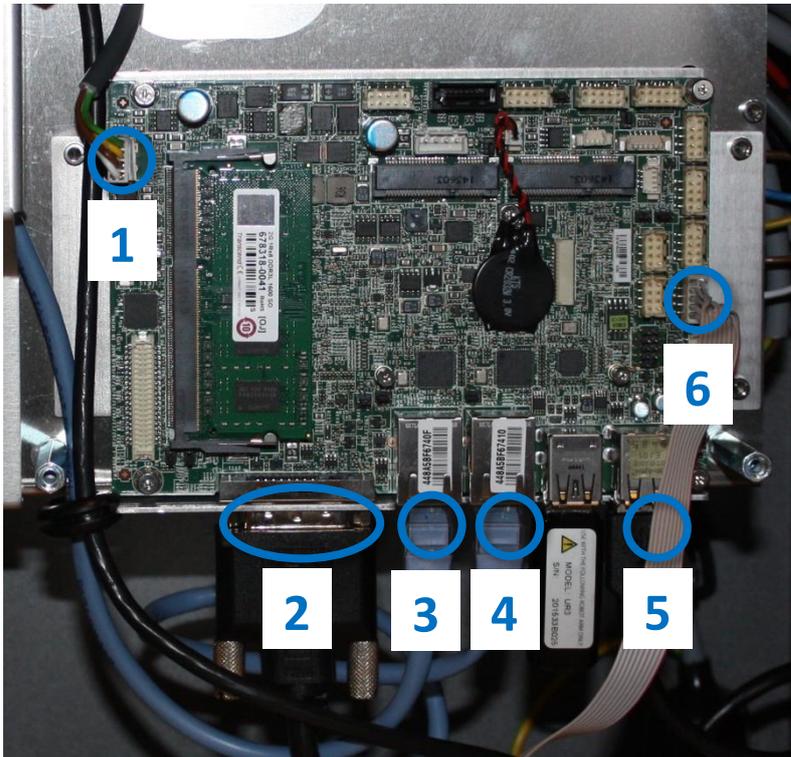
1. Shut down the controller and disconnect the power cable, open the controller cabinet and loosen the 3 Torx screws



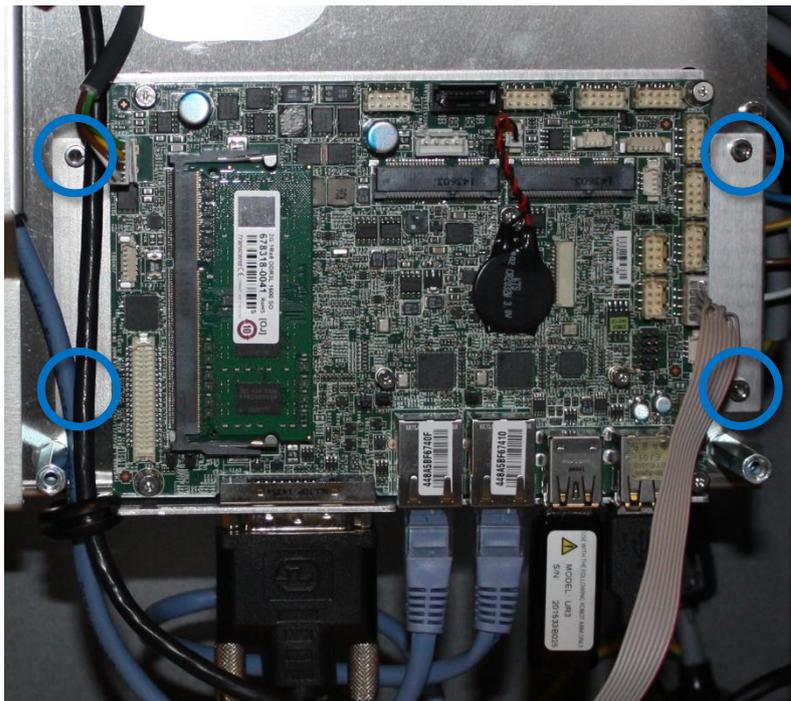
2. Remove the aluminum cover plate



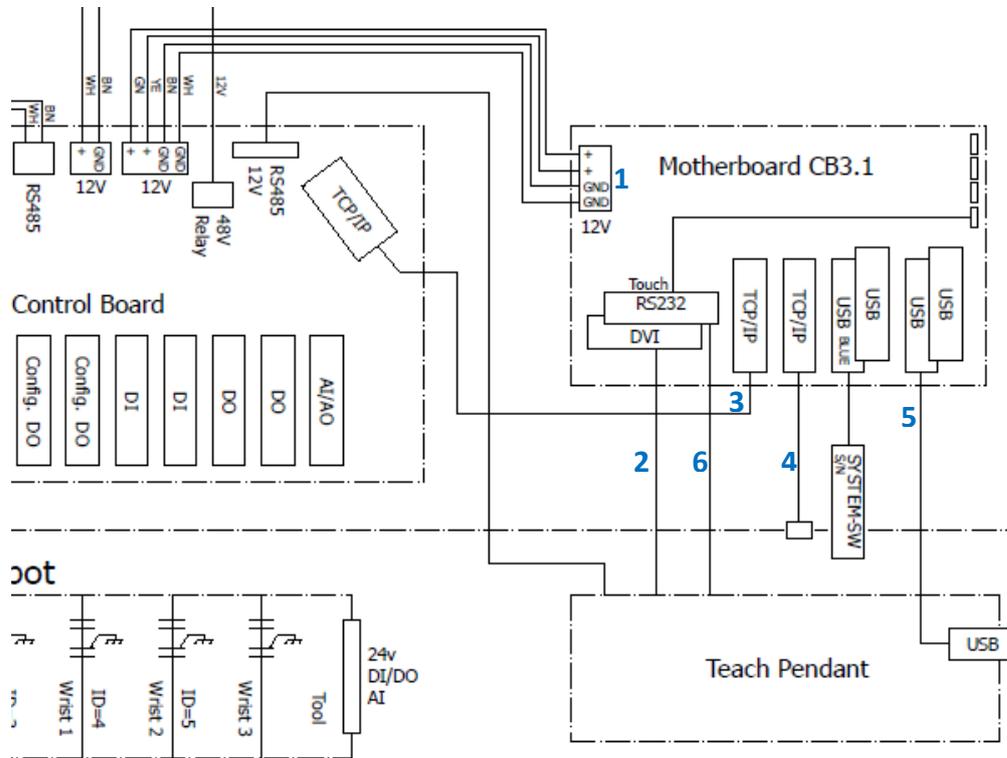
3. Disconnect cable connections from motherboard:
1. White plug with white, brown, yellow and green wires. 12 V Power
  2. DVI-cable for TP screen
  3. Ethernet cable to Safety control board SCB
  4. Ethernet cable to external connector
  5. Black USB cable for TP USB connector
  6. Grey flat cable for RS232-connection for TP touch



7. Remove the 4 screws from the 2 holding brackets



8. Replace Motherboard.
9. Insert the 6 cables in correct connectors.



10. Re-install USB stick for UR system SW.
11. Carefully put back the aluminum cover plate, make sure to mount it correct and fix it with the 3 screws

### 3.2.3 Replacement of Safety Control Board (SCB)

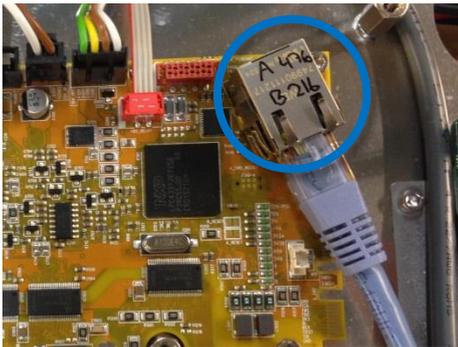
Take care of ESD handling [3.2.1 Handling ESD-sensitive parts](#)

How to replace Safety Control Board in Controller box



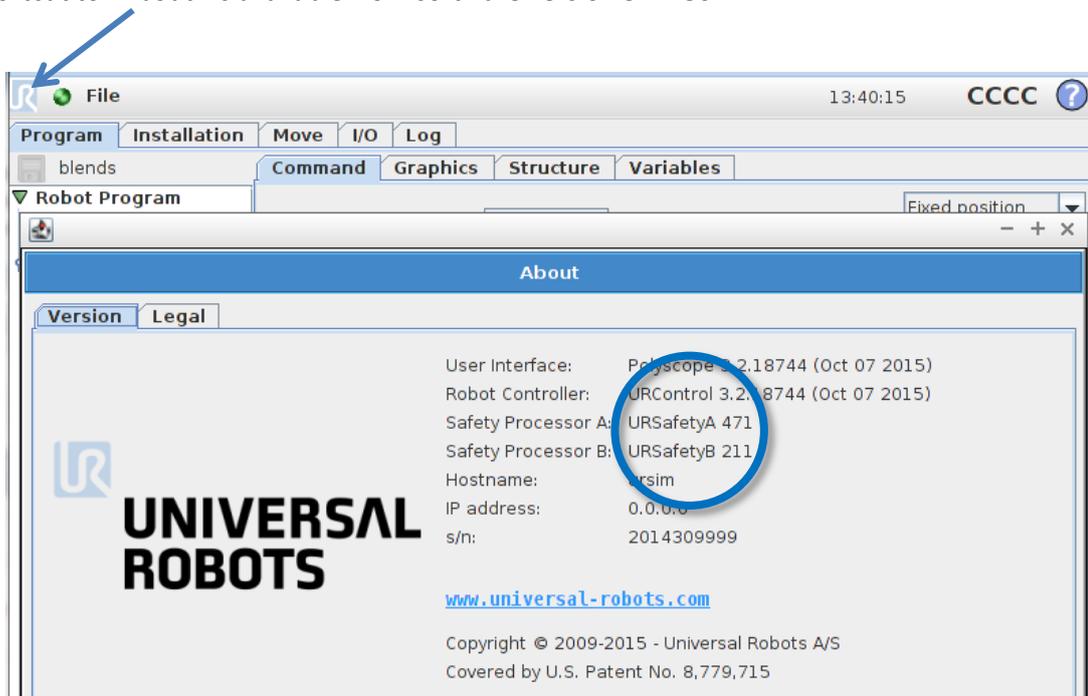
1. Check that the software on the robot is as new as the firmware version on the SCB.  
If the software on the robot is too old then you get an error C203A0.

Find the SCB firmware ver. on the Ethernet connector.

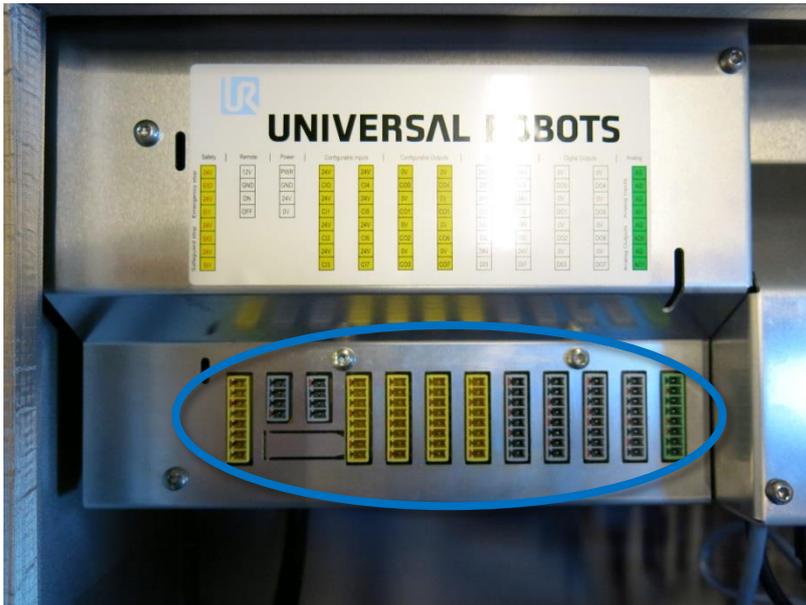


Find the firmware versions in the “About” menu.

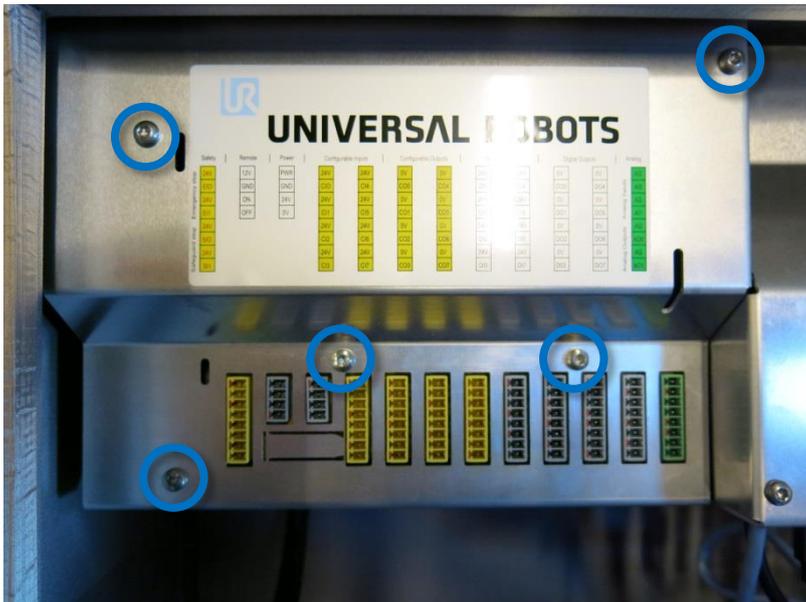
Shortcut to “About” is available from software version 3.2.18642



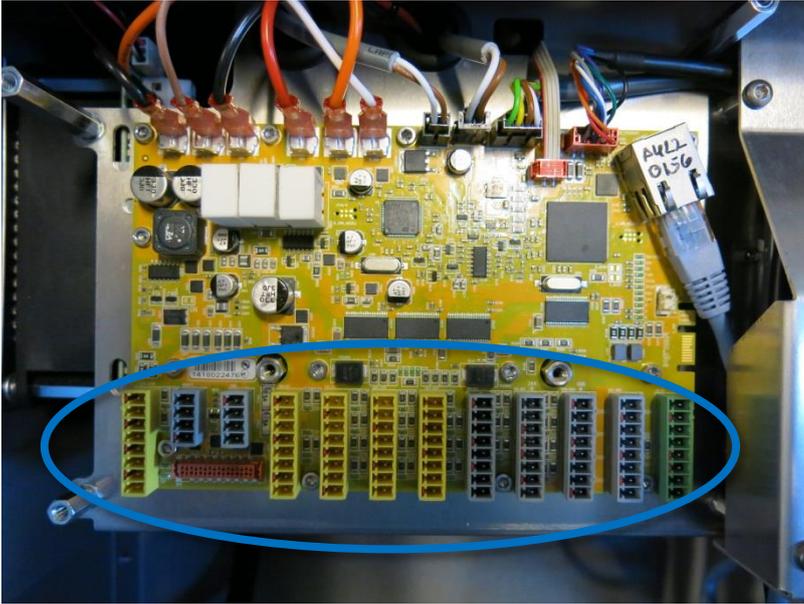
2. Shut down the controller and disconnect the power cable, open the controller cabinet.  
Carefully remove all plugs and connectors



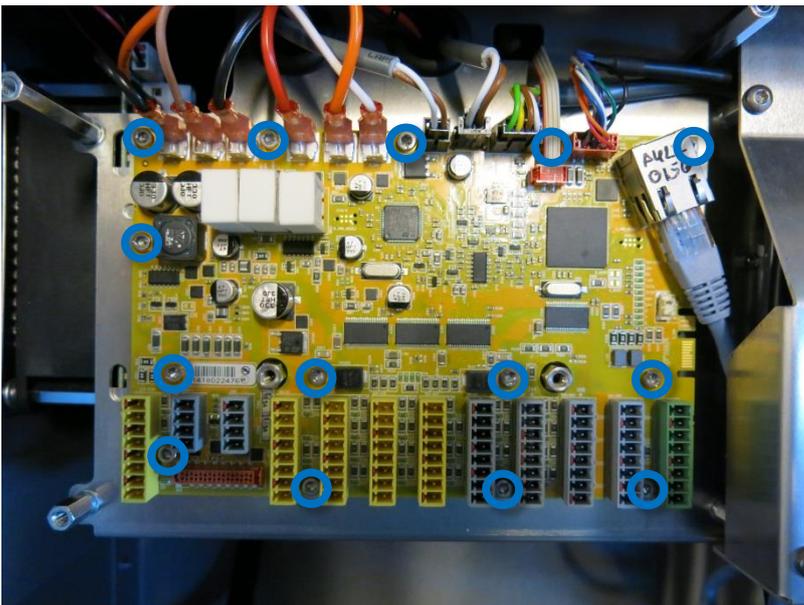
3. Loosen the 5 Torx screws and remove the aluminum cover.



- Carefully remove all plugs and connectors.



- Remove 14 screws holding the Safety Control Board.

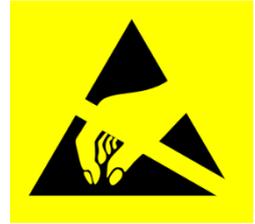


- Replace Safety Control Board with new one and tighten the 14 screws to hold the board
- Insert all connectors and plugs in correct positions. Eventually see section [5.4.1 Schematic overview](#)
- Carefully attach the aluminum cover, make sure to mount it correct and fix it with the 5 screws.

### 3.2.4 Replacement of teach pendant

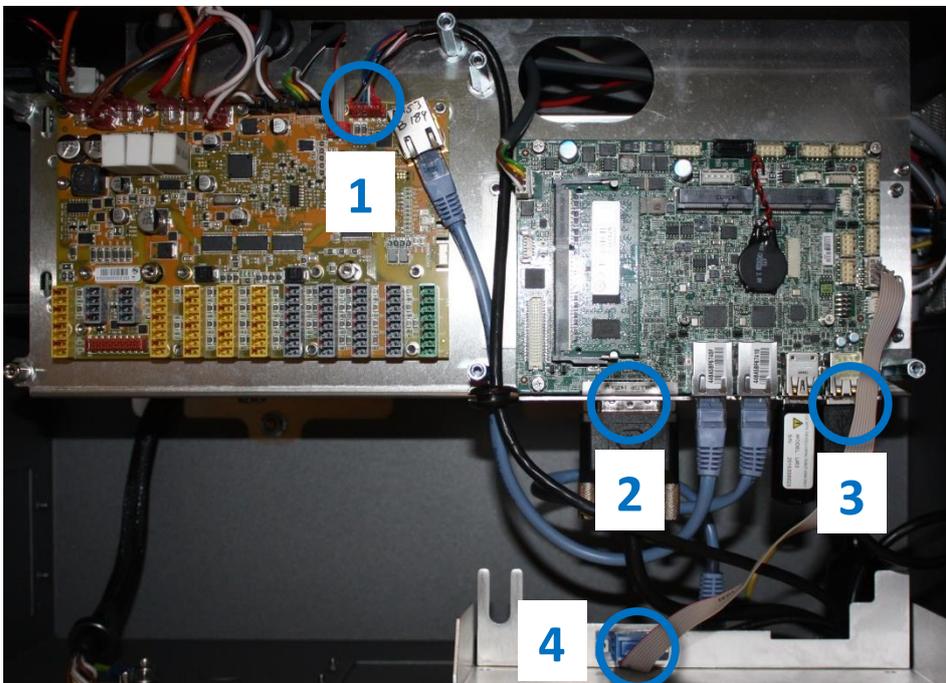
Take care of ESD handling [3.2.1 Handling ESD-sensitive parts](#)

How to replace Teach Pendant on Controller



Note: use the same procedure for power down and removing the aluminum cover plates as in chapter [3.2.2 Replacement of motherboard 3.1](#) and [3.2.3 Replacement of Safety Control Board \(SCB\)](#)

1. Disconnect 4 cables:
  1. Red plug with black cable 12 V Power
  2. Black DVI cable for the TP screen
  3. Black USB cable For the TP USB connector
  4. Black cable for RS232-connection for the TP touchscreen



2. Remove the bracket (foot of the controller box) that holds the cable inlet and pull out the cables and plugs through this hole.



3. Replace teach pendant with new, insert cable in cable inlet and perform reconnection of all plugs and mounting of aluminum cover in reverse order to the above description.
4. Connect power and verify that teach pendant works properly. See diagram: [5.4.1 Schematic overview](#)

### 3.2.5 Replacement of 48V power supply

Take care of ESD handling [3.2.1 Handling ESD-sensitive parts](#)

How to replace 48V power supply in Controller box

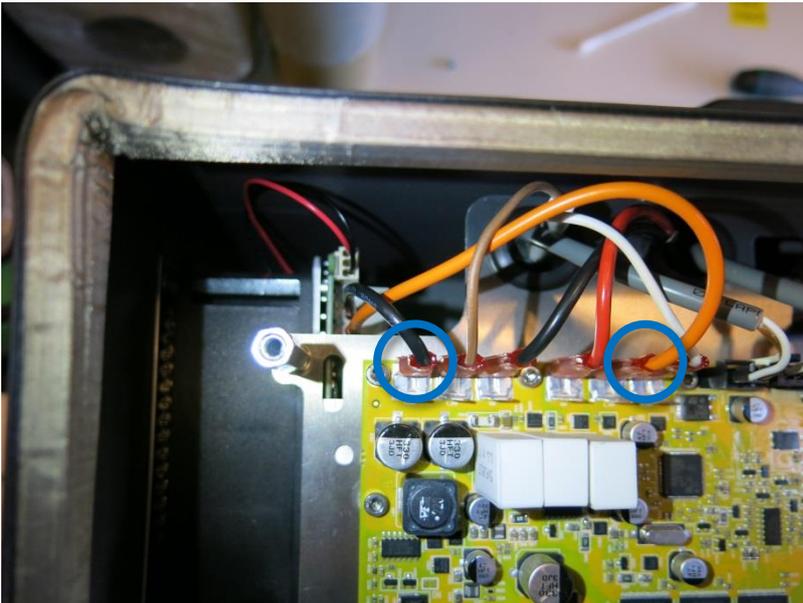
Note: use the same procedure for power down and removing the aluminum covers as in Chapter [3.2.2 Replacement of motherboard 3.1](#) and [3.2.3 Replacement of Safety Control Board \(SCB\)](#)



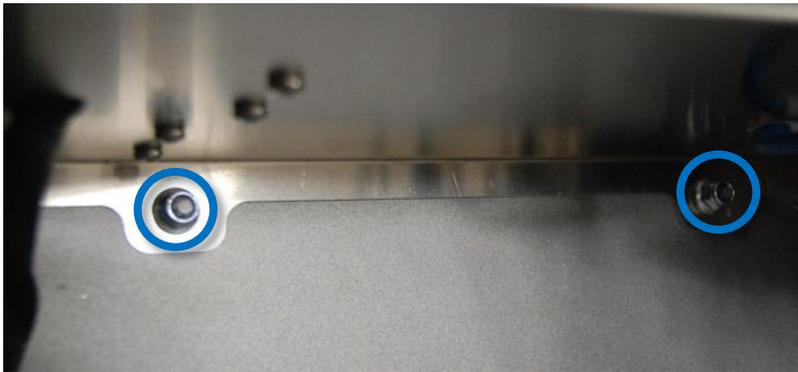
1. Remove the handle on Controller box by loosen the 2 screws holding it.



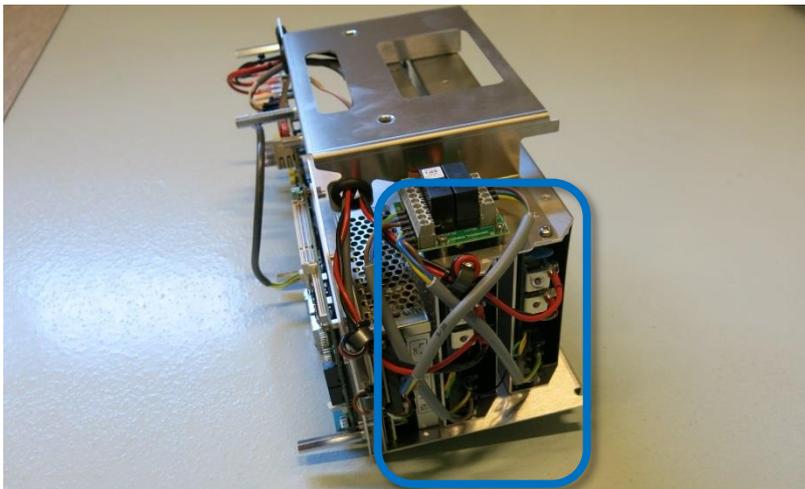
2. Removes the black and orange wires for the energy eater/fan.



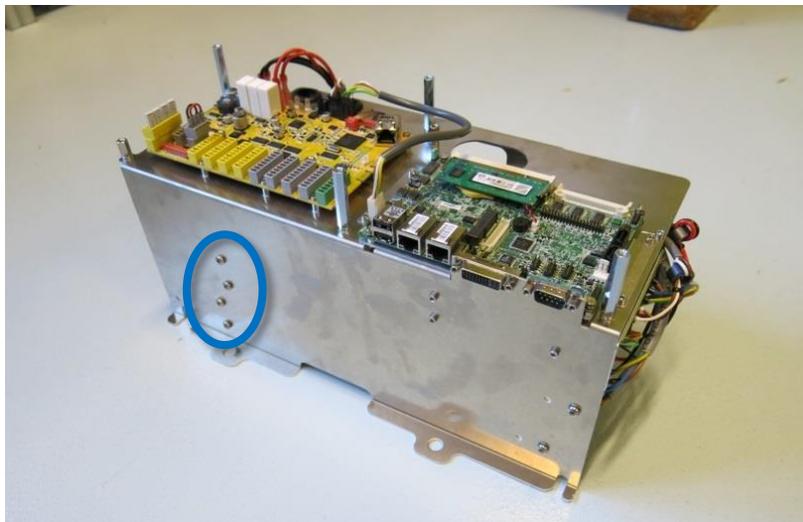
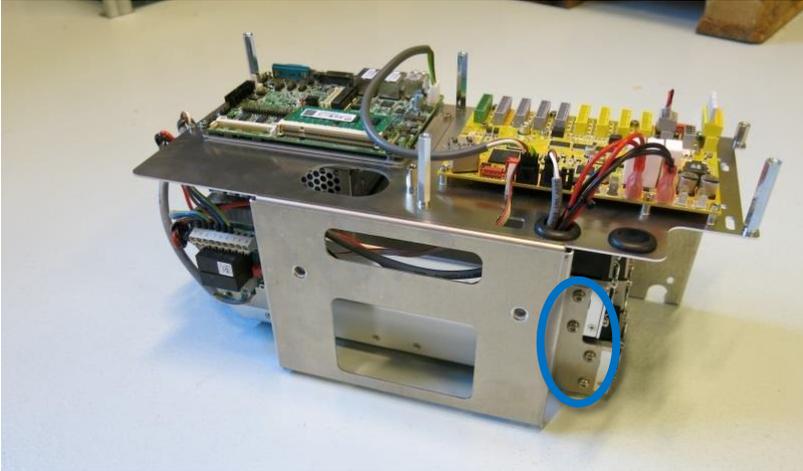
3. Remove the 2 nuts (M6) in the bottom of Controller module.



4. Gently take out the controller module from the Controller box
5. Power supplies are located in the rack under the controller module, the two 48V power supplies are the lower ones in the rack. (UR3 and UR5 have one and the UR10 have two 48V power supplies)  
Before dismantling the 48V power supply, mark and disconnect the cables from that supply.



6. Remove the screws respectively of the defective 48V power supply from the side of the rack.



7. Replace 48V power supply with new one.
8. Reconnect the wires for the 48V power supply.
9. Re-install Controller module in reverse order and connect the 2 wires for the fan and cables for the teach pendant.
10. Carefully put back the aluminum cover, make sure to mount it correct and fix it with the screws.
11. Connect power and verify that teach pendant works properly.

### 3.2.6 Replacement of 12V power supply

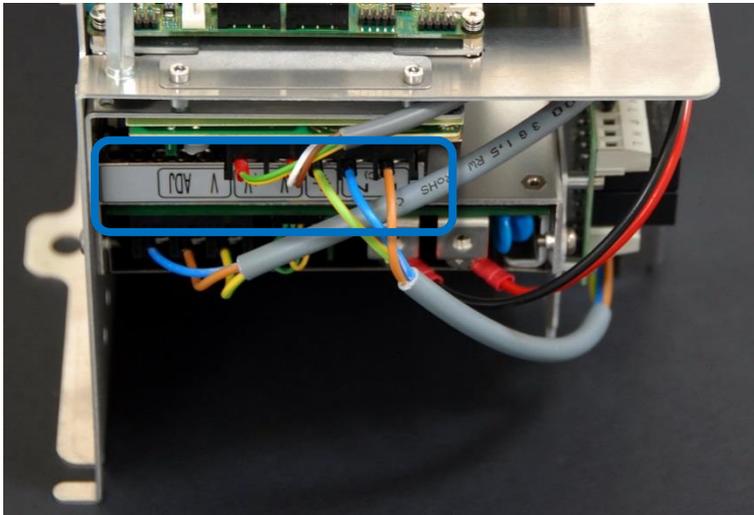
Take care of ESD handling [3.2.1 Handling ESD-sensitive parts](#)

How to replace 12V power supply in Controller box

*Note: use the same procedure for power down and removing the aluminium cover and cables for teach pendant as in chapter [3.2.4 Replacement of teach pendant](#)*

To replace the 12V power supply follow exactly the same steps as for the procedure in chapter [3.2.5 Replacement of 48V power supply](#)

1. The 12V power supply is placed in top of rack. The screws holding it in the frame are placed on the sides.



2. Replace 12V power supply with new one.
3. Reconnect the wires for the 12V power supply.
4. Re-install Controller module in reverse order and connect the 2 wires for the fan and cables for the teach pendant.
5. Carefully attach the grey aluminum cover, make sure to mount it correct and fix it with the screws.
6. Connect power and verify that teach pendant works properly.

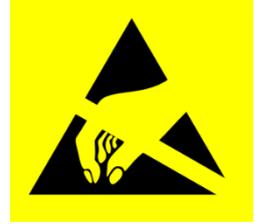


### 3.2.7 Replacement of current distributor

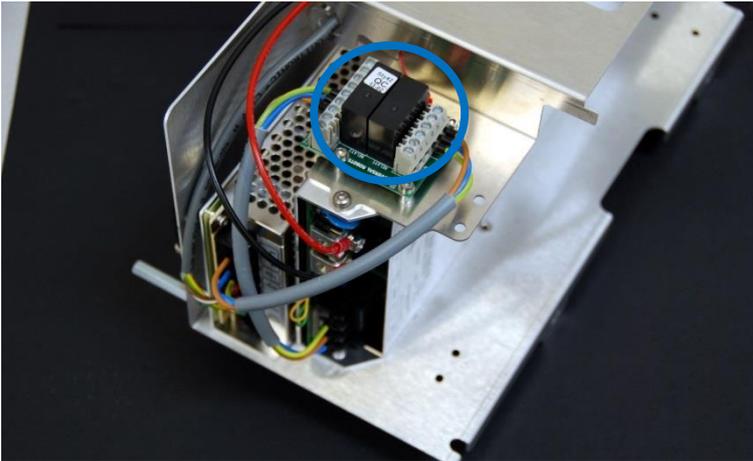
Take care of ESD handling [3.2.1 Handling ESD-sensitive parts](#)

How to replace current distributor in Controller box

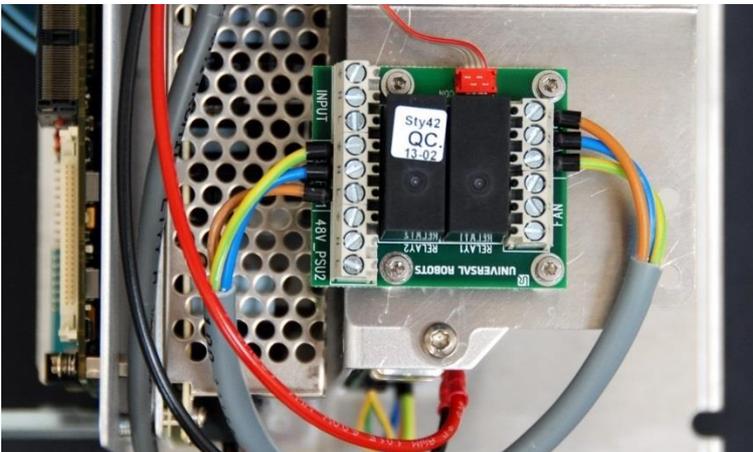
*Note: use the same procedure for power down and removing the aluminum cover and cables for teach pendant as in chapter [3.2.4 Replacement of teach pendant](#)*



1. Current distributor is placed on top of rack.



2. Before dismantling the current distributor, mark and disconnect the cables from the circuit board.



3. Replace current distributor with new one.
4. Reconnect the wires for the current distributor.
5. Re-install Controller module in reverse order and connect the 2 wires for the fan and cables for the teach pendant.
6. Carefully put back the grey aluminum cover, make sure to mount it correct and fix it with the screws.
7. Connect power and verify that teach pendant works properly.

## 4. Software

### 4.1 Update software

Universal Robots software is named PolyScope.

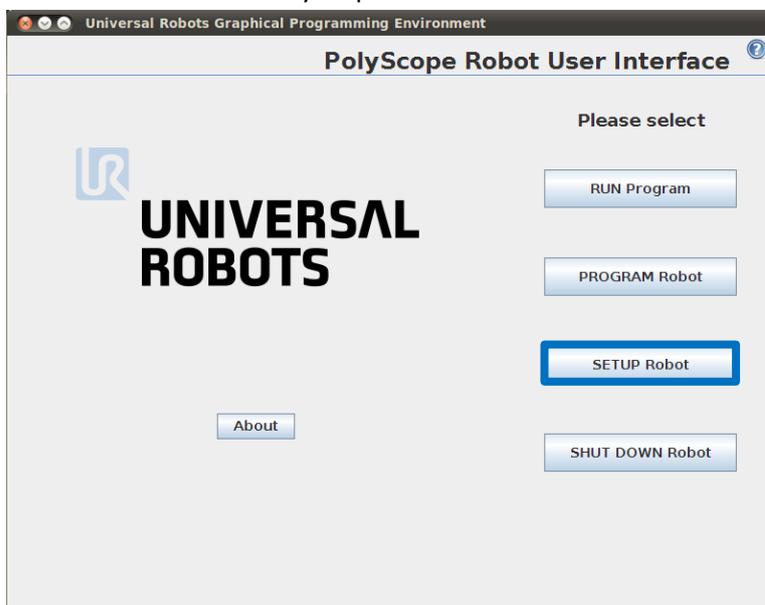
**Read This Prior to Updating Your Software:**

**Updating the software may cause changes or restrictions to functionality.**

- Do not downgrade the software to earlier version than the version the robot was produced with.
- We advise you only to update, if you can benefit from the new features or the fixed issues.
- We advise you to thoroughly read the release notes before doing an update, in order to avoid surprises, caused by changed or added functionality.
- In case of concerns related to your actual or planned applications, please contact your supplier for advice and assistance.
- Follow the instructions in the guide in the download section of the support web site.  
Find it under [universal-robots.com/support](http://universal-robots.com/support)

Instructions to update software:

1. Download software update. Carefully read requirements on support site relating to which software must be installed on robot prior to updating to the downloaded version.
2. Save it in the root folder on a USB-stick.
3. Insert USB-stick into USB-connector on right-hand side of teach pendant.
4. Go to main screen of PolyScope.

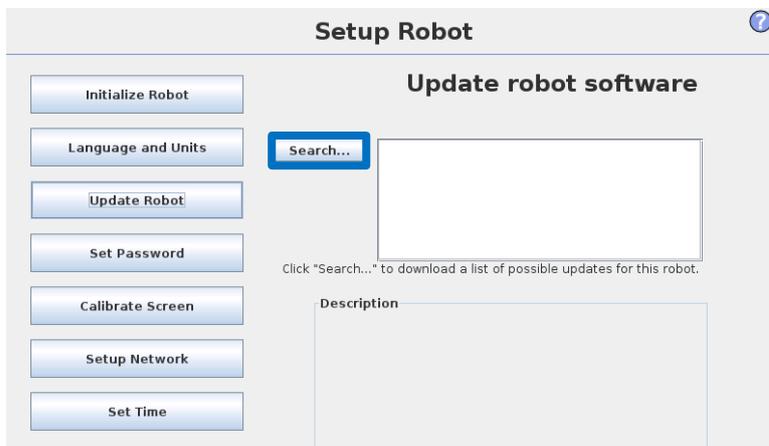


5. Press button *SETUP Robot*.

- In left side menu, select *Update Robot*.



- Press button *Search* for searching after software update on USB-stick.



- Select the found software update and press *UPDATE*.
- Press *YES* to update the software.
- Wait for update to complete, after successful update controller will automatically power off.
- Remove USB-stick and boot robot.

## 4.2 Update joint firmware

Each joint on the robot contains firmware to control the joint.

When the software is updated on a UR3 robot the firmware is **automatically** updated.

After replacement of a joint on a UR3 the firmware is **automatically** updated.

## 4.3 Using Magic files

For easy backup, Universal Robots provides Magic files to automatically copy data from controller to USB-stick.

These files are available:

- URmagic log file
- URmagic backup programs
- URmagic configuration files
- URmagic upload programs
- URmagic screenshot

Function:

- copies the entire log history file to USB-stick
- copies all programs and installation files to USB-stick
- copies all configuration files to USB-stick
- copies all programs and installation files *from* USB-stick
- generates a screenshot of GUI when USB-stick is inserted

Go to <http://www.universal-robots.com/support/> to download Magic files.

### Instruction for using Magic files.

1. Download Magic file.
2. Save it in the root folder on a USB-stick.  
If more than one Magic file is on USB-stick, they will be run in sequence; the warnings will then appear for each file. Do not remove the USB-stick until after the last file has been run. Multiple folders will be created and named with serial number plus a sequential no, like 201430xxxx\_0, 201430xxxx\_1etc.
3. Insert USB-stick into USB-connector on right-hand side of teach pendant.
4. After a few seconds a red **! USB !** -sign will appear on the screen, this is a warning not to remove the USB-stick, while the file will do its magic.
5. Await a green **<- USB** -sign appears on the screen, If there is more than one Magic file on the USB-stick then go to 4.
6. After the last Magic file is completed the USB-stick can be safely removed.
7. Remove USB-stick and the process is complete.

The Magic file creates a folder on USB-stick named with the serial number of the robot.

## 5. Troubleshooting

In the error codes different words have been used for the same thing:

- On the Safety Control Board: Processor A = A uP = SafetySys1
- On the Safety Control Board: Processor B = B uP = SafetySys2

PSU = Power Supply

PC = Controller

Open log files with Support Log Reader.

Go to <http://www.universal-robots.com/support/> to download Support Log Reader

### 5.1 Error codes

Code	Error description	Explanation	How to fix
CODE_0	No error		
CODE_1	Outbuffer overflow error		
CODE_1A1	Buffer of stored warnings overflowed		
CODE_1A2	Outbuffer to RS485 overflowed (problem with PCs message)		
CODE_2	Inbuffer overflow error		
CODE_3	Processor overloaded error	Processor in any part could give this error.	
CODE_4	Broken communication		
CODE_4A1	Communication with PC lost.	Between Safety Control Board and Motherboard	
CODE_4A2	Communication with Safety Control Board A uP lost	If either processor A or processor B is communicating, the Safety Control Board or cable between the Motherboard and Safety Control Board is defect	a) Check TCP/IP connection between Motherboard and Safety Control Board. b) Exchange Safety Control Board
CODE_4A3	Communication with Safety Control Board B uP lost	If either processor A or processor B is communicating, the Safety Control Board or cable between the Motherboard and Safety Control Board is defect	a) Check TCP/IP connection between Motherboard and Safety Control Board. b) Exchange Safety Control Board
CODE_4A4	Communication with primary Teach Pendant uP lost	If either processor A or processor B is communicating, the Teach Pendant or cable between the Motherboard and Teach Pendant is defect	a) Check TCP/IP-12V connection between Motherboard and Teach Pendant. b) Exchange Teach Pendant
CODE_4A5	Communication with secondary Teach Pendant uP lost	If either processor A or processor B is communicating, the Teach Pendant or cable between the Motherboard and Teach Pendant is defect	a) Check TCP/IP-12V connection between Motherboard and Teach Pendant. b) Exchange Teach Pendant

<b>CODE_4A6</b>	Communication with primary EUROMAP67 uP lost	If either processor A or processor B is communicating, Euromap67 or cable between the Motherboard and Euromap is defect	a) Check Euromap67 connection between Motherboard and Euromap67. b) Exchange Euromap67
<b>CODE_4A7</b>	Communication with secondary EUROMAP67 uP lost	If either processor A or processor B is communicating, Euromap67 or cable between the Motherboard and Euromap is defect	a) Check Euromap67 connection between Motherboard and Euromap67. b) Exchange Euromap67
<b>CODE_4A8</b>	Primary EUROMAP67 uP present, but euromap67 is disabled	Incorrect safety configuration	Update the miscellaneous settings in the Safety Configuration
<b>CODE_4A9</b>	Secondary EUROMAP67 uP present, but euromap67 is disabled	Incorrect safety configuration	Update the miscellaneous settings in the Safety Configuration
<b>CODE_4A10</b>	Primary Teach Pendant present, but Teach Pendant safety is disabled	Incorrect safety configuration	Update the miscellaneous settings in the Safety Configuration
<b>CODE_4A11</b>	Secondary Teach Pendant uP present, Teach Pendant safety is disabled	Incorrect safety configuration	Update the miscellaneous settings in the Safety Configuration
<b>CODE_4A12</b>	Communication with joint 0 lost	More than 1 package lost	
<b>CODE_4A13</b>	Communication with joint 1 lost	More than 1 package lost	
<b>CODE_4A14</b>	Communication with joint 2 lost	More than 1 package lost	
<b>CODE_4A15</b>	Communication with joint 3 lost	More than 1 package lost	
<b>CODE_4A16</b>	Communication with joint 4 lost	More than 1 package lost	
<b>CODE_4A17</b>	Communication with joint 5 lost	More than 1 package lost	
<b>CODE_4A18</b>	Communication with tool lost	More than 1 package lost	
<b>CODE_4A65</b>	Lost package from Primary Teach Pendant	1 package lost - warning	
<b>CODE_4A66</b>	Lost package from Secondary Teach Pendant	1 package lost - warning	
<b>CODE_4A67</b>	Lost package from Primary Euromap67	1 package lost - warning	
<b>CODE_4A68</b>	Lost package from Secondary Euromap67	1 package lost - warning	
<b>CODE_4A69</b>	Lost package from Secondary Masterboard	1 package lost - warning	
<b>CODE_4A70</b>	Lost package from joint 0	1 package lost - warning	
<b>CODE_4A71</b>	Lost package from joint 1	1 package lost - warning	
<b>CODE_4A72</b>	Lost package from joint 2	1 package lost - warning	
<b>CODE_4A73</b>	Lost package from joint 3	1 package lost - warning	
<b>CODE_4A74</b>	Lost package from joint 4	1 package lost - warning	
<b>CODE_4A75</b>	Lost package from joint 5	1 package lost - warning	
<b>CODE_4A76</b>	Lost package from tool	1 package lost - warning	

<b>CODE_4A77</b>	Lost package from uPA to joints	1 package lost - warning
<b>CODE_4A78</b>	Lost package from uPA to teach pendant	1 package lost - warning
<b>CODE_4A79</b>	Lost package from uPA to uPB	1 package lost - warning
<b>CODE_4A80</b>	Lost package from uPB	1 package lost - warning
<b>CODE_4A81</b>	Packet counter disagreement in packet from Primary Screen	
<b>CODE_4A82</b>	Packet counter disagreement in packet from Secondary Screen	
<b>CODE_4A83</b>	Packet counter disagreement in packet from Primary Euromap67	
<b>CODE_4A84</b>	Packet counter disagreement in packet from Secondary Euromap67	
<b>CODE_4A85</b>	Packet counter disagreement in packet from Safety Control Board B	
<b>CODE_4A86</b>	Packet counter disagreement in packet from joint 0	
<b>CODE_4A87</b>	Packet counter disagreement in packet from joint 1	
<b>CODE_4A88</b>	Packet counter disagreement in packet from joint 2	
<b>CODE_4A89</b>	Packet counter disagreement in packet from joint 3	
<b>CODE_4A90</b>	Packet counter disagreement in packet from joint 4	
<b>CODE_4A91</b>	Packet counter disagreement in packet from joint 5	
<b>CODE_4A92</b>	Packet counter disagreement in packet from tool	
<b>CODE_4A93</b>	Packet counter disagreement in packet from processor A to joints	
<b>CODE_4A94</b>	Packet counter disagreement in packet from processor A to B	
<b>CODE_4A95</b>	Packet counter disagreement in packet from processor A to Teach Pendant and EUROMAP	
<b>CODE_5</b>	Heavy processor load warning	
<b>CODE_5A1</b>	Heavy processor load warning:1	
<b>CODE_5A2</b>	Heavy processor load warning:2	
<b>CODE_10</b>	Broken PC communication error	Eventually update the software

<b>CODE_10A1</b>	Lost packet from PC		Eventually update the software
<b>CODE_10A101</b>	PC packet received too early		Eventually update the software
<b>CODE_10A102</b>	Packet counter does not match		Eventually update the software
<b>CODE_10A103</b>	PC is sending packets too often		Eventually update the software
<b>CODE_11</b>	Bad CRC error	Serial communication problem with joint	Check black 2-wire connectors and wires in joints. Eventually 2 joints with the same ID.
<b>CODE_12</b>	Unknown message error		
<b>CODE_14</b>	Debug message		
<b>CODE_14A1</b>	{float}	Should not occur in the field	Do you see this error on a robot report it to Universal Robots.
<b>CODE_14A2</b>	{signed}	Should not occur in the field	Do you see this error on a robot report it to Universal Robots.
<b>CODE_14A3</b>	{unsigned}	Should not occur in the field	Do you see this error on a robot report it to Universal Robots.
<b>CODE_17</b>	Inbuffer overflow in package from PC	Communication error between Safety Control Board and Motherboard	Check ethernet connection between circuit boards. Eventually update the software
<b>CODE_26</b>	Motor Encoder index drift detected	Joint mechanical problem	Replace joint
<b>CODE_27</b>	Calibration data is invalid or does not exist, selftest is needed!		
<b>CODE_29</b>	Online Calibration data checksum failed	Calibration data is not in the joint	a) Power OFF and Power ON. b) replace joint
<b>CODE_30</b>	Master received data from too many joints		
<b>CODE_31</b>	Caught wrong message (not from master)	Serial communication problem with joint	Check black 2-wire connectors and wires in joints
<b>CODE_32</b>	Flash write verify failed	Debug message	Ignor
<b>CODE_33</b>	Calibration flash checksum failed		
<b>CODE_34</b>	Program flash checksum failed		Update Firmware
<b>CODE_34A0</b>	Program flash checksum failed during bootloading		Update Firmware
<b>CODE_34A1</b>	Program flash checksum failed at runtime		Update Firmware
<b>CODE_35</b>	Joint ID is undefined		
<b>CODE_36</b>	Illegal bootloader command	Debug message	Ignor
<b>CODE_37</b>	Inbuffer parse error	Serial communication problem with joint	Check black 2-wire connectors and wires in joints

<b>CODE_38</b>	Online RAM test failed		Replace Item
<b>CODE_38A1</b>	Data-bus test failed		Replace Item
<b>CODE_38A2</b>	Address-bus stuck-high test failed		Replace Item
<b>CODE_38A3</b>	Address-bus stuck-low test failed		Replace Item
<b>CODE_38A4</b>	Address-bus shorted test failed		Replace Item
<b>CODE_38A5</b>	Memory-cell test failed		Replace Item
<b>CODE_39</b>	Logic and Temporal Monitoring Fault		
<b>CODE_39A1</b>	Max current deviation failure		The joint is broken, it must be replaced
<b>CODE_39A2</b>	Max joint-encoder speed exceeded		The joint is broken, it must be replaced
<b>CODE_39A3</b>	Max motor-encoder speed exceeded		The joint is broken, it must be replaced
<b>CODE_39A4</b>	Illegal state change in joint detected		If this error occurs several times, report it as a bug
<b>CODE_39A5</b>	Too fast state change in joint detected		If this error occurs several times, report it as a bug
<b>CODE_39A6</b>	5V regulator voltage too low		Replace joint
<b>CODE_39A7</b>	5V regulator voltage too high		Replace joint
<b>CODE_39A100</b>	Watchpoint fault: ADC task timeout		
<b>CODE_39A101</b>	Watchpoint fault: Motor-Control task timeout		
<b>CODE_39A102</b>	Watchpoint fault: Motor-encoder task timeout		
<b>CODE_39A103</b>	Watchpoint fault: Joint-encoder task timeout		
<b>CODE_39A104</b>	Watchpoint fault: Communication task timeout		
<b>CODE_39A105</b>	Watchpoint fault: RAM-test task timeout		
<b>CODE_39A106</b>	Watchpoint fault: CalVal-test task timeout		
<b>CODE_39A107</b>	Watchpoint fault: ROM-test task timeout		
<b>CODE_40</b>	AD-Converter hit high limit joint	EMC issue external or electronics internal	Check grounding and shielding for EMC problems
<b>CODE_44</b>	CRC check failure on primary bus	Serial communication problem with joint or secondary bus node	Check black 2-wire connectors and wires in joints
<b>CODE_44A0</b>	Joint 0 CRC check failure on primary bus	Serial communication problem with joint or secondary bus node	Replace joint 0
<b>CODE_44A1</b>	Joint 1 CRC check failure on primary bus	Serial communication problem with joint or secondary bus node	Replace joint 1
<b>CODE_44A2</b>	Joint 2 CRC check failure on primary bus	Serial communication problem with joint or secondary bus node	Replace joint 2

<b>CODE_44A3</b>	Joint 3 CRC check failure on primary bus	Serial communication problem with joint or secondary bus node	Replace joint 3
<b>CODE_44A4</b>	Joint 4 CRC check failure on primary bus	Serial communication problem with joint or secondary bus node	Replace joint 4
<b>CODE_44A5</b>	Joint 5 CRC check failure on primary bus	Serial communication problem with joint or secondary bus node	Replace joint 5
<b>CODE_44A6</b>	Tool CRC check failure on primary bus	Serial communication problem with tool or secondary bus node	Replace Tool mounting bracket
<b>CODE_44A80</b>	CRC Check failure on primary bus	Most likely an interference on the communication bus	a) Check green 2-wire connectors and wires in joints, b) If the error reappears contact your local service provider for assistance.
<b>CODE_45</b>	AD-Converter error		Replace Item
<b>CODE_46</b>	Loose gearbox or bad encoder mounting	Mechanical problem in gear related to encoder mounting	Replace joint
<b>CODE_47</b>	AD-Converter hit low limit	EMC issue external or electronics internal	a) Check grounding and shielding for EMC problems. b) Replace Item
<b>CODE_48</b>	Powerbus voltage drop detected.	Error on 48V powerbus to robot arm	Check 48V output from PSU. Check current-distributor PCB. Replacement of 48V PSU or current-distributor is necessary
<b>CODE_49</b>	RS485 receive warning		
<b>CODE_49A200</b>	Secondary RS485 bus is down	Bus for: Teach Pendant, Processor A and Processor B on the Safety Control Board.	Check TCP/IP-12V cable to Teach Pendant
<b>CODE_50</b>	Robot powerup failure	Electrical error control box	Remove all external connections to I/O-interface of Safty Control Board. Check for short circuit. Argument of error code specifies in details what causes the error.
<b>CODE_50A1</b>	Voltage detected at 24V rail before startup		
<b>CODE_50A2</b>	Voltage present at unpowered robot		
<b>CODE_50A5</b>	Powersupply voltage too low		
<b>CODE_50A6</b>	Powersupply voltage too high		
<b>CODE_50A11</b>	Voltage not detected at 24V rail after startup	24 V to the I/O interface in the controller	
<b>CODE_50A15</b>	Warning, waiting for SafetySYS2	SafetySYS2 = Processor B on Safety Control Board	

<b>CODE_50A16</b>	The Teach Pendant does not respond	Loose wire or incorrect safety configuration. Message comes from Safety Control Board	Check the cable or change in the Safety Configuration of the Installation the miscellaneous settings
<b>CODE_50A17</b>	The Euromap67 interface does not respond	Loose wire or incorrect safety configuration	Check the cable or change in the Safety Configuration of the Installation the miscellaneous settings
<b>CODE_50A18</b>	Warning, waiting for SafetySYS1	SafetySYS1 = Processor A on Safety Control Board	
<b>CODE_50A20</b>	5V, 3V3 or ADC error (5V too high)		
<b>CODE_50A21</b>	5V, 3V3 or ADC error (5V too low)		
<b>CODE_50A22</b>	Robot current sensor reading too high		
<b>CODE_50A23</b>	Robot current sensor reading too low		
<b>CODE_50A24</b>	48V not present (Check internal connection) This error can have several root causes and you have to measure the voltage some places. There are 3 different components that could be the root cause and you have to measure the voltage to determine which one of them that is the faulty one. - 48 V power supply - Current distributor - Safety Control Board. Find the schematic drawing in the this service manual		
<b>CODE_50A25</b>	Robot voltage present at 48V PSU powereup		
<b>CODE_50A26</b>	Voltage present on unpowered 48V power supply		
<b>CODE_50A27</b>	12V, 3V3 or ADC error (12V too high)		
<b>CODE_50A28</b>	12V, 3V3 or ADC error (12V too low)		
<b>CODE_50A29</b>	Analog I/O error (-12V too high)		
<b>CODE_50A30</b>	Analog I/O error (-12V too low)		
<b>CODE_50A31</b>	The other safetySYS do not initialize		
<b>CODE_50A40</b>	Wrong voltage from PSU1		
<b>CODE_50A41</b>	Wrong voltage from PSU2		
<b>CODE_50A42</b>	Voltage will not disappear from PSU		
<b>CODE_50A43</b>	Warning, waiting for CB2 type answer from primary processor		
<b>CODE_50A50</b>	Processor A 3.3V supply voltage out of bounds		
<b>CODE_50A51</b>	Robot voltage below threshold		
<b>CODE_50A52</b>	Robot voltage above threshold		

<b>CODE_50A53</b>	58V generator deviation error		
<b>CODE_50A54</b>	5V regulator too low		
<b>CODE_50A55</b>	5V regulator too high		
<b>CODE_50A56</b>	-4V generator too low		
<b>CODE_50A57</b>	-4V generator too high		
<b>CODE_50A80</b>	Last CPU reset caused by Low-Power-Reset		
<b>CODE_50A81</b>	Last CPU reset caused by Window-Watchdog-Reset		
<b>CODE_50A82</b>	Last CPU reset caused by Independent-Watchdog-Reset		
<b>CODE_50A83</b>	Last CPU reset caused by Software-Reset		
<b>CODE_50A84</b>	Last CPU reset caused by External-Pin-Reset		
<b>CODE_50A85</b>	Last CPU reset caused by Brown-Out-Reset		
<b>CODE_50A99</b>	Wrong software on PCB		
<b>CODE_50A100</b>	Cable not connected	Robot Problem: Robot Cable is not detected	
<b>CODE_50A101</b>	Short circuit in robot detected or wrong robot connected to control box	Robot Problem: 48V or wrong robot type	Check robot type. Look for short circuit In cable and in robot arm.
<b>CODE_50A102</b>	Voltage rising too slowly	Robot Problem: 48V	
<b>CODE_50A103</b>	Voltage failed to reach acceptable level	Robot Problem: 48V	
<b>CODE_51</b>	CRC check failure on secondary bus		
<b>CODE_51A0</b>	Processor B		
<b>CODE_51A1</b>	Primary screen processor		
<b>CODE_51A2</b>	Secondary screen processor		
<b>CODE_51A3</b>	Primary E67		
<b>CODE_51A4</b>	Secondary E67		
<b>CODE_53</b>	IO overcurrent detected	Safety Control Board error	Remove all external connections to I/O-interface of Safety Control Board. Check for short circuit
<b>CODE_53A1</b>	IO overcurrent detected, max is 800mA	Safety Control Board error	Remove all external connections to I/O-interface of Safety Control Board. Check for short circuit
<b>CODE_53A2</b>	IO overcurrent detected, max is 600mA	Tool error	Remove tool connector. Check for short circuit
<b>CODE_55</b>	Safety system error	Safety system malfunction	Check Motherboard, Safety Control Board, Screenboard, Current distributor( Euromap, if installed ). Bypass safety connections to I/O-interface of Safety Control

			Board
<b>CODE_55A23</b>	Safety relay error (minus connection)	Current distributor error	Fault: Cable SCB-Current distributor or 48V Power supply or Current distributor.
<b>CODE_55A24</b>	Safety relay error (plus connection)	Current distributor error	Fault: Cable SCB-Current distributor or 48V Power supply or Current distributor.
<b>CODE_55A33</b>	Safety relay error (a relay is stuck)	Current distributor error	Fault: Cable SCB-Current distributor or 48V Power supply or Current distributor.
<b>CODE_55A34</b>	Safety relay error (relays are not on)	Current distributor error	Fault: Cable SCB-Current distributor or 48V Power supply or Current distributor.
<b>CODE_55A50</b>	Voltage present at unpowered robot	SCB hardware fault	Replace Safety Control Board (SCB)
<b>CODE_55A51</b>	Voltage will not disappear from robot	SCB hardware fault	Replace Safety Control Board (SCB)
<b>CODE_55A52</b>	5V, 3V3 or ADC error (5V too low)	SCB hardware fault	Replace Safety Control Board (SCB)
<b>CODE_55A53</b>	5V, 3V3 or ADC error (5V too high)	SCB hardware fault	Replace Safety Control Board (SCB)
<b>CODE_55A90</b>	Bootloader error, robot voltage too low or current too high		
<b>CODE_55A91</b>	Bootloader error, robot voltage too high		
<b>CODE_55A100</b>	Safety violation		
<b>CODE_55A101</b>	Safety Channel Error In Safety Control Board		
<b>CODE_55A102</b>	Safety Channel Error In Screen		
<b>CODE_55A103</b>	Safety Channel Error In Euromap67 Interface		
<b>CODE_55A109</b>	Received fault message from PC		
<b>CODE_55A110</b>	Safety State is changing too often		
<b>CODE_55A111</b>	On/Off State is changing too often		
<b>CODE_55A112</b>	Robot current sensors readings differ		
<b>CODE_55A120</b>	Robot current is too high while emergency stopped		
<b>CODE_55A121</b>	Robot current is too high while safeguard stopped		
<b>CODE_56</b>	Overvoltage shutdown	Voltage exceeded 55V	Check Energy Eater. Cable to Energy eater, Replace Energy Eater

<b>CODE_57</b>	Brake release failure		Check Brake, solenoide, Payload, TCP and Mount
<b>CODE_57A1</b>	Joint did not move or motor encoder is not functioning		Check Brake, solenoide, Payload, TCP and Mount
<b>CODE_57A2</b>	Large movement detected during brake release		Check Brake, solenoide, Payload, TCP and Mount
<b>CODE_57A3</b>	Robot was not able to brake release, see log for details		Check Brake, solenoide, Payload, TCP and Mount
<b>CODE_58</b>	Motor encoder not calibrated		Callibrate joint
<b>CODE_59</b>	Overcurrent shutdown	Overcurrent in joint. Argument = Current in Amps.	Check for short circuit. Check program for singularity issues. Replace joint if necessary
<b>CODE_62</b>	Joint temperature		
<b>CODE_62A1</b>	High (80 C)	Warning	
<b>CODE_62A3</b>	Static load too high warning	Warning	
<b>CODE_62A11</b>	Shut down (85 C)	Stop	
<b>CODE_62A13</b>	Static load too high	Stop	Check Payload
<b>CODE_63</b>	Selftest failed		
<b>CODE_68</b>	SPI error	Joint: Absolut encoder on joint communication error	Replace joint
<b>CODE_70</b>	Close to gearbox shear limit	Acceleration / deceleration to high. Mechanical problem in gear related to encoder mounting	Reduce acceleration in user program. Replace joint if necessary
<b>CODE_71</b>	Startup check error	Fault: Firmware in joint	
<b>CODE_71A1</b>	Hardware is size1, software is not	Fault: Firmware in joint	
<b>CODE_71A2</b>	Hardware is size2, software is not	Fault: Firmware in joint	
<b>CODE_71A3</b>	Hardware is size3, software is not	Fault: Firmware in joint	
<b>CODE_71A4</b>	Hardware is size4, software is not	Fault: Firmware in joint	
<b>CODE_71A5</b>	Invalid hardware size read		
<b>CODE_71A6</b>	Motor indication signal not working		
<b>CODE_71A7</b>	Phase 1 and phase 2 not working	The motor wires are damaged, bad connection in screw terminals or defect PCB	Replace joint (Replace PCB)
<b>CODE_71A8</b>	Phase 2 not working	The motor wires are damaged, bad connection in screw terminals or defect PCB	Replace joint (Replace PCB)
<b>CODE_71A9</b>	Phase 1 not working	The motor wires are damaged, bad connection in screw terminals or defect PCB	Replace joint (Replace PCB)
<b>CODE_71A10</b>	Invalid motor test result		
<b>CODE_71A11</b>	ADC calibration failed	Only in joint	
<b>CODE_71A50</b>	Current sensor test failed	Sensor reported wrong current when probed	Replace the joint. Defect Printed circuit board
<b>CODE_71A51</b>	Current sensor test failed	Sensor reported wrong current when probed	Replace the joint. Defect Printed circuit board

<b>CODE_71A52</b>	Current sensor test failed	Sensors reported different currents when probed	Replace the joint. Defect Printed circuit board
<b>CODE_72</b>	Power Supply Unit failure	48 V Power problem	
<b>CODE_72A1</b>	0 PSUs are active	PSU was not able to deliver 48V (In UR10: No 48V)	Check power connection between power supply and Safety Control Board
<b>CODE_72A2</b>	1 PSU active, but we expect 2 (UR10)	PSU was not able to deliver 48V or UR10 flash card in UR5 robot	Check power connection between power supply and Safety Control Board and check that the flash card and robot match
<b>CODE_72A3</b>	2 PSUs active, but we expect 1 (UR5)	UR5 flash card in UR10 robot	Check that the flash card and robot match
<b>CODE_73</b>	Brake test failed during selftest, check brakepin		
<b>CODE_74</b>	Joint encoder warning	Magnetic encoder error (Absolut encoder)	
<b>CODE_74A1</b>	Invalid decode: Readhead misalignment, ring damaged or external magnetic field present.	Warning: The argument is the sum of C74 errors	
<b>CODE_74A2</b>	Speed reading is not valid	Warning: The argument is the sum of C74 errors	
<b>CODE_74A4</b>	System error=malfunction or inconsistent calibration detected	Warning: The argument is the sum of C74 errors	
<b>CODE_74A8</b>	Supply voltage is out of range	Warning: The argument is the sum of C74 errors	
<b>CODE_74A16</b>	Temperature is out of range	Warning: The argument is the sum of C74 errors	
<b>CODE_74A64</b>	Signal low =Too far from magnetic ring	Warning: The argument is the sum of C74 errors	
<b>CODE_74A128</b>	Signal saturation =Too close to magnetic ring	Warning: The argument is the sum of C74 errors	
<b>CODE_74A207</b>	Joint encoder error	Example: Argument 207 is the sum of 128,64,8,4,2,1 which means that all the errors in connection to argument 1, 2, 4, 8, 64 and 128 have been reported.	Example.
<b>CODE_75</b>	Joint encoder error	Magnetic encoder error (Absolut encoder)	
<b>CODE_75A1</b>	Invalid decode: Readhead misalignment, ring damaged or external magnetic field present.	Error: The argument is the sum of C75 errors	Replace joint
<b>CODE_75A2</b>	Speed reading is not valid	Error: The argument is the sum of C75 errors	Replace joint
<b>CODE_75A4</b>	System error=malfunction or inconsistent calibration detected	Error: The argument is the sum of C75 errors	Replace joint

<b>CODE_74A8</b>	Supply voltage is out of range	Error: The argument is the sum of C75 errors	Check previous error
<b>CODE_74A16</b>	Temperature is out of range	Error: The argument is the sum of C75 errors	Check previous error
<b>CODE_75A32</b>	Signal lost =Misaligned readhead or damaged ring	Error: The argument is the sum of C75 errors	Replace joint
<b>CODE_75A64</b>	Signal low =Too far from magnetic ring	Error: The argument is the sum of C75 errors	Replace joint
<b>CODE_75A128</b>	Signal saturation =Too close to magnetic ring	Error: The argument is the sum of C75 errors	Replace joint
<b>CODE_75A207</b>	Joint encoder error	Example: Argument 207 is the sum of 128,64,8,4,2,1 which means that all the errors in connection to argument 1, 2, 4, 8, 64 and 128 have been reported.	Example
<b>CODE_76</b>	Joint encoder communication CRC error	Error between sensor and joint circuit	Check connections or very heavy electrical noise
<b>CODE_77</b>	Sudden position change detected on the joint-encoder	The position reading from the encoder was different than expected	?
<b>CODE_78</b>	Large sudden position change detected on the joint-encoder	The position reading from the encoder was severely different than expected, the latest measurement was discarded	Contact your local service provider for assistance
<b>CODE_78A255</b>	Large sudden position change detected on the joint-encoder	The argument 255 is a number that relates to the size of the position change. In other words this can be treated as a C78 error.	Example.
<b>CODE_80A51</b>	Window watchdog reset		
<b>CODE_100</b>	Robot changed mode	Status warning, general modulus change	Check preceding errors in log history
<b>CODE_101</b>	Real Robot Connected		
<b>CODE_102</b>	Real Robot not connected - Simulating Robot		
<b>CODE_103</b>	UR Ethernet Error	Comm. Prob. between Mother Board and Safety Control Board	Check cable
<b>CODE_103A1</b>	Connection to Safety Control Board lost	PC did not receive 3 packets in a row	Check that the ethernet cable between PC board and Safety Control Board is connected and restart system
<b>CODE_103A2</b>	Package lost from Safety Control Board		

<b>CODE_104</b>	Error=Empty command sent to robot		
<b>CODE_111</b>	Something is pulling the robot		Check Payload setting
<b>CODE_115</b>	Unknown robot type	The robot type specified in the configuration is unknown	
<b>CODE_116</b>	Realtime part warning	Possible CPU-overload due to structure of user program	Restructure user program
<b>CODE_117</b>	Restart SCB failed	The Safety Control Board couldn't be rebooted from the controller.	Reboot the robot
<b>CODE_150</b>	Protective Stop: Position close to joint limits		
<b>CODE_151</b>	Protective Stop: Tool orientation close to limits		
<b>CODE_152</b>	Protective Stop: Position close to safety plane limits		
<b>CODE_153</b>	Protective Stop: Position deviates from path		
<b>CODE_154</b>	Protective Stop: Position in singularity	Robot cannot move linear in a singularity	Use jointspace movement or change the motion
<b>CODE_155</b>	Protective Stop: Robot cannot maintain its position, check if payload is correct		
<b>CODE_156</b>	Protective Stop: Wrong payload or mounting detected, or something is pushing the robot when entering Freedrive mode	The robot may move unexpected due to wrong settings	Verify that the TCP configuration and mounting in the used installation is correct
<b>CODE_160</b>	Protective stop: The robot was powered off last time due to a joint position disagreement	<ol style="list-style-type: none"> <li>1. Verify that the robot position in the 3D graphics matches the real robot, to ensure that the encoders function before releasing the brakes. Stand back and monitor the robot performing its first program cycle as expected.</li> <li>2. If the position is not correct, the robot must be repaired. In this case, click "Power Off Robot".</li> <li>3. If the position is correct, please tick the check box below the 3D graphics and click "Robot Position Verified"</li> </ol>	

<b>CODE_161</b>	Protective stop: Large movement of the robot detected while it was powered off. The joints were moved while it was powered off, or the encoders do not function.	<ol style="list-style-type: none"> <li>1. Verify that the robot position in the 3D graphics matches the real robot, to ensure that the encoders function before releasing the brakes. Stand back and monitor the robot performing its first program cycle as expected.</li> <li>2. If the position is not correct, the robot must be repaired. In this case, click "Power Off Robot".</li> <li>3. If the position is correct, please tick the check box below the 3D graphics and click "Robot Position Verified"</li> </ol>	
<b>CODE_171</b>	Issue with blends		
<b>CODE_171A0</b>	A MoveC-waypoint were skipped due to a blend.	The value for the blend radius is too large compared to the distance between the waypoints.	Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A1</b>	Blend radius too small in a MoveC		
<b>CODE_171A3</b>	A ServoC-waypoint were skipped due to a blend.	The value for the blend radius is too large compared to the distance between the waypoints.	Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A4</b>	Overlapping Blends in a MoveJ, a waypoint was skipped		Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A5</b>	Overlapping Blends in a MoveJ, a waypoint was skipped		Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A6</b>	Overlapping Blends in a MoveJ, a waypoint was skipped		Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A7</b>	Overlapping Blends in a MoveJ, a waypoint was skipped		Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A9</b>	A MoveP-waypoint were skipped due to a blend.	The value for the blend radius is too large compared to the distance between the waypoints.	Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A10</b>	Blend radius too small error in a MoveP		
<b>CODE_171A11</b>	Overlapping Blends in a MoveL, a waypoint was skipped		Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A12</b>	Overlapping Blends in a MoveL, a waypoint was skipped		Decrease the blend radius or choose waypoints that are further apart.

<b>CODE_171A13</b>	Overlapping Blends in a MoveL, a waypoint was skipped		Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_171A14</b>	Overlapping Blends in a MoveL, a waypoint was skipped		Decrease the blend radius or choose waypoints that are further apart.
<b>CODE_172</b>	Illegal control mode		
<b>CODE_184</b>	Joint self test not received by controller		
<b>CODE_185A1</b>	START_NORMAL_OPERATION is not allowed on selftest firmware		
<b>CODE_185A2</b>	GOTO_BACKDRIVE_COMMAN D is not allowed on selftest firmware		
<b>CODE_186A1</b>	joint_mode == JOINT_RUNNING_MODE is not allowed on selftest firmware		
<b>CODE_191</b>	Safety system violation		
<b>CODE_191A1</b>	Joint position limit violated		
<b>CODE_191A2</b>	Joint speed limit violated		Reduce acceleration or speed for joint
<b>CODE_191A3</b>	TCP speed limit violated		Reduce acceleration or speed for joint
<b>CODE_191A4</b>	TCP position limit violated		
<b>CODE_191A5</b>	TCP orientation limit violated		
<b>CODE_191A6</b>	Power limit violated		Reduce acceleration or speed for joint
<b>CODE_191A7</b>	Joint torque window violated		
<b>CODE_191A8</b>	Joint torque window too large		
<b>CODE_191A9</b>	Reduced mode output violation		
<b>CODE_191A10</b>	Safeguard stop output violation		
<b>CODE_191A11</b>	Emergency stop output violation		
<b>CODE_191A12</b>	Momentum limit violation		
<b>CODE_191A13</b>	Robot moving output violation		
<b>CODE_191A14</b>	Robot is not braking in stop mode	During the braking process, the safety system monitors if the robots brakes as expected. If this is not the case, this error is generated	Check payload settings and mounting
<b>CODE_191A15</b>	Robot is moving in stop mode	When the robot is stopped due to a safety violation or a safeguard stop, the safety system generates this error, if the robot moves while in this mode	Is the robot physically pushed while safeguard stopped?
<b>CODE_191A16</b>	Robot did not stop in time		
<b>CODE_191A17</b>	Received a null vector for TCP orientation	Fault in config file, when no GUI is used	

<b>CODE_191A18</b>	Robot not stopping output violation		
<b>CODE_191A19</b>	Invalid safety IO configuration	Fault in config file, when no GUI is used	
<b>CODE_191A20</b>	Configuration information or limit sets not received		
<b>CODE_191A21</b>	The other safety processor detected a violation		
<b>CODE_191A22</b>	Received unknown command from Controller		Check Firmware
<b>CODE_191A23</b>	Invalid setup of safety limits		Check Firmware
<b>CODE_191A24</b>	Reduced Mode Output set, while it should not be		Check Firmware
<b>CODE_191A25</b>	Reduced Mode Output not set, while it should be		Check Firmware
<b>CODE_191A26</b>	Not Reduced Mode Output set, while it should not be		Check Firmware
<b>CODE_191A27</b>	Not Reduced Mode Output not set, while it should be		Check Firmware
<b>CODE_191A28</b>	Robot Emergency Stop exceeded maximum stop time	Too high payload	
<b>CODE_191A29</b>	System Emergency Stop exceeded maximum stop time	Too high payload	
<b>CODE_191A30</b>	Safeguard Stop exceeded maximum stop time	Too high payload	
<b>CODE_191A31</b>	Operation mode switch is present while the three position switch is missing		
<b>CODE_192</b>	Safety system fault		
<b>CODE_192A1</b>	Robot still powered in emergency stop	When emergency stop is active, the robot arm powers off. The controller is responsible for sending the power off command. This error is generated, if the safety system detects that the robot arm still has power.	
<b>CODE_192A2</b>	Robot emergency stop disagreement	E-stop in teach pendant or in Robot E-stop circuit problem	Check cables or replace Safety Control Board (SCB)
<b>CODE_192A3</b>	System emergency stop disagreement	System E-stop circuit problem	Check cables or replace Safety Control Board (SCB)
<b>CODE_192A4</b>	Safeguard stop disagreement	Safeguard circuit problem	Check cables or replace Safety Control Board (SCB)
<b>CODE_192A5</b>	Euromap safeguard stop disagreement	Euromap circuit problem	Check cables from Safety Control Board to Euromap to external machine
<b>CODE_192A6</b>	Joint position disagreement		Reduce payload, check for encoder problems
<b>CODE_192A7</b>	Joint speed disagreement		Reduce payload, check for encoder problems
<b>CODE_192A8</b>	Joint torque disagreement		Reduce payload, check for encoder problems

<b>CODE_192A9</b>	TCP speed disagreement		Reduce payload, check for encoder problems
<b>CODE_192A10</b>	TCP position disagreement		Reduce payload, check for encoder problems
<b>CODE_192A11</b>	TCP orientation disagreement		Reduce payload, check for encoder problems
<b>CODE_192A12</b>	Power disagreement	Power calculation: uP-A and uP-B disagreement	Joint error: Check previous error codes from the same joint and evaluate
<b>CODE_192A13</b>	Joint torque window disagreement		
<b>CODE_192A14</b>	Reduced mode input disagreement	Safety I/O uP-A and uP-B disagreement	Check cables
<b>CODE_192A15</b>	Reduced mode output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A16</b>	Safety output failed		
<b>CODE_192A17</b>	Safeguard stop output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A18</b>	The other safety processor is in fault		
<b>CODE_192A19</b>	Emergency stop output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A20</b>	SPI output error detected	Safety Control Board	Check 24 V supply
<b>CODE_192A21</b>	Momentum disagreement		
<b>CODE_192A22</b>	Robot moving output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A23</b>	Wrong processor ID		
<b>CODE_192A24</b>	Wrong processor revision		
<b>CODE_192A25</b>	Potential brownout detected	Voltage drop on Safety Control Board(SCB) or defect SCB	
<b>CODE_192A26</b>	Emergency stop output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A27</b>	Safeguard stop output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A28</b>	Robot not stopping output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A29</b>	Safeguard reset input disagreement	Safety I/O uP-A and uP-B disagreement	Check cables
<b>CODE_192A30</b>	Safety processor booted up in fault mode		
<b>CODE_192A31</b>	Reduced Mode Output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A32</b>	Not Reduced Mode Output disagreement	Safety I/O uP-A and uP-B disagreement	Check Cables and Software error on motherboard
<b>CODE_192A33</b>	Checksum disagreement between uA and uB		
<b>CODE_192A34</b>	User safety config checksum disagreement between uA and GUI		
<b>CODE_192A35</b>	Robot config checksum disagreement between uA and GUI		

<b>CODE_192A36</b>	Online RAM test failed		
<b>CODE_192A37</b>	Not all safety related functionalities are running		
<b>CODE_192A38</b>	Package too short for CRC calculation		
<b>CODE_192A39</b>	Three position switch input disagreement		
<b>CODE_192A40</b>	Operation mode switch input disagreement		
<b>CODE_193</b>	One of the nodes is in fault mode	SCB has detected an error	See previous error or update the firmware on the joint or reboot system
<b>CODE_193A0</b>	Joint 0 is in fault mode	SCB has detected an error	See previous error or update the firmware on the joint or reboot system
<b>CODE_193A1</b>	Joint 1 is in fault mode	SCB has detected an error	See previous error or update the firmware on the joint or reboot system
<b>CODE_193A2</b>	Joint 2 is in fault mode	SCB has detected an error	See previous error or update the firmware on the joint or reboot system
<b>CODE_193A3</b>	Joint 3 is in fault mode	SCB has detected an error	See previous error or update the firmware on the joint or reboot system
<b>CODE_193A4</b>	Joint 4 is in fault mode	SCB has detected an error	See previous error or update the firmware on the joint or reboot system
<b>CODE_193A5</b>	Joint 5 is in fault mode	SCB has detected an error	See previous error or update the firmware on the joint or reboot system
<b>CODE_193A6</b>	Tool is in fault mode	SCB has detected an error	See previous error or reboot system
<b>CODE_193A7</b>	Screen 1 is in fault mode	SCB has detected an error	See previous error or reboot system
<b>CODE_193A8</b>	Screen 2 is in fault mode	SCB has detected an error	See previous error or reboot system
<b>CODE_193A9</b>	Euromap 1 is in fault mode	SCB has detected an error	See previous error or reboot system
<b>CODE_193A10</b>	Euromap 2 is in fault mode	SCB has detected an error	See previous error or reboot system
<b>CODE_194</b>	One of the nodes is not booted or not present		
<b>CODE_194A0</b>	Joint 0 is not booted or not present	SCB has detected an error	
<b>CODE_194A1</b>	Joint 1 is not booted or not present	SCB has detected an error	
<b>CODE_194A2</b>	Joint 2 is not booted or not present	SCB has detected an error	
<b>CODE_194A3</b>	Joint 3 is not booted or not present	SCB has detected an error	
<b>CODE_194A4</b>	Joint 4 is not booted or not present	SCB has detected an error	

<b>CODE_194A5</b>	Joint 5 is not booted or not present	SCB has detected an error	
<b>CODE_194A6</b>	Tool is not booted or not present	SCB has detected an error	
<b>CODE_194A7</b>	Screen 1 is not booted or not present	SCB has detected an error	
<b>CODE_194A8</b>	Screen 2 is not booted or not present	SCB has detected an error	
<b>CODE_194A9</b>	Euromap 1 is not booted or not present	SCB has detected an error	
<b>CODE_194A10</b>	Euromap 2 is not booted or not present	SCB has detected an error	
<b>CODE_194A128</b>	Joint 0 not ready while brake release requested	Must be at least in IDLE mode when the brake release is requested	1. Check for loose communication cable. 2. replace base
<b>CODE_194A129</b>	Joint 1 not ready while brake release requested	Must be at least in IDLE mode when the brake release is requested	1. Check for loose communication cable. 2. replace shoulder
<b>CODE_194A130</b>	Joint 2 not ready while brake release requested	Must be at least in IDLE mode when the brake release is requested	1. Check for loose communication cable. 2. replace elbow
<b>CODE_194A131</b>	Joint 3 not ready while brake release requested	Must be at least in IDLE mode when the brake release is requested	1. Check for loose communication cable. 2. replace Wrist 1
<b>CODE_194A132</b>	Joint 4 not ready while brake release requested	Must be at least in IDLE mode when the brake release is requested	1. Check for loose communication cable. 2. replace Wrist 2
<b>CODE_194A133</b>	Joint 5 not ready while brake release requested	Must be at least in IDLE mode when the brake release is requested	1. Check for loose communication cable. 2. replace Wrist 3
<b>CODE_194A134</b>	Tool not ready while brake release requested	Must be at least in IDLE mode when the brake release is requested	1. Check for loose communication cable. 2. replace Tool
<b>CODE_195</b>	Conveyor speed too high	Conveyor speed higher than robot is able to run	Make sure that conveyor tracking is set correct up
<b>CODE_195A1</b>	Conveyor speed too high for joint speed safety limit		Make sure that conveyor tracking is set correct up
<b>CODE_195A2</b>	Conveyor speed too high for TCP speed safety limit		Make sure that conveyor tracking is set correct up
<b>CODE_195A3</b>	Conveyor speed too high for momentum safety limit		Make sure that conveyor tracking is set correct up
<b>CODE_196</b>	MoveP speed too high	Too high speed in relation to blend radius	Reduce speed or increase blend radius in user program
<b>CODE_197</b>	Blend overlap warning		
<b>CODE_200</b>	Safety Control Board hardware error	SCB: uP-A has detected an error	

<b>CODE_200A1</b>	Hardware ID is wrong	SCB: uP-A has detected an error: Wrong SCB	
<b>CODE_200A2</b>	MCU type is wrong	SCB: uP-A has detected an error	
<b>CODE_200A3</b>	Part ID is wrong	SCB: uP-A has detected an error	
<b>CODE_200A4</b>	RAM test failed	SCB: uP-A has detected an error	Replace Safety Control Board (SCB)
<b>CODE_200A5</b>	Register test failed	SCB: uP-A has detected an error	Replace Safety Control Board (SCB)
<b>CODE_200A6</b>	pRom Crc test failed	SCB: uP-A has detected an error: firmware error	Replace Safety Control Board (SCB)
<b>CODE_200A7</b>	Watchdog reset the processor	SCB: uP-A has detected an error	
<b>CODE_200A8</b>	OVG signal test not passed	SCB: uP-A has detected an error: over voltage generator	Replace Safety Control Board (SCB)
<b>CODE_200A9</b>	3V3A power good pin is low	SCB: uP-A has detected an error	Replace Safety Control Board (SCB)
<b>CODE_200A10</b>	3V3B power good pin is low	SCB: uP-A has detected an error	Replace Safety Control Board (SCB)
<b>CODE_200A11</b>	5V power good is low	SCB: uP-A has detected an error	Replace Safety Control Board (SCB)
<b>CODE_200A12</b>	3V3 voltage too low	SCB: uP-A has detected an error	Replace Safety Control Board (SCB)
<b>CODE_200A13</b>	3v3 voltage too high	SCB: uP-A has detected an error	Replace Safety Control Board (SCB)
<b>CODE_200A14</b>	48V input is too low		Check: 48 V power supply, current distributor energy eater or replace SCB
<b>CODE_200A15</b>	48V input is too high		Check: 48 V power supply, current distributor energy eater or replace SCB
<b>CODE_200A16</b>	24V IO short circuited	Too high current	Disconnect external connections
<b>CODE_200A17</b>	PC current is too high	Motherboard takes too high current	
<b>CODE_200A18</b>	Robot voltage is too low		Check: Short circuit in robot arm, 48 V power supply, current distributor energy eater or replace SCB
<b>CODE_200A19</b>	Robot voltage is too high		Check: 48 V power supply, current distributor energy eater or replace SCB
<b>CODE_200A20</b>	24V IO voltage is too low		Disconnect I/O or replace SCB
<b>CODE_200A21</b>	12V voltage is too high		Check 12 V power supply, cables or replace SCB
<b>CODE_200A22</b>	12V voltage is too low		Check 12 V power supply, cables or replace SCB
<b>CODE_200A23</b>	It took too long to stabilize 24V	Safety Control Board error(SCB)	External 24 V problem or replace SCB

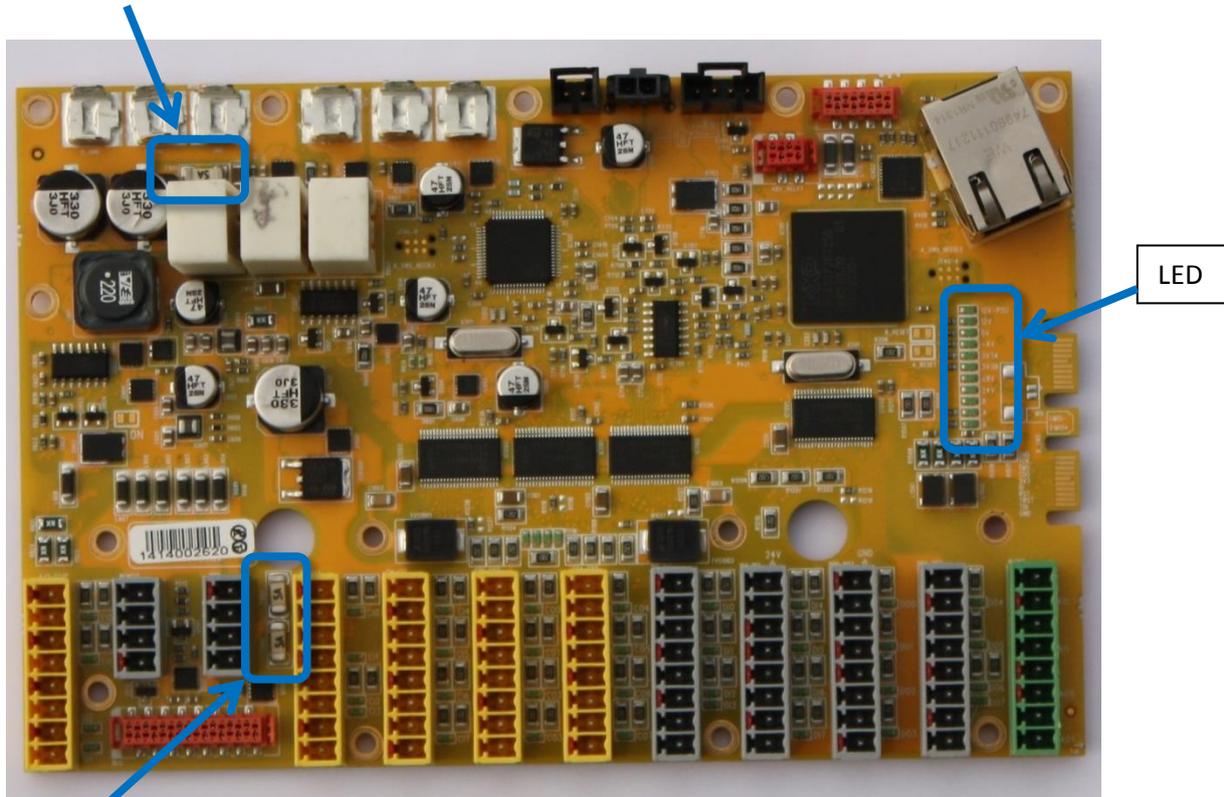
<b>CODE_200A24</b>	It took too long to stabilize 24V IO	Safety Control Board error(SCB)	External 24 V problem or replace SCB
<b>CODE_200A25</b>	24V voltage is too high	Safety Control Board error(SCB)	Replace Safety Control Board (SCB)
<b>CODE_200A26</b>	24V IO voltage is too high		Disconnect I/O or replace SCB
<b>CODE_201</b>	Setup of safety board failed	Invalid safety parameters have been received	Verify that the setup of the Safety Configuration is valid. Check the Ethernet connection between Motherboard and Safety Control Board.
<b>CODE_202</b>	SCE configuration was illegal, after applying tolerances		
<b>CODE_203A0</b>	PolyScope detected a mismatch between the shown and (to be) applied safety parameters	The PolyScope continuously verifies that the shown safety parameters are equal to the running parameters	Check that the software version is the same or newer than the firmware on the safety control board. Reload the installation and re boot the robot
<b>CODE_204A0</b>	Protective Stop: Invalid setpoint		
<b>CODE_204A1</b>	Sudden change in target position		
<b>CODE_204A2</b>	Inconsistency between target position and speed		
<b>CODE_204A3</b>	Sudden stop	The program contains motions that are not ramped correctly down	To abort a motion, use <code>\stopj\</code> or <code>\stopl\</code> script commands to generate a smooth deceleration."
<b>CODE_204A4</b>	Robot is not braking in stop or pause mode		If this happens, report it as a bug
<b>CODE_204A5</b>	Robot program resulted in invalid setpoint		
<b>CODE_204A6</b>	Blending failed and resulted in an invalid setpoint		Try changing the blend radius or contact technical support
<b>CODE_205</b>	Target speed does not match target position		
<b>CODE_205A0</b>	Inconsistency between target position and speed		
<b>CODE_206</b>	Sanity check failed		The software version on the robot must be the same or later than the version the robot had from the factory.
<b>CODE_206A0</b>	Target joint speed does not match target joint position - Joint 0 (Base)		

<b>CODE_206A1</b>	Target joint speed does not match target joint position - Joint 1 (Shoulder)	
<b>CODE_206A2</b>	Target joint speed does not match target joint position - Joint 2 (Elbow)	
<b>CODE_206A3</b>	Target joint speed does not match target joint position - Joint 3 (Wrist 1)	
<b>CODE_206A4</b>	Target joint speed does not match target joint position - Joint 4 (Wrist 2)	
<b>CODE_206A5</b>	Target joint speed does not match target joint position - Joint 5 (Wrist 3)	
<b>CODE_207</b>	Fieldbus input disconnected	Check fieldbus connections or disable the fieldbus in the installation

## 5.2 LED indicators and Fuses on Safety Control Board

### Safety Control Board (SCB)

The 5 A fuse "48 V" protects all 48 V for over current in the system inclusive Euromap. This information is only for troubleshooting. Do NOT replace the fuse on any circumstances. Do ONLY replace the SCB with a new tested board.



Fuse 24 V: 2 fuses 5 Amp in parallel for the DI/DO 24 V supply on the safety control board no matter if the 24 V is from the controller or external power supply.

LED indicators:

	12V-PSU	On when the power plug is connected.
	12V	System: On when the power on has been activated
	5V	On when "12 V System" is on and indicate that 5 V is ok.
	-4V	On when "12 V System" is on and indicate that - 4 V to analog I/O is ok.
	3V3A	On when 5V is on and indicate 3.3 V for logic Safety circuit A
	3V3B	On when 5V is on and indicate 3.3 V for logic Safety circuit B
	48V	48 V is present on the safety control board
	24V	48 V is detected and ok, indicate that internal 24 V is present for I/O's
	R	48 V on robot arm
	A	Status for Logic A: a blink sequence
	B	Status for Logic B: a blink sequence

**Normal startup sequence on a CB3.x UR3:**

1. When the power plug connected and the robot is not turned on the 12 V LED is on.
2. After the power on button is activated the power up sequence starts.
3. In this sequence The 48 V LED indicator and the "R" LED indicator is on in about 1 second. This is done to test that the 48V power supply is working and to test that the robot arm is connected.

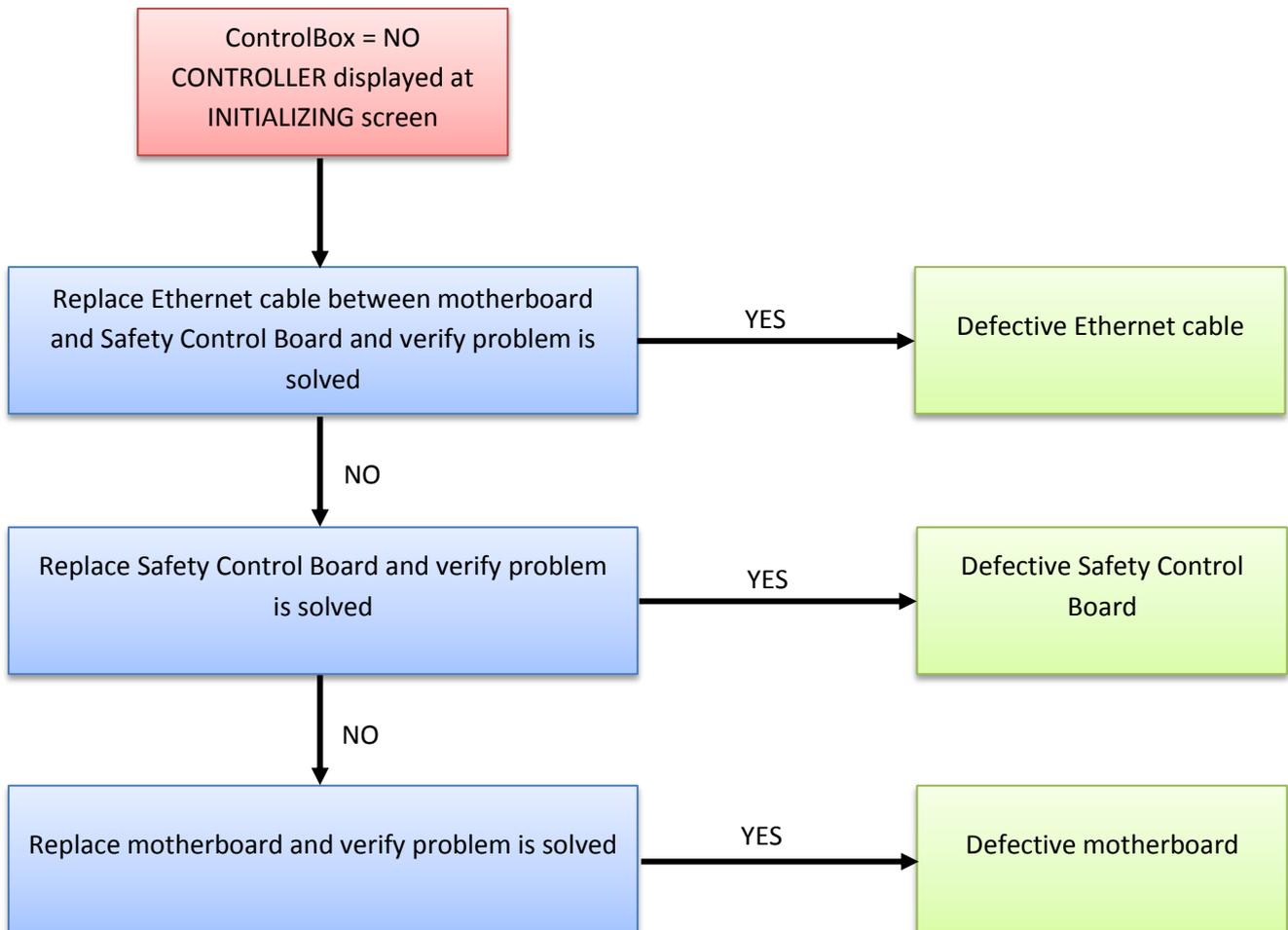
If the 48V LED indicator is off all the time in the startup sequence you should measure the voltage:

See the E-Plan diagram: [5.4.1 Schematic overview](#)

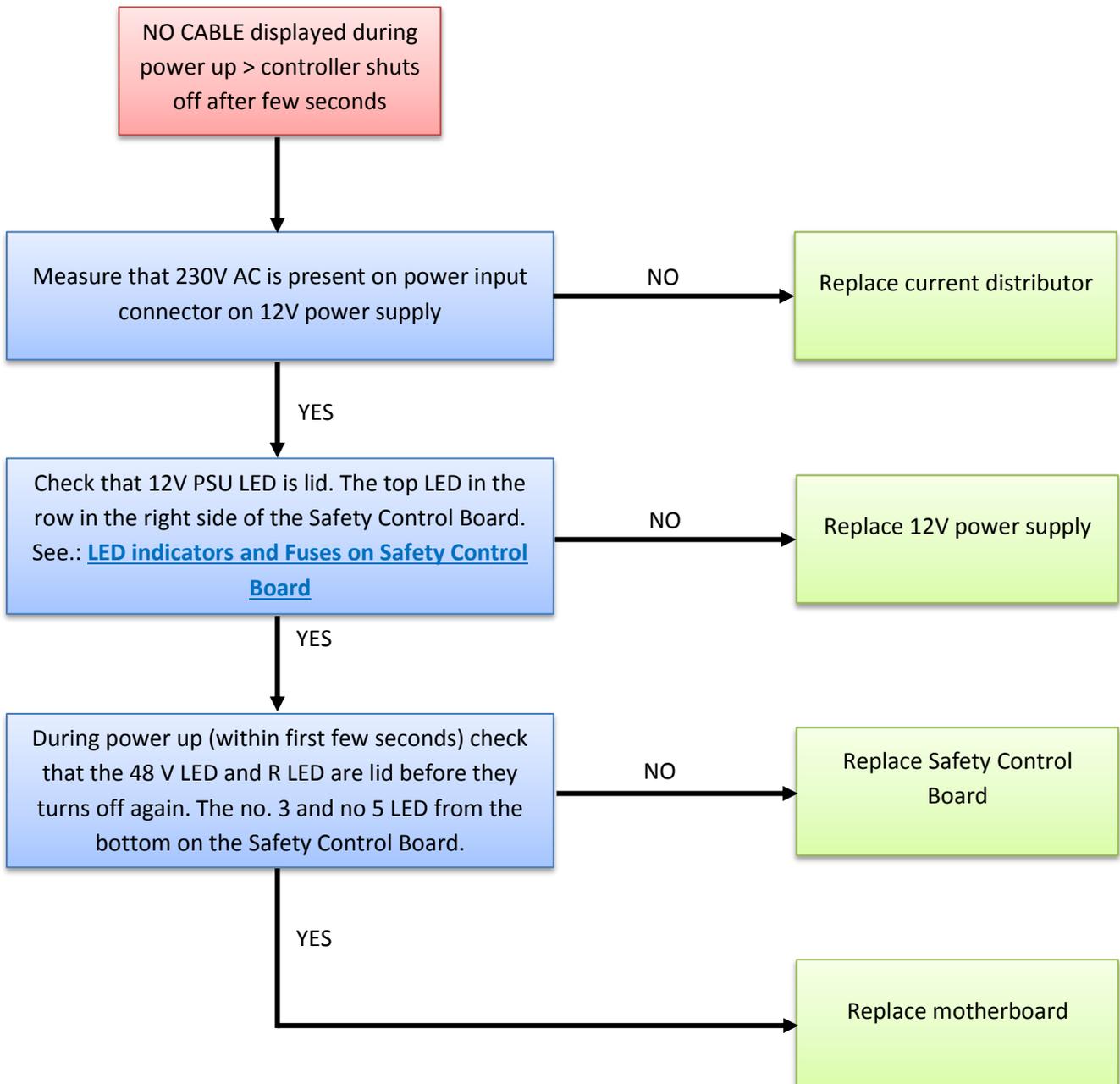
- 3.1. Measure the 48V on the Safety Control Board (SCB) where the 48V comes from the Current distributor. And check this 1 second pulse.
  - 3.1.1. The voltage is measured on the Safety Control Board. That means the Safety Control Board is defect.
  - 3.1.2. No voltage is measured on the Safety Control Board. Then measure the 230 V on the input side of the 48V power supply. If the voltage pulse of 1 second is present the Power supply is defect.
  - 3.1.3. No voltage is measured on the input of the power supply. Then measure the 230 V on the input side of the Current distributor. If the voltage is present the current distributor is defect.

## 5.3 Error phenomena

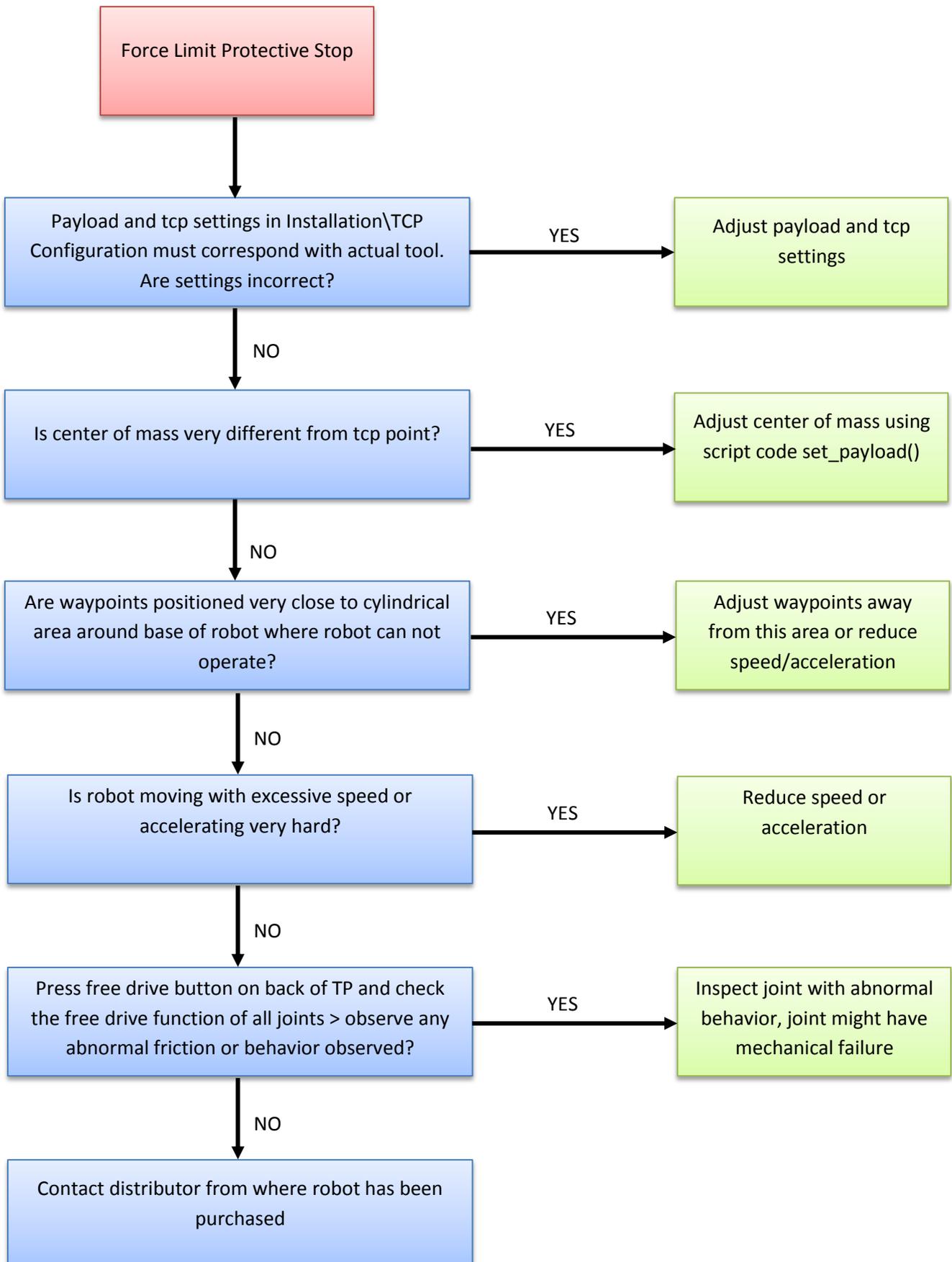
### 5.3.1 ControlBox: NO CONTROLLER displayed in Initializing



### 5.3.2 NO CABLE displayed during power up



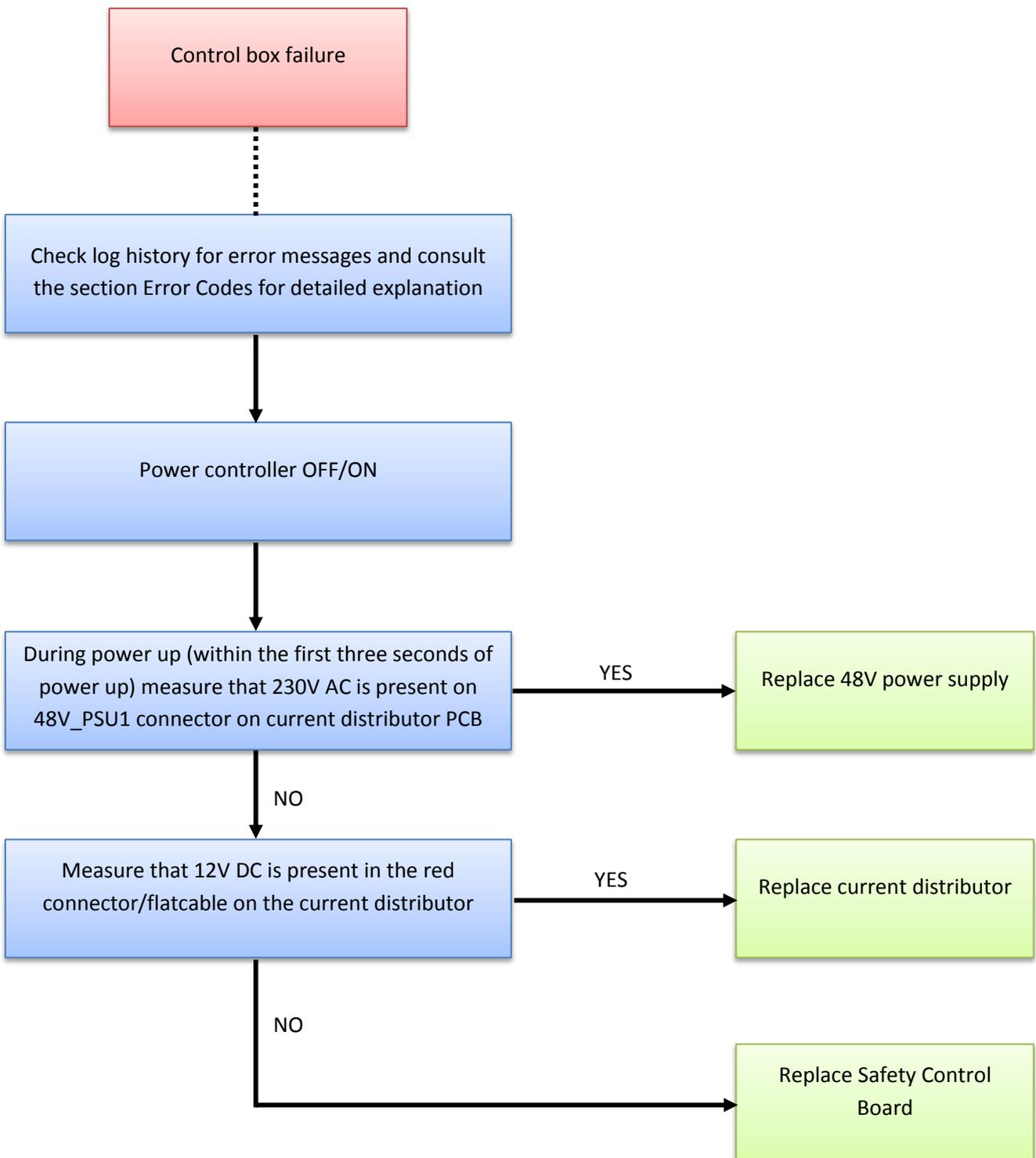
### 5.3.3 Force limit protective stop

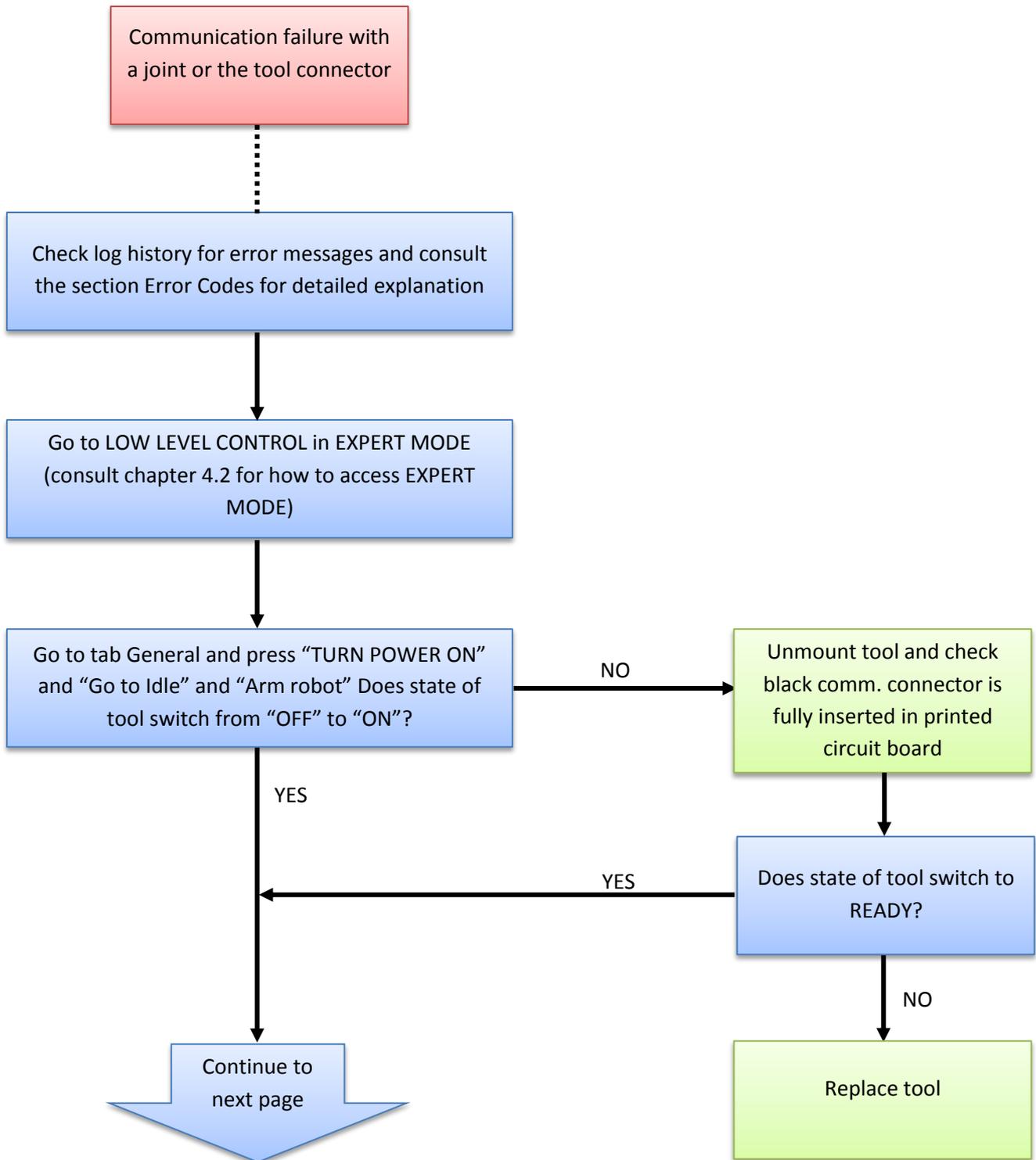


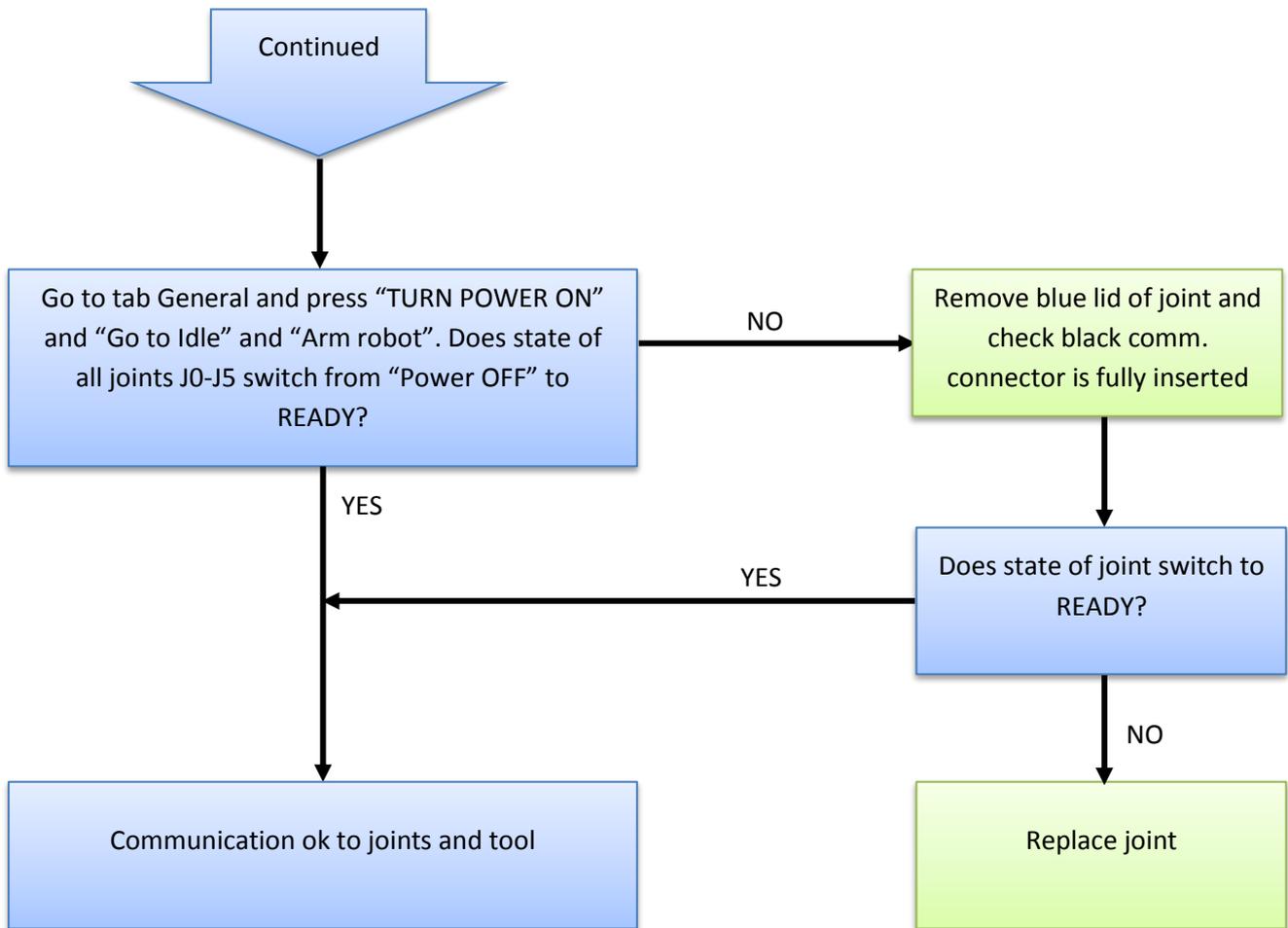
### 5.3.4 Power on failure in Initializing

If power turns off a few seconds after Robot Power is turned On in the Initializing window, there are many possible causes for this phenomenon.

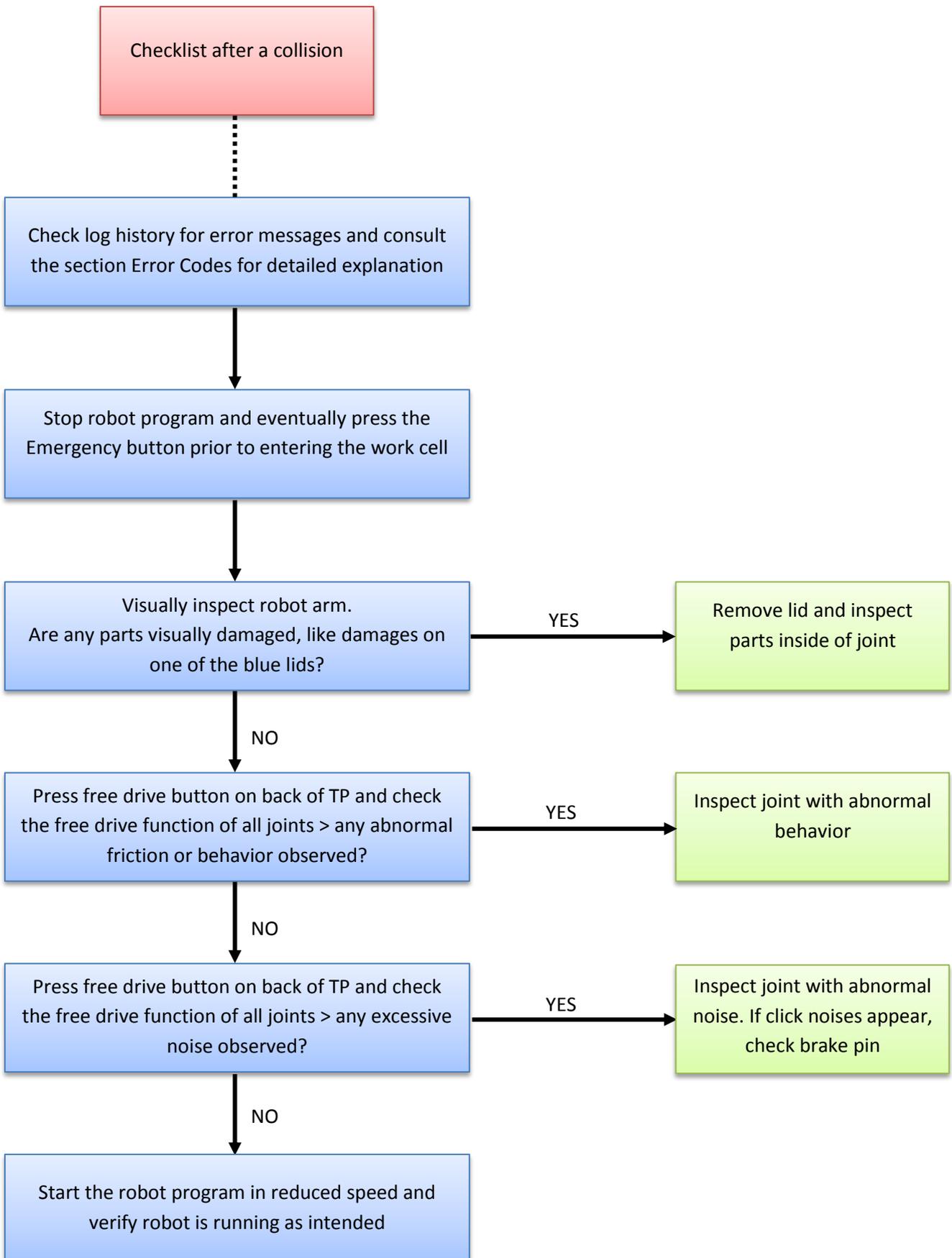
Most likely it is a control box failure or a communication failure with a joint or the tool.







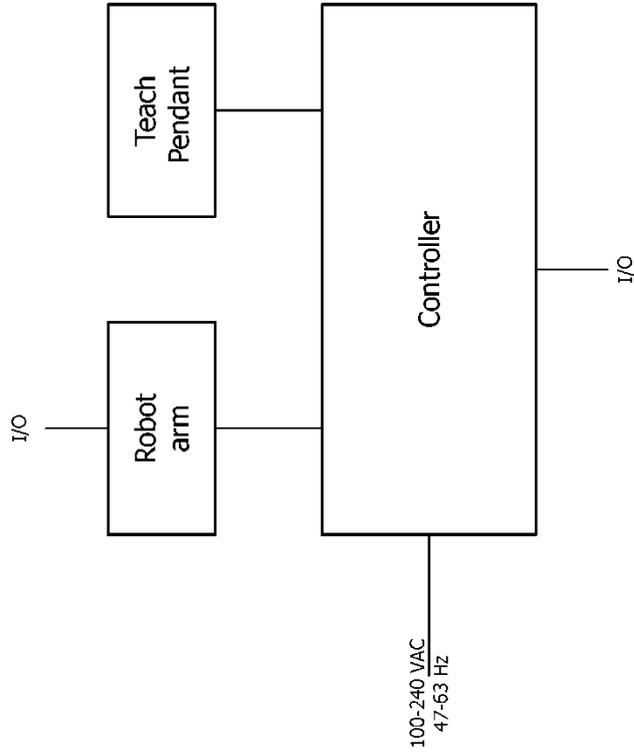
### 5.3.5 Checklist after a collision





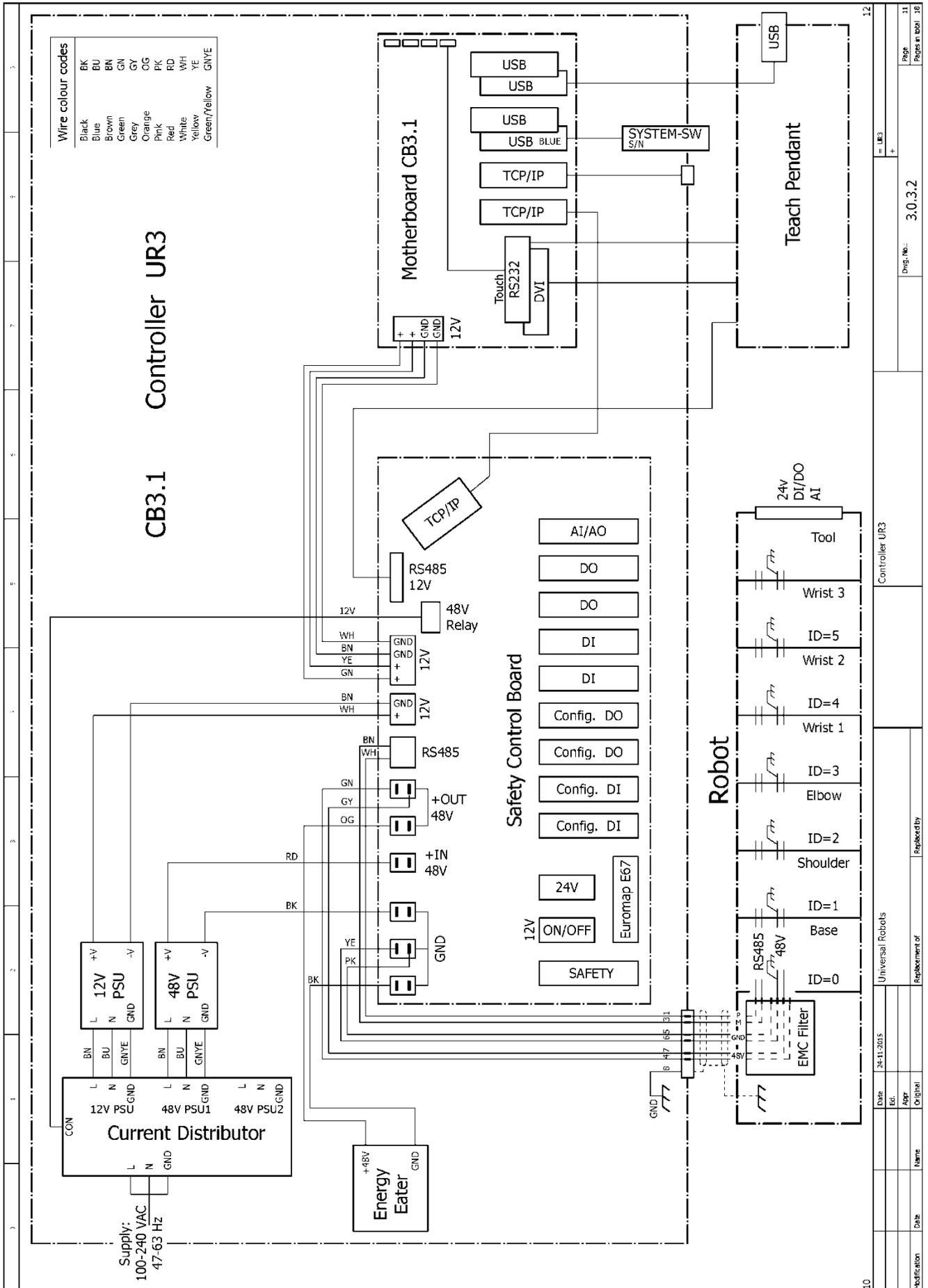


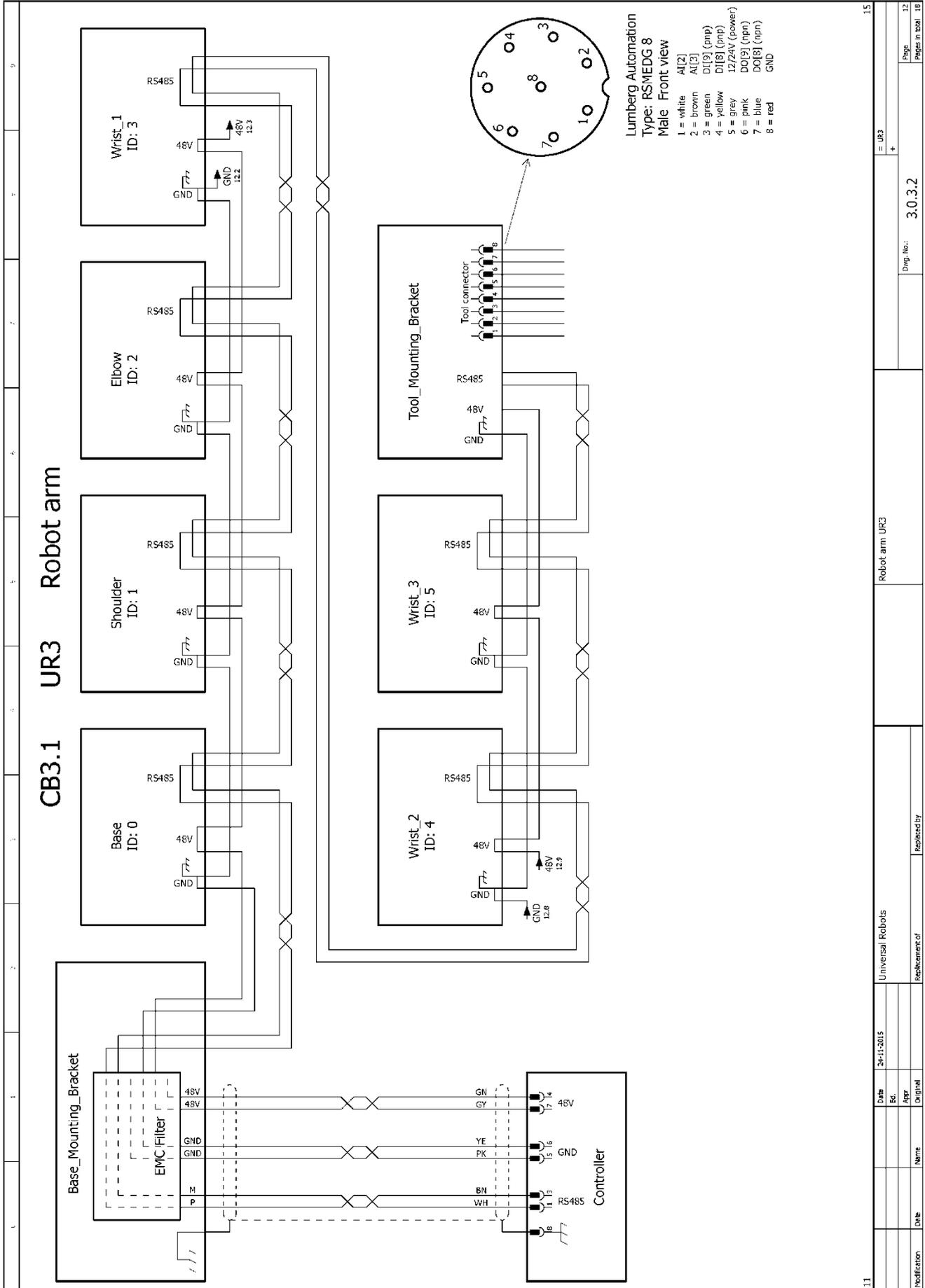
## CB3.1 Overview UR3



= / 2

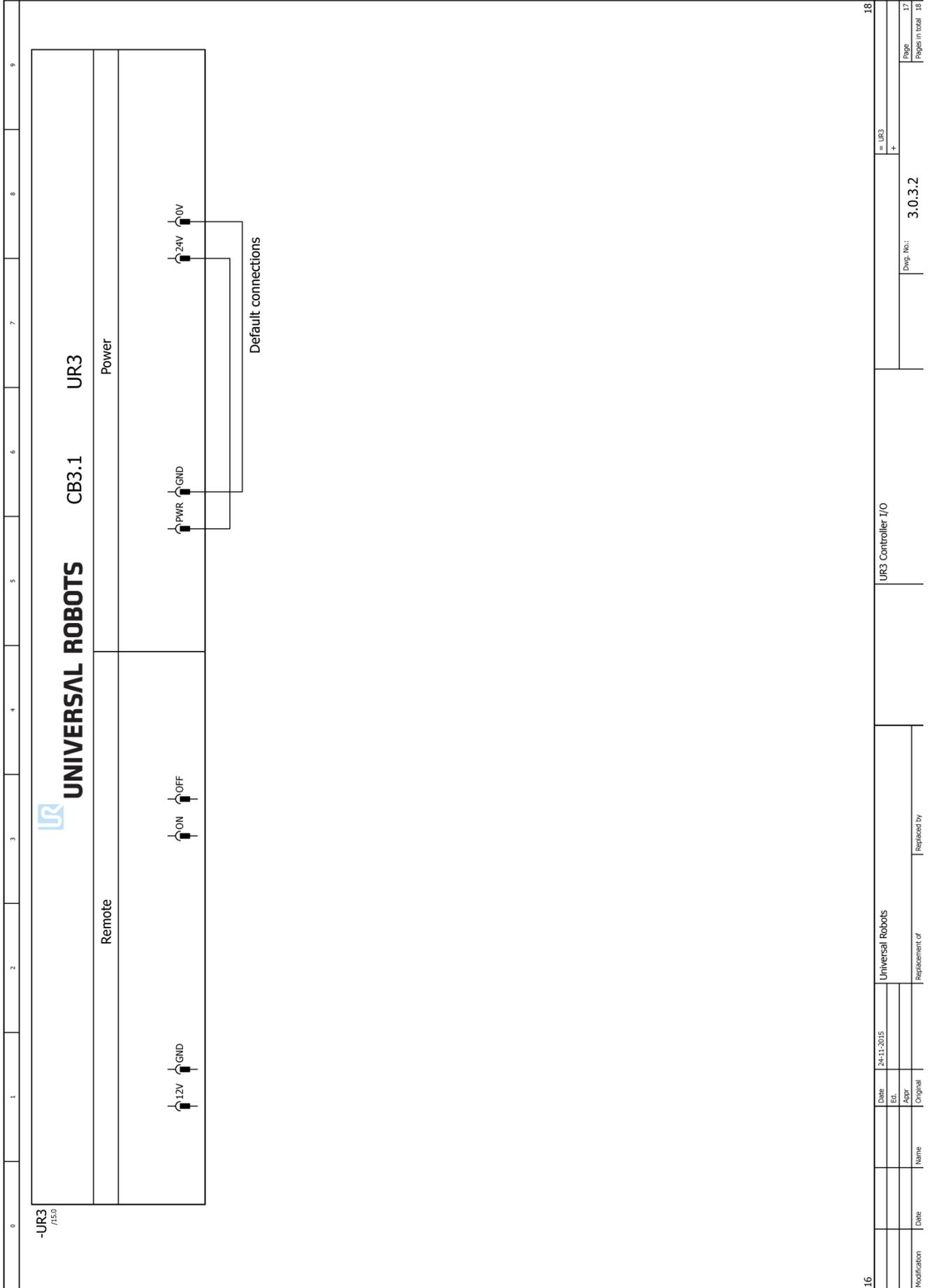
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Ed.								+			
Appr.		Original		Replacement of		Replaced by		3.0.3.2		Page 10	
Date		Name		Date		Name		Doc. No.		Pages in total 10	











16	UR3 Controller I/O	UR3	18
		= UR3	
		+	
		Dwg. No.:	3.0.3.2
		Page	17
		Pages in total	18

0	1	2	3	4	5	6	7	8	9
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Page 18 Pages in total 18									

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<p><b>UNIVERSAL ROBOTS</b> CB3.1 UR3</p> <p>Configurable Inputs</p> 									
18	Date		24-11-2015		Universal Robots		UR3 Controller I/O		20
	Edt.				Replacement of		= UR3 +		19
	Name				Replaced by		Dwg. No.: 3.0.3.2		18
	Date								Pages in total
	Modification								

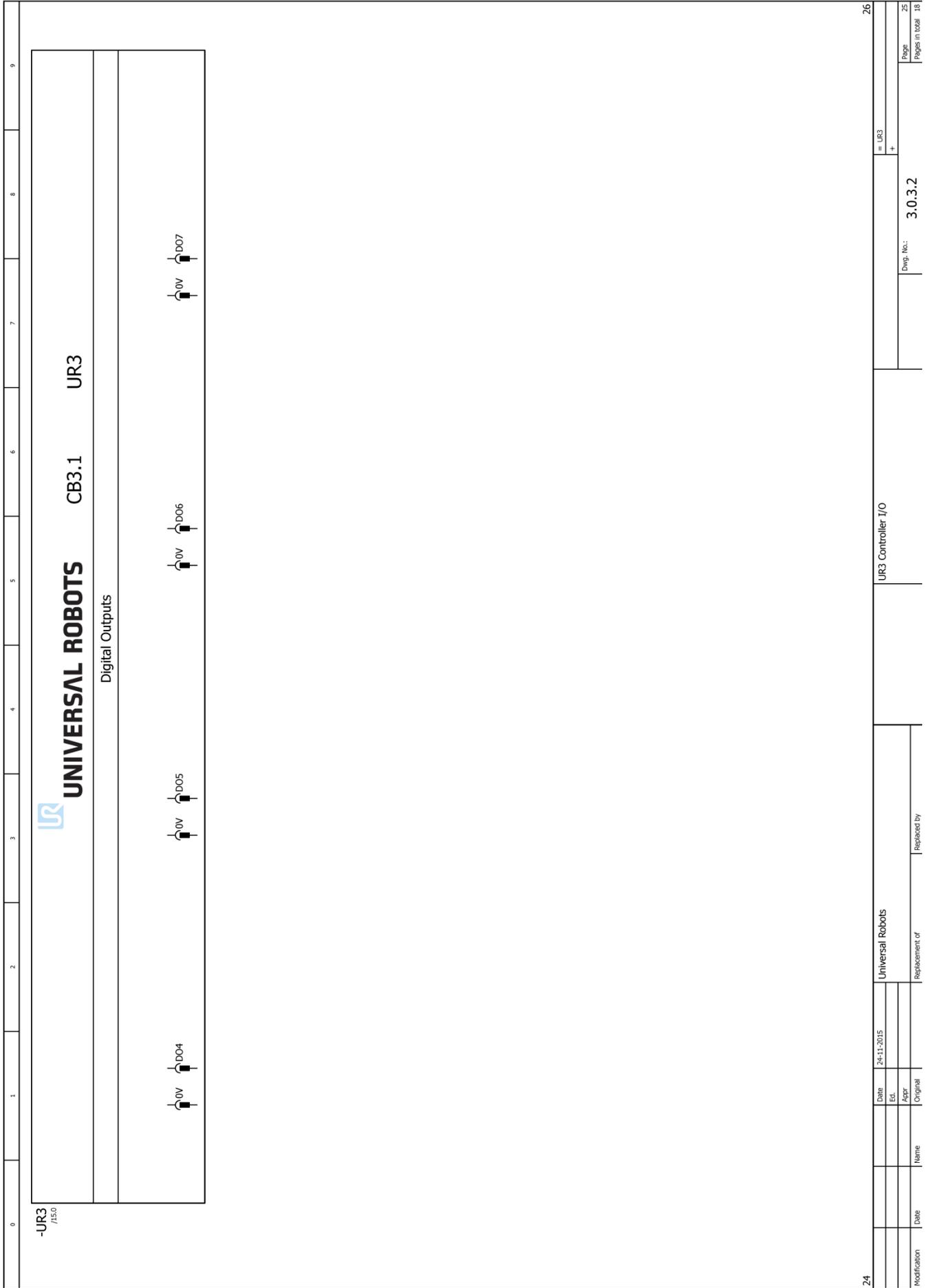




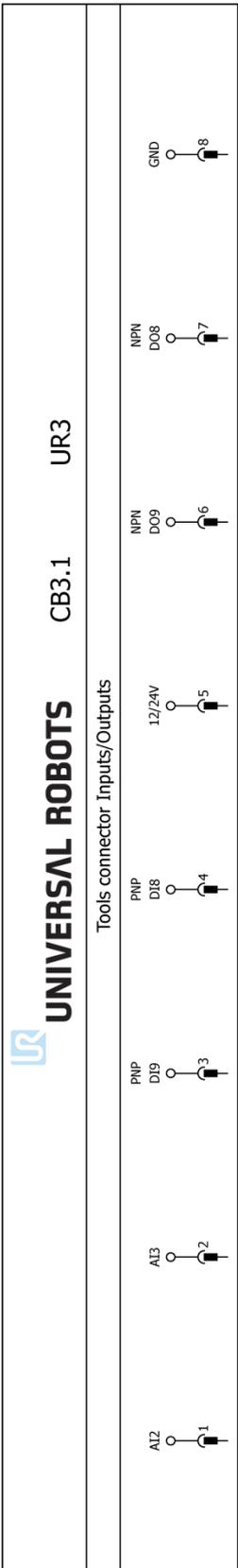
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Digital Inputs											
											
21									23		
Modification	Date	Name	Universal Robots				UR3 Controller I/O				
			Date: 24-11-2015				= UR3 +				
			ECL								
			Appr								
			Original								
			Replacement of				Dwg. No.: 3.0.3.2				
			Replaced by				Page 22				
							Pages in total 18				







0	1	2	3	4	5	6	7	8	9
 <b>UNIVERSAL ROBOTS</b> <b>CB3.1</b> <b>UR3</b>									
<b>-UR3</b> <small>/15.0</small>									
<b>Analog I/O (is not galvanically isolated from Control Box)</b>									
<b>Analog Inputs</b>					<b>Analog Outputs</b>				
 					 				
25									
27									
UR3 Controller I/O									
= UR3 +									
Dwg. No.: <b>3.0.3.2</b>									
Page 26 Pages in total 18									

0	1	2	3	4	5	6	7	8	9
<p><b>UNIVERSAL ROBOTS</b>      <b>CB3.1</b>      <b>UR3</b></p> <p><b>Tools connector Inputs/Outputs</b></p> 									
<p>26</p>									
<p>Modification   Date   Name   Date   2x-11-2015   Universal Robots   Replaced by</p>									
<p>Esq.   Appr.   Original</p>									
<p>Dwg. No.: <b>3.0.3.2</b>      = UR3</p>									
<p>Page 27</p>									
<p>Pages in total 18</p>									

## 6 Spare parts

### 6.1 Spare part list

Item no.	Item designation
<b>Controller:</b>	
122973	Controller excl. Teach Pendant CB3.1 UR3 (With cabinet)
124903	Controller OEM CB3.1 UR3 (Without Teach Pendant and cabinet)
122091	Teach Pendant incl. Touch Screen & power cable UR3, UR5 & UR10
180001	Stylus Pen
171010	USB Flash 2 GB for UR system SW
122650	Motherboard kit CB3.1
172290	Safety Control board kit
177002	Power Supply Unit 12V
177003	Power Supply Unit 48V
172080	Current Distributor PCB
122745	Energy-eater incl. fan
164228	Connector Epic w. cable UR3 (Controller output connector to robot arm)
171031	RAM module DDR3L
177503	Filter kit for controller
106800	Euromap E67 kit CB3
122671	Euromap E67 Bypass Plug
122673	Euromap E67 module CB3
123670	Euromap E67 cable 6 m
<b>Robot arm:</b>	
122030	Base Mounting Bracket incl. Cable 6 m UR3
124122	Joint Size 2 Base UR3
124222	Joint Size 2 Shoulder UR3
124321	Joint Size 1 Elbow UR3
104003	Elbow counterpart and Lower arm kit UR3
124120	Joint Size 0 Wrist 1 UR3
124220	Joint Size 0 Wrist 2 UR3
124320	Joint Size 0 Wrist 3 UR3
122020	Tool Mounting Bracket UR3
103303	Sealing set UR3, external. Visible flat rings between joints
103413	Lid set complete UR3 incl. seal in the lids

Item no.	Item designation
<b>Acessories:</b>	
<b>173101</b>	Cable for tool, angle: external
<b>131095</b>	Lid Tool protective cap Alu. For tool connector
<b>139033</b>	Bracket for Mounting Teach Pendant
<b>103203</b>	Cover plug kit for UR3 base: 4 x covering screw holes + 1 x cover for cable hole
<b>132407</b>	Bracket for Mounting Controller
<b>107000</b>	Safety Control board Terminal kit
<b>131503</b>	Bracket for mounting robot arm UR3 (Item and Bosch profiles)

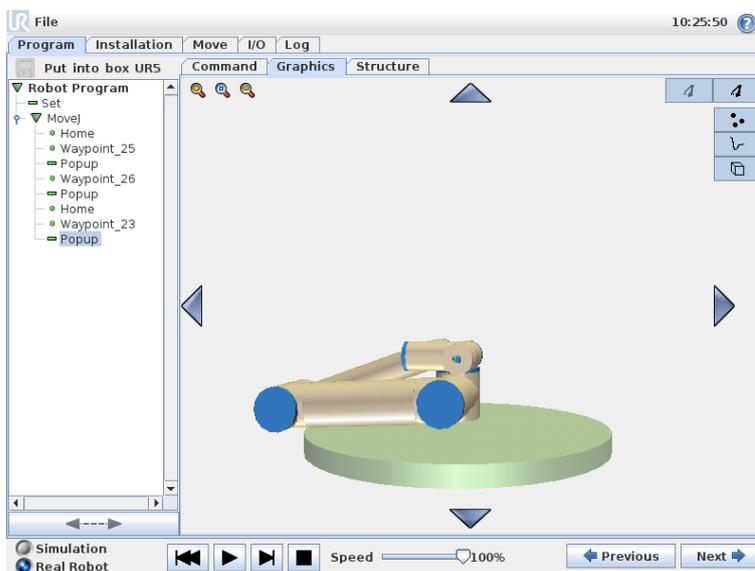
## 6.2 Service kit

Item no.	Item designation	
<b>109010</b>	Service kit UR3/UR5/UR10	(kit includes all of the below part no.'s)
<b>109101</b>	Spanner Hex 5.5mm	UR5 & UR10
<b>109102</b>	Spanner Hex 7.0mm	UR5 & UR10
<b>109110</b>	Spanner Hex 10.0mm	UR10 only
	Screwdriver Flat 2.5	UR3 & UR5 & UR10
<b>109103</b>	Screwdriver torx T10	UR5 & UR10
<b>109105</b>	Torque wrench Hex 5.5mm Size 1 and Size 2 (1.3 Nm)	UR5 & UR10
<b>109106</b>	Torque wrench Hex 7.0mm Size 3 (3.0 Nm)	UR5 & UR10
<b>109107</b>	Torque wrench Hex 10.0mm Size 4 (8.0 Nm)	UR10 only
<b>109104</b>	Torque screwdriver torx T8 + T10 (0.4 Nm)	UR3 & UR5 & UR10
<b>109111</b>	Torque screwdriver torx T10 (1.3 Nm)	UR3
<b>109112</b>	Torque screwdriver torx T20 (3.0 Nm)	UR3
<b>164084</b>	Bypass cable (for setting joint-ID)	UR3 & UR5 & UR10
<b>109180</b>	ESD wrist strap	UR3 & UR5 & UR10
	Service kit box	UR3 & UR5 & UR10

# 7 Packing of robot

Packing of robot and controller box for shipment

- Remove any external tooling and external electrical connections.
- Download the Put\_Into\_Box program to a USB stick. Download it from: <http://www.universal-robots.com/support/>
- Load program *Put\_into\_box\_ur3.urp* on the robot and follow instructions while removing mounting bolts.



While robot folds together, hold a piece of bubble wrap between Shoulder joint and wrists.

Note: If robot cannot run or power is not available, it is possible to manually release the brakes for each joint individually and pack the robot accordingly. For brake release, see [3.1.3 Brake release](#)

- Power down, disconnect power and disconnect robot arm from controller.
- Pack robot arm and Controller box in designated boxes. Make sure the orientation of the robot arm is correct in the box.



## 8 Changelog

### 8.1 Changelog

Date	Revision	Action	Changes
20. Marts 2015	UR3_en_3.1.1	Added	Revision 3.1.1 released
December 2015	UR3_en_3.1.2	Added	More details for replacements of parts, additional error codes, Updated Electrical drawings, Torque value for elbow changed,