

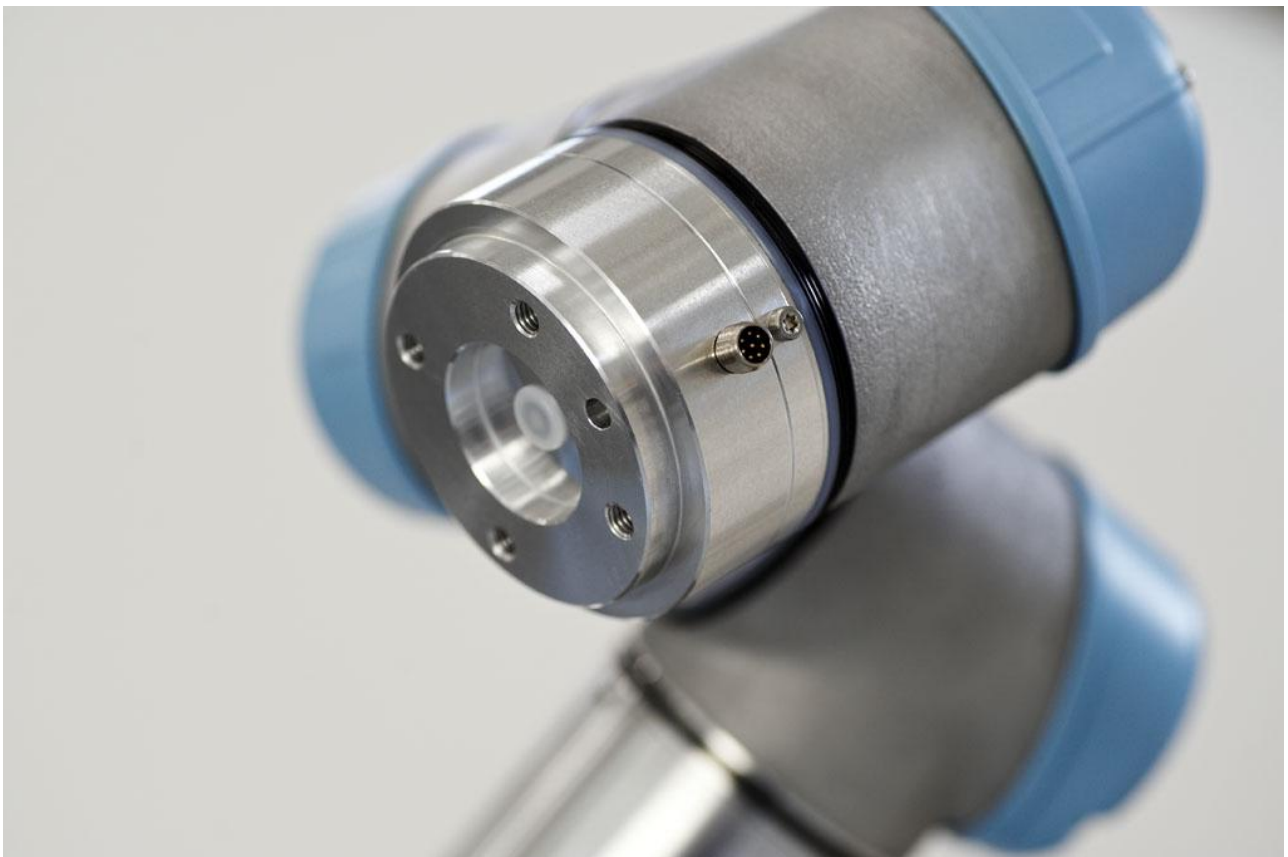


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Service Manual for:

UR-6-85-5-A

Serial numbers from and including: 2010200093 (Robot Arm)



Version: 2011-R01



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Background

Universal Robots Industrial Robots are a quality product, designed and produced in Denmark by highly qualified technicians and engineers.

The robot has a service interval of 7,000 to 10,000 hours of operation. At this point it should be lubricated with new grease.

Different circumstances may mean that it is necessary to service the robot sooner than the interval indicated above.

For example, the robot may have been overloaded on an overrun or it may have been dropped on the floor when relocating or have run with a load not recommended by Universal Robots.

Purpose

The purpose of this Service Manual is to help the reader perform general servicing and replace defective components in the robot.

Universal Robots recommends that you do not attempt repair, adjustment or other intervention in the mechanical or electrical systems of the robot. Any unauthorised intervention will invalidate the guarantee.

In the event of a defect, Universal Robots recommends ordering a new component from the Universal Robots dealer who supplied the robot. Alternatively, you can order from your nearest dealer, whose details you can obtain by contacting Universal Robots at the following address:

Universal Robots ApS
Svendborgvej 102
DK-5260 Odense
Denmark
Tel.: +45 89 93 89 89
Fax +45 38 79 89 89
sales@universal-robots.com
www.universal-robots.com



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Lubricating joints using special grease

To ensure that the gears function correctly and have the optimum life, only special grease supplied by Universal Robots must be used.

This special grease is manufactured by Harmonic Drive AG specifically for use in the gears.

Special grease, like other spare parts and tools, may be ordered from Universal Robots.

Tools required:

- Torx T10 screwdriver
- Pressure lubrication press
- Heavy-duty gloves.

Procedure

To top up the grease, remove the M3 screw between the cover and the contacting surface of the robot joint.



Use a pressure gun to insert grease in the hole, thereby distributing it to the gear.

Top up as follows for every 10,000 hours of operation:

Each size 1 joint – 3,5 g of grease

Each size 3 joint – 15 g of grease.

Replace the screw in the hole and tighten to 0.6 Nm.

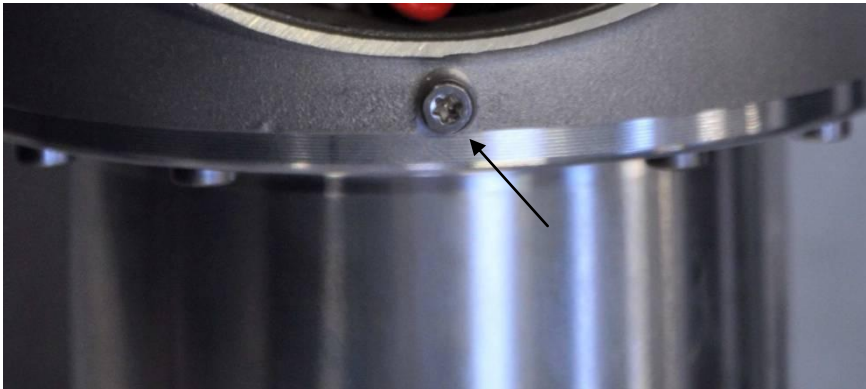
Thoroughly clean away any excess grease.



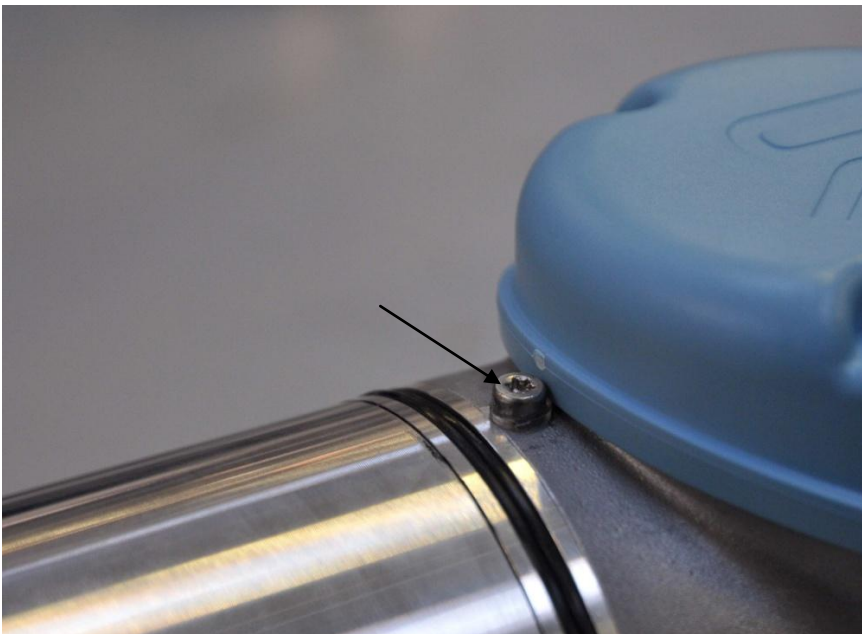
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Please note that there should be no grease in the screw holes closest to the robot's upper arm and lower arm tubes:

Screw (x2) on the upper arm not suitable for topping up grease.



Screw on the lower arm not suitable for topping up grease.





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Replacement of robot joint

Size 1 joints are the three small joints that form the robot's "hand joint".

Size 3 joints are the three large joints that form the robot's elbow, shoulder and base.

Size 1 and size 3 joints, like other spare parts and tools, may be ordered from Universal Robots.

IMPORTANT

Please indicate which joint is being replaced when ordering. The joints are pre-programmed and must be fitted to the robot in a specific position.

Se reservedelsliste med varenumre på side: 18

Tools required:

- 5,5 mm open-ended spanner, flat model, e.g. USAG 250 N (Size 1)
- 7.0 mm open-ended spanner, flat model, e.g. USAG 250 N (Size 3)
- Torx T10 screwdriver
- Torque wrench with 5.5 mm or 7.0 mm jaw.

Steps required to replace a joint:

1. Disconnect the robot from the power supply
2. Remove the wires
3. Remove the gaskets
4. Loosen the screws
5. Disassemble the joint
6. Clean the surfaces
7. Adjust the length of the screws
8. Assemble the joint
9. Tighten the screws
10. Fit the gaskets
11. Fit the wires
12. Reset the robot (joint)

The tool flange and base plate are usually replaced when the joint is replaced, as the assembly method is the same for all joint assemblies in the robot. Special precautions to be taken when replacing the tool flange and base plate are described at the end of this manual.



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Procedure

The robot must always be disconnected from the power supply before any work is carried out on the robot's mechanical components.

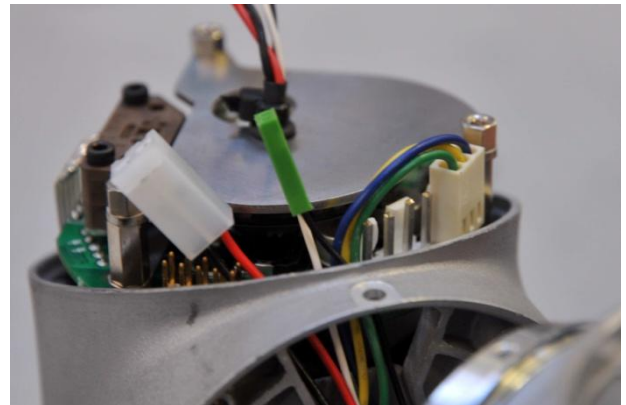
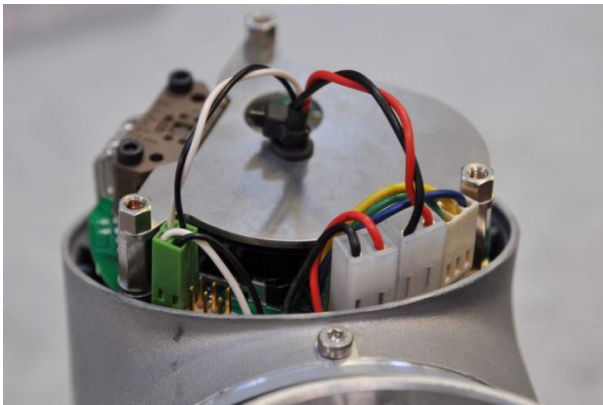
Turn off the robot using the touch screen and remove the plug from the socket supplying the robot.

Remove the blue plastic cover on the joint using a Torx T10 screwdriver/spanner.

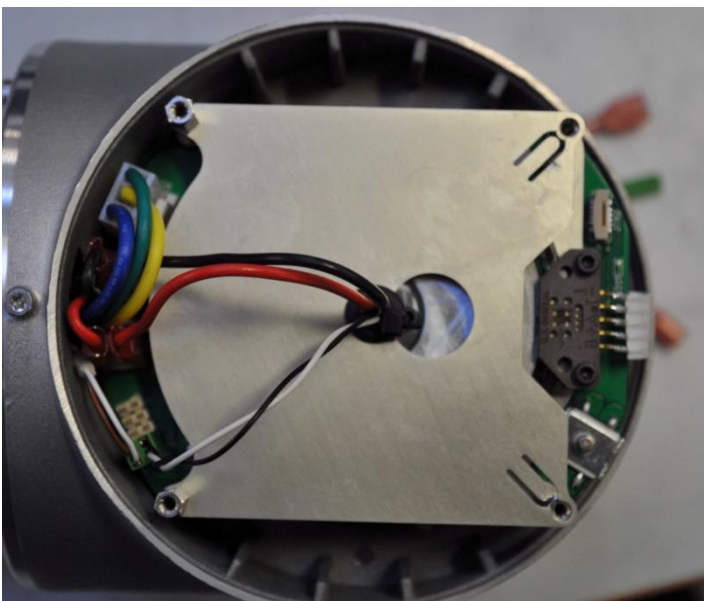
Removing the wires:

Remove the live wire (connector with red and black wire) and the BUS wire (green connector with black and white wire) from their respective connection terminals in the joint.

Size 1:



Size 3:

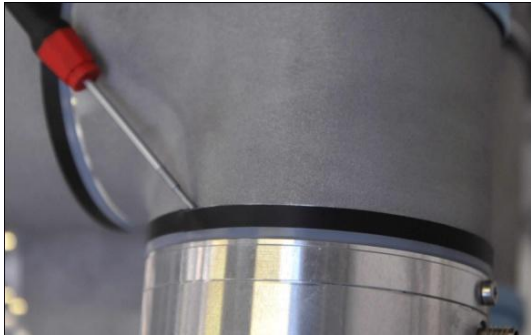




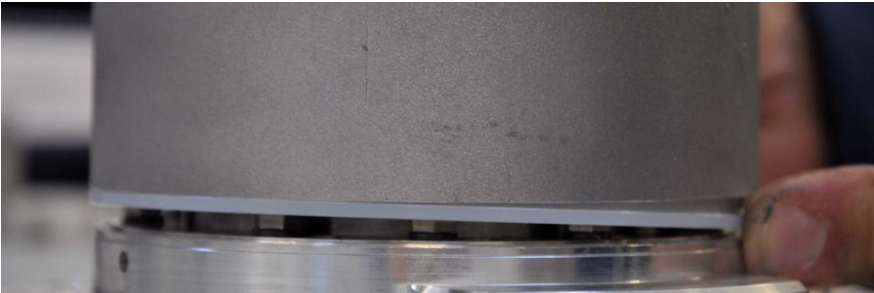
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Removing the joint gaskets

The gaskets between the joints, both on size 1 and size 3 joints, is a flating made of rubber. Carefully remove it, by pulling them out using a small screwdriver and then rolling the gaskets away from the assembly with your fingers.



The Teflon ring can then be pushed up into the joint, providing access to the screws holding the joint together.



Remove the M3 screw for grease filling.

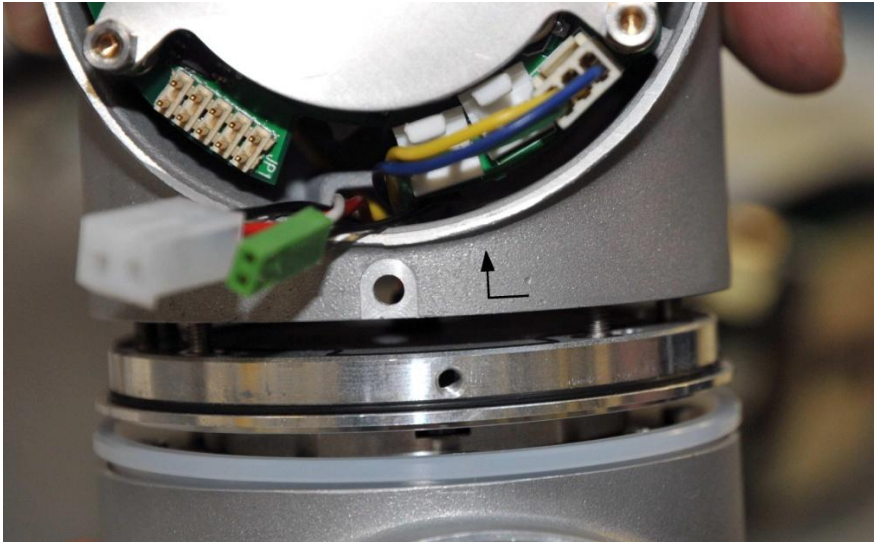
Loosen all screws (8 x M3 for size 1 and 10 x M4 for size 3) by approximately two turns using an open-ended spanner – use a 5.5 mm spanner for a size 1 joint and a 7 mm spanner for a size 3 joint.





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Disassemble the joint by rotating the joints in opposite directions and pulling them away from one another.



The screw assembly is shown here on a separated joint in order to show the "screw tracks", which are the reason why the joints have to be rotated in order to separate them.



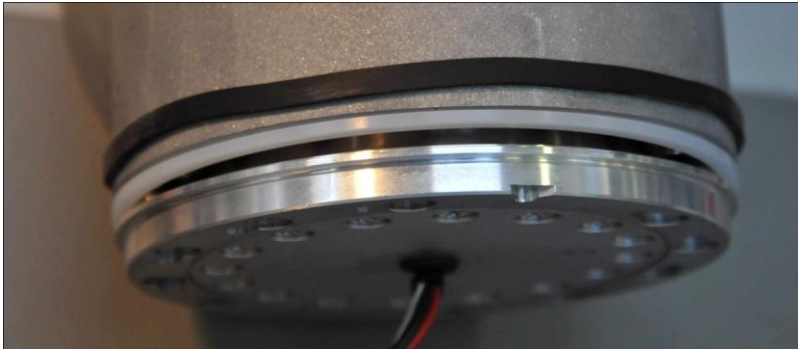
Before fitting the new joint, clean the surfaces of dirt and grease.



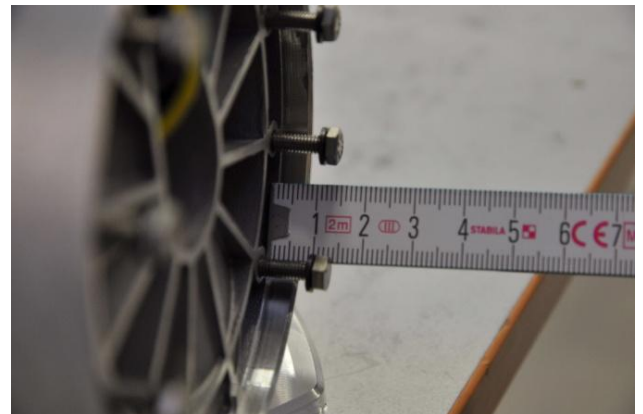
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Assembling the joint

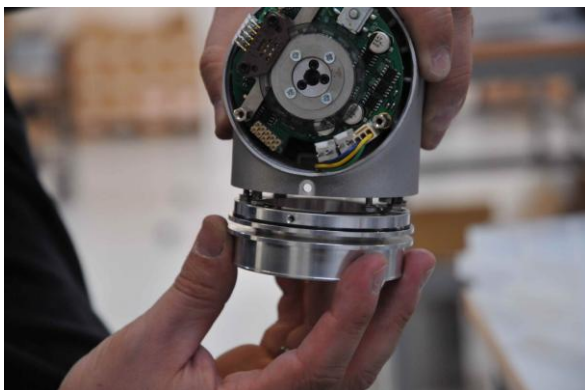
Before assembling the joints, take the flatring which are to be fitted in the seal and push it over the joint. We recommend fitting new gaskets. See the spare parts list on page 18 for item numbers.



Adjust the length of the screws so that they stick out by 10-11 mm including washers.



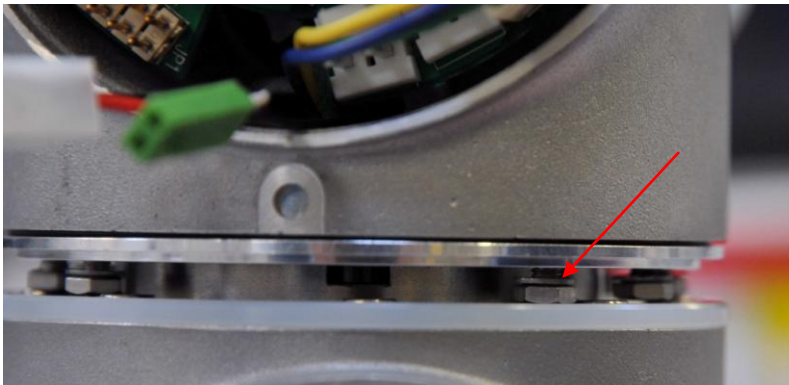
Assemble the joint by pushing the screws through the "screw tracks". The grease filling holes will indicate whether the joints are turning correctly.





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It is important that the washers are also pushed through, otherwise the joints may not rotate into place. The grease filling holes must be properly aligned once the joints have been rotated into position. There is a guide groove opposite the grease filling section and it is important that this groove falls into place when the joints are rotated into position.



Tighten the screws alternately a little at a time until all screws are tightened to the torque set out below.



Size 1: tighten screws to 0.5 Nm and then 1.0 Nm

Size 3: tighten screws to 1.2 Nm and then 2.4 Nm

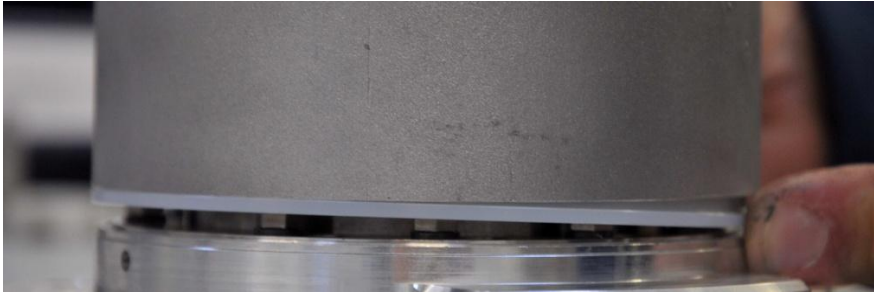
A special torque wrench is recommended for this procedure – see the spare parts list on page 18 for item number.



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Fitting the gaskets

Push the Teflon into place so that it covers the screws.



Fit the flaring into the seal by pulling carefully.



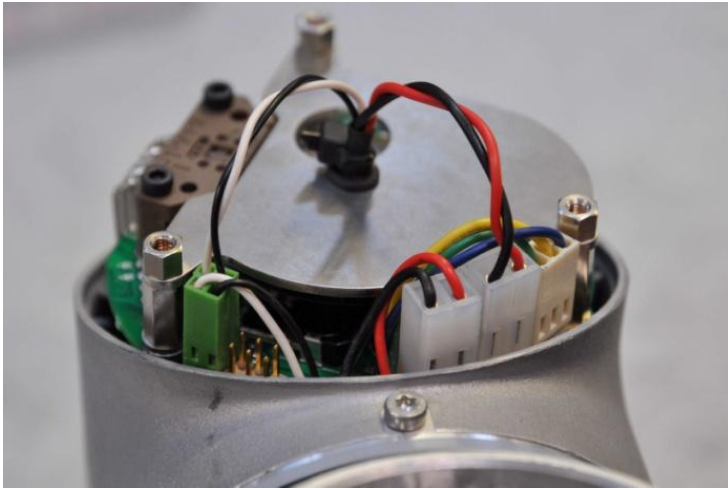


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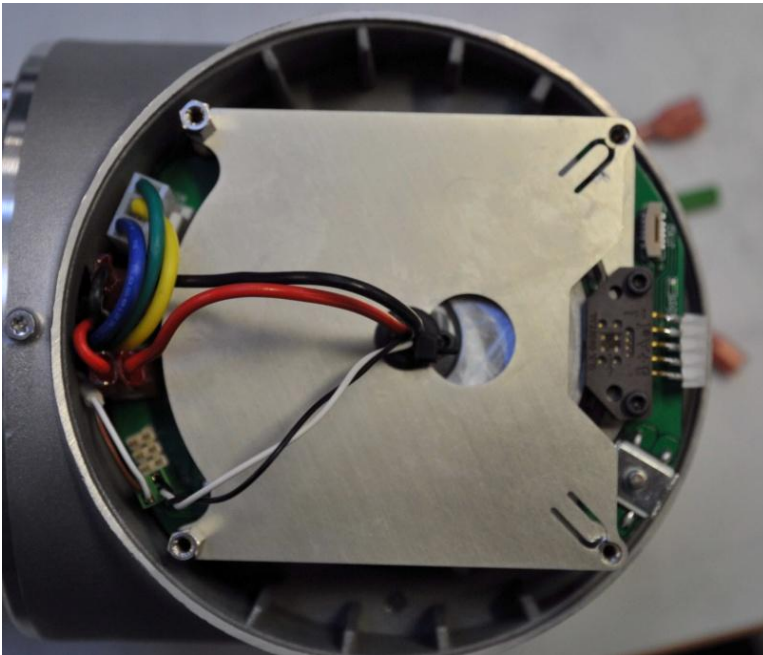
Fitting the wires

Fit the wires as shown in the image.

Size 1: Insert the white connector with the red and black live wire into the pin on the circuit board. Insert the green communications connector into the pin on the circuit board.



Size 3: Insert the red and black live wire on the spade lug on the circuit board. Insert the green communications connector into the pin on the circuit board.



Replace the blue plastic protective cover, perform a reset and the robot is ready for use.



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Replacing the tool flange

The tool flange, like other spare parts and tools, may be ordered from Universal Robots.

Tools required:

- 5,5 mm open-ended spanner, flat model, e.g. USAG 250 N
- Torx T10 screwdriver
- Torque wrench with a 5,5mm jaw.

The procedure for replacing the tool flange is the same as for replacing a joint – see page 8.

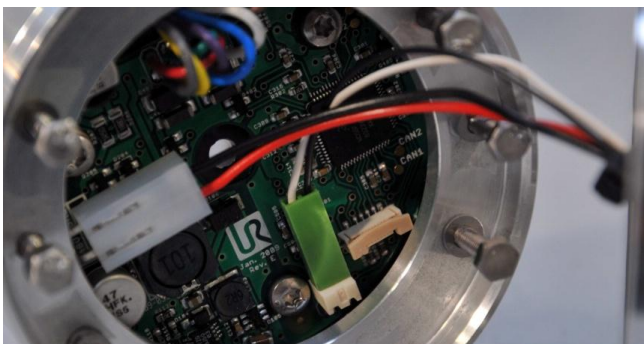
The robot must always be disconnected from the power supply before any work is carried out on the robot's mechanical components.

Turn off the robot using the touch screen and remove the plug from the socket supplying the robot.

When the tool flange is fitted to the joint, it is important that the wires are not caught up.

If necessary, rotate the tool flange one whole turn in relation to the joint in order to make the wires twist and so be positioned in the middle under the tool flange when it is fitted on the joint.

Connect the (connector) terminals as shown in the image below.



When fitting the tool flange on the joint, tighten the screws to 0.5 Nm and then to 1.0 Nm.



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Replacing the base plate

The base plate (including 10 metres of cable), like other spare parts and tools, may be ordered from Universal Robots.

Tools required:

- 7.0 mm open-ended spanner, flat model, e.g. USAG 250 N
- Torx T10 screwdriver
- Torque wrench with a 7.0mm jaw.

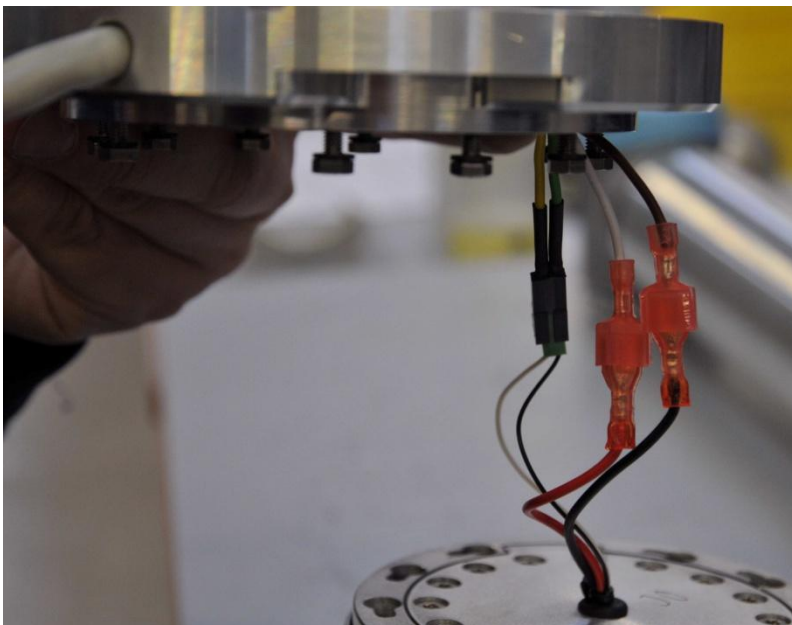
The procedure for replacing the base plate is the same as for replacing a joint – see page 8.

The robot must always be disconnected from the power supply before any work is carried out on the robot's mechanical components.

Turn off the robot using the touch screen and remove the plug from the socket supplying the robot.

When the base plate is fitted to the joint, it is important that the wires are not caught up.

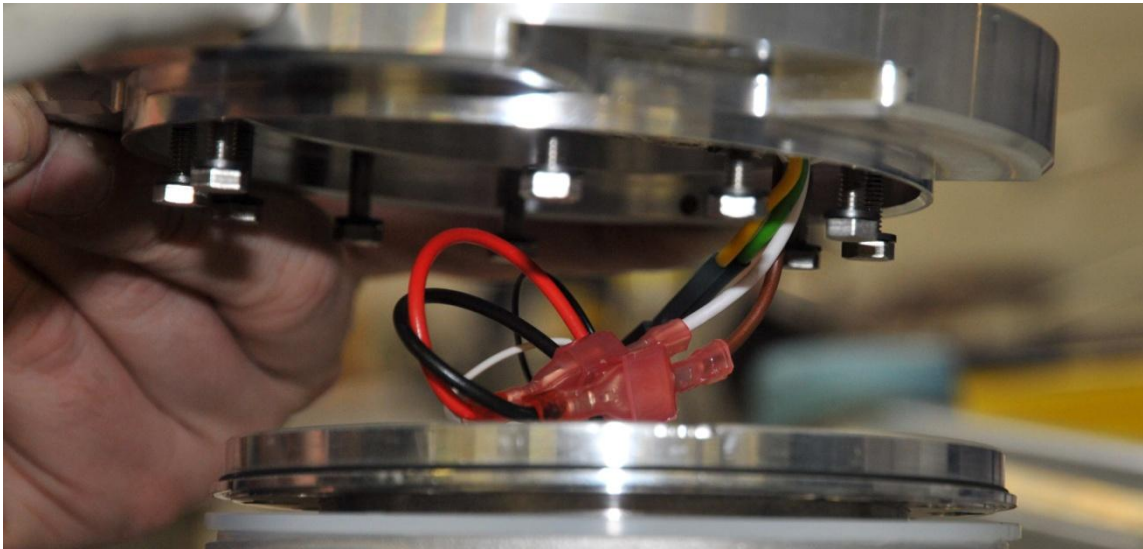
Connect the (connector) terminals as shown in the image below.



If necessary, rotate the base plate one whole turn in relation to the joint in order to make the wires twist and so be positioned in the middle under the tool flange when it is fitted on the joint.



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Check whether the wires have got caught up during assembly.



Tighten the screws in the base plate to 1.2 Nm initially and then to 2.4 Nm.



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Exchange of encoders:

Exchange of new encoder type



Fixture for Jointencoder size1.



Fixture for jointencoder size3.

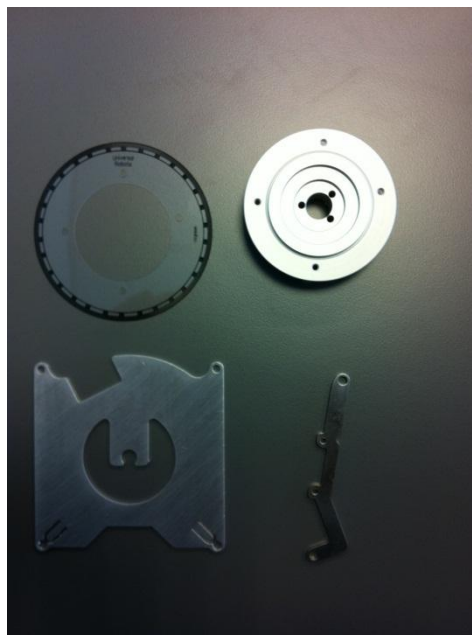


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Encoder kit Joint size 1.



Encoder kit Joint size 3.

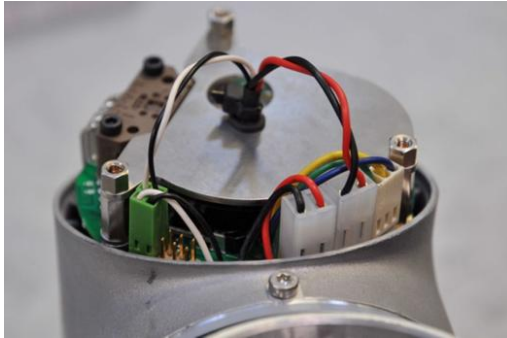




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Exchange of encoders

1. Disconnect power
2. Blue cap has to be removed
3. Dismounting of plugs



Dismantle encoder.

The bracket that the encoder is mounted on

Is replaced with the new type.



Remove hub with encoder disk

Mount New hub, mount new encoder disk,

Shim / End slices is to be mounted with "UR marks up"

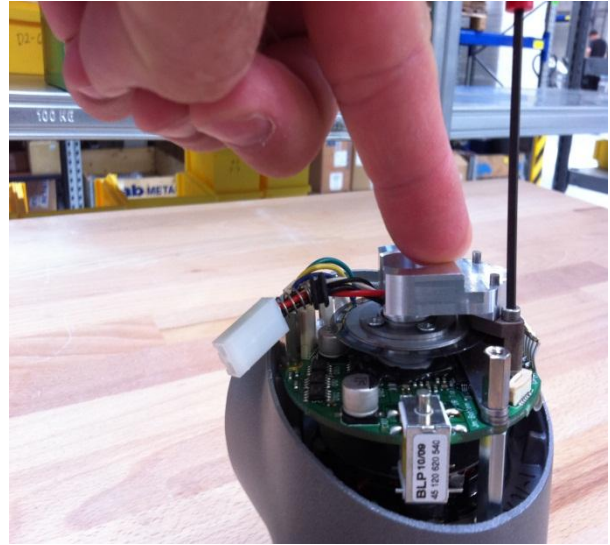
Encoder sensor is mounted on the new bracket.





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Fixture is to be put on so the correct distance is achieved, tighten the screws but not too much. Tighten Hexagonscrews 5 NM ,remove fixture, mount aluplate and blue cap .



Then the joint/-s that have had new encoder must be reset, have new firmware update and be initialized.

The manual for resetting the robot is available on the UR-Support page.

Service on the fan filter

In exposed factory environments it may be need to clean or replace fan filter of the controller box.

Pull out the plastic of the filter to snap it off.



Change the filter or use a compressor to clean it (See list of spare parts)



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Spare parts list

Item number	Item designation
08001	Flexolub grease, 1 kg
03011	Screw for grease hole, size 1 joint
03013	Screw for grease hole, size 3 joint
04101	Plastic cover for size 1 joint, includes screws and gaskets
04103	Plastic cover for size 3 joint, includes screws and gaskets
02050	Base plate complete with 6 metres of cable and connectors
02031	Size 3 joint, "Base"
02032	Size 3 joint, "Shoulder"
02033	Size 3 joint, "Elbow"
03003	Screw set for one size 3 joint; 10 x RF M4 screws
02011	Size 1 joint, "wrist 1"
02012	Size 1 joint, "wrist 2"
02013	Size 1 joint, "wrist 3"
03001	Screw set for one size 1 joint or tool; 8 x RF M3 screws.
02040	Tool, complete
04050	Wire set for size 1 joint
04051	Wire set for size 3 joint
04041	Wire set for upper arm
04042	Wire set for lower arm
03105	Flatring for upper arm.
03106	Flatring for Size 1 joint.
03306	Flatring for Size 3 joint.
07753	Fan filter for controller box



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Tools

Item number	Item designation
09001	Open-ended spanner 5,5mm, USAG 250N
09002	Open-ended spanner 7.0mm, USAG 250N
09010	Torx screwdriver, T10
09020	Torx spanner, T10
09050	Torque wrench with 5.5 mm and 7.0 mm open-ended spanners.
09060	Nozzle for greasegun
09061	Greasenipple
00000	Fixtur for led Size 1
00000	Fixtur for led Size 3



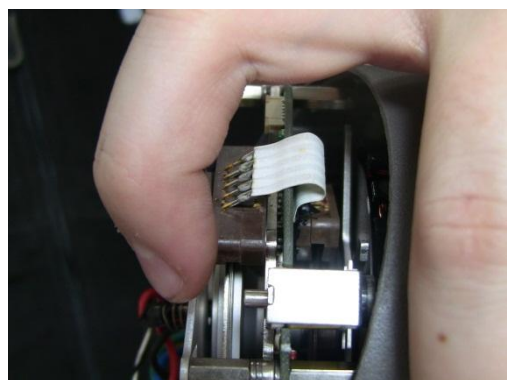
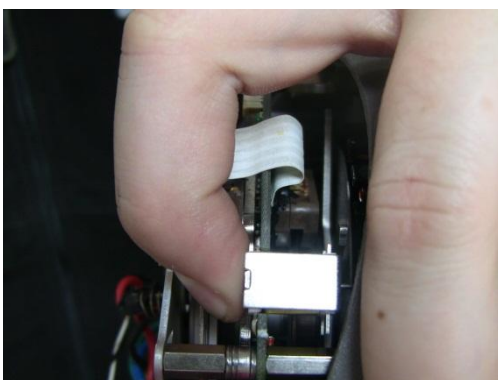
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Packing of the UR-robot

Packing of robotic arm for shipment:

Use the program "PUT INTO BOX" which is on the controller

1. Load the program "Put_into_box2.urp" on the controller.
2. Remove first screw in base, press Continue.
3. Remove second screw in base, press Continue.
4. The robot folds together, hold a piece of bubble wrap between the pipe and surface.
5. If the robot cannot run, it is possible to pack it manually by removing the cap on the affected joints, and trigger the brakes (see illustration)



6. Follow the packing instructions below.





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Own notes

Date	Initials	Note