

Installation and Maintenance

CiRo S / M / MHD / L / XL

M0410-1

Tool changers | **Swivels** | Swivels with Tool changers | Grippers | Hose packages | Valve Units | Tool systems



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1 INTRODUCTION

Robot System Products is a front-rank provider of peripheral products for high performance robot applications. We provide complete tool systems solutions for your robot installations, aiming to improve your productivity with the most reliable and cost-effective tooling on the market. Continuously we explore emerging technologies, working with leading edge design.

Robot System Products has a wide range of standard robot peripheral products:



- Tool changers
- Swivels
- Swivel tool changers
- CiRo
- Grippers
- Hose Packages
- Valve units
- Tool systems
- Tool stands

Robot System Products' tool changers are constructed to maximize the flexibility and reliability of your robot fleet. Through our patented locking device TrueConnect™ robustness and high safety are combined with low weight and compactness. With our swivels compressed air, water, electrical and data signals as well as weld and servo power are transferred to your tools with robot motion capabilities fully maintained. Our Swivel tool changers unite the TrueConnect™ mechanism with our swivel technology, combining the best out of the two technologies. With RSPs unique CiRo, cables and hoses can be freely selected with high robot flexibility maintained, and the space requirements reduced. Our integrated Tool systems are delivered as complete plug-and-play solutions designed for quick and simple installation.

Robot System Products' product lines are available for all major robot brands and come with complete documentation. 3D-models for simulation are available for download at: robotsystemproducts.com.

1.1 Installation and Maintenance manual

This document describes how the Robot System Products' CiRo S, M, MHD, L and XL, including cables, hoses and tool adaptation kits, are installed and replaced. In addition, the document describes required maintenance activities, including inspection, cleaning, lubrication, replacement of wear parts, required tools and products and disposal and recycling.

The document, *Product Description* (M0409-1) contains product information, drawings, technical data, electrical and pneumatic diagrams, safety software function and lists of spare parts.

1.2 Safety

1.2.1 General

The integrator installing a CiRo must follow the safety demands stated in standards and provisions applicable in the country where the CiRo is to be installed. The products are all prepared for CE-certification.

The user of the Robot System Products' CiRo is responsible that law and directives applicable in respective countries, with regards to safety, are followed. The user is also responsible to guarantee that all safety devices are installed correctly.



WARNING!

Never carry out service work on a robot that has not been taken out of operation. See safety information for the robot.



WARNING!

Only perform work on tools or tool changers attached to the CiRo if the air pressure is safely switched off.



WARNING!

Be aware that the CiRo is heavy and may cause personal injury and equipment damage if dropped.

1.2.2 Explanation of warnings

The warnings in this document are specific to the products in this manual. It is expected that the user also pay attention to certain notifications from the robot manufacturer and/or the manufacturers of other components used in the installation.



WARNING!

The warning sign will make you aware that a situation could result in potential serious injury or damage to equipment.



NOTE!

The note sign will alert you about something important to consider.

1.3 Tightening torques

Tightening torques for mounting with screw class 8.8

Dimension	Torque
M4	3 Nm
M5	6 Nm
M6	10 Nm
M8	24 Nm
M10	47 Nm
M12	82 Nm
M16	200 Nm

1.4 Recommended equipment

Equipment recommended for installation and maintenance work

Tools	Applications
Complete set of Allen keys	For all socket head cap screws
Torx key (T25)	For dismounting and mounting.
Torque wrench	For dismounting and mounting.
Cable ties (200 mm x 4–5 mm)	For fastening of cables and hoses
Nipper	For cutting of cable ties

1.5 Required products

Products required for installation and maintenance work

Product	Specification	Note
Cleaning agent	Industrial alcohol or similar	For CiRo
Grease I1934	Renolit HLT2	For hose/cable guide
Cable grease	Castrol Optitemp RB 1	For cables and hoses
Threadlocker	Loctite 2400 (or similar)	For locking of screw when mounting hose/cable guide.
Cloth	Lint free cloth	For cleaning.



NOTE! Chemical resistance protective gloves and safety goggles are recommended when using cleaning agents such as industrial alcohol. Adequate ventilation should be provided when chemical substances are used.

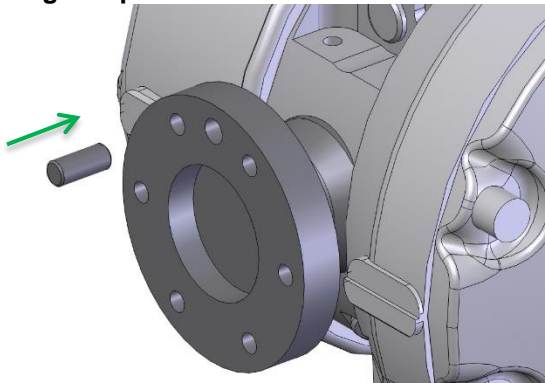

2 INSTALLATION

2.1 Guide to Product numbers

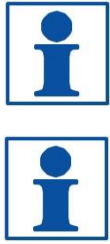
Model	Product number	Installation guide
CiRo S1	P5131	Section 2.2
CiRo S2	P5132	Section 2.2
CiRo S3	P5133	Section 2.2
CiRo S4	P5134	Section 2.2
CiRo M1	P5121	Section 2.3
CiRo M2	P5124	Section 2.3
CiRo MHD1	P5125	Section 2.4
CiRo MHD2	P5126	Section 2.4
CiRo L1	P5141	Section 2.4
CiRo XL1	P5151	Section 2.4
CiRo XL2	P5152	Section 2.4

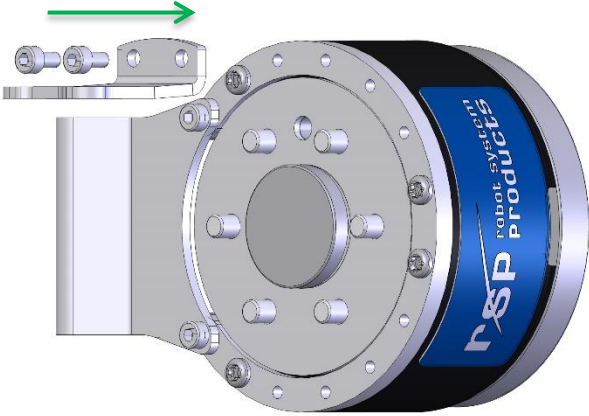
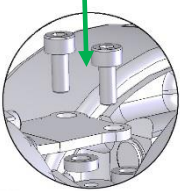
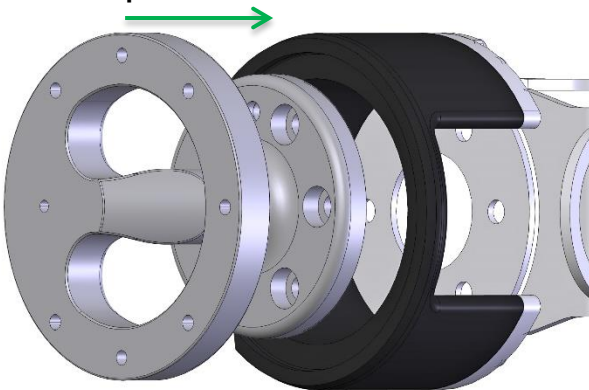
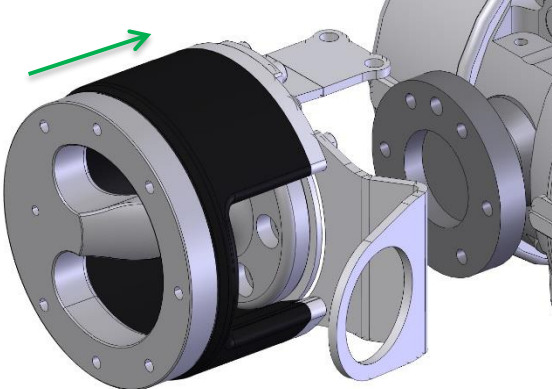
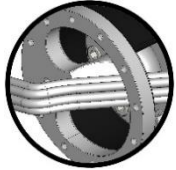
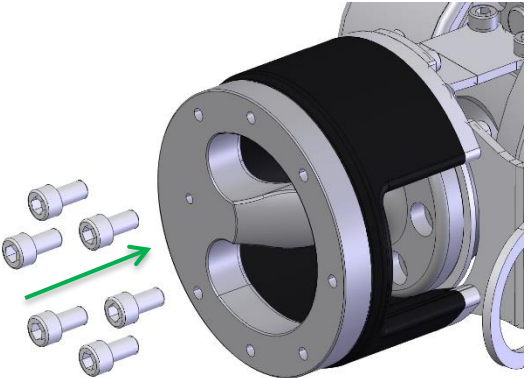
2.2 Installation of CiRo S on robot



	Action	Note
1	Safety	Read safety section (1.2).
2	Service position	Place the robot in service position.
3	Power off	Switch the power off and lock the circuit breaker. NOTE! Read the safety chapter for the robot.
4	Mount guide pin 	Press the enclosed guide pin into its position on the robot flange.
5	Mount hose holder 	Mount hose holder on the backside of the CiRo housing, through the mounting ring. NOTE! The hose holder shall be positioned at the opening in the housing.

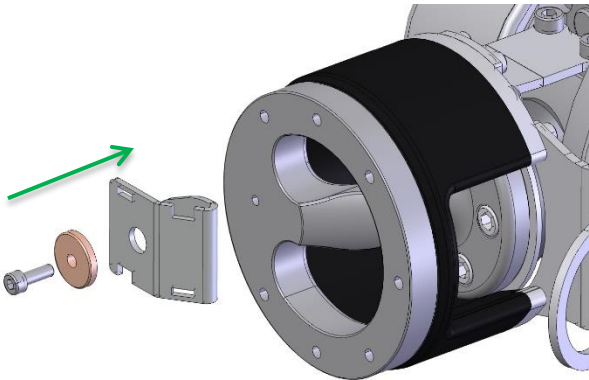
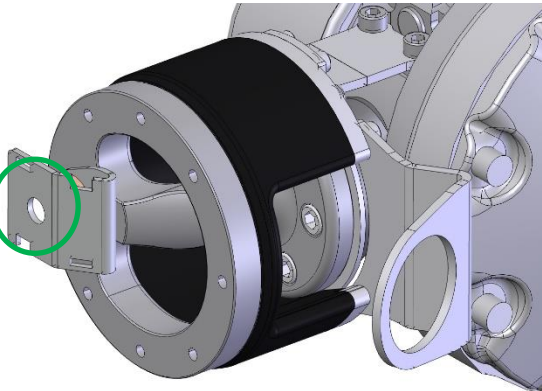
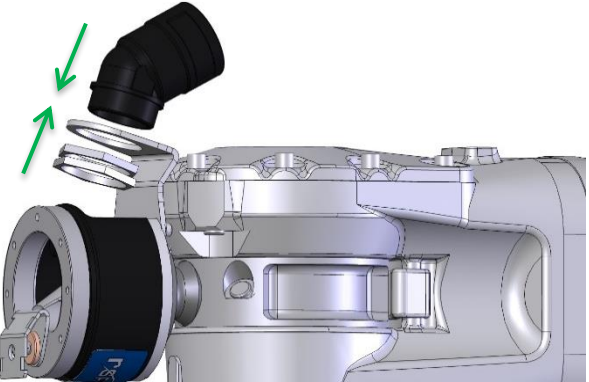
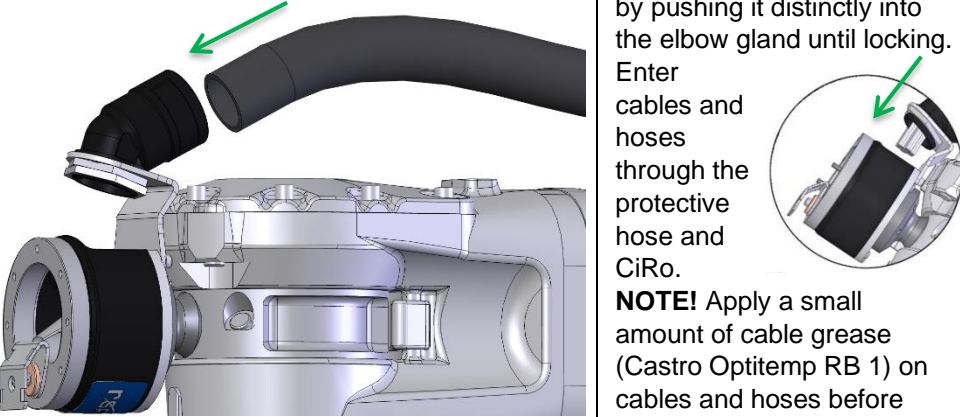




6	Mount rotation stops 	<p>Mount the rotation stops on the backside of the CiRo housing with the enclosed screws (see tightening torques in section 1.3).</p> <p>NOTE! On some robot models the rotation stops are mounted after the CiRo is mounted to the robot.</p> <p>NOTE! On some robot models the rotation stops shall be fastened to the robot with screws</p> 
7	Join CiRo parts 	<p>Fit and join the CiRo-shaft and the housing, with hose holder and rotation stops mounted, before fitting and mounting to the robot flange.</p> <p>NOTE! The CiRo is heavy and may cause damage if dropped.</p>
8	Fit CiRo 	<p>Lift the CiRo to the robot flange. Fit the CiRo using the guide pin. It can be rotated 180° around its own axis.</p> <p>NOTE! The CiRo should be mounted with opening and cabling on the same side of the robot arm.</p> 
9	Mount CiRo 	<p>Mount the CiRo with the screws enclosed in the adaptation kit. Use a torque wrench for tightening (see tightening torques in section 1.3).</p> <p>NOTE! Rotate the CiRo, successively around the Z-axis, to reach all screws, during tightening.</p>

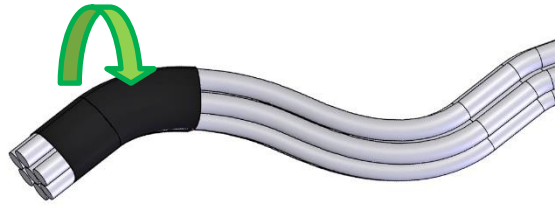




10	Fit hose/cable guide 	<p>Fit the hose/cable guide, bushing and enclosed screw to the CiRo.</p> <p>NOTE! Apply a small amount of threadlocker (Loctite 2400) on the screw before mounting.</p> <p>NOTE! One guide for radial mounting and one for axial mounting are enclosed.</p>
11	Mount hose/cable guide 	<p>Fasten the hose/cable guide and bushing with the enclosed screw. Use a torque wrench for tightening (see tightening torques in section 1.3).</p> <p>NOTE! Apply a small amount of grease (Renolit HLT2) on the surfaces between the hose/cable guide and the housing and bushing, before tightening.</p>
12	Mount elbow gland 	<p>Mount the elbow gland with the two enclosed nuts.</p> <p>NOTE! The elbow gland and nut are delivered as parts of an RSP hose package.</p>
13	Mount protective hose 	<p>Mount the protective hose by pushing it distinctly into the elbow gland until locking. Enter cables and hoses through the protective hose and CiRo.</p> <p>NOTE! Apply a small amount of cable grease (Castro Optitemp RB 1) on cables and hoses before entering the protective hose.</p>



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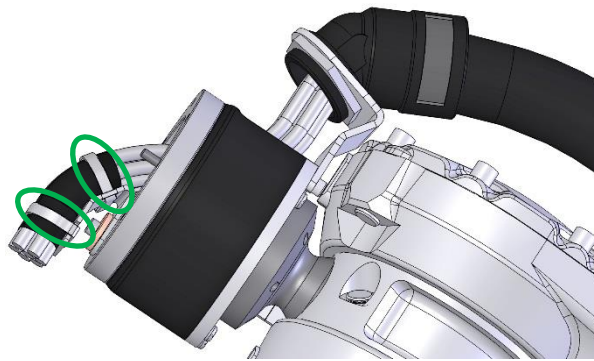
Attach rubber strip

Attach the enclosed rubber strip around the cable and hoses to be mounted on the CiRo.

NOTE! The rubber strip protects the cable and hoses from wear!



15

Fasten cables

Fasten the cables and hoses to the hose/cable guide by two cable ties.

NOTE! The cable ties should be mounted around the rubber strip via the slots in the hose/cable guide. Cut off loose ends of cable ties.



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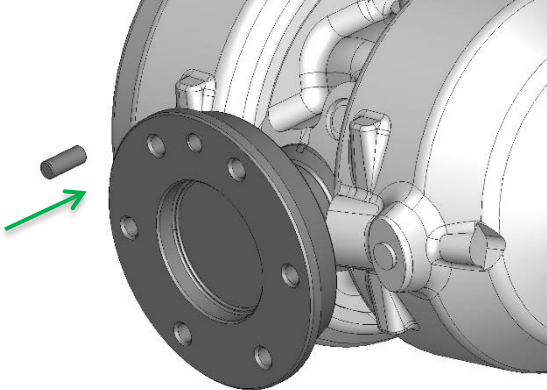
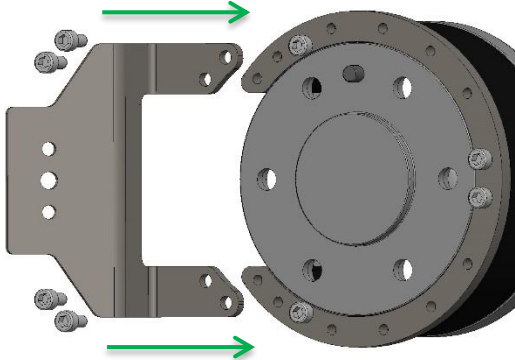
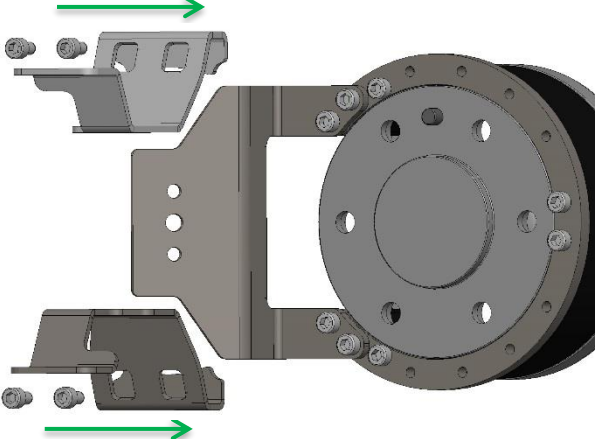
Mount tool

Mount tool or tool adapter and connect cables and hoses.

NOTE! Ensure that cables and hoses can slide freely through the protective hose during 6th axis rotation.

2.3 Installation of CiRo M on robot

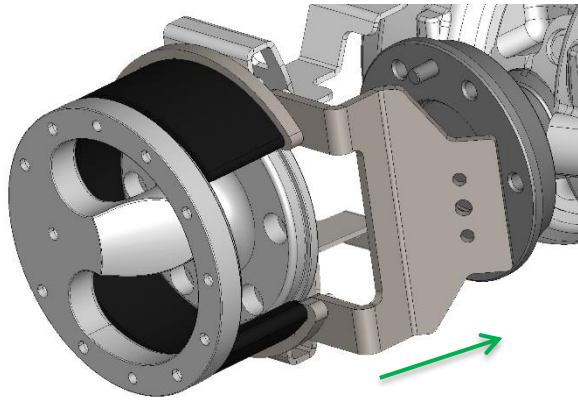


	Action	Note
1	Safety	Read the safety section (1.2).
2	Service position	Place the robot in service position.
3	Power off	Switch the power off and lock the circuit breaker. NOTE! Read the safety chapter for the robot.
4	Mount guide pin 	Press the enclosed guide pin into its position on the robot flange.
5	Mount hose holder 	Mount hose holder (part of adaptation kit) on the backside of the CiRo with four enclosed M6 screws. Use a torque wrench for tightening (see tightening torques in section 1.3). NOTE! The hose holder shall be positioned at the opening in the mounting ring (P183-002).
6	Mount rotation stops 	Mount rotation stops on the backside of CiRo with enclosed M6 screws. Use a torque wrench for tightening (see tightening torques in section 1.3). NOTE! Rotation stops are part of adaptation kits and dependent on robot models. NOTE! The CiRo is heavy and may cause damage if dropped.



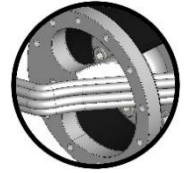


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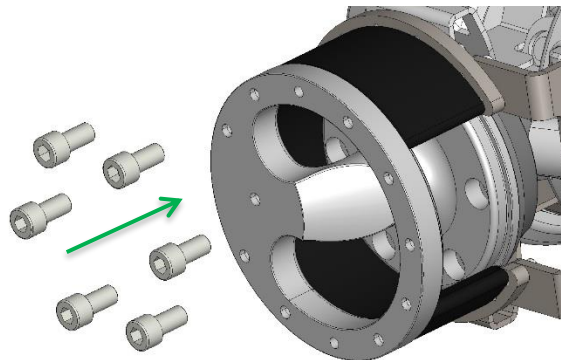
Fit CiRo

Lift the CiRo to the robot flange. Fit the CiRo using the guide pin. It can be rotated 180° around its own axis.

NOTE! The CiRo should be mounted with opening and cabling on the same side of the robot arm



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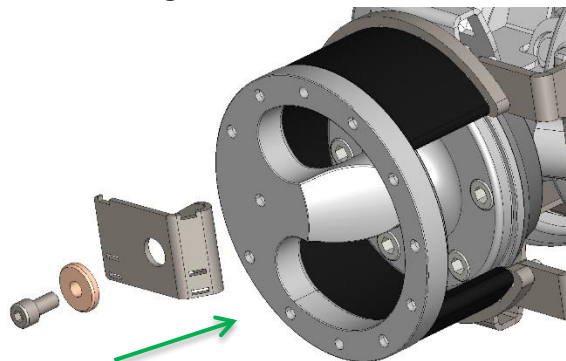
Mount CiRo

Mount the CiRo with the screws and washers (when applicable) enclosed in the adaptation kit. Use a torque wrench for tightening (see tightening torques in section 1.3).

NOTE! Rotate the CiRo, successively around the Z-axis, to reach all screws, during tightening.



9

Fit hose/cable guide

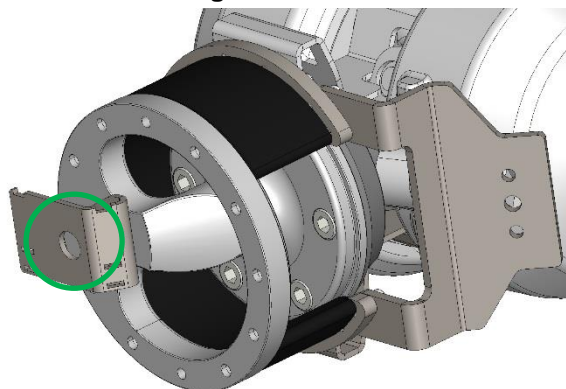
Fit the hose/cable guide, the bushing, and enclosed screw to the CiRo.

NOTE! Apply a small amount of threadlocker (Loctite 2400) on the screw before mounting.

NOTE! One guide for radial mounting and one for axial mounting are enclosed.



10

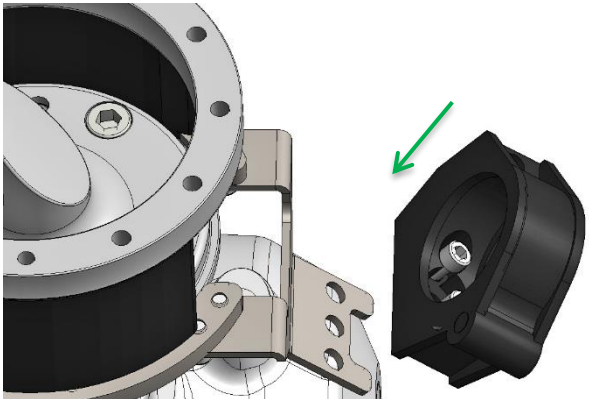
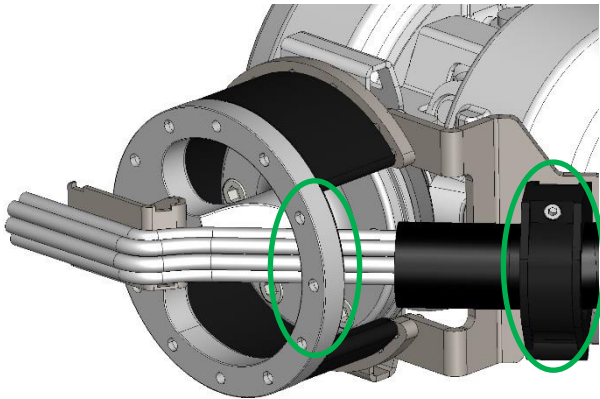
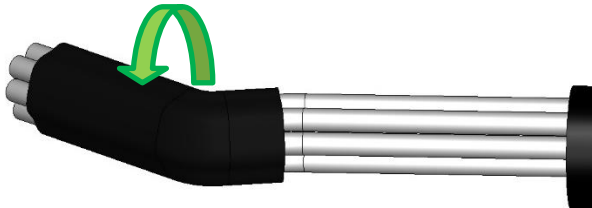
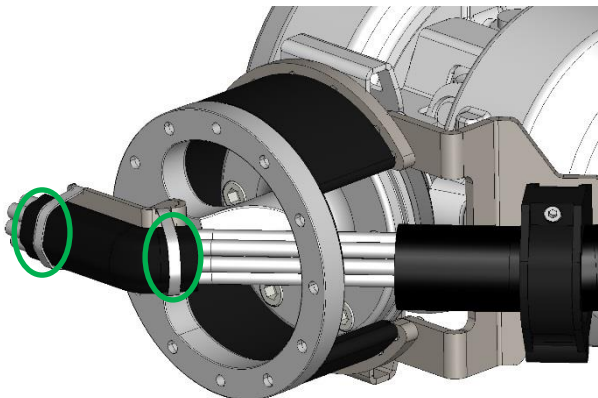

Mount hose/cable guide

Fasten the hose/cable guide and bushing with the enclosed screws. Use a torque wrench for tightening (see tightening torques in section 1.3).

NOTE! Apply a small amount of grease (Renolit HLT2) on the surfaces between the hose/cable guide and housing and the hose/cable guide and bushing, before tightening.



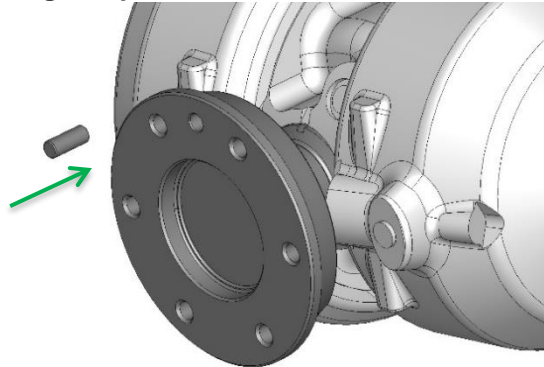
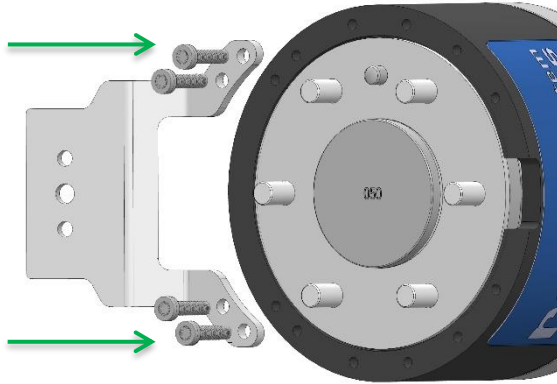

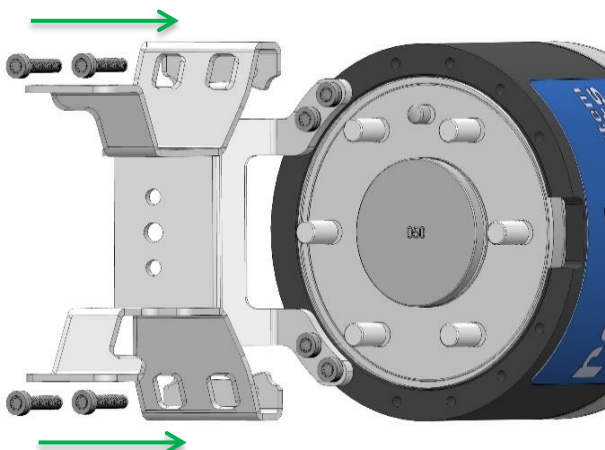


11	Mount hose clamp 	<p>Mount a hose clamp with two screws on the hose holder. Use a torque wrench for tightening (see tightening torques in section 1.3).</p> <p>NOTE! The hose clamp and screws are delivered as parts of an RSP hose package.</p>
12	Mount protective hose 	<p>Mount the protective hose, including cable and hoses, on the robot arm and hose clamp. Enter cable and hoses through the CiRo.</p> <p>NOTE! Apply a small amount of grease (Castrol Optitemp RB 1) on cables and hoses before entering the protective hose.</p>
13	Attach rubber strip 	<p>Attach the enclosed rubber strip around the cable and hoses to be mounted on the CiRo.</p> <p>NOTE! The rubber strip protects the cable and hoses from wear!</p>
14	Fasten cables 	<p>Fasten the cables and hoses to the hose/cable guide by two cable ties.</p> <p>NOTE! The cable ties should be mounted around the rubber strip via the slots in the hose/cable guide. Cut off loose ends of cable ties.</p>
15	Mount tool 	<p>Mount tool or tool adapter and connect cables and hoses.</p> <p>NOTE! Ensure that cables and hoses can slide freely through the protective hose during 6th axis rotation.</p>



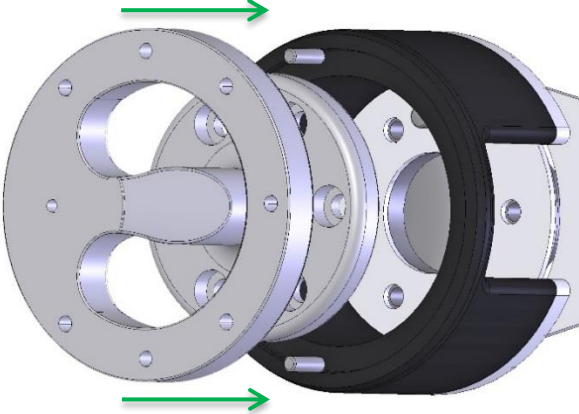
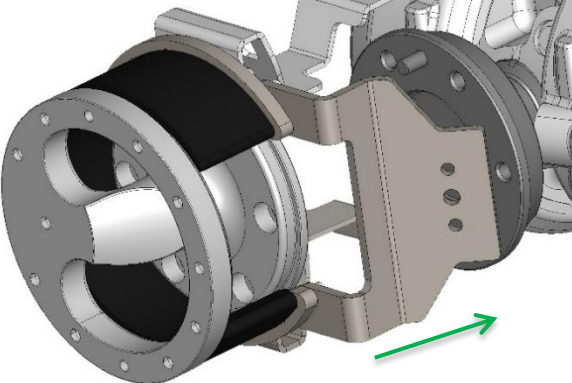
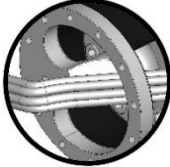
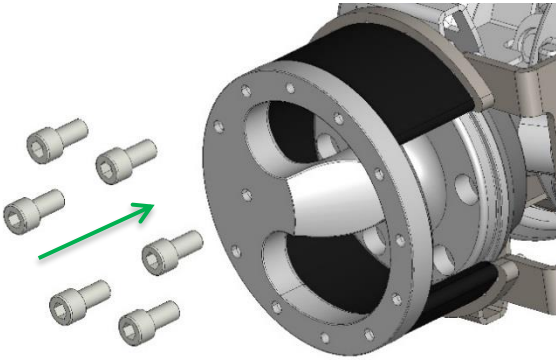
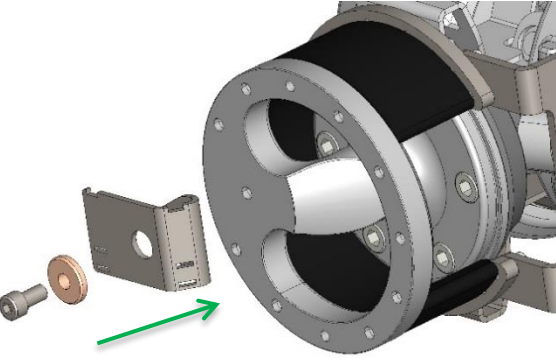
2.4 Installation of CiRo MHD, L and XL on robot



	Action	Note
1	Safety	Read the safety section (1.2).
2	Service position	Place the robot in service position.
3	Power off	Switch the power off and lock the circuit breaker. NOTE! Read the safety chapter for the robot.
4	Mount guide pin 	Press the enclosed guide pin into its position on the robot flange.
5	Mount hose holder 	Mount hose holder on the backside of the CiRo housing with enclosed screws (6 Nm tightening torque). NOTE! Self-tapping screws are used for mounting hose holder and rotation stop. NOTE! Hose holder shall be positioned at the opening in the housing. 
6	Mount rotation stops 	Mount the rotation stops on the backside of the CiRo housing with the enclosed screws (6 Nm tightening torque). NOTE! On some robot models the rotation stops are mounted after the CiRo is mounted to the robot.



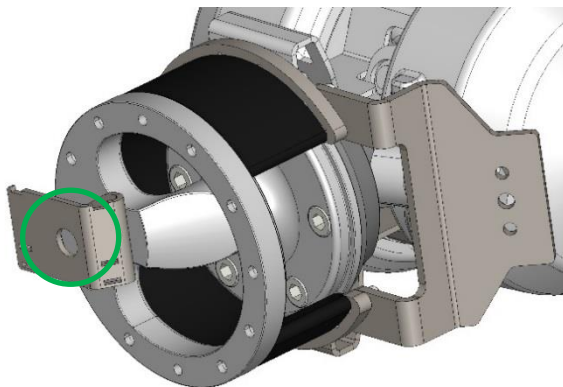


7	Join CiRo parts 	<p>Fit and join the CiRo-shaft and the housing, with hose holder and rotation stops mounted, before fitting and mounting to the robot flange.</p> <p>NOTE! The CiRo is heavy and may cause damage if dropped.</p>
8	Fit CiRo 	<p>Lift the CiRo to the robot flange. Fit the CiRo using the guide pin. It can be rotated 180° around its own axis.</p> <p>NOTE! The CiRo should be mounted with opening and cabling on the same side of the robot arm.</p> 
9	Mount CiRo 	<p>Mount the CiRo with the screws and washers (when applicable) enclosed in the adaptation kit. Use a torque wrench for tightening (see tightening torques in section 1.3).</p> <p>NOTE! Rotate the CiRo, successively around the Z-axis, to reach all screws, during tightening.</p>
10A	Fit hose/cable guide (CiRo MHD and L) 	<p>Fit the hose/cable guide, bushing and enclosed screw to the CiRo.</p> <p>NOTE! Apply a small amount of threadlocker (Loctite 2400) on the screw before mounting.</p> <p>NOTE! One guide for radial mounting and one for axial mounting are enclosed.</p>





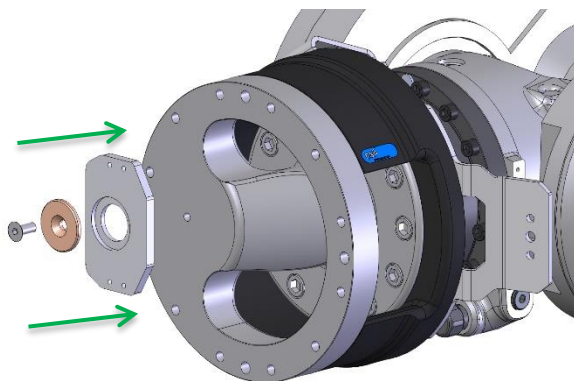
11A

Mount hose/cable guide (CiRo MHD and L)

Fasten the hose/cable guide and bushing with the enclosed screw. Use a torque wrench for tightening (see tightening torques in section 1.3).

NOTE! Apply a small amount of grease (Renolit HLT2) on the surfaces between the hose/cable guide and the housing and bushing, before tightening.

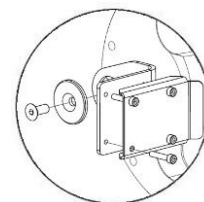
10B

Fit and mount guide base (CiRo XL)

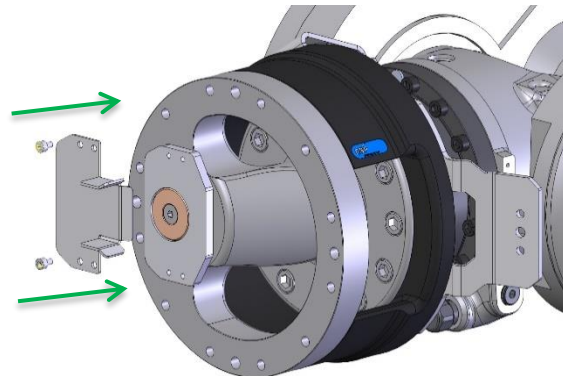
Fit and mount the hose/cable guide base and bushing with the enclosed M8-screw to the CiRo.

NOTE! Apply a small amount of threadlocker (Loctite 2400) on the screw before mounting.

NOTE! The guide for radial mounting is mounted directly on the CiRo.



11B

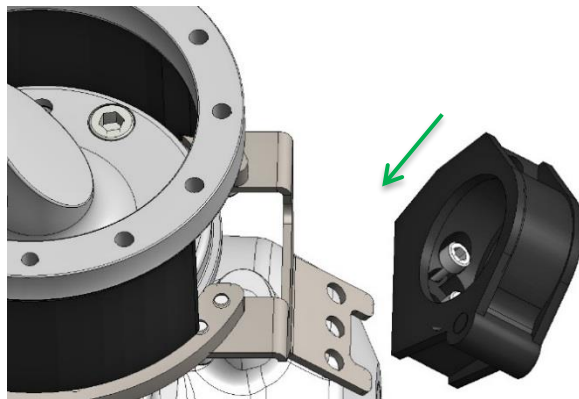
Fit and mount hose/cable guide (CiRo XL)

Fasten the hose/cable guide and bushing with the enclosed screw. Use a torque wrench for tightening (see tightening torques in section 1.3).

NOTE! Apply a small amount of grease (Renolit HLT2) on the surfaces between the hose/cable guide, bushing and guide base, before tightening.



12

Mount hose clamp

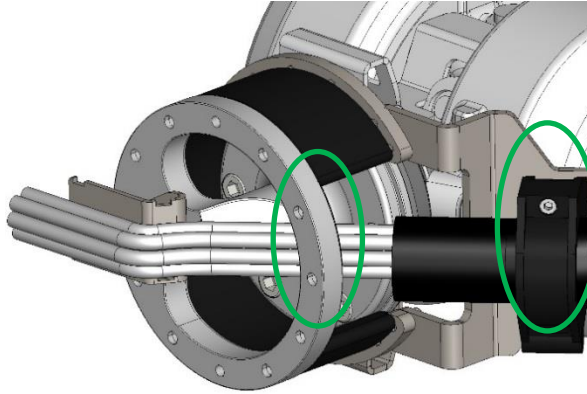
Mount a hose clamp with two screws on the hose holder. Use a torque wrench for tightening (see tightening torques in section 1.3).

NOTE! The hose clamp and screws are delivered as parts of an RSP hose package.





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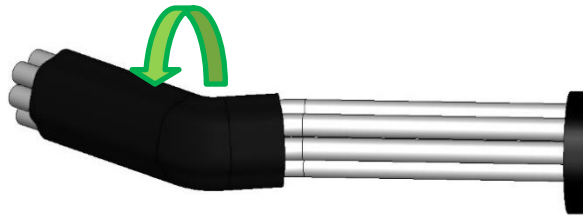
Mount protective hose

Mount the protective hose, including cable and hoses, on the robot arm and hose clamp. Enter cable and hoses through the CiRo.

NOTE! Apply a small amount of cable grease (Castrol Optitemp RB 1) on cables and hoses before entering the protective hose.



14

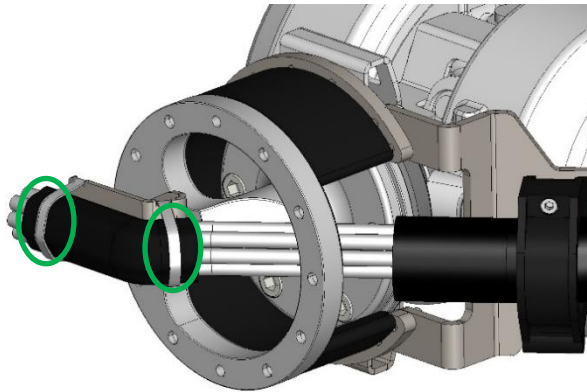
Attach rubber strip

Attach the enclosed rubber strip around the cable and hoses to be mounted on the CiRo.

NOTE! The rubber strip protects the cable and hoses from wear!



15A

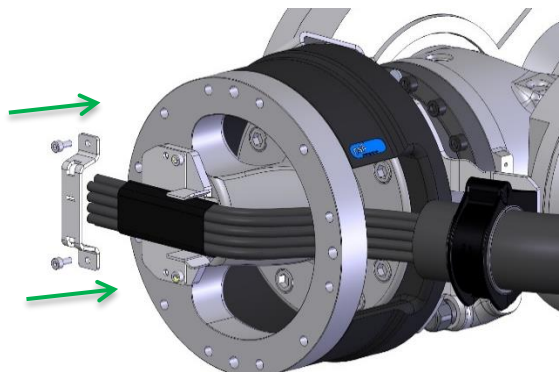
Fasten cables (CiRo MHD and L)

Fasten the cables and hoses to the hose/cable guide by two cable ties.

NOTE! The cable ties should be mounted around the rubber strip via the slots in the hose/cable guide. Cut off loose ends of cable ties.



15B

Fasten cables (CiRo XL only)

Fasten the cables and hoses to the hose/cable guide by the hose clamp and the two enclosed M5-screws.

NOTE! If required, the cables and hoses may be fastened to the hose clamp by a cable tie via the slots on the hose clamp. Cut off loose end of cable tie.



16

Mount tool

Mount tool or tool adapter and connect cables and hoses.

NOTE! Ensure that cables and hoses can slide freely through the protective hose during 6th axis rotation.

3 MAINTENANCE AND SERVICE

The CiRo must be maintained regularly to ensure proper function. The specified intervals are approximate and valid under normal conditions. Under extreme conditions, such as dirty environments or extreme robot movements, the intervals should be shortened. Consider the table as a guide and update as the production experience of each system increases.



NOTE!

Only perform work on grippers, tools or tool changers attached to the CiRo if the air pressure is safely switched off.



NOTE!

During the warranty period the CiRo shall only be dismantled and repaired by Robot System Products. Otherwise the warranty will not be valid.

3.1 Wear parts

Wear parts should be replaced before considerable damage occurs. The interval depends on the intensity of use and the working environment. Generally, the more contaminated environment, the closer maintenance intervals.

The following parts are considered as wear parts:

- Hose/cable guides
- Screws and bushings holding hose/cable guides
- Rubber strips

3.2 Activities and intervals

Maintenance activity	Interval	Description
Inspection	1 month	Visual inspection of CiRo.
Cleaning	6 months	Cleaning and lubrication of CiRo, interval depending on intensity of use and environment.

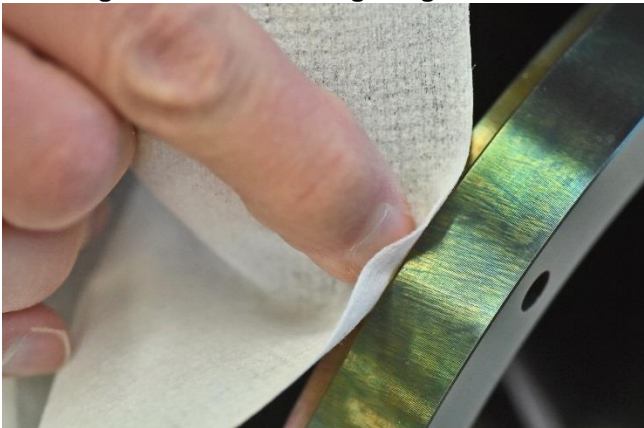
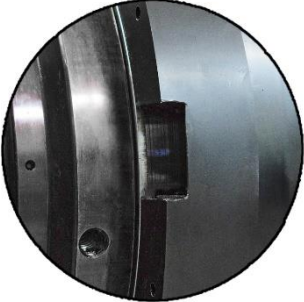


3.2.1 Visual inspection of the CiRo

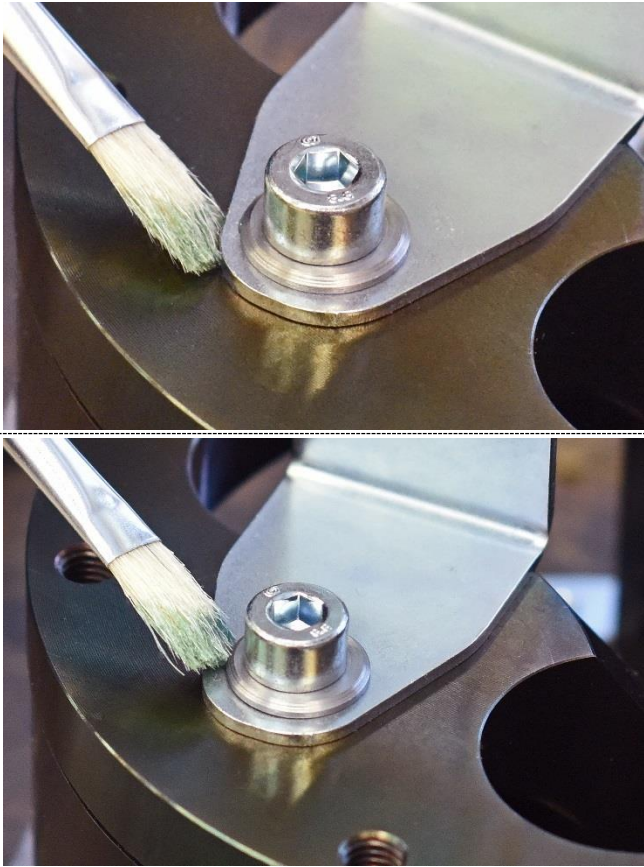

Visually check the following:

Check	Note
Adaptation kit/rotation stop	Not damaged
Cable and hoses	Not damaged or squeezed
Gliding surfaces of mounting ring	No wear, not damaged or dirty
Surface of hose/cable guide and bushing	No wear, not damaged or dirty
All parts	No wear, not damaged or dirty

3.2.2 Cleaning and lubrication of CiRo



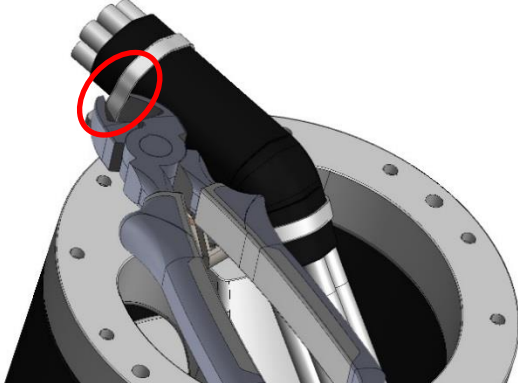
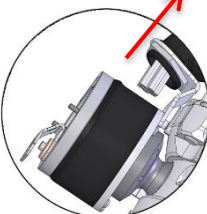
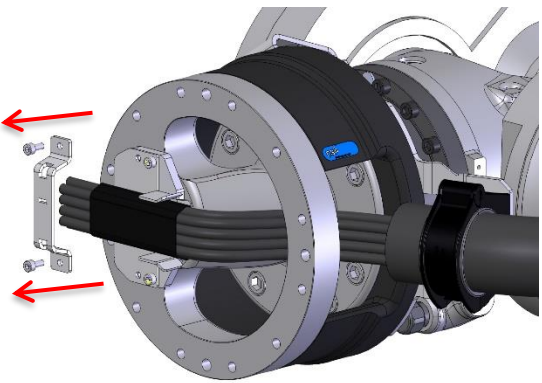
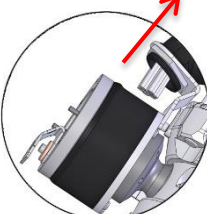
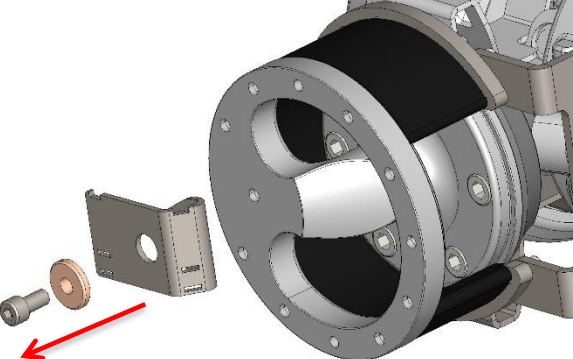
	Action	Note
1	<p>Cleaning and lubrication of gliding surfaces</p>   <p>NOTE! For CiRo S, MHD, L and XL lubrication of the surface between housing and CiRo-shaft is done through a groove at the backside of the housing.</p>	<p>Clean and apply a small amount of grease (Renolit HLT2) on the surfaces between the mounting ring and the CiRo-shaft.</p> <p>NOTE! Rotate the mounting ring successively to clean and grease gliding surfaces all around.</p>
2	<p>Cleaning hose/cable guide</p>  	<p>Clean the surfaces between the hose/cable guide and the CiRo-shaft and the hose/cable guide and the bushing, respectively.</p>

3	Lubricate hose/cable guide 	<p>Apply a small amount of grease (Renolit HLT2) on the surfaces between the hose/cable guide and the CiRo-shaft and the hose/cable guide and the bushing, respectively.</p>
4	Clean CiRo in general 	<p>Wipe clean the CiRo in general, use cleaning agent (industrial alcohol) when required.</p>

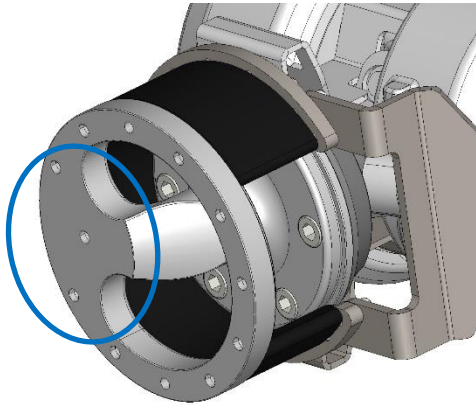
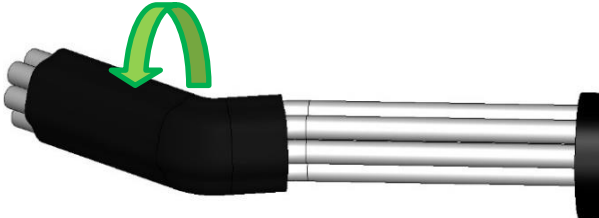
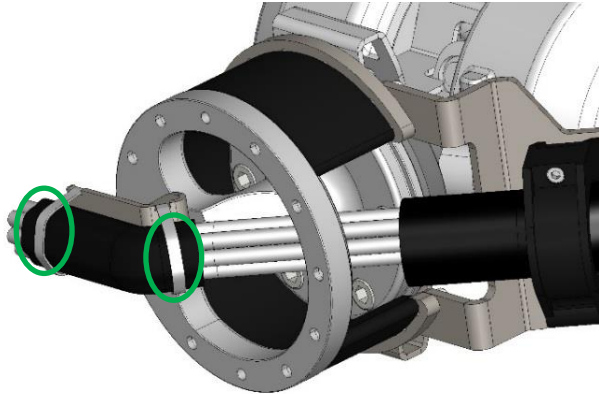
3.3 Replacements

3.3.1 Replacement of wear parts

The hose/cable guide and rubber strip are considered as wear parts and shall be replaced when showing a lot of wear.

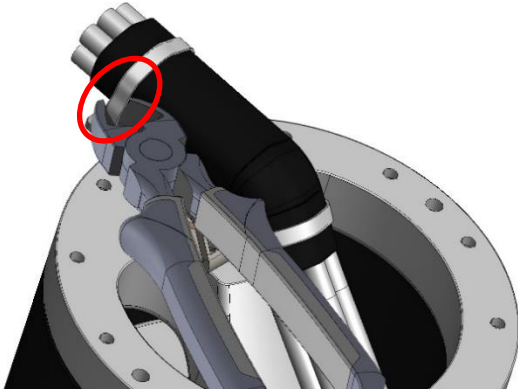
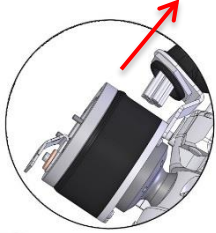
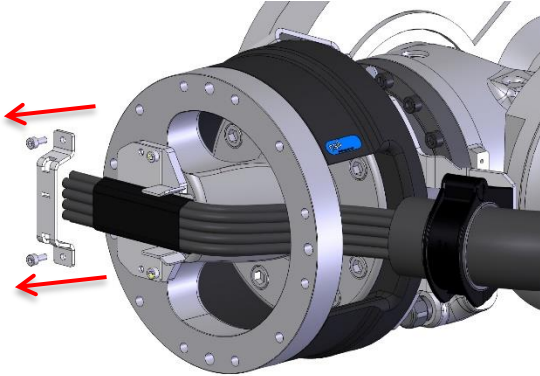
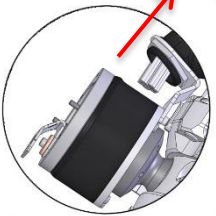
	Action	Note
1	Safety	Read the safety section (1.2).
2	Air and power off	Switch off pneumatic air and electric power (when applicable).
3A	Release cables and hoses (CiRo S, M, MHD and L) 	<p>Cut the two cable ties holding the cables and hoses to the hose/cable guide with a nipper. Remove the rubber strip.</p> <p>Remove cables and hoses from the CiRo.</p> 
3B	Release cables and hoses (CiRo XL) 	<p>Release the two screws holding the hose clamp and release cables and hoses. If applicable cut any cable tie holding cables and hoses with a nipper. Remove the rubber strip.</p> <p>Remove cables and hoses from the CiRo.</p> 
4	Dismount hose/cable guide 	<p>Unscrew the screw holding the hose/cable guide and remove the guide and bushing from the CiRo.</p> <p>NOTE! For CiRo XL with axial mounting also the guide base shall be dismantled.</p>




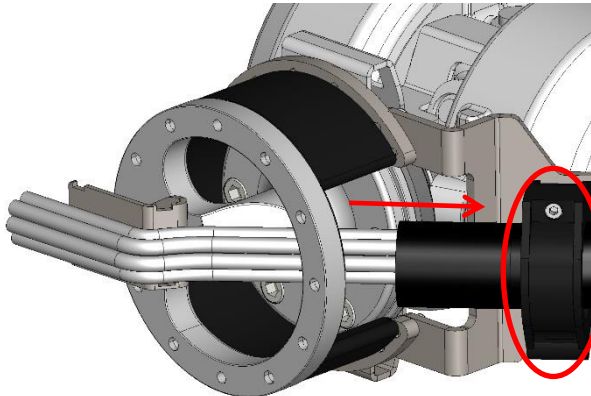
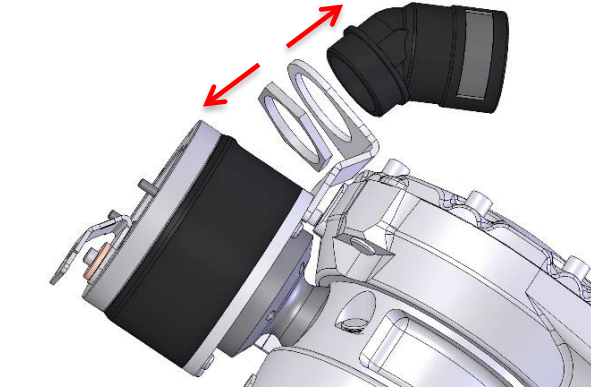
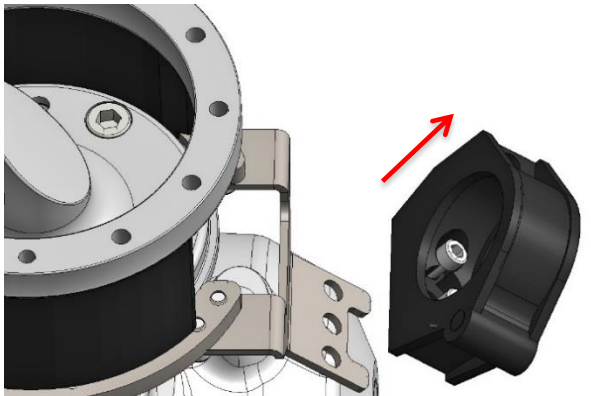
5	Clean CiRo surface 	Clean the surface where the hose/cable guide was mounted.
6	Fit and mount hose/cable guide	Fit and mount new hose/cable guide according to section 2.2 (CiRo S), section 2.3 (CiRo M) or section 2.4 (CiRo MHD, L and XL).
7	Attach rubber strip 	Attach a new rubber strip around the cable and hoses.
8	Fasten cables 	Fasten cables and hoses according to section 2.2 (CiRo S), section 2.3 (CiRo M) or section 2.4 (CiRo MHD, L and XL).
9	Remount tool	Mount tool or tool changer and connect cables and hoses.

3.3.2 Replacement of CiRo

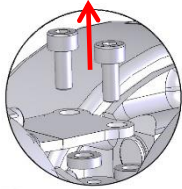
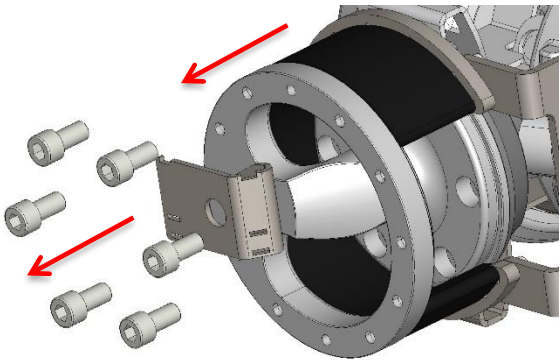


	Action	Note
1	Safety	Read the safety section (1.2).
2	Safe position	Remove tool and place the robot with the CiRo fully supported in a safe position.
3	Air off	Switch off pneumatic air.
4	Power off	Switch the power off and lock the circuit breaker. NOTE! Read the safety chapter for the robot.
5A	Release cables and hoses (CiRo S, M, MHD and L) 	<p>Cut the two cable ties holding the cables and hoses to the hose/cable guide with a nipper.</p> <p>Remove the rubber strip.</p> <p>Remove cables and hoses from the CiRo.</p> 
5B	Release cables and hoses (CiRo XL) 	<p>Release the two screws holding the hose clamp and release cables and hoses. If applicable cut any cable tie holding cables and hoses with a nipper,</p> <p>Remove the rubber strip.</p> <p>Remove cables and hoses from the CiRo.</p> 



6A	Dismount protective hose (CiRo S) 	Loosen and remove the plastic clamping ring, holding the protective hose, with a small screw driver. Remove the protective hose from the elbow gland. NOTE! The plastic clamping ring can be put back in place directly after the protective hose is removed.
6B	Dismount protective hose (CiRo M, MHD, L and XL) 	Loosen the screws holding the hose clamp and remove the protective hose, including cable and hoses, from the CiRo and hose clamp.
7A	Dismount elbow gland (CiRo S) 	Unscrew the nut holding the cable gland and remove it.
7B	Dismount hose clamp (CiRo M, MHD, L, XL) 	Unscrew the screws holding the hose clamp and remove it (when applicable).



8	Remove rotation stops from robot (when applicable) 	Unscrew and remove any rotation stop fastened in the robot. NOTE! Only required when rotation stops are fastened, to the robot with screws.
9	Remove CiRo 	Unscrew the screws holding the CiRo and remove it. NOTE! Rotate the CiRo in order to reach all screws for loosening. NOTE! The CiRo is heavy and may cause damage if dropped.
10	Clean robot flange	
11	Mount replacement CiRo	Follow instructions in section 2.2 (CiRo S), section 2.3 (CiRo M) or section 2.4 (CiRo MHD, L and XL).

4 DISPOSAL AND RECYCLING

Taking care of spent equipment

Used equipment must be taken care of in an environmentally-friendly way.

When disposed of, a major share of the material, or its energy content, can be recycled. The quantities possible to recycle vary depending on technical resources and practises in respective country. Non-recyclable components shall be handed over to an authorized environmental waste treatment facility for destruction or disposal.

Electronics

Electronic equipment shall be sent to an authorized recycling company or sorted into different component materials and treated as such.

Metals

Metals can, in general, be melted down, recycled and used in new products. They shall be sorted according to type and surface coating and handed over to an authorized recycling facility.

Metal components of steel and aluminium are substantial in size and easy to identify. Copper and brass are primarily used in transmission of electric power and in water/air modules. Brass may include small alloy of lead. Silver or gold plating of contact surfaces may occur.

Plastics

Thermoplastics can, in general, be re-heated and recycled without any major loss of quality. They shall be handed over to an authorized recycling facility. POM occurs in swivel housings, etc. PTFE in some sealings.

Rubber

Rubber shall be handed over to an authorized environmental waste treatment facility either for recycling, disposal or destruction. Rubber occurs in O-rings.

Other material

All other material shall be sorted and handed to an authorized environmental waste treatment facility in accordance with national legislation.

