

Product Manual

Swivel S5

M0113-1

Tool changers | **Swivels** | Swivel tool changers | Grippers | Hose packages | Valve units | Tool systems



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1 INTRODUCTION

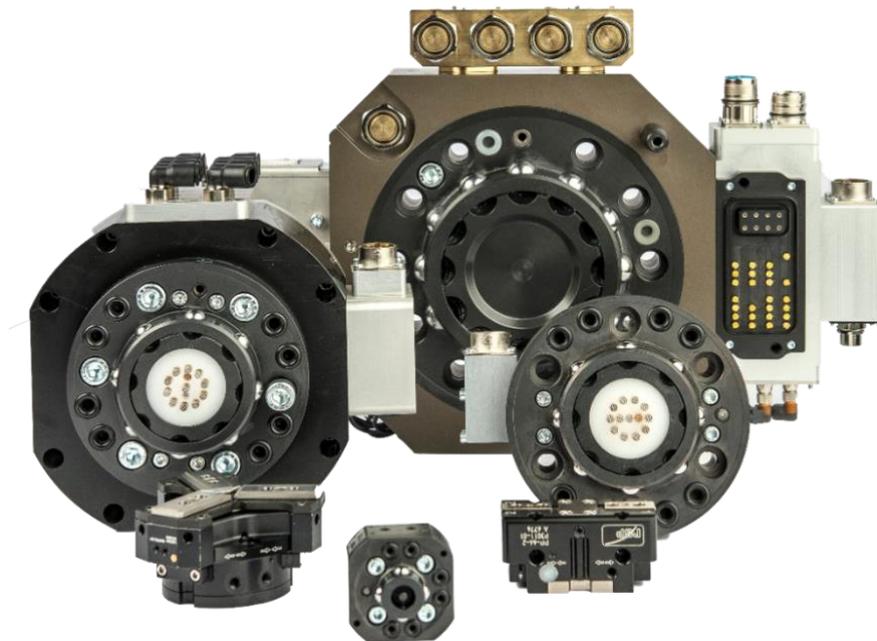
Robot System Products is a front-rank provider of peripheral products for high performance robot applications. We provide complete system solutions for your robot installations, aiming to improve your productivity with the most reliable and cost-effective tooling on the market. Continuously we explore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

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 RSP's cost-effective CiRo, cables and hoses can be freely selected with high robot flexibility maintained, and 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: www.rsp.eu.com.



1.1 Safety

1.1.1 General

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

The user of the Robot System Products swivel 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 attached to the swivel if the air pressure is safely switched off.



WARNING!

Be aware that the swivel may cause personal injury and equipment damage if dropped.

1.1.2 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.

1.2 Complementary Equipment

Complementary equipment is described in separate documents.

Article	Note
Cable and Hose Packages	Complete packages for most robots on the market ready to be mounted without any modifications.
External valve units	Mounted at the rear of the upper arm.
Connection kits	In order to make electrical installation easier, connection kits are available for the swivels.
3D-models	Available in Solid Works® and STEP-format.

2 TECHNICAL SPECIFICATIONS

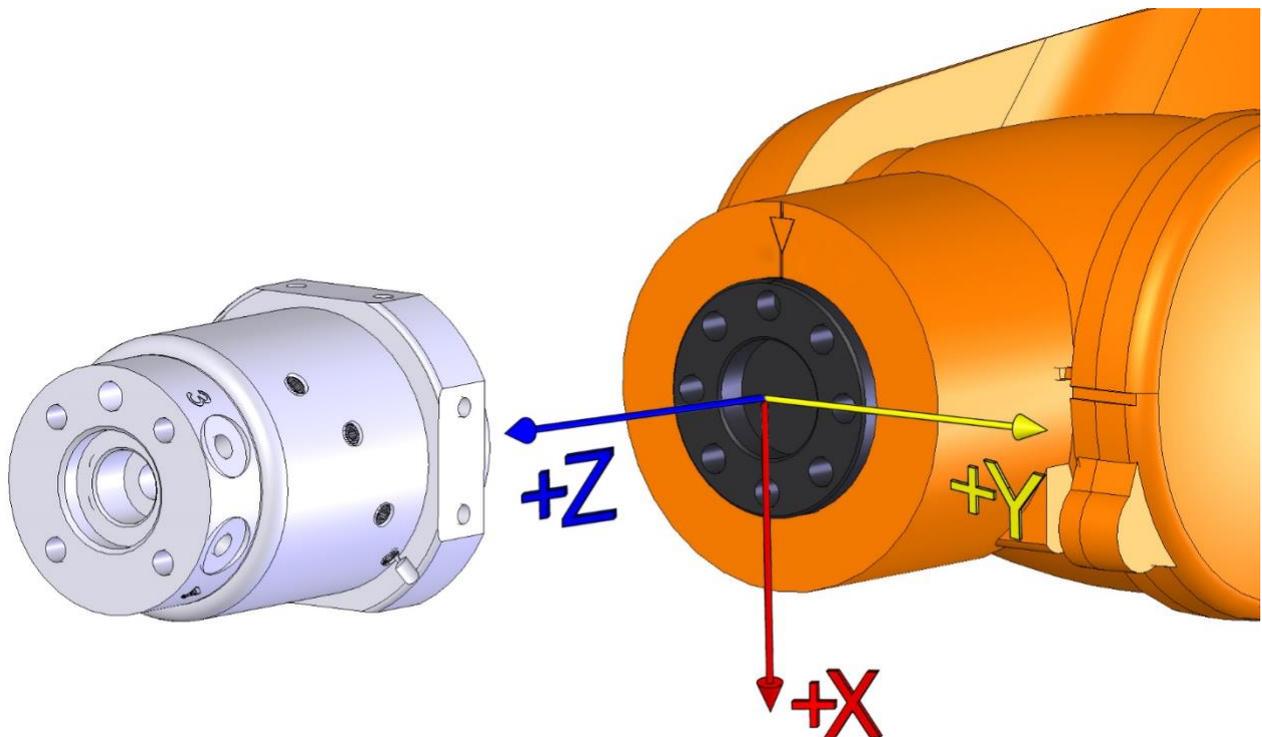
2.1 Description of swivels

This document presents the Robot System Products' S5-2 and S5-4 swivels, which transfers compressed air to the tool and are dedicated for material handling, specifically when a lot of robot movements are performed. When using an RSP swivel compressed air will be directly available at the tool without limiting the axis 6 rotation or the robot's working range. With RSP's hose packages there is no need to consider loose, hanging cables and hoses during programming. In addition, the design and installation time for the system integrator will be significantly reduced.

For swivels rotation stops, which prohibits the swivels from rotating in relation to the robot, are mandatory. Depending on robot model adaptation plates between the swivel and the robot flange may be needed. Adaptation kits including both rotation stops and, when required, adaptation plates are available from RSP. Likewise presented are connection kits to facilitate electrical installation.

2.1.1 Coordinate System Definition

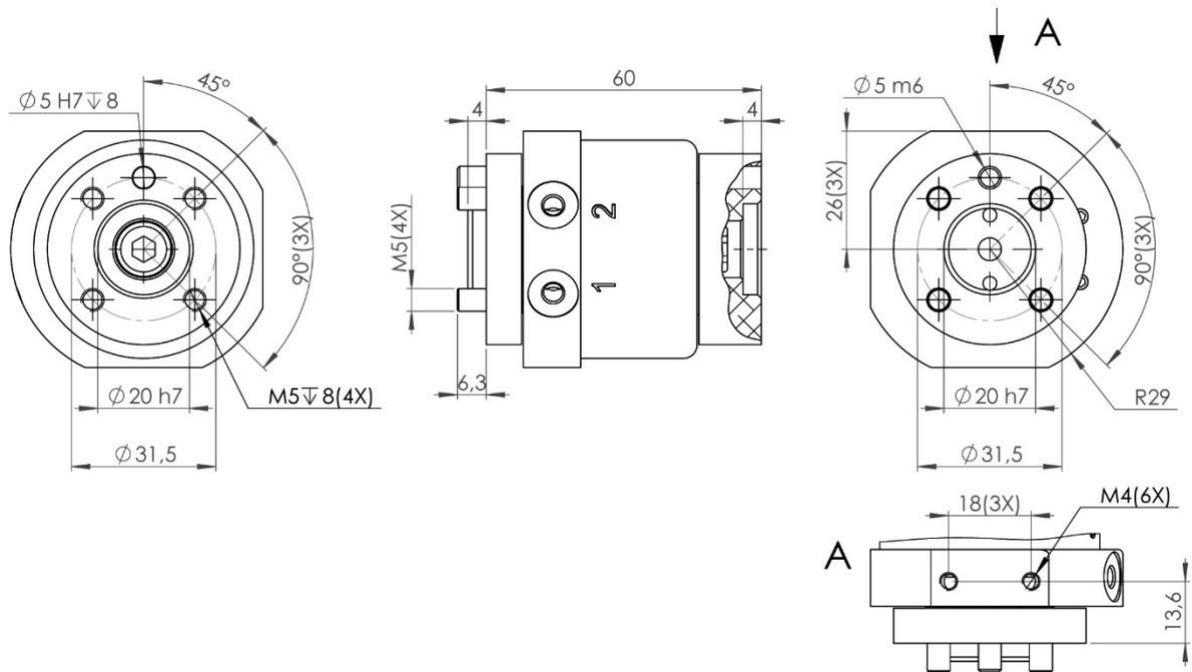
A swivel adds load to the robot. If the arm and tool loads are not stated correctly during programming the behaviour of the robot and the wear of the equipment will be affected. Information about weight and centre of gravity can, in accordance with the co-ordinate system stated below, be found in the technical specification tables of the swivel.



NOTE!

For the swivel the origo is situated on the surface in the centre of the robot mounting flange.

2.1.2 Swivel S5-2 Ø31,5. Article no: P1021



Swivel S5-2 Ø31 transfers 2 pneumatic channels to the tool.

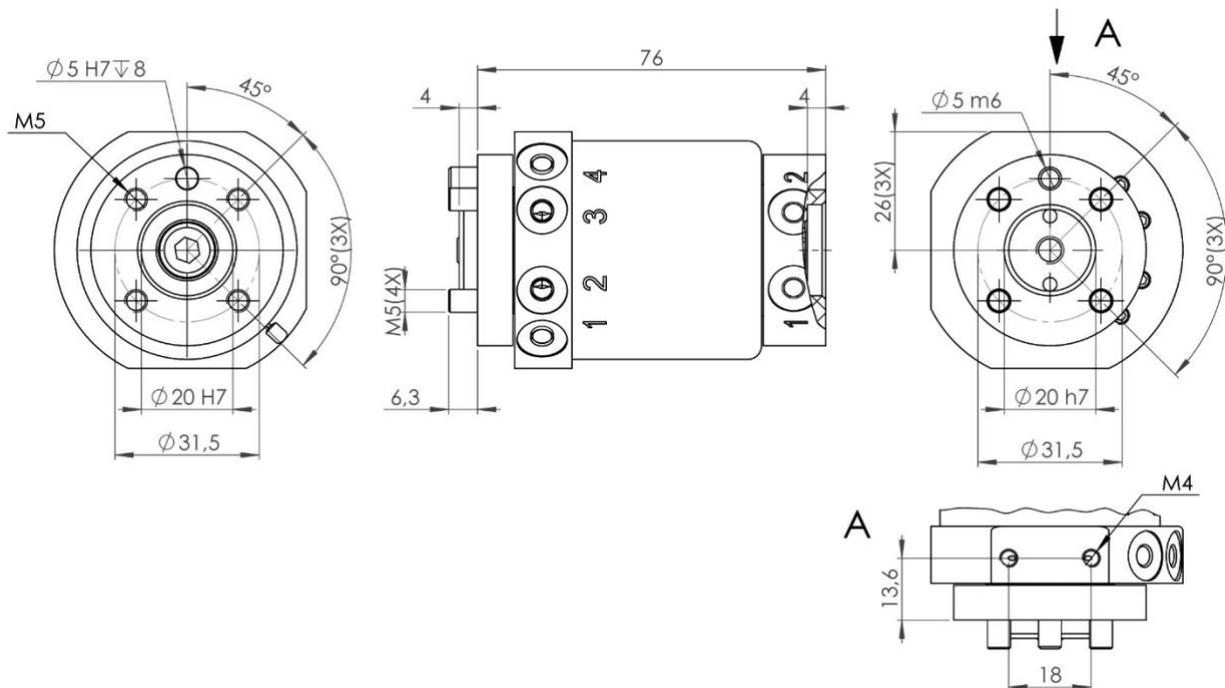
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1-31,5-4-M5
Maximum tool load	Fz (static)	±50 N
	Mx/My (dynamic)	±50 Nm
	Mz (dynamic)	±20 Nm
Weight and centre of gravity		
	Weight	0.35 kg
	Mass centre X	24 mm
Air channels	Pneumatic diagram	See section 2.1.6
	Total number of ducts	2
	Max air pressure	10 bar
	Air flow	150 l/min
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content
	Connection, robot side	M5
Connection, tool side	M5	



NOTE! A puller, P1027, for loosening the swivel from the base plate is included with the swivel ([section 2.2.2](#)).

2.1.3 Swivel S5-4 Ø31,5. Article no: P1022



Swivel S5-4 Ø31,5 transfers 6 pneumatic channels to the tool.

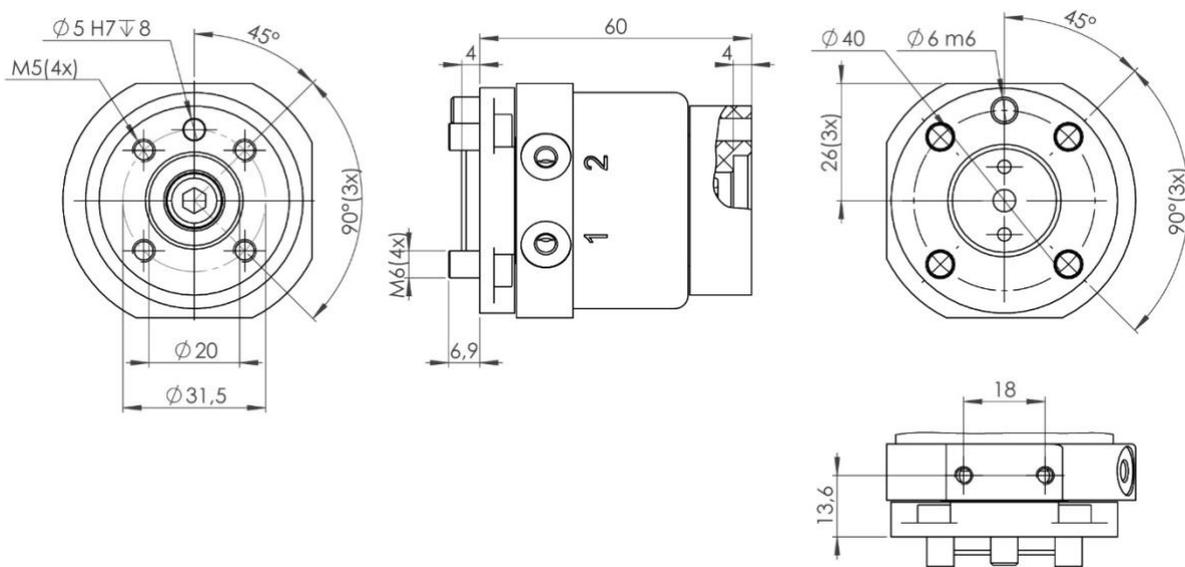
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1-31,5-4-M5
Maximum tool load	Fz (static)	±50 N
	Mx/My (dynamic)	±50 Nm
	Mz (dynamic)	±20 Nm
Weight and centre of gravity		
	Weight	0.45 kg
	Mass centre X	31 mm
Air channels	Pneumatic diagram	See section 2.1.7
	Total number of ducts	4
	Max air pressure	10 bar
	Air flow	150 l/min
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content
	Connection, robot side	M5
	Connection, tool side	M5



NOTE! A puller, P1027, for loosening the swivel from the base plate is included with the swivel ([section 2.2.2](#)).

2.1.4 Swivel S5-2 Ø40. Article no: P1025



Swivel S5-4 Ø40 transfers 2 pneumatic channels to the tool.

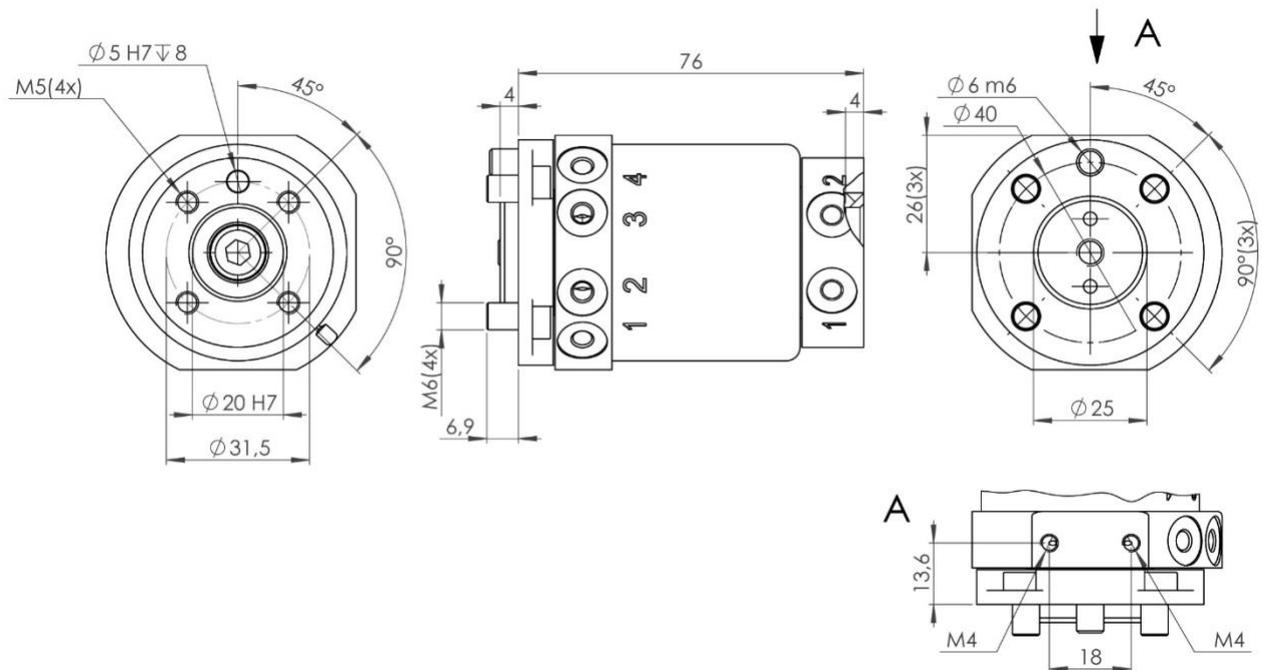
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1-40-4-M6
Maximum tool load	Fz (static)	±50 N
	Mx/My (dynamic)	±50 Nm
	Mz (dynamic)	±20 Nm
Weight and centre of gravity		
	Weight	0.4 kg
	Mass centre X	24 mm
Air channels	Pneumatic diagram	See section 2.1.6
	Total number of ducts	2
	Max air pressure	10 bar
	Air flow	150 l/min
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content
	Connection, robot side	M5
	Connection, tool side	M5



NOTE! A puller, P1027, for loosening the swivel from the base plate is included with the swivel ([section 2.2.2](#)).

2.1.5 Swivel S5-4 Ø40. Article no: P1026



Swivel S20-6 transfers 6 pneumatic channels to the tool.

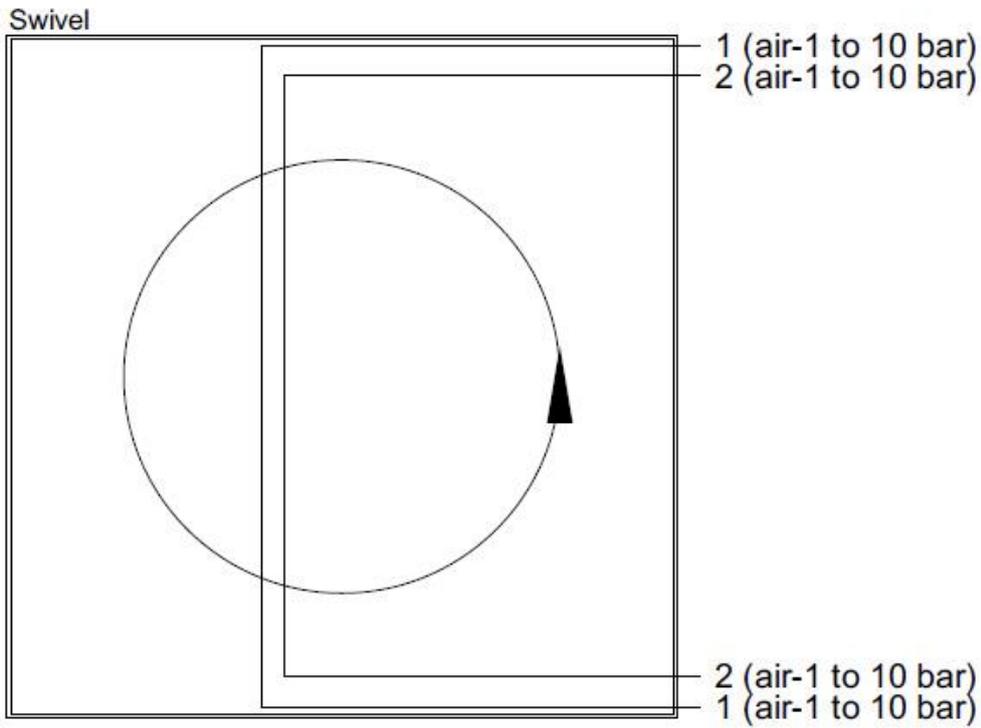
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1-40-4-M6
Maximum tool load	Fz (static)	±50 N
	Mx/My (dynamic)	±50 Nm
	Mz (dynamic)	±20 Nm
Weight and centre of gravity		
	Weight	0.5 kg
	Mass centre X	31 mm
Air channels	Pneumatic diagram	See section 2.1.7
	Total number of ducts	4
	Max air pressure	10 bar
	Air flow	150 l/min
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content
	Connection, robot side	M5
	Connection, tool side	M5

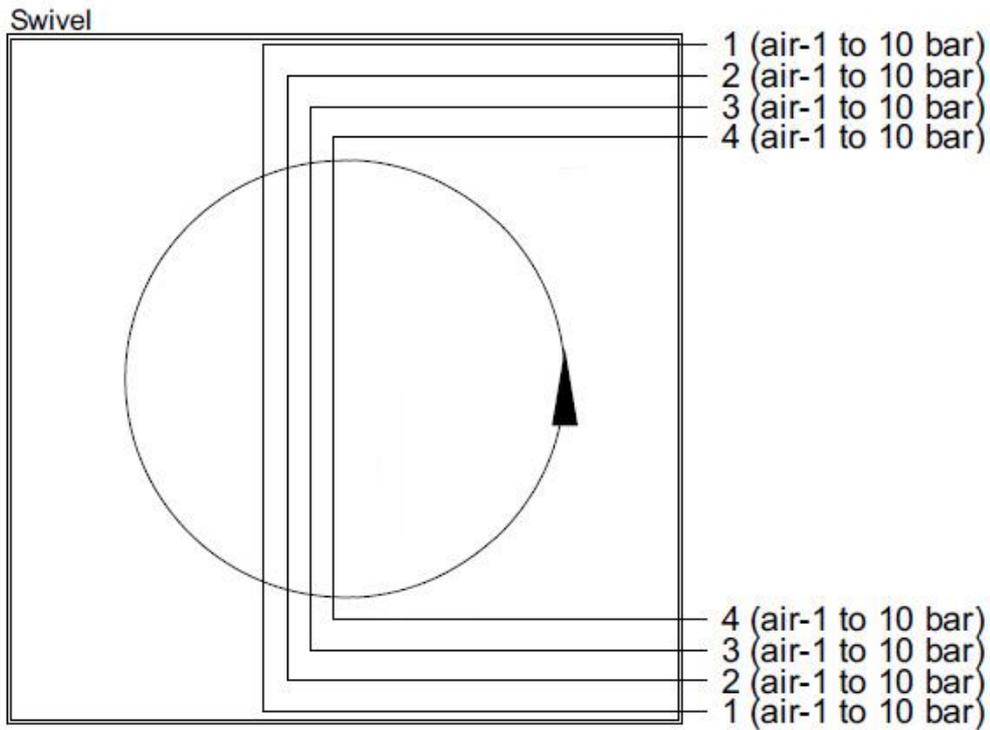


NOTE! A puller, P1027, for loosening the swivel from the base plate is included with the swivel ([section 2.2.2](#)).

2.1.6 Pneumatic diagram swivel P1021 and P1025



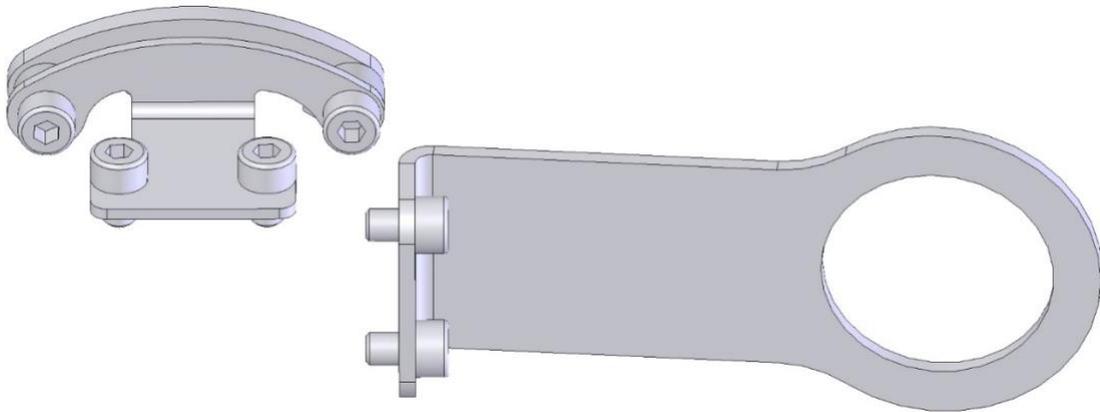
2.1.7 Pneumatic diagram swivel P1022 and P1026



2.2 Options for swivel

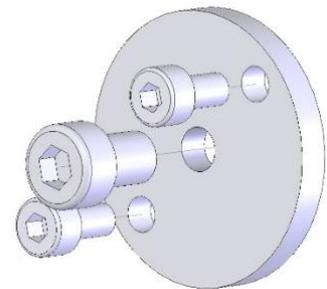
2.2.1 Robot adaptation kit

A rotation stop is mandatory part of the robot adaptation kit and prohibits the swivel to rotate in relation to the robot. Dependent on robot model alternative rotation stops are required, which are available from RSP.



2.2.2 Puller P1027

A puller is included with the S5 swivels in order to enable loosening of the swivel in case when stuck to the base plate mounted on the robot flange.



2.2.3 Limitation of Robot movements

There can be some limitations on the movement of axis 5 for some robot models. Contact Robot System Products for more information.

2.2.4 Recommended air connections

Part number for recommended push-in Ø4 straight air hose is I0927 and for 90° angled hose I0292.

3 INSTALLATION

3.1 Tightening torques

Tightening torques for mounting (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

3.2 Recommended tools for installation and replacement of swivel

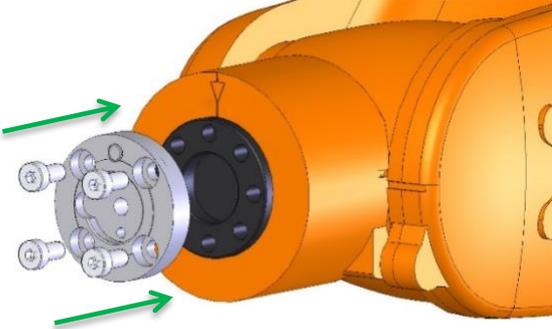
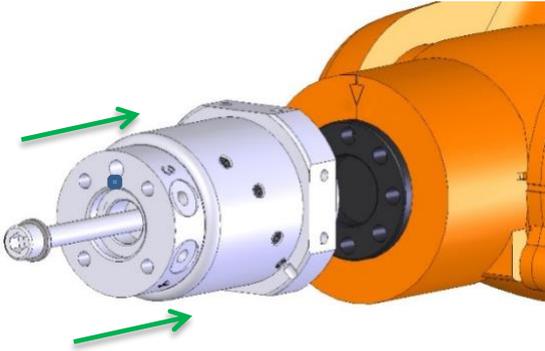
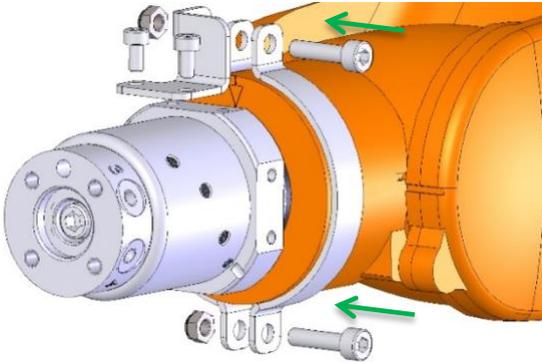
Tools	Applications
Complete set of Allen keys	For dismounting and mounting.
Torque wrench	For all socket head cap screws

3.3 Arm load parameters

Swivel and tools are adding load to the robot and rotational friction and torque to axis 6. If the load and torque force are not stated correctly during programming it may affect the behaviour and wear of the robot and robot peripherals.

3.4 Installation of swivel on robot



	Action	Note
1	Safety	Read the safety section 1.1 .
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 base plate on robot 	Lift the base plate to the robot flange and mount with the four enclosed M5-screws. Make sure the guide pin fits the guide hole in the robot flange. See tightening torques above.
5	Mount swivel 	Mount the swivel with the enclosed screw. Use a torque wrench for tightening. Make sure that the two guide pins fit the guide holes in the base plate. NOTE! Tightening torque for the enclosed M6 12.9 locking screw is 17 Nm. WARNING The swivel may cause damage if dropped.
6	Turn robot arm into position	Rotate axis 6 to put the rotation stop in position for mounting.
7	Mount adaptation kit 	Mount the adaptation kit including rotation stop and hose bracket with enclosed screws and nuts. See tightening torques above. NOTE! Dependent on robot models alternative adaptation kits are available.
8	Connect air	Connect the air hoses according to markings (sections 2.1.6 and 2.1.7).
9	Power on	Unlock circuit breaker and switch power on.



4 MAINTENANCE AND SERVICE

4.1 Maintenance chart

The swivel 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 or tools attached to the swivel if the air pressure is safely switched off.



NOTE!

Swivels must only be dismantled and repaired by Robot System Products during the warranty period. Otherwise the warranty will not be valid.

4.1.1 Required products

Product	Specification	Note
Cleaning agent	Denatured alcohol or similar	For swivel.
Cloth	Lint free cloth	For cleaning.



NOTE!

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

4.1.2 Recommended tools for maintenance

Tools	Applications
Complete set of Allen keys	For dismounting and mounting.
Torque wrench	For all socket head cap screws

4.1.3 Activities and intervals

Maintenance activity	Equipment	Interval	Description
Inspection	Swivel	2 weeks	Visual inspection of swivel.
Cleaning	Swivel	1 month	Cleaning of swivel, interval depending on environment.
Service	Swivel	30 months	Complete service, to be done by Robot System Products

4.2 Visual inspection of the swivel

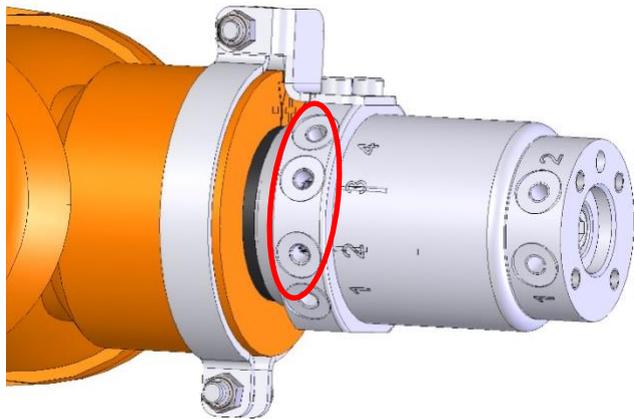
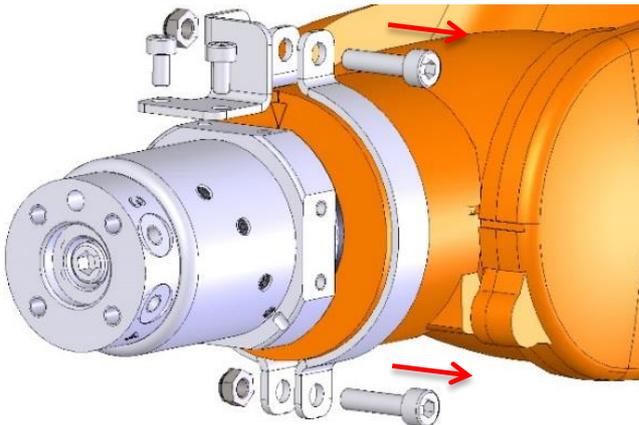
Visually check the following:

Check	Note
Air connections	Not damaged or dirty
All parts	No wear, not damaged or dirty

4.3 Cleaning of swivel

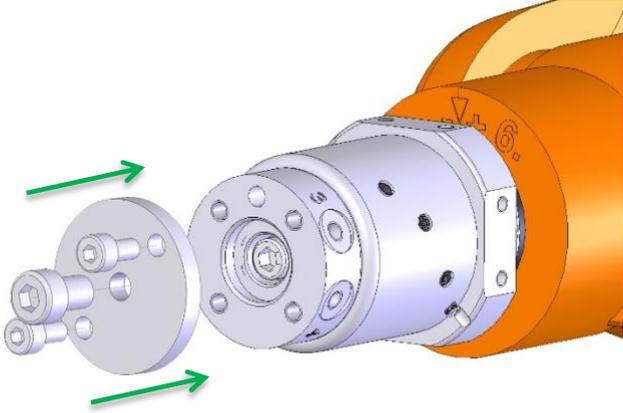
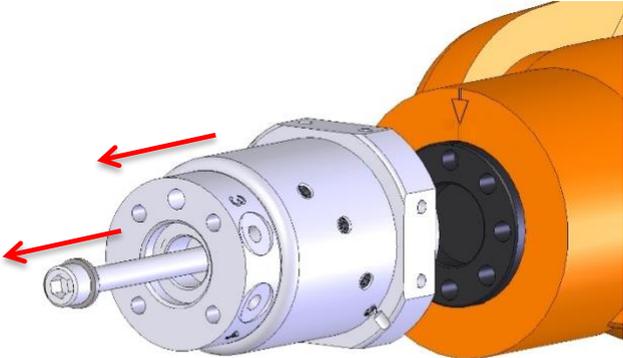
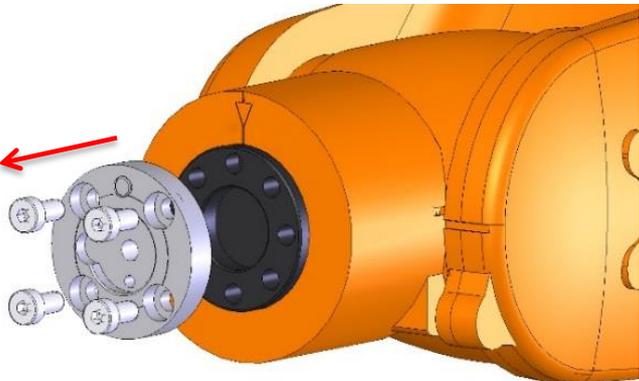
Action	Note
Clean the swivel generally	Clean using lint free cloth and denatured alcohol or similar

4.4 Replacement of swivel

	Action	Note
1	Safety	Read the safety section 1.1 .
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	Pneumatic air off	NOTE! The pressure in the pneumatic system must be released before dismounting begins.
6	Dismount air 	Put markings on the air hoses and dismount them. NOTE! Make sure that no dirt enters into the air hoses.
7	Remove adaptation kit 	Release and remove the screws and nuts holding the rotation stop and hose bracket. Remove the rotation stop and hose bracket.





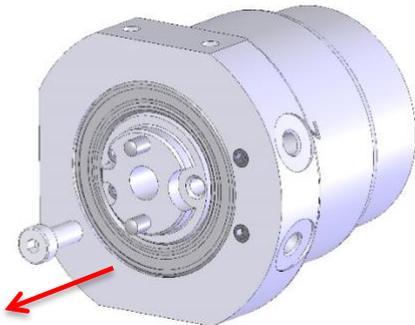
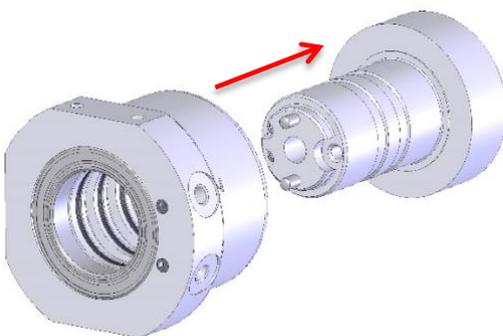
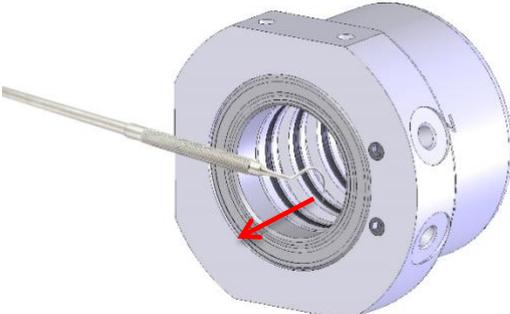
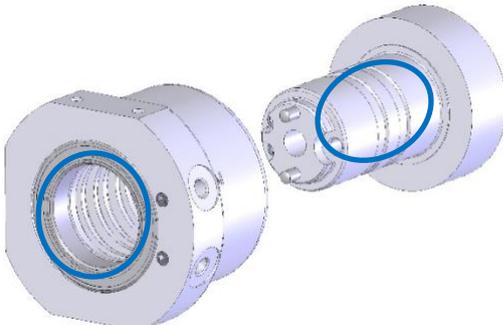
8	Release swivel with puller 	Release the M6 locking screw holding the swivel (5 full turns). Mount the puller (P1027) with the two M5 screws. Press the swivel from the robot flange with the M8 screw in the center until swivel is released NOTE! Use puller only when swivel is stuck in the base plate!
8	Dismount swivel 	Unscrew the M6 locking screw fully and remove the swivel. WARNING The swivel may cause damage if dropped.
9	Dismount base plate 	Release the four screws and remove the base plate. NOTE! A guide pin is mounted between the base plate and the robot flange.
10	Clean the robot flange	
11	Mount replacement swivel	Follow instructions in section 3.4 .

4.5 Replacement of O-rings



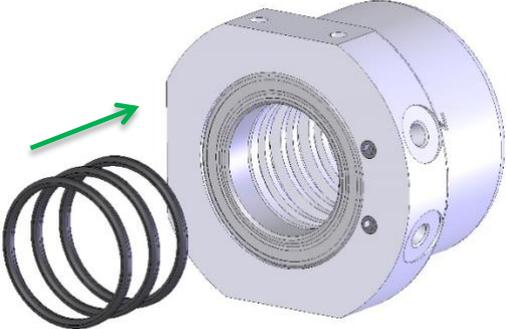
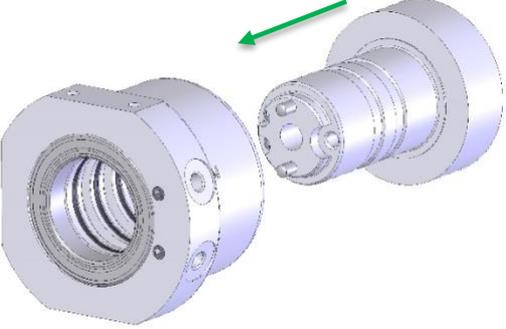
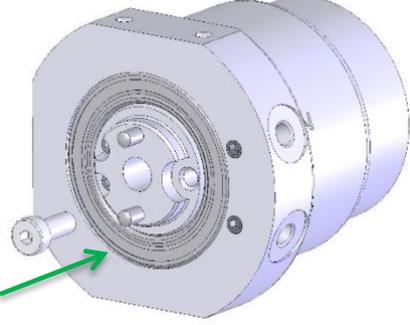
NOTE! O-rings should only be replaced by experienced operators.



	Action	Note
1	Dismount swivel from robot	NOTE! Follow actions 1–8 in section 4.4 .
2	Remove stop screw 	Unscrew and remove the stop screw holding the ball bearing and swivel shaft.
3	Separate swivel shaft 	Remove the swivel shaft by pressing it out of the swivel housing.
4	Remove O-rings 	Remove the O-rings with a sickle probe or similar. NOTE! The number of O-rings is dependent on swivel model, see chapter 5 .
5	Clean swivel 	Clean the swivel shaft using lint free cloth and industrial alcohol or similar. Clean the grooves for the O-rings using a nylon brush, lint free cloth and industrial alcohol.





6	Replace O-rings 	Press new O-rings in the grooves with your fingers. NOTE! Do not by mistake mount the O-rings in the, wider and deeper, air channels between the grooves.
7	Mount swivel shaft 	Enter the swivel shaft to the swivel housing and press together. NOTE! The two ball bearings must be correctly in place when shaft and housing are joined. NOTE! Apply a small amount of grease (Magnalube-G) on shaft and O-rings before mounting!
8	Fasten stop screw 	Secure the ball bearing and swivel shaft in the swivel housing with the stop screw.
9	Mount swivel	Follow instructions in section 3.4 .



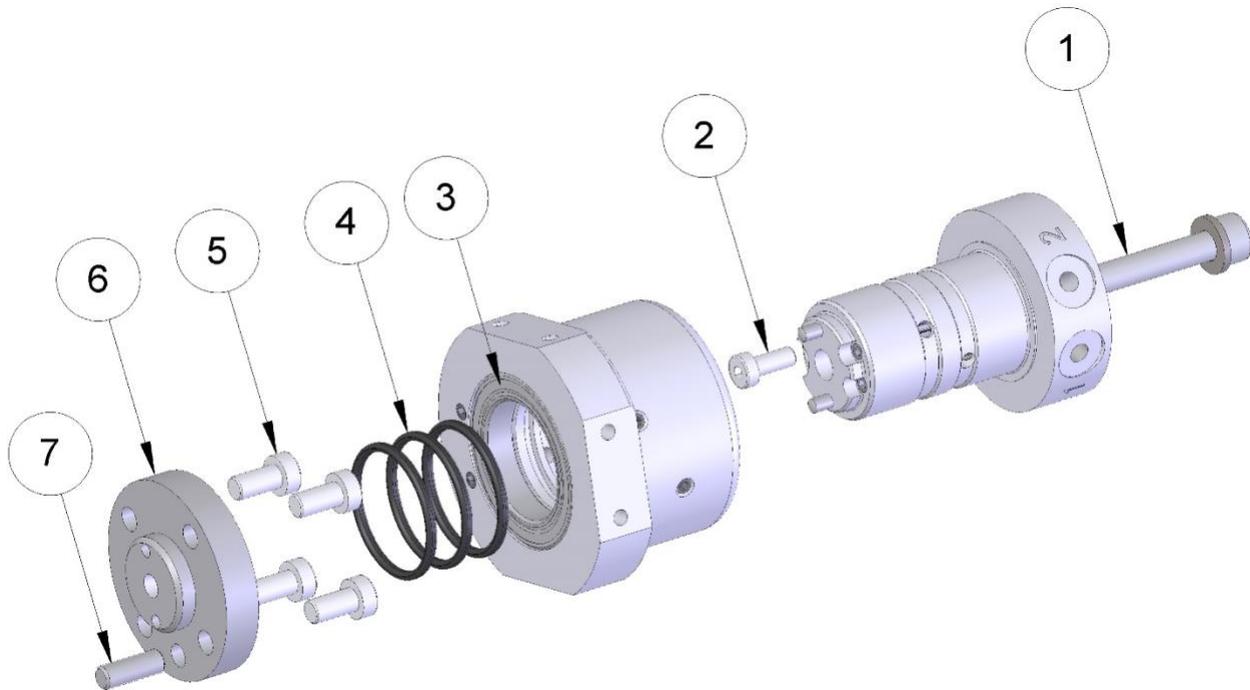
4.6 Complete service of swivel

We recommend a complete service on swivels to be carried out every 30 months. This will ensure proper function and increase the lifespan of the swivel considerably. We further recommend that the maintenance shall be carried out by qualified RSP personnel. Please contact us for a quotation.

The 30 months swivel service at Robot System Products includes inspection and cleaning of the full unit, and replacement of all wear parts.

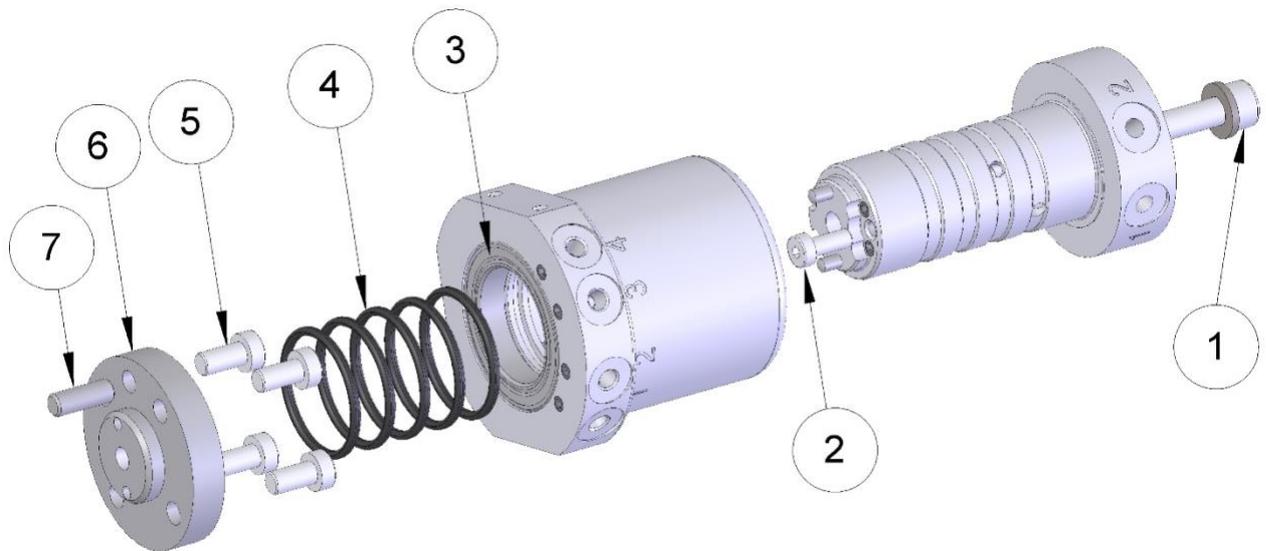
5 SPARE PARTS

5.1 Part list for swivel S5-2 Ø31,5, P1021 and S5-2 Ø40, P1025



Item	Description	Part number	Pcs
1	Screw M6x50 and washer	MC6S 6x50 12.9, 21512062-153	1 + 1
2	Locking screw M4x10	MLC6S 4x10	1
3	Ball bearing	I1569	2
4	O-ring	I1568	3
5	Screw M5x10 (P1021 only)	ML6S 5x10	4
5	Screw M6x10 (P1025 only)	MLC6S 6x10	4
6	Base plate Ø31,5-4-M5 (P1021 only)	P0211-038	1
6	Base plate Ø40-4-M6 (P1025 only)	P0211-043	1
7	Guide pin (P1021 only)	CPK 5x14	1
7	Guide pin (P1025 only)	CPK 6x14	1

5.2 Part list for swivel S5-4 Ø31,5, P1022 and S5-4 Ø40, P1026



Item	Description	Part number	Pcs
1	Screw M6x65 and washer	MC6S 6x65 12.9, 21512062-153	1 + 1
2	Locking screw M4x10	MLC6S 4x10	1
3	Ball bearing	I1569	2
4	O-ring	I1568	5
5	Screw M5x10 (P1021 only)	ML6S 5x10	4
5	Screw M6x10 (P1025 only)	MLC6S 6x10	4
6	Base plate Ø31,5-4-M5 (P1021 only)	P0211-038	1
6	Base plate Ø40-4-M6 (P1025 only)	P0211-043	1
7	Guide pin (P1021 only)	CPK 5x14	1
7	Guide pin (P1025 only)	CPK 6x14	1

6 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 is primarily used in transmission of power for spot welding. 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.

