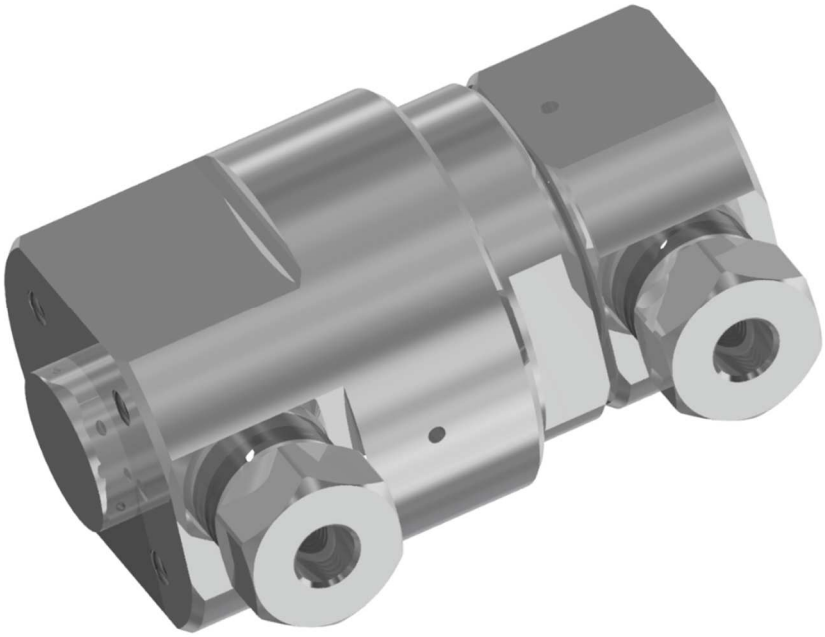
Operating and maintenance instruction

Swivel Joint Parallel 2.0 (4150 bar / 60,000 psi)



Operating and maintenance instruction

ALLFI AG - Riedenmatt 1 – CH-6370 Stans

Tel.: +41 41 618 05 05 - Fax: +41 41 618 05 10

E-Mail: info@allfi.com - http://www.allfi.com

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Scope of application

The present operating and maintenance instruction is valid for Swivel Joints 2.0 (4150 bar / 60,000 psi).

- 921500 - Swivel Joint Parallel 2.0

Table of contents

1 General

1.1 Information on use of the operation and maintenance instruction

This operation and maintenance instruction is a key part of the product. The information in this manual is mandatory and must be read and understood by all the persons before operating with the Swivel Joint Parallel 2.0. The manual must be stored in distance as well as always accessible to the persons, working with the Swivel Joint Parallel 2.0

If you have any questions regarding the contents of this manual, please contact the manufacturer directly.

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1.2 Scope of delivery

The individual parts contained in the shipment can be gathered from the set list in the appendix A (technical drawing and part list). Upon receipt, the shipment has to be checked of integrity. Possible detected defectives must be reported immediately to the manufacturer.

1.3 Warranty claim

The ALLFI AG grants warranty for the shipped parts as followed:

- Material and manufacturer faults of 12 months from date of delivery or
- Defects within the first 2000 hours of operation

Following spare parts are excluded from the warranty:

- Pressure Plate
- HP-Seal
- Shaft
- Bearing

1.4 Disclaimer

ALLFI AG refuses any claims of liability (material damages, physical injury, as well as disruption of operation), that are a result of disregarding this operating and maintenance instruction.

For example, the damage because of:

- Inadmissible application of the Swivel Joint Parallel 2.0
- Defective maintenance
- The disregard of operation instructions
- Chemical and electrolytical influences
- Use of parts, spare parts or accessory from a third-party manufacturer
- Arbitrary modifications
- Not or insufficiently trained staff

The disregard of all these instructions happens on exclusive risk and exclusive responsibility of the client. The ALLFI AG is not liable for any production downtimes.

2 Security

2.1 Declaration of symbols

This operating and maintenance instruction manual contains important notes and symbols, which are to be considered and followed. These include:

• DANGER

Danger emphasizes operating and service procedures that if not avoided, may lead to death or serious personal injuries.

• WARNING

Warnings emphasize operating or service procedures, or conditions that can result in serious personal injury or death.

• CAUTION

Cautions emphasize operating or service procedures, or conditions that can result in equipment damage or impairment of system operation. If not avoided, light or medium body injuries could be the consequence.

NOTE

Notes provide additional information that can expedite or improve operating or service procedures.

Danger symbol without key word: Additional notes

2.2 General warning notes

Using of the Swivel Joint Parallel 2.0, the following warnings are to be considered.

The specified warnings are not only restricted to the operation with the maximal permissible operating pressure of 4150 bar / 60,000 psi. They are also valid on work with reduced operation pressures!

DANGER

Danger of cutting of extremities on contact with waterjet

The contact with the high kinetic energy performing waterjet can have the consequence of cutting of extremities or lead to other injuries.

Therefore:

- Operate the machine only, when nobody stands in the danger zone of the waterjet.
- Never touch the waterjet, not even with personal protective equipment.
- Always maintain a sufficient safety distance from the swivel joint when it is pressurized.

Any injuries in connection with the waterjet, alarm the emergency doctor immediately.

CAUTION

Danger of breathing difficulties and irritation of the skin and eyes by released solid particles or dust.

During machining of certain material, solid particles and dust may float in the air, which could cause breathing difficulties and irritations to the skin and eyes.

Therefore:

- Ensure the proper ventilation of the room surrounding the machinery.
- Ensure to wear the personal protective equipment (protection glasses, breathing mask, gloves, …)

Additionally, the rules and regulations of the working place are to be followed to prevent injuries!

2.3 Intended use

The Swivel Joint Parallel 2.0is designed for the transmission of rotary movements. The swivel joint must be firmly attached to the machine. Only pure water may be used as working fluid. The technical limit values must always be observed.

2.4 Inadmissible usage

Inadmissible usage of the Swivel Joint Parallel 2.0 includes:

- The usage of all other fluids other than water
- The addition of other substances to the water
- Closure of the pressure relief holes
- Excessive application of the Swivel Joint Parallel 2.0
- Exceeding permitted limits
- Operating the Swivel Joint with demounted or disabled technical protection
- Transmission of axial and/or radial forces
- The use in the food or pharmaceutical sector

Likewise, all other uses of the Swivel Joint deviating from the intended use are not permitted. All questions should be adressed directly to the manufacturer.

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2.5 Residual risks

The manufacturer and/or operator of the machine where the Swivel Joint Parallel 2.0 is built in, has taken every precautionary measure possible to reduce residual risks, as far as possible reasonably practicably.

<table>
<tr><th>Operation phase</th><th>Damage</th><th>Danger</th><th>Reason</th><th>(possible) measures</th></tr>
<tr><td rowspan="6">Operation</td><td rowspan="6">Physical injuries</td><td rowspan="3">Liquids leaking under high pressure (e.g. at pressure relief holes)</td><td>Ignoring the torque</td><td>Follow the torque</td></tr>
<tr><td>Damaged sealing surfaces</td><td rowspan="2">Regular supervision</td></tr>
<tr><td rowspan="2">Busted/Cracked connections and high-pressure components as a result of defects</td><td rowspan="2">Protective wall as a technical protective measure</td></tr>
<tr><td rowspan="3">Flying fragments</td><td>Ignoring the torque</td><td>Follow the torque</td></tr>
<tr><td>Damaged sealing surfaces</td><td rowspan="2">Regular supervision</td></tr>
<tr><td>Busted/Cracked connections and high-pressure components as a result of defects</td><td rowspan="2">Protective wall as a technical protective measure</td></tr>
</table>

2.6 Safety installations

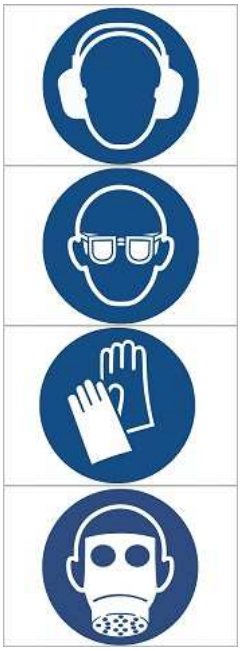
The manufacturer or the operator of the full machine, which the Swivel Joint Parallel 2.0 is built in, has ensured the following safety arrangements:

- Safety devices to prevent flying fragments or liquids leaking under high pressure
- Emergency stoppage to immediately shut down the operating machine. This emergency stoppage is an integral part of the system that automatically activates in case of the failure of high-pressure components or massive operating errors, alternatively it may be manually activated by the operator.

Danger for the operator will arise if safety protections are not functionally, not followed or evaded anytime. The operator has to ensure the functionality of the safety protections anytime.

2.7 Personal protection equipment

The operator must offer his staff following protection equipment while he's working:



Ear protector against:
- Noise emissions

Wear protection glasses against:
- Fluids and dust particles
- Flying fragments

Hand guards against:
- Sharp edges of components
- Intrusion of micro particles into the skin

Inhalation protection against:
- Dust particles, micro particles and spray mist

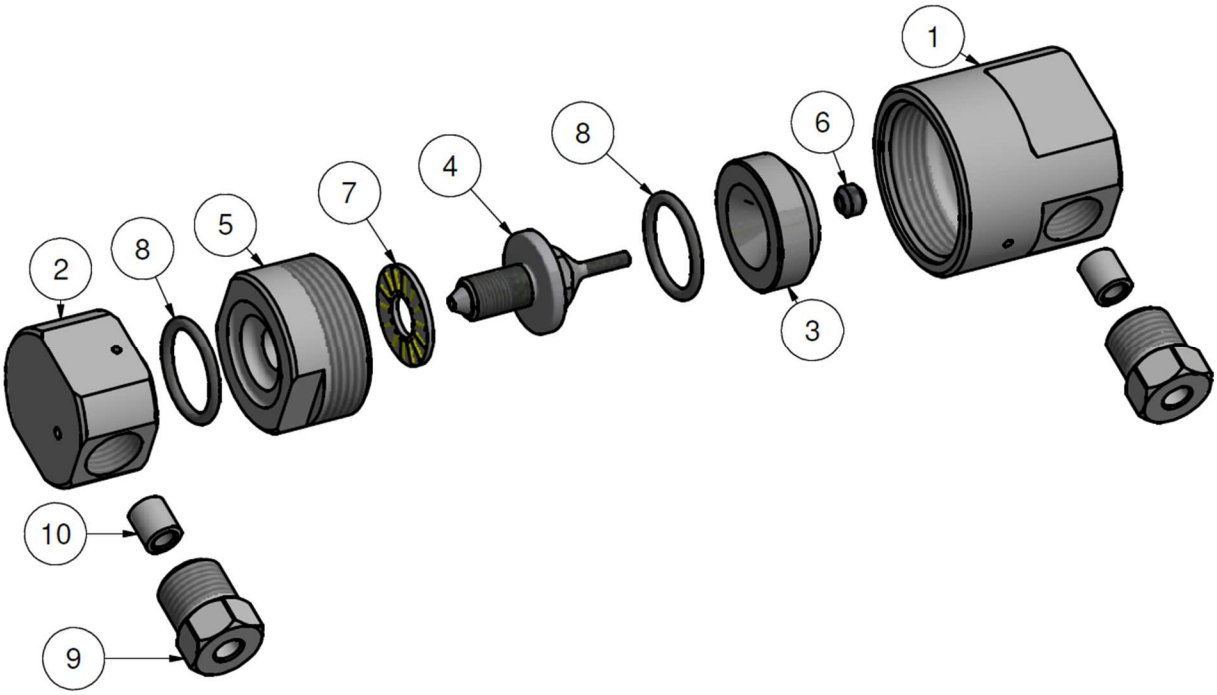
2.8 Qualification of the staff

The Swivel Joint Parallel 2.0 may only be operated and maintained by certified, trained staff.

3 Structure and function

3.1 Structure

The Swivel Joint Parallel 2.0 can be rotated with very low resistance even at a maximum pressure of 4150 bar / 60,000 psi.



Legend:

1. Cover 90°
2. Elbow Swivel Joint 2.0
3. Pressure Plate 2.0
4. Shaft for Swivel Joint 2.0
5. Bearing housing 2.0
6. HP-Seal 2.0
7. Bearing for Swifel Joint
8. O-Ring
9. Gland Nut ¼"
10. Collar ¼"

3.2 Function

The swivel joint transmits rotary motion of 1/4" high pressure lines up to a pressure of 4150 bar / 60,000 psi. The swivel joint cannot transmit forces. The maximum allowable operating pressure of water is 4150 bar / 60,000 psi.

3.3 Accessories

		
Article:	Torque wrench	Spanner
Article no:	883000	AF 17 – 000339 AF 32 – 000503 only for 9/16"
Function:	Tightens screws with a specif-ic torque	

		
Article:	Disassembly Tool	Molykote DX Paste
Article no:	910078	051055
Function:	Disassembly HP Seal from Swivel Joint	Greasing screw connections and metallic contact areas

4 General technical data

Maximal working pressure:	4150 bar / 60,000 psi
Maximum recommended flow rate:	5 L/min / 1.3 gal/min
Connection tube diameter:	HP Tube 1/4“
Weight:	approx. 720g
Maximal working temperature:	50 °C
Maximal stocking temperature:	60 °C

Requested water quality:

Water parameter	Unit	Value
Electrical Conductivity	µS / cm	100 – 450
PH-value	-	7.0 - 8.5
Total hardness	°dH	2.0 - 10.0
Carbonate hardness (acid capacity pH 4.3)	°dH	2.0 - 10.0
Degree of alkalinity pH 8.2	mmol / l	0 - 0.25
Chloride	mg / l	≤ 50
Iron	mg / l	≤ 0.2
Manganese	mg / l	≤ 0.05
Copper	mg / l	≤ 2.0
Silicate	mg / l	≤ 5.0
(Filtrate-) solid content	mg / l	≤ 350

Technical data as dimensions can be found in the technical drawing in appendix A.

5 Installation and commissioning

General installation tip:

- Absolute cleanliness of the pipes is important before connection.
- Follow the steps below for installation.
- During startup and after inspection or maintenance, check the water tightness of the pneumatic valve.

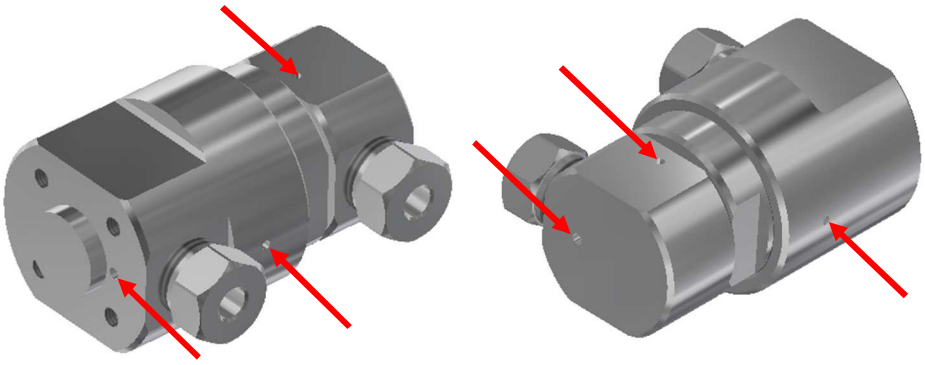
WARNING

Risk of injury: It is forbidden to close the pressure relief holes.

By closing the pressure relief holes, the Swivel Joint or parts of it may explode.

Therefore: Never close or cover any pressure relief holes.

Positions of the pressure relief holes (red arrows):



NOTE

Material damage as a result of pitting

Not or insufficient greased threads or contact areas can pit.

Therefore:

Always grease threads and metallic contact areas with DX-Paste (Article no. 051055). Check appendix A for additional information.

NOTE

Material damage or leakage as a result of fouling

Fouling components, especially at threads, can lead to leakages and damage.

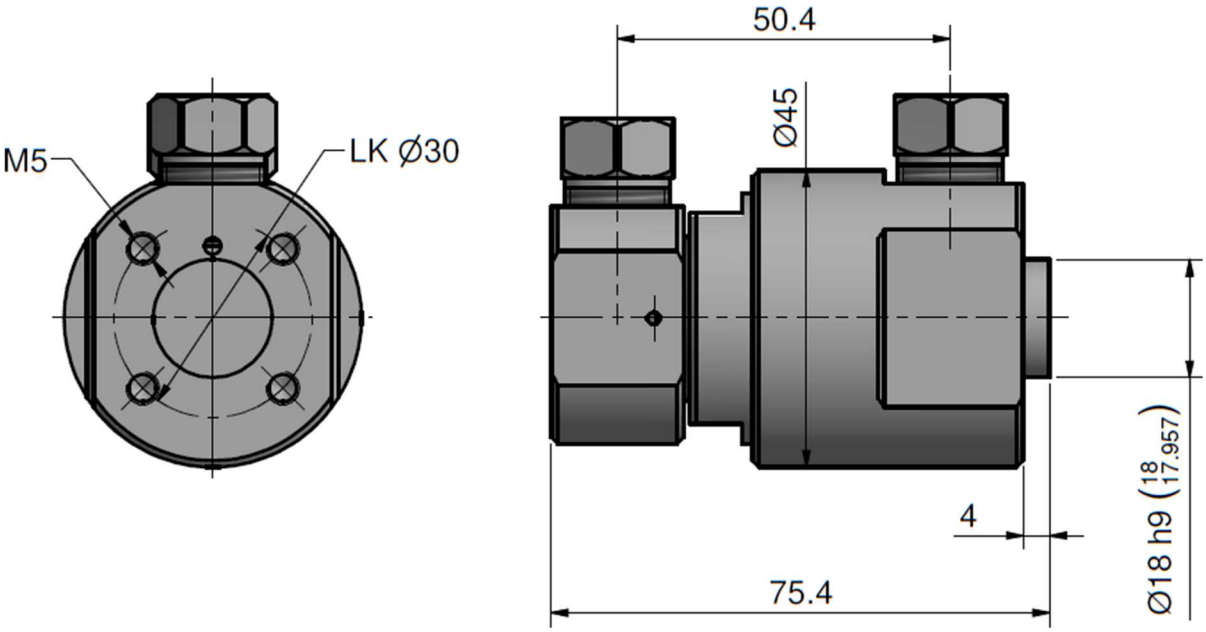
Therefore:

Pay attention to the cleanliness of the components while maintaining.

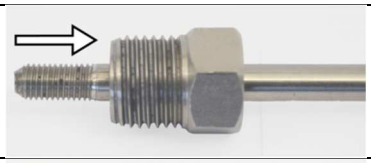
NOTE
Material damage as a result of leakages Constant leakage may damage the product. **Therefore:** Immediately eliminate leakages (see chapter 8 „Faults and Troubleshooting”).

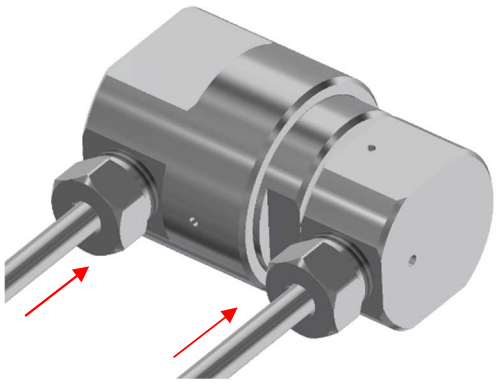
5.1 Fixing the swivel joint to the machine

The swivel joint is attached to the machine with the four M5 threads. Further fastening options must be discussed with the manufacturer.



During installation, ensure that none of the pressure relief holes are closed!

	1. Slide the gland nut over the HP tube
	2. Screw the collar on the HP tube (left-handed thread). There must be 1 or 2 convolutions visible between the conus and the pressure ring.

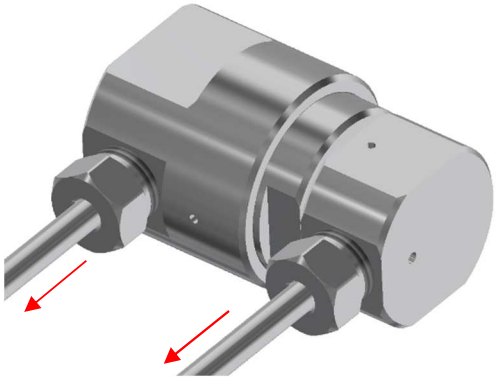
	3. Connect the high-pressure lines to the Swivel Joint Parallel 2.0. (Torque see appendix A)

5.2 Flush the swivel joint

Flush swivel joint with water (p ≤ 500 bar) for 5 to 10 seconds.

6 Deinstallation

Before uninstalling the Swivel Joint Parallel 2.0, release the pressure of the high-pressure pipes and protect them against unexpected re-pressurization

	Remove high pressure line and its components. Remove Swivel Joint Parallel 2.0 from machine.

7 Maintenance, Service and Repair

Before uninstalling the Swivel Joint Parallel 2.0, release the pressure of the high-pressure pipes and protect them against unexpected re-pressurization

The swivel joint must be removed from the machine for maintenance, service and repair work in accordance with Chapter 6.

All maintenance, service and repair work not listed in this chapter must be carried out by the manufacturer.

NOTE

Material damage or leakage as a result of fouling

Dirty components, especially considering the threads, may lead to leakages and damage of the Swivel Joint Parallel 2.0.

Therefore:

Ensure a proper cleaning of the components.

NOTE

Property damage as a result of pitting

Threads that are not greased or insufficiently greased may pit.

Therefore:

Always grease threads and metallic contact areas with DX-Paste (Article no. 051055). Check appendix A for additional information.

7.1 Regular maintenance

What	By whom	When
Check tightness	Operator	Continuous
Rotary resistor	Operator	Periodically

7.2 Preventive maintenance

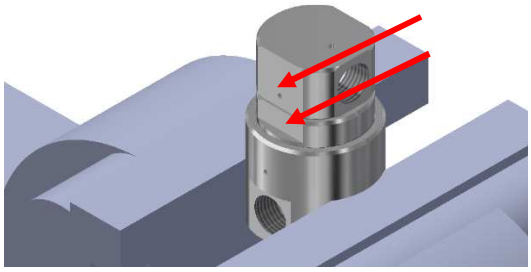
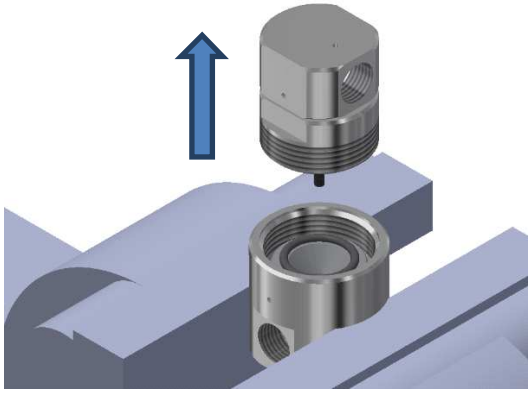
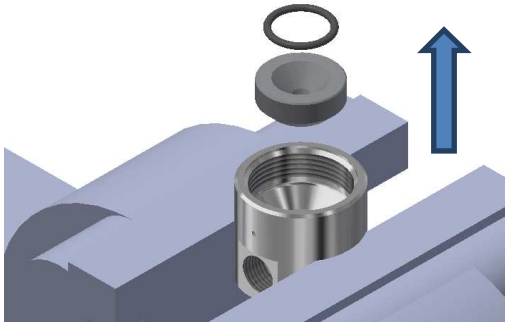
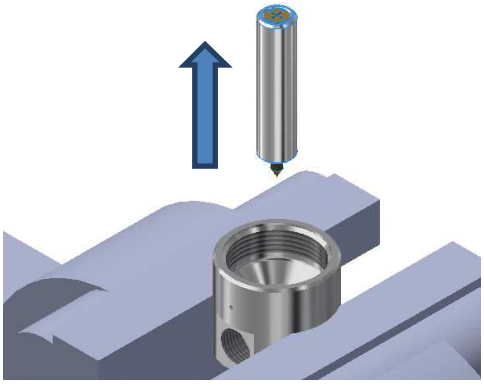
Every 25'000 revolutions or rotational movements: Replace seal and pressure plate, after 1 year at the latest.

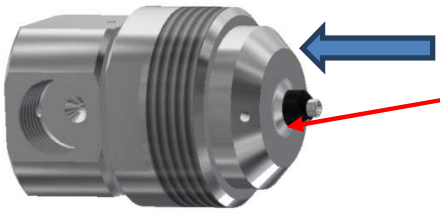
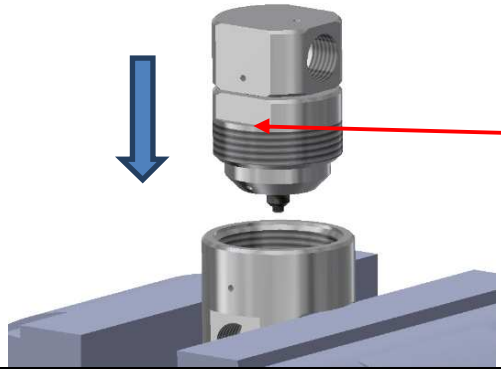
Every 75'000 revolutions or rotational movements: Maintenance at ALLFI, replace bearing and shaft, after 3 years at the latest.

Replace swivel joint after 20'000 cycles: Pressure increase from 0 to > 3500 bar (pump start).

7.3 Replace HP-Seal

Remove the swivel joint from the machine according to chapter 6.

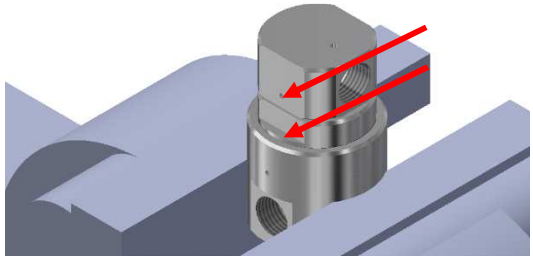
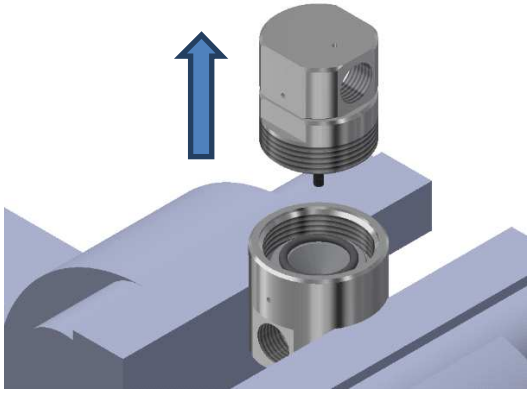
1		1. Clamp the swivel joint in a vice at the wrench size 36mm. **Attention!** Use protective jaws. 2. Turn the elbow of the swivel so that the key flats match those of the bearing housing (red arrows)
2		1. Loosen the bearing housing of the swivel joint with an open-ended wrench AF 32. 2. Screw the bearing housing out of the cover.
3		1. Check the shaft for wear in the area of the seal. 2. Clean the bearing housing. 3. If the swivel joint is damaged, have it repaired by ALLFI service technicians.
4		1. If the pressure plate & O-ring are still in the cover, remove them as well. 2. Clean the pressure plate.
5		1. Remove the seal with the Disassembly Tool (910078). 2. Clean cover

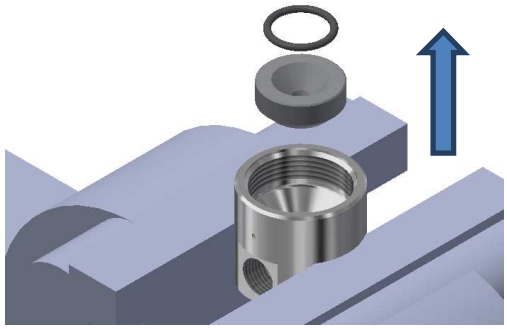
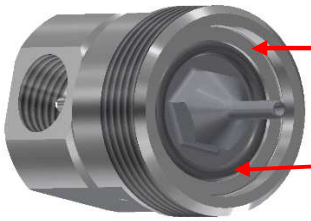
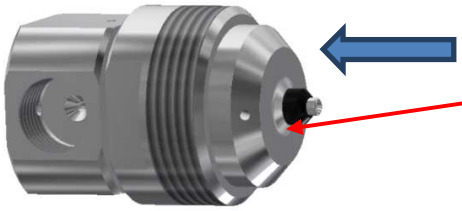
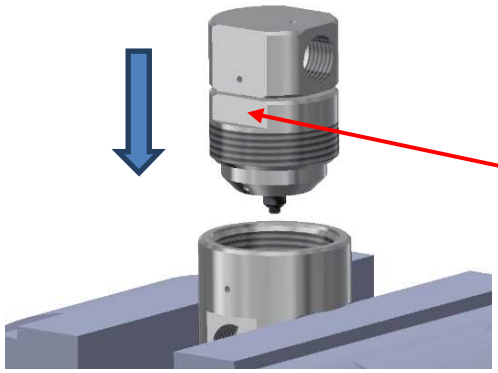
6		1. Grease the O-ring and contact surfaces of the pressure plate according to appendix A 2. Place the O-ring in the bearing housing on the shaft.
7		1. Push the pressure plate over the shaft until it stops. 2. Grease thread and sealing surface according to appendix A. 3. Push a new HP seal over the shaft until it stops.
8		1. Screw bearing housing into cover. 2. Tighten with torque wrench to AF 32 (torque see appendix A). 3. Fix the swivel joint to the machine according to chapter 5.1 and clean it according to chapter 5.2.

Fix the swivel joint in the machine according to chapter 5.1 and flush according to chapter 5.2.
Check the water tightness of the Swivel Joint.

7.4 Replace cover

Remove the swivel joint from the machine according to chapter 6.

1		1. Clamp the swivel joint in a vice at the wrench size 36mm. **Attention!** Use protective jaws. 2. Turn the elbow of the swivel so that the key flats match those of the bearing housing (red arrows)
2		1. Loosen the bearing housing of the swivel joint with an open-ended wrench AF 32. 2. Screw the bearing housing out of the cover.

3		1. If the pressure plate & O-ring are still in the cover, remove them as well and clean them. 2. Clamp a new cover in a vice at the wrench size 36mm.
4		1. Grease the O-ring and contact surfaces of the pressure plate according to appendix A 2. Place the O-ring in the bearing housing on the shaft.
5		1. Push the pressure plate over the shaft until it stops. 2. Grease thread and sealing surface according to appendix A. 3. Push a new HP seal over the shaft until it stops.
6		1. Screw bearing housing into cover. 2. Tighten with torque wrench to AF 32 (torque see appendix A).

Fix the swivel joint in the machine according to chapter 5.1 and flush according to chapter 5.2.
Check the water tightness of the Swivel Joint.

7.5 Replace bearing and if necessary also shaft

Please contact the manufacturer for a repair on site or at the nearest ALLFI location.

ALLFI AG - Riedenmatt 1 – CH-6370 Stans

Tel.: +41 41 618 05 05 - Fax: +41 41 618 05 10

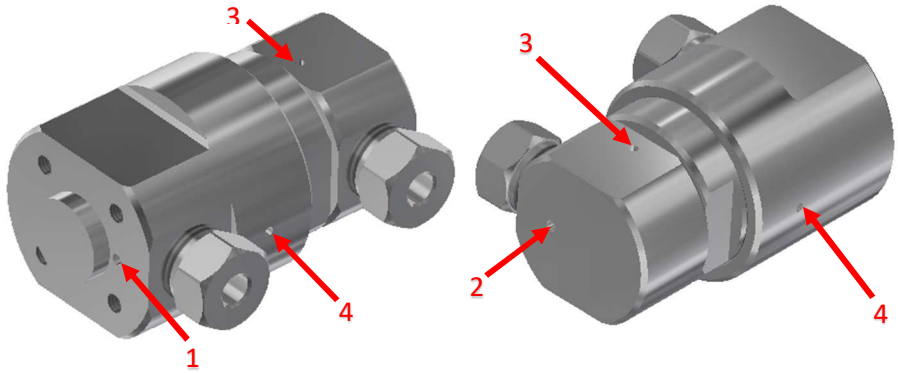
E-Mail: info@allfi.com - http://www.allfi.com

8 Faults and Troubleshooting

Before uninstalling the Swivel Joint Parallel 2.0, release the pressure of the high-pressure pipes and protect them against unexpected re-pressurization

Warning! After any troubleshooting, check the water tightness of the Swivel Joint Parallel 2.0.

8.1 Leakage of the Swivel Joint Parallel 2.0



Pos. of the leakage.	Cause of the leakage	Action	Chapter
1 HP screw connection on cover	Wrong torque of the screw connection	Check torque of screw connection	5.1
	sealing surfaces on HP tube or cover damaged	Check sealing surfaces on HP tube and cover. If parts are damaged, rework or replace	
	Cover broken	Replace cover 90°	7.4
2 HP screw connection on elbow	Wrong torque of the screw connection	Check torque of screw connection	5.1
	sealing surfaces on HP tube or cover damaged	Check sealing surfaces on HP tube and elbow. If parts are damaged, rework or replace	
3 Sealing point shaft - elbow	Wrong torque of the shaft	Check torque of shaft (only by ALLFI service technicians)	7.5
	sealing surfaces damaged	Replace shaft and elbow (only by ALLFI service technicians)	7.5
	Elbow broken	Replace elbow (only by ALLFI service technicians)	7.5
4 Sealing point HP-Seal	HP Seal untighten.	Replace HP Seal	7.3
	Shaft or pressure plate damaged	Replace shaft and pressure plate (only by ALLFI service technicians)	7.5
	sealing surfaces on cover 90° or pressure plate damaged	Replace cover 90° and pressure plate	7.4
	Water pressure too high	Consider application limits	4

8.2 Further troubleshooting

Error	Cause	Action	Chapter
Swivel Joint clogged	pipe dirty	Disassemble, clean and reassemble the swivel joint	7.2 - 7.3
		Use filters	
Swivel Joint is jammed	Bearing defective	Replace bearing (only by ALLFI service technicians)	7.5

9 Recycling

The Swivel Joint Parallel 2.0 is made of metal and plastic. All the metal parts can be recycled. The plastic parts are to be professionally recycled as per local specifications.