Operating and maintenance instruction

Swivel Joint Straight 1/4" 2.0

(4150 bar / 60,000 psi and 6200 bar / 90,000 psi)

Swivel Joint 90° Angle 1/4" 2.0

(4150 bar / 60,000 psi and 6200 bar / 90,000 psi)

Operating and maintenance instruction

ALLFI AG - Riedenmatt 1 – CH-6370 Stans

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Scope of application

The present operating and maintenance instruction is valid for following swivel joints 2.0:

- 921000 Swivel Joint Straight 1/4" 2.0 4150 bar / 60,000 psi
- 921100 Swivel Joint 90° Angle 1/4" 2.0 4150 bar / 60,000 psi
- 921100-I Swivel Joint 90° Angle 1/4" 2.0 4150 bar / 60,000 psi
- 921000-P Swivel Joint Straight 1/4" 2.0 6200 bar / 90,000 psi
- 921100-P Swivel Joint 90° Angle 1/4" 2.0 6200 bar / 90,000 psi
- ST-921100-P Swivel Joint 90° Angle 1/4" 2.0 6200 bar / 90,000 psi

Table of contents

Appendix A – Technical drawing and parts list (shipped with the product)

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 2.0. The manual must be stored in distance as well as always accessible to the persons, working with the Swivel Joint

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:

- Cover Swivel Joint
- Pressure Plate
- HP-Seal
- Shaft to Swivel Joint
- Needle 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
- 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, 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 or 6200 bar / 90,000 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 is the connecting element between a fixed and a rotating high-pressure tube and is therefore approved exclusively for rotating swivels. It must be firmly connected to the machine. The high-pressure tubes must be connected free of stress. Only pure water may be used as the working fluid. The speed is low (< 20 rpm). The technical limit values must always be observed.

2.4 Inadmissible usage

Inadmissible usage of the Swivel Joint includes:

- The usage of ny working fluid other than water
- The addition of other substances to the water
- Closure of the pressure relief holes
- Excessive application of the Swivel Joint
- 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. In case of questions or uncertainties, please contact the manufacturer directly.

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2.5 Residual risks

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

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

2.6 Safety installations

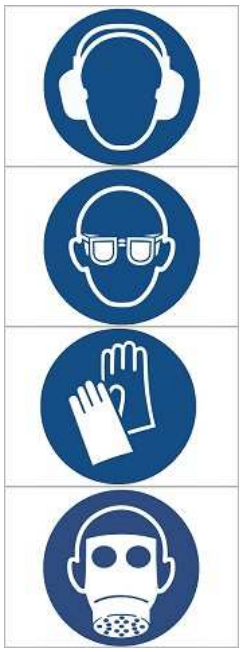
The manufacturer or the operator of the full machine, which the Swivel Joint is built in, has ensured the following safety arrangements:

- Protective devices against flying away parts or escaping liquid with high pressure
- Emergency stop device to interrupt the working process
  - ➔ Active: Manually triggered by operator
  - ➔ Passive: Automatically triggered in case of:
    - Failure of high-pressure components or gross operational malfunctions

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

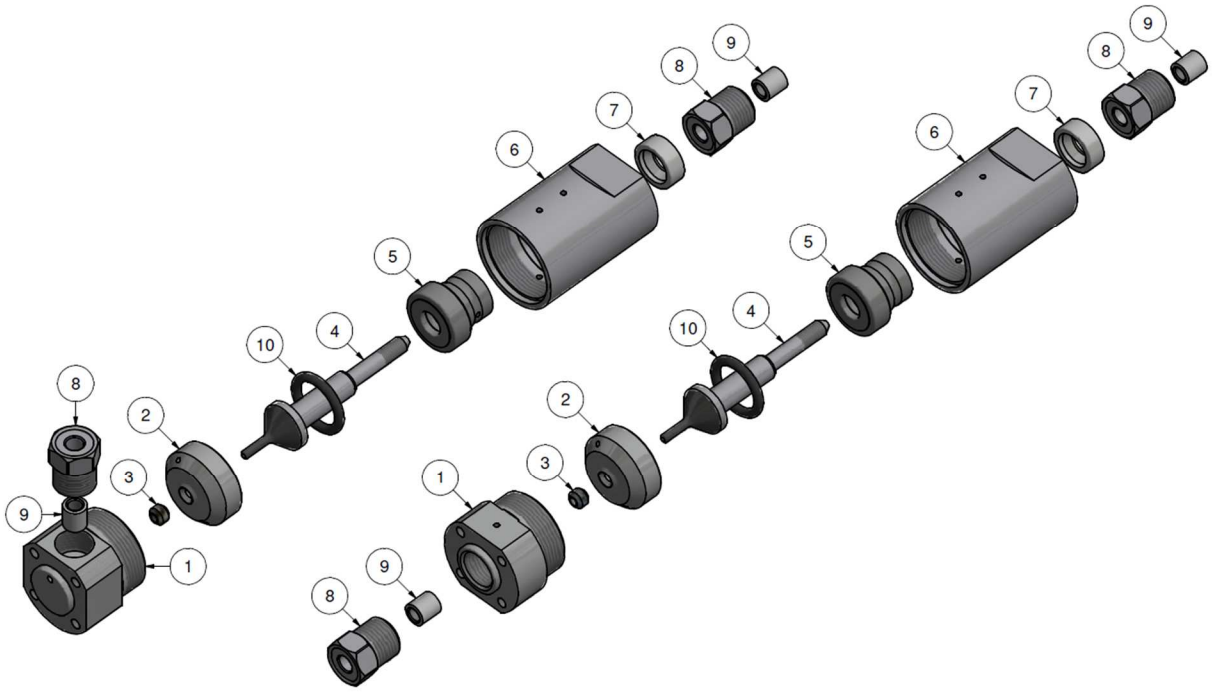
2.8 Qualification of the staff

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

3 Structure and function

3.1 Structure

The swivel joint mainly consists of a housing and a rotatable shaft which is sealed with a high-pressure seal. Thanks to the rolling bearing, this can be rotated with very little force, even at the maximum permissible operating pressure.



Swivel joint 921100/921100-P left and swivel joint 921000/921000-P right

Legend:

1. Cover
2. Pressure Plate
3. HP-Seal
4. Shaft
5. Needle Bearing
6. Case
7. Rotary shaft seal
8. Gland Nut
9. Collar
10. O-Ring

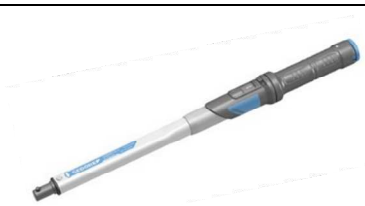
Items 2,3,4,5 7 and 10 can be ordered in a set as spare part-set. (see chapter 3.3)

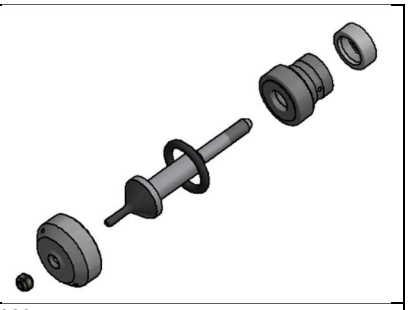
3.2 Function

The swivel joint transmits rotary motion of 1/4" high pressure lines. The swivel joint cannot transmit forces. The maximum allowable operating pressure of water see chapter 4.

3.3 Accessories

		
Article:	Molykote DX Paste	Spanner
Article no:	051055	AF 17 – 000339 AF 32 – 000503 only for 9/16"
Function:	Greasing screw connections and metallic contact areas	

		
rticle:	Torque wrench	Disassembly Tool
Article no:	883000	910078
Function:	Tightens screws with a specific torque	Disassembly HP Seal from Swivel Joint

	
Article:	Wear parts set
Article no:	
890050	for 921000 and 921100
890050-P	for 921000-P, 921100-P and ST-921100-P
Consisting of :	HP-Seal, Pressure plate, shaft, needle bearing, Rotary shaft seal and O-ring.

4 General technical data

Article number	921000/921100	921000-P/921100-P/ ST-921100-P
Maximal working pressure:	4150 bar / 60,000 psi	6200 bar / 60,000 psi
Maximum recommended flow rate:	5 L/min / 1.3 gal/min	3 L/min / 0.8 gal/min
Connection tube diameter:	HP tube 1/4"	HP tube 1/4"
Nominal diameter DN	1.7 mm	1.2 mm
Flow Coefficient Kv/ Cv for water	1.2 l/min / 0.084 gallon/min	0.8 l/min / 0.056 gallon/min
Maximal working temperature:	50 °C	50 °C
Maximal stocking temperature:	60 °C	60 °C
Weight:	approx. 650 g	approx. 600 g

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.

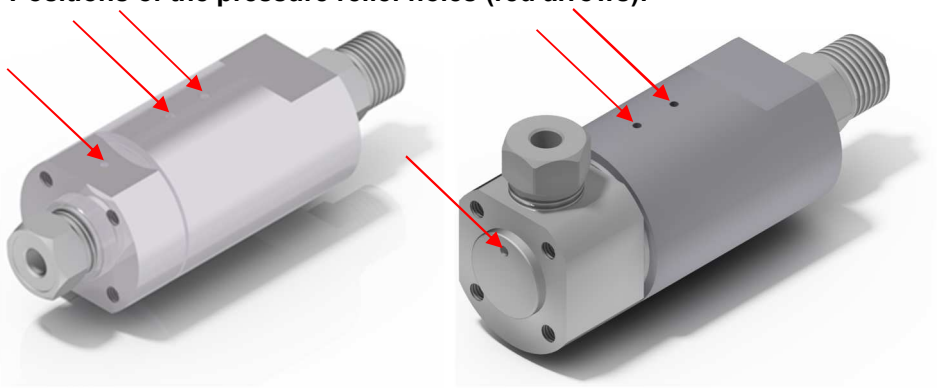
⚠ WARNING

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:

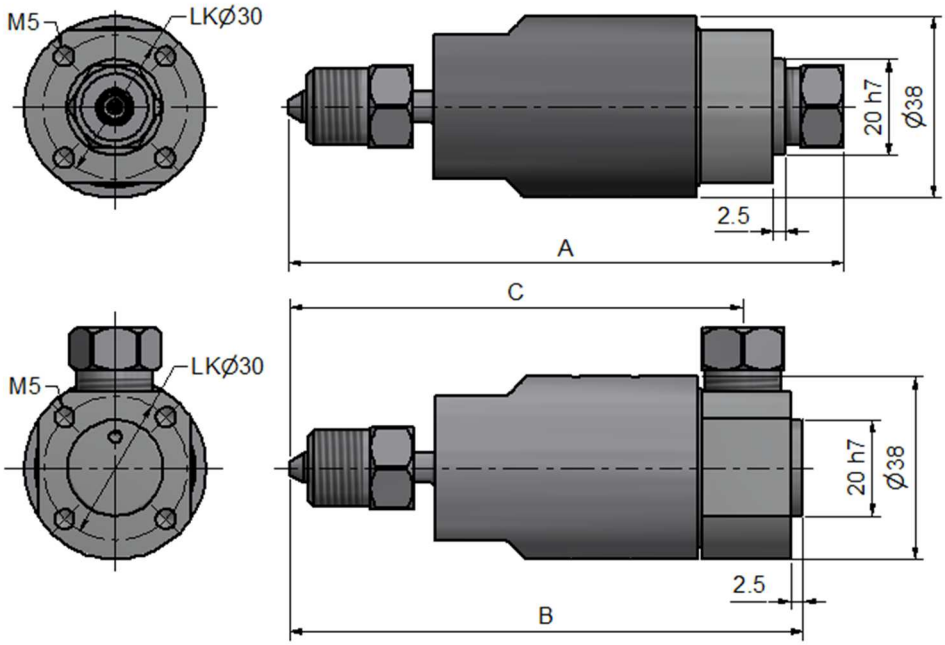
Always grease threads and metallic contact areas with DX-Paste (Article no. 051055). Check appendix A for additional information.

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

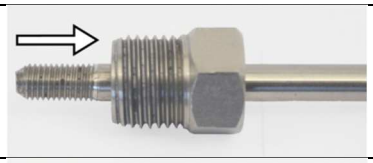
The swivel joint is attached to the machine with the four M5 threads. Further fastening options must be discussed with the manufacturer.



item number	A	B	C
921000	124		
921100		112	99.5
921000-P	116.3		
921100-P / ST-921100-P		107.5	95

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

Consider flow direction → see appendix A (drawing that is shipped with the product)

	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 tube and component. (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, release pressure from the HP tubes and protect against unexpected re-pressurizing.

	Remove high pressure line and components. Remove Swivel Joint from machine.

7 Maintenance, Service and Repair

Release the pressure of the high-pressure pipes before opening and protect them against renewed pressurisation

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.

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.

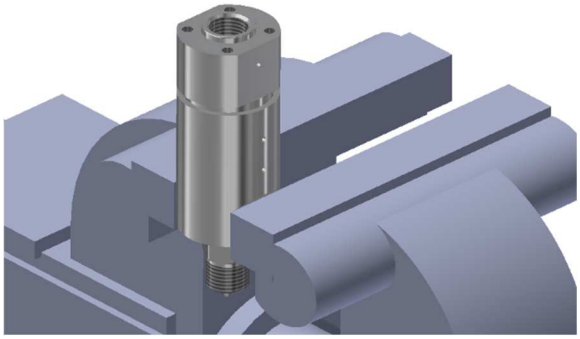
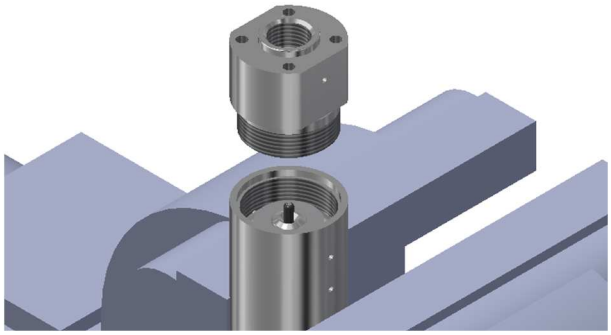
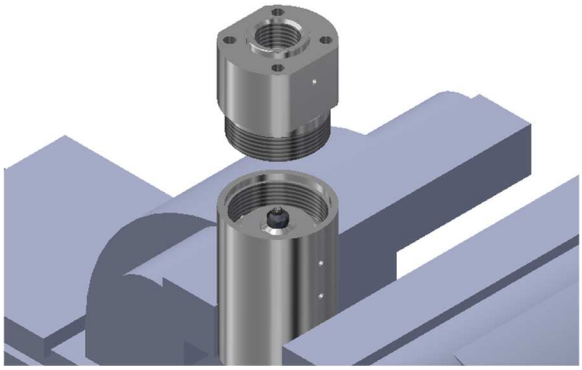
7.1 Regular maintenance

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

The following instructions are described using the Swivel Joint Straight 1/4". The procedure is the same for all other types of Swivel Joint 1/4", unless otherwise noted.

7.2 Replace HP-Seal

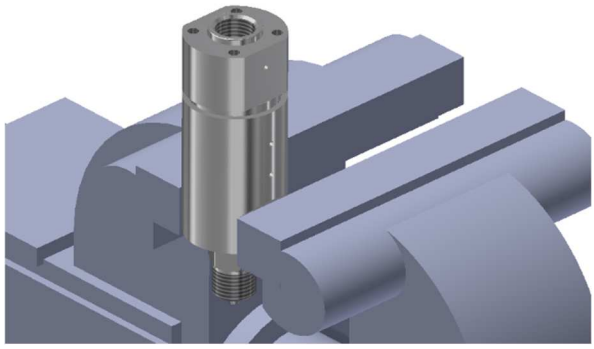
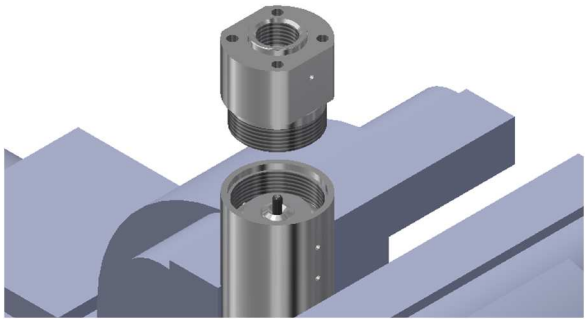
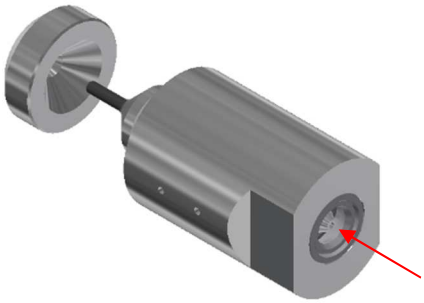
Remove the swivel joint from the machine according to chapter 6. The following pictures show the Swivel Joint Straight, for the Swivel Joint 90° Angle proceed in the same way.

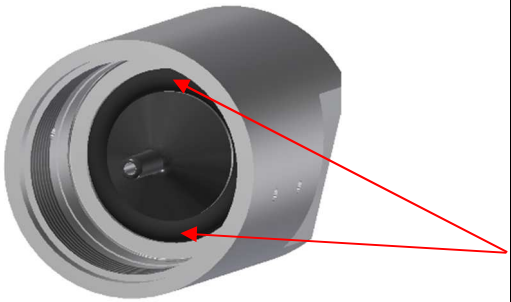
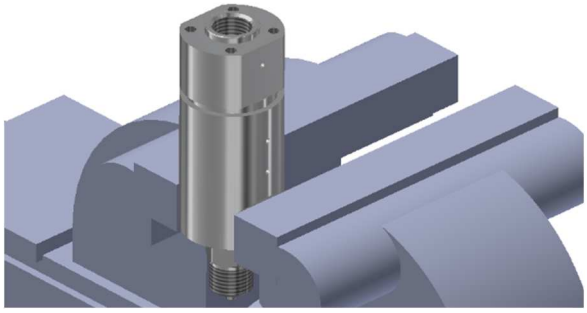
1		Clamp the swivel joint in a vice at the wrench size 30mm. **Attention!** Use protective jaws.
2		Loosen the cover of the swivel joint with an open-ended wrench AF 32. Screw the cover out of the housing.
3		Remove the seal with Disassembly Tool (910078).
4		Grease thread and sealing surface according to appendix A. Push the new HP-seal onto the shaft. Screw on cover. Tighten cover 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.

7.3 Replace cover and pressure plate

Remove the swivel joint from the machine according to chapter 6. The following pictures show the Swivel Joint Straight, for the Swivel Joint 90° Angle proceed in the same way.

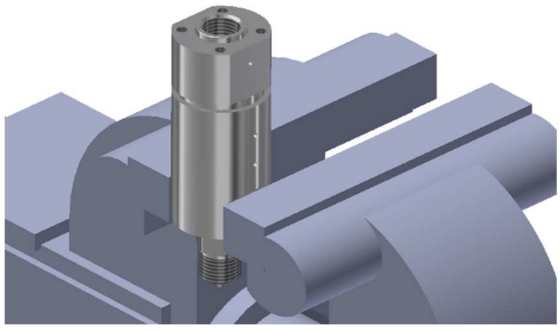
1		Clamp the swivel joint in a vice at the wrench size 30mm. **Attention!** Use protective jaws.
2		Loosen the cover of the swivel joint with an open-ended wrench AF 32. Screw the cover out of the housing.
3		Remove the seal with Disassembly Tool (910078).
4		Remove collar and gland nut
5		The shaft can now be pressed out of the housing without much effort. This also forces the pressure plate out of the housing.

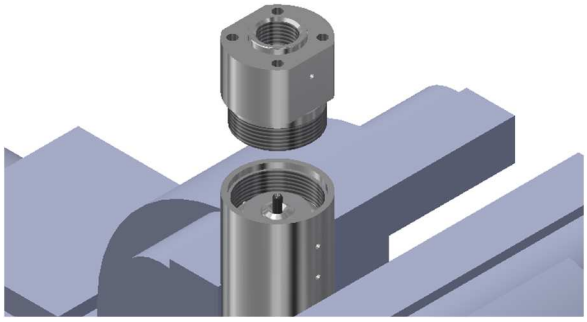
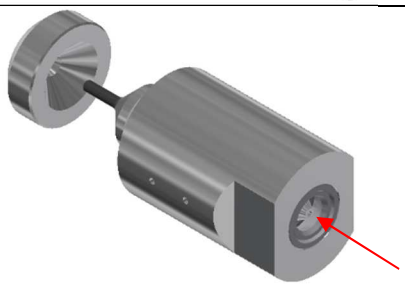
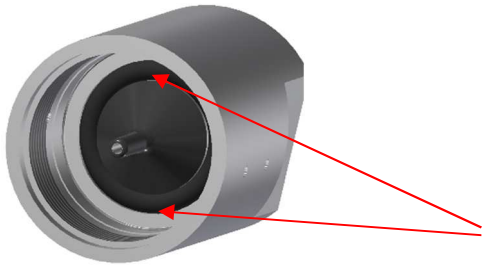
6		Remove the O-ring from the housing if it has not already been ejected with the shaft.
7		Clean housing, shaft and O-ring Grease thread, sealing surface and O-ring according to appendix A. Insert shaft Press the O-ring between the shaft and the housing until it is in contact with the bearing all around.
8		Insert new pressure plate Grease sealing surface according to appendix A. Slide new HP-seal onto shaft, Screw on new cover. Screw collar and gland nut onto shaft
9		Clamp the swivel joint in a vice at the wrench size 30mm. **Attention!** Use protective jaws. Tighten cover with torque wrench to AF 32 (torque see Appendix A).

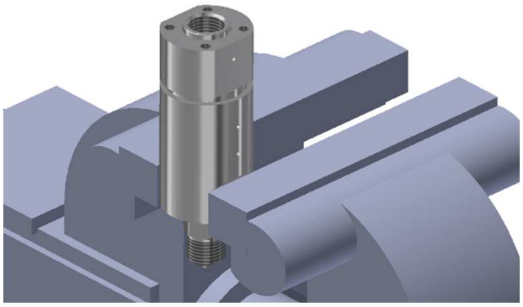
Fix the swivel joint in the machine according to chapter 5.1 and flush according to chapter 5.2.
Check the water tightness of the Swivel Joint.

7.4 Replace shaft and pressure plate

Remove the swivel joint from the machine according to chapter 6. The following pictures show the Swivel Joint Straight, for the Swivel Joint 90° Angle proceed in the same way.

1		Clamp the swivel joint in a vice at the wrench size 30mm. **Attention!** Use protective jaws.

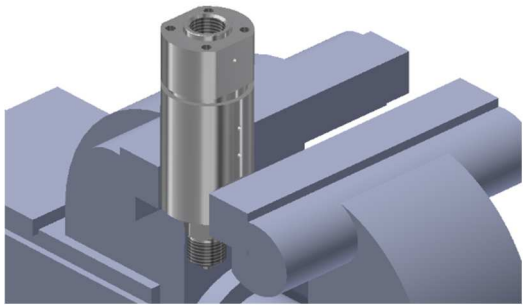
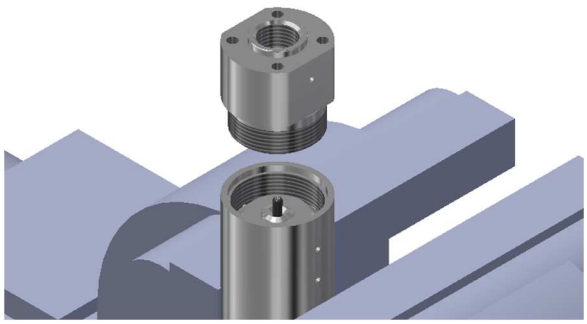
2		Loosen the cover of the swivel joint with an open-ended wrench AF 32. Screw the cover out of the housing.
3		Remove the seal with Disassembly Tool (910078).
4		Remove collar and gland nut
5		The shaft can now be pressed out of the housing without much effort. This also forces the pressure plate out of the housing.
6		Remove the O-ring from the housing if it has not already been ejected with the shaft.
7		Clean housing, cover and O-ring Grease thread, sealing surface and O-ring according to appendix A. Insert new shaft Press the O-ring between the shaft and the housing until it is in contact with the bearing all around.

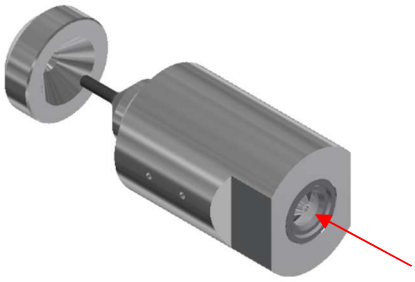
8		Insert new pressure plate, Grease sealing surface according to appendix A. Slide new HP-seal onto shaft, Screw on cover. Screw collar and gland nut onto shaft
9		Clamp the swivel joint in a vice at the wrench size 30mm. **Attention!** Use protective jaws. Tighten cover with torque wrench to AF 32 (torque see Appendix A).

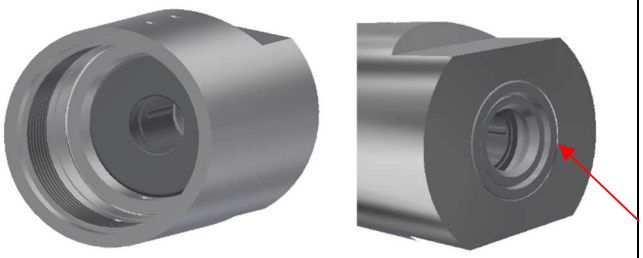
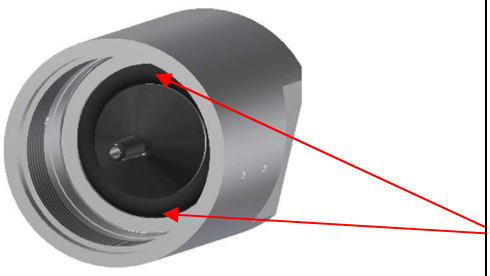
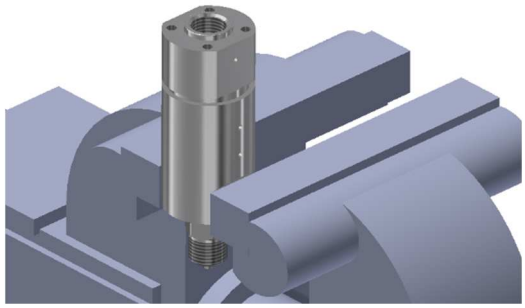
Fix the swivel joint in the machine according to chapter 5.1 and flush according to chapter 5.2.
Check the water tightness of the Swivel Joint.

7.5 Replace needle bearing and rotary shaft seal

Remove the swivel joint from the machine according to chapter 6. The following pictures show the Swivel Joint Straight, for the Swivel Joint 90° Angle proceed in the same way.

1		Clamp the swivel joint in a vice at the wrench size 30mm. **Attention!** Use protective jaws.
2		Loosen the cover of the swivel joint with an open-ended wrench AF 32. Screw the cover out of the housing.

3		Remove the seal with Disassembly Tool (910078).
4		Remove collar and gland nut
		The shaft can now be pressed out of the housing without much effort. This also forces the pressure plate out of the housing.
		Remove the O-ring from the housing if it has not already been ejected with the shaft.
5		Remove the Rotary shaft seal with pliers.
		Press needle bearing out of the housing.

7		Clean the housing, Grease the new needle bearing according to appendix A and push it into the housing up to the stop. Grease the new rotary shaft seal according to appendix A and press it flush into the housing.
8		Clean shaft, pressure plate, cover and O-ring Grease thread, sealing surface and O-ring according to appendix A. Insert shaft Press the O-ring between the shaft and the housing until it is in contact with the bearing all around.
9		Insert pressure plate Grease sealing surface according to appendix A. Slide new HP-seal onto shaft, Screw on cover. Screw collar and gland nut onto shaft
10		Clamp the swivel joint in a vice at the wrench size 30mm. **Attention!** Use protective jaws. Tighten cover with torque wrench to AF 32 (torque see Appendix A).

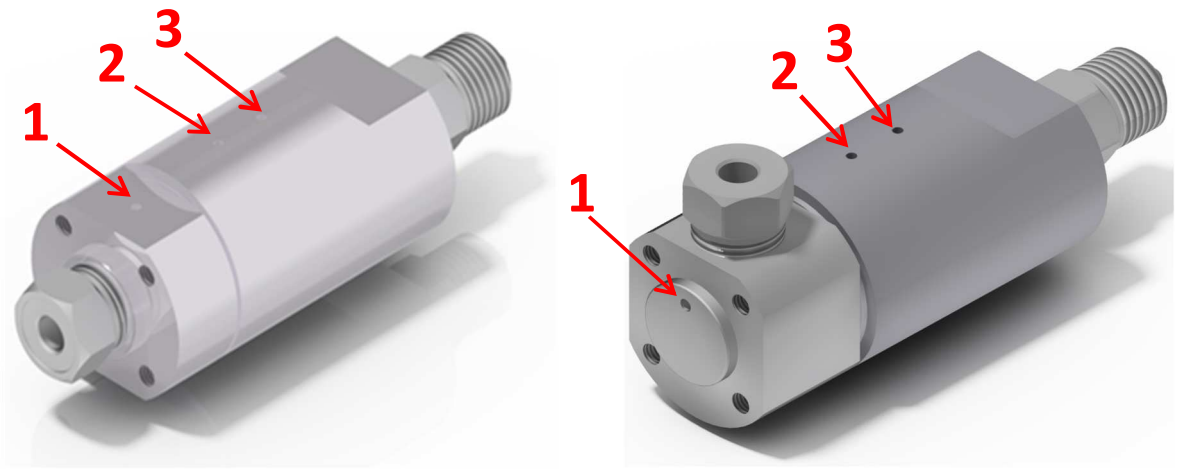
Fix the swivel joint in the machine according to chapter 5.1 and flush according to chapter 5.2.
Check the water tightness of the Swivel Joint.

8 Faults and Troubleshooting

Before uninstalling the Swivel Joint, release pressure from the HP tubes and protect against an unexpected re-pressurizing.

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

8.1 Leakage of the Swivel Joint



Pos. of the leakage.	Cause of the leakage	Action	Chap-ter
1 HP screw connection	Screw connection high pressure tube not tight	Check torque of screw connection	5.1
		Check sealing surfaces on HP tube and Cover. If parts are damaged, rework or re-place	
2 and 3 Sealing point cover - pressure plate and HP-Seal	Sealing between cover and pressure plate un-tighten	Check torque of cover	7.3
		Replace cover and pressure plate	7.3
	HP Seal untighten.	Replace HP Seal	7.2
	Shaft or pressure plate damaged	Replace shaft and pressure plate	7.4
	Water pressure to high	Consider application limits	4

8.2 Further troubleshooting

Error	Cause	Action	Chapter
Swivel Joint clogged	pipe dirty	Disassemble, clean and re-assemble the swivel joint	7.2 - 7.3
		Use filters	
Swivel Joint is jammed	Needle bearing defective	Replace needle bearing and rotary shaft seal	7.5

9 Recycling

The Swivel Joint 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.