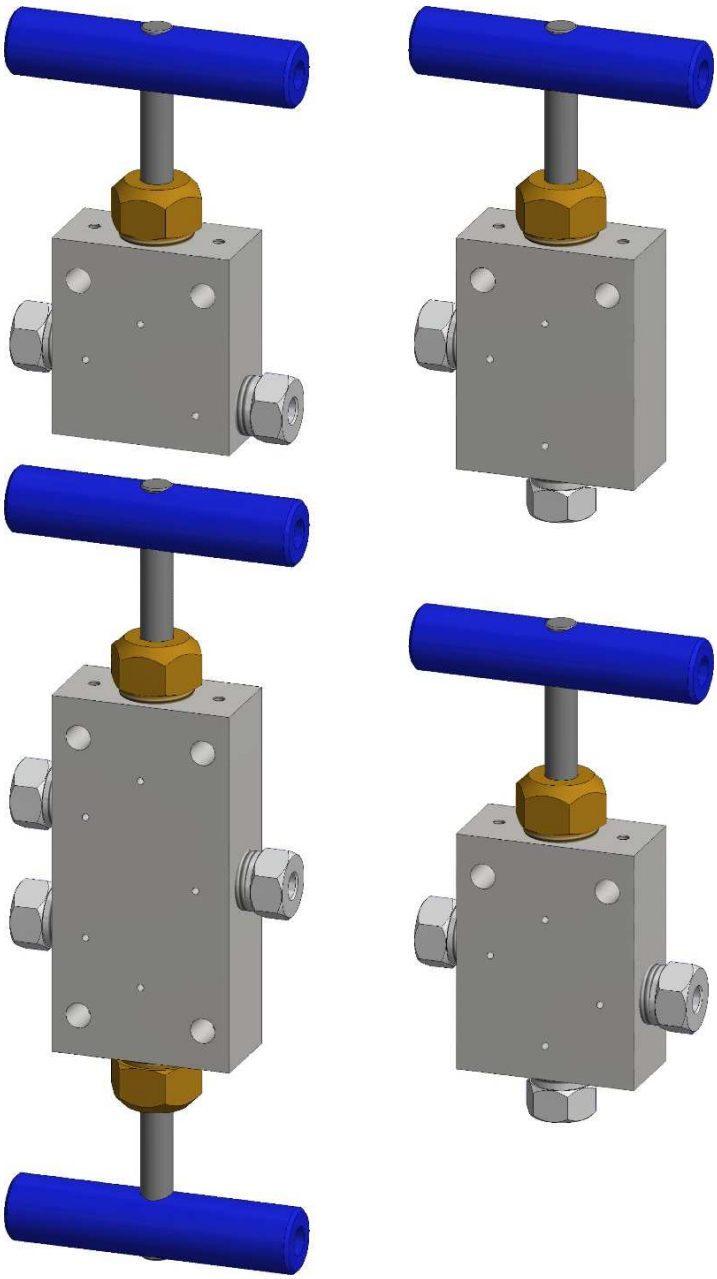
Operating and maintenance instruction

Hand Valve 2.0 (4‘150 bar / 60‘000 psi)



Operating and maintenance instruction

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Scope of application

The present operating and maintenance instruction is valid for all hand valves 2.0 (4‘150 bar / 60‘000 psi).

- 910010
- 910310
- 910610
- 910710
- 910910
- 910110
- 910410
- 901710
- 901010
- 910210
- 910510
- 910810
- 911010
- 911110
- 910010-I
- 910310-I
- 910610-I
- 910710-I
- 910910-I
- 910110-I
- 910410-I
- 901710-I
- 901010-I
- 910210-I
- 910510-I
- 910810-I
- 911010-I
- 911110-I

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

Should you have any questions regarding the content of the 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 2'000 hours of operation

Following spare parts are excluded from the warranty:

- Seal Kit
- Spindle Complete
- Pressure Plate
- Valve Body

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 as a consequence of:

- Inadmissible application of the valve
- 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 hand valve 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 4’150 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.

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 intended use consists in:

- operate the hand valve 2.0 manually
- block the water with a pressure of max. 4’150 bar / 60’000 psi (static applications)
- the fixed installation (no hand guidance) of the hand valve 2.0 to the machine
- if provisions against flying fragments or a leaking liquid with high pressure are made
- if water is used exclusively as working fluid
- if the technical limit values are respected

2.4 Inadmissible usage

Inadmissible usage of the hand valve 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 valve e.g. large fluctuations in pressure
- Exceeding permitted limits
- Operating the valve with demounted or disabled technical protection
- Use the hand valve 2.0 as a cutting head

Likewise, all other uses of the filter 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 hand valve 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

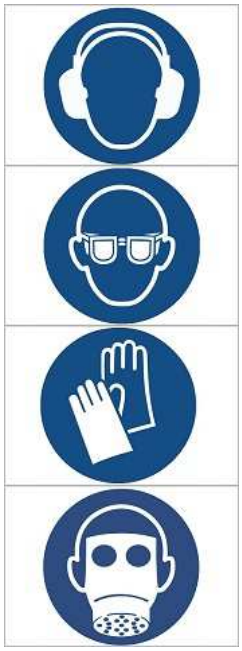
The manufacturer or the operator of the full machine, which the hand valve 2.0 is built in, has ensured the following safety arrangements:

- 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 hand valve 2.0 may only be operated and maintained by certified, trained staff.

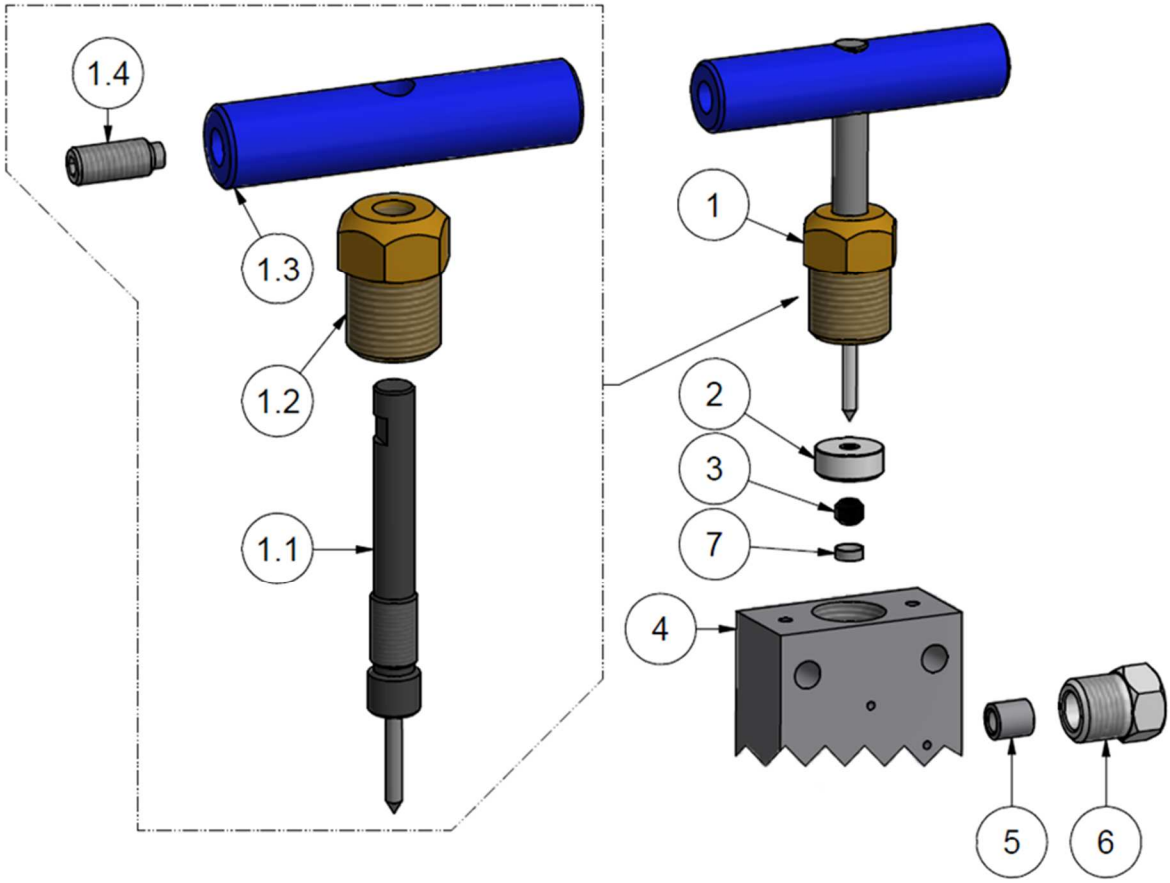
3 Structure and function

3.1 Structure

The hand valve 2.0 is available for 1/4”, 3/8” and 9/16” tubes and as straight, angle, 3-way and 2-stem valve. All hand valves 2.0 use the same spindle.

The valve is also as a pneumatic valve 2.0 normally open and normally closed available (check additional operation and maintenance instruction and article in the web shop.

The explosion view of the hand valve 2.0 is shown below.



Legend:

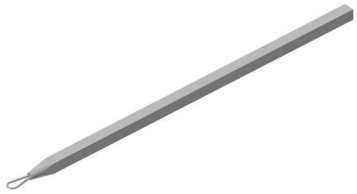
1. Spindle Complete
   1.1. Needle with Spindle
   1.2. Spindle Nut
   1.3. Clamp Handle
   1.4. Screw
2. Pressure Plate
3. HP Seal
4. Valve Body
5. Collar
6. Gland Nut
7. Conical disc

3.2 Function

The hand valve 2.0 is a needle valve. The valve needle is moved by the spindle. The seal kit is replaceable by removing the spindle. The maximal permissible operating water pressure is 4’150 bar / 60’000 psi. The spindle and the needle are a unit and only can be replaced together.

3.3 Accessories

			
Article:	Torque wrench	Spanner	Disassembly Tool
Article no:	000468	AF 17 – 000339 only for 1/4" AF 22 – 000272 for all valves AF 32 – 000503 only for 9/16"	910078
Function:	Tightens screws with a specific torque		Disassembly HP Seal from Valve Body

		
Article:	Molykote DX Paste	Mounting tool for O-ring
Article no:	051055	040011
Function:	Greasing screw connections and metallic contact areas	Conical disc disassembly

4 General technical data

Maximal working pressure:	4‘150 bar / 60’000 psi
Connection tube diameter:	HP Tube 1/4“, 3/8“, 9/16“
Minimum valve diameter:	2.2 mm
Design:	Check appendix B
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.
- Before startup and after inspection or maintenance, check the water tightness of the hand valve 2.0.

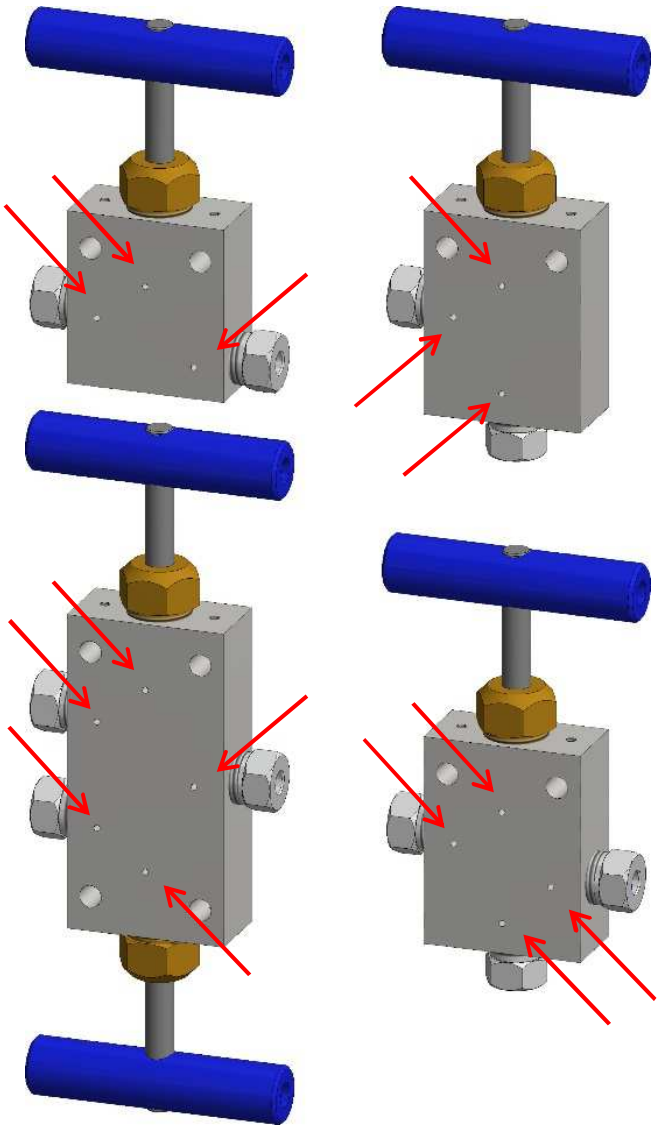
⚠ WARNING

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

By closing the pressure relief holes, the hand valve 2.0 or parts of it may explode.

Therefore: Never close or cover any pressure relief hole.

Positions of the pressure relief holes:



NOTE

Material damage as a result of pitting

Not or insufficient greased threads or contact areas can pit.

Therefore:

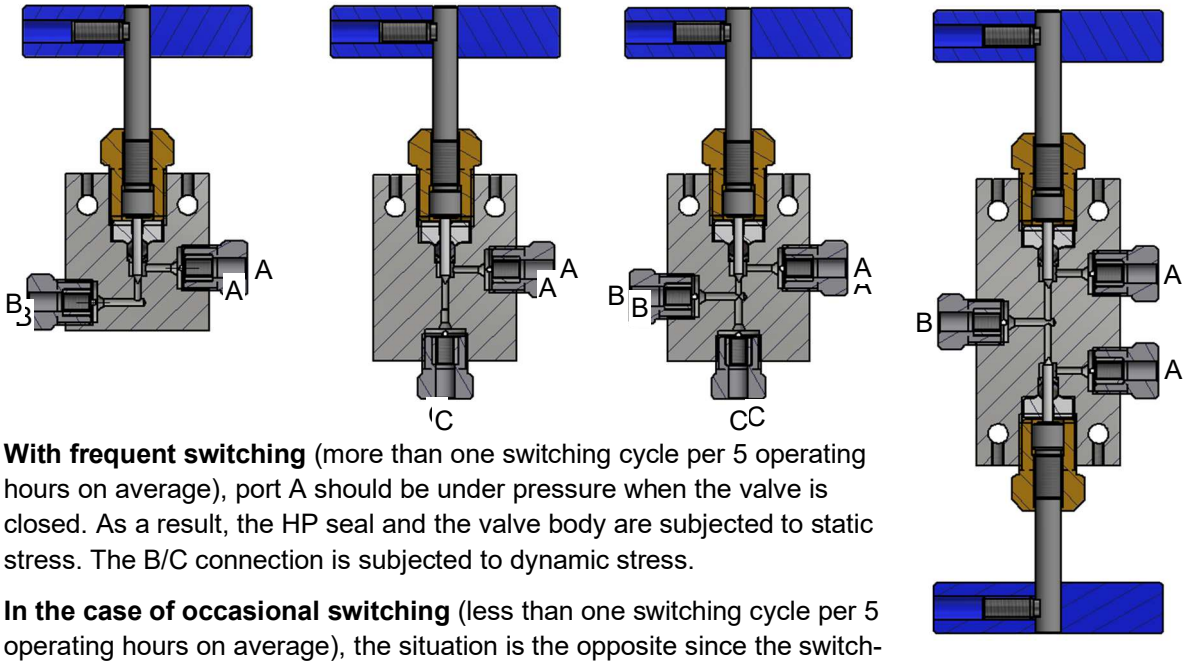
Always grease threads and metallic contact areas with DX-Paste (Article no. 051055). Check appendix A for additional information.

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 Flow direction

The flow direction depends primarily on the pressure conditions in the connected high-pressure pipes. To achieve long service lives, port A should be subjected to as few pressure fluctuations as possible.



With frequent switching (more than one switching cycle per 5 operating hours on average), port A should be under pressure when the valve is closed. As a result, the HP seal and the valve body are subjected to static stress. The B/C connection is subjected to dynamic stress.

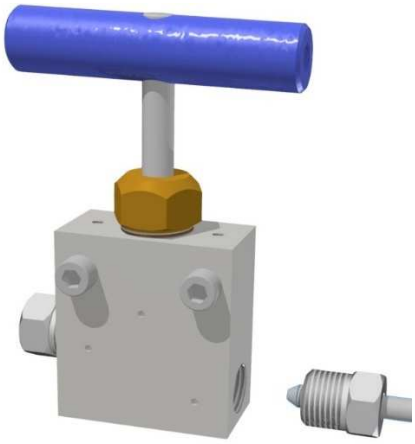
In the case of occasional switching (less than one switching cycle per 5 operating hours on average), the situation is the opposite since the switching cycles are less important than the pressure fluctuations in the line network. When the valve is closed, port B/C should be under pressure. The HP seal and the sealing area of the valve body are therefore not exposed to pressure fluctuations.

The above information on the switching cycles are rough guide values. In case of doubt, it is recommended to contact the supplier. The same also applies to applications where both A and B/C may be under pressure when the valve is closed.

5.2 Installation

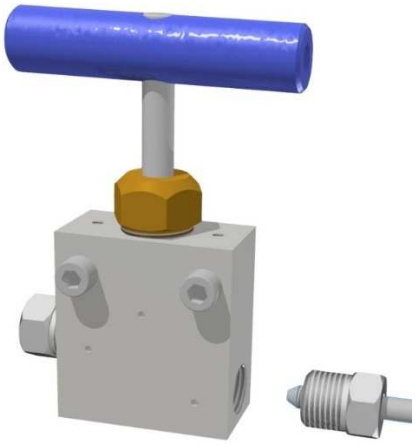
During installation, ensure that none of the pressure relief holes are closed!

Consider flow direction → see chapter 5.1

	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.
	fix the hand valve 2.0 with two/four screws M6 (M5 for imperial 1/4“ and imperial 3/8“) to the machine. Connect the high-pressure line to the hand valve 2.0 (torque see appendix A)

6 Deinstallation

Before uninstalling the hand valve 2.0, release pressure from the HP tubes to avoid unexpected re-pressurizing.

	Remove HP tube. Remove the hand valve 2.0 from the machine.

7 Maintenance, Service and Repair

It's not necessarily to unmount the hand valve 2.0 from the machine. Usually the maintenance is easier if the HP tubes are removed and the hand valve 2.0 is unmounted from the machine.

The hand valve 2.0 requires little maintenance expenditure. The lifetime of the sealing, the needle and the valve body depend on the actuation frequency, the pressure and the pressure fluctuations. Preventive maintenance is not possible. Constant leakage may damage the product. Immediately eliminate leakages

NOTE
Material damage or leakage as a result of fouling Dirty components, especially considering the threads, may lead to leakages and may damage the hand valve 2.0. **Therefore:** Ensure a proper cleaning of the components.

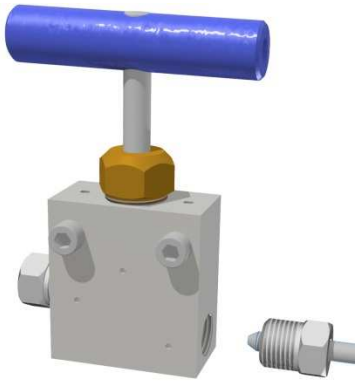
NOTE
Possible damage as a result of direct transfer of the torque to the HP tubes Loosening or tightening the spindle nut (pos. 1.2 on page 10) without fixing the valve body can lead to damages on the tube connections **Therefore:** Hold valve body when loosening or tightening the spindle nut (pos. 1.2 on page 10) with an open-end wrench.

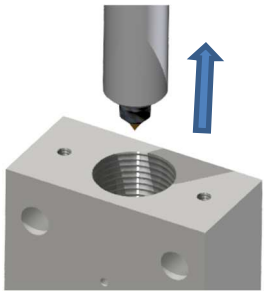
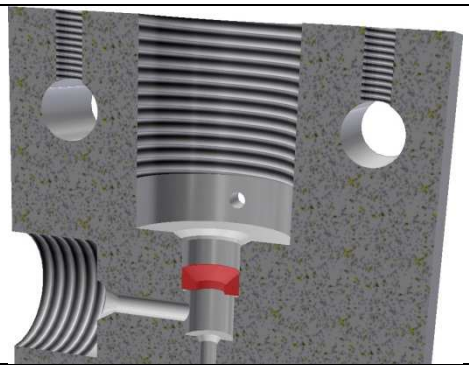
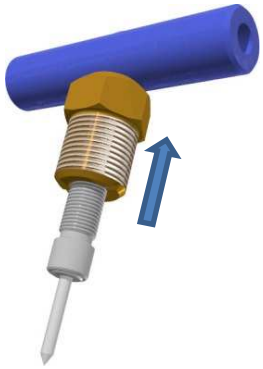
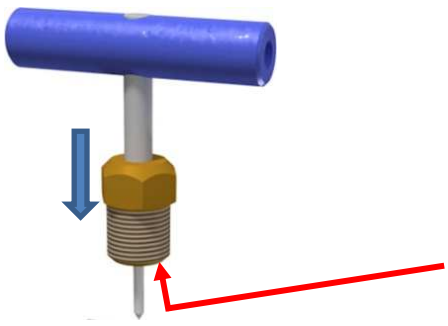
NOTE
Property damage as a result of pitting Threads that are not greased or insufficiently greased may pit. **Therefore:** Always grease threads and metallic contact areas with DX-Paste (Article no. 051055). Check appendix A for additional information.

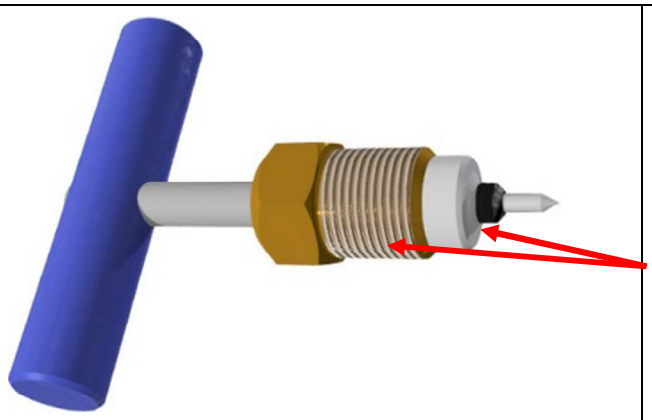
The following instructions are described using the hand valve 2.0 straight. The procedure is the same for all other types of hand valves 2.0.

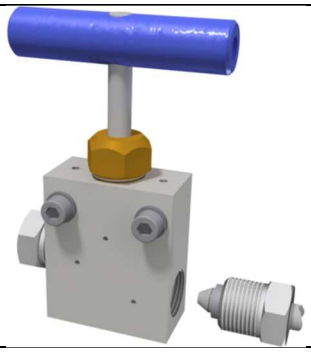
7.1 Replace Seal

Release pressure of the HP tubes before opening and protect against re-pressurization

1		Disconnect the high-pressure line.
2		Disconnect the hand valve 2.0 from the machine. Fix it in bench vice. **Attention!** Use protective jaws.
3		Screw clamp handle anticlockwise until the valve is completely open.
4		Screw spindle nut anticlockwise with open-end wrench (AF22) and removed spindle complete.

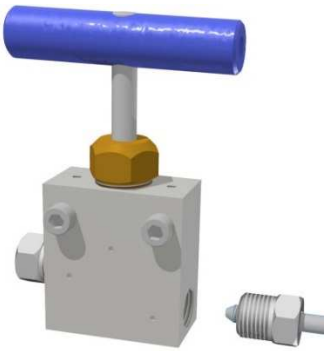
5		Remove pressure plate with a plier.
6		Remove HP seal with disassembly tool 910078.
7		Check that the conical disc (marked red in the picture) is in the correct position.
8		Screw and push the spindle nut back until it touches the clamp handle. Grease the spindle according appendix A
9		Screw the spindle nut in the opposite direction as much as possible. **Attention:** If the spindle nut is not screwed as much as possible away from the clamp handle. The needle will be damaged during assembling. Grease the surface of spindle nut as shown by red arrow

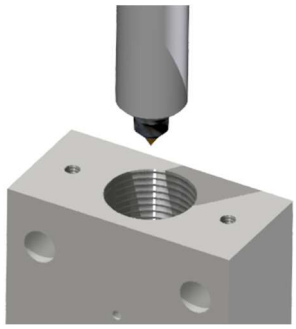
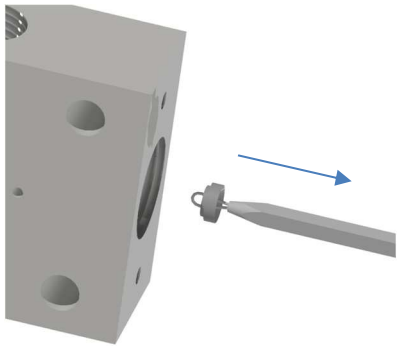
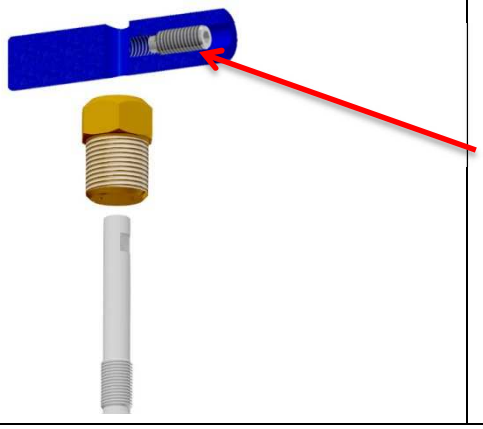
10		press pressure plate and new HP seal over the needle. Grease pressure plate and thread of spindle nut according appendix A.
11		Screw spindle in valve body.
12		Tighten the spindle nut with the torque wrench AF22 (torque see appendix A).
13		Fix the hand valve 2.0 on the machine. **Attention!** Note flow direction.

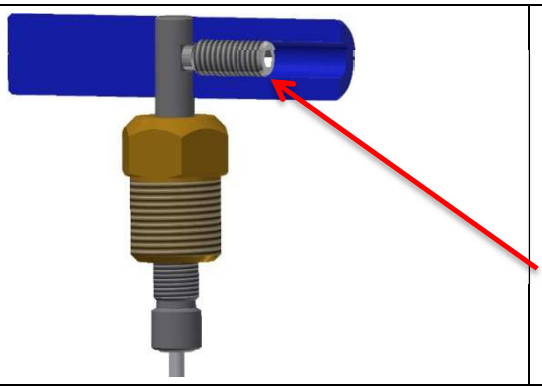
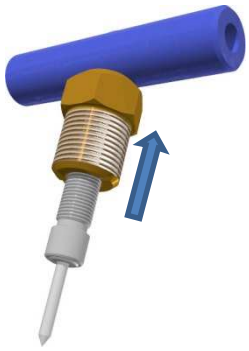
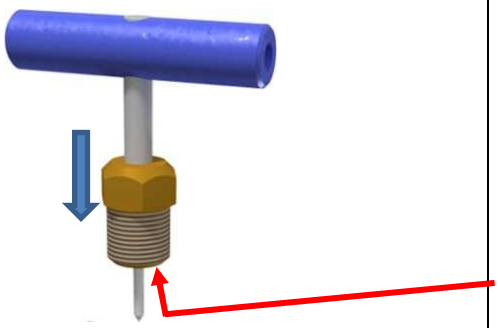
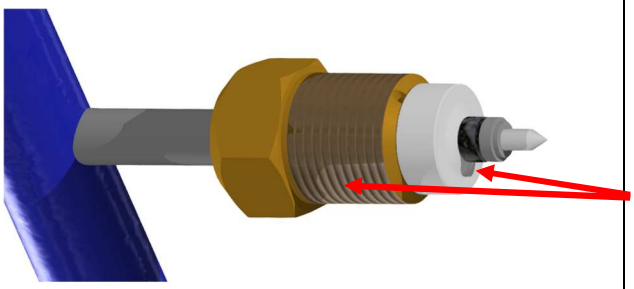
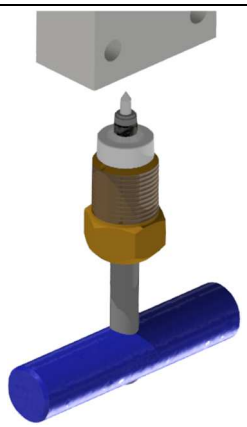
14		Connect the high-pressure line to the hand valve 2.0 (torque see appendix A)

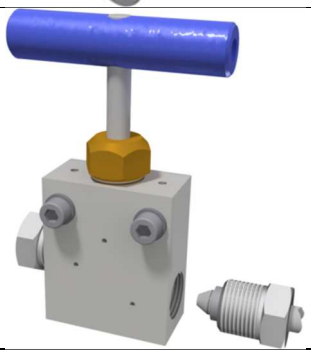
7.2 Replace Sealing kit

Release pressure of the HP tubes before opening and protect against re-pressurization

1		Disconnect the high-pressure line.
2		Disconnect the hand valve 2.0 from the machine. Fix it in bench vice. **Attention!** Use protective jaws.
3		Screw clamp handle anticlockwise until the valve is completely open.

4		Screw spindle nut anticlockwise with open-end wrench (AF22) and removed spindle complete.
5		Remove pressure plate with a plier.
6		Remove HP seal with disassembly tool 910078.
7		Remove valve body from bench vice Remove conical disk with Mounting tool
8		Unscrew 2 turns the screw M8 in the clamp handle. Remove the spindle and the spindle nut from the clamp handle.

9		Assemble new spindle with spindle nut and clamp handle. Check position of the flat on the spindle to the screw Tight the screw M8 in the clamp handle (torque see appendix A).
10		Screw and push the spindle nut back until it touches the clamp handle. Grease the spindle according appendix A
11		Screw the spindle nut in the opposite direction as much as possible. **Attention:** If the spindle nut is not screwed as much as possible away from the clamp handle. The needle will be damaged during assembling. Grease the surface of spindle nut as shown by red arrow
12		Press new pressure plate, new HP seal and new conical disk over the needle. Grease pressure plate and thread of spindle nut according appendix A
13		Screw spindle into valve body from below.

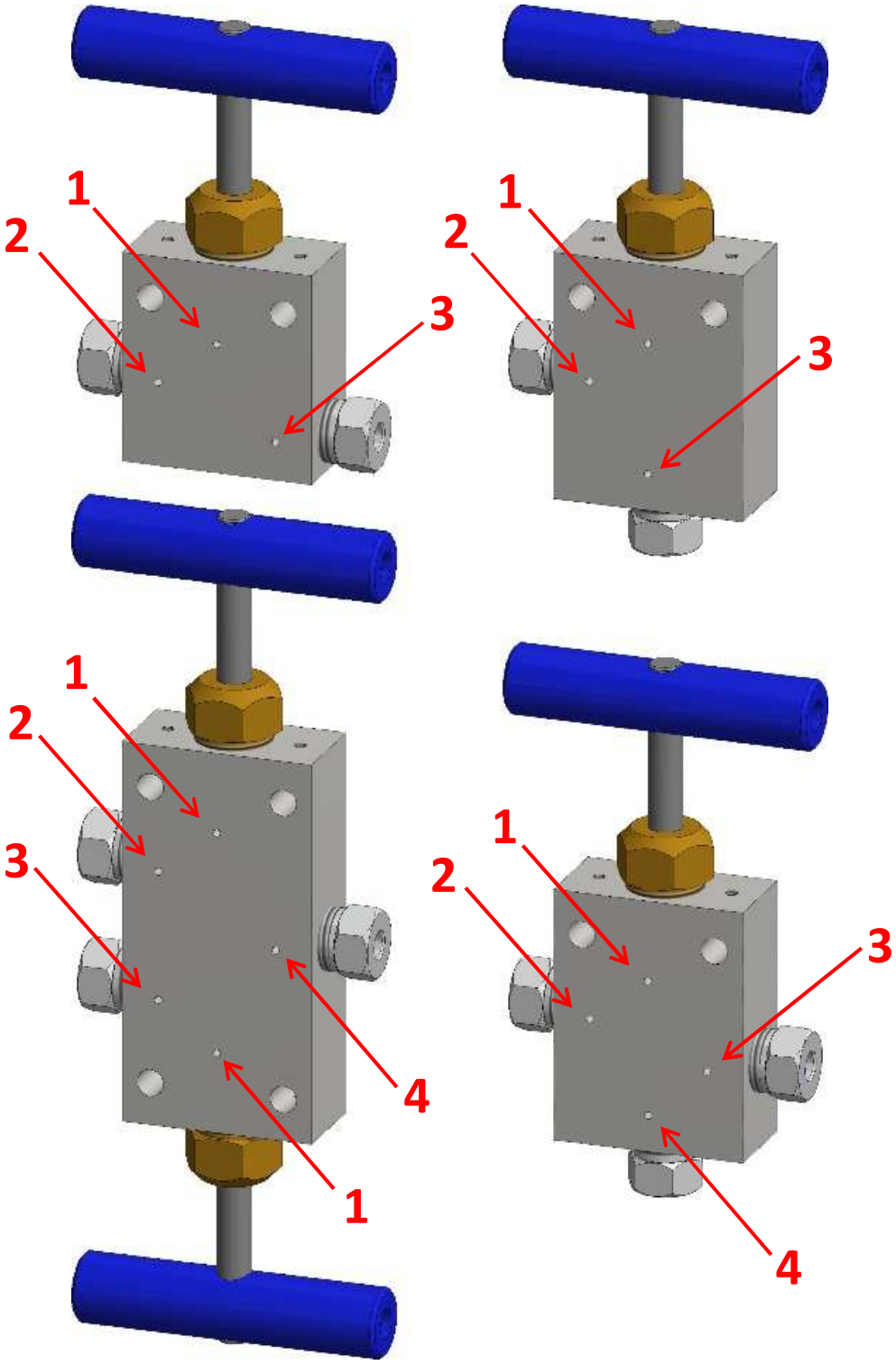
14		Fix valve body in bench vice again. Tighten the spindle nut with the torque wrench AF22 (torque see appendix A).
15		Fix the hand valve 2.0 on the machine. **Attention!** Note flow direction.
16		Connect the high-pressure line to the hand valve 2.0 (torque see appendix A)

8 Faults and Troubleshooting

Before uninstalling the hand valve 2.0, release pressure from the HP tubes and protect against an unexpected re-pressurizing.

Warning! After any troubleshooting, check the tightness of the hand valve 2.0.

8.1 Leakage of the hand valve 2.0



Pos.	Cause of the lockage	Action	Chapter
1	HP Seal untight.	Check moment of force	
		Replace HP seal	7.1
2,3,4	Screw connection high pressure tube not tight	Tighten screw	5.1

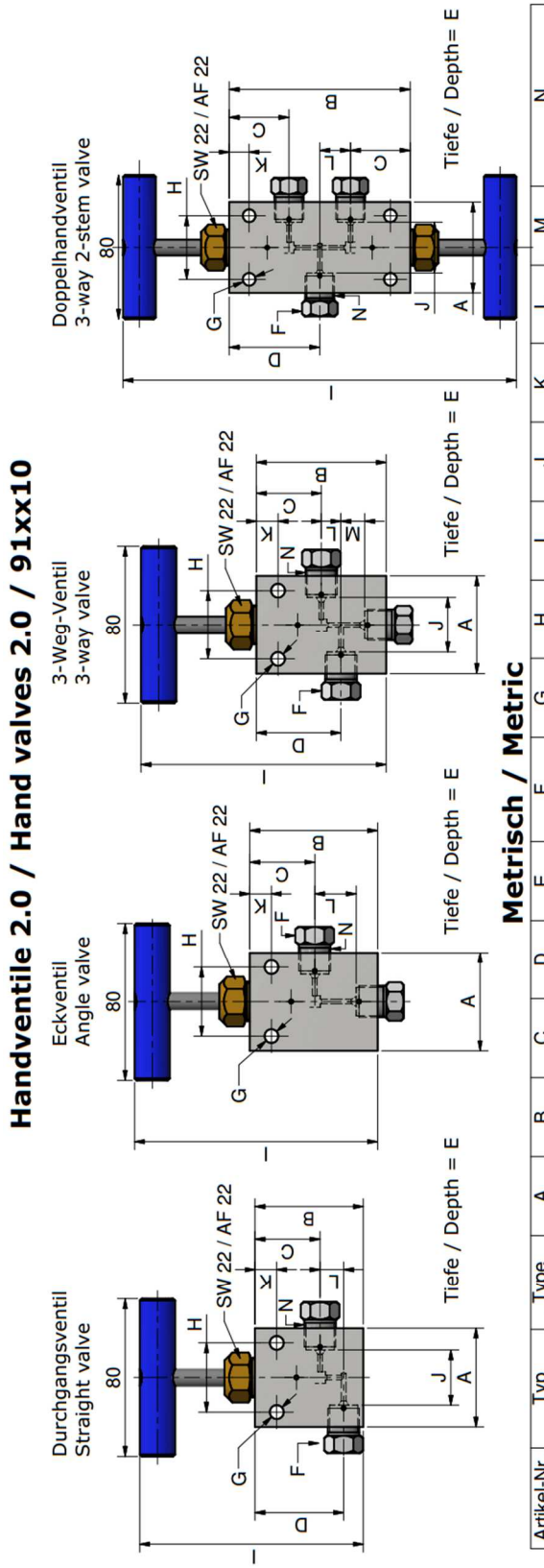
8.2 Further troubleshooting

Error	Cause	Action	Chapter
Hand valve 2.0 doesn't close properly / completely	Spindle not properly closed	Close valve with clamp handle	
	Valve seat and/or needle conus damaged	Replace seal kit and/or valve body	7.1
Spindle / Clamp Handle rough running	Spindle thread damaged	Replace seal kit and spindle nut	7.2
	Insufficient lubrication	Grease parts according appendix A	

9 Recycling

The hand valve 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.

10 Appendix B



Metrisch / Metric

	Artikel-Nr.	Typ	Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1/4"	910010	durchgang	Straight	50	55	33	45	25	SW/AF 17	7	35	114	28	11	12	-	M16 x 1.5
	910310	eck	Angle	50	65	33	-	25	SW/AF 17	7	35	124	-	11	21	-	M16 x 1.5
	910610	3-Weg	3-way	50	66	33	43	25	SW/AF 17	7	35	125	28	11	10	12	M16 x 1.5
	910910	doppelhand	2-stem	50	100	33	50	25	SW/AF 17	7	35	217	28	11	17	-	M16 x 1.5
3/8"	910110	durchgang	Straight	50	60	33	45	25	SW/AF 22	7	35	119	20	11	12	-	M20 x 1.5
	910410	eck	Angle	50	68	33	-	25	SW/AF 22	7	35	127	-	11	20	-	M20 x 1.5
	910710	3-Weg	3-way	50	69	33	43	25	SW/AF 22	7	35	128	20	11	10	11	M20 x 1.5
	911010	doppelhand	2-stem	50	100	33	50	25	SW/AF 22	7	35	217	20	11	17	-	M20 x 1.5
9/16"	910210	durchgang	Straight	70	75	33	53	38	SW/AF 32	7	50	134	30	6	20	-	M30 x 2
	910510	eck	Angle	70	73	33	-	38	SW/AF 32	7	50	132	-	6	20	-	M30 x 2
	910810	3-Weg	3-way	70	77	33	45	38	SW/AF 32	7	50	136	30	6	12	12	M30 x 2
	911110	doppelhand	2-stem	70	112	33	56	38	SW/AF 32	7	50	229	30	6	23	-	M30 x 2

Imperial

	Artikel-Nr.	Typ	Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1/4"	910010-I	durchgang	straight	50	55	33	45	25	SW/AF 17	5.5	35	114	27	10	12	-	9/16" - 18 UNF
	910310-I	eck	angle	50	60	33	-	25	SW/AF 17	5.5	35	119	-	10	15.5	-	9/16" - 18 UNF
	910610-I	3-Weg	3-way	50	66	33	43	25	SW/AF 17	5.5	35	125	27	10	10	11.5	9/16" - 18 UNF
	910910-I	doppelhand	2-stem	50	87	33	43.5	25	SW/AF 17	5.5	35	204	27	10	10.5	-	9/16" - 18 UNF
3/8"	910110-I	durchgang	straight	50	57	33	43	25	SW/AF 22	5.5	35	116	18	10	10	-	3/4" - 16 UNF
	910410-I	eck	angle	50	66	33	-	25	SW/AF 22	5.5	35	125	-	10	17	-	3/4" - 16 UNF
	910710-I	3-Weg	3-way	50	69	33	43	25	SW/AF 22	5.5	35	128	18	10	10	10	3/4" - 16 UNF
	911010-I	doppelhand	2-stem	50	95	33	47.5	25	SW/AF 22	5.5	35	212	18	10	14.5	-	3/4" - 16 UNF
9/16"	910210-I	durchgang	straight	66	64	33	45	38	SW/AF 32	7	35	123	26	10	12	-	1/8" - 12 UNF
	910510-I	eck	angle	66	71	33	-	38	SW/AF 32	7	35	130	-	10	18	-	1/8" - 12 UNF
	910810-I	3-Weg	3-way	66	79	33	45	38	SW/AF 32	7	35	138	26	10	12	14	1/8" - 12 UNF
	911110-I	doppelhand	2-stem	66	105	33	52.5	38	SW/AF 32	7	35	222	26	10	19.5	-	1/8" - 12 UNF

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