Operating and maintenance instructions for type AF90D / AF94D / AF96D ball valves

General information

The following operation instructions are valid for soft seated ball valves type AF90D/AF94D/AF96D.
At correct assembly, maintenance and repair we guarantee a trouble- free function. If the operation- and maintenance manual is not followed correctly, the manufacturer is not responsible for the efficiency and safety of the valves.
The ball valves must not be operated above the limits and rules indicated in the different documents (e.g. operation rules, purchase documents, datasheets). Operation above the indicated limitations can damage the ball valve and finally destroy them.
The descriptions and rules included in this operation- and maintenance manual refer to standard types but apply at the same time for special designs and related constructions.

However, these operating instructions do not take into consideration any:

- Possible accidents and disruptions that could arise due to improper assembly, operation and commissioning. Breaches of safety regulations related to the place where the ball valve is installed.
- The operator is responsible for complying with on-site safety requirements – and also ensuring that assembly personnel comply with them.

The operating and assembly instructions for all other devices installed in connection with the valves must also be observed and complied with, but these are not part of these operating and maintenance instructions.
These operating and maintenance instructions contain important information for the professional assembly, operation, maintenance and commissioning of the described valves.
They must be read by specialist personnel and taken into consideration before assembling and commissioning the system. It is not only the general safety regulations that must be observed, but also all other regulations and rules in the following chapters.

	**A failure to comply with these warnings can lead to injuries and malfunctions or even destruction of the valve and other equipment and machinery; injuries can be caused by leaking media (e.g. cold/heat, poisonous medium properties…).** **Improper use can permanently impair the product properties during operation or even render the valves unusable.**

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Information on these operating instructions

The safety information in these operating instructions aims to avoid accidents or injuries.

Dangers that can arise if safety instructions are not observed

A failure to observe the safety instructions may result in damage to people, the environment and the valve itself. Any claims under liability insurance may then also be lost.

A failure to observe the safety instructions can result in the following dangers:

- Breakdown of important device functions
- Failure of the prescribed procedures for commissioning the valve
- Danger to persons due to electrical, mechanical and chemical influences
- Leakages can cause environmental damage

Working with an awareness of safety

The safety requirements contained in these instructions comply with the accident prevention regulations in Switzerland. The operator must observe further rules and regulations for the prevention of accidents during operation and compliance with the occupational health and safety guidelines in the respective country of destination.

Safety instructions for the operator

There is always a risk of injury if hot or cold valve parts can be touched. It must be ensured that such parts cannot be touched without protection.

- The touch protection for movable valve parts (e.g. couplings) may not be removed when the systems and/or valve are in operation!
- Leakages (e.g. from switching shafts or seals) of dangerous delivery media (explosive, poisonous, hot) must be removed in such a way that there is no danger to life. Troubleshooting must be initiated and any issues rectified.
- Injuries through electrical energy must be excluded (please refer to the regulations of the local energy supply companies for details on this point).

Valves for higher or lower temperatures (>50°C or < 0°C) must be protected against unintentional contact (e.g. insulation) or at least clearly labelled with a warning sign.

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Safety instructions for assembly, commissioning and maintenance

It must be ensured that assembly, commissioning and maintenance of the valves is performed by specialist trained personnel with due consideration of these operating and maintenance guidelines. Work may only be performed on the valve when the system is in downtime, it is cooled and pressureless and the evaporation temperature of the medium is lower than all parts of the valve touched by the medium. The switching ball must be put in a 45° position.

Opening the valves under pressure can be fatal!

Valves that came into contact with products/media that are harmful to health must be decontaminated before starting to perform any work. All safety and protection measures must be reactivated as soon as the work has been completed. Before commissioning the valve, the requirements outlined in the “Commissioning” section must be observed.

Reassembly and procurement of replacement parts

Conversions or modifications of valves are only permissible after consultation with the manufacturer. The use of original replacement parts and accessories approved by the manufacturer supports the functionality and safety of the valve. If damage occurs through the use of other non-original parts, the liability insurance may refuse to pay out.

Scope

The type AF90D / AF94D / AF96D ball valves described in these instructions include the following designs:

Dimension nominal	Pressure nominal
DN15-DN150	PN16/40, PN16, PN40

Casing material: 1.4408 / 1.0619
Standard ball seats: PTFE (virgin), RPTFE (glass reinforced), C-PTFE (PTFE Graphite)
Other materials (e.g. TFM®-1600 or PEEK®) on request

Intended use

Generally, Ball valves are stop valves for "Open / Close" - operation. The correct using and the correct design of the valves (e.g. body material, type of seat seal etc.) depend on the process conditions. Those must be clarified prior ordering and mounting into a plant with the supplier / manufacturer. Amended process conditions may lead to a different construction / design of the ball valve.

Impermissible types of operation

Safe operation can only be guaranteed if the valve is integrated, mounted, installed and used in line with the general provisions of these operating regulations. The technical limits can be seen in the technical documentation and must not be exceeded. The usage limits are also stated again below.

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Areas of use

Material, pressure, temperature

Casing material for DIN 1.0619 -30°C up to +250°C
Casing material for DIN 1.4408: -196°C bis max.+250°C
(depends on the seat material used)

It is important to note that the ball valves with a body material of 1.0619 will not used for aggressive and corrosive media. Working conditions below -30°C are not recommend. In this connection the embrittlement (mechanical strength properties) is most important and must be considered. The correct material selection is up the operator only. The ball valves, type AF90D/AF94D/AF96D fulfill the industrial valves standard EN1983.

The working temperatures depend on the used seat materials (p / T diagram in the data sheet) and on the flange standard EN1092-1 (Pressure-Temperature-Relation). The lower temperature has to be selected.

Pressure-temperature allocations per flange norms EN 1092-1 and EN19

Operating temperature TS	ND	1.0619	1.4408
-30°C to +50°C	PN16 **PN40**	PS = 16 barg **PS = 40 barg**	PS = 16 barg **PS = 40 barg**
+50°C to +100°C	PN16 **PN40**	PS = 14.8 barg **PS = 37.1 barg**	PS = 16 barg **PS = 40 barg**
+100°C to +150°C	PN16 **PN40**	PS = 14 barg **PS = 35.2 barg**	PS = 14.5 barg **PS = 36.3 barg**
+150°C to +200°C	PN16 **PN40**	PS = 13.3 barg **PS = 33.3 barg**	PS = 13.4 barg **PS = 33.7 barg**
+200°C to +250°C	PN16 **PN40**	PS = 12.1 barg **PS = 30.4 barg**	PS = 12.7 barg **PS = 31.8 barg**

TS: maximum permissible temperature
PS: maximum permissible pressure

Low temperature applications

The ball valve with a stainless steel casing can be used for low temperature applications. Separate operating instructions and handling instructions from the operator and assembly company must be taken into consideration.

Potentially explosive areas

The ball valve does not have its own effective ignition source. However, to prevent electrostatic charging in general, the ball valve must be electrically connected to other system components (potential equalisation). See also “ATEX declaration of conformity”

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Torques

Breakaway torques in Nm for a differential pressure Δp = 0 to 10 bar and seat with lubricating media

Dimension nominal	Seating material		
	PTFE	RPTFE	CPTFE
DN15	12	12	16
DN20	13	13	17
DN25	16	16	21
DN32	24	24	32
DN40	44	44	58
DN50	55	55	72
DN65	60	60	78
DN80	90	90	117
DN100	130	130	169
DN125		216	
DN150		300	

For Explanation:

PTFE: PTFE virgin
RPTFE: PTFE glass -reinforced
CPTFE: PTFE with 25% carbon

The values include a 20% safety margin for lubricating media. Torques for other seat materials and/or process conditions on request.

The torques were determined at 20°C and with water.
Other process conditions (high temperatures, abrasive, highly viscous media or steam) require a separate design. Please discuss this with the provider!

Operation

Ball valves do not generally require any special operating regulations. However, care must be taken when opening or closing a ball valve under pressure to prevent pressure surges from occurring and causing damage to people and the system. The hand lever on a manually operated ball valve must not be turned beyond the stop by force, otherwise correct sealing (closed position) is no longer guaranteed. Depending on the application and type of seat gasket, it will be necessary sooner or later to replace the ball seats due to wear (see “Maintenance” section).
Abrasive media generally reduce the service life of the seating ring and ball.
Under certain circumstances, adhesive media can completely prevent the ball valve from functioning. In the case of automation, the process conditions (medium properties, temperature, pressure etc.) must be taken into consideration when designing the required drive system.

Commissioning

Ball valves do not require any special instructions for commissioning. However, it must be ensured that air sacs in the casing are removed as far as possible (put the ball in a 45° position).

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Transport

The valves are supplied ready for use.
The flanges have flange caps as protection against mechanical damage and dirt.
During transport, it must be ensured that the valves retain their mechanical protection through the flange caps.
Suitable transport containers must be used for transport (e.g. wooden crates). The valves must be protected against toppling and compression in the transport containers, otherwise they may be damaged.

<table>
<tr>
<td> 
W R O N G</td>
<td> 
C O R R E C T</td>
<td>Tools for lifting out and transporting in the system must always be attached to the valve housing. The valves must not be picked up and / or carried by the hand lever! The valves should ideally be transported in a horizontal position.
Head protection and safety shoes must be worn during transport!
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</table>

Storage

The connections must remain covered to prevent the penetration of dirt and dust. The ball valves must be stored in a dry and well-ventilated place.
For long-term storage, the valves must be checked and cleaned periodically. Processed surfaces must be protected against corrosion using suitable agents.
They must be protected from the weather and in the open ball position during storage.

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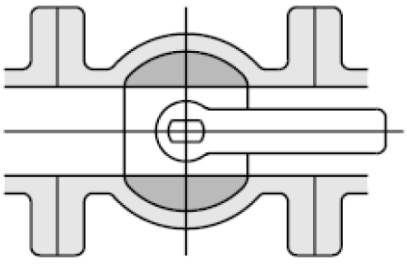
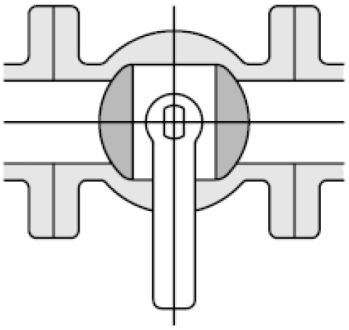
<td>  </td>
<td>  </td>
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<tr>
<td>Ball position “open”</td>
<td>Ball position “closed”</td>
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Carbon steel valves

Valves made of un- alloyed or low- alloyed cast steel in standard design are coated with a primer and a 2-components basic coating. The minimum film thickness is 50 µm. The trim parts as well as the inner surfaces are free of paint and coated with a temporary corrosion protection (e.g. oil) only. Machined flange facings have to be protected against outside influences with flange caps.

Stainless steel valves

Stainless steel valves are delivered in standard form without any additional corrosion protection.

Assembly and maintenance

General assembly information

	**Turn off all affected equipment/machines/systems prior to assembly/repair! If necessary, separate the equipment/machines/systems from the network, air and powers. Check that everything is switched off before starting any work! The decommissioned equipment/machines/systems must be labelled accordingly.**	

Use warning signs to prevent unintentional commissioning of the equipment/machines/systems.

Valves for oxygen applications are fundamentally packed in specially labelled transport bags and marked with the label "oil and grease-free".
Special installation measures are required for use in oxygen applications and must be observed by the operator and the system manufacturer.

Installing the ball valve in the pipe

1. Clean the pipe before installation
2. Remove any dirt from the valve, if necessary
3. When assembling the ball valve, it must be ensured that the pipe connections are exactly parallel to the valve connections. In addition the direction-arrow must show into flow direction.
4. Put in between flange gasket.
5. Flange connection screws are tightened with a torque spanner. Tighten the screws in a crosswise sequence. The tightening torques are governed by the applicable standards (e.g. EN921-934 and ISO4732, 4032, 4017…)
6. Please consider that the ball valve is mounted in a released condition.
7. Ball valves can be mounted in horizontal and vertical pipelines.

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	**The flange gaskets must be correctly centered. Suitable seals are to be used. Please observe the centering! Only bolts and nuts made from approved materials are to be used. All screw holes are to be used for a correct flange connection. The specialist company or system operator is responsible for professional installation.**

	**Do not exceed the permitted pressure!** **All pipes must always be thoroughly rinsed and cleaned when a new system is installed or after a repair. Dirt residues, welding beads and the like can lead to malfunctions and, at the very least, to a loss of valve performance!**

Removing the ball valve from the pipe und dismantling

		**The valve must be cooled, cleaned, decontaminated and pressure less!** **Opening the valve under pressure can be fatal! A helmet, protective goggles and safety shoes must be worn!**

Before starting to dismantle the ball valve from the pipe, **depressurize and completely drain the pipe**.

Electrical and pneumatic components of the system must be separated from the supply!
When using the valve with problematic media (e.g. poisonous, corrosive) the valve must be fully emptied and cleaned or decontaminated before dismantling! The cleaning is to be confirmed on the separate form no. FO-100226. If the valve is to be sent back to Zuercher Technik AG for an overhaul, the valve form must also be included! If this form is not available, it can be requested from Zuercher Technik AG.

Ensure that the valve is also pressure less and completely empty in the dead spaces behind the valve!

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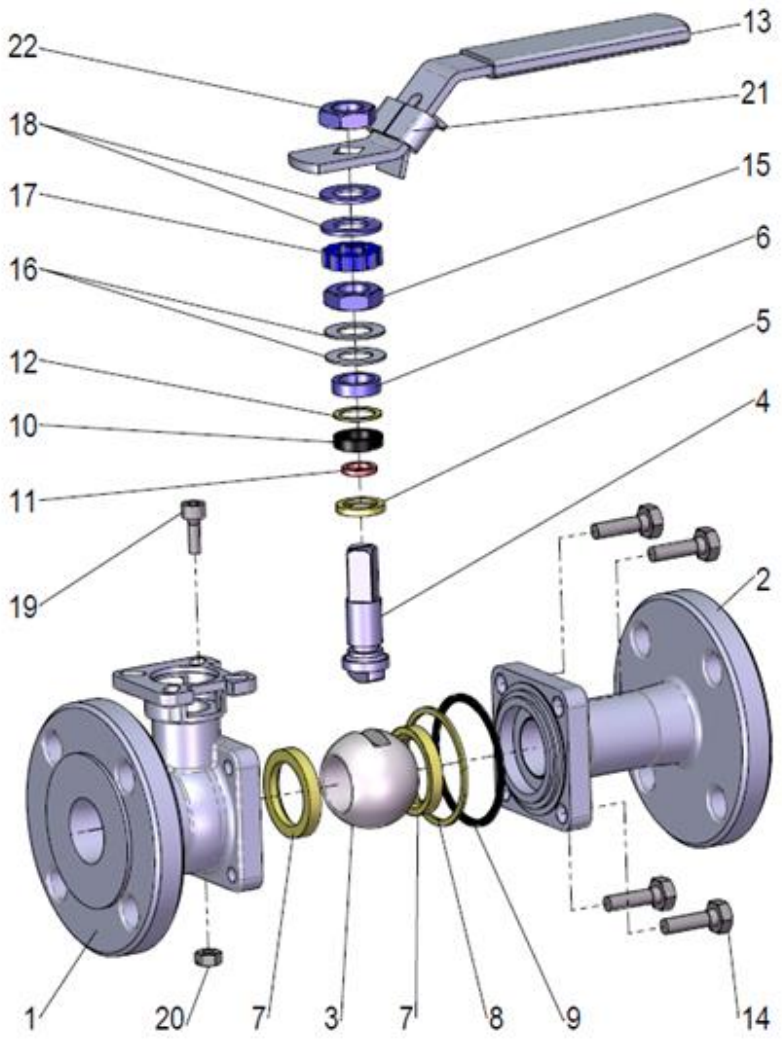
Product description / components / materials

DN15-DN50



Item Nr.	Description	Material	Sealing kit Spare part
1	Body part	1.4408/1.0619	
2	Flange part	1.4408/1.0619	
3	Ball	1.4401	
4	Shaft	1.4401	
5	Seal ring	PTFE	x
6	Pressure ring	1.4401	
7	Seat	See below*	x
8	Body sealing (wetted)	PTFE	
9	Body sealing (outside)	Graphite	x
10	Shaft packing	Graphite	x
11	O-ring (optional TA-Luft)	FKM/NBR/FEP	x

Item Nr.	Description	Material	Sealing kit Spare part
12	Slide ring	PTFE	x
13	Lever	SS 304/PVC	
14	Body screw	A2-70	
15	Shaft nut	SS304	
16	Belleville spring washer	1.4301	
17	Safety cap	1.4301	
18	Spacer	1.4301	
19	Cylinder screw (stop)	1.4301	
20	Hexagon nut	SS 304	
21	Locking device	1.4301	
22	Lever nut	SS 304	

*Material acc. To indication within the article description

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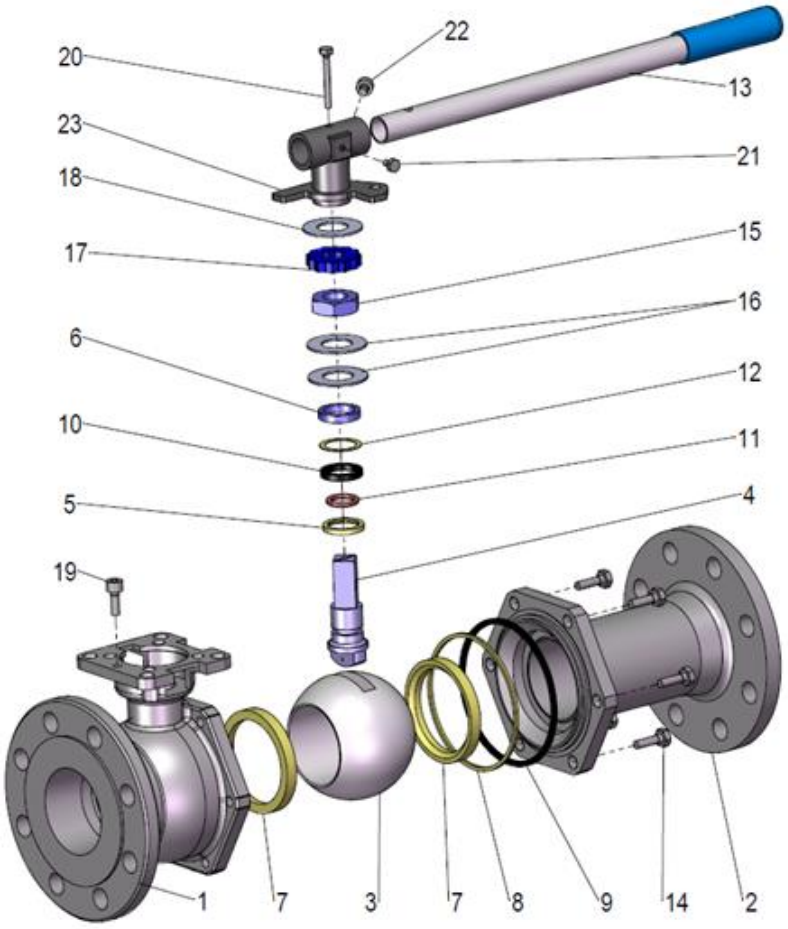
DN65-DN150



Item Nr.	Description	Material	Sealing kit Spare part
1	Body part	1.4408/1.0619	
2	Flange part	1.4408/1.0619	
3	Ball	1.4401	
4	Shaft	1.4401	x
5	Seal ring	PTFE	x
6	Pressure ring	1.4401	x
7	Seat	see below*	
8	Body sealing (wetted)	PTFE	
9	Body sealing (outside)	Graphite	x
10	Shaft packing	Graphite	x
11	O-ring (optional at TA-Luft)	FKM/NBR/FEP	x

*Material acc. to indication within the article description

Item Nr.	Description	Material	Sealing kit Spare part
12	Slide ring	PTFE	x
13	Lever (pipe)	SS 304/PVC	
14	Body screw	A2-70	x
15	Shaft nut	1.4301	
16	Belleville spring washer	1.4301	
17	Safety cap	1.4301	
18	Spacer	A2	
19	Cylinder screw (stop)	1.4408/1.4308	
20	Hexagon screw	1.4301	
21	Hexagon screw	A2-70	
22	Cylinder screw	A2-70	
23	Adapter	A2-70	

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Dismantling procedure

1. Put ball in open position. Lever 13 (at DN15-DN50) or adapter 23 (for DN 65-DN150) or mounted actuator and Spacers needs to be removed.
2. Remove safety cap 17.
3. Remove shaft nut 15.
4. Remove belleville spring washer 16 and pressure ring 6.
5. Put ball 3 in closed position. Please loose body screws 14 and remove them.
6. Split body part 1 and flange part 2 carefully. Please take out ball 3 in closed position.
7. Remove body sealings 8 (PTFE/RPTFE) and 9 (graphite) and both seats 7. (In case of design with pressure relief system, remove the O-ring too)
8. Push shaft 4 inside with a plastic mallet and get it out.
9. Remove shaft packing 10 and slide ring 12.
10. Remove seal ring 5 and optionally O-ring 11 (depend on execution).
11. Clean ball 3, shaft 4, body part 1 and flange part 2 and check on further damages. Damaged parts should not be used again and must be replaced.

If the switching shaft or anti-static devices are defective, the entire switching shaft must be replaced.

Procedures for overhaul / reassembly

1. Have the suitable spare parts available prior start of the assembly. Only original spare parts are to be used.
2. Clean all wetted parts prior assembly and check on possible damages.
3. After cleaning of all single parts have to be dried.
4. If necessary, damaged parts should be replaced by new original parts.
5. During assembly, put new body sealings 8 and 9 in. Please check that the new body sealings 8 and 9 are cleaned and show no damages.
6. Put shaft 4 with seal ring 5 (and optionally O-ring 11) from inside into the body part 1 and push vertical up.
7. Get shaft packing 10 in the body part 1.
8. The shaft packing 10 (graphite) must be pre-pressed with support of a bush. After that, please put slide ring 12 (PTFE) on shaft packing.
9. Bring pressure ring 6 and belleville spring washers 16 (Belleville spring washers on opposite side) in.

10. Fasten the shaft nut acc. to the torque (acc. to table 2). After achievement of the torque, the shaft nut 15 needs to be turned in clockwise direction for the orientation of the safety cap 17 till the safety cap 17 can fall above the shaft nut 15 (only for DN15-50)
11. Put seat 7 and ball 5 in body part 1. Turn shaft 4 in suitable position to be able to move the ball 3 with the notch.
12. Put the flange part 2 with inserted seat 7 (at execution with pressure relief system with O-ring) carefully on to the body part 1. After that, please fasten the screws 14 (please consider fastening torque of the body screws 14 (acc. to table 1).

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13. For nominal sizes DN15-50:
    Put spacers 18, lever 13 and lever nut 22 on to the shaft 4 and fasten the lever nut 22 (acc. to table 3).

    For nominal sizes DN65-150:
    Put spacers 18, adapter 23 with lever (pipe) 13 on to the shaft and fasten the screws 20, 21, 22 in this sequence (acc. to table 3).

14. Move ball 3 several times (at least three times) in full- open and full- closed position. Please check the safe screw connection of the stop pin 19 with hexagon nut 20 (for DN15-50), respectively stop pin 19 (for DN65-100).

15. Check the conductibility of the anti-static device on the shaft 4 (acc. to ATEX). For that, move ball 3 in 45°- position and measure the conductibility between ball 3 and lever 13, respectively between ball 3 and body part 1 with an ohmmeter.

16. Following, the valve has to be tested on pressure, tightness and function acc. to EN12266-1. After successful testing the valve can be used again.

17. In case the valve will be stored, it must be kept in open position.

Torques for screws and nuts

Table 1

Torque: Stem nut (Packing)						
Dimension	**Torque**	**Component**	**Nut/ Screw**	**WS**	**Square wrench**	**Qty.**
DN15	**10 Nm**	Nut	7/16-UNF	17.3	9	1
DN20	**10 Nm**	Nut	7/16-UNF	17.3	9	1
DN25	**13 Nm**	Nut	9/16-UNF	22	11	1
DN32	**13 Nm**	Nut	9/16-UNF	22	11	1
DN40	**16 Nm**	Nut	M18x2.5	26.5	14	1
DN50	**16 Nm**	Nut	M18x2.5	26.5	14	1
DN65	**22 Nm**	Nut	M24x3	36	17	1
DN80	**22 Nm**	Nut	M24x3	36	17	1
DN100	**25 Nm**	Nut	M24x3	36	17	1
DN125	**28 Nm**	Nut	M36x3	55	27	1
DN150	**28 Nm**	Nut	M36x3	55	27	1

Table 2

Torque: Hand lever Attachment						
Dimension	**Torque**	**Component**	**Nut / Screw**	**Lever**	**WS**	**Qty.**
DN15	**8 Nm**	Lever nut	7/16-UNF	Lever (flat)	17.3	1
DN20	**8 Nm**	Lever nut	7/16-UNF	Lever (flat)	17.3	1
DN25	**11 Nm**	Lever nut	9/16-UNF	Lever (flat)	22	1
DN32	**11 Nm**	Lever nut	9/16-UNF	Lever (flat)	22	1
DN40	**14 Nm**	Lever nut	M18x2.5	Lever (flat)	26.5	1
DN50	**14 Nm**	Lever nut	M18x2.5	Lever (flat)	26.5	1
DN65	**8 Nm**	Hexagon screw	M6	Adapter + Tube	36	1
DN80	**8 Nm**	Hexagon screw	M6	Adapter + Tube	36	1
DN100	**8 Nm**	Hexagon screw	M6	Adapter + Tube	36	1
DN125	**20 Nm**	Hexagon screw	M8	Adapter + Tube	55	1
DN150	**20 Nm**	Hexagon screw	M8	Adapter + Tube	55	1

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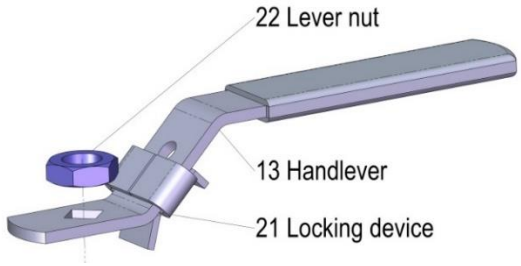
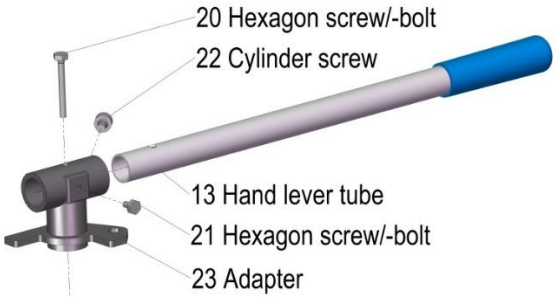
Hand lever attachment AF90D/AF94D/AF96D DN15-50



Round tube hand lever attachment AF90D/AF94D/AF96D DN65-DN150



Declaration of conformity

In the sense of Pressure Equipment Directive 2014/68/EU (previously 97/23/EG)

Zuercher Technik AG confirms that the previously described products in the supplied design comply with the requirements of Pressure Equipment Directive 2014/68/EU. The conformity procedure used corresponds with module A2.
The institution for compliance with and monitoring of the provisions of this directive is:

TÜV Süd Industrie Service GmbH
Westendstrasse 199
DE-80686 Munich
Germany

Any certificates and attestations are generally not valid without a company stamp and signature and may only be passed on to third parties in unchanged form. Amendments always require the prior written approval of Zuercher Technik AG.

Guarantee

The guarantee and warranty provisions of the purchase contract and the General Terms & Conditions of Zuercher Technik AG. If these are not available, they can be requested from Zuercher Technik or downloaded from www.zuercher.com.

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