

# MOUNTING AND OPERATING INSTRUCTIONS



## EB 28t

Translation of the original manual



**Pigable, horizontal 3-way ball valve BR 28t**  
**DIN and ANSI version**  
to combine with actuators  
for installation in piggable pipes

December 2023 edition



### Note regarding this installation and operating manual

This Installation and Operating Manual (EB) provides guidance for safe assembly and operation.

The notes and instructions in this EB are binding when handling PFEIFFER devices. The figures and illustrations in this EB are examples and must therefore be considered as such.

- ⇒ For safe and correct use, read this EB carefully prior to use and keep it for later reference.
- ⇒ In the case of questions that go beyond the scope of this EB, please contact the After Sales Service at PFEIFFER Chemie-Armaturenbau GmbH.
- ⇒ This manual only applies to the 3-way ball valve itself, the respective additional manual applies for the mounted actuator.

### Definition of signal words

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#### **DANGER**

*Hazardous situations that lead to death or serious injuries*

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#### **WARNING**

*Situations that can lead to death or serious injuries*

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#### **NOTE**

*Property damage and malfunctions*

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#### **Info**

*Additional information*

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#### **Tip**

*Recommended action*

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# 1 Safety instructions and safety measures

## Intended use

The BR 28t piggable 3-way ball valve is manually operated in combination with an actuator for the regulation of the volume flow, pressure and temperature of fluid media in a piggable pipe system.

- The ball valve and its actuator are designed for precisely defined conditions (e.g. operating pressure, utilised medium, temperature).

Therefore the operator must make sure that the ball valve is only used when the conditions of use comply with the design criteria defined in the order.

If the operator would like to use the ball valve in other applications or environments, they must contact PFEIFFER.

- Manual 3-way ball valves are only intended for use, after installation in a pipe system, to cut off the media, let it flow through or regulate it within the permitted pressure and temperature limits.
- Automated 3-way ball valves are only intended for use, after installation in a pipe system and after connecting the drive to the control, to cut off the media, let it flow through or regulate it within the permitted pressure and temperature limits.
- The data sheet contains the permissible pressure and temperature range for these ball valves ► TB 28t.
- The safety regulations that apply to the piggable pipe system in which the ball valves are installed and to the control system to which the actuator is connected also apply to the ball valves.

This manual only provides safety instructions that are to be observed additionally for ball valves.

There may be additional safety instructions in the manuals for the actuator assemblies.

- It is assumed that this chapter is observed when using the valve as intended.

## Reasonably foreseeable erroneous use and unintended use

The ball valve is not suited for the following areas of use:

- Use outside of the technical data and the limits defined by the design.
- Use outside of the limited defined by the peripheral devices installed on the ball valve.

Furthermore, the following activities are considered unintended use:

- Use of third-party spare parts.
- Performance of maintenance and repair work that is not described.

## Qualification of operating personnel

The ball valve may only be disassembled, dismantled, assembled and commissioned by qualified specialist personnel trained in pressurised pipes who are familiar with the assembly, commissioning and operation of this product.

- Specialist personnel in terms of this installation and operating manual are persons who, on the basis of their vocational education, knowledge and experience and knowledge of the relevant standards, are capable of evaluating the assigned tasks and identifying possible hazards.

## Personal protective equipment

Depending on the utilized medium, PFEIFFER recommends the following protective equipment:

- Protective garments, protective gloves and eye protection when using hot, cold, aggressive and/or corrosive media.
- Hearing protection when working near the valves.
- Request additional protective equipment from the plant operator.

## Prohibition of modifications

Changes to the product are not permitted without consulting PFEIFFER. Non-compliance invalidates the warranty and product guarantee. PFEIFFER shall not be held liable for any resulting property damage or personal injury.

## Protective devices

In the case of a power supply failure, the automated ball valve automatically switches to a certain fail-safe position, see Fail-safe positions in Chapter "3 Design and principle of operation".

- The fail-safe position corresponds to the effective direction and is indicated on the type plate of the actuators, see the actuator documentation.
- The valve is to be included in the equipotential bonding of the plant.

## Warning of residual risks

To prevent personal injury or property damage, the operator and operating personnel must use suitable measures to prevent the hazards that can result from the flow medium and operating pressure as well as the signal pressure and moving parts of the ball valve.

- Therefore, the operator and operating personnel must observe all the hazard information, warning information and information in this installation and operating manual.

## Obligation of the operator to exercise diligence

The operator is responsible for proper operation as well as compliance with the safety regulations.

- The operator is responsible for providing operating personnel with this installation and operating manual as well as the applicable documents and to provide instructions on proper operation.
- Furthermore, the operator must ensure that operating personnel and third parties are not endangered.

It is not the responsibility of PFEIFFER and therefore when using the ball valve ensure that:

- The ball valve is only used as intended as described in this chapter.

- An actuator unit that is subsequently installed on the ball valve is adapted to the ball valve and the max. torque is observed, and is correctly adjusted in the end positions, and in particular in the closed position of the ball valve.
- The pipe system and control system are properly installed and regularly checked. The wall thickness of the ball valve body is measured such that an additional load of the usual magnitude is taken into account for a pipe system installed properly in this way.
- The valve is connected properly to these systems.
- The customary flow rates in continuous operation are not exceeded in this pipe system.
- PFEIFFER is contacted in the case of abnormal operating conditions, such as vibrations, hydraulic shock, cavitation and also small amounts of solid matter in the medium, especially abrasive matter.

### Obligation of operating personnel to exercise diligence

Operating personnel must be familiar with this installation and operating manual and the applicable documents and comply with the indicated hazard information, warning information and other information. Furthermore, operating personnel must be familiar with the applicable regulations concerning occupational safety and accident prevention and observe them.

### Applicable standards and directives

- The ball valves fulfil the requirements of the European Pressure Equipment Directive 2014/68/EU and the European Machinery Directive 2006/42/EC.

In the case of ball valves provided with a CE marking, the Declaration of Conformity provides information about the conformity assessment procedure that was used.

The corresponding declarations of conformity are available in the Annex of this EB, see chapter "14 Certificates".

- According to an ignition hazard assessment according to DIN EN ISO 80079-36, PFEIFFER valves do not have any own potential ignition sources and therefore are not subject to Directive 2014/34/EU.

CE marking based on this standard is not permitted. The inclusion of valves in the equipotential bonding of a plant applies independently of the directive for all metal parts in potentially explosive areas.

## 1.1 Notes regarding possible severe personnel injury

### DANGER

#### **Hazards and ineffectiveness of the warranty!**

In the case of non-compliance with the following hazard and warning information, hazards may arise and the warranty provided by PFEIFFER may become invalid.

- ⇒ Observe the following hazards and warning information.
- ⇒ Contact PFEIFFER in the case of questions:

### DANGER

#### **Hazards and damage due to unsuitable ball valves!**

Ball valves whose permissible pressure/temperature range (=“rating”) is not sufficient for the operating conditions can pose a danger to the user and cause damage to the pipe system.

- ⇒ Only operate ball valves whose permissible pressure/temperature range (=“rating”) is sufficient for the operating conditions. (see data sheet ► TB 28t)

#### **Risk of bursting of the pressure equipment!**

Ball valves and pipes are pressure equipment. Improper opening can cause the bursting of ball valve components.

- ⇒ Observe the maximum permissible pressure for the ball valve and plant.
- ⇒ Before working on the ball valve, depressurise the concerned plant parts and the ball valve.
- ⇒ Before removing the ball valve from the pipe, completely release the pressure in the pipe so that the medium does not escape uncontrolled from the line.
- ⇒ Bring the ball valve into the open position so the pressure is released from the ball.
- ⇒ Empty the medium from the concerned plant parts and ball valve. (Wear protective equipment)

## 1.2 Notes regarding possible personnel injury

### WARNING

#### **Danger of burning due to hot or cold components and pipes!**

Depending on the utilised medium, ball valve components and pipes can become very hot or very cold and cause burns upon contact.

- ⇒ The ball valves must be protected against contact in the case of operating temperatures  $>+50\text{ °C}$  or  $<-20\text{ °C}$  together with the pipe connections.

#### **Danger of injury during the switching operation if performing test runs on ball valves not installed in the pipe!**

- ⇒ Do not reach into the ball valve. This can result in serious injuries.

#### **Danger of crushing due to moving parts!**

The ball valve contains moving parts (actuator stem, control shaft and hand lever) that can lead to crushing if reaching into it.

- ⇒ Do not reach into the yoke during operation.
- ⇒ When working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Bleed the actuator.

#### **Danger of injury due to venting the actuator!**

During operation, when regulating or opening and closing the ball valve, the actuator can be ventilated.

- ⇒ Install the ball valve such that the actuator does not ventilate at eye level.
- ⇒ Use suitable silencers and plugs.
- ⇒ Wear eye protection and, if necessary, hearing protection when working near valves.

**⚠ WARNING****Danger of injury due to preloaded springs!**

Ball valves that are equipped with preloaded actuator springs are under mechanical tension.

- ⇒ Before working on the actuator, release the compression from the preloaded springs, see the corresponding actuator documentation.

**Danger of injury due to residual medium in the ball valve!**

When a ball valve must be removed from a pipe, medium can escape from the pipe or the ball valve.

- ⇒ In the case of media that is harmful to health or hazardous, the pipe must be completely emptied before a ball valve can be removed.
- ⇒ Pay attention to the afterflow of residuals or residuals that remain in dead spots.

**Danger of injury due to the releasing of body screw connections!**

If the body screw connections must be released, medium can escape from the ball valve.

- ⇒ The screw connections on the connection of the body parts may only be released or loosened after the ball valve has been removed.
- ⇒ During reassembly, tighten the screws according to Table 15-1 to Table 15-3 in Chapter "15.1.1 Tightening torques" using a torque wrench.

**Hazards due to incorrect ball valve use!**

The incorrect use of the ball valve can represent a hazard for the user and cause damage to the pipe system that are then no longer the responsibility of PFEIFFER.

- ⇒ The material selected for the parts of the ball valve that come into contact with the media must be suitable for the utilised media, pressures and temperatures.

**Protection against using the wrong pig!**

The valve shape and size have been adapted to the pigs to be used according to the customer specifications.

- ⇒ In case other pigs are to be used, Pfeiffer must check and confirm the valve's suitability first.

**Dangers due to use as an end fitting!**

During normal operation, in particular with gaseous, hot and/or hazardous media, spraying medium can cause hazards. It must be kept in mind that the media is usually hazardous!

- ⇒ A blind flange must be assembled on the free connecting pieces or the ball valve must be secured against unauthorised actuation.
- ⇒ If a ball valve used as an end fitting in a pressurised line is opened, this may only be done with extreme caution so that the escaping medium does not cause any damage.

## 1.3 Notes regarding possible property damage

**! NOTE****Damage to the ball valve due to contamination!**

Contamination (e.g. solid particles) in the pipes can damage the ball valve.

- ⇒ The plant operator is responsible for cleaning the pipes in the plant.
- ⇒ Rinse the pipes prior to commissioning.
- ⇒ Observe the maximum permissible pressure for the ball valve and plant.

**Damage to the ball valve due to unsuitable medium properties!**

The ball valve is designed for a medium with certain properties. Other media can damage the ball valve.

- ⇒ Only use a medium that corresponds to the design criteria.

**Damage to the ball valve and leakage due to excessively high or low tightening torques!**

The ball valve components must be tightened with specific torques. Deviating torques can lead to ball valve leakage or damage.

- ⇒ Excessively tightened components are subject to increased wear.
- ⇒ Insufficiently tightened components can cause leakage.
- ⇒ Observe the tightening torques, see Table 15-1 to Table 15-3 in Chapter "15.1.1 Tightening torques".

**Damage to the ball valve due to an impermissible pressure increase!**

The ball valve body may contain small amounts of medium in the closed and open position.

- ⇒ Use a ball valve with an optional relief bore if it is possible that the closed area of the ball filled with medium can heat up due to external heat. (This prevents an impermissible pressure)

**Deviation of the breakaway and actuating forces due to non-actuation of the ball valve!**

Depending on the period of time of non-actuation, the breakaway and actuation forces can deviate considerably from the actuating power data in the data sheet.

It is recommended to actuate the ball valve at regular intervals.

- ⇒ In consideration of the design, actuation must take place during the year.
- ⇒ Indicate the duration of non-actuation when making an enquiry, so that this condition is taken into consideration in the actuator design.
- ⇒ In the case of retrofitted actuators by the operator, the correct actuator design as regards the duration of non-actuation is no longer the responsibility of PFEIFFER.

**Damage to the ball valve due to system vibrations!**

- ⇒ If necessary, use a locking device to prevent manually operated ball valves from moving automatically in the event of strong system vibrations.

**NOTE**

**Damage to the ball valve due to unsuitable tools!**

Unsuitable tools can damage the ball valve.

⇒ Suitable tools are required to work on the ball valve, see Chapter "15.1.3 Tools".

**Damage to the ball valve due to unsuitable lubricants!**

Unsuitable lubricants can corrode and damage the surface.

⇒ The ball valve material requires suitable lubricants, see Chapter "15.1.2 Lubricants".

## 1.4 Warning notes on the device

### Warning of moving parts

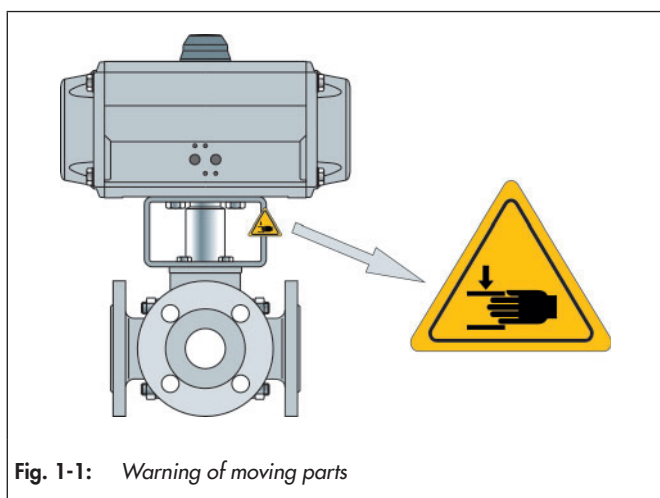


Fig. 1-1: Warning of moving parts

There is a danger of crushing due to the rotary movements of the actuator- and control shaft when reaching into the yoke as long as the pneumatic power is connected to the actuator. At the operator's request, a warning note can be attached to the valve.





## 2.1 Type plate

### 2.1.1 Actuator type plate

See the corresponding actuator documentation.

## 2.2 Material identification

The ball valves are marked on the body with the material specification; see "Table 2-1: Marking on the type plate and on the body of the ball valve".

Further details can be obtained from PFEIFFER.

### 3 Design and principle of operation

#### Characteristics

- Horizontal 3-way version with T-port
- Horizontal version with horizontal third outlet
- With trunnion-mounted ball
- 90° operation
- Exchangeable port seal made of PTFE
- Control shaft, sealed with a V-ring packing, pre-loaded with disc spring set
- Blowout-proof control shaft
- Connecting flange for actuators acc. to DIN ISO 5211
- Piggable flanges in the passage of the ball valve according to DIN 2430-2 with a projection. Non-piggable flanges according to DIN 1092-1 with sealing strip form B or according to customer-specific requirements.

#### Controls and functions

3-way ball valve optionally in the following versions:

- 3-way ball valve with lever
- 3-way ball valve with manual gear
- 3-way ball valve with pneumatic part-turn actuator (refer to the corresponding data sheet for more details)

#### Versions

The valve consists of a cavity-free piggable ball with a T-bore, and performs the following functions according to various versions:

- In **One-pigging system**:
  - As media inlet

#### Function and principle of operation

The piggable 3-way ball valves of the BR 28t series can be flowed through at full flow. They are primarily used to meter media in and out of the piping system.

The ball (3) slew around the control shaft (4). The opening angle of the ball determines the direction of flow in the pipeline.

The ball (3) is sealed by of exchangeable seat ring (6).

The control shaft (4) is sealed with a maintenance free PTFE - V-ring packing (10), which is pre-loaded by a disc spring set (9) located above the packing.

The control shaft is externally equipped with a manual gearbox, or optionally with a pneumatic quarter turn actuator.

#### Control positions

The setup position, and the control functions of the actuator are variable. Depending on the specific customer requirements, the 3-way ball valve are constructed and equipped.

Information about the control positions and safety positions is listed in detail in Chapter 5.

### 3.1 Variants

- With pigging signal strips in automatic systems, for mounting magnetic-inductive pigging sensors
- Special flow pattern
- Special flange version
- Cavity minimized
- Sterile connection
- Heating jacket
- Rinsing connections
- Low and high-temperature versions
- Special seat rings
- With incremental controlled coupling

### 3.2 Additional fittings

#### Insulation

The ball valves can be insulated to reduce the passage of heat energy.

Observe the notes in Chapter " 5 Assembly".

#### Test connection

The test connection (16) can be used to detect the stuffing box flange (e.g. G $\frac{1}{4}$ " ) between the seat ring and the packing.

#### Grip protection

In the case of conditions of use that require a high level of safety (e.g. if the ball valve is freely accessible to untrained specialist personnel), PFEIFFER offers a safety guard to prevent the risk of crushing due to moving parts (actuator- and control shaft).

The risk assessment of the plant by the operator will indicate if the installation of this protective device is required for the safe operation of the ball valve in the plant.

### 3.3 Attachments

The following accessories are available for the valve either individually or in combinations:

- Shaft extension (100 mm Standard)
- Pneumatic or electric quarter-turn actuators
- Positioner
- Limit switch
- Solenoid valves
- Supply air pressure regulator/filter

Further attachments are available according to customer specifications.

### 3.4 Technical data

The type plates of the ball valve and actuator offer information about the valve version, see Chapter "2 Markings on the device".

#### **i** Info

- Detailed information is available in the data sheet ► TB 28t.
- The documentation for the special ball valves BR 28t that are not described in this chapter can be requested from PFEIFFER.

### 3.5 3-way ball valve assembly

#### 3.5.1 Preparation of the assembly

To assemble the 3-way ball valve, all parts must be prepared, e. g. the parts are carefully cleaned and placed on a soft mat (rubber mat or other).

Keep in mind that plastic parts are almost always very soft and very delicate, and in particular the sealing surfaces may not be damaged.

#### **!** NOTE

##### **Damage due to cold welding of the screws in the body!**

- PFEIFFER recommends a heavy-duty grease paste (e.g. Gleitmo 805, manufacturer Fuchs) to prevent the cold-welding of the screws in the bodies.
- ⇒ Do not use this product for ball valves with use of oxygen.
- ⇒ A suitable lubricant must be selected for grease-free ball valves, especially for use with oxygen.

#### 3.5.2 Pre-assembling the Side body (A, B and C)

- ⇒ Place the side body (2) with the flange side facing down on a even and clean work surface.

##### **Seat ring soft seal version, not spring-loaded**

- ⇒ Insert the seat ring (6) into the respective body chamber of the three side bodies (2).

##### **Seat ring soft seal version, spring-loaded on all sides**

Place the disc spring jacket (22) on the disc spring (21).

#### **i** Info

Pull on the disc spring jacket so that the long side of the jacket is positioned towards the body and the short side towards the seat ring. This ensures the sealing function.

- ⇒ Insert the jacketed disc spring (21) into the body chambers in the side body (2).
- ⇒ Press the seat ring (6) up to the disc spring.

##### **Seat ring soft seal version, OF spring-loaded**

- ⇒ Insert the O-ring (23) into the respective body chamber of the three side bodies (2).
- ⇒ Press the seat ring (6) up to the O-ring.

##### **Further assembly for all versions**

- ⇒ Insert the sealing (7) into the corresponding recesses in the side bodies (2).

### 3.5.3 Assembly of the main body

- ⇒ Place the main body (1) on an even and clean work surface, so that the inside of the ball valve is easily to reach.
- ⇒ Screw the lightly greased stud bolts (11) into the main body (1).

#### **i** Info

- Depending on the version, stud bolts (11) with nuts (12) or screws (11) can be used.
- If screws are used, the above step is not necessary.

- ⇒ Press the lower bearing bush (19) into the main body (1). For the alignment of the bearing bush, see Fig. 3-1.
- ⇒ Lightly grease the trunnion of the ball (3).
- ⇒ Carefully insert the ball (3) into the main body. Insert the lower trunnion of the ball into the bearing bush (19) in the main body.

### 3.5.4 Pre-assembly of the packing bush

- ⇒ Push the bearing bush (8) with a slight rotary movement onto the control shaft (4).
- ⇒ Insert the control shaft (4) from the inside through the control shaft duct into the packing bush (14).

#### **!** NOTE

- ⇒ Do not damage the sealing surface of the control shaft (4).
- ⇒ Make sure that the bearing bush (8) and the control shaft (4) do not tilt when positioning in the packing bush (14).

- ⇒ Slide the V-ring packing (10) over the mounted control shaft (4) with a slight rotating movement and insert it into the packing location of the packing bush (14). For the arrangement of the V-rings, see Fig. 3-1.
- ⇒ Place the disk spring set (9) over the control shaft (4) up to the V-ring packing (10). For the arrangement of the disk springs, see Fig. 3-1.
- ⇒ Place the bush (15) over the control shaft (4) up to the disk springs (9).
- ⇒ Press the ring (18) into the stuffing box flange (5).
- ⇒ Insert the O-ring (17) into the stuffing box flange (5).

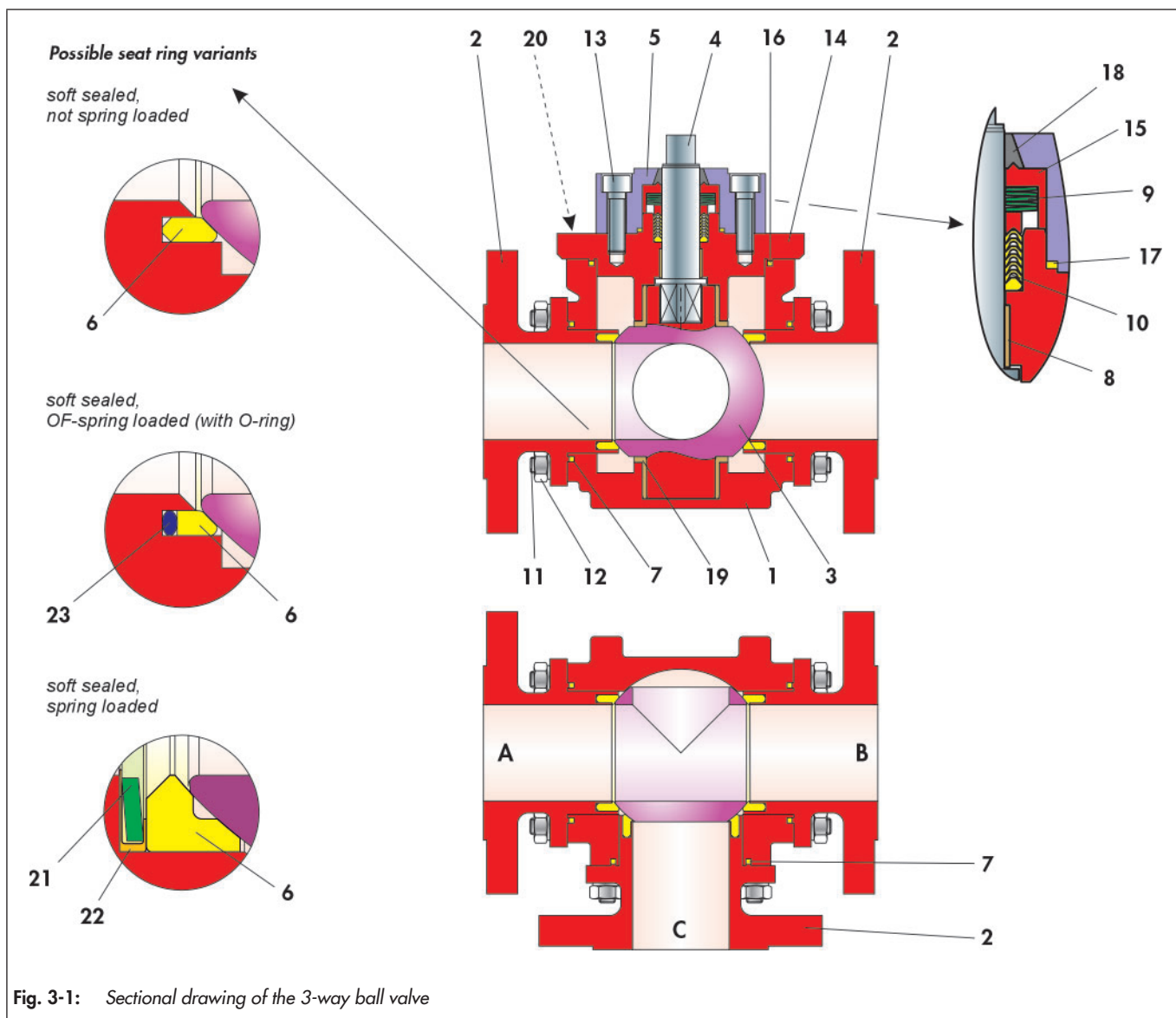


Fig. 3-1: Sectional drawing of the 3-way ball valve

Table 3-1: List of parts

Item	Description
1	Main body
2	Side body
3	Ball
4	Control shaft
5	Stuffing box flange
6	Seat ring
7	Sealing
8	Bearing bush
9	Disc spring set
10	V-ring packing
11 <sup>1)</sup>	Stud bolt / Screws
12 <sup>1)</sup>	Nut

Item	Description
13	Screw
14	Packing bush
15	Bush
16	Ring
17	Ring
18	Ring
19	Bearing bush
20	Screw
21	Disc spring
22	Disc spring jacket
23	O-ring

<sup>1)</sup> Depending on the nominal width, stud bolts can be fitted with nuts or screws.

## Design and principle of operation

- ⇒ Place the stuffing box flange (5) over the control shaft onto the packing bush (14).
- ⇒ Lightly grease the screws (13).
- ⇒ Adjust the stuffing box flange with the screws (13).

---

### **i** Info

*Only tighten the screws hand-tight; final assembly is carried out in a later assembly step.*

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### **i** Info

- ⇒ *The permissible torque for retightening the side bodys can be found in Table 15-1 in Chapter "15.1.1 Tightening torques".*
  - ⇒ *Prior to the leak test, the ball valve should be actuated a few times so that the ball can centre on the seat rings and provide an optimal seal.*
- 

## 3.5.5 Final assembly of the main body

- ⇒ Push the upper bearing bush (19) onto the trunnion of the ball (3) with a slight turning movement.
- ⇒ Insert the O-ring (16) into the main body (1).
- ⇒ Carefully place the pre-assembled packing bush (14) onto the main body (1).

---

### **!** NOTE

*Do not damage the O-ring (16).*

---

- ⇒ Rotate the packing bush until the control shaft engages with the ball and the packing bush slides in the main body.
- ⇒ Rotate the packing bush (14) until the bores of both components are aligned with each other.
- ⇒ After applying grease to the screws (20) both parts are screwed together, evenly and in alternating pattern.

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### **i** Info

- ⇒ *The permissible torque for retightening the connection of the packing bush can be found in Table 15-3 in Chapter "15.1.1 Tightening torques".*
- 

## 3.5.6 Assembly of the ball valve

- ⇒ Turn the main body for further installation so that all three mounting sides (A, B and C) are easily to reach.
- ⇒ The side bodys (2) pre-assembled in chapter 3.5.2 (side A, B and C) are placed on the main body (1) one after the other and adjusted with the nuts (12).

---

### **i** Info

- *Depending on the version, stud bolts (11) with nuts (12) or screws (11) can be used.*
  - *Only tighten the screws or nuts hand-tight; final assembly is carried out in a later assembly step.*
- 

- ⇒ To complete the assembly, align the side bodies (2) and the stuffing box flange (5).
- ⇒ Tighten all screws or nuts evenly in alternating pattern.

## 4 Shipment and on-site transport

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

### ! NOTE

#### **Damage to the ball valve due to improper transport and storage!**

- ⇒ Ball valves must be handled, transported and stored with care.

### 4.1 Accepting delivery

Perform the following steps after receiving the goods:

- ⇒ Check the scope of supply. Compare the delivered goods with the delivery note.
- ⇒ Check the supply for transport damage. Report transport damage to PFEIFFER and the transport company (see the delivery note).

### 4.2 Unpacking the 3-way ball valve

Carry out the following steps:

- ⇒ Unpack the ball valve directly before lifting for installation into the pipe.
- ⇒ Leave the ball valve on the pallet or in the transport container for on-site transport.
- ⇒ The protective caps on the ball valve inlet and outlet prevent foreign matter from entering the ball valve and damaging it. Only remove the protective caps prior to installation in the pipe.
- ⇒ Dispose of the packaging properly.

### 4.3 Transporting and lifting the 3-way ball valve

#### ! DANGER

#### **Danger due to falling of suspended loads!**

*Do not stand under suspended loads.*

#### ! WARNING

#### **Overturning of the lifting equipment and damage to the load lifting equipment by exceeding the lifting capacity!**

- ⇒ Only used approved lifting equipment and load lifting equipment whose lifting capacity corresponds at least to the weight of the ball valve including the actuator.
- ⇒ Take the weights from the respective data sheet.

#### ! WARNING

#### **Danger of injury due to the tipping of the 3-way ball valve!**

- ⇒ Observe the centre of gravity of the ball valve.
- ⇒ Secure the ball valve against tipping and twisting.

#### ! NOTE

#### **Damage to the ball valve due to improper fastening of the sling!**

The screwed-in lifting eyes on actuators are used only for actuator assembling and disassembling as well as for lifting the actuator without the ball valve. These lifting eyes are not intended for lifting the complete ball valve.

- ⇒ When lifting the ball valve, make sure that the entire load is carried by the sling that is fastened to the ball valve body.
- ⇒ Do not fasten the load-bearing sling to the actuator, hand wheel or other components.
- ⇒ Do not use the control air lines, accessories or other components with safety functions for suspension or damage them.

### 4.3.1 Transporting

The ball valve can be transported using lifting equipment such as a crane or a forklift.

- ⇒ Leave the ball valve on the pallet or in the transport container for transport.
- ⇒ Ball valves that weigh more than approx. 10 kg should be transported on a pallet (or supported similarly) (also to the installation site). The packaging should protect the valve from damage.
- ⇒ Comply with the transport conditions.

#### Transport conditions

- ⇒ Protect the ball valve against external influences, such as impacts.
- ⇒ Do not damage the corrosion protection (paint, surface coating). Repair damage immediately.
- ⇒ Protect the ball valve against moisture and dirt.

### 4.3.2 Lifting

When installing the ball valve in the pipe, larger ball valves can be lifted using lifting equipment such as a crane or forklift.

#### Conditions for lifting

- ⇒ Use a hook with a safety clamp as the suspension element so that the sling cannot slip off the hook during lifting and transport, see Fig. 4-1.
- ⇒ Secure the sling against shifting and slipping off.

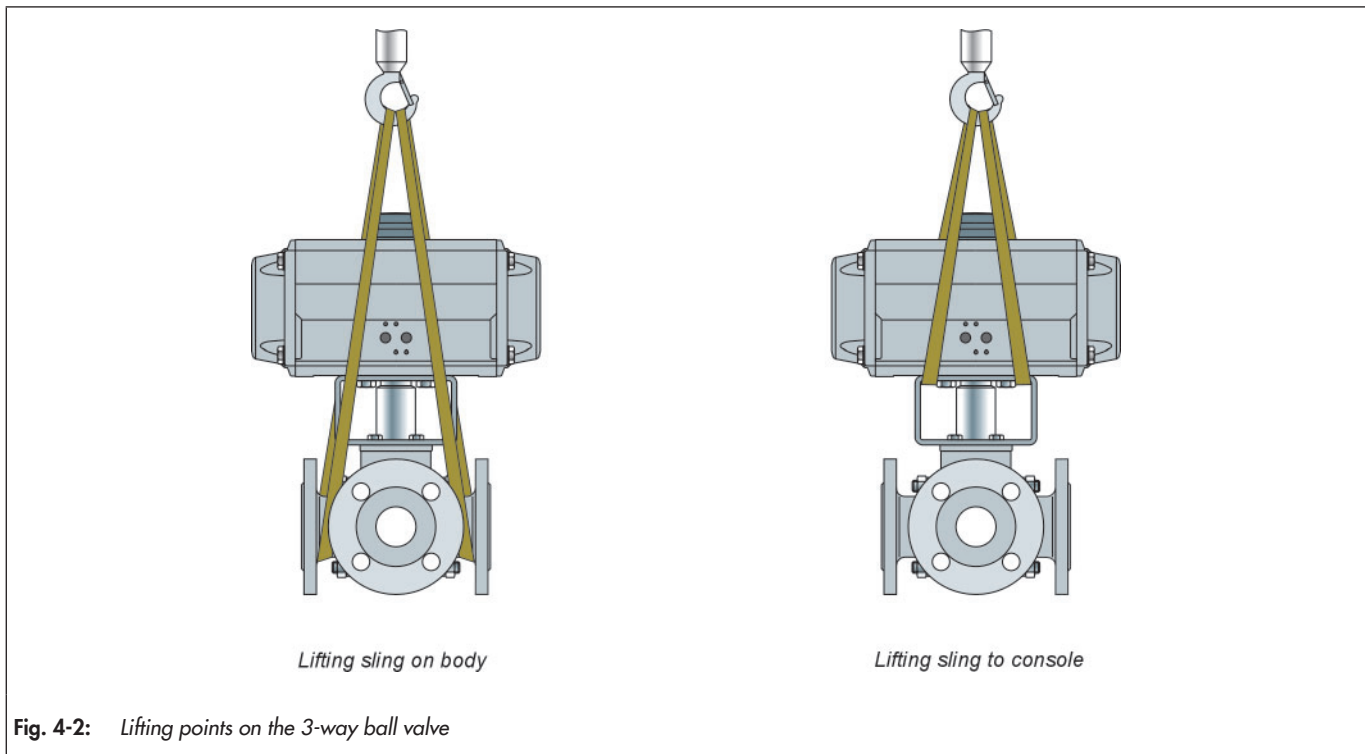


Fig. 4-2: Lifting points on the 3-way ball valve

- ⇒ Fasten the sling such that it can be removed again after installation in the pipe.
- ⇒ Avoid swinging and tipping the ball valve.
- ⇒ In the case of interruptions in work, do not leave the lifting equipment suspended in the air for a long period of time.
- ⇒ Lift the ball valve aligned in the same direction in which it will be installed in the pipe.
- ⇒ Always lift the ball valve in the centre of gravity of the load to prevent uncontrolled tipping.
- ⇒ Make sure that any slings between the lifting eyes on the rotary actuator and suspension element are not loaded. These slings are used only to secure the load against turning over while lifting. Before lifting the ball valve, pretension this sling so it is taut.

**⚠ WARNING**

**Danger due to incorrect lifting and transport!**

The lifting points for the lifting slings shown in the schematic drawing serve as examples for most valve variants. On site the conditions for lifting and transporting the valve can change however.

- ⇒ The operator makes sure that the valve is lifted and transported safely.

### 4.3.3 Lifting points on the body

- ⇒ Fasten a lifting sling to each flange of the housing and on the suspension element (e.g. hook) of the crane or forklift, see Fig. 4-1. When doing so, ensure the safety, bearing capacity and length of the lifting slings
- ⇒ In the case of an actuator with a lifting eye: fasten additional lifting slings to the lifting eye on the actuator and on the suspension element.
- ⇒ Lift the ball valve carefully. Check if the load lifting equipment holds.
- ⇒ Move the ball valve at a constant speed to the installation site.
- ⇒ Install the ball valve in the pipe, see chapter 5.4.
- ⇒ After installation in the pipe: check that the flanges are firmly tightened and that the ball valve holds in the pipe.
- ⇒ Remove the lifting slings.

### 4.3.4 Lifting points on the bracket

- ⇒ Fasten a lifting sling to the bracket and the suspension element (e.g. hook) of the crane or forklift, see Fig. 4-1. When doing so, ensure the safety, bearing capacity and length of the lifting slings.
- ⇒ In the case of an actuator with a lifting eye: fasten additional lifting slings to the lifting eye on the actuator and on the suspension element.
- ⇒ Lift the ball valve carefully. Check if the load lifting equipment holds.



- ⇒ Move the ball valve at a constant speed to the installation site.
- ⇒ Install the ball valve in the pipe, see chapter 5.4
- ⇒ After installation in the pipe: check that the flanges are firmly tightened and that the ball valve holds in the pipe.
- ⇒ Remove the lifting slings.

## 4.4 Storing the 3-way ball valve

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### **!** NOTE

#### **Damage to the ball valve due to improper storage!**

- ⇒ Comply with the storage conditions
  - ⇒ Avoid long storage periods
  - ⇒ In the case of deviating storage conditions and a longer storage period, contact PFEIFFER
- 

### **i** Info

PFEIFFER recommends checking the ball valve and the storage conditions regularly during a longer storage period.

---

- ⇒ In the case of storage prior to installation, the ball valve should normally be stored in a closed room where it is protected against harmful influences such as impacts, dirt or moisture. A room temperature of  $25\text{ °C} \pm 15\text{ °C}$  is recommended.
- ⇒ In particular, the actuator and the ends of the ball valve to the pipe connection may not be damaged by mechanical or any other influences.
- ⇒ Do not stack the ball valves.
- ⇒ Prevent condensation in damp rooms. Use a desiccant or heater.
- ⇒ The ball valve must be stored in its protective packaging and/or with the protective caps on the connection ends.
- ⇒ Ball valves that weigh more than approx. 10 kg should be stored on a pallet (or supported similarly).
- ⇒ Ball valves are usually delivered in a completely closed position. They must be stored in the position in which they were delivered. The actuating device must not be actuated.
- ⇒ Do not place any objects on the ball valve.



## 5 Installation

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

The following instructions apply additionally for 3-way ball valves. Observe chapter "4.3 Transporting and lifting the 3-way ball valve" for transport to the installation site.

### 5.1 Installation conditions

#### Operator level

The operator level for the ball valve is the front view on all operating elements of the ball valve including the attachments from the perspective of operating personnel.

The plant operator must make sure that operating personnel can carry out all work after the device is installed safely and can access it easily from the operator level.

#### Pipe routing

The guidelines applicable on site apply for the installation of ball valves in the pipe.

Install the ball valve such that there is low vibration and no mechanical stress. Observe the sections "Installation orientation" and "Support and mounting" in this chapter.

Install the ball valve so there is enough space to replace the actuator and ball valve as well as to perform maintenance work.

#### Installation position

The ball valve can be installed in any installation position.

PFEIFFER recommends however to install the ball valve in general so that the actuator points up in a vertical position.

In the following versions, the ball valve with actuator must be installed facing upwards or a corresponding support must be provided:

- Nominal sizes from DN 100 / NPS4
- Ball valves with a stem extension or insulating part.
- ⇒ In the case of deviations from this installation position, contact PFEIFFER.

#### Support and mounting

The plant manufacturer is responsible for the selection and implementation of a suitable support or mounting for the installed ball valve as well as the pipe.

#### Venting

Vents are screwed into the exhaust air connections of pneumatic and electropneumatic devices to ensure that the generated exhaust air can be released to the outside (protection against overpressure in the device). Furthermore, vents allow the intake of air (protection against underpressure in the device).

- ⇒ Carry out venting on the side that faces away from the operator level.

- ⇒ When connecting the attachments, make sure that they can be accessed from the operator level safely and easily.

### 5.2 Preparing for assembly

Ball valves must be handled, transported and stored with care, see Chapter "4 Delivery and on-site transport".

#### Perform the following steps after receiving the goods:

- ⇒ Check the scope of supply. Compare the delivered goods with the delivery note.
- ⇒ Check the supply for transport damage. Report transport damage to PFEIFFER and the transport company (see the delivery note).

#### Ensure the following conditions prior to assembly:

- The ball valve is clean.
- The ball valve data on the type plate (type, nominal size, material, nominal pressure and temperature range) matches the plant conditions (nominal size and nominal pressure of the pipe, medium temperature, etc.). For details about the marking, see Chapter "2 Markings on the device".
- Desired or required additional fittings, see Chapter "3.2 Additional fittings", are installed or prepared as far as necessary before the assembly of the ball valve.

### 5.3 Assembling the 3-way ball valve and actuator

PFEIFFER ball valves are supplied in working order. In individual cases, the actuator and ball valve are delivered separately and must be assembled. The tasks are listed below that are necessary for assembly and prior to the commissioning of the ball valve.

#### WARNING

##### **Danger and damage due to retrofitting an actuator unit!**

*The subsequent fitting of an actuator unit can pose a danger to the user and cause damage to the pipe system.*

- ⇒ *The torque, rotation direction, actuation angle and adjustment of the "OPEN" and "CLOSED" end stops must be adapted to the ball valve.*

##### **Danger and damage due to incorrect setting of the actuator!**

*If a actuator unit is subsequently installed, ensure that the position of the ball is 100% in line with the passage of the ball valve and the pipeline.*

- ⇒ *To adjust the ball, remove the 3-way ball valve from the pipeline so that the position of the ball can be seen.*
- ⇒ *To adjust the ball, use actuators with adjusting screws.*

**WARNING**

**Danger and damage due to use of an electrical actuator!**

- ⇒ It must be ensured that the actuator in the end positions is turned off by the limit switch signal.
- ⇒ If shut-off takes place in an intermediate position due to the signal of the torque switch, this signal should be used in addition for an error message. The fault must be remedied as soon as possible see Chapter "8 Malfunction".
- ⇒ For further instructions, see the electrical actuator manual.

**Danger and damage due to high external loads on an actuator unit!**

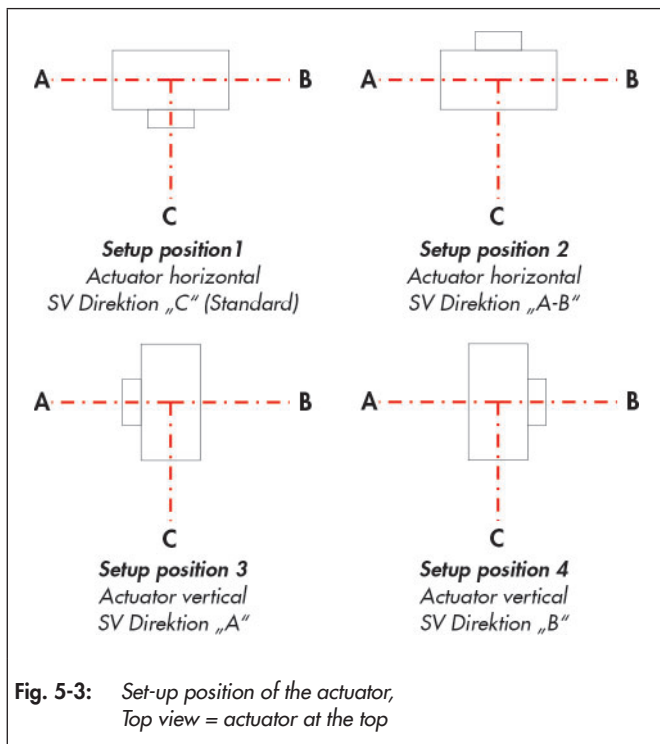
Actuators are not "stepladders".

- ⇒ Loads may not be applied to the actuators as they can damage or destroy the ball valve.

**Danger and damage due to heavy actuator units!**

Actuators that are heavier than the weight of the ball valve can pose a danger to the user and cause damage to the pipe system.

- ⇒ These actuators must be supported if they generate a bending stress on the ball valve due to their size and/or installation situation.

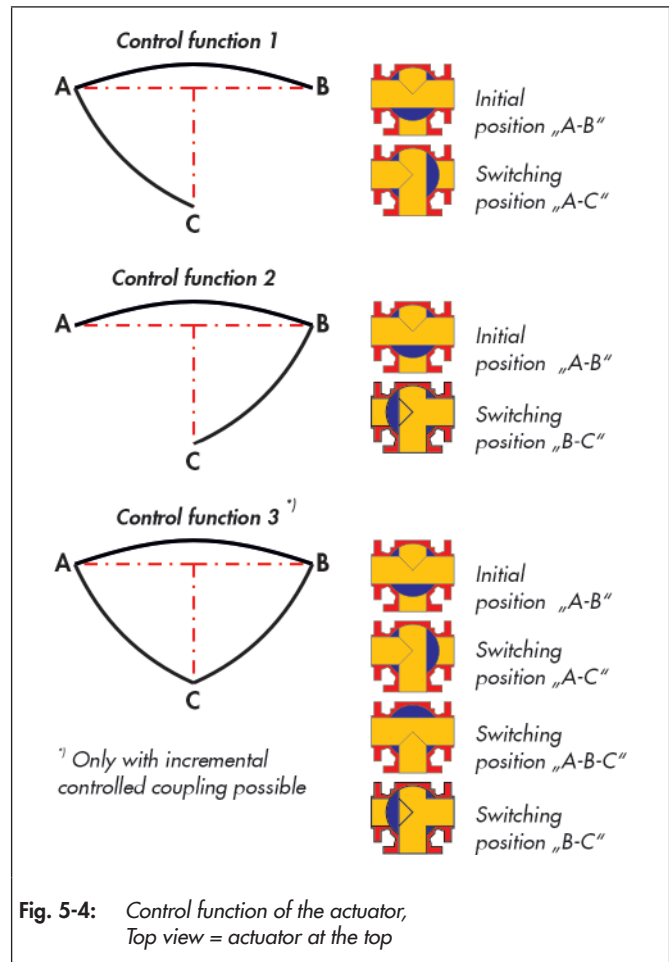


**NOTE**

**Damage to the 3-way ball valve due to the incorrect setting of the end stops!**

The actuating device is designed for the operating data specified in the order and adjusted for the intended functions.

- ⇒ The adjustment of the actuator is adapted to the switching positions of the 3-way ball valve and may not be changed without the consent of PFEIFFER.



## 5.4 Installing the 3-way ball valve in the pipe

### 5.4.1 General

- ⇒ Transport the ball valve in its original packaging to the installation site and unpack it only there.
- ⇒ Inspect the ball valve and actuator for transport damage. Damaged ball valves or actuators may not be installed.
- ⇒ A functional test is to be carried out at the beginning of installation for manually-operated ball valves: the ball valve must close and open correctly. Detected malfunctions must be fixed before commissioning. See also chapter 8 "Malfunction".
- ⇒ Handle the ball valve with care and observe the instructions for the flange connection.
- ⇒ Make sure that only 3-way ball valves are installed whose pressure classes, connection type (flow rate), type of lining and connection dimensions match the conditions of use. See the corresponding marking on the ball valve.

**DANGER**

**Danger due to exceeding the limits of use!**

Exceeding the limits of use can pose a danger to the user and cause damage to the pipe system.

- ⇒ No ball valve may be installed whose permissible pressure/temperature range is not sufficient for the operating conditions.
- ⇒ The max. permissible limits of use are marked on the ball valve, see Chapter "2 Markings on the device".
- ⇒ The permissible range is defined in Chapter "1 Safety instructions and safety measures".

- ⇒ The connection ends of the pipe must align with the ball valve connections and have plane-parallel ends.
- ⇒ Prior to installation, the ball valve and the connected pipe must be carefully cleaned of any contamination, in particular solid foreign matter.
- ⇒ The sealing surfaces on the flange connection and the utilized flange seals must in particular be free of all contamination during installation.
- ⇒ Optionally, an arrow is marked on the body. The direction of the arrow must correspond to the direction of flow in the pipe.
- ⇒ When pushing the ball valve and the required flange seals into an already assembled pipe, the distance between the pipe ends must be measured such that all contact surfaces of the ball valve and seals remain undamaged.

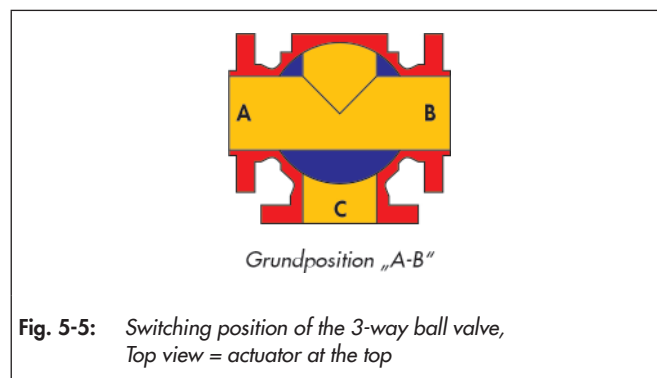
#### **NOTE**

#### **Damage to the sealing surfaces and seals or untight flange connection due to improper assembly!**

- ⇒ After longer storage of the ball valve, retighten the body screws after installation with the corresponding tightening torques according to Table 15-1 to Table 15-3 in Chapter "15.1.1 Tightening torques".

- ⇒ The connection data for the actuator unit must match the control data. See the type plate(s) on the actuator unit.
- ⇒ The associated instructions apply for connecting the actuator to the control.
- ⇒ Vents are screwed into the exhaust air connections of pneumatic and electropneumatic devices to ensure that the generated exhaust air can be released to the outside (protection against overpressure in the device).  
Furthermore, vents allow the intake of air (protection against underpressure in the device).
- ⇒ Carry out venting on the side that faces away from the working area of operating personnel.
- ⇒ When installing peripheral devices, make sure that they can be operated from the working area of operating personnel.

## 5.4.2 Switch position



#### **i Info**

#### **3-way ball valves are delivered with the appropriate ball depending on the function of the ball valve.**

The schematics of the 3-way ball valve Series 28t, see Fig. 5-3. This is always supplied in the basic position "A-B".

#### **The supplied 3-way ball valve BR 28t must be suitable for the pipe section.**

The 3-way ball valve ports designated A, B and C must be connected as shown in Fig. 5-1 in accordance with the intended switching positions in the pipeline.

- ⇒ Check the function before installing the ball valve.

## 5.4.3 Fail-safe position

The safety position depends on the selected actuator variant and must be agreed with the operator.

## 5.4.4 Installing the 3-way ball valve

- ⇒ Close the ball valve in the pipe for the duration of the installation.
- ⇒ Remove the protective caps on the ball valve openings prior to installation.
- ⇒ Lift the ball valve with suitable lifting equipment at the installation site, see chapter "4.3 Transporting and lifting the metering ball valve".
- ⇒ Use correct flange seals.
- ⇒ Clean the sealing surfaces on the ball valve and pipe if necessary.
- ⇒ Screw the pipe together with the ball valve without tension.

**NOTE****Damage to the sealing surfaces and seals or untight flange connection due to improper assembly!**

⇒ Tighten the flange connections evenly and in a criss-cross pattern with the torques indicated in Table 15-4 in Chapter "15.1.1 Tightening torques".

⇒ After installing the 3-way ball valve, open it slowly in the pipe.

**NOTE****Damage to the ball valve due to a sudden pressure increase and resulting high flow speed!**

Open the ball valve slowly in the pipe during commissioning.

⇒ Check the correct function of the ball valve.

## 5.5 Checking the assembled 3-way ball valve

### 5.5.1 Functional test

**WARNING****Danger of crushing due to moving actuator- and control shaft!**

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.
- ⇒ If the actuator- and control shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.

**Danger of injury due to pressurised components and escaping medium!**

⇒ Do not loosen the screw of an optional test connection while the ball valve is pressurised.

**Danger of injury due to escaping exhaust air!**

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

⇒ Wear eye protection and, if necessary, hearing protection when working near valves.

⇒ At the end of installation, perform a functional test with the control signals:

The ball valve must open and close correctly according to the control commands. Detected malfunctions must be fixed before commissioning, see Chapter "8 Malfunction".

**WARNING****Danger due to improperly executed control commands!**

Incorrectly executed control commands can cause serious injuries or even death and damage to the pipe system.

⇒ Check the actuator unit and control command., see chapter "8 Malfunction".

### 5.5.2 Pressure test of the pipe section

The pressure test was already performed on the ball valves by PFEIFFER. Observe the following for the pressure test of a pipe section with installed ball valves:

- ⇒ First carefully rinse newly installed pipe systems in order to wash out all foreign matter.
- ⇒ Ensure the following conditions for the pressure test:
  - Ball valve open: the test pressure may not exceed the value  $1.5 \times PN$  (according to the type plate).
  - Ball valve closed: the test pressure may not exceed the value  $1.1 \times PN$  (according to the type plate).

If a ball valve leaks, observe chapter "8 Malfunction".

**Info**

The plant operator is responsible for performing the pressure test. After Sales Service at PFEIFFER can provide you with support for the planning and implementation of a pressure test specific to your plant.

### 5.5.3 Rotary movement

The rotary movement of the actuator- and control shaft must be linear without any jerky movements.

- ⇒ Open and close the 3-way ball valve. When doing so, observe the movement of the actuator shaft.
- ⇒ Set the maximum and minimum control signal in succession to check the end positions of the ball valve.
- ⇒ Check the display on the position indicator.

### 5.5.4 Fail-safe position

- ⇒ Close the signal pressure line.
- ⇒ Check whether the ball valve moves to the fail-safe position, see "Fail-safe positions in Chapter "3 Design and principle of operation".

## 6 Start-up

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

### WARNING

#### **Danger of burning due to hot or cold components and pipe!**

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

#### **Danger of injury due to pressurised components and escaping medium!**

- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.

#### **Danger of crushing due to moving actuator- and control shaft!**

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.
- ⇒ If the actuator- and control shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.

#### **Danger of injury due to escaping exhaust air!**

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection and, if necessary, hearing protection when working near valves.

### Commissioning/recommissioning

- Open the ball valves slowly in the pipe. Opening slowly prevents a sudden increase in pressure and a resulting high flow speed that damages the ball valve.
- Check the correct function of the ball valve.

#### **Ensure the following conditions prior to commissioning/recommissioning:**

- The 3-way ball valve is installed properly in the pipe, see Chapter "5 Assembly".
- The leak and function tests have been completed successfully, see Chapter "5.1 Installation conditions".
- The current conditions in the concerned plant section correspond to the design of the ball valve, see Intended use in Chapter "1 Safety instructions and safety measures".





## 7 Operation

As soon as the commissioning/recommissioning work is complete, see Chapter "6 Commissioning", the 3-way ball valve is ready for operation.

### **WARNING**

#### **Danger of burning due to hot or cold components and pipe!**

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

#### **Danger of injury due to pressurised components and escaping medium!**

- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.

#### **Danger of crushing due to moving actuator- and control shafts!**

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.
- ⇒ If the actuator- and control shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.

#### **Danger of injury due to escaping exhaust air!**

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection and, if necessary, hearing protection when working near valves.

#### **Observe the following points during operation:**

- If required, after commissioning and reaching the operating temperature, tighten all flange connections between the pipe and ball valve with the corresponding tightening torques, see Table 15-3 in Chapter "15.1.1 Tightening torque".
- It can also be necessary to retighten the screw connections on the body sections with the corresponding tightening torques according to Table 15-1 and Table 15-2 in Chapter "15.1.1 Tightening torques".
- The ball valve/actuator unit must be actuated with the control signals.
- Ball valves that were delivered from the factory with an actuator are precisely adjusted. The user is responsible for any changes they make.
- For the manual operation or manual override of the actuator (if present), normal manual forces are sufficient and the use

of extensions to increase the actuation torque is not permitted.

- In the case of shut-off ball valves with a hand lever, the position of the hand lever indicates the location of the bore in the ball. The hand lever moves in general parallel to the bore. Special versions are to be taken from the respective order.

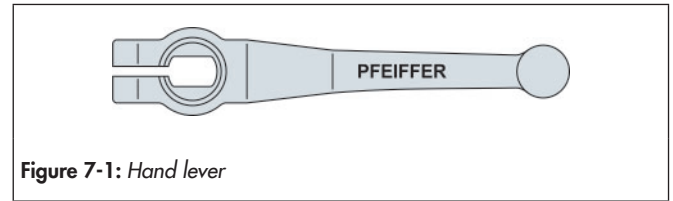


Figure 7-1: Hand lever

### **DANGER**

#### **Danger of injury due to jerky operation of the ball valve!**

The failure to observe these warnings can cause extreme danger for persons or for the pipe system.

- ⇒ Do not open and close the ball valve suddenly to prevent pressure surges and/or a temperature shock in the pipe system.

- If a ball valve leaks, observe chapter "8 Malfunction".



## 8 Malfunction

When rectifying the faults, chapter "1 Safety instructions and safety measures" must be observed.

### 8.1 Detecting and rectifying errors

Type of fault	Possible cause	Measures
Leaks in the pipe connection	The flange connection of the ball valve is leaky	<p>Tighten the flange screws.</p> <hr/> <p><b>! NOTE</b></p> <p><b>An excessive tightening torque when retightening the flange screws can damage the ball valve and pipe!</b></p> <p><i>The permissible torque for retightening the pipe flange screws is limited.</i></p> <hr/> <p>Retighten the flange connection with the respective tightening torque, see Table 15-4 in Chapter "15.1.1 Tightening torques".</p> <p>If necessary, increase the tightening torque to max. 20%.</p>
	The flange connection is still leaky after retightening	<p>Loosen the flange connection and remove the 3-way ball valve, see chapter "1 Safety instructions and safety measures".</p> <p>Check the plane parallelism of the flange connection and correct if it is not sufficient.</p> <p>Check the flange seals, if the seals are damaged, replace them.</p>
Leaks in the body sections	Body section connection loosened	Retighten the connection of the body sections with the respective tightening torque, see Table 15-1 to Table 15-3 in Chapter "15.1.1 Tightening torques".
	Body sections untight after retightening	Replace the body sealing and/or ball valve, see chapter "1 Safety instructions and safety measures".
Increased medium flow rate with the ball valve closed	Leakage in the closed position	Remove and inspect the ball valve, see chapter "1 Safety instructions and safety measures".
	The ball valve is damaged	<p>Repairs are necessary</p> <p>Remove the ball valve, see chapter "1 Safety instructions and safety measures".</p> <p>Request spare parts from PFEIFFER, see Chapter "15.2 Spare parts".</p> <p>For the required repair instructions, see Chapter "12 Repairs"</p>
Leaks in the control shaft sealing	Medium escapes from the stuffing box	<p>Remove the ball valve, see chapter "1 Safety instructions and safety measures".</p> <p>Disassemble the ball valve and replace the control shaft sealing.</p> <p>Request spare parts from PFEIFFER, see Chapter "15.2 Spare parts".</p> <p>For the required repair instructions, see Chapter "12 Repairs"</p>
Malfunction	The actuator unit or control does not react	Check the actuator unit and control command.
	The actuator and control are OK	Remove and inspect the ball valve, see chapter "1 Safety instructions and safety measures".
	The ball valve is damaged	<p>Repairs are necessary.</p> <p>Remove the ball valve, see chapter "1 Safety instructions and safety measures".</p> <p>Request spare parts from PFEIFFER, see Chapter "15.2 Spare parts".</p> <p>For the required repair instructions, see Chapter "12 Repairs"</p>

## Malfunction

Type of fault	Possible cause	Measures
Problems in the actuator unit	The pneumatic actuator must be removed	Disconnect the connection to the control pressure. Remove the actuator from the ball valve (observe the "Safety instructions and safety measures", see the included actuator unit manuals).

### **i** Info

- In the case of faults that are not listed in the table, contact the After Sales Service at PFEIFFER.
- Spare parts must be ordered indicating all the data according to the ball valve marking. Only original parts from PFEIFFER Chemie-Armaturenbau GmbH may be installed.
- If it is determined after removal that the ball valve material lining is not sufficiently resistant for the medium, parts must be selected made of a suitable material.

## 8.2 Carrying out emergency measures

In the case of a power supply failure, the 3-way ball valve automatically switches to the preset fail-safe position, see "Fail-safe positions" in Chapter "3 Design and principle of operation".

The system operator is responsible for emergency measures.

### **In case of a metering ball valve fault:**

- Close the shut-off valves upstream and downstream of the ball valve so that no medium flows through the ball valve.
- Troubleshoot the error, see chapter "8.1 Detecting and rectifying errors".
- Rectify the fault that can be fixed as indicated in the instructions provided in this installation and operating manual. For faults that cannot be fixed, contact the After Sales Service at PFEIFFER.

### **Recommissioning after faults**

See Chapter "6 Commissioning".

## 9 Servicing

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task. The following documents are required in addition for the maintenance of the ball valve:

- Installation and operating manual for the installed actuator, e.g. ► EB 31a for BR 31a rotary actuators or the corresponding actuator documentation of other manufacturers.

### WARNING

#### **Danger of burning due to hot or cold components and pipe!**

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

#### **Danger of injury due to pressurised components and escaping medium!**

- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.

#### **Danger of crushing due to moving actuator- and control shaft!**

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.
- ⇒ If the actuator- and control shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.

#### **Danger of injury due to escaping exhaust air!**

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection and, if necessary, hearing protection when working near valves.

#### **Danger of injury due to preloaded springs!**

Actuators with preloaded actuator springs are pressurised.

- ⇒ Release the compression from the preloaded springs before working on the actuator, see the corresponding actuator documentation.

#### **Danger of injury due to residual medium in the ball valve!**

When working on the ball valve, residual medium can escape and, depending on the medium properties, cause injuries (e.g. scalding, chemical burns).

- ⇒ Wear protective garments, protective gloves and eye protection.
- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.
- ⇒ Bring the ball valve into the open position so the pressure is released from the ball.

### NOTE

#### **Damage to the ball valve due to excessively high or low tightening torques!**

The ball valve components must be tightened with specific torques. Excessively tightened components are subject to increased wear. Insufficiently tightened components can cause leakage.

- ⇒ Observe the tightening torques, see Table 15-1 to Table 15-3 in Chapter "15.1.1 Tightening torques".

#### **Damage to the ball valve due to unsuitable tools!**

- ⇒ Only use tools approved by PFEIFFER, see Chapter "15.1.3 Tools".

#### **Damage to the ball valve due to unsuitable lubricants!**

- ⇒ Only use lubricants approved by PFEIFFER, see Chapter "15.1.2 Lubricants".

### Info

#### **The ball valve was checked by PFEIFFER prior to delivery.**

- Certain test results certified by PFEIFFER are no longer valid when disassembling the ball valve. This includes the test for seat leakage and the leak test (outer tightness).
- If maintenance and repair work is performed without approval from the After Sales Service of PFEIFFER, the product guarantee will be voided.
- Only use original parts from PFEIFFER as spare parts that correspond to the original specification.
- Wear parts are not covered by the warranty.

## 9.1 Periodic tests

- ⇒ Depending on the conditions of use, the ball valve must be checked at defined intervals in order to take remedial measures prior to possible malfunctions. The plant operator is responsible for preparing a suitable test plan
- ⇒ PFEIFFER recommends the following inspections that can be carried out during operation:

Test	Measures in the case of a negative test result
If present, check the optional test connection for tightness. <b>WARNING!</b> Danger of injury due to pressurised components and escaping medium! Do not loosen the screw of the test connection while the ball valve is pressurised.	Decommission the 3-way ball valve, see chapter "10 Decommissioning" Contact the After Sales Service at PFEIFFER for repairs, See chapter "12 Repairs".
Check the control shaft sealing for tightness from the outside.	The control shaft sealing with a PTFE V-ring packing is preloaded with a disc spring set and is therefore maintenance free.

Test	Measures in the case of a negative test result
Check the rotary movement of the actuator- and control shaft for smooth movement.	If the actuator- and control shaft are blocked, remove the blockage. <b>WARNING!</b> If the actuator- and control shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time) they can release unexpectedly and move uncontrolled. This can lead to crushing if reaching into them. Before trying to release a blockage of the actuator- and control shaft, interrupt and lock the pneumatic energy and the control signal. Release the residual energy of the actuator (spring tension or compressed air reservoir) before releasing the blockage, see the corresponding actuator documentation.
If possible, check the fail-safe position of the metering ball valve by briefly interrupting the power supply.	Decommission the ball valve, see chapter "Decommissioning". Then determine the cause and remedy it, see Chapter "8 Malfunctions".
Check pipe connections and seals of the ball valve and actuator for leaks.	Regular maintenance work on the ball valve is not necessary, but when checking the pipe section, no medium may escape from the flange and screw connections of the body or from the control shaft sealing.

## 9.2 Maintenance work

- ⇒ The ball valve must be prepared before all maintenance work, see Chapter "12 Repairs".
- ⇒ After all maintenance work, the ball valve must be checked prior to recommissioning, see Chapter "5.5 Checking the mounted 3-way ball valve".

### 9.2.1 Replacing the seat rings and ball

- ⇒ Check the condition of the ball and seat rings.
- ⇒ Remove the seat rings (6 and 7) as described in Chapter 12.2. Check the seat rings as well as all plastic parts for damage and if in doubt replace them.
- ⇒ Also remove the ball (3). Check the ball as well as all plastic parts for damage and if in doubt replace them.

## 9.3 Ordering spare parts and consumables

Information about spare parts, lubricants and tools can be received from the After Sales Service at PFEIFFER.

### Spare parts

Information on spare parts can be found in Chapter "15.2 Spare parts".

## 10 Decommissioning

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

### WARNING

#### **Danger of burning due to hot or cold components and pipe!**

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

#### **Danger of injury due to pressurised components and escaping medium!**

- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.

#### **Danger of crushing due to moving actuator- and control shaft!**

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.
- ⇒ If the actuator- and control shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.

#### **Danger of injury due to escaping exhaust air!**

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection and, if necessary, hearing protection when working near valves.

#### **Danger of injury due to residual medium in the ball valve!**

When working on the ball valve, residual medium can escape and, depending on the medium properties, cause injuries (e.g. scalding, chemical burns).

- ⇒ Wear protective garments, protective gloves and eye protection.
- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.
- ⇒ Bring the ball valve into the open position so the pressure is released from the ball.

To decommission the 3-way ball valve for maintenance and repair work or for disassembly, perform the following steps:

- ⇒ Close the valves upstream and downstream of the ball valve so that no medium flows through the ball valve.
- ⇒ Empty the pipe and ball valve completely.
- ⇒ Shut off the pneumatic power and lock it, to depressurise the actuator.
- ⇒ Let the pipe and ball valve components cool down or warm up.





## 11 Removal

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

### WARNING

#### **Danger of burning due to hot or cold components and pipe!**

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

#### **Danger of crushing due to moving actuator- and control shaft!**

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.
- ⇒ If the actuator- and control shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.

#### **Danger of injury due to residual medium in the ball valve!**

When working on the ball valve, residual medium can escape and, depending on the medium properties, cause injuries (e.g. scalding, chemical burns).

- ⇒ Wear protective garments, protective gloves and eye protection.
- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.
- ⇒ Bring the ball valve into the open position so the pressure is released from the ball.

#### **Danger of injury due to preloaded springs!**

Actuators with preloaded actuator springs are pressurised.

- ⇒ Before working on the actuator, release the compression from the preloaded springs.

Prior to disassembly, make sure that the following conditions are met:

- The ball valve is decommissioned, see chapter "10 Decommissioning".

### 11.1 Removing the 3-way ball valve from the pipe

- ⇒ Loosen the flange connection.
- ⇒ Remove the ball valve from the pipe, see Chapter "4.3 Transporting and lifting the 3-way ball valve".

### WARNING

**If a used valve is sent to PFEIFFER for service:**

- ⇒ Decontaminate the valves properly in advance.

- ⇒ When returning a used valve, include the safety data sheet for the medium as well as confirmation of decontamination of the valve. Otherwise the valve will not be accepted.

### Tip

- PFEIFFER recommends documenting the following contamination data in the form ► FM 8.7-6 "Declaration regarding the contamination of PFEIFFER valves and components".
- This form is available at ► [www.pfeiffer-armaturen.com](http://www.pfeiffer-armaturen.com).

### 11.2 Disassembling the actuator

See the corresponding actuator documentation.



## 12 Repairs

If the operation of the 3-way ball valve is no longer compliant or if it does not work at all, it is defective and must be repaired or replaced.

### NOTE

**Damage to the metering ball valve due to improper maintenance and repair!**

- ⇒ Do not perform maintenance and repair work on your own.
- ⇒ Contact the After Sales Service at PFEIFFER for maintenance and repair work.

In special cases, certain maintenance and repair work may be performed.

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

The following instructions apply additionally for ball valves. For decommissioning and disassembly, observe Chapter "10 Decommissioning" and Chapter "11 Disassembly".

### 12.1 Replacing the V-ring packing

If a leak is found in the stuffing box flange (5), the rings of the V-ring packing (10) could be defective.

- ⇒ Check the condition of the V-ring packing.

Disassemble the ball valve to remove the packing. For this purpose, observe Chapter "1 Safety instructions and safety measures".

- ⇒ Place the ball valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (13) and carefully remove stuffing box flange (5).
- ⇒ Remove the bush (15).
- ⇒ Remove the disc springs from the disc spring set (9).
- ⇒ Remove the V-ring packing (10).
- ⇒ Check the rings of the packing as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.
- ⇒ Assemble the ball valve as described in Chapter "3.5 Assembly of the metering ball valve. Note the respective design of the ball valve.

### 12.2 Replacing the seat ring and the ball

If there is a leak in the passage, the seat rings (6 and 7) and the ball (3) can be defective.

- ⇒ Check the condition of the seat rings and the ball.

Disassemble the ball valve to remove the seat ring and ball of the ball valve. For this purpose, observe Chapter "1 Safety instructions and safety measures".

- ⇒ Place the ball valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (11) and carefully remove the horizontal side bodys (2).

### Info

Depending on the version, stud bolts (11) with nuts (12) or screws (11) can be used.

- ⇒ Loosen the screws (20) and carefully remove the packing bush (14) with the control shaft (4).
- ⇒ Carefully loosen the ball (3) and remove it from the main body (1). The ball is double mounted in the main body (1) with the bearing bush (19).
- ⇒ Check the seat rings and ball as well as all plastic and graphite parts for damage, in the case of doubt, replace them.
- ⇒ Assemble the ball valve as described in Chapter "3.5 Assembly of the ball valve. Note the respective design of the ball valve.

### 12.3 Additional repairs

- ⇒ In the case of additional major damage, it is recommended to have repairs performed by PFEIFFER.

### 12.4 Sending devices to PFEIFFER

Defective ball valves can be sent to PFEIFFER for repair.

Proceed as follows to send devices:

### WARNING

**Danger due to a contaminated ball valve!**

- ⇒ When returning a used valve to PFEIFFER for service, decontaminate the valve properly in advance.
- ⇒ When returning a used valve, include the safety data sheet for the medium as well as confirmation of decontamination of the valve. Otherwise the valve will not be accepted.

### Tip

- PFEIFFER recommends documenting the following contamination data in the form ► FM 8.7-6 "Declaration regarding the contamination of PFEIFFER valves and components".
- This form is available at ► [www.pfeiffer-armaturen.com](http://www.pfeiffer-armaturen.com).

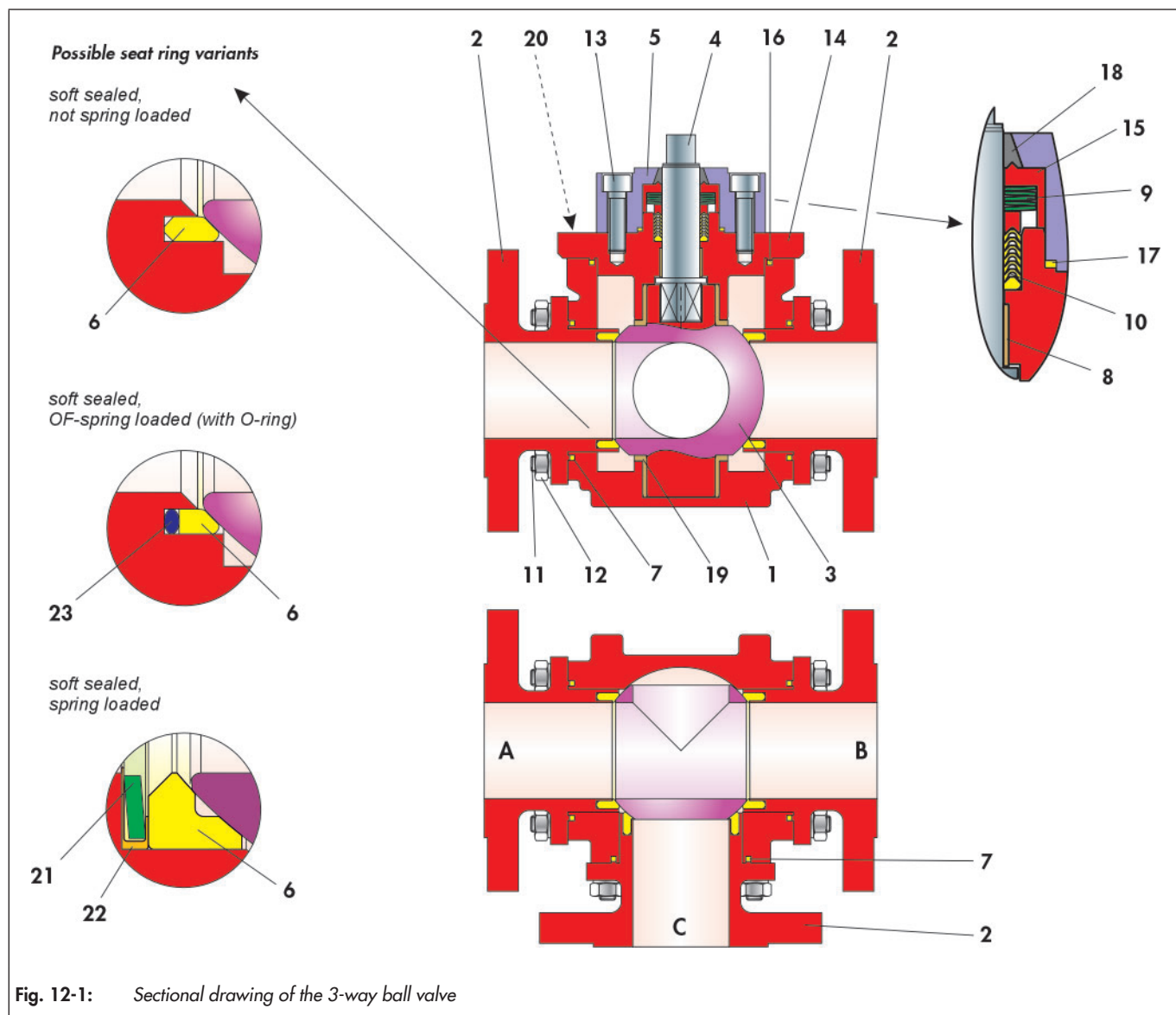


Fig. 12-1: Sectional drawing of the 3-way ball valve

Table 12-1: List of parts

Item	Description
1	Main body
2	Side body
3	Ball
4	Control shaft
5	Stuffing box flange
6	Seat ring
7	Sealing
8	Bearing bush
9	Disc spring set
10	V-ring packing
11 <sup>1)</sup>	Stud bolt / Screws
12 <sup>1)</sup>	Nut

Item	Description
13	Screw
14	Packing bush
15	Bush
16	Ring
17	Ring
18	Ring
19	Bearing bush
20	Screw
21	Disc spring
22	Disc spring jacket
23	O-ring

<sup>1)</sup> Depending on the nominal width, stud bolts can be fitted with nuts or screws.

- ⇒ Include the following information for returns:
- Manufacturer number
  - 3-way ball valve type
  - Article number
  - Nominal size and version of the 3-way valve
  - Manual valve/automated valve
  - Medium (designation and consistency)
  - Medium pressure and temperature
  - Flow rate in m<sup>3</sup>/h
  - Bench range of the actuator
  - Number of actuations (year, month, week or day)
  - Installation drawing if available
  - Completed declaration regarding contamination.



## 13 Disposal

- ⇒ For disposal, observe the local, national and international regulations.
- ⇒ Do not dispose of old components, lubricant and hazardous materials with domestic waste.





## 14 Certificates

The declaration of conformity is available on the following pages:

- Declaration of conformity according to Pressure Equipment Directive 2014/68/EU for automated valves, see page 14-2.
- Declaration of conformity according to Pressure Equipment Directive 2014/68/EU for manually operated valves, see page 14-3.
- Declaration of conformity for completed machinery according to Machinery Directive 2006/42/EC for the 3-way ball valve BR 28t, see page 14-4.
- Declaration of conformity for partly completed machinery according to Machinery Directive 2006/42/EC for 3-way ball valve BR 28t, see page 14-5.

The printed certificates correspond to the status at the time of printing. Further optional certificates are available upon request.

# DECLARATION OF CONFORMITY

As per Pressure Equipment Directive 2014/68/EU  
TRANSLATION



The manufacturer	<b>PFEIFFER Chemie-Armaturenbau GmbH</b> , D47906 Kempen, Germany
declares that:	<b>Type 28t piggable 3-way ball valve (BR 28t), with packing</b> <ul style="list-style-type: none"> <li>• with pneumatic/electric/hydraulic actuator</li> <li>• with free shaft end for subsequent mounting of an actuator</li> </ul>
<p>1. The valves are pressure accessories within the meaning of the <b>Pressure Equipment Directive 2014/68/EU</b> and conform with the requirements of this Directive.</p> <p>2. They may only be operated observing the Mounting and operating instructions ► EB 28t.</p> <p>The commissioning of these valves is only permitted after the valve has been installed from all sides in the pipeline and a risk of injury can be ruled out.</p> <p><i>(See ► EB 28t, Chapter 1 for piggable 3-way ball valves intended for dead-end service)</i></p>	

*Applied standards*

<b>AD 2000 Regulations</b>	Regulations for pressurized valve body parts
----------------------------	--

*Type designation and technical features:*

PFEIFFER data sheet ► TB 28t NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalog.
--

*Applied conformity assessment procedure:*

<b>Conforming to Annex III of the Pressure Equipment Directive 2014/68/EU, Module H</b>
---

*Name of notified body:*

*Identification number of the notified body:*

<b>TÜV Anlagentechnik GmbH</b> Am Grauen Stein 51101 Köln Germany	0035
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These Declarations become invalid when modifications are made to the piggable 3-way ball valves and/or assemblies that affect the technical data of the ball valve or the <Intended use> described in ► EB 28t, section 1 of the Mounting and operating instructions and considerably change the valve or an assembly delivered with it.

Kempen, 22. April 2023

  
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**Stefan Czayka**  
 Head of Quality Management/IMS Representative

# DECLARATION OF CONFORMITY

As per Pressure Equipment Directive 2014/68/EU  
TRANSLATION



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The manufacturer	<b>PFEIFFER Chemie-Armaturenbau GmbH</b> , D47906 Kempen, Germany
declares that:	<b>Type 28t piggable 3-way ball valve (BR 28t), with packing</b> <ul style="list-style-type: none"> <li>• with lever for 90° operation</li> <li>• with worm gear and handwheel</li> </ul>
<p>1. The valves are pressure accessories within the meaning of the <b>Pressure Equipment Directive 2014/68/EU</b> and conform with the requirements of this Directive.</p> <p>2. They may only be operated observing the Mounting and operating instructions ► EB 28t. (See ► EB 28t, Chapter 1 for piggable 3-way ball valves intended for dead-end service)</p>	

*Applied standards*

<b>AD 2000 Regulations</b>	Regulations for pressurized valve body parts
----------------------------	--

*Type designation and technical features:*

<p>PFEIFFER data sheet ► TB 28t                  NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalog.</p>
---

*Applied conformity assessment procedure:*

<b>Conforming to Annex III of the Pressure Equipment Directive 2014/68/EU, Module H</b>
---


*Name of notified body:*

*Identification number of the notified body:*

<p><b>TÜV Anlagentechnik GmbH</b>                  Am Grauen Stein                  51101 Köln                  Germany</p>	0035
---	------

These Declarations become invalid when modifications are made to the piggable 3-way ball valves and/or assemblies that affect the technical data of the ball valve or the <Intended use> described in ► EB 28t, section 1 of the Mounting and operating instructions and considerably change the valve or an assembly delivered with it.

Kempen, 22. April 2023

  
 \_\_\_\_\_  
**Stefan Czayka**  
 Head of Quality Management/IMS Representative

# EU DECLARATION OF CONFORMITY TRANSLATION



The manufacturer	<b>PFEIFFER Chemie-Armaturenbau GmbH</b> , 47906 Kempen, Germany
declares for the listed products that:	<p><b>Type 28t Piggable 3-way ball valve (BR 28t)</b></p> <ul style="list-style-type: none"> <li>• with a <b>Type 31a Quarter-turn Actuator (BR 31a)</b></li> <li>• with a <b>rotary actuator of a different make</b></li> </ul> <p>Prerequisite: the unit was sized and assembled by PFEIFFER Chemie-Armaturenbau GmbH. The serial number on the valve refers to the entire unit.</p>
<p>1. It complies with all applicable requirements stipulated in <b>Machinery Directive 2006/42/EC</b>.</p> <p>2. In the delivered state, the valve with actuator is considered to be final machinery as defined in the above-mentioned directive.</p> <p>The start-up of these units is only permitted after the piggable 3-way ball valve has been installed from both sides in the pipeline and a risk of injury can be ruled out as a result.</p>	

*Referenced standards:*

- a) VCI, VDMA, VGB: "Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen, Mai 2018" [German only]
- b) VCI, VDMA, VGB: "Zusatzdokument zum Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen vom Mai 2018" [German only], based on DIN EN ISO 12100:2011-03

*Product description and technical features:*

Stainless steel - valve consisting of a piggable 3-way ball valve, automated with a single or double-acting piston actuator for butterfly valves, ball valves and other valves with rotating throttle bodies.

For product descriptions refer to:  
 PFEIFFER data sheet for Type 28t 3-way ball valve ▶ TB 28t  
 PFEIFFER data sheet for Type 31a Actuator ▶ TB 31a  
 PFEIFFER mounting and operating instructions for Type 28t 3-way ball valve ▶ EB 28t  
 PFEIFFER mounting and operating instructions for Type 31a Actuator ▶ EB 31a

Valve accessories (e.g. positioners, limit switches, solenoid valves, lock-up valves, supply pressure regulators, volume boosters and quick exhaust valves) are classified as machinery components and do not fall within the scope of the Machinery Directive as specified in § 35 and § 46 of the Guide to Application of the Machinery Directive 2006/42/EC issued by the European Commission.

This declaration becomes invalid when modifications are made to the piggable 3-way ball valves and/or assemblies that affect the technical data of the ball valve or the intended use (▶ EB 28t, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 23 April 2023

  
 -----  
**Stefan Czayka**  
 Head of Quality Management/IMS Representative

# DECLARATION OF CONFORMITY

## TRANSLATION



The manufacturer	<b>PFEIFFER Chemie-Armaturenbau GmbH</b> , 47906 Kempen, Germany
declares for the listed products that:	<b>Type 28t Piggable 3-way ball valve (BR 28t)</b> <ul style="list-style-type: none"> <li>• <b>with free shaft end</b></li> </ul>
<p>1. In the delivered state, the valve prepared for mounting on a rotary actuator (not a clearly defined actuator system) is considered to be partly completed machinery as defined in the <b>Machinery Directive 2006/42/EC</b>. Machinery is considered to be partly completed machinery when the machinery manufacturer has not determined all required specifications such as model type, thrusts, torques etc.</p> <p>The start-up of these units is only permitted after the valve has been installed from both sides in the pipeline and a risk of injury can be ruled out as a result.</p>	

### Referenced standards:

- a) VCI, VDMA, VGB: "Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen, Mai 2018" [German only]
- b) VCI, VDMA, VGB: "Zusatzdokument zum Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen vom Mai 2018" [German only], based on DIN EN ISO 12100:2011-03

### Product description and technical features:

Stainless steel - valve consisting of a piggable 3-way ball valve.

For product descriptions refer to:

PFEIFFER data sheet for Type 28t 3-way ball valve ▶ TB 28t

PFEIFFER mounting and operating instructions for Type 28t 3-way ball valve ▶ EB 28t

Valve accessories (e.g. positioners, limit switches, solenoid valves, lock-up valves, supply pressure regulators, volume boosters and quick exhaust valves) are classified as machinery components and do not fall within the scope of the Machinery Directive as specified in § 35 and § 46 of the Guide to Application of the Machinery Directive 2006/42/EC issued by the European Commission.

This declaration becomes invalid when modifications are made to the piggable 3-way ball valves and/or assemblies that affect the technical data of the ball valve or the intended use (▶ EB 28t, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 23 April 2023

Stefan Czayka

Head of Quality Management/IMS Representative



## 15 Annex

### 15.1 Tightening torques, lubricant and tools

#### 15.1.1 Tightening torques

##### **i** Info

<sup>1)</sup> The tightening torques stated in the tables can only be understood as very rough and non-binding guide values and refer to a coefficient of friction of 0.2 $\mu$ . Lubricating the threads leads to indeterminate tightening conditions.

##### 15.1.1.1 Side body

For the connection of the side bodies, the screw connections are tightened in a criss-cross pattern with the tightening torques indicated below.

**Table 15-1:** Side bodies section tightening torques

Nominal size		Qty.	Thread (11)	Tightening torque <sup>1)</sup>
DN	NPS			
50	2	4	M14	
80	3	4	M20	370 Nm
100	4	8	M12	74 Nm
125	5	On request		
150	6			
200	8			

##### 15.1.1.2 Stuffing box flange

For the assembly of the stuffing box flange, the screw connections are tightened in a criss-cross pattern with the tightening torques indicated below.

**Table 15-2:** Stuffing box flange tightening torques

Nominal size		Qty.	Thread (13)	Tightening torque <sup>1) 2)</sup>
DN	NPS			
50	2	3	M8	21.5 Nm
80	3	4	M10	44 Nm
100	4	4	M12	74 Nm
125	5	On request		
150	6			
200	8			

<sup>2)</sup> Tighten the stuffing box flange screws until the bushing lies on the dome.

#### 15.1.1.3 Packing bush

For the assembly of the packing bush, the screw connections are tightened in a criss-cross pattern with the tightening torques indicated below.

**Table 15-1:** Packing bush tightening torques

Nominal size		Qty.	Thread (20)	Tightening torque <sup>1)</sup>
DN	NPS			
50	2			
80	3			
100	4			
125	5			
150	6			
200	8			

#### 15.1.1.4 Flange connection

##### **i** Info

Required tightening torques for assembly for flanges according to DIN EN 1092-1 type 11 and connecting elements (e.g. screws, threaded pins) made of 25CrMo4 / A4-70 or a comparable strength.

The values are taken from the "Guidelines for assembly of flange connections in processing plants" of the VCI (Verband der Chemischen Industrie e.V.).

**Table 15-2:** Flange connection torque

DN	PN	Thread	Tightening torques [Nm] for sealing units <sup>3)</sup>		Tightening method <sup>4)</sup>		
			A	B			
50	10 ... 40	M16	125 <sup>4)</sup>	80	I		
80	10 ... 40	M16					
100	10 ... 16	M16	240 <sup>5)</sup>	150			
	25 ... 40	M20					
125	10 ... 16	M16	125 <sup>4)</sup>	80	II		
	25 ... 40	M24				340	200
150	10 ... 16	M20	240 <sup>5)</sup>	150	I		
	25 ... 40	M24				340	200
200	10 ... 16	M20	240 <sup>5)</sup>	150	I		
	25	M24				340	200
	40	M27					

<sup>3)</sup> These tightening torques were calculated by the company BASF SE and confirmed by partner companies.

<sup>4)</sup> Recommended lever length 300 mm.

<sup>5)</sup> Recommended lever length 550 mm.

<sup>6)</sup> I) With manually-operated spanner with a suitable extension if necessary.

II) With a torque wrench or other torque-controlled procedure.

**Table 15-3:** *Sealing unit A*

Seal	Nominal pressure	Description
Flat seal	PN 10 to PN 25	Without inner eyelet
	PN 40	With inner eyelet

Shaft ring seals PN 40 are covered by this.  
Flat seals with inner eyelet for PN 10 - 25 are already covered, providing that the required characteristic values are complied with.

## 15.2 Spare parts

PFEIFFER recommends spare part sets for "Commissioning" and for "2-year operation".

**Table 15-4:** *Sealing unit B*

Seal	Nominal pressure	Description
Seal for tongue and groove flanges	PN 10 to PN 40	<ul style="list-style-type: none"> <li>- With fibre gaskets and metal-reinforced graphite gaskets</li> <li>- O-rings of various materials</li> </ul>
Grooved gasket		-
Spiral gasket with graphite		-

### 15.1.2 Lubricant

**Table 15-5:** *Recommended lubricant*

Use	Temperature range	Lubricant
Screws and nuts	-10 ... +200°C	Heavy-duty grease paste (e.g. Gleitmo 805, manufacturer Fuchs) Not suitable for grease-free ball valves or for use with oxygen
Screws and nuts	High temperature	Heavy-duty grease paste Molykote 1000

### 15.1.3 Tools

Suitable tools are required to work on the ball valve. Unsuitable tools can damage the ball valve.



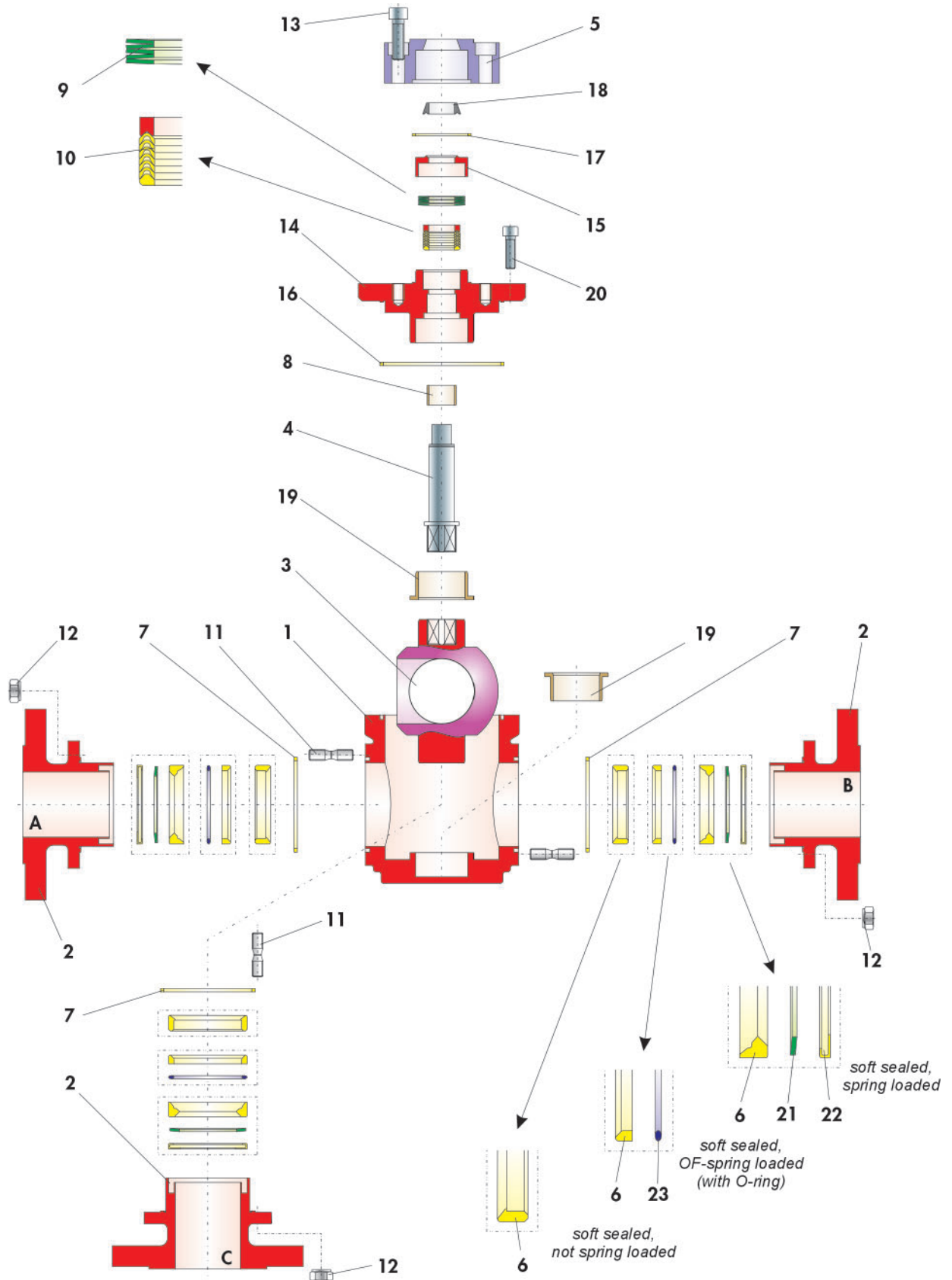


Fig. 15-1: Exploded drawing of the 3-way ball valve

Table 15-6: Recommend spare parts for the 3-way ball valve

Item	Description	Material	Spare parts kit	
			Commissioning	2-year operation
1	Main body	1.4571 • 1.4408		
2	Side body	1.4571 • 1.4408		
3	Ball	1.4571 • 1.4408		•
4	Control shaft	1.4462		•
5	Stuffing box flange	1.4571 • 1.4408		
6	Seat ring	PTFE	•	•
7	Sealing	PTFE	•	•
8	Bearing bush	PTFE with glass	•	•
9	Disc spring set	1.8159 Deltatone	•	•
10	V-ring packing	PTFE / 1.4305	•	•
11 <sup>1)</sup>	Stud bolt / Screw	A4-70		
12 <sup>1)</sup>	Nut	A4-70		
13	Screw	A4-70		
14	Packing bush	1.4571 • 1.4408		
15	Bush	1.4571		
16	Ring	PTFE	•	•
17	Ring	PTFE	•	•
18	Ring	Carbon-Graphite	•	•
19	Bearing bush	PTFE with VA	•	•
20	Screw	A4-70		
21	Disc spring (Option)	1.4404	•	•
22	Disc spring jacket (Option)	PTFE	•	•
23	O-ring (Option)	Viton	•	•

<sup>1)</sup> Depending on the nominal width, stud bolts can be fitted with nuts or screws.

### 15.3 Service

For maintenance and repair work as well as malfunctions or defects, contact the After Sales Service at PFEIFFER for support.

#### E-mail

The After Sales Service can be reached at the e-mail address "sales-pfeiffer-de@samsongroup.com".

#### Necessary data

Provide the following information in the case of questions and for troubleshooting:

- Manufacturer number
- 3-way ball valve type
- Article number
- Nominal size and version of the 3-way ball valve
- Manual valve/automated valve
- Medium (designation and consistency)
- Medium pressure and temperature
- Flow rate in m<sup>3</sup>/h

- Actuator signal pressure
- Number of actuations (year, month, week or day)
- Installation drawing if available
- Completed declaration regarding contamination. This form is available at ► [www.pfeiffer-armaturen.com](http://www.pfeiffer-armaturen.com).

#### Further information

The indicated <data sheets> and further information are available, also in English, at the following address:

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