

# MOUNTING AND OPERATING INSTRUCTIONS



## EB 26s

Translation of the original manual



**Ball valve BR 26s • DIN and ANSI version**  
to combine with actuators

March 2024 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 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 PFEIFFER ball valve BR 26s is manually operated in combination with an actuator for the regulation of the volume flow, pressure and temperature of fluid, gaseous or vaporous media.

- 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 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 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 26s.
- The safety regulations that apply to the pipe system in which the 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 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 opening 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 the data sheet ► TB 26s

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

The ball valve contains moving parts (actuator stem, switching 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 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 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 and Table 15-2 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.

**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 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.

**! 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 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 or Table 15-2 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 increase due to a change in the condition of the unit.)

**Specific aspects in case of use for control purposes!**

- ⇒ In the case of use for control purposes, observe the limitations indicated above in the data sheets.

**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 plant vibrations!**

- ⇒ If necessary, secure hand-operated ball valves in the case of plant vibrations with a locking device to prevent it from moving by itself.

**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".

**NOTE**

**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

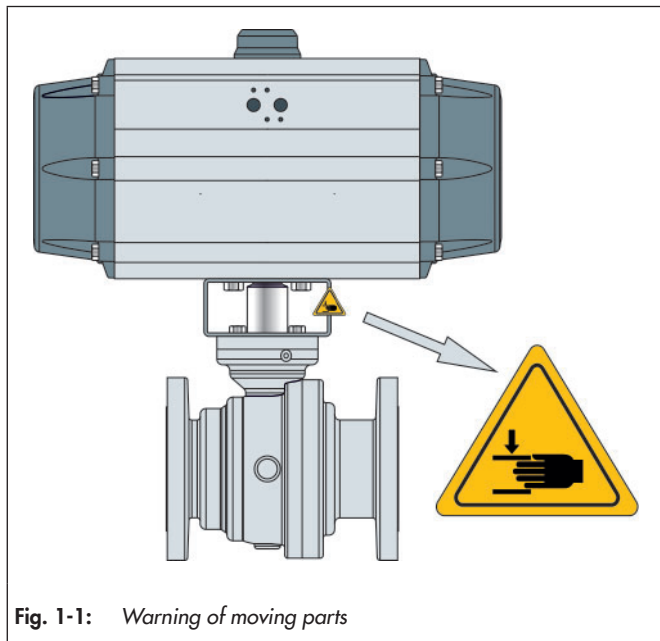


Fig. 1-1: Warning of moving parts

There is a danger of crushing due to the rotary movements of the actuator- and switching 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 Markings on the device

Each ball valve usually has the following marking.

**Table 2-1:** Marking on the type plate and on the body of the valve

Pos.	For	Marking	Remark
1	Manufacturer	PFEIFFER	Address see Chapter "15.3 Service"
2	Valve type	BR (and number value)	e.g. BR 26s = Series 26s, see the PFEIFFER catalogue
3	Body material	e.g. 1.4408	Material standard according to DIN EN 110213-4
4	Size	DN (and number value)	Number value in [mm], e.g. DN 50 / number value in [inches], e.g. NPS2
5	Maximum pressure	PN (and number value)	Number value in [bar], e.g. PN 40 / number value in [inches], e.g. c1 50 at room temperature
6	Max. permissible operating temperature	TS (and number value)	PS and TS are related values here at the max. permissible operating temperature with the max. permissible operating overpressure, see the Pressure-Temperature Diagram on the data sheet ▶ TB 26s
	Max. permissible operating pressure	PS (and number value)	
7	Test pressure	PT (and number value)	The test pressure must be observed depending on the device
8	Manufacturer number from 2018	e.g. 381234/001/001	38 1234 /001 /001 
	Manufacturer number 2009 to 2017	e.g. 211234/001/001	21 1234 /001 /001 
	Manufacturer number until 2008	e.g. 2071234/001/001	207 1234 /001 /001 
9	Characteristic curve	e.g. %	% = equal percentage, lin = linear (optional)
10	Year of manufacture	e.g. 2022	upon customer request, the year of manufacture can also be indicated on the valve
11	Data/Matrix code		
12	Conformity	CE	Conformity is certified separately by the manufacturer
	Code No.	0035	"Notified body" according to EU Directive = TÜV Rheinland Service GmbH
13	Flow direction	➔	Attention: see the note in Chapter "5.5 Installing the ball valve in the pipe"

### Info

Markings on the body and the type plate must be permanent so that the valve remains identifiable.

## 2.1 Type plate

### 2.1.1 Actuator type plate

See the corresponding actuator documentation.

## 2.2 Material marking

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

Further specifications can be requested from PFEIFFER.

### 3 Design and principle of operation

#### Properties

- Body version
  - Two or three-part flange body
- Seat version
  - Soft seal, not spring-loaded
  - Soft seal, spring-loaded
  - Soft seal, metallic chambered and spring loaded
  - Metallic seal, spring-loaded on both sides
- Body material
  - Steel
  - Stainless steel
  - High alloy seal types and special materials
- Further properties
  - High-quality materials for the sealing materials
  - Higher casting quality
  - The bearings are suitable for high loads
  - Anti-static discharge
  - Anti-blowout stem
  - Maintenance-free, spring preloaded packing fulfils TA-Luft (German Technical Instructions on Air Quality Control) 2002
  - Fire Safe according to API 607 4th ed.
  - Overall length EN 558 or ASME B 16.10 / API 6D
  - Flange EN 1092 or ASME B 16.5 / API 6D
  - Actuator mounting ISO 5211

#### Function and principle of operation

The media can flow in both directions through the BR 26s ball valve with full passage.

The ball (3) with its cylindrical passage is swivel-mounted around the control shaft. The ball swivel angle influences the flow through the area freed between the body (1) and the ball channel.

The ball (3) is sealed by replaceable seat rings (4).

The control shaft is sealed by PTFE V-ring packing or graphite packing (9). The disc springs (10) located above the packing provide the pretensioning.

The control shaft that leads outside is fit with a hand lever. Optionally a pneumatic actuator or manual gear can be adapted.

#### Seat rings:

The seat rings used in Pfeiffer ball valves BR 26s are designed for low torques, high sealing and reliable actuation in all operating conditions.

In ball valves with floating ball valve systems, usually seat rings that are not spring loaded are installed.

Alternatively, a seat ring spring-loaded on one side can be selected for severe operating conditions.

Trunnion-mounted ball valves have active seat rings with metal chambering.

All sealing systems are optimised by means of FEM and have been proven in practice. As a result, optimal sealing results are achieved in conventional applications as well as under extreme operating conditions, even in the event of a fire in the plant.

When using abrasive media or media at high temperatures, the floating or trunnion-mounted versions are available with metallic hard-coated sealing systems. These valves not only have a very hard surface and excellent wear, as also their torque characteristic is not influenced by changing operating conditions, such as fluctuations in temperature or pressure.

In addition to the high-quality standard coatings, versions are also available for highly resistant materials, reduced torque, very frequent switching on-off, highly resistant materials, etc.

All sealing systems, except for special versions, are produced with a "Fire Safe Design".

A wide range of solutions are available to meet special requirements. There are technical solutions available with encapsulated springs, low-temperature sealing faces, versions containing suspensions and solids.

#### Operating elements and functions

- Hand-operated ball valve with hand lever
- Hand-operated ball valve with manual gear
- Ball valve with pneumatic actuator
- Ball valve with electric actuator
- Ball valve with hydraulic actuator
- Suitable for fast-closing actuators

#### Fail-safe position

Depending on the mounting of the pneumatic quarter-turn actuator, the ball valve has two fail-safe positions that are activated when the pressure is released as well when the supply air fails:

##### – Ball valve with fail-close actuator [FC]:

Upon air failure, the ball valve is closed. The ball valve opens when the signal pressure increases, acting against the force of the springs.

##### – Ball valve with fail-open actuator [FO]:

Upon air failure, the ball valve is opened. The ball valve closes when the signal pressure increases, acting against the force of the springs.

#### Changing the fail-safe position

The fail-safe position of the actuator can be reversed if required. To do so, see the installation and operating manual for the respective pneumatic actuator.

### 3.1 Variants

- Body heating
- Various types of flanges and end connections
- Modified encapsulated seal systems, other materials
- Non-stick coating inside the body
- Rinsing ports and rinsing nozzles
- Version for media containing solids
- Low-temperature version
- High-temperature version
- High-pressure version
- Special material
- And much more

### 3.2 Additional fittings

#### Strainer

PFEIFFER recommends installing a strainer in front of the valve. A strainer prevents the solid content in the medium from damaging the ball valve.

#### Bypass and shut-off valve

PFEIFFER recommends installing a shut-off valve in front of the strainer as well as behind the ball valve and to create a bypass. By means of the bypass, the entire plant does not have to be decommissioned during maintenance and repair work on the ball valve.

#### 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 can be used to detect the upper flange (16) (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 valves either individually or in combination:

- Backup packing
- Shaft extension
- Locking devices
- Partial stroke equipment
- Limit switch
- Solenoid valves
- Air supply stations
- Pressure gauge mounting blocks
- Positioner

Other accessories are available according to the specifications.

### 3.4 Technical data

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

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#### Info

- Detailed information is available on the data sheet ► TB 26s.
  - The documentation for the special ball valves BR 26s that are not described in this chapter can be requested from PFEIFFER.
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### 3.5 Ball valve assembly

The ball valves BR 26s are produced with various designs so that they cannot be documented in one construction manual.

- Chapter 3.5.1 describes the assembly of the two-part ball valve with a floating ball up to PN 40/cl300.
- Chapter 3.5.2 describes the assembly of the two-part ball valve with a trunnion-mounted ball up to PN 40/cl300.
- Chapter 3.5.3 describes the assembly of the two-part ball valve with a trunnion-mounted ball up to PN 160/cl900.
- Chapter 3.5.4 describes the assembly of the three-part ball valve with a trunnion-mounted ball up to PN 160/cl900.

#### Preparation of the assembly

To assemble the 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.

### 3.5.1 Assembly of the two-part ball valve with a floating ball up to PN 40/cl300

**Info**

The position and arrangement of the individual parts shown in Fig. 3-1 must be observed during assembly.

#### 3.5.1.1 Assembly of the main body

- ⇒ Place the main body (1) with the flange facing downwards on an even and clean work surface, so that the inside of the ball valve is easy to reach.

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

- ⇒ Insert the seat ring (4a) into the body chambers of the main body (1).

##### Seat ring soft seal version, spring-loaded on one side

- ⇒ Place the disc spring jacket (19) on the disc spring (18).

**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 (18) into the body chambers in the main body (1).
- ⇒ Press the seat ring (4a) up to the disc spring.

##### Metallic seat ring version, spring-loaded

- ⇒ Insert the disc spring (18) into the thrust ring (22).
- ⇒ Insert the thrust ring and disc spring into the body chambers in the main body (1).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the seat ring (4a).
- ⇒ Insert the preassembled seat ring (4a) into the main body (1) and press it down to the thrust ring (22).

##### Further assembly for all versions

- ⇒ Push the bearing bush (8) with a slight rotary movement onto the control shaft (5).

- ⇒ Insert the control shaft (5) together with the bearing bush (8) from the inside through the control shaft duct into the main body (1).

**NOTE**

- ⇒ Do not damage the sealing surface of the control shaft (5).

- ⇒ Position the bearing bushing (8) with the control shaft (5) into the turned recess in the main body (1) without twisting it.
- ⇒ Turn the control shaft (5) such that the dihedron is positioned vertically to the work surface.
- ⇒ Insert the ball (3) carefully.

**Tip**

Wet the seals slightly with silicon spray.

- ⇒ Insert the sealing (11 and 12) into the corresponding recesses in the main body (1).

#### 3.5.1.2 Assembly of the side body

- ⇒ Place the side body (2) with the flange facing downwards on an even and clean work surface, so that the inside of the ball valve is easy to reach.

##### Seat ring soft seal version, not spring-loaded and spring loaded on one side

- ⇒ Insert the seat ring (4b) into the body chambers of the side body (2).

##### Metallic seat ring version, spring-loaded

- ⇒ Insert the disc spring (18) into the thrust ring (22).
- ⇒ Insert the thrust ring and disc spring into the side body (2).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the seat ring (4b).
- ⇒ Insert the preassembled seat ring (4b) into the side body (2) and press it down to the thrust ring (22).

##### Further assembly for all versions

- ⇒ Place the side body (2) with the preassembled seat ring (4b) on the main body (1).

#### 3.5.1.3 Final assembly of the ball valve

- ⇒ Turn the side body (2) such that the bores in both body sections (1 and 2) lie above each other.
- ⇒ Lightly grease the screws (17).
- ⇒ Slightly screw the body sections together with screws (17) in an even manner.

**Tip**

Use a control shaft (5) and align the ball (3) evenly in the ball valve.

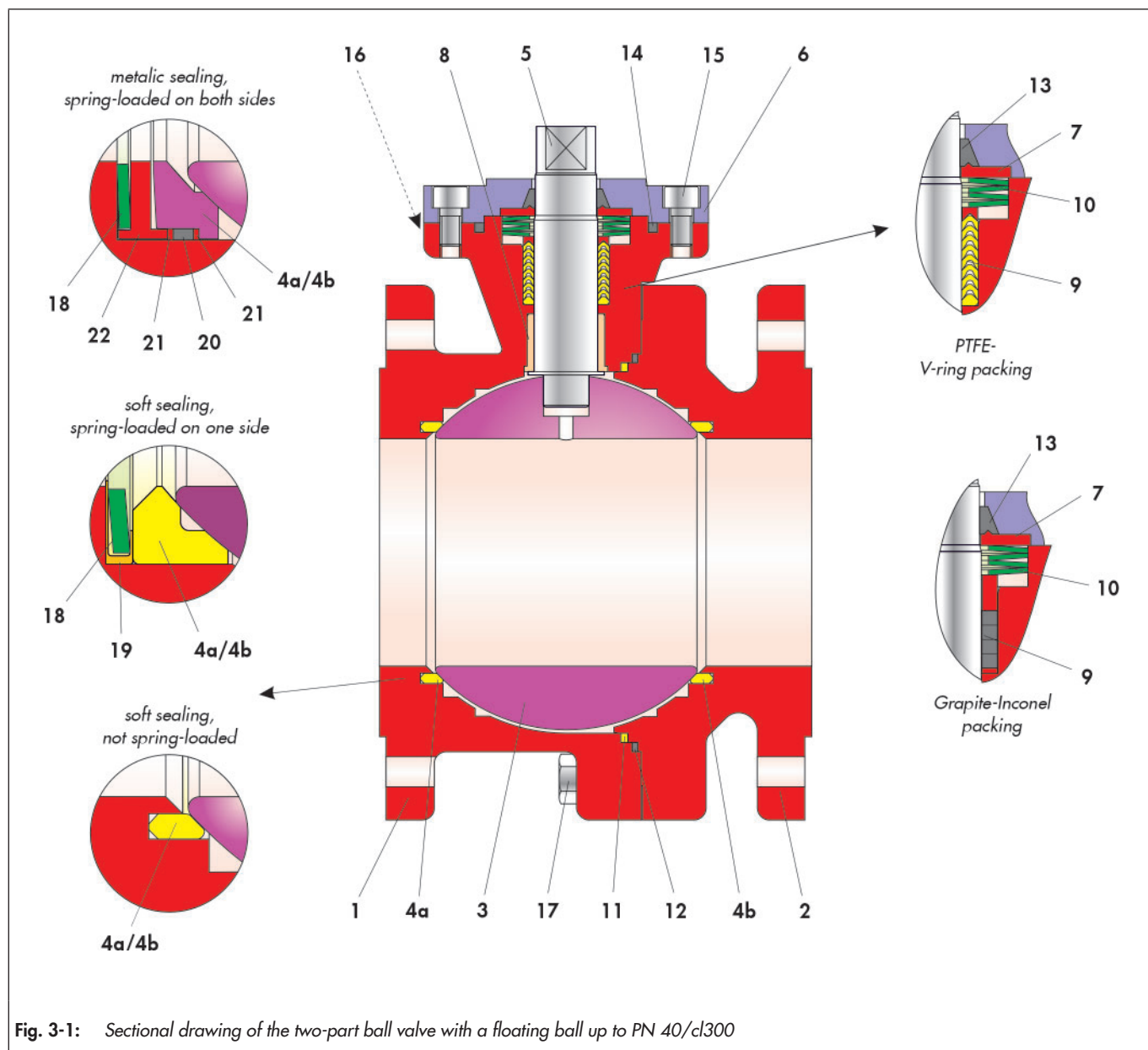


Fig. 3-1: Sectional drawing of the two-part ball valve with a floating ball up to PN 40/cI300

Table 3-1: Parts list of the two-part ball valve with a floating ball up to PN 40/cI300

Item	Designation
1	Main body
2	Side body
3	Ball
4	Seat ring
5	Control shaft
6	Stuffing box flange
7	Bush
8	Bearing bush
9	Packing
10	Disc spring set
11	Sealing

Item	Designation
12	Sealing
13	Ring
14	Ring
15	Screw
16	Screw plug
17	Screw
18	Disc spring
19	Disc spring jacket
20	Ring
21	Thrust ring
22	Thrust ring

- ⇒ Screw the body sections together with screws (17) evenly and in a criss-cross pattern.

---

**! NOTE**

**Damage due to improper assembly!**

- ⇒ Pay attention to not twist the control shaft and bearing bush.
- 

**i Info**

- The permissible torque for tightening the connection of the body sections can be found in Table 15-1 in Chapter "15.1.1 Tightening torques."
  - Depending on the nominal size, stud bolts with nuts or screws can be used
- 

- ⇒ Push the V-ring packing or graphite packing (9) with a slight rotation movement over the assembled control shaft (5) and insert it into the packing space of the main body (1). Arrangement of the V-rings see Fig. 3-1.
  - ⇒ Place the disc spring set (10) on the packing (9). Arrangement of the disc springs, see Fig 3-1.
  - ⇒ Push the bush (7) over the control shaft (5) such that it lies on the disc spring (10).
  - ⇒ Push the carbon-graphite ring (13) carefully over the control shaft (5) up to the bush (7).
  - ⇒ Insert the carbon-graphite ring (14) into the groove of the stuffing box flange (6).
  - ⇒ Place the stuffing box flange (6) over the control shaft (5) onto the main body (1).
  - ⇒ Lightly grease the screws (15).
  - ⇒ Evenly adjust the stuffing box flange (6) with the screws (15) and tighten in a criss-cross pattern.
- 

**i Info**

The permissible torque for tightening the stuffing box flange can be found in Table 15-2 in Chapter "15.1.1 Tightening torques"

- ⇒ Screw in the optional screw plug (16).
- 

**i Info**

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.

---

## 3.5.2 Assembly of the two-part ball valve with a trunnion-mounted ball up to PN 40/cl300

**i Info**

The position and arrangement of the individual parts shown in Fig. 3-2 must be observed during assembly.

---

### 3.5.2.1 Assembly of the main body

- ⇒ Place the main body (1) with the flange facing downwards on an even and clean work surface, so that the inside of the ball valve is easy to reach.

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

- ⇒ Insert the seat ring (4a) into the body chamber of the main body (1).

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

- ⇒ Insert the disc spring (18) or compression spring (31) into the thrust ring (22).
- ⇒ Insert the thrust ring with spring into the body chamber of the main body (1).
- ⇒ Insert the seat ring (4a) into the main body (1) and press it down to the thrust ring (22).

#### Metallic seat ring version, spring-loaded

- ⇒ Insert the disc spring (18) or compression spring (31) into the thrust ring (22).
- ⇒ Insert the thrust ring with spring into the body chamber of the main body (1).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the seat ring (4a).
- ⇒ Insert the preassembled seat ring (4a) into the main body (1) and press it down to the thrust ring (22).

#### Further assembly for all versions

- ⇒ Put the bearing (24, with slit) inside in the bearing shell (23).
  - ⇒ Press the bearing shell (23) with the bearing (24) onto the ball trunnion (3) or drive by striking it with a plastic hammer.
- 

**! NOTE**

Drive the bearing shells straight and without twisting.

---

- ⇒ Carefully insert the preassembled ball (3) with bearing shells into the main body (1).
  - ⇒ In the case of large nominal sizes, lower the ball with ring screws into the main body (1). Screw ring screws into the 4 thread bores for the bearing shells (23).
- 

**! NOTE**

**Damage due to improper assembly!**

Do not place the ball on the wall of the body. Make sure the bearing shells (23) are arranged evenly within the inner diameter of the body chamber.

---

**💡 Tip**

Wet the seals slightly with silicon spray.

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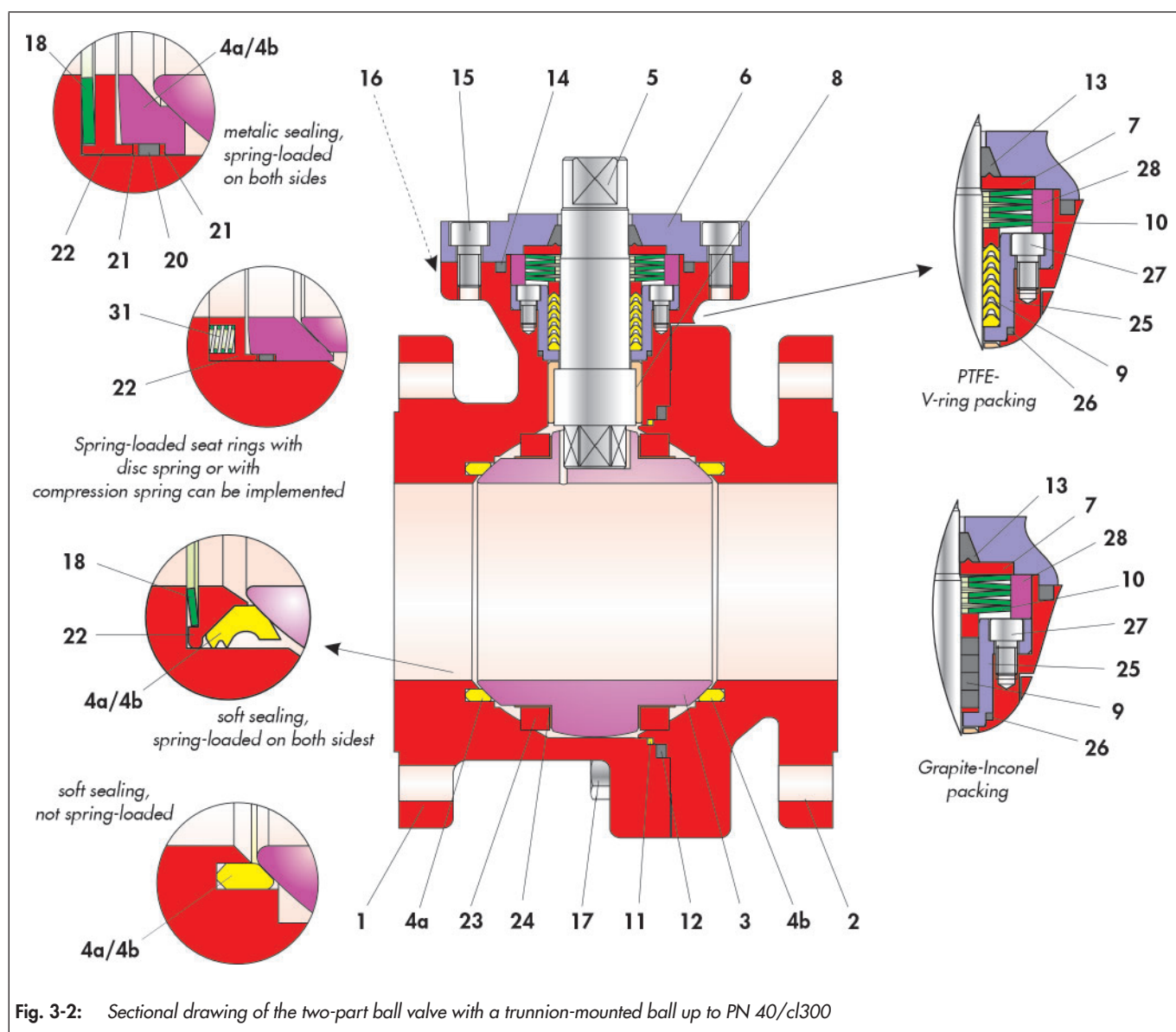


Fig. 3-2: Sectional drawing of the two-part ball valve with a trunnion-mounted ball up to PN 40/cl300

Table 3-2: Parts list of the two-part ball valve with a trunnion-mounted ball up to PN 40/cl300

Item	Designation
1	Main body
2	Side body
3	Ball
4	Seat ring
5	Control shaft
6	Stuffing box flange
7	Bush
8	Bearing bush
9	Packing
10	Disc spring set
11	Sealing
12	Sealingg
13	Ring
14	Ring

Item	Designation
15	Screw
16	Screw plug
17	Screw
18	Disc spring
20	Ring
21	Thrust ring
22	Thrust ring
23	Bearing shell
24	Bearing
25	Packing bush
26	Ring
27	Screw
28	Centre ring
31	Compression spring

⇒ Insert the sealing (11 and 12) into the corresponding recesses in the main body (1).



### 3.5.2.2 Assembly of the side body

- ⇒ Place the side body (2) with the flange facing downwards on an even and clean work surface, so that the inside of the ball valve is easy to reach.

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

- ⇒ Insert the seat ring (4b) into the body chamber of the side body (2).

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

- ⇒ Insert the disc spring (18) or compression spring (31) into the thrust ring (22).
- ⇒ Insert the thrust ring with spring into the body chamber of the side body (2).
- ⇒ Insert the seat ring (4b) into the side body (2) and press it down to the thrust ring (22).

#### Metallic seat ring version, spring-loaded

- ⇒ Insert the disc spring (18) or compression spring (31) into the thrust ring (22).
- ⇒ Insert the thrust ring and spring into the side body (2).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the seat ring (4b).
- ⇒ Insert the preassembled seat ring (4b) into the side body (2) and press it down to the thrust ring (22).

#### Further assembly for all versions

- ⇒ Place the side body (2) with the preassembled seat ring (4b) on the main body (1).

### 3.5.2.3 Final assembly of the ball valve

- ⇒ Turn the side body (2) such that the bores in both body sections (1 and 2) lie above each other.
- ⇒ Lightly grease the screws (17).
- ⇒ Slightly screw the body sections together with screws (17) in an even manner.
- ⇒ Screw the body sections together with screws (17) evenly and in a criss-cross pattern.

#### **i** Info

- The permissible torque for tightening the connection of the body sections can be found in Table 15-1 in Chapter "15.1.1 Tightening torques."
- Depending on the nominal size, stud bolts with nuts or screws can be used

- ⇒ Push the bearing bush (8) with a slight rotary movement onto the control shaft (5).
- ⇒ Insert the control shaft (5) together with the bearing bush (8) through the control shaft duct into the main body (1).

#### **!** NOTE

- ⇒ Do not damage the sealing surface of the control shaft (5).
- ⇒ Position the bearing bush (8) with the control shaft (5) into the ball support (3) without twisting it.
- ⇒ Insert the ring (26) into the packing bush (25).
- ⇒ Fill the packing bush (25) with V-ring packing or graphite packing (9). Arrangement of the V-rings see Fig. 3-2.
- ⇒ Push the preassembled packing bush with a slightly rotary movement without excessive force over the assembled control shaft (5).
- ⇒ Screw the packing bush together with screws (27) evenly and in a criss-cross pattern.

#### **i** Info

The permissible torque for tightening the packing bush can be found in Table 15-3 in Chapter "15.1.1 Tightening torques."

- ⇒ Place the centre ring (28) on the packing bush.
- ⇒ Place the disc spring set (10) in the centre ring on the packing (9). Arrangement of the disc springs, see Fig. 3-2.
- ⇒ Push the bush (7) over the control shaft (5) such that it lies on the disc springs (10).
- ⇒ Push the carbon-graphite ring (13) carefully over the control shaft (5) up to the bush (7).
- ⇒ Insert the carbon-graphite ring (14) into the groove of the stuffing box flange (6).
- ⇒ Place the stuffing box flange (6) over the control shaft (5) onto the main body (1).
- ⇒ Lightly grease the screws (15).
- ⇒ Evenly adjust the stuffing box flange (6) with the screws (15) and tighten in a criss-cross pattern.

#### **i** Info

The permissible torque for tightening the stuffing box flange can be found in Table 15-2 in Chapter "15.1.1 Tightening torques."

- ⇒ Screw in the optional screw plug (16).

#### **i** Info

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.

### 3.5.3 Assembly of the two-part ball valve with a trunnion-mounted ball up to PN 160/cI900

#### **i** Info

The position and arrangement of the individual parts shown in Fig. 3-3 must be observed during assembly.

#### 3.5.3.1 Assembly of the main body

- ⇒ Place the main body (1) with the flange facing downwards on an even and clean work surface, so that the inside of the ball valve is easy to reach.

##### Chambered seat ring soft seal version, spring-loaded

- ⇒ Insert the disc spring (18) or compression springs (31) into the thrust ring (22).
- ⇒ Insert the thrust ring and springs into the body chamber of the main body (1).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the chamber (30).
- ⇒ Insert the seat ring (4a) into the chamber (30).
- ⇒ Insert the preassembled chamber (30) into the main body (1) and press it down to the thrust ring (22).

##### Metallic seat ring version, spring-loaded

- ⇒ Insert the disc spring (18) or compression springs (31) into the thrust ring (22).
- ⇒ Insert the preassembled thrust ring (22) into the body chamber of the main body (1).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the seat ring (4a).
- ⇒ Insert the preassembled seat ring (4a) into the main body (1) and press it down to the thrust ring (22).

##### Further assembly for all versions

- ⇒ Put the bearing (24, with slit) inside in the bearing shell (23).
- ⇒ Press the bearing shell (23) with the bearing (24) onto the ball trunnion (3) or drive by striking it with a plastic hammer.

#### **!** NOTE

##### **Damage due to improper assembly!**

Drive the bearing shells straight and without twisting.

- ⇒ Carefully insert the preassembled ball (3) with bearing shells into the main body (1).
- ⇒ In the case of large nominal sizes, lower the ball with ring screws into the main body (1). Screw ring screws into the 4 thread bores for the bearing shells (23).

#### **!** NOTE

##### **Damage due to improper assembly!**

Do not place the ball on the wall of the body. Make sure the bearing shells (23) are arranged evenly within the inner diameter of the body chamber.

#### **💡** Tip

Wet the seals slightly with silicon spray.

- ⇒ Insert the sealing (11 and 12) into the corresponding recesses in the main body (1).

#### 3.5.3.2 Assembly of the side body

- ⇒ Place the side body (2) with the flange facing downwards on an even and clean work surface, so that the inside of the ball valve is easy to reach.

##### Chambered seat ring soft seal version, spring-loaded

- ⇒ Insert the disc spring (18) or compression springs (31) into the thrust ring (22).
- ⇒ Insert the thrust ring and springs into the body chambers of the side body (2).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the chamber (30).
- ⇒ Insert the seat ring (4b) into the chamber (30).
- ⇒ Insert the preassembled chamber (30) into the side body (2) and press it down to the thrust ring (22).

##### Metallic seat ring version, spring-loaded

- ⇒ Insert the disc spring (18) or compression springs (31) into the thrust ring (22).
- ⇒ Insert the preassembled thrust ring (22) into the body chamber of the side body (2).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the seat ring (4b).
- ⇒ Insert the preassembled seat ring (4b) into the side body (2) and press it down to the thrust ring (22).

##### Further assembly for all versions

- ⇒ Place the side body (2) with the preassembled seat ring (4b) on the main body (1).

#### 3.5.3.3 Final assembly of the ball valve

- ⇒ Turn the side body (2) such that the bores in both body sections (1 and 2) lie above each other.
- ⇒ Lightly grease the screws (17).
- ⇒ Slightly screw the body sections together with screws (17) in an even manner.

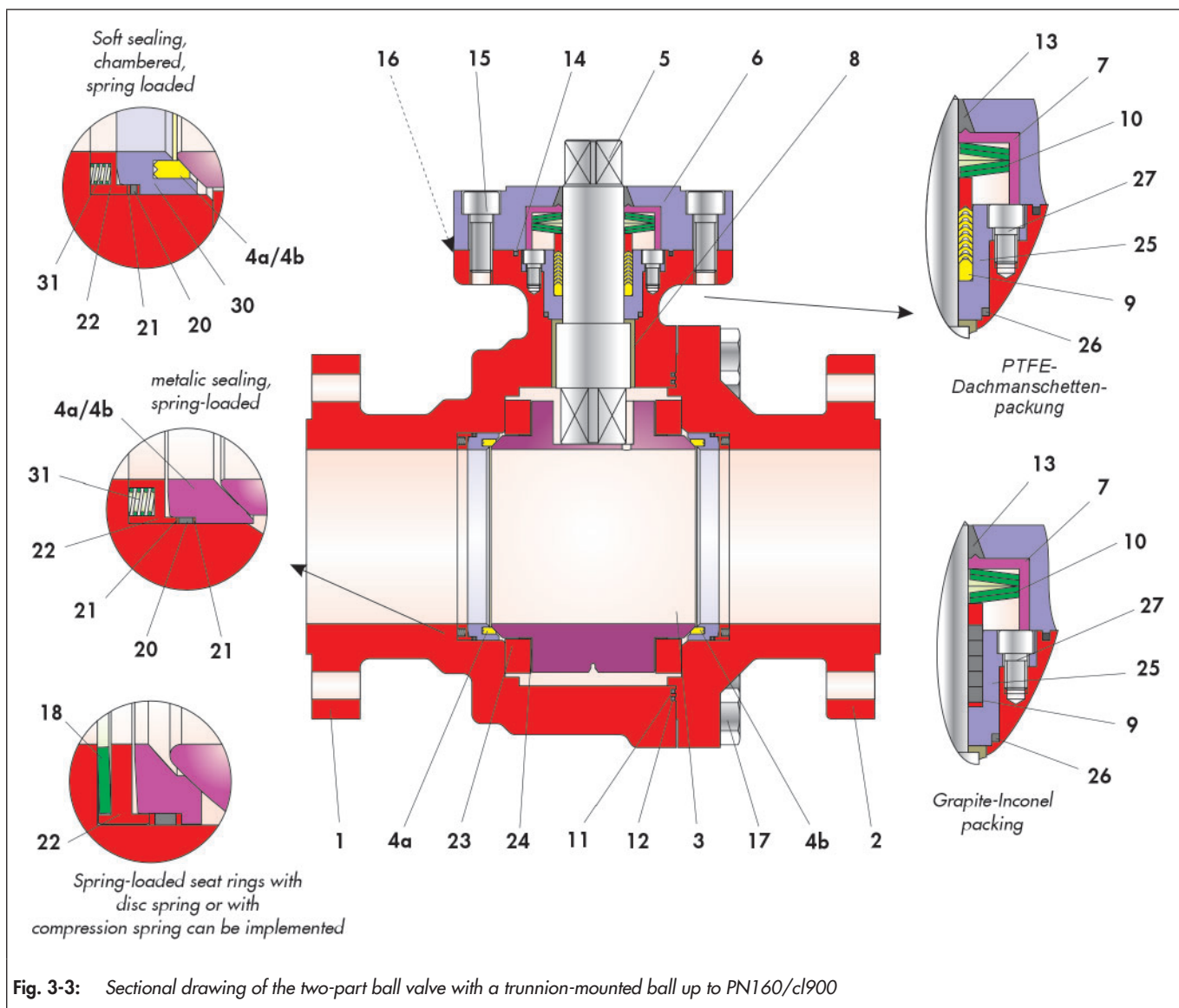


Fig. 3-3: Sectional drawing of the two-part ball valve with a trunnion-mounted ball up to PN160/cl900

Table 3-3: Parts list of the two-part ball valve with a trunnion-mounted ball up to PN160/cl900

Item	Designation	Item	Designation
1	Main body	15	Screw
2	Side body	16	Screw plug
3	Ball	17	Screw
4	Seat ring	18	Disc spring
5	Control shaft	20	Ring
6	Stuffing box flange	21	Thrust ring
7	Bush	22	Thrust ring
8	Bearing bush	23	Bearing shell
9	Packing	24	Bearing
10	Disc spring set	25	Packing bush
11	Sealing	26	Ring
12	Sealing	27	Screw
13	Ring	30	Chamber
14	Ring	31	Compression spring

## Design and principle of operation

- ⇒ Screw the body sections together with screws (17) evenly and in a criss-cross pattern.

### **i** Info

- The permissible torque for tightening the connection of the body sections can be found in Table 15-1 in Chapter "15.1.1 Tightening torques."
- Depending on the nominal size, stud bolts with nuts or screws can be used

- ⇒ Push the bearing bush (8) with a slight rotary movement onto the control shaft (5).
- ⇒ Insert the control shaft (5) together with the bearing bush (8) through the control shaft duct into the main body (1).

### **!** NOTE

- ⇒ Do not damage the sealing surface of the control shaft (5).
- ⇒ Position the bearing bush (8) with the control shaft (5) into the ball support (3) without twisting it.
- ⇒ Insert the ring (26) into the packing bush (25).
- ⇒ Fill the packing bush (25) with V-ring packing or graphite packing (9). Arrangement of the V-rings see Fig. 3-3.
- ⇒ Push the preassembled packing bush with a slightly rotary movement without excessive force over the assembled control shaft (5).
- ⇒ Screw the packing bush together with screws (27) evenly and in a criss-cross pattern.

### **i** Info

The permissible torque for tightening the packing bush can be found in Table 15-3 in Chapter "15.1.1 Tightening torques"

- ⇒ Place the disc spring set (10) on the packing (9). Arrangement of the disc springs, see Fig. 3-3.
- ⇒ Push the bush (7) over the control shaft (5) such that they lie on the disc spring (10) and centre them.
- ⇒ Push the carbon-graphite ring (13) carefully over the control shaft (5) up to the bush (7).
- ⇒ Insert the carbon-graphite ring (14) into the groove of the stuffing box flange (6).
- ⇒ Place the stuffing box flange (6) over the control shaft (5) on to the main body (1).
- ⇒ Lightly grease the screws (15).
- ⇒ Evenly adjust the stuffing box flange (6) with the screws (15) and tighten in a criss-cross pattern.

### **i** Info

The permissible torque for tightening the stuffing box flange can be found in Table 15-2 in Chapter "15.1.1 Tightening torques"

- ⇒ Screw in the optional screw plug (16).

### **i** Info

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.

## 3.5.4 Assembly of the three-part ball valve with a trunnion-mounted ball up to PN 160/cI900

### **i** Info

The position and arrangement of the individual parts shown in Fig. 3-4 must be observed during assembly.

### 3.5.4.1 Preassembly of the side body

- ⇒ Place the side bodies (2a or 2b) with the flange facing downwards on an even and clean work surface, so that the inside of the ball valve is easy to reach.

#### Chambered seat ring soft seal version, spring-loaded

- ⇒ Insert the disc spring (18) or compression springs (31) into the thrust ring (22).
- ⇒ Insert the thrust ring with springs into the body chamber of the side bodies (2a or 2b).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the chamber (30).
- ⇒ Insert the seat ring (4a or 4b) into the chamber (30).
- ⇒ Insert the preassembled chamber (30) into the side bodies (2a or 2b) and press it down to the thrust ring (22).

#### Metallic seat ring version, spring-loaded

- ⇒ Insert the disc spring (18) or compression springs (31) into the thrust ring (22).
- ⇒ Insert the thrust ring with springs into the body chamber of the side bodies (2a or 2b).
- ⇒ Push the first thrust ring (21), carbon-graphite ring (20) and second thrust ring (21) onto the seat ring (4a).
- ⇒ Insert the preassembled seat ring (4a) into the side bodies (2a or 2b) and press it down to the thrust ring (22).

### 3.5.4.2 Assembly of the main body

Screw the stud bolts (33) into the main body (1).

In some versions, the stud bolts in the area of the foot and the lifting eye are somewhat longer. In those areas, screw in the stud bolt (34).

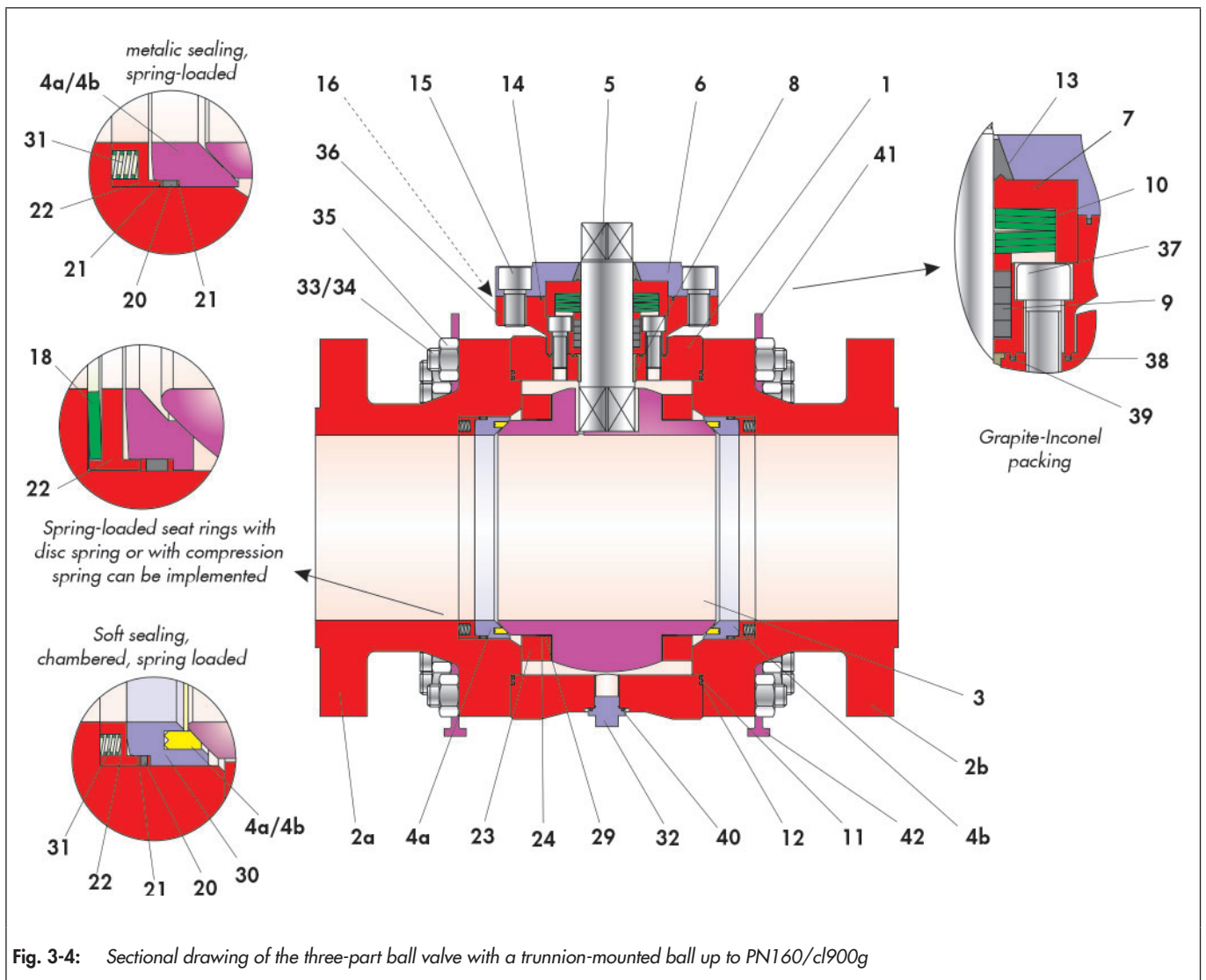


Fig. 3-4: Sectional drawing of the three-part ball valve with a trunnion-mounted ball up to PN160/cl900g

Table 3-4: Parts list of the three-part ball valve with a trunnion-mounted ball up to PN160/cl900

Item	Designation	Item	Designation
1	Main body	21	Thrust ring
2	Side body	22	Thrust ring
3	Ball	23	Bearing shell
4	Seat ring	24	Bearing
5	Control shaft	29	Ring
6	Stuffing box flange	30	Chamber
7	Bush	31	Compression spring
8	Bearing bush	32	Screw plug
9	Packing	33	Stud bolt
10	Disc spring set	34	Stud bolt
11	Sealing	35	Nut
12	Sealing	36	Bonnet flange
13	Ring	37	Screw
14	Ring	38	Ring
15	Screw	39	Ring
16	Screw plug	40	Ring
18	Disc spring	41	Lifting eye
20	Ring	42	Foot

### Info

If screws are used, this work step is omitted

- ⇒ Put the bearing (24, with slit) inside in the bearing shell (23).
- ⇒ Press the bearing shell (23) with the bearing (24) onto the ball trunnion (3) or drive by striking it with a plastic hammer.

### NOTE

#### **Damage due to improper assembly!**

Drive the bearing shells straight and without twisting.

- ⇒ Carefully insert the preassembled ball (3) with bearing shells into the main body (1).
- ⇒ In the case of large nominal sizes, lower the ball with ring screws into the main body (1). Screw ring screws into the 4 thread bores for the bearing shells (23).

### NOTE

#### **Damage due to improper assembly!**

Do not place the ball on the wall of the body. Make sure the bearing shells (23) are arranged evenly within the inner diameter of the body chamber.

### Tip

Wet the seals slightly with silicon spray.

- ⇒ Push the bearing bush (8) with a slight rotary movement onto the control shaft (5).
- ⇒ Insert the control shaft (5) together with the bearing bush (8) through the control shaft duct into the main body (1).

### NOTE

⇒ Do not damage the sealing surface of the control shaft (5).

- ⇒ Position the bearing bush (8) with the control shaft (5) into the ball support (3) without twisting it.
- ⇒ Insert the carbon-graphite rings (38) and (39) into the corresponding recesses on the upper control shaft duct in the main body (1).
- ⇒ Place the bonnet flange (36) on the main body (1) and tighten with the screws (37) evenly and in a criss-cross pattern.

### Info

The permissible torque for tightening the bonnet flange can be found in Table 15-4 in Chapter "15.1.1 Tightening torques"

- ⇒ Push the V-ring packing or graphite packing (9) with a slight rotation movement over the assembled control shaft (5) and insert it into the packing space of the bonnet flange (36). Arrangement of the V-rings see Fig. 3-4.
- ⇒ Place the set of disc springs (10) on the packing (9). Arrangement of the disc springs, see Fig. 3-4.

- ⇒ Push the bush (7) over the control shaft (5) such that they lie on the disc springs (10) and centre them.
- ⇒ Push the carbon-graphite ring (13) carefully over the control shaft (5) up to the bush (7).
- ⇒ Insert the carbon-graphite ring (14) into the groove of the stuffing box flange (6).
- ⇒ Place the stuffing box flange (6) over the control shaft (5) onto the main body (1).
- ⇒ Lightly grease the screws (15).
- ⇒ Adjust the stuffing box flange (6) with the screws (15).

### Info

The screws (15) must be tightened only hand-tight. The final assembly takes place during a subsequent assembly step.

## 3.5.4.3 Final assembly of the ball valve

- ⇒ Insert the sealings (11 and 12) on both sides into the corresponding recesses in the main body (1).
- ⇒ Lightly grease the stud bolts (33 and 34).
- ⇒ Push the preassembled side bodies (2a or 2b) described in Chapter 3.5.4.1 over the stud bolts on the respective side of the main body (1) and adjust with the nuts (35) in the areas without the lifting eye and foot.
- ⇒ Fit the lifting eye (41) and foot (42) in the assigned areas and adjust with the nuts (35).
- ⇒ Slightly screw the body sections together with the nuts (35) in an even manner.

### Tip

Use a control shaft (5) and align the ball (3) evenly in the ball valve.

- ⇒ Screw the body sections together with screws (35) evenly and in a criss-cross pattern.

### NOTE

#### **Damage due to improper assembly!**

⇒ Pay attention to not twist the switching shaft and bearing bushing.

### Info

The permissible torque for tightening the connection of the body sections can be found in Table 15-1 in Chapter "15.1.1 Tightening torques."

- ⇒ Tighten the screws (15) for the stuffing box flange (6).

### Info

The permissible torque for tightening the stuffing box flange can be found in Table 15-2 in Chapter "15.1.1 Tightening torques"

- ⇒ Push the carbon-graphite ring (40) onto the screw plug (32).
- ⇒ Screw the screw plug (32) into the main body (1).
- ⇒ Screw in the optional screw plug (16).

---

**i** Info

*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.*

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## 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 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 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 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 Figure 4-1.

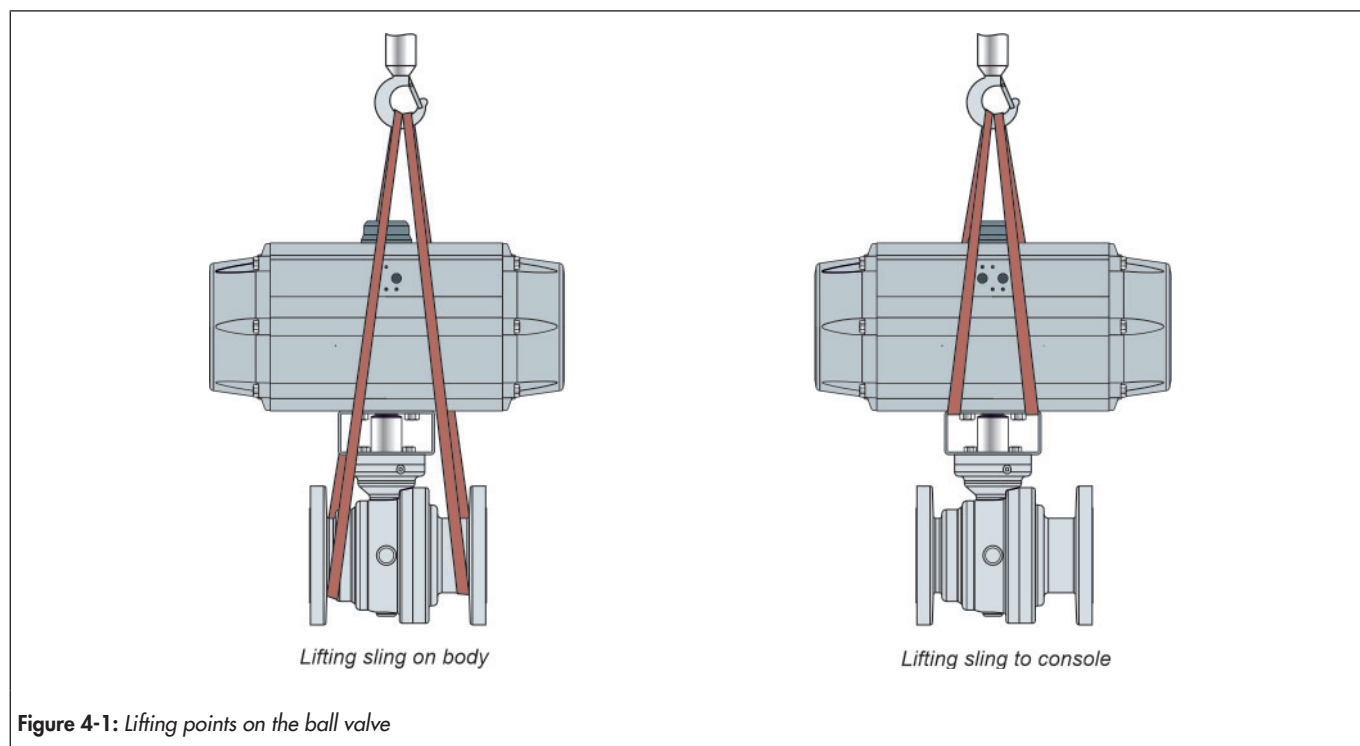


Figure 4-1: Lifting points on the ball valve

- ⇒ Secure the sling against shifting and slipping off.
- ⇒ 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 Figure 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 Figure 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 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
- 

### 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  $25^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$  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 open 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 ball valves. Observe chapter "4.3 Transporting and lifting the 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 ball valve and actuator

The 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 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.*

**⚠ WARNING**

**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 ball valve due to the incorrect setting of the end stops!**

The actuating device is adjusted to the operating data specified in the order.

- ⇒ The adjustment of the "OPEN" and "CLOSED" end stops is the responsibility of the user.

## 5.4 Installing the ball valve in the pipe

### 5.4.1 General

- ⇒ Transport the 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 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.
- ⇒ The counterflanges must have smooth sealing surfaces. Other shapes must be agreed upon with PFEIFFER.

**⚠ 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.
- ⇒ The connection data for the actuator unit must match the control data. See the type plate(s) on the actuator unit.
- ⇒ 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!**

- ⇒ Tighten the flange connection evenly and in a criss-cross pattern, see Table 15-5 in Chapter "15.1.1 Tightening torques".
- ⇒ After longer storage of the ball valves, retighten the body screws after installation with the corresponding tightening torques according to Table 15-1, Table 15-2 or Table 4 in Chapter "15.1.1 Adjustable stuffing box".

- ⇒ 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 Installing the 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.

**i Info****For ball valves spring-loaded on one side:**

To obtain the desired functionality with ball valves spring-loaded on one side with a floating ball, the ball valve is installed in the pipe such that the pressure direction always supports the spring loading (the seal ring in the base body is spring loaded). If installed in the reverse direction, the spring can be damaged, depending on the differential pressure.

- ⇒ Lift the ball valve with suitable lifting equipment at the installation site, see chapter "4.3 Transporting and lifting the ball valve". When doing so observe the flow direction of the ball valve. An optional arrow on the ball valve indicates the flow direction.
- ⇒ 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.
- ⇒ After installing the 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.

**i Info****Observe the following for ball valves with a metal seat:**

To avoid damaging the seat seal, make sure that the pipe connected upstream and downstream of the ball valve is cleaned carefully of all rigid and abrasive particles prior to installation.

- ⇒ Check the correct function of the ball valve.

## 5.5 Checking the assembled ball valve

### 5.5.1 Functional test

**! WARNING****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.

**! 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.

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

The valve must close and open 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 cause 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 x PN (according to the type plate).
  - Ball valve closed: The test pressure may not exceed the value 1.1 x PN (according to the type plate).

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

**i 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 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 Chapter "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.

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

- The 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".

### **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.



## 7 Operation

As soon as the commissioning/recommissioning work is complete, see Chapter "6 Start-up", the 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 15-5 in Chapter "15.1.1 Tightening torques".
- It can also be necessary to retighten the screw connections on the body sections with the corresponding tightening torques according to Table 15-1, Table 15-2 and Table 15-4 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 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.

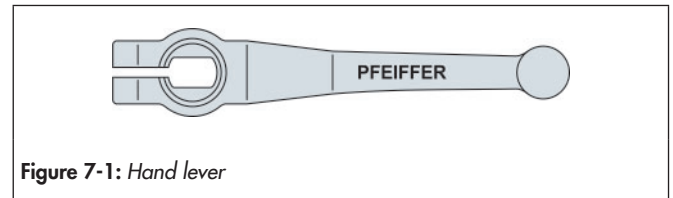


Figure 7-1: Hand lever

### **⚠ DANGER**

#### **Danger 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 Malfunktion".



## 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 15-5 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 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	The body section connection loosened	Retighten the connection of the body sections with the respective tightening torque, see Table 15-1 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 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>or 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 valve marking. Only original parts from PFEIFFER 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 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 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, Table 15-2 or Table 15-4 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".

### **i 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 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 set of disc springs 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 ball valve by briefly interrupting the power supply.	Decommission the ball valve, see chapter "10 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 8 "Malfunction".
- ⇒ After all maintenance work, the ball valve must be checked prior to recommissioning, see Chapter "5.5 Checking the mounted ball valve".

### 9.2.1 Replacing the seat rings and ball

#### NOTE

**Damage to the sealing surfaces on the seat rings and ball due to incorrect maintenance!**

- ⇒ Always replace the metal seat rings and balls together.

- ⇒ Check the condition of the ball and seat rings.
- ⇒ Remove the seat rings (4) as described in Chapter 12.2 or 12.3". 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 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.
- ⇒ Remove the ball valve in 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.

- ⇒ Release the compression from the preloaded springs before working on the actuator.

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

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

### 11.1 Removing the ball valve from the pipe

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

### WARNING

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

- ⇒ The valves must be decontaminated 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 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 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 (6) or the optional test connection (16), the rings of the V-ring packing or graphite packing (9) can be defective.

- ⇒ Check the condition of the 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 (15) and remove the stuffing box flange (6) carefully.
- ⇒ Remove the bush (7).
- ⇒ Remove the disc springs from the disc spring set (10).
- ⇒ Remove the centre ring (28) (available depending on the design).
- ⇒ Remove the V-ring packing or graphite packing (9).
- ⇒ 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 Ball valve assembly". When doing so observe the respective design of the ball valve.

### 12.2 Replacing the seat ring and the ball for two-part ball valves

If there is a leak in the passage, the seat ring (4) and the ball (3) can be defective.

- ⇒ Check the condition of the seat ring 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 (15) and remove the stuffing box flange (6) carefully.
- ⇒ Remove the bush (7).
- ⇒ Remove the disc springs from the disc spring set (10).
- ⇒ Remove the centre ring (28) (available depending on the design).
- ⇒ Remove the V-ring packing or graphite packing (9).
- ⇒ Place the ball valve with the flange on the main body side (1) facing downwards on an even and clean work surface, so that the body connection screws (17) are easy to access.
- ⇒ Undo the screws (17).
- ⇒ Carefully remove the side body (2).
- ⇒ Check the seat rings and the ball 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 Ball valve assembly". When doing so observe the respective design of the ball valve.

### 12.3 Replacing the seat ring and the ball for three-part ball valves

If there is a leak in the passage, the seat ring (4) and the ball (3) can be defective.

- ⇒ Check the condition of the seat ring 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 (15) and remove the stuffing box flange (6) carefully.
- ⇒ Remove the bush (7).
- ⇒ Remove the disc springs from the disc spring set (10).
- ⇒ Remove the V-ring packing or graphite packing (9).
- ⇒ Place the ball valve with the flange on the side body side (2a or 2b) facing downwards on an even and clean work surface, so that the body connection screws (17) or stud bolts (33/34) and nuts (35) are easy to access.
- ⇒ Loosen the screws (17) and nuts (35).
- ⇒ Remove the loosened side body carefully.
- ⇒ Check the seat rings and the ball as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.
- ⇒

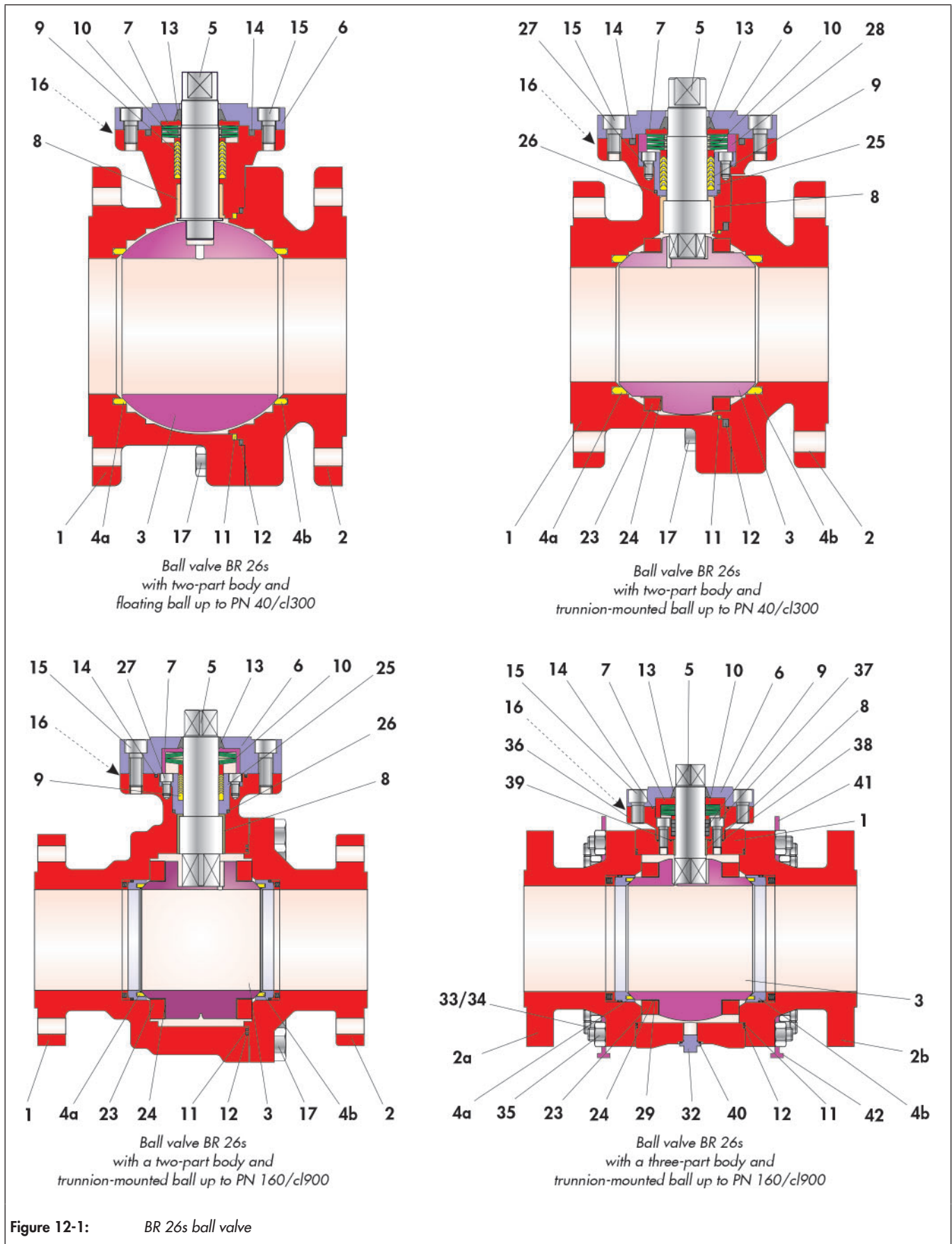


Figure 12-1: BR 26s ball valve

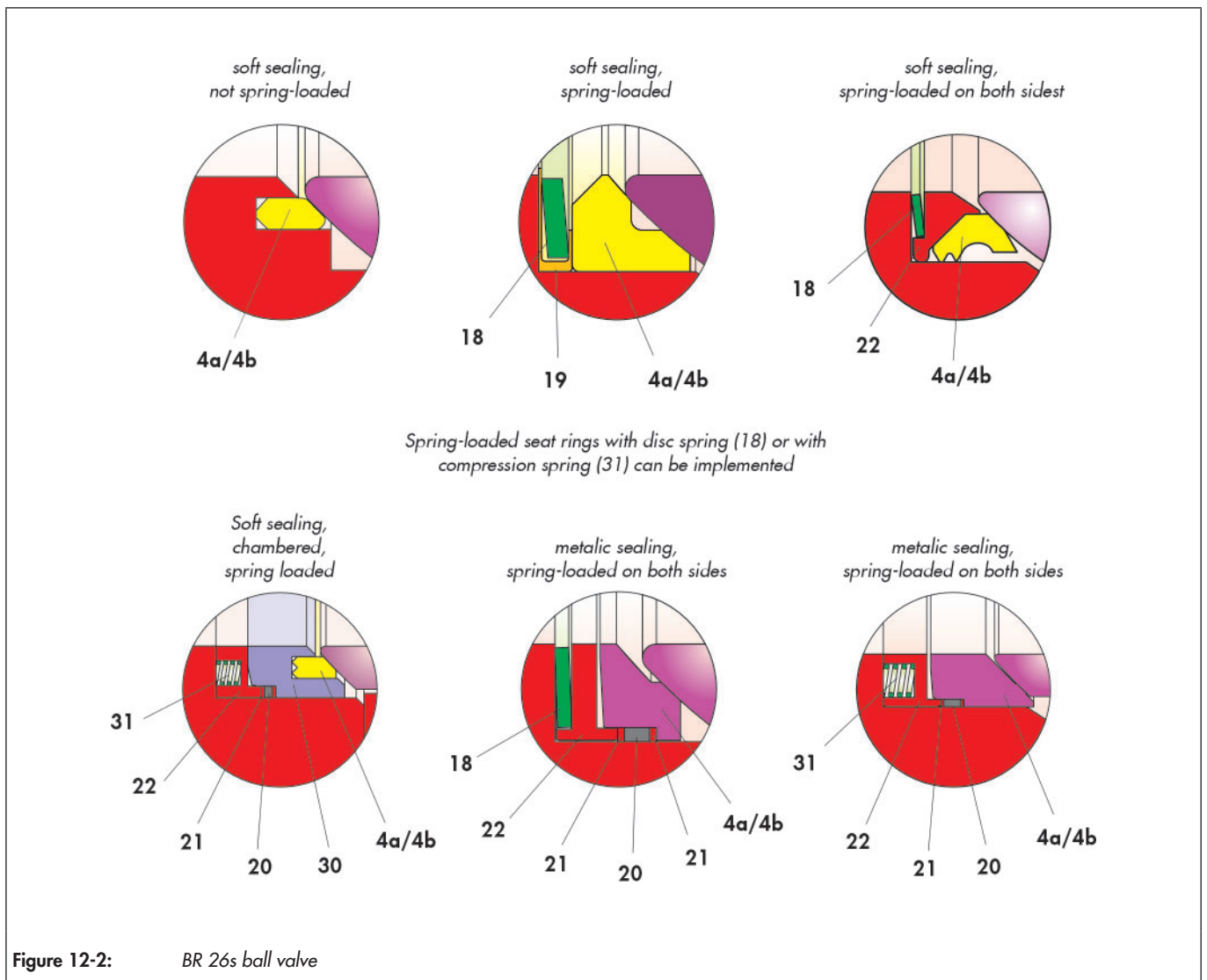


Table 12-1: Parts list

Item	Designation
1	Mail body
2	Side body
3	Ball
4	Seat ring
5	Control shaft
6	Stuffing box flange
7	Bush
8	Bearing bush
9	Packing
10	Disc spring set
11	Sealing
12	Sealing
13	Ring
14	Ring

Item	Designation
15	Screw
16	Screw plug
17	Screw
18	Disc spring
19	Disc spring jacket
20	Ring
21	Thrust ring
22	Thrust ring
23	Bearing shell
24	Bearing
25	Packing bush
26	Ring
27	Screw
28	Centre ring

Item	Designation
29	Ring
30	Chamber
31	Compression spring
32	Screw plug
33	Stud bolt
34	Stud bolt
35	Nut
36	Bonnet flange
37	Screw
38	Ring
39	Ring
40	Ring
41	Lifting eye
42	Foot

## Repairs

- ⇒ Assemble the ball valve as described in Chapter "3.5 Ball valve assembly". When doing so observe the respective design of the ball valve.

### 12.4 Additional repairs

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

### 12.5 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).*
- 

- ⇒ Include the following information for returns:
  - Manufacturer number
  - Ball valve type
  - Article number
  - Nominal size and version of the ball 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. This form is available at ► [www.pfeiffer-armaturen.com](http://www.pfeiffer-armaturen.com).



## 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 ball valve BR 26s, see page 14-4.
- Declaration of conformity for partly completed machinery according to Machinery Directive 2006/42/EC for ball valve BR 26s, 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 26s Ball valves (BR 26s)</b> <b>with stuffing box 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 Installation and operating instructions ► EB 26s delivered together with the valve.</p> <p>The commissioning of these valves is only permitted after the valve has been installed from both sides in the pipeline and a risk of injury can be ruled out.</p> <p><i>(See ► EB 26s, Chapter 1 for 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 26s NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalogue.
--

*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 Rheinland Service GmbH</b> Am Grauen Stein 51101 Köln Germany	0035
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These Declarations become invalid when modifications are made to the ball valves and/or assemblies that affect the technical data of the ball valve or the <Intended use> described in ► EB 26s, Chapter 1 of the operating instructions, and considerably change the valve or an assembly delivered with it.

Kempen, 1. September 2022

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

# 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 26s Ball valves (BR 26s)</b> <b>with stuffing box packing as well as with adjustable packing</b> <ul style="list-style-type: none"> <li>• with lever for 90° operation</li> <li>• with worm gear and handwheel</li> </ul>
<ol style="list-style-type: none"> <li>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.</li> <li>2. They may only be operated observing the Installation and operating instructions ► EB 26s delivered together with the valve.</li> </ol> <p><i>(See ► EB 26s, Chapter 1 for 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 26s NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalogue.
--

*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 Rheinland Service GmbH</b> Am Grauen Stein 51101 Köln Germany	0035
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These Declarations become invalid when modifications are made to the ball valves and/or assemblies that affect the technical data of the ball valve or the <Intended use> described in ► EB 26s, Chapter 1 of the operating instructions, and considerably change the valve or an assembly delivered with it.

Kempen, 1. September 2022

  
 \_\_\_\_\_  
**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 26s Ball Valve (BR26s)</b></p> <ul style="list-style-type: none"> <li>• with a <b>Type 31a Quarter-turn Actuator (BR31a)</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 Machinery Directive 2006/42/EC.</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 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:*

<p>Tight-closing ball valve for aggressive media, particularly for strict requirements in chemical applications, automated with a single or double-acting piston actuator for butterfly valves, ball valves and other valves with rotating throttle bodies.</p> <p>For product descriptions refer to:                  PFEIFFER data sheet for Type 26s Valve ▶ TB 26s                  PFEIFFER data sheet for Type 31a Actuator ▶ TB 31a                  PFEIFFER mounting and operating instructions for Type 26s Valve ▶ EB 26s                  PFEIFFER mounting and operating instructions for Type 31a Actuator ▶ EB 31a                  PFEIFFER safety manual for Type 26s Valve ▶ SH 26                  PFEIFFER safety manual for Type 31a Actuator ▶ SH 31a</p> <p>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.</p>
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This declaration becomes invalid when modifications are made to the ball valves and/or assemblies that affect the technical data of the control valve or the intended use (▶ EB 26s, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 28 May 2021

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

# DECLARATION OF CONFORMITY

## TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH, 47906 Kempen, Germany
declares for the listed products that:	Type 26s Ball Valve (Type 26s) <ul style="list-style-type: none"> <li>• with free shaft end</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 Machinery Directive 2006/42/EC.</p> <p>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:*

Tight-closing ball valve for aggressive media, particularly for strict requirements in chemical applications.

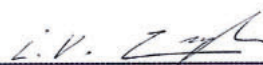
For product descriptions refer to:  
 PFEIFFER Data Sheet for Type 26s Ball Valve ▶ TB 26s  
 PFEIFFER Mounting and Operating Instructions for Type 26s Ball Valve ▶ EB 26s

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 ball valves and/or assemblies that affect the technical data of the ball valve or the intended use (▶ EB 26s, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 22 November 2021


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 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 Body sections

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

**Table 15-1:** Body section tightening torques

Nominal size			Qty.	Thread (17)	Tightening torque <sup>1)</sup>
DN	NPS				
15	½	d150	4	M8	21.5 Nm
-	½	d300	4	M10	44 Nm
25	-	-	4	M10	44 Nm
-	1	d150	4	M10	44 Nm
-	1	d300	4	M12	74 Nm
40	1½	d150	5	M10	44 Nm
-	1½	d300	6	M12	74 Nm
50	-	-	7	M10	44 Nm
-	2	d150	7	M10	44 Nm
-	2	d300	8	M12	74 Nm
80	3	d150	6	M16	183 Nm
-	3	d300	8	M16	183 Nm
100	-	-	8	M16	183 Nm
-	4	d150	8	M16	183 Nm
-	4	d300	8	M16	183 Nm

##### 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 (15)	Tightening torque <sup>1) 2)</sup>
DN	NPS				
15	½	d150	4	M6	8.8 Nm
-	½	d300	4	M6	8.8 Nm

Nominal size			Qty.	Thread (15)	Tightening torque <sup>1) 2)</sup>
DN	NPS				
25	1	d150	4	M6	8.8 Nm
-	1	d300	4	M6	8.8 Nm
40	1½	d150	3	M8	21.5 Nm
-	1½	d300	3	M8	21.5 Nm
50	2	d150	3	M8	21.5 Nm
-	2	d300	3	M8	21.5 Nm
80	3	d150	4	M10	44 Nm
-	3	d300	4	M10	44 Nm
100	4	d150	4	M10	44 Nm
-	4	d300	4	M10	44 Nm

<sup>2)</sup> Tighten the stuffing box 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 15-3:** Packing bush tightening torques

Nominal size			Qty.	Thread (27)	Tightening torque <sup>1)</sup>
DN	NPS				
15	½	d150			
-	½	d300			
25	1	d150			
-	1	d300			
40	1½	d150			
-	1½	d300			
50	2	d150			
-	2	d300			
80	3	d150			
-	3	d300			
100	4	d150			
-	4	d300			

##### 15.1.1.4 Bonnet flange

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

**Table 15-4:** Bonnet flange tightening torques

Nominal size			Qty.	Thread (37)	Tightening torque <sup>1)</sup>
DN	NPS				
15	½	d150			
-	½	d300			
25	1	d150			

Nominal size			Qty.	Thread (37)	Tightening torque <sup>1)</sup>
DN	NPS				
-	1	d300			
40	1½	d150			
-	1½	d300			
50	2	d150			
-	2	d300			
80	3	d150			
-	3	d300			
100	4	d150			
-	4	d300			

### 15.1.1.5 Flange connections

#### **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 15-5:** Required tightening torques

DN [mm]	PN [bar]	Thread	Tightening torques [Nm] for sealing units <sup>3)</sup>		Tightening method <sup>6)</sup>	
			A	B		
25	10 ... 40	M12	50	50	I	
40		M16	125 <sup>4)</sup>	80		
50		M16				
80	M16					
100	10 ... 16	M16	125 <sup>4)</sup>	80		
125	25 ... 40	M20	240 <sup>5)</sup>	150	II	
	10 ... 16	M16	125 <sup>4)</sup>	80		
150	25 ... 40	M24	340	200	II	
	10 ... 16	M20	240 <sup>5)</sup>	150		I
200	25 ... 40	M24	340	200	II	
	10 ... 16	M20	240 <sup>5)</sup>	150		I
	40	M27	500	250		
250	10	M20	240 <sup>5)</sup>	150	II	
	16	M24	340	200		
	25	M27	500	250		
	40	M30	700	300		
300	10	M20	240 <sup>5)</sup>	150	II	
	16	M24	340	200		
	25	M27	500	250		
	40	M30	700	300		

DN [mm]	PN [bar]	Thread	Tightening torques [Nm] for sealing units <sup>3)</sup>		Tightening method <sup>6)</sup>
			A	B	
350	10	M20	240 <sup>5)</sup>	150	II
	16	M24	340	200	
	25	M30	700	300	
	40	M33	900	500	
400	10	M24	340	200	II
	16	M27	500	250	
	25	M33	900	500	
	40	M36	1200	750	
450	10	M24	340	200	II
	16	M27	500	250	
	25	M33	900	500	
500	10	M24	340	200	II
	16	M30	700	300	
	25	M33	900	500	
600	10	M27	500	250	II
	16	M33	900	500	
	25	M36	1200	750	
700	10	M27	500	250	II
	16	M33	900	500	
	25	M39	1400	900	
800	10	M30	700	300	II
	16	M36	1200	750	
	25	M45	2000	1200	

<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 15-6:** 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.

**Table 15-7:** Sealing unit B

Seal	Nominal pressure	Description
Seal for tongue and groove flanges	PN 10 to PN 40	With fibre gaskets and metal-reinforced graphite gaskets
Grooved gasket		-
Spiral gasket with graphite		-

## 15.1.2 Lubricant

**Table 15-8:** *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

## 15.1.3 Tools

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

## 15.2 Spare parts

PFEIFFER recommends spare part sets for "Commissioning" and for "2-year operation", see Chapter:

- "15.2.1 Spare parts for the two-part ball valve with a floating ball up to PN 40/cl300"
- "15.2.2 Spare parts for the two-part ball valve with a trunnion-mounted ball up to PN 40/cl300".
- "15.2.3 Spare parts for the two-part ball valve with a trunnion-mounted ball up to PN 160/cl900".
- "15.2.4 Spare parts for the three-part ball valve with a trunnion-mounted ball up to PN 160/cl900".



**Table 15-1:** Recommended spare parts for the two-part ball valve with a floating ball up to PN 40/cI300

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
1	Main body	1.0619 • 1.6220 • 1.4408		
2	Side body	1.0619 • 1.6220 • 1.4408		
3	Ball	1.4408 • 1.4581/HSB		•
5	Control shaft	1.4462 • 1.4980 • 1.4980/HSB		•
6	Stuffing box flange	1.4571		
7	Bush	1.4571		
8	Bearing bush	PTFE with glass • 1.4571/HSB	•	•
9	Packing	PTFE/1.4305 • graphite/Inconel	•	•
10	Disc spring set	1.8159/Deltatone • Inconel	•	•
11	Sealing	PTFE • carbon-graphite	•	•
12	Sealing	Carbon-graphite	•	•
13	Ring	Carbon-graphite	•	•
14	Ring	Carbon-graphite	•	•
15	Screw	A4-70		
16	Screw plug	1.4572		
17	Screw	A4-70		

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

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	PTFE	•	•

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

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	PTFE	•	•
18	Disc spring	1.4310 • 1.4401 • 2.4668	•	•
19	Disc spring jacket	PTFE	•	•

**Metallic seat ring version, spring-loaded**

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	PTFE	•	•
18	Disc spring	1.4310 • 1.4401 • 2.4668	•	•
20	Ring	Carbon-graphite	•	•
21	Thrust ring	1.4571	•	•
22	Thrust ring	1.4571		

## 15.2.2 Spare parts for the two-part ball valve with a trunnion-mounted ball up to PN 40/cl300

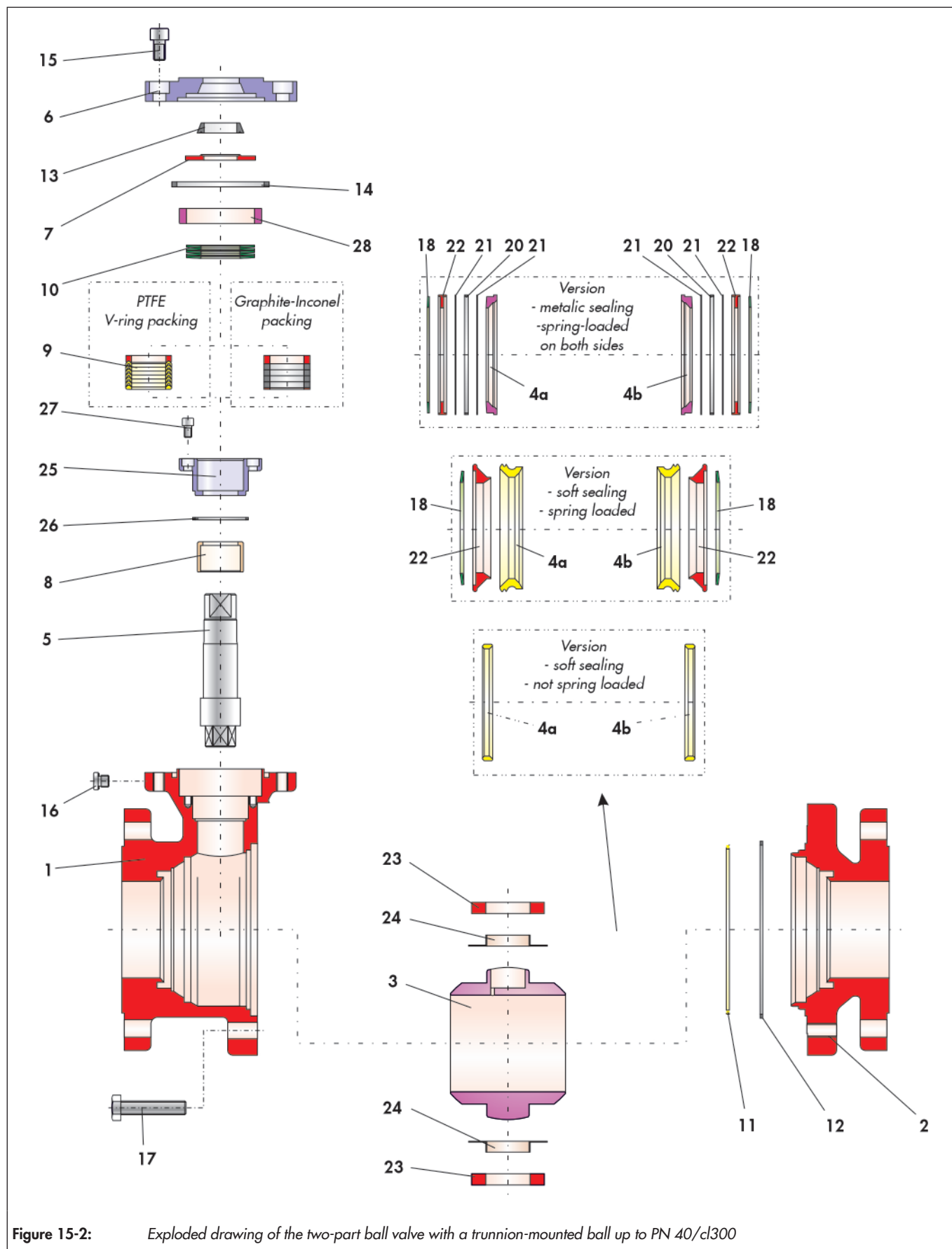


Figure 15-2: Exploded drawing of the two-part ball valve with a trunnion-mounted ball up to PN 40/cl300

<sup>1)</sup> Depending on the version, the seat ring can be spring-loaded with a disc spring or compression springs

**Table 15-2:** Recommended spare parts for the two-part ball valve with a trunnion-mounted ball up to PN 40/cl300

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
1	Main body	1.0619 • 1.6220 • 1.4408		
2	Sid body	1.0619 • 1.6220 • 1.4408		
3	Ball	1.4408 • 1.4581/HSB		•
5	Control shaft	1.4462 • 1.4980 • 1.4980/HSB		•
6	Stuffing box flange	1.4571		
7	Bush	1.4571		
8	Bearing bush	PTFE with glass • PEEK • 1.4571/HSB	•	•
9	Packing	PTFE/1.4305 • graphite/Inconel	•	•
10	Disc spring set	1.8159/Deltatone • Inconel	•	•
11	Sealing	PTFE • carbon-graphite	•	•
12	Sealing	Carbon-graphite	•	•
13	Ring	Carbon-graphite	•	•
14	Ring	Carbon-graphite	•	•
15	Screw	A4-70		
16	Screw plug	1.4572		
17	Screw	A4-70		
23	Bearing shell	1.4571 • 1.4408		
24	Bearing	Compound • 1.4571/HSB	•	•
25	Packing bush	1.4571		
26	Ring	Carbon-graphite	•	•
27	Screw	A4-70		
28	Centre ring	1.4571		

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

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	PTFE	•	•

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

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	PTFE	•	•
18	Disc spring	1.4310 • 1.4401 • 2.4668	•	•
22	Thrust ring	1.4571		

**Metallic seat ring version, spring-loaded**

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	1.4462/HSB	•	•
18 <sup>1)</sup>	Disc spring	1.4310 • 1.4401 • 2.4668	•	•
20	Ring	Carbon-graphite	•	•
21	Thrust ring	1.4571	•	•
22	Thrust ring	1.4571		
31 <sup>1)</sup>	Compression spring	1.4310	•	•

<sup>1)</sup> Depending on the version, the seat ring can be spring-loaded with a disc spring or compression springs

### 15.2.3 Spare parts for the two-part ball valve with a trunnion-mounted ball up to PN 160/cI900

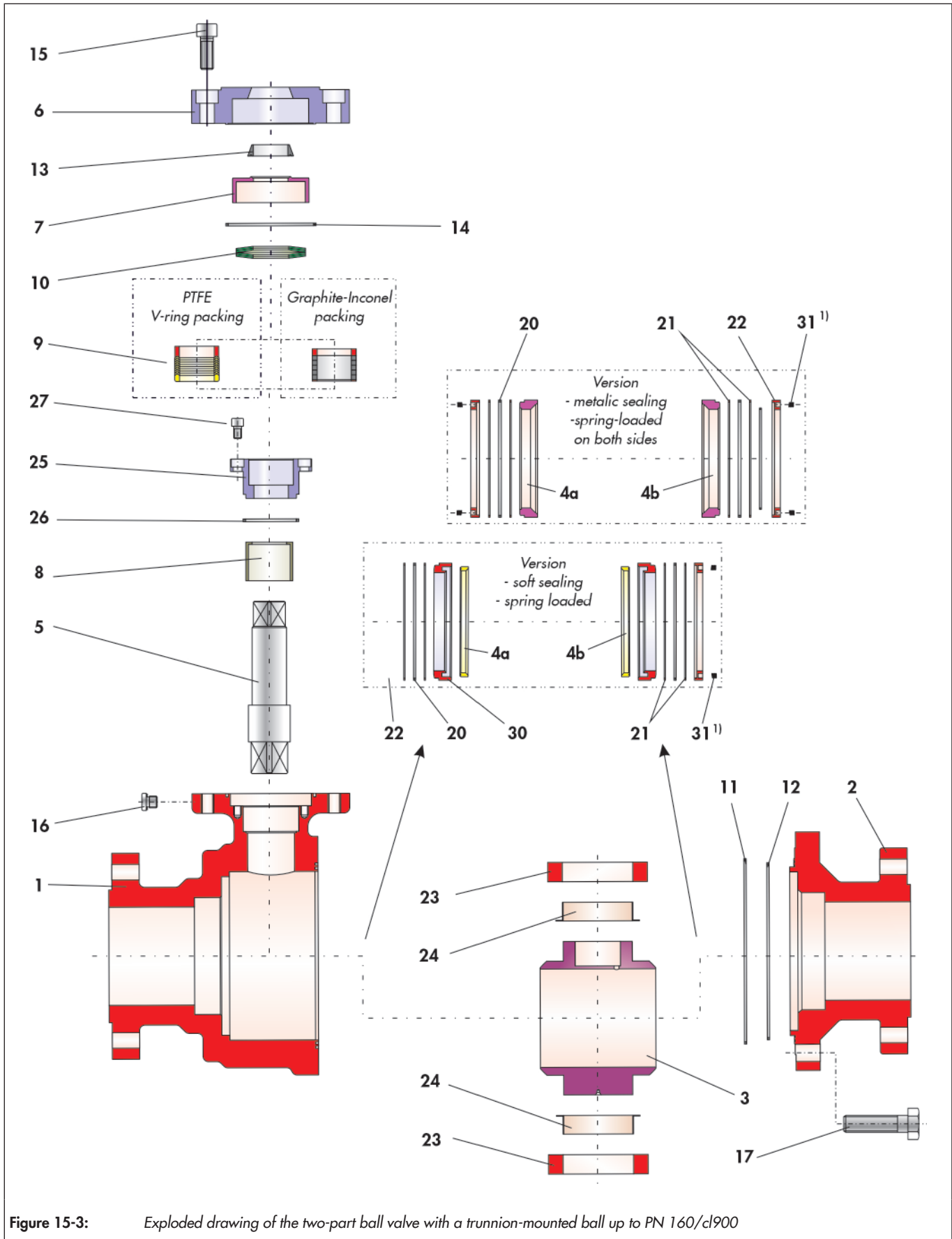


Figure 15-3: Exploded drawing of the two-part ball valve with a trunnion-mounted ball up to PN 160/cI900

<sup>1)</sup> Depending on the version, the seat ring can be spring-loaded with a disc spring or compression springs



**Table 15-3: Recommended spare parts for the two-part ball valve with a trunnion-mounted ball up to PN 160/cl900**

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
1	Main body	1.0619 • 1.6220 • 1.4408		
2	Side body	1.0619 • 1.6220 • 1.4408		
3	Ball	1.4408 • 1.4462/HSB		•
5	Control shaft	1.4462 • 1.4980 • 1.4980/HSB		•
6	Stuffing box flange	1.4571		
7	Bush	1.4571		
8	Bearing bush	PTFE with glass • PEEK • 1.4571/HSB	•	•
9	Packing	PTFE/1.4305 • graphite/Inconel	•	•
10	Disc spring set	1.8159/Deltatone • 1.4122 • Inconel	•	•
11	Sealing	Carbon-graphite	•	•
12	Sealing	Carbon-graphite	•	•
13	Ring	Carbon-graphite	•	•
14	Ring	Carbon-graphite	•	•
15	Screw	A4-70		
16	Screw plug	1.4572		
17	Screw	A4-70		
23	Bearing shell	1.4408		
24	Bearing	Compound	•	•
25	Packing bush	1.4571		
26	Ring	Carbon-graphite	•	•
27	Screw	A4-70		

**Chambered seat ring soft seal version, spring-loaded**

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	PTFE • PEEK	•	•
18 <sup>1)</sup>	Disc spring	1.4310 • 1.4401 • 2.4668	•	•
20	Ring	Carbon-graphite	•	•
21	Thrust ring	1.4571	•	•
22	Thrust ring	1.4571		
30	Chamber	1.4571		
31 <sup>1)</sup>	Compression spring	1.4310	•	•

<sup>1)</sup> Depending on the version, the seat ring can be spring-loaded with a disc spring or compression springs

**Metallic seat ring version, spring-loaded**

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	1.4462/HSB	•	•
18 <sup>1)</sup>	Disc spring	1.4310 • 1.4401 • 2.4668	•	•
20	Ring	Carbon-graphite	•	•
21	Thrust ring	1.4571	•	•
22	Thrust ring	1.4571		
31 <sup>1)</sup>	Compression spring	1.4310	•	•

<sup>1)</sup> Depending on the version, the seat ring can be spring-loaded with a disc spring or compression springs



**Table 15-4:** Recommended spare parts for the three-part ball valve with a trunnion-mounted ball up to PN 160/c1900

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
1	Main body	1.0619 • 1.6220 • 1.4408		
2	Side body	1.0619 • 1.6220 • 1.4408		
3	Ball	1.4408 • 1.4462/HSB		•
5	Control shaft	1.4462 • 1.4980 • 1.4980/HSB		•
6	Stuffing box flange	1.4571		
7	Bush	1.4571		
8	Bearing bush	PTFE with glass • PEEK • 1.4571/HSB	•	•
9	Packing	PTFE/1.4305 • graphite/Inconel	•	•
10	Disc spring set	1.8159/Deltatone • 1.4122 • Inconel	•	•
11	Sealing	Carbon-graphite	•	•
12	Sealing	Carbon-graphite	•	•
13	Ring	Carbon-graphite	•	•
14	Ring	Carbon-graphite	•	•
15	Screw	A4-70		
16	Screw plug	1.4572		
23	Bearing shell	1.4408		
24	Bearing	Compound	•	•
29	Ring	Carbon-graphite	•	•
32	Screw plug	1.4404	•	•
33	Stud bolt	1.4571 • 1.4980		
34	Stud bolt	1.4571 • 1.4980		
35	Nut	A4-70 • 1.4980		
36	Bonnet flange	1.0619 • 1.6220 • 1.4408		
37	Screw	A4-70		
38	Ring	Carbon-graphite	•	•
39	Ring	Carbon-graphite	•	•
40	Ring	Carbon-graphite	•	•
41	Lifting eye	1.4301 • 1.0038		
42	Foot	1.4301 • 1.0038		

**Chambered seat ring soft seal version, spring-loaded**

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	PTFE • PEEK	•	•
18 <sup>1)</sup>	Disc spring	1.4310 • 1.4401 • 2.4668	•	•
20	Ring	Carbon-graphite	•	•
21	Thrust ring	1.4571	•	•
22	Thrust ring	1.4571		
30	Chamber	1.4571		
31 <sup>1)</sup>	Compression spring	1.4310	•	•

<sup>1)</sup> Depending on the version, the seat ring can be spring-loaded with a disc spring or compression springs

**Metallic seat ring version, spring-loaded**

Item	Description	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
4	Seat ring	1.4462/HSB	•	•
18 <sup>1)</sup>	Disc spring	1.4310 • 1.4401 • 2.4668	•	•
20	Ring	Carbon-graphite	•	•
21	Thrust ring	1.4571	•	•
22	Thrust ring	1.4571		
31 <sup>1)</sup>	Compression spring	1.4310	•	•

<sup>1)</sup> Depending on the version, the seat ring can be spring-loaded with a disc spring or compression springs

## 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
- Ball valve type
- Article number
- Nominal size and version of the 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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