

# MOUNTING AND OPERATING INSTRUCTIONS



## EB 28e

### Translation of the original manual



**Pig loading ball valve BR 28e • DIN and ANSI version**  
to combine with manual gearboxes  
for installation in piggable pipes

February 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 pig loading 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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## Content

<b>1</b>	<b>Safety instructions and safety measures</b>	<b>1-1</b>
1.1	Notes regarding possible severe personnel injury	1-2
1.2	Notes regarding possible personnel injury	1-2
1.3	Notes regarding possible property damage	1-3
1.4	Warning notes on the device	1-4
<b>2</b>	<b>Markings on the device</b>	<b>2-1</b>
2.1	Type plate	2-2
2.1.1	Actuator type plate	2-2
2.2	Material identification	2-2
<b>3</b>	<b>Design and principle of operation</b>	<b>3-1</b>
3.1	Variants	3-1
3.2	Additional fittings	3-1
3.3	Attachments	3-2
3.4	Technical data	3-2
3.5	Metering ball valve assembly	3-2
3.5.1	Preparation of the assembly	3-2
3.5.2	Assembly of the main body	3-2
3.5.3	Assembly of the side body	3-2
3.5.4	Final assembly of the metering ball valve	3-2
<b>4</b>	<b>Shipment and on-site transport</b>	<b>4-1</b>
4.1	Accepting delivery	4-1
4.2	Unpacking the metering ball valve	4-1
4.3	Transporting and lifting the metering ball valve	4-1
4.3.1	Transporting	4-1
4.3.2	Lifting	4-1
4.3.3	Lifting points on the body	4-2
4.3.4	Lifting points on the bracket	4-2
4.4	Storing the metering ball valve	4-3
<b>5</b>	<b>Installation</b>	<b>5-1</b>
5.1	Installation conditions	5-1
5.2	Preparing for assembly	5-1
5.3	Assembling the metering ball valve and actuator	5-1
5.4	Installing the metering ball valve in the pipe	5-2
5.4.1	General	5-2
5.4.2	Installing the metering ball valve	5-3
5.5	Checking the assembled metering ball valve	5-3
5.5.1	Functional test	5-3
5.5.2	Pressure test of the pipe section	5-3
5.5.3	Rotary movement	5-3
5.5.4	Fail-safe position	5-4

## Content

<b>6 Start-up</b>	<b>6-1</b>
<b>7 Operation</b>	<b>7-1</b>
<b>8 Malfunction</b>	<b>8-1</b>
8.1 Detecting and rectifying errors	8-1
8.2 Carrying out emergency measures	8-2
<b>9 Servicing</b>	<b>9-1</b>
9.1 Periodic tests	9-1
9.2 Maintenance work	9-2
9.2.1 Replacing the seal rings and ball	9-2
9.3 Ordering spare parts and consumables	9-2
<b>10 Decommissioning</b>	<b>10-1</b>
<b>11 Removal</b>	<b>11-1</b>
11.1 Removing the metering ball valve from the pipe	11-1
11.2 Disassembling the actuator	11-1
<b>12 Repairs</b>	<b>12-1</b>
12.1 Replacing the V-ring packing	12-1
12.2 Replacing the seal ring and the ball	12-1
12.3 Additional repairs	12-1
12.4 Additional repairs	12-1
12.5 Sending devices to PFEIFFER	12-1
<b>13 Disposal</b>	<b>13-1</b>
<b>14 Certificates</b>	<b>14-1</b>
<b>15 Annex</b>	<b>15-1</b>
15.1 Tightening torques, lubricant and tools	15-1
15.1.1 Tightening torques	15-1
15.1.2 Lubricant	15-2
15.1.3 Tools	15-2
15.2 Spare parts	15-2
15.2.1 Spare parts of the metering ball valve	15-3
15.3 Service	15-4

# 1 Safety instructions and safety measures

## Intended use

The BR 28e pig loading ball valve is manually operated and is used for removing, or inserting the pigs into the pigging pipe system.

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

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

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

- Manually operated pig loading ball valves are designed exclusively for launching pigs into and out of the system within the permitted pressure and temperature limits after installation in a pig pipe system.
- The data sheet contains the permissible pressure and temperature range for these ball valves ► TB 28e.
- The safety regulations that apply to the pipe system in which the ball valves are installed also apply to the pig loaded ball valves.
- This manual only provides safety instructions that are to be observed additionally for ball valves.
- It is assumed that this chapter is observed when using the valve as intended.

## Reasonably foreseeable erroneous use and unintended use

The pig loaded 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 and piggable pipes who are familiar with the assembly, commissioning and operation of this product.

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

## Personal protective equipment

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

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

## Prohibition of modifications

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

## Protective devices

- For safety reasons, an automation to the pigging head station should be avoided at all times!
- 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 pig loading ball valve ensure that:

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

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:

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

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

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

### DANGER

#### **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.
- ⇒ 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 (control shaft and hand lever) that can lead to crushing if reaching into it.

- ⇒ Do not reach into the yoke during operation.

#### **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.

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

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

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

**Protection against using the wrong pig!**

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

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

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

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

⇒ If a pig loaded ball valve used as an end fitting in a pressurised line is opened, this may only be done with extreme caution so that the escaping medium does not cause any damage.

### 1.3 Notes regarding possible property damage

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

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

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

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

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

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

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

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

- ⇒ Excessively tightened components are subject to increased wear.
- ⇒ Insufficiently tightened components can cause leakage.
- ⇒ Observe the tightening torques, see Table 15-1 and Table 15-2 in Chapter "15.1.1 Tightening torques".

**! NOTE****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-activity in the enquiry so that this circumstance can be taken into account.

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

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

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

Unsuitable tools can damage the ball valve.

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

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

Unsuitable lubricants can corrode and damage the surface.

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

### 1.4 Warning notes on the device

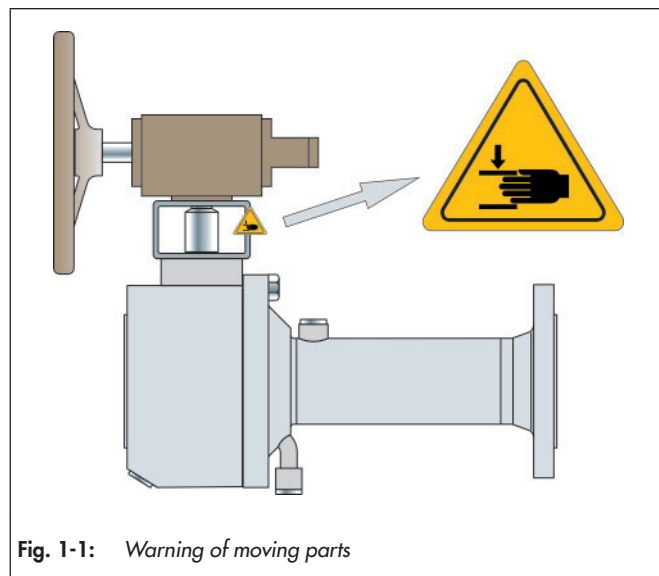
**Warning of moving parts**

Fig. 1-1: Warning of moving parts

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





## 2 Markings on the device

Each pig loaded ball valve usually has the following marking.

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

Pos.	For	Marking	Remark
1	Manufacturer	PFEIFFER	Address see Chapter "15.3 Service"
2	Valve type	BR (and number value)	e.g. BR 28e = Series 28e, see the PFEIFFER catalogue
3	Body material	e.g. 1.4571	Material standard acc. to DIN EN 10272
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, e.g. c1150 at room temperature
6	Max. permissible operating temperature	TS (and number value)	PS are TS are related values here at the max. permissible operating temperature with the max. permissible operating overpressure, see pressure-temperature diagram in data sheet ▶ TB 28e.
	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. 331234/001/001	<p>33 1234 /001 /001</p> <p>Valve no. within the item</p> <p>Item in the order</p> <p>Order</p> <p>Year of manufacture (38=2018, 39=2019, 30=2020, 31=2021, 32=2022, 33=2023 etc.)</p>
	Manufacturer number 2009 to 2017	e.g. 211234/001/001	<p>21 1234 /001 /001</p> <p>Valve no. within the item</p> <p>Item in the order</p> <p>Order</p> <p>Year of manufacture (29=2009, 20=2010, 21=2011, 22=2012 etc.)</p>
	Manufacturer number until 2008	e.g. 2071234/001/001	<p>207 1234 /001 /001</p> <p>Valve no. within the item</p> <p>Item in the order</p> <p>Order</p> <p>Year of manufacture (205=2005, 206=2006, 207=2007 etc.)</p>
09	Year of manufacture	e.g. 2023	Upon customer request, the year of manufacture can also be indicated on the valve
10	Data/Matrix code		
11	Conformity	CE	Conformity is certified separately by PFEIFFER
	Code No.	0035	"Notified body" according to EU Directive = TÜV Rheinland Service GmbH

**i 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 identification

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

Further details can be obtained from PFEIFFER.

### 3 Design and principle of operation

#### Characteristics

- Inside diameter of pipe, according to DIN 2430
- Seat rings, spring-loaded on one side (DN 50 to 80 / NPS2 to 3)
- Trunnion mounted ball (from DN 100 / NPS4)
- Floating ball, i.e. sealed by both seat rings
- Shaft sealed by a V-ring packing loaded by disc spring set
- Blow out proof shaft
- Anti static version with conductive shaft bearing
- Piggable flanges in the passage of the ball valve according to DIN 2430-2 with a projection. Non-piggable flanges according to DIN 1092-1 with sealing strip form B or according to customer-specific requirements.
- Connections for actuators acc. to DIN ISO 5211

#### Versions

The pig loading ball valve fulfils the following functions for the different types of designs:

- As manual operated Head station in **one-pigging system**
- As manual operated Head station in **two-pigging system**

#### NOTE

*For safety reasons, an automation to the Pigging head station should be avoided at all times!*

#### Optional material combination

- Shaft and ball on request
- Seat rings in PTFE-compounds
- Sealing in graphite

#### Function and principle of operation

The pig loading ball valves of BR 28e are used for removing, or inserting the pigs into the pigging pipe system.

The ball (3) with a slight tapered blind bore, is rotatable around the control shaft.

The ball, in which the pig is located in the bore, when rotated 180° the pig can either be inserted into, or removed from the pipe system.

The sealing of the ball (3) is with interchangeable seat rings (6 and 7). The control shaft (4) is sealed with a PTFE V-ring packing (10). The pre-loaded tension is carried out with disc springs (11), which are located above the packing.

The external control shaft can be fitted with a hand-lever, optionally, a manual gear box can be adapted.

### 3.1 Variants

- Preparation for mounting magnetic inductive pigging sensors
- With pigging sensing devices for manual detection
- Different inside diameters

### 3.2 Additional fittings

#### Insulation

The ball valves can be insulated to reduce the passage of heat energy. Observe the notes in Chapter "5 Assembly".

#### Test connection

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

#### Grip protection

In the case of conditions of use that require a high level of safety (e.g. if the ball valve is freely accessible to untrained specialist personnel), PFEIFFER offers a safety guard to prevent the risk of crushing due to moving parts (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 pig loading ball valve either individually or in combinations:

- Hand-lever (180°)
- Manual gear-box (180°)
- Shaft extension (100 mm Standard)
- Limit switch

Further attachments are available according to customer specifications.

### 3.4 Technical data

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

#### Info

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

## 3.5 Pig loading ball valve assembly

The BR 28e pig loading ball valves in nominal sizes up to DN 80 have design differences to the ball valves from DN 100, so that they cannot be included in a construction manual.

- **Chapter 3.5.1** describes the assembly of the ball valves DN 50 to 80.
- **Chapter 3.5.2** describes the assembly of the ball valves from DN 100.

### 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 pig loading ball valves DN 50 to 80

### **i** Info

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

### 3.5.1.1 Assembly of the main body

- ⇒ Place the main body (1) on an even and clean work surface so that the inside of the ball valve is easy to reach.
- ⇒ Place the seat ring (6) in the main body.
- ⇒ With a slight rotating movement, push the bearing bush (8) onto the control shaft (4).
- ⇒ The control shaft (4) with the bearing bush (8) is guided from the inside of the main body (1) through the opening for the control shaft.

### **!** NOTE

- ⇒ The sealing surface of the control shaft (4) must not be damaged.
- ⇒ Make sure that the bearing bush (8) and the control shaft (4) are vertical, when positioned in the opening for the control shaft, and not slanted.

- ⇒ Rotate the control shaft (4) so that the two flats are positioned vertical to the working surface.
- ⇒ Now carefully insert the ball (3).
- ⇒ Place the sealing (14) in the turned recess in the main body (1)

### 3.5.1.2 Assembly of the side body

- ⇒ Place the disc spring jacket (13) on the disc spring (12).

### **i** Info

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

- ⇒ Insert the lined disc spring (12) in the side body (2).
- ⇒ Press the seat ring (7) onto the disc spring.

### 3.5.1.3 Final assembly of the pig loading ball valve

- ⇒ The side body (2) together with the seat ring (7) is carefully pressed onto the main body (1).
- ⇒ Rotate the side body (2) until the bores of both body parts (1 and 2) are aligned with each other.
- ⇒ After applying grease to the screws (15) both parts (1 and 2) are screwed together, evenly and in alternating pattern.

### **!** NOTE

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

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

### **i** Info

- ⇒ Depending on the nominal size, stud bolts (15) with nuts (29) or screws (15) can be used.
- ⇒ 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".

- ⇒ With a light rotating movement, press the V-ring packing (10) over the control shaft (4) and place in the packing chamber of the main body (1). For the positioning of the V-rings, refer to the drawing (Fig. 3-1).
- ⇒ Now the disc spring set (11) is placed on the V-ring packing. Also here, refer to the drawing (Fig. 3-1) for positioning the disc springs.
- ⇒ Press the bearing bush (9) into the stuffing box flange (5).
- ⇒ Following this, place the stuffing box flange (5) over the control shaft (4), and mount onto the main body (1).

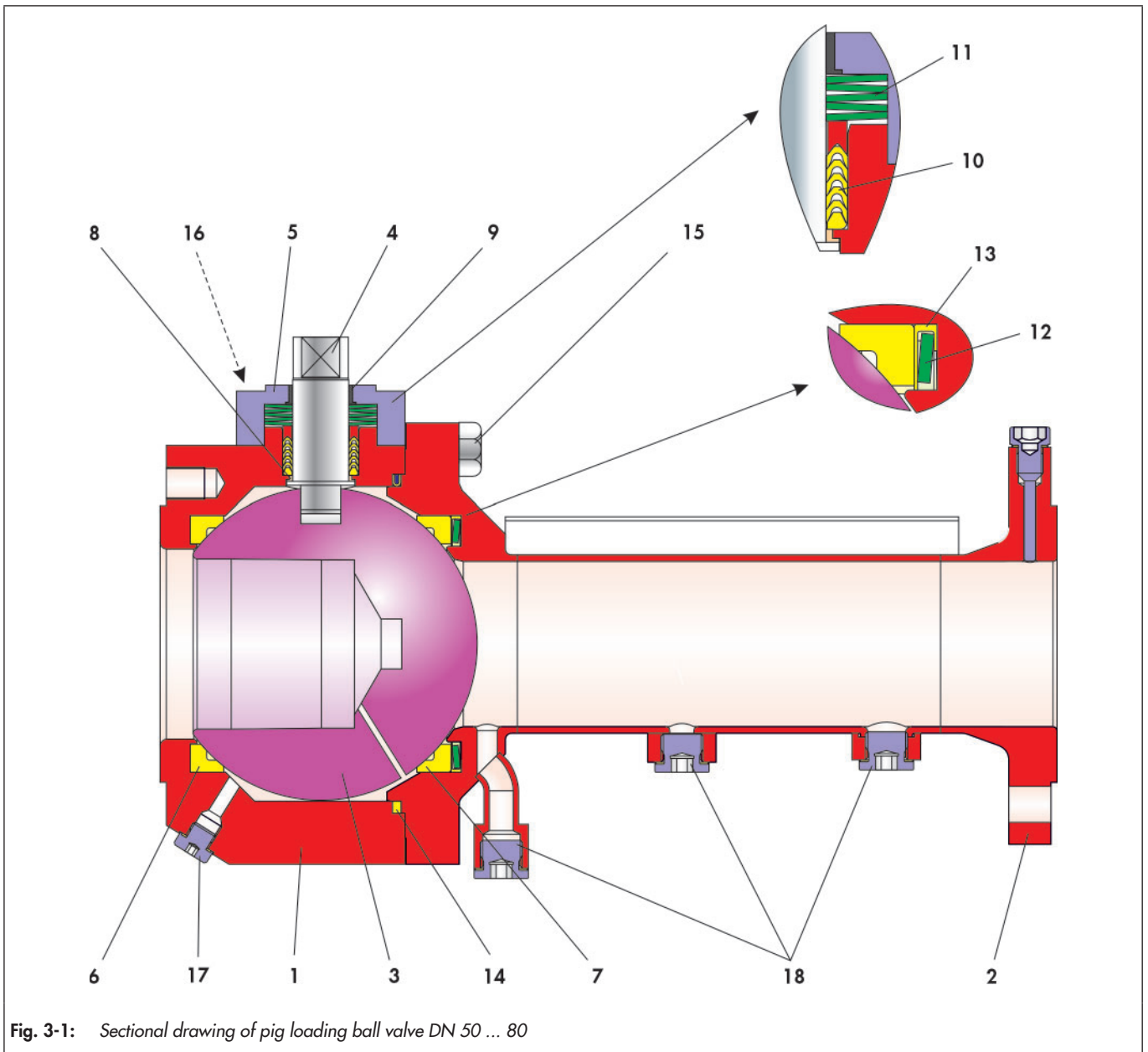


Fig. 3-1: Sectional drawing of pig loading ball valve DN 50 ... 80

Table 3-1: List of parts

Item	Description
1	Main body
2	Side body
3	Ball
4	Control shaft
5	Stuffing box flange
6	Seat ring
7	Seat ring
8	Bearing bush
9	Bearing bush
10	V-ring packing

Item	Description
11	Disc spring set
12	Disc spring
13	Disc spring jacket
14	Sealing
15 <sup>1)</sup>	Screw / Stud bolt
16	Screw
17	Screw plug
18	Screw plug
29 <sup>1)</sup>	Nut

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

## Design and principle of operation

- ⇒ After applying grease to the screws (16) align and tighten evenly in alternating pattern.

### **i** Info

- ⇒ The permissible torque for tightening the stuffing box can be found in Table 15-2 in Chapter "15.1.1 Tightening torques".
- ⇒ Prior to the leak test, the ball valve should be actuated a few times so that the ball can centre on the seat rings and provide an optimal seal.

- ⇒ If required, the screw plugs (17 and 18) are carefully screwed in.

### **i** Info

Do not damage the seals of the screw plugs.

## 3.5.2 Assembly of the pig loading ball valves DN 100 to 200

### **i** Info

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

### 3.5.2.1 Assembly of the main body

- ⇒ Place the main body (1) on an even and clean work surface so that the inside of the ball valve is easy to reach.
- ⇒ Place the disc spring jacket (13) on the disc spring (12).

### **i** Info

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

- ⇒ Insert the lined disc spring (12) in the main body (2).
- ⇒ Press the seat ring (6) onto the disc spring.
- ⇒ Insert the bearing bush (23) into the ball (3).
- ⇒ Insert the ring (22) into the main body (1).
- ⇒ Insert the trunnion (20) through the ring (22) into the bearing bush (23) of the ball (3).
- ⇒ Align and tighten the screws (21) evenly and in alternating pattern.

### **!** NOTE

#### Damage due to improper assembly!

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

### **i** Info

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

- ⇒ Push the bearing bush (24) onto the selector shaft (4).
- ⇒ Insert the control shaft (4) with bush (24) through the control shaft location of the main body (1).

### **i** Info

- ⇒ Turn the control shaft (4) so that the trunnion of the control shaft fits into the groove of the ball (3).
- ⇒ If the counterforce of the disc spring is too great, press the ball (3) into position under a press. Protect the ball from the plunger of the press, e.g. with a plastic disc.
- ⇒ The ball must now be able to rotate easily through the trunnion (20) and the control shaft (4), taking into account the adjacent seat ring (6).

- ⇒ Insert the rings (26 and 28) into the corresponding recesses of the packing bush (25).
- ⇒ Press the bearing bush (8) into the packing bush (25).
- ⇒ Adjust the packing bush (25) with screws (19) and tighten them evenly and alternately.

### **i** Info

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

- ⇒ With a light rotating movement, press the V-ring packing (10) over the control shaft (4) and place in the packing chamber of the packing bush (25). For the positioning of the V-rings, refer to the drawing (Fig. 3-2).
- ⇒ Now the disc spring set (11) is placed on the V-ring packing. Also here, refer to the drawing (Fig. 3-2) for positioning the disc springs.
- ⇒ Press the bearing bushes (9 and 27) into the stuffing box flange (5).
- ⇒ Place the stuffing box flange (5) over the control shaft (4) and the disc springs (11) on the main body (1).
- ⇒ Adjust the stuffing box flange with lightly greased screws (16) and tighten them evenly and alternately.

### **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".

### 3.5.2.2 Assembly of the main body

- ⇒ Insert the sealing (14) into the side body (2).

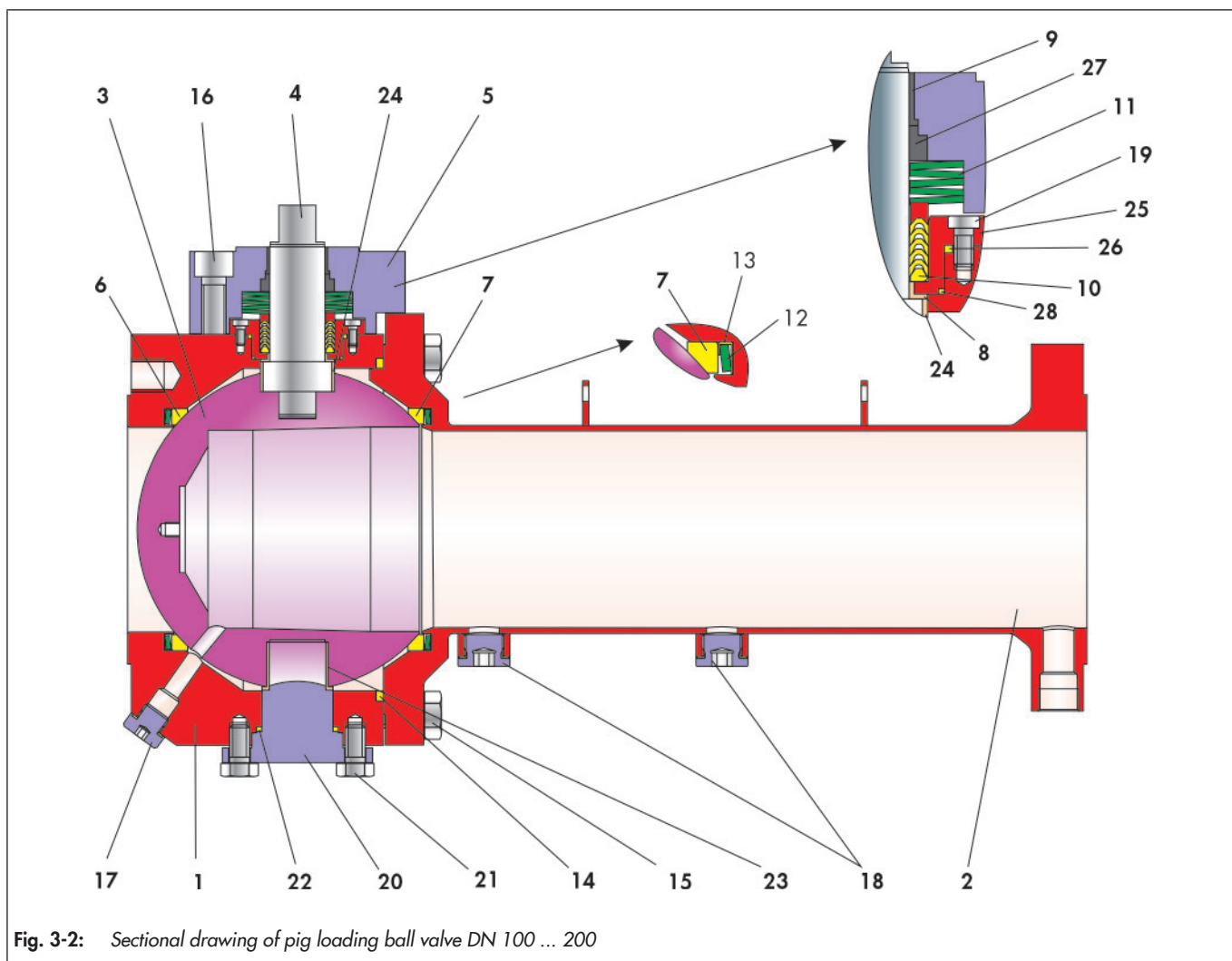


Fig. 3-2: Sectional drawing of pig loading ball valve DN 100 ... 200

Table 3-2: List of parts

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

Item	Description
16	Screw
17	Screw plug
18	Screw plug
19	Screw
20	Trunnion
21	Screw
22	Ring
23	Bearing bush
24	Bearing bush
25	Packing bush
26	Ring
27	Bearing bush
28	Ring
29 <sup>1)</sup>	Nut

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

- ⇒ Place the disc spring jacket (13) on the disc spring (12).

---

### **i** Info

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

---

- ⇒ Insert the lined disc spring (12) in the side body (2).
- ⇒ Press the seat ring (7) onto the disc spring.

### 3.5.2.3 Final assembly of the pig loading ball valve

- ⇒ The side body (2) together with the seat ring (7) is carefully pressed onto the main body (1).
- ⇒ Rotate the side body (2) until the bores of both body parts (1 and 2) are aligned with each other.
- ⇒ After applying grease to the screws (15) both parts (1 and 2) are screwed together, evenly and in alternating pattern.

---

### **!** NOTE

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

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

### **i** Info

- ⇒ Depending on the nominal size, stud bolts (15) with nuts (29) or screws (15) can be used.
  - ⇒ 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".
  - ⇒ 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.
- 

- ⇒ If required, the screw plugs (17 and 18) are carefully screwed in.



## 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 pig loading 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 pig loading 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 pig loading 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 pig loading ball valve!**

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

#### ! NOTE

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

The screwed-in lifting eyes on gear box are used only for gear box assembling and disassembling as well as for lifting the gear box 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 gear box, hand wheel or other components.
- ⇒ Do not use the control air lines, accessories or other components with safety functions for suspension or damage them.

### 4.3.1 Transporting

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

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

#### Transport conditions

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

### 4.3.2 Lifting

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

#### Conditions for lifting

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

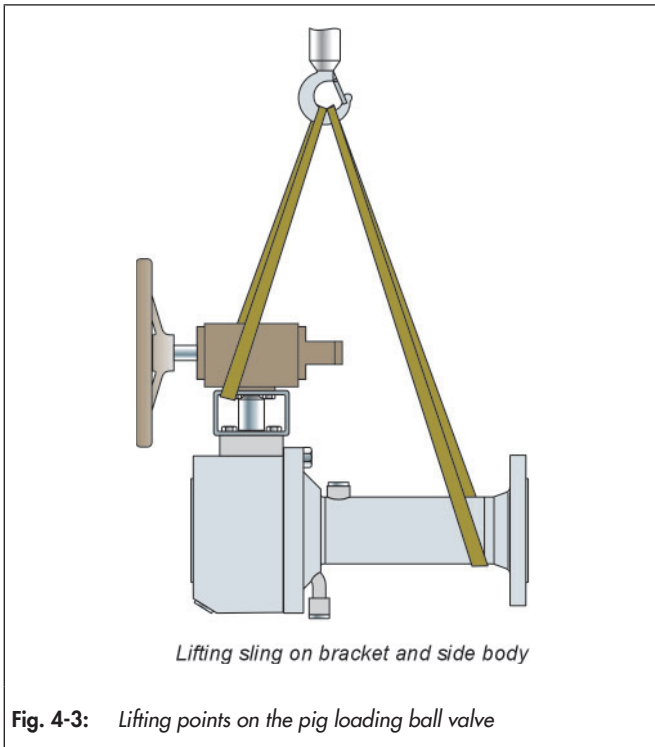


Fig. 4-3: Lifting points on the pig loading ball valve

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

**⚠ WARNING**

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

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

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

### 4.3.3 Lifting points on the bracket and side body

- ⇒ Fasten one lifting sling each to the bracket and the flange of the side body and on the suspension element (e.g. hook) of the crane or forklift, see Fig. 4-1. When doing so, ensure the safety, bearing capacity and length of the lifting slings
- ⇒ 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 pig loading ball valve

**! NOTE**

**Damage to the pig loading ball valve due to improper storage!**

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

**i Info**

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

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

## 5 Installation

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task. The following instructions apply additionally for ball valves. Observe chapter "4.3 Transporting and lifting the pig loading ball valve" for transport to the installation site.

### 5.1 Installation conditions

#### Operator level

The operator level for the pig loading 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 pig loading 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

- ⇒ Pig loading ball valves must be installed in the pipeline with the pig trap as horizontal as possible.
- ⇒ Sufficient space must remain at the valve to launch and handle the pigs.
- ⇒ Dimensions for this must be agreed with the operator of the system.

#### 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

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 pig loading 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 pig loading ball valve and actuator

Pig loading 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 a manual gear box!**

*The subsequent fitting of a manual gear box 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 high external loads on a manual gear box!**

*Manual gear boxes are not "stepladders".*

- ⇒ *Loads may not be applied to the manual gear boxes as they can damage or destroy the ball valve.*
- ⇒ *Manual gear boxes must not be extended or used with additional levers.*

#### **Danger and damage due to heavy manual gear boxes!**

*Gear boxes 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 manual gear boxes 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 pig loading 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 pig loading ball valve in the pipe

### 5.4.1 General

- ⇒ Transport the ball valve in its original packaging to the installation site and unpack it only there.
- ⇒ Inspect the ball valve and actuator for transport damage. Damaged ball valves or actuators may not be installed.
- ⇒ A functional test is to be carried out at the beginning of installation for manually-operated ball valves: the ball valve must close and open correctly. Detected malfunctions must be fixed before commissioning. See also chapter 8 "Malfunction".
- ⇒ Handle the ball valve with care and observe the instructions for the flange connection.
- ⇒ Make sure that only pig loading 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.
- ⇒ Counter flanges must have corresponding flange forms in accordance with DIN 2430-2 recess. Other flange forms must be agreed with PFEIFFER.
- ⇒ The pig loading ball valve must be mounted to a flange that is attached to the end of a pipeline and mounted in a horizontal position.

**DANGER**

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

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

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

- ⇒ The connection ends of the pipe must align with the ball valve connections and have plane-parallel ends.

- ⇒ Prior to installation, the ball valve and the connected pipe must be carefully cleaned of any contamination, in particular solid foreign matter.
- ⇒ The sealing surfaces on the flange connection and the utilized flange seals must in particular be free of all contamination during installation.
- ⇒ Optionally, an arrow is marked on the body. The direction of the arrow must correspond to the direction of flow in the pipe.

**NOTE**

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

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

- ⇒ When installing peripheral devices, make sure that they can be operated from the working area of operating personnel.

### 5.4.2 Installing the pig loading ball valve

- ⇒ Close the ball valve in the pipe for the duration of the installation.
- ⇒ Remove the protective caps on the ball valve openings prior to installation.
- ⇒ Lift the ball valve with suitable lifting equipment at the installation site, see chapter "4.3 Transporting and lifting the pig loading ball valve". When doing so observe the flow direction of the ball valve. An arrow on the ball valve indicates the optional 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.
- ⇒ Open the ball valve slowly in the pipe during commissioning.
- ⇒ Check the correct function of the ball valve.

## 5.5 Checking the assembled pig loading 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 crushing due to moving actuator- and control shaft!**

⇒ Do not allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.

### 5.5.2 Pressure test of the pipe section

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

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

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

#### Info

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

### 5.5.3 Rotary movement

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

- ⇒ Open and close the pig loading 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.



## 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 allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.

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

- The pig loading 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

### 7.1 General

As soon as the commissioning/recommissioning work is complete, see Chapter “6 Commissioning”, the pig loading 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 allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.

#### 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 torque”.
- It can also be necessary to retighten the screw connections on the body sections with the corresponding tightening torques according to Table 15-1, Table 15-2 and Table 15-4 in Chapter “15.1.1 Tightening torques”.
- Ball valves that were delivered from the factory with a manual gear box are precisely adjusted. The user is responsible for any changes they make.
- For the manual operation, normal manual forces are sufficient and the use of extensions to increase the actuation torque is not permitted.
- In the case of shut-off ball valves with a hand lever, the position of the hand lever indicates the location of the bore in the ball. The hand lever moves in general parallel to the bore. Special versions are to be taken from the respective order.

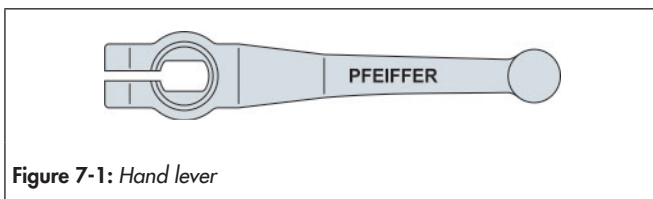


Figure 7-1: Hand lever

#### **⚠ DANGER**

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

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

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

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

### 7.2 Operating the pig loading ball valve

The pig loading ball valve is operated individually for each pigging system in conjunction with the BR 28s control unit. See data sheet ► TB 28s.



## 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 pig loading 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	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 pig loading ball valve closed	Leakage in the closed position	Remove and inspect the ball valve, see chapter "1 Safety instructions and safety measures".
	The pig loading 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>

#### **i** Info

- In the case of faults that are not listed in the table, contact the After Sales Service at PFEIFFER.
- Spare parts must be ordered indicating all the data according to the ball valve marking. Only original parts from PFEIFFER 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

The system operator is responsible for emergency measures.

#### **In case of a pig loading ball valve fault:**

- 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.

## Malfunction

### 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 instructions for attached manual gear boxes from 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 allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.

#### **Danger of injury due to residual medium in the pig loading 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 and 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 pig loading 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 pig loading ball valve, see chapter "10 Decommissioning" Contact the After Sales Service at PFEIFFER for repairs, See chapter "12 Repairs".
Check the control shaft sealing for tightness from the outside.	The control shaft sealing with a PTFE V-ring packing is preloaded with a disc spring set and is therefore maintenance free.
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.
Check pipe connections and seals of the pig loading ball valve 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 pig loading 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 pig loading ball valve".

### 9.2.1 Replacing the seat rings and ball

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

### 9.3 Ordering spare parts and consumables

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

#### Spare parts

Information on spare parts can be found in Chapter "1.5.2 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 allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.

#### **Danger of injury due to residual medium in the pig loading 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 pig loading ball valve for maintenance and repair work or for disassembly, perform the following steps:

- ⇒ Empty the pipe and ball valve completely.
- ⇒ 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 allow the jamming of objects in the yoke to hinder the operation of the actuator- and control shaft.

#### **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.

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

- The pig loading ball valve is decommissioned, see chapter “10 Decommissioning”.

### 11.1 Removing the pig loading ball valve from the pipe

- ⇒ Loosen the flange connection.
- ⇒ Remove the ball valve from the pipe, see Chapter “4.3 Transporting and lifting the pig loading ball valve”.

### WARNING

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

- ⇒ Decontaminate the valves properly in advance.

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

### Tip

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

### 11.2 Disassembling the manual gear box

See the corresponding documentation.



## 12 Repairs

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

### ! NOTE

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

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

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

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

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

### 12.1 Replacing the V-ring packing

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

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

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

- ⇒ Place the ball valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (16) and carefully remove stuffing box flange (5).
- ⇒ Remove the disc springs from the disc spring set (11).
- ⇒ Remove the V-ring packing (10).
- ⇒ Check the rings of the packing as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.
- ⇒ Assemble the ball valve as described in Chapter "3.5 Assembly of the pig loading ball valve. Note the respective design of the ball valve.

### 12.2 Replacing the seat rings and the ball

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

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

Disassemble the ball valve to remove the seal 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 (16) and carefully remove stuffing box flange (5).
- ⇒ Remove the disc springs from the disc spring set (11).
- ⇒ Remove the V-ring packing (10).

#### Further disassembly for DN 50 to 80

- ⇒ Place the ball valve with the flange on the body side (1) facing downwards on an even and clean work surface, so that the body connection screws (15) are easy to reach.
- ⇒ Loosen the screws (15) and carefully remove the side body (2).
- ⇒ Remove the disc spring (12) with the disc spring jacket (13).
- ⇒ Check the seat ring (7), ball (3) and seat ring (6) as well as all plastic and graphite parts for damage, in the case of doubt, replace them.
- ⇒ Assemble the ball valve as described in Chapter "3.5 Assembly of the pig loading ball valve.

#### Further disassembly for DN 100 to 200

- ⇒ Loosen the screws (19) and carefully remove the packing bush (25).
- ⇒ Carefully loosen the control shaft (4) with bearing bushes (9 and 27) from the ball (3) with bearing bush (24) and remove.
- ⇒ Place the ball valve on an even and clean work surface so that the bearing location with the trunnion (20) is easy to reach.
- ⇒ Loosen and remove the screws (21).
- ⇒ Carefully loosen and remove the trunnion (20) from the ball (3) with bearing bush (23).
- ⇒ Place the ball valve with the flange on the body side (1) facing downwards on an even and clean work surface, so that the body connection screws (15) are easy to reach.
- ⇒ Loosen the screws (15) and carefully remove the side body (2).
- ⇒ Remove the disc spring (12) with the disc spring jacket (13).
- ⇒ Check the seat ring (7), ball (3) and seat ring (6) as well as all plastic and graphite parts for damage, in the case of doubt, replace them.
- ⇒ Assemble the ball valve as described in Chapter "3.5 Assembly of the pig loading ball valve.

### 12.3 Additional repairs

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



Table 12-3: List of parts

Item	Description
1	Main body
2	Side body
3	Ball
4	Control shaft
5	Stuffing box flange
6	Seat ring
7	Seat ring
8	Bearing bush
9	Bearing bush
10	V-ring packing
11	Disc spring set
12	Disc spring
13	Disc spring jacket
14	Sealing

Item	Description
15	Screw
16	Screw
17	Screw plug
18	Screw plug
19	Screw
20	Trunnion
21	Screw
22	Ring
23	Bearing bush
24	Bearing bush
25	Packing bush
26	Ring
27	Bearing bush
28	Ring

## 12.4 Sending devices to PFEIFFER

Defective ball valves can be sent to PFEIFFER for repair.

Proceed as follows to send devices:

### WARNING

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

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

### Tip

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

⇒ Include the following information for returns:

- Manufacturer number
- Pig loading 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.



## 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 manually operated valves, see page 14-2.

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



e

The manufacturer	<b>PFEIFFER Chemie-Armaturenbau GmbH</b> , D47906 Kempen, Germany
declares that:	<b>Type 28e Dockin pig ball valve (BR 28a), with packing</b> • with lever
<p>1. The valves are pressure accessories within the meaning of the <b>Pressure Equipment Directive 2014/68/EU</b> and conform with the requirements of this Directive.</p> <p>2. They may only be operated observing the Mounting and operating instructions ► EB 28e.</p>	

*Applied standards*

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

*Type designation and technical features:*

PFEIFFER data sheet ► TB 28e <i>NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalog.</i>
---

*Applied conformity assessment procedure:*

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

*Name of notified body:*

*Identification number of the notified body:*

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

Kempen, 22. April 2023

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

## 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 (15)	Tightening torque <sup>1)</sup>
DN	NPS			
50	2	4	M12	74 Nm
80	3	4	M16	183 Nm
100	4	8	M16	183 Nm
125	5	8	M16	183 Nm
150	6	12	M20	370 Nm
200	8	12	M20	370 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 (16)	Tightening torque <sup>1) 2)</sup>
DN	NPS			
50	2	4	M6	8.8 Nm
80	3	4	M8	21.5 Nm
100	4	4	M8	21.5 Nm
125	5	4	M16	183 Nm
150	6	4	M16	183 Nm
200	8	4	M20	370 Nm

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

##### 15.1.1.3 Packing bush

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

**Table 15-3:** Packing bush tightening torques

Nominal size		Qty.	Thread (19)	Tightening torque <sup>1)</sup>
DN	NPS			
100	4	4	M10	44 Nm
125	5	6	M10	44 Nm
150	6	4	M8	21.5 Nm
200	8	8	M10	44 Nm

##### 15.1.1.4 Trunnion

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

**Table 15-4:** Trunnion tightening torques

Nominal size		Qty.	Thread (21)	Tightening torque <sup>1)</sup>
DN	NPS			
100	4	4	M10	44 Nm
125	5	6	M8	21.5 Nm
150	6	2	M16	183 Nm
200	8	6	M12	74 Nm

##### 15.1.1.5 Flange connection

##### **i** Info

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

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

**Table 15-5:** Flange connection torque

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

DN	PN	Thread	Tightening torques [Nm] for sealing units <sup>3)</sup>		Tightening method <sup>6)</sup>
			A	B	
150	10 ... 16	M20	240 <sup>5)</sup>	150	I
	25 ... 40	M24	340	200	II
200	10 ... 16	M20	240 <sup>5)</sup>	150	II
	25	M24	340	200	
	40	M27	500	250	

<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.

### 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 of the pig loading ball valve DN 50 to 80" on page 15-3.
- "15.2.2 Spare parts of the pig loading ball valve DN 100 to 200" on page 15-4.

**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 – O-rings of various materials
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
Screws and nuts	High temperature	Heavy-duty grease paste Molykote 1000

### 15.2.1 Spare parts of the pig loading ball valve DN 50 to 80"

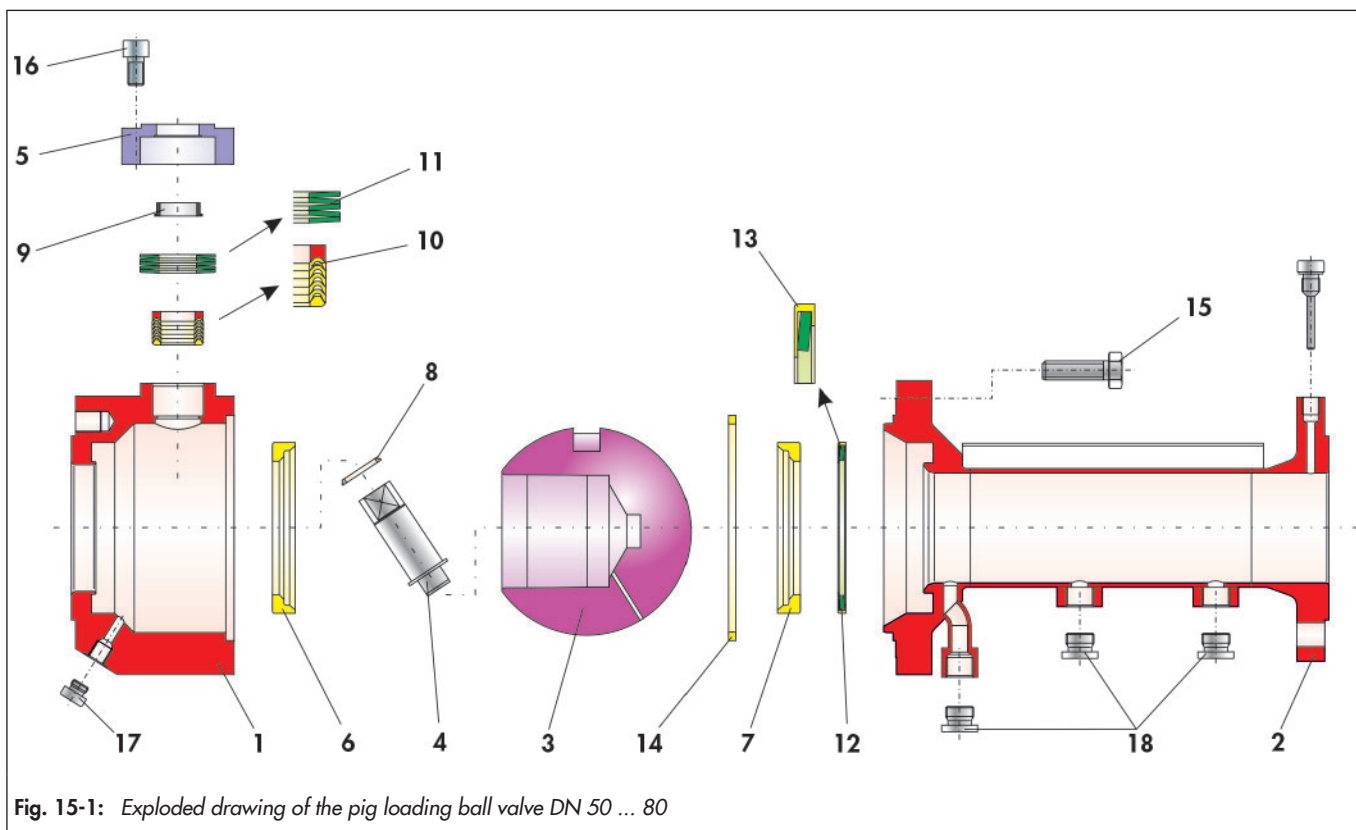


Table 15-9: Recommend spare parts for the pig loading ball valve

Item	Description	Material	Spare parts set	
			Commissioning	2-year operation
1	Main body	1.4571 • 1.4408		
2	Side body	1.4571 • 1.4408		
3	Ball	1.4408 • 1.4571		•
4	Control shaft	1.4571		•
5	Stuffing box flange	1.4571		
6	Seat ring	PTFE	•	•
7	Seat ring	PTFE	•	•
8	Bearing bush	PTFE with glass	•	•
9	Bearing bush	PTFE with carbon	•	•
10	V-ring packing	PTFE / 1.4305	•	•
11	Disc spring set	1.8159 Deltatone	•	•
12	Disc spring	1.4404	•	•
13	Disc spring jacket	PTFE	•	•
14	Sealing	PTFE	•	•
15	Screw	A4-70		
16	Screw	A4-70		
17	Screw plug	St.		
18	Screw plug	St.		



Table 15-10: Recommend spare parts for the pig loading ball valve

Item	Description	Material	Spare parts set	
			Commissioning	2-year operation
1	Main body	1.4571 • 1.4408		
2	Side body	1.4571 • 1.4408		
3	Ball	1.4408 • 1.4571		•
4	Control shaft	1.4571		•
5	Stuffing box flange	1.4571		
6	Seat ring	PTFE	•	•
7	Seat ring	PTFE	•	•
8	Bearing bush	PTFE with glass	•	•
9	Bearing bush	PTFE with carbon	•	•
10	V-ring packing	PTFE / 1.4305	•	•
11	Disc spring set	1.8159 Deltatone	•	•
12	Disc spring	1.4404	•	•
13	Disc spring jacket	PTFE	•	•
14	Sealing	PTFE	•	•
15	Screw	A4-70		
16	Screw	A4-70		
17	Screw plug	St.		
18	Screw plug	St.		
19	Screw	A4-70		
20	Trunnion	1.4571		
21	Screw	A4-70		
22	Ring	PTFE	•	•
23	Bearing bush	PTFE with glass	•	•
24	Bearing bush	PTFE with glass	•	•
25	Packing bush	1.4571		
26	Ring	PTFE	•	•
27	Bearing bush	PTFE with carbon	•	•
28	Ring	PTFE	•	•

## 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
- Pig loading 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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