

MOUNTING AND OPERATING INSTRUCTIONS



EB 29b

Translation of the original manual



Multi-way Diverting valve BR 29b • DIN and ANSI version
to combine with actuators
for installation in piggable pipes

November 2023 edition



Note regarding this installation and operating manual

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

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

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

Definition of signal words

 DANGER

Hazardous situations that lead to death or serious injuries

 WARNING

Situations that can lead to death or serious injuries

 NOTE

Property damage and malfunctions

 Info

Additional information

 Tip

Recommended action

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1 Safety instructions and safety measures

Intended use

The principle function of the BR 29b multi-way diverting valve, is to divert the medium in different directions in the piggable pipe system.

- The diverting 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 diverting 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 diverting valve in other applications or environments, they must contact PFEIFFER.
- Manual diverting valves are only intended for use, after installation in a piggable pipe system, to cut off the media, let it flow through or regulate it within the permitted pressure and temperature limits.

- Automated diverting valves are only intended for use, after installation in a piggable 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 diverting valves ► TB 29b.

- 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 diverting valves.

This manual only provides safety instructions that are to be observed additionally for diverting 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 diverting 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 diverting 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 diverting 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 ed-

ucation, knowledge and experience and knowledge of the relevant standards, are capable of evaluating the assigned tasks and identifying possible hazards.

Personal protective equipment

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

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

Prohibition of modifications

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

Protective devices

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

- The mounting arrangement and the switching functions of the actuator are variable.

The multi-way diverting valve are designed and equipped according to the special requirements of the operator. For information on the switching and safety positions, see "Control 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 diverting 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 diverting valve ensure that:

- The diverting valve is only used as intended as described in this chapter.
- An actuator unit that is subsequently installed on the diverting valve is adapted to the diverting valve and the max. torque is observed, and is correctly adjusted in the end positions, and in particular in the opening position of the diverting valve.
- The piggable pipe system and control system are properly installed and regularly checked. The wall thickness of the diverting 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 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:

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 diverting valves whose permissible pressure/temperature range (=“rating”) is sufficient for the operating conditions. (see data sheet ► TB 29b)

Risk of bursting of the pressure equipment!

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

⇒ Observe the maximum permissible pressure for the diverting valve and plant.

⇒ Before working on the diverting valve, depressurise the concerned plant parts and the diverting valve.

⇒ Before removing the diverting valve from the pipe, completely release the pressure in the pipe so that the medium does not escape uncontrolled from the line.

⇒ Bring the diverting valve into the open position so the pressure is released from the ball.

⇒ Empty the medium from the concerned plant parts and diverting 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 diverting 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 diverting 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 diverting valve, interrupt and lock pneumatic energy and the control signal.

⇒ Bleed the actuator.

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

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

Danger of injury due to venting the actuator!

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

- ⇒ Install the diverting 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..

Danger of injury due to preloaded springs!

Diverting 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 diverting valve!

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

- ⇒ In the case of media that is harmful to health or hazardous, the pipe must be completely emptied before a diverting 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 diverting valve.

- ⇒ The screw connections on the connection of the body parts may only be released or loosened after the diverting 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 Diverting valve use!

The incorrect use of the diverting 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 diverting 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.

! WARNING**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 diverting valve must be secured against unauthorised actuation.
- ⇒ If a diverting 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 diverting valve due to contamination!**

Contamination (e.g. solid particles) in the pipes can damage the diverting 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 diverting valve and plant.

Damage to the diverting valve due to unsuitable medium properties!

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

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

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

The diverting valve components must be tightened with specific torques. Deviating torques can lead to diverting 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"

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

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

- ⇒ Use a diverting 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.)

NOTE

Deviation of the breakaway and actuating forces due to non-actuation of the diverting 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 diverting 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 diverting valve due to plant vibrations!

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

Damage to the diverting valve due to unsuitable tools!

Unsuitable tools can damage the diverting valve.

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

Damage to the diverting valve due to unsuitable lubricants!

Unsuitable lubricants can corrode and damage the surface.

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

1.4 Warning notes on the device

Warning of moving parts

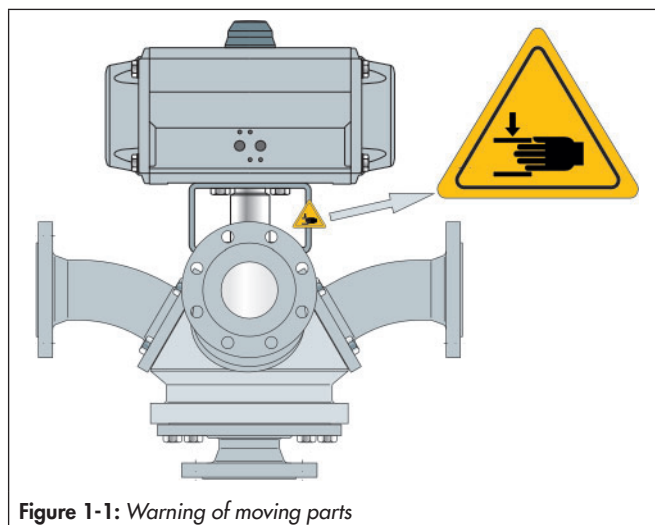


Figure 1-1: Warning of moving parts

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.

2.1 Type plate

2.1.1 Actuator type plate

See the corresponding actuator documentation.

2.2 Material identification

The diverting valves are marked on the body with the material specification, see Table 2-1.

Further details can be obtained from PFEIFFER.

3 Design and principle of operation

Characteristics

- Inside diameter of piping, according to DIN 2430
- Large flexion radius (4D)
- Complex mounted ball
- Spring loaded seat rings
- Control shaft, sealed with a V-ring packing, pre-loaded with disc springs
- 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 EN 1092-1 with sealing strip form B1 or according to customer-specific requirements.
- Connections for actuators, acc. to DIN ISO 5211

Versions

The valve is a multi-way ball valve, with a unique constructed ball, which enables the best possible pig cleaning.

The valve can be equipped with an actuator, and incremental controlled coupling for positioning. Even in different positions, the lower connector is still linked to each one of the connectors at the top.

The valve performs the following functions for the different types of designs:

- In 1-Pigging system:
 - As diverting
 - With integrated pig stopper as inlet- / outlet metering
- In 2-Pigging system:
 - As diverting

Optional material combination

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

Function and principle of operation

The principle function of the multi-way diverting valve BR 29b is to divert the medium in different directions in the piggable pipe system.

The ball (2) with its cylindrical passage slew around the middle axis. The opening angle of the ball determines the flow direction in the pig piping.

The ball (2) is sealed by exchangeable seat rings (7).

The control shaft (4) is sealed by a PTFE V-ring-packing (14) which is spring supported by disc springs (13) positioned above the packing.

The control shaft (4) is externally equipped with a lever, or a pneumatic actuator.

Control positions

The setup position, and the control functions of the actuator are carried out using an incremental controlled coupling for positioning in order to be able to move to all positions. Depending on the specific customer requirements, the multi-way diverting valve are constructed and equipped.

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

3.1 Variants

- Various types, examples see Fig. 3-1

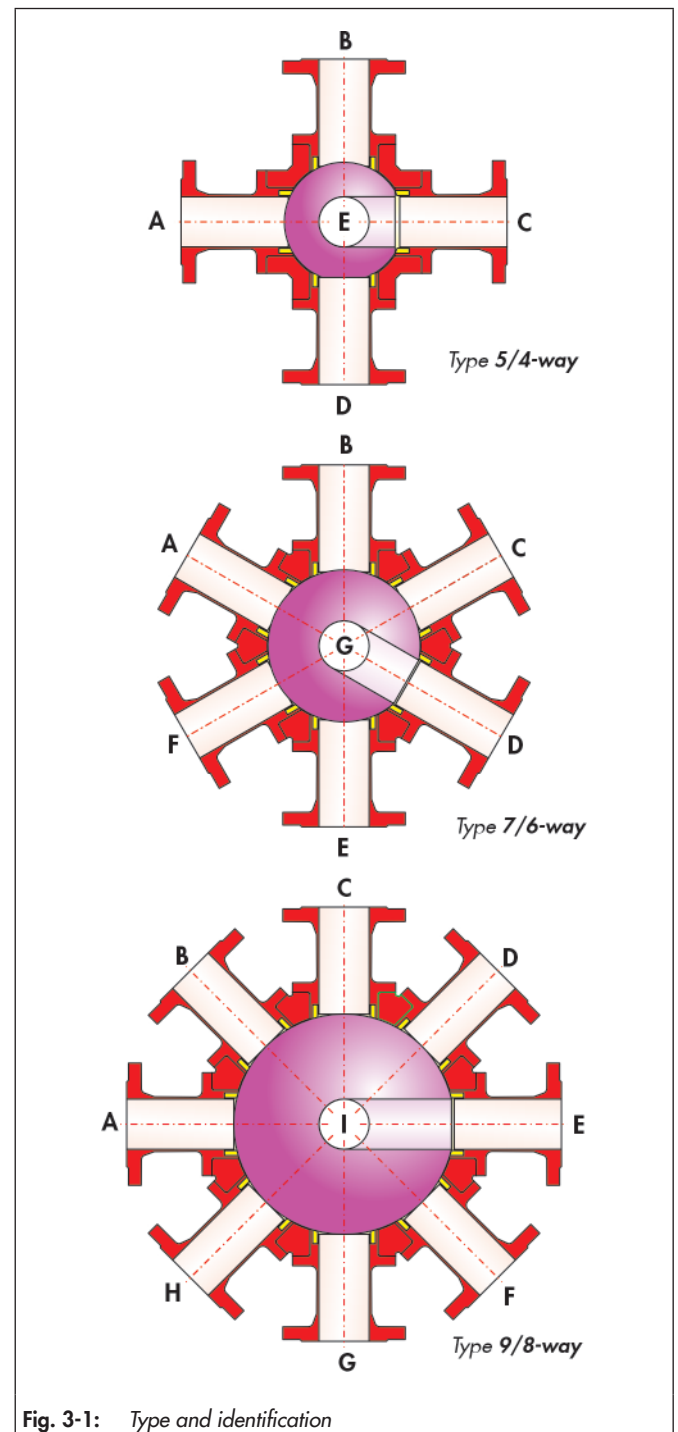


Fig. 3-1: Type and identification

Design and principle of operation

- Minimised cavity with PTFE-strips
- Different connecting designs
- With integrated pig stopper

3.2 Additional fittings

Insulation

The diverting 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 seal ring and the packing.

Grip protection

In the case of conditions of use that require a high level of safety (e.g. if the diverting 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 switching 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 diverting valve in the plant.

3.3 Attachments

The following accessories are available for the diverting valve, either separately or in combination:

- Hand-lever
- Shaft extension (100 mm standard)
- Pneumatic or electric actuator with incremental controlled coupling
- Limit switch
- Solenoid valves
- Air pressure supply regulator / filter

Further accessories are available acc. to customer specifications.

3.4 Technical data

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

i Info

- Detailed information is available in the data sheet ► TB 29b.
- The documentation for the special diverting valves BR 29b that are not described in this chapter can be requested from PFEIFFER.

3.5 Diverting valve assembly

3.5.1 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 diverting valves with use of oxygen.
- ⇒ A suitable lubricant must be selected for grease-free diverting valves, especially for use with oxygen.

i Info

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

3.5.2 Pre-assembly of the base flange

i Info

- Base flange (E) for 5/4-way diverting valve
- Base flange (G) for 7/6-way diverting valve
- Base flange (I) for 9/8-way diverting valve

- ⇒ Place the base flange (3) with the flange side on an even and clean work surface, so that the inside is easy to reach.
- ⇒ Press the bearing bush (8) into the base flange (3).
- ⇒ The O-ring of the body sealing (16) is placed in the respective position of the flange.

3.5.3 Pre-assembly of the side body

i Info

- Side Body (A, B, C and D) for 5/4-way diverting valve
- Base flange (A, B, C, D, E and F) for 7/6-way diverting valve
- Base flange (A, B, C, D, E, F, G and H) for 9/8-way diverting valve

- ⇒ Place the disc spring jacket (10) on the disc spring (9).

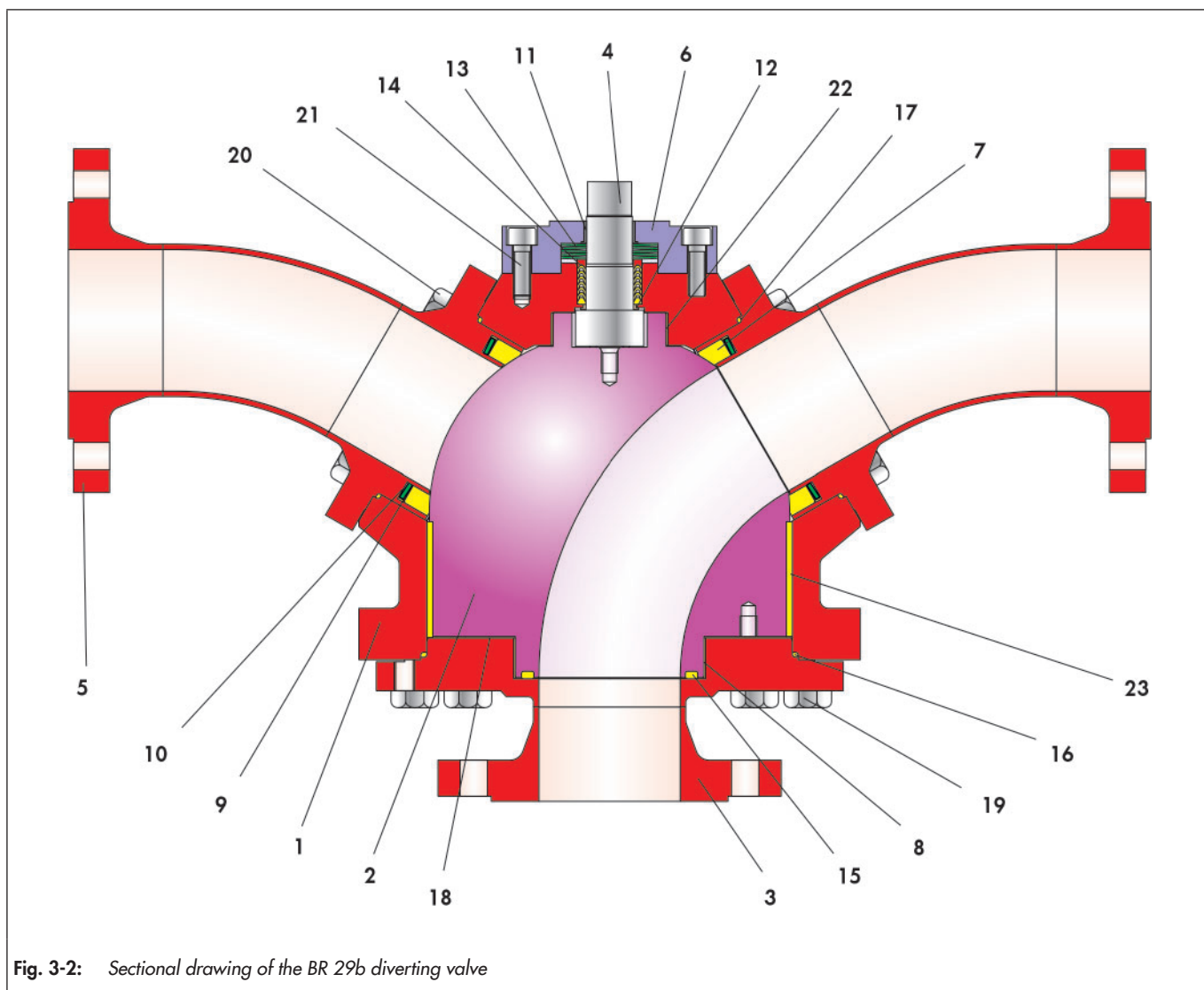


Table 3-2: Parts list

Item	Description
1	Main body
2	Ball
3	Base flange
4	Control shaft
5	Side body
6	Stuffing box flange
7	Seat ring
8	Bearing bush
9	Disc spring
10	Disc spring jacket
11	Bearing bush
12	Bearing bush

Item	Description
13	Disc spring set
14	V-ring packing
15	O-ring
16	O-ring
17	O-ring
18	Washer
19	Screw
20	Screw
21	Screw
22	Bearing bush
23	Cavity bush

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 (9) in the side body (5).
- ⇒ The seat ring (7) is pressed onto the disc spring (9).
- ⇒ Repeat this assembly for all side bodies (5).

3.5.4 Pre-assembly of the main body

- ⇒ Place the main body (1) on an even and clean work surface, so that the inside of the diverting valve is easily to reach.
- ⇒ Press the bearing bush (22) in the main body (1).
- ⇒ With a slight rotating movement, the bearing bush (12) is pressed onto the control shaft (4).
- ⇒ The control shaft (4) together with the bearing bushing (12) is then guided from the inside, through the control shaft opening in the main body (1).

! NOTE

Damage due to improper assembly!

- ⇒ *The sealing surface of the control shaft (4) must not be damaged.*
- ⇒ *Make sure that the bearing bushing (12) with the control shaft (4) does not slanted when positioning in the main body.*

- ⇒ Carefully place the ball (2) in the main body.

! NOTE

From DN 80 / NPS3 use a hoist when placing the ball into the body.

- ⇒ The ball (2) is rotated until the control shaft (4) engages. The ball can now glide cleanly into the main body.
- ⇒ Press the cavity bush (23) in the gap between main body (1) and ball (2).
- ⇒ Place the O-ring (15) in the intended groove of the ball (2).
- ⇒ Also place the washer (18) on the running surface of the ball.

3.5.5 Final assembly of the main body

- ⇒ Carefully place the base flange (3) pre-assembled in Chapter 3.5.2 onto the main body (1) pre-assembled in Chapter 3.5.4 without slanting.

! NOTE

The O-ring (16) of the body sealing must not be damaged.

- ⇒ After applying grease to the screws (19), tighten the flange with the main body (1) together, evenly and in alternating pattern.

i Info

- ⇒ *The permissible torque for tightening the base flange, see Table 15-3 in Chapter "15.1.1 Tightening torques".*

- ⇒ Now place the main body on the base flange (3).
- ⇒ The O-rings (17) are inserted in the respective Positions of the main body.
- ⇒ Attach the side bodies (5) pre-assembled in Chapter 3.5.3 to the main body (1) one after the other. Carefully insert the side bodies into the main body so that the seat rings laying correctly on the ball.

! NOTE

Damage due to improper assembly!

- ⇒ *The seat ring seats (7) and the O-rings (17) of the body sealing must not be damaged.*

- ⇒ Apply grease to the screws (20) and tighten the side bodies with the main body (1) together, evenly and in alternating pattern.

i Info

- ⇒ *The permissible torque for tightening the side bodies, see Table 15-1 in Chapter "15.1.1 Tightening torques".*

3.5.6 Final assembly of the diverting valve

- ⇒ With a light rotating movement, press the V-ring packing (14) 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 (Fig. 3-2).
- ⇒ Now the disc spring set (13) is placed on the V-ring packing. For the positioning of the disc springs, refer to (Fig. 3-2).
- ⇒ Press the bearing bush (11) into the stuffing box flange (6).
- ⇒ Following this, place the stuffing box flange (6) over the control shaft and mount onto the main body (1).
- ⇒ Adjust the stuffing box flange with the greased screws (21) and tighten evenly and alternately.

i Info

- ⇒ *The permissible torque for tightening the stuffing box flange, see 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.*

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 diverting valve due to improper transport and storage!

⇒ Diverting 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 diverting valve

Carry out the following steps:

- ⇒ Unpack the diverting valve directly before lifting for installation into the pipe.
- ⇒ Leave the diverting valve on the pallet or in the transport container for on-site transport.
- ⇒ The protective caps on the diverting valve inlet and outlet prevent foreign matter from entering the diverting 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 diverting 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 diverting valve including the actuator.
- ⇒ Take the weights from the respective data sheet.

! WARNING

Danger of injury due to the tipping of the diverting valve!

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

! NOTE

Damage to the diverting 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 diverting valve. These lifting eyes are not intended for lifting the complete diverting valve.

- ⇒ When lifting the diverting valve, make sure that the entire load is carried by the sling that is fastened to the diverting 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 diverting valve can be transported using lifting equipment such as a crane or a forklift.

- ⇒ Leave the diverting valve on the pallet or in the transport container for transport.
- ⇒ Diverting 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 diverting valve against external influences, such as impacts.
- ⇒ Do not damage the corrosion protection (paint, surface coating). Repair damage immediately.
- ⇒ Protect the diverting valve against moisture and dirt.

4.3.2 Lifting

When installing the diverting valve in the pipe, larger diverting 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.

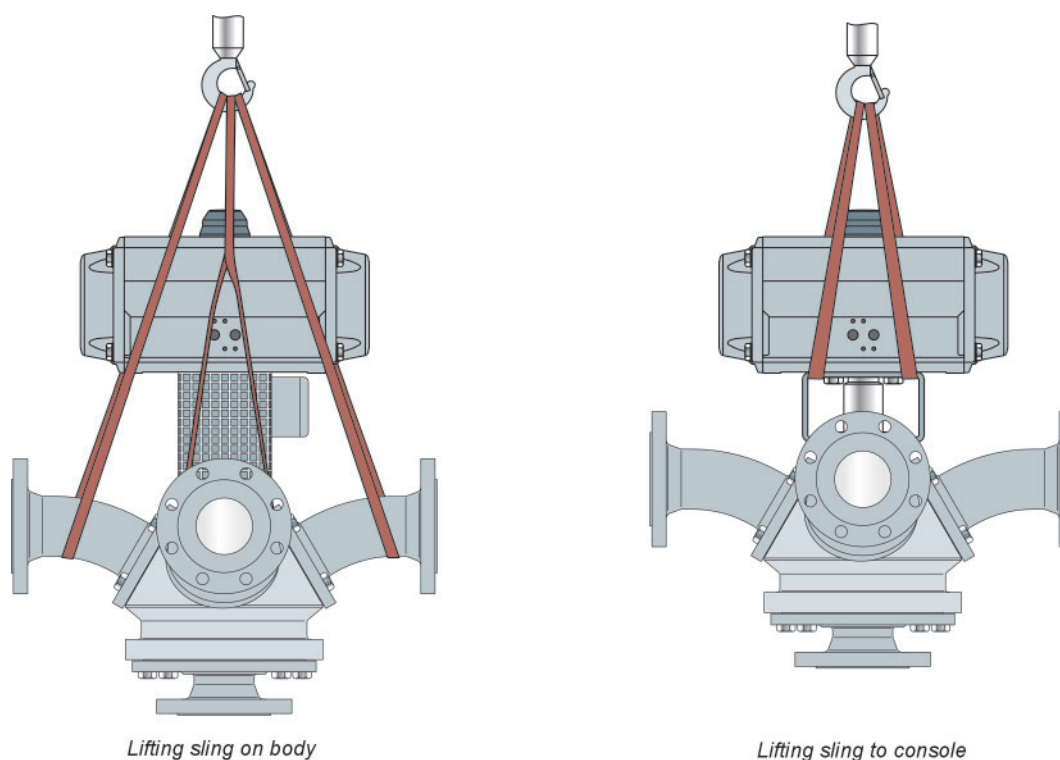


Fig. 4-1: Lifting points on the diverting valve

- ⇒ 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 diverting 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 diverting valve aligned in the same direction in which it will be installed in the pipe.
- ⇒ Always lift the diverting 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 diverting valve, pretension this sling so it is taut.

⚠ WARNING

Danger due to incorrect lifting and transport!

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

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

4.3.3 Lifting points on the body

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

4.3.4 Lifting points on the bracket

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

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

4.4 Storing the diverting valve

NOTE

Damage to the diverting 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 diverting valve and the storage conditions regularly during a longer storage period.

- ⇒ In the case of storage prior to installation, the diverting valve should normally be stored in a closed room where it is protected against harmful influences such as impacts, dirt or moisture. A room temperature of $25\text{ °C} \pm 15\text{ °C}$ is recommended.
- ⇒ In particular, the actuator and the ends of the diverting valve to the pipe connection may not be damaged by mechanical or any other influences.
- ⇒ Do not stack the diverting valves.
- ⇒ Prevent condensation in damp rooms. Use a desiccant or heater.
- ⇒ The diverting valve must be stored in its protective packaging and/or with the protective caps on the connection ends.
- ⇒ Diverting valves that weigh more than approx. 10 kg should be stored on a pallet (or supported similarly).
- ⇒ Diverting 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 diverting 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 diverting valves. Observe chapter "4.3 Transporting and lifting the diverting valve" for transport to the installation site.

5.1 Installation conditions

Operator level

The operator level for the diverting valve is the front view on all operating elements of the diverting 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 diverting valves in the pipe.

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

Installation position

The diverting valve can be installed in any installation position. PFEIFFER recommends however to install the diverting valve in general so that the actuator points up in a vertical position.

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

- Nominal sizes from DN 100 / NPS4
 - Diverting 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 diverting 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

Diverting 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 diverting valve is clean.
- The diverting 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 diverting valve.

5.3 Assembling the diverting valve and actuator

PFEIFFER diverting valves are supplied in working order. In individual cases, the actuator and diverting 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 diverting 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 diverting 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 Faults".
- ⇒ For further instructions, see the electrical actuator manual.

⚠ WARNING

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 diverting valve.

Danger and damage due to heavy actuator units!

Actuators that are heavier than the weight of the diverting 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 diverting valve due to their size and/or installation situation.

! NOTE

Damage to the diverting 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 actuator is adapted to the switching positions of the diverting valve and may not be changed without the consent of PFEIFFER.

Switching functions of the actuator

The different switching positions from the vertical connection to the respective horizontal connections are achieved with a incremental controlled coupling.

A definition of the respective initial and switching positions is therefore not necessary.

5.4 Installing the diverting 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 diverting valve and actuator for transport damage. Damaged diverting valves or actuators may not be installed.
- ⇒ A functional test is to be carried out at the beginning of installation for manually-operated diverting valves: the diverting valve must close and open correctly. Detected malfunctions must be fixed before commissioning. See also chapter 8 "Faults".
- ⇒ Handle the diverting valve with care and observe the instructions for the flange connection.
- ⇒ Make sure that only diverting 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 diverting 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 diverting 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 diverting valve, see Chapter "2 Markings on the device".
- ⇒ The permissible range is defined in Chapter "1 Safety instructions and safety measures".

- ⇒ The mating flanges must have smooth facings. Contact PFEIFFER if you intend to use other flange forms.
- ⇒ The connection ends of the pipe must align with the diverting valve connections and have plane-parallel ends.
- ⇒ Prior to installation, the diverting 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.
- ⇒ When pushing the diverting 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 diverting valve and seals remain undamaged.

i Info

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

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

5.4.2 Switch position

⇒ Before installing the diverting valve, check its function.

5/4-way diverting valve

Depending on the function, diverting valves are supplied with the appropriate ball. The scheme for the 5/4-way diverting valve, see Fig. 5-1.

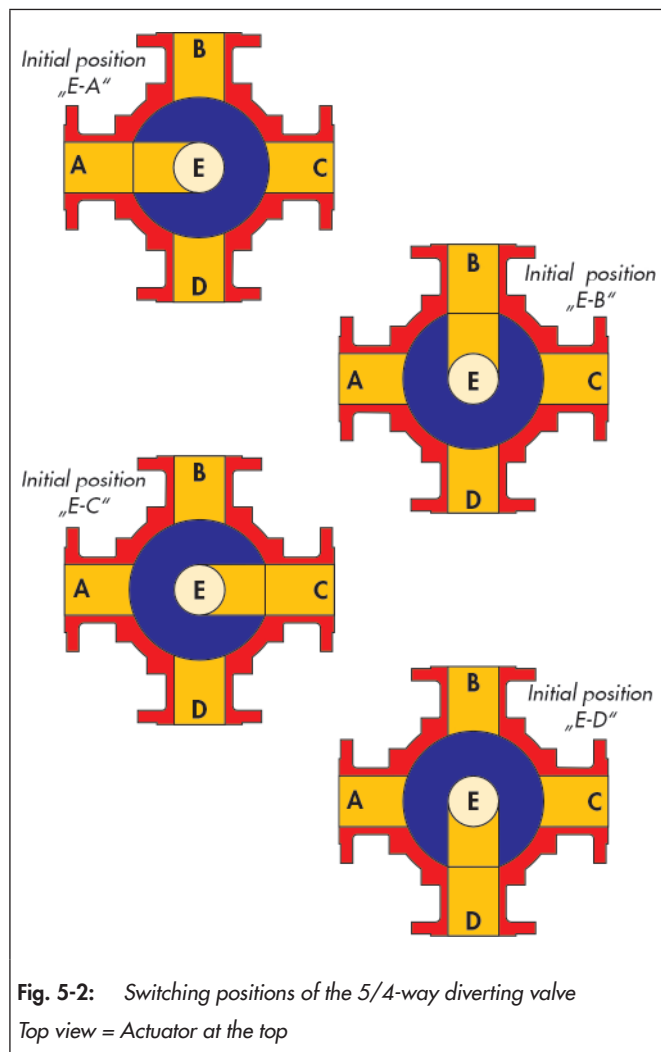


Fig. 5-2: Switching positions of the 5/4-way diverting valve
Top view = Actuator at the top

i Info

The supplied diverting valve must be suitable for the pipe section.

The diverting valve ports designated A, B, C, D etc. must be connected as shown in Fig. 5-1, Fig. 5-2 and Fig. 5-3 in accordance with the intended switching positions in the pipeline. Prior to installation, check the valve's function.

7/6-way diverting valve

The schematic for the 7/6-way diverting valve, see Fig. 5-2. An example of the possible switching positions is shown here.

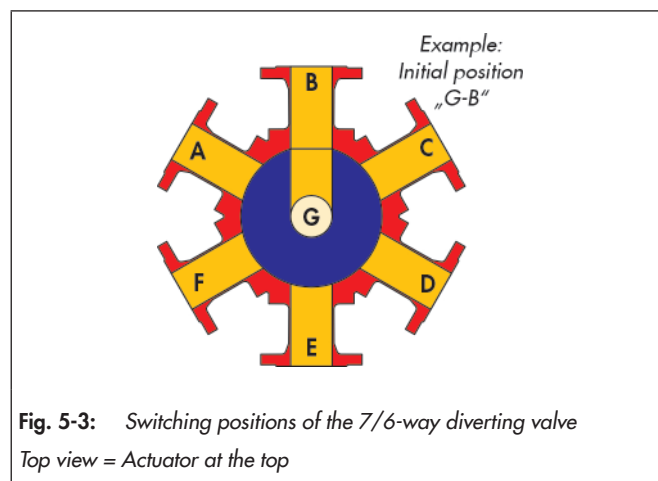


Fig. 5-3: Switching positions of the 7/6-way diverting valve
Top view = Actuator at the top

9/8-way diverting valve

The schematic for the 9/8-way diverting valve, see Fig. 5-3. An example of the possible switching positions is shown here.

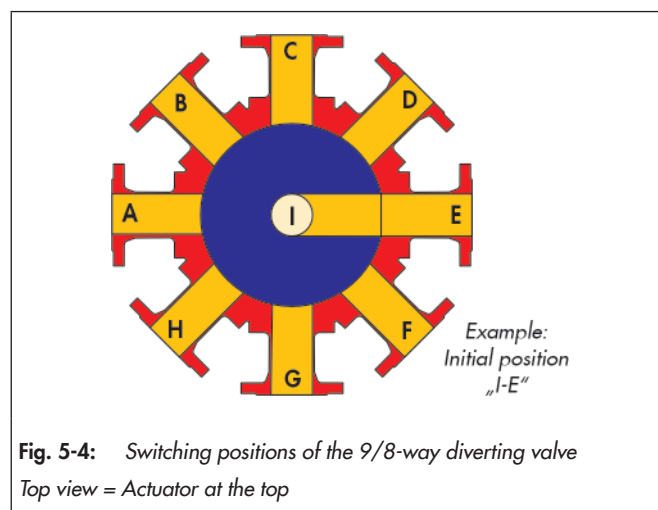


Fig. 5-4: Switching positions of the 9/8-way diverting valve
Top view = Actuator at the top

More multi-way diverting valves

Diverting valves with additional switching positions are available on request.

5.4.3 Fail-safe position

The fail-safe position for all variants is "HOLD". This means that if the supply air fails, the actuator remains in its position.

5.4.4 Installing the diverting valve

- ⇒ Close the diverting valve in the pipe for the duration of the installation.
- ⇒ Remove the protective caps on the diverting valve openings prior to installation.

- ⇒ Lift the diverting valve with suitable lifting equipment at the installation site, see chapter "4.3 Transporting and lifting the diverting valve".
- ⇒ Use correct flange seals.
- ⇒ Clean the sealing surfaces on the diverting valve and pipe if necessary.
- ⇒ Screw the pipe together with the diverting valve without tension.

! NOTE

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

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

- ⇒ After installing the diverting valve, open it slowly in the pipe.

! NOTE

Damage to the diverting valve due to a sudden pressure increase and resulting high flow speed!

Open the diverting valve slowly in the pipe during commissioning.

- ⇒ Check the correct function of the diverting valve.

5.5 Checking the assembled diverting 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 diverting valve is pressurised.

Danger of crushing due to moving actuator- and switching shaft!

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the diverting 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 switching shaft.
- ⇒ If the actuator- and switching 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.

! WARNING

Danger of injury due to escaping exhaust air!

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

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

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

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

! WARNING

Danger due to improperly executed control commands!

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

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

5.5.2 Pressure test of the pipe section

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

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

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

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 diverting 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 diverting valve.

⇒ Check the display on the position indicator.

5.5.4 Fail-safe position

⇒ Close the signal pressure line.

⇒ The position of the diverting valve remains in its position.

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!

Diverting 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 diverting 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 diverting 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 diverting valve, exhaust air can escape, for example from the actuator.

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

Commissioning/recommissioning

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

Ensure the following conditions prior to commissioning/recommissioning:

- The diverting 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 diverting valve, see Intended use in Chapter "1 Safety instructions and safety measures".

7 Operation

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

! WARNING

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

Diverting 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 diverting 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 diverting 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 diverting 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 diverting valve with the corresponding tightening torques, see Table 15-4 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 to Table 15-3 in Chapter "15.1.1 Tightening torque".
- The diverting valve/actuator unit must be actuated with the control signals.
- Diverting 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 diverting 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.

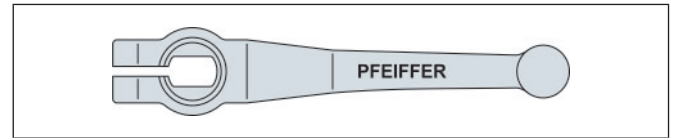


Figure 7-1: Hand lever

! DANGER

Danger of injury due to jerky operation of the diverting valve!

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

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

- If a diverting valve leaks, observe chapter "8 Faults".

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

Malfunction

Type of fault	Possible cause	Measures
Problems in the actuator unit	The pneumatic actuator must be removed	Disconnect the connection to the control pressure. Remove the actuator from the diverting 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 diverting valve marking. Only original parts from PFEIFFER Chemie-Armaturenbau GmbH may be installed.
- If it is determined after removal that the diverting 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 diverting 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 diverting valve fault:

- Close the shut-off valves upstream and downstream of the diverting valve so that no medium flows through the diverting 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 diverting 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!

Diverting 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 diverting 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 diverting 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 diverting 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 diverting valve!

When working on the diverting 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 diverting valve is pressurised.
- ⇒ Bring the diverting valve into the open position so the pressure is released from the ball.

! NOTE

Damage to the diverting valve due to excessively high or low tightening torques!

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

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

Damage to the diverting valve due to unsuitable tools!

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

Damage to the diverting valve due to unsuitable lubricants!

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

i Info

The diverting valve was checked by PFEIFFER prior to delivery.

- Certain test results certified by PFEIFFER are no longer valid when disassembling the diverting 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.

9.1 Periodic tests

- ⇒ Depending on the conditions of use, the diverting 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. WARNING! Danger of injury due to pressurised components and escaping medium! Do not loosen the screw of the test connection while the diverting valve is pressurised.	Decommission the diverting 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. WARNING! 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 diverting valve by briefly interrupting the power supply.	Decommission the diverting valve, see chapter "Decommissioning". Then determine the cause and remedy it, see Chapter "8 Malfunctions".
Check pipe connections and seals of the diverting valve and actuator for leaks.	Regular maintenance work on the diverting 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 diverting valve must be prepared before all maintenance work, see Chapter 12 "Repairs".
- ⇒ After all maintenance work, the diverting valve must be checked prior to recommissioning, see Chapter "5.5 Checking the mounted diverting valve".

9.2.1 Replacing the seat rings and ball

- ⇒ Check the condition of the ball and seat rings.
- ⇒ Remove the seat rings (7) as described in Chapter "12.2 Replacing the seat rings and ball". Check the seat rings as well as all plastic parts for damage and if in doubt replace them.
- ⇒ Also remove the ball (2). 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!

Diverting 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 diverting 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 diverting 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 diverting 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 diverting 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 diverting valve is pressurised.*
- ⇒ *Bring the diverting valve into the open position so the pressure is released from the ball.*

To decommission the diverting valve for maintenance and repair work or for disassembly, perform the following steps:

- ⇒ Close the valves upstream and downstream of the diverting valve so that no medium flows through the diverting valve.
- ⇒ Empty the pipe and diverting valve completely.
- ⇒ Shut off the pneumatic power and lock it, to depressurise the actuator.
- ⇒ Let the pipe and diverting 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!

Diverting 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 diverting 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 diverting valve!

When working on the diverting 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 diverting valve is pressurised.*
- ⇒ *Bring the diverting valve into the open position so the pressure is released from the ball.*

Danger of injury due to preloaded springs!

Actuators with preloaded actuator springs are pressurised.

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

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

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

11.1 Removing the diverting valve from the pipe

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

11.2 Disassembling the actuator

See the corresponding actuator documentation.

12 Repairs

If the operation of the diverting 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 diverting 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 diverting 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), the PTFE rings of the V-ring packing (14) could be defective.

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

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

- ⇒ Place the diverting valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (21) and remove the stuffing box flange (6) carefully.
- ⇒ Remove the disc springs from the set of spring washers (13).
- ⇒ Remove the V-ring packing (14).
- ⇒ Check the PTFE rings of the V-ring packing as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.
- ⇒ Assemble the diverting valve as described in Chapter "3.5 Diverting valve assembly".

12.2 Replacing the seat rings and the ball

If there is a leak in the passage, the seat rings (7) and the ball (2) can be defective.

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

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

- ⇒ Place the diverting valve on an even and clean work surface so that the packing space is easy to reach.

- ⇒ Loosen the screws (20) and remove all side bodies (5).
- ⇒ Remove seat rings (7) and disc spring (9) with disc spring jacket (10).
- ⇒ Place the diverting valve on an even and clean work surface so that the base flange is easy to reach.
- ⇒ Loosen the screws (19).
- ⇒ Loosen the base flange (3) and carefully remove it.
- ⇒ Remove the ball (2).
- ⇒ Check the seat rings (7), the disc spring jacket (10), cavity sleeve (23), the ball (2) and all plastic and graphite parts for damage and replace if in doubt.
- ⇒ Assemble the diverting valve as described in Chapter "3.5 Diverting valve assembly".

12.3 Additional repairs

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

12.4 Sending devices to PFEIFFER

Defective diverting valves can be sent to PFEIFFER for repair.

Proceed as follows to send devices:

WARNING

Danger due to a contaminated 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.

- ⇒ Include the following information for returns:

- Manufacturer number
- Ball valve type
- Article number
- Nominal size and version of the control valve
- Manual valve/automated valve
- Medium (designation and consistency)
- Medium pressure and temperature
- Flow rate in m³/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.

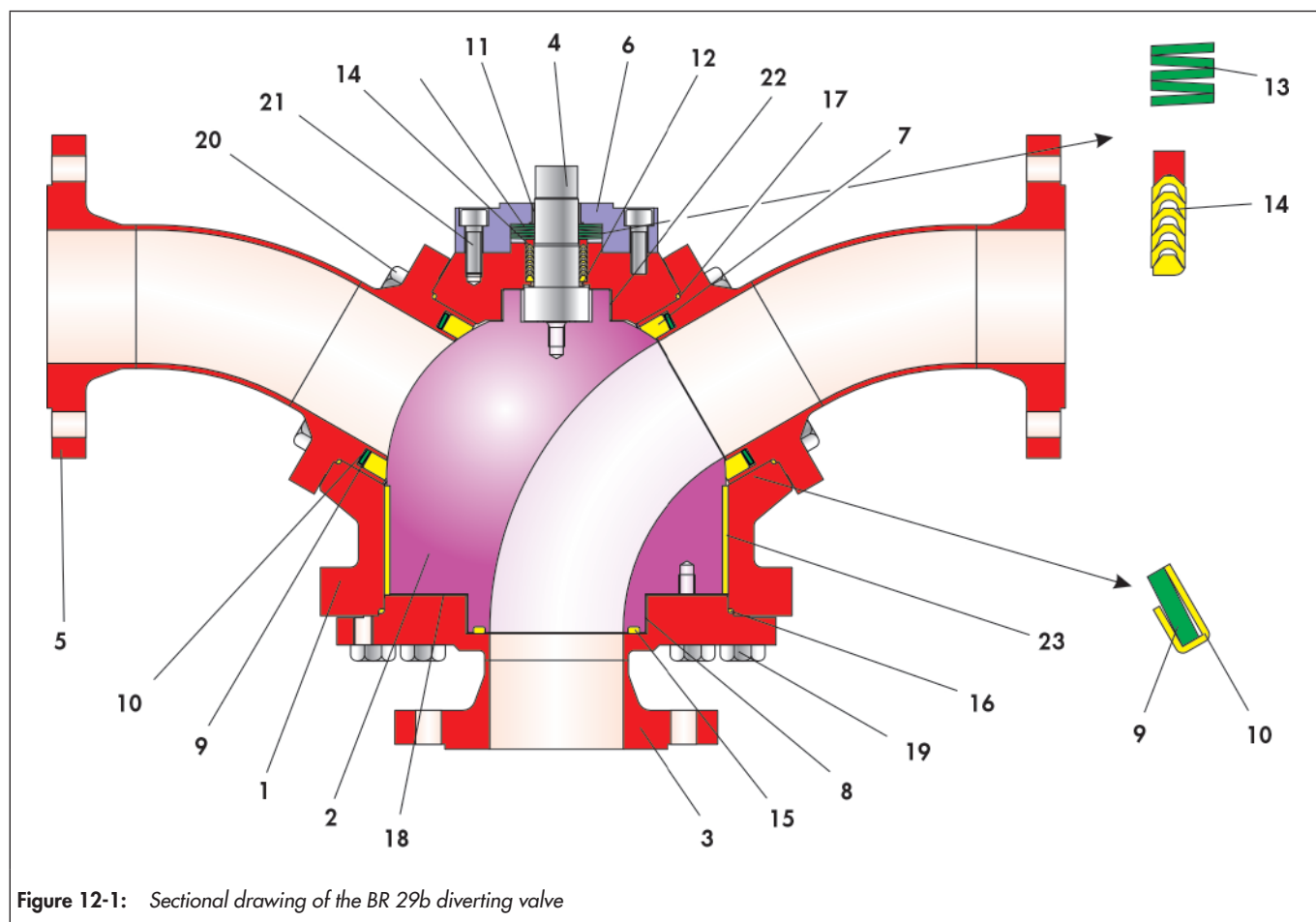


Figure 12-1: Sectional drawing of the BR 29b diverting valve

Table 12-1: Parts list

Item	Description
1	Main body
2	Ball
3	Base flange
4	Control shaft
5	Side body
6	Stuffing box flange
7	Seat ring
8	Bearing bush
9	Disc spring
10	Disc spring jacket
11	Bearing bush
12	Bearing bush

Item	Description
13	Disc spring set
14	V-ring packing
15	O-ring
16	O-ring
17	O-ring
18	Washer
19	Screw
20	Screw
21	Screw
22	Bearing bush
23	Cavity bush

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 diverting valve BR 29b, see page 14-4.
- Declaration of conformity for partly completed machinery according to Machinery Directive 2006/42/EC for diverting valve BR 29b, 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	PFEIFFER Chemie-Armaturenbau GmbH , D47906 Kempen, Germany
declares that:	Type 29b Multi-way diverting valve (BR 29b), with packing <ul style="list-style-type: none"> • with pneumatic/electric/hydraulic actuator • with free shaft end for subsequent mounting of an actuator
<p>1. The valves are pressure accessories within the meaning of the Pressure Equipment Directive 2014/68/EU and conform with the requirements of this Directive.</p> <p>2. They may only be operated observing the Mounting and operating instructions ► EB 29b.</p> <p>The commissioning of these valves is only permitted after the valve has been installed from all sides in the pipeline and a risk of injury can be ruled out.</p> <p><i>(See ► EB 29b, Chapter 1 for Multi-way diverting valves intended for dead-end service)</i></p>	

Applied standards

AD 2000 Regulations	Regulations for pressurized valve body parts
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Type designation and technical features:

<p>PFEIFFER data sheet ► TB 29b</p> <p><i>NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalog.</i></p>
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Applied conformity assessment procedure:

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

Name of notified body:

Identification number of the notified body:

<p>TÜV Anlagentechnik GmbH Am Grauen Stein 51101 Köln Germany</p>	0035
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These Declarations become invalid when modifications are made to the Multi-way diverting valves and/or assemblies that affect the technical data of the diverting valve or the <Intended use> described in ► EB 29b, 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

DECLARATION OF CONFORMITY

As per Pressure Equipment Directive 2014/68/EU
TRANSLATION



e

The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH , D47906 Kempen, Germany
declares that:	Type 29b Multi-way diverting valve (BR 29b), with packing <ul style="list-style-type: none"> • with lever for 90°/45°/60° operation • with worm gear and handwheel
<p>1. The valves are pressure accessories within the meaning of the Pressure Equipment Directive 2014/68/EU and conform with the requirements of this Directive.</p> <p>2. They may only be operated observing the Mounting and operating instructions ► EB 29b. (See ► EB 29b, Chapter 1 for Multi-way diverting valves intended for dead-end service)</p>	

Applied standards

AD 2000 Regulations	Regulations for pressurized valve body parts
----------------------------	--

Type designation and technical features:

PFEIFFER data sheet ► TB 29b NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalog.
--

Applied conformity assessment procedure:

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


Name of notified body:

Identification number of the notified body:

TÜV Anlagentechnik GmbH Am Grauen Stein 51101 Köln Germany	0035
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These Declarations become invalid when modifications are made to the Multi-way diverting valves and/or assemblies that affect the technical data of the diverting valve or the <Intended use> described in ► EB 29b, section 1 of the Mounting and operating instructions and considerably change the valve or an assembly delivered with it.

Kempen, 25. September 2023



 Stefan Czayka
 Head of Quality Management/IMS Representative

EU DECLARATION OF CONFORMITY TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH , 47906 Kempen, Germany
declares for the listed products that:	<p>Type 29b Multi-way diverting valve (BR 29b)</p> <ul style="list-style-type: none"> • with a Type 31a Quarter-turn Actuator (BR 31a) • with a rotary actuator of a different make <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 Multi-way diverting valve has been installed from all sides in the pipeline and a risk of injury can be ruled out as a result.</p>	

Referenced standards:

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

Product description and technical features:

Stainless steel - valve consisting of a main body, with screwed-on side bodies, automated with a single or double-acting piston actuator for butterfly valves, ball valves and other valves with rotating throttle bodies.

For product descriptions refer to:
 PFEIFFER data sheet for Type 29b Diverting valve ▶ TB 29b
 PFEIFFER data sheet for Type 31a Actuator ▶ TB 31a
 PFEIFFER mounting and operating instructions for Type 29b Diverting valve ▶ EB 29b
 PFEIFFER mounting and operating instructions for Type 31a Actuator ▶ EB 31a

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

This declaration becomes invalid when modifications are made to the Multi-way diverting valves and/or assemblies that affect the technical data of the diverting valve or the intended use (▶ EB 29b, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 23 April 2023



 Stefan Czayka
 Head of Quality Management/IMS Representative

DECLARATION OF CONFORMITY

TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH , 47906 Kempen, Germany
declares for the listed products that:	Type 29b Multi-way diverting valve (BR 29b) <ul style="list-style-type: none"> • with free shaft end
<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. 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 Multi-way diverting valve has been installed from all sides in the pipeline and a risk of injury can be ruled out as a result.</p>	

Referenced standards:

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

Product description and technical features:

Stainless steel - valve consisting of a main body, with screwed-on side bodies.

For product descriptions refer to:

PFEIFFER data sheet for Type 29b Diverting valve ▶ TB 29b

PFEIFFER mounting and operating instructions for Type 29b Diverting valve ▶ EB 29b

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 Multi-way diverting valves and/or assemblies that affect the technical data of the diverting valve or the intended use (▶ EB 29b, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 23 April 2023


 Stefan Czayka
 Head of Quality Management/IMS Representative

15 Annex

15.1 Tightening torques, lubricant and tools

15.1.1 Tightening torques

i Info

¹⁾ 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 μ . Lubricating the threads leads to indeterminate tightening conditions.

15.1.1.1 Side bodies

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

Table 15-1: Body section tightening torques

Nominal size		Qty.	Thread (20)	Tightening torque ¹⁾
DN	NPS			
50	2	4	M12	74 Nm
80	3	4	M16	183 Nm
100	4	4	M20	370 Nm
125	5	On request		
150	6			
200	8			

15.1.1.2 Stuffing box flange

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

Table 15-2: Stuffing box flange tightening torques

Nominal size		Qty.	Thread (21)	Tightening torque ^{1) 2)}
DN	NPS			
50	2	4	M8	21.5 Nm
80	3	4	M10	44 Nm
100	4	4	M20	370 Nm
125	5	On request		
150	6			
200	8			

¹⁾ Tighten the stuffing box flange screws until the bushing lies on the dome.

15.1.1.3 Base flange

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

Table 15-3: Base flange tightening torques

Nominal size		Qty.	Thread (19)	Tightening torque ¹⁾
DN	NPS			
50	2	8	M16	74 Nm
80	3	12	M16	183 Nm
100	4	12	M20	370 Nm
125	5	On request		
150	6			
200	8			

15.1.1.4 Flange connection

i Info

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

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

Table 15-4: Flange connection torque

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

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

⁴⁾ Recommended lever length 300 mm.

⁵⁾ Recommended lever length 550 mm.

⁶⁾ I) With manually-operated spanner with a suitable extension if necessary.

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

Table 15-5: 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 15-6: 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		– O-rings of various materials
Spiral gasket with graphite		-

15.1.2 Lubricant

Table 15-7: Recommended lubricant

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

15.1.3 Tools

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

15.2 Spare parts

15.2.1 Spare parts of the multi-way diverting valve

Table 15-8: Recommend spare parts for the multi-way diverting valve

Item	Description	Material	Spare parts set	
			Commissioning	2-year operation
1	Main body	1.4571 • 1.4408		
2	Ball	1.4571 • 1.4408		•
3	Base flange	1.4571		
4	Control shaft	1.4462		•
5	Side body	1.4571 • 1.4408		
6	Stuffing box flange	1.4571		
7	Seat ring	PTFE	•	•
8	Bearing bush	PTFE • PTFE with VA	•	•
9	Disc spring	1.4310 • 1.4401	•	•
10	Disc spring jacket	PTFE	•	•
11	Bearing bush	PTFE with carbon	•	•
12	Bearing bush	PTFE with glass	•	•
13	Disc spring set	1.8159 Deltatone	•	•
14	V-ring packing	PTFE / 1.4305	•	•
15	O-ring	PTFE	•	•
16	O-ring	PTFE	•	•
17	O-ring	PTFE	•	•
18	Washer	TFM	•	•
19	Screw	A4-70		
20	Screw	A4-70		
21	Screw	A4-70		
22	Bearing bush	PTFE • PTFE with VA	•	•
23	Cavity bush	PTFE	•	•

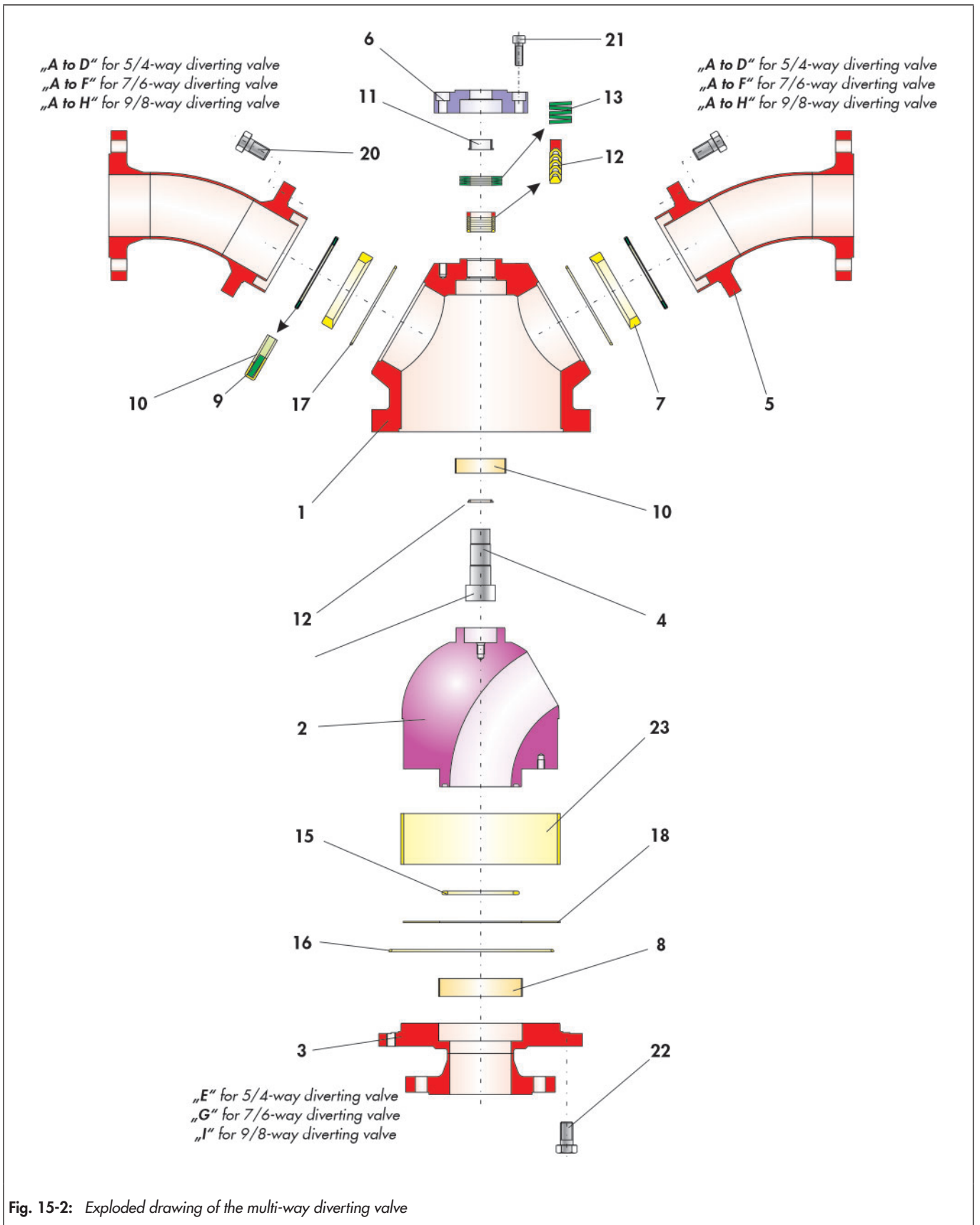


Fig. 15-2: Exploded drawing of the multi-way diverting valve

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
- Diverting valve type
- Article number
- Nominal size and version of the diverting valve
- Manual valve/automated valve
- Medium (designation and consistency)
- Medium pressure and temperature
- Flow rate in m³/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.

Further information

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

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