

MOUNTING AND OPERATING INSTRUCTIONS



EB 14b

Translation of the original manual



Control and shut-off valve BR 14b and BR 14c
to combine with actuators

January 2022 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 butterfly 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 PFEIFFER butterfly valve BR 14b is manually operated in combination with an actuator for the regulation of the volume flow, pressure and temperature of fluid, gaseous or vaporous media.

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

Therefore the operator must make sure that the butterfly 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 butterfly valve in other applications or environments, they must contact PFEIFFER.

- Manual butterfly valves are only intended for use, after installation in a pipe system, to cut off the media, let it flow through or regulate it within the permitted pressure and temperature limits.
- Automated butterfly valves are only intended for use, after installation in a pipe system and after connecting the drive to the control, to cut off the media, let it flow through or regulate it within the permitted pressure and temperature limits.
- The data sheet contains the permissible pressure and temperature range for these butterfly valves ► TB 14b.
- 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 butterfly valves.

This manual only provides safety instructions that are to be observed additionally for butterfly 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 butterfly 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 butterfly 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 butterfly valve may only be disassembled, dismantled, assembled and commissioned by qualified specialist personnel trained in pressurised pipes who are familiar with the assembly, commissioning and operation of this product.

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

Personal protective equipment

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

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

Prohibition of modifications

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

Protective devices

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

- The fail-safe position corresponds to the effective direction and is indicated on the type plate of the rotary 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 butterfly 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 butterfly valve ensure that:

- The butterfly valve is only used as intended as described in this chapter.
- An actuator unit that is subsequently installed on the butterfly valve is adapted to the butterfly valve and the max. torque is observed, and is correctly adjusted in the end positions, and in particular in the closed position of the valve.
- The pipe system and control system are properly installed and regularly checked. The wall thickness of the butterfly valve body is measured such that an additional load of the usual magnitude is taken into account for a pipe system installed properly in this way.
- The valve is connected properly to these systems.
- The customary flow rates in continuous operation are not exceeded in this pipe system. It is recommended to contact Pfeiffer 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.
- Coordinate operating parameters near the cavitation limits and/or with noise emission clearly above 85 dB with PFEIFFER.

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 butterfly 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 butterfly 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 butterfly 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 butterfly valves!

Butterfly 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 butterfly valves with a permissible pressure/temperature range (=“rating”) sufficient for the operating conditions, see the data sheet ► TB 14b

Risk of bursting of the pressure equipment!

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

- ⇒ Observe the maximum permissible pressure the butterfly valve and plant.
- ⇒ Before working on the butterfly valve, depressurise the concerned plant parts and the butterfly valve.
- ⇒ Before removing the butterfly valve from the pipe or loosening the screw connection on the bonnet, completely release the pressure in the pipe so that the medium does not escape uncontrolled from the line.
- ⇒ Empty the medium from the concerned plant parts and butterfly valve. (Wear protective equipment).

Danger due to incorrect loosening of an optional adjustable stuffing box!

The valve shaft is sealed by a stuffing box.

- ⇒ Before the nuts on the compression spacer are loosened or released, fully release the pressure in the pipe so no medium escapes from the stuffing box.

1.2 Notes regarding possible personnel injury

WARNING

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

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

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

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

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

Danger of crushing due to moving parts!

The butterfly valve contains moving parts (actuator stem and switching shaft) that can lead to crushing if reaching into it.

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

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

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

Danger of injury due to venting the actuator!

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

- ⇒ Install the butterfly valve such that the actuator does not ventilate at eye level.
- ⇒ Use suitable silencers and plugs.
- ⇒ Wear eye protection when working near the valve.

Danger of injury due to preloaded springs!

Butterfly 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 butterfly valve!

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

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

- ⇒ The screw connections on the connection of the body parts may only be released or loosened after the butterfly valve has been removed.
- ⇒ During reassembly, retighten the screws according to Chapter "15.1.1.1 Adjustable stuffing box" with a torque wrench.

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

The incorrect use of the butterfly 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 butterfly valve that come into contact with the media must be suitable for the utilised media, pressures and temperatures.

Dangers due to use of the butterfly valve as an end fitting!

During normal operation, in particular with gaseous, hot and/or hazardous media, spraying medium can cause hazards.

- ⇒ A blind flange must be assembled on the free connecting pieces or the butterfly valve must be secured against unauthorised actuation.
- ⇒ If a butterfly valve is 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.

Danger due to incorrect installation in case of use as an end fitting!

The seal is no longer guaranteed if the installation location is incorrect.

- ⇒ Assemble the butterfly valve such that the fastening ring fastened on the valve body with cylinder screws or a tension spring is pressed against the pipe flange.

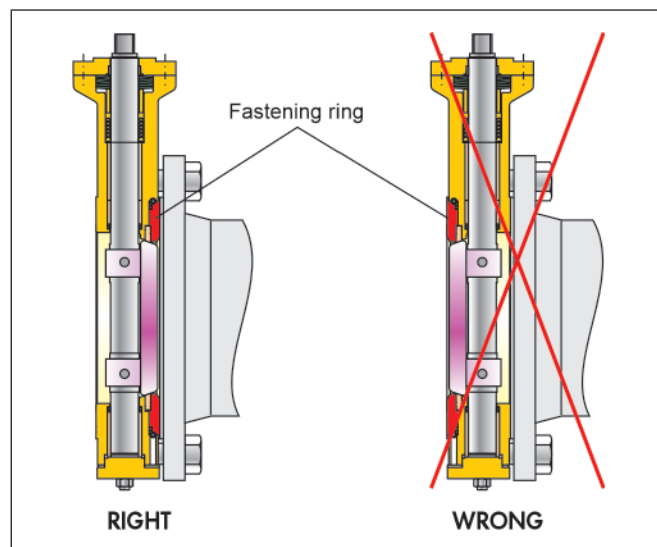


Figure 1-1: Installation location as an end fitting

1.3 Notes regarding possible property damage

NOTE

Damage to the butterfly valve due to unsuitable medium properties!

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

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

NOTE

Damage to the butterfly valve due to contamination!

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

⇒ The plant operator is responsible for cleaning the pipes in the plant.

⇒ Rinse the pipes prior to commissioning.

⇒ Observe the maximum permissible pressure the butterfly valve and plant.

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

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

⇒ Excessively tightened components are subject to increased wear.

⇒ Insufficiently tightened components can cause leakage.

⇒ Comply with tightening torques, see Chapter "15.1.1.1 Adjustable stuffing box".

Specific aspects in case of use for control purposes!

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

Deviation of the breakaway and actuating forces due to non-actuation of the butterfly 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 butterfly 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.

NOTE

Damage to the seal ring or the sealing strip

Turning the valve disc over 0° leads to irreparable damage to the seal ring or the sealing strip.

⇒ Only operate the valve disc within the range of 0°-90°

Damage to the butterfly valve due to unsuitable tools!

Unsuitable tools can damage the butterfly valve.

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

Damage to the butterfly valve due to unsuitable lubricants!

Unsuitable lubricants can corrode and damage the surface.

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

1.4 Warning notes on the device

Warning of moving parts

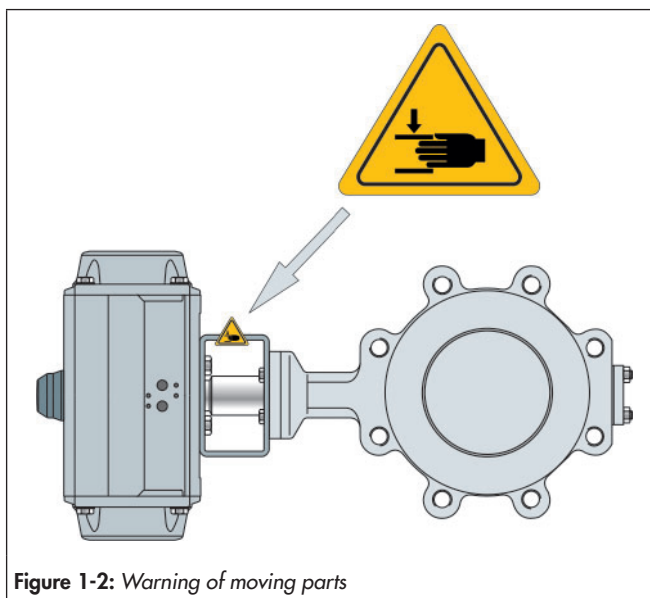


Figure 1-2: Warning of moving parts

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.

2 Markings on the device

Each butterfly valve usually has the following marking.

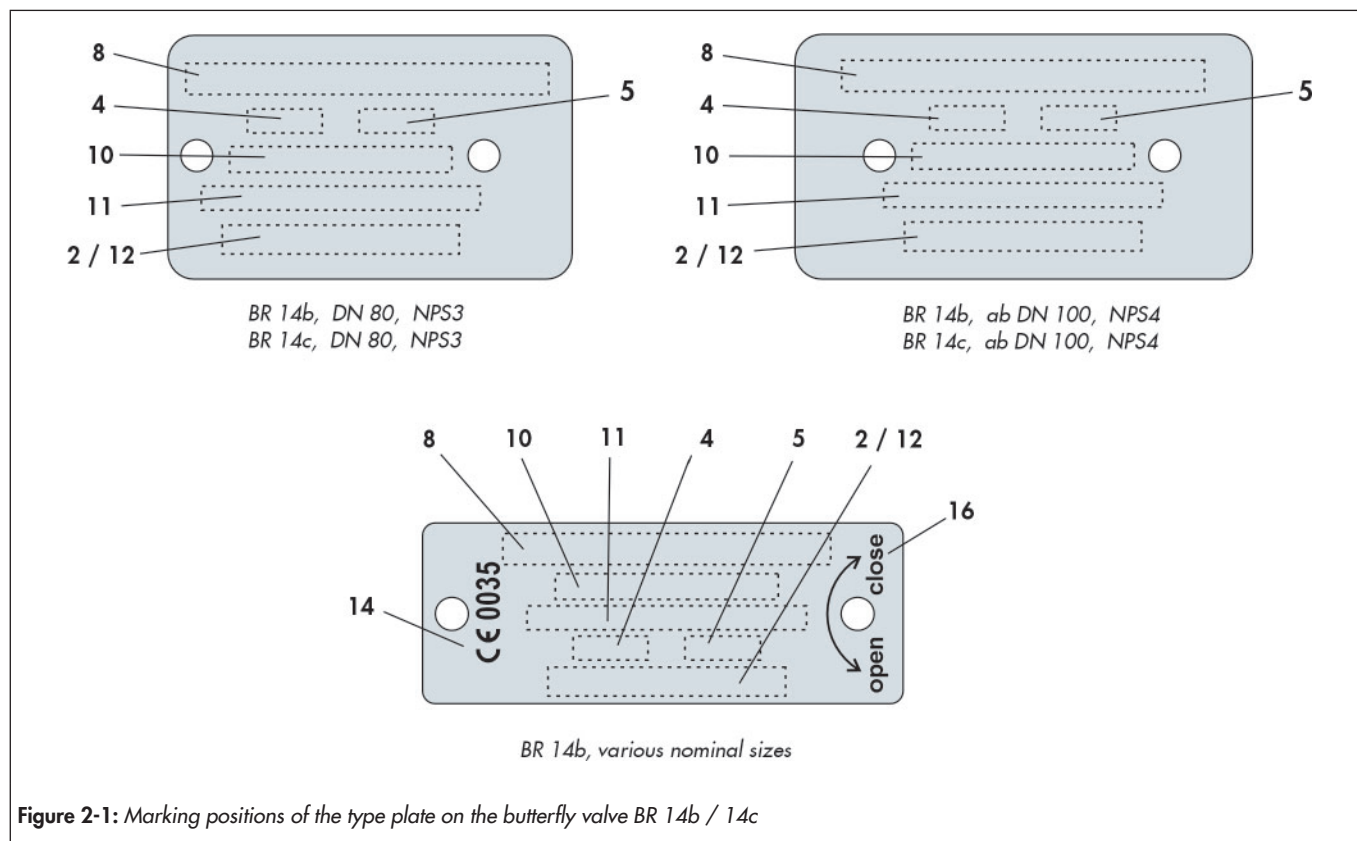
Table 2-1: Marking on the type plate and on the body of the butterfly valve

Pos.	For	Marking	Remark
1	Manufacturer	PFEIFFER	Address see Chapter "15.2 Service"
2	Valve type	BR (and number value)	e.g. BR 14b = Series 14b, see the PFEIFFER catalogue
3	Body material	e.g. 1.4408	No. of the material standard according to DIN EN 10213-4
4	Size	DN (and number value)	Number value in [mm], e.g. DN200 / number value in [inches], e.g. NPS8
5	Maximum pressure	PN (and number value)	Number value in [bar] at room temperature
6	Max. permissible operating temperature	TS (and number value)	PS and TS are related values here at the max. permissible operating temperature with the max. permissible operating overpressure, see the Pressure-Temperature Diagram on the data sheet ► TB 14b
	Max. permissible operating pressure	PS (and number value)	
7	Test pressure	PT (and number value)	The test pressure must be observed depending on the device
8	Manufacturer number from 2018	e.g. 381234/001/001	38 1234 /001 /001 Valve no. within the item Item in the order Order Year of manufacture (38=2018, 39=2019, 30=2020, 31=2021 etc.)
	Manufacturer number 2009 to 2017	e.g. 211234/001/001	21 1234 /001 /001 Valve no. within the item Item in the order Order Year of manufacture (29=2009, 20=2010, 21=2011, 22=2012 etc.)
	Manufacturer number until 2008	e.g. 2071234/001/001	207 1234 /001 /001 Valve no. within the item Item in the order Order Year of manufacture (205=2005, 206=2006, 207=2007 etc.)
9	Year of manufacture	e.g. 2018	Upon customer request, the year of manufacture can also be indicated on the valve
10	Seat material	e.g. PTFE/glass	Material marking
11	Shaft material	e.g. 1.4542/H1150	No. of the material standard according to DIN EN 10088-3
12	Test point number	e.g. TEST POINT F123201-1	Test point numbers are specified by the customer
13	DataMatrix code		
14	Conformity	CE	Conformity is certified separately by Pfeiffer
	Code No.	0035	"Notified body" according to EU Directive = TÜV Rheinland Service GmbH
15	Flow direction	➔	Attention: see the note in Chapter "5.4 Installing the butterfly valve in the pipe"
16	Direction of rotation		Reference to the direction of rotation

Info

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

2.1 Butterfly valve type plate

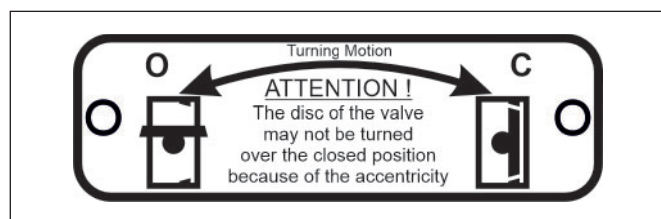


2.2 Actuator type plate

See the corresponding actuator documentation.

2.3 Turning direction notice sign

The turning direction is indicated on the butterfly valve by a sign.



3 Design and principle of operation

Version

The 14b / 14c series butterfly valves have the following properties:

- **BR 14b** is a cast butterfly valve.
- **BR 14c (BR 74b)** is a butterfly valve made of solid material.
- **Butterfly valve body** made of steel or non-corroding steel
- **Body version** as a screw-in butterfly valve (lug type) or clamping butterfly valve (wafer type).
- **Valve seals**
 - Type WTD, soft seal with spring washer preloaded V-ring packing.
 - Type MTD, metal seal with spring washer preloaded V-ring packing.
 - Type WNS, soft seal with adjustable stuffing box.

Function and principle of operation

The BR 14b butterfly valves can be flowed through in both directions.

The position of the valve disc (3) determines the flow with the area released opposite of the seal ring (4). Butterfly valves are sealed between the valve disc (3) and the seal ring (4).

The shaft (2) is sealed towards the outside by a packing (9). This packing is maintenance-free PTFE V-ring packing, which is preloaded by spring washers (10) located above the packing space.

Optionally, this packing can be PTFE meshwork packing, which is preloaded by an adjustable stuffing box, or spring washer preloaded graphite packing.

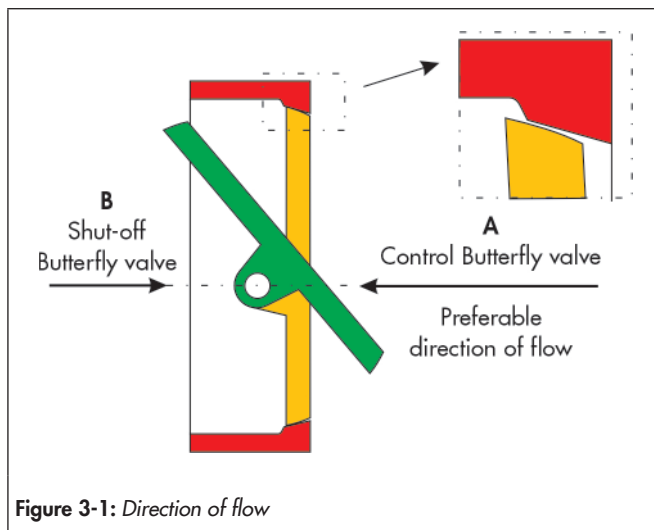


Figure 3-1: Direction of flow

The direction of flow and the differential pressure determine the breakaway torque for opening the butterfly valve.

The double-eccentric bearing design of the shaft causes the valve disc to remain in contact with the seat during opening and closing only over a very small angle of rotation (see Figure 3-1). This reduces wear and increases the service life of the valve. It also reduces the breakaway torque.

When the medium flows through the butterfly valve in **direction A** (see Figure 3-1), the valve disc is pressed slightly out of its seat. This reduces the pre-load force as well as the breakaway torque.

When the medium flows in **direction B**, the pre-load force increases as the breakaway torque rises.

Fail-safe position

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

- **Butterfly valve with fail-close actuator [FC]:**
Upon air failure, the butterfly valve is closed. The butterfly valve opens when the signal pressure increases, acting against the force of the springs.
- **Butterfly valve with fail-open actuator [FO]:**
Upon air failure, the butterfly valve is opened. The butterfly valve closes when the signal pressure increases, acting against the force of the springs.

Changing the fail-safe position

The fail-safe position of the actuator can be reversed if required, for this purpose see the installation and operating instructions for the respective pneumatic actuator.

Operating elements and functions

The BR 14b butterfly valve can be selected in the following versions:

- With lever and ratchet
- With manual gear
- With diaphragm rotary actuator BR 30a
- With PFEIFFER rotary actuator BR 31a
- With rotary actuators from other manufacturers (for details see the respective data sheet).

3.1 Variants

- Double stuffing box
- Primary sealing with o-ring
- Flange with groove according to DIN EN 1092 (rows 16 and 25 only)
- Special material
- High-temperature version (> 350°C)
- Low-temperature version (-196°C)

3.2 Additional fittings

Strainer

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

Bypass and shut-off valve

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

Insulation

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

Test connection

In the version with a double stuffing box, a test connection (e.g. G $\frac{1}{4}$ "") can be used on the upper flange to check the tightness of the butterfly valve towards the atmosphere.

Grip protection

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

3.3 Attachments

The following accessories are available either individually or in combinations:

- Locking device
- Switching shaft extension (100 mm standard)
- Pneumatic or electric rotary actuator
- Positioner (with the control valve option)
- Limit switch
- Solenoid valves
- Filter - reducing station
- Jacket heater

Other additional equipment is possible according to specifications on request.

3.4 Technical data

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

Info

Detailed information is available in the data sheet ► TB 14b.

3.5 Butterfly valve assembly

The BR 14b / 14c butterfly valves have design differences in the various versions so that they cannot be documented in one construction manual.

- Chapter 3.5.1 describes the assembly of the butterfly valve BR 14b - type WTD and MTD.
- Chapter 3.5.2 describes the assembly of the butterfly valve BR 14b - type WNS.
- Chapter 3.5.2 describes the assembly of the butterfly valve BR 14c - type WTD and MTD.

Preparation of the assembly

To assemble the butterfly 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 butterfly valves with use of oxygen.
 - ⇒ A suitable lubricant must be selected for grease-free butterfly valves, especially for use with oxygen.
-

Info

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

3.5.1 Assembly of butterfly valve BR 14b with spring washer preloaded V-ring packing (type WTD and MTD)

3.5.1.1 Preassembly of the butterfly valves

- ⇒ Place the valve body (1) on a clean surface at working height so that the bearing area of the shaft is easy to reach.
- ⇒ Push the bearing bushing (12a) as far as it will go into the bearing bore in the valve body.

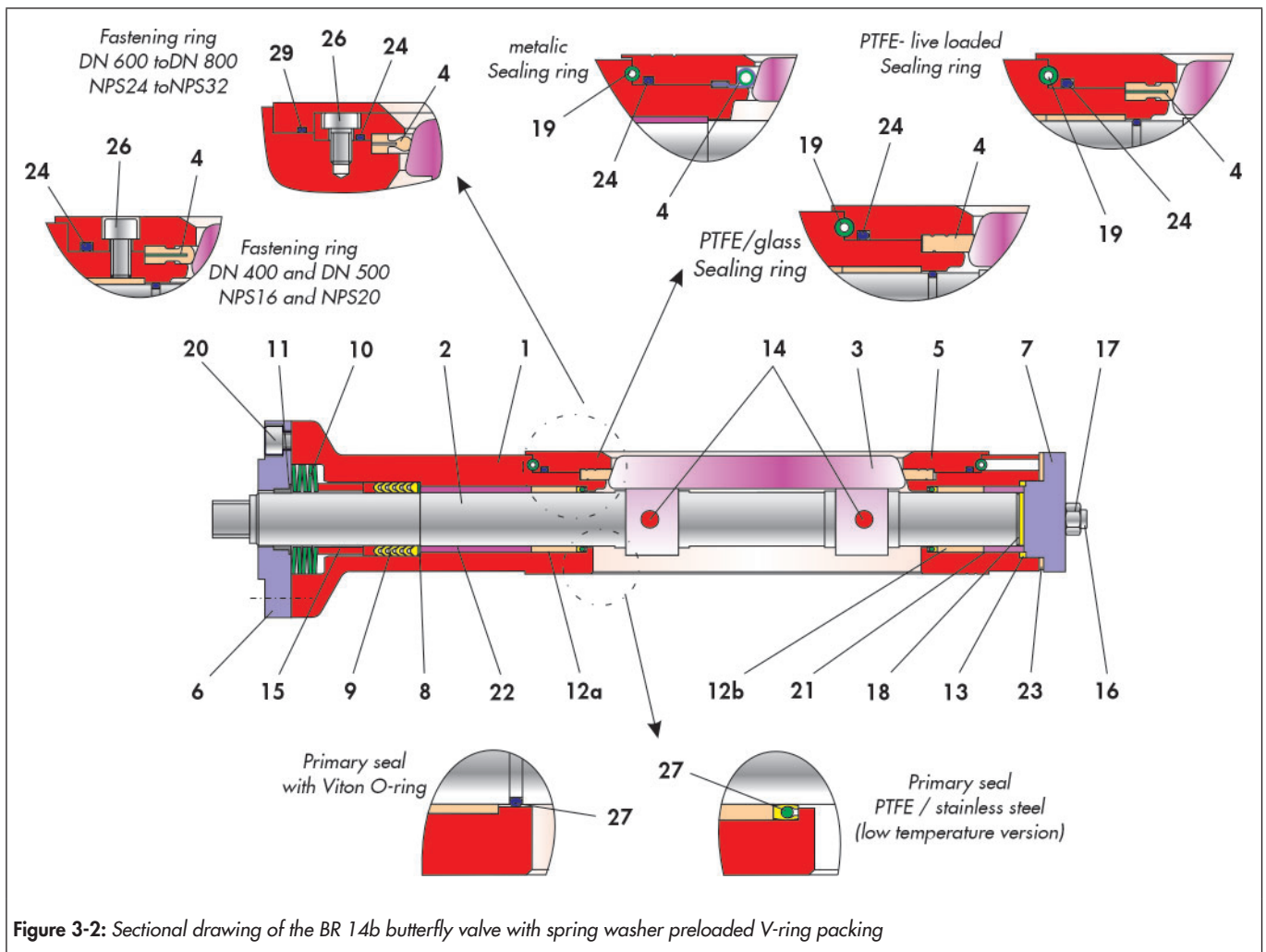


Figure 3-2: Sectional drawing of the BR 14b butterfly valve with spring washer preloaded V-ring packing

Table 3-1: Parts list for the BR 14b butterfly valve with spring washer preloaded V-ring packing

Pos.	Designation	Pos.	Designation	Pos.	Designation
1	Valve body	9	V-ring packing	18	Mating washer
2	Shaft	10	Set of spring washers	19	Tension spring
3	Valve disc	11	Bearing bush	20	Screw
4	Seat ring	12	Bearing bush	21	Spacer
	Metal seat ring	13	Body sealing	22	Spacer
5	Fastening ring	14	Grooved pin	23	Bonnet sealing
6	Stuffing box	15	Spacer	24	O-ring
7	Bonnet	16	Stud bolt	26	Screw
8	Thrust washer	17	Nut	27	Primary sealing

⇒ Insert the spacer (22) into the bearing bore.

i Info

Fit butterfly valves with a nominal size of DN 300 or NPS12 without a spacer (22).

- ⇒ Insert the valve disc (3) into the body such that the bearing bores in the disc align with the bearing bore in the body.
- ⇒ Insert the switching shaft (2) through the bearing bores of the body and the disc.

- ⇒ Push the bearing bushing (12b) over the switching shaft as far as it will go into the bearing bore in the body.
- ⇒ Afterwards the spacer (21) is inserted.

i Info

Fit butterfly valves with a nominal size of DN 100 or NPS4 without a spacer (21).

- ⇒ Screw the stud bolts (16) into the body.
- ⇒ Insert the mating washer (18) into the provided recess in the bonnet (7).

- ⇒ Push also the bonnet sealing (23) onto the bonnet in the same way as the body sealing (13).

i Info

Fit butterfly valves with a nominal size of DN 300 or NPS12 without body sealing (23).

- ⇒ Insert the preassembled bonnet (7) into the bearing bore in the body (1) and adjust with the stud bolts (16).
- ⇒ Tighten the bonnet (7) with the nuts (17) evenly and in a criss-cross pattern.
- ⇒ Push the thrust washer (8) over the free shaft end into position in the valve body.
- ⇒ Push the PTFE V-ring packing (9) over the switching shaft into the body bore and press in with an assembly sleeve. Refer to the sectional drawing Figure 3-2 for the arrangement of the V-ring packing.
- ⇒ Push the thrust piece (15) over the switching valve and press it into position in the body.
- ⇒ Insert the set of spring washers (10). Refer to the sectional drawing Figure 3-2 for the arrangement of the spring washers.
- ⇒ Press the bearing bushing (11) into the stuffing box (6).
- ⇒ Fit the preassembled stuffing box (6) smoothly over the body flange and adjust with screws (20).
- ⇒ Tighten the screws (20) evenly in a criss-cross pattern.
- ⇒ Adjust the dihedral of the switching shaft parallel to the valve disc (3) and secure it against further twisting.

i Info

Press the switching shaft up against the mating washer (18).

- ⇒ Drill dowel holes for connecting the switching shaft (2) and the valve disc (3).
- ⇒ Pin the disc and shaft with close-tolerance grooved pins (14).

3.5.1.2 Assembling butterfly valves up to DN 300 (NPS12)

- ⇒ Insert the PTFE seal ring (4) or the metal seat ring including the corresponding graphite rings (4) into the body.

i Info

It is essential to pay attention to cleanliness during assembly.

- ⇒ Insert the o-ring (24) into the fastening ring (5).
- ⇒ Place the preassembled fastening ring (5) on the seal ring (4) and press it in with a hydraulic press.
- ⇒ Loosen the bonnet (7).
- ⇒ Push the tension spring (19) into the slot.
- ⇒ Fasten the bonnet (7) as previously described.

3.5.1.3 Assembling butterfly valves from DN 400 (NPS16)

- ⇒ Insert the PTFE seal ring (4) or the metal seat ring including the corresponding graphite rings (4) into the body.

i Info

It is essential to pay attention to cleanliness during assembly.

- ⇒ Place the fastening ring (5) on the seal ring (4) and adjust with the screws (26).
- ⇒ Tighten the screws evenly in a criss-cross pattern.

3.5.2 Assembly of butterfly valve BR 14b with adjustable stuffing box (type WNS)

3.5.2.1 Preassembly of the butterfly valves

- ⇒ Place the valve body (1) on a clean surface at working height so that the bearing area of the shaft is easy to reach.
- ⇒ Push the bearing bushing (12a) as far as it will go into the bearing bore in the valve body.
- ⇒ Insert the spacer (22) into the bearing bore.

i Info

Fit butterfly valves with a nominal size of DN 300 or NPS12 without a spacer (22).

- ⇒ Insert the valve disc (3) into the body such that the bearing bores in the disc align with the bearing bore in the body.
- ⇒ Insert the switching shaft (2) through the bearing bores of the body and the disc.
- ⇒ Push the bearing bushing (12b) over the switching shaft as far as it will go into the bearing bore in the body.
- ⇒ Insert the spacer (21).

i Info

Fit butterfly valves with a nominal size of DN 100 or NPS4 without a spacer (21).

- ⇒ Screw the stud bolts (16) into the body.
- ⇒ Insert the mating washer (18) into the provided recess in the bonnet (7).
- ⇒ Push also the bonnet sealing (23) onto the bonnet in the same way as the body sealing (13).

i Info

Fit butterfly valves with a nominal size of DN 300 or NPS12 without body sealing (23).

- ⇒ Insert the preassembled bonnet (7) into the bearing bore in the body (1) and adjust with the stud bolts (16).
- ⇒ Tighten the bonnet (7) with the nuts (17) evenly and in a criss-cross pattern.
- ⇒ Push the thrust washer (8) over the free shaft end into position in the valve body.
- ⇒ Push the PTFE meshwork packing (9) ring by ring over the shaft into the body bore and press in with an assembly sleeve.
- ⇒ Press the bearing bushing (11) into the compression spacer (6).
- ⇒ Fit the preassembled compression spacer (6) smoothly over the shaft and adjust with screws (20) and washers (28).
- ⇒ Tighten the screws (20) evenly in a criss-cross pattern.

i Info

The required torques for tightening the adjustable compression spacers can be found in Table 15-1. Torque wrenches must be used to ensure that the torque is reached.

- ⇒ Adjust the dihedron of the switching shaft parallel to the valve disc and secure it against further twisting.

i Info

Press the switching shaft up against the mating washer (18).

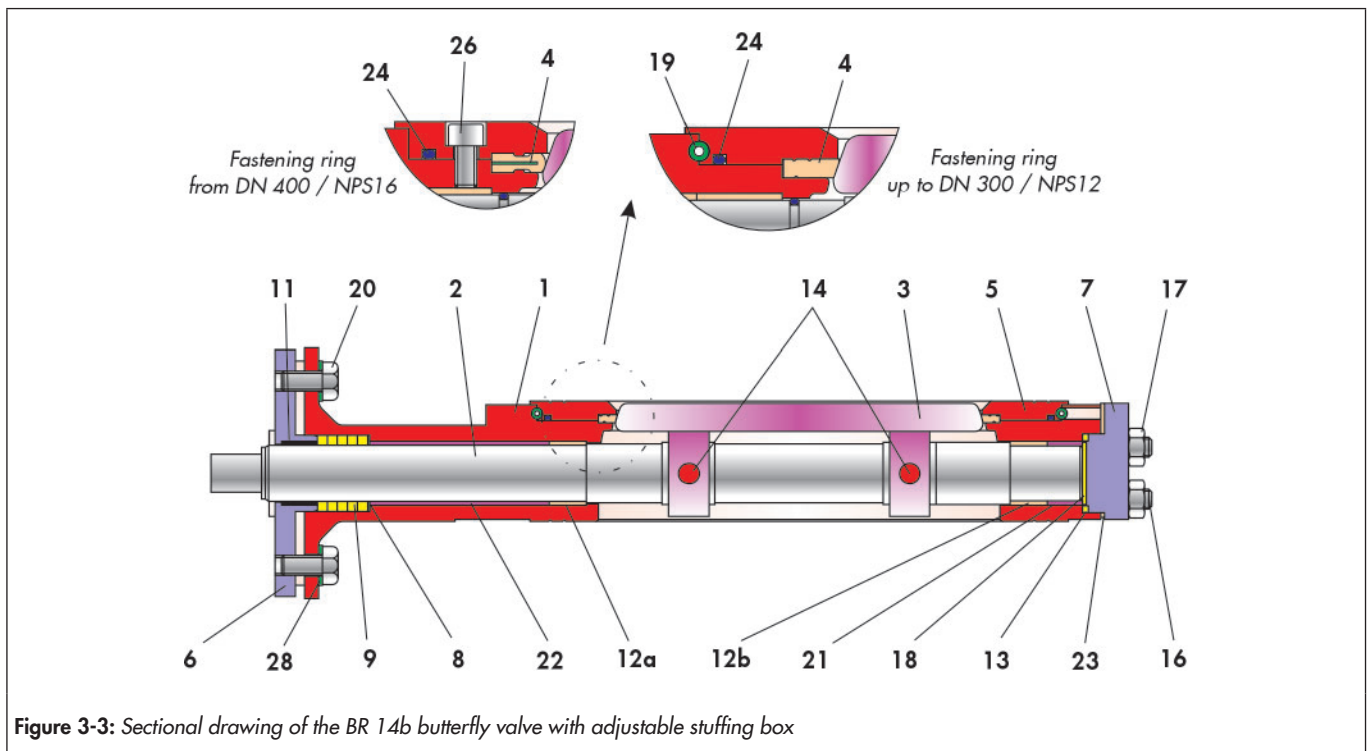


Figure 3-3: Sectional drawing of the BR 14b butterfly valve with adjustable stuffing box

Table 3-2: Parts list for the BR 14b butterfly valve with adjustable stuffing box

Pos.	Designation
1	Valve body
2	Shaft
3	Valve disc
4	Seal ring
5	Fastening ring
6	Adjustable stuffing box
7	Bonnet
8	Thrust washer

Pos.	Designation
9	Packing
11	Bearing bush
12	Bearing bush
13	Body sealing
14	Grooved pin
16	Stud bolt
17	Nut
18	Mating washer

Pos.	Designation
19	Tension spring
20	Screw
21	Spacer
22	Spacer
23	Bonnet sealing
24	O-ring
26	Screw
28	Washer

3.5.2.2 Assembling butterfly valves up to DN 300 (NPS10)

- ⇒ Insert the seal ring (4) into the body.

i Info

It is essential to pay attention to cleanliness during assembly.

- ⇒ Insert the o-ring (24) into the fastening ring (5).
- ⇒ Place the preassembled fastening ring (5) on the seal ring (4) and press it in with a press.
- ⇒ Loosen the bonnet (7).
- ⇒ Push the tension spring (19) into the slot.
- ⇒ Fasten the bonnet as previously described.

3.5.2.3 Assembling butterfly valves from DN 400 (NPS16)

- ⇒ Insert the seal ring (4) into the body.

i Info

It is essential to pay attention to cleanliness during assembly.

- ⇒ Place the fastening ring (5) on the seal ring (4) and adjust with the screws (26).
- ⇒ Tighten the screws evenly in a criss-cross pattern.

3.5.3 Assembly of butterfly valves BR 14c (BR 74b) with spring washer preloaded V-ring packing (type WTD and MTD)

3.5.3.1 Preassembly of the butterfly valves

- ⇒ Place the valve body (1) on a clean surface at working height so that the bearing area of the shaft is easy to reach.
- ⇒ Push the bearing bushing (12a) as far as it will go into the bearing bore in the valve body.
- ⇒ Insert the spacer (22) into the bearing bore.

i Info

Fit butterfly valves with a nominal size of DN 300 or NPS12 without a spacer (22).

- ⇒ Insert the valve disc (3) into the body such that the bearing bores in the disc align with the bearing bore in the body.
- ⇒ Insert the switching shaft (2) through the bearing bores of the body and the disc.
- ⇒ Push the bearing bushing (12b) over the shaft as far as it will go into the bearing bore in the body.
- ⇒ Insert the spacer (21).

- ⇒ Drill dowel holes for connecting the switching shaft (2) and the valve disc (3).
- ⇒ Pin the disc and shaft with close-tolerance grooved pins (14).

i Info

Fit butterfly valves with a nominal size of DN 100 or NPS4 without a spacer (21).

- ⇒ Screw the stud bolts (16) into the body.
- ⇒ Insert the mating washer (18) into the provided recess in the bonnet (7).
- ⇒ The bonnet sealing (23) is also pushed onto the bonnet in the same way as the body sealing (13).

i Info

Fit butterfly valves with a nominal size of DN 300 or NPS12 without body sealing (23).

- ⇒ Insert the preassembled bonnet into the bearing bore in the valve body (1) and adjust with the stud bolts.
- ⇒ Tighten the bonnet (7) with the nuts (17) evenly and in a criss-cross pattern.
- ⇒ Push the thrust washer (8) over the free shaft end into position in the valve body.
- ⇒ Push the PTFE V-ring packing (9) over the shaft into the body bore and press in with an assembly sleeve. Refer to the sectional drawing Figure 3-4 for the arrangement of the V-ring packing.
- ⇒ Place the intermediate flange (25) on the body and adjust with screws (30).
- ⇒ Tighten the screws (30) evenly in a criss-cross pattern.
- ⇒ Push the thrust piece (15) over the switching valve and press it into position in the body.
- ⇒ Insert the set of spring washers (10). Refer to the sectional drawing Figure 3-4 for the arrangement of the spring washers.
- ⇒ Press the bearing bushing (11) into the stuffing box (6).
- ⇒ Fit the preassembled stuffing box smoothly over the intermediate flange and adjust with screws (20).
- ⇒ Tighten the screws (20) evenly in a criss-cross pattern.
- ⇒ Adjust the dihedral of the switching shaft (2) parallel to the valve disc and secure it against further twisting.

i Info

Press the switching shaft up against the mating washer (18).

- ⇒ Drill dowel holes for connecting the switching shaft (2) and the valve disc.
- ⇒ Pin the disc and shaft with pastel pins (14).

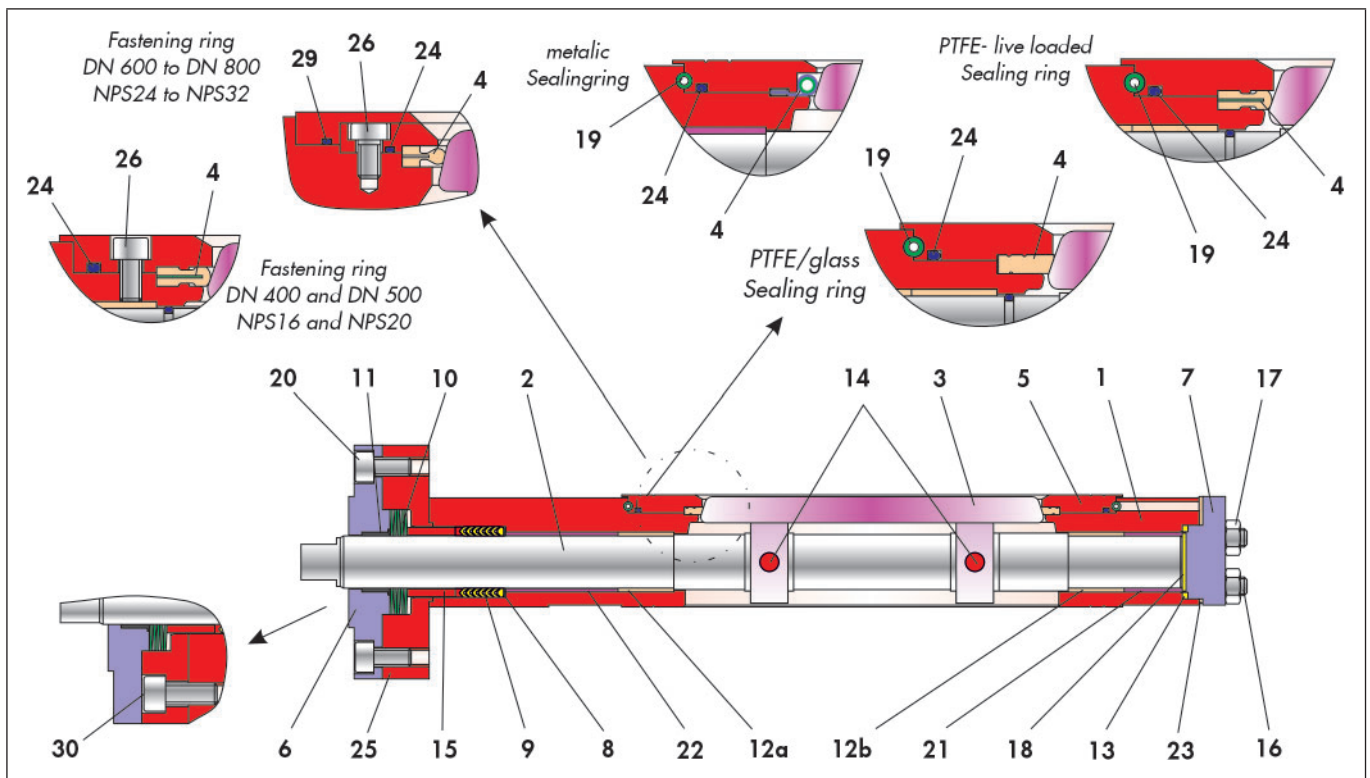


Figure 3-4: Sectional drawing of the BR 14c butterfly valve with spring washer preloaded V-ring packing

Table 3-3: Parts list for the BR 14c butterfly valve with spring washer preloaded V-ring packing

Pos.	Designation	Pos.	Designation	Pos.	Designation
1	Valve body	10	Set of spring washers	20	Screw
2	Shaft	11	Bearing bush	21	Spacer
3	Valve disc	12	Bearing bush	22	Spacer
4	Metal seat ring	13	Body sealing	23	Bonnet sealing
	Seal ring	14	Grooved pin	24	O-ring
5	Fastening ring	15	Spacer	25	Intermediate flange
6	Stuffing box	16	Stud bolt	26	Screw
7	Bonnet	17	Nut	29	O-ring
8	Thrust washer	18	Mating washer	30	Screw
9	V-ring packing	19	Tension spring		

3.5.3.2 Assembling butterfly valves up to DN 300 (NPS12)

- ⇒ Insert the PTFE seal ring (4) or the metal seat ring including the corresponding graphite rings (4) into the body.

i Info

It is essential to pay attention to cleanliness during assembly.

- ⇒ Insert the o-ring (24) into the fastening ring (5).
- ⇒ Place the preassembled fastening ring (5) on the seal ring and press it in with a press.
- ⇒ Loosen the bonnet (7).
- ⇒ Push the tension spring (19) into the slot.
- ⇒ Fasten the bonnet as previously described.

3.5.3.3 Assembling butterfly valves from DN 400 (NPS14)

- ⇒ Insert the PTFE seal ring (4) or the metal seat ring including the corresponding graphite rings (4) into the body.

i Info

It is essential to pay attention to cleanliness during assembly.

- ⇒ Place the fastening ring (5) on the seal ring (4) and adjust with the screws (26).
- ⇒ Tighten the screws (26) evenly in a criss-cross pattern.

3.5.4 Note for installation of actuator elements

! NOTE

Damage to the butterfly valve due to the incorrect actuator assembly!

Double eccentric butterfly valves must always be closed clockwise!

⇒ Observe the turning direction when assembling an actuator.
The turning direction is indicated on the butterfly valve by a sign.

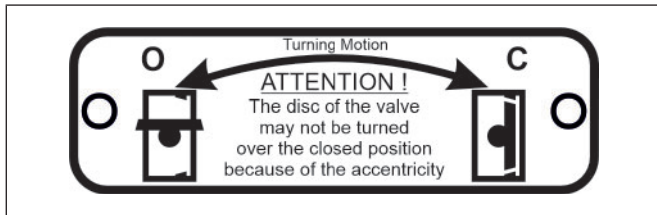


Figure 3-5: Turning direction notice sign

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 butterfly valve due to improper transport and storage!

- ⇒ Butterfly 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 butterfly valve

Carry out the following steps:

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

! WARNING

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

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

! NOTE

Damage to the butterfly valve due to improper fastening of the sling!

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

- ⇒ When lifting the butterfly valve, make sure that the entire load is carried by the sling that is fastened to the butterfly valve body.
- ⇒ Do not fasten the load-bearing sling to the actuator, hand wheel or other components.

4.3.1 Transporting

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

- ⇒ Leave the butterfly valve on the pallet or in the transport container for transport.
- ⇒ Butterfly 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 butterfly valves from damage.
- ⇒ Comply with the transport conditions.

Transport conditions

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

4.3.2 Lifting

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

Conditions for lifting

- ⇒ Use a hook with a safety clamp as the suspension element so that the sling cannot slip off the hook during lifting and transport, see Figure 4-1.
- ⇒ 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 butterfly valve.

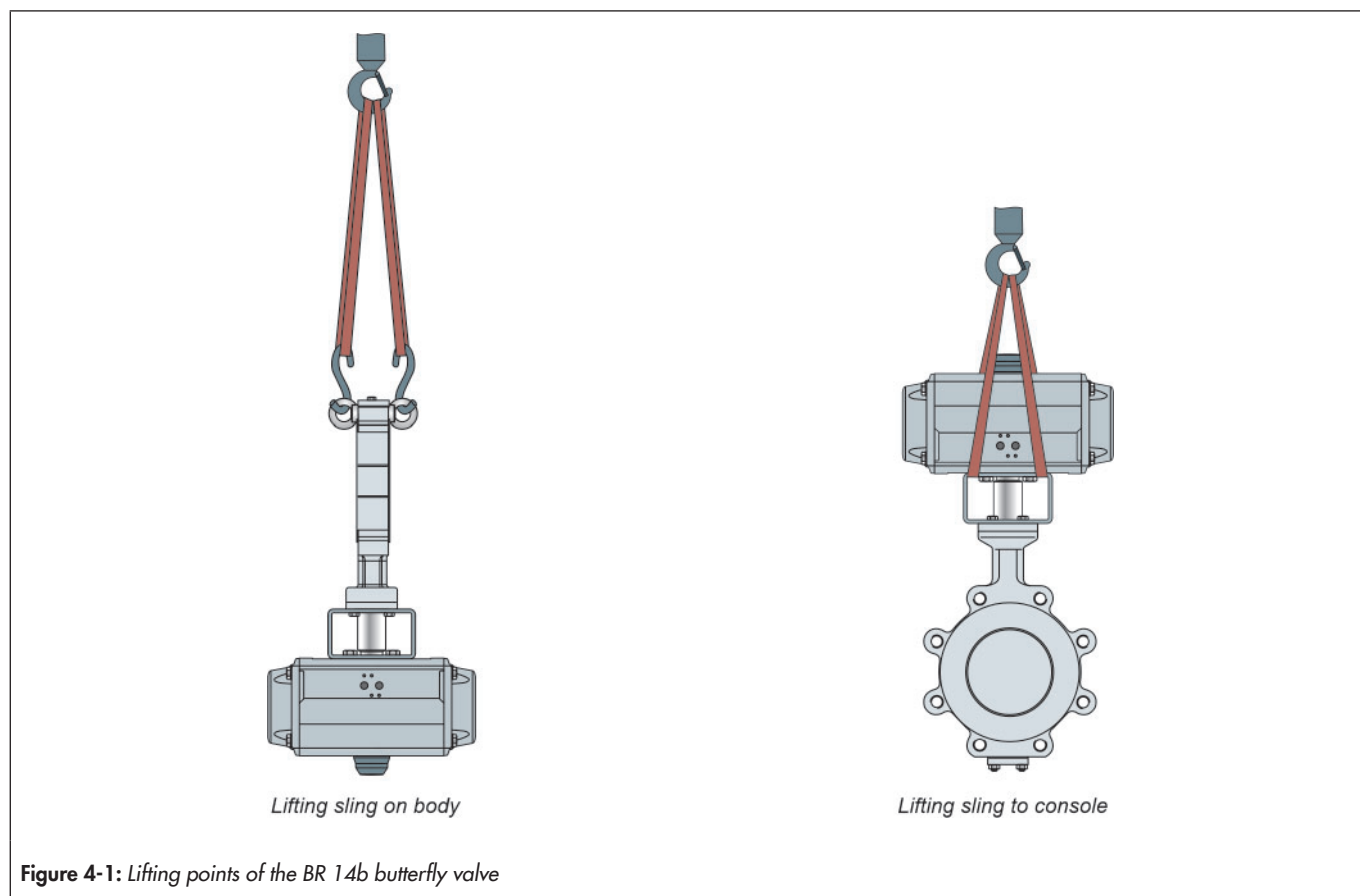


Figure 4-1: Lifting points of the BR 14b butterfly valve

- ⇒ 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 butterfly valves aligned in the same direction in which they will be installed in the pipe.
- ⇒ Always lift the butterfly valve in the centre of gravity of the load to prevent uncontrolled tipping.
- ⇒ Make sure that in the case of butterfly valves, 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 butterfly valve, pretension this sling so it is taut.

⚠ DANGER

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

- ⇒ Attach the eyebolts in the flange bores in the body. When doing so, make sure that the carrying capacity of the utilised eyebolts is sufficient.
- ⇒ Connect the lifting sling with hooks to the eyebolts. Make sure that the hook is seated properly in the eyebolts.
- ⇒ Fasten a lifting sling to each suspension element (e.g. hook) of the crane or forklift, see Figure 4-1. When doing so, ensure the safety, bearing capacity and length of the lifting slings.
- ⇒ In the case of an actuator with a lifting eye: fasten additional lifting slings to the lifting eye on the actuator and on the suspension element.
- ⇒ Lift the butterfly valve carefully. Check if the load lifting equipment holds.
- ⇒ Move the butterfly valve at a constant speed to the installation site.
- ⇒ Install the butterfly valve in the pipe, see chapter 5.4
- ⇒ After installation in the pipe: check that the flanges are firmly tightened and that the butterfly valve holds in the pipe.
- ⇒ Remove the lifting slings.

4.3.4 Lifting points on the bracket

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

4.4 Storing the butterfly valve

! NOTE

Damage to the butterfly valve due to improper storage!

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

i Info

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

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

i Info

In the case of butterfly valves that are delivered without an actuator, the valve disc is not secured to prevent it from moving. It must not be opened from the closed position due to external influences (e.g. shaking).

i Info

Only in the case of butterfly valves with a pneumatic actuator does the valve disc protrude outside of the body on body sides in the delivered state. The packaging on the protruding edge should protect the valve disc from damage.

- ⇒ Do not place any objects on the butterfly 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 butterfly valves. Observe chapter "4.3 Transporting and lifting the butterfly valve" for transport to the installation site.

5.1 Installation conditions

Operator level

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

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

Installation position

The preferred installation position is with the switching shaft horizontal. The actuator should not be located directly below the butterfly valve, if possible.

⇒ 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 butterfly 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

Butterfly 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 butterfly valve is clean.
- The butterfly 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 butterfly valve.

5.3 Assembling the butterfly valve and actuator

PFEIFFER butterfly valves are supplied in working order. In individual cases, the actuator and butterfly 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 butterfly 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 butterfly valve.*

Danger and damage due to use of an electrical actuator!

⇒ *It must be made sure that the valve in the "CLOSED" position is turned off by the signal of the torque switch.*

⇒ *In the "OPEN" position, the butterfly valve must be turned off by the limit switch.*

⇒ *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 butterfly valve.

Danger and damage due to heavy actuator units!

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

! NOTE

Damage to the butterfly valve due to the incorrect setting of the end stops!

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

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

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

- ⇒ The connection ends of the pipe must align with the butterfly valve connections and have plane-parallel ends.
- ⇒ The connection data for the actuator unit must match the control data. See the type plate(s) on the actuator unit.
- ⇒ Prior to installation, the butterfly 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.
- ⇒ An arrow is marked on the body. The direction of the arrow must correspond to the direction of flow in the pipe.

i Info

It may be necessary in special cases for a butterfly valve to be tight against the direction of flow.

For installation in these special cases, contact PFEIFFER as this could lead to an excessive strain on the seal ring, washer, etc.

- ⇒ When pushing the butterfly 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 butterfly valve and seals remain undamaged.

! 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 15-2.

- ⇒ After a long storage period, retighten the body screws. Also retighten the screws of the adjustable compression spacers according to Table 15-1 in Chapter 15.1.1.1.

- ⇒ 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.

! NOTE

Damage to the valve due to improper installation!

The valve disc could be damaged and the butterfly valve could leak.

- ⇒ Push the butterfly valve with a closed valve disc into the gap between the pipe flanges.
- ⇒ The inside diameter of the counterflange must leave enough space for the opened valve disc so that it is not damaged when swinging out, see Table 5-1.

Table 5-1: Minimum required inner diameter D_i of the counterflange

DN		80	100	150	200	250	300	350	400	500	
NPS		3	4	6	8	10	12	14	16	20	
BR14b BR14c BR74b	$\varnothing D_{i1}$	54	78	128	180	227	276	308	365	406	
	$\varnothing D_{i2}$	Row 20	22	50	82	122	151	217	252	308	446
		Row 25	35	60	96	153	210	256	283	308	446
		Row 16	-	-	118	166	217	260	301	348	454

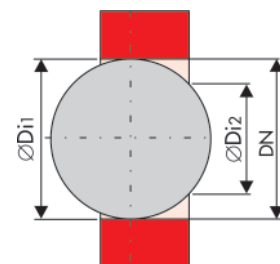


Figure 5-1: Inside diameter

5.4.2 Installing the butterfly valve

- ⇒ Close the butterfly valve in the pipe for the duration of the installation.
- ⇒ Remove the protective caps on the valve openings prior to installation.
- ⇒ Lift the butterfly valve with suitable lifting equipment at the installation site, see chapter “4.3 Transporting and lifting the butterfly valve”. When doing so observe the flow direction of the butterfly valve. An arrow on the butterfly valve indicates the flow direction.
- ⇒ Make sure that the correct flange seals are used.
- ⇒ Screw the pipe together with the butterfly valve without tension.
- ⇒ After installation, open the butterfly valve slowly in the pipe.

! NOTE

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

Open the butterfly valve slowly in the pipe during commissioning.

i Info

Observe the following for butterfly valves with a metal seat:

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

- ⇒ Check the correct function of the butterfly valve.

5.5 Checking the assembled butterfly valve

5.5.1 Functional test

! WARNING

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 butterfly 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.

Danger of injury due to escaping exhaust air!

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

- Wear eye protection when working near the valve.

- ⇒ At the end of installation, perform a functional test with the control signals:
The butterfly 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 cause damage to the pipe system.
- ⇒ *Check the actuator unit and control command., see chapter "8 Faults".*

5.5.4 Fail-safe position

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

5.5.2 Pressure test of the pipe section

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

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

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

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 switching shaft must be linear without any jerky movements.

- ⇒ Open and close the butterfly 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 butterfly valve.
- ⇒ Check the display on the position indicator.

6 Start-up

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

WARNING

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

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 an optional test connection while the butterfly 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 butterfly 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.

Danger of injury due to escaping exhaust air!

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

- ⇒ Wear eye protection when working near the valve.

Commissioning/recommissioning

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

Ensure the following conditions prior to commissioning/recommissioning:

- The butterfly 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 butterfly 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 butterfly valve is ready for operation.

WARNING

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

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 an optional test connection while the butterfly valve is pressurised.

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

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the butterfly 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.

Danger of injury due to escaping exhaust air!

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

- ⇒ Wear eye protection when working near the valve.

Observe the following points during operation:

- After commissioning and reaching the operating temperature, it may be necessary to retighten all flange connections between the pipe and butterfly valve with the corresponding tightening torques, see Table 15-2 in Chapter "15.1.1.2 Flange connections".
- It can also be necessary to retighten the screw connections on the body parts with the corresponding tightening torques according to Table 15-1 in Chapter "15.1.1.1 Adjustable stuffing box".
- The butterfly valve/actuator unit must be actuated with the control signals.

- Butterfly 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 butterfly valves with a ratchet lever, the position of the ratchet lever indicates the position of the butterfly valve:
 - Ratchet lever 90° transverse to the pipe: butterfly valve closed,
 - Ratchet lever parallel to the pipe: butterfly valve open.

DANGER

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

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

- ⇒ Do not open and close the butterfly valve suddenly to prevent pressure surges and/or a temperature shock in the pipe system.
-
- If a butterfly 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 butterfly 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 butterfly 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 15-1 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 butterfly 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>
Leakage on the bonnet	Connection of the bonnet to the body released	Retighten the bonnet screws.
	Bonnet still untight after retightening	Replace the bonnet sealing and/or butterfly valve, see chapter "1 Safety instructions and safety measures".
Leaks in the switching shaft sealing	Medium escapes	<p>! DANGER</p> <p>Danger of injury due to escaping medium!</p> <p><i>To protect operating personnel from danger, depressurise the line on both sides of the butterfly valve, see Chapter "1 Safety instructions and safety measures".</i></p> <hr/>
	Medium escapes from the stuffing box	<p>Remove the butterfly valve, see chapter "1 Safety instructions and safety measures".</p> <p>Disassemble the butterfly valve and replace the switching shaft sealing.</p> <p>Request spare parts from PFEIFFER, see Chapter "15.3 Spare parts".</p> <p>For the required repair instructions, see Chapter "12 Repairs".</p>
	Medium escapes from the adjustable stuffing box	<p>Retighten both screws on the compression spacer alternately and in small amounts with a 1/4 turn each in the clockwise direction until the leakage stops.</p> <p>If the leakage is not stopped in this way, a repair is necessary.</p> <hr/> <p>💡 Tip</p> <p><i>When the nuts on the compression spacer must be loosened or screwed off (counterclockwise):</i></p> <hr/> <p>Request spare parts from PFEIFFER, see Chapter "15.3 Spare parts".</p> <p>For the required repair instructions, see Chapter "12 Repairs".</p>

Type of fault	Possible cause	Measures
Increased medium flow rate with the butterfly valved closed	Leakage in the closed position	<p>Close the butterfly valve 100%.</p> <p>If the butterfly valve is in the closed position, check if the actuator closes with full torque.</p> <p>If the actuator closes with full torque, open/close the butterfly valve when pressurised multiple times.</p> <p>If the butterfly valve is still leaky, increase the tightening torque of the actuator in the "CLOSED" position up to maximum 1.1 x the nominal torque.</p> <p>If the butterfly valve is still leaky, it could be damaged.</p>
	The butterfly valve is damaged	<p>Repairs are necessary.</p> <p>Remove the butterfly valve, see chapter "1 Safety instructions and safety measures".</p> <p>Request spare parts from PFEIFFER, see Chapter "15.3 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 butterfly valve, see chapter "1 Safety instructions and safety measures".
	The butterfly valve is damaged	<p>Repairs are necessary.</p> <p>Remove the butterfly valve, see chapter "1 Safety instructions and safety measures".</p> <p>Request spare parts from PFEIFFER, see Chapter "15.3 Spare parts".</p> <p>For the required repair instructions, see Chapter "12 Repairs".</p>
Problems in the actuator unit	The pneumatic actuator must be removed	<p>Disconnect the connection to the control pressure.</p> <p>Remove the actuator from the butterfly valve, observe the "Safety instructions and safety measures", see the included actuator unit manuals.</p>

i Info

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

In case of a butterfly valve fault:

- Close the shut-off valves upstream and downstream of the butterfly valve so that no medium flows through the butterfly 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".

8.2 Carrying out emergency measures

In the case of a power supply failure, the butterfly 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.

9 Servicing

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

- Installation and operating manual for the installed actuator, e.g. ▶ EB 30a for diaphragm rotary actuators BR 30a, ▶ EB 31a for rotary actuators BR 31a or the corresponding actuator documentation of other manufacturers.

! WARNING

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

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 an optional test connection while the butterfly 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 butterfly 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.

Danger of injury due to escaping exhaust air!

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

- ⇒ Wear eye protection when working near the valve.

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 butterfly valve!

When working on the butterfly 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.

! NOTE

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

The butterfly 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 in Chapter "15.1.1 Tightening torques".

Damage to the butterfly valve due to unsuitable tools!

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

Damage to the butterfly valve due to unsuitable lubricants!

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

i Info

The butterfly valve was checked by PFEIFFER prior to delivery.

- Certain test results certified by PFEIFFER are no longer valid when disassembling the butterfly 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 butterfly 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 test connection while the butterfly valve is pressurised.	Decommission the butterfly valve, see chapter "10 Decommissioning". Contact the After Sales Service at PFEIFFER for repairs, See chapter "12 Repairs".

Test	Measures in the case of a negative test result
Check the rotary movement of the actuator- and switching shaft for smooth movement.	Tighten the packing correctly. If the actuator- and switching shaft are blocked, remove the blockage. WARNING! If the actuator- and switching 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 switching 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 butterfly valve by briefly interrupting the power supply.	Decommission the butterfly valve, see chapter "10 Decommissioning". Then determine the cause and remedy it, see Chapter "8 Malfunctions".

9.2 Maintenance work

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

9.2.1 Replacing the seal ring

- ⇒ Check the condition of the seal ring.
- ⇒ Remove the seal ring (4) as described in Chapter "12.2 Replacing the seal ring". Check the seal ring 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 "15.3 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!

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 an optional test connection while the butterfly 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 butterfly 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.

Danger of injury due to escaping exhaust air!

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

- ⇒ Wear eye protection when working near the valve.

Danger of injury due to residual medium in the butterfly valve!

When working on the butterfly 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 an optional test connection while the butterfly valve is pressurised.

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

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

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 switching shaft!

- ⇒ Do not reach into the yoke as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the butterfly 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.

Danger of injury due to residual medium in the butterfly valve!

When working on the butterfly 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 an optional test connection while the butterfly valve is pressurised.

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 butterfly valve is decommissioned, see chapter "10 Decommissioning".

11.1 Removing the butterfly valve from the pipe

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

WARNING

If a used valve is sent to PFEIFFER for service:

The valves must be decontaminated properly in advance.

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

Tip

PFEIFFER recommends documenting the following contamination data in the form FM 8.7-6 "Declaration regarding the contamination of PFEIFFER valves and components".

11.2 Disassembling the actuator

See the corresponding actuator documentation.

12 Repairs

If the operation of the butterfly 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 butterfly 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 butterfly valves. For decommissioning and disassembly, observe Chapter "10 Decommissioning" and "11 Disassembly".

12.1 Replacing the packing

If a leak is found in the stuffing box (6), the PTFE rings of the V-ring packing (9) or the rings of the meshwork packing (9) could be defective.

- ⇒ Check the condition of the packing.

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

12.1.1 Replacing the V-ring packing with butterfly valve BR 14b (type WTD and MTD)

- ⇒ Place the butterfly valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (20) and remove the stuffing box (6) carefully.
- ⇒ Remove the spring washers from the set of spring washers (10).
- ⇒ Remove the thrust piece (15).
- ⇒ Remove the V-ring packing (9).
- ⇒ 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 butterfly valve as described in Chapter "3.5.1 Assembly of butterfly valve BR 14b with spring washer preloaded V-ring packing (type WTD and MTD).

12.1.2 Replacing the meshwork packing with butterfly valve BR 14b (type WNS)

- ⇒ Place the butterfly valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (20) and remove the compression spacer (6) carefully.
- ⇒ Remove the meshwork packing (9).
- ⇒ Check the rings of the meshwork packing as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.
- ⇒ Assemble the butterfly valve as described in Chapter "3.5.2 Assembly of butterfly valve BR 14b with adjustable stuffing box (type WNS).

12.1.3 Replacing the V-ring packing with butterfly valve BR 14c (BR 74b) (type WTD and MTD)

- ⇒ Place the butterfly valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (20) and remove the stuffing box (6) carefully.
- ⇒ Remove the spring washers from the set of spring washers (10).
- ⇒ Remove the thrust piece (15).
- ⇒ Remove the V-ring packing (9).
- ⇒ 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 butterfly valve as described in Chapter "3.5.3 Assembly of butterfly valves BR 14c (BR 74b) with spring washer preloaded V-ring packing (type WTD and MTD).

12.2 Replacing the seal ring

If a leak is found in the passage of the butterfly valve, the seal ring (4) could be defective.

- ⇒ Check the condition of the seal ring.

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

12.2.1 Replacing the seal ring in butterfly valves up to DN 300 (NPS12)

- ⇒ Place the butterfly valve on an even and clean work surface so that the seal ring is easy to reach.

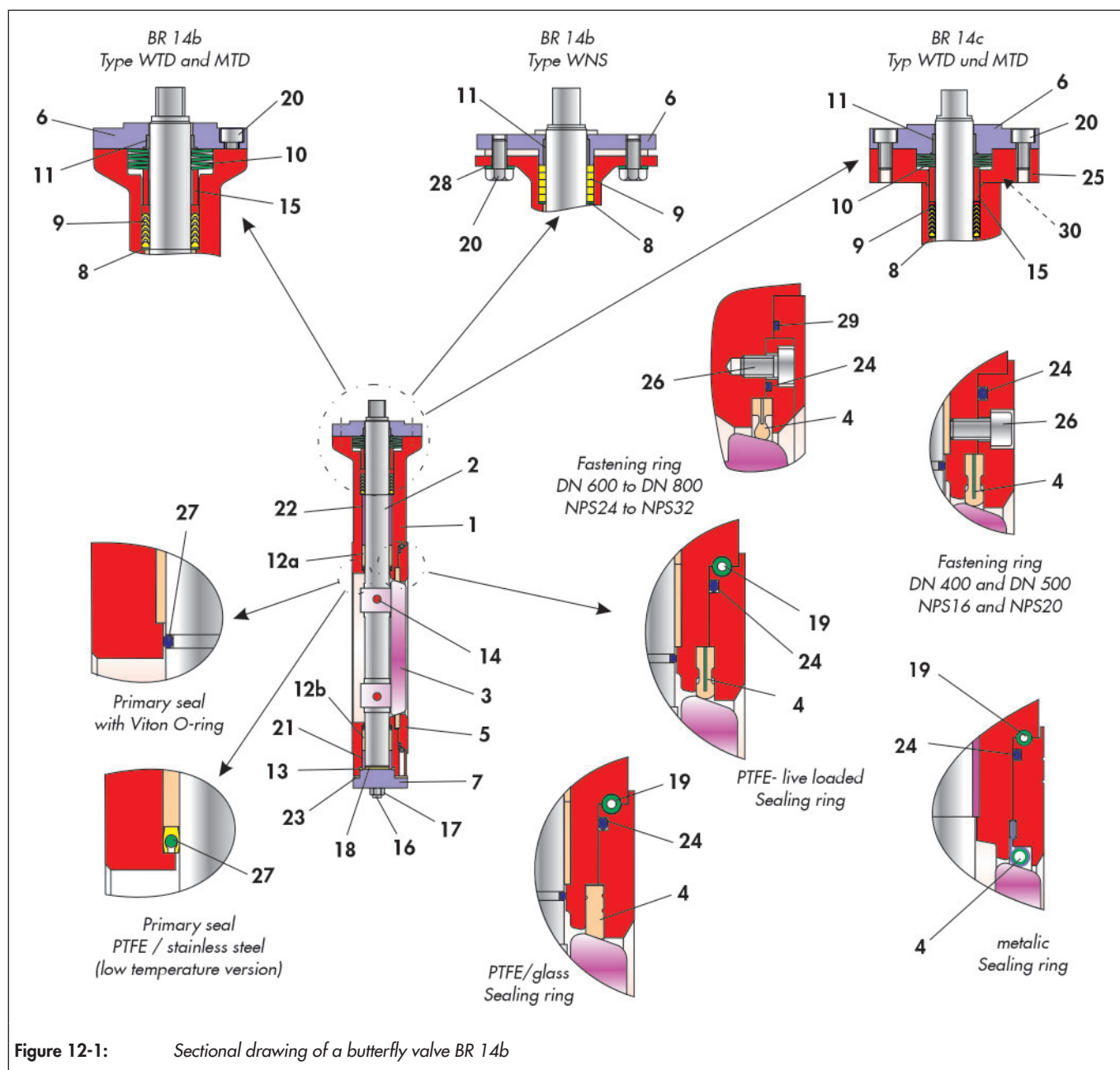


Figure 12-1: Sectional drawing of a butterfly valve BR 14b

Table 12-1: Parts list of the BR 14b butterfly valve

Pos.	Designation
1	Valve body
2	Shaft
3	Valve disc
4	Seal ring
5	Fastening ring
6	Stuffing box
7	Bonnet
8	Thrust washer
9	Packing
10	Set of spring washers

Pos.	Designation
11	Bearing bush
12	Bearing bush
13	Body sealing
14	Grooved pin
15	Spacer
16	Stud bolt
17	Nut
18	Mating washer
19	Tension spring
20	Screw

Pos.	Designation
21	Spacer
22	Spacer
23	Bonnet sealing
24	O-ring
25	Intermediate flange
26	Screw
27	Primary sealing
28	Washer
29	O-ring
30	Screw

- ⇒ Loosen the nuts (17) and remove the bonnet (7).
- ⇒ Remove the tension spring (19).
- ⇒ Disassemble the fastening ring (5).
- ⇒ Remove the PTFE seal ring (4) or the metal seat ring including the corresponding graphite rings (4).
- ⇒ Check the seal ring as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.

i Info

It is essential to pay attention to cleanliness during assembly.

- ⇒ Assemble the valve as described in Chapter "3.5 Butterfly valve assembly".

12.2.2 Replacing the seal ring in butterfly valves from DN 400 (NPS16)

- ⇒ Place the butterfly valve on an even and clean work surface so that the seal ring is easy to reach.
- ⇒ Loosen the screws (26) and disassemble the fastening ring (5).
- ⇒ Remove the PTFE seal ring (4) or the metal seat ring including the corresponding graphite rings (4).
- ⇒ Check the seal ring as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.

i Info

It is essential to pay attention to cleanliness during assembly.

- ⇒ Assemble the valve as described in Chapter "3.5 Butterfly 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 butterfly valves can be sent to PFEIFFER for repair.

Proceed as follows to send devices:

! WARNING

Danger due to contaminated valves!

- ⇒ 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".

- ⇒ Include the following information for returns:
 - Manufacturer number
 - Butterfly valve type
 - Article number
 - Nominal size and version of the butterfly 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.

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 butterfly valve BR 14b, see page 14-4.
- Declaration of installation for partly completed machinery according to Machinery Directive 2006/42/EC for butterfly valve BR 14b, 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 14b, Type 14b eco+ and Type 14c Butterfly valves (BR 14b), (BR 14b eco+) (BR 14c) with packing and adjustable stuffing box <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 Installation and operating instructions ► EB 14b delivered together with the valve.</p> <p>The commissioning of these valves is only permitted after the valve has been installed from both sides in the pipeline and a risk of injury can be ruled out. (See ► EB 14b, Chapter 1 for butterfly valves intended for dead-end service)</p>	

Applied standards:

EN 593 AD 2000 Regulations	Product standard for butterfly valves Regulations for pressurized valve body parts
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Type designation and technical features:

PFEIFFER Data sheets ► TB 14b and ► TB 14b eco+ <i>NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalogue.</i>
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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:

TÜV Rheinland Service GmbH Am Grauen Stein 51101 Köln Germany	0035
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These Declarations become invalid when modifications are made to the shut-off butterfly valves and/or assemblies that affect the technical data of the shut-off butterfly valve or the <intended use> described in ► EB 14b, Chapter 1 of the operating instructions, and considerably change the valve or an assembly delivered with it.

Kempen, 1. September 2022



 Stefan Czayka
 Head of Quality Management/IMS Representative

DECLARATION OF CONFORMITY

As per Pressure Equipment Directive 2014/68/EU
TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH , D47906 Kempen, Germany
declares that:	Type 14b, Type 14b eco+ and Type 14c Butterfly valves (BR 14b), (BR 14b eco+) (BR 14c) with packing and adjustable stuffing box <ul style="list-style-type: none"> • with worm gear and handwheel • with lever for 90° operation
<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 Installation and operating instructions ► EB 14b delivered together with the valve.</p> <p><i>(See ► EB 14b, Chapter 1 for butterfly valves intended for dead-end service)</i></p>	

Applied standards:

EN 593 AD 2000 Regulations	Product standard for butterfly valves Regulations for pressurized valve body parts
---	---

Type designation and technical features:

PFEIFFER Data sheets ► TB 14b and ► TB 14b eco+ <i>NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalogue.</i>
--

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 Rheinland Service GmbH Am Grauen Stein 51101 Köln Germany	0035
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These Declarations become invalid when modifications are made to the shut-off butterfly valves and/or assemblies that affect the technical data of the shut-off butterfly valve or the <Intended use> described in ► EB 14b, Chapter 1 of the operating instructions, and considerably change the valve or an assembly delivered with it.

Kempen, 1. September 2022



Stefan Czayka
 Head of Quality Management/IMS Representative

EU DECLARATION OF CONFORMITY TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH , 47906 Kempen, Germany
declares for the listed products that:	<p>Type 14b Control and Shut-off Butterfly Valve (BR14b)</p> <ul style="list-style-type: none"> • with a Type 30a Multi-turn Actuator (BR30a) • with a Type 31a Quarter-turn Actuator (BR31a) • 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 valve has been installed from both sides in the pipeline and a risk of injury can be ruled out as a result.</p>	

Referenced standards:

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

Product description and technical features:

<p>Tight-closing butterfly valve for aggressive media, particularly for strict requirements in chemical applications, automated with a single or double-acting piston actuator for butterfly valves, ball valves and other valves with rotating throttle bodies.</p> <p>For product descriptions refer to: PFEIFFER data sheet for Type 14b Valve ▶ TB 14b PFEIFFER data sheet for Type 30a Actuator ▶ TB 30a PFEIFFER data sheet for Type 31a Actuator ▶ TB 31a PFEIFFER mounting and operating instructions for Type 14b Valve ▶ EB 14b PFEIFFER mounting and operating instructions for Type 30a Actuator ▶ EB 30a PFEIFFER mounting and operating instructions for Type 31a Actuator ▶ EB 31a PFEIFFER safety manual for Type 14b Valve ▶ SH 14 PFEIFFER safety manual for Type 30a Actuator ▶ SH 30a PFEIFFER safety manual for Type 31a Actuator ▶ SH 31a</p> <p>Valve accessories (e.g. positioners, limit switches, solenoid valves, lock-up valves, supply pressure regulators, volume boosters and quick exhaust valves) are classified as machinery components and do not fall within the scope of the Machinery Directive as specified in § 35 and § 46 of the Guide to Application of the Machinery Directive 2006/42/EC issued by the European Commission.</p>

This declaration becomes invalid when modifications are made to the butterfly valves and/or assemblies that affect the technical data of the control valve or the intended use (▶ EB 14b, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 28 May 2021



Stefan Czayka
 Head of Quality Management/IMS Representative

DECLARATION OF CONFORMITY

TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH, 47906 Kempen, Germany
declares for the listed products that:	Type 14b Control and Shut-off Butterfly Valve (Type 14b) <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.</p> <p>Machinery is considered to be partly completed machinery when the machinery manufacturer has not determined all required specifications such as model type, thrusts, torques etc.</p> <p>The start-up of these units is only permitted after the valve has been installed from both sides in the pipeline and a risk of injury can be ruled out as a result.</p>	

Referenced standards:

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

Product description and technical features:

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

For product descriptions refer to:

PFEIFFER Data Sheet for Type 14b Butterfly Valve ▶ TB 14b

PFEIFFER Mounting and Operating Instructions for Type 14b Butterfly Valve ▶ EB 14b

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 butterfly valves and/or assemblies that affect the technical data of the butterfly valve or the intended use (▶ EB 14b, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 22 November 2021



 Stefan Czayka
 Head of Quality Management/IMS Representative

15 Annex

15.1 Tightening torques, lubricant and tools

15.1.1 Tightening torques

15.1.1.1 Adjustable stuffing box

i Info

The required torques for tightening the adjustable compression spacers can be found in Table 15-1. Torque wrenches must be used to ensure that the torque is reached.

Table 15-1: Tightening values for the adjustable compression spacer

DN [mm]	80	100	150	200	250	300
MA [Nm]	4	5	6	7	7	9

15.1.1.2 Flange connections

i Info

Required tightening torques for assembly for flanges according to DIN EN 1092-1 type 11 and connecting elements (e.g. screws, threaded pins) made of 25CrMo4 / A2-70 or a comparable strength.

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

Table 15-2: Required tightening torques

DN [mm]	PN [bar]	Thread	Tightening torques [Nm] for sealing units ¹		Tightening method
			A	B	
50	10	M16	125 ²⁾	80	With a spanner ⁴⁾
	16				
	25				
	40				
80	10	M16	125 ²⁾	80	With a spanner ⁴⁾
	16				
	25				
	40				
100	10	M16	125 ²⁾	80	With a spanner ⁴⁾
	16				
	25	M20	240 ³⁾	150	
	40				
150	10	M20	240 ³⁾	150	With a torque wrench ⁵⁾
	16				
	25	M24	340	200	
	40				

DN [mm]	PN [bar]	Thread	Tightening torques [Nm] for sealing units ¹		Tightening method	
			A	B		
200	10	M20	240 ³⁾	150	With a spanner ⁴⁾	
	16					
	25	M24	340	200	With a torque wrench ⁵⁾	
	40					
250	10	M20	240 ³⁾	150		With a spanner ⁴⁾
	16					
	25	M24	340	200	With a torque wrench ⁵⁾	
	40					
300	10	M20	240 ³⁾	150		With a spanner ⁴⁾
	16					
	25	M27	500	250	With a torque wrench ⁵⁾	
	40					
350	10	M20	240 ³⁾	150		With a spanner ⁴⁾
	16					
	25	M30	700	300	With a torque wrench ⁵⁾	
	40					
400	10	M24	340	200		With a torque wrench ⁵⁾
	16					
	25	M33	900	500		
	40					
500	10	M24	340	200	With a torque wrench ⁵⁾	
	16					
	25	M33	900	500		
	40					
600	10	M27	500	250	With a torque wrench ⁵⁾	
	16					
	25	M36	1200	750		
	40					
700	10	M27	500	250	With a torque wrench ⁵⁾	
	16					
	25	M39	1400	900		
	40					
800	10	M30	700	300	With a torque wrench ⁵⁾	
	16					
	25	M45	2000	1200		
	40					

¹⁾ These tightening torques were calculated by the company BASF SE and confirmed by partner companies.

²⁾ Recommended lever length 300 mm.

³⁾ Recommended lever length 550 mm.

⁴⁾ With manually-operated spanner with a suitable extension if necessary.

⁵⁾ With a torque wrench or other torque-controlled procedure.

Table 15-3: Sealing unit A

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

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

Table 15-4: Sealing unit B

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

15.1.2 Lubricant

Table 15-5: Recommended lubricant

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

15.1.3 Tools

Recommended tools

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

15.2 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
- Butterfly valve type
- Article number
- Nominal size and version of the butterfly 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:

PFEIFFER Chemie-Armaturenbau GmbH

Hooghe Weg 41 • 47906 Kempen
 Phone: 02152 / 2005-0 • Telefax 02152 / 1580
 E-Mail: sales-pfeiffer-de@samsongroup.com
 Internet: www.pfeiffer-armaturen.com

15.3 Spare parts

PFEIFFER recommends spare part sets for "Commissioning" and for "2-year operation", see Chapter "15.3.1 Spare parts for butterfly valve BR 14b (type WTD and MTD)", "15.3.2 Spare parts for butterfly valve BR 14b (type WNS)" and "15.3.3 Spare parts for butterfly valve BR 14c (type WTD and MTD)".

15.3.1 Spare parts for butterfly valve BR 14b (type WTD and MTD)

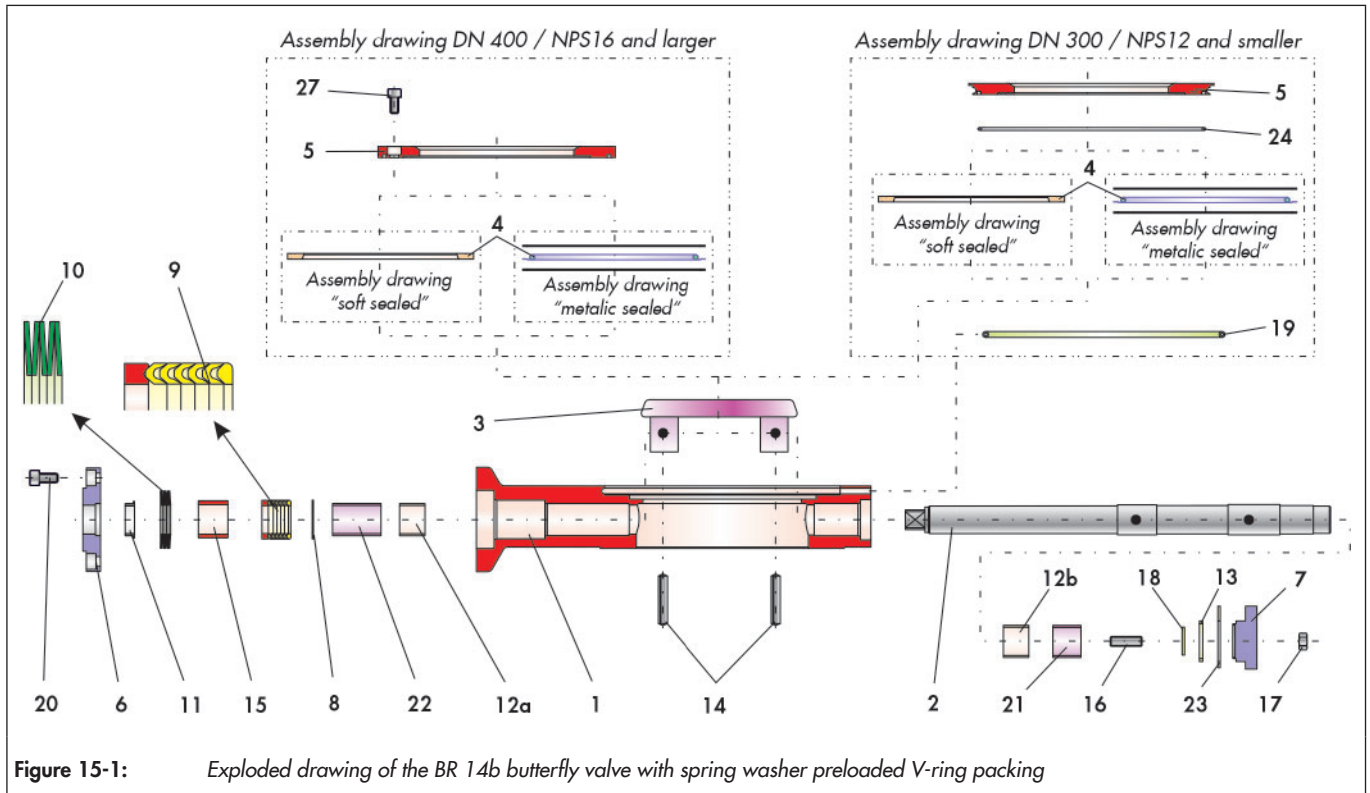


Table 15-6: Recommended spare parts for the butterfly valve BR 14b (type WTD and MTD)

Pos.	Designation	Material	In the spare parts set for commissioning	In the spare parts set for 2 year operation
1	Valve body	1.4408		
2	Shaft	1.4542		•
3	Valve disc	1.4408		•
4	Seal ring	PTFE spring washer preloaded	•	•
	Metal seat ring	Nickel		
5	Fastening ring	1.4571		
6	Stuffing box	1.4571		
7	Bonnet	1.4571		
8	Thrust washer	1.4571		
9	V-ring packing	1.4305 / PTFE	•	•
10	Set of spring washers	1.8159 / Delta Tone	•	•
11	Bearing bush	PTFE with carbon	•	•
12	Bearing bush	PTFE/glass or metal	•	•
13	Body sealing	PTFE	•	•
14	Grooved pin	1.4542		•
15	Spacer	1.4571		
16	Stud bolt	A4-70		•
17	Nut	A4-70		•
18	Mating washer	PTFE	•	•
19	Tension spring	1.4310	•	•
20	Screw	A4-70		•
21	Spacer	1.4571		
22	Spacer	1.4571		
23	Bonnet sealing	PTFE with glass	•	•
24	O-ring	Viton	•	•
26	Screw	A4-70		•

15.3.2 Spare parts for butterfly valve BR 14b (type WNS)

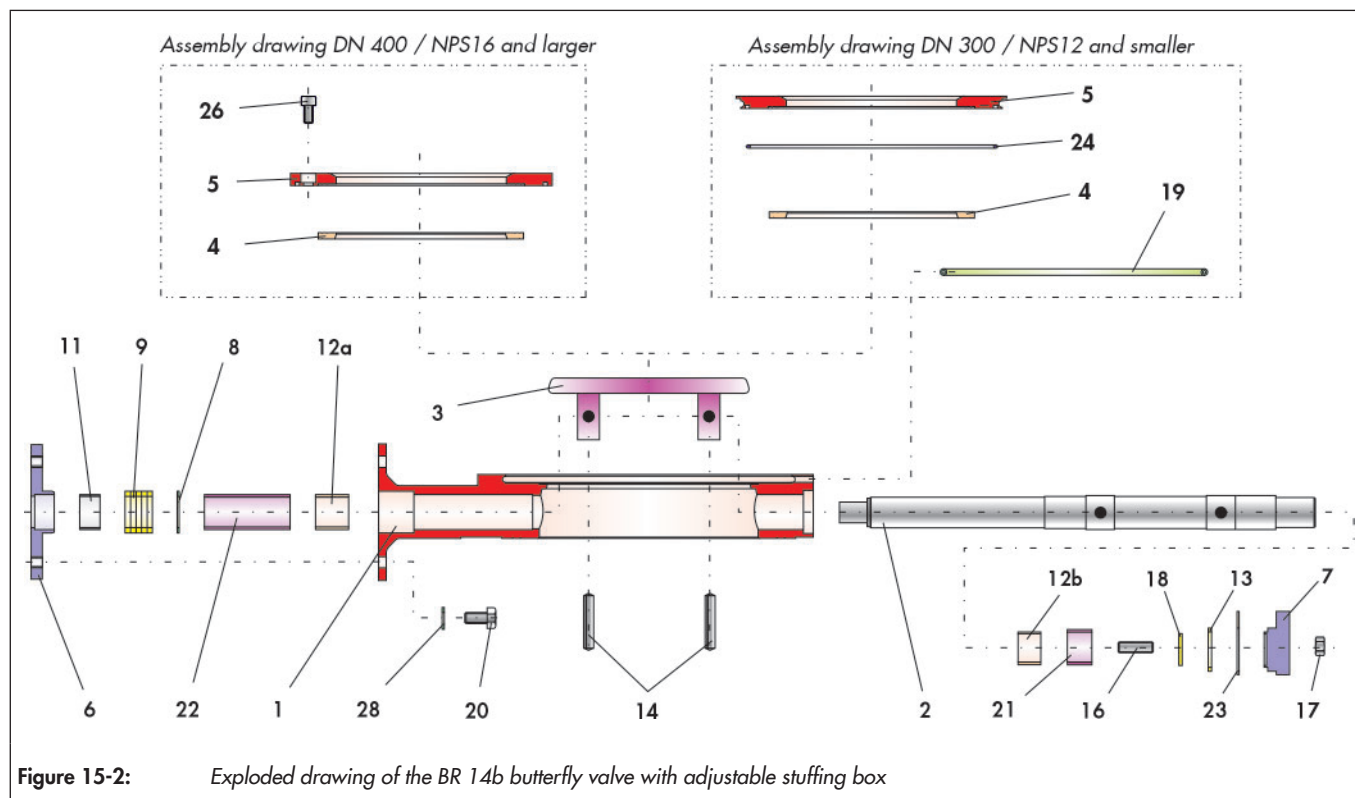


Table 15-7: Recommended spare parts for the butterfly valve BR 14b (type WNS)

Pos.	Designation	Material	In the spare parts set for commissioning	In the spare parts set for 2 year operation
1	Valve body	1.4408		
2	Shaft	1.4542		•
3	Valve disc	1.4408		•
4	Seal ring	PTFE spring washer preloaded	•	•
5	Fastening ring	1.4571		
6	Adjustable stuffing box	1.4571		
7	Bonnet	1.4571		
8	Thrust washer	1.4571		
9	Packing	PTFE	•	•
11	Bearing bush	PTFE with carbon	•	•
12	Bearing bush	PTFE/glass or metal	•	•
13	Body sealing	PTFE	•	•
14	Grooved pin	1.4542		•
16	Stud bolt	A4-70		•
17	Nut	A4-70		•
18	Mating washer	PTFE	•	•
19	Tension spring	1.4310	•	•
20	Screw	A4-70		•
21	Spacer	1.4571		
22	Spacer	1.4571		
23	Bonnet sealing	PTFE with glass	•	•
24	O-ring	Viton	•	•
26	Screw	A4-70		•
28	Washer	1.4571		

15.3.3 Spare parts for butterfly valve BR 14c (type WTD and MTD)

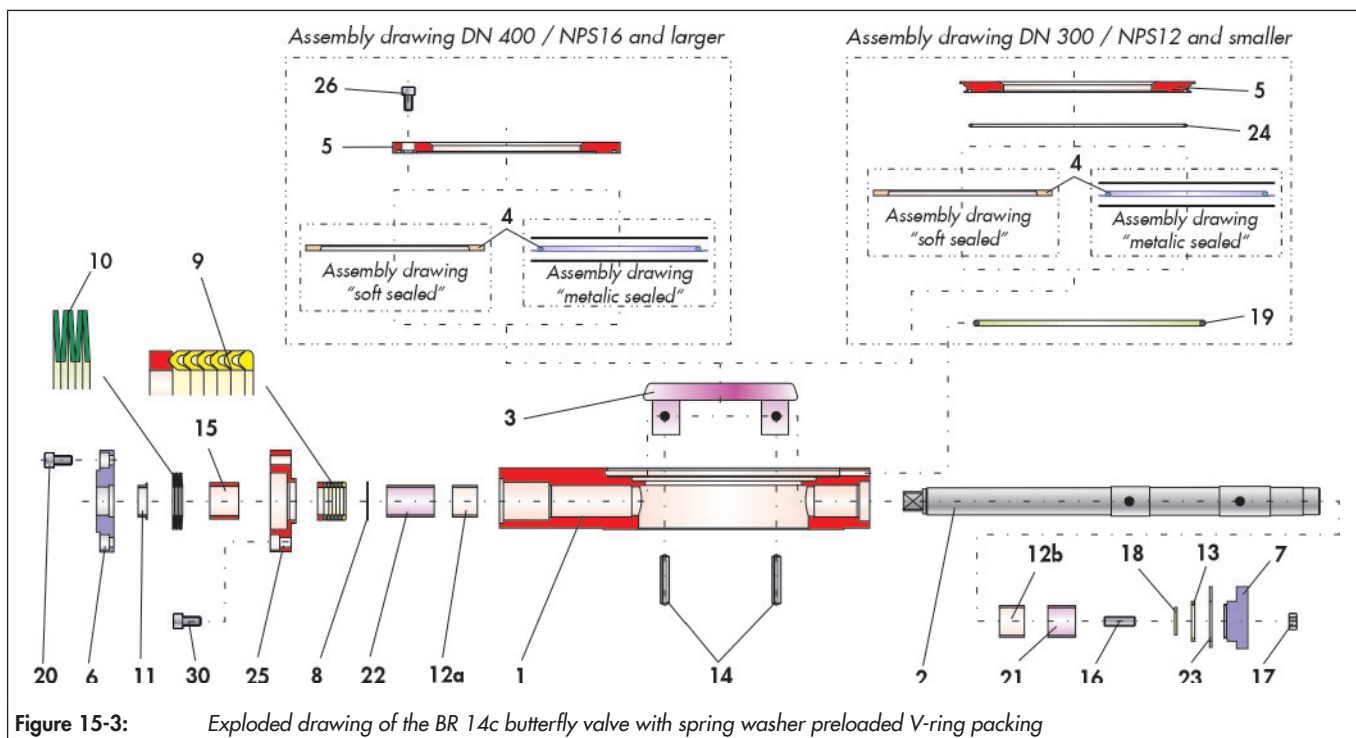


Table 15-8: Recommended spare parts for the butterfly valve BR 14c (type WTD and MTD)

Pos.	Designation	Material	In the spare parts set for commissioning	In the spare parts set for 2 year operation
1	Valve body	1.4408		
2	Shaft	1.4462		•
3	Valve disc	1.4408		•
4	Metal seat ring	Nickel	•	•
	Seal ring	PTFE spring washer preloaded		
5	Fastening ring	1.4408		
6	Stuffing box	1.4571		
7	Bonnet	1.4571		
8	Thrust washer	1.4571		
9	V-ring packing	1.4305 / PTFE	•	•
10	Set of spring washers	1.8159 / Delta Tone	•	•
11	Bearing bush	PTFE with carbon	•	•
12	Bearing bush	PTFE/glass or metal	•	•
13	Body sealing	PTFE	•	•
14	Grooved pin	1.4462		•
15	Spacer	1.4571		
16	Stud bolt	A4-70		•
17	Nut	A4-70		•
18	Mating washer	PTFE	•	•
19	Tension spring	1.4310	•	•
20	Screw	A4-70		•
21	Spacer	1.4571		
22	Spacer	1.4571		
23	Bonnet sealing	PTFE with glass	•	•
24	O-ring	Viton	•	•
25	Intermediate flange	1.4305		
26	Screw	A4-70		•
30	Screw	A4-70		



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