

# Maintenance and repair instructions

## Ball valve Series 20a



Fig 1 - Series 20a Ball valve with Series 31a Actuator

### 1. General

These instructions are intended to support the user in the assembly and repair of ball valves for series 20a.

Technical details, as a result of further development of the valves mentioned in these instructions, are subject to alteration without notice.

The text and illustrations do not necessarily display the scope of supply or an eventual order of spare parts. Drawings and graphics are not to scale.

Customer related special designs, which are not in accordance with our standard offer, are not shown.

The transfer of these instructions to third parties is only allowed with the written approval of Pfeiffer Chemical valve GmbH.



The equipment may only be dismantled and disassembled by skilled staff, who are familiar with the assembly, start-up and operation.

Skilled staff in the sense of these repair and assembly instructions, are persons who, as a result of their training and knowledge of the relevant standards, are able to judge the tasks assigned to them, and to recognise possible dangers.

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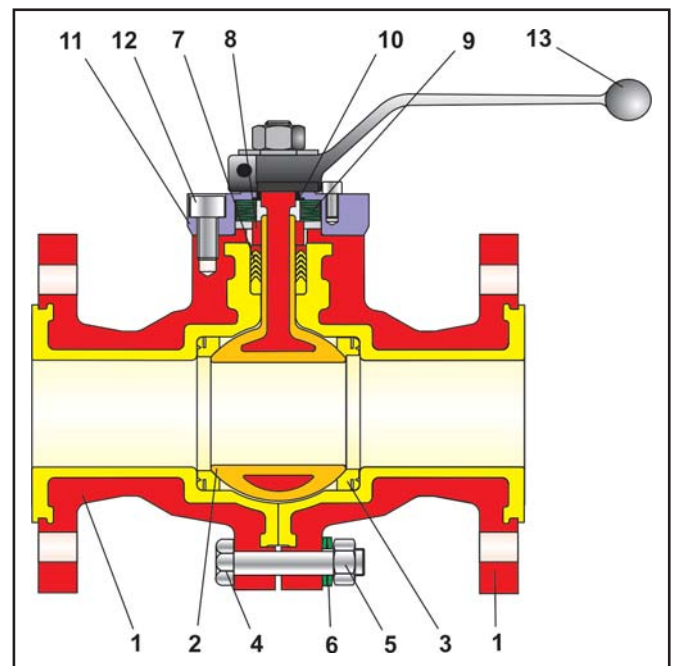


Fig 2 - Cross-section of Series 20a Ball valve => for parts list see table 1 on page 3

## 2. Design, operation and dimensions

Design, operation, dimensions, also all further details may be found in the:

- DIN version Data sheet < **TB 20a** > ,
- ANSI-version Data sheet < **TB 20a-an** > .

## 3. Installation, start-up and maintenance

Guidelines for the installation, start-up and maintenance can be found in the operating instructions:

- For automatic ball valves  
Operating instructions < **BA 20a-01** > ,
- For manually operated ball valves  
Operating instructions < **BA 01a-02** >

## 4. Assembly of the ball valve

The ball valves of series 20a in DIN-Version have a different stem sealing construction compared to the ANSI-Version, so they cannot be included in the same assembly instructions.

Starting from page 2 the DIN-Ball valve is described. The description for the ANSI-Ball valve can be found from page 5.

### 4.1 Preparation for Assembly

To assemble the ball valve, all parts must be prepared, i.e. the parts are carefully cleaned and placed on a soft surface (rubber mat or similar).

Take into consideration, that parts made of plastic are generally soft and sensitive, in particular the sealing surfaces must be handled with care, and not be damaged.



**Attention:** To avoid cold corrosion of the screws in the bodies, the manufacturer has used a high performance lubricating grease (i.e. Gleitmo 805 from Fuchs).

This grease however, may not be applied to valves, which are used in an oxygen environment. Valves which must be free of grease, especially for use in oxygen, an appropriate lubrication must be used.



**Note:** The position and arrangement of the individual parts shown in the drawing (Fig. 3 and Fig. 4), must be followed when assembling the valve.

### 4.2 Assembly of the DIN-Ball valve

Insert both sealing rings ( 3a and 3b ) into both body sections ( 1a and 1b ) which are standing on the flange surfaces.



**Note:** Do not install the seat rings without clearance. To achieve tight shut-off of the ball valve, the seat rings must be installed in the seat with sufficient clearance. If this is not possible, contact the manufacturer.

Then place the ball ( 2 ) on the sealing ring of one of the body sections ( 1a or 1b ).

The V-ring packing ( 7 ) is placed with a light rotation over the shaft of the ball.

The ball shaft and the V-ring packing are placed in the packing insert in the body.

The ball and the V-ring packing now fit firmly in the body.

Place the other body section on the previously described mounted unit, so that it centres itself on the ball stem, the V-ring packing, and on the sealing ring.



**Attention:**

When mounting the body sections, make sure the V-ring packing form is not squashed from both body units.

Screw both body sections together hand-tight. Assembly is with hexagon screws ( 4 ), hexagon nuts ( 5 ) and washers ( 6 ). Refer to the explosion drawing ( Fig 3 ) for positioning the spring washers.



**Note:**

The final screw connection of both body units is carried out at a later stage.

Further assembly now depends on the version concerned.

First the standard-ball valve, and finally the ball valve with double stuffing box is described.

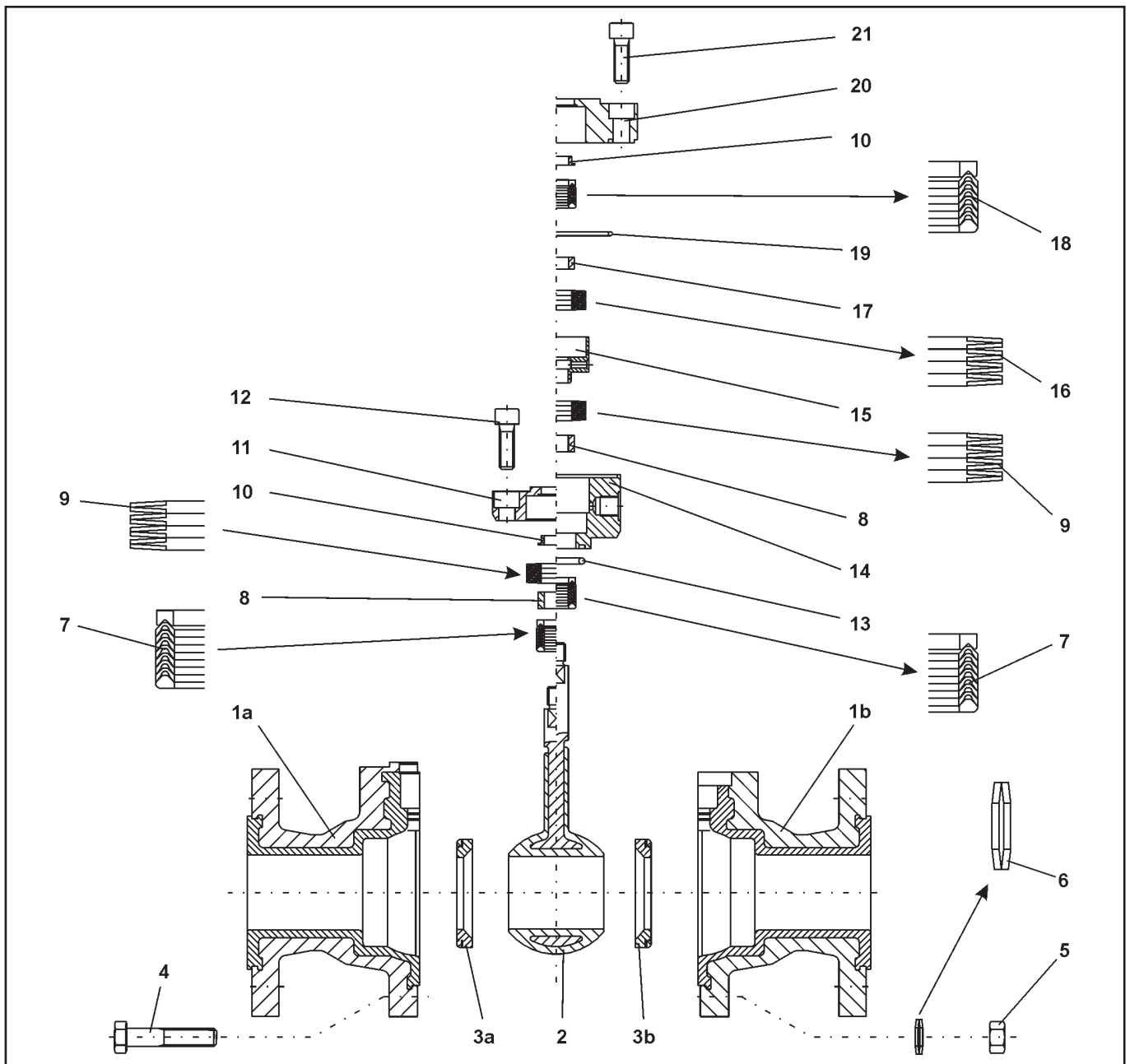


Fig 3 - Explosion drawing of DIN-Ball valve series 20a

Item	Description	Material
1	Body with lining	EN-JS 1049 / PTFE
2	Ball with coating	1.4313 / PFA
3	Set of sealing rings	PTFE
4	Screw	A2-70
5	Nut	A2-70
6	Spring washer	1.4310
7	V-ring packing	1.4305 / PTFE
8	Thrust ring	1.4301
9	Set of spring washers	1.8159 / DeltaTone
10	Bearing bushing	PTFE with carbon
11	Stuffing box flange	1.4305

Table 1 - Parts list

Item	Description	Material
12	Screw	A2-70
13	O-ring	Viton
14	Bottom stuffing box	1.4301
15	Distance ring	1.4301
16	Set of sprig washer	1.8159 / DeltaTone
17	Thrust ring	1.4301
18	V-ring packing	1.4305 / PTFE
19	O-ring	Viton
20	Bottom stuffing box	1.4301
21	Screw	A2-70

#### 4.2.1 Final assembly of the standard ball valve version

Press the thrust ring ( 8 ) over the ball shaft into position in the body.

Following this, place the spring washer set ( 9 ) as shown in the drawing over the ball shaft onto to the thrust ring.

Now the bearing bush ( 10 ) is placed in the stuffing box flange ( 11 ).

The pre-assembled stuffing box flange is placed on the body and aligned with the cap screws ( 12 ).

Tighten the screws evenly and in alternating pattern, until a gap of 1 - 2mm between stuffing box flange and body remains.



**Note:** The final screw connection for the stuffing box is carried out in a later assembly stage.

Now tighten the screws in both body parts.



**Note:** The tightening pattern and tightening torque for each nominal size can be obtained from fig. 5 and table 3 section 4.4

After approx. 24 hours retighten the screws in both body parts.



**Note:** Also here, the tightening pattern and tightening torque for each nominal size can be obtained from fig. 5 and table 3 section 4.4

To complete the assembly, tighten the screws ( 12 ) in the stuffing box ( 11 ).



**Important:** These screws especially must be tightened firmly.

**Assembly of the ball valve is now complete**

#### 4.2.2 Final assembly of the ball valve with double stuffing box

In order to continue the assembly, it is now recommend to insert the O-ring ( 13 ) in the bottom part of the stuffing box ( 14 ) and place it over the ball shaft in the turned recess of the assembled body section.

Now insert the thrust ring ( 8 ) in the bottom part of the stuffing box, so it is bearing on the V-ring packing.

Place in the following sequence, first the spring washer set ( 9 ), the distance sleeve ( 15 ) and the second spring washer ( 16 ).

For the position and arrangement of the spring washers, refer to the explosion drawing ( fig 3 ).

The thrust ring ( 17 ) is placed on top.

The top stuffing box ( 20 ) is prepared for assembly by inserting the bearing bushing ( 10 ), then the V-ring packing ( 18 ).

Insert the O-ring ( 19 ) in the recess.

The complete pre-assembled top part of the stuffing box is placed on the bottom part of the stuffing box.

In order for this unit to be tightened with the cap screws ( 21 ), it must first be pre-tensioned.

To proceed, push an auxiliary assembly sleeve over the ball shaft, to the stuffing box flange.

Tighten the nut, which is on the ball shaft, until the lower- and top part of stuffing box are pulled together, so the cap screws ( 21 ) can be screwed into the body.

Now tighten the cap screws completely. The top- and lower part of the stuffing box are centred together with both body sections, and now form a complete unit.

**The assembly of the ball valve is now complete.**

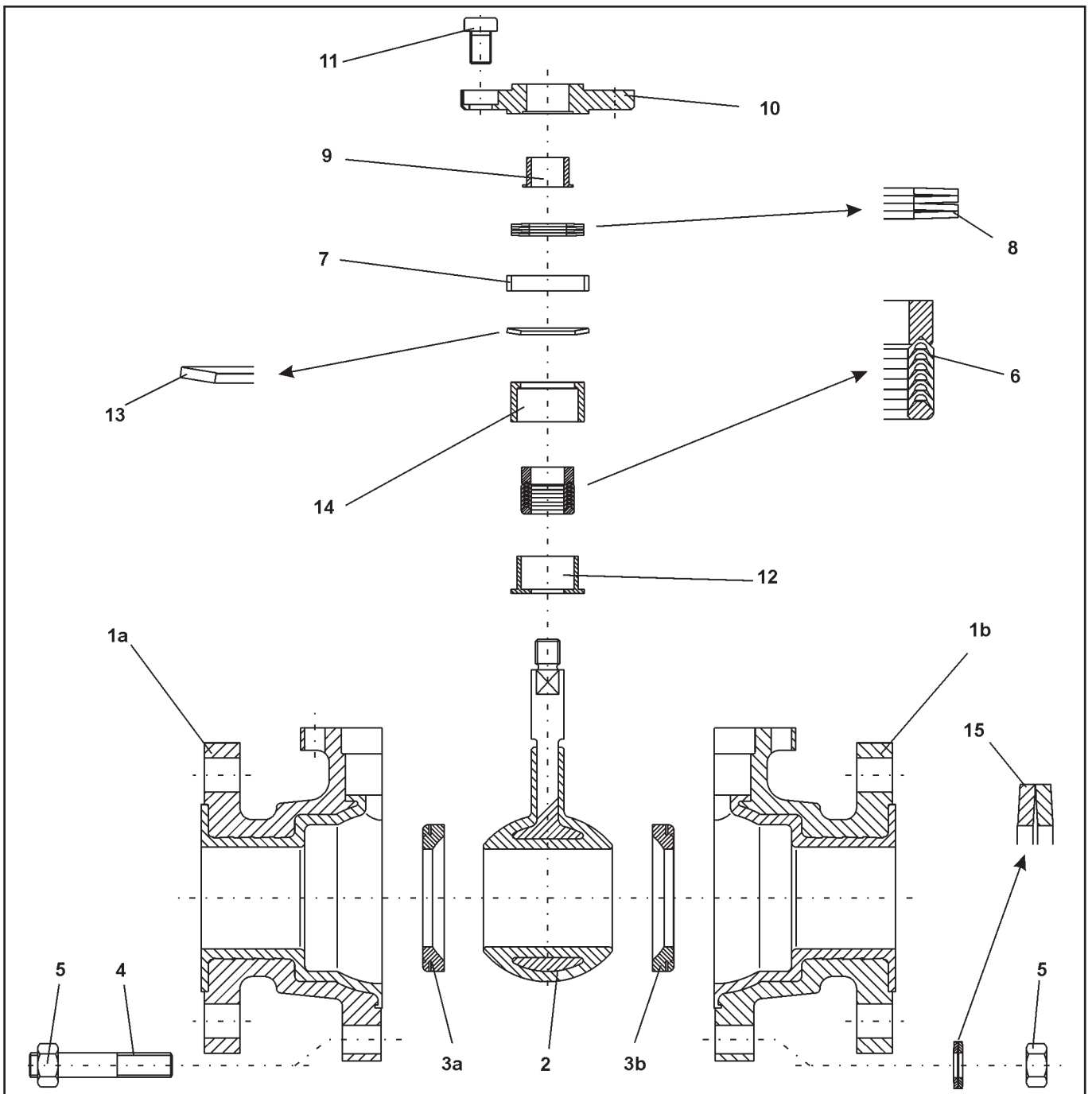


Fig 4 - Explosion drawing for the Series 20a ANSI-Ball valve

Item	Description	Material
1	Body with lining	EN-JS 1049 / PTFE
2	Ball with coating	1.4313 / PFA
3	Set of sealing rings	PTFE
4	Stud bolt	A2-70
5	Nut	A2-70
6	V-ring packing	1.4305 / PTFE
7	Centre ring	1.4301
8	Set of spring washers	1.8159 / DeltaTone

Item	Description	Material
9	Bearing bushing	PTFE with carbon
10	Stuffing box flange	1.4305
11	Screw	A2-70
12	Bushing	PTFE
13	Spring washer	1.4310
14	Bushing	1.4301
15	Spring washer	1.4310

Table 2 - Parts list

### 4.3 Assembly of the ANSI-Ball valve

Insert both sealing rings ( 3a and 3b ) into both body sections ( 1a and 1b ) which are standing on the flange surfaces.



**Note:** Do not install the seat rings without clearance. To achieve tight shut-off of the ball valve, the seat rings must be installed in the seat with sufficient clearance. If this is not possible, contact the manufacturer.

Then place the ball ( 2 ) on the sealing ring of one of the body sections ( 1a or 1b ). The shaft is placed in the side of the stuffing box lead through.

The ball and the control shaft are now guided in the body.

Place the second body part on the previously described mounted unit, so that it centres itself on the ball shaft, and on the sealing ring.

Screw both body sections together hand-tight.

Assembly is with dowel screws, ( 4 ), spring washer ( 15 ) and hexagon nuts ( 5 ).

Refer to the explosion drawing ( Fig. 4 ) for positioning the spring washers.



**Note:** The final screw connection of both body sections is carried out in a later assembly stage.

Push the V-ring packing ( 6 ) in the PTFE-bushing ( 12 ).

Now carefully push the bushing ( 14 ) over the packing and over the PTFE-sleeve ( 12 ).

When the packing unit is pre-assembled, the base ring of the packing ( 6 ) protrudes from the bushing ( 14 ).

The pre-assembled packing unit is placed with light rotation over the shaft of the ball, and placed in the packing recess of the body.

The bushing ( 14 ) is placed on the spring washer ( 13 ). Refer to the explosion drawing ( Fig 4 ) for positioning the spring.

The centre ring 7 is placed on the spring.

The spring washer set ( 8 ) is placed on the base ring of the packing and in the centre ring. Also here, refer to the explosion drawing ( Fig 4 ) for the position of the spring washer set.

Now the bearing bushing ( 9 ) is inserted in the stuffing box flange ( 10 ).

The pre-assembled stuffing box flange is placed on the body and aligned with the cap screws ( 11 ).

Now tighten the screws evenly and alternating pattern, until a gap of 1 - 2mm between stuffing box and body remains.



**Note:** The final screw connection for the stuffing box is carried out in a later assembly stage.

Now tighten the screws in both body parts.



**Note:** The tightening pattern and tightening torque for each nominal size, can be obtained from fig. 5 and table 3 section 4.3

After approx. 24 hours retighten the screws in both body parts.



**Note:** Also here, the tightening pattern and tightening torque for each nominal size can be obtained from fig. 5 and table 3 section 4.3

To complete the assembly, tighten the screws ( 12 ) in the stuffing box ( 11 ).



**Important:** Especially these screws must be tightened firmly.

**The assembly of the ball valve is now complete.**



#### 4.4 Tightening torques for connecting the body sections.

The sequence for bolt connections and tightening torques must be observed when connecting both body sections together.

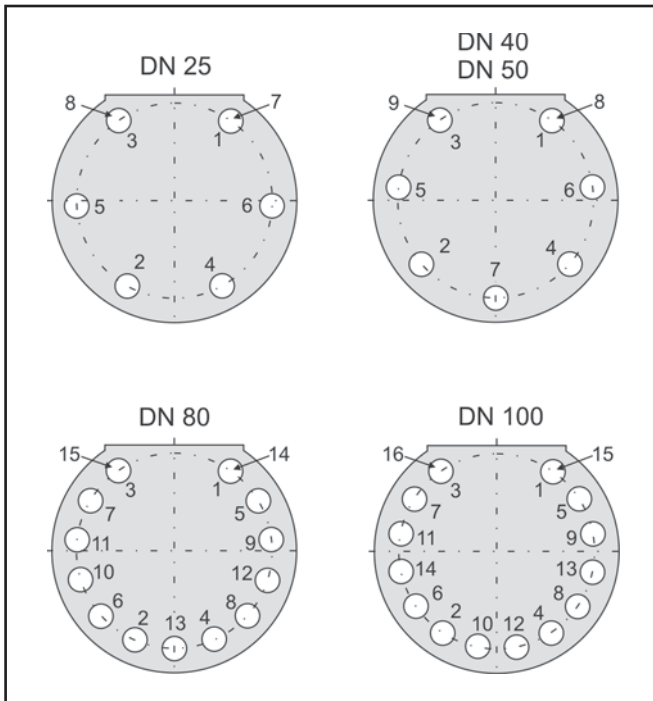


Fig 5 - Sequence for screwing the bolts

Nominal size	Connection	Torque
DN 15	1 to 4	25 Nm
DN 25 / NPS1	1 to 6	25 Nm
	7 to 8	35 Nm
DN 40 / NPS1 1/2	1 to 7	25 Nm
	8 and 9	35 Nm
DN 50 / NPS2	1 to 7	30 Nm
	8 and 9	40 Nm
DN 80 / NPS3	1 to 13	35 Nm
	14 and 15	40 Nm
DN 100 / NPS4	1 to 14	35 Nm
	15 and 16	45 Nm

Table 3 - Tightening torques



**Note:** In compliance with these instructions, the torque and break-off torque in table 3 adjust to within a tolerance margin of +/-15% depending on the nominal size for the standard material PTFE-white.

The sealing in through flow and on the shaft, as well as an efficient function is then assured.

The influence of pressure, temperature, as well as the use of other PTFE-materials can lead to a change in the assembly specifications.

#### 5. Malfunctions and their elimination

Assistance in the case of malfunction is provided in the Operating instructions in section 7

< BA 20a-01 > for automatic ball valves, i.e.

< BA 20a-02 > for manually operated ball valves,

#### 6. Repair of the ball valve



##### Please not the following:

The influence of the medium, also residue by the re-use of old balls and sealings can affect the specified torques in section 4.4 when connecting both bodies together.

##### 6.1 Replacing the packing by the standard version

If a leakage is detected at the stuffing box, the PTFE-rings of the V-ring packing may be defect. It is therefore recommended to check the condition of the packing.

To remove the V-ring packing, disassemble the valve in reverse order to the assembly instructions described in section 4.

As with all other plastic parts, check the PTFE-rings of the V-ring packing for damage, In case of doubt, replace with new parts.

##### 6.2 Replacing the packing by the double stuffing box

If a leakage is detected at the control connection at the lower part of the stuffing box ( 14 ) The PTFE-rings of the V-ring packing ( 7 ) may be defect. It is therefore recommended to check the condition of the packing.

To remove the V-ring packing, disassemble the valve in reverse order to the assembly instructions as described in section 4.

As with all other plastic parts, check the PTFE-rings V-ring packing for damage. In case of doubt, replace with new parts.

If leakage is detected at the stuffing box, the V-ring packing ( 7 ) and ( 18 ) may be defect.

It is therefore recommended to check the condition of the PTFE-rings of both packings.

To remove the packings, disassemble the valve in reverse order to the assembly instructions as described in section 4 As with all other plastic parts, check the V-rings of the V-ring packing for damage. In case of doubt, replace with new parts.

### 6.3 Replacing the sealing unit and the ball

If leakage is located at the flow through of the valve, the sealing ring set ( 3a and 3b ) and the ball ( 2 ) may be defect. It is therefore recommended to check the condition of these components.

The remove the sealing rings and the ball, disassemble the valve in reverse order to the assembly instructions as described in section 4.

Check the sealing rings and the ball for damage. In case of doubt, replace with new parts.



**Note:** Do not install the seat rings without clearance. To achieve tight shut-off of the ball valve, the seat rings must be installed in the seat with sufficient clearance. If this is not possible, contact the manufacturer.

### 6.4 Further repair work

In case of severe damage, we recommend the repair work to be carried out by our skilled service team at Pfeiffer.

### 7. Customer inquiries

( If you have any inquiries, please state the following details)

1. Commission number ( embossed on the nameplate)
2. Type, product number, nominal size and version of valve.
3. Pressure and temperature of the process medium
4. Flow rate in m<sup>3</sup>/h
5. Installation drawing, if possible