

Maintenance and repair instructions

Control valve Series 1b



Fig 1 - Control valve, Series 1b with Samson actuator

1. Introduction

These instructions are intended to support the user in the assembly and repair of control valves for series 1b.

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

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 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 Chemie-Armaturenbau GmbH.

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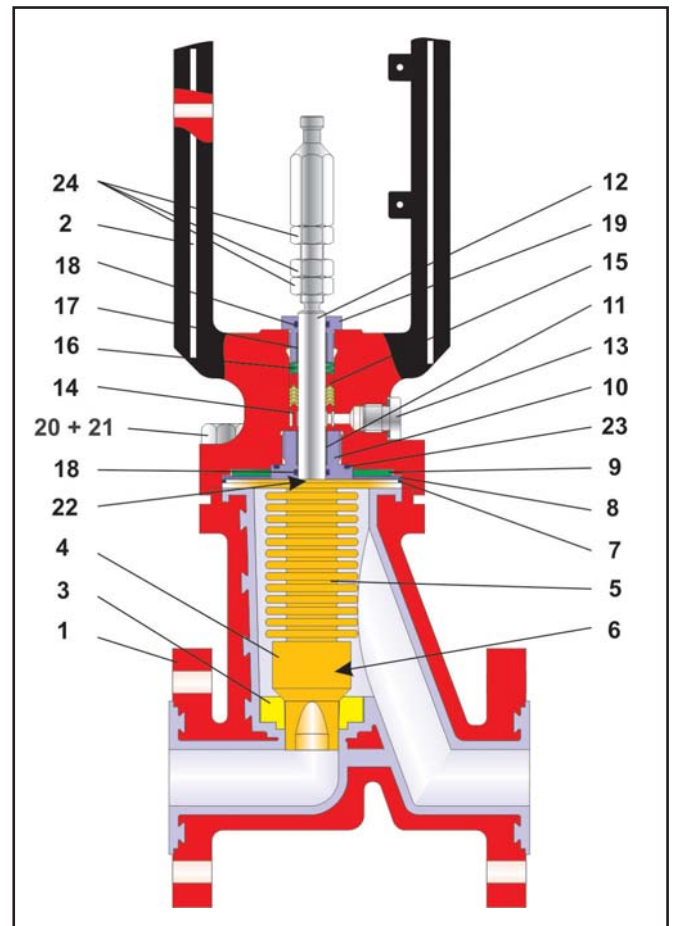


Fig 2 - Sectional view of control valve Series 1b => Parts list, see table 1 on page 3

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This equipment may only be dismantled and disassembled by skilled personnel, who are familiar with the assembly, start-up and operation of this product.

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

2. Design, operation and dimensions

Design, operation and dimensions, als all further technical details can be found in the **Data sheet < TB 01b_EN >**.

3. Installation, start-up and maintenance

Guidelines for the installation, start-up and maintenance can be found in the **Operating instructions < BA 01a-01_EN >** for automatic control valves i.e. **< BA 01a-02_EN >** for manually operated control valves.

4. Assembly of the control valves

The actual version of the control valves, series 1b, **manufactured from 2006**, have distinctive construction differences in the shaft sealing region, compared to the previous version, manufactured up to 2006, which means, these have not been documented in the assembly instructions.

From **page 2**, first the actual control valve is described. From **page 5** you can find the description of the previous control valve.

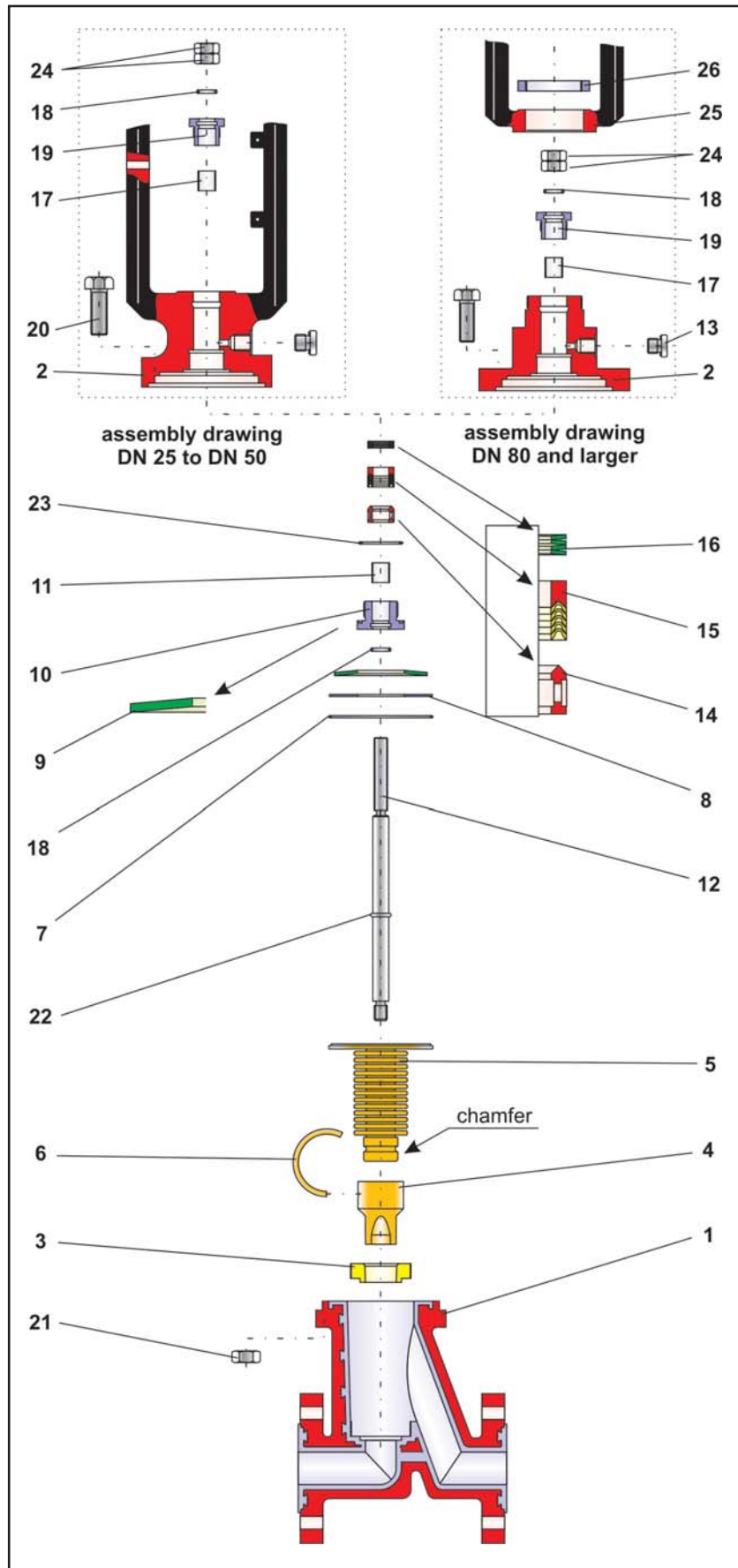


Fig 3 - Explosion drawing of the valve, Series 1b, from year 2006

Pos.	Description	Material
1	Valve body	1049 / PFA
2	Bonnet flange	1049
3	Seat	PTFE
4	Plug	PTFE
5	Bellow	PTFE
6	Cord	PTFE
7	O-ring	EPDM
8	Thrust washer	1.4305
9	Spring washer	1.8159 / Deltatone coated
10	Threaded bushing	1.4305
11	Bearing bushing	PTFE with 25% carbon
12	Shaft unit	1.4571
13	Plug screw	St. / yellow galvanised
14	Distance sleeve	1.4571
15	V-ring packing	1.4305 / PTFE
16	Spring washer set	1.8159 / Deltatone coated
17	Bearing bushing	PTFE with 25% carbon
18	O-ring	Viton
19	Stuffing box	1.4305
20	Screw	A2-70
21	Nut	A2-70
22	Retainer ring	1.4310
23	O-ring	Viton
24	Nut	A2-70
25	Joke	1049
26	Nut	1.0038 / galvanised

Table 1 - Parts list

4.1 Assembly of the actual control valve version, Series 1b from manufacturing year 2006

4.1.1 Preparation for assembly

Before assembling the control valve, all parts must first be cleaned and carefully laid 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 damaged.



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

This grease however many not be used on valves in an oxygen environment. Valves which must be free of grease, especially for use in an oxygen, an appropriate lubrication must be used.



Note: The position and arrangement of individual parts shown in (Fig. 3) must be observed when assembling the valve.

4.1.2 Pre-assembly of the valve body

With the help of a special tool, screw the PTFE-seat (3) in the body (1).

Refer to table 2 for the tightening torques:

Nominal size	Tightening torque
DN 25 / 1"	approx. 7 Nm
DN 40 / 1 1/2"	approx. 10 Nm
DN 50 / 2"	approx. 10 Nm
DN 80 / 3"	approx. 30 Nm
DN 100 / 4"	on request

Table 2 - Tightening torques



Attention: Make sure the seat is not slanted or the thread is damaged when screwing into the body.

Following this, subsequent work to the inside diameter of the seat must be carried out.

4.1.3 Pre-assembly of the shaft unit

Push the retainer ring (22) in the groove on the short threaded side of the shaft (12).

Apply grease to the lower end of the shaft (12) (e.g. micro-slide GP350).

Screw the pre-assembled bellows, with washer and ensat bushing (5) tightly onto the greased thread of the shaft (12).



Note: Due to the sliding property of PTFE, we recommend using emery cloth to prevent the bellows from sliding when screwing onto the shaft.

In order to push the plug onto the stem, make a small notch in the bellows to let air escape. Push the plug (4) onto the bellows (5).

Secure the connection between plug and bellows with PTFE-cord (6) insert as far as possible.

4.1.4 Pre-assembly of the bonnet flange

Place the O-ring (18) in the inside groove of the stuffing box (19).

Press top bearing (17) into the lower part of the stuffing box (19).

Screw the greased thread of the stuffing box (19) in the top of the bonnet flange (2), so the outer recess groove of the stuffing box is still visible.



Note: Do not screw the stuffing box (19) to the end stop.

Clamp the bonnet flange (2) at the joke in a vice, with the flange opening facing upwards.



Note: With DN 80 and DN 100 the joke is assembled at a later stage.

For this reason, the bonnet flange (2) together with the shaft guide, from the stuffing box side, is clamped in a vice facing downwards.

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Attention: Make sure, that the bonnet flange, in particular the thread at the shaft end, is not damaged.

Place the spring washer set (16) in the intended bore. Refer to the explosion drawing (Fig. 3) for the layout and arrangement.

In the correct order, insert now the; End ring, the V-ring of the V-ring packing (15) and the distance bushing (14). Also here, refer to the explosion drawing (Fig. 3) for layout and arrangement.

Press the lower bearing bushing (11) into the top part of the threaded bushing (10).

Place the O-ring (18) in the inside groove, and the O-ring (23) in the collar groove of the threaded bushing.

The greased thread bushing (10) is screwed as far as possible into the bonnet flange (2).



Note: The thread bushing must not be at a slanted angle when screwing into the bonnet flange.



Only for DN 80 and DN 100: The joke (25) is pushed onto the bonnet flange, and tightened with the nut (26).

4.1.5 Final assembly of the bonnet flange

Insert the spring washer (9), the thrust washer (8) and the O-ring (7) in the bonnet flange (2). Refer to the explosion drawing (3) positioning the parts.

Following this, the pre-assembled shaft unit (see section 4.1.3) is inserted in the bonnet, and the flange of the bellows is pressed in the turned recess of the bonnet flange.

To complete the bonnet assembly, the sealing screw (13) is screwed in the flange.

4.1.6 Final assembly of the valve

Clamp the pre-assembled valve body (see section 4.1.2) in a vice with the bonnet opening facing upwards.

Carefully place the pre-assembled bonnet flange (see section 4.1.5) onto the body.

Insert the screws (20) and align with the nuts (21).



Note: To avoid a slanting of the plug when tightening the parts, pull the shaft upwards as far as possible. Following this, tighten the nuts evenly and in alternating pattern.

After adjusting the valve, tighten the stuffing box (19).

The counter nuts (23) are screwed on the shaft. (for adjusting the nuts, see section 4.3).

4.1.7 Final assembly of the valve (version with optional adjustable backup stuffing box)

For the final assembly of the valve, proceed as described in section 4.1.6.

However, do not unscrew the stuffing box (19) and retighten it. Instead, unscrew it completely and remove it from the valve.



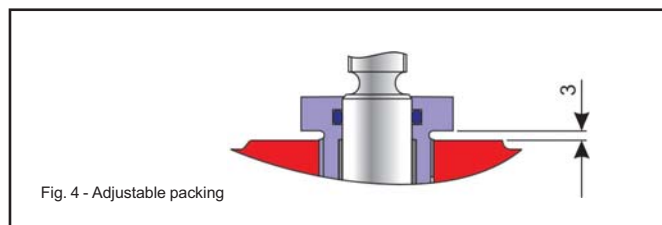
Note!

Clean the removed stuffing box to ensure it is free of grease.

Apply Loctite 668 to the thread of the stuffing box (19). Screw the stuffing box back into the bonnet flange.



Caution! Do not screw tight the stuffing box. The distance between the collar of the stuffing box and the bonnet must be 3 mm!



Seal the stuffing box with a dot of red point.

4.2 Assembly of the control valve, Series 1b for versions up to manufacturing year 2006

4.2.1 Preparation for assembly

Before assembling the control valve, clean all parts carefully and place them on a soft surface (rubber mat, or similar). Take into consideration, that parts made of plastic are generally soft and very sensitive, in particular the sealing surfaces must be handled with care, and not be damaged.



Note: To avoid cold corrosion of the screws in the bodies, the manufacturer has used a high performance lubricating grease (z.B. 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 explosion drawing (Fig. 5) must be observed when assembling the valve.

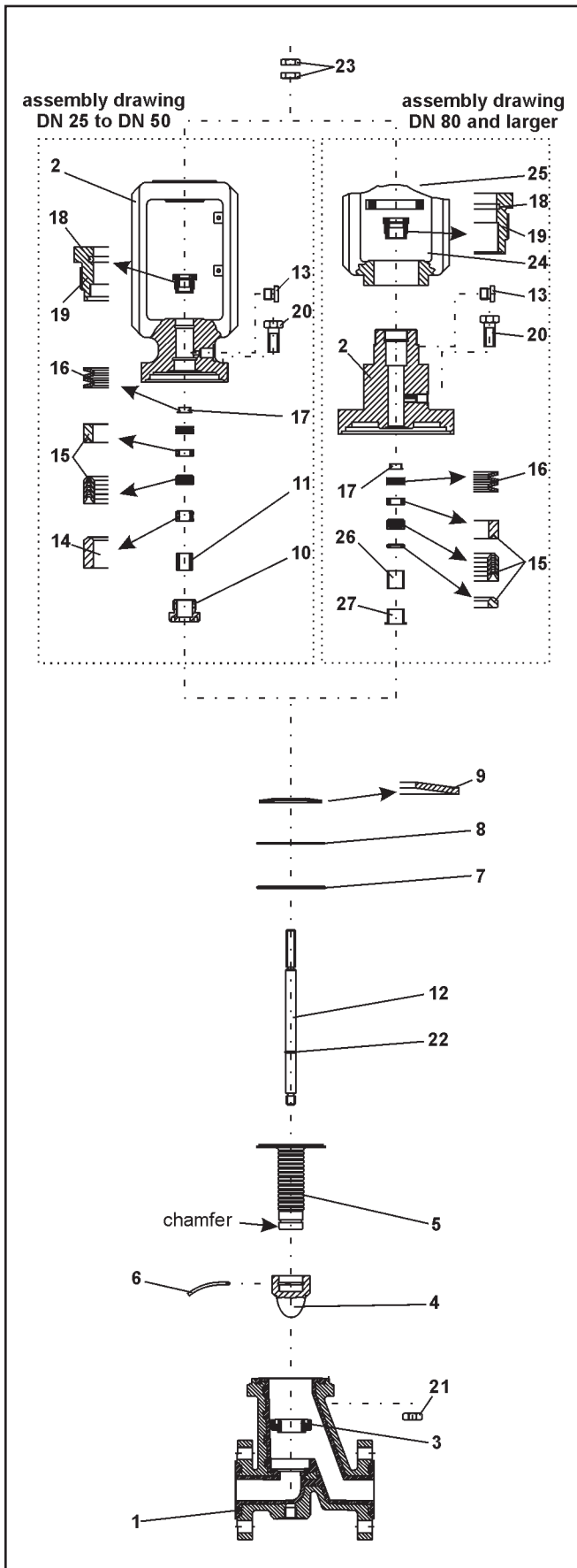


Fig 5 - Explosion drawing of control valve, Series 1b, up to construction year 2006

Pos.	Description	Material
1	Valve body	1049 / PFA
2	Bonnet flange	1049
3	Seat	PTFE
4	Plug	PTFE
5	Bellow	PTFE
6	Cord	PTFE
7	O-ring	EPDM
8	Thrust washer	1.4305
9	Spring washer	.8159 / Deltatone coated
10	Threaded bushing	1.4305
11	Bushing	PTFE with 25% carbon
12	Stem unit	1.4571
13	Plug screw	St. / yellow galvanised
14	Distance ring	1.4571
15	V-ring packing	1.4305 / PTFE
16	Spring washer set	1.8159 / Deltatone coated
17	Bearing bushing	PTFE with 25% carbon
18	O-ring	Viton
19	Stuffing box	1.4305
20	Hexagon screw	A2-70
21	Hexagon nut	A2-70
22	Retainer ring	1.4310
23	Hexagon nut	A2-70
24	Joke	EN-JS 1049
25	Nut	1.0038 / galvanised
26	Sleeve	Glycodur
27	Flange sleeve	Glycodur
28	Threaded pin	A2-70

Table 3 - Parts list

4.2.2 Pre-assembly of the valve body

The PTFE - seat (3) is screwed into the thread of the body (1), using a special tool. The tightening torque is:

Nominal size	Tightening torque
DN 25 / 1"	approx. 7 Nm
DN 40 / 1 1/2"	approx. 10 Nm
DN 50 / 2"	approx. 10 Nm
DN 80 / 3"	approx. 30 Nm

Table 4 - Tightening torque



Attention: When screwing in, make sure that the seat is not slanted, and the thread is not damaged.

Following this, subsequent work to the inside diameter of the seat must be carried out.

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4.2.3 Pre-assembly of the stem unit

Push the retainer ring (22) in the groove on the short threaded side of the shaft (12).

Apply grease to the lower end of the shaft (12) (e.g. micro slide GP350).

Screw the pre-assembled bellows, with washer and ensat bushing (5) tightly onto the greased thread of the shaft (12).



Note: Due to the sliding property of PTFE, we recommend using emery cloth to prevent the bellows from sliding when screwing onto the shaft.

In order to push the plug onto the stem, make a small notch in the bellows to let air escape.

Push the plug (4) onto the bellows (5). Secure the connection between plug and bellows with PTFE- cord (6) insert as far as possible.

4.2.4 Pre-assembly of the bonnet flange

4.2.4.1 Bonnet flange assembly for DN 25 to DN 50

Place the O-ring (18) in the inside groove of the stuffing box (19). Press the top bearing (17) in the lower part of the stuffing box (19).

Screw the greased thread of the stuffing box (19) in the top of the bonnet flange (2), so the outer relief groove of the stuffing box is still visible.



Note: Do not screw the stuffing box (19) to the end stop.

Clamp the bonnet flange (2) at the joke in a vice, with the flange opening facing upwards.

Place the spring washer set (16) in the intended bore. Refer to the explosion drawing (Fig. 5) for the layout and arrangement.

In the correct order, insert now the; End ring, the V-ring of the V-ring packing (15), and the distance bushing (14). Also here, refer to the explosion drawing (Fig. 5) for layout and arrangement.

Press the lower bearing bushing (11) in the turned recess of the threaded bushing (10).

The greased thread bushing (10) is screwed as far as possible in the bonnet flange (2).



Note: The thread bushing must not be at a slanted angle when screwing into the bonnet flange.

4.2.4.2 Bonnet flange assembly for DN 80

Clamp the bonnet flange (2) in a vice, with the shaft guiding bore facing downwards.



Attention: Make sure the bonnet flange, in particular the thread at the shaft end is not damaged.

Using a suitable mandrel, and applying loctite, insert the glycodur-bushing (26), into the shaft guide bore.

Finally, also using loctite, the glycodur-bushing (27) is pressed as far as possible into the shaft guiding bore.

To continue the assembly, the bonnet flange (2) is placed on a clean surface, the flange side facing downwards, and positioned for easy working access to the top opening.

In the following sequence, V-thrust ring, PTFE - ringe and final ring, the V-ring packing (15) is pressed into the intended bore. Refer to the explosion drawing (Fig. 4) for detailed positioning of the V-ring packing.

Finally, insert the spring washer set (16). Also here, refer to the explosion drawing (Fig. 5) for the lay-out of the spring washers.

The O-ring (18) is inserted in the inside groove of the stuffing box (19).

The top bearing bushing (17) is pressed into the bottom part of the stuffing box (19).

After applying grease to the thread of the stuffing box (19), screw into the top of the bonnet flange (2) so, that the outer recess groove of the stuffing box is still visible.



Note: Do not screw the stuffing box (19) to the end stop in the bonnet flange.

Now the joke (24) is pressed onto the bonnet flange and tightened with the nut (25).

4.2.5 Final assembly of the bonnet flange

Place the spring washers (9), the thrust washer (8) and the O-ring (7) into the bonnet flange (2). Refer to the explosion drawing (Fig. 5) for the position and arrangement of the individual parts.

Finally, the pre-assembled shaft unit (see section 4.2.3) is inserted in the bonnet, and the flange of the bellows is pressed into the bonnet flange insert.

Screw in the threaded pin (28). The depth of the slot in the spindle must be considered at all times.

To complete the assembly of the bonnet, the locking screw (13) is inserted.

4.2.6 Final assembly of the valve

Clamp the pre-assembled body (see section 4.2.2) in a vice with the bonnet opening facing upwards.

Carefully place the ready mounted bonnet flange (see section 4.2.5) on to the body.

Insert the screws (20) and align with the bolts (21).



Note: To avoid the plug slanting, pull the shaft upwards to the end stop before tightening the screws. Following this, tighten the screws evenly and in alternating pattern.

After the valve has been adjusted, the stuffing box (19) is tightened.

The conter nuts (23) are screwed onto the shaft (**for adjusting the nuts, see section 4.3**).

4.2.7 Final assembly of the valve (version with optional adjustable backup stuffing box)

For the final assembly of the valve, proceed as described in section 4.2.6.

However, do not unscrew the stuffing box (19) and retighten it. Instead, unscrew it completely and remove it from the valve.



Note!

Clean the removed stuffing box to ensure it is free of grease.

Apply Loctite 668 to the thread of the stuffing box (19). Screw the stuffing box back into the bonnet flange.



Caution! Do screw tight the stuffing box. The distance between the collar of the stuffing box and the bonnet must be 3 mm!

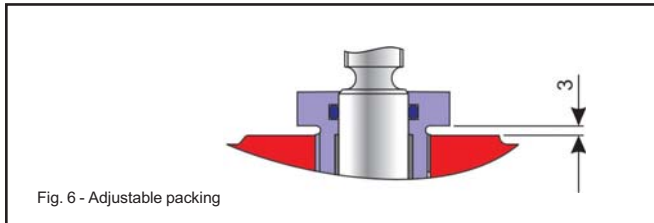


Fig. 6 - Adjustable packing

Seal the stuffing box with a dot of red point.

4.3 Stroke adjustment

If the control valve and Samson actuator are delivered separately, the measurement „ A “ from the top of the stem drive nut to the top of the jock is set as specified in table 5, check this when assembling.

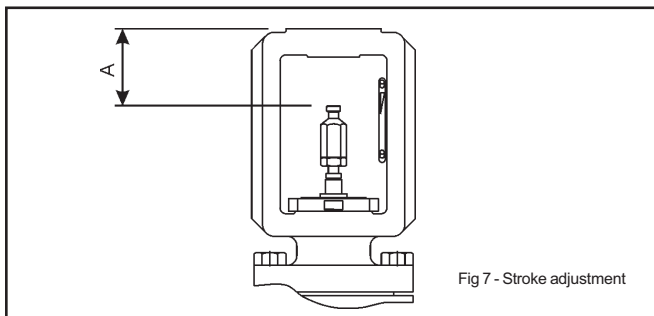


Fig 7 - Stroke adjustment

Hubeinstellung bei Samsonantriebe (Ventil geschlossen)	
DN	A
25 bis 80	75 ± 0,1
100	90 ± 0,1

Table 5 - Stroke adjustment

4.3.1 Stroke limit stop

- **Mechanical limit stop for actuator fail-safe action „Actuator stem extends - STAF“**

The setting for the mechanical limit stop for the actuator fail-safe action air-to open, is set with a retainer ring (22), which is inside the valve stem. The setting is carried out in the factory.

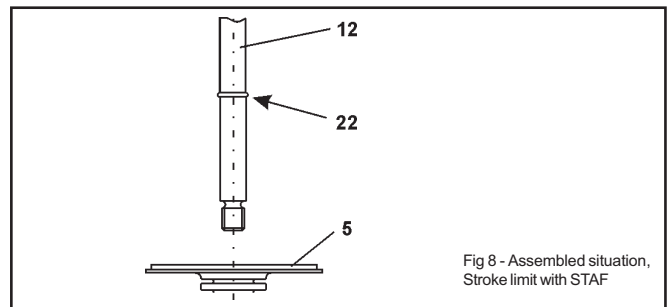


Fig 8 - Assembled situation, Stroke limit with STAF

- **Mechanical limit stop for actuator fail-safe action „Actuator stem retracts - STEF“**

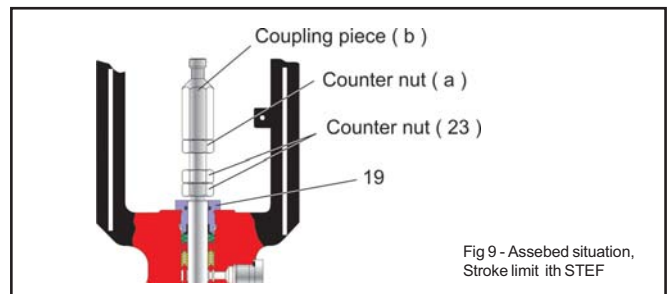


Fig 9 - Assembled situation, Stroke limit with STEF

The mechanical limit stop for the actuator fail-safe „Air-closed“ erfolgt with two counter nuts (23), which are mounted on the valve stem.

The nuts (23) are secured in position with approx. 2 mm clearance to the top of the stuffing box (19).

Theoretical stroke (Samson-Actuator) 15 +0,5 to 1mm

Assembly of the control valve is now complete.

5. Trouble shooting

Action to be taken in case of malfunction is described in the **Operating instructions**

< BA 01a-01_EN > for automatic control valves, i.e.

< BA 01a-02_EN > for manually operated control valves, in **Section 7**.

6. Repairing the control valve

6.1 Replacing the bellows

If leakage is detected at the control connection (13) the bellows (5) may be defect. We therefore recommend checking the condition of the bellows.

To remove the bellows, disassemble the valve in reverse order to the assembly instructions described in section 4. As with all plastic parts, check the bellows for damage. In case of doubt, replace the parts.

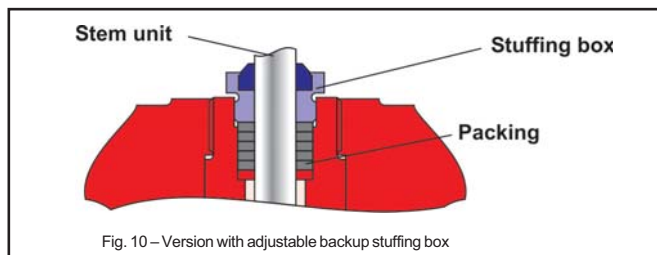
6.2 Replacing the bellows and V-ring packing

If leakage is detected at the stuffing box, the V-ring packing and the bellows may be defect. We therefore recommend checking the sealing of the packing and the bellows.

To remove the bellows and the packing, disassemble the valve in reverse order to the assembly instructions as described in section 4.

As with all plastic parts, check the packing and the bellows for damage. In case of doubt, replace the parts.

6.3 Readjustment of the stuffing box (option)



This version does not have a leak-off connection on the bonnet.

The backup stuffing box:

- Not gas tight from around 2 bar in the delivered state
- Stuck in position with Loctite 668
- Seal with red paint as a marking.
Adjustment YES/NO
- Can be tightened approximately 3 mm further, making it gas tight up to 16 bar.

The glued connection:

- Constantly stuck, but the stuffing box can still be tightened with a tool
- Designed for a temperature range between -10 to +200 °C

If the valve leaks at the stuffing box, the bellows is defective.



Caution! All necessary safety measures must be taken to avoid any possible accidents. Always take into account that you are nearly always dealing with dangerous medium.

Tighten the stuffing box.



Caution! The valve no longer leaks, however, it should be repaired as quickly as possible, as there is no primary sealing. The sealing through the stuffing box should only be for a short period.

The repair work is described in section 6.1.

6.4 Further repair work

In case of severe damage, we recommend the repair work to be carried out by Pfeiffer.

7. Customer inquiries

Should you have any inquiries, please submit the following details:

1. Order number (embossed on the control valve body)
2. Type, product number, nominal size, and version of the valve
3. Pressure and temperature of the process medium
4. Flow rate in m³/h
5. Installation sketch, if possible

For your special requirements, please contact our technical sales team.

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Specifications and versions are subject to modification without notice