

MOUNTING AND OPERATING INSTRUCTIONS



EB 8222 EN

Translation of original instructions



Type 3310/3278 with positioner



Type 3310/AT

Type 3310/AT and Type 3310/3278 Pneumatic Control Valve Type 3310 Segmented Ball Valve

Edition December 2016



Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact SAMSON's After-sales Service Department (aftersaleservice@samson.de).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website at www.samson.de > **Service & Support** > **Downloads** > **Documentation**.

Definition of signal words

DANGER

Hazardous situations which, if not avoided, will result in death or serious injury

WARNING

Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE

Property damage message or malfunction

Note

Additional information

Tip

Recommended action

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1 General safety instructions



- The control valve must be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger.
- All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up and maintenance, must be strictly observed.
- The control valves comply with the requirements of the European Pressure Equipment Directive 2014/68/EU. Valves with a CE marking have a declaration of conformity, which includes information about the applied conformity assessment procedure. The declaration of conformity can be viewed and downloaded at ► <http://www.samson.de>.
- To ensure appropriate use, only use the valve in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the valve at the ordering stage. The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
- Any hazards that could be caused in the valve by the process medium, the operating pressure, the signal pressure or by moving parts are to be prevented by taking appropriate precautions.
- Proper shipping and storage are assumed.
- For installation and maintenance, make sure the relevant section of the pipeline is depressurized and, depending on the process medium, drained as well. Depending on the field of application, allow the valve to cool down or heat up to reach ambient temperature before starting any work on it.
- When working on the valve, make sure that the pneumatic air supply as well as the control signal are disconnected to prevent any hazards caused by moving parts.

2 Design and principle of operation

The pneumatic control valve consists of the Type 3310 Segmented Ball Valve and either the SAMSON PFEIFFER Type AT or the SAMSON Type 3278 Pneumatic Rotary Actuator.

The control valve is designed for both throttling and on/off service in process engineering and plants with industrial requirements. The control valve is suitable for liquids, vapors and gases at temperatures from -29 to +220 °C and pressure rating of Class 150 and 300.

The segmented ball valve in valve sizes NPS 1 to 12 is available with a soft-seated or metal-seated ball. The version used is marked on the nameplate of the valve body (see section 8).

The process medium flows through the valve. The signal pressure applied to the rotary ac-

tuator determines the position (opening angle) of the segmented ball (8) and thus the cross-sectional area of flow between the ball and body (1). The actuator motion is transmitted to the segmented ball valve by a shaft with square or key drive. The valve shaft (4) is sealed by a self-adjusting PTFE V-ring packing (2.3).

2.1 Fail-safe position

2.1.1 Type SRP (single-acting version)

The fail-safe position of the control valve upon supply air (signal pressure) failure is determined in Type 3310/AT (Type SRP single-acting version) by the version used and in Type 3310/3278 by how the rotary actuator is mounted to the valve.

1	Body	4.3	Snap ring	11.3	Gasket
2	Packing gland	5	Support shaft	11.4	Washer
2.1	Bearing bushing	5.1	Bearing bushing	11.5	Metal tubular seal
2.2	Screws	5.2	Threaded pin	11.6	Seat ring (metal)
2.3	V-ring packing	5.3	Clamping bolt	11.7	Support ring
2.4	Washer	5.4	Locking pins	11.8	Seat ring (PTFE)
2.5	Spring	8	Segmented ball	12	Type AT Actuator
2.6	Washer	10	Bottom flange	12.1	Stop bolt
2.7	Spacer	10.1	Flange gasket	12.2	Stop bolt
3	Yoke	10.2	Flange ring	13	Type 3278 Actuator
3.1	Screws	10.3	Flange bolts	13.1	Stop bolt
4	Shaft	11	Retainer	13.2	Stop bolt
4.1	Bearing bushing	11.1	Screw		
4.2	Key drive	11.2	Washer		

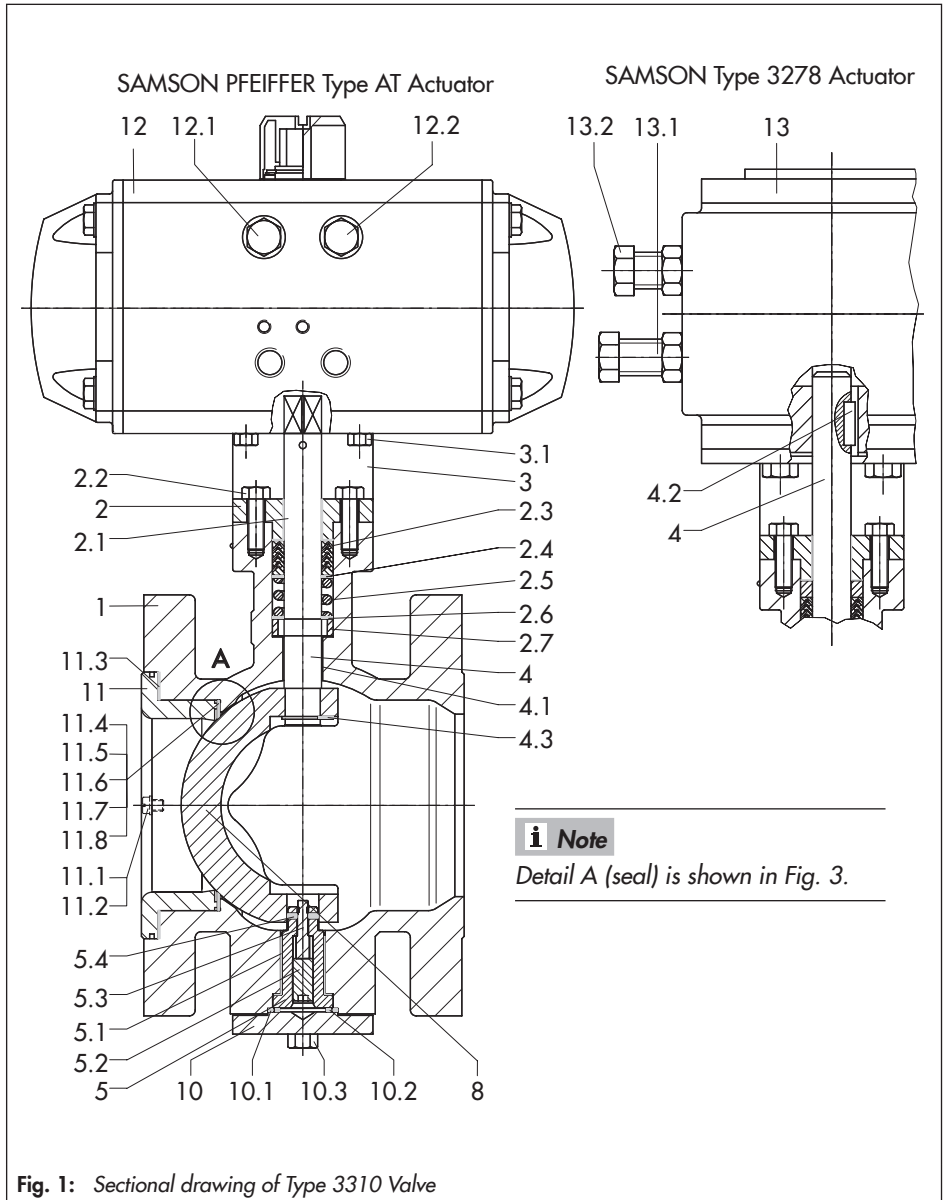


Fig. 1: Sectional drawing of Type 3310 Valve

Mounting

Fail-close

When the pressure is relieved from the rotary actuator or the supply air fails, the actuator springs close the valve. The valve opens opposing the force of the actuator springs when the signal pressure increases.

Fail-open

When the pressure is relieved from the rotary actuator or the supply air fails, the actuator springs open the valve. The valve closes opposing the force of the actuator springs when the signal pressure increases.

2.1.2 Type DAP (double-acting version)

The Type DAP Rotary Actuator (double-acting) has no springs. A defined final position is not reached when the supply air fails.

3 Mounting

3.1 Assembling valve and actuator

3.1.1 Type 3310-SRP

Proceed as follows if the valve and actuator have not been assembled by SAMSON:

i Note

In the standard actuator version (SRP = single-acting with spring return mechanism), the spring return mechanism is designed to close clockwise when there is no signal pressure.

If you require a different direction of rotation or a double-acting actuator (DAP = double-acting without spring return mechanism), this specification must be submitted on ordering the actuator.

Table 1: Type 3310-SRP

Fail-safe position	Springs	Characteristic
Fail-close	Clockwise	Equal percentage
Fail-close	Counterclockwise	Linear
Fail-open	Clockwise	Linear
Fail-open	Counterclockwise	Equal percentage

The square drive allows the actuator to be mounted on the segmented ball valve offset at angles of 90° in such a way that it is either in the upright or horizontal position to meet the installation requirements.

Fail-close

1. Place the segmented ball (8) of the valve in the CLOSED position (0° angle of rotation).
2. Fasten the yoke (3) to the flange of the valve shaft using two or four screws (depending on the valve size).
3. If necessary, place the shaft adapter on the valve shaft. Slide the actuator over the adapter or valve shaft (4) and fasten it onto the yoke with four screws.
4. Adjust the stop bolt (12.1 or 12.2 depending on the direction of rotation) to the point where the valve is completely closed and align the markings on the shaft and packing gland.
5. Lock the position of the stop bolt with the lock nut.
6. Apply a signal pressure to the signal pressure connection which corresponds to the number of actuator springs (see actuator nameplate).
7. Turn the other stop bolt until the segmented ball stops at an opening angle of 90°.
8. Lock the position of the stop bolt with the lock nut.

Fail-open

1. Place the segmented ball (8) of the valve in the OPEN position (90° angle of rotation).
2. Fasten the yoke (3) to the flange of the valve shaft using two or four screws (depending on the valve size).
3. If necessary, place the shaft adapter on the valve shaft. Slide the actuator over

the adapter or valve shaft (4) and fasten it onto the yoke (3) with four screws (3.1).

4. Adjust the stop bolt (12.1 or 12.2 depending on the direction of rotation) to the point where the valve is completely open at 90° and align the markings on the shaft and packing gland.
5. Lock the position of the stop bolt with the lock nut.
6. Apply a signal pressure to the signal pressure connection which corresponds to the number of actuator springs (see actuator nameplate).
7. Turn the other stop bolt until the segmented ball is completely closed and align the markings on the shaft and packing gland.
8. Lock the position of the stop bolt with the lock nut.

3.1.2 Type 3310/3278

If the valve and actuator have not been assembled by SAMSON, mount the actuator onto the body flange 1 or 2 depending on the characteristic and fail-safe position.

'1' or '2' is cast on the corresponding side of the body.

Table 2: *Type 3310/3278*

Fail-safe position	Characteristic	Body flange
Fail-close	Equal percentage	2
Fail-close	Linear	1
Fail-open	Equal percentage	1
Fail-open	Linear	2

Mounting

The four feather key notches on the actuator shaft arranged every 90° allow the rotary actuator to be mounted on the segmented ball valve offset at angles of 90° in such a way that it is either in the upright or horizontal position to meet the installation requirements.

Fail-close

1. Completely undo both stop bolts (13.1 and 13.2) on the rotary actuator. Turn the stop bolt (13.2) clockwise until the grooves of the actuator shaft are aligned with the actuator axis horizontally or vertically.
2. Place the segmented ball (8) of the valve in the CLOSED position (0° angle of rotation).
3. Fasten the yoke (3) to the flange of the valve shaft using two or four screws (depending on the valve size).
4. Slide the actuator over the valve shaft (4) and fasten it onto the yoke (3) with four screws.
5. Undo the stop bolt (13.2) again.
6. Adjust the stop bolt (13.2) to the point where the valve is completely closed and align the markings on the shaft and packing gland.
7. Apply a supply pressure required for the spring range (see actuator nameplate) to the loading pressure connection to open the valve.
8. Turn the stop bolt (13.1) clockwise until the segmented ball (8) of the valve is in the OPEN position (90° angle of rotation).

9. Lock the position of both stop bolts with the lock nuts.

Fail-open

1. Completely undo both stop bolts (13.1 and 13.2) on the rotary actuator. Turn the stop bolt (13.1) clockwise until the grooves of the actuator shaft are aligned with the actuator axis horizontally or vertically.
2. Place the segmented ball (8) of the valve in the OPEN position (90° angle of rotation).
3. Fasten the yoke (3) to the flange of the valve shaft using two or four screws (depending on the valve size).
4. Slide the actuator over the valve shaft (4) and fasten it onto the yoke (3) with four screws.
5. Undo the stop bolt (13.1) again.
6. Apply a supply pressure required for the spring range (see actuator nameplate) to the loading pressure connection to close the valve.
7. Adjust the stop bolt (13.1) to the point where the segmented ball is completely closed and align the markings on the shaft and packing gland.
8. Disconnect the supply air from loading pressure connection.
9. Turn the stop bolt (13.2) clockwise until the segmented ball (8) of the valve is in the OPEN position (90° angle of rotation).
10. Lock the position of both stop bolts with the lock nuts.

3.2 Mounting position

i Note

Prior to installing the valve into the pipeline, place it in the CLOSED position to allow the seat to be centered properly with the segmented ball.

The control valve can be installed into a pipeline either in the upright or horizontal position. However, the following points regarding the direction of flow must be observed:

- Install the valve into the pipeline in such a way that the bottom half of the segmented ball opens in the direction of the flow.
This helps to prevent dirt deposits from accumulating and blocking the valve when it opens. The direction of medium flow into the ball also prevents the medium from collecting unnecessarily in the shaft bearings.
- The standard direction of flow (onto the segmented ball) is indicated by SAMSON by an arrow on the valve body.
- If the direction of flow is to be reversed, e.g. required for abrasive media, indicate the reversed direction by using the arrow plate and the two slotted pins included in the scope of delivery.
This direction of flow causes the pressure of the process medium to constantly act on the packing. On tightening the flange bolts, make sure that an even pressure is exerted on the gaskets.

3.3 Signal pressure connection

The signal pressure connection of the rotary actuator is designed as a borehole with a G 1/8 female thread for small actuators and with G 1/4 female thread for large actuators.

The connection allows in compliance with VDE/VDE 3845 guidelines the connection of a solenoid valve, e.g. Type 3963, or a limit switch with or without a solenoid valve (Type 3776/3777).

The corresponding accessories are available to mount SAMSON positioners.

4 Operation

4.1 Changing the fail-safe action

The fail-safe action of Type 3278 Actuator can be changed from fail-close to fail-open or vice versa after the valve has been installed. In this case, the side where the rotary actuator is mounted must be changed (see Table 2).

The pistons of the Type SRP Actuator must be reversed to change the fail-safe action.

i Note

Refer to the mounting and operating instructions of the rotary actuator used for further details, for example about changing the spring range to achieve other actuator torques.

5 Servicing

The control valve is subject to normal wear, especially at the seat, segmented ball and packing. Depending on the operating conditions, check the valve at regular intervals to prevent possible failure before it can occur.

External leakage can indicate that the packing is defective.

If the valve does not close tightly, tight shut-off may be impaired by dirt stuck between the seat ring and segmented ball or by damaged facings.

→ If you intend to remove parts to clean them, first mark the position of the seat ring (11.8) in the body for a valve with soft-seated ball. This will help you to replace the seat ring in its correct position on reassembling the valve.

→ To replace the seat ring (11.6 or 11.8), proceed as described in section 5.3.

→ Before starting any work on the valve body, first remove the actuator (see section 5.1).

⚠ WARNING

Remove the valve from the pipeline before removing any parts from the valve. Before proceeding, depressurize the relevant plant section.

Wait until the medium cools down if hot media are used.

5.1 Removing the actuator from the valve

→ Unscrew the two or four screws on the flange of the valve shaft and pull off the actuator together with the yoke (3) from the valve.

5.2 Replace the packing

The valves in NPS 1 to 12 are fitted with a V-ring packing.

1. Undo the screws (2.2). Lift off the packing gland (2) with the bearing bushing (2.1).

2. Pull all the packing parts out of the packing chamber using a suitable tool. Clean the packing chamber thoroughly.
 3. Renew the packing (2.3). Slide the packing parts over the shaft (4) into the packing chamber.
 4. Push the packing gland (2) together with bearing bushing (2.1) onto the shaft (4). Tighten the packing gland using the screws (2.2).
 5. Assemble as described in section 5.4.
3. **Soft-seated version:** remove the support ring (11.7) and seat ring (11.8).
Metal-seated version: remove in sequence any washer(s) (11.4), metal tubular seal (11.5) and seat ring (11.6).
 4. Assemble as described in section 5.4.

5.4 Assembly

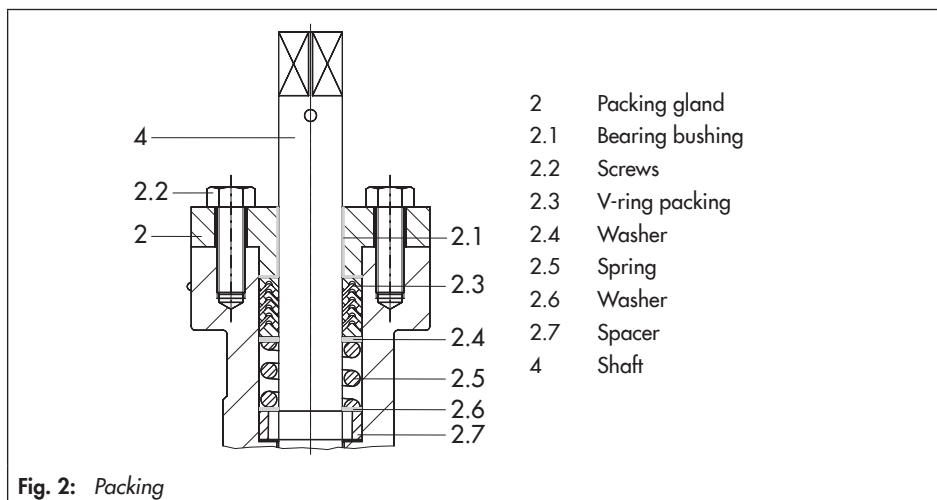
Assemble in the reverse order. Special tools are not necessary.

Tip

The retainer (11) can be pressed into the body using, for example, a blank flange, by tightening the flange bolts accordingly. In this case, first place the valve in the CLOSED position to center the seat ring and segmented ball.

5.3 Replacing the seat ring seal

1. Remove both anchoring screws (11.1) with washers (11.2).
2. Take out the retainer (11) together with the gasket (11.3).
 If you are unable to remove the retainer, use the special tool listed in Table 3.



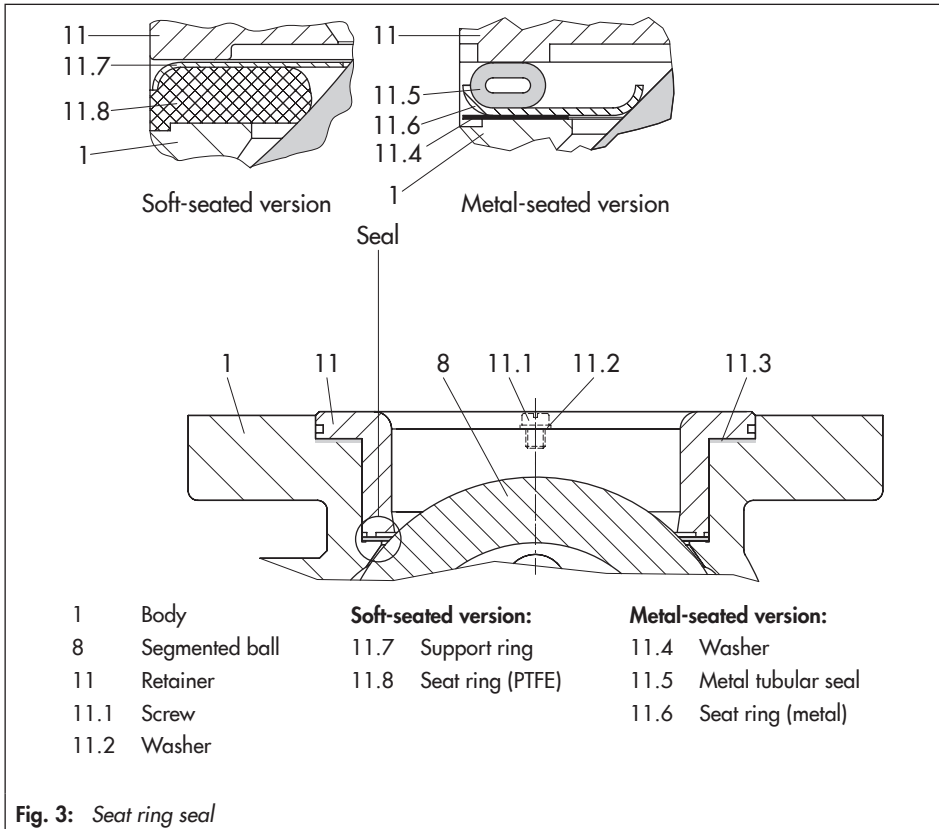


Fig. 3: Seat ring seal

Checking the friction torque

Check the friction torque (breakaway torque) needed to open the valve according to Table 4.

If the friction torque is different from the torque specified in the table, proceed as follows:

- **Soft-seated version:** turn the segmented ball clockwise by 360° in the valve body two or three times to let the seal adapt itself.
- **Metal-seated version:** change the number of washers (11.4) used. If necessary, omit the bottom washer on the valve body side.

5.5 Replacing the segmented ball, shafts and bearings

NOTICE

Risk of valve damage.

No clearance may exist between the segmented ball and shafts. Therefore, the shafts need to be replaced as well when the segmented ball is replaced with a new one. Furthermore, renew the bearing bushings and seat rings as well as the ring and gasket on the bottom flange as well.

5.5.1 Disassembly

1. Unscrew both bolts (10.3) and lift off bottom flange (10) together with the ring (10.2). Remove the flange gasket (10.1).
2. Unscrew the threaded pin (5.2) out of the shaft and remove the clamping bolt (5.3). Make sure that the locking pins (5.4) do not get lost
3. Press out the support shaft.

Tip

If this is not possible, screw in a screw with a washer (see Table 3) in place of the threaded pin. Turning the screw against the washer loosens the support shaft.

4. Pull the bearing bushing (5.1) out of the body.
5. Undo the screws (2.2) and lift off the packing gland (2) with the bearing bushing (2.1).

6. Use snap ring pliers to pull the snap ring (4.3) off the shaft and pull the shaft out of the body using disassembling tool.
7. Pull all the packing parts out of the packing chamber using a suitable tool. Clean the packing chamber thoroughly.
8. Remove the lower bearing bushing (4.1).
9. Take the segmented ball out of the body.

Note

The segmented ball of valves in NPS 1, 1 ½ and 2 must be removed from the retainer side. Proceed as described in section 5.3, dismantling first the retainer and then the seat ring parts.

5.5.2 Assembly

Tip

We recommend ordering the assembly tools listed in Table 3 for reassembling the valve.

Assemble in the reverse order. Observe the tightening torques specified in section 7.

On inserting the shaft (4) into the body and segmented ball, make sure that the shaft is aligned correctly with the segmented ball (the red marking on the shaft must be positioned at a right angle to the pipeline when the valve is closed).

1. Insert the segmented ball (8) into the valve body.
2. Push the bearing bushing (4.1) into the body, then align the shaft (4) and use an

Servicing

- assembling tool to press the bearing bushing into the segmented ball.
- Use the part of the tool that is in the bearing of the support shaft to slide the segmented ball (8) onto the shaft (4) and attach the snap ring (4.3).
 - Insert the locking pins (5.4) into the holes of the support shaft (5), then position the complete support shaft (5, 5.2, 5.3 and 5.4) on the bearing bushing (5.1) and use the packing gland (2) to press them in.
 - Align the segmented ball (8) centrally.
 - Screw the threaded pin (5.2) against the clamping bolt (5.3) to obtain a force-locking connection between the support flange and segmented ball.

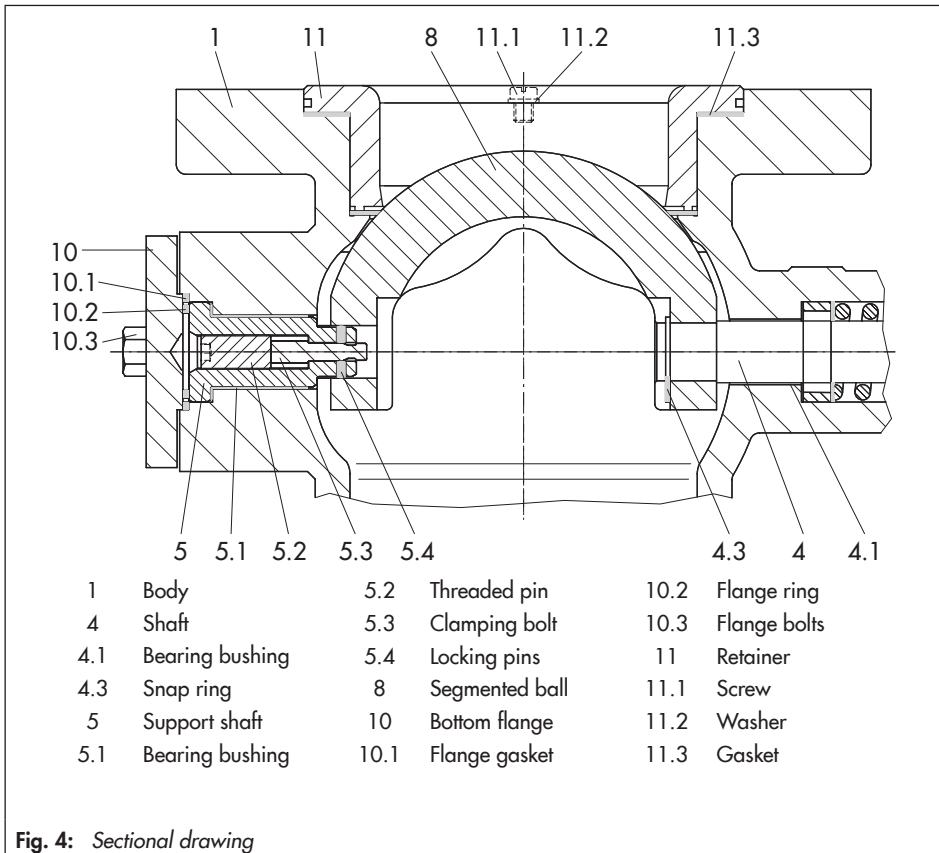


Fig. 4: Sectional drawing

7. Mount the packing with spacer (2.7), washer (1.6), spring (2.5), thrust washer (2.4), packing (2.3) and packing gland (2).

Checking the friction torque

Check the friction torque (breakaway torque) needed to open the valve according to Table 4.

If the friction torque deviates from the specified torque, proceed as described in section 5.4 on Checking the friction torque.

6 Changing the characteristic

Changing the characteristic from equal percentage to linear and vice versa can be performed by changing the actuator's direction of rotation (see Table 1 and Table 2).

7 Tools and tightening torques

7.1 Special tools

Table 3: *Special tools*

	Extracting tool for retainer (11)		Extracting tool for support shaft (5)	Tool to mount and remove the shaft	
	Crossbeam	Flange		Press tool for support shaft	Press tool for actuator shaft
NPS	Order no.				
1	1281-0011	1281-0007	1281-0026	1281-0019	1281-0023
1½	1281-0012			1281-0020	
2	1281-0013	1281-0008			
3	1281-0014				
4	1281-0015	1281-0009	1281-0027	1281-0021	1281-0024
6	1281-0016				
8	1281-0017	1281-0010	1281-0028	1281-0022	1281-0025
10	1281-0018				
12					
Adapter for torque wrench		Shaft with square drive	Shaft with key drive		
NPS	1, 1½, 2, 3	1281-0029	1281-0032		
	4, 6	1281-0030	1281-0033		
	8, 10	1281-0031			
	12				

7.2 Tightening torques

Table 4: *Tightening and friction torques*

Valve size	NPS	1	1½	2	3	4	6	8	10	12
Tightening torques in Nm										
Screws (2.2) on packing gland Bolts (10.3) on bottom flange		35	35	35	35	35	35	60	60	60
Friction torque to open the valve in Nm										
Metal seal		8	10	11	19	40	70	100	155	155
Soft seal		9	12	14	24	50	100	170	260	260

7.2.1 Tightening torques for flange bolts

Table 5: *ANSI version*

NPS	Class	Flange bolts (quality 8.8)	Min. tightening torque in Nm
1	150	4 x ½"	35
	300	4 x ⅝"	45
1½	150	4 x ½"	45
	300	4 x ¾"	65
2	150	4 x ⅝"	90
	300	8 x ⅝"	45
3	150	4 x ⅝"	125
	300	8 x ¾"	65
4	150	8 x ⅝"	80
	300	8 x ¾"	80
6	150	8 x ¾"	125
	300	12 x ¾"	80
8	150	8 x ¾"	165
	300	12 x ⅞"	125
10	150	12 x ⅞"	155
	300	16 x 1"	135
12	150	12 x ⅞"	155
	300	16 x ⅞"	125

Tools and tightening torques

Table 6: *DIN version*

DN	PN	Flange bolts (quality 8.8)	Min. tightening torque in Nm
25	10/40	4 x M12	40
40	10/40	4 x M16	55
50	10/40	4 x M16	75
80	10/16	8 x M16	55
	25/40	8 x M16	55
100	10/16	8 x M16	70
	25/40	8 x M20	85
150	10/16	8 x M20	125
	25/40	8 x M24	150
200	10	8 x M20	165
	16	12 x M20	110
	25	12 x M24	135
	40	12 x M27	150
250	10	12 x M20	140
	16	12 x M24	165
	25	12 x M27	185
	40	12 x M30	205
300	10	12 x M20	140
	16	12 x M24	165
	25	16 x M27	140
	40	16 x M30	165

8 Nameplate

The nameplate includes all details required to identify the valve.



Fig. 5: Nameplate

- 1 Type number
- 2 Serial number
- 3 Valve size DN .../NPS ...
- 4 Plug seal:
 - ME Metal seal
 - PT PTFE
 - PK PEEK 450G Victrex®
 - PK1 PEEK 450FC30 Victrex®
- 5 Body material
- 6 Pressure rating PN .../Class ...
- 7 Flow coefficient K_{VS} .../ C_V ...
 - Characteristic:
 - % Equal percentage
 - LIN Linear
- 8 PED text
- 9 Notified body
- 10 Year of manufacture
- 11 Direction of flow and maximum opening angle

9 Accessories

Table 7: *Accessories*

NPS	Type SRP/DAP Actuator (AT)	Connecting flange DIN 3337	Mounting kit order no.	Actuator area in cm ² (Type 3278)	Mounting kit order no.
1	30 60	F05	1400-7316	160 (F07)	1400-7251
1½	60 100	F05 F07	1400-7316 1400-7317		
2	60 100 150	F05 F07 F07	1400-7348 1400-7239 1400-7239		1400-7252
3	100 150 220	F07 F07 F10	1400-7239 1400-7239 1400-7732		
4	220 300 450	F10 F10 F12	1400-7240 1400-7240 1400-7241	320 (F12)	1400-7255
6	300 450 600	F10 F12 F12	1400-7240 1400-7241 1400-7241		
8	600 900 1200	F12 F14 F14	1400-7755 1400-7243 1400-7243		
10	900 1200	F14 F14	1400-7243		
12	900 1200	F14 F14	1400-7243		

10 Technical data

The technical data as well as the dimensions and weights for the DIN and ANSI versions of the Type 3310 Segmented Ball Valve are listed in the corresponding Data Sheet

► T 8222.

11 Customer inquiries

Please submit the following details:

- Order number (specifications on the nameplate)
- Type, model number, nominal size and valve version
- Pressure and temperature of the process medium
- Flow rate in m³/h
- Signal pressure range (bench range)
- Installation drawing

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