

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

Type 3310 Segmented Ball Valve



Fig. 1 · Type 3310/AT



*Fig. 2
Type 3310/3278
with attached positioner*

Mounting and operating instructions

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Contents	Page
1. Design and principle of operation	4
2. Installation	6
2.1 Assembling valve and actuator	6
2.1.1 Type 3310-SRP	6
2.1.2 Type 3310/3278	7
2.2 Mounting position	8
2.4 Loading pressure connection	8
3. Operation	9
3.1 Changing the fail-safe action	9
4. Maintenance - replacing parts	9
4.1 Replacing the packing	10
4.2 Replacing the seat ring	10
4.3 Replacing the segmented ball, shafts and bearings	12
5. Changing the characteristics	14
6. Description of nameplate	15
7. Accessories	16
8. Customer inquiries	16



General safety instructions

- ▶ *The control valve may only be mounted, started up or serviced by fully trained and qualified personnel, observing the accepted industry codes and practices. Make sure employees or third persons are not exposed to any danger. All safety instructions and warnings in these instructions, particularly those concerning installation, start-up and maintenance, must be observed.*
- ▶ *The control valve fulfills the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity that includes information on the applied conformity assessment procedure. The Declaration of Conformity can be viewed and downloaded from the SAMSON website at www.samson.de.*
- ▶ *For appropriate operation, make sure that the control valve is only used in areas where the operating pressure and temperatures do not exceed the operating values based on the valve sizing data submitted in the order. The manufacturer does not assume any responsibility for damage caused by external forces or any other external influence!
Any hazards which could be caused in the control valve by the process medium, operating pressure, signal pressure or by moving parts are to be prevented by means of the appropriate measures.*
- ▶ *Proper shipping and appropriate storage are assumed.*

Caution!

- ▶ *For installation and maintenance work on the valve, make sure the relevant section of the pipeline is depressurized and, depending on the process medium used, drained as well. If necessary, allow the control valve to cool down or warm up to reach ambient temperature prior to starting any work on the valve.*
- ▶ *When working on the valve, make sure that the supply lines for the air supply as well as the control signal are disconnected to prevent any hazards that could be caused by moving parts.*

1. Design and principle of operation

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

The control valve is used for both throttling and on-off services in process engineering and plants with industrial requirements.

It is suitable for liquids, vapors and gases within a temperature range of -29 to 220 °C and for nominal pressures ANSI Class 150 and 300.

The segmented ball valve in nominal sizes DN 1" to 10" is available with soft or metal sealing. A code number on the nameplate located on the valve body indicates which type of sealing is used.

The process medium flows through the valve. The signal pressure acting on the rotary actuator determines the position (opening angle) of the segmented ball (8) and therefore the flow rate across the open area between the segmented ball and valve body (1).

The actuator motion is transmitted to the segmented ball valve by a square-ended shaft or a feather key end of the valve shaft.

The valve shaft (4) is sealed by a self-adjusting packing (2.3). Valves in sizes DN 1" to 6" contain a packing made of PTFE V-rings and valves in sizes DN 8" to 10" have a compound packing with PTFE silk cord.

Fail-safe action:

The fail-safe action of the control valve, which becomes effective when the supply air (signal pressure) fails, is determined in Type 3310/AT (Type SRP single-acting version) by the version used and in Type 3310/3278 by how the pneumatic actuator is mounted to the valve.

"Control valve CLOSED without supply air"

The actuator springs close the valve when the signal pressure is reduced or the supply air fails.

When the signal pressure increases, the valve is opened, acting against the spring force.

"Control valve OPEN without supply air"

The actuator springs open the valve when the signal pressure is reduced or the supply air fails.

When the signal pressure increases, the valve is closed, acting against the spring force.

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

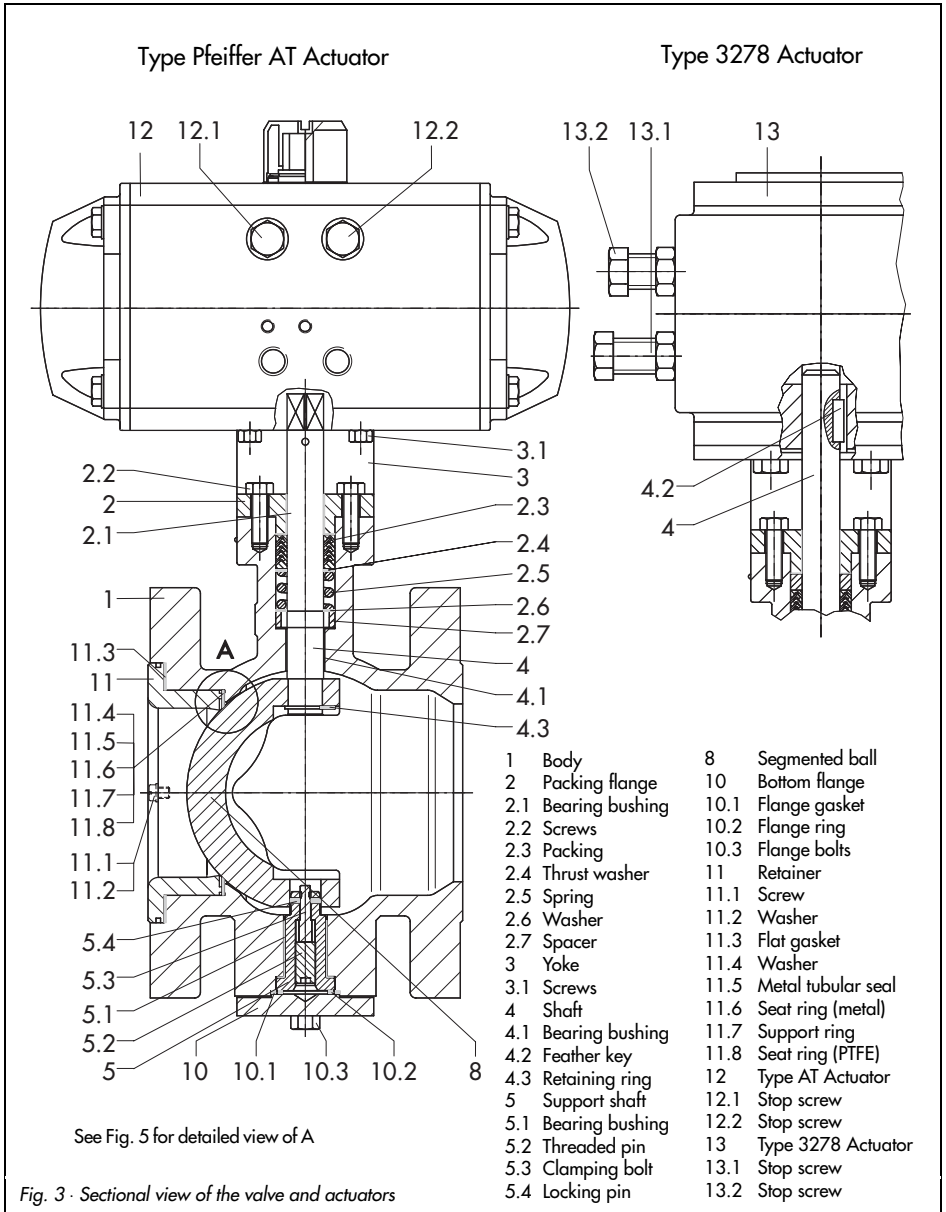


Fig. 3 - Sectional view of the valve and actuators

2. Installation

2.1 Assembling valve and actuator

2.1.1 Type 3310-SRP

If the valve and actuator have not been assembled by the manufacturer, proceed as follows:

NOTE

In the standard actuator version (SRP = single-acting with spring-return) the spring-return mechanism is designed for a valve which closes clockwise when there is no signal pressure.

Should another direction of rotation or a double-acting actuator (DAP = double-acting without spring-return) be required, this must be specified on ordering the actuator.

Fail-safe position	Springs	Characteristic
Valve CLOSED	Clockwise	Equal percentage
Valve CLOSED	Counterclockwise	Linear
Valve OPEN	Clockwise	Linear
Valve OPEN	Counterclockwise	Equal percentage

The rotary actuator can be placed as required either vertically or horizontally at a 90° angle to the segmented ball valve by transmitting the motion via a square-ended shaft.

Control valve CLOSED without supply air

1. Position the segmented ball (8) of the valve to 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 nominal size).
3. If necessary, place the shaft adapter on the valve shaft, then slide the actuator over the adapter or valve shaft (4) and screw onto the yoke with four screws.
4. Adjust the stop screws (12.1 or 12.2 depending on the direction of rotation) to close the valve completely. In addition, align the markings on the shaft and packing flange.
5. Secure the position of the stop screw with its lock nut.
6. Apply a signal pressure to the loading pressure connection which corresponds to the number of springs in the actuator (see nameplate).
7. Adjust the other stop screw so that the segmented ball stops at 90° angle of rotation.
8. Secure the position of the stop screw with its lock nut.

Control valve OPEN without supply air

1. Place the segmented ball (8) of the valve at its 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 nominal size).
3. If necessary, place the shaft adapter on the valve shaft, then slide the actuator over the adapter or valve shaft (4) and screw onto the yoke with four screws (3.1).
4. Adjust the stop screw (12.1 or 12.2 depending on the direction of rotation) so

that the valve is completely open at 90°. In addition, align the markings on the shaft and packing flange.

5. Secure the position of the stop screw with its lock nut.
6. Apply a signal pressure to the loading pressure connection which corresponds to the number of springs in the actuator (see nameplate).
7. Adjust the other stop screw so that the segmented ball is completely closed. In addition, align the markings on the shaft and packing flange.
8. Secure the position of the stop screw with its lock nut.

2.1.2 Type 3310/3278

If the valve and actuator have not been assembled by the manufacturer, proceed as follows to mount the actuator onto the body flange **1** or **2** depending on the characteristic and fail-safe position:

"**1**" and "**2**" are cast onto the corresponding sides of the valve body.

Fail-safe position	Characteristic	Body flange
Valve CLOSED	Equal percent.	2
Valve CLOSED	Linear	1
Valve OPEN	Equal percent.	1
Valve OPEN	Linear	2

The rotary actuator can be placed as required either vertically or horizontally at a 90° angle to the segmented ball valve. The motion from the actuator is transmitted by the actuator shaft with four feather key notches arranged at 90° intervals.

Control valve CLOSED without supply air

1. Completely loosen both stop screws (13.1 and 13.2) at the rotary actuator, then screw back in the stop screw (13.2) until the actuator shaft's grooves are aligned horizontally and vertically to the actuator axis.
2. Place the segmented ball (8) of the valve at its closed position (0° angle of rotation).
3. Fasten the yoke (3) to the flange of the valve shaft with two or four screws depending on the nominal size.
4. Slide the actuator with the actuator shaft over the valve shaft (4) and screw down to the yoke (3) with four screws.
5. Loosen the stop screw (13.2) again.
6. Adjust the other stop screw so that the valve is completely closed. In addition, align the markings on the shaft and packing flange.
7. Apply a supply pressure required for the spring range (see nameplate) to the loading pressure connection to open the valve.
8. Screw back in the stop screw (13.1) until the valve reaches its open position (90° angle of rotation).
9. Secure both stop screws with their lock nuts.

Control valve OPEN without supply air

1. Loosen both stop screws (13.1 and 13.2) at the rotary actuator, then screw back in the stop screw (13.2) until the actuator shaft's grooves are aligned horizontally and vertically to the actuator axis.

- Place the segmented ball (8) of the valve at its open position (90° angle of rotation).
- Fasten the yoke (3) to the flange of the valve shaft with two or four screws depending on the nominal size.
- Slide the actuator over the valve shaft (4) and screw tight to the yoke (3) with four screws.
- Loosen the stop screw (13.1) again.
- Apply a supply pressure required for the spring range (see nameplate) to the loading pressure connection to close the valve.
- Adjust the stop screw (13.1) until the valve is completely closed by the segmented ball. In addition, align the markings on shaft and packing flange
- Disconnect supply pressure.
- Screw back in the stop screw (13.1) until the segmented ball stops at 90° angle of rotation in the open position.
- Secure both stop screws with their lock nuts.

2.2 Mounting position

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 vertically or horizontally, however, the following points regarding the direction of flow must be observed:

Install the valve in the pipeline so that the lower half of the segmented ball opens into

the flow. This helps avoid dirt deposits from accumulating which could prevent the valve from opening. The direction of medium flow into the convex of the ball also prevents the medium from collecting unnecessarily in the shaft bearings.

The standard direction of flow (into the convex face) is indicated by the manufacturer by an arrow on the valve body.

Should the direction of flow be reversed, e.g. required for abrasive media, it is necessary to indicate the reversed direction by using the arrow plate and the two slotted pins included in the control valve delivery. The result of using this direction of flow is that the pressure of the process medium is constantly acting on the packing. On tightening the flange bolts, make sure that an even pressure is exerted on the flat gaskets.

2.4 Loading pressure connection

The loading pressure connection of rotary actuators is a G 1/8 female threaded bore for small actuators and a G 1/4 bore for larger 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).

When combined with SAMSON positioners, the accessories required for the connection are included in the delivery.

3. Operation

3.1 Changing the fail-safe action

The fail-safe action can be changed in the Type 3278 Actuator after delivery from "Control valve CLOSED without supply air" to "Control valve OPEN without supply air" and vice versa. For this, the attachment side of the rotary actuator must be changed (see the table on page 7).

The pistons in the Type SRP Actuator must be reversed.

Note!

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

4. Maintenance – replacing parts

The control valve is subject to natural wear especially at the seat, segmented ball and packing. Depending of the application conditions that prevail, the valve must be inspected at appropriately scheduled intervals to prevent any problems before they occur.

If any leaks occur to the atmosphere, the packing may be leaking.

If the valve does not seal properly, this may be because tight shut-off is prevented by dirt or other impurities between the seat ring and segmented ball or because the seating surfaces have been damaged.

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

Proceed as described in chapter 4.2 to replace the seat ring (11.6 or 11.8) with new ones.



Caution!

If you intend removing parts from the valve, remove the valve from the pipeline. To proceed, first relieve the corresponding plant section of pressure and drain it.

Let the plant section cool down, if necessary.

Note!

Prior to performing any work on the valve body, the actuator must be removed first.

Removing the actuator:

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

4.1 Replacing the packing

The valves in nominal sizes DN 1" to 6" are fitted with a V-ring packing and valves in sizes DN 8" and 10" with a silk cord and compound packing.

1. Loosen the screws (2.2) and take off packing flange (2) with the bearing bushing (2.1).
2. Remove all packing parts from the packing space using a suitable tool. Clean them thoroughly.

3. Renew packing (2.3), then push new packing parts over the shaft (4) into the packing space.
4. Push the packing flange (2) together with bearing bushing (2.1) onto the shaft (4). Screw tight packing flange using screws (2.2).

4.2 Replacing the seat ring

1. Remove both anchoring screws (11.1) with washers (11.2).
2. Take out the retainer (11) with the flat gasket (11.3).
Should you be unable to remove the retainer, use the special tool listed in the table on page 14.

Version with soft sealing:

3. Remove the support ring (11.7) and the seat ring (11.8).

Version with metal sealing:

3. Remove in sequence the washer(s) (11.4), the metal tubular seal (11.5), the seat ring (11.6) and the back washer(s) (11.4).

Reassembly

To reassemble, proceed in the reverse order. Special tools are not necessary.

The retainer can be pressed into the body using, for example, a blank flange, by tightening the flange bolts accordingly. Prior to this, it is absolutely necessary to place the valve in its closed position to center the seat ring and segmented ball.

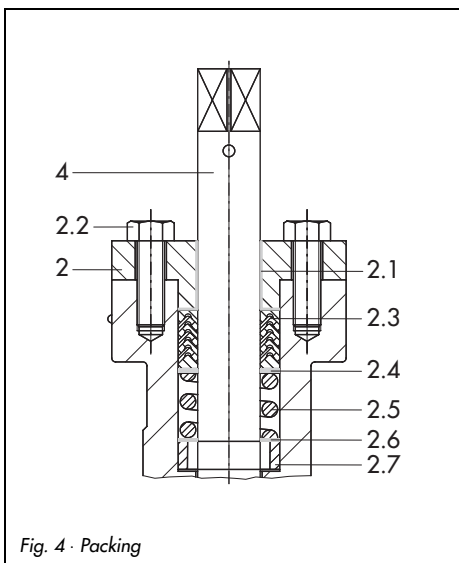


Fig. 4 - Packing

Note!

Check the friction torque (initial breakaway torque) needed to open the valve in the table on page 14.

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

Version with soft sealing:

Turn the segmented ball clockwise by 360° in the valve body two or three times to let the seal adapt itself.

Version with metal sealing:

Change the number of washers used (11.4). If necessary, omit the bottom washer on the valve body side.

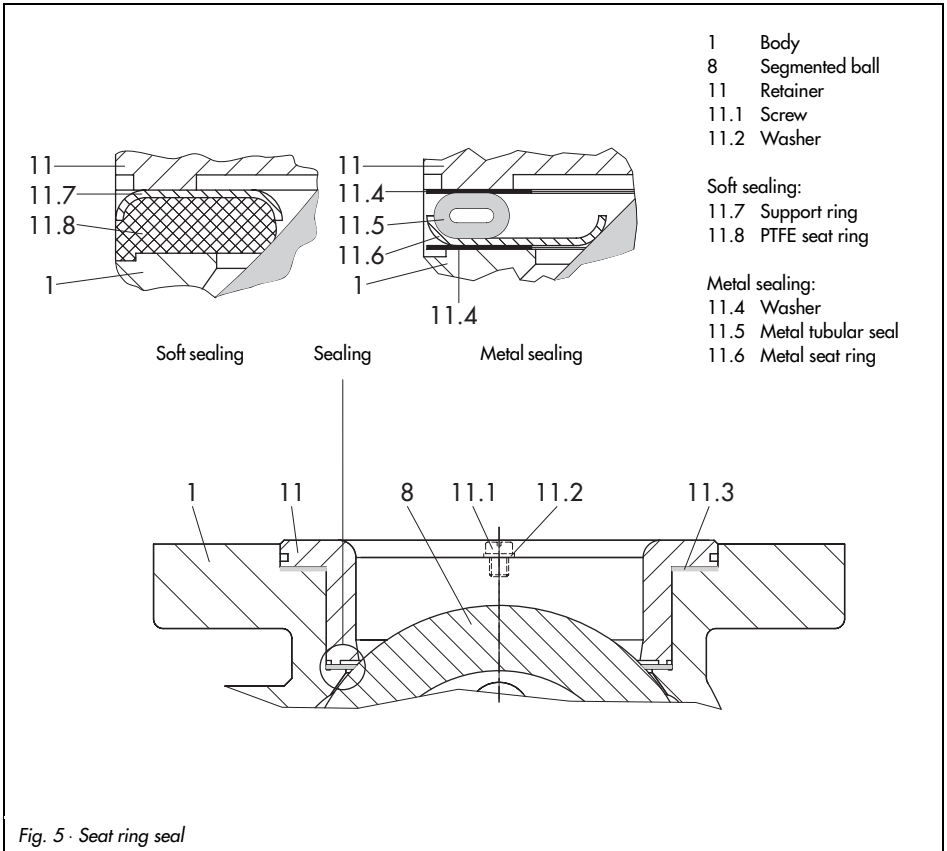


Fig. 5 · Seat ring seal

4.3 Replacing the segmented ball, shafts and bearings

Note!

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, the bearing bushings, seat rings and the ring and gasket on the bottom flange need to be replaced as well.

1. Unscrew both bolts (10.3) and lift off bottom flange (10) together with the ring (10.2). Renew 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.
Press out the support shaft.
If this is not possible, screw in a screw with a washer (see table listing special tools) in place of the threaded pin. Turning the screw against the washer loosens the support shaft.
3. Pull the bearing bushing (5.1) out of the body.
4. Unthread screws (2.2) and lift off the packing flange (2) together with the bearing bushing (2.1).
5. Use snap ring pliers to pull the retaining ring (4.3) off the shaft and pull the shaft out of the body using disassembling tool.
6. Remove all packing parts with the appropriate tool from the packing space, and clean packing space thoroughly.

7. Remove the lower bearing bushing (4.1).
8. Take the segmented ball out of the body. For DN 1", 1 1/2" and 2" sizes, the segmented ball must be removed from the retainer side. Proceed as described in chapter 4.2, dismantling first the retainer and the seat ring parts.

Reassembly

We recommend purchasing the assembly tools listed in the table on page 14 for reassembling the valve.

To assemble the valve, proceed in the reverse order as described in disassembly. Observe the tightening torques of the screws for the packing flange and bottom flange listed on page 14.

On inserting the shaft (4) into the body and the 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 first the bearing bushing (4.1) into the body, then align the shaft (4) and use an assembling tool to press the bearing bushing into the segmented ball.
3. 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 retaining ring (4.3).
4. Insert the locking pin (5.4) into the bores of the support shaft (5), then posi-

tion the complete support shaft (parts 5, 5.2, 5.3 and 5.4) on the bearing bushing (5.1) and use the packing flange (2) to press them in.

5. Align the segmented ball (8) centrally.
6. 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.
7. Attach the packing with spacer (2.7), washer (1.6), spring (2.5), thrust

washer (2.4), packing (2.3) and flange (2).

Note:

Check friction torque (initial breakaway torque) needed to open the valve in the table on page 14.

Proceed as described in chapter 4.2 if the torque is different than specified.

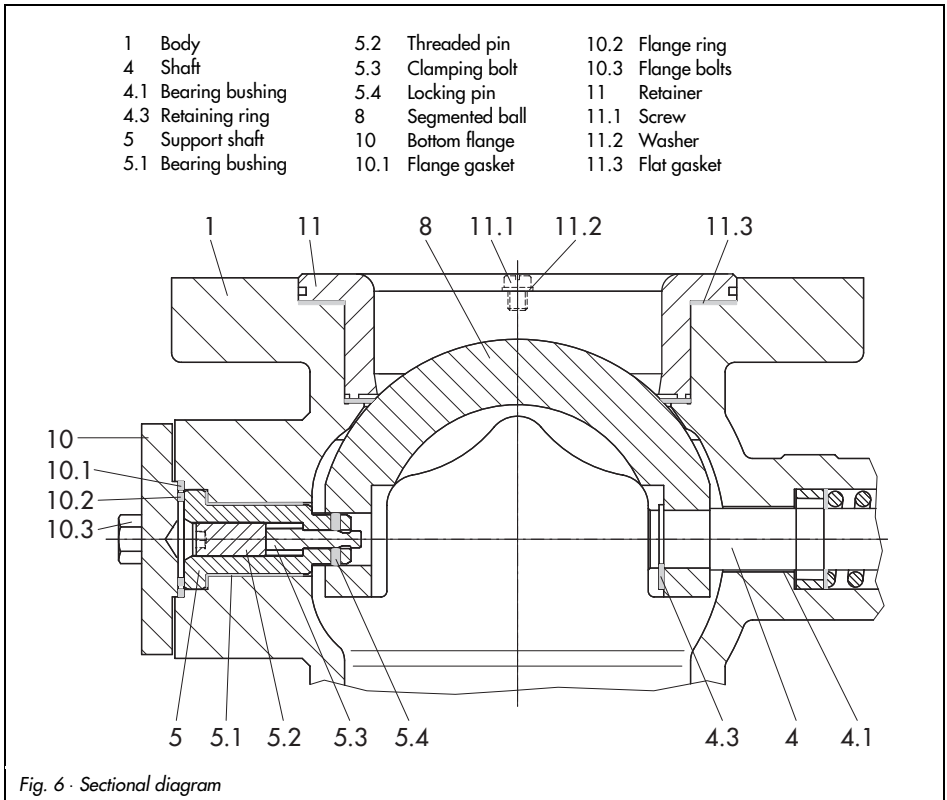


Fig. 6 · Sectional diagram

5. Changing the characteristic

Changing the characteristic from equal percentage to linear and vice versa can be car-

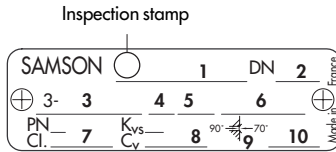
ried out by changing the actuator's direction of rotation.

See the table in chapter 2.1.1 and 2.1.2.

Special tools table						
DN	Extracting tool for retainer (11)		Extracting tool for support flange (5)	Assembling and disassembling tool for the shaft		
	Crossbeam	Flange		Press tool support shaft	Press tool actuator shaft	
	Order no.					
1"	1281-0011	1281-0007	1281-0026	1281-0019	1281-0023	
1 1/2"	1281-0012					
2"	1281-0013	1281-0008		1281-0020		
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					
Adapter for torque wrench		Shaft with square end		Shaft with feather key notch		
DN	1", 1 1/2", 2", 3"		1281-0029		1281-0032	
	4", 6"		1281-0030		1281-0033	
	8", 10"		1281-0031			

Tightening torque table									
Nominal size DN		1"	1 1/2"	2"	3"	4"	6"	8"	10"
Tightening torque Nm Screws (2.2) on packing flange Screws (10.3) on bottom flange		35	35	35	35	35	35	60	60
Friction torque table									
Nominal size DN		1"	1 1/2"	2"	3"	4"	6"	8"	10"
Friction torque Nm to open the valve	soft seal	8	10	11	19	40	70	100	155
	metal seal	9	12	14	24	50	100	170	260

6. Description of nameplate



- 1** Type no.: **3310 - X** X = Modification index of the combination
- 2** Nominal size DN
- 3** Serial number
- 4** Flange version:
 Left blank: Standard version ASME B16.5 (0.06 Raised Face)
- | ANSI: | DIN: |
|--------------------------------------|------------------------------------|
| 03 = Raised Face with 1/4" male face | 20 = Raised Face EN 1092-1 Form B1 |
| 04 = Ring Joint | 21 = Flat Face |
| 05 = Large Male Face | 22 = Male Face |
| 06 = Small Male Face | 23 = Female Face |
| 07 = Large Tongue | 24 = Tongue |
| 08 = Small Tongue | 25 = Groove |
| 09 = Small Groove | |
- 99 = Special flange version
- 5** Surface treatment segmented ball/seat ring
 Left blank: Both hard chrome plating
 9 = Segmented ball: Special treatment
 99 = Seat ring: Special treatment
- 6** Body material
 Body A216 WCB or A351 C351 CF8M
- 7** ANSI Class or nominal pressure PN
- 8** Flow coefficient (Kvs or Cv) and
 Characteristic: % = equal percentage, | = linear
- 9** Direction of flow and maximum opening angle
- 10** Seat/plug sealing:
 Left blank = metal
 PTFE = soft

Fig. 7 · Labeling key for valve nameplate

7. Accessories

DN	Actuator AT Type SRP/DAP	Connecting flange DIN 3337	Mounting kit Order no.	Actuator cm ² Type 3278	Mounting kit Order no.
1"	30 60	F05	1400-7316	160 (F07)	1400-7251
1 1/2"	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		
6"	300 450 600	F10 F12 F12	1400-7240 1400-7241 1400-7241	320 (F12)	1400-7255
8"	600 900 1200	F12 F14 F14	1400-7755 1400-7243 1400-7243		
10"	900 1200	F14 F14	1400-7243		

8. Customer inquiries

Should you have any questions regarding the control valve, please submit the following details:

- ▶ Order number (mentioned on the nameplate)
- ▶ Type, product number, nominal size and valve version
- ▶ Pressure and temperature of the process medium
- ▶ Flow rate in m³/h
- ▶ Signal pressure range (spring range of the actuator)
- ▶ Installation drawing

Dimensions

Refer to the Data Sheet T 8222 EN for details about dimensions and weights.



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