

T 8222 EN

Type 3310 Segmented Ball Valve

DIN and ANSI versions

Application

Rotary valve for throttling or on/off service in industrial applications with high flow rates

Valve size DN 25 to 300 · NPS 1 to 12

Pressure rating PN 16 to 40 · Class 150 to 300

Temperatures -46 to +450 °C · -51 to +842 °F

Type 3310 Segmented Ball Valve with

- Single-acting Type SRP Pneumatic Rotary Actuator
- Double-acting Type DAP Pneumatic Rotary Actuator
- Single-acting Type 3278 Pneumatic Rotary Actuator
▶ T 8321

Valve body made of

- Cast steel
- Cast stainless steel

Segmented ball

- Soft seal
- Metal seal

The control valves can be equipped with various accessories: Positioners, solenoid valves and other accessories according to VDI/VDE 3845 on Type SRP or DAP and Type 3278 Rotary Actuators. Direct attachment of SAMSON valve accessories to Type 3278 Rotary Actuator.

Versions

Standard version for temperatures ranging from -29 to +220 °C/-20 to +428 °F, DN 25 to 300/NPS 1 to 12

Further versions:

- With double packing with or without leak monitoring
- With insulating section for a wider temperature range
- With flanges with special faces
- With pneumatic rotary actuator and additional handwheel
- With manual override
- With heating jacket
- With gaskets and lubricants in compliance with FDA/EC 1935/NSF H1
- With additional seals for protection of the bearing
- Version for oxygen service (GOX) up to 13.8 bar

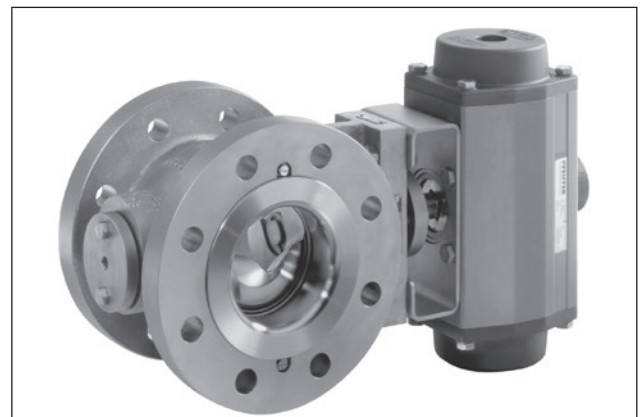


Fig. 1: Type 3310 Segmented Ball Valve with Type SRP/DAP Pneumatic Rotary Actuator



Fig. 2: Cutaway view of Type 3310 Segmented Ball Valve with Type SRP Pneumatic Rotary Actuator and positioner

Principle of operation

In the segmented ball valve, the medium flows into the convex face of the ball. When the valve is closed, the pressure acts on the convex side of the ball. The flow coefficient is determined by the opening angle of the ball.

To reduce the wear on the body on controlling abrasive media, the direction of flow can be reversed.

Fail-safe position

With the Type SRP and Type 3278 Rotary Actuator the control valve has two fail-safe positions which become effective when the pressure acting on the piston or diaphragm is reduced as well as when the supply air fails:

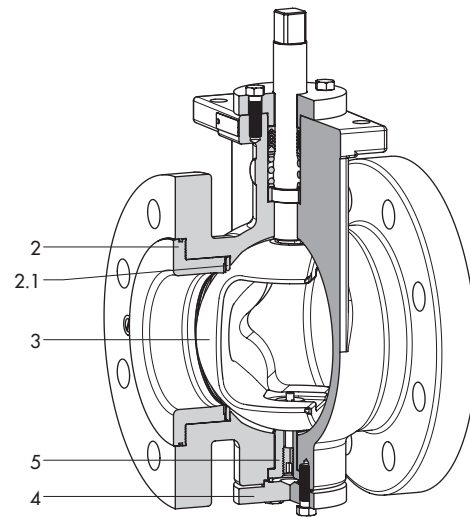
- **Fail-close valve:** The segmented ball valve is closed when the supply air fails.
- **Fail-open valve:** The segmented ball valve is opened when the supply air fails.

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

Selecting the characteristic

The design of the segmented ball allows the same valve to be used with two different types of flow characteristic:

- **Equal percentage (standard):** The actuator turns clockwise (right turning) to close the valve, looking from the actuator toward the valve.
- **Linear:** The converted actuator turns counterclockwise (left turning) to close the valve, looking from the actuator toward the valve.



- 2 Retainer
- 2.1 Seat ring
- 3 Segmented ball
- 4 Bottom flange
- 5 Countershaft

Fig. 3: Type 3310 Segmented Ball Valve

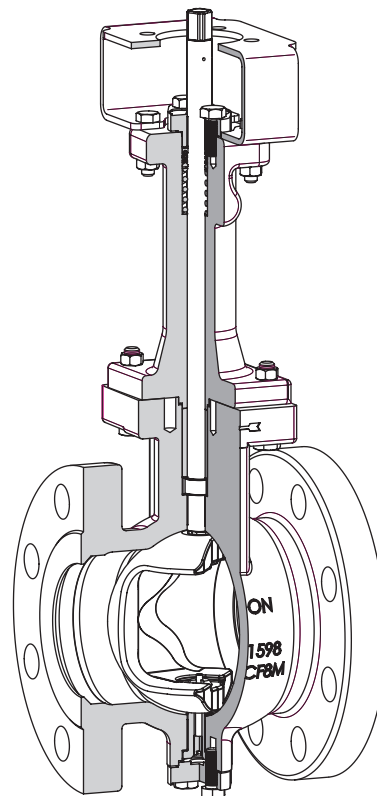


Fig. 4: Insulating section for Type 3310 Segmented Ball Valve

Table 1: Technical data

Valve size		DN 25 to 300		NPS 1 to 12	
Pressure rating		PN 16 to 40		Class 150/300	
Type of connection	Flanges	DIN EN 1092-1		ANSI B16.5	
Seat ring	Soft seal	PTFE with reinforced stainless steel (max. 220 °C) or PEEK		PTFE with reinforced stainless steel (max. 430 °F) or PEEK	
	Metal seal	ARCAP AP1C (copper alloy)			
Characteristic		Linear or equal percentage			
Max. opening angle		90°			
Rangeability		≥100:1			
Face-to-face dimension		DIN EN 558-2 Series 36			
Temperature range	Standard version	-10 to +220 °C (14 to 752 °F)		-20 to +428 °F (-29 to +220 °C)	
	Version with insulating section	1.0619	1.4408	A216 WCC	A351 CF8M
		-10 to +400 °C	-46 to +450 °C	-20 to 797 °F	-51 to +842 °F
Leakage class according to ANSI/FCI 70-2					
Soft seal		VI			
Metal seal		IV			

Table 2: Materials for standard version

Body	1.0619		1.4408		A216 WCC		A351 CF8M	
Valve size	DN 25	DN 40 to 300	DN 25	DN 40 to 300	NPS 1	NPS 1½ to 12	NPS 1	NPS 1½ to 12
Segmented ball ¹⁾	1.4404	1.4409	1.4404	1.4409	316L	CF3M	316L	CF3M
Shaft	DN 150 and NPS 6: AISI 630 · All other valve sizes: 316L							
Plain bearing	Standard version: NORTON® Special version for high temperatures and high pressures: ARCAP AP1C							
Packing	V-ring packing: PTFE with carbon · Spring: Stainless steel							
Bottom flange	Up to DN 80: 1.4409 DN 100 and larger: 1.0460		Up to DN 80: 1.4409 DN 100 and larger: 1.4404		Up to NPS 3: A351 CF3M NPS 4 and larger: A105		Up to NPS 3: A351 CF3M NPS 4 and larger: 316L	

¹⁾ The segmented ball is chrome plated as standard.

Table 3: Opening angle and associated C_V and K_{VS} coefficients**Table 3.1: C_V coefficients for modified linear characteristic**

Valve size		Opening angle										
NPS	DN	5°	10°	20°	30°	40°	50°	55°	60°	70°	80°	90°
1	25	0.35	1	3.4	7	11.5	17.3	20	24.5	32.3	38	40
1½	40	1	3	10	21	35	52	60	74	97	114	120
2	50	1.4	4	13.6	28	46	69	80	98	129	152	160
3	80	3.6	10	34	70	115	173	200	245	323	381	400
4	100	6.3	18	60	123	201	302	350	429	565	666	700
6	150	13	35	119	245	402	605	700	858	1130	1333	1400
8	200	18	50	170	350	574	864	1000	1226	1614	1904	2000
10	250	28	78	264	543	890	1339	1550	1900	2502	2951	3100
12	300	28	78	264	543	890	1339	1550	1900	2502	2951	3100

Table 3.2: K_{VS} coefficients for modified linear characteristic

Valve size		Opening angle										
NPS	DN	5°	10°	20°	30°	40°	50°	55°	60°	70°	80°	90°
1	25	0.3	0.85	3	6	10	14.7	17	20.8	27.4	32.3	34
1½	40	0.85	2.5	8.5	18	30	44	51	63	82.4	97	102
2	50	1.2	3.4	11.68	24	40	59	68	84	110	130	140
3	80	3	8.5	29	60	98	148	170	210	276	325	340
4	100	5.4	15	51	105	172	260	298	367	482	570	600
6	150	11	30	102	210	344	517	595	733	965	1140	1200
8	200	15.4	43	145	300	490	738	850	1048	1380	1630	1700
10	250	24	66	225	464	760	1145	1317	1624	2140	2520	2650
12	300	24	66	225	464	760	1145	1317	1624	2140	2520	2650

Table 3.3: C_V coefficients for modified equal percentage characteristic (standard)

Valve size		Opening angle										
NPS	DN	5°	10°	20°	30°	40°	50°	55°	60°	70°	80°	90°
1	25	0.08	0.16	1.3	3.3	6.3	10.7	14	16.3	23	32	40
1½	40	0.25	0.5	4	10	19	32	42	49	69	95	120
2	50	0.3	0.6	5	13	25	42	56	65	92	126	160
3	80	0.8	1.6	12	32	62	106	140	162	231	316	400
4	100	1.4	2.8	22	56	109	186	245	284	405	553	700
6	150	2.8	5.6	43	112	218	371	490	567	809	1106	1400
8	200	4.0	8	62	160	312	530	700	810	1156	1580	2000
10	250	6.2	12	96	248	484	822	1085	1256	1792	2449	3100
12	300	6.2	12	96	248	484	822	1085	1256	1792	2449	3100

Table 3.4: K_{VS} coefficients for modified equal percentage characteristic (standard)

Valve size		Opening angle										
NPS	DN	5°	10°	20°	30°	40°	50°	55°	60°	70°	80°	90°
1	25	0.07	0.13	1.1	2.8	5.3	9	12	14	20	27	34
1½	40	0.21	0.4	3.4	8.5	16	27	36	42	59	81	102
2	50	0.25	0.5	4	11	21	36	48	56	79	108	140
3	80	0.7	1.4	10	27	53	91	120	138	197	270	340
4	100	1.2	2.4	19	48	93	159	208	243	346	473	600
6	150	2.4	4.8	37	96	186	317	416	485	691	945	1200
8	200	3.4	6.8	53	137	267	453	688	692	990	1350	1700
10	250	5.3	10	82	212	414	702	922	1074	1531	2093	2650
12	300	5.3	10	82	212	414	702	922	1074	1531	2093	2650

Table 4: Terms for control valve sizing and noise level calculation**Table 4.1:** Modified linear characteristic

	Opening angle										
	5°	10°	20°	30°	40°	50°	55°	60°	70°	80°	90°
F_L	0.95	0.95	0.95	0.94	0.87	0.81	0.77	0.73	0.65	0.59	0.57
X_T	0.78	0.78	0.78	0.76	0.65	0.56	0.51	0.46	0.36	0.30	0.27
C	0.39	0.35	0.28	0.23	0.2	0.17	0.16	0.14	0.12	0.10	0.09

Table 4.2: Modified equal percentage characteristic

	Opening angle										
	5°	10°	20°	30°	40°	50°	55°	60°	70°	80°	90°
F_L	0.95	0.95	0.95	0.95	0.95	0.90	0.86	0.82	0.75	0.66	0.57
X_T	0.78	0.78	0.78	0.78	0.78	0.69	0.62	0.58	0.49	0.38	0.27
C	0.44	0.39	0.33	0.29	0.24	0.21	0.19	0.18	0.15	0.12	0.09

Table 5: Permissible differential pressures for Type 3310 Segmented Ball Valve · All pressures stated in bar

Table 5.1: Permissible differential pressures for valve CLOSED · For both fail-safe positions · With Type SRP Rotary Actuator

Valve size		C _v coefficient	Shaft Ø in mm	Type SRP Actuator	No. of springs	Required supply pressure	Max. supply pressure at			Δp with PTFE or metal seal	
NPS	DN						20 °C (71 °F)	220 °C (428 °F)	450 °C ¹⁾ (842 °F)	With standard direction of flow	With reverse direction of flow
1	25	40	16	60	2/3	2.5	6.9	5.5	4	15	10
					4	4	7.5	6.1	4.5	20	20
					5/6	5.5	8	8	8	17	12
1½	40	120	16	100	2/3	2.5	4.8	3.9	2.9	20	17
				60	4	4	7.5	6.1	4.5	20	19
					5/6	5.5	8	6.7	–	20	20
2	50	160	16	150	2/3	2.5	5.6	5	4.4	20	20
				100	4	4	8	7.6	6.6	20	20
				60	5/6	5.5	8	8	8	20	20
3	80	400	16	220	2/3	2.5	3.8	3.5	3.1	20	20
				150	4	4	6.2	5.6	5	20	20
				100	5/6	5.5	8	8	7.2	20	18
4	100	700	25	450	2/3	2.5	6.6	6	5.2	18	15
				300	4	4	8	8	8	18	16
				220	5/6	5.5	8	8	8	20	19
6	150	1400	25	600	3	3	5.5	5	4.4	11	8
					4	4	5.9	5.4	4.8	20	20
				450	5/6	5.5	7.8	7.1	6.3	20	20
				300	5/6	5.5	8	8	8	6	3
8	200	2000	36	1200	2/3	2.5	5	4.5	3.9	9	6
					4	4	5.6	5.1	4.5	20	20
				900	5/6	5.5	7.8	7.1	6.3	20	20
10	250	3100	36	1200	4	4	5.6	5.1	4.5	9	6
					5/6	5.5	6.2	5.7	–	19	16
				900	5/6	5.5	7.8	7.1	6.3	7	5
12	300	3100	36	1200	4	4	5.6	5.1	4.5	9	6
					5/6	5.5	6.2	5.7	–	19	16
				900	5/6	5.5	7.8	7.1	6.3	7	5

¹⁾ Version with insulating section

Table 5.2: Permissible differential pressures for valve CLOSED · For both fail-safe positions · With Type 3278 Rotary Actuator

Valve size		C _v coefficient	Shaft Ø in mm	Actuator area in cm ²	Bench range ¹⁾	Required supply pressure	Max. supply pressure at		Δp with PTFE or metal seal	
NPS	DN						20 °C (71 °F)	220 °C (428 °F)	With standard direction of flow	With reverse direction of flow
1	25	40	16	160	0.5 to 1.0	1.5	2.5	2	17	12
					0.8 to 1.6	2.4	3	2.6	20	20
1½	40	120	16	160	0.5 to 1.0	1.5	2.5	2	10	–
					0.8 to 1.6	2.4	3	2.6	20	20
2	50	160	16	160	0.8 to 1.6	2.5	4.5	4.1	20	20
3	80	400	16	160	1.2 to 2.4	3.7	5.2	4.7	7	–
					1.7 to 3.4	5.1	5.8	5.4	20	20
4	100	700	25	320	0.8 to 1.6	2.4	4.8	4.4	9	4
					1.2 to 2.4	3.6	5.4	5	20	20
6	150	1400	25	320	1.7 to 3.4	5.1	6	5.6	12	10

¹⁾ Only applies to standard direction of flow

Table 6: Permissible shaft and opening torques

Table 6.1: Shaft with square drive (e.g. Type SRP/DAP Actuator)

Valve size		Perm. shaft torque [Nm] at		Opening torque [Nm] for PTFE or metal seal with							
NPS	DN	20 °C (71 °F)	220 °C (428 °F)	Standard direction of flow at Δp				Reverse direction of flow at Δp			
				5 bar	10 bar	15 bar	20 bar	5 bar	10 bar	15 bar	20 bar
1	25	70	54	9	9	11	13	10	11	13	15
1½	40	70	54	12	12	14	16	13	14	16	18
2	50	125	110	14	14	16	18	15	16	18	20
3	80	125	110	29	31	33	35	32	34	36	38
4	100	500	440	60	65	76	87	65	70	81	92
6	150	500	440	115	125	145	165	125	135	155	175
8	200	860	750	190	210	255	300	210	230	275	320
10	250	860	750	300	340	410	480	330	370	440	510
12	300	860	750	300	340	410	480	330	370	440	510

Table 6.2: Shaft with key drive end (e.g. Type 3278 Actuator)

Valve size		Perm. shaft torque [Nm] at		Opening torque [Nm] for PTFE or metal seal with							
NPS	DN	20 °C (71 °F)	220 °C (428 °F)	Standard direction of flow at Δp				Reverse direction of flow at Δp			
				5 bar	10 bar	15 bar	20 bar	5 bar	10 bar	15 bar	20 bar
1	25	70	54	9	9	11	13	10	11	13	15
1½	40	70	54	12	12	14	16	13	14	16	18
2	50	125	110	14	14	16	18	15	16	18	20
3	80	125	110	29	31	33	35	32	34	36	38
4	100	500	440	60	65	76	87	65	70	81	92
6	150	500	440	115	125	145	165	125	135	155	175

Table 7: Dimensions in mm and weights in kg

Valve	NPS	1	1½	2	3	4	6	8	10	12	
	DN	25	40	50	80	100	150	200	250	300	
L - Face-to-face dimension according to ISA S75.04	mm	102	114	124	165	194	229	243	297	338	
d - Shaft Ø	mm	16	16	16	16	25	25	36	36	36	
A	mm	107	117	126	145	170	206	254	281	281	
B	mm	72	82	100	120	140	175	205	230	230	
F - Optional insulating section		170					255				
Flange connecting yoke		See actuators									
SW (standard shaft)	mm	12	12	12	12	19	19	27	27	27	
Shaft with key drive for Type 3278 Actuator	mm	16	16	16	16	25	25	-	-	-	
Weight	kg	5	7	16	28	42	70	110	155	180	

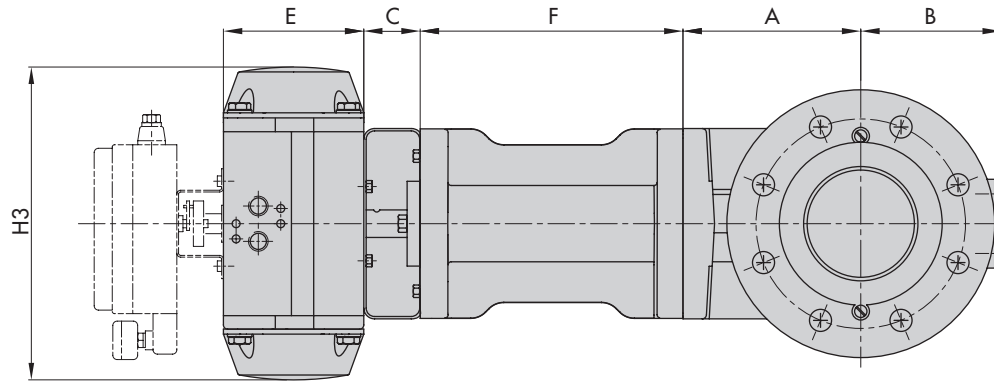
Type SRP/DAP Rotary Actuator ¹⁾		30	60	100	150	220	300	450	600	900	1200
Mounted on valve			NPS 1½ DN 40								
			NPS 2 DN 50			NPS 4 DN 100			NPS 10/12 DN 250/300		
			NPS 1 DN 25		NPS 3 DN 80		NPS 6 DN 150			NPS 8 DN 200	
C	mm	50	50	50	50	50 ²⁾	55	55	55	80	80
H3	mm	159	211	248	269	315	345	409	438	487	543
E	mm	85	102	115	127	145	157	177	196	221	245
Connecting flange	DIN 3337	F05	F05	F07	F07	F10	F10	F12	F12	F14	F14
AF	mm	14	14	17	17	22	22	27	27	36	36
Weight [kg]	Type SRP	1.7	3.2	4.4	6.6	9.5	12.6	18.1	24	31.6	45.1
	Type DAP	1.5	2.7	3.9	5.4	8.4	10.2	14.5	19.8	25	35.5

Type 3278 Rotary Actuator		160 cm ²	320 cm ²
E	mm	118	162
C	mm	50	55 ²⁾ 80
H1	mm	260	421
H2	mm	72	95
D	mm	225	295
Connecting flange	ISO 5211	F07	F12
Weight	kg	16	50

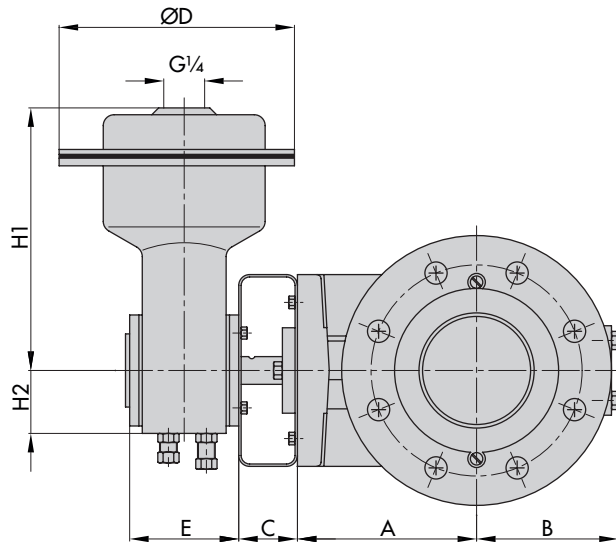
¹⁾ Single-acting Type SRP/SC (clockwise) Actuator and Type SRP/SO (counterclockwise) Actuator
Double-acting Type DAP/DR (clockwise) Actuator and Type SAP/DL (counterclockwise) Actuator

²⁾ C = 55 mm with valve in NPS 4

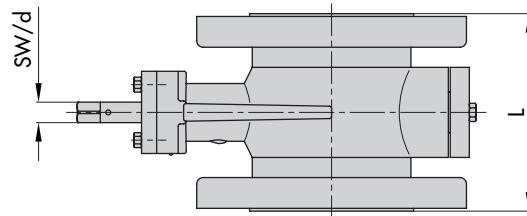
Dimensional drawings



Type 3310 Segmented Ball Valve with Type SRP/
DAP Actuator and short insulating section



Type 3310 Segmented Ball Valve
with Type 3278 Actuator



Order numbers

Valve size	DN .../NPS ...	Rotary actuator	Type SRP, Type DAP or Type 3278
Pressure rating	PN .../Class ...	Fail-safe action	Fail-close or fail-open
Body material	Refer to Table 2	Supply air	... bar
Gasket	Metal or soft seal	Operating range	Number of springs or bench range
Characteristic	Equal percentage or linear	Valve accessories	Positioner and/or limit switch
Direction of flow	Standard or reverse		