Spraytech®
Systems (India) Pvt. Ltd.
The Flow Technologists

Spraytech Pneumatic Segmented / (V-Notch) Ball Valves

Fig. 1: Spraytech Segmented / (V-Notch) Ball Valve with Pneumatic Rotary Actuator

Fig. 2: Spraytech Segmented / (V-Notch) Ball Valve with Pneumatic Rotary Actuator and positioner

Spraytech Systems have gone ahead with its endeavor of optimizing in process control instruments, in adding control elements in its range of manufacture. We at Spraytech Systems have Segmented V-notch ball valve till 12" and up to 300#RF for applications from minus 196 deg cent till 550 deg cent .

Applications in flow element control lead to control of flow through a V-Notch ball Valve affecting control of flow, pressure and temperature thus a playing a vide role in the control element of the plant, used in either

- Isolation of plants
- In field of linear level and temperature control
- In field of fasting acting parameter of pressure and differential pressure and flow control through PID controllers

Spraytech System's V-notch ball valve provides a flow range ability of 100:1 and carries the effect in controlling cavitation, flashing and the choking concept of the media. With its level of control the affect of start up conditions of the plant where shearing off the internal closing member in form of plug and seat of the trim section take place, Spraytech Systems own high density flow control plug which carries the special design to take care of all such critical start up and cavitation effect of the media help you solve a major cost effectiveness and reduce your major man hour usage and maintenance cost of the plan.

Following are the main features of Spraytech Systems V-notch ball valve

- The energy conservation of the plant
- High flow control rangeability
- High flow recovery and controllability factor
- Low maintenance driven design
- Usage from minus 196 deg cent till plus 550 deg cent application
- High density valve sealing gasket design for high and low temperature
- Used for special chemical sealing design concept in plant for all critical applications
- Modular concept thus introducing major plant design concept feasibility with reduce cost of manpower, maintenance
- Highly efficient build up design

Spraytech Systems Flow control effectively uses the closing member of plug falling or closing in on seat of the trim section of the valve and thus with its contour of

- Linear
- Modified equal percentage
- Equal percentage
- Quick opening

Enables a perfect control of the media effectively to the tune of desired level as per your requirements.
Spraytech Systems Manufactures pneumatic actuator with multiple springs and a rolling diaphragm which helps in

- Linear hysteresis of control
- High life cycle of the diaphragm
- Less tension on spring and diaphragm
- Most linear travel record of plug movement

Segmented /(V-notch) Ball Valve with

- Single-acting Pneumatic Rotary Actuator
- Double-acting Pneumatic Rotary Actuator
- Single-acting diaphragm Pneumatic Rotary Actuator

Valve body made of

- Cast steel
- Cast stainless steel

Segmented / (V-Notch) ball valve

- 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 Standard and other international standard

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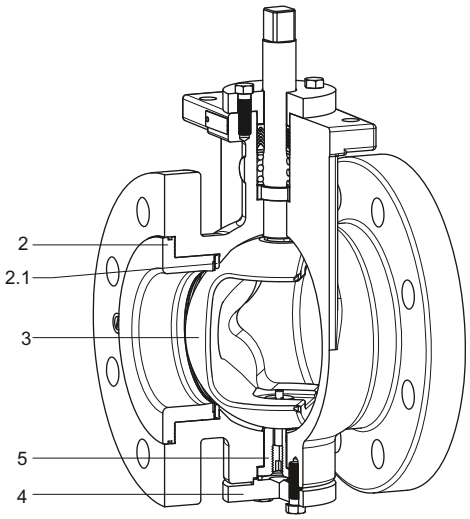

2	Retainer
2.1	Gasket
3	Segmented ball valve
4	Bottom lange
5	Counter bearing

Fig. 3: Spraytech Segmented / (V-Notch) Ball Valve

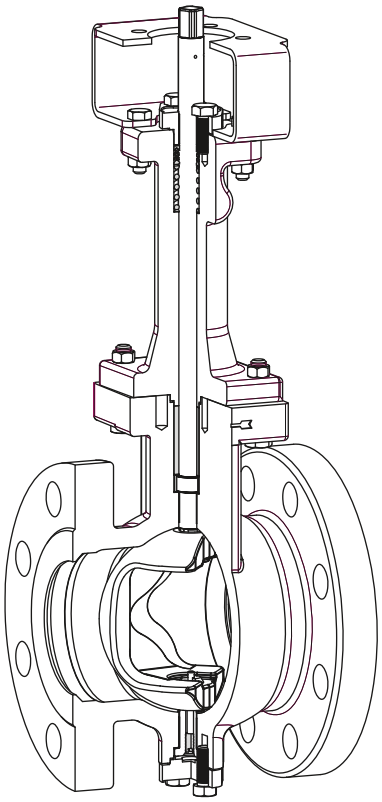

Fig. 4: Insulating section for Spraytech Segmented / (V-Notch) Ball Valve

Principle of operation

In the segmented / (V -Notch) ball valve, the medium lows into the convex face of the ball. When the valve is closed, the pressure acts on the convex side of the ball. The low coefficient is determined by the opening angle of the ball.
To reduce the wear on the body on controlling abrasive media, the direction of low can be reversed.

Fail-safe position

With the Spring Return diaphragm 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 / (V-Notch) ball valve is closed when the supply air fails.
- **Fail-open valve:** The segmented / (V-Notch) ball valve is opened when the supply air fails.

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

Selection of the low characteristic

The design of the segmented / (V-Notch) ball allows the same valve to be used with two different types of low 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.

Spraytech Pneumatic Segmented / (V-Notch) Ball Valves

Table 1: Technical data

Valve size		1" to 12"
Pressure rating		Class 150/300 (PN 40)
Type of end connections	Flanges	ANSI B16.5 · DIN (ISO on request)
Seat ring	Soft seal	PTFE with reinforced stainless steel (max. 430 °F/220 °C)
	Metal seal	ARCAP AP1C
Characteristic		Linear or equal percentage
Max. opening angle		90° · 70° with reverse direction of low in throttling service
Rangeability		≥ 100:1
Temperature range	Standard version	–20 to +428 °F (–29 to +220 °C) · DIN: 14 to 752 °F (–10 to +220 °C)
	Version with insulating section	A216 WCC: –20 to +797 °F (–29 to +425 °C) · DIN: 14 to 752 °F (–10 to +400 °C) A351 CF8M: –51 to +842 °F (–46 to +450 °C) · DIN: –50 to +842 °F (–46 to +450 °C)
Leakage class according to ANSI/FCI 70-2		
Soft seal		VI
Metal seal		IV

Table 2: Materials for standard version

Body	A216 WCC	A351 CF8M
Segmented ball valve	316L, hardened	
Shaft	NPS 1, 1½, 2, 3, 4, 8, 10, 12: 316L · NPS 6: AISI 630	
Plain bearing	304 + PTFE · High-temperature versions: ARCAP AP1C	
Packing	V-ring packing: PTFE with carbon · Spring: Stainless steel	
Bottom lange	Up to 3" 316L · 4" and larger: A105	316L

Table 3: Opening angle and associated C_V and K_{VS} coefficients

Table 3.1 K_{VS} coefficients for modified linear characteristic

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

Table 3.2: K_{VS} coeficients for modified equal percentage characteristic (standard)

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

Valve size DN	Shaft Ø in mm	No. of springs	Required supply pressure	Max. supply pressure at			Δp with PTFE or metal seal	
				20 °C (71 °F)	220 °C (428 °F)	450 °C [1] (842 °F)	With standard direction of low	With reverse direction of low [2]
25	16	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
40	16	2/3	2.5	4.8	3.9	2.9	20	17
		4	4	7.5	6.1	4.5	20	19
		5/6	5.5	8	6.7	–	20	20
50	16	2/3	2.5	5.6	5	4.4	20	20
		4	4	8	7.6	6.6	20	20
		5/6	5.5	8	8	8	20	20
80	16	2/3	2.5	3.8	3.5	3.1	20	20
		4	4	6.2	5.6	5	20	20
		5/6	5.5	8	8	7.2	20	18
100	25	2/3	2.5	6.6	6	5.2	18	15
		4	4	8	8	8	18	16
		5/6	5.5	8	8	8	20	19
150	25	3	3	5.5	5	4.4	11	8
		4	4	5.9	5.4	4.8	20	20
		5/6	5.5	7.8	7.1	6.3	20	20
		5/6	5.5	8	8	8	6	3
200	36	2/3	2.5	5	4.5	3.9	9	6
		4	4	5.6	5.1	4.5	20	20
		5/6	5.5	7.8	7.1	6.3	20	20
250	36	4	4	5.6	5.1	4.5	9	6
		5/6	5.5	6.2	5.7	–	19	16
		5/6	5.5	7.8	7.1	6.3	7	5
300	36	4	4	5.6	5.1	4.5	9	6
		5/6	5.5	6.2	5.7	–	19	16
		5/6	5.5	7.8	7.1	6.3	7	5

Table 6 : Permissible shaft and opening torques

Table 6.1: Shaft with Spring Return Actuator

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

Table 7: Dimensions in mm and weights in kg

Valve	DN	25	40	50	80	100	150	200	250	300
Face to Face	mm	102	114	124	165	194	229	243	297	338
d - Shaft Ø	mm	16	16	16	16	25	25	36	36	36
Yoke bonnet and till 50% Body Valve inlet port	mm	107	117	126	145	170	206	254	281	281
Remaining 50% Body Valve inlet port	mm	72	82	100	120	140	175	205	230	230
Insulating section		170				255				
Standard shaft	mm	12	12	12	12	19	19	27	27	27
Weight w/o Actuator	kg	5	7	16	28	42	70	110	155	180