

DESCRIPTION

The Type SMV valve has performed in some of the world's most demanding applications. If your application requires critical control of liquid, gas or steam, your choice of control valves is one of the most important decisions you will make.

When it comes to specifying a control valve, the variables are complicated and exacting. That is why Research Control® Valves are available in a broad range of options—so we can design a truly engineered solution that matches your requirements.

APPLICATIONS

Processing plants, research facilities and government agencies worldwide rely on Research Control Valves for repeatable performance and durability. Built for applications 1 in. (25.4 mm) and under, our SMV control valve is an integral component in systems ranging from petrochemical to pharmaceutical manufacturing. It is an ideal choice for additive injection or flow and pressure control.

MATERIALS

Body – Bonnet	
Standard cast body	316 stainless steel
Optional cast body	Alloy 20, Alloy B & C, Alloy 400, WCB
Optional barstock body	All the above plus Alloy 600 & 800, titanium, zirconium, 316L, 304/304L, 347SST and others
Standard end connections	NPT
Optional	Flanges (ANSI/ASME, DIN, ISO and others), tube fittings (screwed and backwelded), socket weld (our patented WELD-A-CATOR®), butt weld (for pipe or tubing), plus others
Innervalue	
Standard	316 stainless steel
Optional	Stellite®, titanium nitride coating
Packing	
Standard	PTFE chevron rings
Optional	Graphite, Reduced Emissions Kalrez® (REK) chevron ring, glass-filled chevron



Type SMV Valve

STANDARD FEATURES

- 1/4 in. (6.4 mm), 1/2 in. (12.7 mm), 3/4 in. (19.1 mm) and 1 in. (25.4 mm) models
- Interchangeable trim sets
- Threaded bonnet for quick disassembly
- Trim characteristics: Linear, equal percent, quick open or double taper
- TFE chevron packing
- Anodized aluminum tee-handle
- Coated stem threads

OPTIONAL FEATURES

- Butt and socket weld ends, BSPP, tube connection and others
- Bonnet extensions for temperature extremes
- Bellows packing solutions
- Angle pattern bodies
- Reduced Emissions Kalrez® (REK), graphite, spring-loaded chevron and others
- Exotic alloys for complete valves or trims
- Stellite® trims & soft seats (PTFE & Kel-F)
- TiN coating of innervalue stem and seat
- Purge or leak ports

SPECIFICATIONS

The pressure/temperature ratings listed below are based on material cross sections at the joint between the body and bonnet where a gasketed screwed type bonnet is used. When the proper torque levels are used, the valve should not experience rupture of the joint or the material. The torque levels listed below were used in hydrostatic tests at the factory at 70° F (21.1° C) at maximum body rating and were found to provide acceptable seating. Other factors such as high or cyclic temperatures, light process gases, or poor gasket surfaces can dictate the ability of a seal to be made. Under such conditions, the only way to be assured of tight sealing is to perform a test under the actual process conditions.

Pressure vs Temperature Ratings for Valve Superstructure

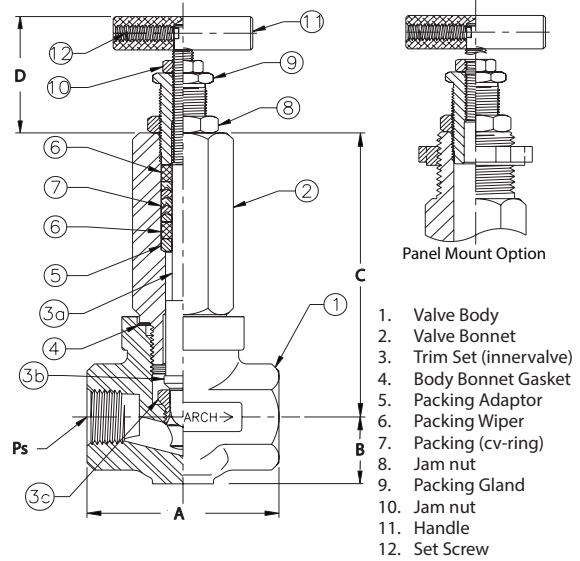
The following tables exclude packing and end fittings:

1/4 in. (6.4 mm) Research Control Valve						
Temp	316 S/S	Carbon Steel	Alloy B or =	Alloy C or =	Monel	Alloy 20
100° F (37.8° C)	5000	4000	5000	5000	4000	5000
200° F (93.3° C)	5000	3700	5000	5000	4000	5000
300° F (148.9° C)	4750	3500	5000	5000	3880	4850
400° F (204.4° C)	4190	3200	5000	5000	3770	4700
500° F (260° C)	4000	2900	4900	4900	3740	4500
600° F (315.6° C)	3820	2600	4850	4850	3740	4200
700° F (371.1° C)	3640	2300	4800	4800	3640	3900
800° F (426.7° C)	3580	—	4750	4750	3580	3700
900° F (482.2° C)	2840	—	—	4500	2280	3000
1000° F (537.8° C)	1160	—	—	4000	940	1500
1100° F (593.3° C)	Consult factory for higher temperatures.			3500	—	—
1200° F (648.9° C)	Consult factory for higher temperatures.			3000	—	—
Rec. Torque ft-lb (+/- 2 ft-lb)	37	37	39	37	31	35

1/2 in. (12.7 mm) Research Control Valve						
Temp	316 S/S	Carbon Steel	Hastelloy B or =	Hastelloy C or =	Monel	Alloy 20
100° F (37.8° C)	5000	4000	5000	5000	4000	5000
200° F (93.3° C)	4750	3800	5000	5000	3780	5000
300° F (148.9° C)	4310	3600	5000	5000	3520	4950
400° F (204.4° C)	3860	3300	5000	5000	3420	4850
500° F (260° C)	3640	3100	4900	4900	3390	4600
600° F (315.6° C)	3470	2900	4850	4870	3390	4300
700° F (371.1° C)	3310	2700	4800	4610	3310	4200
800° F (426.7° C)	3255	—	4750	4430	2090	4000
900° F (482.2° C)	3190	—	—	4200	2070	3000
1000° F (537.8° C)	1860	—	—	4000	850	1500
1100° F (593.3° C)	Consult factory for higher temperatures.			3400	—	—
1200° F (648.9° C)	Consult factory for higher temperatures.			3000	—	—
Rec. Torque ft-lb (+/- 2 ft-lb)	122	122	131	124	102	117

3/4 in. (19.1 mm) and 1 in. (25.4 mm) Research Control Valve				
Temp	316 S/S		Carbon Steel	
	3/4 in.	1 in.	3/4 in.	1 in.
100° F (37.8° C)	1500	1500	1500	1500
200° F (93.3° C)	1450	1450	1350	1350
300° F (148.9° C)	1325	1325	1325	1325
400° F (204.4° C)	1175	1175	1275	1275
500° F (260° C)	1100	1100	1200	1200
600° F (315.6° C)	1050	675	1100	1100
700° F (371.1° C)	840	250	1075	1075
800° F (426.7° C)	575	—	—	4430
3/4 in. and 1 in. torque = 290 ft-lb				

DIMENSIONS



PS	A	B	C	D	Stroke
0.25 in. (6 mm)	2.12 in. (54 mm)	0.68 in. (17 mm)	4.00 in. (102 mm)	1.75...2.36 in. (44...60 mm)	0.437 in. (11 mm)
0.50 in. (13 mm)	2.75 in. (70 mm)	1.00 in. (25 mm)	4.25 in. (108 mm)		0.562 in. (13 mm)
0.75 in. (19 mm)	3.37 in. (86 mm)	1.18 in. (30 mm)	4.75 in. (121 mm)		
1 in. (25 mm)	4.00 in. (102 mm)	1.50 in. (38 mm)	4.74 in. (120 mm)		

Notes

Stem Thread: 5/16-24
 Turns to Full Open: 1/4 in. = 10.5 Turns
 1/2 in., 3/4 in., 1 in. = 13.5 Turns
 Max Stem Thread Load: 140 lb/force

INNERVALVE CHART

Valve Size	Trim Designation	Max Cv	Orifice Dia. in. (mm)	Orifice Area in. ² (mm ²)	Nominal Rangeability Linear	Equal %
1 in. (25.4 mm)	6.0	6.0	0.6250 (15.9)	0.3068 (197.9)	50:1	60:1
	5.0	5.0	0.6250 (15.9)	0.3068 (197.9)	50:1	60:1
	4.5	4.5	0.5000 (12.7)	0.1963 (126.6)	50:1	60:1
3/4 in. (19.1 mm) and 1 in. (25.4 mm)	4.0	4.0	0.5000 (12.7)	0.1963 (126.6)	50:1	60:1
	3.5	3.5	0.5000 (12.7)	0.1963 (126.6)	50:1	60:1
1/2 in. (12.7 mm), 3/4 in. (19.1 mm) and 1 in. (25.4 mm)	A	2.5	0.3750 (9.5)	0.1104 (71.2)	40:1	50:1
	B	2.0	0.3750 (9.5)	0.1104 (71.2)	40:1	50:1
	C	1.25	0.2810 (7.1)	0.0620 (40.0)	40:1	50:1
	D	0.8	0.2500 (6.4)	0.0491 (31.7)	40:1	50:1
	E	0.5	0.2500 (6.4)	0.0491 (31.7)	40:1	50:1
	F	0.32	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	G	0.2	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	H	0.13	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	I	0.08	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	J	0.05	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
1/4 in. (6.4 mm), 1/2 in. (12.7 mm), 3/4 in. (19.1 mm) and 1 in. (25.4 mm)	K	0.03	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	L	0.02	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	M	0.01	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	N	0.006	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	O	0.003	0.0860 (2.2)	0.0058 (3.7)	25:1	—

Control. Manage. Optimize.

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DESCRIPTION

The Type NRMA Non-Rotating Manual Actuation design is used in applications where either our low-flow trims, cooling fins or bellows are needed and when applications demand human interaction. The manual actuator can be mounted on all RC series valves, including all "P" Trims and all Bonnets. Exchanging between electrical, pneumatic and manual actuators is therefore possible at any time with simple additions. The actuator is encapsulated and completely maintenance-free—designed for fine control.

APPLICATIONS

When you turn the hand wheel, the valve interior moves in a linear motion. This linear movement, from the hand wheel to the internal coupling, prevents damage to the trim and seat, distinguishing this design from conventional manual control valves.

FEATURES

- Hand drive, linear
- Suitable for Badger Meter® modular construction

MATERIALS

Case	1.4404 (316L)
Yoke	1.4404 (316L)
Hand Wheel	Duroplast

SPECIFICATIONS

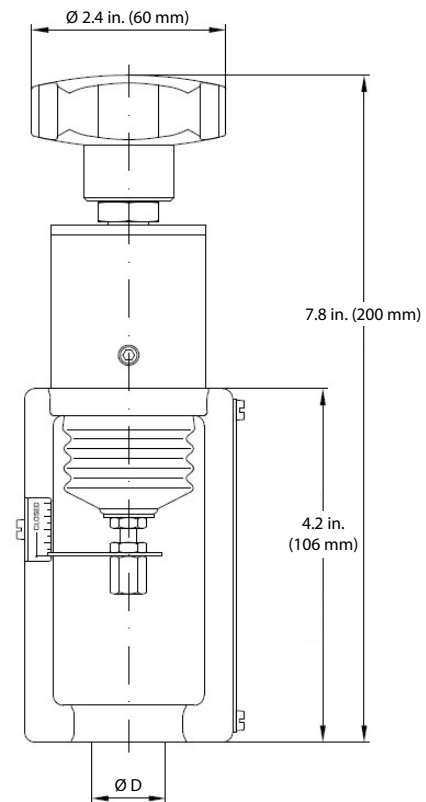
Weight	Approximately 3.3 lb (1.5 kg)
Temperature	-40...176° F (-40...80° C)
Valve Lift	0.04 in. (1 mm) / 360° turn

SIZES FOR RESEARCH CONTROL VALVES

Sizes	Ø Average	Stroke
1/4 in. standard	0.625 in.	11.1 mm
1/2 in., 3/4 in., 1 in. standard	0.875 in.	14.3 mm
1/2 in., 3/4 in., 1 in. heavy duty guiding	0.875 in.	14.3 mm



DIMENSIONS



RCV Valves		Trim Sizes Equal %															
% Lift	% Cv	6.0	5	4.5	4	3.5	A	B	C	D	E	F	G	H	I	J	% Lift
0%	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
5%	1.0%	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.008	0.005	0.003	0.002	0.001	0.001	0.000	5%
10%	1.9%	0.11	0.10	0.09	0.08	0.07	0.05	0.04	0.02	0.015	0.010	0.006	0.004	0.002	0.002	0.001	10%
20%	3.8%	0.23	0.19	0.17	0.15	0.13	0.10	0.08	0.05	0.031	0.019	0.012	0.008	0.005	0.003	0.002	20%
25%	4.8%	0.29	0.24	0.22	0.19	0.17	0.12	0.10	0.06	0.038	0.024	0.015	0.010	0.006	0.004	0.002	25%
30%	5.9%	0.35	0.29	0.26	0.23	0.20	0.15	0.12	0.07	0.047	0.029	0.019	0.012	0.008	0.005	0.003	30%
40%	8.8%	0.53	0.44	0.40	0.35	0.31	0.22	0.18	0.11	0.070	0.044	0.028	0.018	0.011	0.007	0.004	40%
50%	13.2%	0.79	0.66	0.59	0.53	0.46	0.33	0.26	0.16	0.105	0.066	0.042	0.026	0.017	0.011	0.007	50%
60%	19.8%	1.19	0.99	0.89	0.79	0.69	0.49	0.40	0.25	0.158	0.099	0.063	0.040	0.026	0.016	0.010	60%
70%	29.6%	1.78	1.48	1.33	1.19	1.04	0.74	0.59	0.37	0.237	0.148	0.095	0.059	0.039	0.024	0.015	70%
75%	36.3%	2.18	1.81	1.63	1.45	1.27	0.91	0.73	0.45	0.290	0.181	0.116	0.073	0.047	0.029	0.018	75%
80%	44.4%	2.67	2.22	2.00	1.78	1.56	1.11	0.89	0.56	0.356	0.222	0.142	0.089	0.058	0.036	0.022	80%
90%	66.7%	4.00	3.33	3.00	2.67	2.33	1.67	1.33	0.83	0.533	0.333	0.213	0.133	0.087	0.053	0.033	90%
100%	100%	6.00	5.00	4.50	4.00	3.50	2.50	2.00	1.25	0.800	0.500	0.320	0.200	0.130	0.080	0.050	100%
Valve Sizes		1"	1"	1"	1", 3/4"	1", 3/4"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	

Trim Sizes O through P-18 are available only in linear characteristic. See Product Data Sheets for maximum Cvs.

RCV Valves		Trim Sizes Equal %															
% Lift	% Cv	6.0	5	4.5	4	3.5	A	B	C	D	E	F	G	H	I	J	% Lift
0%	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
5%	1.0%	0.30	0.25	0.23	0.20	0.18	0.13	0.10	0.06	0.040	0.025	0.016	0.010	0.007	0.004	0.003	5%
10%	1.9%	0.60	0.50	0.45	0.40	0.35	0.25	0.20	0.13	0.080	0.050	0.032	0.020	0.013	0.008	0.005	10%
20%	3.8%	1.20	1.00	0.90	0.80	0.70	0.50	0.40	0.25	0.160	0.100	0.064	0.040	0.026	0.016	0.010	20%
25%	4.8%	1.50	1.25	1.13	1.00	0.88	0.63	0.50	0.31	0.200	0.125	0.080	0.050	0.033	0.020	0.013	25%
30%	5.9%	1.80	1.50	1.35	1.20	1.05	0.75	0.60	0.38	0.240	0.150	0.096	0.060	0.039	0.024	0.015	30%
40%	8.8%	2.40	2.00	1.80	1.60	1.40	1.00	0.80	0.50	0.320	0.200	0.128	0.080	0.052	0.032	0.020	40%
50%	13.2%	3.00	2.50	2.25	2.00	1.75	1.25	1.00	0.63	0.400	0.250	0.160	0.100	0.065	0.040	0.025	50%
60%	19.8%	3.60	3.00	2.70	2.40	2.10	1.50	1.20	0.75	0.480	0.300	0.192	0.120	0.078	0.048	0.030	60%
70%	29.6%	4.20	3.50	3.15	2.80	2.45	1.75	1.40	0.88	0.560	0.350	0.224	0.140	0.091	0.056	0.035	70%
75%	36.3%	4.50	3.75	3.38	3.00	2.63	1.88	1.50	0.94	0.600	0.375	0.240	0.150	0.098	0.060	0.038	75%
80%	44.4%	4.80	4.00	3.60	3.20	2.80	2.00	1.60	1.00	0.640	0.400	0.256	0.160	0.104	0.064	0.040	80%
90%	66.7%	5.40	4.50	4.05	3.60	3.15	2.25	1.80	1.13	0.720	0.450	0.288	0.180	0.117	0.072	0.045	90%
100%	100%	6.00	5.00	4.50	4.00	3.50	2.50	2.00	1.25	0.800	0.500	0.320	0.200	0.130	0.080	0.050	100%
Valve Sizes		1"	1"	1"	1", 3/4"	1", 3/4"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	

Numbers are for reference or comparison only.

Research Control Valves

CV vs Lift Curve

% Lift	% Maximum Cv	
	Linear	Equal %
0%	0%	0%
5%	5%	1%
10%	10%	2%
20%	20%	4%
25%	25%	5%
30%	30%	6%
40%	40%	9%
50%	50%	13%
60%	60%	20%
70%	70%	30%
75%	75%	36%
80%	80%	44%
90%	90%	67%
100%	100%	100%

% Cv vs. % Lift

