

# Low Flow Control Valves



LowFlow by Jordan Valve is a full range of fractional flow control valves with Cv values to 0.00001 (0,0000086 Kv), temperatures up to 1500°F (816°C) and pressures up to 5000 psi (345 bar). Our low flow range of products has been designed to handle the toughest micro-flow applications.

The Mark 708 Series and Mark 709 Series are available with nearly any type of end connections, in a variety of alloy materials, and in the following configurations:

- MK708
- MK708CR – Cryogenic Bonnet
- MK708MV – Motor Valve
- MK708DP – Double Packed Bonnet
- MK708QC – Quick Change
- MK708HT – High Temperature Finned Bonnet
- MK708BS – Bellows Stem Seal
- MK709 Three Way Valve



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# Mark 708 Series

## Fractional Flow Control Valves

The Mark 708 was developed by Jordan Valve to provide the most accurate control available for fractional flow services; whether for pilot plant installations, test stands, R & D facilities, or for specialized processes such as dosing, injection and venting applications.

With Cv's ranging from 0.00001 to 4.0 available in the 1/4" through 3/4" line sizes (0,000009 to 3,4 Kv in sizes DN8 through DN20), the Mark 708 offers design features that will provide enhanced performance to insure precision control on your most critical micro-flow applications.

### FEATURES

- **Rolling Diaphragm:** The rolling diaphragm design ensures that the effective diaphragm area remains relatively constant, regardless of valve stem position. This increases accuracy of the actuator when positioning the valve by ensuring a linear response to input signal changes.
- **Spring-loaded TFE/Chevron Packing:** The spring-loaded packing maintains a proper compression, while minimizing excessive friction. This alleviates the need for most field adjusting. The TFE packing is suitable for temperatures to 450°F (232°C), while Braided or Graphite/Grafoil may be used for higher temperature requirements.
- **Bolted Body/Bonnet Connection:** The bolting provides solid construction and secure connection. This bolting adds ease to maintenance, as bonnet/actuator assembly may be removed with the valve body in-line.
- **Guided Trim:** Extended orifice and plug guiding are standard and offers improved shutoff and accuracy equivalent to heavy duty trim option of competitors.

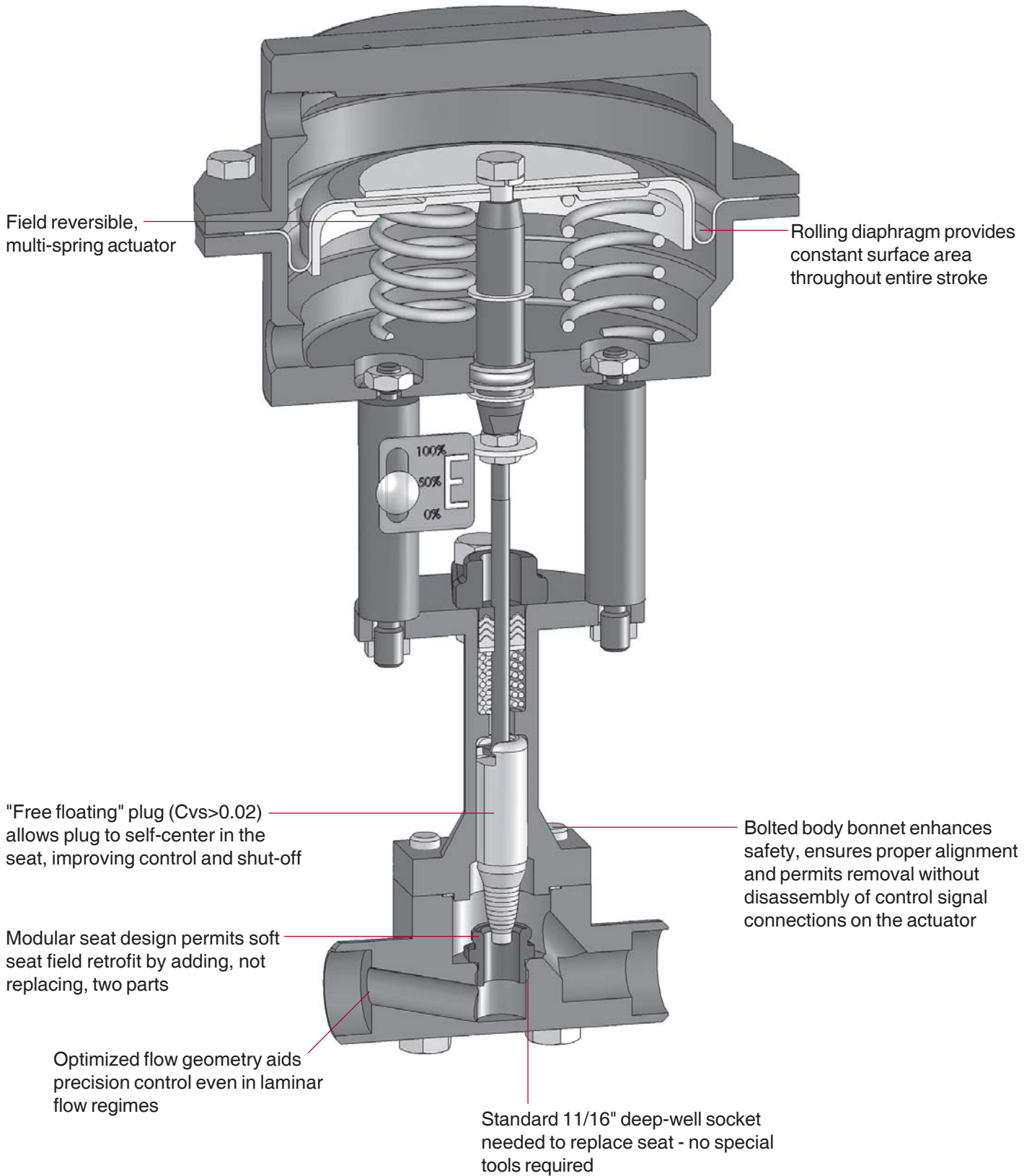
#### *This section includes the following Series:*

- **MK708 (p. 3):** a complete line of pneumatic and electric control valves developed specifically for the unique properties and conditions encountered in fractional flow services.
- **MK708QC P (p. 5):** For applications requiring frequent trim changes, this options allows quick and easy changing of the trim set without disturbing the actuator setting.
- **MK708MV (p. 13):** A compact, lightweight electronic control valve designed for precise fractional flow control.



- **MK708 Bellows Stem Seal (p. 16):** Lightweight, compact control valves with bellows stem seal for dependable leakage protection where fugitive emissions must be contained.
- **MK708 Cryogenic Bonnet (p. 20):** The cryogenic bonnet option is a 9" bonnet extension that isolates the valve packing from service conditions that could have an adverse effect on valve performance and control.
- **MK708 Double Packed Bonnet (p. 22):** A cost effective alternative to a bellow stem seal, the double packed bonnet option is used when tighter containment of the controlled media is desired over that of standard packing arrangements.
- **MK708 with High Temperature Finned Bonnet (p. 24):** The finned bonnet keeps the area around the packing cooler to reduce the effects of high temperatures on packing life, and enables the use of standard packing materials that generally would not be suitable for the elevated service temperatures.

**MK708 CUT-A-WAY**



## SPECIFICATIONS — 708

**Sizes:** 1/4", 1/2", 3/4" (DN8, DN15, DN20)

### End Connections

- Threaded — NPT, BSPT, BSPP
- Socket Weld
- Integral Tube Ends
- Welded Flanges (ANSI, DIN, JIS)

### Actuator:

- 1/4" (DN8) — Standard: 7M (7 in<sup>2</sup>) multi-spring; Optional: 14M (14 in<sup>2</sup>) multi-spring
- 1/2" (DN15) — Standard: 14M; Optional: 7M
- 3/4" (DN20) — Standard: 14M; Optional 35M (35 in<sup>2</sup>)

### Diaphragm Materials

- 7M & 14M — rolling
- 35M — formed

### Body/Bonnet Materials

- Carbon Steel
- Stainless Steel
- Hastelloy C
- Hastelloy B
- Alloy 20
- Monel
- Titanium
- Other materials upon request

### Trim Materials

- Cv's 0.05 (0,04 Kv) and above: 17-4 plug, 316SS & seat
- Cv's below 0.05 (0,04 Kv): Nitronic 60 stem/plug & seat

### Optional Trim Materials

- 17-4 plug, 416SS seat
- Stellite plug and Stellite seat (hard seat only)
- 316SS stem/plug & seat

**Actuator Material:** aluminum, epoxy coated

**Diaphragm Material:** Buna-N, fabric-reinforced

### Stem Packing

- Standard: spring-loaded TFE/Chevron (to 450°F/232°C)
- Optional: braided or Graphite/Grafoil (with positioners on 7M or 14M)

**Body/Bonnet Gasket:** RPTFE or Grafoil (*matches packing material unless specified*)

**Service:** steam, air, gas, oil, water, chemicals

### Shutoff

- Standard — ANSI Class III
- Optional — ANSI Class VI (Cv's 0.05 to 4.0/Kv's 0,04 to 3,4 only) with soft RPTFE seat (consult factory for other soft seat material options )

**Ranges:** 3-15 or 6-30 psi (0,21-1,03 or 0,41-2,07 bar) split ranges are available with optional positioner

### Action

- Direct (air signal closes valve)
- Reverse (air signal opens valve)

**Flow Characteristic:** linear; equal percentage (Cv<sub>≥</sub>0.05 (0,43 Kv) only); or quick opening (Cv<sub>≥</sub>0.05 (0,43 Kv) only)



## OPERATION — 708QC (QUICK CHANGE)

The quick change option allows change of the trim without removing the valve from the process line, or, disturbing the actuator setting. To change the trim, simply unbolt and remove the bonnet assembly, loosen the packing, disconnect the stem, and replace the plug.

## FEATURES

- Compact, lightweight control valves for precise fractional flow control in pilot plants, research facilities, and low flow process applications.
- Trim sets available in Cv's from 0.05 to 4.0 (Kv's from 0,043 to 3,44) with linear, equal percentage, and quick opening flow characteristics.
- Quick and easy trim changes while valve remains in-line.

## SPECIFICATIONS — 708QC

**Sizes:** 1/4", 1/2", 3/4" (DN8, DN15, DN20) (Note: 1/4"/DN8 valve uses 1/2"/DN15 body with 1/4"/DN8 ends)

### End Connections

- Threaded — NPT
- Socket Weld (1/2" & 3/4" (DN15 & DN20) only)

### Actuator:

- Standard: 14M (14 in<sup>2</sup>)
- Optional: 7M (7 in<sup>2</sup>)

**Diaphragm Design:** rolling

### Body/Bonnet Materials

- Carbon Steel
- Stainless Steel
- Hastelloy C
- Hastelloy B
- Alloy 20
- Monel
- Titanium
- Other materials available upon request

### Trim Materials

- Cv's 0.05 (0,04 Kv) and above: 17-4 plug, 316SS & seat

### Optional Trim Materials

- Standard Trim: 17-4 plug, 316 SST stem and seat
- Optional Trim: 17-4 plug, 416 SST seat, Stellite plug and seat; 316 SST stem, plug and seat

**Actuator Material:** aluminum, epoxy coated

**Diaphragm Material:** Buna-N, fabric-reinforced

### Stem Packing

- Standard: spring-loaded TFE/Chevron (to 450°F/232°C)
- Optional: braided or Graphite/Grafoil (with positioners on 7M or 14M)

**Body/Bonnet Gasket:** RPTFE or Grafoil (*matches packing material unless specified*)

**Service:** steam, air, gas, oil, water, chemicals

### Shutoff

- Standard — ANSI Class III
- Optional — ANSI Class VI with soft RPTFE seat (consult factory for other soft seat material options)

**Ranges:** 3-15 or 6-30 psi (0,21-1,03 or 0,41-2,07 bar) split ranges are available with optional positioner

### Action

- Direct (air signal closes valve)
- Reverse (air signal opens valve)

**Flow Characteristic:** linear (available for all Cv's/Kv's); equal percentage or quick opening (Cv ≥ 0.05 (0,43 Kv) only)

### Standard CV (Kv) Selection

4.0** (3,44)	2.0* (1,72)	1.25* (1,08)	1.0* (0,89)
0.5* (0,43)	0.2 (0,17)	0.1 (0,09)	0.05 (0,043)

\* Available in 1/2" & 3/4" sizes (DN15 & DN20) only

\*\* Available in 3/4" size (DN20) only

Consult factory for lower Cv (Kv) values

### Maximum Allowable ΔP Ratings

- Standard 14M Actuator

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
4.0 (3,4)	264 (18)	532 (37)	532 (37)	432 (30)	864 (60)	1994 (137)
2.0 (1,7)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
1.25 (1,1)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
0.32 to 1.0 (0,3 to 0,9)	1275 (88)	2350 (162)	2350 (162)	2065 (142)	4100 (283)	5000 (345)
0.05 to 0.2 (0,04 to 0,17)	2700 (186)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)

- Optional 7M Actuator

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
0.05 to 0.2 (0,04 to 0,17)	1350 (93)	2700 (186)	2700 (186)	5000 (345)	5000 (345)	5000 (345)

Note: ATO ratings determined at nominal bench set and 0 psig in actuator

**Cv (Kv) SELECTION**

■ **Mark 708**

4.0** (3,44)	2.0* (1,72)	1.25* (1,08)	1.0* (0,89)	0.5* (0,43)
0.2 (0,17)	0.1 (0,09)	0.05 (0,043)	0.02 (0,017)	0.01 (0,009)
0.005 (0,0043)	0.002 (0,0017)	0.001 (0,0009)	0.0005 (0,00043)	0.0002 (0,00017)
0.0001 (0,00009)	0.00005 (0,000043)	0.00002 (0,000017)	0.00001 (0,000009)	

\* Available in 1/2" & 3/4" sizes (DN8 & DN15) only

\*\* Available in 3/4" size (DN20) only

■ **Mark 708QC**

4.0** (3,44)	2.0* (1,72)	1.25* (1,08)	1.0* (0,89)
0.5* (0,43)	0.2 (0,17)	0.1 (0,09)	0.05 (0,043)

\* Available in 1/2" & 3/4" sizes (DN8 & DN15) only

\*\* Available in 3/4" size (DN20) only; Consult factory for lower Cv (Kv) values.

**MAXIMUM ALLOWABLE ΔP RATING**

■ **Mark 708 & Mark 708QC, 7M**

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
0.05 to 0.2 (0,04 to 0,17)	1350 (93)	2700 (186)	2700 (186)	5000 (345)	5000 (345)	5000 (345)
≤0.02 (0,017)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)

Note: Cv < 0.02 (Kv 0,017) not available with Mark 708QC

■ **Mark 708 & Mark 708QC, 14M**

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
4.0 (3,4)	264 (18)	532 (37)	532 (37)	432 (30)	864 (60)	1994 (137)
2.0 (1,7)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
1.25 (1,1)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
0.32 to 1.0 (0,3 to 0,9)	1275 (88)	2350 (162)	2350 (162)	2065 (142)	4100 (283)	5000 (345)
0.05 to 0.2 (0,04 to 0,17)	2700 (186)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)
≤0.02 (0,017)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)

Note: Cv < 0.02 (Kv 0,017) not available with Mark 708QC

■ **Mark 708, 35M**

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
4.0 (3,4)	440 (30)	880 (61)	880 (61)	704 (49)	1460 (101)	3600 (248)

Note: ΔP can be doubled in most seats with the use of optional MV1020 motor. Consult factory for details

**PRESSURE & TEMPERATURE RATINGS**

Temp. °F (°C)	1/4" & 1/2" (DN8 * 15) Body/Bonnet psi (bar)		3/4" (DN20) Body/Bonnet psi (bar)	
	CF8M,SST	A105, CS	CF8M, SST	A105, CS
100 (38)	5000 (345)	5000 (345)	4000 (276)	4000 (276)
200 (93)	4299 (296)	4555 (314)	3439 (237)	3644 (251)
300 (149)	3882 (268)	4426 (305)	3106 (214)	3541 (244)
400 (204)	3569 (246)	4278 (295)	2855 (199)	3422 (236)
500 (260)	3319 (229)	4042 (279)	2655 (183)	3234 (223)
600 (316)	3132 (216)	3691 (254)	2506 (173)	2953 (204)
650 (343)	3083 (213)	3623 (250)	2466 (170)	2898 (200)
700 (371)	3000 (207)	3596 (248)	2400 (165)	2877 (198)
750 (399)	2931 (202)	3401 (234)	2345 (162)	2721 (188)
800 (427)	2882 (199)	2780 (192)	2306 (159)	2224 (153)
850 (454)	2819 (194)	—	2255 (155)	—
900 (482)	2736 (189)	—	2189 (151)	—
950 (510)	2681 (185)	—	2145 (148)	—
1000 (538)	2528 (174)	—	2022 (139)	—

**BODY RATINGS TABLES**

Valve pressure rating based on body/bonnet material and bolting material. Units in psi (bar).

■ **1/4" (DN8) Mark 708**

Bolting Material	Body/Bonnet Material				
	At 100°F/38°C		At Maximum Temperature		
	CF8M	A105	CF8M	A105	Max. °F/°C
ASTM A354, Gr. B	5000(345)	5000(345)	3083(213)	3623(250)	650(343)
ASTM 193, Gr. B6 (410 SST)	3000(207)	--	2995(206)	--	200(93)
	--	3705(255)	--	2995(206)	500(260)
ASTM A193, Gr. B7	--	5000(345)	--	2780(192)	800(427)
	3600(248)	--	2736(189)	--	450(232)

■ **1/2" (DN15) Mark 708**

Bolting Material	Body/Bonnet Material				
	At 100°F/38°C		At Maximum Temperature		
	CF8M	A105	CF8M	A105	Max. °F/°C
ASTM A354, Gr. B	5000(345)	5000(345)	3083(213)	3623(250)	650(343)
ASTM 193, Gr. B6 (410 SST)	5000(345)	--	--	2780(192)	800(427)
	--	5000(345)	2736(189)	--	900(482)
ASTM A193, Gr. B7	--	5000(345)	--	2780(192)	800(427)
	5000(345)	--	2736(189)	--	900(482)

■ **3/4" (DN20) Mark 708**

Bolting Material	Body/Bonnet Material				
	At 100°F/38°C		At Maximum Temperature		
	CF8M	A105	CF8M	A105	Max. °F/°C
ASTM A354, Gr. B	4000(276)	4000(276)	2466(170)	2898(200)	650(343)
ASTM 193, Gr. B6 (410 SST)	--	4000(276)	--	2224(153)	800(427)
	4000(276)	--	2917(201)	--	375(191)
ASTM A193, Gr. B7	--	4000(276)	--	2224(153)	800(427)
	4000(276)	--	2400(165)	--	700(371)

Note: standard bolting is Grade B

**Cv VERSUS TRAVEL (FOR SELECT Cv's)**

■ 0.05 Cv

Cv @ Travel															
Cv	Type	0%	1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0.05	Linear	0	0.003	0.004	0.005	0.008	0.011	0.017	0.021	0.027	0.033	0.039	0.043	0.048	0.054
	Equal Percentage	0	0.0006	0.0006	0.0008	0.001	0.002	0.003	0.005	0.007	0.010	0.017	0.030	0.033	0.045

■ 0.5 Cv

Cv @ Travel													
Cv	Type	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0.5	Linear	0	0.026	0.052	0.104	0.157	0.202	0.248	0.298	0.349	0.407	0.460	0.514
	Equal Percentage	0	0.020	0.023	0.030	0.050	0.065	0.078	0.099	0.154	0.272	0.387	0.479

■ 1.0 Cv

Cv @ Travel														
Cv	Type	0%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1.0	Linear	0	0.026	0.051	0.084	0.171	0.236	0.344	0.479	0.602	0.730	0.846	0.958	0.977
	Equal Percentage	0	0.016	0.048	0.081	0.094	0.120	0.162	0.221	0.294	0.407	0.548	0.730	0.996

■ 2.0 Cv

Cv @ Travel														
Cv	Type	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
2.0	Linear	0	0.157	0.241	0.442	0.621	0.768	0.977	1.183	1.391	1.631	1.819	1.966	
	Equal Percentage	0	0.099	0.129	0.165	0.221	0.325	0.442	0.583	0.805	1.108	1.631	1.986	

**Kv VERSUS TRAVEL (FOR SELECT Kv's)**

■ 0,043 Kv

Kv @ Travel															
Kv	Type	0%	1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0,043	Linear	0	0,0026	0,0034	0,0043	0,0069	0,0095	0,0146	0,0181	0,0232	0,0284	0,0335	0,0370	0,0413	0,0464
	Equal Percentage	0	0,0005	0,0005	0,0007	0,0009	0,0017	0,0030	0,0043	0,0060	0,0086	0,0146	0,0258	0,0284	0,0387

■ 0,43 Kv

Kv @ Travel													
Kv	Type	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0,43	Linear	0	0,022	0,045	0,089	0,135	0,174	0,213	0,256	0,300	0,350	0,396	0,442
	Equal Percentage	0	0,017	0,020	0,026	0,043	0,056	0,067	0,085	0,132	0,234	0,333	0,412

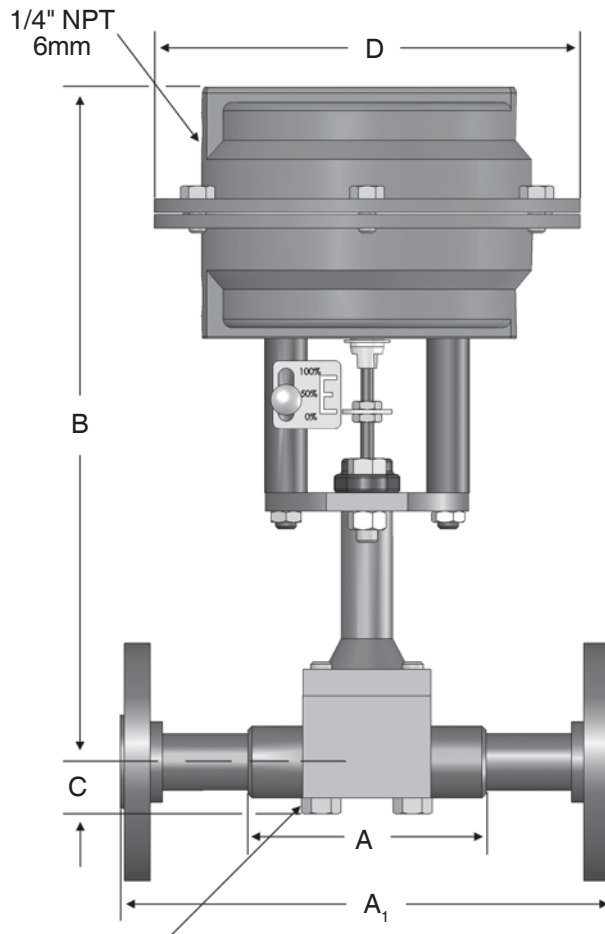
■ 0,86 Kv

Kv @ Travel														
Kv	Type	0%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0,86	Linear	0	0,022	0,044	0,072	0,147	0,203	0,296	0,412	0,518	0,628	0,728	0,824	0,850
	Equal Percentage	0	0,014	0,041	0,070	0,081	0,103	0,139	0,190	0,253	0,350	0,471	0,628	0,857

■ 1,72 Kv

Kv @ Travel														
Kv	Type	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
1,73	Linear	0	0,135	0,207	0,380	0,534	0,660	0,840	1,017	1,196	1,403	1,564	1,691	
	Equal Percentage	0	0,085	0,111	0,142	0,190	0,280	0,380	0,501	0,692	0,953	1,403	1,708	

**DIMENSIONS — MK708**



1/2" (DN15) valve size shown, bolts are from top of valve on 1/4" (DN8) & 3/4" (DN20) sizes

■ Mark 708 Threaded & FSW Ends

Valve Size	Actuator	Dimensions, Inches				Weight (lbs.)
		A	B	C	D	
1/4"	7M	2.06	8.5	0.4	5.0	2.8
1/4"	14M	2.06	8.5	0.4	6.3	3.7
1/2"	7M	3.50	9.6	0.9	5.0	4.5
1/2"	14M	3.50	9.6	0.9	6.3	5.5
3/4"	14M	4.38	9.7	1.2	6.3	7.5
3/4"	35M	4.38	11.5	1.2	9.5	16.5

■ Mark 708 Flanged Ends

Valve Size	ANSI Flange	Dimensions, Inches				Weight (lbs.)
		A1	B	C	D	
1/2"	150#	7.25	9.66	0.9	6.3	9
	300#	7.50	9.66	0.9	6.3	10
3/4"	150#	7.25	9.7	1.2	6.3	12
	300#	7.50	9.7	1.2	6.3	14

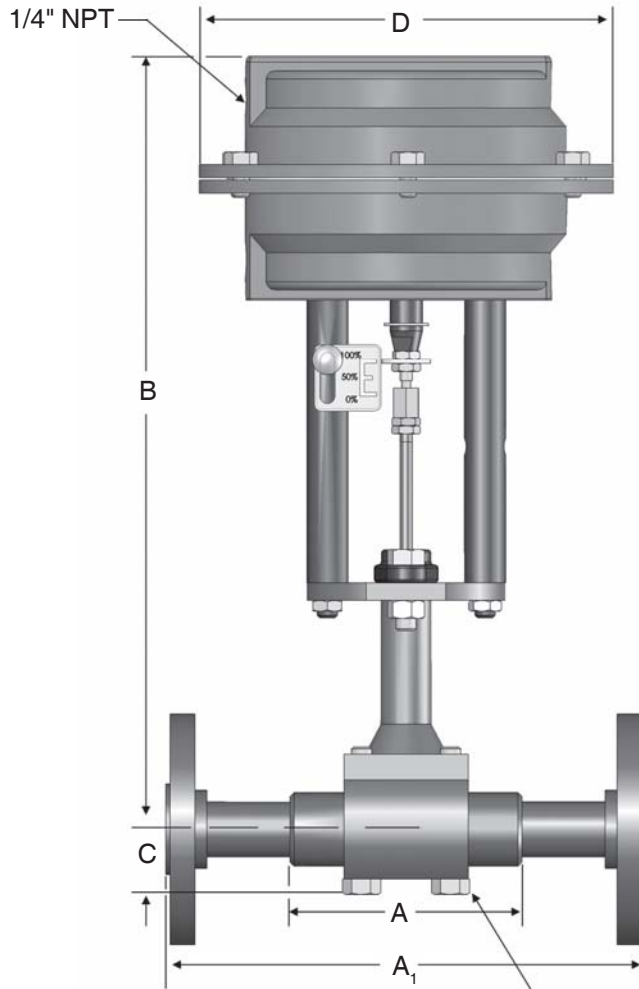
■ Mark 708 Threaded & FSW Ends, Metric

Valve Size (DN)	Actuator	Dimensions, mm				Weight (kg.)
		A	B	C	D	
8	7M	55	216	10	127	1,3
8	14M	55	216	10	160	1,7
15	7M	89	244	23	127	2,0
15	14M	89	244	23	160	2,5
20	14M	111	246	30	160	3,4
20	35M	111	292	30	241	7,5

■ Mark 708 Flanged Ends, Metric

Valve Size (DN)	Actuator	Flange PN	Dimensions, mm				Weight (kg.)
			A1	B	C	D	
15	14M	10/16	130	244	23	160	4,1
		25/40	150	244	23	160	4,5
20	14M	10/16	130	246	30	160	5,4
		25/40	150	246	30	160	6,4

**DIMENSIONS — MK708QC**



1/2" valve (DN15) shown, bolts are from top of valve on 1/4" & 3/4" (DN8 & DN20) size.

■ Mark 708QC Threaded & FSW Ends

■ Mark 708QC Flanged Ends

Valve Size	Actuator	Dimensions, Inches				Weight (lbs.)
		A	B	C	D	
1/4"	7M	3.50	11.6	0.9	5.0	4.6
1/4"	14M	3.50	11.6	0.9	6.3	5.5
1/2"	14M	3.50	11.6	0.9	6.3	5.5
3/4"	14M	4.38	11.7	1.2	6.3	7.5

Valve Size	ANSI Flange	Dimensions, Inches				Weight (lbs.)
		A1	B	C	D	
1/2"	150#	7.25	11.6	0.9	6.3	9
	300#	7.50	11.6	0.9	6.3	10
3/4"	150#	7.25	11.7	1.2	6.3	12
	300#	7.50	11.7	1.2	6.3	14

■ Mark 708QC Threaded and FSW, Metric

■ Mark 708QC Flanged Ends, Metric

Valve Size	Actuator	Dimensions, mm				Weight (kg)
		A	B	C	D	
DN8	7M	89	295	23	127	2,1
DN8	14M	89	295	23	160	2,5
DN15	14M	89	295	23	160	2,5
DN20	14M	111	297	30	160	3,4

Valve Size (DN)	Actuator	Flange PN	Dimensions, mm				Weight (kg.)
			A1	B	C	D	
15	14M	10/16	130	295	23	160	4
		25/40	150	295	23	160	5
20	14M	10/16	130	297	30	160	5
		25/40	150	297	30	160	6

**ORDERING SCHEMATIC — 708 & 708QC**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
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<b>1</b>	<b>Model</b>	
708	Standard	
708QC	Quick Change	

<b>2</b>	<b>Size</b>	
	<b>Inches</b>	<b>DN</b>
025	1/4"	DN8
050	1/2"	DN15
075	3/4"	DN20

<b>3</b>	<b>Body Material</b>	
CB	Carbon Steel (A105)	
S6	Stainless Steel (CF8M)	
MN	Monel	
A2	Alloy 20	

<b>4</b>	<b>End Connections</b>	
PT	NPT	
SW	FSW	
F5	150# FE	
F3	300# FE	
TN	Integral Tube Nuts	
ZZ	Non-standard	

<b>5</b>	<b>Trim</b>	
T6	316SS/Teflon Packing	
TM	Monel/Teflon Packing	
TA	Alloy 20/Teflon Packing	
G6	316SS/Graphite	
ZZ	Non-Standard	

<b>6</b>	<b>Plug Seat</b>		
	<b>Material of Stem/Plug/Seat</b>	<b>Cv (Kv)</b>	
A	Standard-Linear Hard	A 0.00001 (0,000009)	
B	Standard-=% Hard	B 0.00002 (0,000017)	
C	Standard-Q.O. Hard	C 0.00005 (0,00004)	
D	Standard-Linear Soft (RPTFE)	D 0.0001 (0,00009)	
E	Standard-=% Soft (RPTFE)	E 0.0002 (0,00017)	
F	Standard-Q.O. Soft (RPTFE)	F 0.0005 (0,0004)	
M	316/Stellite/Stell-Linear Hard	G 0.001 (0,0009)	
N	316/Stellite/Stell-=% Hard	H 0.002 (0,0017)	
P	316/Stellite/Stell-Q.O. Hard	I 0.005 (0,004)	
Q	316/Stellite/316-Linear Soft (RPTFE)	J 0.01 (0,009)	
R	316/Stellite/316-=% Soft	K 0.02 (0,017)	
S	316/Stellite/316-Q.O. Soft (RPTFE)	L 0.05 (0,04)	
		M 0.1 (0,09)	
		N 0.2 (0,17)	
		P 0.5 (0,4)	
		Q 1.0 (0,9)	
		R 2.0 (1,7)	
		S 4.0 (3,4)	
		T 3.0 (2,6)	
ZZ	Non-Standard		

<b>7</b>	<b>Actuators</b>			
	<b>Range</b>	<b>Diaphragm</b>	<b>Actuator</b>	
	N4Q4N4	3-15 DIR	Nylon/Nitrile	14M
	Q4Q4N4	3-15 REV		
	C4T4D4	3-9 DIR		
	D4T4R4	3-9 REV		
	E4T4D4	9-15 DIR		
	F4T4R4	9-15 REV		
	G4T4D4	6-30 DIR	Nylon/Nitrile	7M
	H4T4R4	6-30 REV		
	A7T7D7	3-15 DIR		
	B7T7R7	3-15 REV		
	C7T7D7	3-9 DIR		
	D7T7R7	3-9 REV		
	E7T7D7	9-15 DIR	Buna-N	35M
	F7T7R7	9-15 REV		
	G7T7D7	6-30 DIR		
	H7T7R7	6-30 REV		
	A3B3D3	3-15 DIR		
	B3B3R3	3-15 REV		
	C3B3D3	3-9 DIR	Buna-N	35M
	D3B3R3	3-9 REV		
	E3B3D3	9-15 DIR		
	F3B3R3	9-15 REV		
	G3B3D3	6-30 DIR		
	H3B3R3	6-30 REV		
	ZZ	Non-Standard		

<b>8</b>	<b>Accessories</b>	
	00	None
	AR	Air Regulator
	TG	TFE Gasket
	G2	Two Gages on TMP
	S6	316SS Bolting
	SH	304SS Strain Hardened
	S2	3-Way Solenoid Energize to Open
	S3	3-Way Solenoid Energize to Close
	ZZ	Non-Standard

<b>9</b>	<b>Action</b>	
	D	Air-to-close
	R	Air-to-open

<b>10</b>	<b>I/P</b>	
	0	None
	7	I/P 7M Act. 4-20Ma/3-15 psi
	4	I/P 14M Act. 4-20Ma/3-15 psi
	3	I/P 35M Act. 4-20Ma/3-15 psi
	9	I/P 7/14M Act. 4-20Ma/6-30 psi
	Z	Non-standard

**ORDERING SCHEMATIC — 708TP/708SP/708TPQC**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
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<b>1</b>	<b>Model</b>	
	708TP	Top Mount Positioner
	708SP	Side Mount Positioner
	708TPQC	Top Mount Positioner with Quick Change

<b>2</b>	<b>Size</b>		
		<b>Inches</b>	<b>DN</b>
	025	1/4"	DN8
	050	1/2"	DN15
	075	3/4"	DN20

<b>3</b>	<b>Body Material</b>	
	CB	Carbon Steel (A105)
	S6	Stainless Steel (CF8M)
	MN	Monel
	A2	Alloy 20

<b>4</b>	<b>End Connections</b>	
	PT	NPT
	SW	FSW
	F5	150# FE
	F3	300# FE
	TN	Integral Tube Nuts
	ZZ	Non-standard

<b>5</b>	<b>Trim</b>	
	T6	316SS/Teflon Packing
	TM	Monel/Teflon Packing
	TA	Alloy 20/Teflon Packing
	G6	316SS/Graphite
	ZZ	Non-Standard

<b>6</b>	<b>Plug Seat</b>			
		<b>Material of Stem/Plug/Seat</b>		<b>Cv (Kv)</b>
	A	Standard-Linear Hard	A	0.00001 (0,000009)
	B	Standard-=% Hard	B	0.00002 (0,000017)
	C	Standard-Q.O. Hard	C	0.00005 (0,00004)
	D	Standard-Linear Soft (RPTFE)	D	0.0001 (0,00009)
	E	Standard-=% Soft (RPTFE)	E	0.0002 (0,00017)
	F	Standard-Q.O. Soft (RPTFE)	F	0.0005 (0,0004)
	M	316/Stellite/Stell-Linear Hard	G	0.001 (0,0009)
	N	316/Stellite/Stell-=% Hard	H	0.002 (0,0017)
	P	316/Stellite/Stell-Q.O. Hard	I	0.005 (0,004)
	Q	316/Stellite/316-Linear Soft (RPTFE)	J	0.01 (0,009)
	R	316/Stellite/316-=% Soft	K	0.02 (0,017)
	S	316/Stellite/316-Q.O. Soft (RPTFE)	L	0.05 (0,04)
			M	0.1 (0,09)
			N	0.2 (0,17)
			P	0.5 (0,4)
			Q	1.0 (0,9)
			R	2.0 (1,7)
			S	4.0 (3,4)
			T	3.0 (2,6)
	ZZ	Non-Standard		

<b>7</b>	<b>Range</b>			
		<b>Range</b>		<b>Actuator</b>
	A	3-15 DIR	7	7M
	B	3-15REV	4	14M
	C	3-9 DIR	3	35M
	D	3-9 REV		
	E	9-15 DIR		
	F	9-15 REV		
	G	6-30 DIR		
	H	6-30 REV		
	ZZ	Non-Standard		

<b>8</b>	<b>Diaphragm</b>			
		<b>Material</b>		<b>Size</b>
	T	Nylon/Nitrile	7	7M
	T	Nylon/Nitrile	4	14M
	B	Buna-M	3	35M
	ZZ	Non-Standard		

**ORDERING SCHEMATIC — 708TP/708SP/708TPQC (CON'T)**

<b>1</b>	—	<b>2</b>	—	<b>3</b>	/	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>

<b>9</b>	<b>Actuator</b>		
	Type		Size
	708TP, 708BS	7	7M
D	Air-to-close	4	14M
R	Air-to-open	3	35M
	708SP		
S	w/SMP		
ZZ	Non-standard		

<b>12</b>	<b>I/P</b>	
	0	None
	7	I/P 7M Act. 4-20Ma/3-15 psi
	4	I/P 14M Act. 4-20Ma/3-15 psi
	3	I/P 35M Act. 4-20Ma/3-15 psi
	9	I/P 7/14M Act. 4-20Ma/6-30 psi
	Z	Non-standard

<b>10</b>	<b>Accessories</b>	
	00	None
	AR	Air Regulator
	G2	Two Gages on TMP
	S6	316SS Bolting
	SH	304SS Strain Hardened
	S2	3-Way Solenoid Energize to Open
	S3	3-Way Solenoid Energize to Close
	ZZ	Non-Standard

<b>13</b>	<b>SMP</b>	
	G	SMP - 16IQ-S Dir/Rev
	0	None
	A	SMP Dir/Rev 3-15
	D	SMP - IP Dir/Rev 4-20
	H	MK16IQ-B Dir/Rev
	J	MK16IQ-FF Dir/Rev
	Z	Non-standard

<b>11</b>	<b>Action</b>	
	D	Air-to-close
	R	Air-to-open

# Mark 708MV

## Electronic Fractional Flow Control Valves

The MK708MV offers several advantages including extreme accuracy, high turndown ratios and repeatability. The features of this high resolution, low hysteresis stepper motor make the MK708MV a premiere control valve for applications involving chemical injection, dosing, pilot plants and research labs. In addition, it is a prime valve for skid builders.

Additional features of the MK708MV include a switch-selectable power supply, a handwheel for manual operation, and a 4-20mA or split range current input signal. 0-5 or 0-10 VDC voltage signal, 4-20mA feedback, and various protective enclosure classes are standard features on these motors. Upon loss of input signal (not loss of power), the motor is designed to either lock in place, or fail to minimum input signal position.



### MOTOR SPECIFICATIONS (MK708MV)

#### Electrical

- Line Voltage: 120/240 VAC (switch selectable)
- Conduit Entry: two 1/2" NPT
- Frequency: 50/60 Hz
- Current: 0.25/0.12A (12VA)
- Command Signal Input (switch selectable)
  - Current: 4-20mA; 4-12mA; 12-20mA (280 ohm max net loading effect)
  - Voltage: 0-5VDC; 0-10VDC (200K ohms impedance)

#### Mechanical

- Thrust: 100 lb (0,4 Kn)
- Speed: 0.02 to 0.20"/sec (0.5 - 5,0 mm/sec) (potentiometer adjustable)
- Action: direct or reverse (switch adjustable)

#### Environmental

- Temperature Limits: -40°F to +150°F (-40°C - +66°C)
- Enclosure:
  - Explosion-proof for Class I, Div. I, Group C & D
  - Dust-ignition-proof for Class II, Div I, Group E,F,G
  - NEMA 4 (IP65), indoor or outdoor

**Performance:** Position Accuracy: +/-0.002" (0,051mm) unrestricted modulating duty

#### Features

- Manual operation by hand knob
- 4-20mA position feedback (requires customer supplied external 12-36VDC power supply and a load connected in series with one lead from power supply).
- Output shaft with soft seating mechanism

- Failure mode is switch selectable — on loss of command, choose lock-in-place or return to minimum input signal

#### Rangeability

Rangeability of fractional flow control valves, defined as the ratio of the maximum flow to minimum controllable flow, is a function of the valve flow coefficient, Cv (Kv).

For Cv values above 0.05 (0,04 Kv), rangeabilities can approach 50:1; for Cv values from 0.05 to 0.005 (0,04 to 0,004 Kv), rangeabilities approximately 25:1; for Cv values below 0.005 (0,004), the rangeability is approximately 15:1.

#### Approvals

Motor is available with CE mark and ATEX approvals

### MAXIMUM ALLOWABLE ΔP RATING

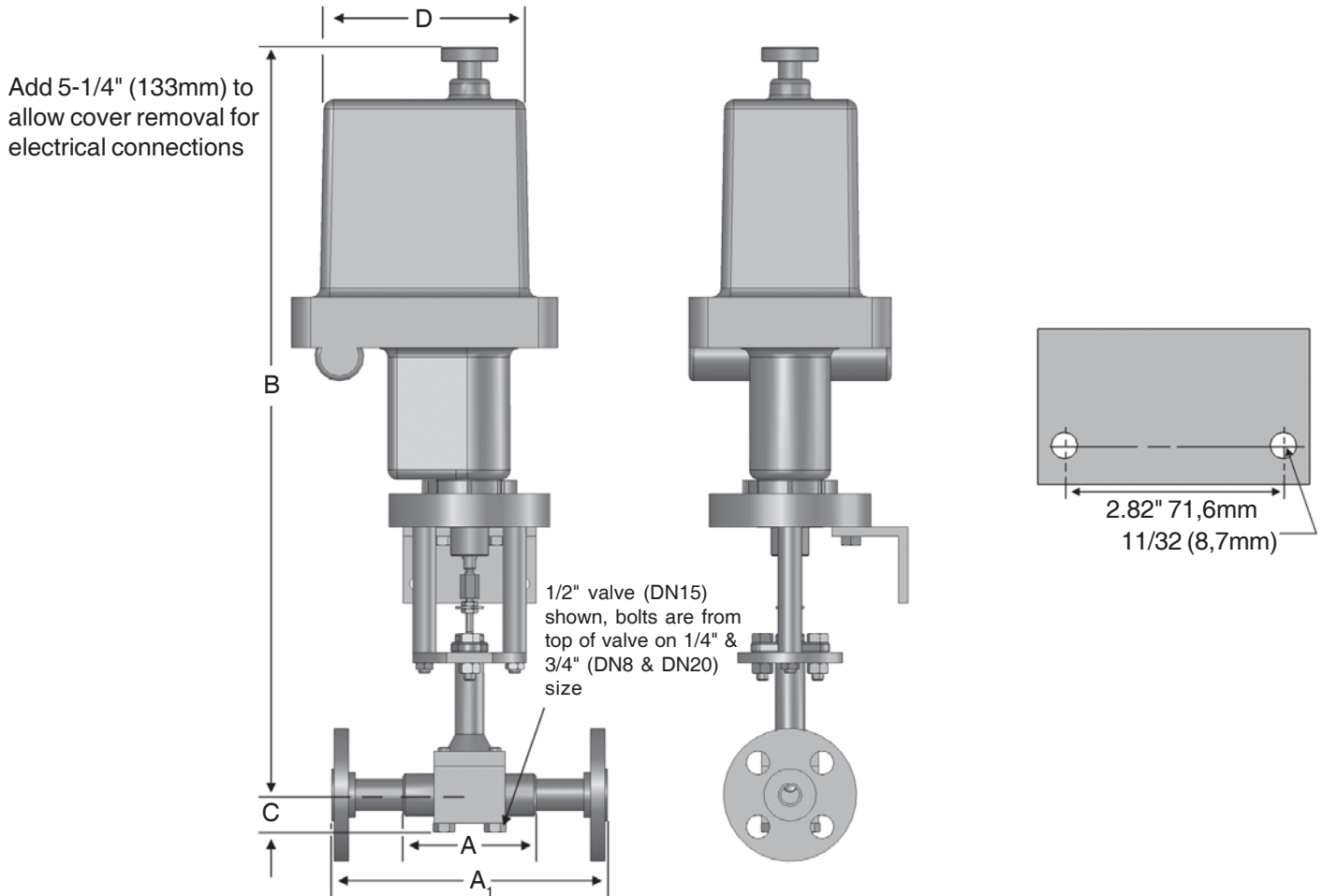
Cv (Kv)	4.0 (3,4)	1.25-2.0 (1,1-1,7)	0.5-1.0 (0,4-0,9)	0.02-0.05 (0,017-0,04)	<0.02 (<0,017)
ΔP (bar)	500 (34)	800 (55)	2500 (172)	5000 (345)	5000 (345)

Note: ΔP can be doubled in most seats with the use of optional MV1020 motor. Consult factory for details

### Cv (Kv) SELECTION

4.0** (3,44)	2.0* (1,72)	1.25* (1,08)	1.0* (0,89)	0.5* (0,43)
0.2 (0,17)	0.1 (0,09)	0.05 (0,043)	0.02 (0,017)	0.01 (0,009)
0.005 (0,0043)	0.002 (0,0017)	0.001 (0,0009)	0.0005 (0,00043)	0.0002 (0,00017)
0.0001 (0,00009)	0.00005 (0,000043)	0.00002 (0,000017)	0.00001 (0,000009)	

**DIMENSIONS — MK708MV**



■ Mark 708MV Threaded Ends

Valve Size	Dimensions, inches				Weight (lbs.)
	A	B	C	D	
1/4" - 1/2"	3.50	19.66	0.9	7.13	15.4
3/4"	4.37	19.66	1.2	7.13	17.6

■ Mark 708MV Threaded Ends, Metric

Valve Size (DN)	Dimensions, mm				Weight (kg.)
	A	B	C	D	
8 - 15	89	499	23	181	7
20	111	499	30	181	8

■ Mark 708MV Flanged Ends

Valve Size	ANSI Flange	Dimensions, Inches				Weight (lbs.)
		A1	B	C	D	
1/2"	150#	7.25	19.66	0.9	7.13	17.3
	300#	7.50	19.66	0.9	7.13	19.3
3/4"	150#	7.25	19.66	1.2	7.13	21.6
	300#	7.62	19.66	1.2	7.13	23.6

■ Mark 708MV Flanged Ends, Metric

Valve Size (DN)	Flange PN	Dimensions, mm				Weight (kg.)
		A1	B	C	D	
15	10/16	130	499	23	212	7,8
	25/40	150	499	23	212	8,8
20	10/16	130	499	30	212	9,8
	25/40	150	499	30	212	10,7

**ORDERING SCHEMATIC — 708MV**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>

<b>1</b>	<b>Model</b>	
	708MV	Motor Valve

<b>2</b>	<b>Size</b>		
	<b>Inches</b>	<b>DN</b>	
	025	1/4"	DN8
	050	1/2"	DN15
	075	3/4"	DN20

<b>3</b>	<b>Body Material</b>	
	CB	Carbon Steel (A105)
	S6	Stainless Steel (CF8M)
	MN	Monel
	A2	Alloy 20

<b>4</b>	<b>End Connections</b>	
	PT	NPT
	SW	FSW
	F5	150# FE
	F3	300# FE
	TN	Integral Tube Nuts
	ZZ	Non-standard

<b>5</b>	<b>Trim</b>	
	T6	316SS/Teflon Packing
	TM	Monel/Teflon Packing
	TA	Alloy 20/Teflon Packing
	G6	316SS/Graphite
	ZZ	Non-Standard

<b>6</b>	<b>Plug Seat</b>		
	<b>Material of Stem/Plug/Seat</b>	<b>Cv (Kv)</b>	
	A Standard-Linear Hard	A	0.00001 (0,000009)
	B Standard=% Hard	B	0.00002 (0,000017)
	C Standard-Q.O. Hard	C	0.00005 (0,00004)
	D Standard-Linear Soft (RPTFE)	D	0.0001 (0,00009)
	E Standard=% Soft (RPTFE)	E	0.0002 (0,00017)
	F Standard-Q.O. Soft (RPTFE)	F	0.0005 (0,0004)
	M 316/Stellite/Stell-Linear Hard	G	0.001 (0,0009)
	N 316/Stellite/Stell=% Hard	H	0.002 (0,0017)
	P 316/Stellite/Stell-Q.O. Hard	I	0.005 (0,004)
	Q 316/Stellite/316-Linear Soft (RPTFE)	J	0.01 (0,009)
	R 316/Stellite/316=% Soft	K	0.02 (0,017)
	S 316/Stellite/316-Q.O. Soft (RPTFE)	L	0.05 (0,04)
		M	0.1 (0,09)
		N	0.2 (0,17)
		P	0.5 (0,4)
		Q	1.0 (0,9)
		R	2.0 (1,7)
		S	4.0 (3,4)
	ZZ Non-Standard		

<b>7</b>	<b>Range</b>	
	42	4-20mA
	V1	0-10 V

<b>8</b>	<b>Diaphragm</b>	
	00	None

<b>9</b>	<b>Actuator/Yoke Feat</b>	
	M4	Act/Yoke 110VAC all ranges
	ZZ	Non-standard

<b>10</b>	<b>Accessories #1</b>	
	00	None
	XC	Oxygen Clean

<b>11</b>	<b>Action</b>	
	D	Direct
	R	Reverse

# Mark 708 Bellows Stem Seal

## Fractional Flow Control Valves

Bellows stem seals eliminate fugitive emissions by surrounding the valve stem with a pressure-tight barrier, isolating the stem from the process fluid and preventing leakage to the atmosphere. For an extra measure of protection, the bellows stem seal option provides a back-up seal of Teflon, braided or Graphite/Grafoil packing along with a detection port for use in monitoring potential emissions leakage.

### FEATURES

- Features standard bonnet port for use in lubricating the packing for added protection against leakage, or for use as a detection port for monitoring potential fugitive emissions
- Triple-ply bellows provides added strength and enhanced performance

### SPECIFICATIONS

**Sizes:** 1/4" (uses 1/2" body with 1/4" ends), 1/2", 3/4" (DN8, DN15, DN20)

#### End Connections

- Threaded — NPT, BSPT, BSPP
- Socket Weld — 1/2" & 3/4" only (DN15, DN20)
- Integral Tube Ends

#### Actuator (*Positioner required with all actuators*)

- 1/4" & 1/2" (DN8 & DN15) — standard: 14M (14 in<sup>2</sup>) multi-spring; optional: 35M (35 in<sup>2</sup>) multi-spring
- 3/4" (DN20) — standard: 14M; optional: 35M

#### Body/Bonnet Materials

- Carbon Steel
- Stainless Steel
- Hastelloy C
- Hastelloy B
- Alloy 20
- Monel
- Titanium

#### Trim Materials

- Standard Trim — Cv's 0.05 (0,04 Kv) & above: 17-4 plug, 316SS stem and seat; Cv's below 0.05 (0,04 Kv): Nitronic 60 stem, plug and seat
- Optional Trim — 17-4 plug, 416SS seat; Stellite plug and seat; 316SS stem, plug and seat



#### Bellows Material

- Standard — 316L, Triple-ply
- Optional — Hastelloy C

**Actuator Material:** Aluminum

**Diaphragm Material:** Buna-N/Nylon (rolling design)

#### Stem Packing Materials

- Standard — spring-loaded TFE/Chevron
- Optional — braided or Graphite/Grafoil with positioner

**Gasket Material:** matched to packing material

**Bellows Performance:** 1500 psi (103 bar) maximum at 100°F (38°C); 1200 cycles at 1500 psi (103 bar)

**Service:** steam, air, gas, chemicals, oil, water

#### Shutoff

- Standard — ANSI Class III
- Optional — ANSI Class VI (Cv's .05 to 4.0 only/0,04 to 3,4 Kv) with soft RPTFE seat (consult factory for other soft seat material options)

**Ranges:** 3-15 (0,2-1,0); 6-30 (0,4-2,1); 3-9 (0,2-0,6) psi (bar)  
**positioner required on all ranges**

*Mark 15 TMP standard. Consult factory for smp configuration*

#### Valve Action:

- Direct (ATC)
- Reverse (ATO)

**Flow Characteristics:** linear (available for all Cv's/Kv's); equal percentage or quick opening for Cv's less than 0,05 (0,04 Kv)

**Standard Cv Selection**

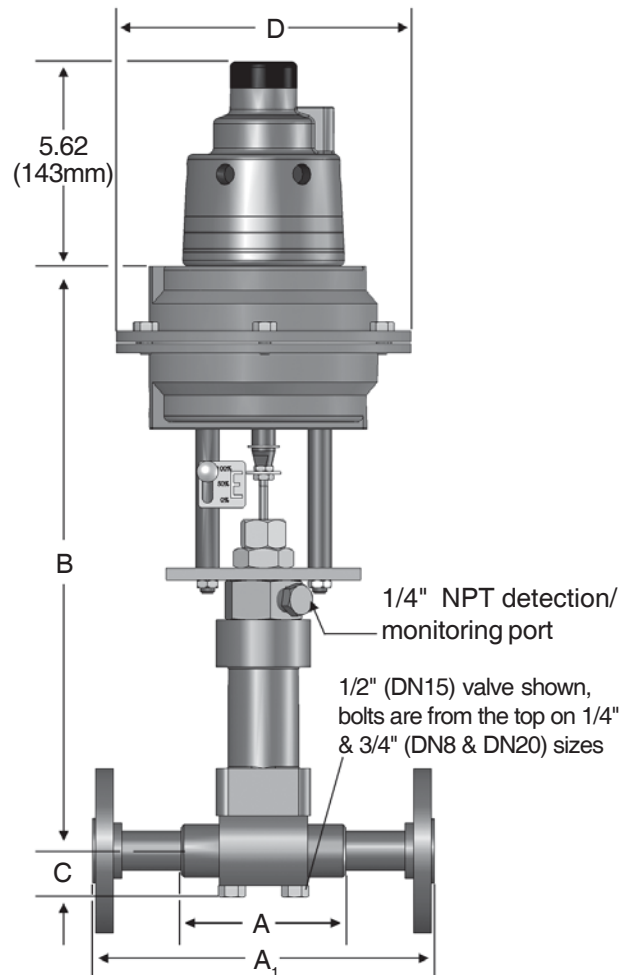
4.0** (3,44)	2.0* (1,72)	1.25* (1,08)	1.0* (0,89)	0.5* (0,43)
0.2 (0,17)	0.1 (0,09)	0.05 (0,043)	0.02 (0,017)	0.01 (0,009)
0.005 (0,0043)	0.002 (0,0017)	0.001 (0,0009)	0.0005 (0,00043)	0.0002 (0,00017)
0.0001 (0,00009)	0.00005 (0,000043)	0.00002 (0,000017)	0.00001 (0,000009)	

\* Available in 1/2" & 3/4" sizes (DN15 & DN20) only  
 \*\* Available in 3/4" size (DN20) only  
 Consult factory for lower Cv (Kv) values

**Maximum Allowable ΔP Ratings**

Cv (Kv)	14M Actuator		35M Actuator	
	ATO w/pos. @ 40psi (2,8bar)	ATC w/pos. @ 40psi (2,8bar)	ATO w/pos. @ 40psi (2,8bar)	ATC w/pos. @ 40psi (2,8bar)
4.0 (3,4)	532 (37)	1500 (103)	880 (61)	1500 (103)
1.25 - 2.0 (1,1 - 1,7)	800 (55)	1500 (103)	1323 (91)	1500 (103)
0.32 to 1.0 (0,3 to 0,9)	1500 (103)	1500 (103)	1500 (103)	1500 (103)
0.05 to 0.2 (0,04 to 0,17)	1500 (103)	1500 (103)	1500 (103)	1500 (103)
≤0.02 (0,017)	1500 (103)	1500 (103)	1500 (103)	1500 (103)

**DIMENSIONS — MK708BSS**



**Mark 708BSS Threaded Ends**

Valve Size	Actuator	Dimensions, Inches				Weight (lbs.)
		A	B	C	D	
1/4"	14M	3.50	12.50	0.9	6.30	17
	35M	3.50	12.50	0.9	9.50	17
1/2"	14M	3.50	12.50	0.9	6.30	17
	35M	3.50	12.50	0.9	9.50	17
3/4"	14M	4.38	13.90	1.2	6.30	22
	35M	4.38	13.90	1.2	9.50	22

**Mark 708BSS Flanged Ends**

Valve Size	ANSI Flange	Dimensions, Inches				Weight (lbs.)
		A1	B	C	D	
1/2"	150#	7.25	9.6	0.9	6.3	17
	300#	7.50	9.6	0.9	6.3	17
3/4"	150#	7.25	9.7	1.2	6.3	22
	300#	7.50	9.7	1.2	6.3	22

**Mark 708BSS Threaded Ends, Metric**

Valve Size (DN)	Actuator	Dimensions, mm				Weight (kg.)
		A	B	C	D	
8	14M	89	318	23	160	7,7
	35M	89	318	23	241	7,7
15	14M	89	318	23	160	7,7
	35M	89	318	23	241	7,7
20	14M	111	353	30	160	10,0
	35M	111	353	30	241	10,0

**Mark 708BSS Flanged Ends, Metric**

Valve Size (DN)	Flange PN	Dimensions, mm				Weight (kg.)
		A1	B	C	D	
15	10/16	130	244	23	160	7,7
	25/40	150	244	23	160	7,7
20	10/16	130	246	30	160	10,0
	25/40	150	246	30	160	10,0

**ORDERING SCHEMATIC — 708BS**

<b>1</b>	—	<b>2</b>	—	<b>3</b>	/	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>

<b>1</b>	<b>Model</b>	
	708BS	Bellows Seal

<b>2</b>	<b>Size</b>		
	<b>Inches</b>	<b>DN</b>	
	025	1/4"	DN8
	050	1/2"	DN15
	075	3/4"	DN20

<b>3</b>	<b>Body Material</b>	
	CB	Carbon Steel (A105)
	S6	Stainless Steel (CF8M)
	MN	Monel
	A2	Alloy 20

<b>4</b>	<b>End Connections</b>	
	PT	NPT
	SW	FSW
	F5	150# FE
	F3	300# FE
	TN	Integral Tube Nuts
	ZZ	Non-standard

<b>5</b>	<b>Trim</b>	
	T6	316SS/Teflon Packing
	TM	Monel/Teflon Packing
	TA	Alloy 20/Teflon Packing
	G6	316SS/Graphite
	ZZ	Non-Standard

<b>6</b>	<b>Plug Seat</b>			
	<b>Material of Stem/Plug/Seat</b>		<b>Cv (Kv)</b>	
	A	Standard-Linear Hard	A	0.00001 (0,000009)
	B	Standard-=% Hard	B	0.00002 (0,000017)
	C	Standard-Q.O. Hard	C	0.00005 (0,00004)
	D	Standard-Linear Soft (RPTFE)	D	0.0001 (0,00009)
	E	Standard-=% Soft (RPTFE)	E	0.0002 (0,00017)
	F	Standard-Q.O. Soft (RPTFE)	F	0.0005 (0,0004)
	M	316/Stellite/Stell-Linear Hard	G	0.001 (0,0009)
	N	316/Stellite/Stell-=% Hard	H	0.002 (0,0017)
	P	316/Stellite/Stell-Q.O. Hard	I	0.005 (0,004)
	Q	316/Stellite/316-Linear Soft (RPTFE)	J	0.01 (0,009)
	R	316/Stellite/316-=% Soft	K	0.02 (0,017)
	S	316/Stellite/316-Q.O. Soft (RPTFE)	L	0.05 (0,04)
			M	0.1 (0,09)
			N	0.2 (0,17)
			P	0.5 (0,4)
			Q	1.0 (0,9)
			R	2.0 (1,7)
			S	4.0 (3,4)
			T	3.0 (2,6)
	ZZ	Non-Standard		

<b>7</b>	<b>Range</b>			
		<b>Range</b>		<b>Actuator</b>
	A	3-15 DIR	7	7M
	B	3-15REV	4	14M
	C	3-9 DIR	3	35M
	D	3-9 REV		
	E	9-15 DIR		
	F	9-15 REV		
	G	6-30 DIR		
	H	6-30 REV		
	ZZ	Non-Standard		

<b>8</b>	<b>Diaphragm</b>			
		<b>Material</b>		<b>Size</b>
	T	Nylon/Nitrile	7	7M
	T	Nylon/Nitrile	4	14M
	B	Buna-M	3	35M
	ZZ	Non-Standard		

**ORDERING SCHEMATIC — 708BS (CON'T)**

<b>1</b>	—	<b>2</b>	—	<b>3</b>	/	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>

<b>9</b>	<b>Actuator</b>		
	Type		Size
	708TP (w/TMP), 708BS	7	7M
	D Air-to-close	4	14M
	R Air-to-open	3	35M
	ZZ	Non-standard	

<b>12</b>	<b>I/P</b>	
	0	None
	7	I/P 7M Act. 4-20Ma/3-15 psi
	4	I/P 14M Act. 4-20Ma/3-15 psi
	3	I/P 35M Act. 4-20Ma/3-15 psi
	9	I/P 7/14M Act. 4-20Ma/6-30 psi
	Z	Non-standard

<b>10</b>	<b>Accessories</b>	
	00	None
	AR	Air Regulator
	G2	Two Gages on TMP
	S6	316SS Bolting
	SH	304SS Strain Hardened
	S2	3-Way Solenoid Energize to Open
	S3	3-Way Solenoid Energize to Close
	ZZ	Non-Standard

<b>11</b>	<b>Action</b>	
	D	Air-to-close
	R	Air-to-open

# Mark 708 Cryogenic Bonnet

## Fractional Flow Control Valves

The Mark 708 for cryogenic service features a 9" bonnet extension that provides protection for the packing and actuator by preventing ice build-up, which can interfere with movement of the valve stem and affect valve performance. For cryogenic services with temperatures as low as -425°F (-254°C).

### FEATURES

- Protects the packing and actuator by preventing ice build-up which can interfere with stem movement.
- For services with temperatures as low as -425°F (-254°C)
- For precise fractional flow control in pilot plants, research facilities, and low flow process applications

### SPECIFICATIONS

**Sizes:** 1/4" (uses 1/2" body with 1/4" ends), 1/2", 3/4" (DN8, DN15, DN20)

#### End Connections

- Threaded — NPT, BSPT, BSPP
- Socket Weld — 1/2" & 3/4" only (DN15, DN20)
- Integral Tube Ends
- Welded Flange Ends

#### Actuator

- 14M (14 in<sup>2</sup>)

#### Body/Bonnet Materials

- Stainless Steel

#### Trim Materials

- Standard Trim — 17-4 plug, 316SS stem and seat
- Optional Trim — 17-4 plug, 416SS seat; Stellite plug and seat; 316SS stem, plug and seat

**Actuator Material:** Aluminum

**Diaphragm Material:** Buna-N/Nylon, fabric-reinforced

#### Stem Packing Materials

- Standard — spring-loaded TFE/Chevron
- Optional — braided or Graphite/Grafoil with positioner

**Bonnet/Body Gasket Material:** Grafoil

**Service:** air, gas, chemicals, oil, water

#### Shutoff

- ANSI Class III



**Ranges:** 3-15 (0,2-1,0) or 6-30 (0,4-2,1) (split ranges are available with optional positioner)

#### Valve Action:

- Direct (air signal closes valve)
- Reverse (air signal opens valve)

**Flow Characteristics:** linear (available for all Cv's/Kv's); equal percentage or quick opening for Cv's greater than or equal to 0.05 (0,04 Kv)

4.0** (3,44)	2.0* (1,72)	1.25* (1,08)	1.0* (0,89)
0.5 (0,43)	0.2 (0,17)	0.1 (0,086)	0.05 (0,043)

\* Available in 1/2" & 3/4" sizes (DN15 & DN20) only

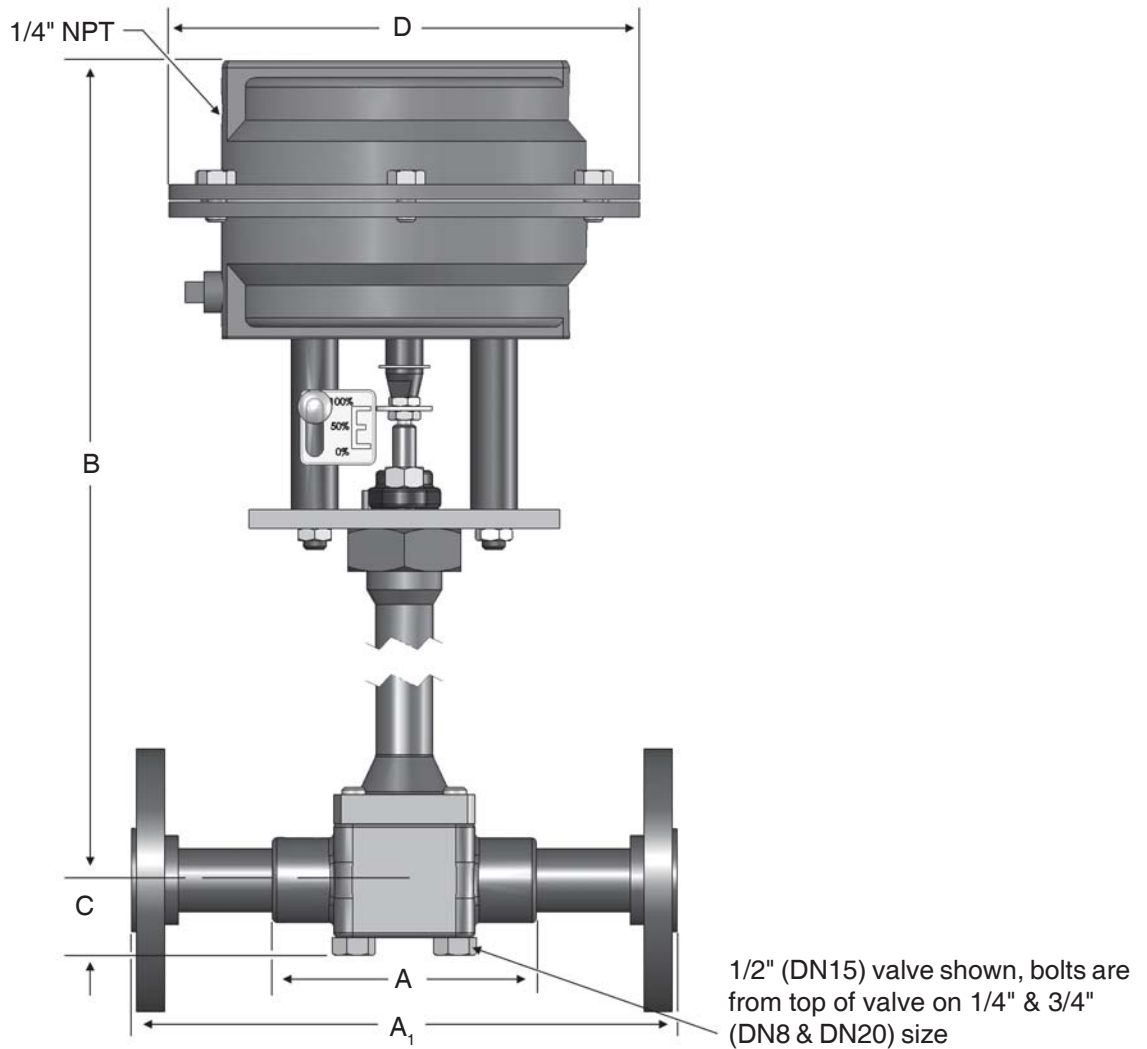
\*\* Available in 3/4" size (DN20) only

Consult factory for lower Cv (Kv) values

#### Maximum Allowable ΔP Ratings

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @ 20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
4.0 (3,4)	264 (18)	532 (37)	532 (37)	432 (30)	864 (60)	1994 (137)
2.0 (1,7)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
1.25 (1,1)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
0.32 to 1.0 (0,3 to 0,9)	1275 (88)	2350 (162)	2350 (162)	2065 (142)	4100 (283)	5000 (345)
0.05 to 0.2 (0,04 to 0,17)	2700 (186)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)

**DIMENSIONS — MK708 CRYOGENIC BONNET**



■ Mark 708 Extended Bonnet Threaded & FSW Ends

Valve Size	Actuator	Dimensions, Inches				Weight (lbs.)
		A	B	C	D	
1/4"	14M	3.50	18.6	0.9	6.3	8
1/2"	14M	3.50	18.6	0.9	6.3	8
3/4"	14M	4.38	18.7	1.2	6.3	10

■ Mark 708 Extended Bonnet Flanged Ends

Valve Size	ANSI Flange	Dimensions, Inches				Weight (lbs.)
		A <sub>1</sub>	B	C	D	
1/2"	150#	7.25	18.6	0.9	6.3	10
	300#	7.50	18.6	0.9	6.3	12
3/4"	150#	7.25	18.7	1.2	6.3	14
	300#	7.50	18.7	1.2	6.3	16

■ Mark 708 Extended Bonnet Threaded & FSW Ends, Metric

Valve Size	Actuator	Dimensions, mm				Weight (kg)
		A	B	C	D	
8	14M	89	472	23	160	3,6
15	14M	89	472	23	160	3,6
20	14M	111	475	30	160	4,5

■ Mark 708 Extended Bonnet Flanged Ends, Metric

Valve Size (DN)	Flange PN	Dimensions, mm				Weight (kg.)
		A <sub>1</sub>	B	C	D	
15	10/16	130	472	23	160	4,5
	25/40	150	472	23	160	5,4
20	10/16	130	475	30	160	6,4
	25/40	150	475	30	160	7,3

# Mark 708 Double Packed

## Fractional Flow Control Valves

The MK708 Double Packed is an alternative to a bellows stem seal, and is used when standard packing will not adequately contain the controlled media.

The optional bonnet features a double packing arrangement separated by a lantern ring. With a double packed bonnet, lubricant is pumped into the packing sets, supplying a tight seal similar to that provided by a bellows stem seal.

The double packed bonnet is an excellent choice when service conditions could cause damage to a bellows assembly.

### FEATURES

- Ideal for applications where service conditions can damage a bellows assembly
- Features standard bonnet port for use in lubricating the packing for added protection against leakage, or for use as a detection port for monitoring potential fugitive emissions
- For use in R & D, pilot plants and low flow process applications

### SPECIFICATIONS

**Sizes:** 1/2" (DN15), 3/4" (DN20)

#### End Connections

- Threaded (NPT, BSPT, BSPP)
- Socket Weld
- Integral Tube Ends
- Welded Flange Ends

#### Actuator

- Standard — 14M (14 in<sup>2</sup>) multi-spring
- Optional — 35M (35 in<sup>2</sup>) multi-spring on 3/4" (DN20) size

#### Body/Bonnet Materials:

- Carbon Steel
- Stainless Steel
- Hastelloy C
- Hastelloy B
- Alloy 20
- Monel
- Titanium

#### Trim Materials:

- Standard Trim: 17-4 plug, 316 SST stem and seat
- Optional Trim: 17-4 plug, 416 SST seat; Stellite plug and seat; 316 SST stem, plug and seat

**Actuator Material:** Aluminum



**Diaphragm Materials:** Buna-N/Nylon (rolling design on 14M)

#### Stem Packing Materials:

- Standard — 2 sets of adjustable TFE/Chevron (to 450°F/232°C)
- Optional — 2 sets of braided or Graphite/Grafoil with positioner on 14M

**Bonnet/Body Seal Materials:** RPTFE or Grafoil (matches packing material unless specified)

**Lantern Ring Material:** Stainless Steel

**Service:** steam, air, gas, chemicals, oil, water

#### Shutoff:

- Standard — ANSI Class III
- Optional — ANSI Class VI with soft RPTFE seat (consult factory for other soft seat material options)

**Ranges:** 3-15 (0,2-1,0) or 6-30 (0,4-2,1) (Split ranges are available with optional positioner)

**Valve Action:** direct (air signal closes valve) or reverse (air signal opens valve)

**Flow Characteristic:** linear (available for all Cv's); equal percentage or quick opening (for Cv's > 0.05/0,04 Kv)

#### Standard Cv (Kv) Selection

4.0** (3,44)	2.0* (1,72)	1.25* (1,08)	1.0* (0,89)
0.5 (0,43)	0.2 (0,17)	0.1 (0,086)	0.05 (0,043)

\* Available in 1/2" & 3/4" sizes (DN15 & DN20) only

\*\* Available in 3/4" size (DN20) only Consult factory for lower Cv (Kv) values

**MAXIMUM ALLOWABLE ΔP RATINGS**

• Standard 14M Actuator

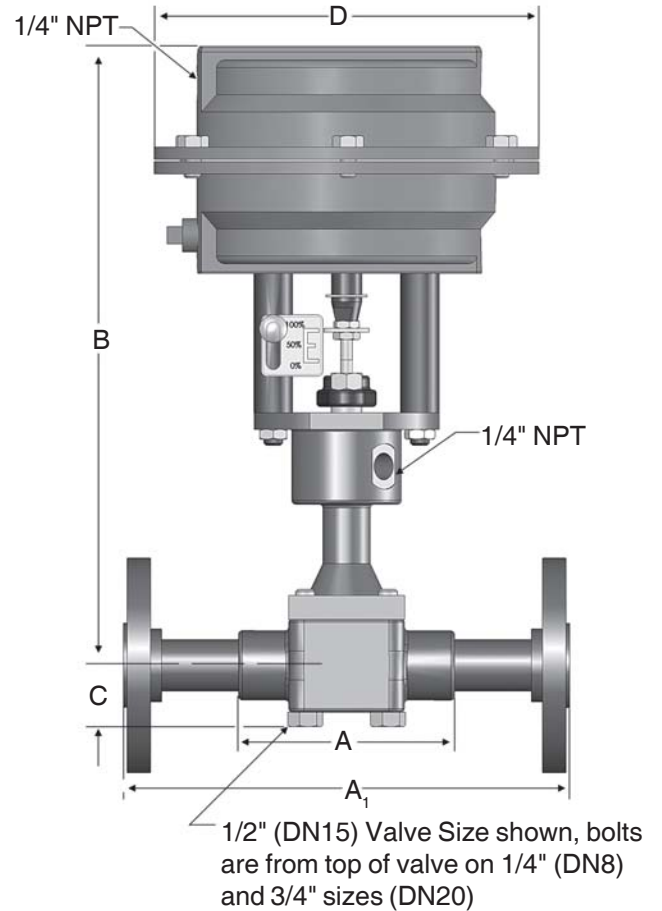
Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
4.0 (3,4)	264 (18)	532 (37)	532 (37)	432 (30)	864 (60)	1994 (137)
2.0 (1,7)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
1.25 (1,1)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
0.32 to 1.0 (0,3 to 0,9)	1275 (88)	2350 (162)	2350 (162)	2065 (142)	4100 (283)	5000 (345)
0.05 to 0.2 (0,04 to 0,17)	2700 (186)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)

• Optional 35M Actuator

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
4.0 (3,44)	440 (30)	880 (61)	880 (61)	704 (49)	1460 (101)	3600 (248)

Note: ATO ratings determined at nominal bench seat and 0 psig in actuator

**DIMENSIONS — MK708 WITH DOUBLE PACKING**



■ Mark 708 Double Packed Threaded & FSW Ends

Valve Size	Actuator	Dimensions, Inches				Weight (lbs.)
		A	B	C	D	
1/4"	14M	3.50	10.04	0.9	6.3	5.5
1/2"	14M	4.38	10.07	1.2	6.3	7.5
3/4"	35M	4.38	12.11	1.2	9.5	16.5

■ Mark 708 Double Packed Flanged Ends

Valve Size	Actuator	Flange ANSI	Dimensions, Inches				Weight (lbs)
			A	B	C	D	
1/2"	14M	150	7.25	10.04	0.9	6.3	9
1/2"	14M	300	7.50	10.04	0.9	6.3	10
3/4"	14M	150	7.25	10.07	1.2	6.3	12
3/4"	14M	300	7.50	10.07	1.2	6.3	14

■ Mark 708 Double Packed Threaded & FSW Ends, Metric

Valve Size	Actuator	Dimensions, mm				Weight (kg.)
		A	B	C	D	
DN8	14M	89	255	23	160	2,5
DN15	14M	111	256	30	160	3,4
DN20	35M	111	308	30	241	7,5

■ Mark 708 Double Packed Ends, Metric

Valve Size	Actuator	Flange PN	Dimensions, mm				Weight (kg)
			A1	B	C	D	
15	14M	10/16	130	255	23	160	4
	14M	25/40	150	255	23	160	4,5
20	14M	10/16	130	256	30	160	5
	14M	25/40	150	256	30	160	6

# Mark 708HT with Finned Bonnet

## Fractional Flow Control Valves

The cooling fin bonnet option is for the protection of the stem packing from elevated temperature associated with steam, hot water, and high temperature oil, gas, and liquid services. The finned bonnet cools the area around the packing, which permits the use of standard packing materials that otherwise would not be suitable for the service temperature conditions.

### FEATURES

- For steam, hot water, and high temperature oil, gas and liquid services up to 1500°F (815°C)
- Provides cooling effect on bonnet, protecting the packing from higher than normal temperature conditions
- For precise control of higher temperature fractional flow services in pilot plants and low flow process applications

### SPECIFICATIONS

**Sizes:** 1/4" (DN8), 1/2" (DN15), 3/4" (DN20)

#### End Connections

- Threaded (NPT)
- Integral Tube Ends
- Socket Weld (1/2" & 3/4" (DN15 & DN20) only)
- ANSI 150 or 300 flanged (1/2" & 3/4" (DN15 & DN20) only)

#### Actuator

- 1/4" (DN8) — standard ~ 7M (7 in<sup>2</sup>); optional ~ 14M (14 in<sup>2</sup>)
- 1/2" & 3/4" (DN15 & DN20) — 14M (14 in<sup>2</sup>)

#### Body/Bonnet Materials:

- Carbon Steel
- Stainless Steel
- Hastelloy C
- Hastelloy B
- Alloy 20
- Monel
- Titanium

#### Trim Materials (Hard Seat):

- Cv's 0.05 (Kv 0,04) & above: 17-4 plug, 316SS stem and seat
- Optional Trim: 17-4 plug, 416SS seat; Stellite plug & seat; 316SS stem, plug and seat



**Actuator Material:** Aluminum

**Diaphragm Materials:** Buna-N, fabric-reinforced

#### Stem Packing Materials:

- Standard — spring-loaded TFE/Chevron
- Optional — braided or Graphite/Grafoil with positioner on 7M and 14M

**Bonnet/Body Seal Materials:** Grafoil

**Lantern Ring Material:** Stainless Steel

**Service:** steam, air, gas, chemicals, oil, water

**Shutoff:** ANSI Class III

**Ranges:** 3-15 (0,2-1,0) or 6-30 (0,4-2,1) (Split ranges are available with optional positioner)

**Valve Action:** direct (air signal closes valve) or reverse (air signal opens valve)

**Flow Characteristic:** linear (available for all Cv's); equal percentage or quick opening (for Cv's ≥ 0.05/0,04 Kv)

#### Standard Cv (Kv) Selection\*

4.0** (3,44)	2.0* (1,72)	1.25* (1,08)	1.0* (0,89)	0.5* (0,43)
0.2 (0,17)	0.1 (0,09)	0.05 (0,043)		

\* Available in 1/2" & 3/4" sizes (DN15 & DN20) only

\*\* Available in 3/4" size (DN20) only

\*Rated at 100 psi (7 bar) at 2 psi (0,1 bar) DP. For sizing to your specific application parameters, we recommend the use of the Jordan Sizing & Selection Program.

**MAXIMUM ALLOWABLE ΔP RATINGS**

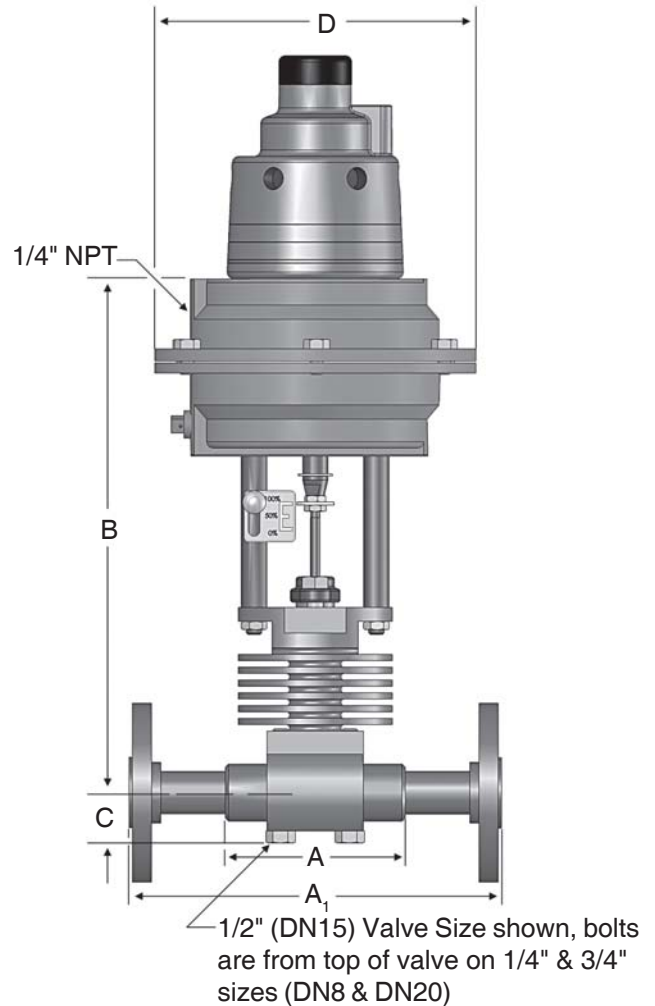
• 7M Actuator

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
0.2 - 0.05 (0,17 - 0,04)	1350 (93)	2700 (186)	2700 (186)	5000 (345)	5000 (345)	5000 (345)
≤0.02 (≤0,017)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)

• 14M Actuator

Cv (Kv)	ATO 3-15	ATO 6-30	ATO w/pos. @ 40psi (2,8bar)	ATC 3-15 @20psi (1,4bar)	ATC 6-30 @ 40psi (2,8bar)	ATC w/pos. @ 40 psi (2,8bar)
4.0 (3,4)	264 (18)	532 (37)	532 (37)	432 (30)	864 (60)	1994 (137)
2.0 (1,7)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
1.25 (1,1)	400 (26)	800 (55)	800 (55)	650 (45)	1300 (90)	3000 (207)
0.32 to 1.0 (0,3 to 0,9)	1275 (88)	2350 (162)	2350 (162)	2065 (142)	4100 (283)	5000 (345)
0.05 to 0.2 (0,04 to 0,17)	2700 (186)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)
≤0.02 (≤0,017)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)	5000 (345)

**DIMENSIONS — MK708 WITH FINNED BONNET**



■ Mark 708 Finned Bonnet Threaded & FSW Ends

Valve Size	Actuator	Dimensions, Inches				Weight (lbs.)
		A	B	C	D	
1/4"	7M	2.06	8.5	0.4	5.0	2.8
1/4"	14M	2.06	8.5	0.4	6.3	3.7
1/2"	14M	3.50	9.6	0.9	5.0	4.5
1/2"	14M	3.50	9.6	0.9	6.3	5.5
3/4"	14M	4.38	9.7	1.2	6.3	7.5
3/4"	35M	4.38	9.7	1.2	9.5	16.5

■ Mark 708 Finned Bonnet Flanged Ends

Valve Size	Actuator	Flange ANSI	Dimensions, Inches				Weight (lbs.)
			A	B	C	D	
1/2"	14M	150#	7.25	9.6	0.9	6.3	9
1/2"	14M	300#	7.50	9.6	0.9	6.3	10
3/4"	14M	150#	7.25	9.7	1.2	6.3	12
3/4"	14M	300#	7.50	9.7	1.2	6.3	14

■ Mark 708 Finned Bonnet Threaded & FSW Ends, Metric

Valve Size (DN)	Actuator	Dimensions, mm				Weight (kg.)
		A	B	C	D	
8	7M	52	216	10	127	1,3
8	14M	52	216	10	160	1,7
15	14M	89	244	23	127	2,0
15	14M	89	244	23	160	2,5
20	14M	111	246	30	160	3,4
20	35M	111	246	30	241	7,5

■ Mark 708 Finned Bonnet Flanged Ends, Metric

Valve Size	Actuator	Flange PN	Dimensions, mm				Weight (kg.)
			A1	B	C	D	
15	14M	10/16	130	244	23	160	4
	14M	25/40	150	244	23	160	5
20	14M	10/16	130	246	30	160	5
	14M	25/40	150	246	30	160	6

# Mark 709 Three Way

## Low Flow Control Valves

The Mark 709 is a lightweight control valve for use as a mixing valve in low flow process applications. Featuring a three-way body design, it is constructed with two inlets to blend two separate flow streams into a common outlet, creating a third fluid.

### FEATURES

- For low flow process applications requiring a three way body for mixing two separate flow sources into one common line
- Compact, lightweight design for precise control in pilot plants, R & D facilities, and low flow process applications
- With multiple spring actuators in a choice of sizes for differential pressures up to 1460 psi (100 bar)

### SPECIFICATIONS

**Sizes:** 1/2" (DN15), 3/4" (DN20)

#### End Connections

- NPT
- Others upon request

#### Actuator

##### 1/2" Size (DN15)

- Standard — 14M (14 in<sup>2</sup>) multi-spring
- Optional — 7M (7 in<sup>2</sup>) multi-spring

##### 3/4" Size (DN20)

- Standard — 14M (14 in<sup>2</sup>) multi-spring
- Optional — 35M (35 in<sup>2</sup>) multi-spring

#### Body/Bonnet Materials:

- Carbon Steel
- Stainless Steel
- Hastelloy C
- Hastelloy B
- Alloy 20
- Monel
- Titanium



#### Trim Materials:

- Standard Trim: 316SS stem, plug & seat

**Actuator Material:** Aluminum

**Diaphragm Materials:** Nitrile or Buna-N, fabric-reinforced

**Stem Packing Materials:** PTFE

**Bonnet/Body Seal Materials:** RPTFE

**Service:** air, gas, chemicals, oil, water

#### Shutoff:

- Standard — ANSI Class III

**Ranges:** 3-15 (0,2-1,0) or 6-30 (0,4-2,1)

**Valve Action:** direct (air signal closes valve) or reverse (air signal opens valve)

**Flow Characteristic:** linear/linear; equal percentage/equal percentage; others upon request

#### Standard Cv (Kv) Selection

Size	Available Cv's (Kv's)			
1/2" (DN15)	2.0 (1,72)	1.5 (1,29)	1.25 (1,08)	
3/4" (DN20)	4.0 (3,44)	3.5 (3,01)	3.0 (2,58)	2.5 (2,15)

## MK709 THREE WAY VALVES

### PRESSURE/TEMPERATURE RATINGS (PSI/BAR)

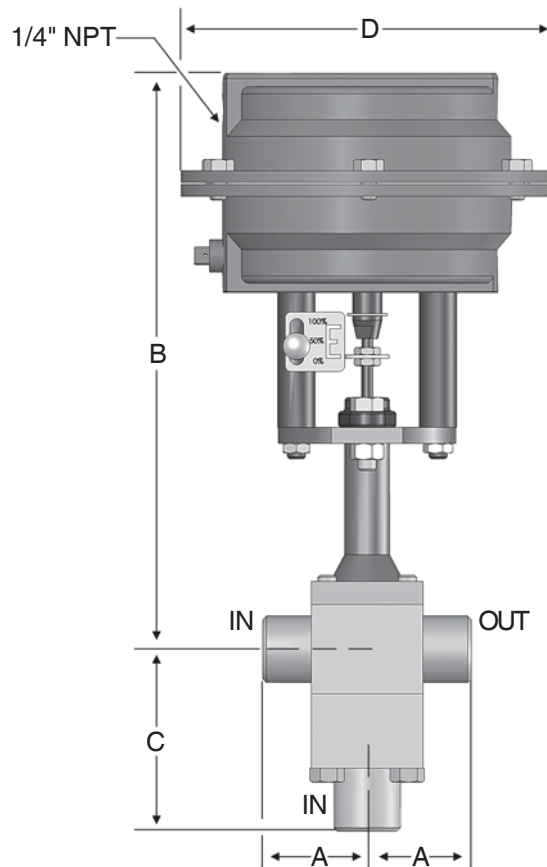
Temp °F (°C)	1/2" (DN15)		3/4" (DN20)	
	CS	SS	CS	SST
100 (38)	5000 (345)	5000 (345)	4000 (276)	4000 (276)
200 (93)	4299 (296)	4555 (314)	3439 (237)	3644 (251)
300 (149)	3882 (268)	4426 (305)	3106 (214)	3541 (244)
400 (204)	3569 (246)	4278 (295)	2855 (197)	3422 (236)
500 (260)	3319 (229)	4042 (279)	2655 (183)	3234 (223)

### MAXIMUM ALLOWABLE ΔP RATINGS

Cv (Kv)	ATO 3-15	ATO 6-30	ATC 3-15 @ 20 psi (1,4 bar)	ATC 6-30 @ 40 psi (2,8 bar)
<b>14M Actuator</b>				
2.5 to 4.0 (2,15 to 3,44)	264 (18,2)	532 (36,7)	432 (29,8)	864 (59,6)
1.25 to 2.0 (1,08 to 1,72)	400 (27,6)	800 (55,2)	650 (44,8)	1300 (89,6)
<b>35M Actuator</b>				
2.5 to 4.0 (2,15 to 3,44)	440 (30,3)	880 (60,7)	704 (48,5)	1460 (100,7)

Note: ATO ratings determined at nominal bench set and 0 psig in actuator

### DIMENSIONS — MK709 THREE WAY



#### ■ Mark 709 Three Way Threaded Ends

Valve Size	Dimensions, Inches				Weight (lbs.)
	A	B	C	D	
1/2"	1.8	9.6	2.7	6.3	8
3/4"	2.2	10.0	3.3	6.3	10

#### ■ Mark 709 Three Way Threaded Ends, Metric

Valve Size	Dimensions, mm				Weight (kgs.)
	A	B	C	D	
15	46	244	69	160	4
20	56	254	84	160	5



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