

Model 390 Control Valves

Technical Sales Bulletin



Figure 1 Model 390 Control Valve

The Model 390 control valve (Figure 1) is a heavy duty globe style control valve. This valve is used in all kinds of demanding applications, including oil and gas production and chemical process industries. Metal seats are used for increased seat life.

Model 390 valves are cage guided, single port valves that can be used in either snap on/off acting or throttling applications of either liquids or gases. A bolted bonnet is standard and a typical actuator is a Dyna-Flo DFC or DFO model linear actuator.

Features

High Quality Construction

Dyna-Flo uses only materials that have been proven to provide superior, trouble free performance. All materials comply with ASME and ASTM specifications.

Versatility

A wide range of trim options including Anti-Cavitation and Low-Noise make the 390 a highly versatile control valve.

Field Service Friendly

No special tools are required to change or inspect trim. Top access makes in-line service easy.

Industrial High Quality External Coatings

Our standard industrial high quality external coatings provide long lasting resistance to the harshest environments.

Pressure Drop Capabilities

The Model 390 can shut off against inlet pressures equal to ASME B16.34 rating.

Sour Gas Service Capability

The Model 390 can be constructed out of materials that comply with the recommendations of the National Association of Corrosion Engineers (NACE) MR-0175-2002.

Shut Off Classification

Seat leakage options range from ASME class IV to class VI.

Plug Design

Standard balanced plug design allows the use of smaller actuators.

Environmentally Friendly

Available with low emission live loaded packing.



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SPECIFICATIONS

Configurations

See Table 1.

Consult your Dyna-Flo sales office for other available configurations.

Sizes and Connection Styles

Model: 390

Size: 2", 3", 4", and 6"

Rating: ASME 900 or 1500

Connections: RF / RTJ / BWE

Maximum Inlet Temperatures and Pressures

Consistent with ASME class rating as per ASME B16.34, unless limited by either material, pressure or temperature limitations.

Maximum Pressure Drops

Same as maximum inlet pressure unless otherwise rated by specific trim construction. For Actuator and Valve assembly shut off pressure drops see Tables 20 and 21. For trim pressure / temperature ratings see Figure 5.

Standard Seat Leakage Classifications

See Table 1.

Dimensions

Valve and Actuator Assembly Dimensions
See Table 3 & 4, and Figure 2.

Approximate Valve Body Weights

See Table 2.

Valve Body to Bonnet Bolting

Standard service body to bonnet:
B7 Studs / 2H Nuts

For NACE-2002

B7M Studs / 2HM Nuts

For CF8M construction:

B8M Studs / 8M Nuts

B7 Studs Fluorokote / 2H Nuts Fluorokote

B7M Studs Fluorokote / 2HM Nuts Fluorokote

Characteristics

- Equal Percentage (Standard) - Flow Down
- Modified Equal Percentage (Same cage as Equal Percentage, different travel) - Flow Down
- Linear - Flow Down
- Low-Noise 3 - Flow Up
- Anti-Cavitation 2-Stage - Flow Down
- Anti-Cavitation 3-Stage - Flow Down

Flow Direction

Typically Flow Down (Low-Noise Trim Flow Up).

Packing Type

The standard packing is PTFE V-Ring. Live loaded low emission, graphite and other packing arrangements are also available.

Valve Sizing Coefficients

See Tables 9 to 18.

Valve Travel and Yoke Boss Sizes

See Table 22.

Trim Materials

See Table 23.

Valve Bolting Temperature Limitations

See Table 24.

Valve Parts List, Material and Temperature Limitations

See Tables 19, 23, 24, and 25.

See Figures 5 and 6.

For more information and other options contact your Dyna-Flo Sales Office.

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Table 1

Standard Seat Leakage Classifications

Body	Port Size	Characteristic	Shut Off Capability
Globe & Angle	All	Linear, Equal Percent, Modified Equal Percent, Low-Noise	IV Standard
		Anti-Cavitation	V Standard
Globe & Angle with PEEK Anti-Extrusion Rings	1-7/8" to 5-3/8" (47.6 mm to 136.5 mm)	All	V Standard to 600°F (316°C)
	1-7/8" to 5-3/8" (47.6 mm to 136.5 mm)	All	IV Optional

Table 2

Globe Valve Approximate Weights lb (kg)

Valve Size (Inch)	Class	Body	
		Flanged	BWE
2	900 / 1500	160 (73)	115 (52)
3	900	275 (125)	---
3	1500	286 (130)	213 (97)
4	900	510 (231)	---
4	1500	552 (250)	444 (201)
6	900	1125 (510)	---
6	1500	1228 (557)	1003 (455)

Angle Valve Approximate Weights lb (kg)

Valve Size	Class	Body	
		Flanged	BWE
2	900 / 1500	153 (69)	110 (50)
3	1500	272 (123)	173 (78)
4	1500	399 (181)	258 (117)
6	1500	788 (357)	445 (202)

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Table 3

Standard Globe Valve Dimensions Inches (mm)

(Refer to Figure 2)

Valve Size (Inch)	ASME Class	Actuator Size	A	B	D		E
					DFC	DFO	
2	900 / 1500 RF	2105	14.75 (375)	3.06 (78)	30.25 (768)	25.72 (653)	16.00 (406)
	900 / 1500 RTJ	2105	14.88 (378)	3.06 (78)	30.25 (768)	25.72 (653)	16.00 (406)
	900 / 1500 BWE	2105	14.75 (375)	3.06 (78)	30.25 (768)	25.72 (653)	16.00 (406)
3	900 RF	2105	17.38 (441)	4.75 (121)	30.25 (768)	25.72 (653)	16.00 (406)
	900 RTJ	2105	17.50 (445)	4.75 (121)	30.25 (768)	25.72 (653)	16.00 (406)
	1500 RF	2156	18.13 (460)	4.75 (121)	30.25 (768)	25.72 (653)	18.62 (473)
	1500 RTJ	2156	18.25 (464)	4.75 (121)	30.25 (768)	25.72 (653)	18.62 (473)
	1500 BWE	2156	18.13 (460)	4.75 (121)	30.25 (768)	25.72 (653)	18.62 (473)
3	900 RF	3156	17.38 (441)	4.75 (121)	30.91 (785)	28.10 (714)	18.62 (473)
	900 RTJ	3156	17.50 (445)	4.75 (121)	30.91 (785)	28.10 (714)	18.62 (473)
	1500 RF	3156	18.13 (461)	4.75 (121)	30.91 (785)	28.10 (714)	18.62 (473)
	1500 RTJ	3156	18.25 (464)	4.75 (121)	30.91 (785)	28.10 (714)	18.62 (473)
	1500 BWE	3156	18.13 (460)	4.75 (121)	30.91 (785)	28.10 (714)	18.62 (473)
4	900 RF	3156	20.12 (511)	6.88 (175)	30.91 (785)	28.10 (714)	18.62 (473)
	900 RTJ	3156	20.25 (514)	6.88 (175)	30.91 (785)	28.10 (714)	18.62 (473)
	1500 RF	3220	20.88 (530)	6.88 (175)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 RTJ	3220	21.00 (533)	6.88 (175)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 BWE	3220	20.88 (530)	6.88 (175)	36.48 (927)	32.69 (830)	21.12 (536)
6	900 RF	3220	28.12 (714)	9.75 (248)	36.48 (927)	32.69 (830)	21.12 (536)
	900 RTJ	3220	28.25 (718)	9.75 (248)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 RF	3220	30.25 (768)	9.75 (248)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 RTJ	3220	30.50 (775)	9.75 (248)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 BWE	3220	30.25 (768)	9.75 (248)	36.48 (927)	32.69 (830)	21.12 (536)

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Table 4

Dimension C for Globe Valves with Standard Bonnets

Inch (mm) (Refer to Figure 2)

Valve Size (Inch)	Dimension C			
	ASME Class	2-13/16 (71) Yoke Boss Diameter	3-9/16 (90) Yoke Boss Diameter	5 (127) Yoke Boss Diameter
2	900 / 1500	10.31 (261)	10.56 (267)	13.06 (331)
2 Anti-Cavitation 2 Stage	900 / 1500	11.00 (279)	11.25 (286)	13.56 (344)
3	900 / 1500	12.69 (322)	12.25 (311)	14.56 (370)
4	900 / 1500	—	11.81 (300)	14.50 (368)
6	900 / 1500	—	14.38 (365)	15.81 (402)

Table 5

Dimension C for Globe Valves with Extension Style 1 Bonnets

Inch (mm) (Refer to Figure 2)

Valve Size (Inch)	Dimension C		
	2-13/16 (71) Yoke Boss Diameter	3-9/16 (90) Yoke Boss Diameter	5 (127) Yoke Boss Diameter
2	16.91 (430)	17.53 (445)	19.84 (504)
2 Anti-Cavitation 2 Stage	17.59 (447)	18.22 (463)	20.34 (517)

Table 6

Dimension C for Angle Valves with Standard Bonnets

Inch (mm) (Refer to Figure 2)

Valve Size (Inch)	Dimension C			
	ASME Class	2-13/16 (71) Yoke Boss Diameter	3-9/16 (90) Yoke Boss Diameter	5 (127) Yoke Boss Diameter
2	900 / 1500	8.94 (277)	9.19 (233)	11.69 (297)
2 Anti-Cavitation 2 Stage	900 / 1500	9.62 (244)	9.88 (251)	12.38 (314)
3	900 / 1500	10.19 (259)	10.44 (265)	12.94 (329)
4	900 / 1500	11.38 (289)	10.94 (278)	13.25 (337)
6	900 / 1500	—	11.81 (300)	14.50 (368)

Table 7

Dimension C for Angle Valves with Extension Bonnets

Inch (mm) (Refer to Figure 2)

Valve Size (Inch)	Dimension C			
	ASME Class	2-13/16 (71) Yoke Boss Diameter	3-9/16 (90) Yoke Boss Diameter	5 (127) Yoke Boss Diameter
2	900 / 1500	15.56 (395)	16.19 (411)	18.50 (470)
2 Anti-Cavitation 2 Stage	900 / 1500	16.25 (413)	16.88 (429)	19.19 (487)

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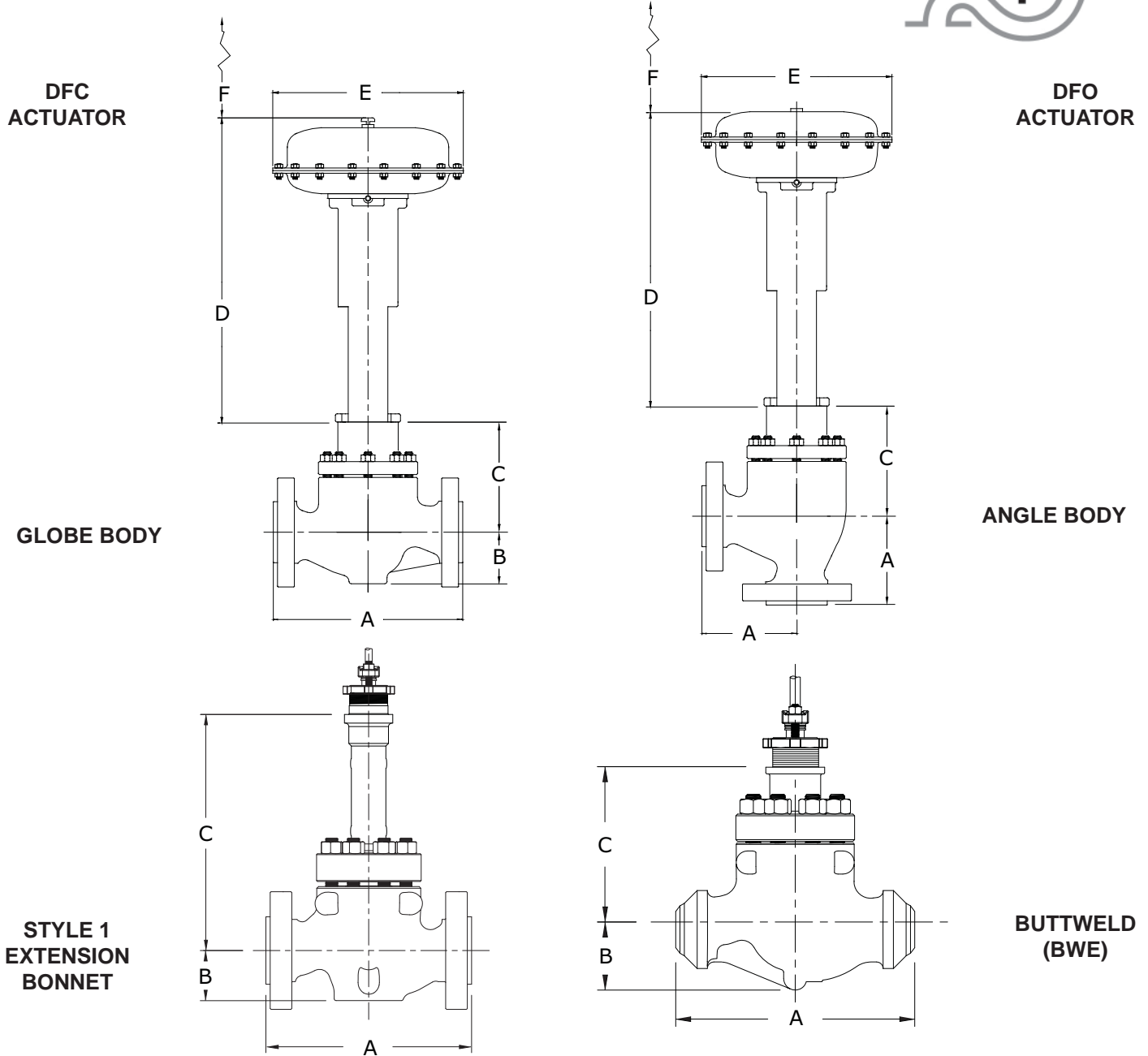
Table 8

Standard Angle Valve Dimensions Inches (mm)
(Refer to Figure 2)

Valve Size (Inch)	ASME Class	Actuator Size	A	D		E
				DFC	DFO	
2	900 RF	2105	7.00 (178)	30.25 (768)	25.72 (653)	16.00 (406)
	900 RTJ	2105	7.06 (179)	30.25 (768)	25.72 (653)	16.00 (406)
	1500 RF	2105	7.00 (178)	30.25 (768)	25.72 (653)	16.00 (406)
	1500 RTJ	2105	7.06 (179)	30.25 (768)	25.72 (653)	16.00 (406)
	1500 BWE	2105	7.00 (178)	30.25 (768)	25.72 (653)	16.00 (406)
3	900 RF	2105	8.88 (226)	30.25 (768)	25.72 (653)	16.00 (406)
	900 RTJ	2105	8.94 (227)	30.25 (768)	25.72 (653)	16.00 (406)
	1500 RF	2156	9.25 (235)	30.25 (768)	25.72 (653)	18.62 (473)
	1500 RTJ	2156	9.31 (236)	30.25 (768)	25.72 (653)	18.62 (473)
	1500 BWE	2156	9.25 (235)	30.25 (768)	25.72 (653)	18.62 (473)
3	900 RF	3156	8.88 (226)	30.91 (785)	28.10 (714)	18.62 (473)
	900 RTJ	3156	8.94 (227)	30.91 (785)	28.10 (714)	18.62 (473)
	1500 RF	3156	9.25 (235)	30.91 (785)	28.10 (714)	18.62 (473)
	1500 RTJ	3156	9.31 (236)	30.91 (785)	28.10 (714)	18.62 (473)
	1500 BWE	3156	9.25 (235)	30.91 (785)	28.10 (714)	18.62 (473)
4	900 RF	3156	10.75 (273)	30.91 (785)	28.10 (714)	18.62 (473)
	900 RTJ	3156	10.81 (275)	30.91 (785)	28.10 (714)	18.62 (473)
	1500 RF	3220	10.75 (273)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 RTJ	3220	10.81 (275)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 BWE	3220	10.75 (273)	36.48 (927)	32.69 (830)	21.12 (536)
6	900 RF	3220	12.81 (325)	36.48 (927)	32.69 (830)	21.12 (536)
	900 RTJ	3220	12.88 (327)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 RF	3220	13.88 (353)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 RTJ	3220	14.00 (356)	36.48 (927)	32.69 (830)	21.12 (536)
	1500 BWE	3220	13.88 (353)	36.48 (927)	32.69 (830)	21.12 (536)

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F Dimension	
2" Valve - 6.88" (175 mm)	4" Valve - 9.12" (232 mm)
3" Valve - 6.88" (175 mm)	6" Valve - 9.12" (232 mm)
3" Valve - 9.12" (232 mm) For DFC/DFO 3156	

Figure 2 Typical Valve Assembly Diagrams



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Table 9

Linear - Flow Down Valve Sizing Coefficients

Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2	1-7/8 (47.6)	1-1/2 (38.1)	C _v	0	3.49	12.5	22.9	31.8	38.4	43.0	46.7	49.9	52.1
			X _T	0.811	0.811	0.632	0.682	0.743	0.829	0.780	0.743	0.726	0.697
			F _L	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
3	2-7/8 (73)	2 (50.8)	C _v	0	8.72	31.5	55.1	74.6	89.4	101	110	117	121
			X _T	0.589	0.589	0.589	0.653	0.728	0.775	0.795	0.791	0.777	0.773
			F _L	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
4	3-5/8 (92.1)	2 (50.8)	C _v	6.91	26.5	26.5	86.4	117	143	165	182	194	201
			X _T	0.327	0.581	0.581	0.509	0.525	0.602	0.673	0.708	0.714	0.726
			F _L	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
6	5-3/8 (136.5)	3 (76.2)	C _v	8.78	63.3	149	231	298	351	385	407	424	425
			X _T	0.763	0.613	0.544	0.573	0.620	0.670	0.721	0.745	0.709	0.726
			F _L	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91

Table 10

Equal Percent - Flow Down Valve Sizing Coefficients

Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2	1-7/8 (47.6)	1-1/8 (28.6)	C _v	0	1.02	3.26	7.53	13.3	19.8	26.4	32.0	36.2	41.0
			X _T	0	0.745	0.619	0.595	0.587	0.593	0.633	0.721	0.791	0.791
			F _L	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
3	2-7/8 (73)	1-1/2 (38.1)	C _v	0	1.21	4.21	11.3	23.0	37.6	53.2	69.5	85.3	92.5
			X _T	0	0.954	0.761	0.600	0.558	0.592	0.661	0.705	0.706	0.762
			F _L	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
4	3-5/8 (92.1)	1-1/2 (38.1)	C _v	3.12	7.35	13.9	23.4	37.9	60.1	90.6	123	147	164
			X _T	0.676	0.551	0.524	0.488	0.449	0.443	0.463	0.509	0.569	0.674
			F _L	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
6	5-3/8 (136.5)	2-1/2 (63.5)	C _v	3.9	13.3	23.1	36.2	63.0	105	156	217	280	319
			X _T	0.961	0.686	0.615	0.584	0.540	0.513	0.496	0.480	0.513	0.586
			F _L	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82

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Table 11

Modified Equal Percent - Flow Down Valve Sizing Coefficients

Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2	1-7/8 (47.6)	1-1/2 (38.1)	C_v	0	2.28	7.52	15.7	24.1	31.6	38.2	43.5	46.7	48.7
			X_T	0.641	0.641	0.571	0.584	0.634	0.698	0.778	0.803	0.771	0.760
			F_L	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
3	2-7/8 (73)	2 (50.8)	C_v	0.475	3.07	11.8	26.8	46.6	69.3	89.5	100	103	114
			X_T	0.949	0.712	0.55	0.604	0.682	0.697	0.706	0.762	0.856	0.771
			F_L	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
4	3-5/8 (92.1)	2 (50.8)	C_v	4.33	11.3	23.3	45.0	79.6	121	155	176	192	202
			X_T	0.624	0.523	0.482	0.45	0.453	0.502	0.599	0.696	0.723	0.735
			F_L	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
6	5-3/8 (136.5)	3 (76.2)	C_v	5.22	16.6	30.8	55.0	100	168	241	299	351	378
			X_T	0.883	0.725	0.571	0.597	0.592	0.514	0.526	0.623	0.667	0.717
			F_L	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89

Table 12

Low-Noise III (A1) - Flow Up Valve Sizing Coefficients

Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2	1-7/8 (47.6)	1-1/2 (38.1)	C_v	3.00	7.70	13.0	17.8	22.3	26.4	31.0	35.3	39.0	42.0
			X_T	0.516	0.602	0.604	0.610	0.607	0.618	0.608	0.607	0.612	0.608
			F_L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
3	2-7/8 (73)	2 (50.8)	C_v	6.60	24.1	42.1	58.9	74.1	86.8	97.4	105	110	111
			X_T	0.727	0.610	0.560	0.558	0.588	0.641	0.687	0.723	0.738	0.772
			F_L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
4	3-5/8 (92.1)	2 (50.8)	C_v	7.56	27.3	50.1	71.5	90.8	109	126	142	155	162
			X_T	0.625	0.586	0.545	0.519	0.520	0.542	0.577	0.614	0.640	0.674
			F_L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
6	5-3/8 (136.5)	3 (76.2)	C_v	28.6	66.4	103	142	180	220	253	284	308	324
			X_T	0.423	0.513	0.533	0.525	0.557	0.535	0.543	0.560	0.598	0.627
			F_L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80

For quick opening valve characteristics please contact Dyna-Flo.

Relationships of Note:

$$C_1 = 39.76 \sqrt{X_T}$$

$$C_G = C_v C_1$$

$$K_M = F_L^2$$

NOTE: Modified Equal Percent is a factor of travel and requires no special trim options above Equal Percent.

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Table 13

Low-Noise III (B1) - Flow Up Valve Sizing Coefficients													
Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
3	2-7/8 (73)	2 (50.8)	C _v	3.00	9.00	14.4	18.6	23.4	28.5	34.6	40.2	45.0	48.8
			X _T	0.615	0.618	0.592	0.622	0.622	0.633	0.620	0.624	0.622	0.622
			F _L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80

Table 14

Low-Noise III (B3) - Flow Up Valve Sizing Coefficients													
Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
4	3-5/8 (92.1)	2 (50.8)	C _v	8.00	20.0	30.0	40.0	52.0	62.0	73.0	82.0	88.9	88.9
			X _T	0.591	0.531	0.524	0.517	0.513	0.509	0.517	0.527	0.522	0.522
			F _L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
6	5-3/8 (136.5)	3 (76.2)	C _v	13.0	30.0	50.0	69.0	87.0	107	125	143	160	166
			X _T	0.577	0.580	0.548	0.552	0.563	0.545	0.554	0.552	0.555	0.554
			F _L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80

Table 15

Low-Noise III (C3) - Flow Up Valve Sizing Coefficients													
Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
4	3-5/8 (92.1)	2 (50.8)	C _v	8.00	15.0	21.5	28.0	34.4	41.0	47.3	53.5	56.5	56.8
			X _T	0.526	0.516	0.530	0.530	0.539	0.535	0.540	0.538	0.540	0.540
			F _L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
6	5-3/8 (136.5)	3 (76.2)	C _v	8.30	20.5	33.0	44.3	57.0	69.0	83.0	96.5	108	112
			X _T	0.567	0.575	0.572	0.572	0.556	0.568	0.563	0.561	0.559	0.563
			F _L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80

Table 16

Low-Noise III (D3) - Flow Up Valve Sizing Coefficients													
Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
4	2-7/8 (73)	2 (50.8)	C _v	4.00	7.90	11.5	15.2	18.8	22.8	27.0	30.8	33.7	37.1
			X _T	0.517	0.525	0.540	0.526	0.533	0.536	0.534	0.530	0.533	0.530
			F _L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
6	4-3/8 (111.1)	3 (76.2)	C _v	7.00	14.0	20.7	28.0	34.8	41.6	48.5	55.7	62.5	69.6
			X _T	0.563	0.557	0.572	0.557	0.569	0.564	0.566	0.562	0.566	0.564
			F _L	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80

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Table 17

Two Stage Anti-Cavitation - Flow Down Valve Sizing Coefficients

Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2	1-3/4 (44.5)	2 (50.8)	C _v	1.07	1.97	3.29	4.86	6.58	8.36	10.1	11.7	13.0	14.0
			F _L	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
3	2-1/2 (63.5)	2-1/2 (63.5)	C _v	1.46	4.98	9.24	13.2	17.0	20.7	24.7	28.5	31.9	34.4
			F _L	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
4	3-7/16 (87.3)	3 (76.2)	C _v	2.61	9.01	15.6	21.8	28.3	34.8	40.4	46.4	52.2	58.0
			F _L	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
6	5-1/4 (133.4)	4 (101.6)	C _v	7.50	20.7	33.8	47.0	60.1	73.3	87.0	100	112	123
			F _L	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Minimum Throttling C_v²			Valve Size	2 inch	3 inch	4 inch	6 inch						
				0.580	0.720	0.900	1.72						

1 The 2 inch three stage anti-cavitation valves have unbalanced plugs, these valves are of a Model 392 valve design.

2 Valves should not be throttled at a Cv less than the specified minimum throttling Cv for extended periods of time, erosion damage to valve trim may occur.

NOTE: All F_L values are at 100% travel.

Table 18

Three Stage Anti-Cavitation - Flow Down Valve Sizing Coefficients

Valve Size (Inch)	Port Inch (mm)	Travel Inch (mm)	Coefficient	Percentage of Valve Travel									
				10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2 ¹	1 (25.4) ¹	2 (50.8)	C _v	0.272	1.10	1.98	2.80	3.63	4.46	5.30	6.07	6.61	6.73
			F _L	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
3	1-7/8 (47.6)	2-1/2 (63.5)	C _v	0.747	20.0	3.92	6.15	8.00	9.50	11.0	12.8	14.9	16.5
			F _L	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
4	2-7/8 (73)	3 (76.2)	C _v	2.80	5.50	8.30	11.0	13.9	16.7	19.4	22.2	25.0	27.8
			F _L	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
6	4-9/16 (115.9)	4 (101.6)	C _v	6.10	13.2	19.8	26.1	34.1	41.5	48.2	54.5	60.9	65.0
			F _L	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Minimum Throttling C_v²			Valve Size	2 inch	3 inch	4 inch	6 inch						
				0.590	1.20	1.70	3.10						

1 The 2 inch three stage anti-cavitation valves have unbalanced plugs, these valves are of a Model 392 valve design.

2 Valves should not be throttled at a Cv less than the specified minimum throttling Cv for extended periods of time, erosion damage to valve trim may occur.

NOTE: All F_L values are at 100% travel.

For Relationships of Note See Page 7.



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Table 19

Typical Construction Materials

Key	Part Description	Standard Construction	CF8M Construction
1	BODY	LCC or WCC	CF8M
2	BONNET	LCC or WCC	CF8M
3	PACKING BOX RING	S31600*	S31600*
4	PACKING SPRING	S30400	-
5	LANTERN RING	-	S31600*
6	RETAINING RING	S31600	S31600
7	SPECIAL WASHER	S30400	-
8	V-RING PACKING SET	PTFE	PTFE (Double)
9	PACKING FOLLOWER	S31600*	S31600*
10	STEM WIPER	FELT	FELT
11	CAGE	S17400	S31600* / ENC
12	VALVE PLUG - STEM ASSEMBLY	S41600 HT PLUG - S20910 STEM	S31600* / Alloy 6 SEAT & GUIDE - S20910 STEM
13	SEAT RING	S41600 HT	S31600* / Alloy 6
14	SEAL RING	CPTFE / R30003	CPTFE / R30003
15	BACKUP RING	S31600*	S31600*
16	PACKING FLANGE	CARBON STEEL-PLATED	CARBON STEEL-PLATED
17	PACKING NUT	2H	8M
18	PACKING STUD	B7	B8M
19	BONNET STUD	B7	B8M
20	BONNET NUT	2H	8M
21	SEAT RING GASKET	N06600 / GRAPHITE	N06600 / GRAPHITE
22	BONNET GASKET	N06600 / GRAPHITE	N06600 / GRAPHITE

Key	Part Description	NACE Construction (2002)
1	BODY	LCC or WCC
2	BONNET	LCC or WCC
3	PACKING BOX RING	S31600*
5	LANTERN RING	S31600*
6	RETAINING RING	S31600
8	V-RING PACKING SET	PTFE (Double)
9	PACKING FOLLOWER	S31600*
10	STEM WIPER	FELT
11	CAGE	S17400 DH1150
12	VALVE PLUG - STEM ASSEMBLY	S31600* / Alloy 6 SEAT & GUIDE - S20910 STEM
13	SEAT RING	S31600* / Alloy 6
14	SEAL RING	CPTFE / R30003
15	BACKUP RING	S31600*
16	PACKING FLANGE	CARBON STEEL-PLATED
17	PACKING NUT	2H
18	PACKING STUD	B7
19	BONNET STUD	B7M
20	BONNET NUT	2HM
21	SEAT RING GASKET	N06600 / GRAPHITE
22	BONNET GASKET	N06600 / GRAPHITE

* All S31600 barstock is dual grade S31600/S31603 (316/316L).

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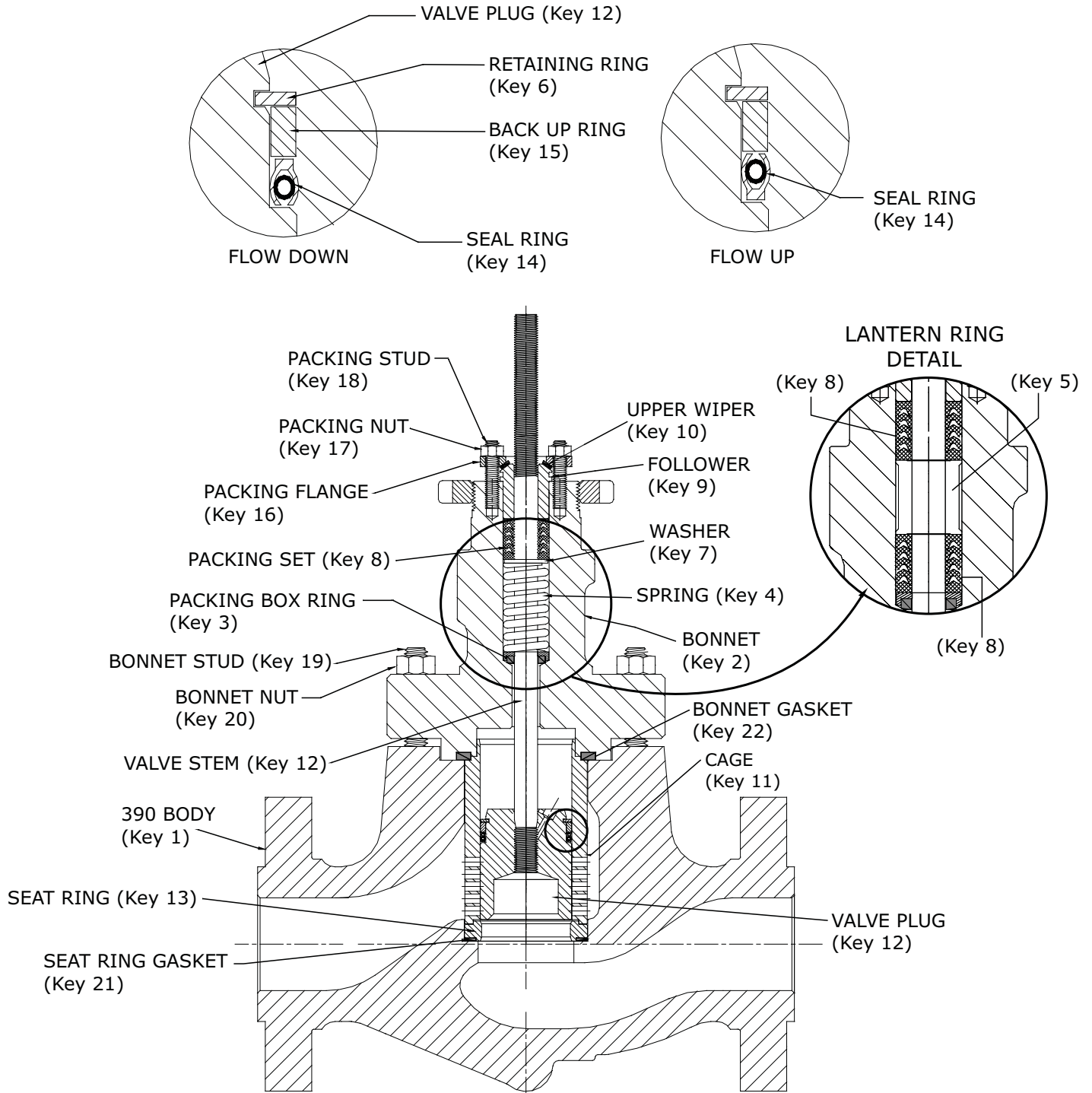


Figure 3 Cross-section of 390 Series Control Valve



Model 390 Control Valves

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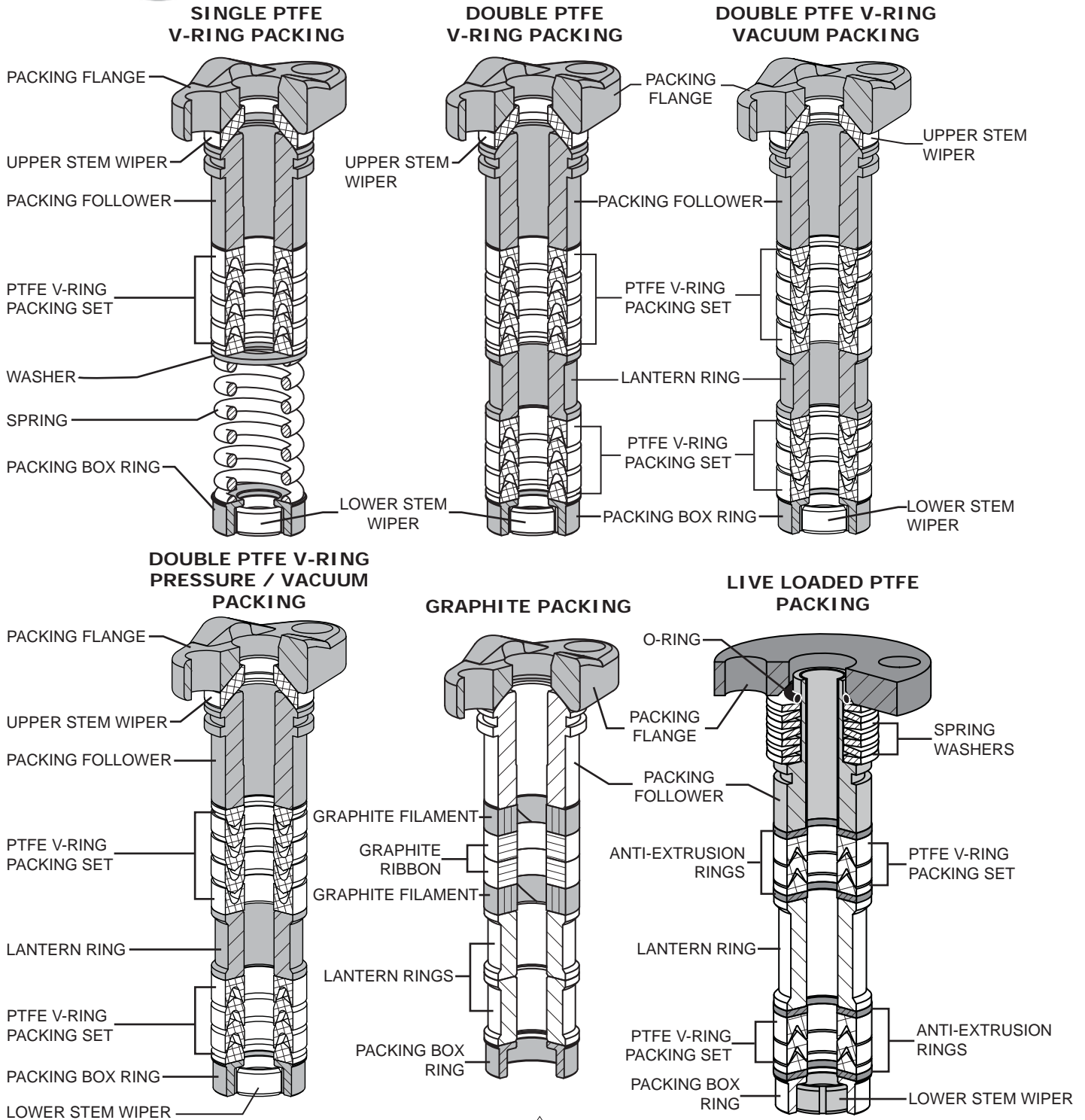


Figure 4 Typical Packing Arrangements

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Table 20

Shut Off Capabilities for Model 390 with Fail Open Actuator
Metal Seat, Class IV Control Valve
35 psig supply pressure

Valve Size (inch)	Actuator Size				
	Pressure Drop Psig (Bar)				
	DFO - 2105	DFO - 2156	DFO - 3105	DFO - 3156	DFO - 3220
2	3750 (259) ¹	3750 (259) ¹	—	—	—
3	3750 (259) ²	3750 (259) ¹	3750 (259) ²	3750 (259) ¹	—
4	—	—	—	3750 (259) ³	3750 (259) ¹
6	—	—	—	—	2280 (157) ⁴

Note

- 1 - 6 to 26 Psig (0.41 to 1.79 Bar) bench range
- 2 - 6 to 24 Psig (0.41 to 1.65 Bar) bench range
- 3 - 6 to 22 Psig (0.41 to 1.52 Bar) bench range
- 4 - 6 to 17 Psig (0.41 to 1.17 Bar) bench range

Table 21

Shut Off Capabilities for Model 390 with Fail Closed Actuator
Metal Seat, Class IV Control Valve
35 psig supply pressure

Valve Size (inch)	Actuator Size				
	Pressure Drop Psig (Bar)				
	DFC - 2105	DFC - 2156	DFC - 3105	DFC - 3156	DFC - 3220
2"	3750 (259) ¹	3750 (259) ¹	—	—	—
3"	3750 (259) ²	3750 (259) ¹	3750 (259) ²	3750 (259) ¹	—
4"	—	—	—	2280 (157) ²	3750 (259) ³
6"	—	—	—	—	2280 (157) ⁴

Note

- 1 - 6 to 30 psig (0.41 to 2.07 Bar) Bench Range
- 2 - 9 to 30 psig (0.62 to 2.07 Bar) Bench Range
- 3 - 15 to 30 psig (1.03 to 2.07 Bar) Bench Range
- 4 - 18 to 30 Psig (1.24 to 2.07 Bar) Bench Range with a DFC4-3220 Actuator



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Table 22

Port Diameters, Valve Plug Travel and Yoke Boss Diameter

Valve Size Inch	Port Diameter Inch (mm)	Max Valve Travel Inch (mm)	Yoke Boss Diameter Inch (mm)	
			Stem	Valve
2" Linear, Mod. Equal Percent & Low-Noise	1 7/8 (47.6)	1-1/2 (38.1)	1/2 (12.7)	2-13/16 (71.4)
			3/4 (19.1)	3-9/16 (90.5)
2" Equal Percent	1-7/8 (47.6)	1-1/8 (28.6)	1/2 (12.7)	2-13/16 (71.4)
			3/4 (19.1)	3-9/16 (90.5)
2" Anti-Cavitation Stage 2	1-3/4 (44.5)	2 (50.8)	1/2 (12.7)	2-13/16 (71.4)
			3/4 (19.1)	3-9/16 (90.5)
2" Anti-Cavitation Stage 3	1 (25.4)	2 (50.8)	3/4 (19.1)	3-9/16 (90.5)
3" Linear, Mod. Equal Percent & Low-Noise	2-7/8 (73)	2 (50.8)	1/2 (12.7)	2-13/16 (71.4)
			3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
3" Equal Percent	2-7/8 (73)	1-1/2 (38.1)	1/2 (12.7)	2-13/16 (71.4)
			3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
3" Anti-Cavitation Stage 2	2-1/2 (63.5)	2-1/2 (63.5)	1/2 (12.7)	2-13/16 (71.4)
			3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
3" Anti-Cavitation Stage 3	1-7/8 (47.6)	2-1/2 (63.5)	1/2 (12.7)	2-13/16 (71.4)
			3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
4" Linear, Mod. Equal Percent & Low-Noise	3-5/8 (98)	2 (50.8)	3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
4" Equal Percent	3-5/8 (92.1)	1-1/2 (38.1)	3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
4" Anti-Cavitation Stage 2	3-7/16 (87.3)	3 (76.2)	3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
4" Anti-Cavitation Stage 3	2-7/8 (73)	3 (76.2)	3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
6" Linear, Mod. Equal Percent & Low-Noise	5-3/8 (136.5)	3 (76.2)	3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
			1-1/4 (31.8)	5 (127)
6" Equal Percent	5-3/8 (136.5)	2-1/2 (63.5)	3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
			1-1/4 (31.8)	5 (127)
6" Anti-Cavitation Stage 2	5-1/4 (133.4)	4 (101.6)	3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
			1-1/4 (31.8)	5 (127)
6" Anti-Cavitation Stage 3	4-9/16 (115.9)	4 (101.6)	3/4 (19.1)	3-9/16 (90.5)
			1 (25.4)	5 (127)
			1-1/4 (31.8)	5 (127)

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Table 23

Common Trim Options and Temperature Ratings

Trim Spec ⁴	Valve Plug	Stem	Cage	Seat Ring	Minimum ³ Temperature	Maximum Temperature
					°F (°C)	°F (°C)
S	S41600 HT	S20910	S17400 PH	S41600 HT	-20 (-29)	650 (343) ¹
N	S31600 ⁵ / ALLOY 6 Seat and Guide	S20910	S17400 PH DHT	S31600 ⁵ / ALLOY 6	-50 (-46)	650 (343)
C	S31600 ⁵ / ALLOY 6 Seat and Guide	S20910	S31600 ⁵ CHROME PLATED	S31600 ⁵ / ALLOY 6	-50 (-46) ²	800 (427) ²
A	S44004	S20910	S17400 H900	S44004	32 (0)	450 (232)

- 1 Maximum temperature limited by body material (LCC body temperature limitation shown).
 - 2 Check body material temperature limitations.
 - 3 Temperatures need to be considered when specifying trim materials for elevated temperatures in corrosive environments, consult factory for further information.
 - 4 Trim Spec relates to Model Numbering System on Page 20.
 - 5 All S31600 barstock is dual grade S31600/S31603 (316/316L).
- NOTE:** Bonnet Bolting refer to Table 24.

Table 24

Valve Bolting Temperature Limitations

Stud Material	Temperature Limitation
B7	-50°F to 900°F (-46°C TO 482°C)
B7M	-50°F TO 900°F (-46°C TO 482°C)
B8M	-325°F TO 1500°F (-198°C TO 816°C)
B7 FLUOROKOTE #1	-50°F TO 500°F (-46°C TO 260°C)
B7M FLUOROKOTE #1	-50°F TO 500°F (-46°C TO 260°C)
Nut Material	Temperature Limitation
2H, 2HM & 8M	Not Limiting Factors



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Table 25

Materials and Temperature Limits for Parts other than Valve Body and Trim

Part	Material	Minimum Temperature Limitation	Maximum Temperature Limitation
Backup Ring	S31600*	-325°F (198°C)	1100°F (593°C)
Retaining Ring	S30200	-425°F (-254°C)	1100°F (593°C)
Seal Ring	PTFE with R30003 Spring	-100°F (-73°C)	450°F (232°C)
Bonnet / Cage Gasket	N06600 / Graphite	-400°F (-240°C)	800°F (427°C)
Seat Ring Gasket	N06600 / Graphite	-400°F (-240°C)	800°F (427°C)
Packing	PTFE V-Ring	-40°F (-40°C)	450°F (232°C)
	Graphite Ribbon / Filament	-425°F (-254°C)	1000°F (537°C)
Body to Bonnet Studs (NACE-2002)	B7M (LCC Body)	-50°F (-46°C)	700°F (371°C)
Body to Bonnet Nuts (NACE-2002)	2HM (LCC Body)	-50°F (-46°C)	700°F (371°C)

For NACE 2003 body to bonnet studs and nuts please contact Dyna-Flo. *All S31600 barstock is dual grade S31600/S31603 (316/316L).

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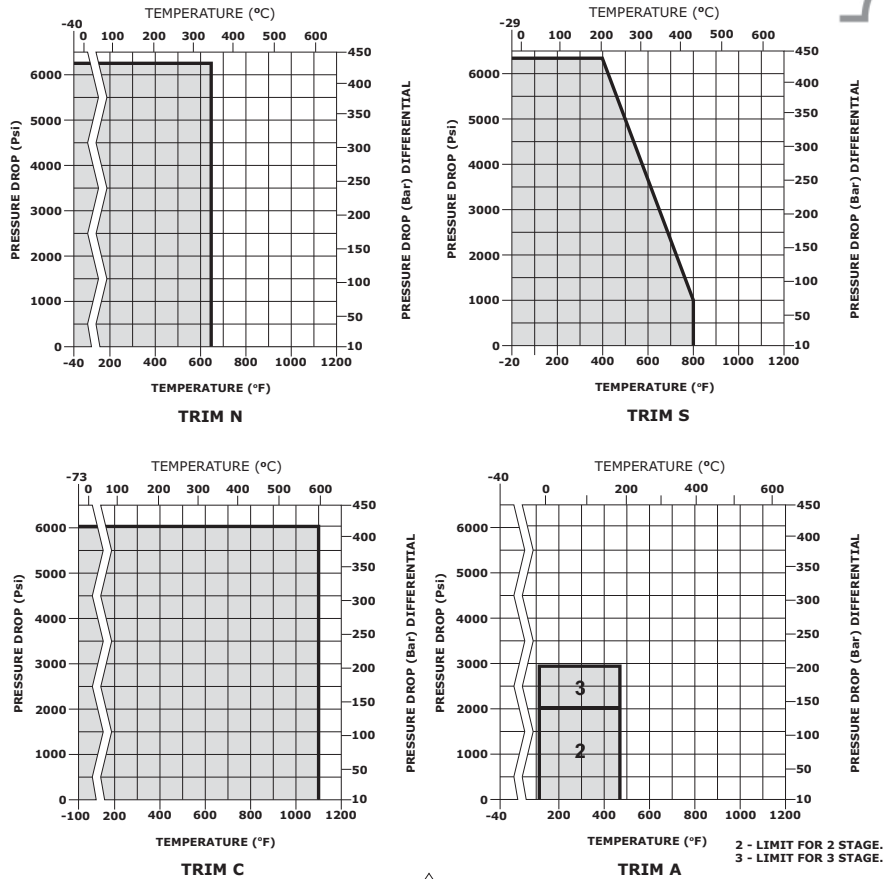


Figure 5 Trim Material Pressure / Temperature Limitations

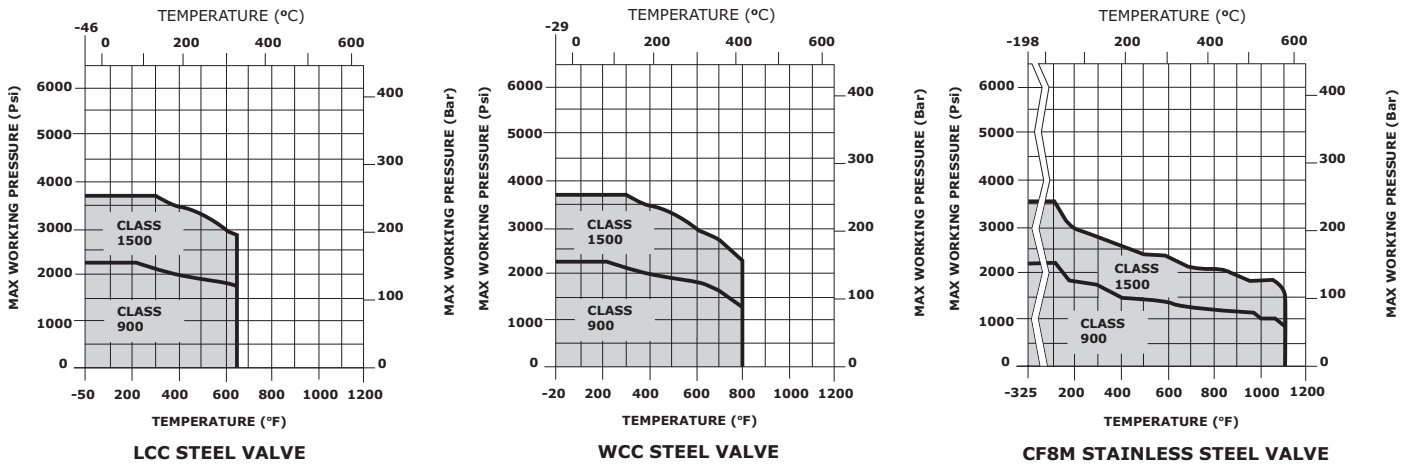


Figure 6 Pressure / Temperature Charts as per ASME B16.34



Model 390 Control Valves

MODEL NUMBERING SYSTEM

SAMPLE PART NUMBER: 390-3AFL-SFP2-GES4

BODY STYLE						-
-	GLOBE	A	ANGLE			
VALVE SIZE						3
2	2 INCH	3	3 INCH	4	4 INCH	6
6	6 INCH					
ASME RATING						A
A	900	B	1500	C	900 / 1500	
END CONNECTION						F
F	RF	J	RTJ	L	BWE SCH 80	U
P	BWE SCH 160					
BODY MATERIAL						L
L	LCC	W	WCC	M	CF8M	
BOLTING						-
-	B7 / 2H	A	B7M / 2HM	B	B8M / 8M	
K	B7 / 2H FLUOROKOTE #1			L	B7M / 2HM FLUOROKOTE #1	
TRIM						S
S	TRIM SPEC S	C	TRIM SPEC C	N	TRIM SPEC N	A
PORT SIZE						F
F	FULL PORT		R	REDUCED PORT		
PACKING STYLE						P
P	SINGLE PTFE V-RING (PRESSURE)			J	DOUBLE PTFE V-RING (PRESSURE)	
L	LIVE LOADED PTFE (PRESSURE)			V	DOUBLE PTFE V-RING (VACUUM)	
R	DOUBLE PTFE V-RING (VACUUM / PRESSURE)			T	LIVE LOADED GRAPHITE (PRESSURE)	
G	SINGLE GRAPHITE (PRESSURE)					
YOKE BOSS SIZE						2
2	2-13/16" (1/2" STEM)	3	3-9/16" (3/4" STEM)	5	5" (1" STEM)	H
PAINT						-
-	STANDARD	1	PAINT SPEC 1	2	PAINT SPEC 2	3
4	PAINT SPEC 3					
BACKUP RING / SEAL RING						G
G	GRAPHITE PISTON RING (STANDARD)			C	S31600 / PTFE - ELGILOY	
K	S31600 / KEL-F - ELGILOY			R	S31600 / PTFE - ELGILOY W/ PEEK AE RINGS	
CHARACTERISTIC						E
E	EQUAL PERCENT	L	LINEAR	M	MODIFIED EQ. PERCENT	
2	ANTI-CAVITATION 2 STAGE			3	ANTI-CAVITATION 3 STAGE	
H	LOW-NOISE III A1	B	LOW-NOISE III B1	P	LOW-NOISE III B3	I
D	LOW-NOISE III D3	Q	QUICK OPENING			
BONNET STYLE						S
S	STANDARD	T	STANDARD TAPPED	E	EXTENSION STYLE 1	
SHUT-OFF CLASS						4
4	CLASS IV	5	CLASS V	6	CLASS VI	

NOTE: Modified Equal Percent is a factor of travel and requires no special parts or trim options that differ from Equal Percent.

390