



CONTENTS

1.0 GENERAL

1.1	Model Number	2
1.2	Specifications	3
1.3	Parts List	8
1.3.1	Model 5500 – Cage Control Trim	8
1.3.2	Model 5500 – Plug Control Trim	10
1.3.3	Model 5500 Actuator – Reverse	12
1.3.4	Model 5500 Actuator – Direct	14
1.4	Dimensions	16

2.0	INSTALLATION	17
-----	--------------	----

3.0 MAINTENANCE

3.1	Packing Replacement	18
3.2	Trim Replacement	19
3.3	Actuator Diaphragm Replacement	19
3.4	Preventive Maintenance	20
3.4.1	Valve Body	20
3.4.2	Valve Trim	20
3.4.3	Packing	20
3.4.4	Actuator Assembly	20
3.5	Troubleshooting	21

Model 5500

Installation, Operation and Maintenance Instructions

1.0 GENERAL

1.1 Model Number Information

Sample Model Number: 5500 - 2 F 6 - G 73 R S - 3 A M

BODY SIZE		CODE
2"		2
3"		3
4"		4
6"		6
END CONNECTIONS		CODE
Female NPT		S
Raised Face (RF) Flange		F
Ring Type Joint (RTJ) Flange		J
ANSI CLASS (PRESSURE RATING)		CODE
150 (275 psig)		1
300 (740 psig)		3
600 (1480 psig)		6
900 (2220 psig)		9
1500 (3750 psig)		5
MATERIALS OF CONSTRUCTION		CODE
Carbon Steel - Standard Service		-
Carbon Steel - NACE MR-01-75		N
BODY STYLE		CODE
Globe		G
Globe with Drain		D
Globe with Pressure Connection Ports		P
ACTUATOR SELECTION		CODE
No. 70 Actuator with 3-15 Spring		73
No. 70 Actuator with 6-30 Spring		76
No. 120 Actuator with 3-15 Spring		23
No. 120 Actuator with 6-30 Spring		26
No. 180 Actuator with 3-15 Spring		83
No. 180 Actuator with 6-30 Spring		86
ACTUATOR TYPE		CODE
Reverse Acting (spring closes/air opens)		R
Direct Acting (spring opens/air closes)		D
GASKET MATERIAL		CODE
304/Grf - Standard		S
INC/Grf - NACE MR-01-75		N
TRIM MATERIAL		CODE
17-4PH SST Cage, Plug, and Seat Ring		1
316 SST Cage, Plug, and Seat Ring with Tungsten Carbide Seating Surfaces		2
316 SST Cage, Plug, and Seat Ring		3
17-4PH SST Cage / 316 SST Plug and Seat Ring with Alloy 6 Hard-faced Seating Surfaces		6
316 SST Cage, Plug, and Seat Ring with TFE Soft-Seat Insert		8
TRIM SIZE		CODE
Full Port		A
Reduced Port, one size down (6" body X 4" trim , 4" body X 3" trim, 3" body X 2" trim, 2" body X 1.5" trim)		B
Reduced Port, two sizes down (4" body X 2" trim, 3" body X 1.5" trim)		C
Reduced Port, three sizes down (4" body X 1.5" trim)		D
1/4"		2
3/8"		3
1/2"		4
3/4"		6
1"		8
TRIM CHARACTERISTIC		CODE
Equal Percentage		E
Linear		L
Quick Opening (On/Off)		Q
Anti-cavitation		C
Noise Abatement		D
Modified Percent		M

1.2 Specifications

Available Body Sizes

2", 3", 4", or 6"

End Connections / Pressure Ratings¹

FNPT ²	3750 psig (259 bar)
150# RF	290 psig (20 bar)
300# RF	750 psig (52 bar)
600# RF	1500 psig (103 bar)
600# RTJ	1500 psig (103 bar)
900# RF	2250 psig (155 bar)
900# RTJ	2250 psig (155 bar)
1500# RF	3750 psig (259 bar)
1500# RTJ	3750 psig (259 bar)

Flow Characteristic

- Equal Percent (Cage Control)
- Linear (Cage Control)
- Quick Opening (Cage Control)
- Anti-cavitation (Cage Control)
- Noise Abatement (Cage Control)
- Modified Percent (Plug Control)

Flow Coefficients

See Tables 1A and 1B

Allowable Pressure Drops

See Tables 2A through 2K

Temperature Limits

Standard Valve Configuration:

- -20 to 400° F (-29 to 204° C)

Modified Valve Configurations³:

- -50 to 750° F (-46 to 288° C)

Materials of Construction

See Tables 3A and 3B

Standard Leakage Rates

Metal-to-Metal Seating	ANSI Leakage Class
0.25" - 0.75"	IV
1.00"	III
1.5" – 6.0"	IV
Soft Seating	ANSI Leakage Class
All Sizes	VI

1. Pressure ratings @ 100°F (38°C).
 2. 2" valve body only.
 3. Consult Factory.

Model 5500

Installation, Operation and Maintenance Instructions

Table 1A. Flow Coefficients (C_V), Modified Percent

Body Size	Orifice Size	Valve Opening (% Travel)									
		10	20	30	40	50	60	70	80	90	100
2"	0.25"	.284	.506	.657	.767	.875	.989	1.10	1.20	1.32	1.43
	0.38"	.311	.621	.942	1.28	1.64	2.07	2.51	2.93	3.35	3.70
	0.50"	.592	1.17	1.76	2.34	2.95	3.70	4.57	5.50	5.95	6.08
	0.75"	.882	1.76	2.76	3.82	5.53	6.57	8.49	10.8	15.0	16.2
	1.00"	1.01	2.02	3.14	5.07	9.68	11.9	14.9	17.2	19.3	20.9
	1.5"	4.74	7.67	9.53	12.9	18.4	24.9	33.6	44.0	53.4	59.5
3"	2.0"	5.01	11.0	20.3	33.8	48.9	61.4	67.2	69.5	70.8	71.6
	0.25"	.284	.506	.657	.767	.875	.989	1.10	1.20	1.32	1.43
	0.38"	.311	.621	.942	1.28	1.64	2.07	2.51	2.93	3.35	3.70
	0.50"	.592	1.17	1.76	2.34	2.95	3.70	4.57	5.50	5.95	6.08
	0.75"	.882	1.76	2.76	3.82	5.53	6.57	8.49	10.8	15.0	16.2
	1.00"	1.01	2.02	3.14	5.07	9.68	11.9	14.9	17.2	19.3	20.9
	1.5"	4.74	7.67	9.53	12.9	18.4	26.2	35.6	46.2	57.0	65.1
4"	2.0"	5.01	9.85	16.6	30.6	47.2	62.9	77.0	88.8	96.4	101
	3.0"	6.15	14.9	27.7	52.5	80.3	104	118	124	128	129
	1.5"	4.74	7.67	9.53	12.9	18.4	26.2	37.9	50.6	62.1	67.4
	2.0"	6.20	11.5	20.9	37.1	53.1	70.3	82.1	93.3	104	110
4"	3.0"	7.60	19.0	36.1	59.1	80.6	111	135	151	166	172
	4.0"	8.42	21.6	38.3	71.5	114	148	177	196	207	211

Table 1B. Flow Coefficients (C_V), Equal Percentage

Body Size	Orifice Size	Valve Opening (% Travel)									
		10	20	30	40	50	60	70	80	90	100
2"	1.5"	1.03	1.52	2.15	2.89	4.08	6.52	9.85	15.1	21.7	27.4
	2.0"	1.20	2.54	4.75	7.84	12.6	19.2	28.8	40.1	50.4	62.2
3"	2.0"	1.40	2.73	4.96	8.12	12.8	20.4	32.6	49.7	71.6	90.4
	3.0"	2.95	5.89	8.76	16.2	26.9	44.2	68.1	92.6	111	124
4"	3.0"	3.14	6.04	8.96	16.8	27.8	46.3	74.3	108	124	148
	4.0"	3.26	21.3	40.7	59.6	76.9	94.0	109	123	135	142
6"	4.0"	5.2	11.4	21.2	33.0	53.8	83.9	129	178	220	265
	6.0"	11.3	24.5	42.8	67.5	102	161	239	319	358	392

Table 1C. Flow Coefficients (C_V), Anti-Cavitation (linear flow characteristic)

Body Size	Orifice Size	Valve Opening (% Travel)									
		10	20	30	40	50	60	70	80	90	100
2"	1.5"	0.47	0.58	2.03	4.82	7.46	10.2	12.5	14.6	16.6	18.0
	2.0"	0.89	1.09	3.84	9.11	14.1	19.3	23.6	27.5	31.4	34.0
3"	3.0"	1.97	2.40	8.47	20.1	31.1	42.7	52.0	60.7	69.3	75.1
4"	4.0"	3.26	21.3	40.7	59.6	76.9	94.3	109	123	135	142
6"	6.0"	6.58	36.1	69.4	128	166	207	240	275	307	324

Table 2A. Plug Control Allowable Pressure Drops, PSID – No. 70 Actuator, Direct Acting (Fail Open), Flow Up

Trim Size	Air to Diaphragm, psig			
	18	20	33	35
1.5"	880	1300	1560	2260
2.0"	700	1040	1260	1800
3.0"	470	830	970	1270
4.0"	280	520	680	890

Table 2B. Plug Control Allowable Pressure Drops, PSID – No. 120 Actuator, Direct Acting (Fail Open), Flow Up

Trim Size	Air to Diaphragm, psig			
	18	20	33	35
1.5"	1560	2340	2820	3750
2.0"	1250	1900	2330	3375
3.0"	870	1330	1740	2360
4.0"	640	920	1350	1550

Table 2C. Plug Control Allowable Pressure Drops, PSID – No. 70 Actuator, Reverse Acting (Fail Close), Flow Up

Trim Size	Initial Actuator Spring Setting ¹ , psig						
	3	6	9	6	9	12	15
	(3-15 spring)			(6-30 spring)			
1.5"	980	1260	1600	940	1280	1450	1850
2.0"	890	1100	1300	850	1120	1160	1560
3.0"	520	660	910	500	680	860	1290
4.0"	370	440	660	350	460	570	970

Table 2D. Plug Control Allowable Pressure Drops, PSID – No. 120 Actuator, Reverse Acting (Fail Close), Flow Up

Trim Size	Initial Actuator Spring Setting ¹ , psig						
	3	6	9	6	9	12	15
	(3-15 spring)			(6-30 spring)			
1.5"	1700	2620	3750	1550	2700	3340	3750
2.0"	1380	2120	3180	1400	2360	2680	3400
3.0"	990	1530	2280	840	1460	1990	2550
4.0"	800	1200	1780	760	990	1370	1780

Model 5500

Installation, Operation and Maintenance Instructions

Table 2E. Cage Control Allowable Pressure Drops, PSID – No. 70 Actuator, Direct Acting (Fail Open), Flow Down

Trim Size	Air to Diaphragm, psig			
	18	20	33	35
1.5"	330	720	3280	3750
2.0"	280	670	3180	3550
3.0"	180	570	2950	3350
4.0"	70	370	2350	2650

Table 2F. Cage Control Allowable Pressure Drops, PSID – No. 120 Actuator, Direct Acting (Fail Open), Flow Down

Trim Size	Air to Diaphragm, psig			
	18	20	33	35
1.5"	750	1440	3750	3750
2.0"	690	1350	3750	3750
3.0"	585	1225	3750	3750
4.0"	400	900	3750	3750
6.0"	120	400	2250	2535

Table 2G. Cage Control Allowable Pressure Drops, PSID – No. 180 Actuator, Direct Acting (Fail Open), Flow Down

Trim Size	Air to Diaphragm, psig			
	18	20	33	35
4.0"	780	1550	3750	3750
6.0"	330	750	3500	3750

Table 2H. Cage Control Allowable Pressure Drops, PSID – No. 70 Actuator, Reverse Acting (Fail Close), Flow Down

Trim Size	Initial Actuator Spring Setting ¹ , psig						
	3	6	9	6	9	12	15
	(3-15 spring)			(6-30 spring)			
1.5"	320	920	1520	800	1400	2100	3350
2.0"	270	850	1440	730	1320	2000	3200
3.0"	185	750	1300	640	1190	1850	3000
4.0"	70	520	980	400	850	1420	2350

Table 2J. Cage Control Allowable Pressure Drops, PSID – No. 120 Actuator, Reverse Acting (Fail Close), Flow Down

Trim Size	Initial Actuator Spring Setting ¹ , psig						
	3	6	9	6	9	12	15
	(3-15 spring)			(6-30 spring)			
1.5"	750	1780	2800	1600	2600	3750	3750
2.0"	690	1700	2700	1530	2520	3650	3750
3.0"	580	1540	2500	1400	2330	3450	3750
4.0"	400	1175	1950	1000	1700	2750	3100
6.0"	120	550	975	400	800	1400	2100

Table 2K. Cage Control Allowable Pressure Drops, PSID – No. 180 Actuator, Reverse Acting (Fail Close), Flow Down

Trim Size	Initial Actuator Spring Setting ¹ , psig						
	3	6	9	6	9	12	15
	(3-15 spring)			(6-30 spring)			
4.0"	780	1950	3120	1740	3320	3750	3750
6.0"	340	970	1600	780	1400	2250	3000

Table 3A. Materials of Construction

Part	Material	Temperature Limits	
		°F	°C
Body	WCC Steel	-20 to 1000	-29 to 538
	316 SST Steel	-20 to 1000	-29 to 538
Bonnet	A105 Forged Carbon Steel	-20 to 1000	-29 to 538
	CF8M Forged Stainless Steel	-20 to 1000	-29 to 538
Yoke	Ductile Iron	-20 to 1000	-29 to 538
Valve Stem	316 Stainless Steel	-50 to 1000	-45 to 538
Packing	PTFE V-Ring	-50 to 400	-45 to 204
	Graphoil	-50 to 750	-45 to 400
Actuator Housing	Steel	-20 to 1000	-29 to 538
Actuator Spring	Steel	-20 to 1000	-29 to 538
Diaphragm	Nylon-Reinforced Buna-N	-20 to 200	-29 to 93

Table 3B. Materials of Construction – Trim Options

Trim Code	Cage	Guide	Plug	Seat	Seal Ring ⁽⁷⁾
1 ^(1,2)	17-4PH SST (H1150M)	---	17-4PH SST (H1150M)	17-4PH SST (H1150M)	Reinforced TFE
2 ⁽⁵⁾	316 SST	316 SST	316 SST with tungsten carbide insert	316 SST with tungsten carbide seating surface	Reinforced TFE
3 ⁽³⁾	316 SST	316 SST	316 SST	316 SST	Reinforced TFE
6 ⁽⁴⁾	17-4PH SST (H1150M)	---	316 SST with Alloy 6 hard-faced seating surface	316 SST with Alloy 6 hard-faced seating surface	Reinforced TFE
8 ⁽⁶⁾	316 SST	316 SST	316 SST with TFE insert	316 SST with TFE insert	Reinforced TFE

- Standard material combination for Cage Control trim design.
- Standard material combination for Plug Control trim design, sizes 1" and smaller.
- Standard material combination for Plug Control trim design, sizes greater than 1".
- Available for Cage Control trim only.
- Available for Plug Control trim only.
- For Cage Control trim, TFE insert is part of the seat. For Plug Control trim, TFE insert is part of the plug.
- Consult Factory for temperature requirements above 400°F.

Table 4. Approximate Shipping Weight, lbs (Kg)

Valve Size	Act. Size	End Connections					
		NPT	150# Flg	300# Flg	600# Flg	900# Flg	1500# Flg
2"	No. 70	135 (53)	150 (59)	165 (65)	180 (71)	200 (78)	200 (78)
	No. 120	190 (75)	205 (80)	220 (86)	235 (92)	255 (100)	255 (100)
3"	No. 70	-	185 (73)	205 (80)	225 (88)	275 (108)	375 (147)
	No. 120	-	240 (95)	260 (102)	280 (110)	330 (129)	430 (167)
4"	No. 70	-	255 (100)	285 (112)	315 (124)	420 (165)	540 (212)
	No. 120	-	310 (121)	340 (133)	370 (145)	475 (186)	595 (233)
6"	No. 120	-	835 (327)	875 (343)	910 (357)	-	-
	No. 180	-	875 (343)	915 (359)	950 (372)	-	-

ITEM	DESCRIPTION	QTY.	PART NUMBER								MAT'L.
			2"		3"		4"		6"		
			1.5" PORT	2" PORT	2" PORT	3" PORT	3" PORT	4" PORT	4" PORT	6" PORT	
* 1	SEAT	1	55614	55006	55615	55138	55616	55218	55617	55555	17-4PH SST
			55614-1	55006-1	55615-1	55138-1	55616-1	55218-1	55617-1	55555-1	316 SST
			55614-4	55006-4	55615-4	55138-4	55616-4	55218-4	55617-4	55555-4	316 SST/ Alloy 6
*1A	SEAT	1	55635	55637	55637	55639	55639	55641	55641	55643	TFE
*1B	SEAT INSERT	1	55634	55636	55630	55638	55628	55640	55626	55642	316 SST
* 2	PLUG	1	55591	55502	55502	55504	55504	55506	55506	55557	17-4PH SST
			55591-1	55502-1	55502-1	55504-1	55504-1	55506-1	55506-1	55557-1	316 SST
			55591-4	55502-4	55502-4	55504-4	55504-4	55506-4	55506-4	55557-4	316 SST/ Alloy 6
3	CAGE EQUAL PERCENT	1	55590	55501	55501	55503	55503	55505	55505	55556	17-4PH SST
			55590-1	55501-1	55501-1	55503-1	55503-1	55505-1	55505-1	55556-1	316 SST
	CAGE NOISE/CAVITATION		55650	55652	55652	55654	55654	55656	55656	55658	17-4PH SST
			55650-1	55652-1	55652-1	55654-1	55654-1	55656-1	55656-1	55658-1	316 SST
	CAGE LINEAR		55670	55672	55672	55672	55672	55676	55676	55678	17-4PH SST
	55670-1	55672-1	55672-1	55674-1	55674-1	55676-1	55676-1	55678-1	316 SST		
	CAGE QUICK OPEN		55690	55692	55692	55694	55694	55696	55696	55698	17-4PH SST
			55690-1	55692-1	55692-1	55694-1	55694-1	55696-1	55696-1	55698-1	316 SST
* 4	BUSHING	1	55594	55516	55516	55517	55517	55518	55518	55562	TFE
			55702	55703	55703	55704	55704	55705	55705	55706	GRAPHITE
* 5	BACK-UP RING	2	55593	55507	55507	55508	55508	55509	55509	55561	TFE
			55607	55510	55510	55512	55512	55514	55514	55539	BUNA
* 6	O-RING	1	55592	55511	55511	55513	55513	55515	55515	55560	VITON
			55064	55519	55519	55520	55520	55521	55521	55551	304/GRF.
* 7	GUIDE GASKET	1	55066	55522	55522	55523	55523	55524	55524	55551-1	‡ INCONEL/GRF.
8	VALVE BODY, NPT	1	55072								WCC STL.
	VALVE BODY, SW		55074								
	VALVE BODY, BW, SCH. 80		55076								
	VALVE BODY, 150# RF		55078		55174		55264		55526		
	VALVE BODY, 300# RF		55080		55176		55266		55527		
	VALVE BODY, 600# RF		55082		55178		55268		55529		
	VALVE BODY, 600# RJ		55084		55180		55270		55618		
	VALVE BODY, 900# RF		55086		55182		55272				
	VALVE BODY, 900# RJ		55088		55184		55274				
	VALVE BODY, 1500# RF		55090		55186		55276				
VALVE BODY, 1500# RJ	55092		55188		55278						
* 9	SEAT GASKET	1	55094		55190		55280		55553	304/GRF.	
			55096		55192		55282		55553-1	‡ INCONEL/GRF.	
10	VALVE STEM	1			55098				55549	316 SST	
11	PACKING SPRING	1			55100				55544	302 SST	
					55102				55538	‡ INCONEL	
12	PACKING KIT				85000				85230		
12A	PACKING	1			55106				55543	TFE	
					55712				55713	GRAPHOIL	
12B	PACKING WASHER	1			55108				55545	SST	
12C	PACKING SPACER	1			55110				55548	SST	
13	UPPER PACKING RETAINER	1			55104				55542	316 SST	
14A	PACKING STUD	2			10182				10183	SST	
14B	PACKING NUT	2				10184				SST	
* 15	ROLL PIN	1			55114				55550	SST	
	DRIVE PIN				55116				55117	‡ 316 SST	
16	VALVE BONNET, BELOW ANSI 1500	1	55118		55194		55284		55558	WCC STL.	
	VALVE BONNET, ANSI 1500		55118		55196		55286			WCC STL.	
* 17	BONNET GASKET	1	55120		55198		55288		55552	304/GRF.	
			55122		55200		55290		55552-1	‡ INCONEL/GRF.	
18	BONNET STUD, BELOW ANSI 1500	8	55124		55124		55292		55292		
	BONNET STUD, ANSI 1500	12	55124(8)		55202(8)		55202			B7	
19	BONNET NUT, BELOW ANSI 1500	8	55126		55126		55296		55296		
	BONNET NUT, ANSI 1500	12	55126(8)		55204(8)		55204			B7	
20	PACKING FLANGE	1			55128				55541	316 SST	
21	WIPER	1			55130				55575	TFE	
22	1/4" PIPE PLUG	1			55432				55432	STEEL	

* INCLUDED IN REPAIR KIT

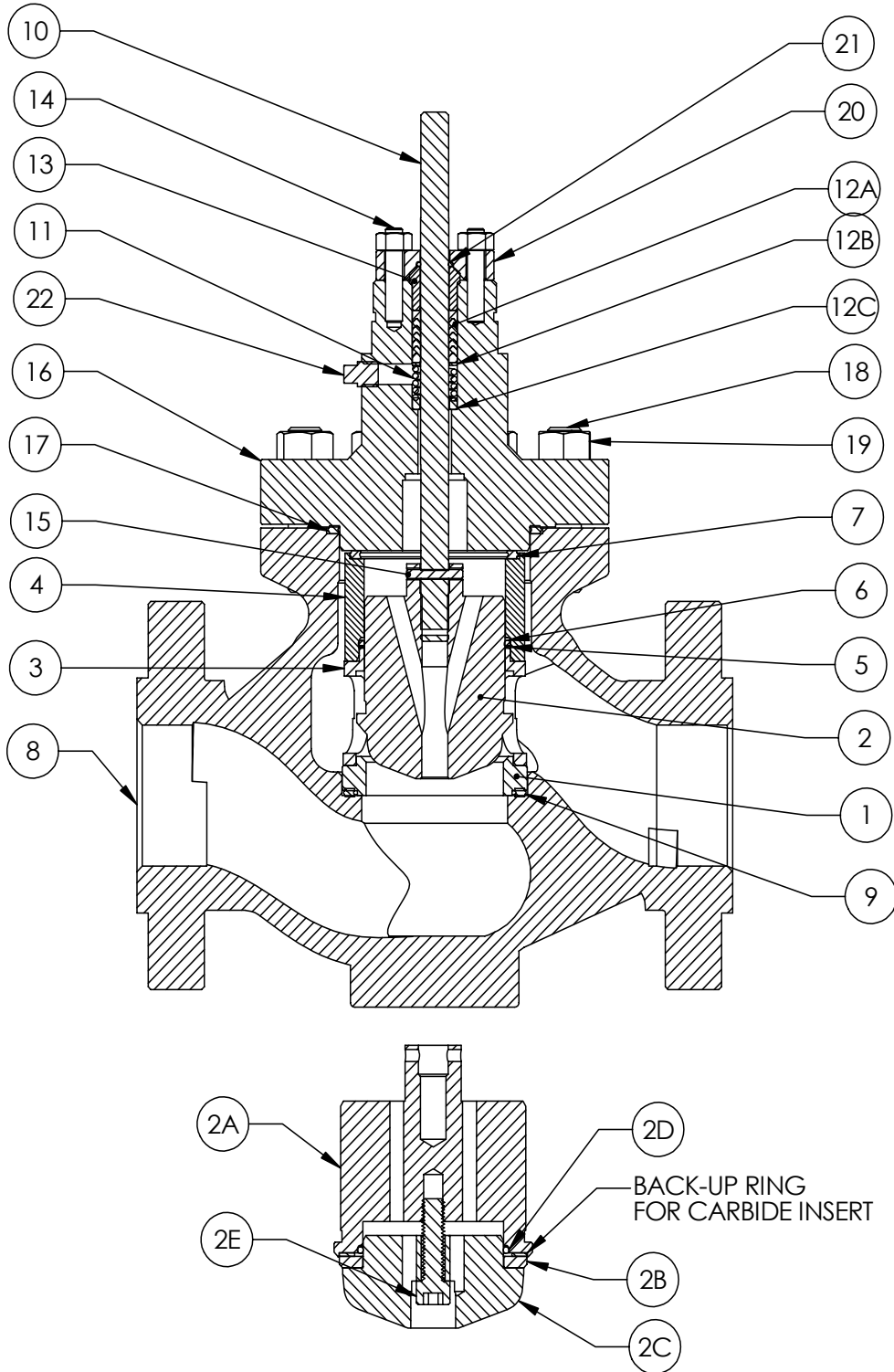
‡ MEETS NACE SPECIFICATIONS

5500 CAGE CONTROL (CC) TRIM REPAIR KIT (INCLUDES: PLUG, SEAT, GASKETS, O-RING, PIN)								
MAT'L	2"		3"		4"		6"	
	1.5" PORT	2" PORT	2" PORT	3" PORT	3" PORT	4" PORT	4" PORT	6" PORT
17-4	85205-1	85207-1	85209-1	85211-1	85213-1	85215-1	85217-1	85219-1
316	85205-3	85207-3	85209-3	85211-3	85213-3	85215-3	85217-3	85219-3
316 / Alloy 6	85205-6	85207-6	85209-6	85211-6	85213-6	85215-6	85217-6	85219-6
316 / TFE	85205-8	85207-8	85209-8	85211-8	85213-8	85215-8	85217-8	85219-8

Model 5500

Installation, Operation and Maintenance Instructions

1.3.2 Model 5500 – Plug Control Trim



ITEM	DESCRIPTION	QTY.	PART NUMBER						MAT'L.
			2"		3"		4"		
			1.5" PORT	2" PORT	2" PORT	3" PORT	3" PORT	4" PORT	
*1	SEAT	1	55002	55006	55134	55138	55124	55218	316 SST
			55004	55008	55136	55140	55216	55220	316 SST/CARBIDE
*2	SOLID VALVE PLUG, MOD. PCNT.	1	55010	55012	55148	55150	55230	55232	316 SST
*2	VALVE PLUG KIT, TFE, MOD. PCNT.	1	55044	55046	55206	55210	55234	55238	
	VALVE PLUG KIT, CARBIDE, MOD. PCNT.	1	55040	55042	55208	55212	55236	55240	
2A	BUTT PLUG	1	55018	55020	55020	55142	55222	55224	316 SST
2B	PLUG INSERT	1	55022	55026	55026	55144	55144	55226	TFE
			55024	55028	55028	55146	55146	55228	CARBIDE
2C	PLUG RETAINER, MOD. PCNT.	1	55030	55032	55152	55154	55242	55244	316 SST
2D	PLUG O-RING	1	55034	55036	55036	55156	55156	55168	TFE
2E	PLUG SOCKET SCREW	1	55038	55038	55038	55038	55038	55038	316 SST
3	CAGE	1	55048	55050	55158	55160	55248	55250	17-4PH SST
4	PLUG GUIDE	1	55052	55054	55162	55164	55252	55254	316 SST
*5	GUIDE BACK-UP RING	1	55056	55058	55058	55166	55166	55256	TFE
*6	GUIDE O-RING	1	55060	55062	55062	55168	55168	55258	TFE
*7	GUIDE GASKET	1	55064	55068	55068	55170	55170	55260	304/GRF.
			55066	55070	55070	55172	55172	55262	‡ INCONEL/GRF.
8	VALVE BODY, NPT	1	55072						WCC STL.
	VALVE BODY, SW		55074						
	VALVE BODY, BW, SCH. 80		55076						
	VALVE BODY, 150# RF		55078		55174		55264		
	VALVE BODY, 300# RF		55080		55176		55266		
	VALVE BODY, 600# RF		55082		55178		55268		
	VALVE BODY, 600# RJ		55084		55180		55270		
	VALVE BODY, 900# RF		55086		55182		55272		
	VALVE BODY, 900# RJ		55088		55184		55274		
	VALVE BODY, 1500# RF		55090		55186		55276		
*9	SEAT GASKET	1	55092		55188		55278		
			55094		55190		55280	304/GRF.	
10	VALVE STEM	1	55096		55192		55282	‡ INCONEL/GRF.	
					55098			316 SST	
11	PACKING SPRING	1			55100			302 SST	
12	PACKING KIT	1			55102			‡ INCONEL	
					85000				
12A	PACKING	1			55106			TFE	
12B	PACKING WASHER	1			55108			SST	
12C	PACKING SPACER	1			55110			SST	
13	UPPER PACKING RETAINER	1			55104			316 SST	
14A	PACKING STUD	2			10182			SST	
14B	PACKING NUT	2			10184			SST	
*15	ROLL PIN	1			55114			SST	
					55116			‡ 316 SST	
16	VALVE BONNET, BELOW ANSI 1500	1	55118		55194		55284		
			55118		55196		55286	WCC STL.	
*17	BONNET GASKET	1	55120		55198		55288	304/GRF.	
			55122		55200		55290	‡ INCONEL/GRF.	
18	BONNET STUD, BELOW ANSI 1500	8	55124		55124		55292		
	BONNET STUD, ANSI 1500	12	55124(8)		55202(8)		55202	B7	
19	BONNET NUT, BELOW ANSI 1500	8	55126		55126		55296		
	BONNET NUT, ANSI 1500	12	55126(8)		55204(8)		55204	B7	
20	PACKING FLANGE	1			55128			316 SST	
21	WIPER	1			55130			TFE	
22	1/4" PIPE PLUG	1			55432			STEEL	

‡ MEETS NACE SPECIFICATIONS

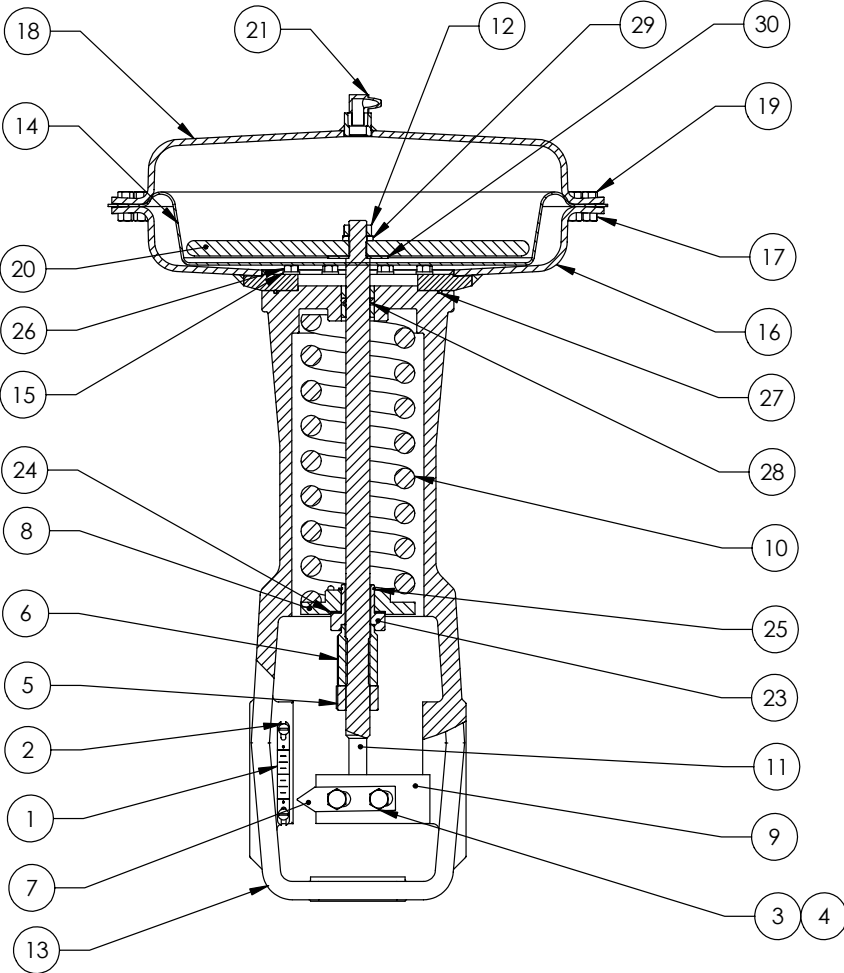
* INCLUDED IN REPAIR KIT

5500 PLUG CONTROL (PC) TRIM REPAIR KIT (INCLUDES: PLUG, SEAT, GASKETS, O-RING, PIN)						
MAT'L	2"		3"		4"	
	1.5" PORT	2" PORT	2" PORT	3" PORT	3" PORT	4" PORT
316	85034	85036	85038	85040	85042	85044
316/TFEG	85046	85048	85050	85052	85054	85056
316 /CARBIDE	85058	85060	85062	85064	85066	85068

Model 5500

Installation, Operation and Maintenance Instructions

1.3.3 Model 5500 Actuator – Reverse



ITEM	DESCRIPTION (TRIM SIZE)	QTY.	PART NUMBER			MAT'L.
			#70	#120	#180	
1	TRAVEL INDICATOR SCALE (.250"-1.00")	1	55305			SST
	TRAVEL INDICATOR SCALE (2.00")		55300			
	TRAVEL INDICATOR SCALE (3.00")		55302			
	TRAVEL INDICATOR SCALE (4.00")		55304			
	TRAVEL INDICATOR SCALE (6.00")			55540		
2	ROUND HEAD SCREW	2		33070		SST
3	HEX JAM NUT	2		55306		SST
4	HEX CAP SCREW	2		55321		SST
5	HEX JAM NUT	1	55348		55414	C. STL. PLTD
6	ACTUATOR SPRING ADJ. SCREW	1	55350		55416	C. STL.
7	TRAVEL INDICATOR	1	55312	55368	55570	SST
8	LOWER SPRING RETAINER	1	SEE SPRING CHART			C. STL.
9	STEM CONNECTOR	1	55320		55374	C. STL.
10	ACTUATOR SPRING	1	SEE SPRING CHART			C. STL.
11	ACTUATOR STEM	1	55352	55418	55606	SST
12	HEX JAM NUT	1		55336		C. STL. PLTD
13	ACTUATOR YOKE	1	55354	55420	55598	DUCTILE IRON
14	MOLDED DIAPHRAGM	1	55360	55428	55573	NITRILE/NYLON
15	SPRING LOCK WASHER	8		51322		C. STL. PLTD
16	LOWER DIAPHRAGM HOUSING	1	55342	55396	55563	C. STL.
17	DIAPHRAGM HOUSING NUT	(x)	51316 (12)		51316 (24)	C. STL. PLTD
18	UPPER DIAPHRAGM HOUSING	1	55344	55398	55564	C. STL.
19	HEX CAP SCREW	(x)	51314 (12)		51314 (24)	C. STL. PLTD
20	DIAPHRAGM PLATE	1	55362	55400	55566	DUCTILE IRON
21	BREATHER PLUG	1		11002	55599	PLASTIC
23	RETAINER BEARING SPRING	1			55408	C. STL. PLTD
24	WASHER THRUST	1			55410	C. STL./MOLY
25	RING RETAINING	1			55412	C. STL. PLTD
26	HEX CAP SCREW	8		51314	70188	C. STL. PLTD
27	O-RING YOKE HOUSING	1	55358		55424	NITRILE
28	O-RING STEM	1	60078		55426	NITRILE
29	WASHER LOCK 3/4"	1			55430	C. STL. PLTD
30	WASHER BEARING	1			55356	C. STL.

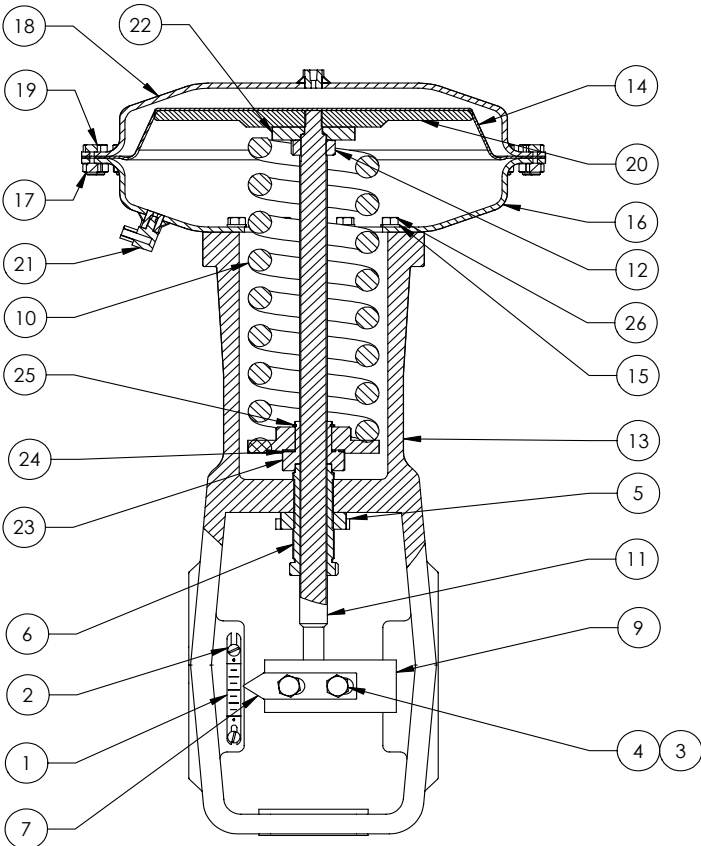
Spring Chart

Body Size	Trim Size	Spring												Spring Retainer							
		Plug Control				Cage Control								#70 (PC)		#70 (CC)		#120		#180	
		#70		#120		#70		#120		#180		#70 (PC)		#70 (CC)		#120		#180			
		3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30		
2"	0.250" - 1.00"	55324											55318								
	1.50"	55322	55324	55376	55378	55332	55718	55386	55719			55314	55318	55318	55318	55370					
	2.00"					55322	55324	55376	55378					55314	55318						
3"	0.250" - 1.00"	55324											55318								
	1.50"	55322	55324	55376	55378							55314	55318								
	2.00"	55326	55328	55380	55382	55322	55324	55376	55378			55314	55314	55314	55318	55370					
	3.00"					55326	55328	55380	55382					55314	55314						
4"	0.250" - 1.00"	55324											55318								
	1.50"	55322	55324	55376	55378							55314	55318								
	2.00"																				
	3.00"	55330	55332	55384	55386	55326	55328	55380	55382			55314	55318	55314	55314	55370					
	4.00"					55330	55332	55384	55386					55314	55318						
6"	4.00"							55384	55386	55716	55717									55370	
	6.00"							55714	55715	55567	55568										

Model 5500

Installation, Operation and Maintenance Instructions

1.3.4 Model 5500 Actuator – Direct



ITEM	DESCRIPTION (TRIM SIZE)	QTY.	PART NUMBER			MAT'L.
			#70	#120	#180	
1	TRAVEL INDICATOR SCALE (.25"-1")	1	55305			SST
	TRAVEL INDICATOR SCALE (2")		55300			
	TRAVEL INDICATOR SCALE (3")		55302			
	TRAVEL INDICATOR SCALE (4")		55304			
	TRAVEL INDICATOR SCALE (6")			55540		
2	ROUND HEAD SCREW	2	33070			SST
3	HEX JAM NUT	2	55306			SST
4	HEX CAP SCREW	2	55321			SST
5	LOCK NUT	1	55308	55364		DUCTILE IRON
6	ACTUATOR SPRING ADJ. SCREW	1	55310	55366		C. STL.
7	TRAVEL INDICATOR	1	55312	55368	55570	SST
8	LOWER SPRING RETAINER	1	SEE SPRING CHART			C. STL.
9	STEM CONNECTOR	1	55320	55374		C. STL.
10	ACTUATOR SPRING	1	SEE SPRING CHART			C. STL.
11	ACTUATOR STEM	1	55334	55388	55565	SST
12	HEX JAM NUT	1	55336	55390		C. STL. PLTD
13	ACTUATOR YOKE	1	55338	55392	55554	DUCTILE IRON
14	MOLDED DIAPHRAGM	1	55340	55394	55574	NITRILE/NYLON
15	SPRING LOCK WASHER	8	51322			C. STL. PLTD
16	LOWER DIAPHRAGM HOUSING	1	55342	55396	55563	C. STL.
17	DIAPHRAGM HOUSING NUT	(x)	51316 (12)	51316 (24)		C. STL. PLTD
18	UPPER DIAPHRAGM HOUSING	1	55344	55398	55564	C. STL.
19	HEX CAP SCREW	(x)	51314 (20)	51314 (24)		C. STL. PLTD
20	DIAPHRAGM PLATE	1	55346	55400	55566	WCC
21	BREATHER PLUG	1	11002	55599		PLASTIC
22	UPPER SPRING GUIDE, 3-15 PSI	1		55404		STEEL PLTD
	UPPER SPRING GUIDE, 6-30 PSI		55406			
23	SPRING BEARING RETAINER	1		55408		C.S.
24	THRUST WASHER	1		55410		C. STL./MOLY
25	SNAP RING	1		55412		STEEL PLTD
26	HEX CAP SCREW	8	51314	70188		C. STL. PLTD

Spring Chart

Body Size	Trim Size	Spring												Spring Retainer							
		Plug Control				Cage Control								#70 (PC)		#70 (CC)		#120		#180	
		#70		#120		#70		#120		#180		#70 (PC)		#70 (CC)		#120		#180			
		3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30	3-15	6-30		
2"	0.250" - 1.00"	55324											55318								
	1.50"	55322	55324	55376	55378	55332	55718	55386	55719						55318	55318					
	2.00"	55322	55324	55376	55378	55322	55324	55376	55378			55314	55318	55314	55318	55370					
3"	0.250" - 1.00"	55324											55318								
	1.50"	55322	55324	55376	55378							55314	55318								
	2.00"	55326	55328	55380	55382	55322	55324	55376	55378			55314	55314	55314	55318	55370					
	3.00"	55326	55328	55380	55382	55326	55328	55380	55382			55314	55314	55314	55314	55370					
4"	0.250" - 1.00"	55324											55318								
	1.50"	55322	55324	55376	55378							55314	55318								
	2.00"	55322	55324	55376	55378							55314	55318								
	3.00"	55330	55332	55384	55386	55326	55328	55380	55382			55314	55318	55314	55314	55370					
	4.00"	55330	55332	55384	55386	55330	55332	55384	55386			55314	55318	55314	55318	55370					
6"	4.00"					55384	55386	55716	55717											55370	
	6.00"					55714	55715	55567	55568												

Model 5500

Installation, Operation and Maintenance Instructions

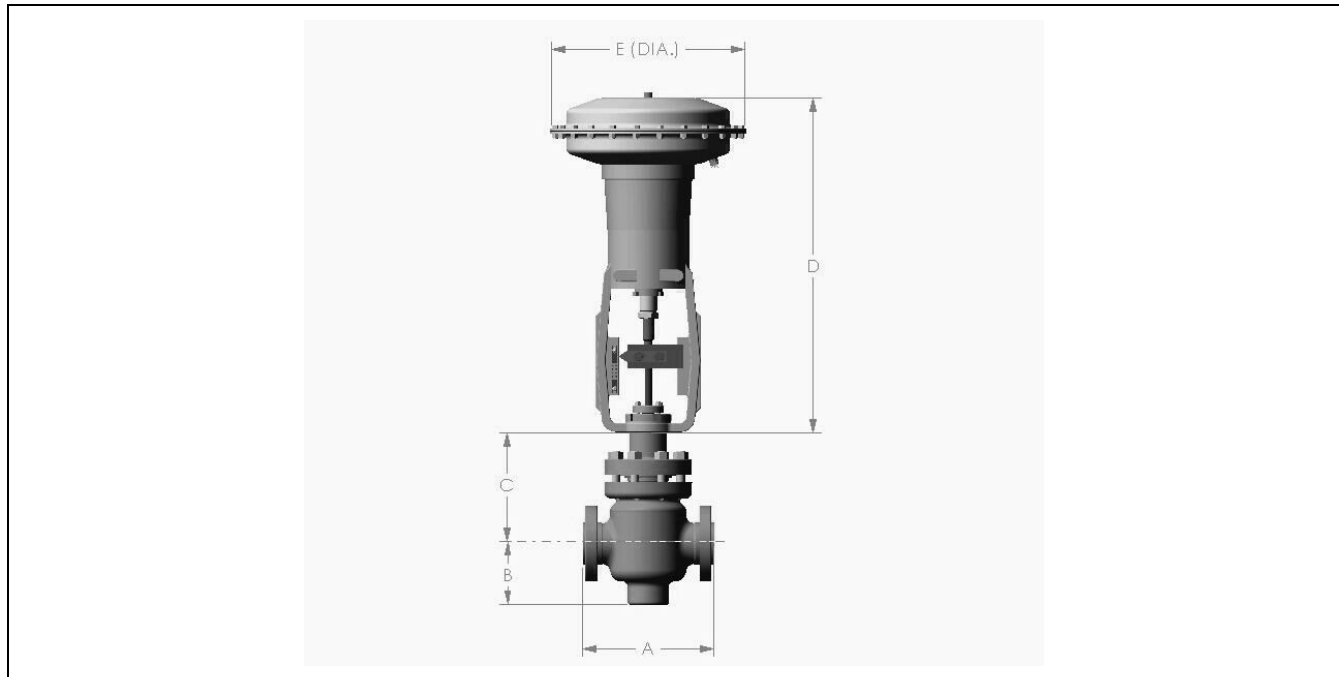
1.4 Dimensions

Valve Body Dimensions, inches (mm)

Body End Connection Style	2"			3"			4"			6"		
	A	B Max.	C	A	B Max.	C	A	B Max.	C	A	B Max.	C
FNPT	11.25 (286)	5.38 (136)	9.00 (228)	11.75 (298)	6.75 (171)	9.25 (235)	13.88 (352)	7.75 (197)	10.12 (257)	17.75 (451)	10.50 (267)	12.63 (321)
BWE	11.25 (286)											
SWE	11.25 (286)											
150# RF	10.00 (254)	5.38 (136)	9.00 (228)	11.75 (298)	6.75 (171)	9.25 (235)	13.88 (352)	7.75 (197)	10.12 (257)	17.75 (451)	10.50 (267)	12.63 (321)
300# RF	10.50 (266)			12.50 (317)			14.50 (368)			18.62 (473)		
600# RF	11.25 (286)			13.25 (336)			15.50 (393)			20.00 (508)		
600# RTJ	11.38 (289)			13.38 (339)			15.62 (397)			20.12 (511)		
900# RF	14.75 (374)			15.50 (393)			17.00 (431)					
900# RTJ	14.88 (378)			15.62 (397)			17.12 (435)					
1500# RF	14.75 (374)			18.12 (460)			20.88 (530)					
1500# RTJ	14.88 (378)			18.25 (463)			21.00 (533)					

Actuator Dimensions, inches (mm)

Actuator Size	D		E	Boss Size	
	Direct	Reverse			
No. 70	24.12 (612)	23.88 (606)	12.50 (317)	2.81 (71)	
No. 120	29.50 (749)	31.38 (796)	16.75 (425)	2.81 (71)	
No. 180	30.12 (765)	32.12 (816)	20.50 (521)	2.81 (71)	3.50 (89)



2.0 INSTALLATION

WARNING: Personal injury or equipment damage caused by sudden release of pressure may result if the valve is installed where service conditions could exceed valve limits.

CAUTION: When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, and controlled fluid conditions, especially since some primary plug/cage material combinations are limited in service temperature ranges due to differences in thermal expansion rates. Do not apply any other conditions to the valve without first contacting your Mallard sales representative.

1. Prior to valve installation, inspect it for damages which might have occurred during shipment and handling. Remove any items covering the process connections of the valve. Inspect the inlet and outlet connections to assure that no debris has become lodged inside the valve. Clean out all pipelines to remove scale, welding slag, and other foreign materials.
2. Unless limited by seismic criteria, the control valve can be installed in any position. The normal method is with the actuator vertical above the body. Size 180 actuators mounted within 45° of horizontal should be supported. If forces other than normal gravitational forces are experienced, smaller size actuators may also need to be supported when they are not in a vertical position.
3. Flow through the body must be in the direction indicated by the flow arrow on the valve body.
4. Install valve using good piping practices. Do not install the valve in a system where the working pressure might exceed the class rating marked on the nameplate.

WARNING: Working pressure of control valve body does not necessarily reflect the shut-off pressure of which the actuator is capable. Check actuator shut-off charts or call the factory.

5. Connect instrument air to the actuator. Keep the length of tubing or piping as short as possible to avoid transmission lag in the control signal. If other devices are installed (i.e., volume booster, valve positioner, etc.), be sure that the device(s) is properly connected to the actuator.
6. Adjust spring load if necessary.

Reverse (Fail Close) Actuators: To increase shut-off capability, increase spring pre-load by turning spring adjusting screw clockwise. To decrease spring pre-load, turn spring adjusting screw counter-clockwise.

Direct (Fail Open) Actuators: To increase opening capability, increase spring pre-load by turning spring adjusting nut clockwise. To decrease spring pre-load, turn spring adjusting nut counter-clockwise.

Model 5500

Installation, Operation and Maintenance Instructions

3.0 MAINTENANCE

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of service conditions. This section includes instructions for packing replacement, trim replacement, and lapping the metal seat.

3.1 Packing Replacement

WARNING: System pressure must be bled off to 0 psig or the valve must be isolated with the pressure bled off prior to any maintenance involving disassembly of the valve or valve actuator.

For spring-loaded TFE V-ring packing, the packing flange nuts are to be tightened until the shoulder on the packing follower contacts the bonnet. If there is still undesirable packing leakage, replace the packing following the numbered steps below.

If there is undesirable packing leakage with other than spring-loaded packing, first try to limit the leakage and establish a stem seal by tightening the packing flange nuts to at least the minimum recommended torque in table 4. However, do not exceed the maximum recommended torque in table 4, or excessive friction may result. If the packing is relatively new and tight on the stem and tightening the packing flange nut does not stop the leakage, it is possible that the valve stem is worn or nicked so that a seal cannot be made. If the leakage comes from the outside diameter of the packing, it is possible that the leakage is caused by nicks or scratches around the packing box wall. While replacing the packing following the numbered steps below, inspect the valve stem and packing box wall for nicks and scratches.

1. Exhaust all actuator pressure and disconnect the actuator supply. Remove the cap screws in the stem connector and separate the two halves of the stem connector.
2. Remove the yoke nut, then remove the actuator from the valve bonnet. Loosen the packing flange nuts so that the packing is not tight on the valve stem.
3. Unscrew the bonnet nuts and carefully lift the bonnet off the valve stem. If the valve plug and stem start to lift with the bonnet, use a brass or lead hammer on the end of the stem to tap it back down. Set the bonnet on a wooden or cardboard surface to avoid damage to gasket surfaces.
4. Remove all gaskets.
5. Cover the valve body to protect the gasket surface and prevent foreign material from getting into the valve body cavity.
6. Remove the packing flange nuts, packing flange, wiper, and packing follower. Carefully push out all the remaining packing parts from the body side of the bonnet using a rounded rod or other tool that will not scratch the packing box wall. Clean all parts carefully, inspecting for damage. Inspect valve stem threads for any sharp edges that might cut the packing. Use emory cloth to smooth the threads, if necessary.
7. Remove the cover protecting the body cavity and install new gaskets. Slide the bonnet over the valve stem and onto the stud bolts.
8. Lubricate the stud bolt threads and the faces of the hex nuts with a suitable lubricant. Tighten the hex evenly with a crisscross pattern to the torque recommended in table 4.
9. Install new packing and the metal packing box parts. Slip a smooth-edged pipe over the valve stem and gently tap each soft packing part into the packing box, being sure that air is not trapped between adjacent soft parts.
10. Slide the packing follower, wiper, and packing flange into position. Lubricate the packing flange studs and the faces of the packing flange nuts and tighten into place. For TFE V-ring packing, tighten packing flange nuts until the shoulder on the packing follower contacts the bonnet.

CAUTION: Do not clamp just the tip of either the valve stem or the actuator stem in the stem connector. Incomplete engagement of both valve stem and actuator stem in the stem connector may result in stripped threads or improper operation. Be sure that the length of each stem clamped in the stem connector is equal to or greater than the diameter of that stem.

11. Mount the actuator on the valve body assembly and reconnect the actuator and valve stem.

12. Align the travel indicator scale to show valve position.

3.2 Trim Replacement

WARNING: System pressure must be bled off to 0 psig or the valve must be isolated with the pressure bled off prior to any maintenance involving disassembly of the valve or valve actuator.

1. Exhaust all actuator pressure and disconnect the actuator supply.
2. Unscrew the bonnet nuts and carefully lift the actuator and bonnet off the valve stem.
3. Pull the seat and gasket out of seat pocket and lift out of valve body.
4. Clean seat pocket in valve body as required.
5. Insert new Seat and gasket.
6. To disassemble the plug from the stem, drive the retaining pin out of valve plug and unscrew the plug from the valve stem.
7. Slide the plug from the cage.
8. Install new plug bushing, O-ring and back-up Ring on new valve plug.
9. Slide new plug into the cage.
10. Place new cage (or guide) gasket onto the cage (or guide, for plug control).
11. Screw new plug onto the valve stem until pinning holes line up and drive new retaining pin into place.
12. Reinstall actuator assembly by sliding the bonnet over the valve stem and onto the stud bolts, making sure the bonnet is aligned correctly with the body..
13. Lubricate the stud bolt threads and the faces of the hex nuts with a suitable lubricant. Tighten the hex evenly with a crisscross pattern to the torque recommended in table 4.
14. Reconnect instrument air supply to actuator.
15. Adjust actuator spring as outlined in Step 6 of Section 2.0, "Installation".

Table 4. Recommended Body-to-Bonnet Bolt Torque (Foot Pounds)

Valve Size		ANSI Pressure Class				
		150	300	600	900	1500
2"	Stud Size	0.75	0.75	0.75	0.75	0.75
	Torque	75	80	80	175	175
3"	Stud Size	0.75	0.75	0.75	0.75	1.00
	Torque	90	90	90	140	275
4"	Stud Size	0.88	0.88	0.88	0.88	1.00
	Torque	145	145	145	225	288
6"	Stud Size	0.88	0.88	0.88	---	---
	Torque	145	145	145	---	---

3.3 Actuator Diaphragm Replacement

WARNING: System pressure must be bled off to 0 psig or the valve must be isolated with the pressure bled off prior to any maintenance involving disassembly of the valve or valve actuator.

1. Remove air supply from actuator.
2. Relieve all spring compression.
3. Remove screws and nuts around diaphragm housing.
4. Remove upper diaphragm housing.
5. If direct-acting, remove actuator diaphragm and replace with new diaphragm.
6. If reverse-acting, remove diaphragm plate nut and/or diaphragm plate. Remove actuator diaphragm and replace with new diaphragm.
7. Reassemble actuator by reversing steps 1-4.

3.4 Preventive Maintenance

The following preventative maintenance should be performed periodically as dictated by the severity of the application or by maintenance schedule.

Model 5500

Installation, Operation and Maintenance Instructions

- 3.4.1 **Valve Body**
The internal valve body should be inspected every time trim is replaced, packing is changed, or the actuator is worked on. Under normal operating conditions the valve body should show no signs of wear. If wear is noticed within the valve body from high pressure drops, abrasive flows, or chemical corrosion, the valve body should be replaced to assure safety during valve operation.
- 3.4.2 **Valve Trim**
Check the valve plug and seat for wear that might be caused by high pressure drops, abrasives in the media, or corrosion. If signs of wear are present, then trim replacement is recommended for optimum valve performance.
- 3.4.3 **Packing**
Check the “weep” hole in the bonnet for discharge. Discharge is a sign of packing leakage. If discharge is present then packing replacement is recommended.
- 3.4.4 **Actuator Assembly**
Visually inspect the actuator operation of the valve by observing the travel indicator while the valve is stroking for a smooth, consistent movement. Jerking type movements may indicate a problem within the valve. De-pressurize the valve and inspect it internally.

Listen for a “hissing” sound during operation. This may indicate a worn seal or diaphragm. Replace any worn seal or diaphragm.

3.5 Troubleshooting

Problem	Possible Cause	Fix
Valve leaks excessively when closed (Section 1.2 defines the Model 5500 leakage rates. Refer to ANSI / FCI 70-2-1976 for control valve allowable leakage classifications.)	<p><u>Reverse Acting:</u> Actuator spring load not sufficient.</p> <p><u>Direct Acting:</u> Inadequate air supply pressure.</p> <p>Debris between the plug and seat preventing tight shut-off.</p> <p>Plug and seat are not sealing.</p> <p>Plug and seat are worn out.</p> <p>Actuator force not enough for shut-off (actuator too small).</p>	<p><u>Reverse Actuator:</u> Increase actuator spring pre-load.</p> <p><u>Direct Acting:</u> Increase air supply pressure but do not exceed maximum rating on nameplate.</p> <p>Remove debris.</p> <p>Re-lap trim.</p> <p>Replace trim.</p> <p>Consult factory or local representative for proper actuator sizing.</p>
Valve will not open	<p><u>Reverse Acting:</u> Not receiving air supply.</p> <p><u>Reverse Acting:</u> Too much spring pre-load.</p> <p><u>Direct Acting:</u> Inadequate spring pre-load.</p> <p>Debris lodged behind valve plug.</p>	<p>Check air supply source and tubing to the actuator connection.</p> <p>Decrease spring pre-load by turning adjusting screw counter-clockwise.</p> <p>Increase spring pre-load by turning adjusting nut clockwise.</p> <p>Remove debris.</p>
Discharge evident from bonnet “weep” hole.	Packing is worn.	Replace packing.
Supply air leaking out of breather plug during operation.	Diaphragm is worn out or torn.	Replace diaphragm.