Mallard CONTROL

Model 5500 Control Valve

The Model 5500 (Figure 1) is a durable and reliable control valve, well suited for throttling or on/off control of non-lubricating, viscous, or other hard-to-handle fluids. The Model 5500 is used over a broad range of pressure drops and temperatures where accurate and reliable control is required. This valve is available in a wide variety of integral end connection styles, and comes complete with a pneumatic spring return fail-open or fail-close diaphragm actuator.

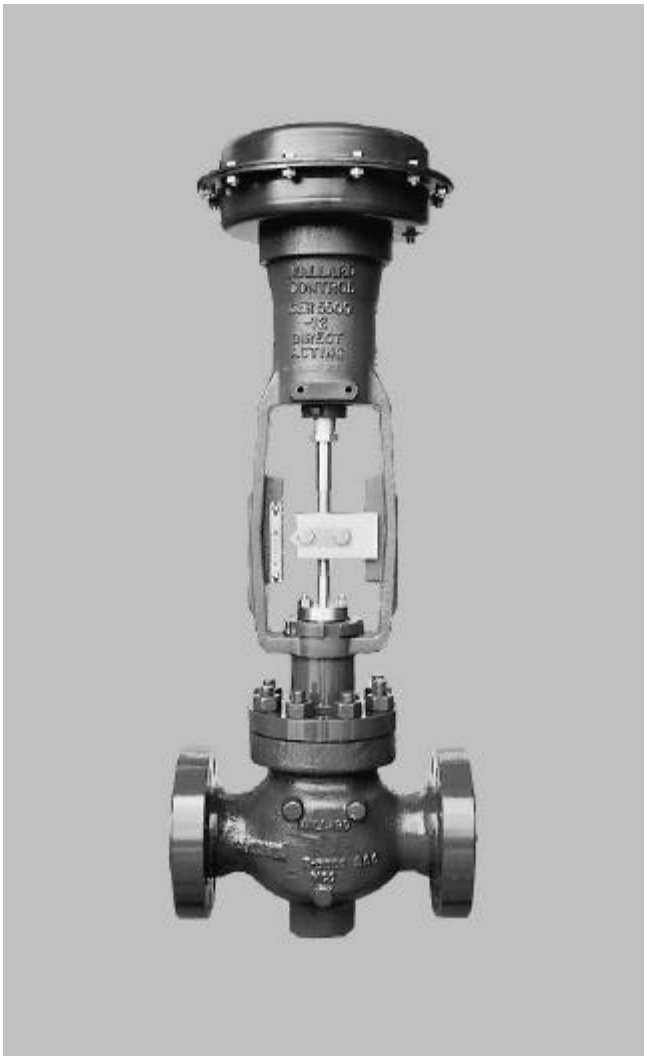


Figure 1. Model 5500 Control Valve

Features:

- **Rugged Construction –** The heavy-duty steel body, bonnet, yoke, and actuator housing constructions enable the Model 5500 to provide reliable service in the harshest industrial environments.
- **Variety of Trim Materials –** Available with 316 SST, 17-4PH SST, tungsten carbide, and TFE seating surfaces.
- **Balanced Trim Design –** The pressure-balanced plug reduces actuator thrust requirements, enabling cost savings on the valve actuator.
- **Excellent Shutoff Performance –** Zero leakage (ANSI Class VI) is achieved with the “TFE plug insert” trim material option.
- **Spring-loaded Packing –** The TFE V-ring packing is “Live Loaded” by means of a load spring so the packing does not need to be constantly adjusted.
- **Simple Maintenance –** The design of the Model 5500 control valve allows for fast and easy inspection or replacement of the trim without removing the valve from the line. Special tools are not required.

ISO 9001 registered Company QOT Quality - On Time

SPECIFICATIONS

Available Body Sizes

- 2”
- 3”
- 4”

End Connections / Pressure Ratings[1]

- 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)

Available Trim Sizes

- 0.25”
- 0.38”
- 0.50”
- 0.75”
- 1.00”
- 1.5”
- 2.0”
- 3.0”
- 4.0”

Flow Characteristics

- Modified Percent (Throttling)
- Quick Opening (On/Off)

Flow Coefficients

See Table 1

Temperature Limits

Standard Valve Configuration:

- -20° to 400° F (-29° to 204° C)

Modified Valve Configurations[3]:

- -50° to 600° F (-46° to 316° C)

Materials of Construction (Std Configuration[4])

- Body & Bonnet ASTM A216 WCC Steel
- Body Studs ASTM A193 Gr. B7
- Stud Nuts ASTM A194 Gr. 2H
- Yoke Ductile Iron
- Actuator Housings Pressed Steel
- Diaphragm Buna-N w/ Nylon[5] Insert

Trim Components:

- Plug 316 SST
- Seat 316 SST
- Cage 17-4PH SST H-1150M
- Guide 316 SST
- Seal & Backup Ring TFE V-Ring
- Valve Stem 316 SST
- Plug Insert TFE or Carbide

Packing Gland Components:

- Packing TFE V-Ring
- Packing Spring 302 SST
- Packing Washer 316 SST
- Packing Spacer 304 SST
- Gaskets 304 SST/Grafoil

Leakage Rates

Hard Trim	**ANSI Leakage Class**
0.25” - 0.75”	IV
1.00”	III
1.5” – 4.0”	II
Soft Insert Trim	**ANSI Leakage Class**
All Sizes	VI

Allowable Pressure Drops

See Tables 2A through 2D

Approximate Shipping Weight

See Table 3

1. Pressure ratings @ 100°F (38°C).
2. 2” valve body only.
3. Consult Factory.
4. Materials of Construction which conform to NACE MR-01-75 are available upon request; consult Factory.
5. “NYLON” is a registered trademark of the DuPont de Nemours Company.

Table 1. Flow Coefficients (C_V)

Body Size	Orifice Size	Modified Percent Valve Opening (% Travel)										Q.O.
		10	20	30	40	50	60	70	80	90	100	100
2”	0.25	.284	.506	.657	.767	.875	.989	1.10	1.20	1.32	1.43	1.68
	0.38	.311	.621	.942	1.28	1.64	2.07	2.51	2.93	3.35	3.70	3.82
	0.50	.592	1.17	1.76	2.34	2.95	3.70	4.57	5.50	5.95	6.08	6.08
	0.75	.882	1.76	2.76	3.82	5.53	6.57	8.49	10.8	15.0	16.2	16.2
	1.00	1.01	2.02	3.14	5.07	9.68	11.9	14.9	17.2	19.3	20.9	20.9
	1.5	4.74	7.67	9.53	12.9	18.4	24.9	33.6	44.0	53.4	59.5	62.0
	2.0	5.01	11.0	20.3	33.8	48.9	61.4	67.2	69.5	70.8	71.6	72.8
3”	0.25	.284	.506	.657	.767	.875	.989	1.10	1.20	1.32	1.43	1.68
	0.38	.311	.621	.942	1.28	1.64	2.07	2.51	2.93	3.35	3.70	3.82
	0.50	.592	1.17	1.76	2.34	2.95	3.70	4.57	5.50	5.95	6.08	6.08
	0.75	.882	1.76	2.76	3.82	5.53	6.57	8.49	10.8	15.0	16.2	16.2
	1.00	1.01	2.02	3.14	5.07	9.68	11.9	14.9	17.2	19.3	20.9	20.9
	1.5	4.74	7.67	9.53	12.9	18.4	26.2	35.6	46.2	57.0	65.1	65.1
	2.0	5.01	9.85	16.6	30.6	47.2	62.9	77.0	88.8	96.4	101	105
	3.0	6.15	14.9	27.7	52.5	80.3	104	118	124	128	129	130
4”	0.25	.284	.506	.657	.767	.875	.989	1.10	1.20	1.32	1.43	1.68
	0.38	.311	.621	.942	1.28	1.64	2.07	2.51	2.93	3.35	3.70	3.82
	0.50	.592	1.17	1.76	2.34	2.95	3.70	4.57	5.50	5.95	6.08	6.08
	0.75	.882	1.76	2.76	3.82	5.53	6.57	8.49	10.8	15.0	16.2	16.2
	1.00	1.01	2.02	3.14	5.07	9.68	11.9	14.9	17.2	19.3	20.9	20.9
	1.5	4.74	7.67	9.53	12.9	18.4	26.2	37.9	50.6	62.1	67.4	67.4
	2.0	6.20	11.5	20.9	37.1	53.1	70.3	82.1	93.3	104	110	110
	3.0	7.60	19.0	36.1	59.1	80.6	111	135	151	166	172	175
	4.0	8.42	21.6	38.3	71.5	114	148	177	196	207	211	213

Liquid Sizing Equation:

$$C_v = Q\sqrt{\frac{SG}{\Delta P}}$$

where:
C_V = flow coefficient
Q = liquid flow rate, gpm
SG = specific gravity
ΔP = pressure drop, psi

Gas Sizing Equation:

$$C_v = (Q/963)\sqrt{\frac{(SG)(T)}{(\Delta P)(P1+P2)}}$$

where:
C_V = flow coefficient
Q = gas flow rate, scfh
SG = specific gravity
$P1$ = inlet pressure, psia
$P2$ = outlet pressure, psia
ΔP = pressure drop, psi
T = inlet gas temperature, °R (°F + 460)

Useful Conversions for Liquid Flow:

To Convert	Multiply By	To Obtain
Barrels	42	U.S. Gallons
Barrels/Hr	0.7	U.S. gpm
Barrels/Day	0.02917	U.S. gpm
Ft^3/Sec	448.83	U.S. gpm
M^3/Hr	4.403	U.S. gpm
Lb/Hr	0.0020	U.S. gpm
Kg/Hr	0.0044	U.S. gpm

Useful Conversions for Gas Flow:

To Convert	Multiply By	To Obtain
scfd	0.04167	scfh
scfs	3600	scfh
scfm	60	scfh
M^3/Hr	35.34	scfh
Lb/Hr	19.52	scfh
Kg/Hr	43.04	scfh

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

Trim Size	Air to Diaphragm, psig			
	18	20	33	35
	(3-15 spring)		(6-30 spring)	
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. Allowable Pressure Drops, PSID – No. 120 Actuator, Direct Acting (Fail Open), Flow Under Seat

Trim Size	Air to Diaphragm, psig			
	18	20	33	35
	(3-15 spring)		(6-30 spring)	
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. Allowable Pressure Drops, PSID – No. 70 Actuator, Reverse Acting (Fail Close), Flow Under Seat

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. Allowable Pressure Drops, PSID – No. 120 Actuator, Reverse Acting (Fail Close), Flow Under Seat

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

1. Initial Actuator Spring Setting is the signal pressure to the diaphragm required to initially lift the plug from the valve seat, while the valve is not in service. (Sometimes referred to as “bench set”.)

Table 3. 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	150 (68.0)	165 (74.8)	190 (86.2)	195 (88.5)	260 (117.9)	270 (122.5)
	No. 120	215 (97.5)	230 (104.3)	255 (115.7)	260 (117.9)	325 (147.4)	335 (152.0)
3”	No. 70	-	205 (93.0)	230 (104.3)	240 (108.9)	440 (199.6)	475 (215.5)
	No. 120	-	270 (122.5)	295 (133.8)	305 (138.3)	505 (229.1)	540 (244.9)
4”	No. 70	-	280 (127.0)	325 (147.4)	345 (156.5)	670 (303.9)	700 (317.5)
	No. 120	-	345 (156.5)	390 (176.9)	410 (186.0)	735 (333.4)	765 (347.0)

HOW TO ORDER

If Valve Specifics are Known:

1. Specify Valve Size with Model 5500. (Example: 3” 5500)
2. Locate the product model code on the back page of this bulletin and select the proper code corresponding to the specifications required.
3. Call Mallard Control or your local representative with the valve size, model, and model code for pricing and delivery.

If Valve Specifics are Unknown:

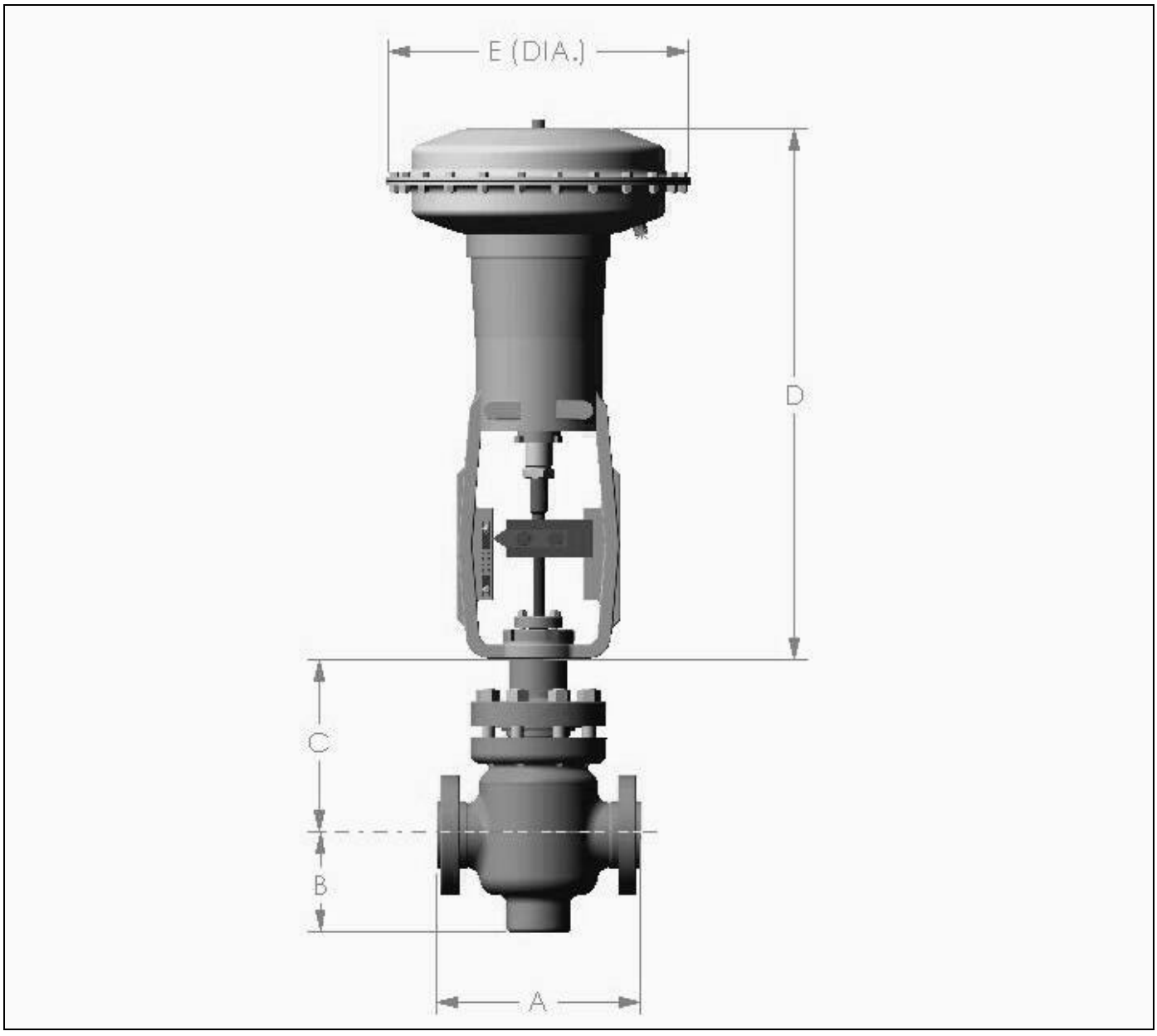
1. Collect as much information about the application as possible per the following guidelines:
   A. Valve application (i.e. suction, back pressure, pressure reducing, dumping, recycle, etc.)
   B. Media being controlled (i.e. water, oil, natural gas, carbon dioxide, steam, etc.)
   C. Specific gravity
   D. Operating temperature
   E. Shut-off pressure(s)
   F. Inlet pressure(s)
   G. Outlet pressure(s) or pressure drop(s)
   H. Flow rate(s)
   I. Actuator action, fail open or close
   J. Accessories (if any)
2. Call Mallard Control or your local representative with the information for assistance in valve sizing, model code development, pricing, and delivery.

Valve Body Dimensions, inches (mm)

Body End Connection Style	2”			3”			4”		
	A	B Max.	C	A	B Max.	C	A	B Max.	C
FNPT	11.25 (286)	5.38 (136)	9.00 (228)	-	6.75 (171)	9.25 (235)	-	7.75 (197)	10.12 (257)
BWE	11.25 (286)			-			-		
SWE	11.25 (286)			-			-		
150# RF	10.00 (254)			11.75 (298)			13.88 (352)		
150# RTJ	10.50 (266)			12.25 (311)			14.38 (365)		
300# RF	10.50 (266)			12.50 (317)			14.50 (368)		
300# RTJ	11.12 (282)			13.12 (333)			15.12 (384)		
600# RF	11.25 (286)			13.25 (336)			15.50 (393)		
600# RTJ	11.38 (289)			13.38 (339)			15.62 (397)		
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	F
	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)


E (DIA.)
D
C
B
A

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

END CONNECTIONS	CODE
Female NPT	S
Raised Face (RF) Flange	F
Ring Type Joint (RTJ) Flange	J
Other	X

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
Other	X

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

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	1
Tungsten Carbide	2
316 Stainless Steel	3
316 Stainless Steel with TFE Plug Insert	8

TRIM SIZE	CODE
Full Port	A
Reduced Port, one size down (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
Quick Opening (On/Off)	Q
Modified Percent (Throttling)	M

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