

# MARINE AND SEAWATER BALL VALVES



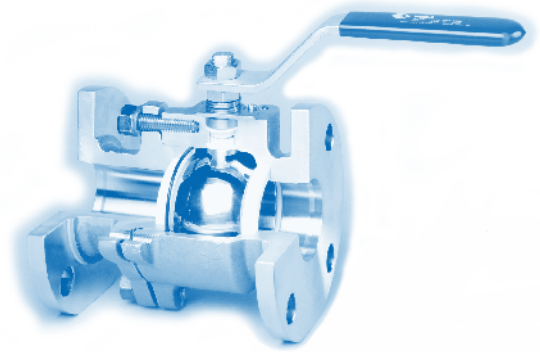
- Shipbuilding
- Bilge
- Ballast
- Utility Seawater
- Sea-Chest
- Injection Water
- Pump Skids
- Water Flood



 **PBM**  
Valve Solutions

# anatomy of a SEAWATER BALL VALVE

- 1/4" through 10" sizes full and reduced port, in various alloys compatible with seawater environments.
- Spring-loaded washers create a live-loaded stem assembly for positive sealing.
- Internal design produces a bubble-tight seal.
- Standard bottom-entry stem provides protection against inadvertent stem removal.
- USCG Category A shut off is available.
- Valves are 100% factory-tested.
- Pneumatic, electric and hydraulic automation available.
- Solenoids and position indicators available.



## BRONZE 2-WAY SP SERIES VALVE COMPARISON

	SERIES 1		SERIES 5	
Standard Body/End Material	836 Bronze (B62, C83600)		922 Bronze (B61, C92200)	
Standard Trim Material	316 Stainless Steel		316 Stainless Steel	
Standard Seat/Seal Material	RTFE (Glass Filled Teflon)		TFM™	
Swing Out Design	No		Yes	
Body Bolt Patterns	Non-Symmetric on 1/2"-1" and 3" sizes		Symmetric patterns on all sizes (4 bolts up to 3", 8 bolts on 4")	
Actuator Mounting	Standard except 1-1/4"		Standard	
Valve Weight (lbs.)	FNPT, Sil-Braze, SW, Solder Joint	150# F.F. Flange	FNPT, Sil-Braze, SW, Solder Joint	150# F.F. Flange
1/2"	2	5.0	2	4
3/4"	3	6.4	2	6
1"	4	8.6	5	0
1-1/4"	8	14.5	N/A	N/A
1-1/2"	9.5	17	11	17
2"	13	25	17	26
2-1/2"	33	52	37	53
3"	49	77	50**	64**
4"	84	115	133**	143**
Face-to-Face Dimensions (inches)	FNPT, Sil-Braze, SW, Solder Joint	150# F.F. Flange	FNPT, Sil-Braze, SW, Solder Joint	150# F.F. Flange
1/2"	3.12	5.38	3.12	5.50
3/4"	3.45	5.75	3.45	5.75
1"	3.90	6.30	4.25	6.50
1-1/4"	4.54	7.26	N/A	N/A
1-1/2"	5.36	6.98	5.50	8.00
2"	5.75	8.43	6.00	9.75
2-1/2"	8.36	10.86	8.00	11.50
3"***	8.62	12.04	9.00	12.75
4"***	10.46	12.90	12.00	15.00

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\*\* Series 1-3" valve had port I.D. of 2.75", Series 1-4" valve had port I.D. of 3.5". Series 5 valves are full port (3.00" and 4.00" respectively).

## SP SERIES 1 (836 BRONZE)

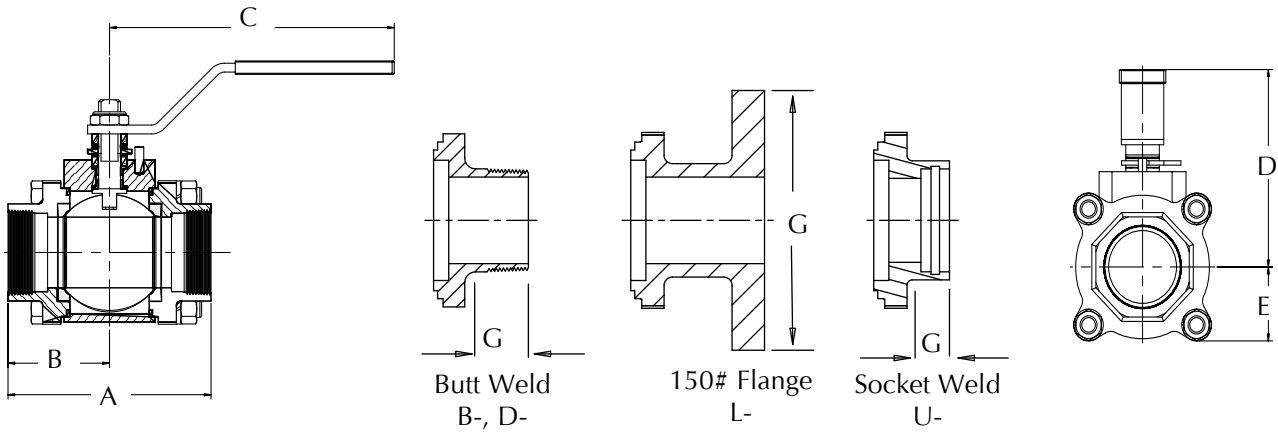
SP Series 1 seawater valves are 3-piece valves available in female NPT, socket-weld (for pipe), sil-braze (for pipe) and 150# flanged end fittings.

### DIMENSIONAL DATA (INCHES)

SP valves with Female NPT (Q-), Sil-Braze (S-), Socket Weld (U-), 150# Flanged (L-) End Fittings

Valve Size	Port Dia.	A		B		C	D	E		Approx. Wgt.	
		Face to Face		C <sub>L</sub> to Face				C <sub>L</sub> to Bottom			
		Q- S- U-	L-	Q- S- U-	L-	Handle Length from C <sub>L</sub>	C <sub>L</sub> to Top of Handle	Q- S- U-	L-	Q- S- U-	L-
1/4"	0.62"	3.12	-	1.56	-	6.09	3.03	1.34	-	2	-
1/2"	0.62"	3.12	5.38	1.56	2.69	6.09	3.03	1.34	1.81	2	5
3/4"	0.81"	3.45	5.75	1.72	2.88	6.09	3.15	1.47	1.88	3	6
1"	1.00"	3.90	6.30	1.95	3.15	8.69	3.53	1.69	2.13	4	9
1-1/4"	1.25"	4.54	7.26	2.27	3.63	8.69	4.90	1.57	2.31	8	15
1-1/2"	1.50"	5.36	6.98	2.68	3.49	8.69	5.08	1.71	2.50	10	17
2"	2.00"	5.75	8.43	2.87	4.21	8.69	5.45	2.03	3.00	13	25
2-1/2"	2.50"	8.36	10.86	4.18	5.42	12.44	5.50	2.81	3.50	33	52
3"	2.75"	8.62	12.04	4.31	6.02	12.44	6.82	3.88	3.88	49	77
4"	3.50"	10.46	12.90	5.23	6.45	12.44	7.32	4.50	4.50	84	115

- NOTES:**
1. SP Series valves with 150# flanges are 3-piece valves that do not meet ANSI face to face dimensions. Use AN Series 2-piece flanged valves if ANSI face to face dimensions are required.
  2. Consult PBM for actuator mounting dimensions.
  3. For flanged valves, flange holes straddle the centerline except for the SP Series 1, 1-1/2" valves.



# SP & SD SERIES 5 (STAINLESS, 922 BRONZE, CARBON STEEL, HASTELLOY® C, DUPLEX, OTHERS)

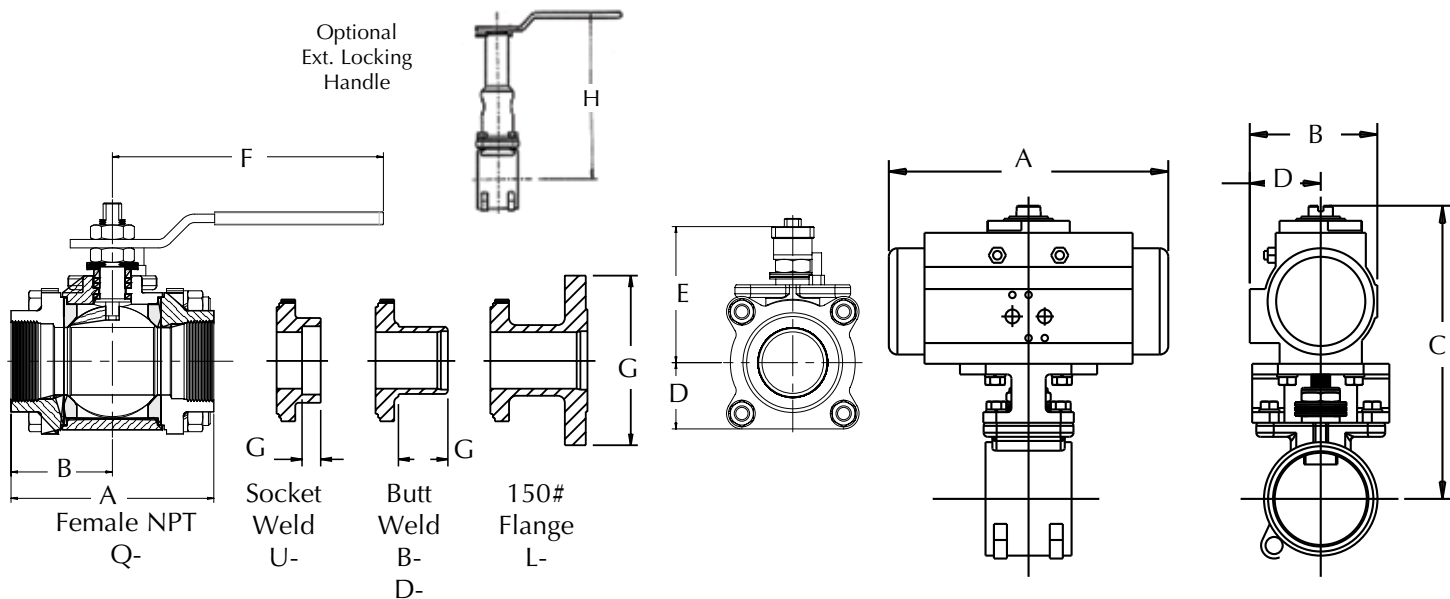
Female NPT (Q-), Socket Weld (U-), 150# Flange (L-), Butt Weld (B-), Sil-Braze (S-), Solder Joint (T-)

Manual valves			A			B			D	E	F	G			H	Approx. Wgt.	
Size	Size Code	Port Dia.	Face to Face			CL to Face			CL to Bottom B-, D- Q-, U, S-, T	CL to Top of Handle	Handle Length from CL	End Fitting Length				B- D- Q- U-	L-
			Q- U- S- T-	B- D-	L-	Q- U- S- T-	B- D-	L-				U- Length	B-, D- Length	L- Dia.			
1/4"	A	0.50	3.12	5.50	—	1.56	2.75	—	0.92	2.63	4.15	.41	1.50	—	7.19	1.7	4.0
3/8"	B	0.50	3.12	5.50	—	1.56	2.75	—	0.92	2.63	4.15	.41	1.50	—	7.19	1.7	4.0
1/2"	C	0.50	3.12	5.50	5.50	1.56	2.75	2.75	0.92	2.63	4.15	.41	1.50	3.50	7.19	1.7	4.0
3/4"	D	0.75	3.44	5.50	5.75	1.72	2.75	2.88	1.00	2.78	4.15	.53	1.50	3.88	7.34	2.0	5.2
1"	E	1.00	4.25	5.99	6.50	2.13	3.00	3.25	1.33	3.03	5.09	.53	1.50	4.25	7.62	4.5	8.7
1-1/2"	G	1.50	5.50	7.50	8.00	2.75	3.75	4.00	1.78	4.10	8.68	.53	1.50	5.00	9.45	10.2	17.4
2"	H	2.00	6.00	8.00	9.75	3.00	4.00	4.88	2.15	4.41	8.68	.66	1.75	6.00	9.76	15.4	26.5
2-1/2"	J	2.50	8.00	11.50	11.5	4.00	5.75	5.75	2.79	6.45	12.44	.69	2.31	7.00	11.36	36.0	53.5
3"	K	3.00	9.00	13.50	12.75	4.50	6.75	6.38	3.14	6.78	12.44	.69	2.31	7.50	11.69	48.0	68.0
4"	L	4.00	12.00	16.00	15.00	6.00	8.00	7.50	4.91	7.34	24.4	.81	2.31	9.00	13.97	109.0	157.0
6"	M	6.0	-	22.00	20.00	-	11.00	10.00	7.25	Note 1	Note 1	CF	3.75	11.00	CF	CF	CF

1. Gear operator is recommended if not actuated.
2. Bronze not available in 6" size, and only BW and Flange ends.

## SP SERIES 5 ACTUATED VALVES

Size	A				B				C				D			
	Double Act.		Spring Ret.		Double Act.		Spring Ret.		Double Act.		Spring Ret.		Double Act.		Spring Ret.	
	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80
1/4"	5.49	5.49	6.38	5.49	2.80	2.80	3.17	2.80	5.37	5.36	5.80	5.36	1.61	1.61	1.77	1.61
3/8"	5.49	5.49	6.38	5.49	2.80	2.80	3.17	2.80	5.37	5.36	5.80	5.36	1.61	1.61	1.77	1.61
1/2"	5.49	5.49	6.38	5.49	2.80	2.80	3.17	3.17	5.37	5.36	5.80	5.36	1.61	1.61	1.77	1.61
3/4"	5.49	5.49	6.38	6.38	2.80	2.80	3.17	3.17	5.51	5.51	5.95	5.95	1.61	1.61	1.77	1.77
1"	5.49	5.49	8.15	8.15	2.80	2.80	3.72	3.72	6.16	6.16	7.25	7.25	1.61	1.61	2.07	2.07
1-1/2"	8.15	6.38	10.69	10.69	3.72	3.17	4.84	4.84	8.55	7.90	9.51	9.51	2.07	1.77	2.68	2.68
2"	8.15	8.15	12.91	10.69	3.72	3.72	4.84	5.39	8.86	8.86	11.00	9.82	2.07	2.07	2.87	2.68
2-1/2"	12.91	12.91	14.41	12.91	5.39	5.39	5.83	5.39	12.66	12.66	13.13	12.66	2.87	2.87	3.15	2.87
3"	12.91	12.91	16.85	14.41	5.39	5.39	6.46	5.83	12.99	12.99	14.35	13.46	2.87	2.87	3.44	3.15
4"	16.85	16.85	20.55	20.55	6.48	6.48	7.36	7.36	16.51	16.51	16.98	16.98	3.44	3.44	3.94	3.94
6"	22.64	22.64	26.46	22.64	8.58	8.58	11.42	8.58	22.59	22.59	26.21	22.59	4.29	4.29	5.71	4.29



# AN SERIES 1, 150# CLASS (BRONZE, ALUMINUM BRONZE, STAINLESS, DUPLEX, AND CARBON)

AN Series seawater valves are 2-piece valves with two flanged end fittings and meet ANSI B16.10 long pattern face to face dimensions. In addition, encapsulated seats facilitate performance in high-velocity applications and support the seats in elevated temperature applications.

## DIMENSIONAL DATA (INCHES)

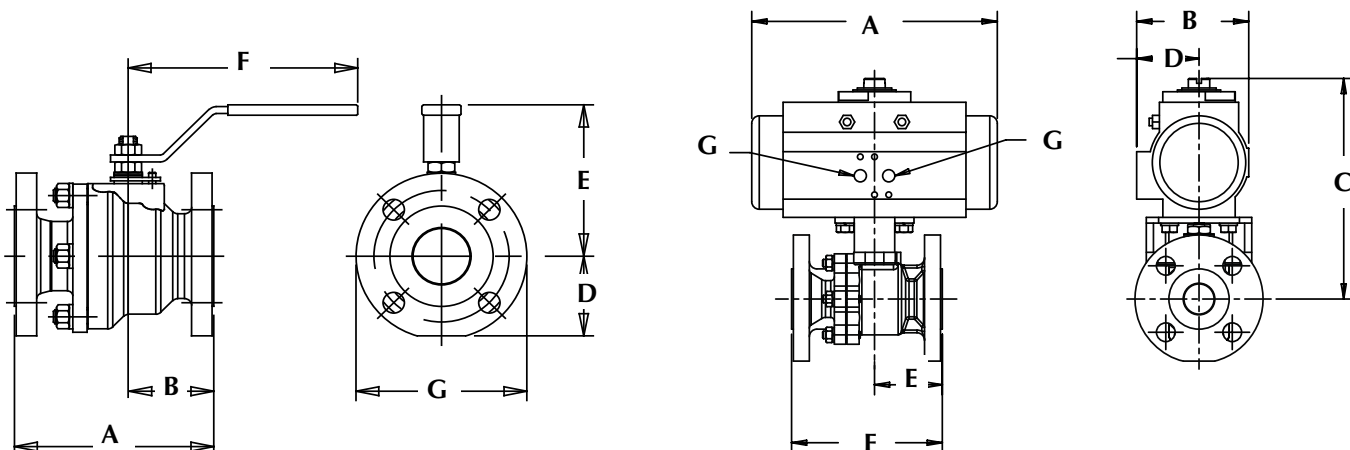
Valve Size	Port Dia.	C	D	E	F	G	H	Approx. Weight
		Overall Length <sup>1</sup>	C <sub>L</sub> to Face End	Handle Length from C <sub>L</sub>	C <sub>L</sub> to top of Handle	C <sub>L</sub> to Bottom of Flange	Flange Diameter	
1/2"	.62	4.25	1.76	6.09	3.07	1.62	3.50	6
3/4"	.81	4.62	1.94	6.09	3.14	1.88	3.88	9
1"	1.00	5.00	2.20	6.09	3.80	2.06	4.25	10
1-1/2"	1.50	6.50	2.78	8.06	5.25	2.38	5.00	20
2"	2.00	7.00	2.99	8.06	5.56	2.88	6.00	24
3"	3.00	8.00	3.62	12.06	7.08	3.75	7.50	92
4"	4.00	9.00	3.84	14.06	7.93	4.50	9.00	118
6"	6.00	15.50	7.35	CF <sup>5</sup>	CF <sup>5</sup>	6.98	11.00	330
8"	8.00	18.00	8.54	CF <sup>5</sup>	CF <sup>5</sup>	8.37	13.50	550
10"	10.00	21.00	12.34	CF <sup>5</sup>	CF <sup>5</sup>	10.15	16.00	680

### NOTES:

- Standard product is 316 Stainless Steel. Carbon Steel, Bronze and other materials are available upon request. Consult PBM.
- Dimensions meet ASME Standard B16.10 long pattern.
- Stainless Steel valves and Carbon Steel valves have raised face flanges, but are also available with flat faced flanges. Bronze valves have flat face flanges only.
- Drawings are for illustration purposes only. Consult PBM prior to any fabrication or installation work.
- A gear operator is recommended for valves 6" and larger. Consult PBM.
- Dimensions are for ANSI 150# Class valves. Consult PBM for 300# Class.

## AN Series 1 Actuated

		TFM™ OR VTFE SEAT MATERIAL								
Size	Actuator	Air Pressure		A	B	C	D	E	F	G
		psig	barg	inches	inches	inches	inches	inches	inches	inches
1" DN 25	Double Acting	60, 80	4.1/5.5	5.00	2.25	4.25	5.49	2.80	6.23	1.61
	Spring Return	60, 80	4.1/5.5	5.00	2.25	4.25	8.15	3.72	7.32	2.07
1-1/2" DN 40	Double Acting	80	5.5	6.50	2.68	5.00	6.38	3.17	7.95	1.77
	Spring Return	60, 80	4.1/5.5	6.50	2.68	5.00	10.69	4.84	9.56	2.68
2" DN 50	Double Acting	60, 80	4.1/5.5	7.00	3.12	6.00	8.15	3.72	8.91	2.07
	Double Acting	60	4.1	7.00	3.12	6.00	8.15	3.72	8.91	2.07
	Spring Return	80	5.5	7.00	3.12	6.00	10.69	4.84	9.86	2.68
3" DN 80	Spring Return	60	4.1	7.00	3.12	6.00	12.91	5.39	11.05	2.87
	Double Acting	60, 80	4.1/5.5	8.00	3.57	7.50	12.91	5.39	12.99	2.87
	Spring Return	80	5.5	8.00	3.57	7.50	14.41	5.83	13.46	3.15
4" DN 100	Spring Return	60	4.1	8.00	3.57	7.50	16.85	6.46	14.35	3.44
	Double Acting	60, 80	4.1/5.5	9.00	3.84	9.00	16.85	6.46	16.51	3.44
	Spring Return	80	5.5	9.00	3.84	9.00	20.55	7.36	16.98	3.94
6" DN 150	Spring Return	60	4.1	9.00	3.84	9.00	22.64	8.58	18.99	4.29
	Double Acting	60, 80	4.1/5.5	15.50	7.33	11.00	22.64	8.58	22.57	4.29
	Spring Return	80	5.5	15.50	7.33	11.00	22.64	8.58	22.57	4.29
	Spring Return	60	4.1	15.50	7.33	11.00	26.46	11.42	26.19	5.71



## AN SERIES 5, (STAINLESS AND CARBON) AND TN SERIES 5 150# CLASS (BRONZE, ALUMINUM BRONZE, STAINLESS, DUPLEX AND CARBON)

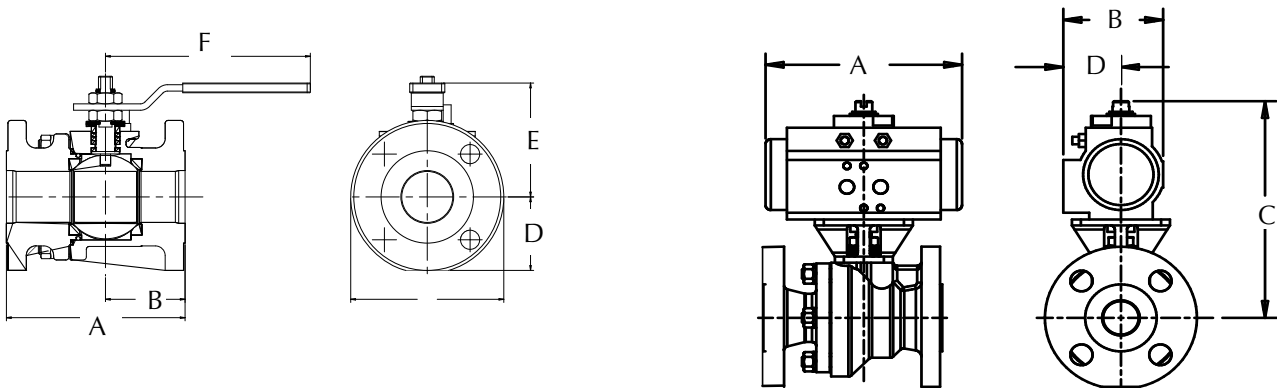
AN Series seawater valves are 2-piece valves with two flanged end fittings and meet ANSI B16.10 long pattern face to face dimensions. In addition, encapsulated seats facilitate performance in high-velocity applications and support the seats in elevated temperature applications. TN adds a trunnion to an AN Series valve.

Size	Port	A	B	D	E	F	G	Approx. Weight Bronze
		Overall Length	$C_L$ to End	$C_L$ to Bottom	$C_L$ to top of handle	Handle Length from $C_L$	Flange Diameter	
1/2"	0.62	4.25	1.84	1.62	3.07	5.09	3.50	6
3/4"	0.81	4.62	2.01	1.88	3.14	5.09	3.88	9
1"	1.00	5.00	2.20	2.06	4.33	6.09	4.25	10
1-1/2"	1.50	6.50	2.78	2.38	5.25	8.68	5.00	20
2"	2.00	7.00	2.99	2.88	5.56	8.68	6.00	24
3"	3.00	8.00	3.62	4.56	7.08	12.44	7.50	92
4"	4.00	9.00	3.84	4.75	7.93	14.44	9.00	118
6"	6.00	15.50	7.35	6.75	N/A	N/A	11.00	330
8"	8.00	18.00	8.54	8.37	N/A	N/A	13.50	550
10"	8.00	21.00	12.34	8.37	N/A	N/A	16.00	680
12"	10.00	24.00	12.00	10.15	N/A	N/A	19.00	1,040

## AN & TN SERIES 5 ACTUATED VALVES

Size	A				B				C				D			
	Double Act.		Spring Ret.		Double Act.		Spring Ret.		Double Act.		Spring Ret.		Double Act.		Spring Ret.	
	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80
1/2"	5.49	5.49	8.15	6.38	2.80	2.80	3.72	3.17	5.83	5.83	6.91	6.26	1.61	1.61	2.07	1.77
3/4"	5.49	5.49	8.15	6.38	2.80	2.80	3.72	3.17	5.94	5.94	7.02	7.02	1.61	1.61	2.07	1.77
1"	5.49	5.49	9.35	8.15	2.80	2.80	4.17	3.72	7.18	7.18	8.72	8.27	1.61	1.61	2.30	2.07
1-1/2"	8.15	8.15	12.91	10.69	3.72	3.72	5.39	4.84	8.42	8.42	10.88	10.56	2.07	1.77	2.87	2.87
2"	8.15	8.15	12.91	10.69	3.72	3.72	5.39	4.84	8.74	8.74	10.88	9.69	2.07	2.07	2.87	2.67
3"	12.91	12.91	16.85	14.41	5.39	5.39	6.46	5.83	13.43	13.43	14.79	13.90	2.87	2.87	3.44	3.15
4"	14.41	12.91	22.64	20.55	6.46	5.39	8.58	7.36	18.92	16.44	22.29	20.28	3.44	3.44	4.29	3.94
6"	20.55	20.55	26.46	22.64	7.36	7.36	11.42	8.58	20.24	20.24	25.87	22.25	3.94	3.94	5.71	4.29
8"	26.46	26.46	CF	26.46	11.42	11.42	CF	11.42	28.12	28.12	CF	28.12	5.71	5.71	CF	5.71
10"	26.46	26.46	CF	26.46	11.42	11.42	CF	12.42	28.12	28.12	CF	28.12	5.71	5.71	CF	5.71
12"	26.46	26.46	CF	26.46	11.42	11.42	CF	13.42	29.94	29.94	CF	29.94	5.71	5.71	CF	5.71

1. Standard product is 316 Stainless Steel. Carbon Steel, Bronze and other materials are available upon request. Consult PBM.
2. Dimensions meet ASME Standard B16.10 long pattern.
3. Stainless Steel valves and Carbon Steel valves have raised face flanges, but are also available with flat faced flanges. Bronze valves have flat face flanges only.
4. Drawings are for illustration purposes only. Consult PBM prior to any fabrication or installation work.
5. A gear operator is recommended for valves 6" and larger. Consult PBM.
6. Dimensions are for ANSI 150# Class valves. Consult PBM for 300# Class.
7. Trunnion mounted (Series TN) available for larger line sizes and pressure classifications. Consult PBM.



## DP SERIES 1 DIMENSIONAL DATA (836 BRONZE)

Diverter Port Valves with Female NPT (Q-), Sil-Braze (S-), Socket weld (U-) and 150# Flanged (L-) End Fittings

### DIMENSIONAL DATA (INCHES)

Valve Size	B Ball Port	C Face-to-Face		D ℄ to End		G ℄ to Bottom or Side		E Handle Length from ℄	F ℄ to Top of Handle	150# Flange Diam.	Approximate Weight	
		Q- S- U-	L-	Q- S- U-	L-	Q- S- U-	L-				Q- S- U-	L-
		1/2"	0.62	3.12	N/A	1.56	N/A				2.50	N/A
3/4"	0.81	3.44	N/A	1.77	N/A	2.50	N/A	5.06	3.03	2.38	2	N/A
1"	1.00	3.90	6.28	1.95	3.14	2.44	3.16	6.06	3.53	4.25	4	10
1-1/2"	1.50	5.36	7.00	2.68	3.50	3.25	3.50	8.06	5.05	5.00	10	23
2"	1.94	5.71	8.40	2.86	4.20	3.25	4.20	8.06	5.42	6.00	15	30
3"	2.75	8.62	11.87	4.31	5.93	5.12	6.00	12.06	6.71	7.50	49	79
4"	3.50	N/A	12.91	N/A	6.45	N/A	6.44	12.06	7.21	9.00	79	120

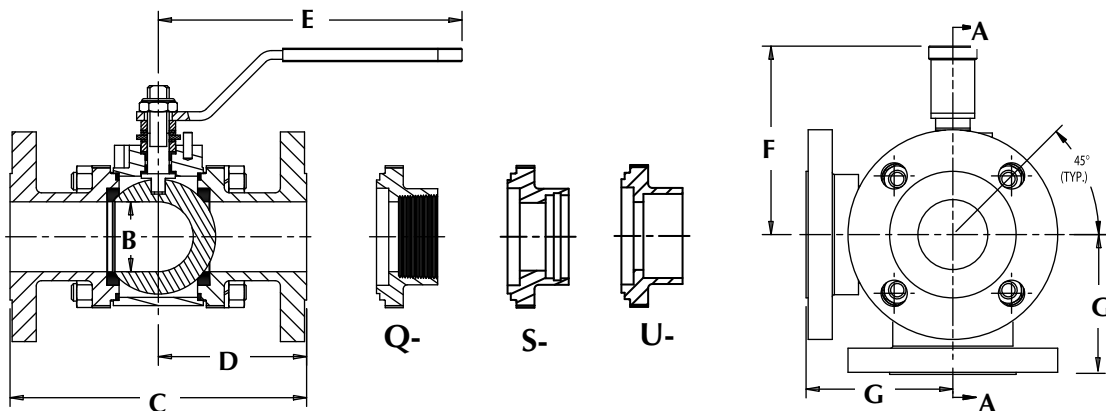
## MP SERIES 1 DIMENSIONAL DATA (836 BRONZE)

Multi-Port Valves with Female NPT (Q-), Sil-Braze (S-), Socket weld (U-) and 150# Flanged (L-) End Fittings

Size	B Ball Port	C Face-to-Face		D, G ℄ to Face		E Handle Length from ℄	F ℄ to Top of Handle	Approximate Weight	
		Q- S- U-	L-	Q- S- U-	L-			Q- S- U-	L-
		1/2"	0.62	4.00	N/A			2.00	N/A
3/4"	0.81	4.00	N/A	2.00	N/A	6.09	3.83	8	N/A
1"	1.00	4.72	N/A	2.36	N/A	8.06	4.99	12	N/A
1-1/2"	1.50	6.56	10.56	3.28	5.28	12.44	5.61	28	46
2"	1.94	7.76	11.94	3.88	5.97	12.44	6.05	40	64
3"	2.75	11.06	14.56	5.53	7.28	12.44	7.01	65	105
4"	3.50	N/A	17.00	N/A	8.50	14.06	8.75	N/A	220

### NOTES:

1. Male NPT, Solder Joint, Camlock and Grooved end fittings are also available.
2. Other flanged end fittings are available upon request.
3. 1/2" through 1" valves have 3 bolts, 3/4" valves have 4 bolts, 1-1/4" through 2" valves have 4 bolts, 3" through 4" valves have 8 bolts.
4. Flange holes straddle the centerline except for Series 1, 1-1/2" size.
5. Drawings are for illustration purposes only. Consult PBM prior to any fabrication or installation work.
6. Using a welded connection on the common port of a DP or MP valve may complicate maintenance. Provisions must be made to allow removal of end fittings and body from the line.



# DP & DD SERIES 5 DIMENSIONAL DATA

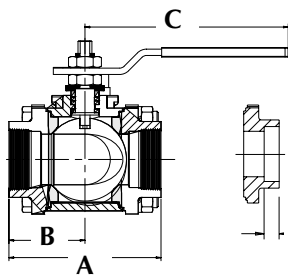
DIVERTER PORT VALVES WITH FEMALE NPT (Q-), SOCKET WELD FOR PIPE (U-), SIL-BRAZE (S-), AND 150# FLANGED (L-) END FITTINGS

Size	A			B			C	D	E			G		
	Face-to-Face			℄ to Face			Handle Length from ℄	℄ to Top of Handle	℄ to Bottom Entry			End Fitting		
	Q-U-	B-D-	L-	Q-U-	B-D-	L-			Q-U-	B-D-	L-Dia.	U-	B-D-	L-Dia.
1/4"	3.12	5.50		1.56	2.75		4.15	2.63	1.56	2.75		0.41	1.50	
3/8"	3.12	5.50		1.56	2.75		4.15	2.63	1.56	2.75		0.41	1.50	
1/2"	3.12	5.50	5.50	1.56	2.75	2.75	4.15	2.63	1.56	2.75	2.80	0.41	1.50	3.50
3/4"	3.44	5.50	5.75	1.72	2.75	2.88	4.15	2.78	1.72	2.75	2.88	0.53	1.50	3.88
1"	4.25	5.99	6.50	2.13	3.00	3.25	5.09	3.03	2.13	3.00	3.25	0.53	1.50	4.25
1-1/2"	5.50	7.50	8.00	2.75	3.75	4.00	8.68	4.10	2.75	3.75	4.00	0.53	2.01	5.00
2"	6.00	8.00	9.75	3.00	4.00	4.88	8.68	4.41	3.00	4.00	4.88	0.66	1.90	6.00
2-1/2"	8.00	11.50	11.50	4.00	5.75	5.75	12.44	6.45	4.00	5.75	5.75	0.69	3.04	7.00
3"	9.00	13.50	12.75	4.50	6.75	6.38	12.44	6.78	4.5	6.75	6.38	0.69	3.65	7.50
4"	12.00	16.00	15.00	6.00	8.00	7.50	24.40	7.34	6.00	8.00	7.50	0.81	3.85	9.00
6"	-	22.00	20.00	-	11.00	10.00	-	-	9.00	11.00	10.00	-	5.26	11.00

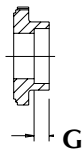
## DP & DD SERIES 5 ACTUATED VALVES

Size	A				B				C				D			
	Double Act.		Spring Ret		Double Act.		Spring Ret		Double Act.		Spring Ret		Double Act.		Spring Ret.	
	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80
1/4"	5.49	5.49	6.38	5.49	2.80	2.80	3.17	2.80	5.36	5.36	5.80	5.36	1.61	1.61	1.77	1.61
3/8"	5.49	5.49	6.38	5.49	2.80	2.80	3.17	2.80	5.36	5.36	5.80	5.36	1.61	1.61	1.77	1.61
1/2"	5.49	5.49	6.38	5.49	2.80	2.80	3.17	2.80	5.36	5.36	5.80	5.36	1.61	1.61	1.77	1.61
3/4"	5.49	5.49	6.38	6.38	2.80	2.80	3.17	3.17	5.51	5.51	5.95	5.95	1.61	1.61	1.77	1.77
1"	5.49	5.49	8.15	8.15	2.80	2.80	3.72	3.72	6.16	6.16	7.25	7.25	1.61	1.61	2.07	2.07
1-1/2"	8.15	6.38	10.69	10.69	3.72	3.17	4.84	4.84	8.55	7.90	9.51	9.51	2.07	1.77	2.68	2.68
2"	8.15	8.15	12.91	10.69	3.72	3.72	5.39	4.84	8.86	8.86	11.00	9.82	2.07	2.07	2.87	2.68
3"	12.91	12.91	16.85	14.41	5.39	5.39	6.46	5.83	12.99	12.99	14.35	13.46	2.87	2.87	3.44	3.15
4"	16.85	16.85	20.55	20.55	6.46	6.46	7.36	7.36	16.51	16.51	16.98	16.98	3.44	3.44	3.94	3.94
6"	22.64	22.64	26.46	22.64	8.58	8.58	11.42	8.58	22.59	22.59	36.21	22.59	4.29	4.29	5.71	4.29

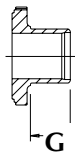
- Notes:
1. Gear operator is recommended for 6" valve.
  2. Other end fittings including flanged end fittings are also available upon special request.
  3. 1/2" - 3" size valves have 4 bolts. 4" and 6" sizes have 8 bolts.
  4. Drawings are for illustration purposes only.
  5. Using a welded connection on the common port of a DP valve may complicate maintenance. Provisions must be made to allow removal of end fittings and body from the line. PBM recommends Female NPT (Q-) or flanged end fittings for common port connection for ease of valve maintenance.



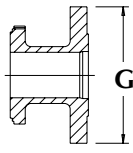
Female NPT  
Q-



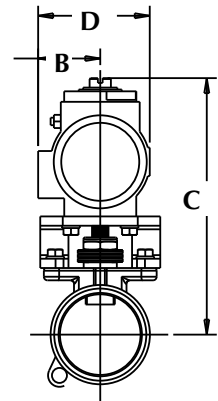
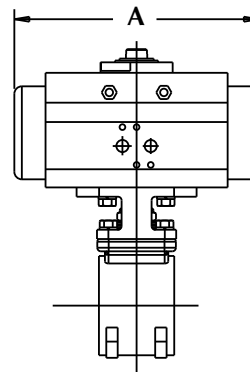
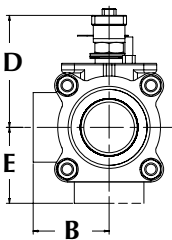
Socket Weld  
U-



Butt Weld  
B-D-



150#  
Flange  
L-



# CV AND TORQUE CHARTS

## AN SERIES 1 VALVE CHART

Valve Size (inches)	C <sub>v</sub> (gpm)		Stem Torque (in lbs.)		100°F Working Pressure	
	Full Port	Reduced Port	Full Port	Reduced Port	955 Bronze Class 150 (psig)	Carbon Steel Class 150 (psig)
1/2"	31	N/A	40	N/A	200	285
3/4"	52	N/A	50	N/A	200	285
1"	80	N/A	72	N/A	200	285
1-1/2"	190	N/A	168	N/A	200	285
2"	400	N/A	192	N/A	200	285
3"	1,100	370	420	192	200	285
4"	2,400	700	780	420	200	285
6"	5,600	760	2,400	780	200	285
8"	10,000	5,600	7,200	2,400	200	285
10"	16,500	10,000	12,000	7,200	200	285

## SP, SD, DP, DD SERIES 5 CHART

Valve Size (inches)	C <sub>v</sub> (gpm)	Stem Torque (in-lbs.)	100°F Working Pressure	
			922 Bronze Non-Flanged (psig)	Carbon Steel Non-Flanged (psig)
1/4"	5	32	600	900
3/8"	10	32	600	900
1/2"	12	32	600	900
3/4"	42	40	600	900
1"	73	58	600	900
1-1/2"	170	154	600	900
2"	360	182	600	740
2-1/2"	650	288	600	740
3"	935	430	600	740
4"	1,900	787	600	740
6"	4,800	1,920	N/A	740

## SP, DP SERIES 1 CHART

Valve Size (inches)	C <sub>v</sub> (gpm)				Stem Torque (in lbs.)	100°F Working Pressure
	Full Port, SP only	DP Series L-Port	DP Series T-Port			836 Bronze Class 150
			Straight	Branch		
1/2"	18	12	14	8.7	48	300
3/4"	35	21	25	16	60	300
1"	53	33	39	24	72	300
1-1/2"	120	79	93	58	168	300
2"	200	149	180	110	192	300
2-1/2"	330	N/A	N/A	N/A	300	300
3"	400	290	345	210	420	300
4"	650	460	540	340	540	300

## MP SERIES 1 CHART

Valve Size (inches)	C <sub>v</sub> (gpm)			Stem Torque (in-lbs.)	100°F Working Pressure
	Straight Thru Cv	Side Cv	LL Port Cv		836 Bronze Non-Flanged (psig)
1/2"	16	10	8	96	300
3/4"	16	10	8	96	300
1"	45	25	22	240	300
1-1/2"	100	56	46	480	300
2"	180	100	78	540	300
3"	228	127	90	720	300
4"	405	225	175	1,020	300

NOTES:

1. AN Series Working Pressure and Seat Ratings are for 150# valves. For 300# valves, consult PBM.
2. Actuator Sizing Torque is twice the Breakaway Torque.
3. If valve has not been factory actuated by PBM, additional margin may be needed due to service conditions.

## AN, TN SERIES VALVES

Valve Size (inches)	C <sub>v</sub> (gpm)		Breakaway Torque (in lbs.)		100°F Working Pressure	
	Full Port	Reduced Port	Full Port	Reduced Port	955 Bronze Class 150 (psig)	Carbon Steel Class 150 (psig)
1/2"	31	N/A	40	N/A	200	285
3/4"	52	N/A	50	N/A	200	285
1"	80	N/A	72	N/A	200	285
1-1/2"	190	N/A	168	N/A	200	285
2"	400	N/A	192	N/A	200	285
3"	1,100	N/A	420	N/A	200	285
4"	2,400	N/A	780	N/A	200	285
6"	5,600	N/A	2,400	N/A	200	285
8"	10,000	1,800	7,200	2,400	200	285
10"	N/A	3,600	N/A	7,200	200	285
12"	N/A	6,200	N/A	8,400	200	285

## TESTING

Testing procedures and acceptance criteria are in accordance with MSS SP-72 for bronze valves and ASTM B16.34 and MSS-61 for other materials.

## CERTIFICATION

PBM valves, when specified, meet USCG Category A shutoff. Certifications of compliance and material certifications are available when requested at the time of order entry. PBM Marine and Seawater Ball Valves are also ABS (American Bureau of Shipbuilding) type approved for SP Series 1 and 5, AN Series 1.

# FLOW PATTERNS AND TECHNICAL DATA

By specifying a T-Port, Double T-Port, Angle Port (L) or Double Angle Port (LL) Ball, different flow configurations are possible.

For example, a DP valve with an Angle Port Ball might be used to control flow to one or two simultaneous operations. The side entry Angle Port Ball and the bottom entry Double Angle Port Ball are ideal for connecting two relief valves to a system. The Double Angle Port Ball diverts flow from one outlet to another outlet 180° away, with only 90° stem rotation. This allows use of 90° double acting or spring return actuation, instead of 180°.

The flow diagrams depicted below are a birds-eye-view - as though you are looking down on the stem. White areas indicate the path available for process flow. Shaded areas indicate unused ports for a given flow position.

For more information on PBM's flow patterns, please see our Industrial, Sanitary Brochures or visit us on the web!  
[www.pbmvalve.com](http://www.pbmvalve.com)

Code (#)	DP • 3-way • SIDE ENTRY				DP • 3-way • BOTTOM ENTRY				
	03	04	06	10	14	15	16	17	18
Port Style	T-90°	T-90°	T-180°	L-90°	L-360°	L-180°	T-90°	TT-180°	LL-90°
Position A									
Position B									
Position C									
Position D									

Code (#)	MP • 3-way • SIDE ENTRY												
	01	02	03	04	05	06	07	08	09	10	11	12	13
Port Style	T-90°	T-90°	T-90°	T-90°	T-180°	T-180°	T-180°	T-180°	T-360°	L-90°	L-180°	L-180°	L-360°
Position A													
Position B													
Position C													
Position D													

Code (#)	MP • 3-way • BOTTOM ENTRY					
	14	15	16	17	18	19
Port Style	L-360°	L-180°	T-90°	TT-180°	LL-90°	L-90°
Position A						
Position B						
Position C						
Position D						

Code (#)	MP • 4-way • BOTTOM ENTRY												
	20	21	22	23	24	25	26	27	28	29	30	31	32
Port Style	LL-90°	LL-180°	LL-180°	LL-180°	LL-180°	LL-360°	L-360°	T-90°	TT-180°	TT-180°	TT-180°	TT-180°	TT-360°
Position A													
Position B													
Position C													
Position D													

Code (#)	MP • 4-way • BOTTOM ENTRY				MP • 4-way • SIDE ENTRY							
	33	34	35	36	37	38	39	40	41	42	43	
Port Style	TT-90°	TT-90°	TT-90°	TT-90°	LL-90°	L-180°	L-360°	T-180°	-90°	T-90°	T-90°	
Position A												
Position B												
Position C												
Position D												

Code (#)	MULTI-PORT • 5-way • BOTTOM ENTRY							
	44	45	46	47	48	49	50	51
Port Style	L-360°	LL-180°	T-90°	TT-90°	TT-90°	TT-180°	TT-360°	LL-360°
Position A								
Position B								
Position C								
Position D								

## BODY, BALL, AND END FITTINGS

FOR OTHER MATERIALS, CONSULT PBM

### BRONZE, ALLOY NO. 922, B61

This material is referred to as Valve, Steam, or Naval Bronze. Alloy 922 (88-6-1.5-4.5) is 88% copper, 6% tin, 1.5% lead, and 4.5% zinc. Alloy 922 falls in the "Tin Bronzes" group. Typical end uses include valves, fittings, and pressure containing parts for use at elevated temperatures.

### MONEL® 400

Monel 400 is used as a shaft (stem) and optional ball material. Monel 400 is 63-70% nickel, 25.5-32.5% copper, 2.5% iron, and 2% manganese. Stem and balls are machined from B164 (bar-stock) alloy N04400. Larger diameter balls are cast from A494 alloy M35-1.

### ALUMINUM BRONZE, ALLOY NO. 955, B148

Alloy 955 (89-1-10) is 81% copper, 4% iron, 11% aluminum and 4% nickel. Alloy 955 is the ideal choice for valve bodies, fittings, and balls used in a seawater environment due to its corrosion resistance in salt water, relatively high tensile and yield strengths, and lower density (lighter weight).

### 316 STAINLESS STEEL

This metal is exceptionally corrosion-resistant to acidic and basic environments. Cast material is made to A351, CF8M and wrought material is made to A479 and S31600.

## BODY, BALL AND END FITTING ALLOY

ALLOY	TENSILE (ksi)	YIELD (ksi)	DENSITY (lb.cu.in)
922 Bronze	34.0	16.0	0.312
953 Al. Bronze	65.0	25.0	0.272
90/10 Copper Nickel	60.0	57.0	0.323
955 Nickel-Al. Bronze	90.0	40.0	0.272
316 SS	75.0	30.0	0.289
Carbon Steel	70-95	36.0	0.280
Hastelloy C	115.0	52.0	0.321
Duplex 2205	90.0	60.0	0.285
836 Bronze	30.0	14.0	0.318

## BODY BOLTS

### 304 STAINLESS STEEL

Alloy 304, A193 grade B8, class 1 bolts/studs and A194, grade 8 nuts. PBM does not recommend the use of stainless steel in a salt-water environment. Stainless is subject to pitting and stress corrosion cracking when in contact with seawater. Alloy 304 is 18-20% chromium, 8-10% nickel, and a balance of iron and trace elements.

### MONEL®

Monel bolts (F468) are alloy N.400 or N.405 nickel copper, and nuts (F467) are alloy N04400 or N04405 nickel copper. Composition is 63-70% nickel, 25.5-32.5% copper, 2.5% iron, and 2% manganese.

### COPPER SILICON BRONZE

Copper Silicon Bronze is supplied to alloy numbers Cu651 and Cu655. Alloy number Cu655 is 94.8% copper, 0.8% iron, 1.5% manganese, 0.6% nickel, 2.8-3.8% silicon, 1.5% zinc, and 0.05% lead. Alloy number Cu651 is 96% copper, 0.8% iron, 0.7% manganese, 0.8-2% silicon, 1.5% zinc, and 0.05% lead. Bolts and studs are made to specification F468 for non-ferrous bolts. Nuts are made to specification F467.

### CARBON STEEL

This versatile material efficiently handles mildly-corrosive media. Cast material is made to A216, WCB and wrought material is made to A105.

### DUPLEX 2205

Duplex 2205 is an austenitic/martensitic stainless steel with about 22% chromium, 6% nickel, 3% molybdenum, and 0.16% nitrogen. The nitrogen serves to significantly improve the corrosion resistance of the alloy and to make the alloy very resistant to chloride stress corrosion cracking. Hence its ideal suitability for marine service. Cast parts are made from CD3MN and wrought parts are made from S31803.

### BRONZE, ALLOY NO. 836, B62

This material is the ideal choice for all general-purpose (mildly corrosive) applications. It is versatile and well suited for steam, air, fresh water, seawater, oil, and gas lines. 836 bronze is specified to MSS SP-72. Alloy 836 (85-5-5-5) is 85% copper, 5% tin, 5% lead, and 5% zinc. This alloy falls in the "Red and Semi-Red Brasses" group.

### ALUMINUM BRONZE, ALLOY NO. 953

Alloy 953 (89-1-10) is 89% copper, 1% iron, and 10% aluminum. Typical end uses include pickling baskets, nuts, gears, steel mill slippers, and marine equipment. Alloy 953 is the ideal choice for valve bodies, fittings, and balls used in a seawater environment due to its corrosion resistance in salt water, relatively high tensile and yield strengths, and lower density (lighter weight).

### 90/10 COPPER NICKEL

90/10 Copper Nickel, Copper Alloy C70600, is an ideal material for valve end connections in copper piping systems. 90/10 copper nickel is also an ideal material for salt water piping and ferrules.

## BODY BOLT ALLOY COMPARISON

BOLT/STUD MATERIAL	ALLOY NUMBER	TENSILE (ksi)	YIELD (ksi)
304 Stainless Steel	B8	75*	30*
Copper Silicon Bronze	Cu651 Cu655	70-100 50-80	55 20
Monel	N.400 N.405	80-130 70-125	40 30

## SOFT MATERIALS

**TFM™** - TFM is Chemically Modified PTFE. It is standard on Series 5.

**RTFE** - RTFE is Polytetrafluoroethylene reinforced with glass fibers, commonly referred to as "glass filled Teflon". It is standard on Series 1.

**S-TEF®** - Stainless Steel Reinforced Polytetrafluoroethylene.

**UHMWPE** - UHMWPE is Ultra High Molecular Weight Polyethylene.

**EPR** - EPR is Ethylene Propylene Rubber, used for O-rings when used to seal the body and the end fitting in water and salt-water applications.

### VITON

Viton is recommended for O-rings when hydrocarbons or other organics are present in the fluid. Viton material is also available when EPR is not suitable for the application (example: hydrocarbons present in fluid).



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 to find the PBM domestic or international representative near you.

## SP, DP, MP, AN, & TN SERIES ORDERING INFORMATION — STANDARD

PRODUCT	MATERIAL	SIZE	SERIES	END FITTINGS	SEAT & SEAL/ FILLER/O-RING	DP FLOW PATTERN	BALL/STEM	OPERATOR
SP Two-Way	B 836 Bronze	C 1/2"	1	L 150# Flange	G TFM™/None/Viton	01*	B 4" stem ext.	-- lever handle
SD Two-Way steam	C Hastelloy® C-276	D 3/4"	(836 Bronze only)	M 300# Flange	V RTFE/None/EPR	02*	F internal and external ground	02 no handle, with actuator prep
DP Three-Way	E Carbon Steel	E 1"		P Male NPT	Z TFM/None/EPR	03	G 17-4 PH stem	04 with locking handle
DD Three-Way steam	H 316 Stainless	F 1-1/4"		PQ Male X Female NPT	A RTFE/None/Viton	04	I Monel® ball	05 with stainless oval handwheel
MP Three-Way	M Monel®	G 1-1/2"	5	Q Female NPT	B RTFE/VTFE/Viton	05*	J 932 bronze ball	08 with gear operator
	N 922 Bronze	H 2"	6*	R Sil Braze	H S/TEF®/None/Viton	06	K Monel stem, followers	13 NEMA 4 Electric Actuator (120 vac)
	S 953 Alum Brz	J 2-1/2"	API 607 Rev. 4 Fire Safe	S Sil Braze (1) Groove	I S/TEF/VTFE/Viton	07*	L Monel ball, stem, and followers	14 NEMA 7 Electric Actuator (120 vac)
	R 955 Alum Brz	K 3"	(836 Bronze only)	T Solder Joint	J TFM/VTFE/Viton	08*	M Aluminum ball	18 4" ext. locking level handle
	B 836 Bronze	L 4"		U Socket Weld	K UHMWPE/None/Viton	09*	N 922 bronze ball	20 D/A Actuator 80 psi
	9 954 Alum Brz	M 6"			L UHMWPE/VTFE/Viton	10	O Hastelloy® C-276 ball	27 D/A Actuator 60 psi
	22 Duplex 2205				0 S/TEF/None/EPR	11*	P C-276 ball, stem, and followers	34 S/R Actuator 80 psi
					3 UHMWPE/None/EPR	12*	Q 922 ball & monel stem	41 S/R Actuator 60 psi
						13*	R Monel stem, followers and bolting	
						14	S Monel ball, stem, followers and bolting	
						15	T 922 ball, monel stem & followers, sil-bronze bolting	
						16	U 922 ball, monel stem & followers	
						17		
						18		
						19*		
						*MP valves only.		
AN ANSI Two-Way	B 836 Bronze	C 1/2"	1	* Add a "3" after End Fitting	Cavity-fillers and other seal materials are available, consult PBM.			Other options are available. For more detailed automation info and dimensional data, please visit <a href="http://www.pbmvalve.com">www.pbmvalve.com</a> .
TN ANSI Trunnion Mounted	C Hastelloy® C-276	D 3/4"	3**	Adjust-O-Seal®.				
	E Carbon Steel	E 1"	API 607 Rev. 4 Fire Safe					
	H 316 Stainless	G 1-1/2"						
	M Monel®	H 2"						
	R 955 Nickle Alum Bronze	K 3"						
	S 953 Alum Brz	L 4"						
	T Gr 5 Titanium	M 6"						
	Y Hastelloy® C-22	N 8"						
		P 10"						

NOTES:

- SP valves with 150# flanges are 3-piece valves that do not meet ANSI face to face dimensions. Use AN Series flanged valves if ANSI face to face dimensions are required.
- Standard ball material is 316/316L stainless steel. Standard stem material is 316/316L stainless steel.
- Standard O-ring material is EPDM\* or Viton.
- Standard hardware material is 18/8 stainless steel\*.

\*\* Fire Rated for Stainless, Carbon, and Hastelloy® C-276 only.



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