



Marine & Offshore Valves

- *Ballast*
- *Bilge*
- *Fire Protection Systems*
- *Flare Gas Systems*
- *Injection Water*
- *Instrument Isolation*
- *Pump Skids*
- *Sea-Chest*
- *Utility Seawater*
- *Water Flood*



Marine and Offshore Valves

PBM ball valves are designed, tested and manufactured in the United States for long service life under arduous conditions and available in a wide choice of materials to meet the most aggressive marine corrosion environments.

- Bilge, Ballast Systems, Fire Protection Systems
- Fuel, Flare Gas, Mud Transfer, Critical Utility and Process Systems for offshore vessels, platforms and FPSOs
- Liquid Natural Gas (LNG) Processing Storage and Transfer, Platform, Tankers
- Specialized Vessels and Terminal Facilities

- Pressures up to 2500# Class (6000 psi)*
- Temperatures: From -320° (-200°C) to 800°F (427°C)*
- Sizes: 1/2" - 12"*
- Materials:

Non-Ferrous:

Bronze; 836, 922

955 NiAl-Bronze, 953 Al-Bronze

70/30 and 90/10 CuNi

(Bronze and Copper Nickel valve testing and acceptance criteria IAW MSS-72)

Ferrous:

Stainless Steels: 304, 316, 316L, 317, etc.

Duplex and Super Duplex Alloys

(ASTM B16.34 and MSS-61 and others as required)

High Performance Alloys:

Monel, Hastelloy, Alloy 20, etc.

- API 622 Low E Packing

APPROVALS:*

- USCG Category A*
- ABS Type Approval
- SIL 3 Capable
- API 6D (certification per order)
- EU Pressure Equipment Directive (PED) pending
- NACE - MR 0175
- ISO 9001
- CE
- API 607 Fire Tested Design
- CRN Registrations

*Vary based on product category and size.



CP & CN Series
Cryogenic and LNG Valves



AN Series
ANSI Valve



SP Series
3-Piece Bronze Valve



TN Series
ANSI Trunion

PBM's CRYOGENIC AND LNG VALVES ARE DESIGNED FOR LIQUEFIED NATURAL GAS PRODUCTION, PURIFICATION, TRANSPORTATION AND STORAGE.

SAFETY is #1.

PBM's Cryogenic Valves are designed to B16.34, tested to API 607 Rev. 6 and meet seat leakage criteria of MSS SP-134.

- Sizes 1/2" – 4"
- Temperatures from 400°F, 205°C down to -320°F, -200°C
- Pressures to ANSI Class 300# (720 psi)
- TFM™ Seats/graphite seals
- Optional Low-e Packing (Cannot be lox cleaned)
- Cleaned for oxygen service
- Manual Locking lever handle, or optional oval locking hand wheel with quarter turn operation
- Custom engineered pneumatic, electric and hydraulic automation and control packages.



PBM Cryogenic Ball Valves meet MSS SP-134 at 1/2 the leakage rate of BS 6364-1984 - See comparison.

Cryogenic Allowable Leakage Rate Comparison

NPS	DN	Allowable He scc/min	
		MSS-SP134-2010	BS 6364-1984
1/4	8	18.75	48
3/8	10	28.125	60
1/2	15	37.5	90
3/4	20	56.25	120
1	25	75	150
1-1/4	32	93.75	192
1-1/2	40	112.5	240
2	50	150	300
2-1/2	65	187.5	390
3	80	225	480
4	100	300	600

VENTED BALL

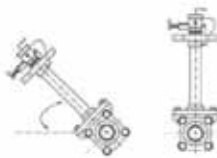
PBM Cryogenic balls are designed for a tight seal and undergo rigorous thermal cycle testing. Upstream vented balls are "keyed" to the stem ensuring error free installation and maintenance.



Open



Closed

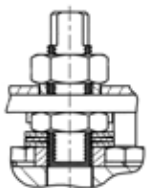


VALVE ORIENTATION

PBM's Cryogenic Valves are optimally oriented with the stem 90° from the horizontal plane. The valves are capable of operating with the stem oriented as low as 45° above the horizontal plane.

THERMAL EXPANSION

PBM's Cryogenic Valves are designed to seal consistently throughout thermal cycles. No disassembly is required for socket weld and butt weld end valves. Laser etched high pressure to low pressure flow direction.



LIVE LOADED STEM PACKINGS

Robust live loaded stem packing ensures reliable positive seal engagement throughout operating the thermal cycle and pressure range.



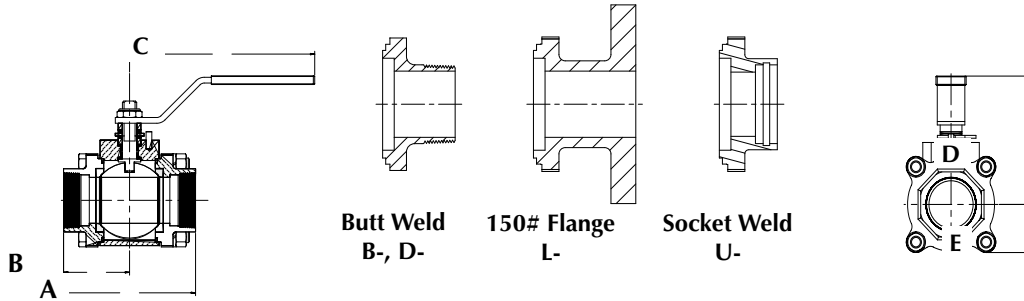
FIRE TESTED TO API-607 REV. 6

Marine and Offshore Valves

SP SERIES 1 MANUAL VALVES (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.

Size	Port Diameter	A						B				C		D		E				Approx. Wgt.			
		Face to Face						CL to Face				Handle Length from CL	CL to Top of Handle	CL to Bottom				Approx. Wgt.					
		Q- S- U-		L-		Q- S- U-		L-		Q- S- U-	L-			Q- S- U-	L-	Q- S- U-	L-	Q- S- U-	L-				
		inch	mm	inch	mm	inch	mm	inch	mm											inches	mm	inch	mm
1/4"	DN8	0.62	16	3.12	79	-	-	1.56	40	-	-	6.09	155	3.03	77	1.34	34	-	-	2	0.9	-	-
1/2"	DN15	0.62	16	3.12	79	5.38	137	1.56	40	2.69	68	6.09	155	3.03	77	1.34	34	1.81	46	2	0.9	5	2.3
3/4"	DN20	0.81	21	3.45	88	5.75	146	1.72	44	2.88	73	6.09	155	3.15	80	1.47	37	1.88	48	3	1.4	6	2.7
1"	DN25	1.00	25	3.90	99	6.30	160	1.95	50	3.15	80	8.69	221	3.53	90	1.69	43	2.13	54	4	1.8	9	4.1
1-1/4"	DN32	1.25	32	4.54	115	7.26	184	2.27	58	3.63	92	8.69	221	4.90	124	1.57	40	2.31	59	8	3.6	15	6.8
1-1/2"	DN40	1.50	38	5.36	136	6.98	177	2.68	68	3.49	89	8.69	221	5.08	129	1.71	43	2.50	64	10	4.5	17	7.7
2"	DN50	2.00	51	5.75	146	8.43	214	2.87	73	4.21	107	8.69	221	5.45	138	2.03	52	3.00	76	13	5.9	25	11.3
2-1/2"	DN65	2.50	64	8.36	212	10.86	276	4.18	106	5.42	138	12.44	316	5.50	140	2.81	71	3.50	89	33	15.0	52	23.6
3"	DN80	2.75	70	8.62	219	12.04	306	4.31	109	6.02	153	12.44	316	6.82	173	3.88	99	3.88	99	49	22.2	77	34.9
4"	DN100	3.50	89	10.46	266	12.90	328	5.23	133	6.45	164	12.44	316	7.32	186	4.50	114	4.50	114	84	38.1	115	52.2

- 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 center line except for the SP Series 1, 1-1/2" valves.



BRONZE 2-WAY SP SERIES VALVE COMPARISON

		VALVE WEIGHT								FACE-TO-FACE DIMENSIONS							
		SERIES 1				SERIES 5				SERIES 1				SERIES 5			
Std Body/End Material		836 Bronze (B62, C83600)				922 Bronze (B61, C92200)				836 Bronze (B62, C83600)				922 Bronze (B61, C92200)			
Std. Trim Material		316 Stainless Steel				316 Stainless Steel				316 Stainless Steel				316 Stainless Steel			
Standard Seat/Seal Material		RTFE (Glass Filled Teflon)				TFM™				RTFE (Glass Filled Teflon)				TFM™			
Swing Out Design		No				Yes				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")				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				Standard except 1-1/4"				Standard			
End Connections		FNPT, Sil-Braze, SW, Solder Joint		150# F.F. Flange		FNPT, Sil-Braze, SW, Solder Joint		150# F.F. Flange		FNPT, Sil-Braze, SW, Solder Joint		150# F.F. Flange		FNPT, Sil-Braze, SW, Solder Joint		150# F.F. Flange	
Size		lb	kg	lb	kg	lb	kg	lb	kg	in	mm	in	mm	in	mm	in	mm
1/2"	DN15	2	0.9	5.0	2.3	2	0.9	4	1.8	3.12	79	5.38	137	3.12	79	5.50	140
3/4"	DN20	3	1.4	6.4	2.9	2	0.9	6	2.7	3.45	88	5.75	146	3.45	88	5.75	146
1"	DN25	4	1.8	8.6	3.9	5	2.3	9	4.1	3.90	99	6.30	160	4.25	108	6.50	165
1 1/4"	DN32	8	3.6	14.5	6.6	-	-	-	-	4.54	115	7.26	184	-	-	-	-
1 1/2"	DN40	9.5	4.3	17	7.7	11	5.0	17	7.7	5.36	136	6.98	177	5.50	140	8.00	203
2"	DN50	13	5.9	25	11.3	17	7.7	26	11.8	5.75	146	8.43	214	6.00	152	9.75	248
2 1/2"	DN65	33	15.0	52	23.6	37	16.8	53	24.0	8.36	212	10.86	276	8.00	203	11.50	292
3"	DN80	49	22.2	77	34.9	50**	22.7	64**	29.0	8.62	219	12.04	306	9.00	229	12.75	324
4"	DN100	84	38.1	115	52.2	133**	60.3	143**	64.9	10.46	266	12.90	328	12.00	305	15.00	381

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

AN SERIES 1 MANUAL VALVES, 150# CLASS (BRONZE, ALUMINUM BRONZE)

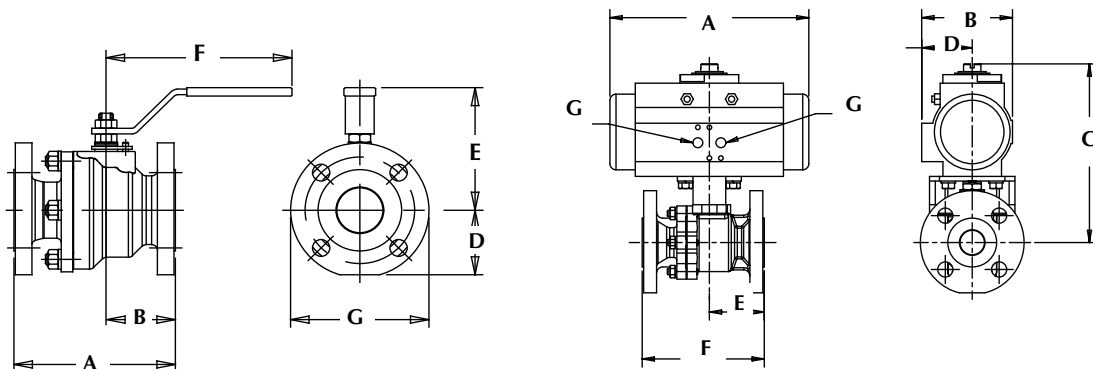
AN Series seawater valves are 2-piece valves with two flanged end fittings and meet ANSI B16.10 long pattern face to face dimensions. In addition, encapsulated seats facilitate performance in high-velocity applications and support the seats in elevated temperature applications.

Valve Size		Port Diameter		A		B		D		E		F		G		Approx. Weight	
				Overall Length ¹		C _L to Face End		C _L to Bottom of Flange		C _L to top of Handle		Handle Length from C _L		Flange Diameter		lb	kg
		inch	mm	inch	mm	inch	mm	inches	mm	inch	mm	inch	mm	inch	mm		
1/2	DN15	.62	16	4.25	108	1.76	45	1.62	41	3.07	78	6.09	155	3.50	89	6	2.7
3/4	DN20	.81	21	4.62	117	1.94	49	1.88	48	3.14	80	6.09	155	3.88	99	9	4.1
1	DN25	1.00	25	5.00	127	2.20	56	2.06	52	3.80	97	6.09	155	4.25	108	10	4.5
1-1/2	DN40	1.50	38	6.50	165	2.78	71	2.38	60	5.25	133	8.06	205	5.00	127	20	9.1
2	DN50	2.00	51	7.00	178	2.99	76	2.88	73	5.56	141	8.06	205	6.00	152	24	10.9
3	DN80	3.00	76	8.00	203	3.62	92	3.75	95	7.08	180	12.06	306	7.50	191	92	41.7
4	DN100	4.00	102	9.00	229	3.84	98	4.50	114	7.93	201	14.06	357	9.00	229	118	53.5
6	DN150	6.00	152	15.50	394	7.35	187	6.98	177	CF ⁵	CF ⁵	CF ⁵	CF ⁵	11.00	279	330	149.7

NOTES:

1. Bronze and other materials are available upon request. Consult PBM.
2. Dimensions meet ASME Standard B16.10 long pattern.
3. 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.

AN Series 1 Actuated Valves



Marine and Offshore Valves

AN SERIES 5, 6 MANUAL VALVES 150# (STAINLESS AND CARBON) AND TN SERIES 5 150# CLASS (BRONZE, ALUMINUM BRONZE, STAINLESS, DUPLEX AND CARBON)

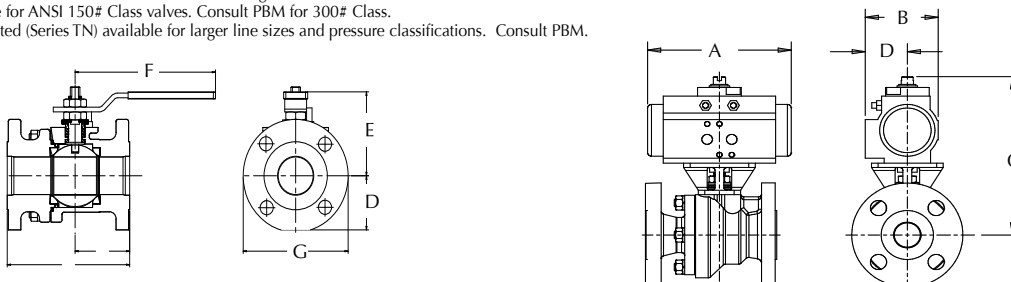
AN Series seawater valves are 2-piece valves with two flanged end fittings and meet ANSI B16.10 long pattern face to face dimensions. In addition, encapsulated seats facilitate performance in high-velocity applications and support the seats in elevated temperature applications. TN (sizes 8" - 12") adds a trunnion to an AN Series valve (sizes 1/2" - 6").

Size	Port		A		B		D		E		F		G		Approx. Weight 150#		
			Overall Length		C _L to End		C _L to Bottom		C _L to top of handle		Handle Length from G		Flange Diameter				
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inches	mm	inch	mm	lb	kg	
1/2"	DN15	0.62	16	4.25	108	1.84	47	1.62	41	3.07	78	5.09	129	3.50	89	6	2.7
3/4"	DN20	0.81	21	4.62	117	2.01	51	1.88	48	3.14	80	5.09	129	3.88	99	9	4.1
1"	DN25	1.00	25	5.00	127	2.20	56	2.06	52	4.33	110	6.09	155	4.25	108	10	4.5
1-1/2"	DN40	1.50	38	6.50	165	2.78	71	2.38	60	5.25	133	8.68	220	5.00	127	20	9.1
2"	DN50	2.00	51	7.00	178	2.99	76	2.88	73	5.56	141	8.68	220	6.00	152	24	10.9
3"	DN80	3.00	76	8.00	203	3.62	92	4.56	116	7.08	180	12.44	316	7.50	191	92	41.7
4"	DN100	4.00	102	9.00	229	3.84	98	4.75	121	7.93	201	14.44	367	9.00	229	118	53.5
6"	DN150	6.00	152	15.50	394	7.35	189	6.75	171	-	-	-	-	11.00	279	330	149.7
8"	DN200	8.00	203	18.00	457	8.54	217	8.37	213	-	-	-	-	13.50	343	550	249.5
10"	DN250	8.00	203	21.00	533	12.34	313	8.37	213	-	-	-	-	16.00	406	680	308.4
12"	DN300	10.00	254	24.00	610	12.00	305	10.15	258	-	-	-	-	19.00	483	1,040	471.7

AN & TN SERIES 5 ACTUATED VALVES

Size	Units	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" DN15	inches	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
	mm	139	139	207	162	71	71	94	81	151	151	178	178	41	41	53	45
3/4" DN20	inches	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
	mm	139	139	207	162	71	71	94	81	151	151	178	178	41	41	53	45
1" DN25	inches	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
	mm	139	139	237	207	71	71	106	94	182	182	221	210	41	41	58	53
1-1/2" DN40	inches	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
	mm	207	207	328	272	94	94	137	123	214	214	276	268	53	45	73	73
2" DN50	inches	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
	mm	207	207	328	272	94	94	137	123	222	222	276	246	53	53	73	68
3" DN80	inches	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
	mm	328	328	428	366	137	137	164	148	341	341	376	353	73	73	87	80
4" DN100	inches	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
	mm	366	328	575	522	164	137	218	187	481	4718	566	515	87	87	109	100
6" DN150	inches	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
	mm	522	522	672	575	187	187	290	218	514	514	657	565	100	100	145	109
8 DN200"	inches	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
	mm	672	672	-	672	290	290	-	290	714	714	-	714	145	145	-	145
10" DN250	inches	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
	mm	672	672	-	672	290	290	-	315	714	714	-	714	145	145	-	145
12" DN300	inches	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
	mm	672	672	-	672	290	290	-	341	760	760	-	760	145	145	-	145

- 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.
- Trunnion mounted (Series TN) available for larger line sizes and pressure classifications. Consult PBM.



DP SERIES 1 MANUAL VALVES DIMENSIONAL DATA (836 BRONZE)

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

Valve Size	B		C				D				G				E		F		Approximate Weight						
	Ball Port		Face-to-Face				℄ to End				℄ to Bottom or Side				Handle Length from ℄		℄ to Top of Handle		150# Flange Diam.		Q-S-U-		L-		
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inches	mm	inch	mm	inch	mm	lb	kg	lb	kg	
1/2"	DN15	0.62	16	3.12	79	-	-	1.56	40	-	-	2.50	64	-	-	5.06	129	3.03	77	3.50	89	2	0.9	-	-
3/4"	DN20	0.81	21	3.44	87	-	-	1.77	45	-	-	2.50	64	-	-	5.06	129	3.03	77	2.38	60	2	0.9	-	-
1"	DN25	1.00	25	3.90	99	6.28	160	1.95	50	3.14	80	2.44	62	3.16	80	6.06	154	3.53	90	4.25	108	4	1.8	10	4.5
1-1/2"	DN40	1.50	38	5.36	136	7.00	178	2.68	68	3.50	89	3.25	583	3.50	89	8.06	205	5.05	128	5.00	127	10	4.5	23	10.4
2"	DN50	1.94	49	5.71	145	8.40	213	2.86	73	4.20	107	3.25	83	4.20	107	8.06	205	5.42	138	6.00	152	15	6.8	30	13.6
3"	DN80	2.75	70	8.62	219	11.87	301	4.31	109	5.93	151	5.12	130	6.00	152	12.06	306	6.71	170	7.50	191	49	22.2	79	35.8
4"	DN100	3.50	89	-	-	12.91	328	N/A	-	6.45	164	-	-	6.44	164	12.06	306	7.21	183	9.00	229	79	35.8	120	54.4

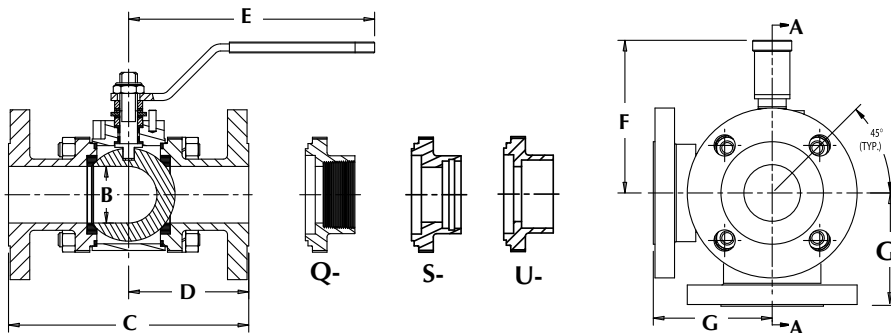
MP SERIES 1 MANUAL VALVES DIMENSIONAL DATA (836 BRONZE)

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

Size	B		C				D, G				E		F		Approximate Weight				
	Ball Port		Face-to-Face				℄ to Face				Handle Length from ℄		℄ to Top of Handle		Q-S-U-		L-		
	inch	mm	inch	mm	inch	mm	inches	mm	inch	mm	inch	mm	inch	mm	lb	kg	lb	kg	
1/2"	DN15	0.62	16	4.00	102	-	-	2.00	51	-	-	6.09	155	3.83	97	8	3.6	-	-
3/4"	DN20	0.81	21	4.00	102	-	-	2.00	51	-	-	6.09	155	3.83	97	8	3.6	-	-
1"	DN25	1.00	25	4.72	120	-	-	2.36	60	-	-	8.06	205	4.99	127	12	5.4	-	-
1-1/2"	DN40	1.50	38	6.56	167	10.56	268	3.28	83	5.28	134	12.44	316	5.61	142	28	12.47	46	20.9
2"	DN50	1.94	49	7.76	197	11.94	303	3.88	99	5.97	152	12.44	316	6.05	154	40	18.1	64	29.0
3"	DN80	2.75	70	11.06	281	14.56	370	5.53	140	7.28	185	12.44	316	7.01	178	65	29.5	105	47.6
4"	DN100	3.50	89	-	-	17.00	432	-	-	8.50	216	14.06	357	8.75	222	-	-	220	99.8

NOTES:

1. Male NPT and Solder Joint 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.



Allowable Working Pressures and Temperatures

Valve Style/ Series	Material	Size (inches)	Non-Flanged					
			-20 to 100°F	-28.9 to 37.8°C	300°F	148.9°C	450°F	232.2°C
			psig	barg	psig	barg	psig	barg
SP, SD, DP, DD FT, FD Series 5	316 SS/316L	1-1/2" (DN40) and smaller	900	62.1	770	53.1	680	46.9
	316 SS/316L	2" and larger	720	49.6	620	42.7	540	37.2
	C-276	All	600	41.4	520	35.9	450	31.0
	Carbon Stl.	1-1/2" (DN40) and smaller	900	62.1	770	53.1	680	46.9
	Carbon Stl.	2" (DN50) and larger	740	51.0	655	45.2	620	42.7
SP, SD Series 5	922 Bronze	All	600	41.4	600	41.4	580	40.0
SP, FT, Series 6	316 SS/316L	3" (DN80) and smaller	720	49.6	620	42.7	540	37.2
	Carbon Stl.	3" (DN80) and smaller	740	51.0	655	45.2	620	42.7
AN, CN All Series	316 SS/316L	All	See Flanged Table at Right.					
	C-276	All						
	Carbon Steel	All						
	Bronze	All						
CP Series 6	316 SS/316L	All	720	49.6	620	42.7	540	37.2
	C-276	All	600	41.4	520	35.9	450	31.0
	922 Bronze	All	600	41.4	600	41.4	580	40.0
MP Series 1	836/922 Bronze	1-1/2" (DN40 and smaller)	400	27.6	385	26.5	360	24.8
	836/922 Bronze	2" (DN50)	350	24.1	340	23.4	315	21.7
	836/922 Bronze	3" (DN80)	300	20.7	290	20.0	270	18.6
	836/922 Bronze	4" (DN100)	See Flanged Table at Right					
	Ductile Iron	1-1/2" (DN40)	550	37.9	440	30.3	340	23.4
	Ductile Iron	2" (DN50)	500	34.5	400	27.6	310	21.4
	Ductile Iron	3" (DN80)	450	31.0	360	24.8	280	19.3
MP, Series 4	316 SS/316L	3/4" (DN20) and smaller	900	62.1	770	53.1	680	46.9
	316 SS/316L	1" (DN 25) thru 4" (DN100)	720	49.6	620	42.7	540	37.2
	316 SS/316L	6" (DN150)	275	19.0	205	14.1	195	13.4
	C-276	3/4" (DN20) and smaller	900	62.1	770	53.1	680	46.9
	C-276	1" (DN25) thru 4" (DN100)	720	49.6	620	42.7	540	37.2
	C-276.	6" (DN150)	275	19.0	205	14.1	195	13.4
	Carbon Stl.	3/4" (DN20) and smaller	900	62.1	770	53.1	680	46.9
	Carbon Stl.	1" (DN25) thru 4" (DN100)	740	51.0	655	45.2	620	42.7
	Carbon Stl.	6" (DN150)	300	20.7	250	17.2	220	15.2
	MP, Series 5	316 SS/316L	All	275	19.0	205	14.1	195
C-276		All	230	15.9	200	13.8	180	12.4
Carbon Stl.		All	285	19.7	230	15.9	185	12.8
TIV Series 5, 6	316 SS/316L	All	See Flanged Table at Right					
	C-276	All						
	Carbon Stl.	All						

Valid for all flanged valves:

ANSI 150# FLANGE

Valve Material	-20° to 100° F psig	-28° to 38° C barg	300° F psig	150° C barg	450° F psig	232° C barg
836 Bronze	225	15.5	180	12.4	135	9.3
922 Bronze	225	15.5	195	13.4	160	11.0
955 Bronze	225	15.5	195	13.4	160	11.0
C-276	230	15.9	200	13.8	180	12.4
316/316L S/S	275	19.0	215	14.8	180	12.4
Carbon Steel.	285	19.7	230	15.9	185	12.8

ANSI 300# FLANGE

Valve Material	-20° to 100° F. psig	-28° to 38° C. barg	300° F. psig	150° C. barg	450° F. psig	232° C. barg
C-276	600	41.4	520	35.9	475	32.8
316/316L S/S	720	49.6	560	38.6	495	34.1
Carbon Steel	740	51.0	655	45.2	620	42.7

Marine and Offshore Valves

ORDERING INFORMATION

INDUSTRIAL VALVES												
PRODUCT (1-2)		MATERIAL ² (3-4)		SIZE (5)		SERIES (6)		END CONNECTION ³ (7-8)		SEAT & SEAL / FILLERS / O-RINGS ⁴ (9)		
										SEAT	FILLER	O-RING
AN	ANSI	A-	Aluminum	A	1/4	1	Series 1	B-	Sch 40 buttweld	A	RT	VI
CN	Cryogenic (ANSI)	B-	836 Bronze	B	3/8	3	Series 3	D-	Sch 10 buttweld	B	RT	VT
CP	Cryogenic	C-	Hastelloy [®] C-276	C	1/2	4	Series 4	L-	150# Flange	F	Metal	
DP	Diverter Port	E-	Carbon Steel ⁵	D	3/4	5	Series 5	M-	300# Flange	G	TF	VI
MP	Multi-Port	H-	316 / 316L Stainless	E	1	6	Series 6	N-	600# Flange	H	HT	VI
SP	Industrial 2-way	HC	Alloy 20	F	1-1/4			P-	Male NPT	I	HT	VT
TN	Trunnion	HL	316L Stainless	G	1-1/2			Q-	Female NPT	J	TF	VT
		N-	922 Bronze ³	H	2			Q1	BSPT	Q	CG	
		R-	955 NIAI-Bronze	J	2-1/2			R-	Sil-braze	U	VT	VT
		S-	953 AI- Bronze	K	3			S-	Sil-braze 1 groove	V	RT	EP
		X-	958 NIAI-Bronze	L	4			T-	Solder joint	W	RT	VT
		Y-	Hastelloy [®] C-22 ⁶	M	6			U-	Socket weld	Z	TF	EP
		9-	954 AI-Bronze	N	8					0	HT	EP
		22	Duplex 2205	P	10					1	HT	VT
										2	TF	EP

CURRENT PRODUCT SERIES	SEAT / SEAL / MATERIAL CODES	O-RING MATERIAL CODES
1 AN, Bronze DP & MP	CG Carbon-Graphite	EP EPR
3 AN(Fire-safe API-607 Rev 4)	HT S-TEF ⁶	VI Viton "A" 75 Durometer
4 Stainless & Carbon Steel MP -150# class maximum	RT RTFE	
5 TN, AN, CN, DP, Stainless MP ⁶ , SP -150# class maximum	TF TFM ⁷	
6 TN, AN, SP (Fire-safe API-607 Rev 4)		
6 CP up to 4" (Fire-safe API-607 Rev 6)		

¹ - Not all options are available on all valve styles; consult PBM. ² - For valves with 2 different materials, use the 1st position for body material and the 2nd position for end fitting material. ³ - For standard seat/seal material by series, please see appropriate pricing page. PBM may substitute TFM⁷ for RTFE at our discretion without notice. TFM⁷ is a registered trademark of Dyneon[™] - a 3M Company. Viton "A" is 75 Durometer. ⁴ - PBM reserves the right to use 922 Bronze in place of 836 Bronze without notification. ⁵ - All Carbon Steel valves will be coated internally and externally with Rust Veto 342, a rust inhibitor. Information on Rust Veto and/or an MSDS is available upon request. If Rust Veto is not acceptable, customer to advise specific coating required. Alternate coatings may impact price and delivery time. In addition, Carbon steel cast products are also painted (black in color) externally prior to Rust Veto coating. ⁶ -150# class maximum

INDUSTRIAL VALVE OPTIONS			
FLOW PATTERN / TANK PAD / PURGE OPTIONS (10 & 11)	BALL / STEM OPTIONS (12)	OPERATOR OPTIONS (13 & 14)	OPTIONS & SPECIALS
<p>DIVERTER PORT AND MULTI-PORT VALVES FOR DIVERTER AND MULTI-PORT VALVES, USE POSITION 10 & 11 TO INDICATE THE FLOW PATTERN - SEE PAGE 8 FOR FLOW PATTERNS</p> <p>PURGE PORT OPTIONS (●● POSITION 10 ONLY ●●) No purge option(s) selected¹</p> <p>A (1) 1/2" clamp on center 90° from stem B (1) 1/2" clamp on center opposite stem C (1) 1/2" clamp upstream 90° from stem D (1) 1/2" clamp downstream opposite stem E (2) 1/2" clamp (1) on center 90° from stem & (1) opposite stem F (2) 1/2" clamp (1) upstream 90° from stem & (1) downstream opposite stem G (1) 1/2" BWTE on center 90° from stem H (1) 1/2" BWTE on center opposite stem I (1) 1/2" BWTE upstream 90° from stem J (1) 1/2" BWTE downstream opposite stem K (2) 1/2" BWTE on center (1) 90° from stem & (1) opposite stem L (2) 1/2" BWTE (1) upstream 90° from stem & (1) downstream opposite stem M (1) 1/4" FNPT on center 90° from stem N (1) 1/4" FNPT on center opposite stem O (1) 1/4" FNPT upstream 90° from stem P (1) 1/4" FNPT downstream opposite stem Q (2) 1/4" FNPT (1) on center 90° from stem & (1) opposite stem R (2) 1/4" FNPT (1) upstream 90° from stem & (1) downstream opposite stem</p> <p>BALL HOLE & FLAT OPTIONS (●● POSITION 11 ONLY ●●) No ball options selected position A Flats in closed downstream position B Flats in closed upstream position C Flats in open upstream position D Flats in open downstream position E Flats in open upstream & downstream position F Holes in closed downstream position G Holes in closed upstream position H Holes in open upstream position I Holes in open downstream position J Holes in open upstream & downstream position V Standard width slotted ball W 30° V-ball X 45° V-ball Y 60° V-ball Z 90° V-ball 1 120° V-ball 7 Self-flush ball with flats closed downstream 8 Self-flushing ball 9 Ball with vent hole</p>	<p>- Standard (316 / 316L ball & stem) F Internal / external grounding G 17-4PH stem I Monel ball J 932 Bronze ball K Monel stem & followers L Monel ball, stem & followers M Aluminum ball N 922 Bronze ball O Hastelloy C-276 ball P C-276 ball, stem & followers Q 922 Bronze ball w/Monel stem R Monel stem, followers & bolting S Monel ball, stem, followers & bolting T 922 Bronze ball, Monel stem & followers, Sil-braze bolting & CuSi fasteners U 922 Bronze ball w/Monel stem & followers V 12" extended stem/body bonnet (cryo only) 1 Chrome carbide (ball & seat coating) 2 Tungsten carbide (ball & seat coating)</p>	<p>-- w/handle 00 Stainless locking oval handle 02 w/o handle, w/stem actr prep 03 w/handle, w/stem actr prep 04 Locking lever handle 05 w/stainless oval handwheel 08 w/gear operator 10 w/man. spring return handle 11 w/fusible link SR handle (165°F) 13 w/N4 electric actuator 14 w/XP electric actuator 17 w/4" ext lockable oval handwheel 18 w/4" ext lockable lever handle PBM, 11@vac Asco & Westlock combo 20 DA80 psig actr 21 DA80 psig actr & GP LS 22 DA80 psig actr & GP Sol 23 DA80 psig actr & GP LS & Sol 24 DA80 psig actr & XP LS 25 DA80 psig actr & XP Sol 26 DA80 psig actr & XP LS & Sol 27 DA60 psig actr 31 DA60 psig actr & XP LS 32 DA60 psig actr & XP Sol 33 DA60 psig actr & XP LS & Sol 34 SR80 psig actr 35 SR80 psig actr & GP LS 36 SR80 psig actr & GP Sol 37 SR80 psig actr & GP LS & Sol 38 SR80 psig actr & XP LS 39 SR80 psig actr & XP Sol 40 SR80 psig actr & XP LS & Sol 41 SR60 psig actr 42 SR60 psig actr & GP LS 43 SR60 psig actr & GP Sol 44 SR60 psig actr & GP LS & Sol 45 SR60 psig actr & XP LS 46 SR60 psig actr & XP Sol 47 SR60 psig actr & XP LS & Sol</p>	<p>LOX & BOLTING OPTIONS (16) - No option(s) required L LOX cleaning per PBM procedure M LOX & CRN bolting Z CRN bolting</p> <p>SPECIAL ENGINEERING # (17-20) EXAMPLE: PXXX suffix at end of standard PBM part number ³ Add \$95 list for Westlock beacon only on actuators</p>
		<p>Abbreviation Index GP = General Purpose XP = Explosion Proof LS = Limit Switch Sol = Solenoid - N/C DA = Double Acting</p>	

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°.

		DP • 3-way • SIDE ENTRY				DP • 3-way • BOTTOM ENTRY				
Code (#)	Port Style	03	04	06	10	14	15	16	17	18
		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										

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.

		MP • 3-way • SIDE ENTRY												
Code (#)	Port Style	01	02	03	04	05	06	07	08	09	10	11	12	13
		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														

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

For more information on PBM's flow patterns, please see our Industrial, Sanitary Brochures or visit us on the web!

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		MP • 4-way • BOTTOM ENTRY												
Code (#)	Port Style	20	21	22	23	24	25	26	27	28	29	30	31	32
		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														

		MP • 4-way • BOTTOM ENTRY				MP • 4-way • SIDE ENTRY						
Code (#)	Port Style	33	34	35	36	37	38	39	40	41	42	43
		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												

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



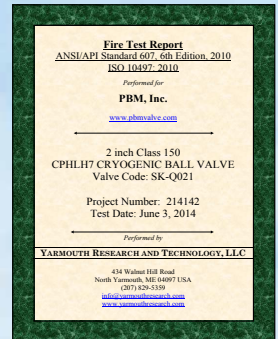
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APPROVALS:*

- USCG Category A
- ABS Type Approval
- SIL 3 Capable
- API 6D (certification per order)
- NACE - MR 0175
- ISO 9001
- CE
- API 607 Fire Tested Design
- API-622 Low-e Packing

* Vary based on product category



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