



 PBM VALVE SOLUTIONS

# MARINE & OFFSHORE VALVES

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



# MARINE VALVE SOLUTIONS

- SHIPBUILDING
- OFFSHORE EXPLORATION & PRODUCTION

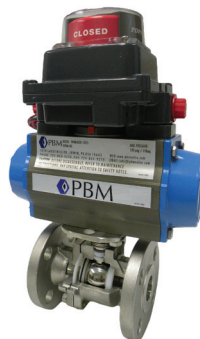
## PBM Seawater Valves - 2-Way, Diverter Port, Multi-Port, & Instrument

- Services: Bilge, Ballast, Utility, Fire Protection, Flare, Pump Skids, Flood Water
- 3-piece Industrial valves\*
- 2-piece per ANSI B16.10 length\*
- Instrument valves\*
- Cryogenic valves - refining processes onboard FPSO, LNG tankers, CNG freighters
- Materials: Bronzes, Stainless Steels, Duplex, Monels, Hastelloys, Carbon Steel
- Seat Materials
  - Soft: TFM™, S-TEF®, RTFE, PEEK
  - Metal: Stellite, Tungsten Carbide, Chrome Carbide
- Sizes: 1/4" - 12"
- Pressure Classes: ANSI CL150 and CL300
- Ends: Flanges, Butt or Socket Welds, Threaded
- Bronze and Copper Nickel valve testing and acceptance criteria IAW MSS SP-72, all other materials ASTM B16.34 and MSS-61 as applicable
- Certified and Material Test Reports are available when requested at the time of order.
- Positive Material Identification (PMI) may be available when requested.
- American Bureau of Shipbuilding (ABS) and U.S. Coast Guard requested at the time of order.
- EU Pressure Equipment Directive (PED) pending
- Automation: Electric, pneumatic and hydraulic automation/control packages available

\* Fire Tight Design



3-Piece Bronze Valve



ANSI Valve

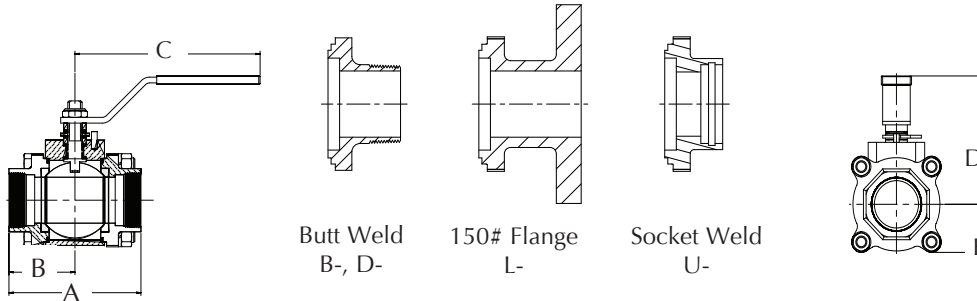


ANSI Trunion

**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.

Size	Port Diameter		A				B				C		D		E				Approx. Wgt.				
			Face to Face				Q <sub>L</sub> to Face				Handle Length from Q <sub>L</sub>	Q <sub>L</sub> to Top of Handle	Q <sub>L</sub> to Bottom				Q <sub>L</sub> to Bottom						
			Q- S- U-		L-		Q- S- U-		L-				Q- S- U-	L-	Q- S- U-		L-		lb	kg	lb	kg	
			inch	mm	inch	mm	inch	mm	inch	mm					inch	mm	inch	mm					inch
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

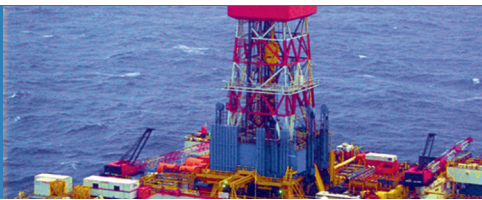
- NOTES:**
1. SP Series valves with 150# flanges are 3-piece valves that do not meet ANSI face to face dimensions. Use AN Series 2-piece flanged valves if ANSI face to face dimensions are required.
  2. Consult PBM for actuator mounting dimensions.
  3. For flanged valves, flange holes straddle the centerline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



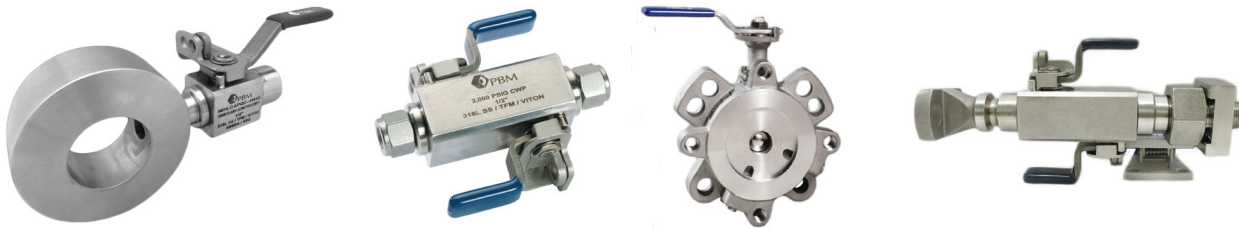
## INSTRUMENT ISOLATION VALVES

PBM’s instrument valve is used for isolation of pressure gauges, orifice plates, flush rings and various measurement instruments. The instrument valve normally “lives” in the open position and is closed only to isolate the instrument for service or replacement. Valves are designed to ASME B16.34.

- **Services:** Primary Isolation (Root), Instrument Isolation, Transmitter Isolation with integrated bleed ring, Double Block & Bleed, & Custom Designs
- **Materials:** Stainless Steels, Duplex, Monels, Hastelloys, Carbon Steel
- **Seat Materials**  
Soft: TFM™, S-TEF®, RTFE, PEEK  
Metal: Stellite, Tungsten Carbide, Chrome Carbide
- **Sizes:** 1/4" - 12"
- **Pressure Classes:** 1/2" - 1" Class 2500, 1-1/2" - 2" Class 900, 3" - 4" Class 600, 6" - 12" Class 300
- **Ends:** Flanges, Butt or Socket Welds, Threaded, Instrument Flange



**Instrument Valve with PBM's patented LOCKING LEVER HANDLE**



## CRYOGENIC VALVES

PBM’s Cryogenic valve is used to provide the necessary gases to the refining processes onboard the FPSO’s. They can also be used on LNG tankers and CNG freighters. PBM’s Cryogenic valves have a unique design that accommodates leak-free operation through cooling and heating cycles.



3-Piece Cryogenic Valve



ANSI Flanged Cryogenic Valve

**SIZES:**

- 1/2" - 2"

**MATERIALS:**

- 316/ 316L Stainless Steel
- Others

**OPTIONS:**

- Actuation
- Locking Handle
- Temperatures from 400°F, 205°C down to -320°F, -200°C
- Class 300 Design

### 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.

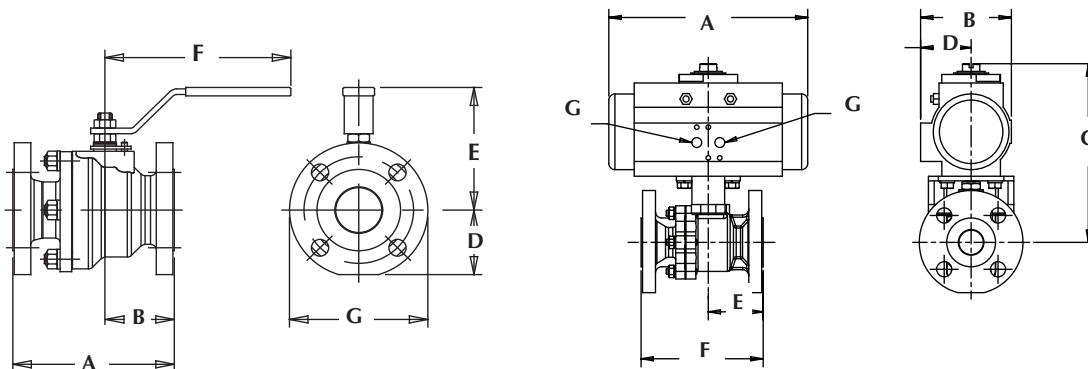
Valve Size	Port Diameter	C				D		E		F		G		H		Approx. Weight	
		Overall Length <sup>1</sup>		C <sub>L</sub> to Face End		Handle Length from C <sub>L</sub>		C <sub>L</sub> to top of Handle		C <sub>L</sub> to Bottom of Flange		Flange Diameter		lb	kg		
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm		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

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	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
1" DN 25	Double Acting	60, 80	4.1/5.5	5.00	127	2.25	57	4.25	108	5.49	139	2.80	71	6.23	158	1.61	41
	Spring Return	60, 80	4.1/5.5	5.00	127	2.25	57	4.25	108	8.15	207	3.72	94	7.32	186	2.07	53
1-1/2" DN 40	Double Acting	80	5.5	6.50	165	2.68	68	5.00	127	6.38	162	3.17	81	7.95	202	1.77	45
	Spring Return	60	4.1	6.50	165	2.68	68	5.00	127	8.15	207	3.72	94	8.60	218	2.07	53
2" DN 50	Double Acting	60, 80	4.1/5.5	7.00	178	3.12	79	6.00	152	10.69	272	4.84	123	9.56	243	2.68	68
	Spring Return	60, 80	4.1/5.5	7.00	178	3.12	79	6.00	152	10.69	272	4.84	123	9.56	243	2.68	68
	Double Acting	60	4.1	7.00	178	3.12	79	6.00	152	12.91	328	5.39	137	11.05	281	2.87	73
	Spring Return	60	4.1	7.00	178	3.12	79	6.00	152	12.91	328	5.39	137	11.05	281	2.87	73
3" DN 80	Double Acting	60, 80	4.1/5.5	8.00	203	3.57	91	7.50	191	12.91	328	5.39	137	12.99	330	2.87	73
	Spring Return	80	5.5	8.00	203	3.57	91	7.50	191	14.41	366	5.83	148	13.46	342	3.15	80
	Spring Return	60	4.1	8.00	203	3.57	91	7.50	191	16.85	428	6.46	164	14.35	364	3.44	87
4" DN 100	Double Acting	60, 80	4.1/5.5	9.00	229	3.84	98	9.00	229	16.85	428	6.46	164	16.51	419	3.44	87
	Spring Return	80	5.5	9.00	229	3.84	98	9.00	229	20.55	522	7.36	187	16.98	431	3.94	100
	Spring Return	60	4.1	9.00	229	3.84	98	9.00	229	22.64	575	8.58	218	18.99	482	4.29	109
6" DN 150	Double Acting	60, 80	4.1/5.5	15.50	394	7.33	186	11.00	279	22.64	575	8.58	218	22.57	573	4.29	109
	Spring Return	80	5.5	15.50	394	7.33	186	11.00	279	22.64	575	8.58	218	22.57	573	4.29	109
	Spring Return	60	4.1	15.50	394	7.33	186	11.00	279	26.46	672	11.42	290	26.19	665	5.71	145



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

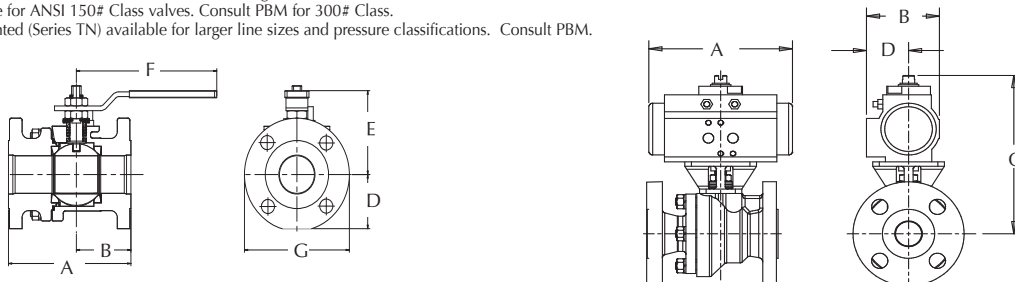
AN Series seawater valves are 2-piece valves with two flanged end fittings and meet ANSI B16.10 long pattern face to face dimensions. In addition, encapsulated seats facilitate performance in high-velocity applications and support the seats in elevated temperature applications. TN adds a trunnion to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

Size	Port	A		B		D		E		F		G		Approx. Weight Bronze			
		Overall Length		C <sub>L</sub> to End		C <sub>L</sub> to Bottom		C <sub>L</sub> to top of handle		Handle Length from C		Flange Diameter		lb	kg		
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inches	mm	inch	mm		
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"	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
DN15	mm	139	139	207	162	71	71	94	81	151	151	178	178	41	41	53	45
3/4"	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
DN20	mm	139	139	207	162	71	71	94	81	151	151	178	178	41	41	53	45
1"	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
DN25	mm	139	139	237	207	71	71	106	94	182	182	221	210	41	41	58	53
1-1/2"	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
DN40	mm	207	207	328	272	94	94	137	123	214	214	276	268	53	45	73	73
2"	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
DN50	mm	207	207	328	272	94	94	137	123	222	222	276	246	53	53	73	68
3"	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
DN80	mm	328	328	428	366	137	137	164	148	341	341	376	353	73	73	87	80
4"	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
DN100	mm	366	328	575	522	164	137	218	187	481	4718	566	515	87	87	109	100
6"	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
DN150	mm	522	522	672	575	187	187	290	218	514	514	657	565	100	100	145	109
8"	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
DN200"	mm	672	672	-	672	290	290	-	290	714	714	-	714	145	145	-	145
10"	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
DN250	mm	672	672	-	672	290	290	-	315	714	714	-	714	145	145	-	145
12"	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
DN300	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 DIMENSIONAL DATA (836 BRONZE)**

DIMENSIONAL DATA (INCHES)

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

Valve Size		B Ball Port		C Face-to-Face				D C to End				G C to Bottom or Side				E Handle Length from C		F C 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-	
Size		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	83	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

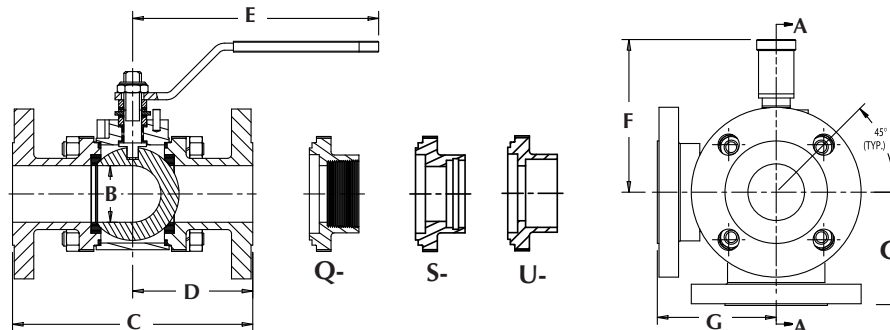
**MP SERIES 1 DIMENSIONAL DATA (836 BRONZE)**

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 C to Face				E Handle Length from C		F C to Top of Handle		Approximate Weight							
				Q- S- U-		L-		Q- S- U-		L-						Q- S- U-		L-					
		inch	mm	inch	mm	inch	mm	inches	mm	inch	mm	inch	mm	inch	mm	lb	kg	lb	kg	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, 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.



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

End Connections: Female NPT (Q-), Socket Weld (U-), 150# Flange (L-), Butt Weld (B-), Sil-Braze (S-), Solder Joint (T-)  
For dimensional information see PBM's Industrial Brochure.

## DP & DD SERIES 5, MP SERIES 5, MANUAL & ACTUATED

END CONNECTIONS: FEMALE NPT (Q-), SOCKET WELD FOR PIPE (U-), SIL-BRAZE (S-), AND 150# FLANGED (L-) END FITTINGS  
For dimensional information see PBM's Industrial Brochure.

# CV & TORQUE CHARTS

## AN SERIES 1 VALVE CHART

Valve Size	Cv				Stem Torque				100°F Working Pressure				
	Full Port		Reduced Port		Full Port		Reduced Port		955 Bronze Class 150		Carbon Steel Class 150		
Size	gpm	lpm	gpm	lpm	in-lbs.	N-m	in-lbs.	N-m	psig	barg	psig	barg	
1/2"	DN15	31	117	-	-	40	5	-	-	200	14	285	20
3/4"	DN20	52	197	-	-	50	6	-	-	200	14	285	20
1"	DN25	80	303	-	-	72	8	-	-	200	14	285	20
1-1/2"	DN40	190	719	-	-	168	19	-	-	200	14	285	20
2"	DN50	400	1,514	-	-	192	22	-	-	200	14	285	20
3"	DN80	1,100	4,164	370	1,401	420	48	192	22	200	14	285	20
4"	DN100	2,400	9,085	700	2,650	780	88	420	48	200	14	285	20
6"	DN150	5,600	21,198	760	2,877	2,400	271	780	88	200	14	285	20
8"	DN200	10,000	37,854	5,600	21,198	7,200	813	2,400	271	200	14	285	20
10"	DN250	16,500	62,459	10,000	37,854	12,000	1,356	7,200	814	200	14	285	20

## AN, TN SERIES 5/6 CHART

Size	gpm	lpm	gpm	lpm	in-lbs.	N-m	in-lbs.	N-m	psig	barg	psig	barg	
1/2"	DN15	31	117	-	-	40	5	-	-	200	14	285	20
3/4"	DN20	52	197	-	-	50	6	-	-	200	14	285	20
1"	DN25	80	303	-	-	72	8	-	-	200	14	285	20
1-1/2"	DN40	190	719	-	-	168	19	-	-	200	14	285	20
2"	DN50	400	1,514	-	-	192	22	-	-	200	14	285	20
3"	DN80	1,100	4,164	-	-	420	48	-	-	200	14	285	20
4"	DN100	2,400	9,085	-	-	780	88	-	-	200	14	285	20
6"	DN150	5,600	21,198	-	-	2,400	271	-	-	200	14	285	20
8"	DN200	10,000	37,854	1,800	6,814	7,200	814	2,400	271	200	14	285	20
10"	DN250	-	-	3,600	13,627	-	-	7,200	814	200	14	285	20
12"	DN300	-	-	6,200	23,470	-	-	8,400	949	200	14	285	20

NOTES:

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

## SP, DP SERIES 1 CHART

Valve Size	Cv (gpm)								Stem Torque (in lbs.)		100°F Working Pressure		
	Full Port, SP only		DP Series L-Port		DP Series T-Port								
	gpm	lpm	gpm	lpm	Straight		Branch		in-lbs.	N-m	psig	barg	
1/2"	DN15	18	68	12	45	14	53	8.7	33	48	5	300	21
3/4"	DN20	35	132	21	79	25	94	16	61	60	7	300	21
1"	DN25	53	201	33	125	39	148	24	91	72	8.1	300	21
1-1/2"	DN40	120	454	79	299	93	352	58	220	168	19	300	21
2"	DN50	200	757	149	564	180	681	110	416	192	22	300	21
2-1/2"	DN65	330	1,249	-	-	-	-	-	-	300	34	300	21
3"	DN80	400	1,514	290	1,098	345	795	210	795	420	48	300	21
4"	DN100	650	2,461	460	1,741	540	1,287	340	1,287	540	61	300	21

## MP SERIES 1 CHART

Valve Size	Cv (gpm)						Stem Torque (in-lbs.)		100°F Working Pressure		
	Straight Thru Cv		Side Cv		LL Port Cv						
Size	gpm	lpm	gpm	lpm	in-lbs.	N-m	in-lbs.	N-m	psig	barg	
1/2"	DN15	16	61	10	38	8	30	96	11	300	21
3/4"	DN20	16	61	10	38	8	30	96	11	300	21
1"	DN25	45	170	25	95	22	83	240	27	300	21
1-1/2"	DN40	100	378	56	212	46	174	480	54	300	21
2"	DN50	180	681	100	378	78	295	540	61	300	21
3"	DN80	228	863	127	481	90	341	720	81	300	21
4"	DN100	405	1,533	225	852	175	662	1,020	115	300	21



## BODY, BALL, AND END FITTINGS

FOR OTHER MATERIALS, CONSULT PBM

### 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.

### 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.

### 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).

### 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).

## BODY, BALL AND END FITTING ALLOY

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

## 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.

### 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.

### 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.

### 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.

### 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.

### 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, 5-6% 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.

### 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 (barstock) alloy N04400. Larger diameter balls are cast from A494 alloy M35-1.

## 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

**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.

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

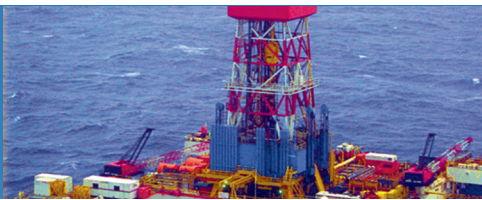
**RTFE** - RTFE is Polytetrafluoroethylene reinforced with glass fibers, commonly referred to as "glass filled Teflon". It is standard on Series 1.

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

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

### 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).



## 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°.

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									

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.

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						

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 (#)	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								

## ORDERING INFORMATION

INDUSTRIAL VALVES												
PRODUCT (1-2)		MATERIAL <sup>2</sup> (3-4)		SIZE (5)		SERIES (6)		END CONNECTION <sup>3</sup> (7-8)		SEAT & SEAL / FILLERS / O-RINGS <sup>4</sup> (9)		
										SEAT	FILLER	O-RING
AN	ANSI	A-	Aluminum	A	1/4	1	Series 1	B-	Sch 40 butt weld	A	RT	VI
CN	Cryogenic (ANSI)	B-	836 Bronze	B	3/8	3	Series 3	D-	Sch 10 butt weld	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 <sup>6</sup>	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	7	Series 7	P-	Male NPT	I	HT	VT
TN	Trunnion	HL	316L Stainless	G	1-1/2			Q-	Female NPT	J	TF	VT
		N-	922 Bronze <sup>5</sup>	H	2			Q1	BSPT	Q	CG	
		R-	955 NiAl-Bronze	J	2-1/2			R-	Sil-braze	U	VT	VT
		S-	953 Al- Bronze	K	3			S-	Sil-braze 1 groove	V	RT	EP
		X-	958 NiAl-Bronze	L	4			T-	Solder joint	W	RT	VT
		Y-	Hastelloy® C-22 <sup>6</sup>	M	6			U-	Socket weld	Z	TF	EP
		9-	954 Al-Bronze	N	8					0	HT	EP
		22	Duplex 2205	P	10					1	HT	VT
										2	TF	VT

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®	VI Viton "A" 75 Durometer
4 Stainless & Carbon Steel MP (300# class maximum)	RT RTFE	
5 TN, AN, CN, DP, Stainless MP®, SP	TF TFM™	
6 TN, AN, SP (Fire-safe API-607 Rev 4)		
7 CP up to 2"		

<sup>1</sup> - Not all options are available on all valve styles; consult PBM. <sup>2</sup> - For valves with 2 different materials, use the 1<sup>st</sup> position for body material and the 2<sup>nd</sup> position for end fitting material. <sup>4</sup> - For standard seat/seal material by series, please see appropriate pricing page. PBM may substitute TFM™ for RTFE at our discretion without notice. TFM™ is a registered trademark of Dyneon™ - a 3M Company. Viton "A" is 75 Durometer. <sup>5</sup> - PBM reserves the right to use 922 Bronze in place of 836 Bronze without notification. <sup>6</sup> - 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. <sup>8</sup> - 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><b>DIVERTER PORT AND MULTI-PORT VALVES</b>                      * FOR DIVERTER AND MULTI-PORT VALVES, USE <b>POSITION 10 &amp; 11</b> TO INDICATE THE FLOW PATTERN - SEE PAGE 8 FOR FLOW PATTERNS</p> <p><b>PURGE PORT OPTIONS (** POSITION 10 ONLY **)</b>                      A No purge option(s) selected<sup>1</sup>                      B (1) 1/2" clamp on center 90° from stem                      C (1) 1/2" clamp on center opposite stem                      D (1) 1/2" clamp upstream 90° from stem                      E (1) 1/2" clamp downstream opposite stem                      F (2) 1/2" clamp (1) on center 90° from stem &amp; (1) opposite stem                      G (2) 1/2" clamp (1) upstream 90° from stem &amp; (1) downstream opposite stem                      H (1) 1/2" BWTE on center 90° from stem                      I (1) 1/2" BWTE on center opposite stem                      J (1) 1/2" BWTE upstream 90° from stem                      K (1) 1/2" BWTE downstream opposite stem                      L (2) 1/2" BWTE on center (1) 90° from stem &amp; (1) opposite stem                      M (2) 1/2" BWTE (1) upstream 90° from stem &amp; (1) downstream opposite stem                      N (1) 1/4" FNPT on center 90° from stem                      O (1) 1/4" FNPT on center opposite stem                      P (1) 1/4" FNPT upstream 90° from stem                      Q (1) 1/4" FNPT downstream opposite stem                      R (2) 1/4" FNPT (1) on center 90° from stem &amp; (1) opposite stem                      S (2) 1/4" FNPT (1) upstream 90° from stem &amp; (1) downstream opposite stem</p> <p><b>BALL HOLE &amp; FLAT OPTIONS (** POSITION 11 ONLY **)</b>                      - 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 &amp; 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 &amp; 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 &amp; stem)                      F Internal / external grounding                      G 17-4PH stem                      I Monel ball                      J 932 Bronze ball                      K Monel stem &amp; followers                      L Aluminum ball                      M 922 Bronze ball                      N Hastelloy C-276 ball                      O C-276 ball, stem &amp; followers                      P 922 Bronze ball w/Monel stem                      R Monel stem, followers &amp; bolting                      S Monel ball, stem, followers &amp; bolting                      T 922 Bronze ball, Monel stem &amp; followers, Sil-braze bolting &amp; CuSi fasteners                      U 922 Bronze ball w/Monel stem &amp; followers                      V 12" extended stem/body bonnet (cryo only)                      1 Chrome carbide (ball &amp; seat coating)                      2 Tungsten carbide (ball &amp; 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, 110vac Asco &amp; Westlock combo                      20 DA80 psig actr                      21 DA80 psig actr &amp; GP LS                      22 DA80 psig actr &amp; GP Sol                      23 DA80 psig actr &amp; GP LS &amp; Sol                      24 DA80 psig actr &amp; XP LS                      25 DA80 psig actr &amp; XP Sol                      26 DA80 psig actr &amp; XP LS &amp; Sol                      27 DA60 psig actr                      31 DA60 psig actr &amp; XP LS                      32 DA60 psig actr &amp; XP Sol                      33 DA60 psig actr &amp; XP LS &amp; Sol                      34 SR80 psig actr                      35 SR80 psig actr &amp; GP LS                      36 SR80 psig actr &amp; GP Sol                      37 SR80 psig actr &amp; GP LS &amp; Sol                      38 SR80 psig actr &amp; XP LS                      39 SR80 psig actr &amp; XP Sol                      40 SR80 psig actr &amp; XP LS &amp; Sol                      41 SR60 psig actr                      42 SR60 psig actr &amp; GP LS                      43 SR60 psig actr &amp; GP Sol                      44 SR60 psig actr &amp; GP LS &amp; Sol                      45 SR60 psig actr &amp; XP LS                      46 SR60 psig actr &amp; XP Sol                      47 SR60 psig actr &amp; XP LS &amp; Sol</p>	<p><b>LOX &amp; BOLTING OPTIONS (16)</b>                      - No option(s) required                      L LOX cleaning per PBM procedure                      M LOX &amp; CRN bolting                      Z CRN bolting</p> <p><b>SPECIAL ENGINEERING # (17-20)</b>                      EXAMPLE: PXXX suffix at end of standard PBM part number  <sup>3</sup> Add \$95 list for Westlock beacon only on actuators</p>

**Abbreviation Index**  
 GP = General Purpose  
 XP = Explosion Proof  
 LS = Limit Switch  
 Sol = Solenoid - N/C  
 DA = Double Acting

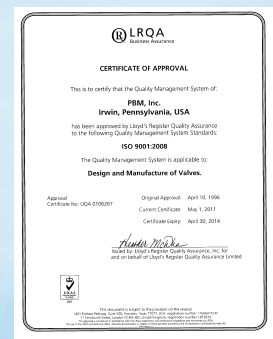


### PBM WORLDWIDE REPRESENTATION

- United States • Canada • Australia • Mexico • Brazil • Argentina • Chile • UAE • United Kingdom
- Central Europe • Germany • Sweden • Spain • Belgium • France • Ireland • Switzerland • Austria • The Netherlands
- South Africa • India • Taiwan • China • Thailand • Singapore • Saudi Arabia • Malaysia • South Korea

## 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



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LT-2D 6/13