



# CRYOGENIC VALVE SOLUTIONS

- 2-WAY & 3-WAY MANUAL AND AUTOMATED VALVES
- TEMPERATURES TO  $-320^{\circ}\text{F}$  /  $-195^{\circ}\text{C}$
- PRESSURES TO 720 PSI CWP / 49.6 BAR (ANSI 300# CLASS)
- MEETS OR EXCEEDS LEAKAGE PERFORMANCE PER MSS SP-134-2010





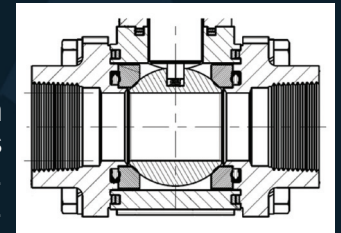
# PBM Cryogenic Ball Valves

## Specifically Designed for Cryogenic Applications

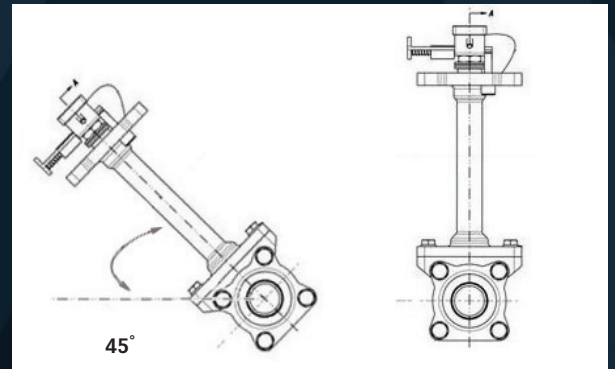
PBM cryogenic valves have a unique design that provides superior performance through cooling and heating cycles. The valves meet leakage criteria per MSS SP-134.

### What Makes It Work

An extended bonnet with an upper set of **live loaded** stem packings. As metal shrinks, it keeps pressure on seals as temperature goes through cooling and heating cycles. Vented ball allows explosive gas expansion to vent upstream.



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



### Leakage Rate Comparison

Cryogenic Allowable Leakage Rate Comparison Allowable He scc/min			
NPS	DN	MSS-SP134-2010	BS 6364-1984
1/2	15	37.5	90
3/4	20	56.25	120
1	25	75	150
1-1/2	40	112.5	240
2	50	150	300
3	80	225	480
4	100	300	600

### Features

- Sizes 1/2" - 4" - Full port. Consult PBM for additional sizes.
- Temperatures from 400° F, 205° C down to -320° F, -200° C.
- **Live-loaded** stem packings
- Fire safe to API 607 Rev. 6.
- Designed and tested in accordance with ASME B31.1 and B16.34.
- Materials of construction: stainless steel, other materials available – consult PBM for details.
- Pressures to 720 psi CWP (ANSI 300# class)
- Cleaned for oxygen service
- Quarter turn operation
- Locking lever handle or optional oval locking handwheel
- Automation available.
- TFM™ seats/graphite seals
- Internal and external grounding
- Uni-directional flow and vented ball
- Valve meets or exceeds leakage performance per MSS SP-134.
- Optional API-622 Low-e Packing (cannot be LOX cleaned).

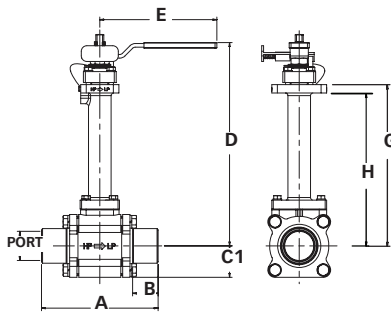
# "CP" Series, 2-Way, Firesafe, Cryogenic Valves

## How To Order:

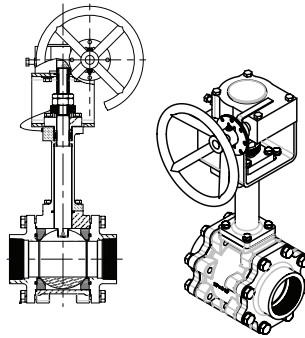
PRODUCT	MATERIAL	SIZE	SERIES	END HP	END LP	SEAT & SEAL	FLOW PATTERN*	BONNET	OPERATOR	VALVE PREPARATION	
CP 2-Way	HL 316L Stainless Steel	C 1/2"	6 Series 6	B Ext. Buttweld Sch. 40 Pipe or ISO tube	B Ext. Buttweld Sch. 40 Pipe or ISO tube	G TFM™ Oxygen Cleaned spiral wound, graphite stem packing and seals	18 3-Way, Bottom Entry L-Port	-- Std. Bonnet Ext.	00 SS locking oval handle	-L Cleaned for O2 Service	
CD 3-Way		D 3/4"		Q Female NPT	Q Female NPT	Z* TFM/ Low emission, wire braided, graphite stem packing/ Graphite seals	-- 2-Way, Valve	-V **12" Ext. Bonnet	04 Locking Lever Handle		
<b>Stainless Steel Construction. Other materials available upon request.</b>				E 1"	J Extended Socket Weld	J Extended Socket Weld	<b>*Note: Valves with seat/seal code "Z" are not O2 clean.</b>  <b>O4 handle option not available for 3" or 4" gear operated or actuated only</b>  <b>Consult PBM for other flow patterns.</b>			08 Gear operator	
				G 1.5"	Q1 Female BSPT	Q1 Female BSPT				09 Tee handle	
				H 2"	D Ext. Buttweld Sch. 10S Pipe	D Ext. Buttweld Sch. 10S Pipe				20 DA80 psig actuator	
				K 3"	L 150# Flange	L 150# Flange				27 DA60 psig actr	
				L 4"						34 SR80 psig actuator	
										41 SR60 psig actuator	

12" Extended Bonnet is Minimum 12" from Pipe Centerline to Bottom of Bonnet Flange.

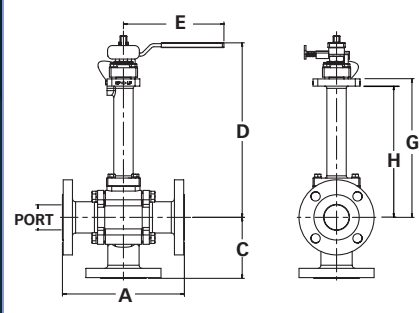
"CP" Series 2-Way Cryogenic Valve



Gear Operated 2-Way Cryogenic Valve



"CD" Series Diverter Cryogenic Valve



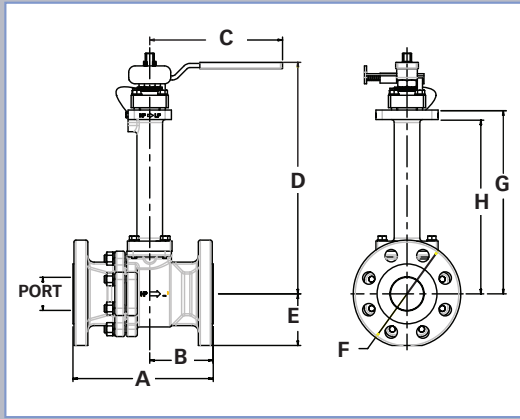
PBM Diverter Cryogenic Valves are not qualified to API-607 rev. 6.

SIZE			UNIT	BALL PORT	BUTT WELD	EXTENDED SOCKET WELD		150# Flange		300# Flange		FNPT		C1	D HANDLE HEIGHT STD. EXT. BONNET	E	G CL to TOP OF BONNET	H CL to BOTTOM OF BONNET	TORQUE				
US	DIN	ISO		A	B	A	Socket Depth	A	C	A	C	A	C						UNIT	at 0° F	at -320° F	ACT. SIZING	
1/2"	8, 10, 15	8, 10	inches	0.50	5.50	1.50	6.32	0.41	5.50	2.75	5.75	2.88	3.12	1.56	1.00	9.92	4.15	7.78	7.46	IN-LBS	45	95	143
			mm	12.70	139.70	38.10	160.53	10.41	139.70	69.85	146.05	73.03	79.25	39.62	25.40	251.97	105.41	32.29	189.48	N-m	5	11	16
3/4"	20	15, 20	inches	0.75	5.50	1.50	6.56	0.53	5.75	2.88	6.00	3.00	3.44	1.72	1.00	9.92	4.15	7.78	7.46	IN-LBS	45	95	143
			mm	19.05	139.70	38.10	166.62	13.46	146.05	73.03	152.40	76.20	87.38	43.69	25.40	251.97	105.41	197.61	189.48	N-m	5	11	16
1"	25, 32	25	inches	1.00	6.00	1.50	7.06	0.53	6.50	3.25	6.75	3.38	4.25	2.13	1.33	9.91	5.09	7.64	7.22	IN-LBS	80	155	233
			mm	25.40	152.40	38.10	179.32	13.46	165.10	82.55	171.45	85.85	107.95	54.10	33.78	251.71	129.29	194.06	183.39	N-m	9	18	27
1-1/2"	40	32, 40	inches	1.50	7.50	1.50	8.56	0.53	8.00	4.00	8.25	4.13	5.50	2.75	1.78	13.60	8.03	10.76	10.18	IN-LBS	300	420	630
			mm	38.10	190.50	38.10	217.42	13.46	203.20	101.60	209.55	104.78	139.70	69.85	45.21	345.44	203.96	273.30	258.57	N-m	34	48	72
2"	50	50	inches	2.00	8.00	1.75	9.32	0.66	9.75	4.88	10.00	5.00	6.00	3.00	2.15	13.95	8.03	11.07	10.49	IN-LBS	480	840	1260
			mm	50.80	203.20	44.45	236.73	16.76	247.65	123.83	254.00	127.00	152.40	76.20	54.61	354.33	203.96	281.18	266.45	N-m	55	96	144
3"	80	80	inches	3.00	13.50	2.31	14.88	0.69	12.75	6.38	13.25	6.63	9.00	4.50	3.14	17.37	12.06	13.41	12.83	IN-LBS	660	1320	1980
			mm	76.20	342.90	58.67	377.95	17.53	323.85	161.93	336.55	168.28	228.60	114.30	79.76	441.20	306.32	340.61	325.88	N-m	75	151	226
4"	80	80	inches	4.00	16.00	2.31	17.62	.81	15.00	7.50	16.00	8.00	12.00	6.00	4.91	n/a	n/a	14.83	12.83	IN-LBS	720	4500	6750
			mm	101.6	406.4	58.67	447.55	20.57	381.0	190.5	406.4	203.2	304.8	152.4	124.71	n/a	n/a	376.68	325.88	N-m	81	508	763

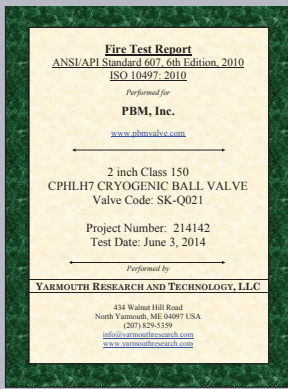
Note: Only Butt Weld ends apply to DIN and ISO dimensions.



# "CN" Series Split-Body ANSI Flanged Cryogenic Valves



Fire Tested to API-607



## Testing and Documentation Available

- MTR (Material Test Reports)
- PMI (Positive Material Identification)
- LP (Liquid Penetrant)
- Radiographic Examination
- Magnetic Particle Examination
- Ultrasonic Examination

SIZE	UOM	PORT DIA.	PRESSURE CLASS	A OVERALL LENGTH	B O TO ENDFACE	C HANDLE LENGTH	D HANDLE HEIGHT TO BOT.	E O TO BOTTOM FLANGE	F FLANGE DIA.	G O TO TOP OF BONNET	H O TO BOTTOM OF BONNET	TORQUE			
												UNIT	@ 70° F	@ -320° F	ACT SIZING
1 1/2"	inches	.37	150#	4.25	1.85	4.15	9.71	1.62	3.50	7.63	7.31	IN-LBS	45	95	143
	mm	9.4	20 PN	107.95	46.99	105.41	246.63	41.15	88.90	193.80	185.67	N-m	5	11	16
	inches	.37	300#	5.50	2.52	4.15	9.71	1.75	3.75	7.63	7.31	IN-LBS	45	95	143
3/4"	mm	9.4	50 PN	139.70	64.01	105.41	246.63	44.45	95.25	193.80	185.67	N-m	5	11	16
	inches	.75	150#	4.62	2.12	4.15	9.86	1.80	3.88	7.78	7.31	IN-LBS	45	95	143
	mm	19.1	20 PN	117.35	53.85	105.41	250.44	45.72	98.55	197.61	185.67	N-m	5	11	16
1"	inches	.75	300#	6.00	2.90	4.15	9.86	2.15	4.62	7.78	7.31	IN-LBS	45	95	143
	mm	19.1	50 PN	152.40	73.66	105.41	250.44	54.61	117.35	197.61	185.67	N-m	5	11	16
	inches	1.00	150#	5.00	2.25	5.09	10.08	2.06	4.25	7.71	7.29	IN-LBS	80	155	233
1-1/2"	mm	25.4	20 PN	127.00	57.15	129.29	256.03	52.32	107.95	195.83	185.67	N-m	9	18	27
	inches	1.00	300#	6.50	3.15	5.09	10.08	2.38	4.88	7.71	7.29	IN-LBS	80	155	233
	mm	25.4	50 PN	165.10	80.01	129.29	256.03	60.45	123.95	195.83	185.67	N-m	9	18	27
2"	inches	2.00	150#	6.50	2.68	8.03	13.70	2.38	5.00	10.81	10.23	IN-LBS	300	420	630
	mm	50.8	20 PN	165.10	68.07	203.96	347.98	60.45	127.00	274.57	259.84	N-m	34	48	72
	inches	2.00	300#	7.50	3.18	8.03	13.70	3.00	6.12	10.81	10.23	IN-LBS	300	420	630
3"	mm	50.8	50 PN	190.50	80.77	203.96	347.98	76.20	155.45	274.57	259.84	N-m	34	48	72
	inches	2.00	150#	7.00	3.12	8.03	14.00	2.88	6.00	11.12	10.53	IN-LBS	480	840	1260
	mm	50.8	20 PN	177.80	79.25	203.96	355.60	73.15	152.40	282.45	267.46	N-m	55	96	144
4"	inches	2.00	300#	8.50	3.84	8.03	14.00	3.12	6.50	11.12	10.53	IN-LBS	480	840	1260
	mm	50.8	50 PN	215.90	97.54	203.96	355.60	79.25	165.10	282.45	267.46	N-m	55	96	144
	inches	3.00	150#	8.00	3.57	12.06	17.37	3.50	7.50	13.41	12.83	IN-LBS	660	1320	1980
4"	mm	76.2	20 PN	203.20	90.68	306.32	441.20	88.90	190.50	340.61	325.88	N-m	75	151	226
	inches	3.00	300#	11.12	5.19	12.06	17.37	4.00	8.25	13.41	12.83	IN-LBS	660	1320	1980
	mm	76.2	50 PN	282.45	131.83	306.32	441.20	101.60	209.55	340.61	325.88	N-m	75	151	226
4"	inches	4.00	150#	9.00	3.84	n/a	n/a	4.38	9.00	14.83	12.83	IN-LBS	720	4500	6750
	mm	101.6	20 PN	228.6	97.54	n/a	n/a	111.25	228.6	376.68	325.88	N-m	81	508	763
	inches	4.00	300#	12.00	5.34	n/a	n/a	4.75	10.00	14.83	12.83	IN-LBS	720	4500	6750
mm	101.6	50 PN	304.8	135.64	n/a	n/a	120.7	254	376.68	325.88	N-m	81	508	763	

## How To Order:

PRODUCT	MATERIAL	SIZE	SERIES	END	SEAT & SEAL	BONNET	OPERATOR	VALVE PREPARATION									
CN	Uni-Directional	H	316/316L Stainless Steel	C	1 1/2"	6	Series 6	L	150#	G	TFM/O2 Cleaned spiral wound, graphite stem packing and seals	--	Std. Bonnet Ext.	00	SS locking oval handle	-L	Cleaned for O2 Service
		D	3/4"			M	300#	*Z	TFM/ Low emission, wire braided, graphite stem packing/Graphite seals	V	**12" Ext. Bonnet	04	Locking Lever Handle				
		E	1"									08	Gear operator				
		G	1-1/2"									09	Tea handle				
		H	2"									20	DA80 psig actuator				
		K	3"									27	DA60 psig actuator				
		L	4"									34	SR80 psig actuator				
												41	SR60 psig actuator				

\*\* 12" Extended Bonnet is Minimum 12" from Pipe CL to Bottom of Bonnet Flange.

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