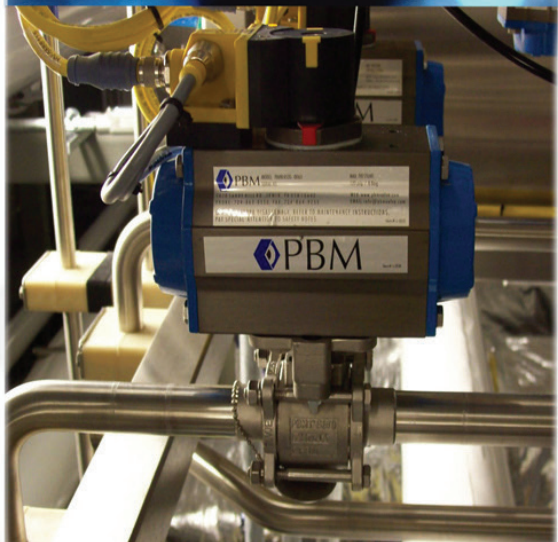


 PBM VALVE SOLUTIONS

SANITARY VALVES





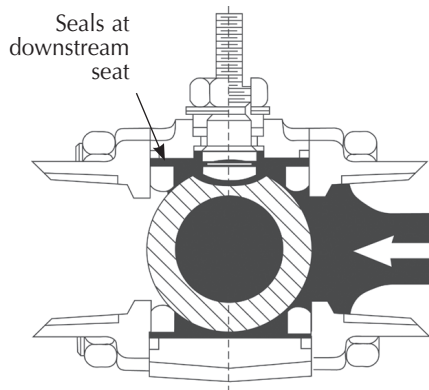
Features

- ASME BPE Compliant
- Low controlled Ferrite, Cast and Forged
- 2, 3, 4, and 5-Way Configurations
- Inline Cleanability
- Optional Purge and Drain Ports
- Material Test Reports on Wetted Parts
- FDA and USP Class VI Compliant Elastomers
- US, DIN, & ISO True-Bore® Port Diameters
- In-house Polishing and Electropolishing
- Full Range of Automation and Controls
- Available in Stainless, Hastelloy, & Exotic Materials
- Optional Clean Steam and Trap Design

Adjust-O-Seal®

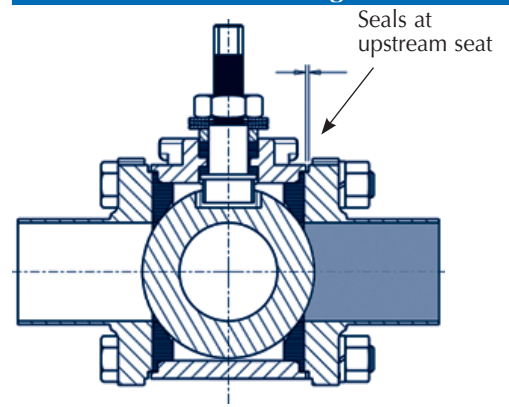
- PBM valves provide bidirectional upstream sealing. Seats are compressed tightly against the ball in the valve.
- Body bolts can be tightened to compensate for normal seat wear without having to remove the valve from service.

Competitor's Design



Line pressure pushes ball downstream in the ball-closed position, providing sealing at the downstream seat. There is no adjustment to compensate for seat wear.

PBM's Design



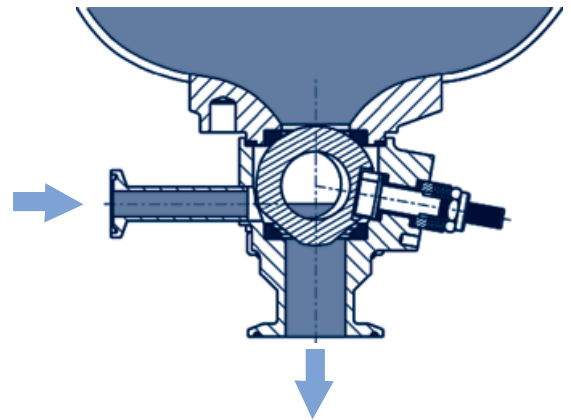
Valve body bolts compress valve seats against the ball, providing bidirectional sealing at the upstream seat. To compensate for seat wear, body bolts can be slightly tightened to re-compress seats against ball.

PBM valves offer value over the life of the product with:

- Fewer process interruptions
- Longer Life
- Clean/drain without process interruption
- Improved product yields

PBM also offers:

- On-time delivery
- Documentation
- Solutions to tough applications



This means on valves mounted vertically like PBM's angle stem flush tank valve, the valve seals on the upstream seat, thus allowing the body to be purged and drained without process interruption.

Table of Contents

ITEM	PAGE
Features	2
Ordering Information, Product Codes	4-5
Materials of Construction, Alloys	6
Seat & Seal Materials, O-ring Materials	6
Allowable Working Pressures and Temperatures	7
Cv Factors	8
Polish Standards and Finishes	8
Torque Values	9
Testing	10
Available Options	10-11
Written Specifications	12-13
DIMENSIONAL INFORMATION, MANUAL & AUTOMATED	
SI and CS Series Igenix® 2-way, Forged and Cast	14-17
FI Series Igenix® Flush Tank	18
DI Series Igenix® 3-Way Diverter	19
Fire-Rated Valves	20-21
Angle Stem Flush Tank	22-23
MI Series Igenix® 3, 4, & 5-Way Multi-Port	24-25
Flow Patterns for 3, 4, and 5-way Valves	26-27
UNIQUE APPLICATION VALVES	
Igenix® Trap Valves	28
Sanitary Check Valves, Vertical and Horizontal	29
Rising Stem Sampling Valves	30
Igenix® Radial Diaphragm Tank Valves	31
Self-Cleaning Ball Valve	32
Igenix® Pinch Valves	33
Flush Tank Sampling Valve	34
Spray Ball Valve	34
Z-Ball™ - Zero Dead Leg Ball Valve	35
Fabflex® Manifolds, Process Break Valves	36
Sanitary Igenix® Block & Bleed Valves	37
Igenix® Control Valves, V-ball	37
Automation & Controls	38-39
REPRESENTATIVE LOCATIONS	
Representative Locations	40



Ordering Information

VALVE CONFIGURATION ORDERING INFORMATION ¹

Number(s) in parentheses indicate valve configuration part number position
PBM part numbers can have up to 20 alpha-numeric characters

Part Number Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Part Number Code example	S	I	H	F	E	9	F	-	G	-	-	-	3	4	A	-	S	X	X	X

SANITARY VALVES												
PRODUCT (1-2)		MATERIAL ² (3-4)		SIZE (5)		SERIES (6)		END CONNECTION ³ (7-8)		SEAT & SEAL / FILLERS / O-RINGS (if used) ⁴ (9)		
										SEAT	FILLER	O-RING
AF	Angle Stem	C-	Hastelloy® C-276	A	¼	1	Series 1	A-	Acme Bevel	C	VT	VI
CS	Clean Steam	H-	316 / 316L Stainless	B	¾	3	Series 3	F-	Ext tube butt weld	D	VT	VI
CT	Clean Steam Trap	HC	Alloy 20	C	½	4	Series 4	G-	Female CBI ⁷	G	TF	VI
DI	Diverter Port	HL	316L Stainless	D	¾	5	Series 5	H-	Male CBI ⁷	H	HT	VI
DC	Diverter (Steam)	HF	F316L Forged	E	1	6	Series 6	I-	Swagelok TS	I	HT	VT
FI	Flush Tank	H2	317L Stainless	G	1½	8	Series 8	SM	Compression	J	TF	VT
FC	Flush Tank (Steam)	I-	Inconel® 600	H	2	9	Series 9	W-	clamp 1" BPE 09	K	UT	VI
MI	Multi-Port	P-	AL6XN	J	2½			X-	Hygienic clamp	L	UT	VT
SI	Sanitary 2-way	T-	Gr. 5 Titanium	K	3			Z-	No end fittings	M	UT	VI
		T2	Gr. 2 Titanium	L	4					N	PK	KA
		T7	Gr. 7 Titanium	M	6					O	PK	VT
PV	see page 23	Y-	Hastelloy® C-22®							P	PK	PK
RD	see page 24	5-	Inconel® 625					3	Non Adjust-O-Seal®	R	PK	KA
S-	see page 25	25	254SMO® 6Mo					4	Reduced port	S	KY	VI
S2	see page 25	21	321 Stainless					5	Non Adjust-O-Seal® & Reduced port	T	VT	EP
S3	see page 25	22	Duplex 2205					7	Flat-faced flanges	U	VT	VT
		76	Super Duplex 32750 / 32760					9	Bar-stock	X	PC	VI
		55	Ferrallium 255							Z	TF	EP
										0	HT	EP
										1	HT	VT
										2	TF	VT
										3	UT	EP
										4	UT	VT
										5	UT	EP
										6	PK	VI
										7	VT	VV
										9	TF	VV

CURRENT PRODUCT SERIES	
1	AF, PV, RD Bronze DP & MP, Ductile Iron MP
3	AF (Fire-safe API-607)
4	Stainless & Carbon Steel MP, Stainless MI (300# class maximum)
5	AN, DD, DP, FD, FT, Stainless MI ⁸ , Stainless MP ⁸ , SP, SD
6	AN, FI, SI, SP, FT (Fire-safe API-607)
6	CN, CP (Fire-Safe API-607), CD (not fire-safe)
8 & 9	CS, CT, DC, DI, FC, FI, SI

STEAM vs. SEAT COMPATIBILITY	
VTFE	• ≤75psig at ≤320°F
TFM™ / RTFE	• ≤150psig at ≤366°F
S-TEF®	• ≤200psig at ≤388°F
PEEK	• ≤320psig at ≤425°F

SEAT / SEAL / MATERIAL CODES	
CG	Carbon-Graphite
HT	S-TEF®
KY	Kynar®
PC	PCTFE (Kel-F)
PK	PEEK®
RT	RTFE
TF	TFM™
UT	UHMWPE
VT	VTFE
CG	Carbon-Graphite

O-RING MATERIAL CODES	
EP	EPR
KA	Kalrez®
VI	Viton™
VV	PTFE Encapsulated Viton™

O-RINGS ARE NOT USED IN ALL VALVE PRODUCTS – SEE EACH RESPECTIVE PAGE

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 valves with 2 different end connections, use both end codes - e.g. - FX = extended butt weld for tube by clamp. ⁴ - 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. ⁵ - PBM reserves the right to use 922 Bronze in place of 836 Bronze without notification. ⁶ - All Carbon Steel and Ductile Iron valves may 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 and Ductile Iron cast products are painted (black in color) externally prior to Rust Veto coating. ⁷ - only available 1" through 6". ⁸ - 150# class maximum. ⁹ Requires 17-4PH stem

Ordering Information cont'd

Part Number Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Part Number Code example	S	I	H	F	E	9	F	-	G	-	-	-	3	4	A	-	S	X	X	X

INDUSTRIAL & SANITARY VALVE OPTIONS

FLOW PATTERN / TANK PAD / PURGE OPTIONS (10 & 11)	BALL / STEM OPTIONS (12)	OPERATOR OPTIONS (13 & 14)	POLISH OPTIONS (15)
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<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 COMMON FLOW PATTERNS</p> <p>FLUSH TANK OPTIONS (** POSITION 10 & 11 **)</p> <p>-- Standard flush tank weld pad 02 Less tank weld pad but with plastic or wood shipping pad</p> <p>05 w/1" bolt-on tank pad 06 w/1.5" bolt-on tank pad 07 w/2" bolt-on tank pad 08 w/3" bolt-on tank pad 09 w/4" bolt-on tank pad 10 w/6" bolt-on tank pad 11 w/8" bolt-on tank pad</p> <p>PURGE PORT OPTIONS (** POSITION 10 ONLY **)</p> <p>- No purge option(s) selected¹ 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</p> <p>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</p> <p>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 **)</p> <p>- 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 K Ball with vent hole (downstream) L Ball with (2) crown flats V Standard width slotted ball W 30° V-ball X 45° V-ball Y 60° V-ball 7 Self-flush ball with flats closed downstream 8 Self-flushing ball 9 Ball with vent hole (upstream)</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, Silicon Bronze 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 handwheel¹ 02 w/o handle, w/stem actr prep 03 w/handle, w/stem actr prep 04 Locking lever handle 05 w/stainless oval handwheel¹ 07 w/45° handle 08 w/gear operator 09 w/T-handle 10 w/manual spring return handle² 11 w/fusible link SR handle (165°F)³ 12 w/vane actr for 80psig 13 w/GP electric actuator 14 w/XP electric actuator 17 w/ext lockable oval handwheel - long¹ 18 w/ext lockable lever handle - long 71 w/ext lockable lever handle - short 72 w/ext lockable oval handwheel - short¹</p>	<p>- No polish A 20Ra ID B 32Ra OD C 20Ra ID / 32Ra OD D 15Ra ID E 10Ra ID F 20Ra ID after EP G 15Ra ID after EP H 10Ra ID after EP I 5Ra ID K 5Ra ID / 32Ra OD L 20Ra ID / 32Ra OD / EP M EP ID N 10Ra ID / 32Ra OD O 15Ra ID / 32Ra OD / EP Q 15Ra ID / 32Ra OD S 10Ra ID / 32Ra OD / EP</p>
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<p>24vdc 24vdc 24vdc 24vdc 24vdc 24vdc PBM, Asco & Westlock combo</p> <p>55 DA80 psig actr & GP Sol ↔ 56 DA80 psig actr & GP LS & Sol ↔</p> <p>57 DA80 psig actr & XP Sol ↔ 58 DA80 psig actr & XP LS & Sol ↔</p> <p>59 DA60 psig actr & GP Sol ↔ 60 DA60 psig actr & GP LS & Sol ↔</p> <p>61 DA60 psig actr & XP Sol ↔ 62 DA60 psig actr & XP LS & Sol ↔</p> <p>63 SR80 psig actr & GP Sol ↔ 64 SR80 psig actr & GP LS & Sol ↔</p> <p>65 SR80 psig actr & XP Sol ↔ 66 SR80 psig actr & XP LS & Sol ↔</p> <p>67 SR60 psig actr & GP Sol ↔ 68 SR60 psig actr & GP LS & Sol ↔</p> <p>69 SR60 psig actr & XP Sol ↔ 70 SR60 psig actr & XP LS & Sol ↔</p>	<p>120vac 120vac 120vac 120vac 120vac PBM, Asco & Westlock combo</p> <p>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 28 DA60 psig actr & GP LS 29 DA60 psig actr & GP Sol 30 DA60 psig actr & GP LS & Sol 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 51⁴ DA80 psig actr & position indicator 52⁴ DA60 psig actr & position indicator 53⁴ SR80 psig actr & position indicator 54⁴ SR60 psig actr & position indicator</p>
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<p>LOX & BOLTING OPTIONS (16)</p> <p>- No option(s) required L LOX cleaning per PBM procedure</p> <p>M LOX & CRN bolting Z CRN bolting</p>	<p>SPECIAL ENGINEERING # (17-20)</p> <p>Special engineering number columns - consult PBM</p> <p>EXAMPLE: SXXX suffix at end of standard PBM part number</p> <p>SXXX = 2016 TXXX = 2017 UXXX = 2018 VXXX = 2019 WXXX = 2020 YXXX = 2021 YXXX = 2022 ZXXX = 2023</p>
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<p>Standard Asco solenoids (120vac & 24vdc) GP - WT8551A001MS XP - EF8551A001MS - solenoids are not wired to position monitors</p> <p>Standard Westlock position monitors GP - 2004NBY2A2M0200 XP - 2007NBY2B2M0200</p> <p>Standard TopWorx position monitor GP / XP - TXP-M21GNEM</p> <p>Standard TopWorx proximity position monitor GP / XP - TXP-P21GNEM</p>	<p>PBM, Asco & Topworx combo - 120vac</p> <p>73 DA80 psig actr & GP Sol 74 DA80 psig actr, XP LS+GP Sol 75 DA80 psig actr, XP LS+XP Sol 76 DA60 psig actr & XP LS 77 DA60 psig actr & XP LS+GP Sol 78 DA60 psig actr & XP LS+XP Sol 79 SR80 psig actr & XP LS 80 SR80 psig actr, XP LS+GP Sol 81 SR80 psig actr, XP LS+XP Sol 82 SR60 psig actr & XP LS 83 SR60 psig actr & XP LS+GP Sol 84 SR60 psig actr & XP LS+XP Sol 85 DA80 psig actr & XP Prox 86 DA80 actr, XP Prox+XP Sol 87 DA60 psig actr & XP Prox 88 DA60 actr, XP Prox+XP Sol 89 SR80 psig actr & XP Prox 90 SR80 actr, XP Prox+XP Sol 91 SR60 psig actr & XP Prox 92 SR60 actr, XP Prox+XP Sol</p>
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<p>Polish Notes</p> <ul style="list-style-type: none"> On ID polished valves, the body, ball, seat retainer (if applicable) and end fittings are polished On ID/OD polished valves, the body, ball, seat retainer (if applicable), and end fittings are polished On ID+EP polished valves, the body, ball, seat retainer (if applicable), end fittings are polished. Stem is EP^d 	<p>Automation Notes</p> <ul style="list-style-type: none"> ¹ for 2" and smaller valves ² for 1 1/2" and smaller valves ³ for 3" and smaller valve ⁴ consult PBM for beacon indicators <p>Abbreviation Index</p> <p>GP = General Purpose XP = Explosion Proof LS = Limit Switch Sol = Solenoid - N/C DA = Double Acting SR = Spring Return - FCW</p>
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Materials

316L Stainless Steel

Castings comply with A351, Alloy CF3M.

Forgings (Series 8) comply with A182, Alloy F316L and 1.4404.

Bar product complies with A479, Alloy S31603.

Cast weld pads comply with SA 351, Alloy CF3M and wrought weld pads comply with SA 479, Alloy S31603.

- Has a low (<0.03%) carbon level to reduce carbide precipitation.
- Is extremely corrosion resistant to acidic and basic environments and does not pit easily.
- Can be mechanically polished to a near-mirror finish for easy clean ability (electro polishing also available).
- Is preferred for sanitary and biotechnological uses.
- Extended butt weld ends have a sulfur content of 0.005 to 0.017% to support orbital welding.
- Low controlled ferrite cast product is available for all product lines. Standard ferrite level of Series 8 forgings is less than 1% and standard ferrite level of Series 9 castings is also low controlled.

Other

- Additional materials available include AL6XN[®], duplex stainless, Hastelloy[®] alloys, Alloy 20, titanium alloys, and Inconel[®] alloys.

Seat and Seal Materials

Designation	Description	Color	Purpose
TFM [™]	Chemically Modified PTFE PBM Standard for Series 6, 7, 8, 9	White	Suitable for applications up to 400°F. This chemically modified PTFE material is PBM's standard seat and seal material. It combines the ruggedness of a filled PTFE with the low coefficient of friction of virgin PTFE. TFM [™] also has much improved porosity control and deformation under load when compared to PTFE grades. FDA and USP Class VI compliant. Meets bubble-tight seat leakage.
VTFE	Virgin PTFE	White	Suitable for applications up to 350°F. A low stem torque material ideal for sanitary use. FDA and USP Class VI compliant. Meets bubble-tight seat leakage.
S-TEF [®]	Stainless Steel Reinforced PTFE	Charcoal Gray	Suitable for applications up to 450°F. A suitable material for higher pressure/temperature applications. Higher stem torque than virgin grades and TFM [™] . USP Class VI compliant. Meets bubble-tight seat leakage.
UHMWPE	Ultra High Molecular Weight Polyethylene	Off White	Suitable for applications under 200°F. An extremely wear resistant material having a wear rate about 1/10th that of PTFE. FDA compliant and is used in high cycle applications where possible. Meets bubble-tight seat leakage.
PEEK [®]	Poly Ether Ether Ketone	Putty	For applications up to 500°F. PEEK [®] is a rugged, high strength material having fairly high stem torque. FDA compliant. PBM's PEEK [®] is 10 weight percent PTFE to reduce the hardness of virgin PEEK [®] . FDA compliant and meets Class V seat leakage.
KYNAR [®]	Polyvinylidene Fluoride	Slightly Transparent White	Suitable for applications under 250°F. Kynar [®] has been used successfully in abrasive service and is suitable for radiation environments where gamma levels accumulate to 1,000 megarads. FDA and USP Class VI compliant. Meets bubble-tight seat leakage.

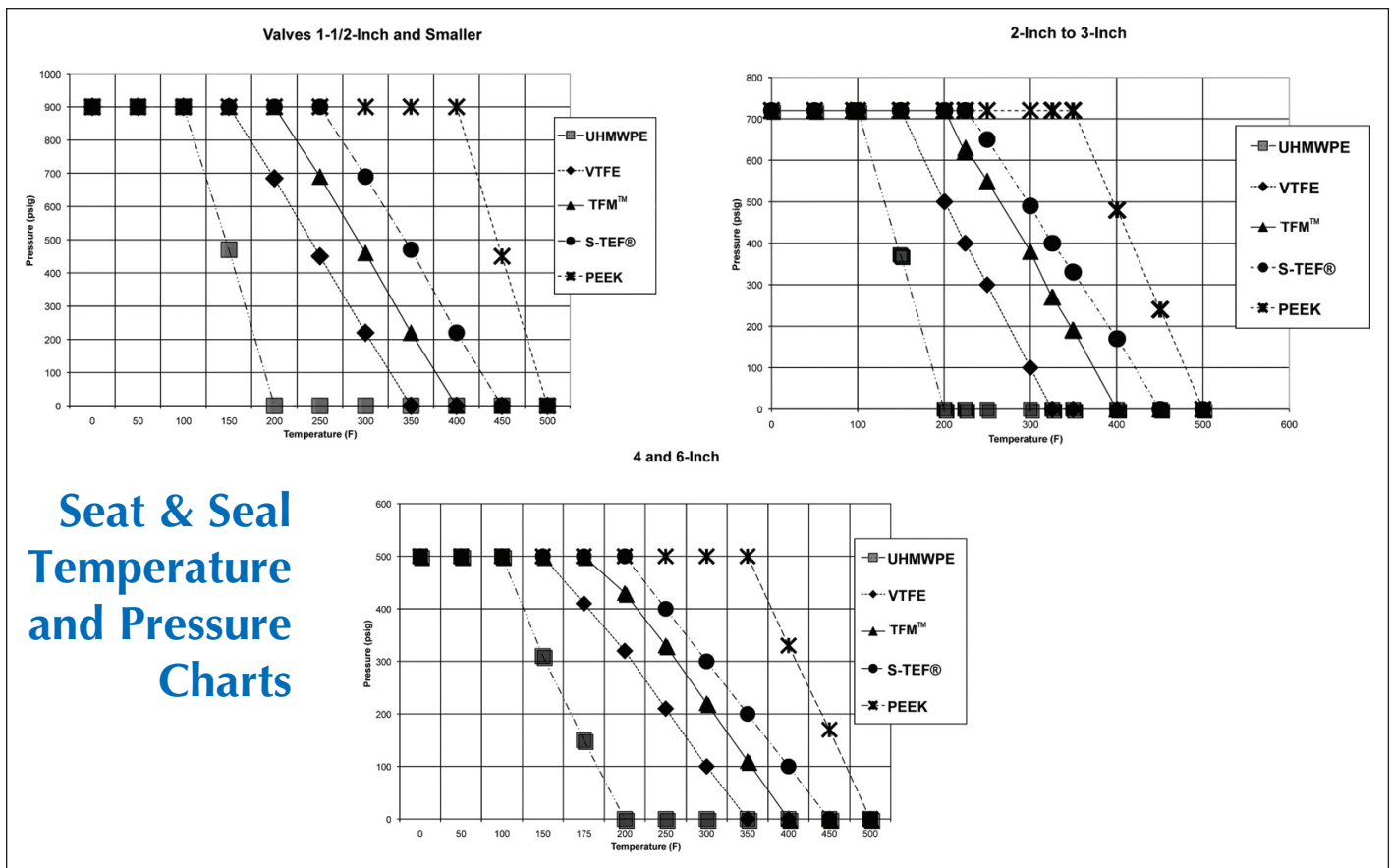
NOTES:

1. PTFE is Polytetrafluorethylene.
2. Seat and seal materials may be mixed in a valve in order to provide media-compatibility and the appropriate torque, temperature and pressure ratings.
3. Temperature ratings based on 0 psi. See Pressure & Temperature Charts on page 8.

Allowable Working Pressures (psig, barg)

Non-Flanged Valve Style/Series	Material	Size	-20°F to 100°F/ -28.9°C to 37.8°C		300°F/148.9°C		450°F/232.2°C	
			psig	barg	psig	barg	psig	barg
			Inches/DIN					
SI, FI Series 6	316 SS/316L	3" (DN80) and under	720	49.6	620	42.7	540	37.2
SI, CS, DI, DC Series 8	316 SS/316L	All	600	41.4	455	31.4	397	27.4
		C-276	740	51.0	655	45.2	620	42.7
SI, CS, DI, DC Series 9	316 SS/316L	1-1/2" (DN40) and smaller	900	62.1	770	53.1	680	46.9
		2" (DN50) thru 4" (DN100)	720	49.6	620	42.7	540	37.2
		6" (DN150)	375	25.9	320	22.1	280	19.3
	C-276	4" (DN100) and smaller	600	4.14	510	35.2	450	31.0
		6" (DN150)	375	25.9	320	22.1	280	19.3
MI Series 5	316 SS/316L	All	275	19.0	205	14.1	195	13.4
AF Series 1	316 SS/316L	1-1/2" (DN40) and smaller	900	62.1	770	53.1	680	46.9
	316 SS/316L	2" (DN50), 4" (DN100)	550	37.9	540	37.2	525	36.2
	316 SS/316L	3" (DN80)	625	43.1	610	42.1	600	41.4
	316 SS/316L	6" (DN150)	375	25.9	365	25.2	360	24.8
	C-276	1-1/2" (DN40) and smaller	600	41.4	520	35.9	475	32.8
	C-276	2" (DN50), 4" (DN100)	550	37.9	540	37.2	525	36.2
	C-276	3" (DN80)	600	41.4	520	35.9	475	32.8
	C-276	6" (DN150)	375	25.9	320	22.1	280	19.3
AF Series 3	316 SS/316L	1-1/2" (DN40) and smaller	720	49.6	620	42.7	540	37.2
	316 SS/316L	2" (DN50), 4" (DN100)	550	37.9	540	37.2	525	36.2
	316 SS/316L	3" (DN80)	625	43.1	610	42.1	600	41.4
	316 SS/316L	6" (DN150)	375	25.9	365	25.2	360	24.8
FI, FC Series 8 & 9	316 SS/316L	4" (DN100) and smaller	600	4.14	510	35.2	440	30.3
	316 SS/316L	6" (DN150)	375	25.9	320	22.1	280	19.3
	C-276	4" (DN100) and smaller	600	4.14	510	35.2	440	30.3
	C-276	6" (DN150)	375	25.9	320	22.1	280	19.3

- Notes:
1. 316 SS and C-276 retain their CWP below minus 20°F.
 2. All valves rated for full vacuum.
 3. Sanitary clamps and gaskets may limit pressure ratings to less than shown above.





Cv Values (gpm)

Cv is defined as the number in U.S. gallons of water per minute, at ambient temperature, that will flow through a valve at 1 psi pressure drop.

VALVE SIZE	2-WAY SI, CS				FLUSH TANK FI SERIES 8 & 9 AF SERIES 1			DIVERTER PORT SERIES 8 & 9			MULTI-PORT SERIES 5		CT Valves	
	SERIES 8 & 9		FIRESAFE SI		AF	FI	FIRESAFE FI	DI SERIES, X-ENDS			MI SERIES 5, X-ENDS		Trap Position	
	End Connection				End Connection			L-PORT	T-PORT		T-PORT		L-PORT	Series
	F-	X-	F-	X-	X-	X-	X-		Straight	Branch	Straight	Branch		8 & 9
1/2"	6.5	8	7	8		8.9	8.9	4.0	4.7	3.0	3.8	2.5	3.8	0.41
3/4"	23	28	24	28		34	34	12	15	9.0	12	7	12	0.72
1"	55	65	55	60	63	62	62	25	29	18	25	15	25	0.96
1 1/2"	160	193	160	190	150	175	175	68	81	49	66	40	66	2.8
2"	365	420	370	420	280	480	480	133	160	92	129	78	129	2.7
2 1/2"	700	800	700	800										
3"	900	1,040	850	1000	505	870	870	324	390	233	310	185	310	5.4
4"	1,800	2,080	1600	1900	690	1,550	1,550	590	715	430	570	340	570	15
6"	4,200	5,000	4200	5000	1,430	3,750	3,750	1,450	1,750	1,040				

* F- (extended butt weld) end
* X- (Sanitary) end

ID Surface Finish. Ra Readings for Valves per ASME BPE (Bioprocessing Equipment)

PBM's IGENIX® forged valves have a standard internal polish of 20 R_a Max/0.50 µm or better.

Surface Description	PBM Polish Code	Ra max.	
		µ-in.	µm
		Mechanical Polish	
SF 1	A	20	0.51
SF 2	A	25	0.64
SF 3	-	30	0.76
		Mechanical polish and electropolish	
SF 4	G	15	0.38
SF 5	F	20	0.51
SF 6	F	25	0.64

Default Polish:
Series 8 - 20 Ra (SF-1)
Series 9 - 30 Ra (SF-3)

Polish Notes:
- On ID polished valves, the body, ball, seat retainer (if applicable) and end fittings are polished.
- On ID/OD polished valves, the body, ball, seat retainer (if applicable) and end fittings are polished.
- On ID+EP polished valves, the body, ball, seat retainer (if applicable), end fittings are polished. Stem is EP'd.
- PBM achieves surface finishes without the use of ADIs (Animal Derived Ingredients).

O-Ring and Seat Compliancy

Material		Compliancy	
		FDA	USP Class VI
EPR O-ring*	E3609-70	Yes	Yes
Seat	Virgin TFM™	Yes	Yes

*O-rings used in "Clean Steam" Series CS, CT, FC, DC and SI, FI, AF Firesafe.

Stem Torque

Valve Style/ Series	Valve Size (in.)	As built Torque		TFM™ and VTFE Seats - Differential Pressure across Seats															
				0 psig	0 barg	100 psig	6.9 barg	200 psig	13.8 barg	300 psig	20.7 barg	400 psig	27.6 barg	500 psig	34.5 barg	600 psig	41.4 barg	700 psig	48.3 barg
		in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m
Fire-safe Series 6	1/4, 1/2	32	3.6	64	7.2	64	7.2	64	7.2	64	7.2	64	7.2	64	7.2	64	7.2	64	7.2
	3/4	40	4.5	80	9.0	80	9.0	80	9.0	80	9.0	80	9.0	96	10.8	112	10.8	128	12.7
	1	58	6.6	116	13.1	116	13.1	116	13.1	150	16.9	185	20.9	220	24.9	trun.			
	1-1/2	154	17.4	308	34.8	308	34.8	440	49.7	580	65.5	715	80.8	trun.	trun.				
	2	182	20.6	364	41.1	364	41.1	635	71.7	910	102.8	1,180	133.3	trun.	trun.				
	2-1/2	288	32.5	576	65.1	576	65.1	1,200	135.6	1,600	180.8	trun.							
	3	430	48.6	860	97.2	860	97.2	1,560	176.3	trun.	trun.								
	4	787	88.9	1,570	177.4	1,570	177.4	2,650	299.4	trun.	trun.								
6	1,920	217.0	3,840	433.9	7,100	802.3	Use trunnion above 75 psig.												
All Series 8 & 9 2-Way and 3-Way	1/2	25	2.8	50	5.7	50	5.7	50	5.7	50	5.7	50	5.7	50	5.7	50	5.7	50	5.7
	3/4	30	3.4	60	6.8	60	6.8	60	6.8	60	6.8	60	6.8	60	6.8	60	6.8	80	9.0
	1	50	5.7	100	11.3	100	11.3	100	11.3	130	14.7	160	18.1	220	24.9	trun.	trun.		
	1-1/2	132	14.9	264	29.8	264	29.8	375	42.4	500	56.5	600	67.8	trun.	trun.				
	2	182	20.6	364	41.1	364	41.1	635	71.8	910	102.8	1,180	133.3	trun.	trun.				
	2-1/2	288	32.5	576	65.1	576	65.1	1,200	136	1,600	181	trun	trun.						
	3	430	49	860	97.2	860	97.2	1,560	176	trun.	trun.								
	4	672	76	1,340	151	1,340	151	2,250	254	trun.	trun.								
6	1,920	217	3,840	434	7,100	802	Use trunnion above 75 psig.												
AF Series 1 and Series 3	1	58	6.6	116	13.1	116	13.1	116	13.1	150	17.0	185	20.9	220	24.9	255	28.8	288	32.5
	1-1/2	132	14.9	264	29.8	264	29.8	375	42.4	500	56.5	600	67.8	725	81.9	850	96.1	950	107
	2	154	17.4	308	34.8	308	34.8	440	49.7	580	65.5	715	80.8	850	96.1				
	3	336	38.0	675	76.3	675	76.3	1,400	158	1,900	215	2,400	271	2,900	328	3,400	384		
	4	432	49	860	97.2	860	97.2	1,560	176	2,050	232	2,540	287	3,030	342				
	6	1,056	119	2,100	237	3,950	446												
Valve Series	Size	As built Torque		0 psig	0 barg	100 psig	6.9 barg	200 psig	13.8 barg	275 psig	19.0 barg								
MI Series 5	1/2	67	7.6	135	9.3	142	9.8	149	10.3	154	10.6								
	3/4	80	9.0	160	11.0	167	11.5	174	12.0	182	12.5								
	1	154	17.4	307	21.2	322	22.2	337	23.2	358	24.7								
	1-1/2	313	35.4	627	43.2	670	46.2	759	52.3	843	58.1								
	2	491	55.5	981	67.6	1,037	71.5	1,238	85.4	1,388	95.7								
	3	840	95.0	1,679	115.8	2,084	143.7	2,761	190.4	3,268	225.3								
4	1,539	173.9	3,077	212.2	4,114	283.7	5,580	384.7	6,679	460.5									

Notes:

1. For valves with UHMWPE seats, multiply the above values by 1.25
2. For valves which have S-TEF® or Kynar® seats, multiply the above values by 1.56.
3. For valves with PEEK® seats, multiply the above values by 1.7.
4. Where trunnion is indicated, PBM recommends trunnion mounting the ball to avoid excessive seat loads and stem torques.
5. To convert in.-lbs. torques to N-m, multiply by 0.113.



Testing

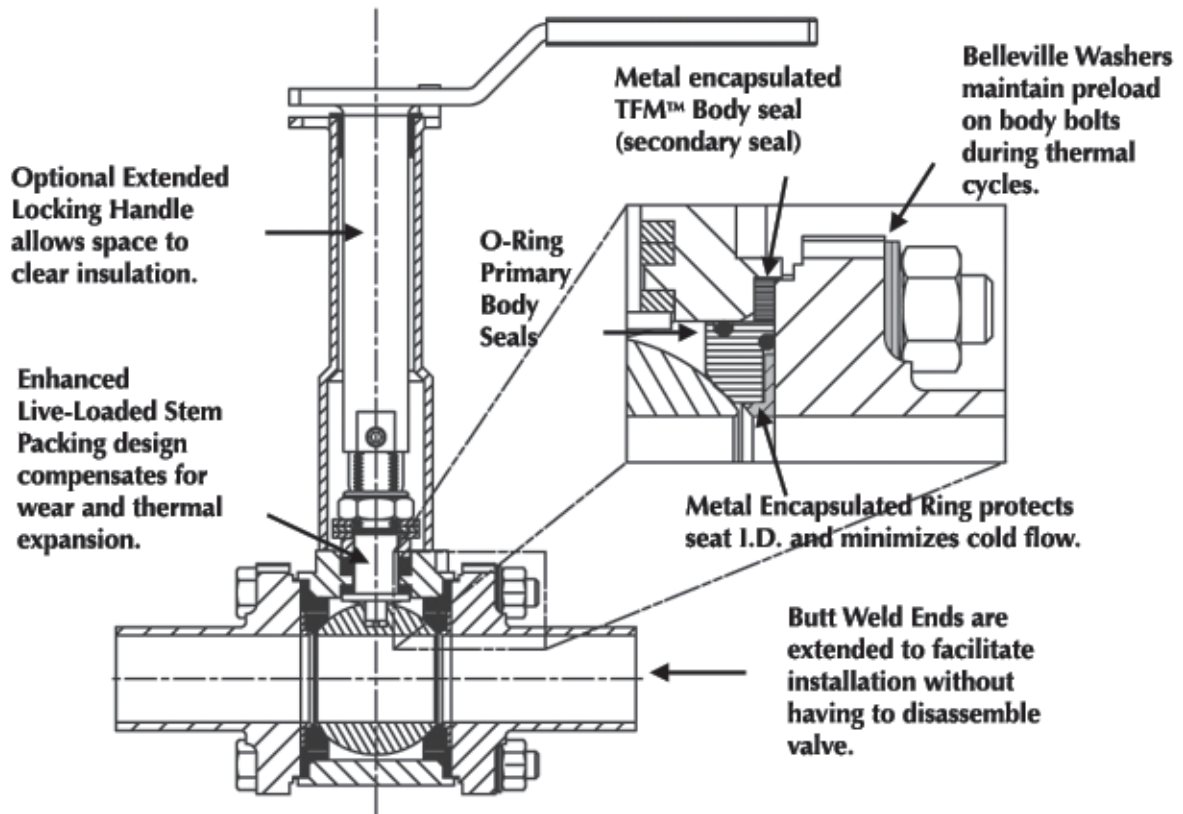
- Vacuum Testing*
- Cycle Testing
- Shock and Vibration
- Seismic
- Hydrostatic
- Material Test Reports
 - Physical testing
 - Chemical testing

Options

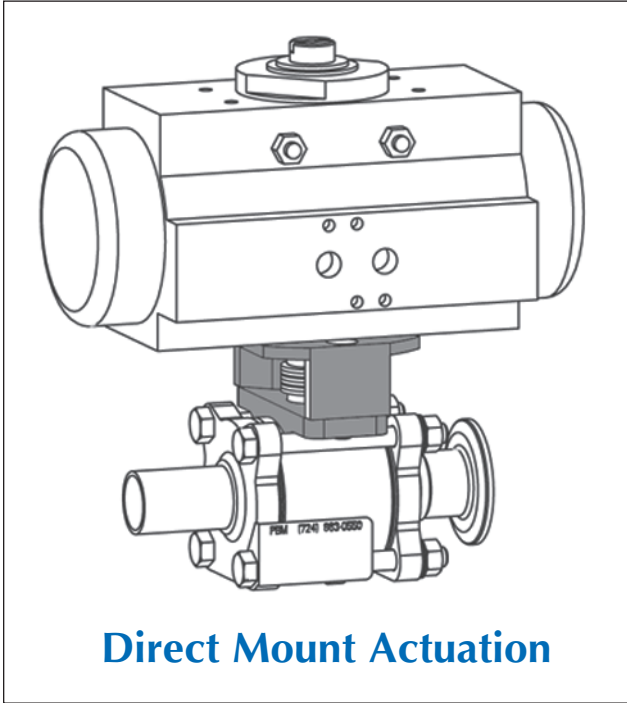
- Cryogenic
- Manual Spring Return Handles
- LOX (Cleaned for Oxygen Service)
- Body Cavity Fillers
- Steam Seats (Encapsulated)
- Purge Ports (SIP/CIP)
- Fire Rated, API 607
- Dribble Control Units
- High Alloys
- Fabflex® Manifolds
- Self Cleaning Flushable Ball
- V-Balls for Flow Control
- Internal & External Grounding
- Mechanical & Electro-Polishing
- Direct Mount Actuation
- Positioners
- Fieldbus, AS-i, DeviceNet
- Ball Flats and Purge Holes
- Locking Handle
- Extended Locking Handle
- Cylindrical Radius Weld Pads

*PBM valves are ideally suited for vacuum service. For valves intended for vacuum service, PBM offers optional helium leakage test of the seats and shell. Also, the seats of the valve are helium leakage tested. PBM valves will meet a leakage rate of 1×10^{-6} std. cc/sec. helium leakage for both tests.

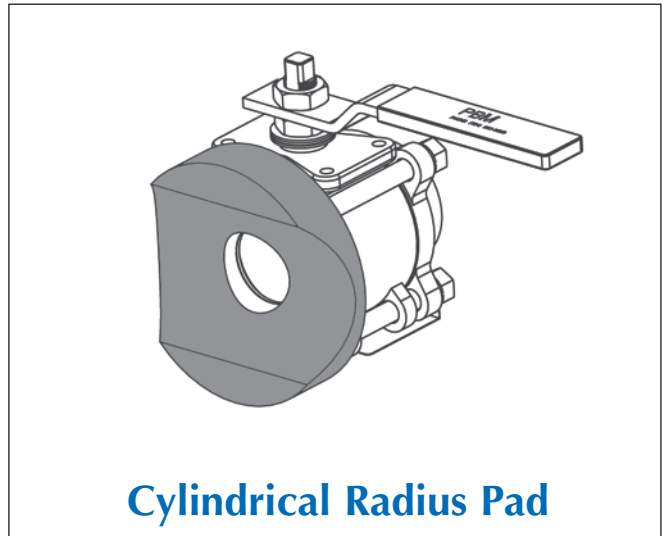
Steam Valves



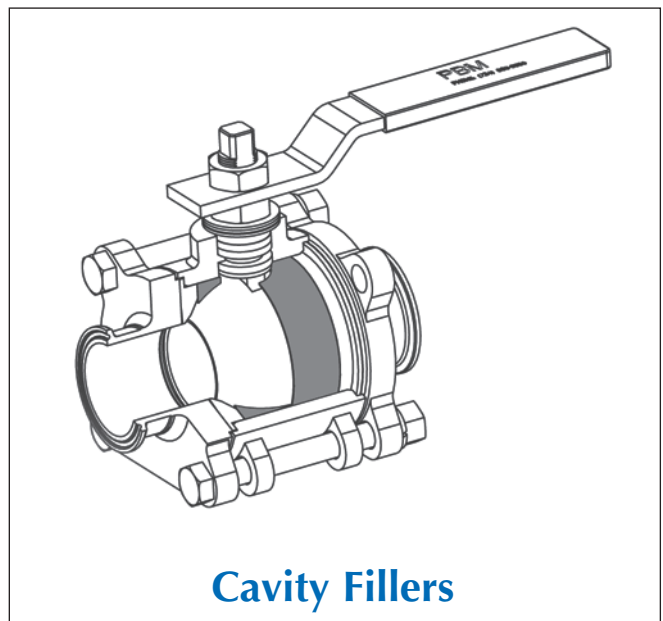
Options



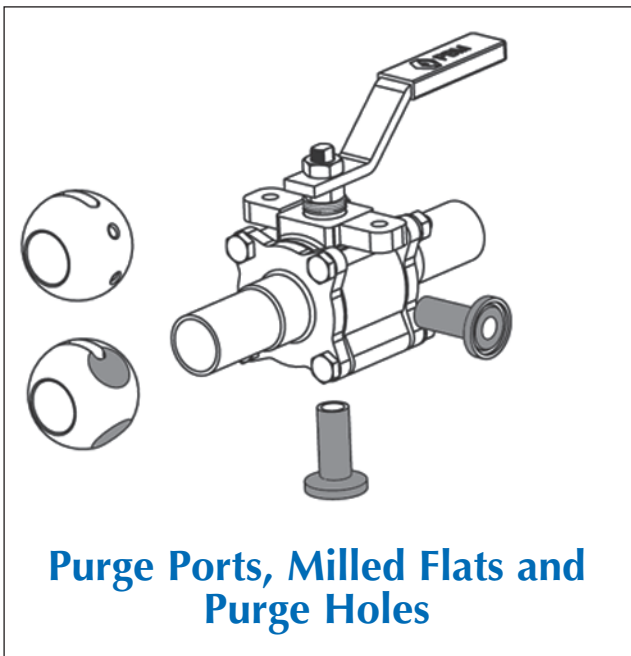
Direct Mount Actuation



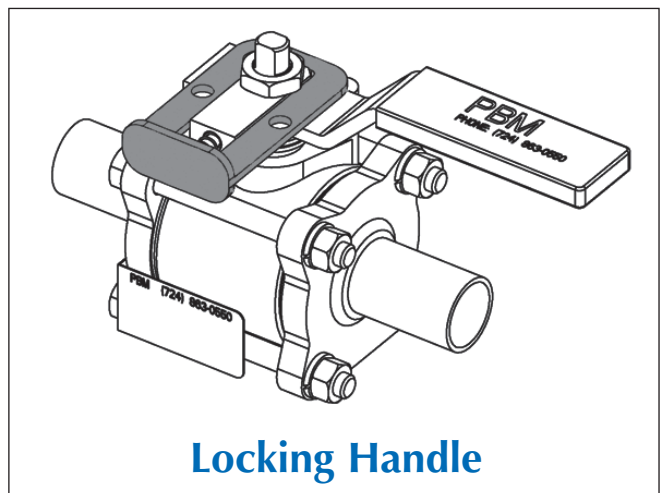
Cylindrical Radius Pad



Cavity Fillers



Purge Ports, Milled Flats and Purge Holes



Locking Handle



Written Specifications

FORGED VALVES

SI-SERIES 8 (1/2" through 4", DIN 11850 DN 8 through DN 100, ISO 1127 DN 8 through DN 80) PBM's Forged IGENIX® Sanitary Series 8, "True Bore®" ball valve with port through ball, seats, and end fittings same as ID of tubing. Forged 316L stainless steel body and end fittings per ASTM A182F316L / DIN 1.4404, wrought or forged 316L ball and stem, less than 1% ferrite, three piece swing-out valve design. Seats and seals shall be white TFM™. Seats shall provide both upstream and downstream bubble-tight seal and be adjustable for inline wear. Stem packing shall be live loaded white TFM™ and S-TEF® material. End fittings shall match to tubing connections. Orbital weld end fittings should have wall thickness to match connecting tubing and have a controlled sulfur content of 0.005% through 0.017%. Valves shall not require disassembly for welding. Body bolts and nuts shall be 18-8 stainless steel. Interior surfaces shall be 20 RA or better with optional electropolish and finer mechanical finishes. Valve shall have integral mounting pad to allow adaptation to ISO 5211 for direct mount automation. All materials are FDA and USP23 Class VI compliant. Maximum working pressure to be 600 PSIG, but is limited based on valve size, valve material and end fitting type. Valves are full vacuum. To add automation and controls, see section "Automation and controls".

PBM Model number SI (material)(size)8(end connection);

CS-SERIES 8 (1/2" through 4", DIN 11850 DN 8 through DN 100, ISO 1127 DN 8 through DN 80) PBM's IGENIX® Clean Steam Series 8. Same Specification as SI-Series 8 above. Add text "Seats and seals shall be white TFM™ with FDA approved EPR O-ring energizer. Seats shall have stainless steel encapsulation on ID. Body seal shall be FDA approved EPR o-rings with white TFM™ back up seal. Optional 300 Series stainless steel stem extension with locking lever handle for thick installation.

PBM Model number CS (material)(size)8(end connection); Trap valve model number CT (material)(size)8(end connection)

CAST VALVES

SI-SERIES 9 (1/2" through 6", DIN 11850 DN 8 through DN 150, ISO 1127 DN 8 through DN 100) PBM's IGENIX® Sanitary Series 9 "True Bore®" ball valve with port through ball, seats, and end fittings same as ID of tubing. Type (316 L stainless steel with low controlled ferrite, Hastelloy® C-276 or C22®, or other) body, ball, stem, and end fittings, three piece swing-out valve design. Seats and seals shall be combined "cartridge" and be white TFM™. Seats shall provide both upstream and downstream bubble-tight seal and be adjustable for inline wear. All materials are FDA and USP23 Class VI compliant. Stem packing shall be live loaded white TFM™ or S-TEF® material. End fittings shall match to tubing connections. Orbital weld end fittings should have wall thickness to match connecting tubing and have a controlled sulfur content of .005% through .017%. Valves shall not require disassembly for welding. Body bolts and nuts shall be 18-8 stainless steel. I.D. and O.D. surface finish shall be the same as specified for tubing. Maximum working pressure to be 900 PSIG, but is limited based on valve size, valve material and end fitting type. Valves are full vacuum. Valves shall be non-fire rated design unless otherwise specified. To add automation and controls, see section "Automation and controls".

PBM Model number SI (material)(size)9(end connection)

CS-SERIES 9 (1/2" through 6"): PBM's IGENIX® Clean Steam Series 9, Same specification as SI (cast) above. Add text "Seats shall be white TFM™ with FDA approved EPR O-ring energizer. Seats shall have stainless steel encapsulation on ID. Optional 300 Series s/s stem extensions for thick insulation.

PBM Model number CS (material)(size)9(end connection)

CT-SERIES 8 (forged) OR SERIES 9 (cast): PBM's IGENIX® Clean Steam Series 8 or 9. Same specification as CS forged or cast above. Add text. "Valve shall have a dual chamber seat design to allow for a 1/2" Tri-Clamp® steam drain purge port positioned in the valve body to facilitate drainage of the body cavity to the trap. Ball shall have 2 steam purge holes to allow steam condensate to flow past seats in closed position to trap. Stem packing shall be live loaded white TFM™ and S-TEF®. Provide a 90° 2-position or 180° 3-position stainless steel handle with blue vinyl grip for closed/open, and/or trap isolated valve positions. A locking handle position mechanism shall be available if required.

PBM Model number CT (material)(size)8 or 9(end connection)

FI & AF SERIES

FI-SERIES 9 (1/2" through 6"): Flush tank bottom ball valve: PBM's IGENIX® Sanitary Series 9 Flush Tank Ball Valve. "True Bore®" flush bottom tank ball valve with port through ball, seats, weld pad, and end fitting same as ID of tubing. Type 316L stainless steel with low controlled ferrite, Hastelloy® C-276, Carbon Steel, Hastelloy® C-22®, or other materials for body, ball, stem, weld pad, and end fitting, three piece swing-out valve design. Seats and seals shall be white TFM™. Seats shall provide both upstream and downstream bubble-tight seal and be adjustable for inline wear. Stem packing shall be live loaded white TFM™ and/or S-TEF® material. End fitting shall match to tubing connections. Orbital weld end fittings should have wall thickness to match connecting tubing and have a controlled sulfur content of .005% through .017%. Valves shall not require disassembly for welding. Body bolts and nuts shall be 18-8 stainless steel. I.D. and O.D. surface finish shall be the same as specified for tubing. Maximum working pressure to be 600 PSIG, but is limited based on valve size, valve material and end fitting type. Valves are full vacuum.

PBM Model number FI(material)-(size)9(end connection)

FC-SERIES 9 (1/2" through 6"): PBM's IGENIX® Clean Steam Series 9, Same specification as SI (cast) above. Add text "Seats shall be white TFM™ with FDA approved EPR O-ring energizer. Seats shall have stainless steel encapsulation on ID. Optional 300 Series s/s stem extensions for thick insulation.

PBM Model number FC (material)(size)9(end connection)

AF SERIES 1: Angle Stem Flush Tank Bottom ball valve; Body, ball, stem, and end fitting material shall be (316 stainless steel, Hastelloy® C276, Hastelloy® C-22®, or other). Weld pad shall be 316L grade stainless steel (or other) material (specify). Valve shall be two-piece design. Seats and seals shall be VTFE material and provide both upstream and downstream bubble-tight seal and be adjustable for inline wear. Stem packing shall be live loaded VTFE material. For manual valves, handle shall be 300 series stainless steel. Body bolts and nuts shall be 18-8 stainless steel. Maximum working pressure is 900 psig, but is limited based on valve size, valve material and end fitting type. Valves are full vacuum. Valves shall be non-firesafe design unless otherwise specified. For fire rated valves to API 607 Ed 4, sizes 1" – 6", designate Series 3. To add automation and controls, see last section.

PBM Model number AF(material)-(size)1(end connection)

———— FIRE RATED ————

FIRE RATED 2-WAY, SI- AND FI- 1/2" TO 3", AF 1" TO 6". Add text: Valve design shall be tested and comply with criteria set forth in API-607 edition 4. Valve body bolts shall be fully encapsulated. Body seals shall be graphite material isolated from product stream under normal operation conditions by o-ring seals. Upon sublimation of seat and seal material in the event of a fire condition, a metal back up seat shall seal the valve at leakage rates in accordance with API-607 Ed. 4.

Model Number: Same as above, except Series "9" Changes to "6", Series "1" changes to "3".

———— D SERIES ————

DI-SERIES 9, Three-Way Diverter Port ball valve. "True Bore®" diverter port ball valve with port through ball, seats and end fitting same as ID of tubing. Type (316L stainless steel with low controlled ferrite, Hastelloy® C-276 or C22®, or other) body, ball, stem, and end fittings, three piece swing-out valve design. Seats and seals shall be combined "cartridge" and be white TFM™. Seats shall provide both upstream and downstream bubble-tight seal and be adjustable for inline wear. Stem packing shall be live loaded white TFM™ or S-TEF® material. End fittings shall match to tubing connections. Orbital weld end fittings should have wall thickness to match connecting tubing and have a controlled sulfur content of .005% through .017%. Valves shall not require disassembly for welding. Body bolts and nuts shall be 18-8 stainless steel. I.D. and O.D. surface finish shall be the same as specified for tubing. Maximum working pressure to be 900 PSIG, but is limited based on valve size, valve material and end fitting type. Valves are full vacuum. Valves shall be non-fire rated design. To add automation and controls, see section "Automation and controls".

PBM Model number DI(material)-(size)9(end connection) – (flow pattern)

DC-SERIES 9 (1/2" through 6"): PBM's IGENIX® Clean Steam Series 9, Same specification as SI (cast) above. Add text "Seats shall be white TFM™ with FDA approved EPR O-ring energizer. Seats shall have stainless steel encapsulation on ID. Optional 300 Series s/s stem extensions for thick insulation.

PBM Model number CS (material)(size)9(end connection)

———— M SERIES ————

MI-SERIES 5: Three, Four, or Five Way Multi-port ball valve; body, ball, stem, and end fitting material shall be 316L stainless steel. Valve shall have 4 or 5 TFM™-PTFE Seats and seals and provide bubble-tight seal and be adjustable for inline wear. Stem packing shall be live loaded TFM™-PTFE material. For manual valves, handle shall be 300 series stainless steel. Body bolts and nuts shall be 18-8 stainless steel. Maximum working pressure to be 275 psig. Valves are full vacuum. Specify PBM flow pattern for 3,4,or 5-Way valve. To add automation and controls, see section "Automation and controls".

PBM Model number MI(material)-(size)5(end connection)-(flow pattern)

———— AUTOMATION AND CONTROLS ————

PBM'S DIRECT MOUNT AUTOMATED BALL VALVES, Valves as specified in "Manual Valves" section with addition of a "Direct Mount" double acting or spring return pneumatic actuator. Actuator shall be of the double opposing piston, rack and pinion design with bi-directional pinion travel stops and hard anodized aluminum oxide body with co-deposited fluoropolymer. End caps to be polyester powder coated with 300 series stainless steel fasteners. Mounting bracket shall be stainless steel and valve stem shall insert directly into actuator drive adapter. Actuator shall be sized utilizing a 100% safety factor. Specify supply air pressure at actuator (60 or 80 psig). PBM Model Number "PA"

PBM's electric actuators, limit switches, positioners, solenoids, and field bus accessories. Specify according to all statutory and regulatory requirements. Include Nema rating requirements and electrical current.

———— RISING STEM SAMPLING VALVES ————

S-, S2, S3 RISING STEM SAMPLING VALVES: Body and stem shall be wrought or cast 316L stainless steel, TFM™ seat and elastomer (Viton, EPR, or EPDM) o-ring seal. Handle knob shall be nylon 6/6. Bore is 1/4", with available inlets and outlets 90 degree or inline in sizes 1/2" through 2".

PBM Model number S- (sanitary wrought split-body), S2 (unibody cast sampling), or S3 (inline version)



Igenix® Cast Series 9 or Forged Series 8 2-Way Sanitary and Clean Steam Valves

U.S. Dimensioned valves in inches													
Valve Size	Size Code	I.D. Port	A1	A2	B1	B2	C	D	E	F	G	H	Approx. Wgt. (lbs)
1/2"***	C	0.37	3.50	5.50	1.75	2.75	1.70	0.75	2.03	4.00	1.50	1.50	1.1
3/4"***	D	0.62	4.00	6.00	2.00	3.00	1.86	0.85	2.19	4.00	1.68	1.50	1.4
1"***	E	0.87	4.50	6.50	2.25	3.25	2.40	1.09	2.97	4.15	2.18	1.50	2.7
1-1/2"***	G	1.37	5.50	7.50	2.75	3.75	3.89	1.68	4.91	8.81	3.31	1.50	8.9
2"***	H	1.87	6.25	8.00	3.12	4.00	4.67	2.15	4.41	8.06	4.30	1.75	15.0
2-1/2"*	J	2.37	8.00	11.50	4.00	5.75	6.51	2.79	6.46	12.06	5.58	2.31	36.0
3"***	K	2.87	8.00	10.50	4.00	5.25	6.76	2.78	6.71	12.06	5.58	1.75	33.0
4"***	L	3.84	10.00	13.00	5.00	6.50	7.53	3.66	7.48	12.06	7.33	2.00	67.0
6"*	M	5.78	13.00	17.00	6.50	8.50	12.14	6.18	CF	CF	12.37	2.50	164.0

*Cast Only

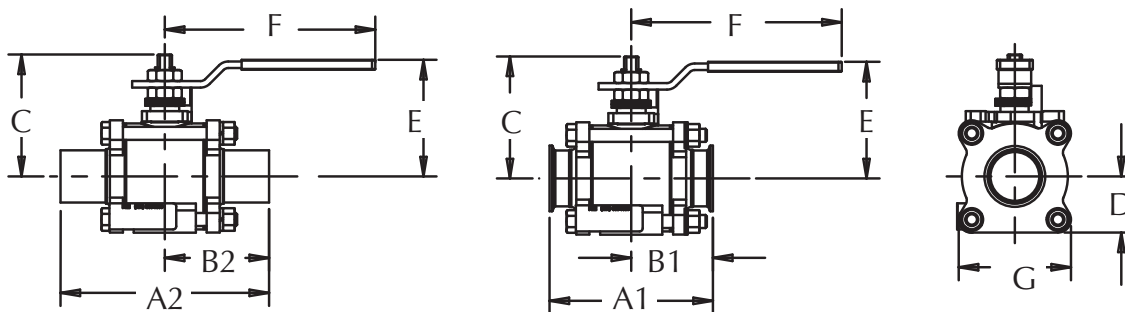
**Wrought Material or Cast

Forged valves are < 1% ferrite.

Cast valves are low controlled ferrite

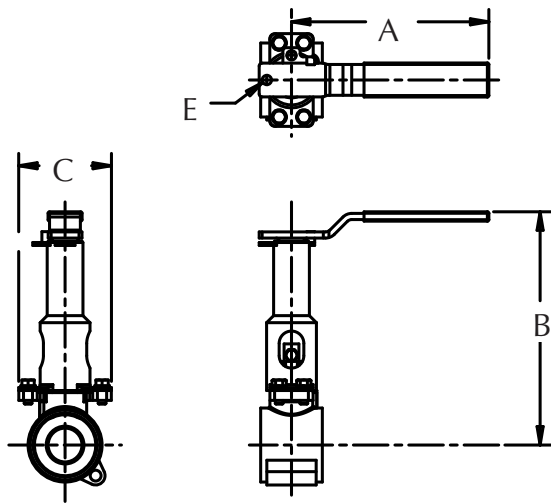
ISO 1127 Dimensioned valves in mm														
Valve Size	Size Code	I.D. Port	Tube O.D.	Tube wall	Tube Series	A2	B2	C	D	E	F	G	H	Approx. Wgt. (kg.)
DN 8	1	10.3	13.5	1.6	1	140	70	44	19	52	103	38	38	0.5
DN 10	2	14.0	17.2	1.6	1	150	75	48	22	56	103	38	38	0.6
DN 15	3	18.1	21.3	1.6	1	165	83	62	28	76	131	55	38	1.2
DN 20	4	23.7	26.9	1.6	1	190	95	100	43	126	226	84	38	4.0
DN 25	5	29.7	33.7	2.0	1	190	95	100	43	126	226	84	38	4.0
DN 32	6	38.4	42.4	2.0	1	190	95	100	43	126	226	84	38	4.0
DN 40	7	44.3	48.3	2.0	1	200	100	120	55	113	208	109	42	6.8

DIN 11850 Dimensioned valves in mm														
Valve Size	Size Code	I.D. Port	Tube O.D.	Tube wall	Tube Series	A2	B2	C	D	E	F	G	H	Approx. Wgt. (kg.)
DN 8	1	8	10	1.0	1	140	70	52	19	52	102	38	38	0.5
DN 10	2	10	13	1.5	2	140	70	52	19	52	102	42	38	0.5
DN 15	3	16	19	1.5	2	152	76	56	22	76	105	42	38	1.2
DN 20	4	20	23	1.5	2	165	83	76	28	76	105	55	38	1.2
DN 25	5	26	29	1.5	2	190	95	100	43	125	224	84	38	4.0
DN 32	6	32	35	1.5	2	190	95	100	43	125	224	84	38	4.0
DN 40	7	38	41	1.5	2	190	95	100	43	125	224	84	38	4.0
DN 50	8	50	53	1.5	2	200	100	120	55	119	205	109	42	6.8



Igenix® Cast Series 9 or Forged Series 8 Extended Locking Lever Handle Extended Locking Lever Handle

Valve Size			A		B		C		E	
US	DN ID	ISO	inches	mm	inches	mm	inches	mm	inches	mm
1/2"	8, 10	8	5.09	129	4.00	102	2.50	64	0.31	8
3/4"	-	10	5.09	129	4.14	105	2.50	64	0.31	8
1"	15,20	15	5.09	129	5.44	138	3.50	89	0.31	8
1-1/2"	25,32,40	20,25,32	8.00	203	7.46	189	3.75	95	0.38	10
2"	50	40	8.00	203	7.74	197	4.30	109	0.38	10
2-1/2"	-	-	12.10	307	11.36	289	5.58	142	0.38	10
3"	-	-	12.40	315	11.61	295	5.58	142	0.38	10
4"	-	-	12.40	315	12.38	314	7.33	186	0.38	10

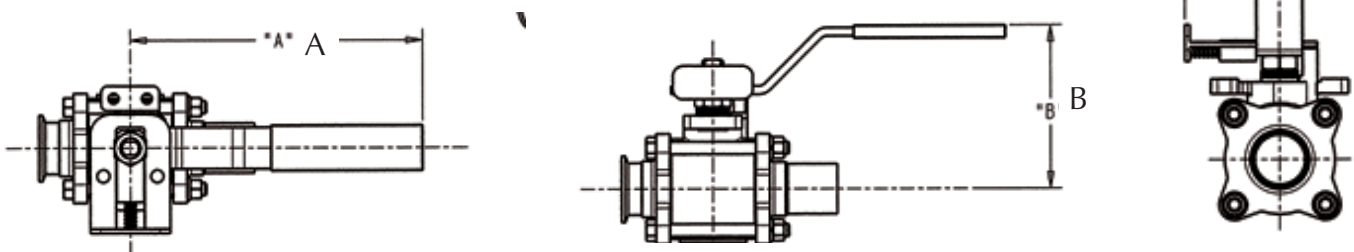


Manual Valves with Tubing Ends (inches)			
Valve Size	Tube OD	Insulation max with no extension	Insulation max with extension
1/2"	0.500	0.76	2.68
3/4"	0.750	0.79	2.72
1"	1.000	1.45	3.88
1-1/2"	1.500	3.10	5.57
2"	2.000	2.31	5.60
2-1/2"	2.500	4.00	8.88
3"	3.000	4.08	8.88
4"	4.000	4.35	9.12

Maximum insulation dimensions shown allow for 3/4" of clearance between outside of insulation and bottom of handle.

Locking Handle

Valve Size			A		B		C	
US	DIN	ISO	inches	mm	inches	mm	inches	mm
1/2"	8, 10	8	4.00	102	2.03	52	1.55	39
3/4"	-	10	4.00	102	2.19	56	1.55	39
1"	15,20	15	5.10	130	2.97	75	1.64	42
1-1/2"	25,32,40	20,25,32	8.80	224	4.91	125	2.57	65
2"	50	40	8.10	206	4.41	112	2.57	65
2-1/2"	-	-	12.40	315	6.46	164	3.84	98
3"	-	-	12.40	315	6.75	171	3.84	98
4"	-	-	12.40	315	7.75	197	3.84	98



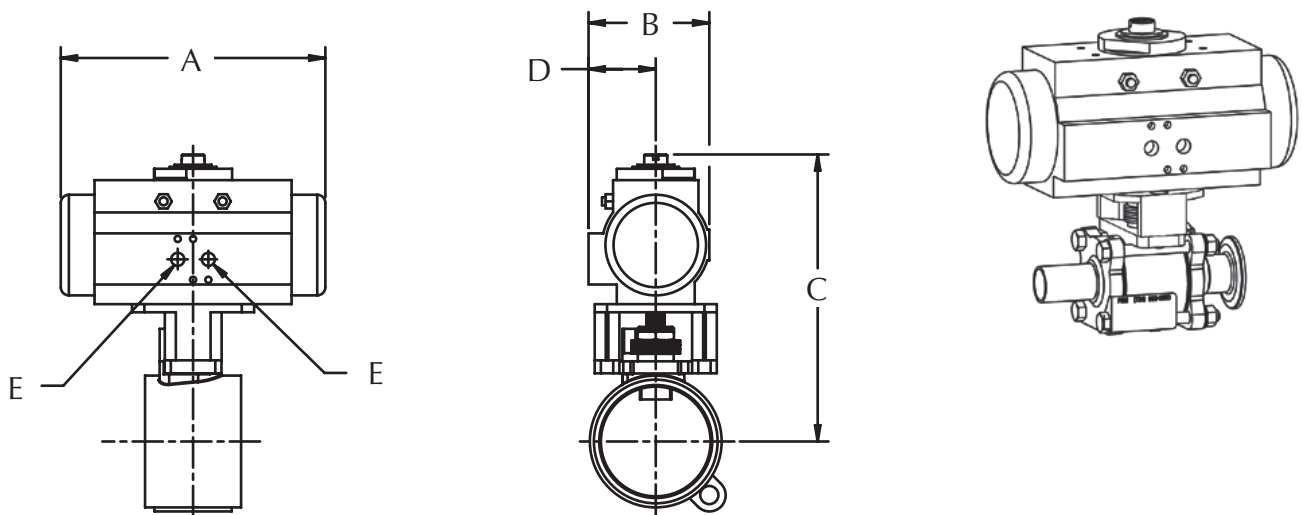


Igenix® Cast Series 9 or Forged Series 8 Actuated Spring Return SR Series 80 PSI/5.5 barg Supply Air, TFM™ Seats

Valve Size			Model Number PAVCL	A		B		C		D		E	F (Flush Tank only)	
US	DIN	ISO		inches	mm	inches	mm	inches	mm	inches	mm	inches	inches	mm
1/2"	8, 10	8	453S--0052	5.55	141	2.80	71	5.45	138	1.61	41	1/8 NPT	-0.13	-3
3/4"	-	10	453S--0052	5.55	141	2.80	71	5.59	142	1.61	41	1/8 NPT	0.00	0
1"	15,20	15	453S--0063	6.46	164	3.17	81	6.51	165	1.77	45	1/8 NPT	0.13	3
1-1/2"	25,32,40	20,25,32	453S--0085	9.47	241	4.17	106	9.65	194	2.30	58	1/8 NPT	0.36	9
2"	50	40	453S--0100	10.83	275	4.84	123	10.45	265	2.68	68	1/4 NPT	0.41	10
2-1/2"	-	-	453S--0115	13.11	333	5.39	137	13.48	342	2.87	73	1/4 NPT	0.57	14
3"	-	-	453S--0125	14.65	372	5.83	148	14.21	340	3.15	80	1/4 NPT	2.01	51
4"	-	-	453S--0140	17.13	435	6.46	164	15.86	382	3.44	87	1/4 NPT	1.60	41
6"	-	-	453S--0200	22.78	579	8.54	218	23.02	546	4.29	109	1/4 NPT	2.00	51

Spring Return SR Series 60 psig/4.1 barg Supply Air, TFM™ Seats

Valve Size			Model Number PAVCL	A		B		C		D		E	F (Flush Tank only)	
US	Din	ISO		inches	mm	inches	mm	inches	mm	Inch	mm	inches	inches	mm
1/2"	8, 10	8	253S--0063	5.55	141	3.17	81	5.90	150	1.77	45	1/8 NPT	-0.13	-3
3/4"	-	10	253S--0063	6.46	164	3.17	81	6.04	153	1.77	45	1/8 NPT	-0.21	-5
1"	15,20	15	253S--0075	8.27	210	3.72	94	7.22	183	2.07	53	1/8 NPT	-0.12	-3
1-1/2"	25,32,40	20,25,32	253S--0100	10.83	275	4.84	123	9.65	245	2.68	68	1/4 NPT	0.07	2
2"	50	40	253S--0115	13.11	333	5.39	137	11.80	300	2.87	73	1/4 NPT	0.05	1
2-1/2"	-	-	253S--0125	14.65	372	5.83	148	13.96	355	3.15	80	1/4 NPT	0.41	10
3"	-	-	253S--0140	17.13	435	6.46	164	15.10	384	3.44	87	1/4 NPT	1.27	32
4"	-	-	253S--0160	19.69	500	7.32	186	16.80	427	3.90	99	1/4 NPT	1.18	30
6"	-	-	253S--0270	22.64	672	11.42	290	27.78	706	5.71	145	1/4 NPT	2.00	51



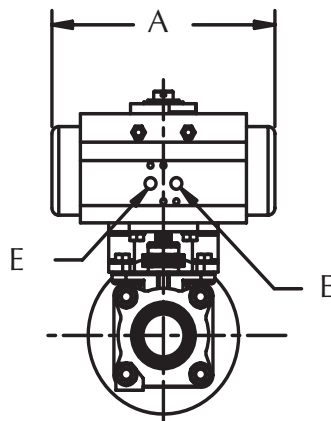
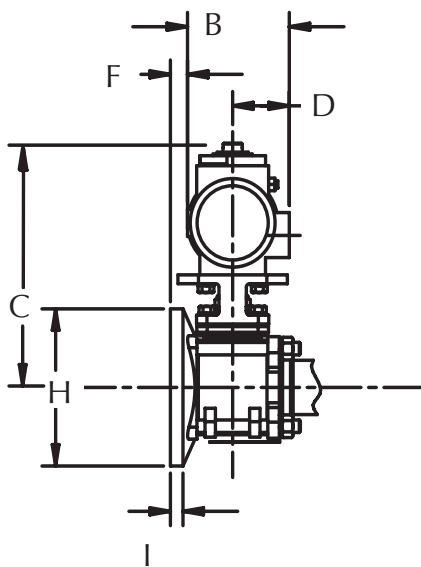
SI, CS shown

Double Acting DA Series 80 psig/5.5 barg Supply Air, TFM™ Seats

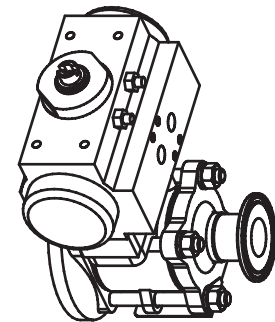
Valve Size			Model Number PAVCL	A		B		C		D		E	F (Flush Tank only)	
US	Din	ISO		PAVBL	mm	inches	mm	inches	mm	inches	mm	inches	inches	mm
1/2"	8, 10	8	453D--0052	5.55	141	2.80	71	5.45	138	1.61	41	1/8 NPT	-0.13	-3
3/4"	-	10	453D--0052	5.55	141	2.80	71	5.59	142	1.61	41	1/8 NPT	0.00	0
1"	15,20	15	453D--0052	5.55	141	2.80	71	6.06	154	1.61	41	1/8 NPT	0.34	9
1-1/2"	25,32,40	20,25,32	453D--0063	8.27	210	3.72	94	9.10	231	2.07	53	1/8 NPT	0.58	15
2"	50	40	453D--0075	8.27	210	3.72	94	9.39	239	2.07	53	1/8 NPT	0.92	23
3"	-	-	453D--0115	13.11	333	5.39	137	13.73	349	2.87	73	1/4 NPT	2.17	55
4"	-	-	453D--0160	13.11	333	5.39	137	14.51	369	2.87	73	1/4 NPT	2.08	53
6"	-	-	453D--0200	22.78	579	8.54	217	23.02	585	4.29	109	1/4 NPT	2.00	51

Double Acting DA Series 60 psig/4.1 barg Supply Air, TFM™ Seats

Valve Size			Model Number PAVCL	A		B		C		D		E	F (Flush Tank only)	
US	Din	ISO		inches	mm	inches	mm	inches	mm	inches	mm	inches	inches	mm
1/2"	8, 10	8	253D--0052	5.55	141	2.80	71	5.45	138	1.61	41	1/8 NPT	-0.13	-3
3/4"	-	10	253D--0052	5.55	141	2.80	71	5.59	142	1.61	41	1/8 NPT	0.00	0
1"	15,20	15	253D--0052	5.55	141	2.80	71	6.00	152	1.61	41	1/8 NPT	0.34	9
1-1/2"	25,32,40	20,25,32	253D--0075	8.27	210	3.72	94	9.10	231	2.07	53	1/8 NPT	0.58	15
2"	50	40	253D--0075	8.27	210	3.72	94	9.39	239	2.07	53	1/8 NPT	0.92	23
3"	-	-	253D--0115	13.11	333	5.39	137	13.73	349	2.87	73	1/4 NPT	2.17	55
4"	-	-	253D--0160	13.11	333	5.39	137	14.51	369	2.87	73	1/4 NPT	2.08	53
6"	-	-	253D--0200	22.78	579	8.54	217	23.02	585	4.29	109	1/4 NPT	2.00	51



FI, FC shown



See Page 20 for "H" and "I".

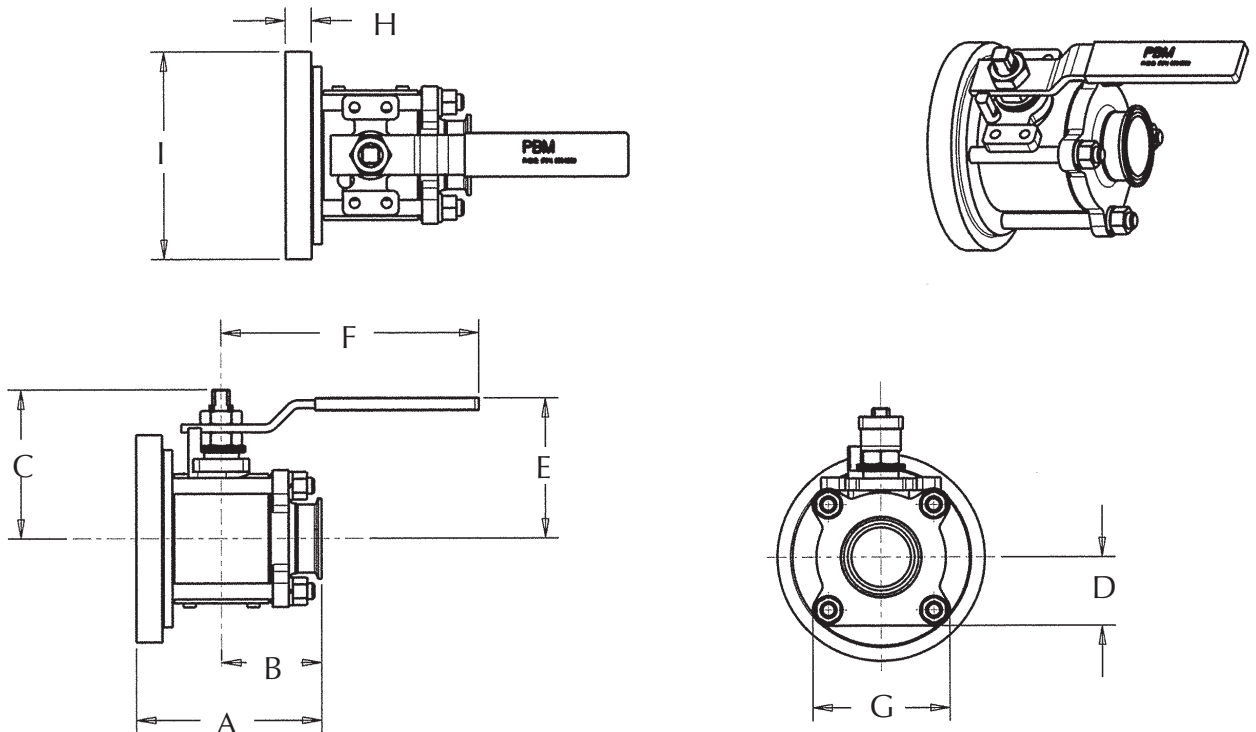


Igenix® Flush Tank Cast Series 9 or Forged Series 8

Valve Size	Size Code	Units	I.D. Port	A	B	C	D	E	F	G	H	I	Approx. Weight
1/2"*** DN 15	C	inches	0.37	2.83	1.75	1.70	0.75	2.05	4.00	1.50	0.30	2.75	1.6 lbs.
		mm	9	72	44	43	19	52	102	38	8	70	.73 kg.
3/4"*** DN 20	D	inches	0.62	3.16	2.00	1.86	0.85	2.23	4.00	1.68	0.30	3.00	2 lbs.
		mm	16	80	51	47	22	57	102	43	8	76	.91 kg.
1"*** DN 25	E	inches	0.87	3.70	2.25	2.38	1.09	3.01	4.15	2.18	0.31	3.75	3.6 lbs.
		mm	22	94	57	60	28	76	105	55	8	95	1.63 kg.
1-1/2"*** DN 40	G	inches	1.37	4.98	2.75	3.89	1.68	5.07	8.81	3.31	0.68	5.50	12 lbs.
		mm	35	126	70	99	43	129	224	84	17	140	5.44 kg.
2"*** DN 50	H	inches	1.87	5.79	3.12	4.67	2.15	4.51	8.03	4.30	0.49	6.50	22 lbs.
		mm	47	147	79	119	55	115	204	109	12	165	9.88 kg.
3"*** DN 80	K	inches	2.87	7.52	4.00	6.76	2.77	6.76	12.06	5.54	0.85	9.00	33 lbs.
		mm	73	191	102	172	70	172	306	141	22	229	15 kg.
4"*** DN 100	L	inches	3.84	9.59	5.00	7.53	3.66	7.53	12.06	7.33	1.18	11.50	94 lbs.
		mm	98	244	127	191	93	191	306	186	30	292	42.64 kg.
6"*** DN 150	M	inches	5.78	12.78	6.50	12.14	6.18	N/A	N/A	12.36	1.34	17.00	164 lbs.
		mm	147	325	165	308	157	N/A	N/A	314	34	432	74.39 kg.

*Cast Only

**Wrought Material or Cast



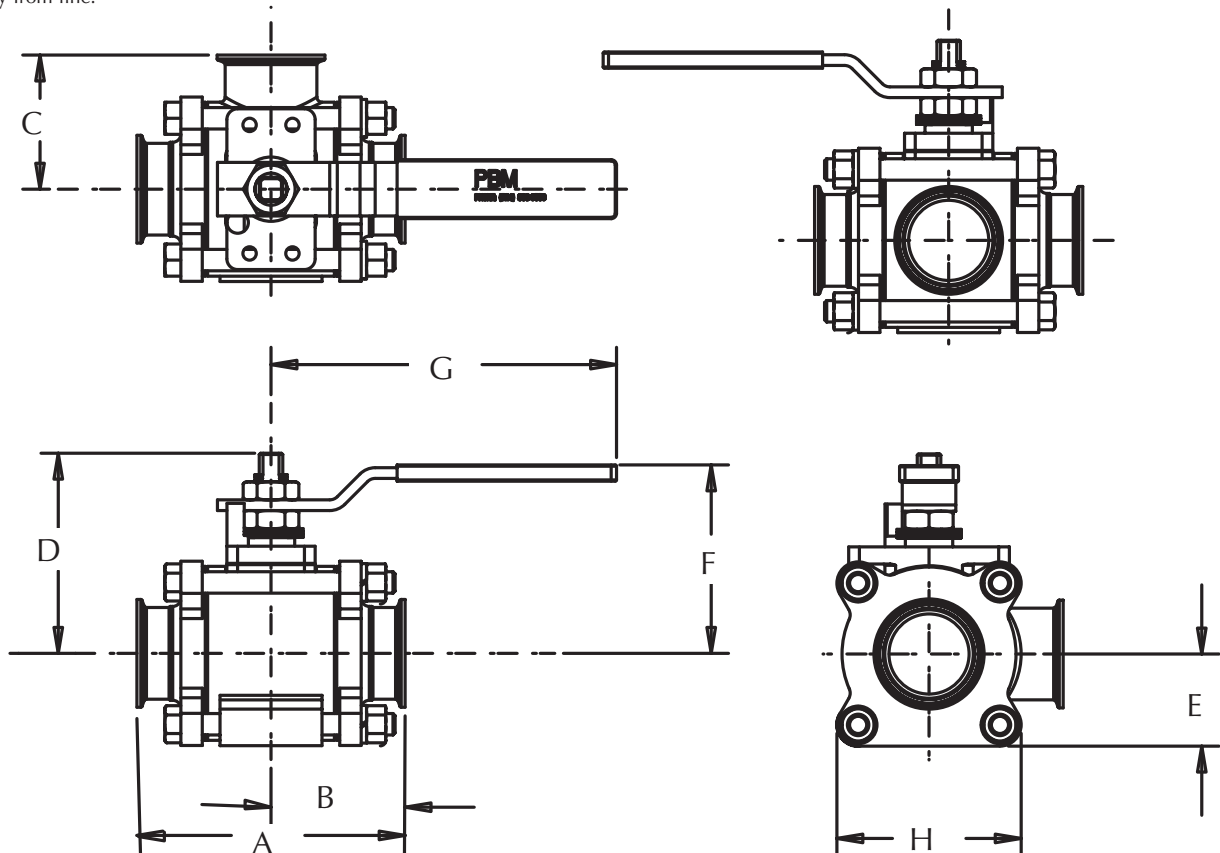
Igenix® Diverter Port Cast Series 9 or Forged Series 8

Valve Size	Size Code	Units	I.D. Port	Ends	A	B	C	D	E	F	G	H	Approx. Weight
1/2"*** DN 15	C	inches	0.37	Clamp	3.50	1.75	1.75	1.70	0.75	2.03	4.00	1.50	1.6 lbs.
		mm	9	Clamp	89	44	44	43	19	52	102	38	0.73 kg.
3/4"*** DN 20	D	inches	0.62	Clamp	4.00	2.00	2.00	2.00	0.85	2.19	4.00	1.68	2 lbs.
		mm	16	Clamp	102	51	51	51	22	56	102	43	0.91 kg.
1"*** DN 25	E	inches	0.87	Clamp	4.50	2.25	2.25	2.40	1.09	2.97	5.12	2.18	3.6 lbs.
		mm	22	Clamp	114	57	57	61	28	75	130	55	1.63 kg.
1-1/2"*** DN 40	G	inches	1.37	Clamp	5.50	2.75	2.75	3.89	1.68	4.91	8.81	3.31	12 lbs.
		mm	35	Clamp	140	70	70	99	43	125	224	84	5.44 kg.
2"*** DN 50	H	inches	1.87	Clamp	6.25	3.12	3.12	4.67	2.15	4.41	8.12	4.30	22 lbs.
		mm	47	Clamp	159	79	79	119	55	112	206	109	9.98 kg.
3"*** DN 80	K	inches	2.87	Clamp	8.00	4.00	4.00	6.76	2.77	6.76	12.06	5.54	33 lbs.
		mm	73	Clamp	203	102	102	172	70	172	306	141	14.97 kg.
4"*** DN 100	L	inches	3.84	Clamp	10.00	5.00	5.00	7.53	3.66	7.47	12.06	7.33	67 lbs.
		mm	98	Clamp	254	127	127	191	93	190	306	186	30.39 kg.
6"*** DN 150	M	inches	5.78	Clamp	13.00	6.50	7.50	12.14	6.18	N/A	N/A	12.37	177 lbs.
		mm	147	Clamp	330	165	191	308	157	N/A	N/A	314	80.29 kg.

*Cast Only

**Wrought Material or Cast

1. Using a welded connection for more than one end fitting on a MI Series valve may complicate maintenance. Provisions must be made to allow removal of end fittings and body from line.



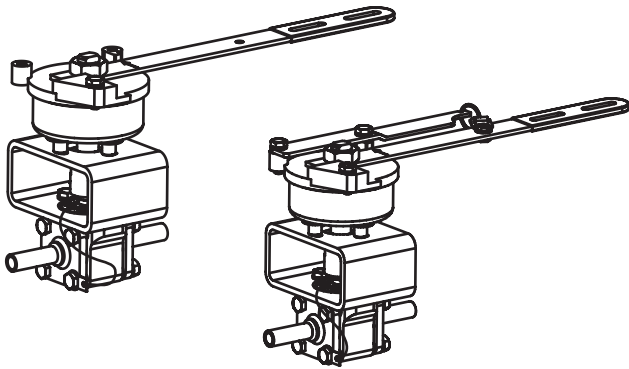


Sanitary Fire-Rated Series 6 valves

PBM's Sanitary Fire Rated design valves accommodate flammable media in sanitary process environments.

Features:

- 1/2" through 3" sizes, 3 piece, 2-way
- Passed API-607 Ed. 4 testing
- 316L stainless (ASTM A351 CF3M), Hastelloy® C276 and other ASME B16.34 listed materials.

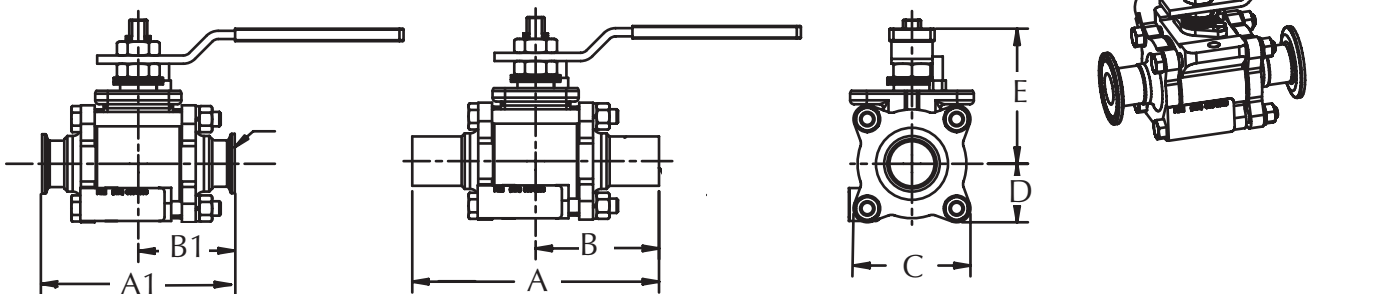


Manual Ball Valves with Spring Return Handle and Optional Fusible Link

PBM's Igenix® Sanitary Series 6 Manual Valves can be modified with a bracket-mounted Spring Return Handle unit. The Spring Return Handle unit can be equipped with an optional fusible link specified to a customer's required melt temperature, which closes the valve during fire conditions.

Valve Size	SI Series Part #	Units	Ball I.D.	Tubing Ga.	A1 Clamp	A Weld	B1 Clamp	B Weld	C	D	E	Approx. Weight
1/4" DN 8	SI--A6#---	inches	0.37	20 ga.	3.50	5.50	1.75	2.75	1.84	0.92	2.63	1.5 lbs.
		mm	9		89	140	44	70	47	23	67	.7 kg.
3/8" DN 10	SI--B6#---	inches	0.37	20 ga.	3.50	5.50	1.75	2.75	1.84	0.92	2.63	1.5 lbs.
		mm	9		89	140	44	70	47	23	67	.7 kg.
1/2" DN 15	SI--C6#---	inches	0.37	16 ga.	3.50	5.50	1.75	2.75	1.84	0.92	2.63	1.6 lbs.
		mm	9		89	140	44	70	47	23	67	.7 kg.
3/4" DN 20	SI--D6#---	inches	0.62	16 ga.	4.00	5.50	2.00	2.75	2.00	1.00	2.78	2 lbs.
		mm	16		102	140	51	70	51	25	71	.9 kg.
1" DN 25	SI--E6#---	inches	0.87	16 ga.	5.37	6.00	2.69	3.00	2.66	1.33	3.03	4.5 lbs.
		mm	22		136	152	68	76	68	34	77	2.0 kg.
1-1/2" DN 40	SI--G6#---	inches	1.37	16 ga.	5.50	7.50	2.75	3.75	3.56	1.78	4.10	10 lbs.
		mm	35		140	191	70	95	90	45	104	4.5 kg.
2" DN 50	SI--H6#---	inches	1.87	16 ga.	6.25	8.00	3.12	4.00	4.30	2.15	4.41	15.3 lbs.
		mm	47		159	203	79	102	109	55	112	6.9 kg.
2-1/2" DN 65	SI--J6#---	inches	2.37	16 ga.	8.00	11.50	4.00	5.75	5.58	2.79	6.45	36 lbs.
		mm	60		203	292	102	146	142	71	164	16.3 kg.
3" DN 80	SI--K6#---	inches	2.87	16 ga.	9.00	13.50	4.50	6.75	6.28	3.14	6.78	49 lbs.
		mm	73		229	343	114	171	160	80	172	22.2 kg.

Sanitary Clamp



Automated SI, FI Series 6 Valves with Direct Mount Actuation

Valve Size	SI, FI Valve Number	Units	DOUBLE ACTING, TFM™ SEATS*									
			80 psig / 5.5 barg Supply Air					60 psig / 4.1 barg Supply Air				
			A	B	C	D	E	A	B	C	D	E
1/2" DN15	** --C6#---	inches	5.55	2.80	5.84	1.61	1/8	5.55	2.80	5.84	1.61	1/8
		mm	141	71	148	41		141	71	146	41	
3/4" DN 20	** --D6#---	inches	5.55	2.80	5.99	1.61	1/8	5.55	2.80	5.99	1.61	1/8
		mm	141	71	152	41		141	71	152	41	
1" DN 25	** --E6#---	inches	5.55	2.80	6.64	1.61	1/8	5.55	2.80	6.64	1.61	1/8
		mm	141	71	169	41		141	71	169	41	
1-1/2" DN 40	** --G6#---	inches	6.46	3.17	8.39	1.77	1/8	8.27	3.72	9.10	2.07	1/8
		mm	164	81	213	45		210	94	231	53	
2" DN 50	** --H6#---	inches	8.27	3.72	9.41	2.07	1/8	8.27	3.72	9.41	2.07	1/8
		mm	210	94	239	53		210	94	239	53	
2-1/2" DN 65	** --J6#---	inches	13.11	5.39	13.48	2.87	1/4	13.11	5.39	13.48	2.87	1/4
		mm	333	137	342	73		333	137	342	73	
3" DN 80	** --K6#---	inches	13.11	5.39	13.81	2.87	1/4	13.11	5.39	13.81	2.87	1/4
		mm	333	137	351	73		333	137	351	73	

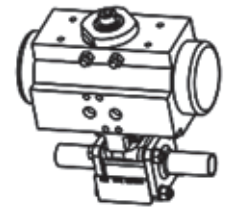
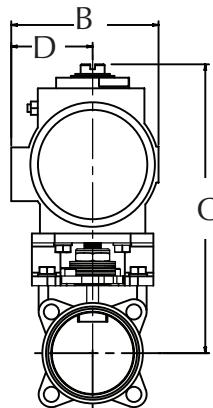
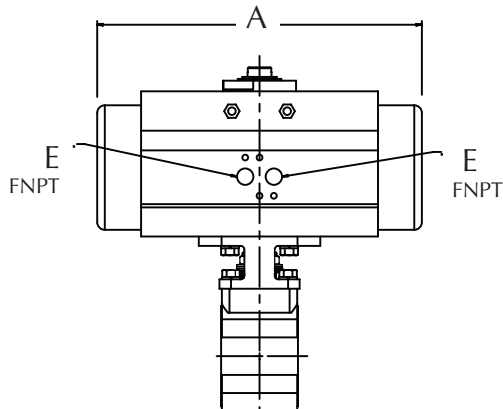
Valve Size	SI, FI Valve Number	Units	SPRING RETURN, TFM™ SEATS*									
			80 psig / 5.5 barg Supply Air					60 psig / 4.1 barg Supply Air				
			A	B	C	D	E	A	B	C	D	E
1/2" DN 15	** --C6#---	inches	5.55	2.80	5.84	1.61	1/8	6.46	3.17	6.27	1.77	1/8
		mm	141	71	148	41		164	81	159	45	
3/4" DN 20	** --D6#---	inches	6.46	3.17	6.44	1.77	1/8	6.46	3.17	6.44	1.77	1/8
		mm	164	81	164	45		164	81	164	45	
1" DN 25	** --E6#---	inches	8.27	3.72	7.80	2.07	1/8	8.27	3.72	7.80	2.07	1/8
		mm	210	94	198	53		210	94	198	53	
1-1/2" DN 40	** --G6#---	inches	10.83	4.84	10.16	2.68	1/4	10.83	4.84	10.16	2.68	1/4
		mm	275	123	258	68		275	123	258	68	
2" DN 50	** --H6#---	inches	10.83	4.84	10.47	2.68	1/4	13.11	5.39	11.82	2.87	1/4
		mm	275	123	266	68		333	137	300	73	
2-1/2" DN 65	** --J6#---	inches	13.11	5.39	13.48	2.87	1/4	14.65	5.83	13.96	3.15	1/4
		mm	333	137	342	73		372	148	355	80	
3" DN 80	** --K6#---	inches	14.65	5.83	14.29	3.15	1/4	17.13	6.46	15.18	3.44	1/4
		mm	372	148	363	80		435	164	386	87	

*Consult factory for other seat materials.

** True Bore® Valve Series SI, FI

End Connection type (See Order Codes)

** Operator Code (See Order Codes)



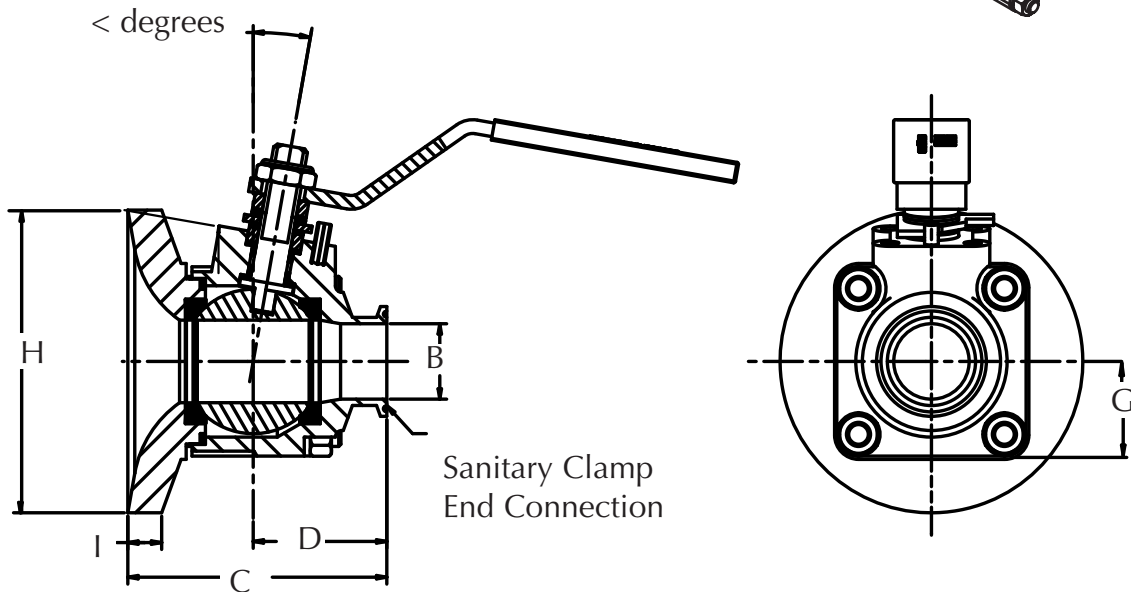
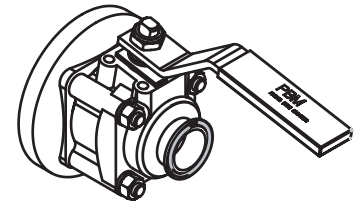


AF-Series 1 & 3

Size	Units	B Port	C	D	G ℄ to Bottom	H Pad Diameter	I Pad Thickness
			Face-to-Face X-Clamp	℄ to End X-Clamp			
1" DN 25	inches	1.00	3.88	2.24	1.69	3.70	0.53
	mm	25	99	57	43	94	13
1-1/2" DN 40	inches	1.50	4.71	2.43	1.78	5.50	0.62
	mm	38	120	62	45	140	16
2" DN 50	inches	1.94	5.51	2.84	2.12	7.00	0.68
	mm	49	140	72	54	178	17
3" DN 80	inches	2.75	7.88	3.81	3.87	10.00	0.79
	mm	70	200	97	98	254	20
4" DN 100	inches	3.50	8.94	4.66	4.47	11.50	0.91
	mm	89	227	118	114	292	23
6" DN 150	inches	5.24	14.59	9.03	6.31	15.00	1.04
	mm	133	371	229	160	381	26

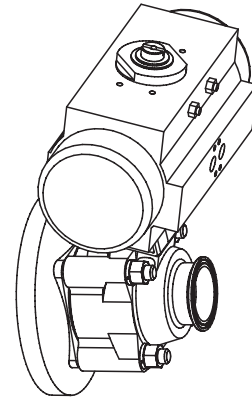
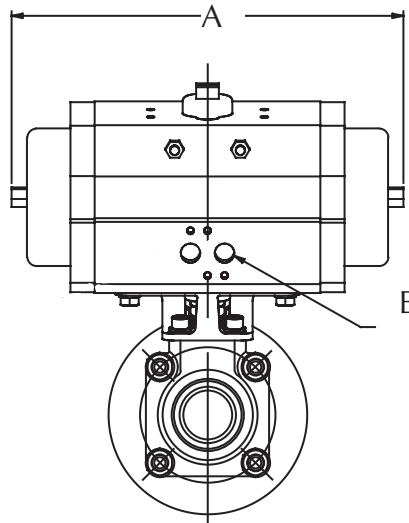
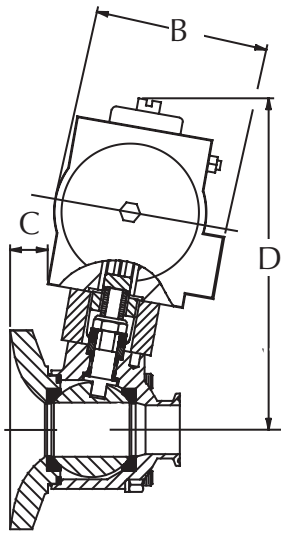
Fire test qualified through 6".

1" & 1-1/2" = 10°
2", 3", 4", & 6" = 15°



AF-Series 1 & 3 Actuated

VTFE Seats														
Size	Actuator Model	Air supply		Port		A		B		C		D		E NPT Air Inlet inches
		psig	barg	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	
1" DN 25	DA 52	80, 60	5.5, 4.1	1.00	25.4	5.55	141	2.79	71	0.85	22	6.67	169	1/8
	SR 75	80, 60	5.5, 4.1			8.27	210	3.72	95	0.73	19	7.86	200	1/8
1-1/2" DN 40	DA 75	80, 60	5.5, 4.1	1.50	38.1	8.27	210	3.72	95	1.55	39	8.90	226	1/8
	SR 85	80	5.5			9.48	241	4.17	106	1.37	35	9.45	240	1/8
	SR 100	60	4.1			10.83	275	4.85	123	1.10		9.96	253	1/4
2" DN 50	DA 75	80, 60	5.5, 4.1	2.00	50.8	8.27	210	3.72	95	2.49	63	8.97	228	1/8
	SR 100	80	5.5			10.83	275	4.85	123	2.07	53	10.01	254	1/4
	SR 115	60	4.1			13.12	333	5.39	137	1.86	47	11.32	288	1/4
3" DN 80	DA 115	80, 60	5.5, 4.1	2.75	69.9	13.12	333	5.39	137	3.32	84	13.80	351	1/4
	SR 125	80	5.5			14.65	372	5.83	148	3.32	84	14.35	364	1/4
	SR 140	60	4.1			16.85	428	6.45	164	3.32	84	15.20	386	1/4
4" DN 100	DA 115	80, 60	5.5, 4.1	3.50	88.9	13.12	333	5.39	137	3.66	93	14.41	366	1/4
	SR 140	80, 60	5.5, 4.1			16.85	428	6.45	164	3.66	93	15.58	396	1/4
6" DN 150	DA 140	80, 60	5.5, 4.1	5.25	133.4	16.85	428	6.45	164	4.88	124	19.24	489	1/4
	SR 200	80	5.5			22.78	579	8.54	217	4.66	118	22.41	569	1/4
	SR 270	60	4.1			26.46	672	11.42	290	4.37	111	26.98	685	1/4



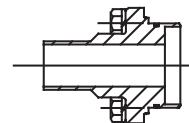
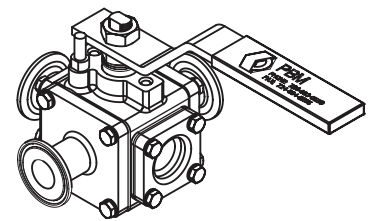
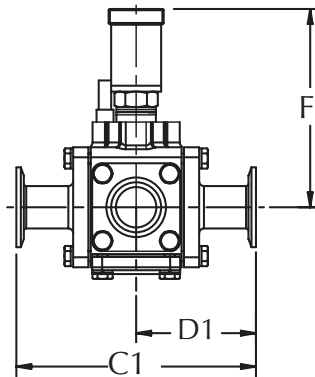
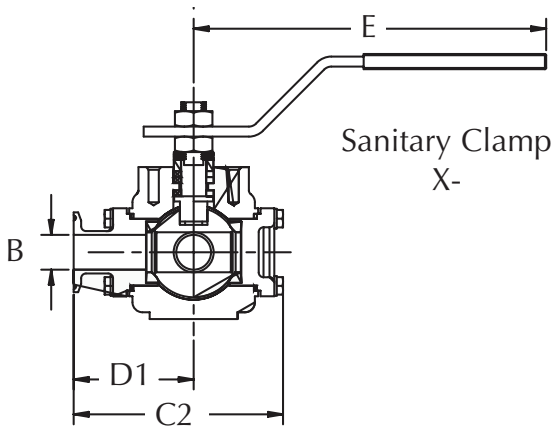


Multi-Port Series 5

Valve Size	Size Code	Units	B	C1		D1		C2		E	F	℄ to Bottom Entry X-	Approx. Weight S/S
			Port Diameter	Face to Face		℄ to Face		Face to Blank		Handle	℄ to Top of Handle		
				F-	X-	F-	X-	F-	X-				
1/2" DN 15	C	inches	0.37	7.00	5.50	3.50	2.75	5.50	4.75	5.09	3.11	2.75	7 lbs.
		mm	9.4	178	140	89	70	140	121	129.3	79	70	3.2 kg.
3/4" DN 20	D	inches	0.62	7.50	5.50	3.75	2.75	5.75	4.75	5.09	3.15	2.75	7 lbs.
		mm	16	191	140	95	70	146	121	129	80	70	3.2 kg.
1" DN 25	E	inches	.87	8.00	6.00	4.00	3.00	6.23	5.23	8.81	5.00	3.00	9.4 lbs.
		mm	22	203	152	102	76	158	133	224	127	76	4.3 kg.
1-1/2" DN 40	G	inches	1.37	10.00	7.50	5.00	3.75	8.13	6.88	11.56	5.53	3.75	27 lbs.
		mm	35	254	191	127	95	206	175	294	141	95	12.2 kg.
2" DN 50	H	inches	1.87	11.50	8.75	5.75	4.38	9.52	8.15	11.56	6.23	4.38	40 lbs.
		mm	47.5	292	222	146	111	242	207	294	158	111	18.1 kg.
3" DN 80	K	inches	2.87	Consult	13.00	Consult	6.50	Consult	11.96	24.06	8.77	Consult	89 lbs.
		mm	73	PBM	330	PBM	165	PBM	304	611	223	PBM	40.4 kg.
4" DN 100	L	inches	3.84	Consult	15.00	Consult	7.50	Consult	14.12	n/a	n/a	Consult	161 lbs.
		mm	97.5	PBM	381	PBM	191	PBM	359	n/a	n/a	PBM	73 kg.

Notes:

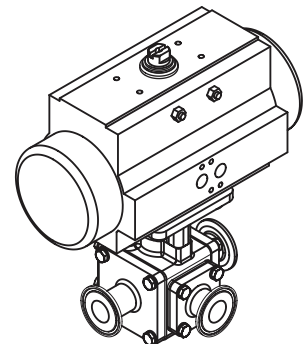
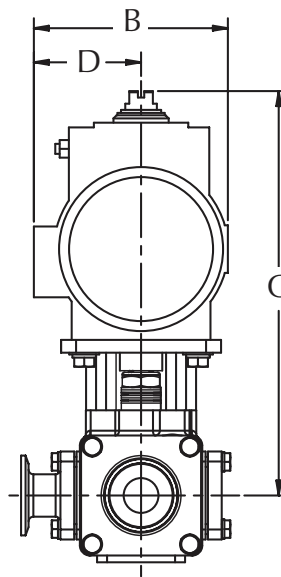
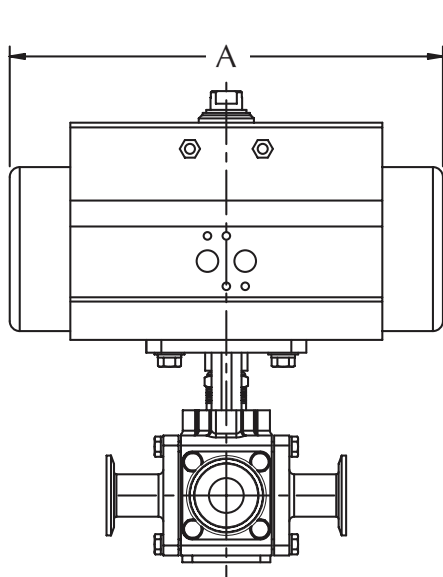
1. Drawings are for illustration purposes only. Consult PBM prior to any fabrication or installation work.
2. Approximate weights are for 3-Way, side entry, angle port MI Series 5 valves, with sanitary clamp end fittings and lever handle.
3. CL to Bottom Entry dimension (G1) based on tri-clamp end connection.
4. Using a welded connection for more than one end fitting on an MI Series valve may complicate maintenance. Provisions must be made to allow removal of end fittings and body from the line.
5. An actuator or gear operator is recommended for 4" valves. Consult PBM.
6. 3" and 4" bottom entry end connections only available as sanitary clamp.



Extended Butt Weld F-

Multi-Port Series 5 Actuated

TFM™ OR VTFF SEAT MATERIAL												
Size	Actuator Type	Air supply		A		B		C		D		E
		psig	barg	inches	mm	inches	mm	inches	mm	inches	mm	inches
1/2" DN 15	Double Acting	80	5.5	4.45	113	2.8	71	6.88	175	1.61	41	1/8
	Double Acting	60	4.1	4.45	113	2.8	71	6.88	175	1.61	41	1/8
	Spring Return	80	5.5	8.27	210	3.72	94	7.59	193	2.07	53	1/8
	Spring Return	60	4.1	9.47	241	4.17	106	8.14	207	2.3	58	1/8
3/4" DN 20	Double Acting	80	5.5	4.45	113	2.8	71	6.88	175	1.61	41	1/8
	Double Acting	60	4.1	4.45	113	2.8	71	6.88	175	1.61	41	1/8
	Spring Return	80	5.5	8.27	210	3.72	94	7.59	193	2.07	53	1/8
	Spring Return	60	4.1	9.47	241	4.17	106	8.14	207	2.3	58	1/8
1" DN 25	Double Acting	60, 80	4.1, 5.5	8.27	210	3.72	94	9.00	229	2.07	53	1/8
	Spring Return	80	5.5	10.83	275	4.84	123	10.0	254	2.68	68	1/4
	Spring Return	60	4.1	13.11	333	5.39	137	11.4	290	2.87	73	1/4
1-1/2" DN 40	Double Acting	60, 80	4.1, 5.5	13.11	333	5.39	137	13.58	345	2.87	73	1/4
	Spring Return	80	5.5	14.65	372	5.83	148	14.06	357	3.15	80	1/4
	Spring Return	60	4.1	17.13	435	6.46	164	14.95	380	3.44	87	1/4
2" DN 50	Double Acting	60, 80	4.1, 5.5	13.11	333	5.39	137	14.00	356	2.87	73	1/4
	Spring Return	80	5.5	14.65	372	5.83	148	14.50	368	3.15	80	1/4
	Spring Return	60	4.1	17.13	435	6.46	164	15.38	391	3.44	87	1/4
3" DN 80	Double Acting	80	5.5	13.11	333	5.39	137	15.67	398	2.87	73	1/4
	Double Acting	60	4.1	14.65	372	5.83	148	14.50	368	3.15	80	1/4
	Spring Return	80	5.5	19.69	500	7.36	187	18.00	457	3.9	99	1/4
	Spring Return	60	4.1	22.78	579	8.58	218	20.25	514	4.29	109	1/4
4" DN 100	Double Acting	60, 80	4.1, 5.5	22.78	579	8.58	218	22.25	565	4.29	109	1/4
	Spring Return	80	5.5	22.78	579	8.58	218	22.25	565	4.29	109	1/4
	Spring Return	60	4.1	26.46	672	11.42	290	27.00	686	5.71	145	1/4



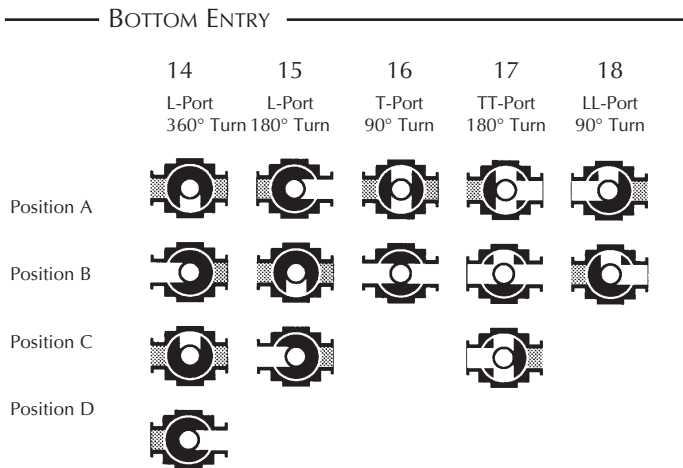
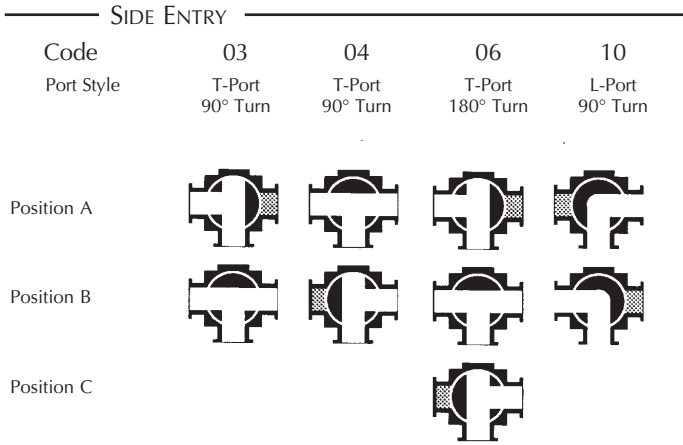


Flow Pattern Diagrams

The diagrams show the top view as though you were looking down on the stem. White areas indicate the path available for process flow. Shaded areas indicate unused ports for a given flow position.

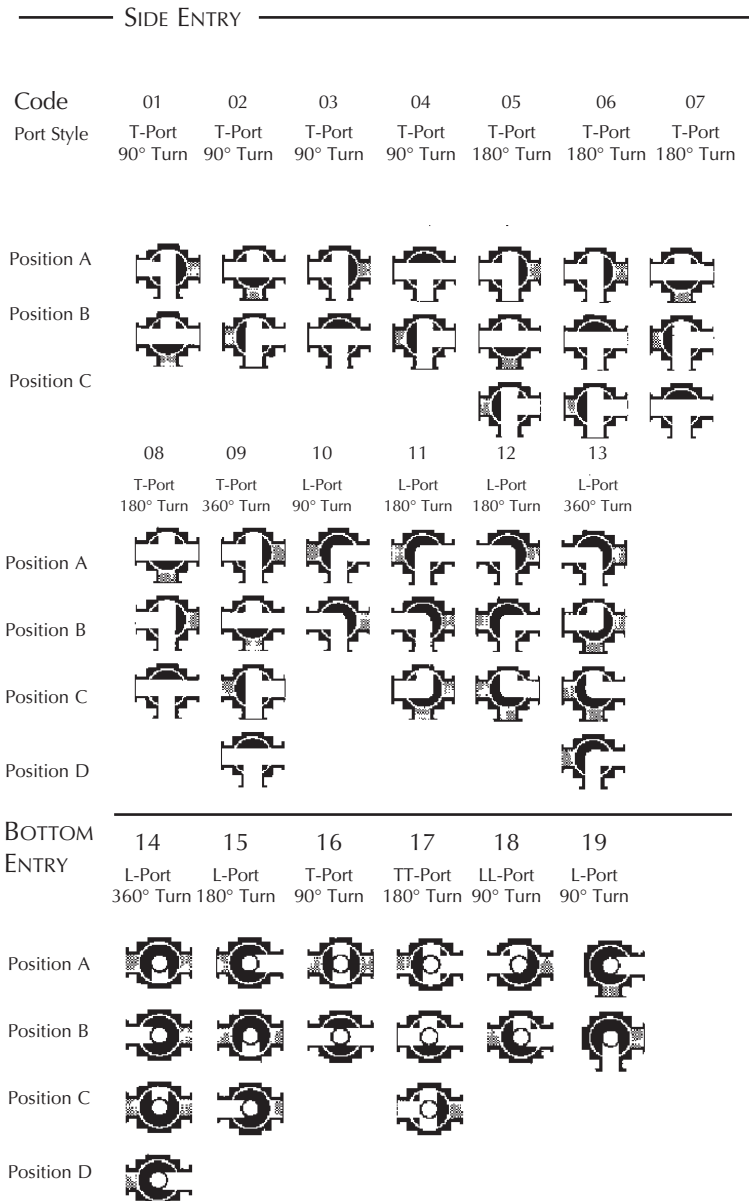
Diverter Port Patterns

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 a T-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°.



3-Way Multi-Port Patterns

3-Way Multi-Ports are a popular choice in a variety of industries. A seal at every port distinguishes the 3-Way MP/MI Series valve from diverting-type valves. In some applications, the 3-Way MP/MI valve can take the place of two or three 2-way valves, with corresponding savings in piping and fittings. For applications requiring simultaneous process line changes, two 3-Way MP/MI Series valves may be mounted in tandem and controlled with a single actuator or handle for greater control and additional savings. Additional flow patterns are possible by using manifolds of two or more valves..



Fail position must be selected.

4-way Multi-Ports are a true multi-port valve with seals at every port. This design makes the 4-way MP/MI Series ideal for flow switching operations. In some applications, this valve can replace as many as four ordinary 2-way valves, with corresponding savings in piping and fittings. The following illustrations show how different ball and port configurations create many flow patterns with a single 4-way Multi-Port.

4-Way Multi-Port Patterns

BOTTOM ENTRY								
Code	20	21	22	23	24	25	26	27
Port Style	Double L-Port 90° Turn	Double L-Port 180° Turn	Double L-Port 180° Turn	Double L-Port 180° Turn	Double L-Port 180° Turn	Double L-Port 360° Turn	L-Port 360° Turn	T-Port 90° Turn
Position A								
Position B								
Position C								
Position D								

Code	28	29	30	31	32	33	34	35
Port Style	Double T-Port 180° Turn	Double T-Port 180° Turn	Double T-Port 180° Turn	Double T-Port 180° Turn	Double T-Port 360° Turn	Double T-Port 90° Turn	Double T-Port 90° Turn	Double T-Port 90° Turn
Position A								
Position B								
Position C								
Position D								

Code	36
Port Style	Double T-Port 90° Turn
Position A	
Position B	

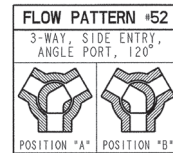
4-Way Multi-Port Patterns

SIDE ENTRY							
Code	37	38	39	40	41	42	43
Port Style	Double L-Port 90° Turn	L-Port 180° Turn	L-Port 360° Turn	T-Port 180° Turn	Straight Port 90° Turn	T-Port 90° Turn	T-Port 90° Turn
Position A							
Position B							
Position C							
Position D							

5-Way Multi-Port Patterns

5-way Multi-Ports are 5-seated to provide positive shut-off and flow control at each port. This design is not only versatile, but extremely economical. In some applications, this valve can replace as many as four ordinary 2-way valves, with corresponding savings in piping and fittings. The following illustrations show available flow patterns with a single 5-way Multi-Port valve.

BOTTOM ENTRY								
Code	44	45	46	47	48	49	50	51
Port Style	L-Port 360° Turn	Double L-Port 180° Turn	T-Port 90° Turn	Double T-Port 90° Turn	Double T-Port 90° Turn	Double T-Port 180° Turn	Double T-Port 360° Turn	Double L-Port 360° Turn
Position A								
Position B								
Position C								
Position D								



Fail position must be selected.



Clean Steam Trap Ball Valves



Clean Steam Trap Connection

2-way sanitary Steam Trap valves use body purge port and ball purge holes to direct flow to the trap while shutting off flow downstream. Permits sampling of steam for purity and safely isolates trap for ease of maintenance.

Dead leg piping is reduced where condensate can cool and cause contamination. These valves perform three functions and also reduce costs by eliminating unnecessary welds, "T"s and piping.

Sizes:

- 1/2" - 2"

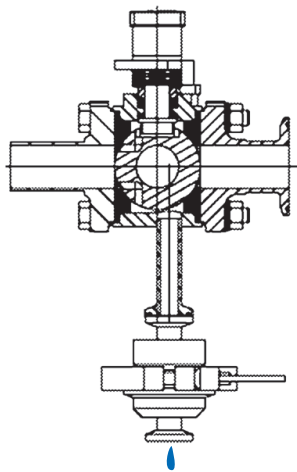
Materials:

- 316L S/S
- Hastelloy® C276 & C-22®
- Titanium
- Others

Options:

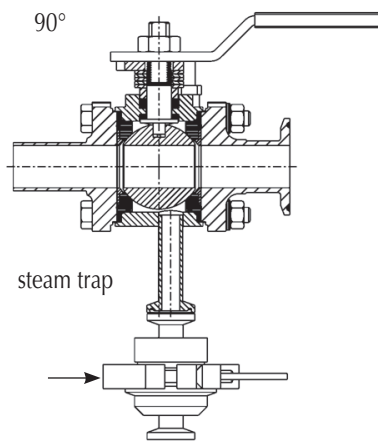
- Actuation
- Polishing
- Vertical or horizontal installation

Trap Position

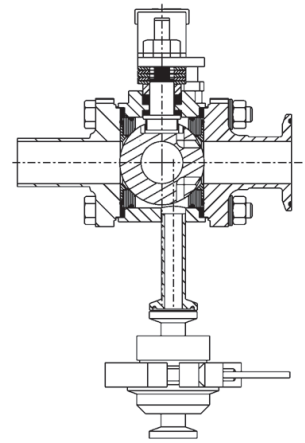


Condensate draining through trap

Open Position



Service Position



Trap can be removed for service

The **Trap Isolated Position** allows condensate to flow past the ball purge holes during normal operation, bypassing the upstream seat. Condensate flows past the purge holes in the ball and out the side port of the valve to the steam trap, allowing the body cavity to remain hot. The point-of-use, or sampling connection, is isolated by the surface of the ball without the purge holes pressing against the downstream seat.

The **Open Position** allows the flow of steam. Appropriate sampling piping or equipment connections are made at the point-of-use port, and the ball is turned 90° counterclockwise, opening the valve. The trap is isolated from flow allowing full sterilization temperature to be quickly reached. The valve is then turned 90° clockwise to return the steam trap to service in the "Trap" position.

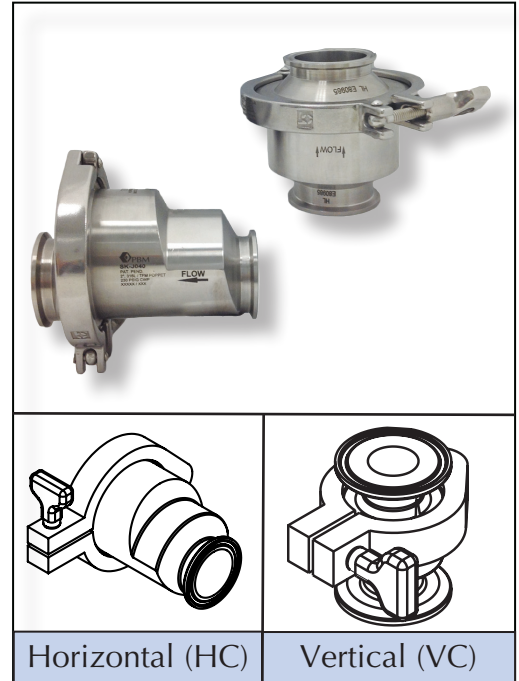
The **Closed or Service Position** allows steam trap maintenance by turning the ball 180° counterclockwise from the normal "Closed" position to the "Trap Isolated" position. As the ball is closed toward the steam-in port, it isolates the steam trap. Maintenance can then be performed on the steam trap. To return the trap to service, the ball is turned 180° clockwise to the "Trap" position.

PBM Check Valves

Use No Internal Spring and Guide

PBM sanitary check valves are specifically designed for use in biotech and pharmaceutical applications. The valves feature a spring-less design which eliminates the concern of media entrapment and particulate generation associated with spring-loaded designs.

- 1/2" through to 4" (DN 15 - DN 100) vertical and horizontal design, larger sizes available
- Available in 316L, Hastelloy, AL6XN and other materials available
- Body interior is polished to 20 Ra (.51 μm) or better
- Sanitary clamp ends standard; extended sanitary tube weld ends upon request
- Innovative poppet design eliminates the use of a spring and guide
- No cracks, crevices, or other localized depressions which could otherwise trap fluid.
- Applicable for liquid and low pressure steam service
- Elastomer materials are FDA compliant, USP Class VI



U.S. Patent 8,794,256

Materials of Construction

Component	Material	Specification
Body (VC & HC) Bonnet (HC only)	316L Stainless steel	Bar Stock: A479, S31603
	Hastelloy® C-276	Bar Stock: B574, N10276
	AL6XN®	Bar Stock: B691, N08367
	Hastelloy® C-22®	Bar Stock: B574, N06022
Poppet	PTFE	Virgin PTFE, USP Class VI
Body Clamp gasket	Viton, PTFE, EPDM	USP Class VI
Body Clamp	304 Stainless Steel	CF8 or F304

Testing: Maximum Allowable Leakage Rates

Size	PTFE Poppet
1/2", 3/4", 1"	5 drops/min @ 3 psi (.2 bar)
1-1/2"	8 drops/min @ 3 psi (.2 bar)
2"	10 drops/min @ 3 psi (.2 bar)
2-1/2" – 3"	15 drops/min @ 3 psi (.2 bar)
4"	20 drops/min @ 3 psi (.2 bar)

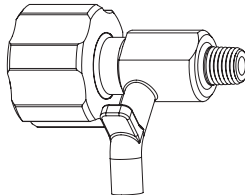
Standard Surface Finish*

Component	ID Finish	OD Finish	Type
Body, End*	20 Ra max	63 Ra max	Standard finish, Mechanical
PTFE poppet	-	-	Standard finish, Mechanical

*Optional finer finishes and electropolish available



Rising Stem Sampling Valves



- Cleanable and maintainable
- Reliable — Simple design, easy to maintain

Features:

- 316L Stainless material
- All materials are FDA compliant
- Swickle outlet
- Autoclavable
- Torchable for sterilization
- Large nylon 6/6 handle knob
- Replaceable O-ring, TFM™ seat
- 3/8" straight thread, 1/4" MNPT, and sanitary clamp inlet connections

Sample process media quickly and easily with PBM's Sampling Valve. Special pad design minimizes dead space. Easy CIP with Purge Ports and Milled Ball Flats ensures reliable samples. Valve can be shipped pre-mounted to piping for easy installation. Ideal for heavy duty and sanitary applications. Manual valve standard.

Sizes:

- 1/2" - 2"

Materials:

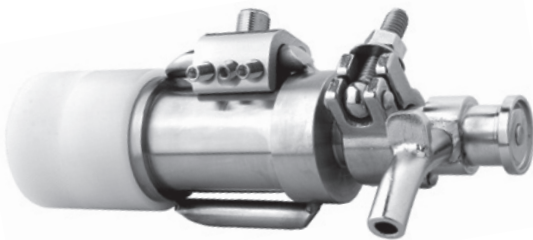
- 316 & 316L S/S
- Hastelloy®
- Titanium
- Others

Options:

- Actuation
- Steam
- Polishing



Actuated Sampling Valves



The actuator is single acting, pneumatic and is spring return to the closed valve position and operates with 50 to 120 psig air pressure. A 1/4-inch FNPT tap is provided for connecting the air line from the solenoid valve. It features an adjustment to set full open flow to the desired level. This flow can be adjusted from a trickle flow to as much as 5 gpm at 25 psi pressure drop. A knob is provided to operate the valve manually in lieu of operating the valve with air.

Option:

Position of the valve can be detected with one or two IFM Efecto MK 5005 proximity switches that sense the position of a magnet above the piston in the valve. These low current switches operate at voltages of 10 to 30 VDC.

Igenix® Radial Diaphragm Tank Outlet Valves

As an ISO 9001 manufacturer, PBM produces standard and custom sanitary valve products for services required to minimize contamination, facilitate CIP/SIP and reduce downtime. PBM Radial Diaphragm Valves comply with ASME BPE guidelines and offer valve certifications. Our absolute mission is to provide time lasting designs which help our users produce high quality biologicals and pharmaceuticals.

Benefits:

- Smooth sloping design for complete drainage
- Weld pad easily detaches with a simple hygienic clamp
- 1/2" through 3", DIN 10 through DIN 80
- 45° and 2° sloped outlet
- Pressure rating 175 psi/12 bar
- Outlet can be oriented in any position
- Machined by PBM from wrought material
- Standard finish 15 Ra with EP (BPE SF4)
- 316L, Hastelloy™ C-276, C-22, AL6XN™, Duplex, others
- Silicone or TFM™ diaphragms, others available
- Full material traceability and documentation package
- Optional purge port and tank connections available
- Exceeds performance requirements of ASME-BPE testing
- Optional position switch options including AS-Interface, DeviceNet, Foundation Fieldbus and Modbus

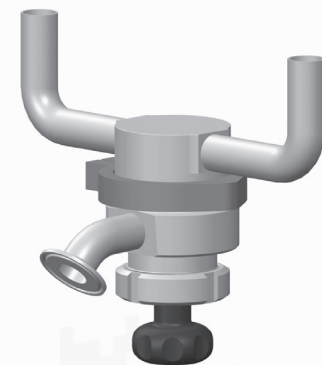


Point of Use Valve - Zero Dead Leg

PBM's Igenix® Radial Diaphragm Zero Static valves eliminate dead-leg on critical process systems including WFI, clean steam and process media. PBM's Radial Diaphragm Zero Static valves have an advantage over traditional weir type diaphragm valves due to a detachable body connection using a standard hygienic clamp that can be capped during system passivation.



Valve Size	Header Size Selection						
	1/2" DIN 15	3/4" DIN 20	1" DIN 25	1-1/2" DN 40	2" DN 50	3" DN 80	4" DN 100
1/2", DIN 15	*	*	*	*	*	*	
3/4", DIN 20		*	*	*	*	*	
1", DIN 25			*	*	*	*	
1-1/2", DN 40				*	*	*	
2", DN 50					*	*	*
3", DN 80						*	*





Self Cleaning Ball Valves

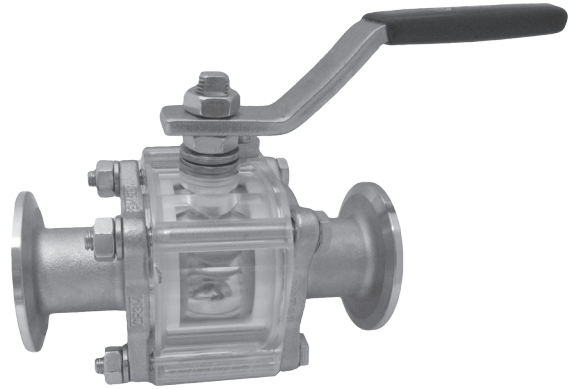
Unlike traditional ball valves, PBM's self-cleaning valve with Adjust-O-Seal® thoroughly cleans valve internals during CIP in the full open position. PBM's self-cleaning ball valve also provides full, unobstructed flow and bidirectional, bubble-tight shutoff. These are significant advantages over floating ball designs, as well as diaphragm and butterfly valves.

Problem:

Cleaning valves and piping systems is critical in sanitary applications. If valves are not thoroughly cleaned, product is trapped in the valve cavity that can contaminate the next batch of product.

Solution:

PBM's self-cleaning ball valve design allows full CIP/SIP access to all valve internals in the full open position. This allows first the process and then the cleaning solution and rinse solution to flow freely throughout the body cavity when the valve is in the open position.



Cleanable without external purge ports or valve removal Quick Line Changeovers Fire-Rated Option – tested to API-607

- USP Class VI elastomers and FDA complaint materials
- Eliminates downtime and maintenance costs associated with removing valves for cleaning.
- Adjustable seats (Adjust O-Seal®) allows valve to retain bidirectional seating.
- Provides full unobstructed flow. Flow of a 1" PBM valve is comparable to a 2" diaphragm valve.
- True-Bore® design ideal for pigging systems
- Certified Material Test Reports (CMTRS) provided for wetted components
- Independent Test Reports available

Igenix® Pinch Valves

PBM Pinch Valves shut off media flow by exerting a clamping force on your existing braided hose and clear tubing.

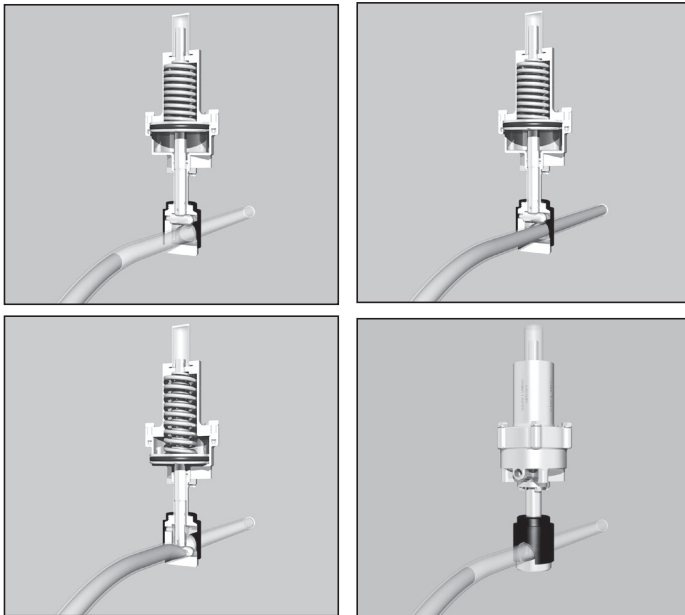
Features:

- PBM's unique design offers true "Fail Closed" without air-assist for flexible tubing sizes up to and including 1", 25.4 mm ID.
- Fits over existing tubing without the need for process breaks.
- Has absolutely no contact with any process media, thus will never introduce contaminants.
- For automated version, designed to function with actuator pressure as low as 60 PSIG, 4.1 barg with a variety of optional limit switches.
- Can be fitted with limit switches and/or position sensors for your monitoring/flow control needs.
- Modular safety cover shields the pinch area when the valve is in service. It can be opened to load/unload the valve without the need for process breaks or complete removal from the valve body.
- Tested and proven to provide absolute shutoff on tubing. Independent test report available on flexible braided hose and clear tubing on request.



PBM Automated Pinch Valves

- Visual Indicator standard
- Optional Limit Switch
- Complete shut off for all sizes
- Modular Safety Cover



Pinch Valve Applications:

Manual Valves

- Shut off valves on Bag totes
- Manual flow control on bench top UF systems

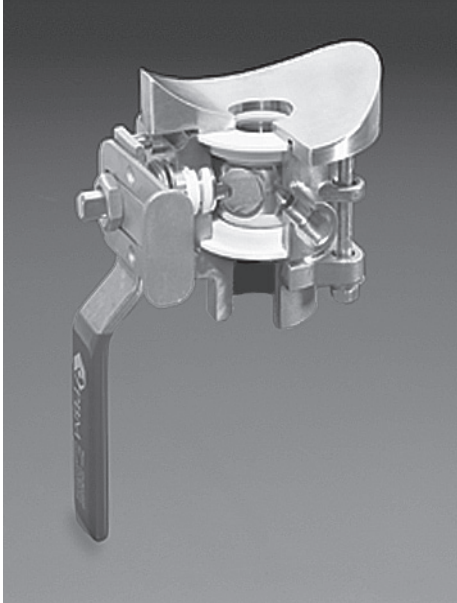
Automated Valves:

- On/Off valves on automated UF and Chromatography skids
- Valves with positioners for flow and pressure control on automated UF and Chromatography skids

Refer to PBM Pinch Brochure for dimensions and technical information.



Flush Tank Sampling Valves



Sample process media quickly and easily with PBM's Sampling Valve. Special pad design minimizes dead space. Easy CIP with Purge Ports and Milled Ball Flats ensures reliable samples. Valve can be shipped pre-mounted to piping for easy installation. Ideal for heavy duty and sanitary applications.

Manual valve standard.

Sizes:

- 1/2" - 2"

Materials:

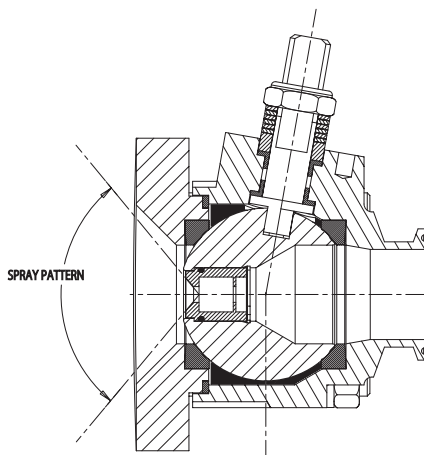
- 316 & 316L S/S
- Hastelloy
- Titanium
- Others

Options:

- Actuation
- Steam
- Polishing
- Sample Cup Ball

Spray Ball Valves

For cleaning inside tanks and other vessels

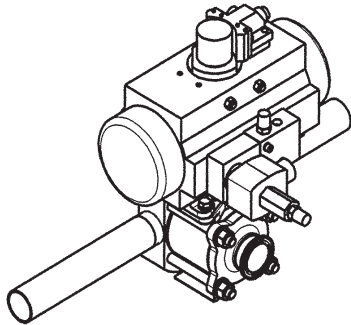


Benefits:

The spray nozzle is not exposed to the inside of the vessel. This minimizes the potential for clogging or damage caused either by the process or by scraping the inside tank walls during cleaning or processing.

- Valve mounts flush with the inside vessel wall, minimizing dead space.
- Valve can be located anywhere on the vessel to accommodate specific needs.
- Many standard nozzles can be used in the Angle Stem Spray Ball Valve.
- Angle Stem Spray Ball Valve allows actuator clearance on jacketed or insulated tanks.
- Easily used while still maintaining a vacuum.

Z-Ball™ - Zero Dead Leg Ball Valve Design



Features:

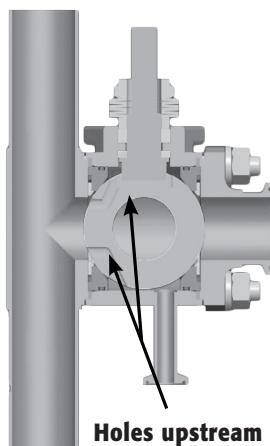
- Eliminates dead-legs in purified water systems and clean steam systems
- Compact size - short branch geometry
- 316L wrought low ferrite stainless steel, other alloys available
- Manual or pneumatic operation with optional device net
- Mechanical and electro-polished surfaces
- Fully drainable
- Adjustable seats (Adjust-O-Seal®) resulting in both upstream and downstream seal.
- Optional purge porting available

PBM's Z-Ball™, zero dead leg ball valve replaces traditional diaphragm valve coupled with a ball valve design used as a sterile barrier for purified water system loops and clean gas utilities. For clean steam header sterilization, the PBM valve is opened to introduce clean steam into the process loop. In a closed position, to prevent condensate from accumulating, the purge port in the valve body removes condensate through trap to drain.

This design offers PBM the ability to provide an ultra-sanitary process isolation valve which seals on both upstream and downstream seats resulting in significant savings compared to traditional methods of using a combination diaphragm valve coupled with a ball valve.

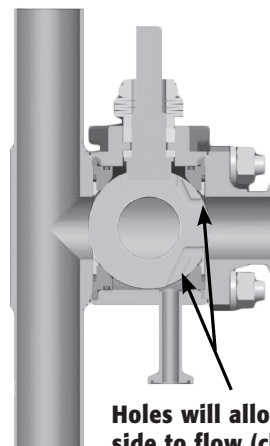


**Run side
(upstream)**



Holes upstream will allow run side to drain

Run side



**Branch side
flow direction**

Holes will allow branch side to flow (clean steam/CIP) into valve body and drain through purge port maintaining isolation from run side



Fabflex Manifolds are space-saving pipe and valve configurations designed to accommodate special industrial and sanitary applications. Can be shipped in lengths up to 18', with multiple manual and automated valves pre-installed. 100% testing before shipment ensures proper performance. Minimal dead space reduces areas where media could become trapped. Blank valve pads can be provided to accommodate future process expansion.

Valve Sizes:

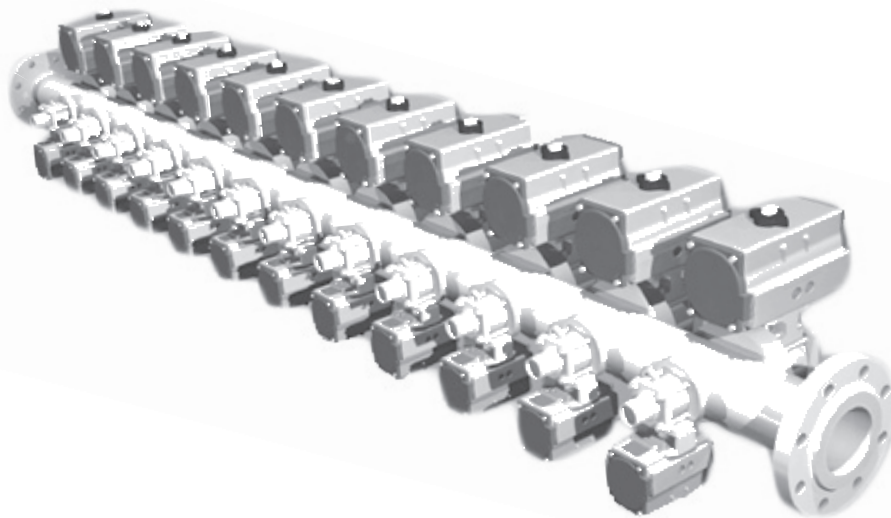
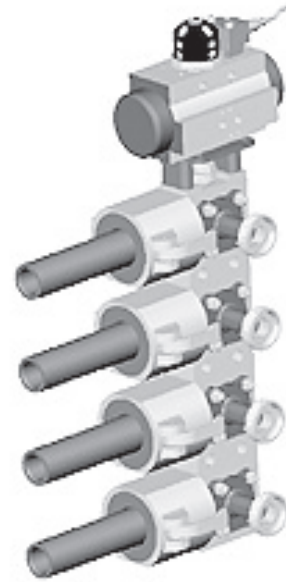
- 1/4" - 6"

Materials:

- 316 & 316L S/S
- Carbon Steel
- Hastelloy®

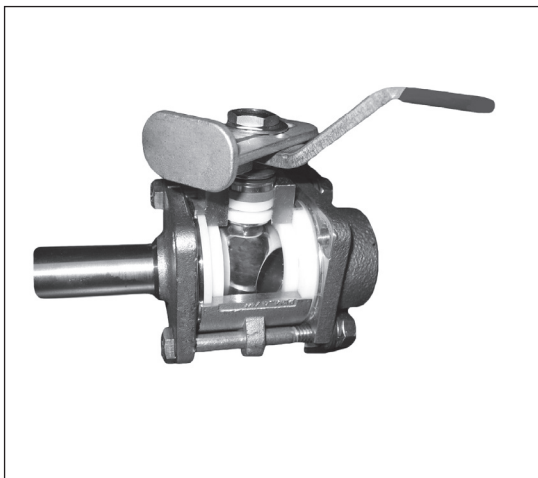
Options:

- Fire-Test
- CIP/SIP
- Cavity Fillers
- Actuation
- Steam
- Polishing & Electropolishing



**Fabflex®
Manifolds**

Process Break Valves



PBM's Adjustable Seat design combined with this material transition could be the answer to failing dielectric unions in your header systems. PBM's design provides an ideal spec transition and "leak resistant" dielectric union.

Sizes:

- 1/2" - 2"

Materials:

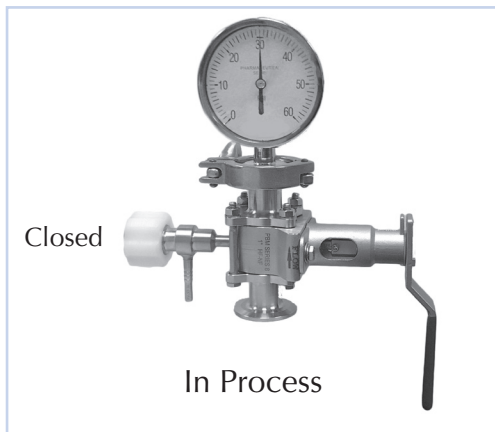
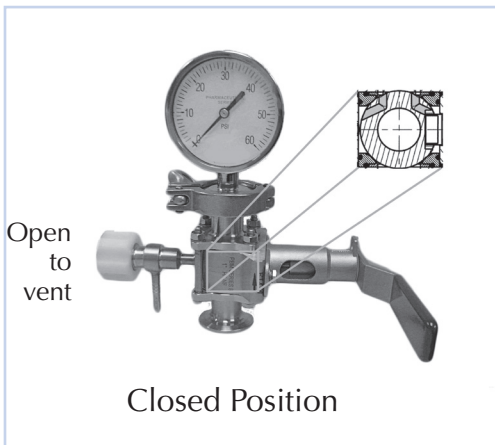
- 316/316L S/S
- 922 Bronze
- Others

Options:

- Interchangeable Seats
- Stem Extension
- Direct Mount Actuation
- Locking Handle
- Body Cavity Fillers

Igenix® Sanitary Block & Bleed Valve

Use PBM's Igenix® Sanitary Block & Bleed Valve to safely isolate the instrument. This valve allows pressure to be vented safely prior to removing the instrument in place.



Problem:

- Common instrument isolation valves retain pressure at the instrument even when the isolation valve is off.

Safe Solution:

- PBM Sanitary Block & Bleed Valve prevents pressure build up near instrument. Once the instrument is de-energized, it allows the operator to safely disconnect the instrument.

Features:

- Adjust-O-Seal® design safely allows for process isolation and instrument bleed.
- Ability to isolate, bleed off pressure and safely remove instruments which are in service on continuous service (ie..clean steam lines).
- Allows instruments to be removed for calibration or replacement without shutting down main process lines.
- Retrofittable center section for existing installed PBM valve.
- Standard material of construction is 316L stainless steel.
- Multiple end connections available, including BWTE for weld and tri-clamp for quick disconnect.

Control Valves

Use PBM's 2-Way Control Valves in industrial and sanitary throttling or shearing applications to accurately control the flow of liquids or thick media. These valves feature characterized balls with various port shapes, including "V."

Manual valve standard.

Sizes:

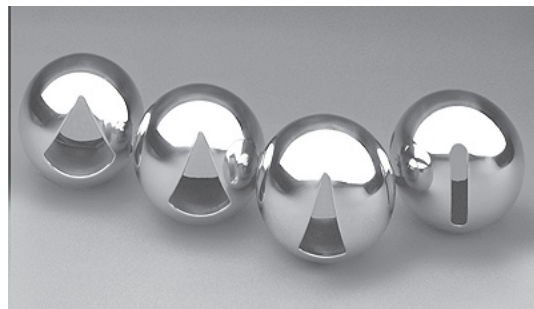
- 1/2" - 6"

Materials:

- 316 & 316L S/S
- Hastelloy®
- Others

Options:

- Actuation
- 30°, 45°, 60° V Angles
- Slotted
- Locking Handle
- Polishing & Electropolishing





Actuator Features



Nominal Values:

Pressure rating of 120 psig (8 barg). Standard temperature range is -4°F to 185°F (-20°C to 85°C). High temperature range is -4°F to 302°F (-20°C; 150°C). Low temperature range is -40°F to 185°F (-40°C to 85°C). Pre-lubricated for life of actuator on assembly. Fully tested on manufacture 100%.

Rotation adjustment 0-90°

From MOD. 52 up to 200

- standard + or - 5° in both clockwise and counterclockwise direction by means of adjusting screws outside the internal air supply chambers
- standard visual position indicators

MOD. 270

- standard + or - 5° in counterclockwise direction by means of adjusting screws in the caps
- kit for + or - 5° in clockwise direction available on request

External connection

- Namur pinion mounting
- Namur solenoid valve mounting
- Bottom of pinion according to ISO 5211-DIN 3337
- Optional Beacon Indicator

Operating Pressure

Range - 40 psig to 120 psig (2.8 barg to 8 barg)

Operating Media

Clean, dry air or clean, dry, non-corrosive gas

Stroke

90 degrees standard

Steel pinion

- Nickel-plated for resistance to corrosion
- Stainless steel (optional) for corrosive environments
- Anti-blowout design

Body manufactured from extruded aluminum UNI 6060

- Hard-coat anodized as standard finish 45-50 (micron)
- Good wear resistance
- Bore finished to high standard to ensure low friction and long life

Seals

- NBR standard
- Viton high temperature (optional)
- HNBR low temperature (optional)

Refer to Series "C" PBM Actuator Brochure for dimensions and technical information.

Positioners

- Gauges/No gauges
- 4-20 mA (Electro-pneumatic)
- 3-15 psi (pneumatic)
- Weatherproof, explosion proof
- Proximity, Mechanical Switches
- Solid State Sensors
- Flat or Domed Indicator



Electric Actuators

- Weatherproof, explosion proof
- Modulating or On/Off
- 2, 3, or 4 position
- Battery back-up
- Communication Bus interfaces available
- Auxiliary Limit Switches
- Motor Brake
- Handwheel override
- Potentiometers
- AC or DC



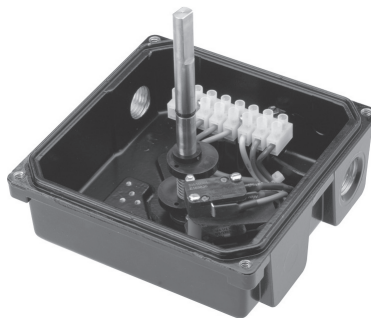
Solenoids

Features:

- Compact spool valve with threaded port, direct mounts to actuator
- All exhaust ports are pipeable, providing better protection against harsh environments.
- Standard manual override.
- DIN, weatherproof and explosion-proof solenoids available.
- Single and dual-coil solenoid constructions.
- Mountable in any position.

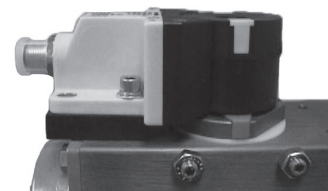


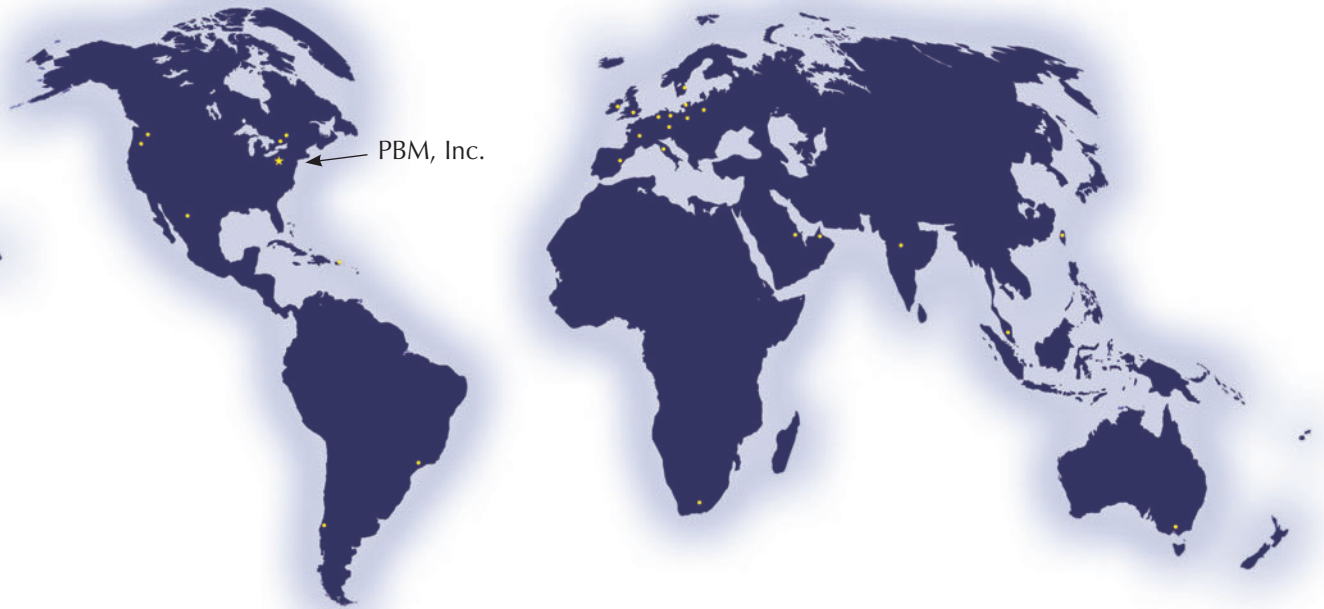
Position Indicators



Options:

- Weatherproof, Explosion proof
- Mechanical or Proximity Switches
- Fieldbus
- DeviceNet
- Visual Indication
- AS-i
- ATEX, IEC, CSA, NEMA, etc.





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