



Valves, Automation & Controls

SERIES C80/C89
C70/C74



CRYOGENIC SERIES VALVES

SMITH-COOPER®
INTERNATIONAL



Valves, Automation & Controls

OVERVIEW:

Valves designed for extreme low temperatures incorporating extended bonnets to ensure stem sealing integrity.

Integral ISO 5211 mounting pad for mounting actuators and other accessories. A lockable handle that keeps valves from being opened or closed accidentally.

An extended bonnet and stem that distances the stem seals from the cryogenic fluids and prevents them from seizing.

A one-piece cast bonnet without any welding or soldering, with the extension length in accordance with BS 6364 and wall thickness complying to ASME B16.34.

Stem to ball contact area is wider and larger, allowing the valve to be used for higher torque applications.

Special seat materials for extreme low temperature fluids, highly polished ball and internals that ensure valve sealing capabilities.

A variety of ends; threaded, socket weld, butt-weld, tube end, flanged Class 150 and 300, raised and flat faced.



Sharpe® cryogenic valves

offered in the following series:

Series C89 3-piece Full Port

in threaded, socket weld, butt-weld and other ends

Series C80 3-piece Standard Port

in threaded, socket weld, butt-weld and other ends

Series C70 2-piece Flanged Full Port

Class 150 and 300

Series C74 1-piece Flanged Standard Port

Class 150 and 300

All in 316 Stainless Steel

Extension Bonnet

The cryogenic extension bonnet is securely bolted to the valve mounting pad.

Visual Indication on Stem

A visual position indicator on the top of the stem provides easy identification of ball position and location of upstream vent in ball.

Blow-Out Proof Stem

The cryogenic bonnet has a one piece blowout proof stem design which enables in-line maintenance of the stem seals and prevents accidental stem release under pressure.

Stem Sealing

Increased stem sealing area for severe service assures bubble tight leakage in the toughest high cycle applications.

Uni-Directional

An alignment pin between the ball and stem assures proper orientation of the ball.

Upstream Vented Ball

Upstream vent hole in the ball prevents excessive body cavity pressure build-up in closed position due to thermal expansion.

DESIGN:

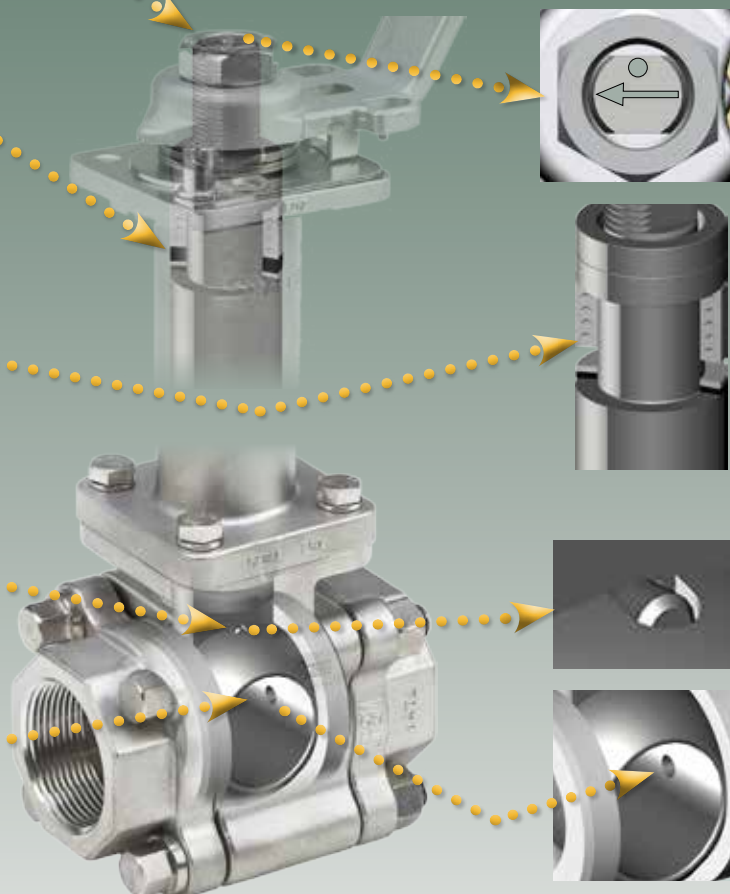
The exceptional capabilities and superiority of Sharpe® cryogenic valves are highlighted in the demanding requirements of cryogenic applications. Continuous operation and sealing at temperatures down to -400°F require special attention to design, manufacturing and assembly.



Series C70

Series C74

Series C80/C89



Heavy Duty Stem Design

Stem diameters have been increased to meet the higher torque requirements of the most demanding applications.

Stem to ball contact area is wider and larger, allowing the valve to be used for higher torque applications.

Design allows for the use of 316 stainless steel stem material, rather than 17-4PH, for superior corrosion resistance.

Tongue and Groove Design

Fully encapsulated body seals, allowing ends to be welded in-line, without time consuming and labor intensive disassembly.

Design compensates for bolt expansion and reduces the chance of external leakage.

Helps prevent seal ruptures in high pressure or cryogenic applications.

Larger Bolt Design

Larger diameter body bolts to comply with Class 600 for C80/C89 Series.

Stem Sealing

Increased Stem Sealing Area

Allows for a range of sealing combinations for severe applications and other stringent design demands.

Live-Loaded Stem

Two pairs of concave and opposing spring washers provide additional compensation for seal wear.

Safe Design

Blowout proof stem ensures the stem cannot be blown out by accidental medium pressure rise.

Wear Resistance

The thrust washer is either metallic for higher temperatures and wear resistance, or PEEK for lower temperatures.

Anti-Static

Static build-up discharges by anti-static device in stem or the metallic thrust washer.

ISO 5211 Top-Works Compatibility

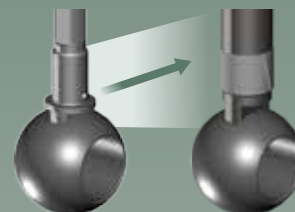
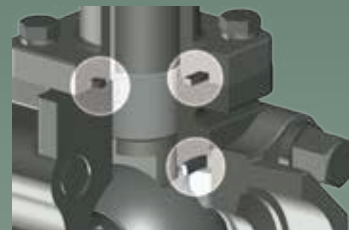
The top-works offer compatibility for mounting a wide range of accessories.

Sharpe® actuators and accessories may be retrofitted on existing valves without disruption of line integrity.

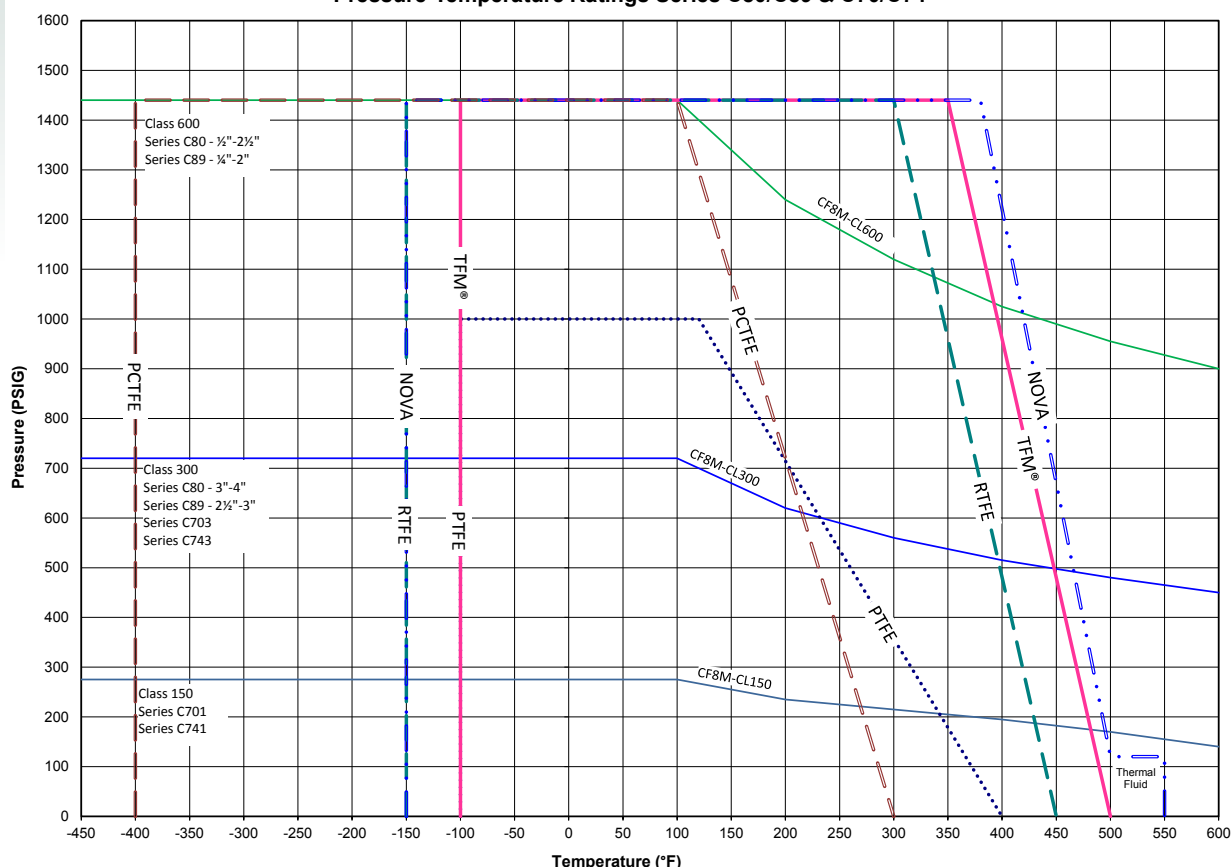
Tamper Proof Locking Device

All Sharpe® Valves come standard with a lockable handle. The optional, Sharpe® exclusive, tamper proof locking device cannot be removed with a lock in place. When not being used with a lock its springs ensure the locking device snaps into place in the open or closed position to prevent accidental operation.

FEATURES



Pressure-Temperature Ratings Series C80/C89 & C70/C74



Note:

The maximum pressure/temperature ratings of the valve assemblies are limited to lowest of the body or seat material fitted.
The valve body ratings are based on ASME B16.34 rating for materials.
The graphs are based on laboratory testing and our experience in field.
The seat ratings depend on the material, design, application and function.

Sharpe® Seat Materials

PTFE

T - Virgin PTFE

Polytetrafluoroethylene is a Fluorocarbon-based polymer. This seating material has excellent chemical resistance and a low coefficient of friction. Its temperature range is -100°F to 400°F (-73°C to 204°C). Color - white.

TFM®

M - TFM® PTFE

Dyneon TFM® PTFE is a second generation PTFE with improved chemical and heat resistance properties as well as better stress recovery. Its temperature range is -100°F to 500°F (-73°C to 260°C). Color - white.

RTFE

R - RTFE

RTFE is PTFE Reinforced with 15% Glass Fill.. PTFE's mechanical properties are enhanced by the glass fill to provide improved strength, stability and wear resistance. Its temperature range is from -150°F to 450°F (-100°C to 232°C). Color-off-white.

NOVA

N - Nova

This is a Teflon base filled with glass amorphous carbon powder and graphite. It has a lower thermal contraction-expansion than PTFE, and is ideal for steam or thermal fluid applications. Its temperature range is from -150°F to 550°F (-100°C to 288°C). Color - black.

PCTFE

K - KEL-F® (PCTFE)

PCTFE is a fluorocarbon based polymer. It offers a unique combination of physical and mechanical properties non flammability, chemical resistance, and near zero moisture absorption. It has a temperature range of -400°F to 300°F (-240°C to 177°C).

Applications

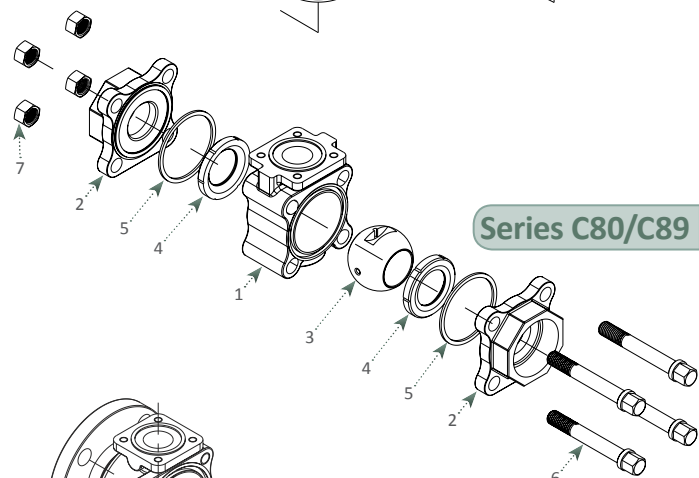
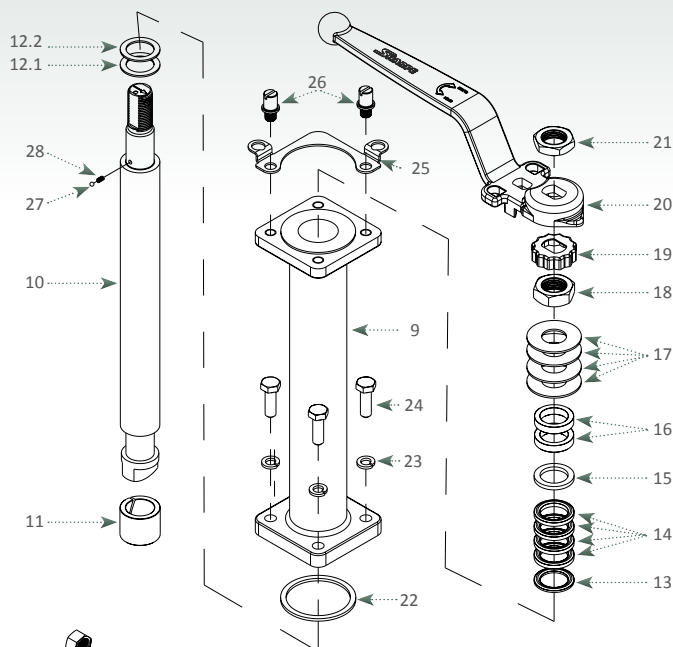
Many processes are using cryogenic gases in different sectors of the industry.

Terminal Unloading Stations	High Purity Cryogenic / Gas Systems
LNG Storage and Distribution	CO ₂ and Nitrogen Injection
Air Separation Plants	Liquid and Gaseous Oxygen For Steel Production
Gas Liquefaction	Transfer Lines
Food processing	Cryogenic transportation trailers

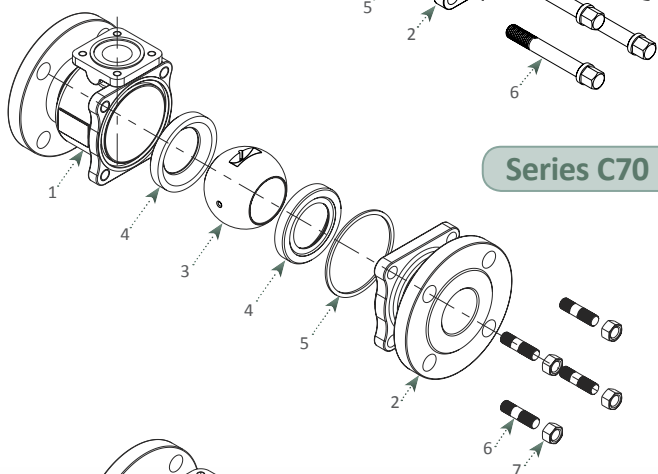
Boiling Point of Cryogenic liquids

Gas	Formula	Boiling Point		Liquid Density (lb/ft ³)
		F°	C°	
Carbon Dioxide	CO ₂	-109	-78	50.6
Methane	CH ₄	-258	-161	26.2
Natural Gas	LNG	-270	-168	26
Oxygen	O ₂	-297	-183	71.2
Argon	Ar	-303	-186	87.4
Air		-318	-194	57.87
Nitrogen	N ₂	-320	-196	50.45
Hydrogen	H ₂	-423	-253	4.43
Helium	He	-452	-269	7.82
Absolute Zero		-460	-273	

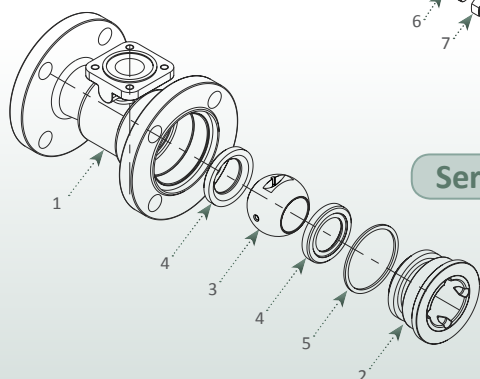
Parts & Materials



Series C80/C89



Series C70



Series C74

Series C80 Sizes ½" to 2 ½" ***

Series C89 Sizes ¼" to 2" ***

Series C70 Sizes ½" to 2"

Series C74 Sizes 1" to 2"

ITEM	DESCRIPTION	MATERIAL	QTY.
1	Body	316 Stainless Steel ASTM A351 CF8M	1
2	End Piece	316 Stainless Steel ASTM A351 CF8M (Weld ends are 316L)	1 - 2
3	Ball	316 Stainless Steel	1
4*	Seat	Kel-F® (PCTFE), Nova, RTFE, TFM®, PTFE	2
5*	Body Seal	Impregnated Graphite	1 - 2
6	Bolt/Stud	A193 Gr. B8	4
7	Nut	300 Series Stainless Steel	4

CRYOGENIC EXTENSION			
ITEM	DESCRIPTION	MATERIAL	QTY.
9	Bonnet Extension	316 Stainless Steel ASTM A351 CF8M	1
10	Stem	316 Stainless Steel	1
11*	Bearing	PTFE	1
12.1*	Thrust Bearing Bottom	PEEK	1
12.2*	Thrust Bearing Top	Nova	1
13*	Stem Packing - Bottom	PTFE, TFM®, Nova	1
14*	Stem Packing - Middle	PTFE, TFM®, Nova	3 - 4
15*	Stem Packing - Top	PTFE, TFM®, Nova	1
16	Gland	300 Series Stainless Steel	1 - 2
17*	Belleville Washer	300 Series Stainless Steel	4
18	Packing Nut	300 Series Stainless Steel	1
19	Lock Tab	300 Series Stainless Steel	1
20	Handle	Stainless Steel ASTM A351 CF8	1
21	Handle Nut	300 Series Stainless Steel	1
22*	Bonnet Seal	Impregnated Graphite	1
23	Lock Washer	300 Series Stainless Steel	4
24	Bonnet Bolt	304 Stainless Steel A2-70	4
25	Lock Plate	300 Series Stainless Steel	1
26	Stop Pin	300 Series Stainless Steel	2
27**	Anti-Static Ball	300 Series Stainless Steel	1
28**	Anti-Static Spring	Hard Drawn Stainless Steel	1

* These parts are used in repair kits.

** These parts are used when NS, Anti-Static Device Option is selected.

*** C80 2-1/2" and C89 2" use cryogenic extension shown on the next page with pipe handles.

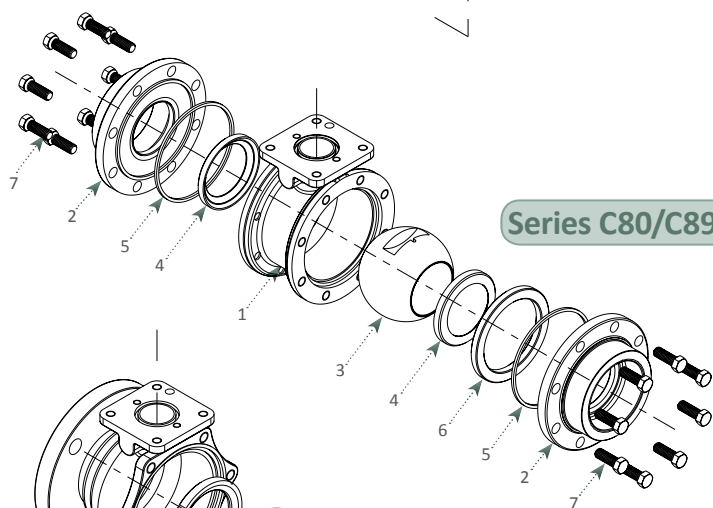
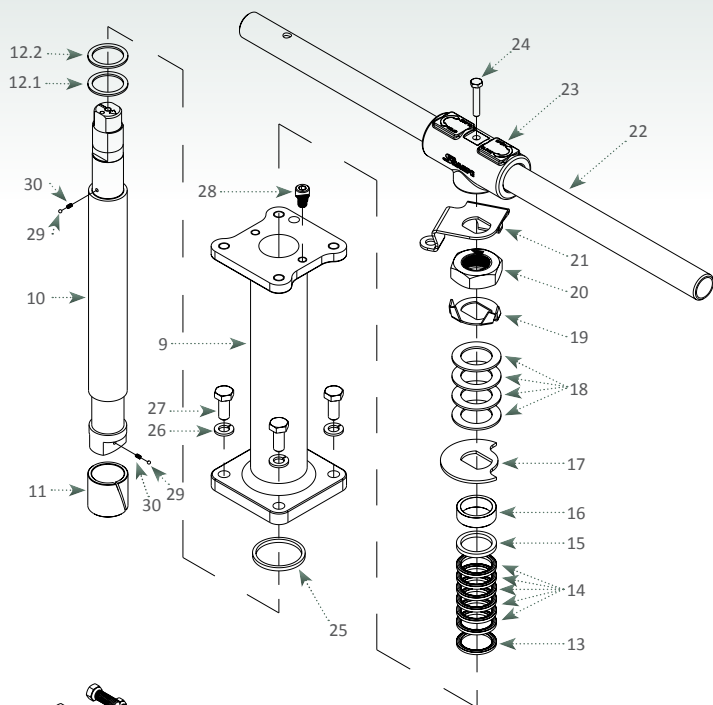
Parts & Materials

Series C80 Sizes 2½" to 4" ***

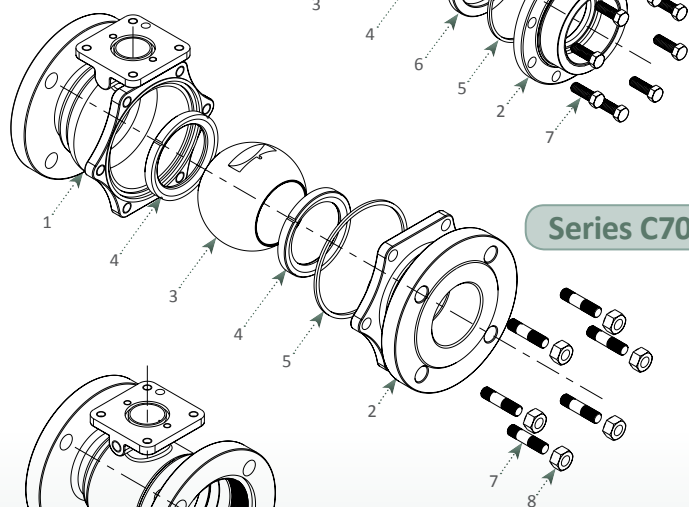
Series C89 Sizes 2" to 3" ***

Series C70 Sizes 2½" to 4"

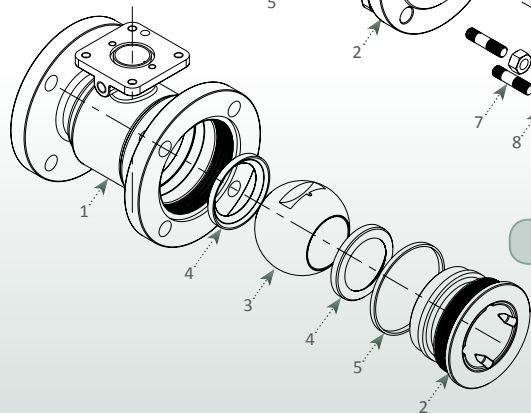
Series C74 Sizes 3" to 4"



Series C80/C89



Series C70



Series C74

ITEM	DESCRIPTION	MATERIAL	QTY.
1	Body	316 Stainless Steel ASTM A351 CF8M	1
2	End cap / Connector	316 Stainless Steel ASTM A351 CF8M (Weld ends are 316L)	1 - 2
3	Ball	316 Stainless Steel	1
4*	Seat	Kel-F® (PCTFE), Nova, RTFE, TFM®, PTFE	2
5*	Body Seal	Impregnated Graphite	1 - 2
6	Seat Ring (80 series only)	316 Stainless Steel ASTM A351 CF8M	1
7	Body Bolt/Stud	A193 Gr. B8	4 - 16
8	Body Nut	300 Series Stainless Steel	4 - 16

CRYOGENIC EXTENSION			
ITEM	DESCRIPTION	MATERIAL	QTY.
9	Bonnet Extension	316 Stainless Steel ASTM A351 CF8M	1
10	Stem	316 Stainless Steel	1
11*	Bearing	PTFE	1
12.1*	Thrust Bearing Bottom	PEEK	1
12.2*	Thrust Bearing Top	Nova	1
13*	Stem Packing - Bottom	PTFE, TFM®, Nova	1
14*	Stem Packing - Middle	PTFE, TFM®, Nova	4 - 6
15*	Stem Packing - Top	PTFE, TFM®, Nova	1
16	Gland	300 Series Stainless Steel	1
17	Stop Plate	300 Series Stainless Steel	1
18*	Belleville Washer	300 Series Stainless Steel	4
19	Lock Tab	300 Series Stainless Steel	1
20	Packing Nut	300 Series Stainless Steel	1
21	Lock Plate	300 Series Stainless Steel	1
22	Handle Pipe	300 Series Stainless Steel	1
23	Wrench Block	Stainless Steel ASTM A351 CF8	1
24	Wrench Bolt	300 Series Stainless Steel	1
25*	Bonnet Seal	Impregnated Graphite	1
26	Lock Washer	300 Series Stainless Steel	4
27	Bonnet Bolt	304 Stainless Steel A2-70	4
28	Stop Pin	300 Series Stainless Steel	1
29**	Anti-Static Ball	300 Series Stainless Steel	2
30**	Anti-Static Spring	Hard Drawn Stainless Steel	2

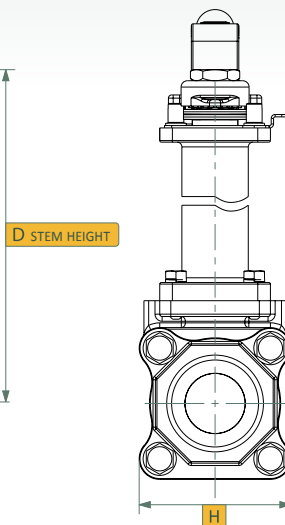
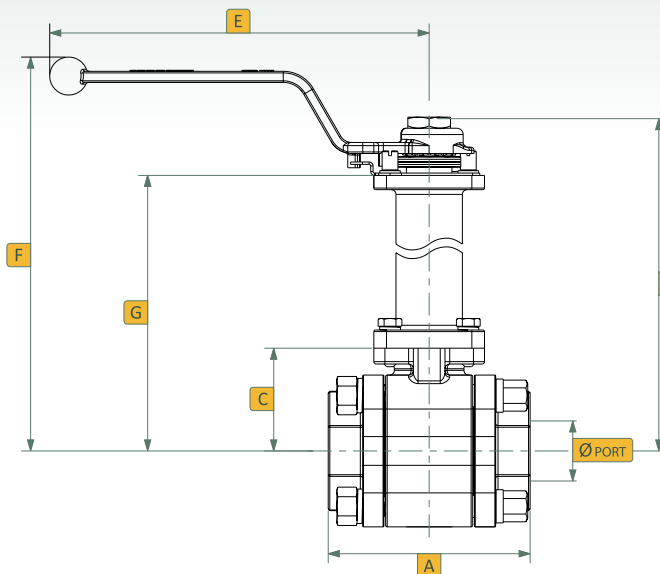
* These parts are used in repair kits.

** These parts are used when NS, Anti-Static Device Option is selected.

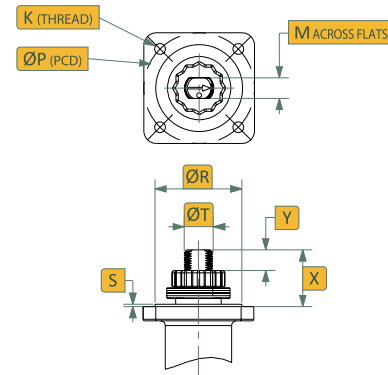
*** C80 2-1/2" and C89 2" use four bolt body shown on the previous page.

Dimensions Series C80/C89

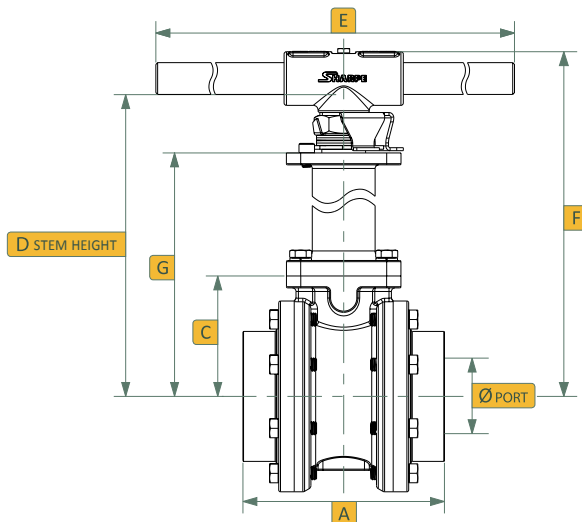
Series C80 sizes ½" - 2"
Series C89 sizes ¼" - 1½"



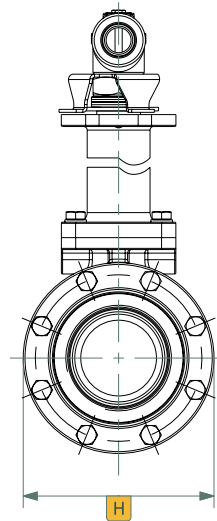
Dimensions for Actuator Mounting



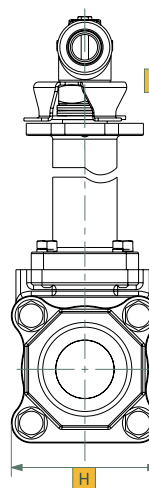
Series C80 sizes 2 ½" - 4"
Series C89 sizes 2" - 3"



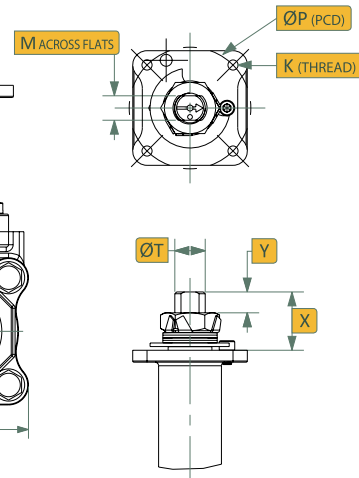
Series C80 - 3" - 4"
Series C89 - 2½" - 3"



Series C80 - 2-½"
Series C89 - 2"



Dimensions for Actuator Mounting

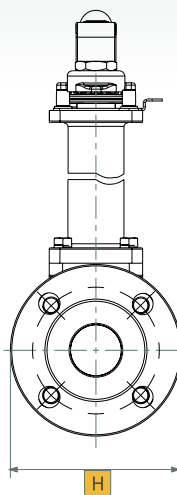
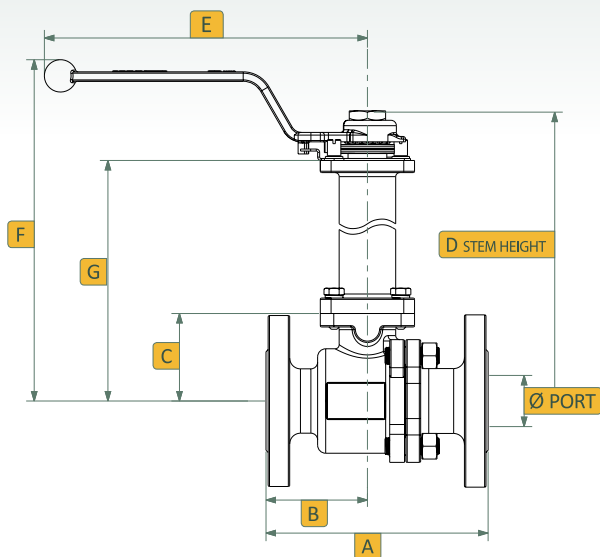


Standard Port	Full Port		TE/SW BW	Ext BW Full Port	Dimensions (Inches)													
C80	C89	ØPORT	A	A	C	D	E	F	G	H	K (Thread)	M	ØP (PCD)	ØR	S	ØT	X	Y
½"	¼", ¾"	0.44	2.91	-	1.27	12.30	6.42	13.62	11.57	1.81	M5-P0.8	0.264	F04 (1.65)	1.18	0.051	0.394	0.74	0.33
¾"	½"	0.56	3.07	-	1.42	12.44	6.42	13.78	11.73	1.95	M5-P0.8	0.264	F04 (1.65)	1.18	0.051	0.394	0.74	0.33
1"	¾"	0.81	3.72	13.10	1.74	12.91	7.28	14.17	12.09	2.39	M6-P1.0	0.343	F05 (1.97)	1.38	0.059	0.472	0.83	0.37
1¼"	1"	1.00	4.25	13.25	1.91	13.07	7.28	14.33	12.24	2.85	M6-P1.0	0.343	F05 (1.97)	1.38	0.059	0.472	0.83	0.37
1½"	1¼"	1.24	4.57	13.61	2.40	14.37	9.45	15.83	12.99	3.15	M8-P1.25	0.512	F07 (2.76)	2.17	0.059	0.709	1.41	0.54
2"	1½"	1.50	5.04	13.90	2.56	14.57	9.45	15.98	13.15	3.78	M8-P1.25	0.512	F07 (2.76)	2.17	0.059	0.709	1.41	0.54
2½"	2"	2.00	6.34	14.21	3.58	16.02	15.75	17.17	14.33	4.92	M10-P1.5	0.630	F10 (4.02)	-	-	0.886	1.70	0.59
3"	2½"	2.50	6.65	14.87	3.98	16.65	23.62	18.11	14.72	6.30	M10-P1.5	0.807	F10 (4.02)	-	-	1.024	1.93	0.68
4"	3"	3.25	8.43	-	4.57	17.20	23.62	18.70	15.35	7.99	M10-P1.5	0.807	F10 (4.02)	-	-	1.024	1.93	0.68

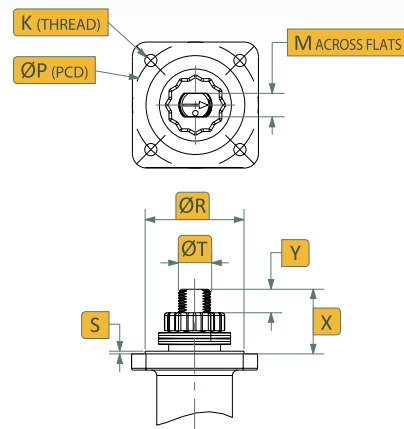
The dimensions above are for informational purposes only. Please refer to Sharpe® Valves if you need dimensions for construction.

Dimensions Series C70

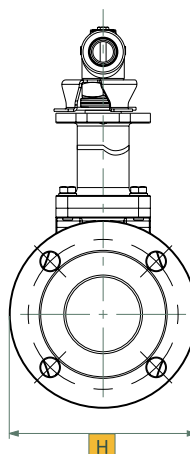
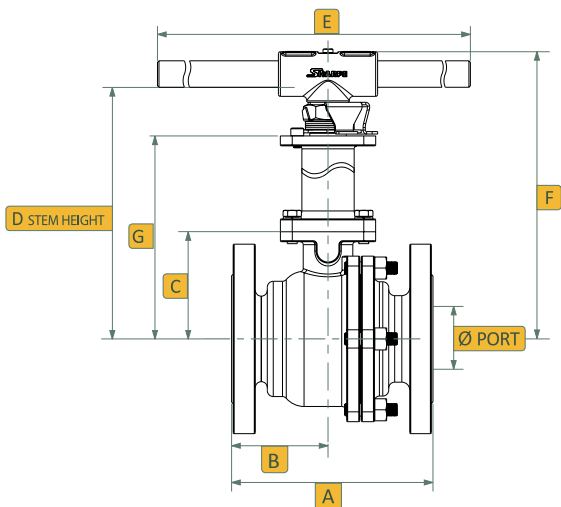
Series C70 sizes ½" - 2"



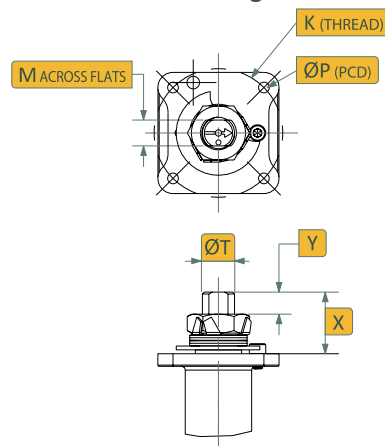
Dimensions for Actuator Mounting



Series C70 sizes 2½" - 4"



Dimensions for Actuator Mounting

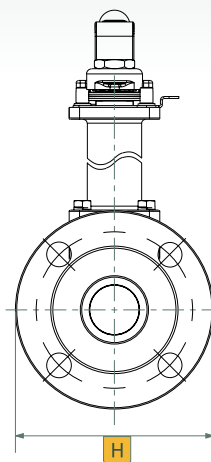
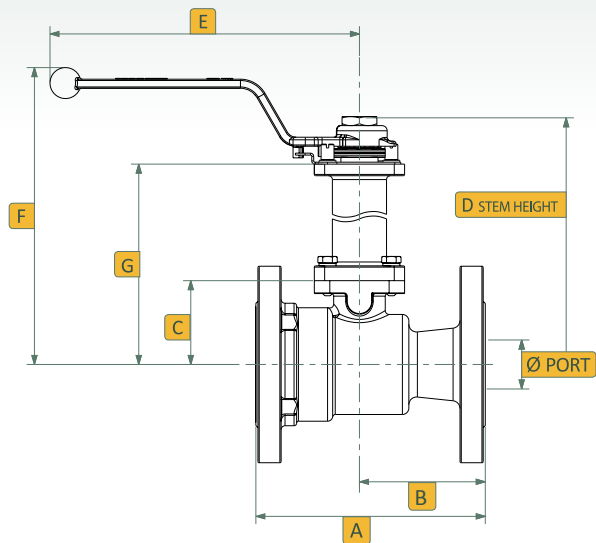


Series	Class 150	Class 300	Class 150	Class 300	Dimensions (Inches)															
C70	ØPORT	A	A	B	B	C	D	E	F	G	ØH	ØH	K (Thread)	M	ØP (PCD)	ØR	S	ØT	X	Y
½"	0.56	4.25	5.50	1.96	2.36	1.41	12.44	6.42	13.88	11.71	3.50	3.75	M5-P0.8	0.264	F04 (1.65)	1.18	0.051	0.394	0.74	0.33
¾"	0.81	4.62	6.00	2.13	2.52	1.53	12.56	6.42	14.00	11.81	3.88	4.61	M5-P0.9	0.264	F04 (1.65)	1.18	0.051	0.394	0.74	0.33
1"	1.00	5.00	6.50	2.13	2.72	1.93	13.07	7.28	14.37	12.24	4.25	4.88	M6-P1.0	0.343	F05 (1.97)	1.38	0.059	0.472	0.83	0.33
1½"	1.50	6.50	7.50	2.97	3.21	2.56	14.53	9.45	15.98	13.11	5.04	6.12	M8-P1.25	0.512	F07 (2.07)	2.17	0.059	0.709	1.41	0.33
2"	2.00	7.00	8.50	3.25	3.37	2.94	14.90	9.45	16.42	13.49	6.00	6.50	M8-P1.26	0.512	F07 (2.07)	2.17	0.059	0.709	1.41	0.50
2½"	2.50	7.50	9.50	3.58	4.00	3.98	16.65	15.75	18.11	14.72	7.01	7.52	M10-P1.5	0.807	F10 (4.02)	-	-	1.024	1.93	0.59
3"	2.99	8.00	11.12	3.83	4.20	4.25	16.93	23.62	18.39	15.00	7.52	8.27	M10-P1.5	0.807	F10 (4.02)	-	-	1.024	1.93	0.68
4"	3.94	9.00	12.00	4.61	5.06	4.90	17.56	23.62	19.03	15.65	9.02	10.00	M10-P1.5	0.807	F10 (4.02)	-	-	1.024	1.93	0.68

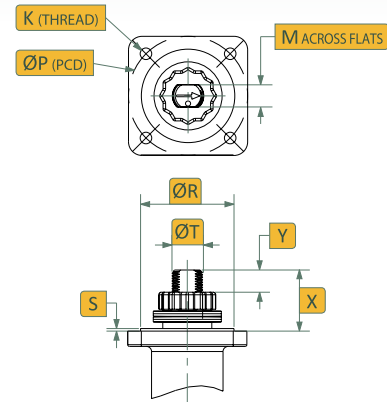
The dimensions above are for informational purposes only. Please refer to Sharpe® Valves if you need dimensions for construction.

Dimensions Series C74

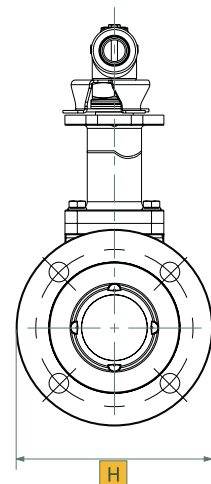
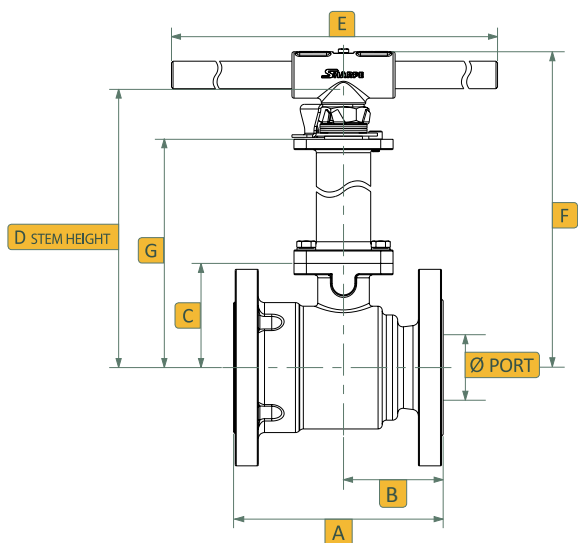
Series C74 sizes 1" - 2"



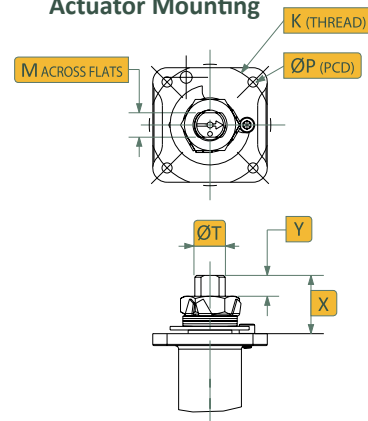
Dimensions for Actuator Mounting



Series C74 sizes 3" - 4"



Dimensions for Actuator Mounting



Series		Class 150	Class 300	Class 150	Class 300	Dimensions (Inches)														
C74	ØPORT	A	A	B	B	C	D	E	F	G	ØH	ØH	K (Thread)	M	ØP (PCD)	ØR	S	ØT	X	Y
1"	0.81	5.00	6.50	2.70	4.20	1.53	12.56	6.40	14.02	11.81	4.25	4.88	M5-P0.8	0.264	F04 (1.65)	1.18	0.051	0.394	0.74	0.37
1½"	1.24	6.50	7.50	3.35	4.34	2.40	14.37	9.45	15.83	12.99	5.04	6.12	M8-P1.25	0.512	F07 (2.07)	2.17	0.059	0.709	1.41	0.33
2"	1.50	7.00	8.50	3.86	5.35	2.56	14.53	9.45	15.98	12.87	6.00	6.50	M8-P1.25	0.512	F07 (2.07)	2.17	0.059	0.709	1.41	0.54
3"	2.50	8.00	11.12	3.82	6.93	3.98	16.65	23.62	18.07	14.72	7.52	8.27	M10-P1.5	0.807	F10 (4.02)	-	-	1.024	1.93	0.68
4"	3.25	9.00	12.00	4.80	7.80	4.59	17.24	23.62	18.66	15.31	9.02	10.00	M10-P1.5	0.807	F10 (4.02)	-	-	1.024	1.93	0.68

The dimensions above are for informational purposes only. Please refer to Sharpe® Valves if you need dimensions for construction.

How To Order Cryogenic Valves C80/C89

1"	C80	-	6	6	6	6	K	I	N	-	SW / TE	-	TP
Size	Series		Body	Ends	Ball	Stem	Seat	Body Seal	Stem Packing		Ends		Options
Size	Series		Body				Seat		Body Seal		Ends		Options
C80 C89 Class	C80 Cryo Reduced Port C89 Cryo Full Port		6 316 Stainless Steel				K PCTFE (Kel-F®) M TFM® N Nova R RTFE T PTFE	I Impregnated Graphite			TE Threaded SW Socketweld BW10 Butt weld SCH 10* BW Butt weld SCH 40		HC High Cycle Stem* NS Anti-Static* TP Tamper Proof Locking Device
1/2" 3/4" 600				Ends									
3/4" 1/2" 600				6 316 Stainless Steel (Weld ends are 316L)									
1" 3/4" 600					Ball								
1 1/4" 1" 600					6 316 Stainless Steel								
1 1/2" 1 1/4" 600						Stem							
2" 1 1/2" 600						6 316 Stainless Steel							
2 1/2" 2" 600								Stem Packing					
3" 2 1/2" 300								N Nova M TFM® T PTFE					
4" 3" 300										Ends (C89 FP Only)			
										BW80 Butt weld SCH 80 EBW Butt weld SCH 80 Extended			

* Price on Application

Other materials / options available please contact us with your unique requirement.

Technical Information			
VALVE SIZE		Cv	APPROX. WEIGHT (lbs.)
C80	C89		
1/2"	3/4"	8	4
3/4"	1/2"	12	4
1"	3/4"	32	6
1 1/4"	1"	46	8
1 1/2"	1 1/4"	80	13
2"	1 1/2"	120	16
2 1/2"	2"	240	33
3"	2 1/2"	350	38
4"	3"	720	59



Applicable Standards

Body Wall Thickness	ASME B16.34
SW & Threaded Ends	ASME B16.11
Butt-Weld Ends	ASME B16.25
Basic Design	ASME B16.34, BS 6364
Pressure Test	API 598, MSS-SP 72
Mounting Dimensions	ISO 5211
Marking	MSS-SP 25

Traceability:

Heat numbers are provided on all valve bodies and ends. CMTR's (certified mill test reports) are available upon request.

Cryogenic Valve Preparation:

All cryogenic valves are shell tested, then completely disassembled. All parts are cleaned and degreased in our clean room. The dry parts are then assembled. The assembled valve undergoes a seat and seal pressure test with nitrogen. The completed tested valve is packaged in polyethylene bags before leaving the clean room.

How To Order Cryogenic Valves C70/C74

1"	C70	1	6	6	6	K	I	N	1 / 1	TP
Size	Series	Class	Body / Ends	Ball	Stem	Seat	Body Seal	Stem Packing	Ends	Options
Size	Series	Class	Body/Ends	Ball	Stem	Seat	Body Seal	Stem Packing	Ends	Options
C70 C74	C70 Cryo Full Port C74 Cryo Reduced Port	1 150 3 300	6 316 Stainless Steel	6 316 Stainless Steel	6 316 Stainless Steel	K PCTFE (Kel-F®) M TFM® N Nova R RTFE T PTFE	I Impregnated Graphite	N Nova M TFM® T PTFE	1 Class 150 Flanged RF 1F Class 150 Flanged FF 3 Class 300 Flanged RF 3F Class 300 Flanged FF	HC High Cycle Stem* NS Anti-Static* TP Tamper Proof Locking Device

* Price on Application

Other materials / options available please contact us with your unique requirement.

C70 Technical Information

VALVE SIZE	Cv	APPROX. WEIGHT lbs	
		Class 150	Class 300
½"	26	5	6
¾"	50	6	9
1"	94	9	12
1½"	260	18	24
2"	480	26	32
2½"	730	44	53
3"	1100	51	68
4"	2100	70	100

C74 Technical Information

VALVE SIZE	Cv	APPROX. WEIGHT lbs	
		Class 150	Class 300
1"	30	10	13
1½"	82	21	27
2"	120	24	28
3"	350	45	54
4"	720	71	91

Applicable Standards

Body Wall Thickness	ASME B16.34
Face to Face Dimensions	ASME B16.10
Flange Dimensions	ASME B16.5
Basic Design	ASME B16.34, BS 6364
Pressure Test	API 598, MSS-SP 72
Mounting Dimensions	ISO 5211
Marking	MSS-SP 25

Traceability:

Heat numbers are provided on all valve bodies and ends. CMTR's (certified mill test reports) are available upon request.

Cryogenic Valve Preparation:

All cryogenic valves are shell tested, then completely disassembled. All parts are cleaned and degreased in our clean room. The dry parts are then assembled. The assembled valve undergoes a seat and seal pressure test with nitrogen. The completed tested valve is packaged in polyethylene bags before leaving the clean room.

Kel-F® is a registered trademark of 3M Company. | TFM® is a registered trademark of Dyneon.

Due to continuous development of our product range we reserve the right to change the dimensions and information contained in the leaflet as required.



SMITH-COOPER®
INTERNATIONAL

Toll Free 877-774-2773

Fax 708-562-9250

www.smithcooper.com • www.sharpevalves.com

Los Angeles, CA • Chicago, IL • Atlanta, GA • Vancouver, WA

