



Valves, Automation & Controls



SERIES INCLUDED
C80/C89, FSC80/FSC89
C70, FSC70
C74, FSC74

CRYOGENIC SERIES

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

www.sharpevalves.com

IM-CRYO 1-21

Installation, Operation, and Maintenance Manual

Cryogenic Ball Valves Series

GENERAL

The following instructions relate to all Sharpe® Cryogenic Ball Valves series including:

Cryogenic C80/C89 and cryogenic fire-safe FSC80/FSC89 3-piece design.

Cryogenic C70 and cryogenic fire-safe FSC70 flanged 2-piece design.

Cryogenic C74 and cryogenic fire-safe FSC74 fully flanged 1-piece design.

All Sharpe® cryogenic ball valve series utilize similar extension bonnet assemblies.

STORAGE

All the valves are individually packed in a sealed bag. Valves should be kept in their bags with the protective packaging, end port plugs/caps, flange covers etc. and stored in a clean, dry environment until ready for use.

All the valves are shipped in the open position. It is recommended that they be left in this position during storage. Valve performance depends on preventing damage to the perfectly clean and spherical ball. Upon removal of covers make sure that the valve is left completely open and free of obstruction until it is set in the pipe line.

SAFETY PRECAUTIONS

Before removing valve from pipeline: media flowing through a valve may be corrosive, toxic, flammable, or of a contaminant nature. Where there is evidence of harmful fluids having flowed through the valve, the utmost care must be taken. It is suggested that the following safety precautions should be taken when handling valves:

- Always wear eye shields
- Always wear gloves and overalls
- Wear protective footwear
- Wear protective headgear
- Ensure that running water is easily available
- Have suitable fire extinguisher ready if media is flammable

By checking line gauges, ensure that no pressure exists on either the upstream or the downstream sides of the valve.

Ensure that any media is released by operating valve slowly to half-open position. The valve should be decontaminated when the ball is in the half-open position.

When removing the valve from the pipeline leave the ball in the fully open position.

OPERATION

Sharpe® valves provide tight shut off when used under normal conditions and in accordance with Sharpe® valves published pressure/temperature charts.

If these valves are used in a partially open (throttled) position, seat life may be reduced.

Any media which might solidify, crystallize or polymerize should not be allowed to stand in the ball valve cavities unless regular maintenance is provided.

MANUAL OPERATION

Sharpe® valves have ¼ turn operation closing in CW direction and opening in CCW direction. It is possible to see when the valve is open or closed by the position of the wrench handle:

- When the wrench is perpendicular to the pipeline the valve is closed.
- When the wrench is parallel to the pipeline the valve is open.

The type of wrench which is fitted to valve sizes ¼” to 2” is a cast handle with integral stop. The type of wrench which is fitted to valve sizes 2½” to 4” is a cast wrench block with a handle pipe and a stop plate.

REMOTE OPERATION

Where manual operation is not required, valves may be automated for remote operation, instrument control, etc. A range of Sharpe® valves pneumatic and electric actuators are available. Operation will be in accordance with Sharpe® valves installation, operation and maintenance instructions for relevant actuator.

Valves with actuators should be checked for alignment of the actuator to the valve stem. Any angular or parallel misalignment may result in high operational torque and potential damage to the stem seals or stem.

MAINTENANCE

Sharpe® ball valves have been designed and engineered to provide long lasting and trouble-free service when used in accordance with the instructions and specifications herein.

Before installing the valves, the pipes must be flushed clean of dirt, burrs and welding residues, or you will damage the seats and ball surface.

Series C80/C89 and C70 valve design along with the fire-safe option allows maintenance without the need for special tools.

Series C74 and FSC74 require a special tool to remove the end cap. The valves are unidirectional and must be installed for flow in one direction as indicated by the flow arrow marked on the body and bonnet pad.

When the valve is in the closed position the relief hole in the ball is on the upstream side. The stem top has a marking indicating the relief hole position and an arrow pointing to the downstream direction.

The valve must be installed in a horizontal piping and its stem axis must be within 45° of the vertical.

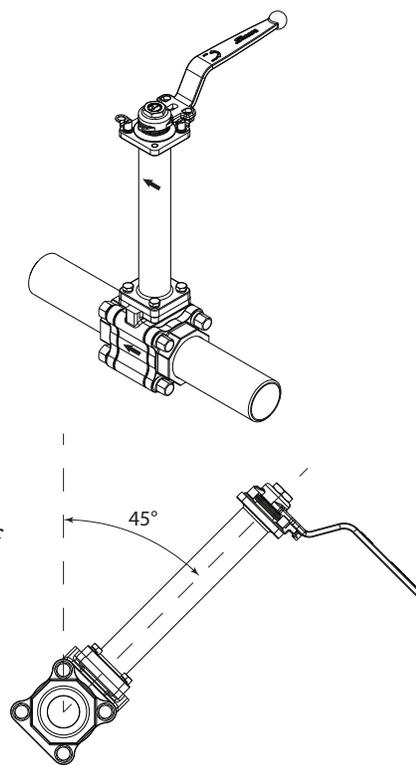
These valves should be installed using good pipe fitting practices.

GENERAL

With its self-wipe ball/seats Sharpe® valves have a long, trouble-free life, and maintenance is seldom required. When necessary, valves may be refurbished using a small number of components, none of which require machining. Sharpe® valves are designed for easy service and assembly in the field. The following checks help extend valve life and reduce plant problems.

Stem leakage in valves

In the unlikely event of stem leakage examine the spring washers for damage. If in good condition, tighten the packing nut until disk springs are firmly compressed, then back nut off ¼” of a turn. If damaged, dismantle the stem down to the gland, fit new disk springs with their outer edges touching. Further maintenance necessitates dismantling of the valve.



Leakage at body or bonnet joint

Check for tightness in the body or bonnet connector bolts. If loose, tighten the bolts. Standard wrenches should only be used. Excessive force will only stretch or strip the bolts (See torque charts on page 8). If there is still leakage, this will be due to damage to the seal, and it will be necessary to dismantle the valve.

In-Line Leakage

Check that the valve is fully closed. If it is, leakage will be due to damaged seat or ball sealing surfaces, and it will be necessary to dismantle the valve.

Note: stem leakage and leakage at body joint, if not cured by simple means described above, necessitate dismantling valve. If there is no stem leakage, the stem assembly should not be touched.

Leakage at Flange Pipeline Joint

Check that the flanged joints are aligned to the valve and assure there is compressive force on the gasket. Excessive force on the gasket may also cause leakage.

Series C80/C89 & FSC80/FSC89

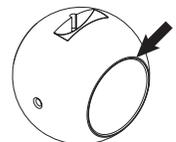
DISMANTLING (C80/FSC80 valves sizes 1/2" to 2", C89/FSC89 valves sizes 1/4" to 1 1/2")

Dismantling the valves can be done by removing the valve with the end caps from the line or by removing the body center section with the bonnet extension from between the end caps.

Follow the instructions using the drawing on page 9 to identify the parts.

When removing the body center section from the pipeline follow these instructions:

1. Bring the valve handle [21] to the open position. Warning: trying to remove the valve body from the line in the closed position will damage the ball.
2. With the valve in the open position, loosen all body bolts [6] and nuts [7] taking care that any leftover pressure or media has been evacuated. Remove the body bolts, so the valve body can be removed from between the end caps. Bring the body [1] out from between the end caps [2] and bring it to a clean area where it can be dismantled.
3. Remove and discard the seats [4] and body seals [5]. Be careful not to damage the sealing surfaces of the end caps.
4. Support the ball [3] to prevent it from falling out of body and turn handle to the closed position for its removal. Set the ball aside in clean secure area for reuse. You may find it easier to remove the bonnet extension first and then the ball.
5. Remove the mounting bonnet bolts [25] and lock washers [24] holding the bonnet extension [9] to the body [1]. Remove the bonnet extension from the top of the valve body.
6. Discard of the bonnet seal [23].
7. To dismantle the stem assembly, first remove the handle nut [22], handle [21] and nut lock [20] from stem [10]. Remove the packing nut [19], spring washers [18] and glands [17]. It is normally not possible to remove all the gland packing [13, 14, 15 or 16] at this stage.
8. Withdraw the stem through the bonnet extension and remove the thrust seals [12.1, 12.2] from the stem. The gland packing may now be removed from the top of the bonnet stem bore.
9. The stem bearing [11] does not need to be replaced unless it is damaged.
10. Clean all components thoroughly and examine all seating/sealing surfaces.
11. Check the stem and bonnet sealing surfaces for visual leak paths or erosion. If any are found, the part must be replaced. The ball must have no scratches across its seating surfaces. Any damage to the ball sealing surface and port edges (see arrow) will destroy the new seats.
A damaged ball must be replaced.

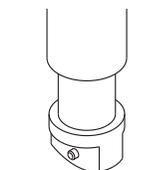
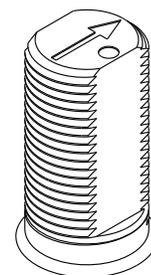
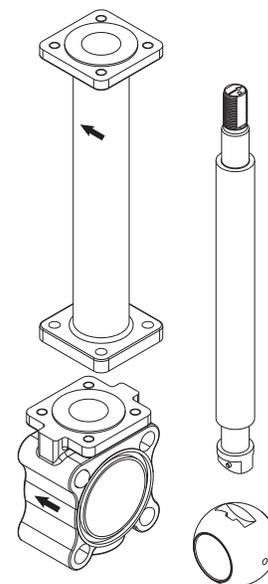
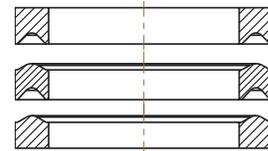


REBUILDING (C80/FSC80 valves sizes 1/2" to 2", C89/FSC89 valves sizes 1/4" to 1 1/2")

Before rebuilding, check that all the correct components are available and that they are fit for re-assembling. Only Sharpe® valves authorized spare parts should be used.

When rebuilding, cleanliness is essential to allow long valve life and provide cost-effective maintenance.

1. Apply appropriate lubricant to the stem nut threads, new stem thrust seals and packing (as needed).
2. Fit the stem thrust bearings to the stem and insert them through the bonnet extension into stem bore and push it up.
3. Fit together the bottom, middle and top gland packing [13, 14, 15 - see sketch] or fire-safe packing [16] to make it easier to assemble.
4. Fit the glands and the disk springs with their outer edges touching. Put the first spring concave side up and the second spring concave side down. Repeat that with the other two springs.
5. Fit the gland nut and tighten to the torque figures in table 1.
6. Place the nut lock on the gland nut and adjust the orientation of the nut (loosen the nut if needed). Over tightening the nut will only reduce the life of the stem packing.
7. Fit the handle and the handle nut on the stem and tighten the nut.
8. Operate the stem several times to readjust. Bring the stem into the closed position - the handle will be perpendicular to the pipeline.
9. Insert the bonnet seal in its groove.
10. Fit the bonnet extension to the body making sure that the flow arrow of the bonnet is according to the flow arrow of the body (see figure on right). Tighten the screws and spring washers to the torque figures in table 2.
11. You may find it easier to insert the ball to the body before mounting the bonnet extension. In this case make sure the ball is inserted in the correct flow direction where the vent hole is on the side of the flow arrow tail as shown in the picture (see figure on right).
12. With the stem still in the closed position, assemble the ball with its pin slot on the same side as the stem pin so the ball can slide in. Slide the ball into the body cavity.
13. Make sure the relief hole in the ball, the flow arrows on the body and bonnet and the marking on the top of the stem are all according to the figure on right.
14. Rotate the handle to the open position. The ball must be in the open position to prevent it from falling out and from colliding with the end connectors when body is replaced in line.
15. Fit the seat rings to the body making sure that the contoured surface is on the ball side.
16. Fit the body seals into the body grooves.
17. Note: a trace of lubricant that is compatible with the media and cryogenic temperatures will ease the rebuilding by holding the seat rings and body connector seals in place.
18. The valve and bonnet extension must be installed back into the pipeline by sliding the body in between the body ends. The pipeline should, however, be sprung apart sufficiently to clear valve body and avoid damage to seat rings, body seals and body connector sealing face.



19. Locate the body on center line of pipe work, fit body connector bolts and nuts.
20. Tighten the bolts to the torque figures in table 3. Excessive force will only stretch or strip the bolts.

Series C80/C89 & FSC80/FSC89

DISMANTLING (C80/FSC80 valves sizes 2¹/₂" to 4", C89/FSC89 valves sizes 2" to 3")

Follow the instructions using the drawing on page 10 to identify the parts.

The instructions for dismantling and rebuilding valve sizes 2¹/₂" to 4" are basically the same as for the smaller valve sizes but differ only in their stem assembly. Remove valve following steps 1-6 on page 3.

1. To dismantle the stem assembly, first remove the wrench bolt [25], the wrench block [24] and handle pipe [23] and lock plate [22] from the stem.
2. To remove the lock tab [20] use a flat screw driver and bend the flats open to enable opening the packing nut [21].
3. Using a wrench to prevent the stem from turning, remove the packing nut, lock tab, Belleville washers [19], stop plate [18] and gland [17]. It is normally not possible to remove the stem packing [13, 14, 15 or 16] at this stage.
4. Continue from stage 8 in previous dismantling section page 3.

REBUILDING (C80/FSC80 valves sizes 2¹/₂" to 4", C89/FSC89 valves sizes 2" to 3")

Apply appropriate lubricant to stem nut threads, new thrust bearings and packing (where needed)

1. Fit the stem thrust bearings to the stem and insert them through the bonnet extension into stem bore and push it up.
2. Fit together the bottom, middle and top gland packing [13, 14, 15] or fire-safe packing [16] to make it easier to assemble.
3. Fit the glands, stop plate and the disk springs with their outer edges touching. Put the first spring concave side up and the second spring concave side down. Repeat that with the other two springs.
4. Fit the lock tab and gland nut.
5. Using a wrench to prevent the stem from turning, tighten to the torque figures in table 1.
6. Bend the lock tab flats on the packing nut sides using a hammer and punch. Adjust the orientation of the nut by loosening it if needed.
7. Fit the lock plate and wrench block to the stem and insert the handle pipe to the wrench block.
8. Fit the wrench bolt to the wrench block and tighten to the stem.
9. Operate the stem several times to readjust. Bring the stem into the closed position - the handle will be perpendicular to the pipeline.
10. Continue from stage 9 in previous rebuilding section page 4.

Series C70/C74 & FSC70/FSC74

DISMANTLING (C70/FSC70 valves sizes 1/2" to 2" , C74/FSC74 valves sizes 1" to 2")

Follow the instructions using the drawing on page 11 to identify the parts.

Dismantling the valves extension bonnets is done in the same manner as with Series C80.

Remove the valves from the line with their extension bonnets.

Bring the ball to the closed position for its removal.

Follow stages 5 to 11 of C80/FSC80 from page 3 for removing the extension bonnet from the valve bodies and dismantling the stem from the extension bonnet.

1. With series C70/FSC70 loosen all body bolts/studs [6] and nuts [7].
2. With series C74/FSC74 first mark a radial line across the end piece and the body to indicate that position and then remove the end piece. This will be required for rebuilding. Hold the valve in a fixture and using a proper tool remove the end piece [2] by turning it in a counter-clockwise direction.
3. Be careful not to damage the sealing surfaces of the end caps and end piece.
4. Remove and discard of the first seat [4] and body seal [5]. To get the seat out it may be easier to push the ball out with a soft mallet through the body port.
5. Carefully lift the ball out from body with a "rolling" motion. With large valves it is recommended to use a strap and lifting device to remove the ball.
6. Set the ball aside in clean secure area for reuse. Extreme caution should be taken to avoid damage to the ball.
7. Remove and discard of the second seat [4].

REBUILDING (C70/FSC70 valves sizes 1/2" to 2" , C74/FSC74 valves sizes 1" to 2")

Follow stages 1 to 9 from page 4 of C80/FSC80 for rebuilding the extension bonnet and stem assembly.

1. Insert the first seat ring inside the body before connecting the extension bonnet to the body.
2. You may find it easier to insert the ball into the body before mounting the bonnet extension. In this case make sure the ball is inserted in the correct flow direction where the vent hole is on the side of the flow arrow tail as shown in the picture on page 4.
3. With the stem still in the closed position, assemble the ball with its pin slot on the same side as the stem pin so the ball can slide in. Slide the ball into the body cavity.
4. Make sure the relief hole in the ball, the flow arrows on the body and bonnet and the marking on the top of the stem are all according to the figure on page 4.
5. Rotate the handle to the open position. The ball must be in the open position to prevent it from falling out.
6. Fit the second seat ring to the body making sure that the contoured surface is on the ball side. A trace of lubricant that is compatible with the media and cryogenic temperatures will ease the rebuilding by holding the seat rings and body connector seals in place.
7. Fit the body seals into the body groove.
8. With series C70 tighten the bolts/studs to the torque figures in table 4. Excessive force will only stretch or strip the bolts..
9. With series C74 thread the end piece back into the body and tighten with a proper tool until the marked lines of the body and end piece align.

Series C70/C74 & FSC70/FSC74

DISMANTLING (C70/FSC70 valves sizes 2½” to 4” , C74/FSC74 valves sizes 3” to 4”)

Follow the instructions using the drawing on page 12 to identify the parts.

The instructions for dismantling and rebuilding valve sizes 2½” to 4” are basically the same as the smaller valve sizes of series C70/C74 but differ in the stem assembly.

Remove the valves from the line with their extension bonnets.

Bring the ball to the closed position for its removal.

For removing the extension bonnet from the valve bodies follow steps 5 to 8 on page 3:

DISMANTLING (C80/FSC80 valves sizes ½” to 2” , C89/FSC89 valves sizes ¼” to 1½”)

For the dismantling of the stem assembly refer to stages 1 to 3 on page 5 in section:

DISMANTLING (C80/FSC80 valves sizes 2½” to 4” , C89/FSC89 valves sizes 2” to 3”)

REBUILDING (C70/FSC70 valves sizes 2½” to 4” , C74/FSC74 valves sizes 3” to 4”)

For rebuilding the stem assembly follow stages 1 to 9 on page 5 of:

REBUILDING (C80/FSC80 valves sizes 2½” to 4” , C89/FSC89 valves sizes 2” to 3”)

For rebuilding the extension bonnet to the valve bodies continue from step 9 on page 4 of:

REBUILDING (C80/FSC80 valves sizes ½” to 2” , C89/FSC89 valves sizes ½” to 1½”)

MAINTENANCE KITS

Maintenance kits are available from Sharpe® valves. These kits consist of the following parts:

1. 2 seat rings [4], 2 body seals [5] (1 body seal for C70/FSC70 and C74/FSC74), 1 bonnet seal [26].
2. 2 stem thrust seals [12.1, 12.2], 1 or 2 glands [17], 4 Belleville washers [18 or 19].

The standard valve stem packing consist of the following items:

1. Sizes ¼”-¾” : 1 bottom, 3 middle, 1 top (2 glands)
2. Sizes 1”-1¼” : 1 bottom, 4 middle, 1 top (1 gland)
3. Sizes 1½”-2” : 1 bottom, 4 middle, 1 top (2 glands)
4. Size 2½” : 1 bottom, 4 middle, 1 top (1 gland)
5. Sizes 3”-4” : 1 bottom, 6 middle, 1 top (1 gland)

Each valve packing build has a bottom and top packing and depending on the valve size and series has a number of middle stem packing.

Fire-safe valves carry graphite stem packing (see quantities in Parts & Materials section).

When ordering maintenance kits, please be sure to specify series and size of the valve, the seating material required.

If the valves are fire-safe it must also be specified.

Where a valve needs repairing, rather than maintaining, it must be noted that only Sharpe® valves authorized spare parts should be used, and these include basic components such as bolts, screws and nuts, etc.

In addition to maintenance kits, other spare parts are available from Sharpe® valves such as balls, stems or other metallic parts.

If additional parts are required, it is normally recommended that the complete valve be replaced.

TABLE 1 STEM NUT TIGHTENING TORQUE

VALVE SIZE	THREAD	TORQUE (NM)	TORQUE (LBS.IN)
¼" - ¾"	M10	9	80
1" - 1¼"	M12	13	115
1½" - 2"	M18	30	265
2½"	1" - 14	60	530
3" - 4"	1½" - 12	80	700

TABLE 2 BONNET BOLTS TIGHTENING TORQUE

VALVE SIZE	THREAD	TORQUE (NM)	TORQUE (LBS.IN)
¼" - ¾"	M5	5	44
1" - 1¼"	M6	8	70
1½" - 2"	M8	19	165
2½" - 4"	M10	39	345

TABLE 3 C80/FSC80 BODY BOLTS TIGHTENING TORQUE

C80 VALVE SIZE	C89 VALVE SIZE	THREAD	TORQUE (NM)	TORQUE (LBS.IN)
¼" - ½"		¼" - 20	9	80
¾" - 1"	½"	M8	19	165
1¼"	¾" - 1"	M10	39	345
1½"	1¼"	M12	65	575
2"	1½"	M14	110	970
2½"	2"	M20	300	2,655
3"	2½"	7/16" - 14	39	345
4"	3"	½" - 13	65	575

TABLE 4 C70/FSC70 BODY BOLTS TIGHTENING TORQUE (Grade 1)

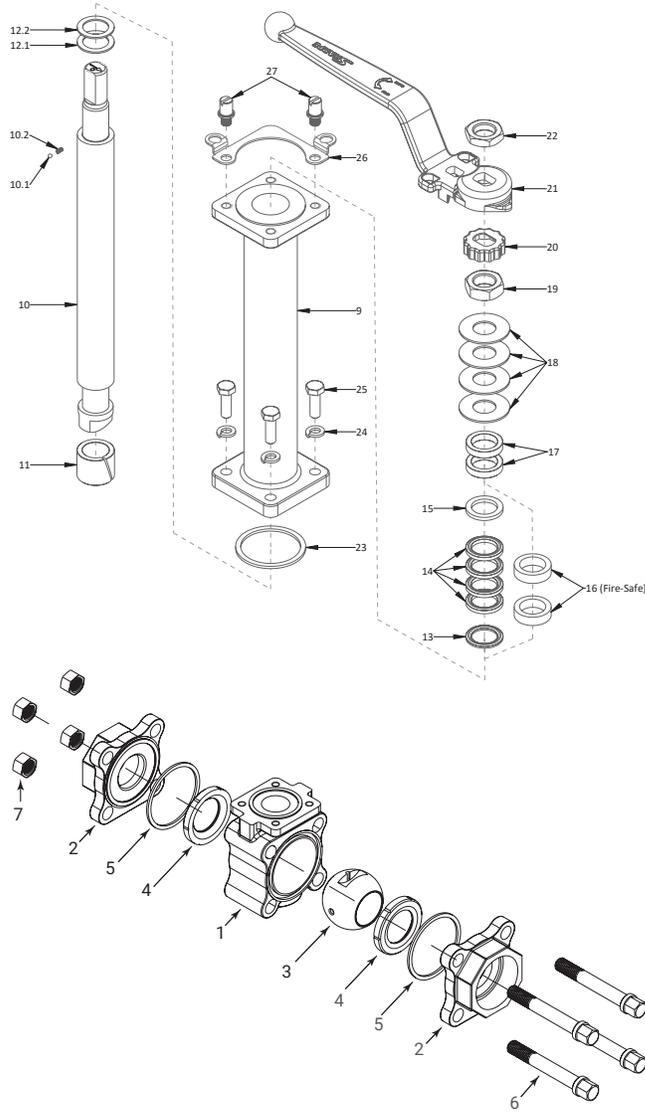
CLASS 150

VALVE SIZE	THREAD	TORQUE (NM)	TORQUE (LBS.IN)
½"	5/16"-18	7	65
¾"	5/16"-18	7	65
1"	3/8"-16	14	125
1½"	1/2"-13	28	250
2"	1/2"-13	28	250
2½"	1/2"-13	28	250
3"	1/2"-13	28	250
4"	1/2"-13	28	250

CLASS 300

VALVE SIZE	THREAD	TORQUE (NM)	TORQUE (LBS.IN)
½"	5/16"-18	7	65
¾"	5/16"-18	7	65
1"	3/8"-16	14	125
1½"	1/2"-13	28	250
2"	5/8"-11	55	355
2½"	5/8"-11	55	355
3"	5/8"-11	55	355
4"	5/8"-11	55	355

Parts & Materials



Series C80 Sizes ½" to 2"
Series FSC80 Sizes ½" to 2"
Series C89 Sizes ¼" to 1½"
Series FSC89 Sizes ¼" to 1½"

ITEM	DESCRIPTION	MATERIAL	QTY.
1	Body	ASTM A351 CF8M (~ 316 SS)	1
2	End Piece	ASTM A351 CF8M (~ 316 SS) ASTM A351 CF3M (~ 316L SS) for weld connections	2
3	Ball (vented)	316 Stainless Steel	1
4*	Seat	PCTFE, TFM™, NOVA, RTFE or PTFE FSC80/ FSC89 (fire-safe): PCTFE	2
5*	Body Seal	Graphite	2
6	Body Bolt	A193 Gr. B8	4
7	Body Nut	300 Series Stainless	4
Tags	Flow Direction & ID Nameplate	300 Series Stainless Steel	1 Each

CRYOGENIC EXTENSION			
ITEM	DESCRIPTION	MATERIAL	QTY.
9	Bonnet Extension	ASTM A351 CF8M (~ 316 SS)	1
10	Stem	316 Stainless Steel	1
10.1**	Anti-Static mini-Ball	300 Series Stainless	0 - 1
10.2**	Anti-Static Spring	Hard Drawn Stainless	0 - 1
11*	Bearing	PTFE	1
12.1*	Thrust Bearing Bottom	PEEK FSC80/ FSC89 (fire-safe): Nova	1
12.2*	Thrust Bearing Top	Nova	1
13*	Bottom Packing	PCTFE, TFM™, NOVA	1
14*	Middle Packing	PCTFE, TFM™, NOVA	3 - 4
15*	Top Packing	PCTFE, TFM™, NOVA	1
16*	Stem Packing	FSC80/ FSC89 (fire-safe): Graphite	2
17	Gland	300 Series Stainless	1 - 2
18*	Belleville Washer	Stainless Steel FSC80/ FSC89 (fire-safe): Inconel	2 or 4
19	Packing Nut	300 Series Stainless	1
20	Nut Lock	300 Series Stainless	1
21	Handle	ASTM A351 CF8 (~304 SS)	1
22	Handle Nut	300 Series Stainless	1
23*	Bonnet Seal	Graphite	1
24	Lock Washer	300 Series Stainless	4
25	Bonnet Bolt	304 Stainless Steel A2-70	4
26	Lock Plate	300 Series Stainless	1
27	Stop Pin	300 Series Stainless	2

* Parts used in repair kits.

** Parts used with NS, Anti-Static option. NS suffix required with FS (fire-safe) valves.

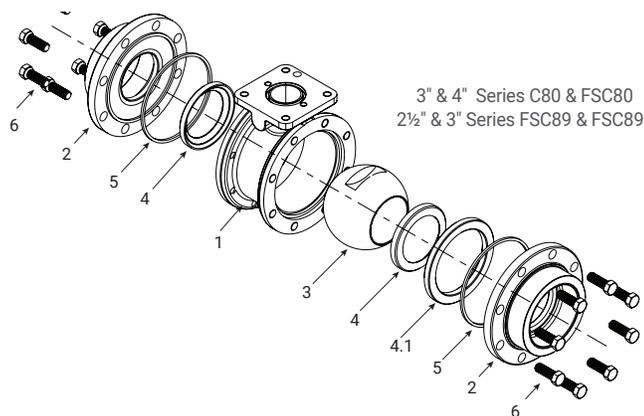
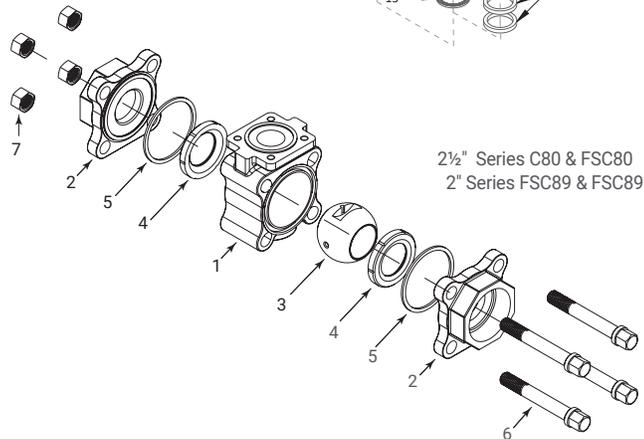
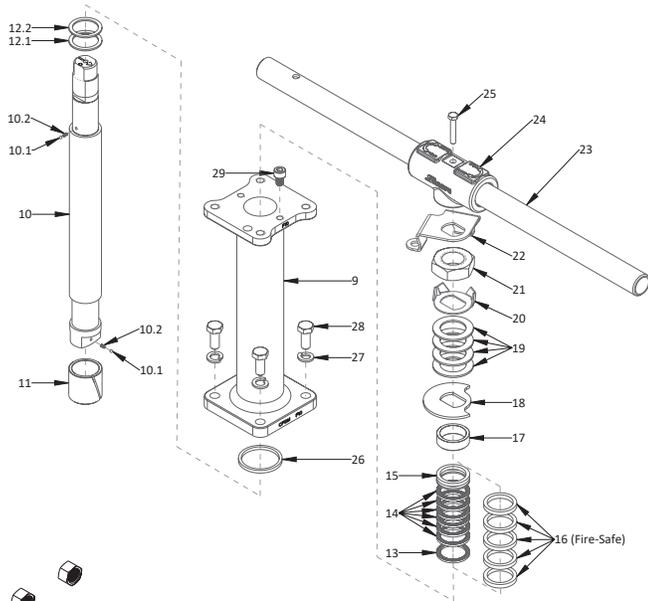
Parts & Materials

Series C80 Sizes 2½" to 4"

Series FSC80 Sizes 2½" to 4"

Series C89 Sizes 2" to 3"

Series FSC89 Sizes 2" to 3"

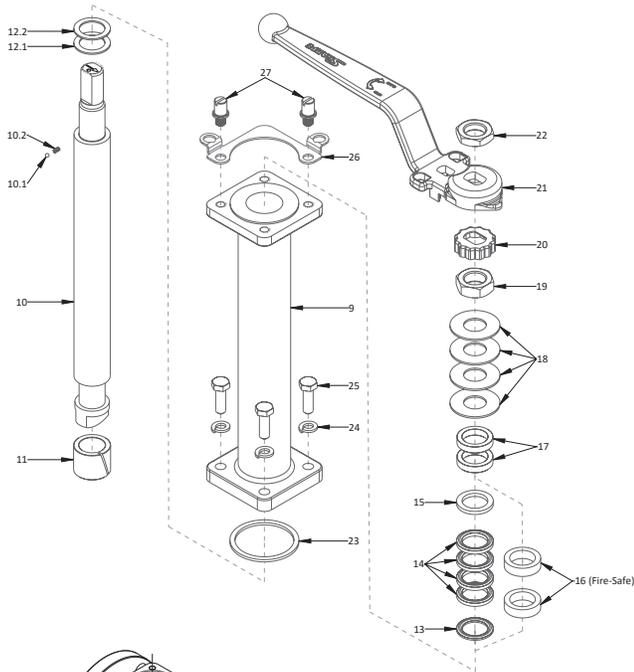


ITEM	DESCRIPTION	MATERIAL	QTY.
1	Body	ASTM A351 CF8M (~ 316 SS)	1
2	End Piece	ASTM A351 CF8M (~ 316 SS), ASTM A351 CF3M (~ 316L SS) for welded connections	2
3	Ball (Vented)	316 Stainless Steel	1
4*	Seat	PCTFE, TFM™, NOVA, RTFE or PTFE FSC80/FSC89 (fire-safe); PCTFE	2
4.1	Seat Ring (C80 & FSC80)	ASTM A351 CF8M (~ 316 SS)	0 - 1
5*	Body Seal	Graphite	2
6	Body Bolt/Stud	A193 Gr. B8	4 or 16
7	Body Nut	300 Series Stainless Steel	4
Tags	Flow Direction & ID Nameplate	300 Series Stainless Steel	1 Each

CRYOGENIC EXTENSION			
ITEM	DESCRIPTION	MATERIAL	QTY.
9	Bonnet Extension	ASTM A351 CF8M (~ 316 SS)	1
10	Stem	316 Stainless Steel	1
10.1**	Anti-Static mini-Ball	300 Series Stainless	0 - 2
10.2**	Anti-Static Spring	Hard Drawn Stainless	0 - 2
11*	Bearing	PTFE	1
12.1*	Thrust Bearing Bottom	PEEK FSC80/FSC89 (fire-safe): Nova	1
12.2*	Thrust Bearing Top	Nova	1
13*	Bottom Packing	PCTFE, TFM™, NOVA	1
14*	Middle Packing	PCTFE, TFM™, NOVA	4 - 6
15*	Top Packing	PCTFE, TFM™, NOVA	1
16*	Stem Packing	FSC80/FSC89 (fire-safe): Graphite	4 - 5
17	Gland	300 Series Stainless	1
18	Stop Plate	300 Series Stainless	1
19*	Belleville Washer	Stainless Steel FSC80/FSC89 (fire-safe): Inconel	4
20	Lock Tab	300 Series Stainless	1
21	Packing Nut	300 Series Stainless	1
22	Lock Plate	300 Series Stainless	1
23	Handle Pipe	300 Series Stainless	1
24	Wrench Block	ASTM A351 CF8 (~ 304 SS)	1
25	Wrench Bolt	300 Series Stainless	1
26*	Bonnet Seal	Graphite	1
27	Lock Washer	300 Series Stainless	4
28	Bonnet Bolt	300 Series Stainless	4
29	Stop Pin	300 Series Stainless	1

* Parts used in repair kits.
 ** Parts used with NS, Anti-Static option. NS suffix required with FS (fire-safe) valves.

Parts & Materials



Series C70
Series FSC70

Series C74
Series FSC74

Series C70
Series FSC70
Series C74
Series FSC74

Sizes ½" to 2"
SIZES ½" to 2"
SIZES 1" to 2"
SIZES 1" to 2"

ITEM	DESCRIPTION	MATERIAL	QTY.
1	Body	ASTM A351 CF8M (~ 316 SS)	1
2	End Piece	ASTM A351 CF8M (~ 316 SS)	1
3	Ball (vented)	316 Stainless Steel	1
4*	Seat	PCTFE, TFM™, NOVA, RTFE or PTFE FSC70/FSC74 (fire-safe): PCTFE	2
5*	Body Seal	Graphite	1
6	Body Bolt/Stud (C70/FSC70)	A193 Gr. B8	4
7	Nut (C70/FSC70)	300 Series Stainless Steel	4
Tags	Flow Direction & ID Nameplate	300 Series Stainless Steel	1 Each

CRYOGENIC EXTENSION			
ITEM	DESCRIPTION	MATERIAL	QTY.
9	Bonnet Extension	ASTM A351 CF8M (~ 316 SS)	1
10	Stem	316 Stainless Steel	1
10.1**	Anti-Static mini-Ball	300 Series Stainless	0-1
10.2**	Anti-Static Spring	Hard Drawn Stainless	0-1
11*	Bearing	PTFE	1
12.1*	Thrust Bearing Bottom	PEEK FSC70/FSC74 (fire-safe): Nova	1
12.2*	Thrust Bearing Top	Nova	1
13*	Bottom Packing	PCTFE, TFM™, NOVA	1
14*	Middle Packing	PCTFE, TFM™, NOVA	3-4
15*	Top Packing	PCTFE, TFM™, NOVA	1
16*	Stem Packing	FSC70/FSC74 (fire-safe): Graphite	2
17	Gland	300 Series Stainless	1-2
18*	Belleville Washer	300 Series Stainless Steel	4
19	Packing Nut	300 Series Stainless Steel	1
20	Nut Lock	300 Series Stainless Steel	1
21	Handle	ASTM A351 CF8 (~304SS)	1
22	Handle Nut	300 Series Stainless	1
23*	Bonnet Seal	Graphite	1
24	Lock Washer	300 Series Stainless	4
25	Bonnet Bolt	304 Stainless Steel A2-70	4
26	Lock Plate	300 Series Stainless	1
27	Stop Pin	300 Series Stainless	2

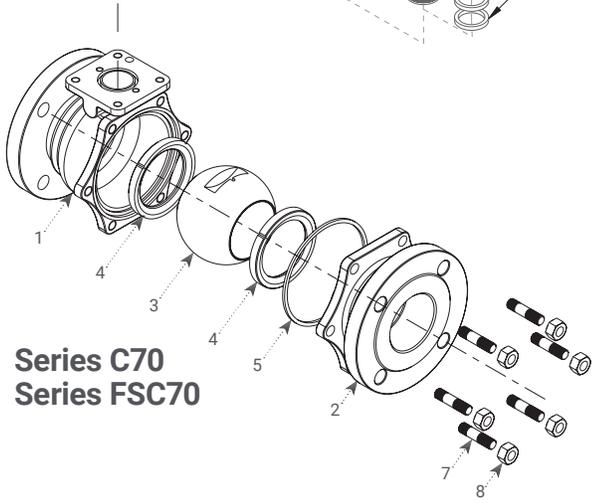
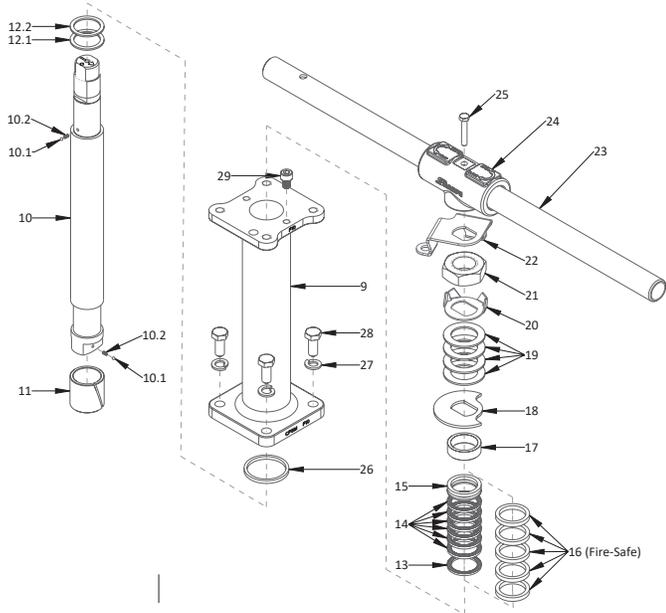
* Parts used in repair kits.

** Parts used with NS, Anti-Static option.
NS suffix required with FS (fire-safe) valves.

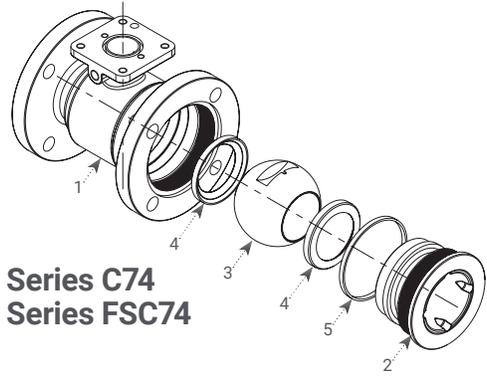
Parts & Materials

Series C70
Series FSC70
Series C74
Series FSC74

Sizes 2½" to 4"
 Sizes 2½" to 4"
 Sizes 3" to 4"
 Sizes 3" to 4"



Series C70
Series FSC70



Series C74
Series FSC74

ITEM	DESCRIPTION	MATERIAL	QTY.
1	Body	ASTM A351 CF8M (~ 316 SS)	1
2	End Piece	ASTM A351 CF8M (~ 316 SS)	1
3	Ball (vented)	316 Stainless Steel	1
4*	Seat	PCTFE, TFM™, NOVA, RTFE or PTFE FSC70/FSC74 (fire-safe): PCTFE	2
5*	Body Seal	Graphite	1
7	Body Bolt/Stud (C70/FSC70)	A193 Gr. B8	6 or 8
8	Nut (C70/FSC70)	300 Series Stainless Steel	6 or 8
Tags	Flow Direction & ID Nameplate	300 Series Stainless Steel	1 Each

CRYOGENIC EXTENSION			
ITEM	DESCRIPTION	MATERIAL	QTY.
9	Bonnet Extension	ASTM A351 CF8M (~ 316 SS)	1
10	Stem	316 Stainless Steel	1
10.1**	Anti-Static mini-Ball	300 Series Stainless	0 - 2
10.2**	Anti-Static Spring	Hard Drawn Stainless	0 - 2
11*	Bearing	PTFE	1
12.1*	Thrust Bearing Bottom	PEEK FSC70/FSC74 (fire-safe): Nova	1
12.2*	Thrust Bearing Top	Nova	1
13*	Bottom Packing	PCTFE, TFM™, NOVA	1
14*	Middle Packing	PCTFE, TFM™, NOVA	4 - 6
15*	Top Packing	PCTFE, TFM™, NOVA	1
16*	Stem Packing	FSC70/FSC74 (fire-safe): Graphite	4 - 5
17	Gland	300 Series Stainless	1
18	Stop Plate	300 Series Stainless	1
19*	Belleville Washer	300 Series Stainless Steel	4
20	Lock Tab	300 Series Stainless	1
21	Packing Nut	300 Series Stainless	1
22	Lock Plate	300 Series Stainless	1
23	Handle Pipe	300 Series Stainless	1
24	Wrench Block	ASTM A351 CF8 (~ 304 SS)	1
25	Wrench Bolt	300 Series Stainless	1
26*	Bonnet Seal	Graphite	1
27	Lock Washer	300 Series Stainless	4
28	Bonnet Bolt	304 Stainless Steel A2-70	4
29	Stop Pin	300 Series Stainless	1

* Parts used in repair kits.
 ** Parts used with NS, Anti-Static option.
 NS suffix required with FS (fire-safe) valves.