
	<b>Manual</b>		Document Number: SP81-MA-3002
	Title: PV-70 Remotely Operated Cryogenic Globe Valve Installation, Operation, and Maintenance Manual	Initial Release Date: 3/22/1996	
		Revision:	Letter: E

# PV-70

## Remotely Operated Cryogenic Globe Valve Installation, Operation, and Maintenance Manual



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### 1. INSTALLATION

The valve must be disassembled prior to installation to prevent damage to soft goods during welding. Item numbers are shown in the parts diagrams, Figure 1 and Figure 2.

#### 1.1. Valve Disassembly

- The valve has been factory calibrated and set to ensure proper fail safe operation. Before proceeding, mark one of the wrench flats at the top of the Valve Stem (5) with a marker so it can be returned to the factory settings.
- On fail-closed operators, apply air pressure to the positioner and set the valve to approximately 50% open.
- Loosen the Operator Shaft Jam Nut (52).
- Turn the Stem to remove it from the Operator (51) shaft.
  - Count and document the number of revolutions made by the marked wrench flat.
- Loosen the Operator Yoke from the Bonnet as follows:
  - For ½" to 4" NPS valves, remove the Operator Yoke Jam Nut (54) by turning it counterclockwise.
  - For 6" to 8" NPS valves, remove the Operator Yoke Bolts (55).
- Lift the Operator off of the Bonnet (10) and carefully set it aside.
  - For ½" to 4" NPS valves, also remove the Operator Yoke Adapter (58) and set it aside.
- Remove the Bonnet Bolts (11).
- Pull Bonnet vertically upward until the top of the Barrel (21) is exposed.

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- Carefully grasp the Barrel so that it will not drop back into the Valve Body, which can damage the PCTFE Seal Disc (36).
- Remove the Stem from the slot in the Barrel and set the Bonnet and Stem assembly aside.
- Remove the Barrel (which has the plug assembly attached; parts 31-38) from Valve Body (1).
- Remove Bonnet Face O-Ring (15) and store in a clean area until ready to reassemble.

**CAUTION:** Assembly may contain equipment plated with nickel. Cleaning with acids or other caustic solutions will remove plating and void warranty.

## 1.2. Welding

- Prepare connection on equipment on which valve will be installed.
- Position Valve Body to equipment and weld in place.

**CAUTION:** All Valve Bodies are 304L Stainless Steel. Therefore, care should be taken not to over-heat Valve Body beyond that required for normal welding.


**CAUTION:** When the valve is to be installed in a vacuum jacketed system, care should be taken in the jacket design to prevent forces on the Bonnet of the Valve caused by differential contraction rates (thermal loads) between the inner process line and the vacuum jacket. Contact PHPK for assistance.

## 1.3. Valve Reassembly

- Allow Valve Body to cool after welding.
- Clean Bonnet Face O-Ring and the O-Ring groove on the Valve Body.
- Apply a very thin film of Halocarbon 25-5S or Krytox®<sup>1</sup> Grease to the o-ring and replace in groove.  
<sup>1</sup>Krytox® is a registered trademark of DuPont.
- Reassemble valve in reverse order of instruction given in Section 1.1.
  - During reassembly, Bonnet Bolts should be tightened as listed in Table 1.

Table 1 – Bonnet Bolt Tightening Torque

NPS Valve Size	Bonnet Bolt Size	Wrench Size	Tightening Torque in-lb (ft-lb)
½", ¾", 1"	1/4"-20	3/16" Allen	90 (7.5)
1-½", 2"	3/8"-16	5/16" Allen	180 (15)
3", 4"	1/2"-13	3/8" Allen	360 (30)
6", 8"	3/4"-16	1-1/4" Crescent	1200 (100)

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## 2. OPERATION

- The Operator and Valve have been pre-adjusted to ensure bubble-tight shut-off of the valve at the seat up to 1.25 times the customer-supplied design pressure rating. No further adjustments should be required.
- The valve is designed to operate smoothly under all cryogenic conditions.
  - All moving and contacting parts have closely-held tolerances for free operation.
  - The self-aligning, tapered plug contains a replaceable PCTFE Seal Disc for positive shut-off.
  - The Bonnet O-Ring Seals, Barrel O-Rings, and Seal Disc are the only replaceable wear items.

## 3. MAINTENANCE

With proper care, the Valve Assembly should require very little maintenance; however, as with all cryogenic equipment, thorough inspection of the system should be performed periodically to ensure continued, reliable operation.


### 3.1. O-Ring Replacement

#### 3.1.1. Gland Nut O-Rings

- Gland Nut O-Rings (7,8) can be replaced by first removing the Operator per Section 1.1 instructions.
- Remove the Gland Nut (6) from Stem by turning Gland Nut counterclockwise and sliding it off the end of the Stem.
- Remove O-Rings from Gland Nut, taking care not to damage the O-Ring grooves during removal.
- Clean O-Ring grooves.
- Apply a very thin film of Halocarbon 25-5S or Krytox® Grease to the new O-Rings and install them.
- Reassemble the Valve in reverse order of this section's instructions.

#### 3.1.2. Bonnet Face O-Ring

- The Bonnet Face O-Ring (15) can be replaced by first removing the Bonnet per the instructions given in Section 1.1.
- Remove O-Ring from Bonnet Face, taking care not to damage the O-Ring groove during removal.
- Clean O-Ring groove.
- Apply a very thin film of Halocarbon 25-5S or Krytox® Grease to the new O-Ring and install it.

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- Reassemble valve per Section 1.3 instructions.


### 3.1.3. Barrel O-Ring

- The Barrel O-Rings (22) can be replaced by first removing the Barrel (21) and plug assembly per the instructions given in Section 1.1.
- Clean O-Ring grooves.
- Install the new O-Rings.
  - New Barrel O-Rings must be split (cut in one location with a razor) prior to installation.
  - If the O-Ring ends overlap, a second cut is necessary to make the O-Ring lay flat in the groove.
  - **Do not** use grease on the Barrel O-Ring.
- Reassemble valve per Section 1.3 instructions.

## 3.2. Seal Disc Replacement

### 3.2.1. For ½” – 2” Valves

- The Seal Disc (36) is replaced by first removing the Barrel (21) and plug assembly per Section 1.1 instructions.
- Next remove the Retainer Body (35) from the Retainer Lock Nut (34) by holding the Retainer Lock Nut and turning Retainer Body counterclockwise until they separate.
- Insert the PHPK Seal Disc Tool (91) into the Seal Disc and remove it from the Retainer Body by turning in the direction indicated on the Seal Disc Tool.
- Install the new Seal Disc onto the Retainer Body using the Seal Disc Tool.
  - The Seal Disc will bottom out on the Retainer Body.
  - Snug hand-tight without causing any deformation around the four holes in the face of the Seal Disc.
- Snug the Retainer Lock Nut Plug (33) hand-tight onto the Barrel using a ¼” Allen wrench.
- Slide the Retainer Lock Nut back and verify the Plug Retainer Nut (31) is hand-tight against the Retainer Ring (32).
- Install the Retainer Body onto the Retainer Lock Nut by holding the Retainer Lock Nut and turning the Retainer Body clockwise until its face bottoms out against the Retainer Lock Nut.
- Reassemble the Valve per Section 1.3 instructions.

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### 3.2.2. For 3" – 8" Valves

- The Seal Disc (36) is replaced by first removing the Barrel (21) and plug assembly per Section 1.1 instructions.
- Next use two PHPK Spanner Wrenches (92). Place one Spanner Wrench on the Retainer Lock Nut (34) and the other on the Retainer Body (35). Hold the Retainer Lock Nut still and turn the Retainer Body counterclockwise until they separate.
- Remove the Seal Disc Support (37) from the Retainer Body by removing the Seal Disc Support Screws (38) with a 3/16" Allen wrench.


**CAUTION:** Care should be taken not to damage sealing serrations in the Seal Disc Support.

- Remove and replace the Seal Disc. The bevel on the outside diameter of the Seal Disc **must** be oriented as shown in Figure 1.
- Install the Seal Disc Support and tighten all of the Seal Disc Support Screws hand-tight.
- Torque all of the screws to 90 in-lbs (7.5 ft-lbs).
- Slide the Retainer Lock Nut back and verify the Plug Retainer Nut (31) is hand-tight against the Retainer Ring (32).
- Install the Retainer Body onto the Retainer Lock Nut by holding the Retainer Lock Nut and turning the Retainer Body clockwise until it seats against the Retainer Lock Nut.
- Use the two PHPK Spanner Wrenches to snug the Retainer Body to the Retainer Lock Nut.
- Reassemble the Valve per Section 1.3 instructions.

### 3.3. Operator Adjustment

#### 3.3.1. Fail Closed Valves


- Temporarily apply loading pressure to move actuator stem in upward position.
- Loosen Operator Shaft Jam Nut (52) and screw Valve Stem (5) into Operator shaft until the Stem stops turning.
- Remove loading pressure from actuator allowing valve stem to move down into valve.
- Screw Stem counterclockwise to move stem down into valve. This should be done until resistance is met. (This should be the PCTFE seal disc coming into contact with the valve seat).
- Supply loading pressure once again to the actuator to lift the valve stem upward.
- Screw the Stem 2 complete rotations counterclockwise adjusting the valve stem downwards; then snug Operator Shaft Jam Nut.

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- Remove loading pressure from actuator; then actuate actuator 4 to 5 times.
- Check valve seat sealing by applying pressure to main process line to insure bubble-tight shut-off. At this point, valve should be ready for service. (If valve does not seat bubble-tight, continue to next step).
- Apply loading pressure once again to the actuator to lift the valve stem upwards.
- Loosen Operator Shaft Jam Nut and screw the Stem 1 complete rotation counterclockwise adjusting the stem downward, then snug Operator Shaft Jam Nut and remove loading pressure.
- Actuate actuator 4 to 5 times and recheck valve for bubble-tight shut-off. (This process can be repeated a maximum of 3 times). If valve does not shut-off bubble-tight at this point, please contact PHPK Technologies.

### 3.3.2. Fail Open Valves

- Remove any loading pressure from the actuator stem to move in upward position.
- Loosen Operator Shaft Jam Nut (52) and screw Valve Stem (5) clockwise into Operator shaft until the Stem stops turning.
- Apply loading pressure from actuator allowing valve stem to move down into valve.
- Screw Stem counterclockwise to move stem down into valve. This should be done until resistance is met. (This should be the PCTFE seal disc coming into contact with the valve seat).
- Remove loading pressure once again to the actuator to lift the valve stem upward.
- Screw the Stem 2 complete rotations counterclockwise adjusting the valve stem downwards; then snug Operator Shaft Jam Nut.
- Apply loading pressure from actuator; then actuate actuator 4 to 5 times.
- Check valve seat sealing by applying pressure to main process line to ensure bubble-tight shut-off. At this point, valve should be ready for service. (If valve does not seat bubble-tight, continue to next step).
- Remove loading pressure once again to the actuator to lift the valve stem upwards.
- Loosen Operator Shaft Jam Nut and screw the Stem 1 complete rotation counterclockwise adjusting the stem downward, then snug Operator Shaft Jam Nut and remove loading pressure.
- Actuate actuator 4 to 5 times and recheck valve for bubble-tight shut-off. (This process can be repeated a maximum of 3 times). If valve does not shut-off bubble-tight at this point, please contact PHPK Technologies.

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#### 4. PRESSURE RATINGS

PV-70 valves from ½” to 8” NPS are designed for a maximum allowable working pressure (MAWP) of 600 psig for temperatures up to 120°F.

Valves are individually tested to the customer-specified required pressure. Not all valves are tested to the MAWP.

#### 5. CONTACT INFORMATION

PHPK Technologies  
2111 Builders Place  
Columbus, OH 43204

Tel (614) 486-4750  
Fax (614) 486-4950

[www.phpk.com](http://www.phpk.com)



## 6. REPLACEMENT PARTS

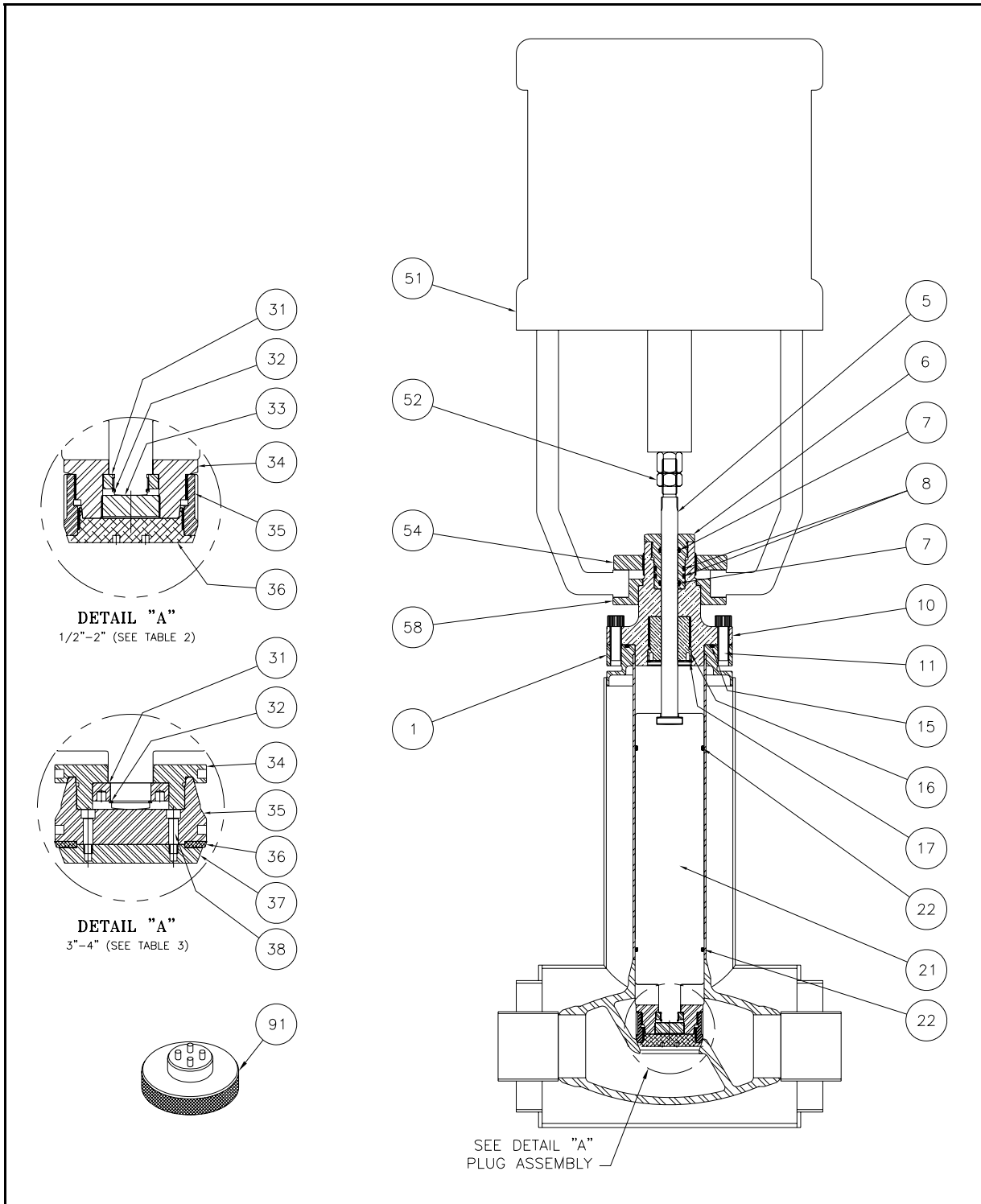


Figure 1 – Parts Diagram, 1/2 to 4" NPS


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Table 2 – Parts List, ½” to 2” NPS

Item	Description	Qty	Part Number (by NPS Valve Size)			
			½” & ¾”	1”	1-½”	2”
1	Valve Body	1	customer specified	customer specified	customer specified	customer specified
5	Stem	1	81-411-010	81-411-010	81-415-010	81-415-010
6	Gland Nut	1	81-391-010	81-391-010	81-395-010	81-395-010
7	O-Ring, Gland Nut Inner (Viton® <sup>1</sup> )	*2	11-02-2112	11-02-2112	11-02-2113	11-02-2113
8	O-Ring, Gland Nut Outer (Viton® <sup>1</sup> )	*2	11-02-2115	11-02-2115	11-02-2118	11-02-2118
10	Bonnet Housing	1	81-331-010	81-331-010	81-304-410	81-304-420
11	Bolt, Bonnet (Niflor™ <sup>2</sup> Coated)	6	81-541-020	81-541-020	81-545-020	81-545-020
15	O-Ring, Bonnet Face (Viton® <sup>1</sup> )	*1	11-02-2130	11-02-2130	11-02-2150	11-02-2150
16	Bonnet Insert	1	n/a	n/a	81-335-240	81-335-240
17	Retaining Ring, Bonnet Insert	1	n/a	n/a	11-12-0012	11-12-0012
21	Barrel, With O-Ring Grooves	1	81-431-030	81-431-030	81-434-020	81-435-080
22	O-Ring, Barrel (Teflon® <sup>4</sup> )	*2	11-05-2123	11-05-2123	11-05-2131	11-05-2139
31	Plug Retainer Nut	1	n/a	n/a	n/a	81-505-030
32	Plug Retainer Ring	1	11-12-0001	11-12-0001	11-12-0002	11-12-0010
33	Plug Retainer Lock Nut Plug	1	81-491-020	81-491-020	81-494-010	81-495-020
34	Plug Retainer Lock Nut	1	81-511-020	81-511-020	81-514-040	81-515-050
35	Plug Retainer Body	1	81-501-020	81-503-010	81-504-030	81-505-020
36	Seal Disc (Neoflon® <sup>3</sup> M-400H)	*1	81-481-020	81-483-010	81-484-030	81-485-020
51	Operator (Many variations available. Call for assistance.)	1	--	--	--	--
52	Jam Nut, Operator Shaft	1	FAS-70832	FAS-70832	FAS-70834	FAS-70834
54	Jam Nut, Operator Yoke, size 25 Jam Nut, Operator Yoke, size 50	1	81-531-010 n/a	81-531-010 n/a	81-534-020 81-535-010	81-534-020 81-535-010
58	Adapter, Operator Yoke, size 25 Adapter, Operator Yoke, size 50	1	81-531-020 n/a	81-531-020 n/a	81-534-010 81-535-020	81-534-010 81-535-020
91	Seal Disc Tool	1	81-911-010	81-911-010	81-911-010	81-911-010
95	Soft Goods Spare Parts Kit	1	81-901-010	81-903-010	81-904-010	81-905-010
96	O-Ring Grease (Halocarbon 25-5S or Krytox® <sup>5</sup> )	*1	11-06-0001	11-06-0001	11-06-0001	11-06-0001

See Table 4 Footnotes.

Table 3 – Parts List, 3” to 4” NPS

Item	Description	Qty	Part Number (by NPS Valve Size)	
			3”	4”
1	Valve Body	1	customer specified	customer specified
5	Stem	1	81-416-010	81-416-010
6	Gland Nut	1	81-396-010	81-396-010
7	O-Ring, Gland Nut Inner (Viton® <sup>1</sup> )	*2	11-02-2214	11-02-2214
8	O-Ring, Gland Nut Outer (Viton® <sup>1</sup> )	*2	11-02-2130	11-02-2130
10	Bonnet Housing	1	81-336-010	81-336-020
11	Bolt, Bonnet (Niflor™ <sup>2</sup> Coated)	8	81-547-050	81-547-050
12	Lock Washer, Bonnet	12	n/a	n/a
13	Flat Washer, Bonnet	12	n/a	n/a
15	O-Ring, Bonnet Face (Viton® <sup>1</sup> )	*1	11-02-2246	11-02-2246
21	Barrel, With O-Ring Grooves	1	81-436-060	81-436-310
22	O-Ring, Barrel (Teflon® <sup>4</sup> )	*2	11-05-2153	11-05-2156
31	Plug Retainer Nut	1	81-506-030	81-506-280
32	Plug Retainer Ring	1	11-12-0008	11-12-0007
34	Plug Retainer Lock Nut	1	81-516-030	81-516-280
35	Plug Retainer Body	1	81-506-010	81-506-260
36	Seal Disc (Neoflon® <sup>3</sup> M-400H)	*1	81-486-010	81-486-260
37	Seal Disc Support	1	81-496-010	81-496-260
38	Screw, Seal Disc Support (Niflor™ <sup>2</sup> coated)	6	81-541-020	81-541-020
51	Operator (Many variations available. Call for assistance.)	1	--	--
52	Jam Nut, Operator Shaft	1	FAS-70837	FAS-70837
54	Jam Nut, Operator Yoke, size 25 Jam Nut, Operator Yoke, size 50	1	Supplied with Operator	Supplied with Operator
92	PHPK Spanner Wrench	2	81-916-010	81-916-010
95	Soft Goods Spare Parts Kit	1	81-906-010	81-907-010
96	O-Ring Grease (Halocarbon 25-5S or Krytox® <sup>5</sup> )	*1	11-06-0001	11-06-0001

See Table 4 Footnotes.

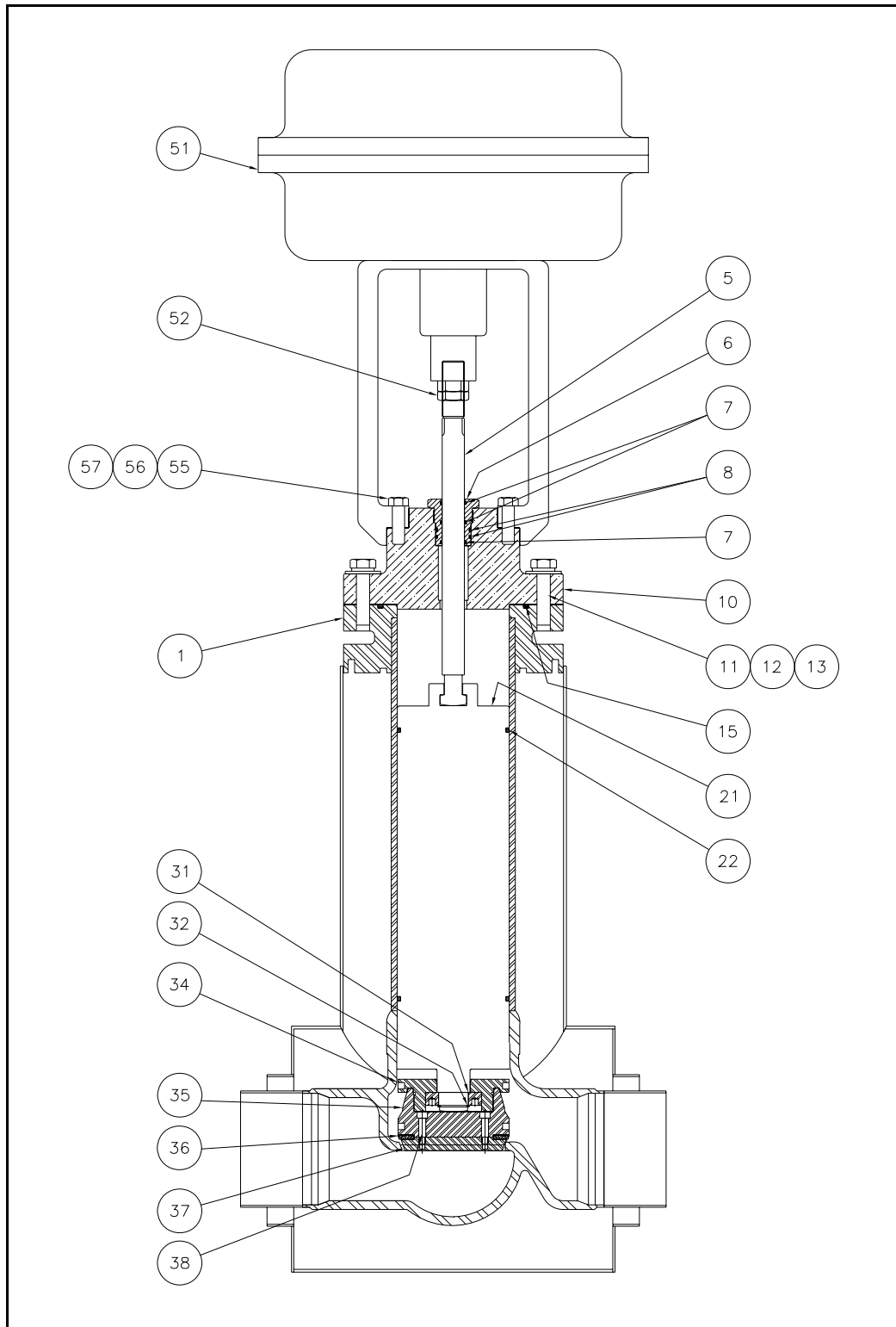


Figure 2 – Parts Diagram, 6" to 8" NPS


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Table 4 – Parts List, 6" to 8" NPS

Item	Description	Qty	Part Number (by NPS Valve Size)	
			6"	8"
1	Valve Body	1	customer specified	customer specified
5	Stem	1	81-417-010	81-417-250
6	Gland Nut	1	81-397-010	81-397-250
7	O-Ring, Gland Nut Inner (Viton® <sup>1</sup> )	*3	11-02-2218	11-02-2222
8	O-Ring, Gland Nut Outer (Viton® <sup>1</sup> )	*2	11-02-2224	10-02-2224
10	Bonnet Housing	1	81-337-050	81-337-250
11	Bolt, Bonnet (Niflor™ <sup>2</sup> Coated)	12	81-547-030	81-547-030
12	Lock Washer, Bonnet	12	10-7000-20	10-7000-20
13	Flat Washer, Bonnet	12	10-6000-17	10-6000-17
15	O-Ring, Bonnet Face (Viton® <sup>1</sup> )	*1	11-02-2442	11-02-2447
21	Barrel, With O-Ring Grooves (Niflor™ <sup>2</sup> Coated)	1	81-437-010	81-437-250
22	O-Ring, Barrel (Teflon® <sup>4</sup> )	*2	11-05-2164	11-05-2171
31	Plug Retainer Nut	1	81-507-260	81-507-260
32	Plug Retainer Ring	1	11-12-0005	11-12-0005
34	Plug Retainer Lock Nut	1	81-517-010	81-517-250
35	Plug Retainer Body	1	81-507-010	81-507-250
36	Seal Disc (Neoflon® <sup>3</sup> M-400H)	*1	81-487-010	81-487-250
37	Seal Disc Support	1	81-497-010	81-497-250
38	Screw, Seal Disc Support (Niflor™ <sup>2</sup> coated)	8	81-541-030	--
		12	--	81-541-030
51	Operator (Many variations available. Call for assistance.)	1	--	--
52	Jam Nut, Operator Shaft	1	FAS-70841	FAS-70841
55	Bolt, Operator Yoke (Niflor™ <sup>2</sup> Coated)	8	81-547-060	81-547-060
56	Lock Washer, Operator Yoke	8	10-7000-56	10-7000-56
57	Flat Washer, Operator Yoke	8	10-6000-14	10-6000-14
92	PHPK Spanner Wrench	2	81-917-020	81-917-270
95	Soft Goods Spare Parts Kit	1	81-908-010	81-908-500
96	O-Ring Grease (Halocarbon 25-5S or Krytox® <sup>5</sup> )	*1	11-06-0001	11-06-0001

\* Recommended spare item.

<sup>1</sup>Viton® is a registered trademark of DuPont for a fluoroelastomer.

<sup>2</sup>Niflor™ is a trademark of Atotech USA for a composite coating of PTFE and electroless nickel.

<sup>3</sup>Neoflon® is a registered trademark of Daikin for PCTFE; Kel-F® 81 is a registered trademark of 3M for PCTFE.

<sup>4</sup>Teflon® is a registered trademark of DuPont for PTFE.

<sup>5</sup>Krytox® is a registered trademark of DuPont.