

Fisher™ HPS-C and HPT-C Valves



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Section 1: Introduction

1.1 Scope of the Manual

This instruction manual includes installation, maintenance, and parts information for Fisher HPS-C and HPT-C valves. Refer to separate manuals for instructions covering the actuator and accessories.



WARNING



Do not install, operate, or maintain HPS-C or HPT-C series valves without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand and follow all of the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your [Emerson sales office](#) before proceeding.

1.2 Description

HPS-C has single-port, globe-style control valve with cage-guiding, unbalanced valve plug, and push-down-to-close valve plug action.

HPT-C has single-port, globe-style control valve with cage guiding, balanced valve plug, and push-down-to-close valve plug action.

These valves feature stainless steel construction materials and fabricated or one-piece extension bonnets. HP-C series globe valves are available in short and long face-to-face designs depending on size and pressure class.

Figure 1. Fisher HP-C Valve with Fisher 657 Actuator



1.3 Specifications

Specifications for HPS-C and HPT-C valves are listed in Table 1, 2 and 3.

1.4 Education Services

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Table 1. Specifications

Valve Sizes	Cryogenic Leak Test per SPE 77/306
HPS-C: NPS ■ 1 to 3 (CL900 and CL1500) and ■ 1 to 2 (CL2500) HPT-C: NPS ■ 4 through 12 (CL900 and CL1500)	Class C (optional)
End Connection Styles ⁽¹⁾	Maximum Allowable Actuator Thrust
CL900, 1500, and 2500 raised-face and ring type joint flanges per ASME B16.5 Butt weld end connection per ASME B16.25 PN160 and PN250 flanges per EN1092-1	See Table 2
Maximum Inlet Pressure ⁽¹⁾	Flow Characteristics
CL900 and 1500—Valves are consistent with pressure-temperature ratings per ASME B16.34 CL2500—Valves are consistent with pressure-temperature ratings per ASME B16.34	HPT-C and HPS-C: Equal percentage, linear, and modified equal percentage
Shutoff Classifications per ANSI/FCI 70-2 and IEC 60534-4	Flow Directions
HPT-C and HPS-C: Metal Seat ■ Class IV is standard ■ Class V air test is optional (test will be at 50 PSID air) ⁽²⁾	HPT-C: Normally down for linear and equal percentage trims. Flow up for Whisper Trim HPS-C: Normally up
Material Temperature Capability ⁽²⁾	Approximate Weights
HPT-C: -198 to 66 °C / -325 to 150 °F HPS-C: -198 to 316 °C / -325 to 600 °F	See Table 3
1. Do not exceed the pressure/temperature limits in this manual and any applicable code limitation. 2. Class V shutoff cannot be performed with water. This residual trapped moisture from testing with water can cause valve and trim damages from the ice crystals formed at below freezing service temperature.	

**Table 2. Maximum Allowable Actuator Thrust for Standard Style 3
Bonnet Extension Length**

VALVE	VALVE SIZE, NPS	STEM DIAMETER		MAXIMUM ALLOWABLE STEM LOAD FOR S20910 STEM MATERIAL	
		mm	in.	N	Lb
HPS-C	1	12.7	1/2	15413	3465
		19.1	3/4	45176	10156
	2	12.7	1/2	16458	3700
		19.1	3/4	46738	10507
		25.4	1	95130	21386
	3	19.1	3/4	48873	10987
		25.4	1	89956	20223
HPT-C with fabricated extension bonnet	4 (long) ⁽¹⁾	19.1	3/4	48055	10803
		25.4	1	89956	20223
	6 (long) ⁽¹⁾	25.4	1	83382	18745
		31.8	1-1/4	139185	31290
	8 (short) ⁽²⁾	25.4	1	83840	18848
		31.8	1-1/4	139741	31415
	10 (short) ⁽²⁾	25.4	1	77662	17459
		31.8	1-1/4	133393	29988
	12 (short) ⁽²⁾	25.4	1	80446	18085
		31.8	1-1/4	136280	30637
		50.8	2	378326	85051
HPT-C with one- piece extension bonnet	4 (short) ⁽²⁾	19.1	3/4	46070	10357
		25.4	1	87158	19594
	6 (short) ⁽²⁾	19.1	3/4	43348	9745
		25.4	1	84049	18895
		31.8	1-1/4	139941	31460
	8 (short) ⁽²⁾	25.4	1	86118	19360
		31.8	1-1/4	142014	31926
	10 (short) ⁽²⁾	25.4	1	82595	18568
		31.8	1-1/4	138469	31129
	12 (short) ⁽²⁾	25.4	1	82154	18469
		31.8	1-1/4	138024	31029
		50.8	2	380029	85434

1. (Long) indicates industry standard long face-to-face.

2. (Short) indicates industry standard short face-to-face.

Table 3. Approximate Weights (Valve and Bonnet Assemblies)

VALVE	VALVE SIZE NPS	RATING	END CONNECTION			
			Flange		SWE, BWE	
			kg	lb	kg	lb
HPS-C	1	CL900 and 1500	51	113	48	105
		CL2500	55	120	44	96
	2	CL900 and 1500	81	178	61	135
		CL2500	113	249	84	184
	3	CL900	135	296	---	---
		CL1500	138	304	106	233
HPT-C with fabricated extension bonnet	4 (long) ⁽¹⁾	CL900	240	527	---	---
		CL1500	258	568	211	464
	6 (long) ⁽¹⁾	CL900	521	1147	---	---
		CL1500	567	1248	465	1023
	8 (short) ⁽²⁾	CL900	809	1779	644	1417
		CL1500	999	2198	781	1718
	10 (short) ⁽²⁾	CL900	1087	2392	887	1951
		CL1500	1560	3432	1193	2625
	12 (short) ⁽²⁾	CL900	1349	2967	1044	2297
		CL1500	1953	4296	1425	3134
HPT-C with one-piece extension bonnet	4 (short) ⁽²⁾	CL900	211	465	163	359
		CL1500	264	582	197	434
	6 (short) ⁽²⁾	CL900	398	877	300	661
		CL1500	549	1210	389	858
	8 (short) ⁽²⁾	CL900	725	1598	540	1190
		CL1500	964	2125	698	1539
	10 (short) ⁽²⁾	CL900	1080	2381	833	1836
		CL1500	1574	3470	1115	2458
	12 (short) ⁽²⁾	CL900	1433	3159	1053	2321
		CL1500	2133	4702	1494	3294
1. (Long) indicates industry standard long face-to-face. 2. (Short) indicates industry standard short face-to-face.						

Section 2: Installation

WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

Personal injury or equipment damage caused by sudden release of pressure may result if the valve assembly is installed where service conditions could exceed the limits given in Table 1 or on the appropriate nameplates. To avoid such injury or damage, provide a relief valve for over-pressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

WARNING

When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions. Responsibility for the safety of process media and compatibility of valve materials with process media rests solely with the purchaser and end-user. Because some valve body/trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your [Emerson sales office](#).

WARNING

Some bonnet flanges have a tapped hole that was used to handle the bonnet during manufacture. Do not use this tapped hole to lift the valve assembly or personal injury may result.

NOTICE

To avoid product damage, inspect the valve before installation for any damage or any foreign material that may have collected in the valve body. Also remove any pipe scale, welding slag, or other foreign material from the pipeline.

1. Before installing the valve, inspect the valve and associated equipment for any damage and any foreign material.
2. Make certain the valve body interior is clean, that pipelines are free of foreign material, and that the valve is oriented so that pipeline flow is in the same direction as the arrow on the side of the valve.

NOTE

NPS 8 to 12 CL900 and CL1500 HPT-C valves contain a flow vane in the lower flow passage. This is critical to proper function of the valve and is not a defect.

3. Gas Service: The normal method of mounting for gas service is with the actuator vertical above the valve body. However, the control valve assembly may be installed in any orientation unless limited by seismic criteria. Other positions may result in uneven valve plug and cage wear that could result in improper operation. For mounting assistance, consult your Emerson sales office.

NOTICE

To avoid possible damage to the packing, do not allow the installed actuator angle to be so flat as to allow liquid inside the bonnet to come in contact with the packing.

Liquid Service: The preferred method of mounting for liquid service is with the actuator vertical above the valve body. This will allow a vapor layer to form between the liquid and the packing. If there are piping constraints, the actuator can be angled slightly from vertical. However, in no case should the angle be so flat as to allow liquid inside the bonnet to come in contact with the packing. For mounting assistance, consult your Emerson sales office.

4. If insulation is applied, make sure it is applied only to the body/bonnet joint. Do not let the insulation run up the extension bonnet.
5. Use accepted piping and welding practices when installing the valve in the line. For flanged valve bodies, use a suitable gasket between the valve body and pipeline flanges.
6. If the actuator and valve are shipped separately, refer to the actuator mounting procedure in the appropriate actuator instruction manual.
7. If the valve body was shipped without packing installed in the packing box, install the packing before putting the valve body into service. Refer to instructions given in the Packing Maintenance procedure.

**WARNING**

Personal injury could result from packing leakage. Valve packing was tightened before shipment; however, the packing might require some readjustment to meet specific service conditions.

Valves with ENVIRO-SEAL™ live-loaded packing will not require this initial readjustment. See the ENVIRO-SEAL Packing System for Sliding-Stem Valves Instruction Manual ([D101642X012](#)) for packing instructions. If you wish to convert your present packing arrangement to ENVIRO-SEAL packing, refer to the retrofit kits listed in the parts kit sub-section near the end of this manual.

Section 3: Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of service conditions. This section includes instructions for packing maintenance and trim maintenance. All maintenance operations may be performed with the valve in the line.



WARNING

Avoid personal injury or property damage from sudden release of process pressure. Before performing any maintenance operations:

- Do not remove the actuator from the valve while the valve is still pressurized.
- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.
- Vent the pneumatic actuator loading pressure and relieve any actuator spring precompression.
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
- The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline*. Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

NOTICE

Follow instructions carefully to avoid damaging the product surfaces, which could result in damage to the product.

NOTE

The HPS-C/HPT-C valves use spiral-wound gaskets which are crushed to provide their seal. A spiral-wound gasket should never be reused. Whenever a gasket seal is disturbed by removing or shifting parts, a new gasket should be installed upon reassembly. This is necessary to ensure a good gasket seal because the used gasket may not seal properly.

3.1 Packing Maintenance

This section covers PTFE V-ring, double PTFE, and graphite packing used in extension bonnets (Figure 2).

NOTE

If the valve has ENVIRO-SEAL live-loaded packing installed, refer to the ENVIRO-SEAL Packing System for Sliding-Stem Valves Instruction Manual ([D101642X012](#)) for packing instructions. Figure 4 shows typical ENVIRO-SEAL arrangements.

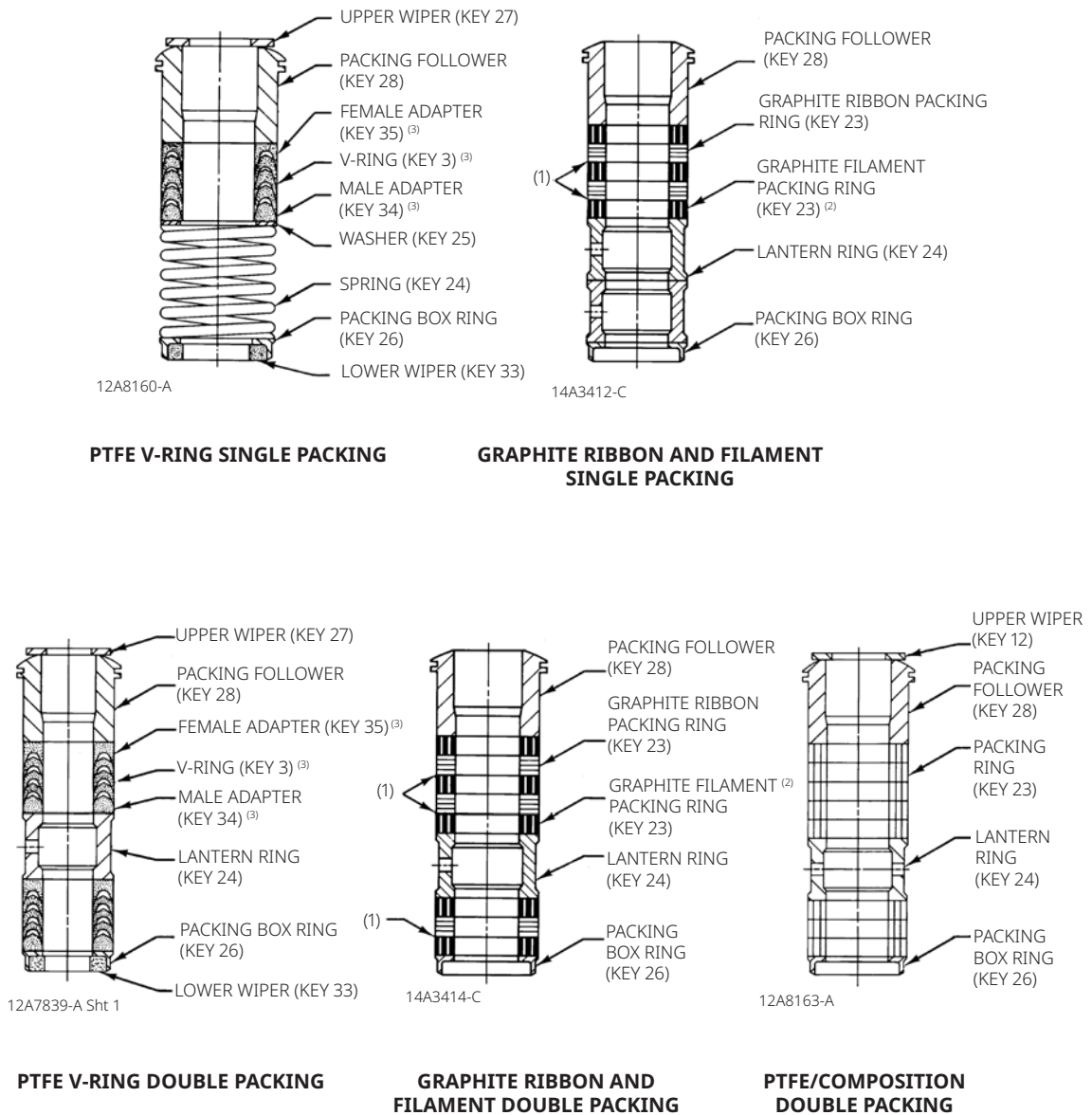
Standard packing key numbers are shown in Figure 2. ENVIRO-SEAL packing key numbers are shown in Figure 4. Bonnet and valve key numbers are shown in Figure 5, 6, 7 and 8.

For spring-loaded single PTFE V-ring packing, the spring (key 24) maintains a sealing force on the packing. If leakage is noted around the packing follower (key 28), check to be sure the shoulder on the packing follower is touching the bonnet. If the shoulder is not touching the bonnet, tighten the packing flange nuts (key 20), until the shoulder is against the bonnet. If leakage cannot be stopped in this manner, proceed with replacing packing procedures.

If there is undesirable packing leakage with other than spring-loaded packing, first try to limit the leakage and establish a stem seal by tightening the packing flange nuts.

If the packing is relatively new and tight on the stem, and if tightening the packing flange nuts does not stop the leakage, it is possible that the valve stem is worn or nicked so that a seal cannot be made. The surface finish of a new valve stem is critical for making a good packing seal. If the leakage comes from the outside diameter of the packing, it is possible that the leakage is caused by nicks or scratches around the packing box wall. If performing any of the following procedures, inspect the valve stem and packing box wall for nicks and scratches. If leakage continues, replace the packing by following the numbered steps presented in the replacing packing procedure.

Figure 2. Packing Arrangements



NOTES:

1. 0.102 mm / 0.004 in. THICK SACRIFICIAL ZINC WASHERS: USE ONLY ONE BELOW EACH GRAPHITE RIBBON RING.

2. HAS THE APPEARANCE OF A WOVEN OR BRAIDED RING.

3. KEY 22 IS COMPRISED OF KEYS 35, 3, AND 34.

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Adding Packing Rings

Key numbers referred to in this procedure are shown in Figure 2, 5 and 6 unless otherwise noted.

When using packing with a lantern ring (key 24) it may be possible to add packing rings above the lantern ring as a temporary measure without removing the actuator from the valve body.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve. If using a power actuator, also shut-off all pressure lines to the power actuator, release all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Remove the packing flange nuts (key 20) and lift the packing flange, upper wiper, and packing follower (keys 18, 27, and 28) away from the valve body
3. It may be possible to dig out the old packing rings on top of the lantern ring, but use care to avoid scratching the valve plug stem or packing box wall. Clean all metal parts to remove particles that would prevent the packing from sealing.
4. Remove the stem connector and slip the packing rings over the end of the valve plug stem.
5. Reassemble the packing follower, upper wiper, packing flange, and packing flange nuts (key 28, 27, 18, and 20).
6. Reconnect the body-actuator stem connection according to the appropriate actuator instruction manual.
7. Tighten the packing flange nuts only far enough to stop leakage under operating conditions. Check for leakage around the packing follower when the valve is being put into service. Retighten the packing flange nuts as required (see Table 4).

Table 4. Recommended Torque for Packing Flange Nuts

STEM DIAMETER		PRESSURE RATING ⁽¹⁾	TORQUE ⁽²⁾			
mm	In.		N•m		Lbf•ft	
			Min	Max	Min	Max
12.7	1/2	CL900	12	18	9	13
		CL1500	15	22	11	16
		CL2500	18	24	13	18
19.1	3/4	CL900	27	41	20	30
		CL1500	34	50	25	37
		CL2500	41	61	30	45
25.4	1	CL900	42	62	31	46
		CL1500	52	77	38	57
		CL2500	61	91	45	67
31.8	1-1/4	CL900	56	83	41	61
		CL1500	68	102	50	75
50.8	2	CL1500	98	146	72	108

1. For intermediate class ratings, use the same torque as the next lower standard class.
2. Lubricate with anti-seize compound.

Replacing Packing

WARNING

Refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

Key numbers and sequence of assembly of packing parts are shown in Figure 2. Bonnet and valve key number locations are shown in Figure 5, 6, 7, and 8, unless otherwise noted.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve. If using a power actuator, also shut-off all pressure lines to the power actuator, release all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment. Observe the warnings at the start of the Maintenance section.
2. Disconnect the operating lines from the actuator and any leak-off piping from the bonnet. Disconnect the stem connector and remove the actuator from the valve by unscrewing the yoke locknut (key 32) or hex nuts (key 30).
3. Loosen the packing flange nuts (key 20) so that the packing is not tight on the valve stem. Remove any travel indicator parts and stem locknuts from the valve stem threads.

WARNING

To avoid personal injury or property damage caused by uncontrolled movement of the bonnet, loosen the bonnet by following the instructions in the next steps.

Do not remove a stuck bonnet by pulling on it with equipment that can stretch or store energy in any other manner. The sudden release of stored energy can cause uncontrolled movement of the bonnet. If the cage sticks to the bonnet, proceed carefully with bonnet removal and support the cage so that it will not fall unexpectedly from the bonnet.

4. When lifting the bonnet, be sure the plug and stem assembly (key 4 and 5), cage (key 2), and cage retainer (key 45), if applicable, remain in the valve body. This avoids damage to the seating surfaces as a result of the assembly dropping from the bonnet after being lifted part way out. The parts are also easier to handle separately.

 WARNING

To avoid possible personal injury, review your process shutdown procedures to be sure process pressure is not applied to the valve for the following procedure.

5. Hex nuts (key 13) attach the bonnet to the valve body (key 1). Loosen these nuts or cap screws approximately 3 mm / 1/8 inch. Then, loosen the body-to-bonnet joint by either rocking the bonnet or prying between the bonnet and valve body. Work with a prying tool around the bonnet until the bonnet loosens.
 - If fluid leaks from the joint, it may indicate that process pressure is applied to the valve. Review your process shutdown procedures, and be sure process pressure is not applied to the valve.
 - If no fluid leaks from the joint, remove the nuts completely and carefully lift the bonnet off the valve body
6. Unscrew the hex nuts (key 13) and carefully lift the bonnet off the valve stem. If the valve plug and stem assembly starts to lift with the bonnet, use a brass or lead hammer on the end of the stem and tap it back down. Set the bonnet on a cardboard or wooden surface to prevent damage to the bonnet gasket surface.
7. If it is necessary to remove and inspect the valve trim, refer to the following Trim Maintenance section.
8. Remove the bonnet gasket (key 10) and cover the opening in the valve to protect the gasket surface and prevent foreign material from getting into the valve body cavity.
9. Remove the packing flange nuts, packing flange, upper wiper, and packing follower (keys 20, 18, 27, and 28). Carefully push out all the remaining packing parts from the valve side of the bonnet using a rounded rod or other tool that will not scratch the packing box wall. Clean the packing box and metal packing parts.
10. Inspect the valve stem threads and packing box surfaces for any sharp edges which might cut the packing. Scratches or burrs in the packing box surfaces could cause leakage or damage to the new packing. If the surface condition cannot be improved by light sanding, replace the damaged parts.
11. If necessary, go to the Trim Maintenance procedures to remove, inspect or replace trim parts. Return to this section when installing the bonnet on the valve body.

Installing the Fabricated Bonnet

1. Remove the covering protecting the valve body cavity and install a new bonnet gasket (key 10), making sure the gasket seating surfaces are clean and smooth. Then slide the bonnet over the stem and onto the stud bolts (key 12).

NOTE

Stud(s) and nut(s) should be installed such that the manufacturer's trademark and material grade marking is visible, allowing easy comparison to the materials selected and documented in the Emerson/Fisher serial card provided with this product.



WARNING

Personal injury or damage to equipment could occur if improper stud and nut materials or parts are used. Do not operate or assemble this product with stud(s) and nut(s) that are not approved by Emerson/Fisher engineering and/or listed on the serial card provided with this product. Use of unapproved materials and parts could lead to stresses exceeding the design or code limits intended for this particular service. Install studs with the material grade and manufacturer's identification mark visible. Contact your Emerson representative immediately if a discrepancy between actual parts and approved parts is suspected.

2. Lubricate the stud threads and the faces of the hex nuts (key 13) with anti-seize lubricant (not necessary if new factory pre lubricated hex nuts are used). Replace the hex nuts and tighten them finger-tight. Stroke the valve several times to center the trim.

Torque the nuts in a crisscross pattern to no more than 1/4 of the nominal torque value specified in Table 5. When all nuts are tightened to that torque value, increase the torque by 1/4 of the specified nominal torque and repeat the crisscross pattern. Repeat this procedure until all nuts are tightened to the specified nominal value. Apply the final torque value again and, if any nut still turns, tighten every nut again.

Table 5. Torque for Body-to-Bonnet Bolting Using Anti-Seize Lubricant ⁽¹⁾

STUD SIZE	TORQUE	
	B8M, B8M2, S20910 Studs	
	N•m	Lbf-ft
3/4	260	190
7/8	370	275
1-1/8	710	525
1-1/4	940	695
1-3/8	1270	935
1-1/2	1650	1220
1-5/8	2130	1570
1-3/4	2670	1970
1. For other lubricants or bolting materials,, contact your Emerson sales office for torque information.		

3. Install new packing and the metal packing box parts according to the appropriate arrangement in Figure 2. Place a smooth-edged pipe over the valve stem and gently tap each soft packing part into the packing box.
4. Slide the packing follower, upper wiper, and packing flange (keys 28, 27, and 18) into position. Lubricate the packing flange studs (key 19) and faces of the packing flange nuts (key 20). Install the packing flange nuts.
5. Tightening packing flange nuts (key 20):
 - For spring-loaded PTFE V-ring packing, tighten the packing flange nuts until the shoulder on the packing follower (key 28) contacts the bonnet.
 - For graphite packing, tighten the packing flange nuts to the maximum recommended torque shown in Table 4. Then, loosen the packing flange nuts, and retighten them to the recommended minimum torque shown in Table 4.
 - For other packing types, tighten the packing flange nuts alternately in small equal increments until one of the nuts reaches the minimum recommended torque shown in Table 4. Then, tighten the remaining nut until the packing flange is level and at a 90 degree angle to the valve stem.
 - For ENVIRO-SEAL live-loaded packing, refer to the ENVIRO-SEAL Packing System for Sliding-Stem Valves Instruction Manual (D101642X012).
6. Mount the actuator on the valve assembly and reconnect the actuator and valve stem according to the procedure in the appropriate actuator instruction manual.

Installing the One-Piece Bonnet

1. Before install bonnet to body, first install bushing spacer (key 46) to bonnet.
2. Install 1/4"-20 eye bolts into the two equally spaced tapped holes on the bottom of bushing spacer. Lift the bushing spacer with eye bolts and put it into the bottom cavity of bonnet, turn the spacer clockwise into bonnet until tight. Afterward, remove the two eye bolts.
3. There are two options to secure bushing spacer.
 - Option 1: Tack weld the bushing spacer to the bonnet using minimal heat. Two welds, 6 mm / 1/4-inch long and 180° apart, are required.
 - Option 2: Use an appropriate tool such as a center punch, stake the threads on the bonnet in one place.
4. Follow steps 1 through 6 of Installing the fabricated Bonnet section to complete the installation process.

3.2 Trim Maintenance

This procedure describes how the valve trim can be completely disassembled. When inspection or repairs are required, perform only those steps necessary to accomplish the task. Observe the Warning at the start of the Maintenance section.

Key number locations are shown in Figure 5 and 6 for NPS 1 through 6 (long), and Figure 7 and 8 for NPS 4 through 12 (short), unless otherwise noted.



WARNING

Refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

To avoid personal injury due to leaking fluids, avoid damaging gasket sealing surfaces. The surface finish of the valve stem (key 5) is critical for making a good packing seal.

NOTICE

The inside surface of the cage (key 2) is critical for tight shutoff and smooth operation of the valve plug. The seating surfaces of the valve plug (key 4) and seat ring (key 3) are critical for proper shutoff. Protect these surfaces accordingly.

Trim Disassembly NPS 1 through 6 (Long)

1. Remove the actuator and the bonnet according to steps 1 through 6 of the Replacing Packing procedures in the Maintenance section.
2. Lift the valve stem and attached valve plug out of the valve body. If the valve plug is to be reused, tape or otherwise protect the valve plug stem and the valve plug seating surface to prevent scratches.
3. Lift out the cage (key 2) and the bonnet gasket (key 10).
4. Remove the seat ring (key 3) and seat ring gasket (key 11).
5. Clean, inspect, and if necessary obtain replacement parts.

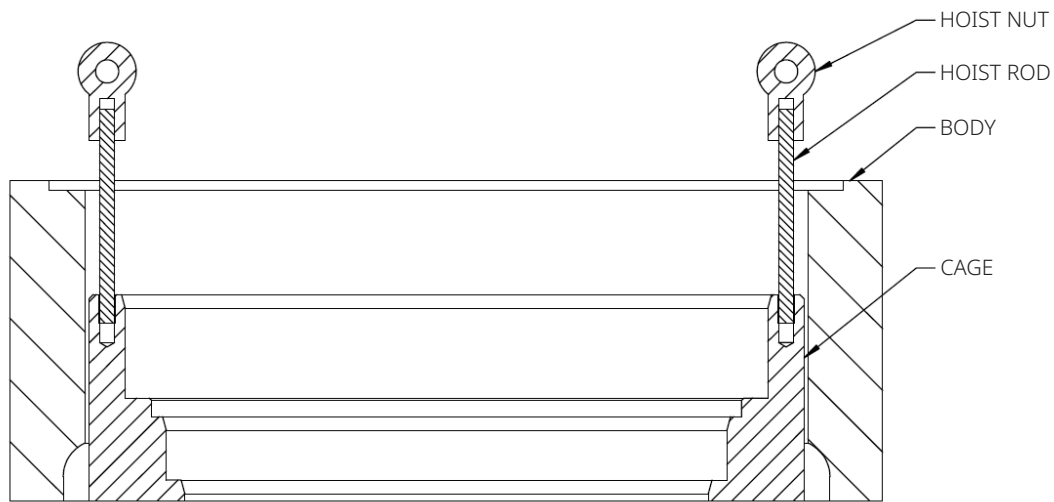
Trim Disassembly NPS 4 through 12 (Short)

1. Remove the actuator and the bonnet according to steps 1 through 6 of the Replacing Packing procedures in the Maintenance section.
2. Lift the valve stem and attached valve plug out of the valve body. If the valve plug is to be reused, tape or otherwise protect the valve plug stem and the valve plug seating surface to prevent scratches.
3. Lift out the cage retainer (key 45), cage gaskets (key 43), and the bonnet gasket (key 10).

WARNING

Lifting of the cage must be done with a vertical or straight lift using the equipment shown in Figure 3. Lifting at angle may damage the lifting equipment and cause property damage or personal injury.

4. Install threaded rods (about 6 in. long) into the holes on top of the cage vertically. Install hoist rings, nuts or eye bolt on to the threaded rods (see Figure 3). Lift out the cage with the hoist nut from the valve body.

Figure 3. Removal of Cage with Hoist Rod and Nut**NOTE**

The cage and cage retainer lifting holes are provided for ease of disassembly. To prevent damage to the cage lifting hole, fully engage the threaded rod into the cage hole, but do not overtighten the hoist rod. It only needs to be hand tight.

If it is hard to lift the cage, a piece of wood and a hammer can be used to strike on the top chamfer of the cage to loosen it from the body or seat ring gasket.

ASTM A193 B7 or comparable threaded rods are required for cage removal. Contact your Emerson sales office for more information.

5. Remove the seat ring gasket (key 11).
6. Clean, inspect, and if necessary, obtain replacement parts.

3.3 Valve Plug Maintenance

NOTICE

To avoid the valve plug seal ring (key 7) not sealing properly and affecting valve performance, be careful not to scratch the surfaces of the ring groove on the valve plug or any of the surfaces of the replacement ring.

1. With the valve plug (key 4) removed, according to the disassembly portion of the Trim Maintenance procedure, proceed as follows:
 - For HPS-C valves, proceed to step 4.
 - For HPT-C valves, the spring-loaded seal ring may be removed by first working the retaining ring (key 9) off with a screwdriver. Then carefully slide the metal backup ring (key 8) and seal ring (key 7) off the valve plug (key 4). Continue on with step 2.
2. A spring-loaded seal ring must be installed so that its open side faces toward the valve stem, or toward the seat of the plug depending on flow direction. To install a spring-loaded seal ring, slide the seal ring (key 7) onto the valve plug followed by the metal backup ring (key 8).
3. Then install the retaining ring (key 9) by inserting one end in the groove and, while turning the plug, press the ring into the groove. Again, be careful not to scratch any surfaces of the ring or plug.

NOTICE

To avoid weakening the stem that may cause failure in service, never reuse an old stem with a new valve plug. Using an old stem with a new plug requires drilling a new pin hole in the stem, which will weaken the stem. However, a used valve plug may be reused with a new stem.

4. To replace the valve stem (key 5), drive or drill out the pin (key 6). Unscrew the valve plug from the stem.
5. Screw the new stem into the valve plug. Tighten to the torque value given in Table 6. Also, use this table to select the proper drill size. Drill through the stem using the hole in the valve plug as a guide. Remove any chips or burrs and drive in a new pin to lock the assembly.

Table 6. Valve Stem Connection Torque and Drill Size for Pin Hole

VALVE STEM DIAMETER		VALVE STEM CONNECTION TORQUE ⁽¹⁾ (MINIMUM-MAXIMUM)		DRILL SIZE FOR PIN
mm	In.	N•m	Lbf-ft	In.
12.7	1/2	81 - 115	60 - 85	1/8
19.1	3/4	237 - 339	175 - 250	3/16
25.4	1	420 - 481	310 - 355	1/4
31.8	1-1/4	827 - 908	610 - 670	1/4
50.8	2	3515-3885	2600 - 2880	3/8

1. Lubricate with anti-seize compound.

Trim Assembly NPS 1 through 6 (Long)

Key number locations are shown in Figure 5 and 6, unless otherwise noted.

1. Install the seat ring gasket (key 11), and seat ring (key 3).
2. Install the cage (key 2). Any rotational orientation of the cage with respect to the valve body is acceptable.
3. Lower the valve plug (key 4) and stem assembly into the cage. Make sure the seal ring (key 7) is evenly engaged in the entrance chamfer at the top of the cage (key 2) to avoid damaging the ring.
4. Place the gaskets (keys 10) on top of the cage.
5. Mount the bonnet on the valve body and complete assembly using the Replacing Packing procedures in the Maintenance section. Torque guidelines for body-to-bonnet bolting are shown in Table 5.
6. If the valve has soft metal-to-metal seats, refer to the Coining Soft Metal-to-Metal Seats section.

Trim Assembly NPS 4 through 12 (Short)

Key number locations are shown in Figure 7 and 8 unless otherwise noted.

1. Install the seat ring gasket (key 11) in the lower gasket groove in the valve body (key 1), making sure the gasket is centered in the groove and the bottom of the gasket is flush with the mating surface in the body.
2. Install threaded rods (about 6" long) into the holes on top of the cage vertically. Install hoist rings, nuts or eye bolt on to the threaded rods.

NOTE

The cage and seat ring lifting holes are 1/4"-20. To prevent damage to the cage/seat ring lifting holes, fully engage the threaded rod into the cage/seat ring hole, but do not overtighten the hoist rod. It only needs to be hand tight.

ASTM A193 B7 or comparable threaded rods are required for cage/seat ring installation.

3. Lift the cage (key 2) using the hoist rings on the threaded rods and install the cage into the valve body (see Figure 3). Any rotational orientation of the cage with respect to the valve body is acceptable. When installing the cage, take care to lower the cage evenly and ensure the cage will not damage the flat sheet gasket (key 11).
 4. For NPS 8 through 12, install quantity-2 cage gaskets (key 43) and make sure the gaskets sit flush on the surface of the groove.
 5. Install the cage retainer (key 45) on top of the cage and a single cage gasket (key 43) on top of the cage retainer.
 6. Install the bonnet gasket (key 10) into the groove around the valve body trim opening.
 7. Lower the valve plug (key 4) and stem assembly through the bore of the cage retainer (key 45) and into the bore of the cage (key 2) and gently rest the plug seating surface against the seating surface in the cage. Make sure the seal ring (key 7) is evenly engaged in the entrance chamfer at the top of the cage retainer (key 45) to avoid damaging the ring.
 8. Mount the bonnet on the valve body and complete assembly using the Replacing Packing procedures in the Maintenance section. Torque guidelines for body-to-bonnet bolting are shown in Table 5.
 9. If the valve has soft metal-to-metal seats, refer to the Coining Soft Metal-to-Metal Seats section.
-

NOTE

Be careful to prevent the bonnet from crushing the spiral wound gaskets as the bonnet is lowered on to the valve.

Damaging the gaskets will require that they are replaced.

Coining Soft Metal-to-Metal Seats

Soft metal-to-metal seat constructions consist of a valve plug with hardfaced CoCr-A seat and a non-hardfaced S31600 seat ring. For optimum shutoff performance of these constructions, coin seats by stroking the valve plug into the seat ring at least three times with maximum actuator force.

NOTICE

To avoid possible product damage which may affect performance, do not lap soft metal-to-metal seats.

Section 4: Parts

4.1 Parts Ordering

Each body-bonnet assembly is assigned a serial number which can be found on the valve. This same number also appears on the actuator nameplate when the valve is shipped from the factory as part of a control valve assembly.

Refer to the serial number when contacting your [Emerson sales office](#) for technical assistance. When ordering replacement parts, refer to the serial number and to the eleven-character part number for each part required from the following parts kit or parts list information.

WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

4.2 Parts Kits

Packing Kits

Table 7. Standard Packing Repair Kits (Non Live-Loaded)

Stem Diameter, mm / in. Yoke Boss Diameter, mm / in.	12.7 / 1/2 71 / 2-13/16	19.1 / 3/4 90 / 3-9/16	25.4 / 1 127 / 5	31.8 / 1-1/4 127 / 5, 5H	50.8 / 2 178 / 7
PTFE Contains keys 22, 24, 25, 26, 27	RPACKX00022	RPACKX00032	RPACKX00342	RPACKX00352	Consult sales office
Double PTFE Contains keys 22, 24, 26, 27	RPACKX00052	RPACKX00062	RPACKX00362	RPACKX00372	
Single Graphite Ribbon/Filament Contains keys 23 [ribbon ring], 23 [filament ring], 24, and 26	RPACKX00112	RPACKX00122	---	---	
Single Graphite Ribbon/Filament Contains keys 23 [ribbon ring], 23 [filament ring], and 26	---	---	RPACKX00532	RPACKX00542	RPACKX00552
Single Graphite Ribbon/Filament Contains keys 23 [ribbon ring], 23 [filament ring]	RPACKX00142	RPACKX00152	---	---	Consult sales office

ENVIRO-SEAL Packing Retrofit Kits

Retrofit kits include parts to convert valves with existing standard bonnets to the ENVIRO-SEAL packing box construction. Refer to Figure 4 for key numbers for PTFE and Graphite ULF packing.

Stems and packing box constructions that do not meet Fisher stem finish specifications, dimensional tolerances, and design specifications, may adversely alter the performance of this packing kit.

Table 8. ENVIRO-SEAL Packing Retrofit Kits

Stem Diameter, mm / in. Yoke Boss Diameter, mm / in.	12.7 / 1/2 71 / 2-13/16	19.1 / 3/4 90 / 3-9/16	25.4 / 1 127 / 5	31.8 / 1-1/4 127 / 5, 5H	50.8 / 2 178 / 7
Double PTFE Contains keys 200, 201, 211, 212, 214, 215, 216, 217, 218, tag, cable tie	RPACKXRT022	RPACKXRT032	RPACKXRT042	RPACKXRT052	Consult sales office
Graphite ULF Contains keys 200, 201, 207, 208, 209, 210, 211, 212, 214, 217, tag, cable tie	RPACKXRT272	RPACKXRT282	RPACKXRT292	RPACKXRT302	
Duplex Contains keys 200, 201, 207, 209, 211, 212, 214, 215, 216, 217, tag, cable tie	RPACKXRT222	RPACKXRT232	RPACKXRT242	RPACKXRT252	

ENVIRO-SEAL Packing Repair Kits

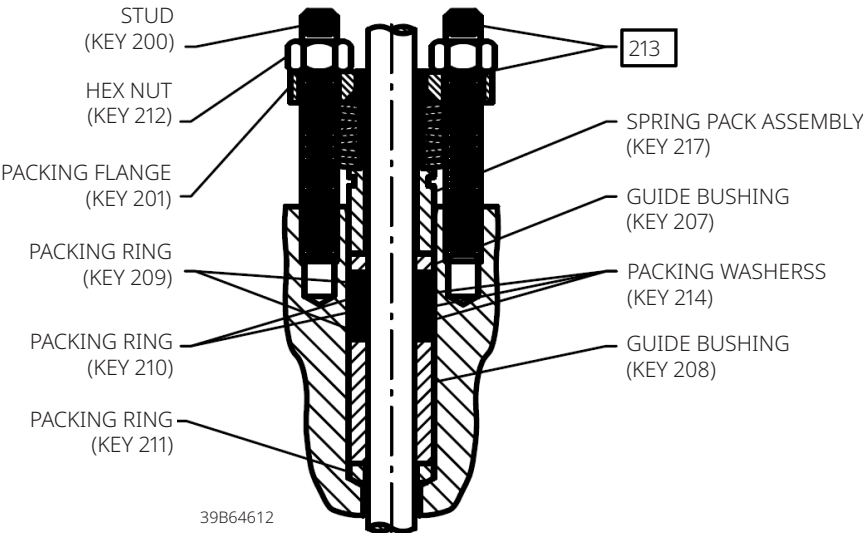
Repair kits include parts to replace the “soft” packing materials in valves that already have ENVIRO-SEAL packing arrangements installed or in valves that have been upgraded with ENVIRO-SEAL retrofit kits. Refer to Figure 4 for key numbers for PTFE and Graphite ULF packing.

Stems and packing box constructions that do not meet Fisher stem finish specifications, dimensional tolerances, and design specifications, may adversely alter the performance of this packing kit.

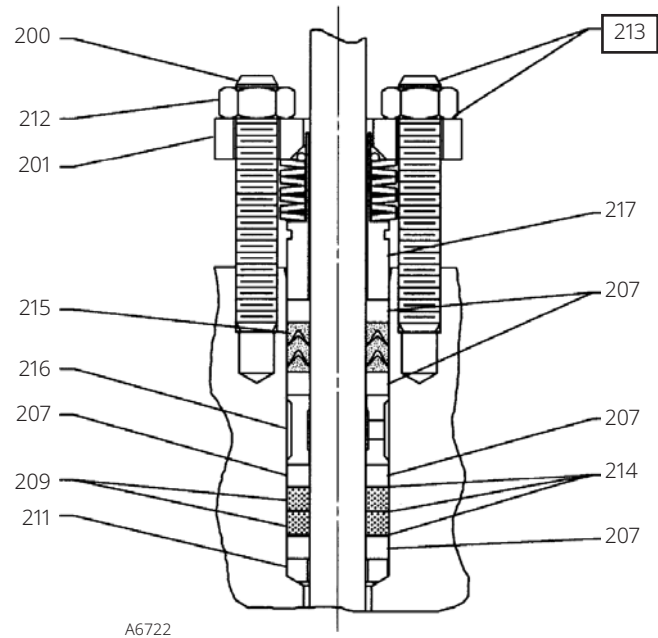
Table 9. ENVIRO-SEAL Packing Repair Kits

Stem Diameter, mm / in. Yoke Boss Diameter, mm / in.	12.7 / 1/2 71 / 2-13/16	19.1 / 3/4 90 / 3-9/16	25.4 / 1 127 / 5	31.8 / 1-1/4 127 / 5, 5H	50.8 / 2 178 / 7
Double PTFE Contains keys 214, 215, & 218	RPACKX00202	RPACKX00212	RPACKX00222	RPACKX00232	Consult sales office
Graphite ULF Contains keys 207, 208, 209, 210, and 214	RPACKX0060	RPACKX00612	RPACKX00622	RPACKX00632	
Duplex Contains keys 207, 209, 214, and 215	RPACKX00302	RPACKX00312	RPACKX00322	RPACKX00332	

Figure 4. ENVIRO-SEAL Packing



TYPICAL ENVIRO-SEAL PACKING SYSTEM
WITH GRAPHITE ULF PACKING



TYPICAL ENVIRO-SEAL PACKING SYSTEM
WITH DUPLEX PACKING

Gasket Kits

Table 10. Gasket Kits

VALVE RATING	VALVE SIZE, NPS	MATERIAL	
		N06600/Graphite	N07750/Graphite
HPS-C CL1500	1	12B7100X012	12B7100X022
	2	12B7100X032	12B7100X042
	3	12B7100X052	12B7100X062
HPT-C CL1500	4 (long)	12B7100X082	---
	6 (long)	12B7100X112	---
HPS-C CL2500	1	12B7100X152	12B7100X122
	2	12B7100X162	12B7100X132

Table 11. Gasket Set HPT-C NPS 4 through 12 ⁽¹⁾⁽²⁾

VALVE RATING	HP GLOBE	MATERIAL		
	Valve Size, NPS	Bonnet Spiral Wound Gasket N06600/Graphite	Cage Spiral Wound Gasket N06600/Graphite	Seat Ring Flat Sheet Gasket S31600/Graphite
CL900	4 (short)	GG62142X012	GG62143X012	GG62144X012
	6 (short)	GG62162X012	GG62163X012	GG62164X012
	8 (short)	GG53667X012	GG53677X012	GG53849X012
	10 (short)	GG53684X012	GG53685X012	GG53852X012
	12 (short)	GG53692X012	GG53693X012	GG53854X012
CL1500	4 (short)	GG62142X012	GG62143X012	GG62144X012
	6 (short)	GG62162X012	GG62163X012	GG62164X012
	8 (short)	GG53678X012	GG53679X012	GG53849X012
	10 (short)	GG53686X012	GG53687X012	GG53852X012
	12 (short)	GG53694X012	GG53695X012	GG53854X012

1. Includes Bonnet Gasket (key 10), Cage Gasket (key 43), and Seat Ring Gasket (key 11).

2. Gaskets should always be replaced as sets, not separately.

4.3 Parts List

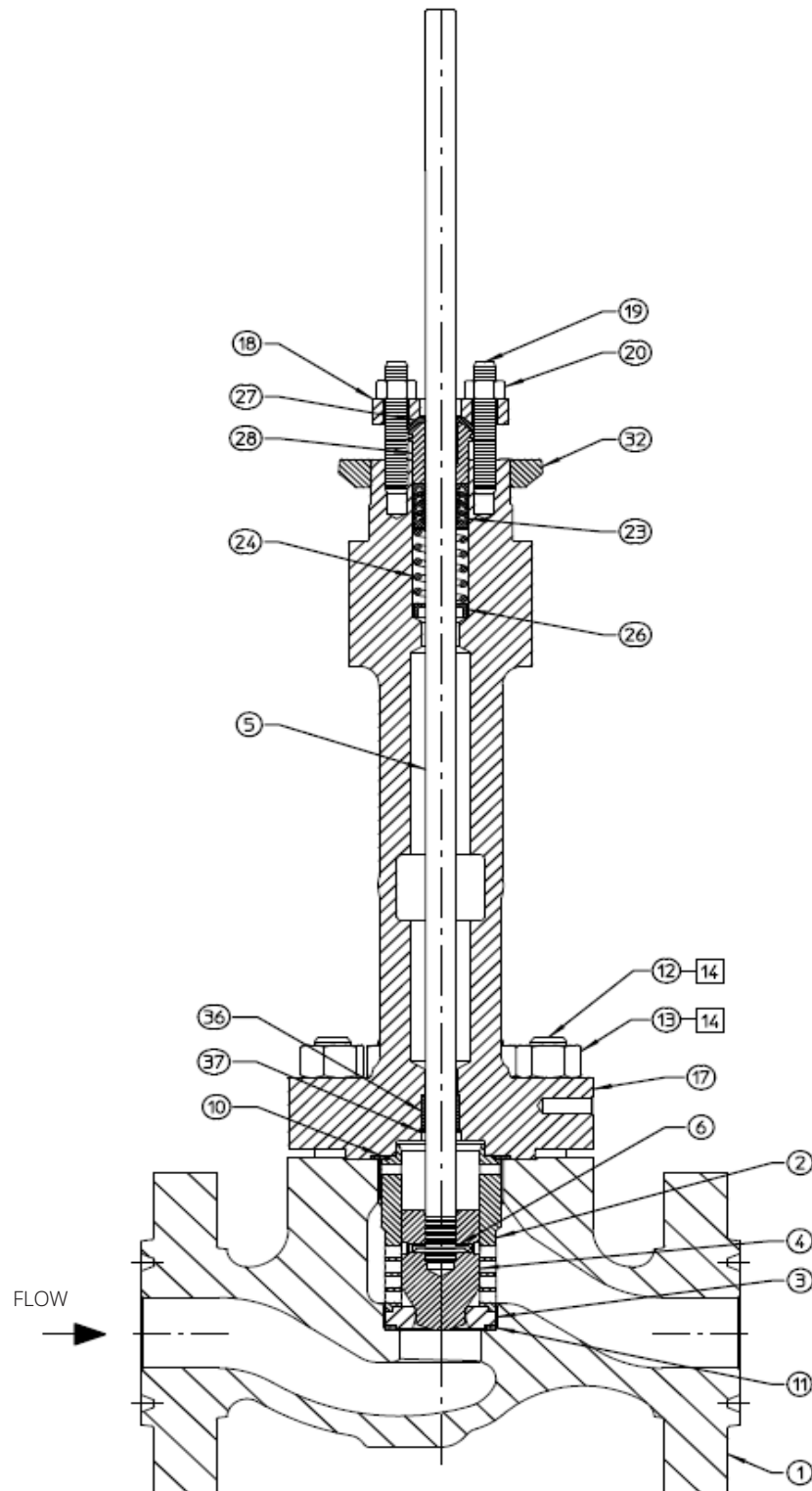
NOTE

Contact your [Emerson sales office](#) for Part Ordering information.

Table 12. Parts

Key No.	Description	Key No.	Description
1	Valve Body If you need a valve body as a replacement part, order by valve size, serial number, and desired material	22*	Packing Set See Parts Kits
2*	Cage	23*	Packing Ring See Parts Kits
3*	Seat Ring	24	Spring or Lantern Ring See Parts Kits
4*	Valve Plug	25	Washer, Special See Parts Kits
5*	Valve Stem	26*	Packing Box Ring See Parts Kits
6*	Pin	27*	Upper Wiper See Parts Kits
7*	Seal Ring	28	Follower
8*	Back Up Ring	29	Stud Bolt
9*	Retaining Ring (for HPT-C only)	30	Hex Nut
10*	Bonnet Gasket	32	Yoke Locknut
11*	Seat Ring Gasket	36	Baffle
12	Stud	37	Retaining Ring
13	Hex Nut	38	Drive Screw
14	Anti-Seize Lubricant	40	Washer
15	Nameplate	41	Flow Arrow
16	Wire	43	Cage Gasket
17	Bonnet If you need a bonnet as a replacement part, order by valve size and stem diameter, serial number, and desired material.	44	Nameplate
18	Packing Flange	45	Cage Retainer
19	Stud Bolt	46	Busing Spacer
20	Hex Nut		
* Recommended spare parts			

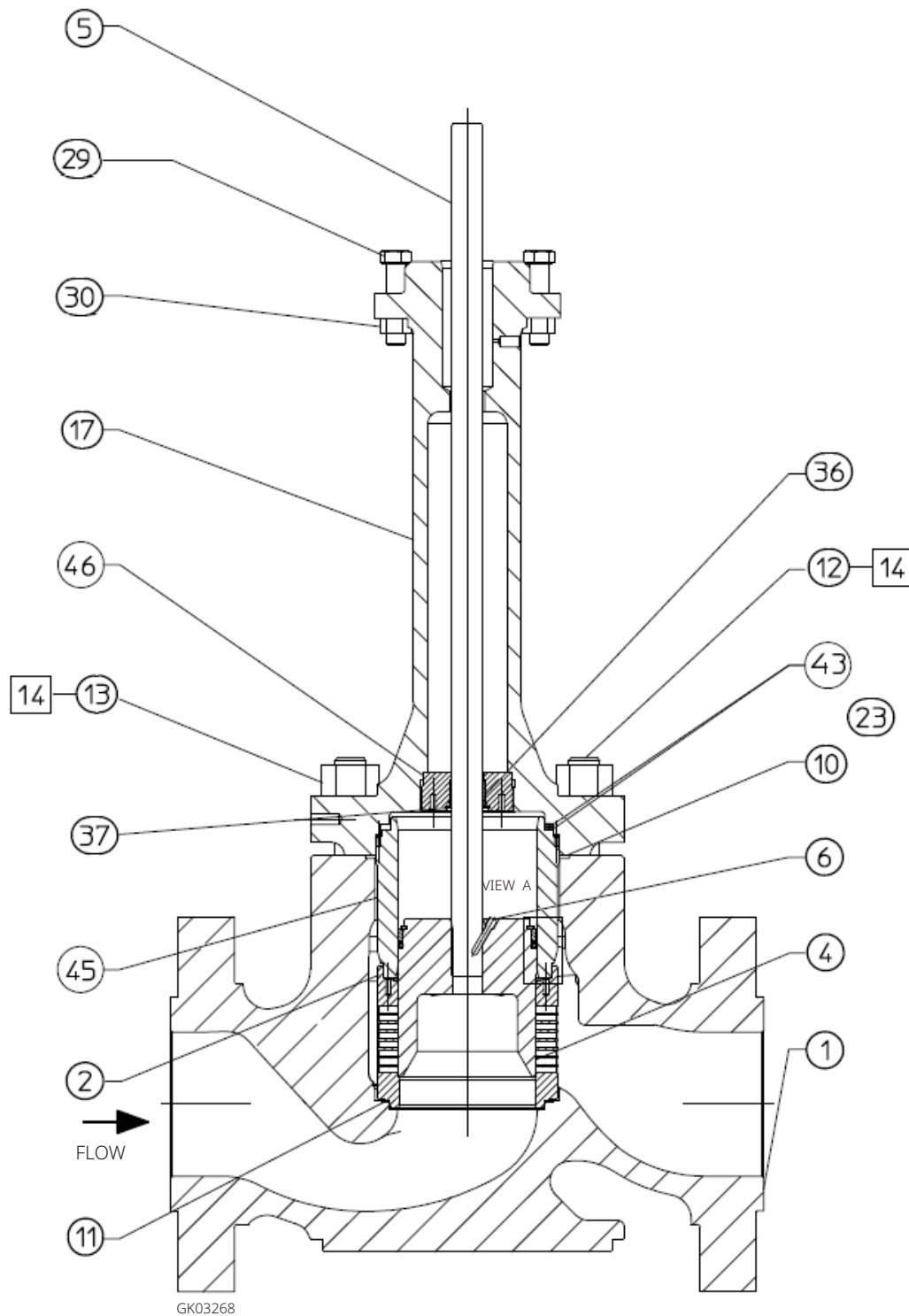
Figure 5. Fisher HPS-C Valve Assembly



GE87219

Figure 6. Fisher HPT-C Valve Assembly with Fabricated Bonnet NPS 1 through 6 (Long)

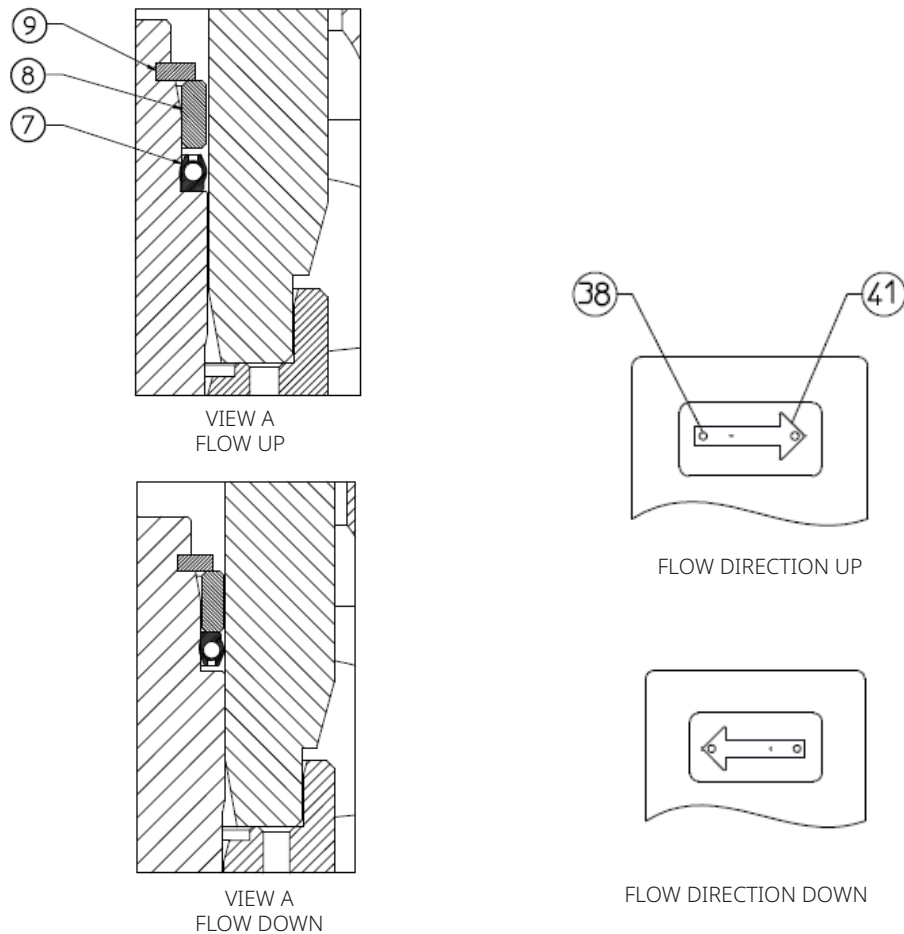


Figure 7. Fisher HPT-C Valve Assembly with One-Piece Bonnet NPS 4 and 6 (Short)

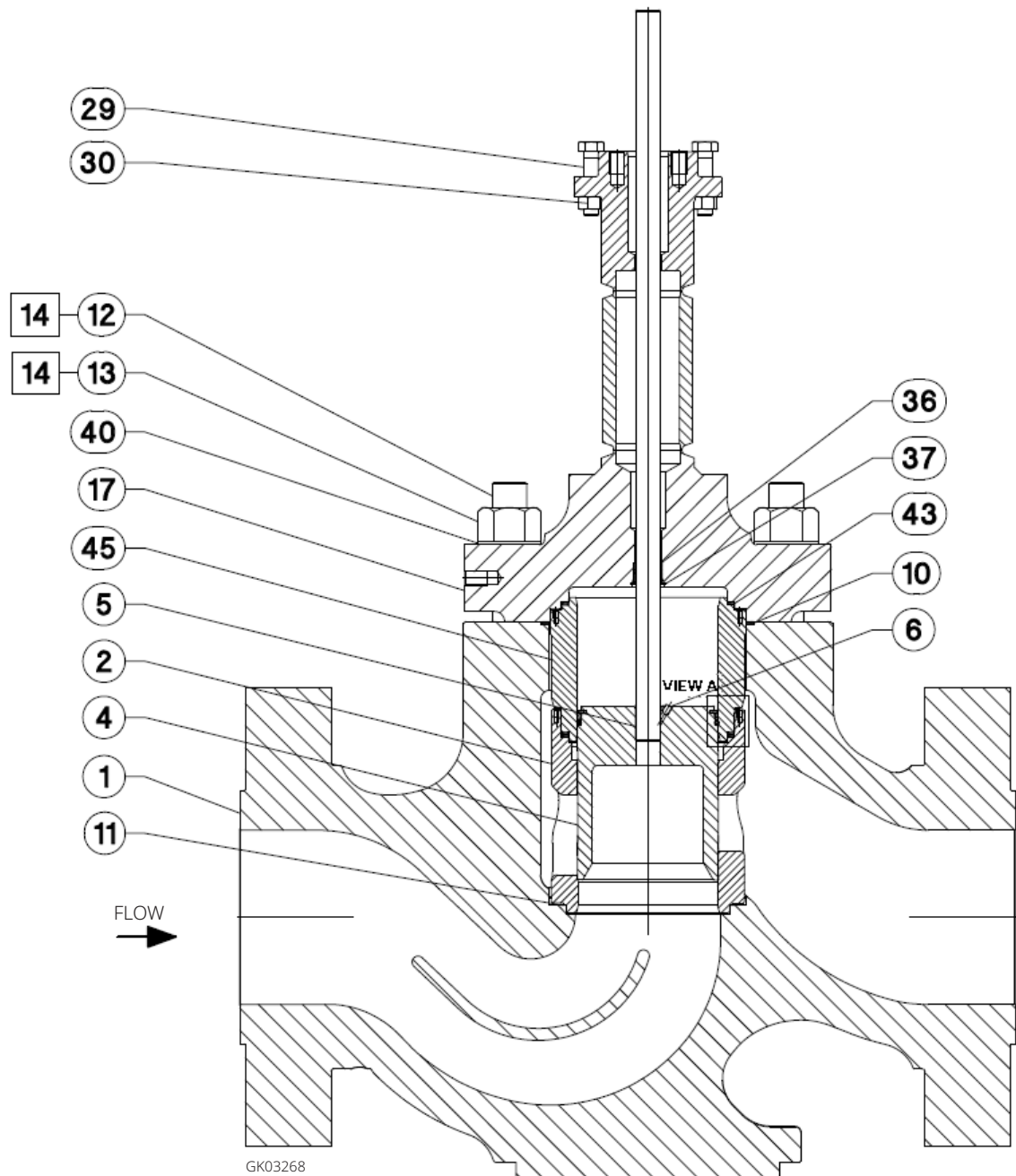
□ APPLY LUB

NOTE: PARTS NOT SHOWN: 15, 16, AND 44

Figure 7. Fisher HPT-C Valve Assembly with One-Piece Bonnet NPS 4 and 6 (Short)
(continued)



**Figure 8. Fisher HPT-C Valve Assembly with Fabricated Bonnet
NPS 8 through 12 (Short)**



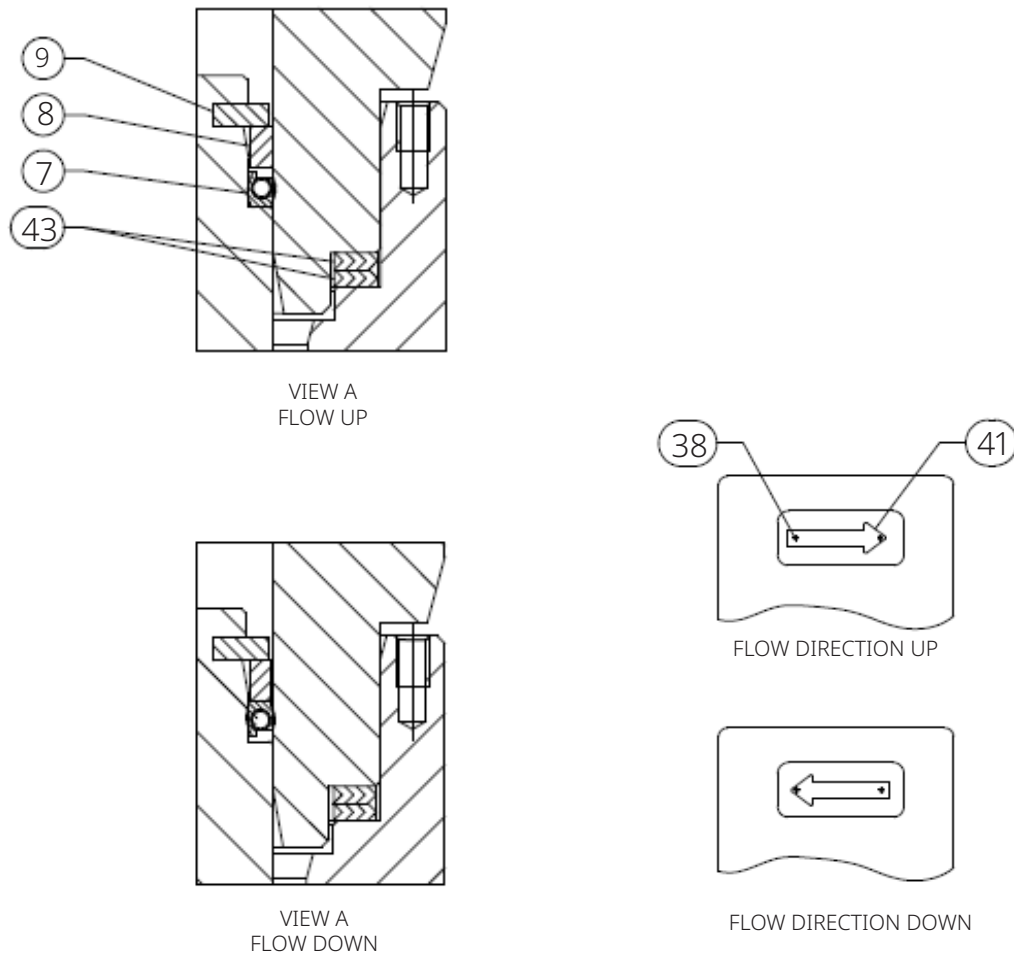
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□ APPLY LUB

NOTE: PARTS NOT SHOWN: 15, 16, AND 44

ONE-PIECE EXTENSION BONNET OPTION IS ALSO AVAILABLE FOR NPS 8 THROUGH 12 (SHORT) HPT-C VALVES

**Figure 8. Fisher HPT-C Valve Assembly with Fabricated Bonnet
NPS 8 through 12 (Short) (continued)**





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