

# Fisher™ 8540 Eccentric Disk Butterfly Control Valve

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Figure 1. Fisher 8540 Butterfly Valve with Bettis RPE Actuator and 3720 Positioner



## Introduction

### Scope of Manual

This instruction manual includes installation, maintenance, and parts information for the Fisher 8540 valve, NPS 3 through NPS 12 or DN80 through DN300 (see figure 1). Refer to separate instruction manuals for information covering the actuator and accessories.



Do not install, operate, or maintain 8540 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 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.

### Description

The seal design of the 8540 eccentric disk high performance butterfly valve provides excellent shutoff capability. This valve has a square drive shaft end and soft seal rings for use in a wide variety of applications.

Table 1. Specifications

<p><b>Valve Size and End Connection Styles</b></p> <p>NPS ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, and ■ 12 wafer body valves DN ■ 80, ■ 100, ■ 150, ■ 200, ■ 250, and ■ 300</p> <p><b>Maximum Inlet Pressure<sup>(1)</sup></b></p> <p>Carbon Steel and Stainless Steel Valve Bodies: Consistent with CL150 and 300 pressure/temperature ratings per ASME B16.34 and PN 10 to 40 per EN 12516-1 unless limited by material temperature capabilities.</p> <p><b>Shutoff Classifications</b></p> <p>■ PTFE Seal: Bidirectional shutoff to Class VI per ANSI/FCI 70-2 and IEC 60534-4.</p> <p><b>Flow Characteristics</b></p> <p>Approximately linear</p>	<p><b>Disk Rotation</b></p> <p>Clockwise to close (when viewing from the drive shaft end) through 90 degrees of disk rotation (see figure 8)</p> <p><b>Flow Direction</b></p> <p>See figure 3</p> <p><b>Actuator/Valve Action</b></p> <p>With the diaphragm or piston actuators, the valve action is field-reversible. Refer to information in the Installation section.</p> <p><b>Valve Classification</b></p> <p>Face-to-face dimensions meet API 609, MSS-SP-68, or EN 558 standards for face-to-face dimensions of wafer-style valves.</p> <p><b>Shaft Diameters</b></p> <p>See table 2</p> <p><b>Approximate Weights</b></p> <p>See table 2</p>
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1. The pressure/temperature limits in this manual and any applicable standard or code limitation for valves should not be exceeded.

## Educational Services

Emerson Educational Services  
Phone: 1-800-338-8158  
E-mail: [education@emerson.com](mailto:education@emerson.com)  
[emerson.com/mytraining](http://emerson.com/mytraining)

Table 2. Valve Size, Shaft Diameter, and Approximate Weight

VALVE SIZE		CLASS		SHAFT DIAMETER		APPROXIMATE WEIGHT	
NPS	DN	ASME	EN	mm	Inches	Wafer-Style	
						kg	lbs
3	80	CL150	PN10-16	12.7	1/2	4.5	10
		CL300	PN25-40	15.9	5/8	5.9	13
4	100	CL150	PN10-16	15.9	5/8	8.6	19
		CL300	PN25-40	19.1	3/4	10	23
6	150	CL150	PN10-16	19.1	3/4	13	39
		CL300	PN25-40	25.4	1	15	33
8	200	CL150	PN10-16	25.4	1	21	47
		CL300	PN25-40	31.8	1-1/4	24	53
10	250	CL150	PN10-16	31.8	1-1/4	34	75
		CL300	PN25-40	38.1	1-1/2	44	96
12	300	CL150	PN10-16	38.1	1-1/2	49	107
		CL300	PN25-40	44.5	1-3/4	64	141

# Installation

The valve is normally shipped as part of a control valve assembly, with the power actuator mounted on the valve. If the valve or actuator have been purchased separately, or if the actuator has been removed for maintenance, mount the actuator on the valve, and adjust actuator travel before inserting the valve body into the line. This is necessary due to the measurements that must be made during the actuator calibration adjustment process. Refer to the Actuator Mounting section of this manual to mount the actuator on the valve. Refer to the actuator instruction manual for mounting and adjusting instructions before proceeding.

## ⚠ WARNING

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

To avoid personal injury or property damage resulting from the sudden release of pressure, do not install the valve assembly where service conditions could exceed the limits given in this manual, the limits on the appropriate nameplates, or the matching pipe flange rating. Use pressure-relieving devices 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. To avoid possible personal injury and because some valve/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](#).

Table 3. Construction Material Temperature Limits<sup>(1)</sup>

COMPONENTS AND MATERIALS OF CONSTRUCTION	TEMPERATURE LIMITS	
	°C	°F
<b>Valve Body Material</b>		
Carbon Steel	-29 to 427	-20 to 800
CF8M	-198 to 538	-325 to 1000
CF8M/1.4408	-196 to 580	-321 to 1076
WCC/1.0619	-10 to 480	-14 to 896
<b>Disk Material</b>		
CF8M	-198 to 538	-325 to 1000
<b>Shaft Material</b>		
S17400	-62 to 427	-80 to 800
<b>Bearing Material</b>		
PEEK / PTFE lined	-46 to 232	-50 to 450
<b>Packing Material</b>		
PTFE V-Rings	-46 to 232	-50 to 450
<b>Seal Ring</b>		
PTFE (standard) Soft Seal Ring	-46 to 232	-50 to 450

1. Refer to Ordering Matrix for 8540 Valves. For selection temperatures not shown above, contact your [Emerson sales office](#).

1. Install a three-valve bypass around the control valve assembly if continuous operation is necessary during inspection and maintenance of the valve.
2. Inspect the valve to be certain that it is free of foreign material.

## CAUTION

**Be certain that adjacent pipelines are free of any foreign material, such as pipe scale or welding slag, that could damage the valve sealing surfaces.**

Table 4. Maximum Allowable Pressure Drops at Temperature

TEMPERATURE		PRESSURE DROP	
°C	°F	bar	psi
-46	-50	52	750
-32	-25		
-18	0		
38	100		
66	150		
93	200	43	620
121	250	35	510
149	300	27	390
204	400	11	160
232	450	3	50

## Valve Orientation

When installing the valve, it is recommended that the valve drive shaft be horizontal as shown in figure 1.

## Valve Direction

The high performance butterfly valve is designed to allow flow in either direction when in the open position. When in the closed position, high pressure should be applied to a specific side of the disk to provide best performance and optimal valve life (see seal types below). See figure 2.

The PTFE soft seal is bi-directional under normal operating conditions can (at different times) experience pressure in both directions; the highest of the two pressures should be exerted on the preferred side of the disk. If the two pressures are equal, then the one lasting the longest period of time should be applied to the preferred side.

1. For PTFE seal ring: This seal is bidirectional. For optimal performance, high pressure should be applied to the front (retaining ring side) of the disk.

Figure 2. Flow Direction Arrow

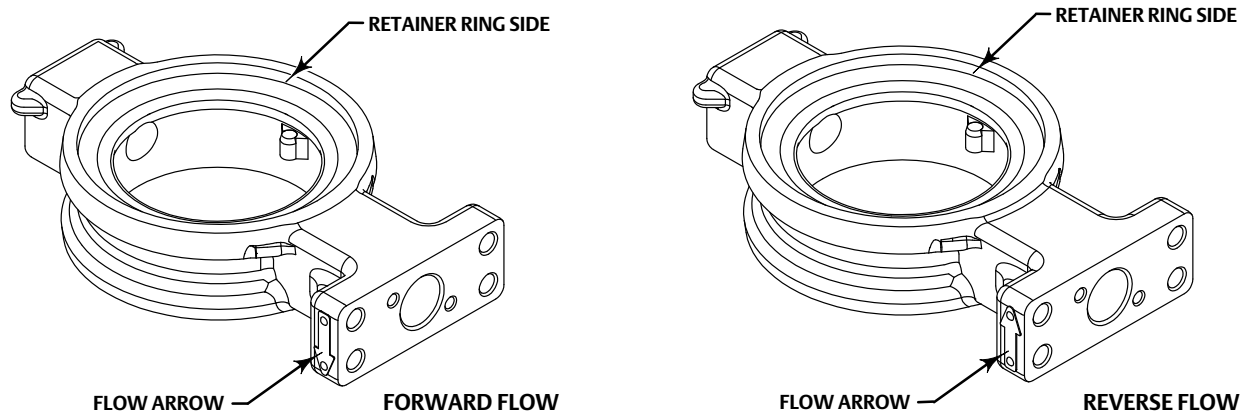


Figure 3. Flow Direction

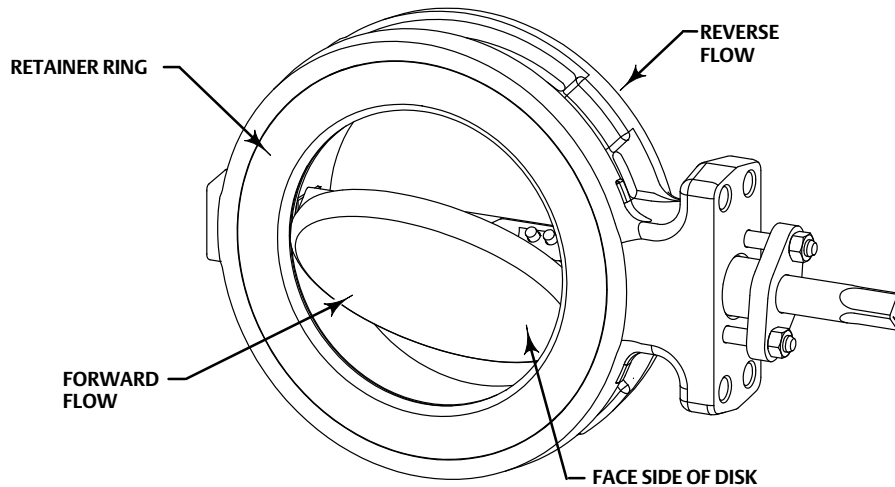


Table 5. Stud Bolt Data, NPS<sup>(1)</sup>

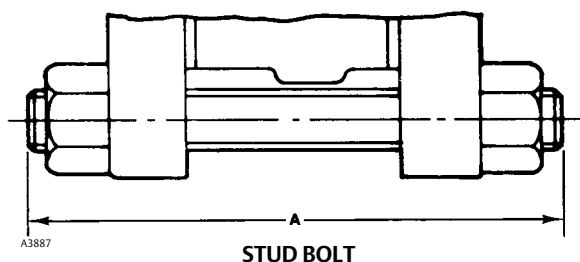
VALVE SIZE, NPS	WAFER STYLE					
	CL150			CL300		
	No. of Stud Bolts	Size Dia Inch & Thread	A Dimension, Inch	No. of Stud Bolts	Size Dia Inch & Thread	A Dimension, Inch
3	4	5/8-11	5.75	8	3/4-10	6.5
4	8	5/8-11	6	8	3/4-10	7
6	8	3/4-10	6.5	12	3/4-10	7.5
8	8	3/4-10	7	12	7/8-9	9
10	12	7/8-9	8	16	1-8	10
12	12	7/8-9	8.5	16	1-1/8-8	11

1. Thread engagement in accordance with ASME B31.3.

Table 6. Stud Bolt Data, DN

VALVE SIZE, DN	WAFER STYLE											
	PN10			PN16			PN25			PN40		
	No. of Stud Bolts	Size Dia Inch & Thread	A Dim, mm	No. of Stud Bolts	Size Dia Inch & Thread	A Dim, mm	No. of Stud Bolts	Size Dia Inch & Thread	A Dim, mm	No. of Stud Bolts	Size Dia Inch & Thread	A Dim, mm
80	8	M16 X 2	140	8	M16 X 2	140	8	M16 X 2	150	8	M16 X 2	150
100	8	M16 X 2	150	8	M16 X 2	150	8	M20 X 2.5	160	8	M20 X 2.5	160
150	8	M20 X 2.5	160	8	M20 X 2.5	160	8	M24 X 3	180	8	M24 X 3	180
200	8	M20 X 2.5	170	12	M20 X 2.5	170	12	M24 X 3	190	12	M24 X 3	210
250	12	M20 X 2.5	180	12	M24 X 3	190	12	M24 X 3	210	12	M30 X 3.5	230
300	12	M20 X 2.5	190	12	M24 X 3	200	16	M24 X 3	230	16	M30 X 3.5	250

Figure 4. Stud Bolts for Installation (also see table 5)



## Installing the Valve in the Pipeline

### ⚠ WARNING

The edges of a rotating disk have a shearing effect that may result in personal injury. To help prevent such injury, stay clear of the disk edges when rotating the disk (key 3, figure 12).

### CAUTION

Damage to the disk will occur if any pipe flanges or piping connected to the valve interfere with the disk rotation path. If the piping flange has a smaller inner diameter than what is specified for schedule 80 piping, measure carefully to be certain the disk rotates without interference before putting the valve into operation.

### CAUTION

Damage to the disk (key 3) sealing surfaces may occur if the disk is not closed when the valve is being installed or removed from the pipeline. If necessary, use a temporary pressure source on the actuator to retain the disk in the closed position while installing or removing the valve from the pipeline.

1. For Fail-Open Actuators: It will be necessary to provide a temporary loading pressure to the actuator diaphragm to move the valve disk to the closed position. Observe the above **Warning** when closing the valve. If a loading pressure is required, use caution when working with the valve. If the loading pressure is disconnected, the disk will open rapidly.
2. With the disk in the closed position, install line flange gaskets, and install the valve between the pipeline flanges.

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**Note**

The wafer style valves use the standard size spiral wound gaskets.

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Select the appropriate gaskets for the application. Gasket types made to ASME 16.5 group or a user's standards can be used for 8540 valves depending on the service conditions and applications.

3. Install the flange studs:

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**Note**

Lubricate line flange studs or bolts before inserting them into flanges. If necessary, provide additional support for the control valve assembly because of its combined weight.

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- **Flange studs:** Install two or more line flange studs into the line flanges to help hold the valve in position while centering the valve. Carefully center the valve on the flanges to ensure disk clearance.
  - Select and install two pipe line gaskets.
4. Install the remaining line flange bolting to secure the valve in the pipeline. Tighten the nuts to the line flange studs in a crisscross pattern to ensure proper alignment of valve, gaskets, and flanges.

## Packing Adjustment and Shaft Bonding

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

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### **CAUTION**

**Use caution when tightening packing follower nuts because over-tightening the nuts will accelerate wear and could produce higher rotating friction loads on the valve stem.**

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- **PTFE packing:** tighten standard packing follower nuts only enough to prevent shaft leakage. Excessive tightening of packing will accelerate wear and could produce higher rotating friction loads on the valve stem. If necessary, refer to the Packing Maintenance section.

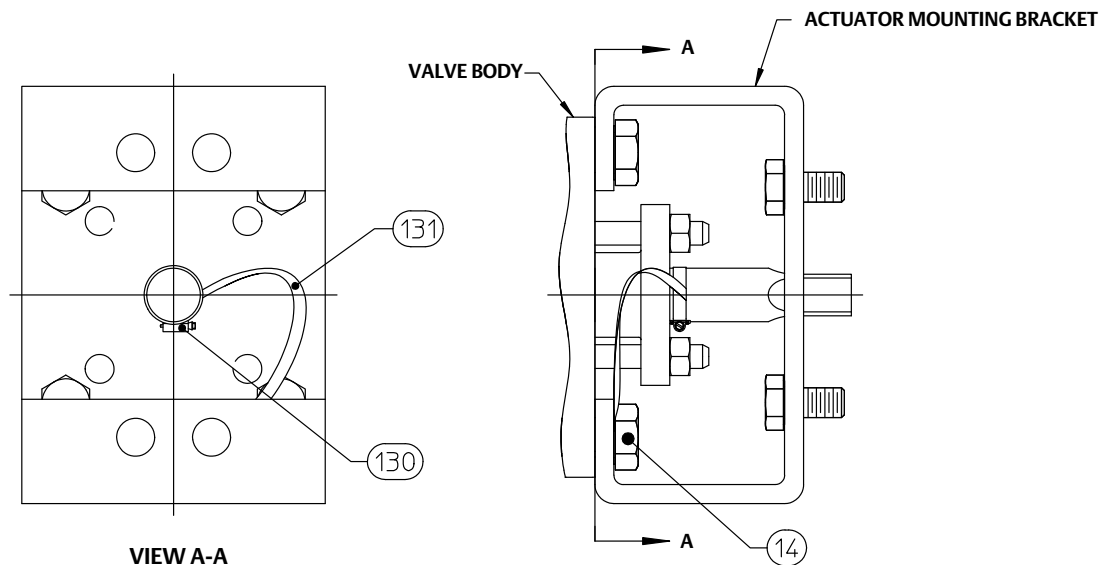
**⚠ WARNING**

The valve drive shaft is not necessarily grounded to the pipeline when installed. Personal injury or property damage could result from an explosion caused by a discharge of static electricity from the valve components if the process fluid or the atmosphere around the valve is flammable. To avoid personal injury or property damage, make sure the valve is grounded to the pipeline before placing the valve assembly into service.

Standard PTFE packing is composed of a partially conductive carbon-filled PTFE female adaptor with PTFE V-ring packing. Alternate shaft-to-valve body bonding is available for hazardous service areas where the standard packing is not sufficient to bond the shaft to the valve (see the following step).

1. Attach the bonding strap assembly (key 131, figure 5) to the shaft with the clamp (key 130, figure 5), and connect the other end of the bonding strap assembly to the valve with the cap screw (key 14, figure 5).
2. For more information, refer to the Packing Maintenance subsection below.

Figure 5. Optional Shaft-to-Valve Body Bonding Strap Assembly



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## Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions. Instructions are given in this section for replacing packing, seal ring, disk, shaft, bearings, and other valve parts. Also, instructions are provided for changing valve action, mounting, and adjusting the actuator. Refer to the actuator instruction manual for additional information for mounting and adjusting the actuator.



**⚠ WARNING**

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. 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.
- It is possible to damage the valve if the actuator travel stops are not properly adjusted before stroking the valve.

**CAUTION**

During any of the following steps, do not rotate the disk past 90 degrees in the open direction. Rotating the disk past 90 degrees can damage the seal ring.

## Packing Maintenance

PTFE-filled packing has a partially conductive packing ring (such as a carbon-filled PTFE female adaptor) to electrically bond the shaft to the valve body.

When replacing the packing, it is recommended to remove the control valve assembly from the pipeline because valve/actuator adjustments must be made with the valve out of the pipeline.

### Disassembly

Key numbers and part locations are shown in figure 12 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 shutoff all pressure lines to the power actuator, release all pressure from the actuator. Use lock-out procedures to be sure the above measures stay in effect while you work on the equipment.
2. Note the position of the mark on the end of the valve shaft, and its relationship to the actuator shaft.
3. Remove the actuator per instructions in separate actuator instruction manuals, then remove the cap screws (key 14, figure 5). Remove the clamp if the strap is used.
4. Remove the packing nuts (key 101) and packing follower (key 114). For NPS12 CL300 and DN300 PN25 and PN40, remove the packing flange and follower (key 102 and 114).
5. Remove the old packing rings, using a formed hook.

**CAUTION**

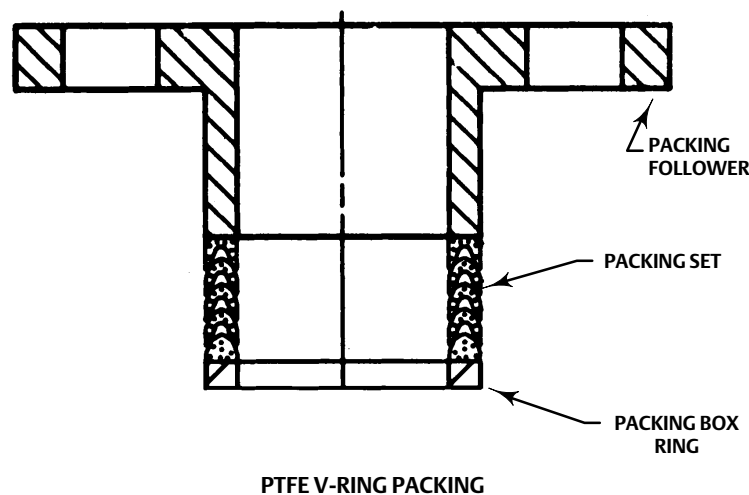
Carefully use the hook. Avoid damaging the drive shaft or packing box wall. Scratches on valve surfaces can cause leakage. (Note: The packing box ring (key 107) can remain in place when replacing packing only.)

- Clean all accessible metal parts and surfaces to remove particles that would prevent the packing from sealing.

**Assembly**

Inspect the shaft: If it is damaged, it cannot make a good seal with the packing, and it must be replaced. 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. Inspect the packing box wall for nicks and scratches when performing the following procedures.

Figure 6. Typical Packing Arrangement



C0785\*A

PTFE V-RING PACKING

- Install the new packing parts (see figure 6). Install the packing follower and finger tighten the packing flange nuts onto the studs only enough to stop leakage.
- If the valve was equipped with a bonding strap assembly (figure 5), re-install the assembly.
- Refer to the Actuator Mounting section of this manual. If necessary, refer to the separate actuator instruction manual for adjustment procedures.
- When the control valve is being placed into operation, check around the packing follower for leakage.

Leakage from the PTFE packing can often be stopped by tightening the packing flange nuts just enough to stop the leak.

**CAUTION**

Use caution when tightening the nuts. Overtightening the nuts can damage packing box parts and result in increased drive shaft friction.

## Seal Ring Maintenance

Perform this procedure if the control valve is not shutting-off properly (if it is leaking downstream). It is recommended, but not required, to remove the actuator for easier handling of the valve during the following procedures.

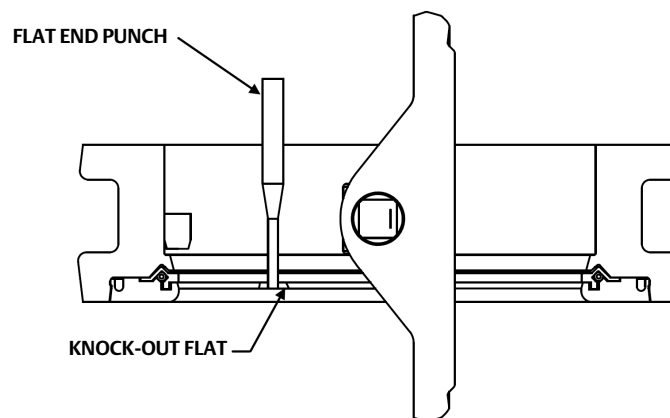
### ⚠ WARNING

The edges of a rotating disk close with a shearing effect that may result in personal injury. To help prevent such injury, stay clear of the disk edges when rotating the disk (key 3).

### CAUTION

During any of the following steps, do not rotate the disk past 90 degrees in the open direction. Rotating the disk past 90 degrees can damage the seal ring.

Figure 7. Retainer Ring Knock-Out Flat



Key numbers are shown in figure 12 unless otherwise noted.

## Disassembly

Most maintenance procedures will require the actuator to be removed.

1. Isolate the control valve from line pressure, and relieve pressure from the valve body. Shut off and disconnect all lines from the power actuator.
2. Be sure the disk is in the closed position before attempting to remove the valve from the pipeline or flanges.
  - For Fail-Open Actuators: It will be necessary to provide a temporary loading pressure to the actuator diaphragm to move the valve disk to the closed position. Observe the above Warning when closing the valve. If a loading pressure is required, use caution when working with the valve. If the loading pressure is disconnected, the disk will open rapidly.
3. With the disk in the closed position, remove line bolting, then remove the control valve assembly from the pipeline.
4. Remove the actuator as described in the Packing Maintenance section.
5. Remove the retainer ring (key 2, figure 8):

- Place the valve on blocks with the seal retainer facing down. (Note: Position blocks so they do not restrict the retainer ring removal.)
- Rotate the disk to the open position as shown in figure 7.
- Locate one of the knock-out points machined on the retainer ring. Using a hammer and flat end punch the knock-out point, pop out the retainer ring from the valve body.

## CAUTION

**When popping out the retainer ring, be very careful to hit only the knock-out points. Hitting anywhere else can cause non-repairable damage to the t-slot area.**

- Clean all sealing surfaces and parts before re-assembly.
6. Remove the seal ring from the valve body seal ring slot. Remove the spring from the PTFE seal ring (key 5) as it may be necessary to re-install the spring into the new PTFE seal ring.
  7. If it is necessary to replace the disk, drive shaft, and the bearings, refer to that section below before proceeding with the assembly procedures for the seal ring and retainer. The seal ring could be damaged if it is in place while removing the disk.

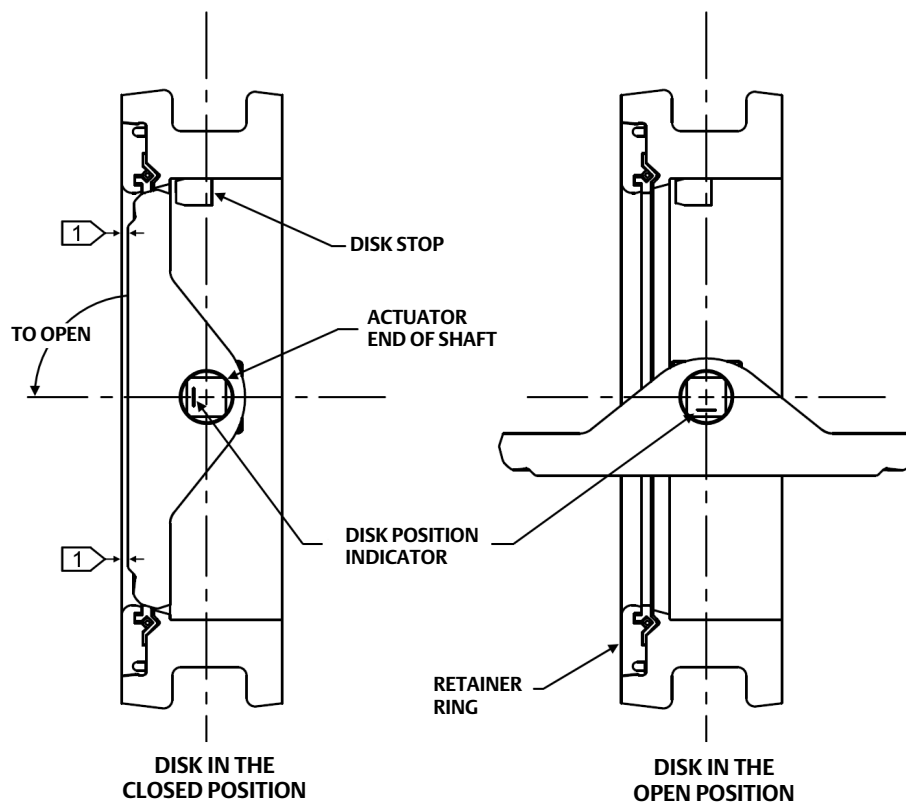
## Assembly

Place the valve on blocks with the seal retainer facing up. If the replacement disk, shaft, and bearings have not been installed in the valve body, go to the proper assembly procedures to install them.

## CAUTION

**Do not install the seal ring without the disk being in place. The seal ring could be damaged while installing the disk.**

Figure 8. Disk Rotation Indication



NOTE:

1 SET ACTUATOR TRAVEL STOPS TO OBTAIN AN EQUAL DISTANCE TO DISK SURFACE AS SHOWN.

**CAUTION**

Do not rotate the disk past 90 degrees in the open direction. Rotating the disk past 90 degrees can damage the seal ring or other component parts.

**Note**

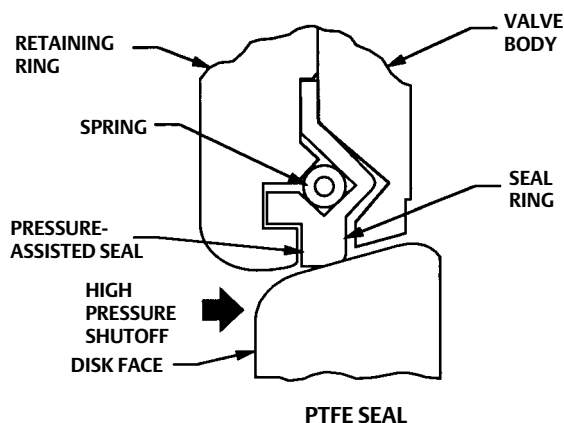
PTFE, NOVEX, and Phoenix III seal rings used in other valve types are not interchangeable with seal rings used in the 8540 valve. The 8540 seal rings are not interchangeable with seal rings in any other valve type. To order seal rings for this valve, provide the serial number on the valve.

1. Installing PTFE seal rings:

- a. The valve disk should be closed while installing the seal ring. If not, rotate the disk to the closed position as shown in figure 8.
- b. Hook the spring ends together, insert the spring (see figure 9) into the groove in the seal ring, and work the spring into the recess in the PTFE seal ring.

- c. Install the seal ring assembly into the slot in the valve body as shown in figure 9. Refer to Installing the retainer ring steps below.

Figure 9. Available Seal Configurations



2. Installing the retainer ring:

- a. Wipe excessive oil off the retainer ring outside diameter, and off the retainer counterbore in the valve body.
- b. Rotate the disk to the open position.
- c. Lay the retainer ring on the valve body.
- d. Use a press, or a soft-faced hammer to press the retainer ring into its groove in the valve body.

### CAUTION

**It takes a considerable amount of force with a hammer to drive the retainer ring into place. Be sure not to damage retainer ring surfaces when installing the ring.**

- e. The retainer ring is properly seated when the face of the retainer ring is flush with the face of the valve body.
- f. To ensure proper seal performance for metal seals, you may need to use the hammer to drive the disk open for the first few times. When closing the valve, use the C-clamps discussed in the next few steps.

### CAUTION

**Do not damage the gasket seating surfaces on either the valve body or the retainer ring when installing or removing the C-clamps. Protect the gasket surface by using a soft material between the clamp and valve body/retaining ring serrations to avoid damage.**

- g. Use three C-clamps to hold the retainer in place. Locate one of the C-clamps near the travel stop in the valve body, and the other two at 120 degrees from the stop.
- h. When cycling the disk for the first three times, use a dead-blow hammer with a soft head to drive the disk closed. Also, you may need to use the hammer to drive the disk open for the first few times.

3. Turn the disk into and out of the seal ring several times, to help break in the seal and reduce actuator torque requirements during adjustment.
4. If replacing the packing, remove all packing parts from the valve body. Upon re-assembly of the valve, refer to the Packing Maintenance procedures to replace the packing.

## Disk, Drive Shaft, and Bearing Maintenance

This procedure is to be performed when replacing the valve disk, drive shaft, taper pins, hollow pins, and bearings due to wear or damage to one or more component parts.

Key numbers are shown in figure 12 unless otherwise noted.

### Disassembly

1. Isolate control valve from line pressure, relieve pressure and drain process fluid, then remove control valve assembly from the pipeline as described in Seal Ring Maintenance section.
2. Loosen the packing flange nuts (key 101). This allows the drive shaft (key 8) to turn without the friction caused by the packing.
3. Remove the actuator using the steps provided in the Packing Maintenance section and separate actuator instruction manuals, and remove the seal ring using the steps provided in the seal ring maintenance procedures above.
4. Place the valve on a flat working surface with the seal ring slot facing down.
5. Use blocks to raise the valve body high enough to allow the disk to be rotated to the fully open position (see figure 8).
6. Rotate the disk (key 3) to the fully open position.
7. Locate the small ends of the taper pins. Drive the two taper pins (key 10) out towards the larger end of the pins. (Note: Attempting to drive the taper pins in the opposite direction only tightens the pins.) Also, remove the hollow pins (key 9) from the disk/shaft connection using the tool shown in figure 11.

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#### Note

Make the tools for removal and installation of the hollow pin shown in figure 11.

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8. Unscrew and remove the packing flange nuts (key 101), and the packing flange (key 102).

### **⚠ WARNING**

**Once the shaft has been removed in the following step, the disk may fall out of the valve body cavity. To avoid personal injury and property damage, support the disk to prevent it from falling as the shaft is being removed.**

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9. Pull the shaft out of the valve body, and remove the disk (key 3) from the valve body bore.
10. If the packing is to be replaced, remove all the packing parts from the valve body. Upon re-assembly of the valve, refer to the Packing Maintenance procedures to replace the packing parts.
11. Remove both of the bearings (key 6) from the valve body.
12. Clean all the sealing surfaces and parts, and inspect and/or obtain replacements before assembly.

## Assembly

1. Install the bearings (key 6):

When installing the bearings in the opposite side of the valve body bore, repeat the following procedures.

- Position the bearing edge to match the valve body bore, and insert the one piece bearing/disk spacer into the bearing bore with the bearing tab facing away from the disk stop as shown in figure 10.

## CAUTION

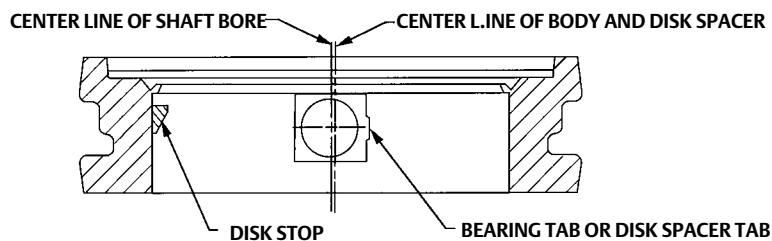
To avoid product damage, protect the disk sealing surfaces while inserting the disk into the valve body bore.

2. Position the disk to be certain that the holes in the disk are towards the actuator side of the valve. Carefully insert the disk into the valve body bore while protecting the disk sealing surfaces. Install the shaft (key 8):
3. Slide the shaft through the valve body bore and bearing. Position the disk as stated above and slide the shaft through the disk and outer bearing. Refer to step 4 below.

## Installing the hollow pin and taper pin

4. Place the valve body on a flat working surface with the slot for the seal ring facing up. Block the valve body high enough to allow the disk to be rotated into the open position as shown in figure 11.

Figure 10. Orientation of Bearing/Spacer Tab



A6357-1

5. Rotate the disk to the open position. On the end of the drive shaft, locate the disk position mark on the end of the drive shaft. Rotate the shaft until it is in the appropriate disk position as shown in figure 11.

## Note

Make sure the taper and hollow pins are free of particulate matter before continuing.

6. Line-up both holes in the disk hub with the holes in the drive shaft (key 8). (Note: The hole in the drive shaft is offset to prevent the shaft from being installed in the wrong position. Be sure the hole in the shaft is lined up with the hole in the disk hub.)
7. Insert the hollow pins (key 9), into the disk hub as shown in figure 11.  
Using the tool shown in figure 11, tap the hollow pin down into the disk hub and shaft until the hollow pin bottoms on the stop in the disk.
8. Insert the taper pins (key 10) into the hollow pins. Using a flat end punch, drive the taper pins into the hollow pins until solid contact is felt. Anchor the pins in place by staking them with a center-punch and hammer. The disk and shaft should rotate smoothly.



9. Install the seal ring assembly using the appropriate instructions in the Seal Ring Maintenance procedures.
10. Install the packing parts using the appropriate instructions provided in the Packing Maintenance procedures. Refer to the Actuator Mounting procedures before installing the valve in the pipeline.

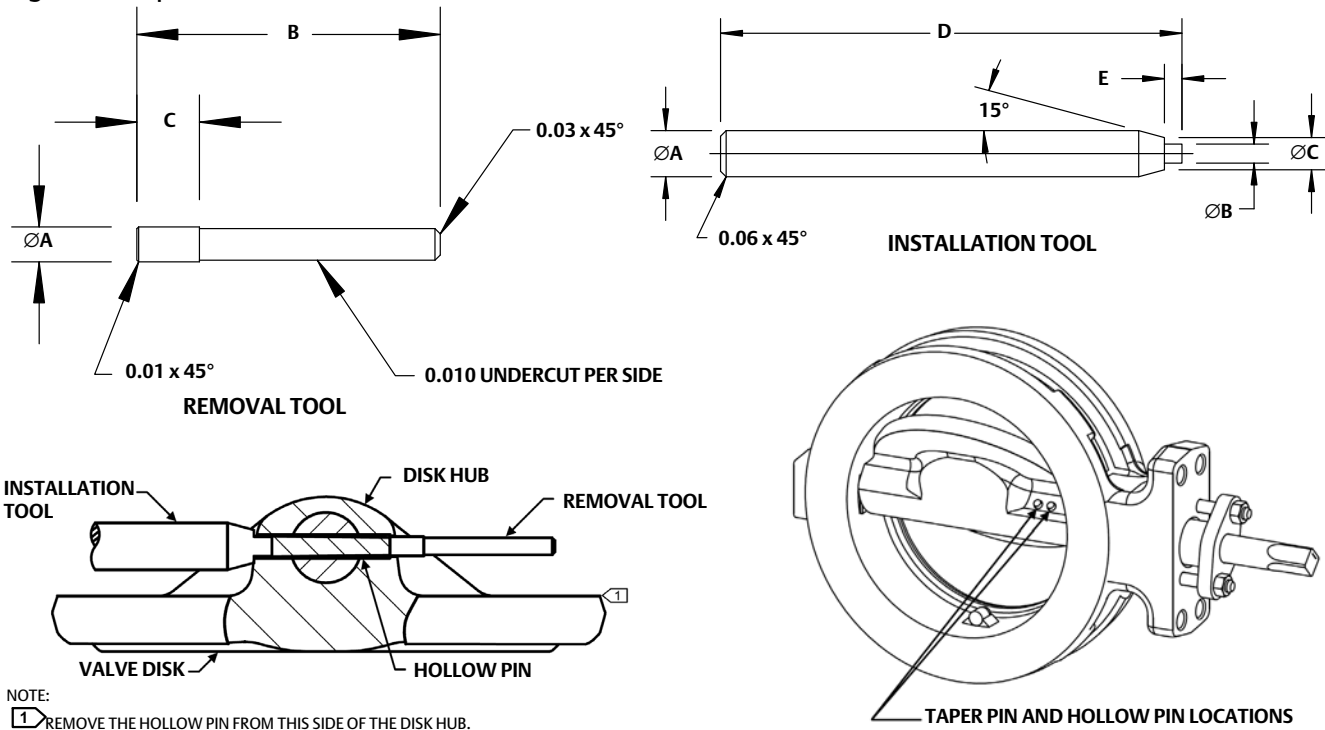
Table 7. Removal Tool Dimensions

SHAFT DIAMETER	ØA	B	C	ØD
<b>mm</b>				
12.7	3.91	28.43	6.35	4.19
15.88	4.60	38.10	7.87	23.37
19.05	5.13	44.45	9.65	5.41
25.4	7.00	59.44	12.70	7.26
31.75	9.50	76.20	19.05	9.78
38.1	10.82	88.90	19.05	11.10
44.45	12.37	114.30	22.35	12.65
<b>Inch</b>				
1/2	0.154	1.12	0.25	0.165
5/8	0.181	1.50	0.31	0.192
3/4	0.202	1.75	0.36	0.213
1	0.275	2.34	0.50	0.286
1-1/4	0.374	3.00	0.75	0.385
1-1/2	0.426	3.50	0.75	0.437
1-3/4	0.487	4.50	0.88	0.498

Table 8. Installation Tool Dimensions

SHAFT DIAMETER	ØA	ØB	ØC	D	E
<b>mm</b>					
12.7	12.7	3.68	6.35	127.0	4.83
15.88	12.7	4.57	7.62	127.0	4.83
19.05	12.7	5.23	8.89	127.0	4.83
25.4	12.7	7.00	10.41	127.0	4.83
31.75	19.05	10.00	13.59	146.0	6.35
38.1	19.05	11.56	15.24	146.0	6.35
44.45	19.05	31.21	16.76	146.0	6.35
<b>Inch</b>					
1/2	0.50	0.145	0.250	5.00	0.19
5/8	0.50	0.180	0.300	5.00	0.19
3/4	0.50	0.206	0.350	5.00	0.19
1	0.50	0.275	0.410	5.00	0.19
1-1/4	0.75	0.395	0.535	5.75	0.25
1-1/2	0.75	0.455	0.600	5.75	0.25
1-3/4	0.75	0.520	0.660	5.75	0.25

Figure 11. Taper Pin and Hollow Pin Removal and Installation



## Actuator Mounting

Re-install the seal ring and packing rings using the appropriate procedures before installing the actuator on the valve. Mount the actuator on the valve body in accordance with the instructions in the actuator instruction manual and this section.

In the Packing Maintenance steps, you should have noted the position of the mark on the end of the valve shaft, and its relationship to the actuator shaft. If not, determine the configuration needed to match your application.

Be certain that the disk is rotating counterclockwise to open when viewed from the actuator side of the valve, and that the disk is not rotated beyond its limits.

1. Orientate the valve drive shaft correctly to match the actuator or handlever position, and install it into the actuator and actuator lever arm until the mounting pads mate with each other.
2. Tighten the actuator-mounting cap screws to the appropriate bolt torque from table 9.

### CAUTION

The valve disk stop, in the valve body bore is **not** to be used as a power actuator travel stop (see figure 10). Use the actuator travel stops to limit the rotation of the valve disk. It is possible to damage the valve component parts if full actuator thrust is applied to the valve disk stop.

For actuators with an adjustable travel stop, the travel stop must be adjusted so that the valve is closed (determined by measuring as shown in figure 7) when the diaphragm or piston is against the actuator at the travel stop.

For manually operated actuators or actuators without adjustable linkage, make certain that the travel of the actuator stops before the disk rotates past the closed position.

Table 9. Recommended Bolt Torques for Actuator/Mounting Cap Screws and Nuts

VALVE SIZE, NPS	VALVE SIZE, DN	RECOMMENDED BOLT TORQUE	
		N•m	lb•ft
		CL150 / PN 10-16	
3, 4, 6, and 8	80, 100, 150, and 200	88	65
10 and 12	250 and 300	135	100
		CL300 / PN 25-40	
3, 4, and 6	80, 100, and 150	88	65
8 and 10	200 and 250	135	100
12	300	183	135

**Note**

To obtain proper shutoff, the closed position of the 8540 valves must be set with the disk parallel to the retaining ring. Do not use the disk stop to set the actuator travel stops.

3. Adjust the actuator travel stop to limit the open and closed positions of the valve disk. (If necessary, refer to the actuator instruction manual for more information about adjustments.) Do not use the disk stop as a actuator travel stop as discussed in the **Caution** above.
4. For actuators with adjustable turnbuckles, adjust the turnbuckle to bring the disk to the fully closed position at the end of the actuator stroke. If necessary, refer to the appropriate actuator instruction manual for assistance.
5. If using a manual handwheel or handlever actuator, refer to the appropriate actuator instruction manual for mounting positions and adjustments.
6. To determine the fully closed disk position (zero degrees of disk rotation), measure the distances between the positions on the disk face as shown in figure 8. Use the actuator to rotate the disk while re-checking the two measurements. Repeat adjustment until the two measurements are equal.

## Parts Ordering

When corresponding with your [Emerson sales office](#) about this equipment, always mention the valve serial number.

### **⚠ 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.**

## Parts List

### Note

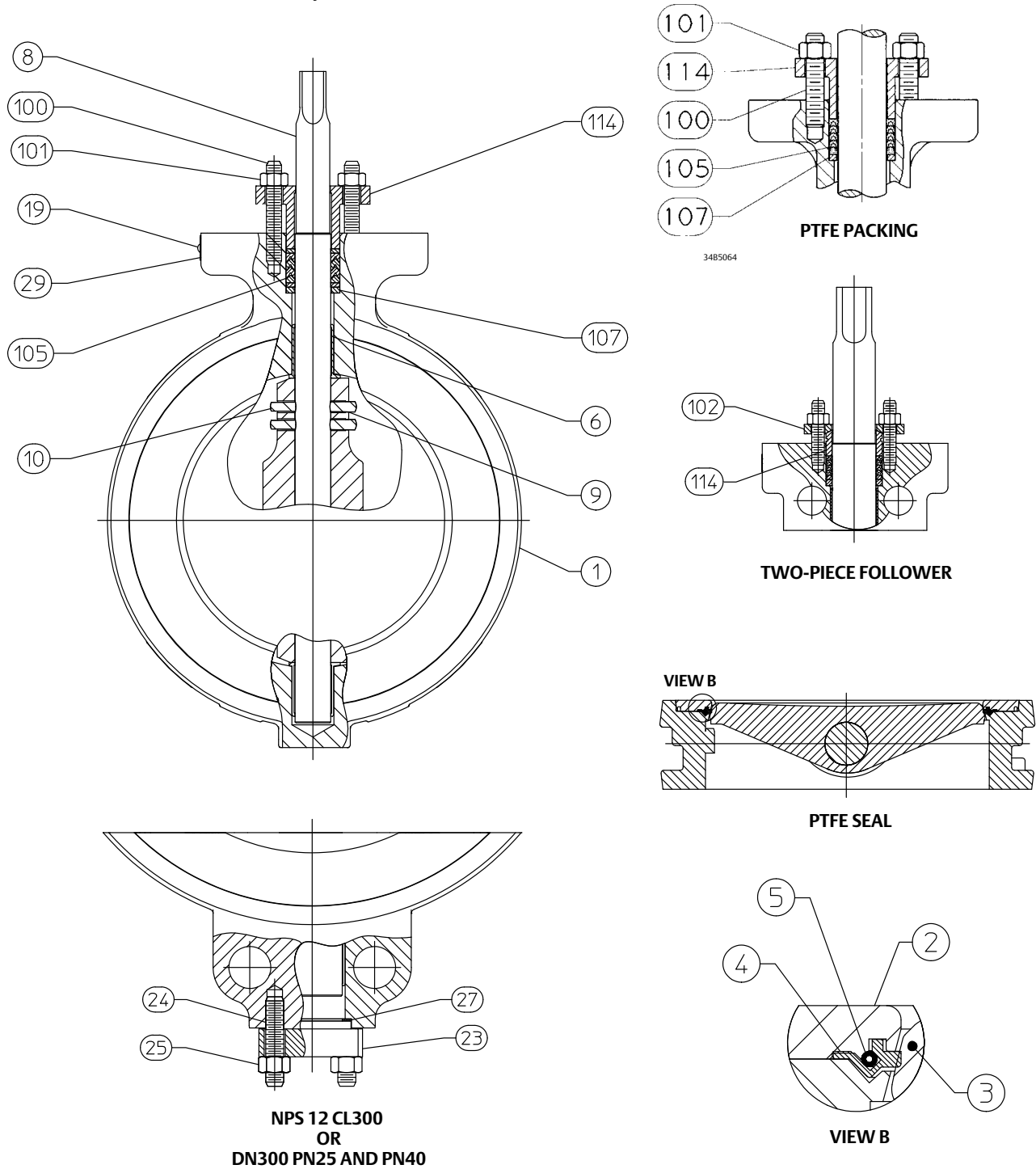
For part ordering information contact your [Emerson sales office](#).

### Key Description

1	Valve Body If you need a new valve body, order by valve size, serial number and desired material.
2*	Seal Retainer
3	Valve Disk
4*	Seal Ring
5*	Spring
6*	Bearing (2 req'd)
8*	Drive Shaft

9*	Hollow Pin
10*	Taper Pin
18	Mfg Label
19	Drive Screw, w/ nameplate
21	Nameplate
22	Lead Seal & Wire (not shown)
23	Bottom Cap, 12-inch only
24	Bottom Cap Stud, 12-inch only
25	Bottom Cap Hex Nut, 12-inch only
27	Bottom Cap Gasket, 12-inch only
29	Flow Arrow
100	Packing Stud (2 req'd)
101	Packing Nut (2 req'd)
102	Packing Flange
105*	Packing Set
107	Packing Box Ring
108*	Packing Ring (4 req'd)
111	Tag
114	Packing Follower
115*	Packing Washer (3 req'd)

**Figure 12. Fisher 8540 Valve Assembly**



**NOTE:**  
KEYS 21, 22, 28, AND 115 ARE NOT SHOWN.  
GH13521





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