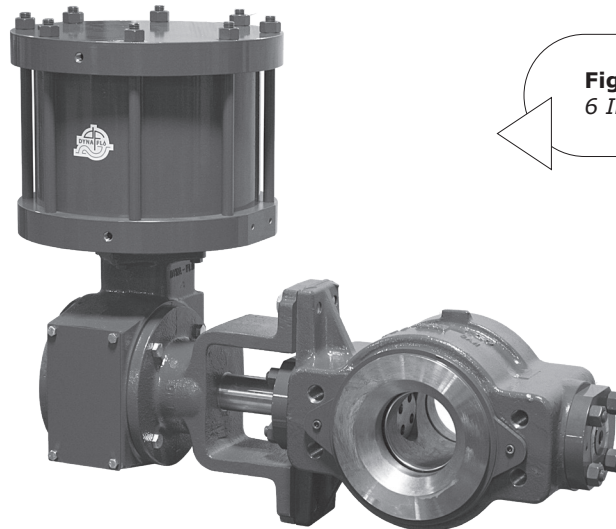


# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 1**  
6 Inch 590 with DFRP-112

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### NOTICE

These instructions are meant to be used with the Dyna-Flo 590 Technical Bulletin as they refer to Figures and Tables therein. If you do not have the Technical Bulletin, contact Dyna-Flo immediately, or visit [www.dynaflo.com](http://www.dynaflo.com)

Each control valve is factory checked. Check the calibration for the specific application, before a valve is put into service.

It is the intention of this document to provide users with an accurate guide for safe installation and maintenance of the 590 Control Valve. Revisions and updates are available at above mentioned website.

### GENERAL

**The following instructions are to be thoroughly reviewed and understood prior to installing, operating or performing maintenance on this equipment. Work on this equipment should be performed by experienced personnel. Throughout the manual, safety and caution notes appear and must be strictly followed, to prevent serious injury or equipment malfunction.**

### SCOPE

The control valve configuration and construction materials were selected to meet particular pressure, temperature, and process conditions. Some material combinations are limited in their pressure and temperature ranges. Do not apply any other conditions to the valve without first contacting your Dyna-Flo sales office.

This manual is written to be a practical and useful guide maintaining the Dyna-Flo 590 Control Valve.

### SAFETY CAUTION

**Only well trained experienced technicians should perform these procedures. Use safe work practices and lock out procedures when isolating valves and actuators. It is also important to wear the proper protective equipment when performing any installation or maintenance activity. Use only parts and materials rated for the process being used, operating conditions, and environmental conditions products will be used in.**

**To avoid personal injury or installation damage as a result of the sudden release of process pressure or damage to equipment, do not install the valve assembly where service conditions could exceed the limits stated in this manual, sales bulletin or on the equipment nameplates. Use government codes, accepted industry standards and good piping practices, and select proper pressure-relieving equipment for protection of your installation. Always be aware of flammable process and instrument gas.**

**Always be aware of the hazards of actuators, especially spring-loaded actuators. Be sure that the actuator is de-energized or in the failed position before performing any maintenance procedure.**

**These valves have dangerous pinch points. Never put your hands inside the valve unless you are certain that the ball cannot rotate.**

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



### SPECIFICATIONS

#### Available Valve Configurations

The 4", 6", 8", 10", 12", and 16" flangeless valves will mate ASME Class 600 and 900. Refer to Table 1 of the Sales Bulletin.

Rotary ball valve assembly available with:

- Single Ball Seal
- Dual Ball Seal
- Flow Ring

#### Maximum Inlet Pressure

4 through 12 inch valve body consistent with Class 600 and 900 ASME B16.34.

16 inch valve body consistent with Class 600 ASME B16.34.

#### Maximum Allowable Shutoff Pressure Drop

**Single Seal and Dual Seal:** Refer to Figure 10 of the Sales Bulletin.

**Flow Ring:** Limited by the pressure/temperature rating of the valve body.

#### Material Temperature Capabilities

##### Single Seal and Dual Seal:

- 50°F to 180°F (-46°C to 82°C) LCC Body.
- 20°F to 180°F (-29°C to 82°C) WCC\* Body.
- 50°F to 180°F (-46°C to 82°C) CF8M Body.

##### Flow Ring with Fluorocarbon O-Rings:

- 50°F to 400°F (-46°C to 204°C) LCC Body.
- 20°F to 400°F (-29°C to 204°C) WCC\* Body.
- 50°F to 400°F (-46°C to 204°C) CF8M Body.

\*NOTE: WCC body material is special order.

#### Construction Materials

See Parts section of manual for material listings. Contact your Dyna-Flo sales office for more information and other options.

#### Flow Direction (Refer to Figures 50, 51 & 52)

**Single Seal Configuration:** Forward flow only.

**Dual Seal Configuration:** Required for bidirectional flow shutoff.

**Flow Ring Configuration:** Forward or reverse flow.

#### Actuator Mounting

Right-hand, or Left-hand (as viewed from seal end of valve). In one of 4 positions (12 (Std.), 3, 6, and 9 o'clock) with respect to the valve body in a horizontal pipe.

#### Maximum Ball Rotation

90 degrees.

#### Shutoff Classification

**Single Seal and Dual Seal:** 0.0001% of maximum valve capacity (less than 1% of Class IV, ANSI/FCI 70-2 and IEC 60534-4).

**Flow Ring:** 1% of maximum valve capacity

#### Flow Characteristic

Modified Equal Percentage

#### Valve Dimensions

Refer to Figure 4 for valve diagram.

Refer to Table 5 for valve dimensions.

#### Approximate Valve Weight

Refer to Table 2.

#### Valve Sizing Coefficients

Refer to Table 9 of the Sales Bulletin.

For more information and other options contact your Dyna-Flo sales office.

Model 590 Available Valve Size and ASME Rating		
Valve Size Inch	ASME Rating	
4	600	900
6	600	900
8	600	900
10	600	900
12	600	900
16	600	



# Model 590 Control Valve

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### UNPACKING VALVE FROM SHIPPING CONTAINER

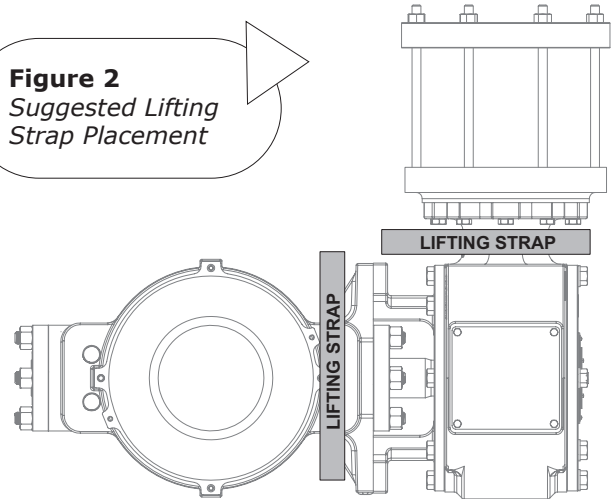
#### Special Tools Required:

- Properly Rated Lifting Straps (2 – 4 Straps). Refer to Table 2 for valve weights.
- Lifting Device (Example: Crane)

Check the packing list, verify that the list includes all the materials in the shipping container before unpacking.

Place the lifting straps around the neck of the actuator and valve body (Refer to Figure 2). Straps should be placed to avoid damage to tubing and other mounted accessories.

**Figure 2**  
*Suggested Lifting Strap Placement*



### INSTALLATION

#### Before You Begin:

- Read the General and Scope section of this manual (Page 2).
- Read Safety Caution (Page 2).
- Place the valve into the OPEN position, this helps to prevent damage to the valve ball (Key 2) during installation.
- Sudden movement of actuator can cause damage or injury. It helps to have the actuator de-energized as long as the valve remains in the OPEN position.
- Use safe work practices and lock out procedures before placing valve in-line.

#### Parts Required:

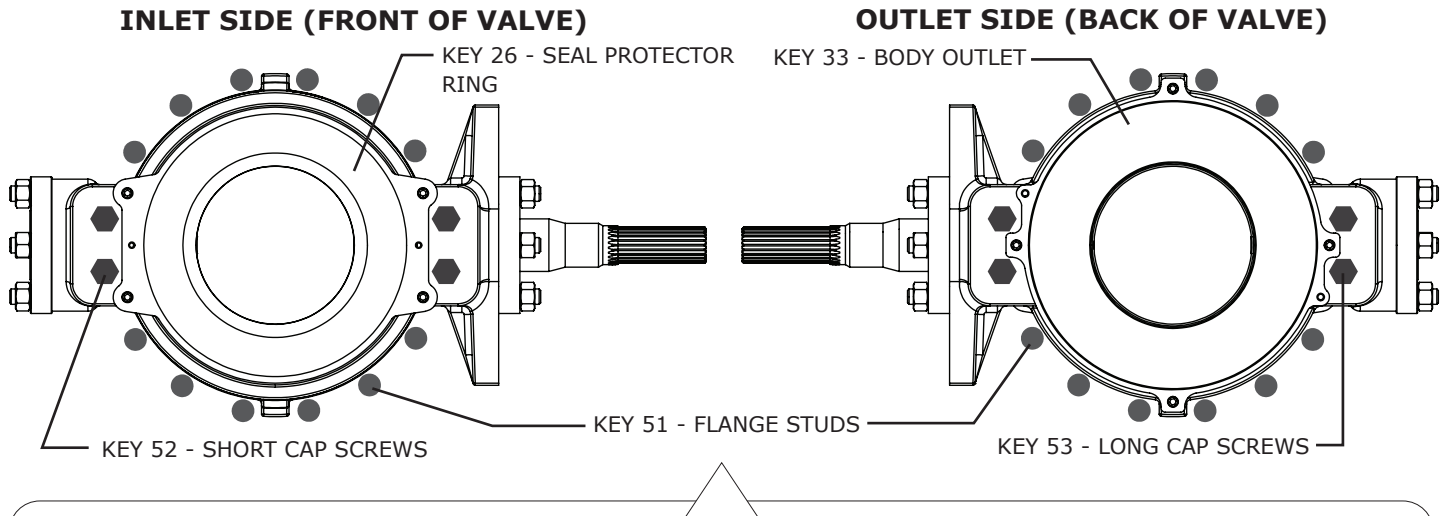
- Flange Studs (Key 51) **NOTE:** Flange Studs will need to span the distance from one line flange, across the valve body, and through the other line flange. (Refer to Tables 3 & 4 for stud lengths & Figure 3 for stud placement)
- Long Cap Screws (Key 53) **NOTE:** Long Cap Screws pass through the line flanges and thread directly into the valve body. Long Cap Screws will be required for the outlet side of the valve for single seal valve configurations. (Refer to Tables 3 & 4 for cap screw length and Figure 3 for cap screw placement)
- Short Cap Screws (Key 52) **NOTE:** Short Cap Screws pass through the line flanges and thread directly into the valve body. (Refer to Tables 3 & 4 for cap screw length and Figure 3 for cap screw placement)
- Appropriate Line Flange Gaskets.

#### Installation Steps:

- 1 Clean dirt, welding chips, scale, or other foreign material from the line and flange surfaces.
- 2 Valve may be installed in any orientation, although to reduce stress and wear on valve assembly it is recommended that valve be installed with the valve shaft (Key 17) horizontal to the ground.
- 3 **For Single Seal Construction**  
Center the valve in-line as indicated by flow arrow (Refer to Figures 37 & 38), standard flow direction has the seal protector ring (Key 26) facing up stream.  
**For Dual Seal Construction**  
Center the valve in-line so the flow direction with the highest pressure matches the direction of the flow arrow (Refer to Figures 36, 37, 38).
- 4 Install the line flange gaskets.
- 5 Apply anti-seize compound (Key A) to the threads of the flange studs (Key 51) and cap screws (Keys 52 & 53).
- 6 Tighten the flange studs and cap screws in even increments in a crisscross pattern until the correct line bolt torque specification is reached.

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 3** Line Bolt Placement Example (10 Inch 590 Shown) Refer to Figure 4 for an alternative view

## INSTALLATION (Continued)

### AIR PIPING

#### WARNING:

Property damage, environmental harm, and personal injury can result from the use of supply gas other than clean, non-corrosive, oil and moisture free air. Do not exceed the supply pressure indicated on the serial plate located on the actuator.

#### Before You Begin:

**NOTE:** Standard actuators accept ¼" (6 mm) NPT connections.

- Refer to the appropriate actuator instruction manual when necessary.

#### Piping Installation Steps:

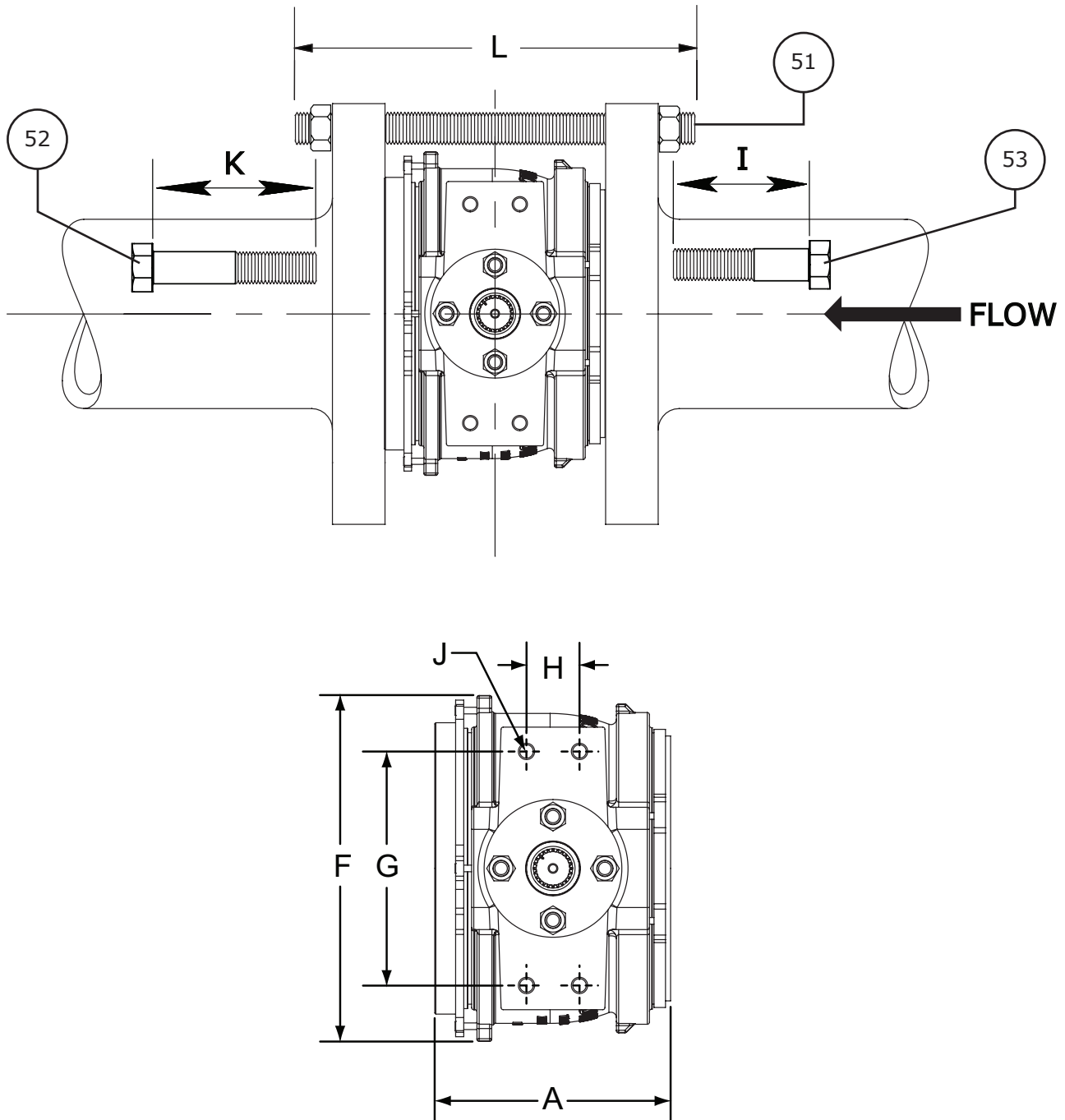
- 1 Use 3/8" (outside diameter) tubing (or equivalent) for air lines.
- 2 Install the required line vents, valves, drains, seals, and filters to the actuator.

Model 590 Approximate Valve Weight	
Valve Size Inch	lb (Kg)
4	160 (73)
6	290 (132)
8	490 (222)
10	760 (345)
12	950 (431)
16	1700 (771)



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 4** Valve Dimensions and Line Bolting

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Table 3**

**Model 590 Valve Dimensions - Flange Bolting - Class 600 Inch**

Valve Size	Dimensional Reference												TPI
	RF						RTJ						
	I	QTY.	K	QTY.	L	QTY.	I	QTY.	K	QTY.	L	QTY.	
4"	-	-	-	-	13.50	8	-	-	-	-	14.50	8	7/8 - 9
6"	4.63	4	4.63	4	16.25	8	4.88	4	4.88	4	16.25	8	1 - 8
8"	5.50	4	5.38	4	17.50	8	5.63	4	5.50	4	17.75	8	1-1/8 - 8
10"	6.25	4	6.38	4	20.75	12	6.50	4	6.50	4	20.75	12	1-1/4 - 8
12"	7.00	4	6.00	4	23.00	16	7.00	4	6.50	4	23.00	16	1-1/4 - 8
16"	7.75	4	7.75	4	26.00	16	8.00	4	8.00	4	26.50	16	1-1/2 - 8

**Table 4**

**Model 590 Valve Dimensions - Flange Bolting - Class 900 Inch**

Valve Size	Dimensional Reference												TPI
	RF						RTJ						
	I	QTY.	K	QTY.	L	QTY.	I	QTY.	K	QTY.	L	QTY.	
4"	4.88	4	4.88	4	14.75	4	4.88	4	5.13	4	14.75	4	1-1/8 - 8
6"	5.00	4	5.00	4	17.50	8	5.00	4	5.25	4	17.50	8	1-1/8 - 8
8"	6.00	4	5.88	4	19.00	8	6.00	4	6.13	4	19.00	8	1-3/8 - 8
10"	6.63	4	6.75	4	21.50	12	6.63	4	6.88	4	21.50	12	1-3/8 - 8
12"	7.25	4	6.63	4	24.00	16	7.25	4	7.50	4	24.00	16	1-3/8 - 8

**Table 5**

**Model 590 Valve Dimensions Continued Inch (mm)**

Valve Size	Dimensional Reference				
	A	F	G	H	J
4"	7.62 (194)	11.00 (279)	9.25 (235)	1.81 (46)	5/8 - UNC
6"	9.00 (229)	12.88 (327)	10.75 (273)	2.00 (51)	3/4 - UNC
8"	9.56 (243)	16.25 (413)	13.25 (337)	3.00 (76)	7/8 - UNC
10"	11.69 (297)	17.50 (445)	13.25 (337)	3.00 (76)	7/8 - UNC
12"	13.31 (338)	19.00 (483)	13.25 (337)	3.00 (76)	7/8 - UNC
16"	15.75 (400)	24.12 (613)	21.00 (533)	5.00 (127)	1-1/4 - 7UNC

ASME Class: 600 and 900

- Envelope Dimensions are + / - 0.25 in. (6.4 mm)
- Face to Face Tolerance Per ASME



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

### PERIODIC INSPECTION

#### Special Equipment Required:

- Bypass or block valves.

#### Before You Begin:

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Disconnect supply lines (air or gas), electric power, or control signal to the actuator. Sudden movement of actuator can cause damage or injury, make sure actuator will not operate.
- Vent any pneumatic actuator loading pressure and relieve any actuator spring preload if present.
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve. Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. For dual seal valves, relieve internal pressure by removing the pipe plug (Key 37). Refer to Figure 52 on Page 40.

#### Inspection Steps:

- 1 Check for visible signs of leakage around all seal and gasket areas.
- 2 Check the valve for damage, especially damage caused by corrosive fumes or process drippings.
- 3 Clean and repaint the areas as required.
- 4 Ensure all accessories, mounting brackets, and fasteners are secure.
- 5 Clean any dirt and foreign material from the valve shaft (Key 17).

### MAINTENANCE

**NOTE:** Shaft seals or live loaded packing and ball seals (Key 30) should all be inspected frequently for leaks, wear and damage. Maintenance to the shaft seals or live loaded packing can be made while the valve is still in-line, the actuator must be removed for drive shaft (Key 17) seal/packing maintenance (Refer to Page 32 for ACTUATOR REMOVAL instructions).

**NOTE:** Perform ball seal (Key 30) maintenance when the control valve will not properly shut off. Ball seal maintenance can be performed without removing the actuator from the valve. Ball seal maintenance cannot be performed with the valve in-line. When removing the valve from pipe line be sure it is in the OPEN position, verify the valve is open using the indicator scale (Key 24) before removing from line.

**NOTE:** When testing the seal integrity of the valve using the pipe plug port (dual seal configuration), it is recommended that the pipe plug (Key 37) be replaced by a hand valve. A hand valve will allow valve pressure to be relieved safely during seat leak rate testing. Refer to Figure 52 for pipe plug location.

#### Before You Begin:

- Read Safety Caution (Page 2).
- Determine if valve has shaft seals or live loaded packing (Refer to Figures 44 & 51).
- Determine if valve is single seal or dual seal (Refer to Figures 50 & 52).
- Follow Steps 2 – 5 of PERIODIC INSPECTION Before you begin.

#### LIVE LOADED PACKING MAINTENANCE

**NOTE:** If the packing is leaking, proper tightening of the packing may correct the leak. If re-tightening the packing to the proper specifications does not stop the leakage, it will be necessary to disassembly and remove the packing box parts in order to inspect, repair, and or replace parts. For instructions on packing removal only, refer to the DISASSEMBLY LIVE LOADED PACKING section on Page 15.

- 1 Refer to Figures 44 to 47 and check that the number and orientation of the spring washers (Key 43) are correct for the size of your valve.



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



### MAINTENANCE (Continued)

#### LIVE LOADED PACKING MAINTENANCE (Continued)

**NOTE:** Spring washers (Key 43) function correctly when their target load (85% of their maximum deflection/compression) is achieved.

- 2 Tighten the packing flange nuts (Key 38) evenly in an alternating pattern keeping the packing flange (Key 41) level until the spring washers (Key 43) are completely compressed (flat). Once completely compressed, loosen each packing flange nut a half turn (180 degrees), this will achieve the proper target load.

#### SHAFT SEAL MAINTENANCE

**NOTE:** It is recommended that the follower shaft seal and the drive shaft seal be replaced at the same time. The actuator must be removed for drive shaft seal maintenance.

#### Special Tools Required:

- Mechanics Pick Set

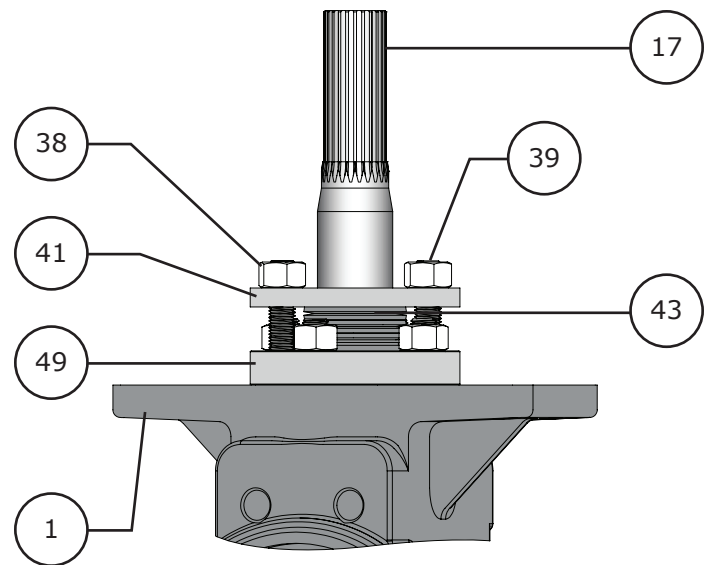
#### Lubricants Required:

- Permatex® Nickel Anti-Seize or equivalent (Key A)
- Dow Corning Molykote® 111 or equivalent (Key B)
- Lubriplate® No. 105 Grease or equivalent (Key C)

#### Follower Shaft Seal (Outboard Seal)

##### Disassembly (Refer to Figures 6 & 7)

- 1 Remove the outboard seal carrier nuts (Key 3).
- 2 Remove the outboard seal carrier (Key 6). **NOTE:** The seal carrier o-ring (Key 7) may stick to the seal carrier and get removed at the same time (Figure 6.1), remove the o-ring after.
- 3 Using a mechanics pick set, carefully remove the backup ring (Key 8) and seal ring (Key 9).
- 4 Inspect all parts for damage, including the follower shaft (Key 21), damaged shafts must be replaced or repaired to avoid leaks (Refer to Page 13 for DISASSEMBLY Instructions). Replace any damaged parts with new parts as necessary.



**Figure 5** Live Loaded Packing Diagram

#### Follower Shaft Seal (Outboard Seal)

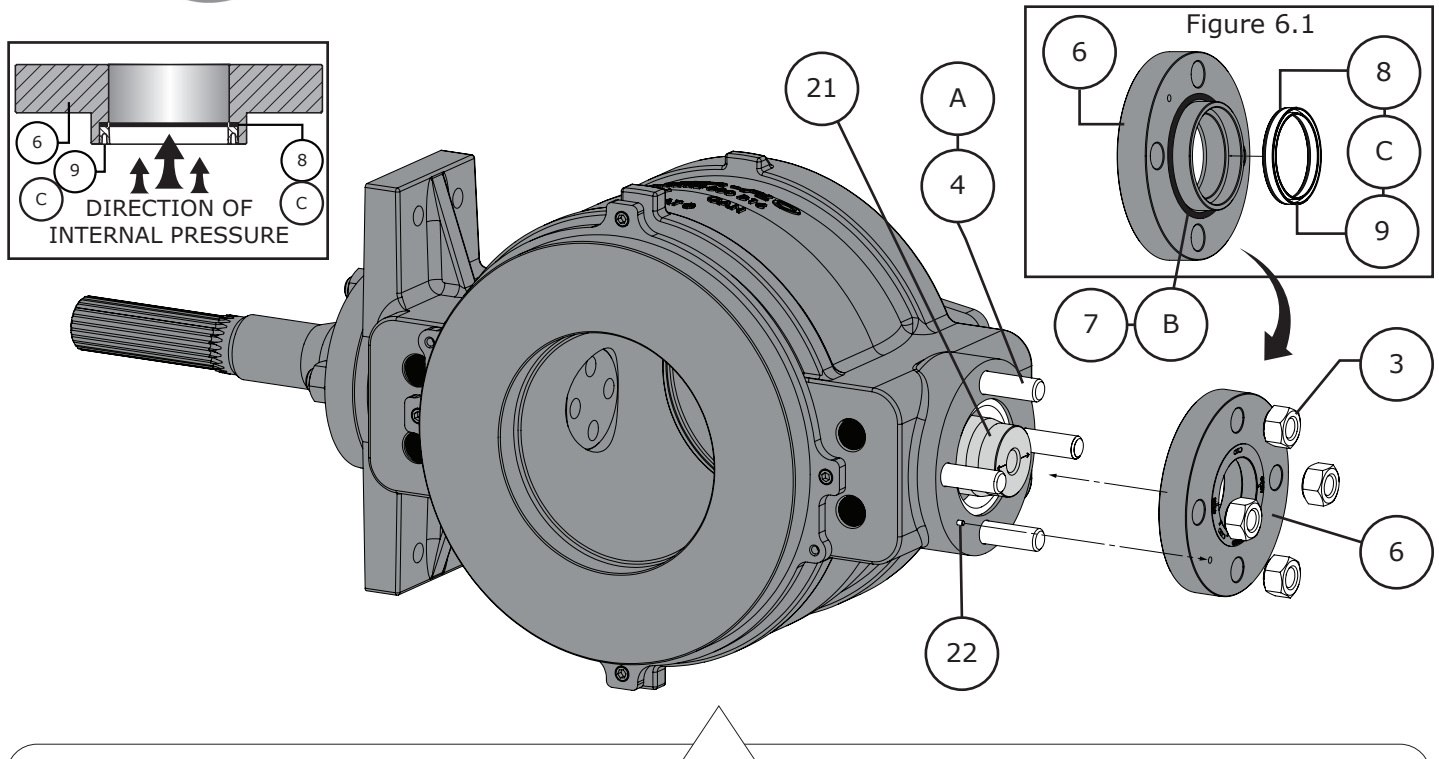
##### Reassembly (Refer to Figure 6)

- 1 Lubricate the backup ring (Key 8) with Lubriplate® No. 105 Grease (Key C) and install into the outboard seal carrier (Key 6).
- 2 Lubricate the seal ring (Key 9) with Lubriplate® No. 105 Grease (Key C) and install into the outboard seal carrier (Key 6).
- 3 Lubricate the seal carrier o-ring (Key 7) with Dow Corning Molykote® 111 (Key B) and install it onto the outboard seal carrier (Key 6).
- 4 Find the locator pin (Key 22), install the seal carrier (Key 6) onto the follower shaft (Key 21) making sure that the locator pin is in alignment with the orientation hole in the seal carrier.
- 5 Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the seal carrier studs (Key 4).
- 6 Thread the seal carrier nuts (Key 3) onto the seal carrier studs (Key 4) and tighten the nuts according to the torque requirements in Table 6 (Page 35).



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 6** Follower Shaft Seal (Outboard Seal) Maintenance Diagram

### MAINTENANCE (Continued)

#### SHAFT SEAL MAINTENANCE (Continued)

##### Drive Shaft Seal (Inboard Seal)

##### Disassembly (Refer to Figure 7)

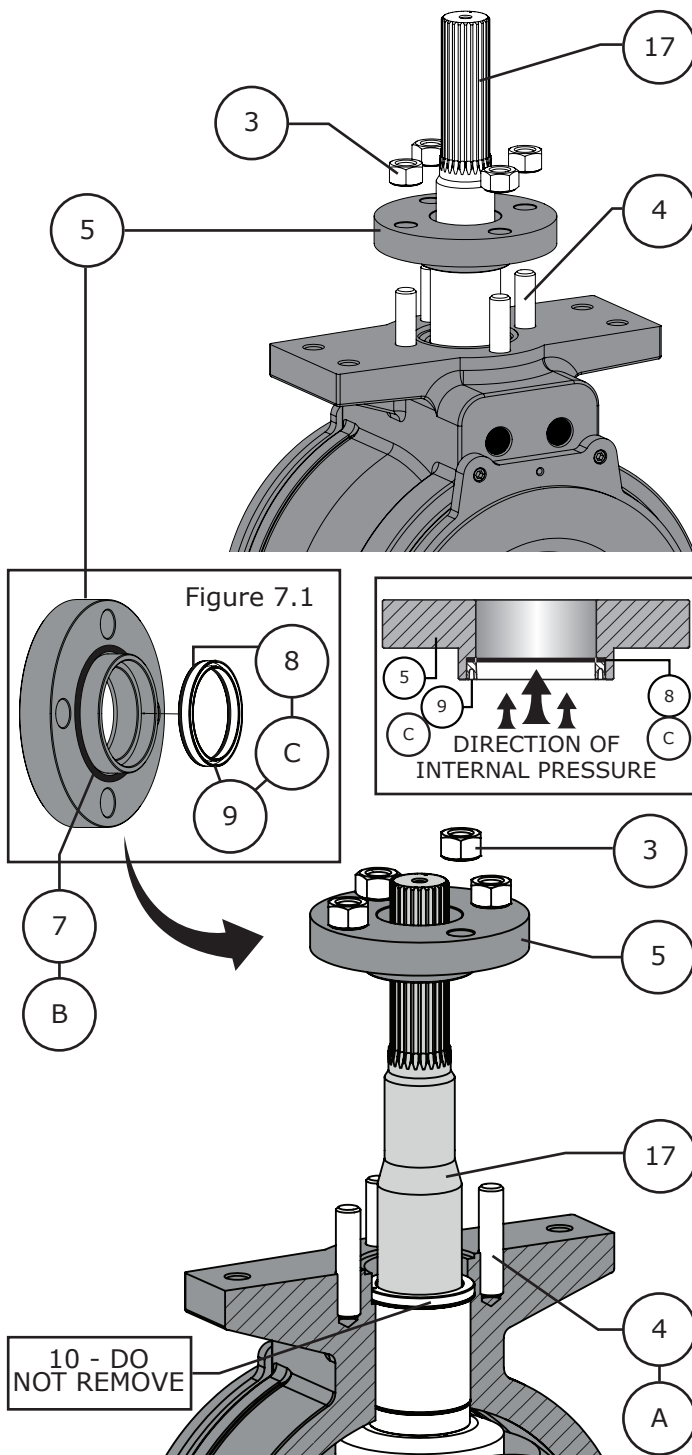
- 1 Remove the actuator (Refer to Page 12 for ACTUATOR REMOVAL instructions).
- 2 Remove the inboard seal carrier nuts (Key 3).
- 3 Remove the inboard seal carrier (Key 5). **NOTE:** The seal carrier o-ring (Key 7) may stick to the seal carrier and get removed at the same time (Figure 7.1), remove the o-ring after.
- 4 Using a mechanics pick set, carefully remove the backup ring (Key 8) and seal ring (Key 9).
- 5 Inspect all parts for damage, including the drive shaft (Key 17), damaged shafts must be replaced or repaired to avoid leaks (Refer to Page 14 for DISASSEMBLY Instructions). Replace any damaged parts with new parts as necessary.

##### Reassembly (Refer to Figure 6)

- 1 Lubricate the backup ring (Key 8) with Lubriplate® No. 105 Grease (Key C) and install it into the inboard seal carrier (Key 5).
- 2 Lubricate the seal ring (Key 9) with Lubriplate® No. 105 Grease (Key C) and install it into the inboard seal carrier (Key 5).
- 3 Lubricate the seal carrier o-ring (Key 7) with Dow Corning Molykote® 111 (Key B) and install it onto the inboard seal carrier (Key 5).
- 4 Install the seal carrier (Key 5) over the drive shaft (Key 17) and into the bore.
- 5 Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the seal carrier studs (Key 4).
- 6 Thread the seal carrier nuts (Key 3) onto the seal carrier studs (Key 4) and tighten the nuts according to the torque requirements in Table 6 (Page 35).
- 7 Re-mount the actuator to the valve. Refer to the ACTUATOR MOUNTING instructions on Page 32, refer to the appropriate actuator instruction manual for more information.

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 7** Drive Shaft Seal (Inboard Seal) Maintenance Diagram

### MAINTENANCE (Continued)

#### BALL SEAL MAINTENANCE

##### Before You Begin:

- Read Safety Caution (Page 2).
- Refer to Maintenance Notes (Page 8).

##### Disassembly (Refer to Figure 8)

- 1 If the valve is still in-line, make sure that the valve is in the OPEN position before it is removed from the pipe line. Remove the valve from pipe line.
- 2 Remove seal protector ring cap screws (Key 25).
- 3 Remove the seal protector ring (Key 26).
- 4 Remove the seal protector ring o-ring (Key 29).
- 5 Remove the ball seal (Key 30).
- 6 Remove the shims (Key 31).
- 7 For Dual Seal construction, repeat Steps 2 to 6 above for the opposite side of the valve.
- 8 Inspect all parts (especially sealing surfaces) for damage, replace parts with new parts as necessary.

##### Reassembly (Refer to Figure 8)

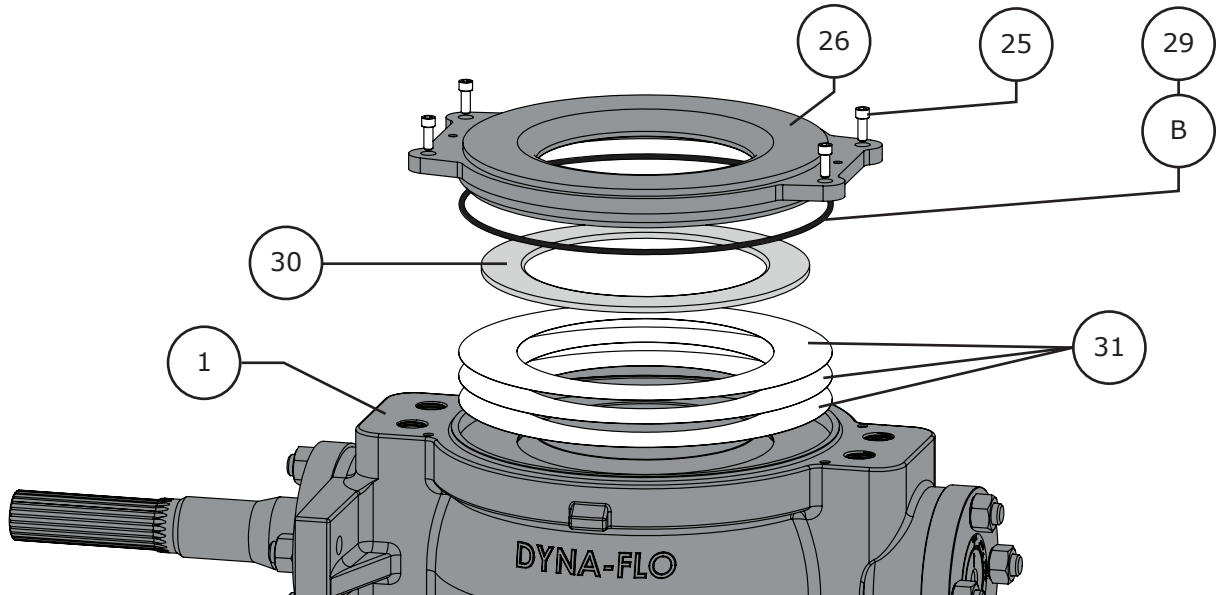
**Note:** If the ball seal (Key 30) was damaged and replaced, it will be necessary to re-adjust the ball deflection of the valve. Ball seal repair kits will included extra shims for adjustment purposes. For instructions on Ball Deflection refer to VALVE BALL CENTERING on Page 24 and Figure 34 on Page 25.

- 1 Place the shims (Key 31) over the ball (Key 2).
- 2 Set the ball seal (Key 30) over the ball (Key 2), make sure it is centered.
- 3 Lubricate the seal protector o-ring (Key 29) with Dow Corning Molykote® 111 (Key B) and place it in the valve.
- 4 The seal protector ring (Key 26) is equipped with threaded holes to attached eye hooks for lifting. Carefully lift and lower the seal protector ring into position.
- 5 Install the seal protector cap screws (Key 25) and tighten them evenly in a crisscross pattern until snug.
- 6 For Dual Seal construction, repeat Steps 1 to 5 above for the other side of the valve.



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 8** Ball Seal Maintenance Diagram

**Figure 9**  
Actuator Removal  
Example

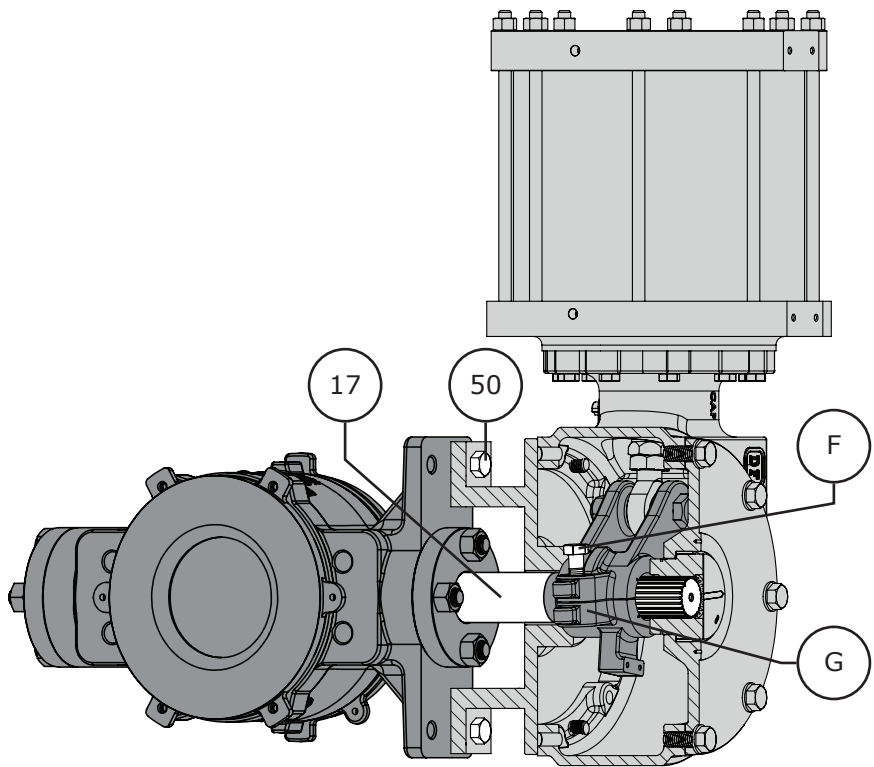
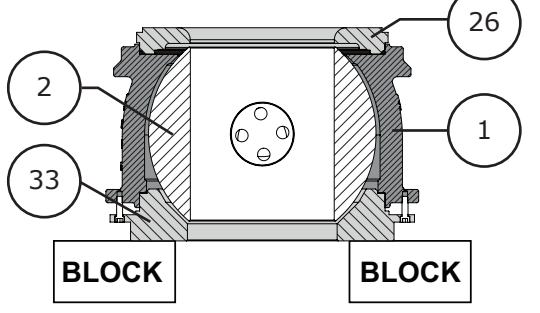


Figure 9.1



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



### ACTUATOR REMOVAL

**NOTE:** Actuator removal does not require that the valve be removed from the pipeline.

#### Before You Begin:

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Disconnect supply lines (air or gas), electric power, or control signal to the actuator. Sudden movement of actuator can cause damage or injury, make sure actuator will not operate.
- Vent any pneumatic actuator loading pressure and relieve any actuator spring preload if present.

#### Removal Steps:

- 1** Refer to the appropriate actuator instruction manual for more information regarding the actuator being removed.
- 2** If the valve has been removed from the pipeline, place the valve assembly on a flat work surface that can support the weight. It helps to have block placed under the valve to raise the valve off the work surface and allow for free ball movement (Refer to Figure 9.1).
- 3** The actuator lever is clamped onto the valve shaft (Key 17), loosen the actuator lever (Key G) by loosening the lever cap screw (Key F).
- 4** Support the actuator and remove the actuator mounting bolts (Key 50).
- 5** Separate the valve and actuator. Sometimes the actuator lever will bind on the valve shaft. Use caution when removing the actuator, forceful removal could damage the valve and actuator or cause the valve ball (Key 2) to be moved off center.

### DISASSEMBLY

#### Before You Begin:

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Remove the actuator from the valve (Refer to Actuator Removal Instructions).
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve. Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. For dual seal valves, relieve internal pressure by removing the pipe plug (Key 37).
- Remove the valve from pipeline, when removing the valve from pipe line be sure it is in the OPEN position, verify the valve is open using the indicator scale (Key 24) before removing from line.

### BODY OUTLET / SEAL PROTECTOR RING REMOVAL

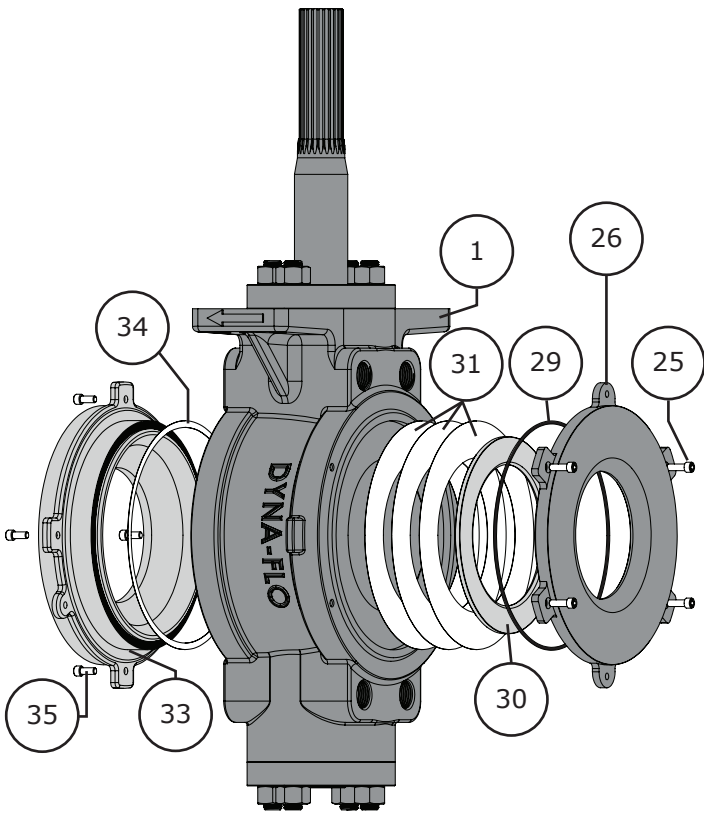
(Refer to Figures 10 & 11)

- 1** Remove the seal protector ring cap screws (Key 25).
- 2** Carefully remove the seal protector ring (Key 26). The seal protector ring is equipped with threaded holes for lifting hooks, utilize these if possible.
- 3** Remove the seal protector o-ring (Key 29).
- 4** Remove the ball seal (Key 30).
- 5** Remove the shims (Key 31).
- 6 For Dual Seal Construction:** flip the valve body, repeat Steps 1 to 5 above. (Refer to Figures 10 & 11)
- 7 For Single Seal Construction** (Refer to Figure 10)
  - A** Remove the cap screws (Key 35) from the body outlet (Key 33).
  - B** Remove the body outlet (Key 33) and body outlet gasket (Key 34).
  - C** Inspect all parts and sealing surfaces for damage, replace or repair parts as necessary.

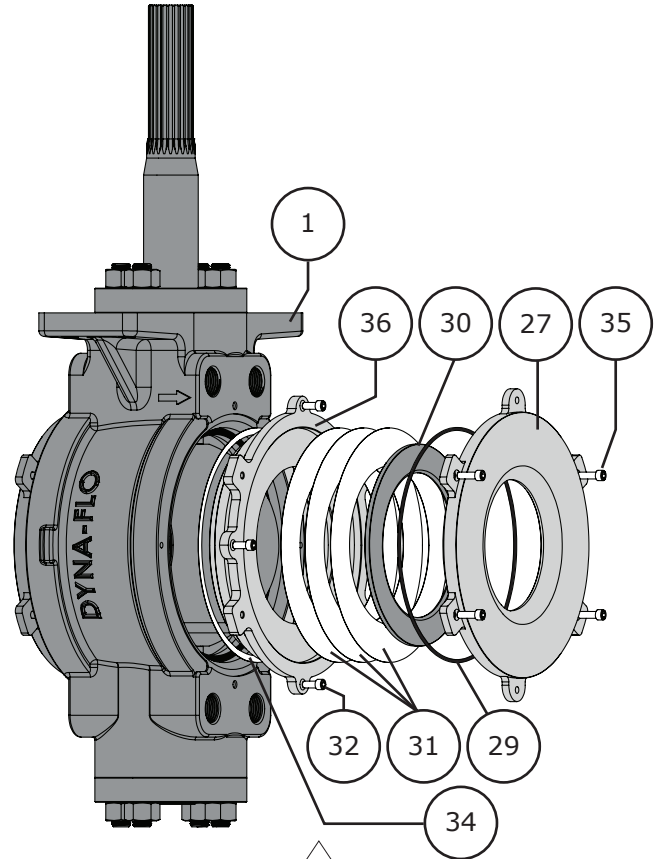


# Model 590 Control Valve

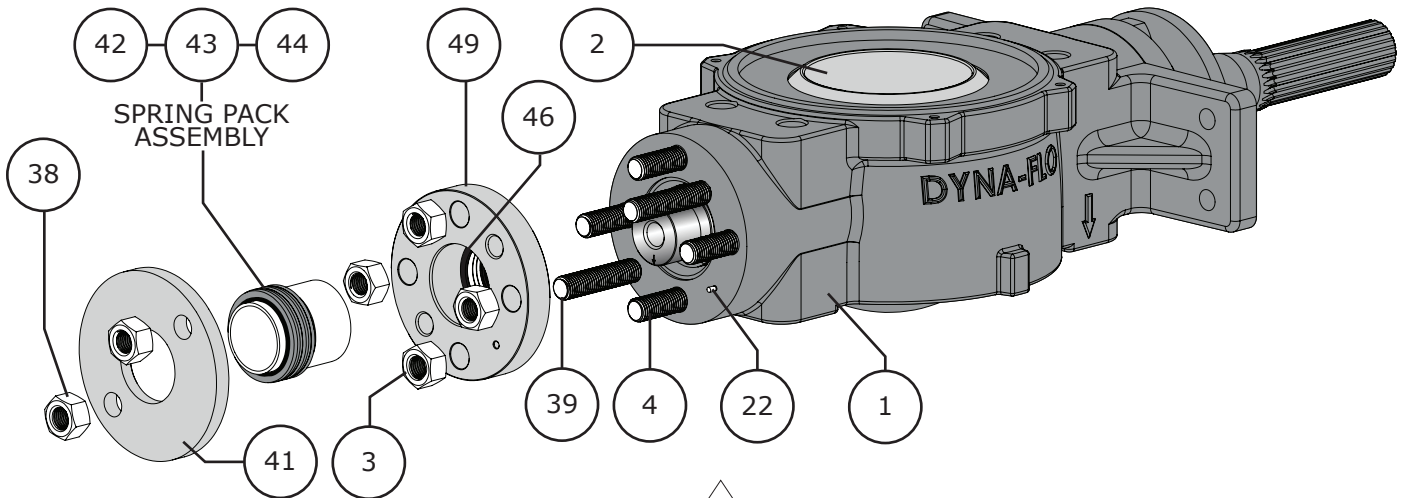
## Operation, Parts, and Instruction Manual



**Figure 10** Typical Single Seal Valve Disassembly



**Figure 11** Typical Dual Seal Valve Disassembly



**Figure 12** Outboard Live Loaded Packing Disassembly



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



### DISASSEMBLY (Continued)

#### BODY OUTLET / SEAL PROTECTOR RING REMOVAL (Continued)

- 7 For Dual Seal Construction (Refer to Figure 11)
  - A Remove the adapter ring cap screws (Key 32).
  - B Remove the adapter ring (Key 36).
  - C Remove the body outlet (Key 33) and body outlet gasket (Key 34).
  - D Inspect all parts and sealing surfaces for damage, replace or repair parts as necessary.

#### LIVE LOADED PACKING REMOVAL OUTBOARD (FOLLOWER SHAFT) SIDE

##### Before You Begin:

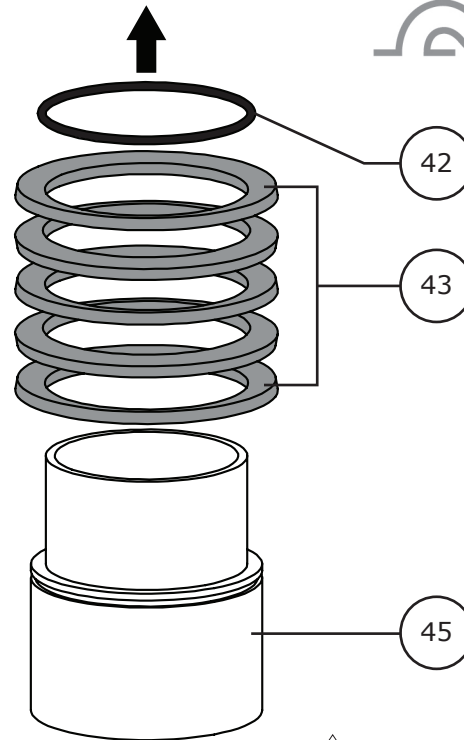
- Have the inlet side of the valve facing up on work surface.
- Place valve in the OPEN position.
- Refer to Figure 12.

##### Special Tools Required:

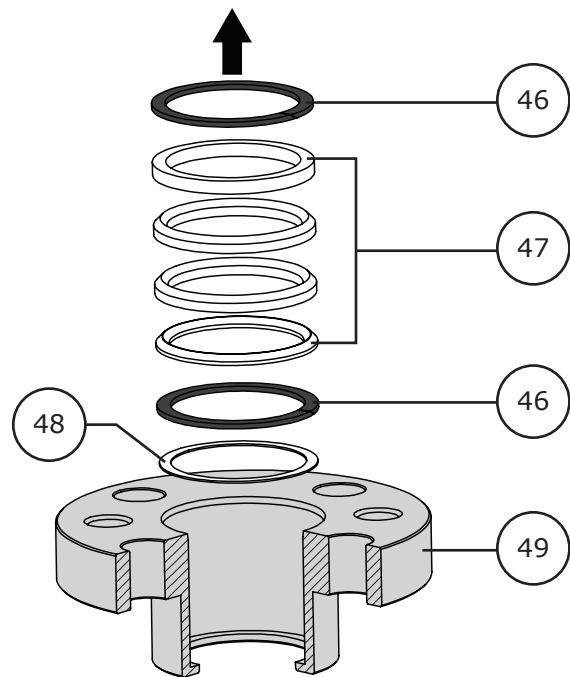
- Mechanic's pick set.

##### Disassembly Steps:

- 1 Remove the packing nuts (Key 38) and the packing flange (Key 41).
- 2 Remove the spring pack assembly (Keys 42, 43, 45).
- 3 Separate the spring pack components by removing the packing flange O-ring (Key 42) then separating the spring washers (Key 43) from the packing follower (Key 44). Refer to Figure 13. **NOTE:** Record the number of spring washers, their order and the orientation they were stacked in for re-assembly purposes.
- 4 Remove the packing box nuts (Key 3) or cap screw (Key 40). Remove the live loaded packing box (Key 49, Figure 14). **NOTE:** The o-ring (Key 7) may stick to the seal carrier during removal. Remove the o-ring (Key 7).
- 5 Using a mechanics pick set, carefully remove the anti-extrusion rings (Key 46), packing set (Key 47), and packing box ring (Key 48) from inside the bore of the packing box (Key 49). Refer to Figure 14.
- 6 Inspect all parts for damage and wear. Replace or repair parts as necessary. **NOTE:** All soft parts should be replaced. Proceed to OUTBOARD SHAFT DISASSEMBLY section on Page 16.



**Figure 13** Spring Pack Assembly Separation Example



**Figure 14** Live Loaded Packing Ring Removal



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

### DISASSEMBLY (Continued)

#### OUTBOARD SHAFT SEAL REMOVAL (FOLLOWER SHAFT)

##### Before You Begin:

- Have the inlet side of the valve facing up on work surface.
- Place valve in the OPEN position.
- Refer to Figure 15.

##### Disassembly Steps:

- 1 Remove the outboard seal carrier nuts (Key 3).
- 2 Remove the outboard seal carrier (Key 6). **NOTE:** The seal carrier o-ring (Key 7) may stick to the seal carrier and get removed at the same time, remove the o-ring after.
- 3 The remaining outboard shaft seal parts (Keys 8, 9, 10, & 11) will be removed along with the outboard (follower) shaft (Key 21). Proceed to OUTBOARD SHAFT DISASSEMBLY instructions.
- 4 Inspect all parts for damage and wear. Replace or repair parts as necessary.

#### OUTBOARD SHAFT DISASSEMBLY (FOLLOWER SHAFT)

##### Before You Begin:

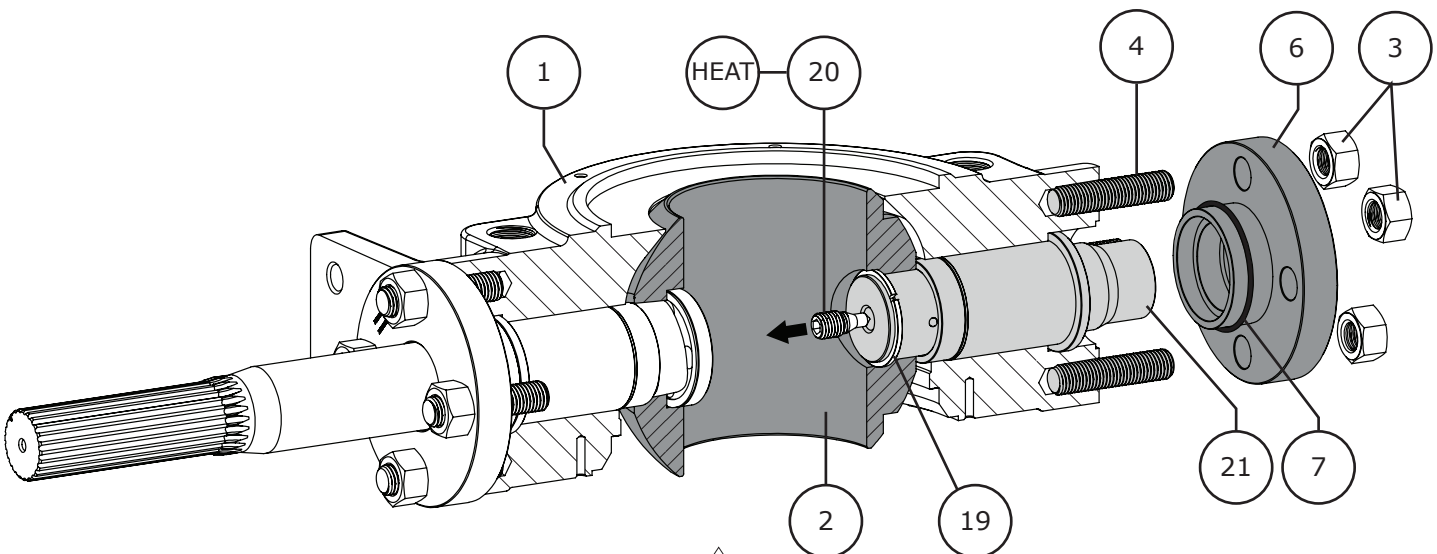
- Have the inlet side of the valve facing up on work surface.
- Place valve in the OPEN position.
- Refer to Figure 15.

##### Special Tools Required:

- Rubber mallet or soft block.
- Appropriate ball support post if possible (Refer to Table 8 and Figure 48 & 22).
- Shaft retainer (Key 16) removal tool (Refer to Table 8 and Figures 48 & 22). Needed for Step 1 of INBOARD SHAFT DISASSEMBLY.

##### Disassembly Steps:

- 1 Remove the retainer screw (Key 20) from the follower shaft (Key 21). **NOTE:** it may be necessary to apply heat to the retainer screw in order to loosen the thread locking compound from the threads. Refer to Figure 15.
- 2 Using a rubber mallet or soft block, carefully drive the follower shaft (Key 21) towards the inboard end of the valve until the split ring (Key 19) can be easily accessed. Refer to Figure 16.

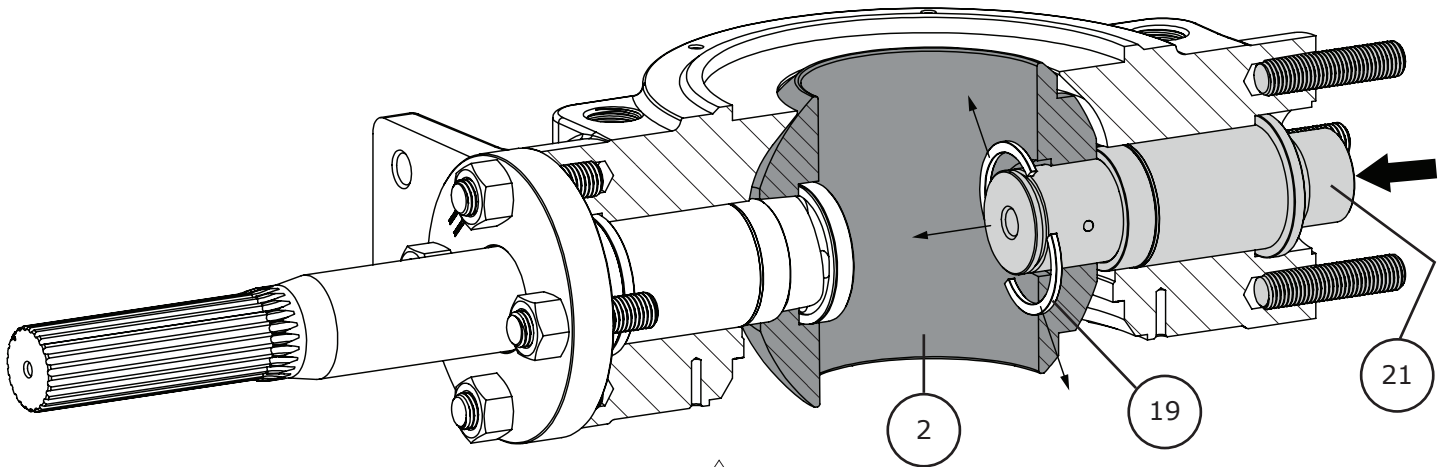


**Figure 15** Outboard Shaft Seal Disassembly and (Follower) Shaft Disassembly (Step 1)



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

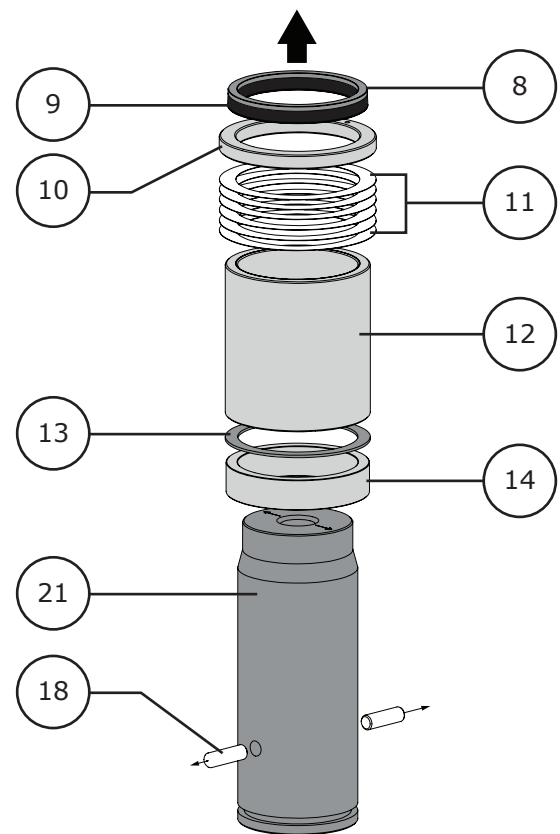


**Figure 16** Outboard (Follower) Shaft Disassembly (Steps 2 - 3)

### DISASSEMBLY (Continued)

#### OUTBOARD SHAFT DISASSEMBLY (FOLLOWER SHAFT) (Continued)

- 3** Remove the split ring (Key 19). **NOTE:** Split ring is two pieces.
- 4** Temporarily support the ball (Key 2) and remove the follower shaft (Key 21). It is recommended that a ball support post be installed into the follower shaft bore to support the ball during INBOARD (DRIVE) SHAFT DISASSEMBLY. Refer to Figure 22.
- 5 For Shaft Seal Assemblies Only:**  
Remove the backup ring (Key 8), seal ring (Key 9), and spacer (Key 10) from the follower shaft (Key 21). Refer to Figure 17. For Live Loaded Packing assemblies, skip this step.
- 6** Remove the bushing spacer shims (Key 11) from the follower shaft (Key 21). Refer to Figure 17.
- 7** Remove the bushing (Key 12).
- 8** Remove the thrust washer (Key 13).
- 9** Remove the thrust spacer (Key 14).
- 10** Remove the pins (Key 18) from the follower shaft (Key 21).
- 11** Inspect all parts for damage and wear. Replace or repair parts as necessary.

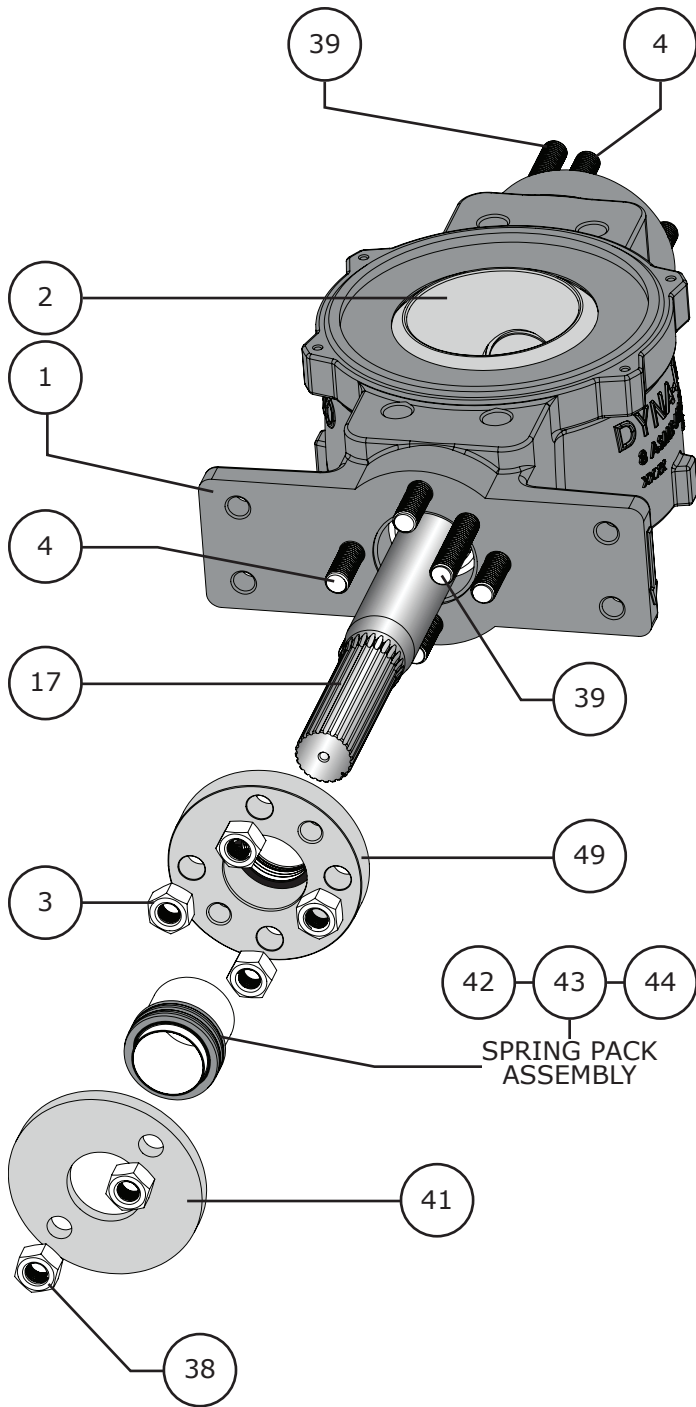


**Figure 17** Follower Shaft Disassembly



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



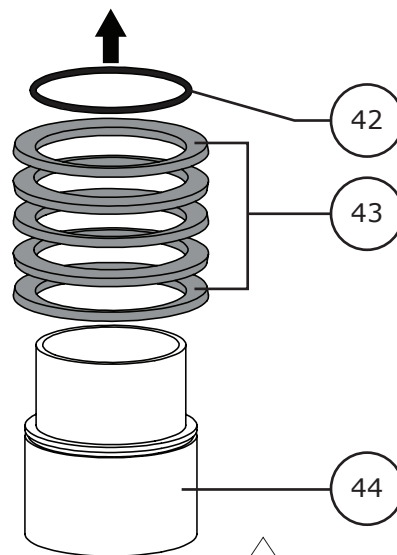
**Figure 18** Inboard Live Loaded Packing Disassembly

### DISASSEMBLY (Continued)

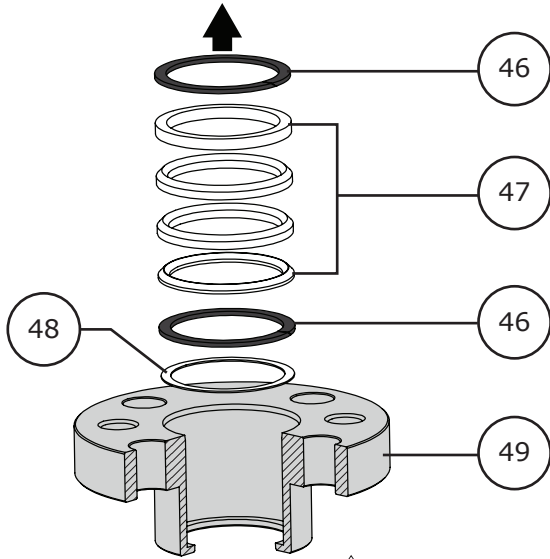
#### LIVE LOADED PACKING REMOVAL INBOARD (DRIVE SHAFT) SIDE

##### Disassembly Steps:

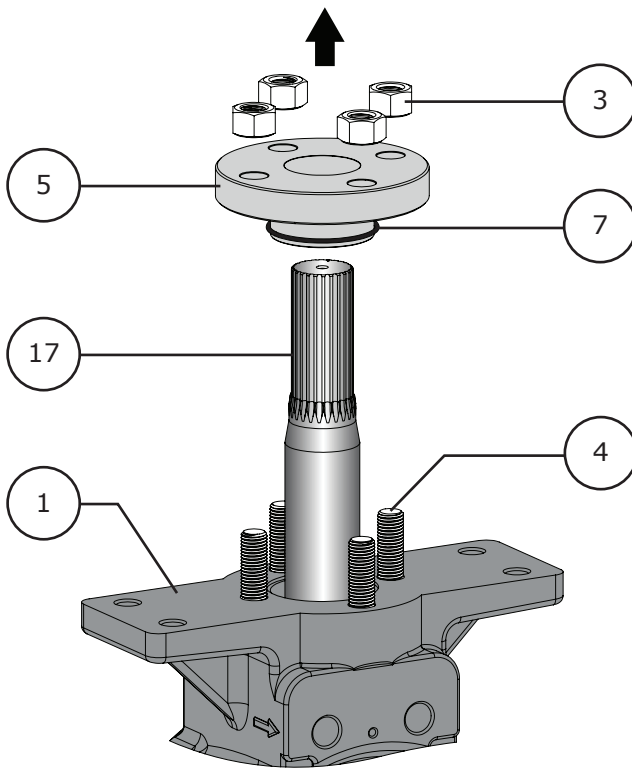
- 1 Remove the packing nuts (Key 38) and the packing flange (Key 41).
- 2 Remove the spring pack assembly (Keys 42, 43, 44).
- 3 Separate the spring pack components by removing the packing flange O-ring (Key 42) then separating the spring washers (Key 43) from the packing follower (Key 44). Refer to Figure 19. **NOTE:** Record the number of spring washers, their order and the orientation they were stacked in for re-assembly purposes.
- 4 Remove the packing box nuts (Key 3) or cap screw (Key 40, Figure 47). Remove the live loaded packing box (Key 49). **NOTE:** The o-ring (Key 7) may stick to the seal carrier during removal. Remove the o-ring (Key 7).
- 5 Using a mechanics pick set, carefully remove the anti-extrusion rings (Key 46), packing set (Key 47), and packing box ring (Key 48) from inside the bore of the packing box (Key 49). Refer to Figure 20.
- 6 Inspect all parts for damage and wear. Replace or repair parts as necessary. **NOTE:** All soft parts should be replaced. Proceed to INBOARD SHAFT DISASSEMBLY section on Page 19.



**Figure 19** Spring Pack Assembly Separation Example



**Figure 20** Live Loaded Packing Ring Removal



**Figure 21** Inboard Shaft Seal Disassembly

### DISASSEMBLY (Continued)

#### INBOARD SHAFT SEAL REMOVAL (DRIVE SHAFT)

##### Disassembly Steps:

- 1 With the ball (Key 2) supported, remove inboard seal carrier nuts (Key 3). Refer to Figure 21.
- 2 Remove the inboard seal carrier (Key 5). **NOTE:** The seal carrier o-ring (Key 7) may stick to the seal carrier and get removed at the same time, remove the o-ring after.
- 3 The remaining outboard shaft seal parts (Keys 8, 9, 10, & 11) will be removed along with the inboard (drive) shaft (Key 17).
- 4 Inspect all parts for damage and wear. Replace or repair parts as necessary. **NOTE:** All soft parts should be replaced. Proceed to INBOARD SHAFT DISASSEMBLY.

#### INBOARD SHAFT DISASSEMBLY (DRIVE SHAFT)

##### Before You Begin:

- Have the inlet side of the valve facing up on work surface.
- Place valve in the OPEN position.
- Refer to Figure 22.

##### Special Tools Required:

- Rubber mallet or soft block.
- Appropriate ball support post if possible (Refer to Table 8 and Figures 48 & 22).
- Shaft retainer (Key 16) removal tool (Refer to Table 8 and Figure 22). Needed for Step 1 of INBOARD SHAFT DISASSEMBLY.

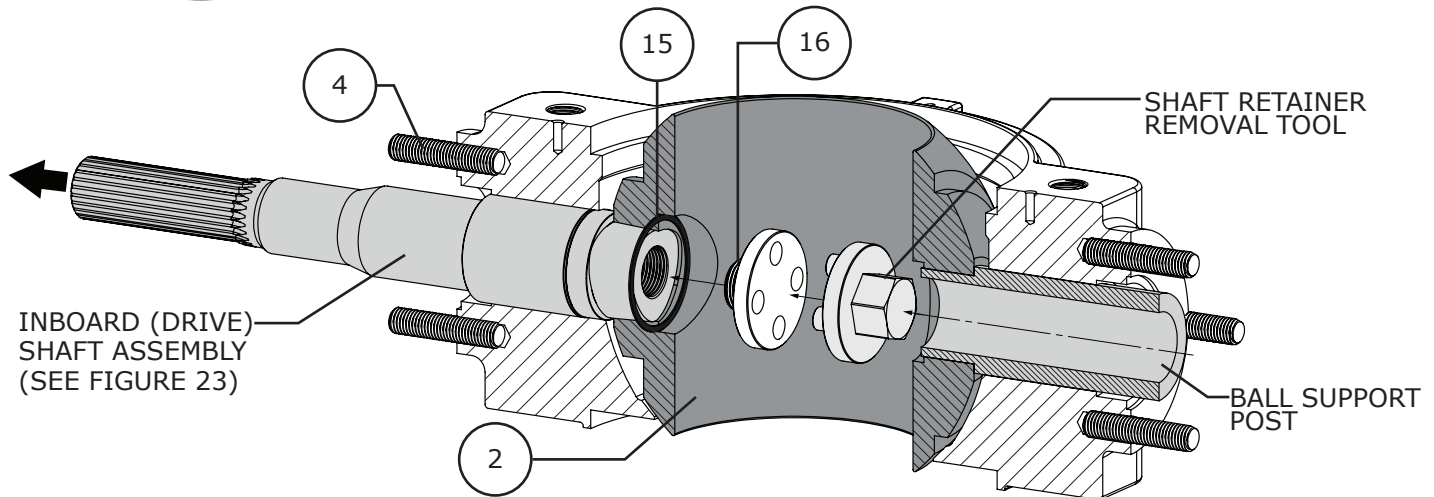
##### Disassembly Steps:

- 1 With the ball (Key 2) supported, remove the shaft retainer (Key 16). **NOTE:** it may be necessary to immobilize the valve shaft (Key 17) and apply heat to the shaft retainer to loosen the thread locking compound from the threads. A shaft retainer removal tool will be required. Refer to Figure 22.
- 2 Remove the shaft retainer washer (Key 15).
- 3 Support the valve ball (Key 2) with a sling to prevent damage.
- 4 Remove the drive shaft (Key 17), light force may be required to dislodge the shaft from the polygon connection.



# Model 590 Control Valve

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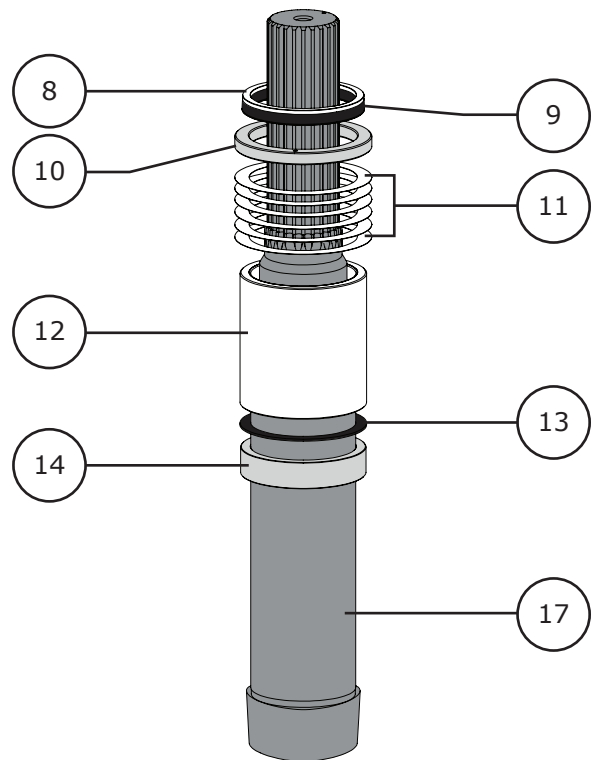


**Figure 22** *Inboard (Drive) Shaft Disassembly*

### DISASSEMBLY (Continued)

#### INBOARD SHAFT DISASSEMBLY (Continued)

- 5 For Shaft Seal Assemblies Only:**  
Remove the backup ring (Key 8), seal ring (Key 9), and spacer (Key 10) from the drive shaft (Key 17). Refer to Figure 23. For Live Loaded Packing assemblies, skip this step.
- 6** Remove the seal ring (Key 9) from the drive shaft (Key 17).
- 7** Remove the spacer (Key 10).
- 8** Remove the bushing spacer shims (Key 11).
- 9** Remove the bushing (Key 12) from the drive shaft.
- 10** Remove the thrust washer (Key 13).
- 11** Remove the thrust spacer (Key 14).
- 12** Continue to support the valve ball (Key 2) and remove the ball support post.
- 13** Carefully remove the ball (Key 2) from the body (Key 1).
- 14** Inspect all parts for damage or wear, replace or repair parts as necessary. All soft parts such as seals and o-rings should be replaced.



**Figure 23** *Drive Shaft Disassembly*

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



### ASSEMBLY

#### Before You Begin:

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Clean and inspect all parts.
- Replace or repair damaged parts. Replace all soft parts (Seals, o-rings, gaskets, live loaded packing).

#### Special Tools Required:

- Rubber mallet or soft block.
- Appropriate ball support post if possible (Refer to Table 8 and Figure 48).
- Shaft retainer (Key 16) removal tool (Refer to Table 8 and Figure 48).
- Mechanic's pick set.
- Felt Marker.
- Feeler Gauge.

#### Lubricants Required:

- Permatex® Nickel Anti-Seize or equivalent (Key A)
- Dow Corning Molykote® 111 or equivalent (Key B)
- Lubriplate® No. 105 Grease or equivalent (Key C)
- Medium Strength Thread Locking Compound (Key D)

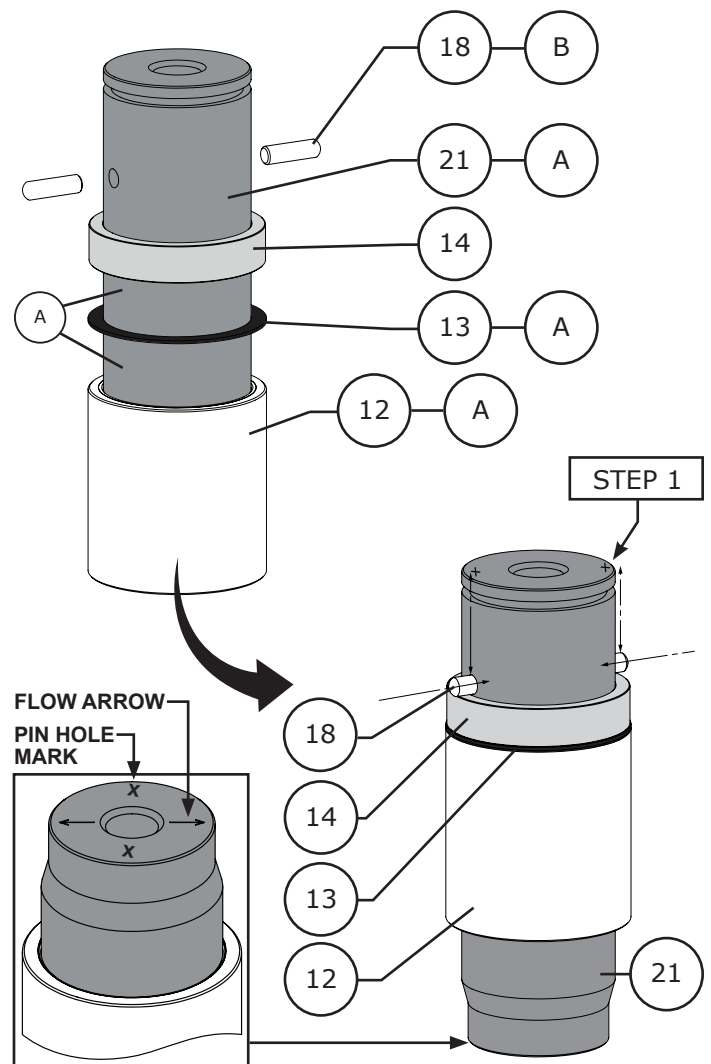
### STUD INSTALLATION

- 1 If the studs (Keys 4 & 39) were replaced, removed, or never installed, apply Permatex® Nickel Anti-Seize (Key A) to the threads of the end of the stud without a material stamp.
- 2 Thread the studs (Key 4) into the valve body (Key 1) anti-seize coated end first until they are completely threaded into the valve body.

### BALL AND SHAFT ASSEMBLY

- 1 Using a felt marker, mark the position of the pin holes of the follower shaft (Key 21) on the bottom and top of the follower shaft for future reference. **NOTE:** The pin holes will be opposite from the flow arrows engraved on the flange side of the follower shaft. Refer to Figure 24.
- 2 Apply Permatex® Nickel Anti-Seize (Key A) to the seal parts portion of the drive shaft (Key 17) and follower shaft (Key 21). Refer to Figures 24 & 25.

- 3 Apply Permatex® Nickel Anti-Seize (Key A) to both faces of the thrust washer (Key 13) and to the outside surface of the bushing (Key 12) and install them (this will need to be done twice, once for the follower shaft & drive shaft).
- 4 Install the thrust spacer (Key 14), thrust washer (Key 13), and bushing (Key 12) on to the drive shaft (Key 17) and follower shaft (Key 21) as shown in Figures 24 & 25.
- 5 Set the assembled shaft aside.

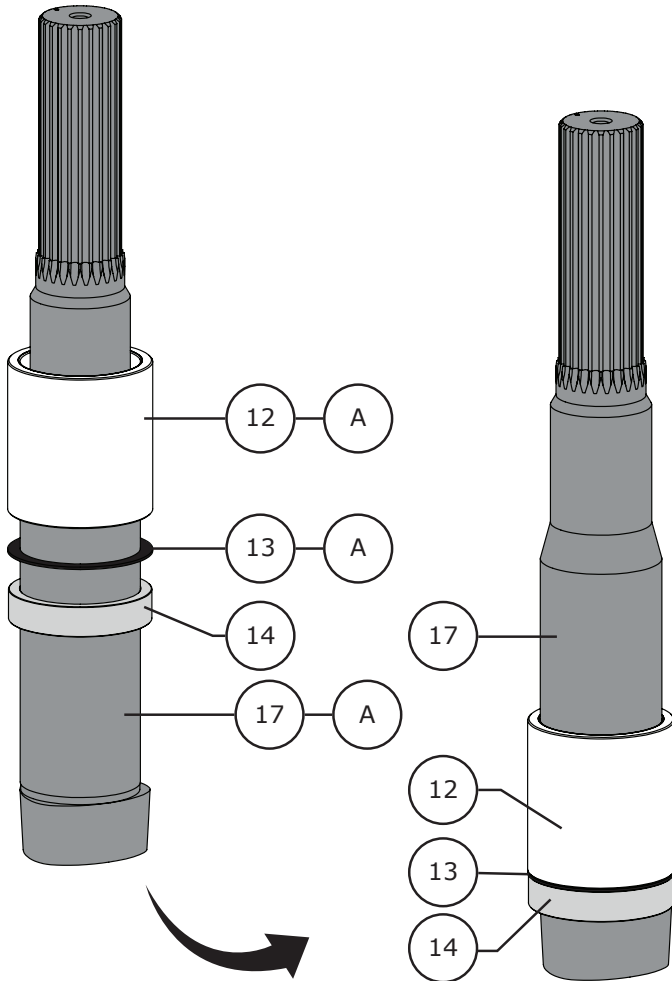


**Figure 24** Outboard (Follower) Shaft Assembly

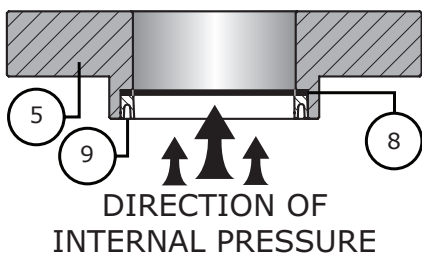


# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 25** Inboard (Drive) Shaft Assembly



**Figure 26** Seal Ring Orientation Diagram (Step 18)

### ASSEMBLY (Continued)

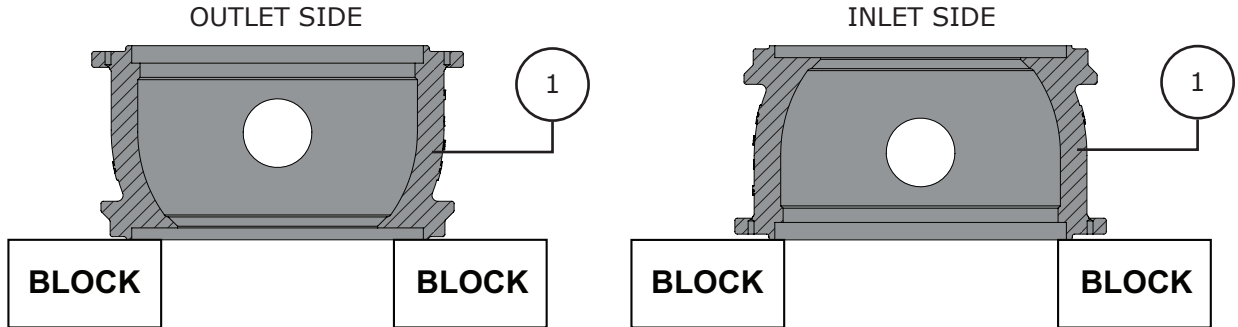
#### BALL AND SHAFT ASSEMBLY (Continued)

- 6** Place the valve body (outlet side up) on blocks (refer to Figure 27 for block placement) on a flat work surface that can support the full assembled valve weight.
- 7** Using slings, carefully insert the ball (Key 2) into the outlet side of the valve body (Key 1).
- 8** Continue to support the valve ball (Key 2) and insert the appropriate ball support post (Refer Table 8 & Figures 48 & 29) if available.
- 9** Insert the drive shaft assembly (Figure 25) into the valve and align the positioning marks of the drive shaft (Key 17) and polygon connection on the ball (Key 2). (Figure 28)
- 10** Apply Permatex® Nickel Anti-Seize (Key A) to the shaft retainer washer (Key 15) and insert it into the shaft bore of the ball (Key 2). Refer to Figure 29.
- 11** Apply medium strength thread locking compound (Key D) to the threads of the shaft retainer (Key 16). Thread the shaft retainer into the drive shaft (Key 17) till hand tight. Immobilize the drive shaft and tighten the shaft retainer to the appropriate torque value listed in Table 7 using the shaft retainer removal tool (Refer to Table 8 and Figure 48 for tool dimensions).
- 12** Support the ball (Key 2) and remove the ball support post.
- 13** Apply Dow Corning Molykote® 111 (Key B) to the pins (Key 18). Install the pins into the pin holes of the follower shaft (Key 21) flat end first and only in far enough to be able to slide through the bushing as shown in Figure 16). **NOTE:** The Dow Corning Molykote® 111 will help keep the pins in place during assembly. Refer to the marks made on the follower shaft (Key 21) during Step 1 to help align the pins with the pin grooves on the valve ball (Key 2).
- 14** Install the outboard (follower) shaft assembly (Figure 24) into the valve body assembly. Push the shaft assembly into the valve far enough that the split ring (Key 19) groove on the follower shaft (Key 21) is visible on the inside of the valve ball (Key 2). Refer to Figure 30.
- 15** Install the split ring (Key 19) and push the follower shaft assembly back out of the valve until it stops in place. Refer to Figure 30.

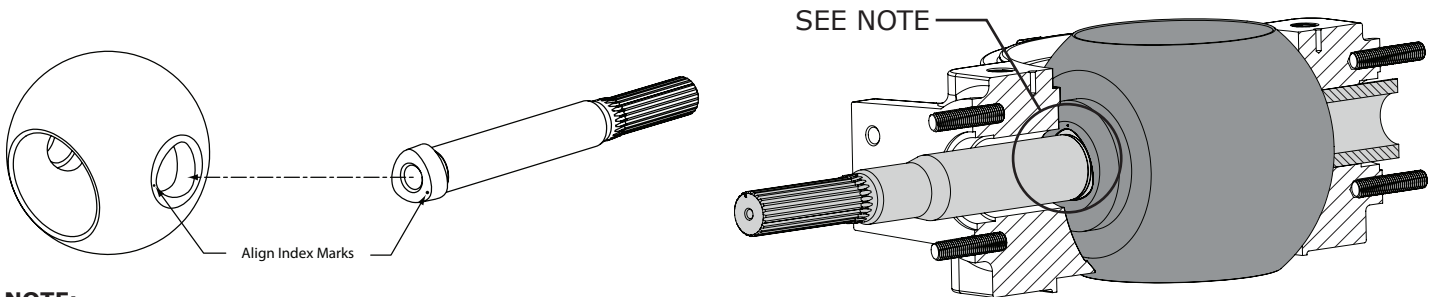


# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



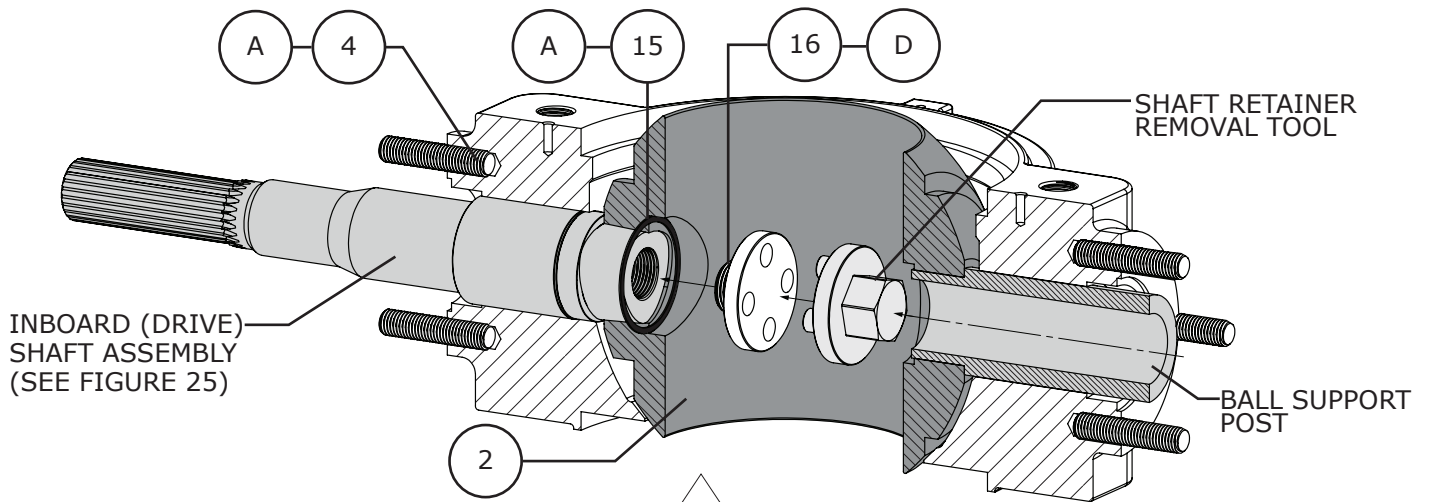
**Figure 27** Support Block Placement (Step 6)



**NOTE:**

For rare circumstances when the alignment mark is not visible (on the 10 inch ball for example), move the ball into the fully open position inside the valve body and insert the tapered polygon end connection of the shaft into the ball so that the alignment mark of the shaft polygon is placed into the corner of the ball polygon that faces the open end of the valve ball (parallel to the flow bore of the valve).

**Figure 28** Proper Polygon to Shaft Alignment Index Marks (Step 9)



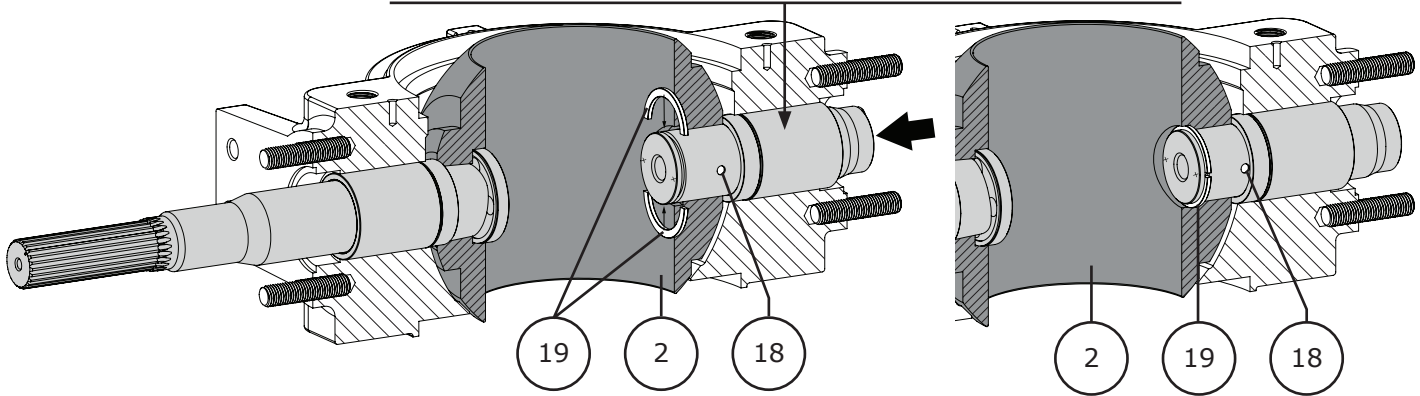
**Figure 29** Inboard (Drive) Shaft Installation (Steps 9 - 11)



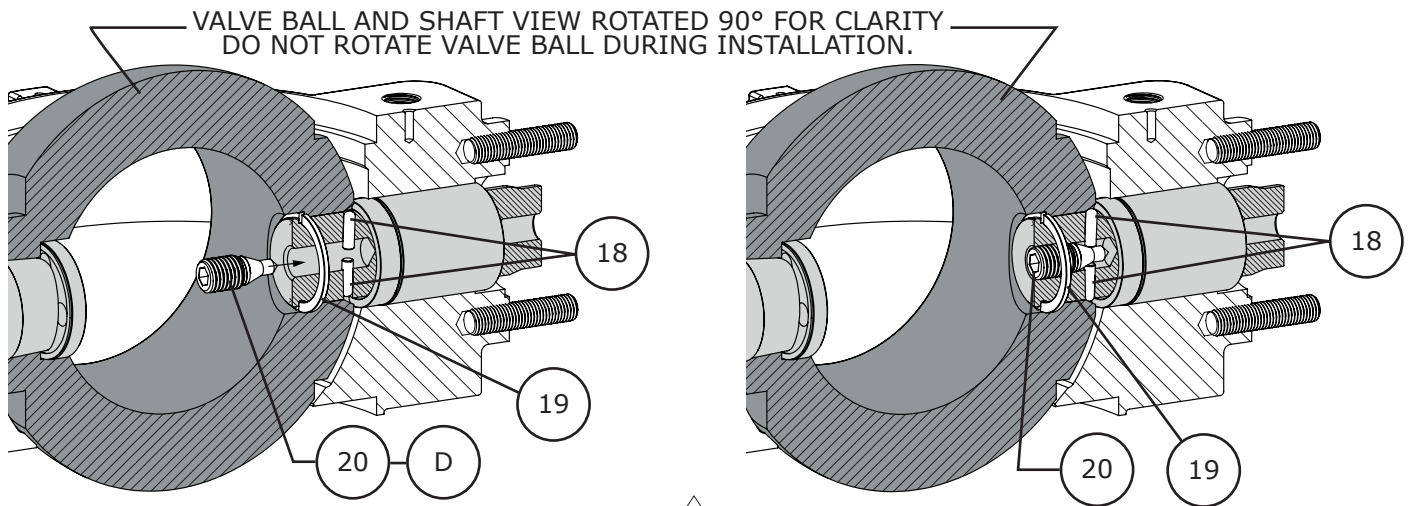
# Model 590 Control Valve

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OUTBOARD (FOLLOWER) SHAFT ASSEMBLY (SEE FIGURE 24)



**Figure 30** Outboard (Follower) Shaft Installation (Steps 14 - 15)



**Figure 31** Outboard (Follower) Shaft Installation (Step 16)

### ASSEMBLY (Continued)

#### BALL AND SHAFT ASSEMBLY (Continued)

**16** Apply medium strength thread locking compound (Key D) to the threads of the retainer screw (Key 20), thread the retainer screw into the follower shaft (Key 21) until the face of the retainer screw is flush with the face of the ball (Key 2). If installed properly, the pins (Key 18) will engage and slide into the pin grooves of the ball (Key 2). Refer to Figure 31.

**17** Flip the valve assembly (Refer to Figure 27 for support block placement on outlet side of valve body).

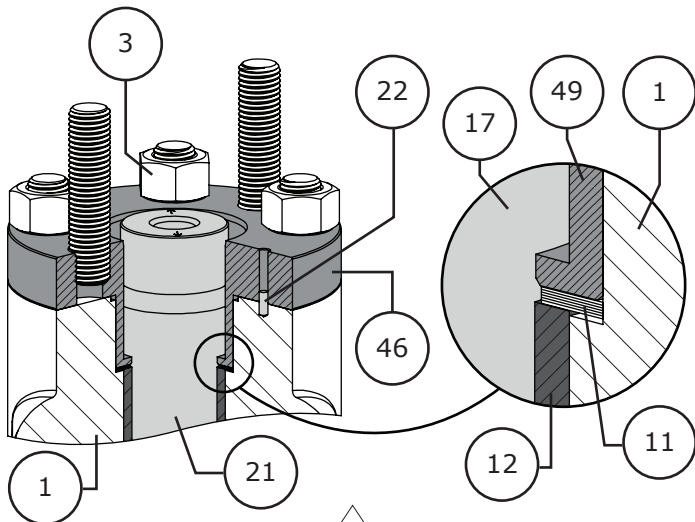
#### VALVE BALL CENTERING

- 1** Install 6 shims (Key 11) into the outboard (follower) shaft bore of the valve body (Key 1). Refer to Figure 32.
- 2 For Live Loaded Packing Assemblies:**  
Temporarily install the packing box (Key 49) and thread on the packing nuts (Key 3) hand tight. **NOTE:** Refer to Figure 32 for locator pin (Key 22) to packing box (Key 49) alignment.

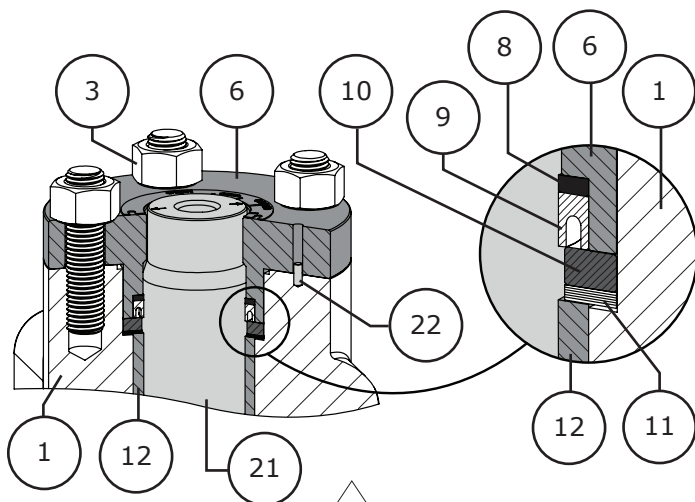


# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 32** Outboard Live Loaded Shim Installation



**Figure 33** Outboard Shaft Seal Shim Installation

### ASSEMBLY (Continued)

#### VALVE BALL CENTERING (Continued)

##### 2 For Shaft Seal Assemblies:

**A** Temporarily install the spacer (Key 14).

**B** Install the backup ring (Key 8) and seal ring (Key 9) into the seal carrier (Key 6) (Refer to Figure 37 for seal ring orientation).

**C** Install the seal carrier assembly and thread on the packing nuts (Key 3) hand tight. **NOTE:** Refer to Figure 33 for locator pin (Key 22) to packing box (Key 49) alignment.

**3** Push the drive shaft (Key 17) towards the follower shaft (Key 21) in an attempt to center the valve ball (Key 2). Using a feeler gauge, measure the gap between the valve body (Key 1) and valve ball (Key 2) on both the inboard and outboard sides. The gap between the valve ball and valve body should be even on both sides, the maximum deviation of the gap should be no more than 0.005 inches (0.127 mm). Refer to Figure 34.

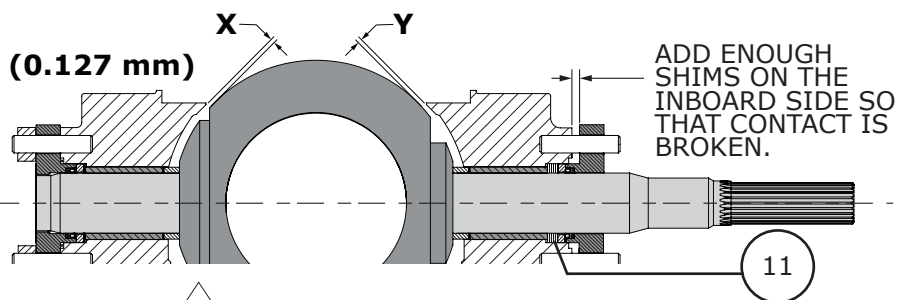
**4** Shims (Key 11) are 0.010 inches (0.254 mm) thick, once the gap has been measured the number of shims may need to be adjusted to center the ball (Key 2).

**5** Remove the nuts (Key 3), packing box (Key 49) or seal carrier assembly (Keys 6, 8, & 9) and spacer (Key 10). Using a mechanics pick set, add or remove shims as necessary to center the valve ball (Key 2) as shown in Figure 34.

**6** Repeat Steps 1 to 5 as necessary until the ball (Key 2) is centered. Proceed to either LIVE LOADED PACKING INSTALLATION (Page 26) or SHAFT SEAL INSTALLATION (Page 28) as determined by the configuration of your valve assembly.

**X-Y = 0.005 inches (0.127 mm)  
Max Deviation**

**Drive and Follower Shaft Axis**



**Figure 34** Ball to Body Centering Tolerance Diagram (Step 3 & 11)



# Model 590 Control Valve

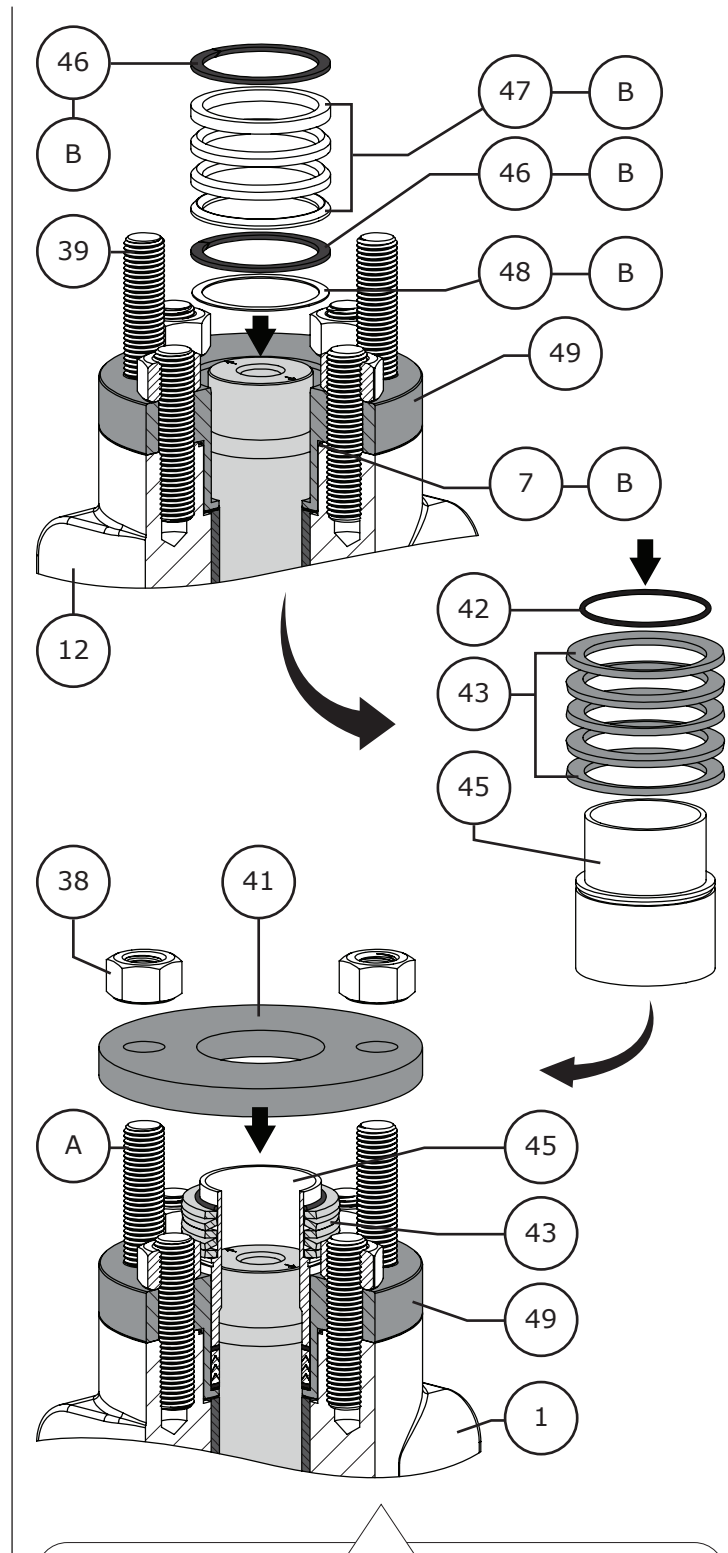
## Operation, Parts, and Instruction Manual

### ASSEMBLY (Continued)

#### LIVE LOADED PACKING INSTALLATION

##### Outboard (Follower Shaft Side)

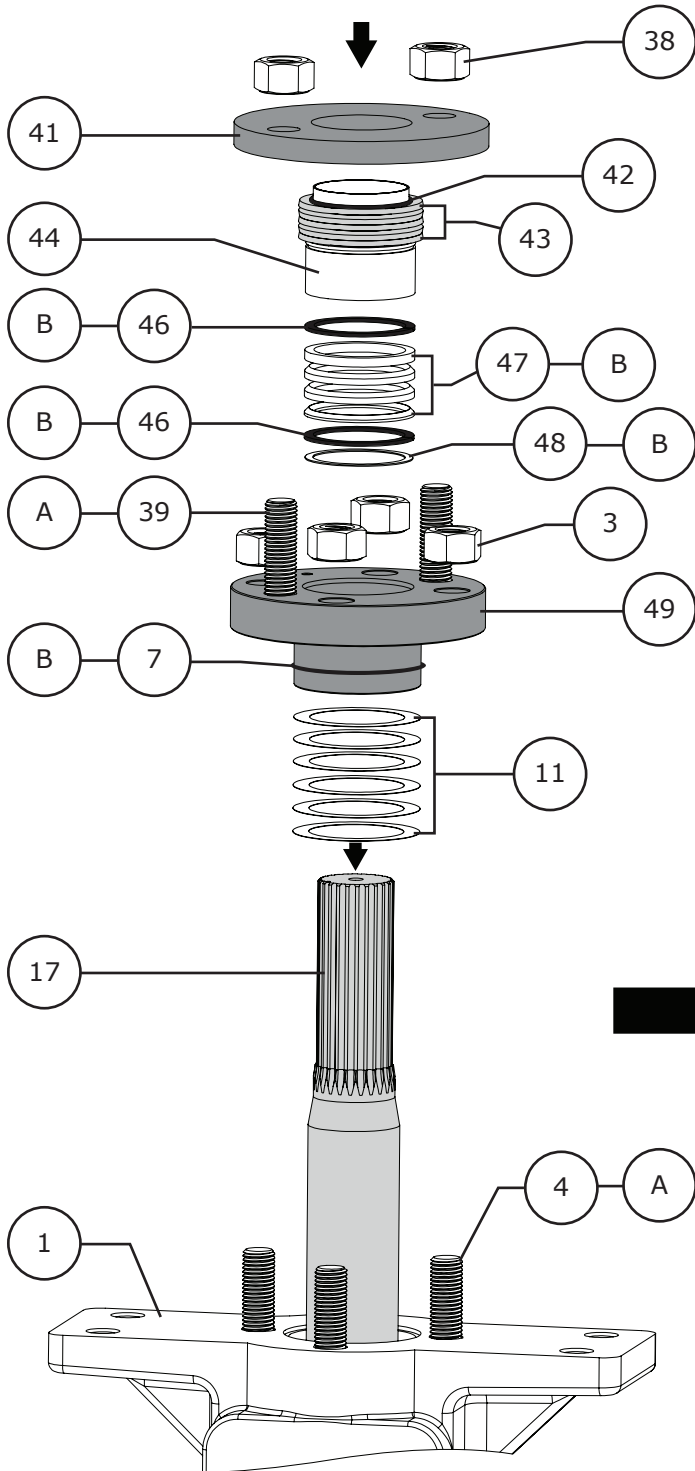
- 1 Once the valve ball (Key 2) has been properly centered, remove the outboard packing box (Key 49). Apply Dow Corning Molykote® 111 (Key B) to the packing box o-ring (Key 7) and install it in to the o-ring groove of the valve body (Key 1). Refer to Figure 35.
- 2 Re-install the outboard packing box (Key 49). **NOTE:** Refer to Figure 32 for locator pin (Key 22) to packing box (Key 49) alignment.
- 3 **For 4, 6, 8, 10, and 16 Inch Valves:**  
Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the outboard packing box studs (Key 4). Thread on the nuts (Key 3) and tighten them evenly in and alternating pattern until the torque listed in Table 6 is reached.  
**For 12 Inch Valves:**  
Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the packing box cap screws (Key 40). Thread the cap screws through the outboard packing box (Key 49) and in to the valve body (Key 1). Torque the cap screws to the specification listed in Table 6. Refer to Figure 47.
- 4 Apply Dow Corning Molykote® 111 (Key B) to the packing box ring (Key 48) and install it in to the packing box (Key 49).
- 5 Apply Dow Corning Molykote® 111 (Key B) to the anti-extrusion ring (Key 46) and install it in to the packing box.
- 6 Apply Dow Corning Molykote® 111 (Key B) to the rings of the packing set (Key 47) and install them one at a time in to the packing box. **NOTE:** It is very important that no air becomes trapped between the packing during installation. If necessary, use the packing follower (Key 45) to push down the packing parts.
- 7 Apply Dow Corning Molykote® 111 (Key B) to the other anti-extrusion ring (Key 46) and install it in to the packing box.
- 8 Install the spring washers (Key 43) on to the outboard packing follower (Key 45) in the appropriate order and orientation shown in Figures 44, 45, 46, 47. Secure the spring washers in place using the packing flange o-ring (Key 42). Install the newly built spring pack assembly (Keys 42, 43, 45) in to the packing box (Key 49).



**Figure 35** Outboard Live Loaded Packing Installation

# Model 590 Control Valve

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### ASSEMBLY (Continued)

#### LIVE LOADED PACKING INSTALLATION (Continued)

- 9 Install the live loaded packing follower (Key 45). Apply Permatex® Nickel Anti-Seize (Key A) to the top threads of the packing studs (Key 39).
- 10 Thread the packing flange nuts (Key 38) onto the studs (Key 39) and tighten them evenly in an alternating pattern (keeping the packing flange (Key 41) level while tightening) until the spring washers (Key 43) are completely compressed. Once completely compressed, loosen each packing nut a half turn (180 degrees).

#### Inboard (Drive Shaft Side)

- 11 Install 6 shims (Key 11) in to the inboard (drive) shaft bore of the valve body (Key 1). Install the inboard packing box (Key 49). **NOTE:** There should be enough shims in place to cause contact between the packing box and valve body to be broken by about 1 shim of space (refer to Figures 34 & 36). If there is contact between the valve body and packing box, install more shims.

**Figure 36** Inboard Live Loaded Packing Installation (Steps 11 to 22)



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

### ASSEMBLY (Continued)

#### LIVE LOADED PACKING INSTALLATION (Continued)

- 12 Install and tighten the nuts (Key 3) or cap screws (Key 40), DO NOT TORQUE the them into place. The valve shaft and ball should no longer be able to rotate freely once the nuts are tightened. Refer to Figures 34 & 36.
- 13 Remove the nuts (Key 3) or cap screws (Key 40) and packing box (Key 49) then remove 1 shim (Key 11). Repeat Step 12 and continue repeating this step, removing 1 shim at a time until the valve shaft and ball rotate freely after the nuts or cap screws have been tightened.
- 14 Once the proper number of inboard shims (Key 11) has been determined, remove the packing box (Key 49). Apply Dow Corning Molykote® 111 (Key B) to the packing box o-ring (Key 7) and install it into the o-ring groove of the valve body (Key 1). Refer to Figure 36.
- 15 Re-install the packing box (Key 49) and:  
**For 4, 6, 8, 10, and 16 Inch Valves:**  
Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the outboard packing box studs (Key 4). Thread on the nuts (Key 3) and tighten them evenly in an alternating pattern until the torque listed in Table 6 is reached.  
**For 12 Inch Valves:**  
Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the packing box cap screws (Key 40). Thread the cap screws through the outboard packing box (Key 49) and in to the valve body (Key 1). Torque the cap screws to the specification listed in Table 6. Refer to Figure 47.
- 16 Apply Dow Corning Molykote® 111 (Key B) to the packing box ring (Key 48) and install it in to the packing box (Key 49). Refer to Figure 36.
- 17 Apply Dow Corning Molykote® 111 (Key B) to the anti-extrusion ring (Key 46) and install it in to the packing box.
- 18 Apply Dow Corning Molykote® 111 (Key B) to the rings of the packing set (Key 47) and install them one at a time in to the packing box. **NOTE:** It is very important that no air becomes trapped between the packing during installation. If necessary, use the packing follower (Key 44) to push down the packing parts.
- 19 Apply Dow Corning Molykote® 111 (Key B) to the other anti-extrusion ring (Key 46) and install it in to the packing box.

- 20 Install the spring washers (Key 43) on to the inboard packing follower (Key 44) in the appropriate order and orientation shown in Figures 44, 45, 46, 47. Secure the spring washers in place using the packing flange o-ring (Key 42). Install the newly built spring pack assembly (Keys 42, 43, 44) in to the packing box (Key 49).
- 21 Install the live loaded packing follower (Key 45). Apply Permatex® Nickel Anti-Seize (Key A) to the top threads of the packing studs (Key 39).
- 22 Thread the packing flange nuts (Key 38) onto the studs (Key 39) and tighten them evenly in an alternating pattern (keeping the packing flange (Key 41) level while tightening) until the spring washers (Key 43) are completely compressed. Once completely compressed, loosen each packing nut a half turn (180 degrees).
- 23 Proceed to BALL SEAL INSTALLATION on Page 30.

#### SHAFT SEAL INSTALLATION

- 1 Once the valve ball (Key 2) has been properly centered, remove the nuts (Key 3) and seal carrier assembly (Keys 6, 8, & 9). **NOTE:** Leave the spacer (Key 10) installed. Separate the seal carrier assembly.
- 2 Apply Lubriplate® No. 105 Grease (Key C) to the backup ring (Key 8) and seal ring (Key 9), then re-install them into the seal carrier (Key 6) as shown in Figure 37.
- 3 Apply Dow Corning Molykote® 111 (Key B) to the o-ring (Key 7) and install the o-ring on to the seal carrier (Key 6). Install the seal carrier in to the valve body (Key 1).

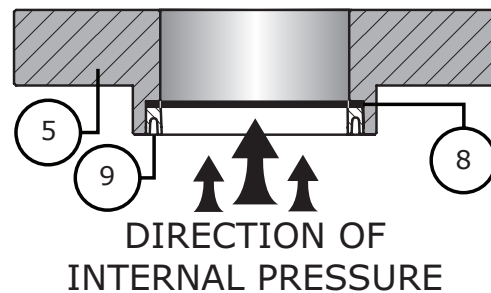
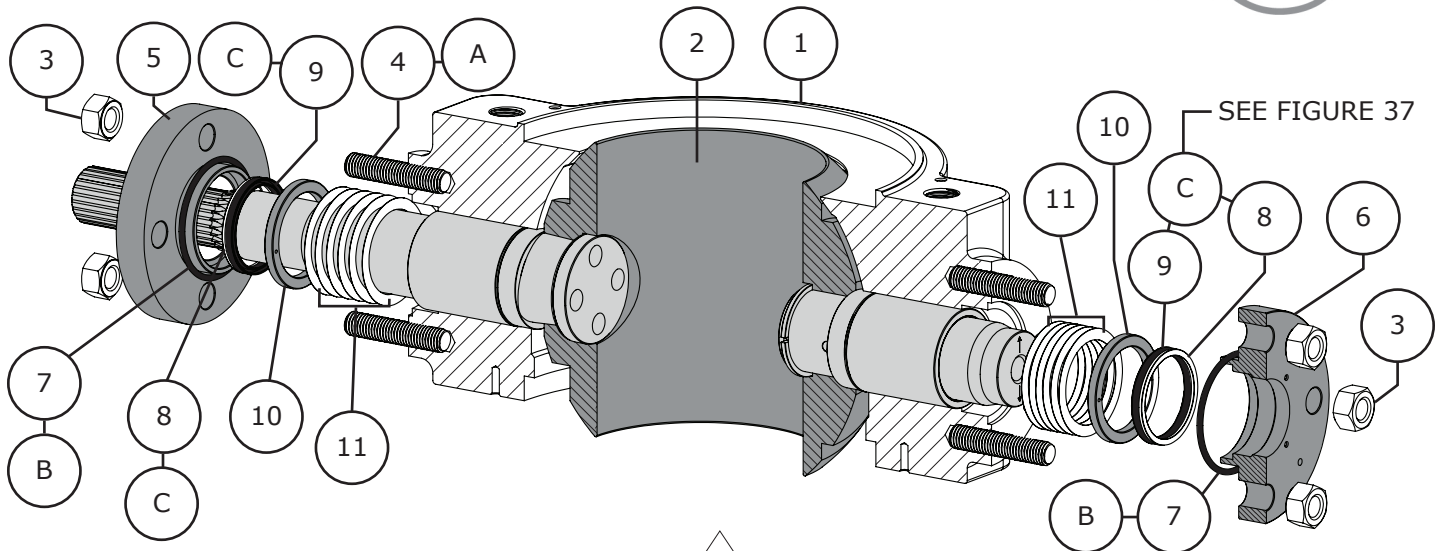


Figure 37 Seal Ring Orientation Diagram

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 38** Shaft Seal Installation Diagram

### ASSEMBLY (Continued)

#### SHAFT SEAL INSTALLATION (Continued)

- 4 Apply Permatex® Nickel Anti-Seize (Key A) to the top threads of the outboard seal carrier studs (Key 4). Thread on the nuts (Key 3) and tighten them evenly in and alternating pattern until the torque listed in Table 6 is reached.
- 5 Install 6 shims (Key 11) in to the inboard (drive) shaft bore of the valve body (Key 1). Temporarily install the spacer (Key 10). Install the backup ring (Key 8) and seal ring (Key 9) into the seal carrier (Key 5) (refer to Figure 37 for seal ring orientation). Install the seal carrier assembly (Keys 5, 8, 9). **NOTE:** There should be enough shims in place to cause contact between the seal carrier and valve body to be broken by about 1 shim of space (refer to Figure 34). If there is contact between the valve body and seal carrier, install more shims.
- 6 Install and tighten the seal carrier nuts (Key 3), DO NOT TORQUE the nuts into place. The valve shaft (Key 17) and ball (Key 2) should no longer be able to rotate freely once the nuts are tightened.
- 7 Remove the seal carrier nuts (Key 3), seal carrier (Key 5), backup ring (Key 8), seal ring (Key 9), and spacer (Key 10) then begin by removing 1 shim (Key 11). Repeat Step 6 and continue repeating this step, removing 1 shim at a time until the valve shaft and ball rotate freely after the seal carrier nuts have been tightened.
- 8 Once the valve shaft (Key 17) and ball (Key 2) are able to rotate freely while the seal carrier (Key 5) is tightened in place. Remove the seal carrier nuts (Key 3) and seal carrier assembly (Keys 5, 8, 9).
- 9 Separate the seal carrier assembly by removing the backup ring (Key 8) and seal ring (Key 9) from the seal carrier (Key 5). Apply Lubriplate® No. 105 Grease (Key C) to both the backup ring and seal ring and then re-install them into the seal carrier as shown in Figures 37 & 38.
- 10 Apply Dow Corning Molykote® 111 (Key B) to the o-ring (Key 7) and install it onto the seal carrier (Key 5). Apply Permatex® Nickel Anti-Seize (Key A) to the top of the threads of the studs (Key 4).
- 11 Install the seal carrier (Key 5) and thread the seal carrier nuts (Key 3) into place. Torque the seal carrier nuts to the torque specification recommended in Table 6.
- 12 Proceed to BALL SEAL INSTALLATION on Page 30.





# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

### ASSEMBLY (Continued)

#### BALL SEAL INSTALLATION

##### Before You Begin:

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Clean and inspect all parts.
- Replace or repair damaged parts. Replace all soft parts (Seals, o-rings, gaskets, live loaded packing).

##### Lubricants Required:

- Permatex® Nickel Anti-Seize or equivalent (Key A)
- Dow Corning Molykote® 111 or equivalent (Key B)
- Lubriplate® No. 105 Grease or equivalent (Key C)

- 1 Carefully rotate the valve ball (Key 2) to the closed position. Refer to Figure 27 for proper support block placement.
- 2 Place 6 ball seal shims (Key 31) over the ball (Key 2) and on to the valve body (Key 1). Refer to Figure 39.
- 3 Place the ball seal (Key 30) on the shims (Key 31) and center the seal on the ball (Key 2).
- 4 Push down on the ball seal (Key 30), while being pressed upon the ball seal should make firm contact with the ball (Key 2). Add or remove shims as necessary to achieve firm contact between the ball and seal. **NOTE:** Shims are 0.010 inches (0.25 mm) thick. Refer to Figure 41.
- 5 Remove the ball seal (Key 30) and remove 3 ball seal shims (Key 31). Return the ball seal to its position on the remaining ball seal shims.
- 6 Apply Dow Corning Molykote® 111 (Key B) to the seal protector o-ring (Key 29). Lay the o-ring into the valve body (Key 1) so that it rests on top of the shims (Key 31). Refer to Figure 38.
- 7 Carefully install the seal protector ring (Key 26). The seal protector ring has threaded holes for lifting hooks, utilize lifting hooks to lower the seal protector ring into position if possible. DO NOT damage the valve ball (Key 2) when installing the seal protector ring.
- 8 Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the seal protector ring cap screws (Key 25). Install the cap screws into the seal protector ring (Key 26) and tighten them evenly in a crisscross pattern.

#### 9 For Dual Seal Valve Construction:

**NOTE:** For Single Seal Construction proceed to BODY OUTLET INSTALLATION below.

- After installing the first ball seal (Steps 1 – 8), flip the valve body.
- Refer to Figure 40.
- Install the adapter ring gasket (Key 34).
- Install the adapter ring (Key 36). **NOTE:** The adapter ring installs the same as the seal protector ring (Key 26) follow steps 7 & 8 above.
- Repeat Steps 1 to 8 above installing the second seal on to the adapter ring (Key 36).

#### BODY OUTLET INSTALLATION

- 1 Flip the valve so the outlet side is up. Carefully rotate the valve ball (Key 2) in to the closed position. Refer to Figure 27 for proper support block placement.
- 2 Install the gasket (Key 34). Refer to Figure 39.
- 3 Carefully lift and lower the body outlet (Key 33) into position over top of the valve ball (Key 2). **NOTE:** The body outlet has threaded holes for lifting hooks, utilize lifting hooks to help install the body outlet if possible. DO NOT damage the valve ball during body outlet installation.
- 4 Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the body outlet cap screws (Key 35). Install the cap screws into the body outlet (Key 33) and tighten them evenly in a crisscross pattern.

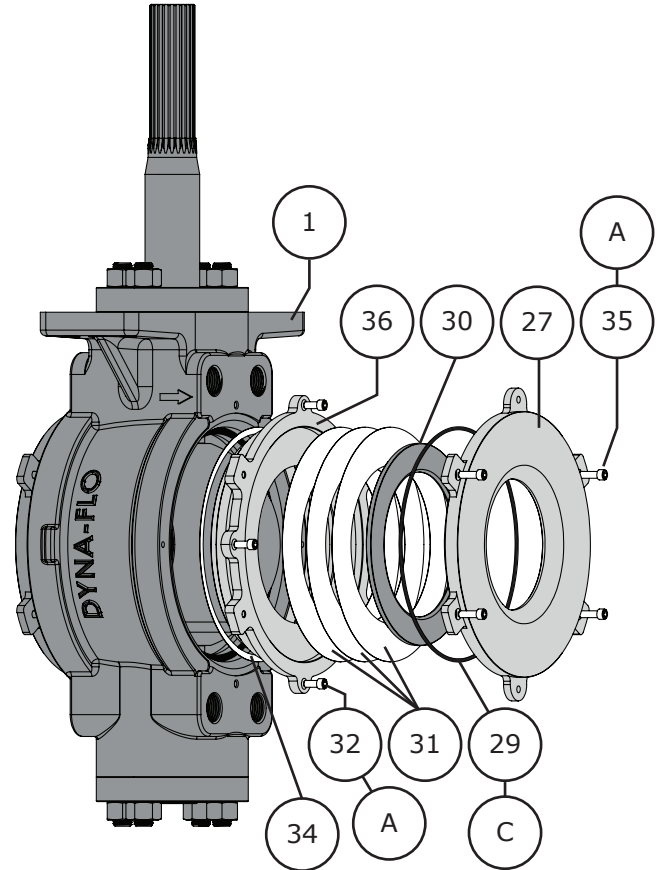
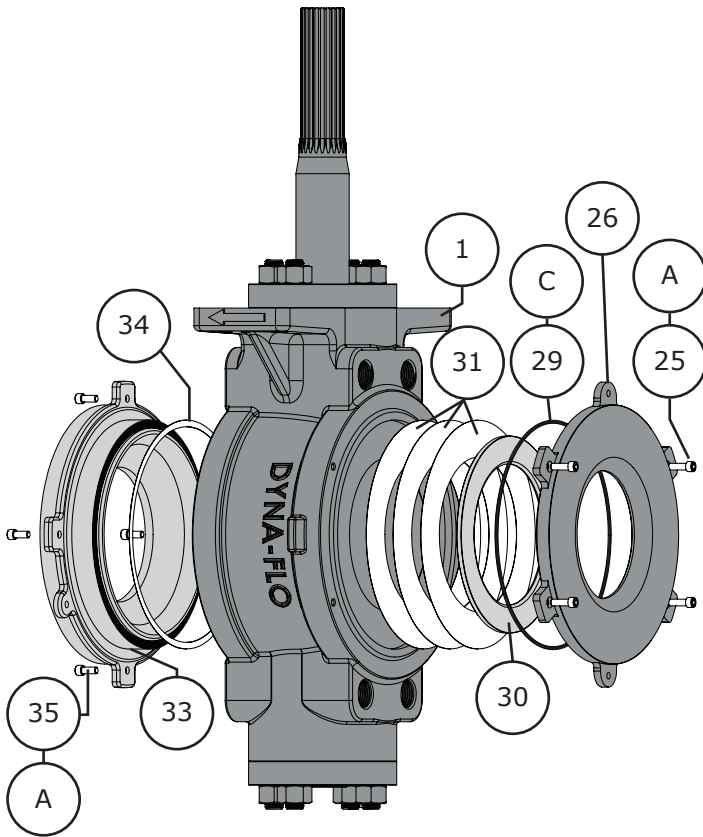
#### FLOW RING INSTALLATION

##### Before You Begin:

- Read Safety Caution (Page 2).
  - Use safe work practices and lock out procedures.
  - Clean and inspect all parts.
  - Replace or repair damaged parts. Replace all soft parts (Seals, o-rings, gaskets, live loaded packing).
- 1 Flip the valve so that the outlet side is facing up. Carefully rotate the valve ball (Key 2) in to the closed position. Refer to Figure 27 for proper support block placement.
  - 2 Place 6 ball seal shims (Key 31) over the ball (Key 2) and on to the valve body (Key 1). Refer to Figure 42.

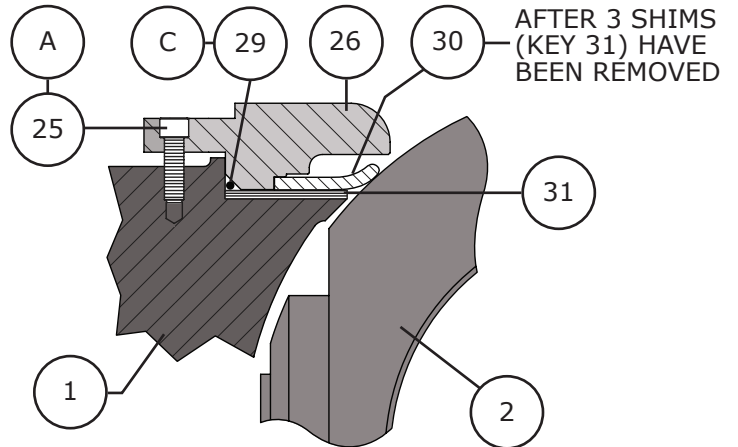
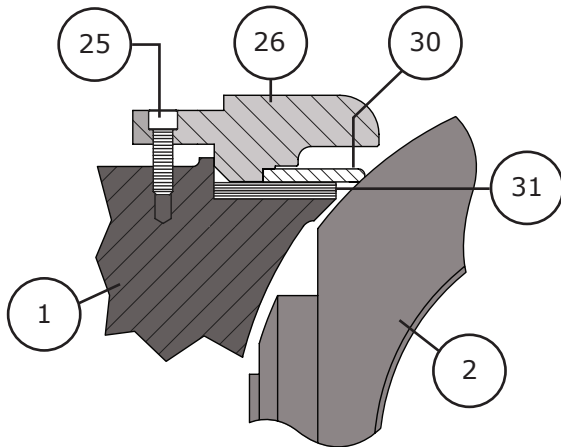
# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 39** Typical Single Seal Valve Disassembly

**Figure 40** Typical Dual Seal Valve Disassembly



**Figure 41** Proper Ball Seal and Shim Installation (Steps 2 to 5)



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

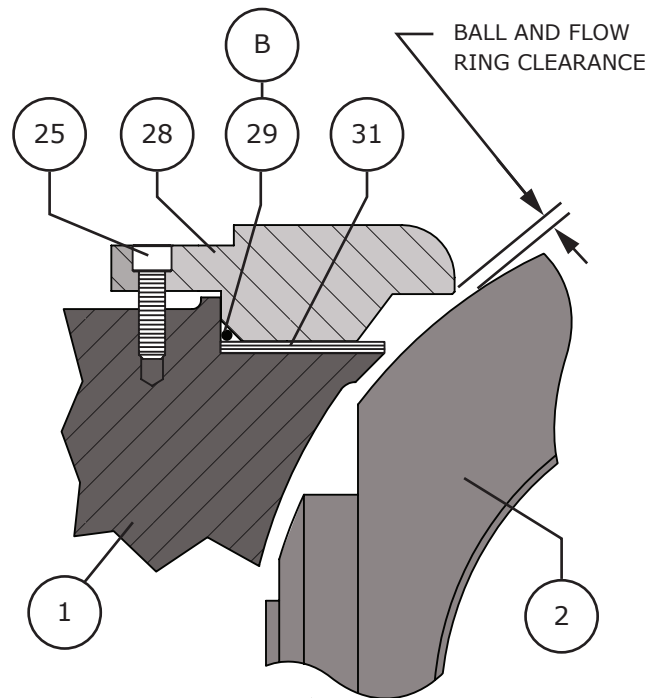
### ASSEMBLY (Continued)

#### FLOW RING INSTALLATION (Continued)

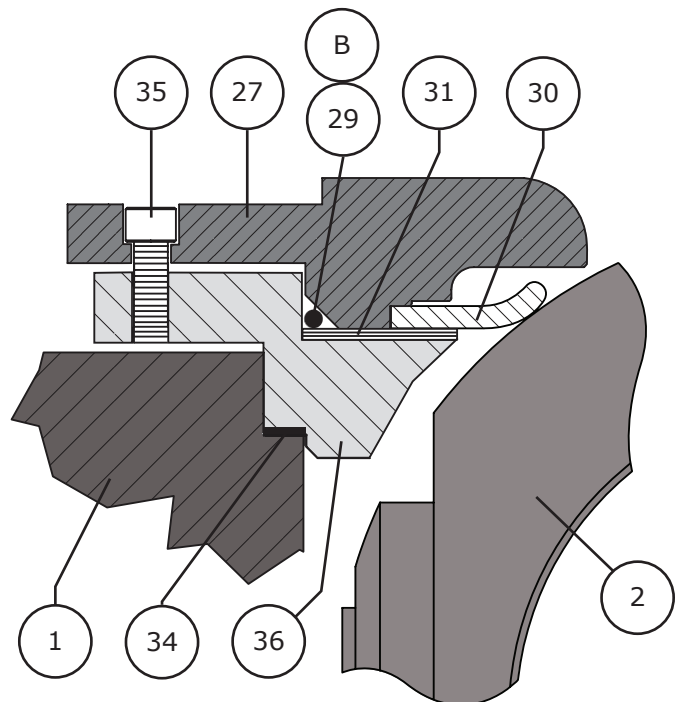
- 3 Carefully install the flow ring (Key 28). The flow ring has threaded holes for lifting hooks, utilize lifting hooks to lower the part into position if possible. DO NOT damage the valve ball (Key 2) when installing.
- 4 Center the flow ring (Key 28) and temporarily install the cap screws (Key 25). Do not completely tighten the cap screws until the clearance between the ball (Key 2) and flow ring has been verified.
- 5 Using a feeler gauge, measure the clearance between the ball (Key 2) and flow ring (Key 28). Clearance should measure:
  - 0.020 inches (0.38 mm) for forward flow valves.
  - 0.030 inches (0.76 mm) for reverse flow valves.
 Add or subtract shims (Key 31) as necessary to achieve proper clearance.
- 6 Once proper clearance has been achieved, apply silicone based o-ring compound (Key B) to the o-ring (Key 29) and install. Carefully re-install the flow ring (Key 28).
- 7 Apply anti-seize compound (Key A) to the threads of the cap screws (Key 25) and thread them into the flow ring (Key 28). Completely tighten the cap screws using a crisscross pattern.

### ACTUATOR MOUNTING

Refer to Figure 49 and the appropriate actuator instruction manual when mounting or changing actuator positions. Actuators may be either right or left hand mounted, Figure 49 shows the correct shaft to lever orientation for both configurations.



**Figure 42** Flow Ring Assembly Diagram

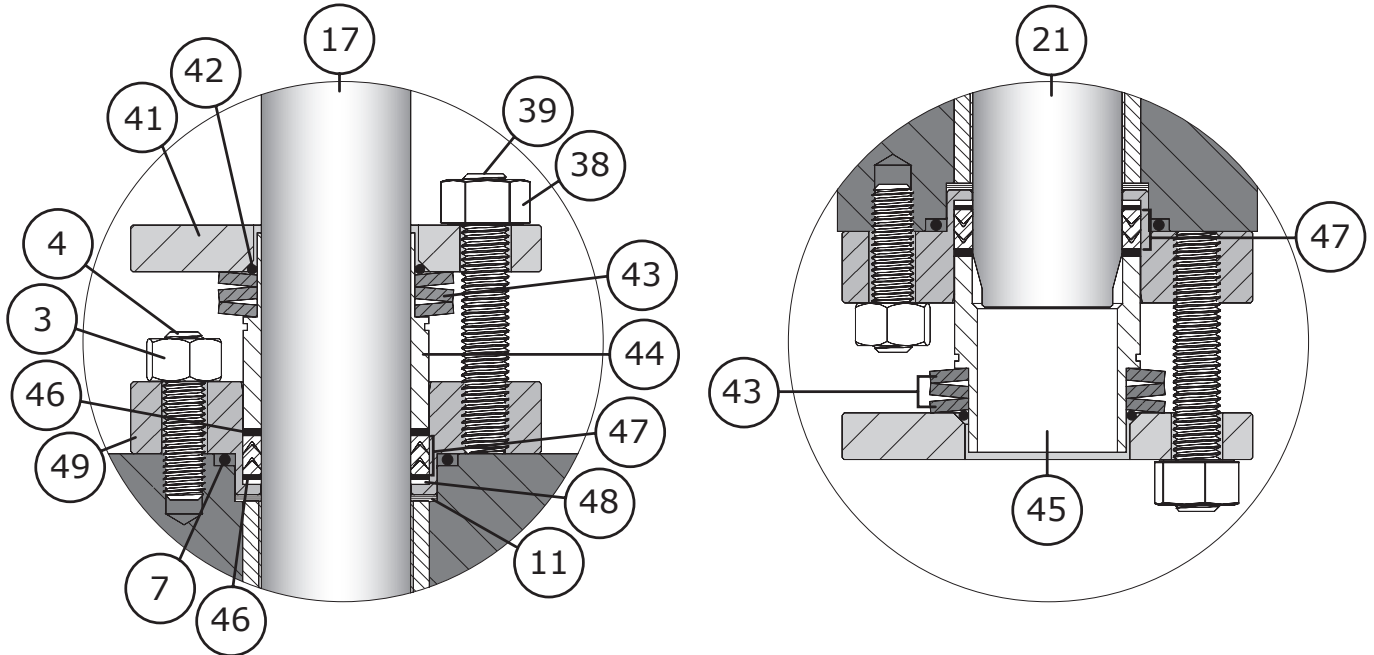


**Figure 43** Typical Dual Seal Valve Disassembly

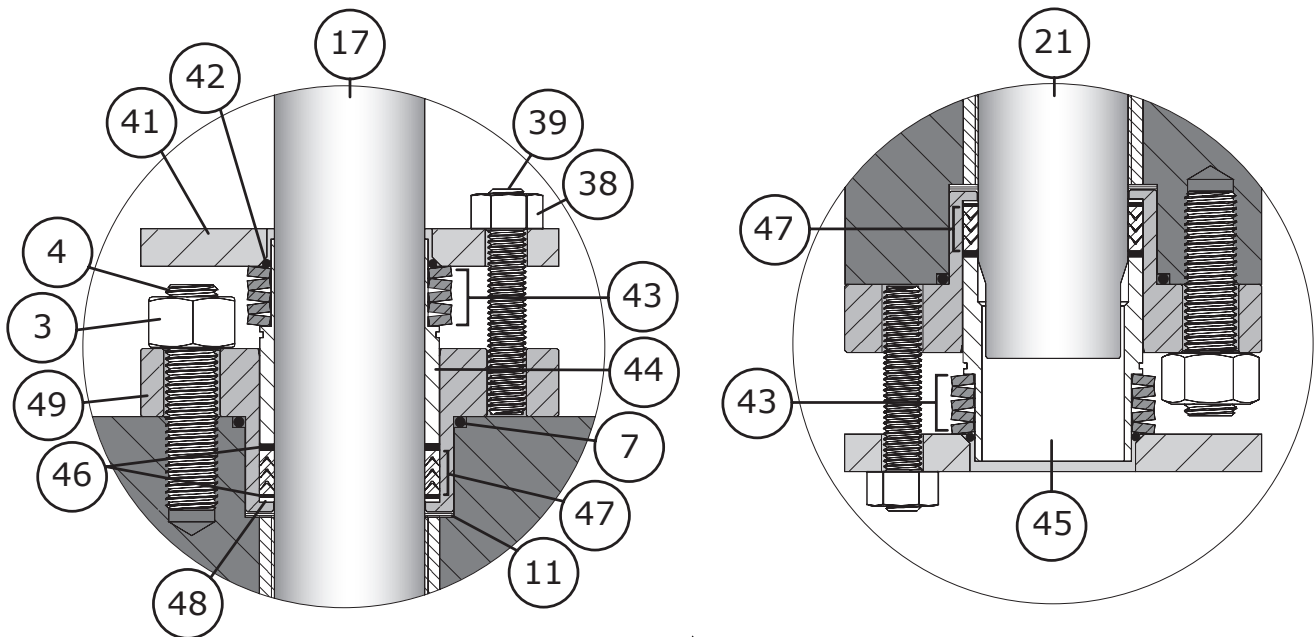


# Model 590 Control Valve

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**Figure 44** 6 Inch Valve Inboard and Outboard Live Loaded Packing Arrangement

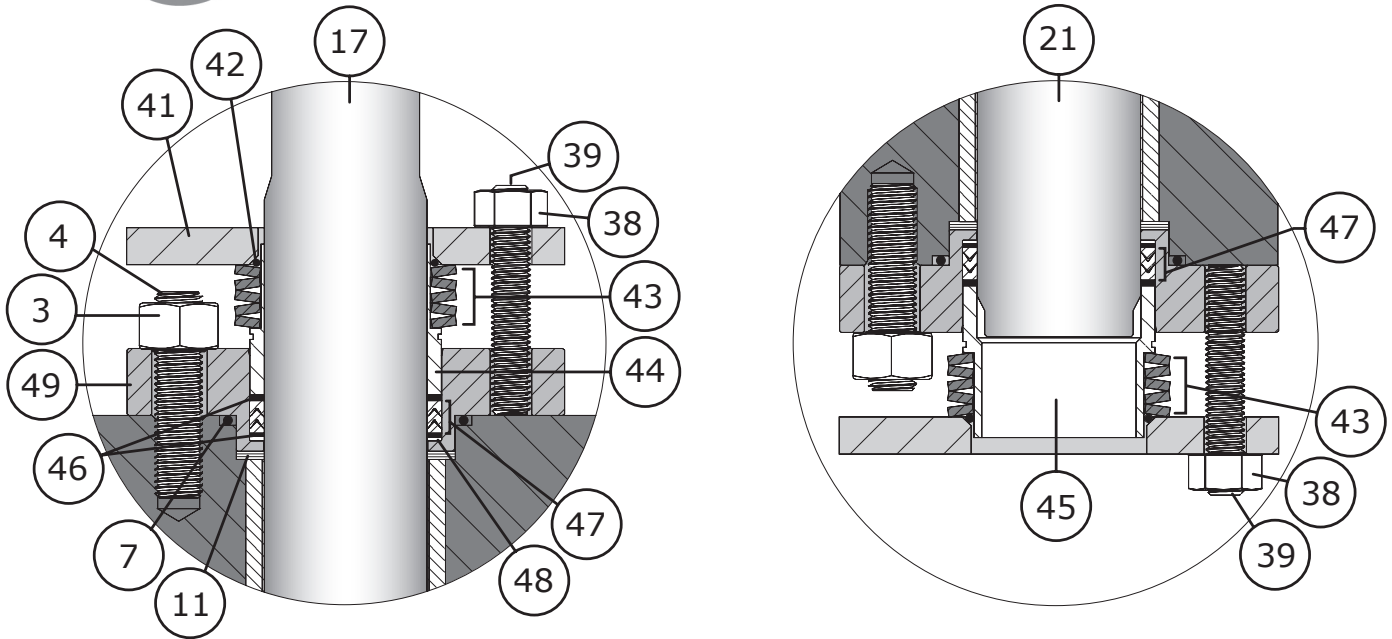


**Figure 45** 4 & 8 Inch Valve Inboard and Outboard Live Loaded Packing Arrangement

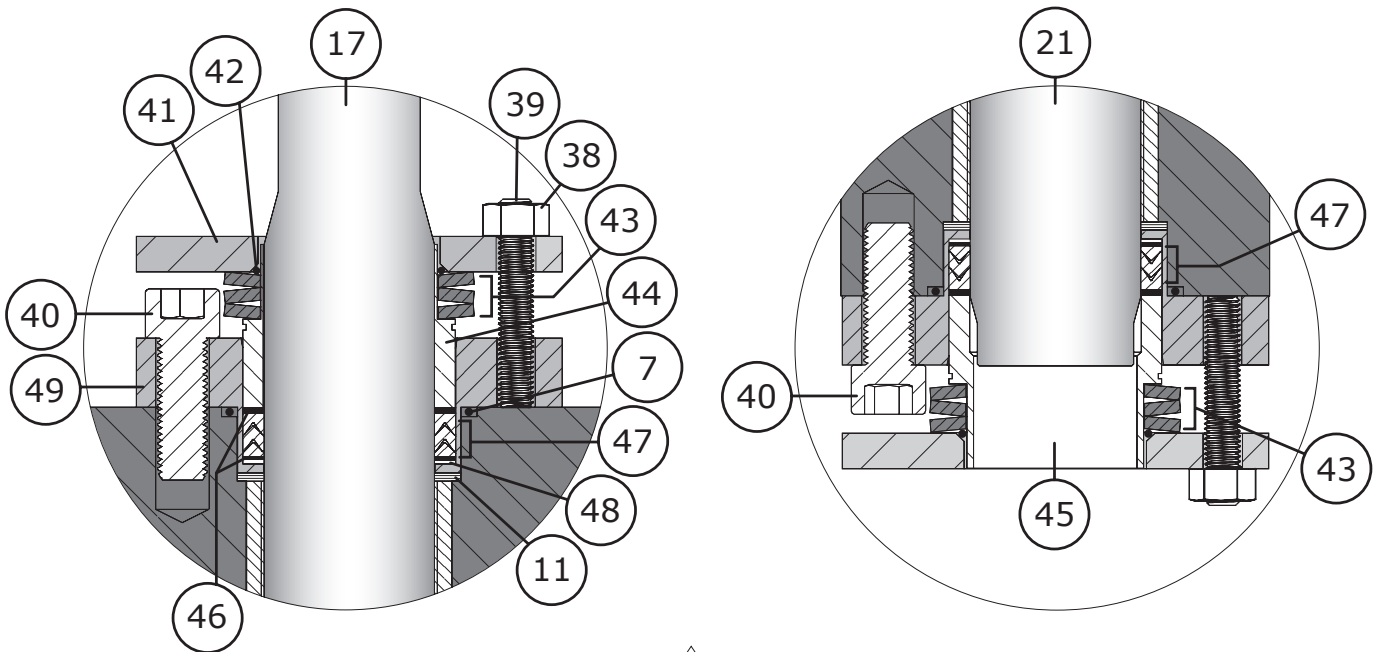


# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 46** 10 & 16 Inch Valve Inboard and Outboard Live Loaded Packing Arrangement



**Figure 47** 12 Inch Valve Inboard and Outboard Live Loaded Packing Arrangement

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



### TRAVEL ADJUSTMENT

Adjustments can be made to actuator travel with the valve assembly either in or removed from the pipeline.

#### For Assemblies In The Pipeline:

- 1 Power the actuator, if needed, to move the ball to the fully open position. If the ball (Key 2) inside bore is not perpendicular to the flange gasket surface of the seal protector ring (Key 26) then refer to the appropriate actuator instruction manual and adjust the actuator to achieve this.

#### For Assemblies Removed From Pipeline:

- 1 Rotate the ball (Key 2) to the fully open position. The ball is full open when the inside surface of the ball bore is square with the line flange gasket surface of the seal protector ring (Key 26).
- 2 Refer to the appropriate actuator instruction manual and adjust the actuator until the inside surface of the ball bore is at a right angle to the line flange gasket surface of the seal protector ring.
- 3 Reposition the indicator scale (Key 24) until the open position of the indicator is aligned with the indicator arrow stamped into the visible surface of the follower shaft (Key 21).

**Table 6**

### Packing Box (Key 49) and Seal Carrier (Key 5) Torque Requirements

Valve Size	Nut (Key 3)	
	lbf-ft.	N•m
4	95	129
6	125	169
8	275	373
10	275	373
12	275	373
16	405	549

**Table 7**

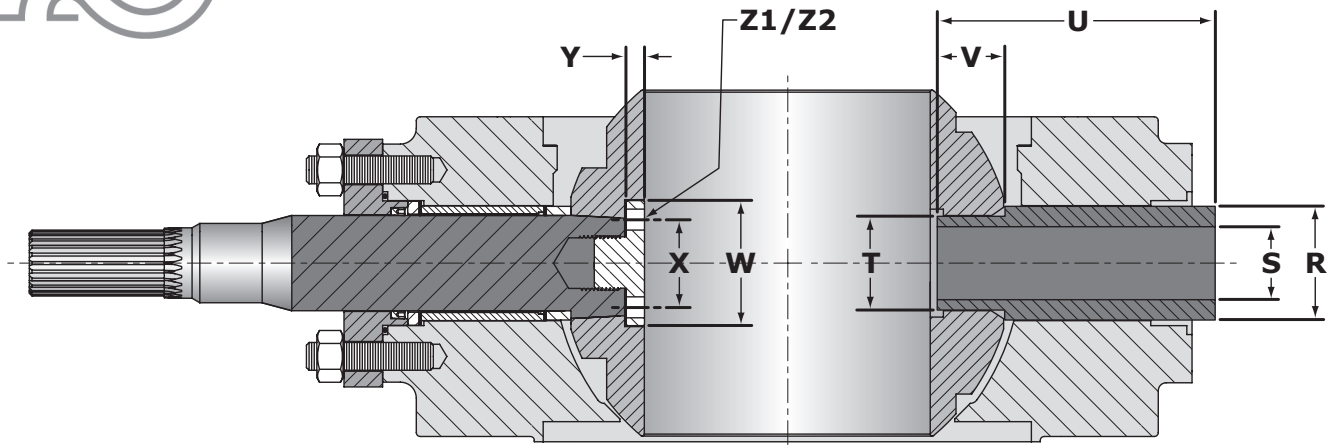
### Shaft Retainer (Key 16) and Retainer Screw (Key 20) Torque Requirements

Valve Size	Shaft Retainer		Retainer Screw	
	lbf-ft.	N•m	lbf-ft.	N•m
4	100	136	20	27
6	560	759	20	27
8	1,025	1,390	30	41
10	1,295	1,760	30	41
12	1,760	2,390	50	68
16	2,825	3,830	50	68



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 48** Ball Support Post and Shaft Retainer Removal Tool Construction Dimensions

<b>Table 8</b>										
<b>Ball Support Post and Shaft Retainer Removal Tool Dimensions Inch (mm)</b>										
<b>Valve Size</b>	<b>R*</b>	<b>S</b>	<b>T*</b>	<b>U</b>	<b>V</b>	<b>W</b>	<b>X</b>	<b>Y</b>	<b>Z1</b>	<b>Z2*</b>
4 Inch	1.615 (41.02)	0.938 (23.83)	1.245 (31.62)	5.750 (146.1)	0.875 (22.23)	1.813 (46.05)	1.188 (30.18)	0.313 (7.95)	4 holes	0.342 (8.69)
	1.605 (40.77)		1.235 (31.37)							0.356 (9.04)
6 Inch	2.490 (63.25)	1.625 (41.28)	1.995 (50.67)	6.500 (165.1)	1.000 (25.40)	2.688 (68.28)	1.812 (46.02)	0.438 (11.13)	4 holes	0.527 (13.39)
	2.480 (62.99)		1.985 (50.42)							0.547 (13.89)
8 Inch	2.990 (75.95)	2.000 (50.80)	2.495 (63.37)	8.500 (215.9)	1.375 (34.93)	3.375 (85.73)	2.188 (55.58)	0.500 (12.70)	4 holes	0.652 (16.56)
	2.980 (75.69)		2.485 (63.12)							0.672 (17.07)
10 Inch	3.365 (85.47)	2.125 (53.98)	2.745 (69.72)	8.500 (215.9)	1.750 (44.45)	3.438 (87.33)	2.188 (55.58)	0.625 (15.88)	4 holes	0.652 (16.56)
	3.355 (85.22)		2.735 (69.47)							0.672 (17.07)
12 Inch	3.615 (91.82)	2.375 (60.33)	2.995 (76.07)	9.000 (228.6)	2.000 (50.80)	3.938 (100.03)	2.562 (65.07)	0.563 (14.30)	4 holes	0.777 (19.74)
	3.605 (91.57)		2.985 (75.82)							0.801 (20.35)
16 Inch	4.990 (126.7)	3.250 (82.55)	3.990 (101.3)	11.500 (292.1)	2.625 (66.68)	5.438 (138.13)	3.688 (93.68)	0.750 (19.05)	4 holes	1.025 (26.04)
	4.975 (126.4)		3.975 (101.0)							1.051 (26.70)

**\*NOTE:** Indicates the maximum and minimum dimensions to establish tolerances.

# Model 590 Control Valve

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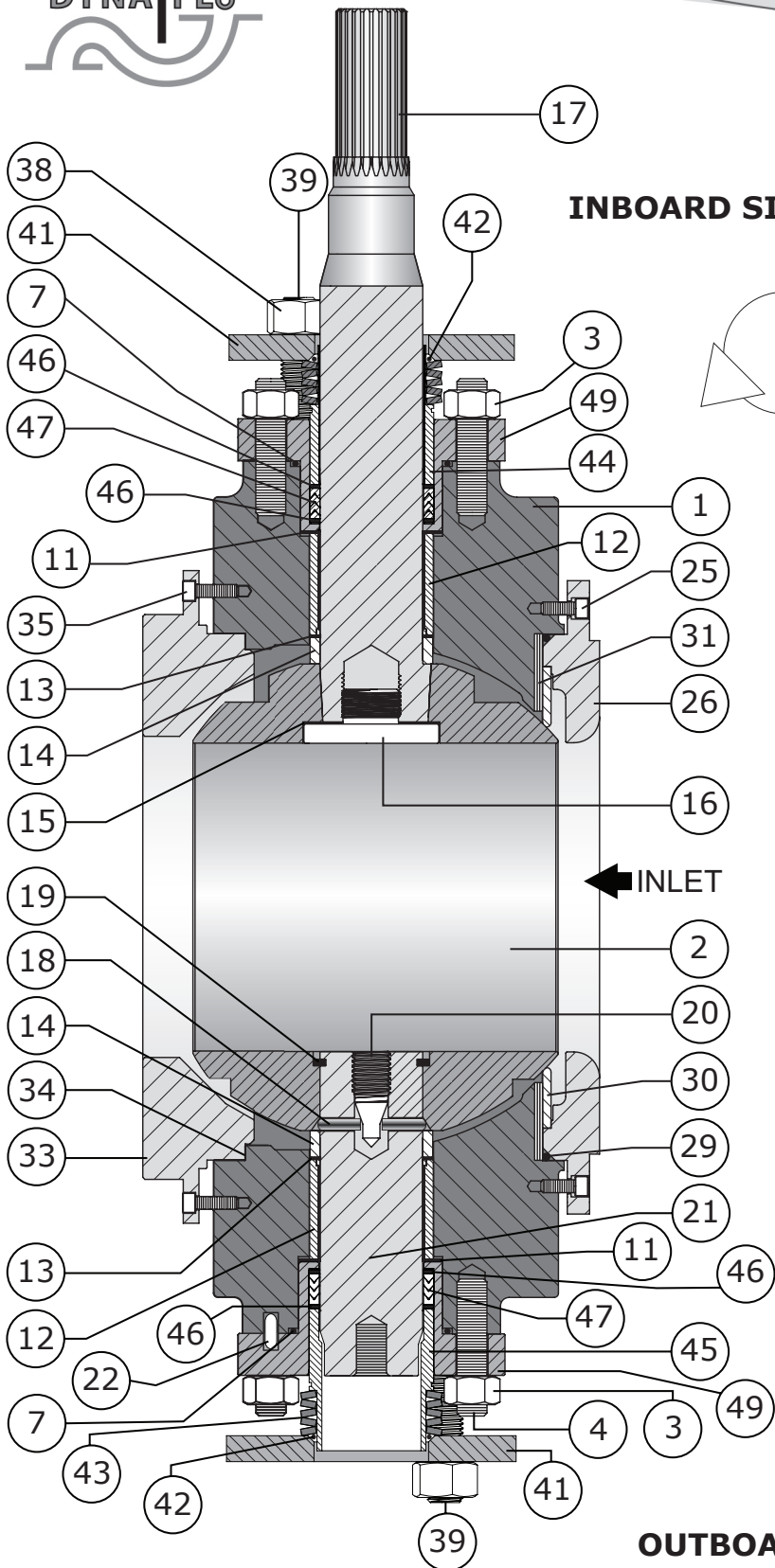
**Figure 49** Actuator / Valve Position Chart

		<b>ACTUATOR</b> (diagrams shown using DFRP model actuators)	<b>VALVE OPEN</b>
<b>RIGHT-HAND MOUNTED ACTUATOR</b>	<p><b>STYLE A</b></p> <p>PUSH DOWN TO CLOSE (PDTC)</p> <p>ACTUATOR POSITIONS</p>		
	<p><b>STYLE B</b></p> <p>PUSH DOWN TO OPEN (PDTO)</p> <p>ACTUATOR POSITIONS</p>		
<b>LEFT-HAND MOUNTED ACTUATOR</b>	<p><b>STYLE C</b></p> <p>PUSH DOWN TO CLOSE (PDTC)</p> <p>ACTUATOR POSITIONS</p>		
	<p><b>STYLE D</b></p> <p>PUSH DOWN TO OPEN (PDTO)</p> <p>ACTUATOR POSITIONS</p>		

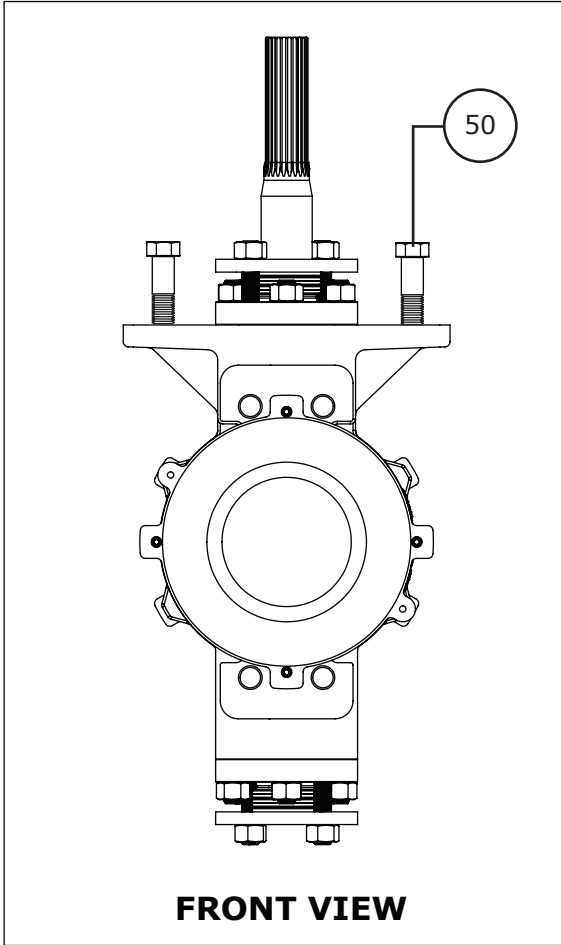


# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Figure 50**  
*Typical Live Loaded Packing  
 Single Seal Valve Assembly*



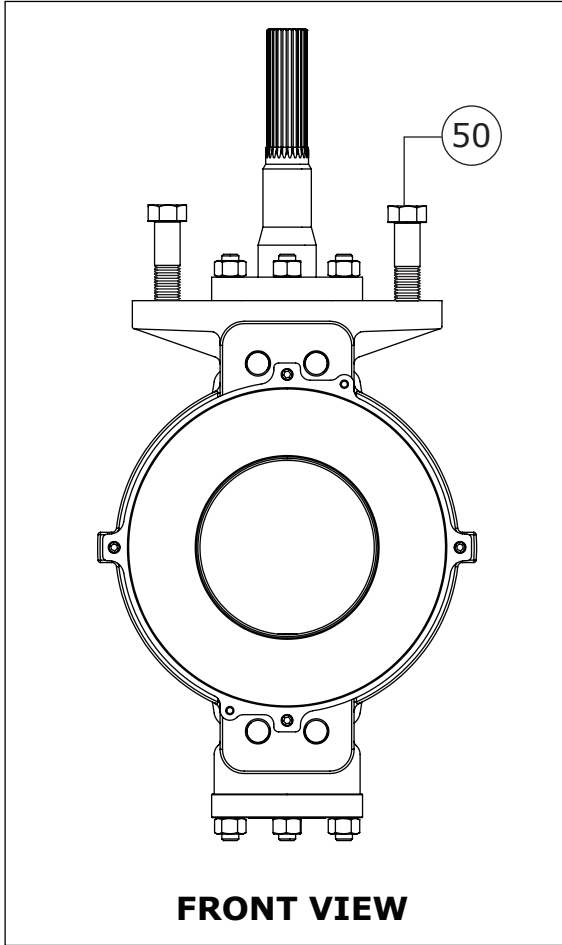
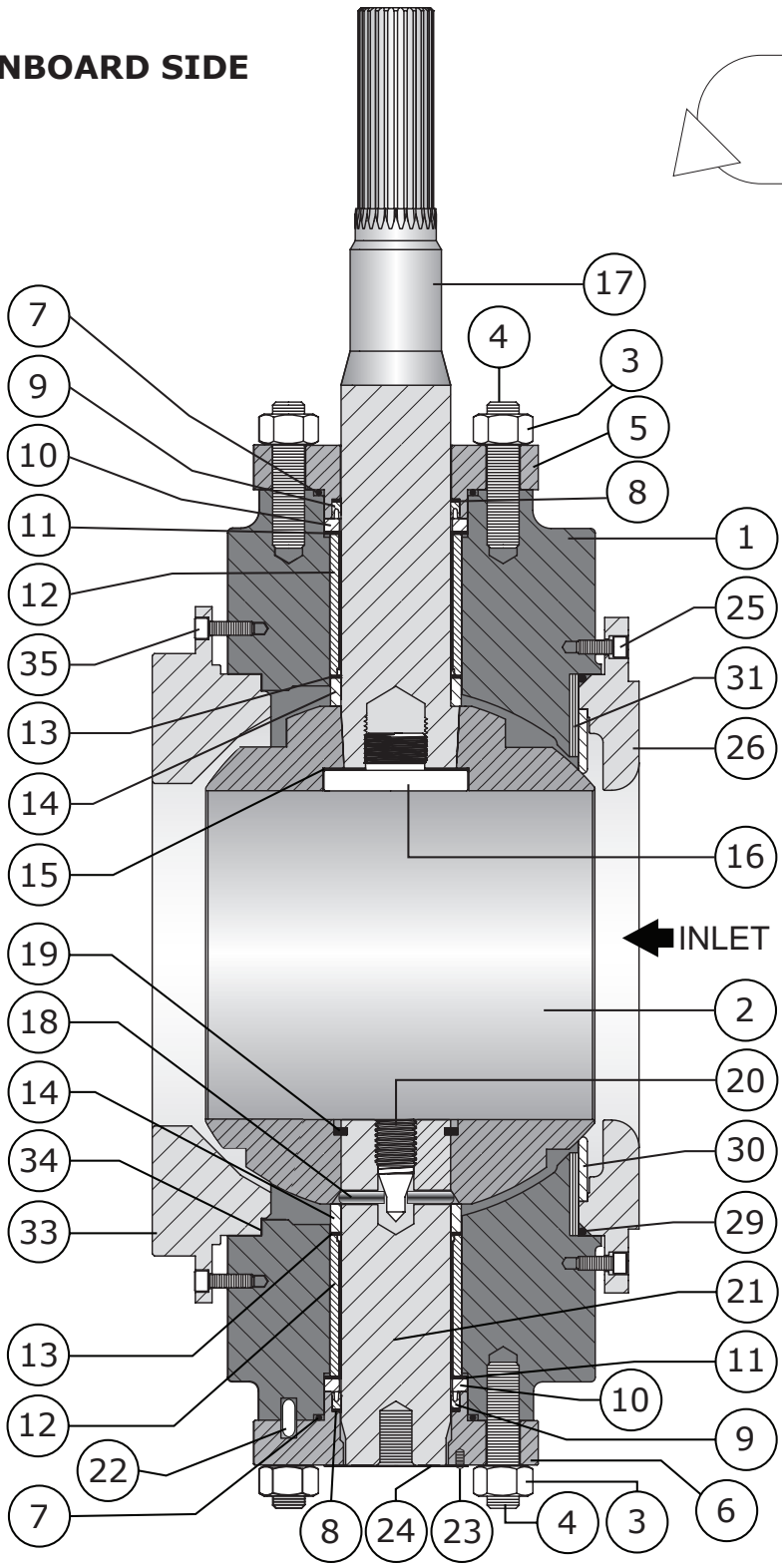
# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**INBOARD SIDE**

**Figure 51**  
*Typical Shaft Seal  
 Single Seal Valve Assembly*



**OUTBOARD SIDE**

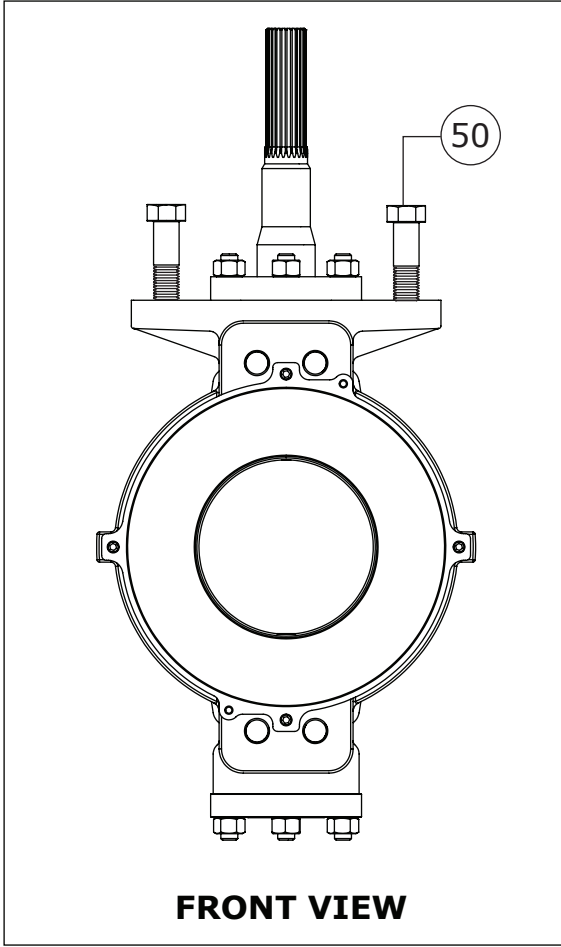
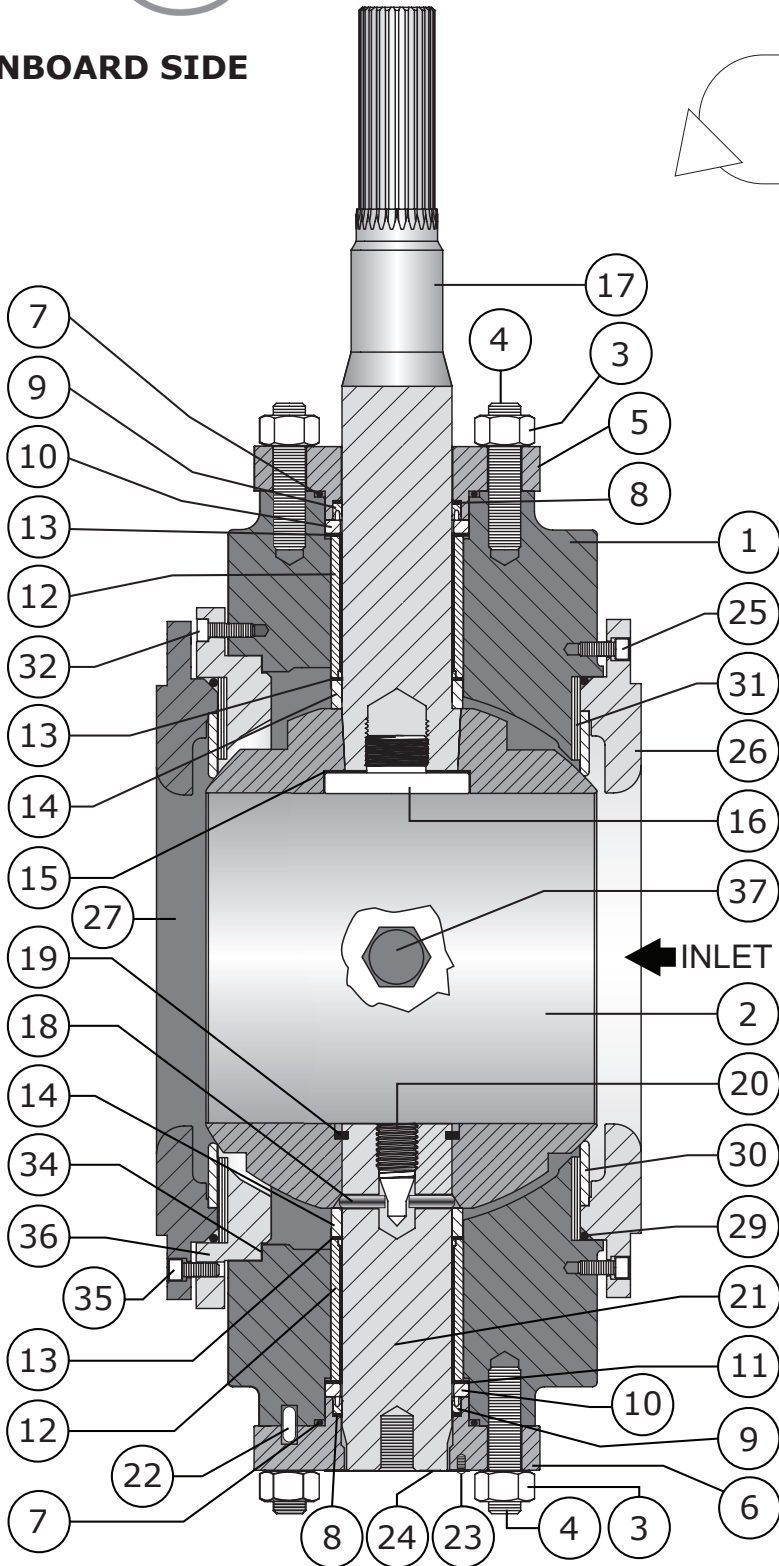


# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

**INBOARD SIDE**

**Figure 52**  
Typical Dual Seal Valve Assembly



**OUTBOARD SIDE**



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



### Parts

Key	Description	Part Number
<b>1</b>	<b>Body</b> If you need a body as a replacement part, order by valve size and stem diameter, serial number and desired material.	
<b>2</b>	<b>Ball</b>	
	-Steel Chrome Plated (Standard)	
	4 Inch	38A2506X04D
	6 Inch	37A6669X04D
	8 Inch	38A2562X04D
	10 Inch	48A2594X04D
	12 Inch	47A6514X04D
	16 Inch	48A4554X04D
	-S31600 Chrome Plated	
	4 Inch	38A2506X02D
	6 Inch	37A6669X02D
	8 Inch	38A2562X02D
	10 Inch	48A2594X02D
	12 Inch	47A6514X02D
	16 Inch	48A4554X02D
<b>3</b>	<b>Nut, Seal Carrier,</b> 2HM, 8 Required	
	4 Inch	1C33062HMDD
	6 Inch	1A37602HMDD
	8 Inch	1C1727X004D
	10 Inch	1C1727X004D
	12 Inch	1C1727X004D
	16 Inch	1A44092HMDD
<b>4</b>	<b>Stud, Seal Carrier,</b> B7M, 8 Required	
	4 Inch	1R2848B7MDD
	6 Inch	1A3781B7MDD
	8 Inch	1A2250X009D
	10 Inch	1A2250X009D
	12 Inch	1A2250X009D
	16 Inch	1L6223X007D
<b>5</b>	<b>Inboard Seal Carrier, S31600</b>	
	4 Inch	28A2515X03D
	6 Inch	38A2540X03D
	8 Inch	28A2572X03D
	10 Inch	28A2604X03D
	12 Inch	28A2633X03D
	16 Inch	28A4564X03D

Key	Description	Part Number
<b>6</b>	<b>Outboard Seal Carrier, S31600</b>	
	4 Inch	28A2514X03D
	6 Inch	38A2539X03D
	8 Inch	28A2571X03D
	10 Inch	28A2603X03D
	12 Inch	28A2632X03D
	16 Inch	28A4563X03D
<b>7</b>	<b>O-Ring, Seal Carrier,</b> Fluorocarbon, 2 Required	
	4 Inch	1K1365X005D
	6 Inch	1D4392X002D
	8 Inch	1K1810X002D
	10 Inch	1D7357X001D
	12 Inch	1P7427X002D
	16 Inch	1R3214X001D
<b>8</b>	<b>Backup Ring, PEEK,</b> Included with the seal ring	
<b>9</b>	<b>Seal Ring, Seal Carrier,</b> R30003 Spring Loaded Carbon PTFE, 2 Required	
	4 Inch	28B2099X02D
	6 Inch	28B2099X03D
	8 Inch	28B2099X04D
	10 Inch	28B2099X05D
	12 Inch	28B2099X06D
	16 Inch	28B2099X07D
<b>10</b>	<b>Spacer, S31600/S31603 Dual Grade,</b> 2 Required	
	4 Inch	18A2524X02D
	6 Inch	18A2549X02D
	8 Inch	18A2580X02D
	10 Inch	18A2613X02D
	12 Inch	18A2642X02D
	16 Inch	18A4573X02D
<b>11</b>	<b>Bushing Spacer Shims, S31600</b>	
	4 Inch	18A2525X01D
	6 Inch	18A2550X01D
	8 Inch	18A2581X01D
	10 Inch	18A2614X01D
	12 Inch	18A2643X01D
	16 Inch	18A4574X01D



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

### Parts (Continued)

Key	Description	Part Number
<b>12</b>	<b>Bushing, S31600/S31603 Dual Grade / CPTFE,</b> 2 Required	
	4 Inch	18A2520X04D
	6 Inch	18A2545X05D
	8 Inch	28A2577X05D
	10 Inch	18A2609X05D
	12 Inch	28A2638X05D
	16 Inch	28A4569X05D
<b>13</b>	<b>Thrust Washer, CTFE</b> 2 Required	
	4 Inch	18A2522X01D
	6 Inch	18A2547X01D
	8 Inch	18A2588X01D
	10 Inch	18A2611X01D
	12 Inch	18A2640X01D
	16 Inch	18A4571X01D
<b>14</b>	<b>Thrust Spacer, S31600/S31603 Dual Grade</b> 2 Required	
	4 Inch	18A2521X02D
	6 Inch	18A2546X02D
	8 Inch	18A2578X02D
	10 Inch	18A2610X02D
	12 Inch	18A2642X02D
	16 Inch	18A4570X02D
<b>15</b>	<b>Shaft Retainer Washer, S31600</b>	
	4 Inch	18A2526X01D
	6 Inch	18A2551X02D
	8 Inch	18A2582X01D
	10 Inch	18A2615X01D
	12 Inch	18A2644X01D
<b>16</b>	<b>Shaft Retainer, S20910</b>	
	4 Inch	18A2517X02D
	6 Inch	18A2542X02D
	8 Inch	18A2574X02D
	10 Inch	18A2606X02D
	12 Inch	18A2635X02D
	16 Inch	28A4566X02D
<b>17</b>	<b>Drive Shaft, S20910</b>	
	4 Inch	38A2518X02D
	6 Inch	38A2543X02D
	8 Inch	38A2575X02D
	10 Inch	38A2607X02D

Key	Description	Part Number
<b>17</b>	<b>Drive Shaft, Continued</b>	
	12 Inch	38A2636X02D
	16 Inch	38A8604X02D
<b>18</b>	<b>Pin, Follower Shaft,</b> S31600/S31603 Dual Grade, 2 Required	
	4 Inch	18A5012X01D
	6 Inch	18A5013X01D
	8 Inch	18A2587X01D
	10 Inch	18A2621X01D
	12 Inch	18A5014X01D
	16 Inch	18A4580X01D
<b>19</b>	<b>Split Ring, S31600/S31603 Dual Grade</b>	
	4 Inch	1P5684X012D
	6 Inch	18A5025X01D
	8 Inch	1R6690X008D
	10 Inch	18A2620X01D
	12 Inch	1R5823X005D
	16 Inch	18A4583X01D
<b>20</b>	<b>Retainer Screw, Follower Shaft</b> 18-8	
	4 Inch	18A5018X01D
	6 Inch	18A5015X01D
	8 Inch	18A5020X01D
	10 Inch	18A5022X01D
	12 Inch	18A5024X01D
	16 Inch	18A4582X01D
<b>21</b>	<b>Follower Shaft, S20910</b>	
	4 Inch	28A2519X02D
	6 Inch	28A2544X02D
	8 Inch	28A2576X02D
	10 Inch	28A2608X02D
	12 Inch	38A2637X02D
	16 Inch	28A4568X02D
<b>22</b>	<b>Locator Pin, Outboard Seal Carrier, 1B5987X006D</b> 18-8	
<b>23</b>	<b>Screw, Indicator Scale, Steel</b>	MPPS632X014
	3 Required (Seal Carrier Only)	
<b>24</b>	<b>Indicator Scale, S30400 (Seal Carrier Only)</b>	
	4 Inch	38A5028X01D
	6 Inch	38A5029X01D
	8 Inch	38A5032X01D
	10 Inch	38A5033X01D

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



### Parts (Continued)

Key	Description	Part Number
<b>24</b>	<b>Indicator Scale</b> , Continued	
	12 Inch	38A5034X01D
	16 Inch	38A5035X01D
<b>25</b>	<b>Cap Screws</b> , Seal Protector Ring, 18-8	
	4 Inch (2 Required / Ring)	SCC18.8516.100
	6 Inch (2 Required / Ring)	SCC18.8516.100
	8 Inch (4 Required / Ring)	SCC18.8516.100
	10 Inch (4 Required / Ring)	SCC18.8516.100
	12 Inch (4 Required / Ring)	10A1058X08D
	16 Inch (4 Required / Ring)	10A1058X08D
<b>26</b>	<b>Seal Protector Ring</b>	Contact Dyna-Flo
<b>27</b>	<b>Seal Protector Ring</b> , Dual Seal	Contact Dyna-Flo
<b>28</b>	<b>Flow Ring</b>	Contact Dyna-Flo
<b>29</b>	<b>O-Ring</b> , Seal Protector Ring, Fluorocarbon	
	4 Inch	19A1334X02D
	6 Inch	18A2556X03D
	8 Inch	1P5585X003D
	10 Inch	1V28260638D
	12 Inch	18A2648X02D
	16 Inch	18A4579X02D
<b>30</b>	<b>Ball Seal</b> , Acetal	
	4 Inch	18A2528X01D
	6 Inch	18A2553X01D
	8 Inch	18A2584X01D
	10 Inch	18A2617X01D
	12 Inch	1R83470637D
<b>31</b>	<b>Shims</b> , S31600	
	3 Required (6 for proper install)	
	4 Inch	18A2529X01D
	6 Inch	18A2554X01D
	8 Inch	18A2585X01D
	10 Inch	18A2618X01D
	12 Inch	18A2646X01D
16 Inch	18A4577X01D	
<b>32</b>	<b>Cap Screws</b> , Body Outlet / Dual Seal Adapter Ring, 18-8	
	4 Inch (2 Required)	SCC18.8516.100
	6 Inch (2 Required)	1N40062898D
	8 Inch (4 Required)	SSC18.8516.100
	10 Inch (4 Required)	SSC18.8516.100

Key	Description	Part Number
	12 Inch (4 Required)	10A1058X08D
	16 Inch (4 Required)	10A1058X08D
<b>33</b>	<b>Body Outlet</b>	Contact Dyna-Flo
<b>34</b>	<b>Gasket</b> , Body Outlet / Adapter Ring, PTFE	
	4 Inch	18A2530X01D
	6 Inch	18A2555X01D
	8 Inch	18A2586X01D
	10 Inch	18A2619X01D
	12 Inch	18A2647X01D
	16 Inch	18A4578X01D
<b>35</b>	<b>Cap Screw</b> , Adapter Ring, 18-8	
	4 Inch (2 Required)	SCC18.8516.100
	6 Inch (2 Required)	SCC18.8516.100
	8 Inch (4 Required)	SCC18.8516.100
	10 Inch (4 Required)	SCC18.8516.100
	12 Inch (4 Required)	10A1058X08D
	16 Inch (4 Required)	10A1058X08D
<b>36</b>	<b>Adapter Ring</b> , Dual Seal	Contact Dyna-Flo
<b>37</b>	<b>Pipe Plug</b> , 2 Required	
	-LF2 (ASTM A350) (For LCC Valve Body)	
	1/2" - For 4" Valve Body	570X0106X3D
	3/4" - All Other Valve Sizes	570X212X03D
	-SA105 (For WCC Valve Body)	
	1/2" - For 4" Valve Body	570X0106X1D
	3/4" - All Other Valve Sizes	570X212X01D
-S31600 (For CF8M Valve Body)		
1/2" - For 4" Valve Body	570X0106X2D	
3/4" - All Other Valve Sizes	570X212X02D	
<b>38</b>	<b>Nut</b> , Live Loaded Packing Flange, 8M, 4 Required	
	4 Inch	1A34123525D
	6 Inch	1A34333525D
	8 Inch	NH316C78
	10 Inch	NH316C78
	12 Inch	NH316C78
	16 Inch	NH316C100
<b>39</b>	<b>Stud</b> , Live Loaded Packing Flange, B8M, 4 Required	
	4 Inch	STB8M-012-238
	6 Inch	STB8M-058-334
	8 Inch	STB8M-078-400



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

### Parts (Continued)

Key	Description	Part Number
<b>39</b>	<b>Stud, Live Loaded Packing Flange (Continued)</b>	
	B8M, 4 Required	
	10 Inch	STB8M-078-400
	12 Inch	STB8M-078-400
	16 Inch	STB8M-100-512
<b>40</b>	<b>Cap Screw, Live Loaded Packing,</b>	
	12 Inch Seal Carrier, S31600,	
	8 Required	SCC316.78.212
<b>41</b>	<b>Packing Flange, Live Loaded,</b>	
	S31600/S31603 Dual Grade, 2 Required	
	4 Inch	LLR12590PFD
	6 Inch	LLR20590PFD
	8 Inch	LLR25590PFD
	10 Inch	LLR27590PFD
	12 Inch	LLR30590PFD
	16 Inch	LLR40590PFD
<b>42-48</b>	Refer to Table 9	
<b>49</b>	<b>Packing Box, Live Loaded,</b>	
	S31600, 2 Required	
	4 Inch	590X421X01D
	6 Inch	590X621X01D
	8 Inch	590X821X01D
	10 Inch	590X021X01D
	12 Inch	590X121X01D
	16 Inch	590X161X01D
<b>50</b>	<b>Actuator Mounting Bolts,</b>	
	Grade 5 Steel	
	4 Inch	H5CZ58.200
	6 Inch	H5CZ34.200
	8 Inch	H5CZ78.212
	10 Inch	H5CZ78.212
	12 Inch	H5CZ78.234
	16 Inch	H5CZ114.314
<b>51</b>	<b>Flange Stud</b>	
<b>52</b>	<b>Short Cap Screw</b>	
<b>53</b>	<b>Long Cap Screw</b>	

### Parts Ordering

Whenever corresponding with Dyna-Flo about a 590 Control Valve, refer to the nameplate for the serial number of the unit. Please order by the complete part number (as given in the following parts list) of each part required.

# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



**Table 9**

### Live Loaded Packing Retro-Fit Kit

Valve Size	Part Number
4 Inch	R590XLR040D
6 Inch	R590XLR060D
8 Inch	R590XLR080D
10 Inch	R590XLR100D
12 Inch	R590XLR120D
16 Inch	R590XLR160D

### Kit Includes

Key	Description
7 (Quantity 2)	Seal Carrier O-ring
38 (Quantity 4)	Live Loaded Packing Flange Nut
39 (Quantity 4)	Live Loaded Packing Flange Stud
40 (Quantity 8)	Live Loaded Packing Cap Screw (12" Valve Only)
41 (Quantity 2)	Packing Flange
42 (Quantity 2)	Packing Flange O-Ring
43 (Refer to Figures 44 to 47 for Quantity) (2 Sets)	Spring Washers
44	Live Loaded Packing Follower (Drive Shaft)
45	Live Loaded Packing Follower (Follower Shaft)
46 (Quantity 4)	Anti-extrusion Ring
47 (Refer to Figures 44 to 47 for Quantity) (2 Sets)	PTFE Packing Set
48 (Quantity 2)	Packing Box Ring
49 (Quantity 2)	Packing Box



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

**Table 10**

**Live Loaded Repair Kit**

Size	Part Number
4 Inch	R590XL0040D
6 Inch	R590XL0060D
8 Inch	R590XL0080D
10 Inch	R590XL0100D
12 Inch	R590XL0120D
16 Inch	R590XL0160D

<b>Kit Includes</b>	
Key	Description
7 (Quantity 2)	Seal Carrier O-ring
46 (Quantity 4)	Anti-extrusion Ring
47 (Refer to Figures 44 to 47 for Quantity) (2 Sets)	PTFE Packing Set
48 (Quantity 2)	Packing Box Ring



# Model 590 Control Valve

## Operation, Parts, and Instruction Manual



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# Model 590 Control Valve

## MODEL NUMBERING SYSTEM

**SAMPLE PART NUMBER: 590-8-CLS-PN**

VALVE SIZE						8	
4	4 INCH	6	6 INCH	8	8 INCH		10
12	12 INCH	16	16 INCH				
BALL MATERIAL						-	
-	STEEL / CRPL	S	S31600 / CRPL				
ASME RATING / END CONNECTION						C	
C	600 RF	D	900 RF	E	600 RTJ		F
BODY MATERIAL						L	
L	LCC	W	WCC <sup>(1)</sup>	M	CF8M		
BALL SEAL CONFIGURATION						S	
S	SINGLE SEAL	D	DUAL SEAL	F	FLOW RING		
PAINT						-	
-	DFPS-01 (STANDARD)			2	DFPS-02 (SEVERE SERVICE)		
3	DFPS-03 (HIGH TEMPERATURE)						
SHAFT SEALS						L	
L	LIVE LOADED PTFE PACKING (STANDARD)						
SHAFT MATERIAL / STYLE						N	
N	S20910 SPLINED						

**NOTES:**

- 1 - WCC material is special order for all parts.
- 2 - This option must be used when mounting the valve to another manufacturer supplied actuator, the use of a non-Dyna-Flo supplied mounting yoke will void warranty.

**590**

***Our Commitment to Quality***

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