Model
**360** Control Valve
Operation, Parts and Instruction Manuals

**Figure 1** *360 Control Valve & DFC Actuator*

# Dyna-Flo 360
## Operation, Parts and Instruction Manual

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# Model 360 Control Valve
## Operation, Parts and Instruction Manuals

**!NOTICE!** These instructions are meant to be used with the Dyna-Flo Model 360 Technical (Sales) Bulletin. If you do not have the Technical Bulletin, contact Dyna-Flo immediately, or visit **www.dynaflo.com**

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

## Introduction

The Model 360 Control Valves are heavy duty globe style control valves used in many demanding oil and gas applications from well head to gas plant and beyond. The Model 360 is also suited for any refinery or chemical process that requires a rugged and easy to maintain control valve solution.

Model 360 control valves are cage guided, pressure balanced with push down to close plug action. The actuator typically used for 360 control valves are Dyna-Flo model DFC or DFO linear actuators. These heavy duty actuators are spring return diaphragm style, and can be used for throttling or on/off service, with or without a valve positioner.

The Model 360 control valve is manufactured to a high level of quality specifications to ensure superior performance and customer satisfaction.

## 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 only be done 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 valve configuration and construction materials were selected to meet particular pressure, pressure drop, temperature, and process fluid conditions. Some body and trim 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 to successfully using the Dyna-Flo Model 360 for many years.

**! CAUTION !**

**To avoid personal injury or installation damage as a result of the sudden release of process pressure or the breaking of parts, do not install the valve assembly where service conditions could exceed the limits stated in this manual or on the equipment nameplates. Use government codes, accepted industry standards and good piping practices to select pressure-relieving equipment for protection of your installation. It is also important to wear the proper protective equipment when performing any installation or maintenance activity.**

# Specifications

## Configurations

The 360 Series control valves are high capacity single port, globe style valves, with a bolted type valve bonnet. The valve plug action is push down to close.

See Table 1 of Sales Bulletin

Consult your Dyna-Flo sales office for other available configurations.

## Sizes and Connection Styles

| | |
|---|---|
| Models: | 360, 361, 362 |
| Size: | 1", 1-1/2", 2", 3", 4", 6", 8" |
| Rating: | ASME 150 / 300 / 600 |
| Connections: | RF / RTJ All Sizes |
| | NPT - 1", 1-1/2" and 2" |

## Maximum Inlet Temperature and Pressures

Flanged valves consistent with ANSI Class rating as per ASME B16.34, unless limited by either material pressure or temperature limitations.

## Maximum Pressure Drops

Maximum pressure drop is the same as maximum inlet pressure unless otherwise rated by a specific trim construction.

## Standard Shut-off Classifications

In accordance with ASME / FCI 70.2
-360 Series - Standard Class IV
-361 Series - Standard Class II
-362 Series - Standard Class IV

See Table 1 of Sales Bulletin for Optional Shut-off capability

## Dimensions

**Valve and Actuator Outline Dimension Diagram**
See Figure 2 of Sales Bulletin

**Valve and Actuator Assembly Dimensions**
See Table 3 and Table 4 of Sales Bulletin

**Approximate Valve Body and Actuator Weights**

See Table 11 of Sales Bulletin

## Materials

The standard body material is LCC. The standard bonnet material is LF2 or LCC. CF8M (316 SST) is an option. See Table 5 of Sales Bulletin for typical construction materials. See Tables 6 and 7 of Sales Bulletin for trim selections.

## Cross-Section of 360 Series Control Valves

See Figure 12

## Flow Characteristics

Standard cage is equal percent. Other cages are available upon request. 360 and 361 control valves normally flow down. 362 control valves normally flow up.

## Port Diameters and Maximum Valve Plug Travel

See Table 2 of Sales Bulletin

## Packing Type

The Standard packing is PTFE V-ring. Live-loaded low emission, graphite and other packing arrangements are available.

## Valve Sizing Coefficients

See Table 8 of Sales Bulletin

**Actuator Sizing**

**Fail Open Actuator**
See Table 9 of Sales Bulletin

**Fail Close Actuator**
See Table 10 of Sales Bulletin

**Trim Style Service Application**

See Table 7 of Sales Bulletin

## Unpacking Valve from Shipping Container

Check the packing list against materials received, while unpacking the valve. The Packing List describes the valve and accessories in each shipping container.

When lifting the valve from shipping container, it is advisable to remove 2 actuator casing bolts, 180° apart, and temporarily replace them with eyebolts and nuts. See Figure 3 for details. Position the lifting straps through the eyebolts to avoid damage to the tubing and mounted accessories.

**! WARNING !**

**The following maintenance procedures require removing the control valve from service. To avoid personnel injury, only qualified technicians should perform the following procedures. Always ensure the control valve is fully released of pressure or process fluid before starting maintenance.**

## Installation

Before installing the valve, clean dirt, welding chips, scale or other foreign material from the line.

Inspect flange gasket surfaces for damage.

Check packing box bolting for proper tightness. Packing nuts should be slightly over finger-tight; however, tighten only as necessary to prevent stem leakage.

### Packing Maintenance:

**! CAUTION !**

**Do not over tighten packing! This can cause excessive packing wear and high stem friction that may impede stem movement!**

**1** Install the valve with flow through the valve in the direction shown by the flow arrow on the valve body. The valve assembly may be installed in any position unless limited by vibration considerations.

**! CAUTION !**

**The normal method is with the actuator vertical above the valve body. In some non-vertical applications, the actuator may need to be supported.**

**! WARNING !**

**Keep hands, hair and clothing away from all moving parts when operating the valve! Serious injury can result from failure to do so!**

**2** When possible, stroke the valve and check for smooth operation through the full-stroke. Unsteady valve stem movement could be an indication of an internal problem.

## Air Piping

The actuators are designed to accept 1/4” NPT connection. Use 3/8” OD tubing (or equivalent) for all air lines. All connections must be free of leaks.

**! CAUTION !**

**Do not exceed maximum casing pressure indicated on serial plate located on the yoke of the actuator.**

## Periodic Inspection

**! CAUTION !**

**Use safe work practices and lock out procedures when isolating valves and actuators! Always be aware of flammable instrument gas!**

**1** Avoid personal injury from sudden release of process pressure! Before performing any maintenance operation:

- **a** Disconnect any power supply media lines providing air / gas pressure, electric power, or a control signal to the actuator. Ensure the actuator cannot suddenly operate the valve.
- **b** Isolate the valve from process pressure with bypass valves or completely shut off the process. Relieve process pressure, and drain the process fluid from the up and down stream of the valve.
- **c** Vent the pneumatic actuator loading pressure and relieve any actuator spring preload.
- **d** Use Safety lock-out procedures to be sure that the above provisions stay in effect while you complete the work on your equipment.

**2** Check for process fluid leakage to the atmosphere through the body to bonnet joint and (if equipped) any NPT connection.

**3** Examine the valve for damage caused by corrosive fumes or process drippings.

**4** Clean the valve and repaint areas of severe oxidation.

**5** Make sure positioner linkage (if equipped) and stem connector are securely fastened. If the stem connector is loose, check plug thread engagement and retighten. Refer to the Dyna-Flo Model DFC, or DFO Manual for detailed instructions.

**6** Ensure all accessories, mounting brackets and fasteners are secure.

**7** Clean any dirt and foreign material from the valve stem.

## Maintenance

**Only "Certified Technicians" should be dissasembling and inspecting these valves and actuators.**

**! CAUTION !**

**Actuator spring is under compression.**

**The actuator is also under pneumatic / gas pressure. Ensure actuator has been disconnected from supply lines before starting any work on the actuator.**

**The actuator needs to be supported before the yoke nut can be removed, failure to support actuator could result in actuator damage and/or personal injury.**

### Removing Actuator from Valve

**Refer to the Dyna-Flo Model DFC/DFO Manual for detailed instructions.**

**1** Disconnect all pneumatic/gas supply lines and any other lines that might supply pressure to the actuator.
**ON MODEL DFC (FAIL CLOSED) ACTUATORS:** Connect a 30 psi supply line to the inlet port of the actuator. Be sure not to exceed the maximum casing pressure. This will open the valve and take downward force off the stem connector.

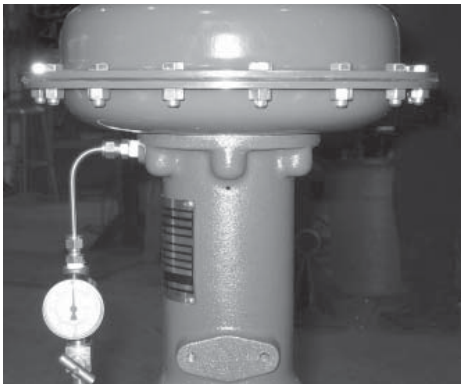


**Figure 2** *Needle Valve w/Gauge setup*

## **Maintenance** (con't)

### **Removing Actuator from Valve** (Con't)

**2** Remove the stem connector (Refer to the DFC / DFO Instruction Manual for stem connector removal instructions).

**3** Support the actuator - the actuator may be able to be removed manually on the smaller sizes. For rigging use two eyebolts in place of two of the casing bolts; make sure they are located 180° apart so that the actuator can be lifted vertically off the valve. Use a sling or chain with hooks to lift the actuator from the valve with the eyebolts. Refer to Figure 3 for rigging setup.

**Figure 3** *Rigging Setup*

**4** Use a blunted heavy chisel to loosen yoke nut (See Figure 4), unscrew yoke nut off of bonnet. Lift actuator off of valve and store in a safe place.

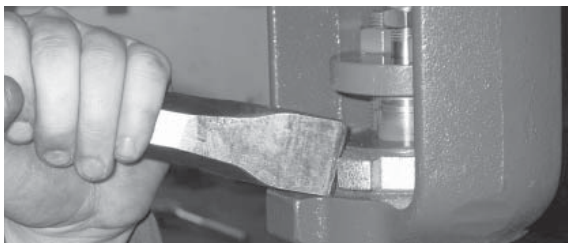


**Figure 4** *Yoke Nut being loosened with a Chisel*

**5** Remove the jam nuts and travel indicator from the valve stem. Refer to DFC / DFO actuator manual for disassembly procedures for actuators.

**6** Once actuator has been removed from the valve the air pressure in the actuator can be released. (DFC actuator only)

### Packing Maintenance

**Refer to Figure 9 & 10 for packing orientation and Key numbers for the following section.**

**For single (spring-loaded) packing:**

**a** Spring-loaded packing has constant force applied to the packing set (Key 2) through a spring (Key 5) in the packing bore. Ensure that the packing follower (Key 8) is in contact with the bonnet (Key 1), if not tighten the packing nuts (Key 12) until the packing follower comes in contact with the bonnet. If this does not stop the leak then the packing will need to be replaced. In some cases the bonnet and/or stem (Key 17) may need to be polished or replaced.

**b** Refer to Valve Disassembly section for Packing Removal and Inspection.

**! CAUTION !**

**Do not tighten the packing nuts past the recommended maximum torque value as this will cause high stem friction and could cause the valve to operate incorrectly.**

**For double packing / graphite ring packing:**

**a** Double packing consists of two packing sets (Keys 2 & 3) separated by a lantern ring (Key 6). This style of packing requires that the packing nuts (Key 12) be kept tight to keep force on the packing. If leakage is detected from the packing, the packing nuts can be tightened to apply more force on the packing set (make sure not to exceed the maximum allowable torque values, see Table 2). If this does not seal off the leak then the packing will need to be replaced. In some cases the bonnet (Key 1) and/or stem (Key 17) may need to be polished or replaced.

**b** Refer to Valve Disassembly section for Packing Removal and Inspection.

## Valve Diassembly

**! CAUTION !**

**If maintenance is to be performed on the valve inline, relieve process pressure and drain the process media from the upstream and downstream sides of the valve. Check that bypass valves are used or the process has been completely shut down.**

### Bonnet Removal

**1** Remove the packing nuts (Key 12) and loosen the bonnet nuts (Key 28) a few millimeters. The bonnet may need to be rocked loose or loosened from the body by prying at the bonnet-to-body joint (See Figure 5). Take care not to damage the gasket-sealing surface when separating the bonnet. If no process medium leaks from the bonnet-to-body joint removal of the bonnet nuts (Key 28) can proceed.

**2** When removing the bonnet (Key 1) ensure that the stem / plug assembly (Key 19) does not drop out of the bonnet. This could damage the plug seating surface.

**3** A razor or a pick-set can be used to remove old gaskets. Inspect the gasket-sealing surface for scratches or dents that may cause the gasket to leak.

**! NOTE !**

**Spiral wound gaskets (Key 24) make their seal by being crushed. Spiral wound gaskets cannot be reused.**

**4** Inspect threads on bonnet studs (Key 27) and on packing studs (Key 11) for any damage.

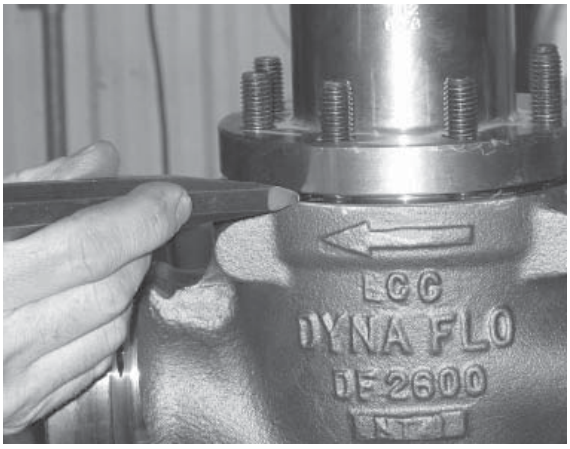



**Figure 5** *Body being separatd with a chisel*

### Trim Parts Removal (plug/seat/cage)

**Refer to Figures 11 & 12 for Key numbers**

**1** **For one-piece seal ring (spring-loaded):** To remove the seal ring (Key 34), first pry the retaining ring (Key 41) out of the groove, then remove the metal backup ring (Key 35). Finally remove the seal ring from the plug.

**For two-piece seal rings:**
These rings (Keys 34 & 35) can be cut with a sharp knife; this will allow you to remove the rings without damaging the sealing surface on the plug.

**On 8-inch valves** the load ring (Key 36) will need to be removed from the cage.

**2** Inspect the valve stem (Key 17) for any deep scratching or corrosion also inspect the threads for any damage. Minor scratching or corrosion is acceptable. A minor scratch can be defined as a scratch that will not stop your fingernail when you run it across the scratch. Anything other then a minor scratch will need to be sent to the factory to be refurbished back to the 4µin finish.

**3** Inspect the seating area on the plug (Key 16). Some minor scratching or corrosion can be lapped out of the plug. The plug can be machined and lapped to remove damage caused by normal wear, corrosion or erosion. Care must be taken not to machine the seat surface back to far as this will effect the position of the seal ring in the cage and may cause failure.

**4** Inspect the seal ring sealing surface on the plug for any scratching.

**5** **For one-piece metal seat ring (Key 21):** Inspect the metal seat surface for any damage caused by erosion, corrosion or deep scratching. Minor scratching or corrosion can be removed by lapping or machining. Seat ring will need to be replaced if lapping or machining cannot remove the damage. Also inspect the gasket-sealing surface for any damage.

**For three-piece soft seat ring disassembly**

**(Keys 31, 32 & 33):**

The disk seat (Key 32), PTFE disk (Key 33) and disk retainer (Key 31) will need to be inspected for any damage. Minor scratching is acceptable

## Valve Diassembly (Cont'd)

**Trim Parts Removal (plug/seat/cage)** (Cont'd)

**For three-piece soft seat ring disassembly (Keys 31, 32 & 33):**

on these parts. The angle on the disk seat that supports the PTFE disk must be in good condition in order to seal effectively. If the PTFE disk cannot seal the imperfections on the disk seat, the valve will leak. These parts will need to be replaced if there is deep scratching or corrosion. The PTFE disk would normally be replaced during routine maintenance.

**6** Inspect the inside diameter of the cage (Key 18) for signs of erosion, corrosion or deep scratching. Cages can be polished, but any deep scratching or corrosion is cause for replacement.

**7** Inspect the gasket surfaces on the load ring (Key 36) for any damage.

**Packing and Packing Parts Removal**

**! CAUTION !**

**Concentrated gases could be trapped in the packing!**

**1** Remove all packing parts (Keys 2 through 9, & 14) from the packing bore. Use a rounded tool to remove the packing set (Keys 2 & 3) from the packing bore. Clean all metal parts; if they are not damaged they can be reused.

**2** Inspect the packing bore for any scratching or corrosion; minor scratching or pitting in the packing bore can be polished out.

**Body Gasket Removal**

**1** A razor or a pick-set can be used to remove old gaskets.

**! CAUTION !**

**Care must be taken to avoid damaging these surfaces.**

**! NOTE !**

**Spiral wound gaskets (Key 24) make their seal by being crushed. Spiral wound gaskets cannot be reused.**

**2** Inspect all gasket surfaces for damage.

**3** Inspect the internal body surfaces for any signs of corrosion, erosion or irregular wear.

## Lapping

Hand lapping is typically performed on new metal seats to optimize sealing performance. In some cases during maintenance, sealing performance of metal seats can be improved by hand lapping. Dyna-Flo recommends the lapping of metal seats on all Model 360 valves when new trim is installed or when seats have been re-machined.

Before proceeding with LAPPING process, inspect the plug / stem and seat as described in **Trim Parts Removal** (page 7).

**1** Ensure all valve parts have been thoroughly cleaned before lapping. If the valve plug (Key 16) and seat ring (Key 21) have minor scratches on the seating surface, lapping can remove thes scratches without having to replace or machine the plug or seat ring.

**2** The seat ring (Key 21) and valve plug (Key 16) can be lapped with the seat in or out of the body. Having the seat ring out of the body will ensure that no lapping compound will be left behind in the body that may get in between the seats causing the valve to leak.

**3** Coat the seating surface of the seat ring (Key 21) with fine grit lapping compound (400-600). Place the valve plug (Key 16) onto the seat ring without the seal ring (Key 34) or backup ring (Key 35) installed.

**4** Lubricate the inner diameter of the cage with light assembly grease. Place the cage (Key 18) over the valve plug (Key 16) and down onto the seat. Refer to Figure 6. This will ensure that no lapping compound gets between the cage and plug.

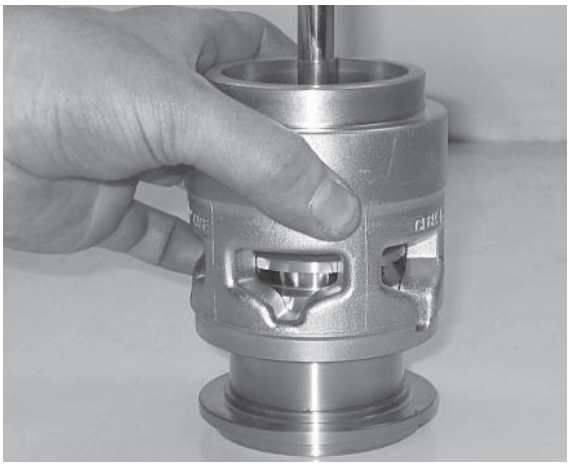


**Figure 6** *Plug going into Cage*

## **Lapping** (Cont'd)

**5** Carefully place bonnet (Key 1) over the stem (Key 17) and down on top of cage (Key 18). Place packing follower (Key 8) over the stem and into the packing bore. The bonnet and packing follower act as a guide while you are lapping, these parts will keep the plug centered while lapping. Use two jam nuts and two and two wrenches to make a lapping handle. Refer to Figure 7 for lapping handle setup.

**Figure 7** *Lapping Handle*

**6** Rotate the valve plug (Key 16) in a clockwise direction and then a counter clockwise direction (only a small amount of rotation is required), apply a light downward force while rotating the valve plug back and forth. After 3 full cycles of turning the valve plug and stem (Key 19), lift the valve plug off of the seat ring (Key 21) to allow for fresh lapping compound to get in between the seats.

**! CAUTION !**

**If while lapping the seats you start to hear a squeaking noise as you rotate the plug / stem, you will need to add more lapping compound to the seats as this noise is caused by shortage of lapping compound.**

**7** Remove the packing follower (key 8) and bonnet (Key 1), wipe the lapping compound off of all parts, inspect plug sealing surface, there should be a fine "lap-line" around the plug. Refer to Figure 8 for "lap-line". If this "lap-line" is not symmetrical all the way around the plug and seat ring then they will both need to be lapped further or possibly replaced. Any deep scores will require that the plug be machined or replaced.

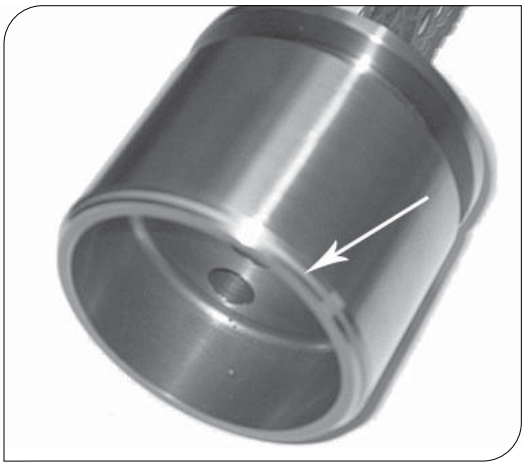


**Figure 8** *Lap-line*

## Assembly

**Ensure that all parts have been cleaned and inspected as per disassembly section.**

**Trim Parts Assembly**

**1** For one-piece metal seat ring refer to **Lapping** section (page 8) for instructions before assembling valve. After lapping has been completed assemble as follows.

**For a three piece soft seat ring design:**

**! NOTE !**

**Use an anti-seize compound that is approved for the service conditions that the valve is being installed into.**

**a** Coat the seat ring gasket with nickle anti-seize compound and insert it into the seat pocket in the body.

**b** Insert a one-piece seat ring (Key 21) or a three-piece (Keys 31, 32, & 33) seat ring assembly into seat pocket.

## **Assembly** (Cont'd)

**Trim Parts Assembly**

**c** Insert the cage (Key 18) into the body (Key 15).

**d** Install one-piece or two-piece seal ring (Key 34) onto plug.

**For one-piece seal ring:**

**a** Refer to assembly diagram (Figure 11). Lubricate plug seal diameter and install seal ring (Key 34) with cup facing the correct direction as shown in diagram. Install back up ring (Key 35) and retaining ring (Key 41) as shown.

**! NOTE !**

**On 8 inch valves the seal ring will need to be gently stretched over the top edge of the plug. Use a constant force when stretching the ring over the plug, failure to do so will cause the ring to get damaged. Refer to Figure 12 for 8 inch seal ring orientation.**

**c** Allow time for the PTFE material to shrink back to its original size before installing the plug into the cage.

**For two-piece seal ring:**

**a** Lubricate the backup ring (Key 35) and seal ring (Key 34) with silicone-based grease. Slide the backup ring down over the plug and into the groove.

**b** Carefully slide the seal ring over the edge of the plug and down into the groove. Allow time for the seal ring to shrink back to its original size after installation.

**2** Lubricate the valve plug / stem (Key 19) assembly with light assembly grease and insert into the cage (Key 18).

**! NOTE !**

**Ensure the seal ring (Key 34) does not shift out of the plug groove when installing the plug into the cage.**

**Bonnet Assembly**

**1** Coat gasket sealing surface on bonnet with nickle based anti-seize compound. Place bonnet (Key 1) over stem (Key 17) and tighten bonnet nuts (Key 28) to specified torque values. Follow standard torque sequence when tightening bolts. Refer to Table 1 for specific torque values.

**Packing Assembly**

**Refer to Figure 10 for packing orientation and Key numbers for the following section.**

**1** Ensure all parts have been cleaned and inspected prior to replacing packing. (See Disassembly section for inspection procedures)

**For single style (spring-loaded) packing:**

**a** Lubricate the packing box ring (Key 13) and lower wiper (Key 14) with silicone-based lubricant. Insert both parts into the packing bore followed by spring (Key 5) and special washer (Key 7).

**b** Lubricate the packing set (Key 2) with silicone-based lubricant and insert on top of the washer (Key 7) in the packing bore.

**c** Place the packing follower (Key 8) on top of the packing set followed by the upper wiper (felt) (Key 9) and packing flange (Key 10).

**d** Tighten the packing nuts (Key 12) until the packing follower comes into contact with the bonnet (Key 1).

**For double style packing:**

**a** Lubricate packing box ring (Key 13), lower wiper (Key 14) and lower packing set (Key 2) with silicone-based lubricant. Insert these parts into the packing bore followed by the lantern ring (Key 6).

**b** Lubricate the upper packing set (Key 2) and place it into the packing bore followed by the packing follower (Key 8).

**c** Insert the upper wiper (felt) (Key 9) and the packing flange (Key 10) over the stem (Key 17) and tighten the packing nuts (Key 12) to the proper torque value as specified in Table 2.

## **Assembly** (Cont'd)

**Packing Assembly** (cont'd)

**For double style graphite packing:**

**a** Refer to Figures 9 & 10 for single and double packing arrangements. Choose proper arrangement based on stem size and single or double configurations.

Install bonnet as described in the Assebly section. Install packing box ring and packing arrangement as shown. Note that Key 4 is graphite filament wound material that typically looks like rope.

Key 3 is graphite ribbon compressed into rings and not split as the graphite filament ring is. Install packing follower (Key 8) and flange (Key 10) and torque as per Table 3.

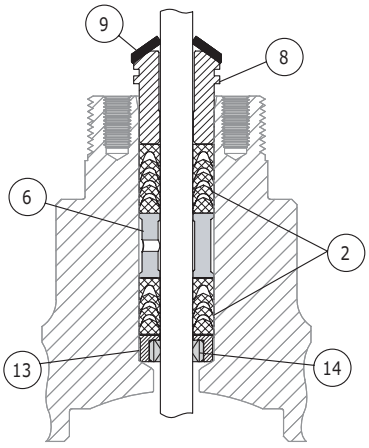
**! CAUTION !**

**Graphite ribbon packing damages easily, care is to be taken when installing it into the packing bore.**

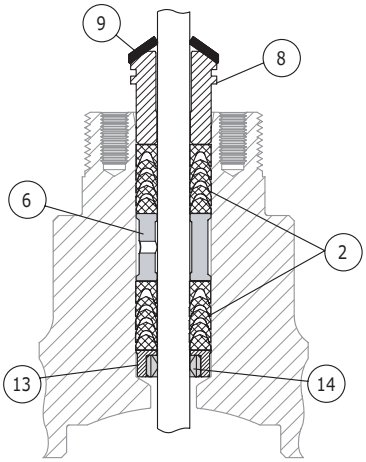
**Table 1**

**Body to Bonnet Stud Torque**

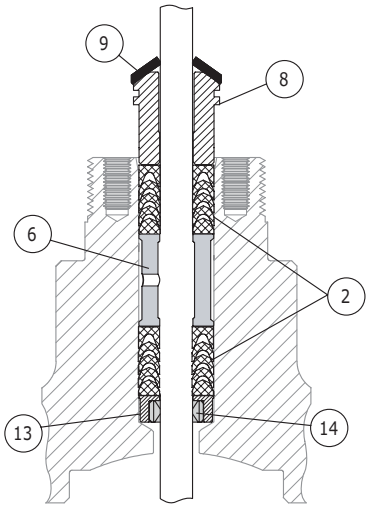
| **Valve Sizes (Inch)** | **Bolt Torques SA193-B7/B7M SA193-B8/B8M** | | | |
|---|---|---|---|---|
| | **Annealed** | | **Strain Hardened** | |
| | **N•m** | **Ft-lbs.** | **N•m** | **Ft-lbs.** |
| 1 | 63-65 | 46-48 | 126-132 | 93-97 |
| 1-1/2, 1-1/2 x 1, 2, or 2 x 1 | 44-46 | 32-34 | 94-98 | 70-73 |
| 3, 3 x 2 | 86-90 | 63-66 | 166-172 | 123-128 |
| 4, 4 x 3 | 153-159 | 113-117 | 266-276 | 196-204 |
| 6 | 359-373 | 265-275 | 538-560 | 397-413 |
| 8 | 518-540 | 382-398 | 731-761 | 382-398 |



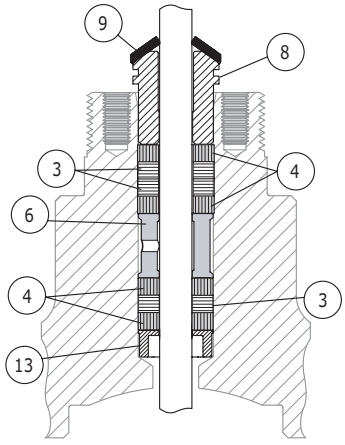

DOUBLE STYLE PACKING
PTFE
3/8" (9.5mm) Stem



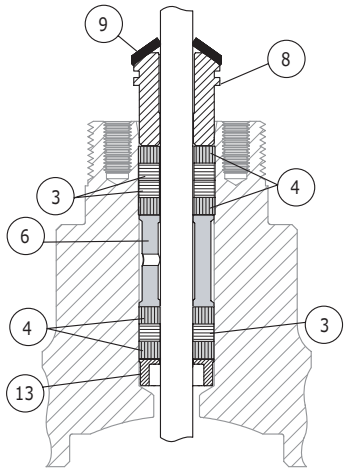

DOUBLE STYLE PACKING
PTFE
1/2" (12.7mm) Stem



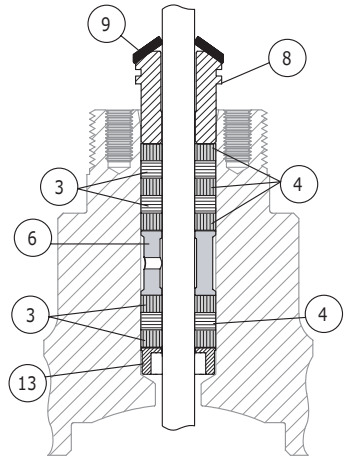

DOUBLE STYLE PACKING
PTFE
3/4" (19.1mm) Stem
1" (25.4mm) Stem
1-1/4" (31.8mm) Stem




DOUBLE STYLE PACKING
GRAPHITE
3/8" (9.5mm) Stem




DOUBLE STYLE PACKING
GRAPHITE
1/2" (12.7mm) Stem




DOUBLE STYLE PACKING
GRAPHITE
3/4" (19.1mm) Stem
1" (25.4mm) Stem
1-1/4" (31.8mm) Stem

**Figure 9** 360 Series Control Valve Packing Diagrams

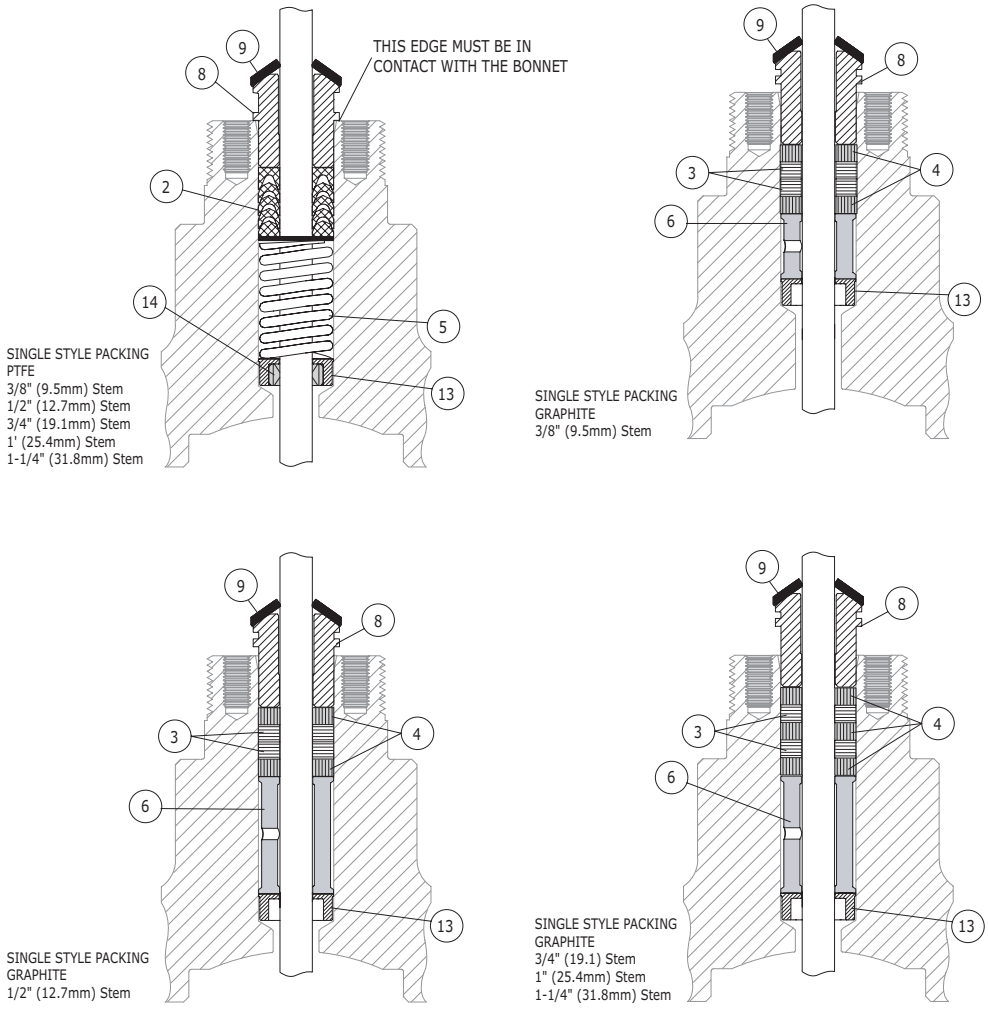



**Figure 10** 360 Series Control Valve Packing Diagrams

**Table 2**

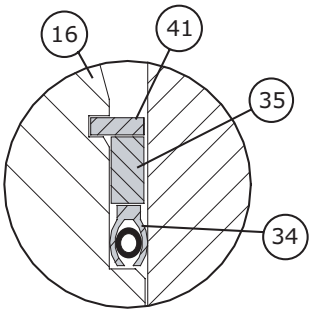
**Valve Stem Connection Assembly Torque and Pin Replacement**

| VSC Diameter Inches (mm) | Torque Ft-lbs. (N•m) | Hole Size Inches (mm) |
|---|---|---|
| 3/8 (9.5) | 25 - 35 (34 - 47) | 0.095 - 00.97 (2.41 - 2.46) |
| 1/2 (12.7) | 60 - 85 (81 - 115) | 0.126 - 0.128 (3.20 - 3.25) |
| 3/4 (19.1) | 175 - 250 (237 - 339) | 0.189 - 0.192 (4.80 - 4.88) |
| 1 (25.4) | 310 - 355 (420 - 481) | 0.251 - 0.254 (6.38 - 6.45) |
| 1-1/4 (31.8) | 610 - 670 (827 - 908) | 0.251 - 0.254 (6.38 - 6.45) |

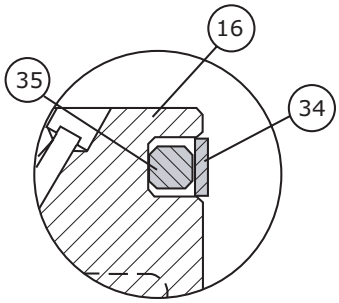
**Table 3**

**Packing Nut Torque Values**

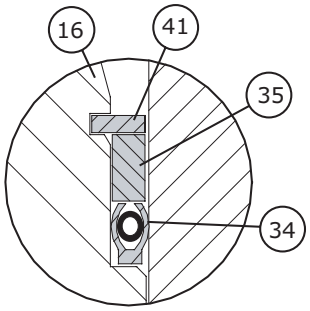
| Valve Stem Diamter Inch (mm) | ASME Class | PTFE Single and Double Type Packing | | | | Graphite Single and Double Type Packing | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Min. Torque | | Max. Torque | | Min. Torque | | Max. Torque | |
| | | In-lbs. | N•m | In-lbs. | N•m | In-lbs. | N•m | In-lbs. | N•m |
| 3/8 (9.5) | 150 | 9 | 1 | 17 | 2 | 27 | 3 | 44 | 5 |
| | 300 | 17 | 2 | 27 | 3 | 35 | 4 | 53 | 6 |
| | 600 | 27 | 3 | 35 | 4 | 53 | 6 | 71 | 8 |
| 1/2 (12.7) | 150 | 17 | 2 | 35 | 4 | 44 | 5 | 71 | 8 |
| | 300 | 27 | 3 | 44 | 5 | 58 | 7 | 89 | 10 |
| | 600 | 35 | 4 | 58 | 7 | 80 | 9 | 124 | 14 |
| 3/4 (19.1) | 150 | 44 | 5 | 71 | 8 | 97 | 11 | 150 | 17 |
| | 300 | 62 | 7 | 97 | 11 | 133 | 15 | 204 | 23 |
| | 600 | 89 | 10 | 133 | 15 | 186 | 21 | 274 | 31 |
| 1 (25.4) | 300 | 106 | 12 | 159 | 18 | 230 | 26 | 336 | 38 |
| | 600 | 150 | 17 | 221 | 25 | 310 | 35 | 469 | 53 |
| 1-1/4 (31.8) | 300 | 150 | 17 | 230 | 26 | 319 | 36 | 478 | 54 |
| | 600 | 212 | 24 | 319 | 36 | 434 | 49 | 655 | 74 |




**ONE-PIECE SEAL RING**
**Spring-Loaded**
**Flow Down**
**(Cup Faces Down)**

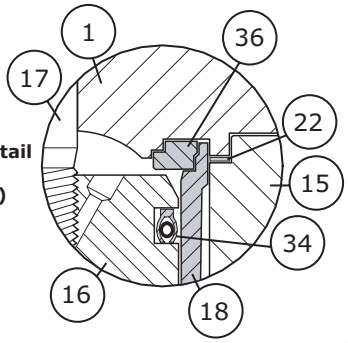



**TWO-PIECE SEAL RING**




**ONE-PIECE SEAL RING**
**Spring-Loaded**
**Flow Up**
**(Cup Faces Up)**

**8-inch Load Ring Detail**
**Flow Down**
**(Cup Faces Down)**




**8-inch Load Ring Detail**
**Flow Down**
**(Cup Faces Up)**

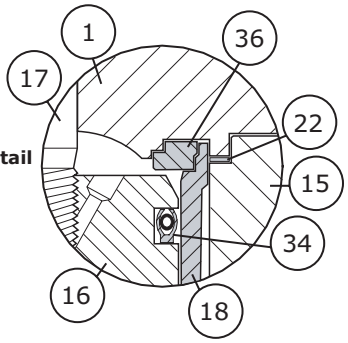



**Figure 11** 360 Series Control Valve Seal Diagrams

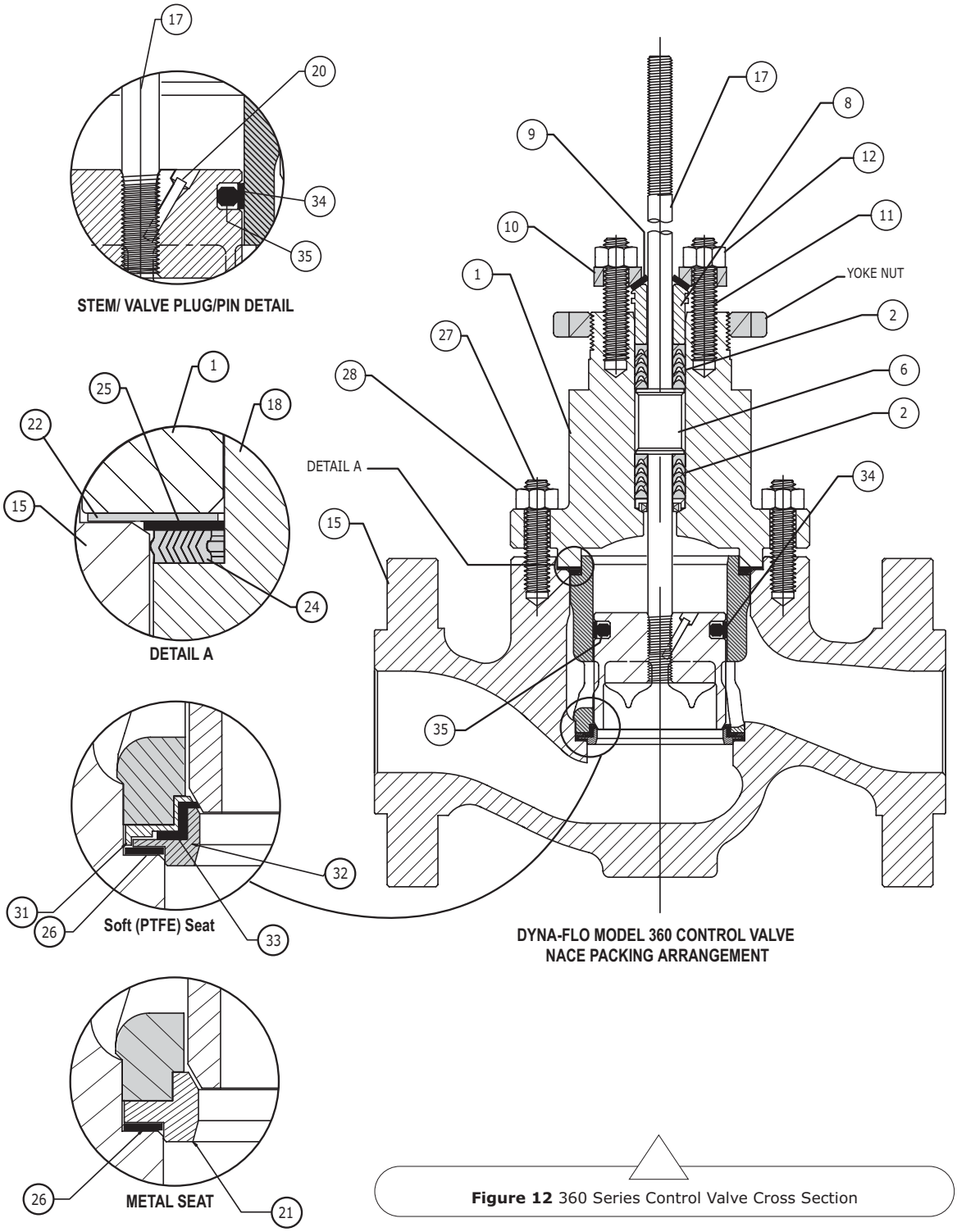



**Figure 12** 360 Series Control Valve Cross Section

## Parts

| Key | Description | Part Number |
|---|---|---|
| **1** | **Bonnet**, if you need a bonnet as a replacement part, order by valve size and stem diameter, serial number and desired material | |
| **2 - 7** | **Packing Box Parts** Refer to Packing Box Parts Table 4 on Page 19 | |
| **8** | **Packing Follower, 316 SST** | |
| | 3/8 inch (9.5mm) stem | 1E94393507D |
| | 1/2 inch (12.7mm) stem | 1E94433507D |
| | 3/4 inch (19.1mm) stem | 1E94473507D |
| | 1 inch (25.4mm) stem | 1H98233507D |
| | 1-1/4 inch (31.8mm) stem | 1H99843507D |
| **9** | **Upper Wiper, Felt** | |
| | 3/8 inch (9.5mm) stem | 1J87260633D |
| | 1/2 inch (12.7mm) stem | 1J87270633D |
| | 3/4 inch (19.1mm) stem | 1J87280633D |
| | 1 inch (25.4mm) stem | 1J87290633D |
| | 1-1/4 inch (31.8mm) stem | 1J87300633D |
| **10** | **Packing Flange, Steel** | |
| | 3/8 inch (9.5mm) stem | 1E94372410D |
| | 1/2 inch (12.7mm) stem | 1E94422307D |
| | 3/4 inch (19.1mm) stem | 1E94482307D |
| | 1 inch (25.4mm) stem | 0V00242505D |
| | 1-1/4 inch (31.8mm) stem | 0W08562505D |
| **11** | **Packing Flange, Stud Steel (2 Req'd)** | |
| | 3/8 inch (9.5mm) stem | 1E94413103D |
| | 1/2 inch (12.7mm) stem | 1E94443103D |
| | 3/4 inch (19.1mm) stem | 1E94493103D |
| | 1 inch (25.4mm) stem | 0V00253103D |
| | 1-1/4 inch (31.8mm) stem | 0W08693103D |
| **12** | **Packing Flange, Nut Steel (2 Req'd)** | |
| | 3/8 inch (9.5mm) stem | 1E94402411D |
| | 1/2 inch (12.7mm) stem | 1E94452411D |
| | 3/4 inch (19.1mm) stem | 1E94462411D |
| | 1 inch (25.4mm) stem | 1A34332411D |
| | 1-1/4 inch (31.8mm) stem | 1A36812411D |
| **13** | **Packing Box Ring, 316** | |
| | 3/8 inch (9.5mm) stem | 1J87313507D |
| | 1/2 inch (12.7mm) stem | 1J87323507D |
| | 3/4 inch (19.1mm) stem | 1J87333507D |
| | 1 inch (25.4mm) stem | 1J87343507D |
| | 1-1/4 inch (31.8mm) stem | 1J87353507D |
| **14** | **Lower Wiper** | |
| | 3/8 inch (9.5mm) stem | 1J87210699D |
| | 1/2 inch (12.7mm) stem | 1J87220699D |
| | 3/4 inch (19.1mm) stem | 1J87230699D |
| | 1 inch (25.4mm) stem | 1J87240699D |
| | 1-1/4 inch (31.8mm) stem | 1J87250699D |
| **15** | **Body**, if you need a body as a replacement part, order by valve size and stem diameter, serial number and desired material. | |
| **16** | **Valve Plug** | Refer to Table 5 |
| **17** | **Valve Stem** | Refer to Table 5 |
| **18** | **Cage** | Refer to Table 7 |
| **19** | **Valve Plug/Stem Assembly** | Refer to Table 5 |
| **20** | **Pin, 316 SST** | |
| | 3/8 inch (9.5mm) stem | 1V32263507D |
| | 1/2 inch (12.7mm) stem | 1V32273507D |
| | 3/4 inch (19.1mm) stem | 1V32603507D |
| | 1 inch (25.4mm) stem | 1V33403507D |
| | 1-1/4 inch (31.8mm) stem | 1V33403507D |
| **21** | **Seat Ring** | |
| | **416 SST** | |
| | 1 inch, 2 x 1 inch | 1U22254617D |
| | 1-1/2 inch | 1U22204617D |
| | 1-1/2 x 1 inch | 1U22194617D |
| | 2 inch or 3 x 2 inch | 1U22264617D |
| | 3 inch | 1U22284617D |
| | 4 inch | 1U22294617D |
| | 6 inch | 1U50804617D |
| | 6 x 4 inch | 2V37194617D |
| | 8 inch | 20A3260X01D |
| | **316 SST** | |
| | 1 inch, 2 x 1 inch | 1U22253507D |
| | 1-1/2 inch | 1U22203507D |
| | 1-1/2 x 1 inch | 1U22193507D |
| | 2 inch or 3 x 2 inch | 1U22263507D |
| | 3 inch | 1U22283507D |
| | 4 inch | 1U22293309D |
| | 6 inch | 1U50803309D |
| | 6 x 4 inch | 2V27193507D |
| | 8 inch | 20A3260X02D |
| | **Alloy 6 (cast)** | |
| | 1 inch, 2 x 1 inch | 1U22253910D |
| | 1-1/2 inch | 1U22203910D |
| | 1-1/2 x 1 inch | 1U22193910D |
| | 2 inch or 3 x 2 inch | 1U22263910D |
| | 3 inch | 1U22283910D |
| | 4 inch | 1U22293910D |
| | 6 inch | 1U50803910D |
| | 6 x 4 inch | 2V37204605D |
| | 8 inch | 20A3260X15D |

## Parts

| Key | Description | Part Number |
|---|---|---|
| **22** | **Bonnet Gasket** | |
| | 1 inch | 1R2859X004D |
| | 1-1/2 inch, 1-1/2 x 1 inch | 1R3101X003D |
| | 2 inch, 2 x 1 inch | 1R3299X004D |
| | 3 inch, 3 x 2 inch | 1R3484X004D |
| | 4 inch | 1R3724X004D |
| | 6 inch, 6 x 4 inch | 1U5081X005D |
| | 8 inch | 20A3265X11D |
| **23** | **Cage Gasket** | |
| | 1-1/2 x 1 inch, 2 x 1 inch | 1R2861X004D |
| | 3 x 2 inch | 1R3298X003D |
| **24** | **Spiral Wound Gasket** | |
| | 1 inch | 1R2860X006D |
| | 1-1/2 inch | 1R30999928D |
| | 1-1/2 x 1 inch | 1R28609944D |
| | 2 inch | 1R32979928D |
| | 2 x 1 inch | 1R28609944D |
| | 3 inch | 1R34829928D |
| | 4 inch | 1R37229928D |
| | 6 x 4 inch | 1U50859944D |
| | 6 inch | 1U50859928D |
| **25** | **Metal Shim** | |
| | 1 inch, 1-1/2x1 inch, 2x1 inch | 16A1936X01D |
| | 1-1/2 inch | 16A1937X01D |
| | 2 inch, 3 x 2 inch | 16A1938X01D |
| | 3 inch | 16A1940X01D |
| | 4 inch | 16A1941X01D |
| | 6 inch, 6 x 4 inch | 16A1942X01D |
| **26** | **Seat Ring Gasket** | |
| | 1 inch, 2 x 1 inch | 1R2862X011D/1R2862X006D |
| | 1-1/2 inch, 1-1/2 x 1 inch | 1R3098X005D |
| | 2 inch, 3 x 2 inch | 1R3296X004D |
| | 3 inch | 1R3481X006D |
| | 4 inch | 1J5047X006D |
| | 6 inch, 6 x 4 inch | 1U5086X003D |
| | 8 inch | 10A3266X08D |
| **27** | **Body/Bonnet Stud** | |
| | 1 inch (4 Req'd) | 1R2848X057D |
| | 1-1/2 inch (8 Req'd) | 1K2429X056D |
| | 1-1/2 x 1 inch (8 Req'd) | 1P5682X019D |
| | 2 inch or 2 x 1 inch (8 Req'd) | 1K2429X056D |
| | 3 inch or 3 x 2 inch (8 Req'd) | 1A3781X045D |
| | 4 inch (8 Req'd) | 1R3690X042D |
| | 6 inch or 6 x 4 inch (12 Req'd) | 1A36563101D |
| | 8 inch (16 Req'd) | 1D94523101D |
| **28** | **Body/Bonnet Nut** | |
| | 1 inch (4 Req'd) | 1C3306X071D |
| | 1-1/2 inch (8 Req'd) | 1A3772X066D |
| | 1-1/2 x 1 inch (8 Req'd) | 1A3772X066D |
| | 2 or 2 x 1 inch (8 Req'd) | 1A3772X066D |
| | 3 or 3 x 2 inch (8 Req'd) | 1A3760X059D |
| | 4 inch (8 Req'd) | 1A3520X060D |
| | 6 inch or 6 x 4 inch (12 Req'd) | 1A44092407D |
| | 8 inch (16 Req'd) | 1A44522402D |
| **29** | **Flow Direction Arrow, SST** | |
| | 1 inch valve | 1V10593898D |
| | 1-1/2 inch thru 8-inch valve | 1V10603898D |
| **30** | **Drive Screw (6 Req'd)** | 1A36822898D |
| **31** | **Disk Retainer** | |
| | 1 inch, 2 x 1 inch | 1V71003507D |
| | 1-1/2 inch | 1V71033507D |
| | 1-1/2 x 1 inch | 1V71213507D |
| | 2 inch or 3 x 2 inch | 1V71083507D |
| | 3 inch | 1V71123507D |
| | 4 inch | 1V71153309D |
| | 6 inch | 1V71183309D |
| | 6 x 4 inch | 1V71233507D |
| | 8 inch | 10A4466X01D |
| **32** | **Disk Seat, 316 SST** | |
| | 1 inch, 2 x 1 inch | 1V71023507D |
| | 1-1/2 inch | 1V71053507D |
| | 1-1/2 x 1 inch | 1V71223507D |
| | 2 inch or 3 x 2 inch | 1V71063507D |
| | 3 inch | 1V71223507D |
| | 4 inch | 1V71173309D |
| | 6 inch | 1V71203309D |
| | 6 x 4 inch | 2V71243507D |
| | 8 inch | 20A4467X01D |
| | **Alloy 6 (cast)** | |
| | 1 inch, 2 x 1 inch | 1V71023910D |
| | 1-1/2 inch | 1V71053910D |
| | 1-1/2 x 1 inch | 1V71223910D |
| | 2 inch or 3 x 2 inch | 1V71063910D |
| | 3 inch | 1V71143910D |
| | 4 inch | 1V71173910D |
| | 6 inch | 1V7120X001D |
| | 6 x 4 inch | 2V7124X001D |
| | 8 inch | 20A4467X02D |
| **33** | **Disk, PTFE** | |
| | 1 inch, 2 x 1 inch | 1V71010624D |
| | 1-1/2 inch | 1V71040624D |
| | 1-1/2 x 1 inch | 1V71010624D |
| | 2 inch or 3 x 2 inch | 1V71070624D |
| | 3 inch | 1V71130624D |
| | 4 inch | 1V71160624D |
| | 6 inch | 1V71190624D |
| | 6 x 4 inch | 1V71160624D |
| | 8 inch | 20A4468X01D |

## Parts

| Key | Description | Part Number |
|---|---|---|
| **34** | **Seal Ring** | |
| | **Carbon Filled PTFE** | |
| | 1 inch, 1-1/2x1 inch or 2x1 inch | 1V65910509D |
| | 1-1/2 inch | 1V65930509D |
| | 2 inch or 3 x 2 inch | 1V55080509D |
| | 3 inch | 1V65970509D |
| | 4 inch or 6 x 4 inch | 1V65990509D |
| | 6 inch | 1V66010509D |
| | **Seal Ring** | |
| | **Spring Loaded PTFE** | |
| | 1 inch, 1-1/2x1 inch or 2x1 inch | 10A4207X01D |
| | 1-1/2 inch | 10A4216X01D |
| | 2 inch or 3 x 2 inch | 10A4206X01D |
| | 3 inch | 10A5351X01D |
| | 4 inch or 6 x 4 inch | 10A4223X01D |
| | 6 inch | 10A2643X01D |
| | 8 inch | 10A3261X01D |
| **35** | **Backup Ring** | |
| | **2-Piece Seal Ring Construction** | |
| | **Nitrile** | |
| | 1 inch, 1-1/2x1 inch or 2x1 inch | 1V65900305D |
| | 1-1/2 inch | 1V65920305D |
| | 2 inch or 3 x 2 inch | 1V55070305D |
| | 3 inch | 1V65960305D |
| | 4 inch or 6 x 4 inch | 1V65980305D |
| | 6 inch | 1V66000305D |
| | **Fluroelastomer** | |
| | 1 inch, 1-1/2x1 inch or 2x1 inch | 1V65900529D |
| | 1-1/2 inch | 1V65920529D |
| | 2 inch or 3 x 2 inch | 1V55070529D |
| | 3 inch | 1V65960529D |
| | 4 inch or 6 x 4 inch | 1V65980529D |
| | 6 inch | 1V66000529D |
| | **Ethylene Propylene** | |
| | 1 inch, 1-1/2x1 inch or 2x1 inch | 1V6590X004D |
| | 1-1/2 inch | 1V6592X003D |
| | 2 inch or 3 x 2 | 1V5507X004D |
| | 3 inch | 1V6596X002D |
| | 4 inch or 6 x 4 inch | 1V6598X002D |
| | 6 inch | 1V6600X002D |
| | **Spring-Loaded Seal Ring Construction** | |
| | **416 SST** | |
| | 1 inch, 1-1/2x1 inch or 2x1 inch | 10A4209X01D |
| | 1-1/2 inch | 10A4218X02D |
| | 2 inch or 3 x 2 inch | 10A5349X01D |
| | 3 inch | 10A4208X01D |
| | 4 inch or 6 x 4 inch | 10X4224X01D |
| | **316 SST** | |
| | 1 inch, 1-1/2x1 inch or 2x1 inch | 10A4209X02D |
| | 1-1/2 inch | 10A4218X01D |
| | 2 inch or 3 x 2 inch | 10A5349X02D |
| | 3 inch | 10A4208X02D |
| | 4 inch or 6 x 4 inch | 10A4224X02D |
| **36** | **Load Ring (8 inch valve only)** | |
| | -101ºC(-150ºF) to 316ºC(600ºF) 17-4 PHSST | 1U22182449D |
| **37** | **Load Ring (8 inch valve only)** | |
| | -254ºC(-425ºF) to 593ºC(1100ºF) Inconel 718 | 20A3267X02D |
| | -240ºC(-400ºF) to 260ºC(500ºF) Corrosive Service, K-Monel | 20A3268X01D |
| **38** | **Cage Adapter** | |
| | 1-1/2 x 1 inch | 1U22182449D |
| | 2 x 1 inch | 1U12072449D |
| | 3 x 2 inch | 1U12462201D |
| **39** | **Seat Ring Adapter** | |
| | 2 x 1 inch | 1U22622449D |
| | 3 x 2 inch | 1U23462201D |
| **40** | **Adapter Gasket** | |
| | 1-1/2 x 1 inch | 1U2152X004D |
| | 2 x 1 inch | 1R3296X004D |
| | 3 x 2 inch | 1R3481X005D |
| **41** | **Retaining Ring** | |
| | 1 inch | 10A4211X01D |
| | 1-1/2 x 1 inch or 2 x 1 inch | 10A4220X01D |
| | 1-1/2 inch | 10A4210X01D |
| | 2 inch or 3 x 2 inch | 10A4219X01D |
| | 3 inch | 10A4225X01D |
| | 4 inch or 6 x 4 inch | 10A5410X01D |

## Keys 2, 3, 4, 5, 6 & 7 Packing Box Parts

**Table 4**

| Description | | | Key No. | Stem Diameter inch (mm) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 3/8 (9.5) | 1/2 (12.7) | 3/4 (19.1) | 1 (25.4) | 1-1/4 (31.8) |
| PTFE V-Ring Packing | Packing Set (PTFE) (Refer to Table 8 for Repair Kits) | | 2 | 1R29000101D | 1R29020101D | 1R29040101D | 1R29060101D | 1R29080101D |
| | Spring (SST) (for single only) | | 5 | 1F12543701D | 1F12533701D | 1F12563701D | 1D58293701D | 1D38743701D |
| | Lantern Ring (SST) (for double only) | | 6 | 1F36413507D | 1J96233507D | 0N02843507D | 0U09973507D | 0W08713507D |
| | Quantitiy Required | Double | | 1 | 2 | 1 | 1 | 1 |
| | Special Washer (SST) (for Single only) | | 7 | 1F12523604D | 1F12513604D | 1F12503604D | 1H98223604D | 1H99593604D |
| Graphite Ribbon / Graphite Filament | Graphite Ribbon (Ring) | | 3 | 1V3160X002D | 1V3802X002D | 1V2396X002D | 1U6768X002D | 1V5666X002D |
| | Quantity Required | Single | | 2 | 2 | 2 | 2 | 2 |
| | | Double | | 3 | 3 | 3 | 3 | 3 |
| | Graphite Filament (Ring) | | 4 | 1F3370X023D | 1E3190X022D | 1E3190X028D | 1D7518X013D | 1D7520X016D |
| | Quantity Required | Single | | 2 | 2 | 3 | 3 | 3 |
| | | Double | | 4 | 4 | 5 | 5 | 5 |
| | Lantern Ring (SST) | | 6 | 1F36413507D | 1J96233507D | 0N02843507D | 0U09973507D | 0W08713507D |
| | Quantity Required | Single | | 2 | 3 | 2 | 2 | 2 |
| | | Double | | 1 | 2 | 1 | 1 | 1 |

**Table 5**

## Key 16, 19 & 20 Valve Plug & Stem Assembly for Two-Piece Seal Ring & Spring-Loaded Seal Ring

| **Valve Size,** inches | **Stem Diameter** inch (mm) | 4**16 SST Hardened (STD) 2 Piece Seal** (Spring-Loaded Seal) | **316 SST 2 Piece Seal** (Spring-Loaded Seal) | **316 with Stellite on Seat** | **316 with Stellite on Seat & Guide 2 Piece Seal** (Spring-Loaded Seal) |
|---|---|---|---|---|---|
| 1 | 3/8 (9.5) | 1V6571X003D (20A4103X05D) | 1V6571X005D | 11A5315X03D | 11A5317X04D |
| | 1/2 (12.7) | 1V6572X002D | 1V6572X006D | 11A5316X02D | 11A5318X04D |
| 1,1-1/2 x 1 | 3/8 (9.5) | 1V6571X004D (20A4103X04D) | 1V6573X005D (20A6711X04D) | 11A5321X02D | 10A4438X02D (22A5941X02D) |
| | 1/2 (12.7) | 1V6572X004D | 1V6574X003D | — | 10A4611X04D |
| 1-1/2 | 3/8 (9.5) | 1V6573X004D (20A6711X03D) | 1V6571X009D | — | 11A5317X07D |
| | 1/2 (12.7) | 1V6574X001D (20A4150X06D) | — | — | 11A5318X03D |
| 2 or 3 x 2 | 1/2 (12.7) | 1V6575X005D (20A4097X06D) | 1V6575X006D (20A4097X18D) | 11A5324X02D | 11A5326X02D (20A4099X10D) |
| | 3/4 (19.1) | 1V6576X001D (20A5414X06D) | — | — | 11A5327X03D |
| 2 x 1 | 1/2 (12.7) | 1V6572X002D | 1V6572X006D | 11A5316X02D | 11A5318X04D |
| 3 | 1/2 (12.7) | 1V6579X009D (20A5414X06D) | 1V6579X011D (20A5414X05D) | 11A5336X03D | 11A5337X08D (22A3458X02D) |
| | 3/4 (19.1) | (20A5342X08D) | — | — | (20A5344X04D) |
| 4 | 1/2 (12.7) | 1V6581X004D (20A2641X04D) | 1V6581X005D (20A2641X16D) | 11A5341X03D | 11A5344X02D |
| | 3/4 (19.1) | 1V6582X002D (20A4194X05D) | 1V6582X007D | — | 11A5345X04D |
| 6 | 3/4 (19.1) | 1V6584X004D (20A2642X05D) | 1V6584X006D (20A2642X06D) | 11A5350X03D | 21A5351X06D (21A8443X03D) |
| 6 x 4 | 3/4 (19.1) | 1V6582X001D (24A9731X03D) | 1V6582X005D | 11A5350X03D | 11A5345X07D |
| 8 | 3/4 (19.1) | (21A5356X05D) | (21A5356X05D) | – | (21A536X06D) |

**Table 6**

## Key 16, Valve Plug for Two-Piece Seal Ring & Spring-Loaded Seal Ring

| **Valve Size,** inches | **Stem Diameter** inch (mm) | 4**16 SST Hardened (STD) 2 Piece Seal** (Spring-Loaded Seal) | **316 SST 2 Piece Seal** (Spring-Loaded Seal) | **316 with Stellite on Seat** | **316 with Stellite on Seat & Guide 2 Piece Seal** (Spring-Loaded Seal) |
|---|---|---|---|---|---|
| 1,1-1/2 x 1 | 3/8 (9.5) | 1V65714617D (20A4103X01D) | 1V65713507D (20A4103X02D) | 11A5315X01D | 11A5317X01D (20A4104X01D) |
| | 1/2 (12.7) | 1V65724617D | 1V65723507D | 11A5316X01D | 11A5318X01D |
| 1-1/2 | 3/8 (9.5) | 1V65734617D (20A6711X01D) | 1V65733507D (20A6711X02D) | 11A5321X01D | 10A4438X01D (22A5941X01D) |
| | 1/2 (12.7) | 1V65744617D (20A4150X01D) | 1V65743507D (20A4150X02D) | 10A4439X01D | 10A4611X01D (20A4151X01D) |
| 2 or 3 x 2 | 1/2 (12.7) | 1V65754617D (20A4097X01D) | 1V65753507D (20A4097X02D) | 11A5324X01D | 11A5326X01D (20A4099X01D) |
| | 3/4 (19.1) | 1V65764617D (20A4098X01D) | 1V65763507D (20A4098X02D) | 11A5325X01D | 11A5327X01D (20A4100X01D) |
| 2 x 1 | 1/2 (12.7) | 1V65724617D | 1V65723507D | 11A5316X01D | 11A5318X01D |
| 3 | 1/2 (12.7) | 1V65794617D (20A5414X01D) | 1V65793507D (20A5414X02D) | 11A5336X01D | 11A5337X01D (22A3458X01D) |
| | 3/4 (19.1) | 1V65804617D (20A5342X01D) | 1V65803507D (20A5342X02D) | 11A5014X01D | 11A5338X01D (20A5344X01D) |
| 4 | 1/2 (12.7) | 1V65814617D (20A2641X01D) | 1V65813507D (20A2641X02D) | 11A5341X01D | 11A5344X01D (21A0187X01D) |
| | 3/4 (19.1) | 1V6582X002D (20A4194X01D) | 1V6582X007D (20A4194X0AD) | — | 11A5345X04D (20A4197X01D) |
| | 1 (25.4) | 1V65834617D (20A4195X01D) | 1V65833507D (20A4195X03D) | 11A5343X01D | 11A5346X01D (20A4198X01D) |
| 6 | 3/4 (19.1) | 1V65844617D (20A2642X01D) | 1V65843507D (20A2642X02D) | 11A5350X01D | 11A5351X01D (21A8443X01D) |
| | 3/4 (19.1) | 1V65854617D (20A5621X01D) | 1V65853507D (20A5621X02D) | 10A5107X01D | 20A0103X01D (20A6706X01D) |
| | 1-1/4 (31.8) | 1V65864617D | 1V65863507D | 10A5108X01D | 20A4608X01D |
| 6 x 4 | 3/4 (19.1) | 1V65824617D (24A9731X01D) | 1V65823507D (24A9731X02D) | 11A5342X01D | 11A5345X01D (25A1579X01D) |
| 8 | 3/4 (19.1) | (21A5356X01D) | (21A5356X02D) | — | (21A5362X01D) |
| | 1 (25.4) | (21A5357X01D) | (21A5357X02D) | — | (21A5363X01D) |
| | 1-1/4 (31.8) | (21A5358X01D) | (21A5358X02D) | — | (21A5364X01D) |

**Table 7**

## Key 18 Cage

| **Valve Size,** inches | **17-4 PH SST** | | |
|---|---|---|---|
| | **Quick Opening Cage** | **Linear Cage** | **Equal Percentage Cage** |
| 1, 1-1/2 x 1 or 2 x 1 | 2U21503327D | 2U21563327D | 2U21533327D |
| 1-1/2 | 2U21923327D | 2U21983327D | 2U21953327D |
| 2 or 3 x 2 | 2U22343327D | 2U22403327D | 2U22373327D |
| 3 | 2U23183327D | 2U23243327D | 2U23213327D |
| 4 | 2U23603327D | 2U23663327D | 2U23633327D |
| 6 | 2U50633327D | 2U50613327D | 2U50593327D |
| 6 x 4 | 2V37223327D | 2V37183327D | 2V37233327D |
| 8 | 20A3249X01D | 20A4349X01D | 20A3245X01D |

## Key 18 Cage (continued)

Table 8

| **Valve Size,** inches | **17-4 DH1150** | | |
|---|---|---|---|
| | **Quick Opening Cage** | **Linear Cage** | **Equal Percentage Cage** |
| 1, 1-1/2 x 1 or 2 x 1 | 2U21501150D | 2U21561150D | 2U21531150D |
| 1-1/2 | 2U21921150D | 2U21981150D | 2U21951150D |
| 2 or 3 x 2 | 2U22341150D | 2U22401150D | 2U22371150D |
| 3 | 2U23181150D | 2U23241150D | 2U23211150D |
| 4 | 2U23601150D | 2U23661150D | 2U23631150D |
| 6 | 2U50631150D | 2U50611150D | 2U50591150D |
| 6 x 4 | 2V37221150D | 2V37181150D | 2V37231150D |
| 8 | 20A3249X05D | 20A4349X05D | 20A3245X05D |
| **Valve Size,** inches | **316 SST (Chrome Coated)** | | |
| | **Quick Opening Cage** | **Linear Cage** | **Equal Percentage Cage** |
| 1, 1-1/2 x 1 or 2 x 1 | 2U69114610D | 2U69174610D | 2U69134610D |
| 1-1/2 | 2U69184610D | 2U69204610D | 2U69194610D |
| 2 or 3 x 2 | 2U69214610D | 2U69234610D | 2U69224610D |
| 3 | 2U69274610D | 2U69294610D | 2U69284610D |
| 4 | 2U69304610D | 2U69334610D | 2U69314610D |
| 6 | 2U69354610D | 2U69384610D | 2U69374610D |
| 6 x 4 | 2V37174610D | 2V37154610D | 2V37164610D |
| 8 | 20A4350X01D | — | 20A4348X01D |
| **Valve Size,** inches | **316 SST (ENC)** | | |
| | **Quick Opening Cage** | **Linear Cage** | **Equal Percentage Cage** |
| 1, 1-1/2 x 1 or 2 x 1 | 2U74034893D | 2U74144893D | 2U74084893D |
| 1-1/2 | 2U72544893D | 2U74154893D | 2U74094893D |
| 2 or 3 x 2 | 2U74044893D | 2U74164893D | 2U74104893D |
| 3 | 2U74064893D | 2U74184893D | 2U74124893D |
| 4 | 2U74074893D | 2U74194893D | 2U74134893D |
| 6 | 2U80694893D | 2U80684893D | 2U80674893D |
| 6 x 4 | 2V37144893D | 2V37124893D | 2V37134893D |
| 8 | 20A5469X01D | 20A5468X01D | 20A5467X01D |

## Gasket Descriptions

Table 9

| **Description** | **Key Number** | **Material** | |
|---|---|---|---|
| | | -198° to 593°C (-325° to 1100°F) | -73° to 232°C (-100° to 450°F) |
| Bonnet Gasket | 22 | Graphite / 316 SST | Graphite / 316 SST |
| Cage Gasket | 23 | | |
| Seat Ring Gasket | 26 | | |
| Adapter Gasket | 40 | | |
| Spiral-Wound Gasket | 24 | Inconel 600 / Graphite | 316L SST / Composition |
| Shim | 25 | 316 SST | 316 SST |

**Table 10**

**Key 17 Valve Stem, 316 SST**

| **Valve Size** inches | **Stem Diameter** inces (mm) | **Stem Length** inches (mm) | **Part Number** |
|---|---|---|---|
| 1, 1-1/2 | 3/8 (9.5) | 8-7/8 (225) | 1U38883516D |
| | 1/2 (12.7) | 11-13/16 (300) | 1U38903516D |
| 2 | 1/2 (12.7) | 12-1/4 (311) | 1K58693516D |
| | 3/4 (19.1) | 14-5/8 (372) | 1U22653516D |
| 3 | 1/2 (12.7) | 12-5/8 (321) | 1U23053516D |
| | 3/4 (19.1) | 15 (381) | 1U23083516D |
| 4 | 1/2 (12.7) | 12-5/8 (321) | 1U23053516D |
| | 3/4 (19.1) | 15-1/2 (394) | 1K58773516D |
| | 1 (25.4) | 18-1/4 (464) | 1K75903516D |
| 6 | 3/4 (19.1) | 15-7/8 (403) | 1L99643516D |
| | 1 (25.4) | 19-5/8 (499) | 1N70473516D |
| | 1-1/4 (31.8) | 20 (508) | 1K41543516D |
| 8 | 3/4 (19.1) | 19-3/8 (492) | 1K58803516D |
| | 1 (25.4) | 24-3/16 (614) | 1K7891X001D |
| | 1-1/4 (31.8) | 27-7/16 (705) | 1L26883516D |
| 1-1/2 x 1 | 3/8 (9.5) | 9-3/8 (241) | 1U22363516D |
| | 1/2 (12.7) | 12-1/4 (311) | 1K58693516D |
| 2 x 1 | 1/2 (12.7) | 11-13/16 (300) | 1U38903516D |
| 3 x 2 | 1/2 (12.7) | 12-1/4 (311) | 1K58693516D |
| | 3/4 (19.1) | 14-5/8 (372) | 1U22653516D |
| 6 x 4 | 3/4 (19.1) | 15-7/8 (403) | 1L99643516D |

**Table 11**

**Gasket Kits**

| Description | Part Number |
|---|---|
| 1 inch | RGASKETX31D |
| 1-1/2 inch | RGASKETX32D |
| 2 inch | RGASKETX33D |
| 3 inch | RGASKETX35D |
| 4 inch | RGASKETX36D |
| 6 inch | RGASKETX37D |
| 8 inch | RGASKETX08D |
| 2 x 1 inch | RGASKETX25D |
| 3 x 2 inch | RGASKETX27D |

**Table 12**

**Packing Repair Kits**

| **Stem Diameter [Yoke Boss Diameter]** inces (mm) | **Single** | | **Double** | | |
|---|---|---|---|---|---|
| | **PTFE** | **Graphite** | **PTFE** | **Graphite** | **PTFE/Composition** |
| 3/8 (9.5) [2-1/8 (54)] | RPACKX0001D | RPACKX0010D | RPACKX0004D | RPACKX0016D | RPACKX0007D |
| 1/2 (12.7) [2-13/16 (71)] | RPACKX0002D | RPACKX0011D | RPACKX0005D | RPACKX0017D | RPACKX0008D |
| 3/4 (19.1) [3-9/16 (90)] | RPACKX0003D | RPACKX0012D | RPACKX0006D | RPACKX0018D | RPACKX0009D |

## *Our Commitment of Quality*

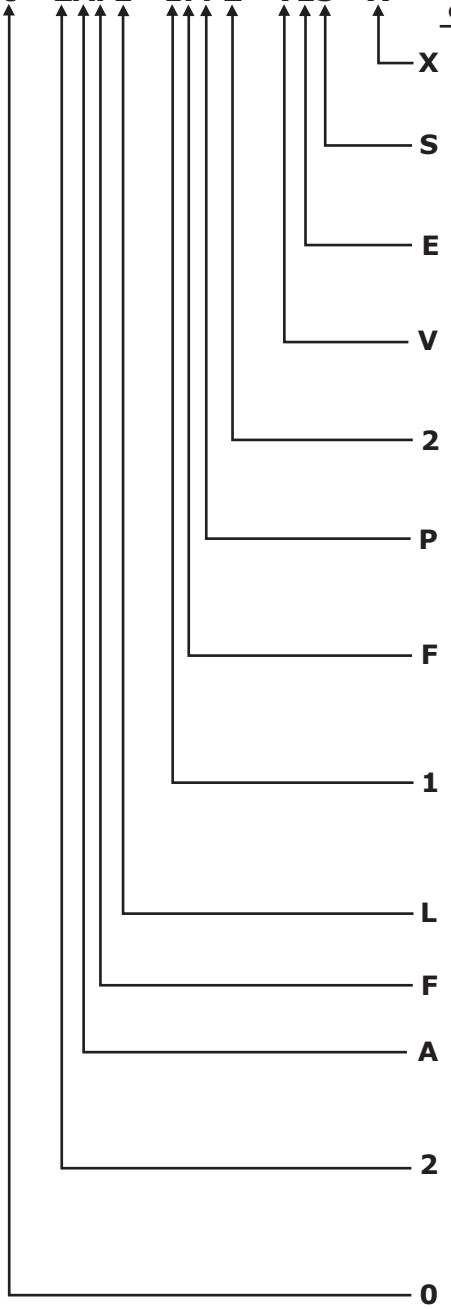
Dyna-Flo is committed to continuous improvement. All efforts have been taken to maximize the accuracy of this information. Without notification, product specifications and designs may be modified at any time. The issue of this document is for information only, and does not imply suitability, a warranty, or guarantee for a specific service.

Ordering Guide

## **Dyna-Flo 360** Series Control Valve | **Model Numbering System**

**Sample Part Number**

**360 - 2AFL - 1FP2 - VES - X**



| Code | Description | | | | |
|---|---|---|---|---|---|
| **X** | Special | | | | |
| **S** | **Bonnet Style** | | | | |
| S | Standard | | E | Extension | |
| C | Cryogenic | | X | Special | |
| **E** | **Characteristic** | | | | |
| E | Equal Percentage | | L | Linear | |
| Q | Quick Open | | N | Noise 1 | |
| **V** | **Back-up Ring (360 only)** | | | | |
| V | Viton | | N | Nitrile | |
| E | Ethylene Propylene | | X | Special | |
| **2** | **Yoke Boss Size** | | | | |
| 1 | 2-1/8" | | 2 | 2-13/16" | |
| 3 | 3-9/16" | | 5 | 5" | |
| **P** | **Packing Style** | | | | |
| P | Spring Loaded PTFE V-ring | | D | Double PTFE V-ring | |
| G | Graphite High Temp | | L | Live Loaded (Graphite) | |
| T | Live Loaded (PTFE) | | | | |
| **F** | **Port Size** | | | | |
| F | Full | | R | Reduced | |
| **1** | **Trim Number** | | | | |
| 1 | D1 | | 6 | D6 | |
| 2 | D2 | | 7 | D7 | |
| 3 | D3 | | 8 | D8 | |
| 4 | D4 | | 9 | D9 | |
| 5 | D5 | | | | |
| **L** | **Body Material** | | | | |
| L | LCC | W | WCC | M | CF8M |
| **F** | **Connection Style** | | | | |
| F | RF | J | RTJ | N | NPT |
| **A** | **ASME Rating** | | | | |
| A | 150 | B | 300 | C | 600 |
| **2** | **Valve Size** | | | | |
| 1 | 1 inch | | 5 | 1-1/2 inch | |
| 2 | 2 inch | | 3 | 3 inch | |
| 4 | 4 inch | | 6 | 6 inch | |
| 8 | 8 inch | | | | |
| **0** | **Valve Model** | | | | |
| 0 | Style 360 | | 2 | Style 362 | |
| 1 | Style 361 | | | | |