FLOWSERVE

Repair Instructions

ISC2

Single pusher seal



Experience In Motion

1 Nomenclature

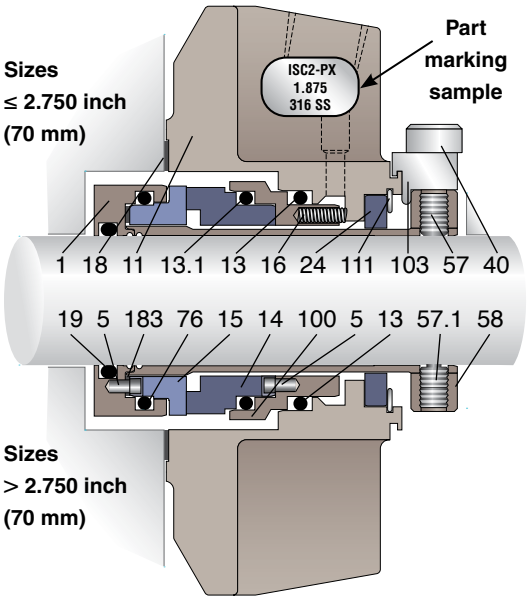


Figure 1

Part Ref.	Description
1	Sleeve Assembly
5	Square-headed Pin
11	Gland
13	Seat Gasket O-ring
13.1	Seat Gasket O-ring
14	Stationary Face
15	Rotating Face
16	Springs
18	Gland Gasket
19	Sleeve Gasket O-ring
24	Gland Bushing
40	Cap Screw
57	Cup-point Set Screw
57.1	Quarter-dog Set Screw
58	Drive Collar
76	Rotating Face Gasket O-ring
100	Stationary Face Support
103	Setting Device
111	Snap Ring
183	Vibration Dampener

Part references in this document are denoted in square parenthesis, e.g. [15]
Primary seal O-rings [13], [13.1] and [76] are the same size and cross-section.

2 Disassembly

When disassembling the seal, inspect for conditions which may have caused the seal to be removed from service. If seal was removed due to premature failure, determine what conditions caused that failure and correct any problems prior to returning the repaired seal to service. For assistance with seal failure analysis, please contact your Flowserve representative.

3 Repair or Replace Guide

Seal parts that are always replaced

- Stationary face [14]
- Rotating face [15]
- Springs [16]
- Square-headed pin [5]
- Stationary face support [100]
- All gaskets (O-rings) [13], [13.1], [19] and [76]
- Gland gasket [18]
- Vibration dampener [183]
- Setting devices [103] and cap screws [40]
- Cup-point [57] and quarter-dog set screws [57.1]
- Gland bushing [24] and snap ring [111]

Seal parts that are reconditionable

- Gland assembly [11]
- Sleeve assembly [1]
- Sleeve collar [58]

4 Inspection and Reconditioning

There are certain critical areas of each part where special attention should be paid to the condition. If any of the listed areas show signs of wear, corrosion, or other defects that cannot be removed without affecting the dimensional size of the surfaces by more than 0.001 - 0.002 inch (0.025 - 0.05 mm), then the respective part should be replaced. If grit blasting is performed, polish the O-ring surfaces to achieve the required surface finish (see critical area listings for finish requirements). If any parts require machining to correct damage, please contact your Flowserve representative for dimensional requirements, or for any other questions regarding repair.

4.1 **Gland assembly** [11] see Figures 2 and 3.

A Dynamic O-ring surface - Inspect for wear, fretting, nicks, scratches or corrosion. Required surface finish: 32 RMS

B Gasket surface - Remove the old gasket and clean the gasket surface. Inspect for nicks, scratches or corrosion.

C Pipe taps and lifting holes - Inspect for damaged threads or corrosion. Re-tap as necessary.

D Anti-rotation pins - Inspect for wear or corrosion. Replace as necessary.

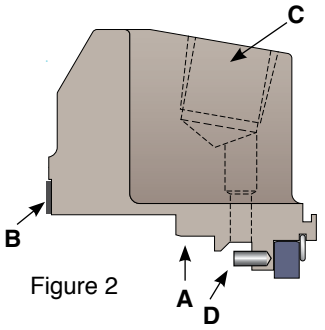


Figure 2

4.2 **Sleeve assembly** [1] see Figures 4 and 5.

A O-ring surfaces - Inspect for wear, nicks, scratches, or corrosion. Required surface finish: 63 RMS.

B Drive flats or drive pin - Inspect for wear or corrosion. Replace pin as necessary.

C Drive end roundness - No greater than 0.001 inch (0.025 mm) TIR (Total Indicated Reading) under the bushing.

D Inspect ID of sleeve at weld point for corrosion.

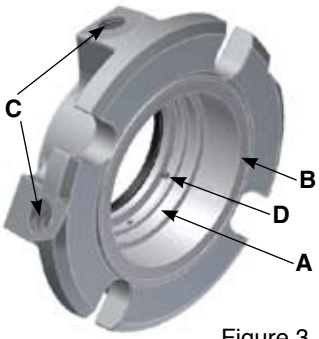


Figure 3



Figure 4a, sizes ≤ 2.750 inch (70 mm)



Figure 4b, sizes > 2.750 inch (70 mm)

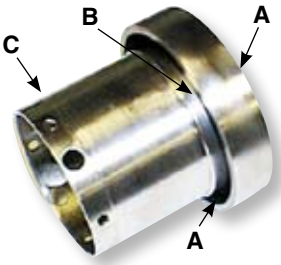


Figure 5

4.3 **Drive Collar** [58] see Figure 6.

A Threaded holes - Inspect for thread damage and re-tap as necessary.

B ID bore roundness - No greater than 0.002 inch (0.05 mm) TIR.

C Set screws - Replace cup-point and quarter-point set screws with those included with the repair kit. Make sure the same threaded holes are used.

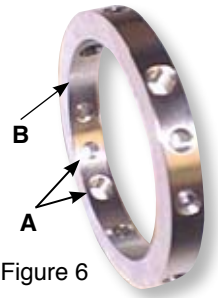


Figure 6

5 Seal Assembly Preparation

Tools Needed:

- Sizes ≤ 2.750": 3/16", 1/8" hex key wrenches
- Sizes > 2.750": 1/8", 3/16" and/or 7/32" hex key wrenches
- Sizes ≤ 65 mm: 3 mm hex key wrench
- Sizes > 65 mm: 5 mm hex key wrench for standard bore
- Sizes > 65 mm: 6 mm hex key wrench for enlarged bore
- Silicone grease (included in repair kit)
- Ethyl alcohol and clean, lint-free towel for cleaning seal faces
- Needle nose pliers or tweezers

6 Seal Assembly Instructions

Some assembly steps include blind fits of pins and drive flats. Mark the locations of the pins or drive flats with a felt tip marker, or align the feature with another visible feature on the seal to assist with assembly. All seal faces should be cleaned with ethyl alcohol prior to placing the faces together at each respective step in the assembly process.

6.1 Arrange O-rings by diametrical size. There are two sizes: quantity 3 of the largest size [13], [13.1] and [76], and quantity 1 of the smallest size [19]. Prior to installing each O-ring at its respective step, lightly lubricate with silicone grease, unless an alternative lubricant is specified, and stretch slightly.

6.2 Place the sleeve assembly [1] on the work surface with the drive end (set screw holes) positioned upward.

For sizes ≤ 2.750 inch (70 mm) install the vibration damper [183] into the back counterbore of the sleeve assembly.

For sizes > 2.750 inch (70 mm) install the square-headed pin [5] in the hole on the counterbore of the sleeve assembly. Cut a 0.25 inch (6 mm) slot in the vibration dampener [183] and install onto the sleeve assembly where the rotating face will be installed with the slot positioned where the drive pin is located. See Figure 7.

6.3 Select O-ring [19] and stretch slightly. Lightly lubricate the O-ring using silicone grease.

For sizes ≤ 2.750 inch (70 mm) install the O-ring into the sleeve assembly, on the inner diameter groove of the sleeve. See Figure 8.

For sizes > 2.750 inch (70 mm) install the O-ring into the inner diameter groove of the bellows assembly.



Figure 7

6.4 Select rotating face [15] and lightly lubricate O-ring surface using silicone grease unless otherwise specified. Install the rotating face [15] into the sleeve/O-ring assembly. See Figure 9. Use hand pressure only.

For sizes ≤ 2.750 inch (70 mm) ensure that the flats on the rotating face and the flats on the sleeve are aligned.



Figure 8

For sizes > 2.750 inch (70 mm) ensure that the drive slot on the rotating face and the square-headed drive pin in the sleeve are aligned.



Figure 9

6.5 **Check for the proper seating of the rotating face by measuring from the back of the sleeve assembly to the face of the rotating face with a caliper or micrometer. Measure in 3 equally spaced locations, measurement variations should not exceed 0.005 inch (0.127 mm).**

6.6 Clean the sealing face of the rotating face [15] to remove dirt, dust, fingerprints or any other residue using alcohol on a clean cloth or tissue.

6.7 Select gland assembly [11] and using a parallel-plate press, press bushing [24] into the outboard side of the gland. Once the bushing is fully pressed in the gland assembly [11] (no gap behind bushing), insert the snap ring [111] into the groove on the inner diameter of the gland to retain the bushing as shown in Figure 10.

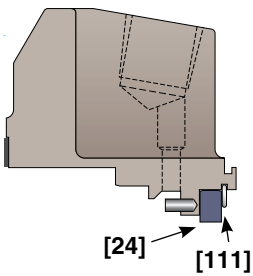


Figure 10

6.8 Select O-ring [13]. Lightly lubricate the O-ring using silicone grease. Install the O-ring onto the stationary face [14]. See Figure 11.

6.9 Select the square-headed pins [5] and install the long end of the pins into the stationary face support [100]. Tweezers or needle nose pliers may assist installation of the pins. See Figure 12.



Figure 11

6.10 Select the stationary face [14] and install it onto stationary face support [100], the square-headed pins must line up with the slots in the stationary face [14]. Silicone grease may be applied to the O-ring bore in the stationary face support [100].

6.11 Clean the sealing face of the stationary face [14] to remove dirt, dust, fingerprints or any other residue using alcohol on a clean cloth or tissue.

6.12 Install springs [16] into the holes in the stationary face support [100]. Silicone grease should be used to hold the springs in the spring holes. See Figure 13.



Figure 12

6.13 Install the stationary face assembly down onto the sleeve assembly as shown in Figure 14.

6.14 Lightly lubricate the area where the O-ring [13] will ride on the stationary face support [100] with silicone grease. See Figures 14 and 15, area A.

Lightly lubricate the area where the O-ring [13] will ride in the gland [11] with silicone grease. See Figure 15, area B. Install the dynamic O-ring [13.1] into the gland [11].



Figure 13

6.15 Install the gland assembly [11] onto the sleeve assembly. See Figure 16. During the installation, ensure that the drive pins in the gland line up with the slots in the stationary face support [100].

Caution: Do not rotate the gland assembly during installation.This may cause the springs [16] to buckle. Verify the pins are aligned with the slots by exercising the gland.

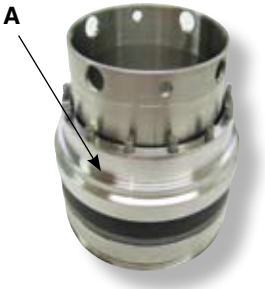


Figure 14

6.16 Thread set screws and quarter-dog set screws in proper, equally spaced locations in drive collar [58].

Note: Some sizes > 2.750 inch (70 mm) do not utilize quarter-dog set screws.

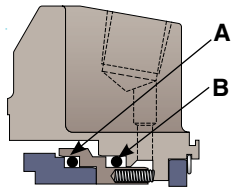


Figure 15

6.17 Perform a dry fit of the collar on the sleeve.

6.18 Install the drive collar [58] onto the sleeve assembly [1]. The drive collar may need to be rotated so that the set screws [57] line up with the large holes and quarter-dog set screws [57.1] line up with the two smaller holes.

Note: Some sizes > 2.750" do not utilize quarter-dog set screws.



Figure 16

6.19 Install the setting devices and cap screws [103] and [40] into the drive collar, engaging with the gland [11]. See Figure 17.

Caution: Do not rotate the gland assembly during installation. This may cause the springs [16] installed in step 6.12 to buckle if the gland assembly [11] is rotated with respect to the stationary face support [100].

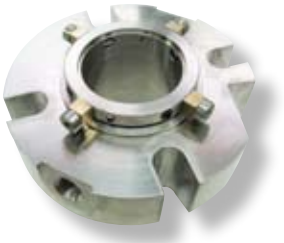


Figure 17

6.20 While compressing seal by pushing down on gland assembly [11], tighten the quarter-dog set screws [57.1] to engage into the two smaller holes of the sleeve assembly [1]. If the seal does not contain quarter-dog set screws then install the set screws [57] into the sleeve [1]. See Figure 18.

Caution: Over tightening will cause distortion of the sleeve assembly [1]. Check integrity of the sleeve with a plug of the appropriate size to ensure no distortion has occurred.

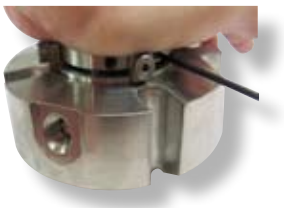


Figure 18

6.21 Install sleeve O-ring [19] into the inner diameter groove of the sleeve assembly.

6.22 The cartridge seal assembly is now ready for testing.

6.23 Adhere the gland gasket [18] to the gland gasket surface with a spray adhesive such as 3M Super 77®. See Figure 19.

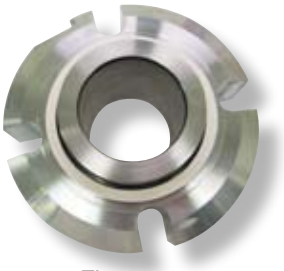


Figure 19

6.24 Permanently mark the seal type ISC2-PX or ISC2-XP, seal size and gland ring material clearly on the gland surface. See Figure 1 for placement location.

ISC2-PX
1.875
316 SS

Example inch marking

ISC2-PX
M060
316 SS

Example metric marking

FLOWSERVE®

TO REORDER REFER TO
B/M #_____
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7 Static Testing

The ISC2 single pusher seal may be static tested at pressures up to 300 psi (20.6 bar) prior to installation on the equipment. Flowserve manufacturing typically tests the ISC2 at 25 psig (1.7 bar). To static test the seal, bolt it to a single seal test barrel or to the equipment. Secure the cup-point set screws to the stub shaft or equipment shaft to prevent deformation of the centering tabs due to axial loads. The seal can be pressurized through the tangential flush port. If the seal does not pass, according to QP-B.28, the static pressure test, disassemble the seal and inspect for O-ring damage, as this is the most common cause of static test failure.

8 Installation

For installation instructions, reference FIS190eng ISC2 Series.

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USA and Canada
Kalamazoo, Michigan USA
Telephone: 1 269 381 2650
Telefax: 1 269 382 8726

Europe, Middle East, Africa
Essen, Germany
Telephone: 49 201 31937-0
Telefax: 49 201 2200-561

Asia Pacific
Singapore
Telephone: 65 6544 6800
Telefax: 65 6214 0541

Latin America
Mexico City
Telephone: 52 55 5567 7170
Telefax: 52 55 5567 4224