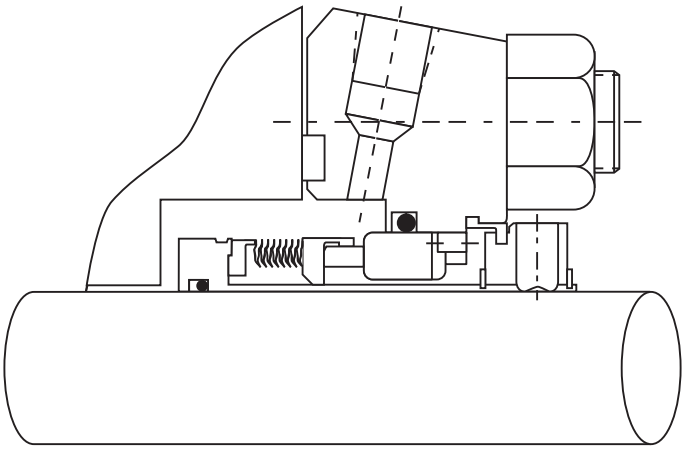
EZ-1®

METAL BELLOWS SEAL

Installation, Operation & Maintenance Instructions



Foreword

These instructions are provided to familiarize the user with the seal and its designated use. The instructions must be read and applied whenever work is done on the seal, and must be kept available for future reference.

ATTENTION These instructions are for the installation and operation of a seal as used in rotating equipment and will help to avoid danger and increase reliability. The information required may change with other types of equipment or installation arrangements. These instructions must be read in conjunction with the instruction manuals for both the pump and any ancillary equipment.

If the seal is to be used for an application other than that originally intended or outside the recommended performance limits, John Crane must be contacted before its installation and use.

Any warranty may be affected by improper handling, installation or use of this seal. Contact John Crane for information as to exclusive product warranty and limitations of liability.

If questions or problems arise, contact your local John Crane representative or the original equipment manufacturer, as appropriate.

ATTENTION John Crane mechanical seals are precision products and must be handled appropriately. Take particular care to avoid damage to lapped sealing faces and to flexible sealing rings. Do not excessively compress the seal before or during installation.

Safety Instructions

- The following designations are used in the installation instructions to highlight instructions of particular importance.

NOTE: *refers to special information on how to install or operate the seal most efficiently.*

ATTENTION refers to special information or instructions directed toward the prevention of damage to the seal or its surroundings.

⚠ **refers to mandatory instructions designed to prevent personal injury or extensive damage to the seal or its surroundings.**

- Installation, removal and maintenance of the seal must be carried out only by qualified personnel who have read and understood these installation instructions.
- The seal is designed exclusively for sealing rotating shafts. The manufacturer cannot be held liable for use of the seal for purposes other than this.
- The seal must only be used in technically perfect condition, and must be operated within the recommended performance limits in accordance with its designated use set out in these installation instructions.
- If the pumped fluid is hazardous or toxic, appropriate precautions must be taken to ensure that any seal leakage is adequately contained. Further information on sealing hazardous or toxic fluids should be obtained from John Crane prior to seal installation.
- Fluorocarbon components should never be burned or incinerated as the fumes and residues are highly toxic. If fluorocarbons are accidentally heated above 750°F/400°C, they can decompose. Protective gloves should be worn as hydrofluoric acid may be present.
- PTFE components should never be burned or incinerated as the fumes are highly toxic.

Before Starting the Equipment

1. Check the pump at the coupling for proper alignment of the driver or motor.
2. Ensure that the gland plate nuts/bolts are securely tightened according to the pump manual instructions, and that all screws are securely fastened.
3. Complete the assembly of the pump, and turn the shaft (by hand if possible) to ensure free rotation.
4. Consult all available equipment operating instructions to check for correctness of all piping and connections, particularly regarding seal recirculation/flush, heating or cooling requirements, and services external to the seal.

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ATTENTION This mechanical seal is designed to operate in a liquid so the heat energy it creates is adequately removed. The following check should be carried out not only after seal installation, but also after any period of equipment inactivity.

5. Check that the seal chamber fluid lines are open and free of any obstruction, and ensure that the seal chamber is properly vented and filled with liquid — refer to the pump instruction manual.

ATTENTION Dry-running — often indicated by a squealing noise from the seal area — will cause overheating and scoring or other damage to the sealing surfaces, resulting in excessive leakage or a much shortened seal life.

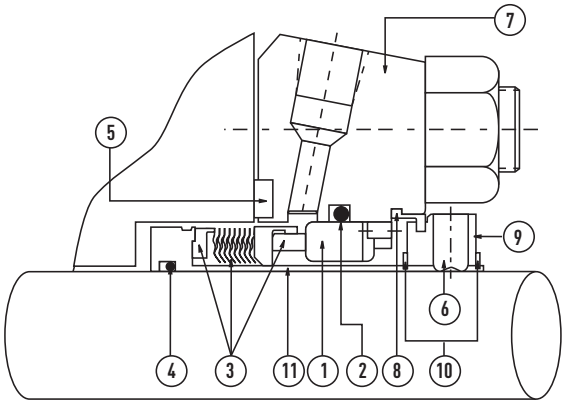
⚠ **Before start-up, ensure that all personnel and assembly equipment have been moved to a safe distance so there is no contact with rotating parts on the pump, seal, coupling or motor.**

WARNING Seal installation should be handled only by qualified personnel. If questions arise, contact the local John Crane representative. Improper use and/or installation of this product could result in injury to the person and/or harmful emissions to the environment, and may affect any warranty on the product. Please contact the company for information as to exclusive product warranty and limitations of liability.

General Instructions

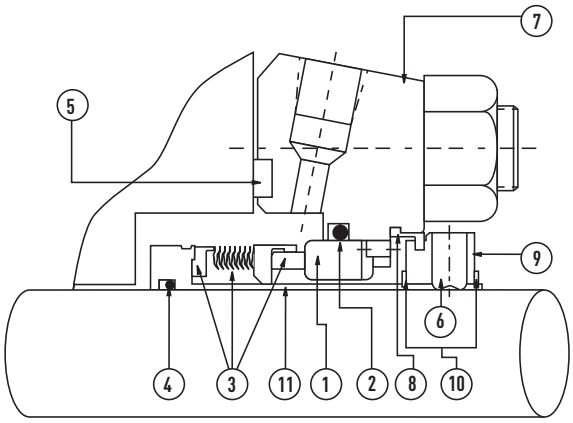
1. Study the engineering layout drawing to confirm the proper seal arrangement for the pump being used.
2. To assure satisfactory operation, handle seal with care. Take particular caution to see that the lapped sealing faces are not scratched or damaged.

Typical EZ-1® Seal Arrangement for Standard Seal Chambers



1 – Mating ring
2 – O-ring
3 – Rotary head assembly
4 – O-ring
5 – Gland gasket
6 – Set screws
7 – Gland plate assembly
8 – Centering bushing
9 – Locking collar
10 – Retaining rings
11 – Sleeve

Typical EZ-1® Seal Arrangement for Enlarged Seal Chambers



1 – Mating ring
2 – O-ring
3 – Rotary head assembly
4 – O-ring
5 – Gland gasket
6 – Set screws
7 – Gland plate assembly
8 – Centering bushing
9 – Locking collar
10 – Retaining rings
11 – Sleeve

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METAL BELLOWS SEAL

Installation, Operation & Maintenance Instructions

EZ-1® Dimensional Data (metric)

Shaft Size A	B	C	D	E	F	G	H	J
28	42.8	49.2	60.3	17.4	42.9	61.9	14.3	111.1
33	49.2	52.4	60.3	17.4	39.7	61.9	14.3	106.0
35	49.2	52.4	60.3	17.4	39.7	61.9	14.3	106.0
38	55.5	58.7	69.8	19.0	42.9	71.5	14.3	130.2
40	58.7	61.9	71.4	19.1	42.8	73.0	14.3	133.4
43	61.9	65.7	79.4	19.1	42.9	81.0	14.3	133.4
45	61.9	65.1	79.4	19.1	42.9	81.0	14.3	133.4
48	65.1	68.3	82.6	19.1	42.9	84.2	14.3	136.5
50	68.2	71.4	82.6	19.0	44.5	84.2	17.4	139.7
53	71.4	74.6	88.9	22.2	42.9	90.5	17.4	138.0
55	71.4	74.6	88.9	22.2	42.9	90.5	17.4	138.0
60	80.9	84.1	96.8	25.4	41.3	98.4	17.4	158.8
65	87.3	90.5	109.5	30.2	41.2	111.1	17.4	177.8
70	92.1	95.2	114.3	27.0	41.2	115.9	17.5	190.0
75	98.4	101.6	122.2	28.5	42.1	123.8	20.6	196.9
80	104.8	108.0	125.4	28.5	42.1	127.0	20.6	190.0
85	108.0	111.1	125.4	31.7	42.1	127.0	19.1	203.2
100	128.6	131.8	154.0	34.9	42.1	155.6	22.2	228.6

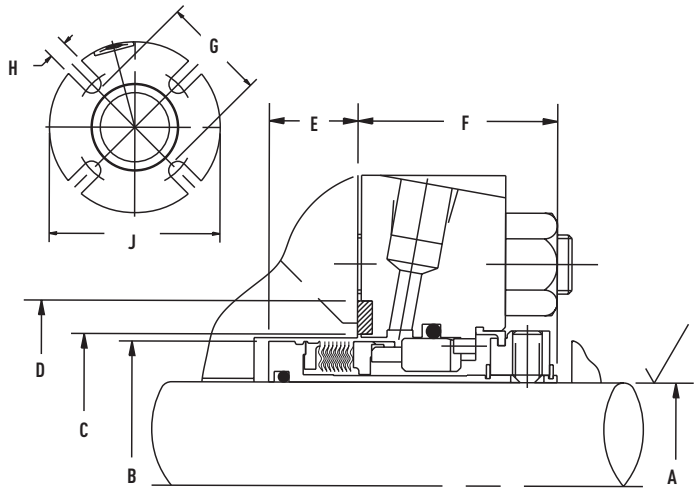
EZ-1® Dimensional Data (inch)

Shaft Size A	B	C	D	E	F	G	H	J
1-1/8	1.687	1.937	2.375	.687	1.687	2.437	.562	4.375
1-3/8	1.937	2.062	2.375	.687	1.562	2.437	.562	4.375
1-1/2	2.187	2.312	2.750	.750	1.687	2.812	.562	5.125
1-5/8	2.312	2.437	2.812	.750	1.687	2.875	.562	5.250
1-3/4	2.437	2.562	3.125	.750	1.687	3.187	.562	5.250
1-7/8	2.562	2.687	3.250	.750	1.687	3.312	.562	5.375
2	2.687	2.812	3.250	.750	1.750	3.312	.687	5.500
2-1/8	2.812	2.937	3.500	.875	1.687	3.562	.687	5.437
2-1/2	3.312	3.437	4.250	1.000	1.687	4.312	.812	6.250
2-5/8	3.437	3.562	4.375	1.187	1.625	4.437	.562	6.500
2-3/4	3.625	3.750	4.500	1.062	1.625	4.562	.750	7.000
3	3.875	4.000	4.812	1.125	1.658	4.875	.812	7.750
3-1/4	4.125	4.250	4.937	1.125	1.658	5.000	.812	7.480
3-1/2	4.375	4.687	5.625	1.250	1.656	5.687	.812	8.500

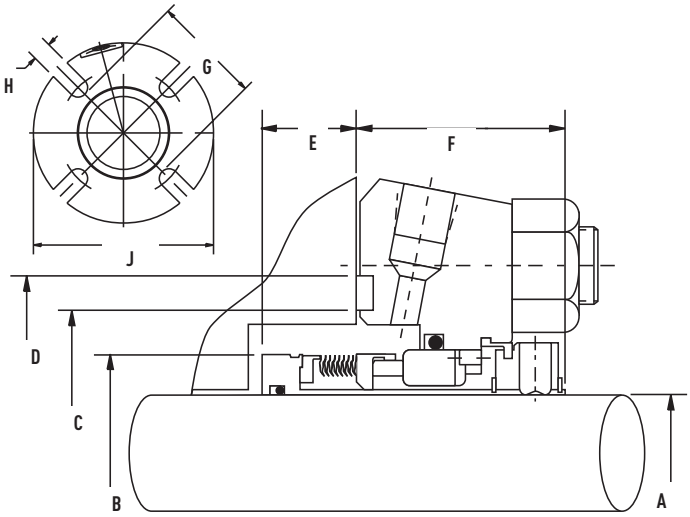
Seal Chambers (inch)

Shaft Size A	B	C	D	E	F	G	H	J
1-1/8	1.687	1.937	1.750	.687	1.687	3.312	.437	4.500
1-3/8	1.937	2.812	3.250	.687	1.562	3.437	.500	5.250
1-3/4	2.437	3.437	4.250	.750	1.687	4.562	.562	6.500
1-7/8	2.562	3.562	4.250	.750	1.687	4.437	.562	6.500
2-1/2	3.312	4.375	5.500	1.000	1.687	5.625	.750	8.000
2-5/8	3.437	4.375	5.375	1.312	1.625	5.437	.562	7.000

EZ-1® Standard Seal Chamber Version



EZ-1® Enlarged Seal Chamber Version



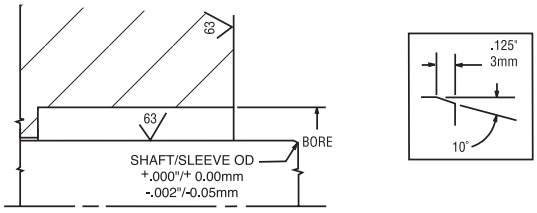
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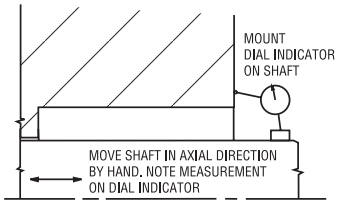
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Preparing the equipment

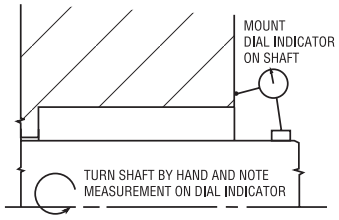
1. Check seal chamber dimensions and finishes.



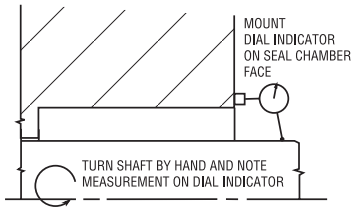
2. Measure axial end play (.005"/0.13 mm F.I.M. max.).



3. Determine squareness of seal chamber face to shaft (.001" per inch/0.001 mm per mm of shaft diameter F.I.M. max.), and shaft concentricity to the seal chamber.



4. Measure shaft runout (.001" per inch/0.001 mm per mm of shaft diameter F.I.M. max.).



NOTE: *If the measured dimensions exceed these values given, correct the equipment to meet the specifications prior to installing the seal cartridge.*

Installing the seal in an overhung pump

1. Disassemble the seal chamber housing. Wipe the shaft/sleeve clean and apply a lubricant that is compatible with the sealed fluid and the O-ring material.* Take the complete cartridge assembly from its package. Do not disassemble or alter the unit.
2. Slide the complete cartridge assembly as far as possible onto the shaft/sleeve, toward the bearings. Be careful not to damage the O-ring inside the cartridge sleeve.

   Reassemble the seal chamber housing and the impeller. Complete all required axial adjustments to the pump rotating assembly.
3. With the gland gasket in place, slide the complete assembly into position against the face of the seal chamber. Assemble the gland bolts, finger-tight. Continue tightening alternately until secure. Do not distort the gland by overtightening.
4. Tighten the cartridge sleeve set screws evenly. Do not remove the PTFE centering bushing.
5. Complete reassembly of the pump, frequently turning the shaft by hand to check for free rotation. If the shaft will not turn, the seal has been improperly set. Some frictional resistance, due to the centering bushing, is normal.

ATTENTION Refer to assembly drawing and/or pump manual for piping connections and coupling alignment. Proceed as indicated.

Installing the seal between bearings

1. Disassemble the bearings and bearing housings. Wipe the shaft/sleeve clean and apply a lubricant which is compatible with the sealed fluid and the O-ring material.* Take both complete cartridges from their packages. Do not disassemble or alter the units.
2. Slide the complete cartridge assemblies onto the shaft/sleeves, being careful not to damage the O-rings inside the cartridge sleeves.

   Reassemble the bearing housings and bearings, and complete all required axial adjustments to the pump rotating assembly.
3. With the gland gasket in place, slide the complete assembly into position against the face of the seal chamber. Assemble the gland bolts, finger-tight. Continue tightening alternately until secure. Do not distort the gland by overtightening.
4. Tighten the cartridge sleeve set screws evenly. Do not remove the PTFE centering bushing.
5. Complete reassembly of the pump, frequently turning the shaft by hand to check for free rotation. If the shaft will not turn, the seal has been improperly set. Some frictional resistance, due to the centering bushing, is normal.

ATTENTION Refer to assembly drawing and/or pump manual for piping connections and coupling alignment. Proceed as indicated.

* Additional sleeve elastomers are provided. The O-ring can be changed prior to seal installation in order to meet your specific application requirements.

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Decommissioning the Equipment

1. Ensure that the equipment is electrically isolated.

If the equipment has been used on toxic or hazardous fluids, ensure that the equipment is correctly decontaminated and made safe prior to commencing work. Remember, fluid is often trapped during draining and may exist outside the seal. The equipment instruction manual should be consulted to check for any special precautions.

2. Ensure that the equipment is isolated by the appropriate valves. Check that the fluid is drained and pressure is fully released.

Maintenance

No maintenance of a seal is possible while installed. It is recommended that a spare seal unit and mating ring be held in stock to allow immediate replacement of a removed seal.

Used seals should be returned to a John Crane service location, as rebuilding to as-new specifications must be carried out by qualified personnel.

It is the responsibility of the equipment user to ensure that any parts being sent to a third party have appropriate safe handling instructions externally attached to the package.

Quality Assurance

This seal has been assembled in accordance with John Crane quality assurance standards and, with proper maintenance and use, will give safe and reliable operation to the maximum recommended performance as shown in any relevant approved John Crane publication.

Ordering information

1. Cartridge seal size = solid shaft or sleeve outside diameter (OD).
2. Determine whether seal chamber is standard or enlarged bore.

Materials of Construction — Standard	
Bellows	Alloy 20 (UNS N08020)
Adaptive hardware	316 stainless steel
Faces	Carbon vs. silicon carbide or silicon carbide vs. silicon carbide (sintered version)
Gland gasket	Glass-filled PTFE
Mating ring elastomer	PTFE encapsulated fluorocarbon
Sleeve elastomer	Fluorocarbon O-ring
Additional sleeve elastomers in package* Fluorocarbon	AFLAS®, EPR and PTFE encapsulated

*Additional sleeve elastomers are provided. The O-ring can be changed prior to seal installation in order to meet your specific application requirements.

AFLAS is a registered trademark of Asahi Glass Co. Ltd.

Operating (non-concurrent) Limits	
Process pressure:	Vacuum to 300 psi/20 bar
Process temperature:	-20˚F to +400˚F/-30˚C to +200˚C
Shaft speed:	4,500 sfpm/25 m/s

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If the products featured will be used in a potentially dangerous and/or hazardous process, your John Crane representative should be consulted prior to their selection and use. In the interest of continuous development, John Crane Companies reserve the right to alter designs and specifications without prior notice. It is dangerous to smoke while handling products made from PTFE. Old and new PTFE products must not be incinerated. ISO 9001 and ISO14001 Certified, details available on request.

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