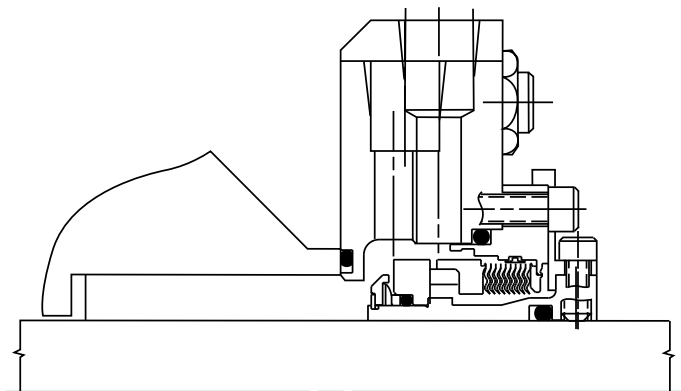


## METAL BELLOW CARTRIDGE SEAL

Installation, Operation &amp; 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

1. 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 towards 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.**

2. Installation, removal and maintenance of the seal must be carried out only by qualified personnel who have read and understood these installation instructions.
3. 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.
4. 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.

5. 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.
6. Fluorocarbon components should never be burned or incinerated as the fumes and residues are highly toxic. If fluorocarbons are accidentally heated above 400°C/750°F, they can decompose. Protective gloves should be worn as hydrofluoric acid may be present.
7. 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.

**ATTENTION** This mechanical seal is designed to operate in a liquid under normal conditions, and operate reliably during short periods in dry-running conditions. Therefore, 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.



**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.

## METAL BELLOW CARTRIDGE SEAL

Installation, Operation & Maintenance Instructions

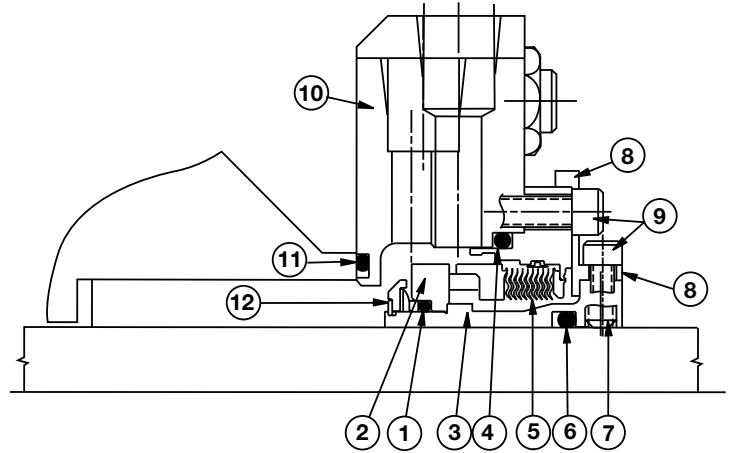
### General Instructions

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 marred.

### Typical Type 613 Standard Seal Chambers Arrangement

Part Name	
1 O-ring	7 Set Screws
2 Mating Ring	8 Spacer
3 Sleeve Assembly	9 Cap Screws
4 O-ring	10 Gland Plate Assembly
5 Seal Head Assembly	11 O-ring
6 O-ring	12 Compression Ring Assembly

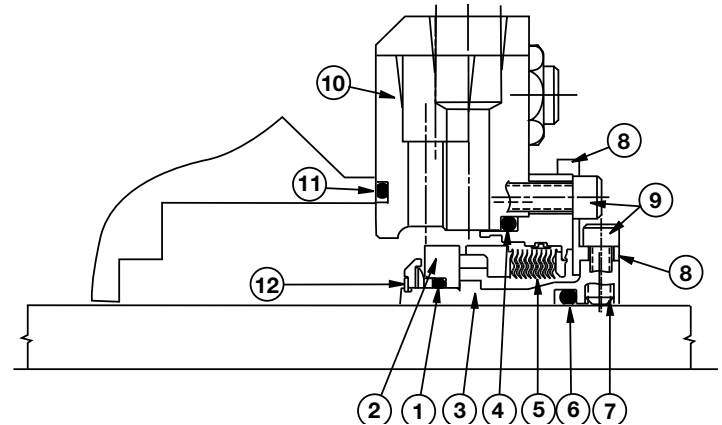
### Typical Type 613 Standard Seal Chambers Arrangement (cont'd)



### Typical Type 613 Enlarged Seal Chambers Arrangement

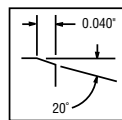
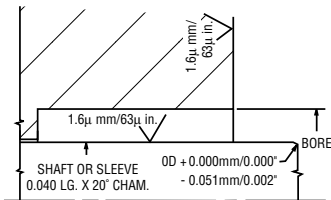
Part Name	
1 O-ring	7 Set Screws
2 Mating Ring	8 Spacer
3 Sleeve Assembly	9 Cap Screws
4 O-ring	10 Gland Plate Assembly
5 Seal Head Assembly	11 O-ring
6 O-ring	12 Compression Ring Assembly

### Typical Type 613 Enlarged Seal Chambers Arrangement (cont'd)



### Preparing the Equipment

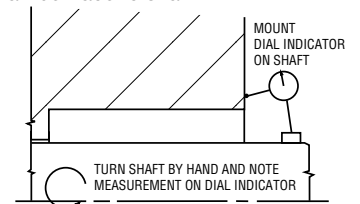
1. Check seal chamber dimensions and finishes.



3. Determine squareness of seal chamber face to shaft:

Rotating Mating Ring  
- 0.1mm/0.005" FIM max.

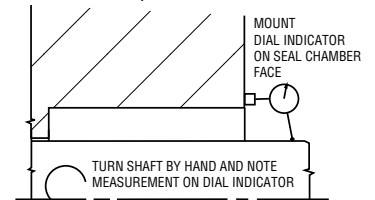
Rotating Seal Head  
- 0.1mm/0.002" FIM max.



2. Measure axial end play (0.1mm/0.003" FIM max.).

4. Measure shaft runout (0.1mm/0.002" FIM max.).

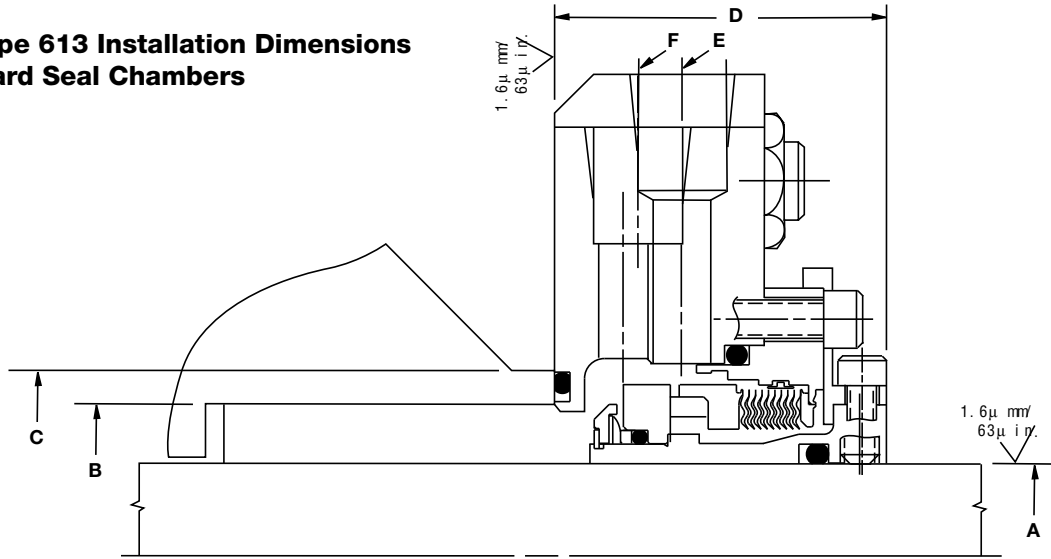
**NOTE:** If measured dimensions exceed those values given, correct the equipment to meet specifications prior to seal installation.



## METAL BELLOW CARTRIDGE SEAL

Installation, Operation & Maintenance Instructions

### Typical Type 613 Installation Dimensions for Standard Seal Chambers



### Type 613 Standard Seal Chamber Dimensional Data (mm)

Dash Number	A +0.00-0.05mm	B Max.	C Min.	D	E	F
M033	33	53.98	60.33	52.43	1/4-18	3/8-18
M035	35	53.98	60.33	52.43	1/4-18	3/8-18
M043	43	66.68	76.19	53.98	3/8-18	3/8-18
M045	45	66.68	76.19	53.98	3/8-18	3/8-18
M053	53	83.00	95.00	61.90	3/8-18	3/8-18
M055	55	83.00	95.00	61.90	3/8-18	3/8-18
M065	65	92.08	107.95	70.64	3/8-18	3/8-18

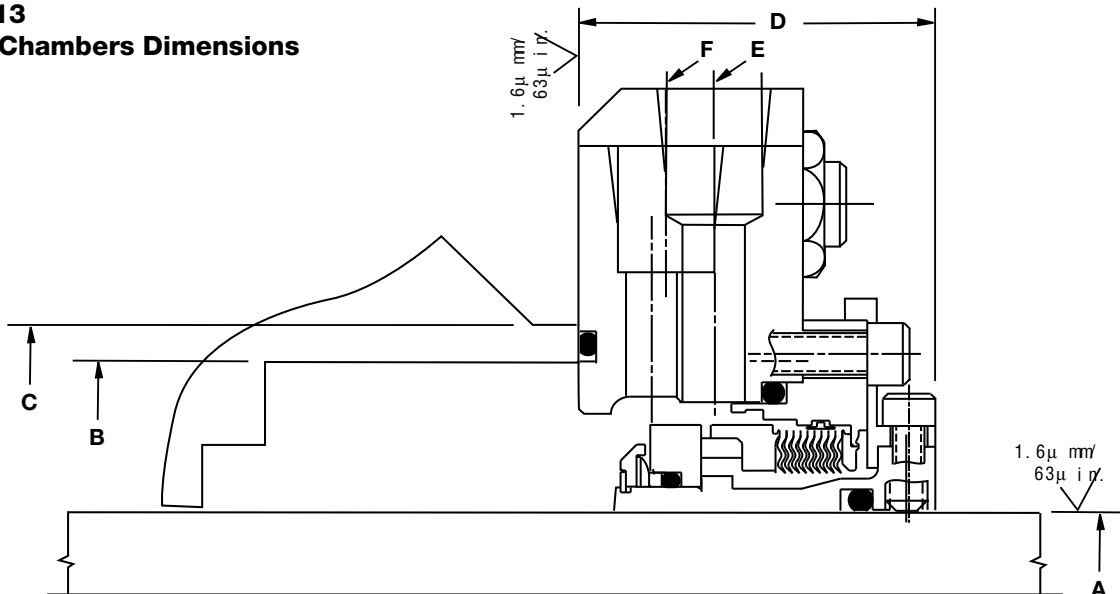
### Type 613 Standard Seal Chamber Dimensional Data (inches)

Dash Number	A +0.000-0.002"	B Max.	C Min.	D	E	F
-24	1.125	2.000	2.250	2.00	1/4-18	3/8-18
-28	1.375	2.125	2.375	2.06	1/4-18	3/8-18
-34	1.750	2.625	3.000	2.13	3/8-18	3/8-18
-36	1.875	2.750	3.125	2.19	3/8-18	3/8-18
-40	2.125	3.062	3.437	2.44	3/8-18	3/8-18
-46	2.500	3.500	4.000	2.63	3/8-18	3/8-18
-48	2.625	3.625	4.250	2.78	3/8-18	3/8-18

### Type 613 Enlarged Seal Chamber Dimensional Data (inches)

Dash Number	A +0.000-0.002"	B Max.	C Min.	D	E	F
-28	1.375	2.875	3.312	2.06	1/4-18	3/8-18
-34	1.750	3.500	3.937	2.13	3/8-18	3/8-18
-36	1.875	3.625	4.125	2.56	3/8-18	3/8-18
-40	2.125	4.000	4.437	2.44	3/8-18	3/8-18
-46	2.500	4.750	5.250	2.63	3/8-18	3/8-18
-48	2.625	4.625	5.125	2.78	3/8-18	3/8-18

### Typical Type 613 Enlarged Seal Chambers Dimensions



## METAL BELLOW CARTRIDGE SEAL

Installation, Operation &amp; Maintenance Instructions

### Installing the Seal in an Overhung Pump

1. Disassemble the seal chamber housing. Wipe the shaft/sleeve clean and apply a lubricant which is compatible with the sealed fluid and the O-ring material. Take the complete cartridge assembly from its package.

**NOTE:** Do not disassemble or alter the unit

2. Slide the complete cartridge assembly as far as possible onto the shaft/sleeve, towards the bearings. Be careful not to damage the O-ring inside the cartridge sleeve.
3. Reassemble the seal chamber housing and the impeller. Complete all required axial adjustments to the pump rotating assembly.
4. With the gland O-ring 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.

5. Tighten the cartridge sleeve set screws evenly.
6. Remove and save the spacers, item 8.
7. 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.

**NOTE:** Plug all unused connections with pipe plugs provided.

**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 cartridge assemblies from their packages.

**NOTE:** Do not disassemble or alter the units

2. Slide the complete cartridge assemblies as far as possible onto the shaft/sleeves, towards the bearings. Be careful not to damage the o-ring inside the cartridge sleeves.
3. Reassemble the bearing housings and bearings. Complete all required axial adjustments to the pump rotating assembly.
4. With the gland o-ring in place, slide the complete assemblies 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.

5. Tighten the cartridge sleeve set screws evenly.
6. Remove and save the spacers.
7. 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.

**NOTE:** Plug all unused connections with pipe plugs provided.

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

### 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. Therefore, it is recommended that a spare seal unit and mating ring be held in stock to allow immediate replacement of a removed seal.

It is recommended that used seals are returned to a John Crane Seal Rebuilding Center, 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.**

**METAL BELLOW CARTRIDGE SEAL**

Installation, Operation &amp; Maintenance Instructions

**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 OD.
2. Select Type 613 arrangement.
3. Determine whether standard or enlarged seal chamber configuration is required.
4. Choose seal drawing number from charts below.

**Type 613 Standard Seal Chamber Part Numbers (mm)**

Seal Size	Part Number
33mm	705919
35mm	705920
43mm	705921
45mm	705922
53mm	705923
55mm	705924
65mm	705925

**Materials of Construction - Standard**

Primary Ring	Carbon
Mating Ring	Silicon Carbide
Bellows	Alloy C-276 (UNS N10276)
Gland	Alloy 20
Sleeve	316SS or Alloy 20 (optional)
Elastomers	Fluorocarbon, EPR, TFE Encapsulated Fluorocarbon, Perfluoroelastomer

**Operating Limits**

Pressure:	Vacuum to 10 bar g/150 psig
Temperature:	-75°C to 200°C/-100°F to 400°F (depending on elastomer specified)
Speed:	Up to 25 m/s / 5,000 sfpm

**Type 613 Standard Seal Chamber Part Numbers (ANSI inch)**

Seal Size	Part Number
1.125"	705912
1.375"	705913
1.750"	705914
1.875"	705915
2.125"	705916
2.500"	705917
2.625"	705918

**Type 613 Enlarged Seal Chamber Part Numbers (ANSI inch)**

Seal Size	Part Number
1.375" (Goulds & Durco)	706317
1.750"	706318
1.875"	706319
2.125"	706320
2.500"	706321
2.625"	706322

# TYPE 613 WET/DRY

## METAL BELLOW CARTRIDGE SEAL

Installation, Operation & Maintenance Instructions

# TYPE 613 WET/DRY

## METAL BELLOW CARTRIDGE SEAL

Installation, Operation & Maintenance Instructions

**METAL BELLOW CARTRIDGE SEAL**

Installation, Operation &amp; Maintenance Instructions



**North America**  
 United States of America  
 Tel: 1-847-967-2400  
 Fax: 1-847-967-3915

**Europe**  
 United Kingdom  
 Tel: 44-1753-224000  
 Fax: 44-1753-224224

**Latin America**  
 Brazil  
 Tel: 55-11-3371-2500  
 Fax: 55-11-3371-2599

**Middle East & Africa**  
 United Arab Emirates  
 Tel: 971-481-27800  
 Fax: 971-488-62830

**Asia Pacific**  
 Singapore  
 Tel: 65-6518-1800  
 Fax: 65-6518-1803

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.