

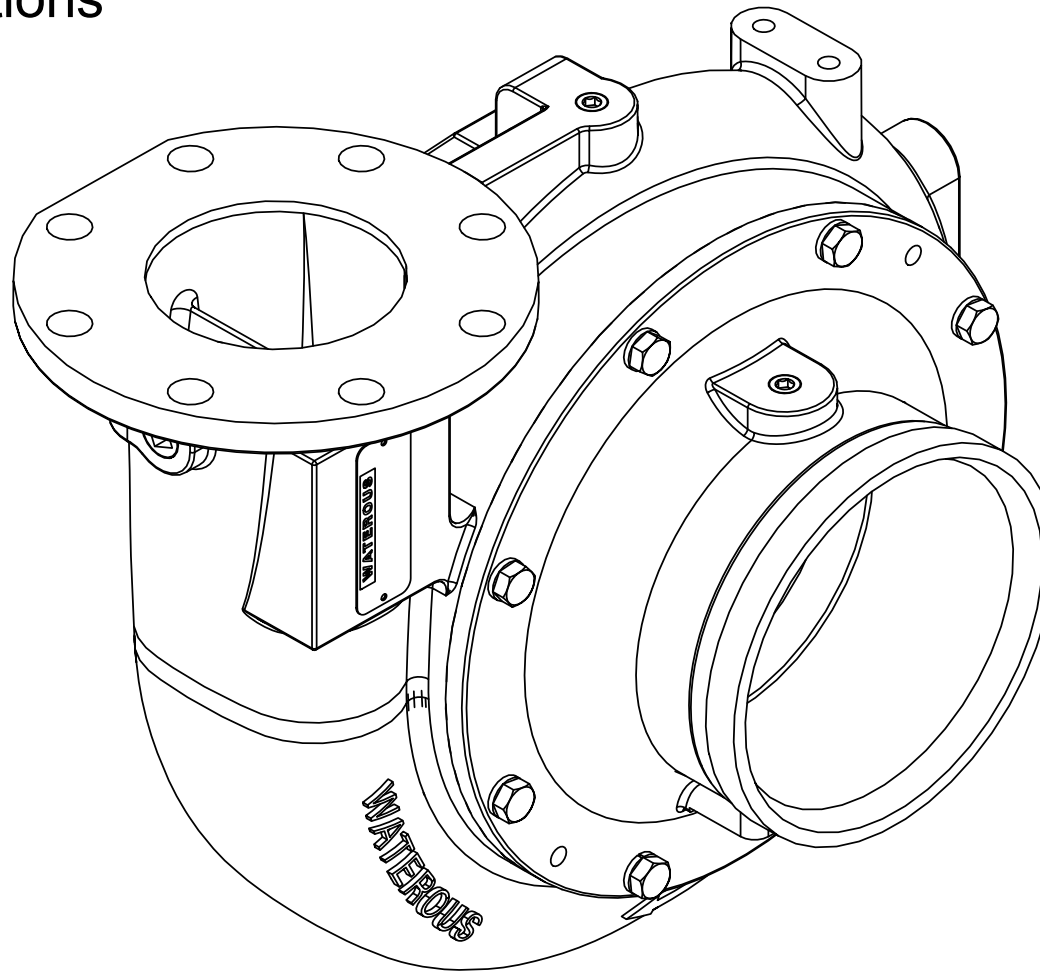
# WATEROUS

Form Number: F-3036

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## ESU1 Series Fire Pumps Overhaul Instructions

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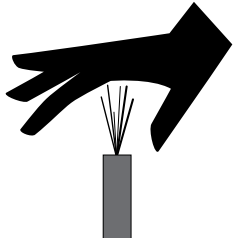
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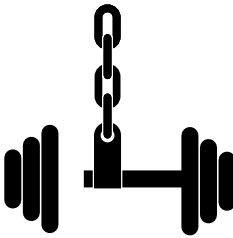
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## Safety Precautions

- Read and understand this document before you begin the overhaul.
- Read and understand all the notices and safety precautions.
- Be aware that these instructions are only guidelines and are not meant to be definitive. Contact Waterous when you have questions.
- Do not overhaul this equipment if you are not familiar with the tools and skills needed to safely perform the required procedures.
- Do not modify the equipment.
- Waterous reserves the right to make modifications to the instructions without notice.

 <b>WARNING</b>	
<b>High Pressure</b> <ul style="list-style-type: none"><li>• Liquid ejected at high pressure can cause serious injury.</li><li>• Drain the pump after use and before servicing.</li></ul>	

 <b>WARNING</b>	
<b>Hot Surface</b> <ul style="list-style-type: none"><li>• Hot surfaces can burn you.</li><li>• Do not touch the surface during operation—allow it to cool after operating.</li></ul>	

 <b>WARNING</b>	
<b>Unsupported Equipment</b> <ul style="list-style-type: none"><li>• Unsupported equipment may shift or fall during disassembly, causing injury or damage.</li><li>• Always support heavy equipment while servicing.</li></ul>	

## This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across its entire width, providing a guide for handwriting or typing. The paper itself is a clean, bright white, and there are no margins, text, or other markings present.

Use this document to overhaul your Waterous equipment. Please understand the following conditions:

- Be aware that these instructions are only guidelines and are not meant to be definitive. Contact Waterous when you have questions.
- Understand that your configuration may require additional steps, that are not described in the illustrations or instructions, to perform the overhaul.
- The equipment described in this document is intended to be overhauled by a person or persons with the necessary skills and knowledge to perform the overhaul.

This document is divided into the following sections:

#### SAFETY

This section describes general precautions and alert symbols in this document.

#### INTRODUCTION

This section is an overview of the document.

#### DISASSEMBLY

This section describes disassembly procedures.

#### ASSEMBLY

This section describes assembly procedures.

## Using this Document

Use the guidelines below when viewing this document.

### Viewing the Document Electronically

- View this document in landscape orientation.
- Use the table of contents to navigate directly to that section.
- Text **with this appearance** is linked to a reference.

### Printing the Document

- The document is best viewed when printed on both sides and in color.
- Use a 3-ring binder to store the document.

## Additional Documentation

Additional documentation is available through the MyWaterous login at [waterousco.com](http://waterousco.com). Use your serial number to gain access to the service parts list associated with your system. Dimensional drawings are available through the Waterous Service department.

## Symbols

Symbols are used to illustrate additional tools or operations that are required to complete the instructions.



Anti-seize compound—This symbol tells you to apply the appropriate anti-seize compound to the part.



Arbor press—This symbol tells you to use an arbor press to complete this step.



Discard—This symbol tells you to discard or recycle the part in accordance with local regulations.



High-pressure grease—This symbol tells you to apply high-pressure grease to the surfaces that you are pressing together.



Lubrication—This symbol tells you to apply the appropriate lubricant to the part.



Sealant—This symbol tells you to apply an appropriate sealant to the part.



Torque to specification—This symbol tells you to torque the hardware to the specified value.

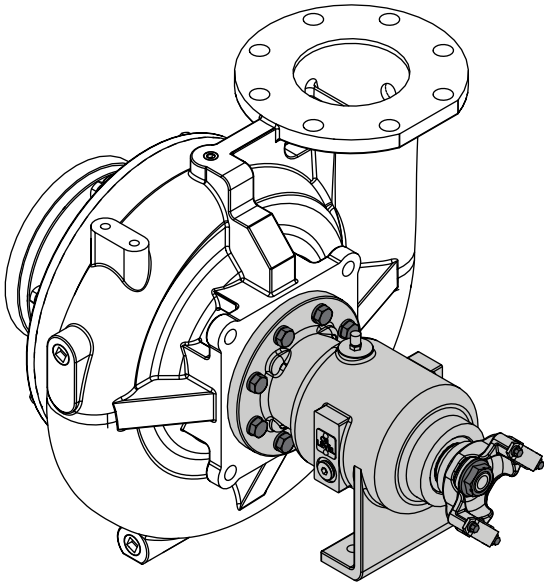


Threadlocker—This symbol tells you to apply threadlocker to the hardware.

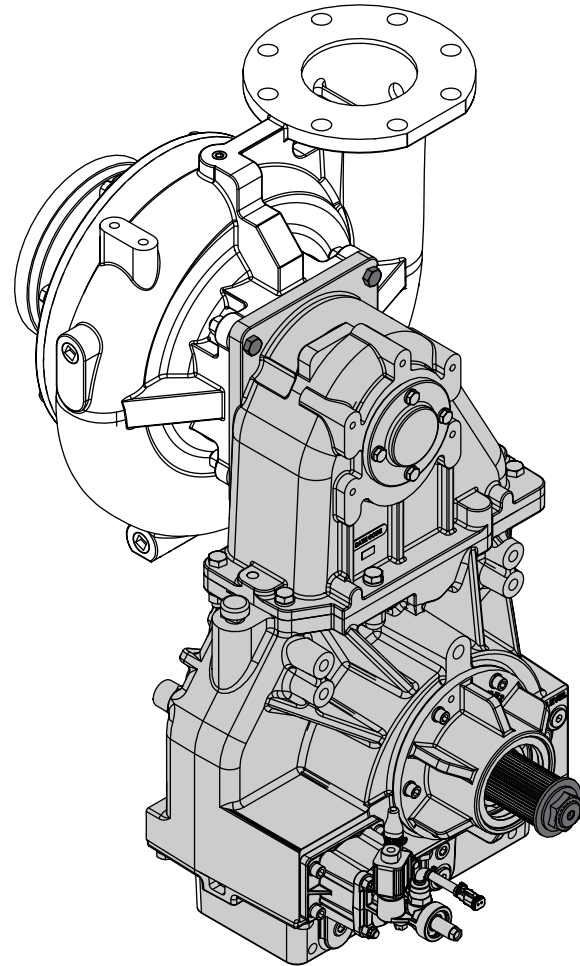


Retaining compound—This symbol tells you to apply retaining compound to the component.

## ESU1 Series Pump Drive Option Overview



ESU1 with Direct Drive Pedestal



ESU1 with C22 Transmission

## Preparing to Disassemble the Equipment

- Read and understand the instructions before disassembling the equipment.
- Prepare a workspace suitable to accommodate and support the equipment.
- Gather the necessary tools, cleaning cloths, brushes, and penetrating fluids.
- Understand that your configuration may require additional steps that are not described in the illustrations or instructions to perform the disassembly.
- This equipment is intended to be disassembled by a person or persons with the basic knowledge of servicing similar equipment. Contact Waterous for more information.

## Tools Required

- Typical automotive mechanics hand tools.
- Suitable arbor press.
- Suitable support and lifting equipment.

## Preparing the Apparatus

- Park the apparatus on a level surface in a well-lit area.
- Engage the parking brake.
- Shut off the engine and remove the key from the ignition switch.
- Allow the apparatus to cool before servicing.

## Best Practices

- Remove any dirt, sand, grease, or oil from the enclosure before you disassemble the equipment. Surface debris can transfer into the equipment interior and prematurely wear internal parts.
- Only use a clean, lint-free cloth, a debris-free work surface, and properly maintained tools to perform the disassembly.
- Replace any gaskets and O-ring seals during the overhaul.
- Do not reuse lock nuts.
- Apply penetrating oil to screws and nuts before disassembly.

## Removing the Equipment

Removing the equipment for overhaul varies by application. Your application may require components such as drain lines, support brackets, plumbing connections, and other accessories to be removed or disconnected before removing the equipment.

Additionally, when overhauling some pump and transmission combinations you are required to remove the pump and transmission together before separating the pump from the transmission. Refer to the transmission instructions before proceeding.

Record the process used to remove the equipment from the apparatus. Use this information to install the equipment into the apparatus after the overhaul.

## Disassembling the Equipment Components

- Refer to the service parts list (SPL) for part identification and disassemble order.

**Note:** Documents specific to your application are available through the MyWaterous login at [waterousco.com](http://waterousco.com) by entering the serial number for your system. Depending on the application, the serial number for your equipment is located on the operator panel, pump, transmission, or some combination of the three.

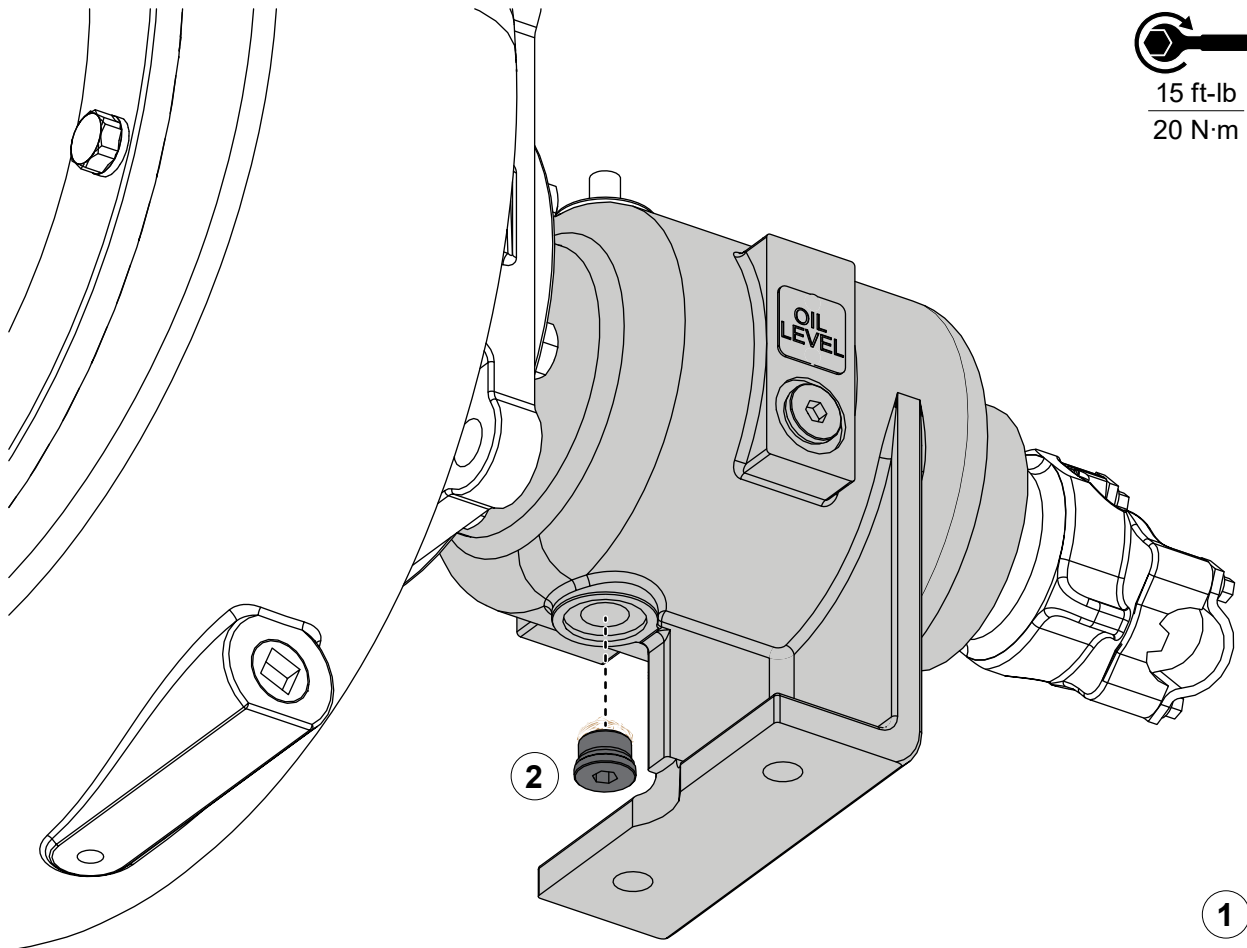
- Use established industry practices to disassemble the equipment.
- Record or mark components as you remove them to make sure that you install them in the same orientation.
- Discard or recycle drained fluids collected during the overhaul in accordance with local regulations.

## Optional Equipment

Be aware that the disassembly instructions may include optional equipment not included in your application.



## Draining the Pedestal Oil



15 ft-lb  
20 N·m

Use the illustration and instructions to drain the direct drive pedestal oil.

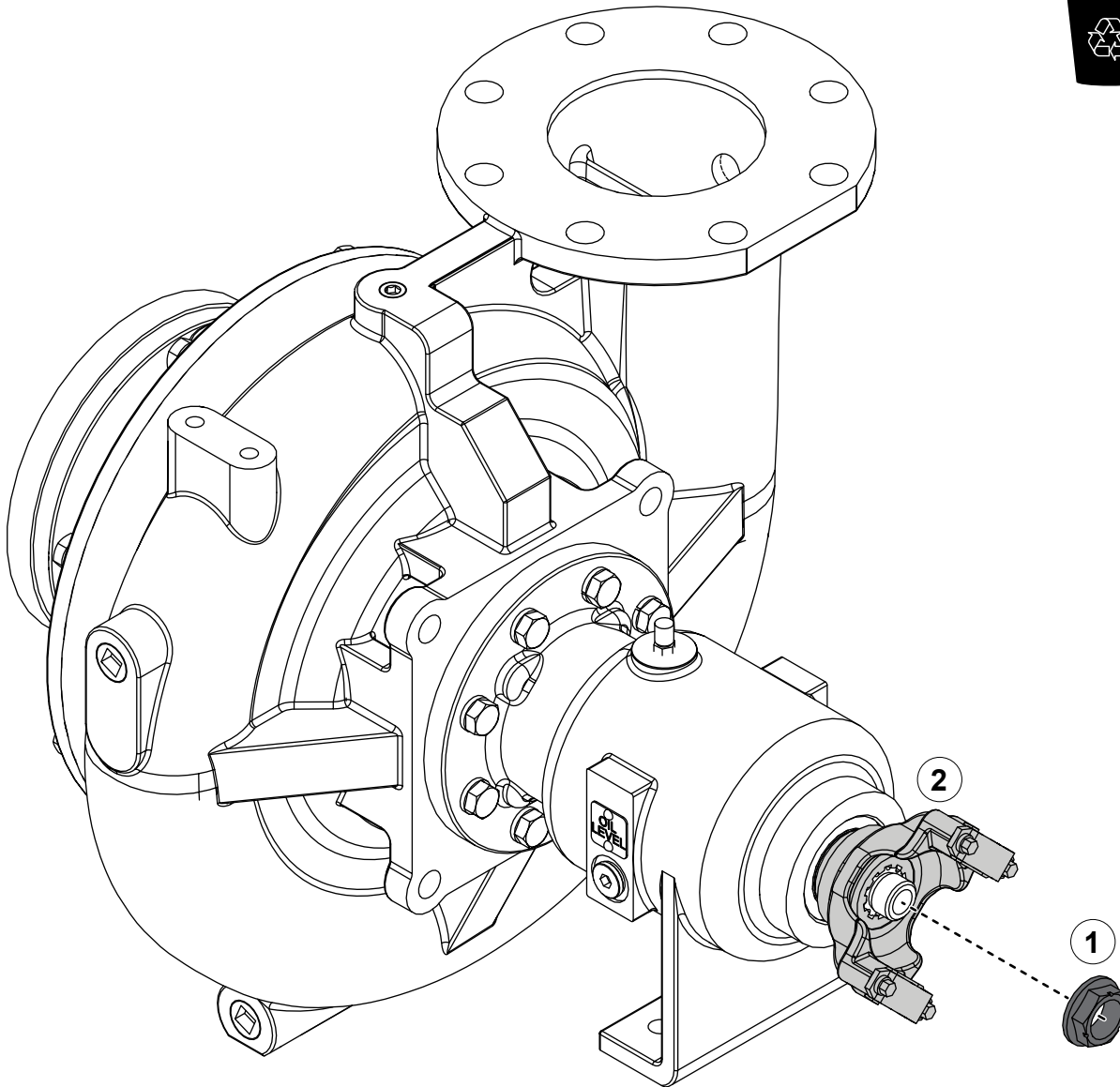
- 1 Place a suitable container under the direct drive pedestal to collect approximately 1/2 qt (0.43 L) of drained oil.
- 2 To drain the pedestal oil, do the following:
  - Remove the magnetic plug.
  - While the oil drains, remove any metal fragments that collected on the magnetic plug.
  - After the oil drains, install the magnetic plug and torque it to 15 ft-lb (20 N·m).

## Removing the Direct Drive Pedestal Yoke Adapter



Use the illustration and instructions to remove the yoke adapter.

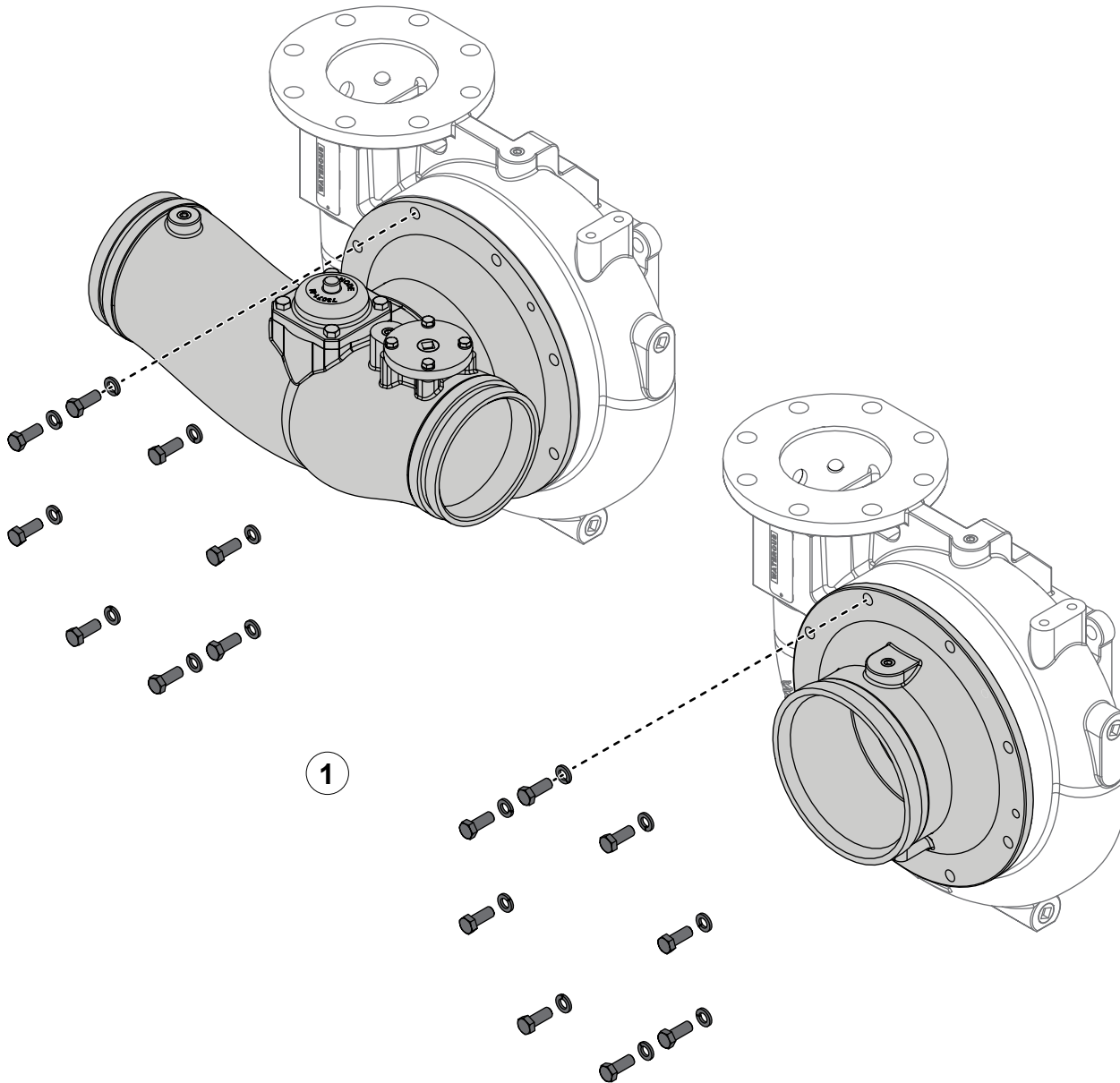
- 1 Remove and discard the nut.
- 2 Remove the yoke.



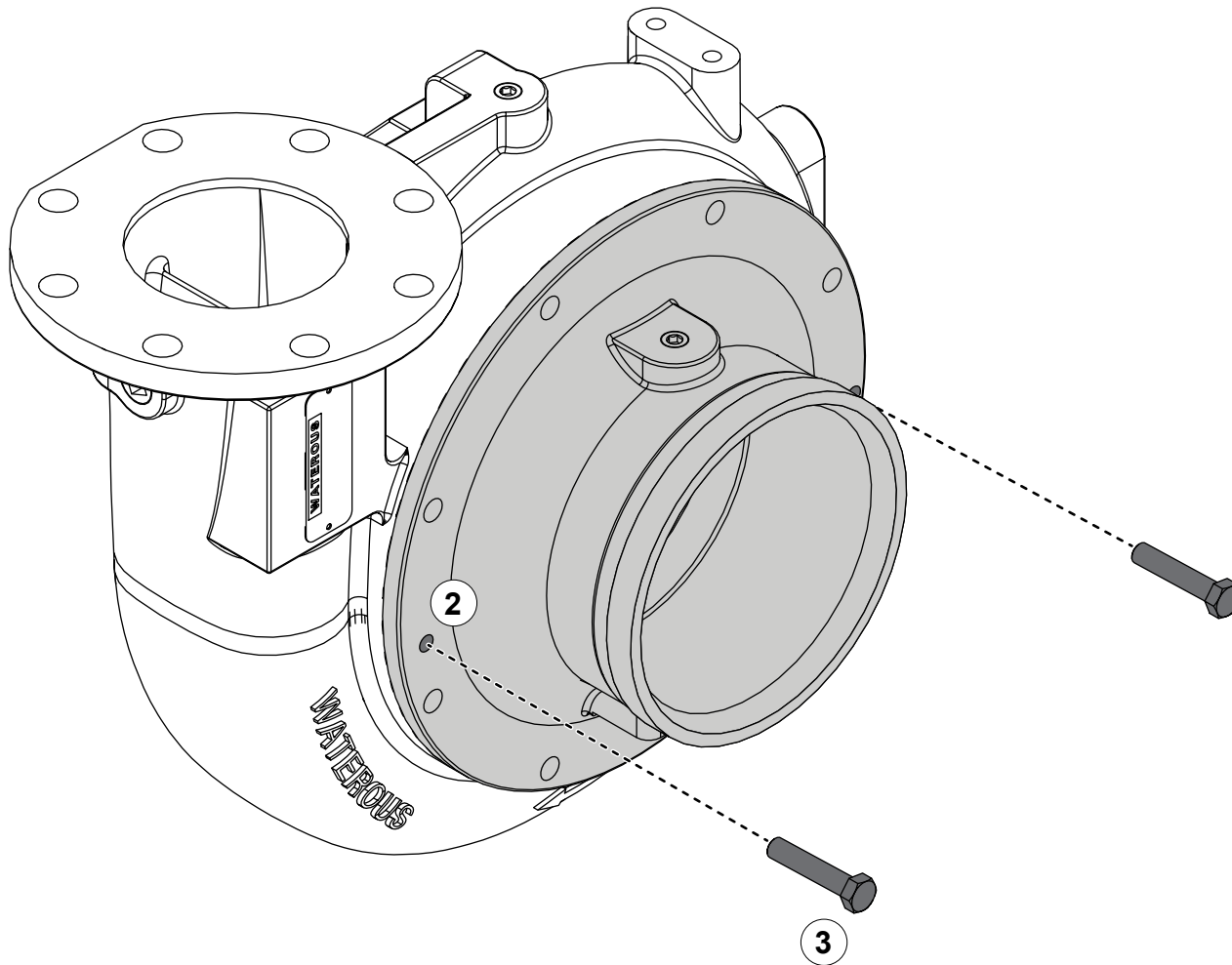
## Removing the Intake Adapter

Use the illustration and instructions to remove the intake adapter.

- 1 Remove the intake adapter hardware.



## Removing the Intake Adapter



Use the illustration and instructions to remove the intake adapter.

- 2 Locate the 2 jacking threads on the adapter.

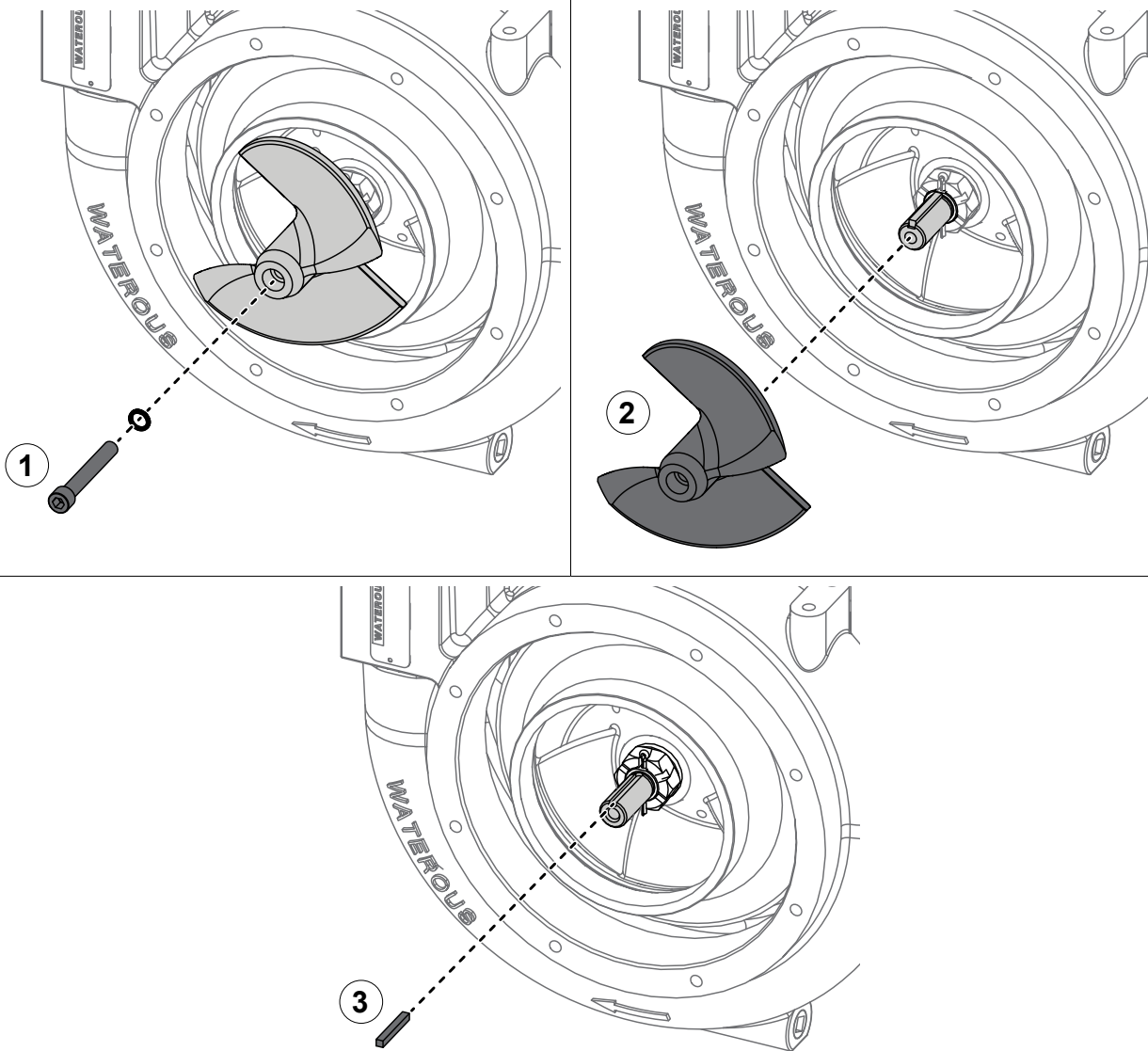
**Note:** Locations vary by adapter.

- 3 Use a 1/2-13 screw with a minimum length of 1 3/4-inch as a jacking screw to separate the adapter from the volute.

## Removing the Optional Inducer

Use the illustrations and instructions to remove the optional inducer.

- 1 Remove the inducer hardware.
- 2 Remove the inducer.
- 3 Remove the key.

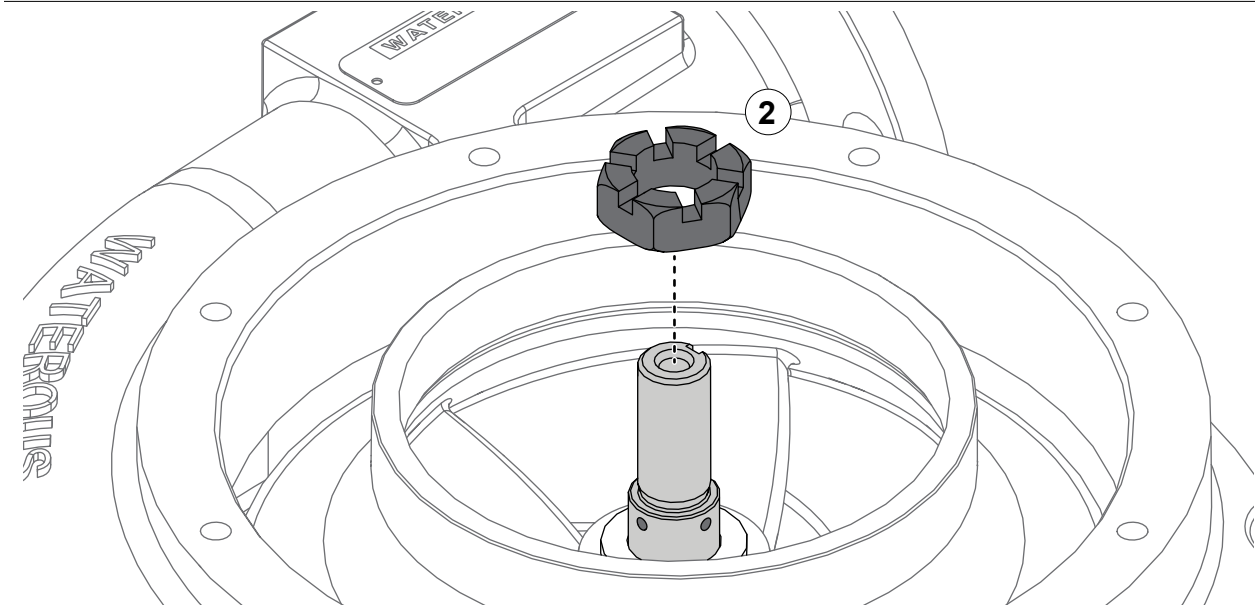
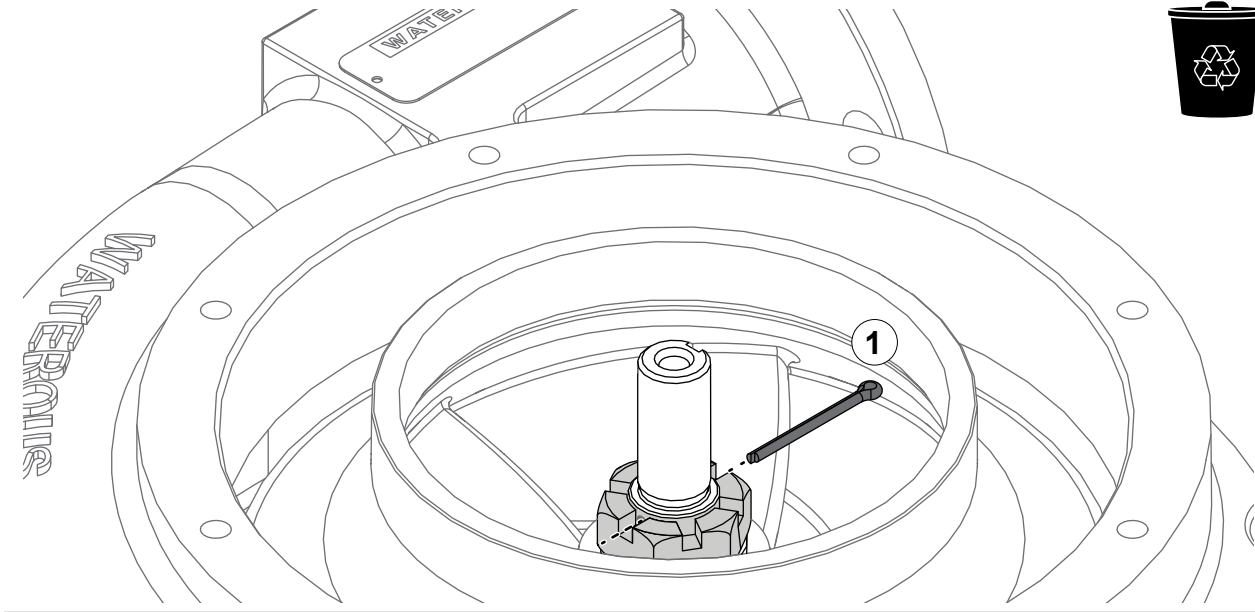


## Removing the Pump Components



Use the illustrations and instructions to remove the castle nut.

- 1 Remove and discard the cotter pin.
- 2 Remove the castle nut.



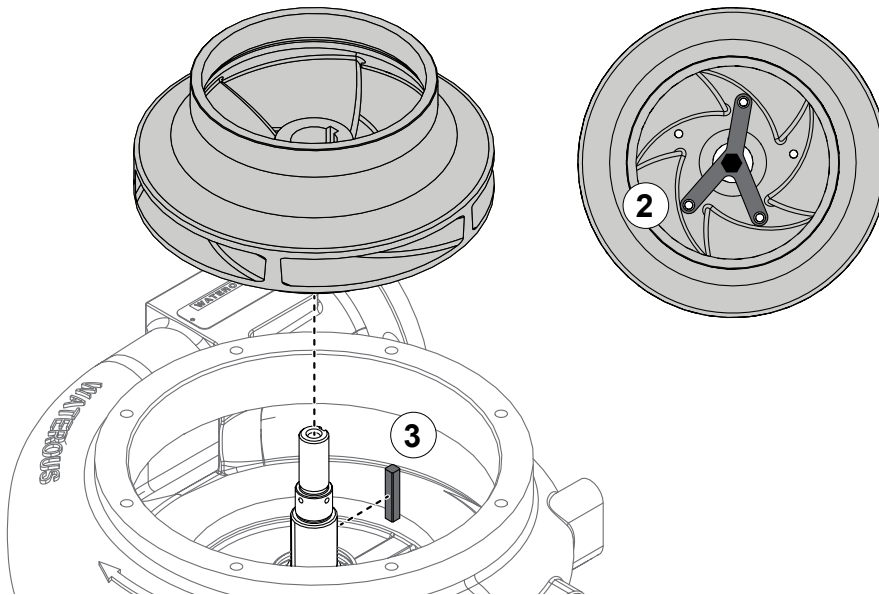
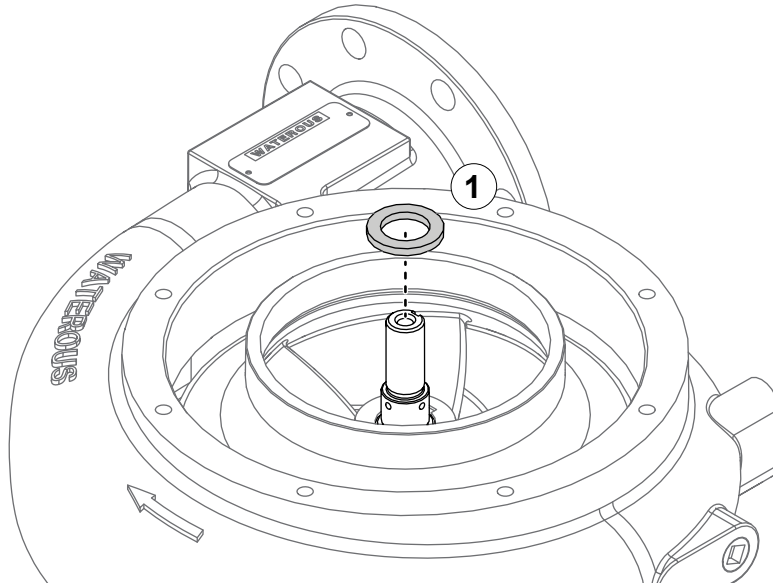
## Removing the Pump Components

Use the illustrations and instructions to remove the impeller.

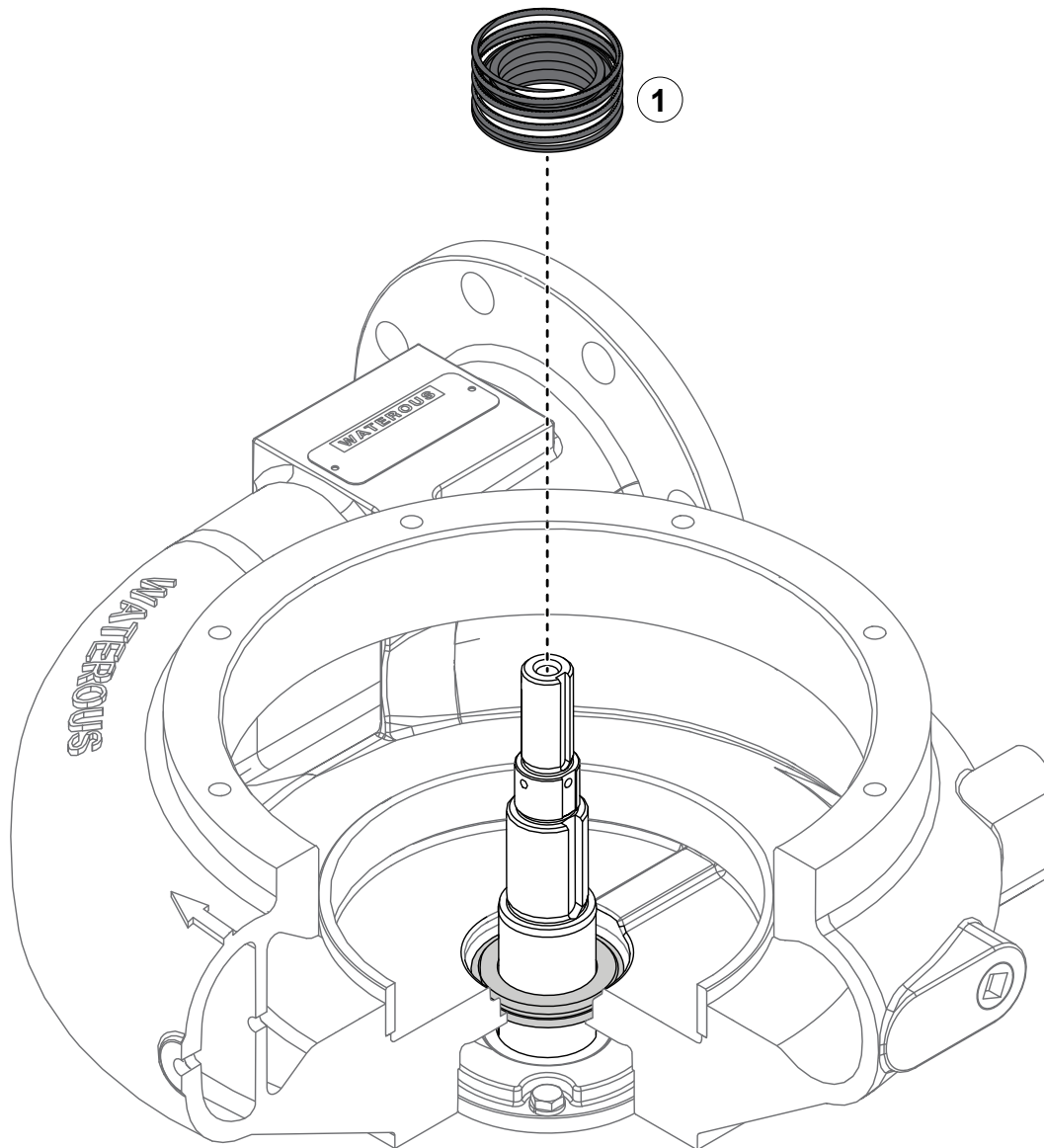
- 1 Remove the washer.
- 2 Use the appropriate puller and 3/8-16 screws to remove the impeller.

**Note:** Use or fabricate a puller compatible with a  $\varnothing 4.75$  bolt circle.

- 3 Remove the key.



## Removing the Mechanical Seal—Rotating Bellows



Use the illustration and instructions to remove the rotating bellows assembly.

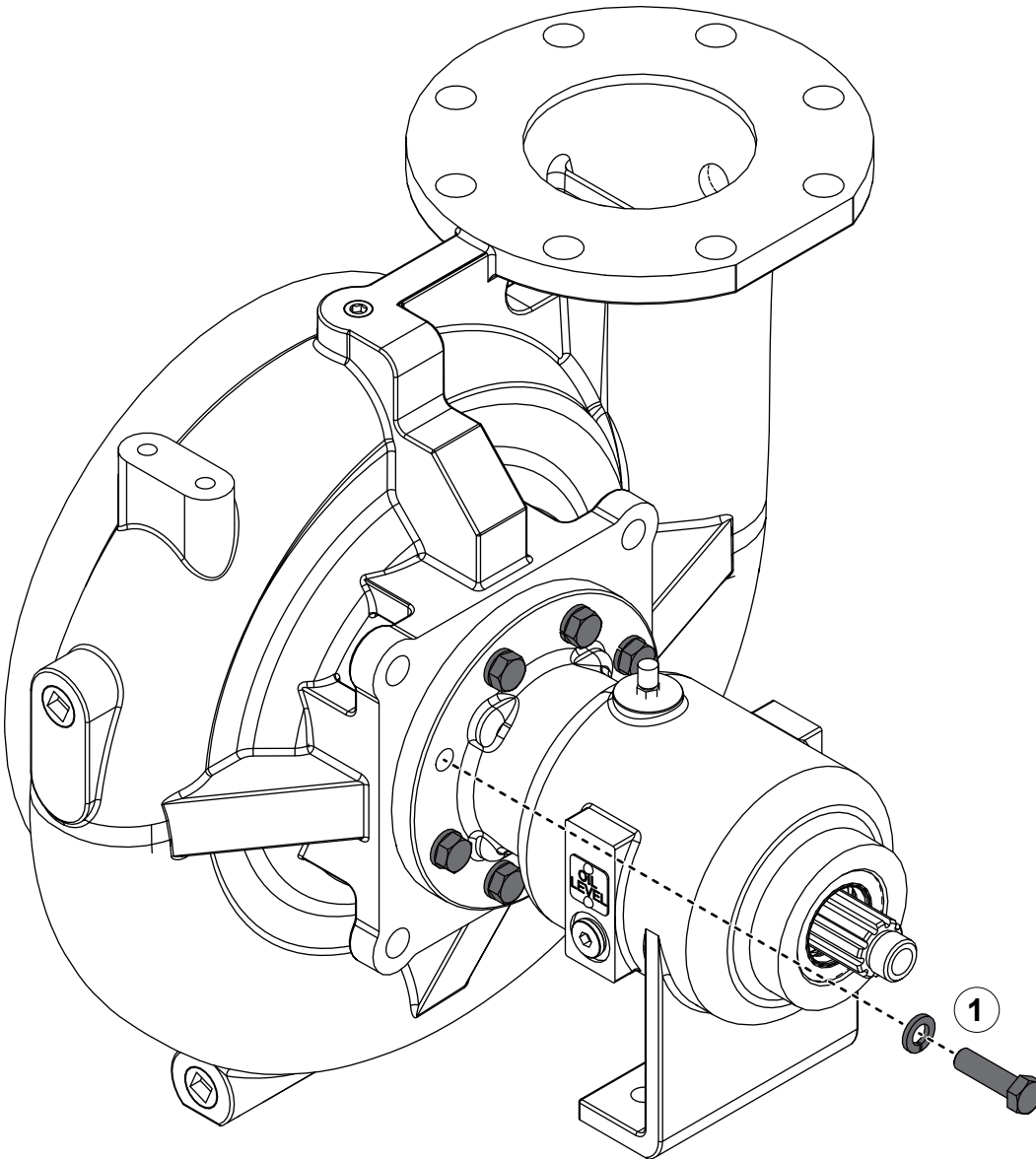
- 1 Remove and discard the rotating bellows assembly.



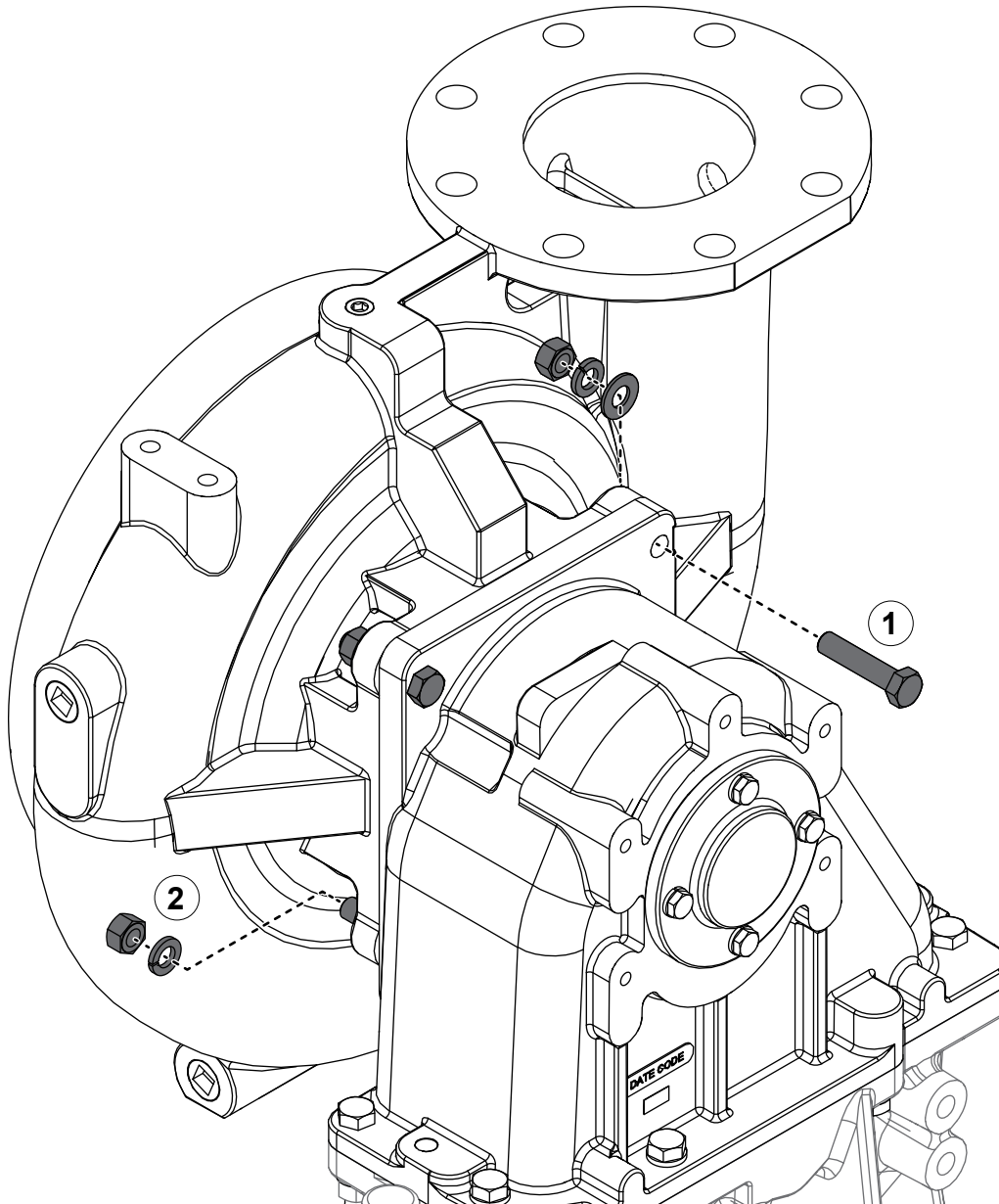
## Removing the Volute—Direct Drive Pedestal

Use the illustration and instructions to separate the pump and direct drive pedestal.

- 1 Remove the mounting hardware.



## Removing the Volute—C22 Series Transmission

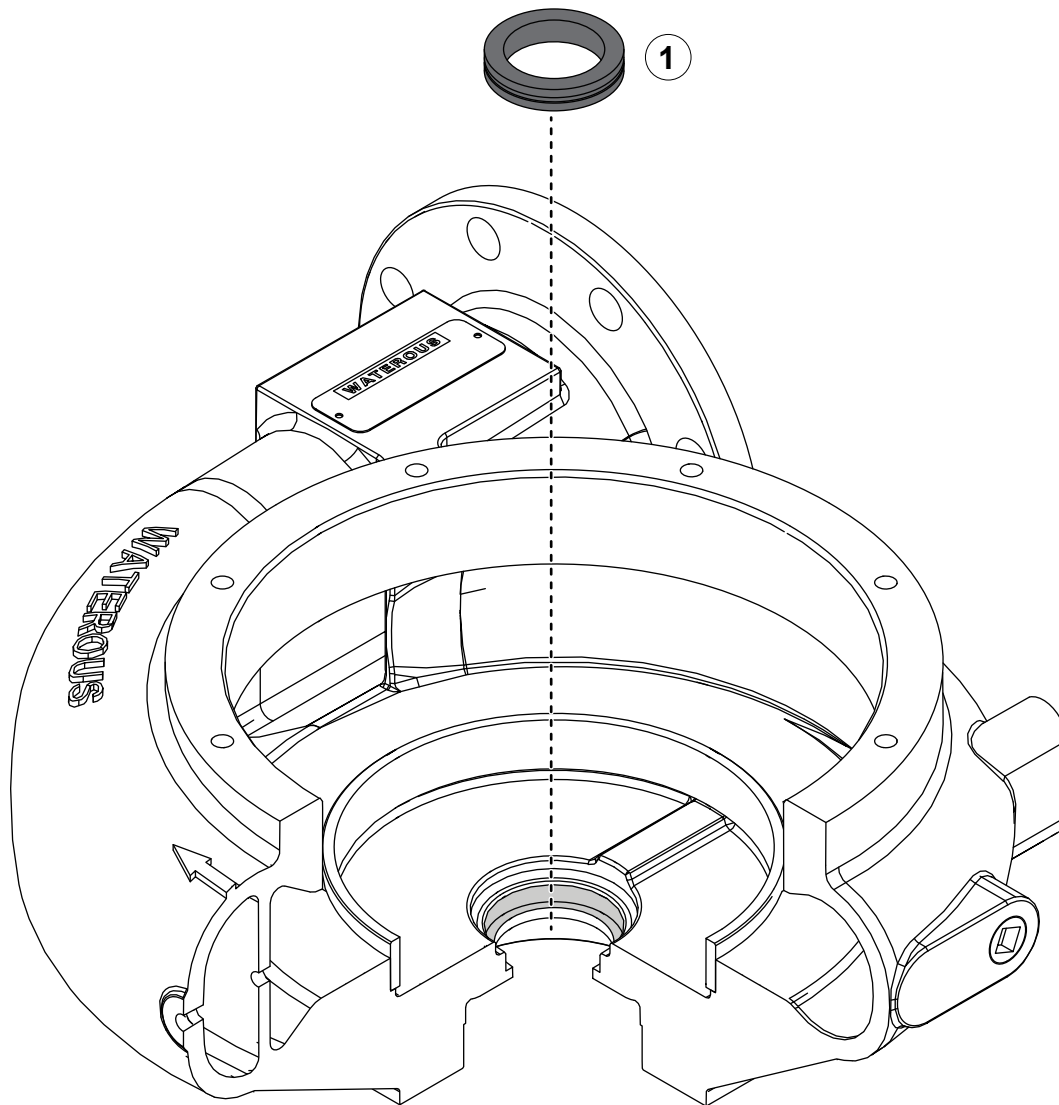


Use the illustration and instructions to separate the pump and transmission.

**Note:** Refer to the C22 overhaul instructions to overhaul the C22 transmission.

- 1 Remove the mounting hardware.

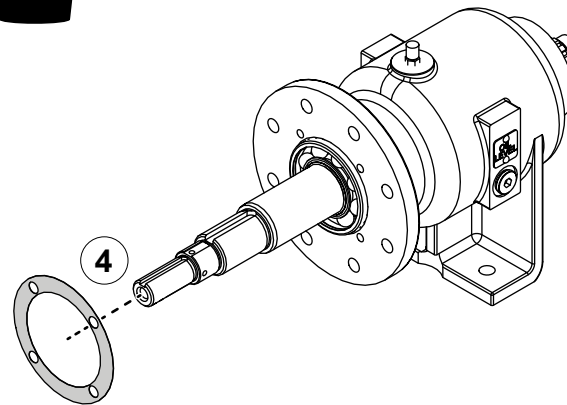
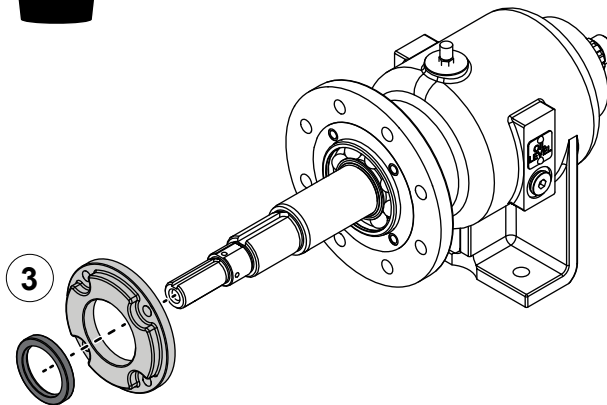
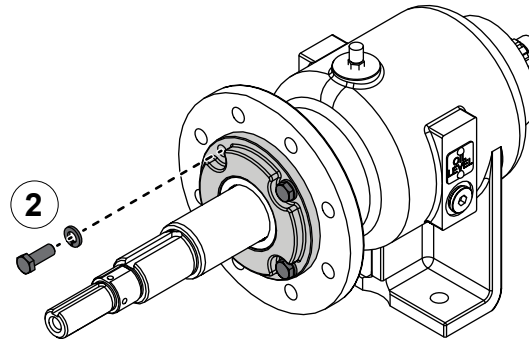
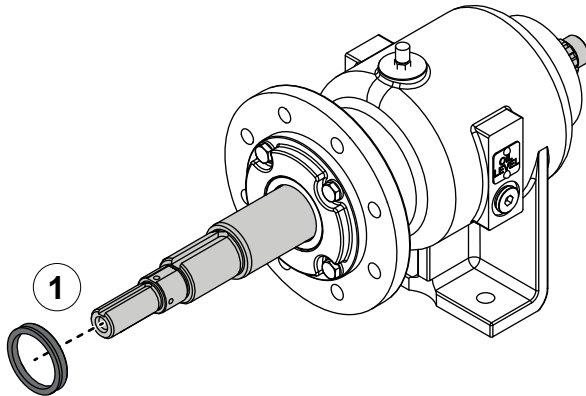
## Removing the Mechanical Seal—Stationary Ring



Use the illustration and instructions to remove the stationary ring.

- 1 Remove and discard the stationary ring.

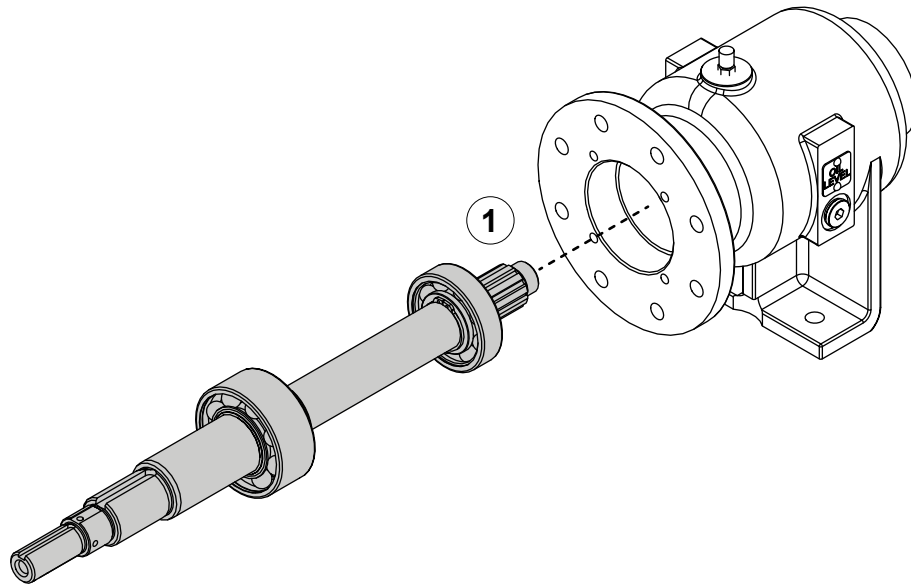
## Removing the Bearing Cover and Gasket



Use the illustrations and instructions to remove the bearing cover and gasket.

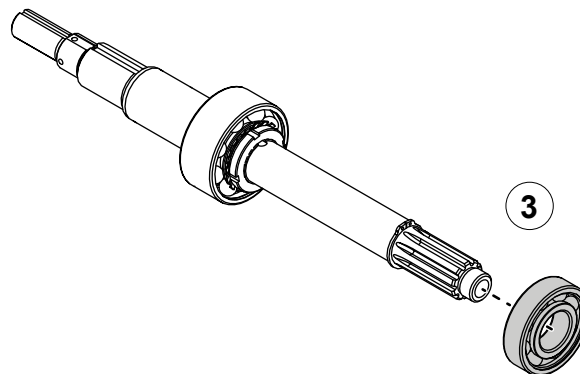
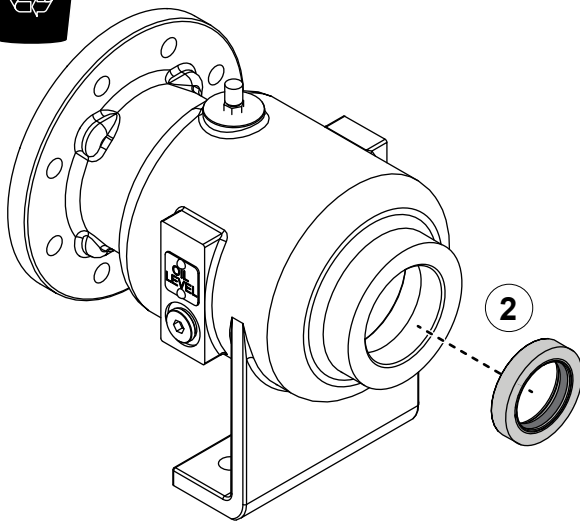
- 1 Remove the flinger ring.
- 2 Remove the bearing cover hardware.
- 3 Remove the bearing cover and oil seal. Discard the oil seal.
- 4 Remove and discard the bearing cover gasket.

## Disassembling the Drive Shaft Components

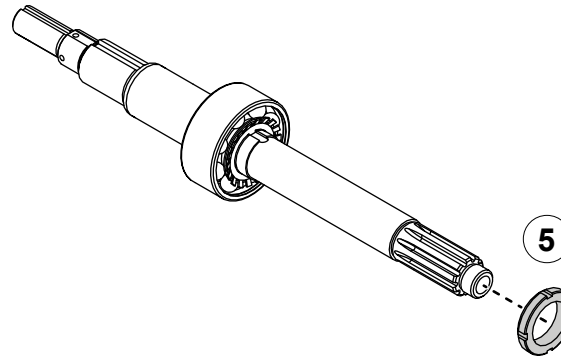
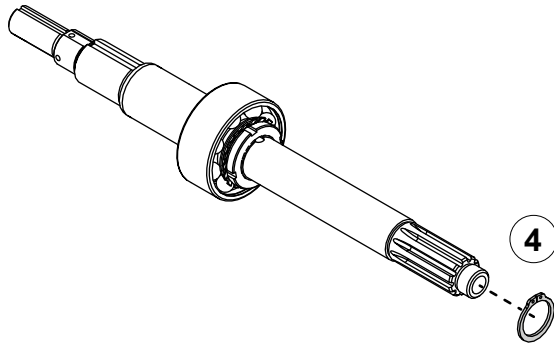


Use the illustrations and instructions to remove the drive shaft components.

- 1 Press the drive shaft assembly from the direct drive pedestal housing.
- 2 Remove and discard the oil seal.
- 3 Remove the bearing from the shaft and discard the bearing.

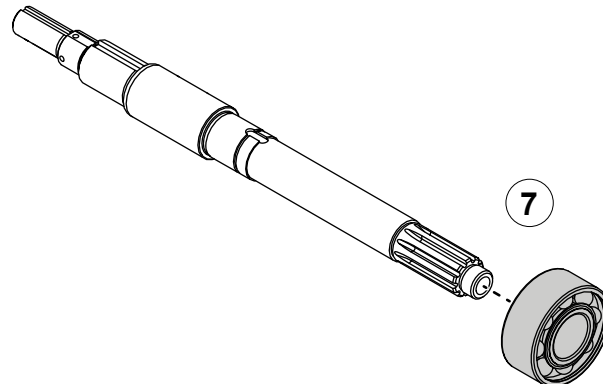
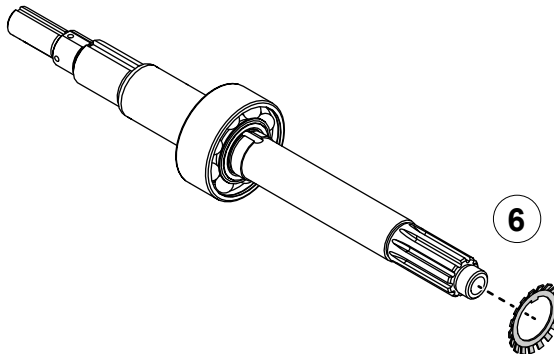


## Disassembling the Drive Shaft Components

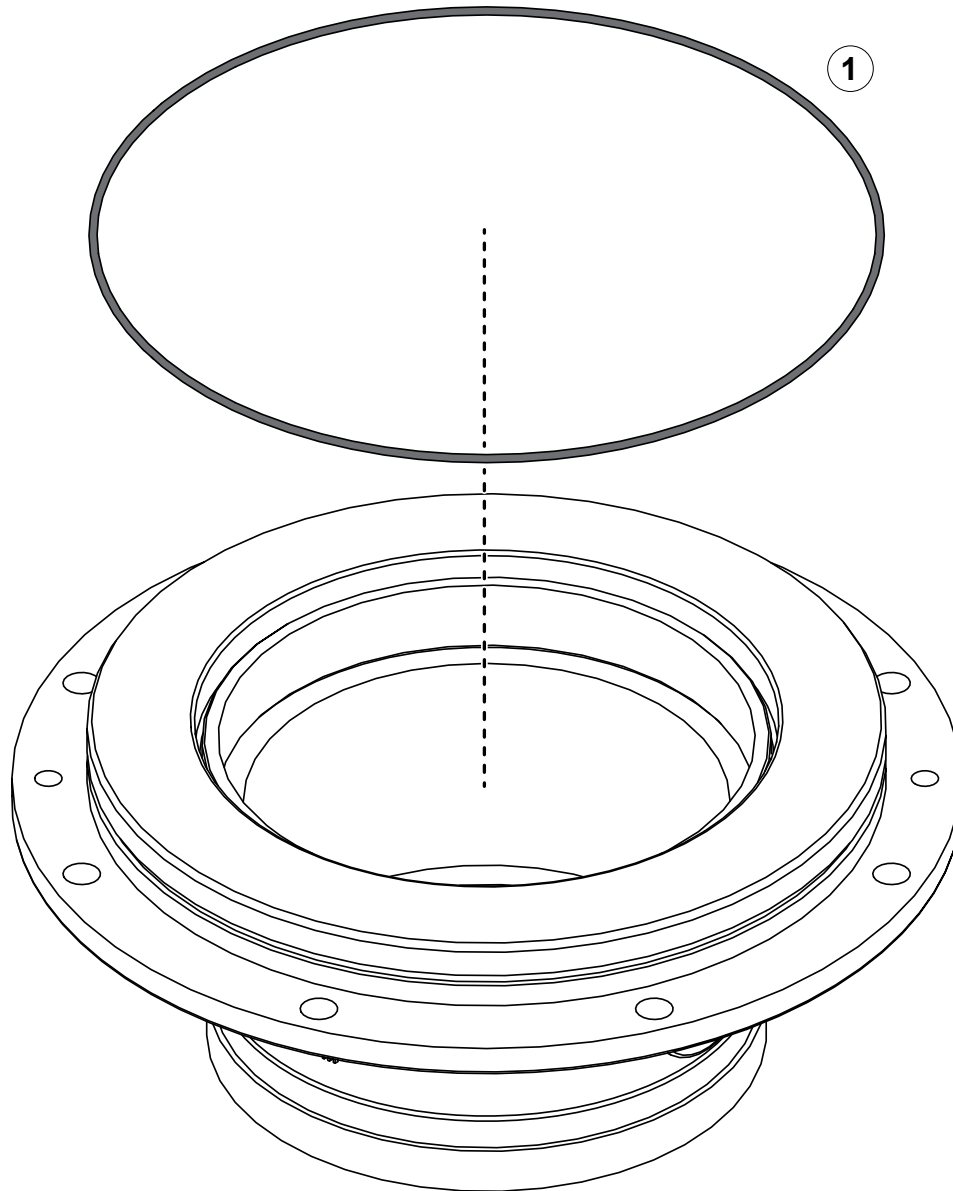


Use the illustrations and instructions to remove the drive shaft components.

- 4 Remove and discard the retraining ring.
- 5 Straighten the tab on the bearing lock washer and remove the nut. Discard the bearing lock washer.
- 6 Remove the bearing lock washer.
- 7 Remove the bearing from the shaft and discard the bearing.



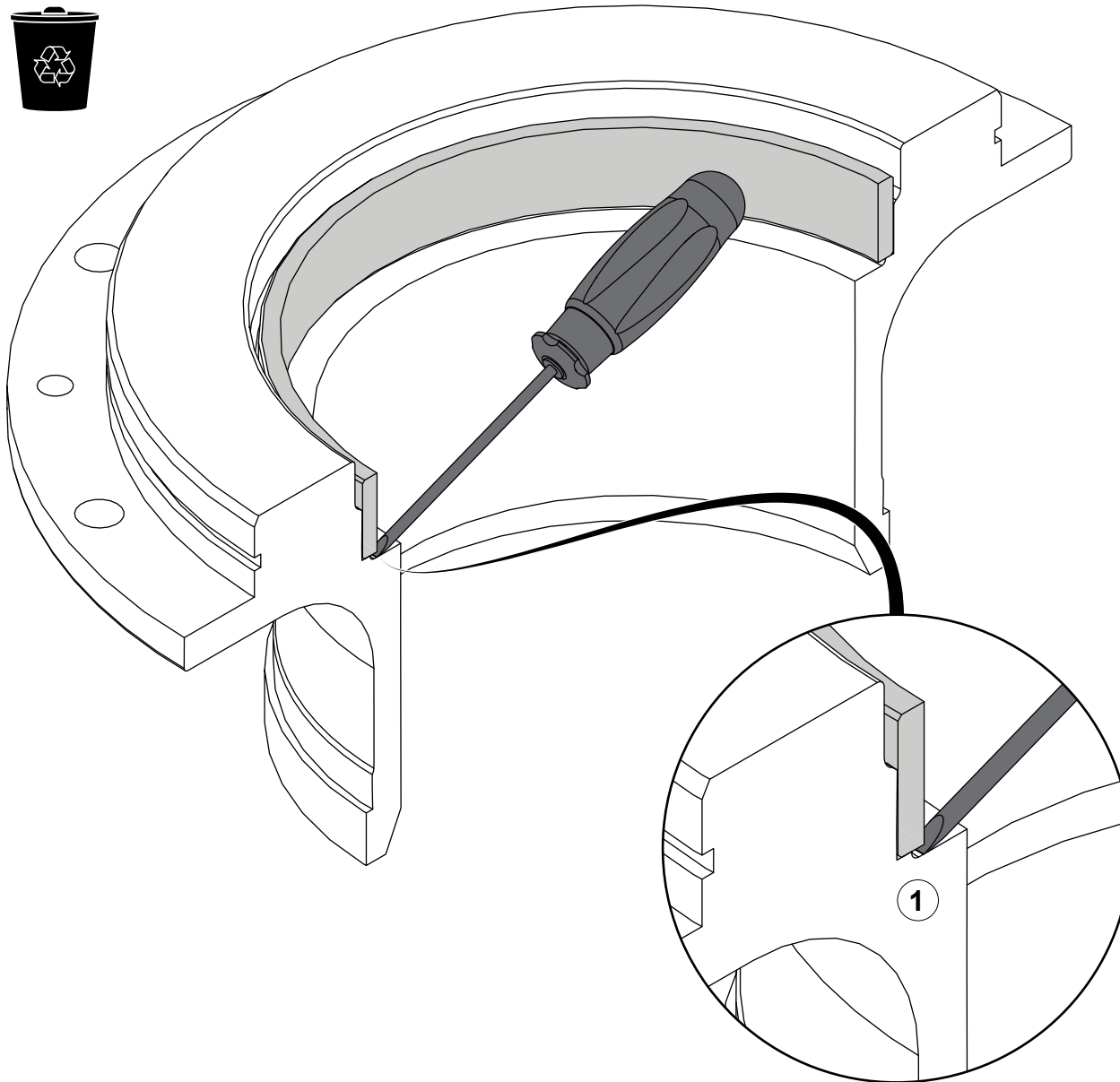
## Removing the Adapter O-Ring



Use the illustration and instructions to remove the O-ring.

- 1 Remove and discard the O-ring.

## Removing the Wear Ring—Adapter



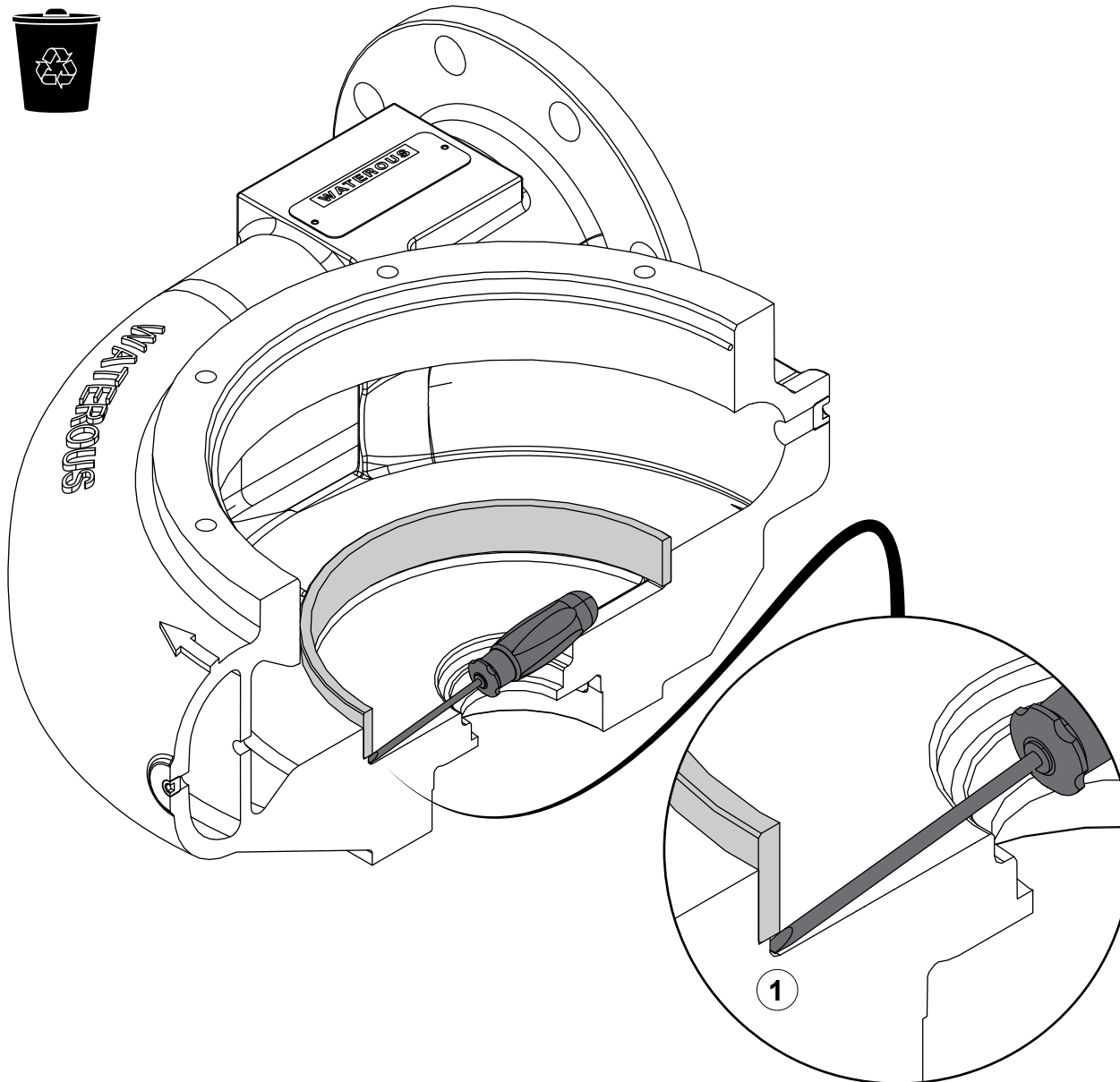
Use the illustration and instructions to remove the wear ring.

**Note:** Only remove the wear rings if damaged or if the deterioration of the wear ring affects the pump performance.

- 1 Locate the gap under the wear ring and use a screwdriver to gently pry the wear ring from the adapter.



## Removing the Wear Ring—Volute



Use the illustration and instructions to remove the wear ring.

**Note:** Only remove the wear rings if damaged or if the deterioration of the wear ring affects the pump performance.

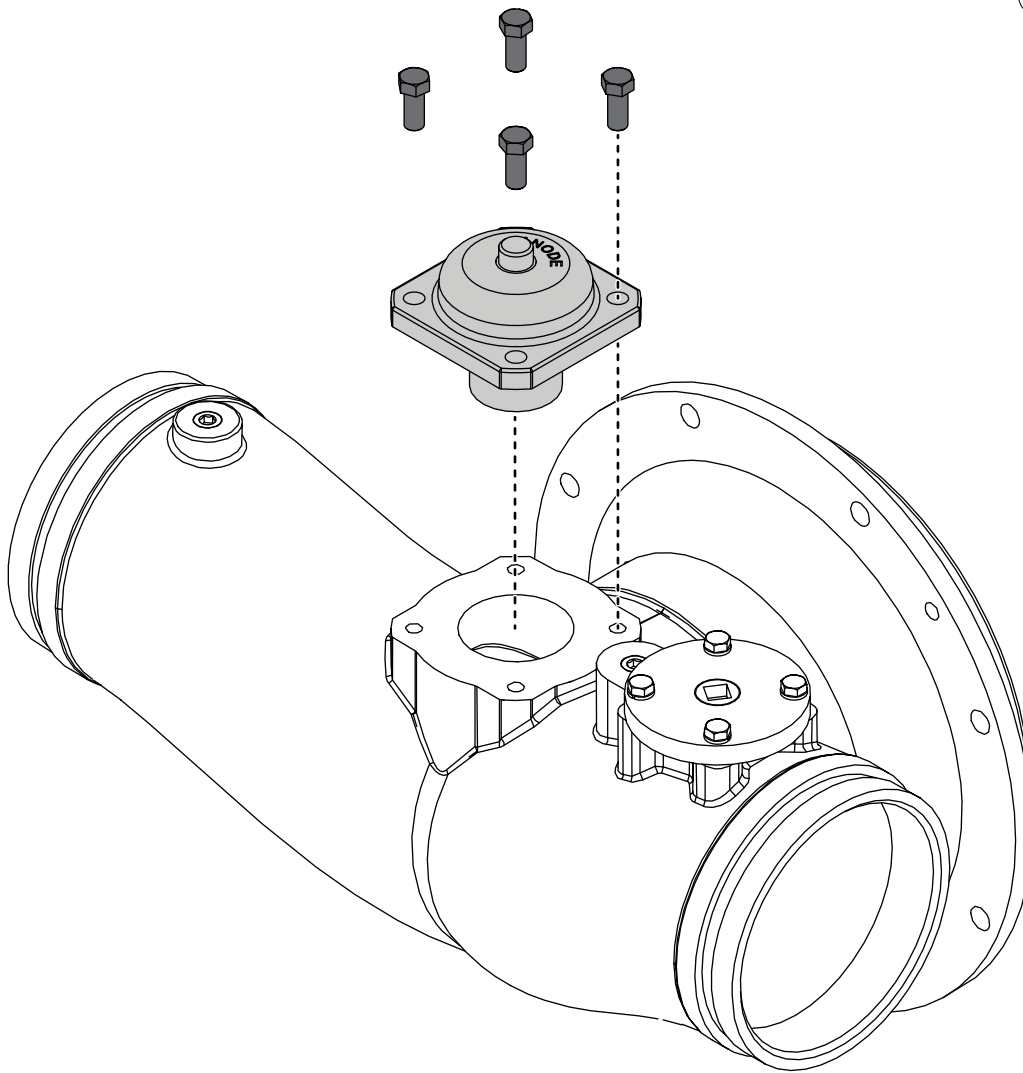
- 1 Locate the gap under the wear ring and use a screwdriver to gently pry the wear ring from the volute.

## Removing the Optional Anode

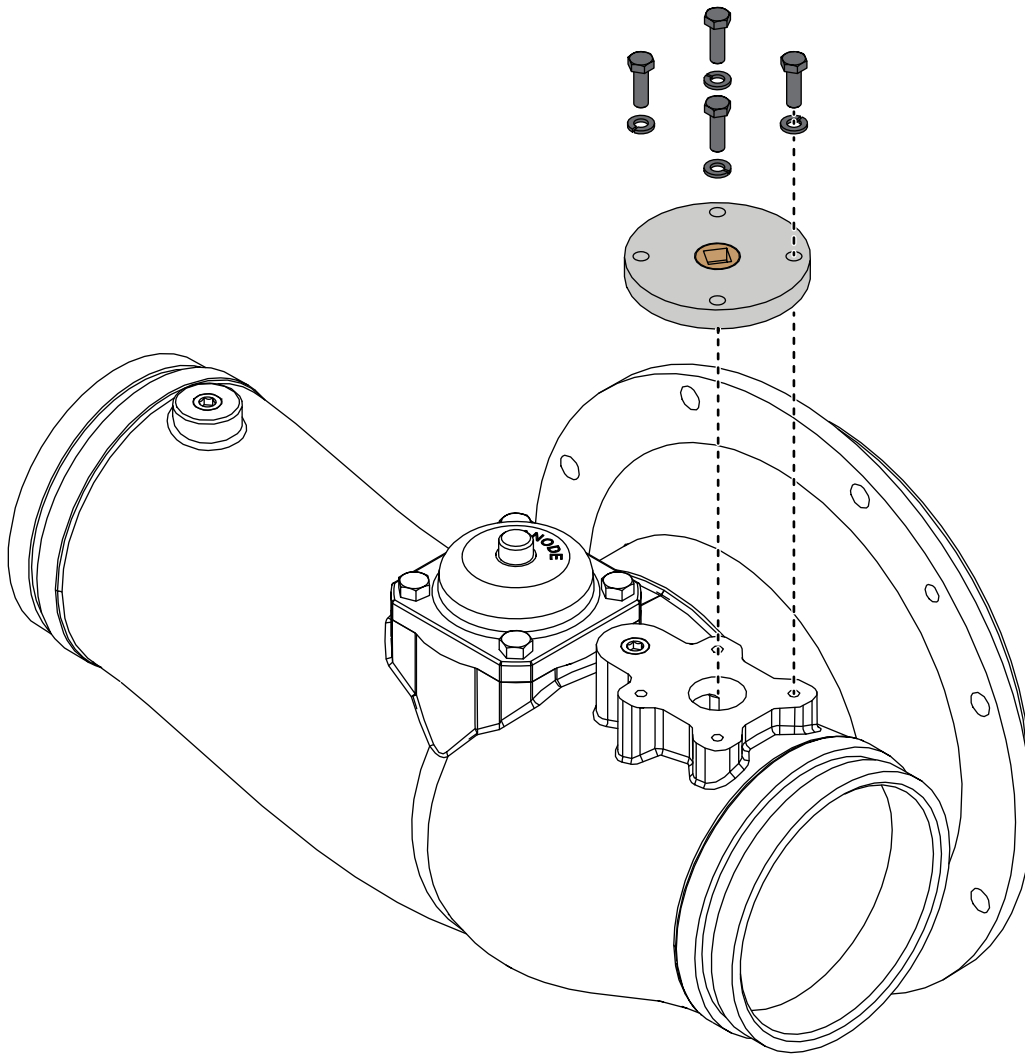
Use the illustration and instructions to remove the optional anode.

1

- 1 Remove the 4 screws securing the anode to the intake adapter. Remove the anode.



## Removing the Blanking Plate

**1**

Use the illustration and instructions to remove the blanking plate.

- 1 Remove the 4 screws securing the blanking plate to the intake adapter. Remove the blanking plate.

## Preparing to Assemble the Equipment

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- Read and understand the instructions before assembling the equipment.
- Prepare a workspace suitable to accommodate and support the equipment.
- Gather the necessary tools and assembly aids.
- Gather the necessary overhaul components, such as lubricant, bearings, seals, and O-rings—only use equivalent components.
- Understand that your configuration may require additional steps that are not described in the illustrations or instructions to perform the assembly.
- This equipment is intended to be assembled by a person or persons with the basic knowledge of servicing similar equipment. Contact Waterous for more information.

## Tools Required

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- Typical automotive mechanics hand tools.
- Suitable arbor press.
- Torque wrench capable of 425 ft-lb (576 N·m).
- Suitable support and lifting equipment.

## Best Practices

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- Remove any dirt, sand, grease, or oil from the enclosure before you begin the assembly. Surface debris can transfer into locations that could prematurely wear internal parts.
- Replace any gaskets and O-ring seals during the assembly.
- Do not reuse the lock nuts.
- Apply anti-seize compound to lock nut threads before installation.

## Optional Equipment

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Be aware that the assembly instructions may include optional equipment not included in your application.

## Assembling the Equipment Components

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- Refer to the service parts list (SPL) for part identification.

**Note:** Documents specific to your application are available through the MyWaterous login at [waterousco.com](https://waterousco.com) by entering the serial number for your system. Depending on the application, the serial number for your equipment is located on the operator panel, pump, transmission, or some combination of the three.

- Use established industry practices to assemble the equipment.
- Tighten hardware to industry standard torque specification—unless otherwise noted.
- Make sure that you do not over-tighten plugs.
- Install retaining rings with the rounded face toward the component you are retaining.
- Replace items such as O-rings, bearings, gaskets, oil seals, lubricants, and locknuts with their equivalent.

## Installing the Equipment

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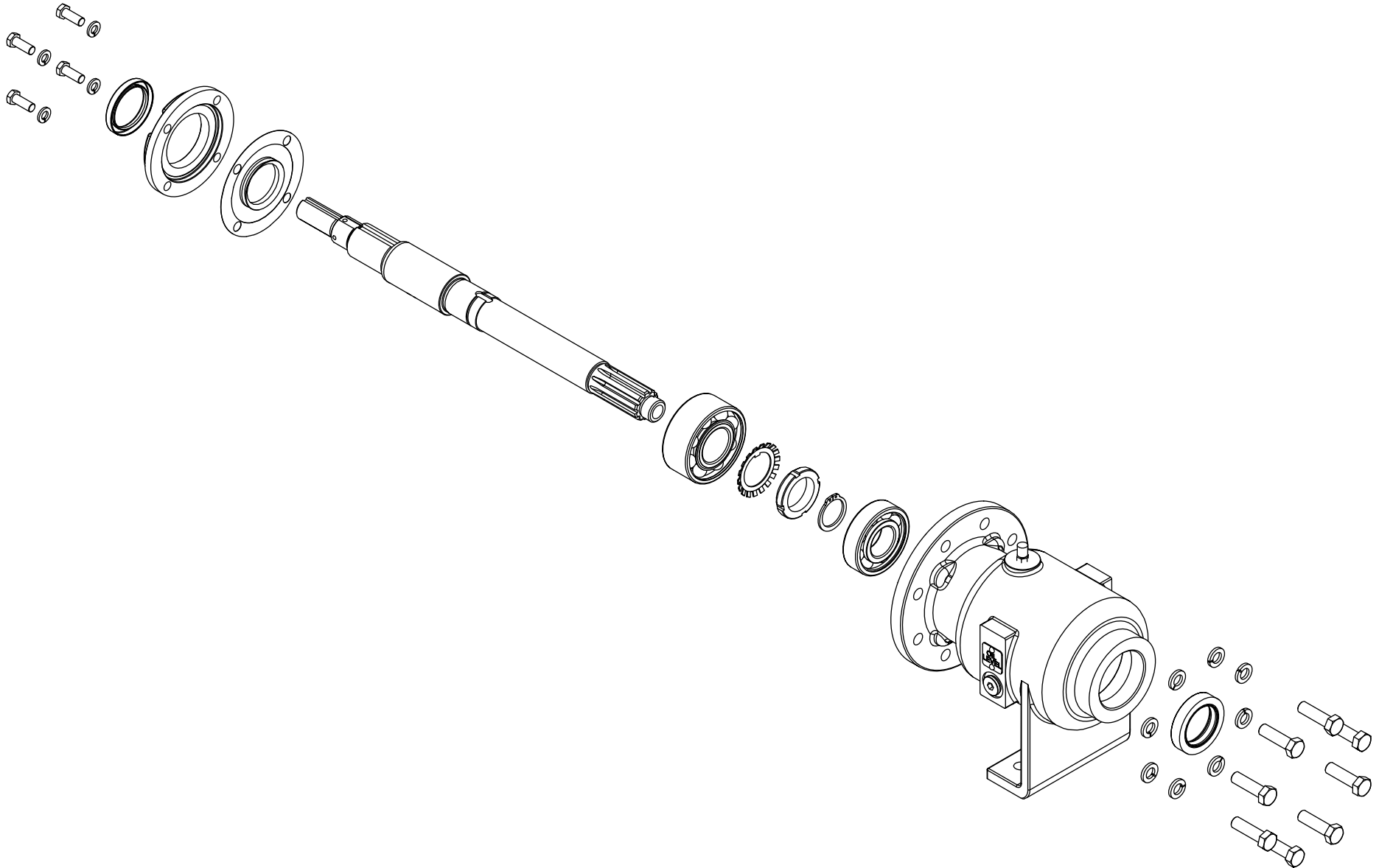
Use the information that you recorded when you removed the equipment to install it into the apparatus.

## Understanding the Illustrations

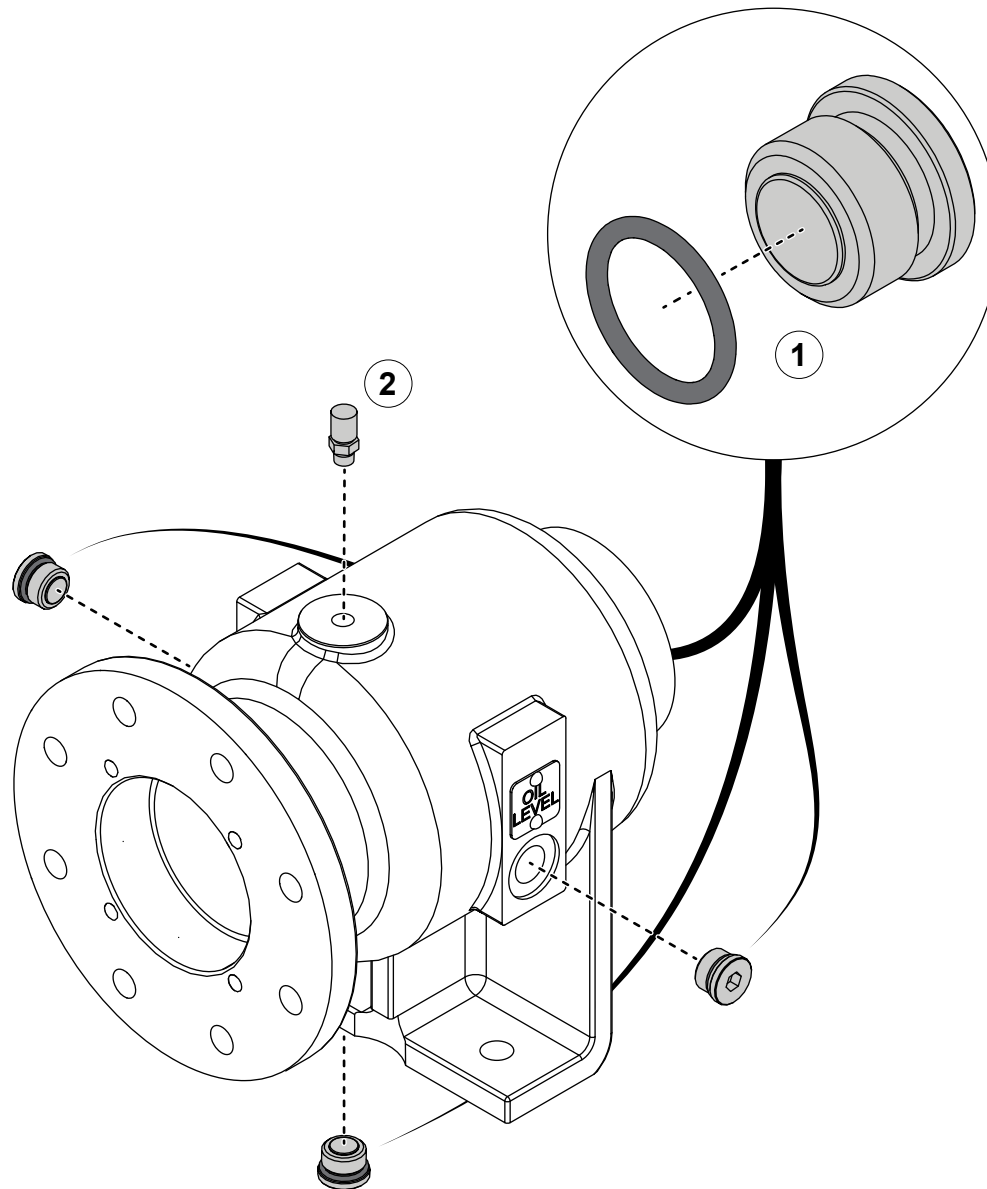
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The assembly illustrations depict a typical application. Plugs, breathers, cooling hoses, and fittings are not illustrated, as they may be in a different location on your application. Refer to the SPL for your application to identify the various plug locations.

## Assembling the Direct Drive Pedestal



## Inspecting the Magnetic Oil Plugs and Breather

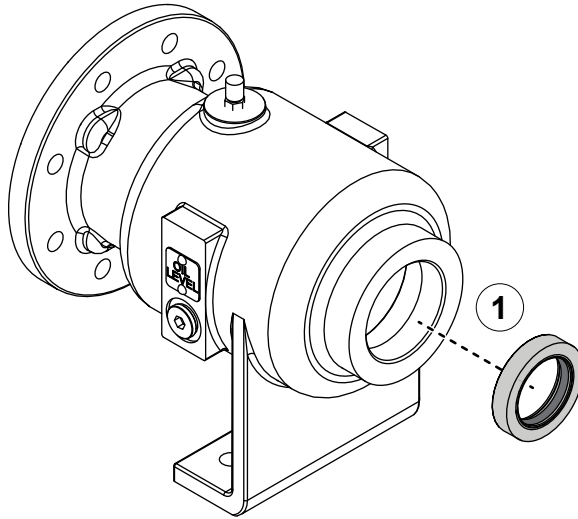


15 ft-lb  
20 N·m

Use the illustration and instructions to inspect the oil plugs and breather.

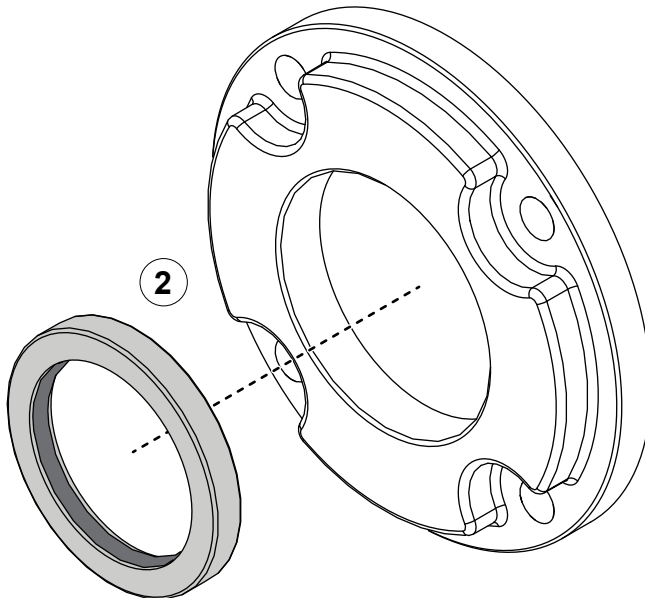
- 1 Remove each magnetic oil plug. Remove any metal fragments that collected on the plug. Replace the O-ring. Torque the oil plug to 15 ft-lb (20 N).
- 2 Remove and inspect the breather for deterioration and replace it if necessary.

## Installing the Oil Seals

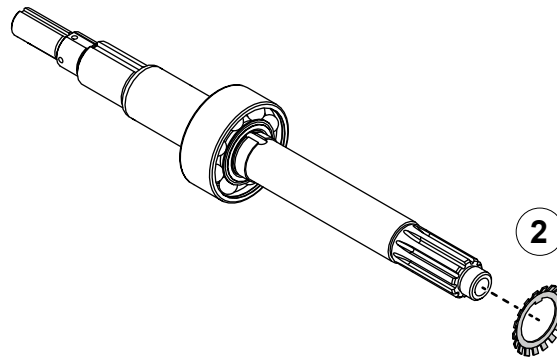
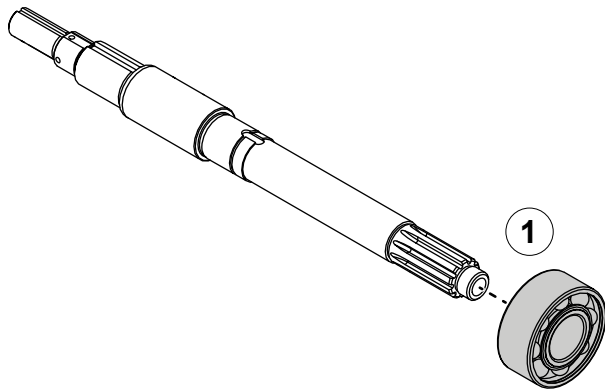
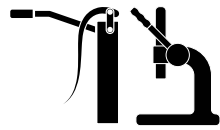


Use the illustrations and instructions to install the oil seals.

- 1 Apply sealant to the outside of the oil seal and lubrication to the inside. Install the oil seal into the pedestal.
- 2 Apply sealant to the outside of the oil seal and lubrication to the inside. Install the oil seal into the bearing cover.



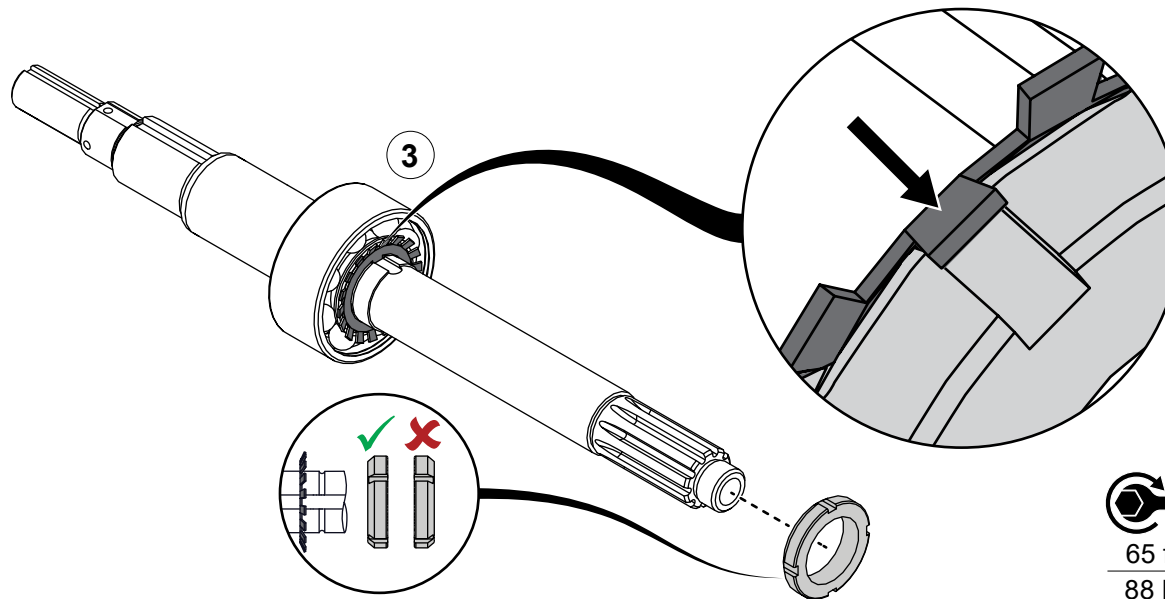
## Assembling the Direct Drive Pedestal



Use the illustrations and instructions to install the direct drive components.

- 1 Apply high-pressure grease to the mating surfaces and press the bearing into place.
- 2 Align the inner tab on the bearing washer with the slot on the shaft and install the washer.
- 3 Install the bearing lock nut and torque it to 65 ft-lb (88 N·m). Bend one outer tab that aligns with a slot on the bearing lock nut.

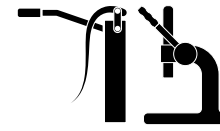
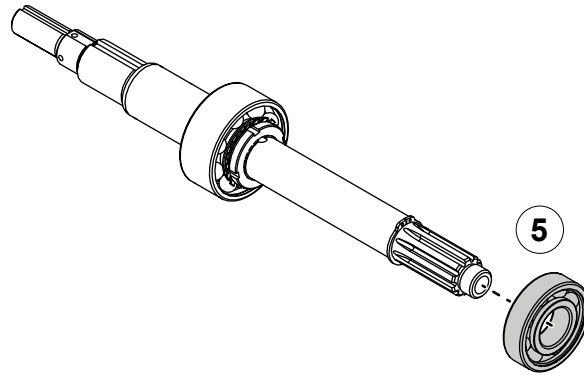
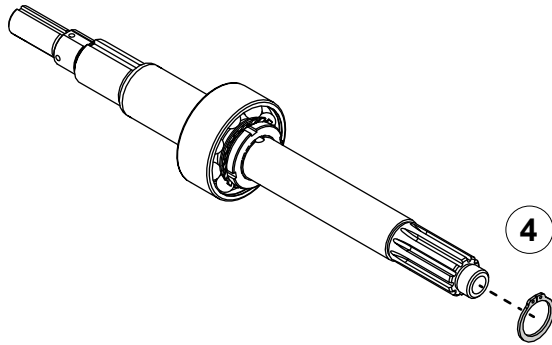
**Note:** Do not loosen the nut to align it with a tab. Tighten the nut purposefully to achieve alignment.



65 ft-lb  
88 N·m

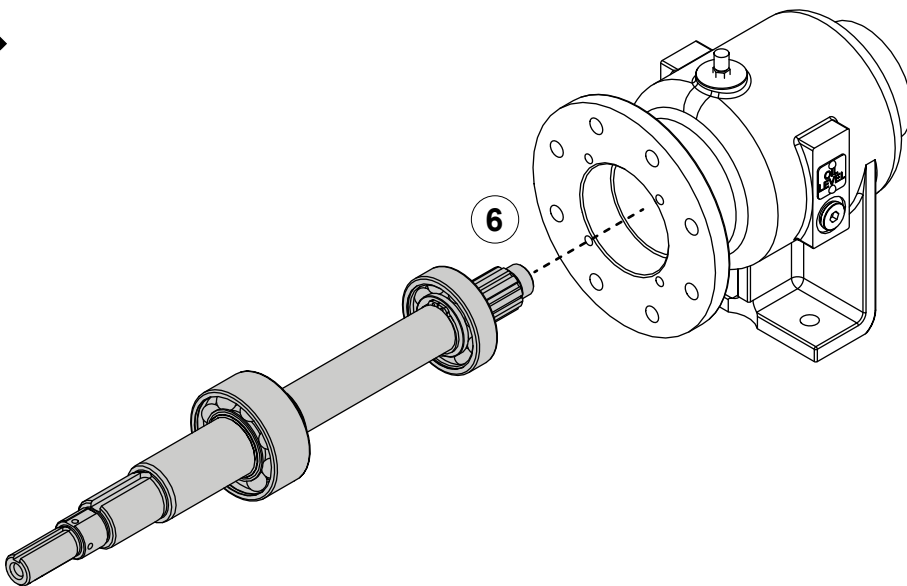


## Assembling the Direct Drive Pedestal

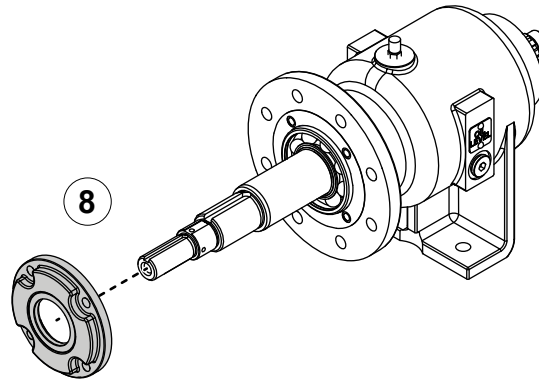
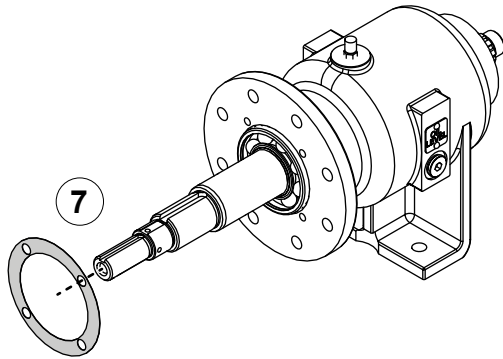


Use the illustrations and instructions to install the direct drive components.

- 4 Install the retaining ring.
- 5 Apply high-pressure grease to the mating surfaces and press the bearing into place.
- 6 Apply high-pressure grease to the mating surfaces and lubricant to the oil seal. Press the drive shaft assembly into the pedestal.

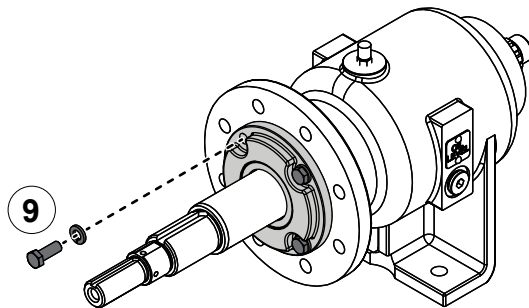


## Assembling the Direct Drive Pedestal

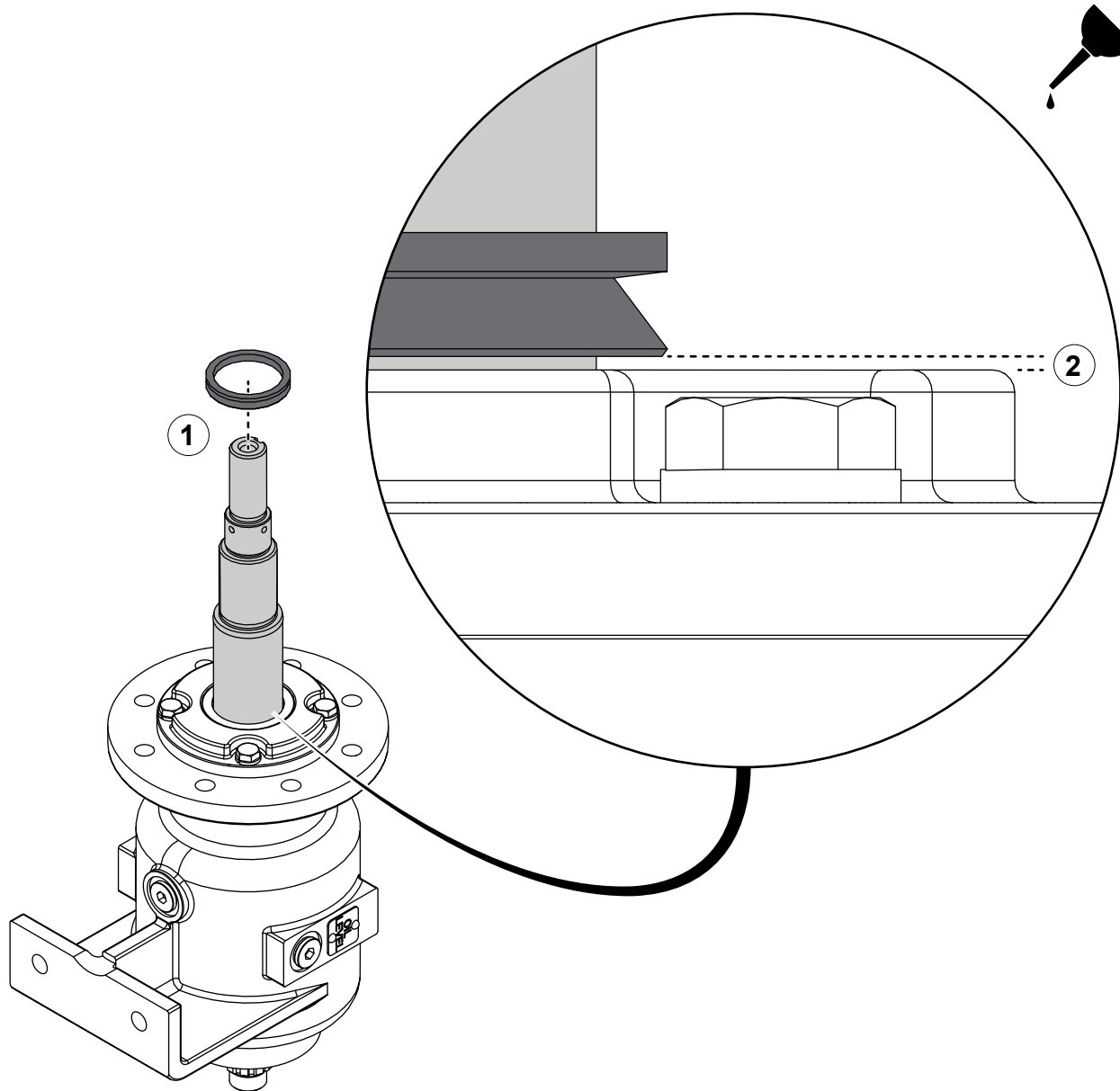


Use the illustrations and instructions to install the direct drive pedestal components.

- 7 Align the gasket to the mounting holes on the pedestal.
- 8 Install the bearing cover over the gasket on the pedestal.
- 9 Use the mounting hardware to secure the bearing cover and gasket to the pedestal.



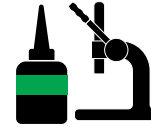
## Installing the Flinger Ring



Use the illustration and instructions to install the flinger ring.

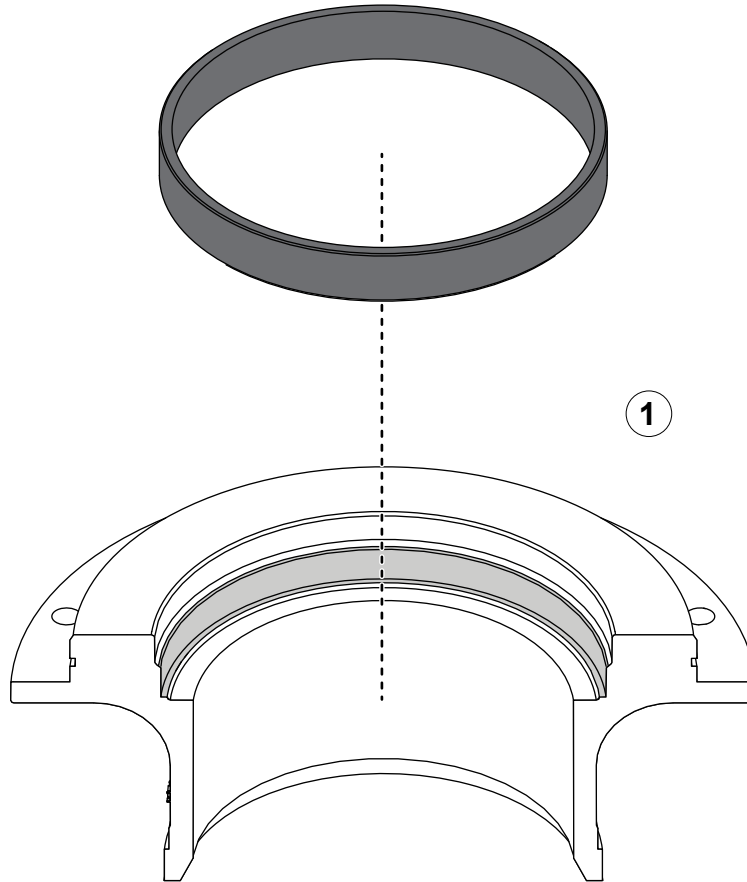
- 1 Apply lubrication to the flinger ring and install it onto the drive shaft.
- 2 Position the flinger ring close to the oil seal housing without making contact.

## Installing the Wear Ring—Adapter

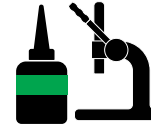


Use the illustration and instructions to install the adapter wear ring.

- 1 Apply retaining compound to the wear ring. Align the wear ring with the bore and press it into place.

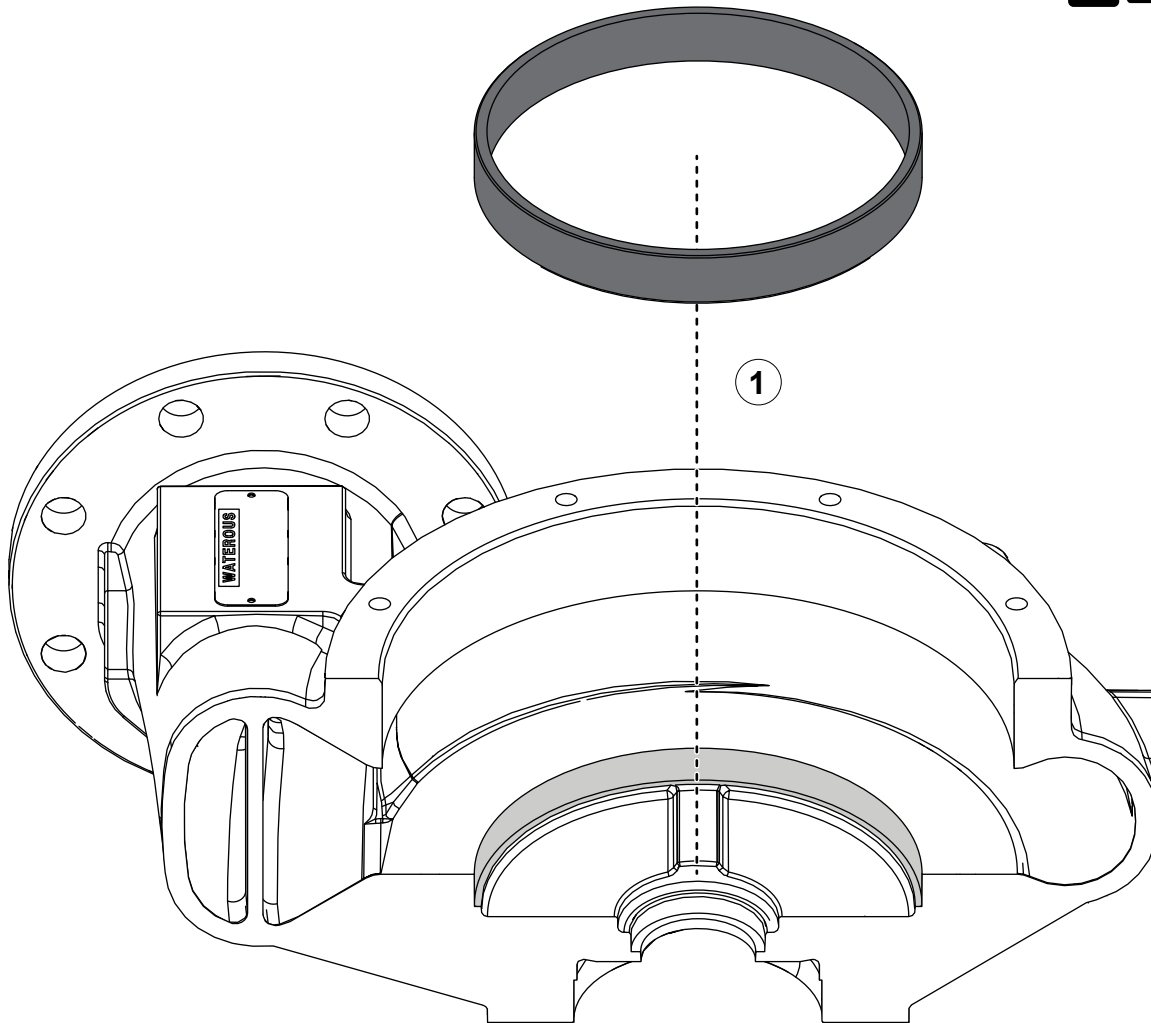


## Installing the Wear Ring—Volute

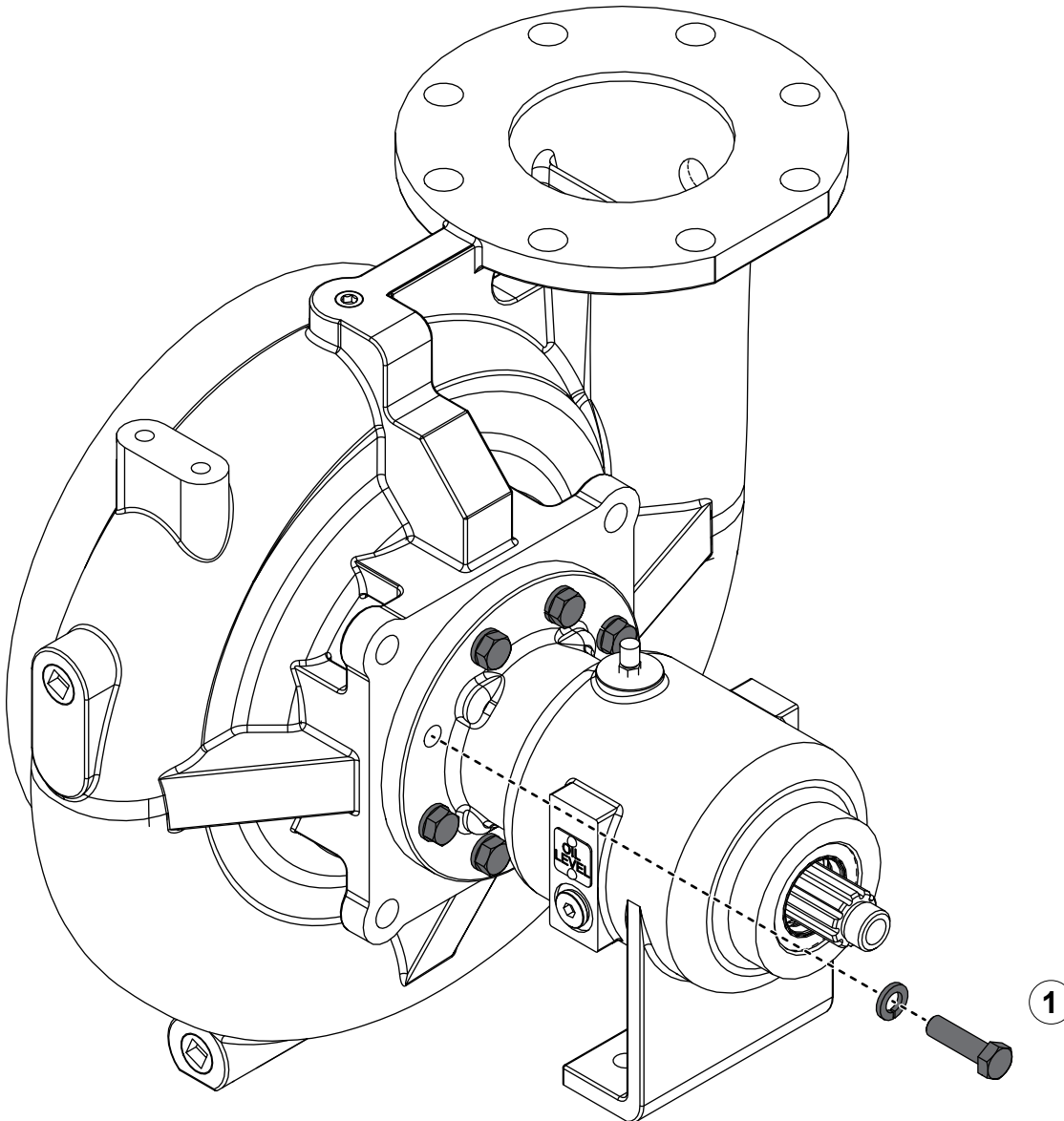


Use the illustration and instructions to install the volute wear ring.

- 1 Apply retaining compound to the wear ring. Align the wear ring with the bore and press it into place.



## Installing the Volute—Direct Drive Pedestal

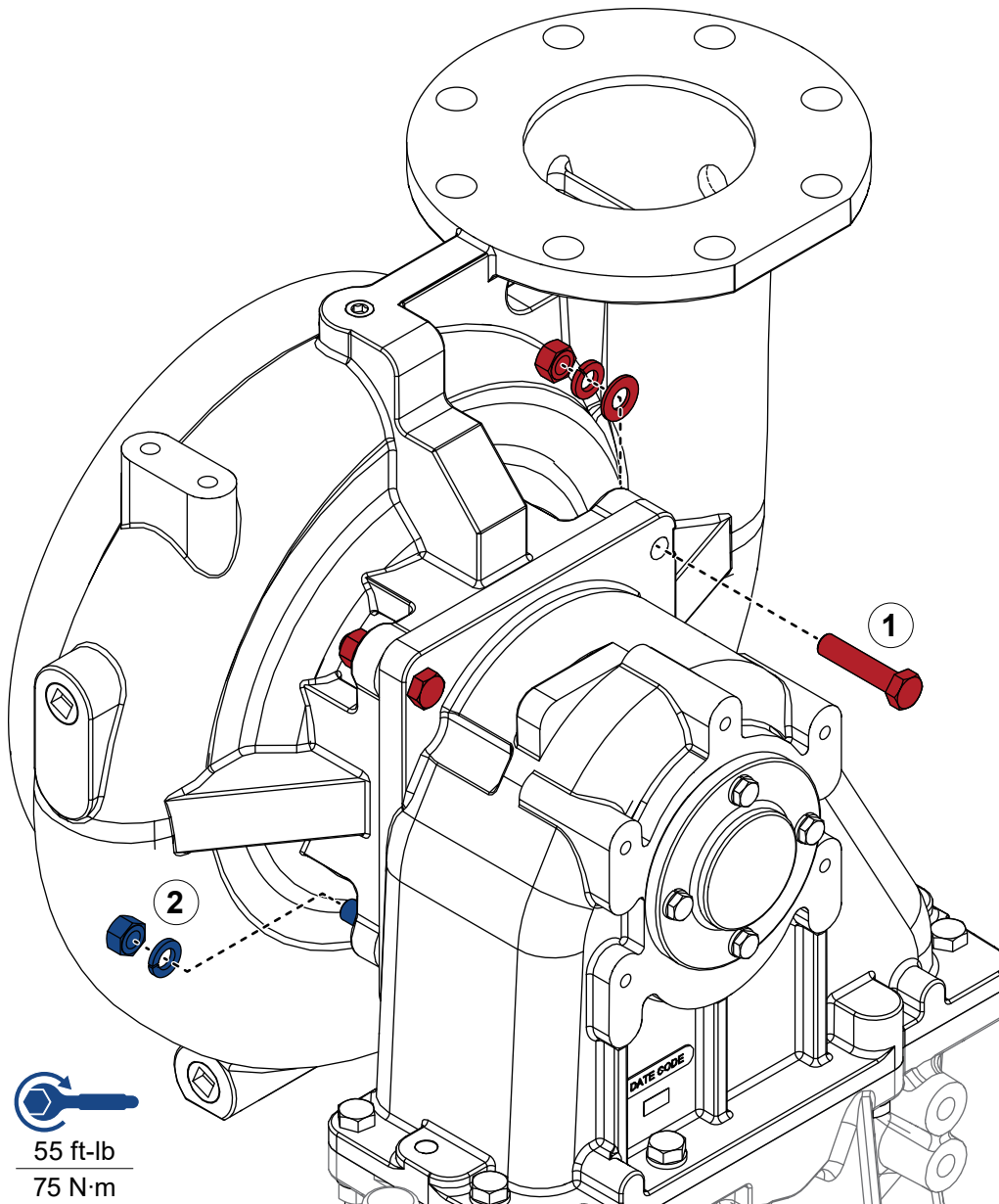


75 ft-lb  
102 N·m

Use the illustration and instructions to install the pump to the direct drive pedestal.

- 1 Use the mounting hardware to secure the pump to the direct drive pedestal. Torque the hardware to 80 ft-lb (108 N·m).

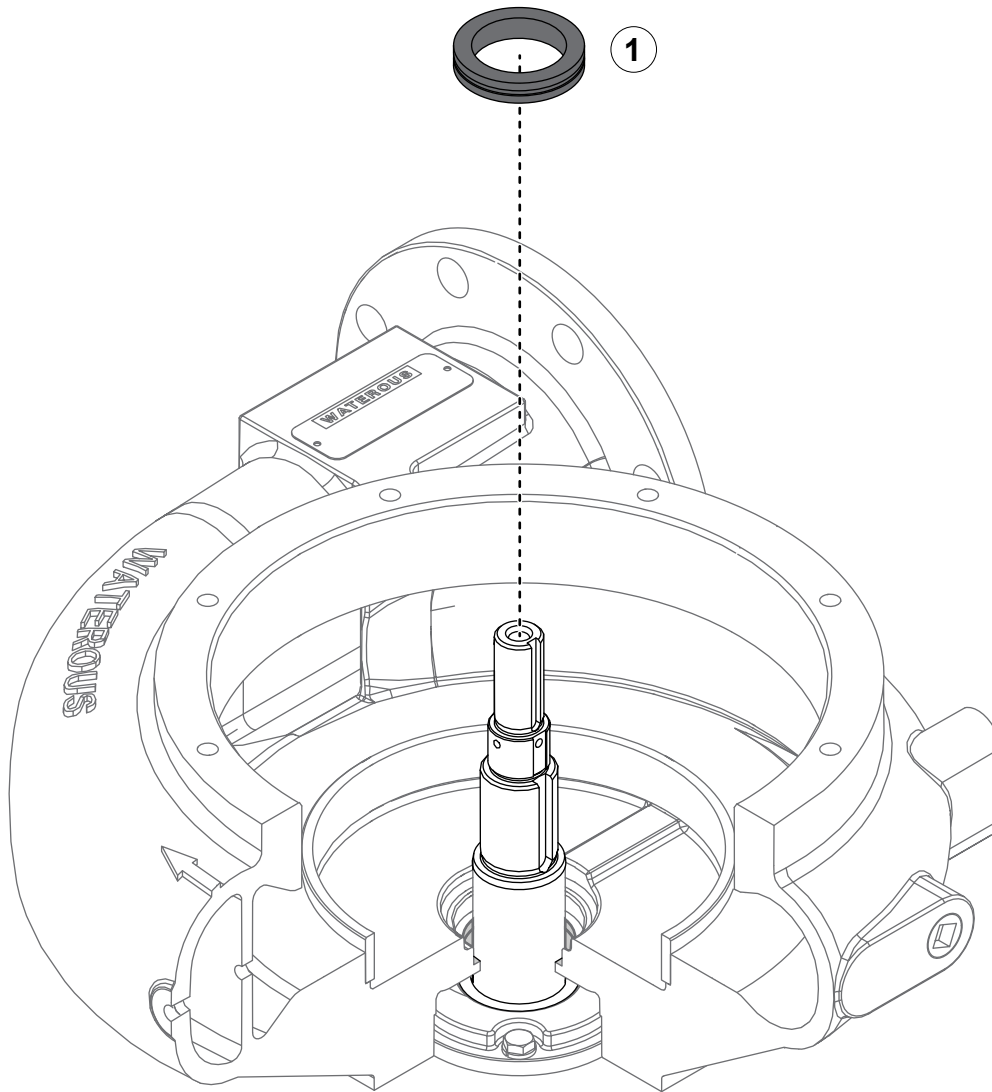
## Installing the Volute—C22 Series Transmission



Use the illustration and instructions to install the pump to the transmission.

- 1 Use the mounting hardware to secure the pump to the transmission. Torque the upper hardware to 60 ft-lb (81 N·m).
- 2 Use the mounting hardware to secure the pump to the transmission. Torque the lower hardware to 55 ft-lb (75 N·m).

## Installing the Mechanical Seal—Stationary Ring

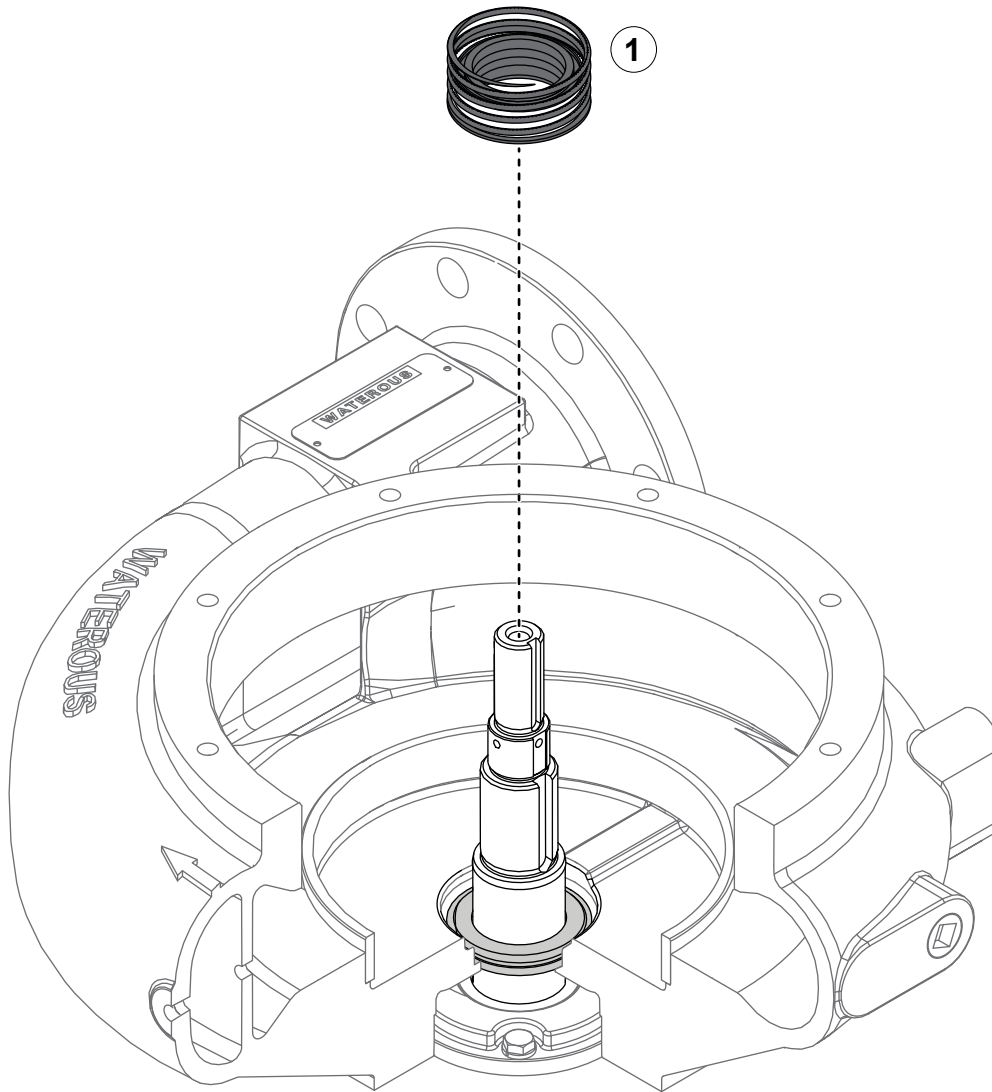


Use the illustration and instructions to install the mechanical seal stationary ring into the volute.

- 1 Apply lubrication to the mechanical seal stationary ring and install it over the drive shaft.



## Installing the Mechanical Seal—Rotating Bellows



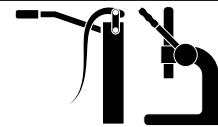
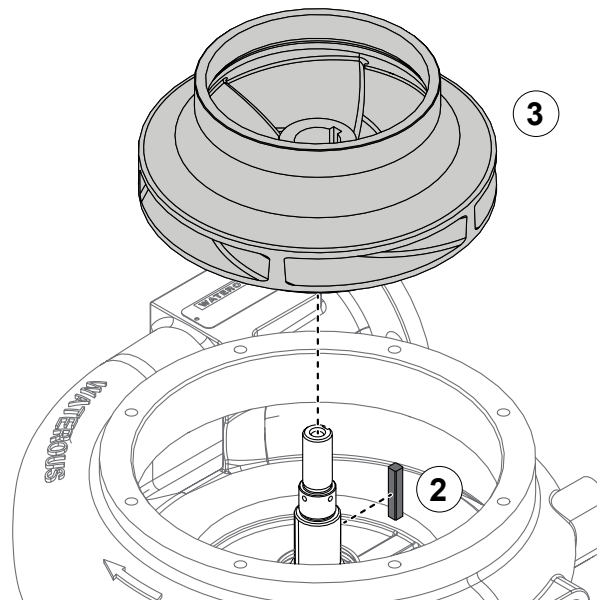
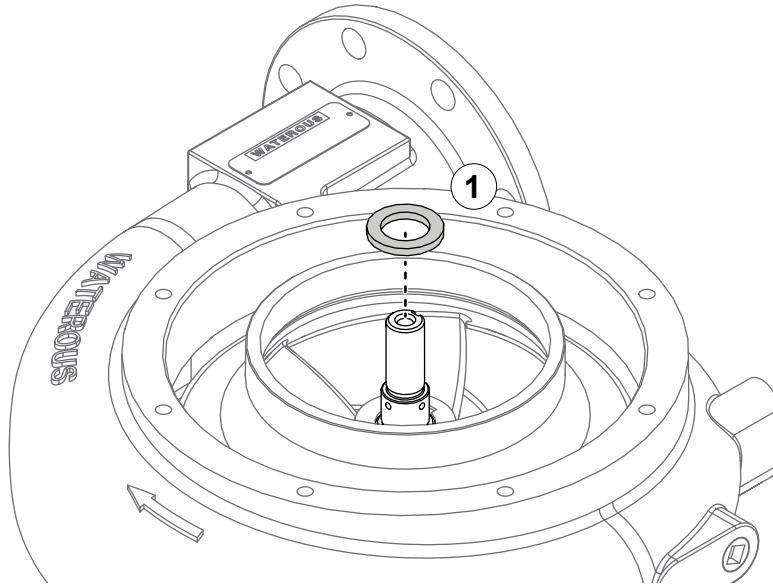
Use the illustration and instructions to install the rotating bellows.

- 1 Apply lubrication to the bellows and install it over the drive shaft.

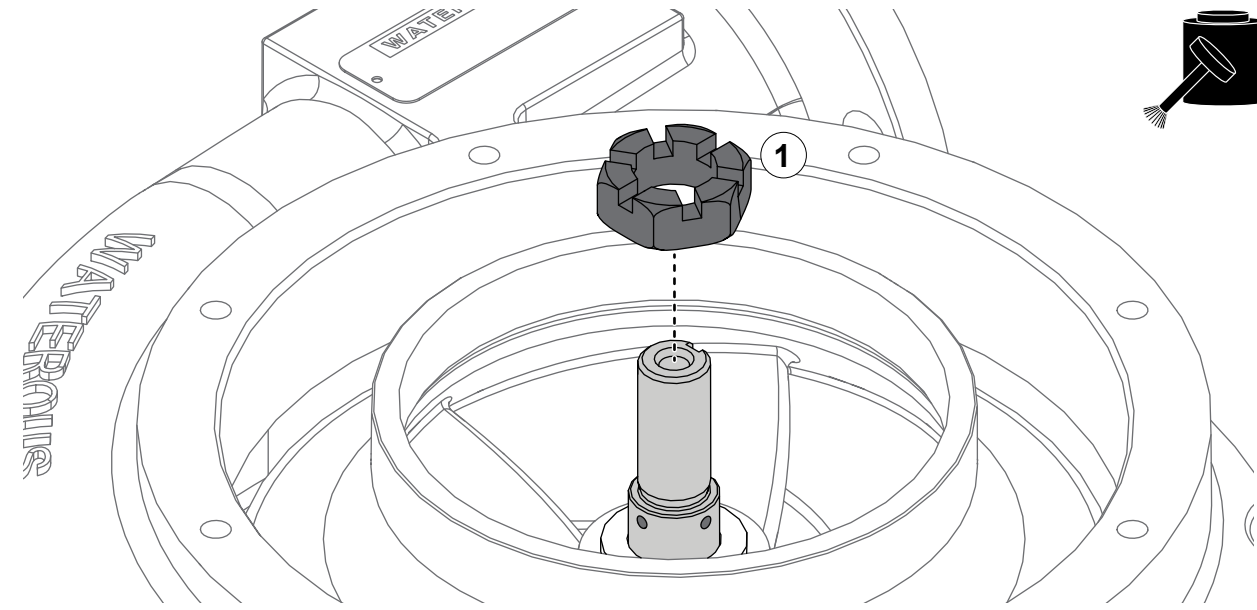
## Installing the Pump Impeller

Use the illustrations and instructions to install the impeller.

- 1 Install the washer.
- 2 Install the key into the keyway.
- 3 Apply high-pressure grease to the mating surfaces and press the impeller onto the drive shaft.



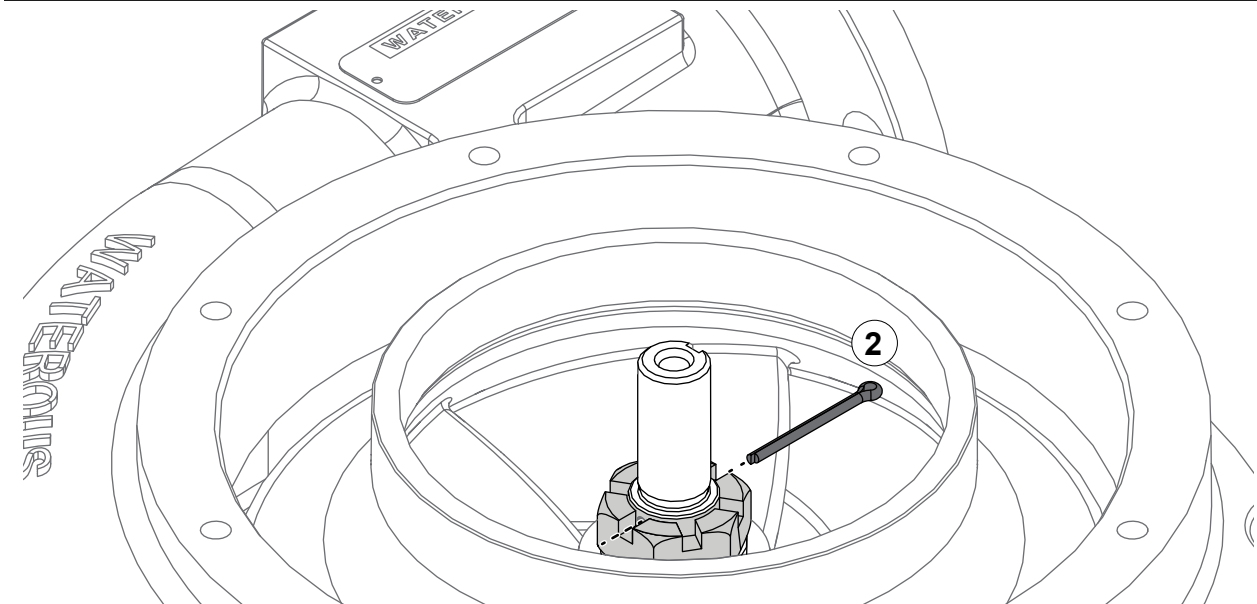
## Installing the Castle Nut



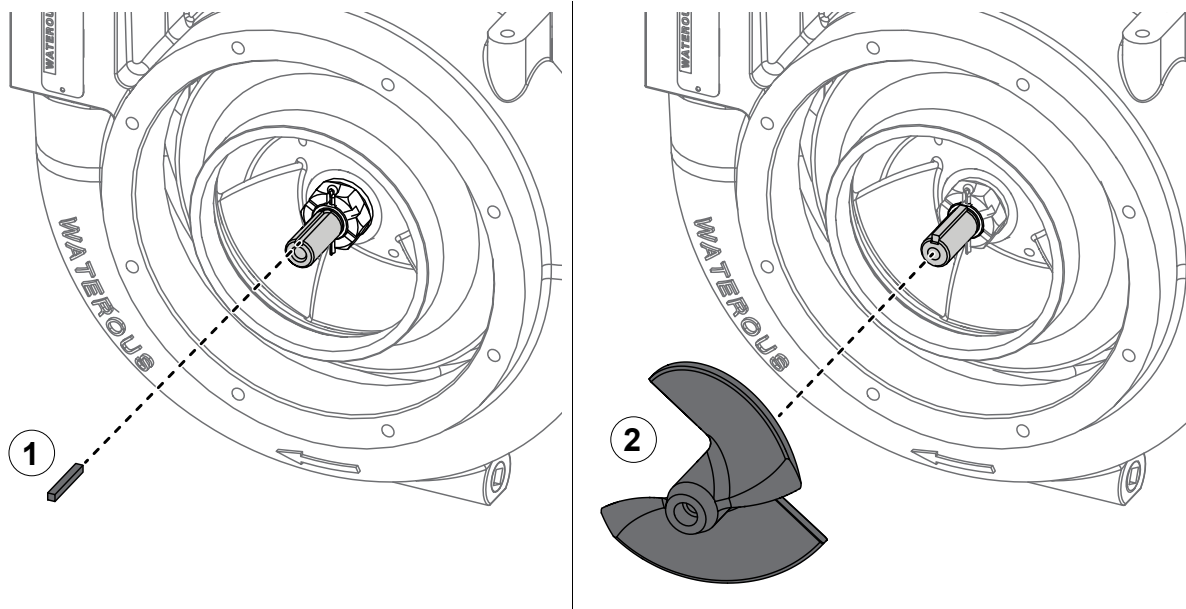
Use the illustrations and instructions to install the castle nut.

- 1 Apply anti-seize to the threads and install the castle nut to the impeller shaft.
- 2 Tighten the castle nut so that a slot on the nut aligns with a hole on the impeller shaft. Install the cotter pin and bend the ends to secure it.

**Note:** Do not loosen the nut to align it with the cotter pin hole. Tighten the nut purposefully to achieve alignment.

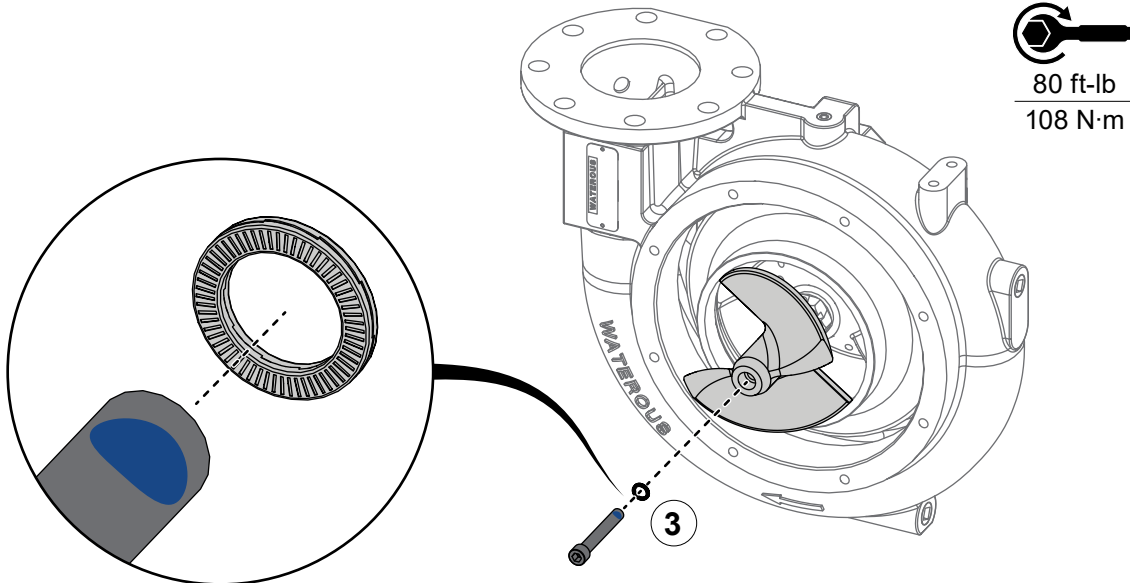


## Installing the Optional Inducer

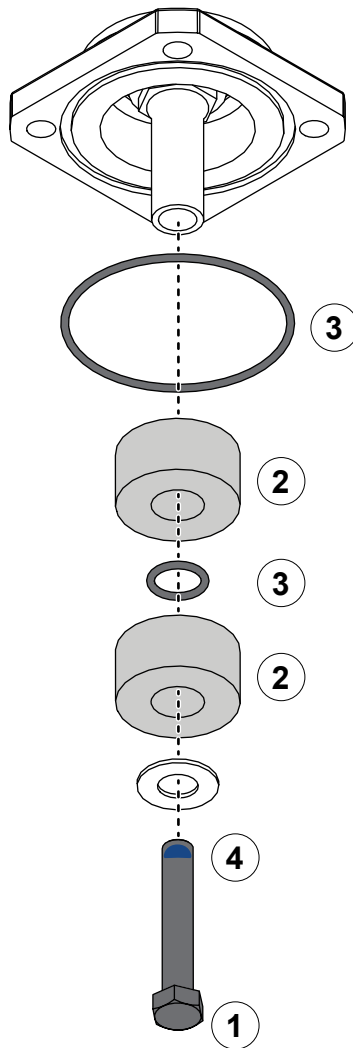


Use the illustrations and instructions to install the optional inducer.

- 1 Install the key into the keyway.
- 2 Align the inducer to the key and install it onto the shaft.
- 3 Apply threadlocker to the hardware and install the screw and wedge lock washer to secure the inducer to the shaft. Torque the screw to 80 ft-lb (108 N·m).



## Overhauling the Optional Anode Assembly



28 ft-lb  
38 N·m

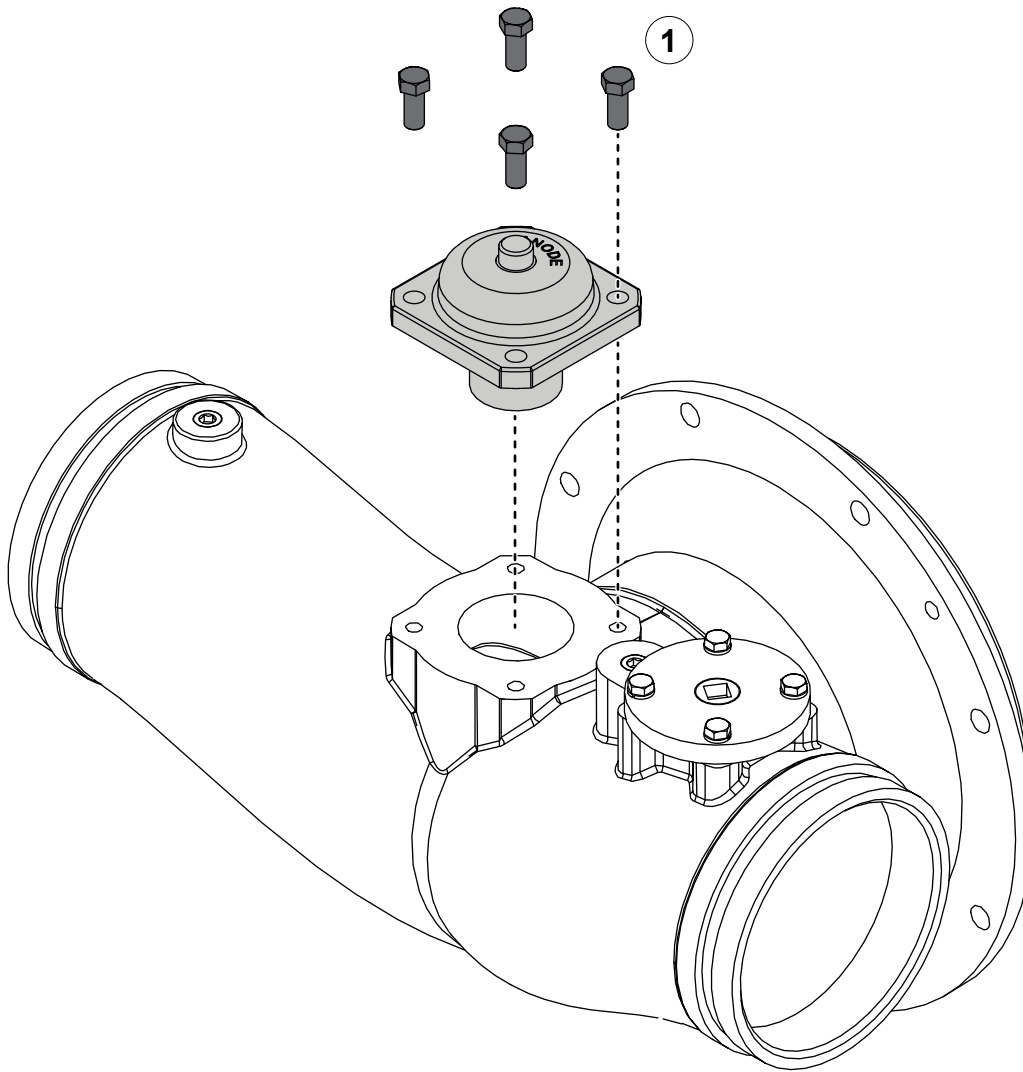
Use the illustration and instructions to overhaul the anode assembly.

- 1 Remove the bolt securing the anode assembly.
- 2 Replace the anodes.
- 3 Replace the O-rings.
- 4 Apply threadlocker to the screw. Assemble the anode. Use the screw to secure the anode assembly.  
Torque the screw to 28 ft-lb (38 N·m).

## Installing the Optional Anode

Use the illustration and instructions to install the anode assembly.

- 1 Use the mounting hardware to secure the anode to the adapter.

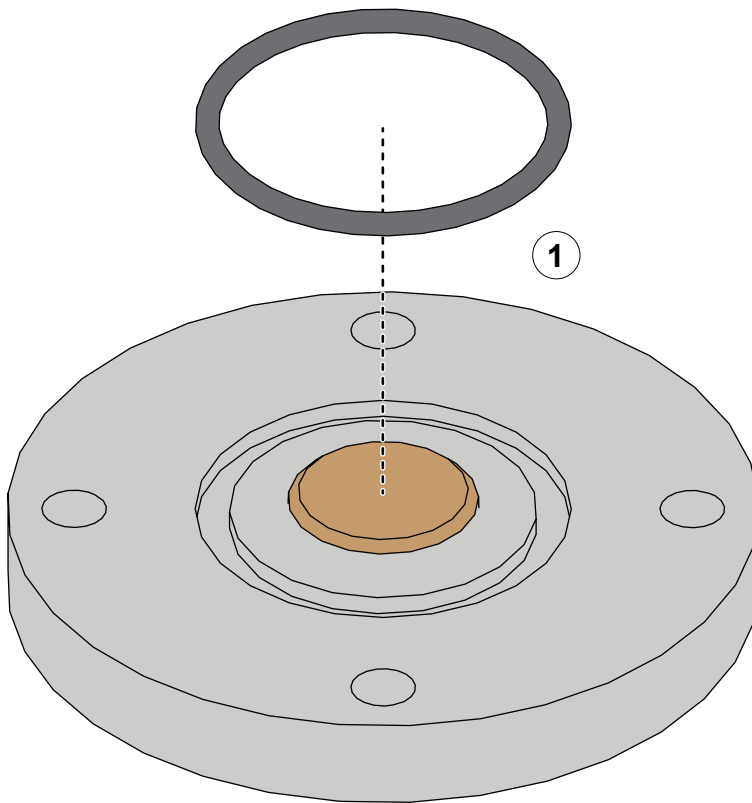


## Overhauling the Blanking Plate



Use the illustration and instructions to overhaul the blanking plate assembly.

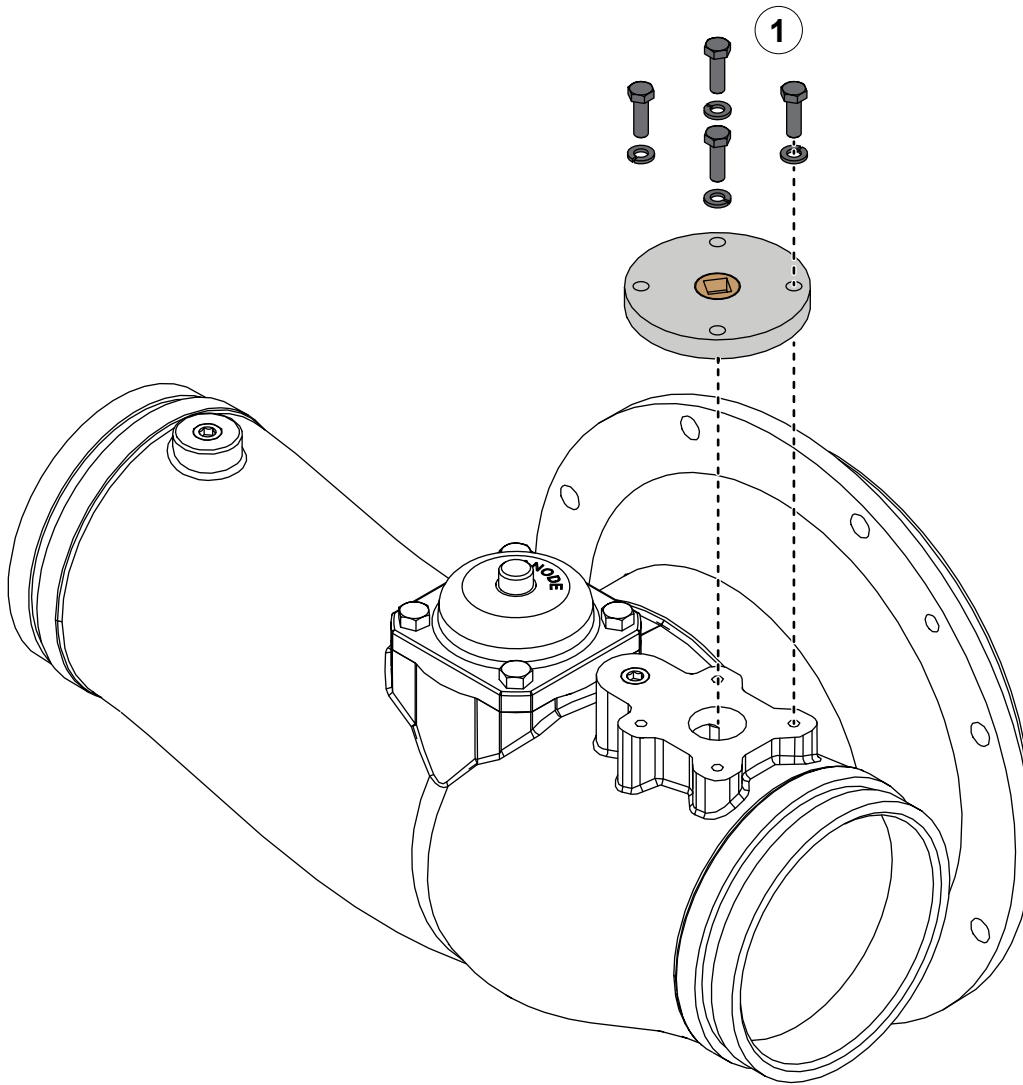
- 1 Replace the O-ring.



## Installing the Blanking Plate

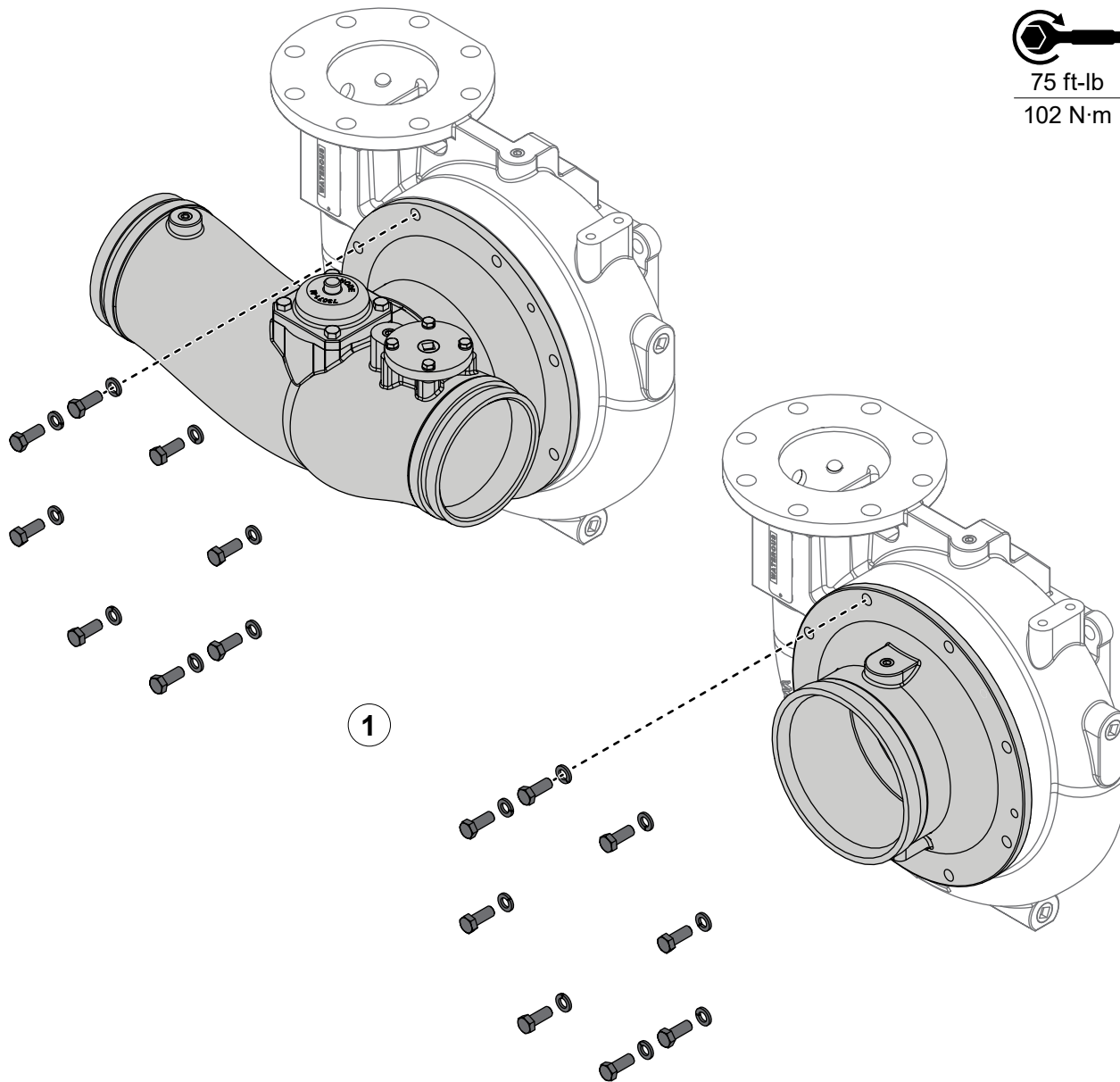
Use the illustration and instructions to install the blanking plate.

- 1 Use the mounting hardware to secure the blanking plate to the adapter.





## Installing the Intake Adapter



Use the illustration and instructions to install the intake adapter.

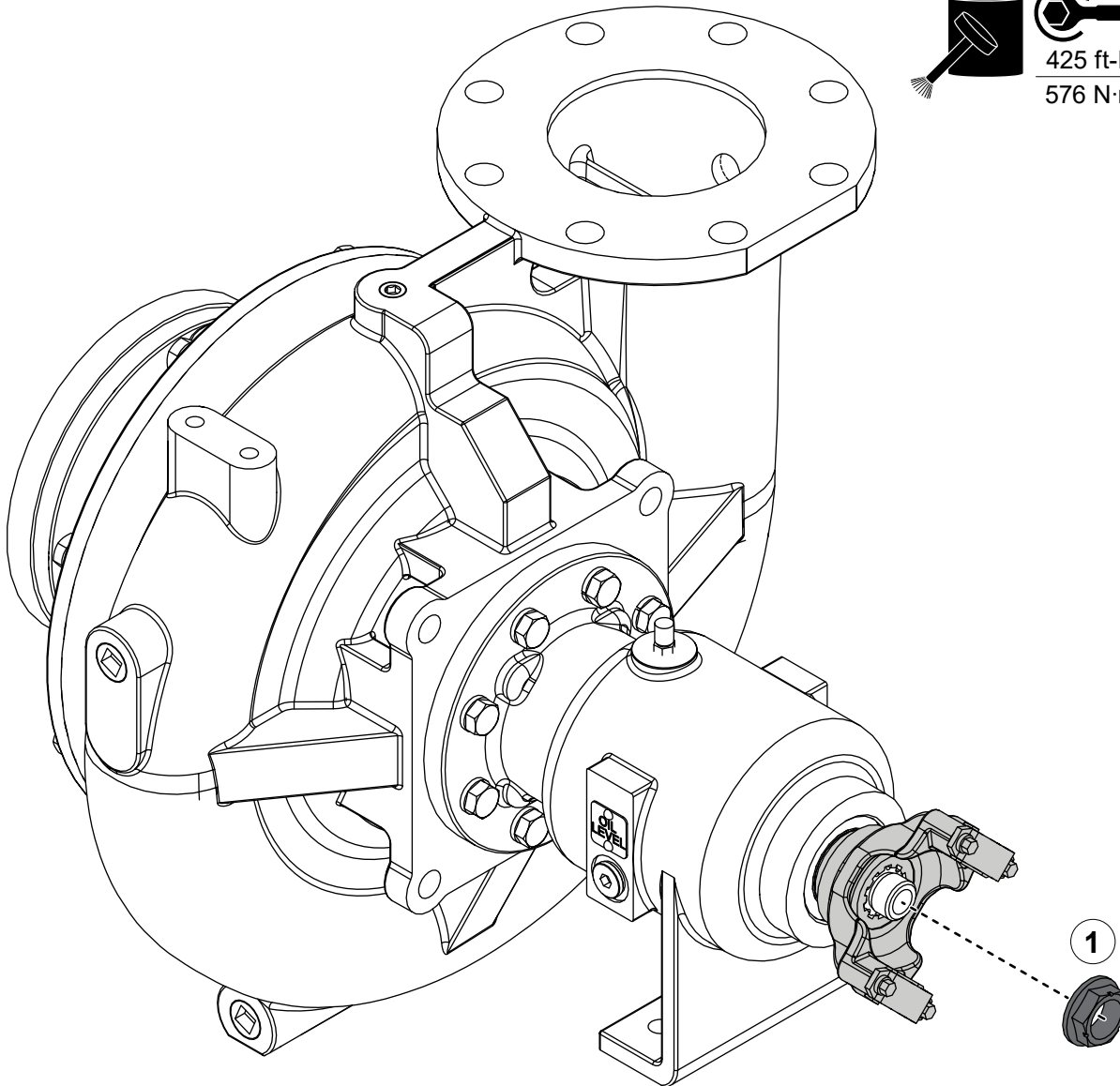
- 1 Use the hardware to install the intake adapter. Torque the mounting hardware to 75 ft-lb (102 N·m).

## Installing the Direct Drive Pedestal Yoke Adapter

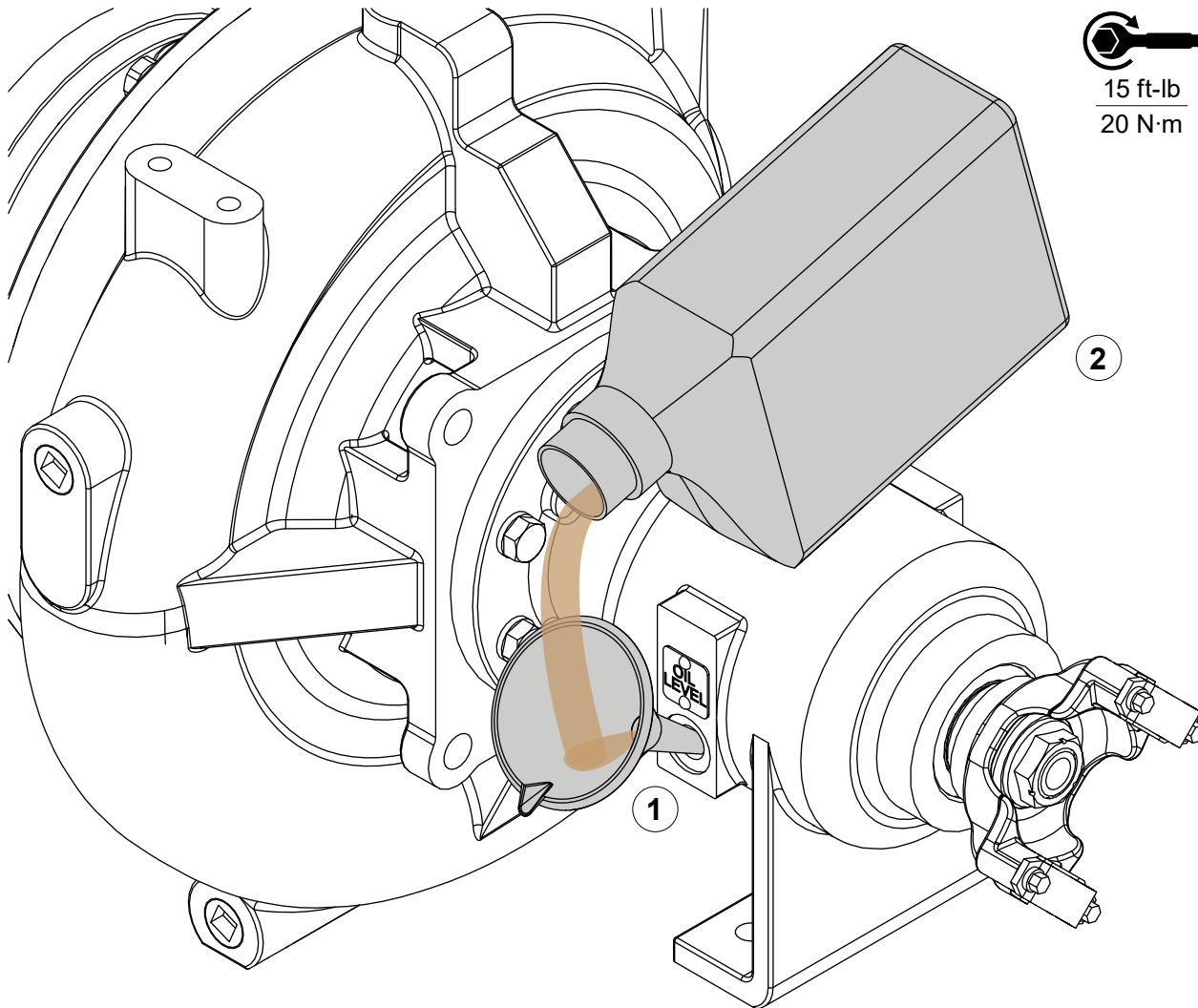


Use the illustration and instructions to install the yoke adapter.

- 1 Install the yoke adapter to the drive shaft. Apply anti-seize to the threads and use the nut to secure the yoke adapter to the drive shaft. Torque the nut to 425 ft-lb (576 N·m).



## Adding Pedestal Oil

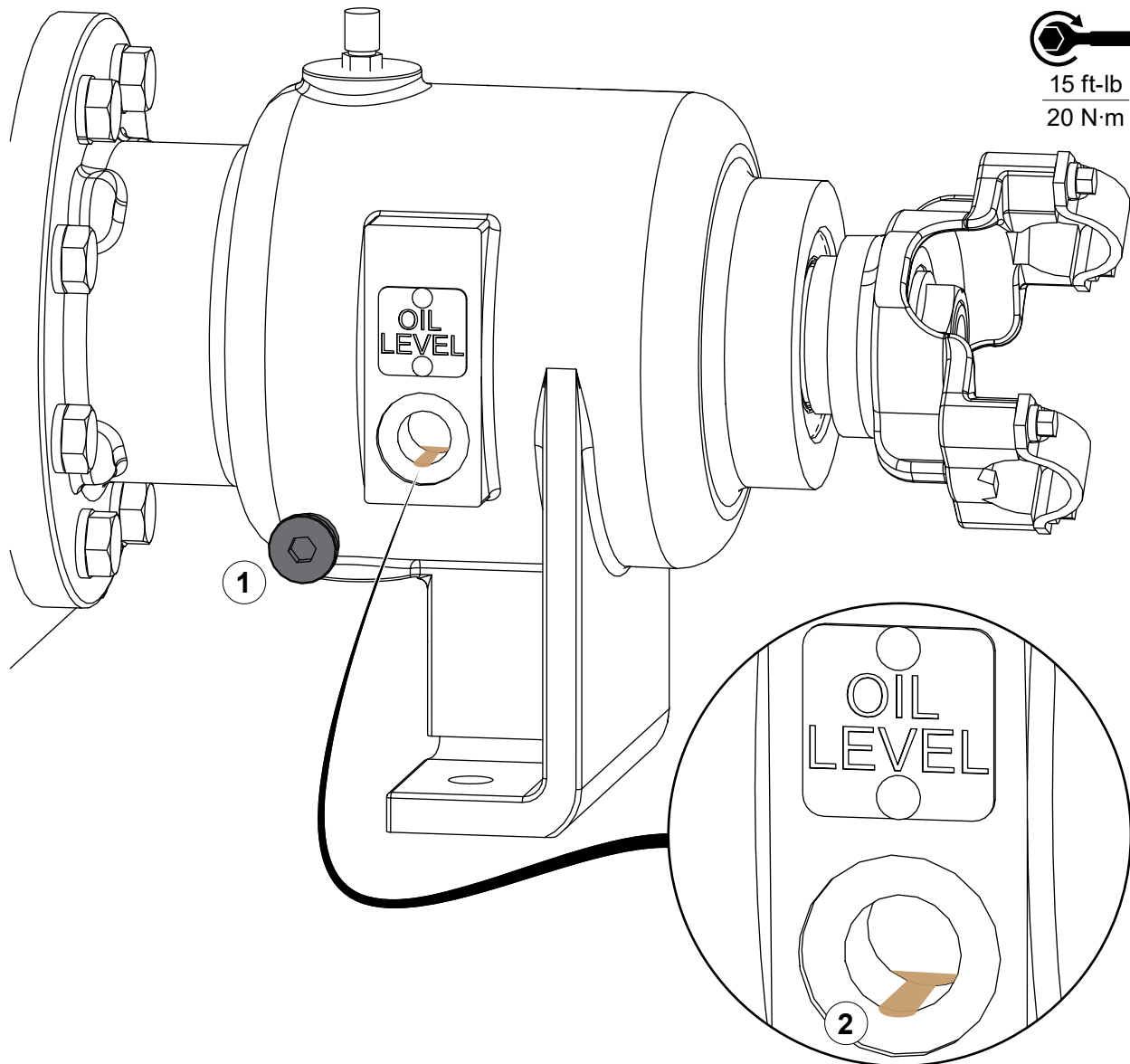


Use the illustration and instructions to add oil to the direct drive pedestal.

**Note:** Make sure that you park the apparatus so that the direct drive pedestal is level before you add oil.

- 1 Remove the oil-level plug and arrange a funnel to direct oil into the pedestal.
- 2 Pour approximately 1/2 qt (0.43 L) of non-detergent SAE 30 oil. Allow the oil to settle before checking the oil level. Refer to: **"Checking the Direct Drive Pedestal Oil Level" on page 52**. After adding the oil, install the magnetic plug and torque it to 15 ft-lb (20 N·m).

## Checking the Direct Drive Pedestal Oil Level



Use the illustration and instructions to check the direct drive pedestal oil level.

**Note:** Make sure that you park the apparatus so that the direct drive pedestal is level before you check the fluid level.

- 1 Remove the magnetic plug.
- 2 Make sure that the oil reaches the bottom of the oil-level port before you securely install the magnetic plug. After checking the fluid level, install the magnetic plug and torque it to 15 ft-lb (20 N·m).

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# **WATEROUS**

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