

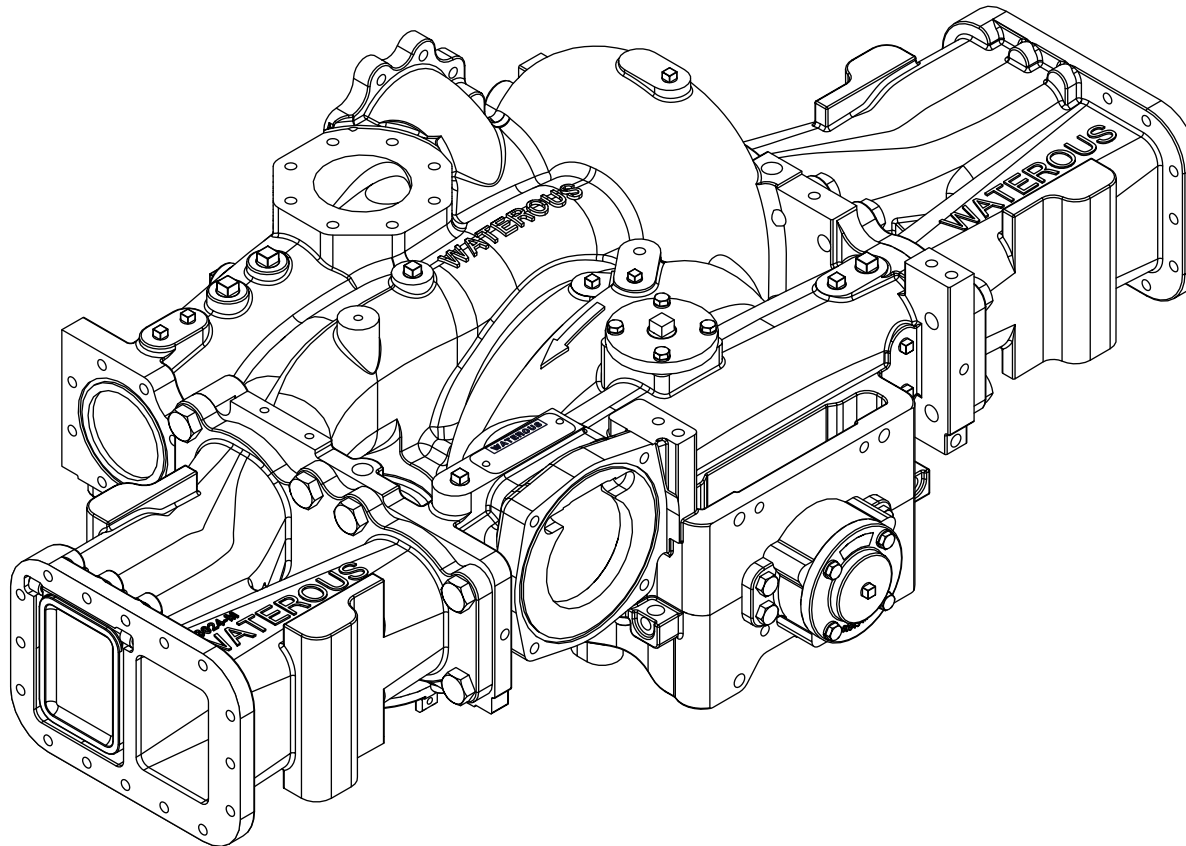
WATEROUS

Form Number: F-3005

Issue Date: Feb 6, 2023

Revision Date: Jun 29, 2023

CM Series Fire Pumps Overhaul Instructions



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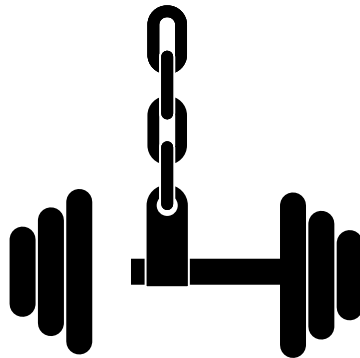
Safety Precautions

- 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.

! WARNING

Unsupported Equipment

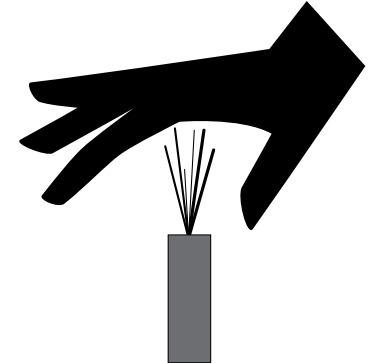
- Unsupported equipment may shift or fall during disassembly, causing injury or damage.
- Always support heavy equipment while servicing.



! WARNING

High Pressure

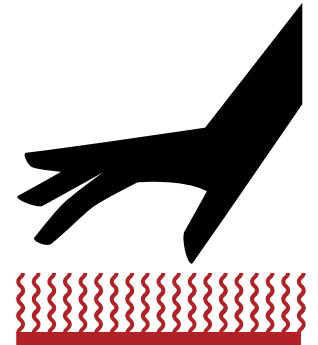
- Liquid ejected at high pressure can cause serious injury.
- Drain the pump after use and before servicing.



! WARNING

Hot Surface

- Hot surfaces can burn you.
- Do not touch the surface during operation—allow it to cool after operating.



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 that are 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 viewed the best when printed in color.
- The *print on both sides* and *flip on long edge* features can provide the best results.
- Use a 3-ring binder to store the document.

Symbols

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



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.



Finger tight, then full turn—This symbol tells you to secure the hardware to finger tight, then use a wrench to tighten the hardware an additional turn.



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.

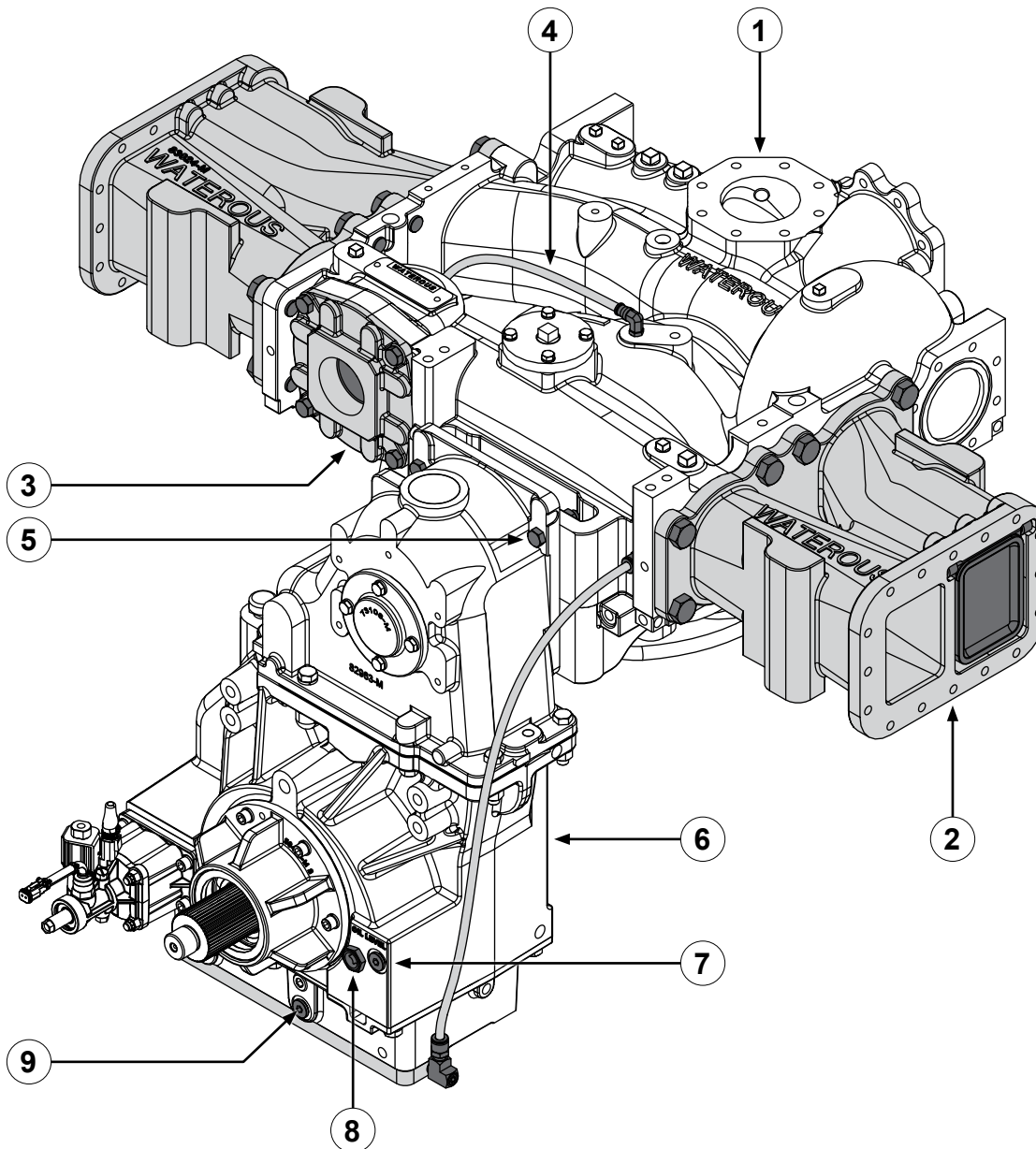


Sealant—This symbol tells you to apply the appropriate sealant to the part.



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

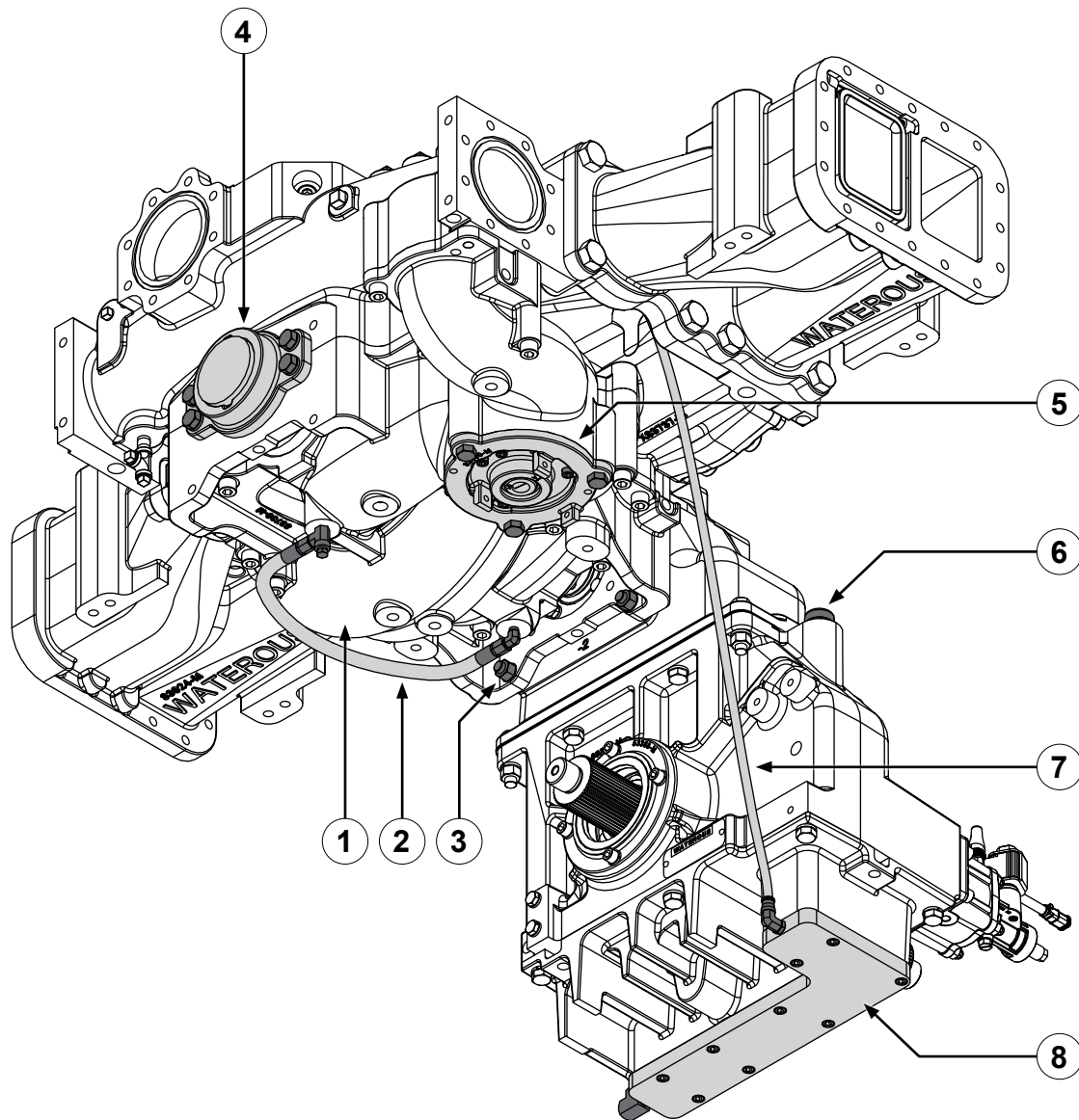
Identifying Exterior Components—Rear



Use the illustration to identify various components on the pump.

- | | |
|---|--------------------------------|
| 1 | Pump body |
| 2 | Intake adapter |
| 3 | Tank intake adapter |
| 4 | Oil cooling lines—optional |
| 5 | Transmission mounting hardware |
| 6 | Transmission—C22 shown |
| 7 | Oil level plug |
| 8 | Oil level sight plug |
| 9 | Oil drain plug |

Identifying Exterior Components—Front



Use the illustration to identify various components on the pump.

- | | |
|---|--------------------------------|
| 1 | Volute cover |
| 2 | Seal cooling hose |
| 3 | Transmission mounting hardware |
| 4 | Bearing housing |
| 5 | Transfer valve cover |
| 6 | Breather |
| 7 | Oil cooling lines—optional |
| 8 | Oil cooler plate—optional |

Preparing to Disassemble the Pump

- Read and understand the instructions before disassembling the equipment.
- Prepare a workspace suitable to accommodate and support the pump.
- 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 pump. Surface debris can transfer into the pump 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 the self-locking nuts.
- Apply penetrating oil to screws and nuts before disassembly.

Removing the Pump

Removing the pump 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 pump.

Furthermore, some applications require you to remove the transmission and pump together before separating the pump from the transmission. Other applications allow you to separate the pump without removing the transmission from the apparatus. 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 Pump 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 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.

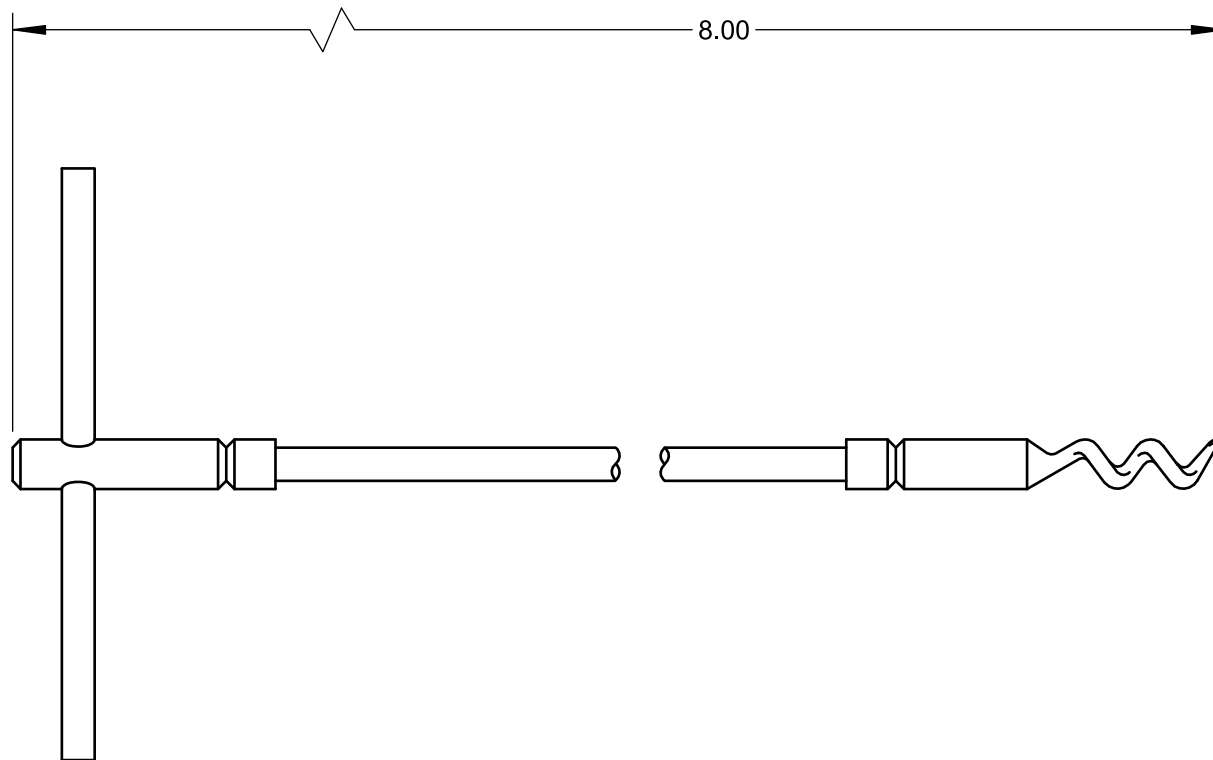
- Use established industry practices to disassemble the pump.
- Record or mark components as you remove them to make sure that you install them in the same orientation.
- Discard or recycle drained fluids collected during the overhaul in accordance with local regulations.

Optional Equipment

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

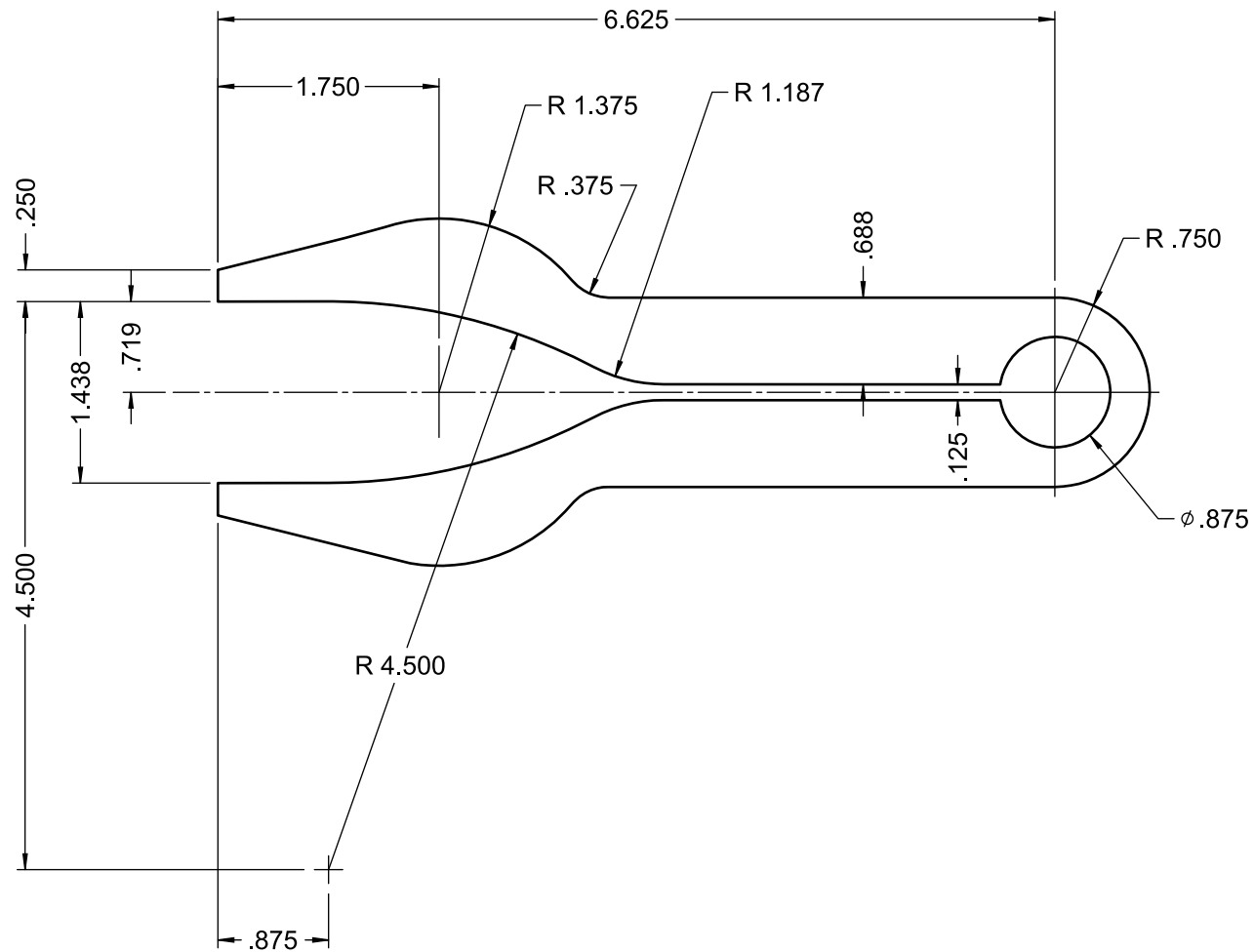
Packing Ring Removal Tool

An optional packing ring removal tool (5782) is available from Waterous to aid in removing the packing rings—dimensions shown in inches.

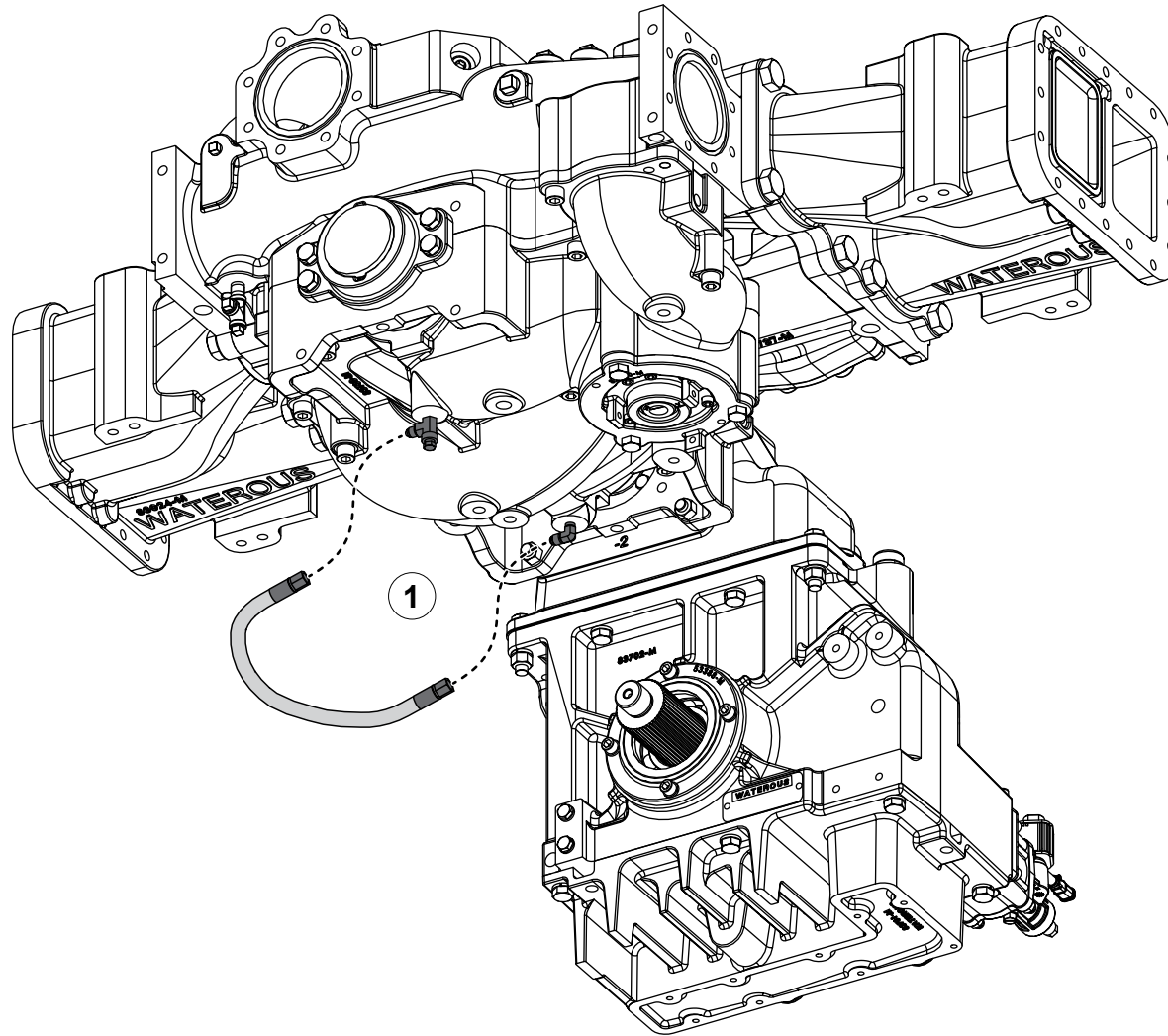


Retaining Ring Removal Tool

An optional retaining ring removal tool (62917) is available from Waterous to aid in removing the retaining rings—dimensions shown in inches.



Removing the Seal Cooling Hose



Use the illustration and instructions to remove the seal cooling hose.

Note: Only remove the hose if it needs to be replaced.

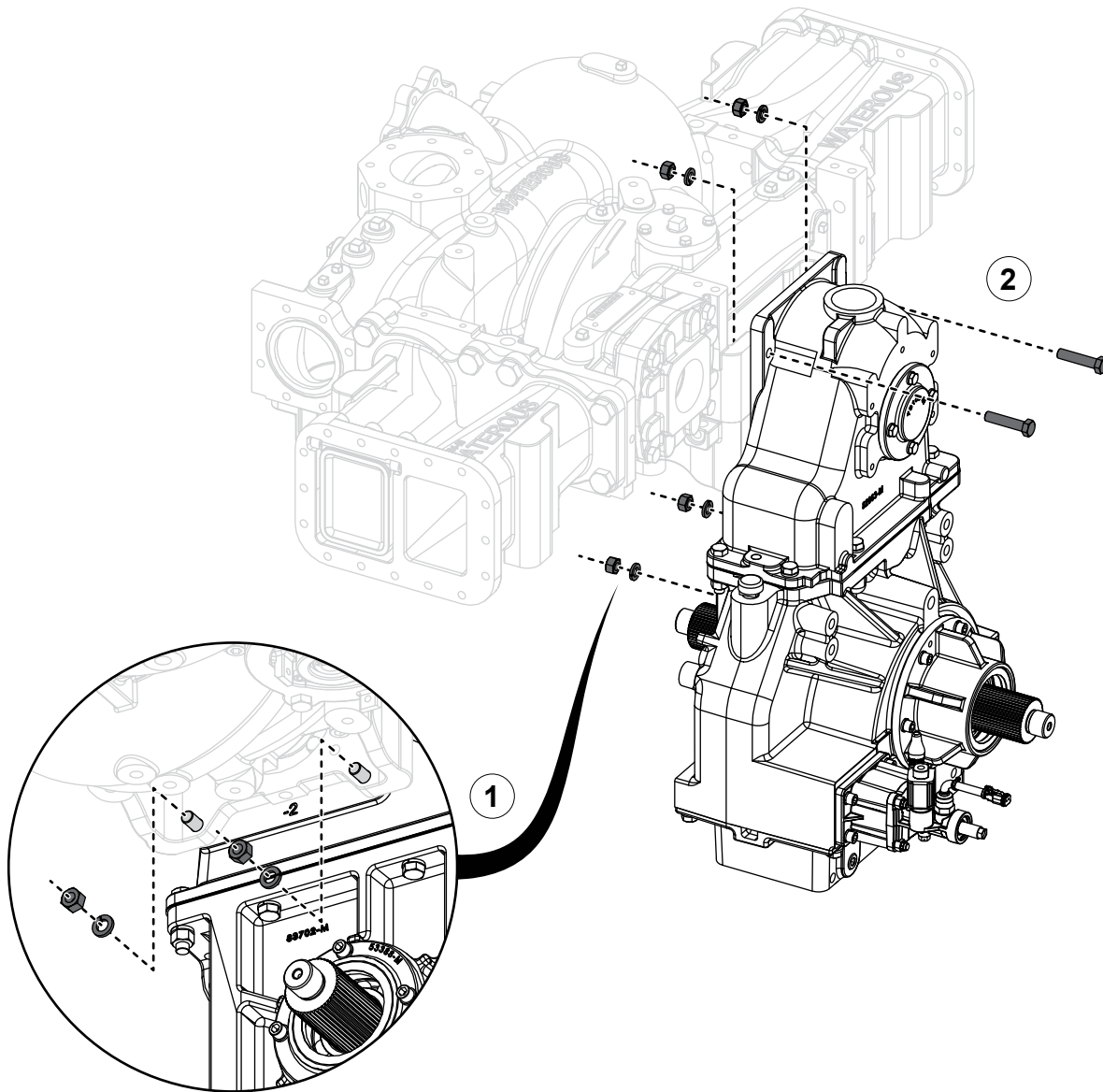
- 1 Remove the hose from the fittings on the underside of the pump.

Separating the Pump and Transmission

Use the illustration and instructions to separate the pump and transmission—C22 transmission shown.

Note: *Separating the pump and transmission is a similar process regardless of transmission model and mounting location.*

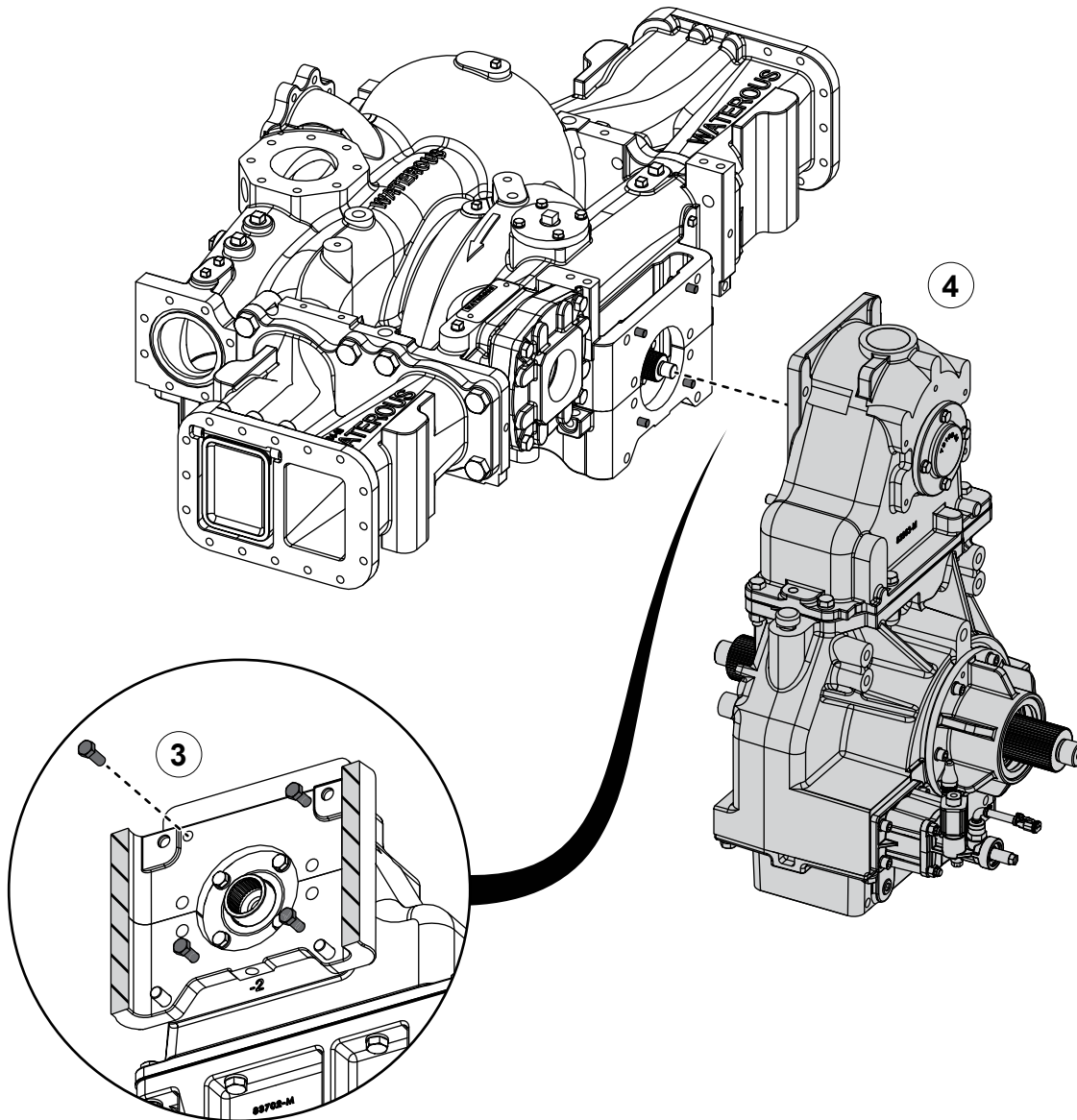
- 1 Remove the lower transmission mounting hardware.
- 2 Remove the upper transmission mounting hardware.



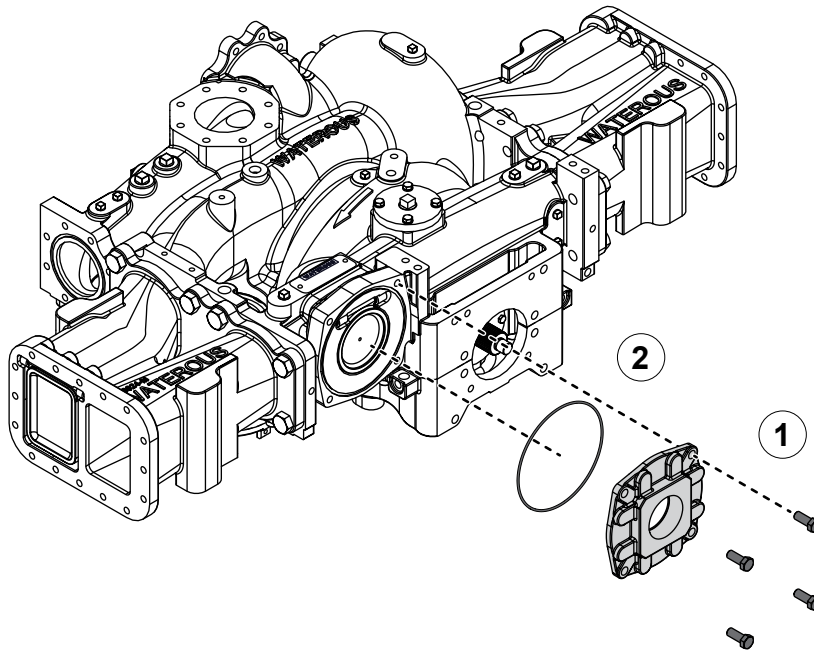
Separating the Pump and Transmission

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

- 3 Use locally sourced 1/2-13 jacking screws to separate the pump and transmission.
- 4 Remove the transmission from the pump.



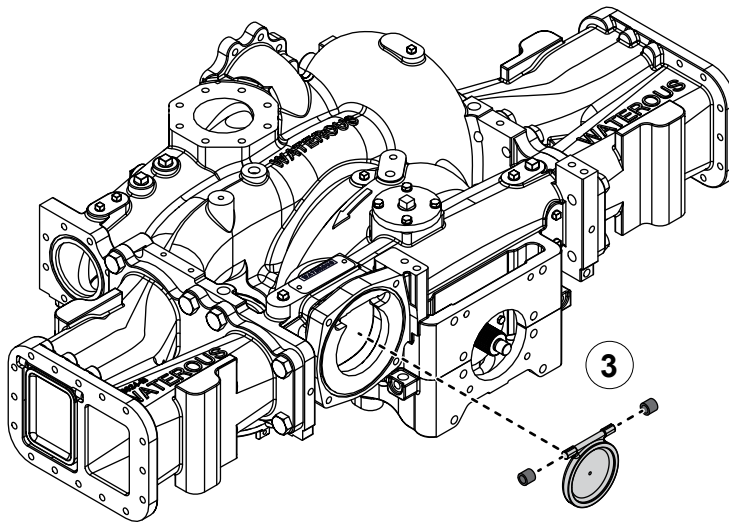
Removing the Tank Intake Adapter



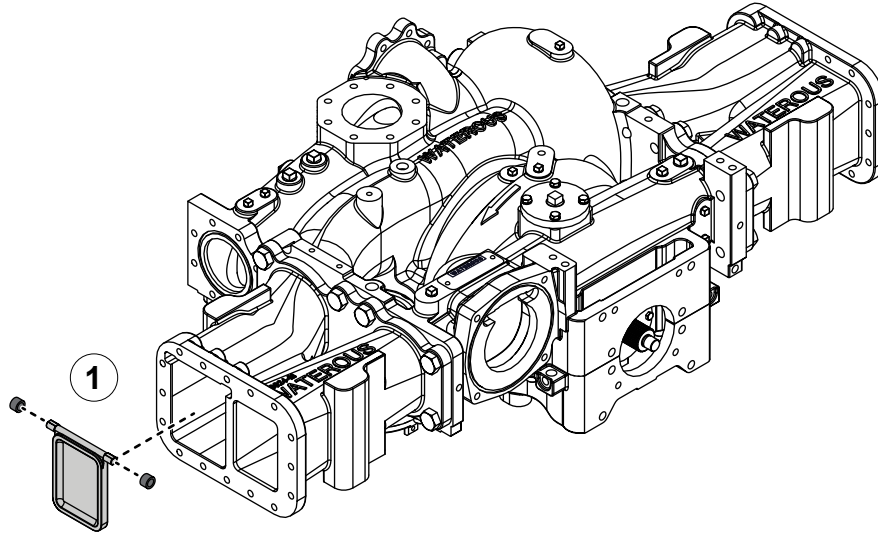
Use the illustrations and instructions to remove the tank intake adapter.

Note: The tank-to-pump fitting or valve may differ depending on your application.

- 1 Remove the mounting hardware, then remove the tank intake adapter.
- 2 Remove and discard the O-ring.
- 3 Remove the flap valve, then remove the bearing from each end of the valve.



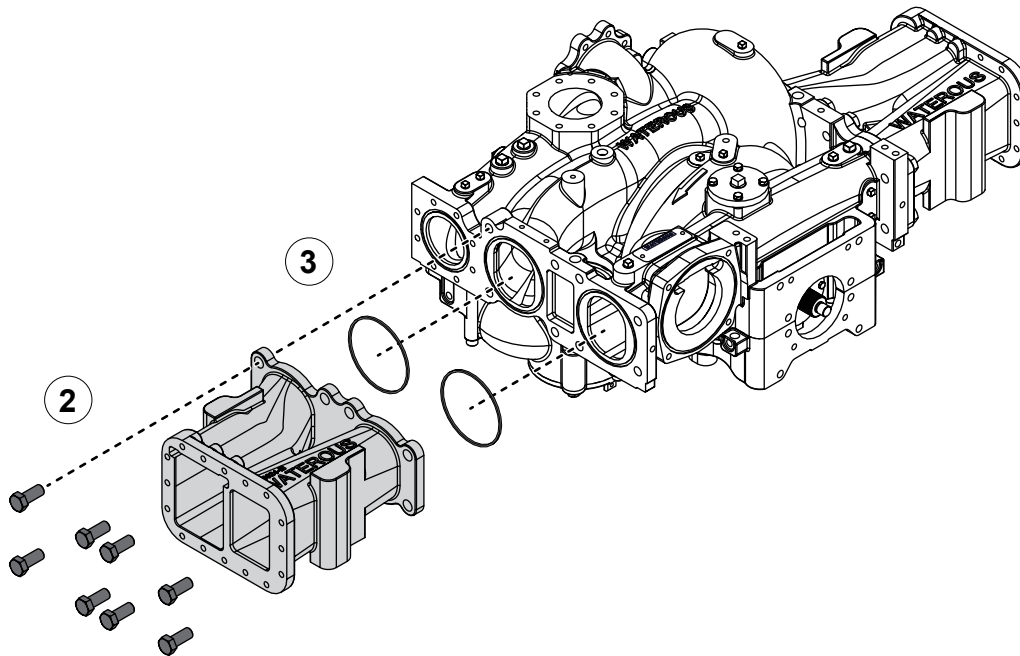
Removing the Intake Adapters



Use the illustrations and instructions to remove the intake adapters.

Note: Only remove the intake adapters if they or the pump body need to be replaced.

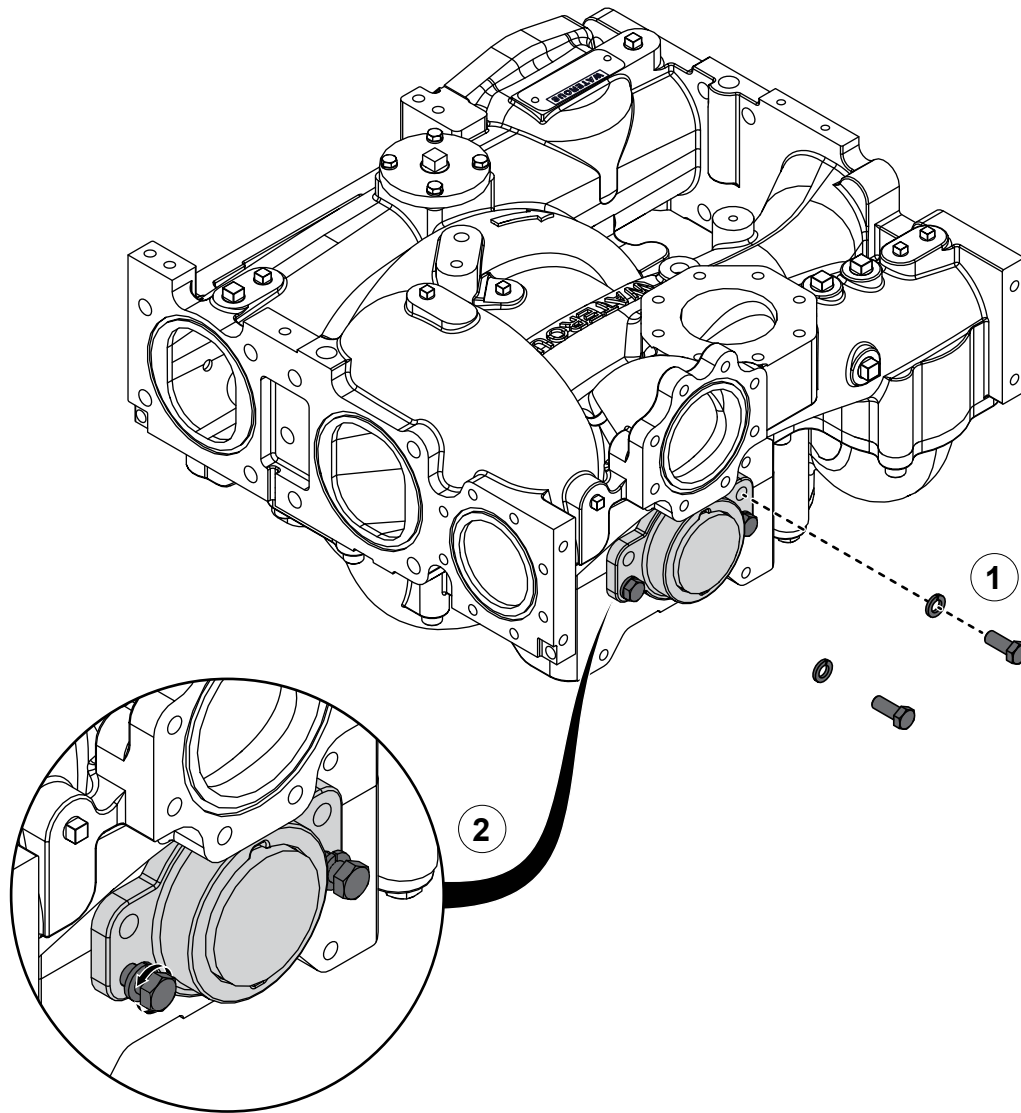
- 1 Remove the flap valve, then remove the bearing from each end of the valve.
- 2 Remove the mounting hardware, then remove the intake adapter.
- 3 Remove and discard the gaskets.
- 4 Repeat the previous steps to remove the intake adapter at the other end of the pump.



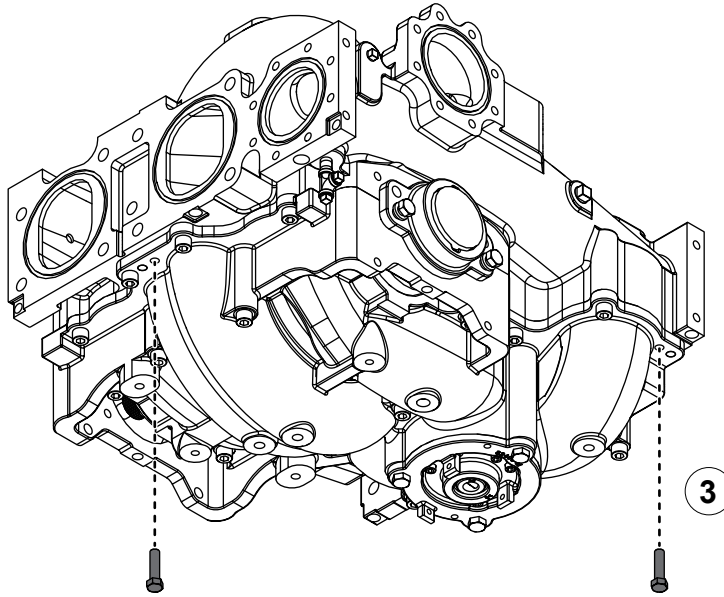
Disassembling the Pump Body

Use the illustration and instructions to disassemble the pump body.

- 1 Remove the upper bearing housing hardware.
- 2 Loosen, but do not remove, the lower bearing housing hardware.

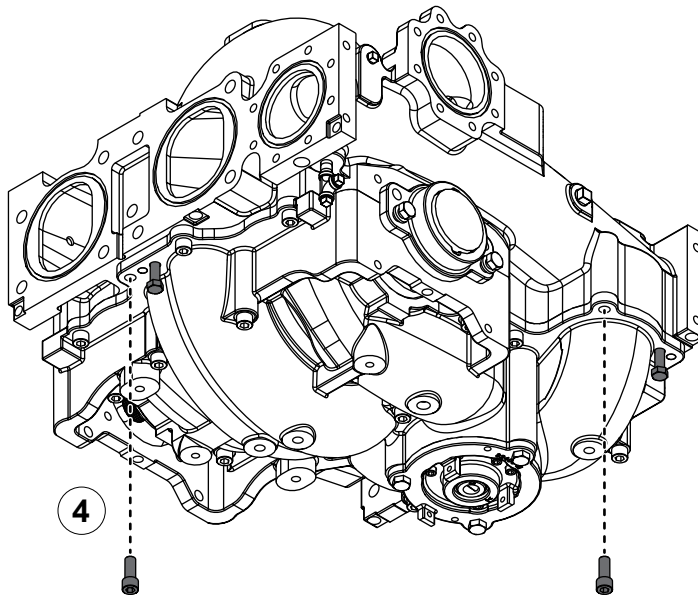


Disassembling the Pump Body

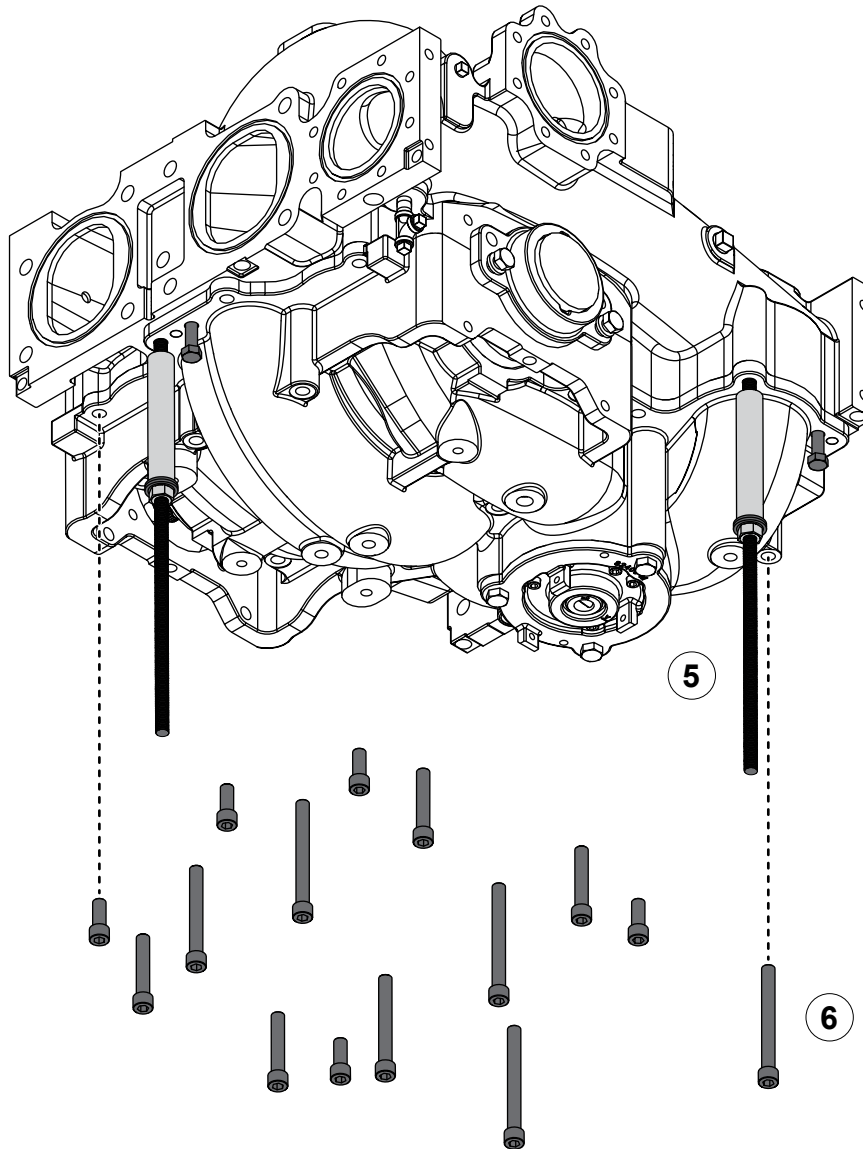


Use the illustrations and instructions to disassemble the pump body.

- 3 Insert locally sourced 1/2-13 jacking screws into the volute cover jacking screw holes.
- 4 Remove screws on both sides of the volute cover to accommodate the threaded rods.



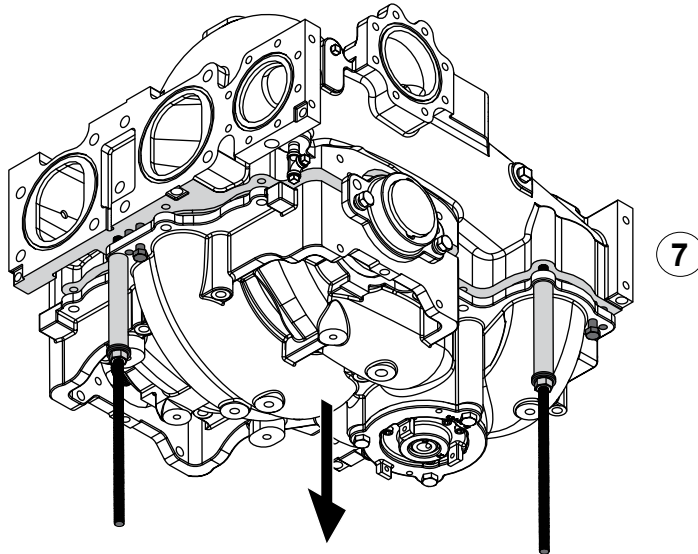
Disassembling the Pump Body



Use the illustration and instructions to disassemble the pump body.

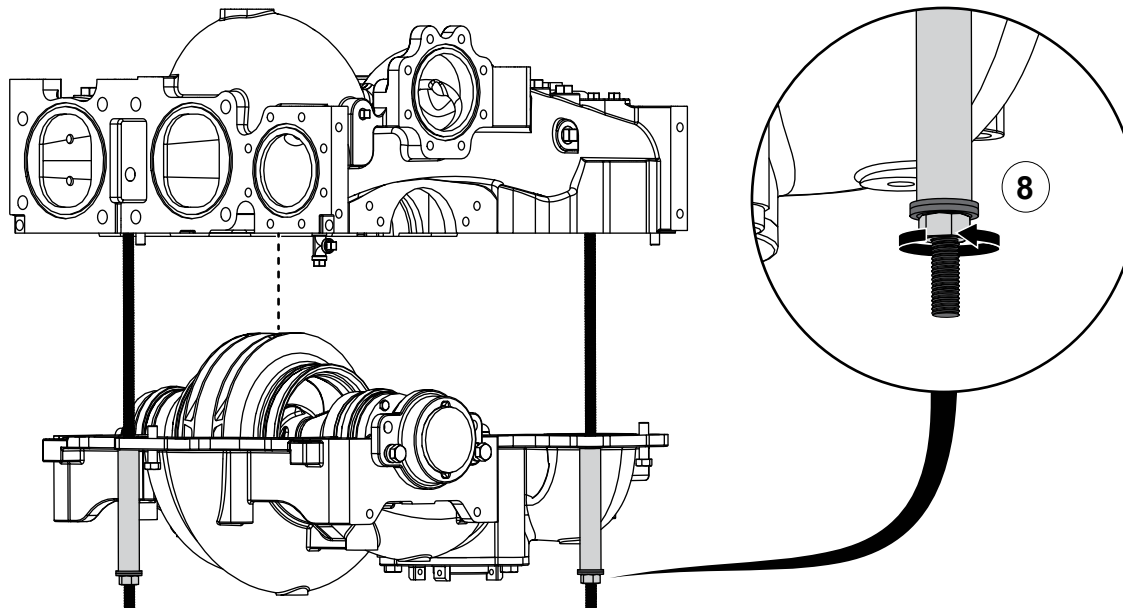
- 5 To prepare the threaded rods to lower the volute cover, do the following:
 - Thread a spacer (6 inches), 2 washers, and a nut onto each rod (1/2-13 x 18 inches).
 - Install the rods into the volute cover.
 - Tighten the nuts so that the spacers sit 1/2 to 3/4 inch below the cover.
- 6 Remove the remaining volute cover hardware.

Disassembling the Pump Body

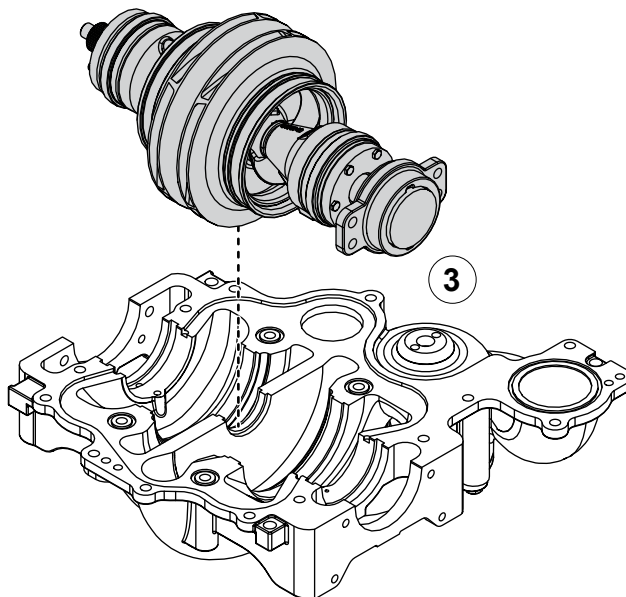
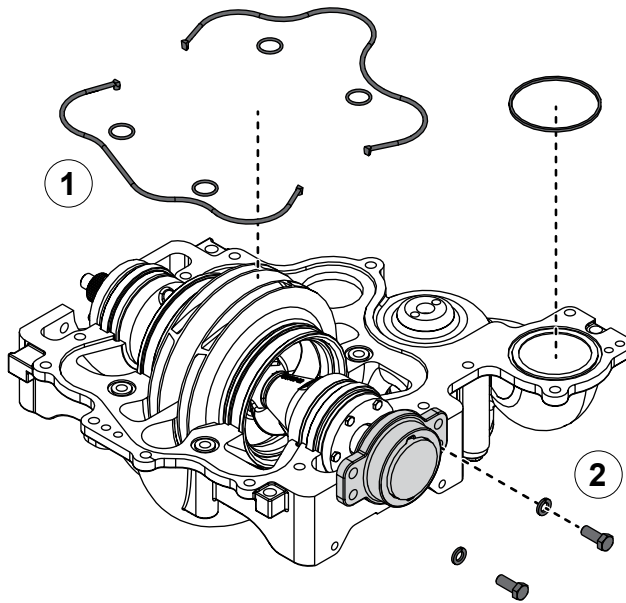


Use the illustrations and instructions to disassemble the pump body.

- 7 Tighten the jacking screws to separate the volute cover from the pump body, alternating between them to avoid damaging the dowel pins.
- 8 Loosen the nuts on the rods, alternating between them to gradually lower the volute cover.



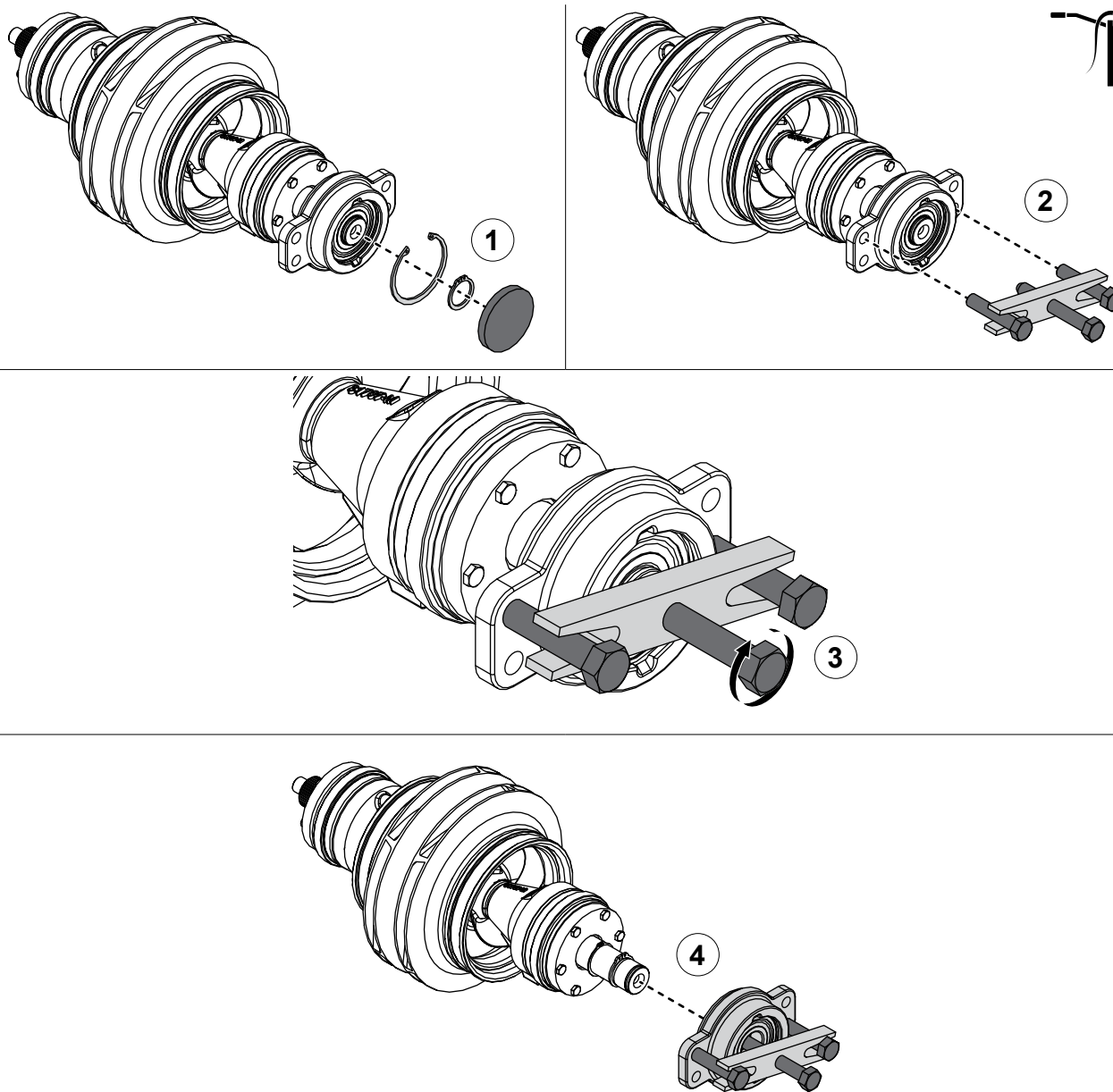
Removing the Impeller Shaft Assembly



Use the illustrations and instructions to remove the impeller shaft assembly from the volute cover.

- 1 Remove and discard the molded gaskets and O-rings.
- 2 Remove the lower bearing housing hardware.
- 3 Remove the impeller shaft assembly.

Removing the Outboard Bearing Housing



Use the illustrations and instructions to remove the outboard bearing housing. The tools being used are included in the Outboard Bearing Removal and Installation Kit (K 956).

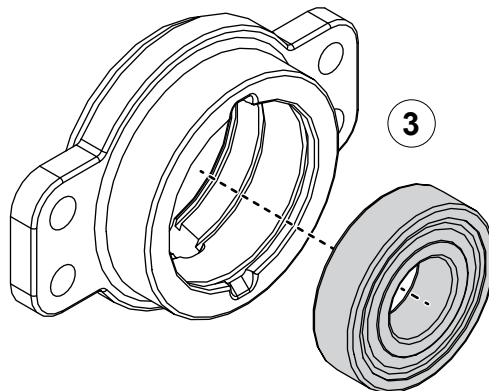
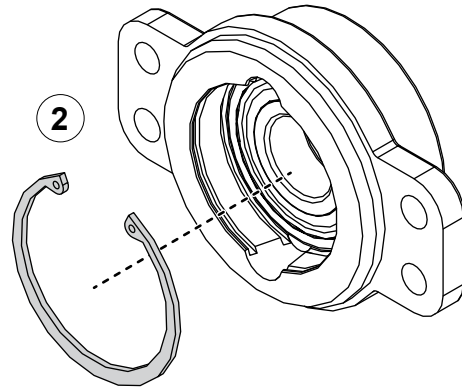
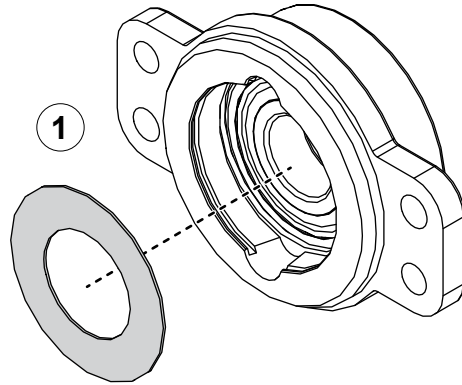
Note: Use the same method to remove the bearing housing when the impeller shaft assembly remains in the pump and only the mechanical seals are replaced.

- 1 Remove the bearing housing plug and outermost retaining rings.
- 2 Grease the end of the puller screw, then install the hub puller bar into the oversized holes on the bearing housing.
- 3 Tighten the hub puller screw to separate the bearing housing from the shaft.
- 4 Remove the bearing housing.

Disassembling the Outboard Bearing Housing

Use the illustrations and instructions to disassemble the outboard bearing housing.

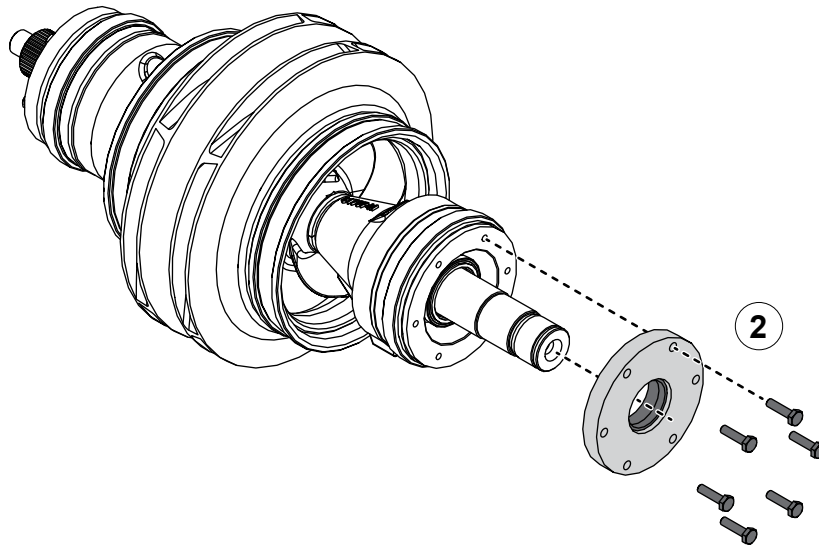
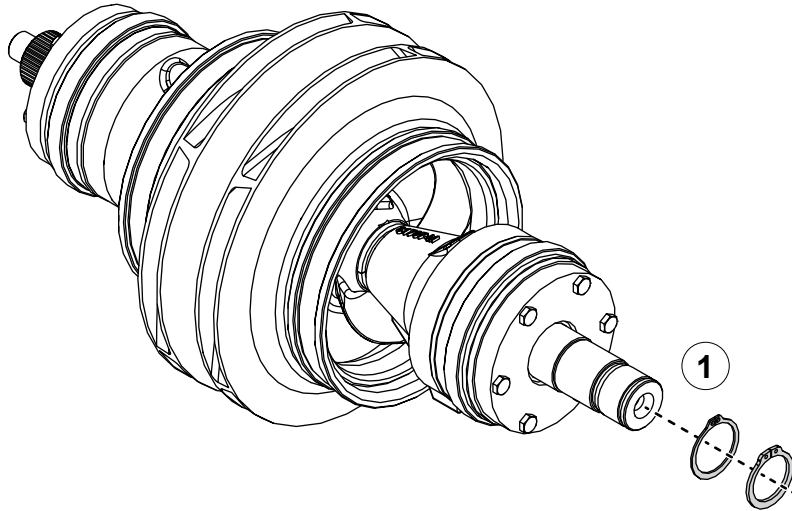
- 1 Remove the bearing shield.
- 2 Remove the retaining ring.
- 3 Remove the bearing.



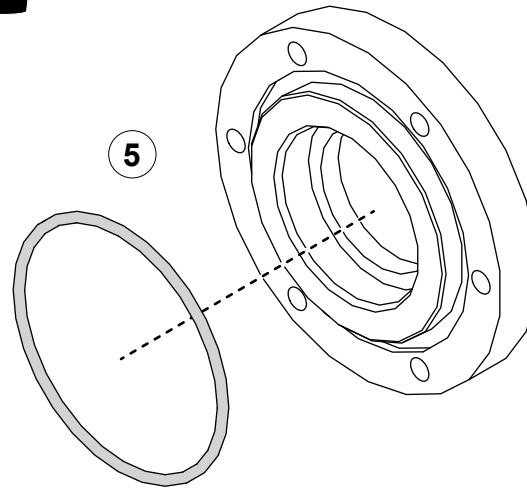
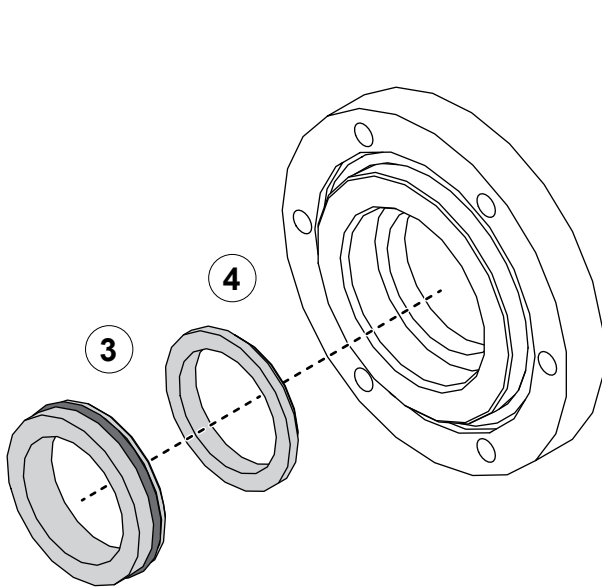
Disassembling the Impeller Shaft with Mechanical Seals

Use the illustrations and instructions to disassemble the impeller shaft.

- 1 Remove the retaining rings.
- 2 Remove the seal housing hardware, then remove the seal housing cover.



Disassembling the Impeller Shaft with Mechanical Seals

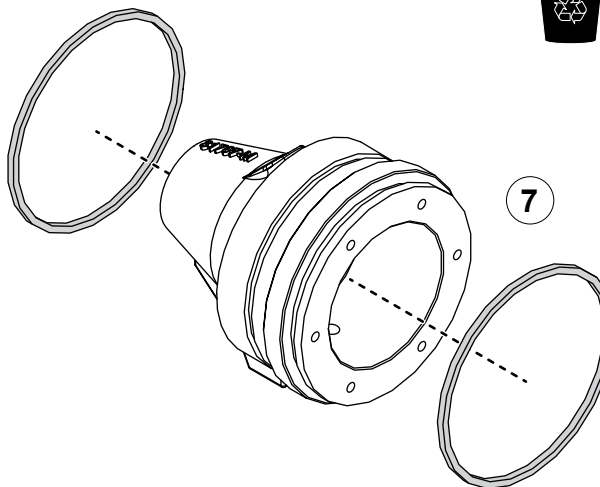
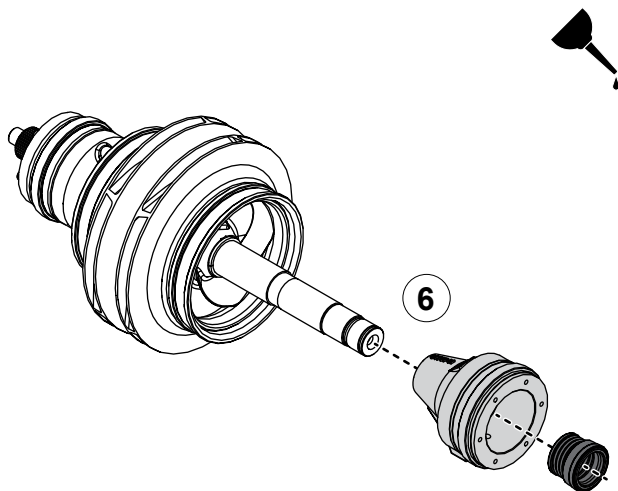


Use the illustrations and instructions to disassemble the impeller shaft.

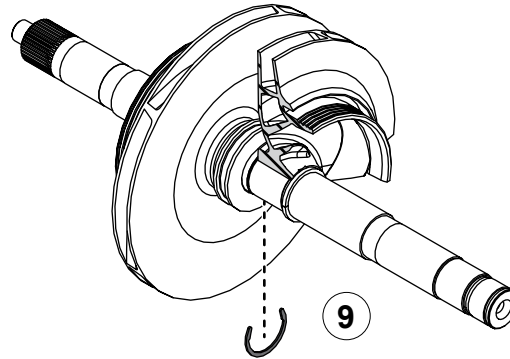
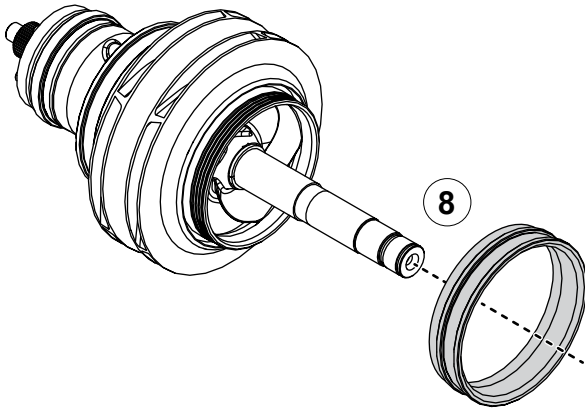
- 3 Remove the stationary ring.
- 4 Remove the throttle bushing.
- 5 Remove and discard the O-ring.
- 6 Clean and lubricate the shaft, then pull on the seal housing to release the mechanical seal bellows. Remove the seal housing and mechanical seal.

Note: If the mechanical seal is not freed by the seal housing, a removal tool is included in the Mechanical Seal Removal and Installation Kit (K 628).

- 7 Remove and discard the seal housing gaskets.



Disassembling the Impeller Shaft with Mechanical Seals



Use the illustrations and instructions to disassemble the impeller shaft.

8 Remove the wear ring.

9 Remove the retaining ring.

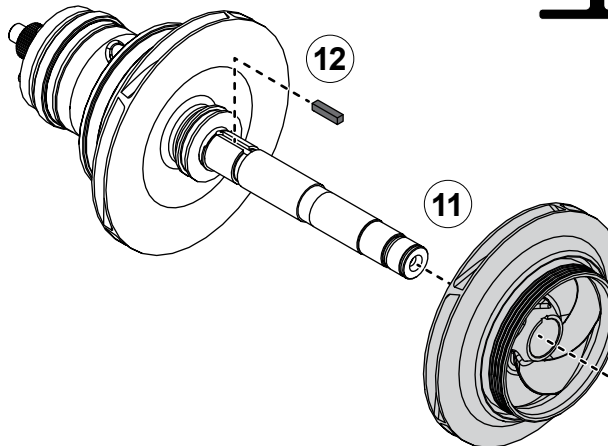
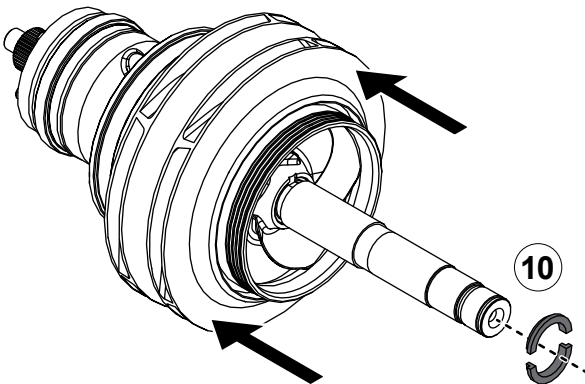
Note: An optional retaining ring removal tool (62917) is available from Waterous.

10 Press the impeller toward the center of the shaft to remove the lock ring.

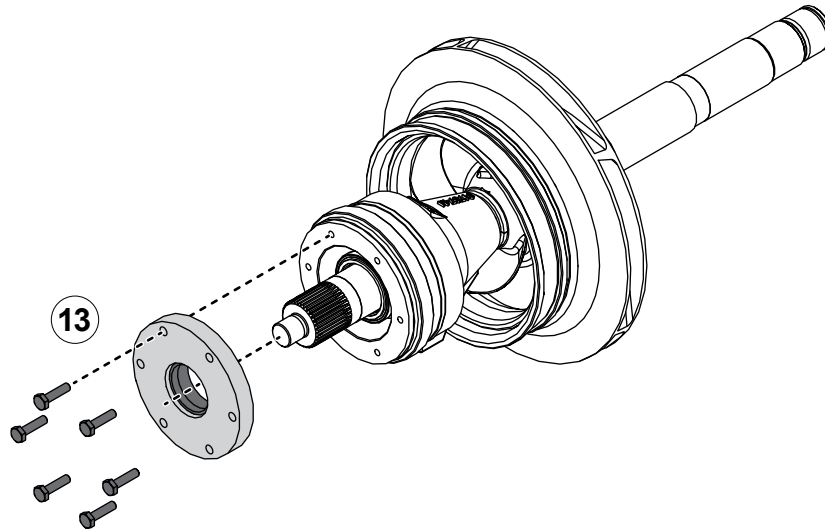
11 Use an arbor press to remove the impeller.

Note: Make sure to note the orientation of the impellers as you remove them for later in the assembly.

12 Remove the key.

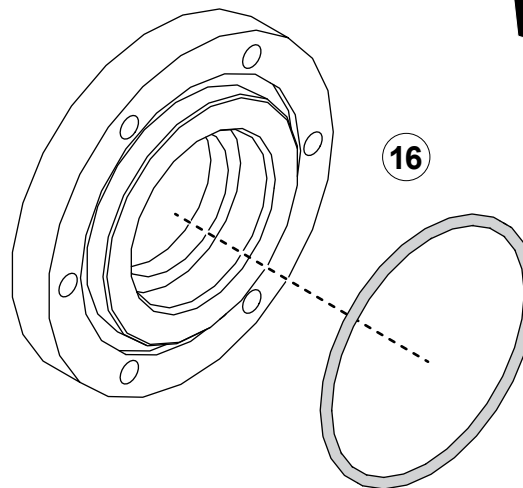
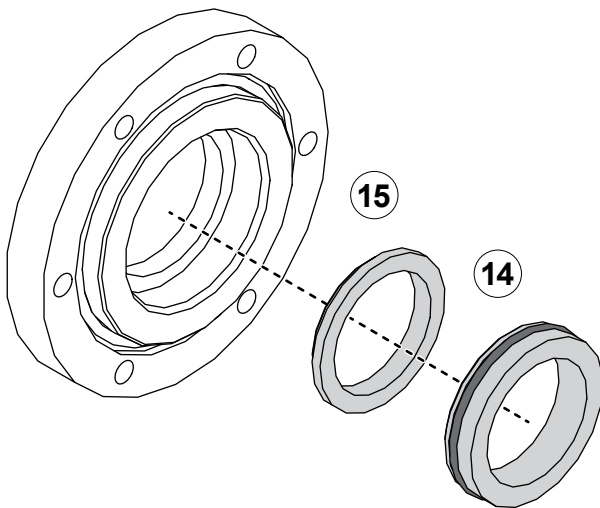


Disassembling the Impeller Shaft with Mechanical Seals

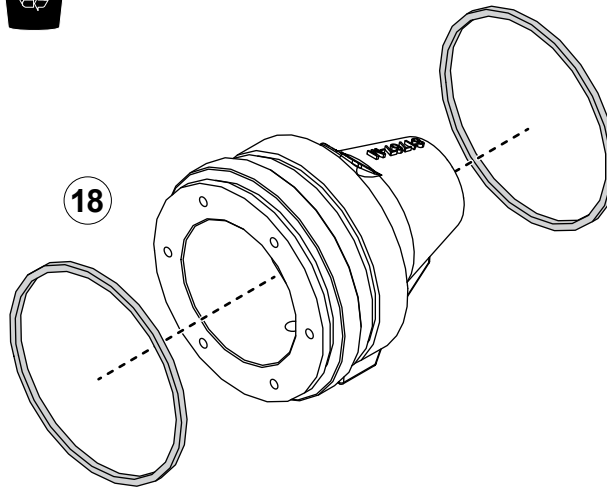
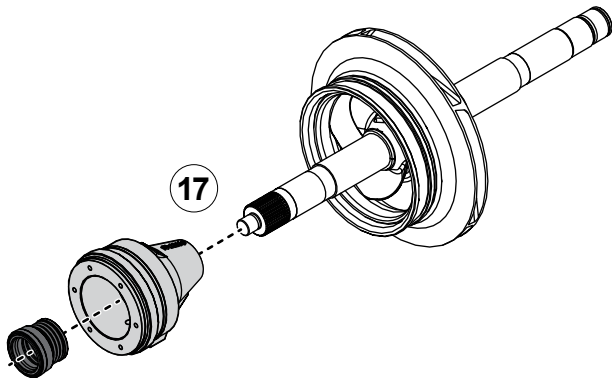


Use the illustrations and instructions to disassemble the impeller shaft.

- 13 Remove the seal housing hardware, then remove the seal housing cover.
- 14 Remove the stationary ring.
- 15 Remove the throttle bushing.
- 16 Remove and discard the O-ring.

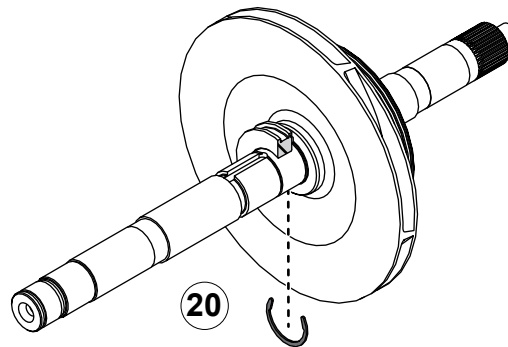
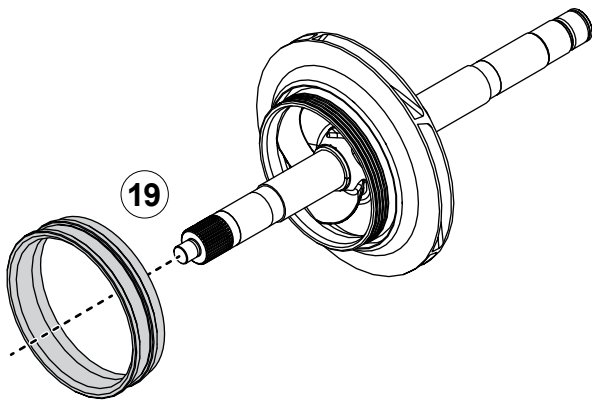


Disassembling the Impeller Shaft with Mechanical Seals

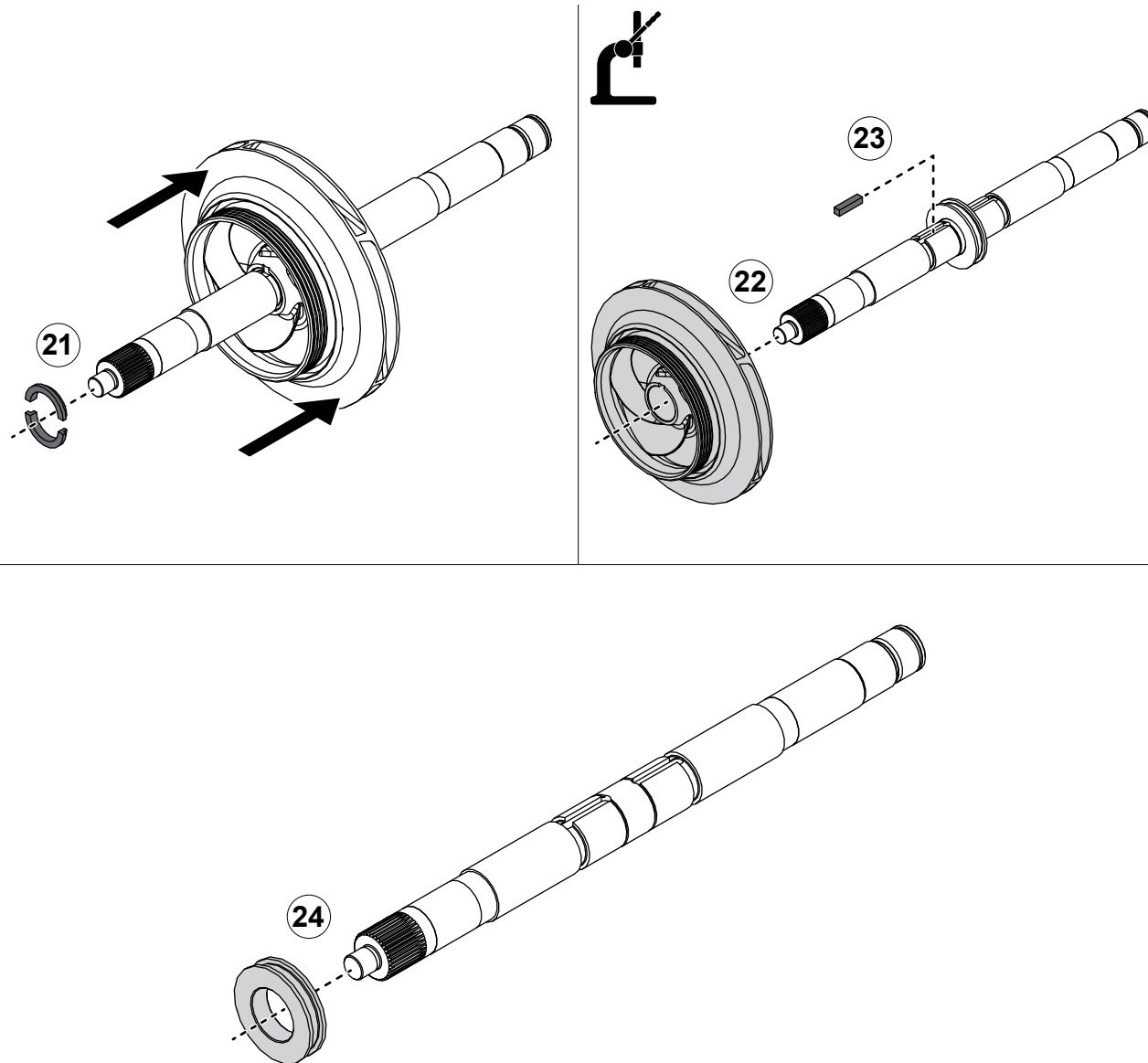


Use the illustrations and instructions to disassemble the impeller shaft.

- 17 Clean and lubricate the shaft, then pull on the seal housing to release the mechanical seal bellows. Remove the seal housing and mechanical seal.
- 18 Remove and discard the seal housing gaskets.
- 19 Remove the wear ring.
- 20 Remove the retaining ring.



Disassembling the Impeller Shaft with Mechanical Seals



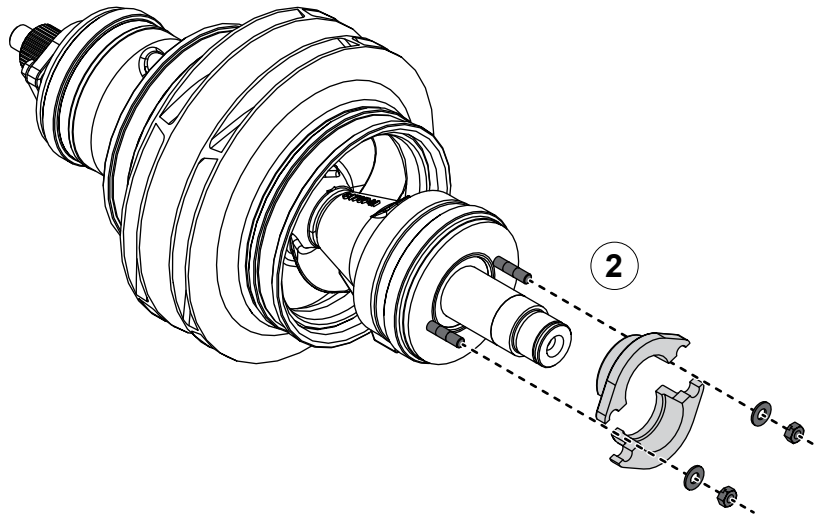
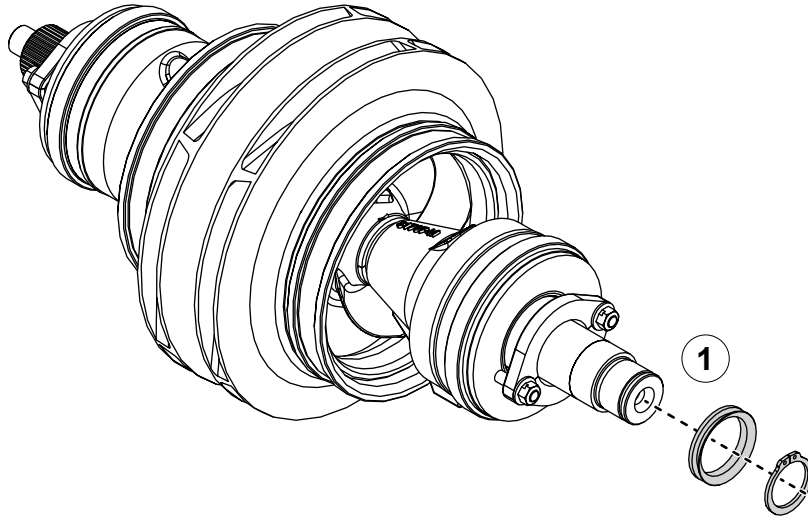
Use the illustrations and instructions to disassemble the impeller shaft.

- 21 Press the impeller toward the center of the shaft to remove the lock ring.
- 22 Use an arbor press to remove the impeller.
- 23 Remove the key.
- 24 Remove the interstage seal.

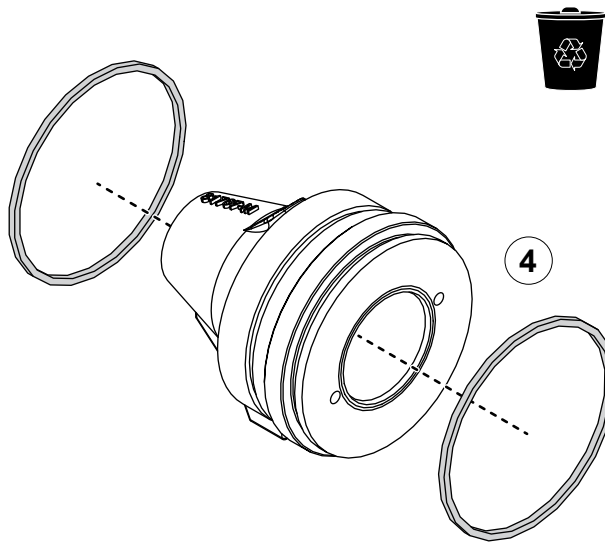
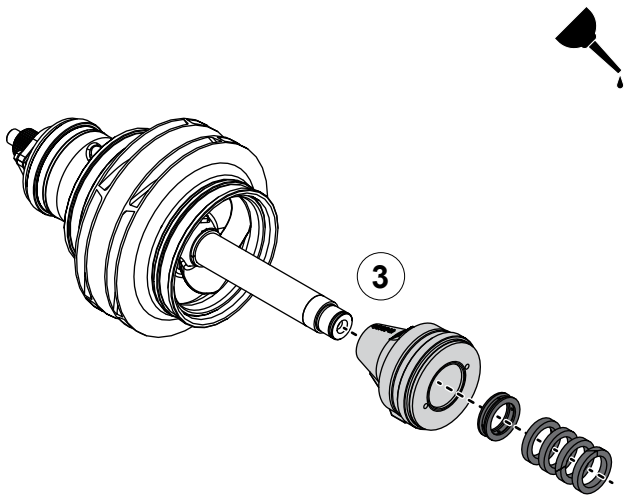
Disassembling the Impeller Shaft with Packing

Use the illustrations and instructions to disassemble the impeller shaft.

- 1 Remove the retaining ring and V-ring seal.
- 2 Remove the hardware and gland halves.



Disassembling the Impeller Shaft with Packing



Use the illustrations and instructions to disassemble the impeller shaft.

- 3 Clean and lubricate the shaft, then pull on the seal housing to release the packing. Remove the packing rings and lantern ring.

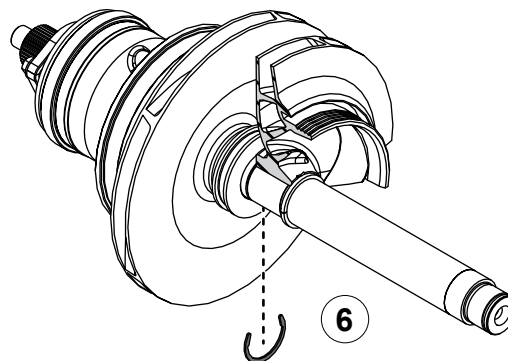
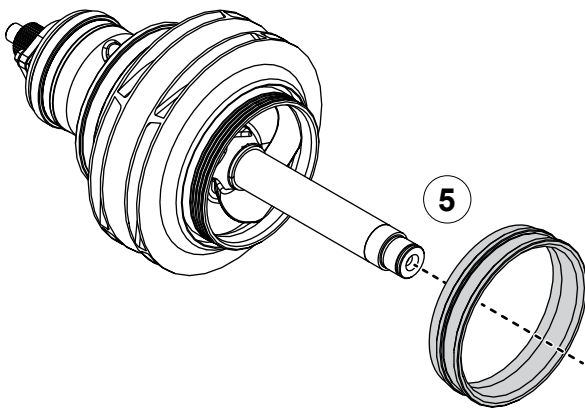
Note: An optional packing removal tool (5782) is available from Waterous.

- 4 Remove and discard the seal housing gaskets.

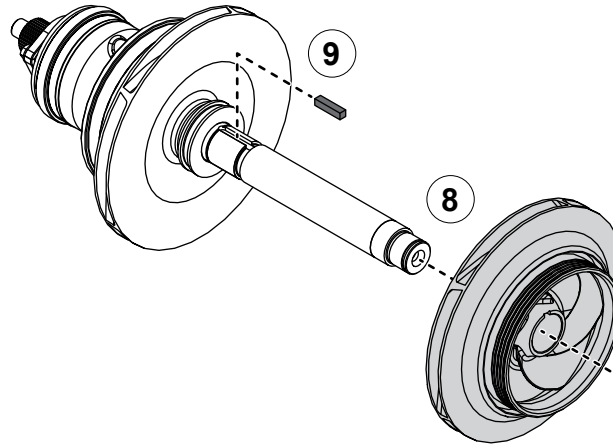
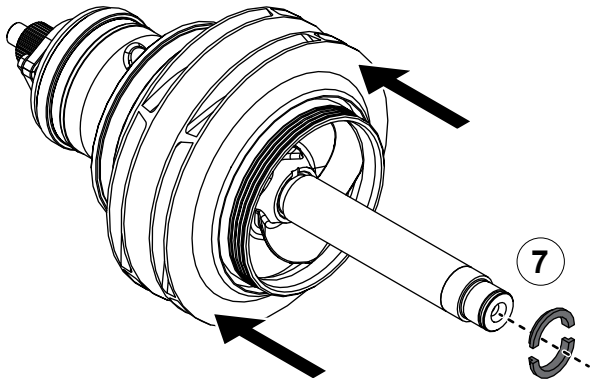
- 5 Remove the wear ring.

- 6 Remove the retaining ring.

Note: An optional retaining ring removal tool (62917) is available from Waterous.

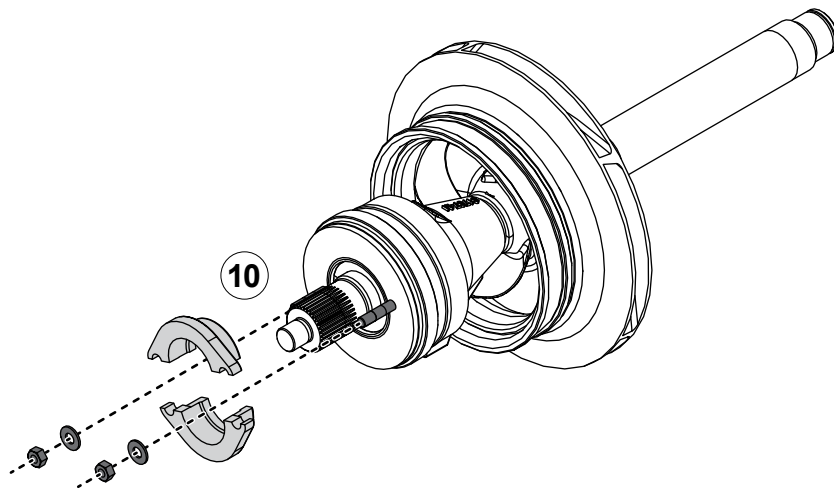


Disassembling the Impeller Shaft with Packing

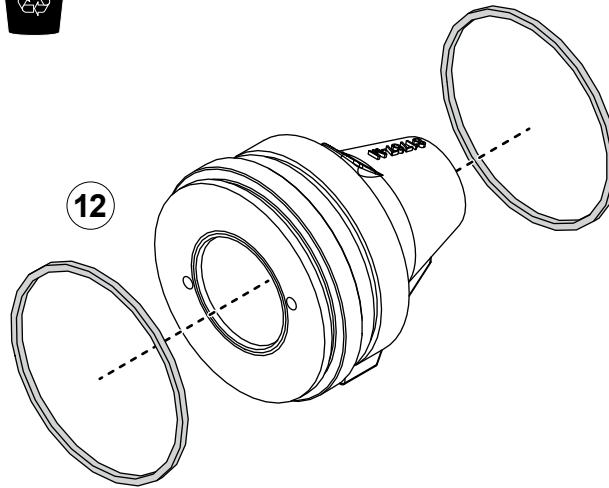
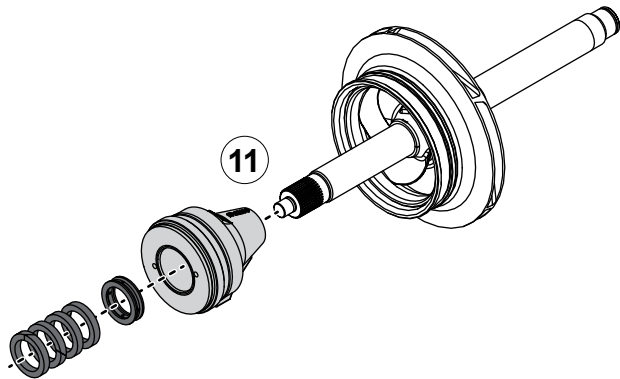


Use the illustrations and instructions to disassemble the impeller shaft.

- 7 Press the impeller toward the center of the shaft to remove the lock ring.
- 8 Use an arbor press to remove the impeller.
- 9 Remove the key.
- 10 Remove the hardware and gland halves.

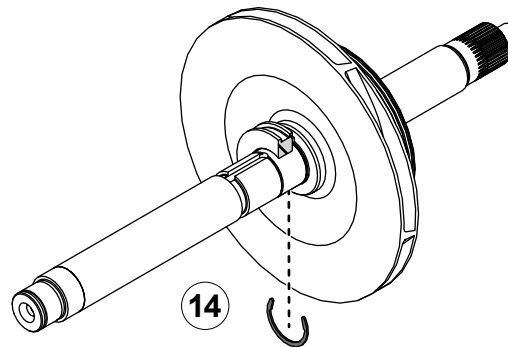
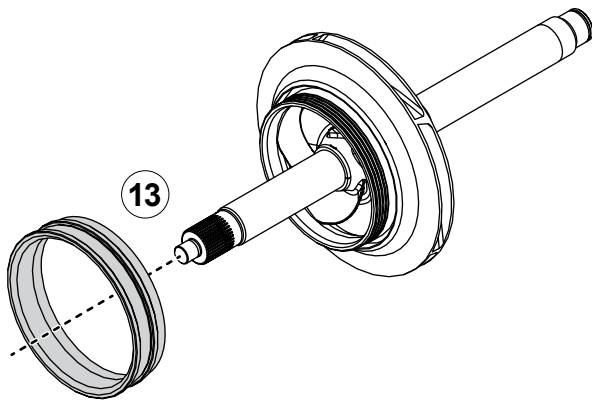


Disassembling the Impeller Shaft with Packing

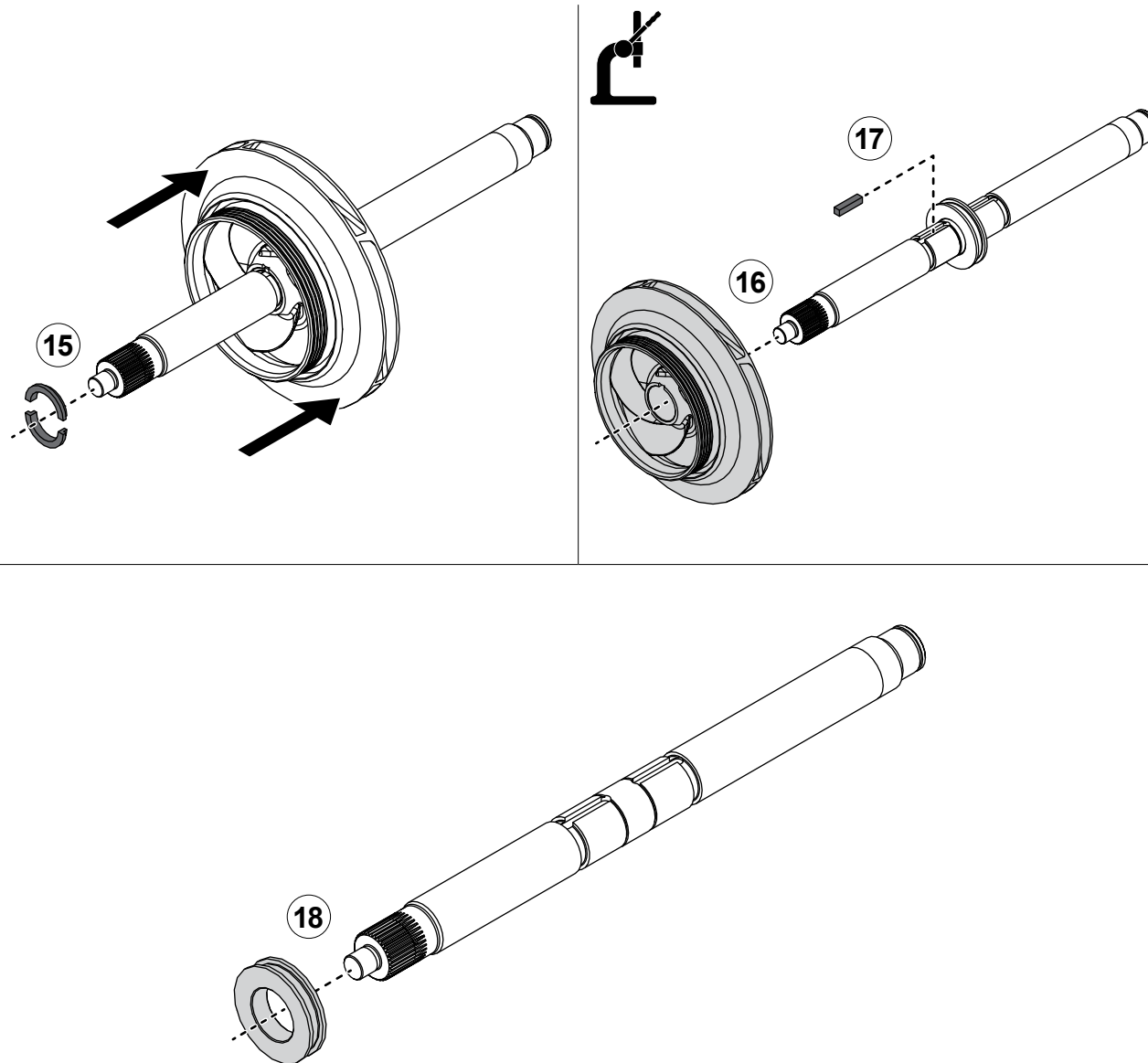


Use the illustrations and instructions to disassemble the impeller shaft.

- 11 Clean and lubricate the shaft, then pull on the seal housing to release the packing. Remove the packing rings and lantern ring.
- 12 Remove and discard the seal housing gaskets.
- 13 Remove the wear ring.
- 14 Remove the retaining ring.



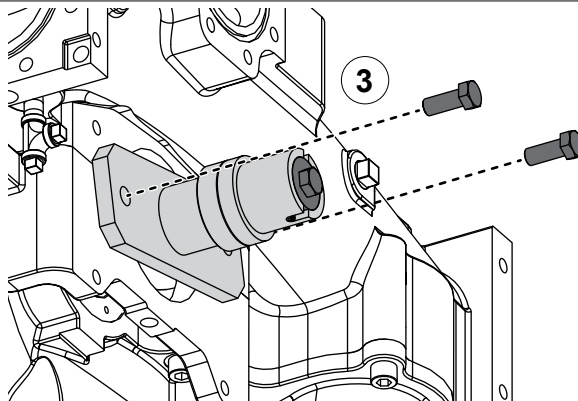
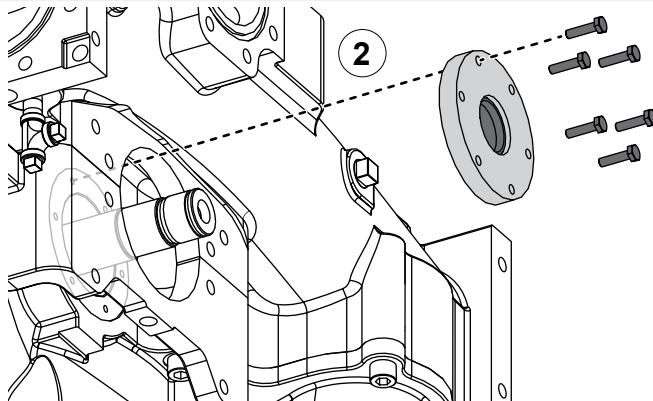
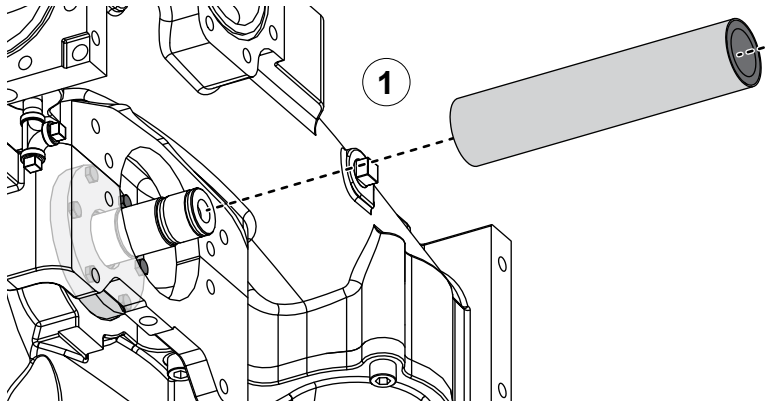
Disassembling the Impeller Shaft with Packing



Use the illustrations and instructions to disassemble the impeller shaft.

- 15 Press the impeller toward the center of the shaft to remove the lock ring.
- 16 Use an arbor press to remove the impeller.
- 17 Remove the key.
- 18 Remove the interstage seal.

Removing the Mechanical Seal

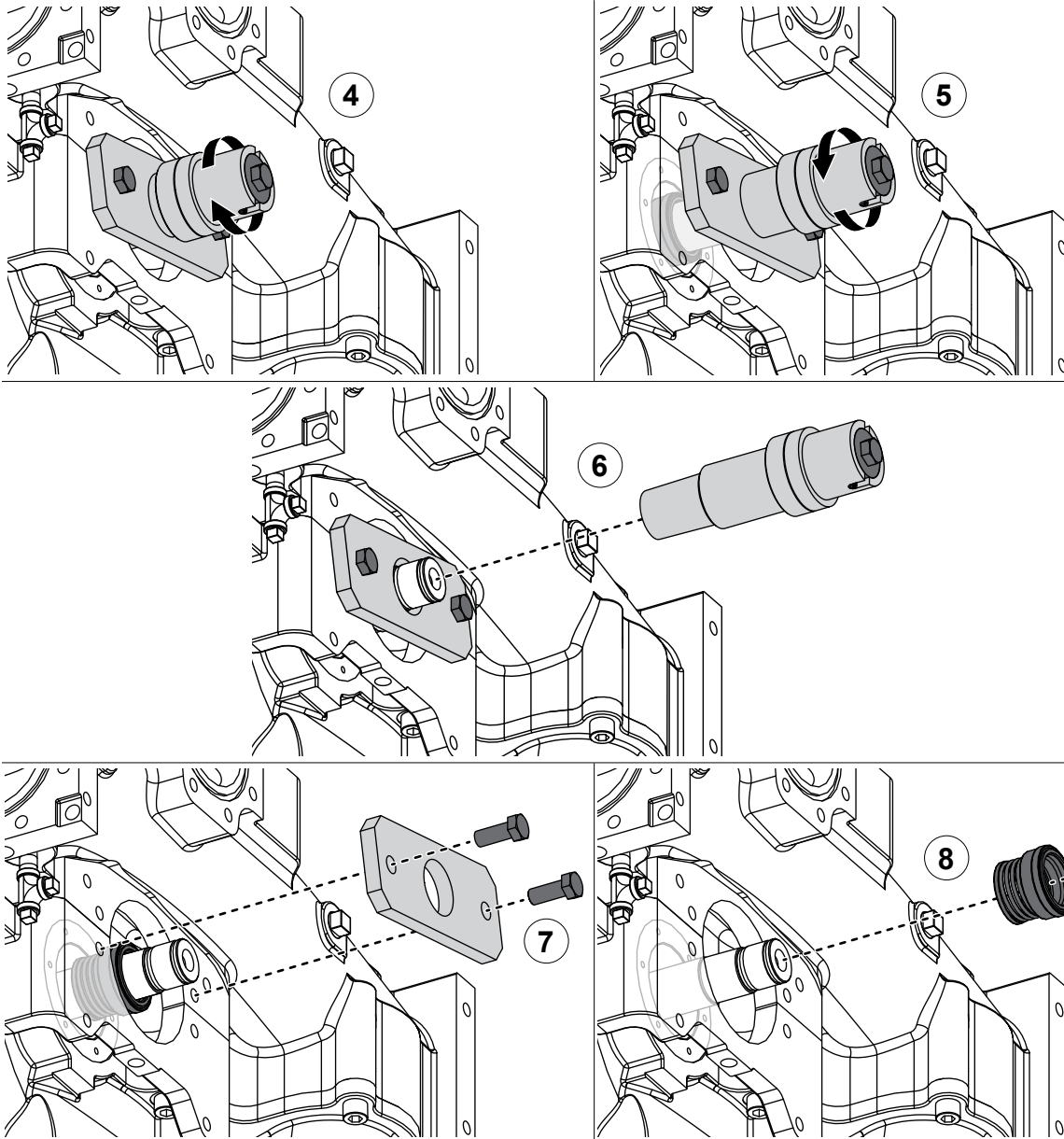


Use the illustrations and instructions to remove the mechanical seal without disassembling the pump. The tools being used are included in the Mechanical Seal Removal and Installation Kit (K 628).

Note: When a mechanical seal needs to be replaced, it is recommended to replace both seals at the same time. Always replace the outboard-side mechanical seal first.

- 1 Use the shaft brush to clean the impeller shaft.
- 2 Remove the seal housing hardware, then remove the seal housing cover. Clean the shaft again.
- 3 Install the mechanical seal removal tool onto the shaft, then insert the bearing housing screws into the mounting plate. Hand-tighten the screws until the mounting plate is flush with the pump body.

Removing the Mechanical Seal



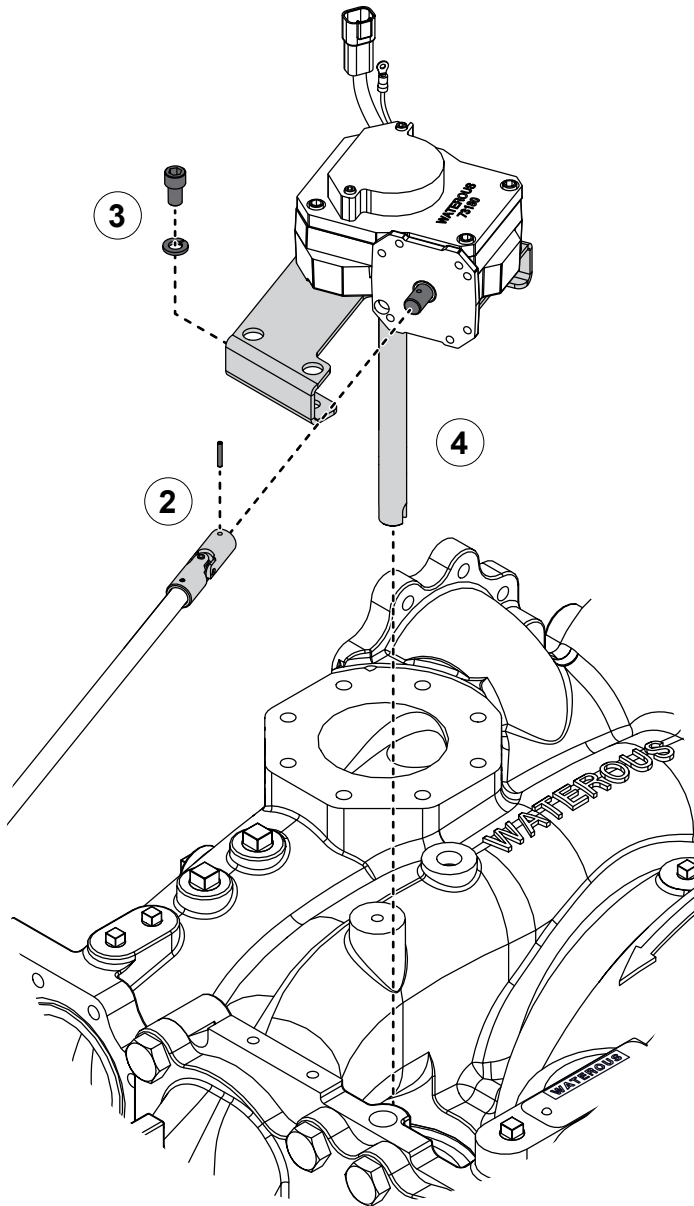
Use the illustrations and instructions to remove the mechanical seal without disassembling the pump. The tools being used are included in the Mechanical Seal Removal and Installation Kit (K 628).

- 4 Turn the body of the tool until it touches the mechanical seal, then tighten the drive plug until the spacer is a minimum of 1/2 inch from the mounting plate.

Note: Do not over-tighten the mechanical seal removal tool.

- 5 Loosen the drive plug to free the mechanical seal from the seal housing. The seal will attach to the tool.
- 6 Remove the tool. As you pull it away from the mounting plate, it will separate from the mechanical seal.
- 7 Remove the hardware and mounting plate.
- 8 Remove the mechanical seal.

Removing the Transfer Valve Actuator—Top-Mounted



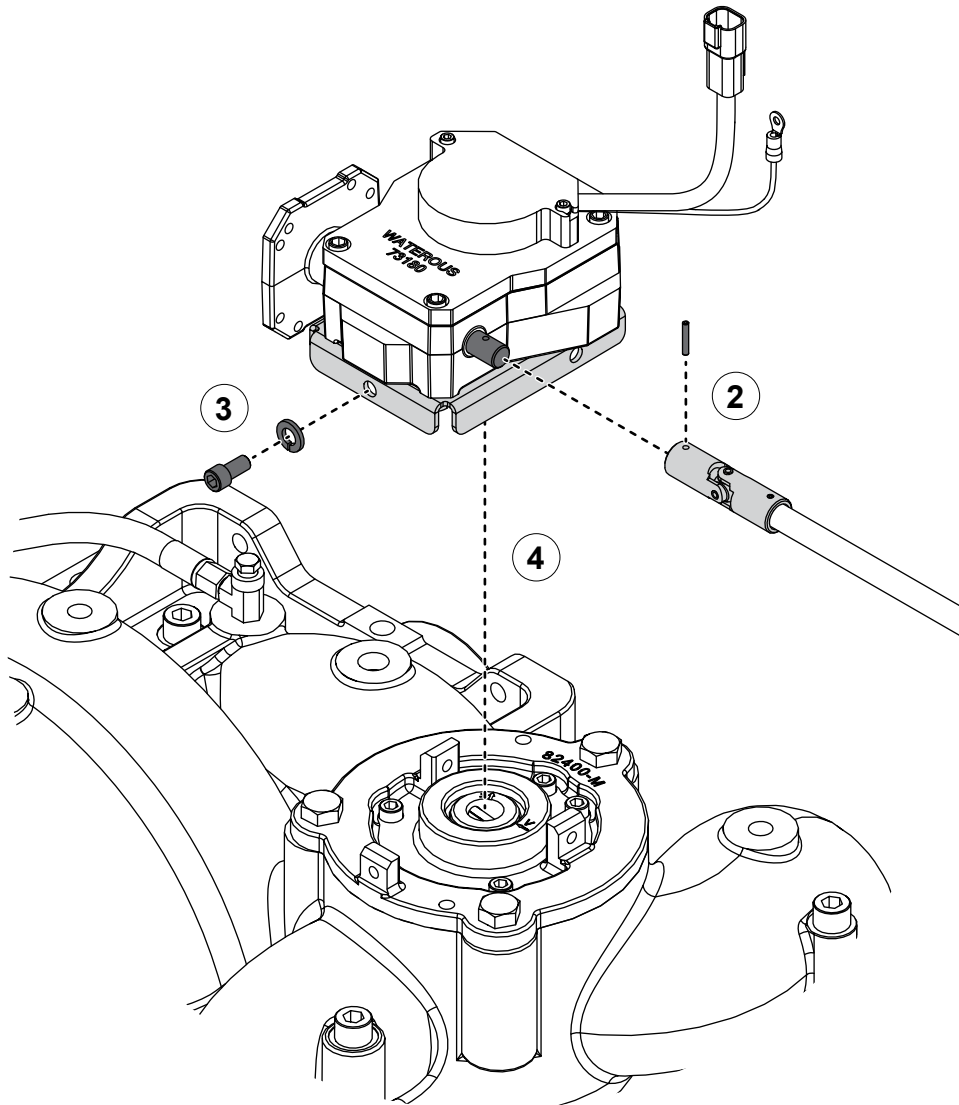
Use the illustration and instructions to remove the top-mounted transfer valve actuator—manual option shown.

- 1 If possible, move the valve into the volume position.
- 2 Remove the spiral pin connecting the actuator shaft to the U-joint.

Note: For the electric actuator, this step is only required if your application includes the optional manual override.

- 3 Remove the actuator mounting hardware.
- 4 Remove the actuator assembly from the pump. The extension shaft may come loose during removal.

Removing the Transfer Valve Actuator—Bottom-Mounted



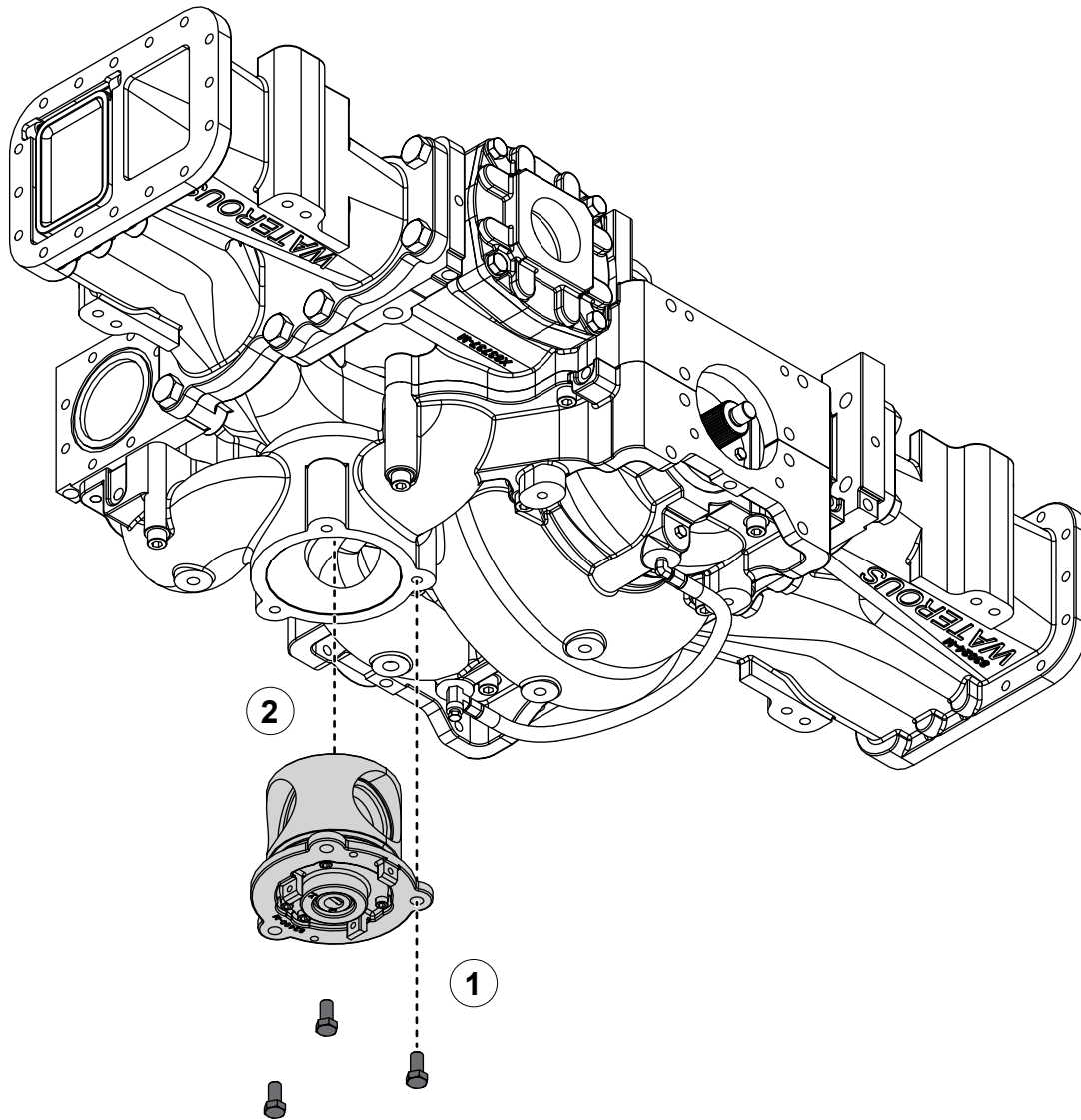
Use the illustration and instructions to remove the bottom-mounted transfer valve actuator—manual option shown.

- 1 If possible, move the valve into the volume position.
- 2 Remove the spirol pin connecting the actuator shaft to the U-joint.

Note: For the electric actuator, this step is only required if your application includes the optional manual override.

- 3 Remove the actuator mounting hardware.
- 4 Remove the actuator assembly from the pump. The extension shaft may come loose during removal.

Removing the Transfer Valve



Use the illustration and instructions to remove the transfer valve from the pump.

Note: The transfer valve should only be removed if it needs to be repaired or replaced.

- 1 Remove the hardware securing the valve cover to the pump.
- 2 Remove the valve assembly from the pump.

Note: If needed, there are 3/8-16 jacking screw holes to aid in separating the valve assembly from the pump.

Notes

Preparing to Assemble the Pump

- Read and understand the instructions before assembling the pump.
- Prepare a workspace suitable to accommodate and support the pump.
- 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

- Typical automotive mechanics hand tools.
- Suitable arbor press.
- Torque wrench capable of 200 ft-lb (271 N·m).
- Suitable support and lifting equipment.

Best Practices

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

Optional Equipment

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

Assembling the Pump Components

- Refer to the service parts list (SPL) for part identification.
- The SPL specific to your application is determined by the following:
 - The transmission drive method.
 - Whether the transmission drives a CAFS compressor.

Note: Documents specific to your application are available through the MyWaterous login at 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 pump.
- 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 Pump

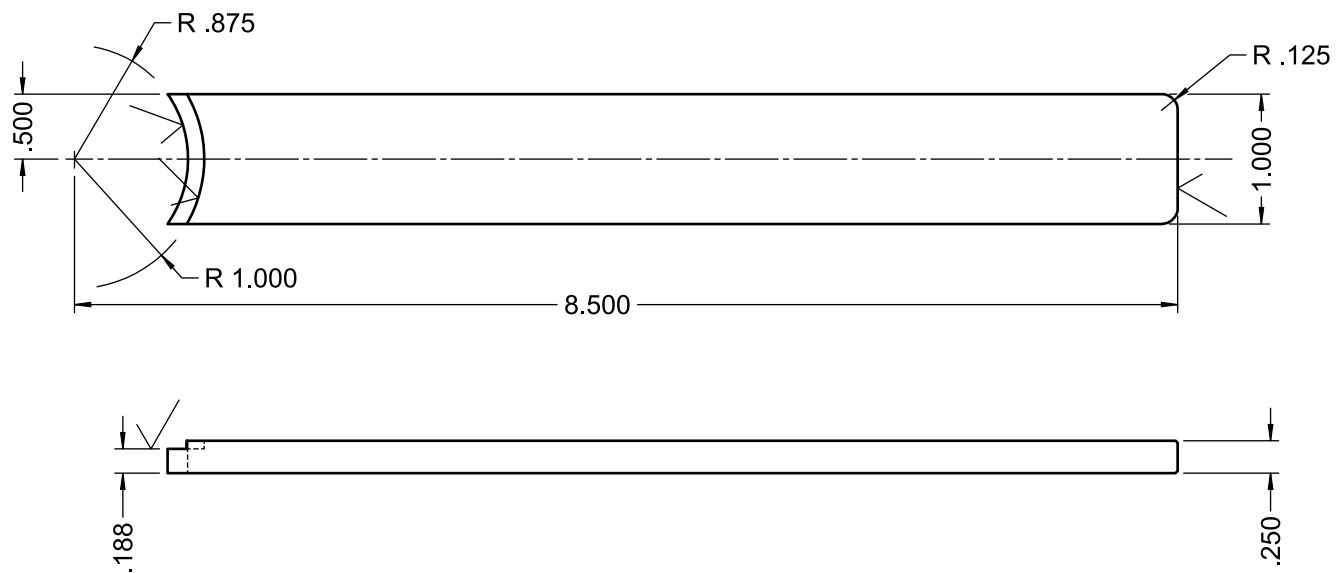
Use the information that you recorded when you removed the equipment to install it into the apparatus.

Understanding the Illustrations

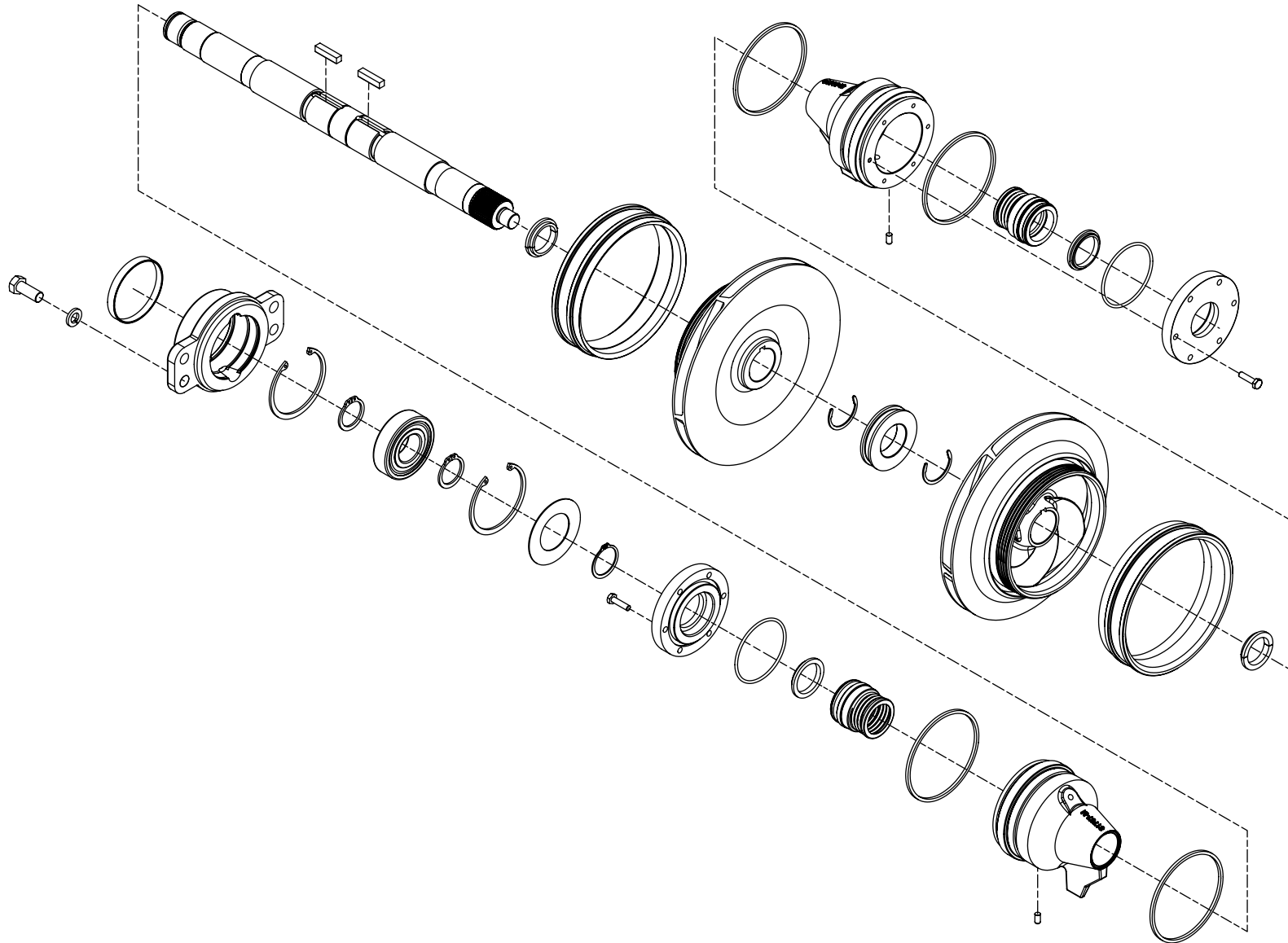
The assembly illustrations depict a typical application. Plugs, breathers, cooling hoses, and fittings are not illustrated, as they may be in a different location on your application. Refer to the SPL for your application to identify the various plug locations.

Retaining Ring Installation Tool

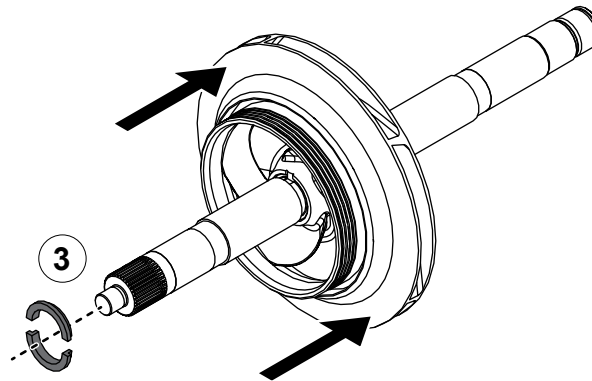
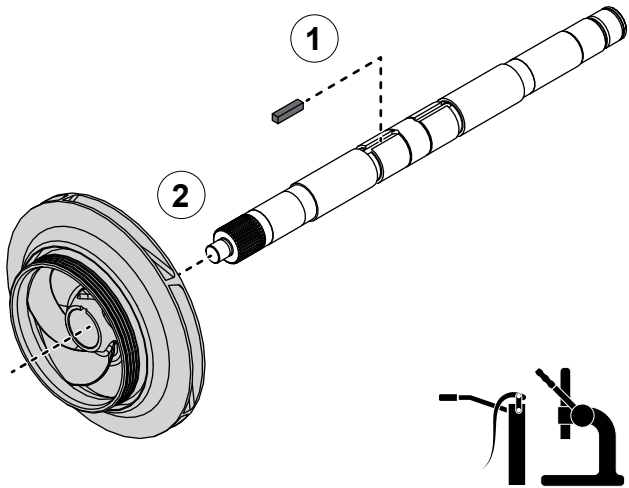
An optional retaining ring installation tool (62918) is available from Waterous to aid in installing the retaining rings—dimensions shown in inches.



Separable Impeller Shaft with Mechanical Seals



Assembling the Impeller Shaft



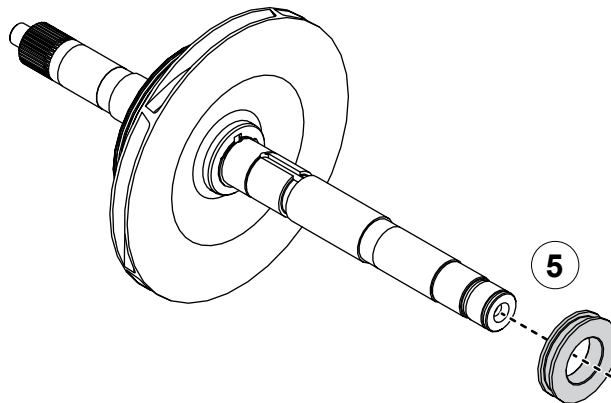
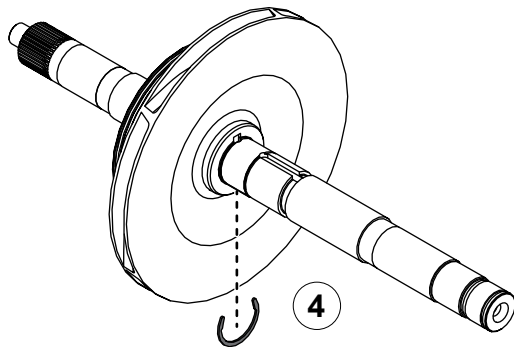
Installing the Impellers

Use the illustrations and instructions to install the impellers onto the impeller shaft.

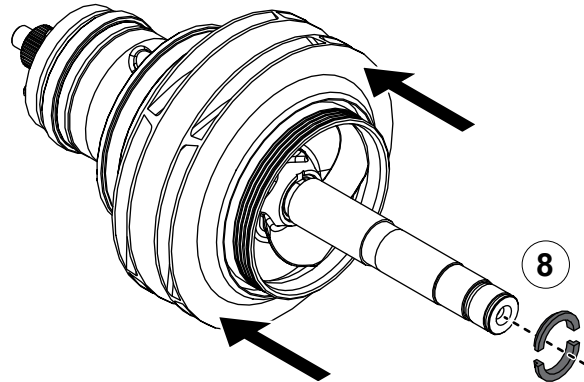
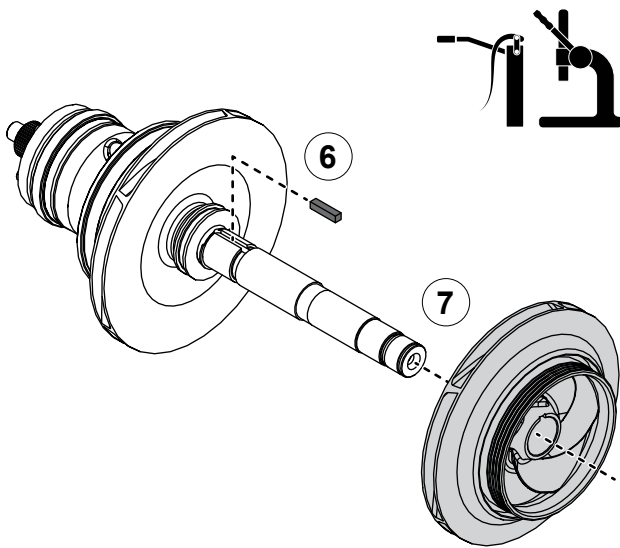
- 1 Insert the key into the key slot.
- 2 Apply grease to the shaft, then press the impeller onto the shaft.

Note: Make sure that the impeller orientation is correct before installation.

- 3 Press the impeller toward the center of the shaft to install the lock ring, then press the impeller back into its original position to secure the lock ring.
- 4 Install the retaining ring onto the shaft.
- 5 Install the interstage seal onto the shaft.



Assembling the Impeller Shaft



Installing the Impellers

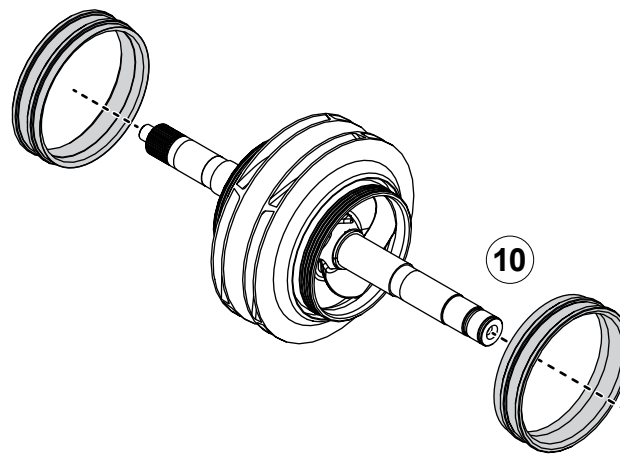
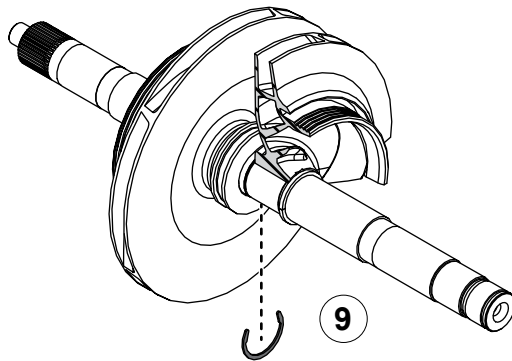
Use the illustrations and instructions to install the impellers onto the impeller shaft.

- 6 Insert the key into the key slot.
- 7 Apply grease to the shaft, then press the impeller onto the shaft.
- 8 Press the impeller toward the center of the shaft to install the lock ring, then press the impeller back into its original position to secure the lock ring.

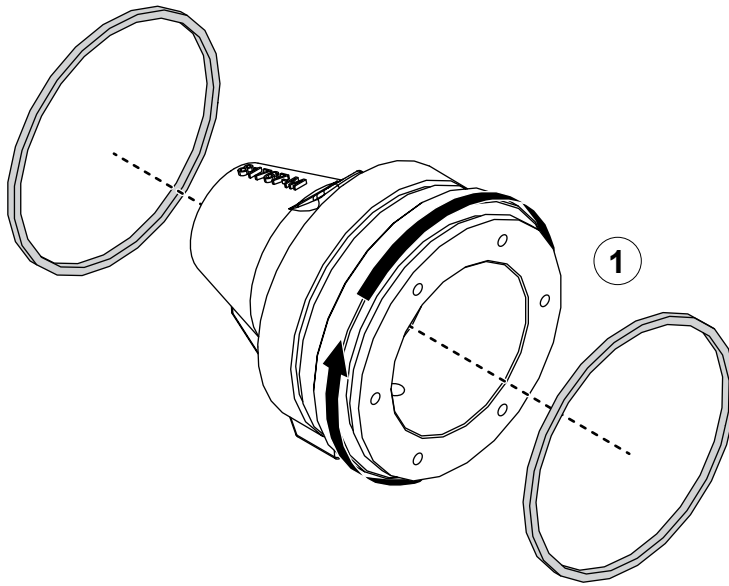
- 9 Install the retaining ring onto the shaft.

Note: An optional retaining ring installation tool (62918) is available from Waterous.

- 10 Install the wear rings onto the impellers.



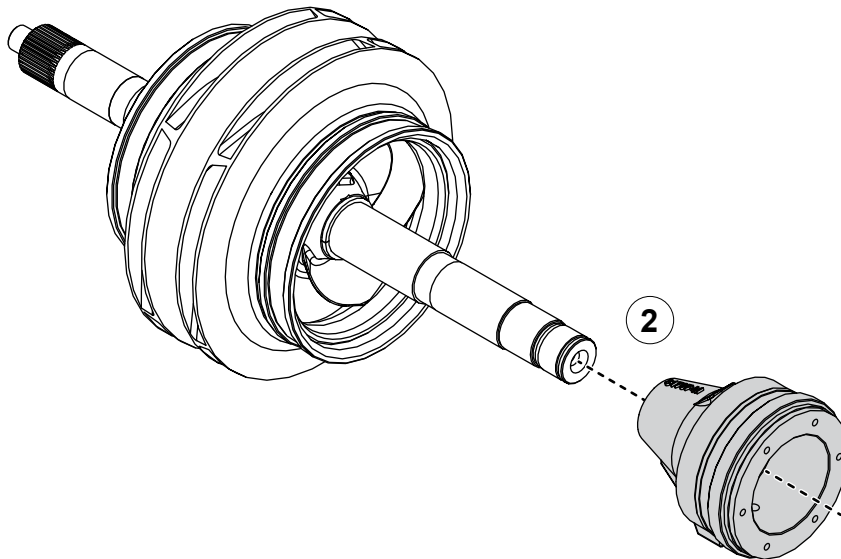
Assembling the Impeller Shaft



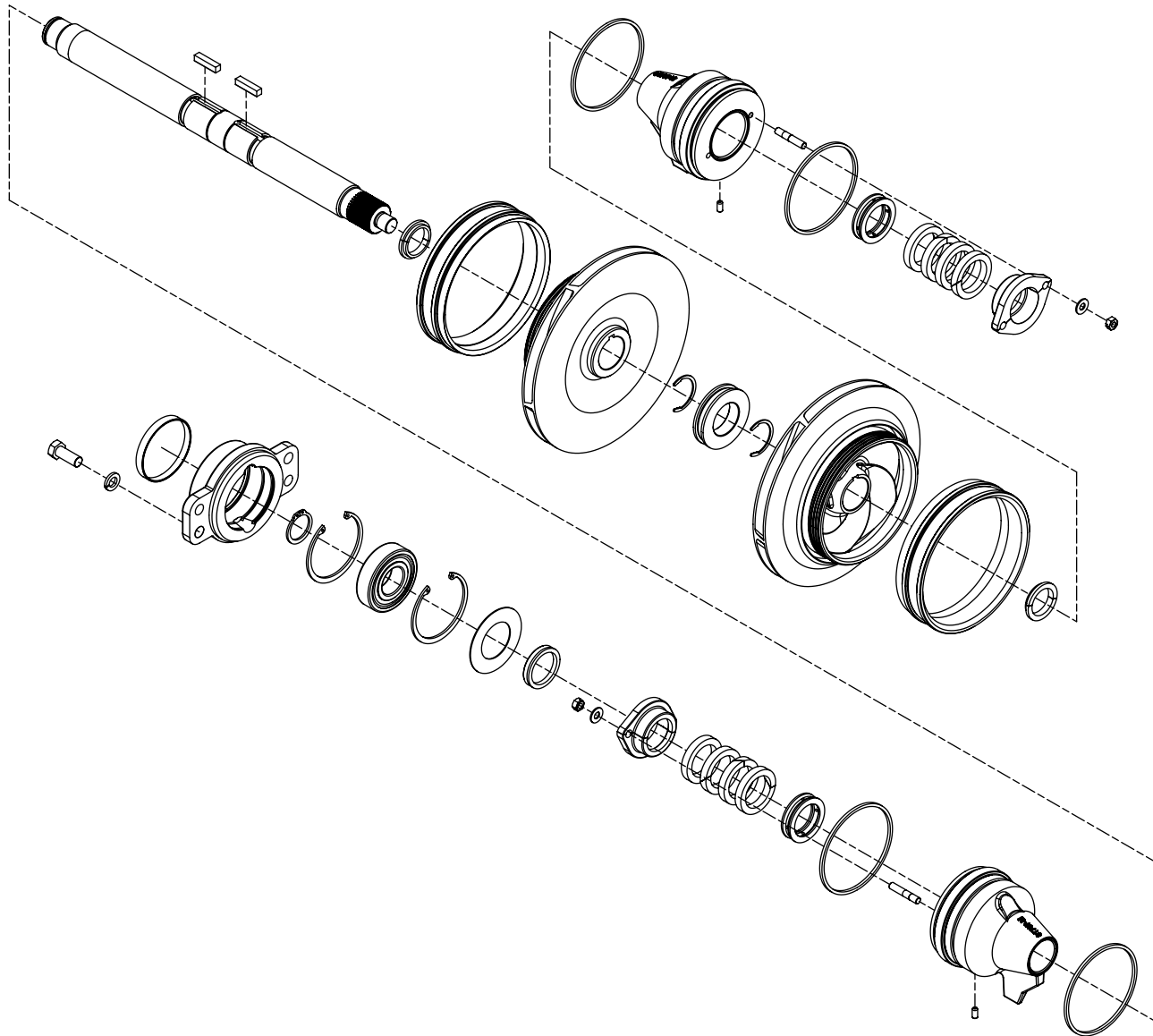
Installing the Seal Housings

Use the illustrations and instructions to install the seal housings onto the impeller shaft.

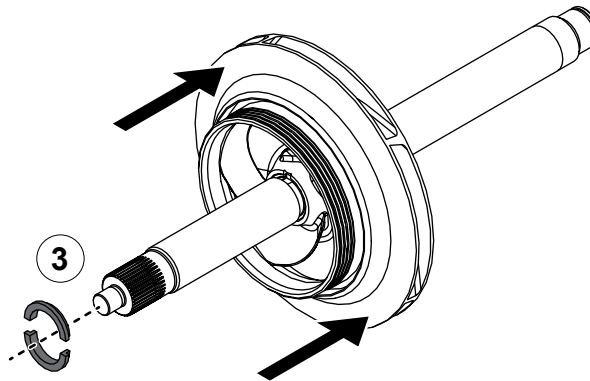
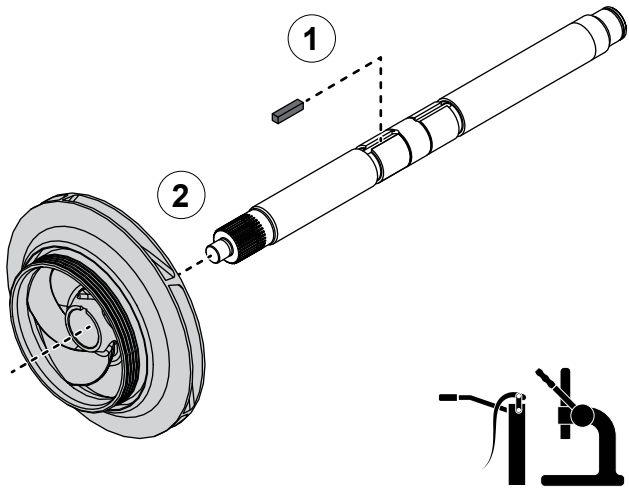
- 1 Apply lubricant to the gasket grooves, then install the gaskets around the outboard-side seal housing.
- 2 Slide the seal housing onto the shaft.
- 3 Repeat the process to install the transmission-side seal housing.



Separable Impeller Shaft with Packing



Assembling the Impeller Shaft



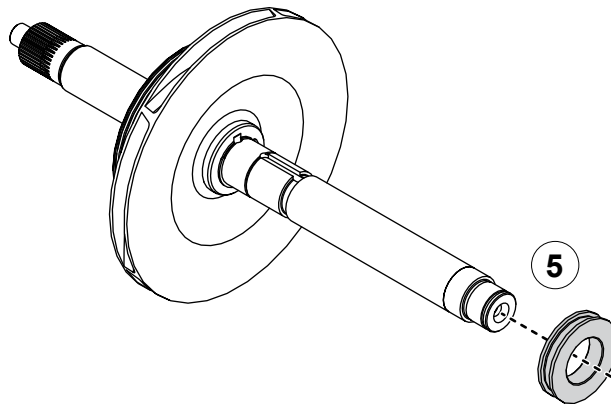
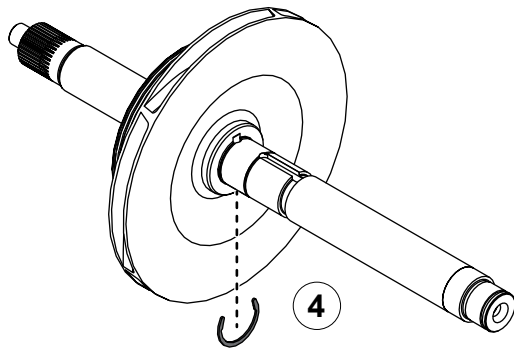
Installing the Impellers

Use the illustrations and instructions to install the impellers onto the impeller shaft.

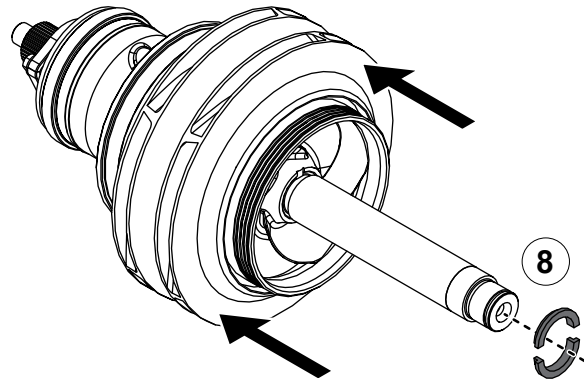
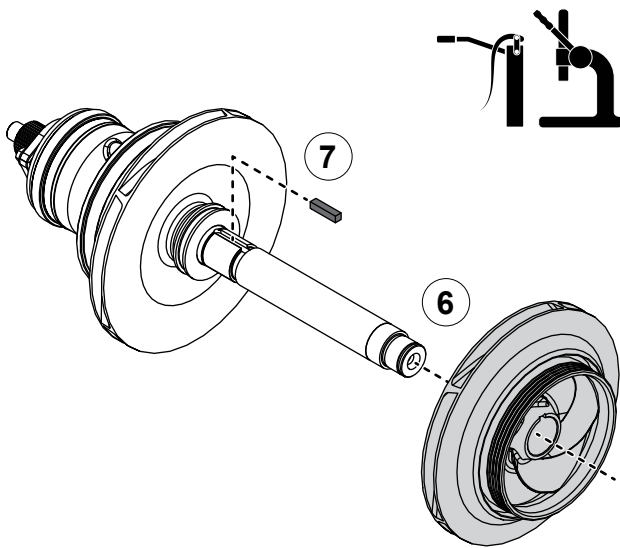
- 1 Insert the key into the key slot.
- 2 Apply grease to the shaft, then press the impeller onto the shaft.

Note: Make sure that the impeller orientation is correct before installation.

- 3 Press the impeller toward the center of the shaft to install the lock ring, then press the impeller back into its original position to secure the lock ring.
- 4 Install the retaining ring onto the shaft.
- 5 Install the interstage seal onto the shaft.



Assembling the Impeller Shaft



Installing the Impellers

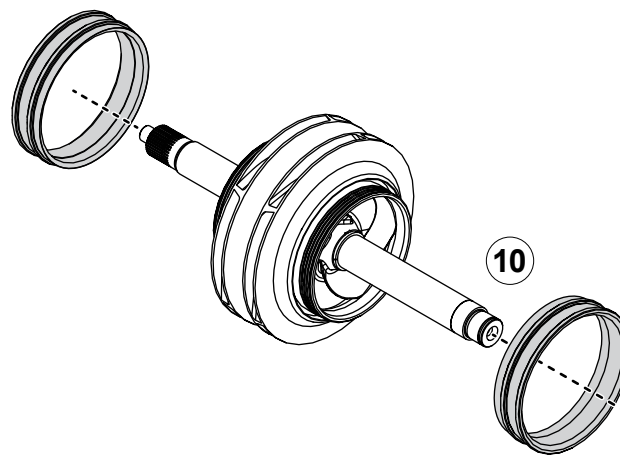
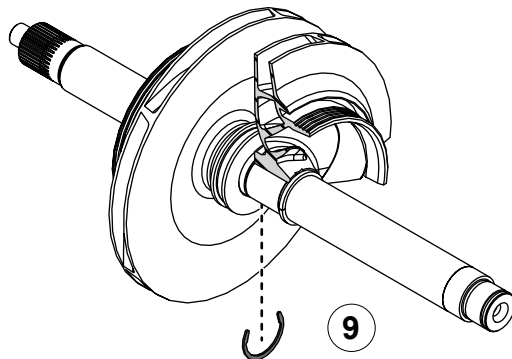
Use the illustrations and instructions to install the impellers onto the impeller shaft.

- 6 Insert the key into the key slot.
- 7 Apply grease to the shaft, then press the impeller onto the shaft.
- 8 Press the impeller toward the center of the shaft to install the lock ring, then press the impeller back into its original position to secure the lock ring.

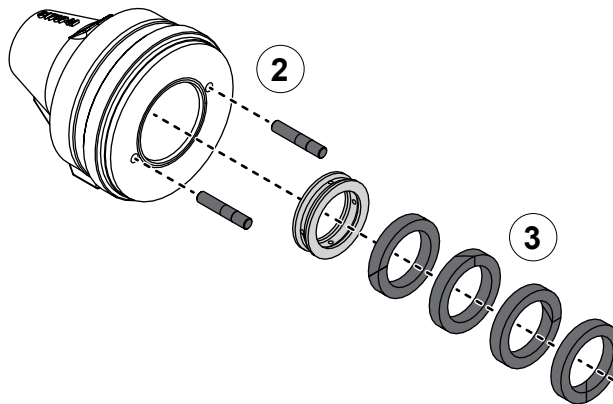
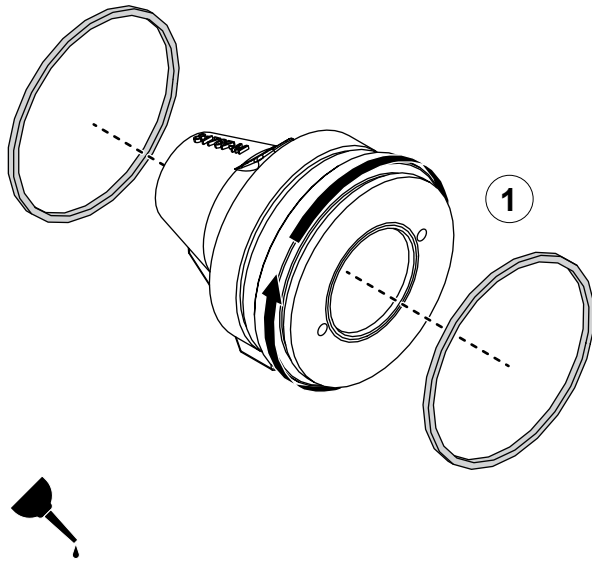
- 9 Install the retaining ring onto the shaft.

Note: An optional retaining ring installation tool (62918) is available from Waterous.

- 10 Install the wear rings onto the impellers.



Assembling the Impeller Shaft



Installing the Seal Housings

Use the illustrations and instructions to install the seal housings onto the impeller shaft.

1 Apply lubricant to the gasket grooves, then install the gaskets around the outboard-side seal housing.

2 Install the studs into the seal housing.

3 Install the lantern ring and packing rings into the seal housing.

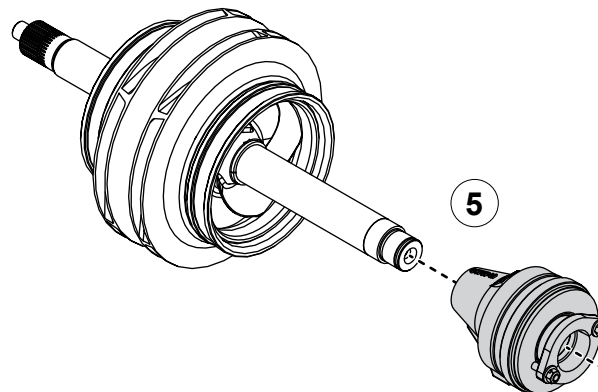
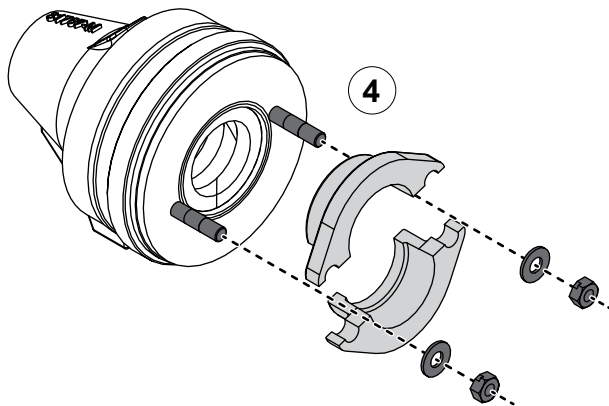
Refer to: **"Installing and Tightening the Packing" on page 50.**

4 Install the gland halves onto the packing housing studs, then secure them with the hardware that you removed earlier.

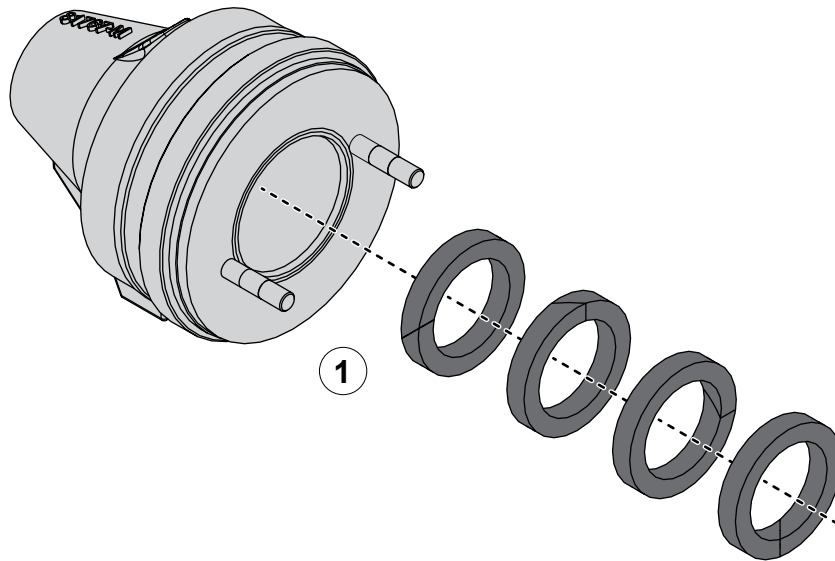
Refer to: **"Installing and Tightening the Packing" on page 50.**

5 Slide the seal housing onto the shaft.

6 Repeat the process to install the transmission-side seal housing.

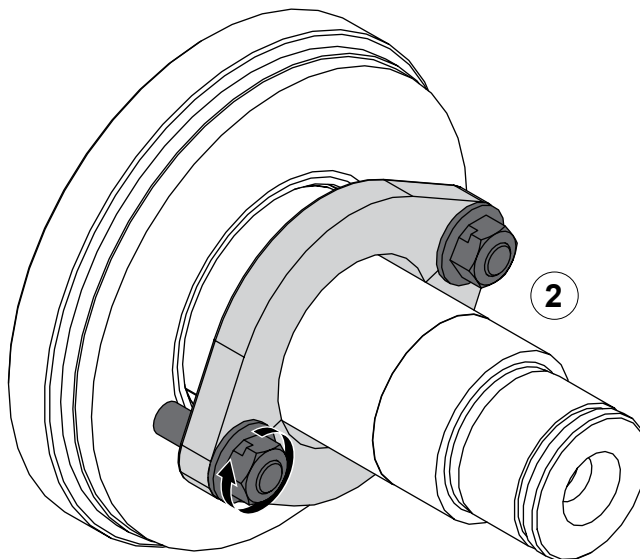


Installing and Tightening the Packing

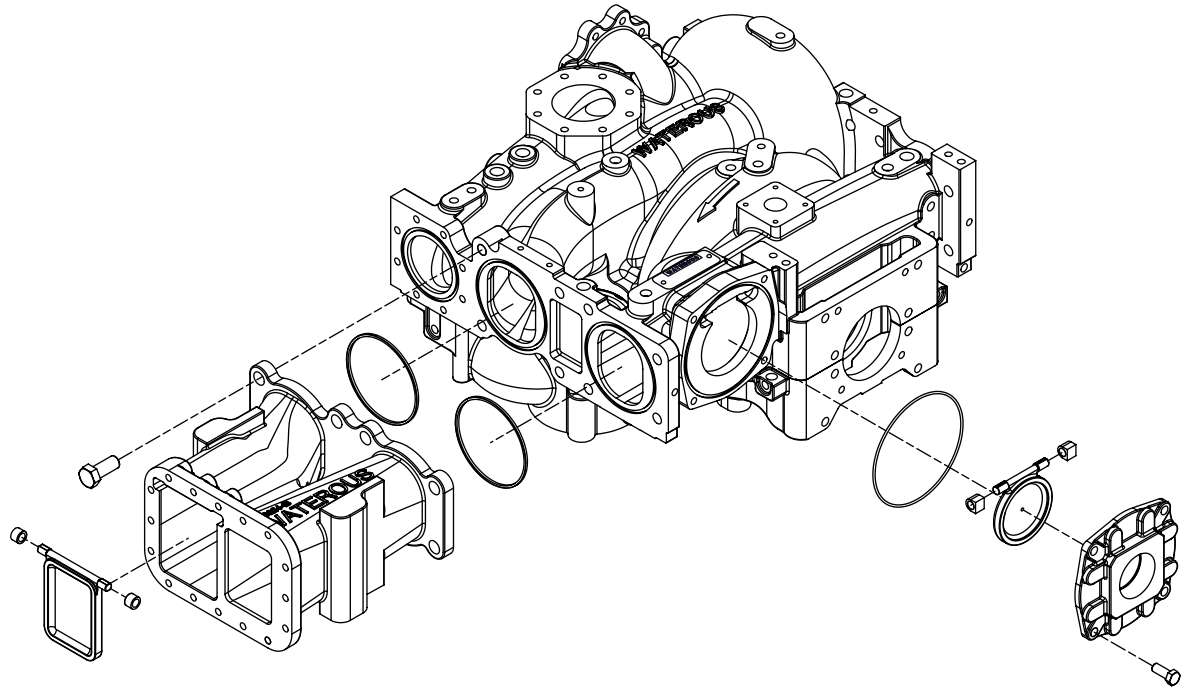
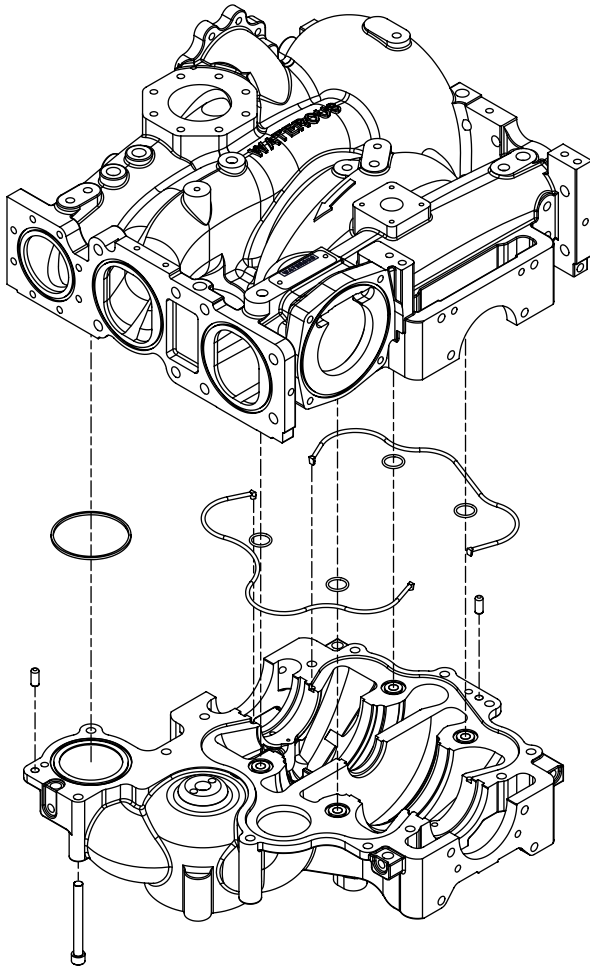


Use the illustrations and instructions to install and tighten the packing.

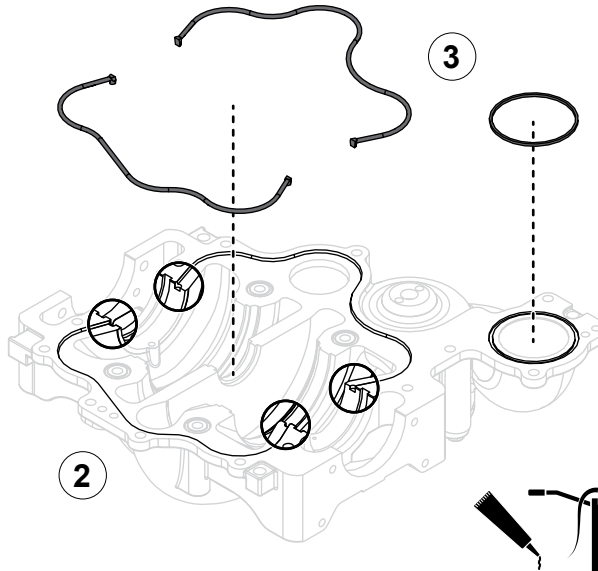
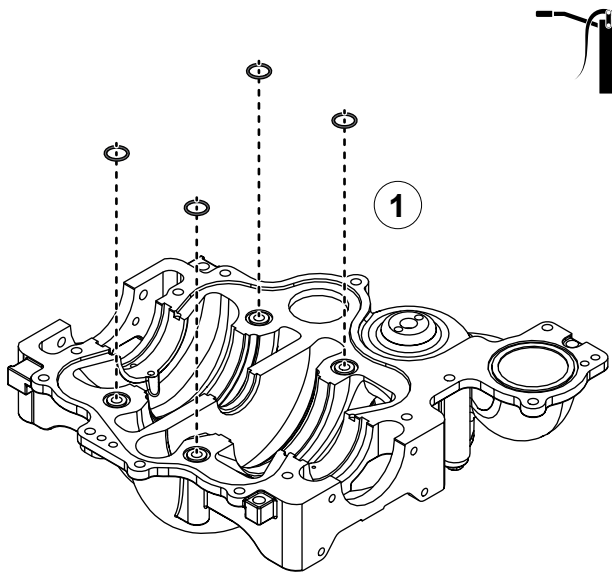
- 1 When installing the packing rings, stagger the joints so that they are 90° apart.
- 2 To properly set the gland, do the following:
 - Install the nuts onto the packing housing studs so that the milled slots are facing the gland.
 - Finger-tighten the nuts, alternating between them to make sure that the gland stays level.
 - Use a wrench to tighten the nuts one additional turn.



Pump Body Assembly



Installing the Impeller Shaft Assembly

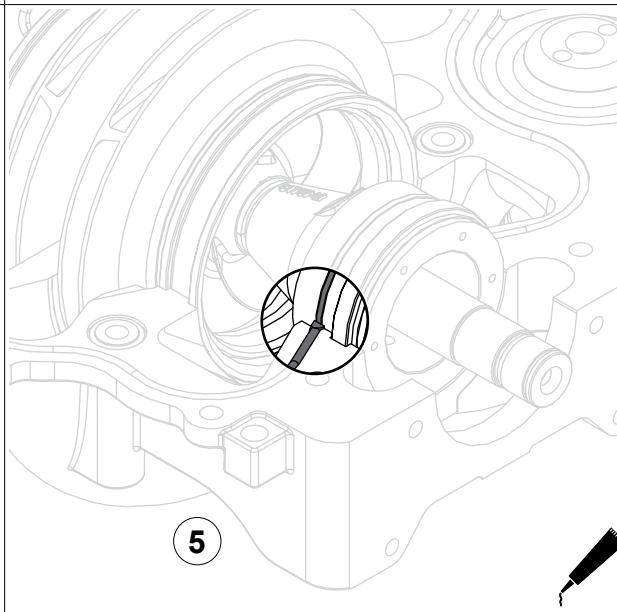
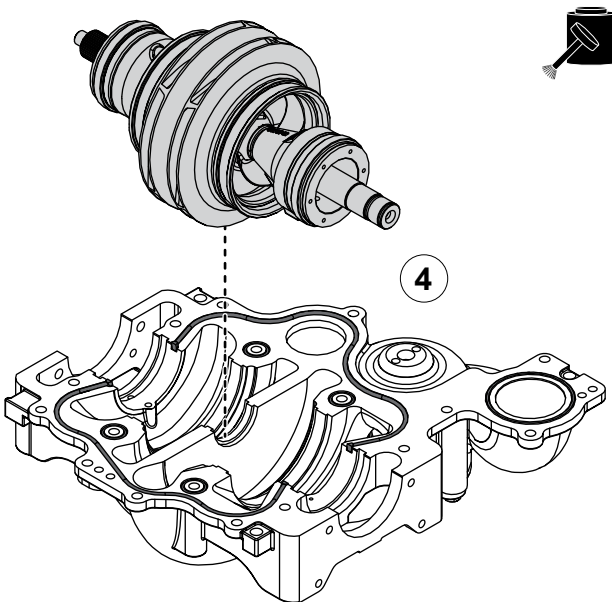


Use the illustrations and instructions to install the impeller shaft assembly into the volute cover.

Note: Make sure that the pump body and seal housing passageways are clean and free of debris before assembly.

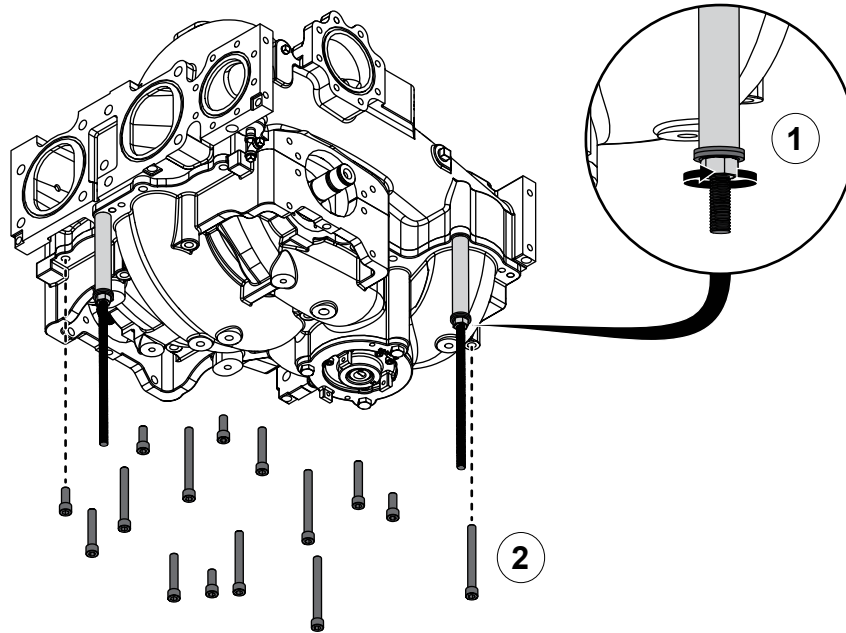
- 1 Apply grease to the O-ring grooves, then install the O-rings into the volute cover.
- 2 Apply grease to the gasket grooves, then add a small drop of silicone sealant at the cutout for each molded gasket plug.
- 3 Install the gaskets into the volute cover.
- 4 Apply anti-seize compound to the seal housings, then lower the impeller shaft assembly into the volute cover.

Note: Make sure that the seal housing dowel pins, wear rings, and interstage seal are fully seated in the volute cover.



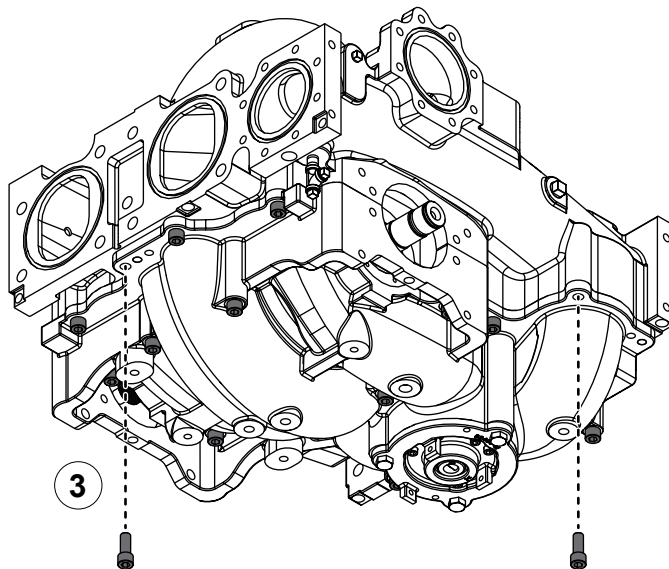
- 5 Add a small drop of silicone sealant at each point where the molded gaskets meet the seal housing gaskets.

Installing the Volute Cover



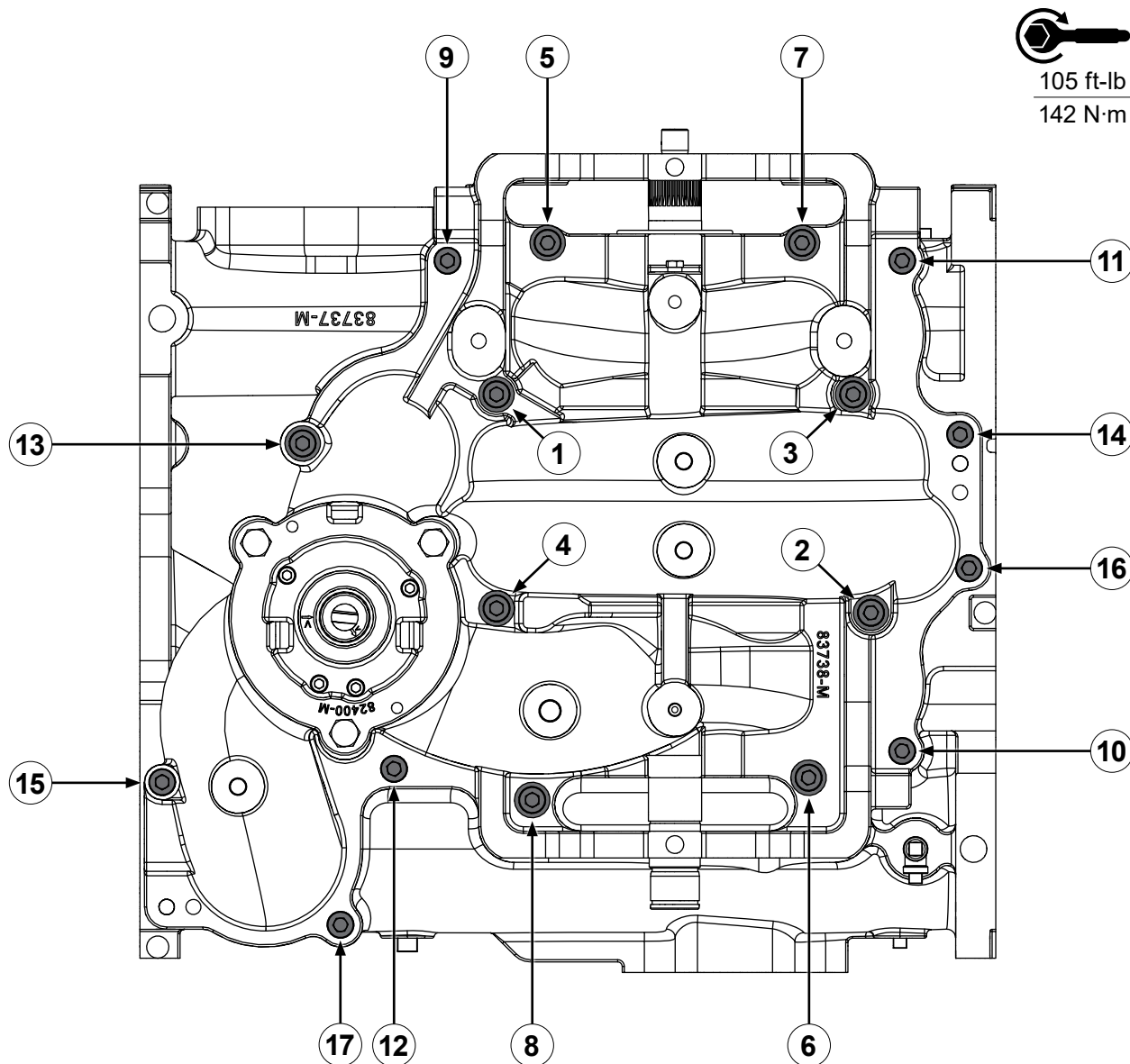
Use the illustrations and instructions to install the volute cover.

- 1 Tighten the nuts on the rods, alternating between them to gradually raise the volute cover.
- 2 Install the volute cover hardware.
- 3 Remove the threaded rods, then install the remaining volute cover hardware.



105 ft-lb
142 N·m

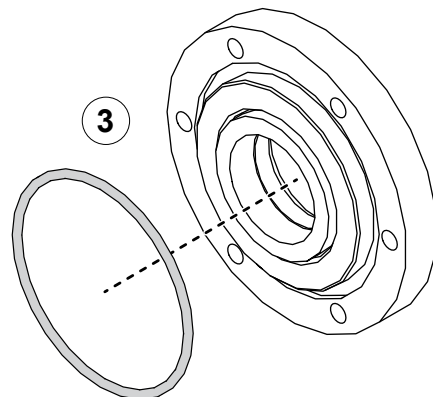
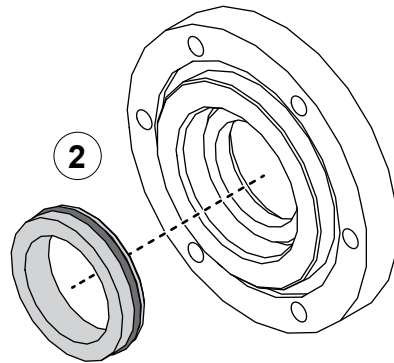
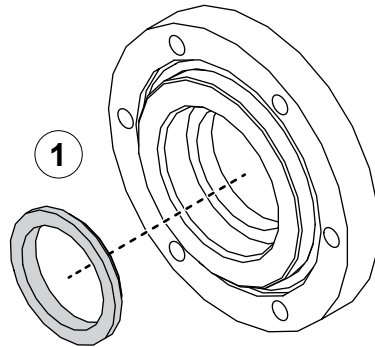
Tightening the Volute Cover Hardware



105 ft-lb
142 N·m

Use the illustration and callouts to tighten the volute cover hardware in the proper order.

Assembling the Seal Housing Covers



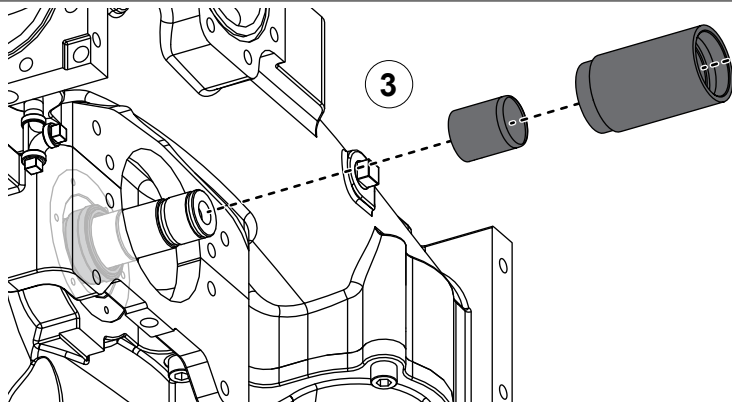
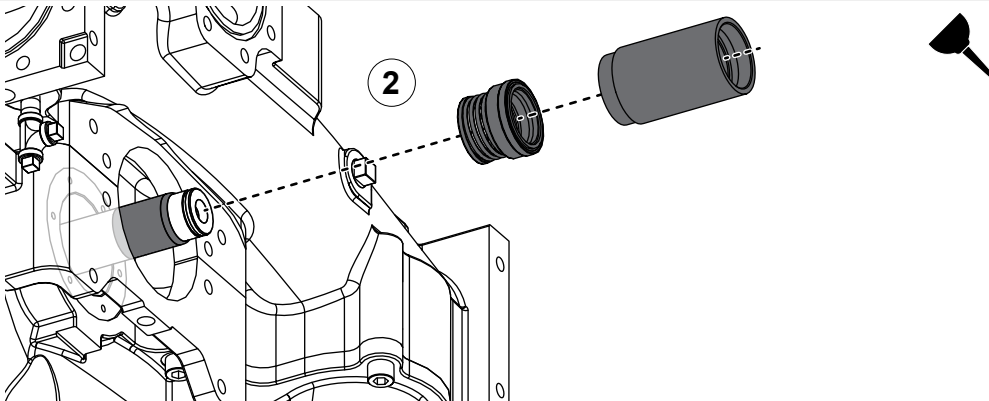
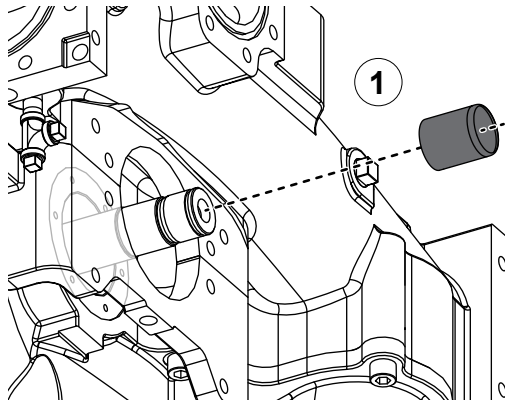
Use the illustrations and instructions to assemble the seal housing covers.

- 1 Install the throttle bushing into the cover.
- 2 Apply lubricant to the O-ring, then install the stationary ring into the cover so that the chamfered edge sits against the throttle bushing.

Note: Make sure that the sealing surface of the stationary ring is clean.

- 3 Apply lubricant to the O-ring, then install the O-ring into the cover.

Installing the Mechanical Seals



Use the illustrations and instructions to install the mechanical seals. The tools being used are included in the Mechanical Seal Removal and Installation Kit (K 628).

Note: Always replace the outboard-side mechanical seal first.

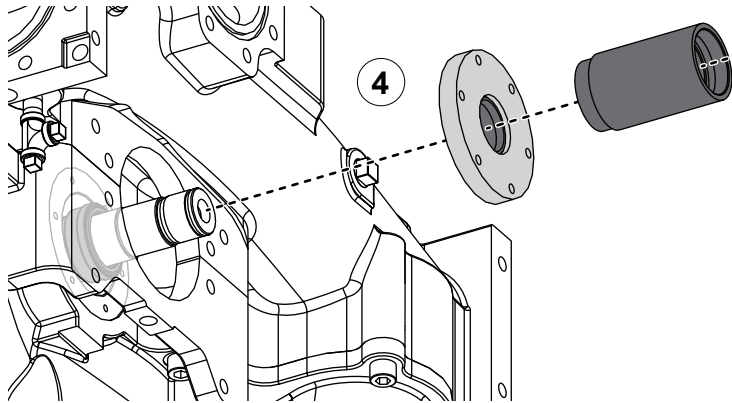
- 1 Install the installation sleeve onto the impeller shaft, then apply lubricant to the sleeve and shaft.
- 2 Apply lubricant to the mechanical seal bellows, then use the installation tool to gently press the bellows onto the shaft until the spring is fully compressed.

Note: Make sure that the sealing surface of the mechanical seal is clean.

- 3 Remove the installation tool and installation sleeve. Allow the spring to expand.

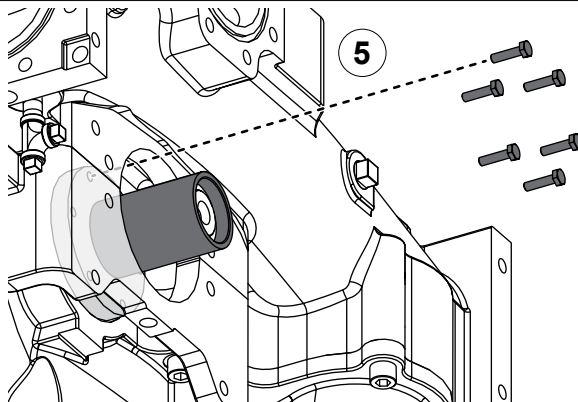
Note: If the spring does not expand to push the bellows out of the seal housing, remove the mechanical seal, apply more lubricant, and reinstall the seal.

Installing the Mechanical Seals

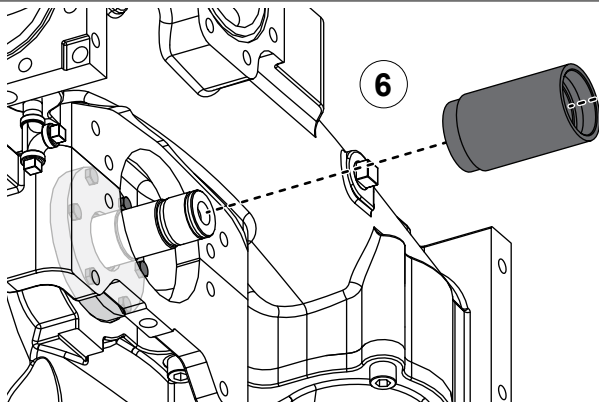


Use the illustrations and instructions to install the mechanical seals. The tools being used are included in the Mechanical Seal Removal and Installation Kit (K 628).

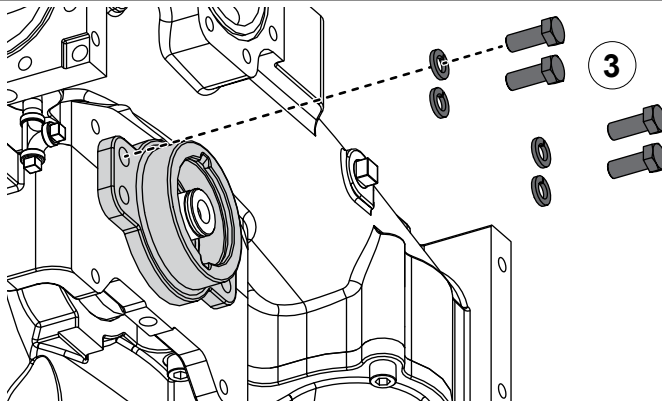
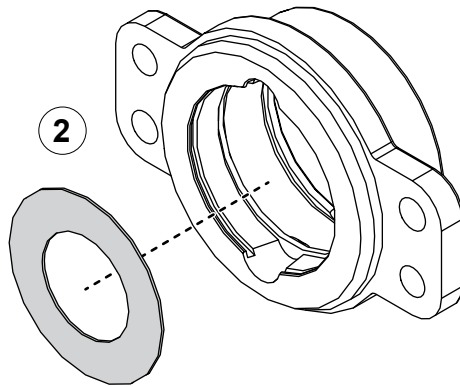
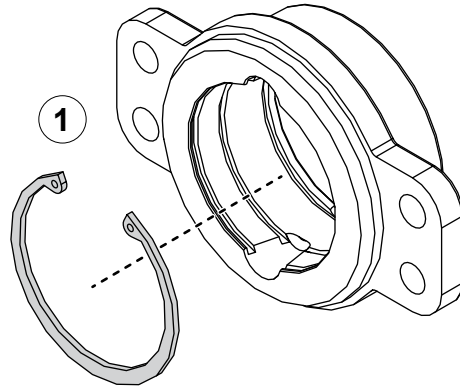
- 4 Use the installation tool to gently press the seal housing cover onto the shaft.
- 5 Install the seal housing hardware.
- 6 Remove the installation tool.



12 ft-lb
16 N·m



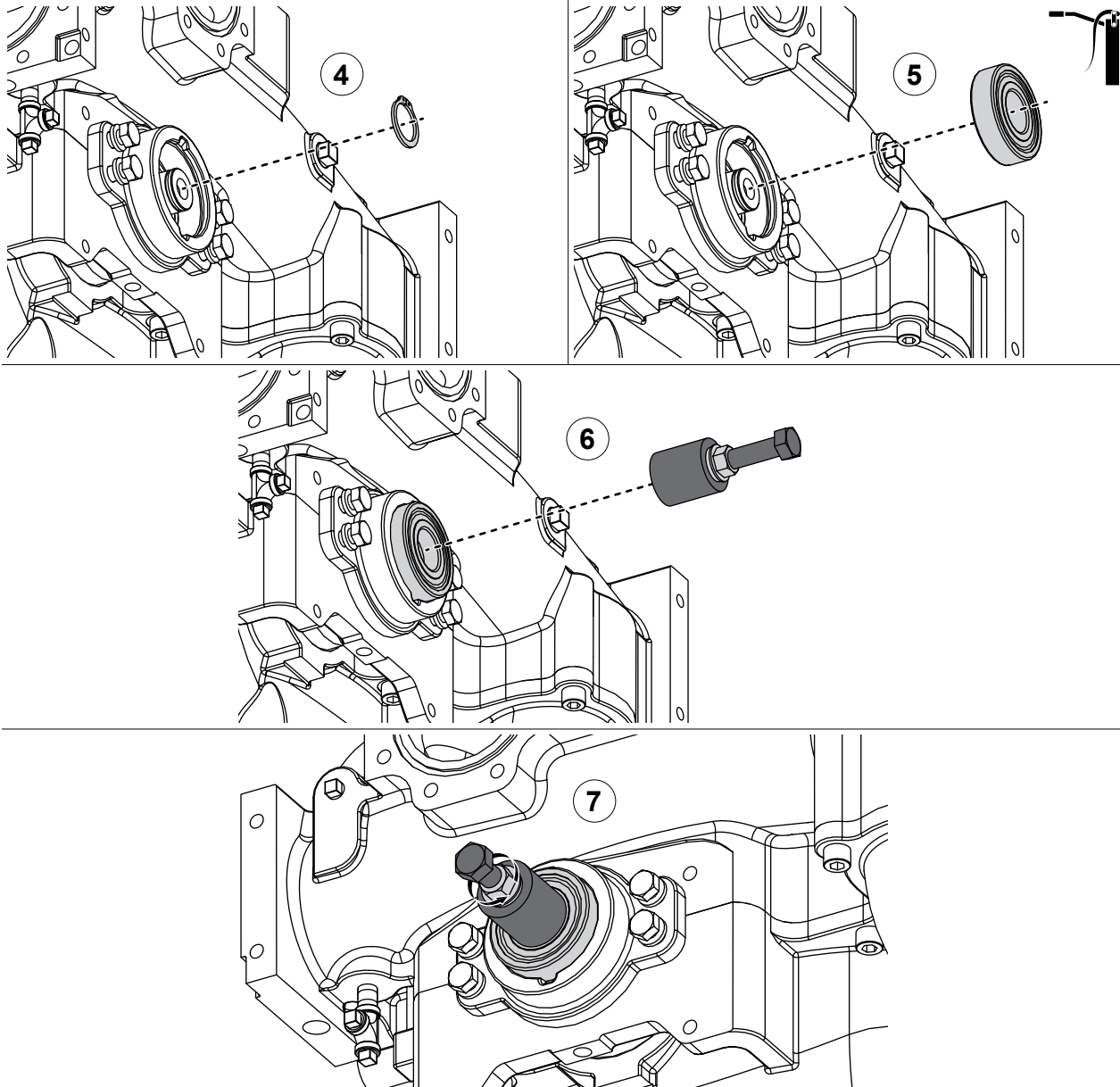
Installing the Outboard Bearing Housing



Use the illustrations and instructions to install the outboard bearing housing.

- 1 Install the retaining ring into the bearing housing.
- 2 Install the bearing shield into the bearing housing.
- 3 Install the bearing housing, then loosely install the bearing housing hardware.

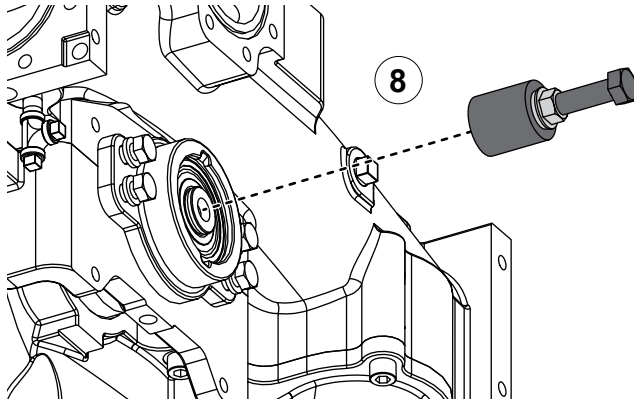
Installing the Outboard Bearing Housing



Use the illustrations and instructions to install the outboard bearing housing. The tools being used are included in the Outboard Bearing Removal and Installation Kit (K 956).

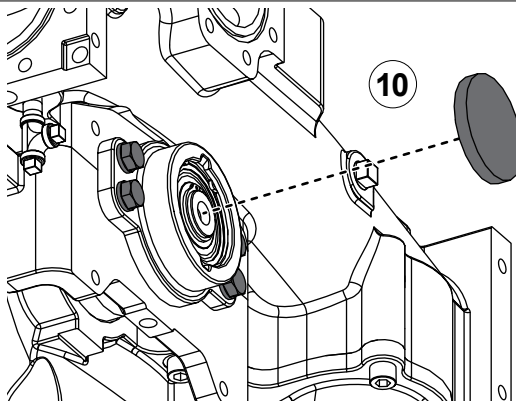
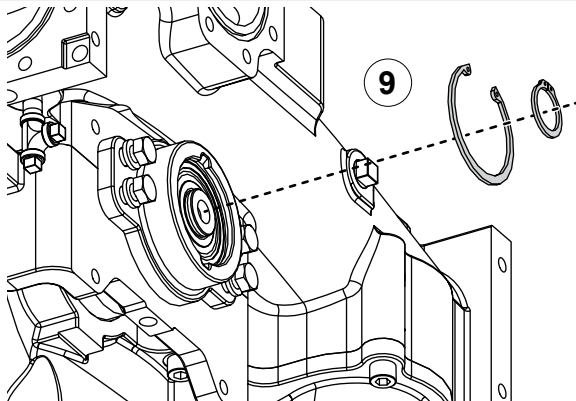
- 4 Install the retaining ring onto the impeller shaft.
- 5 Apply grease to the shaft, bearing housing, and bearing, then gently tap the bearing halfway into the bearing housing.
- 6 Align the bearing installation tool with the center of the bearing, then thread the screw into the end of the impeller shaft until it bottoms out.
- 7 Turn the nut to press the bearing into the bearing housing so that it sits against the retaining ring.

Installing the Outboard Bearing Housing

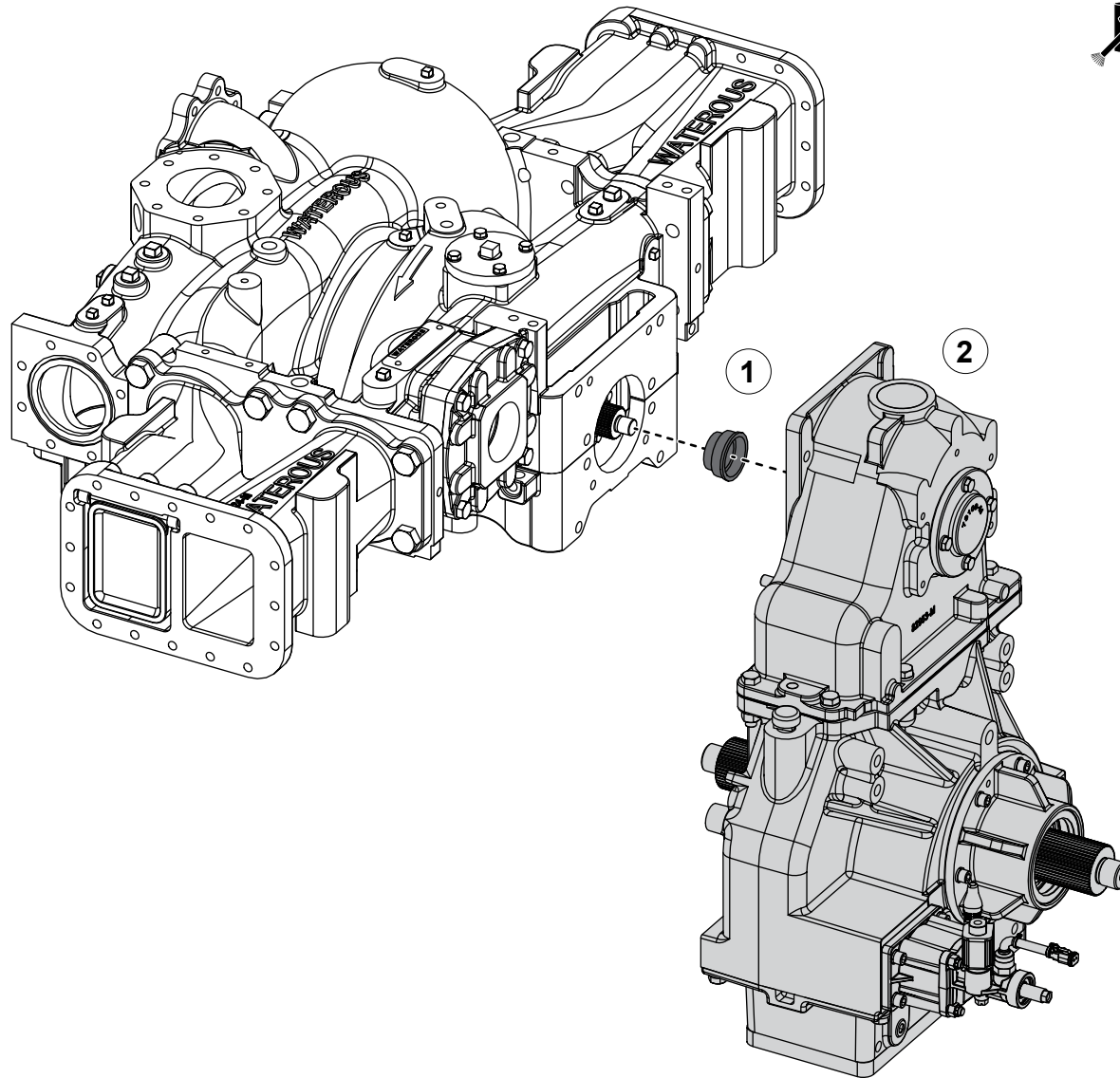


Use the illustrations and instructions to install the outboard bearing housing. The tools being used are included in the Outboard Bearing Removal and Installation Kit (K 956).

- 8 Loosen the screw to remove the bearing installation tool.
- 9 Install the retaining rings into the bearing housing and onto the shaft.
- 10 Tighten the bearing housing hardware, then install the dust cover.



Installing the Transmission



Use the illustration and instructions to install the transmission onto the pump—C22 transmission shown.

Note: *Installing the transmission is a similar process regardless of transmission model and mounting location.*

- 1 Install the sealing boot onto the impeller shaft.
- 2 Apply a thin coat of anti-seize compound to the splines of the shaft, then press the transmission onto the shaft.

Note: *Do not allow anti-seize compound to get on the pilot of the shaft.*

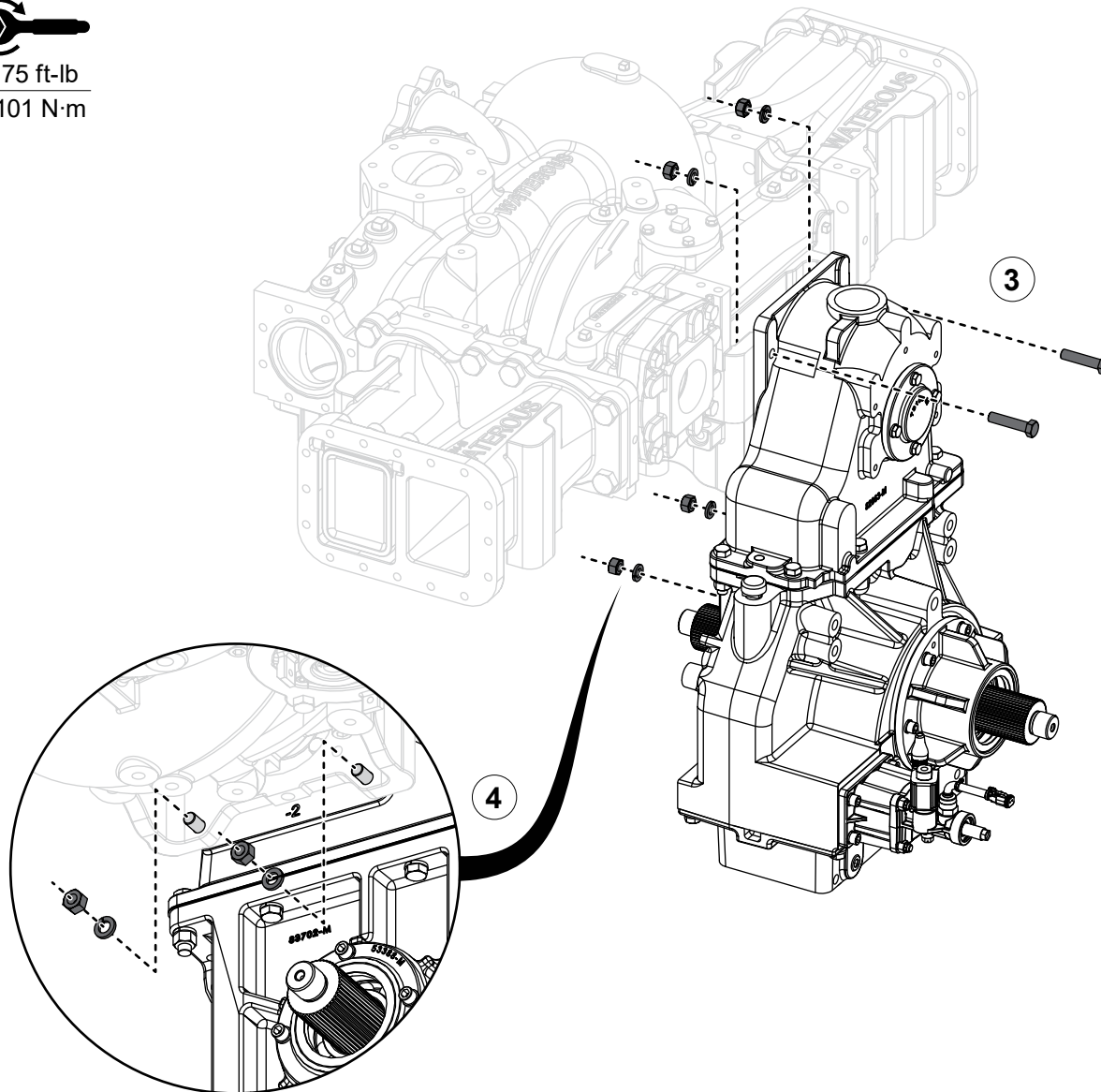
Installing the Transmission



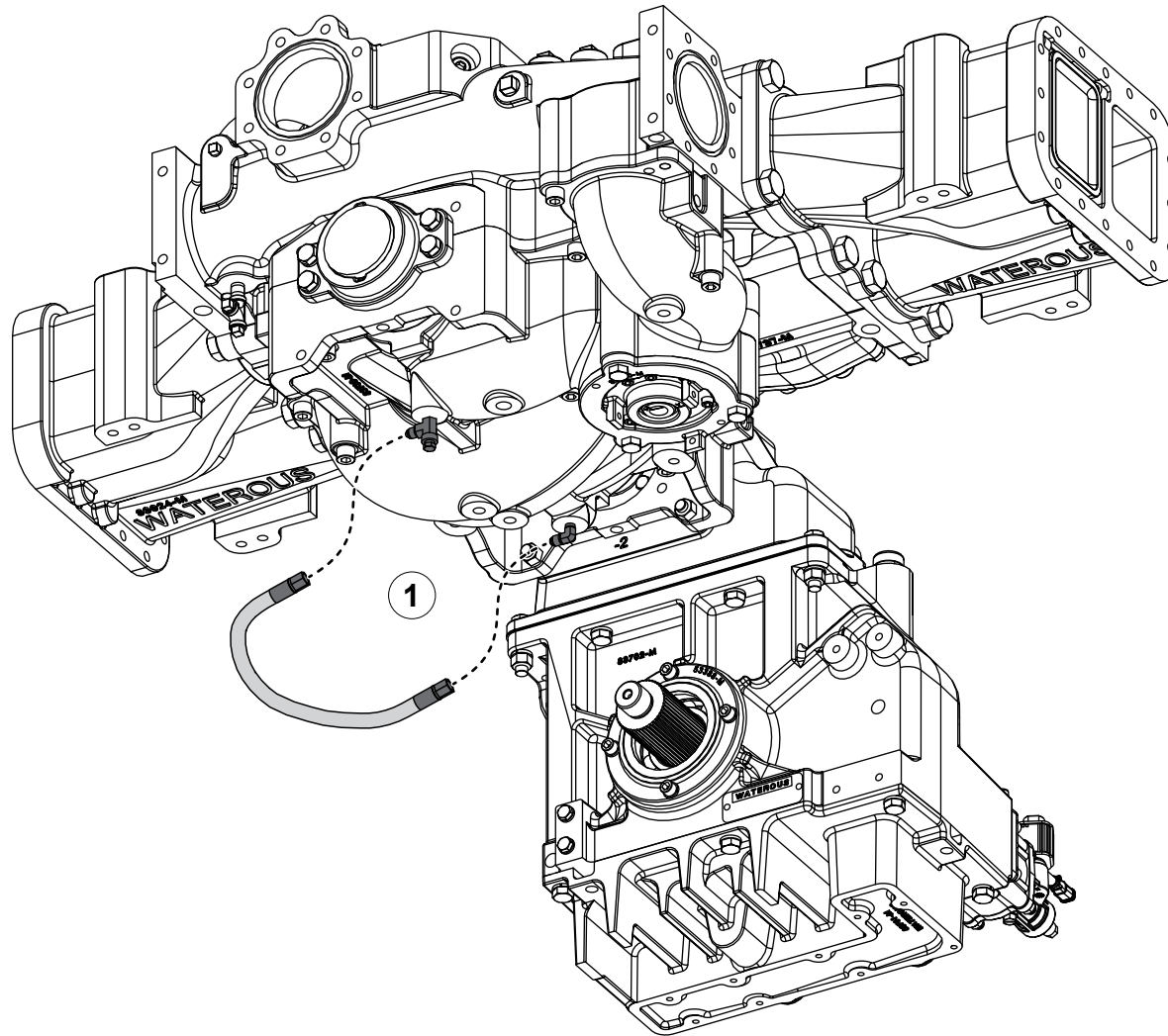
75 ft-lb
101 N·m

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

- 3 Install the screws and studs, then apply sealant to the threads.
- 4 Install the washers and nuts onto the threads of the screws and studs.



Installing the Seal Cooling Hose

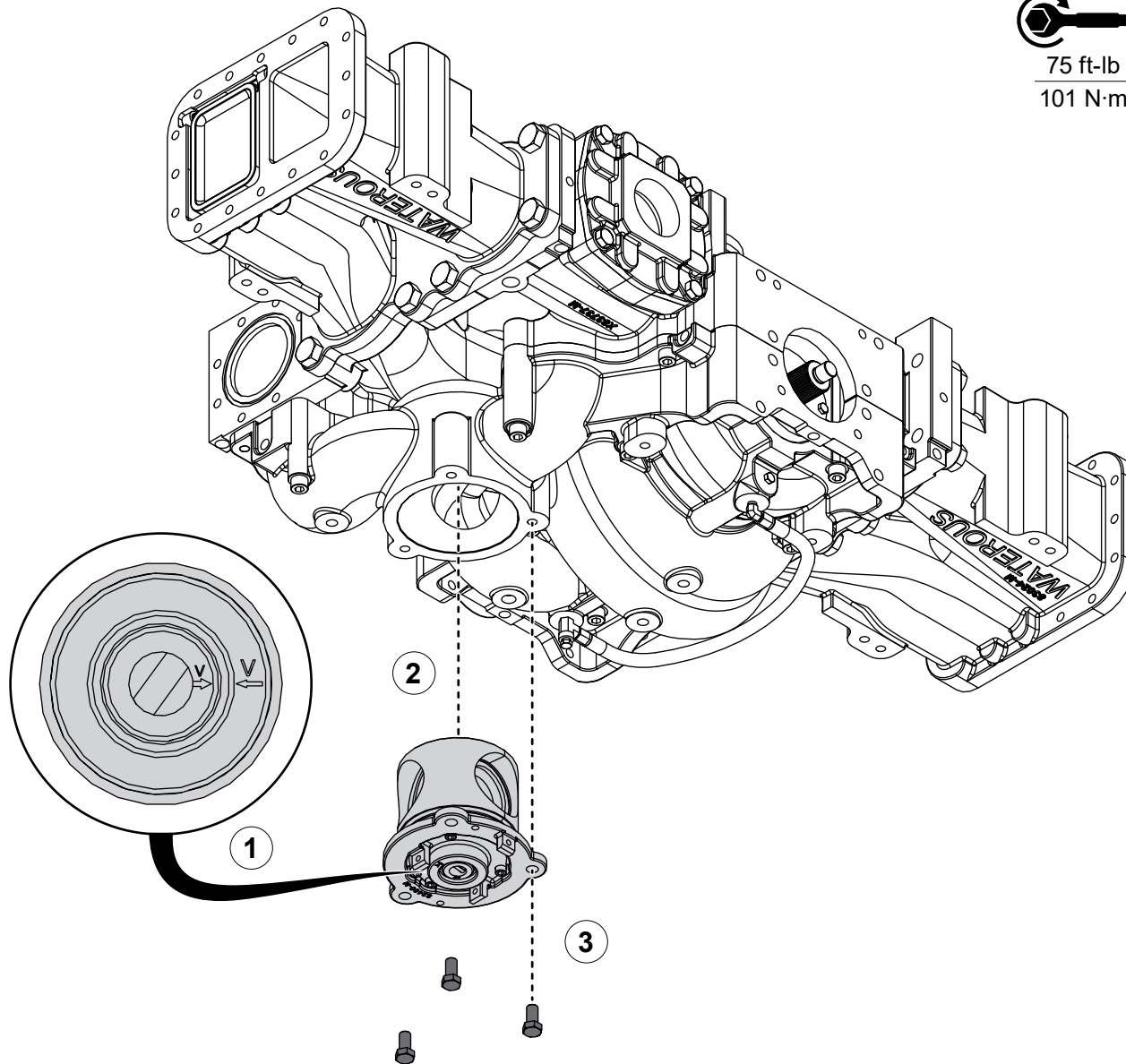


Use the illustration and instructions to install the seal cooling hose.

Note: Make sure that the hose is clean and free of debris before installation.

- 1 Install the hose onto the tee fitting and elbow fitting on the underside of the pump.

Installing the Transfer Valve

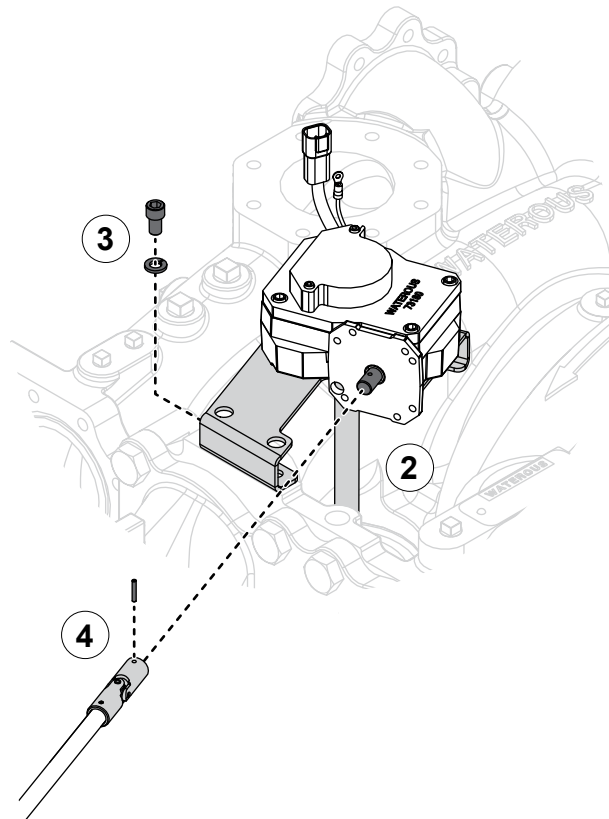
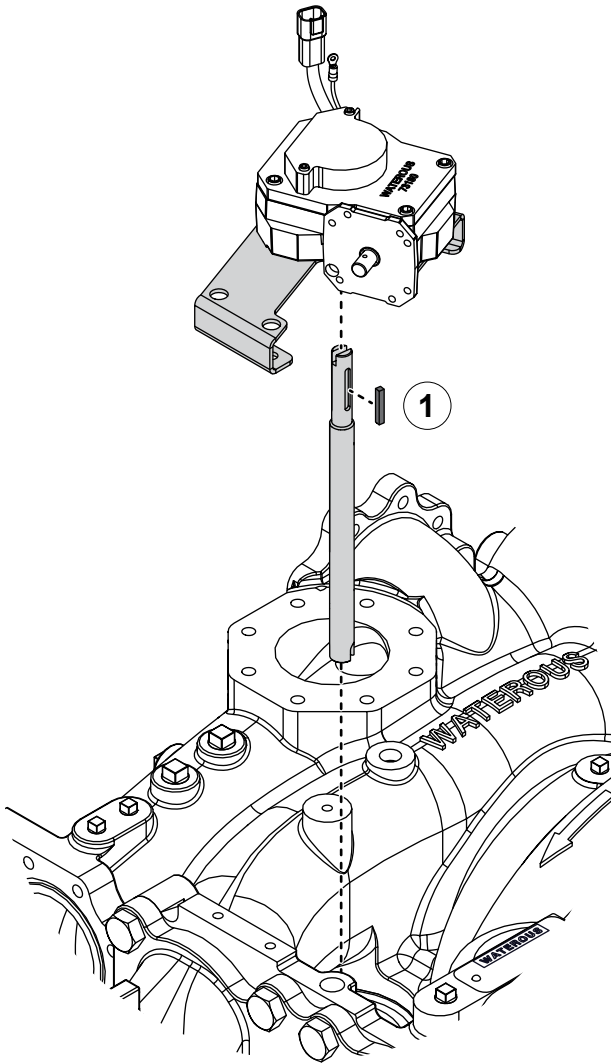


75 ft-lb
101 N·m

Use the illustration and instructions to install the transfer valve.

- 1 Move the valve into the volume position by aligning the arrows on the valve ball and cover.
- 2 Install the valve assembly into the pump.
- 3 Install the valve cover hardware.

Installing the Transfer Valve Actuator—Top-Mounted



Use the illustration and instructions to install the top-mounted transfer valve actuator—manual option shown.

- 1 Install the extension shaft into the actuator, then move the shaft into the volume position.

Note: Make sure the shaft is fully aligned with the arrow under the mounting bracket.

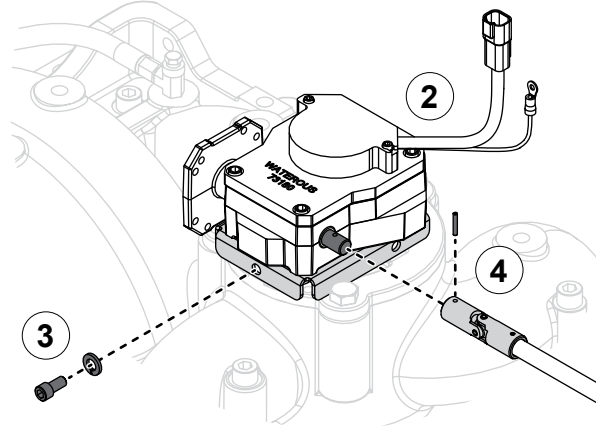
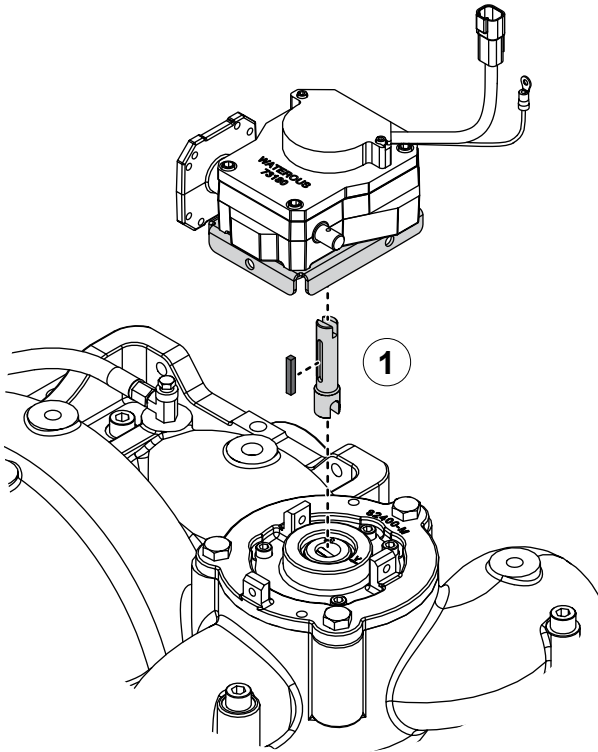
- 2 Install the actuator assembly onto the pump.

- 3 Use the mounting hardware to secure the actuator to the pump.

- 4 Install the U-joint onto the actuator shaft, then secure the joint with a spirol pin.

Note: For the electric actuator, this step is only required if your application includes the optional manual override.

Installing the Transfer Valve Actuator—Bottom-Mounted



Use the illustration and instructions to install the bottom-mounted transfer valve actuator—manual option shown.

- 1 Install the extension shaft into the actuator, then move the shaft into the volume position.

Note: Make sure the shaft is fully aligned with the arrow under the mounting bracket.

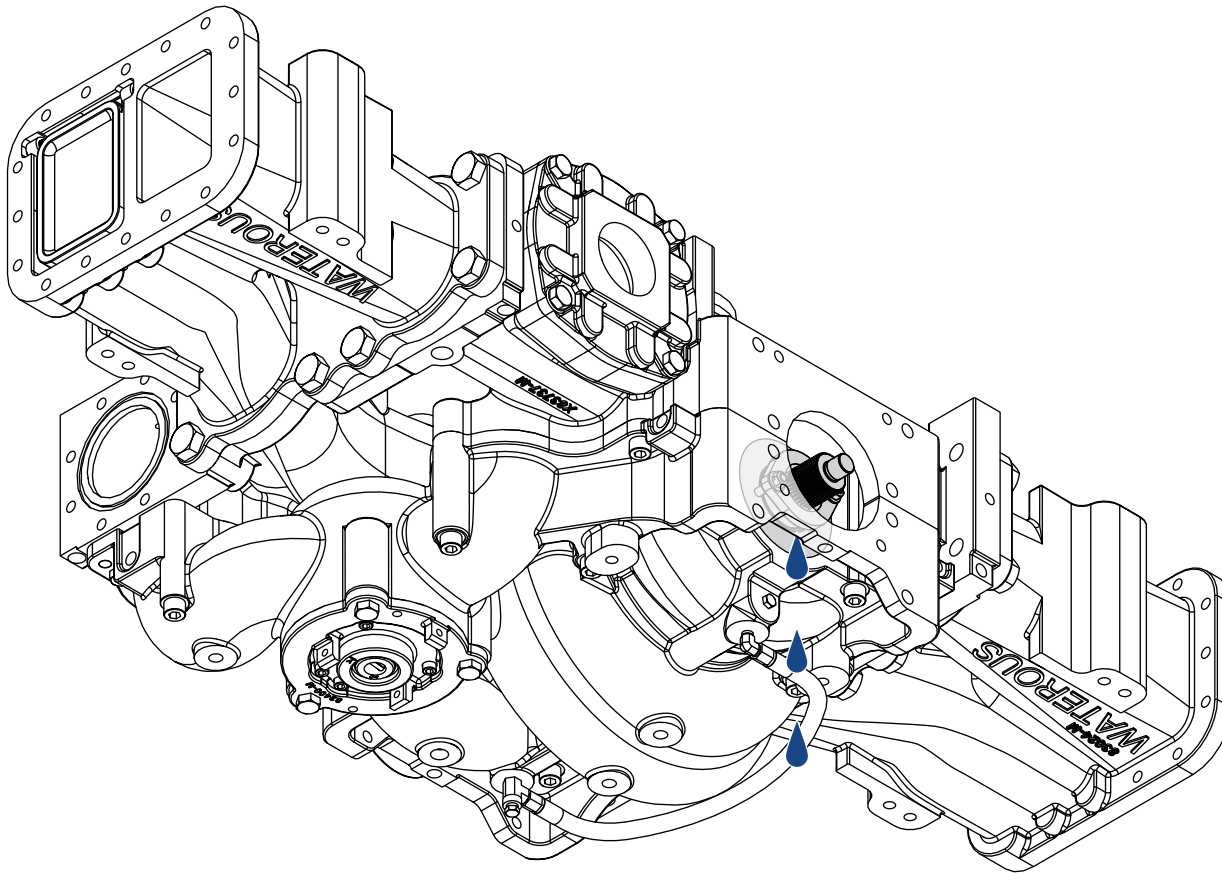
- 2 Install the actuator assembly onto the pump.

- 3 Use the mounting hardware to secure the actuator to the pump.

- 4 Install the U-joint onto the actuator shaft, then secure the joint with a spirol pin.

Note: For the electric actuator, this step is only required if your application includes the optional manual override.

Adjusting the Packing



If your configuration includes an impeller shaft with packing, use the illustration and instructions to adjust the packing after installing the pump into the apparatus.

Note: The transmission has been removed from the illustration to provide a clear view of the packing housing.

- 1 Operate the pump at its maximum intended pressure for 10 minutes.
- 2 Observe the drip rate. Optimal leakage is 10 to 120 drops per minute. Maintaining this rate facilitates the cooling of the packing.
- 3 If the drip rate is too high, turn off the pump and gradually tighten the gland nuts by 1/6 turn, alternating between them to make sure that the gland stays level.
- 4 Operate the pump at its maximum intended pressure for 2 minutes. Observe the drip rate, then repeat the previous step until leakage is within optimal range.
- 5 Repeat the process with the packing housing at the other end of the pump.

WATEROUS

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