

WATEROUS

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Medium-Duty Model T-Transmissions

Overhaul Instructions

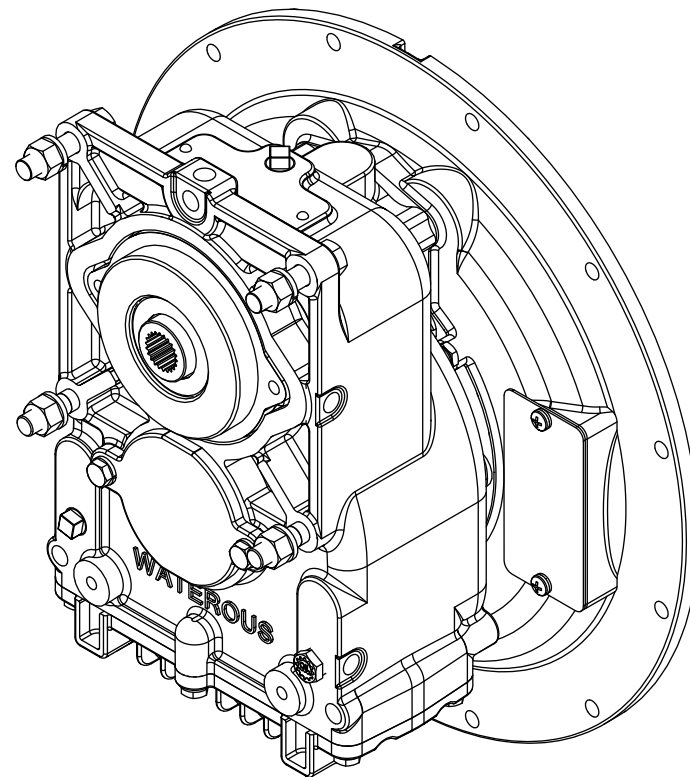
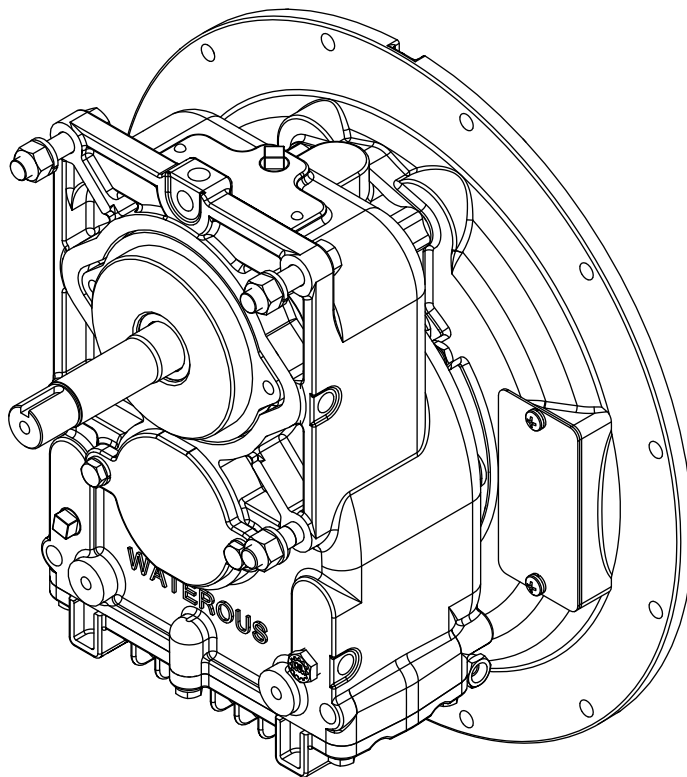



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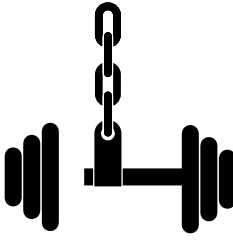
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Safety Precautions

- 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.

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

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

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

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. 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.



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.



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.

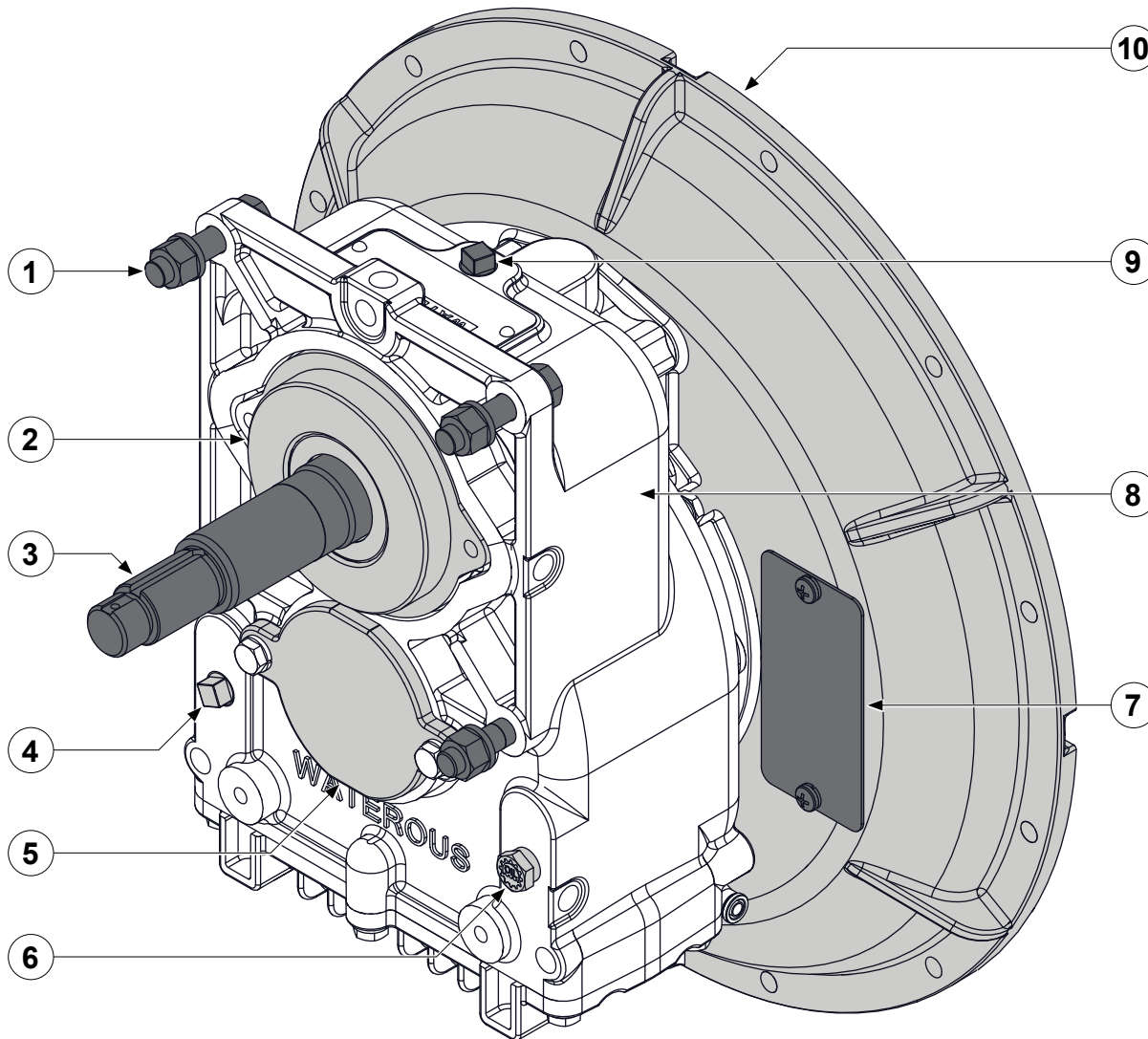


Removable threadlocker—This symbol tells you to apply removable threadlocker to the hardware.



Anti-scoring extreme pressure oil—This symbol tells you to apply anti-scoring extreme pressure oil to the mating surfaces before installation.

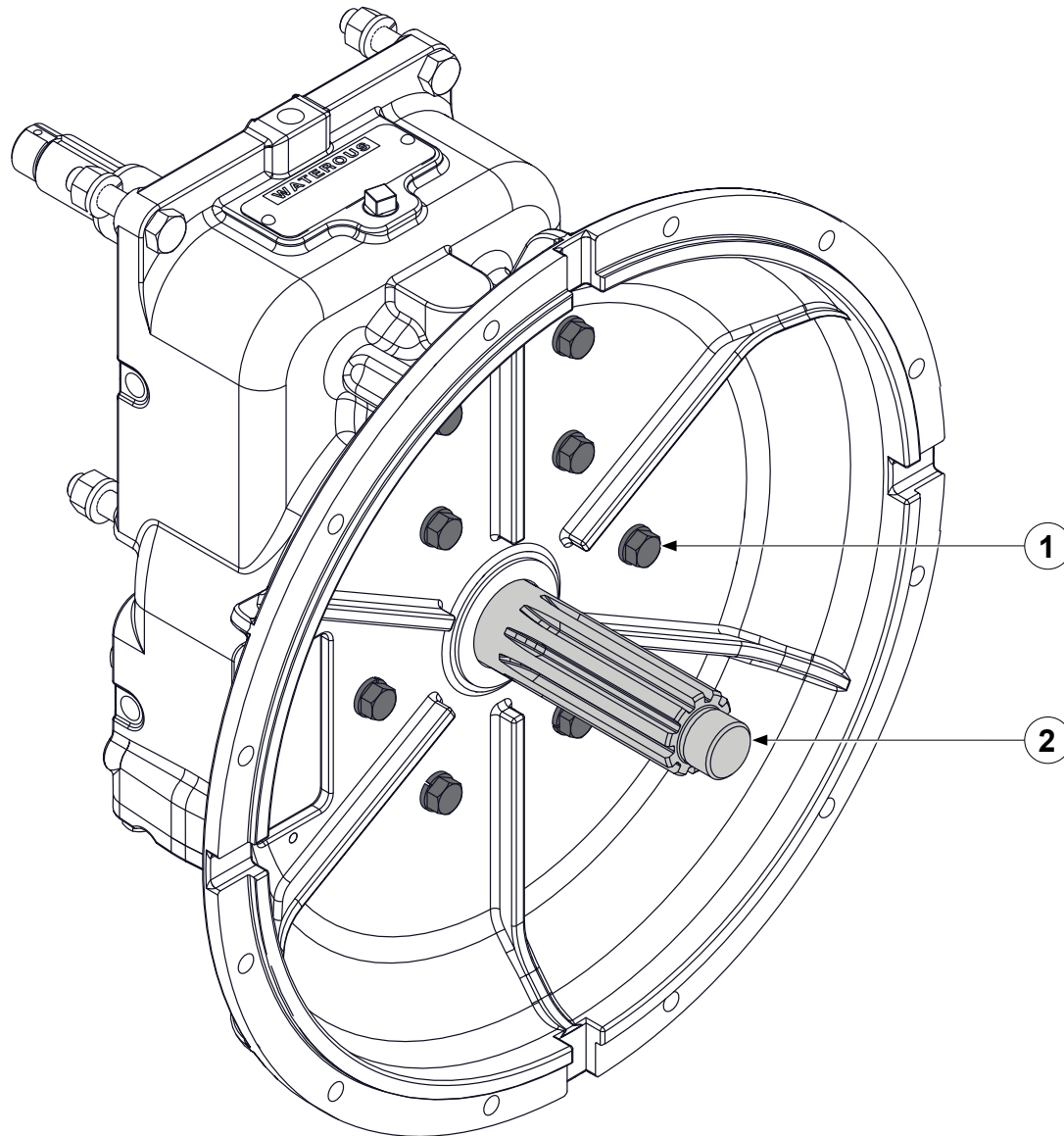
Identifying Exterior Components—Pump Side



Use the illustration to identify various components on the transmission.

- | | |
|----|---|
| 1 | Mounting hardware |
| 2 | Bearing housing |
| 3 | Impeller shaft—varies by application |
| 4 | Oil level plug—location varies by application |
| 5 | Bearing cover |
| 6 | Oil level plug—location varies by application |
| 7 | Serial number plate |
| 8 | Case |
| 9 | Oil fill plug—location varies by application |
| 10 | Bellhousing adapter—varies by application |

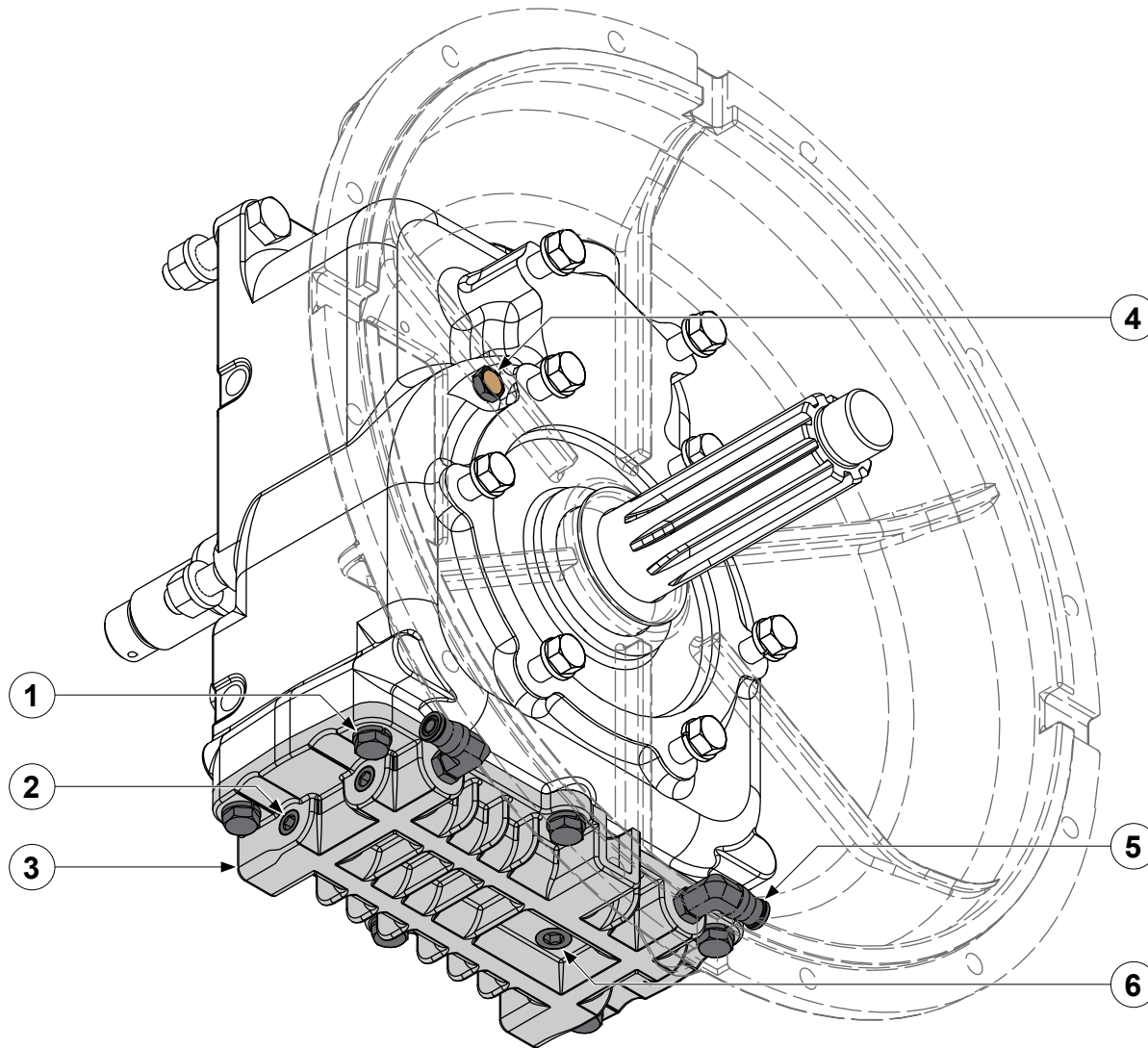
Identifying Exterior Components—Input Side



Use the illustration to identify various components on the transmission.

- 1 Bellhousing adapter hardware
- 2 Drive shaft

Identifying Exterior Components—Oil Pan Side



Use the illustration to identify various components on the transmission.

- | | |
|---|---|
| 1 | Oil pan hardware |
| 2 | Oil pan drain |
| 3 | Oil pan |
| 4 | Breather—location varies by application |
| 5 | Oil pan cooler fitting—optional |
| 6 | Oil drain plug—location varies by application |

Preparing to Disassemble the Transmission

- Read and understand the instructions before disassembling the equipment.
- Prepare a workspace suitable to accommodate and support the transmission.
- 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 with questions.

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, anti-scoring extreme pressure oil, or oil from the enclosure before you disassemble the transmission. 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 Transmission

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

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

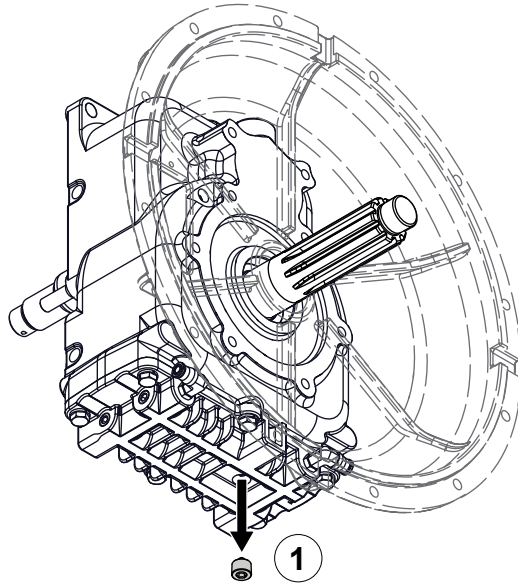
Disassembling the Transmission Components

- Refer to the service parts list (SPL) for part identification and disassemble order.
- The SPL specific to your application is determined by the following:
 - The pump connected to the transmission.
 - The transmission drive method.

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, or the pump, or the transmission, or some combination of the three.

- Use established industry practices to disassemble the transmission.
- 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.

Draining the Gear Oil



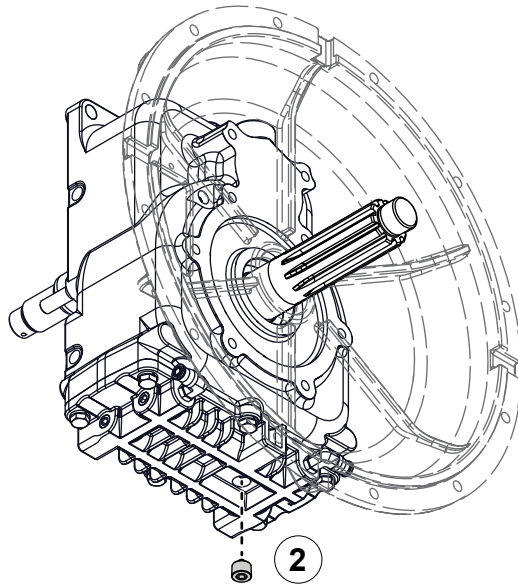
Use the illustrations and instructions to drain the gear oil.

Note: *The illustrations may not represent the orientation of your specific transmission. Refer to the SPL for your application to locate the oil drain plug.*

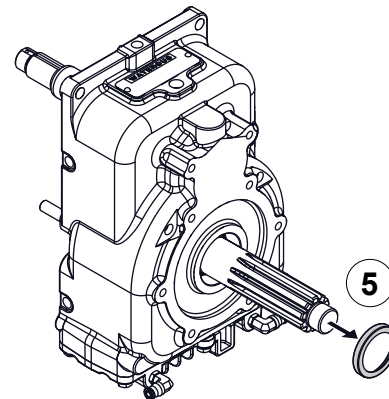
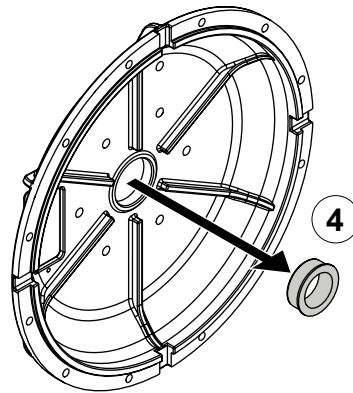
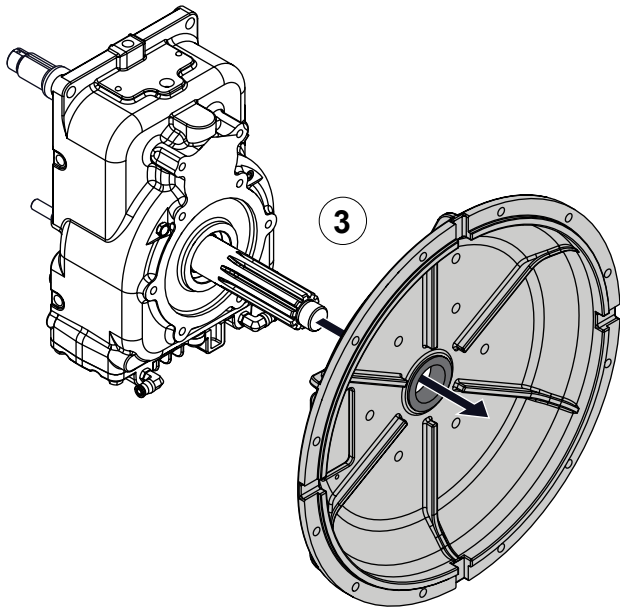
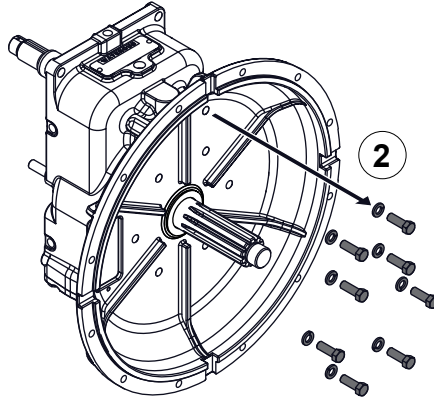
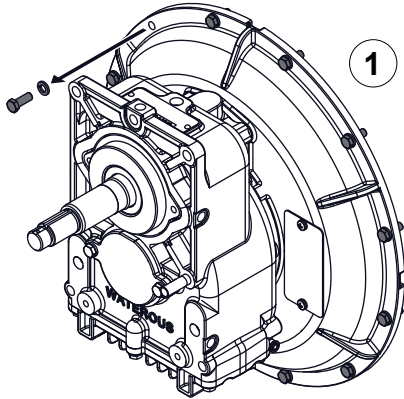
- 1 To drain the gear oil, do the following:
 - Locate the oil level plug to approximate the amount of oil in the transmission.
 - Place a suitable container under the transmission to collect the drained oil.
 - Locate and remove the oil drain plug.
 - Allow the oil to drain.

- 2 Install the oil drain plug.

Note: *Make sure that you do not over-tighten the plug.*



Removing the Bellhousing Adapter

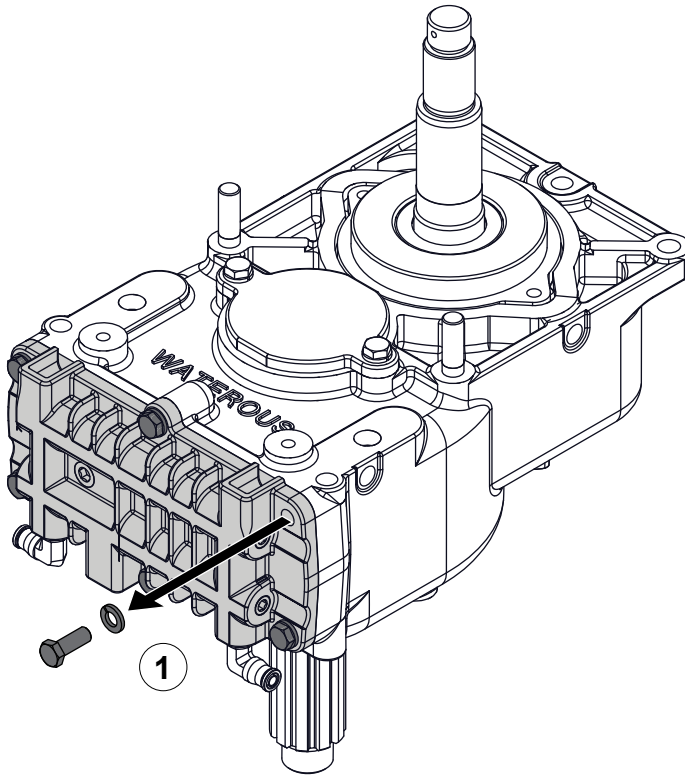


Use the illustrations and instructions to remove the bellhousing adapter.

- 1 To separate the transmission from the engine, do the following:
 - Drain any fluids, then disconnect the cooling lines that will be affected when you separate the transmission and engine.
 - Remove the hardware securing the bellhousing adapter to the engine.
- 2 Remove the bellhousing adapter hardware.
- 3 Remove the bellhousing adapter and bushing.
- 4 Press the bushing out of the bellhousing adapter.
- 5 Remove and discard the oil seal.

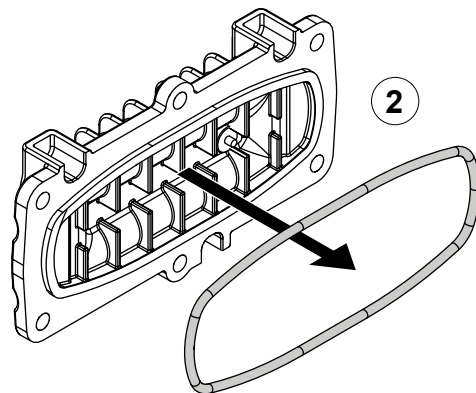
Note: You can also remove the oil seal during the drive shaft disassembly.

Removing the Oil Pan

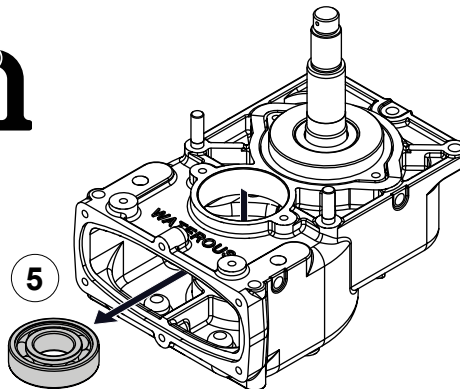
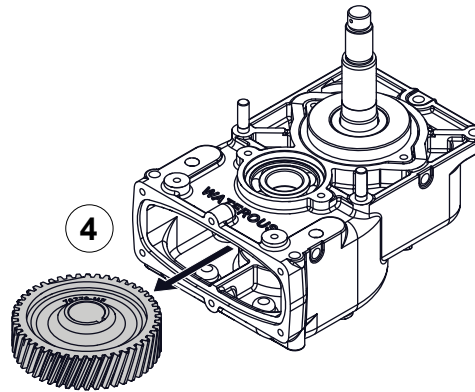
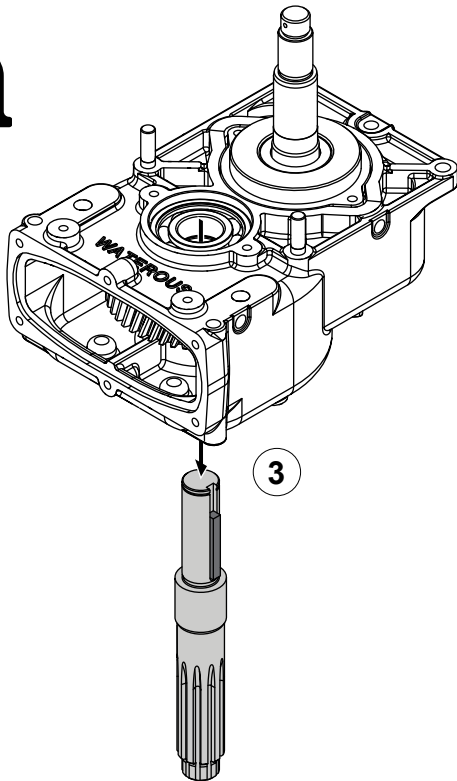
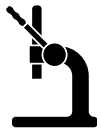
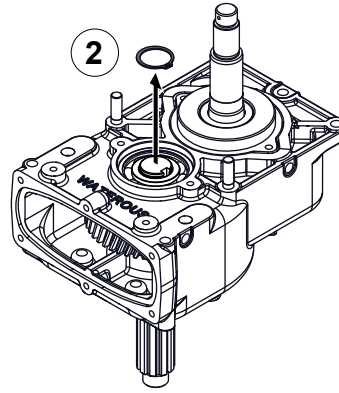
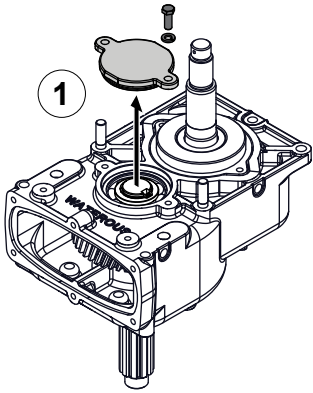


Use the illustrations and instructions to remove the oil pan.

- 1 Remove the hardware securing the oil pan to the transmission case.
- 2 Remove and discard the O-ring.



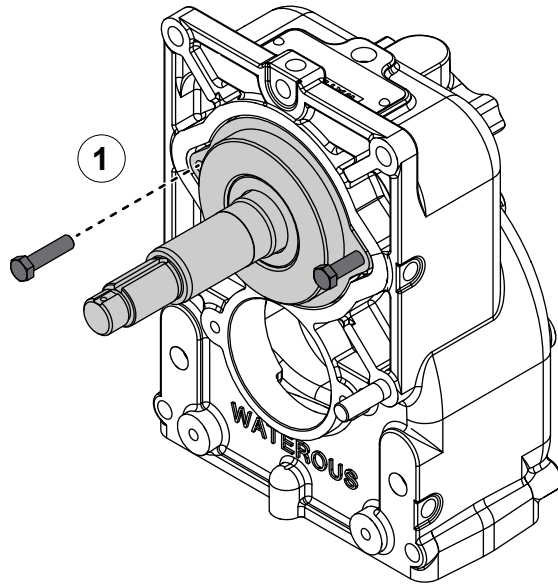
Removing the Drive Components



Use the illustrations and instructions to remove the drive components.

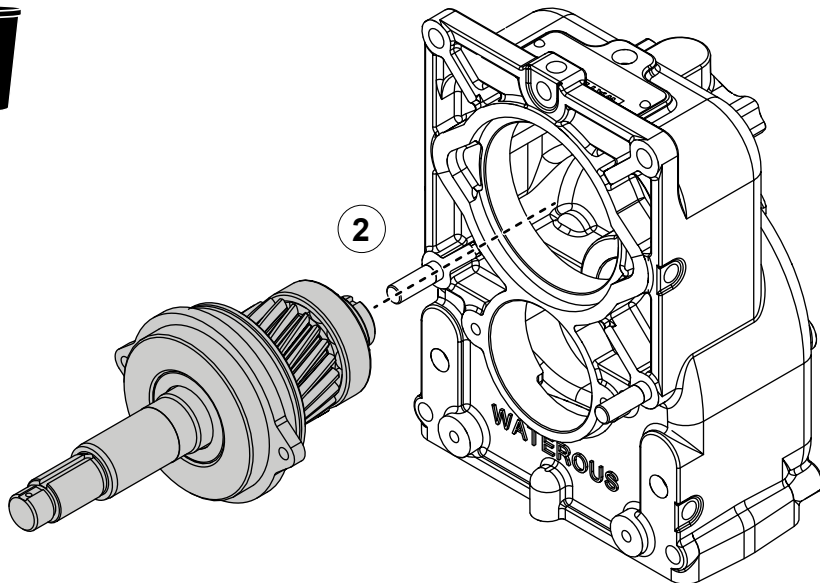
- 1 Remove the hardware and bearing cover from the transmission case, then remove and discard the O-ring.
- 2 Remove the drive shaft retaining ring.
- 3 Press the drive shaft from the assembly.
- 4 Remove the drive gear.
- 5 Press the drive shaft bearing from the case.

Removing the Impeller Shaft Assembly



Use the illustrations and instructions to remove the impeller shaft assembly.

- 1 To remove the impeller shaft assembly from the transmission case, do the following:
 - Insert locally sourced jacking screws (3/8-24 x 1-1/2 inches) into the jacking screw holes.
 - Alternate applying a quarter turn to each jacking screw until the impeller shaft assembly is free from the case.
- 2 After removing the impeller shaft assembly, do the following:
 - Remove and discard the O-ring and oil seal.
 - Use an arbor press to separate the remaining components.



Preparing to Assemble the Transmission

- Read and understand the instructions before assembling the transmission.
- Prepare a workspace suitable to accommodate and support the transmission.
- Gather the necessary tools and assembly aids.
- Gather the overhaul components such as, lubricant, bearings, seals, 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.
- Suitable support and lifting equipment.

Best Practices

- Remove any dirt, sand, grease, or oil from the enclosure before you begin the overhaul. 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 to the self-locking nut threads before installation.

Assembling the Transmission Components

- Refer to the service parts list (SPL) for part identification.
- The SPL specific to your application is determined by the attached pump.

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, or the pump, or the transmission, or some combination of the three.

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

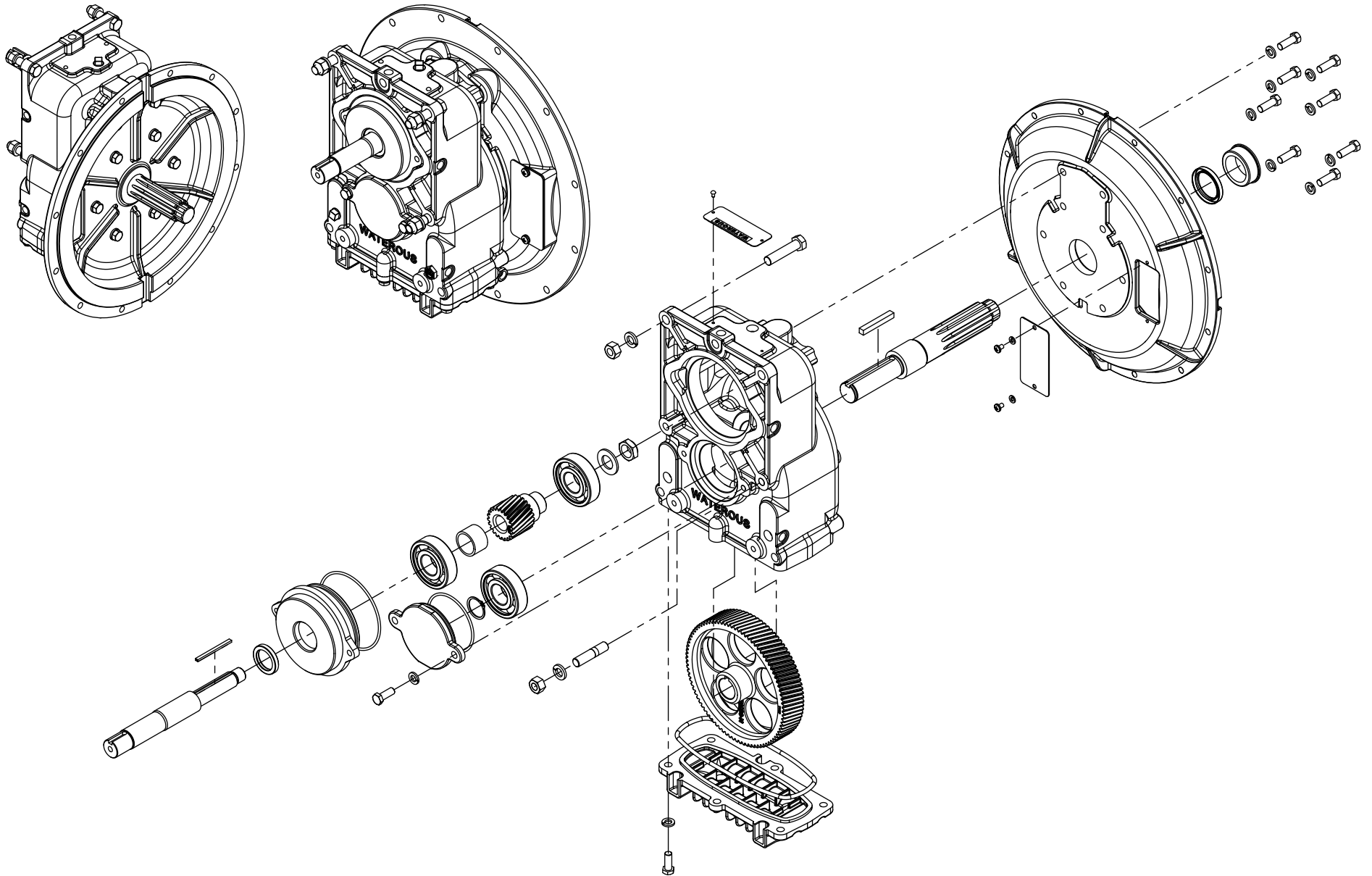
Installing the Transmission

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

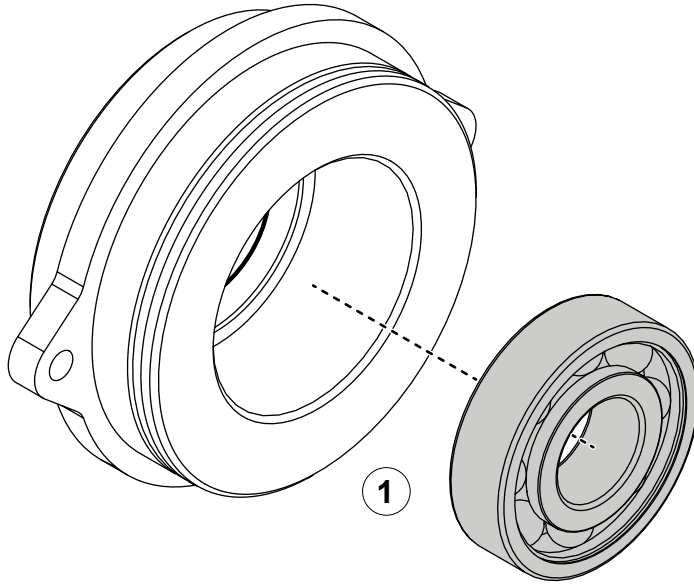
Understanding the Illustrations

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

CP-2, CP-4, CLR, CLV, and CLS Pumps with One Piece Impeller Shaft



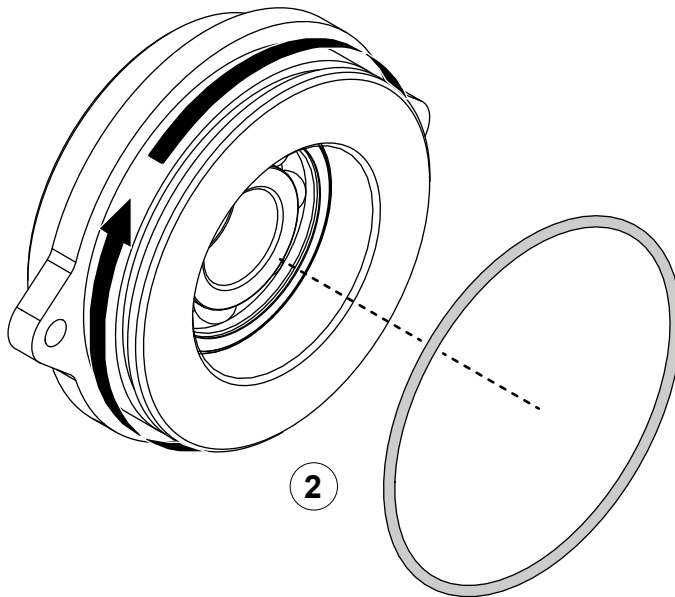
CP-2, CP-4, CLR, CLV, and CLS Pumps with One Piece Impeller Shaft



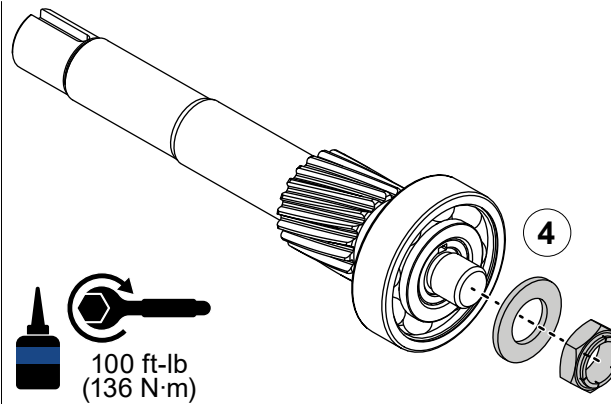
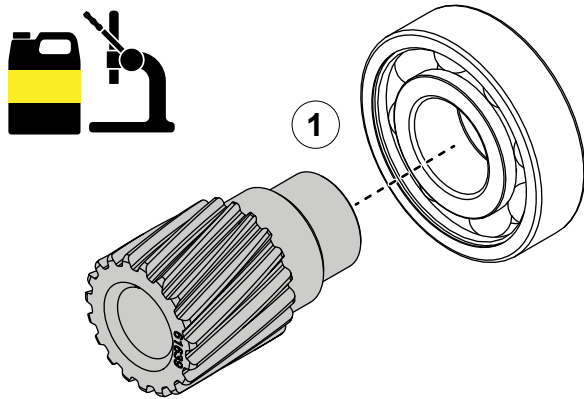
Assembling the Bearing Housing

Use the illustrations and instructions to assemble the bearing housing.

- 1 Apply anti-scoring extreme pressure oil to the mating surfaces, then press the bearing into the bearing housing.
- 2 Apply lubricant to the O-ring groove, then install the O-ring around the bearing housing.



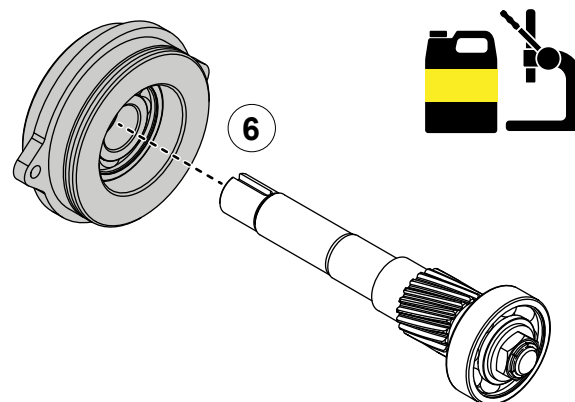
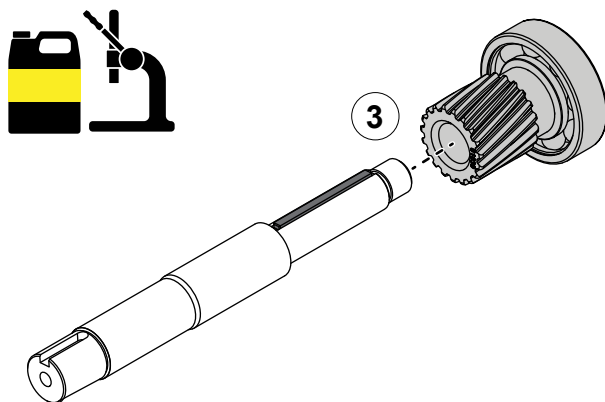
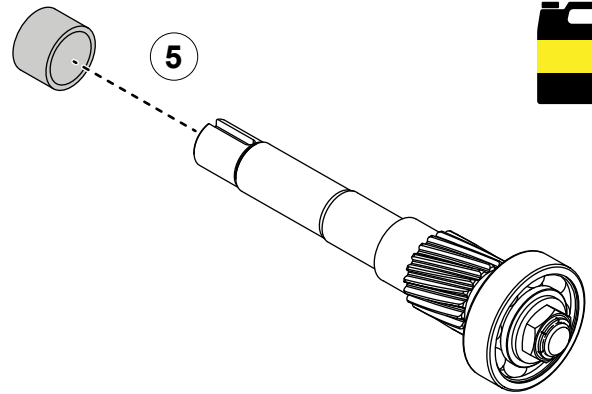
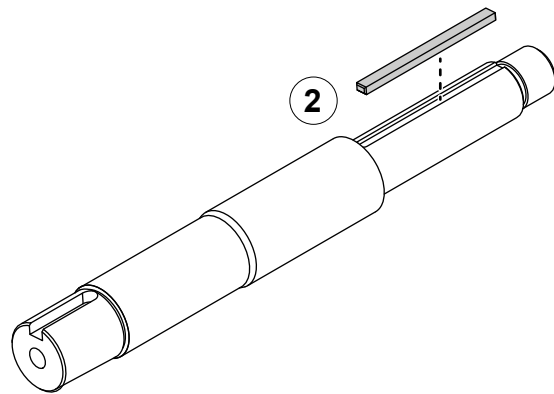
CP-2, CP-4, CLR, CLV, and CLS Pumps with One Piece Impeller Shaft



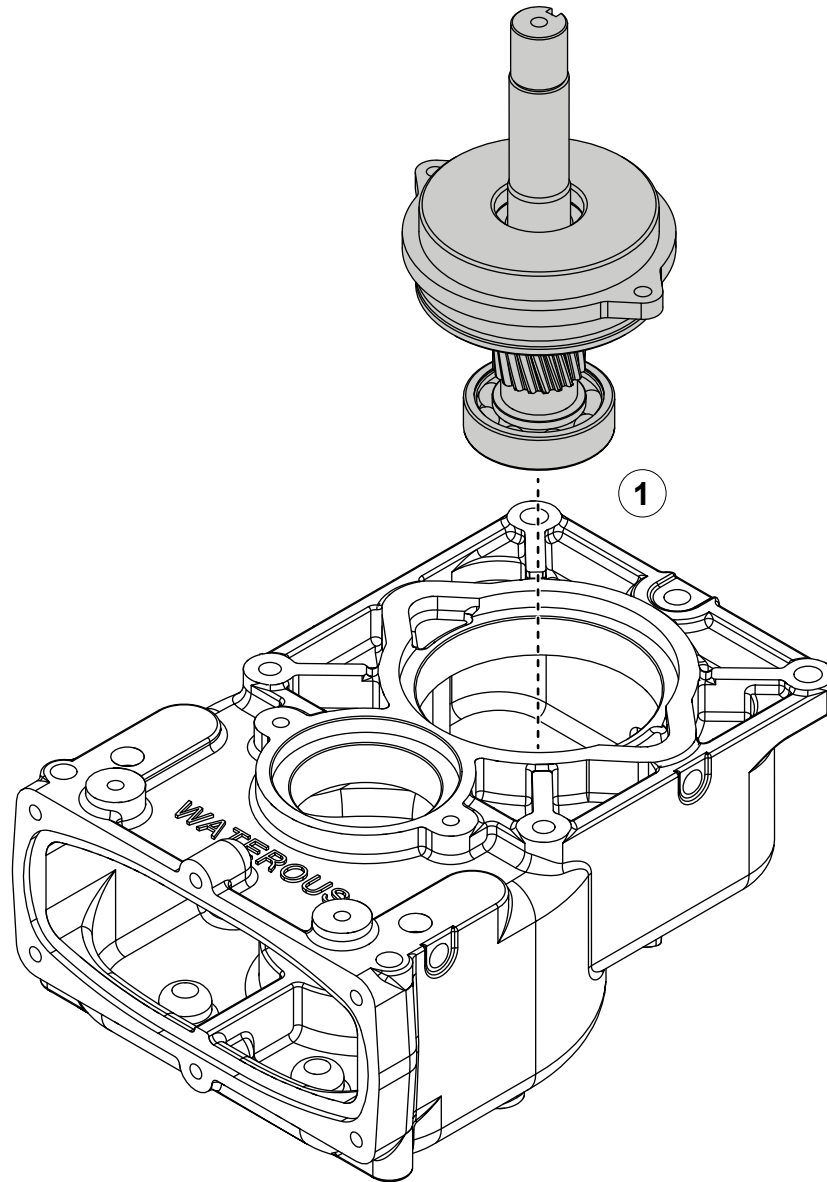
Assembling the Impeller Shaft

Use the illustrations and instructions to assemble the impeller shaft.

- 1 Apply anti-scoring extreme pressure oil to the mating surfaces, then press the driven gear and bearing together.
- 2 Insert the key into the keyway.
- 3 Apply anti-scoring extreme pressure oil to the mating surfaces, then align the driven gear with the key on the shaft and press the components together.
- 4 To install the impeller shaft hardware, do the following:
 - Install the washer onto the shaft.
 - Apply removable threadlocker to the threads, then install the locknut.
 - Torque the locknut to 100 ft-lb (136 N·m).
- 5 Apply anti-scoring extreme pressure oil to the mating surfaces, then install the spacer.
- 6 Apply anti-scoring extreme pressure oil to the mating surfaces, then press the shaft into the bearing house.



CP-2, CP-4, CLR, CLV, and CLS Pumps with One Piece Impeller Shaft

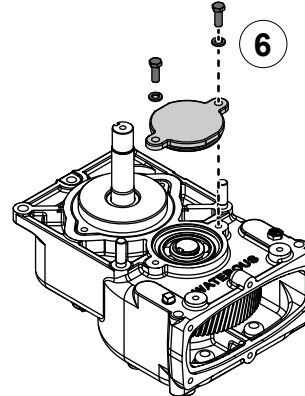
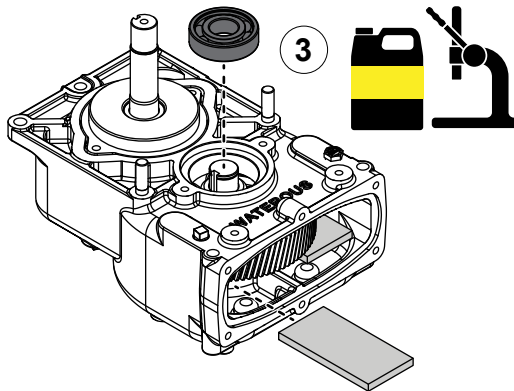
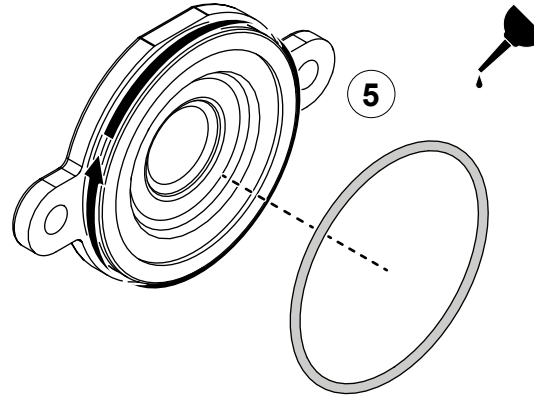
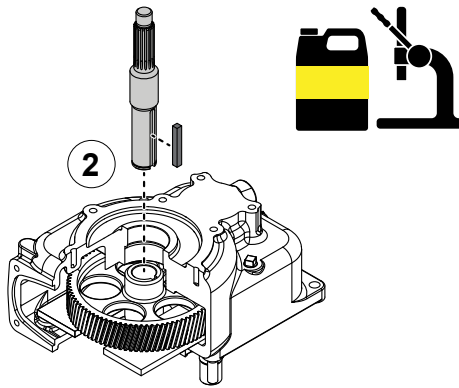
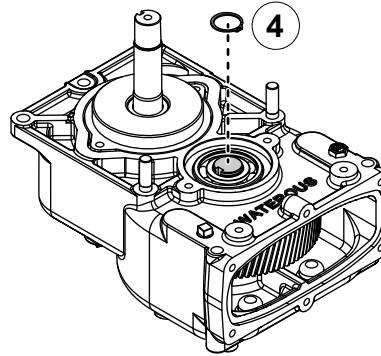
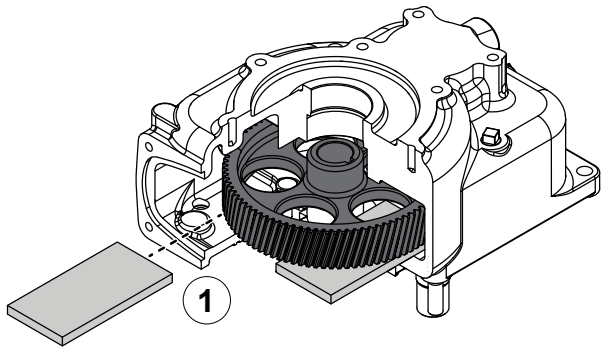


Installing the Driven Gear Assembly

Use the illustration and instructions to install the impeller shaft assembly.

- 1 Apply anti-scoring extreme pressure oil to the mating surfaces, then press the impeller shaft assembly into the transmission case.

CP-2, CP-4, CLR, CLV, and CLS Pumps with One Piece Impeller Shaft



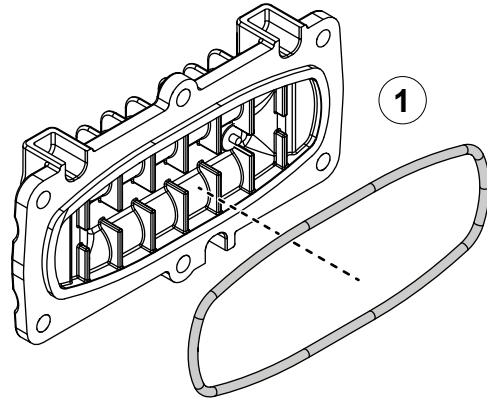
Installing the Drive Components

Use the illustrations and instructions to install the drive shaft assembly and associated components.

Note: Refer to "**Support Block Assembly Aid Dimensions**" on page 33 to fabricate the support block assembly aid.

- 1 To install the drive gear, do the following:
 - Align the drive gear in the case with the bearing bore.
 - Position the support blocks under the drive gear.
- 2 To install the drive shaft, do the following:
 - Apply anti-scoring extreme pressure oil to all mating surfaces.
 - Install the key into the keyway, then press the drive shaft into the drive gear.
- 3 To install the bearing, do the following:
 - Flip over the transmission case and reposition the support blocks.
 - Apply anti-scoring extreme pressure oil to all mating surfaces.
 - Press the bearing into the bore.
- 4 Install the retaining ring onto the drive shaft.
- 5 Apply lubricant to the O-ring, then install the O-ring around the bearing cover.
- 6 Use the mounting hardware to secure the bearing cover.

CP-2, CP-4, CLR, CLV, and CLS Pumps with One Piece Impeller Shaft

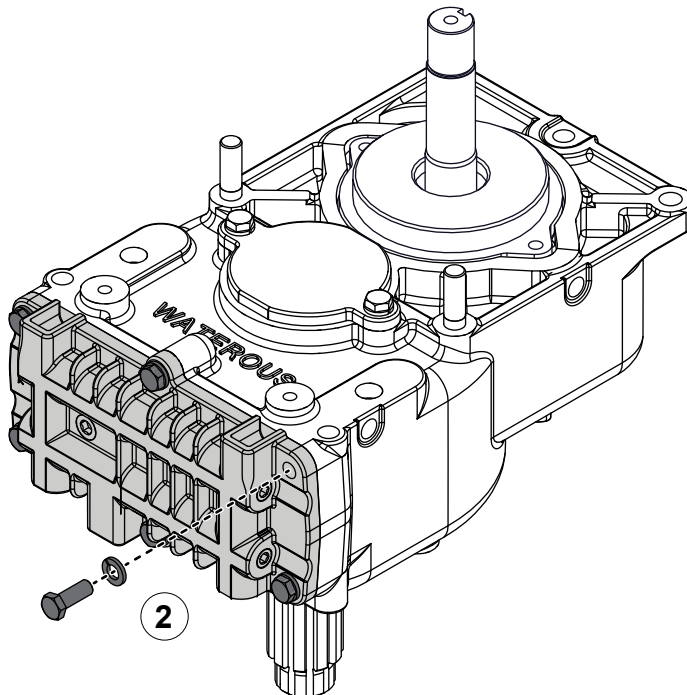


Installing the Oil-Pan

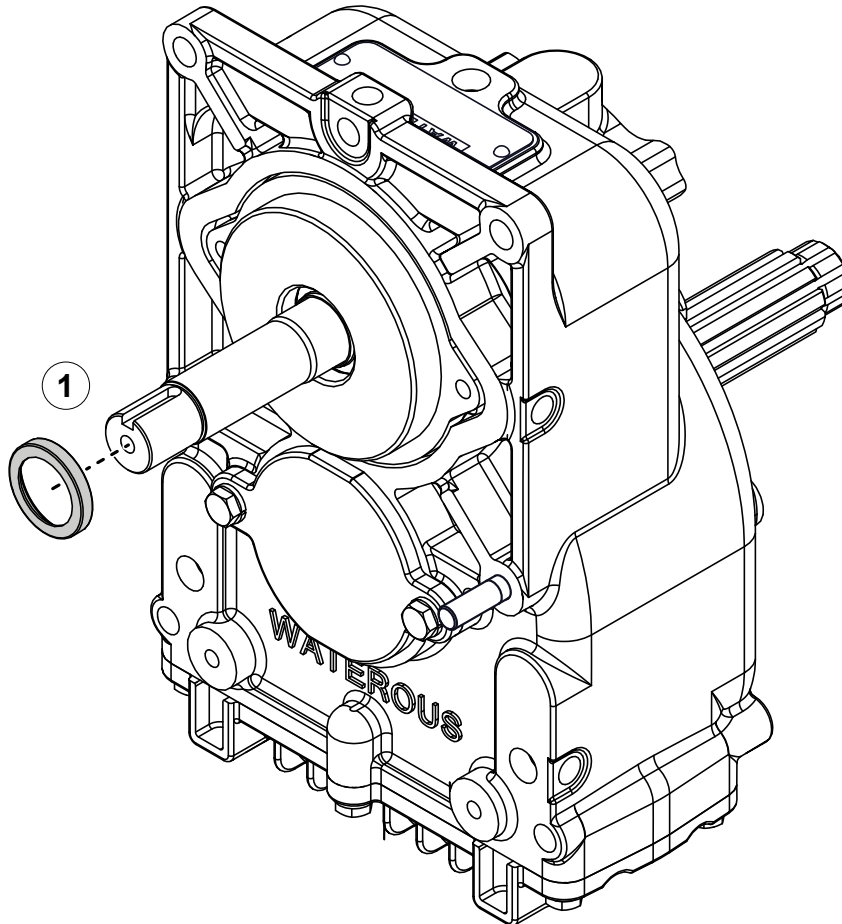
Use the illustrations and instructions to install the oil pan.

Note: Refer to the SPL for your application to determine the orientation of the oil pan.

- 1 Apply lubricant to the O-ring, then install it around the oil pan.
- 2 Use the hardware that you removed earlier to install the oil pan.



CP-2, CP-4, CLR, CLV, and CLS Pumps with One Piece Impeller Shaft



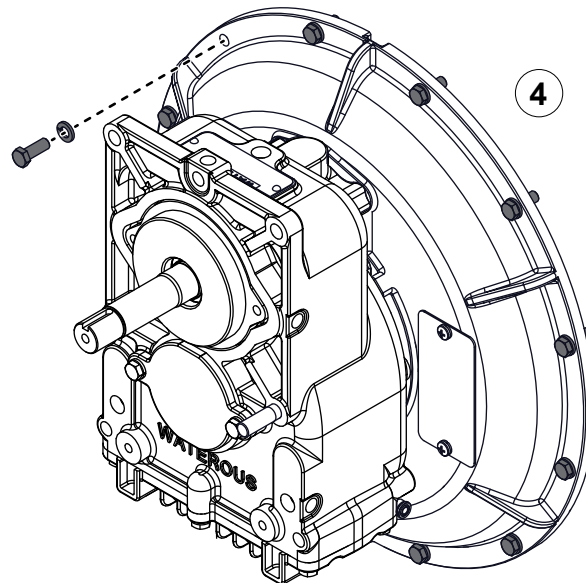
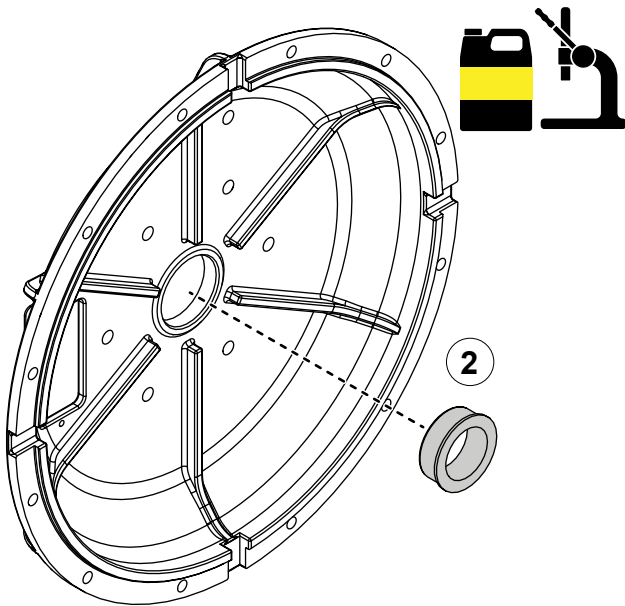
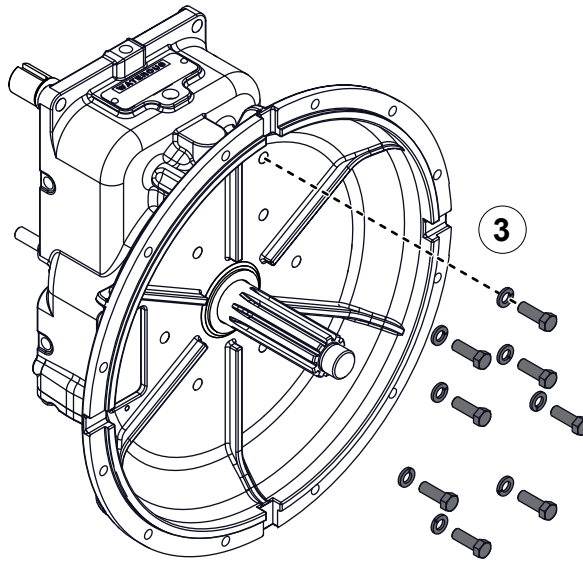
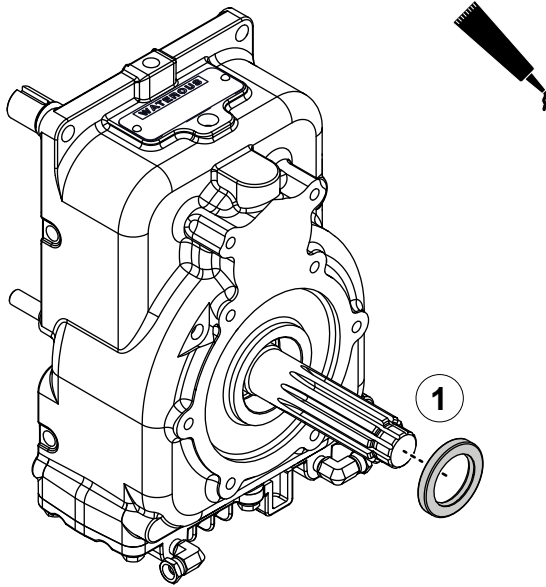
Installing the Oil Seal

Use the illustration and instructions to install the oil seal.

- 1 Apply sealant to the oil seal, then install it onto the impeller shaft.

Note: The oil seal should sit flush with the oil seal housing.

CP-2, CP-4, CLR, CLV, and CLS Pumps with One Piece Impeller Shaft

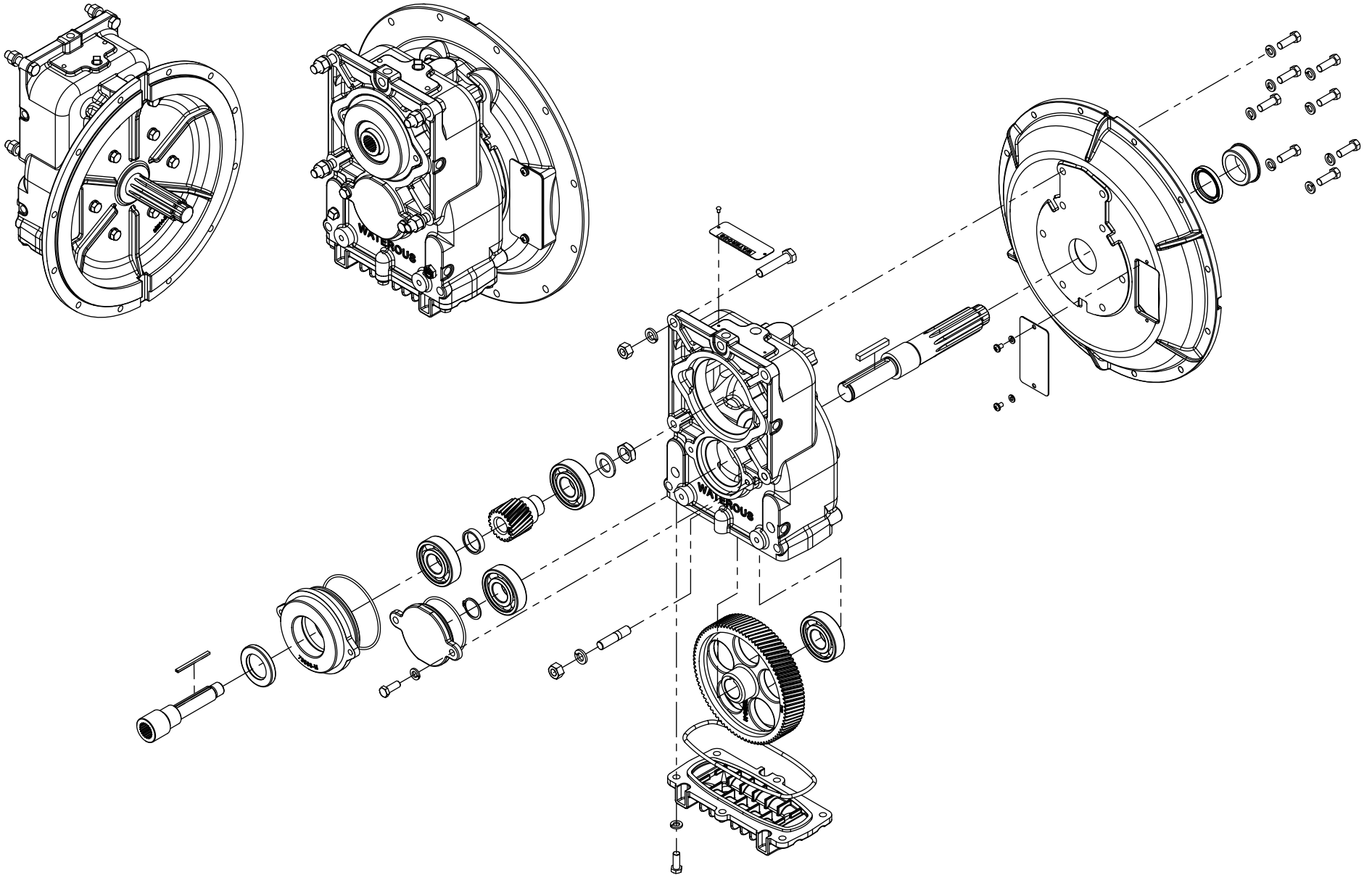


Installing the Bellhousing Adapter

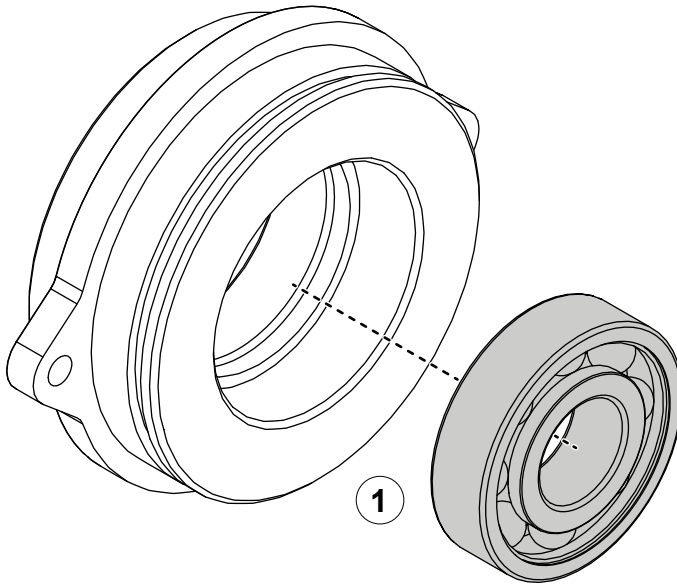
Use the illustrations and instructions to the install bellhousing adapter.

- 1 Apply sealant to the oil seal, then install it onto the shaft at least 1/2 inch (12 mm) into the bore.
- 2 Apply anti-scoring extreme pressure oil to the mating surfaces, then press it into the bellhousing adapter.
- 3 Use the mounting hardware to secure the bellhousing adapter to the transmission case.
- 4 Use the mounting hardware to secure the bellhousing adapter to the engine.

CP-3 Pump with Separable Shaft



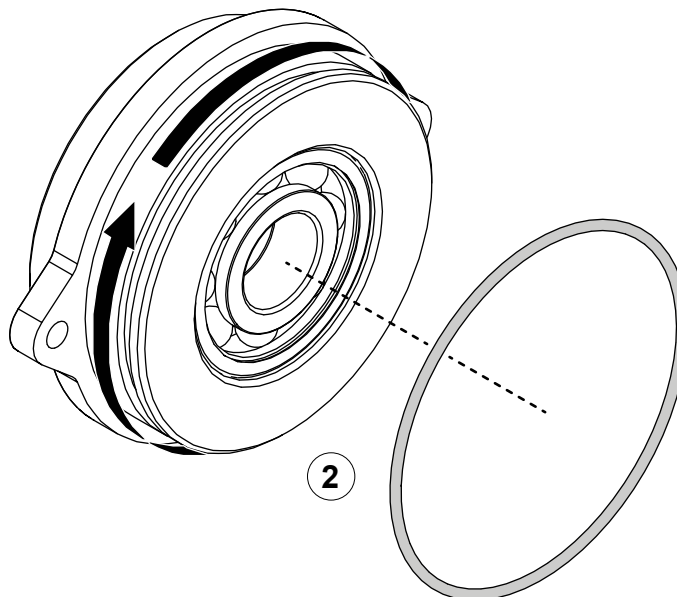
CP-3 Pump with Separable Shaft



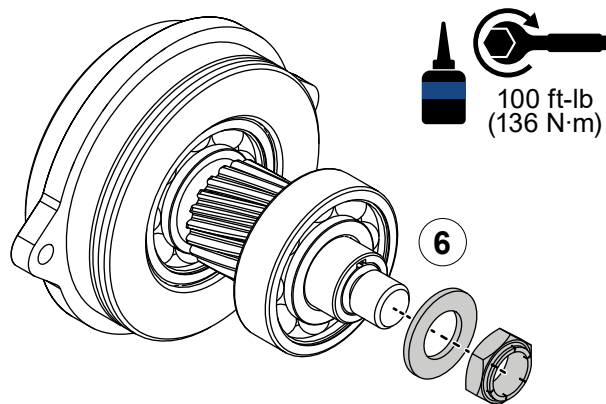
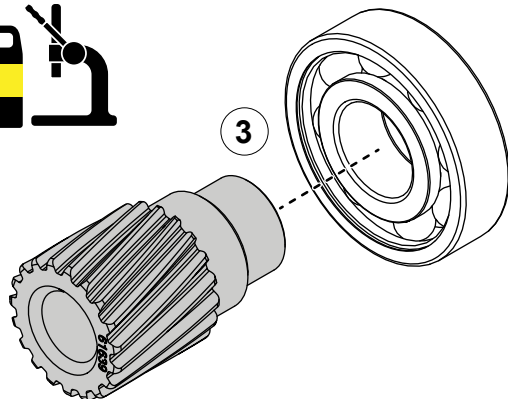
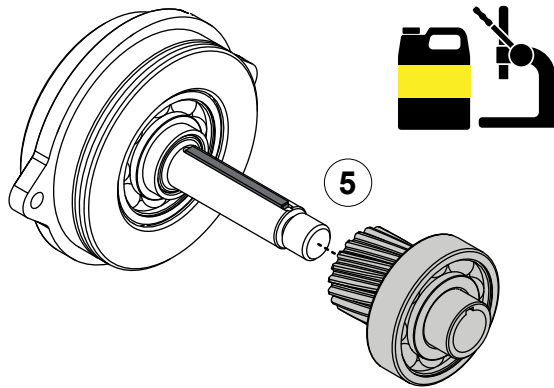
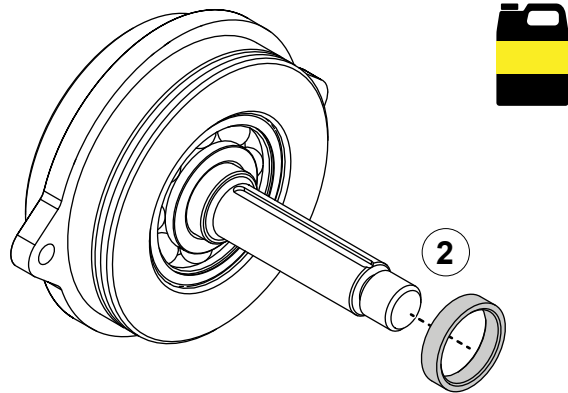
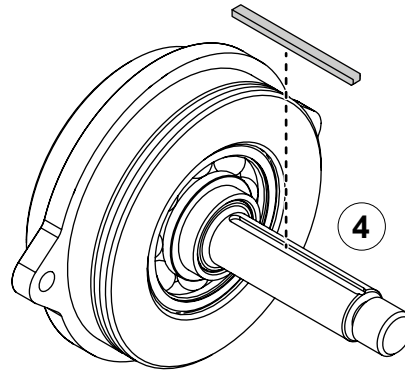
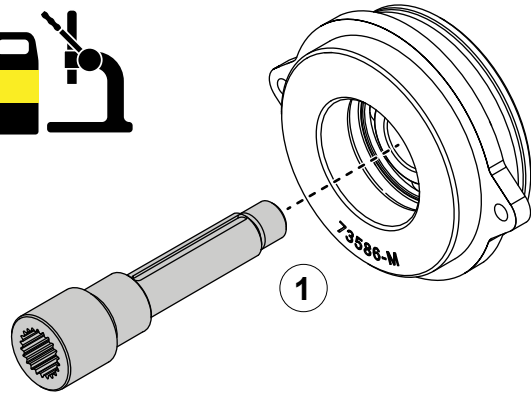
Assembling the Bearing Housing

Use the illustrations and instructions to assemble the bearing housing.

- 1 Apply anti-scoring extreme pressure oil to the mating surfaces, then press the bearing into the bearing housing.
- 2 Apply lubricant to the O-ring groove, then install the O-ring around the bearing housing.



CP-3 Pump with Separable Shaft

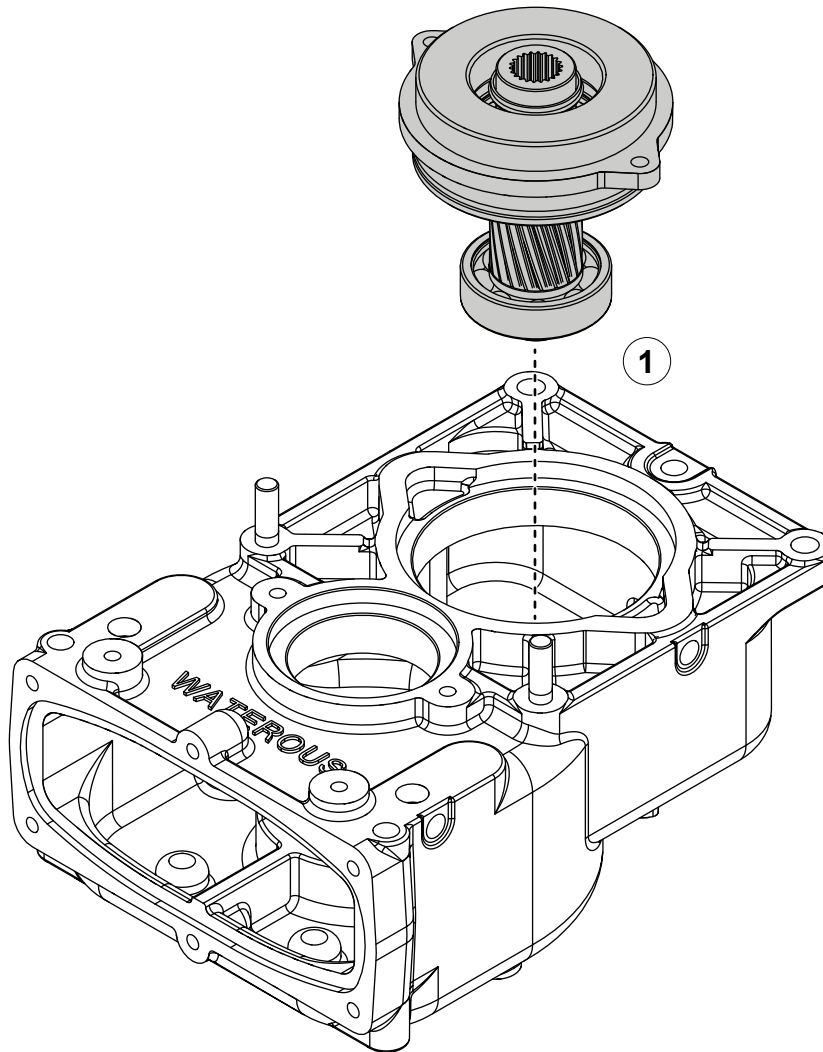


Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply anti-scoring extreme pressure oil to the mating surfaces, then press the driven shaft into the bearing housing.
- 2 Apply anti-scoring extreme pressure oil to the mating surfaces, then install the spacer onto the shaft.
- 3 Apply anti-scoring extreme pressure oil to the mating surfaces, then press the driven gear and bearing together.
- 4 Insert the key into the keyway.
- 5 Apply anti-scoring extreme pressure oil to the mating surfaces, then align the driven gear with the key on the shaft and press the components together.
- 6 To install the driven shaft hardware, do the following:
 - Install the washer.
 - Apply removable threadlocker onto the threads, then install the locknut.
 - Torque the locknut to 100 ft-lb (136 N·m).

CP-3 Pump with Separable Shaft

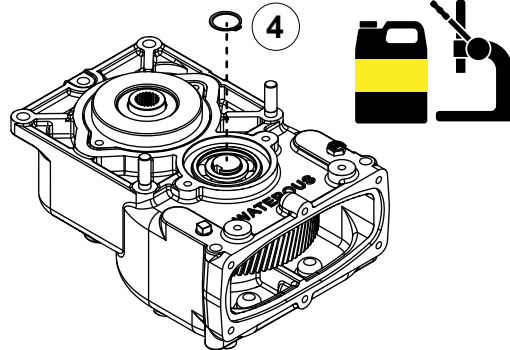
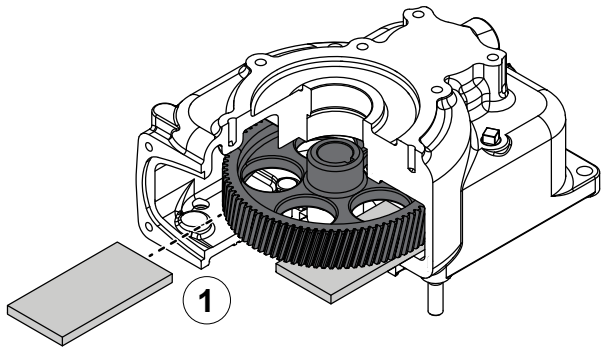


Installing the Driven Shaft Assembly

Use the illustration and instructions to install the driven shaft assembly.

- 1 Apply anti-scoring extreme pressure oil to the mating surfaces, then press the driven shaft assembly into the transmission case.

CP-3 Pump with Separable Shaft

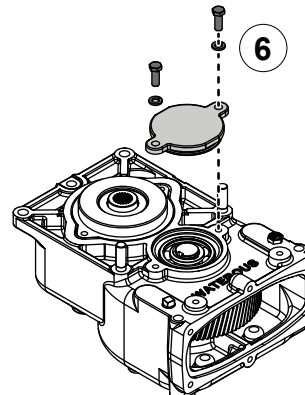
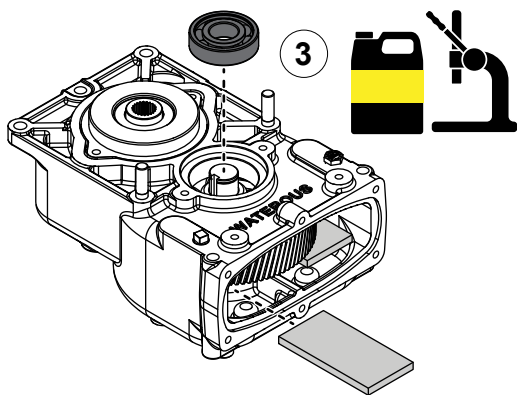
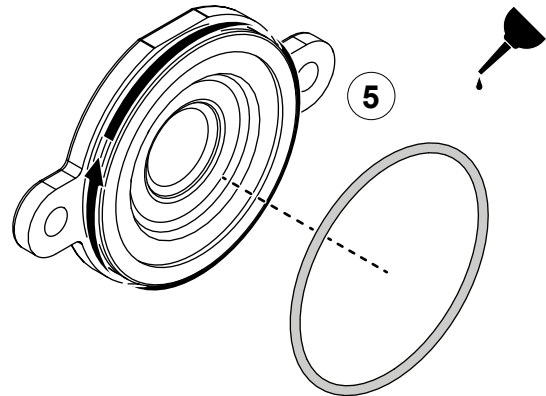
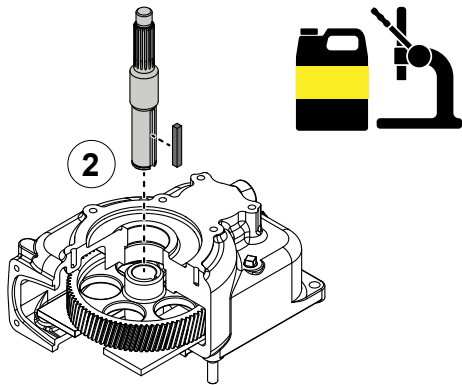


Installing the Drive Components

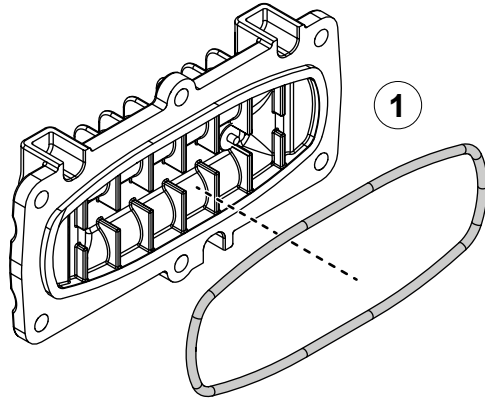
Use the illustrations and instructions to install the drive shaft assembly and associated components.

Note: Refer to "**Support Block Assembly Aid Dimensions**" on page 33 to fabricate the support block assembly aid.

- 1 To install the drive gear, do the following:
 - Align the drive gear in the case with the bearing bore.
 - Position the support blocks under the drive gear.
- 2 To install the drive shaft, do the following:
 - Apply anti-scoring extreme pressure oil to all mating surfaces.
 - Install the key into the keyway, then press the drive shaft into the drive gear.
- 3 To install the bearing, do the following:
 - Flip over the transmission case and reposition the support blocks.
 - Apply anti-scoring extreme pressure oil to all mating surfaces.
 - Press the bearing into the bore.
- 4 Install the retaining ring onto the drive shaft.
- 5 Apply lubricant to the O-ring, then install the O-ring around the bearing cover.
- 6 Use the mounting hardware to secure the bearing cover.



CP-3 Pump with Separable Shaft

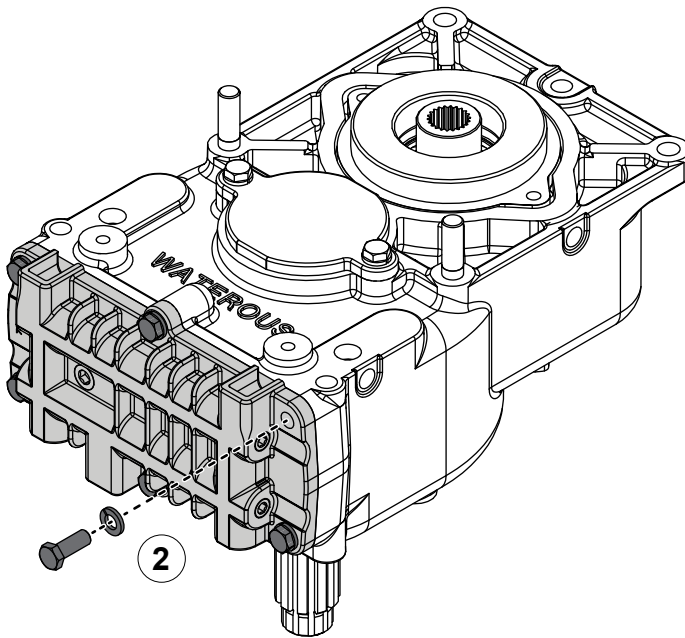


Installing the Oil Pan

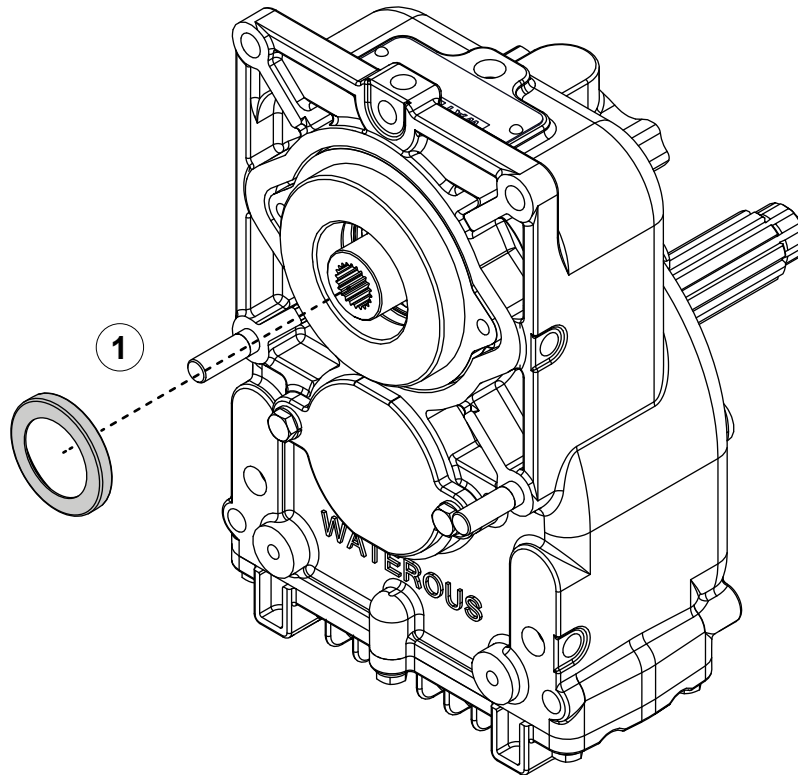
Use the illustrations and instructions to install the oil pan.

Note: Refer to the SPL for your application to determine the orientation of the oil pan.

- 1 Apply lubricant to the O-ring, then install it around the oil pan.
- 2 Use the mounting hardware to secure the oil pan.



CP-3 Pump with Separable Shaft



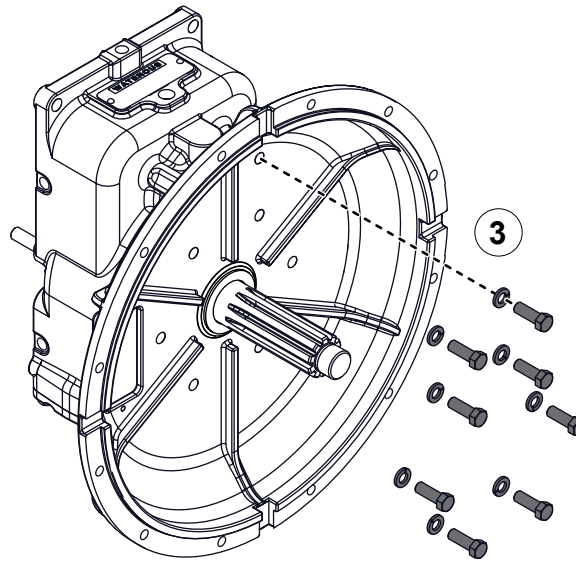
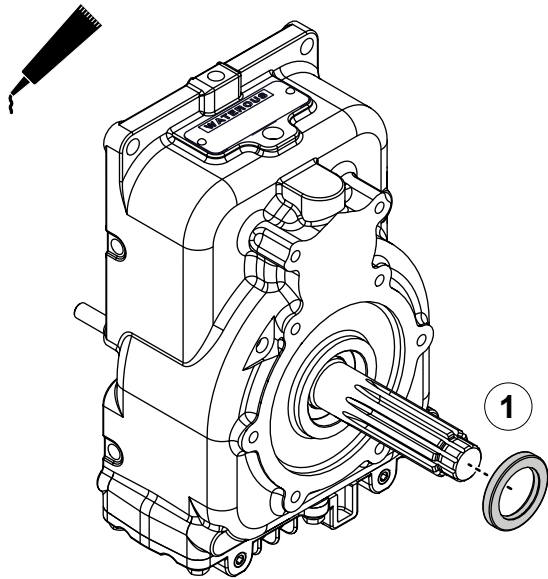
Installing the Oil Seal

Use the illustration and instructions to install the oil seal.

- 1 Apply sealant to the oil seal, then install it onto the impeller shaft.

Note: The oil seal should sit flush with the oil seal housing.

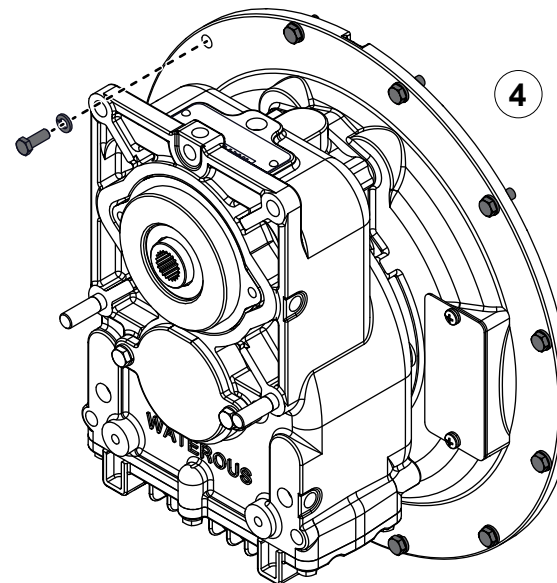
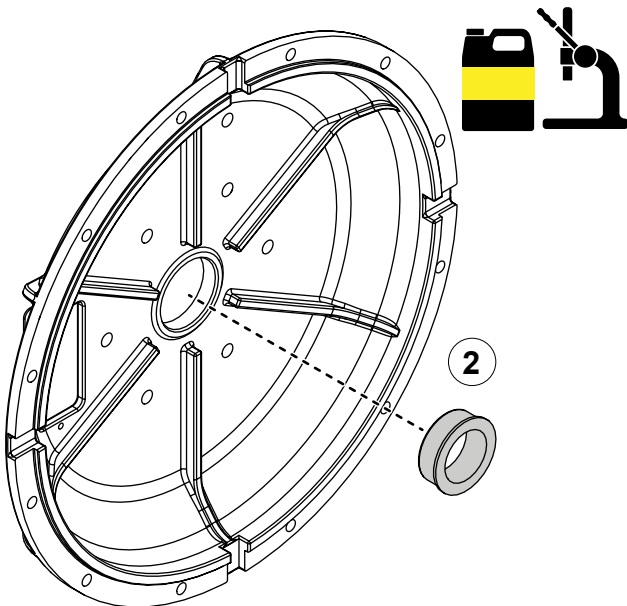
CP-3 Pump with Separable Shaft



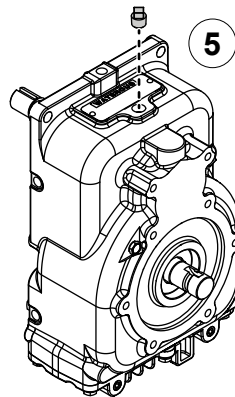
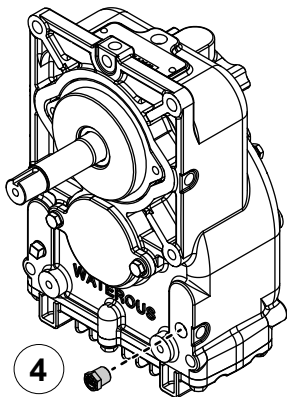
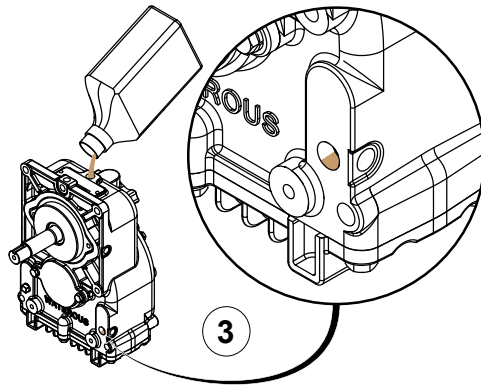
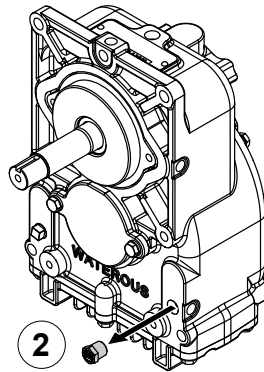
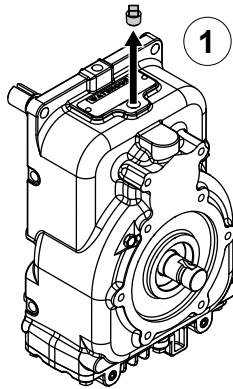
Installing the Bellhousing Adapter

Use the illustrations and instructions to install the bellhousing adapter.

- 1 Apply sealant to the oil seal, then install it onto the shaft.
- 2 Apply anti-scoring extreme pressure oil to the bushing, then press it into the bellhousing adapter.
- 3 Use the mounting hardware to secure the bellhousing adapter to the transmission case.
- 4 Use the mounting hardware to secure the bellhousing adapter to the engine.



Adding Oil to the Transmission



Use the illustrations and instructions to add oil to the transmission.

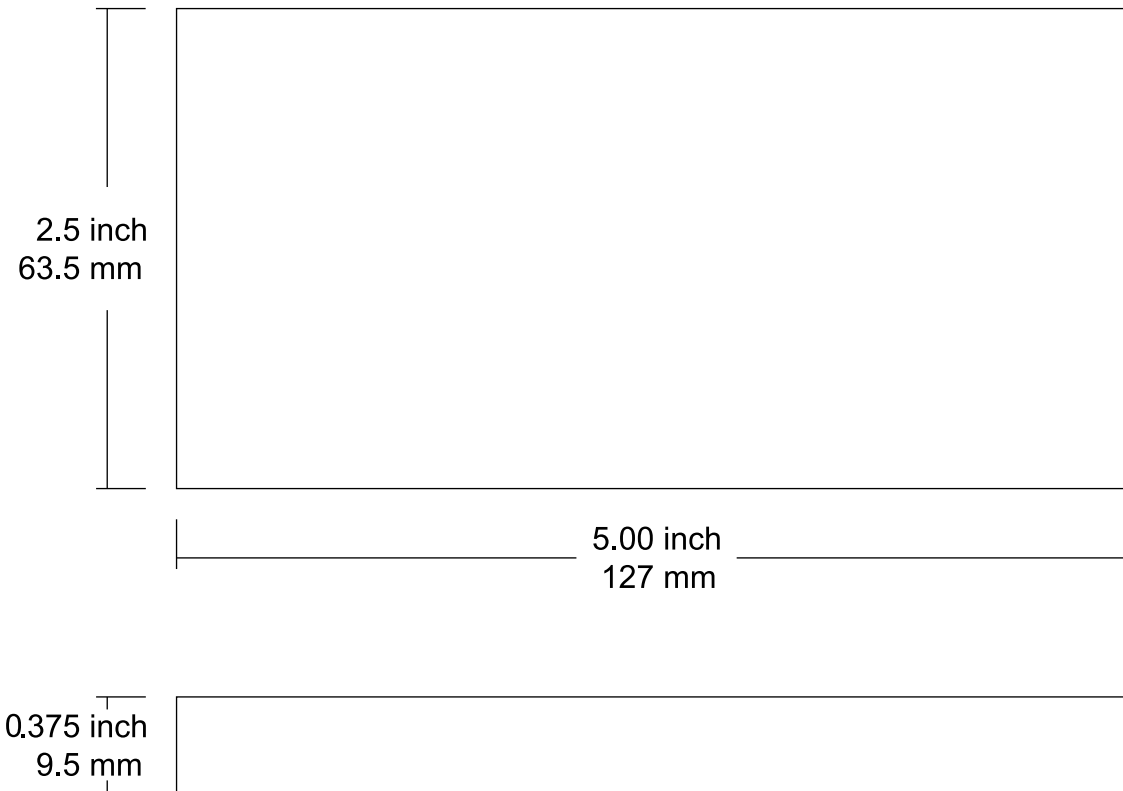
Note: The illustrations may not represent the orientation of your transmission. Refer to the SPL for your application to locate the oil fill and oil level plugs.

Refer to the documentation provided with your equipment to determine the correct type and amount of lubricant for your application.

- 1 Remove and set aside the oil fill plug.
- 2 Remove and set aside the oil level plug.
- 3 Add lubricant to the transmission.
Note: After pouring some oil into the case, allow it to settle before adding more to avoid over-filling.
- 4 Install the oil level plug.
- 5 Install the oil fill plug.

Support Block Assembly Aid Dimensions

Use the illustration to fabricate support blocks to aid installing the drive gear components.



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