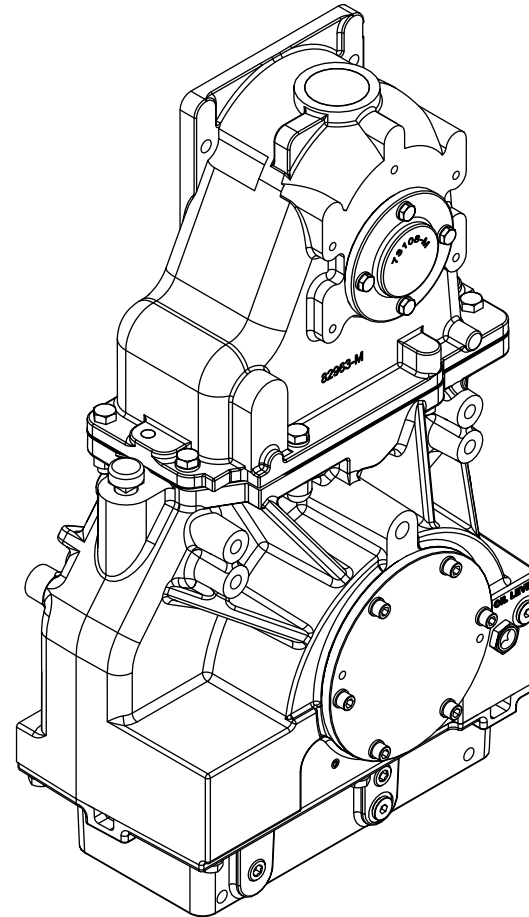
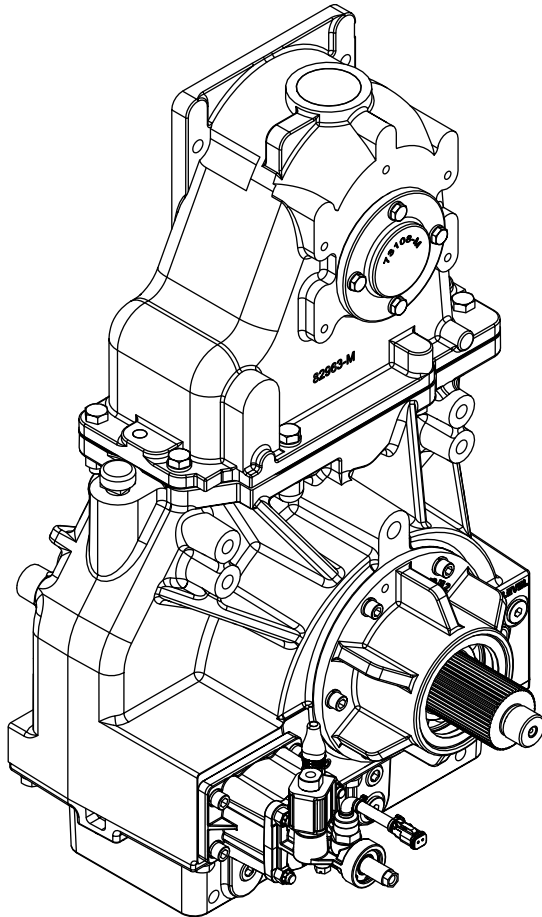


# WATEROUS

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Issue Date: Dec 14, 2023

## C22 Transmissions & TC22 Power Take-Offs Overhaul Instructions





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## Safety Precautions

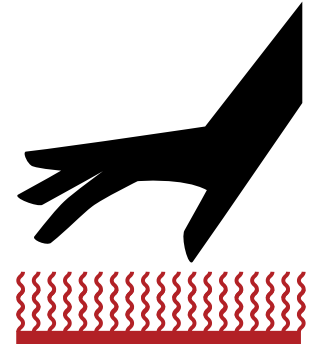
- Read and understand this document before you begin the overhaul.
- Read and understand all the notices and safety precautions.
- Be aware that these instructions are only guidelines and are not meant to be definitive. Contact Waterous when you have questions.
- Do not overhaul this equipment if you 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

### Hot Surface

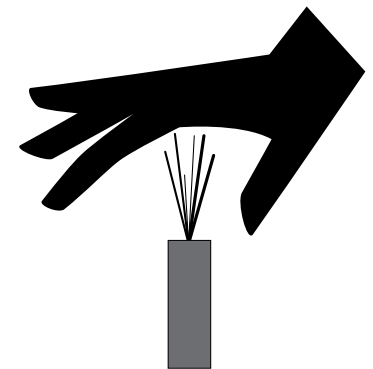
- Hot surfaces can burn you.
- Do not touch the surface during operation—allow it to cool after operating.



## WARNING

### High Pressure

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

#### INTRODUCTION

This section is an overview of the document.

#### OVERVIEW

This section describes the components that make up the system and any available overhaul tools.

#### 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 a section.
- Text **with this appearance** is linked to a reference.

### Printing the Document

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

## Additional Documentation

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

## Symbols

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



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



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



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



Finger tight—This symbol tells you to secure the hardware to finger tight.



Finger tight, then quarter turn—This symbol tells you to secure the hardware to finger tight, then use a wrench to turn the hardware an additional quarter 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 an appropriate lubricant to the part.



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



Tap—This symbol tells you to use a non-marring hammer to gently tap the part into position.



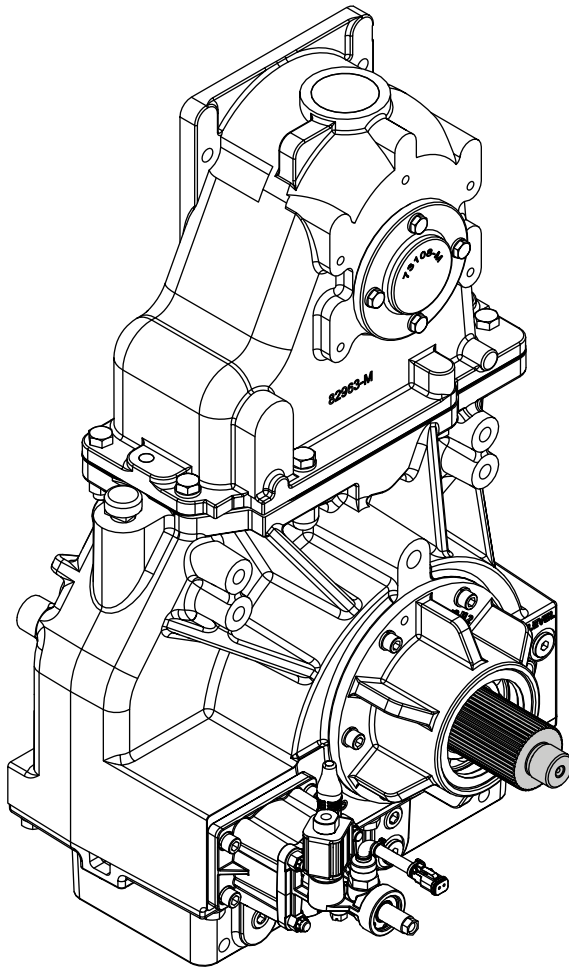
Threadlocker—This symbol tells you to apply an appropriate threadlocker to the part.



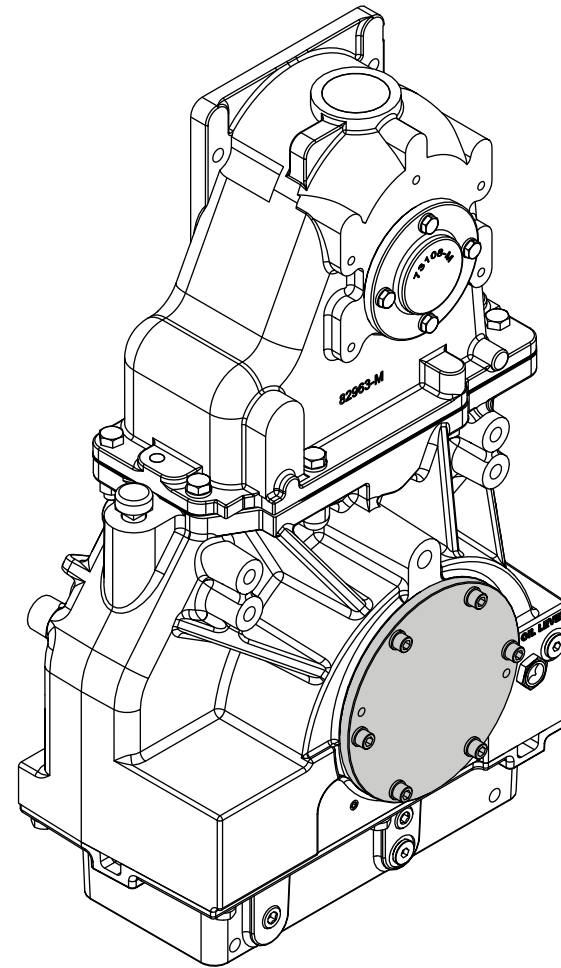
Torque to specification—This symbol tells you to torque the hardware to the specified value.

## Driveline Options

C22 Series transmissions and TC22 Series PTOs are available with an input and output shaft or an input shaft only. The driveline options depend on the pump model and mounting location. Input shaft only configurations do not include a pneumatic shift unit.



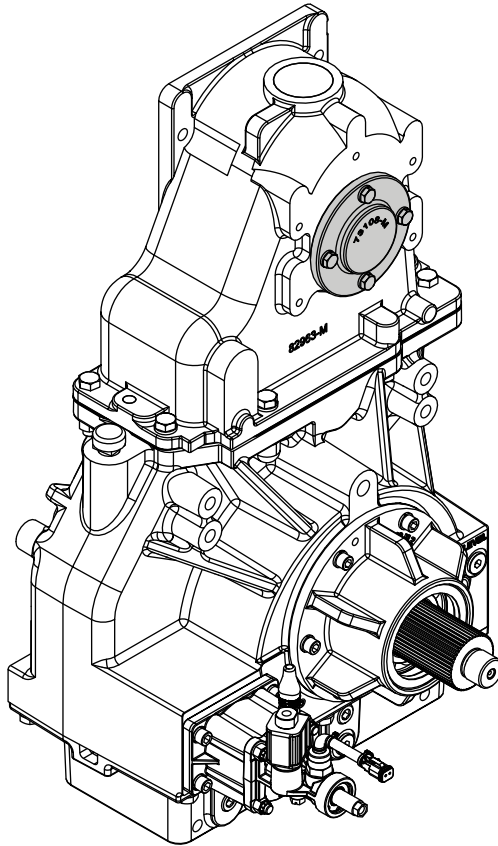
Input and Output Shaft



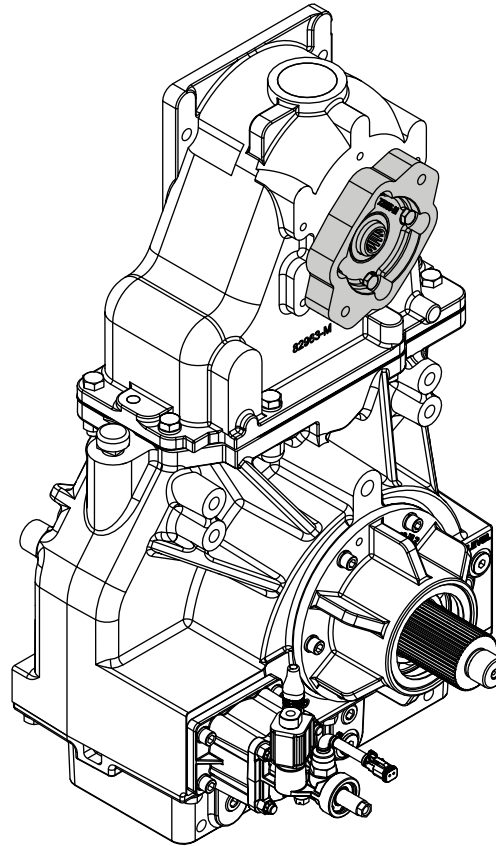
Input Shaft Only

## C22 Driven Shaft Outputs

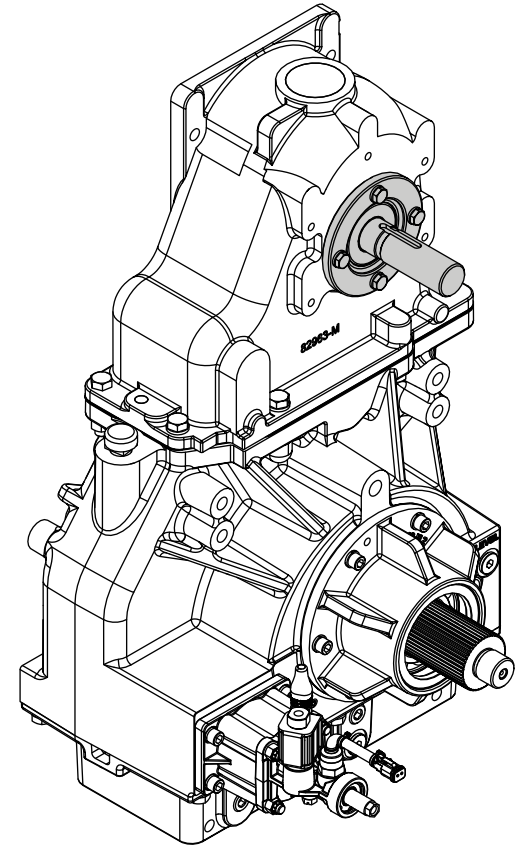
C22 Series transmissions are available with two connection options for the driven shaft output: a hydraulic adapter or a CAFS drive. Additionally, the driven shaft can be purchased with no output.



None



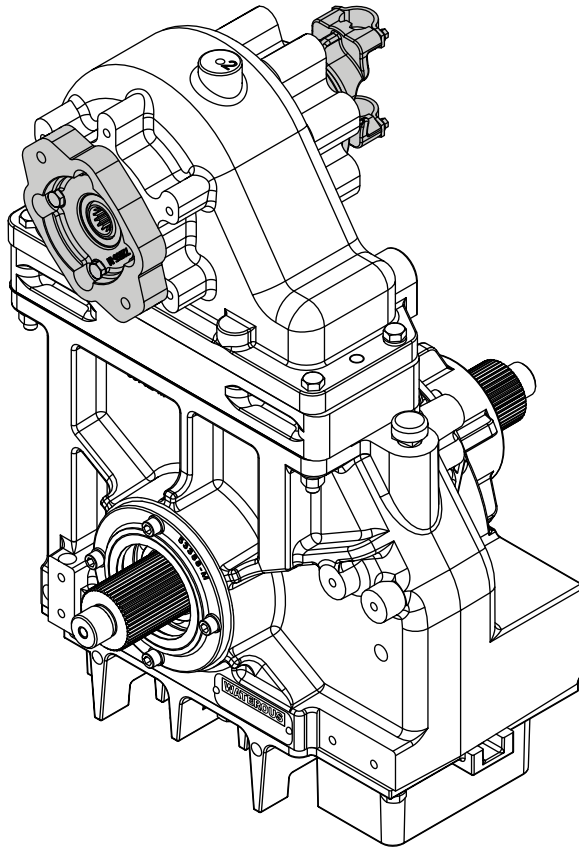
Hydraulic Adapter



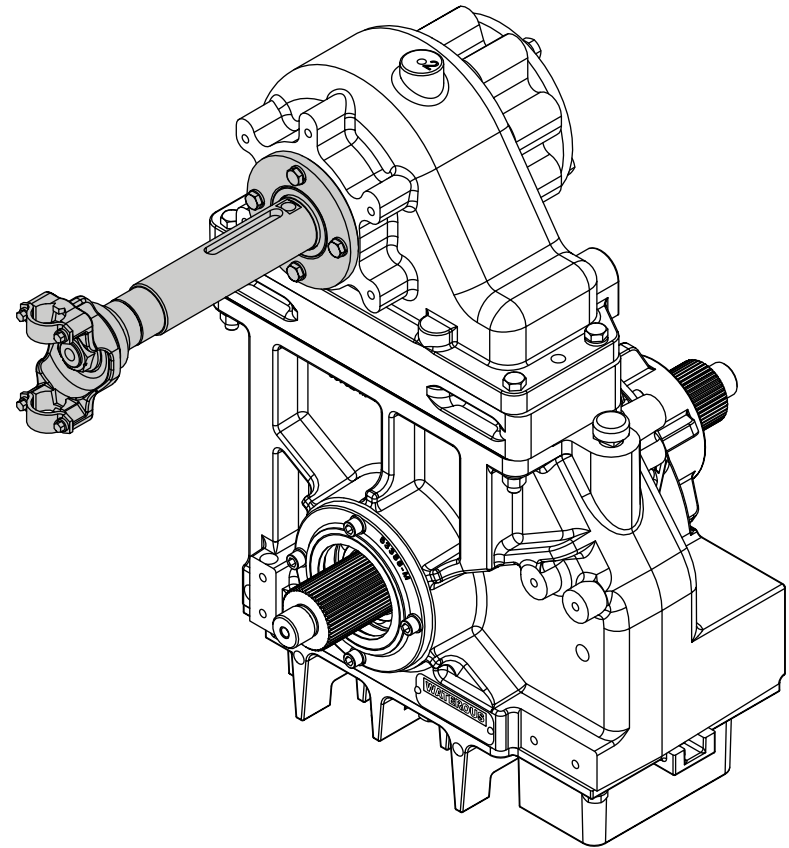
CAFS Drive

## TC22 Driven Shaft Outputs

TC22 Series power take-offs are available with three connection options for the driven shaft output: a hydraulic adapter, an end yoke, or a CAFS drive. Output connections can be placed on either or both sides of the PTO to suit your application.



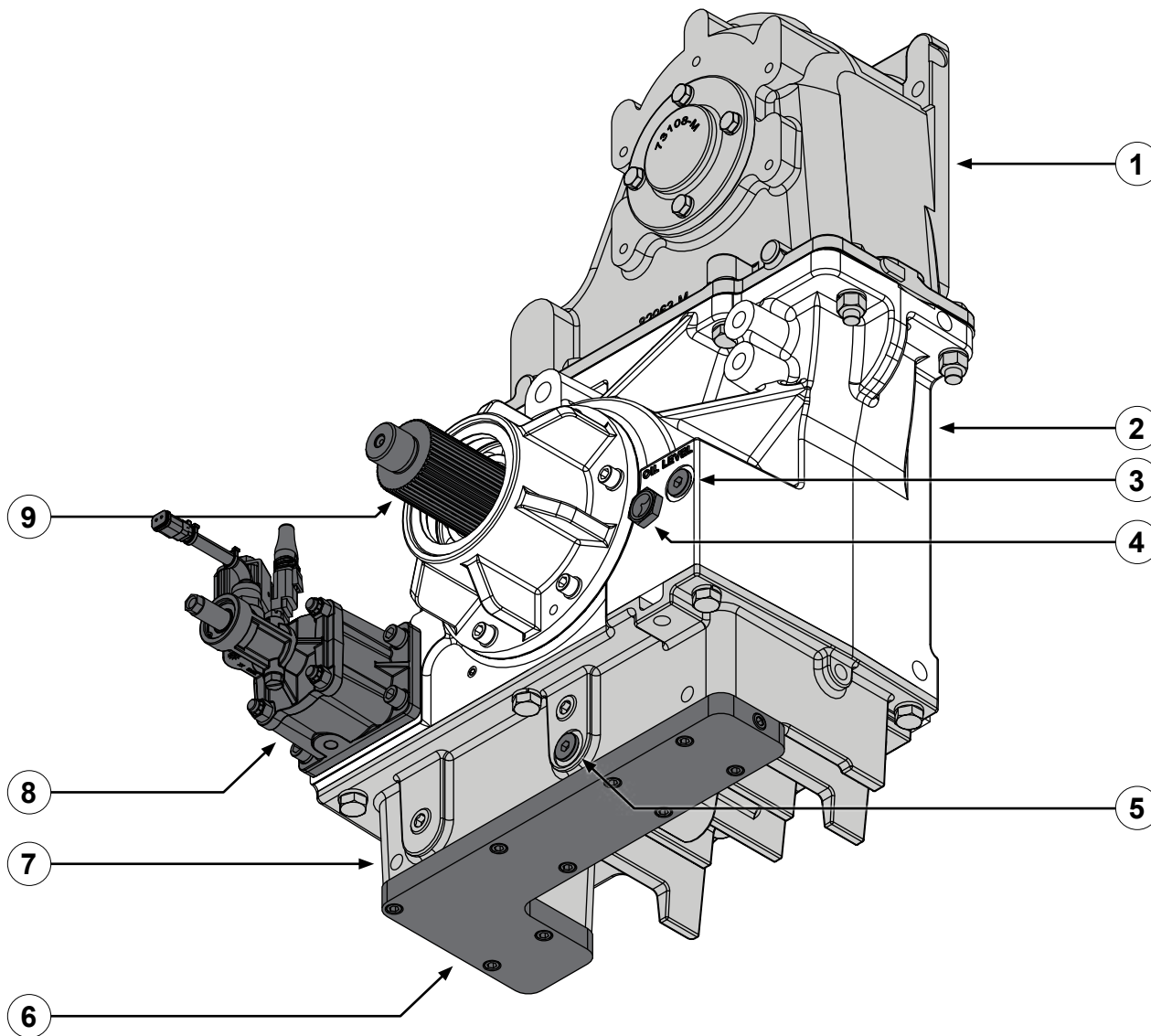
Dual Output (Hydraulic Adapter and End Yoke)



CAFS Drive

## Identifying Exterior Components

Use the illustration to identify various components on the transmission.

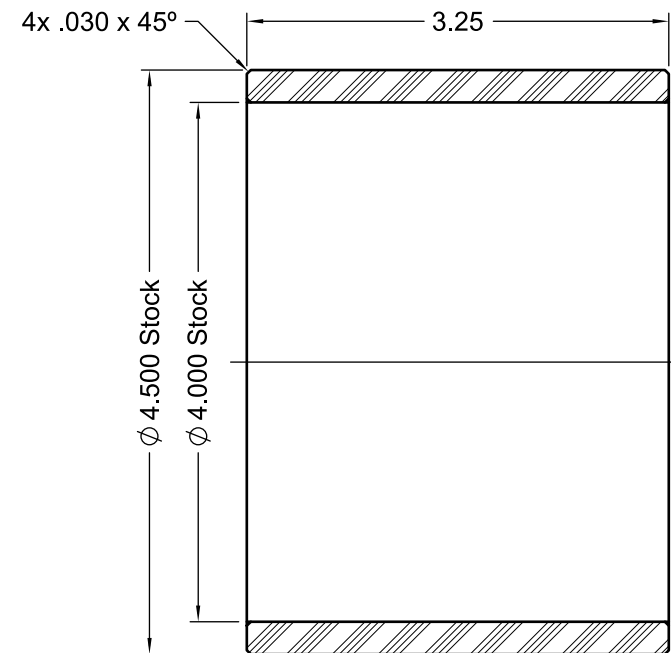
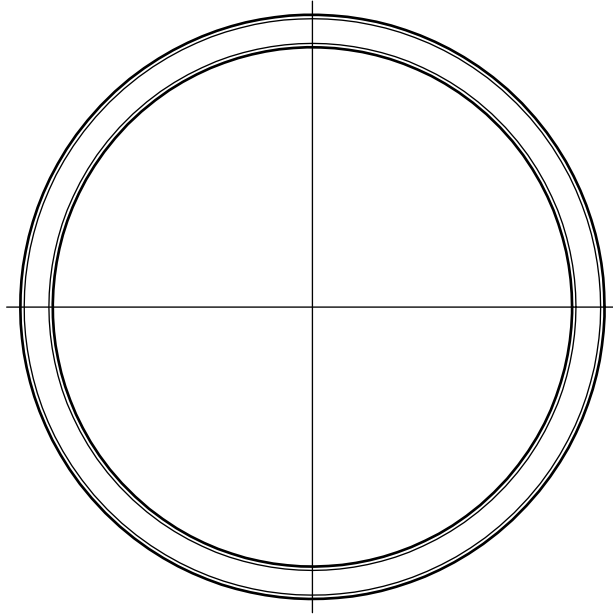


- |   |                           |
|---|---------------------------|
| 1 | Transmission cap          |
| 2 | Transmission case         |
| 3 | Magnetic plug—oil fill    |
| 4 | Oil level sight plug      |
| 5 | Magnetic plug—oil drain   |
| 6 | Oil cooler plate—optional |
| 7 | Transmission pan          |
| 8 | Pneumatic shift unit      |
| 9 | Driveline                 |



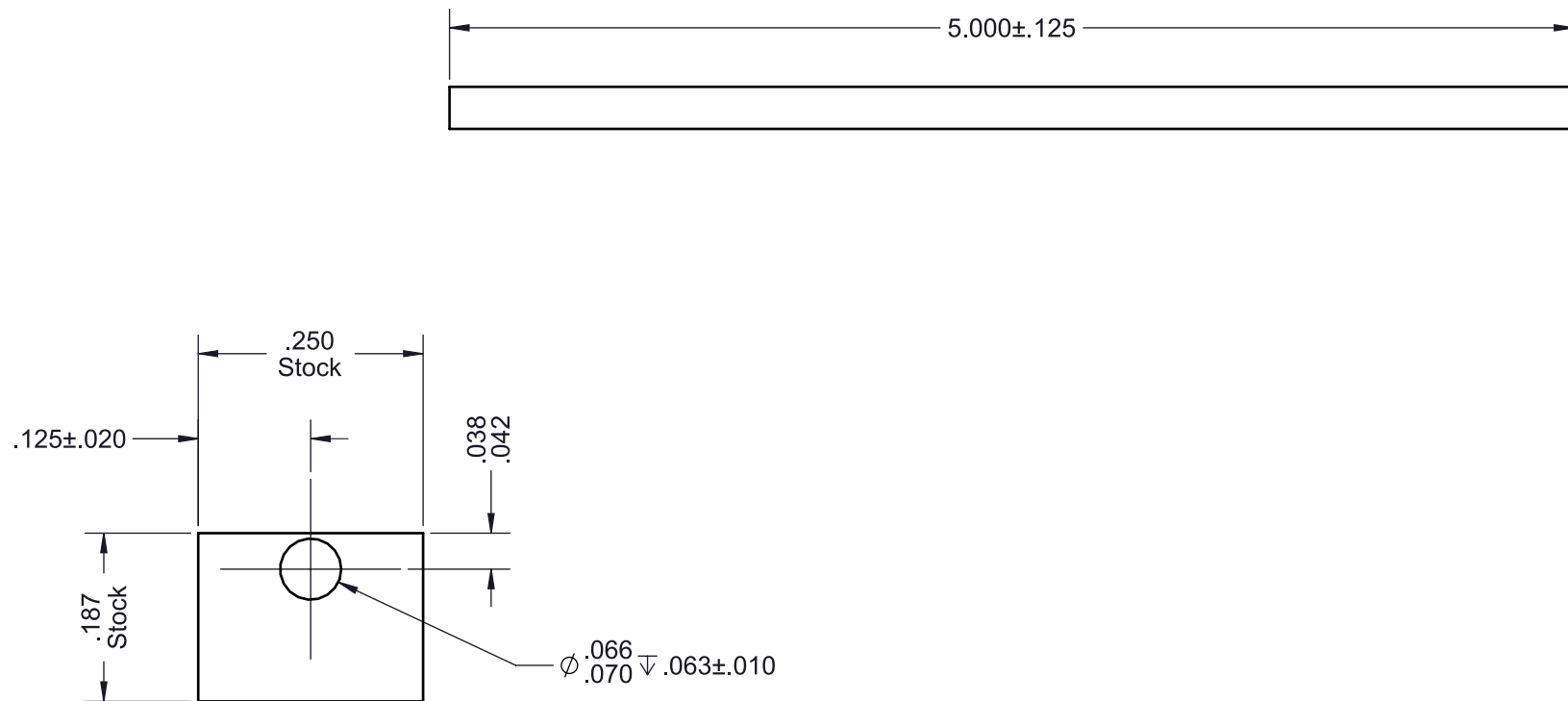
## Drive Shaft Removal Sleeve

An optional drive shaft removal sleeve is available (63431) is available from Waterous to support the drive shaft components during disassembly. Use schedule 40 PVC pipe to fabricate your own—dimensions shown in inches.



## Pin Installation Tool

An optional pin installation tool (53402) is available from Waterous to aid in installing the spirol pin into the drive chain connecting link. Use steel to fabricate your own—dimensions shown in inches.



## 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 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 transmission. Surface debris can transfer into the transmission 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 to 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 remove 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.

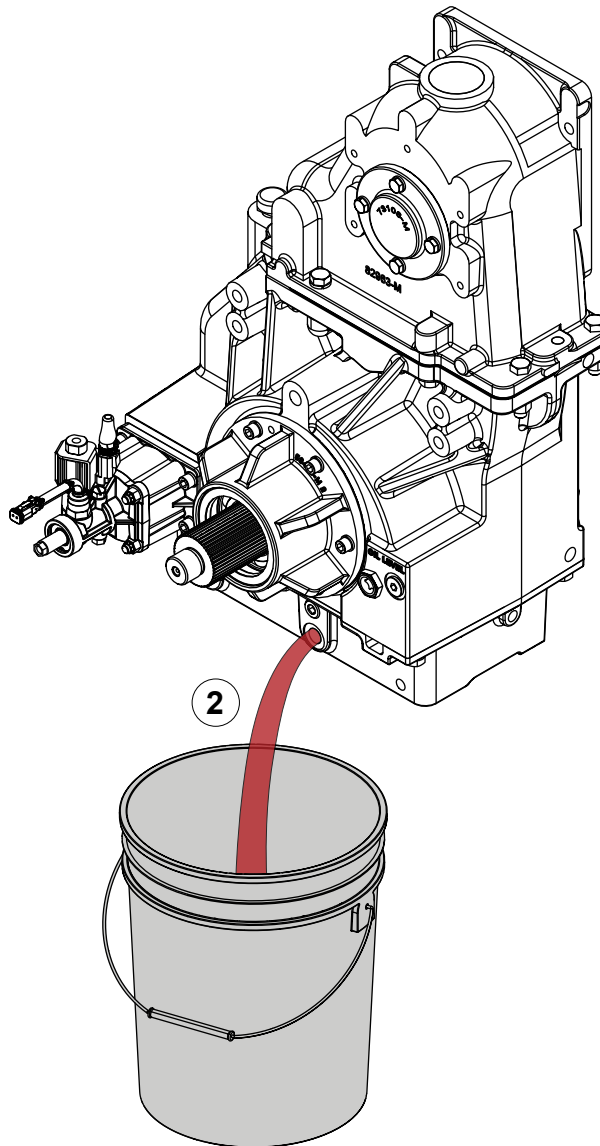
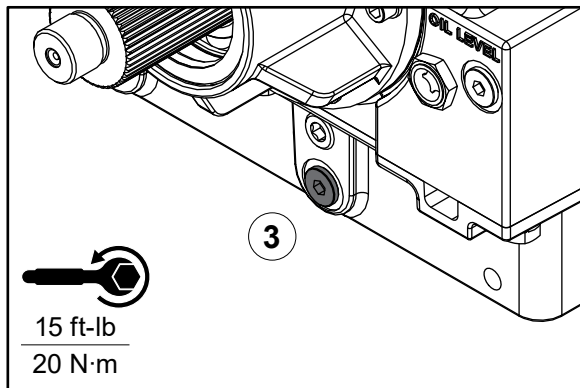
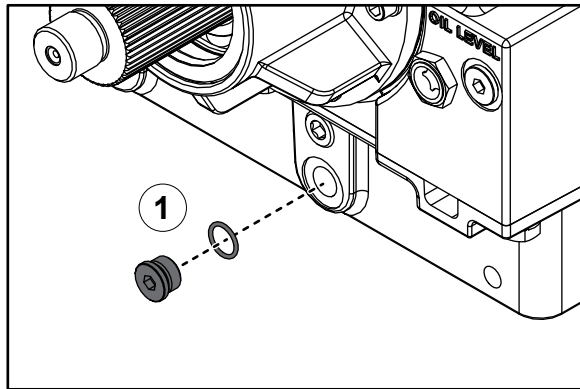
## Disassembling the Transmission Components

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

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

- The SPL specific to your application is determined by the following:
  - The pump connected to the transmission.
  - The transmission drive method.
  - Whether the transmission drives a CAFS compressor.
- 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 your local regulations.

## Draining the Lubricant



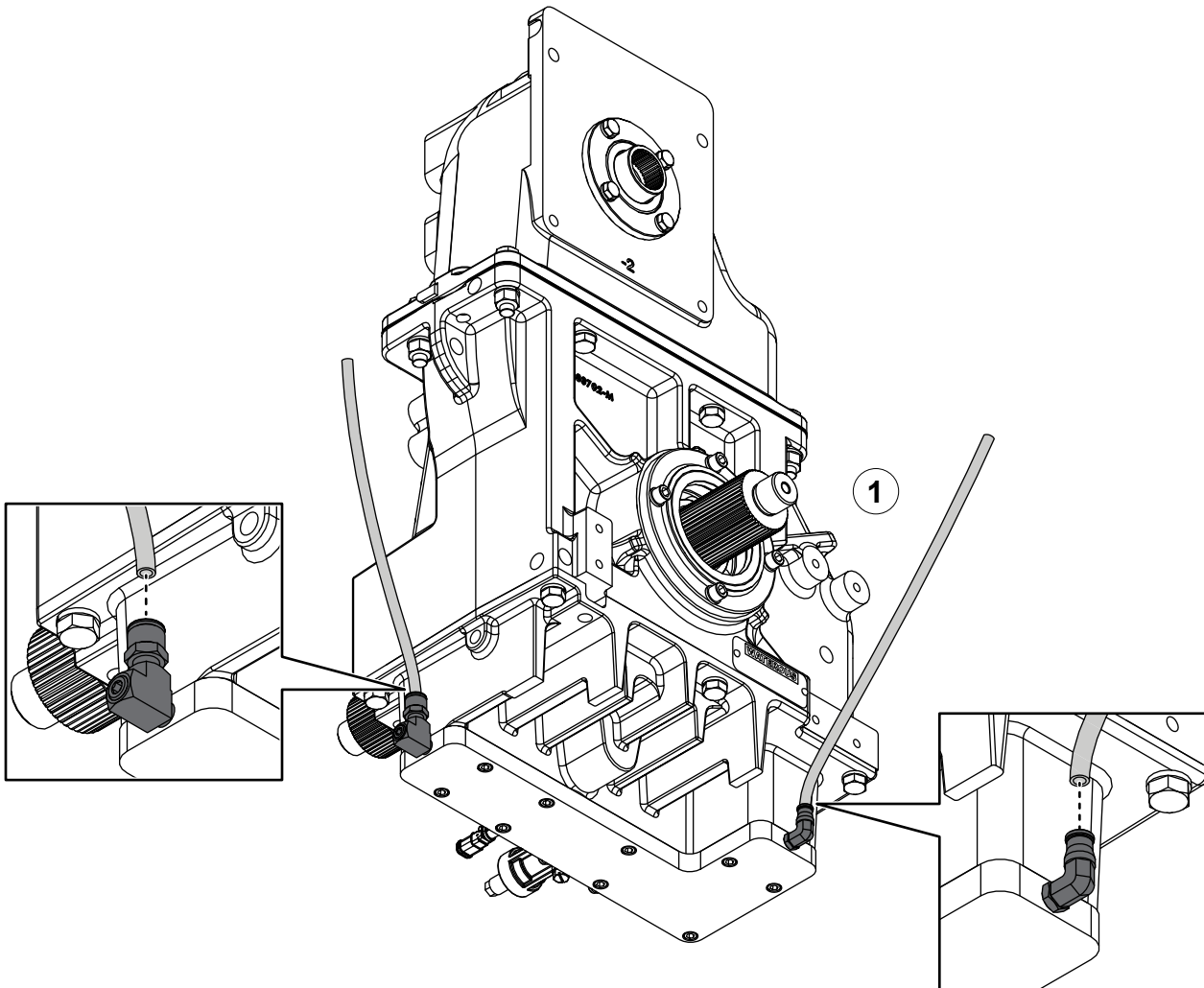
Use the illustrations and instructions to drain the lubricant from the transmission.

- 1 Place a suitable container under the transmission to collect the drained lubricant, then remove the oil drain plug. Clear any debris that may have adhered to the drain plug. If needed, replace the O-ring.
- 2 Allow the lubricant to drain.  
**Note:** It may take several minutes for the lubricant to completely drain from the transmission's internal chambers.
- 3 Install the oil drain plug.  
**Note:** Make sure that you do not over-tighten the plug.

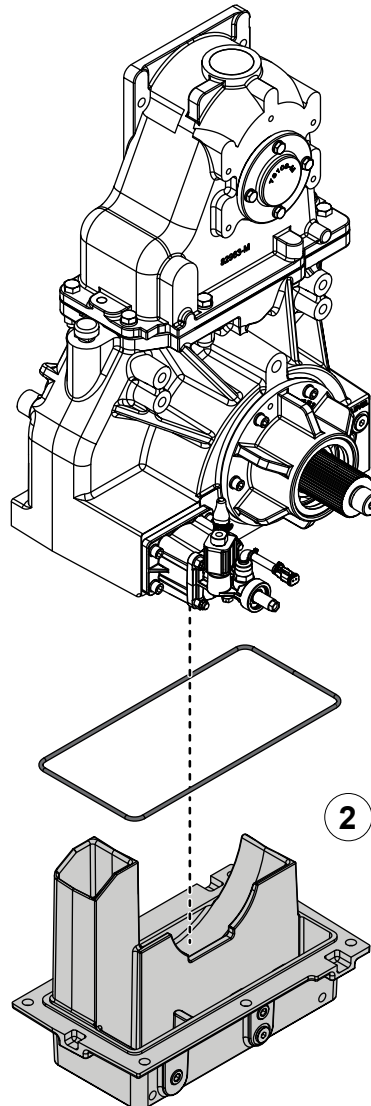
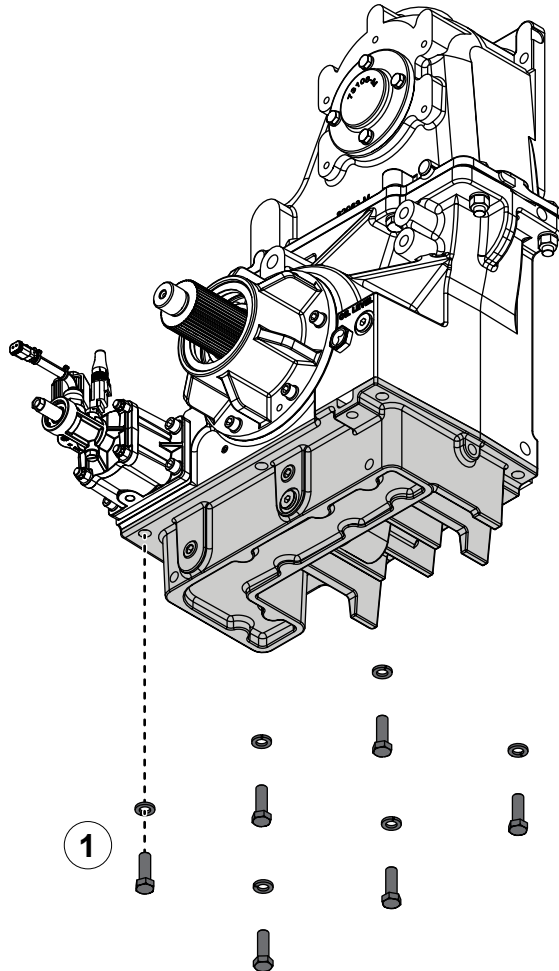
## Disconnecting the Cooling Lines

If included in your application, use the illustration and instructions to disconnect the cooling lines.

- 1 Drain any water in the cooling lines, then remove the tubing from the fittings on the cooler plate.



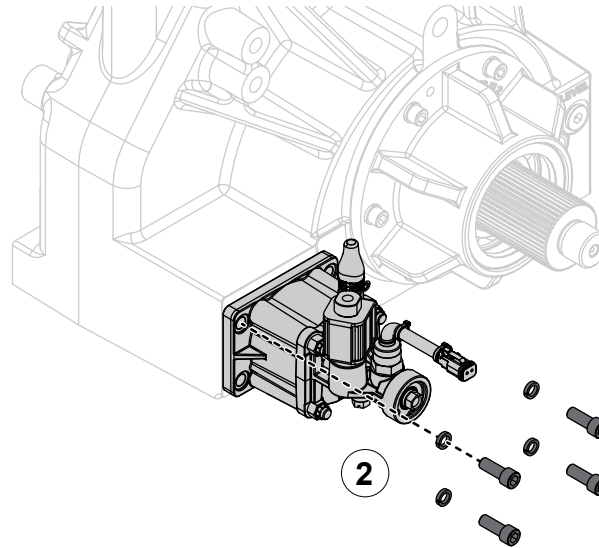
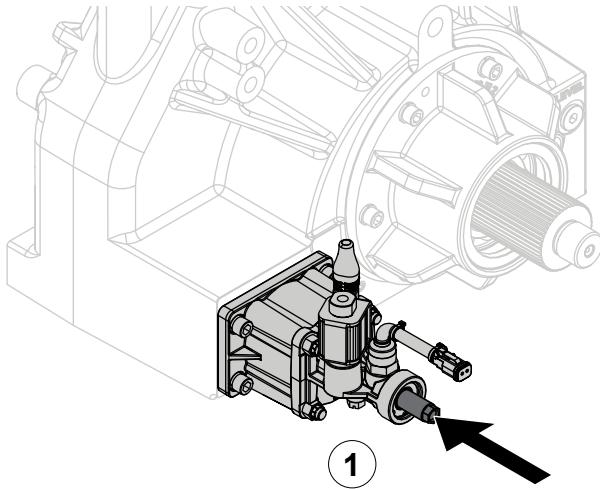
## Removing the Transmission Pan



Use the illustrations and instructions to remove the transmission pan.

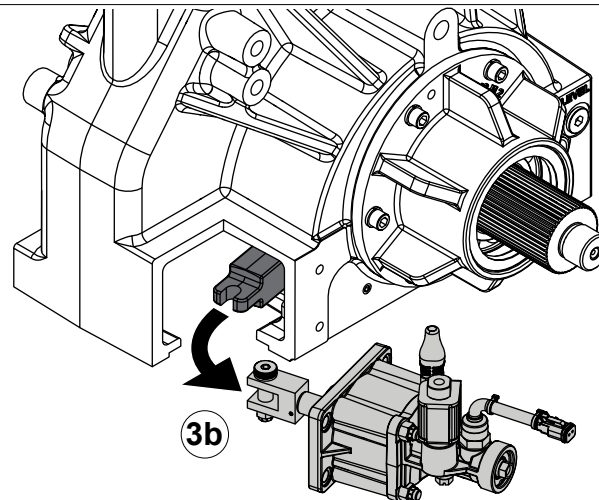
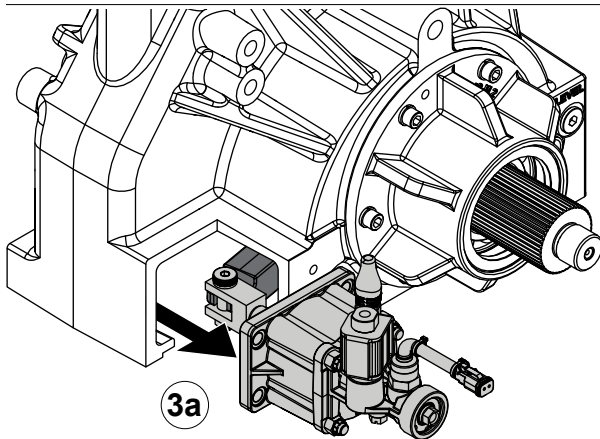
- 1 Remove the hardware securing the transmission pan to the case.
- 2 Remove the transmission pan, then remove and discard the transmission pan gasket.

## Removing the Pneumatic Shift Unit

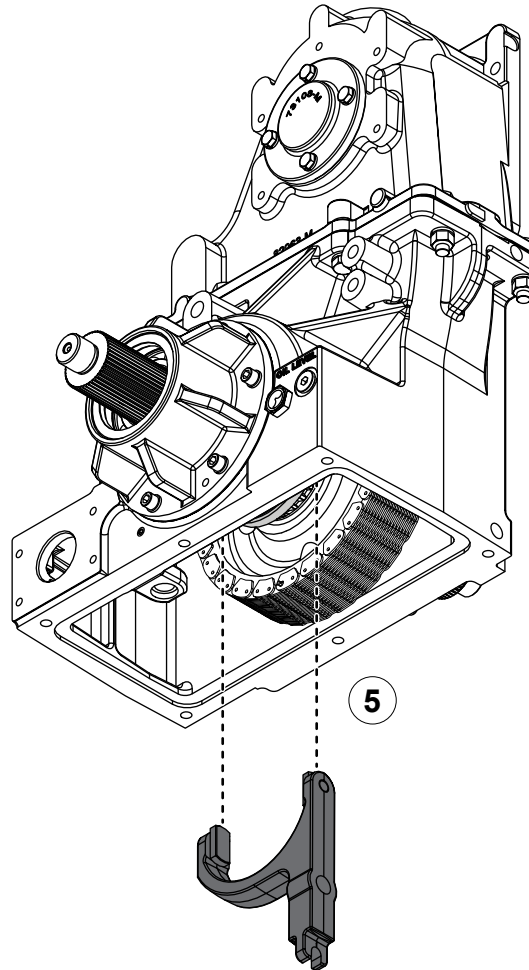
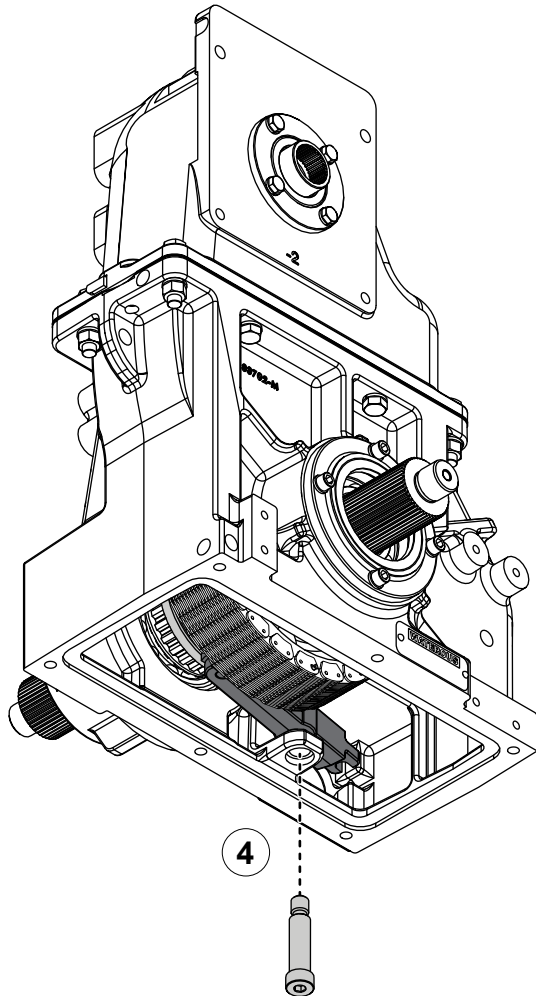


If included in your application, use the illustrations and instructions to remove the pneumatic shift unit.

- 1 Move the shift unit into road position.
- 2 Remove the shift unit hardware.
- 3
  - a. Pull the shift unit away from the case.
  - b. Tilt the shift unit toward the center of the case to disengage the clevis.



## Removing the Pneumatic Shift Unit

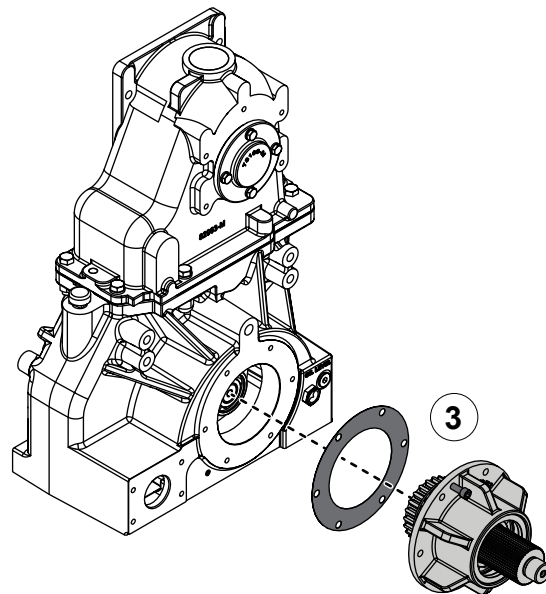
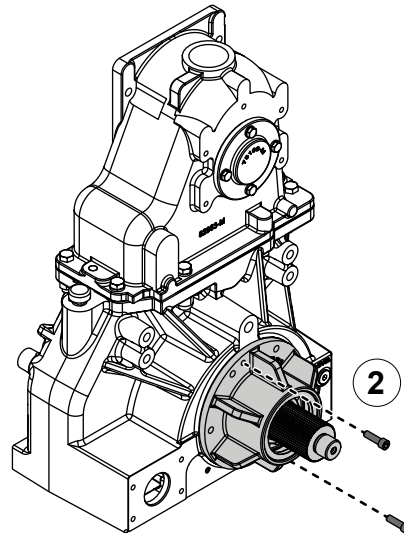
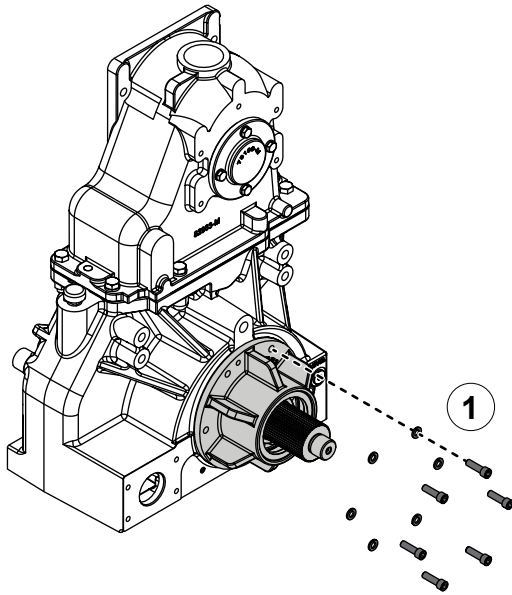


If included in your application, use the illustrations and instructions to remove the pneumatic shift unit.

- 4 Move the shift collar into pump position, then remove and discard the shoulder screw.
- 5 Remove the shift fork.



## Input and Output Shaft Configurations

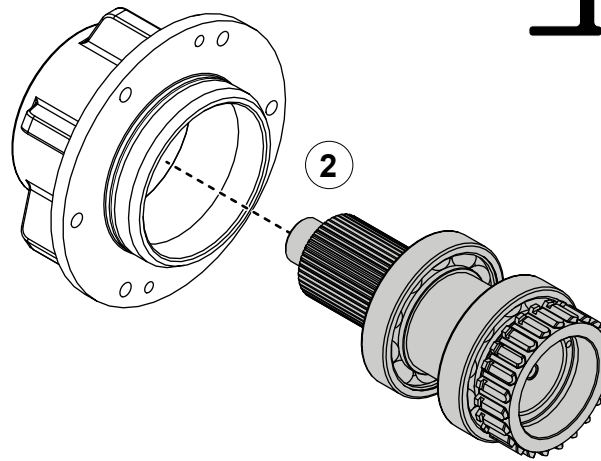
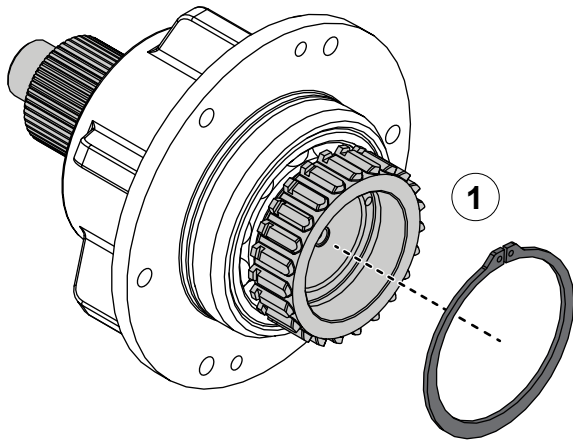


### Removing the Output Shaft

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

- 1 Remove the output shaft housing hardware.
- 2 Use the screws that you just removed (or locally sourced 3/8-16 jacking screws) to separate the output shaft housing from the case.
- 3 Remove the output shaft assembly, then remove the shims.

## Input and Output Shaft Configurations



### Disassembling the Output Shaft

Use the illustrations and instructions to disassemble the output shaft assembly.

1 Remove the retaining ring from the output shaft.

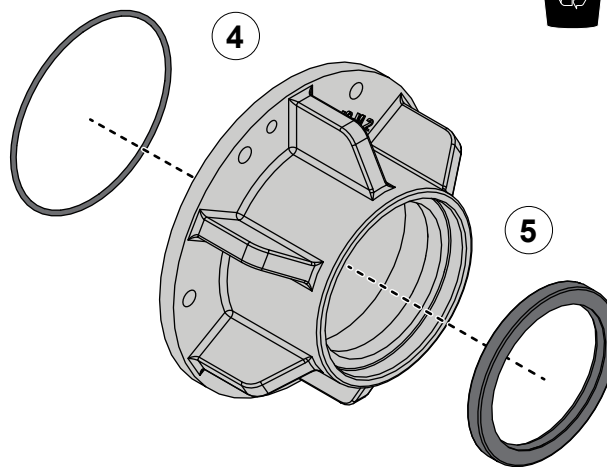
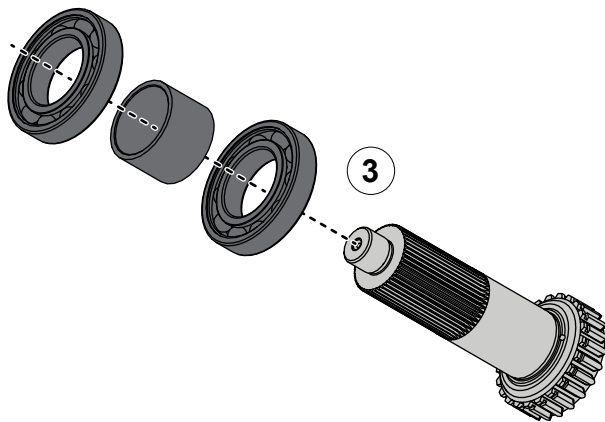
2 Press the output shaft from the housing.

**Note:** If the pilot bearing sticks inside the output shaft bore, use a punch to tap it out through the bore access holes.

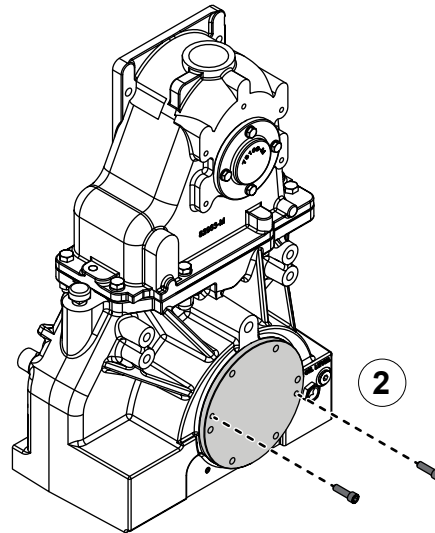
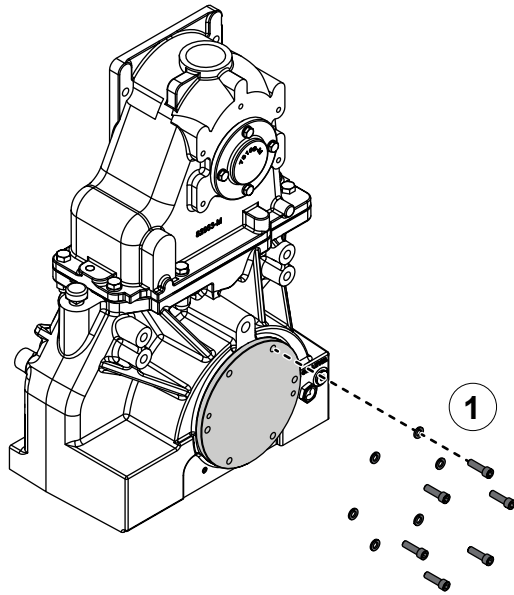
3 Remove the outer bearing, spacer, and inner bearing from the shaft.

4 Remove and discard the O-ring.

5 Remove and discard the oil seal.



## Input Shaft Only Configurations



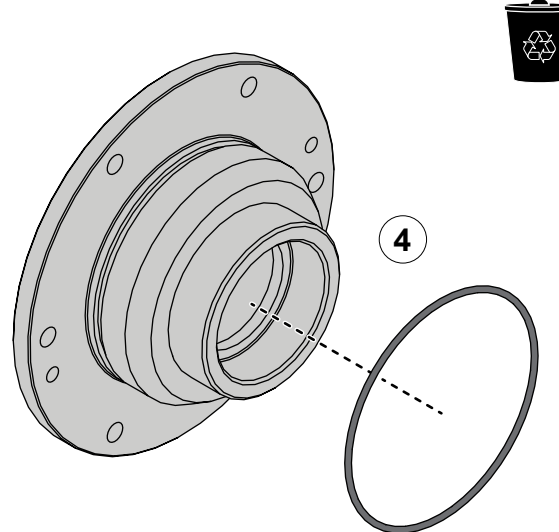
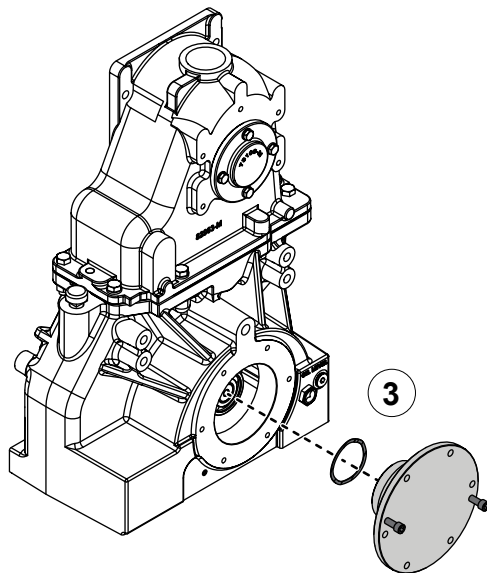
### Removing the Output Bearing Housing

Use the illustrations and instructions to remove the output bearing housing.

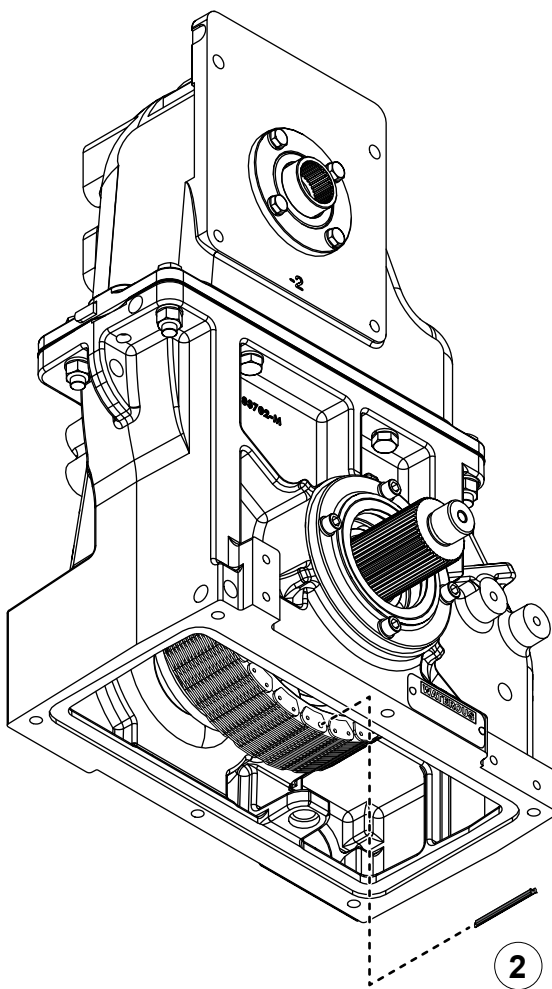
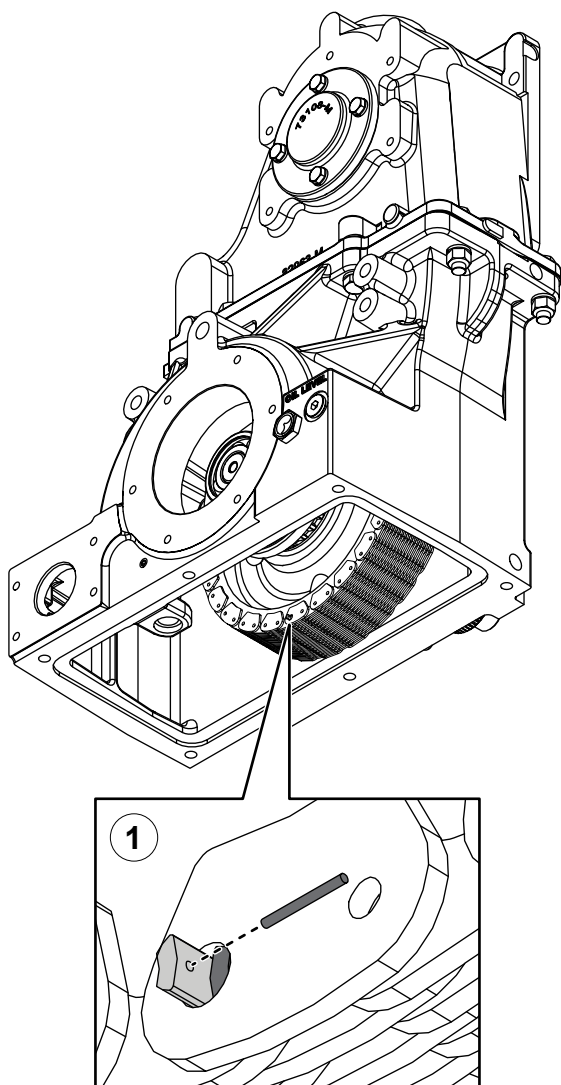
- 1 Remove the bearing housing hardware.
- 2 Use the screws that you just removed (or locally sourced 3/8-16 jacking screws) to separate the bearing housing from the case.
- 3 Remove the bearing housing, then remove the wave spring.

**Note:** If the pilot bearing comes out with the bearing housing, a bearing puller can be used to remove it. The bearing will most likely be damaged and made unusable if removed using this method.

- 4 Remove and discard the O-ring.



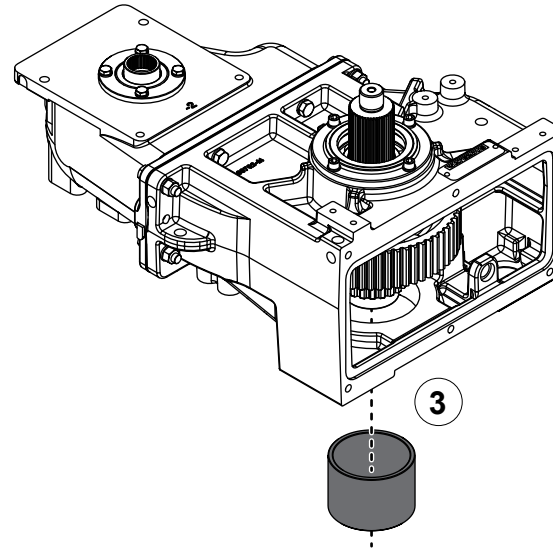
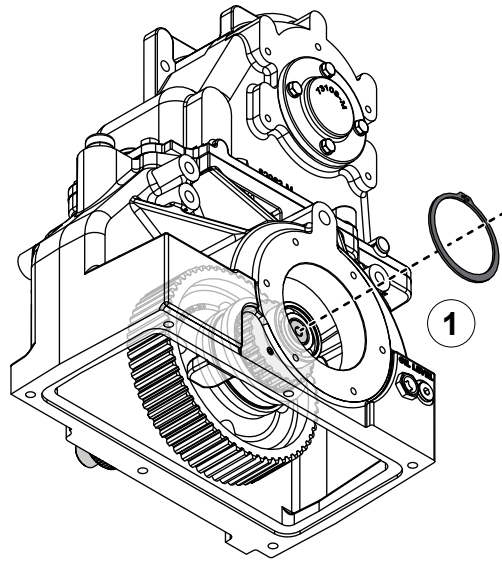
## Removing the Chain



Use the illustrations and instructions to remove the drive chain.

- 1 Locate the connecting link, then remove the spiral pin.
- 2 Remove the connecting pin and rocker, then remove the chain from the case.

## Removing the Drive Shaft

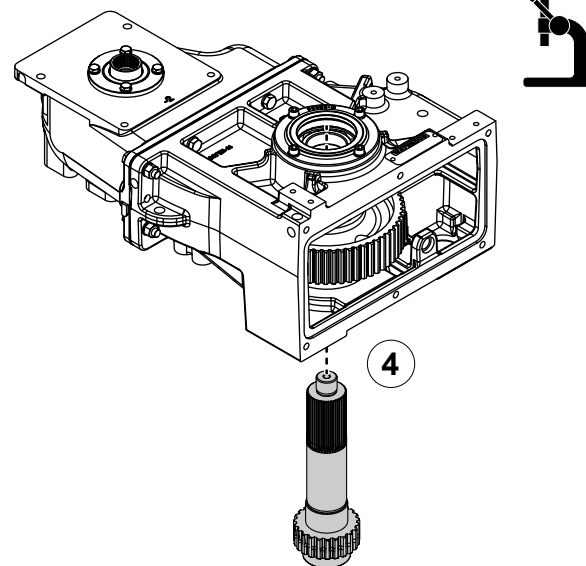
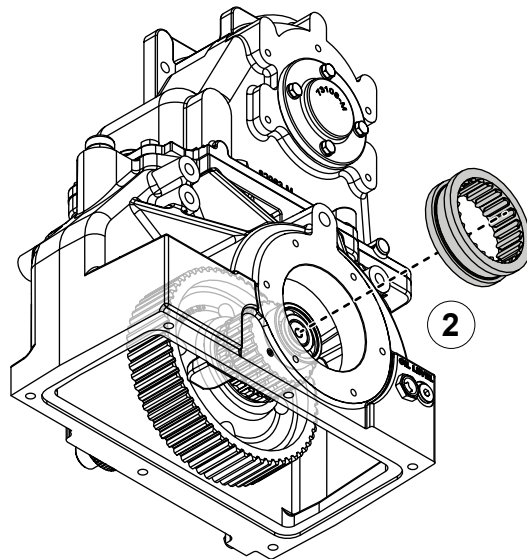


Use the illustrations and instructions to remove the drive shaft assembly.

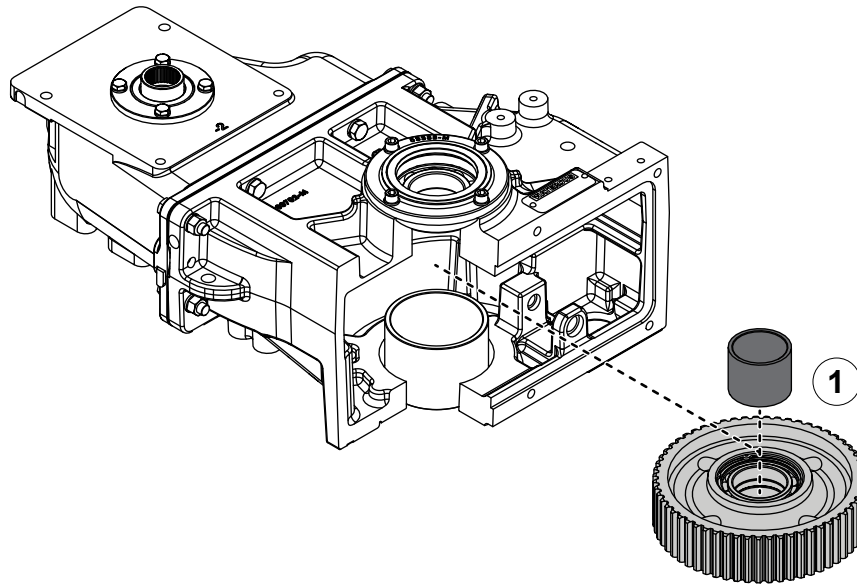
- 1 Remove the retaining ring from the drive shaft.

**Note:** This step is only required for input shaft only driveline configurations.

- 2 Remove the shift collar.
- 3 Install the drive shaft removal sleeve below the shift collar.
- 4 Make sure that the case is level, then press the drive shaft out of the case.

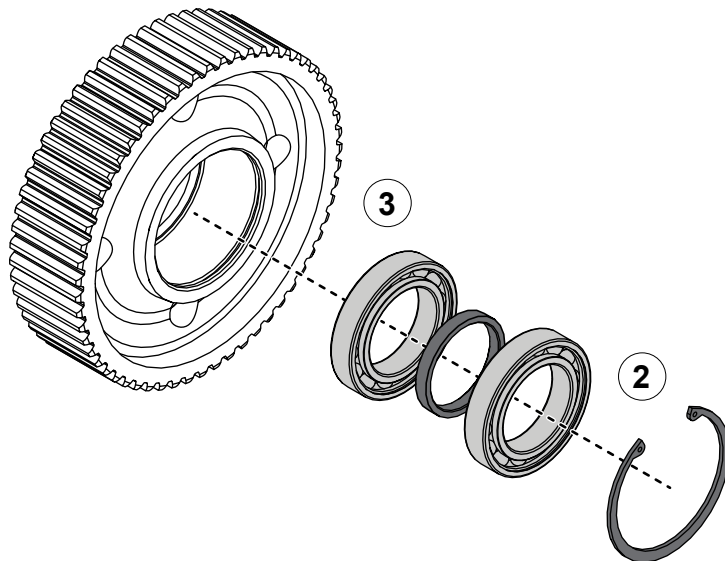


## Removing the Drive Components



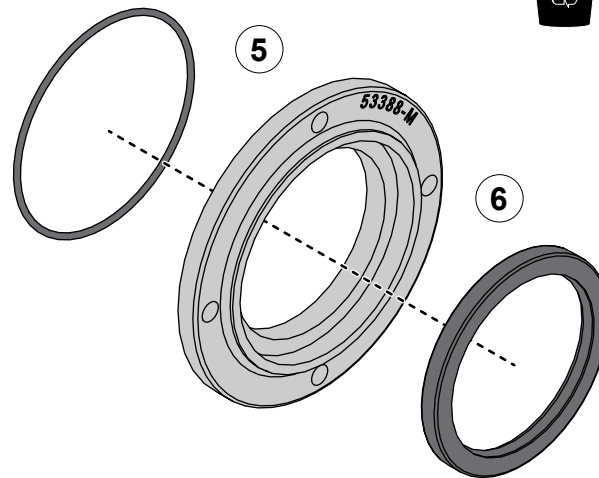
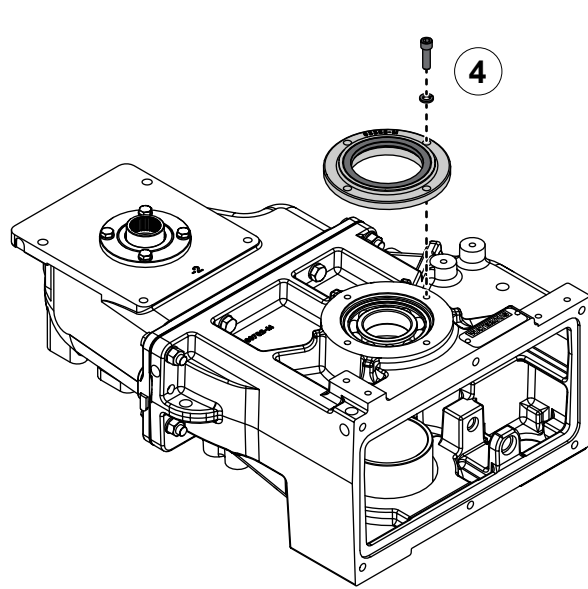
Use the illustration and instructions to remove the drive components from the transmission case.

- 1 Remove the sprocket assembly and spacer.
- 2 Remove the retaining ring.
- 3 Press the outer bearing, spacer, and inner bearing out of the sprocket.



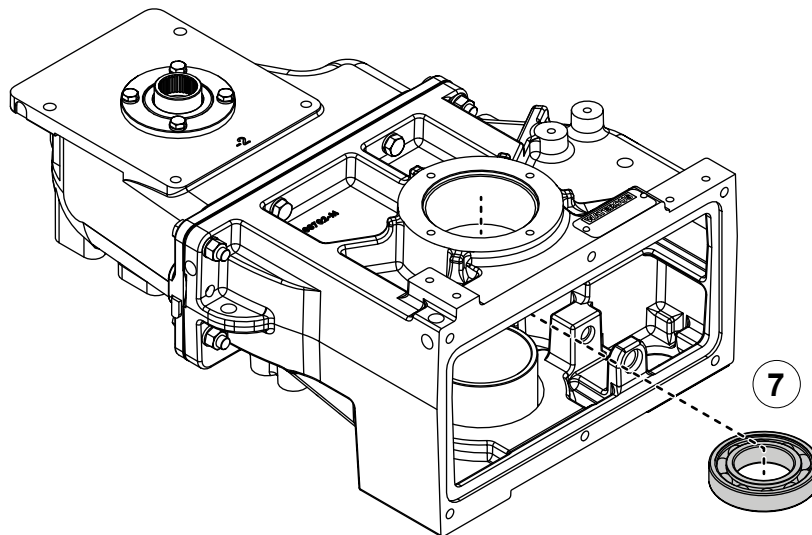


## Removing the Drive Components

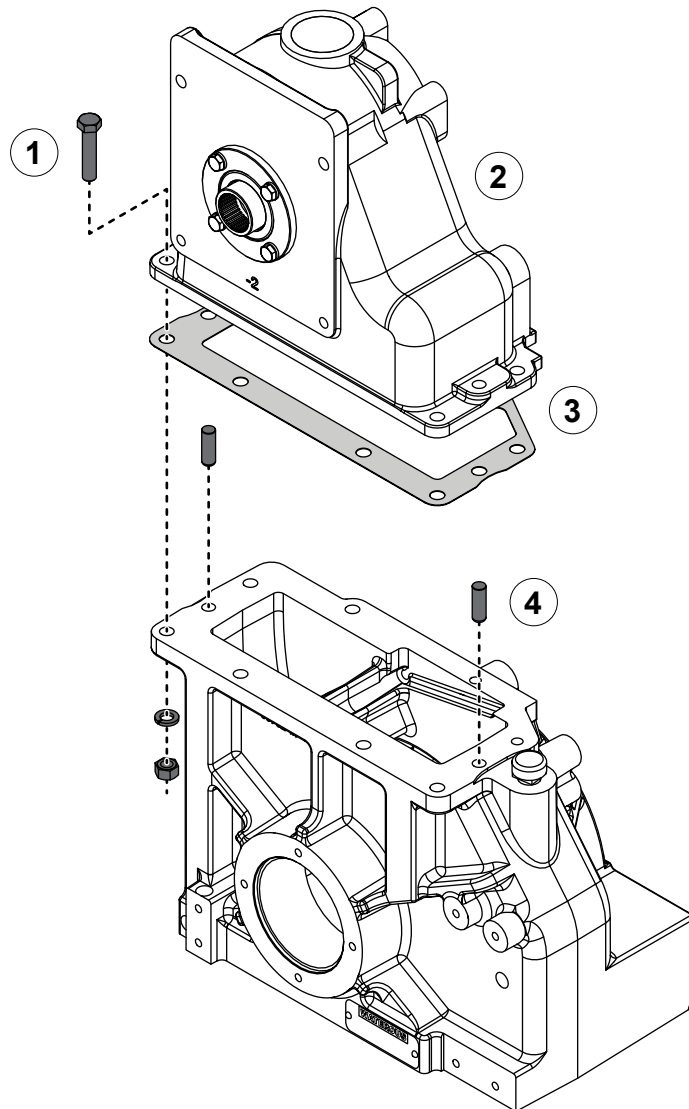


Use the illustrations and instructions to remove the drive components from the transmission case.

- 4 Remove the drive shaft housing hardware, then remove the drive shaft housing.
- 5 Remove and discard the O-ring.
- 6 Remove and discard the oil seal.
- 7 Press the bearing out of the case.



## Removing the Cap



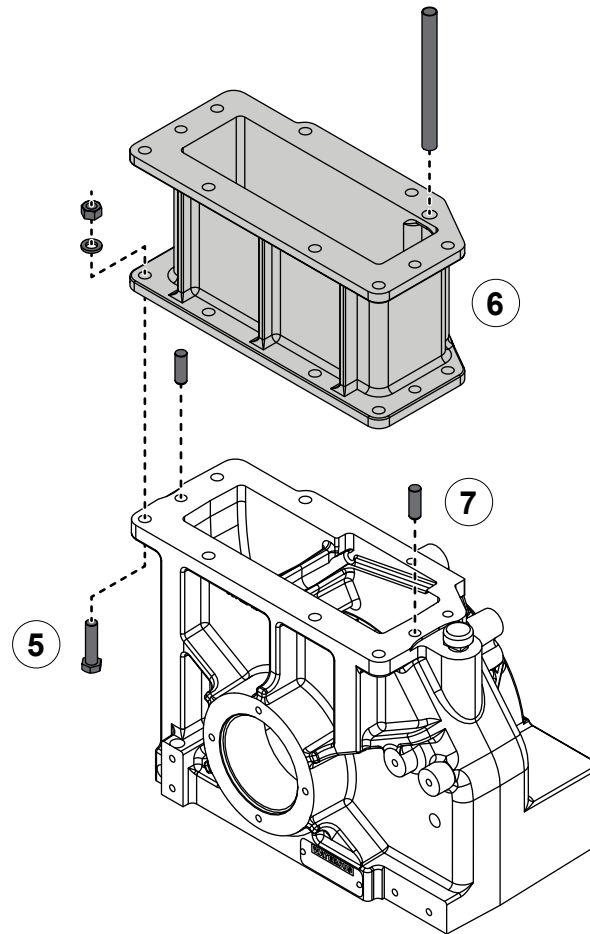
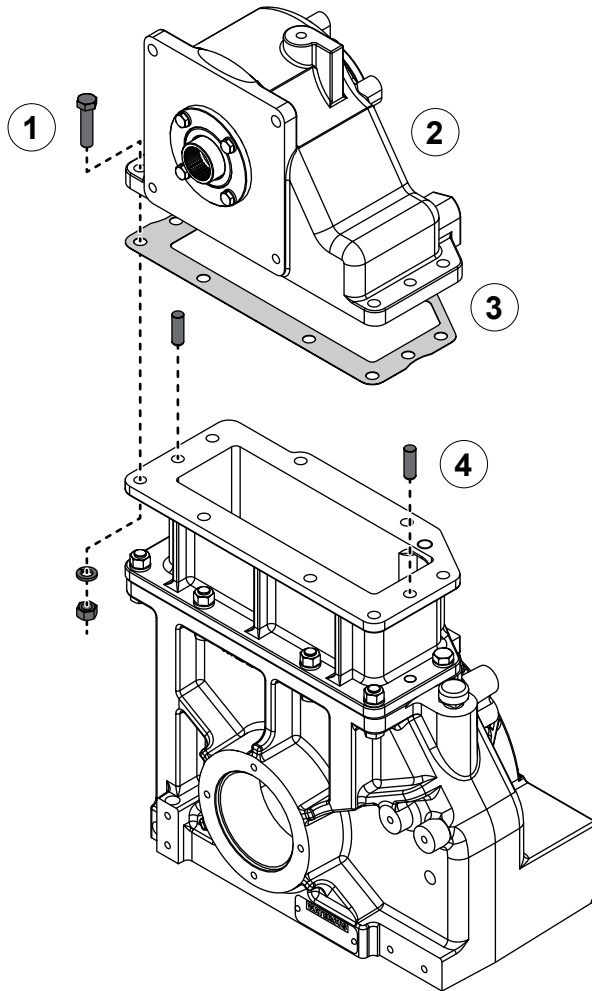
### Transmissions with B, C, and D Drops

Use the illustration and instructions to remove the cap from the transmission case.

- 1 Remove the cap hardware.
- 2 Separate the cap from the case.
- 3 Remove the shims.
- 4 If needed, remove the dowel pins.



## Removing the Cap

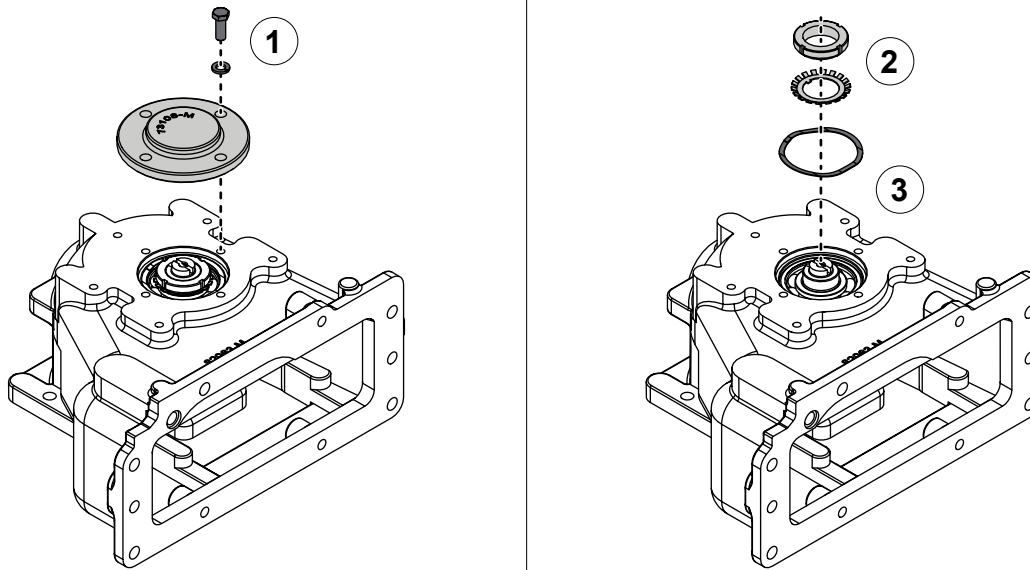


### Transmissions with E and F Drops

Use the illustrations and instructions to remove the cap and spacer from the transmission case.

- 1 Remove the cap hardware.
- 2 Separate the cap from the spacer.
- 3 Remove the shims.
- 4 If needed, remove the dowel pins.
- 5 Remove the spacer hardware.
- 6 Remove the spacer and oil tube.
- 7 If needed, remove the dowel pins.

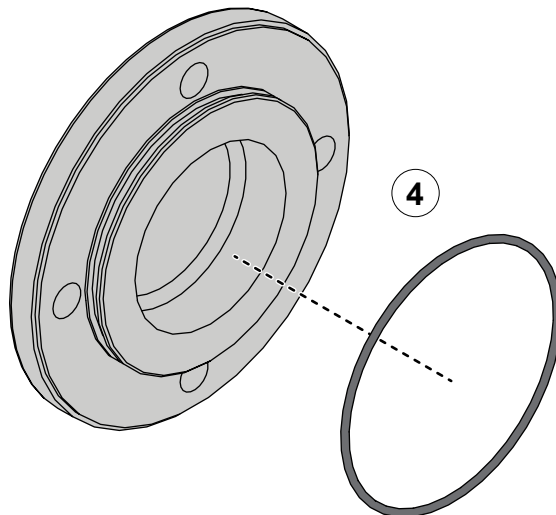
## Removing the Driven Shaft



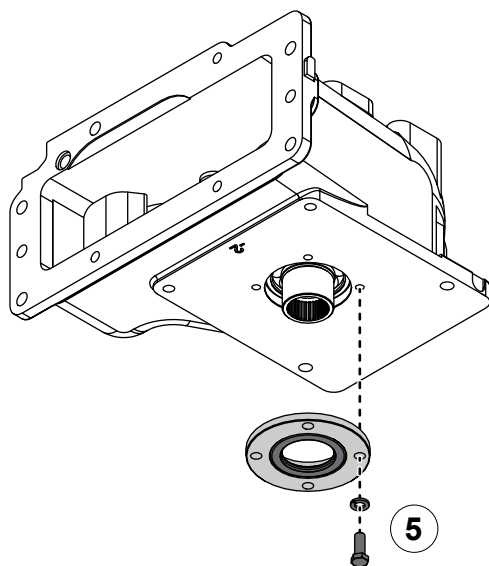
Use the illustrations and instructions to remove the driven shaft assembly from the cap.

**Note:** The illustrations may not depict your specific configuration. The removal process is similar regardless of the output and shaft design.

- 1 Remove the bearing cover hardware, then remove the bearing cover.
- 2 Straighten the tab on the lock washer, then remove the lock nut and washer.
- 3 Remove the wave spring.
- 4 Remove and discard the O-ring.

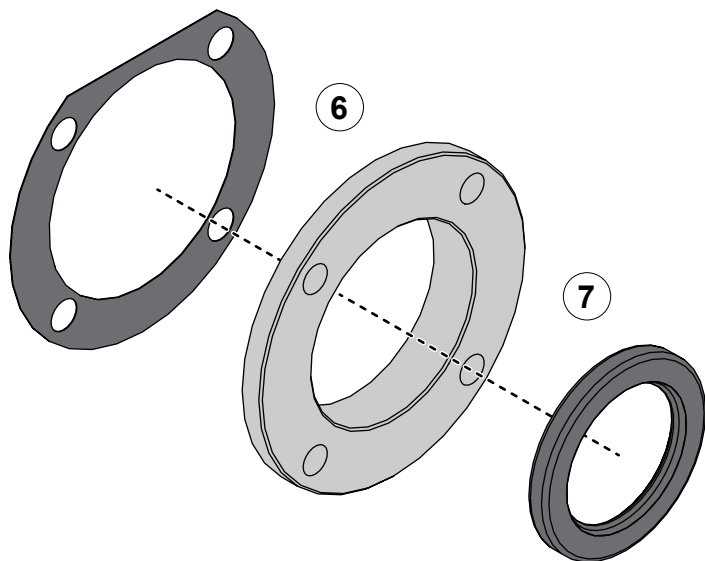


## Removing the Driven Shaft

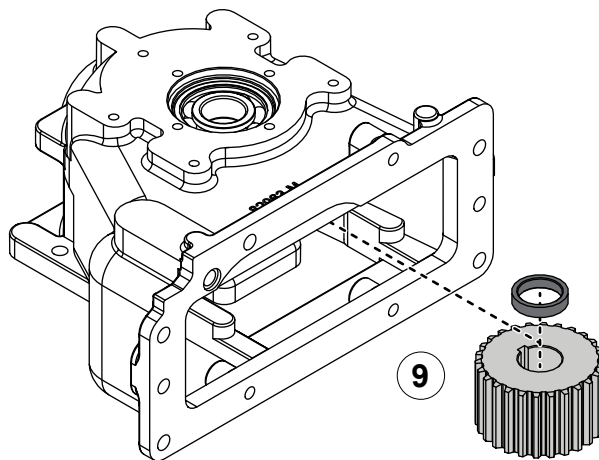
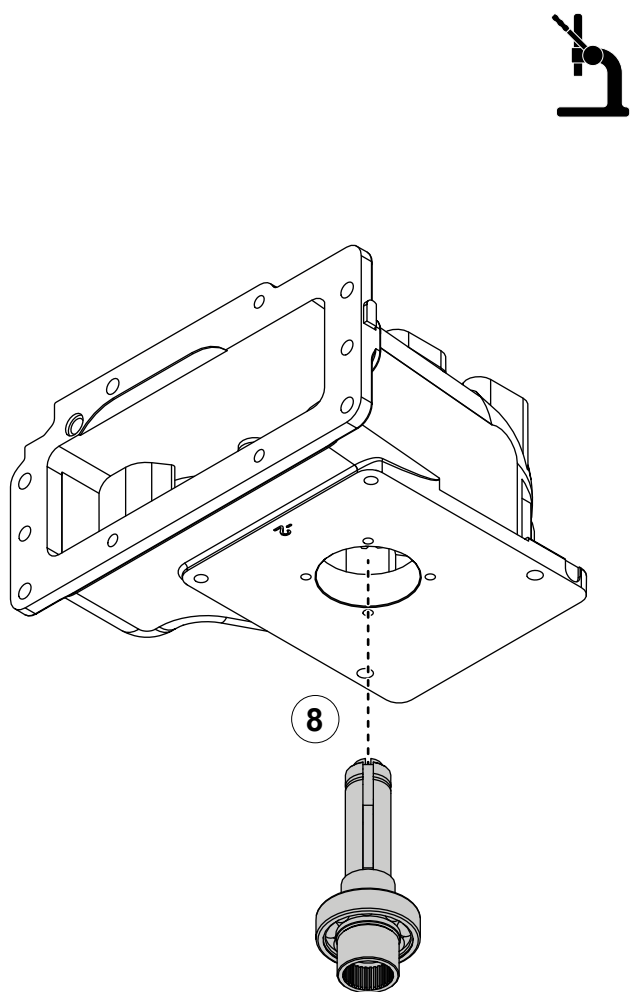


Use the illustrations and instructions to remove the driven shaft assembly from the cap.

- 5 Remove the oil seal housing hardware, then remove the oil seal housing.
- 6 Remove and discard the oil seal gasket.
- 7 Remove and discard the oil seal.



## Removing the Driven Shaft

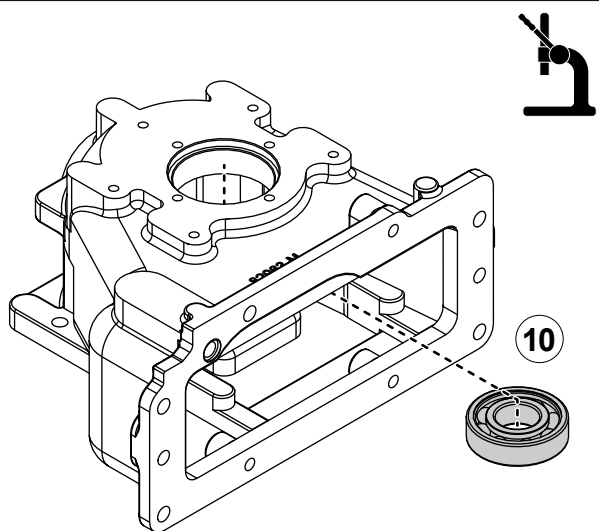


Use the illustrations and instructions to remove the driven shaft assembly from the cap.

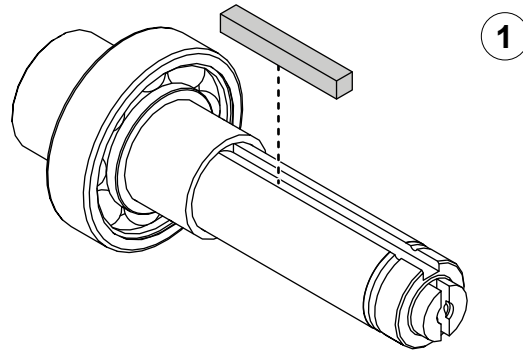
8 Press the driven shaft out of the cap.

9 Remove the sprocket and spacer.

10 Press the bearing out of the cap.

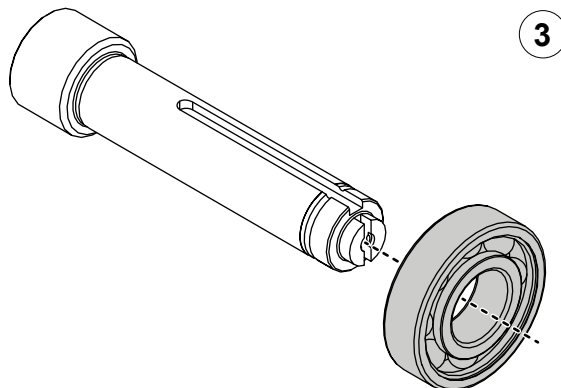
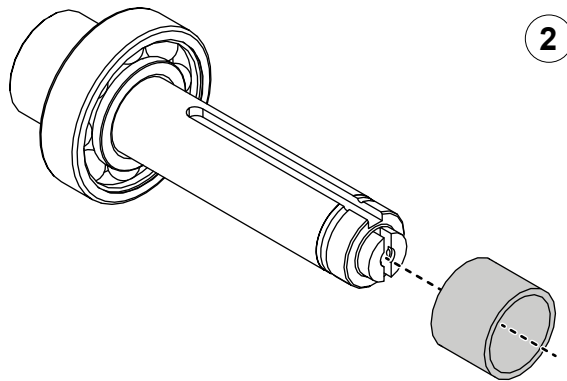


## Disassembling the Driven Shaft



Use the illustrations and instructions to disassemble the driven shaft.

- 1 Remove the key.
- 2 Remove the spacer.
- 3 Remove the bearing.



## 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, 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 450 ft-lb (610 N·m).
- 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 transmission interior and prematurely wear internal parts.
- Replace any gaskets and O-ring seals during the assembly.
- Do not reuse the lock nuts.
- Apply anti-seize to the lock 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 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](http://waterousco.com) by entering the serial number for your system. Depending on the application, the serial number for your equipment is located on the operator panel, pump, transmission, or some combination of the three.

- Use established industry practices to assemble the transmission.
- Tighten hardware to industry standard torque specifications—unless otherwise noted.
- Make sure that you do not over-tighten plugs.
- Install retaining rings with the flat face towards the component that you are retaining.
- Replace components such as O-rings, bearings, gaskets, oil seals, lock nuts, lock washers, and lubricants with equivalent components.

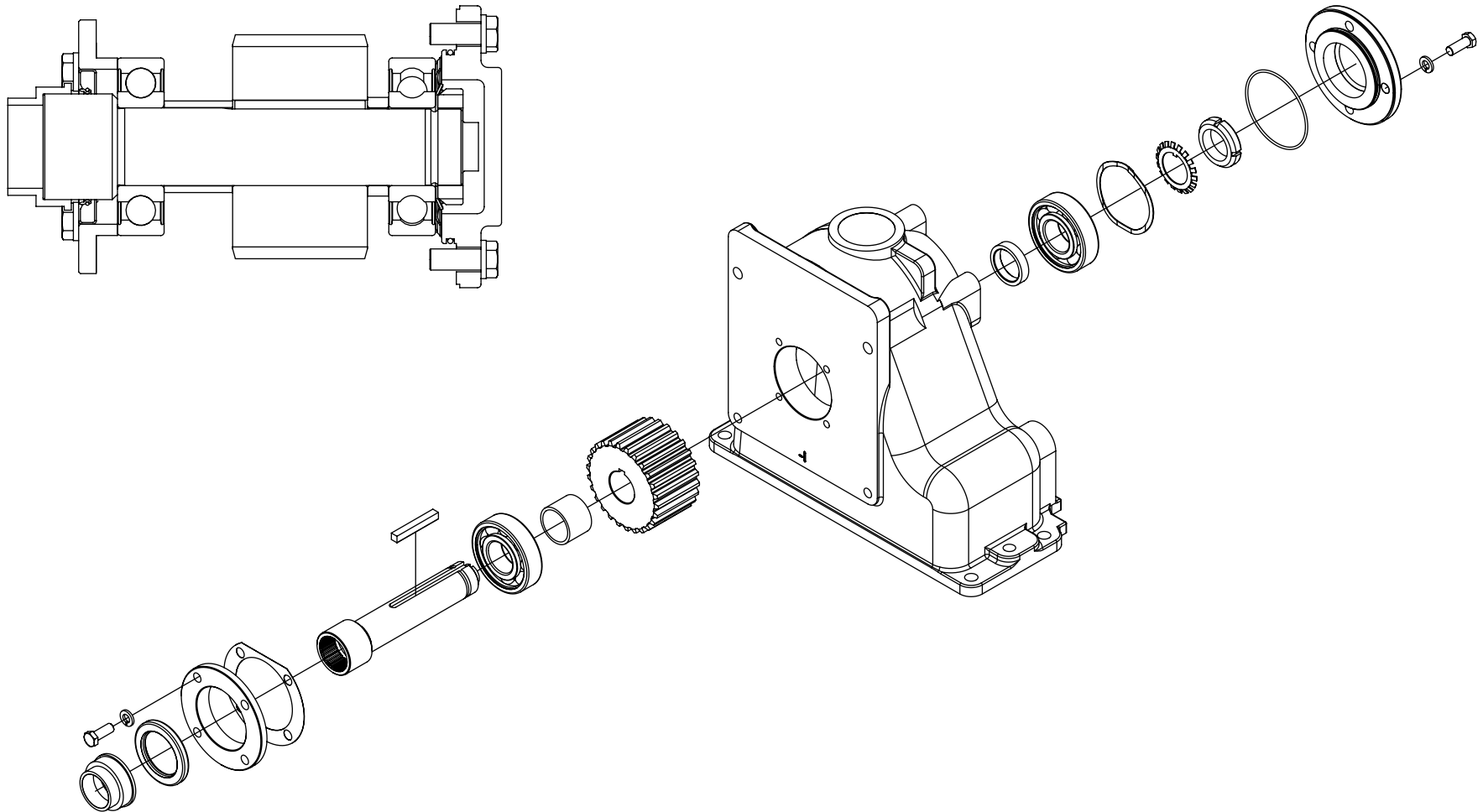
## Installing the Transmission

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

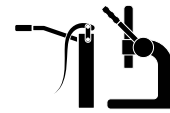
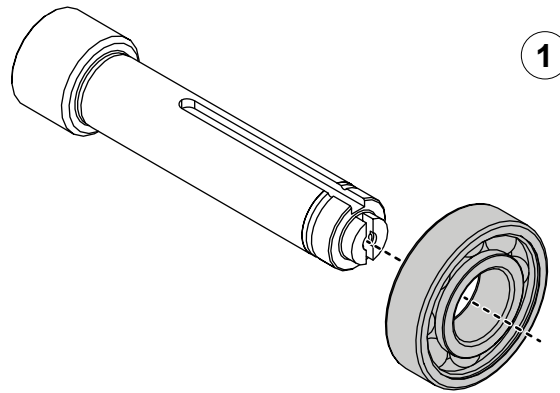
## Understanding the Illustrations

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

## CM and CS Series Pumps with Rear Drive and No Output



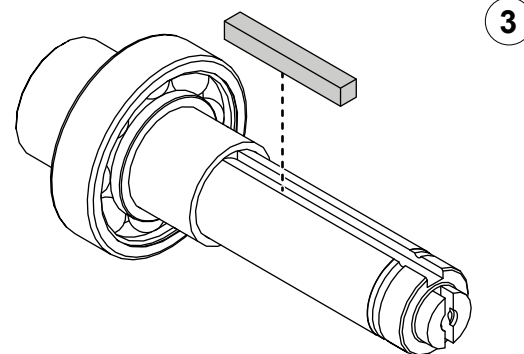
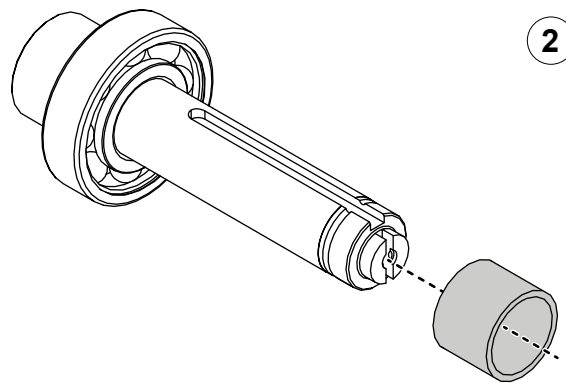
## CM and CS Series Pumps with Rear Drive and No Output



### Assembling the Driven Shaft

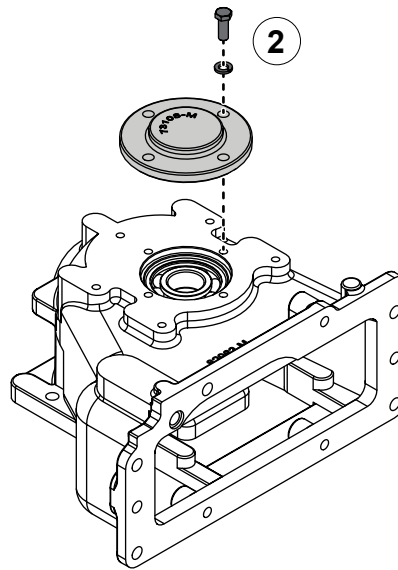
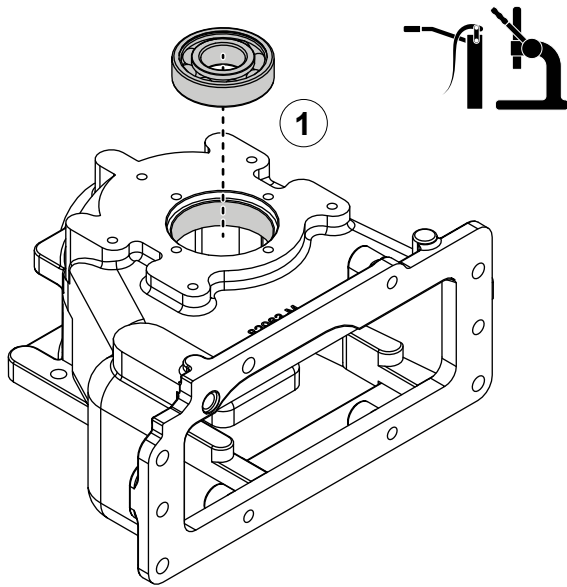
Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.





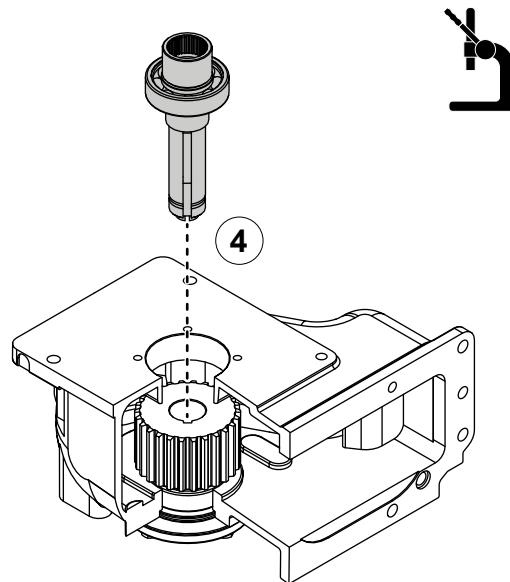
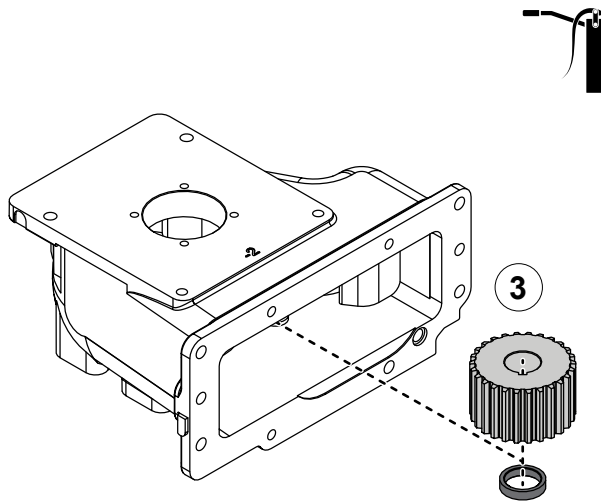
## CM and CS Series Pumps with Rear Drive and No Output



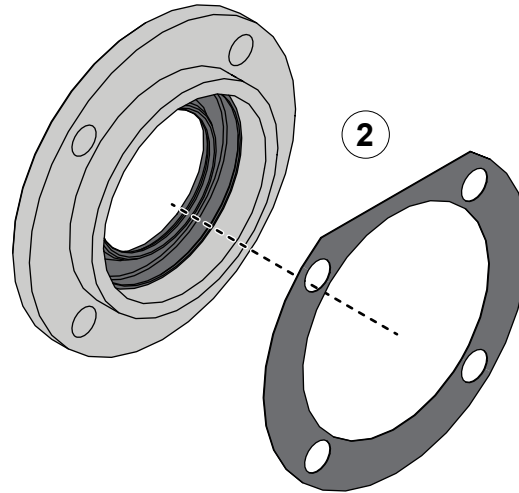
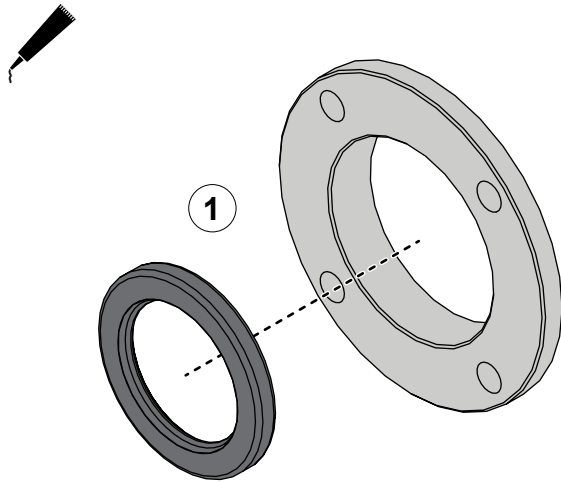
### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the bearing cover onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.
- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.



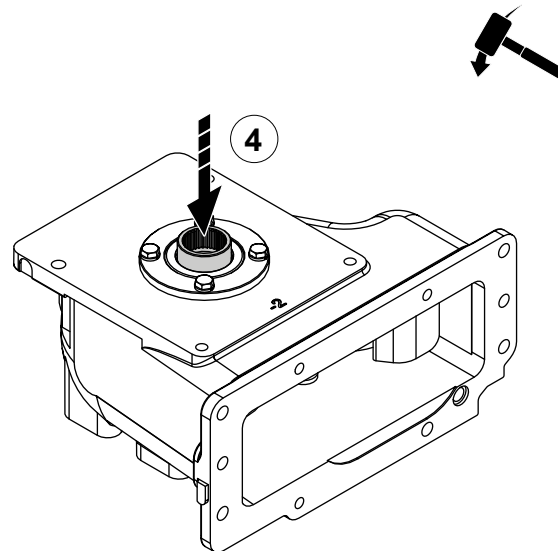
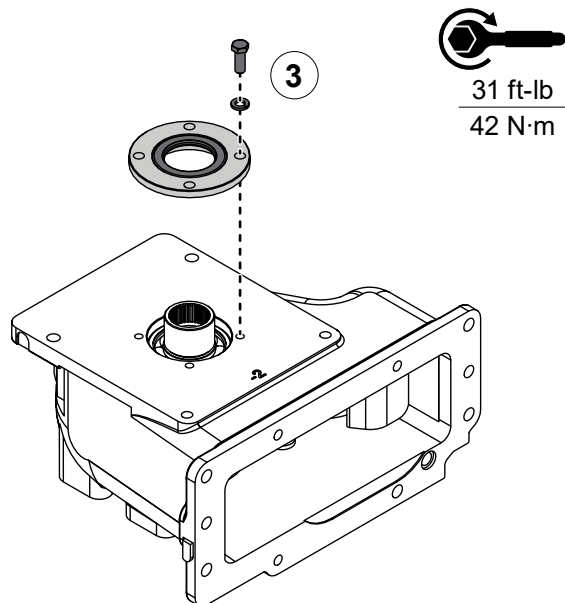
## CM and CS Series Pumps with Rear Drive and No Output



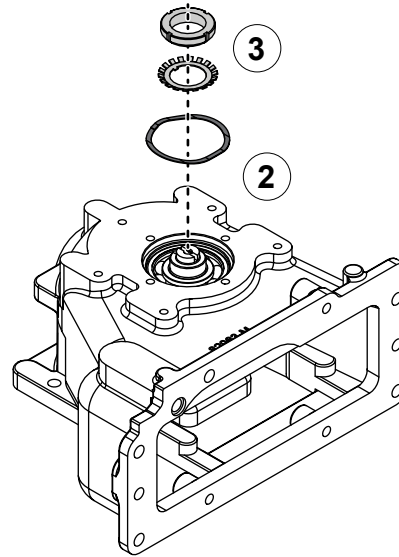
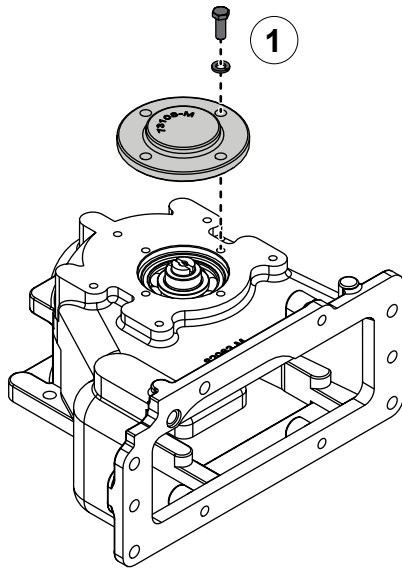
### Installing the Oil Seal Housing

Use the illustrations and instructions to install the oil seal housing.

- 1 Apply sealant around the oil seal, then install it into the oil seal housing.
- 2 Install the gasket onto the oil seal housing flange.
- 3 Use the mounting hardware to secure the oil seal housing to the cap.
- 4 Use a non-marring hammer to gently tap the driven shaft into position.



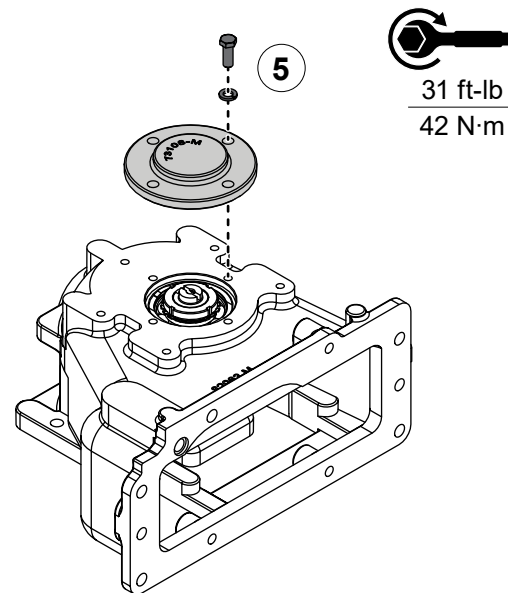
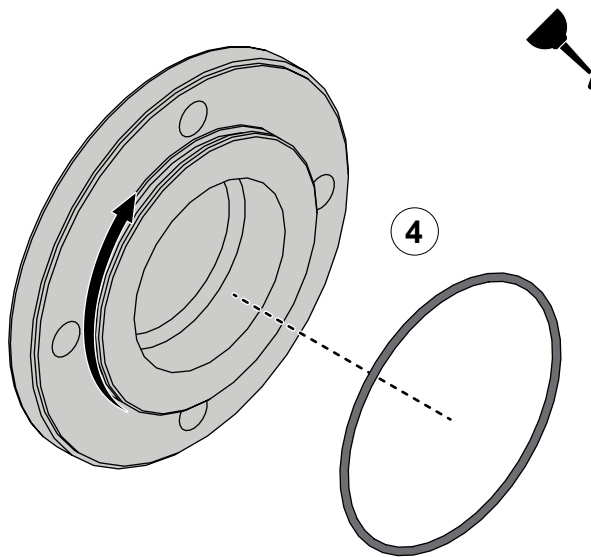
## CM and CS Series Pumps with Rear Drive and No Output



### Installing the Bearing Cover

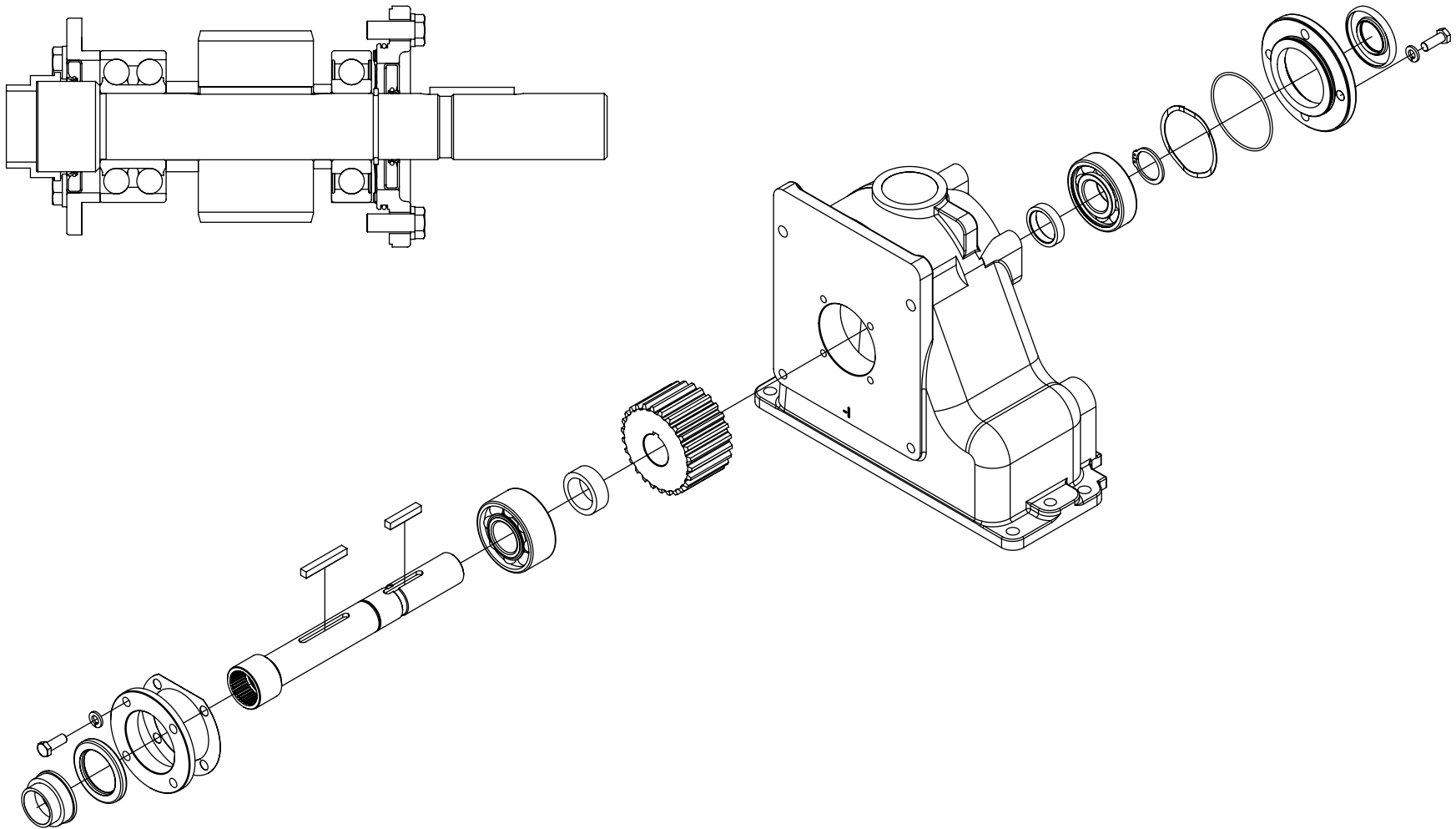
Use the illustrations and instructions to install the bearing cover.

- 1 Remove the bearing cover.
- 2 Install the wave spring into the cap.
- 3 Install the bearing lock nut and washer. Refer to: **"Installing the Bearing Lock Washer and Nut" on page 118.**
- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Use the mounting hardware to secure the bearing cover to the cap.

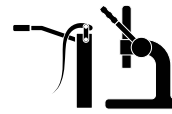
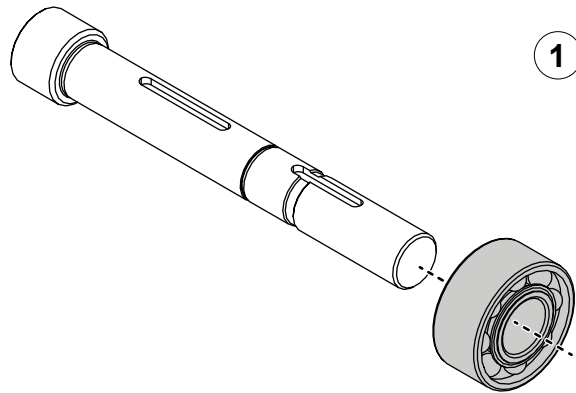


31 ft-lb  
42 N·m

## CM and CS Series Pumps with Rear Drive and CAFS Output



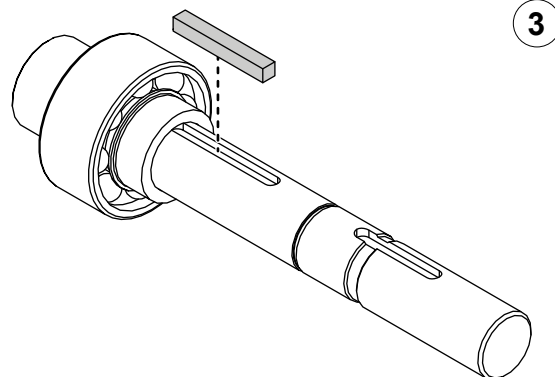
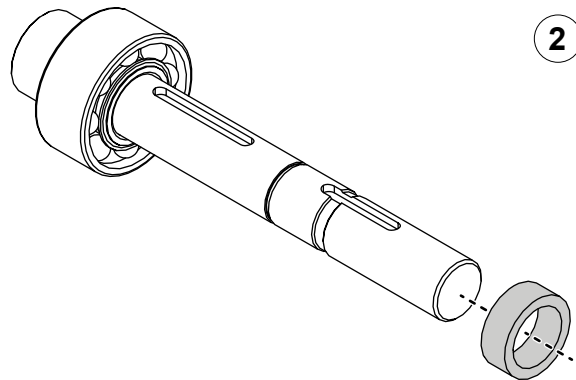
## CM and CS Series Pumps with Rear Drive and CAFS Output



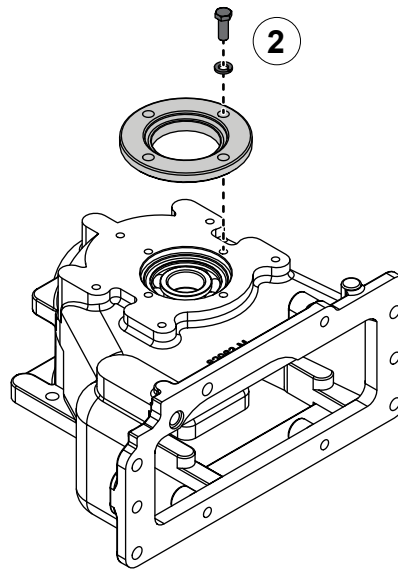
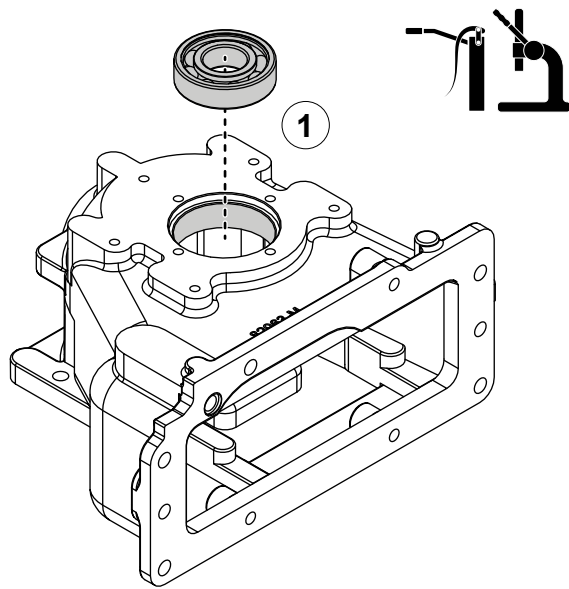
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.



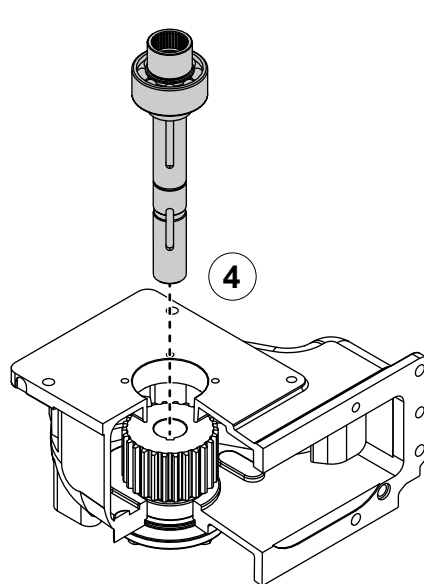
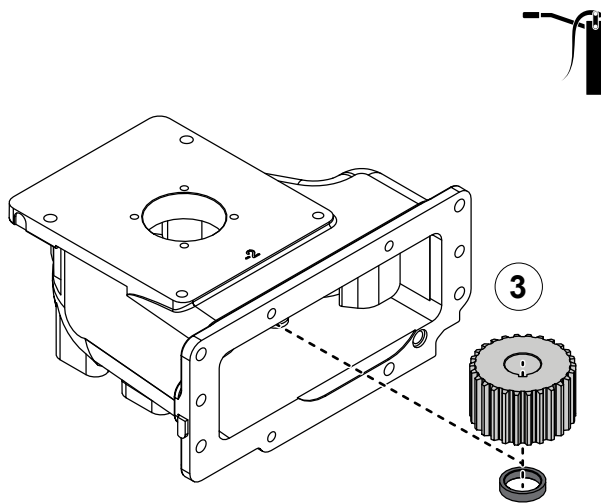
## CM and CS Series Pumps with Rear Drive and CAFS Output



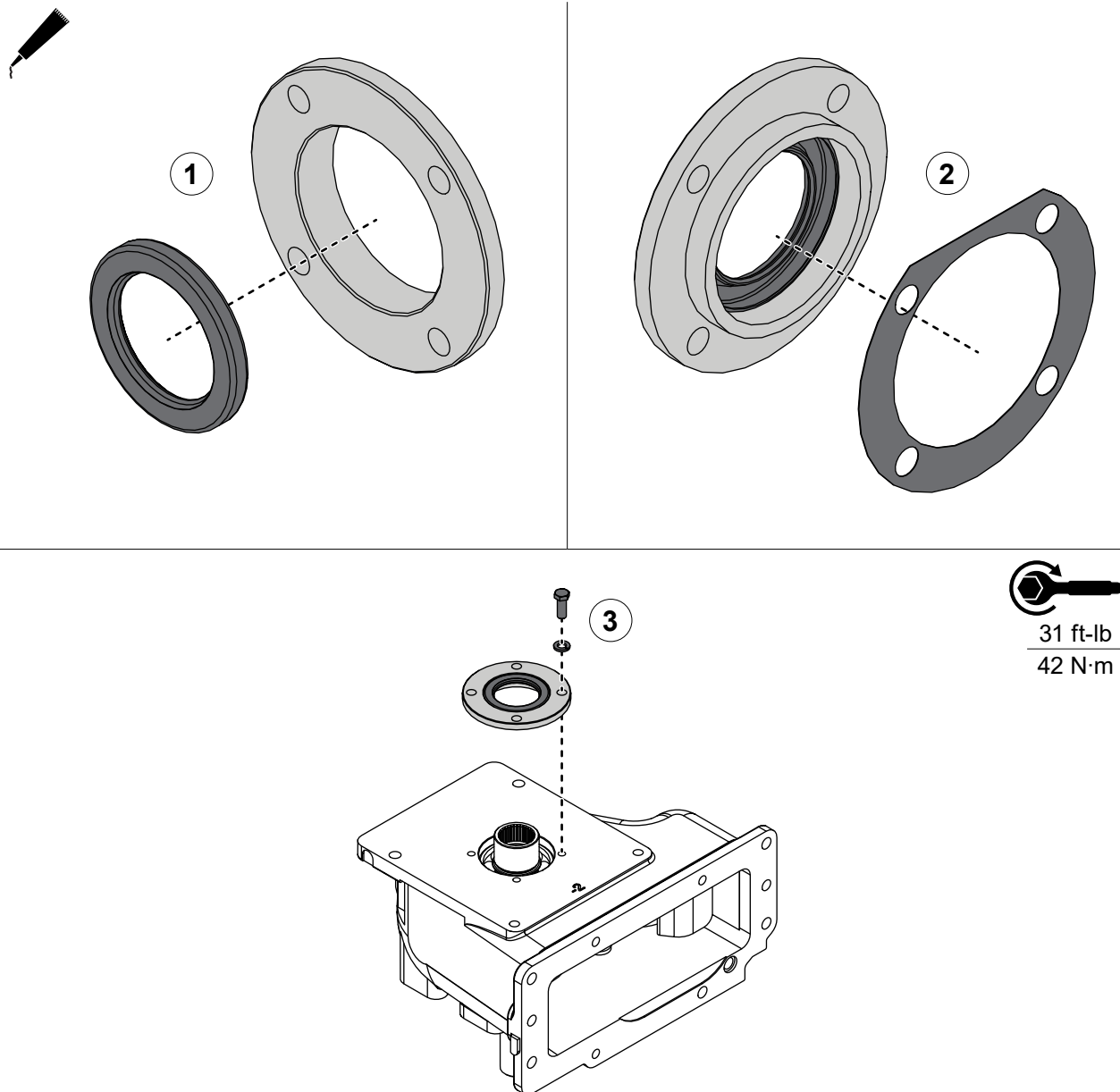
### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the output oil seal housing onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.
- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.



## CM and CS Series Pumps with Rear Drive and CAFS Output

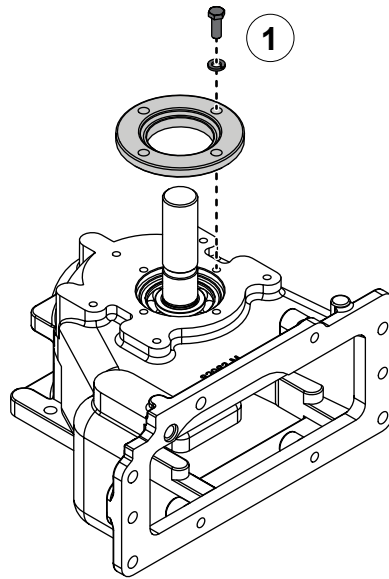


### Installing the Input Oil Seal Housing

Use the illustrations and instructions to install the input oil seal housing.

- 1 Apply sealant around the oil seal, then install it into the oil seal housing.
- 2 Install the gasket onto the oil seal housing flange.
- 3 Use the mounting hardware to secure the oil seal housing to the cap.

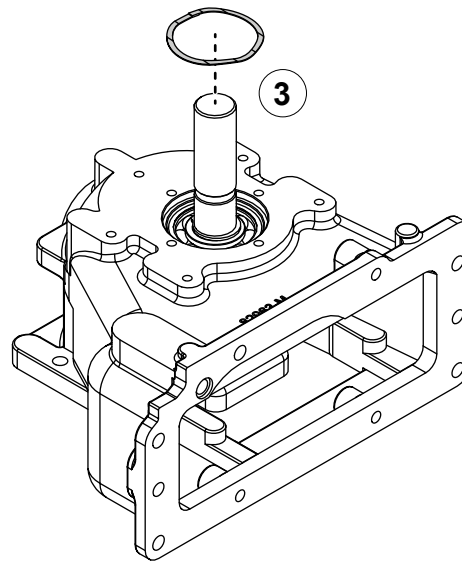
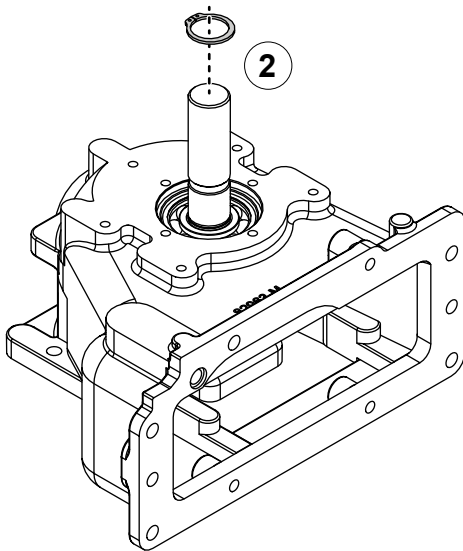
## CM and CS Series Pumps with Rear Drive and CAFS Output



### Installing the Output Oil Seal Housing

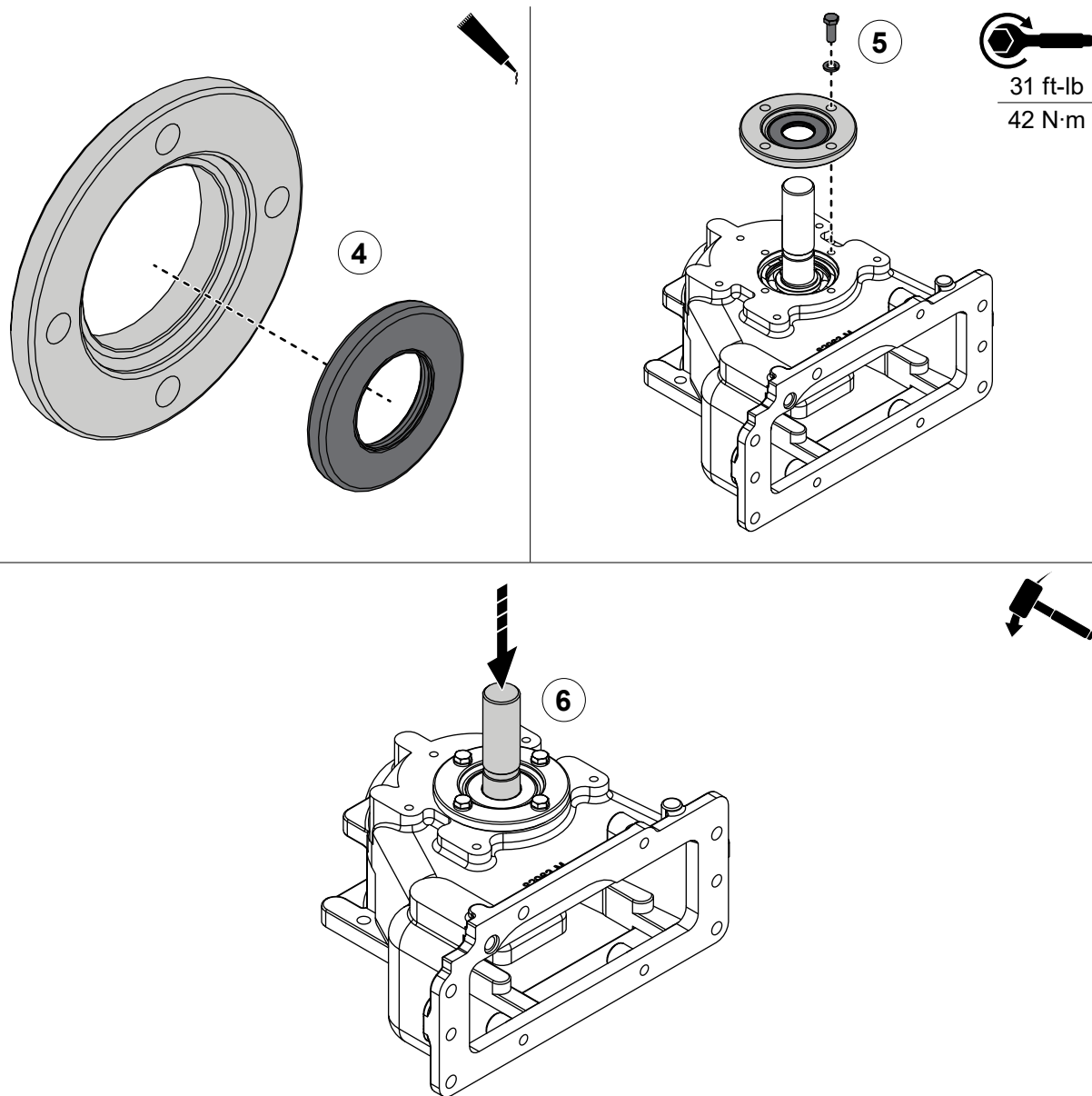
Use the illustrations and instructions to install the output oil seal housing.

- 1 Remove the oil seal housing.
- 2 Install the retaining ring onto the shaft.
- 3 Install the wave spring into the cap.





## CM and CS Series Pumps with Rear Drive and CAFS Output

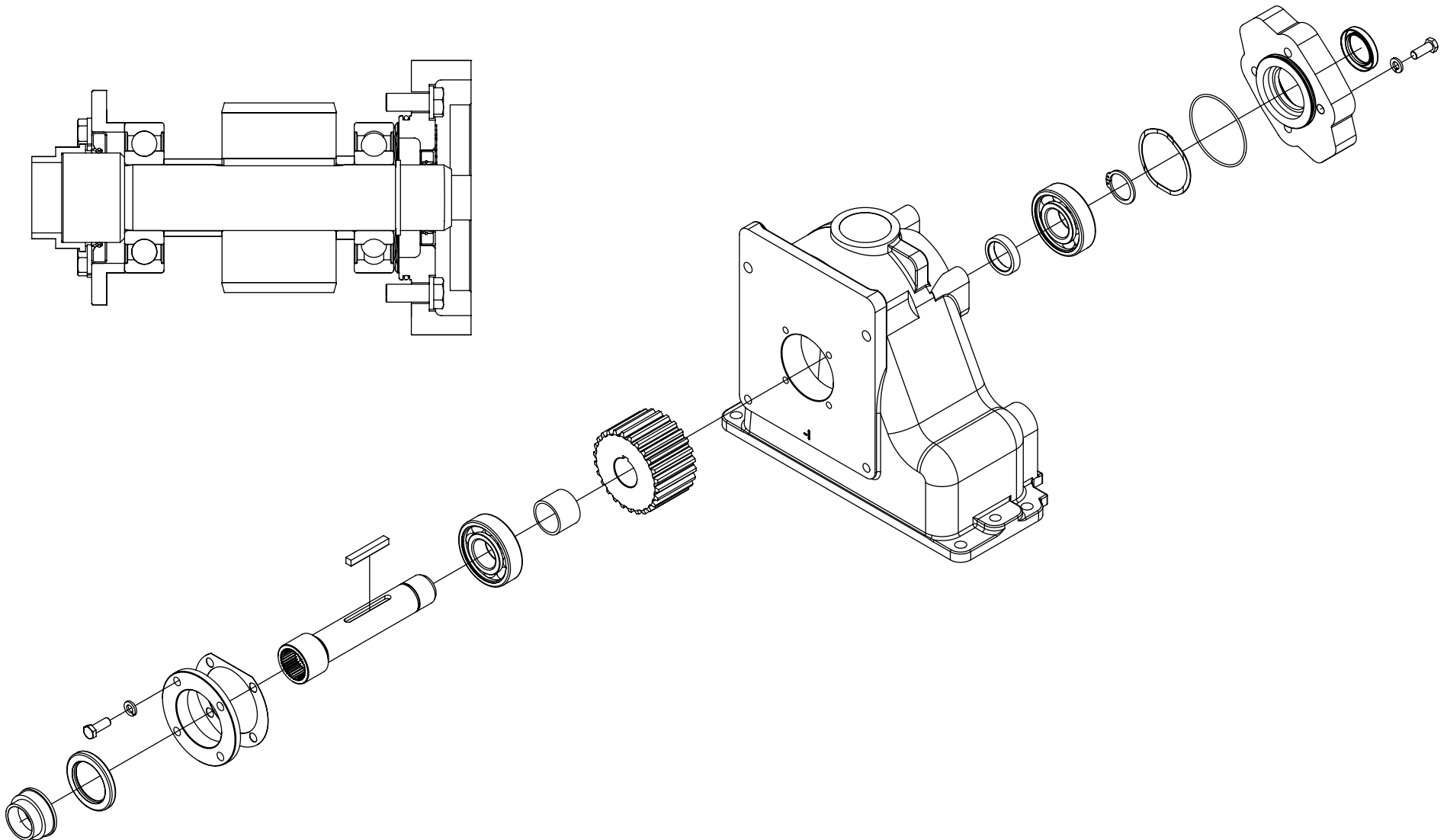


### Installing the Output Oil Seal Housing

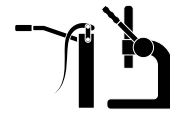
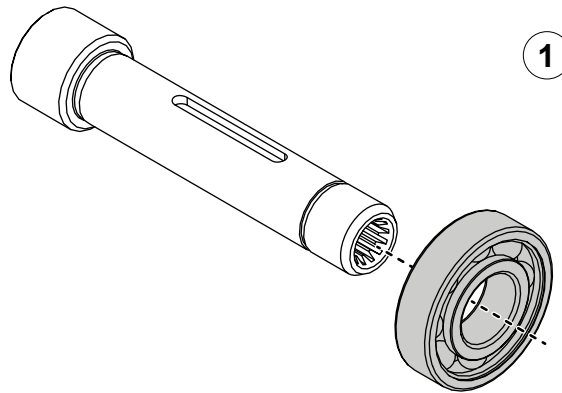
Use the illustrations and instructions to install the output oil seal housing.

- 4 Apply sealant around the oil seal, then install it into the oil seal housing.
- 5 Use the mounting hardware to secure the oil seal housing to the cap.
- 6 Use a non-marring hammer to gently tap the driven shaft into position.

## CM and CS Series Pumps with Rear Drive and Hydraulic Output



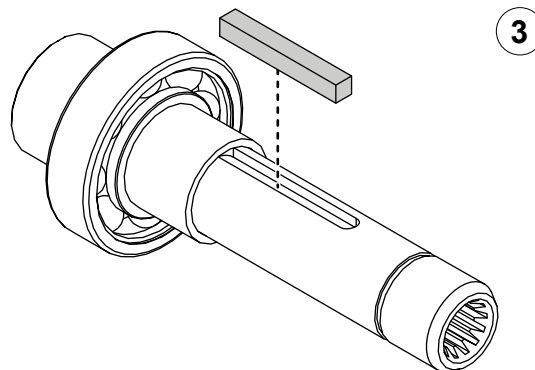
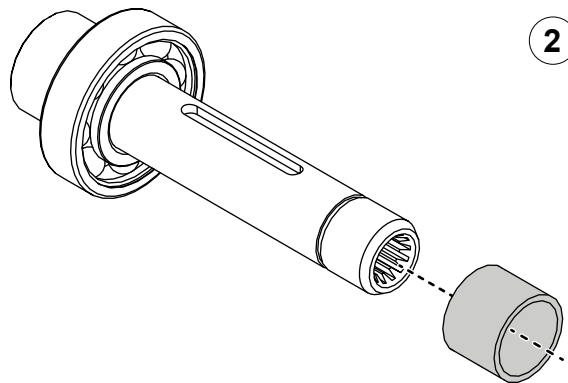
## CM and CS Series Pumps with Rear Drive and Hydraulic Output



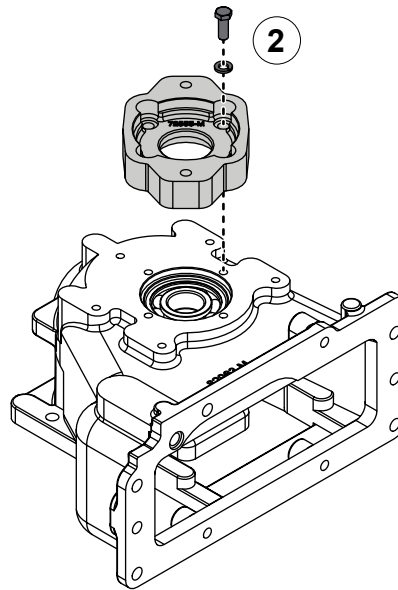
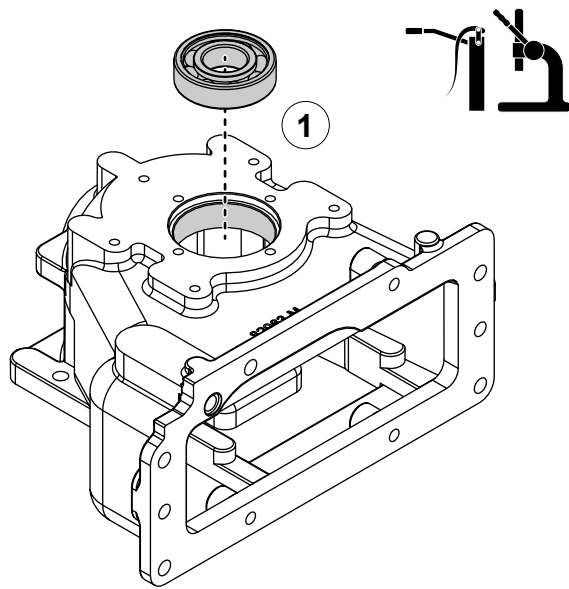
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.



## CM and CS Series Pumps with Rear Drive and Hydraulic Output



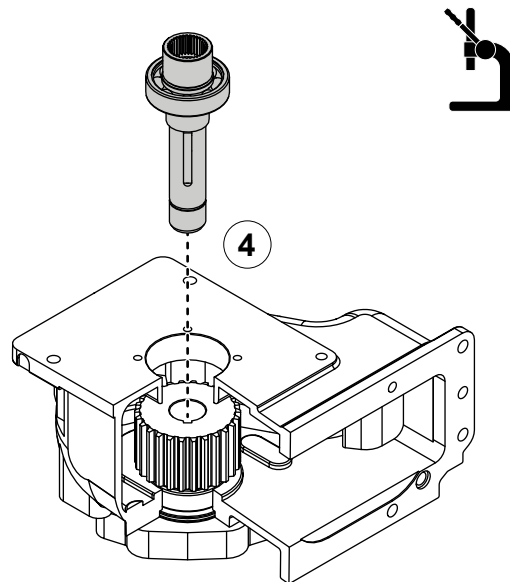
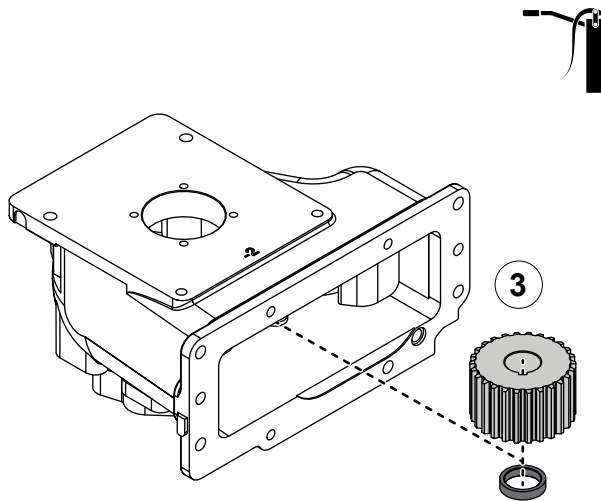
### Installing the Driven Shaft

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

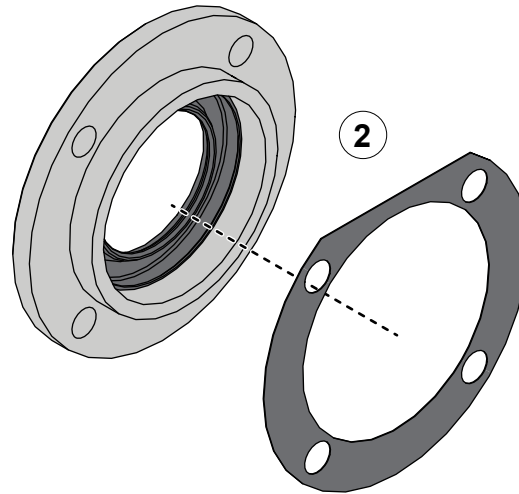
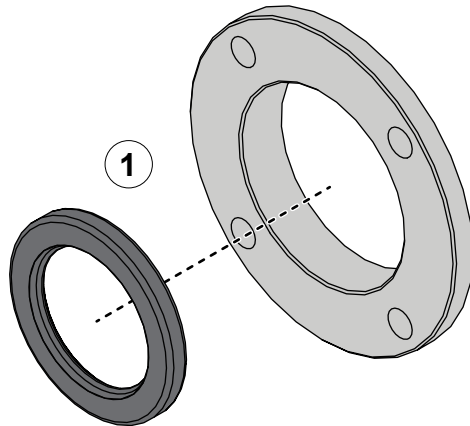
- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the hydraulic adapter onto the cap.

**Note:** Use the information that you recorded during the disassembly to determine component orientation.

- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.
- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.



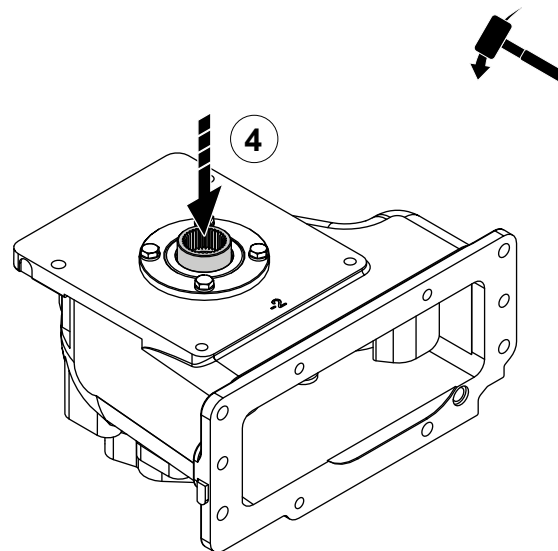
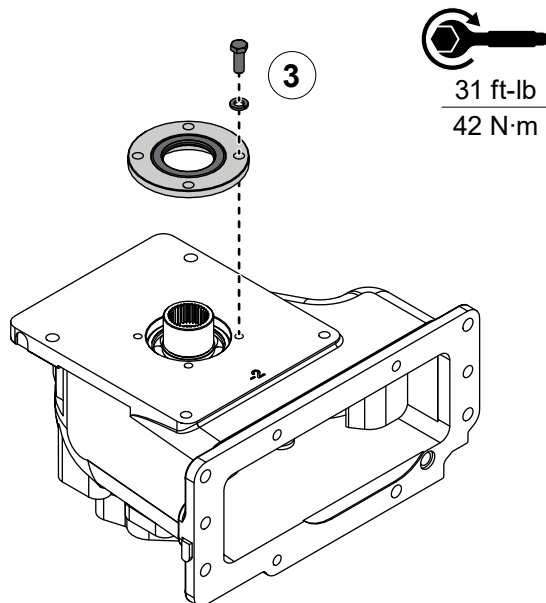
## CM and CS Series Pumps with Rear Drive and Hydraulic Output



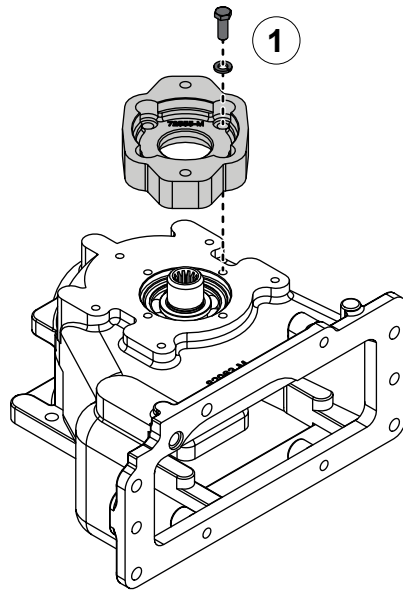
### Installing the Oil Seal Housing

Use the illustrations and instructions to install the oil seal housing.

- 1 Apply sealant around the oil seal, then install it into the oil seal housing.
- 2 Install the gasket onto the oil seal housing flange.
- 3 Use the mounting hardware to secure the oil seal housing to the cap.
- 4 Use a non-marring hammer to gently tap the driven shaft into position.



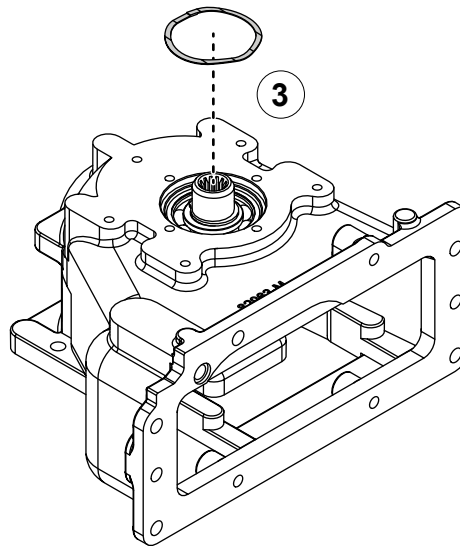
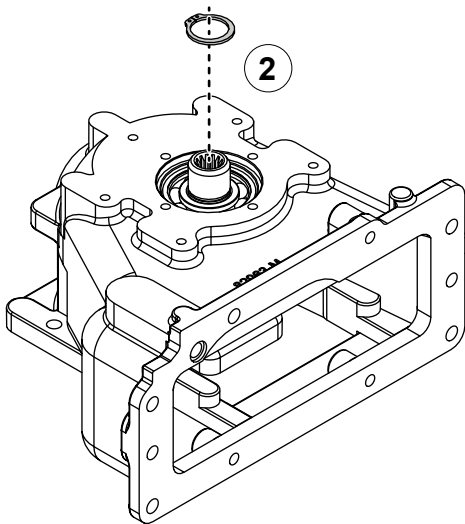
## CM and CS Series Pumps with Rear Drive and Hydraulic Output



### Installing the Hydraulic Adapter

Use the illustrations and instructions to install the hydraulic adapter.

- 1 Remove the hydraulic adapter.
- 2 Install the retaining ring onto the shaft.
- 3 Install the wave spring into the cap.

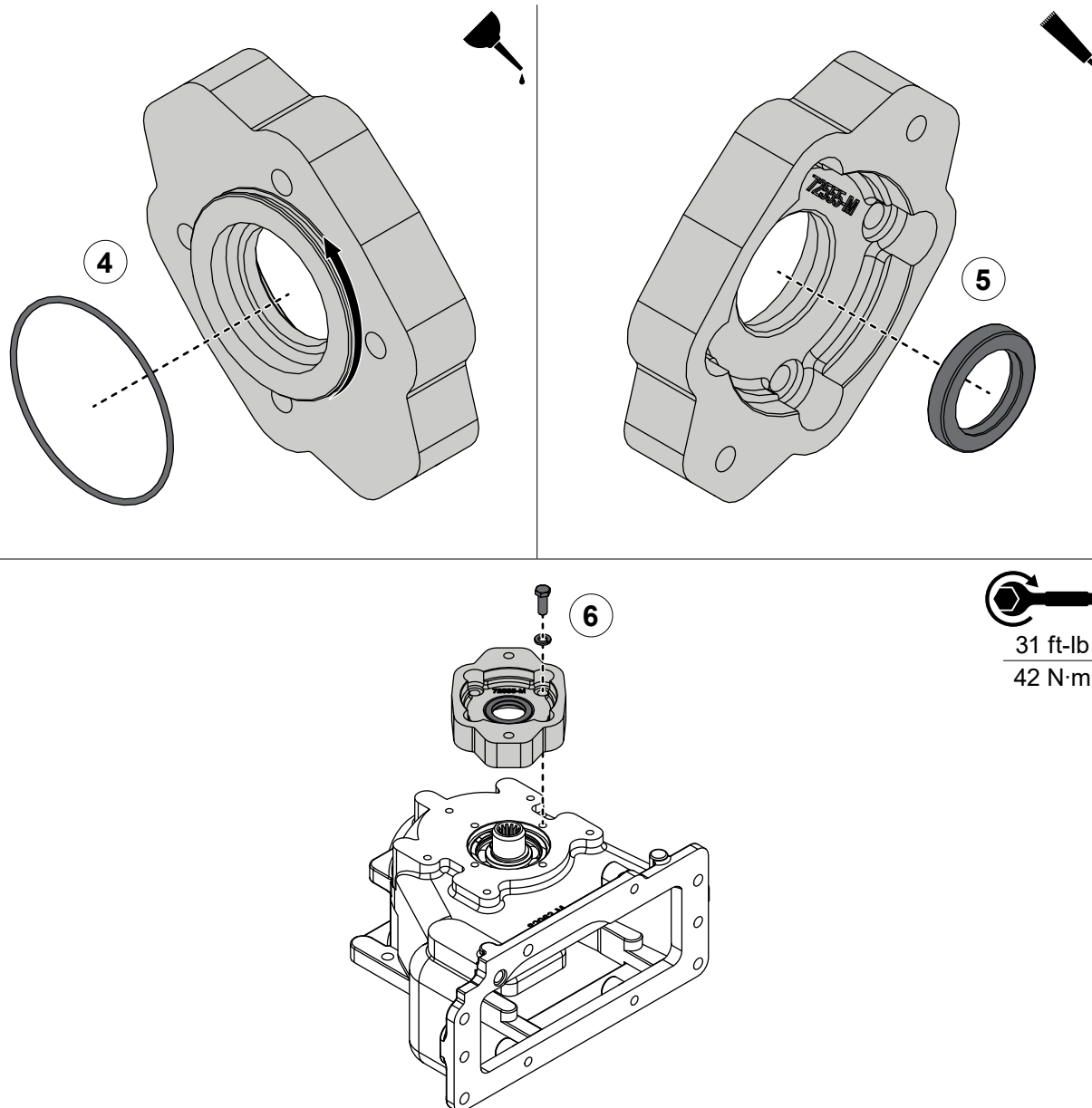


## CM and CS Series Pumps with Rear Drive and Hydraulic Output

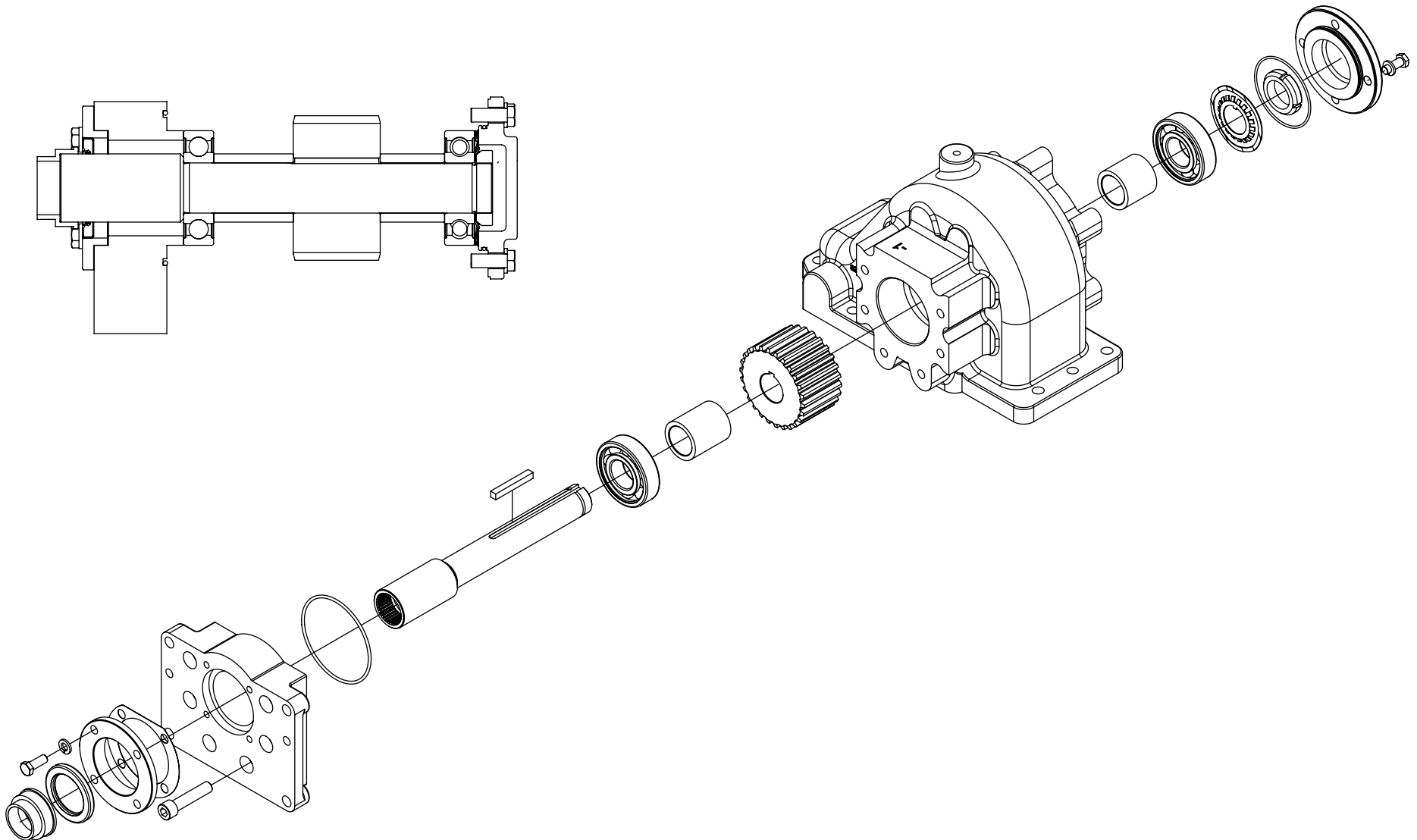
### Installing the Hydraulic Adapter

Use the illustrations and instructions to install the hydraulic adapter.

- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Apply sealant around the oil seal, then install it into the hydraulic adapter.
- 6 Use the mounting hardware to secure the hydraulic adapter to the cap.

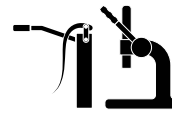
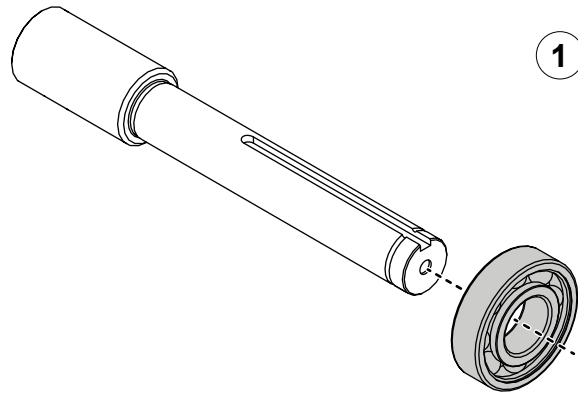


## CM and CS Series Pumps with Front Drive and No Output





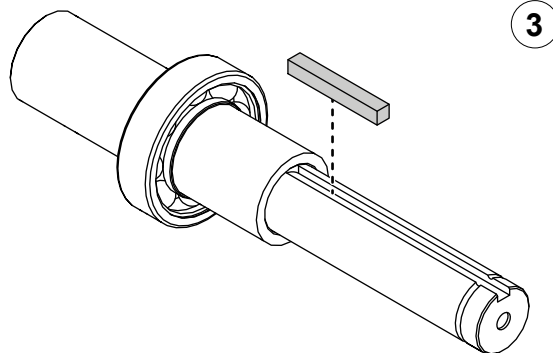
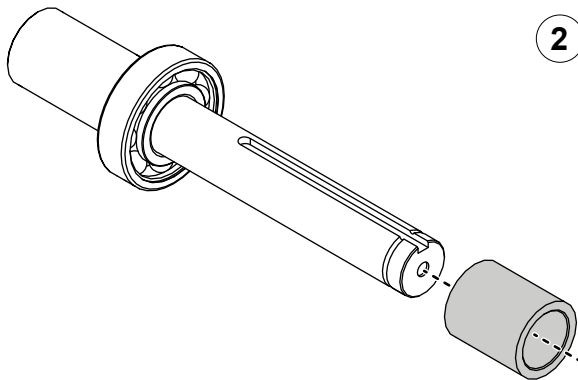
## CM and CS Series Pumps with Front Drive and No Output



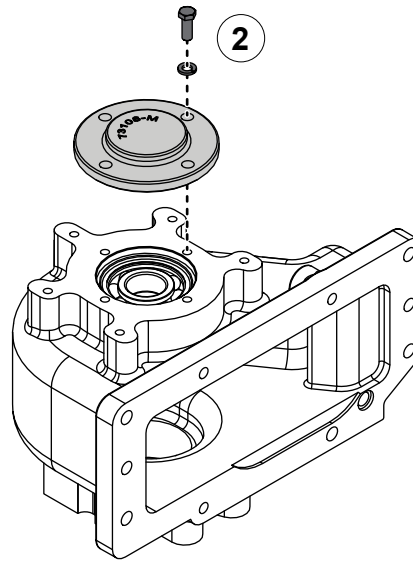
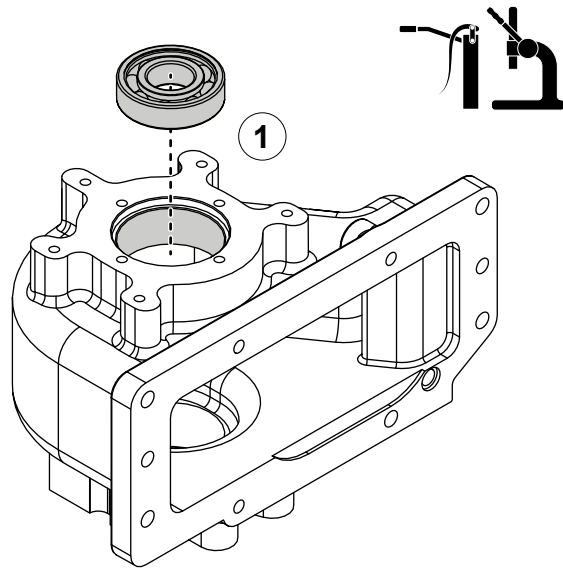
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.



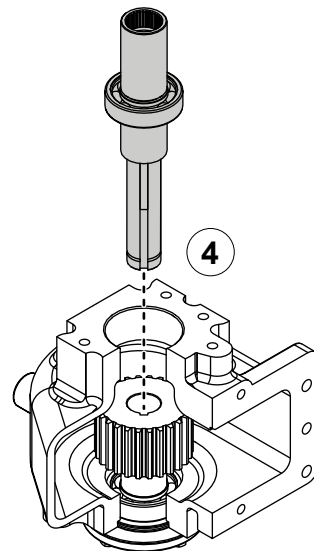
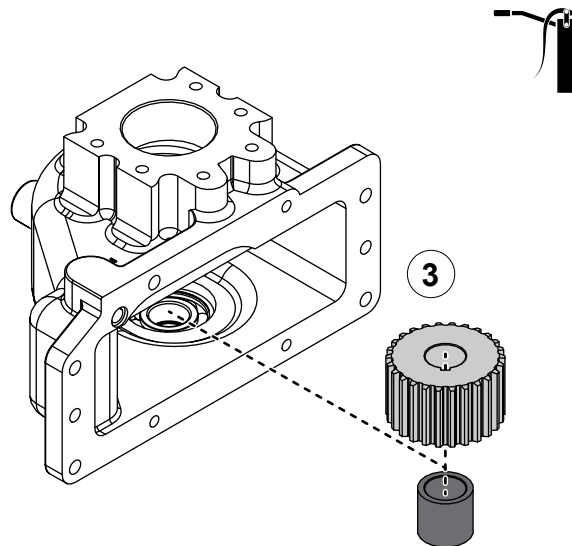
## CM and CS Series Pumps with Front Drive and No Output



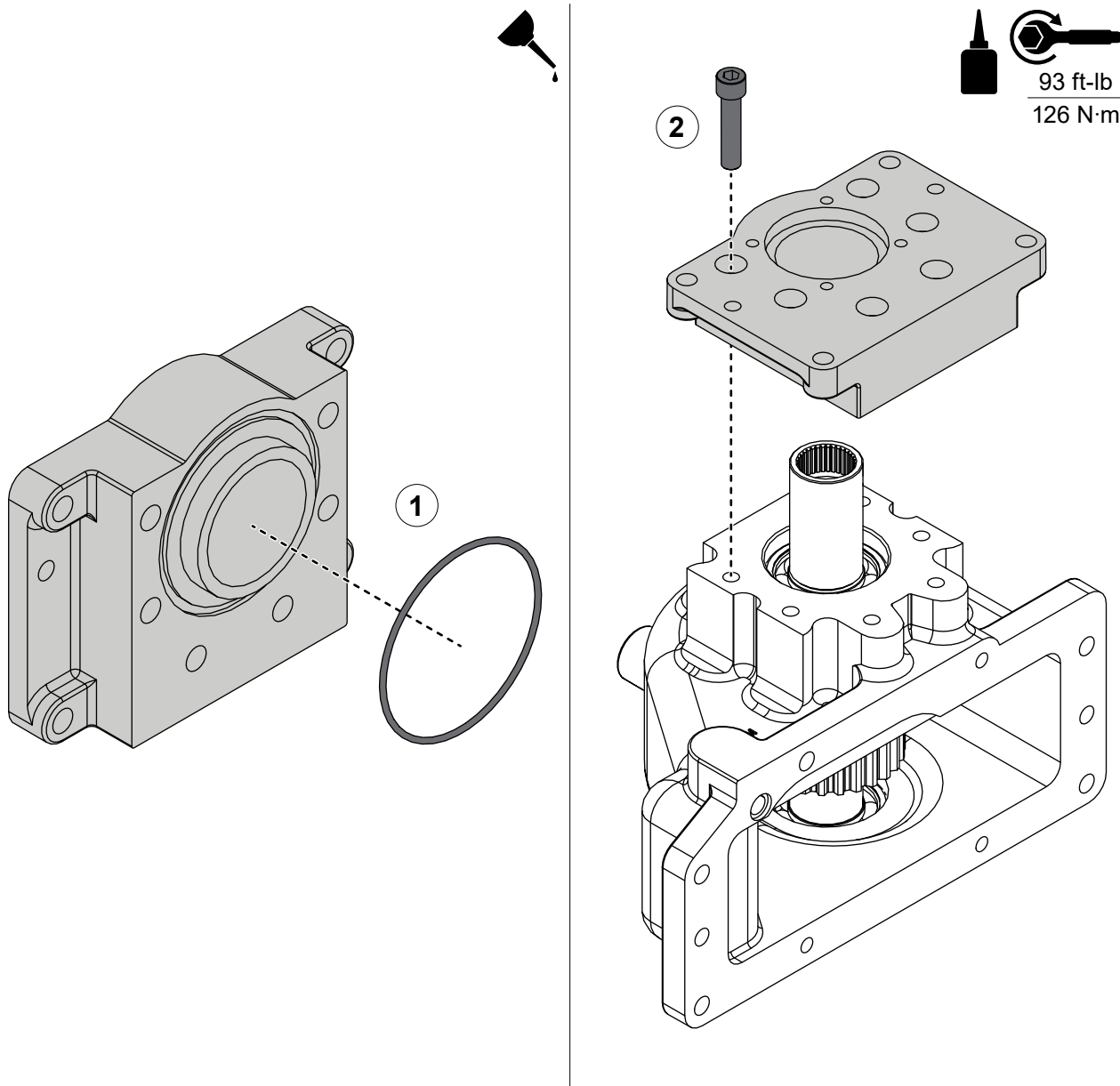
### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the bearing cover onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.
- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.



## CM and CS Series Pumps with Front Drive and No Output

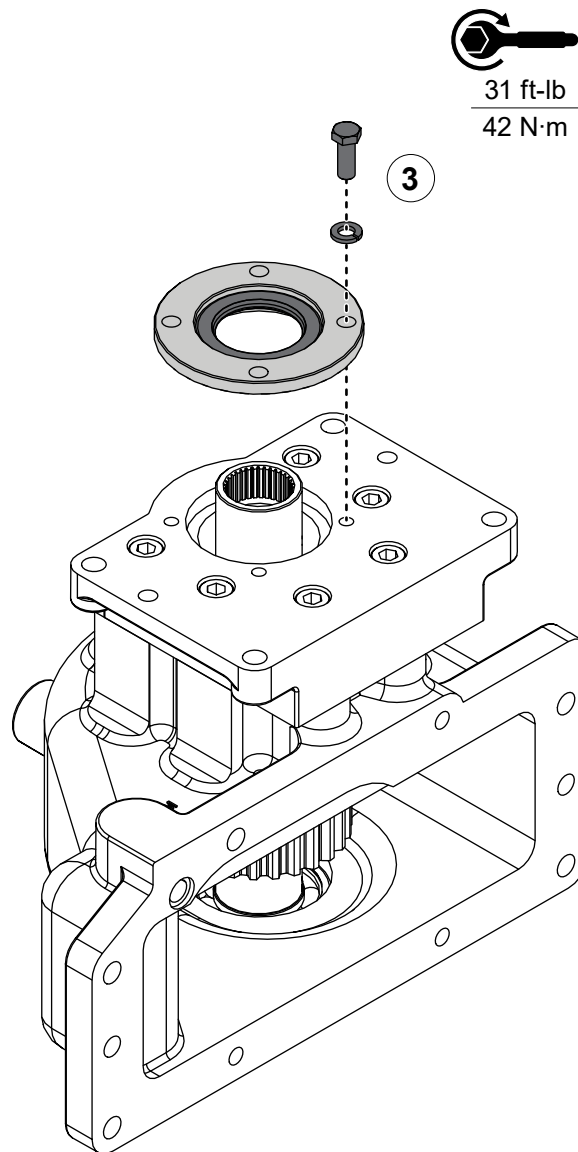
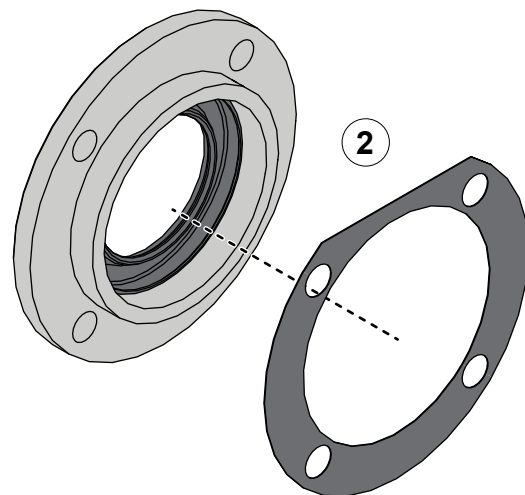
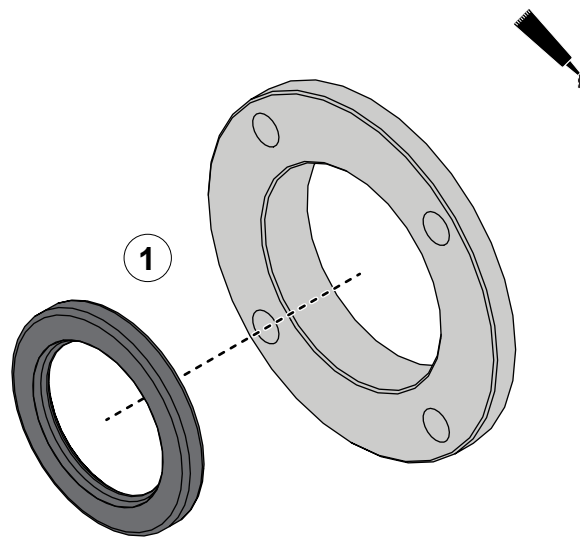


### Installing the Front Mount Adapter

Use the illustrations and instructions to install the front mount adapter.

- 1 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 2 Apply threadlocker to the threads of the mounting hardware, then use the hardware to secure the adapter to the cap.

## CM and CS Series Pumps with Front Drive and No Output



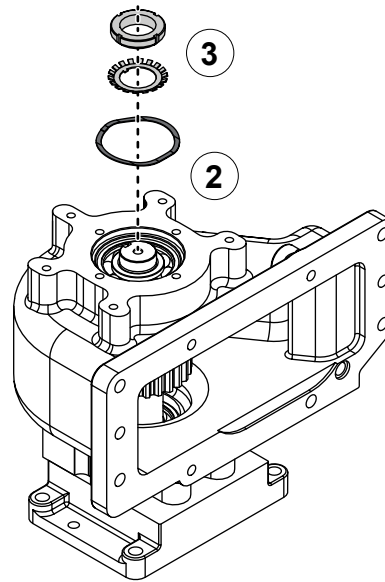
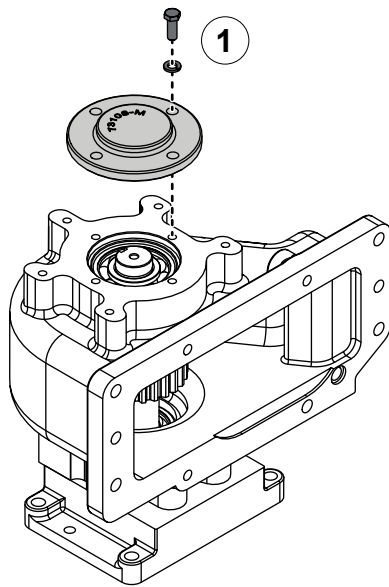
31 ft-lb  
42 N·m

### Installing the Oil Seal Housing

Use the illustrations and instructions to install the oil seal housing.

- 1 Apply sealant around the oil seal, then install it into the oil seal housing.
- 2 Install the gasket onto the oil seal housing flange.
- 3 Use the mounting hardware to secure the oil seal housing to the front mount adapter.

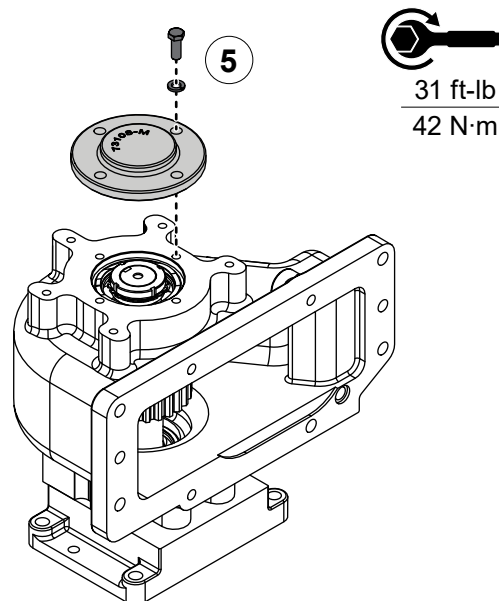
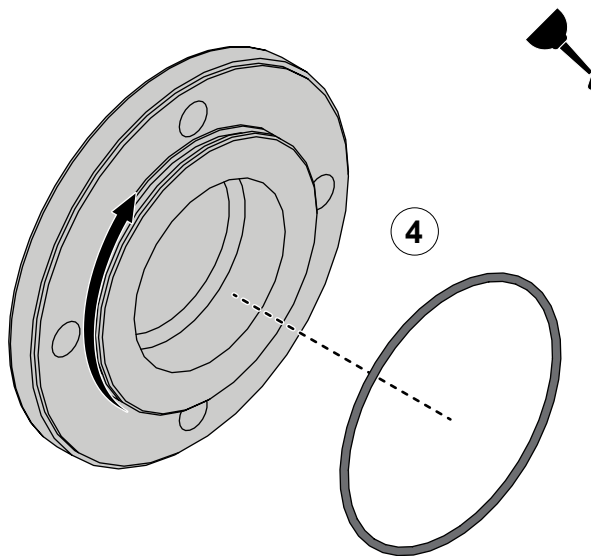
## CM and CS Series Pumps with Front Drive and No Output



### Installing the Bearing Cover

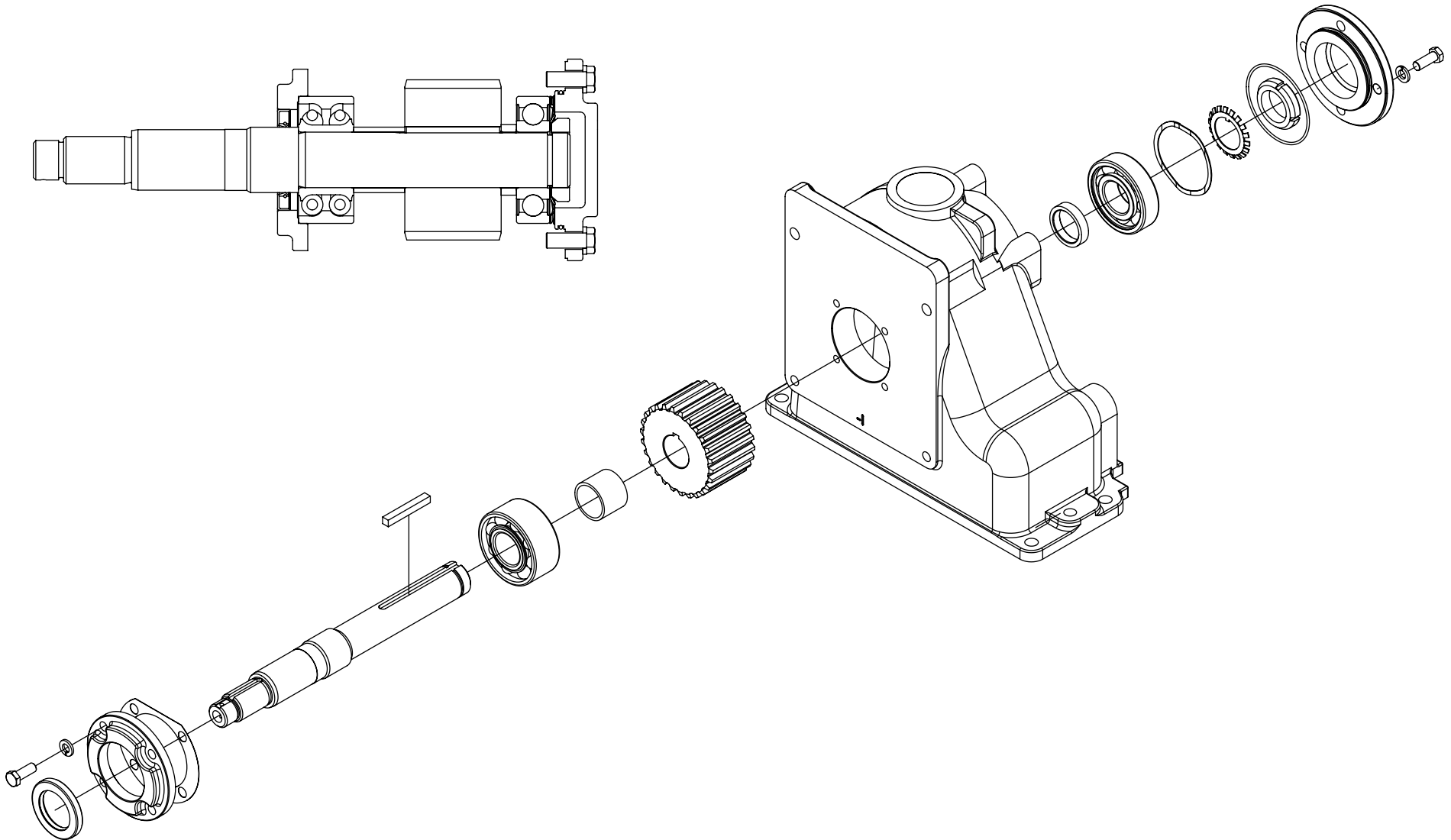
Use the illustrations and instructions to install the bearing cover.

- 1 Remove the bearing cover.
- 2 Install the wave spring into the cap.
- 3 Install the bearing lock nut and washer. Refer to: **"Installing the Bearing Lock Washer and Nut" on page 118.**
- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Use the mounting hardware to secure the bearing cover to the cap.

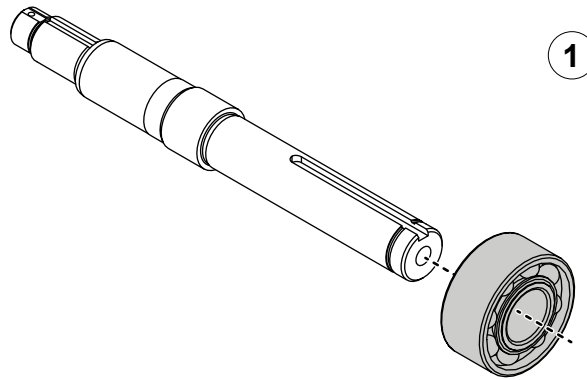


31 ft-lb  
42 N·m

## CG, CX, and ESU1 Series Pumps with No Output



## CG, CX, and ESU1 Series Pumps with No Output



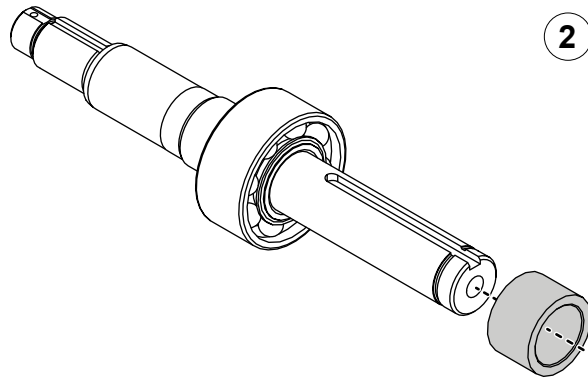
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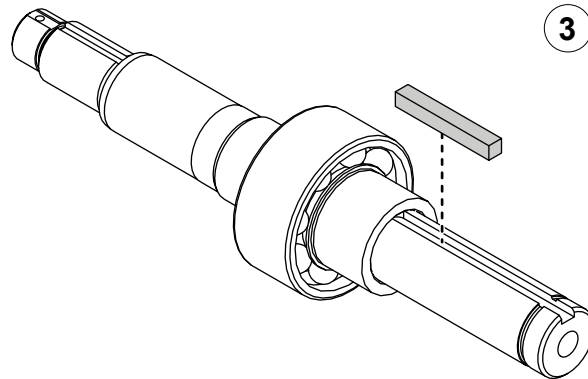
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.

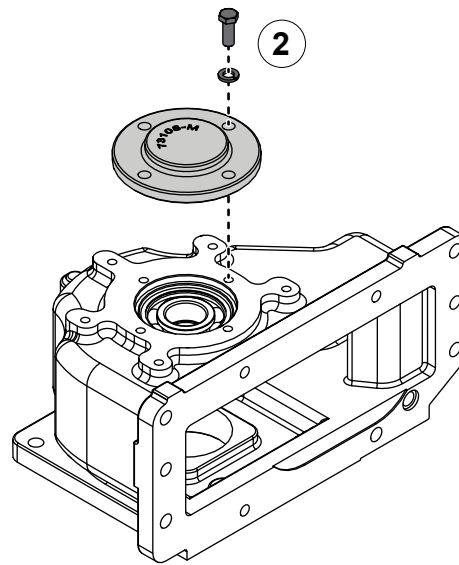
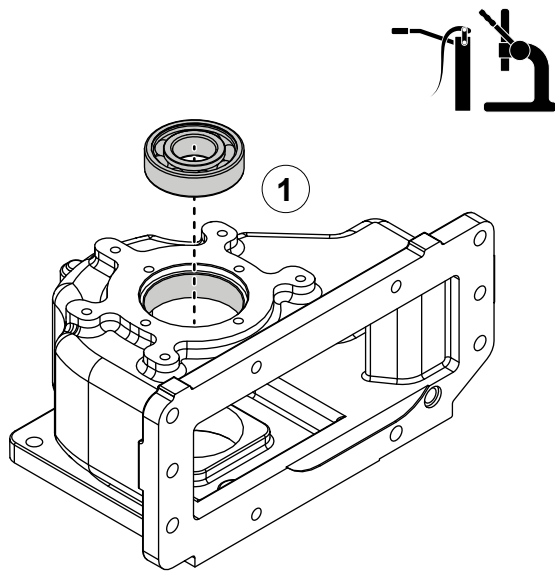


2



3

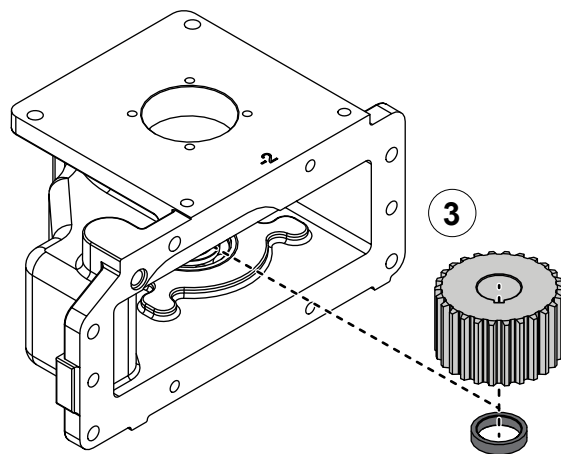
## CG, CX, and ESU1 Series Pumps with No Output



### Installing the Driven Shaft

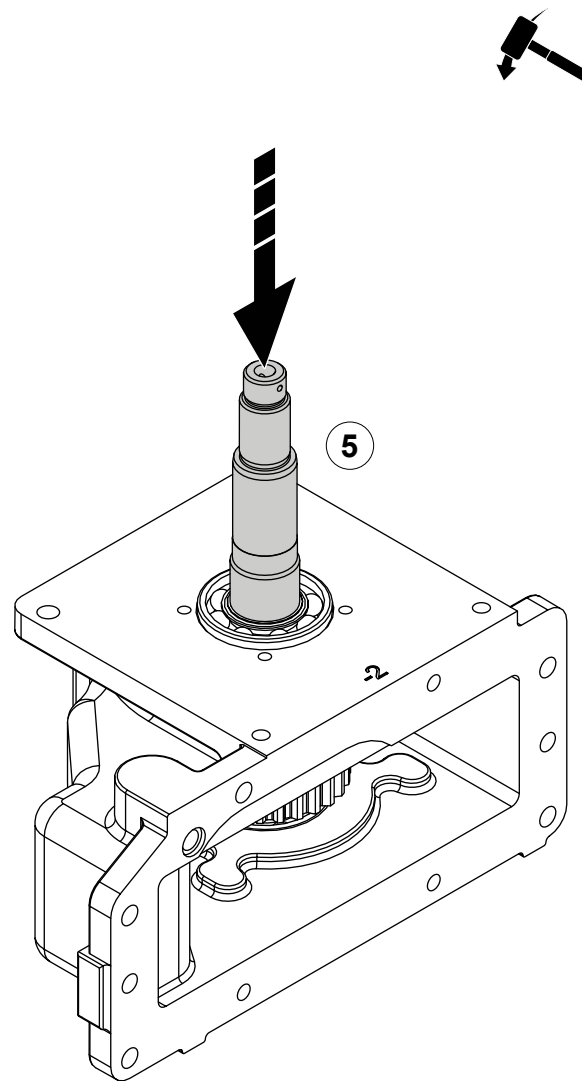
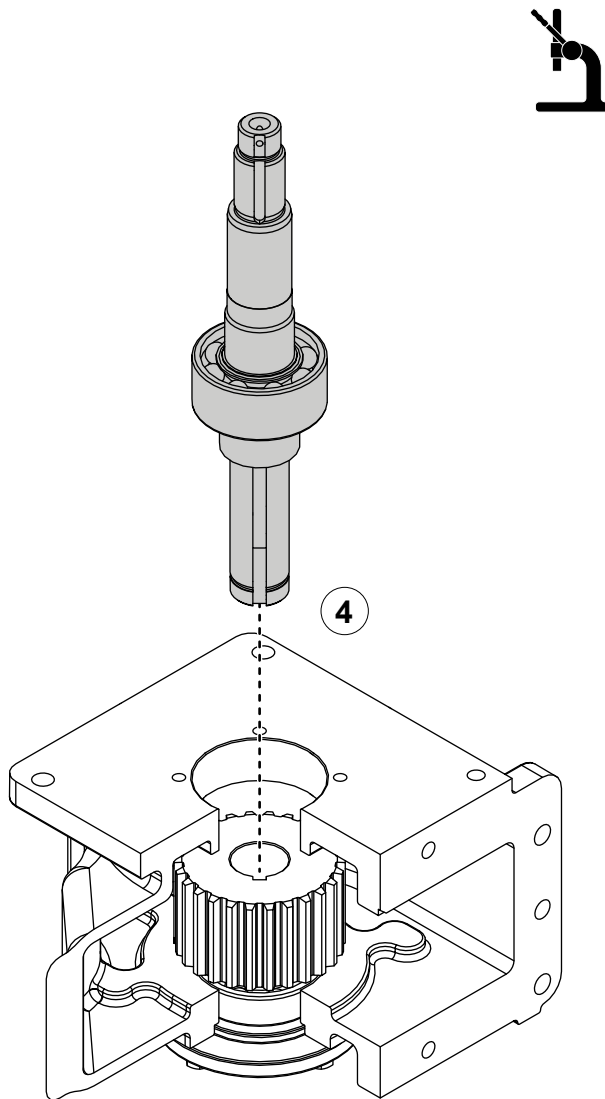
Use the illustrations and instructions to install the driven shaft assembly.

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the bearing cover onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.





## CG, CX, and ESU1 Series Pumps with No Output

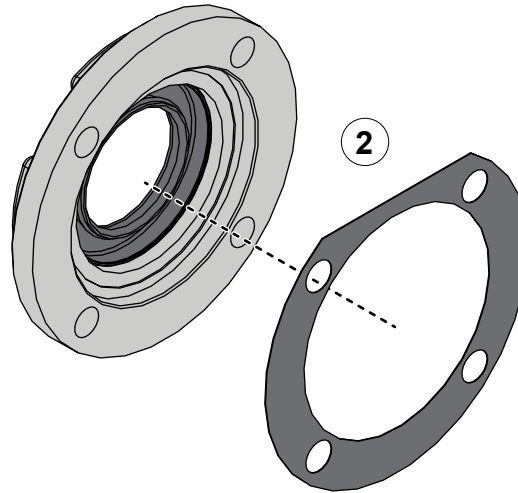
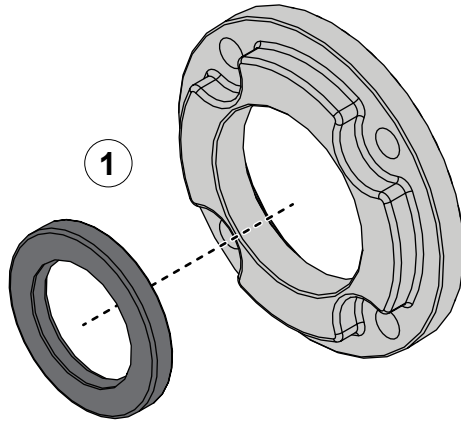


### Installing the Driven Shaft

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

- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.
- 5 Use a non-marring hammer to gently tap the driven shaft into position.

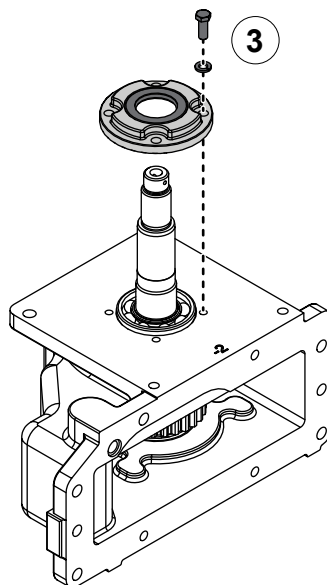
## CG, CX, and ESU1 Series Pumps with No Output



### Installing the Oil Seal Housing

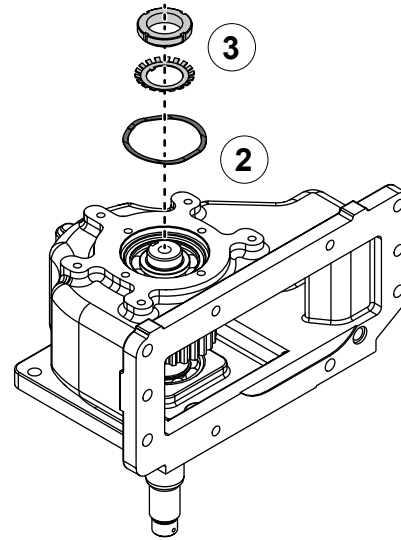
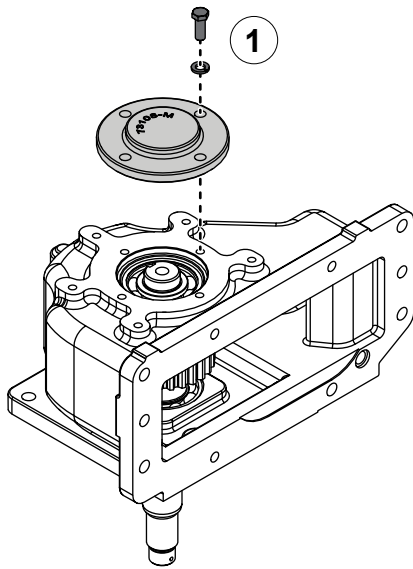
Use the illustrations and instructions to install the oil seal housing.

- 1 Apply sealant around the oil seal, then install it into the oil seal housing.
- 2 Install the gasket onto the oil seal housing flange.
- 3 Use the mounting hardware to secure the oil seal housing to the cap.



31 ft-lb  
42 N·m

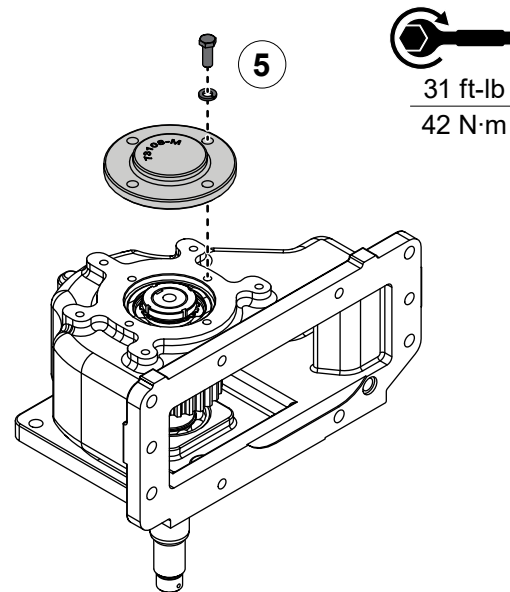
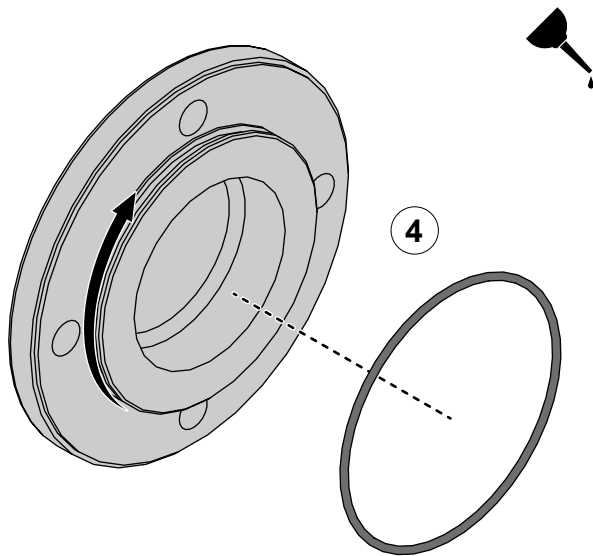
## CG, CX, and ESU1 Series Pumps with No Output



### Installing the Bearing Cover

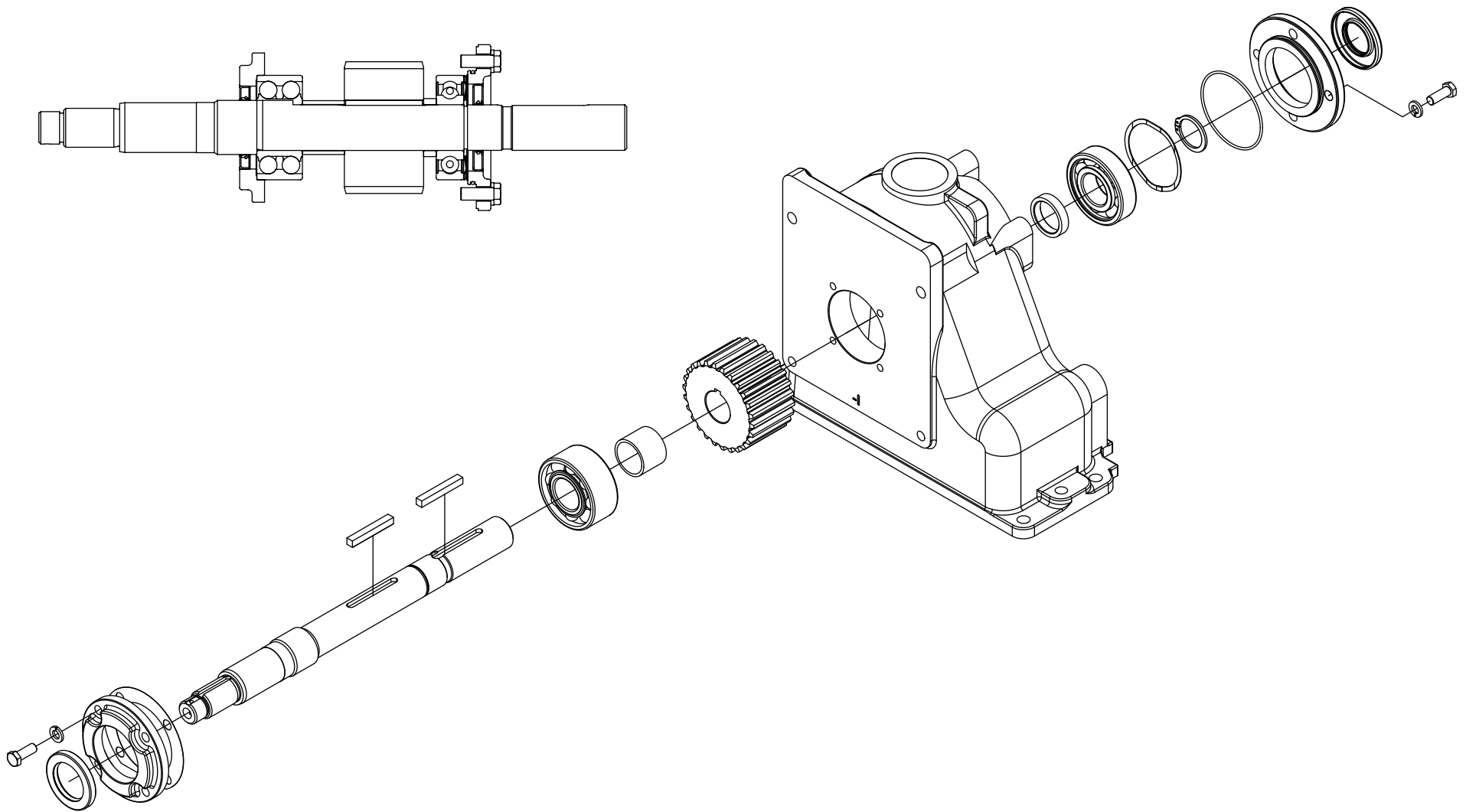
Use the illustrations and instructions to install the bearing cover.

- 1 Remove the bearing cover.
- 2 Install the wave spring into the cap.
- 3 Install the bearing lock nut and washer. Refer to: **"Installing the Bearing Lock Washer and Nut" on page 118.**
- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Use the mounting hardware to secure the bearing cover to the cap.

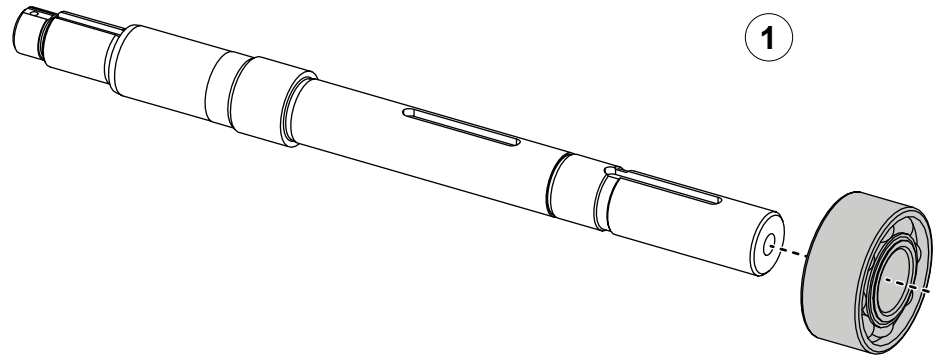


31 ft-lb  
42 N·m

## CG, CX, and ESU1 Series Pumps with CAFS Output



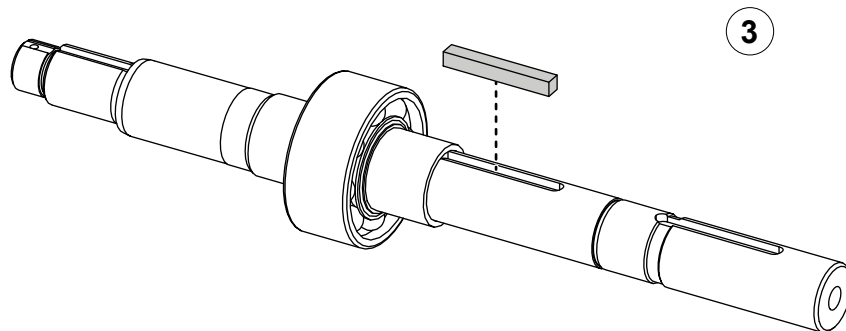
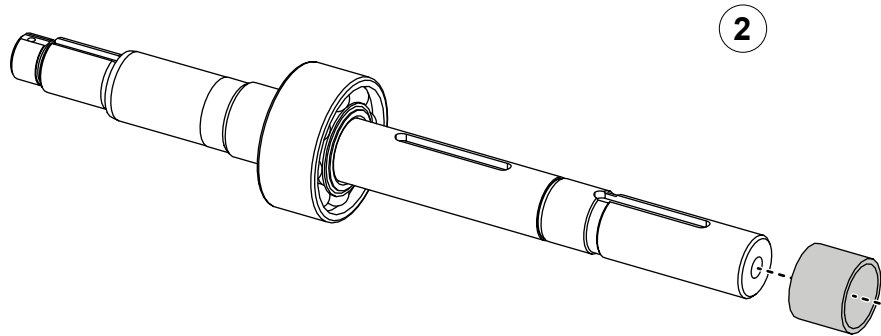
## CG, CX, and ESU1 Series Pumps with CAFS Output



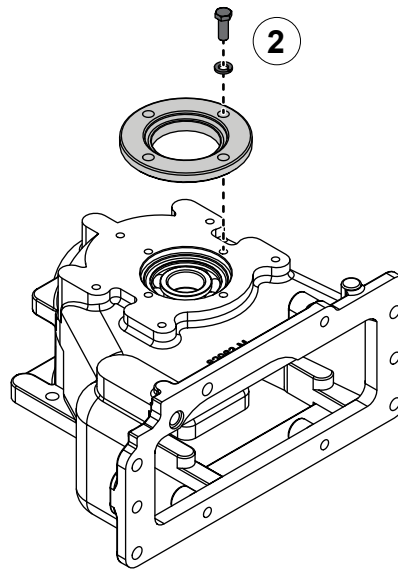
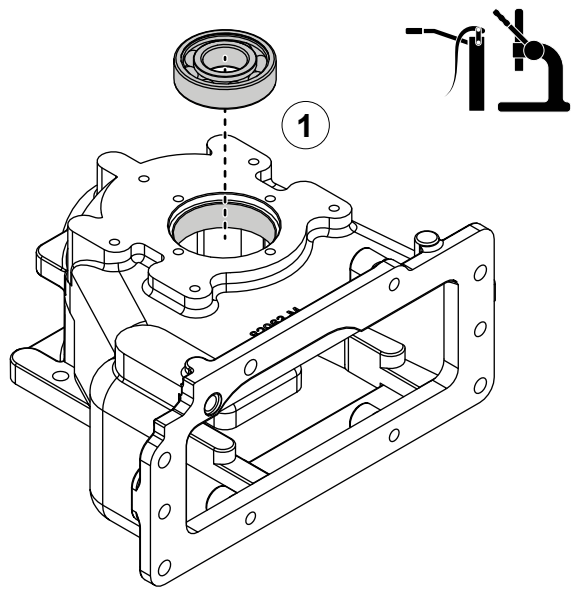
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.



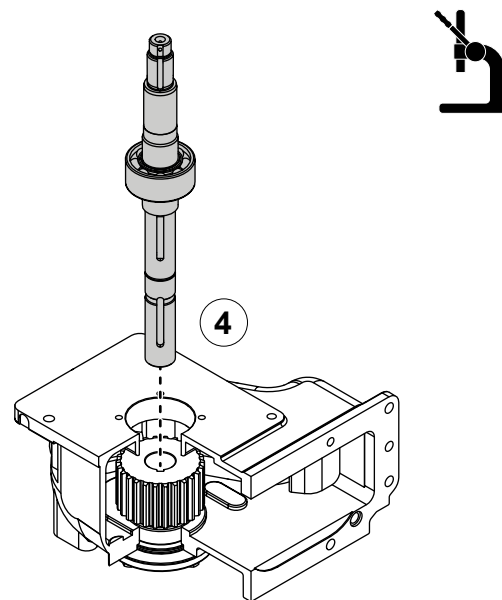
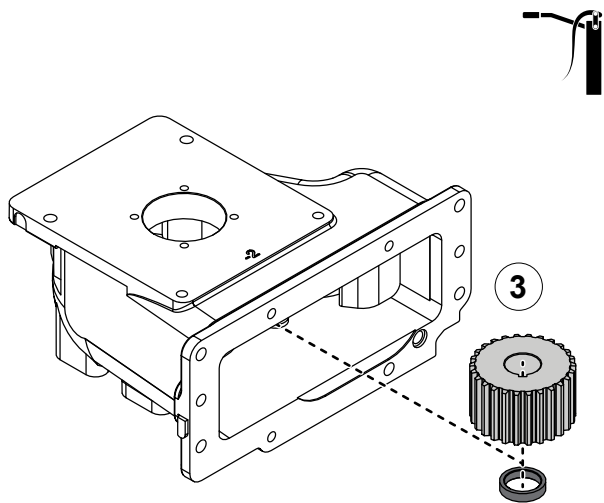
## CG, CX, and ESU1 Series Pumps with CAFS Output



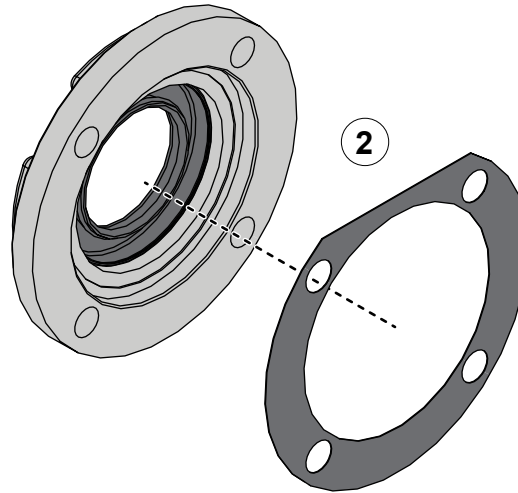
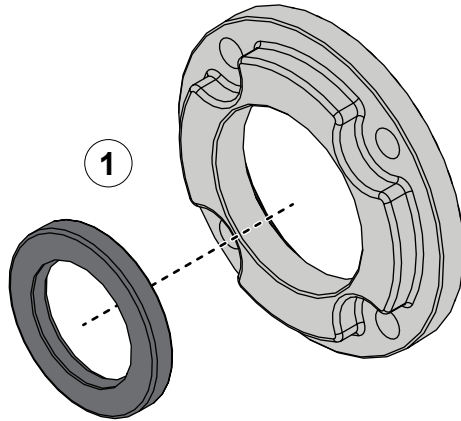
### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the output oil seal housing onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.
- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.



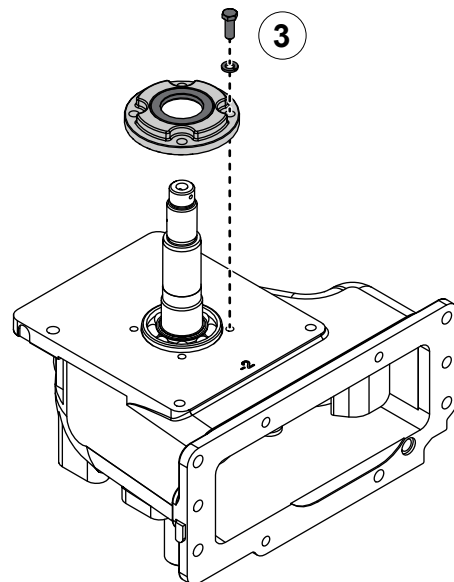
## CG, CX, and ESU1 Series Pumps with CAFS Output



### Installing the Input Oil Seal Housing

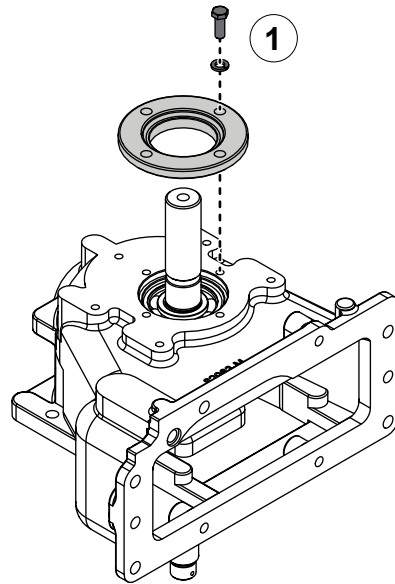
Use the illustrations and instructions to install the input oil seal housing.

- 1 Apply sealant around the oil seal, then install it into the oil seal housing.
- 2 Install the gasket onto the oil seal housing flange.
- 3 Use the mounting hardware to secure the oil seal housing to the cap.



31 ft-lb  
42 N·m

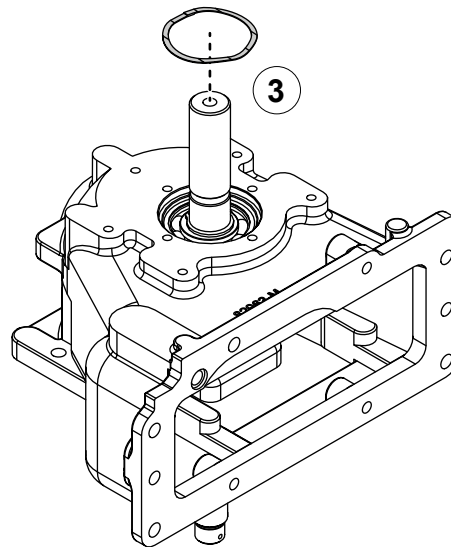
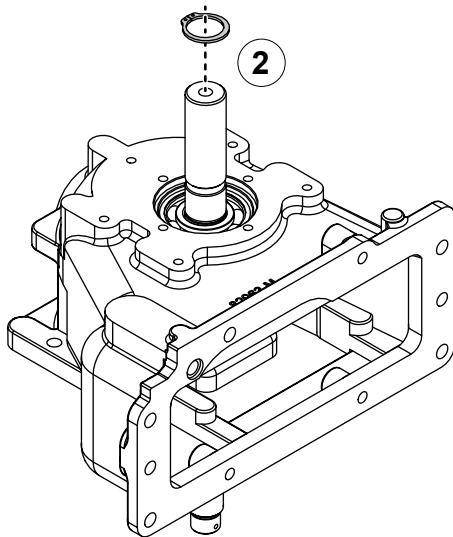
## CG, CX, and ESU1 Series Pumps with CAFS Output



### Installing the Output Oil Seal Housing

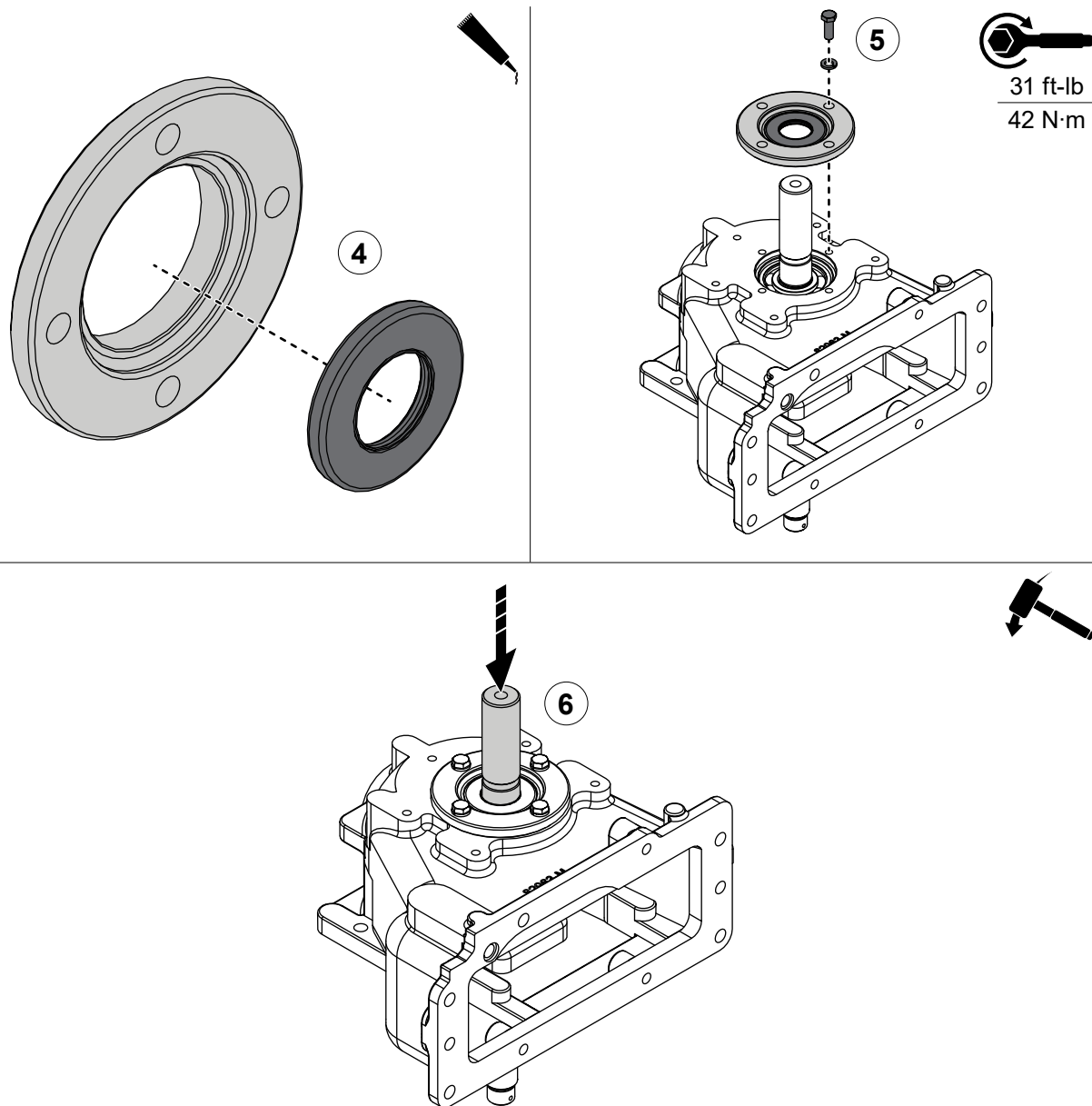
Use the illustrations and instructions to install the output oil seal housing.

- 1 Remove the oil seal housing.
- 2 Install the retaining ring onto the shaft.
- 3 Install the wave spring into the cap.





## CG, CX, and ESU1 Series Pumps with CAFS Output

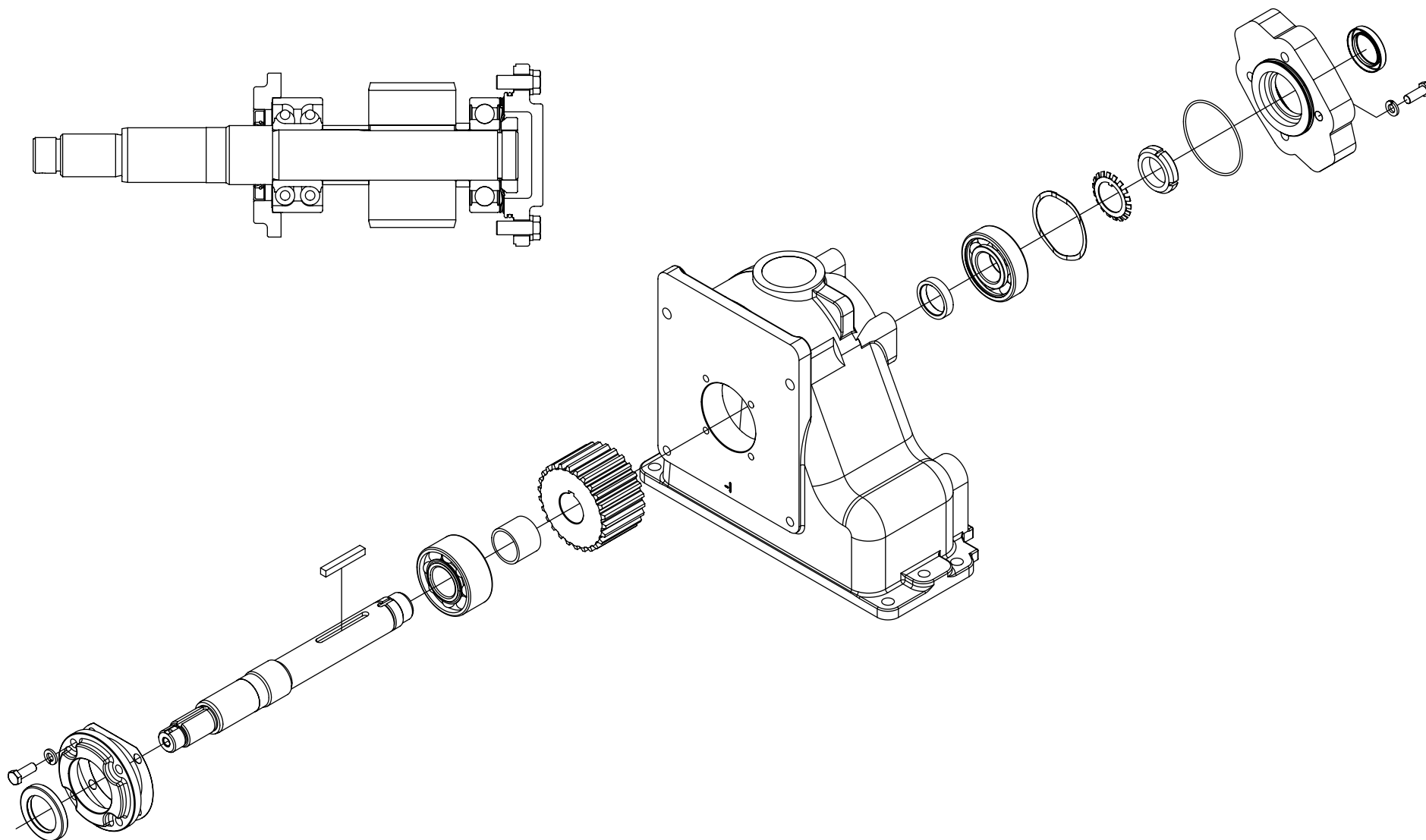


### Installing the Output Oil Seal Housing

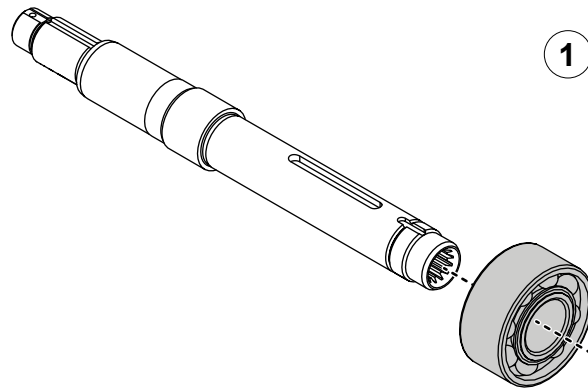
Use the illustrations and instructions to install the output oil seal housing.

- 4 Apply sealant around the oil seal, then install it into the oil seal housing.
- 5 Use the mounting hardware to secure the oil seal housing to the cap.
- 6 Use a non-marring hammer to gently tap the driven shaft into position.

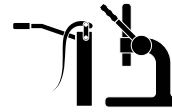
## CG, CX, and ESU1 Series Pumps with Hydraulic Output



## CG, CX, and ESU1 Series Pumps with Hydraulic Output



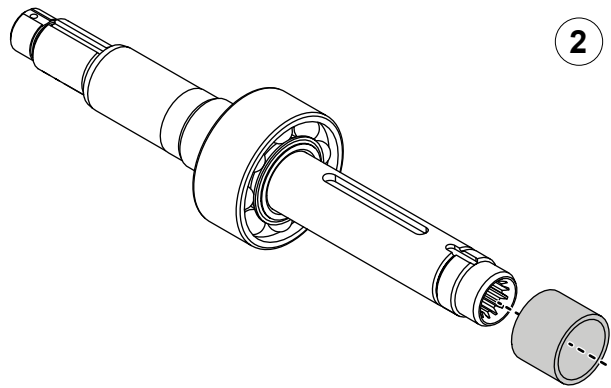
1



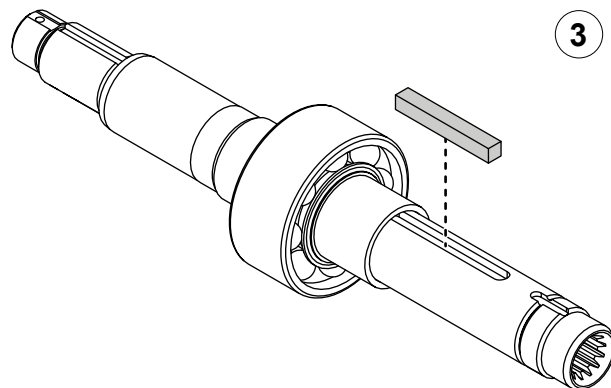
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.

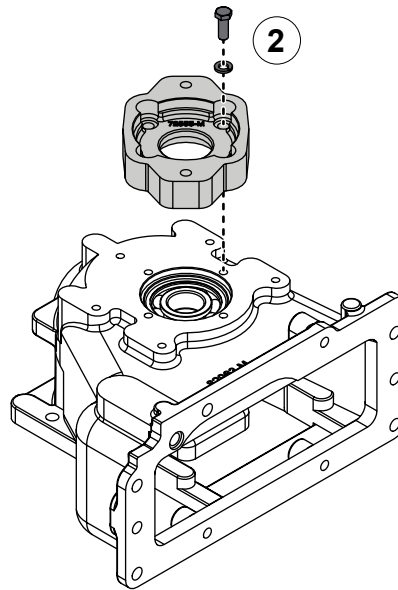
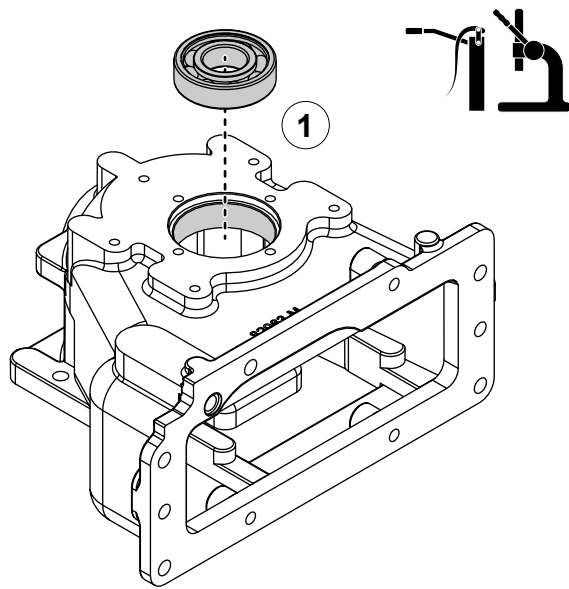


2



3

## CG, CX, and ESU1 Series Pumps with Hydraulic Output



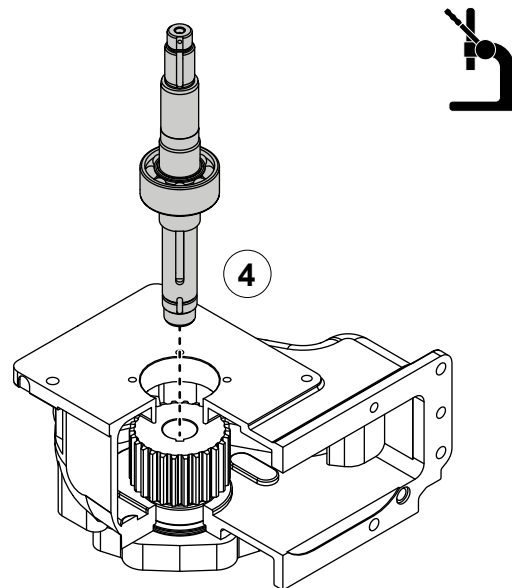
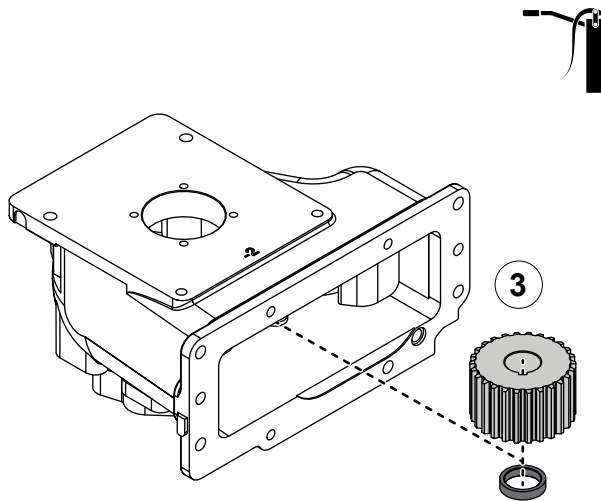
### Installing the Driven Shaft

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

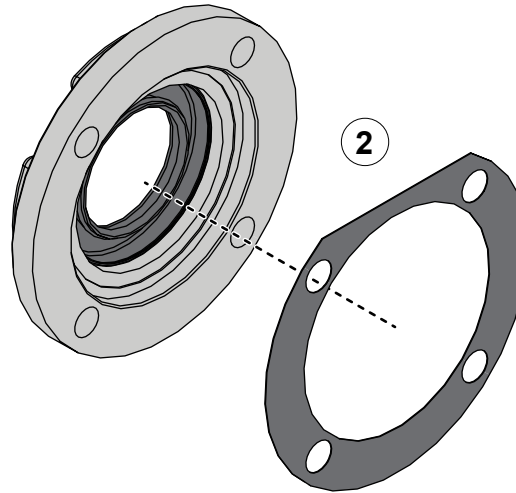
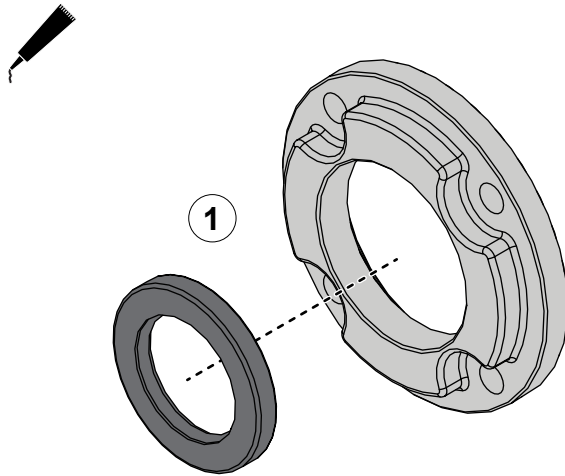
- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the hydraulic adapter onto the cap.

**Note:** Use the information that you recorded during the disassembly to determine component orientation.

- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.
- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.



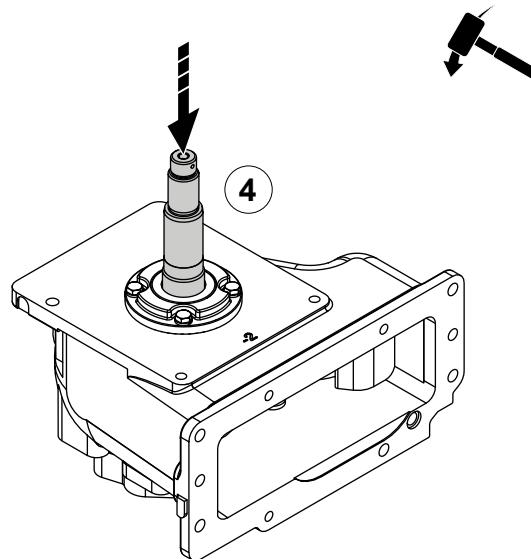
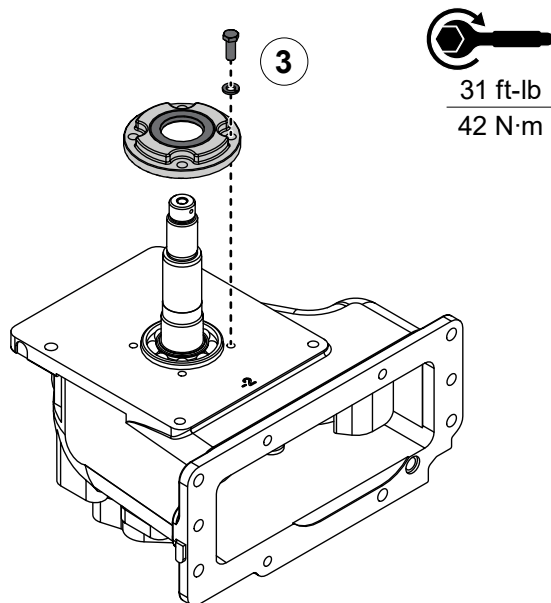
## CG, CX, and ESU1 Series Pumps with Hydraulic Output



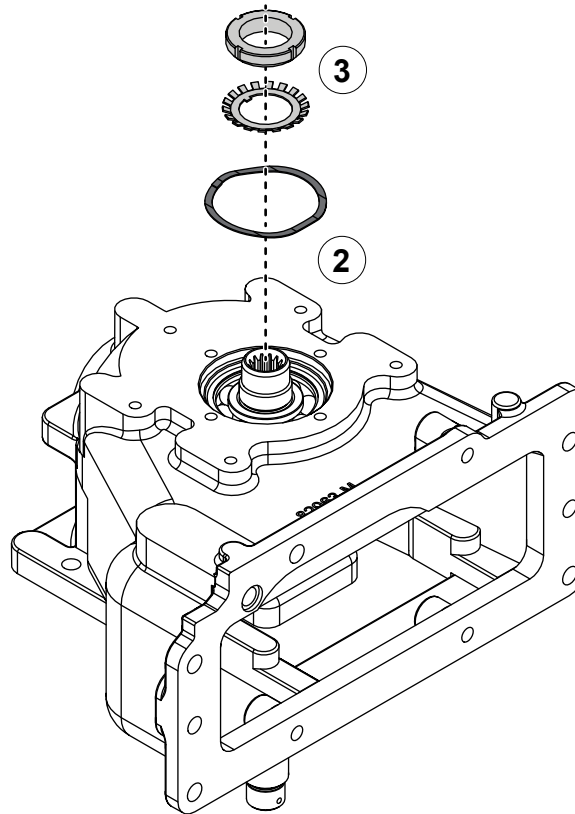
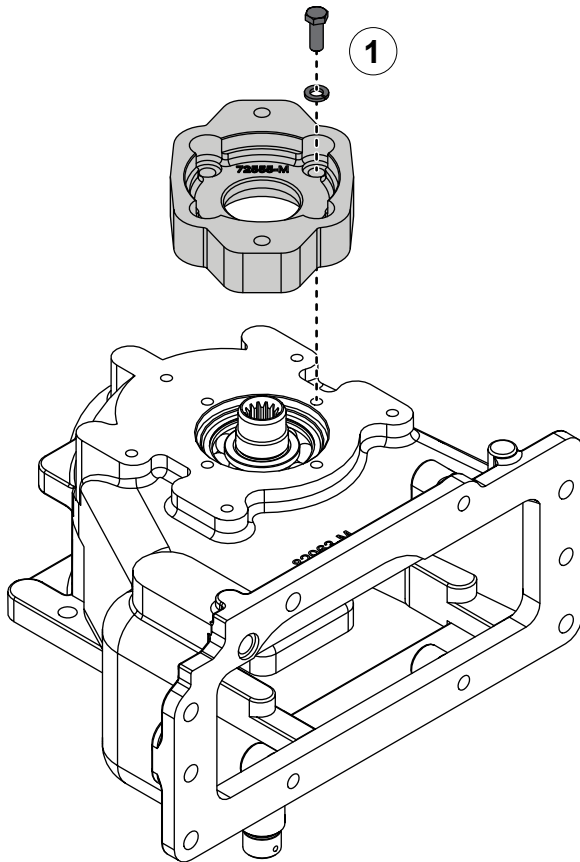
### Installing the Oil Seal Housing

Use the illustrations and instructions to install the oil seal housing.

- 1 Apply sealant around the oil seal, then install it into the oil seal housing.
- 2 Install the gasket onto the oil seal housing flange.
- 3 Use the mounting hardware to secure the oil seal housing to the cap.
- 4 Use a non-marring hammer to gently tap the driven shaft into position.



## CG, CX, and ESU1 Series Pumps with Hydraulic Output



### Installing the Hydraulic Adapter

Use the illustrations and instructions to install the hydraulic adapter.

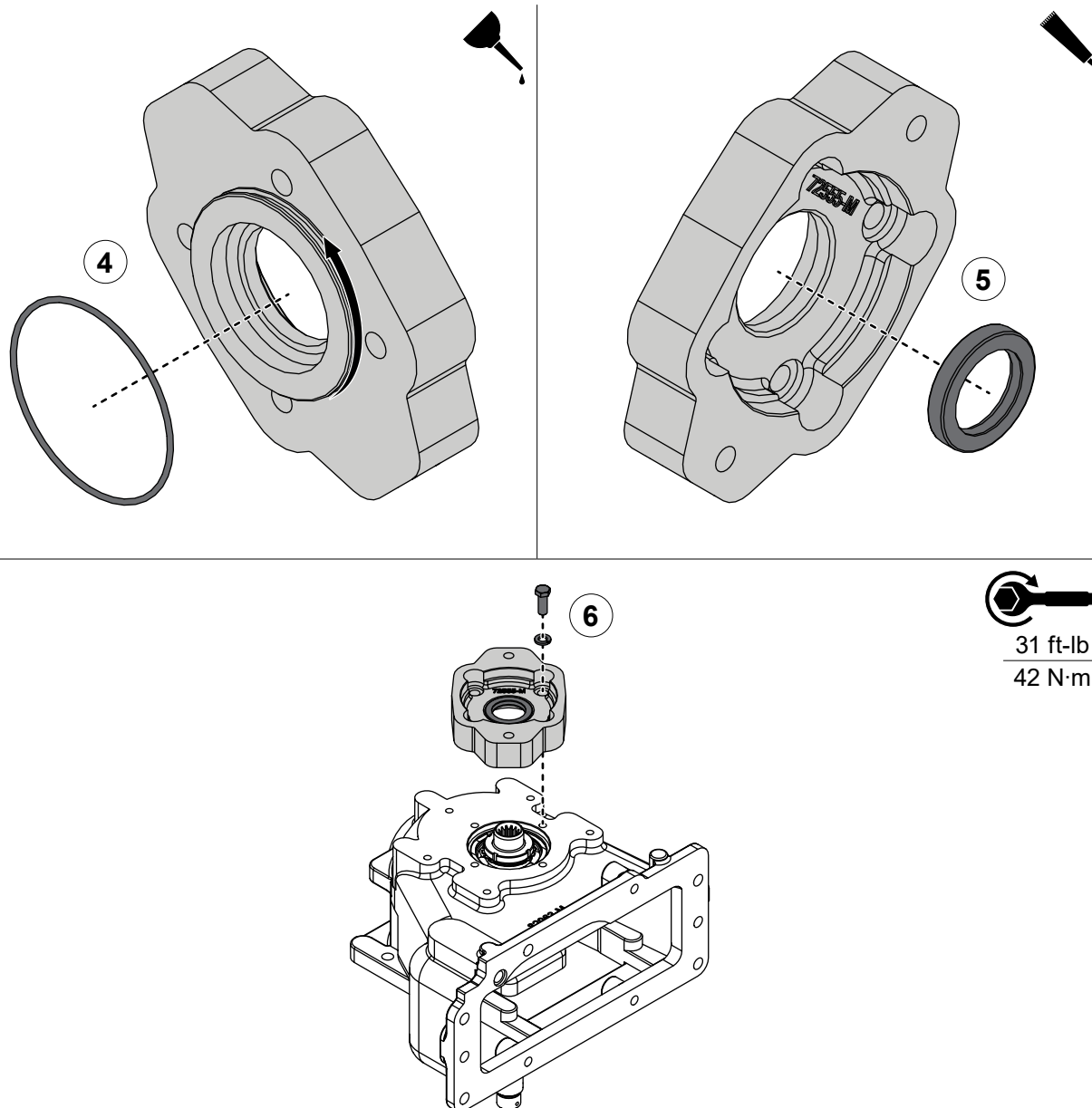
- 1 Remove the hydraulic adapter.
- 2 Install the wave spring into the cap.
- 3 Install the bearing lock nut and washer. Refer to: **"Installing the Bearing Lock Washer and Nut" on page 118.**

## CG, CX, and ESU1 Series Pumps with Hydraulic Output

### Installing the Hydraulic Adapter

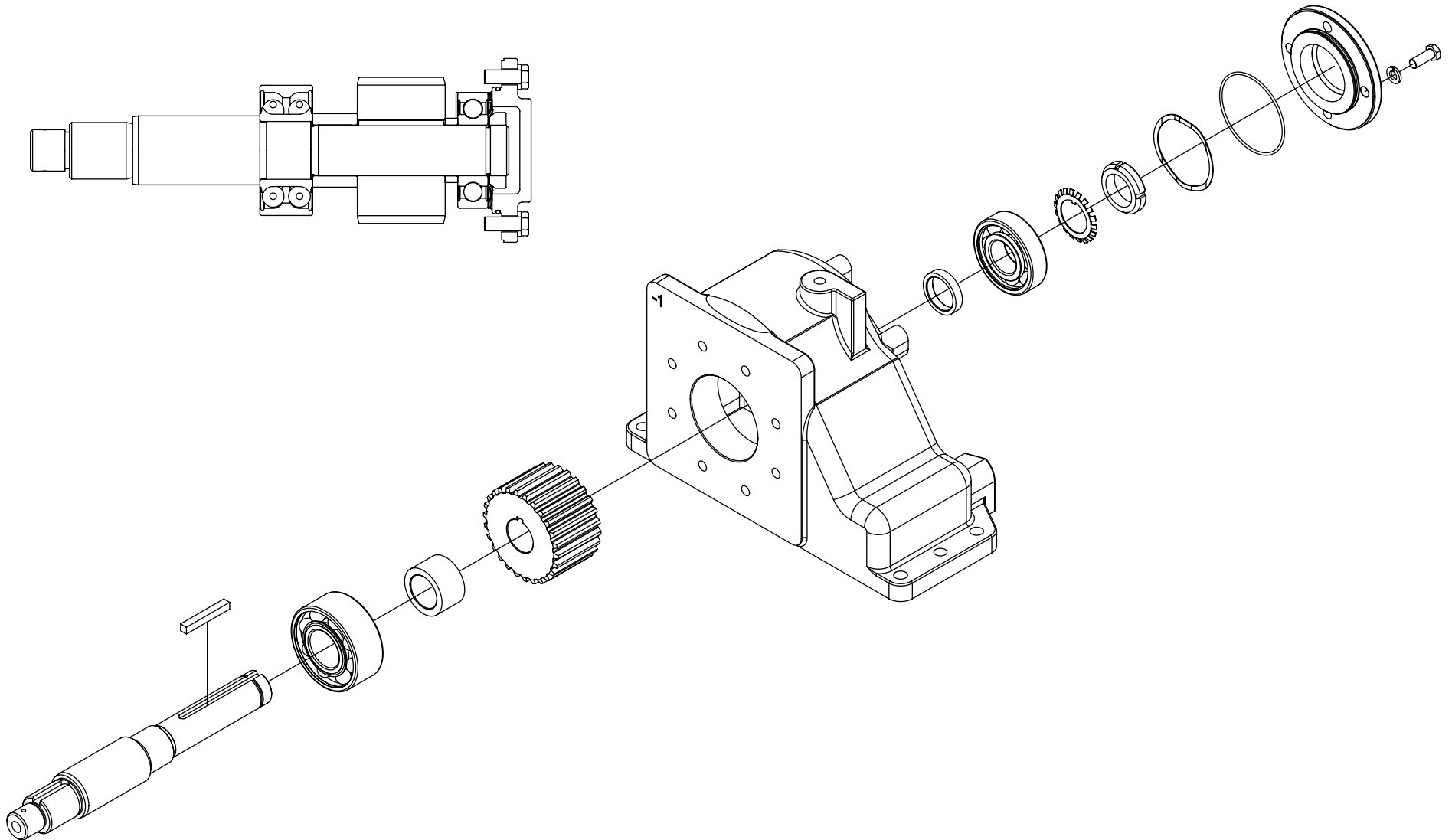
Use the illustrations and instructions to install the hydraulic adapter.

- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Apply sealant around the oil seal, then install it into the hydraulic adapter.
- 6 Use the mounting hardware to secure the hydraulic adapter to the cap.



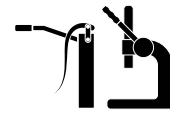
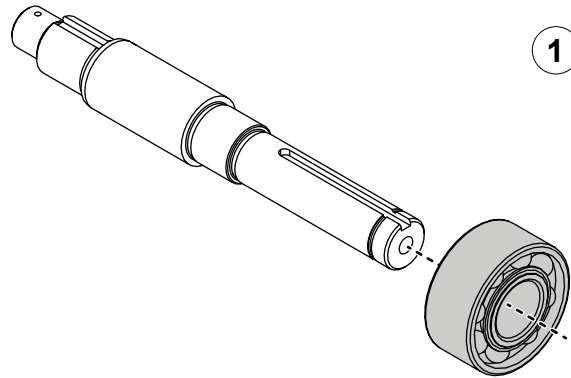
31 ft-lb  
42 N·m

## S100 Series Pumps with No Output





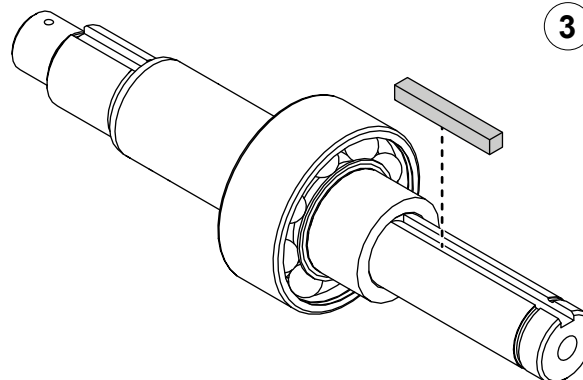
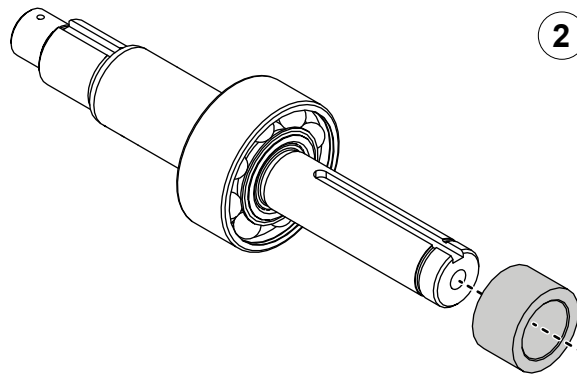
## S100 Series Pumps with No Output



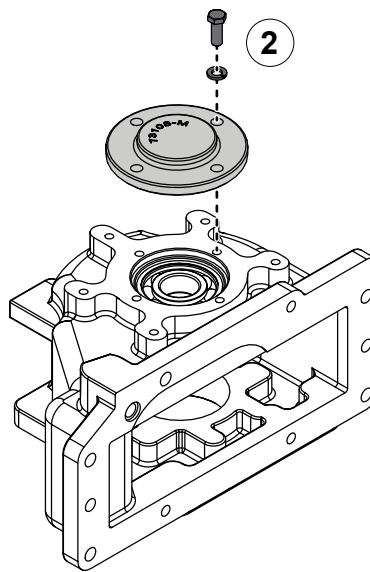
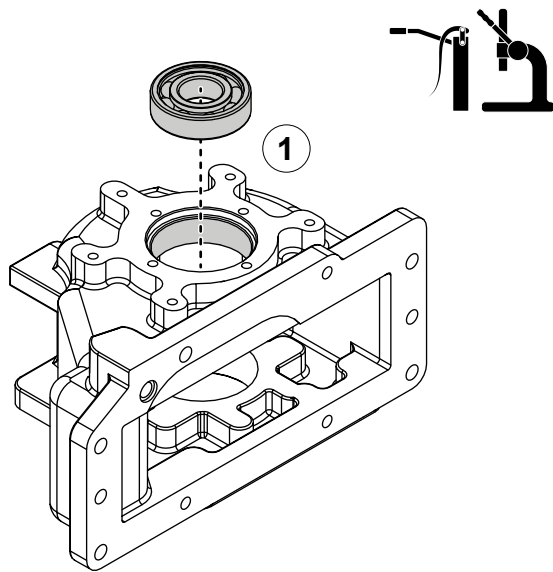
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.



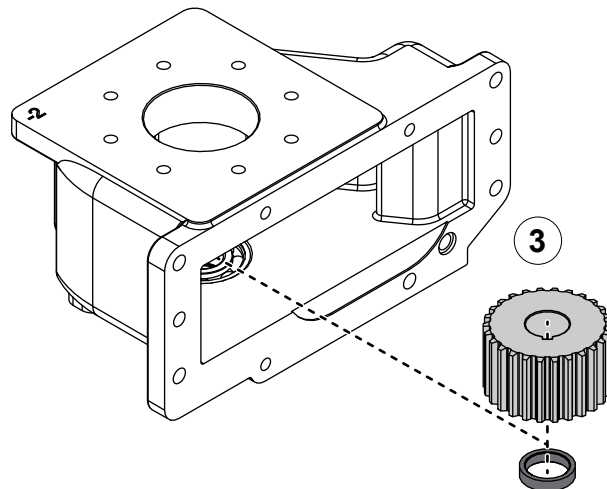
## S100 Series Pumps with No Output



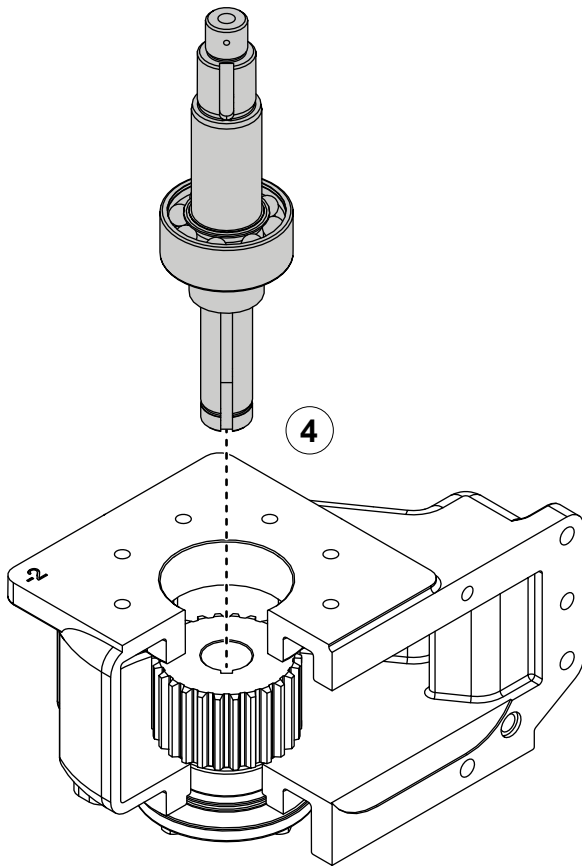
### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the bearing cover onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.



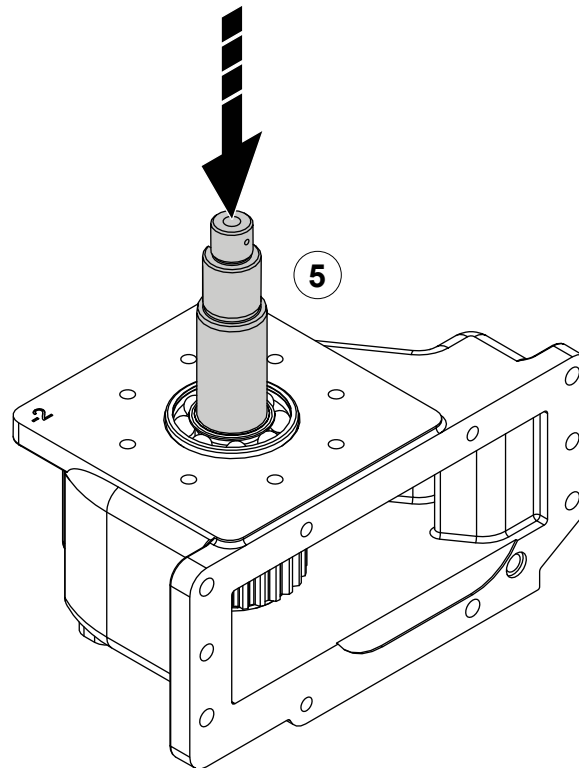
## S100 Series Pumps with No Output



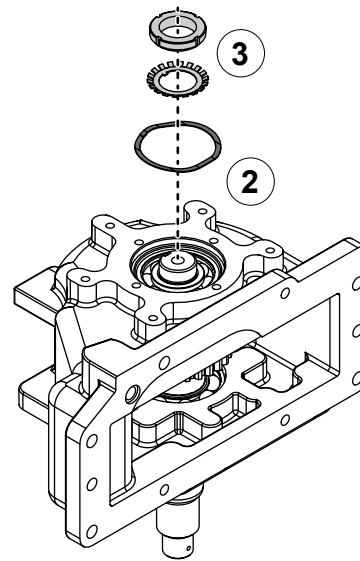
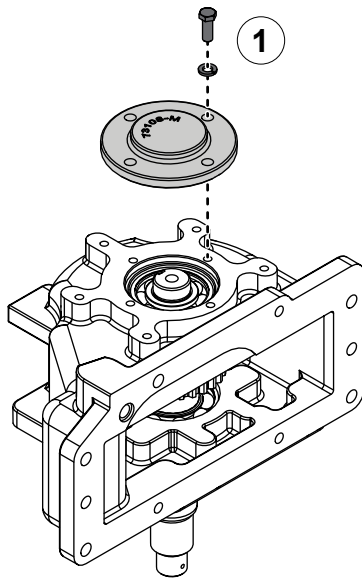
### Installing the Driven Shaft

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

- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.
- 5 Use a non-marring hammer to gently tap the driven shaft into position.



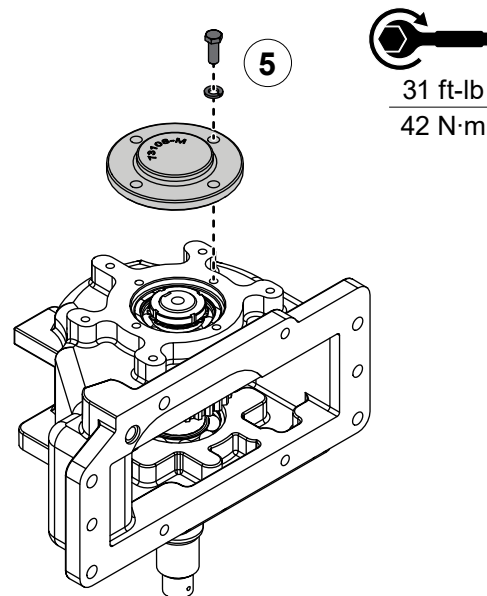
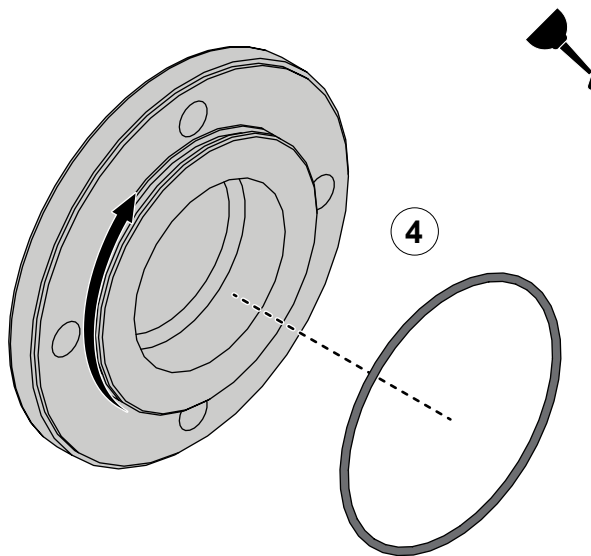
## S100 Series Pumps with No Output



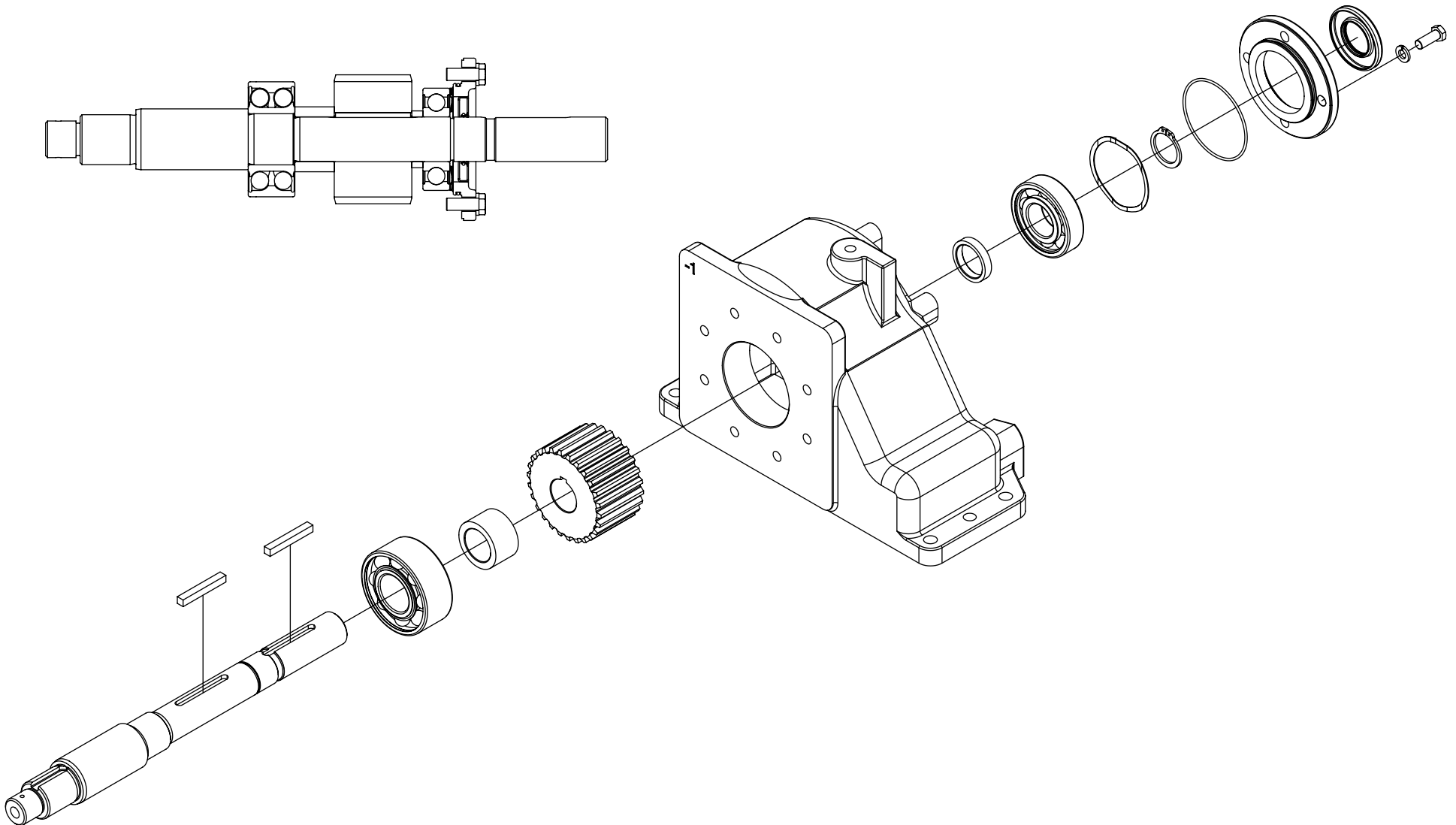
### Installing the Bearing Cover

Use the illustrations and instructions to install the bearing cover.

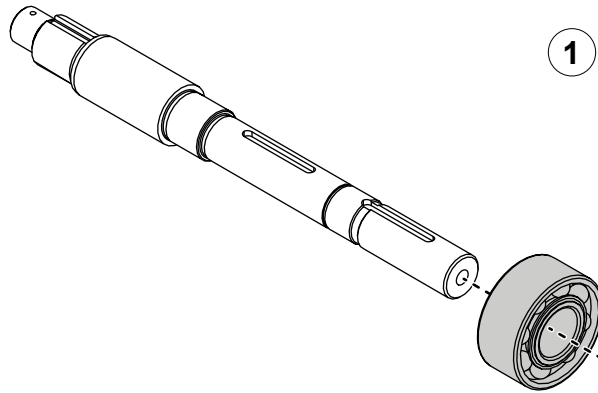
- 1 Remove the bearing cover.
- 2 Install the wave spring into the cap.
- 3 Install the bearing lock washer and nut. Refer to: **"Installing the Bearing Lock Washer and Nut" on page 118.**
- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Use the mounting hardware to secure the bearing cover to the cap.



## S100 Series Pumps with CAFS Output



## S100 Series Pumps with CAFS Output



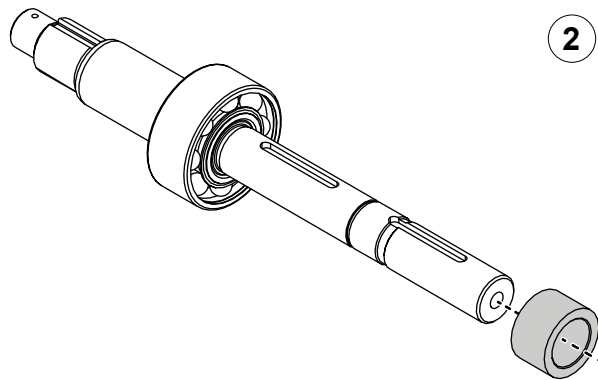
1



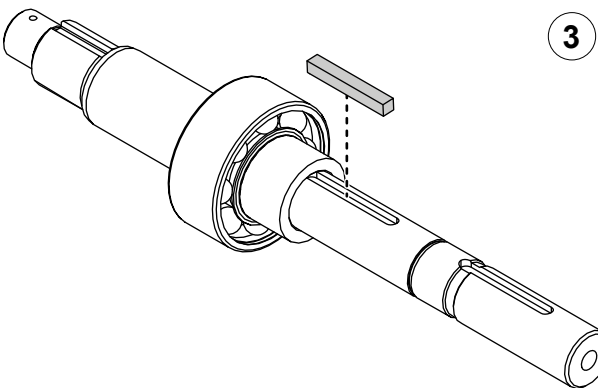
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.

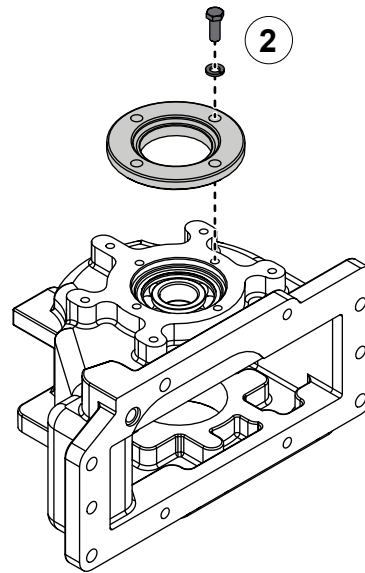
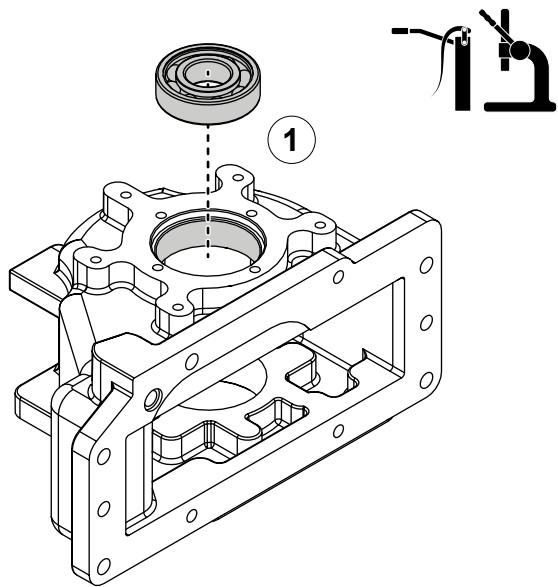


2



3

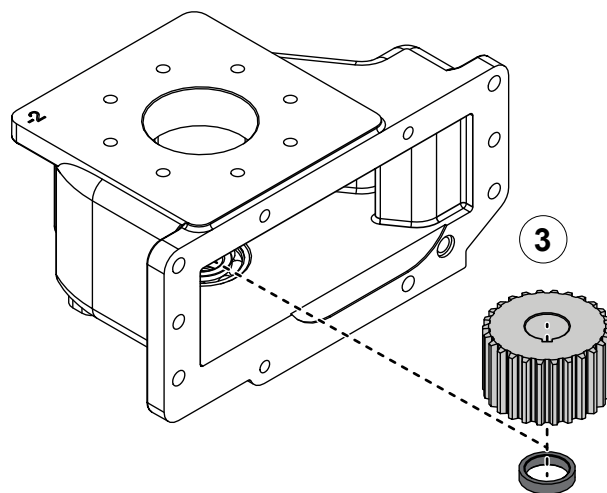
## S100 Series Pumps with CAFS Output



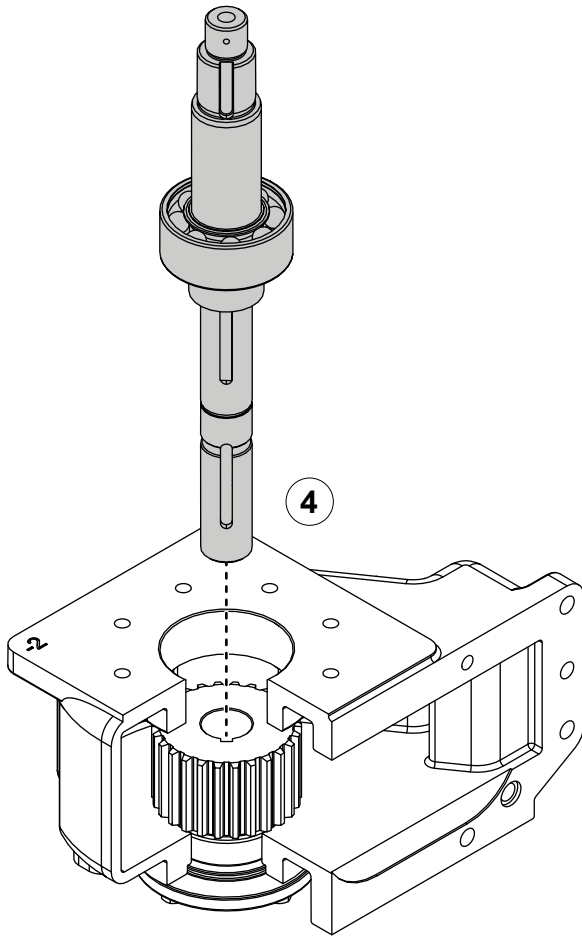
### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the oil seal housing onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.



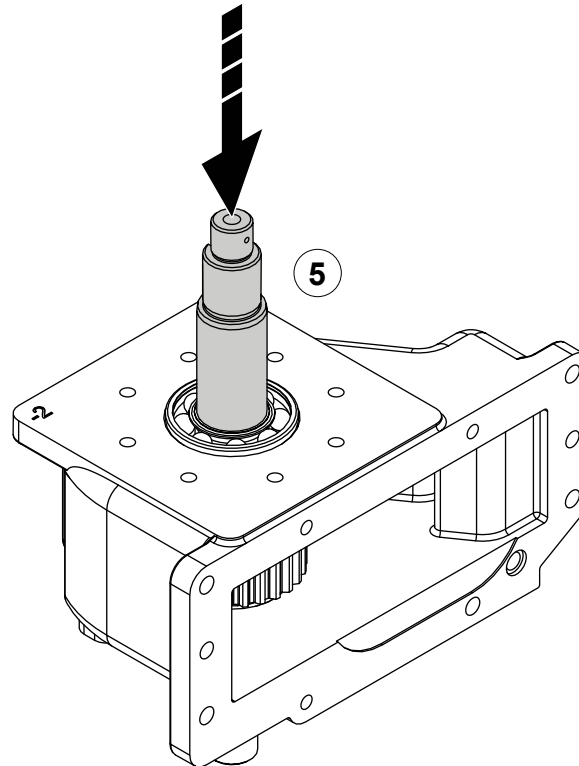
## S100 Series Pumps with CAFS Output



### Installing the Driven Shaft

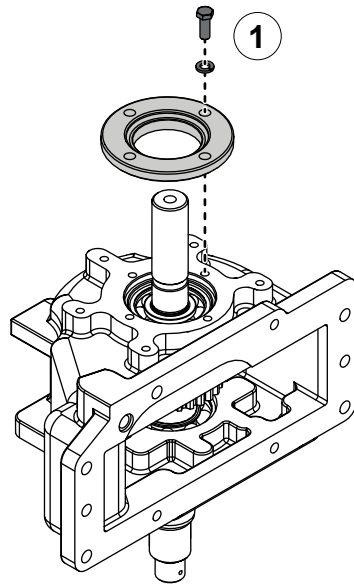
Use the illustrations and instructions to install the driven shaft assembly.

- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.
- 5 Use a non-marring hammer to gently tap the driven shaft into position.





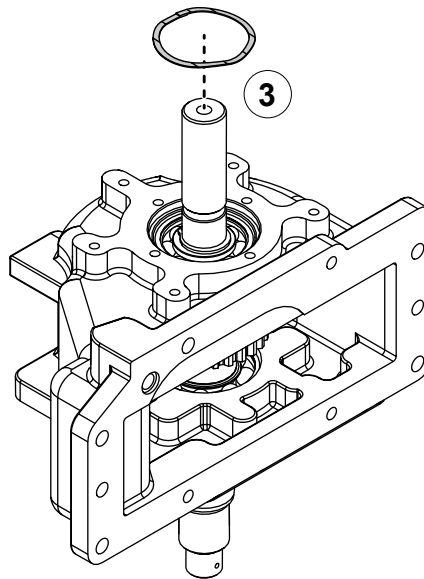
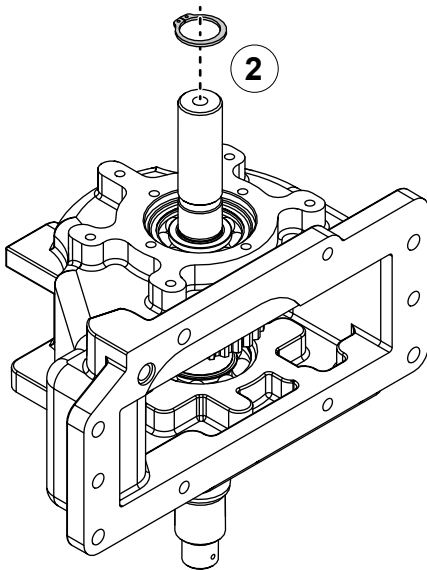
## S100 Series Pumps with CAFS Output



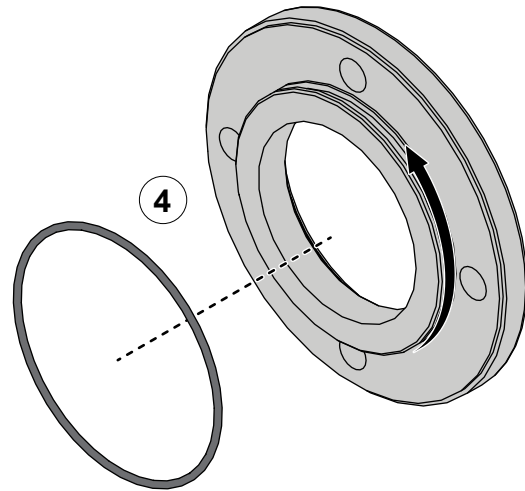
### Installing the Oil Seal Housing

Use the illustrations and instructions to install the oil seal housing.

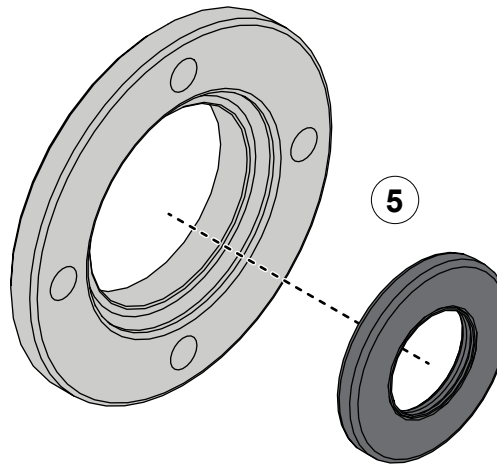
- 1 Remove the oil seal housing.
- 2 Install the retaining ring onto the shaft.
- 3 Install the wave spring into the cap.



## S100 Series Pumps with CAFS Output



4

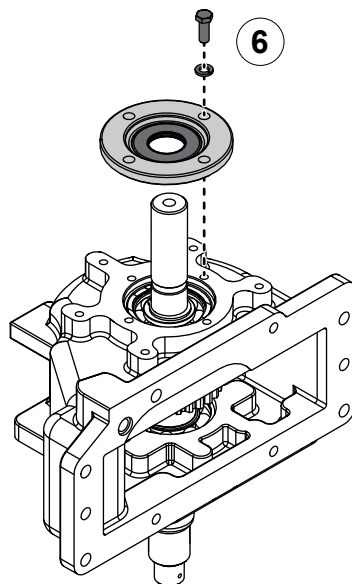


5

### Installing the Oil Seal Housing

Use the illustrations and instructions to install the oil seal housing.

- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Apply sealant around the oil seal, then install it into the oil seal housing.
- 6 Use the mounting hardware to secure the oil seal housing to the cap.

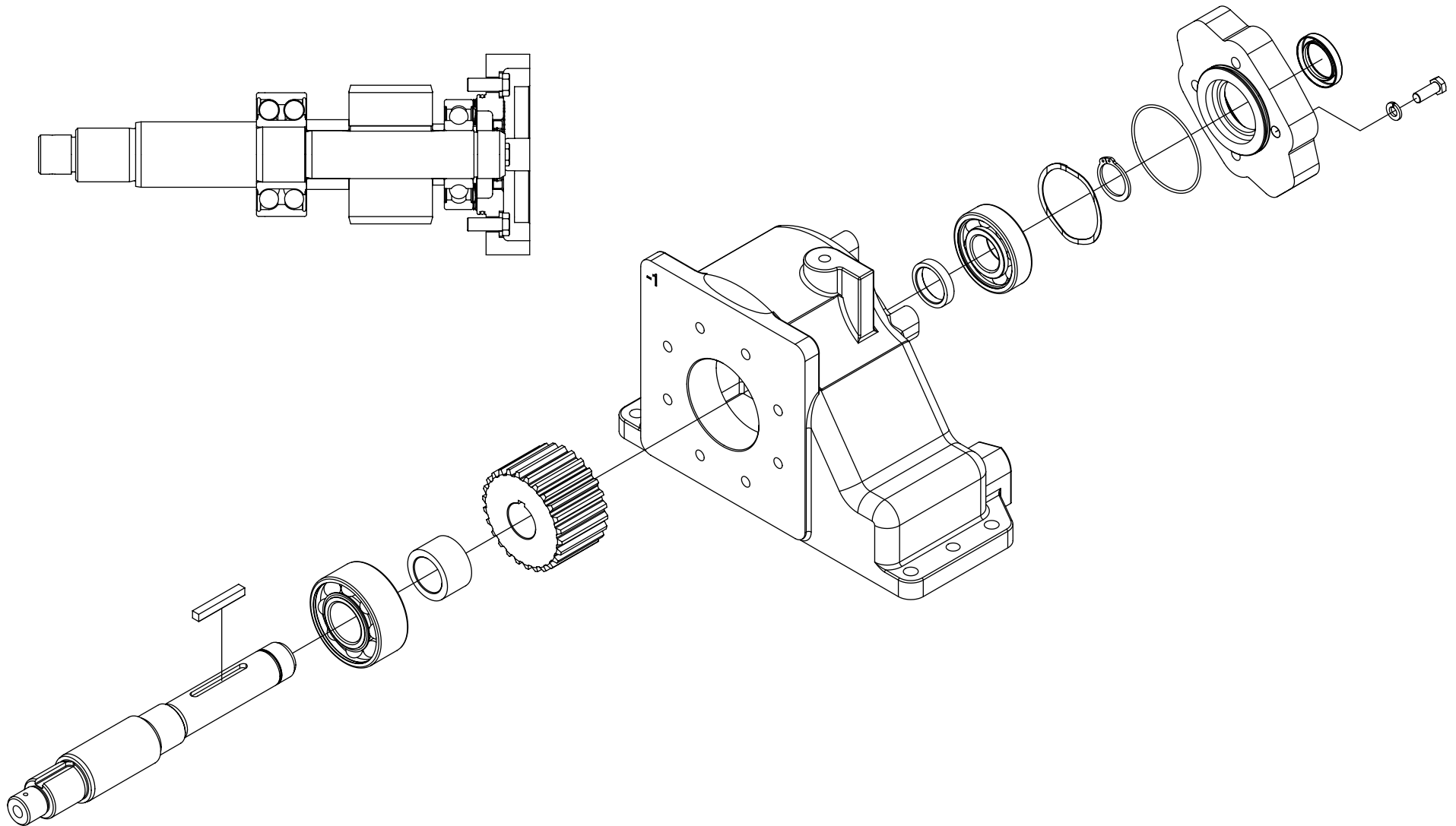


6

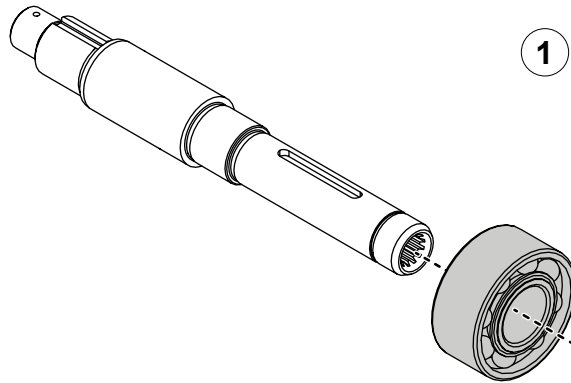


31 ft-lb  
42 N·m

## S100 Series Pumps with Hydraulic Output



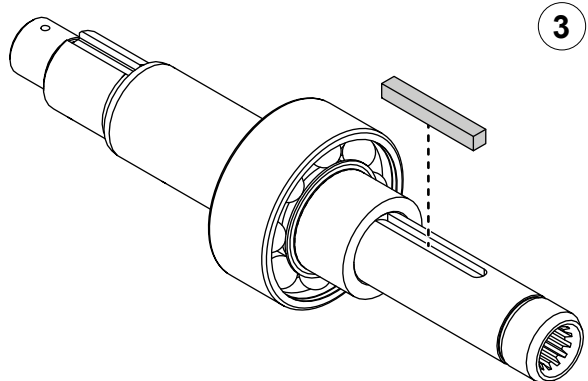
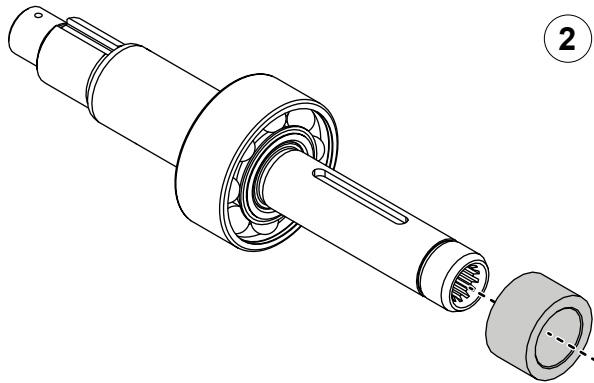
## S100 Series Pumps with Hydraulic Output



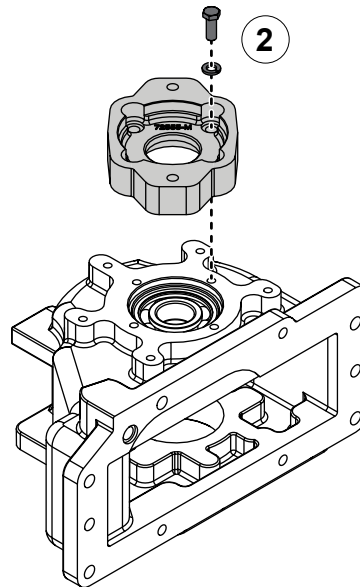
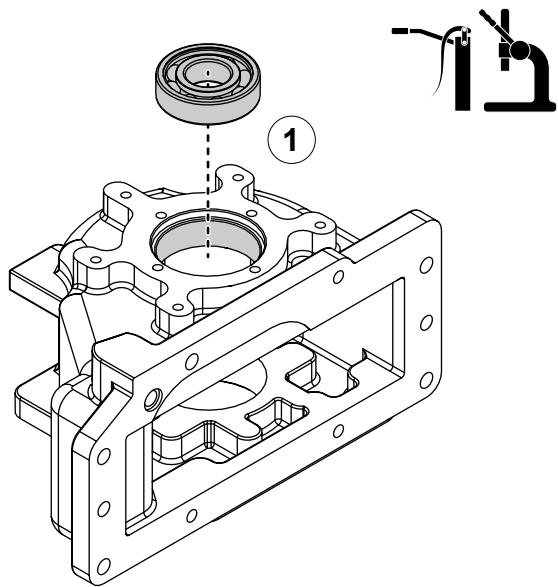
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Install the key into the key slot.



## S100 Series Pumps with Hydraulic Output



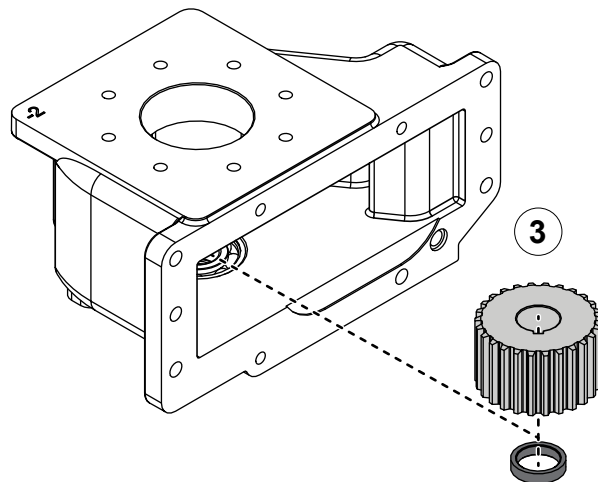
### Installing the Driven Shaft

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

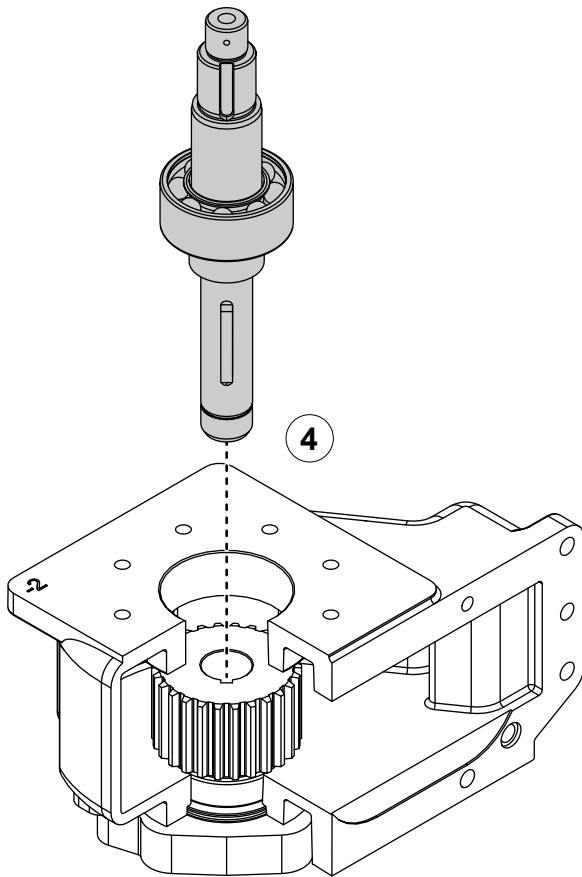
- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the hydraulic adapter onto the cap.

**Note:** Use the information that you recorded during the disassembly to determine component orientation.

- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.



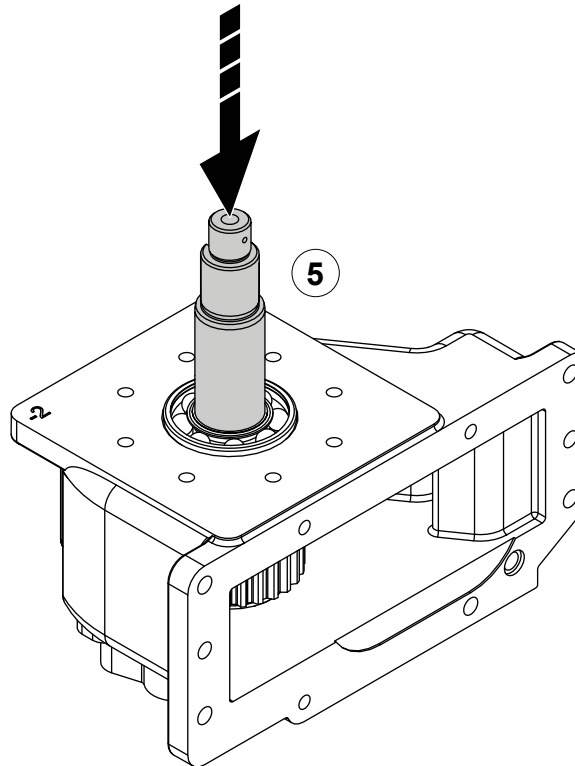
## S100 Series Pumps with Hydraulic Output



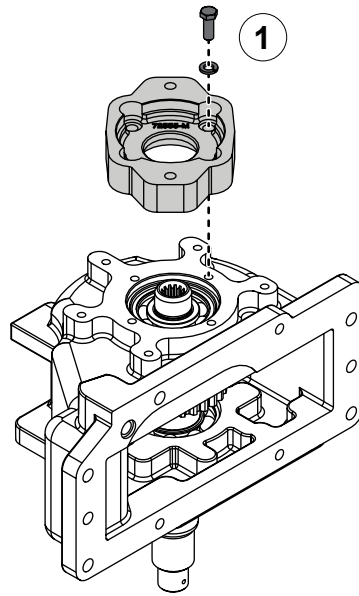
### Installing the Driven Shaft

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

- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.
- 5 Use a non-marring hammer to gently tap the driven shaft into position.



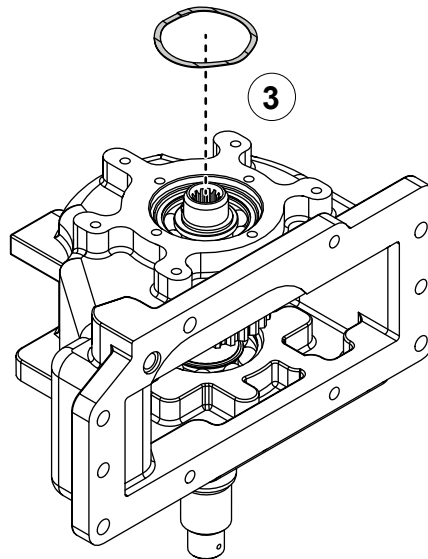
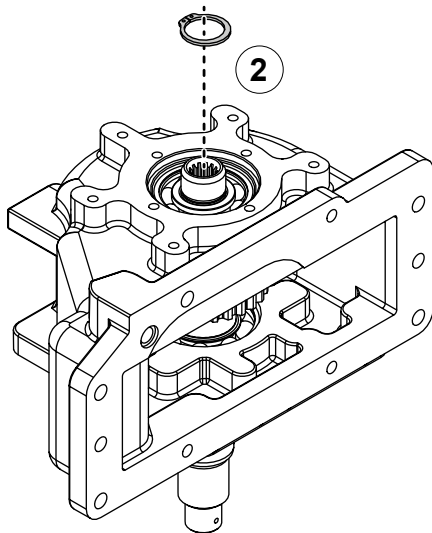
## S100 Series Pumps with Hydraulic Output



### Installing the Hydraulic Adapter

Use the illustrations and instructions to install the hydraulic adapter.

- 1 Remove the hydraulic adapter.
- 2 Install the retaining ring onto the shaft.
- 3 Install the wave spring into the cap.

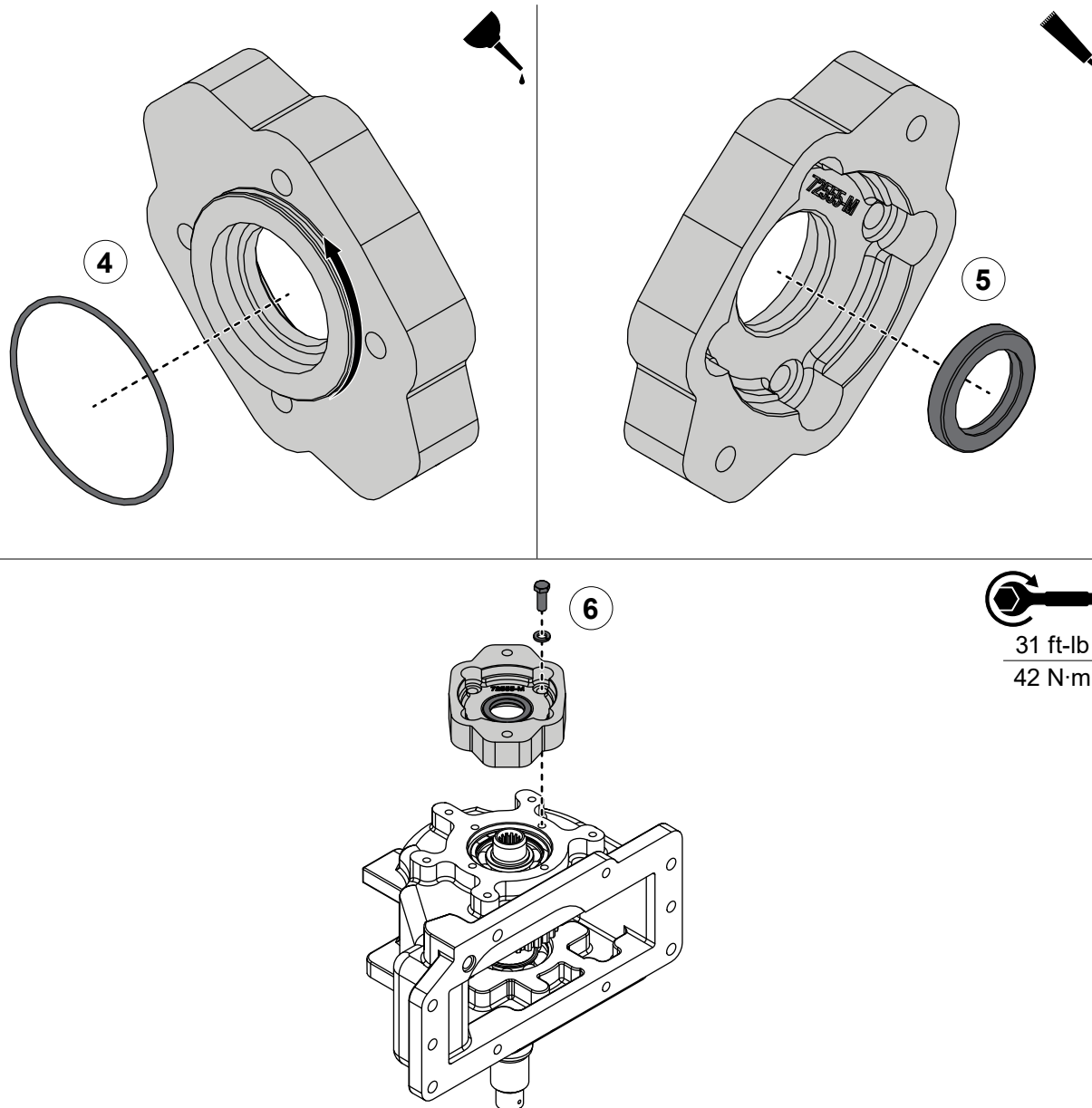


## S100 Series Pumps with Hydraulic Output

### Installing the Hydraulic Adapter

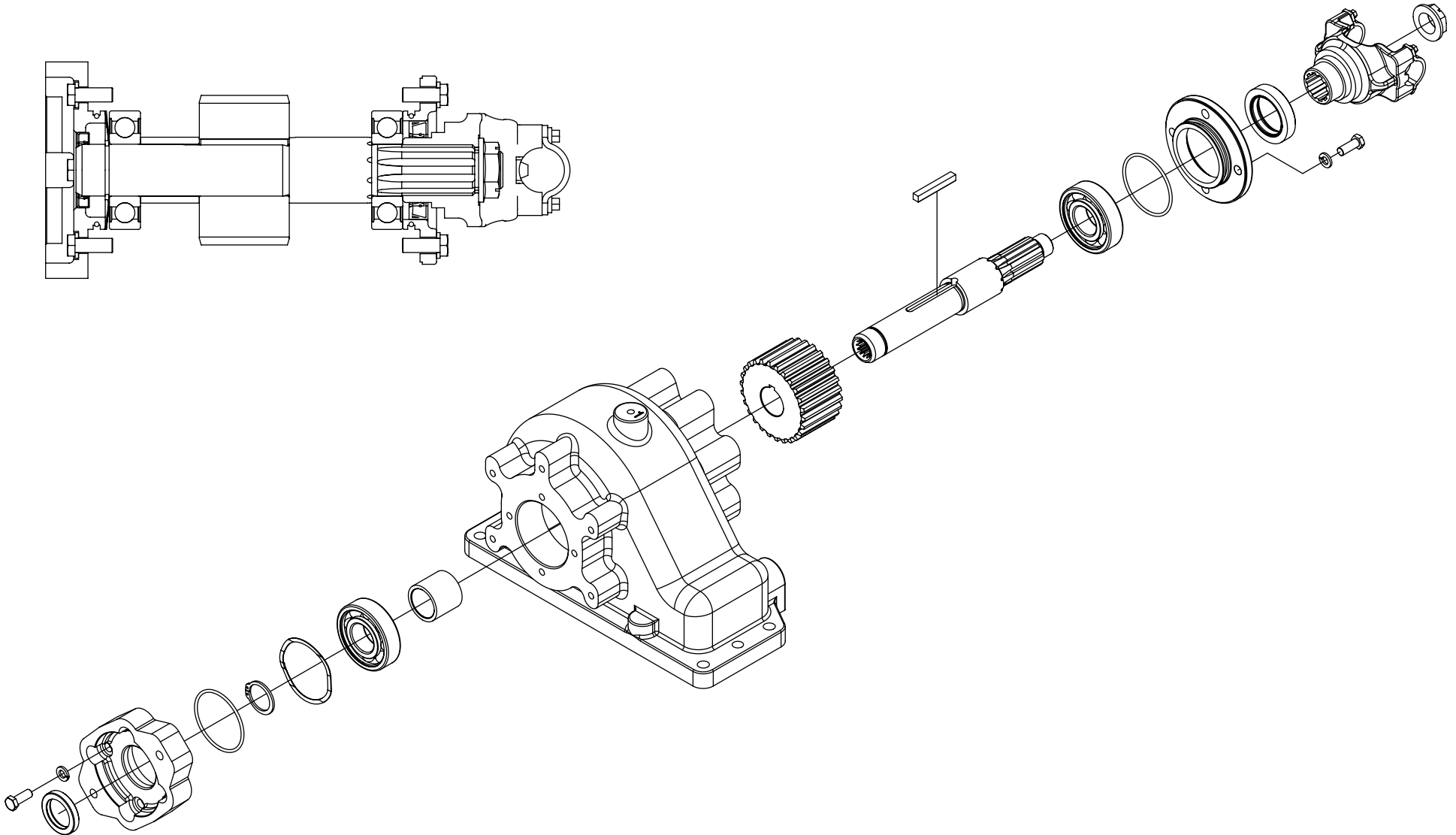
Use the illustrations and instructions to install the hydraulic adapter.

- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Apply sealant around the oil seal, then install it into the hydraulic adapter.
- 6 Use the mounting hardware to secure the hydraulic adapter to the cap.

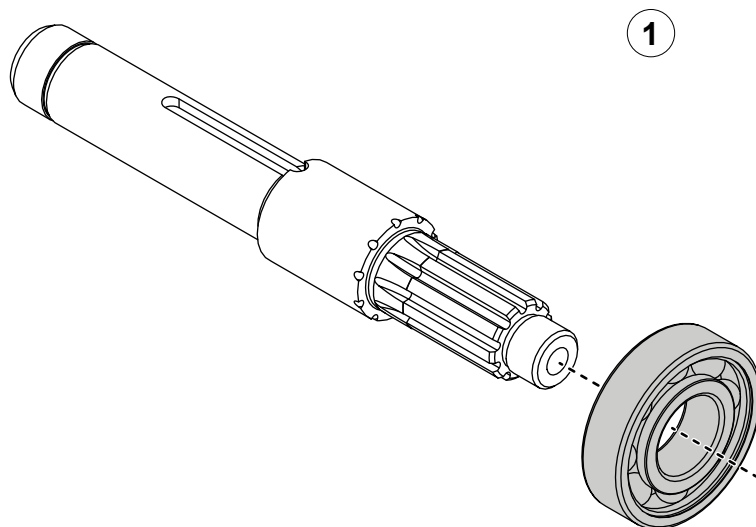




## TC22 Series PTOs with Dual Output



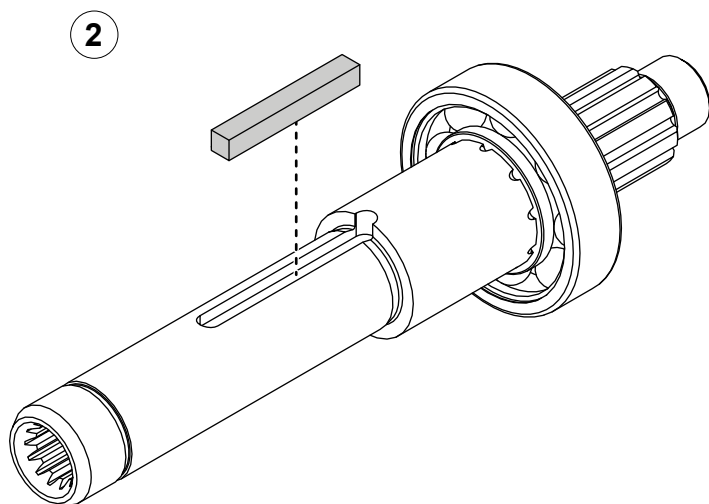
## TC22 Series PTOs with Dual Output



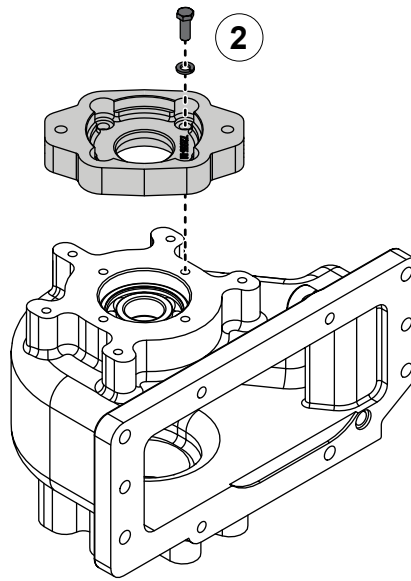
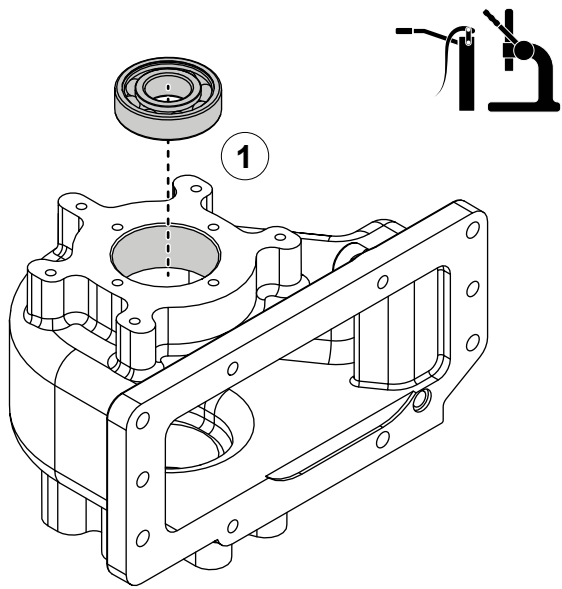
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

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



## TC22 Series PTOs with Dual Output



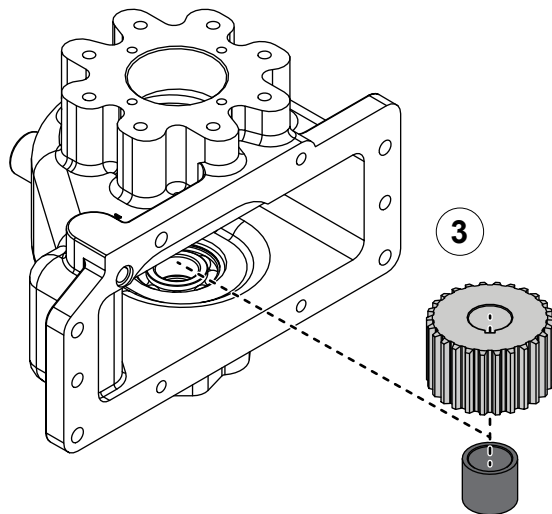
### Installing the Driven Shaft

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

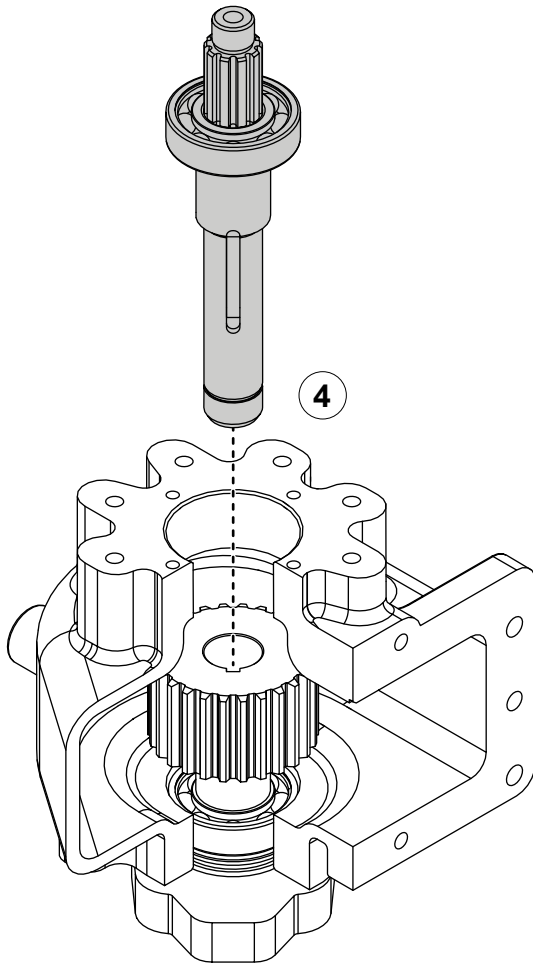
- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the hydraulic adapter onto the cap.

**Note:** Use the information that you recorded during the disassembly to determine component orientation.

- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.



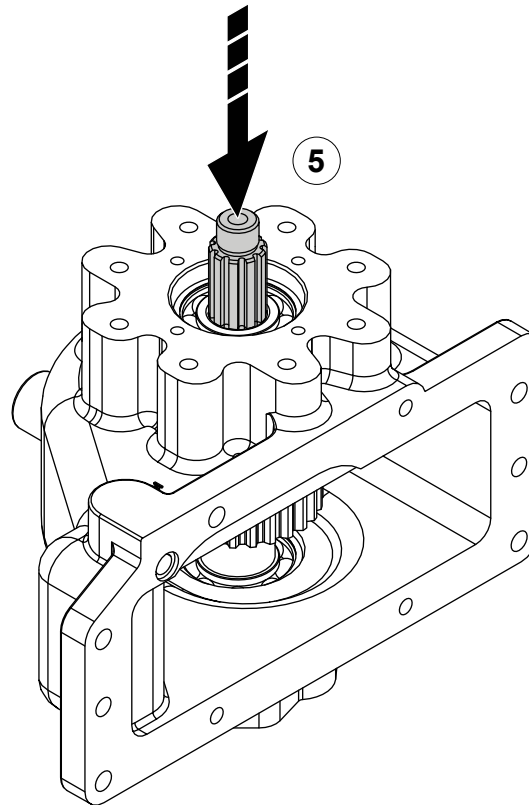
## TC22 Series PTOs with Dual Output



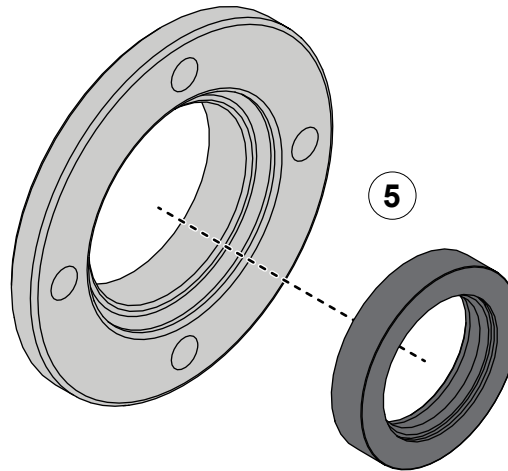
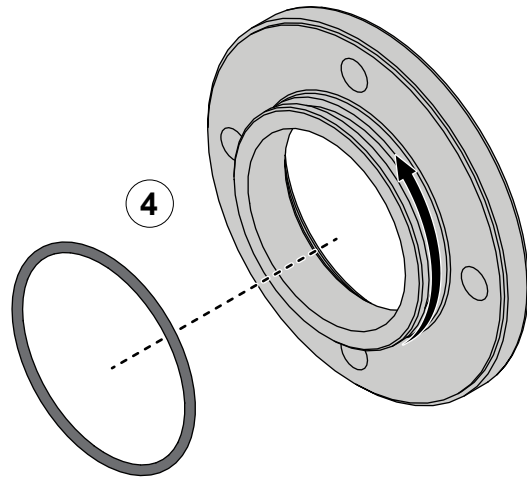
### Installing the Driven Shaft

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

- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.
- 5 Use a non-marring hammer to gently tap the driven shaft into position.



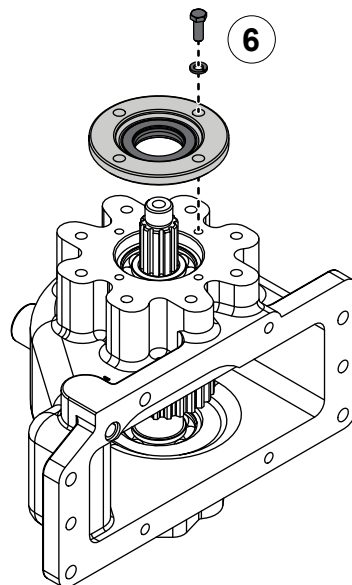
## TC22 Series PTOs with Dual Output



### Installing the Oil Seal Housing

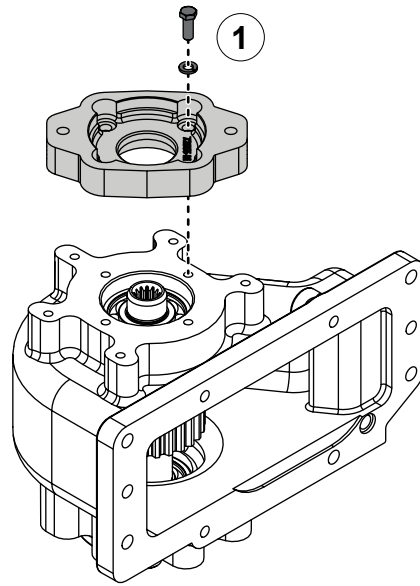
Use the illustrations and instructions to install the oil seal housing.

- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Apply sealant around the oil seal, then install it into the oil seal housing.
- 6 Use the mounting hardware to secure the oil seal housing to the cap.



31 ft-lb  
42 N·m

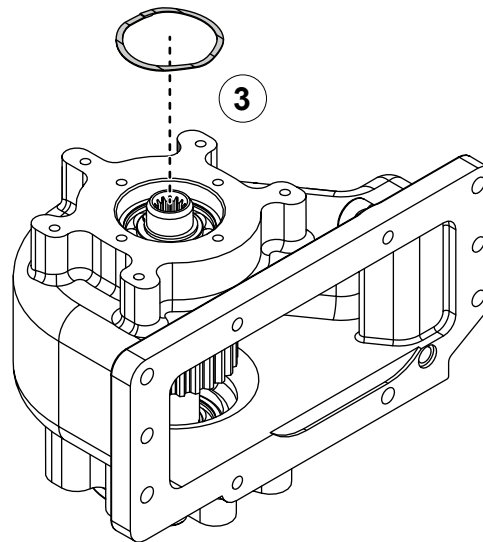
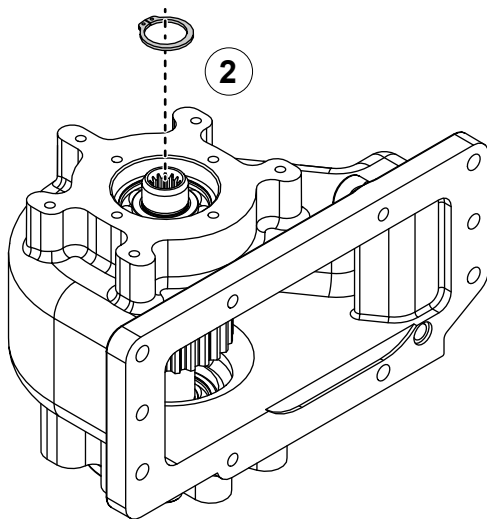
## TC22 Series PTOs with Dual Output



### Installing the Hydraulic Adapter

Use the illustrations and instructions to install the hydraulic adapter.

- 1 Remove the hydraulic adapter.
- 2 Install the retaining ring onto the shaft.
- 3 Install the wave spring into the cap.

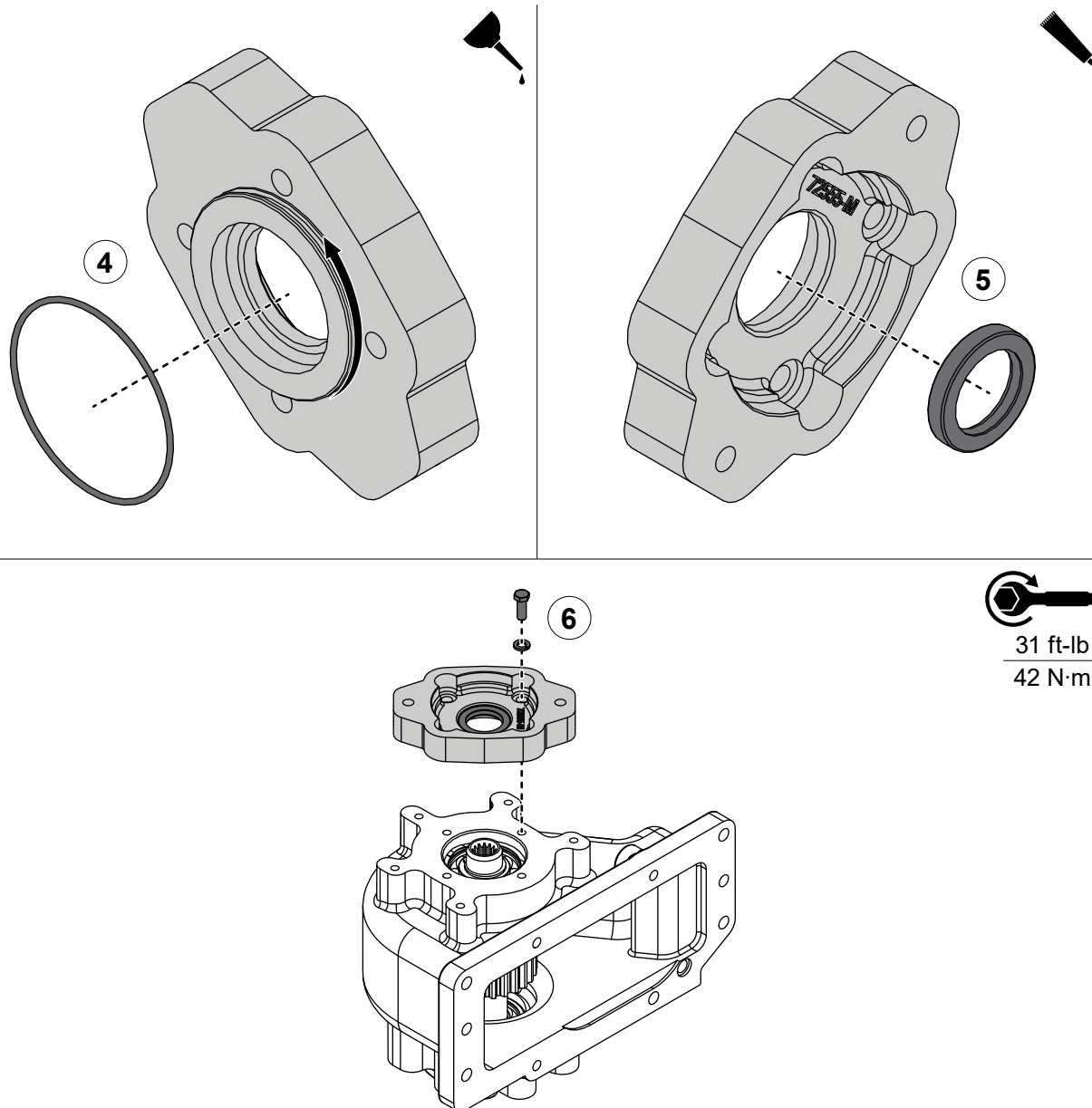


## TC22 Series PTOs with Dual Output

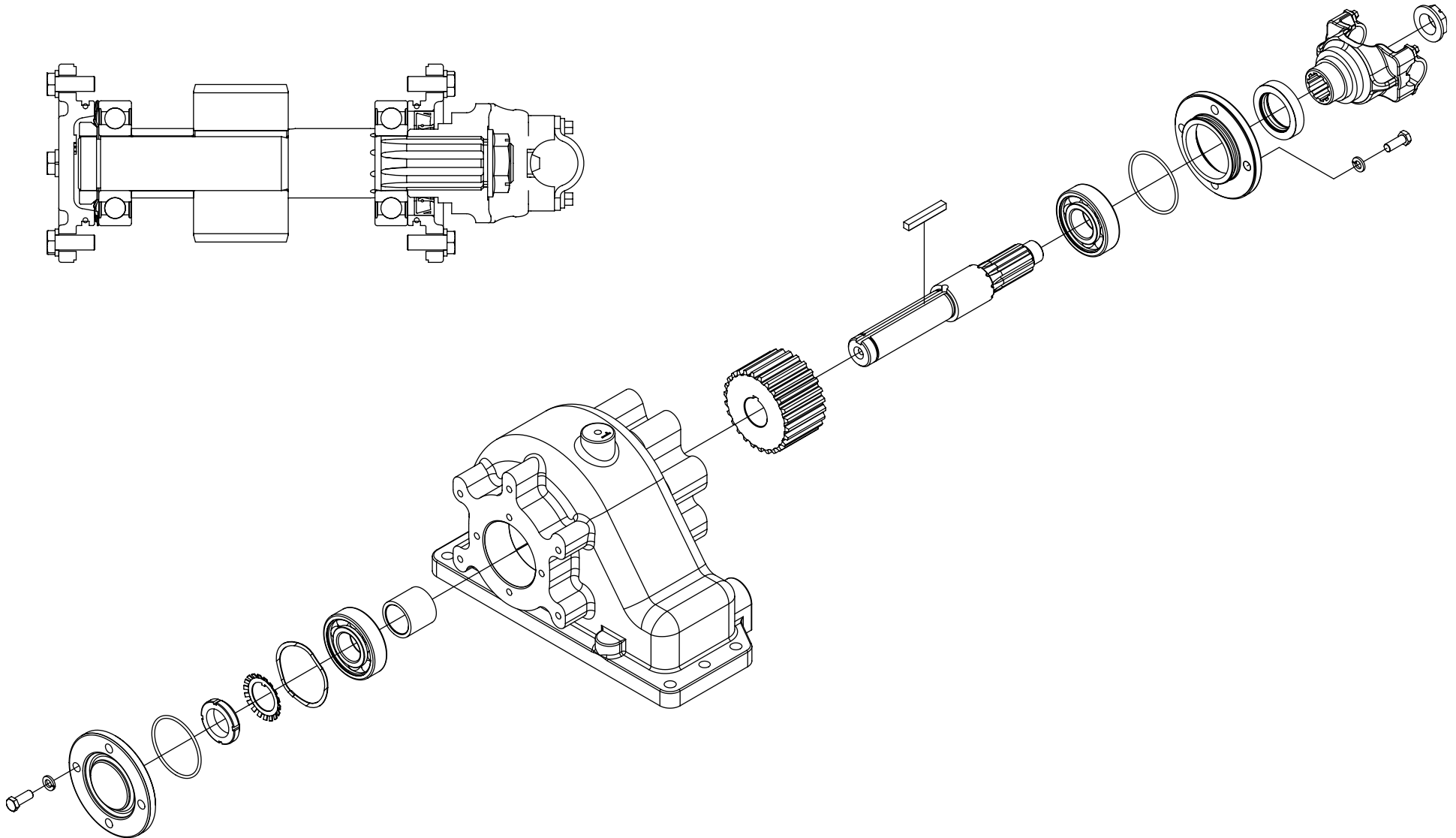
### Installing the Hydraulic Adapter

Use the illustrations and instructions to install the hydraulic adapter.

- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Apply sealant around the oil seal, then install it into the hydraulic adapter.
- 6 Use the mounting hardware to secure the hydraulic adapter to the cap.

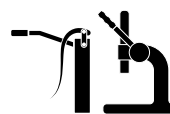
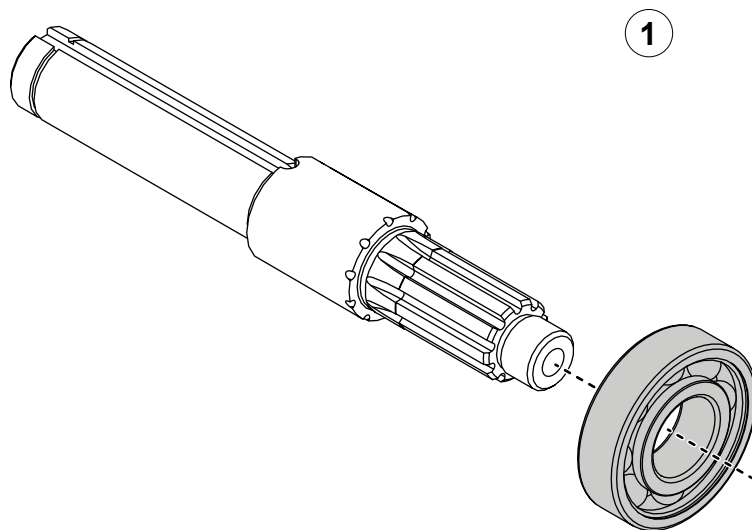


## TC22 Series PTOs with Single Yoke Output





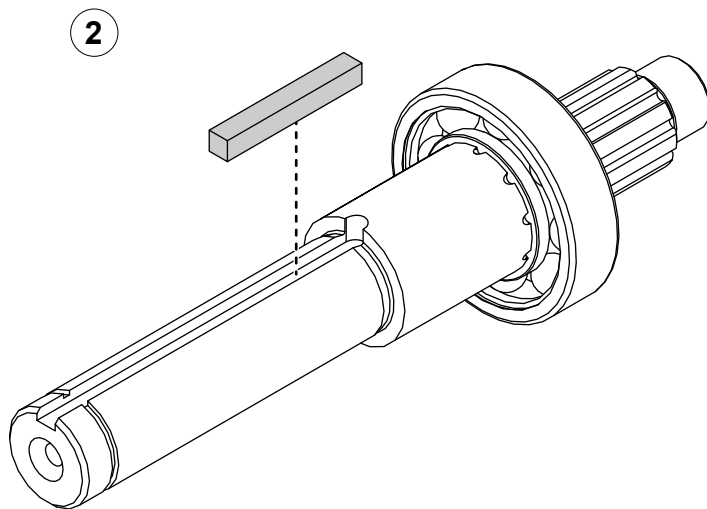
## TC22 Series PTOs with Single Yoke Output



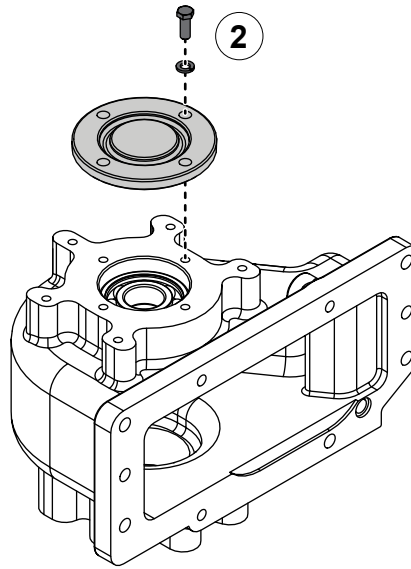
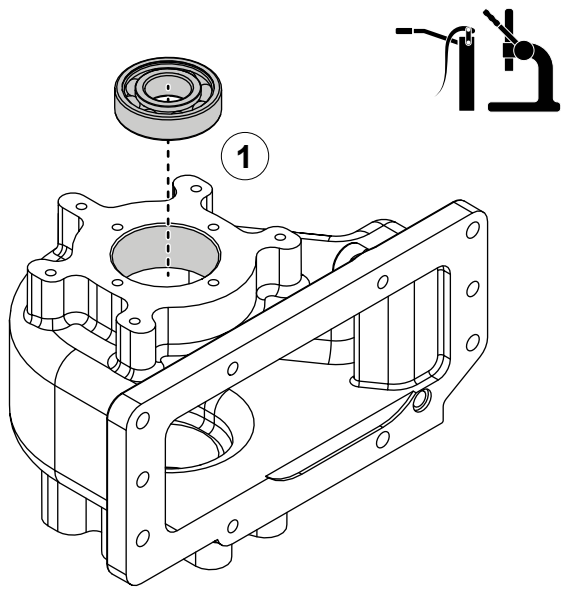
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

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



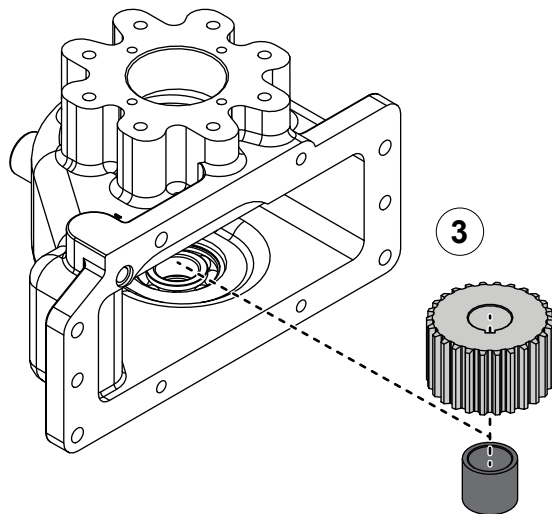
## TC22 Series PTOs with Single Yoke Output



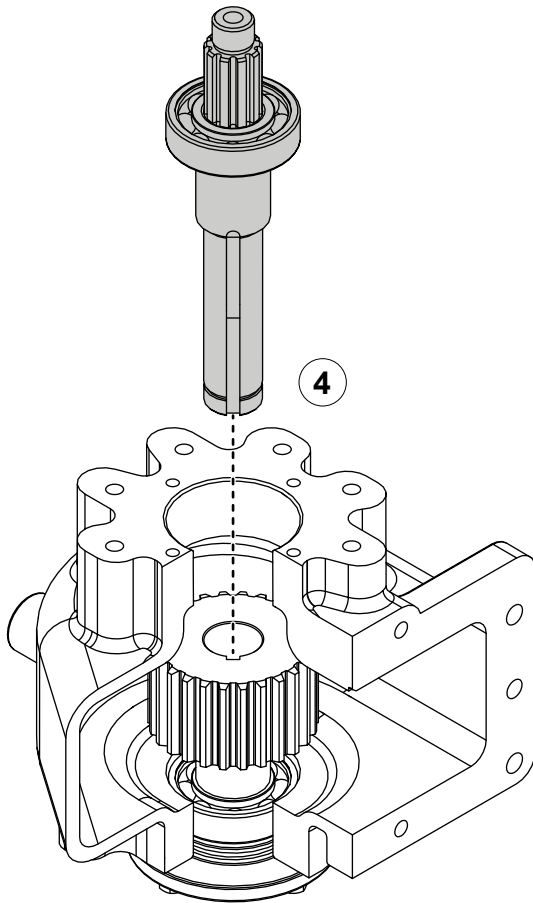
### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the bearing cover onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.



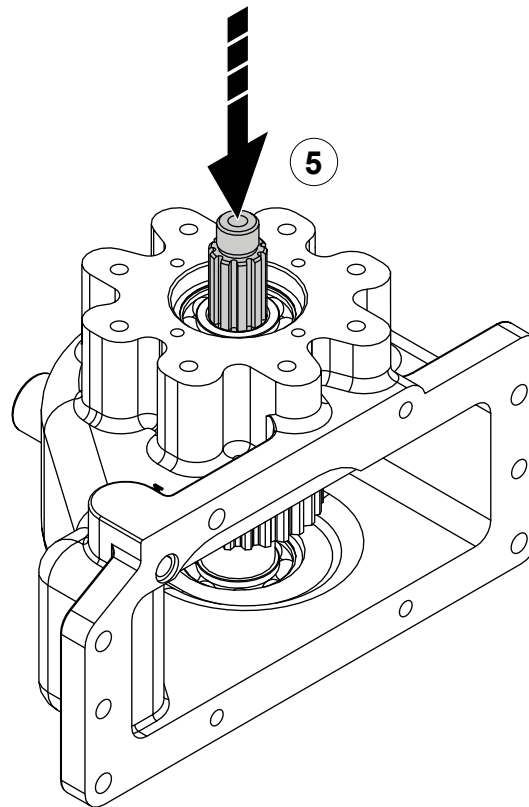
## TC22 Series PTOs with Single Yoke Output



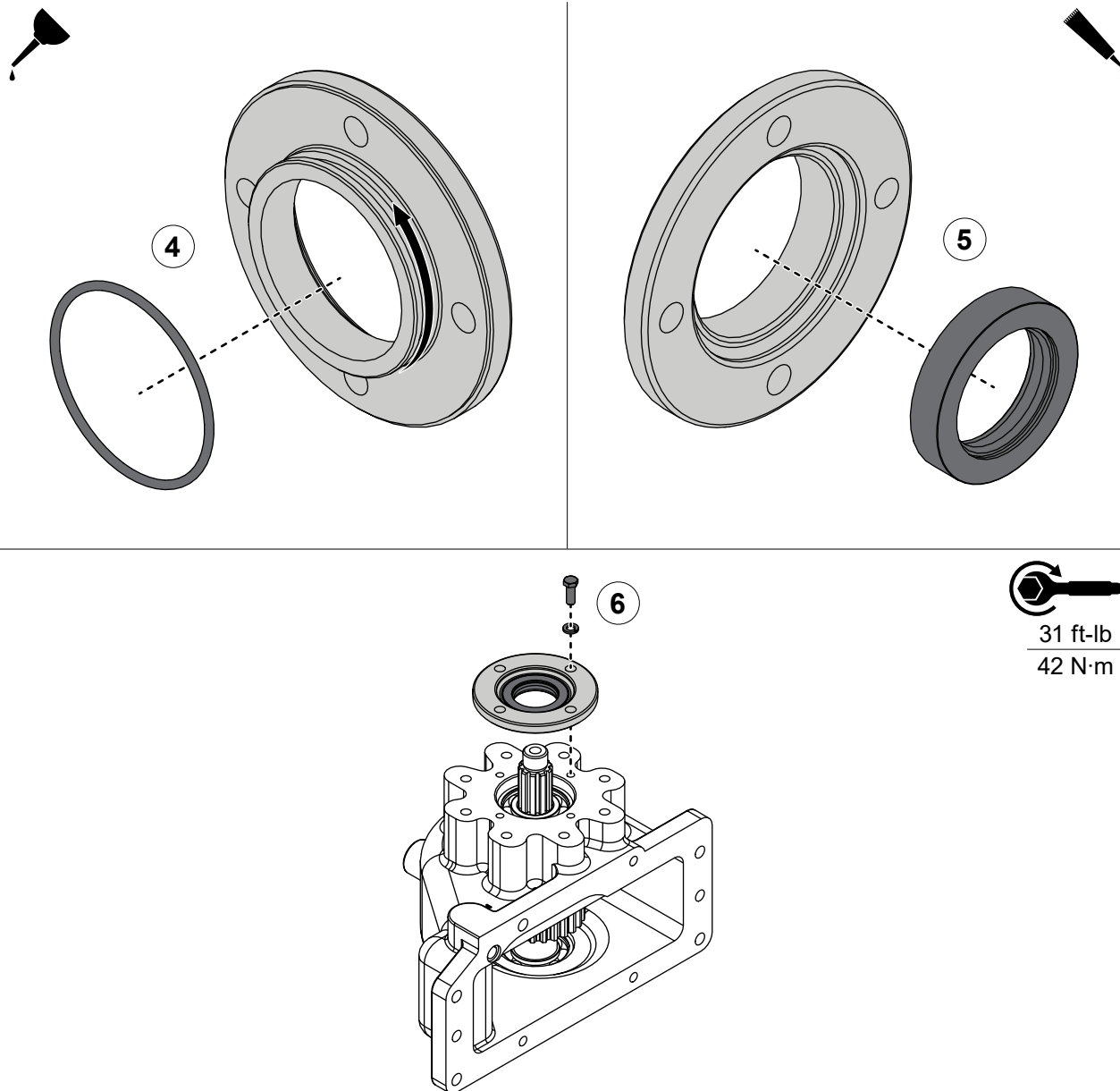
### Installing the Driven Shaft

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

- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.
- 5 Use a non-marring hammer to gently tap the driven shaft into position.



## TC22 Series PTOs with Single Yoke Output

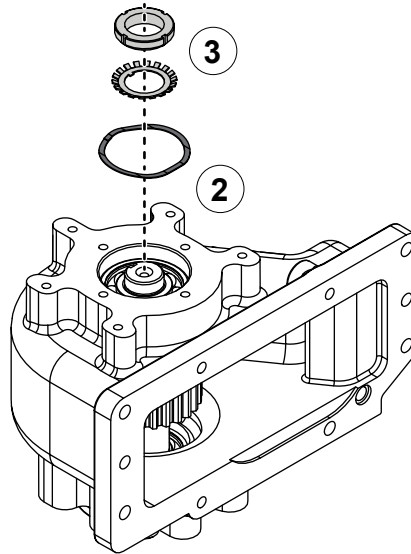
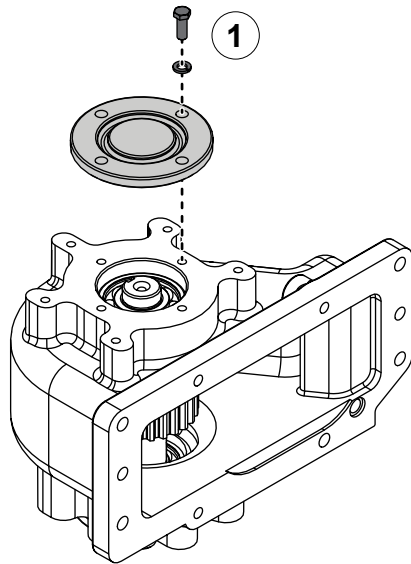


### Installing the Oil Seal Housing

Use the illustrations and instructions to install the oil seal housing.

- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Apply sealant around the oil seal, then install it into the oil seal housing.
- 6 Use the mounting hardware to secure the oil seal housing to the cap.

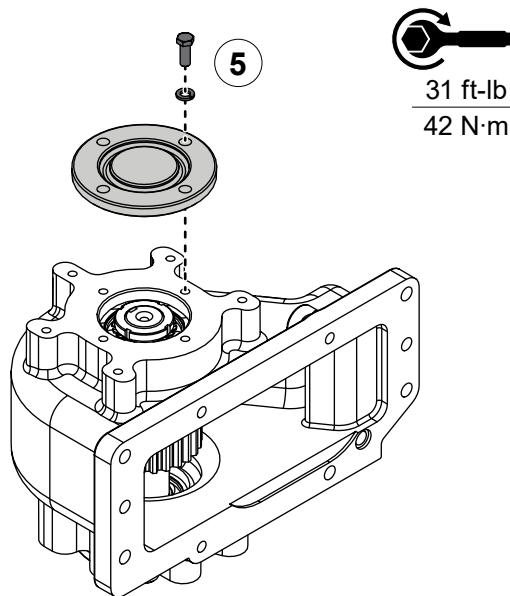
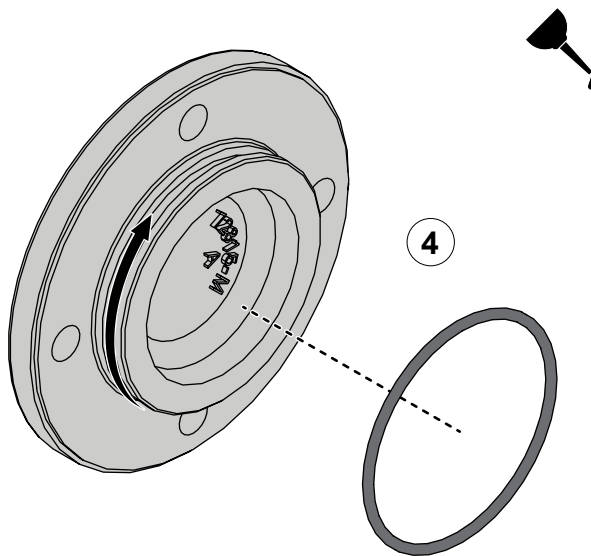
## TC22 Series Pumps with Single Yoke Output



### Installing the Bearing Cover

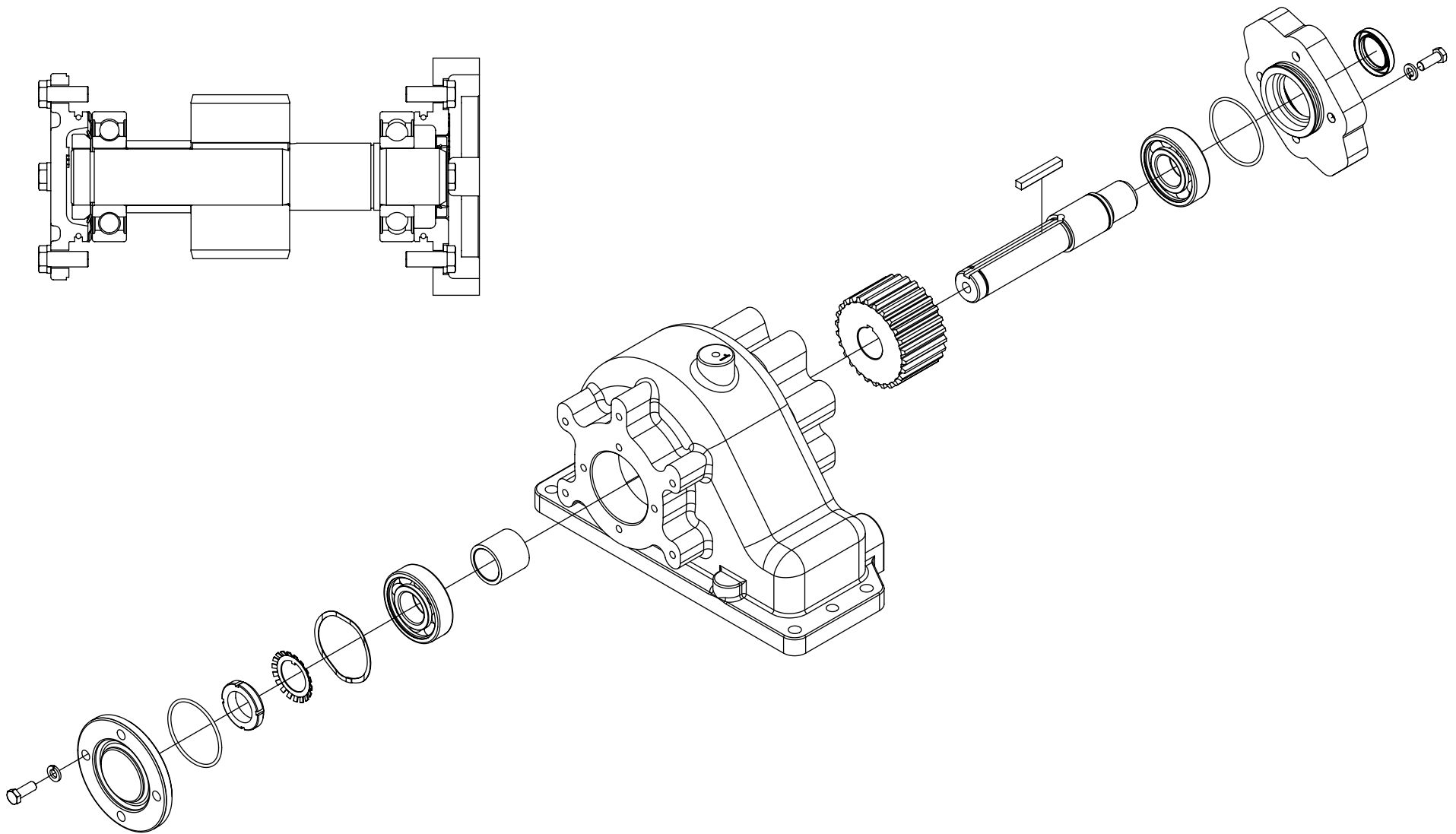
Use the illustrations and instructions to install the bearing cover.

- 1 Remove the bearing cover.
- 2 Install the wave spring into the cap.
- 3 Install the bearing lock washer and nut. Refer to: **"Installing the Bearing Lock Washer and Nut" on page 118.**
- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Use the mounting hardware to secure the bearing cover to the cap.

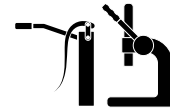
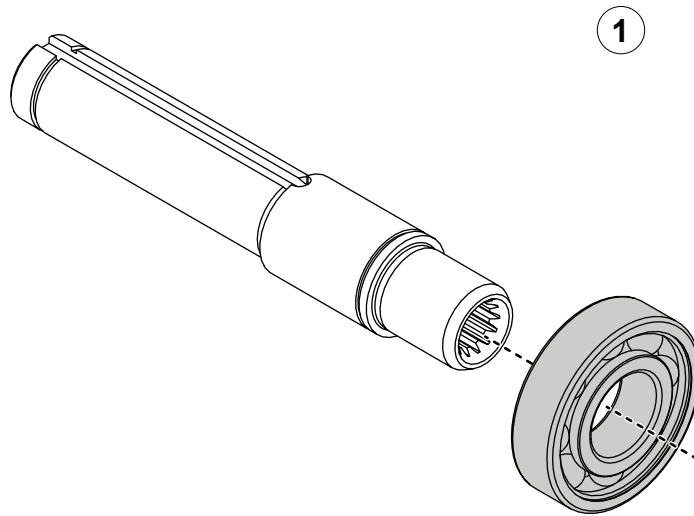


31 ft-lb  
42 N·m

## TC22 Series PTOs with Hydraulic Output



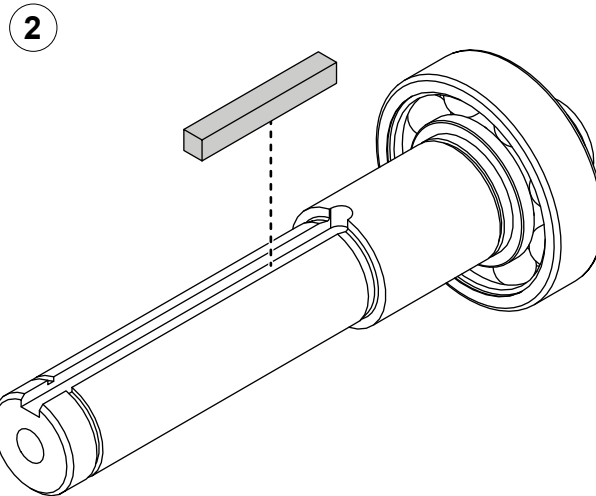
## TC22 Series PTOs with Hydraulic Output



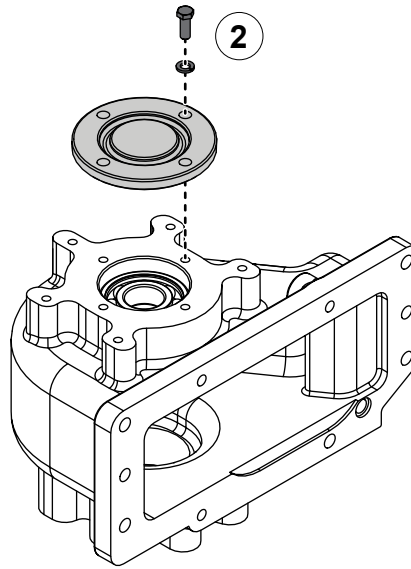
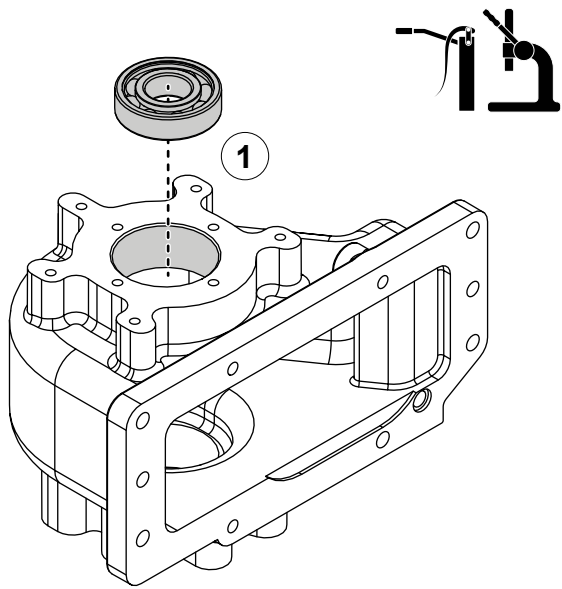
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

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



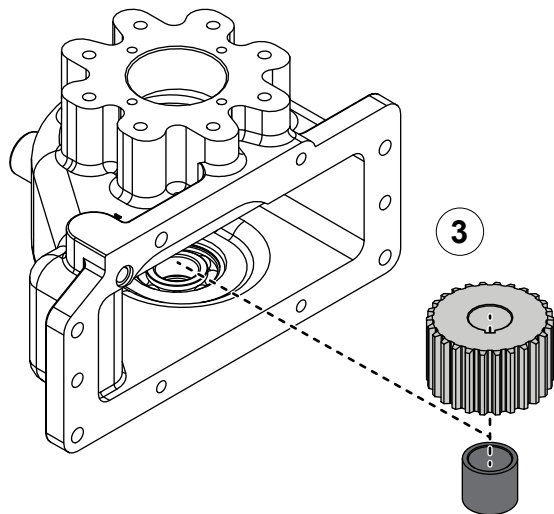
## TC22 Series PTOs with Hydraulic Output



### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the bearing cover onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.





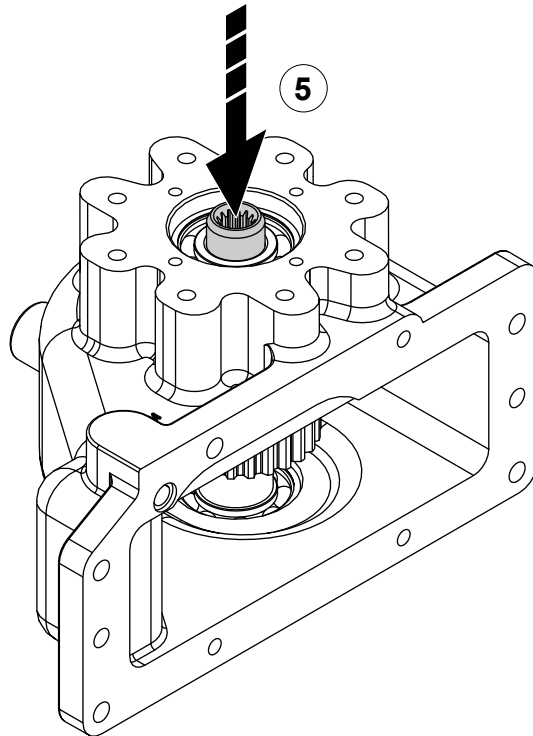
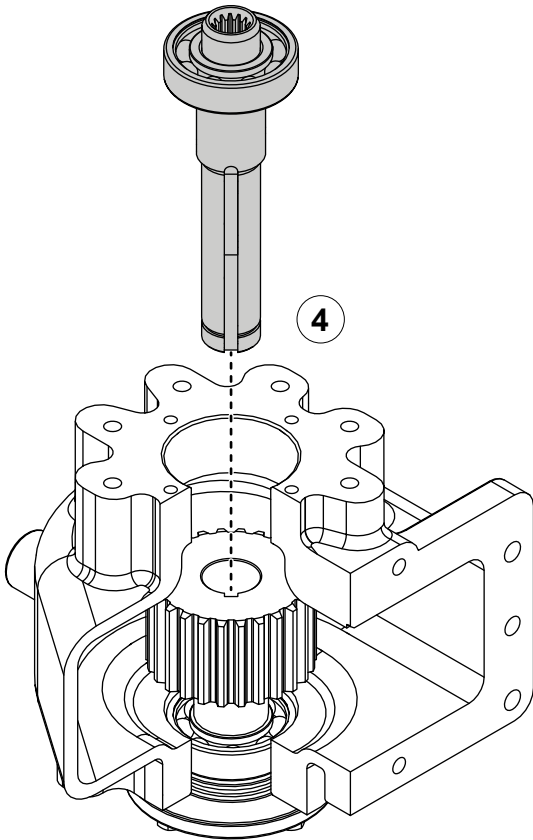
## TC22 Series PTOs with Hydraulic Output



### Installing the Driven Shaft

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

- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.
- 5 Use a non-marring hammer to gently tap the driven shaft into position.



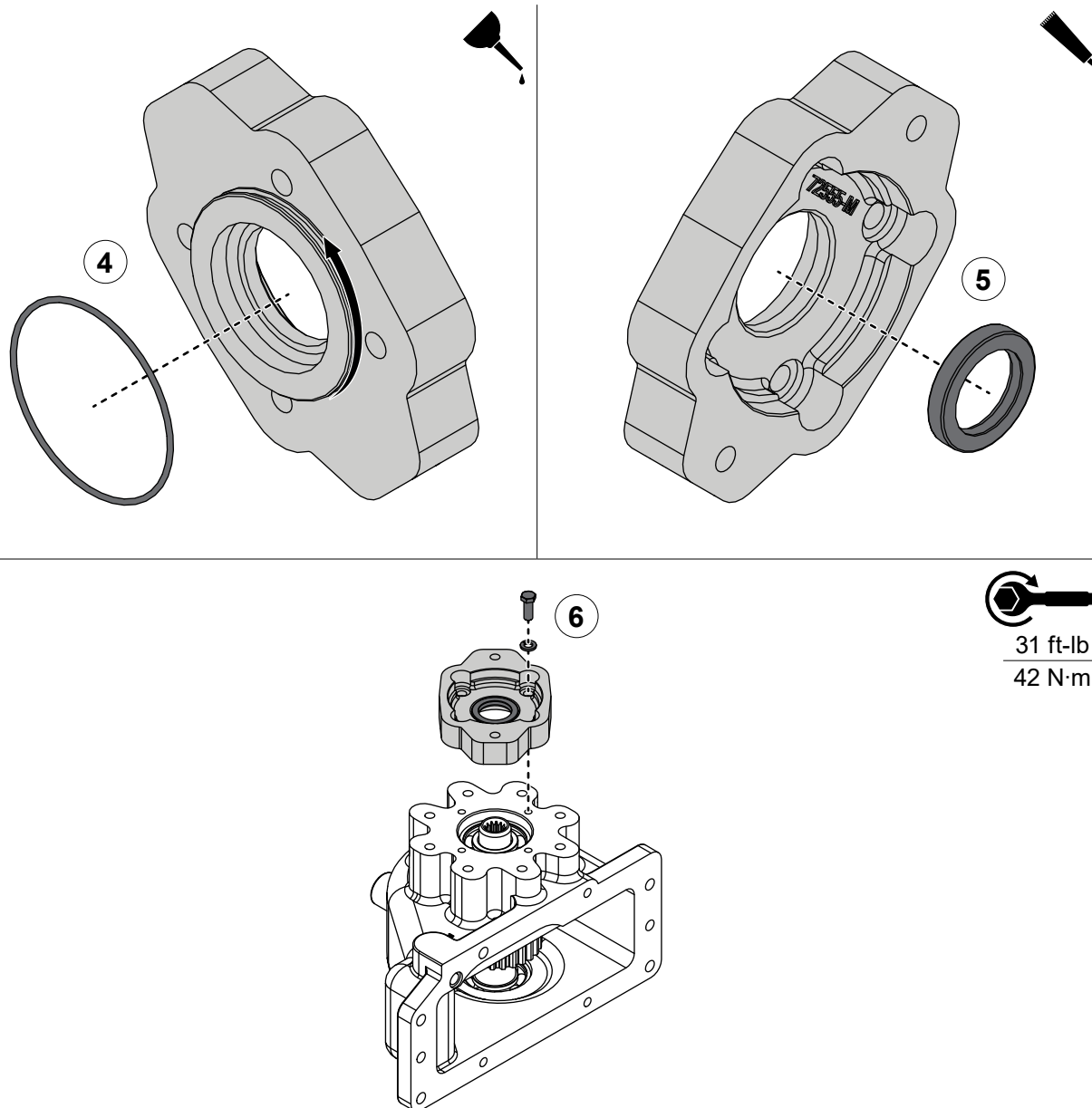
## TC22 Series PTOs with Hydraulic Output

### Installing the Hydraulic Adapter

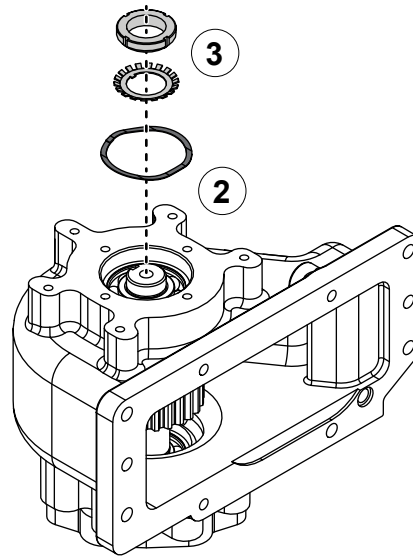
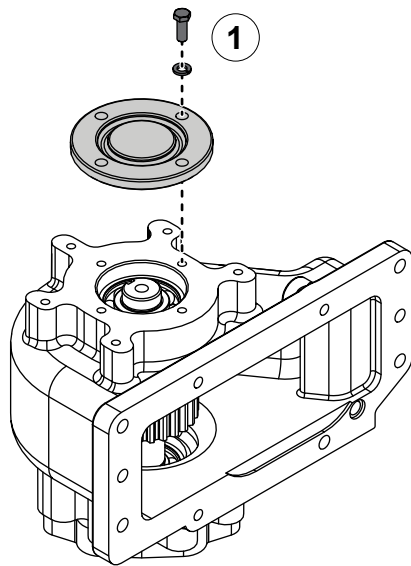
Use the illustrations and instructions to install the hydraulic adapter.

- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Apply sealant around the oil seal, then install it into the hydraulic adapter.
- 6 Use the mounting hardware to secure the hydraulic adapter to the cap.

**Note:** Use the information that you recorded during the disassembly to determine component orientation.



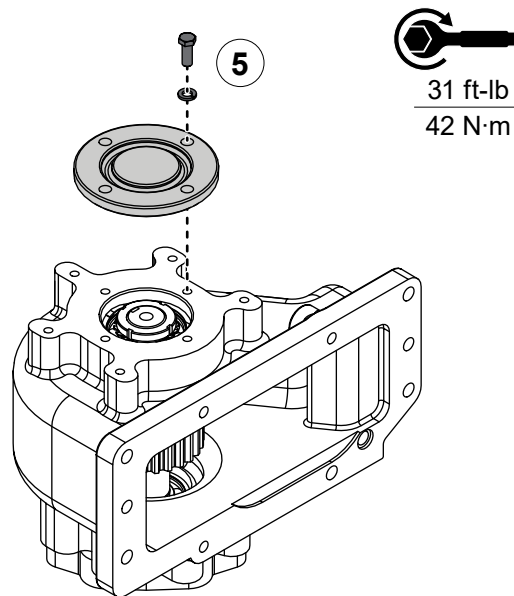
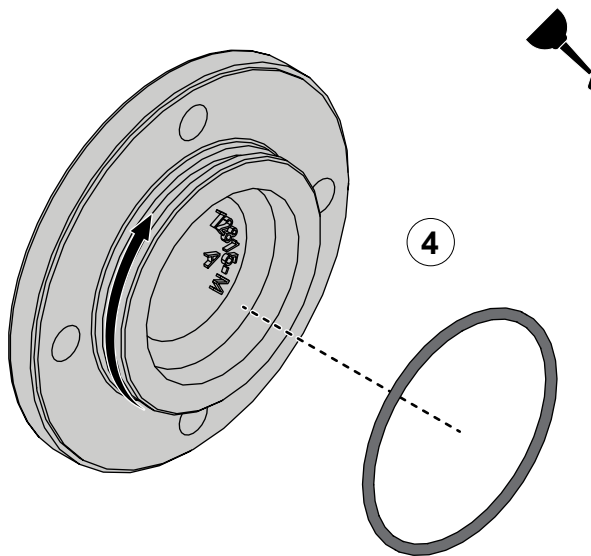
## TC22 Series Pumps with Hydraulic Output



### Installing the Bearing Cover

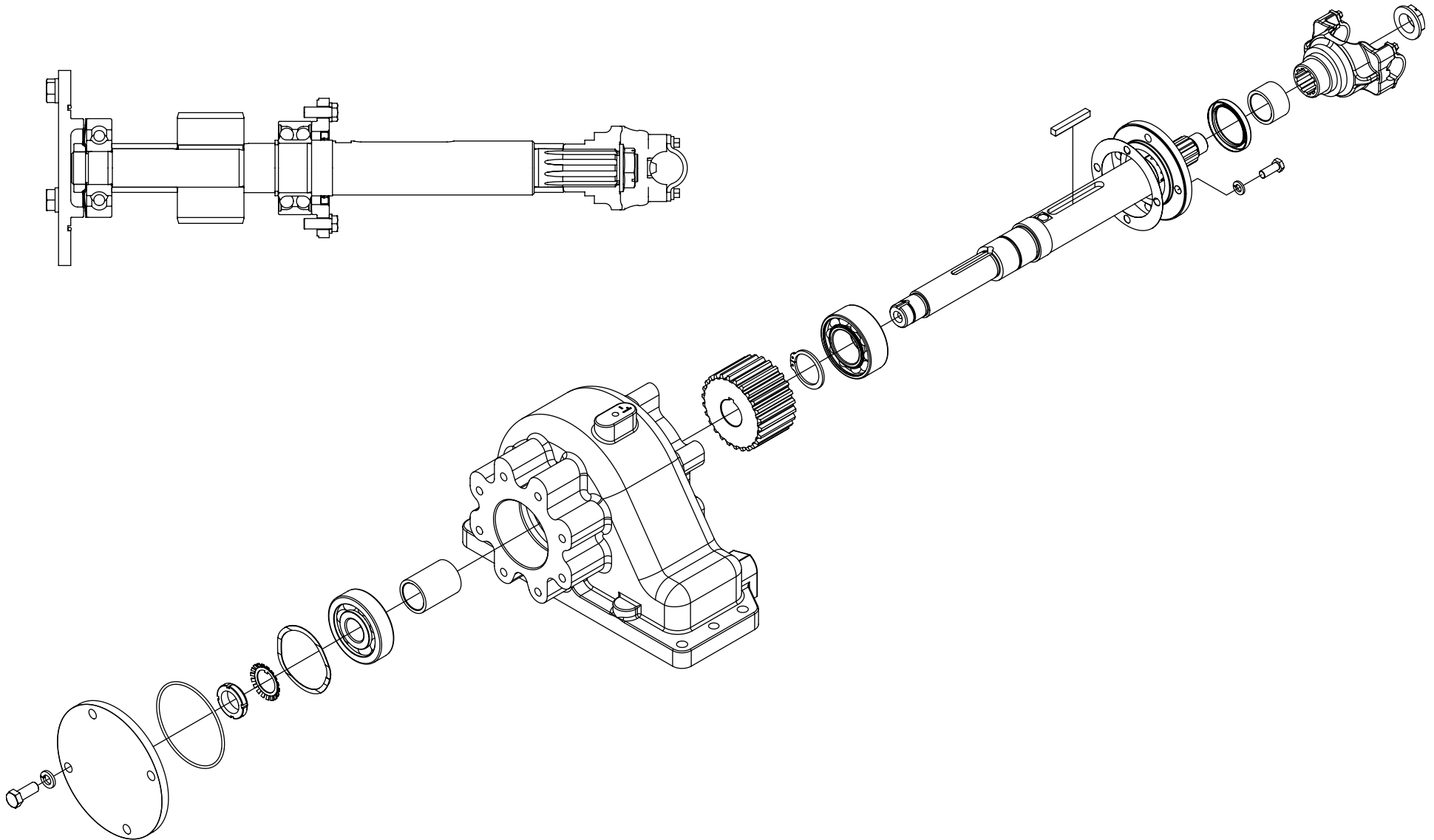
Use the illustrations and instructions to install the bearing cover.

- 1 Remove the bearing cover.
- 2 Install the wave spring into the cap.
- 3 Install the bearing lock washer and nut. Refer to: **"Installing the Bearing Lock Washer and Nut" on page 118.**
- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Use the mounting hardware to secure the bearing cover to the cap.

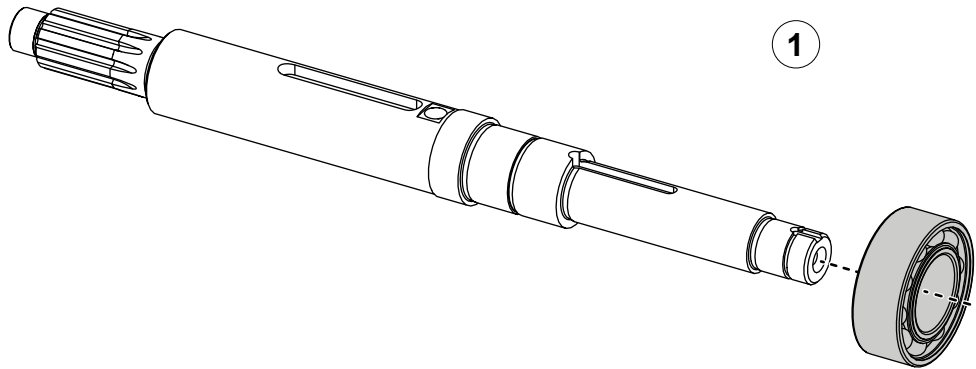


31 ft-lb  
42 N·m

## TC22 Series PTOs with CAFS Output



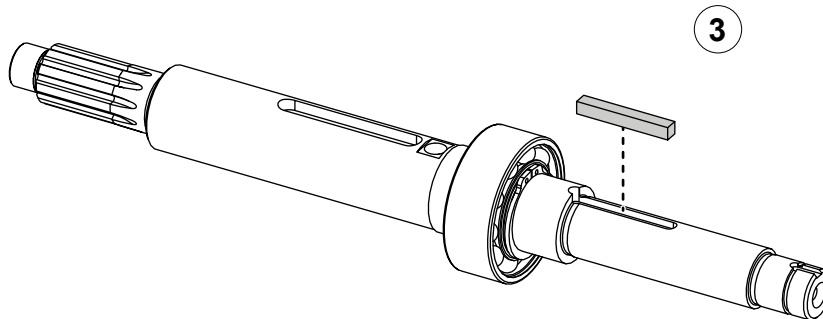
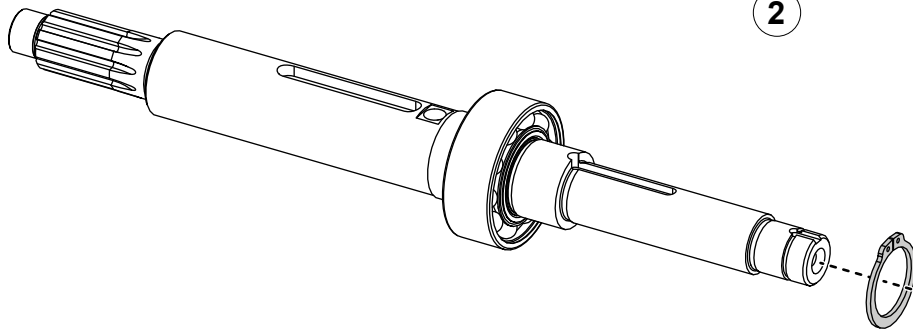
## TC22 Series PTOs with CAFS Output



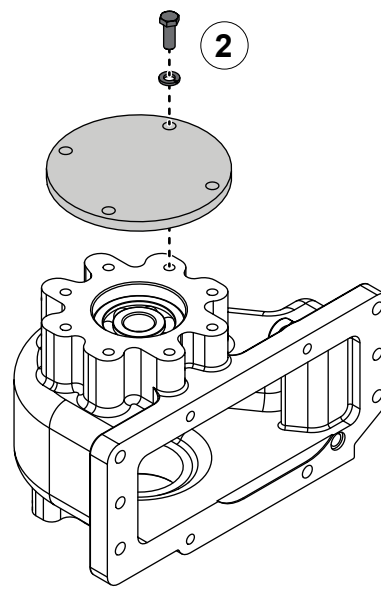
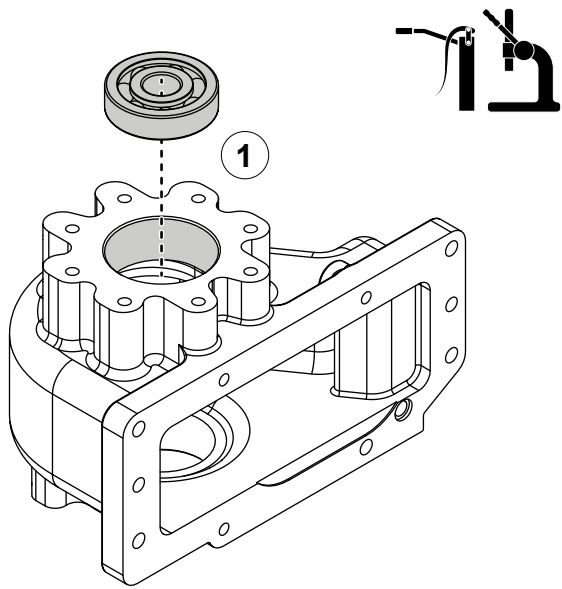
### Assembling the Driven Shaft

Use the illustrations and instructions to assemble the driven shaft.

- 1 Apply grease to the shaft, then press the bearing onto the shaft.
- 2 Install the retaining ring onto the shaft.
- 3 Install the key into the key slot.



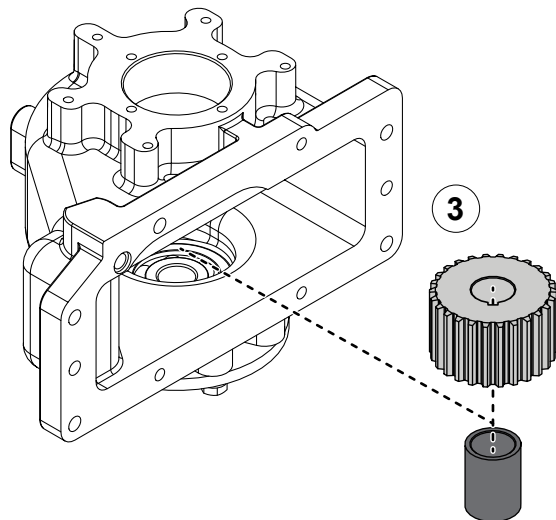
## TC22 Series PTOs with CAFS Output



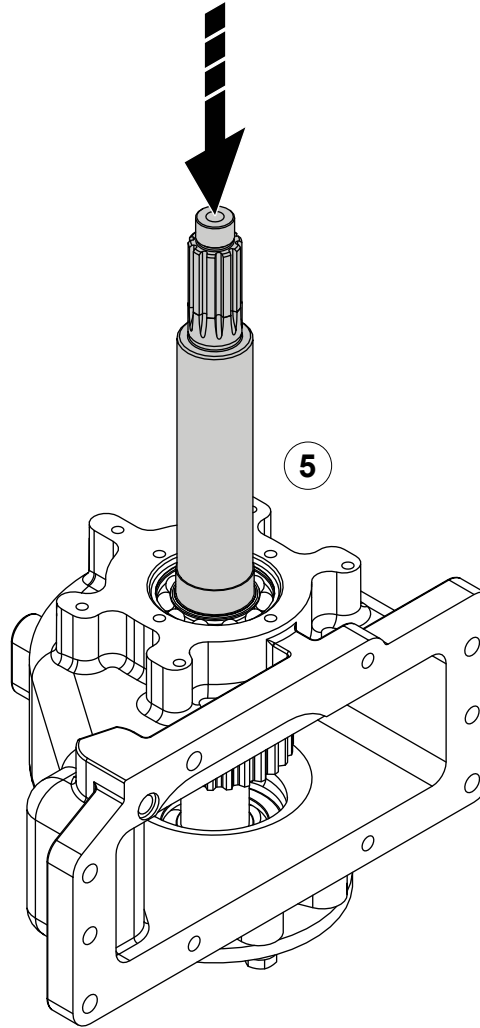
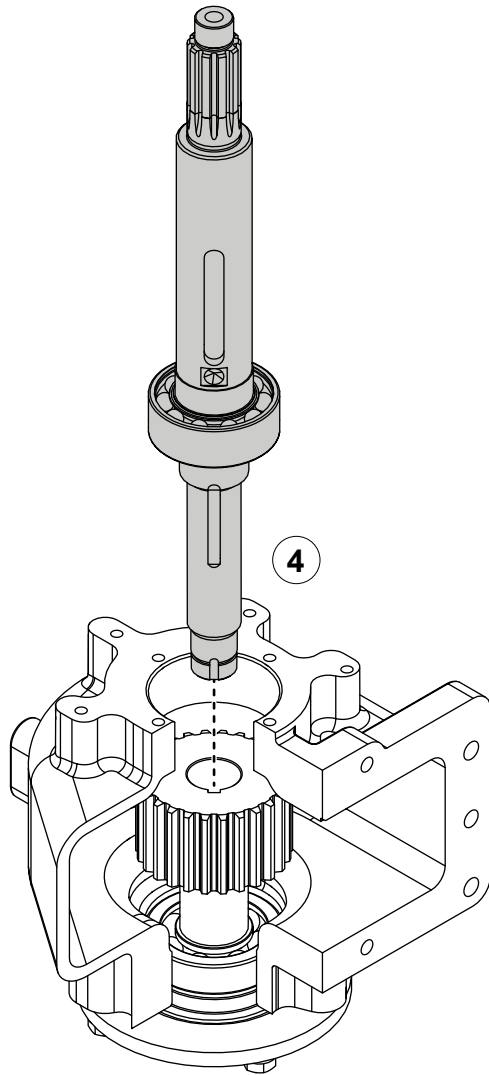
### Installing the Driven Shaft

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

- 1 Apply grease to the output bore of the cap, then press the bearing into the bore.
- 2 Temporarily install the bearing cover onto the cap.
- 3 Flip the cap so that the output side is facing down, then position the sprocket and spacer inside the cap.



## TC22 Series PTOs with CAFS Output

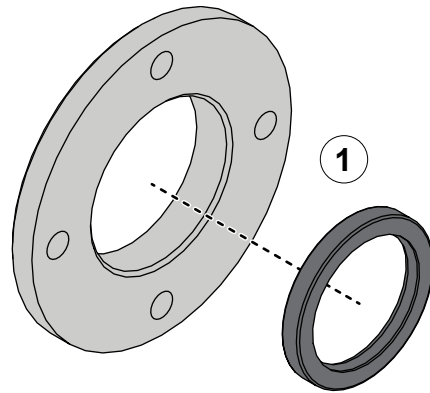


### Installing the Driven Shaft

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

- 4 Press the driven shaft assembly through the cap, sprocket, and spacer.
- 5 Use a non-marring hammer to gently tap the driven shaft into position.

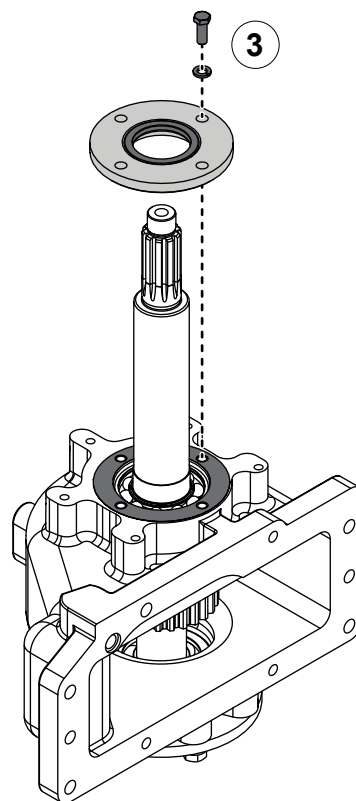
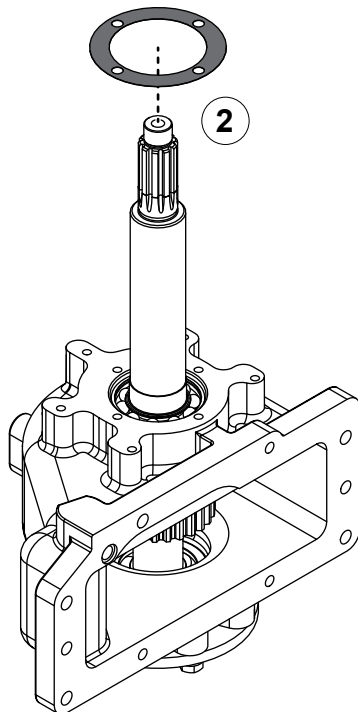
## TC22 Series PTOs with CAFS Output



### Installing the Oil Seal Housing

Use the illustrations and instructions to install the oil seal housing.

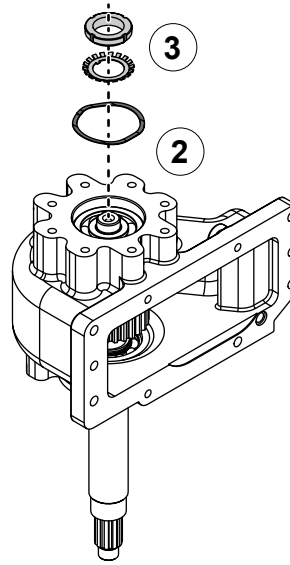
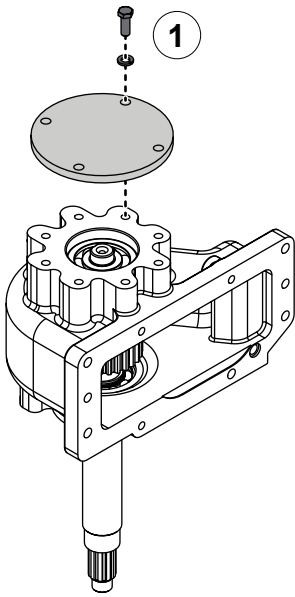
- 1 Apply sealant around the oil seal, then install it into the oil seal housing.
- 2 Install the shim between the case and the oil seal housing.
- 3 Use the mounting hardware to secure the oil seal housing to the cap.



31 ft-lb  
42 N·m



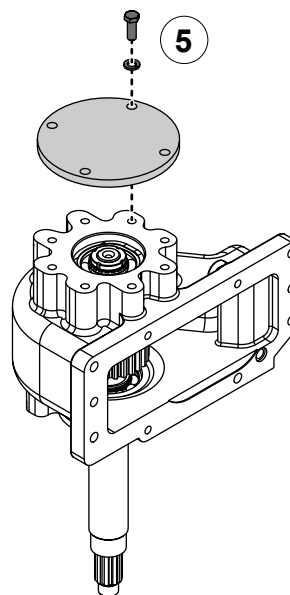
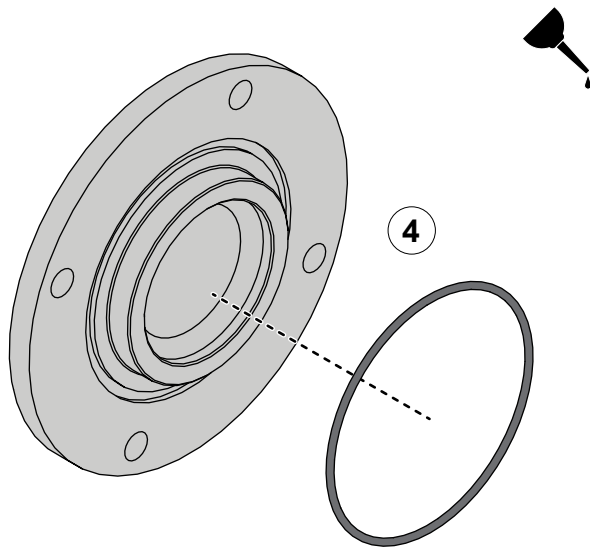
## TC22 Series PTOs with CAFS Output




### Installing the Bearing Cover

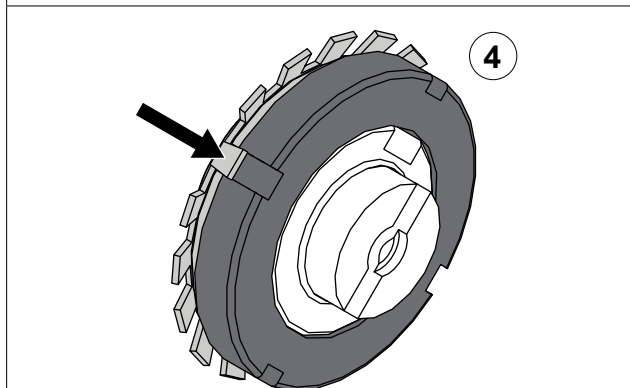
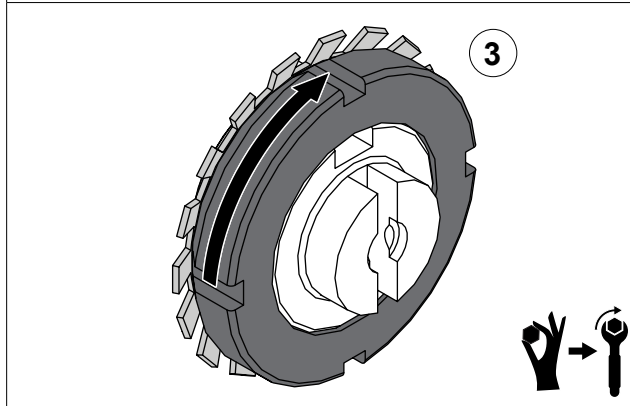
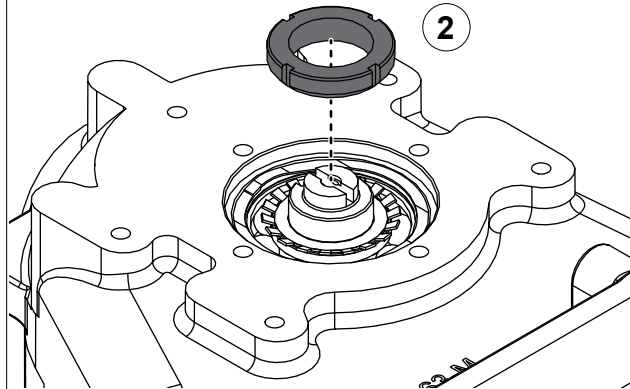
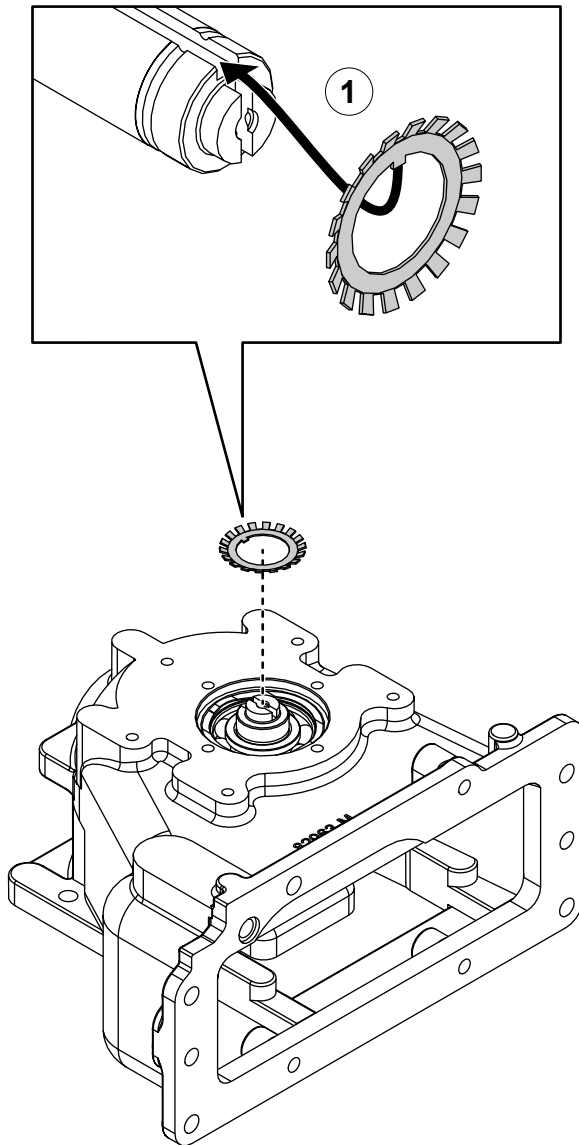
Use the illustrations and instructions to install the bearing cover.

- 1 Remove the bearing cover.
- 2 Install the wave spring into the cap.
- 3 Install the bearing lock washer and nut. Refer to: **"Installing the Bearing Lock Washer and Nut" on page 118.**
- 4 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 5 Use the mounting hardware to secure the bearing cover to the cap.



  
75 ft-lb  
101 N·m

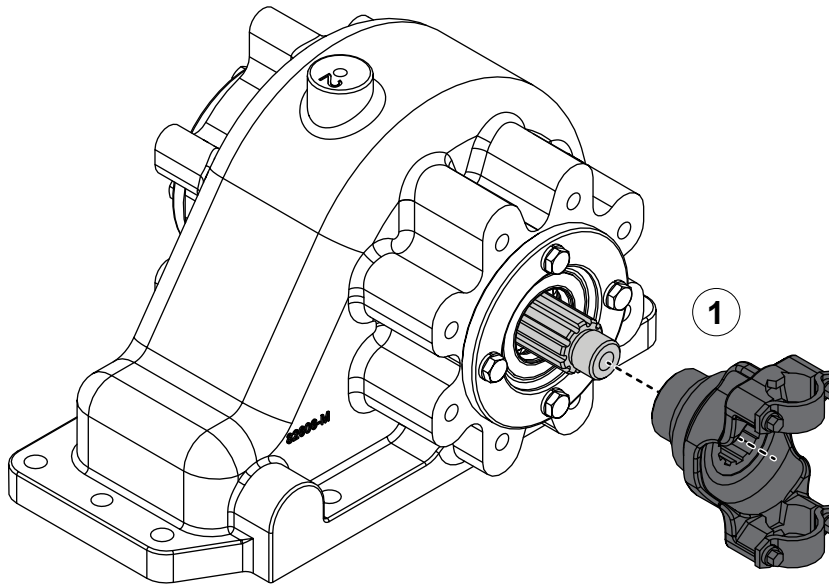
## Installing the Bearing Lock Washer and Nut



Use the illustrations and instructions to install the bearing lock washer and nut.

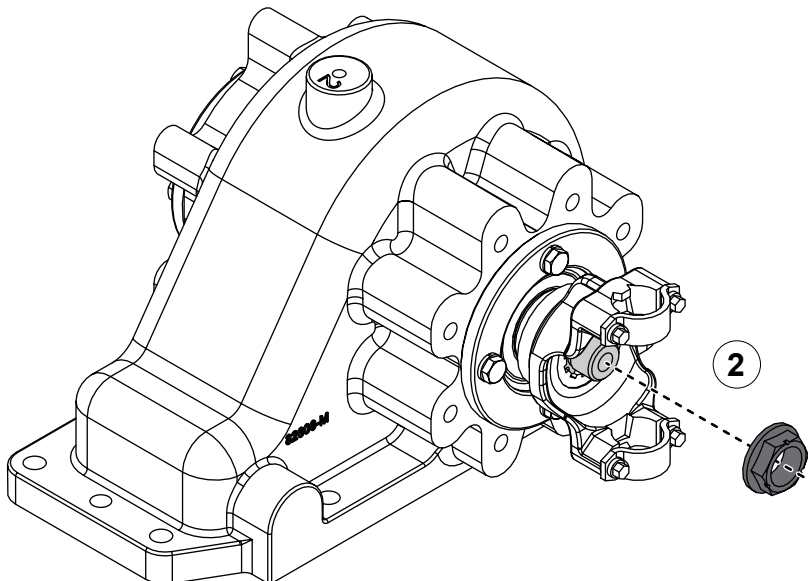
- 1 Align the inner tab on the bearing lock washer with the slot in the shaft, then install the washer onto the end of the shaft.
- 2 Install the nut onto the shaft.
- 3 Finger tighten the nut, then use a wrench to tighten it an additional quarter turn.
- 4 Align one of the outer tabs on the washer with one of the slots on the nut, then bend the tab to lock the nut into position.

## Installing the Driven Shaft End Yoke



Use the illustrations and instructions to install the driven shaft end yoke.

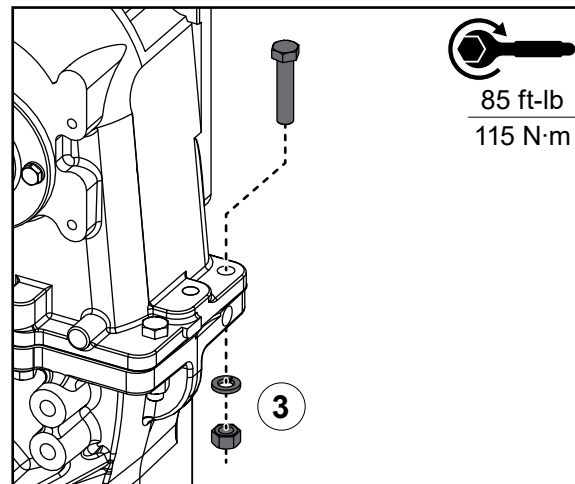
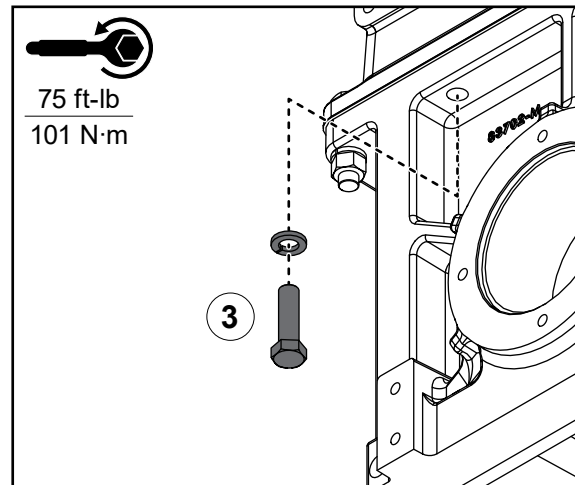
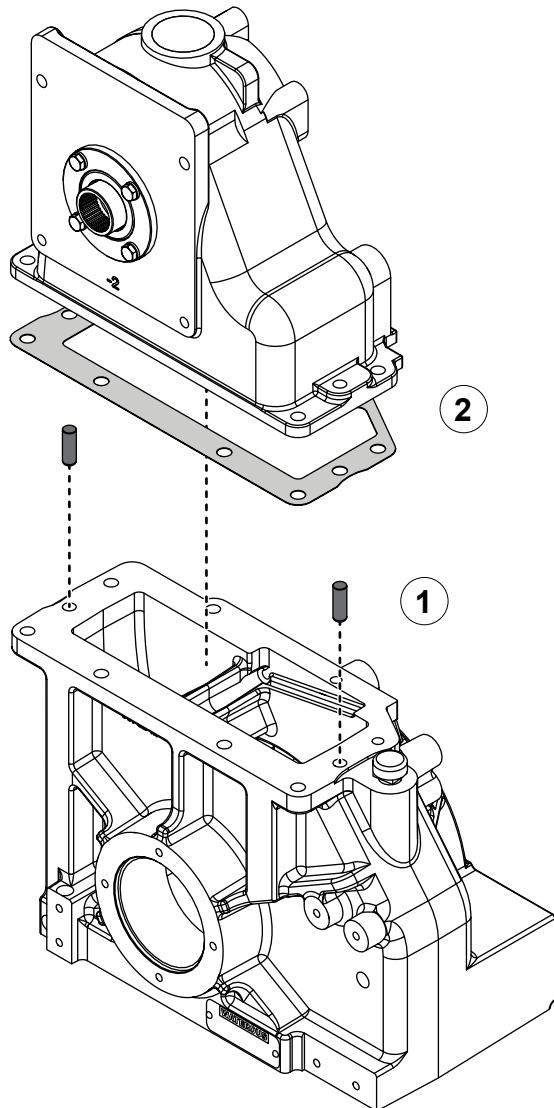
- 1 Apply grease to the driven shaft, then install the end yoke onto the shaft.
- 2 Apply anti-seize to the lock nut threads, then install the lock nut onto the shaft.



425 ft-lb  
576 N·m

[illegible]

## Installing the Cap



### Transmissions with B, C, and D Drops

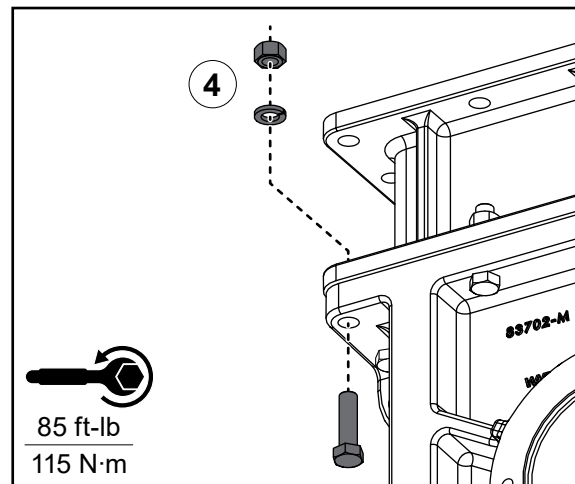
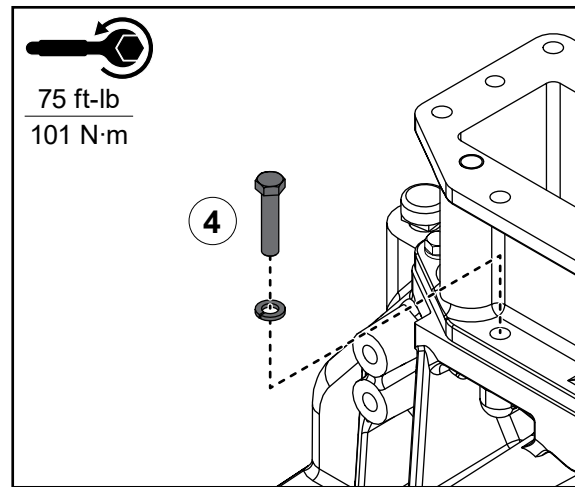
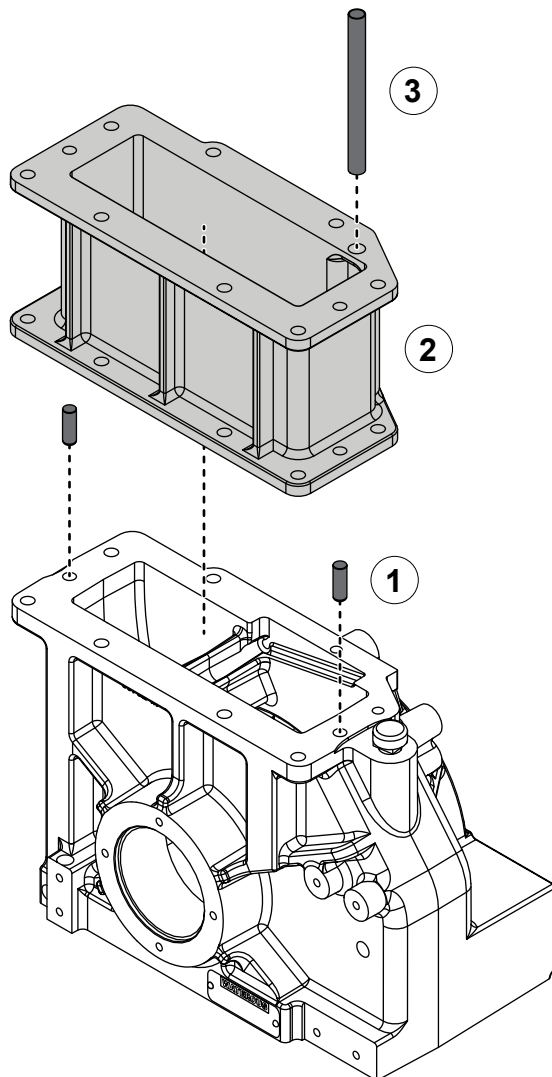
Use the illustration and instructions to install the cap onto the transmission case.

- 1 If needed, install the dowel pins.
- 2 Apply sealant to the flanges and between the shims, then install the shims between the case and cap.

**Note:** Refer to the SPL for your application to determine the required shim thickness for each transmission model and ratio.

- 3 Use the mounting hardware to secure the cap to the case.
  - Torque hardware that screws directly into the cap or case to 75 ft-lb (101 N·m).
  - Torque hardware that requires a nut to 85 ft-lb (115 N·m).

## Installing the Cap

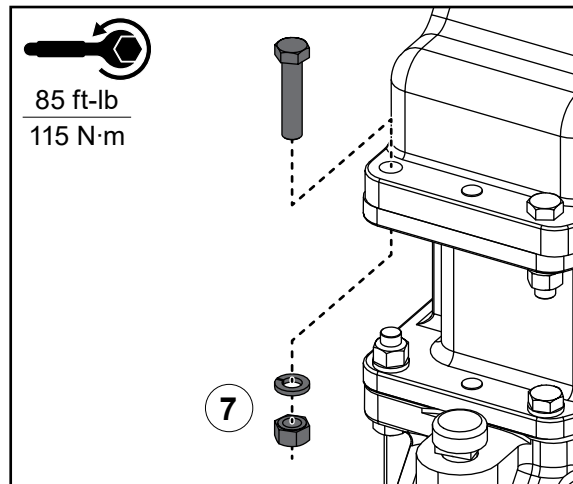
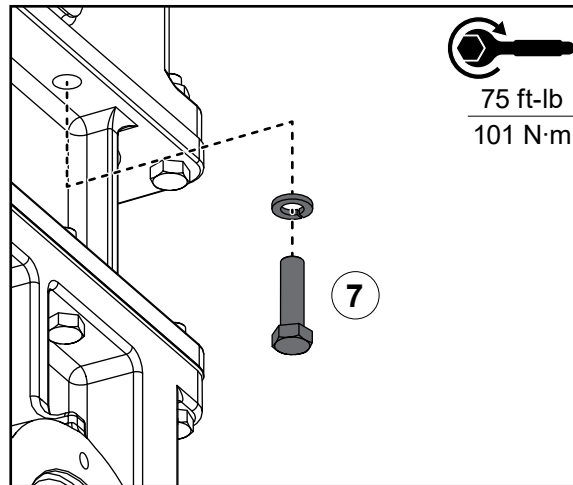
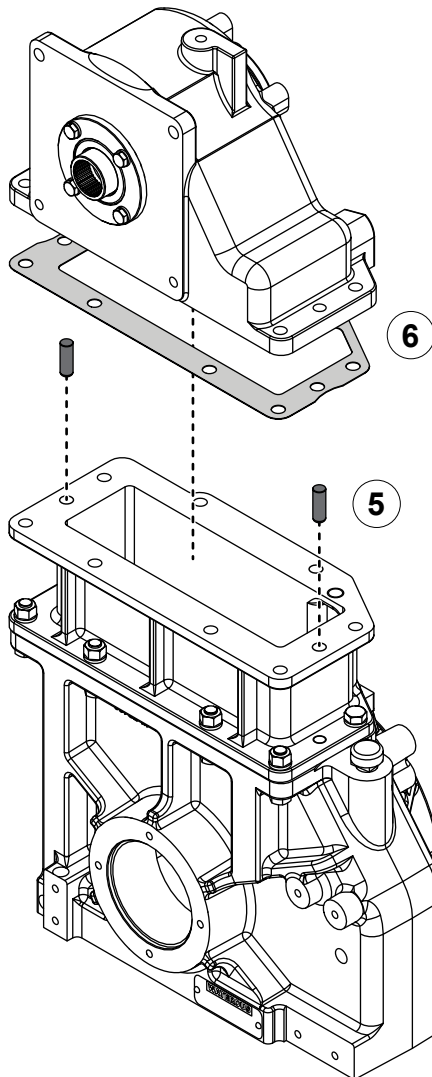


### Transmissions with E and F Drops

Use the illustrations and instructions to install the spacer onto the transmission case.

- 1 If needed, install the dowel pins.
- 2 Apply sealant to the flanges, then install the spacer between the case and spacer.
- 3 Install the oil tube into the spacer.
- 4 Use the mounting hardware to secure the spacer to the case.
  - Torque hardware that screws directly into the case to 75 ft-lb (101 N·m).
  - Torque hardware that requires a nut to 85 ft-lb (115 N·m).

## Installing the Cap



### Transmissions with E and F Drops

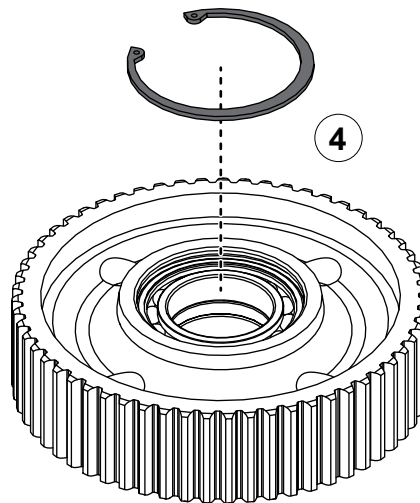
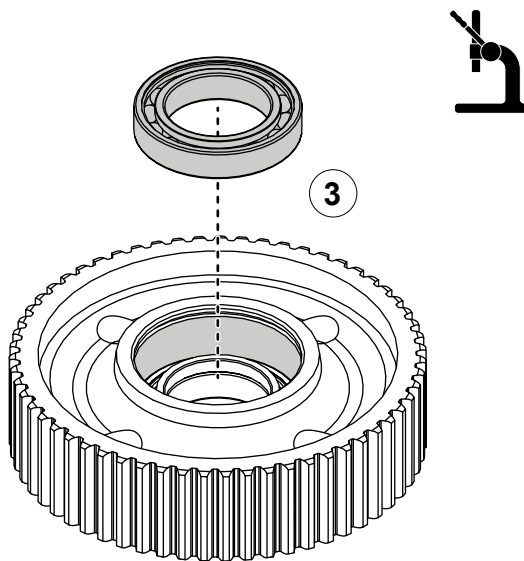
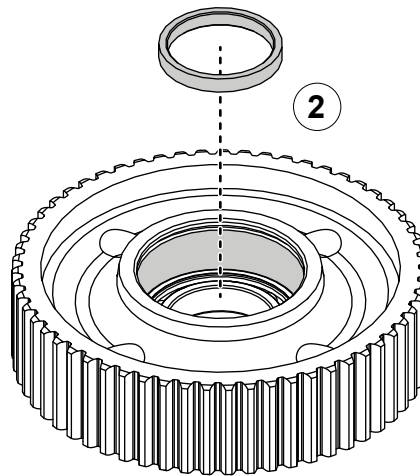
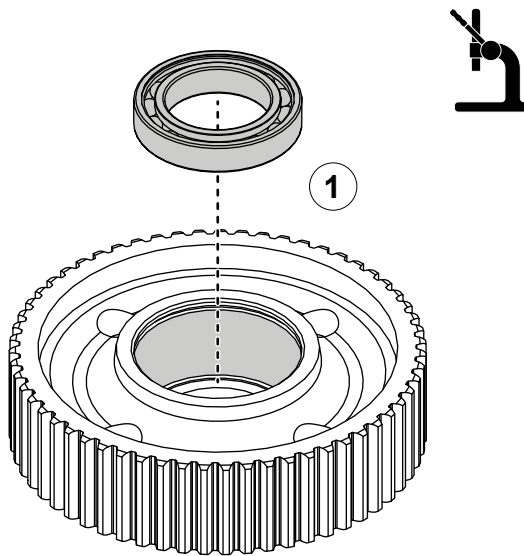
Use the illustrations and instructions to install the cap onto the transmission case.

- 5 If needed, install the dowel pins.
- 6 Apply sealant to the flanges and between the shims, then install the shims between the spacer and cap.

**Note:** Refer to the SPL for your application to determine the required shim thickness for each transmission model and ratio.

- 7 Use the mounting hardware to secure the cap to the spacer.
  - Torque hardware that screws directly into the case to 75 ft-lb (101 N·m).
  - Torque hardware that requires a nut to 85 ft-lb (115 N·m).

## Installing the Drive Components



### Assembling the Drive Sprocket

Use the illustrations and instructions to assemble the drive sprocket assembly.

- 1 Grease the inside of the sprocket, then press the inner bearing into the sprocket.
- 2 Install the spacer into the sprocket.
- 3 Press the outer bearing into the sprocket.
- 4 Install the retaining ring into the sprocket.



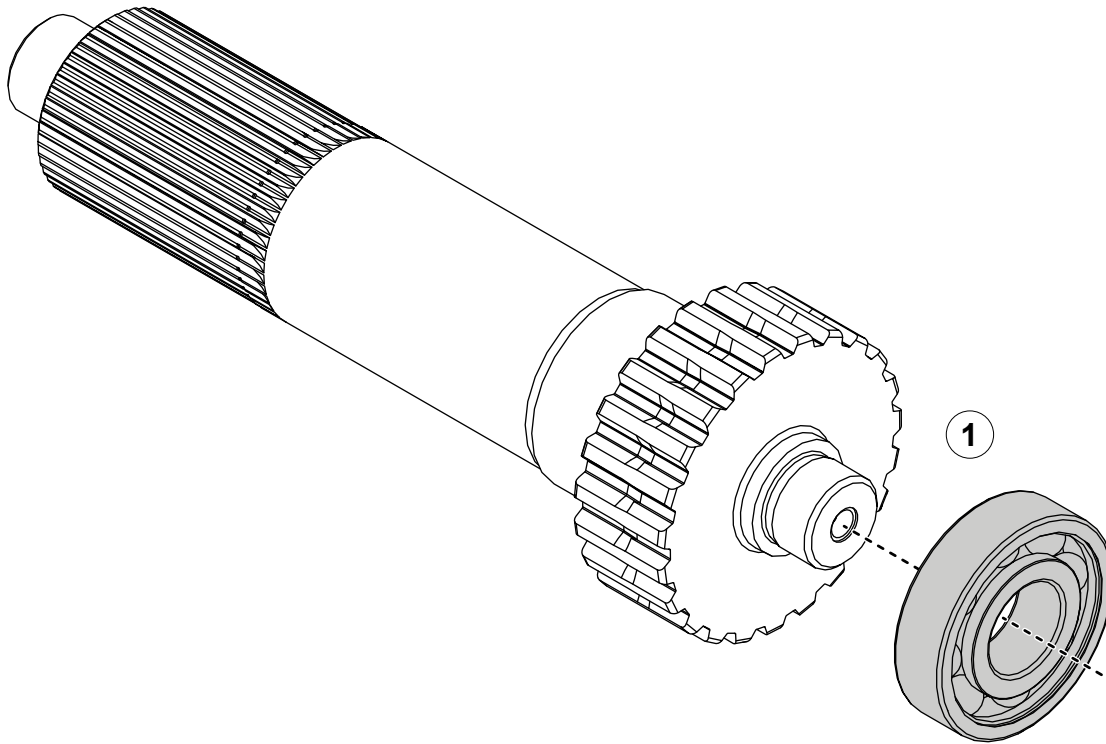
## Installing the Drive Components



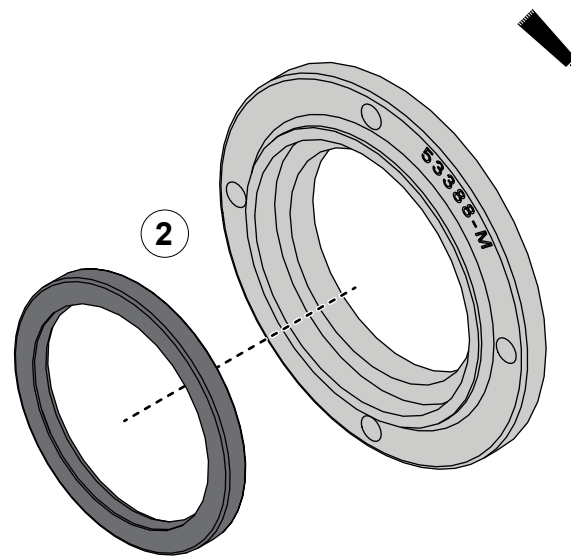
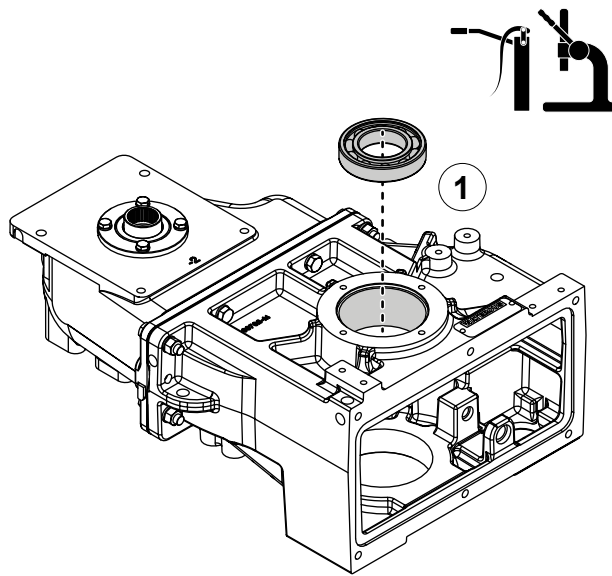
### Assembling the Drive Shaft

Use the illustration and instructions to assemble the drive shaft assembly.

- 1 Apply grease to the shaft, then press the pilot bearing onto the shaft.



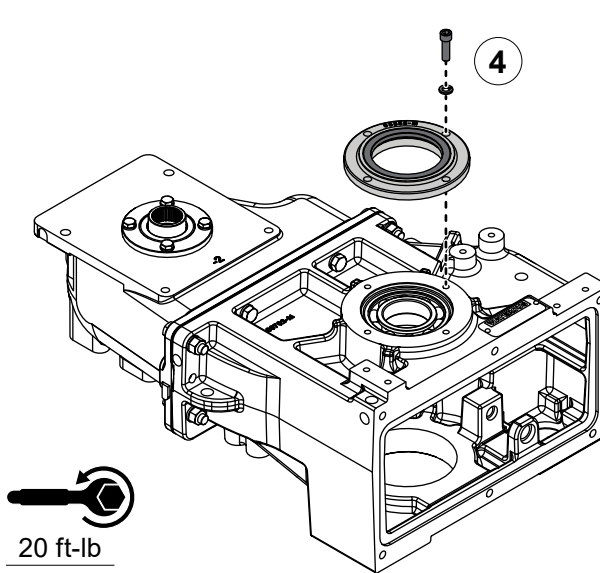
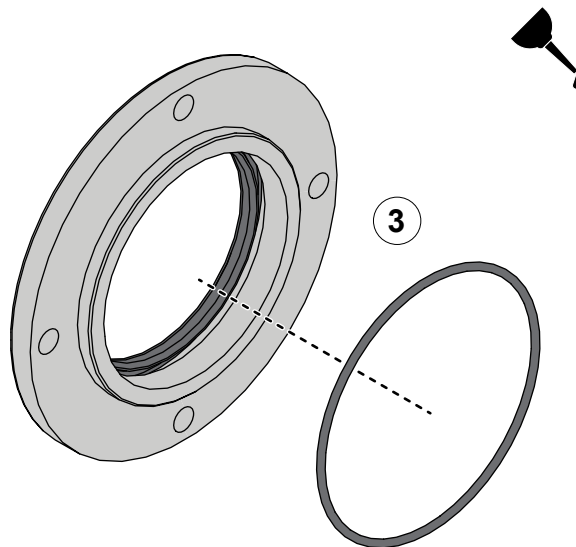
## Installing the Drive Components



### Installing the Drive Shaft Housing

Use the illustrations and instructions to install the drive shaft housing onto the transmission case.

- 1 Apply grease to the input bore of the case, then press the bearing into the bore.
- 2 Apply sealant around the oil seal, then install it into the housing.
- 3 Apply lubricant around the housing bore, then install the O-ring around the bore.
- 4 Use the mounting hardware to secure the housing to the case.



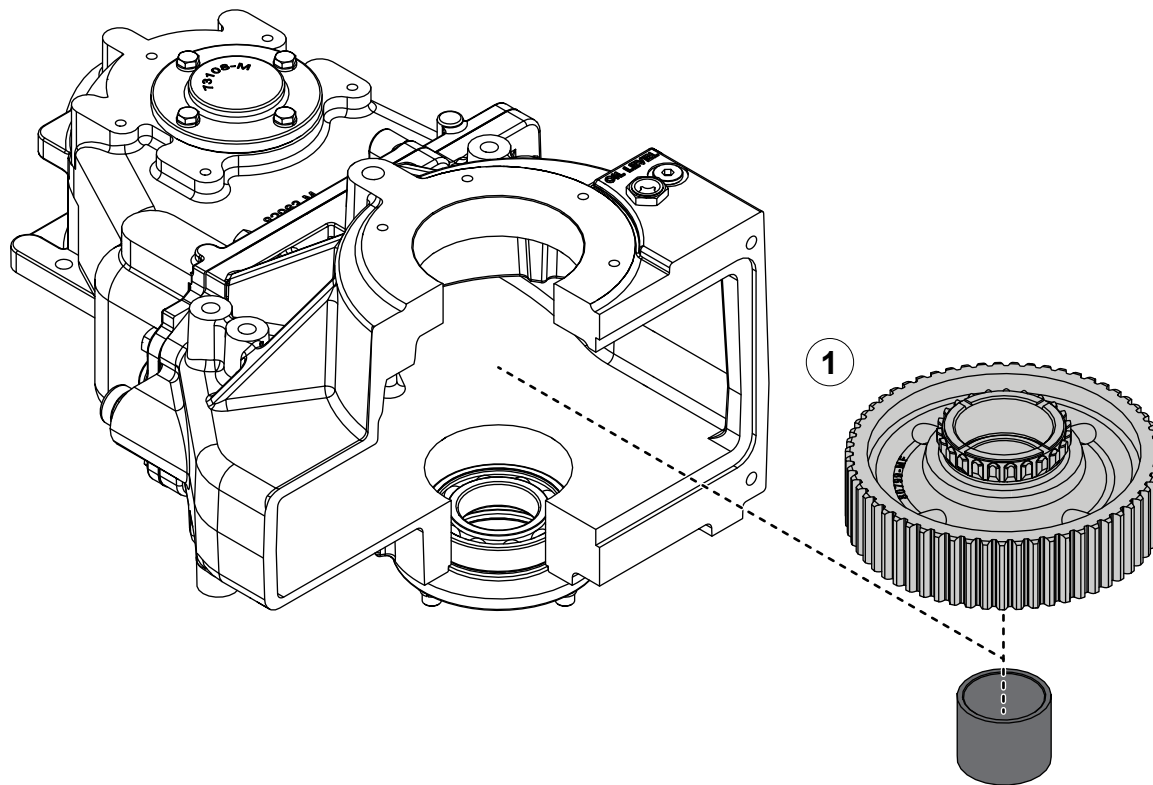
20 ft-lb  
27 N·m

## Installing the Drive Components

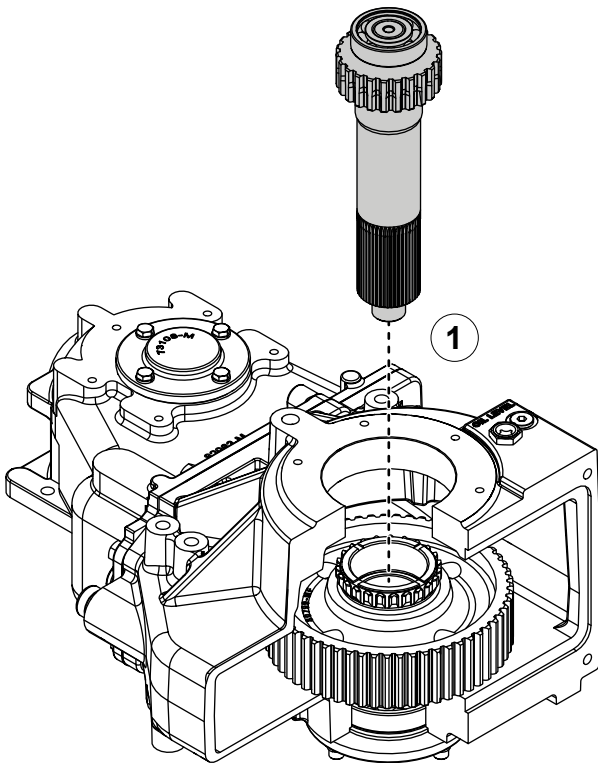
### Installing the Drive Sprocket

Use the illustration and instructions to install the drive sprocket into the transmission case.

- 1 Flip the case so that the input side is facing down, then position the sprocket and spacer inside the case.



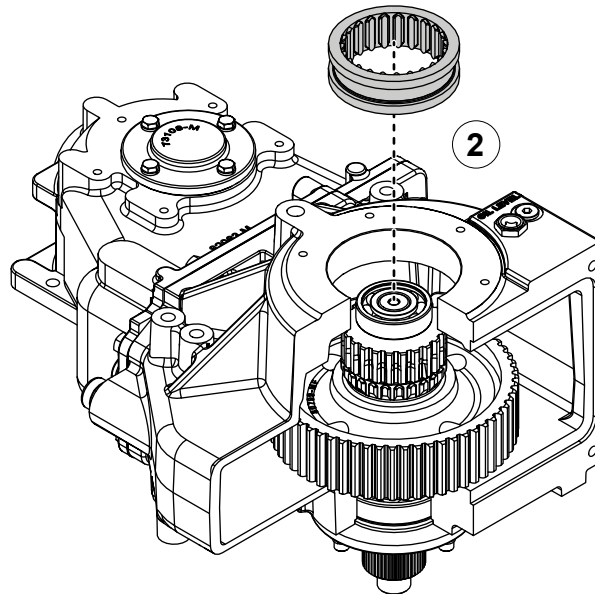
## Installing the Drive Components—Input and Output Shaft Configurations



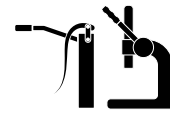
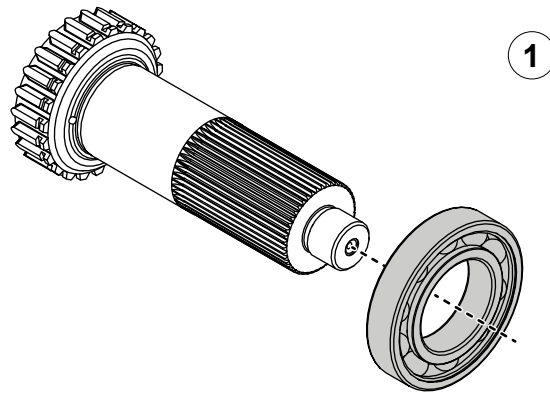
### Installing the Drive Shaft

Use the illustrations and instructions to install the drive components into the transmission case.

- 1 Press the drive shaft assembly through the case, sprocket, and spacer.
- 2 Install the shift collar onto the shaft so that it couples with the sprocket spline.



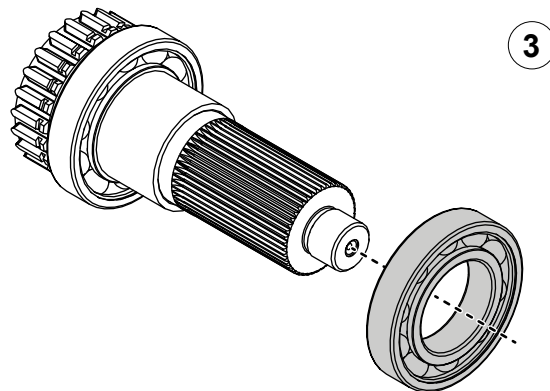
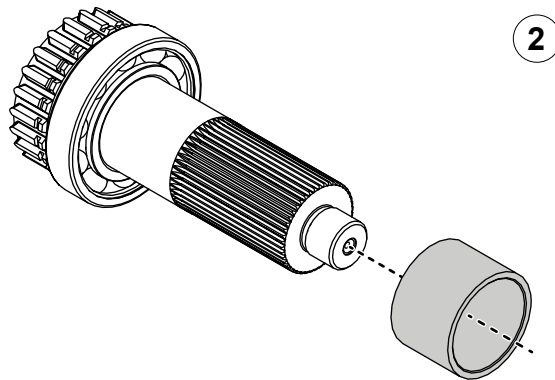
## Installing the Drive Components—Input and Output Shaft Configurations



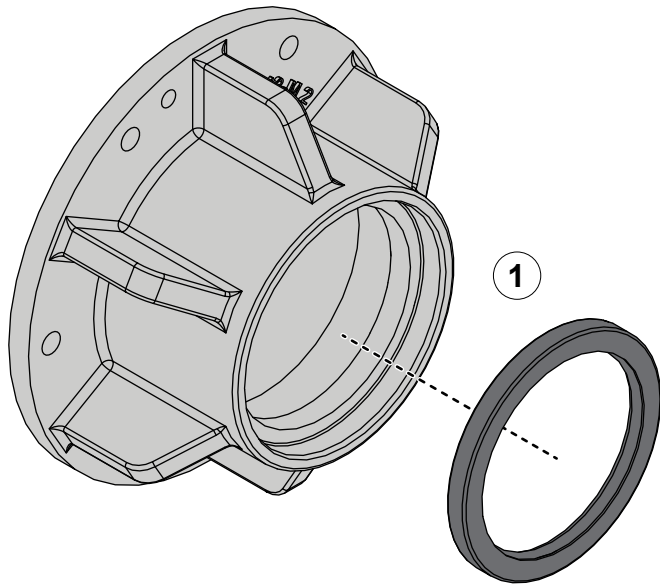
### Assembling the Output Shaft

Use the illustrations and instructions to assemble the output shaft assembly.

- 1 Apply grease to the output shaft, then press the bearing onto the shaft.
- 2 Install the spacer onto the shaft.
- 3 Press the bearing onto the shaft.



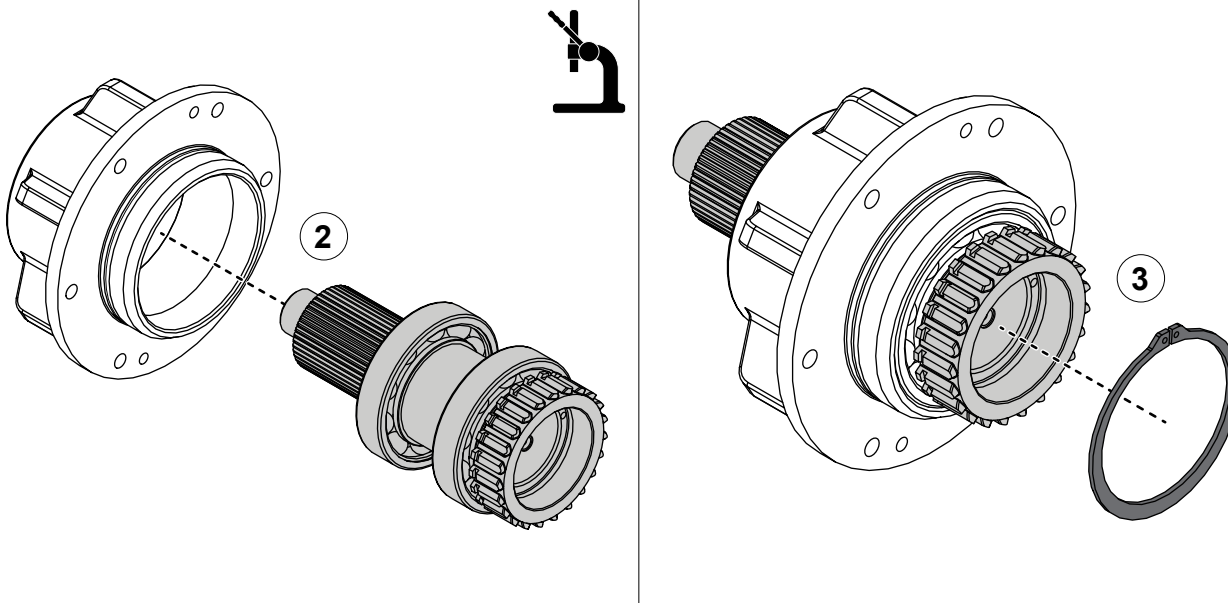
## Installing the Drive Components—Input and Output Shaft Configurations



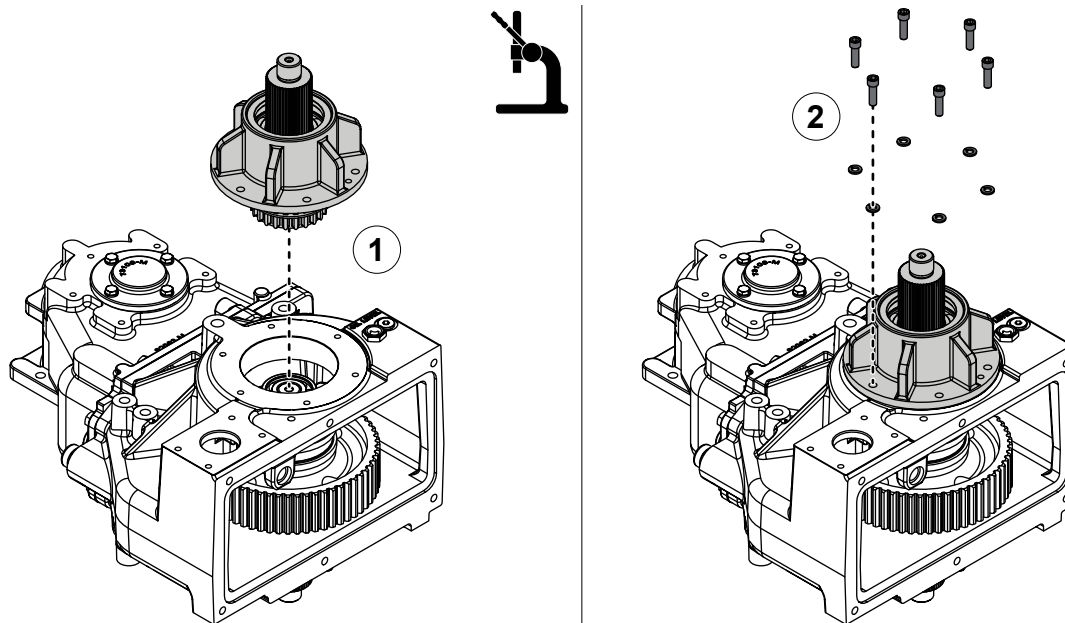
### Assembling the Output Shaft Housing

Use the illustrations and instructions to assemble the output shaft housing.

- 1 Apply sealant around the oil seal, then install it into the output shaft housing.
- 2 Press the output shaft assembly into the housing.
- 3 Install the retaining ring onto the shaft.



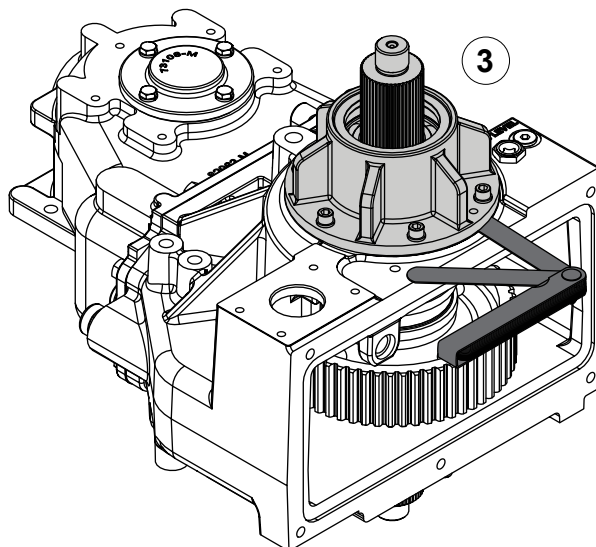
## Installing the Drive Components—Input and Output Shaft Configurations



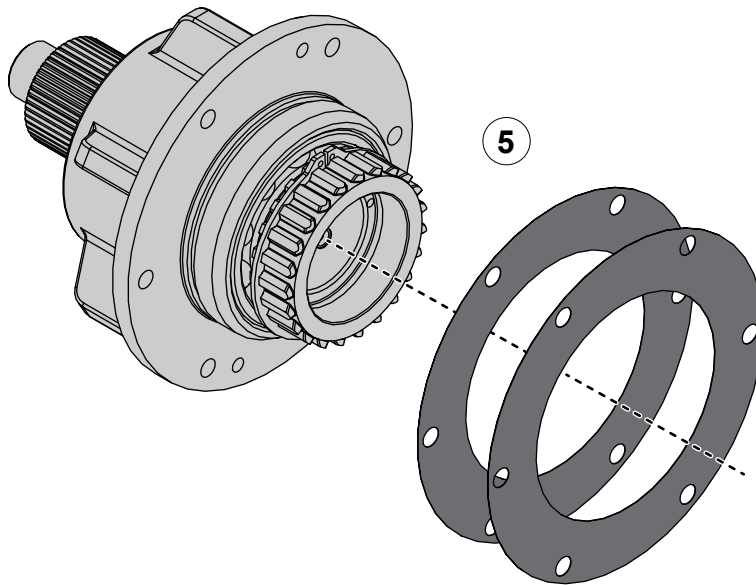
### Installing the Shims

Use the illustrations and instructions to install the shims between the output shaft housing and the transmission case.

- 1 Press the output shaft assembly onto the pilot bearing.
- 2 Use the mounting hardware to secure the housing to the case.
- 3 To determine the required shim thickness, do the following:
  - Measure the gap between the housing and the case.
  - Measure the gap at multiple points to make sure that the results are consistent.
  - Add 0.005 inch (0.127 mm) to the final measurement to achieve the recommended axial float (0.005 to 0.01 inch).
- 4 Remove the output shaft assembly. Refer to: **"Removing the Output Shaft" on page 21.**



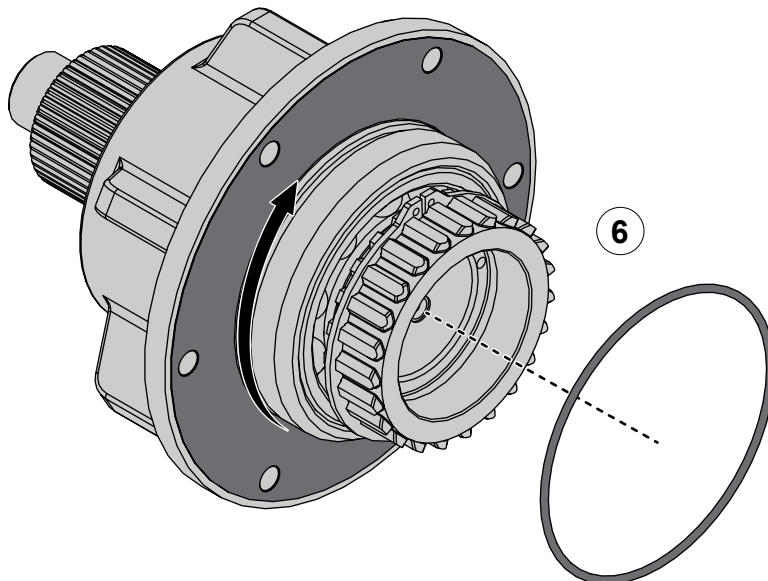
## Installing the Drive Components—Input and Output Shaft Configurations



### Installing the Shims

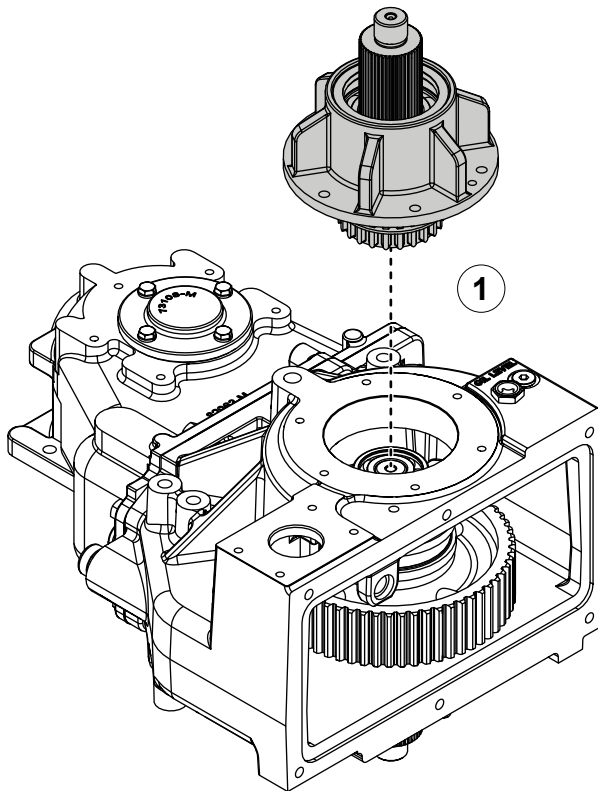
Use the illustrations and instructions to install the shims between the output shaft housing and the transmission case.

- 5 Install the shims onto the output shaft housing flange.
- 6 Apply lubricant to the O-ring groove, then install the O-ring into the groove.

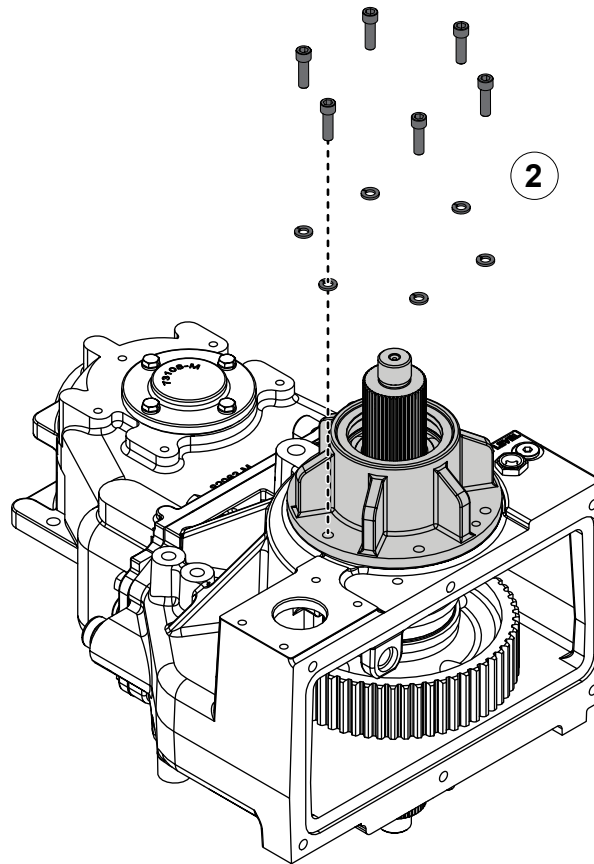




## Installing the Drive Components—Input and Output Shaft Configurations



20 ft-lb  
27 N·m

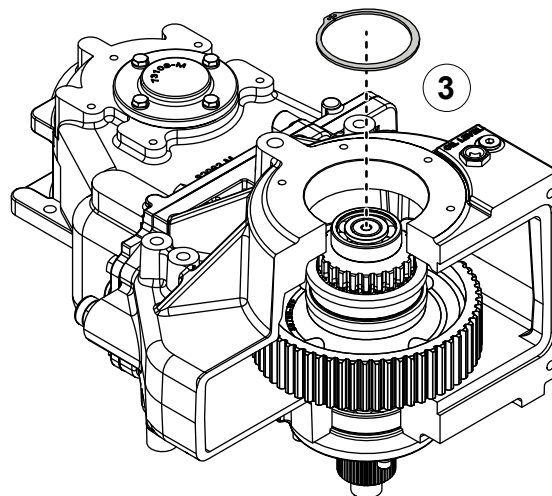
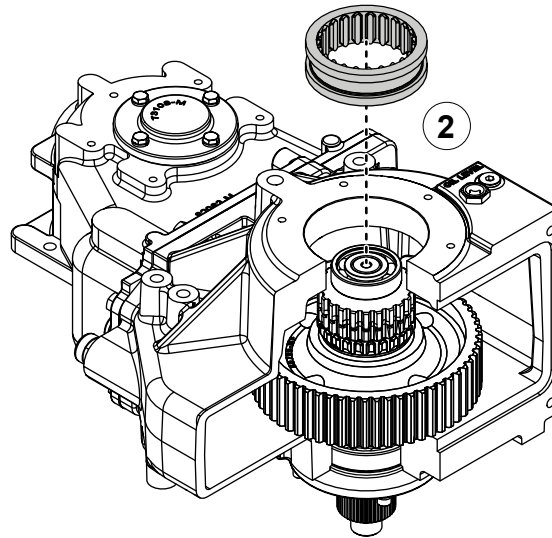
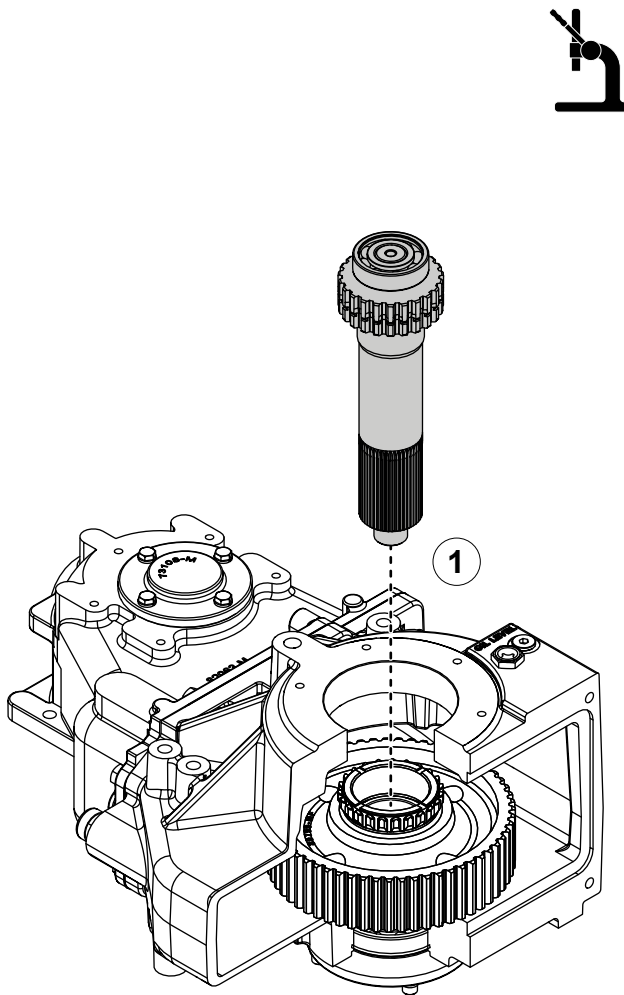


### Installing the Output Shaft Assembly

Use the illustrations and instructions to install the output shaft assembly.

- 1 Press the output shaft assembly onto the pilot bearing.
- 2 Use the mounting hardware to secure the housing to the case.

## Installing the Drive Components—Input Shaft Only Configurations

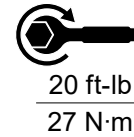
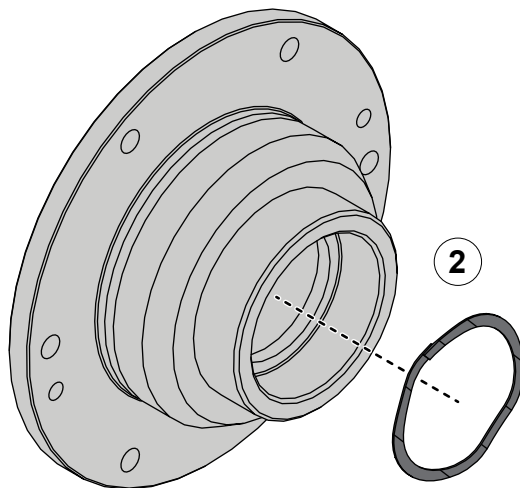
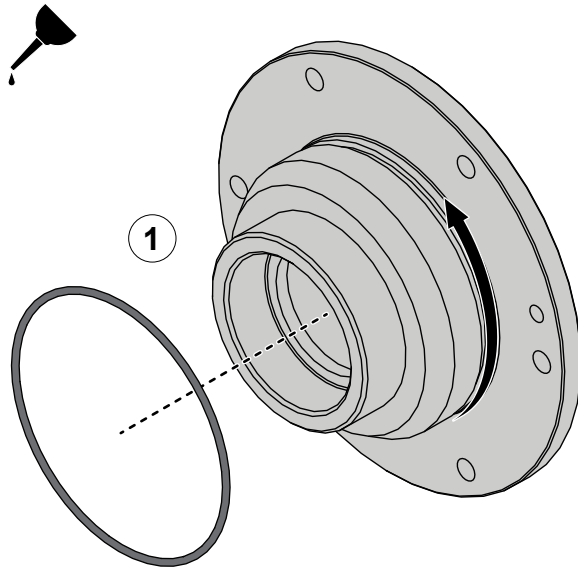


### Installing the Drive Shaft

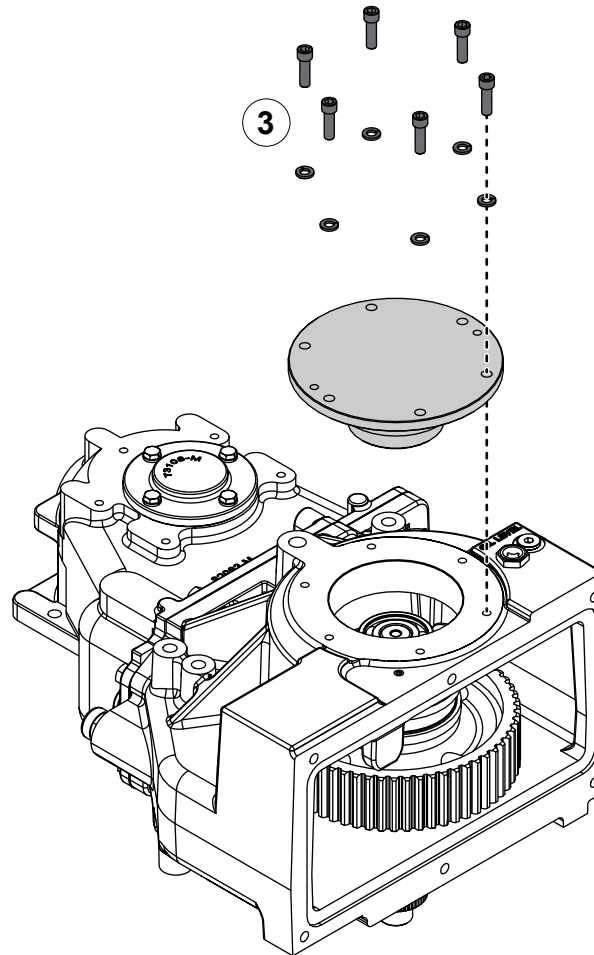
Use the illustrations and instructions to install the drive components into the transmission case.

- 1 Press the drive shaft assembly through the case, sprocket, and spacer.
- 2 Install the shift collar onto the shaft so that it couples with the sprocket spline.
- 3 Install the retaining ring onto the shaft.

## Installing the Drive Components—Input Shaft Only Configurations



20 ft-lb  
27 N·m

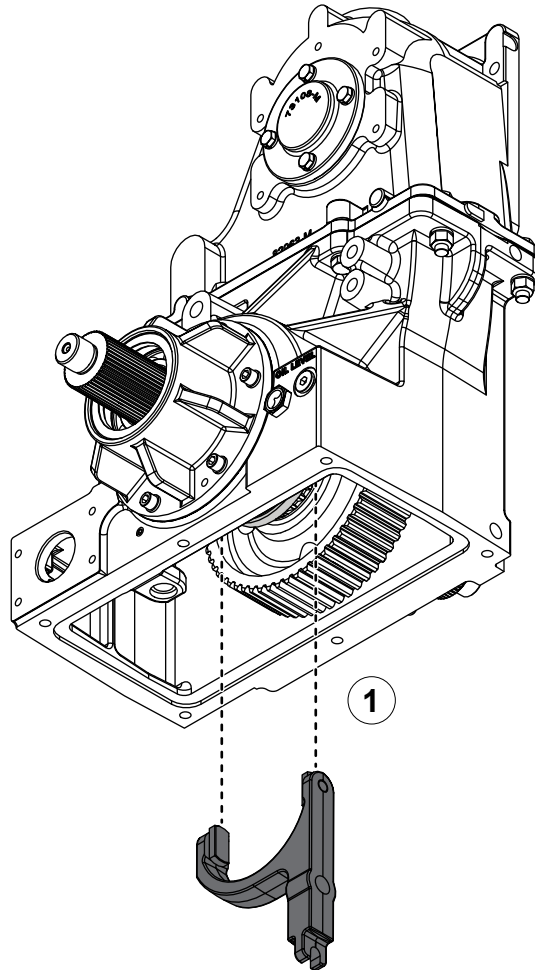


### Installing the Output Bearing Housing

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

- 1 Apply lubricant to the O-ring groove, then install the O-ring into the groove.
- 2 Install the wave spring into the housing.
- 3 Use the mounting hardware to secure the housing to the case.

## Installing the Shift Fork

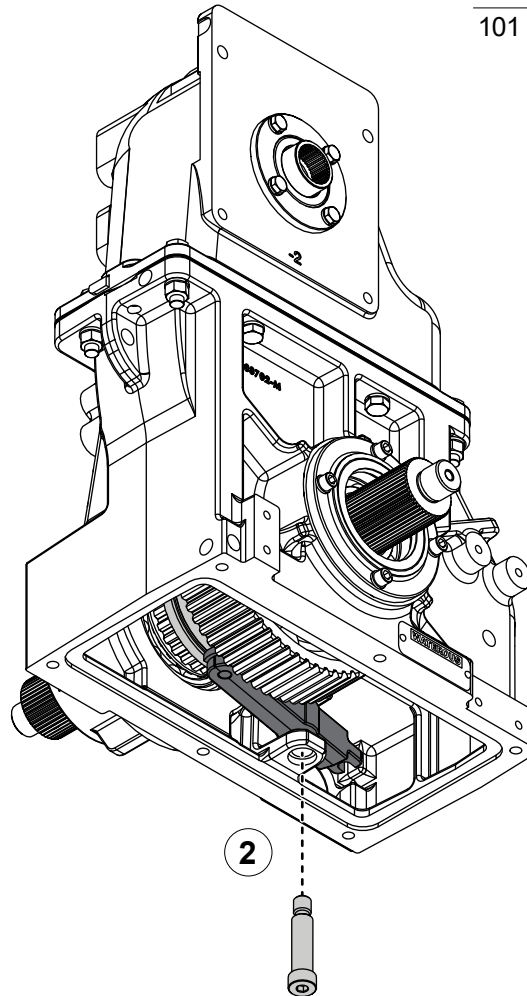


75 ft-lb  
101 N·m

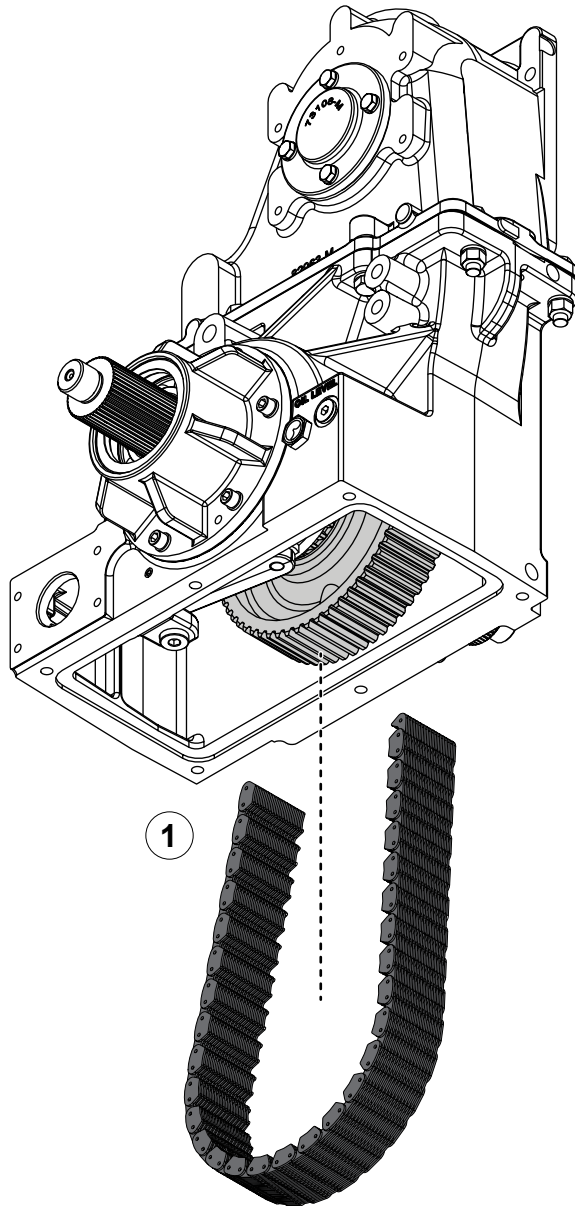
Use the illustrations and instructions to install the shift fork.

- 1 Move the collar into the pump position, then install the shift fork onto the collar.
- 2 Align the hole in the shift fork with the holes inside the case, then secure the shift fork with the shoulder screw.

**Note:** Always replace the shoulder screw during overhaul.



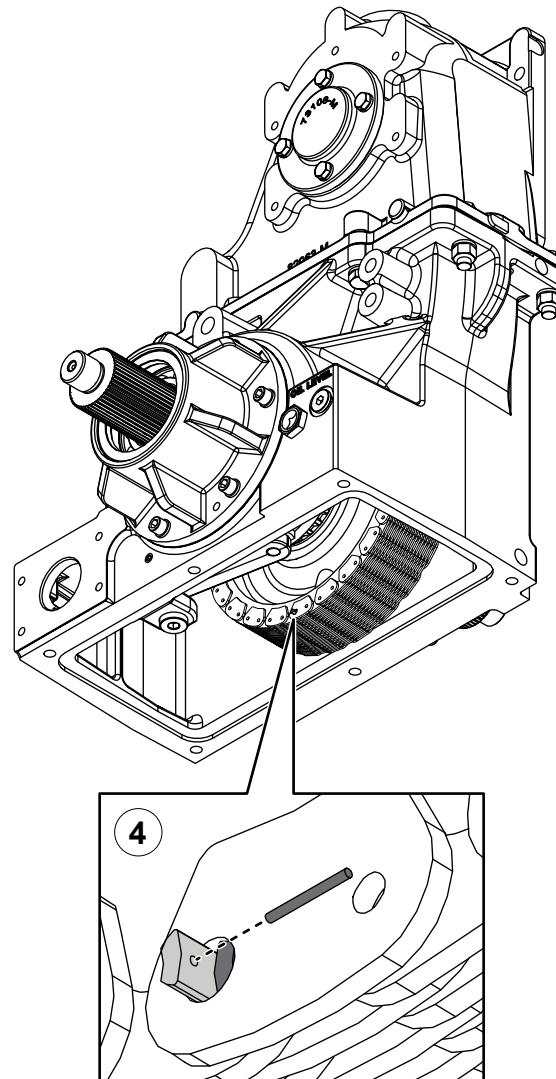
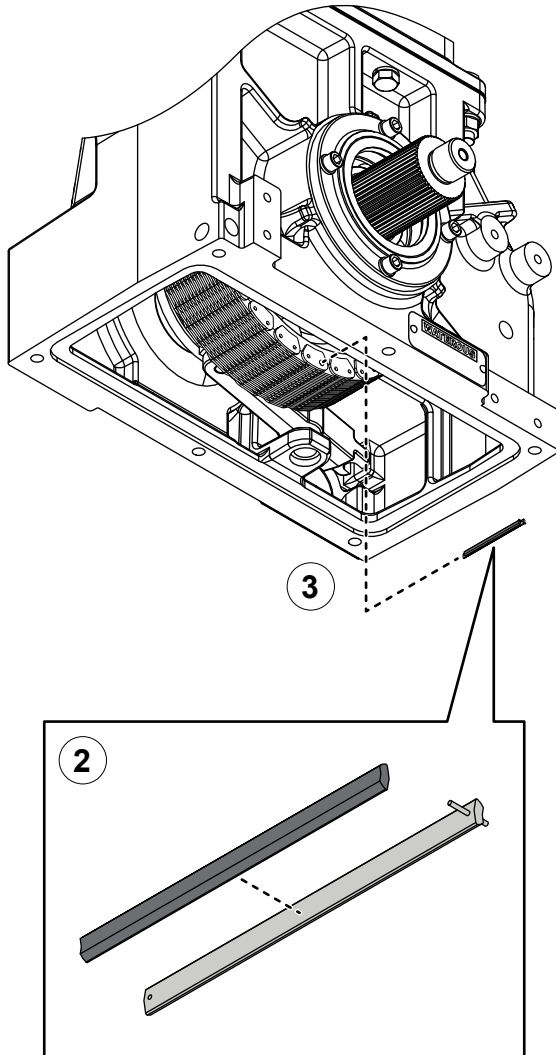
## Installing the Chain



Use the illustration and instructions to install the chain into the transmission case.

- 1 Install the chain around the driven sprocket inside the case, then overlap the chain ends around the drive sprocket.

## Installing the Chain

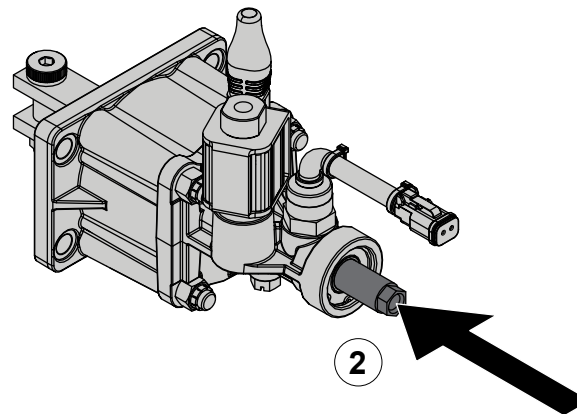
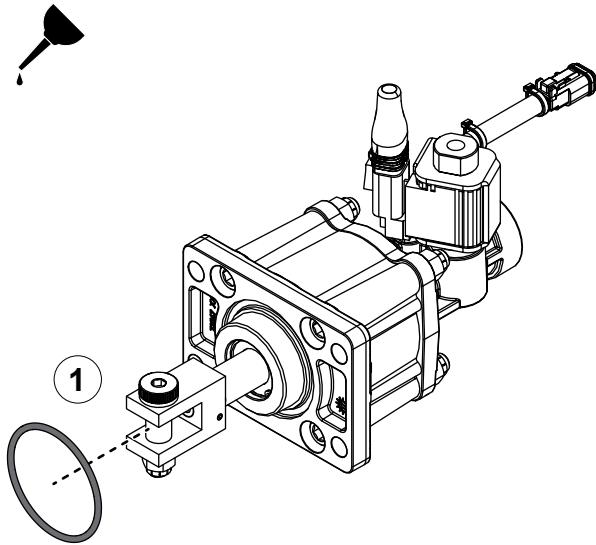


Use the illustrations and instructions to install the chain into the transmission case.

- 2 Align the connecting pin and rocker with their curved faces toward each other at the entrance of the connecting link.
- 3 Push the connecting pin and rocker through the connecting link.
- 4 Use the spirol pin to secure the connecting pin and rocker.

**Note:** An optional pin installation tool (53402) is available from Waterous.

## Installing the Pneumatic Shift Unit



If included in your application, use the illustrations and instructions to install the pneumatic shift unit.

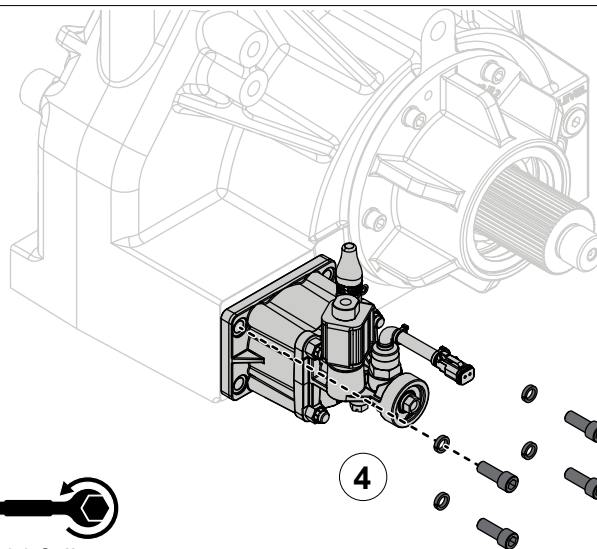
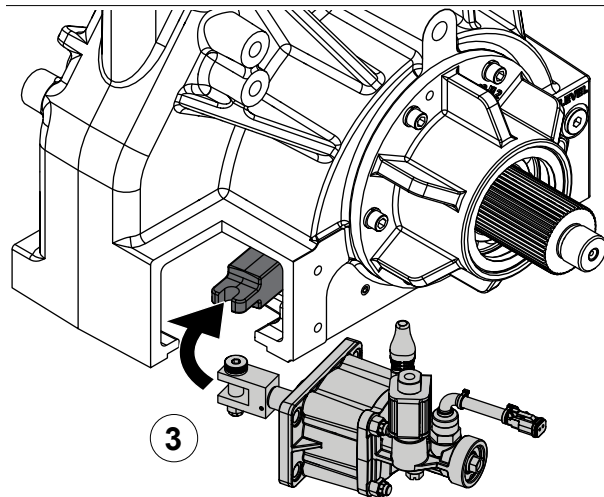
- 1 Apply lubricant to the O-ring groove, then install the O-ring into the groove.

- 2 Move the shift unit into the road position.

**Note:** Make sure that the shift collar is in the pump position before installing the shift unit.

- 3 Tilt the shift unit away from the center of the case to engage the clevis with the shift fork.

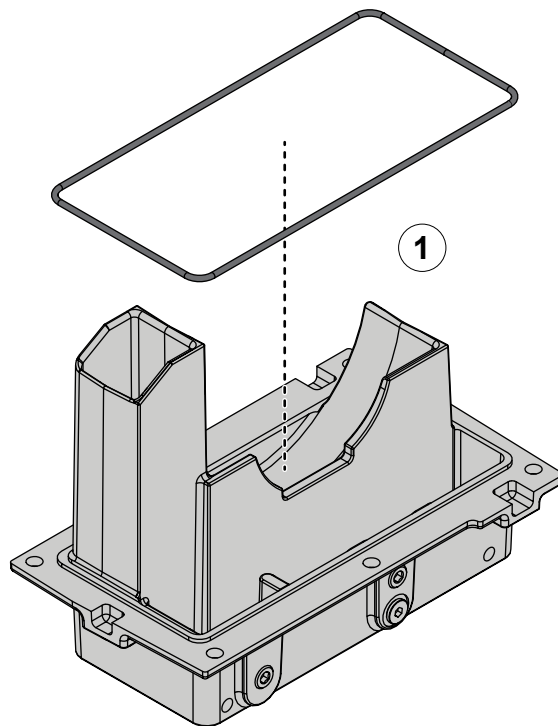
- 4 Push the shift unit back against the case, then use the mounting hardware to secure it to the case.



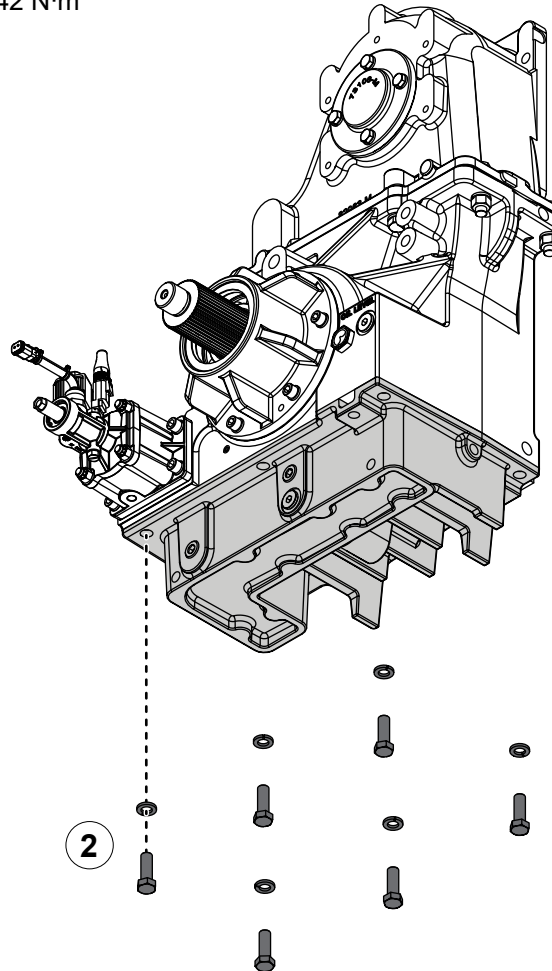
31 ft-lb  
42 N·m



## Installing the Transmission Pan



31 ft-lb  
42 N·m



Use the illustrations and instructions to install the transmission pan.

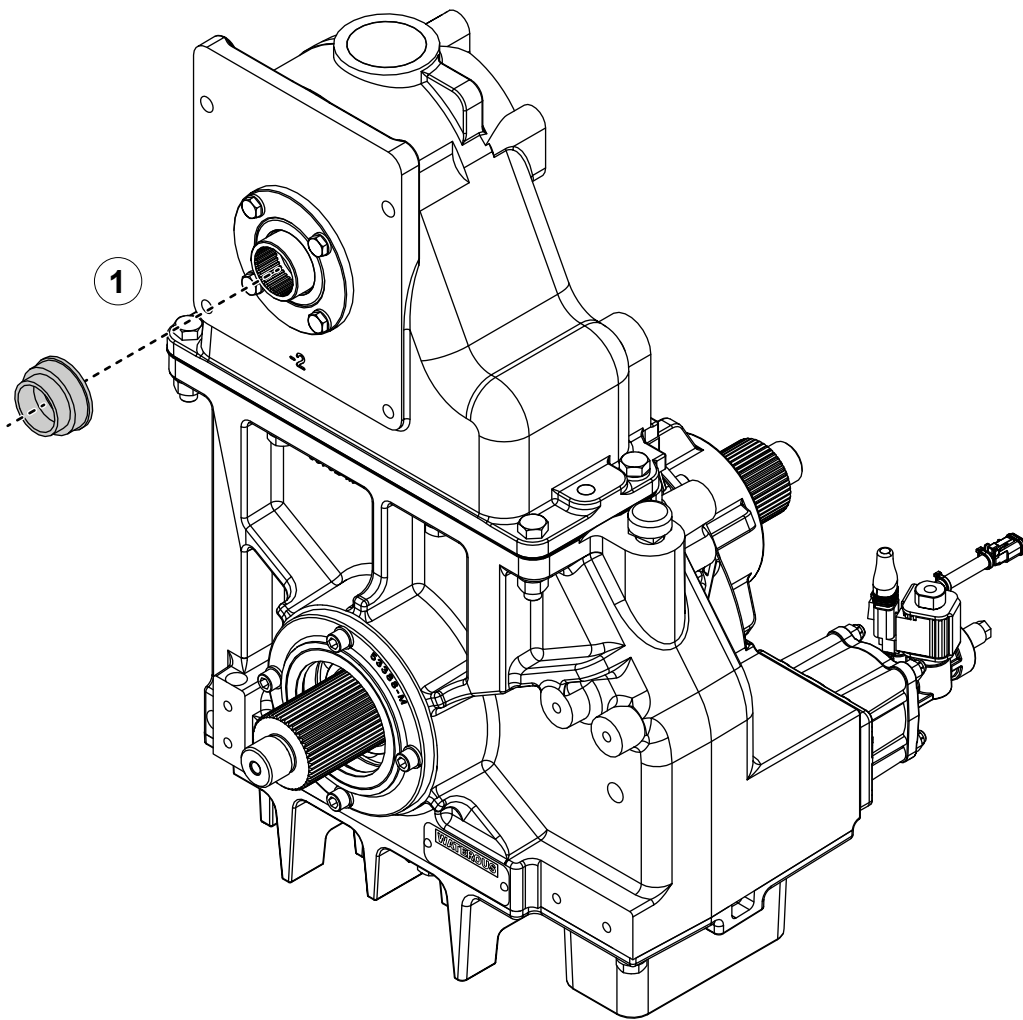
- 1 Apply grease to the O-ring groove, then install the O-ring into the transmission pan.
- 2 Use the mounting hardware to secure the transmission pan to the case.



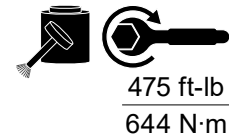
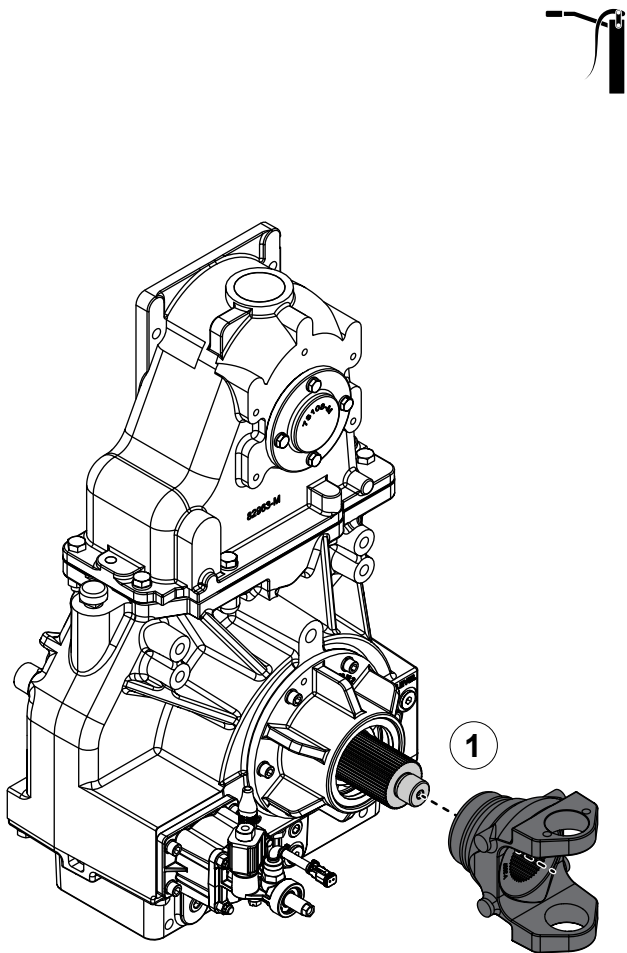
## Installing the Sealing Boot

Use the illustrations and instructions to install the sealing boot.

- 1 Install the sealing boot onto the end of the driven shaft.

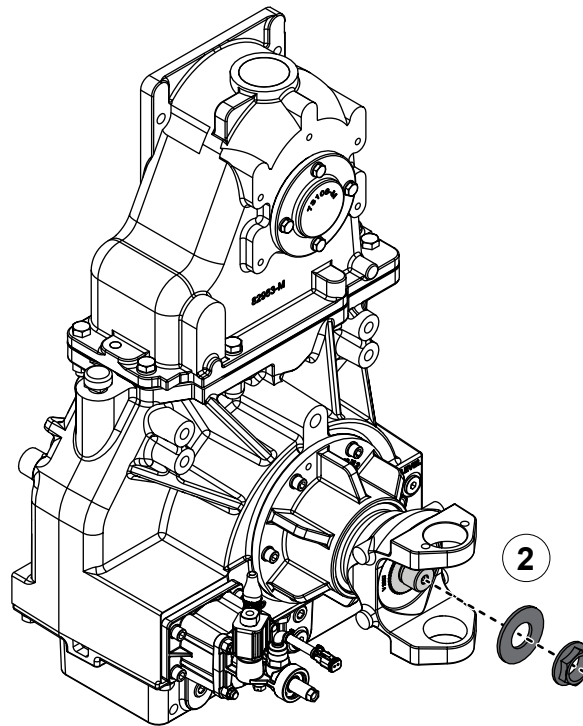


## Installing the Drive Shaft End Yoke or Companion Flange

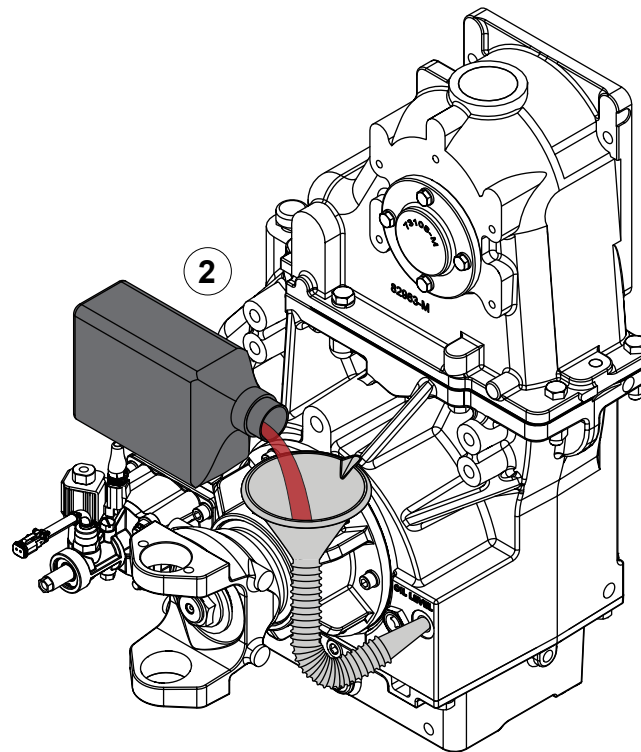
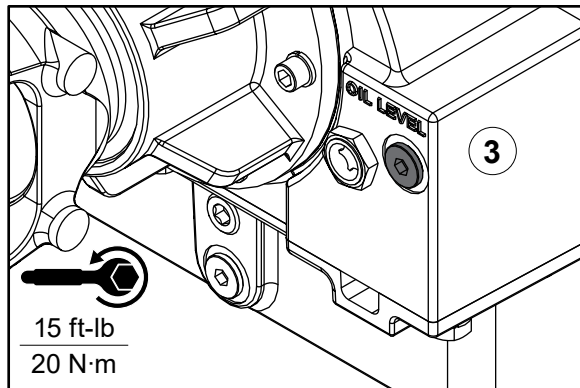
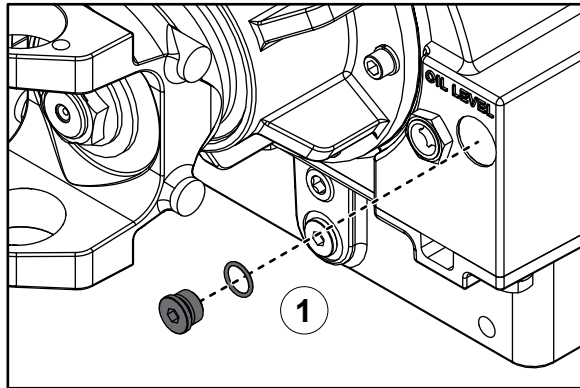


Use the illustrations and instructions to install the optional drive shaft end yoke or companion flange. The end yokes or companion flanges included in your application may be supplied by Waterous or the truck builder.

- 1 Apply grease to the drive shaft, then install the end yoke onto the shaft.
- 2 Apply anti-seize compound to the lock nut threads, then install the washer and lock nut onto the shaft.



## Adding Lubricant to the Transmission



Use the illustrations and instructions to add lubricant to the transmission. The transmission capacity is approximately 6 qt (5.68 L).

Use automatic transmission fluid that meets the requirements of DEXRON III or MERCON V.

- 1 Remove the oil fill plug. If needed, replace the O-ring.

- 2 Add lubricant to the transmission until it reaches halfway up the oil level sight plug.

**Note:** After pouring some lubricant into the case, allow it to settle before adding more to avoid over-filling. It may take several minutes for the lubricant to flow into the transmission's internal chambers.

- 3 Securely install the oil fill plug.

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

# **WATEROUS**

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