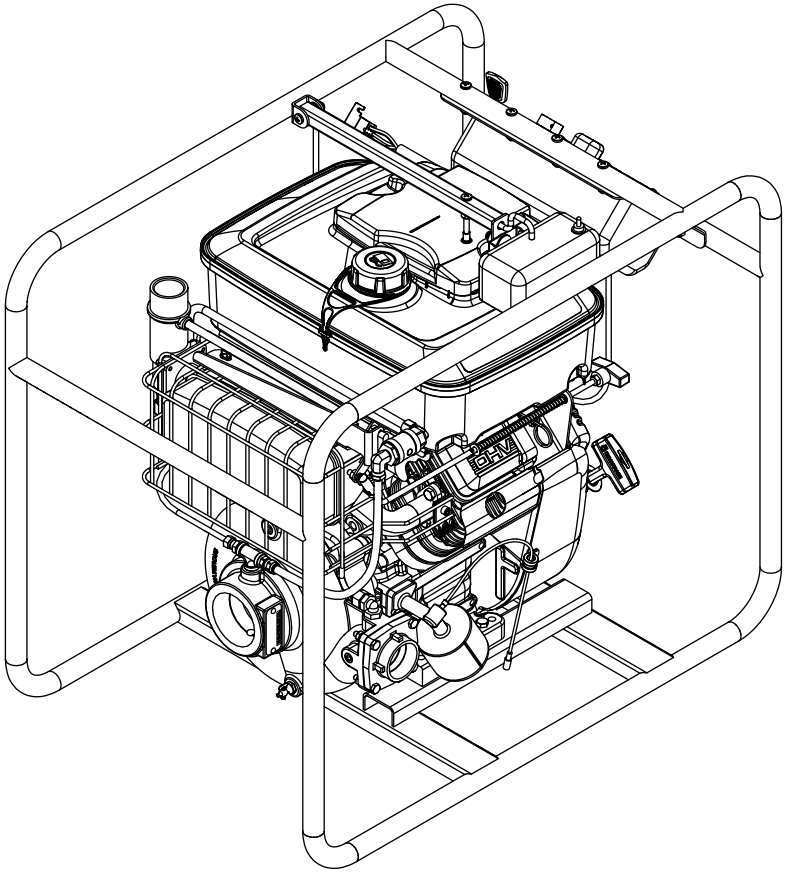
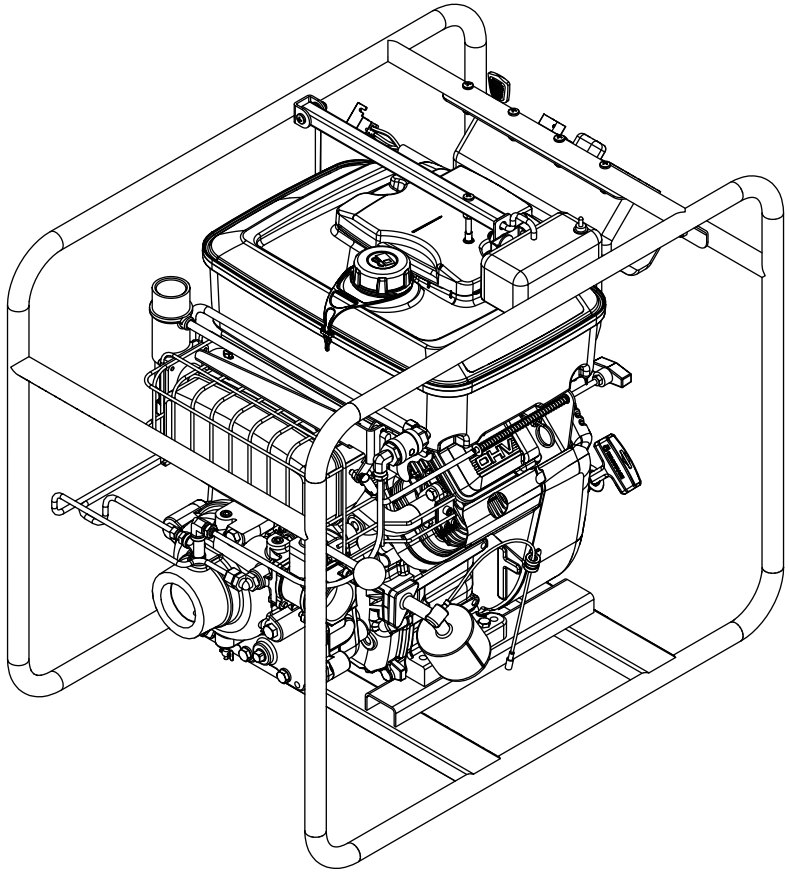
WATEROUS

Form Number: F-3027
Issue Date: Mar 28, 2024
Revision Date: Jul 22, 2024

PB18 Series Portable Pumps

Operation, Maintenance, and Overhaul





Waterous Company • 125 Hardman Avenue South • South Saint Paul, MN 55075 • (651) 450-5000
www.waterousco.com

Table of Contents

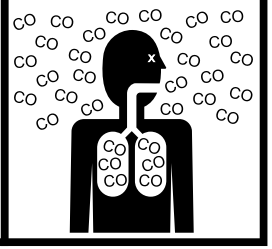
Safety Precautions

- Read and understand all the associated documentation before you begin operating or overhauling the equipment.
- Contact Waterous when you have questions about operating, maintaining, or overhauling the equipment.
- Read and understand all the notices and safety precautions.
- Do not operate the equipment when safety guards are removed.
- Do not modify the equipment.

WARNING

Carbon Monoxide

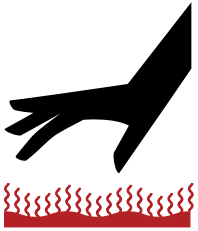
- **Carbon monoxide gas will kill you.**
- **Never operate the engine in an enclosed space.**



WARNING

Hot Liquid

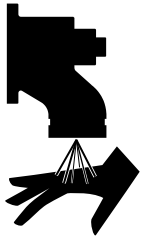
- **Hot liquid can scald you.**
- **Do not operate if water temperature exceeds 160ºF (71ºC).**



WARNING

High Pressure

- **Discharge ejected at high pressure can cause serious injury and damage.**
- **Direct discharge away from people and equipment.**



WARNING

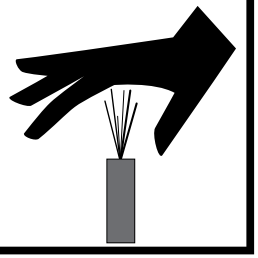
Hot Surface

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

WARNING

High Pressure

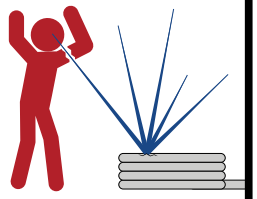
- **Liquid ejected at high pressure can cause serious injury.**
- **Do not operate beyond recommended pressure.**



WARNING

Hose Testing

- **Using a pump to test fire hoses can cause serious injury and damage.**
- **Do not use pumps to test fire hoses.**



Read and understand all warnings following this symbol.

Safety Precautions

NOTICE

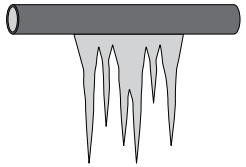
Before Operation

- Read and understand all the instructions provided.
- Check all fluid levels and replenish if necessary.
- Remove all shipping plugs and install the operation plugs or caps.

NOTICE

Freeze Damage

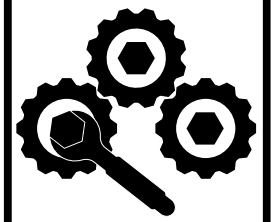
- Do not allow fluid in the lines to freeze.
- Remove all freezable fluid from the lines before storing the apparatus.



NOTICE

Maintenance

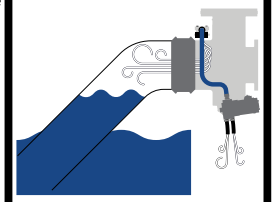
- Not following maintenance procedures can damage your equipment.
- Perform all maintenance procedures as required.



NOTICE

Priming Pump Damage

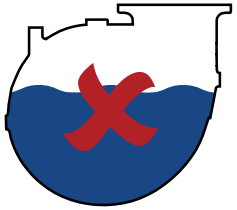
- Do not prime the pump for more than 1 minute.
- Operating the priming pump longer than 1 minute can damage the motor or the motor solenoid.



NOTICE

Pump Damage

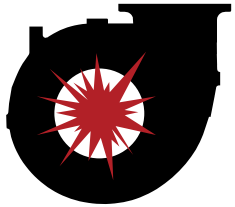
- Storing the pump partially full causes undesirable corrosion.
- Always store the pump completely full or empty.



NOTICE

Pump Damage

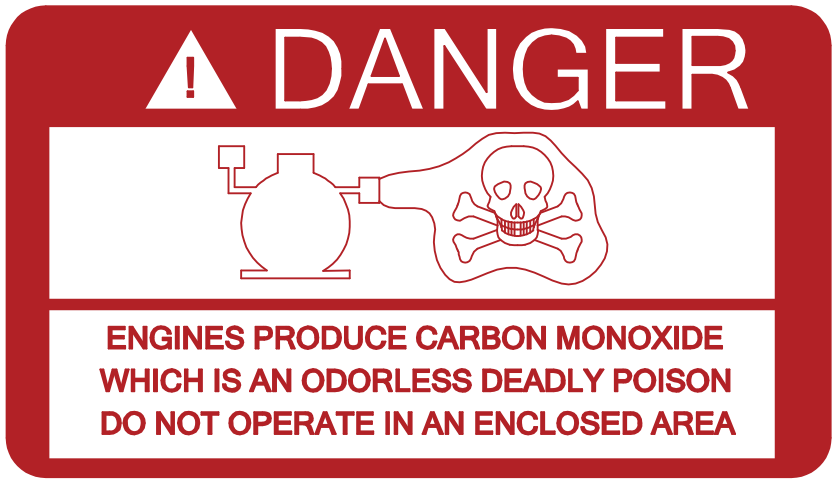
- Pump damage occurs when operating without adequate water supply.
- Do not operate the pump without adequate water supply.



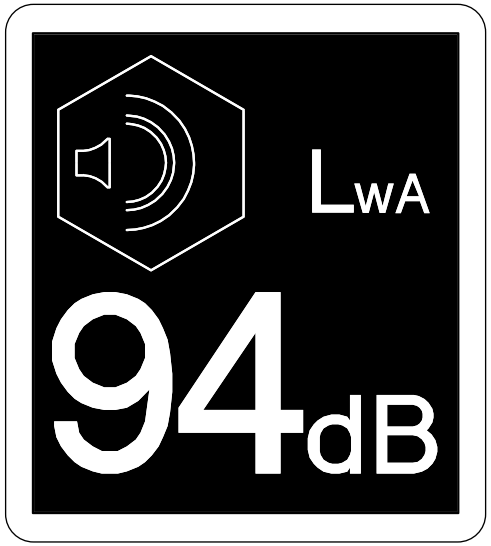
Safety and Instructional Decals

Locate and review the safety decals. Replace any decals that are damaged or missing.

Carbon Monoxide Warning



Sound Level Warning



Hot Surface Warning

Use this document to operate and overhaul your Waterous equipment. Understand the following conditions before continuing with the document:

- The instructions may refer to options or equipment that you have not purchased with your system.
- The illustrations in this document are intended to convey concepts. Do not use the illustrations to determine physical attributes, placement, or proportion.
- Understand that your application 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.
- The equipment described in this document is intended to be operated by a person or persons with the basic knowledge of operating similar equipment.
- The information in this document is subject to change without notice.

This document is divided into the following sections:

SAFETY
This section describes precautions and alert symbols that are in the document.

INTRODUCTION
This section is an overview of the document.

OVERVIEW
This section describes the components that make up the system.

OPERATION
This section describes equipment operation.

MAINTENANCE
This section describes required maintenance.

DISASSEMBLY
This section describes disassembly procedures.

ASSEMBLY
This section describes assembly procedures.

TROUBLESHOOTING
This section describes how to troubleshoot any issues with the equipment.

Using this Document

Use the guidelines below when viewing this document.

Viewing the Document Electronically

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

Printing the Document

- The document is best viewed when printed 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 www.waterousco.com. Use your serial number to gain access to the service parts lists associated with your system. Dimensional drawings are available through the Waterous Service department.

Symbols

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

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

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

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

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

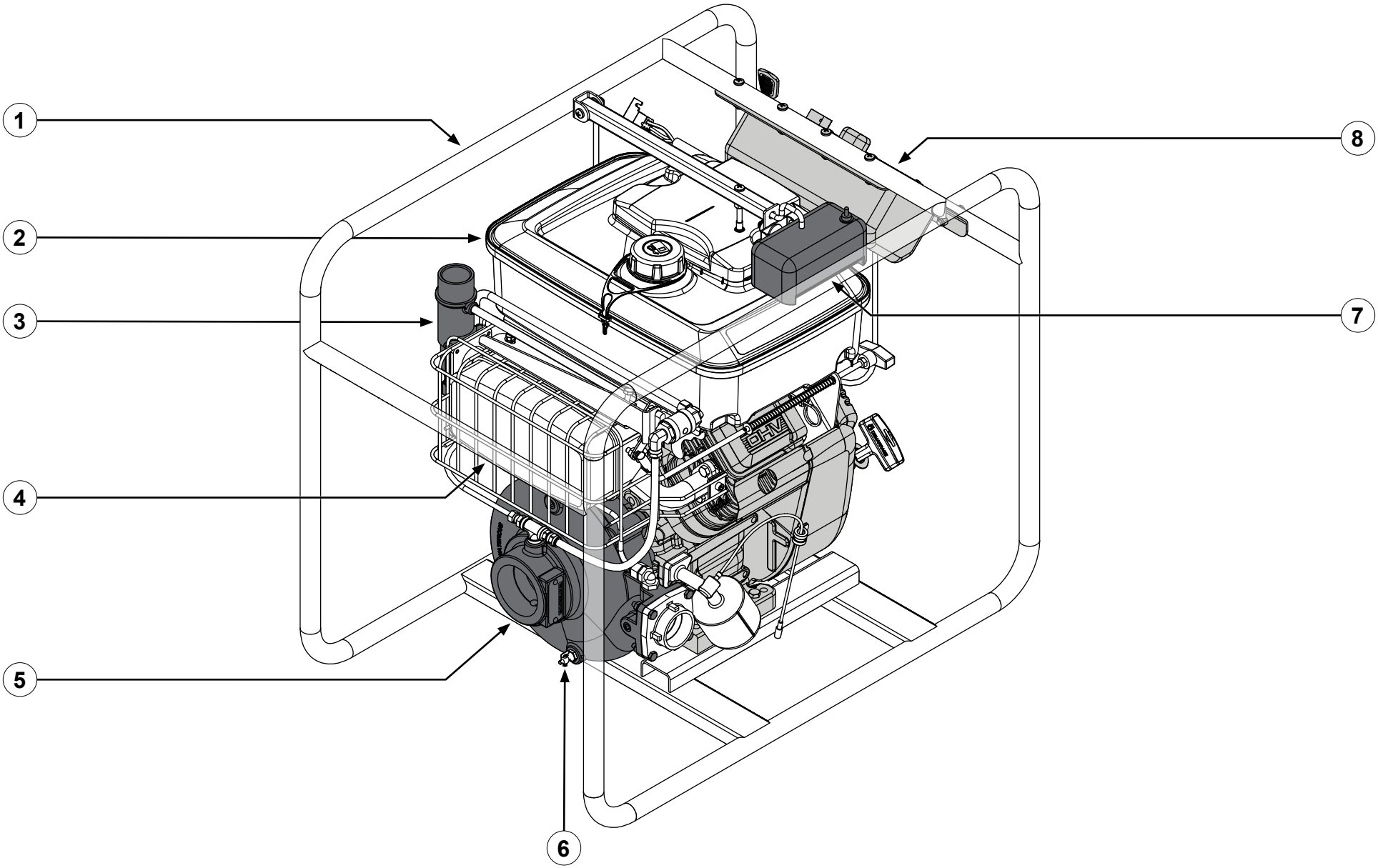
Lubrication—This symbol tells you to apply an appropriate lubricant to the part.

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

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

Notes

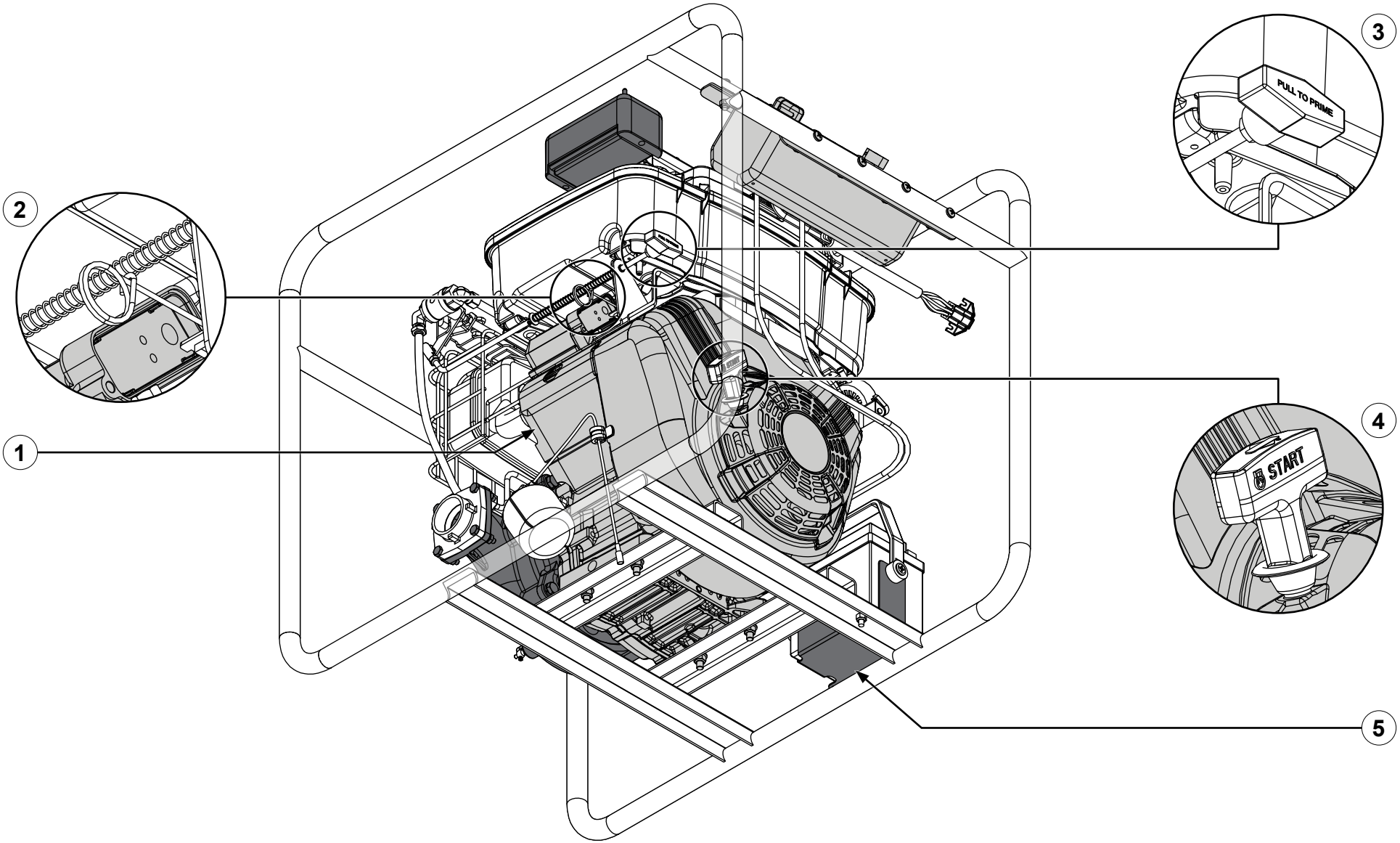
System Components—PB18 (Pump End)



System Components—PB18 (Pump End)

	Feature	Description
1	Wrap-around frame—optional	This supports the unit and provides mounting options.
2	Fuel tank	This stores the fuel that powers the engine.
3	Exhaust primer	This uses the exhaust gas from the engine to prime the pump.
4	Muffler	This dampens the sound created by the engine.
5	Pump	Water enters the pump through the intake and exits through the discharge. The PB18 pump is available with a capacity of 190 gpm (720 lpm) at 145 psi (10 bar) or 350 gpm (1,325 lpm) at 118 psi (8.13 bar).
6	Drain cock	This is where water is drained from the pump.
7	Mast light—optional	This illuminates the unit during operation.
8	Control panel	This houses the ignition switch, throttle control, and pressure gauges.

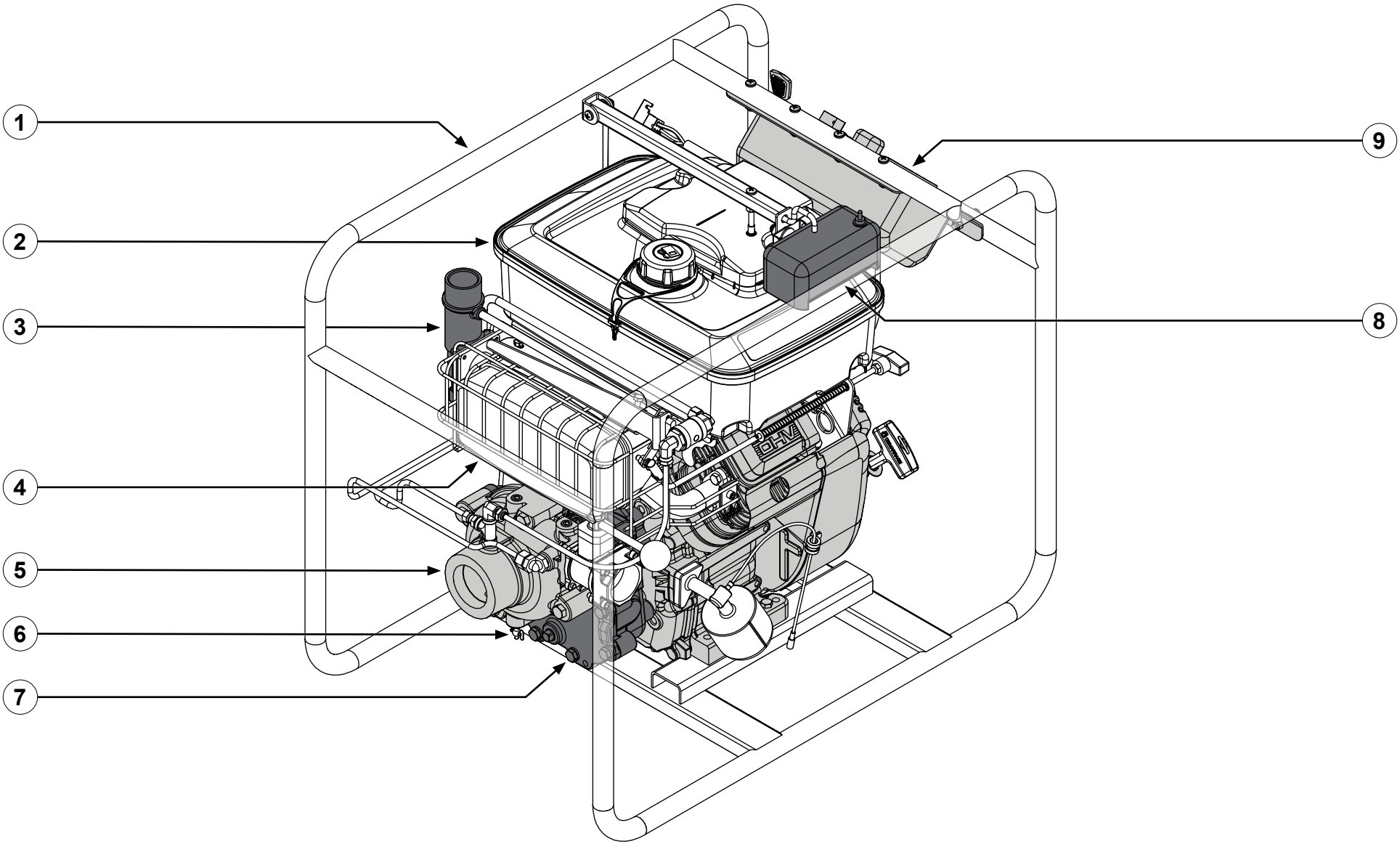
System Components—PB18 (Engine End)



System Components—PB18 (Engine End)

	Feature	Description
1	Engine	This powers the system. Refer to the manufacturer's instructions to locate additional features and controls.
2	Choke control	This is used to open and close the choke valve.
3	Prime control	This is used to operate the primer.
4	Manual starter cord	This is used to start the engine when the ignition switch is not working or not available.
5	Battery tray	This holds the battery that connects to the engine and optional mast light.

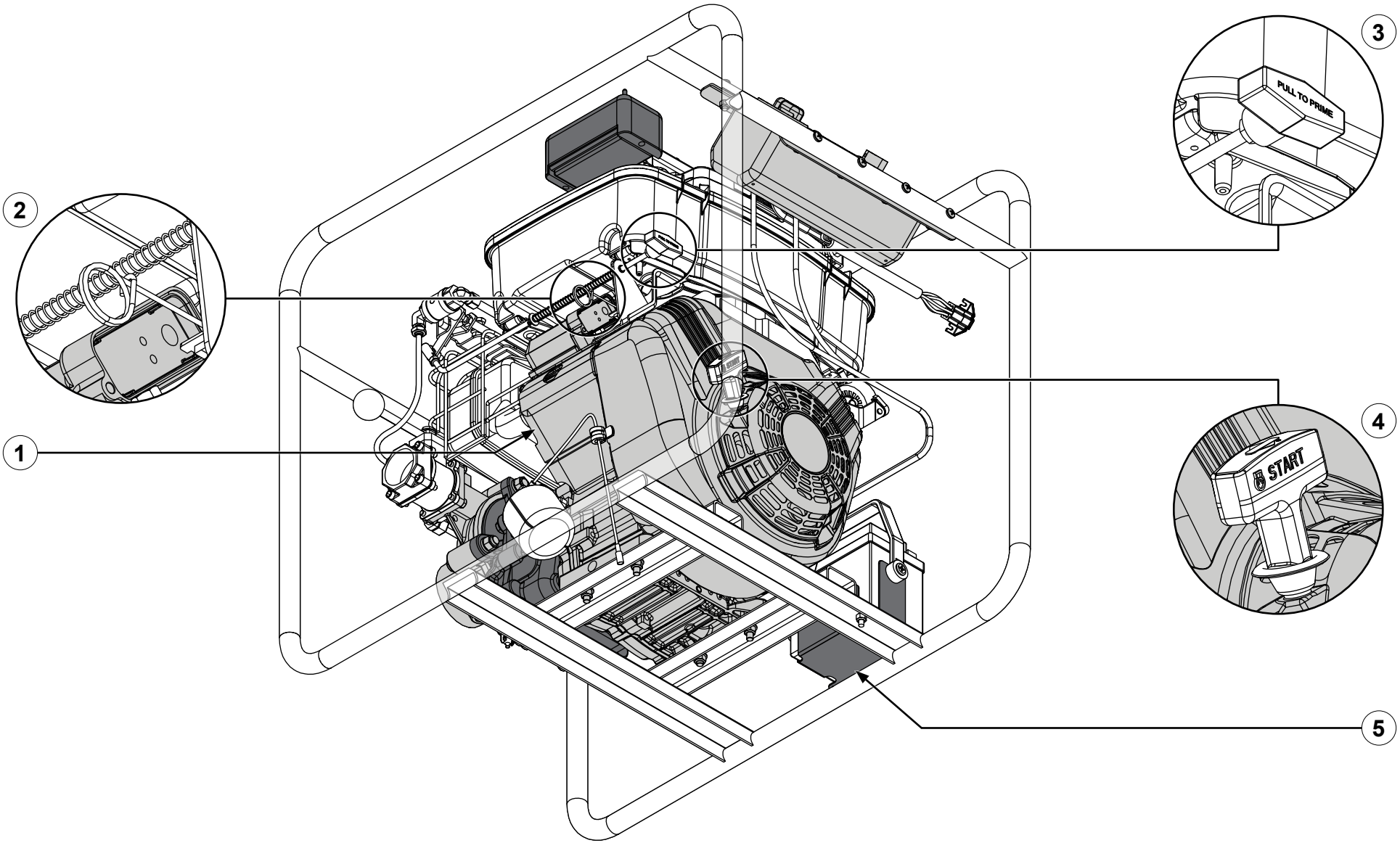
System Components—PB18-G (Pump End)



System Components—PB18-G (Pump End)

	Feature	Description
1	Wrap-around frame—optional	This supports the unit and provides mounting options.
2	Fuel tank	This stores the fuel that powers the engine.
3	Exhaust primer	This uses the exhaust gas from the engine to prime the pump.
4	Muffler	This dampens the sound created by the engine.
5	Pump	Water enters the pump through the intake and exits through the discharge. The PB18-G pump has a capacity of 100 gpm (378 lpm) at 400 psi (27.58 bar).
6	Drain cock	This is where water is drained from the pump.
7	Gear case	This increases the speed of the pump.
8	Mast light—optional	This illuminates the unit during operation.
9	Control panel	This houses the ignition switch, throttle control, and pressure gauges.

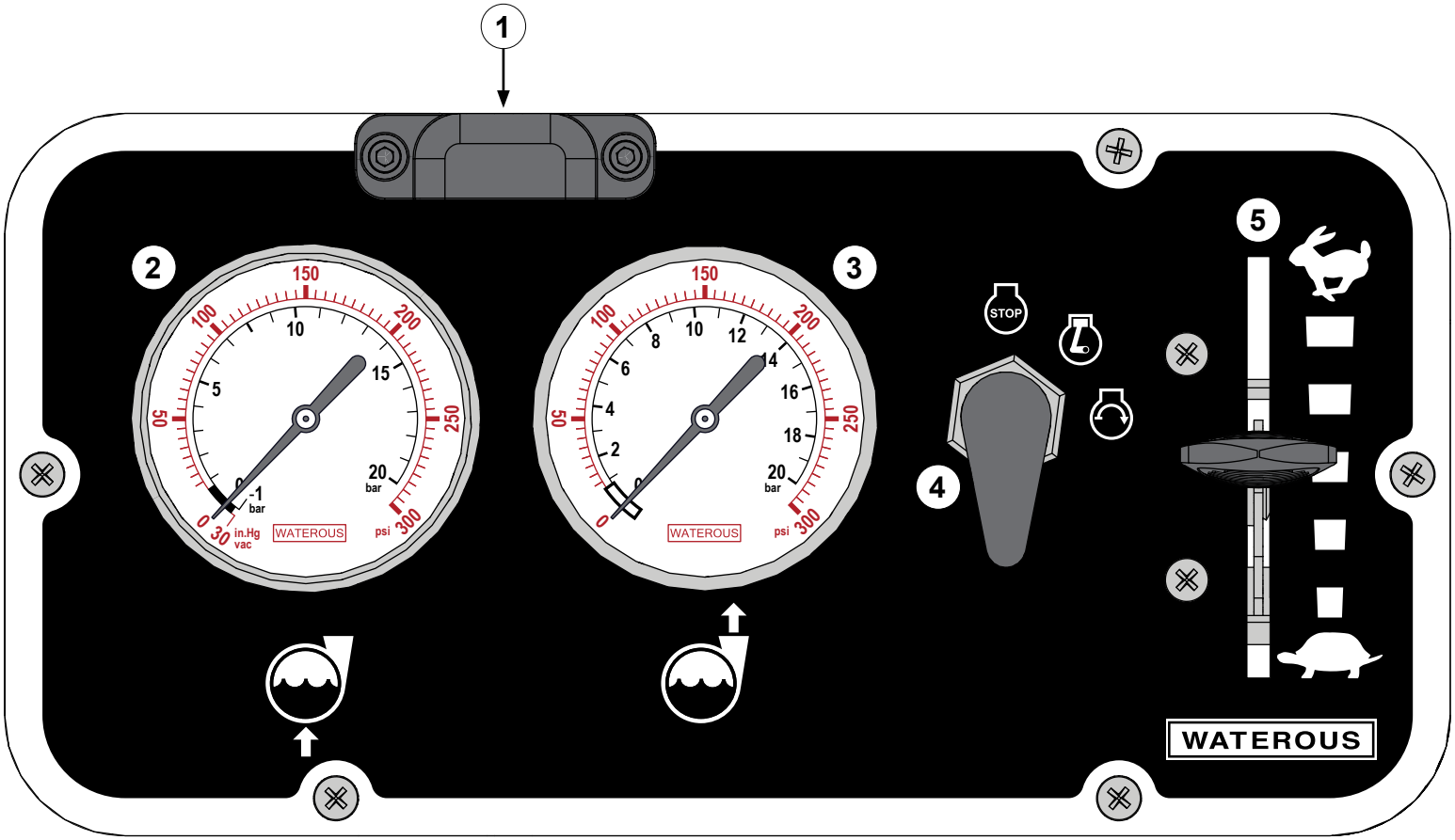
System Components—PB18-G (Engine End)



System Components—PB18-G (Engine End)

	Feature	Description
1	Engine	This powers the system. Refer to the manufacturer's instructions to locate additional features and controls.
2	Choke control	This is used to open and close the choke valve.
3	Prime control	This is used to operate the primer.
4	Manual starter cord	This is used to start the engine when the ignition switch is not working or not available.
9	Battery tray	This holds the battery that connects to the engine and optional mast light.

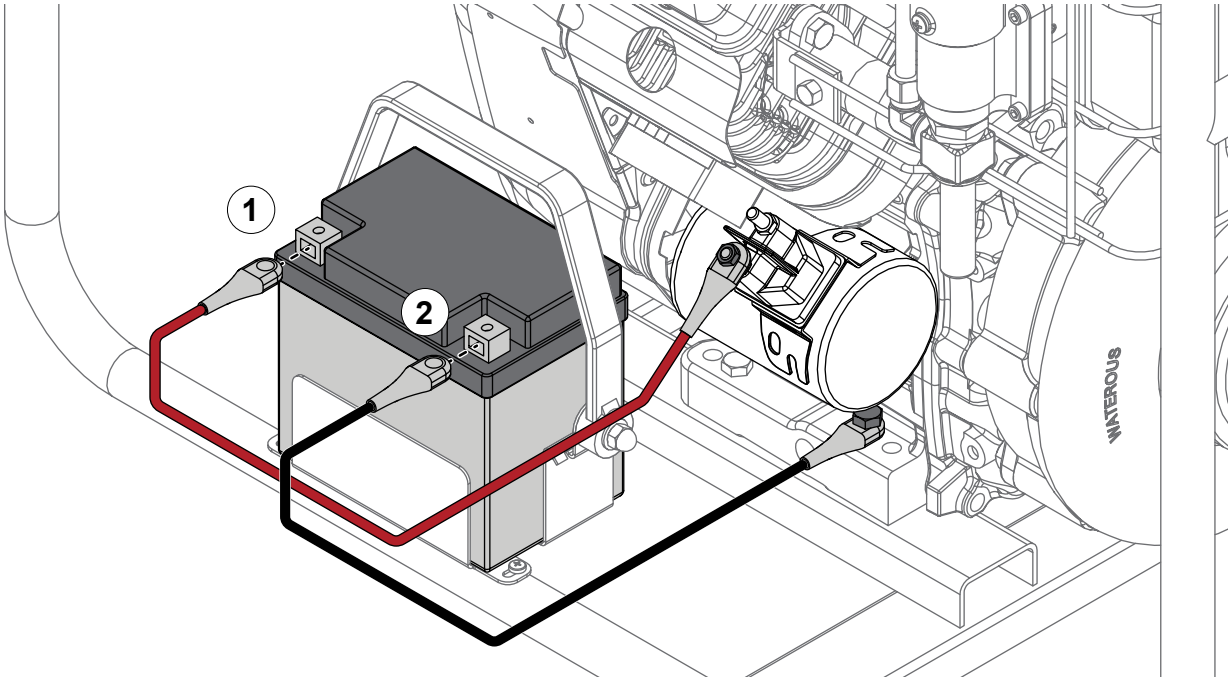
Control Panel



Control Panel

	Feature	Description
1	Panel LED	This illuminates the panel during pump operation.
2	Intake pressure gauge	This measures the water pressure (psi/bar) at the pump intake.
3	Discharge pressure gauge	This measures the water pressure (psi/bar) at the pump discharge.
4	Ignition switch	This is used to start the engine. Turning the ignition to the *START* position engages the starter relay. Turning the ignition to the *RUN* position allows you to operate the unit. Turning the ignition to the *OFF* position stops engine operation.
5	Throttle control	This is used to adjust the engine speed. Moving the throttle toward the *FAST* position (rabbit icon) increases the discharge pressure and pump flow. Moving the throttle toward the *SLOW* position (turtle icon) decreases the discharge pressure and pump flow.

Installing the Battery



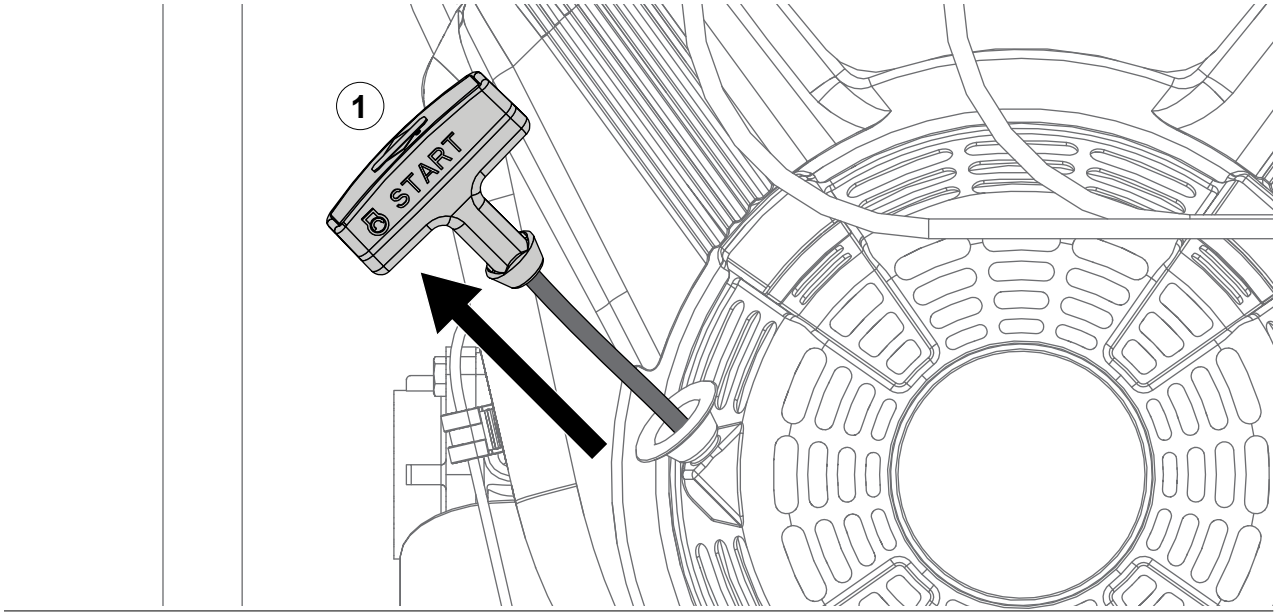
Use the illustration and instructions to connect the battery to the engine. Fully charge the battery before installing it.

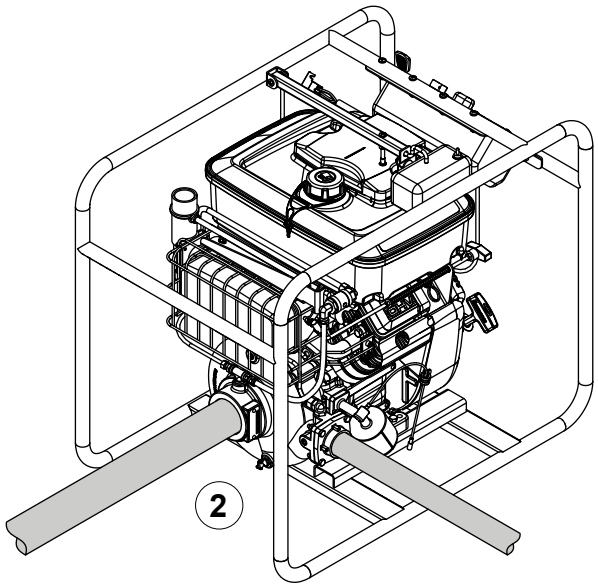
Battery requirements:

- 12N14-3A battery
- Capacity: 14 amp hours
- CCA: 130 amps
- Size: 3-1/2 x 5-1/4 x 6-1/2 inches

1	Secure the power wire (red) from the engine starter to the positive terminal on the battery.
2	Secure the ground wire (black) from the engine base to the negative terminal on the battery.

Preparing for Operation





80 ft-lb
108 N·m

Use the illustrations and instructions to prepare the system for operation. Refer to the manufacturer's instructions to fill the engine and fuel tank. To add oil to the gear case (PB18-G units only), refer to: **"Adding the Gear Case Oil" on page 31.**

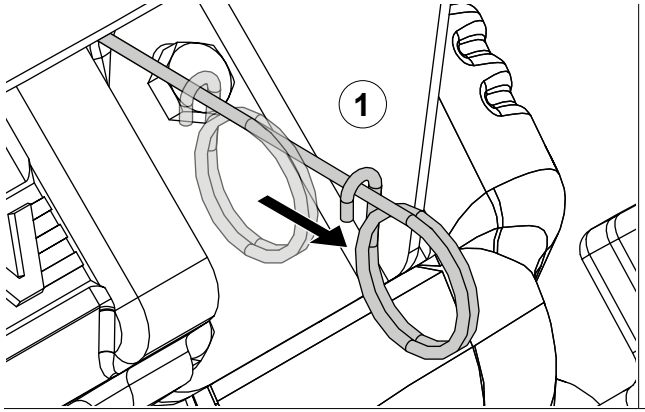
1. Pull the starter cord several times to make sure that the engine turns over freely.

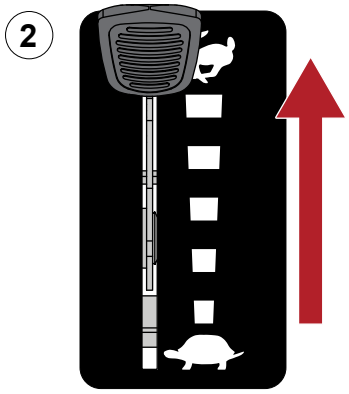
   Listen closely for any abnormal noises.

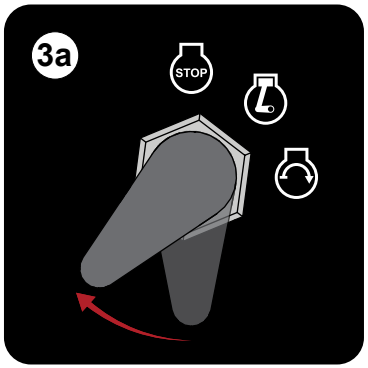
2. Tighten the intake and discharge connections to prevent leaking.

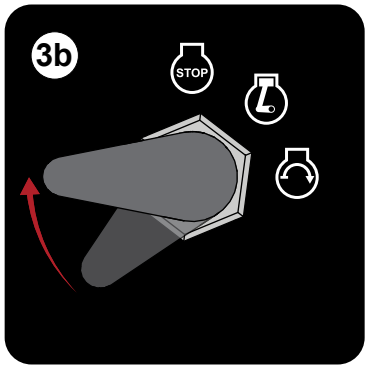
   Do not apply more than 80 ft-lb (108 N·m) of torque to the connections. If additional torque is required, use two wrenches (one on the fitting and one on the pipe) to balance the torque being applied.

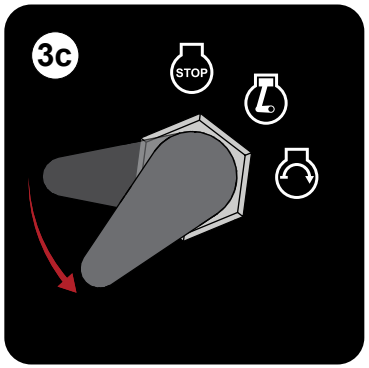
Starting the Engine

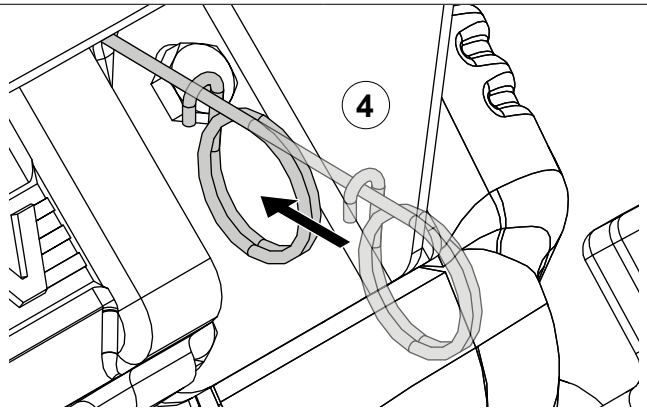












Use the illustrations and instructions to start the engine. Refer to the manufacturer's instructions before operating the engine.

⚠ ***Low oil:*** *May cause loss of engine power, personal injury, or property damage. Check the oil regularly to maintain the correct level.*

⚠ ***Tipping equipment:*** *May cause personal injury or equipment damage. Do not run the engine if the unit is not on a stable, level surface (a maximum operating slope of 15° is allowed).*

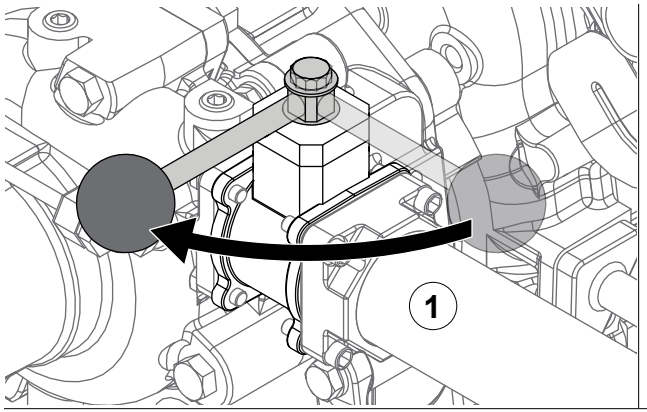
⚠ ***Accidental start:*** *May cause personal injury to hands, arms, or feet. Prevent an accidental start by removing the spark plug wire and grounding it during maintenance. If your configuration has an electric start system, disconnect the negative wire from the battery terminal.*

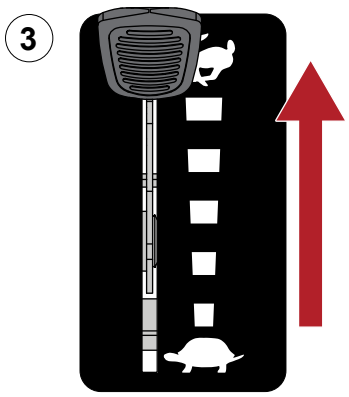
⚠ ***Kickback:*** *May cause personal injury to hands or arms. Prevent kickback by pulling the starter cord slowly until you meet resistance, then pulling it quickly.*

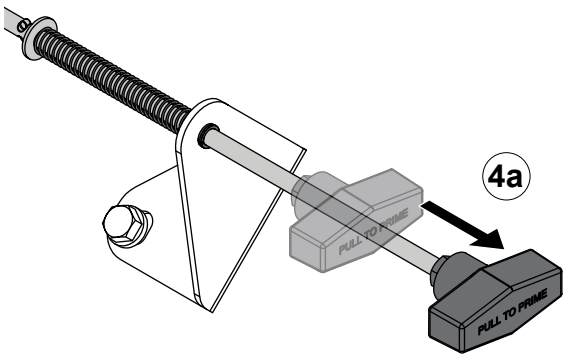
1. Move the choke control to the *CHOKE* position.
2. Move the throttle toward the *FAST* position.
3. a. Turn the ignition to the *RUN* position.
   b. Turn the ignition to the *START* position.
   c. After the engine starts, release the ignition to return to the *RUN* position.

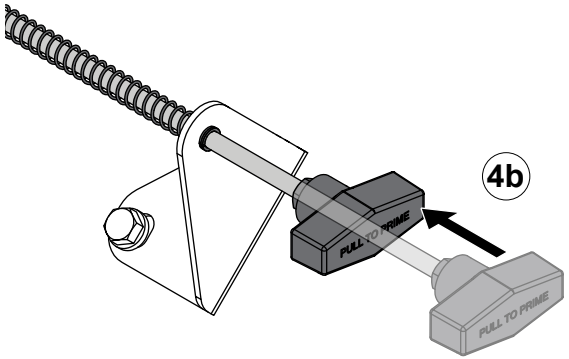
   Note: *If the ignition fails, use the manual starter cord.*
4. Move the choke control to the *RUN* position.

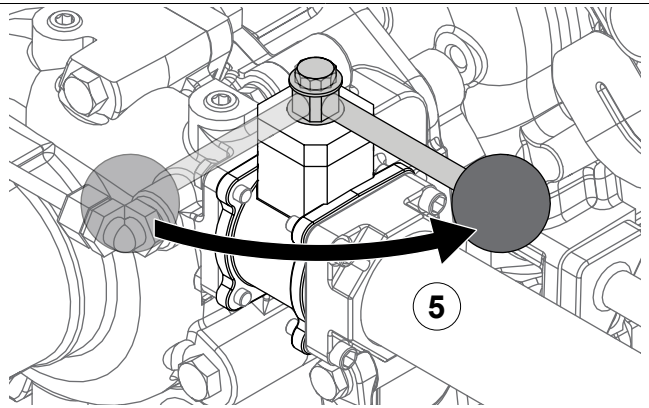
Priming the Pump







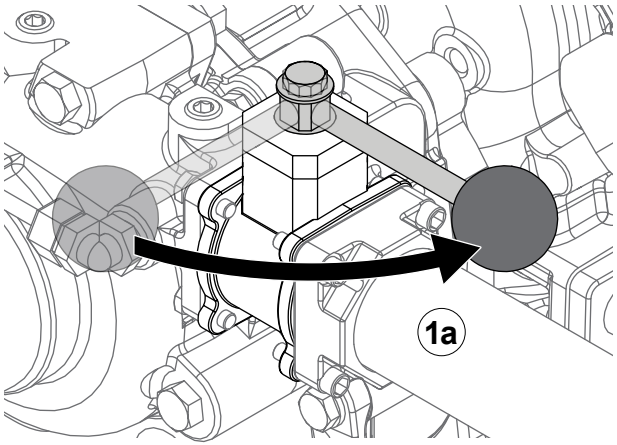


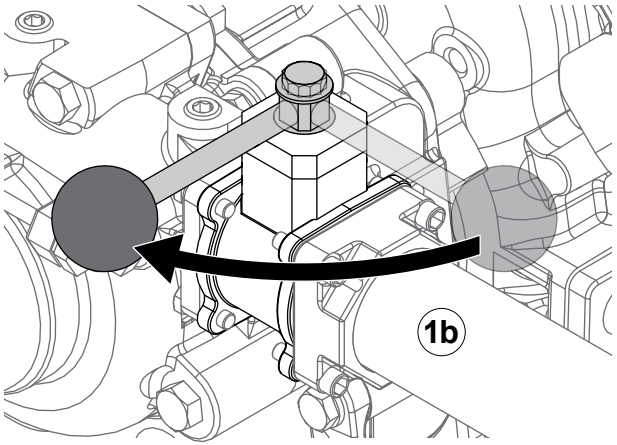


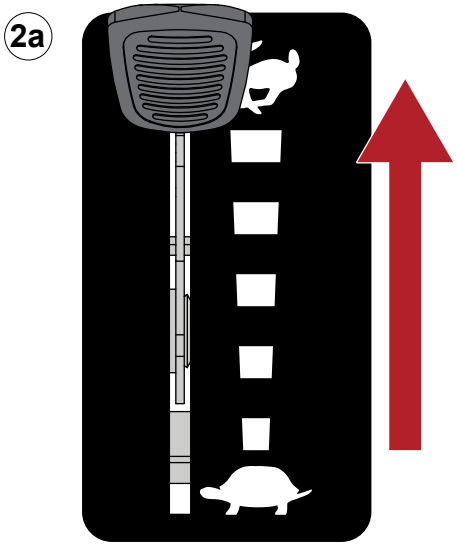
Use the illustrations and instructions to prime the pump.

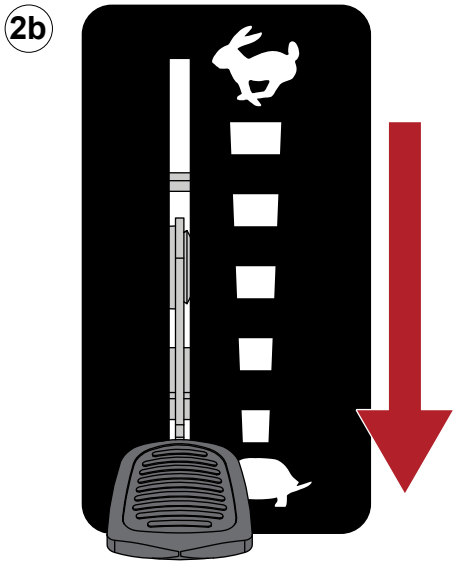
1. Close the discharge valve.
2. Start the engine. Refer to: **"Starting the Engine" on page 22.**
3. Move the throttle toward the *FAST* position.
4. a. Pull the priming control into the *PRIME* position, then allow the primer to operate until it releases water.
   b. Push the priming control into the *RUN* position.
5. Slowly open the discharge valve.

Operating the Pump









Use the illustrations and instructions to operate the pump. Two methods can be used to adjust pump performance during operation: adjusting the discharge valve or adjusting the throttle.

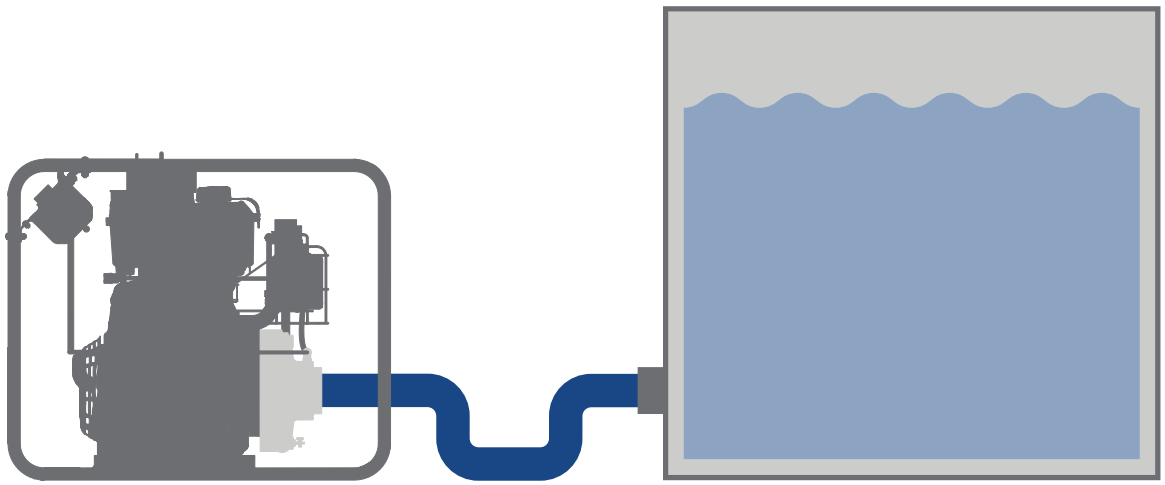
⚠ ***Pump overheating:*** *May cause personal injury or pump damage. During operation, make sure that the discharge valve is always slightly open.*

⚠ ***Pressure:*** *May cause personal injury. After operation, proceed with caution when disconnecting hoses.*

1 Adjust the discharge valve.
   a. Open the valve to decrease discharge pressure and increase water flow.
   b. Close the valve to increase discharge pressure and decrease water flow.

2 Move the throttle control to increase or decrease the engine speed.
   a. Move the throttle control toward the *FAST* position to increase discharge pressure and water flow.
   b. Move the throttle control toward the *SLOW* position to decrease discharge pressure and water flow.

Pumping from the Water Tank



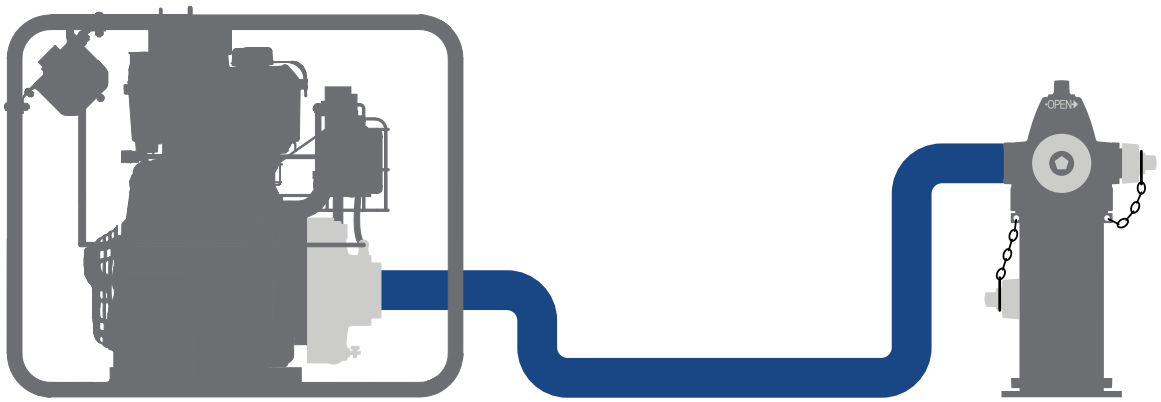
Use the illustration and instructions to operate the pump from the water tank.

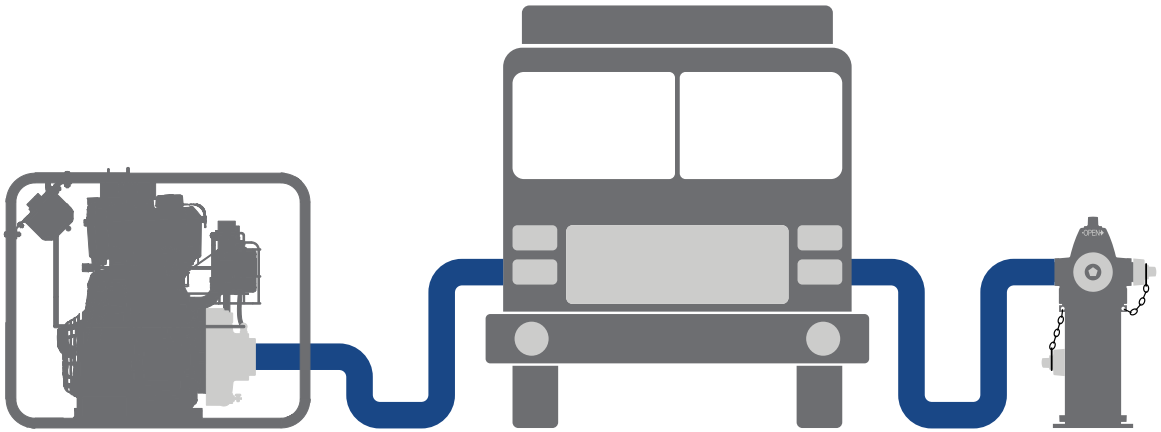
Note: *Do not pump more water than is available from the water tank. Make sure that the intake pressure stays above 0 psi (0 bar).*

1. Open the valves between the water tank and pump intake, then open the discharge valve.
2. Allow water to flow into the pump for approximately 30 seconds.

   Note: *Priming the pump may be necessary if air is trapped in the pump or piping.*
3. Move the throttle control to increase or decrease the engine speed.
4. After pumping, stop the engine. Refer to: **"After Operation" on page 28.**

Pumping from a Hydrant or Relay





Use the illustrations and instructions to operate the pump from a hydrant or relay pumper.

Note: *Do not pump more water than is available from the hydrant or relay pumper. Make sure that the intake pressure stays above 0 psi (0 bar).*

1. Open the pump intake, hydrant or relay pumper discharge, and any valves between them.

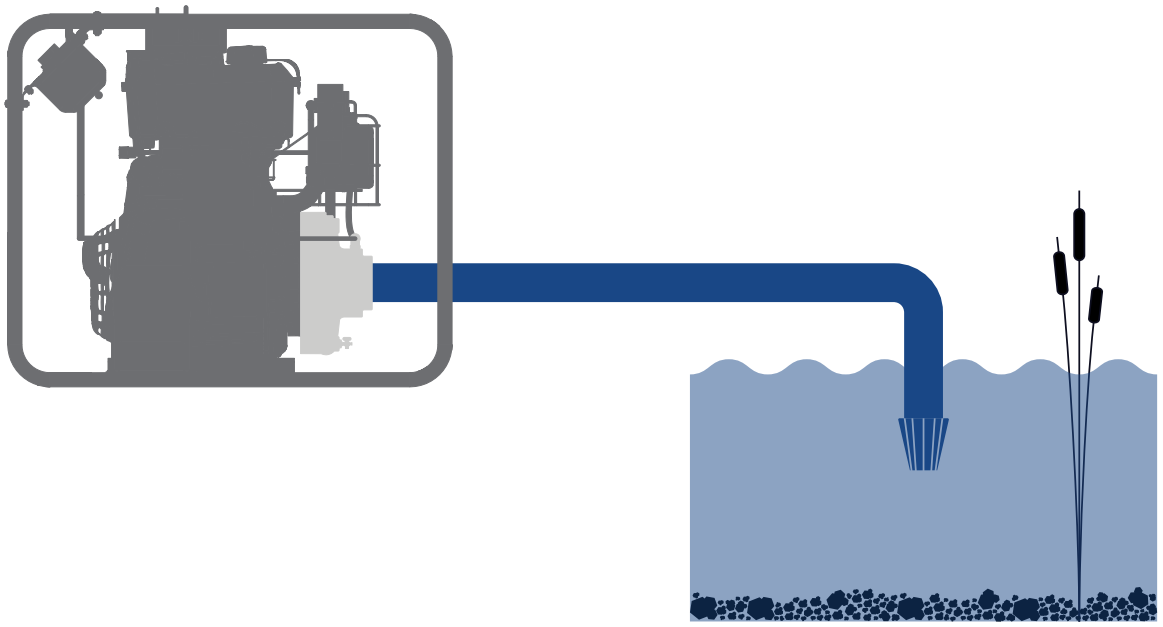
   Note: *If possible, limit the intake pressure to 75 psi (5.17 bar) to reduce mechanical seal wear.*

2. Open the discharge valve, then increase the engine speed until the desired pressure and flow are reached.

   Note: *Do not exceed 400 psi (27.57 bar) of discharge pressure.*

3. After pumping, stop the engine. Refer to: **"After Operation" on page 28.**

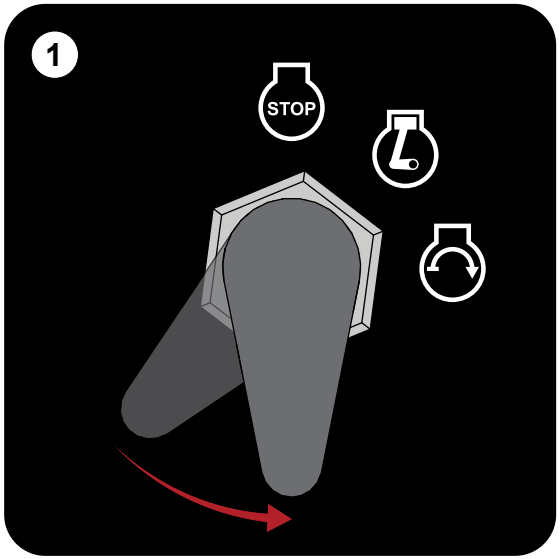
Pumping from Draft

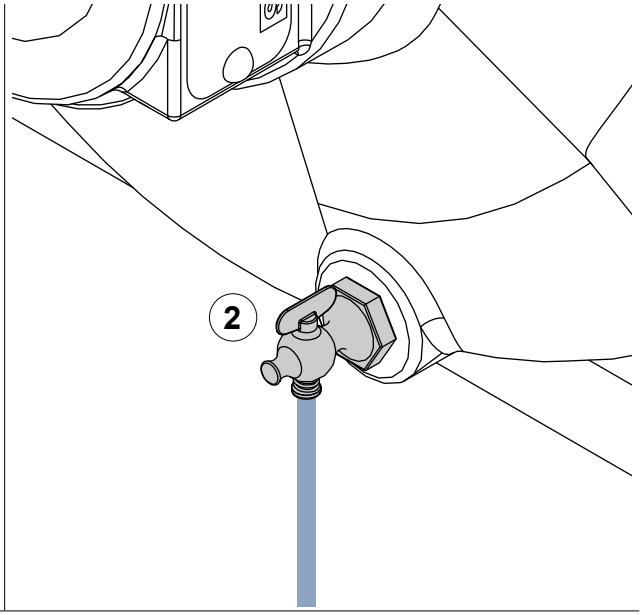


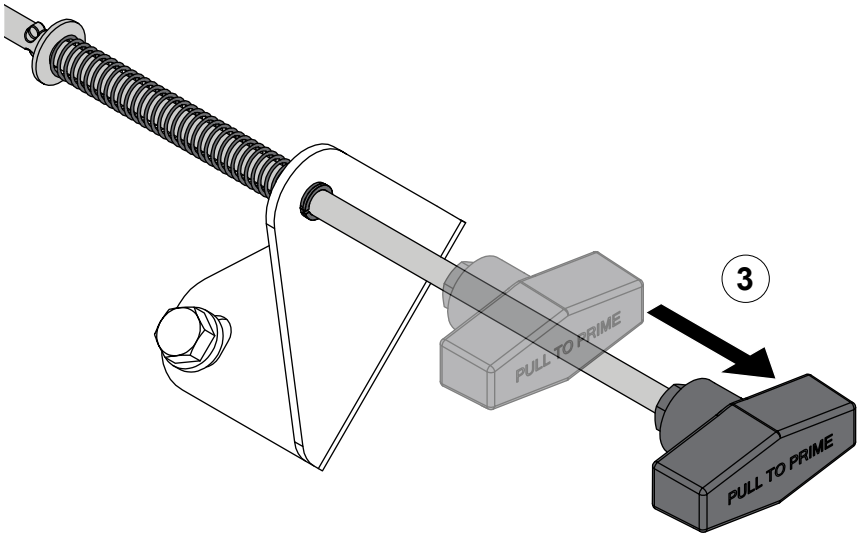
Use the illustration and instructions to operate the pump from draft.

1. To achieve the best results, do the following:
   - Position the unit close to the water supply.
   - Position the intake hose so that no part of it is higher than the pump intake.
   - Make sure that there are no kinks or sharp bends in the hose.
   - Make sure that the intake strainer is at least 2 ft (0.61 m) below the water surface.
   - Make sure that the intake does not draw debris from the bottom.
2. Prime the pump. Refer to: **"Priming the Pump" on page 23.**
3. Open the discharge valve, then increase the engine speed until the desired pressure and flow are reached.
4. After pumping, stop the engine. Refer to: **"After Operation" on page 28.**

After Operation







Use the illustrations and instructions to stop the engine and drain the unit for storage.

Freezing water: *May cause pump damage. If the pump is exposed to freezing temperatures, drain all water from the pump, lines, and any accessories.*

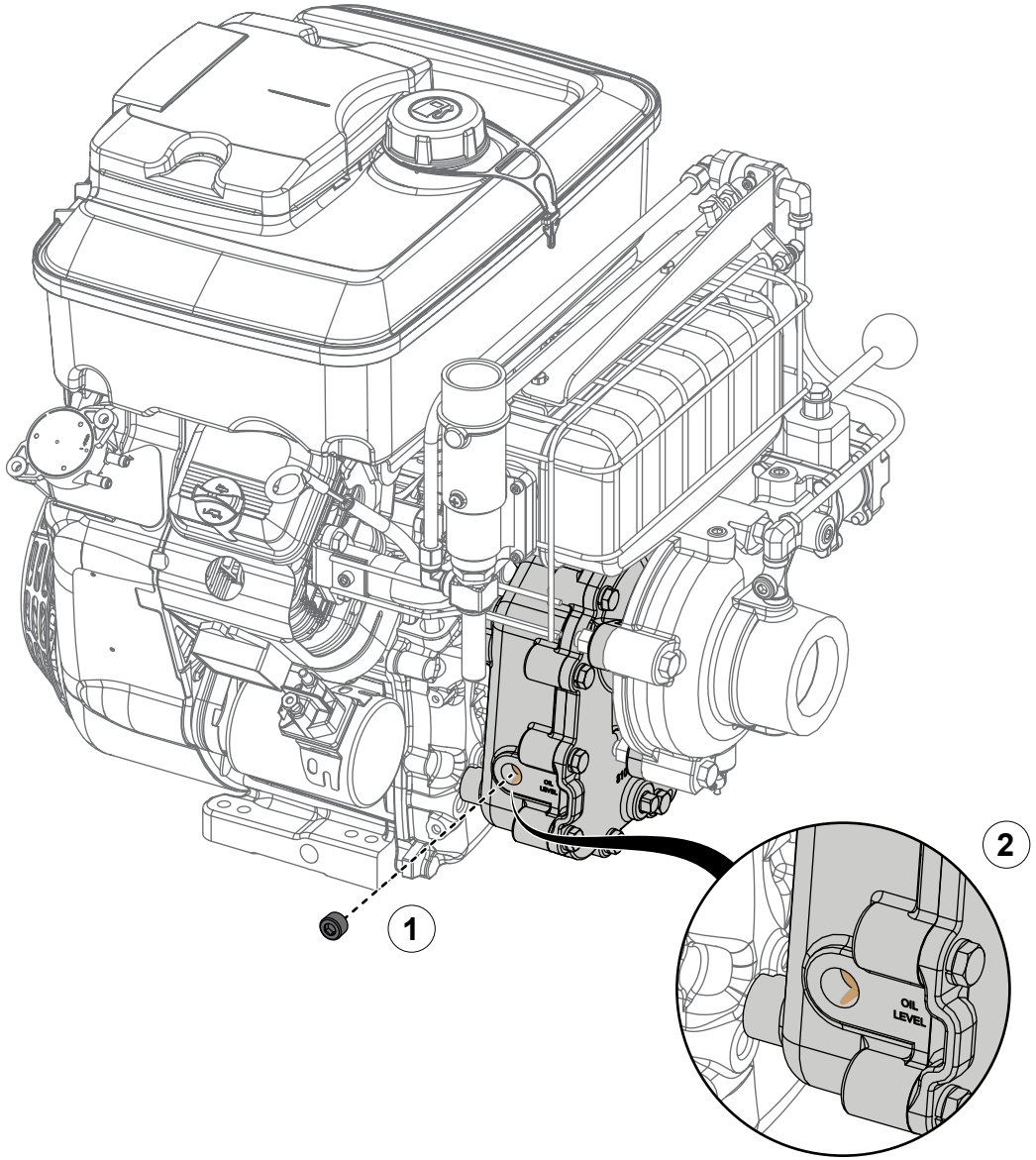
1. Turn the ignition to the *STOP* position.
2. If anything other than clean water was used, open all valves and drains. Flush the system with clean water until contaminants are removed, then close all drains and install any intake or discharge caps.
3. Pull the priming control into the *PRIME* position, then allow the primer to drain.

Maintenance Schedule

Perform the following procedures at the recommended intervals at a minimum. Environmental conditions affect the maintenance requirements. Inspect the components frequently and create a maintenance schedule suitable to your application and environment. Replace wear components with equivalent components. Use your serial number to gain access to the service parts lists associated with your system through the MyWaterous login at www.waterousco.com. For engine maintenance, refer to the manufacturer's instructions.

Operation	Initial Operation	Daily	Monthly	12 Months	Comment
Check the engine oil level.	X	X			Check the oil level before each use.
Inspect the hoses and fittings.	X	X			Inspect the hoses and fittings before each use.
Drain the pump.		X			Drain the pump after each use. If needed, flush the system with clean water to remove contaminants.
Check the gear case oil level.			X		PB18-G units only.
Change the gear case oil.				X	PB18-G units only. Replace the oil every 100 hours of operation or annually. Use approximately 1 pt (0.47 L) of SAE 90 gear oil.
Inspect the spark arrestor.				X	Inspect the spark arrestor every 100 hours of operation or annually. Clean or replace the screen if needed.
Inspect the mounting hardware.				X	

Checking the Gear Case Oil Level

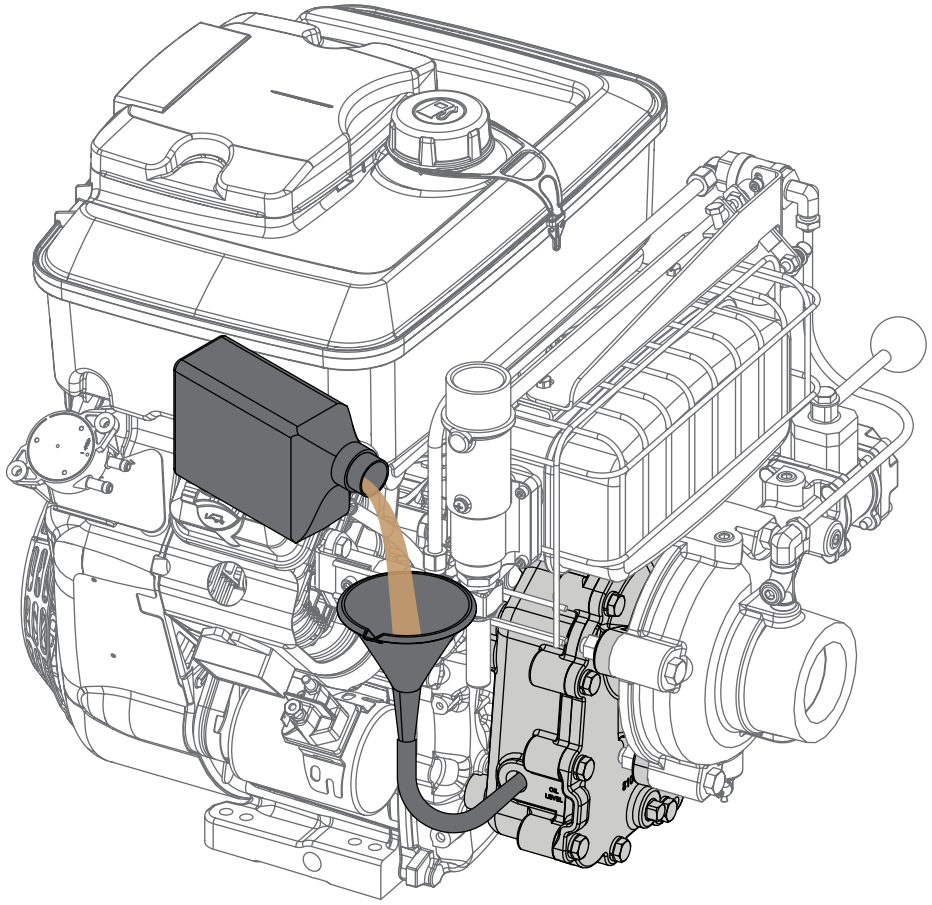


Use the illustration and instructions to check the gear case oil level.

Note: *Make sure that the unit is level before checking the gear case oil level.*

1. Remove the oil level plug.
2. The oil should reach the bottom of the oil level port. Refer to: **"Adding the Gear Case Oil" on page 31.**

Adding the Gear Case Oil

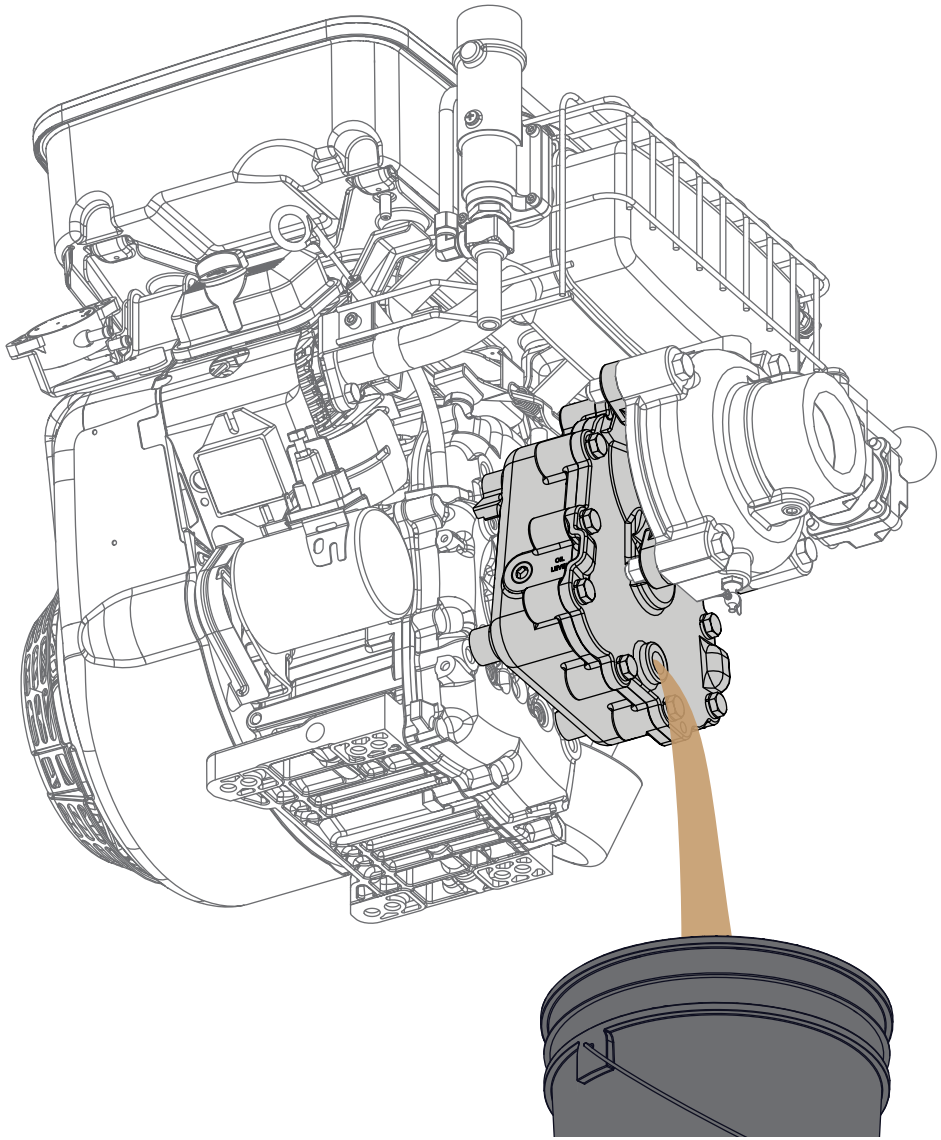


Use the illustrations and instructions to add oil to the gear case. Use approximately 1 pt (0.47 L) of SAE 90 gear oil.

Note: *Oil can be added through the oil level port or through the port on the opposite side of the gear case.*

1	Arrange a funnel to direct oil into the gear case.
2	Add oil to the gear case until it reaches the bottom of the oil level port.
3	Install the oil level plug.

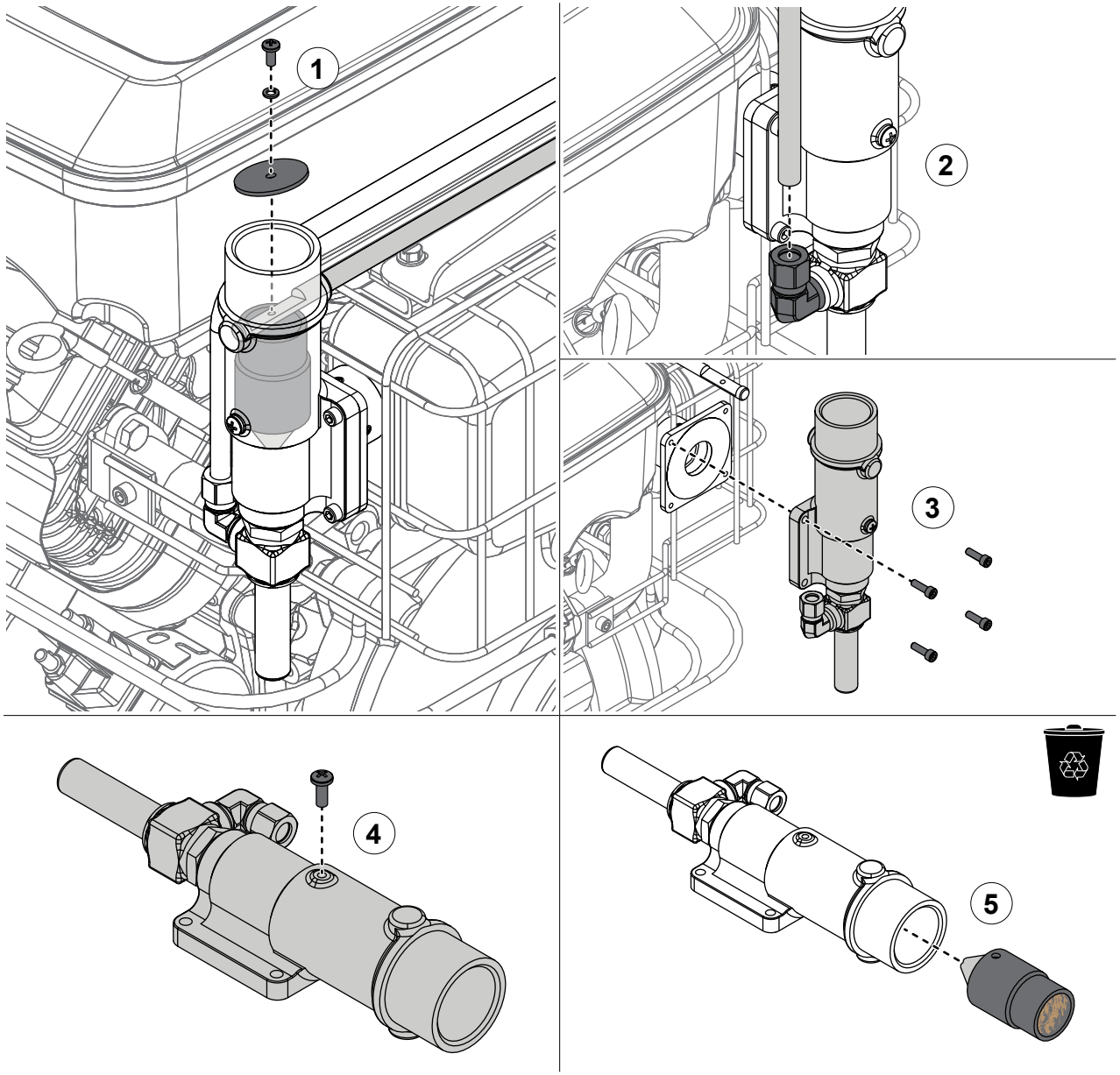
Draining the Gear Case Oil



Use the illustrations and instructions to drain the oil in the gear case.

1. Place a suitable container under the gear case to collect the drained oil.
2. Remove the magnetic drain plug. Clear any debris that may have adhered to the plug.
3. Allow the oil to drain.
4. To add oil to the gear case, refer to: **"Adding the Gear Case Oil" on page 31.**
5. Properly recycle or dispose of the oil per local regulations.

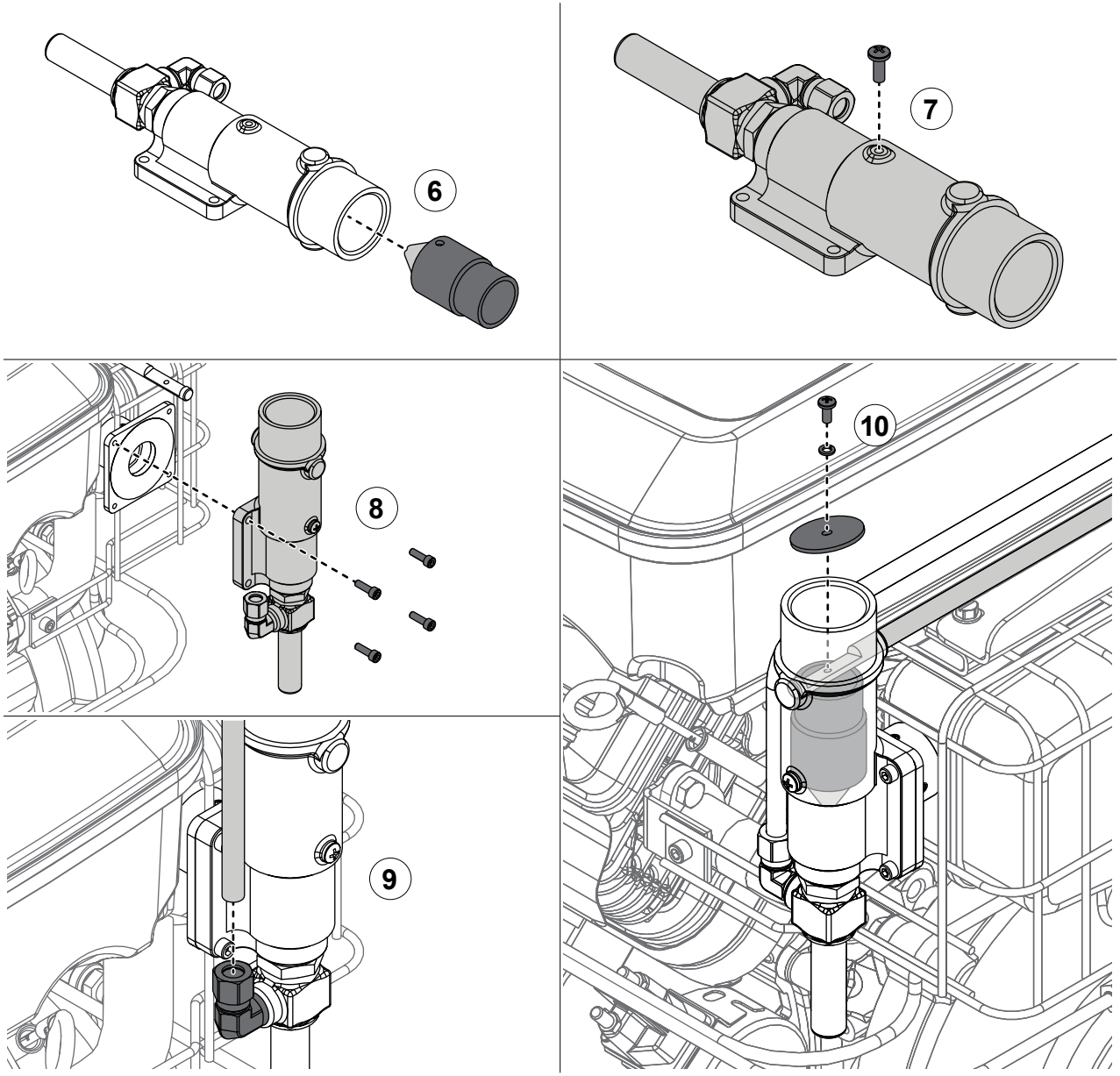
Replacing the Spark Arrestor



Use the illustrations and instructions to replace the spark arrestor inside the primer.

1	Remove the screw and nut securing the butterfly valve to the primer rod, then remove the butterfly valve.
2	Disconnect the primer tube from the elbow adapter.
3	Remove the primer hardware, then remove the primer assembly.
4	Remove the screw.
5	Remove and discard the spark arrestor.

Replacing the Spark Arrestor



Use the illustrations and instructions to replace the spark arrestor inside the primer.

6	Install the new spark arrestor.
7	Install the screw.
8	Use the mounting hardware to secure the primer assembly to the primer adapter.
9	Connect the primer tube to the elbow adapter.
10	Use the screw and nut to secure the butterfly valve to the primer rod.

Preparing to Disassemble the Pump

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

Best Practices

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

Optional Equipment

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

Removing the Pump

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

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

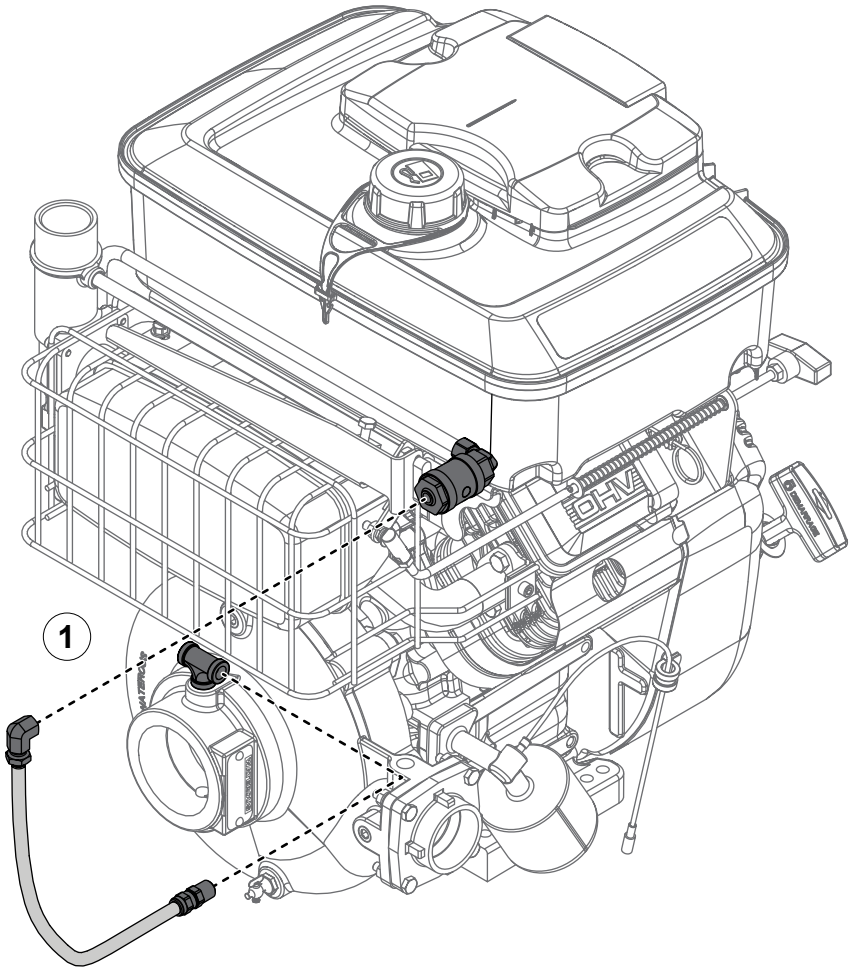
Disassembling the Pump Components

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

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

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

PB18



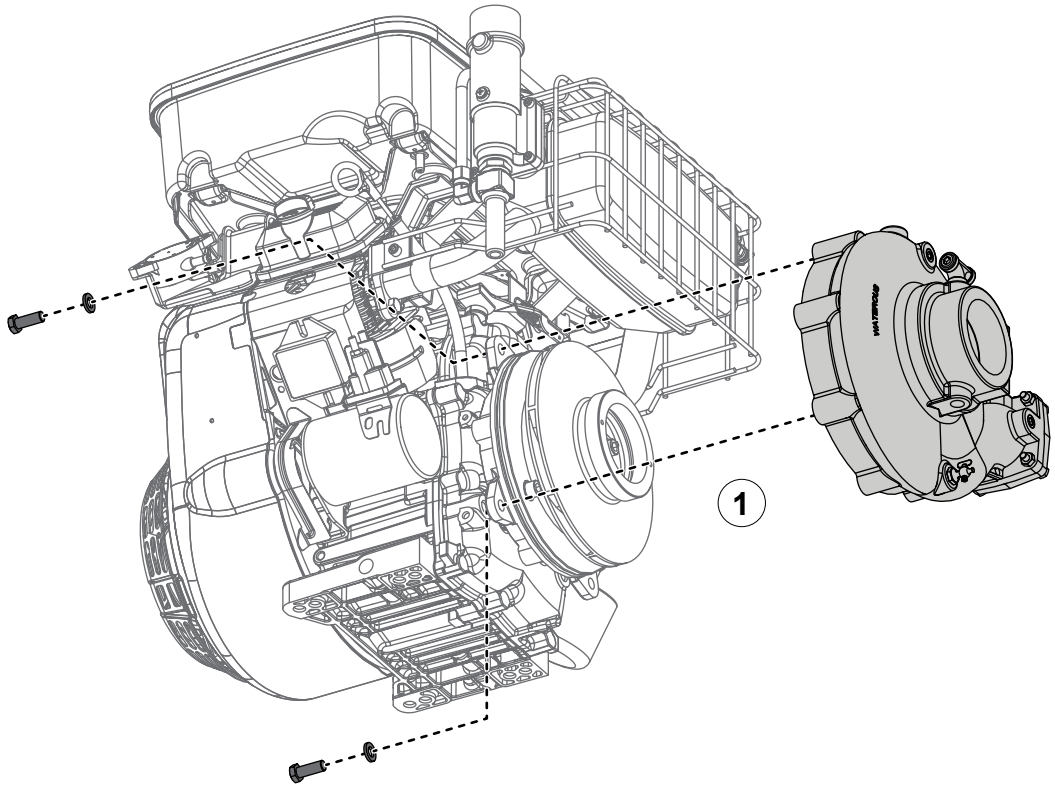
Removing the Priming Tube

Use the illustration and instructions to remove the priming tube.

Note: *Remove any intake or discharge piping that may interfere with overhaul procedures.*

1 Remove the tube connecting the priming valve to the pump intake.

PB18



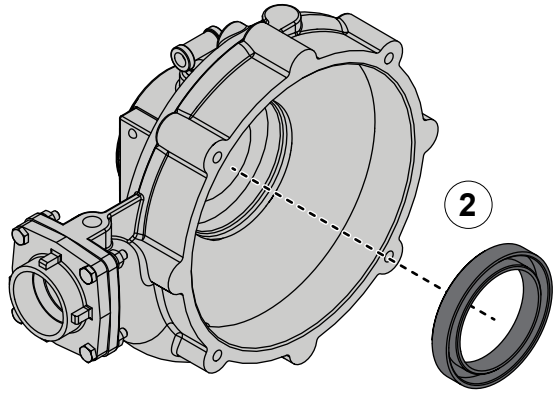
Removing the Pump Body

Use the illustrations and instructions to remove the pump body.

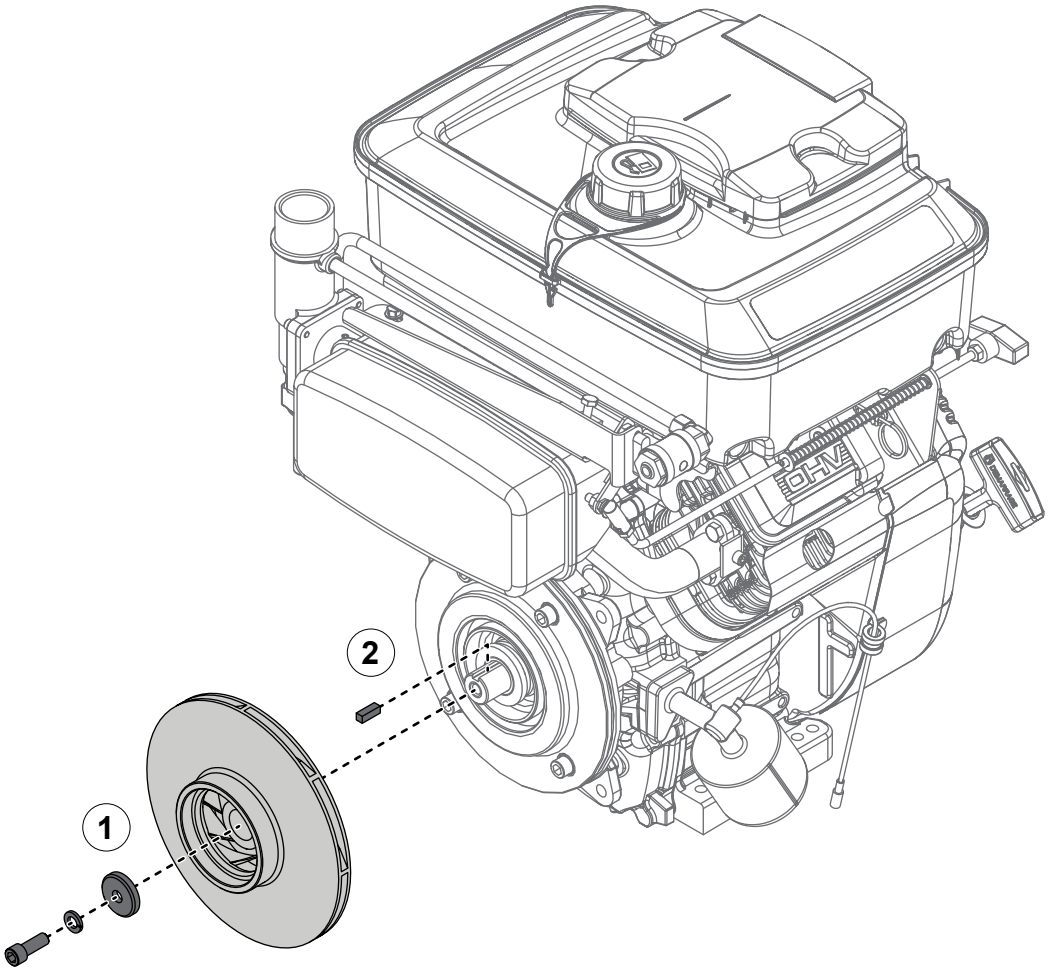
1 Remove the pump body hardware, then remove the pump body from the adapter.

2 Remove the wear ring.

Note: *If needed, there are 10-32 tapped holes to aid in removing the wear ring.*



PB18



Removing the Impeller

Use the illustration and instructions to remove the impeller.

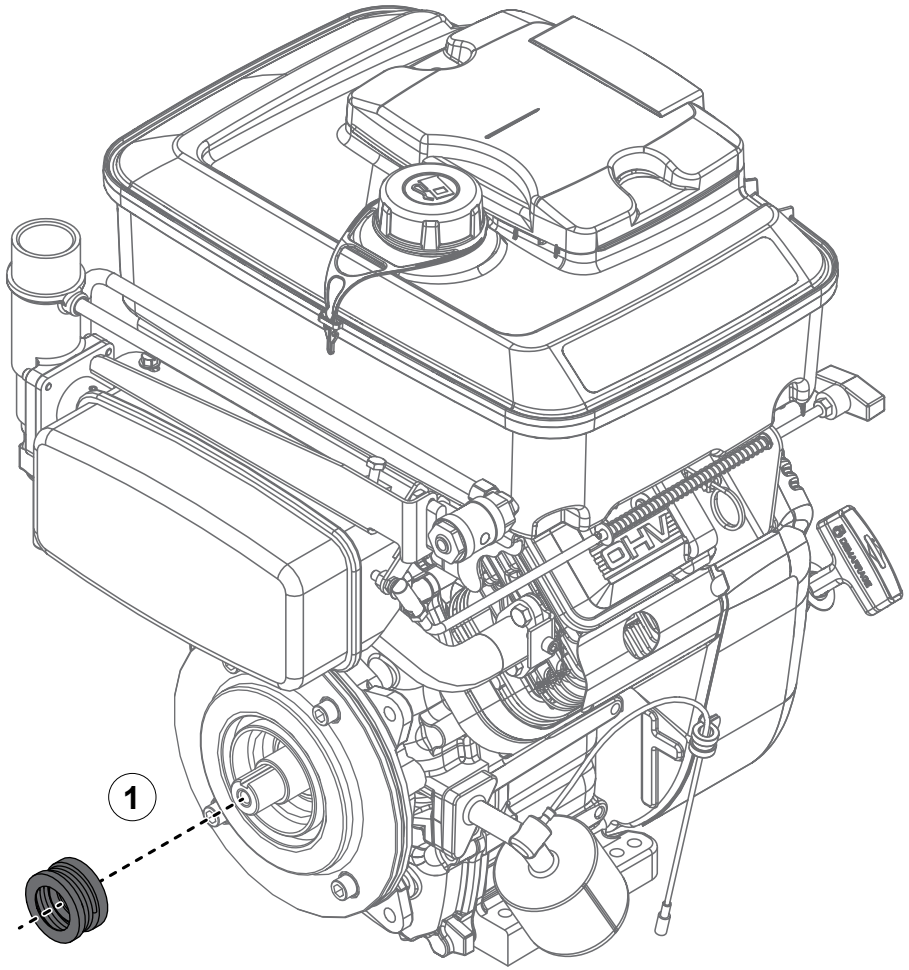
Note: *The muffler guard has been removed from the illustration to provide a clear view of the impeller and related components.*

1. Remove the impeller hardware, then remove the impeller.

   Note: *If needed, there are 1/4-20 puller holes to aid in removing the impeller.*

2. Remove the key.

PB18



Removing the Mechanical Seal

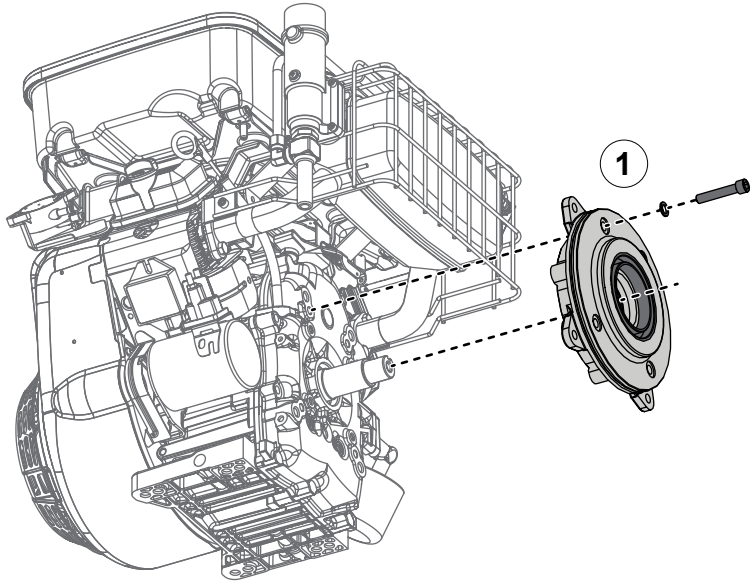
Use the illustration and instructions to remove the mechanical seal.

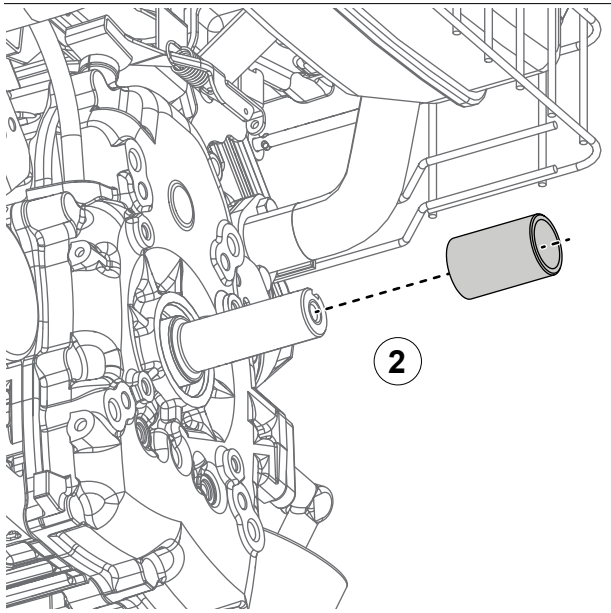
Note: *The muffler guard has been removed from the illustration to provide a clear view of the mechanical seal and related components.*

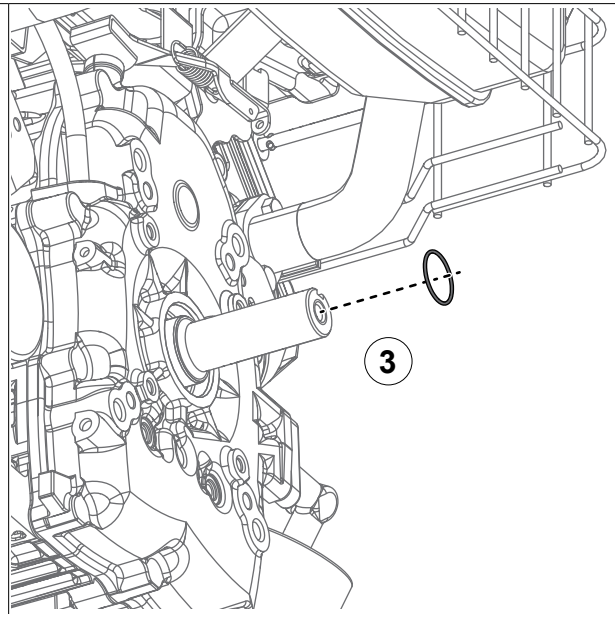
1 Remove the mechanical seal.

Note: *The stationary seal ring will remain in the pump adapter.*

PB18





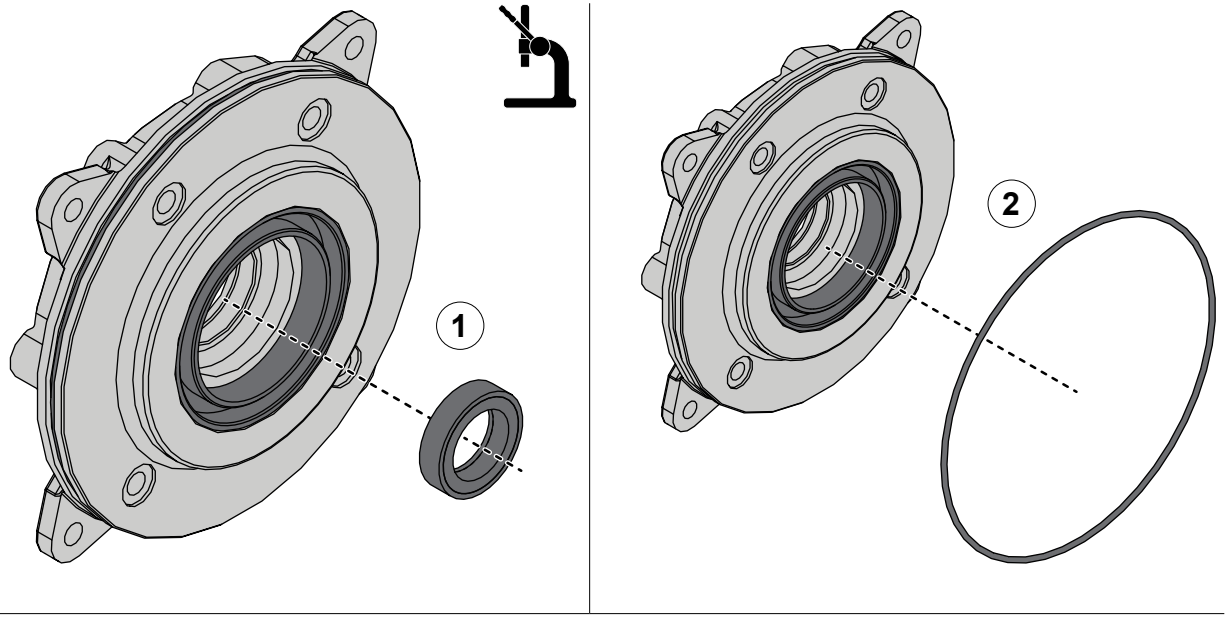


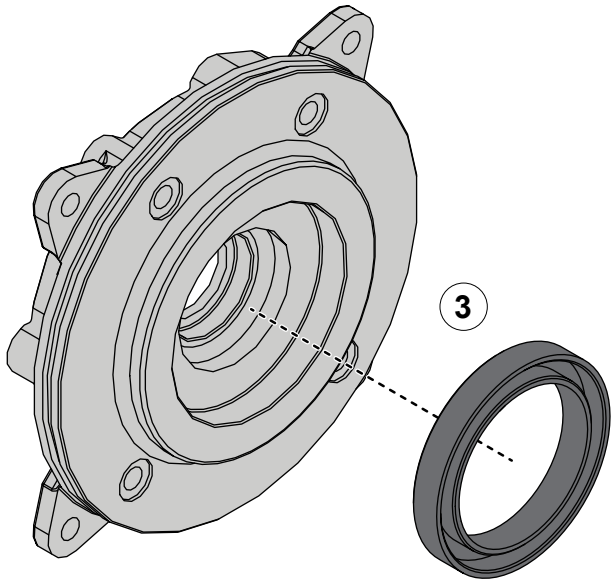
Removing the Adapter

Use the illustrations and instructions to remove the engine adapter.

1. Remove the adapter hardware, then remove the adapter.
2. Remove the shaft sleeve.
3. Remove the O-ring.

PB18





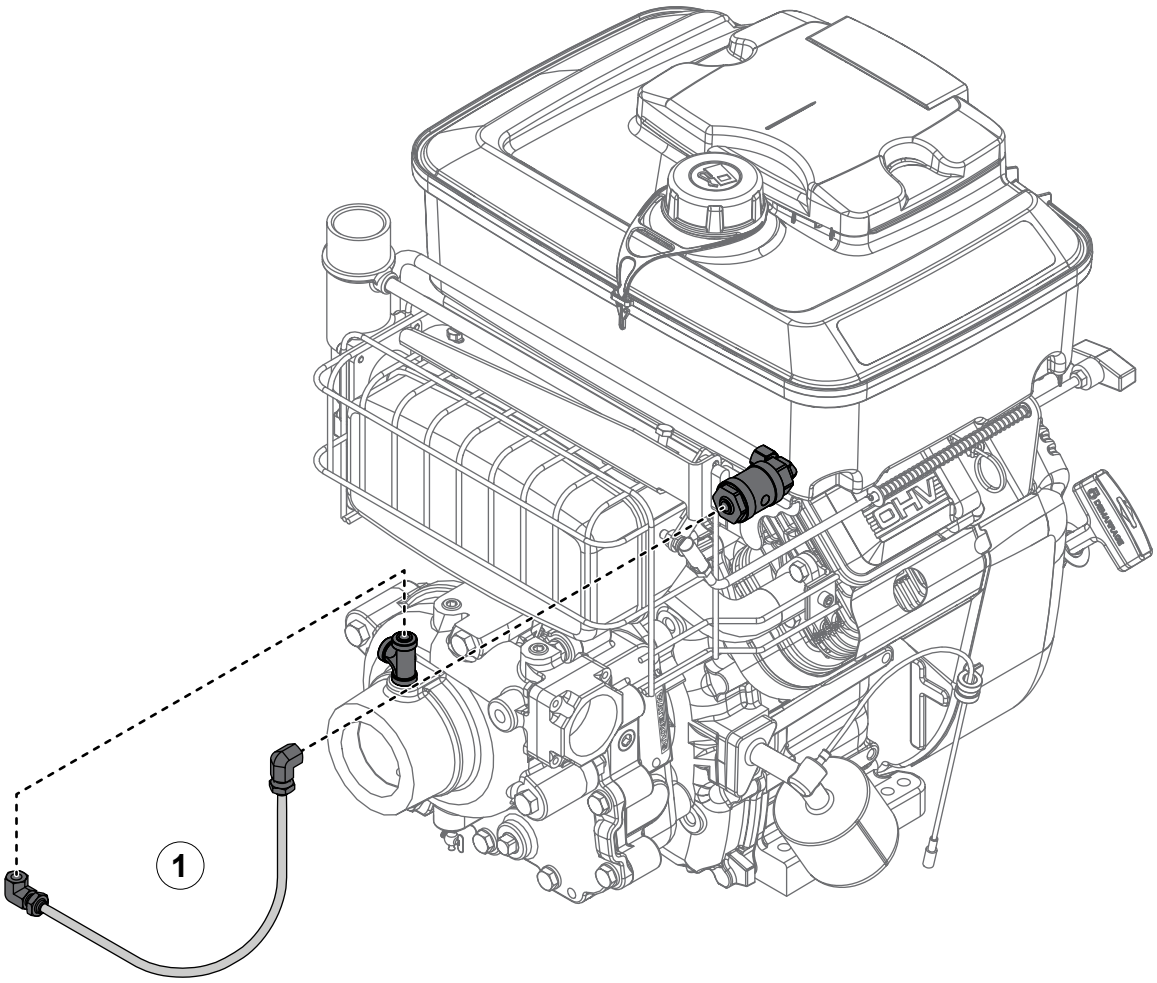
Disassembling the Adapter

Use the illustrations and instructions to disassemble the engine adapter.

1. Press the mechanical seal stationary ring from the adapter.
2. Remove the O-ring.
3. Remove the wear ring.

   Note: *If needed, there are 10-32 tapped holes to aid in removing the wear ring.*

PB18-G



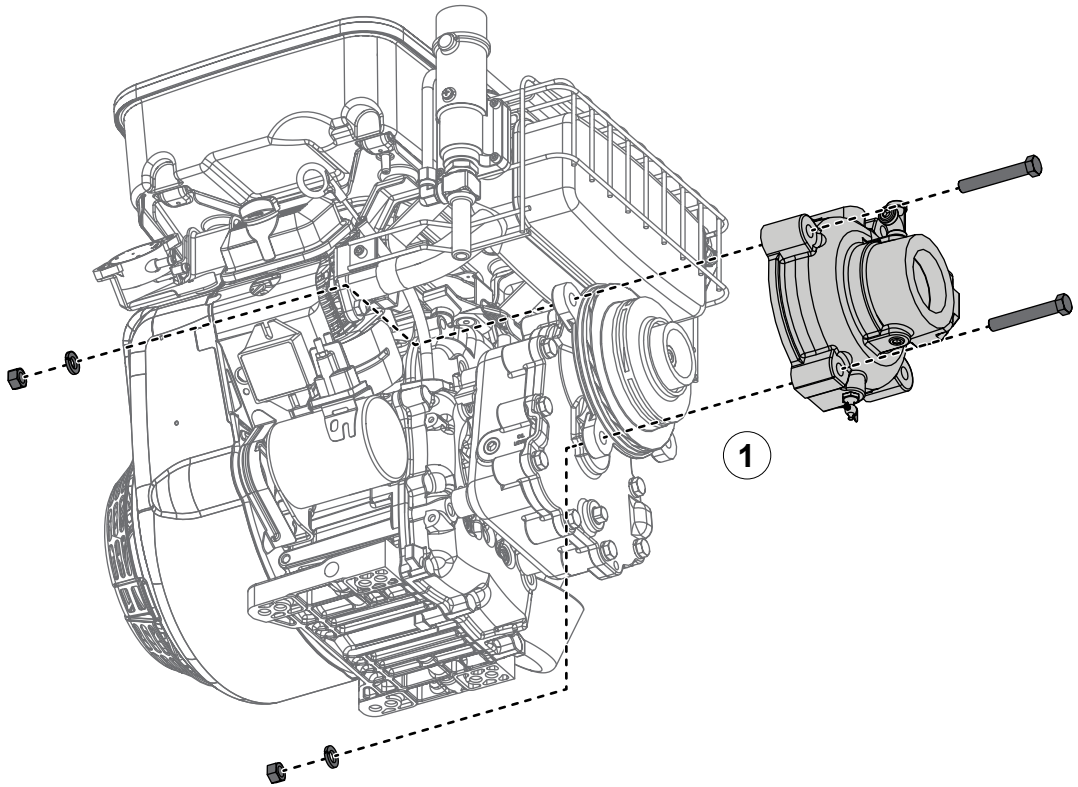
Removing the Priming Tube

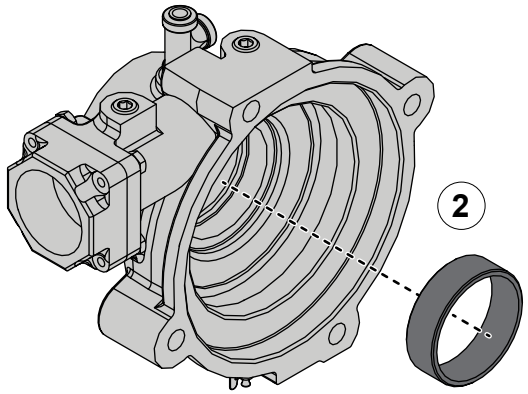
Use the illustration and instructions to remove the priming tube.

Note: *Remove any intake or discharge piping that may interfere with overhaul procedures.*

1 Remove the tube connecting the priming valve to the pump intake.

PB18-G



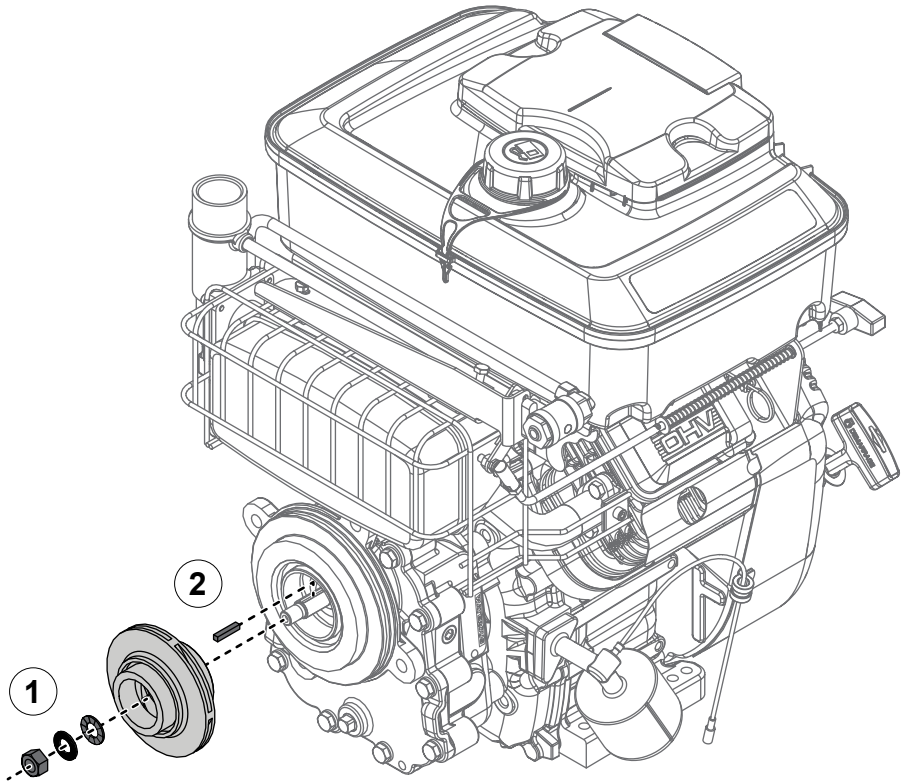


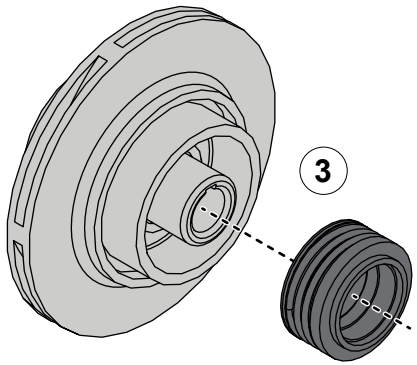
Removing the Pump Body

Use the illustrations and instructions to remove the pump body.

1. Remove the pump body hardware, then remove the pump body from the gear case.
2. Use pry bars to remove the wear ring.

PB18-G



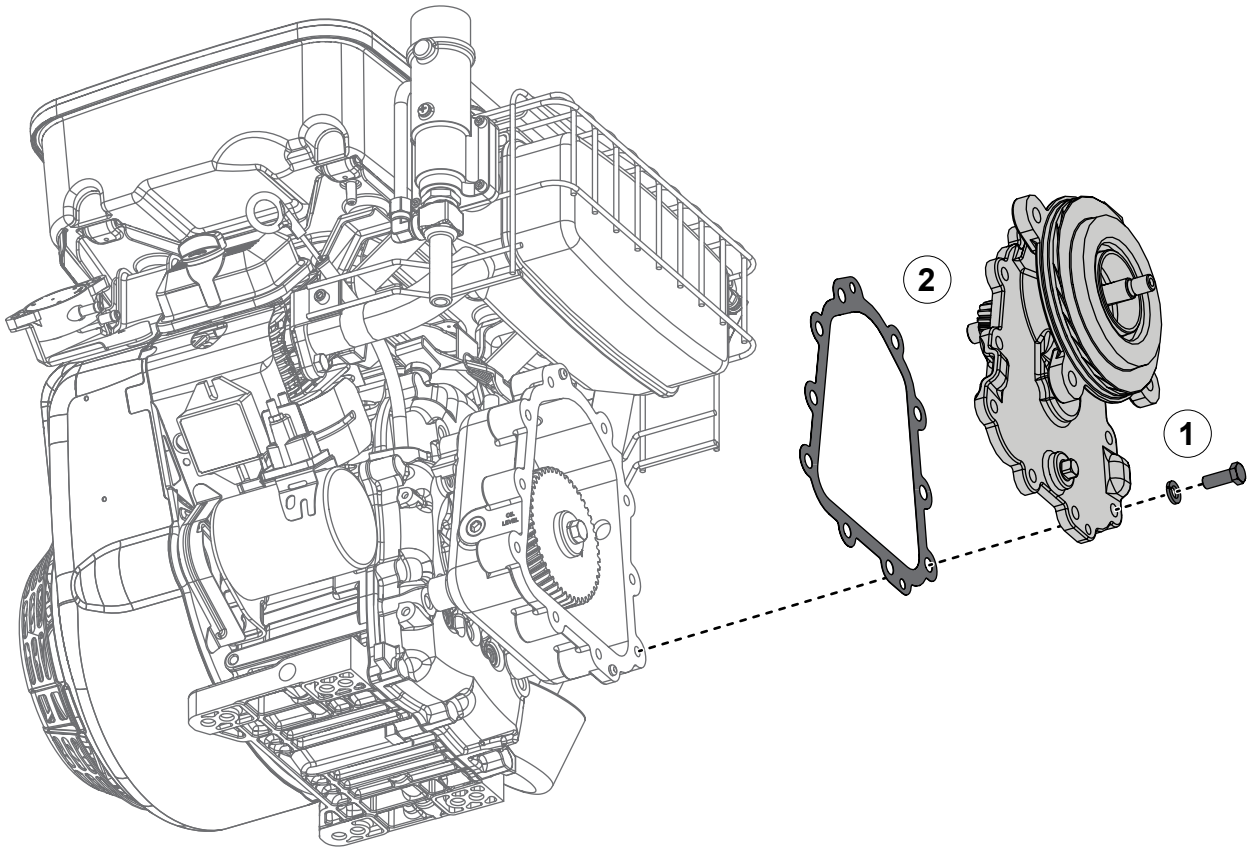


Removing the Impeller

Use the illustrations and instructions to remove the impeller.

1. Remove the impeller hardware, then use pry bars to remove the impeller.
2. Remove the key.
3. Remove the mechanical seal bellows and primary ring.

PB18-G

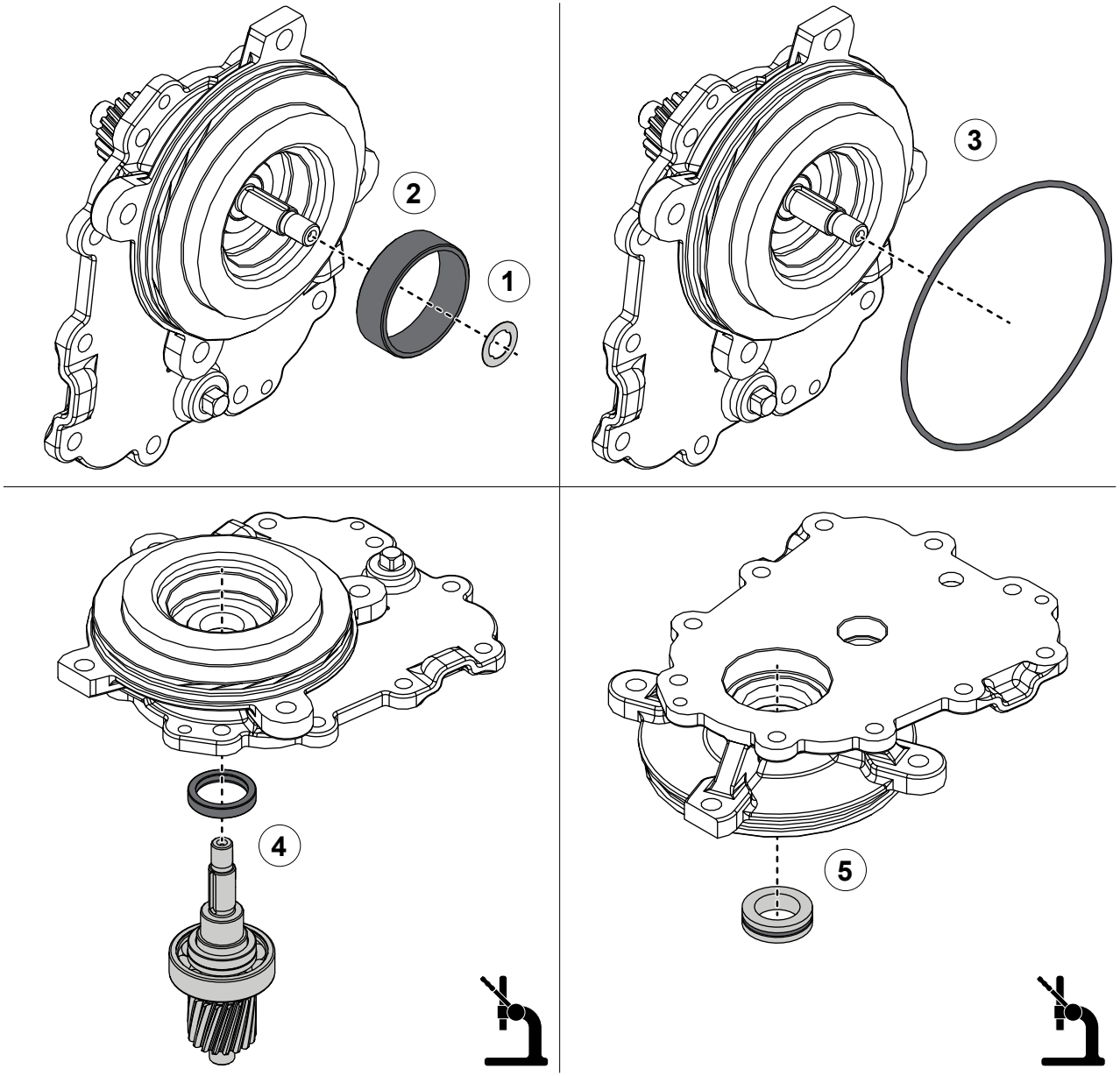


Removing the Gear Case Cover

Use the illustration and instructions to remove the gear case cover. To drain the gear case oil before removing the cover, refer to: **"Draining the Gear Case Oil" on page 32.**

1. Remove the cover hardware, then remove the cover.
2. Remove the cover gasket.

PB18-G



Disassembling the Cover

Use the illustrations and instructions to disassemble the gear case cover.

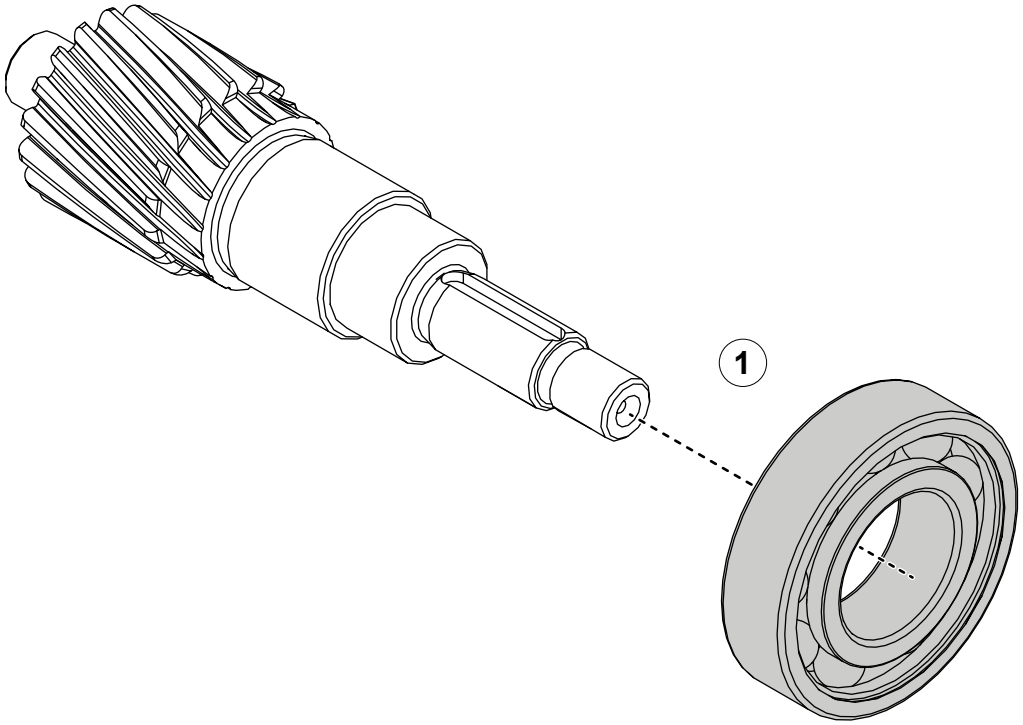
1	Remove the impeller gasket.
2	Use pry bars to remove the wear ring.
3	Remove the O-ring.
4	Press the impeller shaft assembly out of the gear case cover, then remove the oil seal if it was not pressed out with the impeller shaft.
5	Press the mechanical seal stationary ring out of the gear case cover.

PB18-G

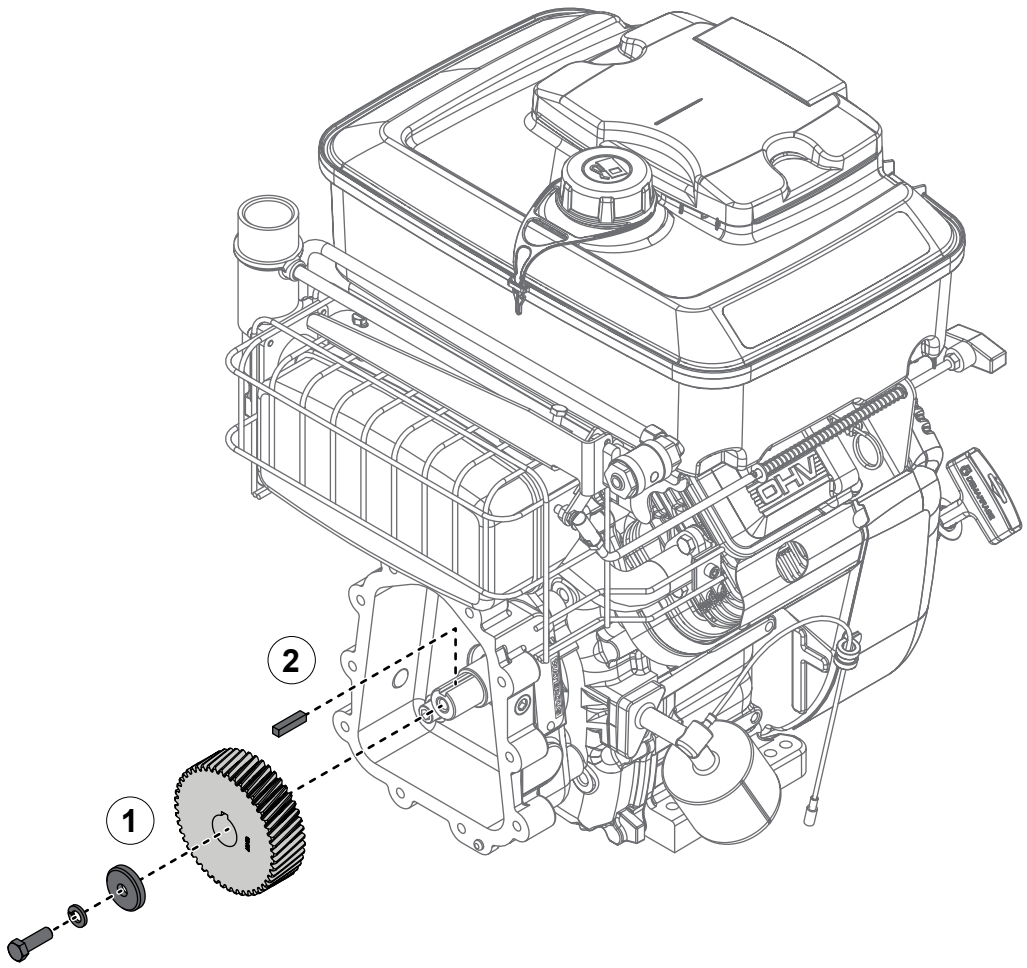
Disassembling the Impeller Shaft

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

1 Remove the bearing.



PB18-G

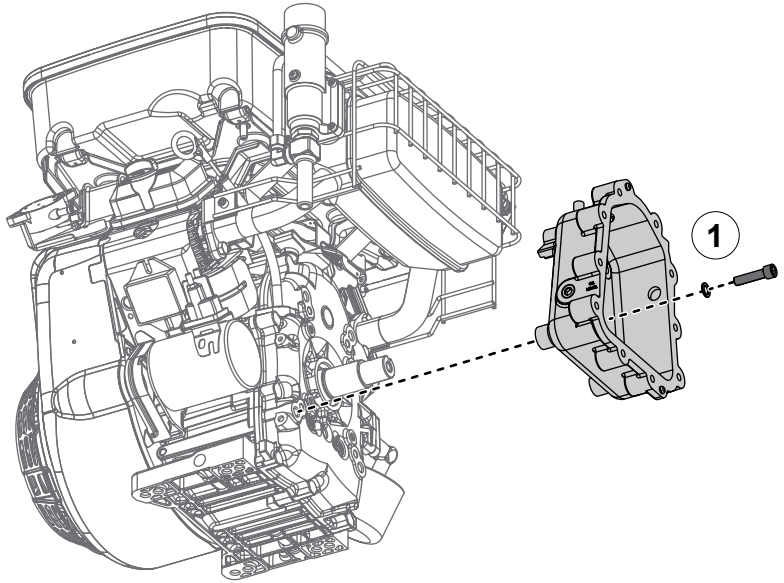


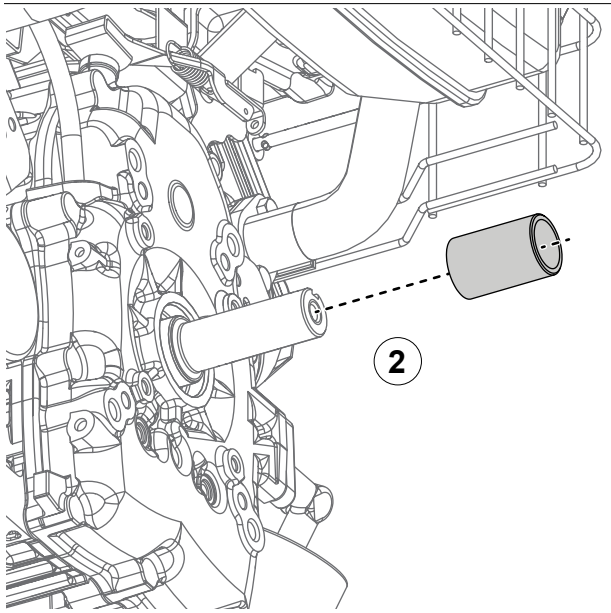
Removing the Drive Gear

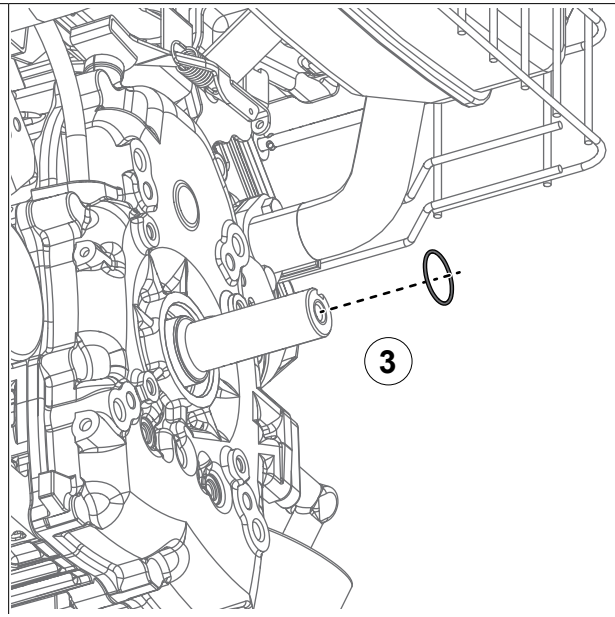
Use the illustration and instructions to remove the drive gear.

1. Remove the drive gear hardware, then remove the drive gear.
2. Remove the key.

PB18-G





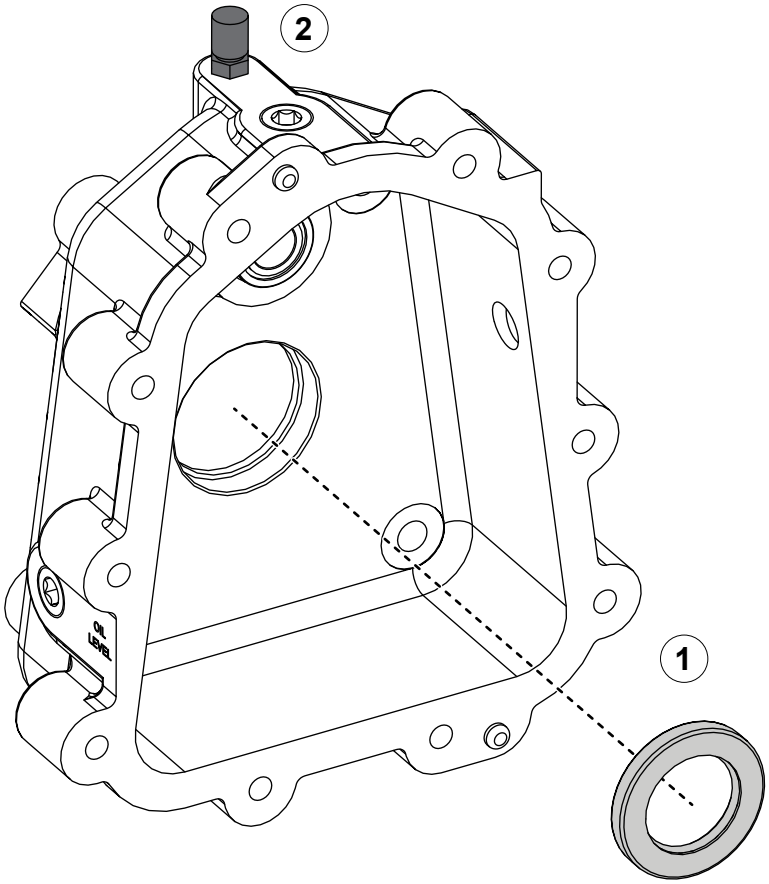


Removing the Gear Case

Use the illustrations and instructions to remove the gear case.

1. Remove the gear case hardware, then remove the gear case.
2. Remove the shaft sleeve.
3. Remove the O-ring.

PB18-G



Disassembling the Gear Case

Use the illustration and instructions to disassemble the gear case.

1. Remove the oil seal.
2. If needed, clean the breather.

Preparing to Assemble the Pump

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

Tools Required

- Typical automotive mechanics hand tools.
- Suitable arbor press.
- Torque wrench capable of 80 ft-lb (108 N·m).
- Suitable support and lifting equipment.

Best Practices

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

Optional Equipment

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

Assembling the Pump Components

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

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

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

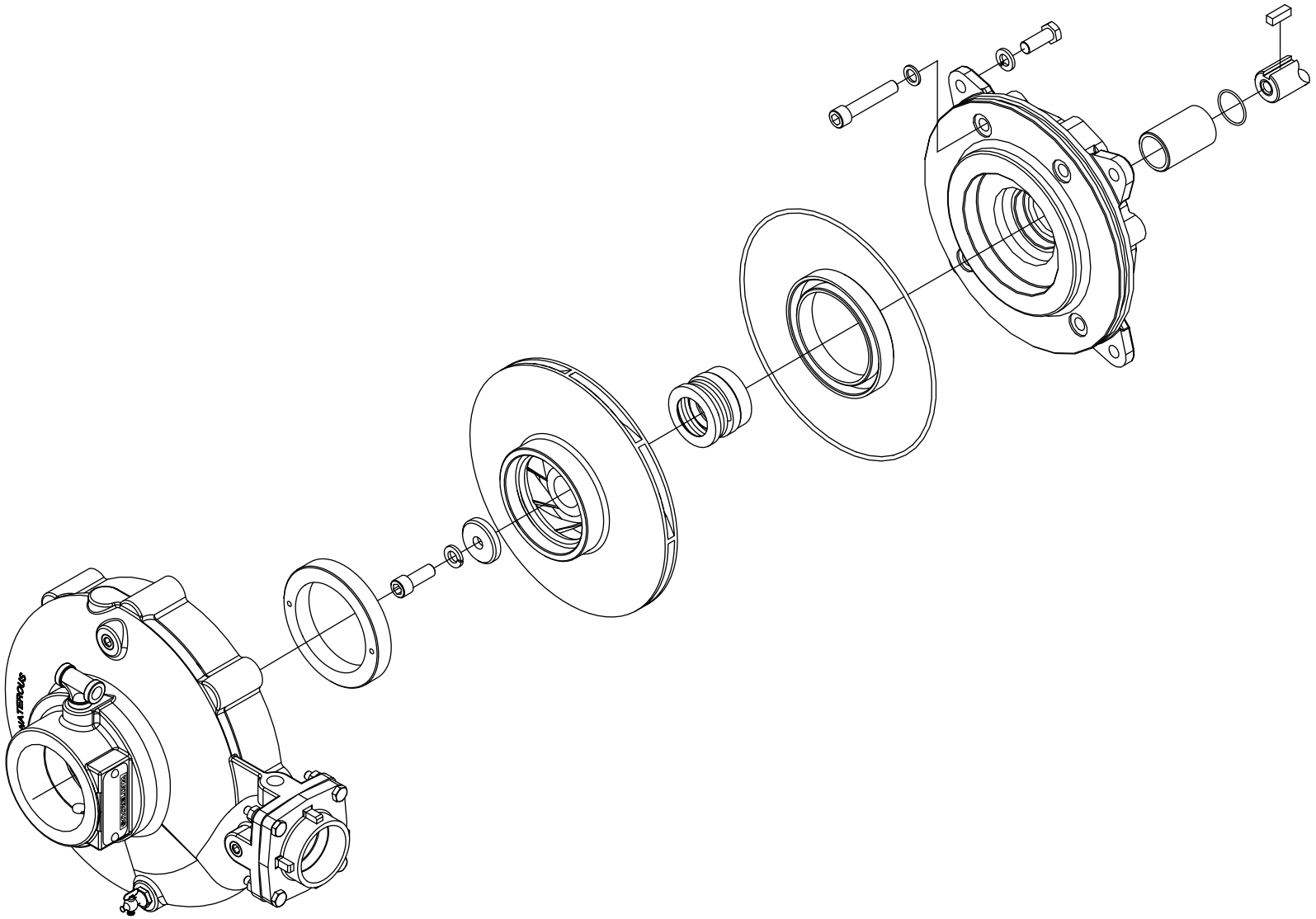
Installing the Pump

Use the information that you recorded when you removed the equipment to install it into the apparatus. If the unit is permanently mounted in an apparatus and connected to rigid piping, use flexible couplings to lessen the force applied to the pump.

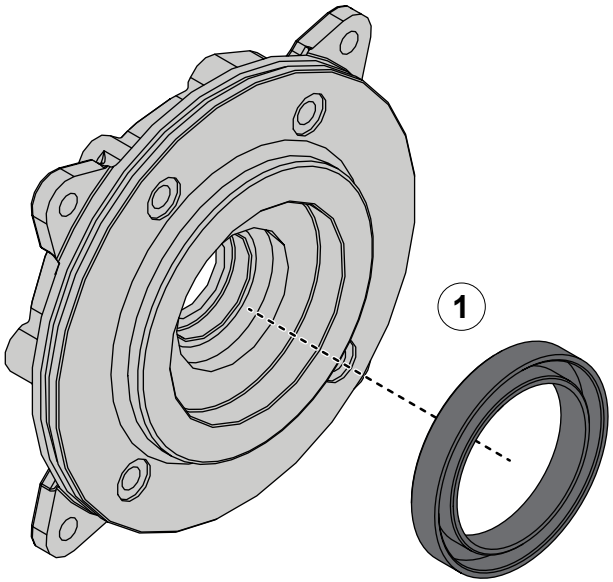
Understanding the Illustrations

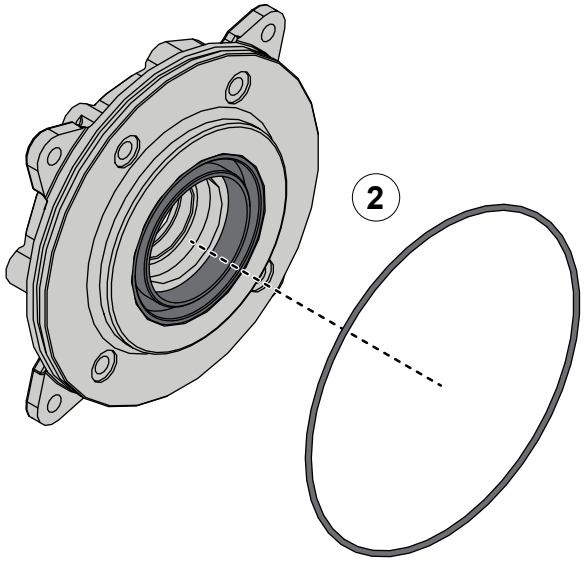
The assembly illustrations depict a typical application. Plugs, breathers, cooling hoses, and fittings are not illustrated, as they may be in a different location on your application. Refer to the SPL for your application to identify the various plug locations.

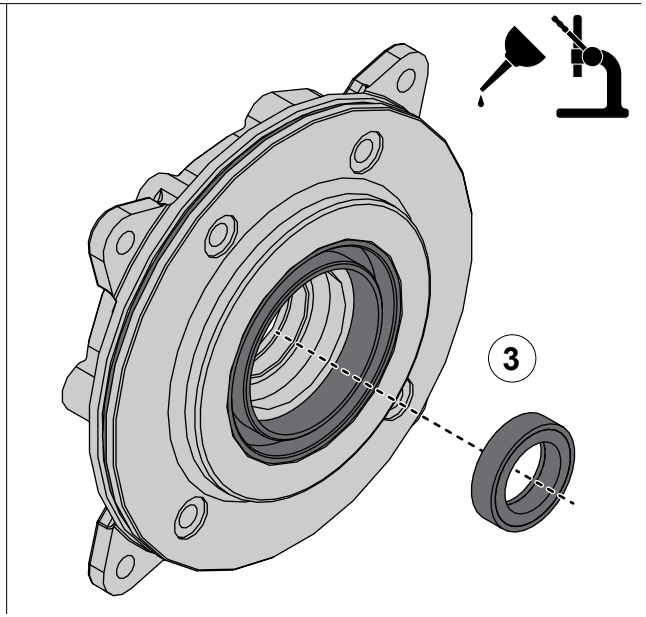
PB18



PB18







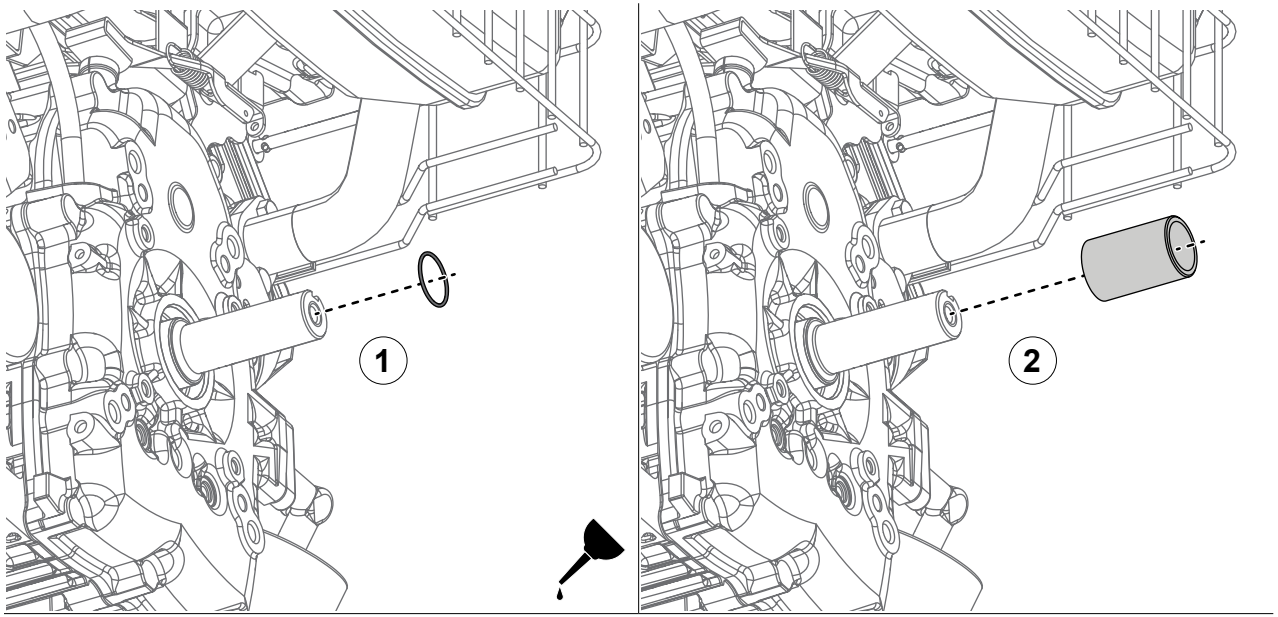
Assembling the Adapter

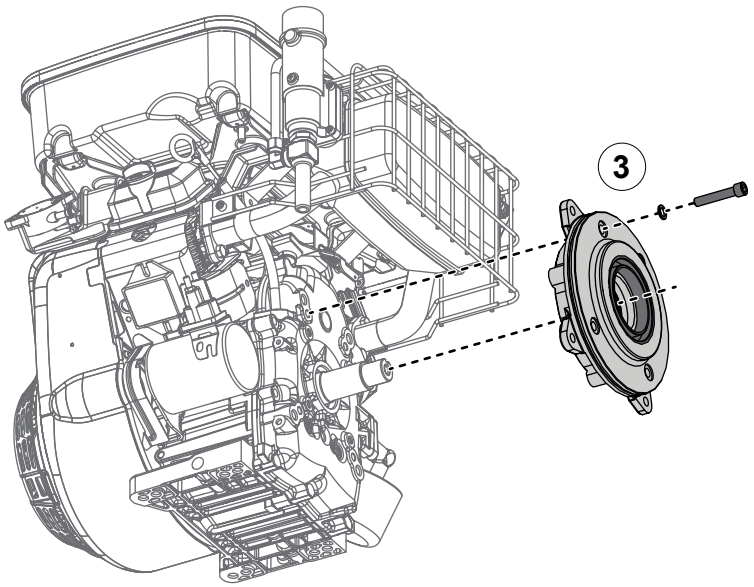
Use the illustrations and instructions to assemble the engine adapter.

1. Apply anti-seize compound to the outside of the wear ring, then install it into the adapter.
2. Install the O-ring into the O-ring groove.
3. Apply lubricant to the outside of the mechanical seal stationary ring, then press it into the adapter with the chamfered edge facing in.

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

PB18





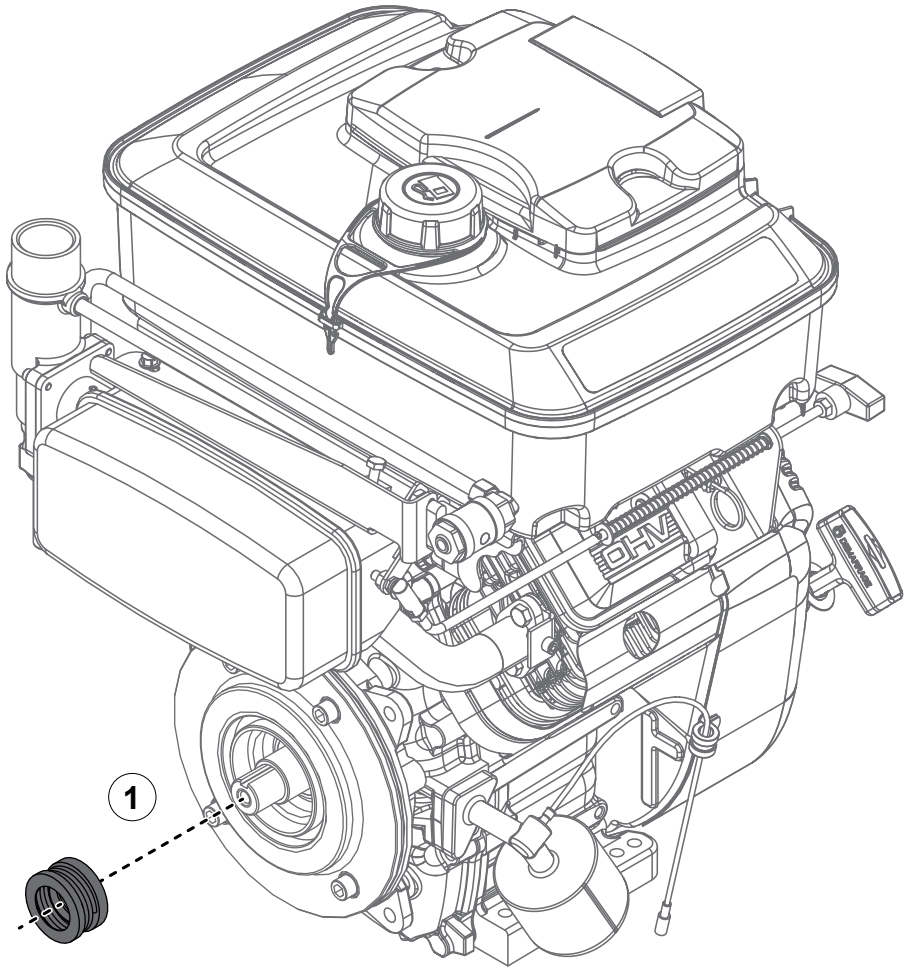
25 ft-lb
33 N·m

Installing the Adapter

Use the illustrations and instructions to install the engine adapter.

1. Apply lubricant to the shaft, then install the O-ring.
2. Install the shaft sleeve.
3. Use the adapter hardware to secure the adapter to the engine.

PB18



Installing the Mechanical Seal

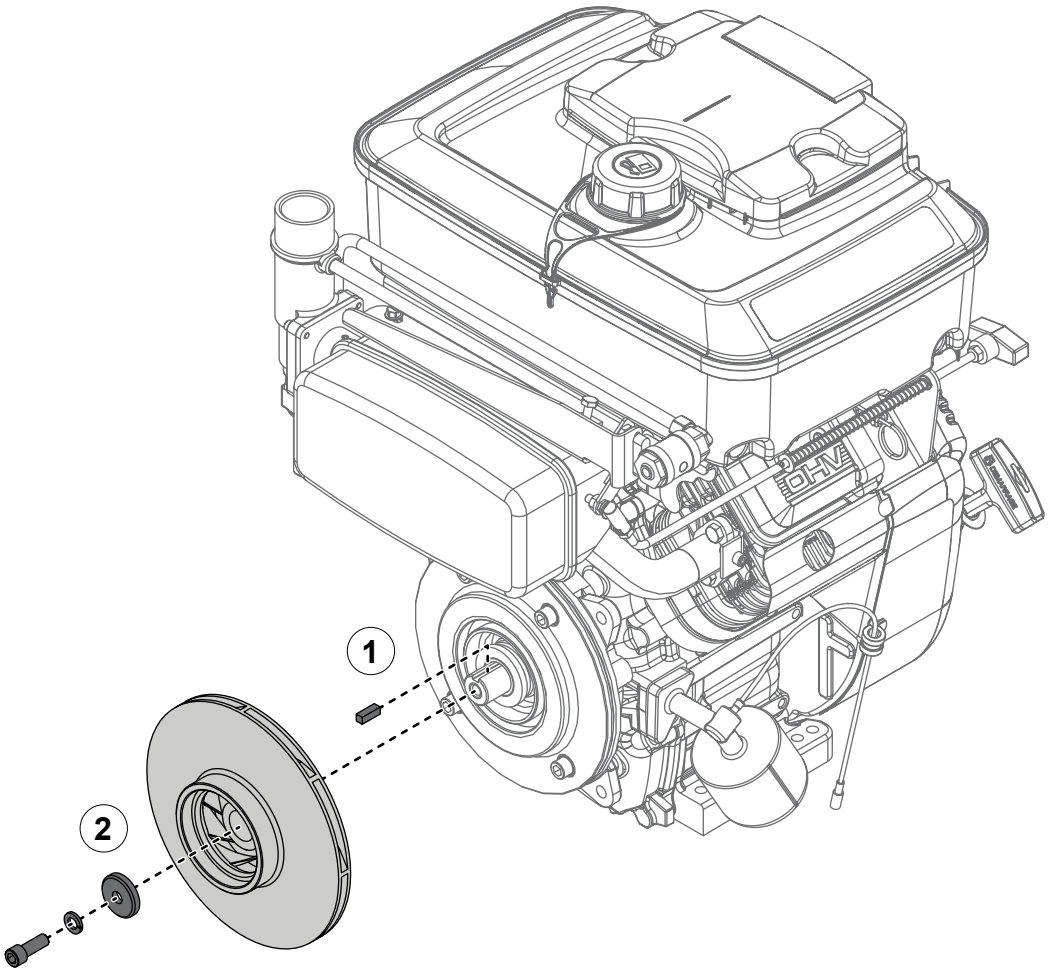
Use the illustration and instructions to install the mechanical seal.

Note: *The muffler guard has been removed from the illustration to provide a clear view of the mechanical seal and related components.*

1 Apply lubricant to the inside of the mechanical seal bellows, then install the mechanical seal bellows and primary ring into the adapter.

Note: *Make sure that the sealing surface of the bellows is clean. If the new mechanical seal comes with a spring retainer, discard it.*

PB18



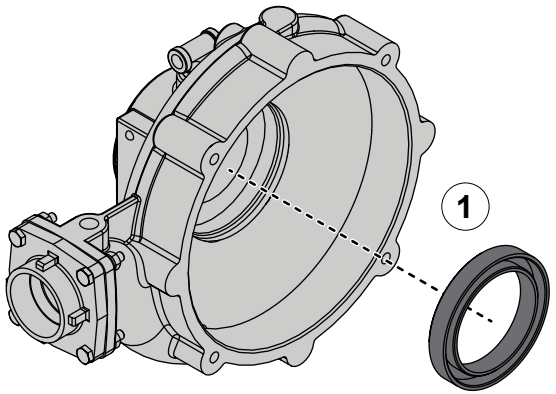
Installing the Impeller

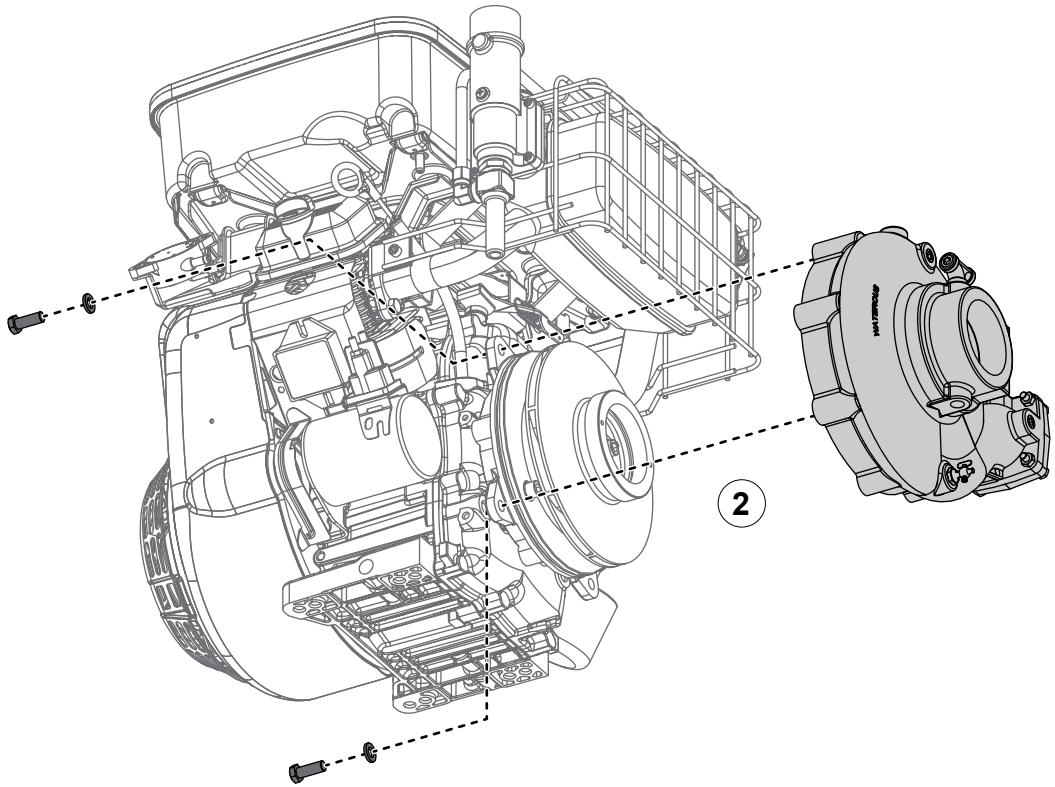
Use the illustration and instructions to install the impeller.

Note: *The muffler guard has been removed from the illustration to provide a clear view of the impeller and related components.*

1. Insert the key into the key slot.
2. Install the impeller onto the shaft, then use the impeller hardware to secure it.

PB18



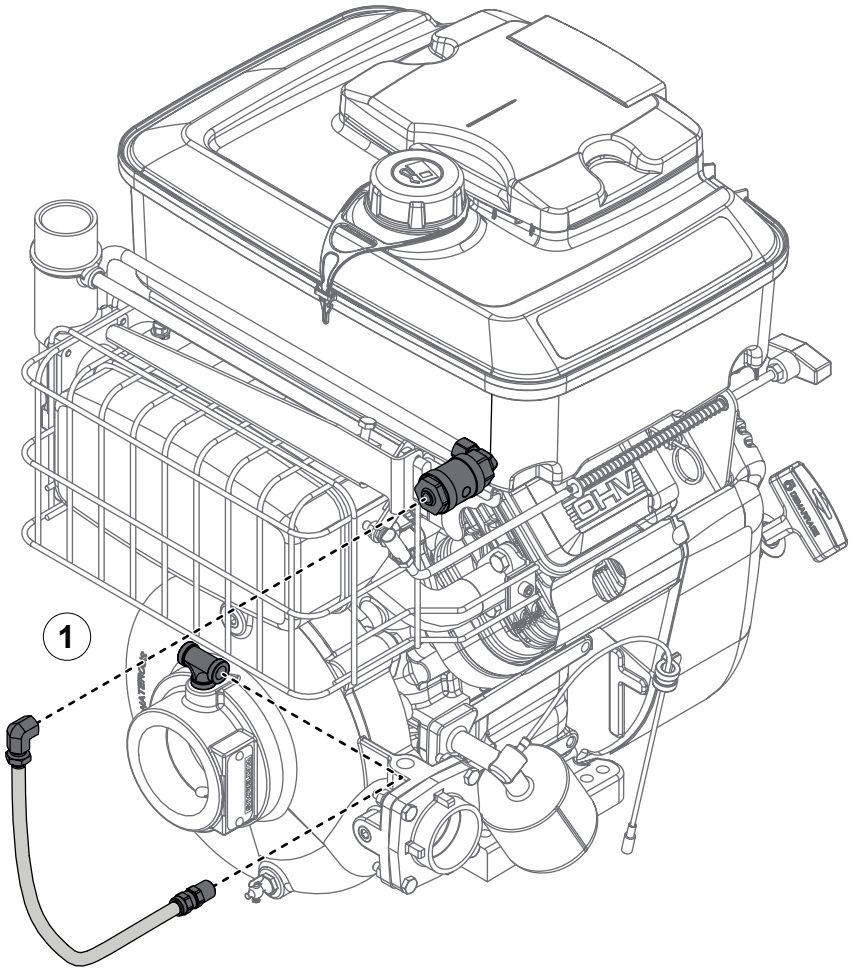


Installing the Pump Body

Use the illustrations and instructions to install the pump body.

1. Apply anti-seize compound to the outside of the wear ring, then install it into the pump body.
2. Use the pump body hardware to secure the pump body to the adapter.

PB18

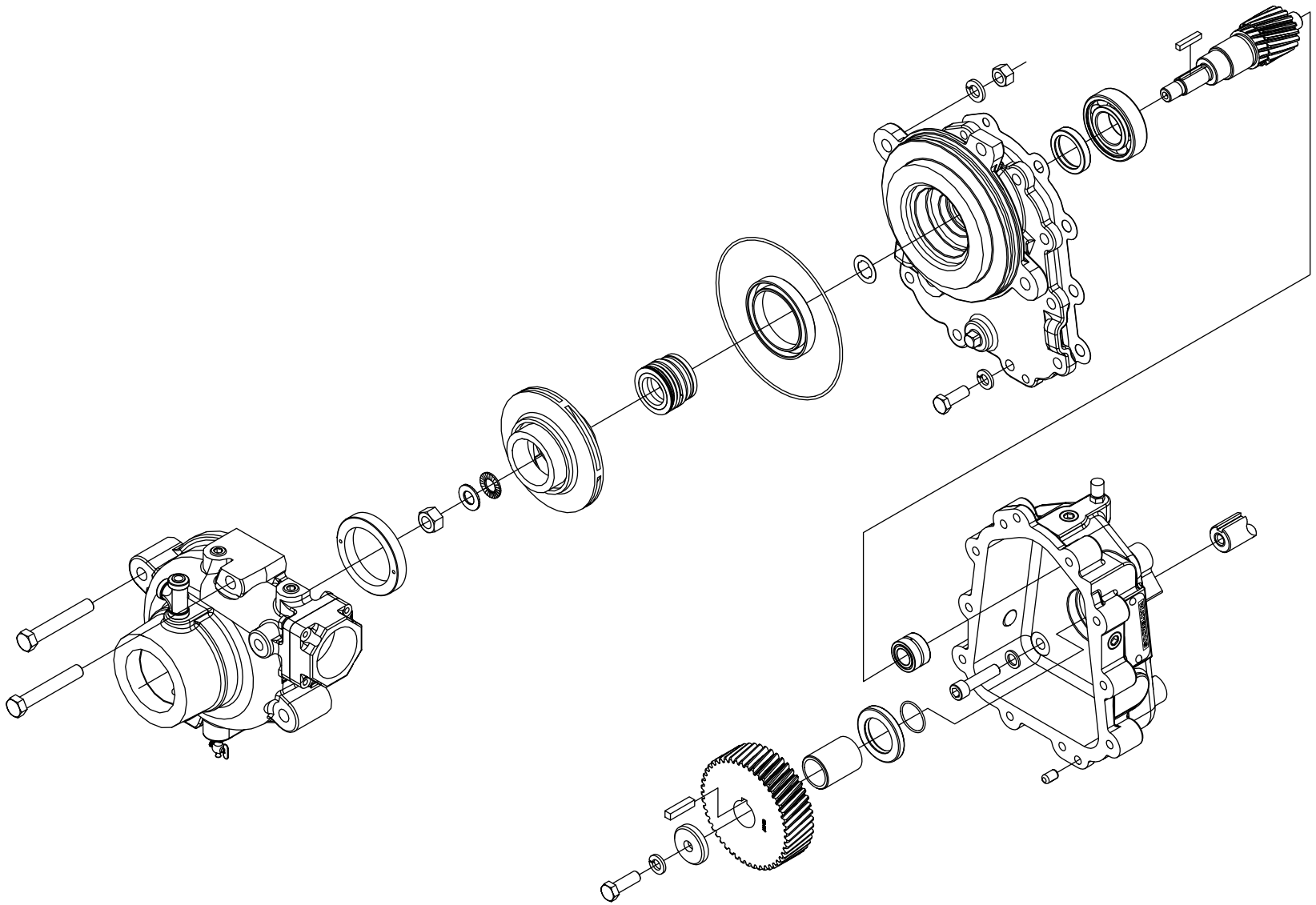


Installing the Priming Tube

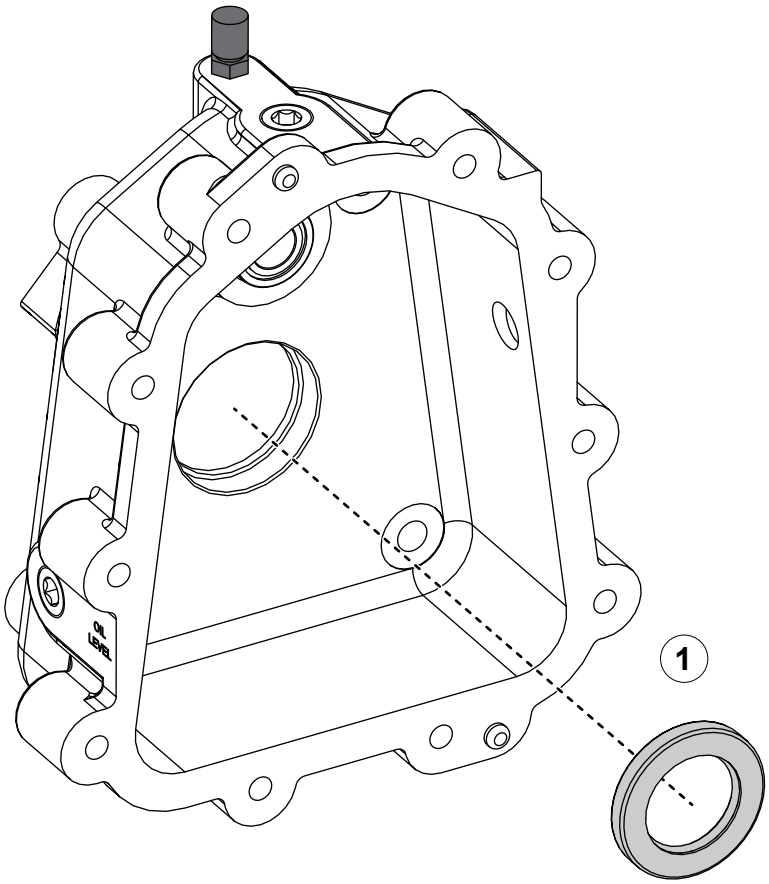
Use the illustration and instructions to install the priming tube.

1 Connect the tube to the priming valve and pump intake.

PB18-G



PB18-G

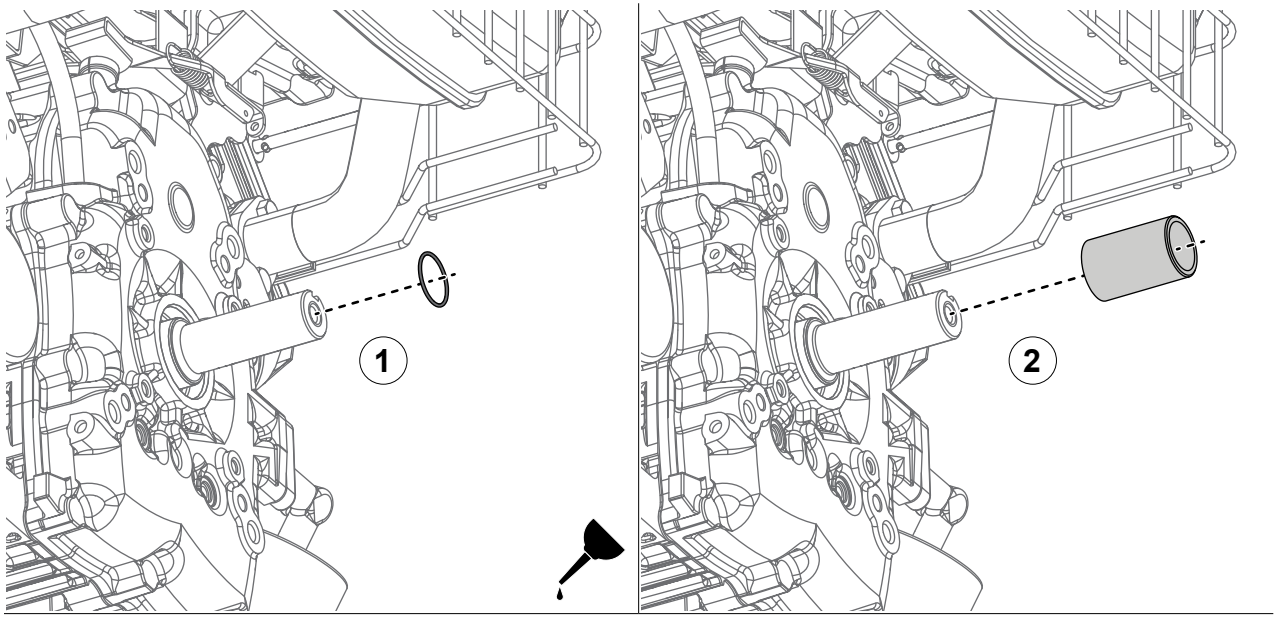


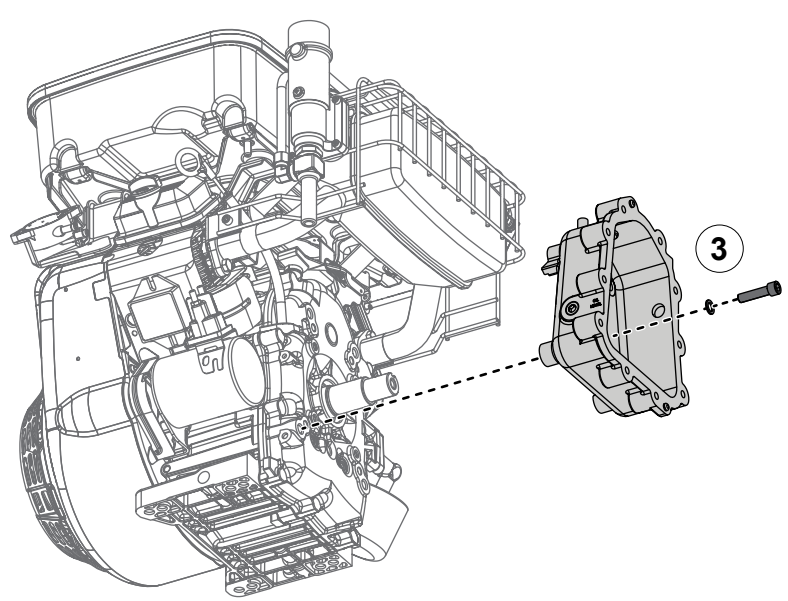
Installing the Oil Seal

Use the illustration and instructions to install the oil seal into the gear case.

1 Apply sealant around the oil seal, then install it into the gear case.

PB18-G





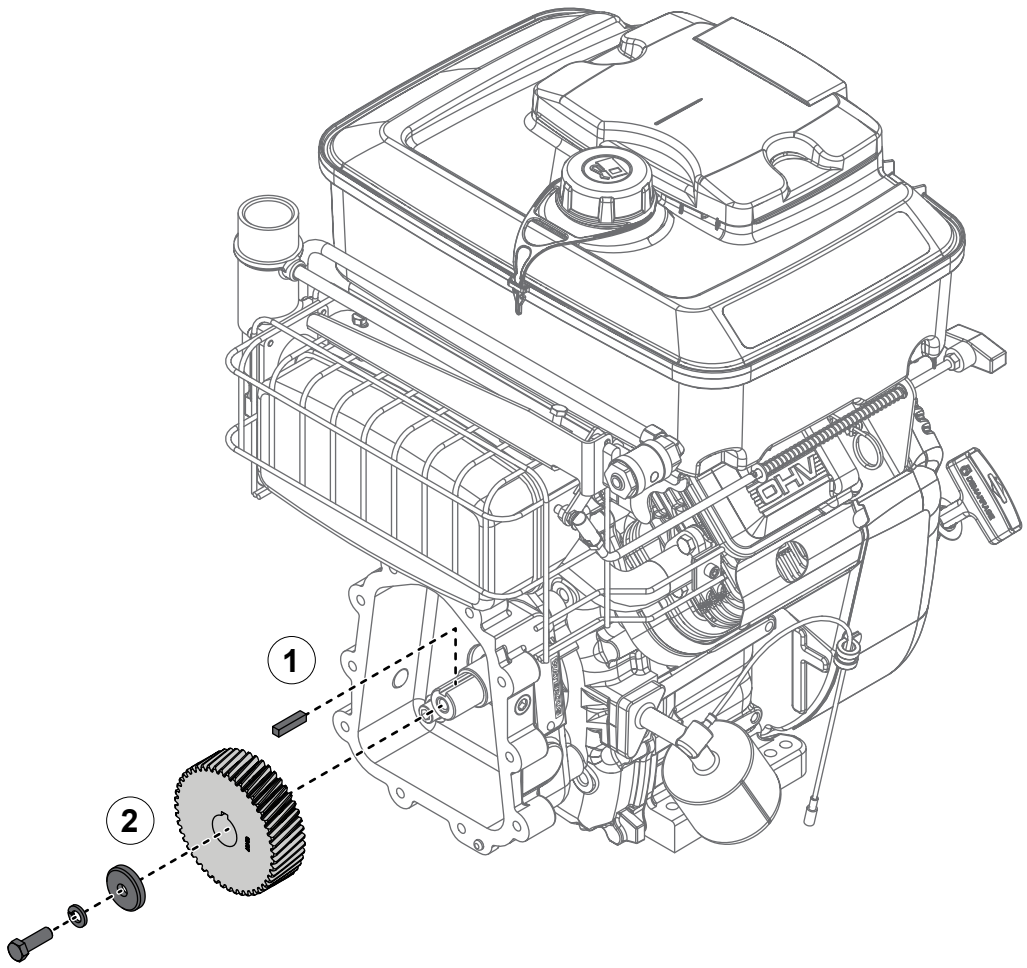
25 ft-lb
33 N·m

Installing the Gear Case

Use the illustrations and instructions to install the gear case.

1. Apply lubricant to the shaft, then install the O-ring.
2. Install the shaft sleeve.
3. Use the gear case hardware to secure the gear case to the engine.

PB18-G

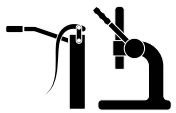


Installing the Drive Gear

Use the illustration and instructions to install the drive gear.

1. Insert the key into the key slot.
2. Install the drive gear onto the shaft, then use the drive gear hardware to secure it.

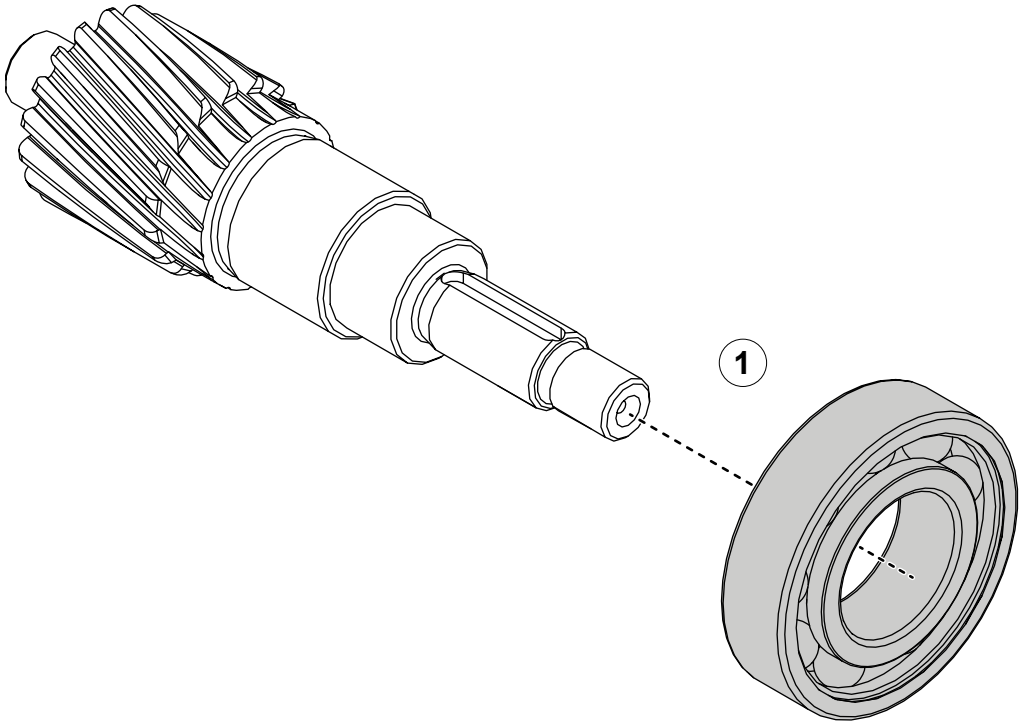
PB18-G



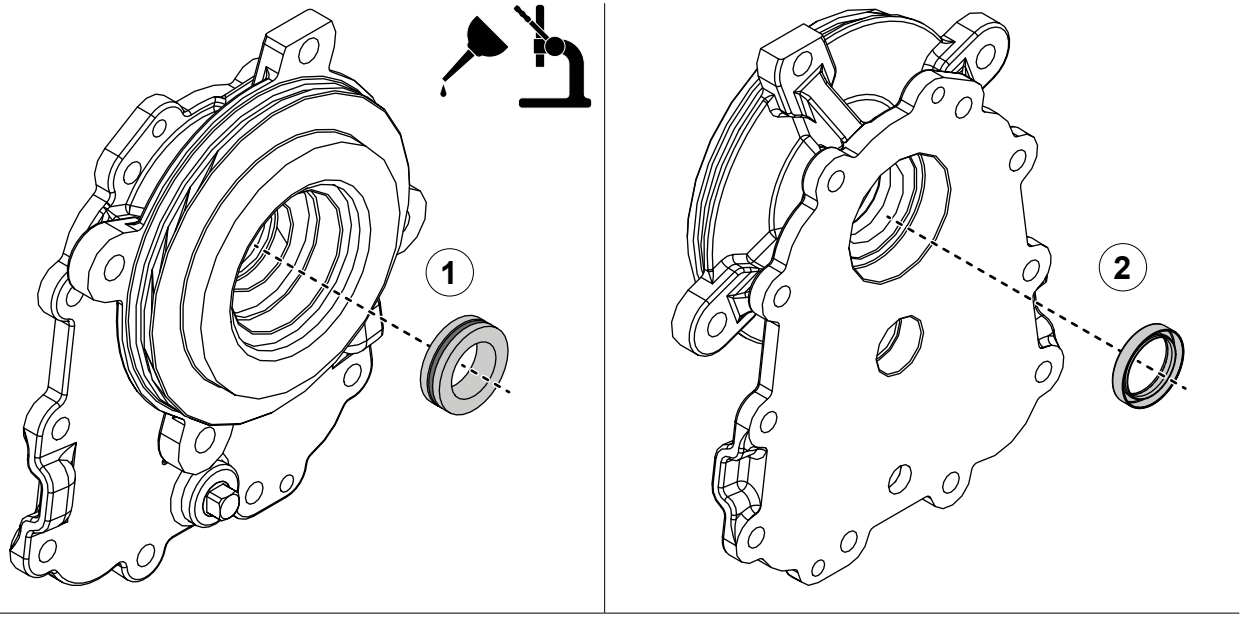
Assembling the Impeller Shaft

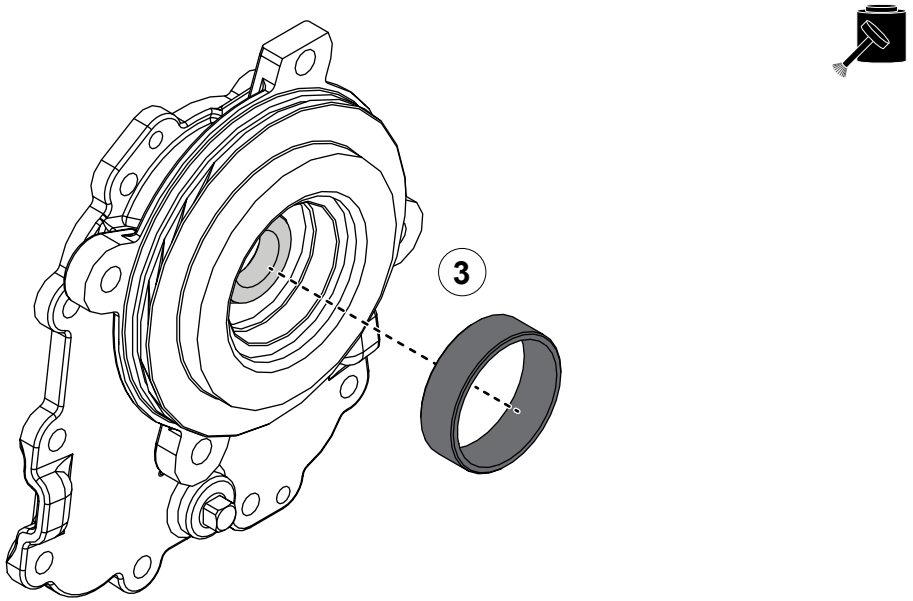
Use the illustration and instructions to assemble the impeller shaft assembly.

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



PB18-G





Assembling the Cover

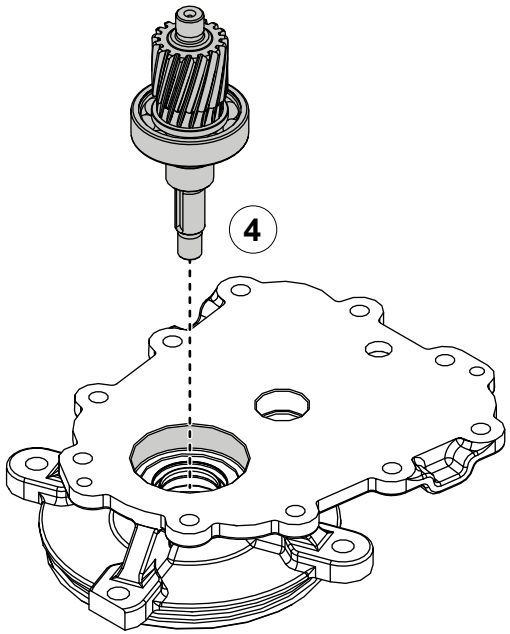
Use the illustrations and instructions to assemble the gear case cover.

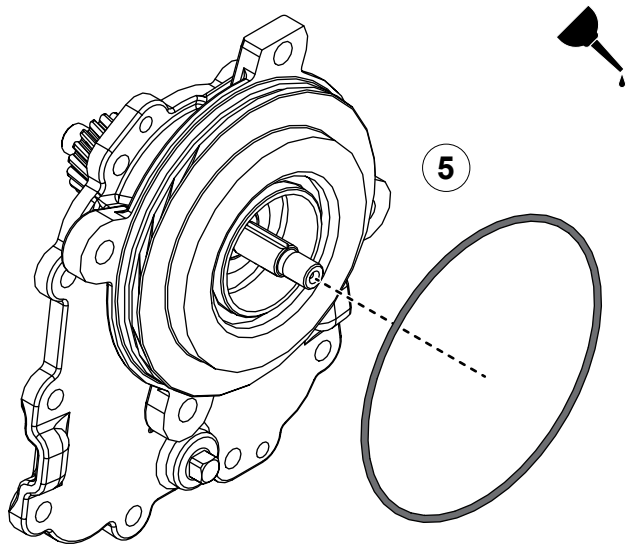
1. Apply lubricant to the outside of the mechanical seal stationary ring, then press it into the cover with the chamfered edge facing in.

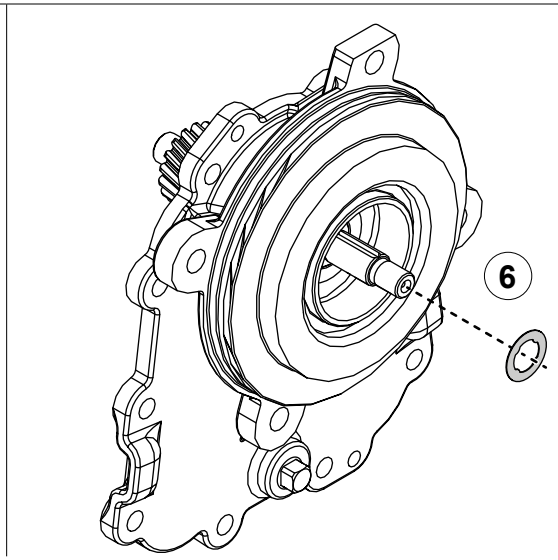
   Note: *Make sure that the sealing surface of the stationary ring is clean.*

2. Install the oil seal into the cover.
3. Apply anti-seize compound to the outside of the wear ring, then install it into the cover.

PB18-G







Assembling the Cover

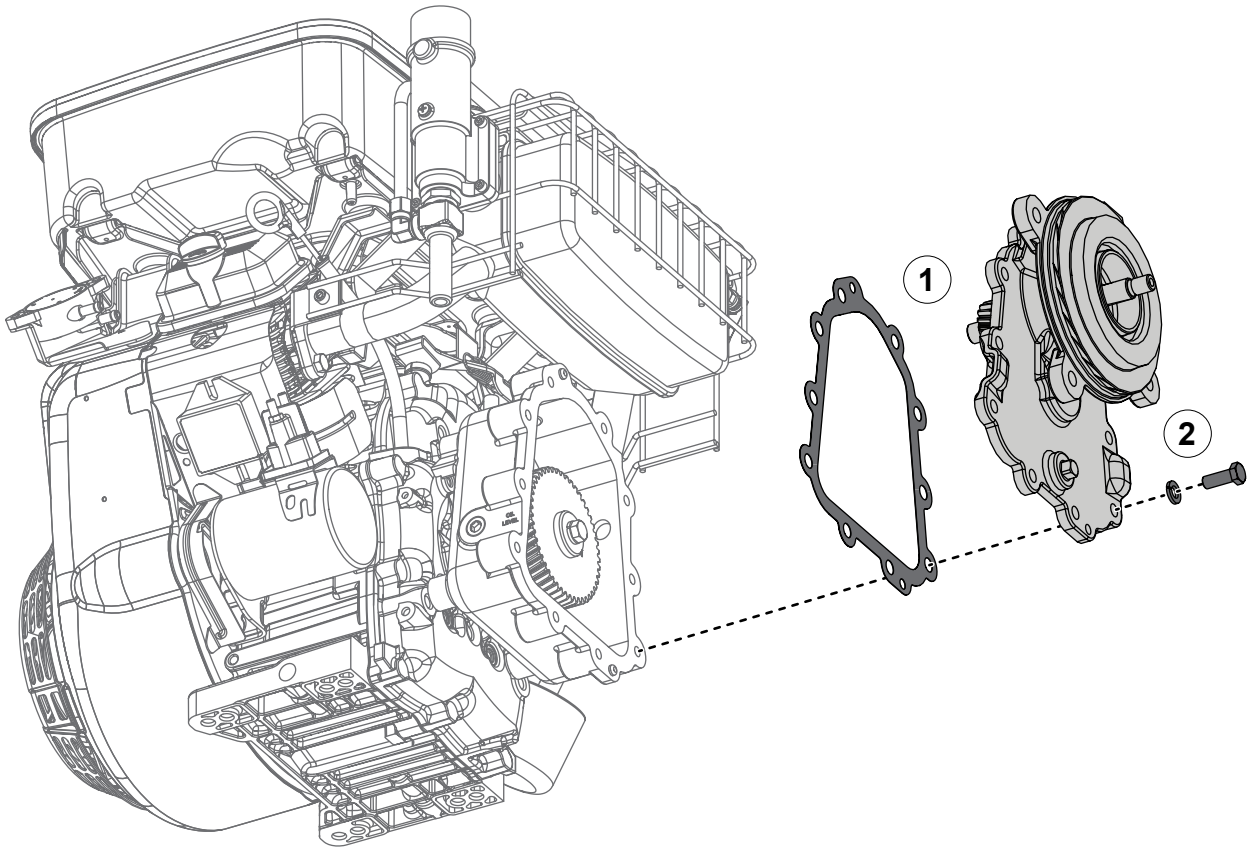
Use the illustrations and instructions to assemble the gear case cover.

4 Apply grease to the bore of the cover, then press the impeller shaft assembly through the cover.

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

6 Install the impeller gasket.

PB18-G

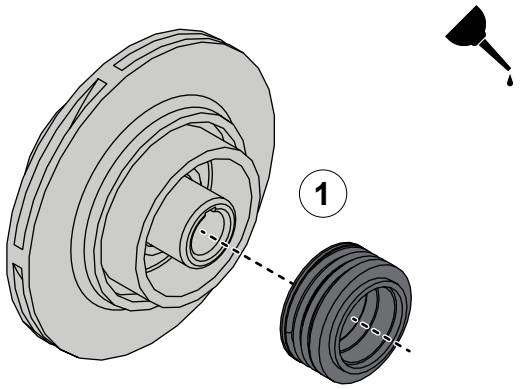


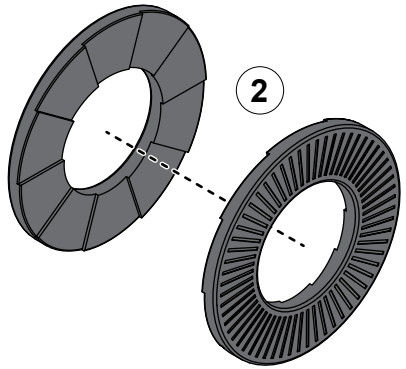
Installing the Gear Case Cover

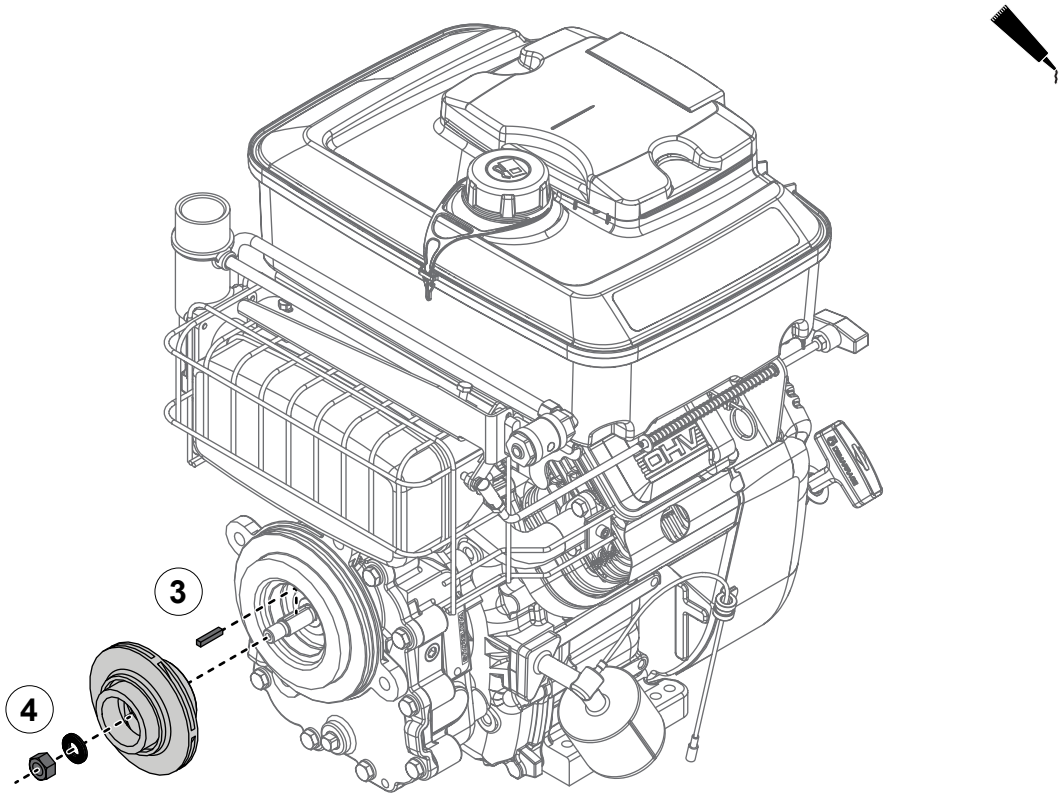
Use the illustration and instructions to install the gear case cover.

1. Install the gasket between the gear case and cover.
2. Use the cover hardware to secure the cover to the gear case.

PB18-G







Installing the Impeller

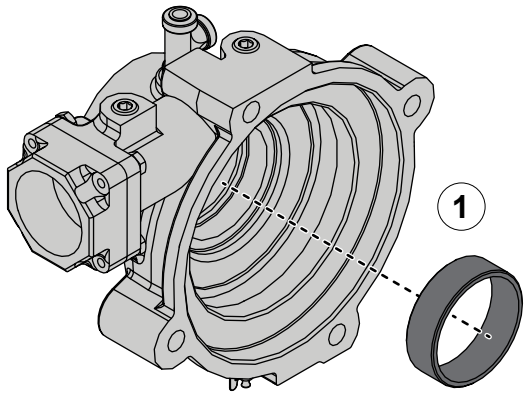
Use the illustrations and instructions to install the impeller.

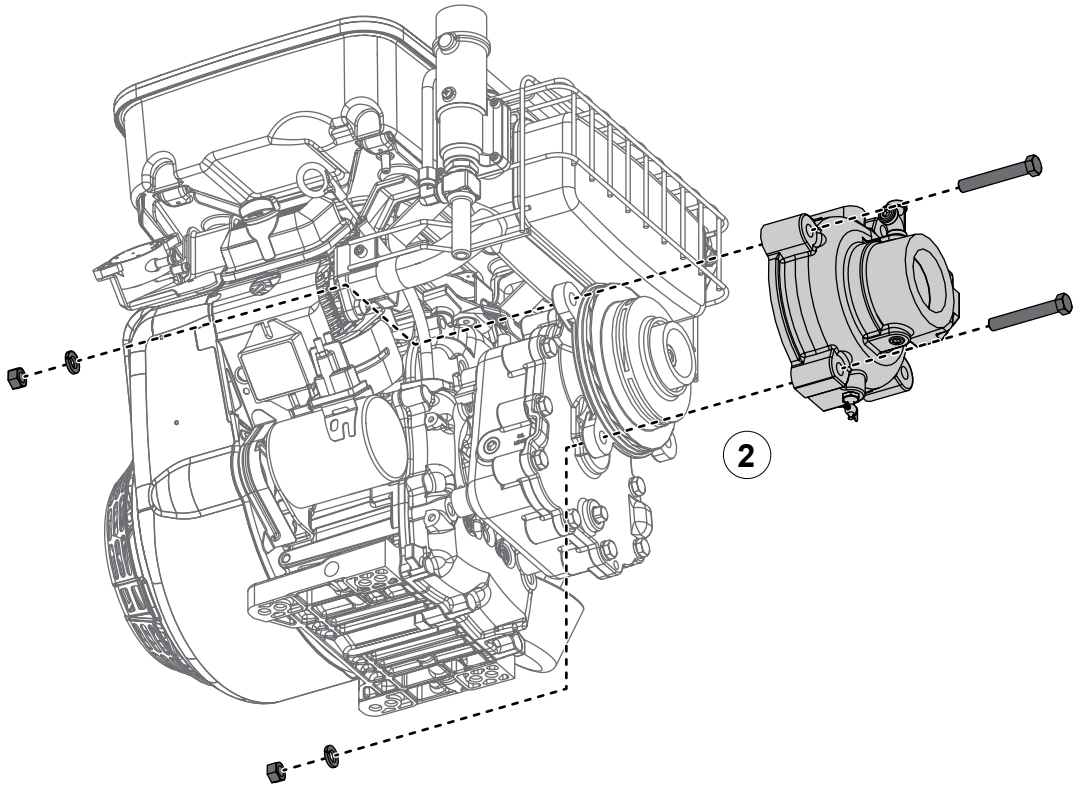
1. Apply lubricant to the inside of the impeller and inside of the mechanical seal bellows, then install the mechanical seal bellows and primary ring into the impeller. Compress the bellows so that the primary ring is level with the impeller hub.

   Note: *Make sure that the sealing surface of the bellows is clean.*

2. Align the wedge lock washers with the cam faces toward each other.
3. Insert the key into the key slot.
4. Install the impeller onto the shaft, then install the wedge lock washer. Apply sealant to the shaft, then install the nut onto the shaft to secure the impeller.

PB18-G



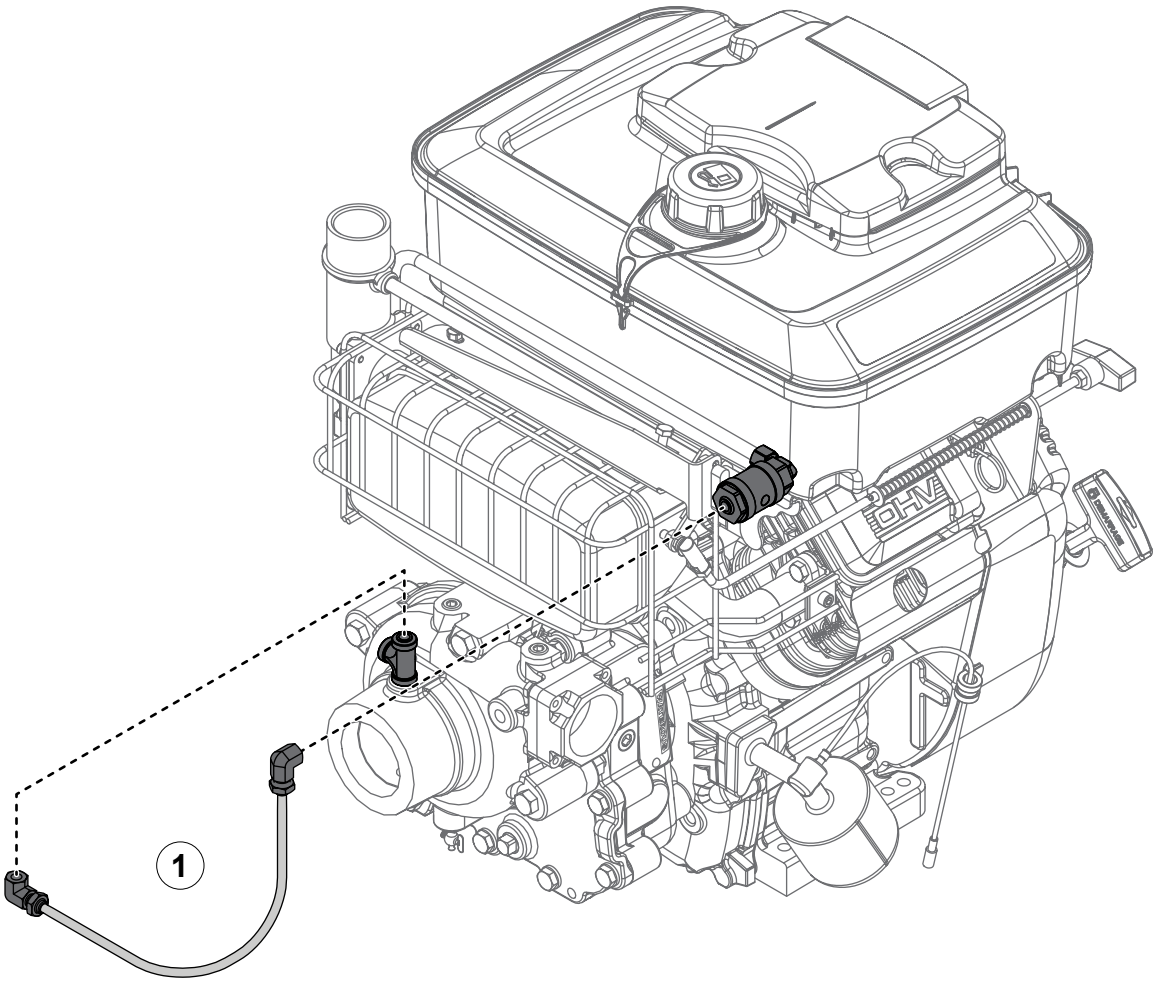


Installing the Pump Body

Use the illustrations and instructions to install the pump body.

1. Apply anti-seize compound to the outside of the wear ring, then install it into the pump body.
2. Use the pump body hardware to secure the pump body to the gear case.

PB18-G



Installing the Priming Tube

Use the illustration and instructions to install the priming tube.

1 Connect the tube to the priming valve and pump intake.

Troubleshooting Guide

Symptom	Possible Cause	Solution
The pump fails to prime or loses prime.	There is a leak in the system.	Clean and tighten all intake connections and make sure that the hoses and gaskets are in working condition—repair or replace the leaking components. There are two tests for locating leaks, a negative pressure test and a positive pressure test. Choose the method that will work best for your application. To perform the negative pressure test, do the following: 1. Connect an intake hose to the pump 2. Cap the open end to seal the hose. 3. Close all pump openings. 4. Start the engine, then move the throttle to the *FAST* position. 5. Pull the priming control and hold it in the *PRIME* position until you develop -10.8 psi (-0.75 bar) of intake pressure. ***Note:*** *If you are unable to develop -10.8 psi (-0.75 bar) of intake pressure, the primer may be defective or the leak may be too large for the primer to overcome. If this is the case, perform the positive pressure test to determine whether the primer is defective or the system is leaking.* 6. Push the priming control back to the *RUN* position, then stop the engine. 7. Observe the intake pressure gauge. If the vacuum drops by 2.5 psi (0.17 bar) or more within 5 minutes, there is most likely a leak. Leaks are often audible and can be located by listening for them. To perform the positive pressure test, do the following: 1. Use an auxiliary pump to provide positive pressure at the pump intake. 2. Run water through the pump to expel any air. 3. Close the discharge to build the pump pressure—do not exceed 100 psi (8.6 bar). 4. Stop the auxiliary pump, then examine the system for leaks.
	Air is trapped in the pump and/or pipes.	When pumping from a water tank, you may need to prime the pump because of trapped air.
	The primer is defective.	Repair or replace the primer.
	The engine speed (rpm) is too low.	Move the throttle to the *FAST* position.
	The bypass line is open.	If there is a check valve installed between the pump discharge and water tank, it may be stuck—repair or replace the check valve.
	The lift is too high.	Reduce the vertical distance between the water source and intake.
	The intake strainer is plugged with debris.	Clean the intake strainer.
		When drafting from a shallow water source, protect the intake strainer by suspending the intake with a float. Anchor the float to prevent drifting.
	The intake is not submerged deep enough.	Make sure that the intake is submerged at least 2 ft (0.6 m) below the water surface.
	There is a high point in the intake line.	Avoid positioning any part of the intake line higher than the pump intake. If a high point is unavoidable, close the discharge valve as soon as the pressure drops and attempt to prime again. Repeat multiple times as needed to eliminate air in the line.
	The priming time was not long enough.	The maximum priming time should not exceed 45 seconds for lifts up to 10 ft (3 m).

Symptom	Possible Cause	Solution
The pump capacity is insufficient.	The engine is not providing enough power.	The engine requires maintenance—repair according to the manufacturer's instructions.
	The impeller and/or wear rings are damaged or worn.	Replace the impeller and wear rings.
	The intake strainer and/or impeller vanes are plugged with debris.	Clean the intake strainer—pressure backwash should clear any debris from the impeller vanes when pump operation stops.
	The intake hose is defective.	Replace the intake hose.
	The intake hose is too small.	Use an intake hose with a larger diameter when pumping from high lifts or at high altitudes.
	The intake hose is too long.	Position the pump as near as possible to the water source.
The pump pressure is insufficient.	The pump capacity is limiting the pressure.	Do not exceed the pump capacity—address any issues with the pump capacity.

WATEROUS

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