

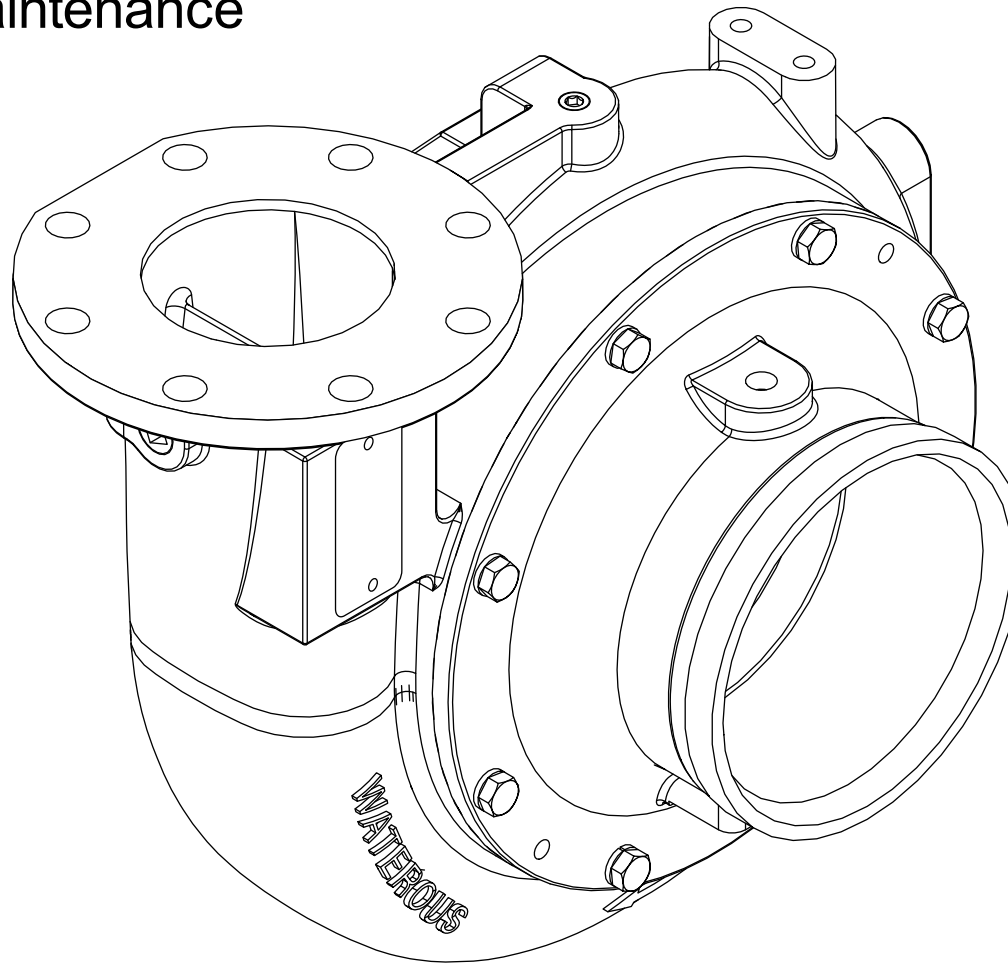
WATEROUS

Form Number: F-3035

Issue Date: Apr 24, 2024

ESU1 Pump

Operation and Maintenance



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Safety Precautions

- Read and understand all the associated documentation before you begin operating the product.
- Contact Waterous when you have questions about operating or maintaining 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	
<p>Sudden Unexpected Movement</p> <ul style="list-style-type: none"> • Unexpected movement can cause injury or death. • Make sure the shift unit is in the proper mode before operation. 	

! WARNING	
<p>Hot Liquid</p> <ul style="list-style-type: none"> • Hot liquid can scald you. • Do not operate if water temperature exceeds 160°F (71°C). 	

! WARNING	
<p>High Pressure</p> <ul style="list-style-type: none"> • Discharge ejected at high pressure can cause serious injury and damage. • Direct discharge away from people and equipment. 	

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

! WARNING	
<p>High Pressure</p> <ul style="list-style-type: none"> • Liquid ejected at high pressure can cause serious injury. • Do not operate beyond recommended pressure. 	

 Read and understand all instructions following this symbol.

Safety Precautions

NOTICE

Before Operation

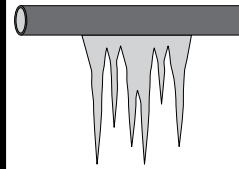
- Read and understand all the instructions provided.
- Check all fluid levels and replenish if necessary.
- Remove all shipping plugs and install the operation plugs or caps.



NOTICE

Freeze Damage

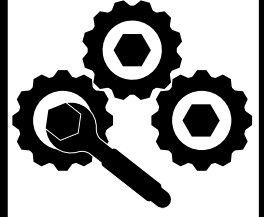
- Do not allow fluid in the lines to freeze.
- Remove all freezable fluid from the lines before storing the apparatus.



NOTICE

Maintenance

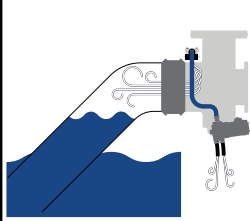
- Not following maintenance procedures can damage your equipment.
- Perform all maintenance procedures as required.



NOTICE

Priming Pump Damage

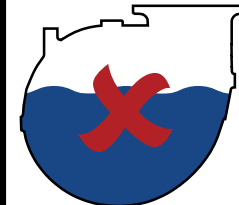
- Do not prime the pump for more than 1 minute.
- Operating the priming pump longer than 1 minute can damage the motor or the motor solenoid.



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.



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

- The instructions may refer to options or equipment that you may not have 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 installation.
- The equipment described in this document is intended to be installed by a person or persons with the necessary skills and knowledge to perform the installation.
- 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 general precautions and alert symbols that are in this document.

INTRODUCTION

This section is an overview of the document.

PRODUCT OVERVIEW

This section describes the components that make up the system.

OPERATION

This section describes the equipment operation.

MAINTENANCE

This section describes maintenance procedures.

Using this Document

Use the guidelines below when viewing this document.

Viewing the Document Electronically

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

Printing the Document

- The document is best viewed when printed 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. 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

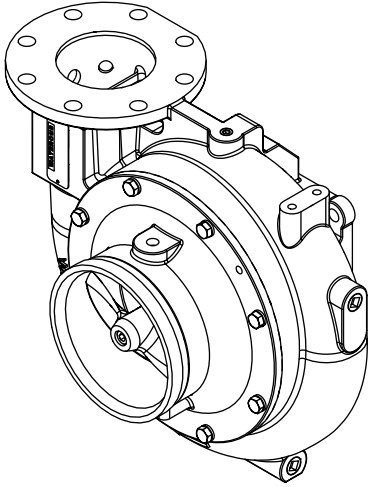
Symbols are use to illustrate additional tools or operations that are required to complete the instruction.



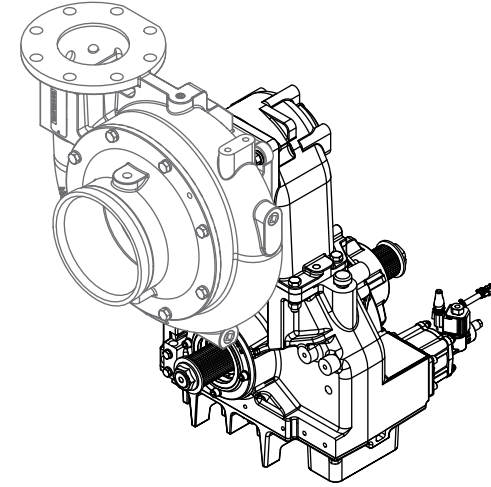
Torque to specification—This symbol tells you to torque the hardware to the specified value.

ESU1 Series Pump Configurations

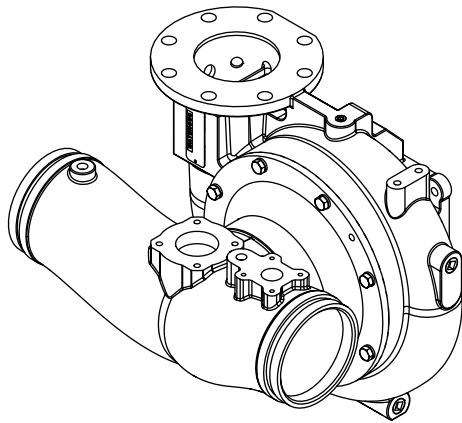
The ESU1 series pump is available in several configurations. Configurations include a combination of, a single or dual intake fitting, direct drive or transmission drive, and with or without an inducer.



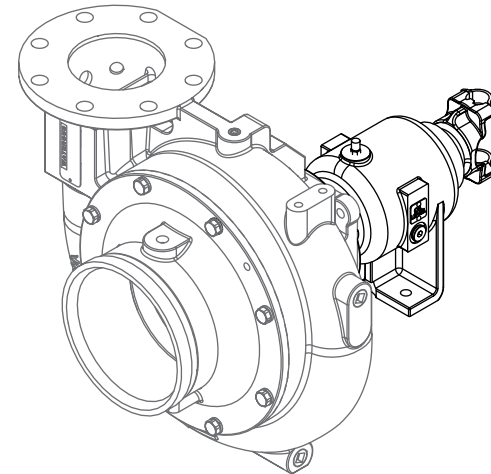
Single Intake—Shown with Optional Inducer



C22 Transmission Drive

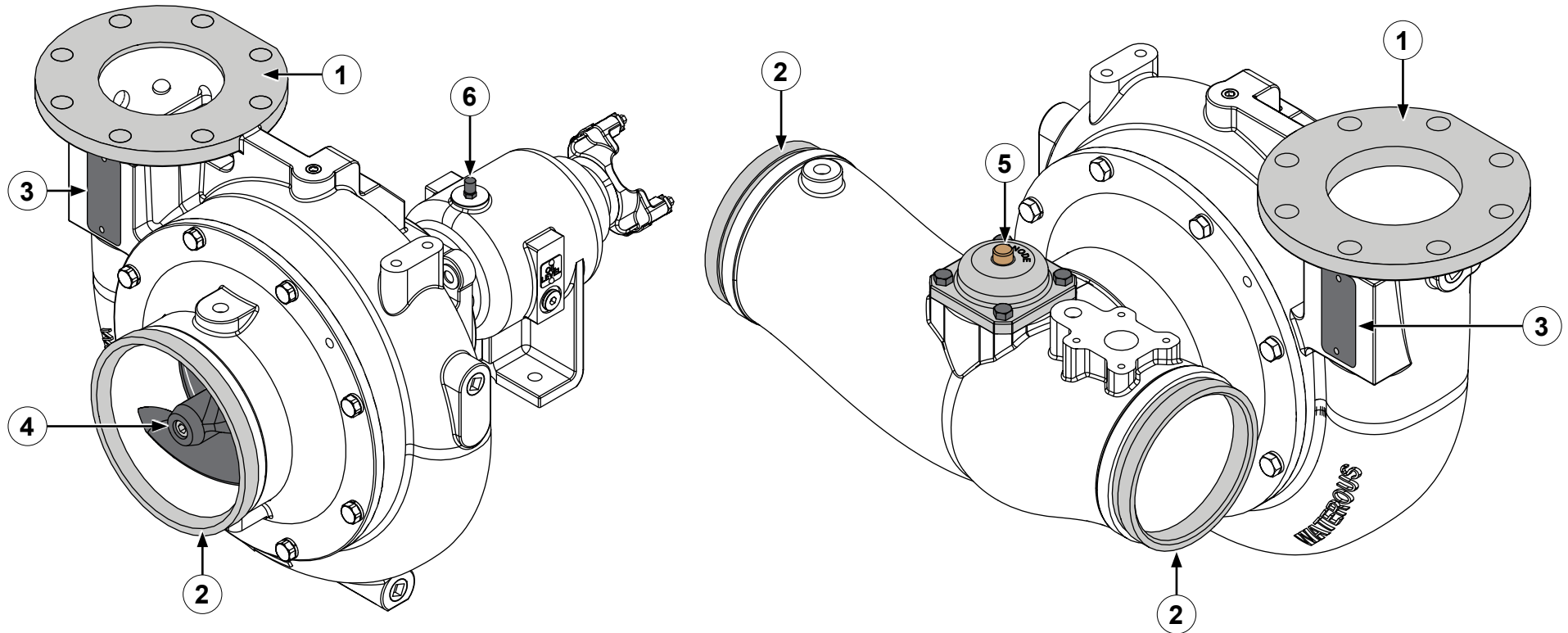


Dual Intake



Direct Drive


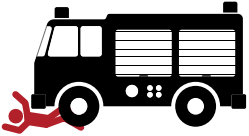
ESU1 Series Pump Overview




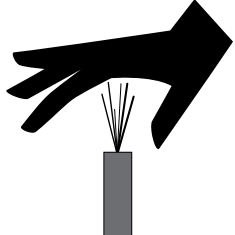
Feature	Description
1 Discharge	Water exits the pump through this discharge.
2 Intake	Water enters the pump through this intake.
3 Serial number plate	This displays the pump serial number.
4 Inducer—optional	This option improves intake flow.
5 Anode—optional	This anode aids in corrosion protection—bolt-on style shown.
6 Breather—direct drive only	This prevents internal pressure buildup during operation.

Understanding Operation Safety



Understand that each application is unique. Options included or not included with your application determine the operation of your specific system. It is incumbent upon the operators to develop operational protocols that include robust safety considerations and industry best practices before operating the system. Use the information in this section to guide you in developing operating protocols for your application.

 WARNING	
<p>Sudden Unexpected Movement</p> <ul style="list-style-type: none"> • Unexpected movement can cause injury or death. • Make sure the shift unit is in the proper mode before operation. 	

Understand the safety concerns associated with shifting the pump transmission in to pump mode.

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

Understand the safety concerns associated with the discharge and pump pressure before servicing.

 WARNING	
<p>Hot Liquid</p> <ul style="list-style-type: none"> • Hot liquid can scald you. • Do not operate if water temperature exceeds 160°F (71°C). 	

Understand the safety concerns associated with the pump raising the water temperature during operation.

 WARNING	
<p>High Pressure</p> <ul style="list-style-type: none"> • Discharge ejected at high pressure can cause serious injury and damage. • Direct discharge away from people and equipment. 	

Understand the safety concerns associated with the discharge and pump pressure during operation.

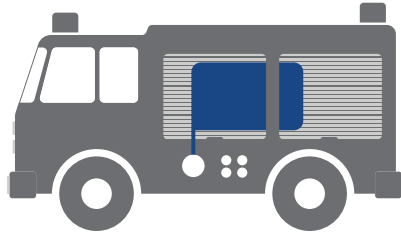
 WARNING	
<p>Hot Surface</p> <ul style="list-style-type: none"> • Hot surfaces can burn you. • Do not touch the surface during operation—allow it to cool after operating. 	

Understand the safety concerns associated with the pump surface temperature before servicing.



Read and understand all instructions following this symbol.

Pumping from the On-Board Tank



Follow the instructions to operate the pump from the on-board tank.

! **High Pressure Hazard:** Prior to connection of hoses, caps, or other closures with pump intake or pump discharge connections, relieve pressure by opening drains.

! **Scalding Water Hazard:** When operating the pump, be sure to open at least one discharge valve slightly to prevent the pump from overheating. If the pump runs for a few minutes completely closed, it may heat the water enough to scald someone when the valve is opened. Overheating can damage the seals and other pump parts. If the apparatus builder has installed a by-pass system or other provision designed to prevent overheating, opening a discharge valve may be unnecessary.

! **Unexpected Truck Movement:** Failure to properly shift transmission in accordance with the transmission operating instructions may result in unexpected truck movement which may result in serious personal injury or death.

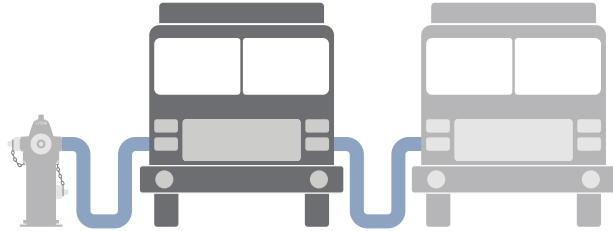
1. Engage the pump—refer to the pump transmission instructions for your application.
2. Open valve(s) in piping between water tank.
3. Allow about 30 seconds for water to flow into pump.
NOTE: Priming the pump may be necessary because of air trapped in piping.
4. Open discharge valves and accelerate engine to obtain desired discharge pressure and capacity.
5. Set relief valves or other pressure governing device to desired pressure.

After operation do the following:

! **High Pressure Hazard:** Prior to removal of hoses, caps, or other closures with pump intake or pump discharge connections, relieve pressure by opening the drains.

1. Disengage the pump—refer to the pump transmission instructions for your application.
2. If pumping other than clean water during operation, flush the pump until all contaminants are removed.
3. Close all drains and install intake and discharge caps.

Pumping from Hydrant or Relay



Follow the instructions to operate the pump from hydrant or relay.

! **High Pressure Hazard:** Prior to connection of hoses, caps, or other closures with pump intake or pump discharge connections, relieve pressure by opening drains.

! **Scalding Water Hazard:** When operating the pump, be sure to open at least one discharge valve slightly to prevent the pump from overheating. If the pump runs for a few minutes completely closed, it may heat the water enough to scald someone when the valve is opened. Overheating can damage the seals and other pump parts. If the apparatus builder has installed a by-pass system or other provision designed to prevent overheating, opening a discharge valve may be unnecessary.

! **Unexpected Truck Movement:** Failure to properly shift transmission in accordance with the transmission operating instructions may result in unexpected truck movement which may result in serious personal injury or death.

1. Engage the pump—refer to the pump transmission instructions for your application.
2. Open intake, hydrant, and other valves as necessary to allow water to enter the pump.
NOTE: Bleeder valves should be used while filling a hose connected to an intake with water.
3. Open discharge valves and accelerate engine to obtain desired discharge pressure and capacity.

4. Set relief valves or other pressure governing device to desired pressure.

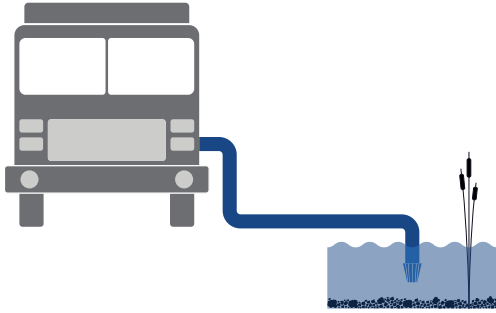
NOTE: Do not attempt to pump more water than is available from the hydrant. Always make sure the intake pressure compound gauge reading stays above zero. Some fire departments operate at a minimum intake pressure of 10 psi (0.7 bar) when pumping from hydrant to prevent a “soft” intake hose from collapsing.

After operation do the following:

! **High Pressure Hazard:** Prior to removal of hoses, caps, or other closures with pump intake or pump discharge connections, relieve pressure by opening the drains.

1. Disengage the pump—refer to the pump transmission instructions for your application.
2. If pumping other than clean water during operation, flush the pump until all contaminants are removed.
3. Close all drains and install intake and discharge caps.

Pumping from Draft



Follow the instructions to operate the pump from draft.

! **High Pressure Hazard:** Prior to connection of hoses, caps, or other closures with pump intake or pump discharge connections, relieve pressure by opening drains.

! **Scalding Water Hazard:** When operating the pump, be sure to open at least one discharge valve slightly to prevent the pump from overheating. If the pump runs for a few minutes completely closed, it may heat the water enough to scald someone when the valve is opened. Overheating can damage the seals and other pump parts. If the apparatus builder has installed a by-pass system or other provision designed to prevent overheating, opening a discharge valve may be unnecessary.

! **Unexpected Truck Movement:** Failure to properly shift transmission in accordance with the transmission operating instructions may result in unexpected truck movement which may result in serious personal injury or death.

1. Position vehicle as near as possible to water supply.
2. Avoid humps and sharp bends in intake hose. Make sure no part of hose is higher than pump intake inlet. Air pockets in intake hose may cause loss of prime or erratic pump action, and may reduce pump capacity.
3. Make sure all intake connections are tight and discharge valves are closed.
4. Immerse intake strainer at least two feet below water surface to prevent pump from drawing air. Whirlpools forming above intake strainer indicate that the strainer is too close to the surface of the water.
5. Make sure intake strainer is far enough from the bottom to prevent sand, gravel, and other foreign matter from being drawn into the pump.

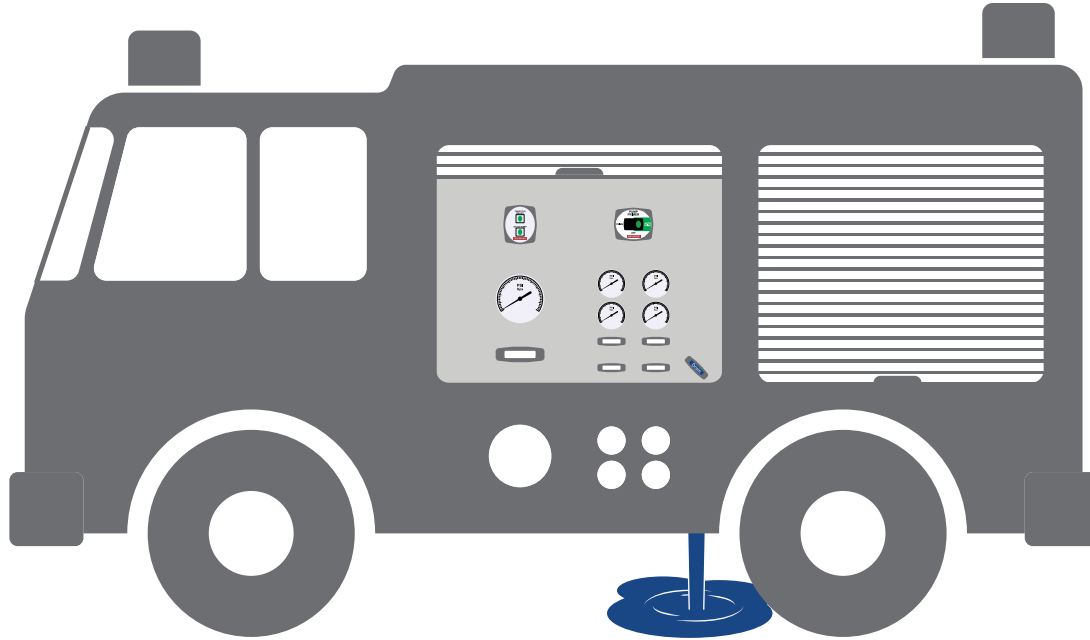
6. Open discharge valves and accelerate engine to obtain desired discharge pressure and capacity.
7. Set relief valves or other pressure governing device to desired pressure.

After operation do the following:

! **High Pressure Hazard:** Prior to removal of hoses, caps, or other closures with pump intake or pump discharge connections, relieve pressure by opening the drains.

1. Disengage the pump—refer to the pump transmission instructions for your application.
2. If pumping other than clean water during operation, flush the pump until all contaminants are removed.
3. Close all drains and install intake and discharge caps.

Storing the Pump



Use the illustration and instructions when storing the pump.

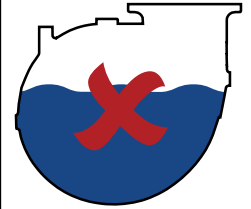
When storing the apparatus, do the following:

- Never store the pump partially full. Always store the apparatus with the pump completely full or completely empty.

NOTICE

Pump Damage

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

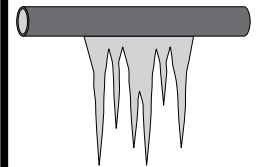


- Use the master drain valve to drain any freezable fluid before storing the apparatus.

NOTICE

Freeze Damage

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

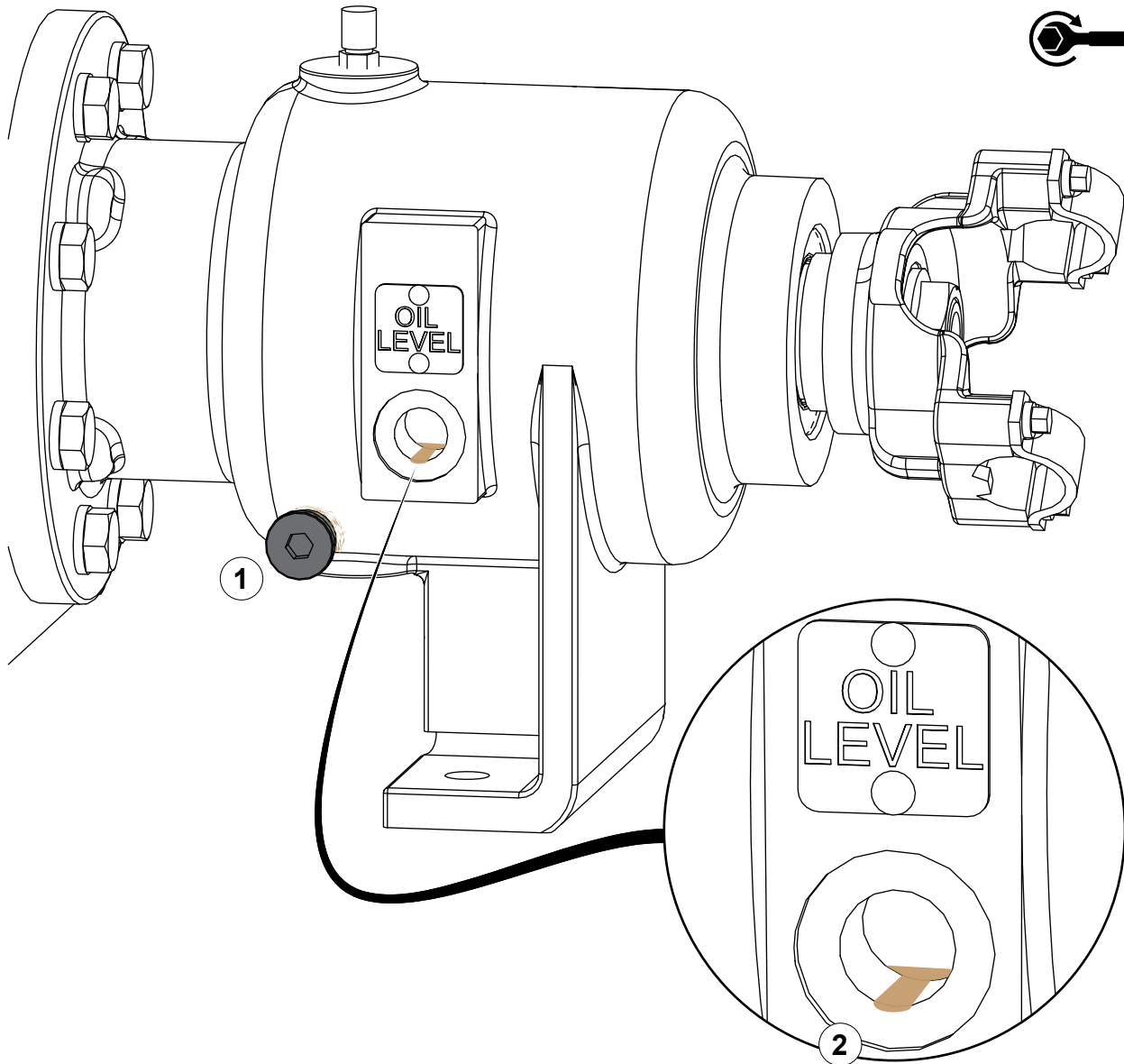


Maintenance Schedule

Perform the following procedures at the recommended intervals at a minimum. Environmental conditions determine the maintenance intervals. Inspect the components frequently, and create a maintenance schedule suitable to your application and environmental conditions. Replace wear components with equivalent components.

Operation	Weekly	6 Months	Annually	Comment
Check fluid level—direct drive only	X			
Check anode condition		X		If included in your application.
Change oil—direct drive only			X	Change every 100 hours of pump operation or annually, whichever comes first.
Check breather—direct drive only			X	Inspect every 100 hours of pump operation or annually, whichever comes first. Clean or replace as required.

Checking the Pedestal Oil Level



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

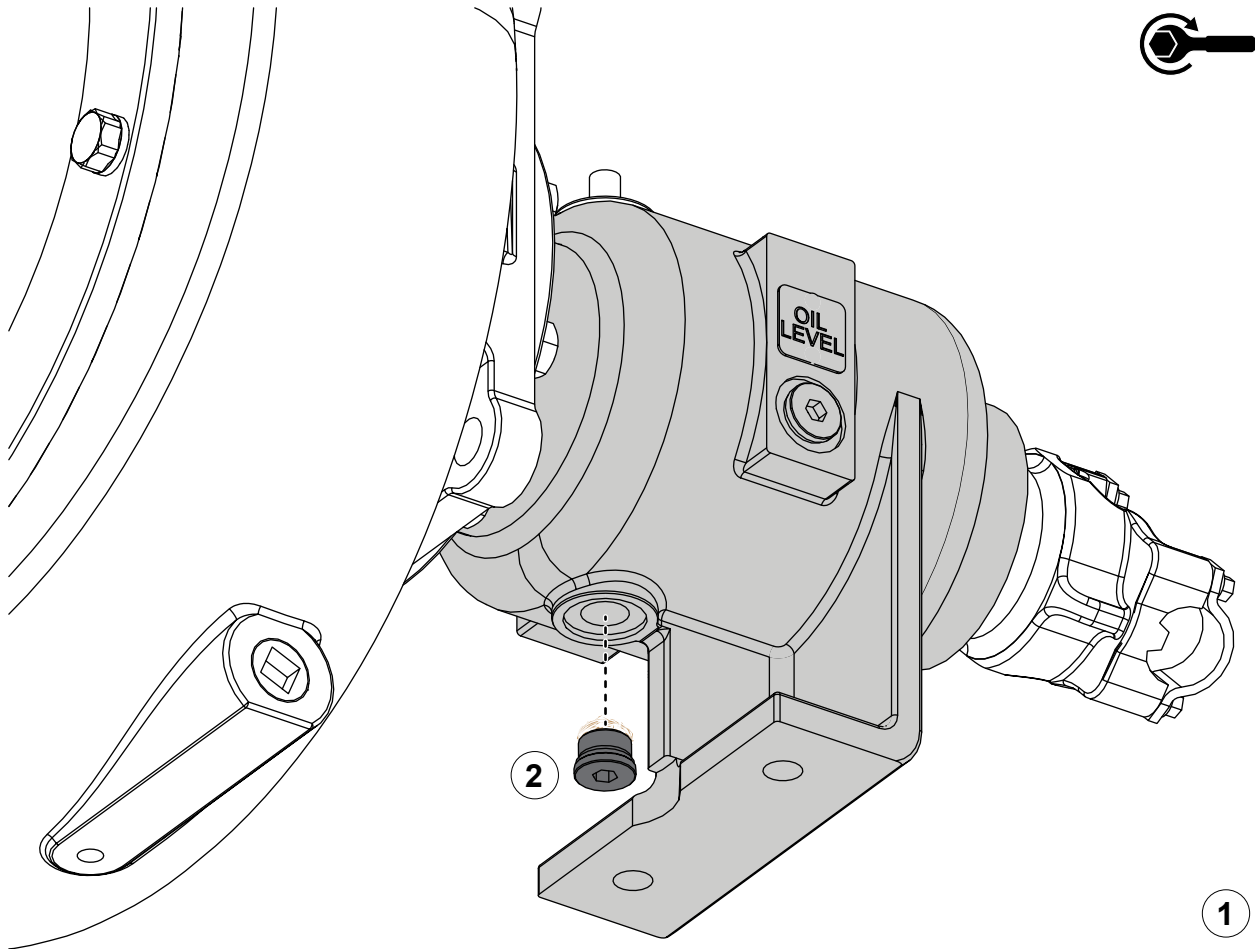
Note: Make sure that you park the apparatus so that the direct-drive pedestal is level before you check the fluid level.

Note: In cases where the fluid level is too low, it is important to determine the cause. Look for and repair any leaks found in the direct-drive pedestal.

Note: In cases where the fluid is too high, it is important to determine the cause. Look to see if water from the pump is entering the direct-drive pedestal—repair or replace any seals or components that allow water to enter the direct-drive pedestal.

- 1 Remove the magnetic plug. Remove any metal fragments that collected on the magnetic plug. Inspect the O-ring for deterioration and replace it if necessary.
- 2 Make sure that the oil reaches the bottom of the oil-level port before you securely install the magnetic plug. After checking the fluid level, install the magnetic plug and torque it to 15 ft·lb (20 N·m).

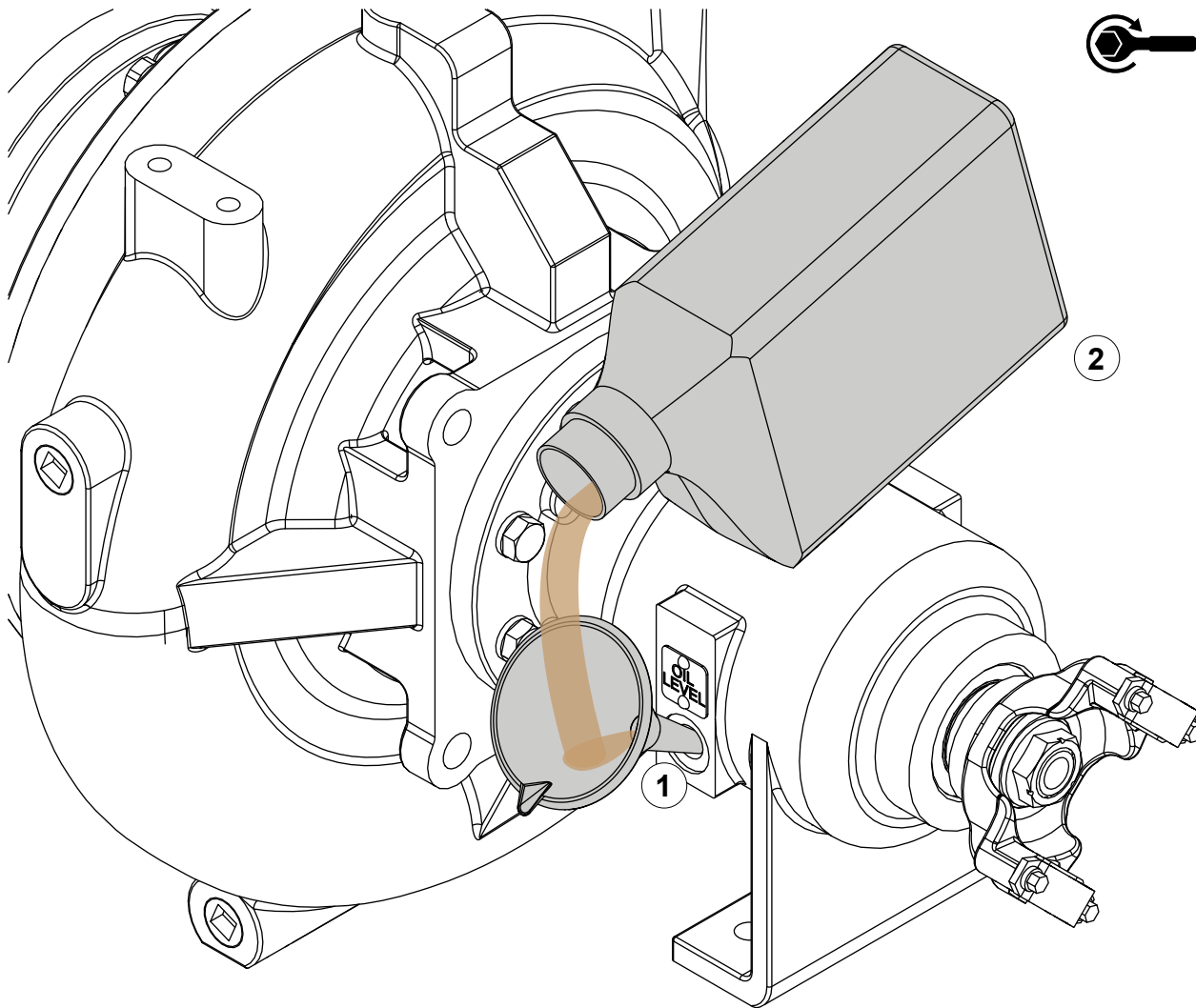
Draining the Pedestal Oil



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

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

Adding Pedestal Oil

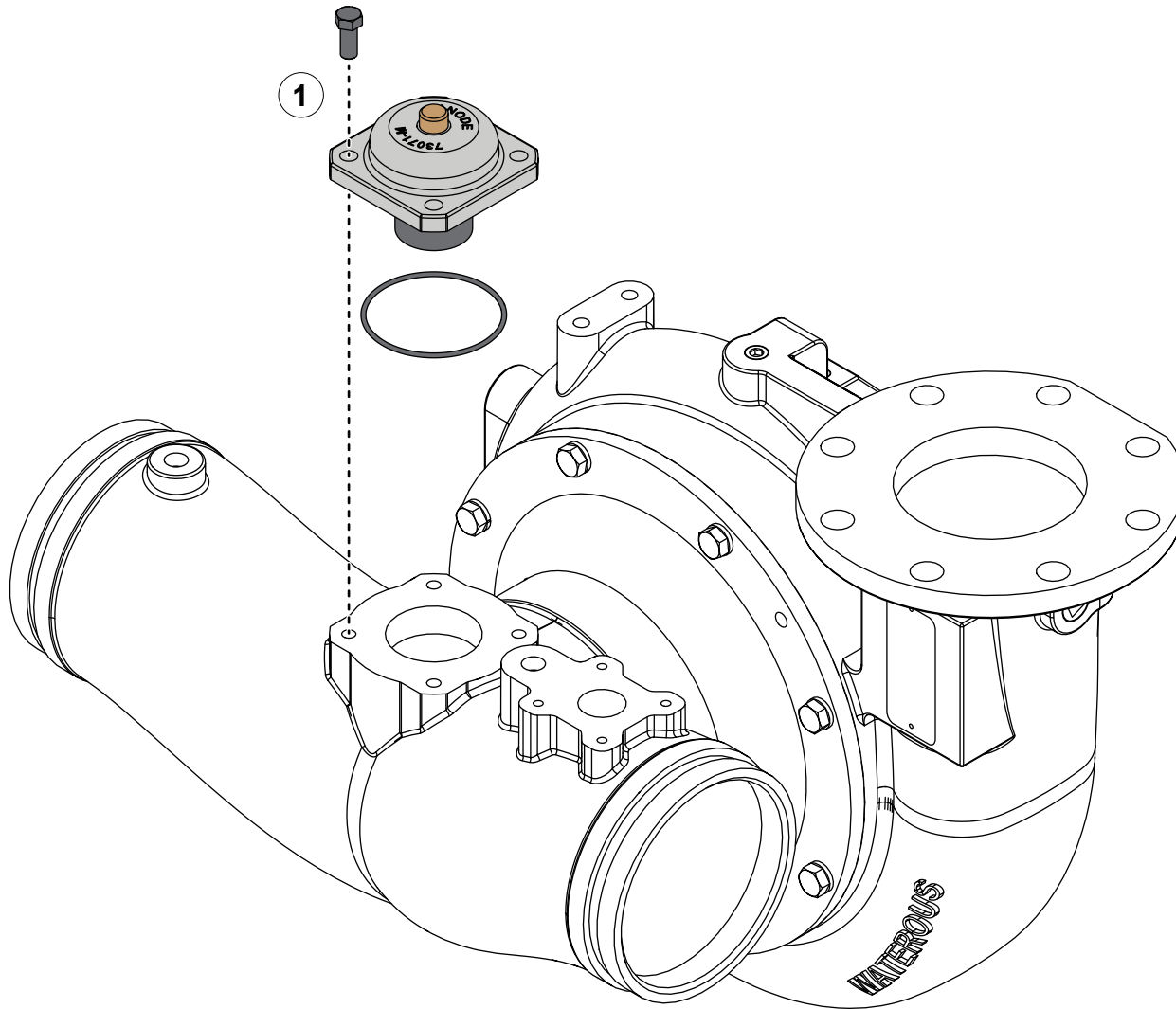


Use the illustration and instructions to add oil to the direct-drive pedestal.

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

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

Replacing the Bolt-On Anode—Optional



Use the illustration and instructions to replace the optional bolt-on anode.

- 1 To inspect the anode, do the following:
 - Remove the 4 screws securing the bolt-on anode to the adapter.
 - Inspect the anodes and replace the assembly if more than half the anode is depleted.
 - Discard or recycle the depleted assembly in accordance with local regulations.
 - Inspect the O-ring for deterioration and replace it if necessary.
 - Install the bolt-on anode.

WATEROUS

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