

# WATEROUS

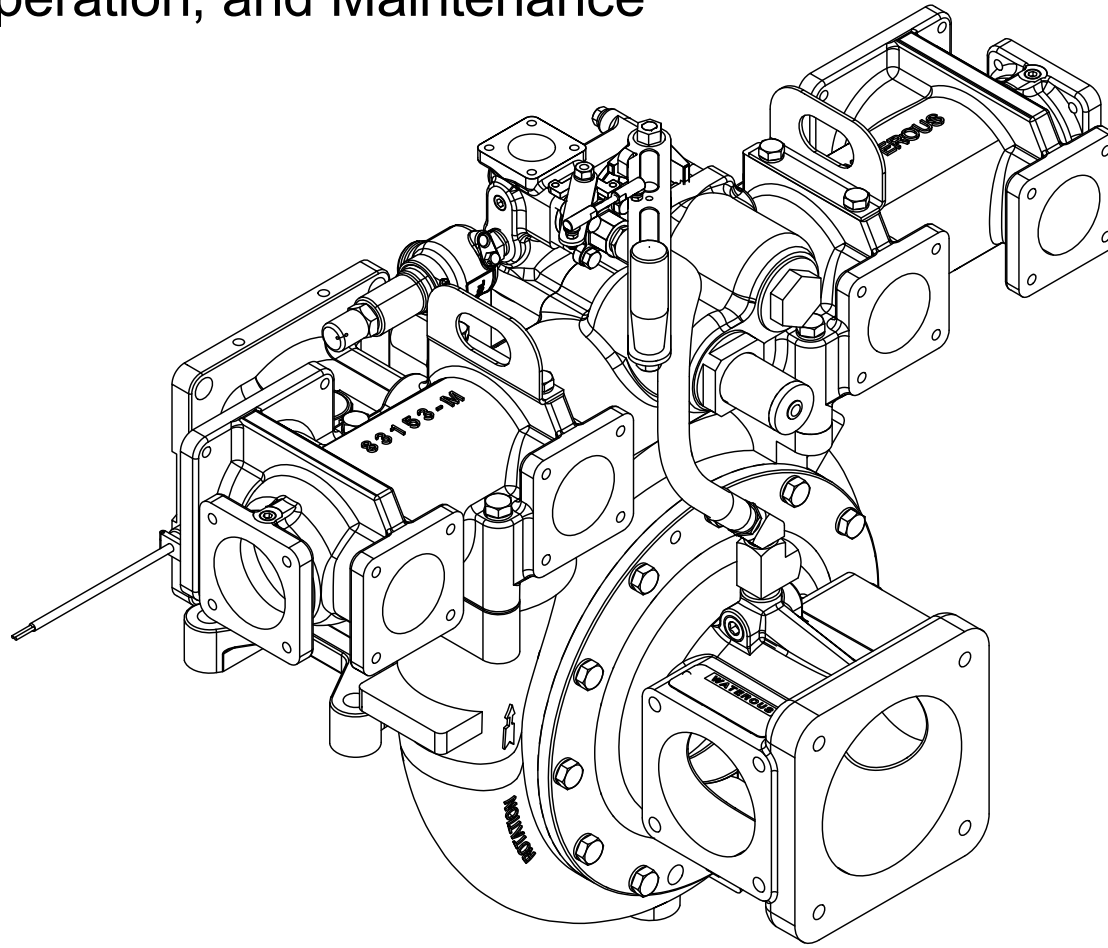
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## HLU Series Fire Pump

### Installation, Operation, and Maintenance

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## Safety Precautions

- Read and understand all the associated documentation before you begin the installation.
- 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 about installing, operating, or maintaining the equipment.
- Do not install the equipment if you are not familiar with the tools and skills needed to safely perform the required procedures—proper installation is the responsibility of the purchaser.
- Do not operate the equipment when safety guards are removed.
- Do not modify the equipment.

Regularly check for leaks, worn, or deteriorated parts.

## NOTICE

### Before Operation

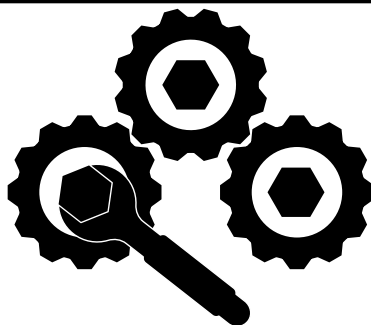
- Read and understand all the instructions provided.
- Check all fluid levels and replenish if necessary.
- Remove all shipping plugs and install the operation plugs or caps.



## NOTICE

### Modification

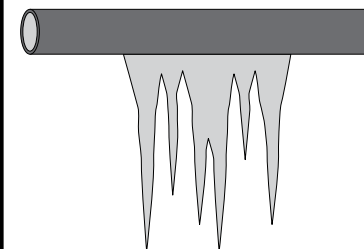
- Modifying the equipment can damage components and void your warranty.
- Do not modify the system or any of its components.



## NOTICE

### Freeze Damage

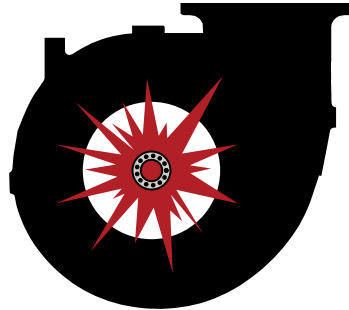
- Do not allow fluid in the lines to freeze.
- Remove all freezable fluid from the lines before storing the apparatus.



# NOTICE

## Premature Failure

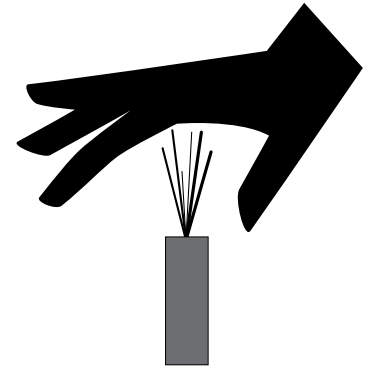
- Premature component failure occurs when operating beyond system specifications.
- Do not operate the system beyond specifications.



# ! WARNING

## High Pressure

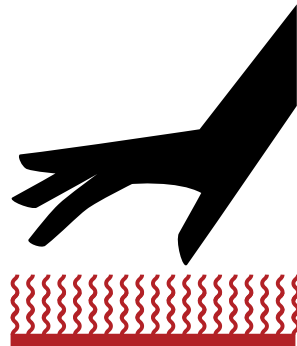
- Liquid ejected at high pressure can cause serious injury.
- Drain the pump after use and before servicing.



# ! WARNING

## Hot Surface

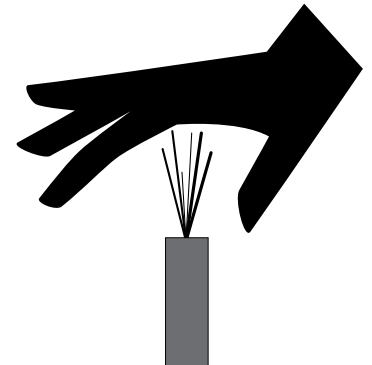
- Hot surface can burn you.
- Do not touch the surface during operation—allow it to cool after operating.



# ! WARNING

## High Pressure

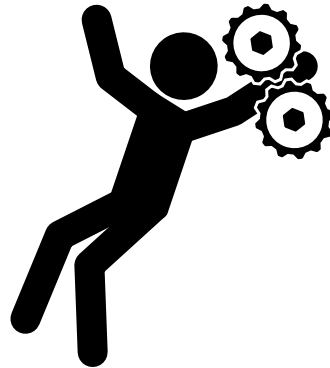
- Liquid ejected at high pressure can cause serious injury.
- Do not operate beyond recommended pressure.



## ! WARNING

### Moving Parts

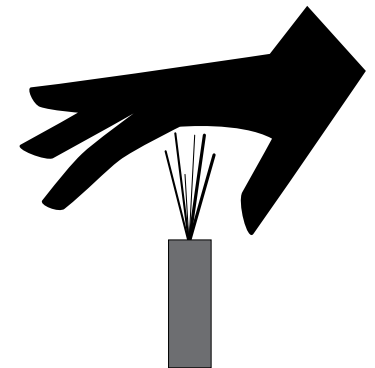
- Rotating parts can cause severe injury or death
- Keep clear of moving parts when the equipment is operating.



## ! WARNING

### High Pressure

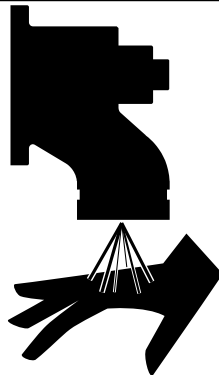
- Liquid ejected at high pressure can cause serious injury.
- Purge all pressure before servicing.



## ! WARNING

### High Pressure

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



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.

### INSTALLATION

This section describes the installation and initial setup procedures.

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

## Additional Documentation

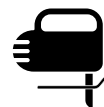
Additional documentation is available through the MyWaterous login at [Waterousco.com](http://Waterousco.com). Use your serial number to gain access to the service parts list associated with your system. Dimensional drawings are available through the Waterous Service department.

## Symbols

Here are the symbols found in the document a their definitions.



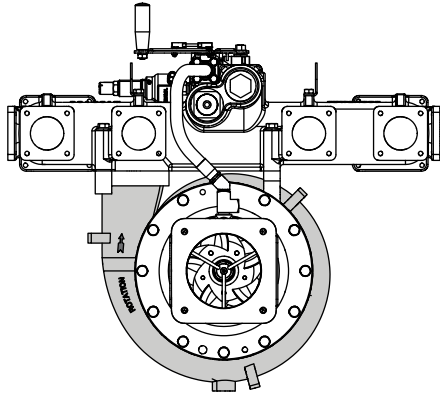
Drill—This symbol tells you to drill the mounting holes in the apparatus.



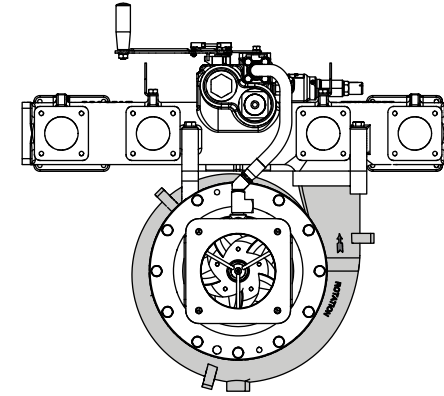
Jig saw—This symbol tells you to make a cutout in the apparatus.

## HLU Series Pump Overview and Versions

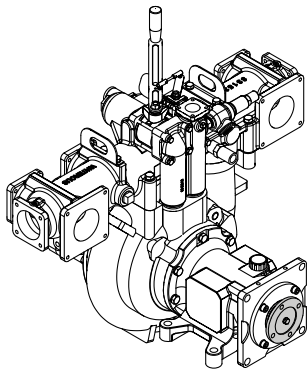
The HLU series pump has a discharge manifold with 8 normal pressure discharges and 1 high-pressure discharge. A lever on the pump opens a crossover valve that diverts a portion of the incoming water into the high-pressure discharge, while simultaneously operating the remaining discharges. The pump is available in several variations. Pump variations include clockwise and counterclockwise rotation, as well as direct drive, or with a transmission. Optional priming and foam generation systems are also available.



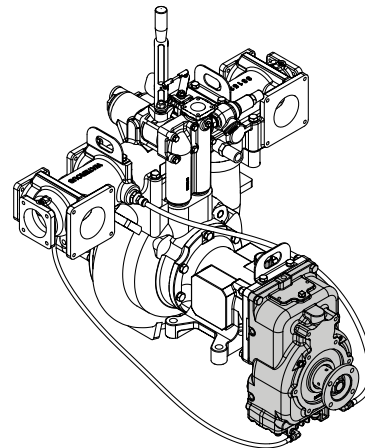
**Clockwise Rotation**



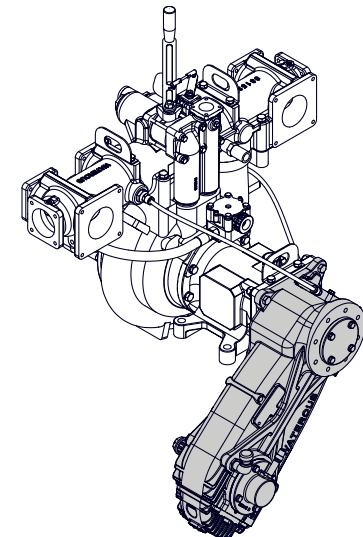
**Counterclockwise Rotation**



**With Direct Drive—HLUD**



**With K-Transmission—HLUK**

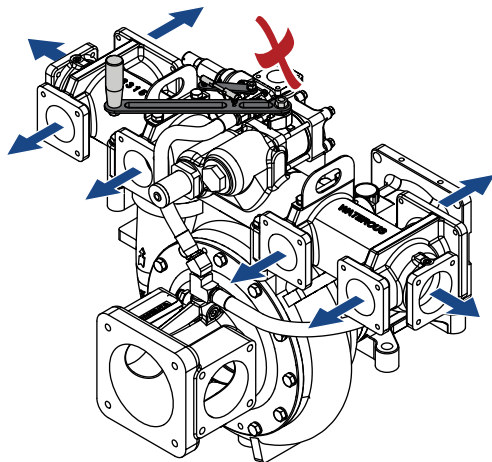


**With PA-Transmission—HLUPA**



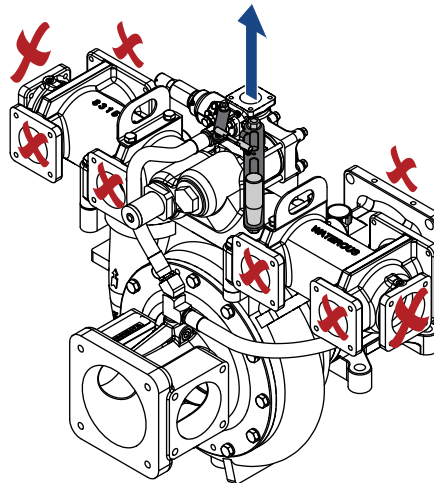
## HLU Pump Operation Overview

You can operate the pump in 3 modes: high pressure, low pressure, and simultaneous mode. Each mode is achieved by opening or closing a combination discharges. Access low pressure mode by closing the crossover valve and opening the low pressure discharges. Access high pressure mode by opening the crossover valve and closing the low pressure discharges. Access simultaneous mode by opening both the crossover valve for high pressure discharge and the low pressure discharges. You can open and close the crossover valve manually by using the handle, or with the optional pneumatically actuated pressure mode control module.



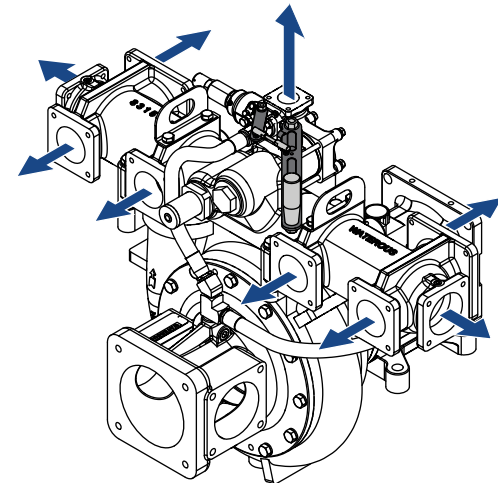
**Low Pressure Mode**

Access low pressure mode by opening only the low pressure discharges.



**High Pressure Mode**

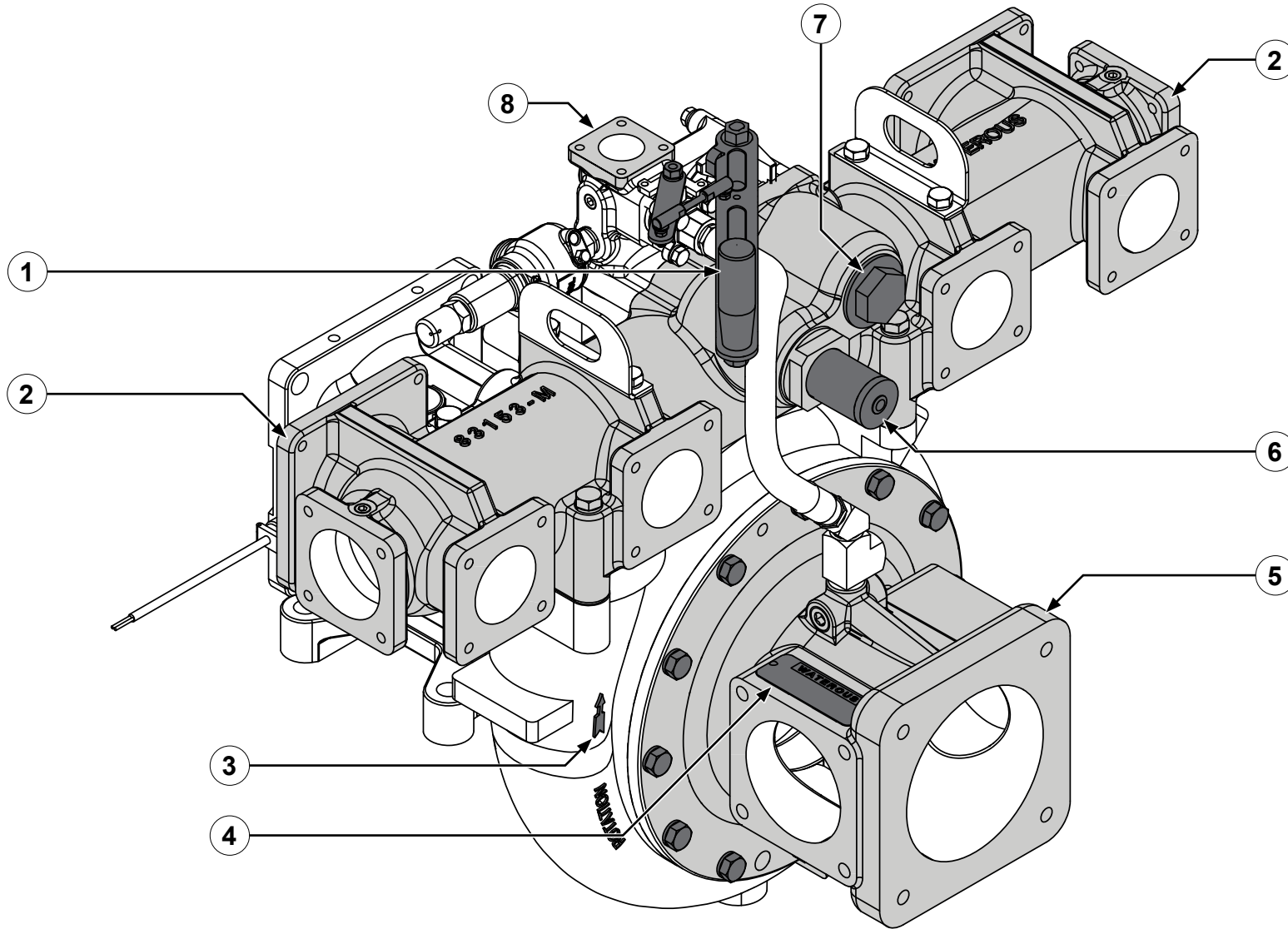
Access high pressure mode by opening only the high pressure discharge.



**Simultaneous Mode**

Access simultaneous pressure mode by opening both the low pressure and high pressure discharges.

### Pump Components—Intake Side

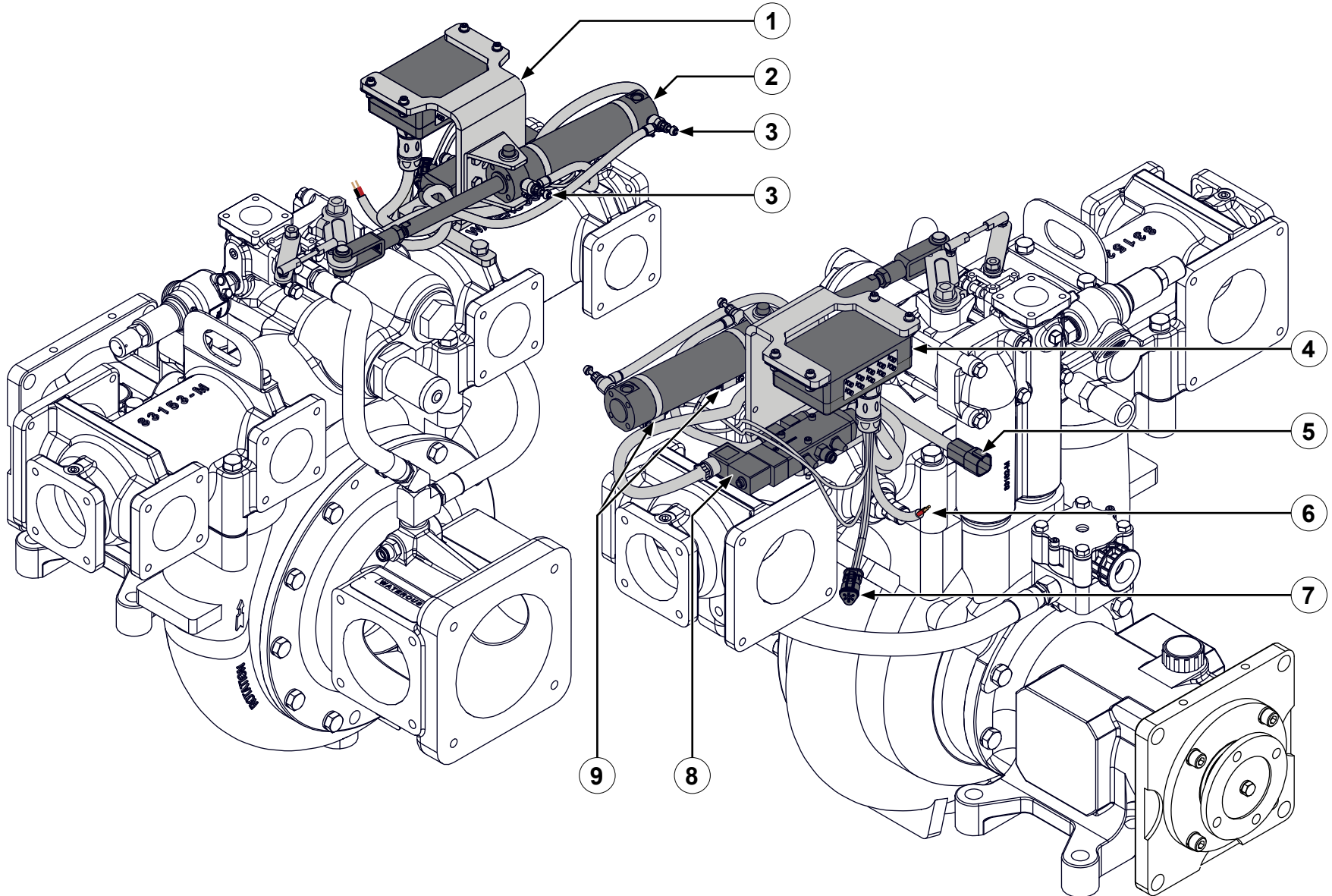


## Fire Pump Components—Intake Side

Feature	Description
1 Crossover valve handle	This opens and closes the crossover valve that diverts a portion of the incoming water into the high-pressure discharge.
2 Low-pressure discharge manifold	The low pressure discharge offers 6 outlets for 65 mm adapters and 2 outlets for 80 mm adapters. You can install a blind flange or 1 to 3-inch tapped flanges to the outlets.
3 Rotation indicator	This indicates the impeller rotation.
4 Serial number plate	This displays the pump serial number.
5 Intake manifold	This is the inlet for the pump—various intake configurations are available.
6 Internal-pressure relief valve	This pressure relief valve opens when a predetermined pressure is reached in the discharge manifold.
7 Intake strainer	This collects debris that would otherwise flow through the system.
8 High-pressure discharge	This is the discharge for the high-pressure stage.

## Pressure Mode Controller—Optional

The pressure mode controller allows you to remotely actuate the crossover valve. The pressure mode controller is available as a factory installed option.

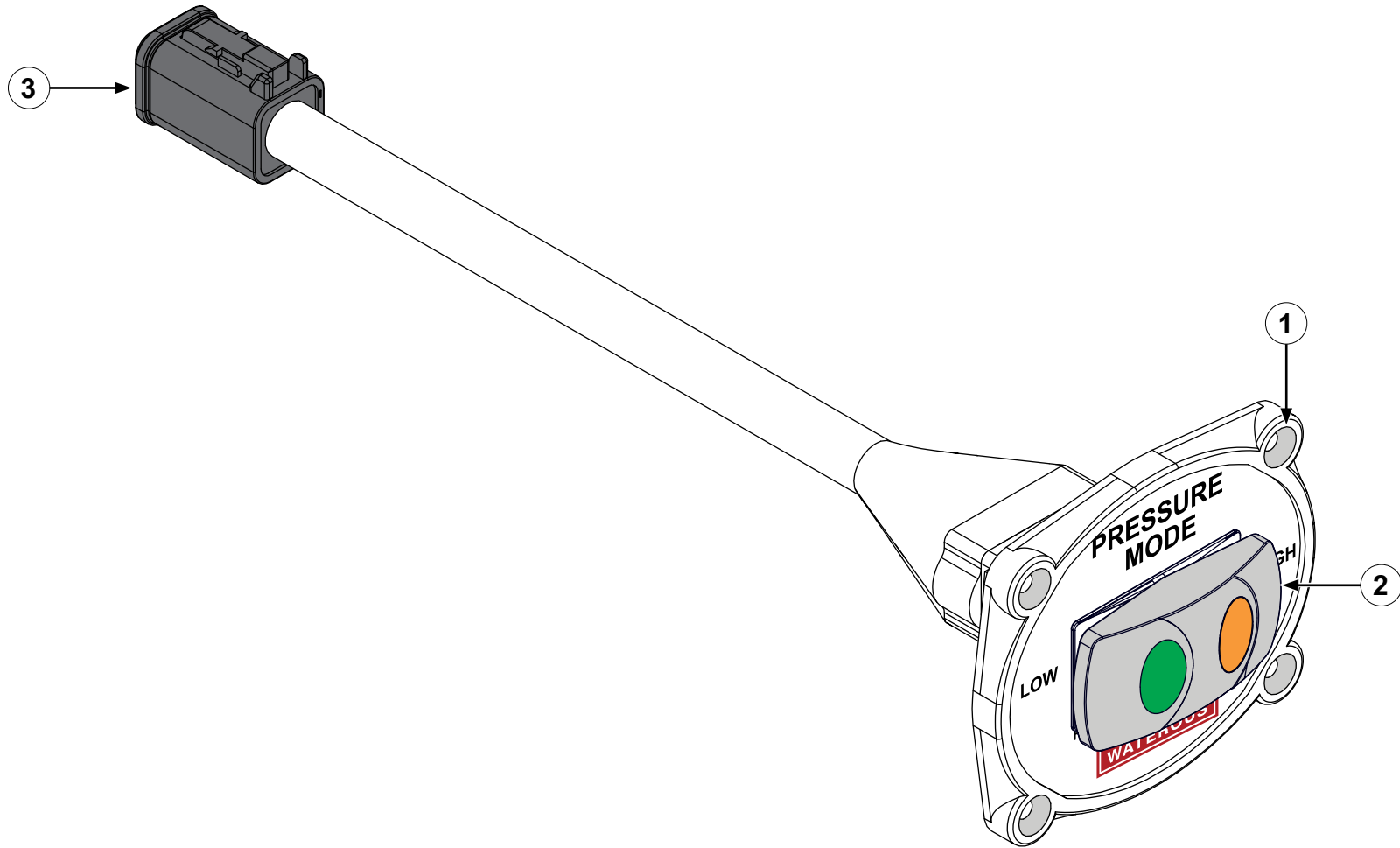


## Pressure Mode Controller—Optional

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Feature	Description
1 Bracket	This mounts the controller to the pump.
2 Cylinder	This controls the actuation speed of the cylinder.
3 Flow control	This controls the cylinder movement.
4 Controller	This houses the electronics and manages operation.
5 Actuator switch connector	This connects to the pressure mode switch—DT04-6P.
6 Power wire	This connects to apparatus power—12 V.
7 CANbus connector	This connects to the apparatus CANbus—DT06-3S.
8 Solenoid valve	This actuates the cylinder.
9 Proximity sensors	This senses the cylinder shaft position.

# Pressure Mode Switch

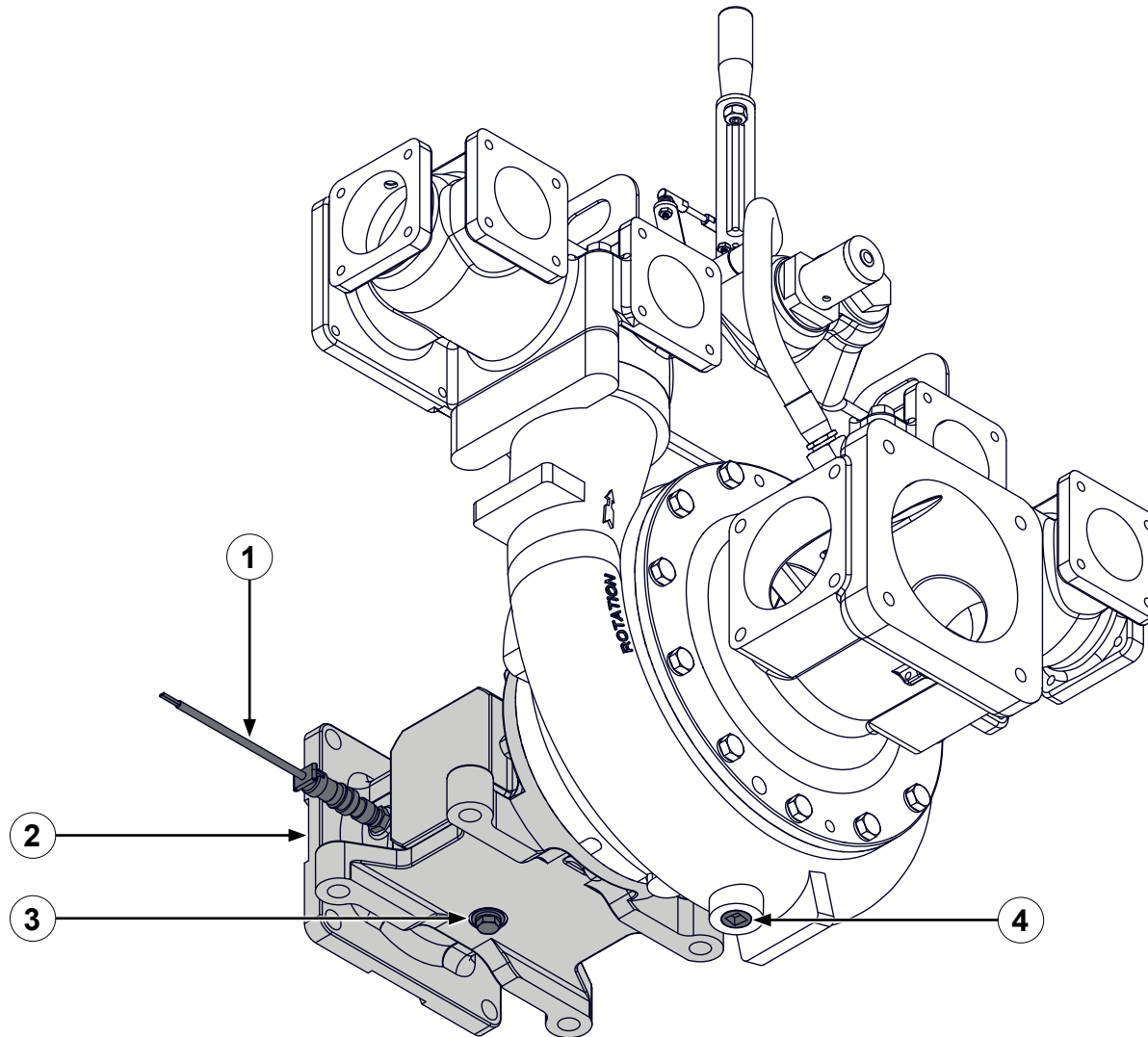


## Pressure Mode Switch

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Feature	Description
1 Mounting holes	This mounts the switch to the apparatus.
2 Mode switch	This operates the pressure mode controller.
3 Connector	This connects to the pressure mode controller—DT06-6S.

## Pump Components—Underside



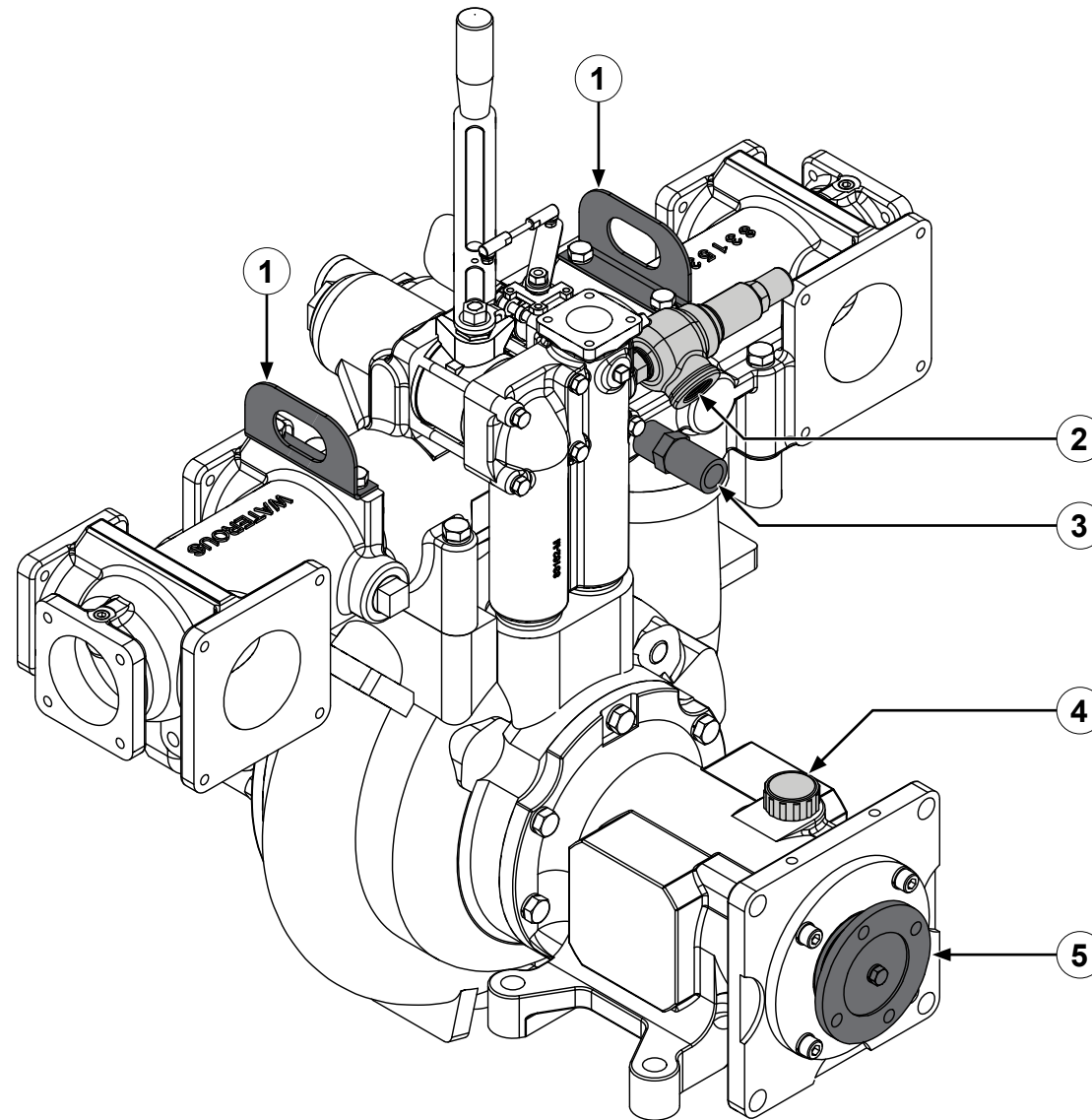


## Pump Components—Underside

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Feature	Description
1 Tachometer	This measures the impeller shaft rotational speed—4 pulses per revolution.
2 Pedestal	This mounts the pump to the apparatus.
3 Pedestal drain plug	This drains the oil from the pedestal.
4 Pump drain plug	This drains the water from the pump.

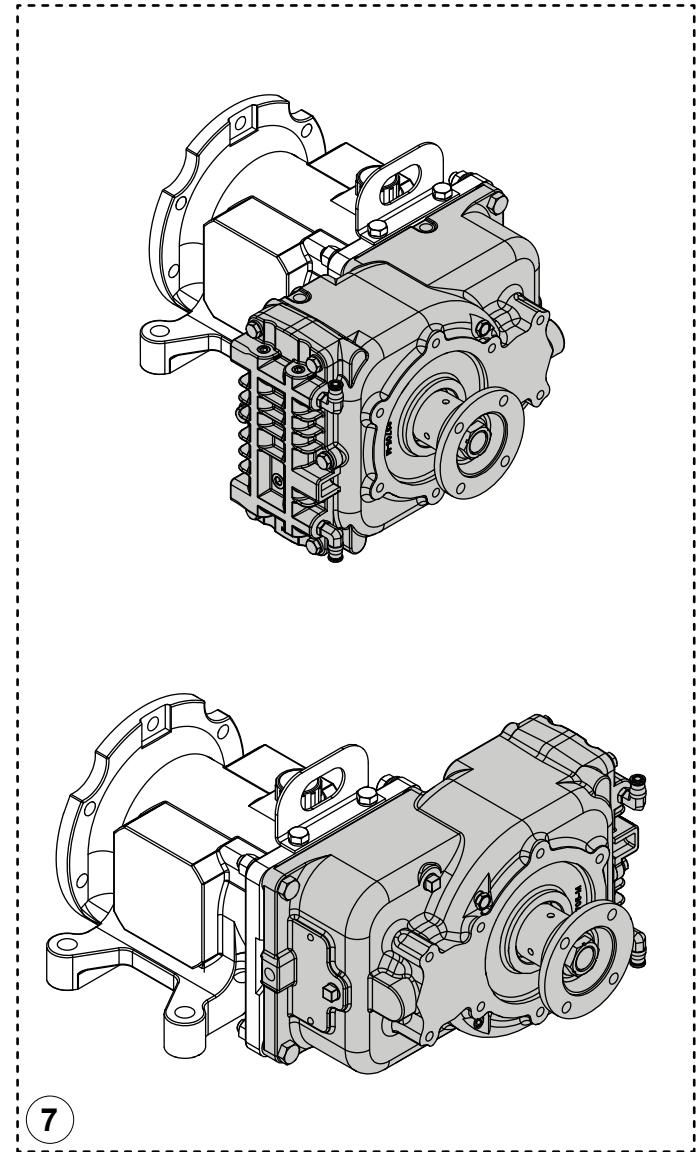
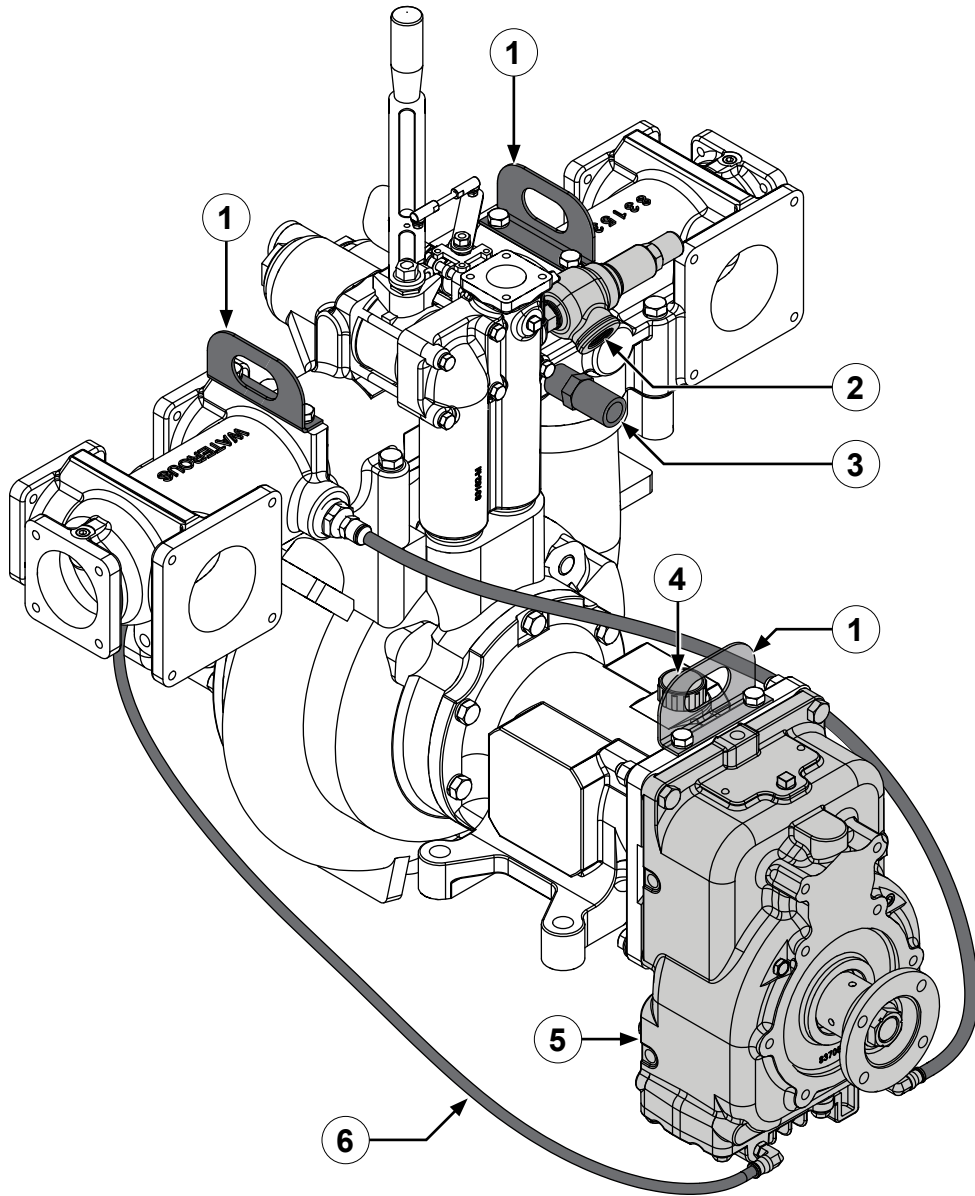
## Pump Components—Drive Side with Direct Drive



## Pump Components—Drive Side with Direct Drive

Feature	Description
1 Lift point	This provides access for a lift or hoist to position the pump assembly into the install location.
2 External pressure relief valve	<p>This pressure relief valve is set to open at approximately 650 psi (45 bar) at the factory. When open, the valve flows about 100 gpm (379 l/min), and resets when the pressure reduces to approximately 580 psi (40 bar).</p> <p>Alternatively, you can choose to substitute the external pressure-relief valve with one with the same specifications as the valve supplied by Waterous, or employ a speed-governor system that limits the pump speed to 3450 rpm when the high-pressure discharge is enabled.</p> <p><b>Note:</b> <i>The discharge plumbing for the external high-pressure relief must be directed away from people to avoid injury and equipment to avoid damage. It is the responsibility of the installer to make sure that a high-pressure control system for the high-pressure discharge is installed and operating properly before the pump is placed into service.</i></p>
3 Thermal relief valve	This opens when circulating water reaches a predetermined temperature, allowing cooler water to replace it.
4 Oil-fill cap	This is where oil is added to the pedestal.
5 PTO companion flange	This provides a connection for the PTO drive.

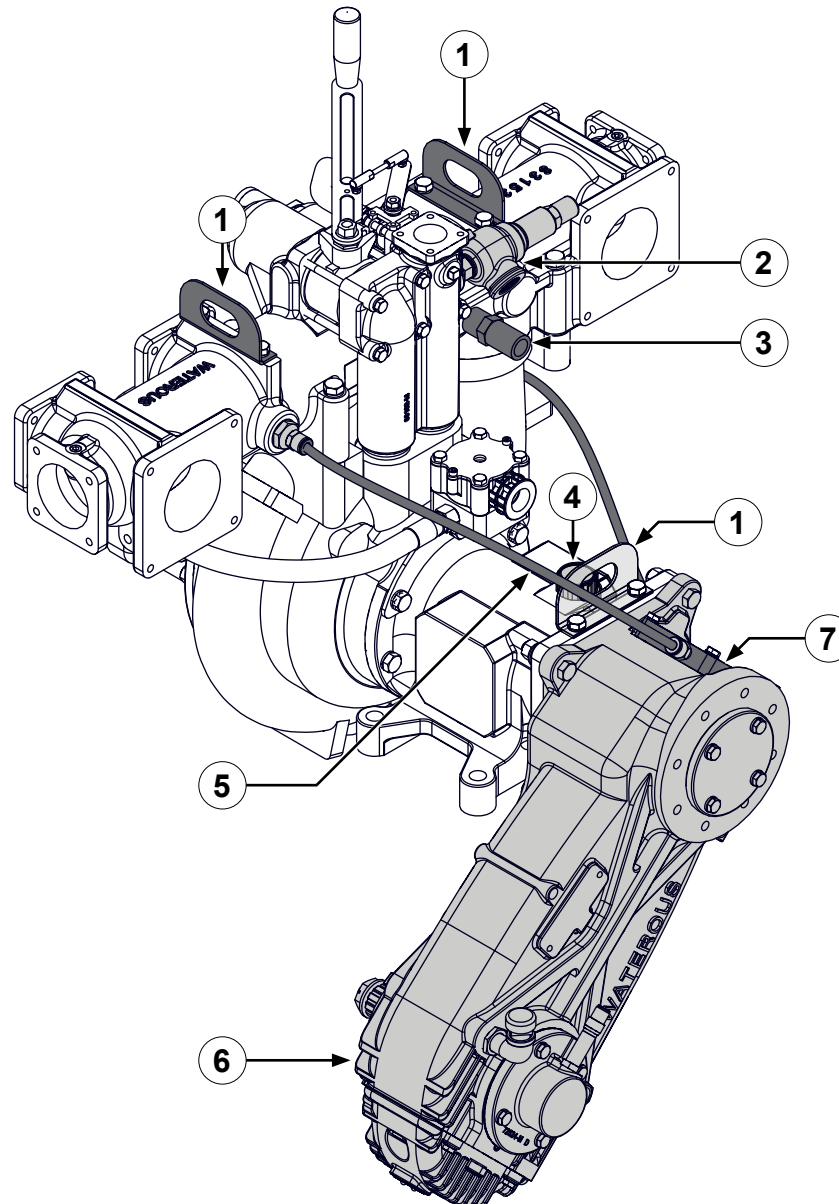
# Pump Components—Drive Side with K-Transmission



## Pump Components—Drive Side with Transmission

Feature	Description
1 Lift point	This provides access for a lift or hoist to position the pump assembly into the install location.
2 External pressure relief valve	<p>This pressure relief valve is set to open at approximately 650 psi (45 bar) at the factory. When open, the valve flows about 100 gpm (379 l/min), and resets when the pressure reduces to approximately 580 psi (40 bar).</p> <p>Alternatively, you can choose to substitute the external pressure-relief valve with one with the same specifications as the valve supplied by Waterous, or employ a speed-governor system that limits the pump speed to 3450 rpm when the high-pressure discharge is enabled.</p> <p><b>Note:</b> <i>The discharge plumbing for the external high-pressure relief must be directed away from people to avoid injury and equipment to avoid damage. It is the responsibility of the installer to make sure that a high-pressure control system for the high-pressure discharge is installed and operating properly before the pump is placed into service.</i></p>
3 Thermal relief valve	This opens when circulating water reaches a predetermined temperature, allowing cooler water to replace it.
4 Oil-fill cap	This is where oil is added to the pedestal.
5 Transmission	This provides an increase in the drive-line speed that is required by some applications—K-transmission shown.
6 Transmission orientation	This illustrates additional transmission orientations that are required by some applications.
7 Cooling line	This circulates water from the pump to cool the oil in the transmission.

## Pump Components—Drive Side with PA-Transmission



## Pump Components—Drive Side with PA-Transmission

Feature	Description
1 Lift point	This provides access for a lift or hoist to position the pump assembly into the install location.
2 External pressure relief valve	<p>This pressure relief valve is set to open at approximately 650 psi (45 bar) at the factory. When open, the valve flows about 100 gpm (379 l/min), and resets when the pressure reduces to approximately 580 psi (40 bar).</p> <p>Alternatively, you can choose to substitute the external pressure-relief valve with one with the same specifications as the valve supplied by Waterous, or employ a speed-governor system that limits the pump speed to 3450 rpm when the high-pressure discharge is enabled.</p> <p><b>Note:</b> <i>The discharge plumbing for the external high-pressure relief must be directed away from people to avoid injury and equipment to avoid damage. It is the responsibility of the installer to make sure that a high-pressure control system for the high-pressure discharge is installed and operating properly before the pump is placed into service.</i></p>
3 Thermal relief valve	This opens when circulating water reaches a predetermined temperature, allowing cooler water to replace it.
4 Oil-fill cap	This is where oil is added to the pedestal.
5 Cooling line	This circulates water from the pump to cool the oil in the transmission.
6 Transmission	This provides an increase in the drive-line speed that is required by some applications—PA-transmission shown.
7 Plate cooler	This cools the oil during operation.

## Operating Limits

Every application has operating limits. Do not exceed the maximum pressure or speed listed below during operation.

### Maximum pressure

- Low-pressure mode—250 psi (17 bar)
- High-pressure mode—600 psi (43 bar)

### Maximum speed

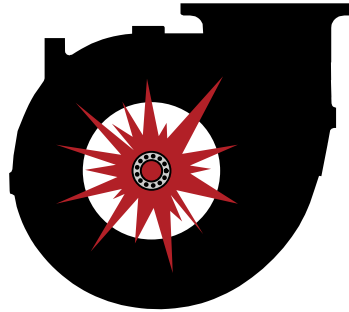
- Low-pressure mode—3950 rpm
- High-pressure mode—3450 rpm

Operating the pump beyond specified limits causes accelerated wear on components such as seals, bearings, and other parts—this can cause premature component failure.

## NOTICE

### Premature Failure

- Premature component failure occurs when operating beyond system specifications.
- Do not operate the system beyond specifications.



Operating the system beyond the operating limits or system specifications will void your warranty.

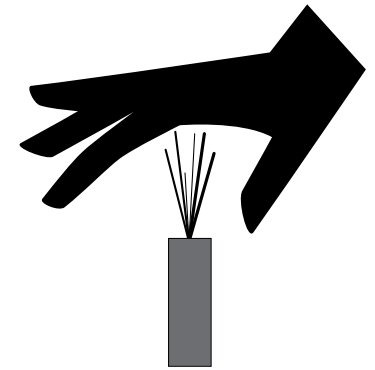
Operating the pump beyond recommended maximum pressure can cause liquid to eject at high pressure—this can cause injury to the operator and/or bystanders.



## WARNING

### High Pressure

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



Operating the system beyond the operating limits or system specifications will void your warranty.



## Installation Overview

This equipment is intended to be installed by a person or persons with the basic knowledge of installing similar equipment. Contact Waterous with questions about installing the equipment. The installation may require the following tasks and abilities:

- Locating, drilling, and cutting features into the apparatus.
- Routing and securing the wiring.
- Installing and securing plumbing.
- Calibration and final testing.

## Preparing for the Installation

Use the following guidelines before, during, and after the installation.

- Read and understand all the installation instructions before installing the equipment.
- Prepare a suitable, well-lit area, and gather all the necessary tools before you begin the installation.
- Make sure that you remove any shipping plugs or caps before installing the component.
- Make sure that you bring all fluids to operating levels before using the equipment.

# 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.



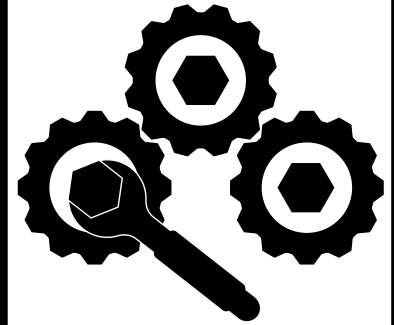
## Modifying the Equipment

This equipment is intended to operate as designed. Do not remove, modify, or change the components in the system. Doing so will void the warranty.

# NOTICE

## Modification

- Modifying the equipment can damage components and void your warranty.
- Do not modify the system or any of its components.



*Do not modify the system or any components. Doing so will void your warranty.*

## Determining the Pump Location

Use the following guidelines to determine a location to install the pump:

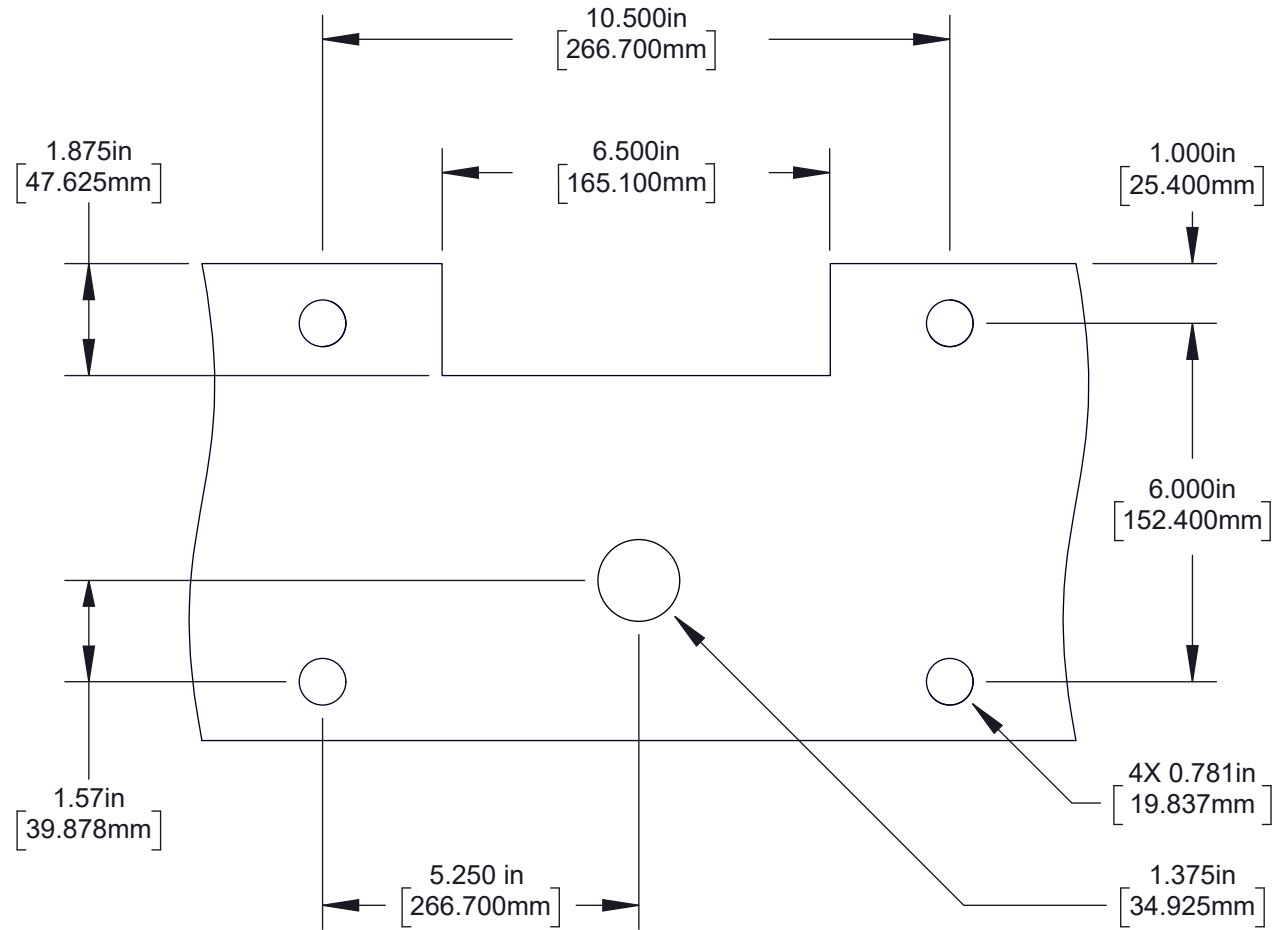
- Consider how the location influences the drive-shaft alignment.
- Consider hose and cable routing.
- Consider accessibility for operation and maintenance.
- Install the pump where it has minimal exposure to excessive dirt, road debris, and heat buildup.

## Determining Cable and Wire Routing

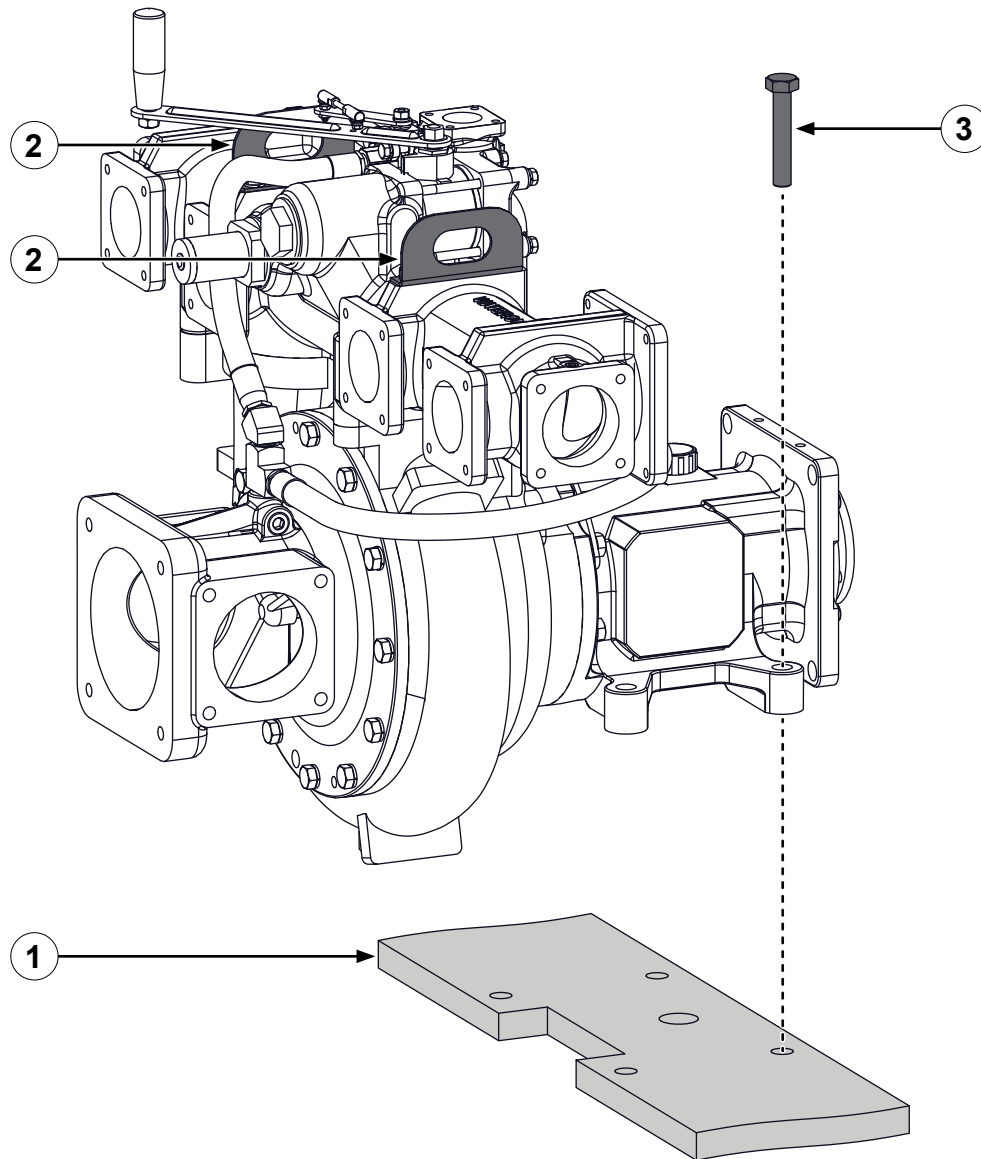
Use the *Wiring Best Practices* document, available at [www.waterousco.com](http://www.waterousco.com), as a guide to select and route wiring for your application.

## Mounting Holes and Flange Cutout

Use the illustration to locate and drill the pedestal mounting holes, the pump flange cutout, and drain-plug hole.



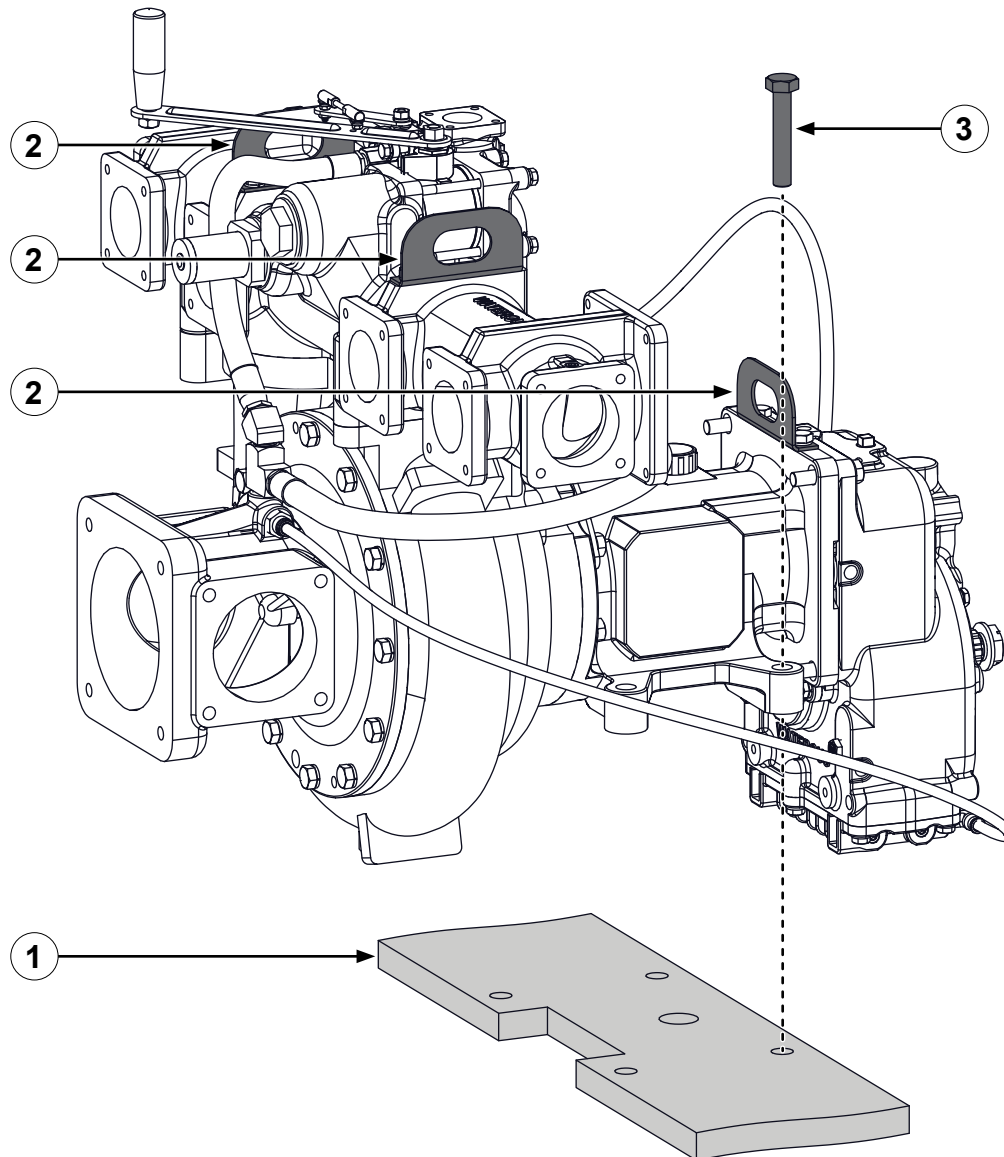
## Installing the Pump—HLUD



Use the illustration and instructions to install the pump. Locate the pump where you can access the mode handle, and perform regular maintenance. The pump location must comply with the drive-shaft requirements. Contact the drive shaft manufacturer for more information.

- 1 Locate and drill the mounting holes, and cut the flange cutout on the mounting plate. Refer to: **"Mounting Holes and Flange Cutout" on page 26.**
- 2 Use the lift-points to position the pump assembly into the install location.
- 3 Locally source the appropriate hardware to securely mount to the apparatus.

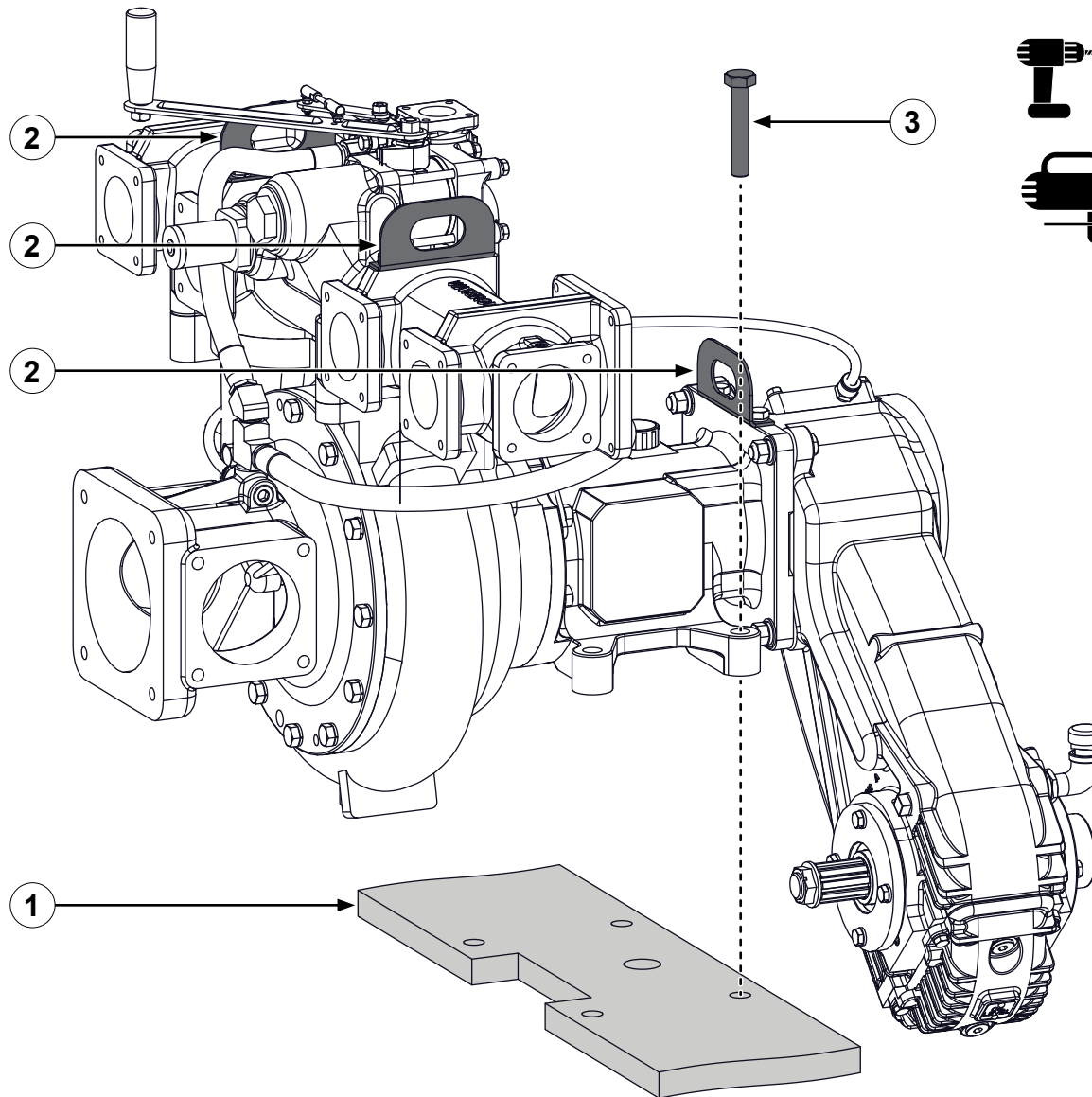
## Installing the Pump—HLUK



Use the illustration and instructions to install the pump. Locate the pump where you can access the crossover valve handle and perform regular maintenance. The pump location must comply with the drive-shaft requirements. Contact the drive shaft manufacturer for more information.

- 1 Locate and drill the mounting holes, and cut the flange cutout on the mounting plate. Refer to: **"Mounting Holes and Flange Cutout" on page 26.**
- 2 Use the lift-points to position the pump assembly into the install location.
- 3 Locally source the appropriate hardware to securely mount to the apparatus.

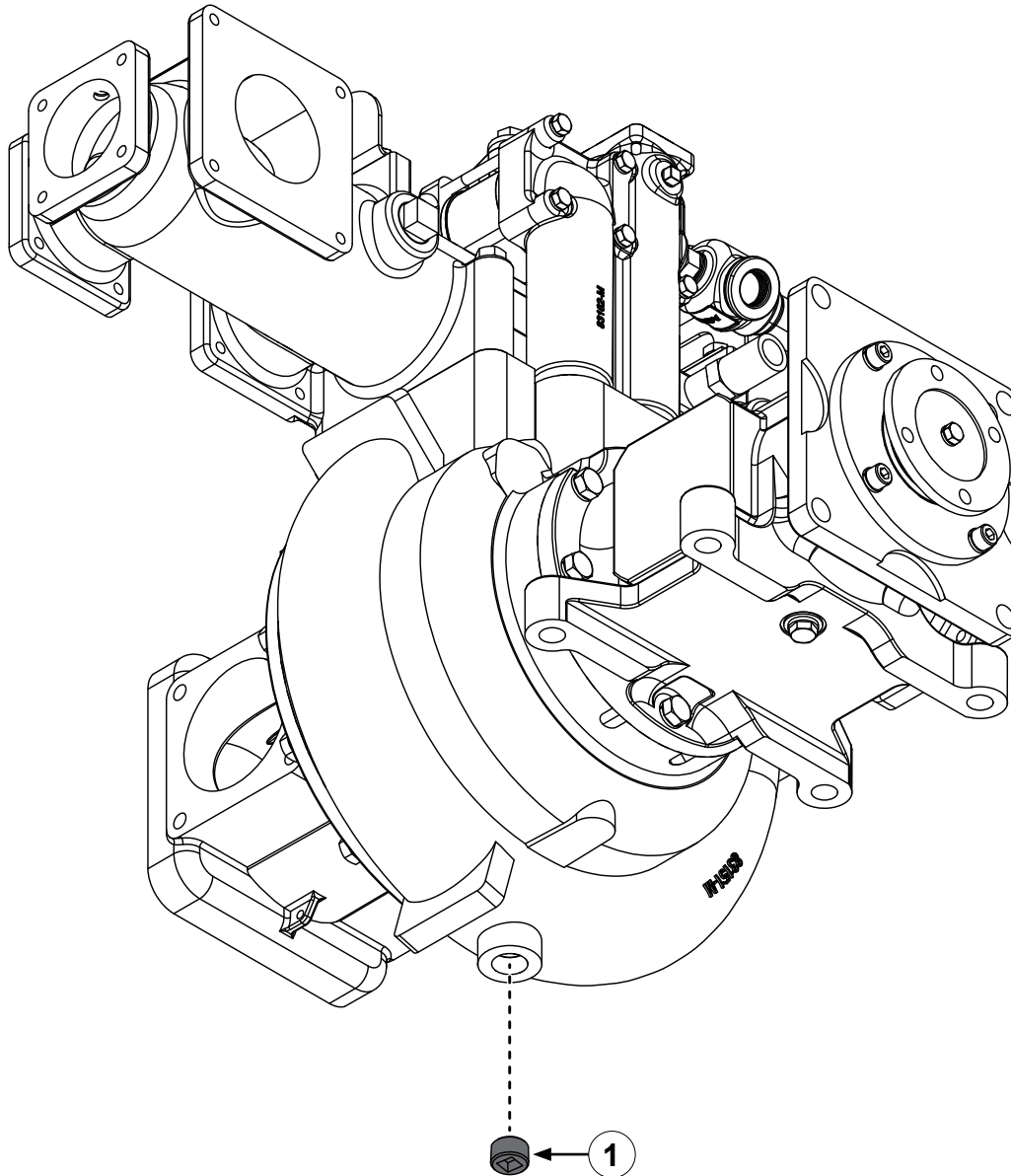
## Installing the Pump—HLUPA



Use the illustration and instructions to install the pump. Locate the pump where you can access the crossover valve handle and perform regular maintenance. The pump location must comply with the drive-shaft requirements. Contact the drive shaft manufacturer for more information.

- 1 Locate and drill the mounting holes, and cut the flange cutout on the mounting plate. Refer to: **"Mounting Holes and Flange Cutout" on page 26.**
- 2 Use the lift-points to position the pump assembly into the install location.
- 3 Locally source the appropriate hardware to securely mount to the apparatus.

## Installing the Pump Drain Lines—Pump Body

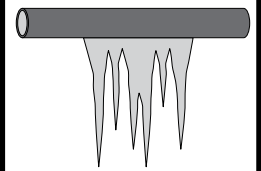


Use the illustration and instructions to install the pump drain line. All freezable fluids must be drained from the pump to prevent damage.

### NOTICE

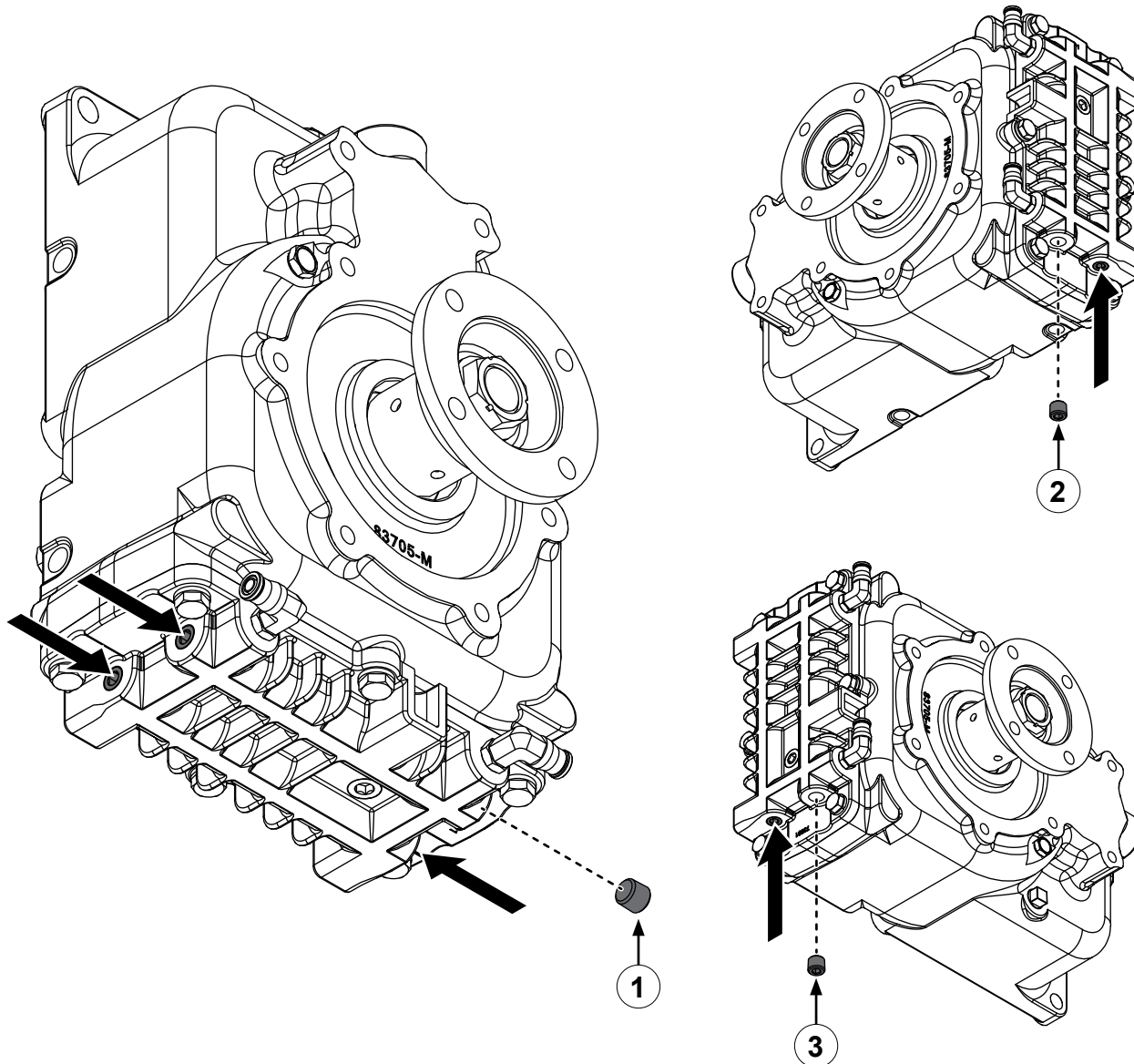
#### Freeze Damage

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



- 1 Install a drain line to the pump by performing the following:
  - Locate the drain port on the pump bottom.
  - Remove the drain plug.
  - Install the appropriate fittings and hoses to drain the pump when required.

## Installing the Transmission Drain Lines—K Transmission



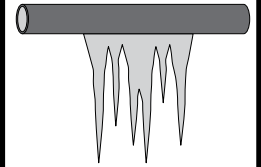
Use the illustration and instructions to install the transmission drain lines. All freezable fluids must be drained from the transmission to prevent damage.

**Note:** Multiple options are available for draining the oil cooler on the K-transmission. Consider your specific application when determining the appropriate drain port.

### NOTICE

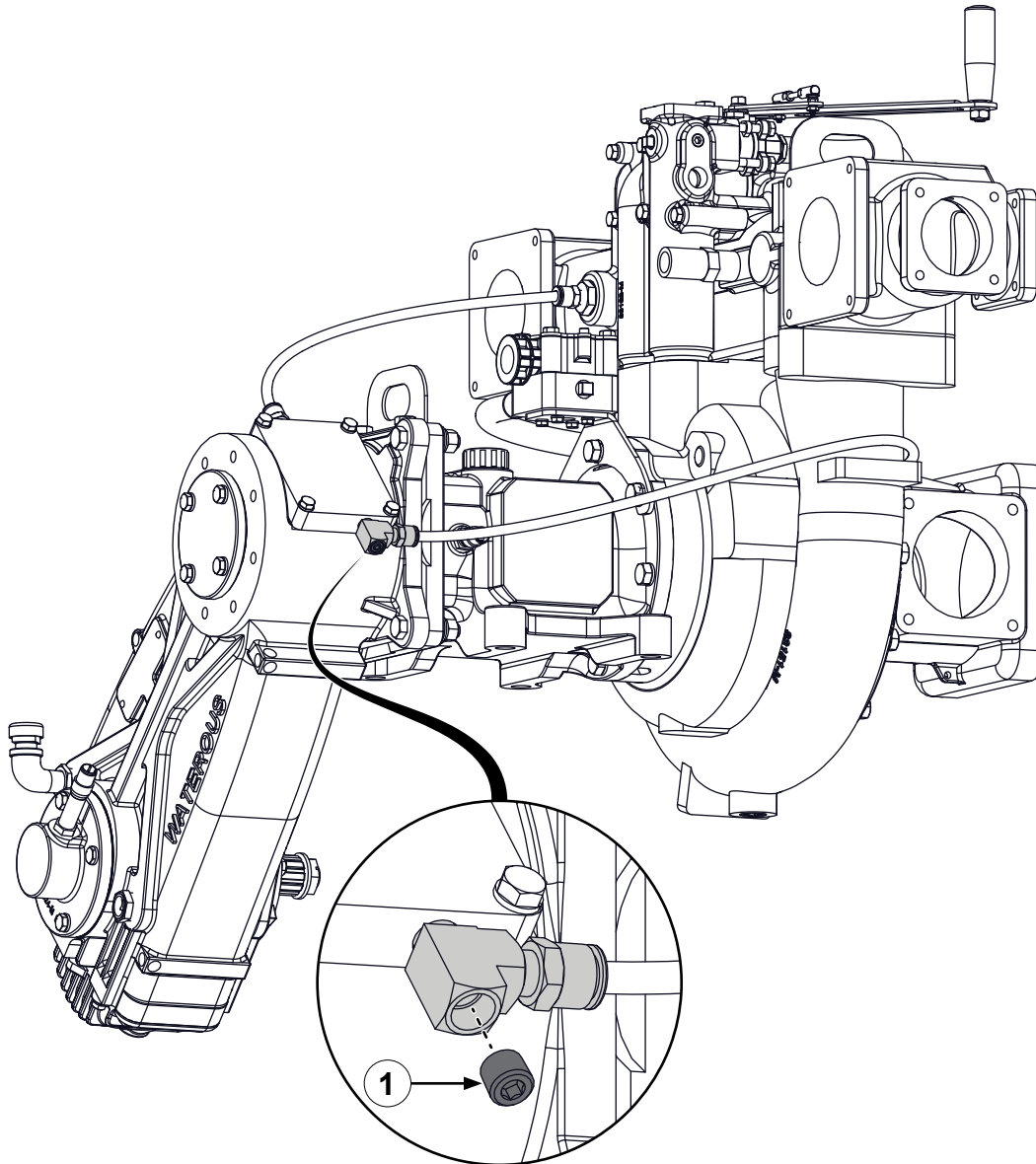
#### Freeze Damage

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



- For applications with a vertically mounted transmission, perform the following:
  - Locate the 4 drain ports on the case bottom.
  - Remove the appropriate drain plug.
  - Install the drain line to the transmission.
- For applications with a right-mount transmission, perform the following:
  - Locate the 2 drain ports on the case bottom.
  - Remove the appropriate drain plug.
  - Install the drain line to the transmission.
- For applications with a left-mounted transmission, perform the following:
  - Locate the 2 drain ports on the case bottom.
  - Remove the appropriate drain plug.
  - Install the drain line to the transmission.

## Installing the Transmission Drain Lines—PA Transmission

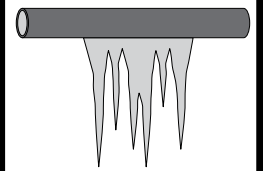


Use the illustration and instructions to install the transmission drain lines. All freezable fluids must be drained from the transmission to prevent damage.

### NOTICE

#### Freeze Damage

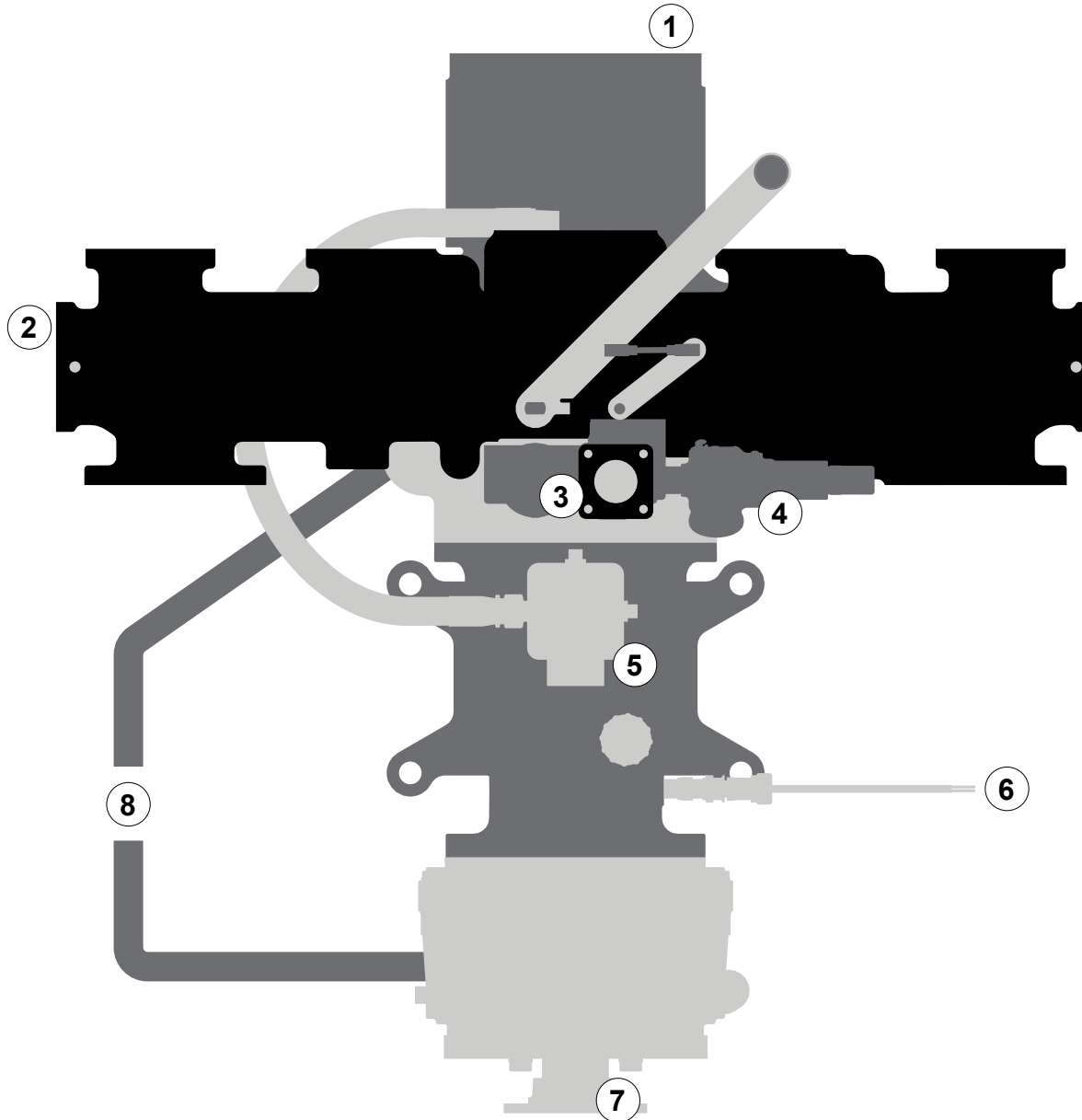
- Do not allow fluid in the lines to freeze.
- Remove all freezable fluid from the lines before storing the apparatus.



- 1 Install a drain line to the PA transmission by performing the following:
  - Locate the drain port on the cooler plate.
  - Remove the drain plug.
  - Install the appropriate fittings and hoses to drain the pump when required.



## Connecting the Pump



Use the illustration and instructions to connect the various pump components to the apparatus.

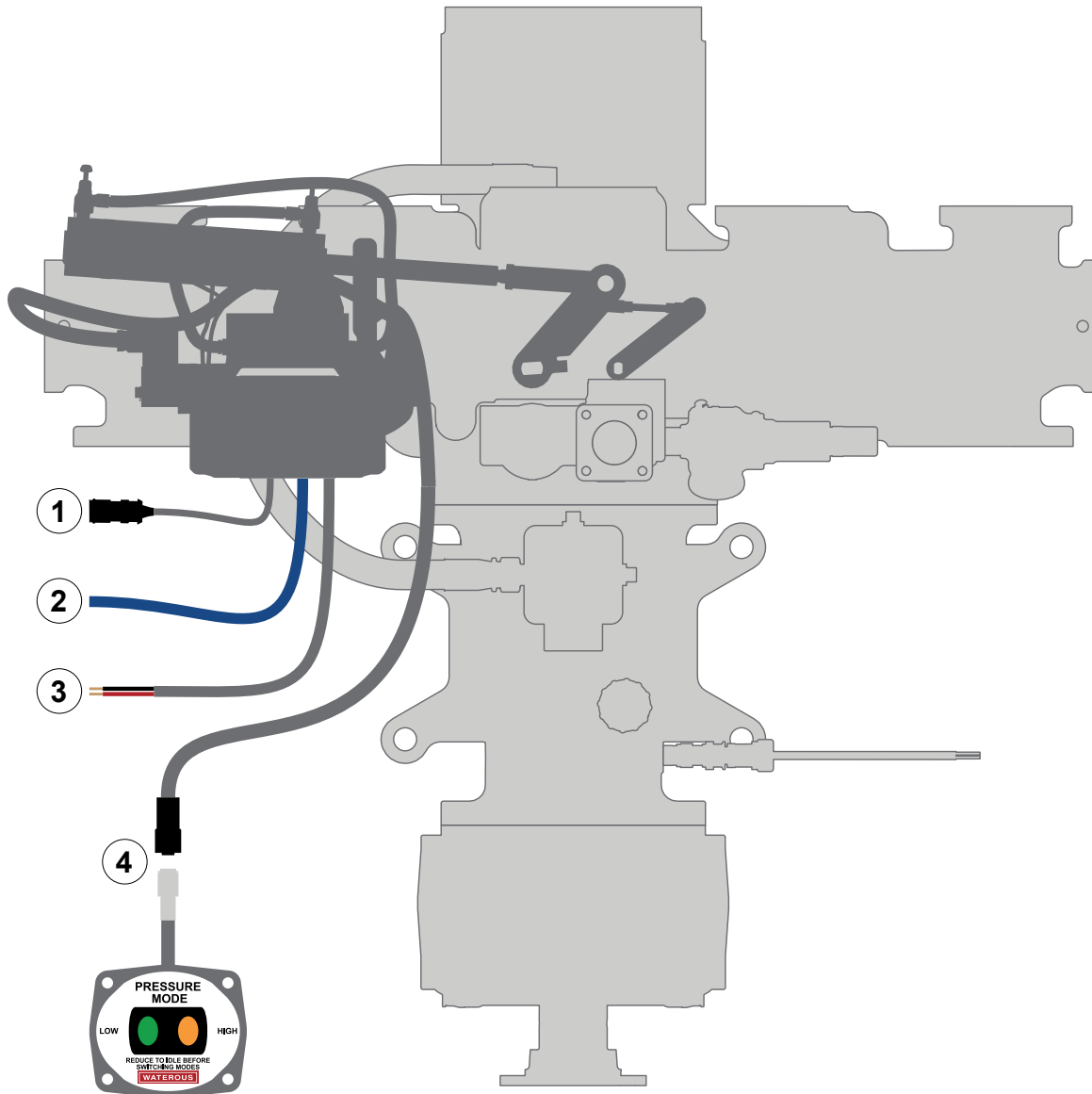
- 1 Connect the pump intake to a water source.
- 2 Connect the appropriate outlets on the low-pressure discharge manifold to the discharges on the apparatus.
- 3 Connect the high-pressure outlet to the high-pressure discharge on the apparatus.
- 4 Connect and plumb the external high-pressure relief valve.

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

**Note:** The discharge plumbing for the external high-pressure relief must be directed away from people to avoid injury, and equipment to avoid damage. It is the responsibility of the installer to make sure that a high-pressure control system for the high-pressure discharge is installed and operating properly, before the pump is placed into service.

- 5 Connect the priming system—if equipped.
- 6 Connect the speed sensor to the appropriate electronics.
- 7 Connect the drive to the transmission.
- 8 Install the drain lines.

## Connecting the Pneumatic Actuator



Use the illustration and instructions to connect the various pump components to the apparatus.

- 1 If applicable to your application, connect the CANbus connector to the CANbus controller.
- 2 Connect the solenoid valve to the compressed air supply.

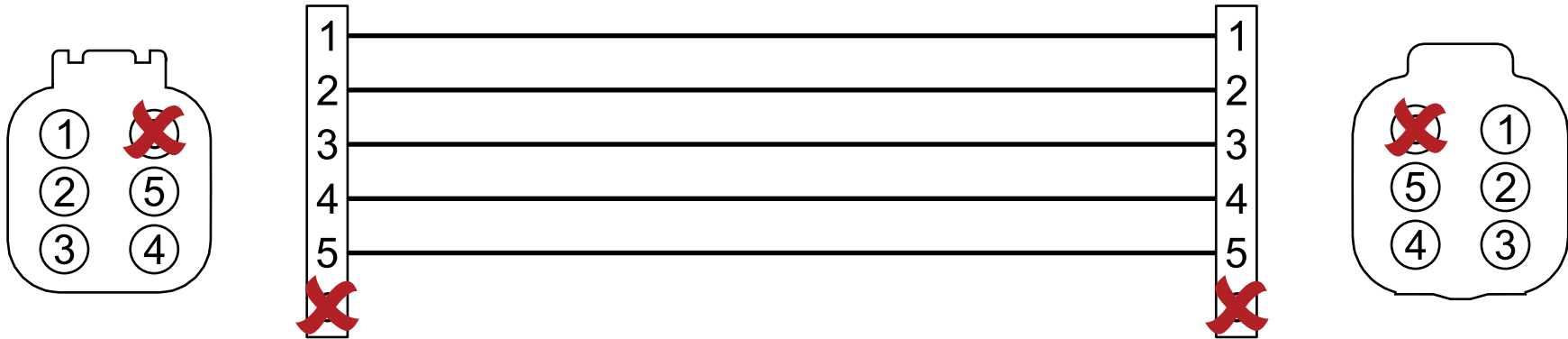
**Note:** A clean and dry air supply is required for consistent operation.

- 3 Connect power and ground from the apparatus:
  - Red or White = 12 V
  - Black = Ground
- 4 Connect the switch connector to the panel switch.

**Note:** Use the optional splitter cable if your application requires an additional pressure mode switch.

## Mode Switch Extension Cable

Your application may require an extension cable to connect between the mode switch and the controller. Use locally sourced components and the information below to construct an extension cable for your application.



### Deutsch Connector

- |   |            |
|---|------------|
| 1 | (+) LP LED |
| 2 | HP Switch  |
| 3 | Ground     |
| 4 | LP Switch  |
| 5 | (+) HP LED |
| 6 | Plugged    |

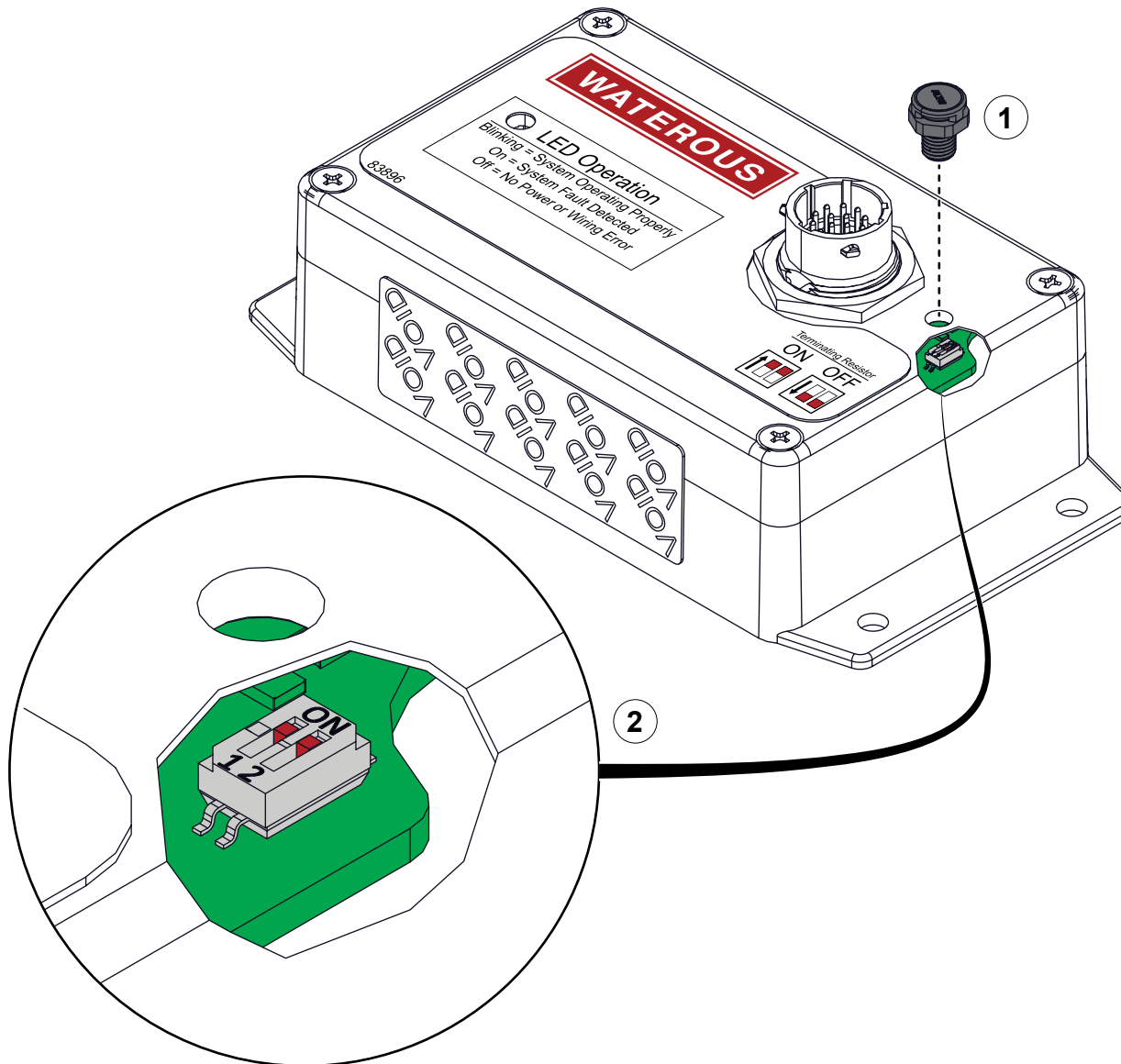
Deutsch DT06-6S or equivalent

### Deutsch Connector

- |   |            |
|---|------------|
| 1 | (+) LP LED |
| 2 | HP Switch  |
| 3 | Ground     |
| 4 | LP Switch  |
| 5 | (+) HP LED |
| 6 | Plugged    |



Deutsch DT04-6P or equivalent

## Setting the CANbus Terminating Resistor



Use the illustration and instructions to set the CANbus terminating resistor if your application uses CANbus communication.

- 1 Remove and set aside the vent plug. Install the vent plug after setting the dip switches.
- 2 Set the terminating resistor dip switches to the following:

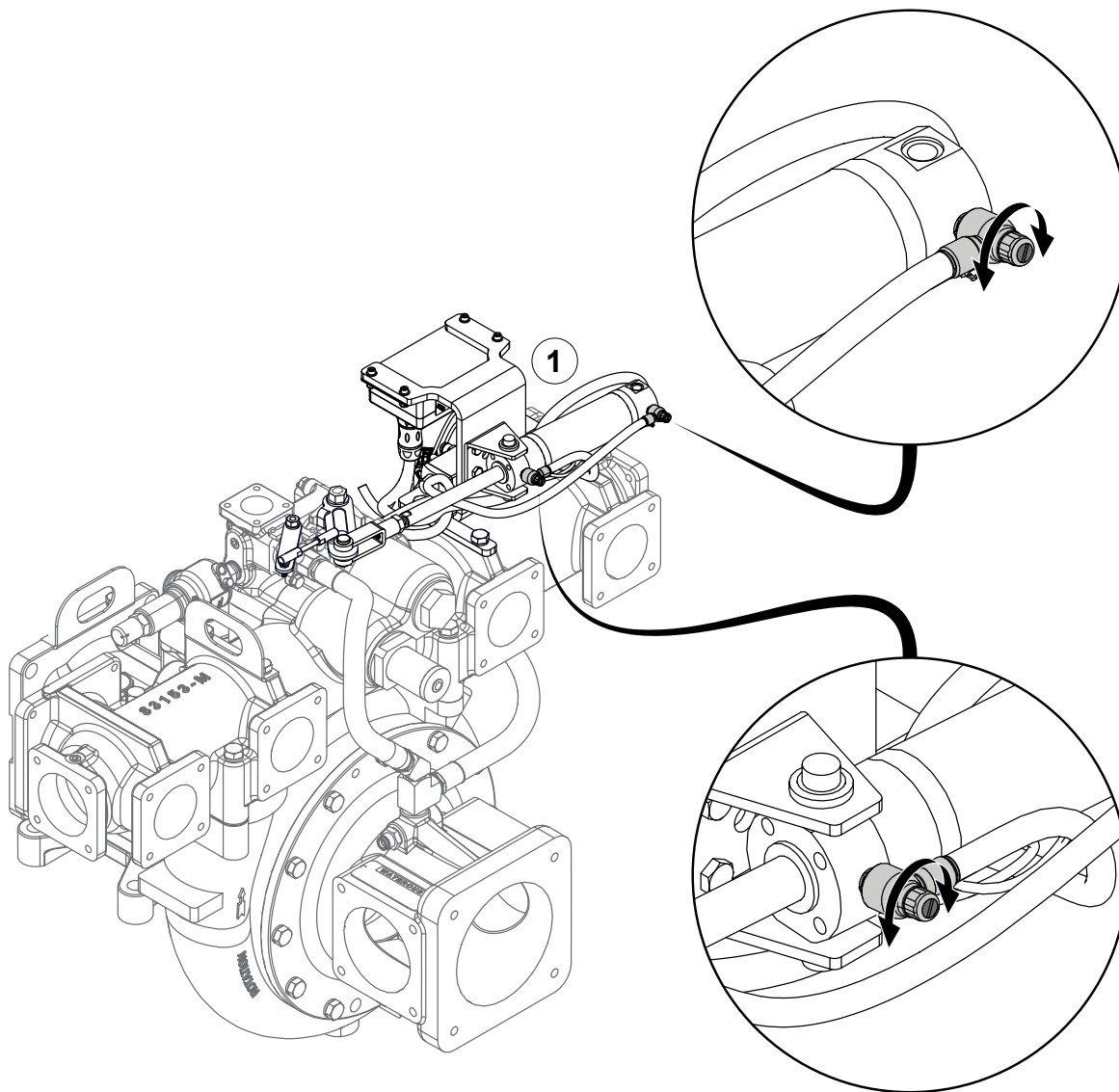
- Terminate CANbus = 
- Pass through CANbus = 

## Adjusting the Flow Controls

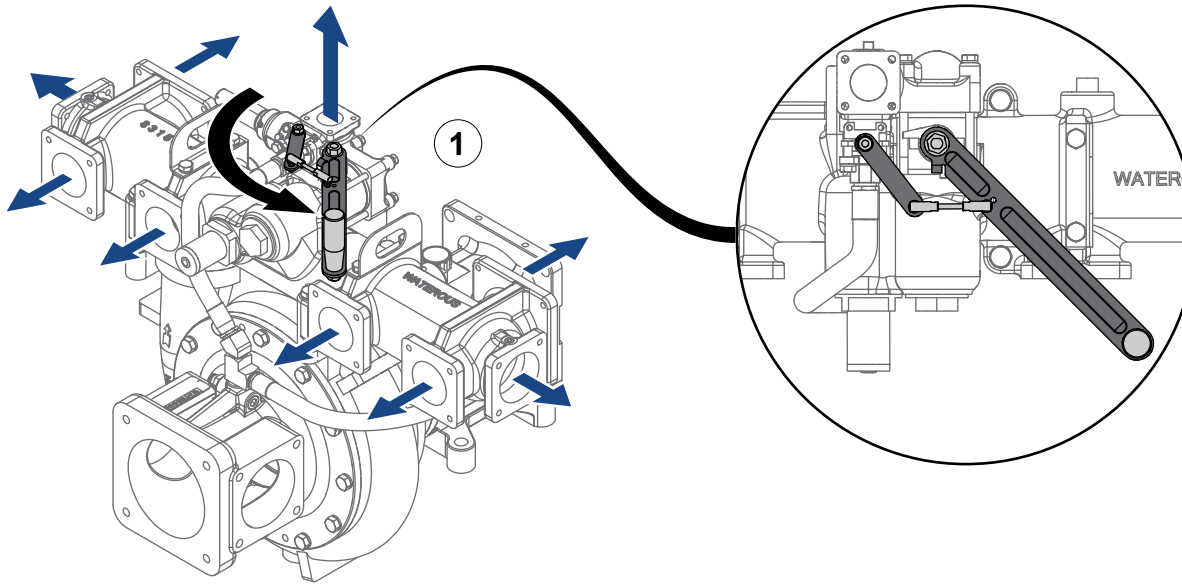
Use the illustration and instructions to adjust the flow controls on the cylinder.

1 Adjust this flow control valves to cause the cylinder to fully extend, or retract between 3 and 5 seconds. This is achieved by doing the following:

1. Fully open each valve.
2. Adjust each valve the same amount until the cylinder extends and retracts between 3 to 5 seconds.



## Enabling the High-Pressure Discharge—Manual Handle



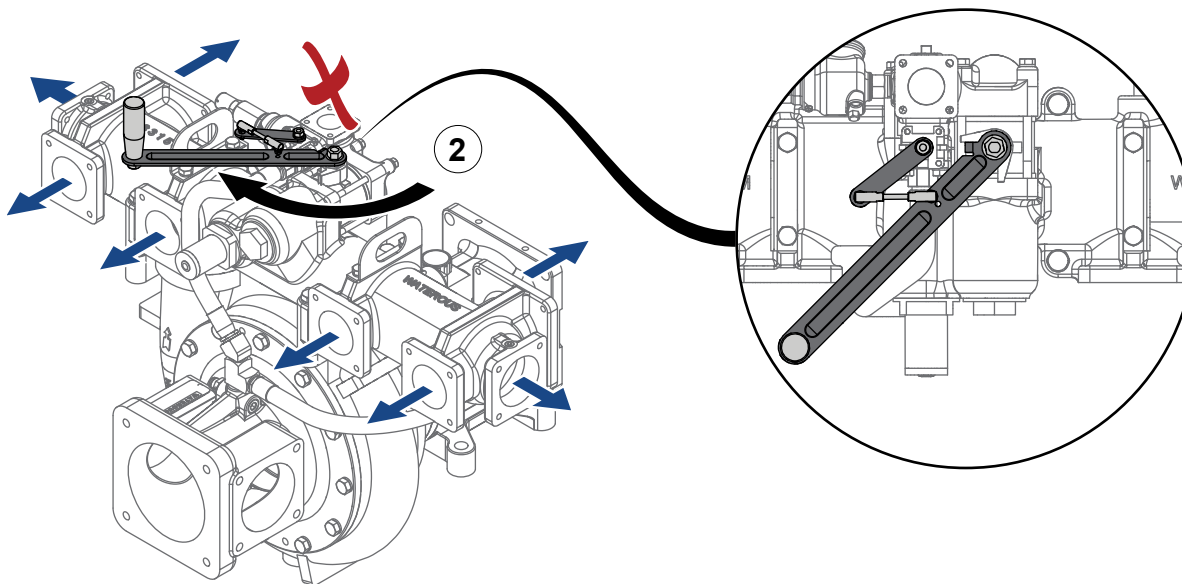
Use the illustrations and instructions to enable the high-pressure discharge.

**Note:** Make sure that you set the engine to idle before you engage the high-pressure discharge to avoid activating the external pressure relief valve or the speed governor system.

- 1 Position the handle to the right to enable the high-pressure discharge.
- 2 Position the handle to the left to disable the high-pressure discharge.

After operation, follow established procedures that include:

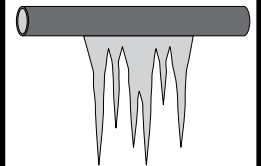
- Do not store the pump partially full. Completely fill, or drain, the pump before storage.
- Always drain the pump when freezing can occur.



### NOTICE

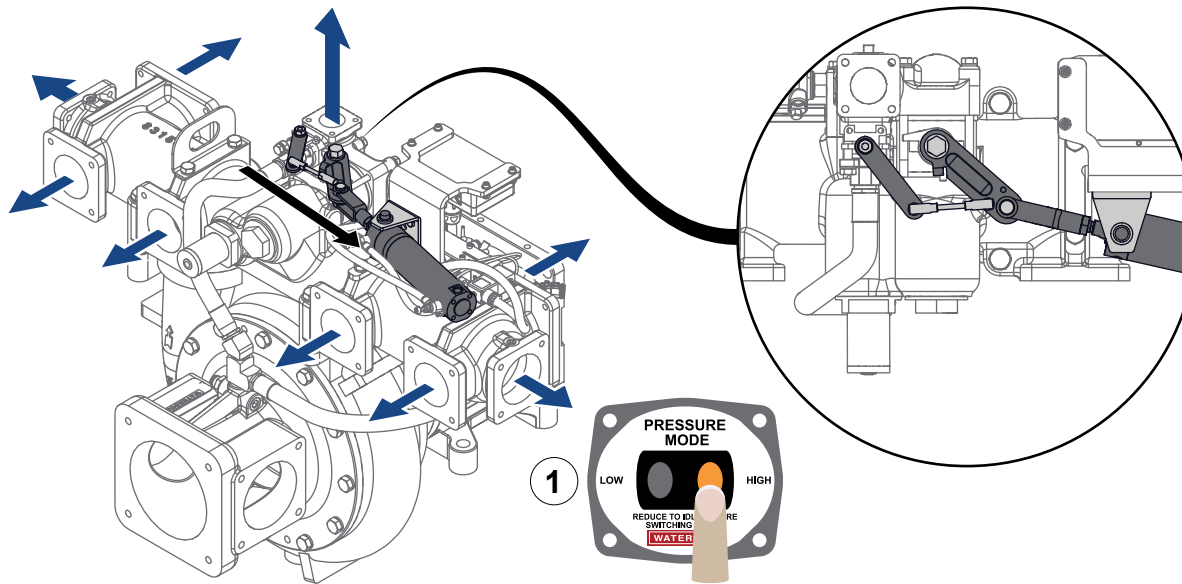
#### Freeze Damage

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



- Disable the pump drive when placing the apparatus into storage.

## Enabling the High-Pressure Discharge—Pressure Mode Controller



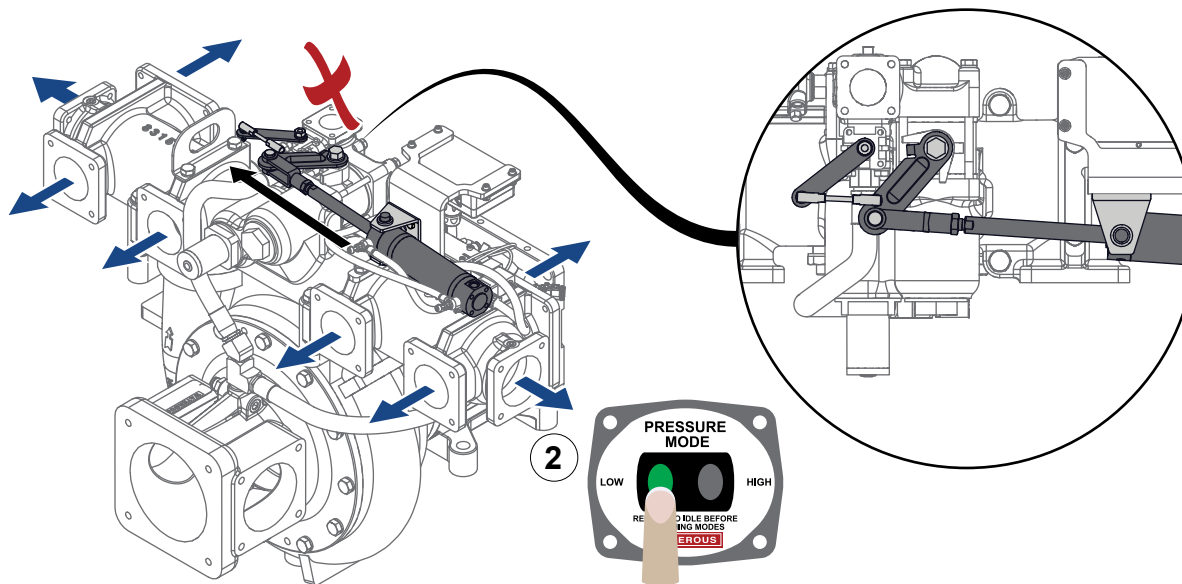
Use the illustrations and instructions to enable the high-pressure discharge.

**Note:** Make sure that you set the engine to idle before you engage the high-pressure discharge to avoid activating the external pressure relief valve or the speed governor system.

- 1 Enable the high-pressure discharge by pressing the *HIGH* side of the switch. The amber LED flashes as the cylinder traverses between modes and illuminates solid once the mode is achieved.
- 2 Disable the high-pressure discharge by pressing the *LOW* side of the switch. The green LED flashes as the cylinder traverses between modes and illuminates solid once the mode is achieved.

After operation, follow established procedures that include:

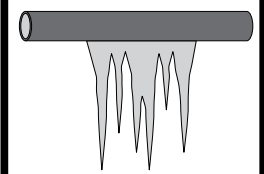
- Do not store the pump partially full. Completely fill, or drain, the pump before storage.
- Always drain the pump when freezing can occur.



### NOTICE

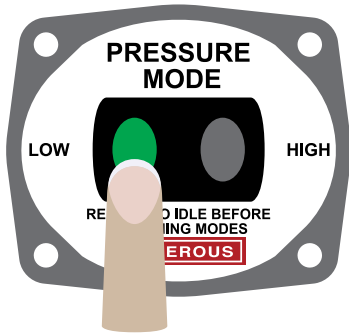
#### Freeze Damage

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



- Disable the pump drive when placing the apparatus into storage.

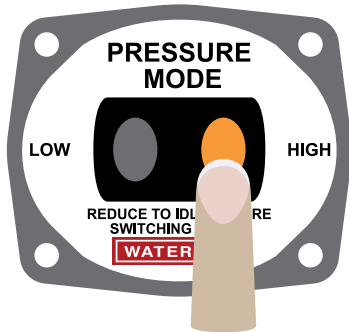
## Operating the Manual Override Mode



1

Use the illustrations and instructions to operate manual override.

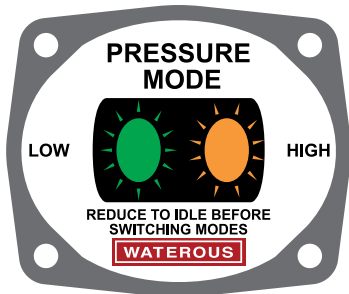
- 1 On startup, the cylinder is in the low-pressure mode. This is the default state for the system.
- 2 When switching to high-pressure mode, the solenoid valve retracts the cylinder to open the crossover valve, making the high pressure discharge available. The proximity sensors on the cylinder communicate the cylinder position to the controller, which illuminates the appropriate mode LED.



2

- 3 In the event that high-pressure mode is not achieved after being selected, the mode LEDs will flash to indicate an error condition.

Depending on the error condition, you can achieve high-pressure mode by pressing and holding the high-pressure side of the switch for 3 seconds, or by tapping the high-pressure side of the switch 3 times within 3 seconds. The system then attempts to open the crossover valve while ignoring the proximity sensors.



3

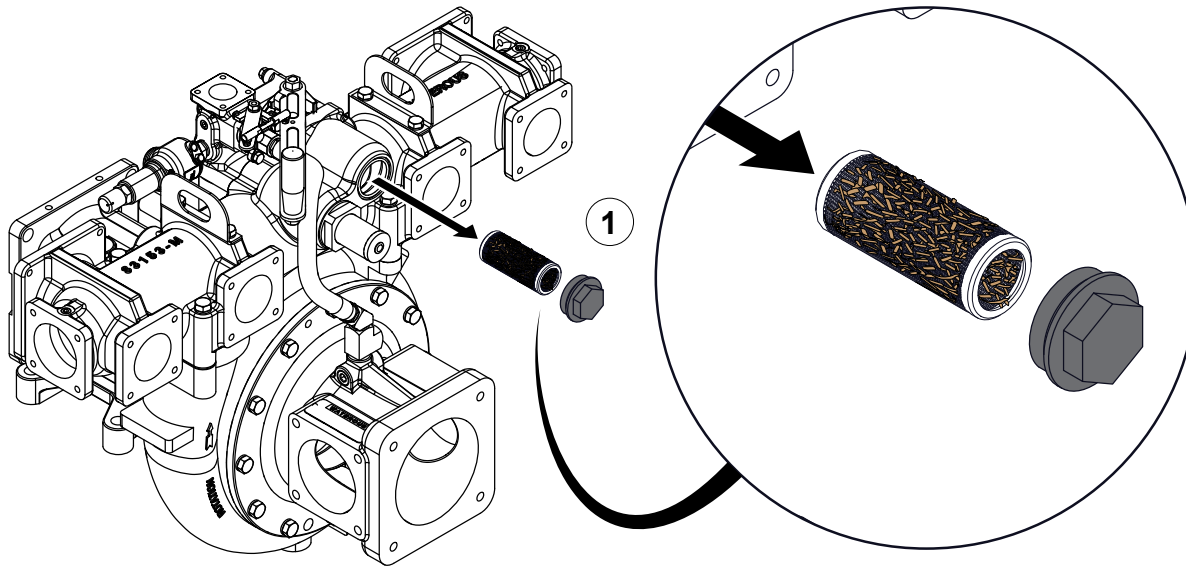


## Maintenance Schedule

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	Before Initial Operation	Weekly	Monthly	12 Months	Comment
Clean the intake strainer		X			More or less often as determined by usage, and the water quality used. Replace strainer cover O-ring—1-7/8 x 2-1/8 inches.
Check the pedestal oil level	X		X		
Verify operation		X			Verify the pneumatic actuator operation.
Change the pedestal oil				X	SAE 10W-30—standard or synthetic oil is acceptable
Inspect the mounting hardware				X	

## Cleaning the Intake Strainer

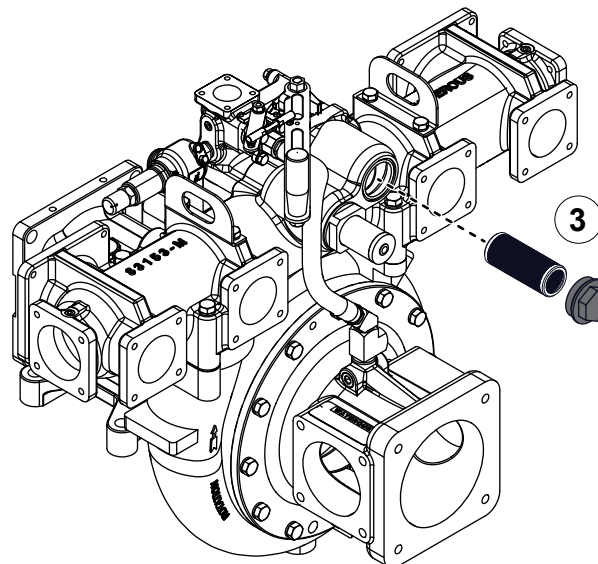
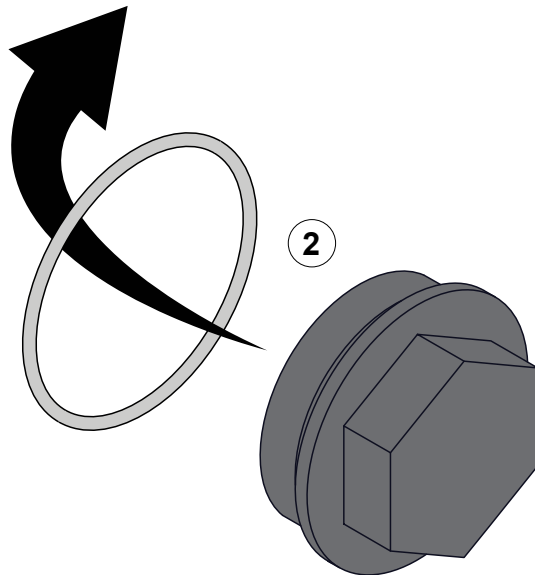


Use the illustrations and instructions to clean the intake strainer.

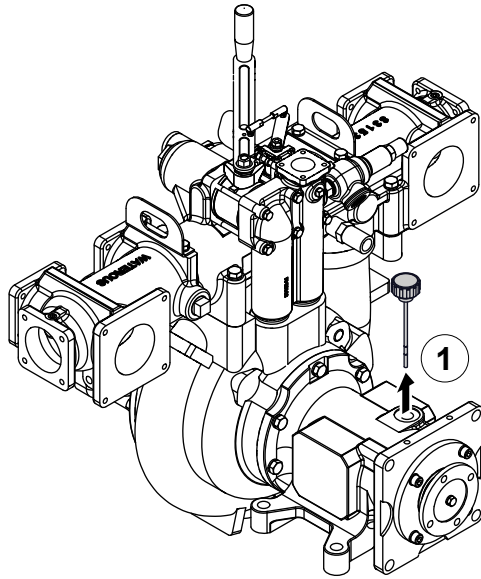
**Note:** Make sure that you purge all pressure before continuing.

<span style="font-size: 2em;">!</span> <b>WARNING</b>	
<p><b>High Pressure</b></p> <ul style="list-style-type: none"> <li>• Liquid ejected at high pressure can cause serious injury.</li> <li>• Purge all pressure before servicing.</li> </ul>	

- 1 Remove the strainer cover and the strainer.
- 2 Remove and replace the strainer cover O-ring with an equivalent—1-7/8 x 2-1/8 inches.
- 3 Install the strainer and securely install the strainer cover.

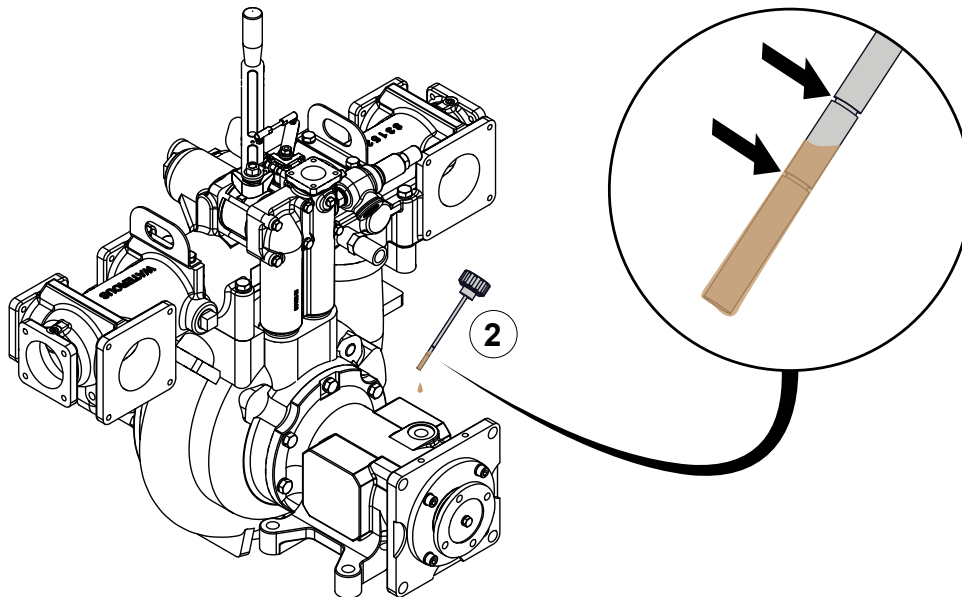


## Checking the Pedestal Oil Level

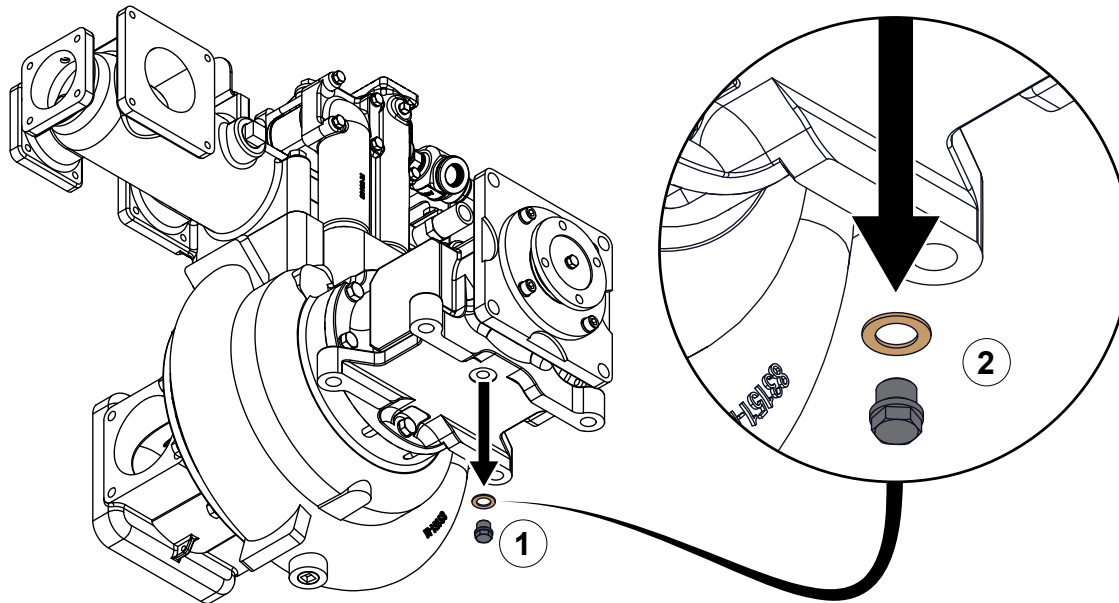


Use the illustrations and instructions to check the pedestal-oil level.

- 1 To check the pedestal-oil level do the following:
  - Unscrew the oil-fill cap.
  - Wipe the dipstick clean.
  - Fully screw the oil-fill cap back into the pedestal.
  - Unscrew the oil-fill cap to inspect the oil level.
- 2 Inspect where the oil falls on the dipstick. The oil should fall between the grooves on the dipstick. Add oil to the pedestal if the oil level is low. Refer to: **"Adding the Pedestal Oil" on page 45**. Install the oil-fill cap to complete the procedure.

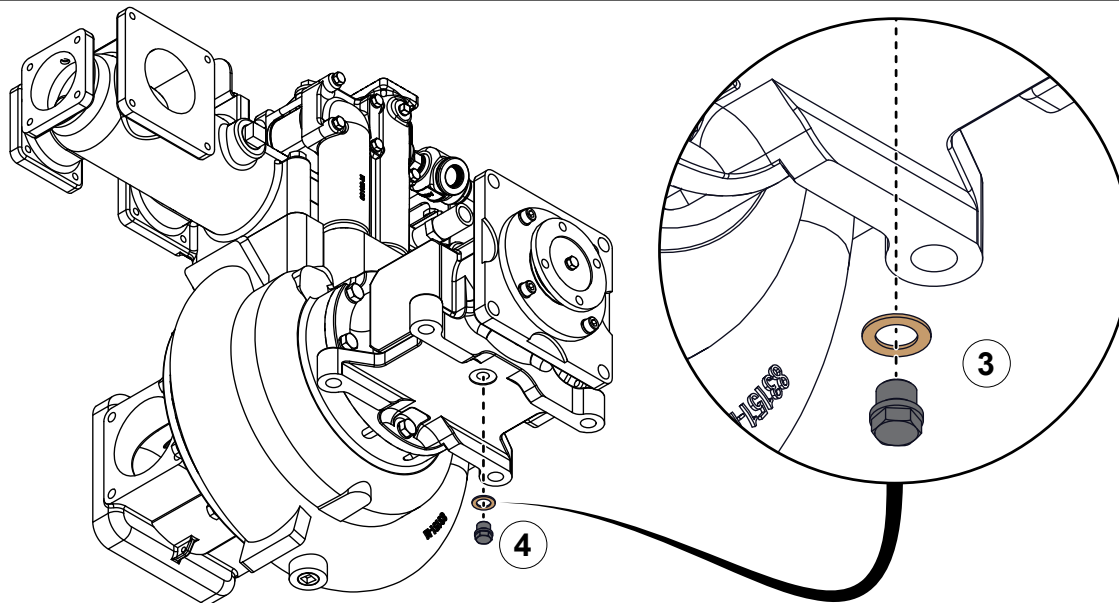


## Draining the Pedestal Oil

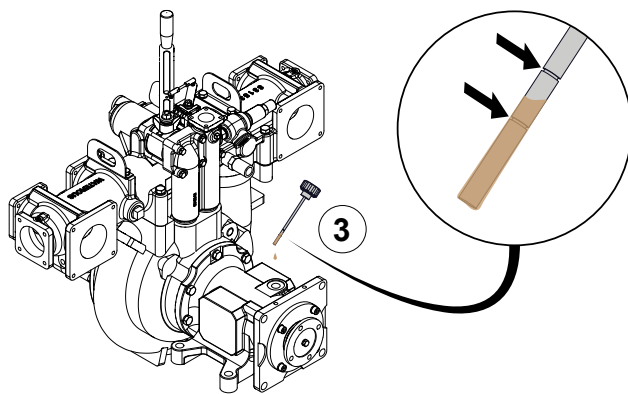
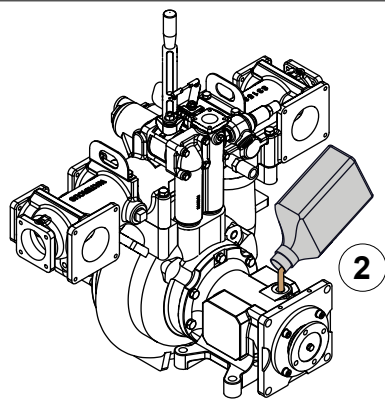
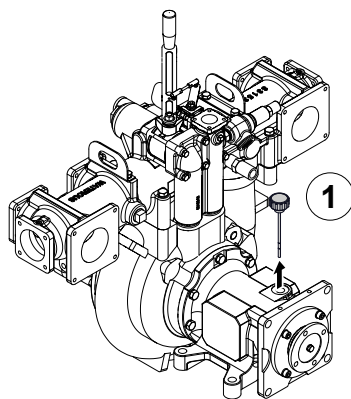


Use the illustrations and instructions to drain the pedestal oil.

- 1 Perform the following to drain the pedestal oil:
  - Place a suitable container under the pedestal to collect the oil.
  - Locate the drain plug and copper washer on the bottom of the pedestal.
  - Remove the drain plug and copper washer.
- 2 Continue the process by performing the following:
  - Set aside the drain plug.
  - Set aside the copper washer.
  - Completely drain the pedestal oil.
- 3 Inspect the copper washer for damage and replace it if necessary. Only replace the washer with its equivalent.
- 4 Perform the following to complete the procedure:
  - Locate the drain plug that you set aside, and the copper washer.
  - Securely install the drain plug and copper washer to the pedestal.
  - Dispose of the oil in accordance with local regulations.



## Adding the Pedestal Oil



Use the illustrations and instructions to add the pedestal oil. Use 1 qt (0.95 L), SAE 10W-30, standard or synthetic.

- 1 Remove the oil-fill cap from the pedestal.
- 2 Add oil to the pedestal.
- 3 Check the oil level. Refer to: "**Checking the Pedestal Oil Level**" on page 43. Install the oil-fill cap when the oil is within specification.



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