WATEROUS

Form Number: F-3010
Issue Date: May 23, 2023
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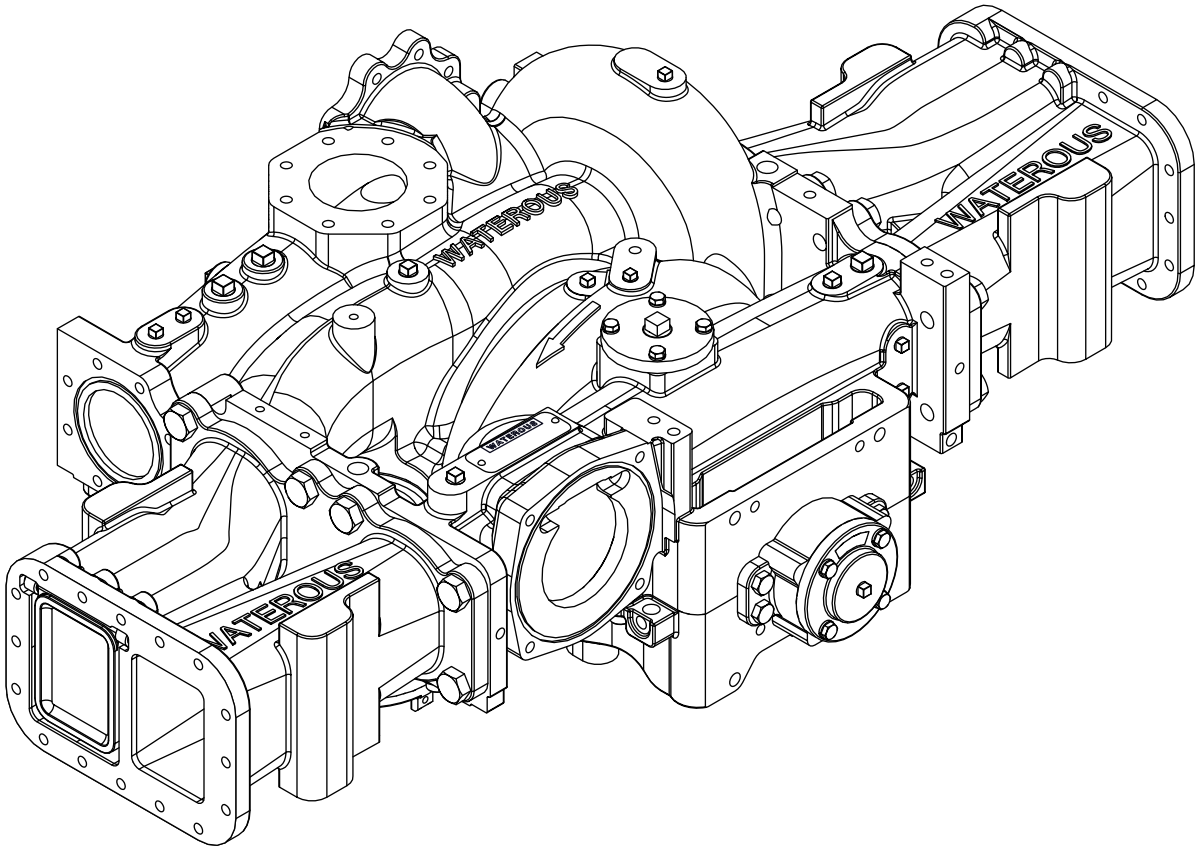
CM Series Fire Pumps

Operation and Maintenance



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

Table of Contents

Safety Precautions

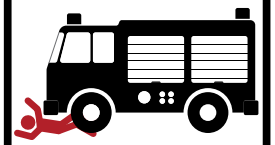
- Read and understand all the associated documentation before you begin operating the product.
- Contact Waterous when you have questions about operating or maintaining the equipment.
- Read and understand all the notices and safety precautions.
- Do not operate the equipment when safety guards are removed.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

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 instruction to guide you in developing operating protocols for your application.

WARNING

Sudden Unexpected Movement

- **Unexpected movement can cause injury or death.**
- **Make sure the shift unit is in the proper mode before operation.**



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

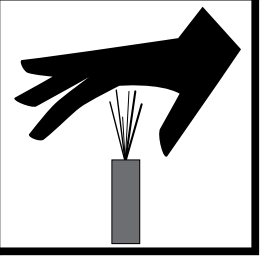
Hot Surface

- **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.**



Read and understand all instructions following this symbol.

Safety Precautions

Read and understand all Notices to provide the best performance in your application and to prevent premature service requirements.

NOTICE

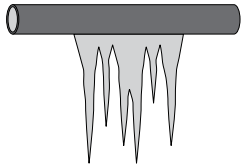
Before Operation

- 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

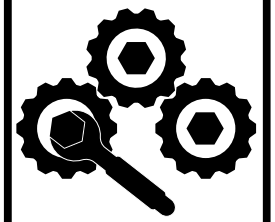
- Do not allow fluid in the lines to freeze.
- Remove all freezable fluid from the lines before storing the apparatus.



NOTICE

Maintenance

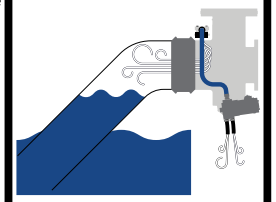
- Not following maintenance procedures can damage your equipment.
- Perform all maintenance procedures as required.



NOTICE

Priming Pump Damage

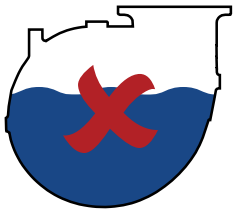
- Do not prime the pump for more than 1 minute.
- Operating the priming pump longer than 1 minute can damage the motor or the motor solenoid.



NOTICE

Pump Damage

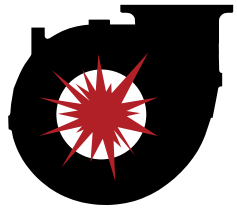
- Storing the pump partially full causes undesirable corrosion.
- Always store the pump completely full or empty.



NOTICE

Pump Damage

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



Read and understand all notices following this symbol.

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 in this 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 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 designed to be printed on both sides and in color.
- Use a 3-ring binder to store the document.

Additional Documentation

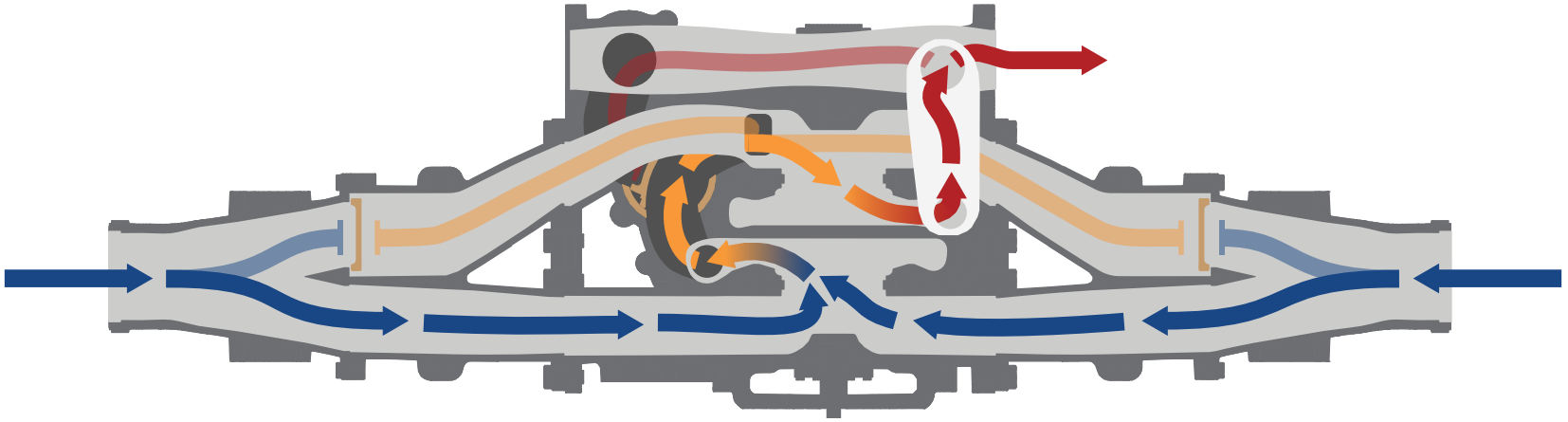
Additional documentation is available through the MyWaterous login at waterousco.com. Use your serial number to gain access to the service parts list (SPL) associated with your system. Dimensional drawings are available through the Waterous Service department.

CM Series Pump

The CM series pump is capable of operating in 2 modes. The 2-stage design allows you to operate the pump in pressure or volume mode. An electric or manual panel-mounted controller operates the transfer valve in the pump that directs the flow to operate the pump in either mode. The pump is available with many intake and discharge options. Understand that these instructions may not include all the options in your application.

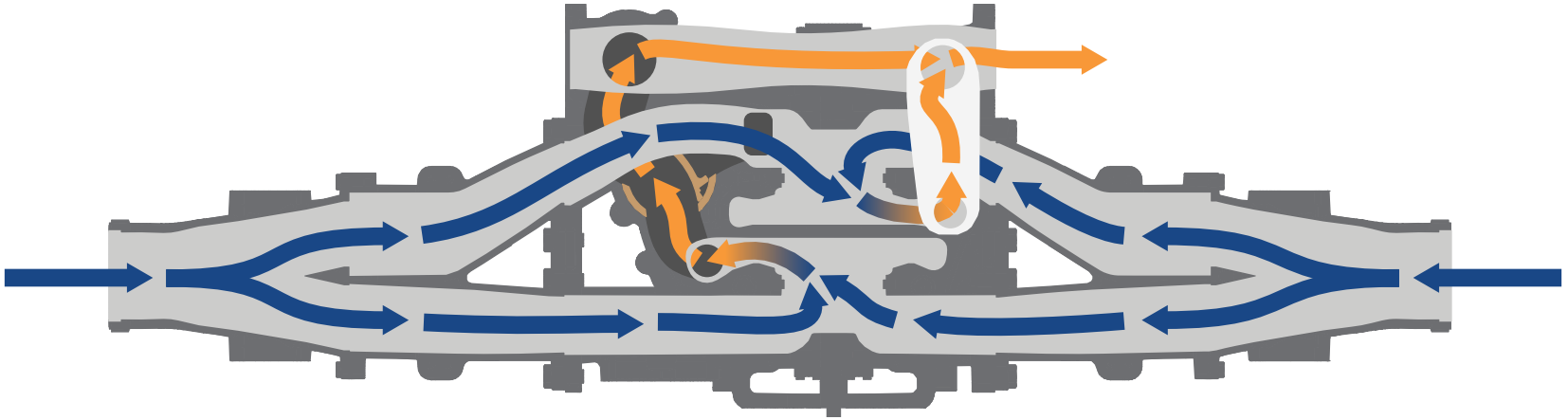
Pressure Mode

In pressure mode, the 2 stages operate in series. The fist stage sends pressurized water to the second stage. The second stage further pressurizes the water before sending it into the pump discharge at a maximum pressure of 600 psi (41 bar).

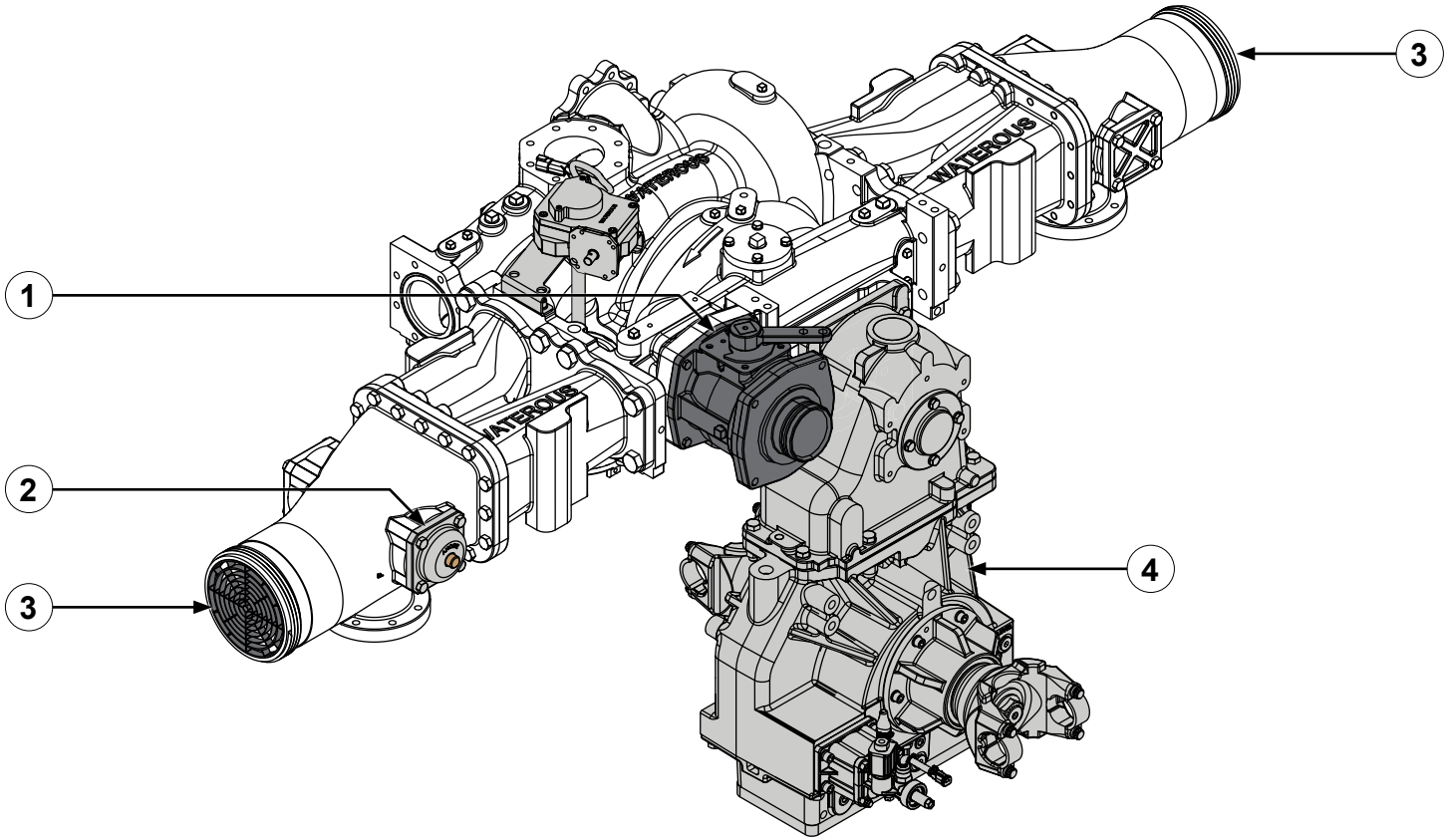


Volume Mode

In volume mode, both stages operate in parallel. Each stage flows water directly into the pump discharge to provide maximum flow.

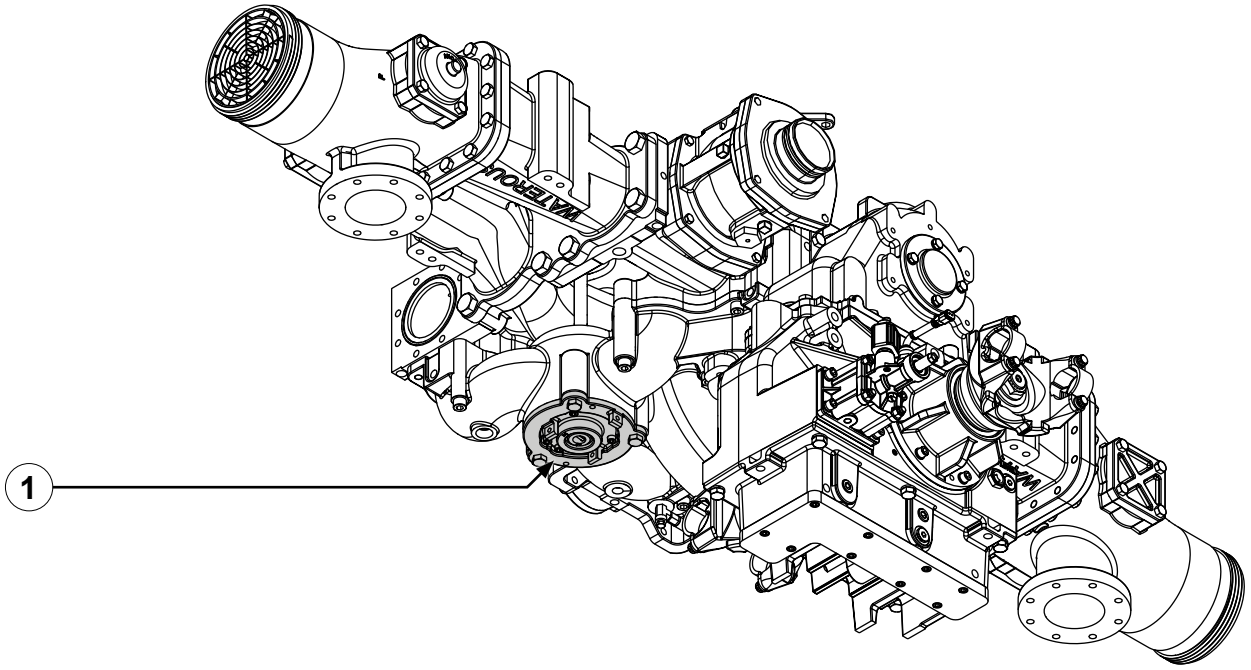


Pump Components—Top



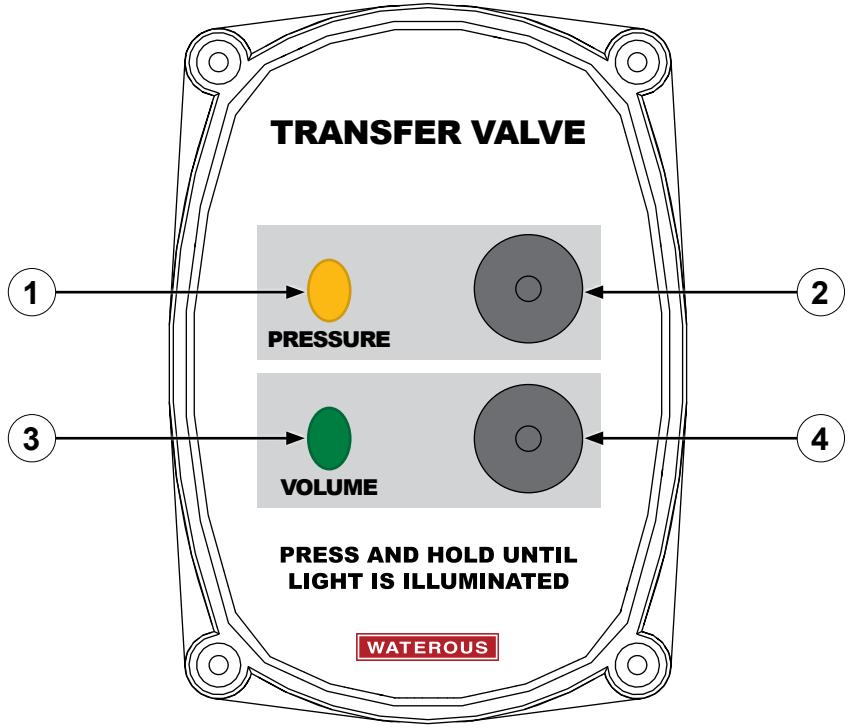
	Feature	Description
1	Transfer valve actuator	This actuator operates the transfer valve that switches the pump between pressure and volume mode. Depending on your application, it operates manually or electrically. ***Note:*** *The transfer valve actuator can be mounted on the top or the bottom of the pump.*
2	Anode	This is an anode (bolt-on style shown) that aids in corrosion protection—optional.
3	Intake screen	This filters debris and aids with corrosion protection—optional.
4	Transmission	This provides an increase in the driveline speed required by some applications (C22 transmission shown).

Pump Components—Bottom



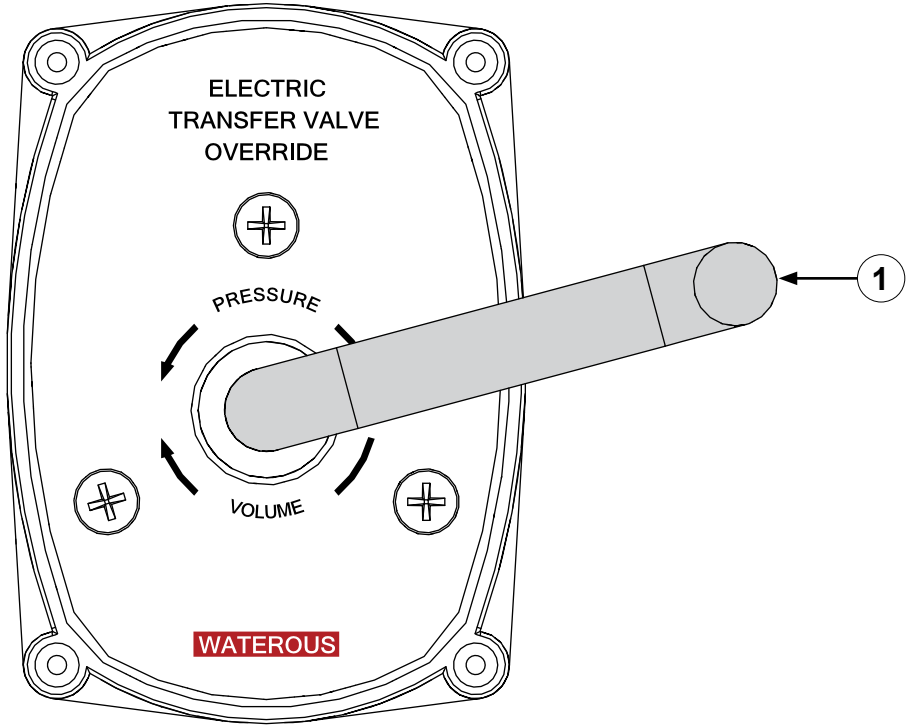
	Feature	Description
1	Transfer valve	This switches the pump between pressure and volume mode.

Transfer Valve Actuator Control Panel—Electric Version



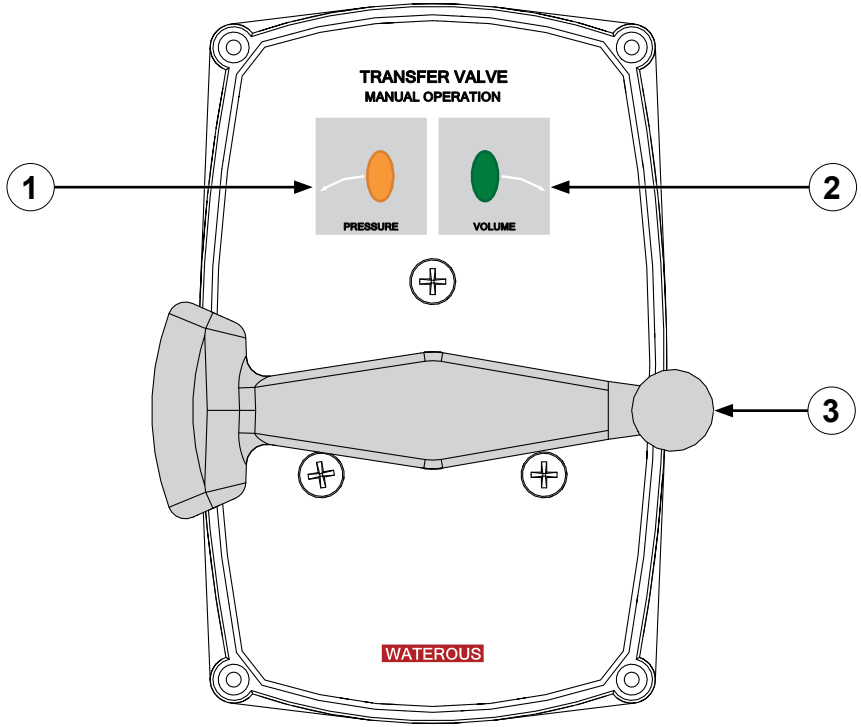
	Feature	Description
1	Pressure LED	This illuminates when the transfer valve is in pressure mode.
2	Pressure button	This moves the transfer valve into pressure mode.
3	Volume LED	This illuminates when the transfer valve is in volume mode.
4	Volume button	This moves the transfer valve into volume mode.

Transfer Valve Manual Override Actuator—Optional



	Feature	Description
1	Removable crank handle	This allows you to manually move the transfer valve into the pressure or volume position.

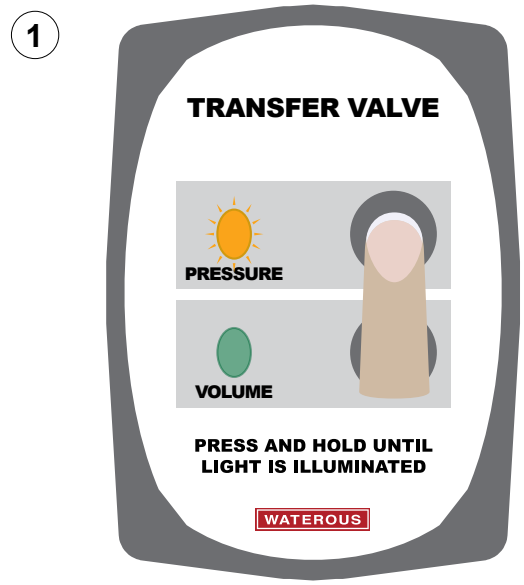
Transfer Valve Actuator Control Panel—Manual Version

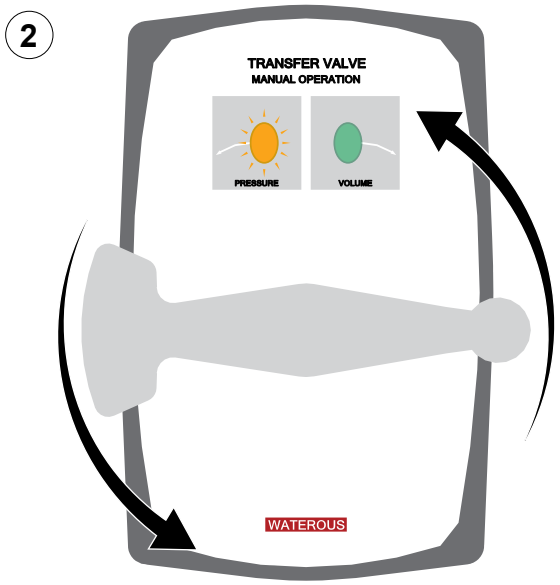


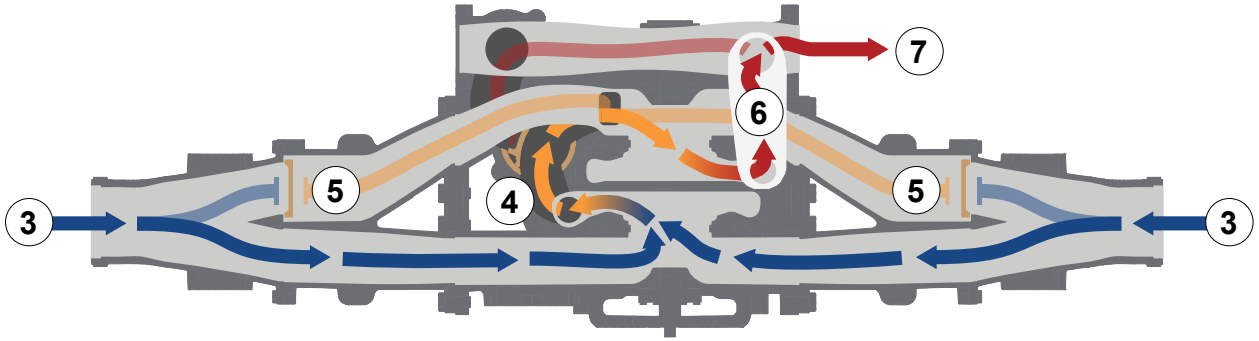
	Feature	Description
1	Pressure LED	This illuminates when the transfer valve is in pressure mode.
2	Volume LED	This illuminates when the transfer valve is in volume mode.
3	Handle	This moves the transfer valve into pressure or volume mode.

Notes

Switching to Pressure Mode







Use the illustrations and instructions to operate the pump in pressure mode.

High Pressure Hazard: *Changing the position of the transfer valve with the pump operating may result in a significant change in discharge pressure. The operator may need to adjust the engine speed to maintain the desired discharge pressure. Reducing the engine to idle speed before transferring will minimize the change in discharge pressure.*

1 Press and hold the *PRESSURE* button until the volume LED illuminates to place the pump into pressure mode.

Note: *Reduce the discharge pressure to 250 psi (17.2 bar) when you change between modes electrically.*

2 Rotate the handle in the direction indicated on the label until the pressure LED illuminates to place the pump into pressure mode.

Note: *Reduce the discharge pressure to 75 psi (5.2 bar) when you change between modes manually.*

3 Water enters the intake and flows into the first stage.

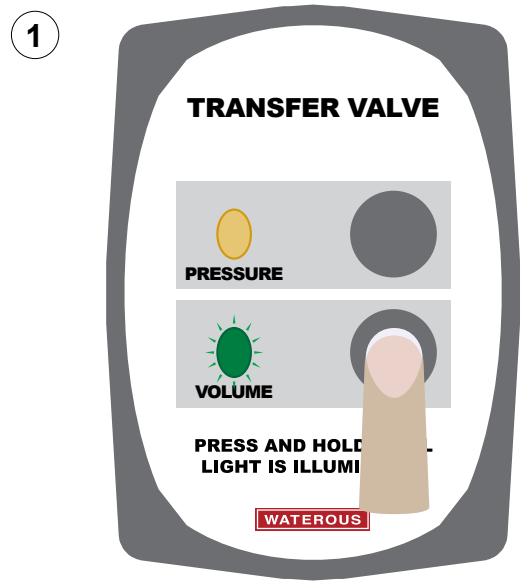
4 Water flows from the first stage through the transfer valve into the second stage.

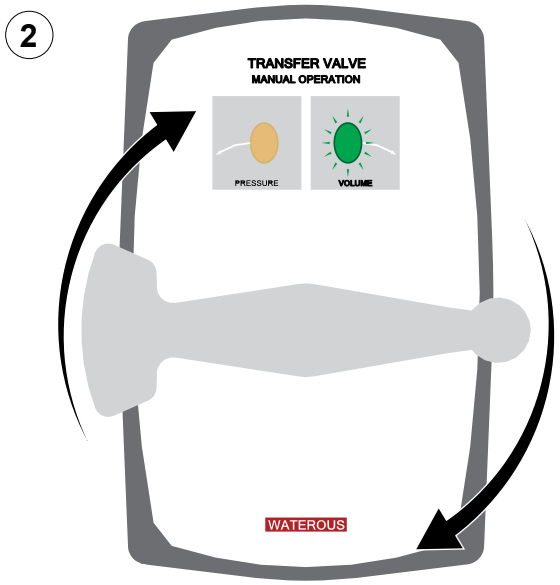
5 Flaps in the second stage isolate the flow where it builds additional pressure.

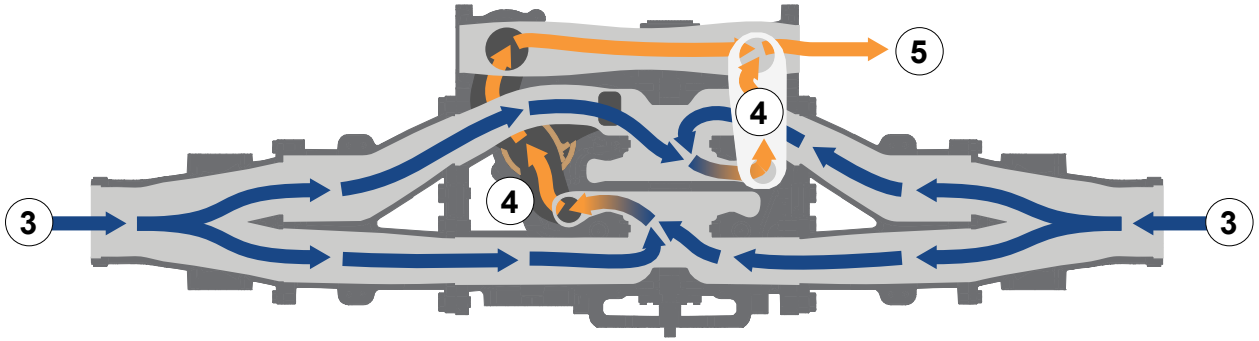
6 Water flows out of the second stage into the discharge.

7 Water exits the pump discharge.

Switching to Volume Mode







Use the illustrations and instructions to operate the pump in volume mode.

High Pressure Hazard: *Changing the position of the transfer valve with the pump operating may result in a significant change in discharge pressure. The operator may need to adjust the engine speed to maintain the desired discharge pressure. Reducing the engine to idle speed before transferring will minimize the change in discharge pressure.*

1. Press and hold the *VOLUME* button until the volume LED illuminates to place the pump into volume mode.

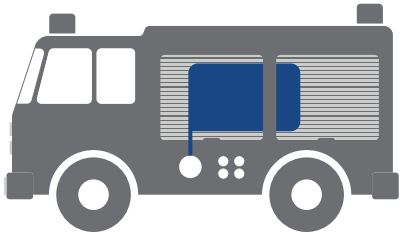
   Note: *Reduce the discharge pressure to 250 psi (17.2 bar) when you change between modes electrically.*

2. Rotate the handle in the direction indicated on the label until the volume LED illuminates to place the pump into volume mode.

   Note: *Reduce the discharge pressure to 75 psi (5.2 bar) when you change between modes manually.*

3. Water enters the intake and flows to either stage.
4. Each stage flows water into the discharge.
5. Water exits the pump discharge.

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 packing, seals and other pump parts. If the apparatus builder has installed a bypass 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. Switch transfer valve to desired position.

   Note: *As a general rule, keep the transfer valve in pressure position when pumping up to 2/3 of the rated capacity of the pump and in volume when pumping more than 2/3 of the rated capacity. If high pressure is required (more than 200 psi, 13.8 bar), operating the pump in the PRESSURE position may be necessary even if it means closing one or more valves to reduce volume and avoid cavitation. The transfer valve may be changed from one position to the other while operating the pump. Decreasing the discharge pressure will make this easier. If the pump has a manually operated transfer valve, slow engine speed to reduce the discharge pressure to 75 psi (5.2 bar) or less. With the electric transfer valve, reducing the discharge pressure is necessary only if it exceeds 250 psi (17.3 bar).*
3. Open valve(s) in piping between water tank and pump.
4. Allow about 30 seconds for water to flow into pump.

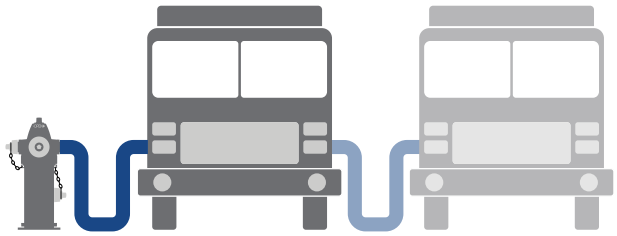
   Note: *Priming the pump may be necessary because of air trapped in piping.*
5. Open discharge valves and accelerate engine to obtain desired discharge pressure and capacity.
6. Set relief valves or other pressure governing device to desired pressure.

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 packing, seals and other pump parts. If the apparatus builder has installed a bypass 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. Switch transfer valve to desired position.

   Note: *As a general rule, keep the transfer valve in pressure position when pumping up to 2/3 of the rated capacity of the pump and in volume when pumping more than 2/3 of the rated capacity. If high pressure is required (more than 200 psi, 13.8 bar), operating the pump in the pressure position may be necessary even if it means closing one or more valves to reduce volume and avoid cavitation. The transfer valve may be changed from one position to the other while operating the pump. Decreasing the discharge pressure will make this easier. If the pump has a manually operated transfer valve, slow engine speed to reduce the discharge pressure to 75 psi (5.2 bar) or less. With the electric transfer valve, reducing the discharge pressure is necessary only if it exceeds 250 psi (17.3 bar).*
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.

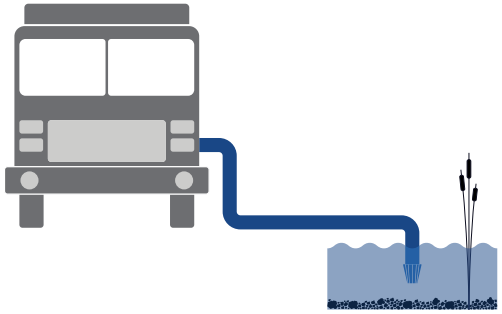
   Note: *Do not attempt to pump more water than is available from the hydrant. Always make sure the intake pressure compound gauge reading stays above zero. Some fire departments operate at a minimum intake pressure of 10 psi (0.7 bar) when pumping from hydrant to prevent a "soft" intake hose from collapsing.*

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.
4. Switch transfer valve back and forth once.

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 packing, seals and other pump parts. If the apparatus builder has installed a bypass 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. Switch transfer valve to desired position.

   Note: *As a general rule, keep the transfer valve in pressure position when pumping up to 2/3 of the rated capacity of the pump and in volume when pumping more than 2/3 of the rated capacity. If high pressure is required (more than 200 psi, 13.8 bar), operating the pump in the PRESSURE position may be necessary even if it means closing one or more valves to reduce volume and avoid cavitation. The transfer valve may be changed from one position to the other while operating the pump. Decreasing the discharge pressure will make this easier. If the pump has a manually operated transfer valve, slow engine speed to reduce the discharge pressure to 75 psi (5.2 bar) or less. With the electric transfer valve, reducing the discharge pressure is necessary only if it exceeds 250 psi (17.3 bar).*
7. Open discharge valves and accelerate engine to obtain desired discharge pressure and capacity.
8. Set relief valves or other pressure governing device to desired pressure.

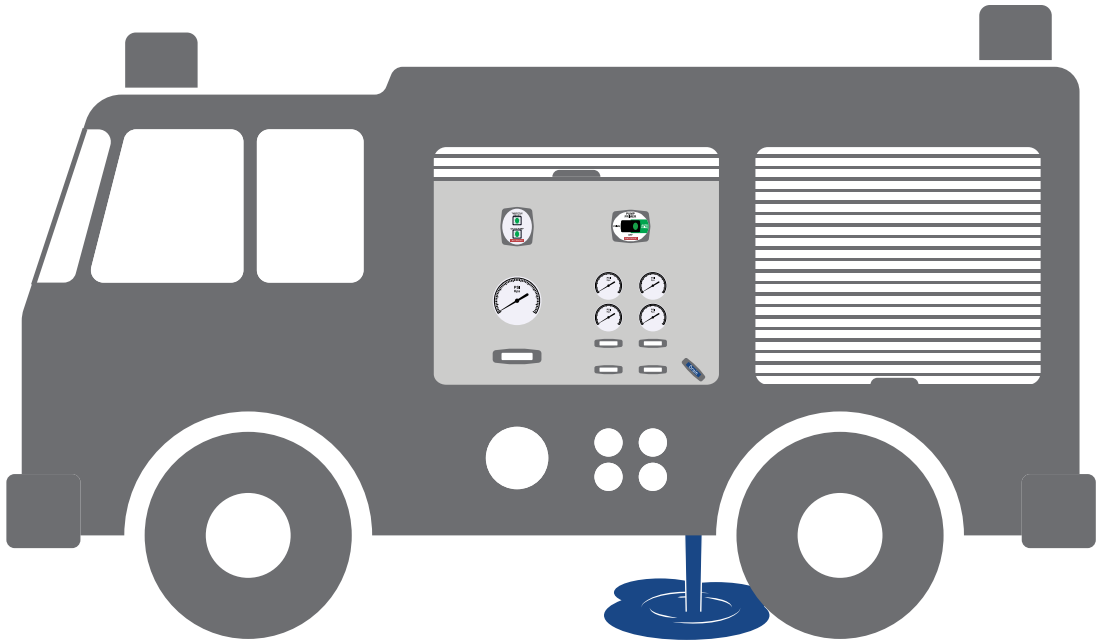
   Note: *Do not attempt to pump more water than is available from the hydrant. Always make sure the intake pressure compound gauge reading stays above zero. Some fire departments operate at a minimum intake pressure of 10 psi (0.7 bar) when pumping from hydrant to prevent a "soft" intake hose from collapsing.*

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.
4. Switch transfer valve back and forth once.

Storing the Apparatus



Use the illustration and instructions when storing the apparatus.

When storing the apparatus, do the following:

- Do not store the pump partially filled with fluid. Either fill the pump fully, or drain the pump completely.

Pump Damage: *Never store the pump partially full. Always store the apparatus with the pump completely full or completely empty.*

- Drain all fluids from the system when freezing conditions exist.

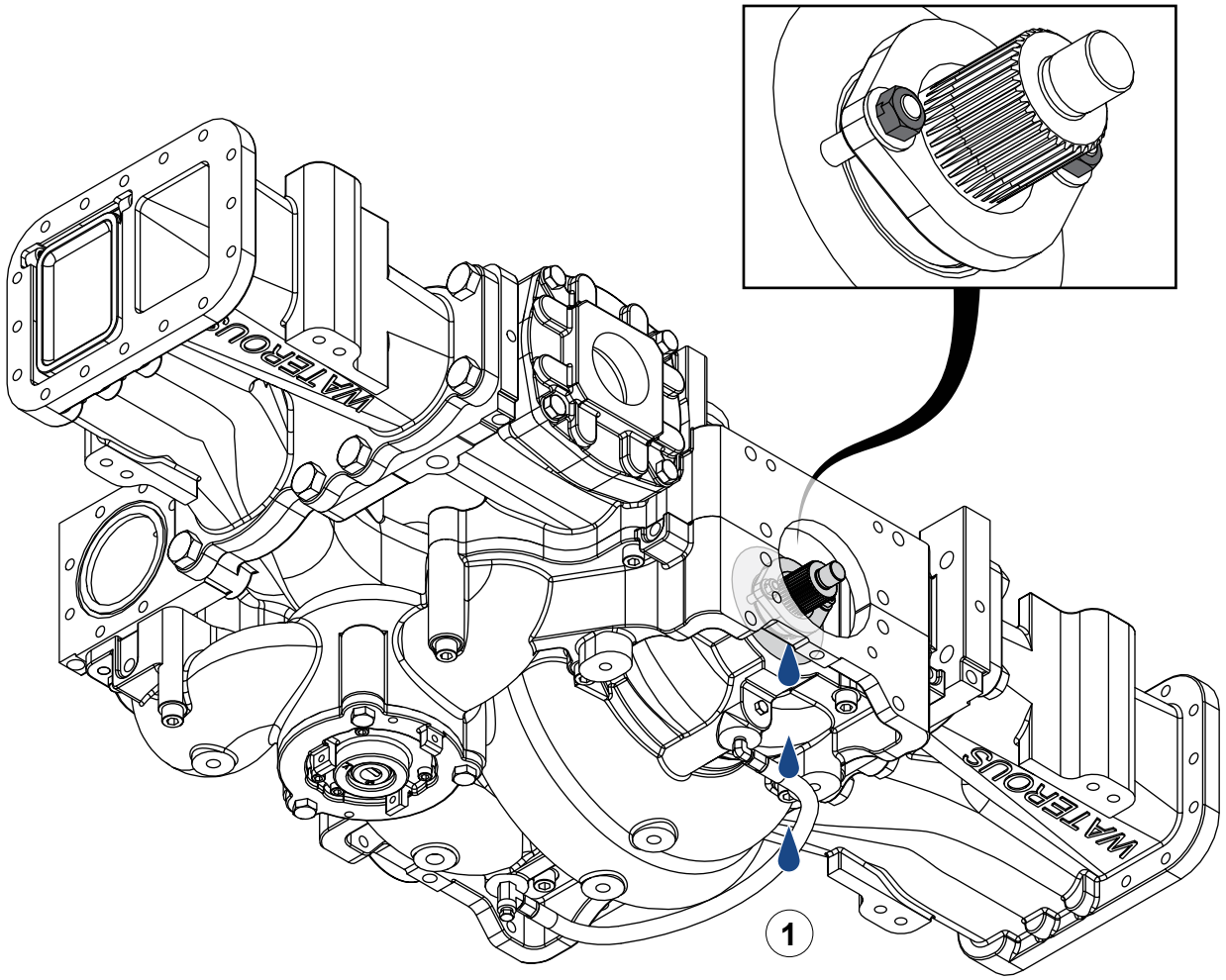
Freeze Damage: *Do not allow fluid in the lines to freeze. Use the master drain valve to drain any freezable fluid before storing the apparatus when freezing is possible.*

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	Monthly	6 Months	Comment
Check intake screens	X		If included in your application.
Check seals	X		Refer to "Adjusting the Packing Glands" on page 21 to adjust the packing glands in the stuffing box. Refer to CM Series Pumps Overhaul Instructions to replace the mechanical seals.
Check anode condition		X	If included in your application.
Grease in/outboard bearing		X	Direct drive version only—CMD and CMUD.

Adjusting the Packing Glands



Use the illustration and instructions to adjust the packing glands. Do not calculate the drip rate until the leakage runs clear.

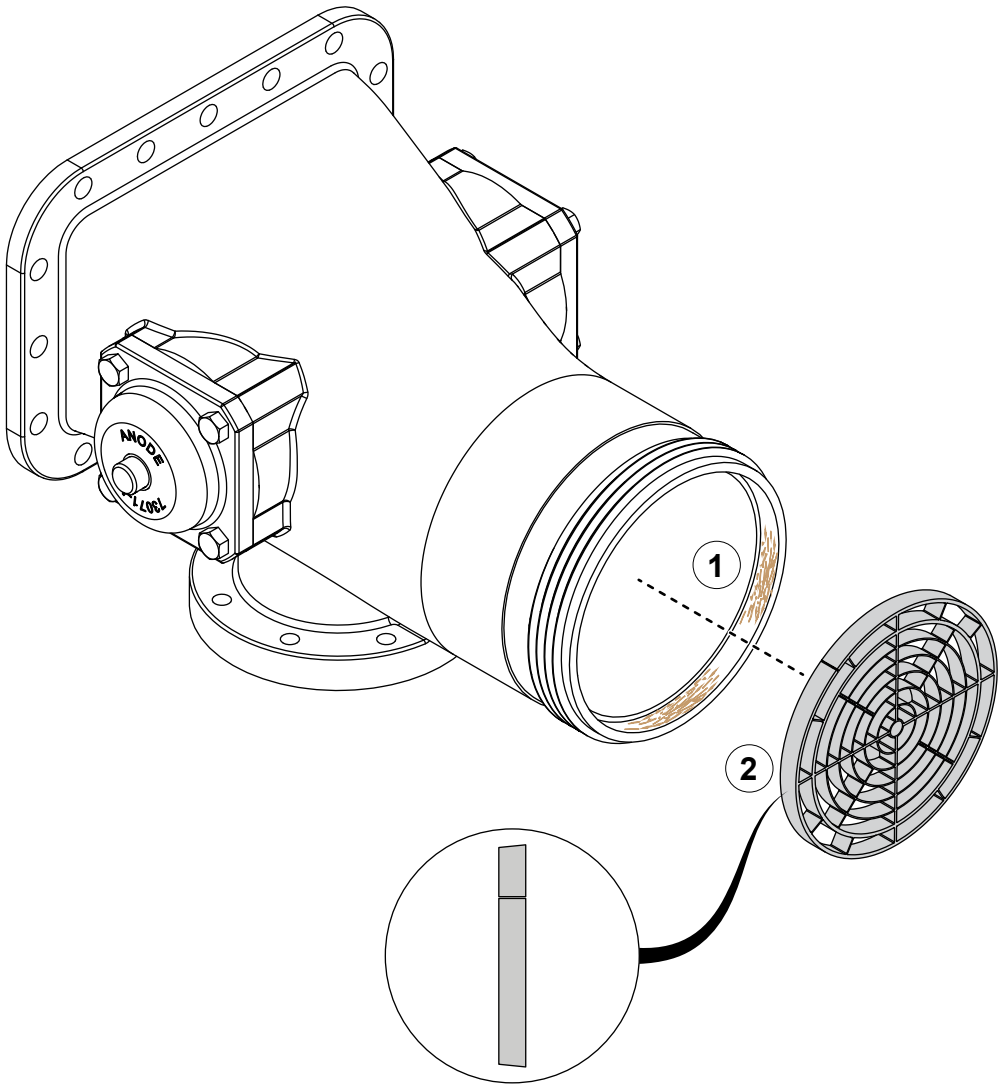
Note: *The transmission has been removed from the illustration to provide a clear view of the packing housing.*

1. Operate the pump at its maximum intended pressure for 10 minutes.

> ***Hot Surface:*** *Heat is dissipated through the cross-section of the packing, transferring the heat to the packing gland and pump body. Hot surfaces can burn you. Do not touch the surface during operation—allow it to cool after operating.*

2. Observe the drip rate. Optimal leakage is 10 to 120 drops of clear water per minute. Maintaining this rate facilitates the cooling of the packing.
3. If the drip rate is too high, turn off the pump and gradually tighten the gland nuts by 1/6 turn, alternating between them to make sure that the gland stays level.
4. Operate the pump at its maximum intended pressure for 2 minutes. Observe the drip rate, then repeat the previous step until leakage is optimal.
5. Repeat the process with the packing housing at the other end of the pump.
6. Perform vacuum test per local industry standards.

Replacing the Intake Screen—Optional

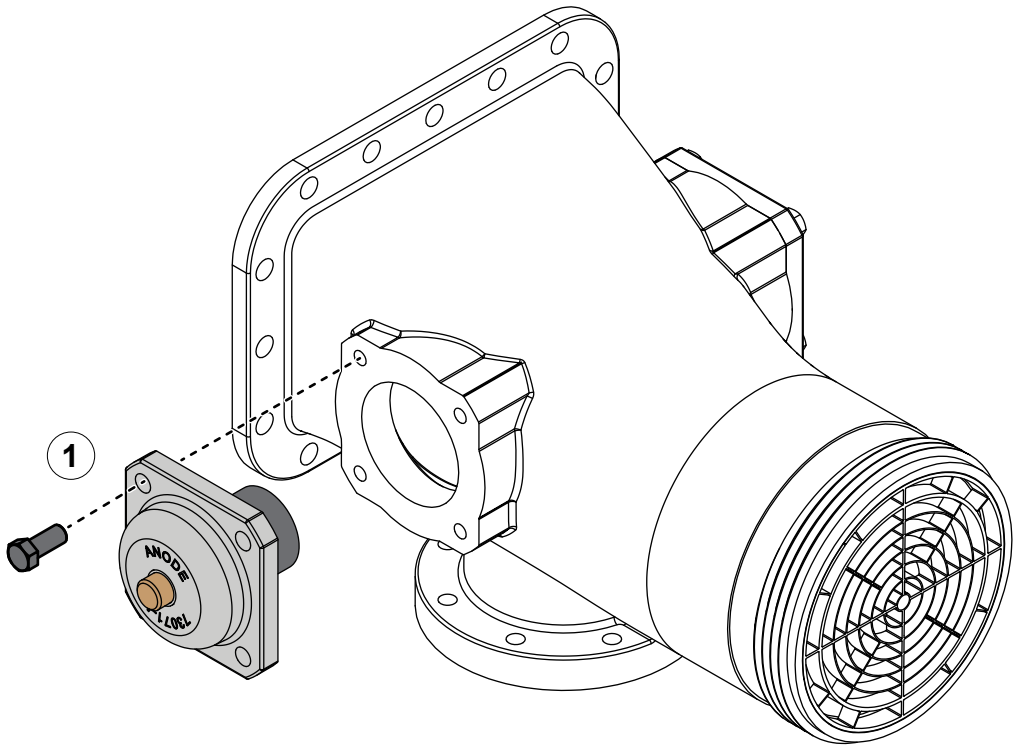


Use the illustration and instructions to replace the optional intake screen.

1. Inspect the intake screen and replace it if damaged or depleted.
2. To install the intake screen do the following:
   - Remove any rust or debris that prevents direct contact between the intake and intake screen.

     Note: *Do not use grease or similar when installing the intake screen. That prevents the intake screen from functioning as intended.*
   - Locate and install the tapered side of the intake screen into the intake. Adjust the screen at the slot to achieve a secure fit.

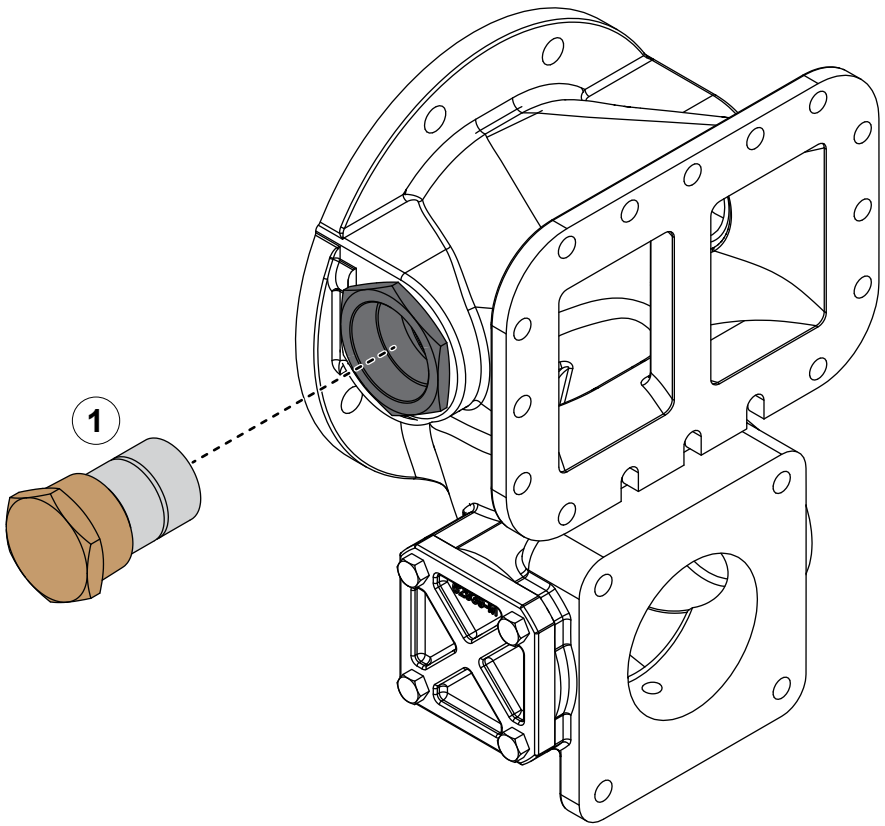
Replacing the Bolt-On Anode—Optional



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

1 Remove the 4 screws securing the bolt-on anode to the adapter and inspect the anodes. Replace the assembly if more than half the anode is depleted. Discard or recycle the depleted assembly in accordance with local regulations.

Replacing the Threaded Anode—Optional



Use the illustration and instructions to replace the optional threaded anode.

1 Remove the threaded anode and inspect the anodes. Replace the assembly if more than half the anode is depleted. Discard or recycle the depleted assembly in accordance with local regulations.

Notes

WATEROUS

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