

# WATEROUS

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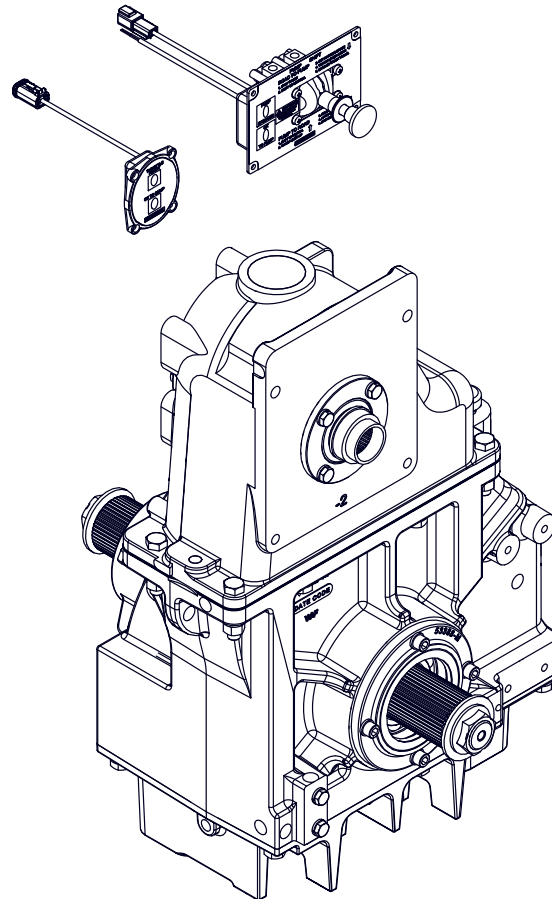
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## C22 Series Transmission

### 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.

### NOTICE

#### Before Operation

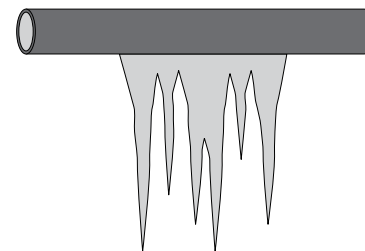
- Read and understand all the instructions provided.
- Check all fluid levels and replenish if necessary.
- Remove all shipping plugs and install the operation plugs or caps.



### NOTICE

#### Freeze Damage

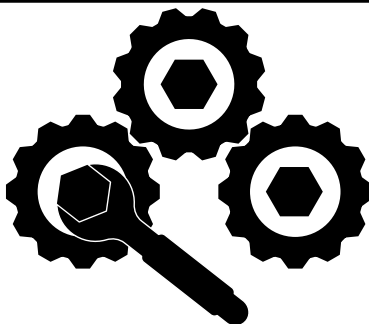
- Do not allow fluid in the lines to freeze.
- Remove all freezable fluid from the lines before storing the apparatus.



### NOTICE

#### Modification

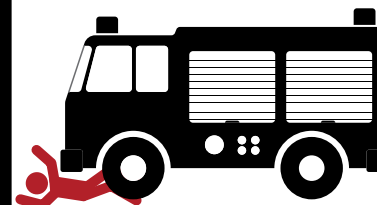
- Modifying the equipment can damage components and void your warranty.
- Do not modify the system or any of its components.



### ! WARNING

#### Sudden Unexpected Movement

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



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 the 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.

#### TROUBLESHOOTING

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

## Using this Document

Use the guidelines below when viewing this document.

### Viewing the Document Electronically

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

### Printing the Document

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

## Additional Documentation

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

## Symbols

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

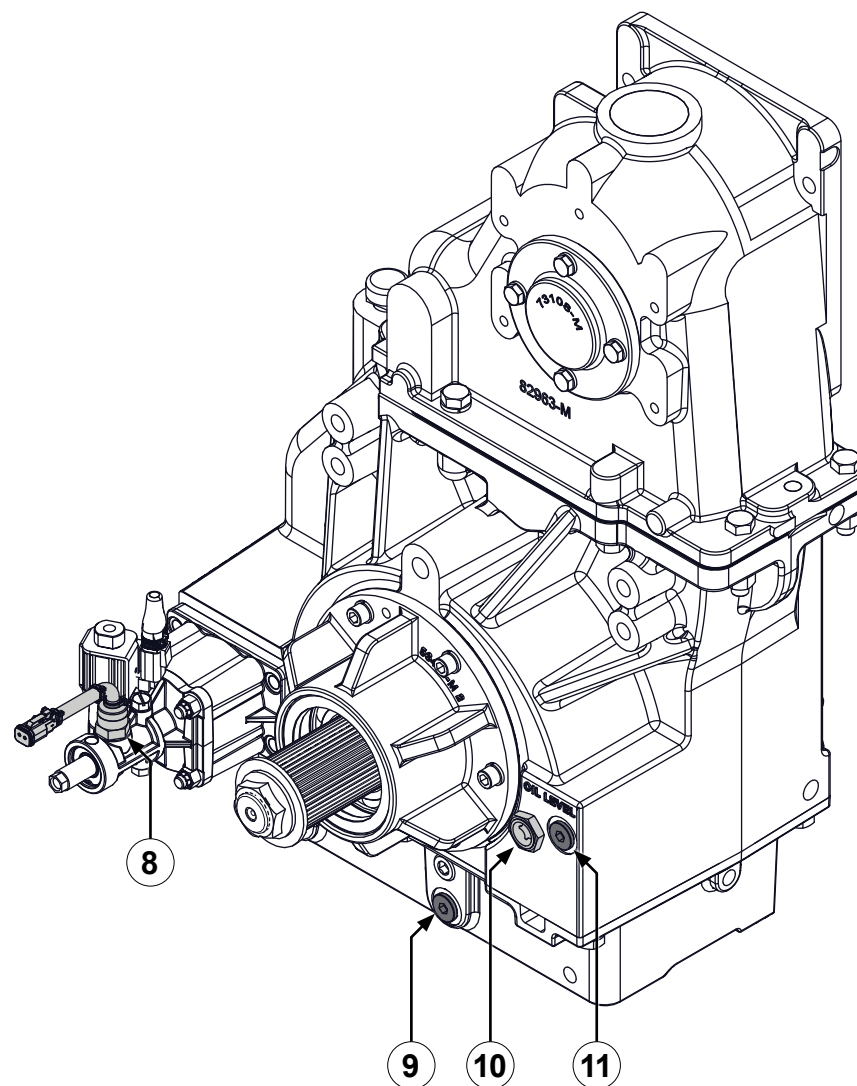
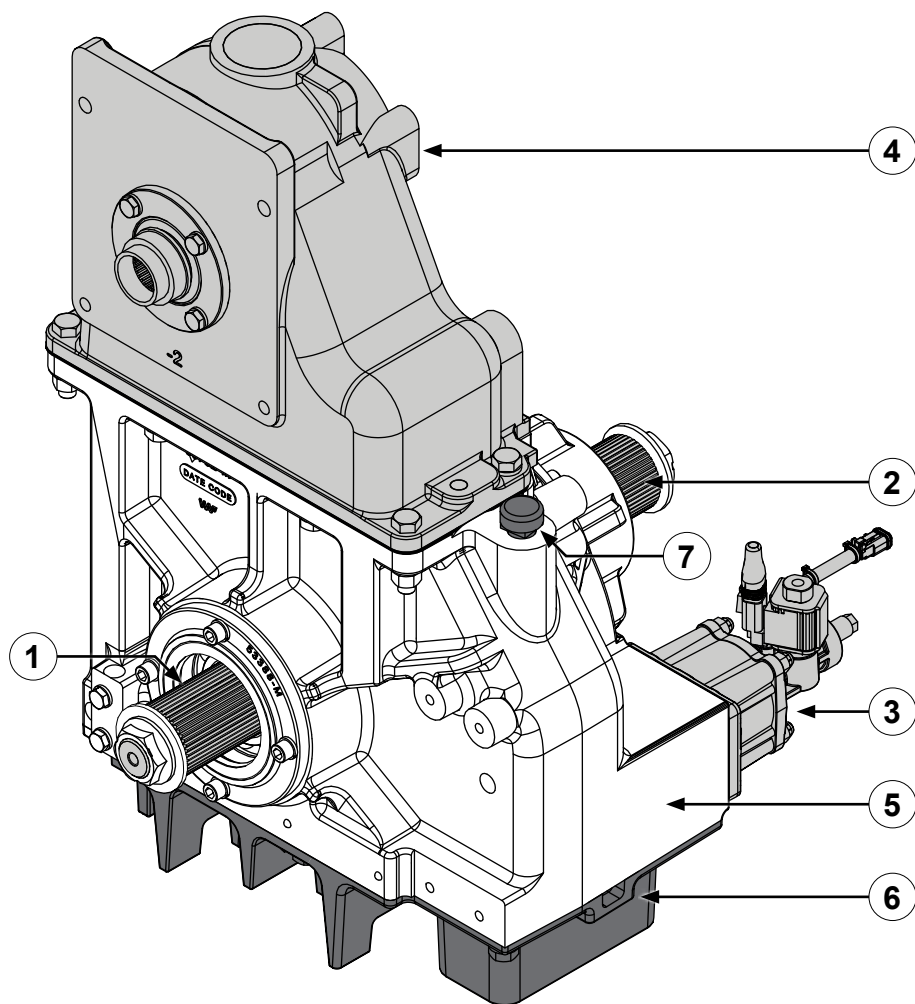


Discard—This symbol tells you to discard or recycle the part in accordance with local regulations.



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

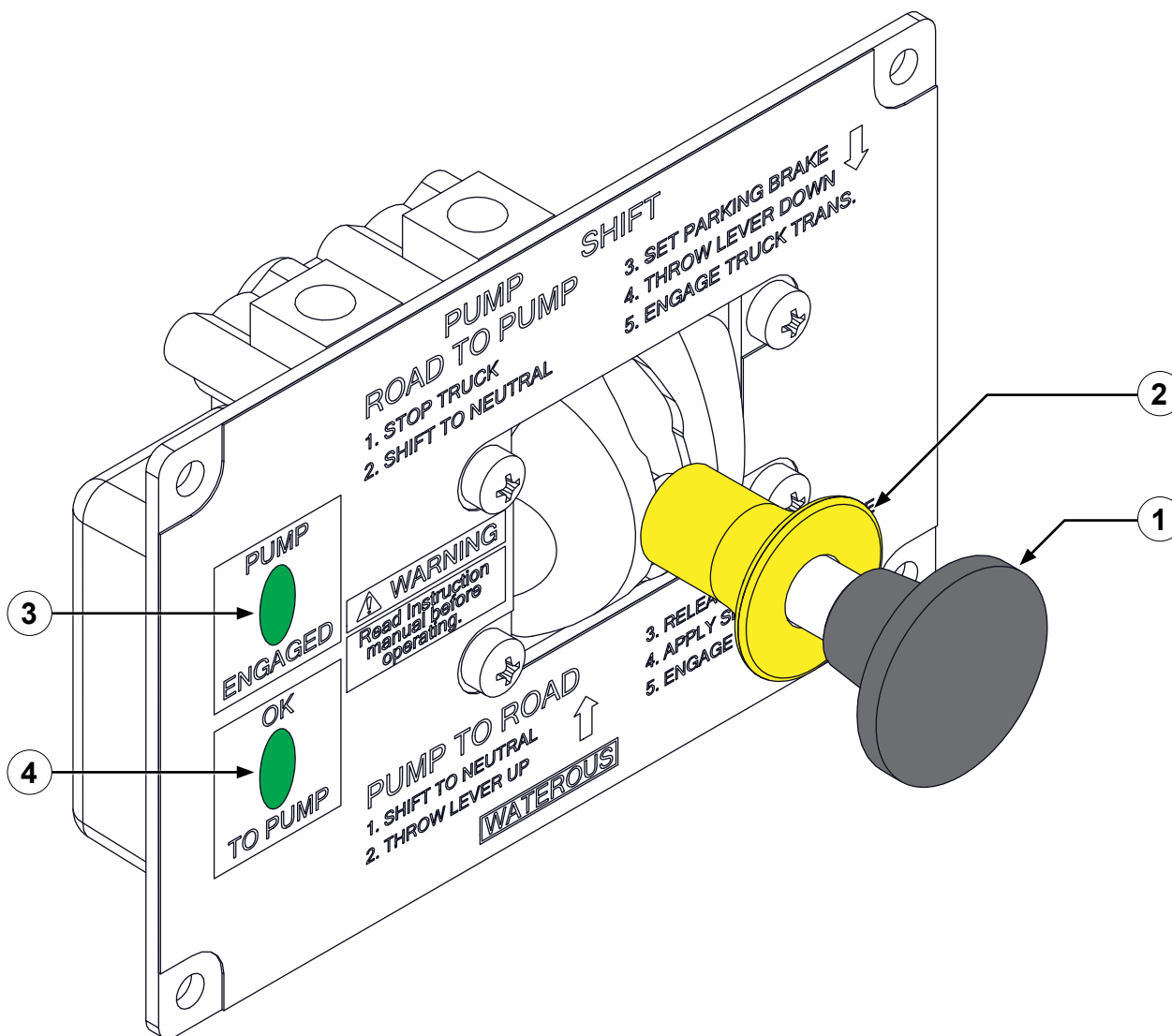
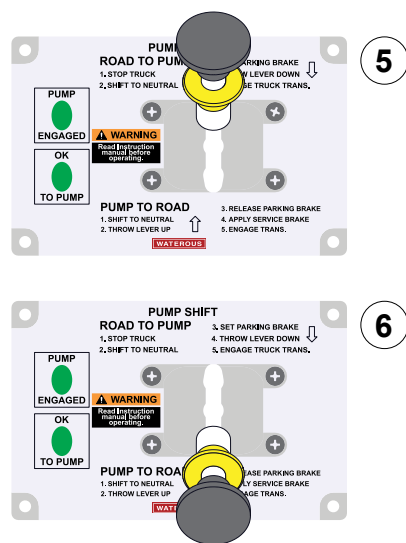
## C22 Transmission Overview



## C22 Transmission Overview

Feature	Description
1 Drive shaft—input	This connects to the apparatus drive line.
2 Coupling shaft—output	This connects the apparatus drive line to the wheels when in drive mode.
3 Shift unit	This switches the transmission between drive mode and pump mode.
4 Cap	This accommodates the different requirements between the pump/transmission mounting location and drive line.
5 Transmission case	This houses the internal components.
6 Transmission pan	This allows access to the internal components.
7 Breather	This prevents internal pressure buildup during operation.
8 Shift indicator switch	This indicates the position of the pneumatic shift unit.
9 Magnetic plug—drain	This is where the fluid drains from the transmission.
10 Sight glass plug	This allows you to visually determine the transmission fluid level.
11 Magnetic plug—lubricant	This allows you to add transmission fluid to the transmission.

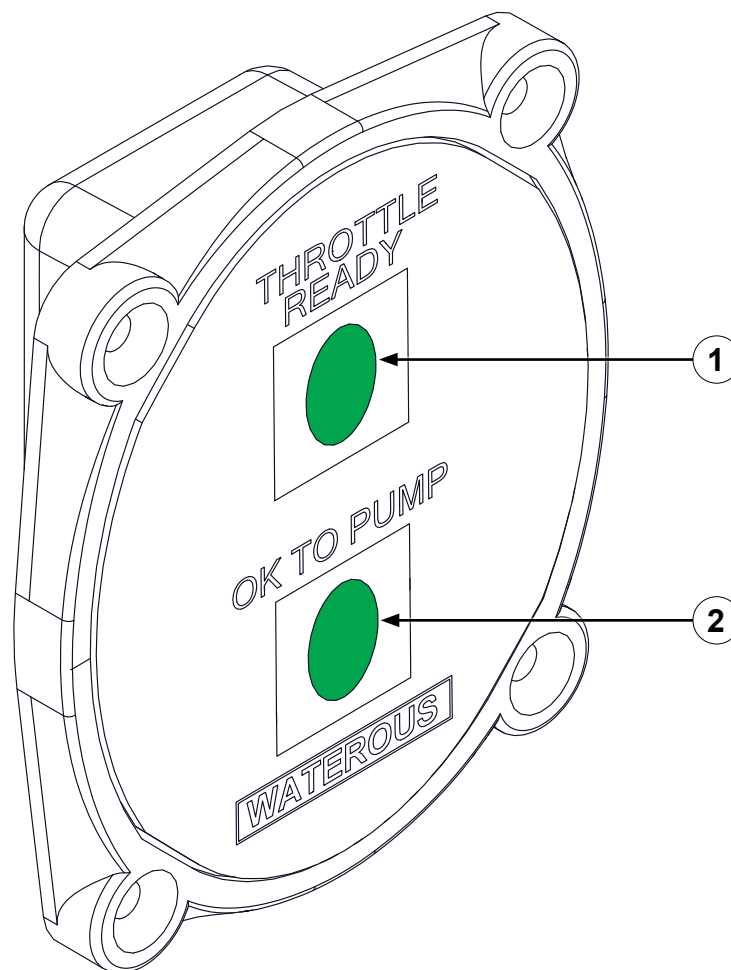
## In-Cab Panel



## In-Cab Panel

Feature		Description
1	Shift knob	This shifts the pneumatic shift unit.
2	Shift knob lock	This locks the shift knob into position.
3	Pump engaged LED	This illuminates when the shift unit is in the pump position.
4	OK to pump LED	This illuminates when the OK to pump interlock conditions are satisfied.
5	Road position	This position transfers power from the chassis transmission to the drivetrain.
6	Pump position	This position transfers power from the chassis transmission to operate the pump.

## Throttle Ready Panel

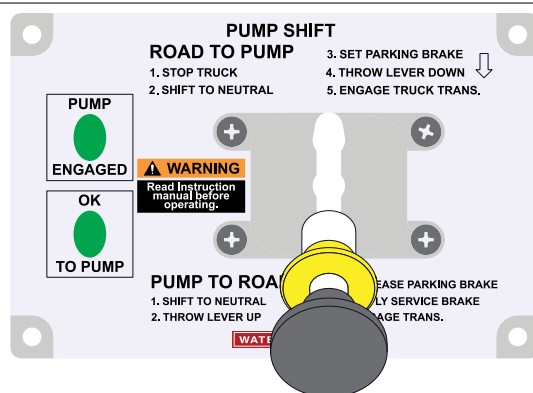
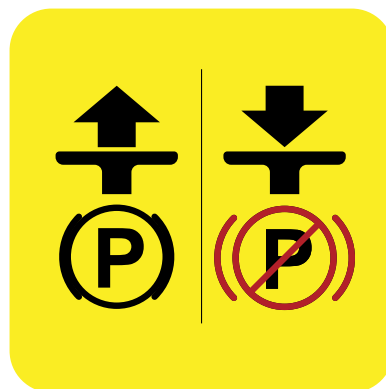
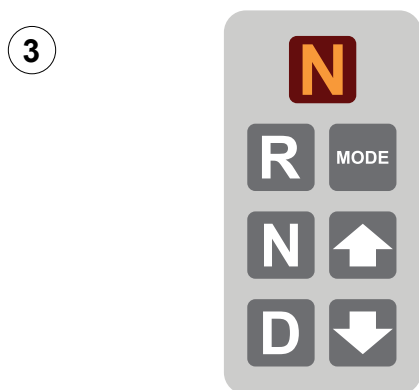
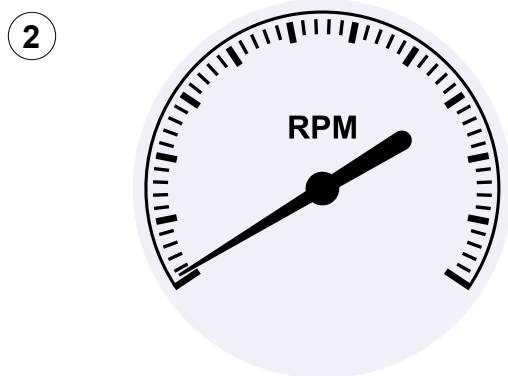
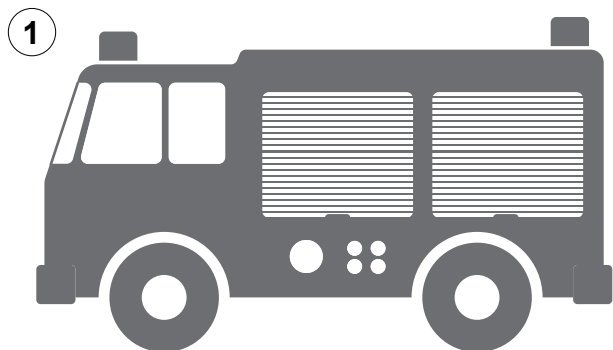


## Throttle Ready Panel

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Feature		Description
1	Throttle ready LED	This illuminates when the throttle ready interlock is made.
2	OK to pump LED	This illuminates when the OK to pump interlock is made.

## Shifting from Road to Pump Mode



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Use the illustrations and instructions to shift the pump transmission into pump mode. Understand that each application operates with its own characteristics and that it is common to hear the pneumatic shift unit during the procedure. Complete each step in the procedure and verify that the shift was achieved before you leave the cab.

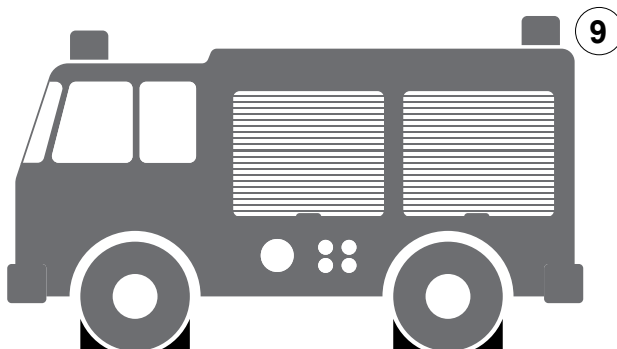
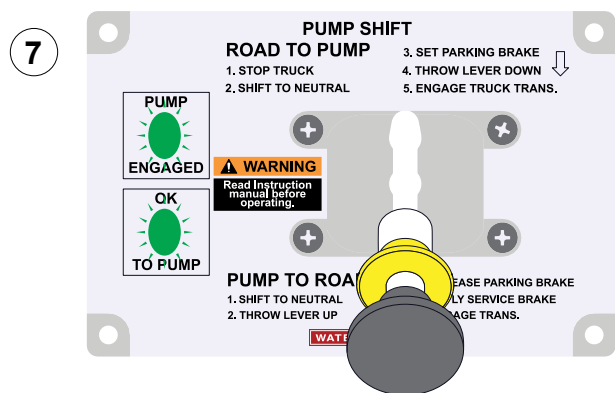
**! WARNING**

**Sudden Unexpected Movement**

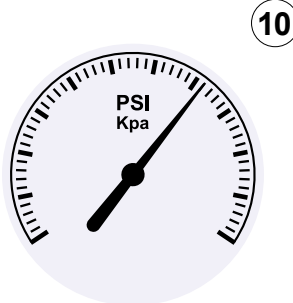
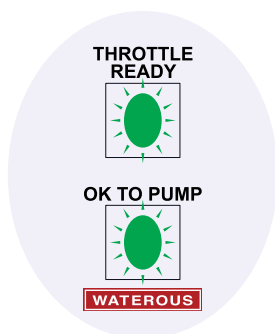
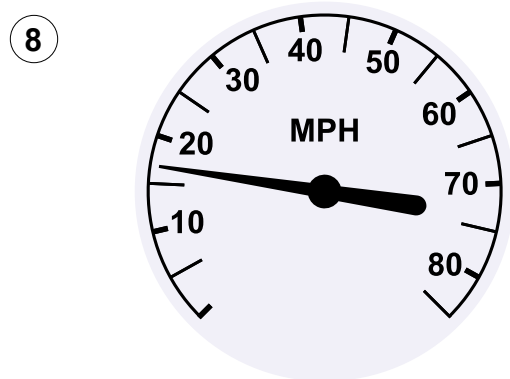
- Unexpected movement can cause injury or death.
- Make sure the shift unit is in the proper mode before operation.

- 1 Bring the apparatus to a complete stop—keep the foot-brake applied.
- 2 Reduce the engine speed to idle.
- 3 Shift the chassis transmission into *NEUTRAL*.
- 4 Apply the *PARKING BRAKE*—release the foot-brake.
- 5 Move the shift knob on the in-cab panel down to the pump position.
- 6 With the engine speed at idle, shift the chassis transmission into the pumping gear.

## Shifting from Road to Pump Mode



Continue to use the illustrations and instructions to shift the pump transmission into pump mode. Understand that each application operates with its own characteristics and that it is common to hear the pneumatic shift unit during the procedure. Complete each step in the procedure and verify that the shift was achieved before you leave the cab.



**! WARNING**

**Sudden Unexpected Movement**

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

- 7 If all the appropriate interlock conditions are satisfied, the pump engaged LED and the OK to pump LED on the in-cab shift panel will illuminate.
- 8 If allowed by the apparatus interlock, slowly increase the engine speed above idle and verify that the speedometer also increases in speed.
- 9 You may now leave the cab and chock the wheels.
- 10 The final indicator that you shifted the apparatus from road mode to pump mode is that the throttle ready/OK to pump LEDs are illuminated on the throttle ready panel and that discharge pressure builds in the pump.

## Shifting from Pump to Road Mode

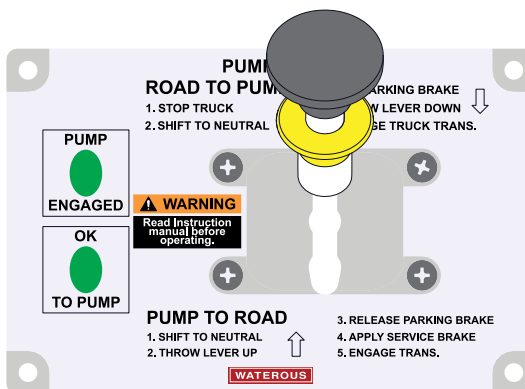
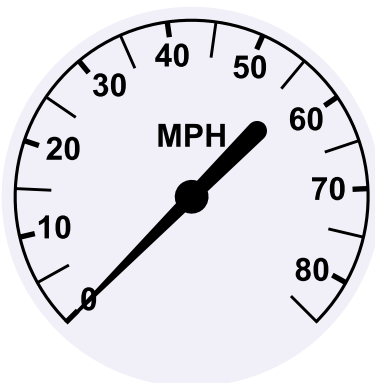
1



2



3



4

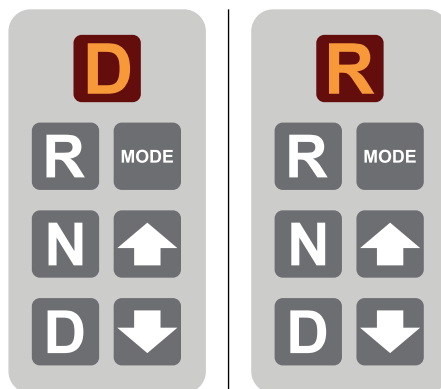
Use the illustrations and instructions to shift the pump transmission into road mode. Understand that each application operates with its own characteristics and that it is common to hear the pneumatic shift unit during the procedure. Complete each step in the procedure and verify that the shift was achieved before you leave the cab.

**! WARNING**

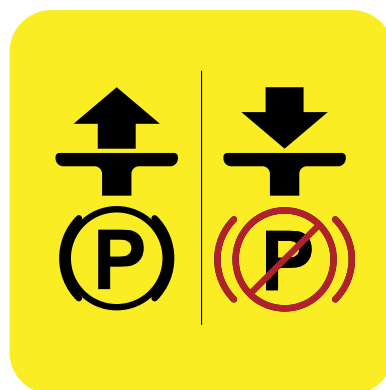
**Sudden Unexpected Movement**

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

5

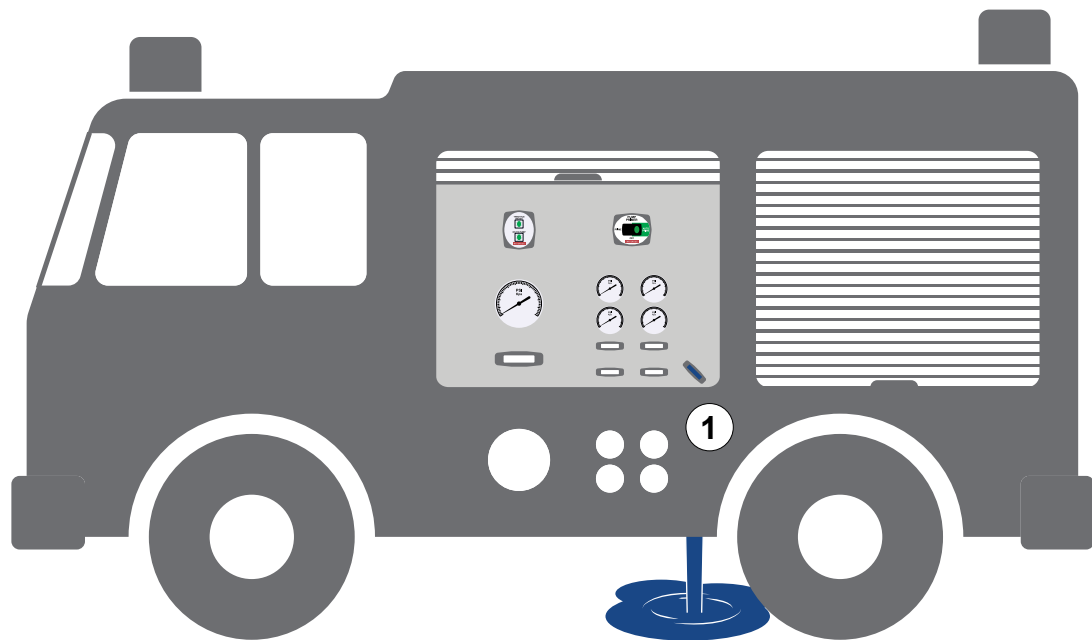


6



- 1 Reduce the engine speed to idle.
- 2 Shift the transmission into *NEUTRAL*.
- 3 Allow the speedometer to return to 0.
- 4 Move the shift unit on the in-cab panel up to road position.
- 5 With the engine speed at idle and the foot-brake applied, shift the chassis transmission into *DRIVE* or *REVERSE*.
- 6 Release the *PARKING BRAKE*.

## Draining the Apparatus

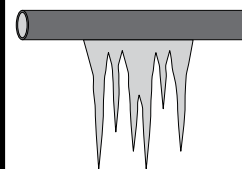


Use the illustration and instruction to drain the apparatus.

### NOTICE

#### Freeze Damage

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



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

## Maintenance Schedule

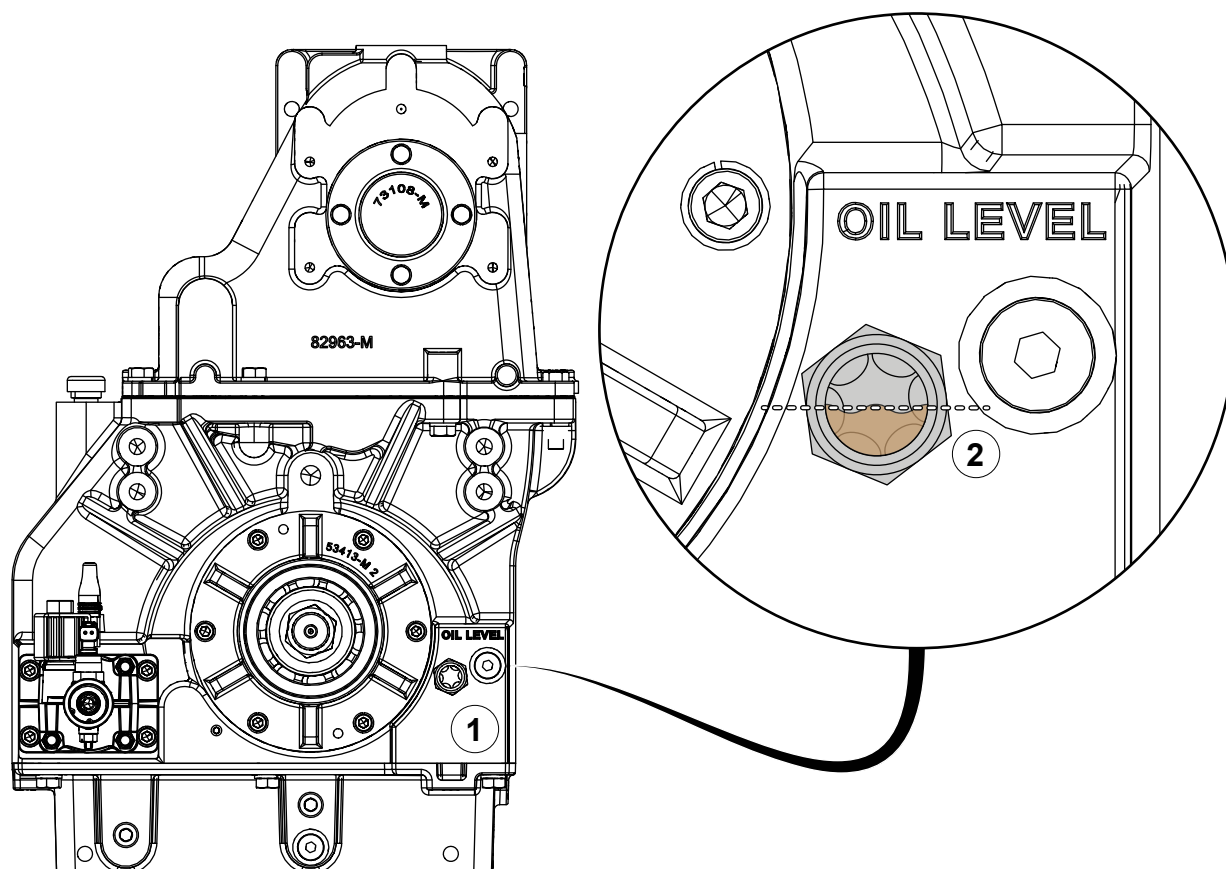
Perform the following procedures at the recommended intervals at a minimum. Environmental conditions determine the maintenance intervals. Inspect the components frequently, and create a maintenance schedule suitable to your application and environmental conditions. Replace wear components with equivalent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

Operation	Weekly	Monthly	12 Months	Comment
Check the fluid level	<b>X</b>			
Change transmission fluid			<b>X</b>	Change every 100 hours of pump operation or annually, whichever comes first.
Inspect the breather			<b>X</b>	Inspect every 100 hours of pump operation or annually, whichever comes first. Clean or replace as required.

## Towing

To prevent damage to the pump transmission when towing is required, disconnect the driveshaft connecting the output shaft on the pump transmission to the rear wheel differential on the chassis.

## Checking the Transmission Fluid Level



Use the illustration and instructions to check transmission fluid level. Refer to the **"Maintenance Schedule" on page 16** for a suggested interval.

**Note:** Make sure that you park the apparatus so that the transmission is level before you check the fluid level.

- 1 Locate the sight glass on the transmission.
- 2 Make sure that the fluid is at the midpoint of the sight glass, if not perform the following:
  - If the fluid level is too low, add fluid to the transmission. Refer to: **"Adding the Transmission Fluid" on page 19.**

**Note:** In cases where the fluid level is too low, it is important to determine the cause. Look for and repair any leaks found on the transmission.

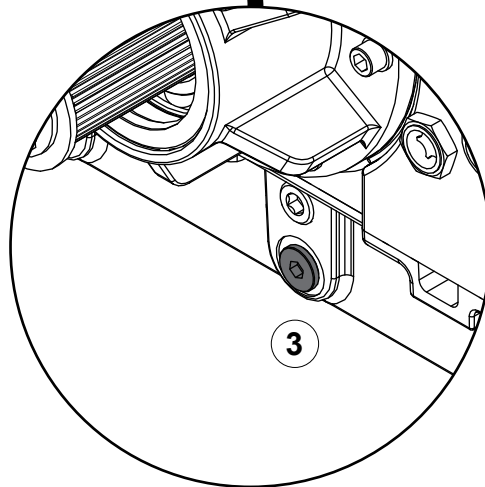
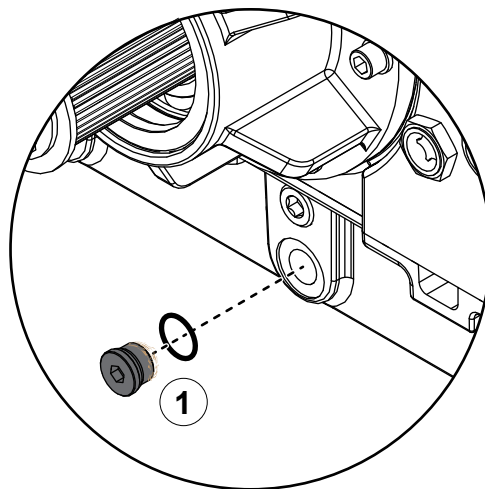
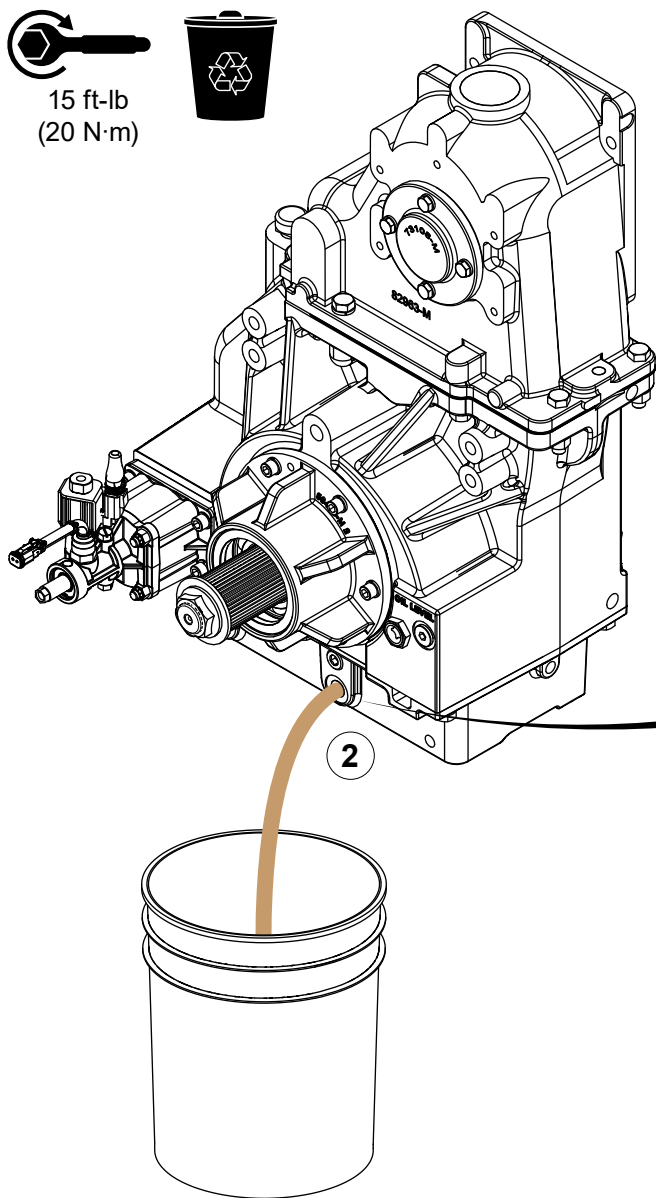
- If the fluid level is too high, drain the contaminated fluid and refill with fresh fluid. Refer to: **"Draining the Transmission Fluid" on page 18.**

**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 transmission—repair or replace any seals or components that allow water to enter the pump.

## Draining the Transmission Fluid



15 ft-lb  
(20 N·m)



Use the illustration and instructions to drain the transmission fluid. Begin by placing a suitable container under the transmission to collect the drained fluid.

- 1 Remove the magnetic plug from the transmission. Remove any metal fragments that collected on the magnetic plug. Inspect the O-ring for deterioration and replace it if necessary.
- 2 Allow the transmission fluid to completely drain from the transmission.

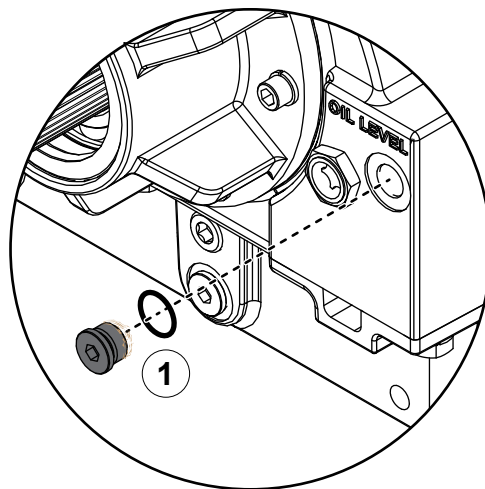
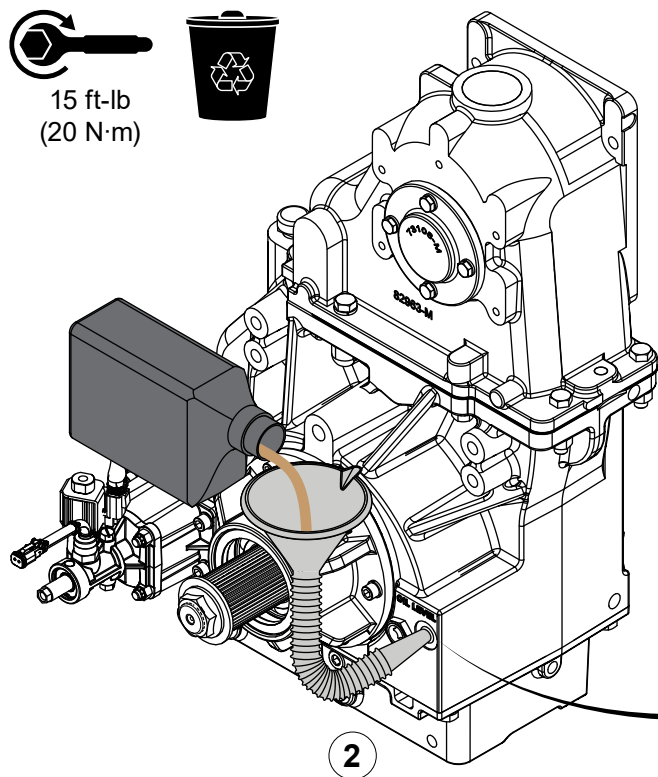
**Note:** Know that it will take several minutes for fluid to completely drain from the internal chambers within the transmission.

- 3 Install the magnetic plug and torque to 15 ft-lb (20 N·m).

## Adding the Transmission Fluid



15 ft-lb  
(20 N·m)

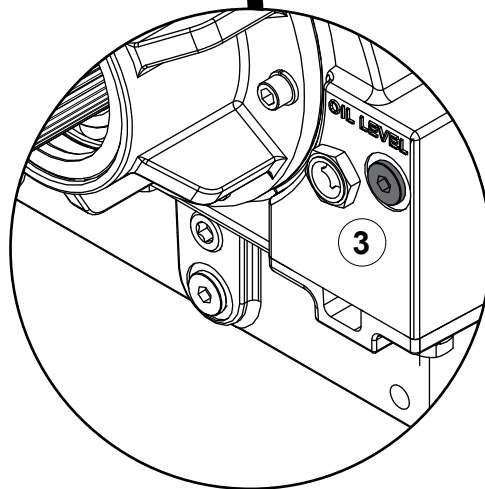


Use the illustration and instructions to add transmission fluid. Use approximately 6 qt (5.7 L) of automatic transmission fluid (ATF) that meets the requirements of DEXRON III or MERCON V.

- 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 Add transmission fluid until it is at the midpoint of the sight glass. Refer to **"Checking the Transmission Fluid Level"** on page 17.

**Note:** Know that it will take several minutes for fluid to circulate within the transmission. Allow time for fluid to flow into the internal chambers of the transmission.

- 3 Install the magnetic plug and torque to 15 ft-lb (20 N·m).



Problem	Possible Cause	Solution
The pump does not engage. <ul style="list-style-type: none"> <li>The in-cab shift panel is in the pump position.</li> <li>The pump engaged LED on the in-cab panel does not illuminate when expected.</li> </ul>	The indicator switch on the pneumatic shift unit is malfunctioning.	Replace the indicator switch on the pneumatic shift unit.
	Insufficient air pressure is available to the pneumatic shift unit—80 psi minimum.	Allow air pressure to build in the system, repair any leaks in the system.
	Leaking pneumatic shift unit.	Replace the pneumatic shift unit.
	Malfunctioning air control valve on the in-cab shift unit.	Repair or replace the air control valve.
	Improper shifting sequence	Attempt shifting using the proper sequence.
Pump engaged LED is illuminated but the OK to pump LED is not.	Pump transmission shifting components are damaged.	Inspect the pump transmission shifting components for leaks or damage.
	The parking brake is not applied.	Apply the parking brake.
	Chassis transmission is not in pumping gear.	Shift chassis transmission into pumping gear.
	Malfunction with the high range lockup or safety interlock systems.	Contact the apparatus manufacturer.
The in-cab shift panel is in the road position, but the pump engaged LED and/or OK to pump LED remains illuminated. <i><b>Note:</b> The engine may stall when the chassis transmission is placed into a drive gear.</i>	Malfunction with the chassis transmission or transmission electronic control unit.	Contact the chassis transmission manufacturer.
	Shift indicator switch on the pneumatic shift unit may be stuck in the closed position.	Replace the shift indicating switch.
	Insufficient air pressure is available to the pneumatic shift unit—80 psi minimum.	Allow air pressure to build in the system, repair any leaks in the system.
	Leaking pneumatic shift unit.	Replace the pneumatic shift unit.
	Malfunctioning air control valve on the in-cab shift unit.	Repair or replace the air control valve.
The in-cab shift panel is in the road position and you hear a grinding sound emanating from the pump transmission.	Improper shifting sequence	Attempt shifting using the proper sequence.
	Pump transmission shifting components are damaged.	Inspect the pump transmission shifting components for leaks or damage.
	Improper shifting sequence	Attempt shifting using the proper sequence.
	Malfunction with the chassis transmission or transmission electronic control unit.	Contact the chassis transmission manufacturer.

Problem	Possible Cause	Solution
The engine stalls when the chassis transmission is placed in <i>DRIVE</i> after moving the pump transmission to road mode.	Shift indicating switch malfunctioning.	Replace the shift indicating switch.
	Malfunctioning chassis transmission or transmission electronic control unit.	Contact chassis transmission manufacturer.
The interlock allows shifting to road mode when the chassis transmission is in pump gear.	The shift unit solenoid is stuck in the de-energized (open) position.	Check that the interlock is operating properly.
		Verify that the solenoid is operating properly. Replace if needed.
The in-cab shift panel is in the road position, but the vehicle will not move.	Improper shifting sequence.	Repeat shifting procedure.

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