

# PIERCE<sup>®</sup>

PULLING FOR YOU

## HOW DO I FIX MY PUMP?

*A Guide to Troubleshoot and Test Your Pump*



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# 1. INTRODUCTION

Dear Equipment Owner,

Something is bound to malfunction and you're either going to call a neighbor, YouTube, or pay a shop to fix your pump.

This year is going to be different! You are going to become a pump fixing expert.

This guide will teach you everything you need to know to:

- ***Identify your pump and its parts***
- ***Troubleshoot, diagnose and fix common problems***
- ***Test parts of a pump and control***
- ***Maintain your pump***
- ***Drain, clean and refill your pump with fluid***

**LET'S GET STARTED**



## 2. PUMP DIAGRAM: *Identifying the parts of your pump*

### SOLENOID

A solenoid is a contact. So, when you put power to the activator, the contacts, contact and 12V run through the solenoid. The solenoid is mounted on the pump motor and connects to the motor post. The solenoid has two posts, which bridges your hot wire.

### COIL

A coil is a magnet. Applying electricity magnetizes the coil and opens the valve. The coil is located on the pump's valve. The coil has one post, which connects the remote.

### VALVE

A device for controlling the passage of fluid through a port or hose.

**Cartridge Valves**, also known as 2/2-way valves are industrial hydraulic valves used for directional, pressure, check, and flow control. These cartridge valves are a compact design that can be used in hydraulic manifold systems for many types of industrial and mobile machinery.

A **check valve** is a valve that closes to prevent backward flow of liquid.

A **spool valve** is a valve that allows fluid flow into different paths from one or more sources. They usually consist of a spool inside a cylinder which is mechanically or electrically controlled.

### MOTOR

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. *We offer two options:*

**Single Post Motor:** A single direction motor. These motors are specific to brand usually and can't be interchanged.

**Double Post Motor:** A bi-rotational motor. These motors can be changed either direction clockwise or counterclockwise. These motors are usually specific to brand and can't be interchanged.

### BREATHER VENT

The vent on the top of the reservoir that will unscrew so that fluid can be added to the pump.



### RESERVOIR

A place where fluid collects. The tank, either made of plastic or steel, on your pump is the reservoir.

### GROUND CONNECTION

Ground or "earth" is the reference point in an electrical circuit from which voltages are measured, a common return path for electric current, or a direct physical connection to the vehicle's ground.

### O-RING FITTING

Also referred to as SAE An o-ring boss seal is a technique for joining two fluid-carrying pipes, hoses, or tubing. In an o-ring boss (abbreviated ORB) system, a male-threaded part is inserted into a female-threaded part, providing a mechanical seal. This system differs from others in that an additional nut is tightened over an o-ring into a chamfered area, creating a fluid-tight seal.

*This system has the advantage of being able to be tightened mechanically before being sealed. Most threaded systems, such as NPT, have a seal provided by a taper in the thread, so it is difficult to orient both ends of the hose, pipe or tube so that it is not twisted. In the o-ring boss system, this problem is eliminated because the threads do not seal the connection and therefore can be rotated at least a full revolution before they are sealed while maintaining a proper mechanical connection. The orientation problem could also be solved with a suitable union.*

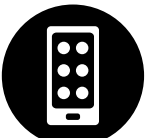











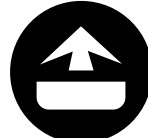



# 3. TROUBLESHOOTING YOUR ISSUES

If you turn on the pump and hear clicking, or it runs in only one direction you may have to replace parts on your pump. The question is which part? If your pump isn't working, it could be the motor, solenoid, coil, or a combination of problems.

USE THIS TABLE TO:

1. Identify your symptom

2. Locate which part to test

SYMPTOMS				
<b>Pump only runs on one direction</b>	<b>Pump motor does not turn and you hear a click</b>	<b>Pump does not run at all</b>	<b>Pump does not build up pressure</b>	<b>Hydraulic fluid is cloud, milky, or pink</b>
 REMOTE	 MOTOR	 REMOTE	 WATER	 WATER
 COIL	 SOLENOID	 MOTOR	 CORROSION	
 WATER	 CORROSION	 SOLENOID	 PRESSURE RELIEF	
 CORROSION		 CORROSION		
 VALVE				

# 4. TESTING YOUR PUMP

## ▶ HOW DO I TEST A COIL?

Testing the coil on your pump is simple. You can locate the coil and distinguish it from the solenoid by how many posts it has. The solenoid is located on the motor, and has two posts while the coil is located on the valve and only has one post.

### STEP 1

Make sure the pump is grounded.



### STEP 2

Put 12V of power directly to the contact post (the coil only has one post).



### STEP 3

Take a non-magnetic screwdriver or other metal tool and attempt to stick it to the coil. If the coil is working (magnetized) the metal tool will stick to the end of the coil. If it is not working the magnet is not getting a charge (magnetizing) and the tool will not stick to the coil. Usually if your coil is not working you will only get movement in one direction.



## ▶ HOW TO TEST YOUR PUMP SOLENOID:

### STEP 1

Make sure your solenoid is properly grounded. To ground the solenoid, run a small 14 gauge ground wire from the ground on the pump to the screw mounting the solenoid to the motor.



### STEP 2

Make sure you have 12V to the solenoid (usually when looking from the rear it will be the large copper terminal on the left).



### STEP 3

Using a jumper wire, (14 gauge wire 10" long with alligator clips on both ends is easiest) jump from the 12V terminal on the solenoid to the activator post (the small post). You should hear a loud click.



### STEP 4

Using a 12V test light, check to see if you have 12V on the copper terminal that connects the solenoid to the motor (usually looking from the rear the copper terminal on the right). If you do have 12V, the solenoid is good. If you don't, the solenoid needs to be replaced. If your solenoid tests as working then it could be your coil.



## 4. TESTING YOUR PUMP (Continued)

### ▶ HOW TO TEST A SINGLE POST HYDRAULIC PUMP MOTOR:

#### STEP 1

Ground the housing of the motor using a jump pack or battery.



#### STEP 2

Take the positive directly to the post on the motor.



#### STEP 3

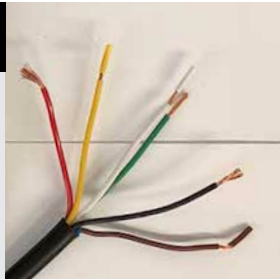
If it doesn't run or runs slowly, it's time to replace the motor.



### ▶ HOW TO TEST YOUR WIRELESS CONTROL: (PS002)

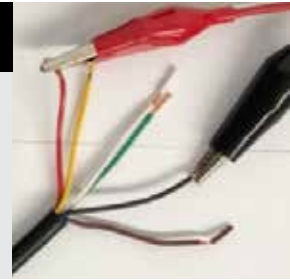
#### STEP 1

Disconnect the green, yellow and white wires from the pump.



#### STEP 2

Have the red wire attached to 12V power source and the black wire grounded in the 12V circuit.



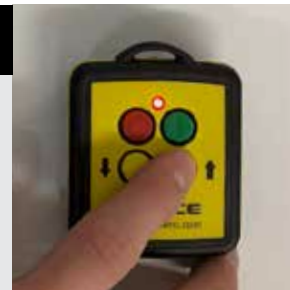
#### STEP 3

Turn on the transmitter and hold the down button. Using a 12V test light grounded to the 12V circuit test the **green** wire. The test light should light up.



#### STEP 4

Hold the up button. Using the test light check the **green** wire. The test light should light up.



#### STEP 5

Hold the down button again and test the **white** wire with the test light. The test light should light up.



#### STEP 6

Hold the up button again and test the **white** wire with the test light. The test light should light up.



If these functions work, the remote is working properly.

If they do not work, order a replacement **PS002 system** at [www.piercearrowinc.com](http://www.piercearrowinc.com). PLEASE NOTE: a replacement transmitter or receiver is available. A full system may not require replacement.

**NOTE:** If the wireless keeps turning off the remote, the receiver is sensing low voltage. Check all connections for corrosion and good connection. Also, check to make sure you have a good 12V connection when the winch or pump is running.

## 4. TESTING YOUR PUMP (Continued)

### ▶ HOW TO TEST YOUR WIRED CONTROL: (CP077K)

#### STEP 1

Disconnect remote from pump.



#### STEP 2

Apply 12V power to the **green** wire.



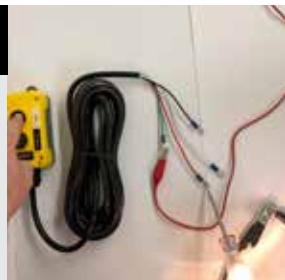
#### STEP 3

Ground a 12V test light to your 12V circuit.



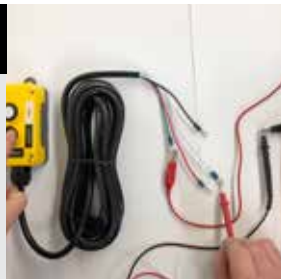
#### STEP 4

When pushing the up function test the **red** wire for power with test light. The test light should light up.



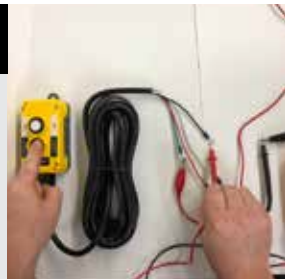
#### STEP 5

Push the down function and test the **white** wire with test light. The test light should light up.



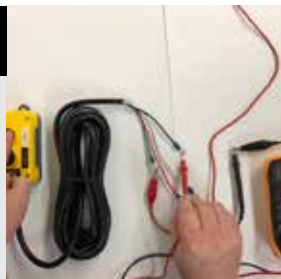
#### STEP 6

Push the down function and test the **black** wire with the test light. The test light should light up.



#### STEP 7

Push the up function and test the **black** wire again with the test light. The test light should light up.



If all these work properly, the remote is good.

If the test lights do not light up, order a replacement **CP077K**.



# 5. PUMP MAINTENANCE:

## Water, Ice, Corrosion & Flushing the Hydraulic System

### WATER and ICE

Water in your hydraulic system can lead to clogged valves and filters. Water can rust components in the cylinders leading to mechanical failure. Here's how to determine if you have water in the hydraulic fluid:

- *The pump does not build up pressure*
- *The hydraulic fluid starts looking milky, cloudy or pink.*

Water will freeze, impeding flow in colder climates. To get water out of your hydraulic pump you need to flush the system:

#### STEP 1

Disconnect the hoses. Place the disconnected hoses into a bucket or drain pan to collect the hydraulic fluid from the cylinder.

#### STEP 2

Drain the cylinder. In order to drain the cylinder retract and extend the cylinder until all the fluid is removed. The fluid will exit the hoses removed in step 1.

#### STEP 3

Remove the reservoir and empty the fluid. The reservoir is located on the end of the pump.

#### STEP 4

While you have the reservoir off, use a mild parts cleaner to clean the filters and the inside of the reservoir. You may need to replace the filters.

#### STEP 5

Pull the valve out of the pump and clean with parts cleaner as well, flushing the block. The cleaner will flow out of the tubes into your collection bucket.

#### STEP 6

Allow the parts cleaner to evaporate from the disassembled pump. This process takes about ten minutes.

#### STEP 7

Reassemble pump, reconnect hoses, and fill the reservoir with hydraulic fluid or automatic transmission fluid\* and purge the system until it's full.

Your hydraulic system is flushed and ready to operate. Taking the steps to keep our equipment in working order adds to the life of the product.

### \* WHICH FLUID GOES IN MY PUMP?

We suggest changing the hydraulic fluid in your pump yearly. First let's look at the types of hydraulic fluid that can be found at most auto parts stores:

#### Type 1: Dextron 3 Automatic Transmission Fluid

Dextron 3 is red and is a little thinner than hydraulic fluid. It is used in northern regions since it works well in colder conditions.

#### Type 2: AW46 Hydraulic Fluid

AW46 is a gold clear color and has a thick consistency. The consistency helps the fluid resist thinning out in the heat. AW46 is used in warmer climates.

**ATTENTION:** It's very important you don't mix the two types of fluids. The fluid will gel together and cause damage to your pump.

## 5. PUMP MAINTENANCE: (Continued)

### Water, Ice, Corrosion & Flushing the Hydraulic System

#### CORROSION



*The pump motor below did not have a cover and had been sitting on the ground for a year or two:*

After installing and using your equipment it may sit for an extended period of time. The motor contains a small weep hole. Depending on the weather in your area and where you're storing your equipment the motor can retain condensation and cause rust.

#### HOW TO GET RID OF RUST IN YOUR PUMP MOTOR:

While you may have to replace it if the rust has moved to the brushes and springs, there is a good chance a thorough cleaning will get your equipment running.

##### STEP 1

Disassemble the pump and clean off the rust. Use an emery cloth or steel wool to gently remove the rust.

##### STEP 2

Reassemble and test the equipment. If your equipment still isn't working, you probably need to replace the motor.

#### TO AVOID RUST IN YOUR PUMP MOTOR:

- Turn on your equipment every other month and use the remote, or button to work the hydraulic pump a few times. This will keep the inner workings moving and ensure any built up moisture is being dealt with.
- Make sure the pump is not mounted where water cannot drain. Toolboxes can retain water. Hay can block drainage and retain moisture.

# 6. WHICH PUMP DO YOU HAVE?

## APPLICATION:



**DUMP HOIST**



PM-319  
PM-319-6P  
PM-319-10



PM-319-5G



PM-3551



**BALE SPIKE**



PM-3554-0131



PM-3554-6



PM-3554-5G



**WRECKER**



PM-3554-0131



PM-3554-6



PM-3554-5G



PM-3530



PM-3530-3ST  
PM-3530-4ST



PM-3530-3ST-DD  
PM-3530-2STK-DD  
PM-3530-4ST-DD

# 6. WHICH PUMP DO YOU HAVE? (Continued)

## POWER DRIVE:

POWER UP / POWER DOWN



PM-3551



PM-3554-0131



PM-3554-6



PM-3554-5G



PM-3530-3ST  
PM-3530-4ST



PM-3530-3ST-DD  
PM-3530-2STK-DD  
PM-3530-4ST-DD



PM-3530

POWER UP / GRAVITY DOWN



PM-319



PM-319-6P  
PM-319-10



PM-319-5G



# 6. WHICH PUMP DO YOU HAVE? (Continued)

## FUNCTIONS:

2 WAY



PM-319



PM-319-6P  
PM-319-10



PM-319-5G



PM-3551



PM-3554-013



PM-3554-6



PM-3554-5G

4 WAY



PM-3530  
PM-3530-2STK-DD

6 WAY



PM-3530-3ST



PM-3530-3ST-DD

8 WAY



PM-3530-4ST



PM-3530-4ST-DD



# 6. WHICH PUMP DO YOU HAVE? *(Continued)*

## FLUID CAPACITY:

3 QUARTS



PM-319



PM-3554-0131



PM-3530



PM-3530-3ST  
PM-3530-4ST-DD

2.125 GALLON

6 QUARTS



PM-319-6P



PM-3554-6

5 GALLON



PM-319-5G



PM-3554-5G



PM-3530-3ST-DD  
PM-3530-2ST-DD  
PM-3530-4ST-DD

3.25 GALLON

3.75 GALLON



PM-3551



PM-319-10

4.25 GALLON

# 6. WHICH PUMP DO YOU HAVE? (Continued)

## RESERVOIR TYPE:

STEEL



PM-319  
PM-319-10



PM-3554-0131



PM-3530-3ST-DD  
PM-3530-2ST-DD  
PM-3530-4ST-DD



PM-3554-6



PM-3554

POLY



PM-319-6P



PM-319-5G



PM-3554-5G



PM-3551



PM-3530 | PM-3530-3ST | PM-3530-4ST



# 7. BUCHER PUMP PARTS



**SOLENOID  
P050T**



**COIL (STUD)  
1019660**



**COIL (SINGLE WIRE)  
P07392**



**OIL RESERVOIR CAP  
P050BM**



**PUMP VALVES**

PUMP	VALVE
PM319 PM3551	P07193
PM3530	P00679-D
PM3551 PM3554	P00455D



**RESERVOIRS**

PUMP	RESERVOIR
PM-319-6P	14167
PM-3551	14168
PM-319-5G	14223
PM-3530 PM-3530-3ST	14166
PM-3554-0131	06855
PM-319-10	04967



**MOTOR**

MOTOR	TYPE
P228	STANDARD
P229	HEAVY DUTY
08111	BUCHER



**WIRELESS REMOTE**

REMOTE	TYPE
PS002	2 FUNCTION
PS002TS	2 FUNCTION DUMP TRAILERS + CONNECTORS
PS004	4 FUNCTION
PS004B	4 FUNCTION ROLL OFF TRAILERS



**WIRED REMOTES**

REMOTE	TYPE
P040	TOGGLE
CP077K	UNIVERSAL
CP071	MOMENTARY

For more information regarding remotes refer to our website or controls product line guide.