



# Pump Operations

## *UDOR Diaphragm Pumps*

**CAREFULLY READ AND FOLLOW THESE INSTRUCTIONS BEFORE OPERATING YOUR UDOR PUMP. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY DAMAGE PUMP AND VOID WARRANTY.**

**1. HOW THE PUMP WORKS (The diaphragm is what separates the pump oil from the spray material.)**

Each piston **DOWNSTROKE** lowers the piston-attached diaphragm, drawing spray material into pump head. As piston passes below cylinder sleeve side openings, oil is pulled into lower diaphragm cavity. During each piston **UPSTROKE** the cushion of oil between the piston and the diaphragm hydraulically pushes and cushions the diaphragm as the piston tops out. This discharges the fluid in the pump head. The lower diaphragm cavity oil cushion also lubricates the diaphragm and piston ensuring minimal mechanical wear. **REMEMBER** low oil level causes excessive mechanical wear on diaphragms and internal components. The transparent oil sight guage makes oil checks easy. Keep filled to mark on sight guage.

**2. BEFORE OPERATING SYSTEM**

Open Suction Valve and check tightness of suction lines, fittings and filter.

**3. DO NOT RUN PUMP WITH A STARVED SUCTION**

The diaphragm pump will not suffer if run dry due to an empty tank. However, a "starved" suction due to a clogged strainer or a closed suction valve will cause premature failure of the pump diaphragms. **NOTE:** Only use filter screens that are between 10 & 20 mesh. Never use a fine filter screen with a diaphragm pump.

**4. SUCTION VALVE (To prevent pump damage, shut down system before closing suction valve.)**

This valve is in the system to close off tank flow for emergency system repair or if strainer screen requires unexpected cleaning after a tank refill. (Strainer screen should be cleaned just before each tank refill.)

**5. MAINTAIN PROPER OIL LEVEL**

The crankcase oil plays a dual role. It lubricates all moving parts and is hydraulically functional in the pumping capacity. Oil supports the diaphragm during each pressure stroke. It is important to maintain the recommended oil level, marked on the oil sight guage.

**6. DO NOT OVER SPEED PUMP**

UDOR diaphragm pumps are designed to operate at or below a specific speed. Over speeding will cause valves and diaphragms to prematurely fail and could cause other internal damage. Refer to the performance chart of your specific pump for maximum operating speed.

**7. PULSATION DAMPENER INTRODUCTION**

It is the nature of diaphragm pumps to have some pulsation. This is caused by sudden changes in piston direction. The pulsation dampener has one function in the pumping system, reduce pulsation by providing a cushion of air to bump against. The UDOR pulsation dampener uses a rubber bladder to separate the air cushion from the solution being pumped.

**8. PULSATION DAMPENER SETTING**

The basic rule is to fill the pulsation dampener to twenty percent (20%) of the system working pressure. If you have your spraying pressure set at 100 psi, the setting for the pulsation dampener should be 20 psi. Always shut down the pump before adding air to the pulsation dampener or checking its pressure. Air supply can be from a compressor or a manual type pump. The dome containing air is small. Take care to apply the pressure guage evenly on the air valve to prevent air from leaking out of the pulsation dampener. It is not uncommon to lose 5-10 psi when checking pulsation dampener pressure. **NOTE:** 2-cylinder diaphragm pumps may require more air than 20% of operating pressure. 20 psi is the minimum pulsation dampener pressure. **DO NOT RUN PUMP WITH LESS THAN 20 PSI IN THE PULSATION DAMPENER.**



# Maintenance Procedures

## *UDOR Diaphragm Pumps*

Establishing and following a maintenance schedule is a good investment. It will add greatly to the longevity of your pump and your sprayer.

### UDOR DIAPHRAGM PUMP MAINTENANCE PROCEDURE

**STEP NO. 1 “AFTER EACH USE”** flush pump with clean water. Most diaphragm “attacks” occur when chemicals are left sitting in the pump. These few minutes of cleaning are well spent, extending diaphragm life and minimizing chemical buildup throughout the system

**STEP NO. 2 “AFTER EVERY 500 HOURS OF USE OR AT SEASON’S END”** (whichever comes first). Install a new set of diaphragms. Inspect check valves for spring fatigue and seat wear. Change oil using UDOR LUBE premium pump oil or a non-detergent 30 weight oil: hand rotate shaft while filling. This evacuates most unwanted air pockets. Run pump five minutes under “no-load” conditions. This evacuates remaining air pockets from diaphragm cavity. Recheck oil level.

**STEP NO. 3 “WINTER STORAGE”** Perform **Step 1** (above), then, with tank empty and suction and discharge valves “open”, run pump one minute to ensure complete drainage of pump heads and lines. Recirculate antifreeze and leave in system to complete winterizing procedure.

**NOTE:** Allow antifreeze to replace any possible water in hoses and booms. If a handgun is in the system, run antifreeze through the hose and handgun into tank lid opening to clear and/or dilute water. (Depending on the length of hose, more than one gallon of antifreeze may be required to protect the system from freezing).

### NOTE

**TO PROTECT AGAINST SERIOUS INJURY, NEVER SPRAY  
FLAMMABLE LIQUIDS, OR FLUSH PUMP WITH FLAMMABLE LIQUIDS!  
THIS WILL VOID ANY AND ALL WARRANTIES.**



# Diaphragm Pump Service Guide

## 1. DRAIN CRANKCASE OIL

Drain pump crankcase by removing the oil drain plug located at the bottom of the pump, also remove the oil fill cap or plug.

**NOTE:** On older pump models that **DO NOT** have the oil drain plug, oil needs to be drained after the head, diaphragm and piston sleeve have been removed. **NOTE:** When re-installing piston sleeves, the oil holes must always align parallel with the pump crankshaft.

## 2. EXTERNAL MANIFOLD REMOVAL

If your pump has external manifolds, these must be removed prior to head removal.

## 3. HEAD REMOVAL

Remove the head bolts, and then remove the pump heads which may require some "light" prying.

## 4. DIAPHRAGM REMOVAL

Turn crankshaft to bring piston up to the top of its stroke, remove the diaphragm bolt and washer, then remove the diaphragm.

## 5. CRANKCASE CLEANING

To properly clean the crankcase you need to remove the piston sleeves and wash the crankcase with parts washing solution or equivalent. Before re-installing the piston sleeves, apply a light coating of oil to both the pistons and sleeves. **NOTE:** Make sure the oil holes in the piston sleeve align parallel with the pump crankshaft.

## 6. INSTALLING NEW DIAPHRAGMS

Install the diaphragm bolt and washer into the new diaphragm. Install this assembly to the piston, flat side of the diaphragm down. Use blue thread locker or equivalent on the diaphragm bolt. Then torque to the recommended specs. Now rotate crankshaft to bring the piston and diaphragm to the bottom of its stroke. Then seat the outside edge of the diaphragm into the pump body.

## 7. HEAD INSTALL

When reinstalling the pump heads it is very "**IMPORTANT**" to make sure that the check valves are installed correctly. For each cylinder there are two valves, one valve lets fluid **into** the head, the other valve lets fluid **out** of the head. **PAY VERY CLOSE ATTENTION TO THIS!** Then torque pump heads to rated torque specs.

## 8. INSTALLING PULSATION DAMPNER DIAPHRAGM

Bleed off the air in the chamber, then remove the cover bolts, cover and diaphragm, install the new diaphragm dome down. Reinstall cover and torque to recommended specs. Recharge dampner with air to 20% of the pumps operating pressure.

## 9. REFILL PUMP CRANKCASE

Check the oil drain plug, making sure that it is installed in the crankcase. Fill the pump with **UDOR LUBE** premium pump oil or SAE 30 weight non-detergent oil to the recommended mark on the oil sight glass/gauge; about halfway on the oil sight glass/gauge. Rotate the crankshaft while filling to eliminate air pockets.

## 10. INITIAL START UP

Run pump for five minutes under **NO Load** conditions. This will evacuate any remaining air pockets in the crankcase. Turn pump off and re-check oil level. Refill as necessary to proper oil level. "**IMPORTANT**" During initial start up, monitor the oil color. If it turns milky white, the diaphragms were not seated or installed correctly.



# Trouble Shooting

## for UDOR Diaphragm Pumps

**UDOR diaphragm and plunger pumps “pump volume”, not pressure. The pressure is determined by adjusting the relief valve and selecting proper orifice size of spray nozzle or nozzles.**

PROBLEM	CAUSE	REMEDY
<ul style="list-style-type: none"> <li>• NO PRESSURE</li> <li>• VERY LITTLE PRESSURE</li> <li>• PRESSURE DROPS BELOW WORKING RANGE WHEN RELIEF VALVE IS OPEN TO BOOM OR GUN</li> </ul>	<ol style="list-style-type: none"> <li>1) Plugged strainer* restricting flow</li> <li>2) Suction hose obstruction</li> <li>3) Collapsed suction hose inside or outside tank restricting flow</li> <li>4) Pump drawing air through suction line hoses or fittings</li> <li>5) Pressure relief valve stuck or worn</li> <li>6) Excessive tank foam due to low tank volume</li> <li>7) Nozzle volume is greater than pump capacity</li> <li>8) One or more check valves seating improperly</li> </ol>	<ul style="list-style-type: none"> <li>• Clean Screen</li> <li>• Clear obstruction</li> <li>• Replace collapsed hose</li> <li>• Examine hoses and fittings, ensure air tight fit and no leaks</li> <li>• Repair or replace relief valve</li> <li>• Refill tank</li> <li>• Reduce nozzle orifice size or number of nozzles used</li> <li>• Clean or replace check valves</li> </ul>
<ul style="list-style-type: none"> <li>• PRESSURE GAUGE FLUCTUATES WILDLY</li> <li>• EXCESSIVE PULSATION</li> </ul>	<ol style="list-style-type: none"> <li>1) Pulsation dampener pressure too low or too high</li> <li>2) Pump drawing air through suction line hoses or fittings</li> <li>3) Plugged strainer* restricting flow</li> <li>4) Air not entirely evacuated from pump cavity</li> </ol>	<ul style="list-style-type: none"> <li>• Adjust pulsation dampener pressure (Refer to pulsation dampener setting on Pump Operation Sheet)</li> <li>• Examine hoses and fittings, ensure air tight fit and no leaks</li> <li>• Clean screen</li> <li>• Run pump with an open discharge to totally evacuate air</li> </ul>
<ul style="list-style-type: none"> <li>• PUMP DOES NOT DRAW WATER</li> </ul>	<ol style="list-style-type: none"> <li>1) Pump drawing air through suction line hoses or fittings</li> <li>2) Plugged strainer* restricting flow</li> <li>3) One or more check valves seating improperly</li> </ol>	<ul style="list-style-type: none"> <li>• Examine hoses and fittings, ensure air tight fit and no leaks</li> <li>• Clean screen</li> <li>• Clean or replace check valves</li> </ul>
<ul style="list-style-type: none"> <li>• PUMP OIL HAS MILKY COLOR OR OIL PLUG POPS OUT</li> </ul>	<ol style="list-style-type: none"> <li>1) One or more diaphragms have ruptured</li> </ol>	<ul style="list-style-type: none"> <li>• Replace diaphragms</li> </ul>

\* NOTE - Only use filter screens that are between 10 & 20 mesh. Never use a fine filter screen with a diaphragm pump.

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