



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.

WARNING!: UDOR Diaphragm Pumps are positive displacement pumps, therefore a properly designed pressure relief valve or pressure regulating valve must be installed on the pump or in the discharge plumbing. A secondary safety relief valve is also recommended. Failure to install a pressure relief valve or pressure regulating valve could result in personal injury, property damage or damage to the pump or system and void any warranty. In no way does UDOR USA assume any liability or responsibility for the construction or operation of a customer's or potential customer's high pressure system.

REFER TO THE PROPER PUMP BREAKDOWN AND DIAPHRAGM PUMP SERVICE GUIDE
BEFORE PERFORMING ANY MAINTENANCE OR SERVICING OF THE PUMP. www.udorusa.com

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 the 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 gauge makes oil checks easy. Keep filled to mark on sight gauge.

2. PRESSURE REGULATING VALVE

A proper pressure regulating valve directs the fluid in your system and also provides a by-pass or return feature for the fluid to travel when the discharge flow of the pump is shut off. Never run any UDOR Diaphragm Pump without a pressure regulating valve installed on the pump or in the discharge plumbing. Always start the pump with the pressure regulating valve in full by-pass or with minimal spring tension on the pressure adjustment knob or handle.

3. BEFORE OPERATING SYSTEM

Open suction valve and check tightness of suction lines, fittings and filter.

4. 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 on the inlet side of a diaphragm pump.

5. 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.)

6. 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 gauge. Only use UDOR LUBE premium pump oil. For any pump with a gear reduction, make sure the gear box is filled to the center of the sight glass or to the level plug with 90 wt. gear lube before operating.

7. PUMP VALVES OR CHECK VALVES

Every UDOR Diaphragm Pump has two valves per cylinder or head assembly. One valve lets fluid **"IN"** each head assembly (suction) and the other valve lets fluid **"OUT"** of each head assembly (discharge). Pay very close attention to valve placement when reinstalling the head assemblies during diaphragm replacements, pump maintenance or when servicing the pump.

8. PRESSURE GAUGE

Install pressure gauge as close as possible to the outlet or discharge of the pump, or on the high pressure manifold. This is extremely important for adjusting pressure regulating devices and for proper sizing of nozzle or restricting orifice. The pump is rated for a maximum pressure, which should be read at the pump only, not at the gun or nozzle.

9. DO NOT OVER SPEED PUMP

UDOR diaphragm pumps are designed to operate at or below a specific RPM. 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 RPM. Most UDOR Diaphragm Pumps are rated at 540 RPM max.

10. 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: to 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.

11. 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 gauge 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.**

WARNING!: DO NOT PUMP OR FLUSH PUMP WITH ANY FLAMMABLE, EXPLOSIVE, CAUSTIC OR CORROSIVE FLUIDS. DO NOT USE ANY OF THESE PRODUCTS IN AN EXPLOSIVE ATMOSPHERE. FAILURE TO FOLLOW THIS WARNING CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE AND WILL VOID ANY AND ALL WARRANTIES.



MAINTENANCE PROCEDURES

UDOR DIAPHRAGM PUMPS

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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 PROCEDURES

- 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 pump valves / check valves for spring fatigue and seat wear. Change oil using UDOR LUBE premium pump oil or a non-detergent 30 weight oil: rotate shaft while filling. This evacuates most unwanted air pockets. Run pump for five minutes under "no-load" condition or in full by-pass only. This evacuates remaining air pockets from diaphragm cavity. Re-check oil level. *Refer to proper pump breakdown and Diaphragm Pump Service Guide before installing new diaphragms or servicing the pump.
- 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. Re-circulate anti-freeze at low pressure only and leave in system to complete winterizing procedure.
- STEP NO. 4 "RE-STARTING AFTER WINTER STORAGE"** Before re-starting the pump after anti-freezing, make sure to purge all anti-freeze from pump and complete system at low pressure only. Anti-freeze will foam under high pressure and can cause severe damage to the pump and pressure regulator. Failure to follow this step will void any and all warranty.
- NOTE:** Allow anti-freeze to replace any possible water in hoses and booms. If a handgun is in the system, run anti-freeze through the hose and handgun into tank lid opening to clear and/or dilute water. (Depending on the length of hose and size of tank, more than one gallon of anti-freeze may be required to protect the system from freezing). ****DO NOT RUN PUMP WITH FROZEN FLUID****

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TROUBLE SHOOTING UDOR DIAPHRAGM PUMPS

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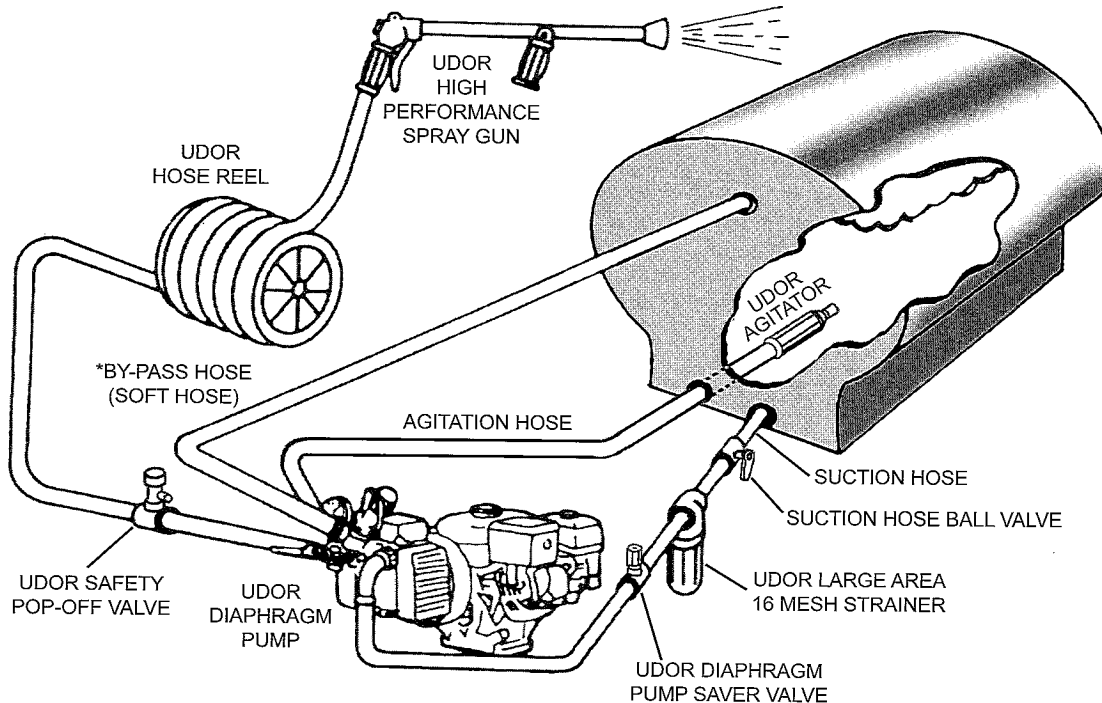
**UDOR diaphragm and plunger pumps “pump volume”, not pressure.
The pressure is determined by adjusting the pressure regulating valve
and selecting the proper orifice size of spray nozzle or nozzles.**

**NEVER run any UDOT diaphragm pump without a pressure regulating valve
installed on the pump or in the discharge plumbing.**

PROBLEM	CAUSE	REMEDY
• NO PRESSURE • VERY LITTLE PRESSURE • PRESSURE DROPS BELOW WORKING RANGE WHEN RELIEF VALVE IS OPEN TO BOOM OR GUN	1) Plugged filter* restricting flow 2) Suction hose obstruction 3) Collapsed suction hose inside or outside tank restricting flow 4) Pump drawing air through suction line hoses or fittings 5) Pressure relief valve stuck or worn 6) Excessive tank foam due to low tank volume 7) Nozzle volume is greater than pump capacity 8) One or more pump valves / check valves seating improperly	• Clean filter screen • Clear obstruction • Replace collapsed hose • Examine hoses and fittings, ensure air tight fit and no leaks • Repair or replace relief valve • Refill tank • Reduce nozzle orifice size or number of nozzles used • Clean or replace pump valves / check valves
• PRESSURE GAUGE FLUCTUATES WILDLY • EXCESSIVE PULSATION	1) Pulsation dampener pressure too low or too high 2) Pump drawing air through suction line hoses or fittings 3) Plugged filter* restricting flow 4) Air not entirely evacuated from pump cavity	• Adjust pulsation dampener pressure (Refer to pulsation dampener setting on Pump Operation Sheet) • Examine hoses and fittings, ensure air tight fit and no leaks • Clean filter screen • Run pump with an open discharge to totally evacuate air
• PUMP DOES NOT DRAW WATER	1) Pump drawing air through suction line hoses or fittings 2) Plugged filter* restricting flow 3) One or more pump valves / check valves seating improperly	• Examine hoses and fittings, ensure air tight fit and no leaks • Clean filter screen • Clean or replace pump valves / check valves
• PUMP OIL HAS MILKY COLOR OR OIL PLUG POPS OUT	1) One or more diaphragms have ruptured	• Replace all diaphragms • Clean filter screen
* NOTE - Only use filter screens that are between 10 & 20 mesh. Never use a fine filter screen on the inlet side of a diaphragm pump.		

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These are basic tank feed plumbing diagrams and are not recommended for all systems.
Consult UDOR USA for specific system requirements and components.



NOTE: All plumbing accessories should be the same or greater diameter as the feed line. All ball valves should be full port valves only.

On any tank feed system each pump must be fed by its own separate feed line only. Never feed multiple pumps with one common feed line.

FEED TANK SIZE: A recommended minimum feed tank size is 6-10 times the maximum GPM output rating of the pump or pumps being used.

SAMPLE: 10 GPM PUMP x 6 = 60 GALLON MINIMUM FEED TANK SIZE.

USE BLUE THREADLOCKER OR EQUIVALENT ON ALL PLUMBING COMPONENTS, FITTINGS AND ACCESSORIES.

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* IMPORTANT INSTRUCTIONS:

**FAILURE TO
FOLLOW
THESE
IMPORTANT
INSTRUCTIONS
WILL VOID
ANY AND ALL
WARRANTY.**

- KEEP SUCTION HOSE BALL VALVE OPEN WHENEVER SYSTEM IS BEING OPERATED.
- BY-PASS HOSE MUST BE OPEN AND UNRESTRICTED AT ALL TIMES.
- MAKE SURE ALL FEED TANKS HAVE PROPER BAFFLES AND VENTING.
- NEVER INSTALL AN AGITATOR OR BALL VALVE ON THE BY-PASS HOSE; USE SOFT HOSE ONLY.
- NEVER RUN ANY PUMP WITHOUT A PRESSURE RELIEF VALVE OR PRESSURE REGULATING VALVE INSTALLED.
- ALWAYS KEEP THE BY-PASS LINE AS FAR AWAY AS POSSIBLE FROM THE SUCTION HOSE LINE TO PREVENT AIREATION OR CAVITATION OF THE FLUID BEING PUMPED.
- ONLY USE FILTER SCREENS THAT ARE BETWEEN 10 & 20 MESH ON THE INLET SIDE OF THE PUMP. NEVER USE A FINE FILTER SCREEN ON THE INLET SIDE OF A DIAPHRAGM PUMP.

NOTE: Protect the pump and system from freezing. If freezing conditions exist, flush the pump, all hoses and complete system with a 50/50 mixture of anti-freeze and water. ** DO NOT RUN PUMP WITH FROZEN FLUID **

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****SEE REVERSE SIDE FOR MORE PLUMBING DIAGRAMS****



DIAPHRAGM PUMP SERVICE GUIDE

* Refer to proper pump breakdown & diaphragm pump torque spec sheet before rebuilding or servicing any pump. www.udorusa.com

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 threadlocker 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 pump valves or check valves are installed correctly. For each cylinder or head assembly there are two valves, one valve lets fluid **"IN"** the head assembly (suction), the other valve lets fluid **"OUT"** of the head assembly (discharge). **PAY VERY CLOSE ATTENTION TO THIS!** Then torque pump heads to rated torque specs. **WARNING: Never run any UDOR diaphragm pump with the pump valves or check valves installed incorrectly. Failure to follow this warning could result in personal injury, property damage or damage to the pump and will void any and all warranties.**

8. INSTALLING PULSATION DAMPENER DIAPHRAGM

Bleed off the air in the chamber and then remove the cover bolts, cover and diaphragm. Install the new diaphragm dome down. Reinstall cover and torque to recommended specs. Recharge dampener 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** condition or in full by-pass only. 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.

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LIMITED PRODUCT WARRANTY

UDOR Diaphragm Pumps and Gamma Series Plunger Pumps & Accessories

In the course of marketing or servicing the customer or potential customer's needs, UDOR USA will use its best judgement in its product recommendations. However, the ultimate responsibility for product application decisions shall rest with the customer. The sole and only warranty made by UDOR USA is the limited warranty described below.

UDOR Diaphragm Pumps and GAMMA Series Plunger Pumps are warranted by the manufacturer to the original purchaser to be free from defects in materials and workmanship under normal use and service for a period of one (1) year.

UDOR Accessories are warranted to be free from defects in materials and workmanship under normal use and service for a period of ninety (90) days.

"Normal use and service" is defined as applications not in excess of recommended maximum speeds, pressures, temperatures or vacuums, only handling fluids which are compatible with pump or accessory materials and maintaining proper oil change intervals.

"Proper oil change intervals" for Plunger Pumps is changing PUMP OIL after the first 50 hour break-in period, and after every 500 hours of use thereafter using UDOR LUBE Premium Pump Oil and UDOR USA original equipment parts.

"Proper oil change intervals" for Diaphragm Pumps is changing pump oil and diaphragms at the end of the spraying season or after 500 hours of use, whichever comes first using UDOR LUBE Premium Pump Oil and UDOR USA original equipment parts.

This Warranty DOES NOT APPLY to freight damage, damage due to freezing, running pump dry (plunger pumps only) or improper lubrication of crankcase, normal wear of moving parts, damage due to misuse or misapplication, defects caused by the fault or negligence of the buyer or third party, or damage due to use of parts or accessories not obtained from or approved by UDOR USA.

This Warranty also does not apply to any pump or accessory which has been altered or modified to affect its performance or reliability or any pump or accessory that has been returned disassembled.

This Warranty excludes "normal wear items" such as elastomers, diaphragms, seals and valves.

All pumps and accessories being returned to UDOR USA for repair or warranty evaluation must be flushed of any and all chemicals. This also pertains to crankcases that have contaminated oil. Any pump received that has not been properly flushed will be immediately returned to sender freight collect. This policy has been put into place to protect our personnel from possible exposure to hazardous or unknown substances.

All warranty evaluation returns must be accompanied by the original purchase invoice and a RMA number. If invoice is not included, UDOR USA will determine warranty by manufacturer's serial number and date of manufacture on the pump label. Any collect shipments or any product returned without a RMA number will be refused and returned to sender.

UDOR USA's obligation under this warranty is limited to repair or replacement of product in question, at UDOR's option, upon return of the product, freight prepaid, to UDOR USA. UDOR USA agrees to be responsible for return shipping costs ONLY on any approved warranty repair or replacement product via ground transportation ONLY. This warranty is in lieu of all other warranties expressed or implied, including any warranty of merchantability and any warranty of fitness for a particular purpose.

IN NO EVENT SHALL UDOR USA BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OR EXPENSES OF ANY KIND. This includes lost income, travel time and expenses, lodging expenses, labor expenses, down time, shipping costs and any other INCIDENTAL or CONSEQUENTIAL damages or expenses.

The only and total liability of UDOR USA under this limited warranty or in any claim regarding or involving UDOR USA is expressly limited to the repair, replacement or purchase price of the product.

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This Warranty supersedes any and all previous Warranties.