UV PROCESS SUPPLY, INC.

CON-TROL-CURE® ½" DIAPHRAGM PUMP INSTRUCTION MANUAL

PART # J004-003

IMPORTANT: READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING.

PUMP DATA

TYPE:	Air Operated Double Diaphragm
MAT'L:	Polypropylene or PVDF or Acetal
	PVDF (Polyvinylidene Fluoride) (Kynar®)
	Acetal is filled with Stainless Steel
WEIGHT:	Polypropylene- 7.5 lb.
	PVDF or Acetal -10.3 lb.
MAXIMUM AIR INLET PRESSURE:	100 psi max. (6.9 bar)
MAXIMUM MAT'L OUTLET PRESSURE:	100 psi max. (6.9 bar)
MAXIMUM FLOW:	(Ball) 13 gpm. (Duckbill) 10 gpm.
MAXIMUM PARTICLE SIZE:	(Ball) - 3/32". (Duckbill) - Fibers
MAX.TEMP. LIMITS:	Polypropylene 35°F to 150°F
	PVDF 10°F to 200°F
	ACETAL 10°F to 180°F

GENERAL DESCRIPTION

The 1/2" Non-metallic diaphragm pump offers high volume delivery even at low air pressures, easy self-priming, the ability to pump various viscosity materials and ability to easily pass solids to 3/32" diameter. This pump is versatile and is designed to correspond to the needs of the customer. Several "wetted parts" options are available to handle almost any application. See option chart on page 3 for model description. Although all possible options are shown, certain combinations may not be recommended, consult the factory if you have questions concerning availability.

Acetal material used in this pump contains Stainless Steel fibers, which allows it to be connected to a suitable ground via a clamp and wire assembly.

OPERATING INSTRUCTIONS

Always flush the pump with a solvent compatible with material being pumped if the material being pumped is subject to setting up when not in use for a period of time. Disconnect air supply from pump if it is to be inactive for a few hours.

The outlet material volume is governed not only by the air supply but also by the supply available at the inlet. The material supply tubing should not be too small or restrictive.

When the diaphragm pump is used in a force-feed (flooded inlet) situation it is recommended that a "Check Valve" be installed at the air inlet, Secure the pump legs to a suitable surface to insure against damage by vibration.

OPERATING AND SAFETY PRECAUTIONS FOR DIAPHRAGM PUMPS

- ❑ HEED ALL WARNINGS AND CAUTIONS.
- ❑ Use manufacturer replacement parts to maintain appropriate pressure rating.
- ❑ WARNING: DO NOT EXCEED MAXIMUM INLET AIR PRESSURE OF100 PSI (6.9 BAR). OPERATING PUMP AT HIGHER PRESSURE MAY CAUSE PUMP DAMAGE AND/OR PERSONAL INJURY AND/OR PROPERTY DAMAGE.
- ❑ WARNING: WHEN USING PUMP IN A LOCATION WHERESURROUNDING ATMOSPHERE IS CONDUCIVE TO SPONTANEOUS COMBUSTION OR WHEN PUMPING, FLUSHING OR RECIRCULATING INFLAMMABLE SUBSTANCES (E.G., PAINTS, SOLVENTS, Lacquers, ETC.), FAILURE TO SAFEGUARD AGAINST STATIC SPARK, OPEN FLAME, HEAT AND IMPROPER VENTILATION COULD RESULT IN EXPLOSION AND/OR FIRE CAUSING SEVERE PERSONAL INJURY OR DEATH AND/OR PROPERTY DAMAGE.

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SAFETY PRECAUTIONS SHOULD INCLUDE:

Use of static wire hoses.

Proper grounding of pump (at clamps), dispensing valve or device, hoses, any object to which material is being transferred, and containers. After grounding, periodically check to verify continuity of electrical path to ground. Test with ohmmeter from each component (i.e., hoses, pump, clamps, container, spray gun, etc.) to ground to insure continuity. Ohmmeter reading shown should be 10 ohms or less. Consult local electric codes for specific grounding requirements.

1. Submersion of outlet hose end, dispensing valve or device within material being dispensed whenever possible. (Avoid free streaming of material being dispensed.)

2. Piping exhaust to a safe remote location when pumping hazardous or inflammable substances since the material being pumped is exhausted with the air if the diaphragm ruptures. Use a grounded 3/8" min. I.D. hose between pump and muffler.

3. Proper ventilation of area where pump and containers are located.

4. Keeping inflammables away from heat, open flames and sparks.

5. Keeping containers closed when not in use.

6. Secure pump, connections and all contact points to ovoid vibration and generation of contact or static spark.

7. Be sure material hoses and other components ore able to withstand fluid pressures developed by this pump. Check all hoses for damage or wear. Be certain dispensing device is clean and in proper working condition.

8. Disconnect air line from pump when system sits idle for long periods of time.

9. Suction and discharge connections should be flexible connections (such as hose), not rigid piped, and should be compatible with the substance being pumped.

10. WARNING: DO NOT SERVICE OR CLEAN PUMP, HOSES OR DISPENSING VALVE WHILE THE SYSTEM IS PRESSURIZED AS SERIOUS PERSONAL INJURY COULD RESULT. First disconnect air line, then relieve pressure from system by opening dispensing valve or device and/or carefully and slowly loosening and removing outlet hose or piping from pump.

11. CAUTION: Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substance being pumped, flushed, or recirculated. Consult ARO Form 8677-P, Fluid Compatibility Guide, for information on chemical compatibility.

12. CAUTION: Maximum temperature limits are based upon mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperatures. Consult engineering guide for chemical compatibility and temperature limits.

    - Temperature Limits: Polypropylene 35°F to 150°F
      PVDF 10°F to 200°F
      Acetal 10°F to 180°F

13. BE CERTAIN ALL THE OPERATORS OF THIS EQUIPMENT HAVE BEEN TRAINED FOR SAFE WORKING PRACTICES, UNDERSTAND ITS LIMITATIONS, AND WEAR SAFETY GOGGLES/EQUIPMENT WHEN REQUIRED.

14. CAUTION: The pump should not be used for the structural support of the piping system. Be certain system components are properly supported to prevent stress on the pump parts.

15. CAUTION: Do not allow pump to operate when out of material for long periods of time; this may cause unnecessary wear or damage to the pump.

AIR AND LUBE REQUIREMENTS

1. WARNING: DO NOT EXCEED MAXIMUM INLET AIR PRESSURE OF 100 PSI (6.9 BAR). OPERATING PUMP AT HIGHER PRESSURE MAY CAUSE PUMP DAMAGE AND/OR PERSONAL INJURY AND/OR PROPERTY DAMAGE.

2. A filter capable of filtering out particles larger than 50 microns should be used on the air supply. In most applications there is no lubrication required other than the "O" Ring lubricant which is applied during assembly or repair. When lubricated air is necessary, supply air lubricator with a good grade of SAE 90 wt. nondetergent oil and set lubricator to a rate not to exceed one drop per minute.

MAINTENANCE

This pump is relatively easy to service and maintain. A clean work surface should be provided to protect sensitive internal moving parts from dirt and foreign matter during service. The service kits are divided to service two separate diaphragm pump functions: 1. AIR SECTION 2. FLUID SECTION. The FLUID SECTION is divided further to match typical active part MATERIAL OPTIONS.

Before disassembling, turn the pump upside down to drain material from pump, this will empty captured material in outlet manifold. The duckbill style pumps cannot be drained in this manner.

(OPTIONAL) DUCKBILL CHECK VALVES

Pump models with the suffix (-OC1 or -OD1) come equipped with duckbill type checks. Standard duckbill pumps are shipped with the material inlet in the top and the material outlet on the bottom manifold. To change the direction of flow, disassemble the pump as instructed in the FLUID SECTION and reassemble as described below.

A pump that was factory built with balls and seats can be retro-fitted with duckbill type checks valves by purchasing the necessary parts and installing them as shown.

RE-ASSEMBLY:

The duckbills may be installed in either direction to produce flow from top to bottom of the pump or from bottom to top of the pump. In either case, all of the (42) duckbills must point in the same direction.

Flow from Top to Bottom: *(See Page 5)*

With fluid caps (15) installed, stand the pump upside down

1. Place (21) insert into (42) duckbill and slide (41) sleeve over (42) duckbill.

2. Slide the complete check assembly into the fluid cap bore with the (21) insert end first (Duckbills (42) point up).

3. Position (19) "O" ring over (41) sleeve.

4. Attach (35) manifold feet/ (36) swivel assembly to the fluid caps.

5. Turn pump over to right side up position.

6. Assemble duckbill check as in Step #I

7. Slide the complete check assembly into the fluid cap bore with the (41) sleeve end first. (Duckbill is pointing down toward fluid cap cavity.)

8 Position (19) "O" ring around (21) insert.

9. Attach (34) manifold / (36) swivel assembly to fluid cap.

Flow from Bottom to Top: (Inlet Bottom - Outlet Top)

To reverse flow direction, slide check valve assemblies into the (15) fluid caps backwards from what is indicated in Steps #2 and #7. In Step #2 the (42) duckbills will be pointing down and in Step #7 they will be pointing up.

FLUID SECTION DISASSEMBLY

1. Remove (34) top manifold / (36) swivel assembly.

Note: Manifold options involve single piece manifolds (60/61) or three piece swivel type manifolds with clamps.

2. Remove (41) ball cages, (22) balls, (19), (20) "O" rings and (21) seats. Note: If cages are difficult to remove at this step it may be helpful to proceed through step 5 and remove them once they are accessible from the inside of the fluid cap

3. Remove (35) bottom manifolds / (36) swivel assembly

4. Remove (19) "O" rings, (21) seats and (22) balls

5. Remove (15) fluid caps.

6. Remove (6) diaphragm nut, (8),((7) Teflon Models only) diaphragm(s) and (5) diaphragm washer from (1) diaphragm connecting rod.

7. Remove (1) connecting rod from air motor

8. Carefully remove remaining (6) diaphragm nut, (8), ((7) Teflon Models), diaphragm, and (5) diaphragm washer from (1) connecting rod. Do not mar surface of connecting rod.

9. Remove (2) "O" ring from connecting rod.

10. Remove (37) clamps from top and bottom manifold/swivel assemblies

11. Remove (33) "O" rings from (36) swivels.

FLUID SECTION REASSEMBLY

1. Reassemble in reverse order.
2. Lubricate (1) connecting rod and (2) "O" ring with Key-Lube® or equivalent "O" ring lubricant.
3. Install (5) diaphragm washers with I.D. chamfer toward diaphragm.
4. When replacing Teflon diaphragms, install the 93112 Urethane diaphragm behind the Teflon diaphragm
5. When installing (41) cage, ball guides must line up with notches in (21) seat to prevent damage
6. Before installing (35), (34) manifolds, (19) "O" ring should be properly seated on the O.D. of (41) ball cage.
7. Before tightening (39) nut on (38) carriage bolts on (37) swivels, attach the manifold/swivel assembly to the fluid caps. Rotate (36) swivel to desired position and tighten each of the nuts approx. 8-9 turns, then finish tightening (29) nuts.
8. Apply anti-seize compound to threads on (38) carriage bolts.

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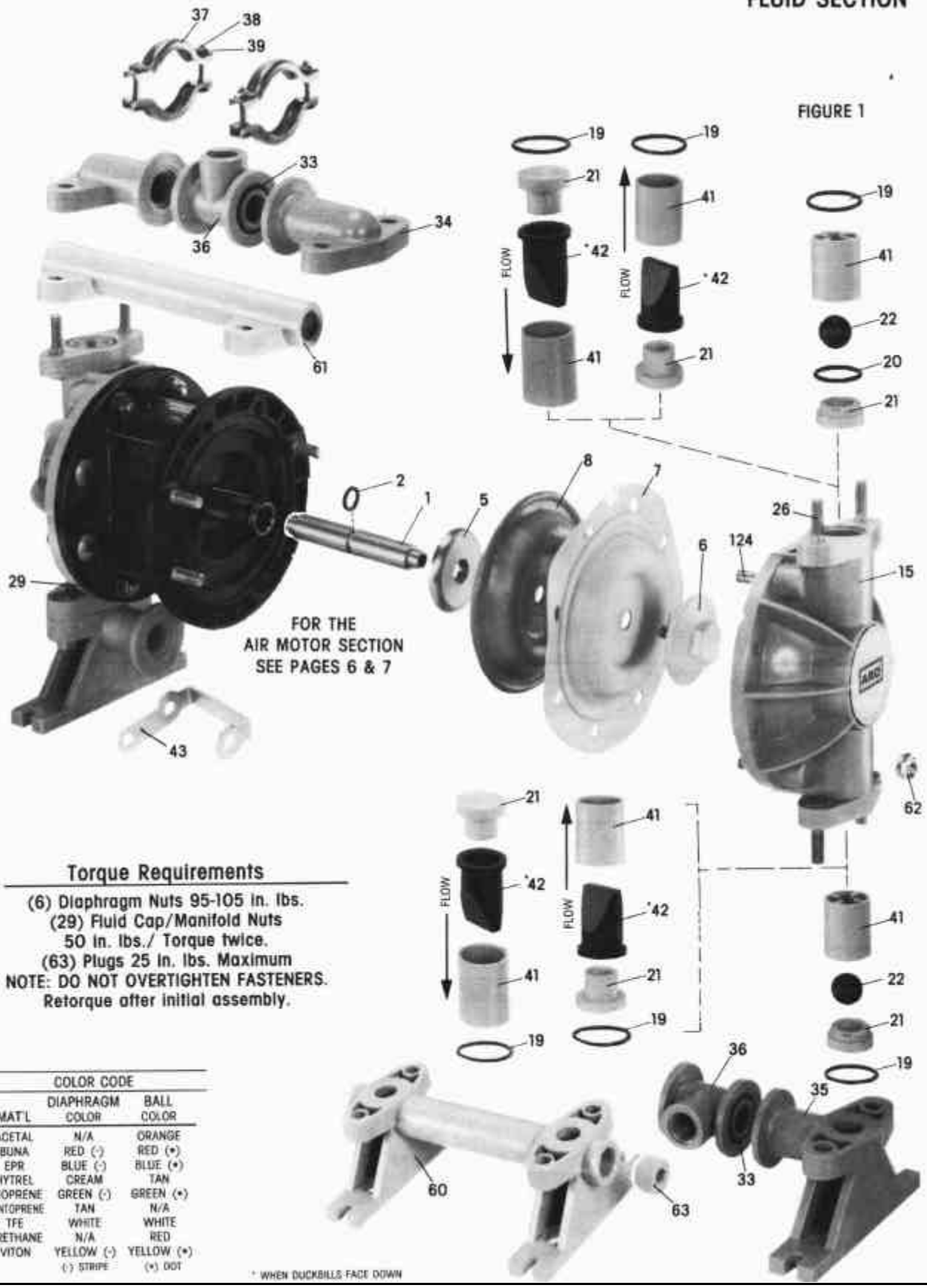
FLUID SECTION

FIGURE 1



Torque Requirements

(6) Diaphragm Nuts 95-105 in. lbs.
(29) Fluid Cap/Manifold Nuts
50 in. lbs./ Torque twice.
(63) Plugs 25 in. lbs. Maximum
NOTE: DO NOT OVERTIGHTEN FASTENERS.
Retorque after initial assembly.

COLOR CODE

MAT'L	DIAPHRAGM COLOR	BALL COLOR
ACETAL	N/A	ORANGE
BUNA	RED (-)	RED (•)
EPR	BLUE (-)	BLUE (•)
HYTREL	CREAM	TAN
NEOPRENE	GREEN (-)	GREEN (•)
SANTOPRENE	TAN	N/A
TFE	WHITE	WHITE
URETHANE	N/A	RED
VITON	YELLOW (-)	YELLOW (•)
	(-) STRIPE	(•) DOT

* WHEN DUCKBILLS FACE DOWN

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AIR MOTOR SECTION DISASSEMBLY

Disassembly will be done in two parts:
Part I - PILOT VALVE
Part 11- MAJOR VALVE

PILOT VALVE DISASSEMBLY*: (See page 7)*

1. Remove snap rings (122) and (104)

2. Remove plates (143).

3. Remove sleeve (103) and "O" rings (102).

4. Remove piston (118), washers (142), "0" rings (119), and spacers (120) front center body (101).

PILOT VALVE REASSEMBLY

1. Assemble "O" rings (119), (120) spacers and (142) washers on (118) pilot rod.

2. Insert the stack into the (101) body. Sleeve (103) may be used to assist pressing stack into body.

3. Install (103) sleeve and (102) "0" rings into (101) body.

4. Install (143) plates and (122), (104) snap rings.

MAJOR VALVE DISASSEMBLY

1. Remove (129) exhaust cover and (130) gasket.

2. Pull (135) valve block assembly from (101) body.

3. Remove (134) bolts, (133) washers, and (132) gasket from (135) valve block.

4. Remove (141) valve plate and (140) valve insert.

5. Remove (136) plug and (111) spool

MAJOR VALVE REASSEMBLY

1. Install new (139) "U" cups, (138) on (111) spool - LIPS MUST FACE EACH OTHER.

2. Insert (111) spool into (135) valve block

3. Install (137) "O" ring on (136) plug and insert plug into (135) valve block

4. Install (140) valve insert and (141) valve plate into (135) valve block Note: After 9/92, parts (140,141) are white (ceramic), the dished side of the (140) valve insert should be against the shiny face of (141) valve plate for best performance

5. Replace (132) gasket and install valve block assembly on (101) body.

AIR MOTOR ASSEMBLY NOTES:

1. **Lubricate all air motor "O" rings with Key-Lube or equivalent.**

2. **Do not over-tighten fasteners.**

3. **Torque (134) Valve Block Bolts to 25-35 in-lb**

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AIR MOTOR SECTION

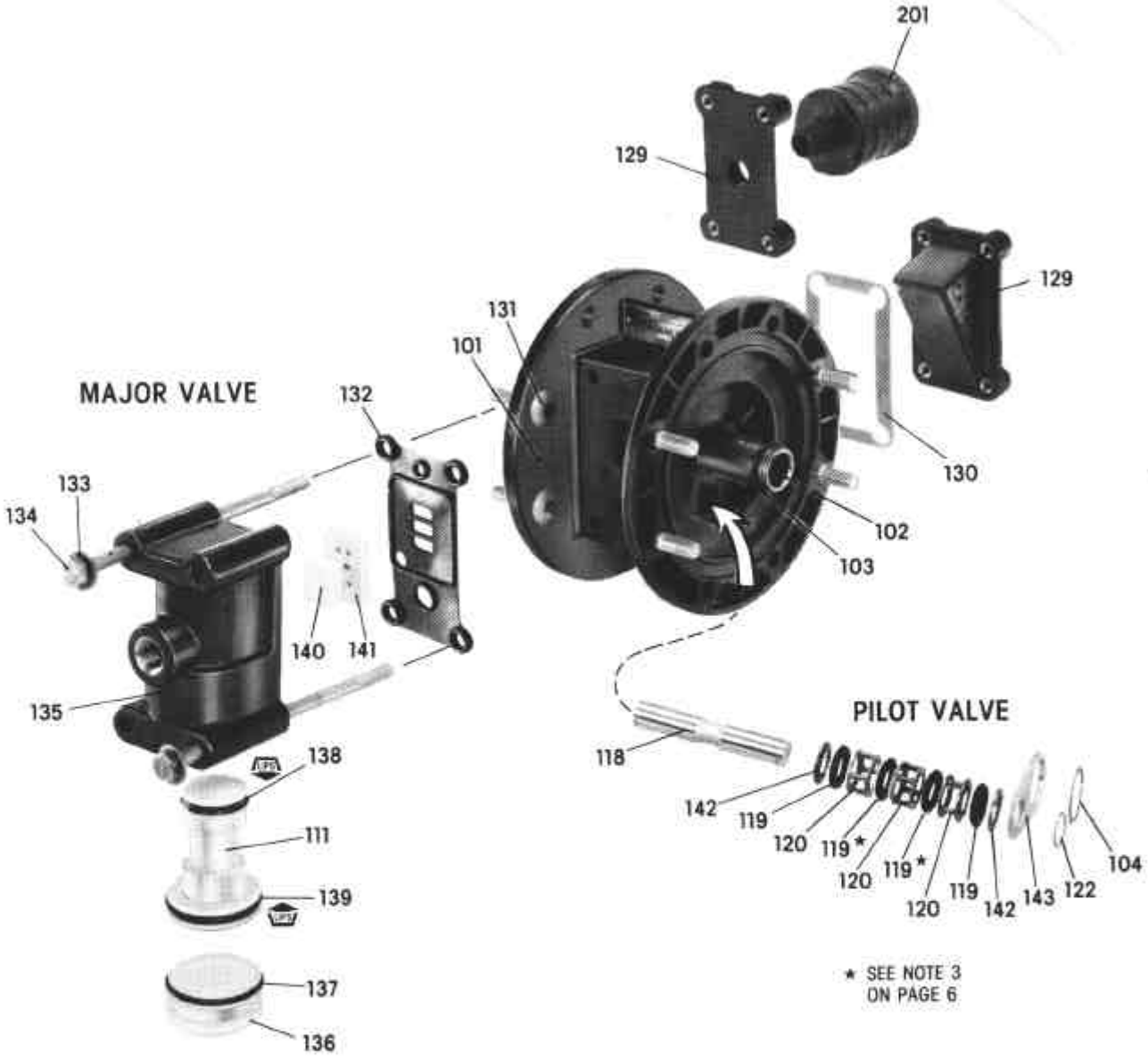

FIGURE 2

UV PROCESS SUPPLY, INC.

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TROUBLESHOOTING - Most problems can be avoided through regular cleaning and maintenance. If the pump is not properly cleaned or maintained, dried ink or foreign matter may accumulate within the pump, and block or reduce material flow.

Product discharged from air exhaust

- Check for diaphragm rupture.
- Check tightness of diaphragm nut (6).

Air bubbles in product discharge

- Check connections of suction plumbing.
- Check band clamps on intake manifold.
- Check "O" rings between intake manifold and fluid caps.
- Check tightness of diaphragm nut.

Pump blows air out main exhaust when stalled on either stroke

- Check "U" cups on (111) spool in major valve.
- Check (141) valve plate and (140) insert for wear.
- Check (103) sleeve and (2) "O" ring on diaphragm connecting rod.
- Check (119) "O" rings on (118) piston for wear.

Low output volume

- Check air supply.
- Check for plugged outlet hose.
- Check for pump cavitation – suction pipe should be ½ min. or larger if high viscosity fluids are being pumped. Suction hose must be non-collapsible type, capable of pulling a high vacuum.
- Check all joints on intake manifolds and suction connections. These must be airtight.
- Check for sticking or improperly seating check valves.
- If pump cycles at a high rate or runs erratically check (143) piston "O" rings for wear.

*To remove material blockage, you must open the pump, clean out all dried ink and foreign particulate. After cleaning, examine air pressure, air and material lines, the diaphragm and other internal components. If components are OK, reassemble the pump and test. If these troubleshooting remedies and the others listed above do not correct the problem, the pump may be returned for evaluation (must obtain return authorization number first). **Failure to clean the pump prior to return will result in a cleaning and maintenance fee above and beyond any repair costs, and regardless of whether the repair is covered by warranty**

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