



Price Pump® Co.



INSTALLATION, OPERATING AND MAINTENANCE MANUAL

2" POLYPROPYLENE and PVDF
AIR OPERATED
DIAPHRAGM PUMPS
MODELS: 2AOD-P
2AOD-K

ALL ELASTOMERS

PLEASE FILL IN DATA
FROM YOUR PUMP
NAMEPLATE

Pump Model _____

Spec. No. _____

Serial No. _____

Seal No. _____

RETAIN MANUAL
FOR REFERENCE

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47392-2/98
IN-AOD-1

Congratulations

You are now the owner of a Price® Pump Co. Air Operated Diaphragm Pump. This pump was carefully inspected and subjected to final performance tests before releasing for shipment. In order to achieve maximum performance and reliability, please follow the simple instructions in this manual.

RECOMMENDED PRECAUTIONS

1. For satisfactory operation and safety, maximum inlet air pressure must not exceed 125 psi (8.79 kg/sq cm).
2. No modifications, additions or deletions should be made to the pump without prior approval of the factory.
3. Drain casing completely and flush with water before servicing pump handling volatile or harmful liquids.

READ CAREFULLY THE CAUTION BELOW

CAUTION:

The performance of Price® pump is based upon clear, cold, fresh water with suction conditions as shown on the performance curves. If used to pump other liquids, pump performance may differ from rated performance based on the different specific gravity, temperature, viscosity, etc. of the liquid being pumped. A standard pump, however, may not be safe for pumping all types of liquids, such as toxic, volatile or chemical liquids, or liquids under extreme temperatures or pressures.

Please consult Price® Pump catalogs as well as local codes and general references to determine the appropriate pumps for your particular application. Since it is impossible for us to anticipate every application of a Price® pump, if you plan to use the pump for a non-water application, consult Price® Pump beforehand to determine whether such application may be proper or safe under the circumstances. Failure to do so could result in property damage or personal harm.



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OPERATING INSTRUCTIONS

2" POLYPROPYLENE AND PVDF

AIR OPERATED DIAPHRAGM PUMPS

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INSTALLATION

Bolt pump to a mounting pad using appropriately sized diameter bolts. Rubber vibration insulators should be used between the pump mounting feet and mounting pad to reduce pump vibrations and stresses. In permanent installations the pump should not be directly attached to rigid piping, but instead should be connected through flexible hoses or equivalent on both the suction and discharge. This should be done to reduce pipe stresses and vibrations which are characteristic of the reciprocating nature of the pump. A surge suppressor may be required on the discharge line of the pump if further reduction in vibration or a reduction of pulsation in the discharge flow is desired.

If the pump is used in a submerged application a line or hose should be attached to the pump air exhaust to prevent liquid from entering the air valve when the pump is shutdown or operating at low discharge heads. **CARE MUST BE EXERCISED WHEN SUBMERGING THE PUMP IN CORROSIVE PUMPING MEDIA.**

Suction and discharge pipe size should be at least equal to the inlet pipe diameter or larger. Larger, if highly viscous liquid is to be pumped or long lengths of pipe are used. When using suction hoses use the non-collapsing reinforced type, since this pump is capable of producing high vacuum at the suction inlet.

SOLIDS-HANDLING CAPABILITY

Price® Pump Air Operated Diaphragm Pumps will pass the following spherical solid sizes:

Model	Size
2 AOD-P or K	3/8" Dia. (9.5 mm)

If the possibility exists that larger sized solids may be suspended or carried along by the pumping media, install a strainer on the suction line with smaller sized holes than the allowable solid size. This will prevent the larger solids from entering the pump and interfering with operation of the pump ball valves.

AIR SUPPLY

The inlet to the air valve is a female 3/4" NPT. The air supply line should be sized accordingly so that there is no restriction less than inlet pipe size.

NOTE: Longer air lines require larger diameters to reduce the air system pressure loss and make available required pressure and flow at the pump air inlet. It is safe to use up to **110 psig (7.73 kg/sq cm)** for pumping requirements.

WARNING: DO NOT EXCEED **125 PSIG (8.79 KG/SQ CM)** AIR SUPPLY PRESSURE AS COMPONENT DAMAGE OR PERSONAL INJURY MAY RESULT.

PUMP CONTROL

The pump operating conditions, flow (GPM) and discharge head (PSIG) can be controlled in the following manner:

1. Throttling the pump discharge by means of a valve on the discharge line. When the pump discharge pressure equals the air supply pressure, the pump will stop. This will not harm the pump, however, **do not exceed 125 psig (8.6 kg/sq cm)** air supply pressure. The pump may be in this mode indefinitely. By opening the discharge valve the pump will resume pumping.
2. The air pressure supply can be limited to the pump. Price® Pump recommends the installation of a Price® Pump air filter/pressure regulator for all AOD® applications. A globe or gate valve can be used before the regulator for on or off control. Failure to use an air pressure regulator will cause the pump air inlet pressure and thus discharge pressure to climb to maximum air system pressure when the pump is stopped.

Minimum Air Supply Pressure

This air valve incorporates a stall-free design and will begin operating with air inlet pressures as low as 5 psig (.35 kg/sq cm).

OPERATING INSTRUCTIONS

The pump air valve is of an oilless design; that is, no lubrication is required or recommended. A clean, dry air supply should be provided for optimum air valve operation and life.

1. In cases where freezing of the air valve occurs due to excessive moisture in the compressed air system, it may be advantageous to install a desiccant type compressed air dryer in the air system to

OPERATING INSTRUCTIONS

purge the air supply of unwanted moisture.

For permanent installations, an air filter and water/oil separator should be used. This is always good practice, since it insures maximum lift of the air valve moving parts and seals by keeping them clean of dirt and oil residue.

Excessive oil and water in the inlet air supply will cause a varnish-like substance to form on the self-lubricated valve spool. This will eventually lead to valve spool "sticking" and result in erratic spool operation. Should this occur, the spool and housing bore may be cleaned with a commercial safety solvent and reinstalled. (See page 7).

2. When starting the pump, make sure all valving on the suction and discharge lines are open. The pump will not prime with the valves closed. Pump cavitation will occur if the suction line is restricted with foreign matter - use a suction strainer with hole size less than allowable solid size.
3. When pumping highly viscous materials, it is advisable to check the pump flow rate vs. the pump stroke rate.

Pump Model	Avg. Gallons Per Stroke*	
	Teflon Fitted	STD Fitted
2 AOD	.85	(3.2 l)

*Actual test data with flooded suction and specific gravity of 1.0.

One pump stroke is equal to one exhaust blast. The pump should not pump faster than the material is capable of being drawn into the pump. If this occurs, cavitation will occur and damage to the pump could result in time.

4. To determine maximum pumping speed, increase air supply while pump discharge flow increases. When discharge flow no longer increases, throttle back air until pump discharge flow starts to fall off. This point is the optimum pumping speed achievable under those controlled by either one of the two methods previously mentioned under the PUMP CONTROL section of this manual.
5. The two pump air exhaust ports should be kept free of blockage. The pump should never be operated submerged without installing a line to the exhaust ports and directing the same above the liquid surface. An appropriately sized hose 3/4" (19mm) may be piped up to the exhaust port and directed away. The required exhaust line should be kept as short as possible or pump performance could be affected. If long lengths of exhaust line are necessary, increase the internal diameter of the exhaust line to minimize

pressure drop and pump performance loss. If the exhaust sound level becomes too objectionable, use the air mufflers provided.

Note: Installing an air exhaust muffler on a submerged pump will not prevent the liquid in which the pump is submerged, from entering the air valve.

Caution: If a diaphragm failure occurs, the pumping media may be blown out the exhaust port. This could be hazardous if the pumping media is toxic or aggressive. It is advisable to add lines to the exhaust ports and direct them safely away when pumping toxic or aggressive media.

6. Drain pump and flush after use when pumping material which can pack, settle out of liquid suspension, or solidify in time. A packed pump can cause damage to the diaphragm clamping plates and pump shaft when started after a period of interrupted use. The pump may be inverted and drained through the discharge port and flushed through the suction port.

OPERATING TEMPERATURE

Polypropylene models are limited to 120° F (49° C). PVDF models are limited to 200° F (93° C). Note that PVDF models fitted with Buna N or Neoprene elastomers are limited to 180° F (82° C).

TROUBLESHOOTING

1. Pump will run but not pump:
 - a. check suction line for leaks
 - b. tighten cap screws on suction manifold of pumps.
 - c. material too viscous to pump at high rate of flow - slow down pump by reducing air supply to pump.
 - d. increase suction pipe diameter to reduce viscous friction loss.
 - e. suction or discharge balls jammed open with foreign object - disassemble pump & examine.

Note: Optimum priming speed for these pumps is obtained when air inlet pressure is maintained between 15-20 psi, (1.0-1.4 kg./sqcm) with open pump discharge.

2. Air bubbles in pump discharge:
 - a. check suction line and all sealed surfaces for leaks.
 - b. cracked or ruptured diaphragm
3. Intermittent pump operation:
 - a. remove obstruction from suction line
 - b. worn ball valves or ball valve seats
 - c. sticky air valve - remove spool and clean with safety solvent
 - d. one or both mufflers clogged - clean or replace

4. **Pump Stops Pumping:**

- a. increase air supply pressure - Do Not exceed 125 psig (8.8kg/cm²) under any circumstances and check for obstruction in suction or discharge line.
- b. spool sticking - remove spool & clean with safety solvent - install suitable filter on air inlet if dirt or contaminant's persist.
- c. mufflers plugged - excess moisture on the mufflers is an indication that significant water is present in the air supply. Depending on the degree of severity, an inline water separator or air dryer is recommended.

5. **Severe Pump Vibration with Intermittent Flow:**

- a. ruptured diaphragm - disassemble pump, replace diaphragm and clean air valve if necessary.
- b. mechanical failure - disassemble pump and inspect for bent shaft, ect.

6. **Pumping Media coming from Exhaust Port:**

- a. ruptured diaphragm - disassemble pump, replace diaphragm - clean air valve if necessary.

7. **Varying Pump Discharge Per Stroke:**

- a. remove suction manifold and check for obstructions.
- b. worn or leaky ball valves & seats - disassemble pump and replace worn parts.

Slowing Up of Pumping Action:

- a. clogged air exhaust muffler - replace.
- b. excessive moisture in air - install water separator on air inlet line.

PUMP DISASSEMBLY INSTRUCTIONS

Prior to disassembly of any AOD® pump included herein; follow the "warning" below.

Warning: Do not attempt to perform any maintenance or repair on air operated diaphragm pumps until the compressed air line to the pump and pump discharge line has been shut off, bled down, and disconnected. In addition, when pumps are being used to pump toxic or aggressive media the pumps should be flushed clean prior to disassembly.

DISASSEMBLY INSTRUCTIONS FOR MODELS 2AOD-P & 2AOD-K

(refer to Fig. 1 , page 9)

1. Pump should be disassembled in the normal upright position. Remove the discharge manifold (23) by removing the eight capscrews (52) and flat washers (96). Note that these capscrews mate to inserts in the pump chamber (1).
2. Remove o-rings (47), ball valve cages (57), ball valves (29), and ball valve seats (28) from both pump chambers (1).
3. Turn the unit upside down so that the suction manifold (24) is facing up. Remove the suction manifold (24) by removing the capscrews (52) and flat washers (96). Note that these capscrews mate to inserts in the pump chamber (1).
4. Remove 0-rings (47), ball valve seats (28), ball valves (29), and ball valve cages (57) from both pump chambers (1).
5. Check all o-rings, ball valves, ball valve cages and ball valve seats for excessive wear or deep gouges. Replace if necessary. Excessively worn parts will adversely affect pump performance.
6. Turn unit on its side so that it is resting on one of the pump chambers (1). Remove the twelve capscrews (9) and flat washers (96) fastening the other pump chamber (1) to its air valve half (86). Note that four of these capscrews mate to inserts in the pump chamber (1). The other eight capscrews mate to hex nuts (32) and flat washers (96). Remove pump chamber. Depress diaphragm assembly into the air valve half (86) by gently pushing on the outer diaphragm plate (4).
7. Turn the unit over so that it is resting on the air valve half (86) and the other pump chamber (1) is facing up. Remove the twelve capscrews (9) and flat washers (96) fastening the other pump chamber (1) to its air valve half (86). Note that four of these capscrews mate to inserts in the pump chamber (1). The other eight capscrews mate to hex nuts (32) and flat washers (96). Remove pump chamber.
8. Place the hex head of one of the outer diaphragm plates (4) in a table vise and remove the opposing outer diaphragm plate using a 1-1/2" socket, box wrench, or adjustable wrench. If a vise is not available two wrenches can be used.

Teflon Fitted Models

Remove the diaphragm (50), diaphragm (6A), backup diaphragm (48A), diaphragm plate (7A), and bumper (8).

Standard Elastomer Fitted Models

Remove the diaphragm (6), inner diaphragm plate (7), and bumper (8).

9. Remove pump shaft (16/16A) and remaining diaphragm assembly (still attached) from pump by sliding through the sleeve bearings (43). Place free end of shaft in a soft metal jaws vise (or place two blocks of wood between the vise jaws to protect the shaft) and remove the outer diaphragm plate and the remaining parts.
10. Check both diaphragms and rubber bumpers for wear. Replace if necessary. Excessively worn parts will adversely affect pump performance.
11. Check shaft sleeve bearings (43) and inner clamp plate (7) for wear or mechanical damage. Replace any worn parts.
12. Refer to air valve disassembly instructions on page 7 of this manual.

REASSEMBLY INSTRUCTIONS FOR MODELS 2AOD-P AND 2AOD-K

(refer to fig. 1, page 9)

1. Place the pump shaft (16/16A) in soft metal jaws vise (or place two blocks of wood between the vise jaws to protect the shaft).

Teflon Fitted Models

Assemble new rubber bumper (8), inner diaphragm plate (7A), backup diaphragm (48A), Teflon diaphragm (6A), diaphragm (50A), and outer diaphragm plate (4) to pump shaft (16A). Apply a few drops of Blue Loctite #242 to pump shaft threads. Tighten outer clamping plate but do not torque down completely until later in the reassembly.

Standard Elastomer Fitted Models

Assemble new rubber bumper (8), inner diaphragm plate (7), diaphragm (6), and outer diaphragm plate (4) to pump shaft (16). Apply a few drops of Blue Loctite #242 to pump shaft threads. Tighten outer clamping plate but do not torque down completely until later in the reassembly.

2. Insert the shaft and diaphragm assembly through the sleeve bearings in the air valve halves. Check for free movement of the shaft. Shaft must not bind. Depress the diaphragm assembly completely into the air valve half (86).
3. Turn the unit over so that the threaded end of the shaft is facing upwards.

Teflon Fitted Model

Assemble new rubber bumper (8), inner diaphragm plate (7A), backup diaphragm (48A) (with convex side facing toward the end of the shaft), Teflon diaphragm (6A) (with convex side facing toward the end of the shaft), diaphragm (50A), and outer diaphragm plate (4) to pump shaft (16A). Apply a few drops of Blue Loctite #242 to pump shaft threads. Tighten outer clamping plate but do not torque down completely until later in the reassembly.

Standard Elastomer Fitted Models

Assemble new rubber bumper (8), inner diaphragm plate (7), diaphragm (6) (with convex side facing toward the end of the shaft), and outer diaphragm plate (4) to pump shaft (16). Apply a few drops of Blue Loctite #242 to pump shaft threads. Tighten outer clamping plate but do not torque down completely until later in the reassembly.

4. Place the hex head of one of the outer diaphragm plates (4) in a table vise and tighten the opposing outer diaphragm plate using a 1-1/2" socket or box wrench. **Torque the assembly to 80 ft. lbs. (108n-m). Be certain both outer diaphragm plates are torqued to 80 ft. lbs. (108n-m).**
5. Depress one of the diaphragm assemblies completely into one of the air valve halves (86). Set this side flat onto the workbench so that the other diaphragm is facing up.
6. Carefully align the outer bead of the diaphragm with the groove on the air valve half (86). Place the pump chamber (1) over the diaphragm so that the bead on the diaphragm is aligned with the groove on the pump chamber. The pump chamber (1) should be oriented so that the suction port runs parallel to the muffler (44) and the discharge port is facing up toward the main spool housing (68). Assemble the pump chamber (1) to the air valve half (86) using twelve capscrews (9) and flat washers. Four of these capscrews will mate to inserts located in the pump chamber (1). Eight of the capscrews will engage flat washers (96) and hex nuts (32). Torque each capscrew to 15 ft. lbs. (20n-m).
7. Turn the unit over so that it is resting on the pump chamber (1) previously fastened. Repeat step #6 for the other side of the unit.
8. Turn unit upside down so that it is resting on the discharge ports of the pump chamber (1) and the suction ports are facing up. Place a bail cage (57), ball valve (29), ball valve seat (28) and o-ring (47) into each suction port of the pump chamber (1). Check to make sure the surface of the o-ring is above the surface of the pump chamber.
9. Fasten the suction manifold (24) to each pump chamber (1) using eight flat washers (96) and capscrews (52). The capscrews will mate to inserts located in each pump chamber (1). **Torque each capscrew to 25 ft. lbs. (34n-m).**
10. Turn the unit right-side up so that it is standing on its feet. Place a ball valve seat (28), ball valve (29), bail cage (57) and o-ring (47) into each discharge port of the pump chamber (1). Check to make sure the surface of the o-ring is above the surface of the pump chamber.

11. Fasten the discharge manifold (23) to each pump chamber (1) using eight flat washers (96) and capscrews (52). The capscrews will mate to inserts located in each pump chamber (1). **Torque each capscrew to 25 ft. lbs. (34n-m).**

Note that the suction and discharge manifolds can be oriented to fit the installation requirements.

DISASSEMBLY INSTRUCTIONS FOR THE AIR VALVE CENTER SECTION

(refer to Fig. 1, page 9)

1. Place the air valve center section on its side so that it is resting on one of the air valve halves (86) and the other is facing up. Remove the lower two allen head capscrews (95) from the spool housing (68). Do not remove the other two allen head capscrews at this time.
2. Remove the two flat head capscrews (91) from inside the upper air valve half (86). Remove flathead capscrew (99) from the coupling nut (100).
3. Carefully turn the unit over so that the other air valve half is facing up. Remove the two flat head capscrews (91) from the upper air valve half. Remove flathead capscrew (99) from the coupling nut (100).
4. Separate the two air valve halves carefully. Note that the lower air valve half will have the spool housing (68) still attached.
5. Remove the pilot spool (82) carefully by withdrawing it up through the open side of the spool housing (68). Inspect the pilot spool for excessive wear. Replace if worn or loose in its bore.
6. Remove the spool housing by removing the last two allen head capscrews (95). Remove and inspect the spool housing gasket (98). Replace if necessary.
7. Inspect the air valve gasket (15) and replace if necessary. Remove the pilot spool seals (12) from the air valve halves. Inspect the seals and replace if necessary.
8. Inspect the pump shaft seals (14) and the sleeve bearings (43) with out removing them from the air valve halves. If it becomes necessary to replace the sleeve bearings, they can be pressed out of each bore. The shaft seals can be removed by prying them out with a small screwdriver or similar blunt tool.
9. Remove the mufflers (44) from each air valve half (86). Inspect the muffler for damage or any debris that may be trapped inside. Restrictions to air flow will adversely affect pump performance. Clean the mufflers thoroughly or replace with new.
10. Inspect the air valve halves (86). Clean any exposed

passages to ensure complete and unobstructed air flow. Should the interior surfaces be coated with oil, clean thoroughly all internal passages and both main and pilot spools prior to reassembly. Make sure an air filter or air filter regulator is installed on the air inlet line upon reinstallation.

11. Remove the spool caps (36) from the spool housing (68) by removing the eight capscrews (35). Remove and inspect the cap gaskets (37). Replace if necessary.
12. Remove the main spool (39) from the spool housing (68) by pushing the spool through on end of the housing. The spool should slide out of its bore freely. Do not hit the spool or tap it out of the bore. If the spool does not slide freely by hand pressure alone then press the spool out of the bore. Inspect the main spool (39) and the piston rings (38) for wear. Replace if worn or damaged. Worn parts will adversely affect pump performance.

REASSEMBLY INSTRUCTIONS FOR THE AIR VALVE CENTER SECTION

(refer to fig. 1, page 9)

Caution: Care must be exercised at this stage of reassembly to ensure cleanliness. A dirty air valve will stick and function improperly. Keep area free of dirt, oil and metal chips.

1. Clean main spool (39), pilot spool (82) and the spool bores in the spool housing (68) with a good grade safety solvent prior to reassembly. The solvent should be of a type that evaporates and does not leave a film or oil on the components. Remove any obstructions from the signal ports in the spool housing using a pipe cleaner.
2. Assemble the piston ring set (45) to the main spool (39). Place each metal expander into one of the grooves on the main spool. Place a Teflon piston ring over each metal expander. Note that the split in the piston ring should be placed 180° from the split in the metal expander. These parts should move freely on the main spool (39).
3. Insert the main spool and piston ring assembly into the spool housing (68). Note that the split in each Teflon piston ring should enter into the spool bore at either the 3 or 9 o'clock position relative to the main air inlet of the spool housing. This will prevent the split from hanging up on one of the air ports machined onto the spool bore. Carefully compress each piston ring set as it enters the spool bore. Be certain to push the main spool completely into the bore so that one end of the main spool is flush with one end of the spool housing bore.

OPERATING INSTRUCTIONS

4. Fasten the cap gaskets (37) and spool caps (36) to both ends of the spool housing (68) using eight cap-screws (35).
5. Place the two air valve halves (86) flat on the work-bench so that the ribs are facing up. Install the main shaft seals (14) into each bore. Note that the cupped side of the seal should face down toward the diaphragm area. Carefully press one of the sleeve bearings (43) into each bore until the bearing makes contact with the shoulder located in the bore.

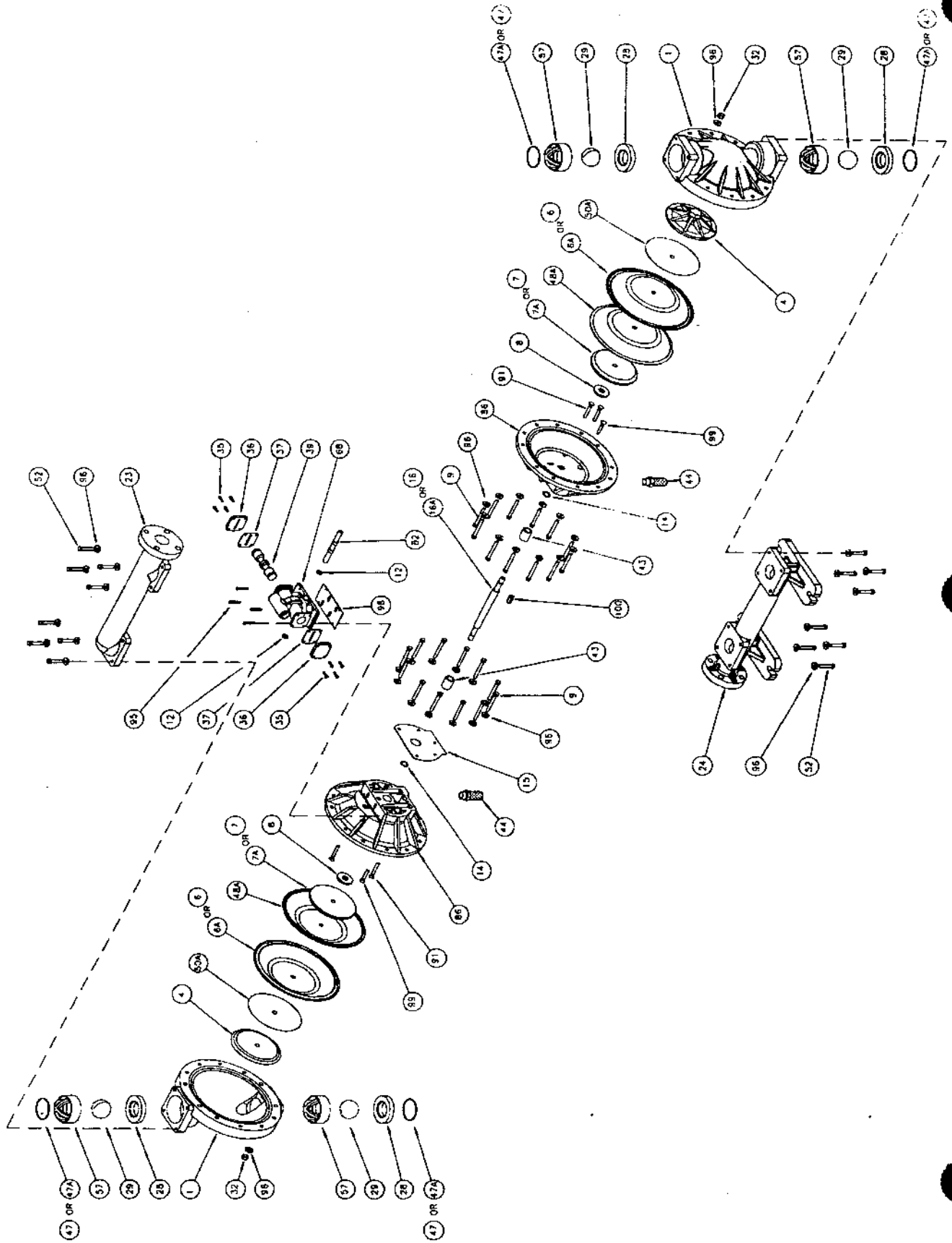
Caution: Do not attempt to force the bearings any deeper into the bore once contact with the shoulder is achieved.
6. Install a pilot spool seal (12) into each air valve half. Note that the cupped side of the seal should face down toward the diaphragm area.
7. Place the air valve gasket (15) onto one of the air valve halves (86). Loosely fasten the spool housing (68) and spool housing gasket (98) to this air valve half using two allen head capscrews (95).
8. Insert the pilot spool (82) through the open end of the spool housing (68). The pilot spool should pass through the seal (12) and protrude approximately 1/2" into the diaphragm side of the air valve half.
9. Apply a few drops of Blue Loctite #242 to flat head screw (99) and install through the hole closest to the muffler port. Thread coupling nut (100) onto flathead screw (99).
10. Place the other air valve half (86) onto the air valve assembly. Allow the pilot spool to pass through the seal (12) and into the air side of the air valve half. Be certain the air valve gasket (15) and the spool housing gasket (98) sit flat and are aligned with each respective bolt hole.
11. Loosely fasten the spool housing (68) to the upper air valve half using two allen head capscrews (95).
12. Apply a few drops of Blue Loctite #242 to the threads then install two flat head capscrews (91) into the upper air valve half. Note these two screws will mate to inserts located in the lower air valve half. **Torque each capscrew to 15 ft. lbs. (23n-m).**
13. Carefully turn the unit so that the other air valve half is facing up. Apply a few drops of Blue Loctite #242 to the threads then install two flat head capscrews (91) into this air valve half. Note these two screws will mate to inserts located on the lower air valve half. **Torque each capscrew to 15 ft. lbs. (23n-m).** Apply a few drops of Blue Loctite #242 to flat head screw (99) and install through the hole closest to the muffler port, threading it into the coupling nut (100). **Torque to 15 ft. lbs. (23n-m).**
14. Proper alignment of the air valve halves (86) and the spool housing (68) should allow for free movement of the pilot spool (82) and the pump shaft. It is normal for the pilot spool to drag slightly as it passes through the seal (12). Check for proper alignment then tighten the four allen head capscrews (95). **Torque each capscrew to 12 ft. lbs. (16n-m).** Check for free movement of the pilot spool and pump shaft again once all capscrews are tightened.
15. Install a muffler (44) into each exhaust port located 180° from the spool housing (68). The mufflers only need to be hand tightened. Do not use a wrench to tighten the mufflers.

2" Polypropylene & PVDF Parts List

<u>Key #</u>	<u>Description</u>	<u>Quantity</u>	<u>Drawing No.</u>
1	Chamber, Pump	2	47988
4	Plate, Diaphragm (outer)	2	47985
6 or 6A	Diaphragm, Teflon	2	44101
7	Plate, Inner	2	49021
7A	Plate, Inner, Teflon	2	44108
8	Bumper	2	44106
9	Capscrew	24	49016
12	Seal	2	46058
14	Seal	2	44372
15	Gasket, Air Valve	1	48636
16	Shaft, Pump	1	49109
16A	Shaft, Pump (Teflon)	1	46175
23	Manifold, Discharge	1	47986
24	Manifold, Suction	1	47987
28	Seat, Ball Valve, Teflon	4	47983
29	Valve, Ball	4	44102
32	Hex, Nut	16	51744
35	Capscrew, Socket head	8	51640
36	Cap, Spool	2	45452
37	Gasket, Cap	2	46218
39	Spool, Main	1	47180
43	Sleeve, Bearing	2	44120
44	Muffler	2	48638
45	Piston Ring with Expander	2	44366
47	O-Ring	4	49022,3,4,5
47A	O-Ring, Teflon	4	48639
48A	Back Up Diaphragm (Teflon Fitted Only)	2	46233
50A	Diaguard (Teflon Fitted Only)	2	45503
52	Capscrew	16	49134
57	Cage, Ball Valve	4	47991
68	Housing, Spool	1	47996
82	Pilot Spool Assembly	1	47587
86	Air Valve Half	2	47995
91	Capscrew, Flat Socket Head	4	48946
95	Capscrew, Socket Head	4	48667
96	Flat Washer	56	49015
98	Gasket, Spool Housing	1	48967
99	Capscrew, Flat Socket Head	2	49018
100	Coupling Nut	1	49017

Key numbers with suffix "A" denote parts used for Teflon fitted pumps only.

2" Polypropylene & PVDF





GENERAL TERMS OF SALE FOR PRODUCTS

Effective: January 1, 1999

1. GENERAL

A. Seller's price is based on these sales terms and conditions. This contract shall represent the final, complete and exclusive statement of the agreement between the parties and may not be modified, supplemented, explained or waived by parol evidence, any terms and Conditions contained in Buyer's purchase order or request for quotation, any course of dealings between the parties, Seller's performance or delivery, or in any other way. The Terms and Conditions of this contract may only be modified or waived in a written document signed by an Officer of Seller. These terms are intended to cover all activity of Seller and Buyer hereunder, including sales and use of products, parts and work and all related matters (references to products include parts and references to work include construction, installation and start-up). Any reference by Seller to Buyer's specifications and similar requirements are only to describe the products and work covered hereby and no warranties or other terms therein shall have any force of effect. Any information provided by Seller, including but not limited to suggestions as to specific equipment does not imply any guarantee of specific suitability and/or material compatibility in a particular application since many factors outside the control of Seller may affect the suitability of products in a particular application. Catalogs, circulars and similar pamphlets of the Seller are issued for general information purposes only and shall not be deemed to modify the provisions hereof.

B. The agreement formed hereby and the language herein shall be construed and enforced under the Uniform Commercial Code as in effect in the State of California on the date hereof.

2. TAXES

Any sales, use or other similar type taxes imposed on this sale or on this transaction are not included in the price. Such taxes shall be billed separately to the Buyer. Seller will accept a valid exemption certificate from the Buyer if applicable; however, if an exemption certificate previously accepted is not recognized by the governmental taxing authority involved and the Seller is required to pay the tax covered by such exemption certificate. Buyer agrees to promptly reimburse Seller for the taxes paid.

3. PERFORMANCE, INSPECTION AND ACCEPTANCE

A. Unless Seller specifically assumes installation, construction or start-up responsibility, all products shall be finally inspected and accepted within thirty (30) days after arrival at point of delivery. Products not covered by the foregoing and all work shall be finally inspected and accepted with thirty (30) days after completion of the applicable work by Seller. All claims whatsoever by Buyer (including claims for shortages) excepting only those provided for under the WARRANTY AND LIMITATION OF LIABILITY and PATENTS Clauses hereof must be asserted in writing by Buyer within said thirty (30) day period or they are waived. If this contract involves partial performance, all such claims must be asserted within said thirty- (30) day period for each partial performance. There shall be no revocation of acceptance. Rejection may be only for defects substantially impairing the value of products or work and Buyer's remedy for lesser defects shall be those provided for under the WARRANTY AND LIMITATION OF LIABILITY Clause.

B. Seller shall not be responsible for non-performance or for delays in performance occasioned by any causes beyond Seller's reasonable control, including, but not limited to, labor difficulties, delays of vendors or carriers, fires, governmental actions, or shortages of material, components, labor, or manufacturing facilities. Any delays so occasioned shall affect a corresponding extension of Seller's performance dates, which are, in any event, understood to be approximate. In no event shall Buyer be entitled to incidental or consequential damages for late performance or for a failure to perform. Seller reserves the right to make partial shipments and to ship products, parts or work which may be completed prior to the scheduled performance date.

C. In the event that Seller has agreed to mount motors, turbines, gears, or other products which are not manufactured by Seller and which are not an integral part of Seller's manufactured product, and a delay in the delivery of such products to Seller occurs that will cause a delay in Seller's performance date, Seller reserves the right to ship its product upon completion of manufacture and to refund an equitable portion of the amount originally included in the purchase price for mounting without incurring liability for non-performance.

D. Seller reserves to itself the right to change its specifications, drawings and standards if such changes will not impair the performance of its products, and parts, and further that such products, and parts, will meet any of Buyer's specifications and other specific product requirements which are a part of this agreement.

E. The manufacture and inspection of products and parts shall be to Seller's Engineering and Quality Assurance standards plus such other inspections, tests of documentation as are specifically agreed to by Seller. Requirements for any additional inspection, tests, documentation, or Buyer witness of manufacture, test, and/or inspection shall be subject to additional charges.

4. TITLE AND RISK OF LOSS

Title and risk of loss shall pass to buyer upon delivery of products at the designated Ex Works place (Incoterms 1990) unless otherwise agreed by the parties.

5. EROSION AND CORROSION

It is specifically understood that products and parts sold hereunder are not warranted for operation with erosive or corrosive fluids. No product or part shall be deemed to be defective by reason of failure to resist erosive or corrosive action of any fluid and Buyer shall have no claim whatsoever against Seller therefore.

6. WARRANTY AND LIMITATION OF LIABILITY.

A. Seller warrants only that its product and parts, when shipped, will be free from defects in materials and workmanship. With respect to products and parts not manufactured by Seller, Seller's only obligation shall be to assign to Buyer, to the extent possible, whatever warranty Seller requires from the manufacturer. All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and, in any event, within one (1) year after initial start-up or eighteen (18) months after shipment, whichever first occurs, and all claims for defective work must be made in writing immediately upon discovery and in any event, within one (1) year of completion thereof by Seller. Defective items must be held for Seller's inspection and returned to the original f.o.b. point upon request.

THE FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS.

B. ANY PRODUCT (S) SOLD HEREUNDER WHICH IS NOT MANUFACTURED BY SELLER IS NOT WARRANTED BY SELLER and shall be covered only by the express warranty, if any, of the manufacturer thereof.

C. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product, part or work at the original place of delivery, or (ii) refund an equitable portion of the purchase price.

D. THE FOREGOING IS SELLER'S ONLY OBLIGATION AND BUYER'S EXCLUSIVE REMEDY FOR BREACH OF WARRANTY AND, EXCEPT FOR GROSS NEGLIGENCE, WILLFUL MISCONDUCT, AND REMEDIES PERMITTED UNDER THE PERFORMANCE, INSPECTION AND ACCEPTANCE AND THE PATENTS CLAUSES HEREOF, THE FOREGOING IS BUYER EXCLUSIVE REMEDY AGAINST SELLER FOR ALL CLAIMS ARISING HEREUNDER OR RELATING HERETO WHETHER SUCH CLAIMS ARE BASED ON BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHER THEORIES. BUYER'S FAILURE TO SUBMIT A CLAIM AS PROVIDED ABOVE SHALL SPECIFICALLY WAIVE ALL CLAIMS FOR DAMAGES OR OTHER RELIEF, INCLUDING BUT NOT LIMITED TO CLAIMS BASED ON LATENT DEFECTS. IN NO EVENT SHALL BUYER BE ENTITLED TO INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, NOR FOR DAMAGES FOR LOSS OF USE, LOST PROFITS OR REVENUE, INTEREST, LOST GOODWILL, WORK OR PRODUCTION STOPPAGE, IMPAIRMENT OF OTHER GOODS, INCREASED EXPENSES OF OPERATION, OR THE COST OF PURCHASING REPLACEMENT POWER OR OTHER SERVICES BECAUSE OF SERVICE INTERRUPTIONS. FURTHERMORE, IN NO EVENT SHALL SELLER'S TOTAL LIABILITY FOR DAMAGES OF BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS OR PARTS MANUFACTURED BY SELLER AND UPON WHICH SUCH LIABILITY IS BASED. ANY ACTION ARISING HEREUNDER RELATED HERETO, WHETHER BASED ON BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHER THEORIES, MUST BE COMMENCED WITHIN ONE (1) YEAR AFTER THE CAUSE OF ACTION ACCRUES OR IT SHALL BE BARRED.

7. PURCHASER'S REPRESENTATIONS & WARRANTIES

Purchaser represents and warrants that the products(s) covered by this contract shall not be used in or in connection with a nuclear facility or application. The parties agree that this representation and warranty is material and is being relied on by seller. This provision may be modified in a separate writing signed by an officer of PPC.

8. PATENTS

Seller agrees to assume the defense of any suit for infringement of any patents brought against Buyer to the extent of such suit charges infringement of an apparatus or product claim by Seller's product in and of itself, provided (i) said product is built entirely to Seller's design, (ii) Buyer notifies Seller in writing of the filing of such suit within ten (10) days after the service of process thereof, and (iii) Seller is given complete control of the defense of such suit, including the right to defend, settle and make changes in the product for the purpose of avoiding infringement of any process or method claims, unless infringement of such claims is the result of following specific instruction furnished by Seller.

9. EXTENT OF SUPPLY

Only products as listed in Seller's proposal are included in this agreement. It must not be assumed that Seller has included anything beyond same.

10. MANUFACTURING SOURCES

To maintain delivery schedules, Seller reserves plants on a world-wide basis.

11. TERMS OF PAYMENT

Net 30 days from date of invoice.

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