

# AODD PUMP OPERATIONS & MAINTENANCE MANUAL



## AIR OPERATED DOUBLE DIAPHRAGM PUMP

**FLOW UP TO: 750 LPM**

**HEAD UP TO: 60 MTRS**

**DELIVERY SIZE UP TO: 2 INCH**

**TEMP. UP TO: 230 DC**

**MOC: PPH, PP, PVDF, S.S. 316, ALU**

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## **RECOMMENDED PRECAUTIONS**

1. For satisfactory operation and safety maximum inlet air pressure must not exceed 6 Kg/cm<sup>2</sup>g (90 PSIG).
2. Install FRL before the Air inlet of the pump. This ensures maximum life of the Air Valve moving parts and shaft O – Rings.
3. No modifications, additions, or deletions should be made to the pump, without prior approval of the factory.

## **INSTALLATION**

Bolt pump to rubber mountings pads using appropriately sized bolts.

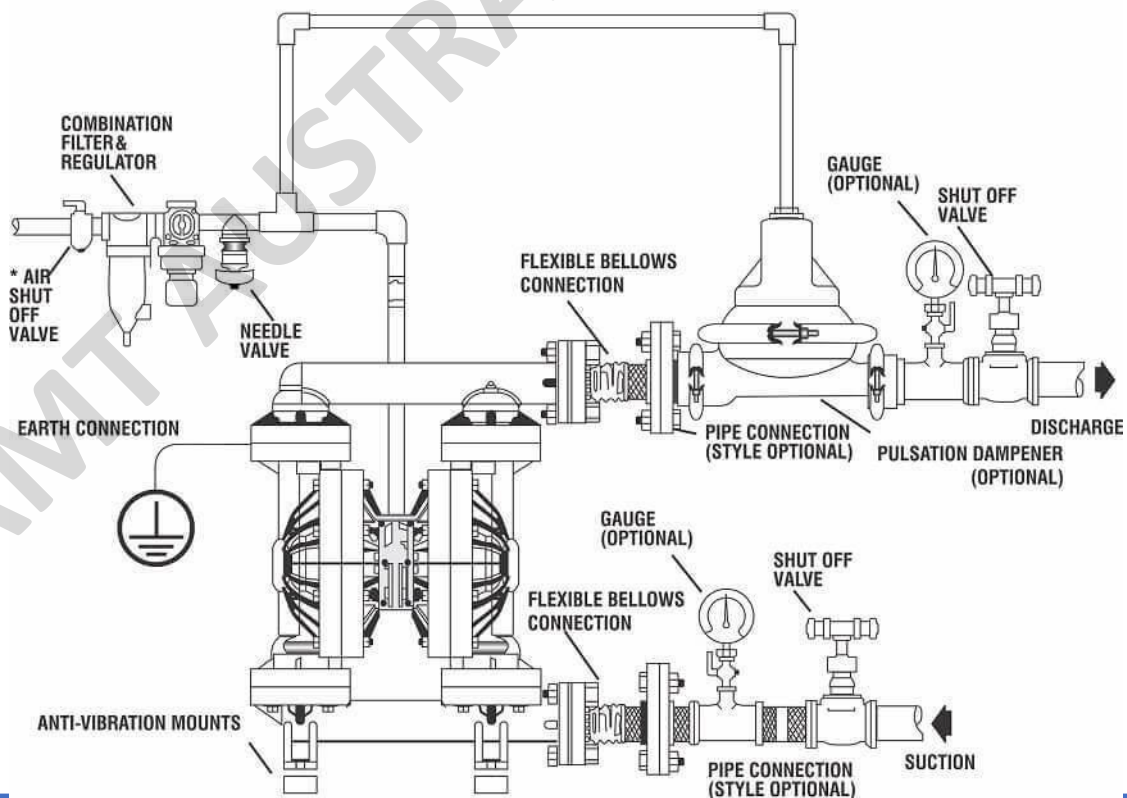
(4 rubber pads are provided with each pump with bolts)

This should be done to reduce pipe stresses and vibrations which are characteristic of reciprocating nature of the pump. A surge suppresser may be required on the discharge line of the pump if further reduction in vibration or reduction in pulsation in the discharge flow is needed.

**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 length 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.

## **SUGGESTED INSTALLATION**

Air Operated Diaphragm Pumps Example Installation



## **SOLIDS – HANDLING CAPABILITY**

“AMBICA” AIR Operated Pumps will pass the following spherical solid sizes:

MODEL	SIZE
AOD – 150	19 mm Dia.

If 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 size holes than the all-larger solids from entering the pump and interfering with operation of the pump ball valves.

## **AIR SUPPLY**

PUMP MODEL	AIR INLET	MAX. AIR PRESSURE
AOD - 150	1/4" BSP	4 Kg/cm <sup>2</sup>

## **MAXIMUM AIR PRESSURE**

Use flexible hose connection at the pump inlet to avoid stresses on the piston Block (Air Valve)

**NOTE:** Longer air lines require larger diameter 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 90 p sig for pumping requirements.

**CAUTION:** Do not exceed 6 Kg/cm<sup>2</sup> (90 PSIG) Air supply pressure. Blow out air line for 10 to 20 seconds before attaching to pump to make sure all pipeline debris is clear.

**USE OF FRL:** F – Air Filter. R - Regulator - L - Oil Lubricator

The use of FRL is must before the air inlet.

**F: THE AIR FILTER** removes pipeline debris & moisture which may otherwise cause damage to the Air Valve assembly and cause poor air valve performance.

**R: THE AIR PRESSURE REGULATOR** keeps the inlet pressure constant which protects the diaphragm from getting ruptured at high pressure.

**L: OIL LUBRICATOR** This helps the moving parts i.e. Piston, shaft & shaft O Ring to get lubricator. Use thin oil (GTX), one drop after every five minutes is sufficient for normal operation. This can be controlled in oil lubricator.

## **PUMP CONTROL**

The pump operating conditions flow and discharge head can be controlled in the following manner:

- 1 THROTTLING THE PUMP DISCHARGE BY THE MEANS OF A VALVE ON DISCHARGE LINE:** When the pump discharge pressure equals the air supply pressure, the pump will stall. Stalling will not harm pump, however, do not exceed 90 psig air supply pressure. The pump may be in the stalled mode indefinitely. By opening the discharge valve, the pump will start pumping.
- 2 LIMITING THE VOLUME AND/OR PRESSURE OF THE AIR SUPPLY TO THE PUMP**  
This can be done by installing a needle valve at the air inlet. If a pump discharge pressure limit is required then set the air regulator (R) as per the pressure required. Failure to use air pressure regulator valve, will cause the pump discharge pressure raise to the max. Air pressure system when the pump is stalled. This will damage the diaphragms. **When starting the pump, the air pressure input should be gradually increased.**

### **OPERATING INSTRUCTIONS**

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Clean, dry air with mist of oil should be provided for optimum air valve operation and life. In cold weather conditions of high pump discharge pressure and relatively high humidity, air valve freezing may occur as a result of moisture in the compressed air being released.

For permanent installations, an air filter and water/oil separator should be used. This is always a good practice for air valve moving parts and seals by keeping them clean from dirt and oil residue.

Excessive oil and water in the air supply will cause a varnish-like substance to form on the self lubricated valve piston "sticking" and result in erratic piston operation. Should this occur, the piston and housing bore may be cleaned with a commercial safety solvent or kerosene

1. When starting the pump, make sure all valves on the suction and discharge lines are open. The Pump will not prime with the valve 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 for model in question.
2. When pumping highly viscous materials, it is advisable to check the pump flow rate vs. the Pump stroke rate:
3. The pump air exhaust port should be kept free from blockage. The exhaust line, if required, should be kept as short as possible or pump performance loss. If the exhaust sound level becomes too objectionable, use the air muffler provided. Using the muffler supplied with the pump will not affect pump performance.

**CAUTION:** If a diaphragm failure occurs, the pumping media may be blown out of the exhaust port. This could be hazardous if the pumping media is toxic or aggressive media.

4. 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. In no permanent installation, the pump may be inverted, drained and flushed, through the suction port.

## **OPERATING TEMPERATURE: 60 Deg. C**

Operating Temperature 60 deg. C for Polypropylene Pump with Neoprene / Hypalon Diaphragm and 70 deg. To 80 deg, with Teflon diaphragm.

## **TROUBLE SHOOTING**

### **A) Diaphragm is ruptured or getting deformed:**

- 1) Liquid is containing sharp impurities.
- 2) Piping residue are attacking diaphragm
- 3) Check diaphragm elastomer suitability with the liquid to be pumped.
- 4) Check the alignment of shaft with diaphragm. Misalignment will cause bigger hole in diaphragm and erratic noise and will corrode shaft also.

### **B) Air bubbles in pump discharge**

- 1) Check suction line & clamps for leaks.
- 2) Cracked or ruptured diaphragm.

### **C) Intermittent pump operation and / or ice blowing form exhaust port.**

- 1) Remove obstruction from suction line.
- 2) Air valve freeze – up – install de-icer on air inlet line or suitable air drier in compressed air Line.
- 3) Sticky air valve – remove piston & clean with safety solvent.

### **D) Severe pump vibration with intermittent flow**

- 1) Ruptured diaphragm – disassemble pump and replace diaphragm and clean air valve if necessary.
- 2) Mechanical failure – disassemble pump and inspect for bent shaft.
- 3) Shaft “O” ring damaged.

### **E) Pumping media coming from exhaust port**

- 1) Ruptured diaphragm – disassemble pump and replace diaphragm – disassemble & clean air valve if necessary.

## **F) Varying pump discharge per stroke**

- 1) Remove suction manifold and check for obstruction.
- 2) Worm or leaky ball valves & seat – disassemble pump & replace worm parts.
- 3) Change shaft sealing: O" rings.
- 4) Ruptured diaphragm – disassemble pump and replace. Disassemble and clean air valve if necessary.

## **G) Slowing up of pumping action**

- 1) Clogged air exhaust muffler replace.

## **H) Pump stalls**

- 1) Increase air supply pressure – do not exceed 90 psig under any circumstances and check for obstruction in suction & discharge line.
- 2) Piston sticking – remove piston & clean with safety solvent – Install suitable filter on air inlet if dirt or contaminants persist.



# PUMP DISASSEMBLY INSTRUCTION

**CAUTION:** Before any maintenance or repair is attempted, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from the pump. Disconnect all intake, discharge, and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable container. Be aware of any hazardous effects of contact with your process fluid.

The Pump has a 19 mm (1/2") inlet and outlet.

## AVAILABLE MOCs:

Polypropylene  
PVDF  
SS  
AL  
CI

## TOOLS REQUIRED:

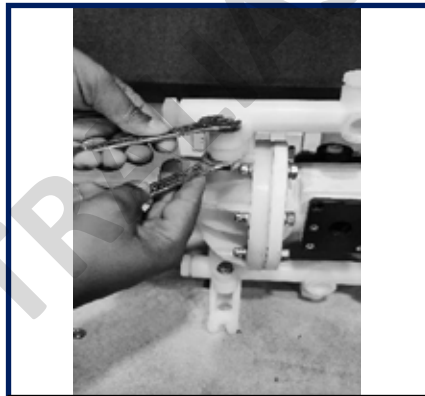
Wrench  
Allen Wrench  
Adjustable Wrench  
Vise equipped with soft jaws (such as plywood, plastic or other suitable material)

## DISASSEMBLY



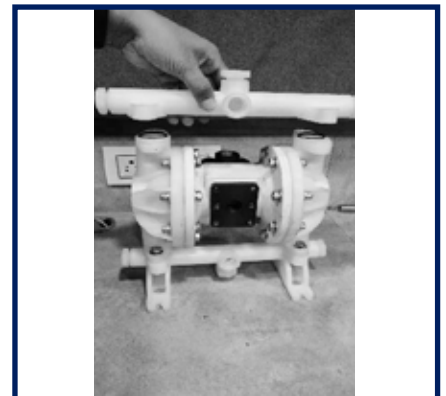
STEP 1 (Fig 1)

Before starting disassembly, mark a line from each liquid chamber to its corresponding air chamber. This line will assist in proper alignment during reassembly. (Fig 1)



STEP 2 (Fig 2)

Utilizing a wrench, remove the bolts that fasten the discharge manifold to the liquid chambers. (Fig 2)



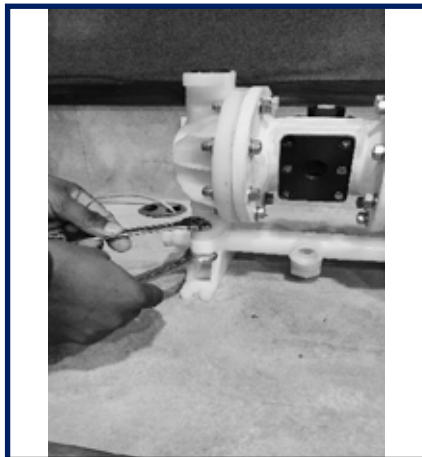
STEP 3 (Fig 3)

Lift away the discharge manifold. (Fig 3)



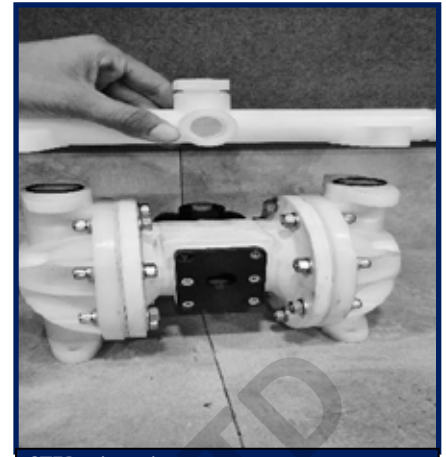
STEP 4 (Fig 4)

Remove the discharge valve balls, O-rings and seats (Fig 4) from the liquid chambers and inspect for nicks, gouges, chemical attack or abrasive wear. Replace worn parts with genuine parts.



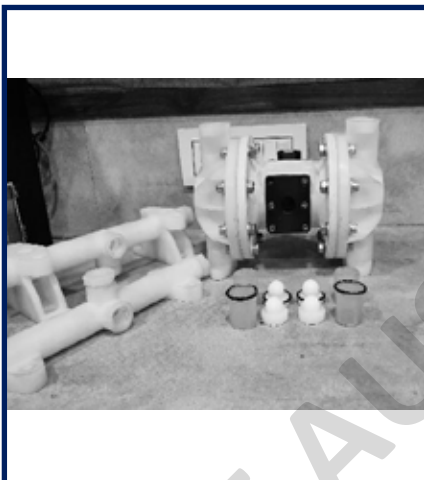
STEP 5 (Fig 5)

Remove the bolts which fasten the suction manifold to the liquid chambers. (Fig 5)



STEP 6 (Fig 6)

Lift suction manifold from liquid chambers and centre section to expose suction valve balls and seats. Inspect ball cage area of liquid chamber for excessive wear and damage. (Fig 6)



STEP 7 (Fig 7)

Remove the valve balls, O-rings and seats (Fig 7) from the liquid chambers and inspect for nicks, gouges, chemical attack or abrasive wear.



STEP 8 (Fig 8)

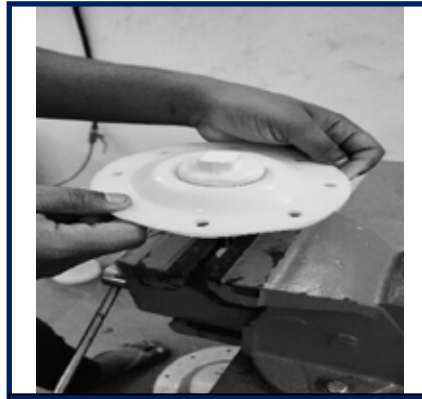
Remove one set of bolts, which secure one liquid chamber to the center section. Lift liquid chamber away from center section to expose diaphragm and outer piston. (Fig 8)





STEP 9 (Fig 9)

Using an adjustable wrench, or by rotating the diaphragm by hand, remove the diaphragm assembly. (Fig 9)



STEP 10 (Fig 10)

To remove diaphragm assembly from shaft, secure shaft with soft jaws (a vise fitted with plywood or other suitable material) to ensure shaft is not nicked, scratched, or gouged. Using an adjustable wrench or by hand, remove diaphragm assembly from shaft. Inspect all parts for wear and replace with genuine parts if necessary. (Fig 10)

NOTE: Due to varying torque values, one of the following two situations may occur:  
The lock nut (outer piston), diaphragm and holding plate (inner piston) remain attached to the shaft and the entire assembly can be removed from the center section.  
The lock nut (outer piston), diaphragm and holding plate (inner piston) separate from the shaft which remains connected to the opposite side diaphragm assembly. Repeat disassembly instructions for the opposite liquid chamber. Inspect diaphragm assembly and shaft for signs of wear or chemical attack. Replace all worn parts with genuine parts for reliable performance.

## REASSEMBLY

Upon performing applicable maintenance to the air distribution system, the pump can now be reassembled. Please refer to the disassembly instructions for photos and parts placement. To reassemble the pump, follow the disassembly instructions in reverse order. The air distribution system needs to be assembled first, then the diaphragms and finally the wetted part. Clean the inside of the center section shaft bushing to ensure no damage is done to new seals. Stainless bolts should be lubed to reduce the possibility of seizing during tightening. Ensure proper alignment on the sealing surfaces of intake and discharge manifolds. Liquid chambers are easier to attach when the diaphragm is inverted. Prior to attaching the second water chamber, push diaphragm assembly so that it is as close as possible to the center section. PVDF pumps require Teflon® gasket kits for improved sealing. Gasket kits may be installed on other pumps where sealing is an issue.

# AIR VALVE / CENTER BLOCK OF AODD-150

## DISASSEMBLY



STEP 1 (Fig 1)

Remove the locknuts with the help of a spanner.



STEP 2 (Fig 2)

Remove diaphragms from the centre block. (Fig 2)



STEP 3 (Fig 3)

Remove the main shaft and check it. Remove the pilot shaft and check it. Replace it if worn out. (Fig 3)



STEP 4 (Fig 4)

Unscrew the pilot shaft bush if required by removing one circlip. (Fig 4)



STEP 5 (Fig 5)

Remove the pilot shaft bush. Check the o rings. Replace if worn out. (Fig 5)



STEP 6 (Fig 6)

Remove the piston block. (Fig 6)



STEP 7 (Fig 7)

Remove circlip from piston block. (Fig 7)



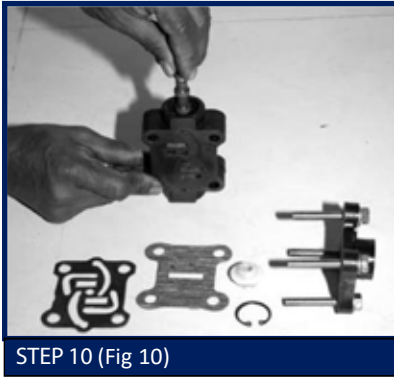
STEP 8 (Fig 8)

Take out the piston block cap by using mounting bolts. Check the cap with 'O' ring. (Fig 8)



STEP 9 (Fig 9)

move the piston and check it. Replace it if worn out. (Fig 9)



STEP 10 (Fig 10)

Check the piston block gasket along with piston block cover gasket. Replace it if worn out or damaged. (Fig10)

### REASSEMBLY

For assembly, follow the reverse procedure.