



**Powerwise Ink Pumps**  
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### AIR DRIVEN, DOUBLE DIAPHRAGM PUMP MANUAL

Congratulations on purchasing one of the most durable and versatile pumps made anywhere. With the proper installation and maintenance the pump will provide years of great performance.

READ THESE WARNINGS AND SAFETY PRECAUTIONS PRIOR TO INSTALLATION OR OPERATION. FAILURE TO COMPLY WITH THESE INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

**⚠ WARNING** Before placing the pump in service make certain it is compatible with the fluid being pumped. Changes of temperature, concentrations or combinations of chemicals may vary resistance of material. Always consult Material Safety Data Sheets and Engineering Resistance Tables for chemical compatibility.

- Be certain all operators of this equipment have been trained for safe working practices.

**⚠ DANGER** **HAZARDOUS MATERIAL:** Protective eye wear and clothing should be used whenever pumping hazardous or toxic fluids.

- If a diaphragm ruptures, the pumped product can enter the air side of the pump and exit through the air exhaust. When the fluid is hazardous pipe exhaust away from the work area and personnel.
- When the fluid source is at a higher level than the pump (flooded suction), the exhaust should be piped to a higher level than the fluid source to prevent spills caused by siphoning if a diaphragm rupture should occur.

**⚠ DANGER** **HAZARDOUS PRESSURE:** Do not clean or service pump, hoses or dispensing valves when the system is pressurized - serious injury may result.

- Disconnect air supply line and relieve pressure from the system prior to disassembly.

**⚠ DANGER** **STATIC WARNING:** Pumping of flammable materials may cause a build-up of a static charge within the electrically non-conductive pumps. Static spark can cause explosion resulting in severe injury or death. Ground pump and pumping systems when pumping flammable products or when used in a location where surrounding atmosphere is conducive to spontaneous combustion. Optional conductive non-metallic models are available when grounding is necessary. Use grounding lugs and always connect to a good ground source.

- Secure pump, connections and all contact points to avoid vibrations and generation of contact or static spark. Periodically verify continuity of electrical path to ground with an ohmmeter from each component.
- Consult local building codes and electrical codes for specific grounding requirements.
- Use hoses incorporating a static wire.
- Use proper ventilation
- Keep flammables away from heat, open flames and sparks.
- Keep containers closed when not in use.

**⚠ WARNING** Maximum temperatures are based on mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult engineering guides for chemical compatibility and temperature limits.

- Always use minimum air pressure when pumping at elevated temperatures.

**⚠ WARNING** Excessive air pressure can cause pump damage, personal injury or property damage.

**⚠ WARNING** Pump must be reassembled properly after maintenance.

**⚠ CAUTION** Do not use the pump for the structural support of the piping system. Be certain the system components are supported to prevent stress on the pump parts.

- Flexible connections will avoid damage to piping due to vibration.

<b>⚠ DANGER</b>	= Immediate hazards which will result in severe personal injury or death.
<b>⚠ WARNING</b>	= Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.
<b>⚠ CAUTION</b>	= Hazards or unsafe practices which could result in minor personal injury, product or property damage.



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### INSTALLATION

**NOTICE:** Re-torque fasteners prior to use. Refer to torque requirements listed in maintenance manual and attached to pump

1. A lube-free, clean, dry, compressed air source (or any nonflammable, compressed gas) is recommended. Use a filter that is capable of filtering out particles larger than 50 microns.
2. All pumps should be mounted in an upright position with the exception of the 1/4" models which may be rotated 360° to suit the application.
3. When particles exceed the maximum particle specification of the pump or are sharp enough to cut elastomers install a particle fluid filter on the fluid suction line.
4. Fluid suction lines and air exhaust lines should never be smaller than specified pipe size of pump.
5. Apply PTFE tape to threads upon assembly to prevent leakage.
6. Never use pipe dope on air line connections.
7. Never use collapsible tube on fluid inlet.
8. Do not exceed 10 ft-pounds of torque on plastic pipe threads.
9. If changing to a different application reconfirm compatibility of fluid.

### SUBMERGED APPLICATIONS

1. Fluid must be compatible with fasteners and with intermediate material.
2. Pipe exhaust above the level of the fluid.

### HIGH VISCOSITY APPLICATIONS

1. Position the pump close to or below the level of the fluid source.
2. Suction lines should be increased in size - up to three times the size of the inlet manifold. Dual manifolds may be used when available.
3. Start the pump slowly using a valve on the air line.

### LOW TEMPERATURE and UV EXPOSURE

1. Polypropylene tends to embrittle at freezing temperature. Pump must be insulated or heated, otherwise use pumps with different materials of construction.
2. If excessive icing occurs at the pump exhaust, air source must be dried using mechanical means or through the introduction of ethyl alcohol in the air line.
3. UV rays will damage polypropylene pumps, either shroud the pumps from UV rays or use pumps with UV stabilized materials.

### GENERAL MAINTENANCE

1. Check periodically for product or air leakage. Tighten any joint where leakage is occurring.
2. When pumping hazardous or toxic materials, diaphragms should be replaced at regularly scheduled intervals based upon pump usage.

3. In freezing temperatures, the pump must be completely drained when idle.
4. When pumping highly abrasive fluids reduce discharge flow rate or reduce air pressure to prolong diaphragm life.
5. If you are pumping a material that will settle or compact the pump must be flushed before shut down.

### TROUBLE SHOOTING

#### AIR IS APPLIED TO PUMP BUT PUMP IS NOT STARTING

1. Clean filters and debris from all fluid lines
2. Make sure all valves on fluid lines are open.
3. Inspect diaphragms for rupture.
4. Air pressure must not be below 20 psi (1,3 bar)

#### PUMP IS PUMPING BUT NOT PRIMING

1. Check all suction line connections for leakage.
2. Inspect check valves for wear or debris.
3. Suction lift specifications may be exceeded.
4. If fluid is viscous use larger suction lines.

#### LEAKAGE

1. Retorque all fasteners to specified torque requirements.
2. Replace o-rings.
3. Inspect diaphragms for rupture

#### LOW FLOW RATE

1. Confirm air pressure and air capacity at the air valve as required.
2. Check for leaks in suction line or obstructions in lines.
3. If fluid is viscous use larger suction lines.
4. Viscosity of fluid may have increased if temperature is lower.

#### AIR IN DISCHARGE LINES

1. Check for leaks in suction lines.
2. Inspect diaphragms for rupture.

#### ERRATIC CYCLING

1. Inspect check valve seats for debris.
2. Inspect fluid lines for debris.
3. Automatic valves must be properly functioning.
4. Viscosity of product may be changing.

#### PREMATURE DESTRUCTION OF WETTED COMPONENTS

1. If fluid is abrasive slow down pump or increase size of pump
2. Filter fluid for sharp objects.
3. Make sure fluid is compatible with wetted materials.

# 3/8" SPECIALTY PERFORMANCE MAINTENANCE MANUAL

## BEFORE YOU BEGIN

Flush and neutralize the pump to be certain all corrosive or hazardous materials are removed prior to any maintenance. This procedure should always be followed when performing maintenance, transporting used pumps or returning pumps for factory service.

## VALVE AND O-RING MAINTENANCE

1. Remove the nuts (3) and washers (4) from the bolts (23) in manifolds. Remove the manifolds (20), (11). Two of the four max pass valves and back-ups (13, 14) are located inside of the bottom of the outer chambers (16). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect manifold o-ring (12) as well and replace if necessary.
2. The other two max-pass valves are located inside of the bottom of the discharge manifold (20). Repeat the procedure for inspection of discharge valves, back-ups and o-rings. (Some pumps such as those built with PTFE have ball valves in place of the max pass valves. Repeat the procedure—inspect valve seat (28), balls (29), ball cage (27) and o-ring (12)).
3. When re-assembling the max-pass pump, the sleeve (15) should be assembled into the valve cavity first, followed by the max-pass valve (13), the valve back-up (14) and finally the o-ring (12). For pumps with balls valves, the cage (27) should be assembled into the valve cavity first, followed by the ball (29), valve seat (28), and finally the o-ring (12). Lightly tighten all external fasteners when assembling, torquing them to their requirements after pump is completely assembled.

**NOTE: When using pumps built with PTFE o-rings, always replace with new PTFE o-rings, since the original o-rings may not reseal the pump.**

## DIAPHRAGM MAINTENANCE

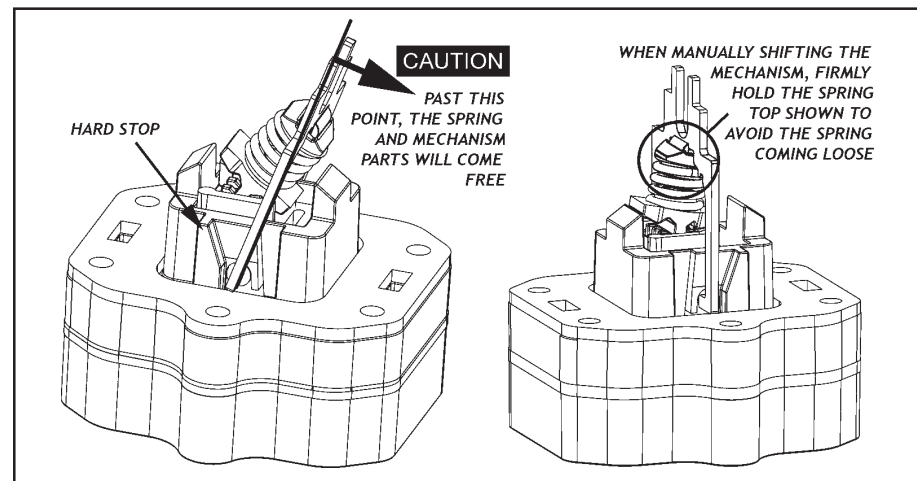
4. To inspect diaphragms, remove the nuts (7) from the carriage bolts (8) on the band clamps (16) surrounding the outer pump chambers (16). If replacement is necessary due to abrasion or rupture, unscrew the outer diaphragm plates (17). Only models that have PTFE elastomers will have both a PTFE overlay (18) that faces the outer pump chamber and an o-ring (25) on the air side of pump. (NOTE: Pumps that do not contain PTFE will not have o-ring (25) – they are built with diaphragms (19) only.)
5. To inspect the diaphragm rod's lip seals, remove diaphragm rod and carefully pick out the lip seals from inside the intermediate (22). Replace if necessary. Be sure to reinsert the lip seals with open cup facing the inside of the pump. Make sure that the rod guide is facing the air valve assembly and slide the diaphragm rod back into intermediate.
6. Take one diaphragm and with the curved side of the inner diaphragm plate facing the diaphragm, assemble onto the outer diaphragm plate stud. Screw the assembly into the end of the diaphragm rod. Repeat for the other side. Torque the outer diaphragm plates to requirements.
7. Position outer diaphragm chambers onto the intermediate, making sure that the witness line of the intermediate matches with the parting line of the chamber.
8. When positioning band clamps, use soapy water or a compatible lubricating spray on the inside of the band clamps to aid assembly. Tap with a mallet on the outside of the

clamp to help position it while tightening the fasteners. The band clamp fasteners are stainless steel. To prevent galling, apply an anti-seize compound to the thread. Tighten to final torque requirements.

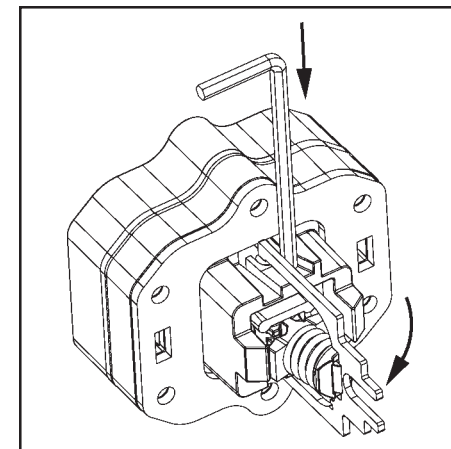
9. Position the manifolds, making sure of their orientation in relation to the air valve for your application. Also, make sure that the manifold o-rings do not shift from their grooves during reassembly. Tighten all external fasteners to final torque requirements after the pump is completely assembled.

## AIR VALVE ASSEMBLY INSPECTION

**CAUTION: Only one side of the mechanism has a hard-stop. Shifting the mechanism past its operating position can cause the spring to pop free and internal components to come loose. Use caution when shifting the mechanism manually.**



10. If there has been a diaphragm rupture and fluid has entered the air side of the pump, the complete air system should be inspected. Remove the air valve assembly (2) by unscrewing the six long hex-head air valve assembly screws (9).
11. Clean or replace the air valve assembly if there is excessive wear, dirt build-up or chemical attack. Inspect for proper shifting of the spring mechanism by manually pushing the metal spring retainer from one side to the other.
12. To reinstall the air valve, first shift the spring mechanism to the side with the hard-stop. Next, prop the spring retainer into a more neutral position by inserting a 7/64" or 3mm hex key as shown between the hard-stop and the spring retainer.
13. With the rod guide (1) positioned such that the opened end is facing the air valve assembly opening, slide the air valve assembly in place so that the forks slide into the rod guide. Once the fork of the spring retainer is in the rod guide, pull the hex key free and push the air valve assembly fully into place. Finally, reinsert and tighten the air valve assembly screws to the torque listed on the specs sheet.



(Over)

## FASTENER TORQUE REQUIREMENTS

**NOTE:** When reassembling, loosely tighten all external fasteners adjusting and aligning. Then gradually, in an alternating fashion, tighten to the torque requirements listed below.

AIR VALVE ASSEMBLY SCREWS 12 in-lbs (1,35 NM)

BAND CLAMPS 13.3 ft-lbs (18,8 NM)

MANIFOLD BOLTS, 10 in-lbs (1,13 NM)

OUTER DIAPHRAGM PLATES, 40 in-lbs (4,5 NM)

U.S. Patent Number 5232352

## SPECIFICATIONS

### CAPACITY:

Adjustable 0-9 GPM (34,0 LPM)

### MAXIMUM TEMP:

PVDF models – 200°F (93°C)

Other models – 150°F (66°C)

### MAXIMUM AIR PRESSURE:

120 psi (8,2 bar)

### MINIMUM AIR PRESSURE:

20 psi (1,3 bar)

### DRY LIFT:

Models with PTFE balls –  
10 feet (3 meters)

Models with Max-Pass™ valves –  
17 feet (5,2 meters)

### WEIGHT:

PVDF models – 5 pounds (2,3 kg)

Other models – 3.8 pounds (1,7 kg)

### MAXIMUM SOLIDS:

Models with Max-Pass™ valves – 1/4"  
(6,4 mm)

Other models – 1/16" (3,2 mm)

### AIR SUPPLY:

Inlet – 1/4" NPS Female  
(BSP or NPT compatible)

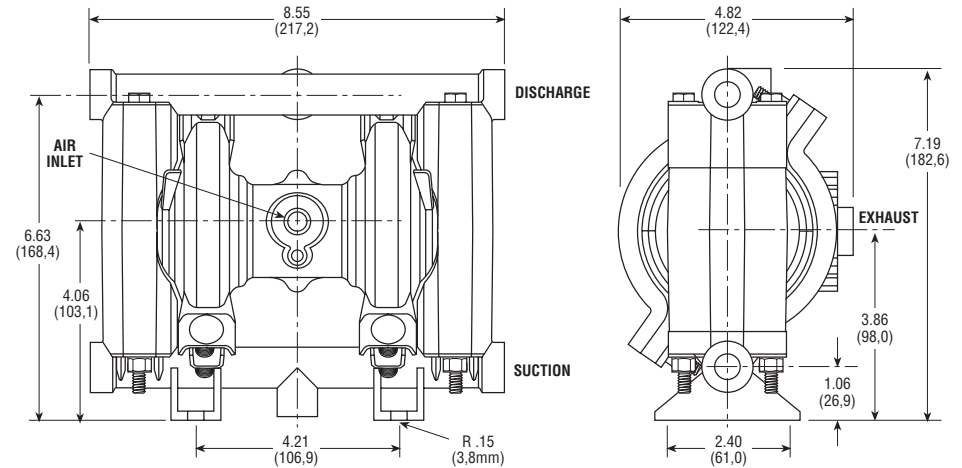
Outlet – 3/8" NPS Female  
(BSP or NPT compatible)

### FLUID INLET/DISCHARGE:

3/8" NPS Female  
(BSP or NPT compatible)

## DIMENSIONS

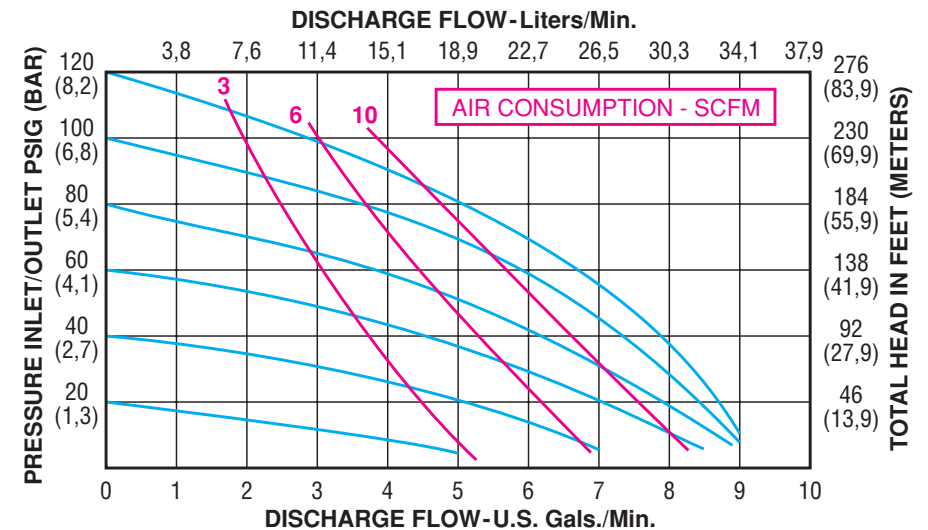
Dimensions in inches and (mm)



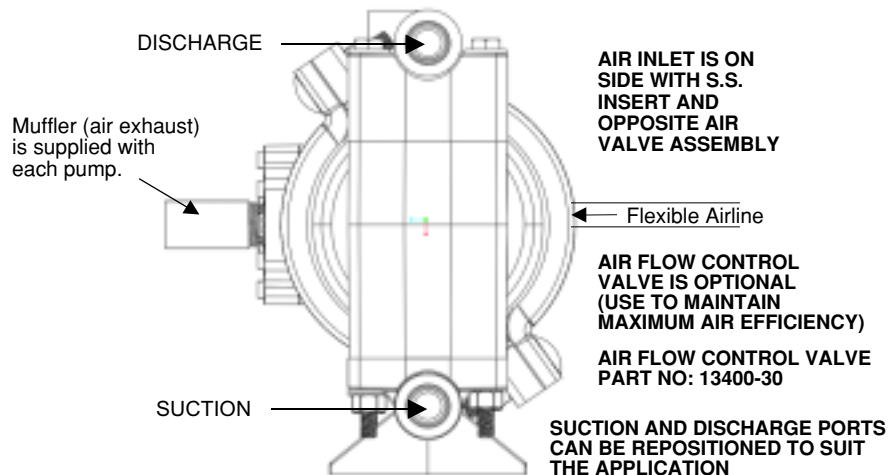
**NOTE: AIR INLET IS ON THE SIDE WITH STAINLESS STEEL INSERT. THE AIR VALVE ASSEMBLY IS ON THE OPPOSITE SIDE OF THE PUMP.**

## PERFORMANCE CURVE

(Based on water-flooded suction)



## Typical Installation



**DO NOT USE AIR LINE LUBRICATION**