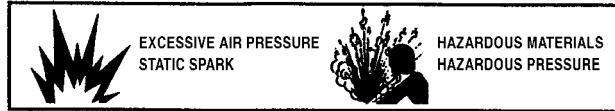


1/2" AIR DRIVEN DIAPHRAGM PUMP



Refer to Bulletin P-605,
Parts List P-9151

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 conductive 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.

DANGER = Immediate hazards which will result in severe personal injury or death.

WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

CAUTION = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

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.

1/2" PERFORMANCE PLUS PLASTIC MAINTENANCE MANUAL

CHECK VALVE AND O-RING MAINTENANCE

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. Remove nuts (18) from bolts (16) in both the discharge and suction manifolds. Suction check valve seats and check balls (26, 27) are located inside of the bottom of the outer chamber (28). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect valve seat and manifold o-rings (38, 19). Replace if necessary. Discharge check valves are located inside of the bottom of the discharge manifold (32). Repeat procedure for inspection of discharge check valves and o-rings. (Pumps built with optional Max-Pass valves, repeat procedure for removing and inspecting Max-Pass valves(48), back-ups(49) and o-rings (50, 19).
3. When re-assembling, the check ball should fit within the ball cavity of the chamber and discharge manifold. Press fit the valve seats into position with the curved portion facing the ball. Lightly tighten fasteners. Tighten all external fasteners to final torque requirement 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 AND PILOT SLEEVE ASSEMBLY MAINTENANCE

4. To inspect diaphragms remove nuts (18) from bolts (16) from the outer pumping chambers (28). If replacement is necessary due to abrasion or rupture, unscrew the outer diaphragm plates (29). Models that are built with PTFE elastomers will have a PTFE overlay (30) that faces the outer pumping chamber and a back-up diaphragm (31) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms.
5. If there has been a diaphragm rupture and corrosive or viscous fluid has entered the air side of pump the complete air system should be inspected. After removing diaphragms and inner diaphragm plate (33), the pilot sleeve assembly (14, 40, 42, 45-47) and diaphragm rod assembly (13, 15) may be removed by removing the retaining plates (41) and pushing the entire unit out through the bore in the intermediate (34). Diaphragm rod assembly must be unscrewed to remove pilot sleeve.
NOTE: To aid in reassembly use a non-synthetic, petroleum based lubricating grease without EP additives. Carleton-Stuart MagnaLube G is recommended.
6. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers, o-rings and lip seals (40) within bore of intermediate. Make sure that the open side, of the lip seals are facing outward toward the diaphragms. Also make sure that the end pilot spacers (14) are at the end on either side of the pilot sleeve assembly and all inner spacers (47) are separated by o-rings. Next carefully insert the diaphragm rod assembly with pilot sleeve inside the assembly in the bore. Reattach retaining plates. Do not over tighten self-tapping screws (24).
7. Take one diaphragm and invert (reverse the natural bow of the material) and with the curved side of the inner diaphragm

plate facing the diaphragm assemble onto outer diaphragm plate stud and then screw assembly into diaphragm rod. Push diaphragm rod to the opposite side of the intermediate and add the opposite diaphragm assembly. Tighten the outer diaphragm plates to 70 in-lbs (7,91 NM) of torque. After tightening, reverse the inverted diaphragm back to its original state, allowing the outer bead to seat in the groove of the intermediate.

NOTE: Inverting the first diaphragm aids reassembly.

8. Position outer diaphragm chambers onto intermediate making sure that witness lines are matching.
NOTE: If air valve has been removed, proper orientation of air system with fluid chambers must be observed. The bottom of the intermediate has the smaller hook shaped air passage slot on the air valve mounting face, and the outer chamber check ball cavity should be pointing downward.
9. Tighten all external fasteners to final torque requirement after pump is completely assembled.
10. Position the manifolds making sure of the proper 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 requirement after pump is completely assembled.

EXTERNAL FASTENER TORQUE REQUIREMENTS

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

AIR VALVE CAP SCREWS 40 in-lbs (4,52 NM)
MANIFOLD BOLTS, 90-100 in-lbs (10,17-11,3 NM)
OUTER CHAMBER CAP SCREWS, 75-85 in-lbs (8,48-9,61 NM)

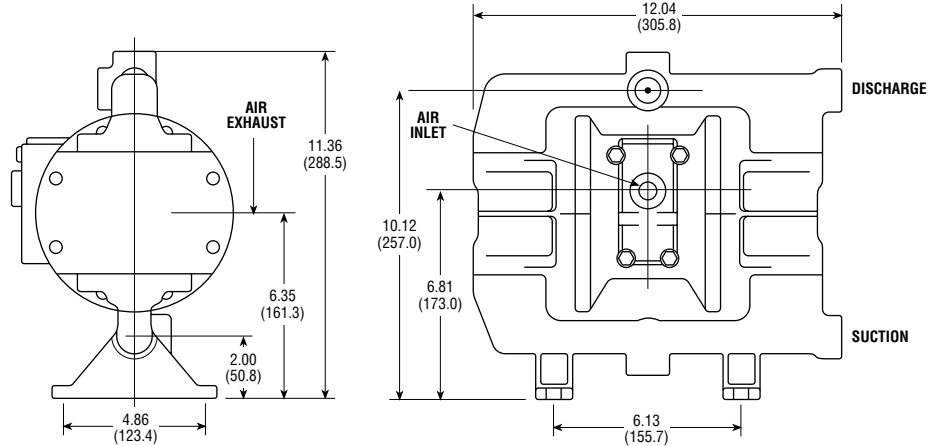
AIR VALVE MAINTENANCE

11. To evaluate air valve components, remove the four cap screws (11), washers, (25, 10) and nuts (17) from the air valve body (7). The shuttle plate (5) and shuttle (6) can be inspected by removing them from their location in the slot in the back of the air valve. Inspect for scratches or surface irregularities. Replace if necessary. Remove the plug (1) at the bottom of the air valve. Next push the air valve spool (2) out of the air valve body. Gently reach in and pull lip seals (43) out of inside bore of the air valve body. Check for cracks, splitting or scratches. Clean components if replacement is not necessary. Inspect plug o-ring (44) for any damage, replace if necessary and reposition o-ring into groove in air valve body.
NOTE: Make sure that the open sides of the two lip seals face each other when reassembling air valve. Lube all components with suggested maintenance grease as an aid in reassembly.
12. Reinsert air valve spool inside of air valve body. Place shuttle on middle rib of air valve spool through the square slot in back of air valve. Lubricate side of plate that faces the shuttle and reposition valve plate over shuttle. Press the valve plug into air valve body, chamfered end first.
13. Check that gasket (4) is not cracked. If damaged replace.
14. After gasket is pressed back into position align air valve onto intermediate and reinsert the four cap screws with lock washer and flat washers. Apply 40 in-lbs (4,52 NM) of torque to fasteners.

PLASTIC DIAPHRAGM PUMP

DIMENSIONS

Dimensions in inches and (mm)



SPECIFICATIONS

CAPACITY:

Adjustable 0-17 GPM (64,6 LPM)

MAXIMUM TEMP:

KT-05 model – 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)

Other models – 15 feet (4,5 meters)

WEIGHT:

PVDF models – 12 pounds (5,4 kg)

Other models – 9 pounds (4,1 kg)

MAXIMUM SOLIDS:

1/8" (3,2 mm) Ball Check Valve

3/8" (9,5 mm) Max-Pass Valve

AIR SUPPLY:

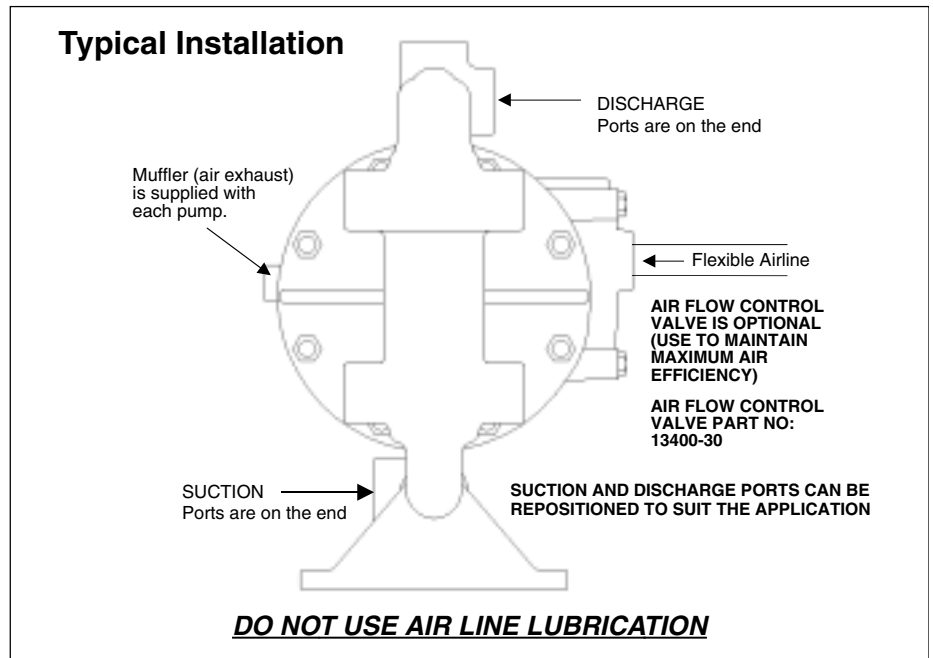
Inlet – 1/4" NPT Female
(BSP compatible)

Outlet – 3/8" NPT Female

FLUID INLET/DISCHARGE:

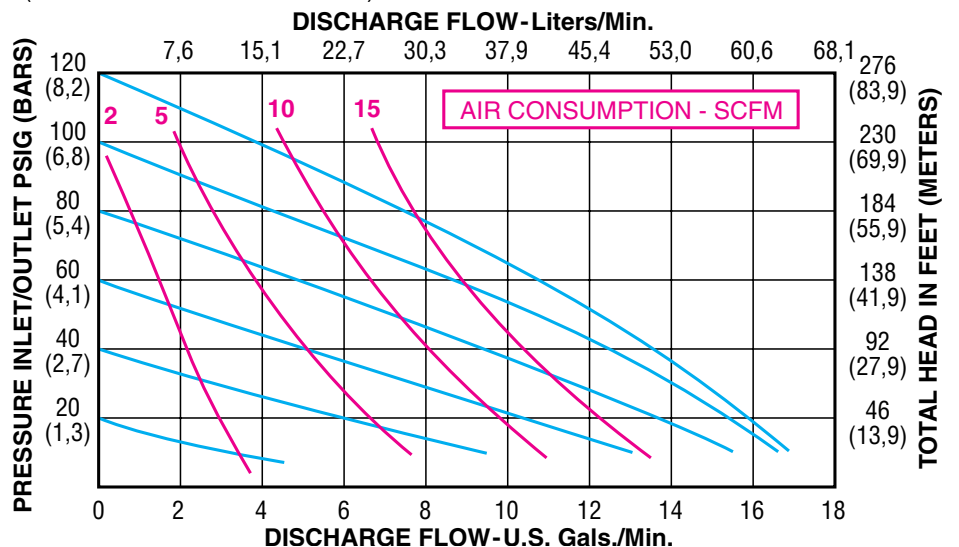
1/2" NPS Female (NPT or BSP compatible)

Typical Installation



PERFORMANCE CURVE

(Based on water-flooded suction)



1/2" PERFORMANCE PLUS METALLIC MAINTENANCE MANUAL

CHECK VALVE AND O-RING MAINTENANCE

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. Remove bolts (19) in both the discharge and suction manifolds. Suction check valve seats and check balls (26, 27) are located inside of the bottom of the outer chamber (28). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect valve seat and manifold o-rings (38). Replace if necessary. Discharge check valves are located inside of the bottom of the discharge manifold (32). Repeat procedure for inspection of discharge check valves and o-rings.
3. When re-assembling, the check ball should fit within the ball cavity of the chamber and discharge manifold. Press fit the valve seats into position with the curved portion facing the ball. Lightly tighten fasteners. Tighten all external fasteners to final torque requirement 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 AND PILOT SLEEVE ASSEMBLY MAINTENANCE

4. To inspect diaphragms remove nuts (18) from bolts (16) from the outer pumping chambers (28). If replacement is necessary due to abrasion or rupture, unscrew the outer diaphragm plates (29). Models that are built with PTFE elastomers will have a PTFE overlay (30) that faces the outer pumping chamber and a back-up diaphragm (31) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms.
5. If there has been a diaphragm rupture and corrosive or viscous fluid has entered the air side of pump the complete air system should be inspected. After removing diaphragms and inner diaphragm plate (33), the pilot sleeve assembly (14, 40, 42, 45-47) and diaphragm rod assembly (13, 15) may be removed by removing the retaining plates (41) and pushing the entire unit out through the bore in the intermediate (34). Diaphragm rod assembly must be unscrewed to remove pilot sleeve.
NOTE: To aid in reassembly use a non-synthetic, petroleum based lubricating grease without EP additives. Carleton-Stuart MagnaLube G is recommended.
6. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers, o-rings and lip seals (40) within bore of intermediate. Make sure that the open sides of the lip seals are facing outward toward the diaphragms. Also make sure that the end spacers (14) are at the end on either side of the pilot sleeve assembly and all inner spacers (47) are separated by o-rings. Next, carefully insert the diaphragm rod assembly with pilot sleeve inside the assembly in the bore. Reattach retaining plates. Do not over tighten self-tapping screws (24).
7. Take one diaphragm and invert (reverse the natural bow of the material) and with the curved side of the inner diaphragm plate facing the diaphragm assemble onto outer diaphragm plate stud and then screw assembly into diaphragm rod. Push diaphragm rod to the opposite side of the intermediate

and add the opposite diaphragm assembly. **Tighten the outer diaphragm plates to 70 in-lbs (7,91 NM) of torque.** After tightening, reverse the inverted diaphragm back to its original state, allowing the outer bead to seat in the groove of the intermediate.

- NOTE: Inverting the first diaphragm aids reassembly.**
8. Position outer diaphragm chambers onto intermediate making sure that witness lines are matching.
NOTE: If air valve has been removed, proper orientation of air system with fluid chambers must be observed. The bottom of the intermediate has the smaller hook shaped air passage slot on the air valve mounting face, and the outer chamber check ball cavity should be pointing downward.
9. Tighten all external fasteners to final torque requirement after pump is completely assembled.
10. Position the manifolds making sure of the proper 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 requirement after pump is completely assembled.

EXTERNAL FASTENER TORQUE REQUIREMENTS

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

AIR VALVE CAP SCREWS 40 in-lbs (4,52 NM)

MANIFOLD BOLTS, 90-100 in-lbs (10,17-11,3 NM)

OUTER CHAMBER CAP SCREWS, 75-85 in-lbs (8,48-9,61 NM)

AIR VALVE MAINTENANCE

11. To evaluate air valve components, remove the four cap screws (11), washers, (25, 10) and nuts (17) from the air valve body (7). The shuttle plate (5) and shuttle (6) can be inspected by removing them from their location in the slot in the back of the air valve. Inspect for scratches or surface irregularities. Replace if necessary. Remove the plug (1) at the bottom of the air valve. Next, push the air valve spool (2) out of the air valve body. Gently reach in and pull lip seals (43) out of inside bore of the air valve body. Check for cracks, splitting or scratches. Clean components if replacement is not necessary. Inspect plug o-ring (44) for any damage, replace if necessary and reposition o-ring into groove in air valve body.
NOTE: Make sure that the open sides of the two lip seals face each other when reassembling air valve. Lube all components with suggested maintenance grease as an aid in reassembly.
12. Reinsert air valve spool inside of air valve body. Place shuttle on middle rib of air valve spool through the square slot in back of air valve. Lubricate side of plate that faces the shuttle and reposition valve plate over shuttle. Press the valve plug into air valve body, chamfered end first.
13. Check that gasket (4) is not cracked. If damaged replace.
14. After gasket is pressed back into position align air valve onto intermediate and reinsert the four cap screws with lock washer and flat washers. Apply 40 in-lbs (4,52 NM) of torque to fasteners.

METALLIC DIAPHRAGM PUMP

SPECIFICATIONS

CAPACITY:

Adjustable 0-17 GPM (64,6 LPM)

MAXIMUM TEMP:

Metallic models – 200°F (93°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)
Other models – 15 feet (4,5 meters)

WEIGHT:

Aluminum models – 10 pounds (4,5 kg)
Stainless Steel models – 19 pounds (8,6 kg)

MAXIMUM SOLIDS:

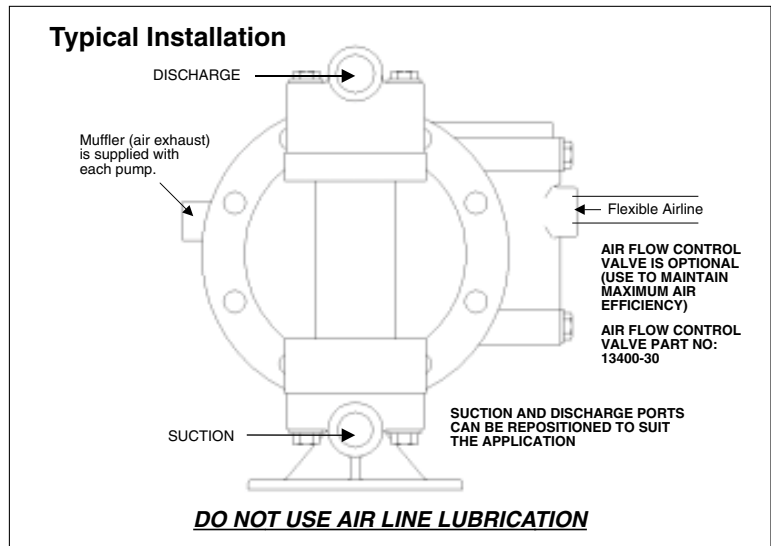
1/8 " (3,2 mm) Ball Check Valve

AIR SUPPLY:

Inlet – 1/4 " NPT Female (BSP compatible)
Outlet – 3/8" NPT Female

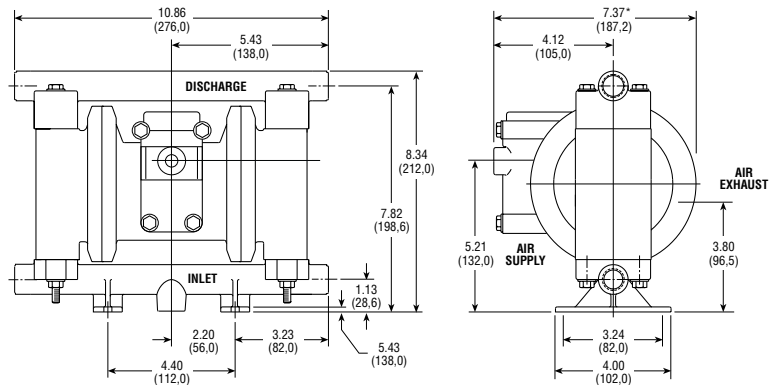
FLUID INLET/DISCHARGE:

1/2 " NPS Female (NPT or BSP compatible)

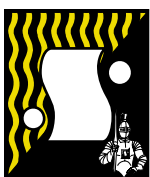
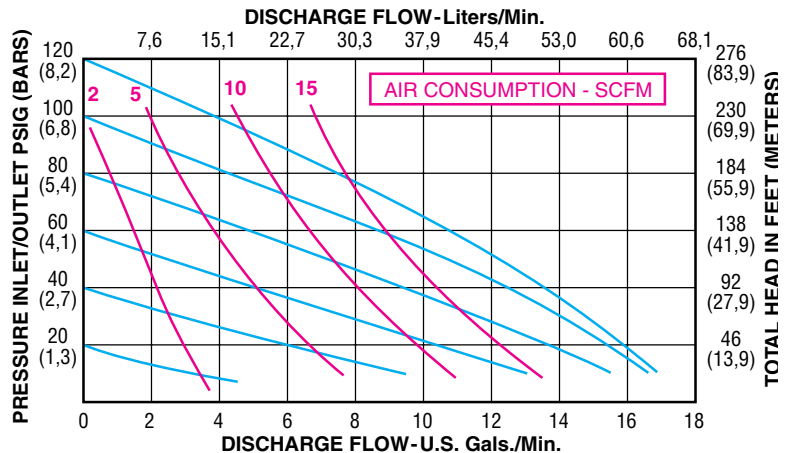


DIMENSIONS

Dimensions in inches and (mm)



(Based on water-flooded suction)



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