

# SERVICE & OPERATING MANUAL

## Original Instructions

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ISO 14001 Certified



EAC

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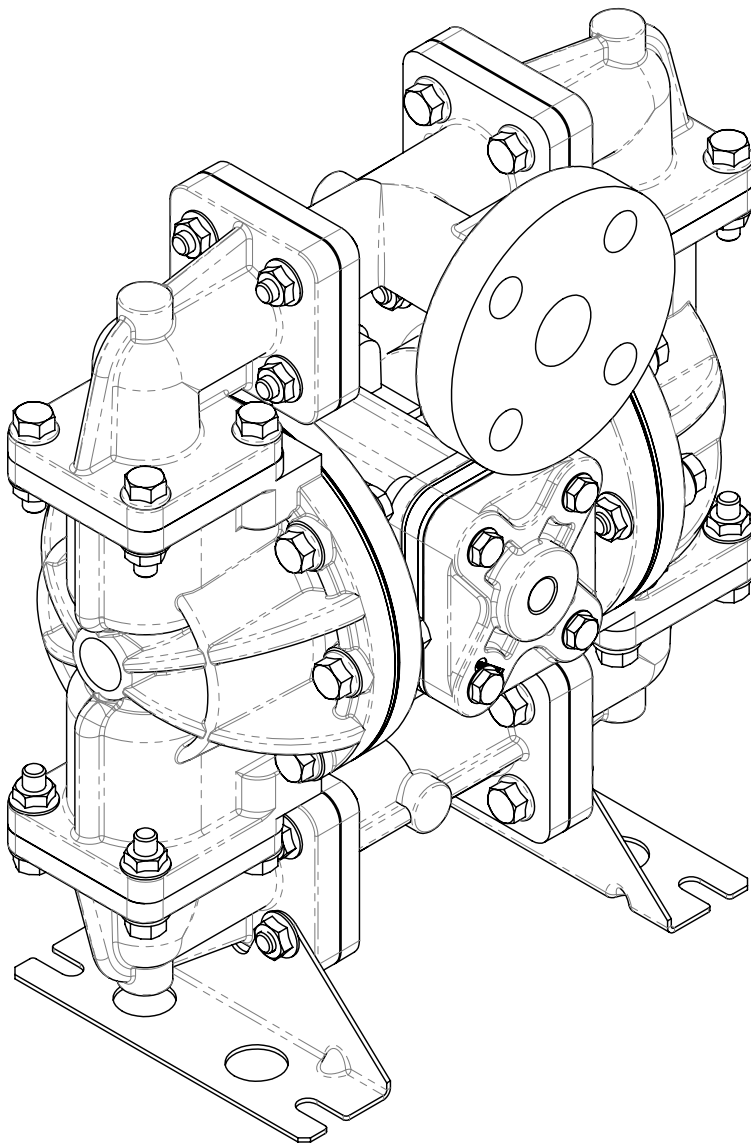
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## Model S10

### Non-Metallic Design Level 2



1: PUMP SPECS

2: INSTAL & OP

3: EXP VIEW

4: AIR END

5: WET END

6: OPTIONAL

7: WARRANTY

**SANDPIPER®**  
A WARREN RUPP, INC. BRAND

SANDPIPERPUMP.COM

# Safety Information

## ! IMPORTANT



Read the safety warnings and instructions in this manual before pump installation and start-up. Failure to comply with the recommendations stated in this manual could damage the pump and void factory warranty.



When the pump is used for materials that tend to settle out or solidify, the pump should be flushed after each use to prevent damage. In freezing temperatures the pump should be completely drained between uses.

## ! CAUTION



Before pump operation, inspect all fasteners for loosening caused by gasket creep. Retighten loose fasteners to prevent leakage. Follow recommended torques stated in this manual.



Nonmetallic pumps and plastic components are not UV stabilized. Ultraviolet radiation can damage these parts and negatively affect material properties. Do not expose to UV light for extended periods of time.



### **WARNING**

Pump not designed, tested or certified to be powered by compressed natural gas. Powering the pump with natural gas will void the warranty.

## ! WARNING



When used for toxic or aggressive fluids, the pump should always be flushed clean prior to disassembly.



Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. Be certain that approved eye protection and protective clothing are worn at all times. Failure to follow these recommendations may result in serious injury or death.



Airborne particles and loud noise hazards. Wear eye and ear protection.



In the event of diaphragm rupture, pumped material may enter the air end of the pump, and be discharged into the atmosphere. If pumping a product that is hazardous or toxic, the air exhaust must be piped to an appropriate area for safe containment.



Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers and other miscellaneous equipment must be properly grounded.



This pump is pressurized internally with air pressure during operation. Make certain that all fasteners and piping connections are in good condition and are reinstalled properly during reassembly.



Use safe practices when lifting

## ATEX Pumps - Conditions For Safe Use

1. Ambient temperature range is as specified in tables 1 to 3 on the next page (*per Annex I of DEKRA 18ATEX0094X*)
2. ATEX compliant pumps are suitable for use in explosive atmospheres when the equipment is properly grounded in accordance with local electrical codes
3. **Non-Metallic ATEX Pumps only — See Explanation of Pump Nomenclature / ATEX Details Page**  
Conductive Polypropylene, conductive Acetal or conductive PVDF pumps are not to be installed in applications where the pumps may be subjected to oil, greases and hydraulic liquids.
4. The optionally provided solenoids shall be protected by a fuse corresponding to its rated current (max 3\*I<sub>rat</sub> according to EN 60127) or by a motor protecting switch with short circuit and thermal instantaneous tripping (set to the rated current) as short circuit protection. For solenoids with a very low rated current, a fuse with the lowest current value according to the indicated standard will be sufficient. The fuse may be accommodated in the associated supply unit or shall be separately arranged. The rated voltage of the fuse shall be equal or greater than the stated rated voltage of the solenoid. The breaking capacity of the fuse shall be as high as or higher than the maximum expected short circuit current at the location of the installation (usually 1500 A). The maximum permissible ripple is 20% for all dc solenoids.  
**\*Not applicable for all pump models — See Explanation of Pump Nomenclature / ATEX Details Page**
5. When operating pumps equipped with non-conductive diaphragms that exceed the maximum permissible projected area, as defined in EN ISO 80079-36 : 2016 section 6.7.5 table 8, the following protection methods must be applied
  - Equipment is always used to transfer electrically conductive fluids or
  - Explosive environment is prevented from entering the internal portions of the pump, i.e. dry running.
6. Pumps provided with the pulse output kit and used in the potentially explosive atmosphere caused by the presence of the combustible dust shall be installed in such a way that the pulse output kit is protected against impact  
**\*Not applicable for all pump models — See Explanation of Pump Nomenclature / ATEX Details Page**

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1: PUMP SPECS

2: INSTAL & OP

3: EXP VIEW

4: AIR END

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6: OPTIONAL

7: WARRANTY

# Explanation of Pump Nomenclature

**Your Model #: S**  
(fill in from pump nameplate)

| Pump Brand | Pump Size | Check Valve | Design Level | Wetted Material | Diaphragm/Check Valves | Check Valve Seat | Non-Wetted Material | Porting Options | Pump Style | Pump Options | Kit Options |
|------------|-----------|-------------|--------------|-----------------|------------------------|------------------|---------------------|-----------------|------------|--------------|-------------|
|------------|-----------|-------------|--------------|-----------------|------------------------|------------------|---------------------|-----------------|------------|--------------|-------------|

Model #: **S XX X X X X X X X X X XX**

## Pump Brand

S SANDPIPER®

## Pump Size

10 1"

## Check Valve Type

B Ball

## Design Level

1 Design Level 1

## Wetted Material

K PVDF

N Nylon

P Polypropylene

## Diaphragm/Check Valve Materials

1 Santoprene/Santoprene

2 Virgin PTFE-Santoprene Backup/  
Virgin PTFE

7 Santoprene/Nitrile

8 Virgin PTFE-Santoprene Backup/  
FKM

Z One-Piece Bonded/PTFE

## Check Valve Seat

K PVDF

N Nylon

P Polypropylene

## Non-Wetted Material Options

P Polypropylene

I Polypropylene with PTFE Hardware

## Porting Options

A ANSI Flange

## Pump Style

S Standard

## Pump Options

0 None

1 Sound Dampening Muffler

2 Mesh Muffler

6 Metal Muffler

## Kit Options

00. None

P0. 10-30VDC Pulse Output Kit

P1. Intrinsically-Safe 5-30VDC, 110/120VAC,  
220/240VAC  
Pulse Output Kit

P2. 110/120 or 220/240VAC Pulse  
Output Kit

E0. Solenoid Kit w/24VDC Coil

E1. Solenoid Kit 24VDC Explosion-Proof  
Coil

E2. Solenoid Kit w/24VAC/12VDC Coil

E3. Solenoid Kit w/12VDC Explosion-  
Proof Coil

E4. Solenoid Kit w/110VAC Coil

E5. Solenoid Kit w/110VAC 60 Hz  
Explosion-Proof Coil

E6. Solenoid Kit w/220VAC Coil

E7. Solenoid Kit w/220VAC 60 Hz  
Explosion-Proof Coil

E8. Solenoid Kit w/110VAC 50 Hz  
Explosion-Proof Coil

E9. Solenoid Kit w/230VAC 50 Hz  
Explosion-Proof Coil

SP Stroke Indicator Pins



IEC EEX m T4



**Note:** Pump models equipped with these explosion-proof solenoid kit options E1, E3, E5, E7, E8 or E9, are certified and approved by the above agencies. They are NOT ATEX compliant.

**Your Serial #:** (fill in from pump nameplate) \_\_\_\_\_

# Performance

## S10 NON-METALLIC

### SUCTION/DISCHARGE PORT SIZE

- 1" ANSI Flange

### CAPACITY

- 0 to 23 gallons per minute  
(0 to 87 liters per minute)

### AIR DISTRIBUTION VALVE

- No-lube, no-stall design

### SOLIDS-HANDLING

- Up to .15 in. (4mm)

### HEADS UP TO

- 100 psi or 231 ft. of water  
(7 bar or 70 meters)

### DISPLACEMENT/STROKE

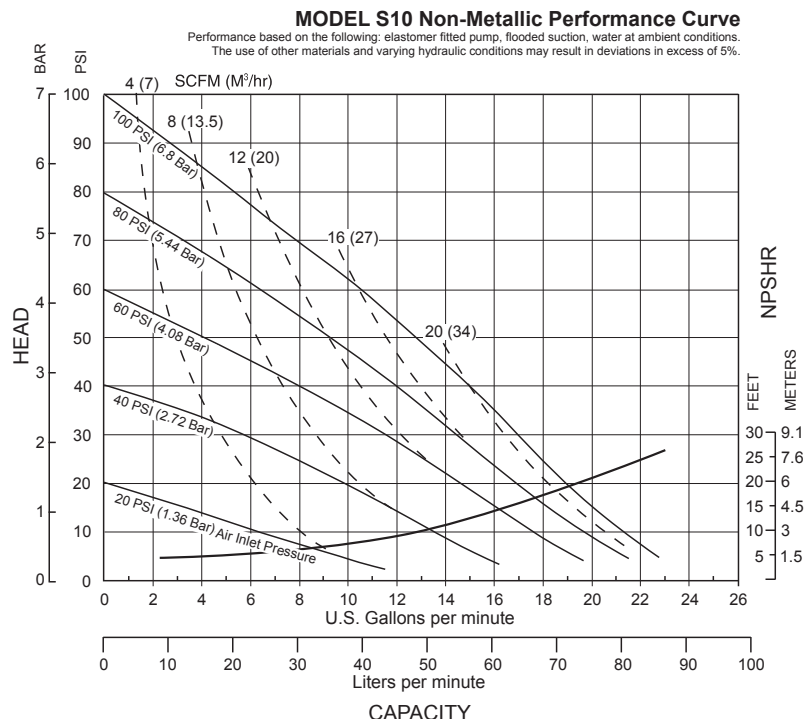
- .026 Gallon / .098 liter

### MAXIMUM OPERATING PRESSURE

- 100 psi (6.8 bar)

### SHIPPING WEIGHT

- 19 lbs. (9 kg)
- 23 lbs. (10 kg)
- 20 lbs. (9 kg)



# Materials

| Material Profile:                                                                                                                                                                                                                                                               | Operating Temperatures: |                | Polypropylene: A thermoplastic polymer. Moderate tensile and flex strength. Resists strong acids and alkali. Attacked by chlorine, fuming nitric acid and other strong oxidizing agents.                                                                                                                                                 | 180°F<br>82°C  | 32°F<br>0°C    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
|                                                                                                                                                                                                                                                                                 | Max.                    | Min.           |                                                                                                                                                                                                                                                                                                                                          |                |                |
| <b>CAUTION!</b> Operating temperature limitations are as follows:                                                                                                                                                                                                               |                         |                |                                                                                                                                                                                                                                                                                                                                          |                |                |
| <b>Conductive Acetal:</b> Tough, impact resistant, ductile. Good abrasion resistance and low friction surface. Generally inert, with good chemical resistance except for strong acids and oxidizing agents.                                                                     | 190°F<br>88°C           | -20°F<br>-29°C | <b>PVDF:</b> (Polyvinylidene Fluoride) A durable fluoroplastic with excellent chemical resistance. Excellent for UV applications. High tensile strength and impact resistance.                                                                                                                                                           | 250°F<br>121°C | 0°F<br>-18°C   |
| <b>EPDM:</b> Shows very good water and chemical resistance. Has poor resistance to oils and solvents, but is fair in ketones and alcohols.                                                                                                                                      | 280°F<br>138°C          | -40°F<br>-40°C | <b>Santoprene®:</b> Injection molded thermoplastic elastomer with no fabric layer. Long mechanical flex life. Excellent abrasion resistance.                                                                                                                                                                                             | 275°F<br>135°C | -40°F<br>-40°C |
| <b>FKM:</b> (Fluorocarbon) Shows good resistance to a wide range of oils and solvents; especially all aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegetable oils. Hot water or hot aqueous solutions (over 70°F) will attack FKM.                       | 350°F<br>177°C          | -40°F<br>-40°C | <b>UHMW PE:</b> A thermoplastic that is highly resistant to a broad range of chemicals. Exhibits outstanding abrasion and impact resistance, along with environmental stress-cracking resistance.                                                                                                                                        | 180°F<br>82°C  | -35°F<br>-37°C |
| <b>Hytrel®:</b> Good on acids, bases, amines and glycols at room temperatures only.                                                                                                                                                                                             | 220°F<br>104°C          | -20°F<br>-29°C | <b>Urethane:</b> Shows good resistance to abrasives. Has poor resistance to most solvents and oils.                                                                                                                                                                                                                                      | 150°F<br>66°C  | 32°F<br>0°C    |
| <b>Neoprene:</b> All purpose. Resistance to vegetable oils. Generally not affected by moderate chemicals, fats, greases and many oils and solvents. Generally attacked by strong oxidizing acids, ketones, esters and nitro hydrocarbons and chlorinated aromatic hydrocarbons. | 200°F<br>93°C           | -10°F<br>-23°C | <b>Virgin PTFE:</b> (PFA/TFE) Chemically inert, virtually impervious. Very few chemicals are known to chemically react with PTFE; molten alkali metals, turbulent liquid or gaseous fluorine and a few fluoro-chemicals such as chlorine trifluoride or oxygen difluoride which readily liberate free fluorine at elevated temperatures. | 220°F<br>104°C | -35°F<br>-37°C |
| <b>Nitrile:</b> General purpose, oil-resistant. Shows good solvent, oil, water and hydraulic fluid resistance. Should not be used with highly polar solvents like acetone and MEK, ozone, chlorinated hydrocarbons and nitro hydrocarbons.                                      | 190°F<br>88°C           | -10°F<br>-23°C | <i>Maximum and Minimum Temperatures are the limits for which these materials can be operated. Temperatures coupled with pressure affect the longevity of diaphragm pump components. Maximum life should not be expected at the extreme limits of the temperature ranges.</i>                                                             |                |                |
| <b>Nylon:</b> 6/6 High strength and toughness over a wide temperature range. Moderate to good resistance to fuels, oils and chemicals.                                                                                                                                          | 180°F<br>82°C           | 32°F<br>0°C    | <b>Metals:</b>                                                                                                                                                                                                                                                                                                                           |                |                |
|                                                                                                                                                                                                                                                                                 |                         |                | <b>Alloy C:</b> Equal to ASTM494 CW-12M-1 specification for nickel and nickel alloy.                                                                                                                                                                                                                                                     |                |                |
|                                                                                                                                                                                                                                                                                 |                         |                | <b>Stainless Steel:</b> Equal to or exceeding ASTM specification A743 CF-8M for corrosion resistant iron chromium, iron chromium nickel and nickel based alloy castings for general applications. Commonly referred to as 316 Stainless Steel in the pump industry.                                                                      |                |                |

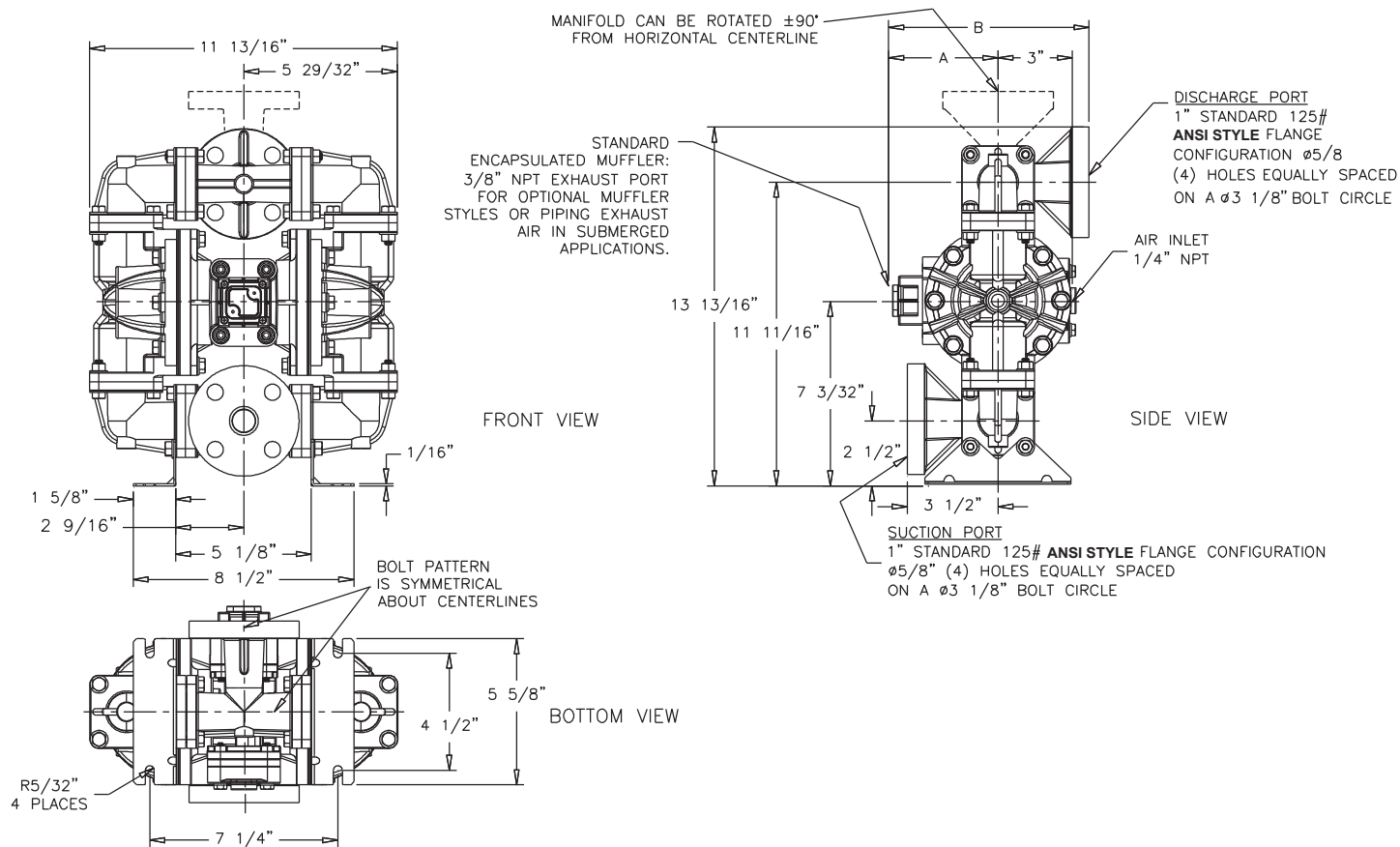
**Ambient temperature range** -20 C to +40 C  
**Process temperature range** -20 C to +80 C for models rated as category 1 equipment  
-20 C to +100 C for model rated as category 2 equipment

For specific applications, always consult the Chemical Resistance Chart.

In addition, the ambient temperature range and the process temperature range do not exceed the operating temperature range of the applied non-metallic parts as listed in the manuals of the pumps.

# S10 Non-Metallic

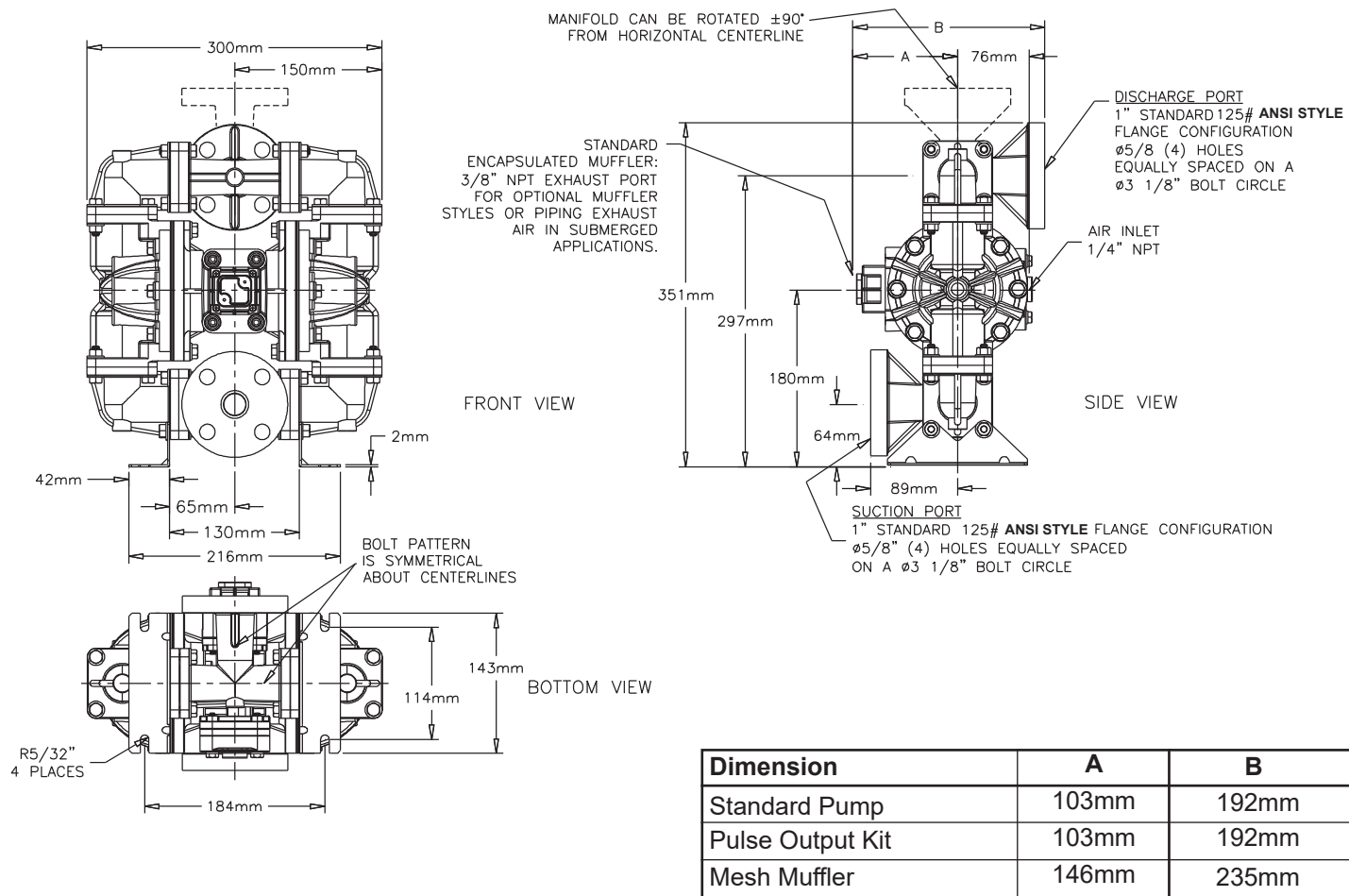
Dimensions in inches (metric dimensions in brackets). Dimensional Tolerance .125" (3mm).



| Dimension        | A       | B       |
|------------------|---------|---------|
| Standard Pump    | 4 1/16" | 7 9/16" |
| Pulse Output Kit | 4 1/16" | 9 5/16" |
| Mesh Muffler     | 5 3/4"  | 9 1/4"  |

# S10 Non-Metallic

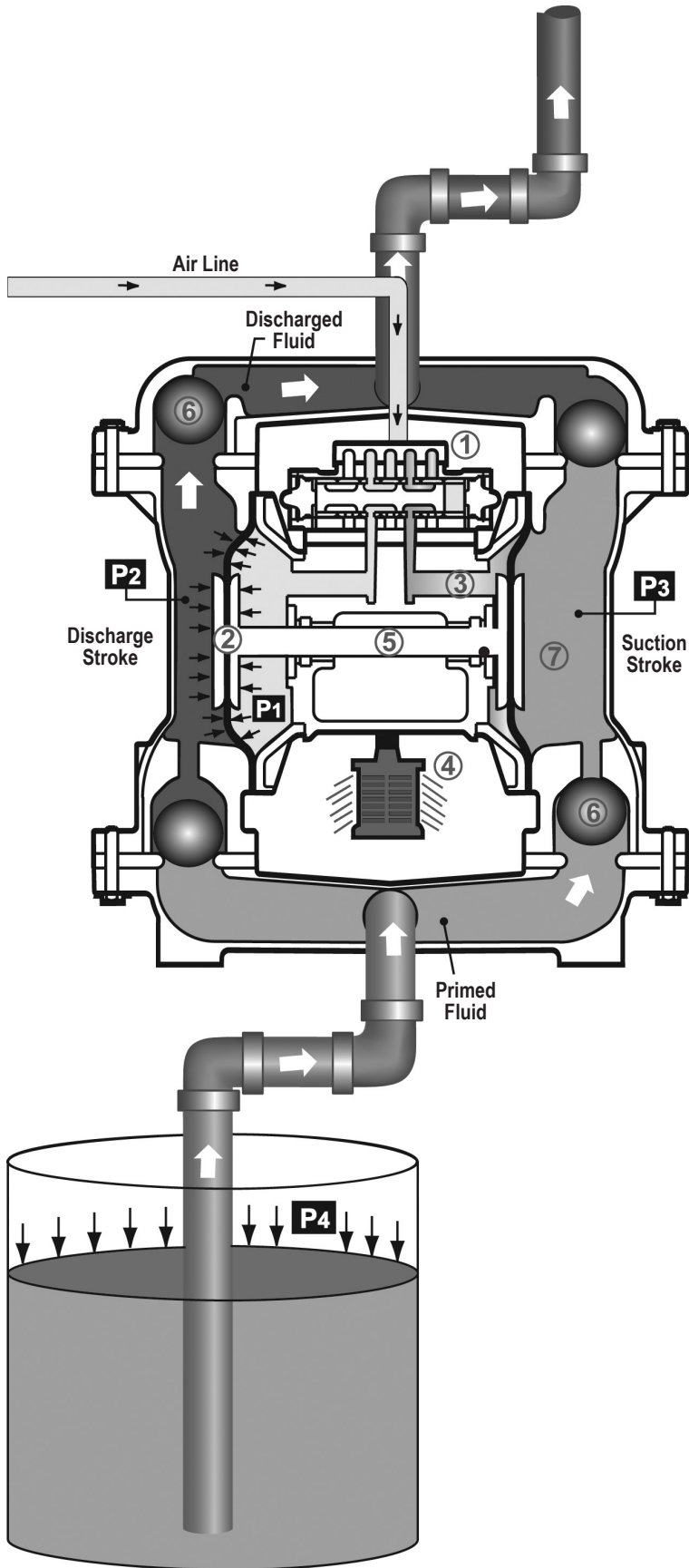
Dimensions in inches (metric dimensions in brackets). Dimensional Tolerance .125" (3mm).





# Principle of Pump Operation

2: INSTAL & OP



Air-Operated Double Diaphragm (AODD) pumps are powered by compressed air or nitrogen.

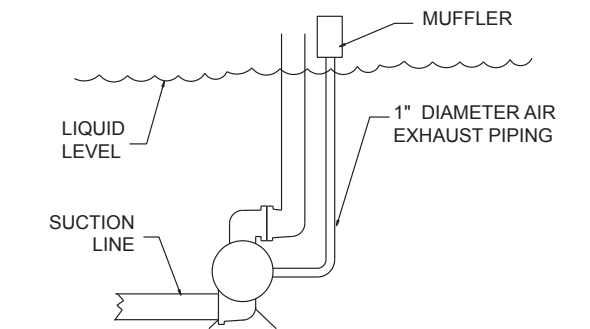
The main directional (air) control valve distributes compressed air to an air chamber, exerting uniform pressure over the inner surface of the diaphragm. At the same time, the exhausting air from behind the opposite diaphragm is directed through the air valve assembly(s) to an exhaust port.

As inner chamber pressure (**P1**) exceeds liquid chamber pressure (**P2**), the rod connected diaphragms shift together creating discharge on one side and suction on the opposite side. The discharged and primed liquid's directions are controlled by the check valves (ball or flap) orientation.

The pump primes as a result of the suction stroke. The suction stroke lowers the chamber pressure (**P3**) increasing the chamber volume. This results in a pressure differential necessary for atmospheric pressure (**P4**) to push the fluid through the suction piping and across the suction side check valve and into the outer fluid chamber.

Suction (side) stroking also initiates the reciprocating (shifting, stroking or cycling) action of the pump. The suction diaphragm's movement is mechanically pulled through its stroke. The diaphragm's inner plate makes contact with an actuator plunger aligned to shift the pilot signaling valve. Once actuated, the pilot valve sends a pressure signal to the opposite end of the main directional air valve, redirecting the compressed air to the opposite inner chamber.

## SUBMERGED ILLUSTRATION



Pump can be submerged if the pump materials of construction are compatible with the liquid being pumped. The air exhaust must be piped above the liquid level. When the pumped product source is at a higher level than the pump (flooded suction condition), pipe the exhaust higher than the product source to prevent siphoning spills.

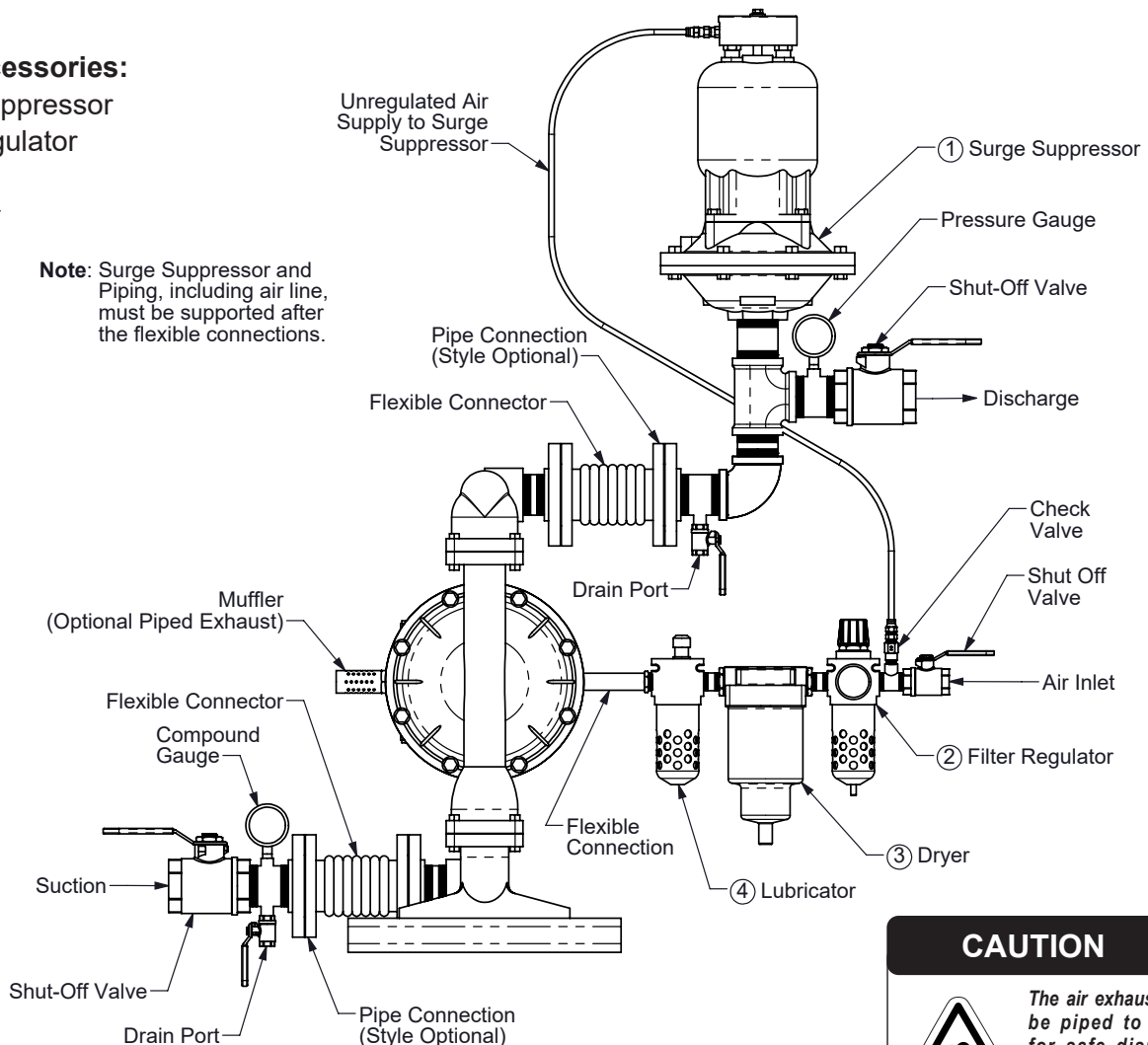


# Recommended Installation Guide

## Available Accessories:

1. Surge Suppressor
2. Filter/Regulator
3. Air Dryer
4. Lubricator

**Note:** Surge Suppressor and Piping, including air line, must be supported after the flexible connections.



## CAUTION



*The air exhaust should be piped to an area for safe disposition of the product being pumped, in the event of a diaphragm failure.*

## Installation And Start-Up

Locate the pump as close to the product being pumped as possible. Keep the suction line length and number of fittings to a minimum. Do not reduce the suction line diameter.

## Air Supply

Connect the pump air inlet to an air supply with sufficient capacity and pressure to achieve desired performance. A pressure regulating valve should be installed to insure air supply pressure does not exceed recommended limits.

## Air Valve Lubrication

The air distribution system is designed to operate WITHOUT lubrication. This is the standard mode of operation. If lubrication is desired, install an air line lubricator set to deliver one drop of SAE 10 non-detergent oil for every 20 SCFM (9.4 liters/sec.) of air the pump consumes. Consult the Performance Curve to determine air consumption.

## Air Line Moisture

Water in the compressed air supply may cause icing or freezing of the exhaust air, causing the pump to cycle erratically or stop operating. Water in the air supply can be reduced by using a point-of-use air dryer.

## Air Inlet And Priming

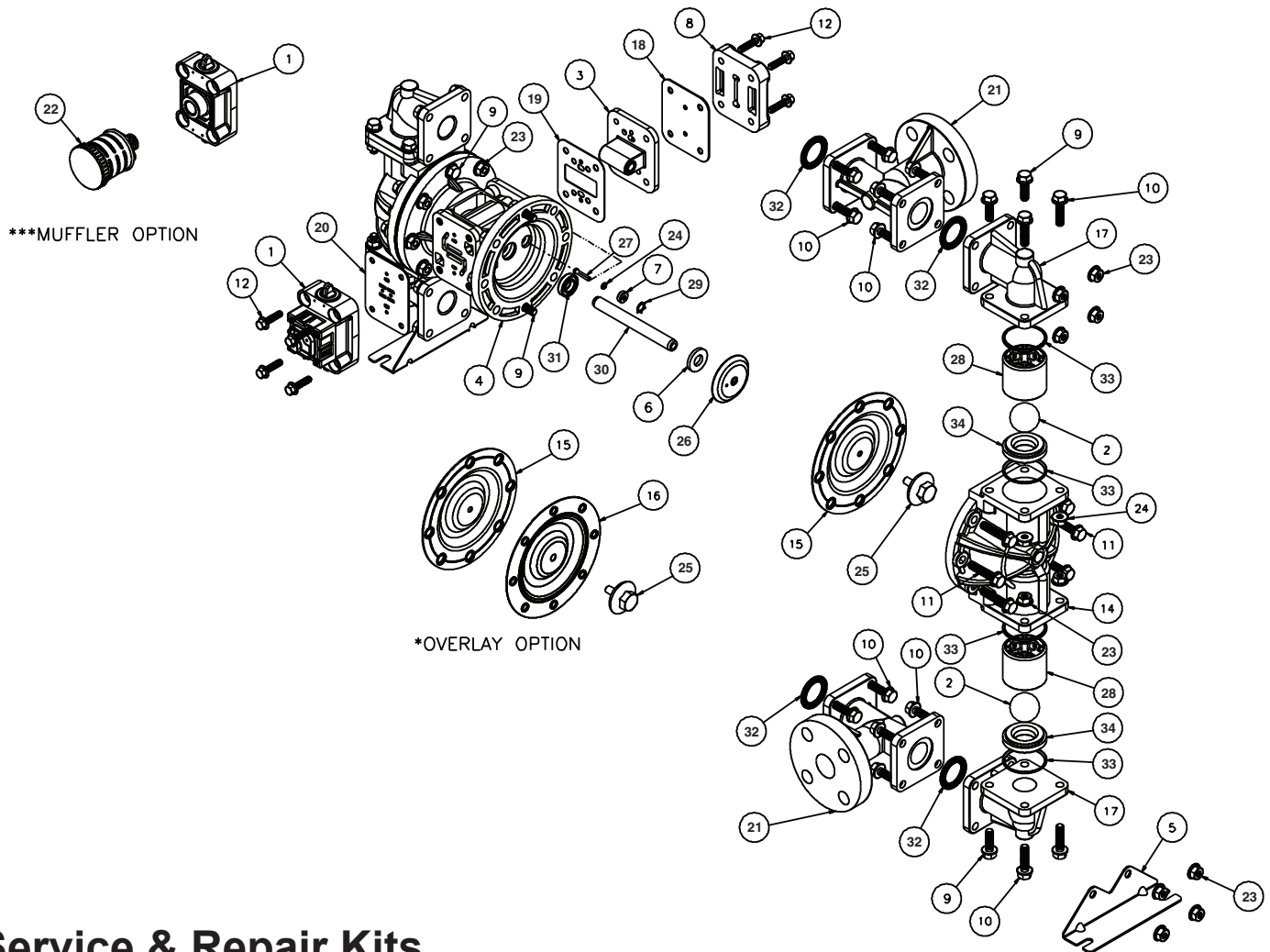
To start the pump, slightly open the air shut-off valve. After the pump primes, the air valve can be opened to increase air flow as desired. If opening the valve increases cycling rate, but does not increase the rate of flow, cavitation has occurred. The valve should be closed slightly to obtain the most efficient air flow to pump flow ratio.

# Troubleshooting Guide

| Symptom:                                                          | Potential Cause(s):                                                               | Recommendation(s):                                                                                                                                                                                                                   |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pump Cycles Once</b>                                           | Deadhead (system pressure meets or exceeds air supply pressure).                  | Increase the inlet air pressure to the pump. Pump is designed for 1:1 pressure ratio at zero flow. (Does not apply to high pressure 2:1 units).                                                                                      |
|                                                                   | Air valve or intermediate gaskets installed incorrectly.                          | Install gaskets with holes properly aligned.                                                                                                                                                                                         |
|                                                                   | Bent or missing actuator plunger.                                                 | Remove pilot valve and inspect actuator plungers.                                                                                                                                                                                    |
| <b>Pump Will Not Operate / Cycle</b>                              | Pump is over lubricated.                                                          | Set lubricator on lowest possible setting or remove. Units are designed for lube free operation.                                                                                                                                     |
|                                                                   | Lack of air (line size, PSI, CFM).                                                | Check the air line size and length, compressor capacity (HP vs. CFM required).                                                                                                                                                       |
|                                                                   | Check air distribution system.                                                    | Disassemble and inspect main air distribution valve, pilot valve and pilot valve actuators.                                                                                                                                          |
|                                                                   | Discharge line is blocked or clogged manifolds.                                   | Check for inadvertently closed discharge line valves. Clean discharge manifolds/piping.                                                                                                                                              |
|                                                                   | Deadhead (system pressure meets or exceeds air supply pressure).                  | Increase the inlet air pressure to the pump. Pump is designed for 1:1 pressure ratio at zero flow. (Does not apply to high pressure 2:1 units).                                                                                      |
|                                                                   | Blocked air exhaust muffler.                                                      | Remove muffler screen, clean or de-ice, and re-install.                                                                                                                                                                              |
|                                                                   | Pumped fluid in air exhaust muffler.                                              | Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly.                                                                                                                                          |
|                                                                   | Pump chamber is blocked.                                                          | Disassemble and inspect wetted chambers. Remove or flush any obstructions.                                                                                                                                                           |
| <b>Pump Cycles and Will Not Prime or No Flow</b>                  | Cavitation on suction side.                                                       | Check suction condition (move pump closer to product).                                                                                                                                                                               |
|                                                                   | Check valve obstructed. Valve ball(s) not seating properly or sticking.           | Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket. Clean out around valve ball cage and valve seat area. Replace valve ball or valve seat if damaged. Use heavier valve ball material. |
|                                                                   | Valve ball(s) missing (pushed into chamber or manifold).                          | Worn valve ball or valve seat. Worn fingers in valve ball cage (replace part). Check Chemical Resistance Guide for compatibility.                                                                                                    |
|                                                                   | Valve ball(s)/seat(s) damaged or attacked by product.                             | Check Chemical Resistance Guide for compatibility.                                                                                                                                                                                   |
|                                                                   | Check valve and/or seat is worn or needs adjusting.                               | Inspect check valves and seats for wear and proper setting. Replace if necessary.                                                                                                                                                    |
|                                                                   | Suction line is blocked.                                                          | Remove or flush obstruction. Check and clear all suction screens or strainers.                                                                                                                                                       |
|                                                                   | Excessive suction lift.                                                           | For lifts exceeding 20' of liquid, filling the chambers with liquid will prime the pump in most cases.                                                                                                                               |
|                                                                   | Suction side air leakage or air in product.                                       | Visually inspect all suction-side gaskets and pipe connections.                                                                                                                                                                      |
|                                                                   | Pumped fluid in air exhaust muffler.                                              | Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly.                                                                                                                                          |
|                                                                   |                                                                                   | Set lubricator on lowest possible setting or remove. Units are designed for lube free operation.                                                                                                                                     |
| <b>Pump Cycles Running Sluggish/Stalling, Flow Unsatisfactory</b> | Over lubrication.                                                                 | Set lubricator on lowest possible setting or remove. Units are designed for lube free operation.                                                                                                                                     |
|                                                                   | Icing.                                                                            | Remove muffler screen, de-ice, and re-install. Install a point of use air drier.                                                                                                                                                     |
|                                                                   | Clogged manifolds.                                                                | Clean manifolds to allow proper air flow                                                                                                                                                                                             |
|                                                                   | Deadhead (system pressure meets or exceeds air supply pressure).                  | Increase the inlet air pressure to the pump. Pump is designed for 1:1 pressure ratio at zero flow. (Does not apply to high pressure 2:1 units).                                                                                      |
|                                                                   | Cavitation on suction side.                                                       | Check suction (move pump closer to product).                                                                                                                                                                                         |
|                                                                   | Lack of air (line size, PSI, CFM).                                                | Check the air line size, length, compressor capacity.                                                                                                                                                                                |
|                                                                   | Excessive suction lift.                                                           | For lifts exceeding 20' of liquid, filling the chambers with liquid will prime the pump in most cases.                                                                                                                               |
|                                                                   | Air supply pressure or volume exceeds system hd.                                  | Decrease inlet air (press. and vol.) to the pump. Pump is cavitating the fluid by fast cycling.                                                                                                                                      |
|                                                                   | Undersized suction line.                                                          | Meet or exceed pump connections.                                                                                                                                                                                                     |
|                                                                   | Restrictive or undersized air line.                                               | Install a larger air line and connection.                                                                                                                                                                                            |
|                                                                   | Suction side air leakage or air in product.                                       | Visually inspect all suction-side gaskets and pipe connections.                                                                                                                                                                      |
|                                                                   | Suction line is blocked.                                                          | Remove or flush obstruction. Check and clear all suction screens or strainers.                                                                                                                                                       |
|                                                                   | Pumped fluid in air exhaust muffler.                                              | Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly.                                                                                                                                          |
|                                                                   | Check valve obstructed.                                                           | Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket.                                                                                                                                     |
|                                                                   | Check valve and/or seat is worn or needs adjusting.                               | Inspect check valves and seats for wear and proper setting. Replace if necessary.                                                                                                                                                    |
|                                                                   | Entrained air or vapor lock in chamber(s).                                        | Purge chambers through tapped chamber vent plugs. Purging the chambers of air can be dangerous.                                                                                                                                      |
|                                                                   |                                                                                   |                                                                                                                                                                                                                                      |
| <b>Product Leaking Through Exhaust</b>                            | Diaphragm failure, or diaphragm plates loose.                                     | Replace diaphragms, check for damage and ensure diaphragm plates are tight.                                                                                                                                                          |
|                                                                   | Diaphragm stretched around center hole or bolt holes.                             | Check for excessive inlet pressure or air pressure. Consult Chemical Resistance Chart for compatibility with products, cleaners, temperature limitations and lubrication.                                                            |
| <b>Premature Diaphragm Failure</b>                                | Cavitation.                                                                       | Enlarge pipe diameter on suction side of pump.                                                                                                                                                                                       |
|                                                                   | Excessive flooded suction pressure.                                               | Move pump closer to product. Raise pump/place pump on top of tank to reduce inlet pressure. Install Back pressure device (Tech bulletin 41r). Add accumulation tank or pulsation dampener.                                           |
|                                                                   | Misapplication (chemical/physical incompatibility).                               | Consult Chemical Resistance Chart for compatibility with products, cleaners, temperature limitations and lubrication.                                                                                                                |
|                                                                   | Incorrect diaphragm plates or plates on backwards, installed incorrectly or worn. | Check Operating Manual to check for correct part and installation. Ensure outer plates have not been worn to a sharp edge.                                                                                                           |
| <b>Unbalanced Cycling</b>                                         | Excessive suction lift.                                                           | For lifts exceeding 20' of liquid, filling the chambers with liquid will prime the pump in most cases.                                                                                                                               |
|                                                                   | Undersized suction line.                                                          | Meet or exceed pump connections.                                                                                                                                                                                                     |
|                                                                   | Pumped fluid in air exhaust muffler.                                              | Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly.                                                                                                                                          |
|                                                                   | Suction side air leakage or air in product.                                       | Visually inspect all suction-side gaskets and pipe connections.                                                                                                                                                                      |
|                                                                   | Check valve obstructed.                                                           | Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket.                                                                                                                                     |
|                                                                   | Check valve and/or seat is worn or needs adjusting.                               | Inspect check valves and seats for wear and proper setting. Replace if necessary.                                                                                                                                                    |
|                                                                   | Entrained air or vapor lock in chamber(s).                                        | Purge chambers through tapped chamber vent plugs.                                                                                                                                                                                    |

For additional troubleshooting tips contact After Sales Support at [service.warrenrupp@idexcorp.com](mailto:service.warrenrupp@idexcorp.com) or 419-524-8388

# Composite Repair Parts Drawing



3: EXP VIEW

## Service & Repair Kits

- 476.219.000 AIR END KIT**  
Seals, O-rings, Gaskets, Bumpers, Retaining Rings, Air Valve Assembly and Pilot Valve Assembly.
- 476.220.000 AIR END KIT** for pumps equipped with Stroke Indicator (same components as above, except Valve Assembly with pins replaces Standard Air Valve).
- 476.166.354 WETTED END KIT**  
Santoprene Diaphragms, Santoprene Check Balls and TFE Seals.
- 476.166.650 WETTED END KIT**  
One-Piece Bond Diaphragm, PTFE Check Balls and PTFE Seals.
- 476.166.654 WETTED END KIT**  
Santoprene Diaphragms, TFE Overlay Diaphragm, TFE Check Balls and TFE Seals.

**\*\*Note:** Pumps equipped with these components are not ATEX compliant.

# Composite Repair Parts List

| ITEM | PART NUMBER | DESCRIPTION                                                              | QTY |
|------|-------------|--------------------------------------------------------------------------|-----|
| 1    | 031.166.000 | Air Valve Assembly (Integral Muffler)                                    | 1   |
|      | 031.166.002 | Air Valve Assembly (with PTFE Coated Hardware)                           | 1   |
|      | 031.167.000 | Air Valve Assembly (with stroke Indicator Pins)                          | 1   |
|      | 031.167.002 | Air Valve Assembly (with Stroke Indicator Pins and PTFE Coated Hardware) | 1   |
|      | 031.168.000 | Air Valve Assembly (Optional Mufflers)                                   | 1   |
|      | 031.168.000 | Air Valve Assembly (Stroke Indicator & Optional Mufflers)                | 1   |
|      | 031.176.000 | Air Valve (High Temperature)                                             | 1   |
|      | 031.177.000 | Air Valve (High Temperature With Mufflers)                               | 1   |
| 2    | 050.028.354 | Ball, Check Valve                                                        | 4   |
|      | 050.028.600 | Ball, Check Valve                                                        | 4   |
| 3    | 095.091.000 | Pilot Valve Assembly                                                     | 1   |
|      | 095.091.558 | Pilot Valve Assembly (Conductive Acetal)                                 | 1   |
| 4    | 114.023.551 | Bracket, Intermediate                                                    | 1   |
| 5    | 115.142.115 | Bracket, Mounting                                                        | 2   |
| 6    | 132.034.360 | Bumper, Diaphragm                                                        | 2   |
| 7    | 135.036.506 | Bushing, Plunger                                                         | 2   |
| 8    | 165.110.551 | Cap, Air Inlet                                                           | 1   |
| 9    | 171.062.115 | Capscrew, Flanged 5/16-18 x 1.00                                         | 8   |
|      | 171.062.308 | Capscrew, Flanged 5/16-18 x 1.00                                         | 8   |
|      | 171.075.115 | Capscrew, Flanged 5/16-18x 1.00                                          | 4   |
| 10   | 171.063.115 | Capscrew, Flanged 5/16-18 x 1.25                                         | 24  |
|      | 171.063.308 | Capscrew, Flanged 5/16-18 x 1.25                                         | 24  |
| 11   | 171.064.115 | Capscrew, Flanged 5/16-18 x 1.50                                         | 12  |
|      | 171.064.308 | Capscrew, Flanged 5/16-18 x 1.50                                         | 12  |
| 12   | 171.066.115 | Capscrew, Flanged 1/4-20 x 1.25                                          | 8   |
|      | 171.066.308 | Capscrew, Flanged 1/4-20 x 1.25                                          | 8   |
| 14   | 196.162.520 | Chamber, Outer                                                           | 2   |
|      | 196.162.542 | Chamber, Outer                                                           | 2   |
|      | 196.162.552 | Chamber, Outer                                                           | 2   |
| 15   | 286.095.354 | Diaphragm                                                                | 2   |
|      | 286.116.000 | Diaphragm, One-Piece Bonded                                              | 2   |
| 16   | 286.096.600 | Diaphragm, Overlay                                                       | 2   |
| 17   | 312.107.520 | Elbow                                                                    | 4   |
|      | 312.107.542 | Elbow                                                                    | 4   |
|      | 312.107.552 | Elbow                                                                    | 4   |
| 18   | 360.100.360 | Gasket, Air Inlet                                                        | 1   |
|      | 360.100.379 | Gasket, Air Inlet (Solenoid Option Only)                                 | 1   |
| 19   | 360.101.379 | Gasket, Pilot Valve                                                      | 1   |
| 20   | 360.102.360 | Gasket, Air Valve                                                        | 1   |
| 21   | 518.140.520 | Manifold (ANSI)                                                          | 2   |
|      | 518.140.542 | Manifold (ANSI)                                                          | 2   |
|      | 518.140.552 | Manifold (ANSI)                                                          | 2   |
| 22   | 530.023.000 | Muffler                                                                  | 1   |
|      | 530.024.000 | Muffler                                                                  | 1   |
| 23   | 544.005.115 | Nut, Flanged 5/16-18                                                     | 36  |
|      | 544.005.308 | Nut, Flanged 5/16-18                                                     | 36  |
| 24   | 560.001.360 | O-ring                                                                   | 2   |
| 25   | 612.091.520 | Plate, Outer Diaphragm                                                   | 2   |
|      | 612.091.542 | Plate, Outer Diaphragm                                                   | 2   |
|      | 612.091.552 | Plate, Outer Diaphragm                                                   | 2   |
| 26   | 612.177.330 | Plate, Inner Diaphragm                                                   | 2   |
|      | 612.221.330 | Plate, Inner Diaphragm (use with One-Piece Bonded Diaphragm only)        | 2   |
| 27   | 620.019.115 | Plunger, Actuator                                                        | 2   |
| 28   | 670.050.520 | Retainer, Ball                                                           | 4   |
|      | 670.050.542 | Retainer, Ball                                                           | 4   |
|      | 670.050.552 | Retainer, Ball                                                           | 4   |
| 29   | 675.042.115 | Ring, Retaining                                                          | 2   |
| 30   | 685.056.120 | Rod, Diaphragm                                                           | 1   |
| 31   | 720.012.375 | Seal, Diaphragm Rod                                                      | 2   |
| 32   | 720.046.600 | Seal, Manifold                                                           | 4   |
| 33   | 720.051.600 | Seal, Check Valve Retainer                                               | 8   |
| 34   | 722.081.520 | Seat, Check Valve                                                        | 4   |
|      | 722.081.542 | Seat, Check Valve                                                        | 4   |
|      | 722.081.552 | Seat, Check Valve                                                        | 4   |

NOT SHOWN:

535.069.000 Nameplate

# MATERIAL CODES - THE LAST 3 DIGITS OF PART NUMBER

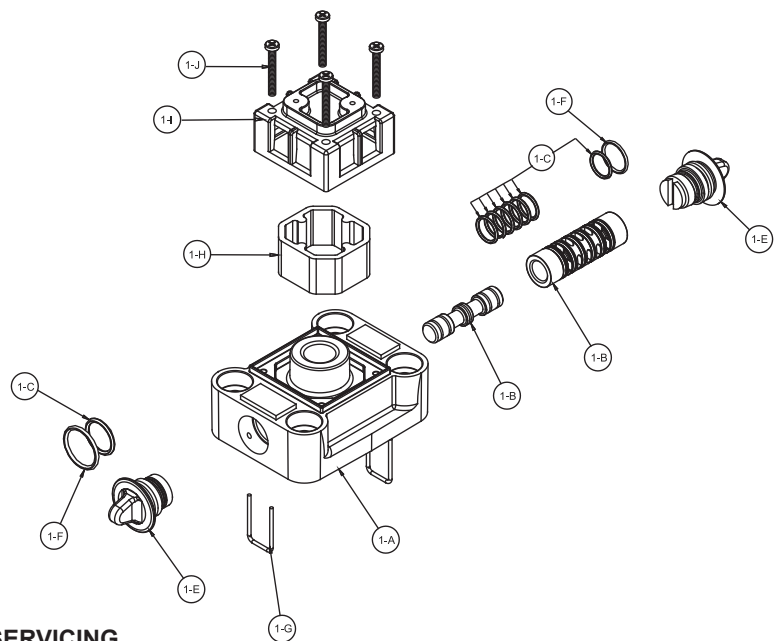
|     |                                                                      |     |                                                     |     |                                                                 |
|-----|----------------------------------------------------------------------|-----|-----------------------------------------------------|-----|-----------------------------------------------------------------|
| 000 | Assembly, sub-assembly;<br>and some purchased items                  | 364 | E.P.D.M. Rubber<br>Color coded: BLUE                |     | PTFE Overlay, Balls, and Seals                                  |
| 010 | Cast Iron                                                            | 365 | Neoprene Rubber<br>Color coded: GREEN               | 668 | PTFE, FDA Santoprene®/PTFE                                      |
| 015 | Ductile Iron                                                         | 366 | Food Grade Nitrile                                  |     | Delrin and Hytrel are registered<br>tradenames of E.I. DuPont.  |
| 020 | Ferritic Malleable Iron                                              | 368 | Food Grade EPDM                                     |     | Nylatron is a registered tradename<br>of Polymer Corp.          |
| 080 | Carbon Steel, AISI B-1112                                            | 371 | Philthane (Tuftane)                                 |     | Gylon is a registered tradename<br>of Garlock, Inc.             |
| 110 | Alloy Type 316 Stainless Steel                                       | 374 | Carboxylated Nitrile                                |     | Santoprene is a registered tradename<br>of Exxon Mobil Corp.    |
| 111 | Alloy Type 316 Stainless Steel<br>(Electro Polished)                 | 375 | Fluorinated Nitrile                                 |     | Rulon II is a registered tradename<br>of Dixon Industries Corp. |
| 112 | Alloy C                                                              | 378 | High Density Polypropylene                          |     | Ryton is a registered tradename<br>of Phillips Chemical Co.     |
| 113 | Alloy Type 316 Stainless Steel<br>(Hand Polished)                    | 379 | Conductive Nitrile                                  |     | Valox is a registered tradename<br>of General Electric Co.      |
| 114 | 303 Stainless Steel                                                  | 408 | Cork and Neoprene                                   |     |                                                                 |
| 115 | 302/304 Stainless Steel                                              | 425 | Compressed Fibre                                    |     |                                                                 |
| 117 | 440-C Stainless Steel (Martensitic)                                  | 426 | Blue Gard                                           |     |                                                                 |
| 120 | 416 Stainless Steel<br>(Wrought Martensitic)                         | 440 | Vegetable Fibre                                     |     |                                                                 |
| 148 | Hardcoat Anodized Aluminum                                           | 500 | Delrin® 500                                         |     |                                                                 |
| 150 | 6061-T6 Aluminum                                                     | 502 | Conductive Acetal, ESD-800                          |     |                                                                 |
| 152 | 2024-T4 Aluminum (2023-T351)                                         | 503 | Conductive Acetal, Glass-Filled                     |     |                                                                 |
| 155 | 356-T6 Aluminum                                                      | 506 | Delrin® 150                                         |     |                                                                 |
| 156 | 356-T6 Aluminum                                                      | 520 | Injection Molded PVDF<br>Natural color              |     |                                                                 |
| 157 | Die Cast Aluminum Alloy #380                                         | 540 | Nylon                                               |     |                                                                 |
| 158 | Aluminum Alloy SR-319                                                | 542 | Nylon                                               |     |                                                                 |
| 162 | Brass, Yellow, Screw Machine Stock                                   | 544 | Nylon Injection Molded                              |     |                                                                 |
| 165 | Cast Bronze, 85-5-5-5                                                | 550 | Polyethylene                                        |     |                                                                 |
| 166 | Bronze, SAE 660                                                      | 551 | Glass Filled Polypropylene                          |     |                                                                 |
| 170 | Bronze, Bearing Type,<br>Oil Impregnated                             | 552 | Unfilled Polypropylene                              |     |                                                                 |
| 180 | Copper Alloy                                                         | 555 | Polyvinyl Chloride                                  |     |                                                                 |
| 305 | Carbon Steel, Black Epoxy Coated                                     | 556 | Black Vinyl                                         |     |                                                                 |
| 306 | Carbon Steel, Black PTFE Coated                                      | 557 | Unfilled Conductive Polypropylene                   |     |                                                                 |
| 307 | Aluminum, Black Epoxy Coated                                         | 558 | Conductive HDPE                                     |     |                                                                 |
| 308 | Stainless Steel, Black PTFE Coated                                   | 559 | Glass-Filled Conductive Polypropylene               |     |                                                                 |
| 309 | Aluminum, Black PTFE Coated                                          | 570 | Rulon II®                                           |     |                                                                 |
| 313 | Aluminum, White Epoxy Coated                                         | 580 | Ryton®                                              |     |                                                                 |
| 330 | Zinc Plated Steel                                                    | 600 | PTFE (virgin material)<br>Tetrafluorocarbon (TFE)   |     |                                                                 |
| 332 | Aluminum, Electroless Nickel Plated                                  | 603 | Blue Gylon®                                         |     |                                                                 |
| 333 | Carbon Steel, Electroless<br>Nickel Plated                           | 604 | PTFE                                                |     |                                                                 |
| 335 | Galvanized Steel                                                     | 606 | PTFE                                                |     |                                                                 |
| 337 | Silver Plated Steel                                                  | 607 | Envelon                                             |     |                                                                 |
| 351 | Food Grade Santoprene®                                               | 608 | Conductive PTFE                                     |     |                                                                 |
| 353 | Geolast; Color: Black                                                | 610 | PTFE Encapsulated Silicon                           |     |                                                                 |
| 354 | Injection Molded #203-40<br>Santoprene® Duro 40D +/-5;<br>Color: RED | 611 | PTFE Encapsulated FKM                               |     |                                                                 |
| 356 | Hytrel®                                                              | 632 | Neoprene/Hytrel®                                    |     |                                                                 |
| 357 | Injection Molded Polyurethane                                        | 633 | FKM/PTFE                                            |     |                                                                 |
| 358 | Urethane Rubber<br>(Some Applications)<br>(Compression Mold)         | 634 | EPDM/PTFE                                           |     |                                                                 |
| 359 | Urethane Rubber                                                      | 635 | Neoprene/PTFE                                       |     |                                                                 |
| 360 | Nitrile Rubber Color coded: RED                                      | 637 | PTFE, FKM/PTFE                                      |     |                                                                 |
| 363 | FKM (Fluorocarbon)<br>Color coded: YELLOW                            | 638 | PTFE, Hytrel®/PTFE                                  |     |                                                                 |
|     |                                                                      | 639 | Nitrile/TFE                                         |     |                                                                 |
|     |                                                                      | 643 | Santoprene®/EPDM                                    |     |                                                                 |
|     |                                                                      | 644 | Santoprene®/PTFE                                    |     |                                                                 |
|     |                                                                      | 656 | Santoprene® Diaphragm and<br>Check Balls/EPDM Seats |     |                                                                 |
|     |                                                                      | 661 | EPDM/Santoprene®                                    |     |                                                                 |
|     |                                                                      | 666 | FDA Nitrile Diaphragm,                              |     |                                                                 |

## RECYCLING

Warren Rupp is an ISO14001 registered company and is committed to minimizing the impact our products have on the environment. Many components of SANDPIPER® AODD pumps are made of recyclable materials. We encourage pump users to recycle worn out parts and pumps whenever possible, after any hazardous pumped fluids are thoroughly flushed. Pump users that recycle will gain the satisfaction to know that their discarded part(s) or pump will not end up in a landfill. The recyclability of SANDPIPER products is a vital part of Warren Rupp's commitment to environmental stewardship.



# Air Distribution Valve Assembly



## AIR DISTRIBUTION VALVE SERVICING

To service the air valve first shut off the compressed air, bleed pressure from the pump, and disconnect the air supply line from the pump.

**STEP #1:** See COMPOSITE REPAIR PARTS DRAWING. Using a 3/8" wrench or socket, remove the four hex flanged capscrews (item 12). Remove the air valve assembly from the pump.

**STEP #2:** Disassembly of the air valve. To access the internal air valve components first remove the two end cap retainers (item 1-G) by inserting a small flat screwdriver into the two slotted grooves on the valve body and gently lifting the retainers out.

Next remove the two end caps (item 1-E) by grasping the pull tab with finger and thumb or pliers and tugging. Inspect the two o-rings (items 1-C and 1-F) on each end cap for wear or cuts. Replace the o-rings if necessary.

Remove the spool (part of item 1-B) from the sleeve. Be careful not to scratch or damage the outer diameter of the spool. Wipe spool with a soft clean cloth and inspect for scratches or abrasive wear.

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B). **Note:** The sleeve and spool set is match-ground to a specified clearance. Sleeves and spools cannot be interchanged.

**STEP #3:** Reassembly of the air distribution valve. Install one end cap with o-rings (items 1-E, 1-C, and 1-F) into one end of the air valve body (item 1-A). Insert one end cap retainer (item 1-G) into the two smaller holes, align with groove in the end cap, and push until the closed end of the retainer is below the flat surface of the valve body.

Remove the new sleeve and spool set (item 1-B) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-C) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body. Align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Push the spool in until the pin touches the end cap on the opposite end. Install the remaining end cap with o-rings and retaining ring.

Fasten the air valve assembly (item 1) and gasket (item 23) to the pump, using the four hex flanged capscrews (item 12). Connect the compressed air line to the pump. The pump is now ready for operation.

## MAIN AIR VALVE ASSEMBLY PARTS LIST

| Item | Part Number | Description          | Qty |
|------|-------------|----------------------|-----|
| 1    | 031.166.000 | Air Valve Assembly   | 1   |
| 1-A  | 095.106.551 | Body, Air Valve      | 1   |
| 1-B  | 031.132.000 | Sleeve and Spool Set | 1   |
| 1-C  | 560.101.360 | O-Ring               | 8   |
| 1-E  | 165.122.551 | End Cap              | 2   |
| 1-F  | 560.026.360 | O-Ring               | 2   |
| 1-G  | 675.062.115 | End Cap Retainer     | 2   |
| 1-H  | 530.031.550 | Muffler              | 1   |
| 1-I  | 165.109.551 | Muffler Cap          | 1   |
| 1-J  | 710.011.115 | Self-Tapping Screw   | 4   |

### For Pumps with Virgin PTFE coated hardware:

|     |             |                    |   |
|-----|-------------|--------------------|---|
| 1   | 031.166.002 | Air Valve Assembly | 1 |
| 1-G | 675.062.308 | End Cap Retainer   | 2 |
| 1-J | 710.011.308 | Self Tapping Screw | 4 |

(Includes all other items used on 031.166.000 above)

### For Pumps with alternate Mesh or Sound Dampening Mufflers or Piped Exhaust:

|   |             |                    |   |
|---|-------------|--------------------|---|
| 1 | 031.168.000 | Air Valve Assembly | 1 |
|---|-------------|--------------------|---|

(Includes all items used on 031.166.000 above minus 1-H, 1-I and 1-J)

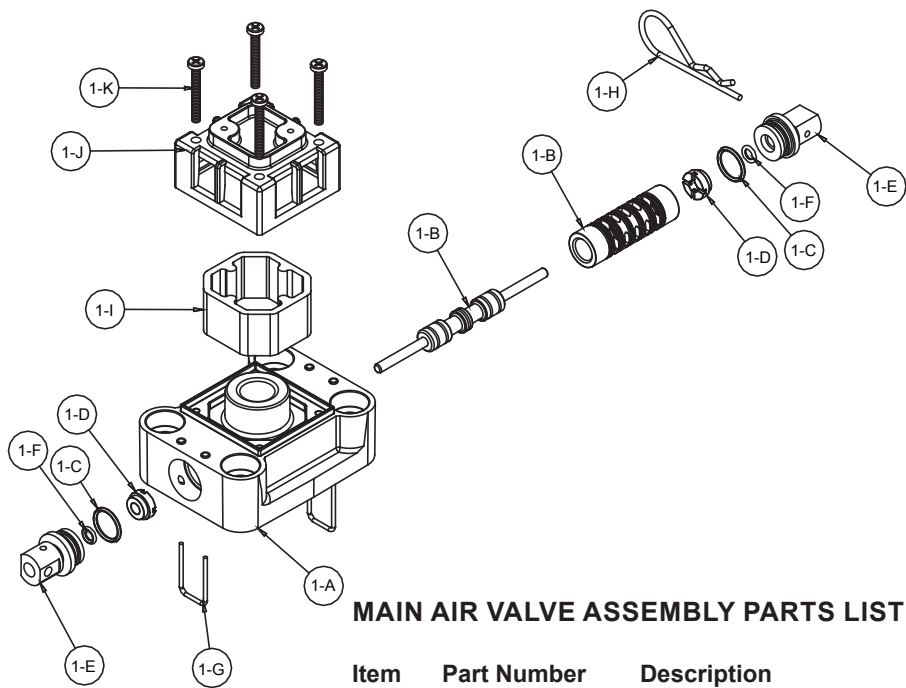
## IMPORTANT



Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.



# Air Distribution Valve Assembly



MAIN AIR VALVE ASSEMBLY PARTS LIST

## AIR DISTRIBUTION VALVE WITH STROKE INDICATOR OPTION SERVICING

To service the air valve first shut off the compressed air, bleed pressure from the pump, and disconnect the air supply line from the pump.

### STEP #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 3/8" wrench or socket, remove the four hex flanged capscrews (item 12). Remove the air valve assembly from the pump.

### STEP #2: Disassembly of the air valve.

To access the internal air valve components first remove the two end cap retainers (item 1-G) by inserting a small flat screwdriver into the two slotted grooves on the valve body and gently lifting the retainers out.

Next remove the two end caps (item 1-E) by grasping the pull tab with finger and thumb or pliers and tugging. Inspect the two o-rings (items 1-C and 1-F) on each end cap for wear or cuts. Replace the o-rings if necessary.

Remove the spool (part of item 1-B) from the sleeve. Be careful not to scratch or damage the outer diameter of the spool. Wipe spool with a soft clean cloth and inspect for scratches or abrasive wear.

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B). **Note:** The sleeve and spool set is match-ground to a specified clearance. Sleeves and spools cannot be interchanged.

### STEP #3: Reassembly of the air distribution valve.

Install one end cap with o-rings (items 1-E, 1-C, and 1-F) into one end of the air valve body (item 1-A). Insert one end cap retainer (item 1-G) into the two smaller holes, align with groove in the end cap, and push until the closed end of the retainer is below the flat surface of the valve body.

Remove the new sleeve and spool set (item 1-B) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-C) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body. Align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Push the spool in until the pin touches the end cap on the opposite end. Install the remaining end cap with o-rings and retaining ring.

Fasten the air valve assembly (item 1) and gasket (item 23) to the pump, using the four hex flanged capscrews (item 12).

Connect the compressed air line to the pump. The pump is now ready for operation.

**IMPORTANT:** Remove the safety clip. The pump will not function properly until it is removed. The pump is now ready for operation.

| Item | Part Number | Description          | Qty |
|------|-------------|----------------------|-----|
| 1    | 031.167.000 | Air Valve Assembly   | 1   |
| 1-A  | 095.106.559 | Body, Air Valve      | 1   |
| 1-B  | 031.134.000 | Sleeve and Spool Set | 1   |
| 1-C  | 560.101.360 | O-Ring               | 8   |
| 1-D  | 132.030.552 | Bumper               | 2   |
| 1-E  | 165.123.147 | End Cap              | 2   |
| 1-F  | 560.029.360 | O-Ring               | 2   |
| 1-G  | 675.062.115 | End Cap Retainer     | 2   |
| 1-H  | 210.008.330 | Safety Clip          | 1   |
| 1-I  | 530.031.550 | Muffler              | 1   |
| 1-J  | 165.109.559 | Muffler Cap          | 1   |
| 1-K  | 710.011.115 | Self-Tapping Screw   | 4   |

### For Pumps with Virgin PTFE coated hardware:

|     |             |                    |   |
|-----|-------------|--------------------|---|
| 1   | 031.167.002 | Air Valve Assembly | 1 |
| 1-G | 675.062.308 | End Cap Retainer   | 2 |
| 1-J | 710.011.308 | Self Tapping Screw | 4 |

(Includes all other items used on 031.166.000 above)

### For Pumps with alternate Mesh or Sound Dampening Mufflers or Piped Exhaust:

|   |             |                    |   |
|---|-------------|--------------------|---|
| 1 | 031-169-000 | Air Valve Assembly | 1 |
|---|-------------|--------------------|---|

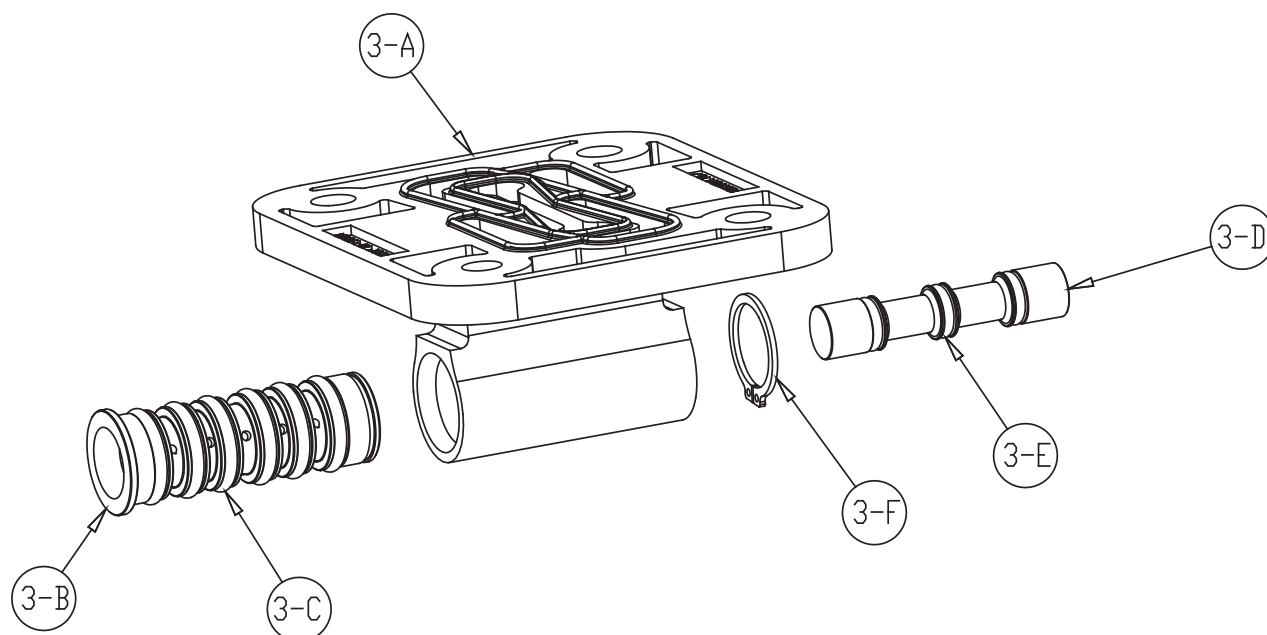
(Includes all items used on 031-167-000 above minus 1-H, 1-I and 1-J)

## ⚠ IMPORTANT



Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

# Pilot Valve Assembly



## PILOT VALVE ASSEMBLY PARTS LIST

| ITEM | PART NUMBER | DESCRIPTION           | QTY |
|------|-------------|-----------------------|-----|
| 3    | 095.091.000 | Pilot Valve Assembly  | 1   |
| 3-A  | 095.087.551 | Valve Body            | 1   |
| 3-B  | 755.051.000 | Sleeve (With O-rings) | 1   |
| 3-C  | 560.033.379 | O-ring (Sleeve)       | 6   |
| 3-D  | 775.055.000 | Spool (With O-rings)  | 1   |
| 3-E  | 560.023.379 | O-ring (Spool)        | 3   |
| 3-F  | 675.037.080 | Retaining Ring        | 1   |

### PILOT VALVE SERVICING

To service the pilot valve first shut off the compressed air supply, bleed the pressure from the pump, and disconnect the air supply line from the pump.

#### STEP #1: See pump assembly drawing.

Using a 7/16" wrench or socket, remove the four capscrews (item 12). Remove the air inlet cap (item 8) and air inlet gasket (item 18). The pilot valve assembly (item 3) can now be removed for inspection and service.

#### STEP #2: Disassembly of the pilot valve.

Remove the pilot valve spool (item 3-D). Wipe clean and inspect spool and o-rings for dirt, cuts or wear. Replace the o-rings and spool if necessary.

Remove the retaining ring (item 3-F) from the end of the sleeve (item 3-b) and remove the sleeve from the valve body (item 3-A). Wipe clean and inspect sleeve and o-rings for dirt, cuts or wear. Replace the o-rings and sleeve if necessary.

#### STEP #3: Re-assembly of the pilot valve.

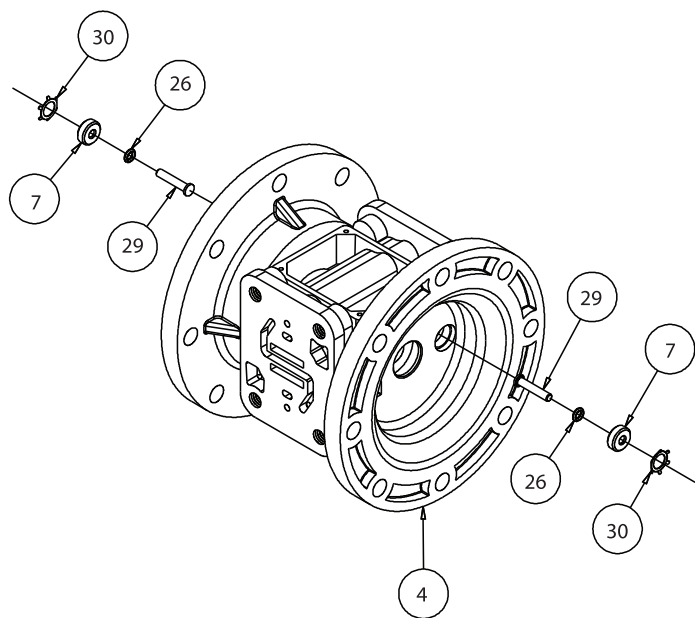
Generously lubricate outside diameter of the sleeve and o-rings. Then carefully insert sleeve into valve body. Take CAUTION when inserting sleeve, not to shear any o-rings. Install retaining ring to sleeve. Generously lubricate outside diameter of spool and o-rings. Then carefully insert spool into sleeve. Take CAUTION when inserting spool, not to shear any o-rings. Use BP-LS-EP-2 multipurpose grease, or equivalent.

#### STEP #4: Re-install the pilot valve assembly into the intermediate.

Be careful to align the ends of the pilot valve stem between the plunger pins when inserting the pilot valve into the cavity of the intermediate.

Re-install the gasket, air inlet cap and capscrews. Connect the air supply to the pump. The pump is now ready for operation.

# Intermediate Assembly



## ACTUATOR PLUNGER SERVICING

To service the actuator plunger first shut off the compressed air supply, bleed the pressure from the pump, and disconnect the air supply line from the pump.

**Step #1:** See PUMP ASSEMBLY DRAWING.  
Using a 3/8" wrench or socket, remove the four capscrews (items 12). Remove the air inlet cap (item 8) and air inlet gasket (item 20). The pilot valve assembly (item 3) can now be removed.

**Step #2:** Servicing the actuator plungers.  
See PUMP ASSEMBLY DRAWING.  
The actuator plungers (items 28) can be reached through the stem cavity of the pilot valve in the intermediate bracket (item 4). To service bushings, o-rings and retaining rings, see Intermediate Drawing.

Remove the plungers (items 28) from the bushings (item 7) in each end of the intermediate cavity. Inspect for wear or damage. Replace plunger as needed. Apply a light coating of grease to each o-ring and re-install the plungers in to the bushings. Push the plungers in as far as they will go.

**Step #3:** Re-install the pilot valve assembly into the intermediate assembly.

Be careful to align the ends of the stem between the plungers when inserting the stem of the pilot valve into the cavity of the intermediate. Re-install the gasket (item 20), air inlet cap (item 8) and capscrews (items 12).

Connect the air supply to the pump. The pump is now ready for operation.

## PLUNGER BUSHING, O-RING, AND RETAINING RING SERVICING

To service the plunger bushing components first remove the two retaining rings (items 30) using a small flat screwdriver. **\*Note:** It is recommended that new retaining rings be installed.

Next remove the two plunger bushings (items 7). Inspect the bushings for wear or scratches. Replace the bushings as necessary.

Inspect the two o-rings (25) for cuts and/or wear.

## INTERMEDIATE ASSEMBLY REPAIR PARTS LIST

| Item | Part Number | Description           | Qty |
|------|-------------|-----------------------|-----|
| 4    | 114.023.551 | Bracket, Intermediate | 1   |
| 7    | 135.036.506 | Bushing, Plunger      | 2   |
| 25   | 560.001.360 | O-Ring                | 2   |
| 28   | 620.019.115 | Plunger, Actuator     | 2   |
| 30   | 675.042.115 | Ring, Retaining*      | 2   |

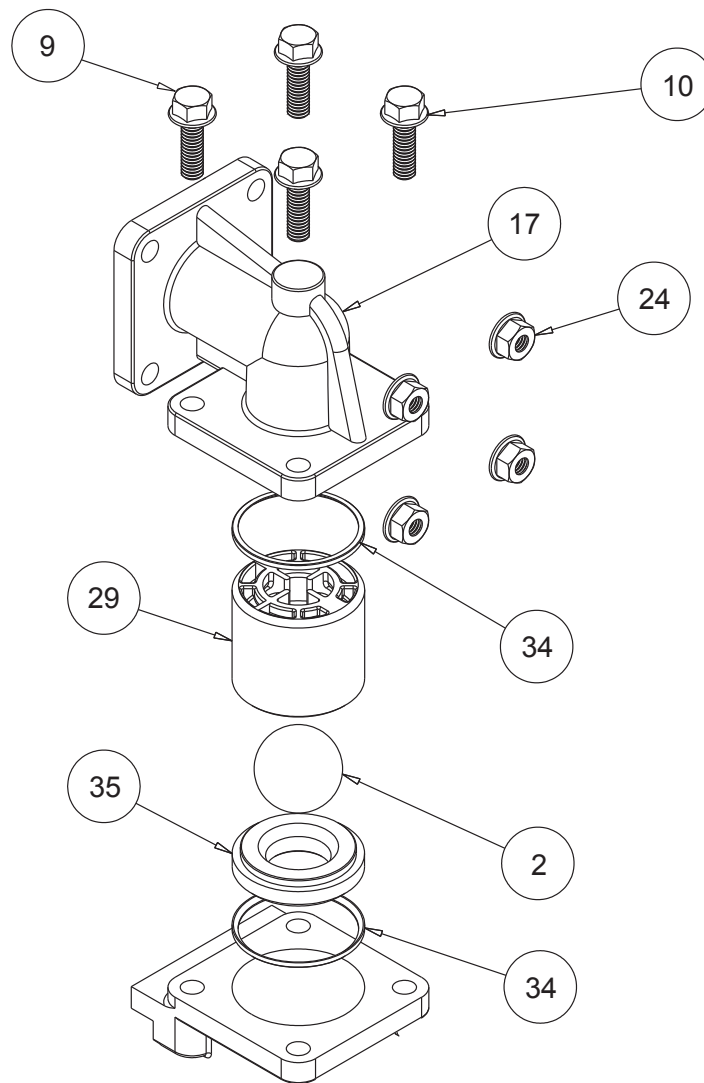
**\*NOTE:** It is recommended that when plunger components are serviced, new retaining rings be installed.

### ! IMPORTANT



When the pumped product source is at a higher level than the pump (flooded suction condition), pipe the exhaust higher than the product source to prevent siphoning spills. In the event of a diaphragm failure a complete rebuild of the center section is recommended.

# Modular Check Valve Drawing



## MODULAR CHECK BALL VALVE SERVICING

Before servicing the check valves, first shut off the suction line and then the discharge line to the pump. Next, shut off the compressed air supply, bleed air pressure from the pump, and disconnect the air supply line from the pump. Drain any remaining fluid from the pump. The pump can now be removed for service.

To access the modular check valve, remove the elbows (items 17 from pump composite repair parts drawing). Use a 1/2" wrench or socket to remove the fasteners. Once the elbows are removed, the modular check valves can be seen in the cavities of the outer chamber (items 14).

Next remove the check valve seal (item 34). Inspect the seal for cuts or pinched areas. Replace seal as needed.

Disassemble the component parts of each modular check valve. Inspect the check valve retainer (item 29) for cuts, abrasive wear, or embedded materials.

Replace as needed.

Inspect the check balls (items 2) for wear, abrasion, or cuts on the spherical surface. The check valve seats (items 35) should be inspected for cuts, abrasive wear, or embedded material on the surfaces of both the external and internal chambers. The spherical surface of the check balls must seat flush to the surface of the inner chamfer on the check valve seats for the pump to operate to peak efficiency. Replace any worn or damaged parts as necessary.

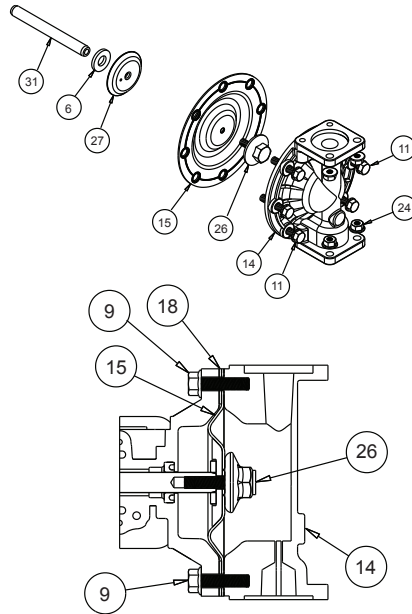
Remove the check valve seal (item 34). Inspect the seal for cuts or pinched areas. Replace seal as needed.

## RE-ASSEMBLE THE MODULAR CHECK VALVES.

Place a check valve seal (item 34) into the cavity of the outer chamber (item 14). Make sure the chamfer side of the seal faces out. Insert the modular check valve into the outer chamber with the retainer facing up. Install a check valve seal (item 34). Make sure the chamfer side of the seals face the chamfer on the check valve seat or retainer.

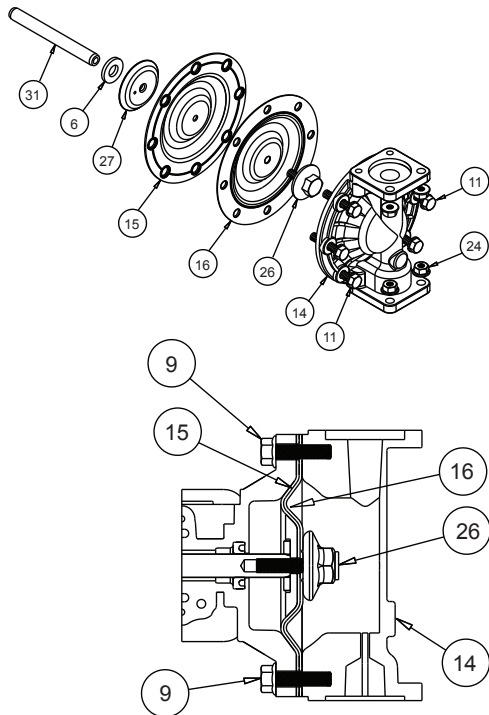
The pump can now be reassembled, reconnected and returned to operation.

# Diaphragm Service Drawing



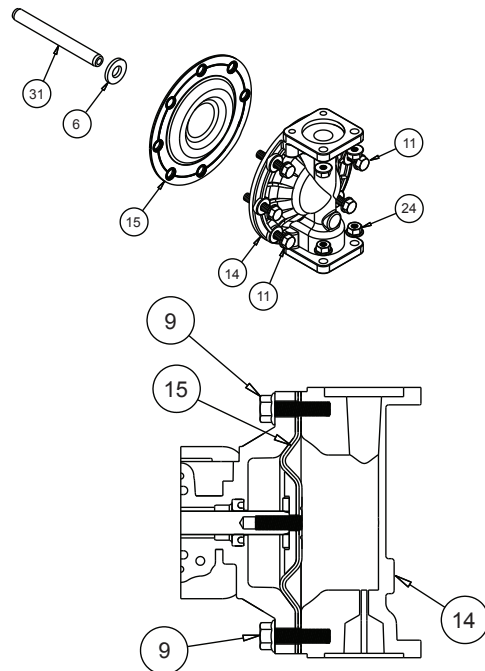
**Diaphragm Orientation**  
Install diaphragm and spacer  
as shown above.

## Diaphragm Service Drawing, With Overlay



**Diaphragm Orientation**  
Install diaphragm and overlay  
as shown above.

## Diaphragm Service Drawing with One-Piece Bonded



**Diaphragm Orientation**  
Install diaphragm (286.116.000 only)  
as shown above.



# Diaphragm Servicing

## DIAPHRAGM SERVICING

To service the diaphragms first shut off the suction, then shut off the discharge lines to the pump. Shut off the compressed air supply, bleed the pressure from the pump, and disconnect the air supply line from the pump. Drain any remaining liquid from the pump.

**Step #1:** See the pump composite repair parts drawing, and the diaphragm servicing illustration.

Using a 1/2" wrench or socket, remove the 16 capscrews (items 9 & 10), and nuts that fasten the elbows (items 17) to the outer chambers (items 14). Remove the elbows with the manifolds and spacers attached.

**Step #2:** Removing the outer chambers.

Using a 1/2" wrench or socket, remove the 16 capscrews (items 9 & 11), and nuts that fasten the outer chambers, diaphragms, and intermediate bracket (items 4) together.

**Step #3:** Removing the diaphragm assemblies.

Use a 3/4" (19mm) wrench or six pointed socket to remove the diaphragm assemblies (outer plate, diaphragm, and inner plate) from the diaphragm rod (item 31) by turning counterclockwise.

Insert a 6-32 set screw into the smaller tapped hole in the inner diaphragm plate (item 27). Insert the protruding stud and the 6-32 fastener loosely into a vise. Use a 3/4" wrench or socket to remove the outer diaphragm plate (item 26) by turning counterclockwise. Inspect the diaphragm (item 15) for cuts, punctures, abrasive wear or chemical attack. Replace the diaphragms if necessary.

**Step #4:** Installing the diaphragms.

Push the threaded stud of the outer diaphragm plate through the center hole of the diaphragm. Thread the inner plate clockwise onto the stud. Use a torque wrench to tighten the diaphragm assembly together to 90 in Lbs. (10.17 Newton meters) 120 in lbs.

Santoprene (13.56 Newton meters). Allow a minimum of 15 minutes to elapse after torquing, then re-torque the assembly to compensate for stress relaxation in the clamped assembly.

**Step #5:** Installing the diaphragm assemblies to the pump.

Make sure the bumper (item 6) is installed over the diaphragm rod.

Thread the stud of the one diaphragm assembly clockwise into the tapped hole at the end of the diaphragm rod (item 31) until the inner diaphragm plate is flush to the end of the rod. Insert rod into pump.

Align the bolt holes in the diaphragm with the bolt pattern in the inner chamber (item 4). Make sure the molded directional arrows on the diaphragm point vertically.

Fasten the outer chamber (item 14) to the pump, using the capscrews (items 9 & 11), hex nuts and flat washers.

On the opposite side of the pump, pull the diaphragm rod out as far as possible. Make sure the bumper (item 6) is installed over the diaphragm rod.

Thread the stud of the remaining diaphragm assembly clockwise into the tapped hole at the end of the diaphragm rod (item 31) as far as possible and still allow for alignment of the bolt holes in the diaphragm with the bolt pattern in the inner chamber. The molded directional arrows on the diaphragm must point vertically.

Fasten the remaining outer chamber (item 14) to the pump, using the capscrews (items 9 & 11) and nuts.

**Step #6:** Re-install the elbow/spacer/manifold assemblies to the pump, using the capscrews (items 9 & 10) and nuts.

The pump is now ready to be re-installed, connected and returned to operation.

## OVERLAY DIAPHRAGM SERVICING

The PTFE overlay diaphragm (item 16) is designed to fit snugly over the exterior of the standard TPE diaphragm

(item 15).

The molded directional arrows on the overlay diaphragm must point vertically.

Follow the same procedures described for the standard diaphragm for removal and installation.

## ONEPIECEDIAPHRAGMSERVICING (Bonded PTFE with integral plate)

The One Piece diaphragm has a threaded stud installed in the integral plate at the factory. The inner diaphragm plate has a through hole instead of a threaded hole.

Place the inner plate over the diaphragm stud and thread the first diaphragm / inner plate onto the diaphragm rod only until the inner plate contacts the rod. Do not tighten.

A small amount of grease may be applied between the inner plate and the diaphragm to facilitate assembly.

Insert the diaphragm / rod assembly into the pump and install the outer chamber. Turn the pump over and thread the second diaphragm / inner plate onto the diaphragm rod. Turn the diaphragm until the inner plate contacts the rod and hand tighten the assembly. Continue tightening until the bolt holes align with the inner chamber holes. **DO NOT LEAVE THE ASSEMBLY LOOSE.**

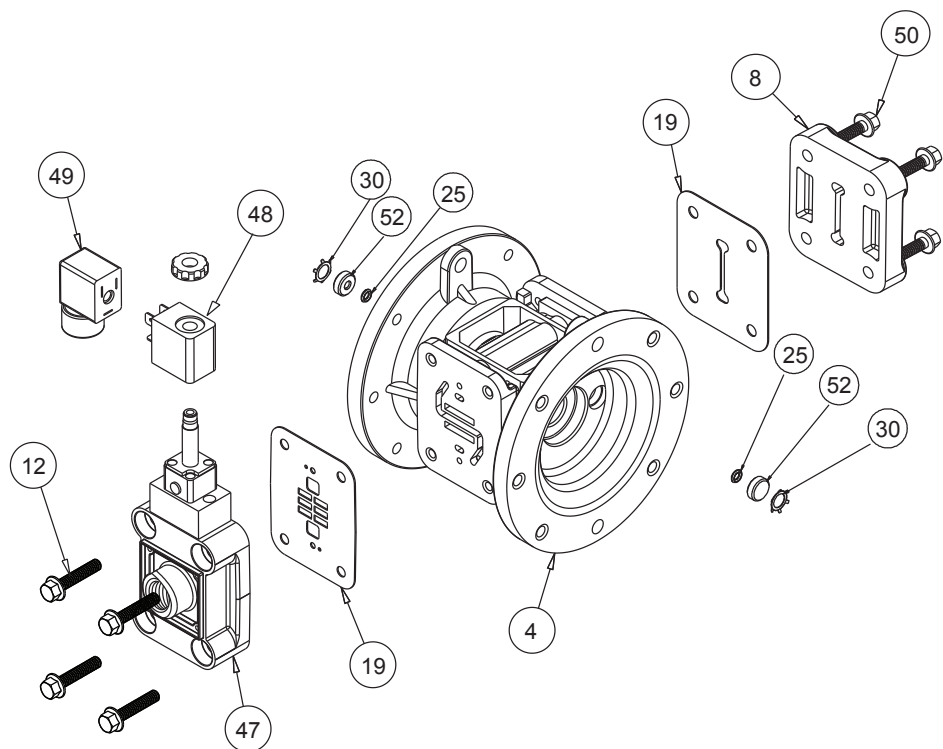
### IMPORTANT



*Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.*



# Solenoid Shifted Air Valve



## SOLENOID SHIFTED AIR DISTRIBUTION VALVE OPTION

Warren Rupp’s solenoid shifted, air distribution valve option utilizes electrical signals to precisely control your MARATHON’s speed. The solenoid coil is connected to a customer - supplied control. Compressed air provides the pumping power, while electrical signals control pump speed (pumping rate).

### OPERATION

The Solenoid Shifted MARATHON has a solenoid operated, air distribution valve in place of the standard MARATHON’s pilot operated, air distribution valve. Where a pilot valve is normally utilized to cycle the pump’s air distribution valve, an electric solenoid is utilized. As the solenoid is powered, one of the pump’s air chambers is pressurized while the other chamber is exhausted. When electric power is turned off, the solenoid shifts and the pressurized chamber is exhausted while the other chamber is pressurized. By alternately applying and removing power to the solenoid, the pump cycles much like a standard MARATHON pump, with one exception. This option provides a way to precisely control and monitor pump speed.

### BEFORE INSTALLATION

Before wiring the solenoid, make certain it is compatible with your system voltage.

### Solenoid Shifted Air Valve Parts List

| Item | Part Number | Description                      | Qty |
|------|-------------|----------------------------------|-----|
| 4    | 114-023-551 | Bracket, Intermediate            | 1   |
| 47   | 893-099-000 | Solenoid Valve, NEMA4            | 1   |
| 48   | 219-001-000 | Solenoid Coil, 24VDC             | 1   |
|      | 219-004-000 | Solenoid Coil, 24VAC/12VDC       | 1   |
|      | 219-002-000 | Solenoid Coil, 120VAC            | 1   |
|      | 219-003-000 | Solenoid Coil, 240VAC            | 1   |
| 49   | 241-001-000 | Connector, Conduit               | 1   |
| 50   | 171-065-115 | Capscrew, Flanged 1/4-20 x 1.004 | 1   |
| 52   | 618-050-150 | Plug (Replaces item 7)           | 2   |

### For Explosion Proof Solenoid Coils:

|    |             |                            |   |
|----|-------------|----------------------------|---|
| 48 | 219-009-001 | Solenoid Coil, 120VAC 60Hz | 1 |
|    | 219-009-002 | Solenoid Coil, 240VAC 60Hz | 1 |
|    | 219-009-003 | Solenoid Coil, 12VDC       | 1 |
|    | 219-009-004 | Solenoid Coil, 24VDC       | 1 |
|    | 219-009-005 | Solenoid Coil, 110VAC 50Hz | 1 |
|    | 219-009-006 | Solenoid Coil, 230VAC 50Hz | 1 |

6: OPTIONAL

# Optional Muffler Configurations



## OPTION 0

530-031-550 Integral Muffler uses (1) Cap and (4) 706-027-115 Machine Screw to hold it in place.

## OPTION 1

530-024-000 Sound Dampening Muffler screws directly into the Air Valve body. This muffler is equipped with a porous plastic element.

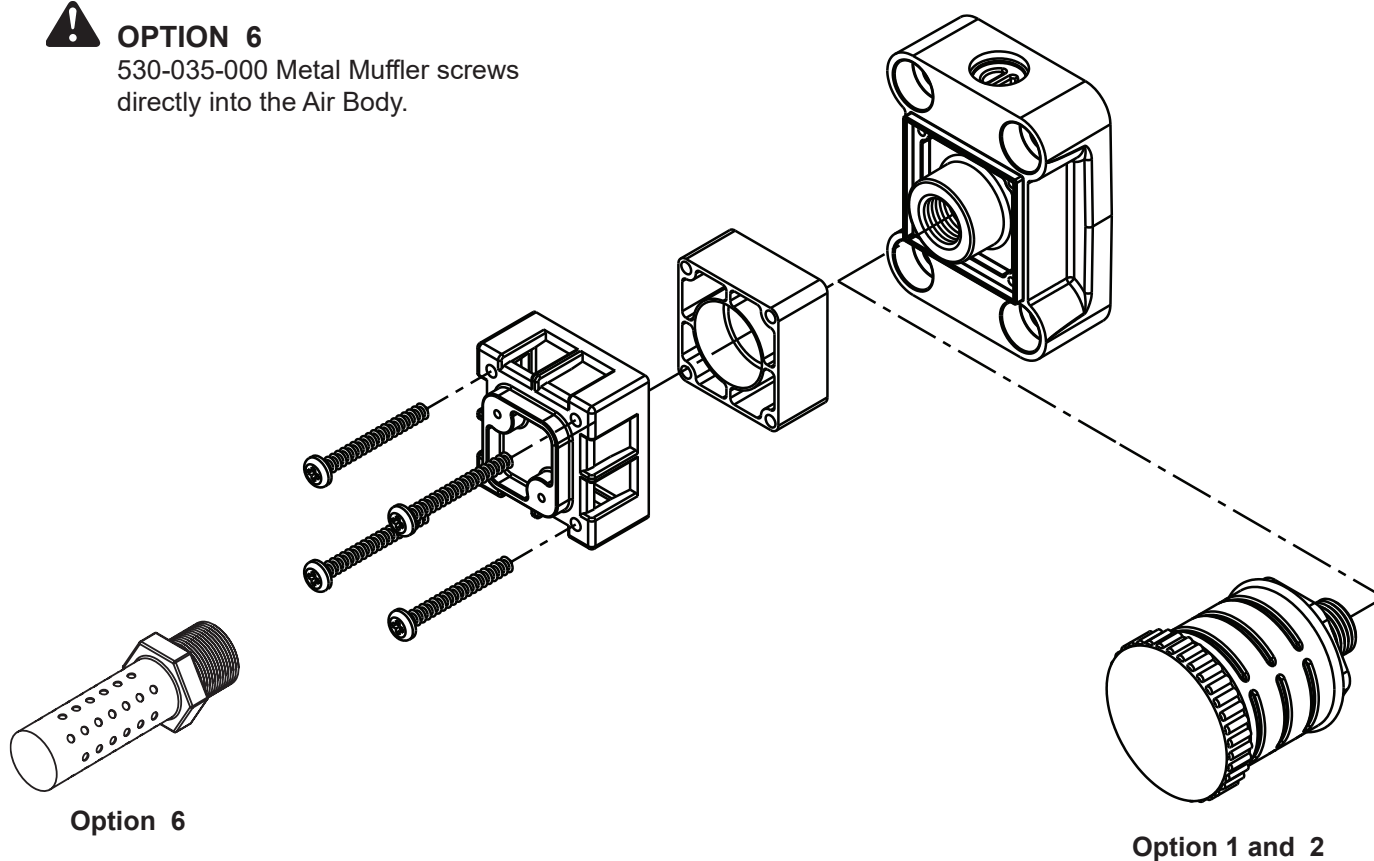
## OPTION 2

530-023-000 Mesh Muffler screws directly into the Air Valve Body. This muffler is equipped with a metal element.



## OPTION 6

530-035-000 Metal Muffler screws directly into the Air Body.

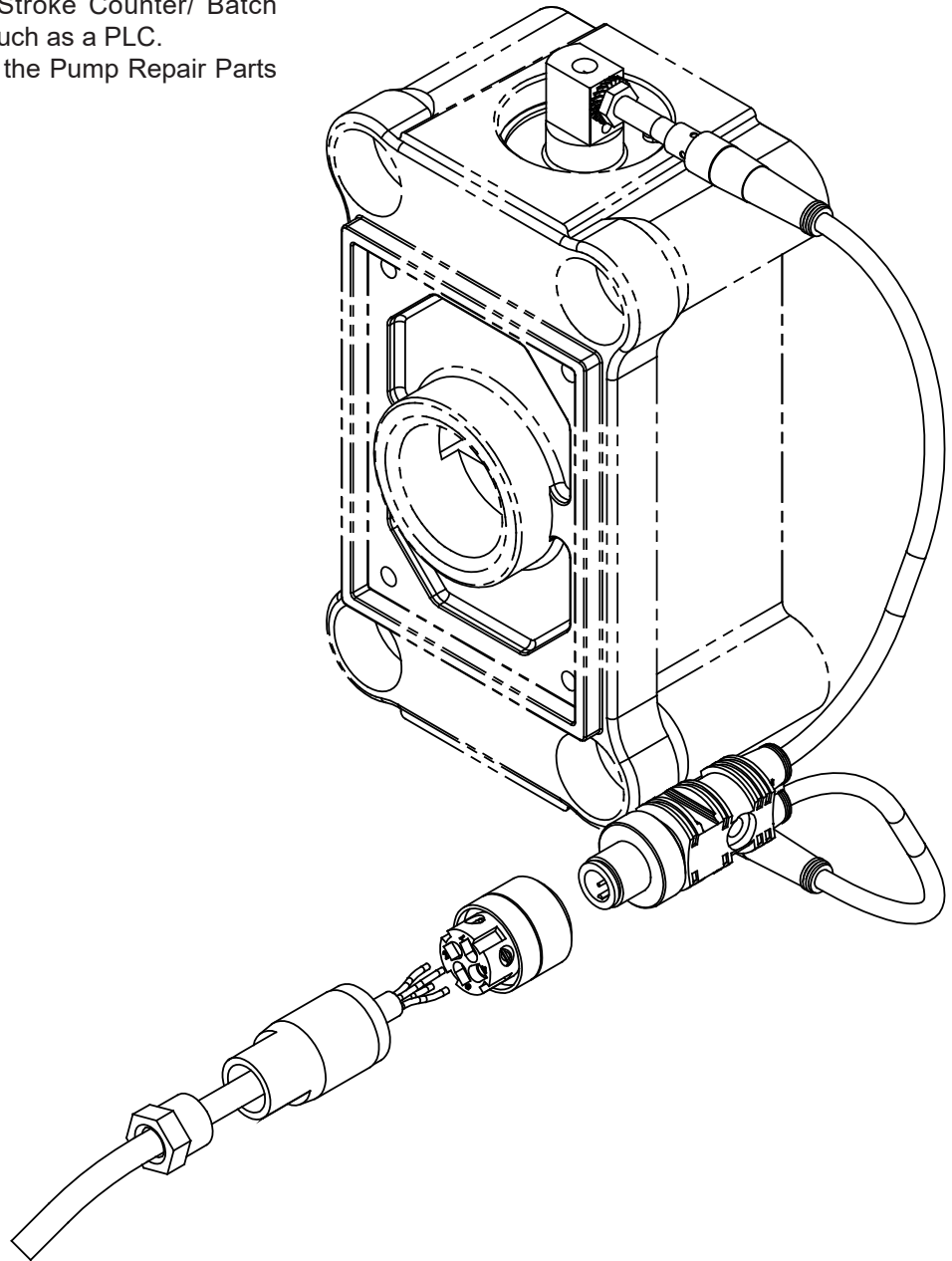


# Pulse Output Kit

## PULSE OUTPUT KIT OPTION

This pump can be fitted with a Pulse Output Kit. This converts the mechanical strokes of the pump to an electrical signal which interfaces with the Stroke Counter/ Batch Controller or user control devices such as a PLC.

See the individual kits listed on the Pump Repair Parts List for further information..



6: OPTIONAL

# 5 - YEAR Limited Product Warranty

Warren Rupp, Inc. ("Warren Rupp") warrants to the original end-use purchaser that no product sold by Warren Rupp that bears a Warren Rupp brand shall fail under normal use and service due to a defect in material or workmanship within five years from the date of shipment from Warren Rupp's factory. Warren Rupp brands include Warren Rupp®, SANDPIPER®, SANDPIPER Signature Series™, MARATHON®, Porta-Pump®, SludgeMaster™ and Tranquilizer®.

The use of non-OEM replacement parts will void (or negate) agency certifications, including CE, ATEX, CSA, 3A and EC1935 compliance (Food Contact Materials). Warren Rupp, Inc. cannot ensure nor warrant non-OEM parts to meet the stringent requirements of the certifying agencies.

~ See [sandpiperpump.com/content/warranty-certifications](http://sandpiperpump.com/content/warranty-certifications) for complete warranty, including terms and conditions, limitations and exclusions. ~



## EC Declaration of Conformity

Manufacturer:  
Warren Rupp, Inc.  
800 N. Main Street  
Mansfield, Ohio, 44902 USA

Certifies that Air-Operated Double Diaphragm Pump Models: DSB Series, DMF Series, G Series, HDB Series, HDF Series, HP Series, F Series, MS Series, S Series, SL Series, SP Series, SSB Series, T Series, U1F Series, WR Series; High Pressure Pump Models: EH Series, GH Series, SH Series; Submersible Pump Models: SMA3 Series, SPA Series; and Surge Dampener/Suppressor Models: DA Series, TA Series comply with the European Community Directive 2006/42/EC on Machinery, according to Annex VIII. This product has used Harmonized Standard EN809:2012, Pumps and Pump Units for Liquids - Common Safety Requirements, to verify conformance.

October 3, 2022

DATE/APPROVAL/TITLE:

Technical File on record with:  
DEKRA Certification B.V.  
Meander 1051  
6825 MJ Arnhem  
The Netherlands

A handwritten signature in dark ink, appearing to read 'Dennis Hall', is written over a horizontal line.

Signature of authorized person

Dennis Hall

Printed name of authorized person

Engineering Manager

Title





## EC Declaration of Conformity

**Manufacturer:**  
**Warren Rupp, Inc.**  
**800 N. Main Street**  
**Mansfield, Ohio, 44902 USA**

Certifies that Air-Operated Double Diaphragm Pump Models: DSB Series, DMF Series, G Series, HDB Series, HDF Series, HP Series, F Series, MS Series, S Series, SL Series, SP Series, SSB Series, T Series, U1F Series, WR Series; High Pressure Pump Models: EH Series, GH Series, SH Series; Submersible Pump Models: SMA3 Series, SPA Series; and Surge Dampener/Suppressor Models: DA Series, TA Series comply with the United Kingdom Statutory Instruments 2008 No. 1597, The Supply of Machinery (Safety) Regulations 2008, according to Annex VIII. This product has used Designated Standard EN809:2012, Pumps and Pump Units for Liquids - Common Safety Requirements, to verify conformance.

October 17, 2022

DATE/APPROVAL/TITLE:

Technical File on record with:  
DEKRA Certification UK Limited  
Stokenchurch House  
Oxford Road  
Stokenchurch  
HP14 3SX

Signature of authorized person

Dennis Hall

Printed name of authorized person

Engineering Manager

Title



**SCAN ME**

Register Your Pump