Model SB1 & SB25
Metallic
Design Level 5
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. Relighten 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**

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.

**RECYCLING**

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.

**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*Irat 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
## Temperature Tables

### Table 1. Category 1 & Category 2 ATEX Rated Pumps

<table>
<thead>
<tr>
<th>Ambient Temperature Range [°C]</th>
<th>Process Temperature Range [°C]</th>
<th>Temperature Class</th>
<th>Maximum Surface Temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°C to +60°C</td>
<td>-20°C to +80°C</td>
<td>T5</td>
<td>T100°C</td>
</tr>
<tr>
<td></td>
<td>-20°C to +108°C</td>
<td>T4</td>
<td>T135°C</td>
</tr>
<tr>
<td></td>
<td>-20°C to +160°C</td>
<td>T3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-20°C to +177°C (225°C)</td>
<td>T2</td>
<td>T200°C</td>
</tr>
</tbody>
</table>

1Per CSA standards ANSI LC6-2018 US & Canadian Technical Letter R14, G-Series Natural Gas Models are restricted to (-20°C to + 80°C) process temperature

### Table 2. Category 2 ATEX Rated Pumps Equipped with Pulse Output Kit or Integral Solenoid:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°C to +60°C</td>
<td>-20°C to +100°C</td>
<td>T5</td>
<td>T100°C</td>
<td>X</td>
</tr>
<tr>
<td>-20°C to +50°C</td>
<td>-20°C to +100°C</td>
<td>T5</td>
<td>T100°C</td>
<td>X</td>
</tr>
</tbody>
</table>

2ATEX Pulse output or Integral Solenoid Not Available For All Pump Models See Explanation of Pump Nomenclature / ATEX Details Page

### Table 3. Category M1 ATEX Rated Pumps for Mining

<table>
<thead>
<tr>
<th>Ambient Temperature Range [°C]</th>
<th>Process Temperature Range [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°C to +60°C</td>
<td>-20°C to +150°C</td>
</tr>
</tbody>
</table>

**Note:** The ambient temperature range and the process temperature range should not exceed the operating temperature range of the applied non-metallic parts as listed in the manuals of the pumps.
Table of Contents

SECTION 1: PUMP SPECIFICATIONS ..........1
• Explanation of Nomenclature
• Performance
• Materials
• Dimensional Drawings

SECTION 2: INSTALLATION & OPERATION ...5
• Principle of Pump Operation
• Recommended Installation Guide
• Troubleshooting Guide

SECTION 3: EXPLODED VIEW .........................8
• Composite Repair Parts Drawing
• Composite Repair Parts List
• Material Codes

SECTION 4: AIR END ..................................11
• Air Valve Assembly for Aluminum Center Sections
• Air Valve Assembly for Cast Iron Center Sections
• Pilot Valve Assembly

SECTION 5: WET END ................................15
• Diaphragm Drawings
• Diaphragm Servicing

SECTION 6: OPTIONAL CONFIGURATIONS .17
• Dual Port

SECTION 7: WARRANTY & CERTIFICATES ..19
• Warranty
• EC Declaration of Conformity - Machinery
• EC Declaration of Conformity - ATEX
**Explanation of Pump Nomenclature**

Your Model #: [fill in from pump nameplate]

<table>
<thead>
<tr>
<th>Pump Series</th>
<th>Pump Design</th>
<th>Pump Size</th>
<th>Discharge Porting Position</th>
<th>Construction Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>B</td>
<td>1</td>
<td>D</td>
<td>P1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>S</td>
<td></td>
</tr>
</tbody>
</table>

Diaphragm Check Valve Materials

- B: Nitrile
- C: FKM with PTFE
- F: FDA Accepted White Nitrile
- GN: Neoprene Backup with PTFE Overlay and PTFE Check Balls
- GR: Hytrel Backup with PTFE Overlay/PTFE Balls
- GZ: PTFE/Nitrile Bonded One-Piece/PTFE Balls
- H: EPDM with PTFE
- N: Neoprene
- R: Hytrel
- S: Santoprene
- V: FKM

Design Level

5

Your Serial #: [fill in from pump nameplate]

**ATEX Detail**

<table>
<thead>
<tr>
<th>ATEX Details</th>
<th>Construction</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>II 1 G Ex h IIC T5...225°C (T2) Ga</td>
<td>Si, Hi</td>
<td>00</td>
</tr>
<tr>
<td>II 1D Ex h IIIC T100°C...200°C Da</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I M1 Ex h I Ma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II 2 G Ex h IIC T5...225°C (T2) Gb</td>
<td>A, SS, HC, HI</td>
<td>00</td>
</tr>
<tr>
<td>II 2 D Ex h IIIC T100°C...200°C Db</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II 2 G Ex h ia IIC T5 Gb</td>
<td>A, HC, HI, SS</td>
<td>P1</td>
</tr>
<tr>
<td>II 2 D Ex h ia IIIc T100°C Db</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Materials

<table>
<thead>
<tr>
<th>Material Profile:</th>
<th>Operating Temperatures:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTION! Operating temperature limitations are as follows:</td>
<td>Max.</td>
</tr>
<tr>
<td>Conductive Acetal: Tough, impact resistant, ductile. Good abrasion resistance and low friction surface. Generally inert, with good chemical resistance except for strong acids and oxidizing agents.</td>
<td>190°F 88°C</td>
</tr>
<tr>
<td>EPDM: Shows very good water and chemical resistance. Has poor resistance to oils and solvents, but is fair in ketones and alcohols.</td>
<td>280°F 138°C</td>
</tr>
<tr>
<td>FKM: (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(21°C)) will attack FKM.</td>
<td>350°F 177°C</td>
</tr>
<tr>
<td>Hytrel®: Good on acids, bases, amines and glycols at room temperatures only.</td>
<td>220°F 104°C</td>
</tr>
<tr>
<td>Neoprene: 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.</td>
<td>200°F 93°C</td>
</tr>
<tr>
<td>Nitrile: 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.</td>
<td>190°F 88°C</td>
</tr>
<tr>
<td>Nylon: 6/6 High strength and toughness over a wide temperature range. Moderate to good resistance to fuels, oils and chemicals.</td>
<td>180°F 82°C</td>
</tr>
</tbody>
</table>

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 82°C | 32°F 0°C |

PVDF: (Polyvinylidene Fluoride) A durable fluoroplastic with excellent chemical resistance. Excellent for UV applications. High tensile strength and impact resistance. | 250°F 121°C | 0°F -18°C |

Santoprene®: Injection molded thermoplastic elastomer with no fabric layer. Long mechanical flex life. Excellent abrasion resistance. | 275°F 135°C | -40°F -40°C |

UHMW PE: 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 82°C | -35°F -37°C |

Urethane: Shows good resistance to abrasives. Has poor resistance to most solvents and oils. | 150°F 66°C | 32°F 0°C |

Virgin PTFE: (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 104°C | -35°F -37°C |

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.

Metals:

- **Alloy C**: Equal to ASTM494 CW-12M-1 specification for nickel and nickel alloy.
- **Stainless Steel**: 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.

For specific applications, always consult the Chemical Resistance Chart.
**SB1 & SB25 Heavy Duty Ball Valve**

- **Discharge Port**
  - 1" NPT (SB1)
  - 1" BSPT (SB25)

- **Suction Port**
  - 1/2" NPT

- **Air Exhaust**
  - 3/4" NPT

- **Air Inlet**
  - 1/2" NPT

- **Discharge Port**
  - 1" NPT (SB1)
  - 1" BSPT (SB25)

- **4X φ .28 [7] Mounting Hole**

**Note:**
Unit furnished with sub-base plate and rubber feet as standard. For stationary bolt down use, rubber feet can be removed.

---

**SB1 / SB25**

**HEAVY DUTY BALL VALVE PUMP**

**DIMENSIONAL TOLERANCE ±1/8 [3]**

<table>
<thead>
<tr>
<th>PUMP CONFIGURATION</th>
<th>DIM &quot;A&quot;</th>
<th>DIM &quot;B&quot;</th>
<th>DIM &quot;C&quot;</th>
<th>DIM &quot;D&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAST IRON CENTER SECTION</td>
<td>4.10 [104]</td>
<td>5.54 [141]</td>
<td>13.60 [345]</td>
<td>15.75 [400]</td>
</tr>
</tbody>
</table>

[XX] = MILLIMETERS

---

- **DIMENSIONAL TOLERANCE 1/8 [3]**
- **[XX] = MILLIMETERS**
- **Note:**
- **Unspecified**
- **Do not scale drawing**
- **Dimensions are in inches**
- **Surface finish**
- **1/2 angular .010 .005 .XX .XXX**
- **UNLESS OTHERWISE SPECIFIED**

---

**SKILLS:**
- Dimensional Drawings
- Model Specific
NOTE:
UNIT FURNISHED WITH SUB-BASE PLATE AND RUBBER FEET AS STANDARD. FOR STATIONARY BOLT DOWN USE, RUBBER FEET CAN BE REMOVED.

SB1 / SB25
HEAVY DUTY BALL VALVE PUMP
BOTTOM PORTED
DIMENSIONAL TOLERANCE ±1/8 [3]
[XX] = MILLIMETERS

<table>
<thead>
<tr>
<th>PUMP CONFIGURATION</th>
<th>DIM &quot;A&quot;</th>
<th>DIM &quot;B&quot;</th>
<th>DIM &quot;C&quot;</th>
<th>DIM &quot;D&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAST IRON CENTER SECTION</td>
<td>4.10 [104]</td>
<td>5.54 [141]</td>
<td>15.06 [383]</td>
<td>15.69 [398]</td>
</tr>
<tr>
<td>PULSE OUTPUT CONFIGURATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Air-Operated Double Diaphragm (AODD) pumps are powered by compressed air or nitrogen.

The main directional (air) control valve ① distributes compressed air to an air chamber, exerting uniform pressure over the inner surface of the diaphragm ②. At the same time, the exhausting air ③ from behind the opposite diaphragm is directed through the air valve assembly(s) to an exhaust port ④.

As inner chamber pressure (P1) exceeds liquid chamber pressure (P2), the rod ⑤ 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) ⑥ 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 ⑦.

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. SurgeSuppressor
2. Filter/Regulator
3. AirDryer
4. Lubricator

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.

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.
### Troubleshooting Guide

#### Pump Cycles Once
- **Deadhead (system pressure meets or exceeds air supply pressure).**
  - Potential Cause(s): 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).
  - Recommendation(s): Install gaskets with holes properly aligned.

- **Air valve or intermediate gaskets installed incorrectly.**
  - Potential Cause(s): Bent or missing actuator plunger.
  - Recommendation(s): Remove pilot valve and inspect actuator plungers.

#### Pump Will Not Operate / Cycle
- **Pump is over lubricated.**
  - Potential Cause(s): Check the air line size and length, compressor capacity (HP vs. cfm required).
  - Recommendation(s): Check air distribution system. Disassemble and inspect main air distribution valve, pilot valve and pilot valve actuators.

- **Lack of air (line size, PSI, CFM).**
  - Potential Cause(s): Discharge line is blocked or clogged manifolds.
  - Recommendation(s): Check for inadvertently closed discharge line valves. Clean discharge manifolds/piping.

- **Check air distribution system.**
  - Potential Cause(s): Deadhead (system pressure meets or exceeds air supply pressure).
  - Recommendation(s): 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).

- **Pump Cycles and Will Not Prime or No Flow**
  - **Check valve obstructed.**
    - Potential Cause(s): Valve ball(s) missing (pushed into chamber or manifold).
    - Recommendation(s): Check Chemical Resistance Guide for compatibility.

- **Suction side air leakage or air in product.**
  - Potential Cause(s): Valve ball(s) missing (pushed into chamber or manifold).
  - Recommendation(s): Check Valve and/or seat is worn or needs adjusting.

#### Pump Cycles Running Sluggish / Stalling, Flow Unsatisfactory
- **Over lubrication.**
  - Potential Cause(s): Check valve obstructed. Valve ball(s) not seating properly or sticking.

- **Check valve and/or seat is worn or needs adjusting.**
  - Potential Cause(s): Check valve obstructed. Valve ball(s) not seating properly or sticking.
  - Recommendation(s): Inspect check valves and seats for wear and proper setting. Replace if necessary.

- **Valve ball(s) / seat(s) damaged or attacked by product.**
  - Potential Cause(s): Suction line is blocked.
  - Recommendation(s): Check valve obstructed. Valve ball(s) not seating properly or sticking.

- **Suction line is blocked.**
  - Potential Cause(s): Increase the inlet air pressure to the pump. Pump is designed for 1:1 pressure ratio at zero flow.
  - Recommendation(s): Remove or flush obstruction. Check and clear all suction screens or strainers.

- **Excessive suction lift.**
  - Potential Cause(s): Excessive suction lift.
  - Recommendation(s): Install a point of use air drier.

- **Suction side air leakage or air in product.**
  - Potential Cause(s): Suction side air leakage or air in product.
  - Recommendation(s): Visually inspect all suction-side gaskets and pipe connections.

- **Pumped fluid in air exhaust muffler.**
  - Potential Cause(s): Excessive suction lift.
  - Recommendation(s): Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly.

- **Pump chamber is blocked.**
  - Potential Cause(s): Increase the inlet air pressure to the pump. Pump is designed for 1:1 pressure ratio at zero flow.
  - Recommendation(s): Disassemble and inspect wetted chambers. Remove or flush any obstructions.

#### Product Leaking Through Exhaust
- **Diaphragm failure, or diaphragm plates loose.**
  - Potential Cause(s): Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly.
  - Recommendation(s): Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly.

- **Diaphragm stretched around center hole or bolt holes.**
  - Potential Cause(s): Check valve obstructed. Valve ball(s) not seating properly or sticking.
  - Recommendation(s): Inspect check valves and seats for wear and proper setting. Replace if necessary.

#### Premature Diaphragm Failure
- **Cavitation.**
  - Potential Cause(s): Excessive flooded suction pressure.
  - Recommendation(s): Move pump closer to product. Install Back pressure device (Tech bulletin 4lt). Add accumulation tank or pulsation damper.

- **Under sized suction line.**
  - Potential Cause(s): Excessive flooded suction pressure.
  - Recommendation(s): Move pump closer to product. Install Back pressure device (Tech bulletin 4lt). Add accumulation tank or pulsation damper.

- **Restrictive or undersized air line.**
  - Potential Cause(s): Under sized suction line.
  - Recommendation(s): Install a larger air line and connection.

- **Suction line is blocked.**
  - Potential Cause(s): Under sized suction line.
  - Recommendation(s): Remove or flush obstruction. Check and clear all suction screens or strainers.

- **Pumped fluid in air exhaust muffler.**
  - Potential Cause(s): Under sized suction line.
  - Recommendation(s): Visually inspect all suction-side gaskets and pipe connections.

- **Check valve obstructed.**
  - Potential Cause(s): Under sized suction line.
  - Recommendation(s): Check Operating Manual to check for correct part and installation. Ensure outer plates have not been worn to a sharp edge.

- **Check valve and/or seat is worn or needs adjusting.**
  - Potential Cause(s): Under sized suction line.
  - Recommendation(s): Inspect check valves and seats for wear and proper setting. Replace if necessary.

- **Entrained air or vapor lock in chamber(s).**
  - Potential Cause(s): Under sized suction line.
  - Recommendation(s): Purge chambers through tapped chamber vent plugs.

For additional troubleshooting tips contact After Sales Support at service.warrenrupp@idexcorp.com or 419-524-8388
**Service & Repair Kits**

**475.283.000**  
**Air End Conversion Kit**  
(Converts from a Conductive Polypropylene Air Valve Assembly to the Die Cast Aluminum Air Valve Assembly) Valve Body Assembly, Gaskets, and Longer Capscrews

**475.284.379**  
**Wet End Conversion Kit**  
(Converts to Ribbed Check Valve Seats and Thicker Gaskets) Check Valve Seats, Conductive Nitrile Gaskets, and Longer Capscrews

**475.284.384**  
**Wet End Conversion Kit**  
(Converts to Ribbed Check Valve Seats and Thicker Gaskets) Check Valve Seats, Conductive Neoprene Gaskets, and Longer Capscrews

**475.284.385**  
**Wet End Conversion Kit**  
(Converts to Ribbed Check Valve Seats and Thicker Gaskets) Check Valve Seats, Conductive EPDM Gaskets, and Longer Capscrews

**475.284.608**  
**Wet End Conversion Kit**  
(Converts to Ribbed Check Valve Seats and Thicker Gaskets) Check Valve Seats, Conductive PTFE Gaskets, and Longer Capscrews

**476.103.00**  
**Air End Kit**  
(For cast iron centers)  
Sleeve and Spool Set, Pilot Valve Body Assembly, Bumpers, Bushings, Gaskets, O-rings, Seals, Plungers, and Retaining Rings

**476.311.000**  
**Air End Kit**  
(For aluminum centers)  
Sleeve and Spool Set, Pilot Valve Body Assembly, Bumpers, Bushings, Gaskets, O-rings, Seals, Plungers, and Retaining Rings

**476.341.000**  
**Air End Refurbishment Kit**  
(With new die cast aluminum air valve body)  
Bumpers, Bushings, Gaskets, O-rings, Seals, Plungers, and Retaining Rings

**476.313.000**  
**Air End Refurbishment Kit**  
(For cast iron centers with conductive polypropylene air valve body)  
Bumpers, Bushings, Gaskets, O-rings, Seals, Plungers, and Retaining Rings

**476.309.354**  
**Wet End Kit**  
Santoprene Diaphragms, Santoprene Check Balls, PTFE Manifold Gaskets, Conductive EPDM Gaskets, and Copper Sealing Washers

**476.309.356**  
**Wet End Kit**  
Hytrel Diaphragms, Hytrel Check Balls, Fiber Manifold Gaskets, Conductive Nitrile Flange Gaskets, and Copper Sealing Washers

**476.309.360**  
**Wet End Kit**  
Nitrile Diaphragms, Nitrile Check Balls, Fiber Manifold Gaskets, Conductive Nitrile Flange Gaskets, and Copper Sealing Washers

**476.309.363**  
**Wet End Kit**  
FKM Diaphragms, FKM Check Balls, PTFE Gaskets, and Copper Sealing Washers

**476.309.365**  
**Wet End Kit**  
Neoprene Diaphragms, Neoprene Check Balls, Fiber Manifold Gaskets, Conductive Neoprene Flange Gaskets, and Copper Sealing Washers

**476.309.368**  
**Wet End Kit**  
FKM Diaphragms, PTFE Check Balls, PTFE Gaskets, and Copper Sealing Washers

**476.309.364**  
**Wet End Kit**  
EPDM Diaphragms, PTFE Check Balls, PTFE Manifold Gaskets, Conductive EPDM Gaskets, and Copper Sealing Washers

**476.309.365**  
**Wet End Kit**  
Neoprene Backup Diaphragms, PTFE Overlay Diaphragms, PTFE Check Balls, PTFE Gaskets, and Copper Sealing Washers

**476.309.368**  
**Wet End Kit**  
Hytrel Backup Diaphragms, PTFE Overlay Diaphragms, PTFE Check Balls, PTFE Gaskets, and Copper Sealing Washers

**476.309.631**  
**Wet End Kit**  
One-Piece Bonded PTFE Diaphragms, PTFE Check Balls, PTFE Gaskets, and Copper Sealing Washers
## Composite Repair Parts List

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
<th>Qty.</th>
<th>Item</th>
<th>Part Number</th>
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**LEGEND:**

- = Items contained within Air End Kits
- = Items contained within Wet End Kits
- = Items contained within Wet End Kits

*Air End Kit only includes sleeve and spool set, not entire air valve assembly

**Note:** Kits contain components specific to the material codes.

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**SANDPIPERPUMP.COM**

Model SB1 & SB25 • 13
Material Codes - The Last 3 Digits of Part Number

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

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
With Aluminum Center

Air Distribution Valve Servicing
See repair parts drawing, remove screws.

Step 1: Remove hex capscrews (1E).
Step 2: Remove end cap (1D).
Step 3: Remove spool part of (1A) (caution: do not scratch).
Step 4: Press sleeve (1A) from body (1B).
Step 5: Inspect bumpers (1C) and o-rings (1F).
Step 6: Lightly lubricate O-Rings (1F) on sleeve (1A).
Step 7: Press sleeve (1A) into body (1B).
Step 8: Reassemble in reverse order, starting with step 3.

Main Air Valve Assembly Parts List

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<td>F</td>
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<td>7/8 ID X 1/16 CS O-Ring</td>
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Note: Sleeve and spool (1A) set is match ground to a specified clearance sleeve and spoolls (1A) cannot be interchanged.

ATEX Compliant

LEGEND:

= Items contained within Air End Kits

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**

*With Cast Iron Center*

**Air Distribution Valve Servicing**

See repair parts drawing, remove screws.

**Step 1:** Remove end cap retainer (1E).

**Step 2:** Remove end cap (1C).

**Step 3:** Remove spool part of (1A) (caution, do not scratch).

**Step 4:** Press sleeve (1A) from body (1B).

**Step 5:** Inspect O-Ring (1D) and replace if necessary.

**Step 6:** Lightly lubricate O-Rings (1D) on spool (1A).

**Step 7:** Press sleeve (1A) into body (1B).

**Step 8:** Reassemble in reverse order.

**Note:** Sleeve and spool (1A) set is match ground to a specified clearance sleeve and spools (1A) cannot be interchanged.

---

**Main Air Valve Assembly Parts List**

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⚠️ ATEX Compliant
### Pilot Valve Assembly

**Pilot Valve Servicing**

With Pilot Valve removed from pump.

**Step 1:** Remove snap ring (4F).

**Step 2:** Remove sleeve (4B), inspect O-Rings (4C), replace if required.

**Step 3:** Remove spool (4D) from sleeve (4B), inspect O-Rings (4E), replace if required.

**Step 4:** Lightly lubricate O-Rings (4C) and (4E).

Reassemble in reverse order.

---

### Pilot Valve Assembly Parts List

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**Legend:**
- O = Items contained within Air End Kits

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**ATEX Compliant**
Diaphragm Service Drawing

Diaphragm Service Drawing - with Overlay

Diaphragm Service Drawing - One Piece Bonded
**Diaphragm Servicing**

**Step 1:** With manifolds and outer chambers removed, remove diaphragm assemblies from diaphragm rod. **DO NOT** use a pipe wrench or similar tool to remove assembly from rod. Flaws in the rod surface may damage bearings and seal. Soft jaws in a vise are recommended to prevent diaphragm rod damage.

**Step 1.A:** **NOTE:** Not all inner diaphragm plates are threaded. Some models utilize a through hole in the inner diaphragm plate. If required to separate diaphragm assembly, place assembly in a vise, gripping on the exterior cast diameter of the inner plate. Turn the outer plate clockwise to separate the assembly.

Always inspect diaphragms for wear cracks or chemical attack. Inspect inner and outer plates for deformities, rust scale and wear. Inspect intermediate bearings for elongation and wear. Inspect diaphragm rod for wear or marks. Clean or repair if appropriate. Replace as required.

**Step 2:** Reassembly: There are two different types of diaphragm plate assemblies utilized throughout the Sandpiper product line: Outer plate with a threaded stud, diaphragm, and a threaded inner plate. Outer plate with a threaded stud, diaphragm, and an inner plate with through hole. Secure threaded inner plate in a vise. Ensure that the plates are being installed with the outer radius against the diaphragm.

**Step 3:** Lightly lubricate, with a compatible material, the inner faces of both outer and inner diaphragm plates when using on non Overlay diaphragms (For EPDM water is recommended). No lubrication is required.

**Step 4:** Push the threaded outer diaphragm plate through the center hole of the diaphragm. **Note:** Most diaphragms are installed with the natural bulge out towards the fluid side. S05, S07, and S10 non–metallic units are installed with the natural bulge in towards the air side.

**Step 5:** Thread or place, outer plate stud into the inner plate. For threaded inner plates, use a torque wrench to tighten the assembly together. Torque values are called out on the exploded view. Repeat procedure for second side assembly. 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 6:** Thread one assembly onto the diaphragm rod with sealing washer (when used) and bumper.

**Step 7:** Install diaphragm rod assembly into pump and secure by installing the outer chamber in place and tightening the capscrews.

**Step 8:** On opposite side of pump, thread the remaining assembly onto the diaphragm rod. Using a torque wrench, tighten the assembly to the diaphragm rod. Align diaphragm through bolt holes, always going forward past the recommended torque. Torque values are called out on the exploded view. **NEVER** reverse to align holes, if alignment cannot be achieved without damage to diaphragm, loosen complete assemblies, rotate diaphragm and reassemble as described above.

**Step 9:** Complete assembly of entire unit.

One Piece Diaphragm Servicing (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.
## Dual Port Options

Illustration for Dual Port Suction and Single or Dual Port Discharge

### Dual Port Suction / Single Discharge Repair Parts List

<table>
<thead>
<tr>
<th>Item</th>
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### Dual Port Suction and Discharge Repair Parts List

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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 for complete warranty, including terms and conditions, limitations and exclusions. ~

Declaration of Conformity

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


This product has used Harmonized Standard EN809:2012, Pumps and Pump Units for Liquids - Common Safety Requirements, to verify conformance.

October 20, 2005
Date of issue

David Roseberry
Signature of authorized person

Director of Engineering
Title

Authorised Representative:
IDEX Pump Technologies
R79 Shannon Industrial Estate
Shannon, Co. Clare, Ireland

Attn: Barry McMahon

February 27, 2017
Date of revision

Revision Level: F
EU Declaration of Conformity

Manufacturer:
Warren Rupp, Inc.
A Unit of IDEX Corporation
800 North Main Street
Mansfield, OH 44902 USA

Warren Rupp, Inc. declares that Air Operated Double Diaphragm Pumps (AODD) and Surge Suppressors listed below comply with the requirements of Directive 2014/34/EU and all applicable standards.

Applicable Standards
- EN ISO 60079-25: 2010

1. AODD Pumps and Surge Suppressors - Technical File No.: 20310400-1410/MER

Hazardous Location Applied:
- II 2 G Ex h IIC T5...225°C (T2) Gb
- II 2 D Ex h IIC T100°C...T200°C Db
- II 2 G Ex h II B T5...225°C (T2) Gb
- II 2 D Ex h IIIB T100°C...T200°C Db

- Metallic pump models with external aluminum components (S Series, HD Series, G Series, DMF Series, MSA Series, U Series, F Series, T Series, EH Series, SH Series, GH Series )
- Conductive plastic pump models with integral muffler (S Series, PB Series)
- Tranquilizer® surge suppressors

2. AODD Pumps - EU Type Examination Certificate No.: DEKRA 18ATEX0094X - DEKRA Certification B.V. (0344) Meander 1051 6825 MJ Arnhem The Netherlands

Hazardous Location Applied:
- I M1 Ex h I Ma
- II 1 G Ex h IIC T5...225°C (T2) Ga
- II 1 D Ex h IIIC T100°C...T200°C Da

- II 2 G Ex h ia IIC T5 Gb
- II 2 D Ex h ia IIIC T100°C Db
- II 2 G Ex h mb II C T5 Gb
- II 2 D Ex mb tb IIIC T100° Db

- Metallic pump models with no external aluminum (S series, HD Series, G series)
- Conductive plastic pumps equipped with metal muffler (S series, PB Series)
- ATEX pump models equipped with ATEX rated pulse output kit or solenoid kit

See “ATEX Details” page in user’s manual for more information
See “Safety Information” page for conditions of safe use

DATE/APPROVAL/TITLE:
26 SEP 2018

David Roseberry, Director of Engineering