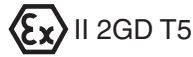




# SERVICE AND OPERATING MANUAL

## Model SB1-A/SB25A



Type 4

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# SERVICE AND OPERATING MANUAL

## Model SB1-A/SB25A



Type 4

### PLEASE NOTE!

The photos shown in this manual are for general instruction only. Your specific model may not be shown. Always refer to the parts list and exploded view drawing for your specific model when installing, disassembling or servicing your pump.

### PRINCIPLE OF PUMP OPERATION

This ball valve pump is powered by compressed air and is a 1:1 pressure ratio design. It alternately pressurizes the inner side of one diaphragm chamber, while simultaneously exhausting the other inner chamber. This causes the diaphragms, which are connected by a common rod, to move endwise. Air pressure is applied over the entire surface of the diaphragm, while liquid is discharged from the opposite side. The diaphragm operates under a balanced condition during the discharge stroke, which allows the unit to be operated at discharge heads over 200 feet (61 meters) of water head.

Since the diaphragms are connected by a common rod, secured by plates to the center of the diaphragms, one diaphragm performs the discharge stroke, while the other is pulled to perform the suction stroke in the opposite chamber.

For maximum diaphragm life, keep the pump as close to the liquid being pumped as possible. Positive suction head in excess of 10 feet of liquid (3.048 meters) is not recommended. For applications with higher suction heads, consult the factory.

Alternate pressuring and exhausting of the diaphragm chamber is performed by means of an externally mounted, pilot operated, four-way spool type air distribution valve. When the spool shifts to one end of the valve body, inlet air pressure is applied to one diaphragm chamber and the other diaphragm chamber exhausts. When the spool shifts to the opposite end of the valve body, the porting of chambers is reversed. The air distribution valve spool is moved by an internal pilot valve which alternately pressurizes one side of the air distribution valve spool, while exhausting the other side. The pilot valve is shifted at each end of the diaphragm stroke by the diaphragm plate coming in contact with the end of the pilot valve spool. This pushes it into position for shifting of the air distribution valve.

The chambers are manifolded together with a suction and discharge check valve for each chamber, maintaining flow in one direction through the pump.

### INSTALLATION & START-UP

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

For installations of rigid piping, short flexible sections of hose should be installed between pump and piping. This reduces vibration and strain to the piping system. A Warren Rupp Tranquilizer<sup>®</sup> surge suppressor is recommended to further reduce pulsation in flow. Tighten all fasteners before pump startup.

This pump was tested at the factory prior to shipment and is ready for operation. It is completely self-priming from a dry start for suction lifts of 10-15 feet (3.05-4.57 meters) or less. For suction lifts exceeding 15 feet of liquid, fill the chambers with liquid prior to priming.

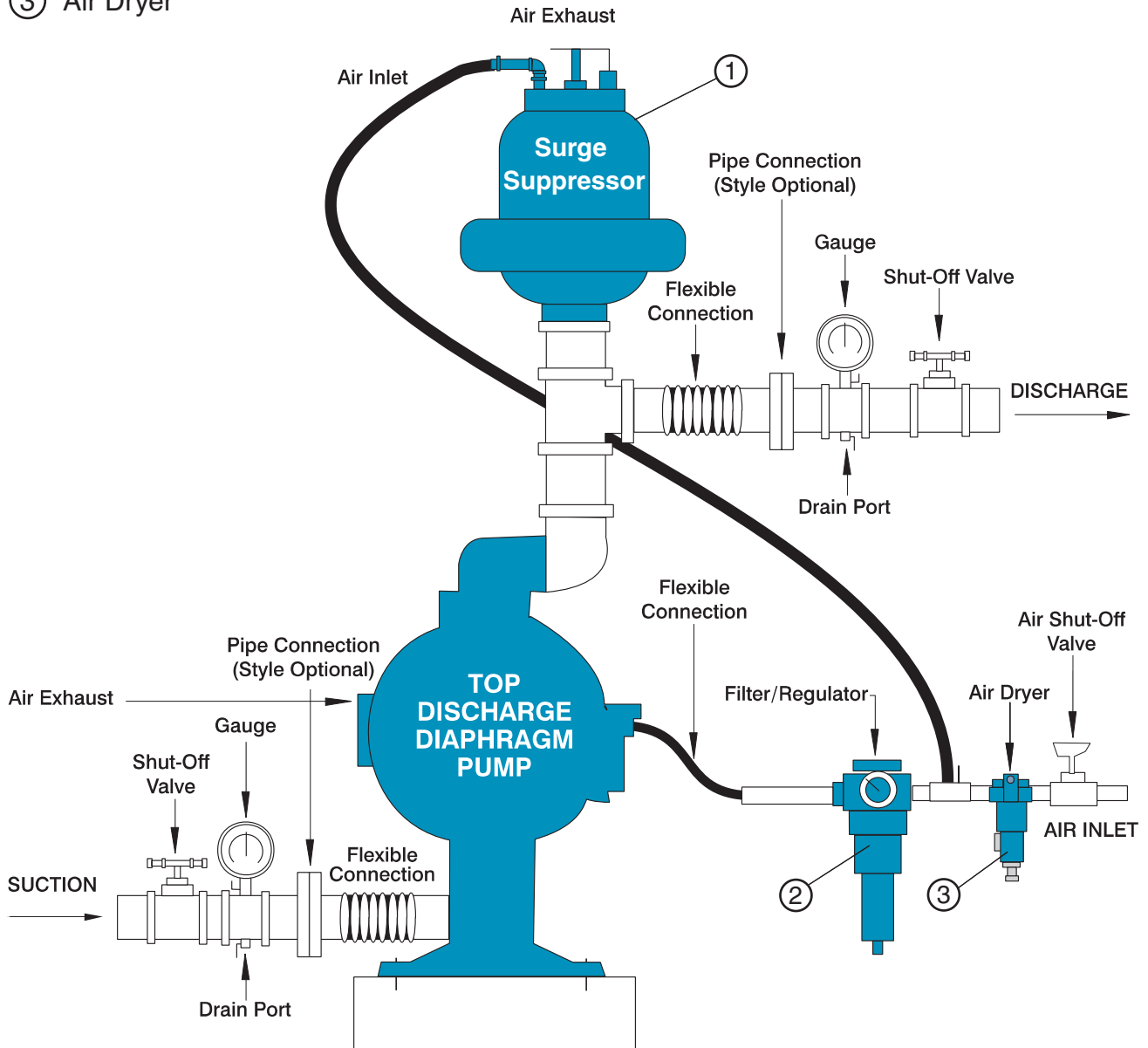
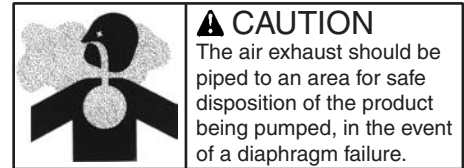
### AIR SUPPLY

Air supply pressures cannot exceed 125 psi (8.61 bar). Connect the pump air inlet to an air supply of sufficient capacity and pressure required for desired performance. When the air line is solid piping, use a short length of flexible hose (not less than 3/4" (19mm) in diameter) between pump and piping to eliminate strain to pipes.

## INSTALLATION GUIDE Top Discharge Ball or Flap Valve Unit

Available from  
Warren Rupp

- ① Tranquilizer®/Surge Suppressor
- ② Filter/Regulator
- ③ Air Dryer



## AIR INLET & PRIMING

For start-up, open an air valve approximately 1/2" to 3/4" turn. After the unit primes, an air valve can be opened to increase flow as desired. If opening the valve increases cycling rate, but does not increase flow rate, cavitation has occurred, and the valve should be closed slightly.

For the most efficient use of compressed air and the longest diaphragm life, throttle the air inlet to the lowest cycling rate that does not reduce flow.

## AIR EXHAUST

If a diaphragm fails, the pumped liquid or fumes can enter the air end of the pump, and be exhausted into the atmosphere. When pumping hazardous or toxic materials, pipe the exhaust to an appropriate area for safe disposition.

This pump can be submerged if materials of construction are compatible with the liquid. The air exhaust must be piped above the liquid level. Piping used for the air exhaust must not be smaller than 1" (2.54 cm). Reducing the pipe size will restrict air flow and reduce pump performance. When the product source is at a higher level than the pump (flooded suction), pipe the exhaust higher than the product source to prevent siphoning spills.

Freezing or icing-up of the air exhaust can occur under certain temperature and humidity conditions. Use of an air dryer should eliminate most icing problems.

## BETWEEN USES

When used for materials that tend to settle out or transform to solid form, the pump should be completely flushed after each use, to prevent damage. Product remaining in the pump between uses could dry out or settle out. This could cause problems with valves and diaphragms at re-start. In freezing temperatures, the pump must be drained between uses in all cases.

## CHECK VALVE SERVICING

Need for inspection or service is usually indicated by poor priming, unstable cycling, reduced performance or the pump's cycling but not pumping.

Remove the six flange bolts securing the inlet and outlet flanges to the manifold. Inspect the surfaces of both check valve and seat for wear or damage that could prevent proper sealing. If pump is to prime properly, valves must seat air tight.

## DIAPHRAGM SERVICING

Remove the four bolts securing the manifold flange to the chamber. Remove the eight nuts securing the outer diaphragm chamber flange and remove the chamber. Loosen the capscrew securing the diaphragm and plate to the rod by leaving the diaphragm engaged with the capscrews around the outer flange, preventing rotation of the rod. **DO NOT USE A WRENCH ON THE DIAPHRAGM ROD. FLAWS ON THE SURFACE MAY DAMAGE BEARINGS AND SEAL.**

During reassembly make certain that the rubber bumper is on the rod on each side. Install the diaphragm with the natural bulge outward as indicated on the diaphragm. Install the heavier plate on the outside of the diaphragm and make certain that the large radius side of both plates are toward the diaphragm. Place the sealing washer between the inner diaphragm plate and the end of the rod. Tighten the capscrew to approximately 25 ft. lbs. (33.9 Newton meters). Torque while allowing diaphragm to turn freely with plates. Except for EPDM Rubber, use a lightweight oil between plates and diaphragm when doing this procedure. Use a wrench on the capscrew of the opposite side to keep the rod from rotating. If the opposite chamber is assembled, the rod need not be held.

When reassembling the outer chambers and the manifold, the bolts securing the manifold flange to the chamber should be snugged prior to tightening the chamber bolts, to insure that the chamber port flange is square with the manifold flange. Finish tightening the manifold flange bolts after chamber bolting is secured.

## AIR VALVE LUBRICATION

***The SANDPIPER pump's pilot valve and main air valve assemblies are designed to operate WITHOUT lubrication. This is the preferred mode of operation.*** There may be instances of personal preference, or poor quality air supplies when lubrication of the compressed air supply is required. The pump air system will operate with properly lubricated compressed air supplies. Proper lubrication of the compressed air supply would entail the use of an air line lubricator (available from Warren

Rupp) set to deliver one drop of 10 weight, non-detergent oil for every 20 SCFM of air the pump consumed at its point of operation. Consult the pump's published Performance Curve to determine this.

It is important to remember to inspect the sleeve and spool set routinely. It should move back and forth freely. This is most important when the air supply is lubricated. If a lubricator is used, oil accumulation will, over time, collect any debris from the compressed air. This can prevent the pump from operating properly.

Water in the compressed air supply can create problems such as icing or freezing of the exhaust air causing the pump to cycle erratically, or stop operating. This can be addressed by using a point of use air dryer to supplement a plant's air drying equipment. This device will remove excess water from the compressed air supply and alleviate the icing or freezing problem.

## ESADS+PLUS®: EXTERNALLY SERVICEABLE AIR DISTRIBUTION SYSTEM

Please refer to the exploded view drawing and parts list in the Service Manual supplied with your pump. If you need replacement or additional copies, contact your local Warren Rupp Distributor, or the Warren Rupp factory Literature Department. To receive the correct manual, you must specify the MODEL and TYPE information found on the name plate of the pump.

The main air valve sleeve and spool set is located in the valve body mounted on the pump with four hex head capscrews. The valve body assembly is removed from the pump by removing these four hex head capscrews.

With the valve body assembly off the pump, access to the sleeve and spool set is made by removing a retaining ring (each end) securing the end cap on the valve body assembly. With the end caps removed, slide the spool back and forth in the sleeve. The spool is closely sized to the sleeve and must move freely to allow for proper pump operation. An accumulation of oil, dirt or other contaminants from the pump's air supply, or from a failed diaphragm, may prevent the spool from moving freely. This can cause the spool to stick in a position that prevents the pump from operating. If this is the case, the sleeve and spool set should be removed from the valve body for cleaning and further inspection.

Remove the spool from the sleeve. Using an arbor press or bench vise (with an improvised mandrel), press the sleeve from the valve body. Take care not to damage the sleeve. At this point, inspect the o-rings on the sleeve for nicks, tears or abrasions. Damage of this sort could happen during assembly or servicing. A sheared or cut o-ring can allow the pump's compressed air supply to leak or bypass within the air valve assembly, causing the pump to leak compressed air from the pump air exhaust or not cycle properly. This is most noticeable at pump dead head or high discharge pressure conditions. Replace any of these o-rings as required or set up a routine, preventive maintenance schedule to do so on a regular basis. This practice should include cleaning the spool and sleeve components with a safety solvent or equivalent, inspecting for signs of wear or damage, and replacing worn components.

To re-install the sleeve and spool set, lightly lubricate the o-rings on the sleeve with an o-ring assembly lubricant or lightweight oil (such as 10 wt. air line lubricant). Re-install one end cap, and retaining ring (see safety warning), on the valve body. Using the arbor press or bench vise that was used in disassembly, carefully press the sleeve back into the valve body, without shearing the o-rings. Re-install the spool, opposite end cap and retaining ring (see safety warning), on the valve body. After inspecting and cleaning the gasket surfaces on the valve body and intermediate, reinstall the valve body on the pump using new gaskets. Tighten the four hex head capscrews evenly and in an alternating cross pattern, at 150 in./lbs. (16.94 Newton meters).

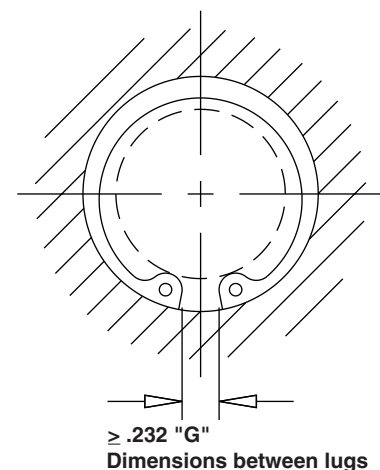
## PILOT VALVE

The pilot valve assembly is accessed by removing the main air distribution valve body from the pump and lifting the pilot valve body out of the intermediate housing.

Most problems with the pilot valve can be corrected by replacing the o-rings. Always grease the spool prior to inserting it into the sleeve. If the sleeve is removed from the body, reinsertion must be at the chamfered side. Grease the o-rings to slide the sleeve into the valve body. Securely insert the retaining ring around the sleeve. When reinserting the pilot valve, push both plungers (located inside the intermediate bracket) out of the path of the pilot valve spool ends to avoid damage.

**⚠ SAFETY WARNING ⚠**

*To assure proper pump function and safe installation of the retaining ring, check the gap "G" dimension for full installation into the valve body grooves.*



## PILOT VALVE ACTUATOR

Bushings for the pilot valve actuators are held in the inner chambers with retaining rings. An o-ring is behind each bushing. If the plunger has any sideways motion, check o-rings and bushing for deterioration or wear. The plunger may be removed for inspection or replacement. First remove the air distribution valve body and the pilot valve body from the pump. The plungers can be located by looking into the intermediate. It may be necessary to use a fine piece of wire to pull them out. The bushing can be turned out through the inner chamber by removing the outer chamber assembly. Replace the bushings if pins have bent.

## SERVICE INSTRUCTIONS: TROUBLE SHOOTING

### Pump will not cycle

- A. Check to make sure the unit has enough pressure to operate and that the air inlet valve is open.
- B. Check the discharge line to insure that the discharge line is neither closed nor blocked.
- C. If the spool in the air distribution valve is not shifting, check the main spool. It must slide freely.
- D. Excessive air leakage in the pump can prevent cycling. This condition will be evident. Air leakage into the discharge line indicates a ruptured diaphragm. Air leakage from the exhaust port indicates leakage in the air distribution valve. See further service instructions.
- E. Blockage in the liquid chamber can impede movement of diaphragm.

### Pump cycles but will not pump

- A. Suction side of pump pulling in air. Check the suction line for air leaks and be sure that the end of the suction line is submerged. Check flange bolting. Check valve flanges and manifold to chamber flange joints.
- B. Make certain the suction line or strainer is not plugged. Restriction at the suction is indicated by a high vacuum reading when a vacuum gauge is installed in the suction line.
- C. Check valves may not be seating properly. To check, remove the suction line and cover the suction port with your hand. If the unit does not pull a good suction (vacuum), the check valves should be inspected for proper seating.
- D. Static suction lift may be too high. Priming can be improved by elevating the suction and discharge lines higher than the check valves and pouring liquid into the unit through the suction inlet. When priming at high suction lifts or with long suction lines operate the pump at maximum cycle rate.

### Low performance

- A. Capacity is reduced as the discharge pressure increases, as indicated on the performance curve. Performance capability varies with available inlet air supply. Check air pressure at the pump inlet when the pump is operating to make certain that adequate air supply is maintained.
- B. Check vacuum at the pump suction. Capacity is reduced as vacuum increases. Reduced flow rate due to starved suction will be evident when cycle rate can be varied without change in capacity. This condition will be more prevalent when pumping viscous liquids. When pumping thick, heavy materials the suction line must be kept as large in diameter and as short as possible, to keep suction loss minimal.
- C. Low flow rate and slow cycling rate indicate restricted flow through the discharge line. Low flow rate and fast cycling rate indicate restriction in the suction line or air leakage into suction.
- D. Unstable cycling indicates improper check valve seating on one chamber. This condition is confirmed when unstable cycling repeats consistently on alternate exhausts. Cycling that is not consistently unstable may indicate partial exhaust restriction due to freezing and thawing of exhaust air. Use of an air dryer should solve this problem.

For additional information, see the Warren Rupp Troubleshooting Guide.

## WARRANTY

This pump is warranted for a period of five years against defective material and workmanship. Failure to comply with the recommendations stated in this manual voids all factory warranty.

### RECOMMENDED WARREN RUPP ACCESSORIES TO MAXIMIZE PUMP PERFORMANCE:

- Tranquilizer® Surge Suppressor. For nearly pulse-free flow.
- Warren Rupp Filter/Regulator. For modular installation and service convenience.
- Warren Rupp Speed Control. For manual or programmable process control. Manual adjustment or 4-20mA reception.

For more detailed information on these accessories, contact your local Warren Rupp Factory-Authorized Distributor, or Warren Rupp corporate headquarters or visit:

[www.warrenrupp.com](http://www.warrenrupp.com)




# IMPORTANT SAFETY INFORMATION




**IMPORTANT**

Read these safety warnings and instructions in this manual completely, before installation and start-up of the pump. 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.



**WARNING**

Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers or other miscellaneous equipment must be grounded. (See page 32)



**WARNING**

This pump is pressurized internally with air pressure during operation. Always make certain that all bolting is in good condition and that all of the correct bolting is reinstalled during assembly.



**CAUTION**

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




**WARNING**

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



**WARNING**

Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. The discharge line may be pressurized and must be bled of its pressure.



**WARNING**

Before doing any maintenance on the pump, be certain all pressure is completely vented from the pump, suction, discharge, piping, and all other openings and connections. Be certain the air supply is locked out or made non-operational, so that it cannot be started while work is being done on the pump. Be certain that approved eye protection and protective clothing are worn all times in the vicinity of the pump. Failure to follow these recommendations may result in serious injury or death.



**WARNING**

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 which is hazardous or toxic, the air exhaust must be piped to an appropriate area for safe disposition.



**WARNING**

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

## RECYCLING

Many components of SANDPIPER® AODD pumps are made of recyclable materials (see chart on page 9 for material specifications). We encourage pump users to recycle worn out parts and pumps whenever possible, after any hazardous pumped fluids are thoroughly flushed.



Pump complies with EN809 Pumping Directive, Directive 98/37/EC Safety of Machinery, and Directive 94/9/EC, EN13463-1 Equipment for use in Potentially Explosive Environments. For reference to the directive certificates visit: [www.warrenrupp.com](http://www.warrenrupp.com). The Technical File No. AX1 is stored at KEMA, Notified Body 0344, under Document #203040000.

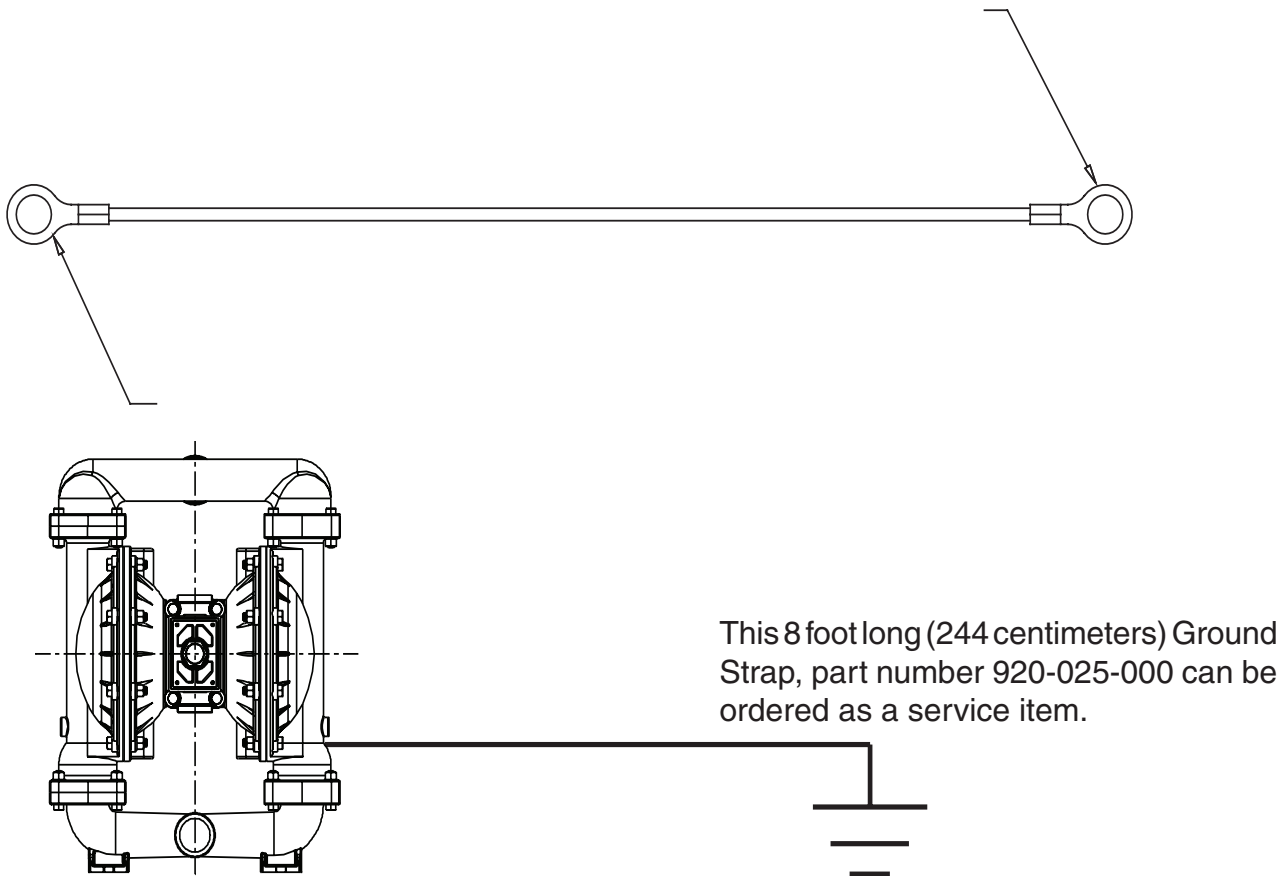




# GROUNDING THE PUMP

To be fully groundable, the pumps must be ATEX Compliant. Refer to pump data sheet for ordering.

	<b>WARNING</b>	
<p><i>Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers or other miscellaneous equipment must be grounded.</i></p>		



To reduce the risk of static electrical sparking, this pump must be grounded. Check the local electrical code for detailed grounding instruction and the type of equipment required, or in the absence of local codes, an industry or nationally recognized code having jurisdiction over specific installations.

## MATERIAL CODES THE LAST 3 DIGITS OF PART NUMBER

000	Assembly, sub-assembly; and some purchased items	342	Filled Nylon	580	Ryton
010	Cast Iron	351	Food Grade Santoprene	590	Valox
012	Powered Metal	353	Geolast; Color: Black	591	Nylatron G-S
015	Ductile Iron	354	Injection Molded #203-40 Santoprene- Duro 40D +/-5; Color: RED	592	Nylatron NSB
020	Ferritic Malleable Iron			600	PTFE (virgin material) Tetrafluorocarbon (TFE)
025	Music Wire	355	Thermal Plastic	601	PTFE (Bronze and moly filled)
080	Carbon Steel, AISI B-1112	356	Hytrell	602	Filled PTFE
100	Alloy 20	357	Injection Molded Polyurethane	603	Blue Gylon
110	Alloy Type 316 Stainless Steel	358	Urethane Rubber (Some Applications) (Compression Mold)	604	PTFE
111	Alloy Type 316 Stainless Steel (Electro Polished)			606	PTFE
112	Alloy C	359	Urethane Rubber	607	Envelon
113	Alloy Type 316 Stainless Steel (Hand Polished)	360	Nitrile Rubber Color coded: RED	608	Conductive PTFE
114	303 Stainless Steel	361	Nitrile	610	PTFE Encapsulated Silicon
115	302/304 Stainless Steel	363	FKM (Fluorocarbon). Color coded: YELLOW	611	PTFE Encapsulated FKM
117	440-C Stainless Steel (Martensitic)	364	E.P.D.M. Rubber. Color coded: BLUE	632	Neoprene/Hytrel
120	416 Stainless Steel (Wrought Martensitic)	365	Neoprene Rubber. Color coded: GREEN	633	FKM/PTFE
123	410 Stainless Steel (Wrought Martensitic)	366	Food Grade Nitrile	634	EPDM/PTFE
148	Hardcoat Anodized Aluminum	368	Food Grade EPDM	635	Neoprene/PTFE
149	2024-T4 Aluminum	370	Butyl Rubber Color coded: BROWN	637	PTFE , FKM/PTFE
150	6061-T6 Aluminum	371	Philthane (Tuftane)	638	PTFE , Hytrel/PTFE
151	6063-T6 Aluminum	374	Carboxylated Nitrile	639	Nitrile/TFE
152	2024-T4 Aluminum (2023-T351)	375	Fluorinated Nitrile	643	Santoprene®/EPDM
154	Almag 35 Aluminum	378	High Density Polypropylene	644	Santoprene®/PTFE
155	356-T6 Aluminum	379	Conductive Nitrile	656	Santoprene Diaphragm and Check Balls/EPDM Seats
156	356-T6 Aluminum	405	Cellulose Fibre	661	EPDM/Santoprene
157	Die Cast Aluminum Alloy #380	408	Cork and Neoprene	666	FDA Nitrile Diaphragm, PTFE Overlay, Balls, and Seals
158	Aluminum Alloy SR-319	425	Compressed Fibre	668	PTFE, FDA Santoprene/PTFE
159	Anodized Aluminum	426	Blue Gard		
162	Brass, Yellow, Screw Machine Stock	440	Vegetable Fibre		Delrin and Hytrel are registered tradenames of E.I. DuPont.
165	Cast Bronze, 85-5-5-5	465	Fibre		Gylon is a registered tradename of Garlock, Inc.
166	Bronze, SAE 660	500	Delrin 500		Nylatron is a registered tradename of Polymer Corp.
170	Bronze, Bearing Type, Oil Impregnated	501	Delrin 570		Santoprene is a registered tradename of Monsanto Corp.
175	Die Cast Zinc	502	Conductive Acetal, ESD-800		Rulon II is a registered tradename of Dixion Industries Corp.
180	Copper Alloy	503	Conductive Acetal, Glass-Filled		Ryton is a registered tradename of Phillips Chemical Co.
305	Carbon Steel, Black Epoxy Coated	505	Acrylic Resin Plastic		Valox is a registered tradename of General Electric Co.
306	Carbon Steel, Black PTFE Coated	506	Delrin 150		PortaPump, Tranquilizer and SludgeMaster are registered tradenames of Warren Rupp, Inc.
307	Aluminum, Black Epoxy Coated	520	Injection Molded PVDF Natural color		
308	Stainless Steel, Black PTFE Coated				
309	Aluminum, Black PTFE Coated	540	Nylon		
310	PVDF Coated	541	Nylon		
313	Aluminum, White Epoxy Coated	542	Nylon		
330	Zinc Plated Steel	544	Nylon Injection Molded		
331	Chrome Plated Steel	550	Polyethylene		
332	Aluminum, Electroless Nickel Plated	551	Glass Filled Polypropylene		
333	Carbon Steel, Electroless Nickel Plated	552	Unfilled Polypropylene		
335	Galvanized Steel	553	Unfilled Polypropylene		
336	Zinc Plated Yellow Brass	555	Polyvinyl Chloride		
337	Silver Plated Steel	556	Black Vinyl		
340	Nickel Plated	558	Conductive HDPE		
		570	Rulon II		

**WARREN  
RUPP®**

**IDEX**  
FLUID & METERING

## Declaration of Conformity

Warren Rupp, Inc., 800 North Main Street, Mansfield, Ohio, certifies that Air-Operated Double Diaphragm Metallic Pumps Series: HDB, HDF, M Non-Metallic, S Non-Metallic, M Metallic, S Metallic, Containment Duty, Gas, UL, High Pressure, W, Submersible and Tranquilizers comply with the European Community Directive 98/37/EC, Safety of Machinery. This product has used EN 809, Pumps and Pump Units for Liquids - Common Safety Requirements harmonized standard to verify conformance.

*David Roseberry*  
Signature of authorized person

October 20, 2005

Date of issue

David Roseberry

Printed name of authorized person

Engineering Manager

Title

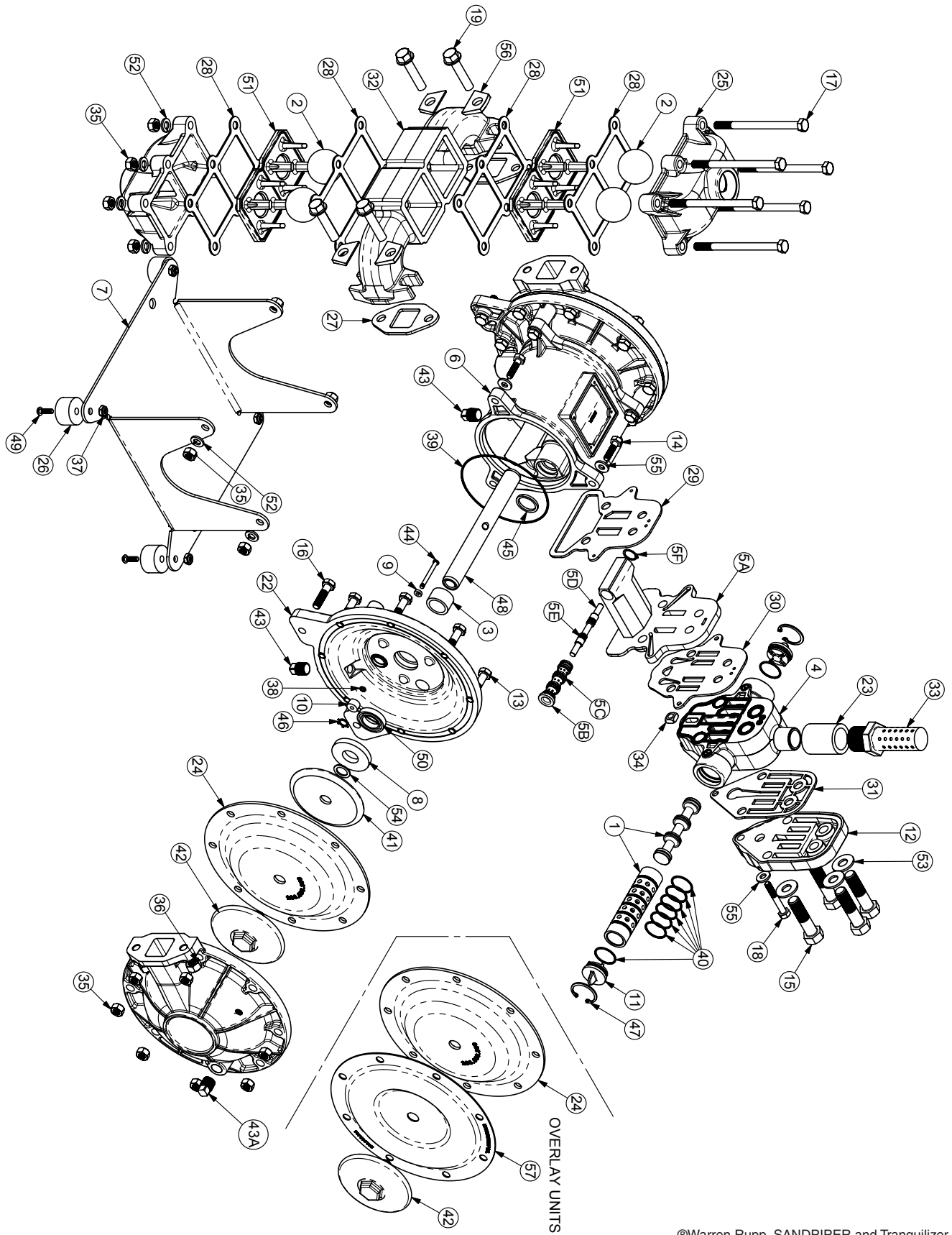
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## Composite Repair Parts List

ITEM NO.	PART NUMBER	DESCRIPTION	TOTAL RQD.
1	031.039.000	Sleeve and Spool Set	1
2	050.008.354	Check Ball	4
	050.008.356	Check Ball	4
	050.008.360	Check Ball	4
	050.008.363	Check Ball	4
	050.008.365	Check Ball	4
	050.011.600	Check Ball	4
3	070.012.170	Sleeve Bearing	2
4	095.051.558	Valve Body	1
5	095.074.000	Pilot Valve Assembly	1
5A	095.071.551	Pilot Valve Body	1
5B	755.025.162	Pilot Valve Sleeve	1
5C	560.033.360	O-ring	4
5D	775.014.115	Pilot Valve Spool	1
5E	560.023.360	O-ring	4
5F	675.037.080	Retaining Ring	1
6	114.007.157	Intermediate Bracket	1
	114.012.010	Intermediate Bracket (cast iron centers)	1
7	115.071.330	Mounting Bracket	1
	115.070.330	Mounting Bracket (top ported only)	1
8	132.019.360	Bumper	2
9	132.022.360	Actuator Bumper	2
10	135.034.506	Bushing	2
11	165.038.356	End Cap	2
12	165.042.157	Valve Body Cap	1
	165.042.558	Valve Body Cap (cast iron centers)	1
13	170.029.330	Hex Capscrew	16
14	170.032.330	Hex Capscrew 1/4-20 x 1.00	6
15	170.033.330	Hex Capscrew 3/8-16 x 3.25	4
16	170.045.330	Hex Capscrew	4
17	170.047.330	Hex Capscrew	6
18	170.063.115	Hex Capscrew	1
19	171.010.330	Flanged Capscrew	4
20	196.012.110	Outer Chamber	2
	196.012.112	Outer Chamber	2
	196.012.157	Outer Chamber	2
21	196.042.157	Inner Chamber	1
	196.090.010	Inner Chamber (cast iron centers)	1
22	196.043.157	Inner Chamber	1
	196.084.010	Inner Chamber (cast iron centers)	1
23	255.012.335	Pipe Coupling 3/4 NPT	1
24	286.008.354	Diaphragm	2
	286.008.356	Diaphragm	2
	286.008.360	Diaphragm	2

ITEM NO.	PART NUMBER	DESCRIPTION	TOTAL RQD.
24	286.008.363	Diaphragm	2
	286.008.364	Diaphragm	2
	286.008.365	Diaphragm	2
	286.008.366	Diaphragm	2
25	334.013.110	Porting Flange 1" NPT	2
	334.013.110 E	Porting Flange 1" BSP Tapered	2
	334.013.112	Porting Flange 1" NPT	2
	334.013.112 E	Porting Flange 1" BSP Tapered	2
	334.013.157	Porting Flange 1" NPT	2
	334.013.157 E	Porting Flange 1" BSP Tapered	2
26	350.002.360	Rubber Foot	4
27	360.030.426	Gasket	2
	360.030.600	Gasket	2
28	360.031.379	Gasket	4
	360.031.384	Gasket	4
	360.031.608	Gasket	4
29	360.056.379	Gasket	1
30	360.057.360	Gasket	1
31	360.058.360	Gasket	1
32	518.006.110	Manifold	1
	518.006.112	Manifold	1
	518.006.156	Manifold	1
33	530.036.000	Muffler	1
34	542.001.330	Square Nut	1
35	545.004.330	Hex Nut	26
36	545.005.330	Hex Nut	4
37	547.002.330	Stop Nut 1/4-20	4
38	560.001.360	O-ring	2
39	560.040.360	O-ring	2
40	560.058.360	O-ring	8
41	612.022.330	Inner Diaphragm Plate	2
42	612.101.110	Outer Diaphragm Plate	2
	612.101.112	Outer Diaphragm Plate	2
	612.108.157	Outer Diaphragm Plate	2
43	618.003.330	Pipe Plug 1/4 NPT	3
43A	618.003.110	Pipe Plug 1/4 NPT	2
	618.003.112	Pipe Plug 1/4 NPT	2
	618.003.330	Pipe Plug 1/4 NPT	2
44	620.007.114	Actuator Plunger	2
45	675.040.360	Sealing Ring	2
46	675.042.115	Retaining Ring	2
47	675.043.115	Retaining Ring	2
48	685.039.120	Diaphragm Rod	1
49	706.013.330	Machine Screw 1/4-20 Slotted	4
50	720.010.375	U-Cup Seal	2
51	722.026.580	Check Valve Seat	2
	722.047.110	Check Valve Seat	2
	722.047.112	Check Valve Seat	2
52	900.004.330	Lock Washer	10
53	901.005.330	Flat Washer	4
54	901.012.180	Flat Washer	2
55	901.035.330	Flat Washer	7
56	905.001.015	Taper Washer	4
57	286.015.604	Overlay Diaphragm	2

# Composite Repair Drawing



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

ITEM NO.	PART NUMBER	DESCRIPTION	TOTAL RQD.
17	170.047.330	Hex Capscrew	3
25	334.013.110	Porting Flange 1" NPT	1
	334.013.110 E	Porting Flange 1" BSP Tapered	1
	334.013.112	Porting Flange 1" NPT	1
	334.013.112 E	Porting Flange 1" BSP Tapered	1
	334.013.157	Porting Flange 1" NPT	1
	334.013.157 E	Porting Flange 1" BSP Tapered	1
58	334.036.110	Dual Porting Flange 1" NPT	1
	334.036.110 E	Dual Porting Flange 1" BSP Tapered	1
	334.036.112	Dual Porting Flange 1" NPT	1
	334.036.112 E	Dual Porting Flange 1" BSP Tapered	1
	334.036.156	Dual Porting Flange 1" NPT	1
	334.036.156 E	Dual Porting Flange 1" BSP Tapered	1
59	170.121.330	Hex Capscrew 5/16-18 x 5.50 long	3

## Dual Port Suction and Discharge

ITEM NO.	PART NUMBER	DESCRIPTION	TOTAL RQD.
17	170.047.330	Hex Capscrew	3
58	334.036.110	Dual Porting Flange 1" NPT	2
	334.036.110 E	Dual Porting Flange 1" BSP Tapered	2
	334.036.112	Dual Porting Flange 1" NPT	2
	334.036.112 E	Dual Porting Flange 1" BSP Tapered	2
	334.036.156	Dual Porting Flange 1" NPT	2
	334.036.156 E	Dual Porting Flange 1" BSP Tapered	2
60	170.084.330	Hex Capscrew 5/16-18 x 7.00 long	3

<sup>1</sup>Available in kit form. Order P/N 031-060-000 which also includes items 2, 13, 15, 31, & 45.

<sup>2</sup>Available in kit form, Air End Kit 476-103-000.

Wet End Kits for SB1-A & SB25A:

Kit Number	Pump Type
476-034-354	
476-034-356	SR
476-034-360	SB
476-034-363	SV
476-034-365	SN
476-034-633	SC
476-034-634	SH
476-034-635	SGN
476-034-638	SGR



# Composite Repair Drawing for Dual Port Options

