SERVICE & OPERATING MANUAL

SANDPIPER®
A WARREN RUPP PUMP BRAND

Model S05 Metallic Design Level 1

U.S. Patent #
5,996,627 & 6,241,487
Other U.S. Patents
Applied for

II 2GD b T5

CE

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****Note: Not ATEX compliant**

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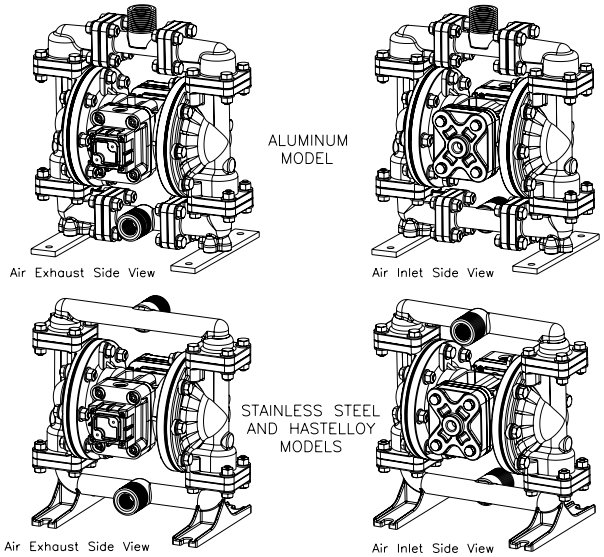
520-342-000 4/04 Rev C

WARREN RUPP®

Quality System ISO9001 Certified

Environmental Management System ISO14001 Certified

IDEX CORPORATION



II 2GD b T5

U.S. Patent # 5,996,627; 6,241,487 Other U.S. Patents Applied for

CE

SANDPIPER®
A WARREN RUPP PUMP BRAND

S05 Metallic Design Level 1 Ball Valve

Air-Powered Double-Diaphragm Pump

ENGINEERING, PERFORMANCE & CONSTRUCTION DATA

INTAKE/DISCHARGE PIPE SIZE	CAPACITY	AIR VALVE	SOLIDS-HANDLING	HEADS UP TO	DISPLACEMENT/STROKE
½" NPT or ½" BSP (Internal) 1" NPT or 1" BSP (External)	0 to 15 gallons per minute (0 to 56 liters per minute)	No-lube, no-stall design	Up to .125 in. (3mm)	125 psi or 289 ft. of water (8.6 Kg/cm² or 86 meters)	.026 Gallon / .098 liter

CAUTION! ***Operating temperature limitations are as follows:***

Materials		Operating Temperatures Maximum	Minimum
Buna N	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 hyrdrocarbons.	190°F 88°C	-10°F -23°C
EPDM	Shows very good water and chemical resistance. Has poor resistance to oil and solvents, but is fair in ketones and alcohols.	280°F 138°C	-40°F -40°C
Neoprene	All Purpose. Resistant to vegetable oil. Generally not affected by moderate chemicals, fats,greases and many oils and solvents. Generally attacked by strong oxidizing acids, ketones, esters, nitro hydrocarbons and chlorinated aromatic hydrocarbons.	200°F 93°C	-10°F -23°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
Virgin PTFE	Chemically inert, virtually impervious. Very few chemicals are known to react chemically with PTFE: molten alkali metals, turbulent liquid or gases 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
Viton®	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 Viton®.	350°F 177°C	-40°F -40°C
Polypropylene		180°F 82°C	32°F 0°C
Polyethylene		180°F 82°C	-40°F -40°C

SANDPIPER® pumps are designed to be powered only by compressed air.

For specific applications, always consult The Warren Rupp Chemical Resistance Chart

Explanation of Pump Nomenclature

S05 Metallic · Design Level 1· Ball Valve

MODEL	Pump Brand	Pump Size	Check Valve Type	Design Level	Wetted Material	Diaphragm/ Check Valve Materials	Check Valve Seat	Non-Wetted Material Options	Porting Options	Pump Style	Pump Options	Kit Options	Shipping Weight lbs. (kg)
S05B1ABWANS000.	S	05	B	1	A	B	W	A	N	S	0	00.	15 (7)
S05B1ACTANS000.	S	05	B	1	A	C	T	A	N	S	0	00.	15 (7)
S05B1AEWANS000.	S	05	B	1	A	E	W	A	N	S	0	00.	15 (7)
S05B1ANWANS000.	S	05	B	1	A	N	W	A	N	S	0	00.	15 (7)
S05B1AXTANS000.	S	05	B	1	A	X	T	A	N	S	0	00.	15 (7)
S05B1A1WANS000.	S	05	B	1	A	1	W	A	N	S	0	00.	15 (7)
S05B1A2TANS000.	S	05	B	1	A	2	T	A	N	S	0	00.	15 (7)
S05B1SBWANS000.	S	05	B	1	S	B	W	A	N	S	0	00.	21 (10)
S05B1SCTANS000.	S	05	B	1	S	C	T	A	N	S	0	00.	21 (10)
S05B1SEWANS000.	S	05	B	1	S	E	W	A	N	S	0	00.	21 (10)
S05B1SNWANS000.	S	05	B	1	S	N	W	A	N	S	0	00.	21 (10)
S05B1SXTANS000.	S	05	B	1	S	X	T	A	N	S	0	00.	21 (10)
S05B1S1WANS000.	S	05	B	1	S	1	W	A	N	S	0	00.	21 (10)
S05B1S2TANS000.	S	05	B	1	S	2	T	A	N	S	0	00.	21 (10)
S05B1HBWANS000.	S	05	B	1	H	B	W	A	N	S	0	00.	23 (11)
S05B1HCTANS000.	S	05	B	1	H	C	T	A	N	S	0	00.	23 (11)
S05B1HEWANS000.	S	05	B	1	H	E	W	A	N	S	0	00.	23 (11)
S05B1HNWANS000.	S	05	B	1	H	N	W	A	N	S	0	00.	23 (11)
S05B1HXTANS000.	S	05	B	1	H	X	T	A	N	S	0	00.	23 (11)
S05B1H1WANS000.	S	05	B	1	H	1	W	A	N	S	0	00.	23 (11)
S05B1H2TANS000.	S	05	B	1	H	2	T	A	B	S	0	00.	23 (11)

Pump Brand
S= SANDPIPER®

Pump Size
05=½"

Check Valve Type
B= Ball

Design Level
1=Design Level

Wetted Material
A= Aluminum
S= Stainless Steel
H= Hastelloy

Diaphragm/Check Ball Material
B= Buna/Buna
C= Viton/PTFE
N= Neoprene/Neoprene
E= EPDM/EPDM

Diaphragm/Check Ball Material Cont.
X= uniRupp® PTFE/PTFE
1= Santoprene/Santoprene
2= PTFE-Santoprene/PTFE

Valve Seat
A= Aluminum
C= Cast Iron
H= Hastelloy
S= Stainless Steel
T= PTFE
W= UHMW Polyethylene

Non-Wetted Material
A= Aluminum

Porting Options
N= NPT Threads
B= BSPT Threads
1= Dual Porting (NPT)
2= Top Dual Porting (NPT)
3= Bottom Dual Porting (NPT)
4= Dual Porting (BSPT)
5= Top Dual Porting (BSPT)
6= Bottom Dual Porting (BSPT)

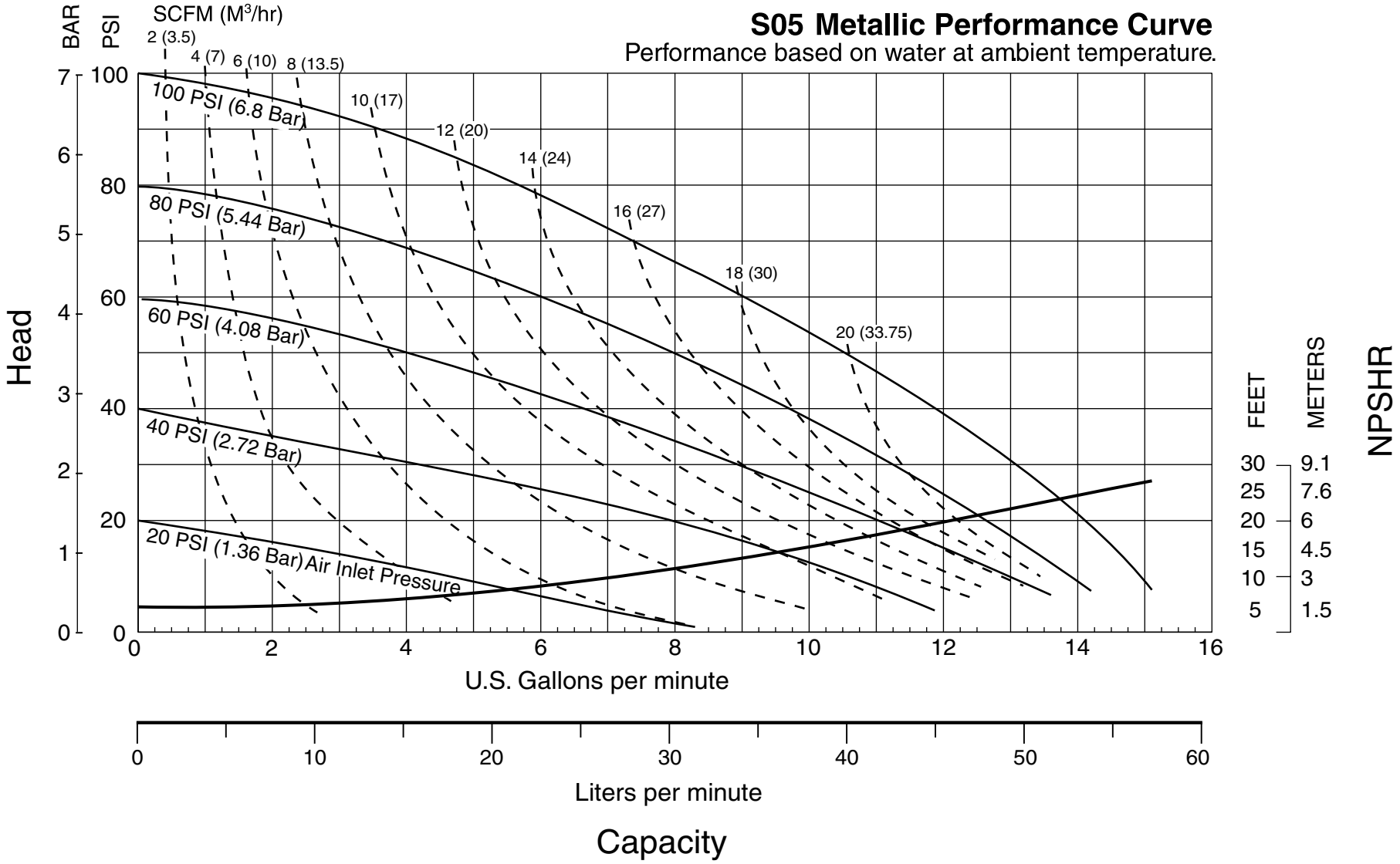
Pump Style
S= Standard

Pump Options
0= Encapsulated Muffler
1= Sound Dampening Muffler
2= Mesh Muffler
6= Metal Muffler*⚠

Kit Options
00.=None*⚠
P0.=0-30VDC Pulse Output Kit
P1.=Intrinsically-Safe 10-30VDC Pulse Output Kit
P2.=110/120 or 220/240VAC Pulse Output Kit
P3.=Intrinsically-Safe 110/120VAC Pulse Output Kit
P4.=Intrinsically-Safe 220/240VAC Pulse Output Kit
E0.=Solenoid Kit with 24VDC Coil
E1.=Solenoid Kit with 24VDC Explosion-Proof Coil
E2.=Solenoid Kit with 24VAC/12VDC Coil
E3.=Solenoid Kit with 24VAC12VDC Explosion-Proof Coil
E4.=Solenoid Kit with 110VAC Coil
E5.=Solenoid Kit with 110VAC Explosion-Proof Coil
E6.=Solenoid Kit with 220VAC Coil
E7.=Solenoid Kit with 220VAC Explosion-Proof Coil
SP.=Stroke Indicator Pins

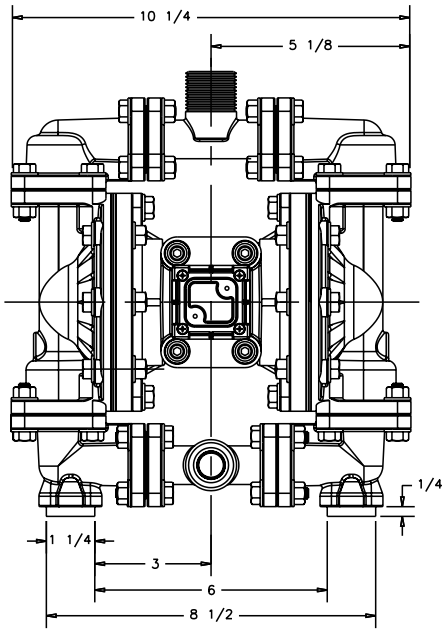
*⚠ **Note: ATEX compliant pumps must be ordered with a metal muffler and no kit options** ⚠

Performance Curve, S05 Metallic, Design Level 1

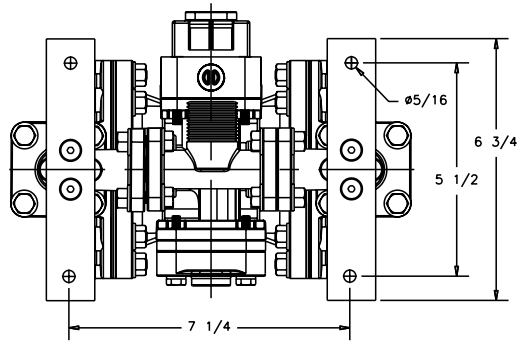


Dimensions: S05 Metallic (Aluminum Model)

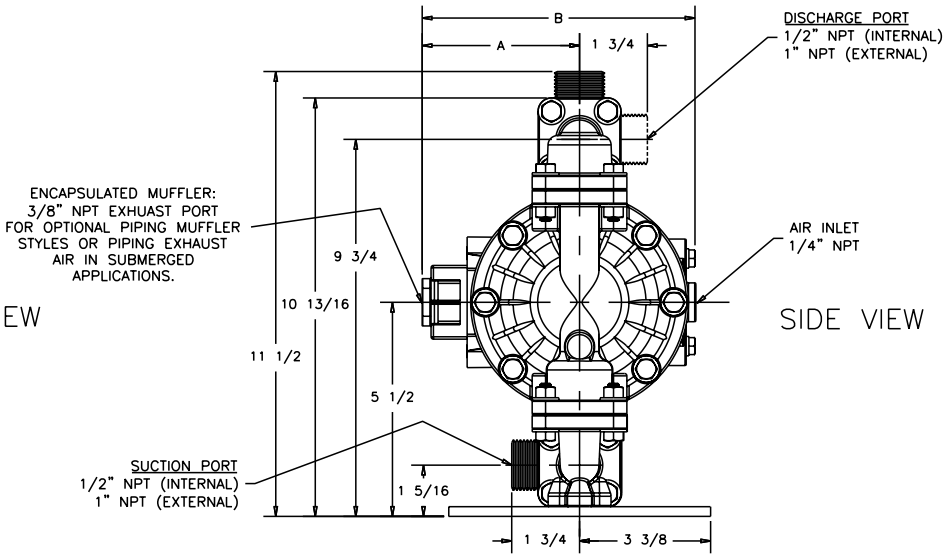
Dimensions in Inches
Dimensional tolerance: ±1/8"



FRONT VIEW



BOTTOM VIEW



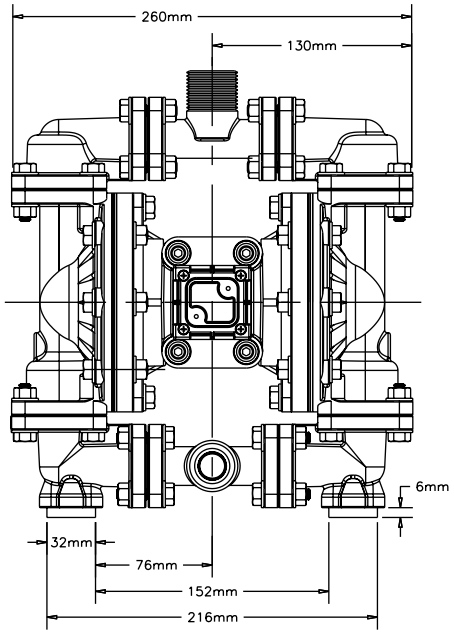
SIDE VIEW

BOTH SUCTION AND DISCHARGE
PORTS ARE AVAILABLE IN
1/2" BSPT (TAPERED INTERNAL)
1" BSPT (TAPERED EXTERNAL)

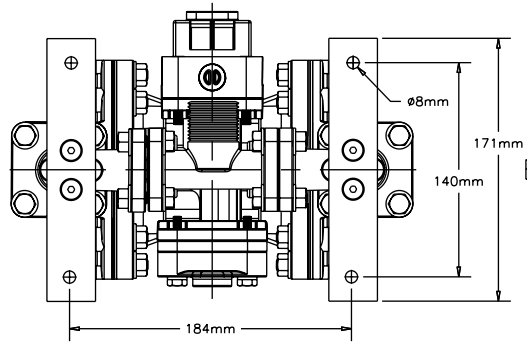
DIMENSION	A	B
Encapsulated Muffler	4 1/16"	7 1/16"
Pulse Output Kit	5 13/16"	8 13/16"
Mesh Muffler	5 3/4"	8 3/4"
Sound Dampening Muffler	5 3/4"	8 3/4"
Metal Muffler	5 1/8"	8 1/8"

Metric Dimensions: S05 Metallic (Aluminum Model)

Dimensions in millimeters
Dimensional tolerance: ±3mm

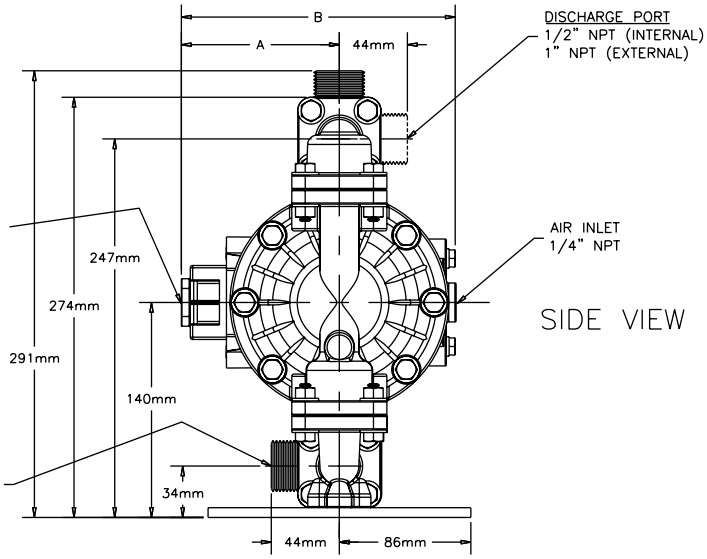


FRONT VIEW



BOTTOM VIEW

ENCAPSULATED MUFFLER:
3/8" NPT EXHUAST PORT
FOR OPTIONAL PIPING MUFFLER
STYLES OR PIPING EXHAUST
AIR IN SUBMERGED
APPLICATIONS.



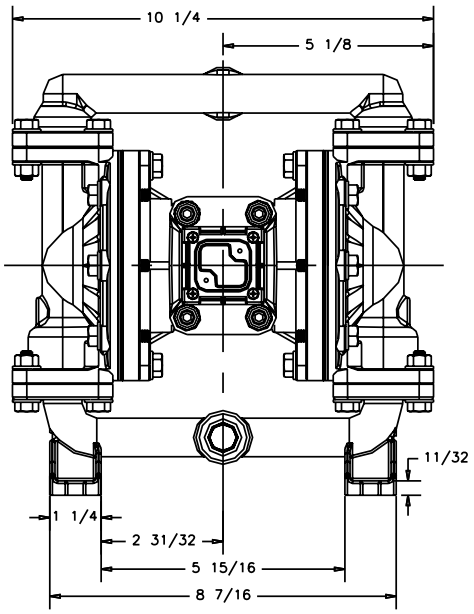
SIDE VIEW

BOTH SUCTION AND DISCHARGE
PORTS ARE AVAILABLE IN
1/2" BSPT (TAPERED INTERNAL)
1" BSPT (TAPERED EXTERNAL)

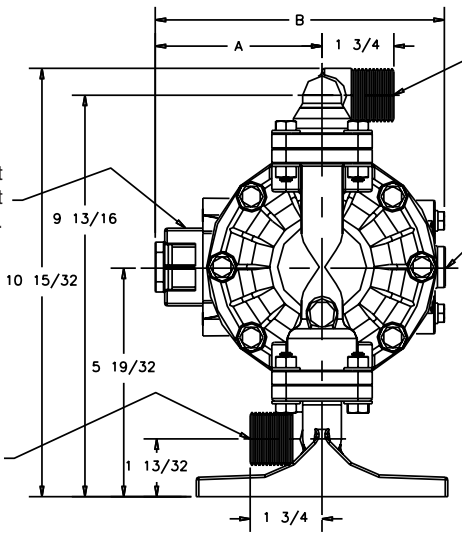
DIMENSION	A	B
Encapsulated Muffler	103mm	179mm
Pulse Output Kit	148mm	224mm
Mesh Muffler	146mm	222mm
Sound Dampening Muffler	146mm	222mm
Metal Muffler	130 mm	206 mm

Dimensions: S05 Metallic (Stainless Steel & Hastelloy Models)

Dimensions in Inches
Dimensional tolerance: ±1/8"



FRONT VIEW



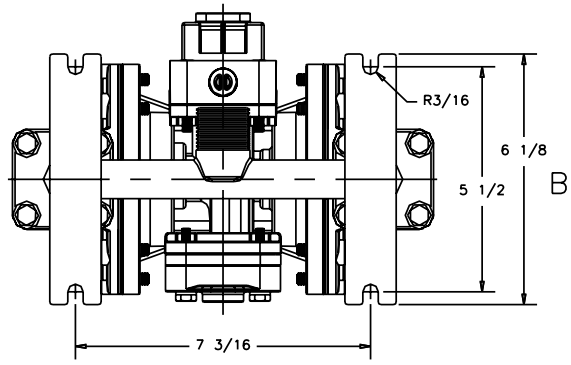
Discharge Port
1/2" NPT (Internal)
1" NPT (External)

3/8" NPT Exhaust Port
For Optional Piping Exhaust
Air In Submerged Applications.

Air Inlet
1/4" NPT

SIDE VIEW

Suction Port
1/2" NPT (Internal)
1" NPT (External)



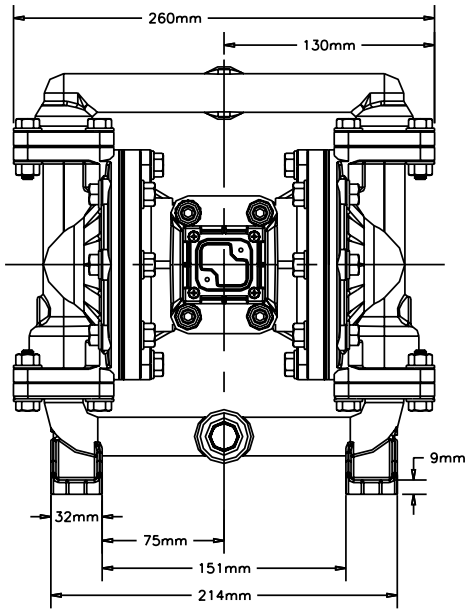
BOTTOM VIEW

Both Suction And
Discharge Ports Are
Available In
1/2" BSPT Tapered (Internal)
1" BSPT Tapered (External)

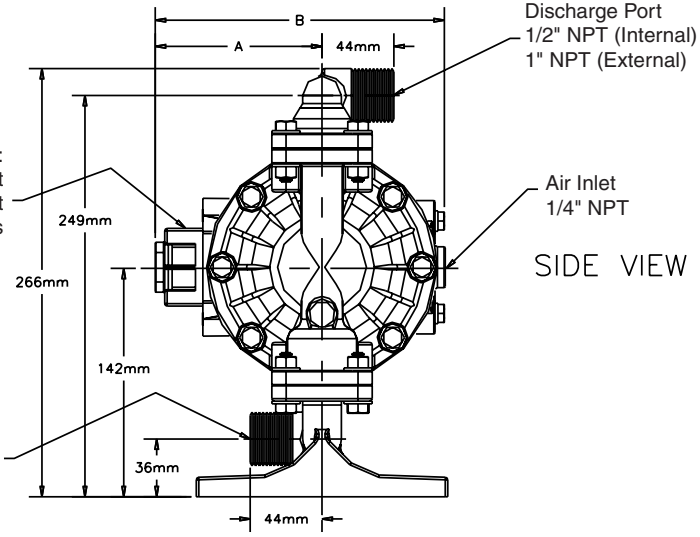
DIMENSION	A	B
Standard Pump	4 1/16"	7 1/16"
Pulse Output Kit	5 13/16"	8 13/16"
Mesh Muffler	4 25/32"	9 17/32"
Sound Dampening Muffler	5 1/8"	8 3/32"

Metric Dimensions: S05 Metallic (Stainless Steel & Hastelloy Models)

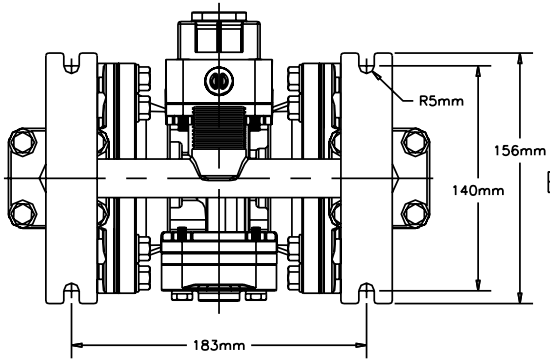
Dimensions in millimeters
Dimensional tolerance: ±3mm



FRONT VIEW



SIDE VIEW



BOTTOM VIEW

Both Suction And
Discharge Ports Are
Available In
1/2" BSPT Tapered (Internal)
1" BSPT Tapered (External)

DIMENSION	A	B
Encapsulated Muffler	103mm	179mm
Pulse Output Kit	148mm	224mm
Mesh Muffler	121mm	197mm
Sound Dampening Muffler	121mm	197mm
Metal Muffler	130mm	206mm

PRINCIPLE OF PUMP OPERATION

This ball type check valve pump is powered by compressed air and is a 1:1 ratio design. The inner side of one diaphragm chamber is alternately pressurized while simultaneously exhausting the other inner chamber. This causes the diaphragms, which are connected by a common rod secured by plates to the centers of the diaphragms, to move in a reciprocating action. (As one diaphragm performs the discharge stroke the other diaphragm is pulled to perform the suction stroke in the opposite chamber.) Air pressure is applied over the entire inner surface of the diaphragm while liquid is discharged from the opposite side of the diaphragm. The diaphragm operates in a balanced condition during the discharge stroke which allows the pump to be operated at discharge heads over 200 feet (61 meters) of water.

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) may require a back pressure regulating device to maximize diaphragm life.

Alternate pressurizing and exhausting of the diaphragm chamber is performed by an externally mounted, pilot operated, four way spool type air distribution valve. When the spool shifts to one end of the valve body, inlet 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 pressure to the chambers is reversed. The air distribution valve spool is moved by a internal pilot valve which alternately pressurizes one end of the air distribution valve spool while exhausting the other end. The pilot valve is shifted at each end of the diaphragm stroke when a actuator plunger is contacted by the diaphragm plate. This actuator plunger then pushes the end of the pilot valve spool into position to activate the air distribution valve.

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

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.

For installations of rigid piping, short sections of flexible hose should be installed between the pump and the piping. The flexible hose reduces vibration and strain to the pumping system. A Warren Rupp DA05 Surge Dampener is recommended to further reduce pulsation in flow.

AIR SUPPLY

Air supply pressure cannot exceed 100 psi (7 bar). Connect the pump air inlet to an air supply of sufficient capacity and pressure required for desired performance. When the air supply line is solid piping, use a short length of flexible hose not less than 1/2" (13mm) in diameter between the pump and the piping to reduce strain to the piping. The weight of the air supply line, regulators and filters must be supported by some means other than the air inlet cap. Failure to provide support for the piping may result in damage to the pump. A pressure regulating valve should be installed to insure air supply pressure does not exceed recommended limits.

AIR VALVE LUBRICATION

The air distribution valve and the pilot valve 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 supply. Proper lubrication requires the use of an air line lubricator (available from Warren Rupp) set to deliver one drop of SAE 10 non-detergent oil for every 20 SCFM (9.4 liters/sec.) of air the pump consumes at the point of operation. Consult the pump's published Performance Curve to determine this.

AIR LINE MOISTURE

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. Water in the air supply can be reduced by using a point-of-use air dryer to supplement the user's air drying equipment. This device removes water from the compressed air supply and alleviates the icing or freezing problems.

AIR INLET AND PRIMING

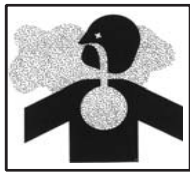
To start the pump, open the air valve approximately 1/2" to 3/4" turn. After the pump primes, the air valve can be opened to increase air flow as desired. If opening the valve increases cycling rate, but does not increase the rate of flow, cavitation has occurred. The valve should be closed slightly to obtain the most efficient air flow to pump flow ratio.

BETWEEN USES

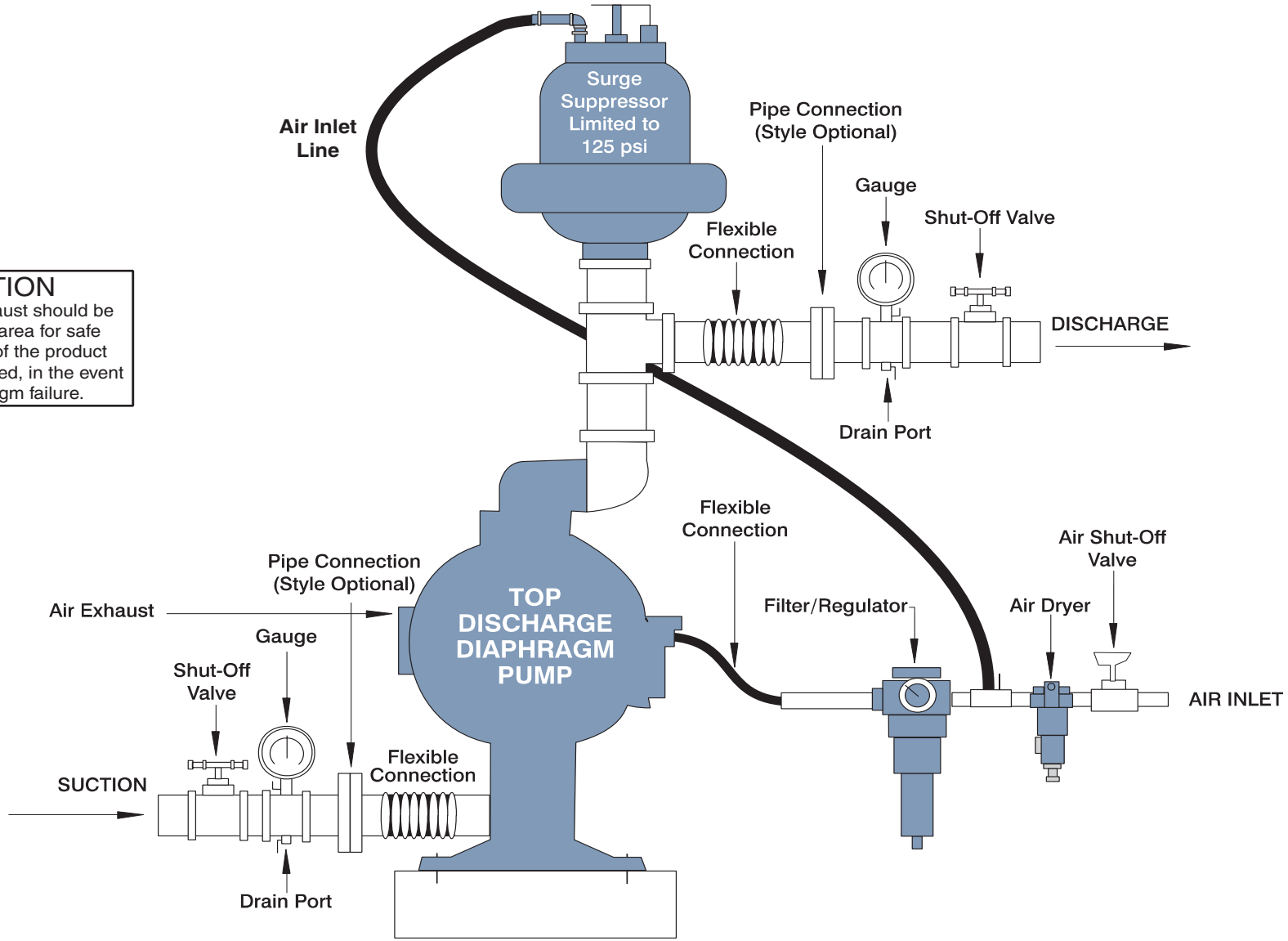
When the pump is used for materials that tend to settle out or solidify when not in motion, the pump should be flushed after each use to prevent damage. (Product remaining in the pump between uses could dry out or settle out. This could cause problems with the diaphragms and check valves at restart.) In freezing temperatures the pump must be completely drained between uses in all cases.

TYPICAL INSTALLATION GUIDE
For Metallic Pumps

Available from Warren Rupp



⚠ 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

Possible Symptoms:

- Pump will not cycle.
- Pump cycles, but produces no flow.
- Pump cycles, but flow rate is unsatisfactory.
- Pump cycle seems unbalanced.
- Pump cycle seems to produce excessive vibration.

What to Check: Excessive suction lift in system.
Corrective Action: For lifts exceeding 20 feet (6 meters), filling the pumping chambers with liquid will prime the pump in most cases.

What to Check: Excessive flooded suction in system.
Corrective Action: For flooded conditions exceeding 10 feet (3 meters) of liquid, install a back pressure device.

What to Check: System head exceeds air supply pressure.
Corrective Action: Increase the inlet air pressure to the pump. Most diaphragm pumps are designed for 1:1 pressure ratio at zero flow.

What to Check: Air supply pressure or volume exceeds system head.
Corrective Action: Decrease inlet air pressure and volume to the pump as calculated on the published PERFORMANCE CURVE. Pump is cavitating the fluid by fast cycling.

What to Check: Undersized suction line.
Corrective Action: Meet or exceed pump connection recommendations shown on the DIMENSIONAL DRAWING.

What to Check: Restricted or undersized air line.
Corrective Action: Install a larger air line and connection. Refer to air inlet recommendations shown in your pump's SERVICE MANUAL.

What to Check: Check ESADS, the Externally Serviceable Air Distribution System of the pump.
Corrective Action: Disassemble and inspect the main air distribution valve, pilot valve and pilot valve actuators. Refer to the parts drawing and air valve section of the SERVICE MANUAL. Check for clogged discharge or closed valve before reassembly.

What to Check: Rigid pipe connections to pump.
Corrective Action: Install flexible connectors and a Warren Rupp surge dampener.

What to Check: Blocked air exhaust muffler.
Corrective Action: Remove muffler screen, clean or de-ice and reinstall. Refer to the Air Exhaust section of your pump SERVICE MANUAL.

What to Check: Pumped fluid in air exhaust muffler.
Corrective Action: Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly. Refer to the Diaphragm Replacement section of your pump SERVICE MANUAL.

What to Check: Suction side air leakage or air in product.
Corrective Action: Visually inspect all suction side gaskets and pipe connections.

What to Check: Obstructed check valve.
Corrective Action: Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket. Refer to the Check Valve section of the pump SERVICE MANUAL for disassembly instructions.

What to Check: Worn or misaligned check valve or check valve seat.
Corrective Action: Inspect check valves and seats for wear and proper seating. Replace if necessary. Refer to Check Valve section of the pump SERVICE MANUAL for disassembly instructions.

What to Check: Blocked suction line.
Corrective Action: Remove or flush obstruction. Check and clear all suction screens and strainers.

What to Check: Blocked discharge line.
Corrective Action: Check for obstruction or closed discharge line valves.

What to Check: Blocked pumping chamber.
Corrective Action: Disassemble and inspect the wetted chambers of the pump. Remove or flush anyobstructions. Refer to the pump SERVICE MANUAL for disassembly instructions.
What to Check: Entrained air or vapor lock in one or both pumping chambers.
Corrective Action: Purge chambers through tapped chamber vent plugs. PURGING THE CHAMBERS OF AIR CAN BE DANGEROUS! Contact the Warren Rupp Technical Services Group before performing this procedure. A model with top-ported discharge will reduce or eliminate problems with entrained air.

If your pump continues to perform below your expectations, contact your local Warren Rupp Distributor or factory Technical Services Group for a service evaluation.

WARRANTY

Refer to the enclosed Warren Rupp Warranty Card.

RECYCLING

Many components of SANDPIPER® Metallic AODD pumps are made of recyclable materials (see chart on page 12 for material specifications). We encourage pump users to recycle worn out parts and pumps whenever possible, after any hazardous pumped fluids are thoroughly flushed.

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CE

Pump complies with EN809 Pumping Directive, Directive 98/37/EC Safety of Machinery, and ATEX 100a Directive 94/9/EC Equipment for use in Potentially Explosive Environments. For reference to the directive certificates visit: 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.

⚠ CAUTION

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

⚠ 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

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

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.

⚠ WARNING

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

⚠ 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

Airborne particles and loud noise hazards.

Wear ear and eye protection.

MATERIAL CODES

The Last 3 Digits of Part Number

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

Delrin, Viton and Hytrel are registered tradenames of E.I. DuPont.

Gylon is a registered tradename of Garlock, Inc.

Nylatron is a registered tradename of Polymer Corp.

Santoprene is a registered tradename of Monsanto Corp.

Rulon II is a registered tradename of Dixion Industries Corp.

Hastelloy-C is a registered tradename of Cabot Corp.

Ryton is a registered tradename of Phillips Chemical Co.

Valox is a registered tradename of General Electric Co.

Warren Rupp, SANDPIPER, Portapump, Tranquilizer and SludgeMaster are registered tradenames of Warren Rupp, Inc.

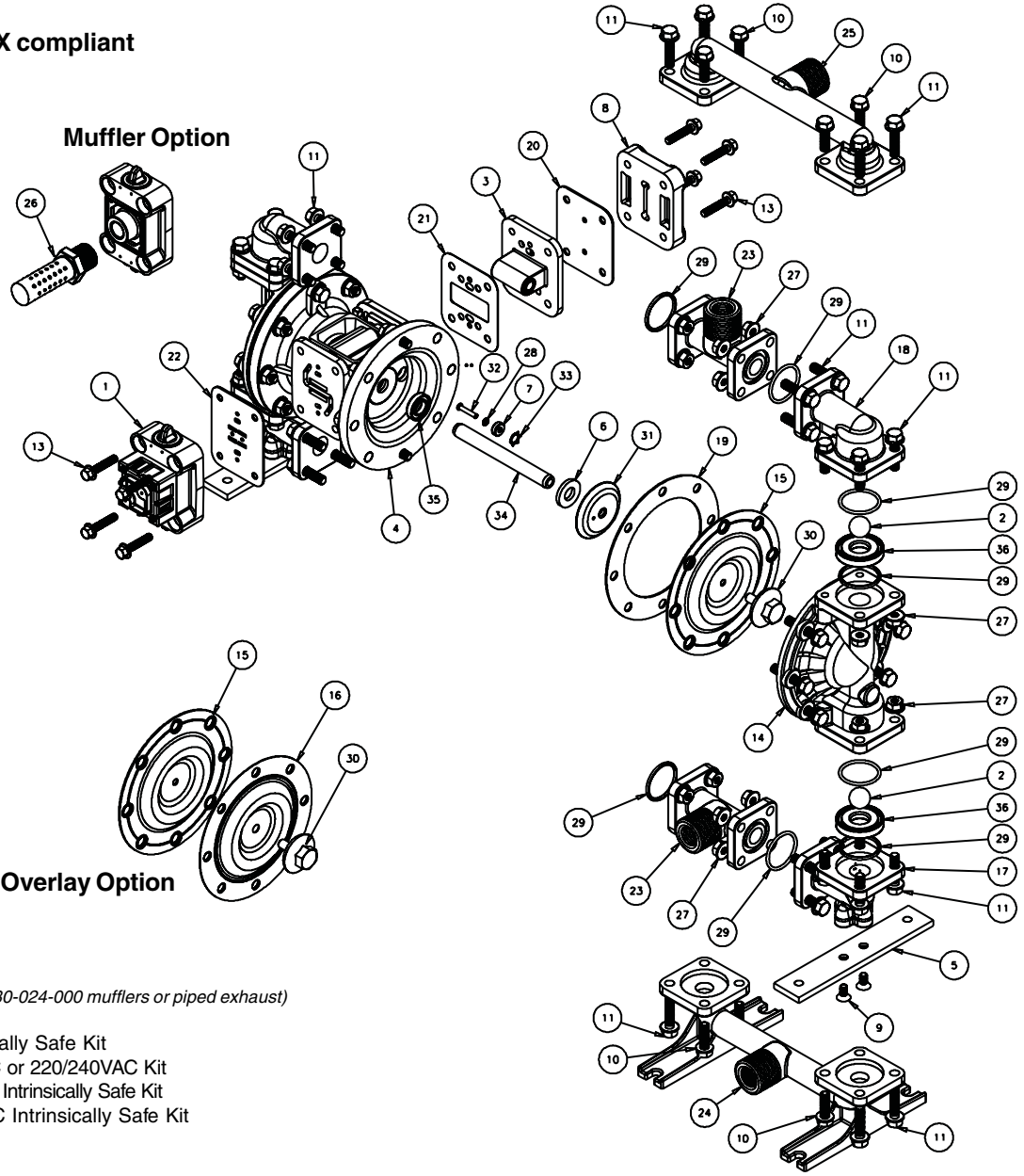
Model S05 Metallic Composite Repair Parts Drawing

****Note: Pumps equipped with these components are <u>not</u> ATEX compliant**

Available Service and Conversion Kits

PART NO.	DESCRIPTION
****476-219-000**	**AIR END KIT** Seals, O-rings, Gaskets, Bumpers, Retainers, Air Valve Assembly and Pilot Valve Assembly
476-234-000	**AIR END KIT (ATEX Compliant Pumps)** Seals, O-rings, Gaskets, Bumpers, Retainers, Air Valve Assembly and Pilot Valve Assembly.
****476-220-000**	**AIR END KIT** for pumps equipped with Stroke Indicator (same components as above, except Air Valve Assembly with pins replaces Air Valve Standard)
476-199-354	**WETTED END KIT** Santoprene Diaphragm, Santoprene Check Balls, UHMW Seats, Buna Spacer Gasket.
476-199-356	**WETTED END KIT** Hytrel Diaphragm, Hytrel Check Balls, UHMW Seats.
476-199-360	**WETTED END KIT** Buna Diaphragm, Buna Check Balls, UHMW Seats.
476-199-661	**WETTED END KIT** EPDM Diaphragm, Santoprene Check Balls, UHMW Seats.
476-199-365	**WETTED END KIT** Neoprene Diaphragm, Neoprene Check Balls, UHMW Seats.
476-199-633	**WETTED END KIT** Viton Diaphragm, PTFE Check Balls, PTFE Seats.
476-199-650	**WETTED END KIT** uniRupp® bonded PTFE and Santoprene Diaphragm, PTFE Check Balls, PTFE Seats.
476-199-654	**WETTED END KIT** Santoprene Diaphragm, PTFE Overlay Diaphragm, PTFE Check Balls, PTFE Seats.

Muffler Option



Overlay Option

**PULSE OUTPUT KITS

(For use with 530-010-550 encapsulated muffler)

475-198-021	DC Kit
475-198-022	DC Intrinsically Safe Kit
475-198-023	110/120VAC or 220/240VAC Kit
475-198-024	110/120VAC Intrinsically Safe Kit
475-198-025	220/240VAC Intrinsically Safe Kit

(For use with 530-023-000 and 530-024-000 mufflers or piped exhaust)

475-198-026	DC Kit
475-198-027	DC Intrinsically Safe Kit
475-198-028	110/120VAC or 220/240VAC Kit
475-198-029	110/120VAC Intrinsically Safe Kit
475-198-030	220/240VAC Intrinsically Safe Kit

Composite Repair Parts List

NOTE: See Pages 16 and 18 For Full Explanation of Air Valve Options.

ITEM	PART NUMBER	DESCRIPTION	QTY
1	**031-166-000	Air Valve Assembly (Integral Muffler)	1
	**031-166-002	Air Valve Assembly (w/ PTFE Coated Hardware)	1
	**031-167-000	Air Valve Assembly (w/ stroke Indicator Pins)	1
	**031-167-002	Air Valve Assembly (w/ Stroke Indicator Pins & PTFE Coated Hardware)	1
	**031-168-000	Air Valve Assembly	1
	031-168-001	Air Valve Assembly (ATEX Compliant)	1
	**031-169-000	Air Valve Assembly (Stroke Indicator & Optional Mufflers)	1
	**031-176-000	Air Valve (High Temperture)	1
	**031-177-000	Air Valve (High Temperture With Mufflers)	1
2	050-022-600	Ball, Check	4
	050-027-354	Ball, Check	4
	050-027-356	Ball, Check	4
	050-027-360	Ball, Check	4
	050-027-364	Ball, Check	4
	050-027-365	Ball, Check	4
3	095-091-000	Pilot Valve Assembly	1
4	114-023-157	Bracket, Intermediate	1
5	115-152-151	Bracket, Mounting (Aluminum)	2
6	132-034-360	Bumper, Diaphragm	2
7	135-036-506	Bushing, Plunger	2
8	165-110-157	Cap, Air Inlet	1
9	171-017-115	Capscrew, Flat Socket Head 1/4-20 x .50	4
	171-017-330	Capscrew, Flat Socket Head 1/4-20 x .50	4
10	171-062-115	Capscrew, Flanged 5/16-18 X 1.00	20
	171-062-330	Capscrew, Flanged 5/16-18 X 1.00	20
11	171-063-115	Capscrew, Flanged 5/16-18 X 1.25 (alum)	28
	171-063-330	Capscrew, Flanged 5/16-18 X 1.25 (alum)	28
	171-063-115	Capscrew, Flanged 5/16-18 x 1.25 (ss)	12
	171-063-330	Capscrew, Flanged 5/16-18 x 1.25 (ss)	12
12	171-064-115	Capscrew, Flanged 5/16-18 x 1.50	20
	171-064-330	Capscrew, Flanged 5/16-18 x 1.50	20
13	171-066-115	Capscrew, Flanged 1/4-20 x 1.25	8
	171-066-330	Capscrew, Flanged 1/4-20 x 1.25	8
14	196-171-110	Chamber, Outer	2
	196-171-112	Chamber, Outer	2
	196-171-157	Chamber, Outer	2
15	286-095-354	Diaphragm	2
	286-095-356	Diaphragm	2
	286-095-360	Diaphragm	2
	286-095-363	Diaphragm	2
	286-095-364	Diaphragm	2
	286-095-365	Diaphragm	2
	286-095-650	Diaphragm, uniRupp®	2
16	286-096-600	Diaphragm, Overlay	2
17	312-110-157	Elbow, Suction	2
18	312-111-157	Elbow, Discharge	2
19	360-099-360	Gasket, Spacer (used TPE Diaphragms only)	2
20	360-100-379	Gasket, Air Inlet	1
21	360-101-379	Gasket, Pilot Valve	1
22	360-102-360	Gasket, Air Valve	1
23	518-157-157	Manifold (see item 29)	2
	518-157-157E	Manifold 1/2" BSP (tapered) (see item 29)	2
24	518-158-110	Manifold, Suction	1
	518-158-110E	Manifold, Suction 1/2" BSP (tapered)	1
	518-158-112	Manifold, Suction	1
	518-158-112E	Manifold, Suction 1/2" BSP (tapered)	1
25	518-159-110	Manifold, Discharge	1
	518-159-110E	Manifold, Discharge 1/2" BSP (tapered)	1
	518-159-112	Manifold, Discharge	1
	518-159-112E	Manifold, Discharge 1/2" BSP (tapered)	1
26	530-035-000	Metal Muffler	1
27	544-005-115	Nut, Hex Flanged 5/16-18 (Aluminum)	24
	544-005-330	Nut, Hex Flanged 5/16-18 (Aluminum)	24
	544-005-115	Nut, Hex Flanged 5/16-18 (Stainless Steel)	8
	544-005-330	Nut, Hex Flanged 5/16-18 (Stainless Steel)	8
28	560-001-360	O-ring	2
29	560-083-360	O-ring (Aluminum Manifold)	4
	560-083-363	O-ring (Aluminum Manifold)	4
	560-083-364	O-ring (Aluminum Manifold)	4
	560-083-365	O-ring (Aluminum Manifold)	4
	720-064-600	Seal (Aluminum Manifold)	4
	560-083-360	O-ring (metallic seats only)	8
	560-083-363	O-ring (metallic seats only)	8
	560-083-364	O-ring (metallic seats only)	8
	560-083-365	O-ring (metallic seats only)	8
	560-083-611	O-ring (metallic seats only)	8
30	612-091-110	Plate, Outer Diaphragm	2
	612-091-112	Plate, Outer Diaphragm	2
	612-091-157	Plate, Outer Diaphragm	2
31	612-177-330	Plate, Inner Diaphragm	2
32	620-019-115	Plunger, Actuator	2
33	675-042-115	Ring, Retainer	1
34	685-056-120	Rod, Diaphragm	2
35	720-012-360	Seal, U-Cup Shaft	4
36	722-094-080	Seat, Check Valve (item 29 required)	4
	722-094-110	Seat, Check Valve (item 29 required)	4
	722-094-150	Seat, Check Valve (item 29 required)	4
	722-094-550	Seat, Check Valve	4
	722-094-600	Seat, Check Valve	4
	722-080-552	Seat, Check Valve	4

****Note: Pumps equipped with these components are <u>not</u> ATEX compliant**

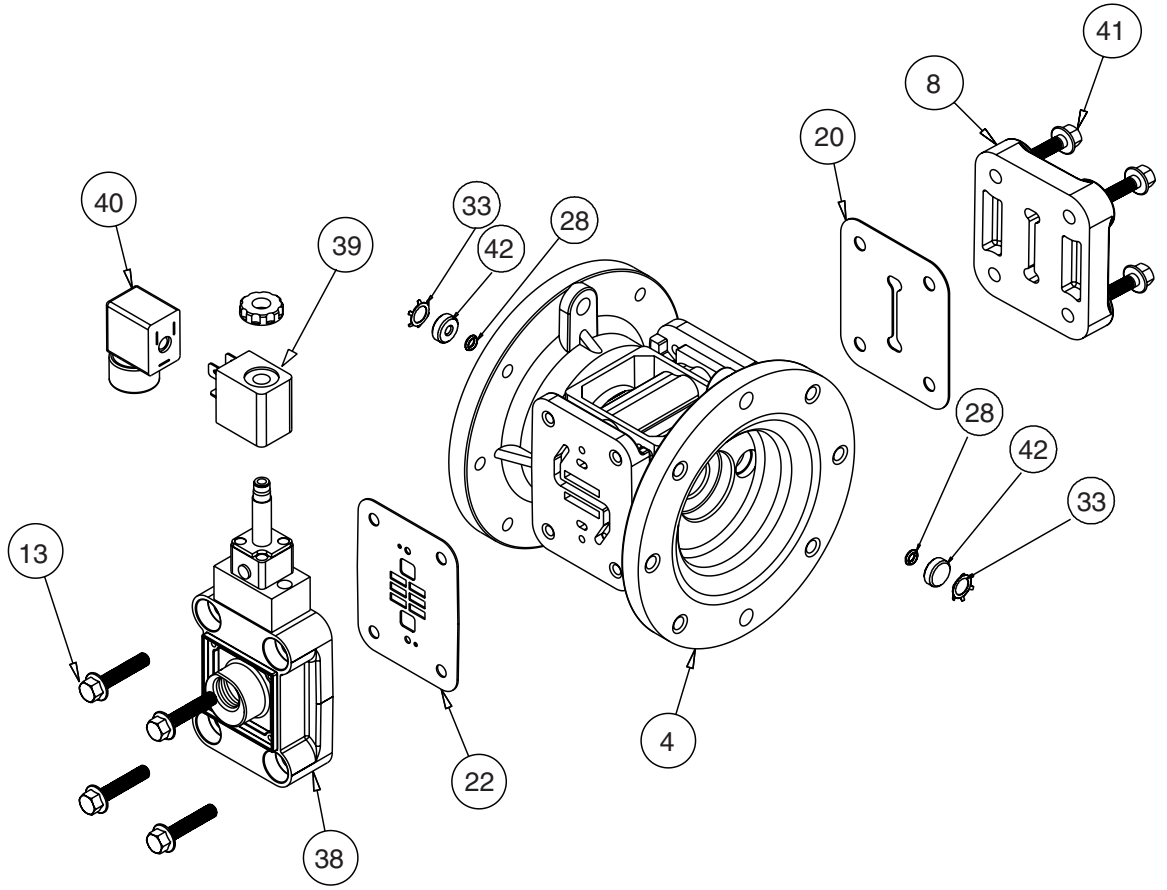
Solenoid Shifted Air Valve Drawing

****Note: Pumps equipped with Integral Solenoid Valves are <u>not</u> ATEX compliant**

SOLENOID SHIFTED AIR VALVE PARTS LIST

(Includes all items used on Composite Repair Parts List except as shown)

ITEM	PART NUMBER	DESCRIPTION	QTY
4	114-023-157	Bracket, Intermediate	1
38	893-093-000	Solenoid Valve, NEMA4	1
39	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
40	241-001-000	Connector, conduit	1
	241-003-000	Conduit Connector with Suppression Diode (DC Only)	1
41	171-065-115	Capscrew, Flanged ¼-20 x 1.00	4
42	618-050-150	Plug (Replaces Item 7)	2
For Explosion Proof Solenoid Valve			
(Connector not required for explosion proof coil; coil is integral with valve)			
38	893-094-001	Solenoid Valve, NEMA 7/9, 24VDC	1
	893-094-002	Solenoid Valve, NEMA 7/9, 24VAC/12VDC	1
	893-094-003	Solenoid Valve, NEMA 7/9, 120VAC	1
	893-094-004	Solenoid Valve, NEMA 7/9, 240VAC	1



SOLENOID SHIFTED AIR DISTRIBUTION VALVE OPTION

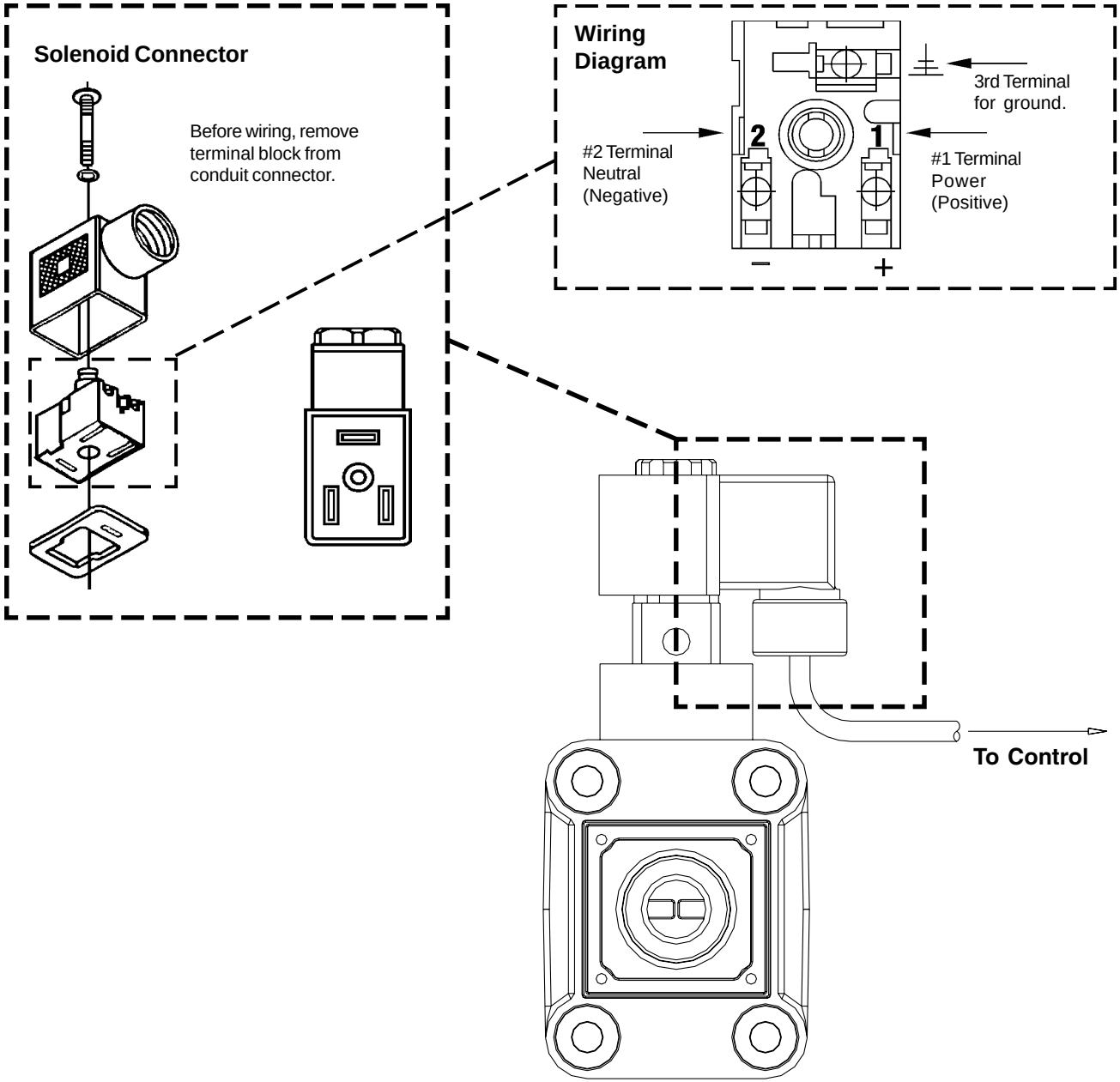
Warren Rupp's solenoid shifted, air distribution valve option utilizes electrical signals to precisely control your SANDPIPER's speed. The solenoid coil is connected to a customer - supplied control. Compressed air provides the pumping power, while electrical signals control pump speed (pumping rate).

OPERATION

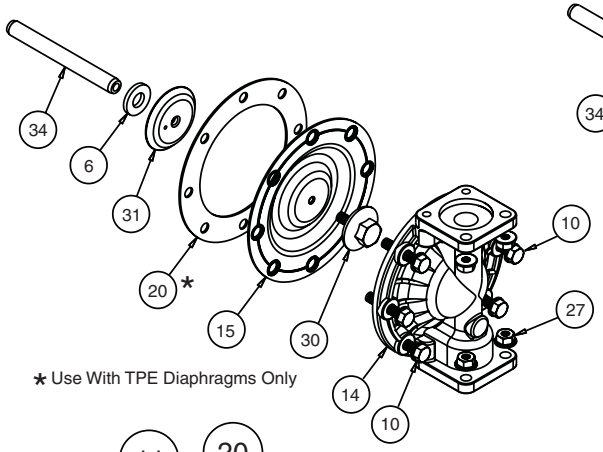
The Solenoid Shifted SANDPIPER has a solenoid operated, air distribution valve in place of the standard SANDPIPER's pilot operated, air distribution valve. Where a pilot valve is normally utilized to cycle the pump's air distribution valve, an electric solenoid is utilized. As the solenoid is powered, 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 SANDPIPER pump, with one exception. This option provides a way to precisely control and monitor pump speed.

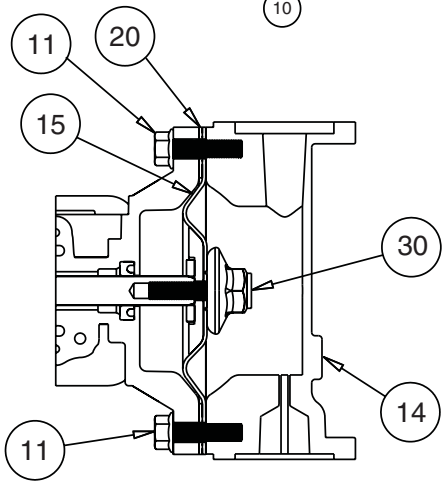
BEFORE INSTALLATION

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



Diaphragm Service Drawing

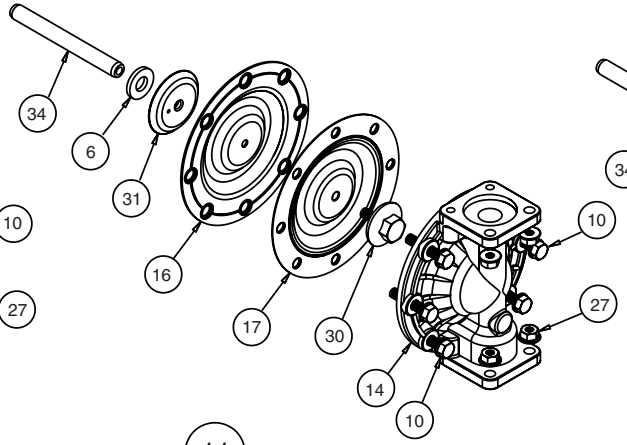


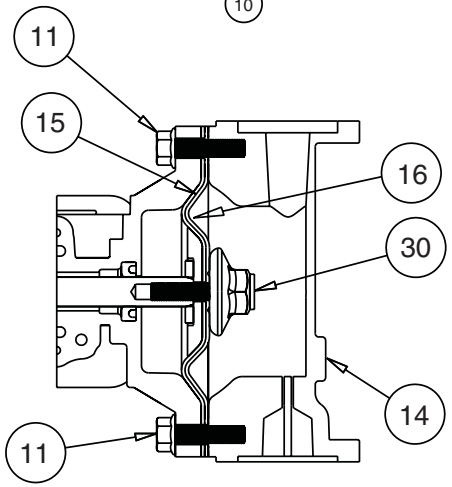


Diaphragm Orientation

Install diaphragm and spacer as shown above.

Diaphragm Service Drawing, with Overlay

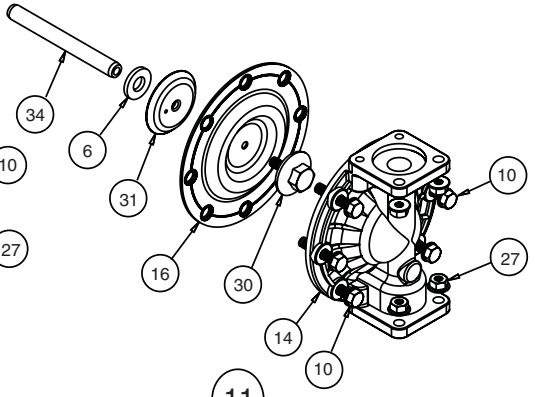


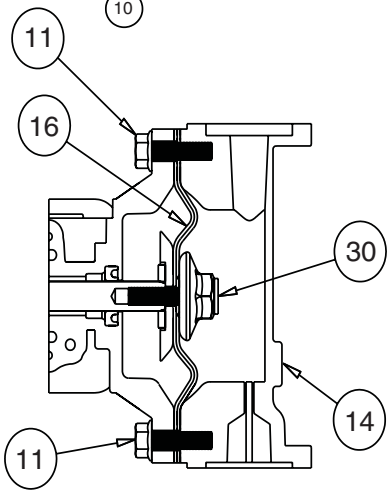


Diaphragm Orientation

Install diaphragm and overlay as shown above.

Diaphragm Service Drawing with UniRupp®





Diaphragm Orientation

Install diaphragm (286-095-650 only) as shown above.

DIAPHRAGM SERVICING

To service the diaphragm 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 8 capscrews (items 10 & 11), and nuts that fasten the discharge elbows (item 18) or the discharge manifold (item 25). Remove the elbows and manifold assembly (items 18 & 23) or manifold (item 25).Use the same procedure to remove the suction elbows (item 17) or suction manifold (item 24).

Step #2: Removing the outer chambers. Using a 1/2" wrench or socket, remove the 16 capsrews (items 10 & 11), and nuts that fasten the outer chambers (item 14), diaphragms (items 15 & 16) and intermediate bracket (item 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 34) by turning counterclockwise.

Insert a 6-32 set screw into the smaller tapped hole in the inner diaphragm plate (item 31). 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 30) by turning counterclockwise. Inspect the diaphragm (item 15 & 16) 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. Insert the loose assembly with the above 6-32 fastener back into the vise. Use a torque wrench to tighten the diaphragm assembly together to 7.5 ft. Lbs. (10.17 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 34) 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 intermediate (item 4).

Fasten the outer chamber (item 14) to the pump, using the capscrews (items 10 and 11) and flanged nuts.

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 34) as far as possible and still allow for alignment of the bolt holes in the diaphragm with the bolt pattern in the inner chamber. Install diaphragms with convolutions facing towards center of pump. See sectional view on previous page.

Fasten the remaining outer chamber (item 14) to the pump, using the capscrews (items 10 and 11) and flanged nuts.

Step #6: Re-install the elbow/manifold assemblies to the pump, using the capscrews (items 10 and 11) and flanged nuts.

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

OVERLAY DIAPHRAGM SERVICING

The overlay diaphragm (item 16) is designed to fit snugly over the exterior of the standard TPE diaphragm (item 15).

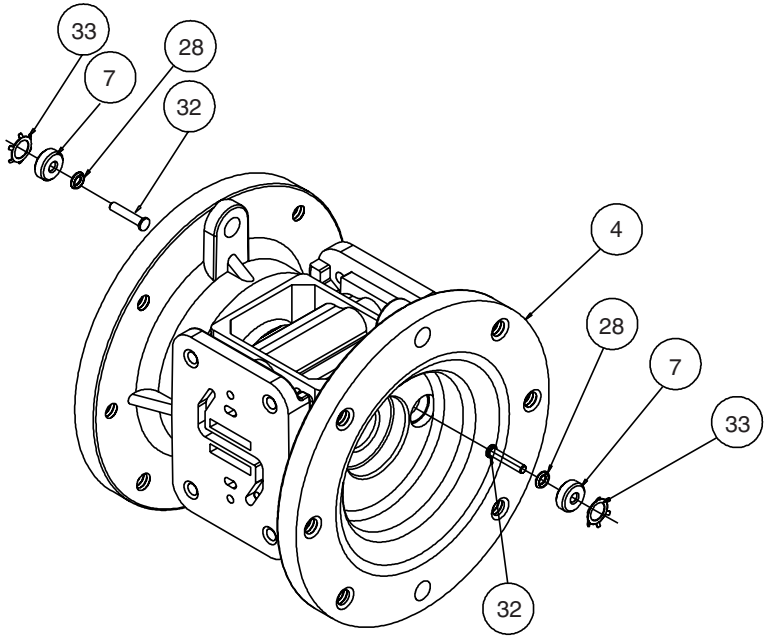
uniRupp® DIAPHRAGM SERVICING

Follow the same procedures described for the standard diaphragm for removal and installation. **Note:** Install diaphragms in the direction shown in the lower right view above.

⚠ 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.

Intermediate Assembly Drawing



INTERMEDIATE REPAIR PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
4	114-023-157	Bracket, Intermediate	1
7	135-036-506	Bushing, Plunger	2
28	560-001-360	O-Ring	2
32	620-019-115	Plunger, Actuator	2
33	675-042-115	Ring, Retaining*	2

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

Intermediate Assembly Servicing

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 32) 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 32) 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 33) 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 (28) for cuts and/or wear.

⚠ 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.

CHECK VALVE SERVICING

Before servicing the check valve components, 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 check valve components, remove the manifold/ manifold assembly. Use a 1/2" wrench or socket to remove the fasteners. Once the manifold is removed, the check valve components can be seen.

Inspect the check balls (items 2) for wear, abrasion, or cuts on the spherical surface. The check valve seats (item 36) 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 check valve seats for the pump to operate to peak efficiency. Replace any worn or damaged parts as necessary.

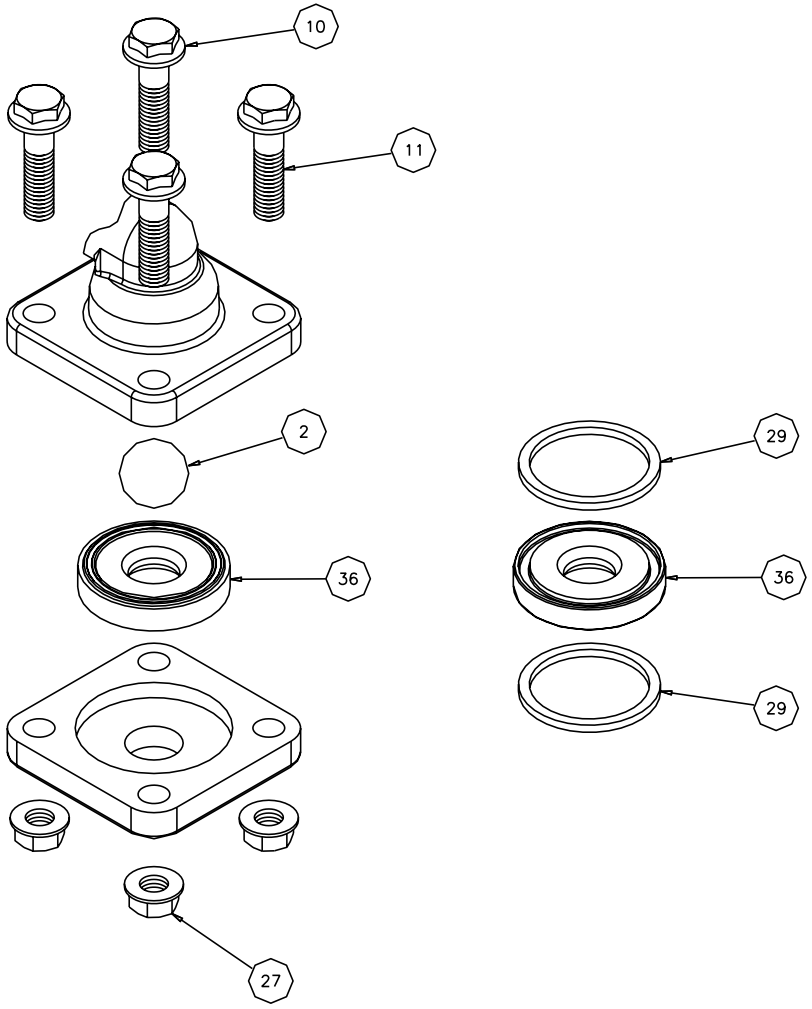
Re-assemble the check valve components. The seat should fit into the counter bore of the outer chamber.

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

METALLIC SEATS

Two o-rings (or conductive PTFE seals) (item 29) are required for metallic seats.

Check Valve Drawing



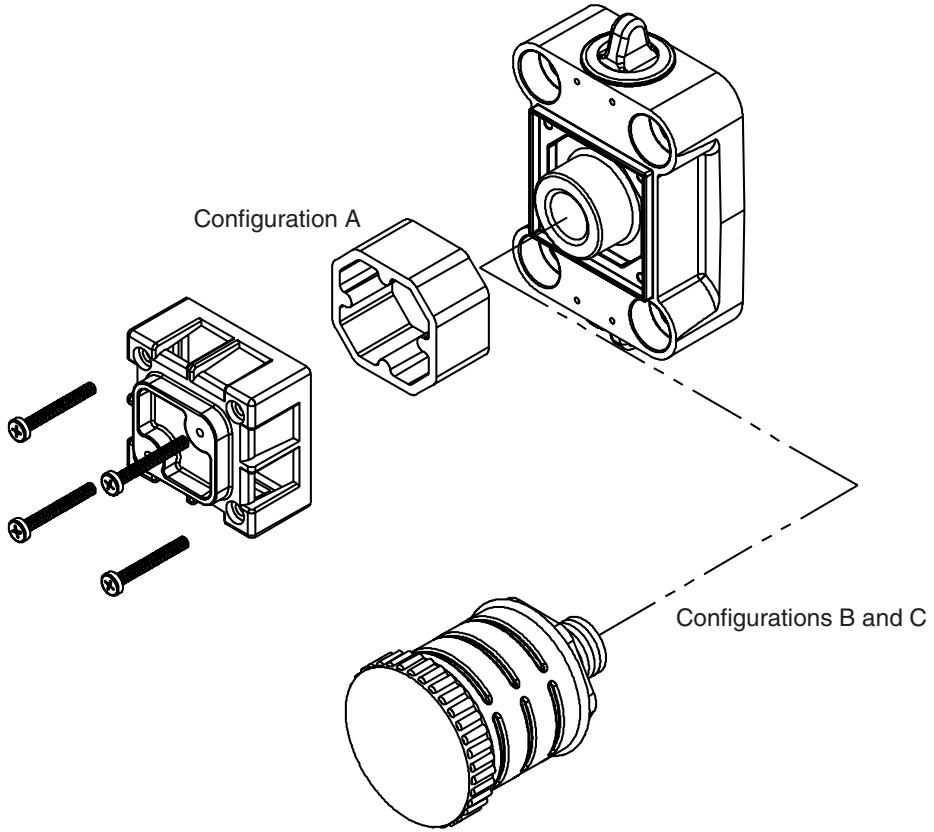
**Optional Muffler Configurations, Drawing

****Note: Pump is built with a metal muffler as standard equipment for static electric dissipation, meeting ATEX requirements. The options shown on this page are <u>not</u> ATEX compliant.**

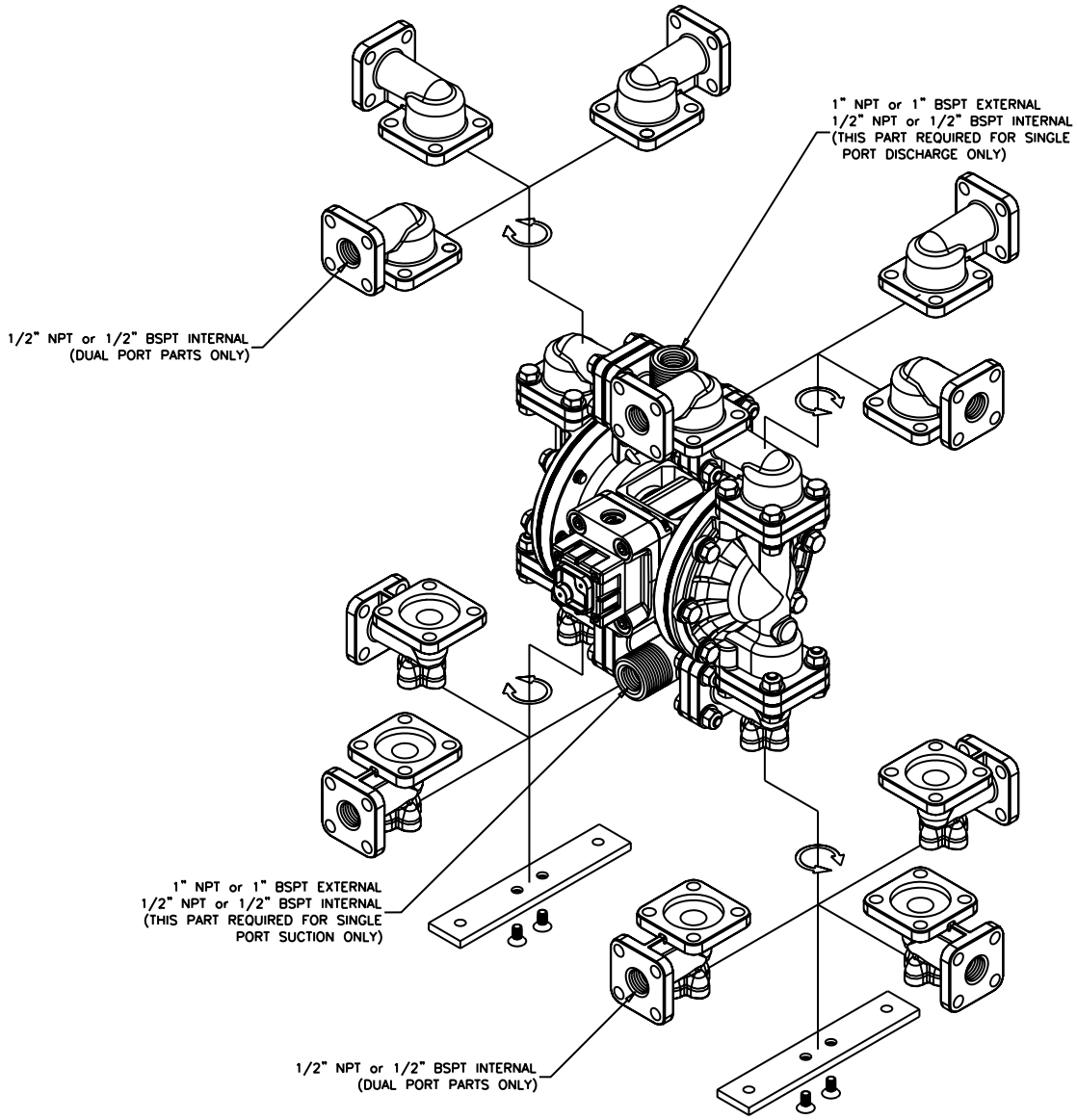
****Configuration A**
530-031-550 Encapsulated Muffler
Uses (1) 165-109-551 Cap and
(4) 710-011-115 self tapping
screws to hold it in place.

****Configuration B**
530-023-000 Muffler, with metal
mesh element, screws directly into
the air valve body.

****Configuration C**
530-024-000 Muffler, with porous
plastic element, screws directly
into the air valve body.



Dual Port Option Drawing (Aluminum Model Only)



DUAL PORTING OPTIONS

Several dual porting options are possible. The pump can be converted to a dual port arrangement on both the suction and the discharge ends. The porting can be configured to a single suction and a dual discharge. The porting can be changed to a dual suction and a single discharge.

The above changes are possible because the porting flange of the elbows (items 19) are designed to mate with 1/2" NPT or 1/2" BSPT (tapered) connection.

DUAL PORTING OF BOTH SUCTION AND DISCHARGE ENDS OF THE PUMP

Converting the pump from the standard single suction and discharge porting configuration to dual porting at each end is easy. Simply remove the manifold seals and manifolds (items 24 and 29 from pump assembly drawing) from the pump.

The discharge elbows and suction elbows can be rotated 90° increments (see arrows and optional positioning in the Dual Port Options Drawing.)

SINGLE PORTING OF THE SUCTION AND DUAL PORTING OF THE PUMP DISCHARGE

To convert the pump from the standard single suction and single discharge porting configuration to a dual discharge porting arrangement remove the only the discharge manifolds and manifold seals. Position the discharge elbows in the desired direction at 90° increments. (See arrows and optional positioning in the Dual Porting Drawing.)

DUAL PORTING OF THE SUCTION AND SINGLE PORTING OF THE PUMP DISCHARGE

To convert the pump from the standard single suction and single discharge porting configuration to a dual suction porting arrangement remove the only the suction (bottom) manifolds and manifold seals.

Position the suction elbows in the desired direction at 90° increments. (See arrows and optional positioning in the Dual Porting Drawing.)

NOTE: See Repair Parts Lists on next page.

⚠ 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.

SINGLE PORT SUCTION REPAIR PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
11*	171-063-115	Capscrew, Flanged 5/16-18 x 1.25 (Alum)	16
	171-063-330	Capscrew, Flanged 5/16-18 x 1.25 (Alum)	16
18*	312-111-157E	Elbow, Discharge 1/2" BSPT (repalces 312-111-157)	2
	312-111-157N	Elbow, Discharge 1/2" NPT (replaces 312-111-157)	2
23*	518-157-157	Manifold BSPT (suction position only)	1
	518-157-157E	Manifold NPT (suction position only)	1
27*	544-005-115	Nut, Hex Flanged 5/16-18 (Alum)	28
	544-005-330	Nut, Hex Flanged 5/16-18 (Alum)	28
29*	560-083-360	O-ring (Alum Manifold)	2
	560-083-363	O-ring (Alum Manifold)	2
	560-083-364	O-ring (Alum Manifold)	2
	560-083-365	O-ring (Alum Manifold)	2
	720-064-600	Seal (Alum Manifold)	2

SINGLE PORT DISCHARGE REPAIR PARTS LIST

11*	171-063-115	Capscrew, Flanged 5/16-18 X 1.25 (Alum)	16
	171-063-330	Capscrew, Flanged 5/16-18 X 1.25 (Alum)	16
17*	312-110-157E	Elbow, Suction 1/2" BSPT (replaces 312-110-157)	2
	312-110-157N	Elbow, Suction 1/2" NPT (replaces 312-110-157)	2
23*	518-157-157	Manifold BSPT (discharge position only)	1
	518-157-157E	Manifold NPT (discharge position only)	1
27*	544-005-115	Nut, Hex Flanged 5/16-18 (Alum)	28
	544-005-330	Nut, Hex Flanged 5/16-18 (Alum)	28
29*	560-083-360	O-ring (Alum Manifold)	2
	560-083-363	O-ring (Alum Manifold)	2
	560-083-364	O-ring (Alum Manifold)	2
	560-083-365	O-ring (Alum Manifold)	2
	720-064-600	Seal (Alum Manifold)	2

DUAL PORT SUCTION AND DISCHARGE REPAIR PARTS LIST

11*	171-063-115	Capscrew, Flanged 5/16-18 X 1.25 (Alum)	8
	171-063-330	Capscrew, Flanged 5/16-18 X 1.25 (Alum)	8
17*	312-110-157E	Elbow, Suction 1/2" BSPT (replaces 312-110-157)	2
	312-110-157N	Elbow, Suction 1/2" NPT (replaces 312-110-157)	2
18*	312-111-157E	Elbow, Discharge 1/2" BSPT (replaces 312-111-157)	2
	312-111-157N	Elbow, Discharge 1/2" NPT (replaces 312-111-157)	2
23*	518-157-157	Manifold (not required)	0
27*	544-005-115	Nut, Hex Flanged 5/16-18 (Alum)	20
	544-005-330	Nut, Hex Flanged 5/16-18 (Alum)	20
29*	560-083-360	O-ring (Alum Manifold) (not required)	0
	560-083-363	O-ring (Alum Manifold) (not required)	0
	560-083-364	O-ring (Alum Manifold) (none required)	0
	560-083-365	O-ring (Alum Manifold) (none required)	0
	720-064-600	Seal (Alum Manifold) (none required)	0

**Quantities change from Composite Repair Parts List.*

PUMPING HAZARDOUS LIQUIDS

When a diaphragm fails, the pumped liquid or fumes enter the air end of the pump. Fumes are exhausted into the surrounding environment. When pumping hazardous or toxic materials, the exhaust air must be piped to an appropriate area for safe disposal. See illustration #1 at right.

This 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. See illustration #2 at right. Piping used for the air exhaust must not be smaller than 1/2" (1.27 cm) diameter. Reducing the pipe size will restrict air flow and reduce pump performance. 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. See illustration #3 at right.

CONVERTING THE PUMP FOR PIPING THE EXHAUST AIR

The following steps are necessary to convert the pump to pipe the exhaust air away from the pump.

Use a Phillips screwdriver to remove the four self-tapping screws (item 1-H).

Remove the muffler cap and muffler (items 1-G and 1-F). The 3/8" NPT molded threads in the air distribution valve body (item 1-A).

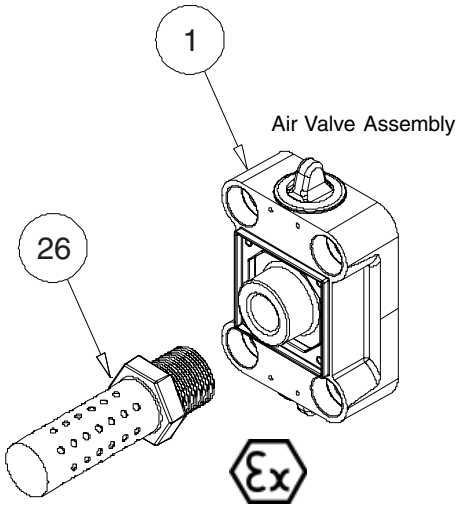
Piping or hose may now be installed.

IMPORTANT INSTALLATION NOTE:

The manufacturer recommends installing a conductive flexible hose or connection between the pump and any rigid plumbing. This reduces stresses on the molded plastic threads of the air exhaust port. Failure to do so may result in damage to the air distribution valve body.

Any piping or hose connected to the pump's air exhaust port must be conductive and physically supported. Failure to support these connections could also result in damage to the air distribution valve body.

Exhaust Conversion Drawing



On ATEX compliant units the pump comes equipped with a metal muffler

CONVERTED EXHAUST ILLUSTRATION

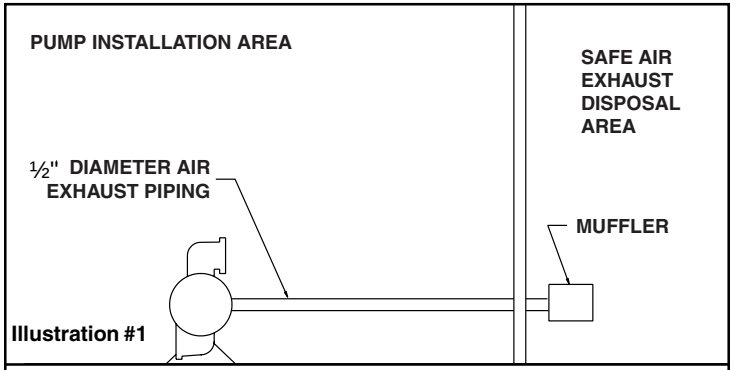


Illustration #1

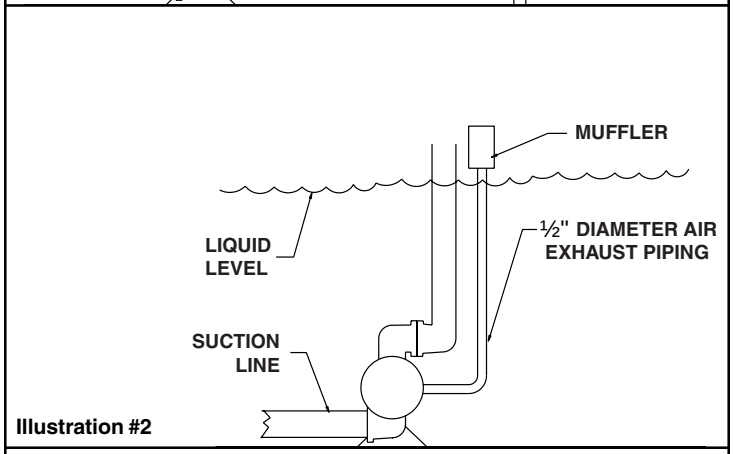


Illustration #2

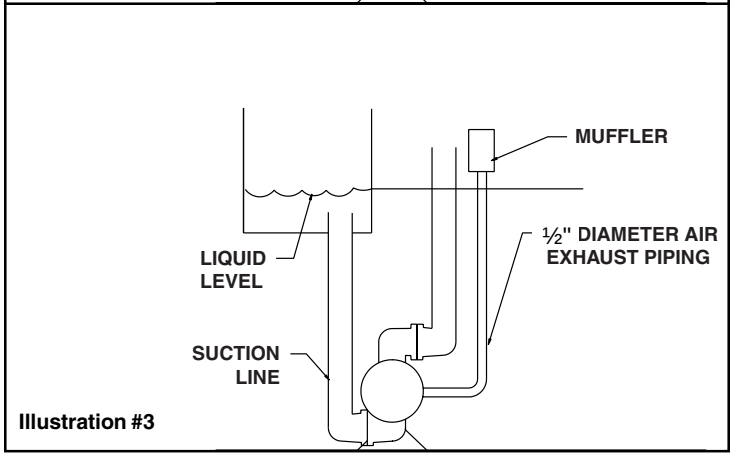


Illustration #3

Pulse Output Kit Drawing

****Note: Pumps equipped with Pulse Output Kits are <u>not</u> ATEX compliant**

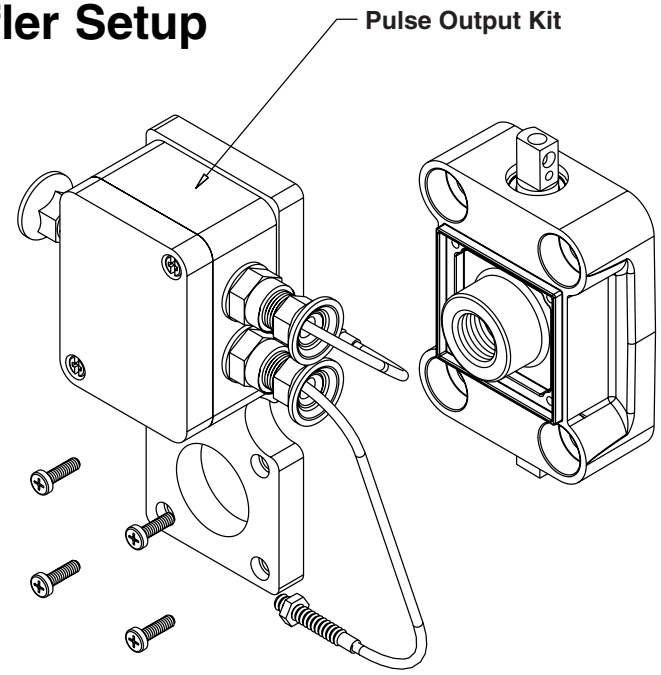
PULSE OUTPUT KIT OPTION

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 RuppTech® Stroke Counter/ Batch Controller or user control devices such as a PLC.

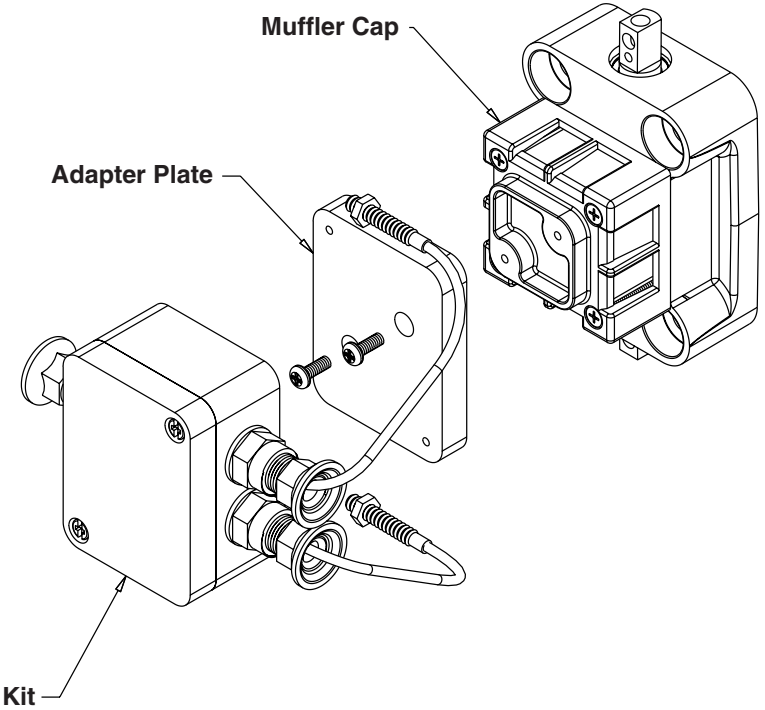
The Pulse Output Kits mount directly onto the Muffler Cap on the Air Distribution Valve Assembly or onto the Air Distribution Valve Assembly when the threaded exhaust port or an auxiliary muffler is being used.

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

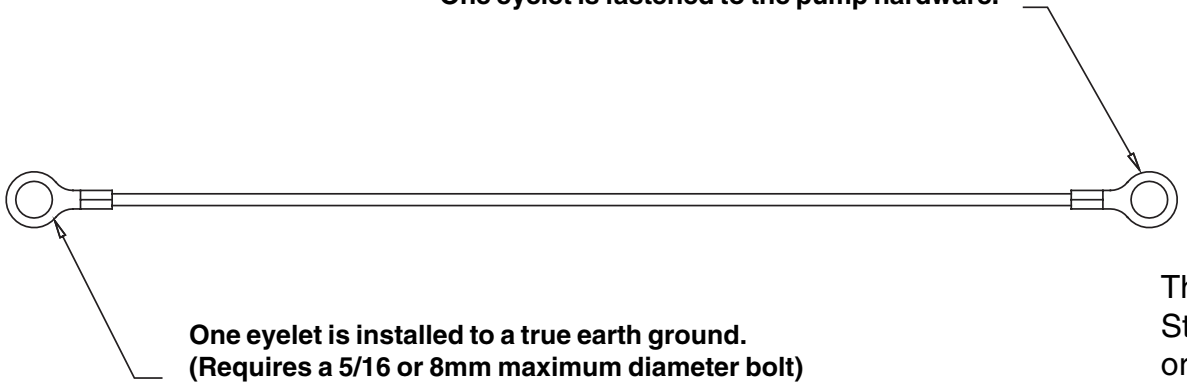
Exhaust Port or Auxiliary Muffler Setup



Integral Muffler Setup

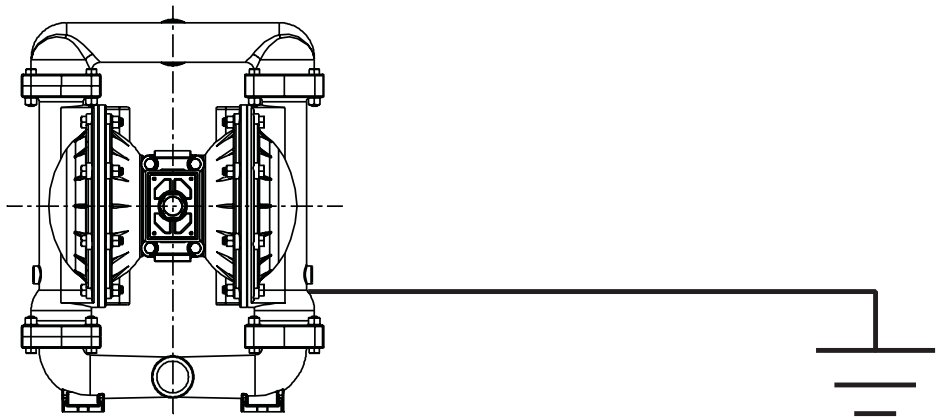


Grounding The Pump



This 8 foot long (244 centimeters) Ground Strap, part number 920-025-000, can be ordered as a service item.

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.



⚠ 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.