SERVICE & OPERATING MANUAL



Model S20 Metallic Design Level 1

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I M2 c T5 II 2GD T5

CE

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

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WARREN RUPP, INC. • A Unit of IDEX Corporation • P.O. Box 1568, Mansfield, Ohio 44901-1568 USA • Telephone (419) 524-8388 • Fax (419) 522-7867 • www.warrenrupp.com

Auality System SO9001 Certified Environmental Management System SO14001 Certified	Air Inlet Side View	Air Exhaust Side View	E I M2 c T5 II 2GD T5 CE U.S. Patent # 5,996,627; 6,241,487 Other U.S. Patents Applied for	A WARREN RUPP PU S20 Design Ball Va Air-Operato Double Dia	ed phragm Pump PERFORMANCE
INTAKE/DISCHARGE PIPE SIZE	CAPACITY	AIR VALVE	SOLIDS-HANDLING	HEADS UP TO	DISPLACEMENT/STROKE
2" NPT (internal) 2" BSP Tapered (internal)	0 to 150 gallons per minute (0 to 567 liters per minute)	No-lube, no-stall design	Up to .25 in. (6mm)	125 psi or 289 ft. of water (8.6 Kg/cm ² or 86 meters)	.42 Gallon / 1.59 liter
2" BSP Tapered (internal) CAUTION! Operating Materials		design		(8.6 Kg/cm ² or 86 meters)	.42 Gallon / 1.59 liter g Temperatures Minimum -10° F
2" BSP Tapered (internal) CAUTION! Operating Materials Nitrile: General purpose, oil-resist acetone and MEK, ozone, chlorinat	(0 to 567 liters per minute) g temperature limitations a	design Fre as follows: hydraulic fluid resistance. Should not	be used with highly polar solvents like	(8.6 Kg/cm² or 86 meters) Operatin Maximum 190° F 88° C 280° F	g Temperatures Minimum
2" BSP Tapered (internal) CAUTION! Operating Materials Nitrile: General purpose, oil-resist acetone and MEK, ozone, chlorinat EPDM: Shows very good water an Neoprene: All purpose. Resistant	(0 to 567 liters per minute) g temperature limitations a ant. Shows good solvent, oil, water and h ted hydrocarbons and nitro hydrocarbons	design Tre as follows: hydraulic fluid resistance. Should not ce to oil and solvents, but is fair in ke y moderate chemicals, fats, greases	be used with highly polar solvents like	(8.6 Kg/cm² or 86 meters) Operatin Maximum 190° F 88° C	g Temperatures <u>Minimum</u> -10° F -23° C -40° F
2" BSP Tapered (internal) CAUTION! Operating Materials Nitrile: General purpose, oil-resist acetone and MEK, ozone, chlorinat EPDM: Shows very good water an Neoprene: All purpose. Resistant attacked by strong oxidizing acids,	(0 to 567 liters per minute) g temperature limitations a ant. Shows good solvent, oil, water and h ted hydrocarbons and nitro hydrocarbons id chemical resistance. Has poor resistan to vegetable oil. Generally not affected by	design Tre as follows: hydraulic fluid resistance. Should not ce to oil and solvents, but is fair in ke y moderate chemicals, fats, greases chlorinated aromatic hydrocarbons.	be used with highly polar solvents like	(8.6 Kg/cm² or 86 meters) Operatin Maximum 190° F 88° C 280° F 138° C 200° F	g Temperatures <u>Minimum</u> -10° F -23° C -40° F -40° C -10° F
2" BSP Tapered (internal) CAUTION! Operating Materials Nitrile: General purpose, oil-resist acetone and MEK, ozone, chlorinat EPDM: Shows very good water an Neoprene: All purpose. Resistant attacked by strong oxidizing acids, Santoprene®: Injection molded the Excellent abrasion resistance. Virgin PTFE: Chemically inert, viri	(0 to 567 liters per minute) g temperature limitations a ant. Shows good solvent, oil, water and h ted hydrocarbons and nitro hydrocarbons id chemical resistance. Has poor resistan to vegetable oil. Generally not affected by ketones, esters, nitro hydrocarbons and o permoplastic elastomer with no fabric layer	design tre as follows: hydraulic fluid resistance. Should not ce to oil and solvents, but is fair in ke y moderate chemicals, fats, greases i chlorinated aromatic hydrocarbons. Chong mechanical flex life.	be used with highly polar solvents like tones and alcohols. and many oils and solvents. Generally E- molten alkali metals, turbulent liquid or	(8.6 Kg/cm² or 86 meters) Operatin Maximum 190° F 88° C 280° F 138° C 200° F 93° C 275° F	g Temperatures Minimum -10° F -23° C -40° F -40° C -10° F -23° C -40° F -23° C -40° F
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For specific applications, always consult The Warren Rupp Chemical Resistance Chart

 $\mathsf{SANDPIPER}^{\texttt{0}}$ pumps are designed to be powered only by compressed air.

Explanation of Pump Nomenclature, S20 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 Ibs. (kg)
S20B1ABBANS000	S	20	В	1	A	В	В	A	N	S	0	00.	69 (31)
S20B1AEEANS000	S	20	В	1	Α	E	E	A	N	S	0	00.	69 (31)
S20B1AGTANS000	S	20	В	1	A	G	Т	A	N	S	0	00.	69 (31)
S20B1ANNANS000	. S	20	В	1	Α	N	N	A	N	S	0	00.	69 (31)
S20B1A1EANS000	S	20	В	1	Α	1	E	A	N	S	0	00.	69 (31)
S20B1ACTANS000.	S	20	В	1	Α	С	Т	A	N	S	0	00.	69 (31)
S20B1IBBANS000.	S	20	В	1	1	В	В	A	N	S	0	00.	129 (59)
S20B1IEEANS000.	S	20	В	1	I	E	E	A	N	S	0	00.	129 (59)
S20B1IGTANS000.	S	20	В	1	I	G	Т	A	N	S	0	00.	129 (59)
S20B1INNANS000.	S	20	В	1	I	N	N	A	N	S	0	00.	129 (59)
S20B1I1EANS000.	S	20	В	1	I	1	E	A	N	S	0	00.	129 (59)
S20B1ICTANS000.	S	20	В	1	I	С	Т	A	N	S	0	00.	129 (59)
S20B1IEEANS000.	S	20	В	1	I	E	E	A	N	S	0	00.	129 (59)
S20B1SBBANS000	S	20	В	1	S	В	В	A	N	S	0	00.	114 (52)
S20B1SGTANS000	S	20	В	1	S	G	Т	A	N	S	0	00.	114 (52)
S20B1SNNANS000	. S	20	В	1	S	N	N	A	N	S	0	00.	114 (52)
S20B1S1EANS000	S	20	В	1	S	1	E	A	N	S	0	00.	114 (52)
S20B1SCTANS000.	S	20	В	1	S	С	Т	A	N	S	0	00.	114 (52)
SANDPIPER® Mater Pump Size 1= Si 2 = P	ragm Chec ials antoprene/Sa FE-Santopr trile/Nitrile	antoprene	N= Neo S= Stair	hless Steel E	N	Forting Options I= NPT Threads I= BSP (Tapered) Th R= Raised Face 150# Threaded ANSI FI		 A 6= Metal Mu A 7= Metal Muf Kit Options 00.= None 		0	E5.= So 60	lenoid Kit wit Hz Explosion lenoid Kit wit	n-Proof Coil

Check Valve Type C= FKM/PTFE B= Ball

Design Level

1= Design Level

Wetted Material

- A= Aluminum I = Cast Iron
- S= Stainless Steel
- H= Alloy C
- E= EPDM/EPDM I = EPDM/Santoprene G= PTFE-Neoprene/PTFE N= Neoprene/Neoprene

Z= One-Piece Bonded/PTFE

Check Valve Seat

E= EPDM

A= Aluminum B= Nitrile C= Carbon Steel

- W=UHMW Polyethylene

Non-Wetted Material Options

- A= Painted Aluminum
- I = Cast Iron
- J= Painted Aluminum w/PTFE Coated Hardware
 - S= Stainless Steel with Stainless Steel Hardware Y= Painted Aluminum with
 - Stainless Steel Hardware Z= Cast Iron with
 - Stainless Steel Hardware

- Threaded ANSI Flange
- **Pump Style**
- S= Standard
- **Pump Options**
- 0= None
 - 1= Sound Dampening Muffler
 - 2= Mesh Muffler
 - 3= High temperature Air Valve w/Integral Muffler
 - 4= High temperature Air Valve w/Sound Dampening Muffler
 - 5= High temperature Air Valve w/Mesh Muffler

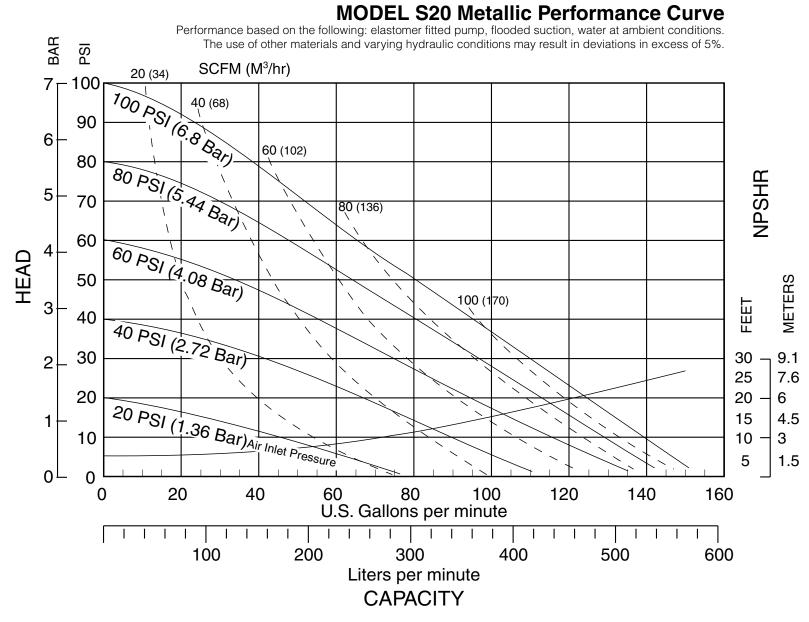
- P0.= 10-30VDC Pulse Output Kit P1.= Intrinsically-Safe 5-30VDC,110/120VAC,
- 220/240VAC Pulse Output Kit P2.= 110/120 or 220/240VAC Pulse
- Output Kit E0.= Solenoid Kit with 24VDC Coil
- E1.= Solenoid Kit with 24VDC Explosion-Proof Coil
 - E2.= Solenoid Kit with
- 24VAC/12VDC Coil E3.= Solenoid Kit with 12VDC Explosion-Proof Coil

- Coil E7.= Solenoid Kit with 220VAC,
- 60 Hz Explosion-Proof Coil
- E8.= Solenoid Kit with 110VAC, 50 Hz Explosion-Proof Coil
- E9.= Solenoid Kit with 230VAC, 50 Hz Explosion-Proof Coil SP.= Stroke Indicator Pins
 - Note: Pumps are only ATEX compliant when ordered with pump options 6 or 7, and kit options 00, P1, E1, E3, E5, E7, E8 or E9.

s20mdl1sm-REV0508

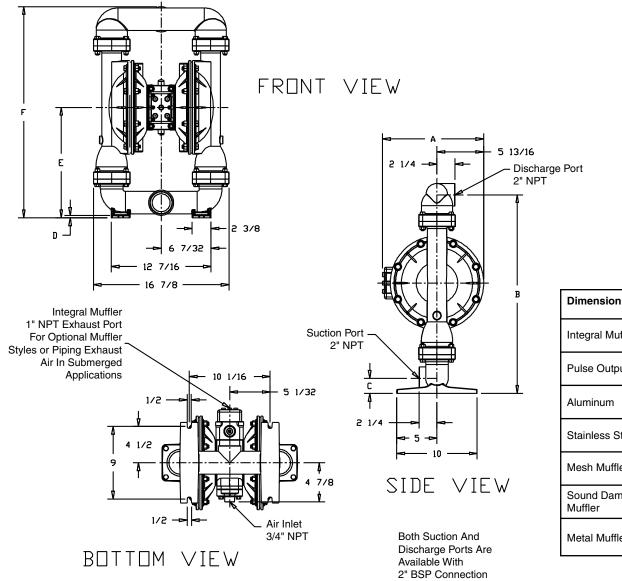
Model S20 Metallic Page 2

Performance Curve, S20 Metallic Design Level 1



Dimensions: S20 Metallic

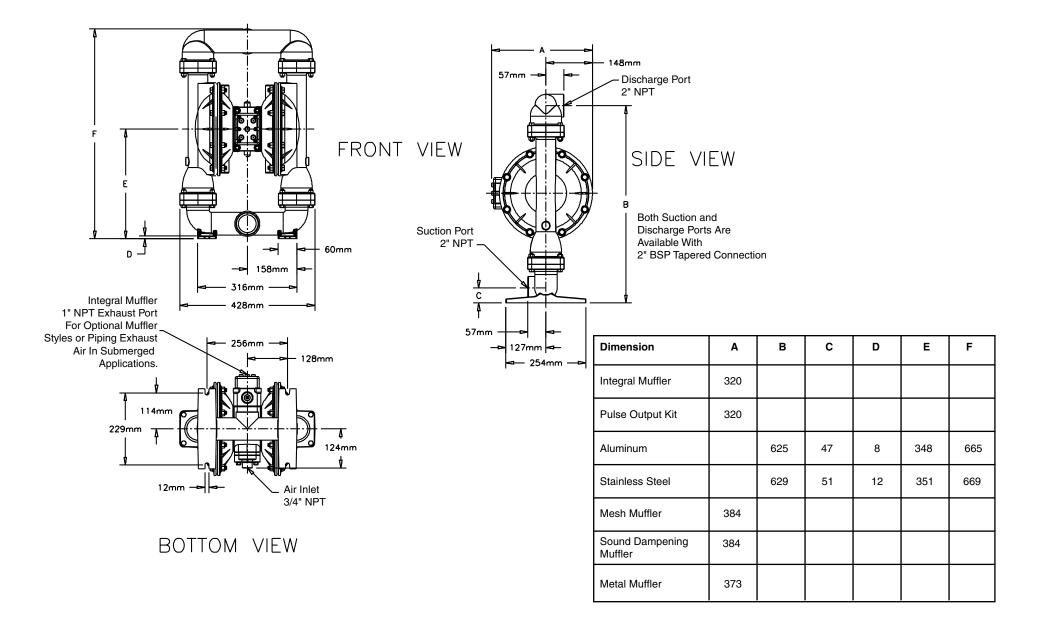
Dimensions in Inches Dimensional Tolerance: ± 1/8"



Dimension	Α	В	С	D	E	F
Integral Muffler	12 19/32					
Pulse Output Kit	12 19/32					
Aluminum		24 5/8	1 7/8	5/16	13 11/16	26 3/16
Stainless Steel		24 3/4	2	7/16	13 13/16	26 5/16
Mesh Muffler	15 1/8					
Sound Dampening Muffler	15 1/8					
Metal Muffler	14 11/16					

Metric Dimensions: S20 Metallic

Dimensions in Millimeters Dimensional Tolerance: ± 3mm



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 Tranquilizer[®] surge suppressor is recommended to further reduce pulsation in flow.

AIR SUPPLY

Air supply pressure cannot exceed 125 psi (8.6 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.

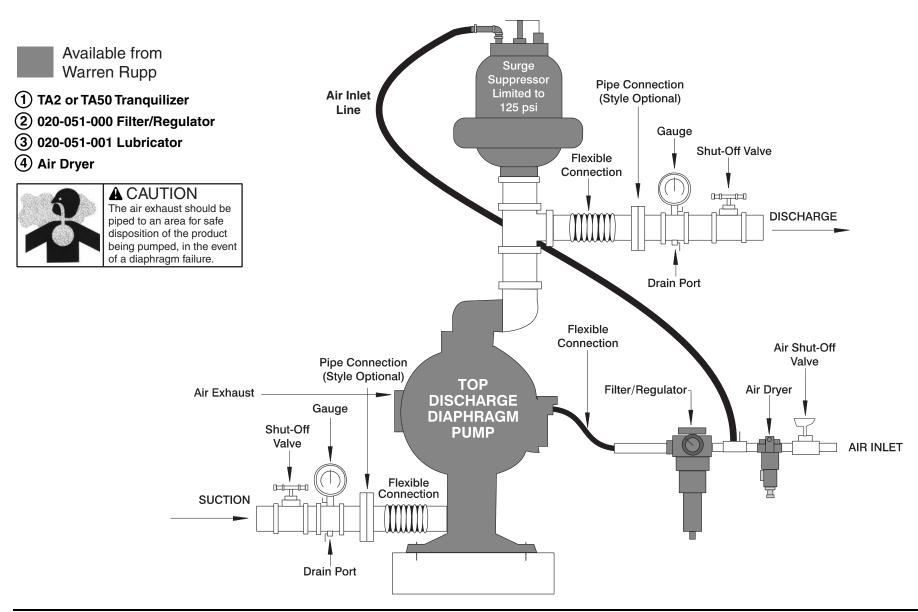
BETWEEN USES

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



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.

<u>What to Check:</u> 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.

<u>Corrective Action:</u> For flooded conditions exceeding 10 feet (3 meters) of liquid, install a back pressure device.

What to Check: System head exceeds air supply pressure.

<u>Corrective Action:</u> Increase the inlet air pressure to the pump. Most diaphragm pumps are designed for 1:1 pressure ratio at zero flow.

<u>What to Check:</u> 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.

<u>Corrective Action</u>: Meet or exceed pump connection recommendations shown on the DIMENSIONAL DRAWING.

What to Check: Restricted or undersized air line.

<u>Corrective Action:</u> Install a larger air line and connection. Refer to air inlet recommendations shown in your pump's SERVICE MANUAL.

What to Check: Check ESADS+Plus, 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.

<u>Corrective Action</u>: Install flexible connectors and a Warren Rupp Tranquilizer[®] Surge Suppressor.

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.

<u>What to Check:</u> Suction side air leakage or air in product.

<u>Corrective Action</u>: 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.

<u>Corrective Action</u>: Check for obstruction or closed discharge line valves.

<u>What to Check:</u> Blocked pumping chamber.

Corrective Action: Disassemble and inspect the wetted chambers of the pump. Remove or flush any obstructions. Refer to the pump SERVICE MANUAL for disassembly instructions.

<u>What to Check:</u> 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. Any 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 Certificate.

Recycling

Many components of SANDPIPER® Metallic AODD pumps are made of recyclable materials (see chart on page 10 for material specifications). We encourage pump users to recycle worn out parts and pumps whenever possible, after any hazardous pumped fluids are thoroughly flushed.

IMPORTANT SAFETY INFORMATION

A 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 and void factory warranty.

purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump,

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.

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.

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.

Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids.

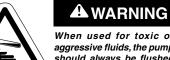
The pump, piping, valves, containers or other miscellaneous equipment must be grounded. (See page 28)



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.



When used for toxic or

aggressive fluids, the pump should always be flushed clean prior to disassembly.



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.



Airborne particles and loud noise hazards.

Wear ear and eye protection.



(F

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. The Technical File No. AX1 is stored at KEMA, Notified Body 0344, under Document #203040000.

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
- Alloy Type 316 Stainless SteelAlloy 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 (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

s20mdl1sm-REV0508

- Copper Alloy
- 305 Carbon Steel, Black Epoxy Coated306 Carbon Steel, Black PTFE Coated
- 306 Carbon Steel, Black PTFE Coat307 Aluminum, Black Epoxy Coated
- 308 Stainless Steel. Black PTFE Coated
- 309 Aluminum, Black PTFE Coated
- 310 PVDF Coated
- 330 Zinc Plated Steel

180

- 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 Nitrile Rubber. Color coded: RED
- 361 FDA Accepted Nitrile
- 363 FKM (Fluorocarbon). 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 Polypropylene379 Conductive Nitrile

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of E.I. DuPont.

Polymer Corp.

Monsanto Corp.

Dixion Industries Corp.

Phillips Chemical Co.

General Electric Co.

PTFE (Bronze and moly filled)

Filled PTFE

Blue Gylon

PTFE

PTFE

Envelon

Conductive PTFE

PTFE Integral Silicon

FKM (Fluorocarbon)/PTFE

PTFE. FKM (Fluorocarbon)/PTFE

Bonded Santoprene and PTFE

Santoprene Diaphragm and

Delrin and Hytrel are registered tradenames

Gylon is a registered tradename of Garlock. Inc.

Model S20 Metallic Page 10

Nylatron is a registered tradename of

Rulon II is a registered tradename of

Ryton is a registered tradename of

Valox is a registered tradename of

Santoprene is a registered tradename of

Check Balls/EPDM Seats

Santoprene Diaphragm, PTFE Overlay

PTFE Integral FKM

Neoprene/Hvtrel

Neoprene/PTFE

PTFE, Hytrel/PTFE

Santoprene/EPDM

Santoprene/PTFE

Balls and seals

EPDM/Santoprene

EPDM/PTFE

Nitrile/TFE

- 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
- 521 Conductive PVDF
- 540 Nylon
- 540 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
- 557 Conductive Polypropylene

PTFE (virgin material)

Tetrafluorocarbon (TFE)

- 558 Conductive HDPF
- 559 Glass-Filled Conductive Polypropylene
- 570 Rulon II
- 580 Rvton
- 590 Valox

600

- 591 Nylatron G-S
- 592 Nvlatron NSB

Composite Repair Parts Drawing

Available Service And Conversion Kits

476-227-000	AIR END KIT (Aluminum Center)
	Seals, O-ring, Gaskets, Retaining Rings, Air Valve
	Sleeve and Spool Set and Pilot Valve Assembly.
476-170-000	AIR END KIT (Air Valve with Stroke Indicator Pin, Aluminum Center)
	Seals, O-ring, Gaskets, Retaining Rings, Air Valve
	Sleeve and Spool Set, and Pilot Valve Assembly.
476-042-360	WET END KIT
470-042-000	Nitrile Diaphragms, Balls, and Seats.
470 040 050	
476-042-656	WET END KIT
	Santoprene Diaphragms, Balls and EPDM Seats.
476-042-365	WET END KIT (46) 🔮 🦝
	Neoprene Diaphragms, Balls and Seats.
476-042-633	WET END KIT
	FKM Diaphragms, PTFE Balls and FKM Seats.
476-042-635	WET END KIT
	Neoprene Diaphragms, PTFE Overlay, PTFE Balls
	and PTFE Seats.
476-042-364	WET END KIT
	EPDM Diaphragms, Balls and Seats.
476-042-654	WET END KIT
	Santoprene Diaphragm, PTFE Overlays, PTFE Balls, PTFE Seats.
476-042-659	WETTED END KIT
	One-Plece Bonded PTFE/Nitrile Diaphragm,
	PTFE Balls, PTFE Seats.
475-216-000	MIDSECTION CONVERSION KIT
	(Replaces Aluminum Midsection With Cast Iron
	Components) Air Inlet Cap, Intermediate Bracket, Inner
Hardware Kits	Chamber and Inner Diaphragm Plates.
475-200-330	Zinc Plated Capscrews, Washers, and Hex Nuts.
475-200-330	Stainless Steel Capscrews, Washers, and Hex Nuts.
475-200-115	סומווויבסט סובבו טמאסורבישט, שמטווביט, מווע דובא וענוט.
**Electronic Le	ak Detector Kits

032-037-000 100-120/220-290 VAC 032-045-000 12-32 VDC

(28) 22 Overlay Diaphragm Option 17 One-Piece Bonded Diaphragm Option

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

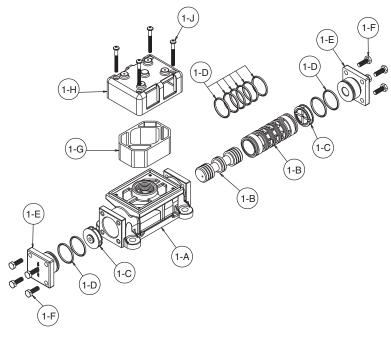
Composite Parts List



TELM PArt Number DesChiPTION OTV Itel PArt Number DesChiPTION OT 1 Str.10003 At Value Assently (Streamed Technics Contron Only) 1 581465.1011 Mainking, Stating 1 4 011-16-000 At Value Assently (Streamed Stote Technics Only) 1 24 5134465.1011 Mainking, Stating 1 4 011-16-000 At Value Assently (Stating Technics Only) 1 24 5134465.1011 Mainking, Stating Technics Only 1 4 011-16-000 At Value Assently (Stating Technics Development Develop	Con	nposite Par	rts List				RECORDENCE	071
1 031-140-000 Air Weite Assembly (Cast in Contens Only) 1 031-140-000 Air Weite Assembly (Cast in Contens Only) 1 031-140-000 1 031-140-000 1 031-140-000 1 1 031-140-000 1 031-140-000 1		•		QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
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A D31-147-000 Ar Valee Assembly (Structure Only) 1 24 351-16-102 Marding, Discharger 2587 Pagered 1 A D31-147-000 Ar Valee Assembly (Structure Steel Contex Only) 551-16-102 Marding, Discharger 2587 Pagered 1 A D31-137-000 Ar Valee Assembly (Structure Steel Contex Only) 551-16-101 Marding, Discharger 2587 Pagered 1 2 052-017-364 Bal, Onech 26 545-00716 Marding, Discharger 2587 Pagered 1 050-017-364 Bal, Onech 26 545-00716 Marding, Discharger 2587 Pagered 1 050-017-364 Bal, Onech 26 545-00716 Mai, Hen 776-14 16 050-017-364 Bal, Onech 27 550-001367 Mai, Hen 776-14 16 050-017-000 Pile Valee Assembly (Structure Steel Contex Only) 28 812-162-177 Mai, Hen 776-14 16 050-017-000 Pile Valee Assembly (Structure Steel Contex Only) 28 812-162-177 Mai, Hen 776-14 16 050-017-000 Pile Valee Assembly (Structure Steel Contex Only) 28 812-162-177 Mai, Hen 776-14		A 031-146-000		1				1
031-173-000 Air Valee Assembly (with again multife " 1 311-16-1000 Mathods, Lickarage 1 1 2 031-173-000 Air Valee Assembly (with again statutes Steel Centers Ony) 1 <t< td=""><td></td><td></td><td></td><td>1</td><td>24</td><td></td><td></td><td>1</td></t<>				1	24			1
D1-173-001 Ar Valee Assembly (vbit Stanless Steel (darware) 1 101-11-11/10 Marindo, Discharge 'B SP Tagored 1 A 01-173-001 Ar Valee Assembly (vbit Assembly 2 101-11-11/10 Marindo, Discharge 'B SP Tagored 1 A 01-173-001 Ar Valee Assembly (vbit Assembly 2 64-0.0-115 Marindo, Discharge 'B SP Tagored 1 C 000-07-360 Ball, Check 2 64-0.0-115 Marindo, Discharge 'B SP Tagored 1 G 00-07-360 Ball, Check 2 64-0.0-115 Marindo, Discharge 'B SP Tagored 1 G 00-07-360 Ball, Check 2 64-0.07-310 Mat, Hes 7716-14 1 1 G 00-07-080-7830 Ball, Check 2 81-01-127 Palls, Inco Daglephraph 2 G 00-07-081-700 Ball Vive Assembly (blankes Steel Centers Only) 12-21-130 Palls, Inco Daglephraph 2 G 11-12-137 Palls (All Palls) G 11-12-137 Palls (All Palls) Palls (All Palls) Palls (All Palls) Palls (All Palls)				1				1
A C11-185-00 Ar Work Assembly (Cast from or Stainless Steel Centers Only) 158-164-1102 Municid. Discharge 2: USP Tapered 1 2 0050-17-364 Buil, Check 25 545.006-110 Nu, Hex 38-16 16 0050-17-364 Buil, Check 26 545.006-110 Nu, Hex 38-16 16 0050-17-364 Buil, Check 26 545.007-330 Nu, Hex 38-16 16 0050-17-364 Buil, Check 26 545.007-330 Nu, Hex 38-16 16 0050-110 Pilot Wale Assembly (Stainless Steel Centers Only) 28 672-149-117 Pilate, Inner Daphragm 2 015-110-525 Pilot Wale Assembly (Stainless Steel Centers Only) 28 672-149-117 Pilate, Louer Daphragm Assembly 2 015-105-505 Burger, Daphragm 2 672-149-110 Pilate, Louer Daphragm Assembly 2 114-022-110 Intermediate Brackel (Stainless Steel Centers Only) 162-149-110 Pilate, Louer Daphragm Assembly 2 114-022-110 Intermediate Brackel (Stainless Steel Centers Only) 162-149-110 Pilate, Uuer Daphragm Assembly 2				1				1
▲ 011-175-00 Air Value Assembly (Cast tion c: Sharless Stel Centers Only) 1 3 He - Hu -				1				1
2 00-017-354 Bit, Check ************************************				1				1
056-017-360 Ball, Check 4 Case Set Action 10 With Hist Set Info Mith Hist Set Info 056-017-364 Ball, Check 4 25 545-007-115 Nith Hist Set Info 16 056-017-364 Ball, Check 7 846-007-330 Nit, Hist X76-14 16 056-017-300 Pilot Valve Assembly 2 864-007-330 Nit, Hist X76-14 16 066-0110 Pilot Valve Assembly (Saltines Steel Centers Only) 1 28 612-121-10 Plate, Inner Disphragin 2 015-0110-000 Pilot Valve Assembly (Cast Ino Centers Only) 1 612-141-10 Plate, Inner Disphragin 2 014-022-101 Intermediate Bracket (Saltiness Steel Centers Only) 1 612-141-107 Plate, Inner Disphragin Leasembly (Saltines Steel Centers Only) 2 612-145-107 Plate, Inner Disphragin Leasembly (Saltines Steel Centers Only) 2 612-145-107 Plate, Inner Disphragin Leasembly (Saltines Steel Centers Only) 2 612-145-107 Plate, Inner Disphragin Leasembly (Saltines Steel Centers Only) 2 612-145-107 Plate, Inner Disphragin Leasembly (Saltines Steel Centers Only) 2 612-145-107 </td <td>2</td> <td></td> <td></td> <td>4</td> <td></td> <td></td> <td></td> <td>1</td>	2			4				1
050-017-364 Ball, Check 4 28 564-007-38 Bull, Disk 100	2			4	25			
05:017:365 Ball, Check 4 Col				4				
050-018-600 Ball, Check 4 276 Bit Join 277 During the Mark Assembly (Bit Ma				4	26			
3 070-006-170 Bushing 2 2 2 812:12:147 Fraitale, more Diaphragm 2 4 065:063-110 Pilot Ware Assembly (Balines Steel Centers Only) 1 612:21:41:50 Pilate, inner Diaphragm 2 5 014:024-107 Intermediate Bracket 1 29 612:18:110 Pilate, funct Diaphragm 2 6 114:024-101 Intermediate Bracket 1 29 612:18:110 Pilate, funct Diaphragm Assembly 2 7 136:34:506 Bushing, Punger V 2 30 612:18:16:10 Pilate, inner Diaphragm Assembly 2 6 132:03:500 Bushing, Punger V 2 30 612:18:510 Pilate, inner Diaphragm Assembly (used with 286:020-604) 2 7 136:116:101 Cape Air Intel Assembly (Used with 286:020-604) 2 612:12:110 Pilate, Outer Diaphragm Assembly (used with 286:020-604) 2 7 17:052:115 Cape Air Intel Assembly (Used with 286:020-604) 2 612:12:110 70:052:110 Pilate, Outer Diaphragm Assembly (Used with 286:020-604) 2 7 17:052:310 Capeoreret, Mex H 03:15:12:25:1 13 62:02:02				4				
4 065-110-000 Filet Vale Assembly 1 2 0 12/12/10/10 Filet Vale Assembly (Stath ton Centers Only) 1 12/12/10/10 Filet Vale Assembly (Stath ton Centers Only) 2 05110-250 Filet Vale Assembly (Stath ton Centers Only) 1 2012/11/20 Filet Vale Assembly (Stath ton Centers Only) 2 612/12/11/20 Filet Vale Assembly 2 114-024-110 Intermediate Backet (Statiness Steel Centers Only) 1 612/12/10/11 Filet Vale Assembly 2 114-024-110 Intermediate Backet (Statiness Steel Centers Only) 1 612/12/10/10 Filet Vale Assembly 2 114-024-110 Cap, Air Intel Assembly 1 612/02/10 Filet Vale Assembly 2 115-116-17 Cap, Air Intel Assembly 1 612/02/10 Filet Vale Assembly 2 115-116-10 Cap, Air Intel Assembly 1 612/02/10 Filet Vale Assembly 2 116-10-00 Cap, Air Intel Assembly 1 612/02/10 Filet Vale Assembly 2 117-050-2330 Capacerw, Hex H 33-16 X 2.25 16 28 6	з			2				
OBS-065-110 Pitot Value Assembly (Satel Centers Only) 1 B2/19/2-110 Pitot Nume Assembly 2 5 114-024-157 Intermediate Bracket 1 29 612-194-177 Pitot Aute Assembly 2 1 114-024-157 Intermediate Bracket 1 29 612-194-177 Pitot Aute Dispragm Assembly (Sate Inco Centers Only) 2 1 114-024-157 Intermediate Bracket 612-194-110 Pitet, Outer Dispragm Assembly (Sate Inco Centers Only) 2 1 14-024-110 Intermediate Bracket 612-194-110 Pitet, Inner Dispragm Assembly (Sate Inco Centers Only) 2 1 165-116-101 Cap, Air Intel Assembly (Sate Inco Centers Only) 1 612-194-170 Pitet, Inner Dispragm Assembly (Sate Inco Centers Only) 2 1 165-116-101 Cap, Air Intel Assembly (Sate Inco Centers Only) 1 612-039-1157 Pitete, Outer Dispragm Assembly (Sate Inco Centers Only) 2 1 170-062-130 Capacrem, Hee Hd 38-164 2.25 16 3 665-120-170 Pitete, Outer Dispragm Assembly (Sate Inco Centers Only) 2 1 170-062-330 <t< td=""><td></td><td></td><td></td><td>1</td><td>28</td><td></td><td></td><td></td></t<>				1	28			
095-110-558 Pilot Value Assembly (Cast Inc Centers Only) 1 DE2/21/-180 Prace. Inter-deals Pracedet 2 5 114-024-1010 Intermediate Bracket 1 2 612-194-1010 Pilot Value Assembly 2 6 112-024-1010 Intermediate Bracket 1 612-194-1010 Pilote, Outer Diaphragm Assembly 2 6 112-024-1010 Intermediate Bracket 612-194-1010 Pilote, Outer Diaphragm Assembly 2 6 112-035-360 Bumple, Diaphragm 2 30 612-195-117 Pilote, Outer Diaphragm Assembly (used win 286-020-604) 2 8 165-116-100 Cap, Air Iniet Assembly 1 612-039-010 Pilote, Outer Diaphragm Assembly (used win 286-020-604) 2 9 170-052-115 Capacrem, Hex Hd 38-16 X 2.25 16 2 605-000-117 Pilotegm Assembly (used win 286-020-604) 2 10 170-063-135 Capacrem, Hex Hd 38-16 X 2.25 16 36 722-042-116 Pilote, Diaphragm Assembly (used win 286-020-604) 2 11 170-063-30 Capacrem, Hex Hd 716-14 X 2.00 16 <td>-</td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td>2</td>	-			1				2
5 114-024-107 Intermediate Bracket 1 29 112-194-107 Utak min on paper brought laphings (20-19-10-00) 2 114-024-110 Intermediate Bracket (Statiness Steel Centers Only) 1 012-194-110 Plate. Outer Diaphragm Assembly 2 1 114-024-110 Intermediate Bracket (Statiness Steel Centers Only) 1 012-194-110 Plate. Outer Diaphragm Assembly 2 7 105-116-177 Cap. At Intel Assembly 2 30 612-195-100 Plate. Outer Diaphragm (seed with 286-020-604) 2 105-116-110 Cap. At Intel Assembly 31 612-087-110 Plate. Outer Diaphragm Assembly (seed with 286-020-604) 2 10 170-062-115 Capscrew, Hex Hd 38-16 X2.25 16 32 020-00-115 Planger, Actual Resembly (seed with 286-020-604) 2 11 170-062-115 Capscrew, Hex Hd 376-18 X 1.75 43 68-058-120 Planger, Actual Resembly (seed with 286-020-604) 2 12 171-062-330 Capscrew, Hex Hd 376-18 X 1.75 43 68-058-120 Red. Diaphragm Assembly (seed with 286-020-604) 2 13 171-069-330 Capscrew, Rex Hd 376-18 X 1.75 43 722-040-360 <t< td=""><td></td><td></td><td></td><td>1</td><td></td><td>612-214-150</td><td></td><td></td></t<>				1		612-214-150		
114-024-100 Intermediate Bracket 1 29 51/2-194-107 Plate, Uter Uniphing Assembly 2 6 132-023-560 Burnpe, Diaphragn 2 30 61/2-194-100 Plate, Dueb Diaphragn, Assembly 2 7 135-024-560 Burnpe, Diaphragn 2 30 61/2-195-170 Plate, Inner Diaphragn (used with 286-020-604) 2 8 152-165-170 Cap, Ar Initia Assembly 1 31 61/2-097-110 Plate, Inner Diaphragn (used with 286-020-604) 2 9 170-052-310 Cap, Ar Initia Assembly (Losd with 286-020-604) 2 1 11 12-039-110 Plate, Outer Diaphragn (used with 286-020-604) 2 9 170-052-310 Capscrew, Hex Hd 38-16 X 2.25 16 38 62-02-01.16 Plate, Outer Diaphragn Assembly (used with 286-020-604) 2 10 170-065-115 Capscrew, Hex Hd 716-14 X 2.00 16 34 62-02-04.16 Planger, Actuator 2 11 170-066-115 Capscrew, Hex Hd 716-14 X 2.00 16 35 722-040-36 Seat, Diaphragn Assembly (used with 286-020-604) 2 </td <td>5</td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td>	5			1				
114 4024-110 Internediate Bracket (Stanless Steel Centers Only) 1 0.12 + 94-10 Piles, Unifer Dispinger Assembly 2 7 135-034-506 Burnper, Diphyragin 2 0 612 + 195 + 107 Piles, Outrie Dispinger Assembly 2 0 8 165 + 116 + 57 Cap, Ar linet Assembly 1 31 612 + 035 + 107 Pilet, Inuer Dispinger Assembly (used with 286 + 020 + 004) 2 165 + 116 + 107 Cap, Ar linet Assembly 1 612 + 039 + 107 Pilet, Outer Dispinger Assembly (used with 286 + 020 + 004) 2 165 + 116 + 100 Cap, Ar linet Assembly 1 612 + 039 + 107 Pilet, Outer Dispinger Assembly (used with 286 + 020 + 004) 2 165 + 105 + 100 Cap, Ar linet Assembly Cap, Ar linet Assembly 1 612 + 039 + 107 Pilet, Outer Dispinger Assembly (used with 286 + 020 + 004) 2 170 + 053 - 030 Capscrew, Heat H 716 + 14 × 2.00 16 31 675 - 042 + 115 Pilet, Outer Dispinger Assembly (used with 286 + 020 + 004) 2 170 + 056 - 330 Capscrew, Heat H 516 + 13 × 1.75 4 36 772 + 040 + 300 Seatt, Cheat Ball 4 772 +	0			1	29			
6 132-035-360 Burniger, Diaphragm 2 30 612-169-100 Pilles, Uniter Diaphragm Assembly 5 7 135-041-566 Bushing, Plunger 2 30 612-169-100 Pilles, Uniter Diaphragm Assembly (used with 286-020-604) 2 8 165-116-157 Cap, Air Intel Assembly 1 31 612-095-100 Pilles, Outer Diaphragm Assembly (used with 286-020-604) 2 9 170-0422-135 Capscrew, Hex H0 38-16 X 2.25 16 32 620-042-115 Pilles, Outer Diaphragm Assembly (used with 286-020-604) 2 10 170-0422-135 Capscrew, Hex H0 38-16 X 2.25 16 32 620-042-115 Pilles, Outer Diaphragm Assembly (used with 286-020-604) 2 11 170-0422-135 Capscrew, Hex H0 716-16 X 2.25 16 34 685-088-1.26 Rod, Diaphragm Assembly (used with 286-020-604) 2 12 170-0422-130 Capscrew, Hex H0 716-16 X 1.75 4 37 72-040-360 Seat, Diaphragm Assembly (used with 286-020-604) 2 13 171-063-130 Capscrew, Hex H0 716-16 X 1.75 4 37 72-040-360 Seat, Check Ball 4 14 171-063-15				1				
7 136-034-0506 Bushing, Plunger 2 300 010-109-107 Plate, Timber Diaghtagin (bask with 286-024-054) 2 8 165-116-101 Cap, Ar Intel Assembly 1 31 612-039-110 Plate, Timber Diaghtagin (bask with 286-024-054) 2 9 170-052-115 Capa Ar Intel Assembly (Stalinless Steel Centers Only) 1 612-039-110 Plate, Duebragin Assembly (used with 286-024-054) 2 10 170-052-315 Capa Arer Intel Assembly (Stalinless Steel Centers Only) 16 32 667-042-115 Plunger, Actuator 2 10 170-056-315 Capacrew, Hex Hd 38-16 X 2.25 16 33 675-042-115 Ring, Relating 2 11 170-066-315 Capacrew, Hex Hd 716-14 X 2.00 16 34 667-062-300 Seat, Check Ball 4 12 171-058-115 Capacrew, Hex Hd 516-18 X 1.75 4 36 722-040-360 Seat, Check Ball 4 11 170-068-315 Capacrew, Hex Hd 516-18 X 1.75 4 36 722-040-360 Seat, Check Ball 4 12 171-058-315 Capacrew, Hex Hd 516-18 X 1.75 4 36 722-040-360 </td <td>6</td> <td></td> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td></td>	6			2				
8 165-116-107 Cap, Air linet Assembly 1 0 16-103-100 Plate. Inter Dapitagin (Desk Mini 269-024-004) 2 165-116-110 Cap, Air linet Assembly 1 31 612-037-110 Plate. Inter Dapitagin (Desk Mini 269-024-004) 2 165-116-110 Cap, Air linet Assembly (Stainless Steel Centers Only) 1 612-037-115 Plate. Under Daphtagin Assembly (used with 286-020-604) 2 170-052-115 Capscrew, Hex Hd 376-16 X 2.25 16 32 620-020-157 Plute, Aduator 2 170-058-330 Capscrew, Hex Hd 776-14 X 2.00 16 34 685-058-108 Chapk Tage Haw Hd 376-14 X 2.00 16 35 720-004-360 Seat. Check Ball 2 170-058-330 Capscrew, Hex Hd 576-18 X 1.75 4 36 722-040-360 Seat. Check Ball 4 12 171-055-115 Capscrew, Hex Hd 576-18 X 1.75 4 36 722-040-360 Seat. Check Ball 4 13 171-055-315 Capscrew, Hex Hd 376-18 X 2.50 8 Seat. Check Ball 4 14 171-055-115 Capscrew, Hex Hd 376-1				2	30			
165-116-010 Cap, År Inlet Assembly (Island Inter A				- 1				
165-116-110 Cap, Air Inlet Assembly (Stabilities Steel Centers Only) 1 16/205/110 Prate, Outer Displicing/In Assembly (used with 260-024-004) 2 1 170-052-115 Capscrew, Hex H3 38-16 X.2.25 16 32 620-020-115 Plane, Outer Displicing/In Assembly (used with 260-024-004) 2 10 170-052-330 Capscrew, Hex H3 716-14 X 2.00 16 33 650-020-115 Planger, Actuator 17 11 170-068-115 Capscrew, Hex H3 716-14 X 2.00 16 34 657 7220-00-550 Sat, Check Ball 2 12 171-053-130 Capscrew, Hex H3 716-16 X 2.50 4 7220-00-0580 Sat, Check Ball 4 171-053-330 Capscrew, Hex H3 24-16 X 2.50 4 7220-00-0580 Sat, Check Ball 4 171-053-330 Capscrew, Hex H3 24-16 X 2.50 4 722-040-0630 Sat, Check Ball 4 170-006-115 Capscrew, Hex H3 24-16 X 2.50 4 722-040-060 Sat, Check Ball 4 170-005-330 Capscrew, Nex H3 24-16 X 1.50 4 722-040-060 Sat, Check Ball 4 13 171-053-330 Capscrew, Soc H3 71-16 X 1.25 8	0			1	31			
9 170-052-115 Capsorew, Hex H3 38-16 X 2.25 16 32 621-039-15 Prilate, Outer Dispinsion, Assembly (used with 280-02-040) 2 10 170-062-330 Capsorew, Hex H3 716-14 X 2.00 16 33 675-042-115 Ring, Retaining 2 11 170-066-115 Capsorew, Hex H3 716-14 X 2.00 16 34 685-082-120 Hod, Diaphragm 1 12 170-066-115 Capsorew, Hex H3 716-14 X 2.00 16 35 720-004-360 Seat, Check Sall 4 12 171-058-3115 Capsorew, Hex H3 716-16 X 1.75 4 722-040-360 Seat, Check Sall 4 12 171-053-3115 Capsorew, Hex H3 716-16 X 1.75 4 722-040-360 Seat, Check Sall 4 13 Capsorew, Hex H3 38-16 X 2.50 4 722-040-360 Seat, Check Sall 4 170-006-115 Capsorew, Hex H3 38-16 X 1.00 4 722-040-360 Seat, Check Sall (seals required see item 40) 4 13 171-059-330 Capsorew, Soch d716-14 X 1.25 8 722-040-360 Seat, Check Sall (seals required see item 40) 4 14 196-167-155/75 Chamber, Neth 2				1		612-097-110	Plate, Outer Diaphragm Assembly (used with 286-020-604)	
170-052.330 Capserew. Hex Hd 376-16 X 2.25 16 32 62/4/20-115 Prunger, Actuator 2 10 170-060-115 Capserew, Hex Hd 7716-14 X 2.00 16 33 675-062-115 Fluig, Relating 1 11 170-060-330 Capserew, Hex Hd 5716-18 X 1.75 4 35 725-040-360 Seat, Diaphragm Rod 2 12 171-053-135 Capserew, Hex Hd 5716-18 X 1.75 4 36 722-040-384 Seat, Check Ball 4 12 171-053-135 Capserew, Hex Hd 3716-18 X 1.75 4 36 722-040-384 Seat, Check Ball 4 13 171-053-135 Capserew, Hex Hd 3716-18 X 1.55 4 722-040-386 Seat, Check Ball 4 170-066-135 Capserew, Hex Hd 371-18 X 1.00 4 722-040-386 Seat, Check Ball (seals required see item 40) 4 13 171-059-135 Capserew, Hex Hd 371-18 X 1.00 4 722-040-500 Seat, Check Ball (seals required see item 40) 4 14 196-167-105 Capserew, Soc Hd 7716-14 X 1.25 8 722-040-500 Seat, Check Ball (seals required see item 40) 4 14 196-167-105	0			•		612-039-157	Plate, Outer Diaphragm Assembly (used with 286-020-604)	
10 170-060-115 Capscrew, Hax H4 7/16-14 X 2.00 16 33 6/5-942-115 Hind, Hetalning 2 11 170-060-300 Capscrew, Hax H4 7/16-14 X 2.00 16 34 635-08-120 Rod, Diaphragm Rod 2 11 170-069-115 Capscrew, Hax H5 0/16-18 X 1.75 4 722-040-380 Seat. Check Ball 4 12 171-053-3115 Capscrew, Soc H3 /8-16 X 2.50 4 36 722-040-380 Seat. Check Ball 4 170-053-330 Capscrew, Soc H3 /8-16 X 2.50 4 722-040-384 Seat. Check Ball 4 170-006-115 Capscrew, Hax H5 0/16-18 X 1.70 4 722-040-384 Seat. Check Ball 4 170-006-115 Capscrew, Hax H5 3/16-18 X 1.00 4 722-040-300 Seat. Check Ball 4 170-006-115 Capscrew, Soc H3 /16-14 X 1.25 8 722-040-150 Seat. Check Ball 4 171-059-30 Capscrew, Soc H3 /16-14 X 1.25 8 722-040-500 Seat. Check Ball 4 18 196-167-101 Chapscrew, Soc H3 /16-14 X 1.25 8 722-040-500 Seat. Check Ball 4 19	9				32	620-020-115		
110 170-060-330 Capscrew, Hex Hd 7/16-14 X 2.00 16 34 689-059-120 Hot, Japhragm Rod 1 11 170-069-115 Capscrew, Hex Hd 5/16-18 X 1.75 4 35 722-040-360 Seat, Check Ball 4 12 171-053-115 Capscrew, Nex Hd 5/16-18 X 1.75 4 36 722-040-360 Seat, Check Ball 4 12 171-053-130 Capscrew, Soc Hd 3/16-18 X 2.50 4 36 722-040-365 Seat, Check Ball 4 170-069-115 Capscrew, Soc Hd 3/16-18 X 1.00 4 722-040-365 Seat, Check Ball 4 170-068-300 Capscrew, Hex HD 38-16 X 1.00 4 722-040-365 Seat, Check Ball 4 13 171-059-130 Capscrew, Hex HD 38-16 X 1.00 4 722-040-10 Seat, Check Ball 4 14 196-167-156/157 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-600 Seat, Check Ball 4 14 196-167-156/157 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-600 Seat, Check Ball 4 14 196-167-160 Chamber, Ouler 2 30 900-005-330	10							2
11 170-069-115 Capscrew, Hex Hd 5/16-18 X 1.75 4 35 722-040-360 Seat, Diaghtaght Hold 4 4 12 171-053-115 Capscrew, Soc Hd 3/8-16 X 2.50 4 36 722-040-360 Seat, Check Ball 4 12 171-053-330 Capscrew, Soc Hd 3/8-16 X 2.50 4 722-040-366 Seat, Check Ball 4 170-066-115 Capscrew, Noc Hd 3/8-16 X 1.00 4 722-040-366 Seat, Check Ball 4 170-066-115 Capscrew, Nex HD 3/8-16 X 1.00 4 722-040-366 Seat, Check Ball 4 170-066-330 Capscrew, Hex HD 3/8-16 X 1.00 4 722-040-150 Seat, Check Ball (seats required see item 40) 4 13 171-059-115 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-150 Seat, Check Ball (seats required see item 40) 4 14 196-167-110 Chapscrew, Soc Hd 7/16-14 X 1.25 8 37 900-005-115 Washer, Lock 16 14 196-167-110 Chamber, Outer 2 38 901-048-310 Washer, Flat 3/16 4 196-167-10 Chamber, Outer 2 39 901-048-310 </td <td>10</td> <td></td> <td></td> <td></td> <td></td> <td>685-058-120</td> <td></td> <td>1</td>	10					685-058-120		1
12 170-069-330 Capscrew, Hex Hd 5/16-18 X.1.75 4 36 722-040-380 Selit, Check Ball 4 12 171-053-115 Capscrew, Soch dJ 3/F-18 X.2.50 4 372-040-383 Seat, Check Ball 4 170-006-115 Capscrew, Soch dJ 3/F-18 X.2.50 4 722-040-363 Seat, Check Ball 4 170-006-15 Capscrew, Hax HD 3/8-16 X.1.00 4 722-040-365 Seat, Check Ball (seals required see item 40) 4 13 171-059-300 Capscrew, Hax HD 3/8-16 X.1.00 4 722-040-305 Seat, Check Ball (seals required see item 40) 4 13 171-059-300 Capscrew, Soch dJ 7/16-14 X.1.25 8 722-040-50 Seat, Check Ball (seals required see item 40) 4 14 196-167.158/157 Chamber, Outer 2 38 90-005-330 Washer, Lock 4 14 196-167.158/157 Chamber, Outer 2 38 901-038-330 Washer, Flat 3/16 4 15 196-167.10 Chamber, Outer 2 39 901-048-330 Washer, Flat 3/16 4 16 196-167.10 Chamber, Outer 2 39	4.4				35			2
12 171-053-115 Capscrew, Soc Hd 3/8-16 X.2.50 4 .59 722-040-363 Seat, Check Ball 4 171-053-330 Capscrew, Soc Hd 3/8-16 X.2.50 722-040-366 Seat, Check Ball 4 170-066-115 Capscrew, Hex HD 3/8-16 X.1.00 4 722-040-366 Seat, Check Ball (seals required see item 40) 4 13 171-059-115 Capscrew, Hex HD 3/8-16 X.1.00 4 722-040-150 Seat, Check Ball (seals required see item 40) 4 13 171-059-115 Capscrew, Soc Hd 7/16-14 X.1.25 8 722-040-100 Seat, Check Ball (seals required see item 40) 4 14 196-167-156/157 Chamber, Outer 2 38 900-005-115 Washer, Lock 16 14 196-167-110 Chamber, Outer 2 38 901-038-115 Washer, Flat 3/16 4 196-167-110 Chamber, Inner 2 39 901-048-30 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-010 Chamber, Inner 2 39 901-048-30 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-010 Chamber, Inner 2 30 901-048-30	11					722-040-550	Seat, Check Ball	4
Sincke Indicator Only) 722-040-383 Seat, Check Ball 4 170-036-115 Capscrew, Soc Hd 308-18 × 2.50 4 722-040-385 Seat, Check Ball 4 170-006-115 Capscrew, Hex HD 38-16 × 1.00 4 722-040-386 Seat, Check Ball (seals required see item 40) 4 13 171-059-303 Capscrew, Hex HD 38-16 × 1.00 4 722-040-800 Seat, Check Ball (seals required see item 40) 4 14 171-059-303 Capscrew, Soc Hd 7116-14 × 1.25 8 722-040-500 Seat, Check Ball (seals required see item 40) 4 14 196-167-156/157 Chamber, Outer 8 37 900-005-330 Washer, Flat 5/16 4 196-167-156/157 Chamber, Outer 2 38 901-338-115 Washer, Flat 5/16 4 196-167-101 Chamber, Juner 2 39 901-048-330 Washer, Flat 3/16 4 15 196-168-150 Chamber, Inner 2 39 901-048-330 Washer, Flat 3/16 4 15 196-168-100 Diaphragm, Overlay 2 40	10			4	36	722-040-360	Seat, Check Ball	4
171-053-330 Capscrew, Soc Hd 3/2-16 X 2.50 4 722-040-365 Seat, Check Ball 4 170-006-115 Capscrew, Hex HD 3/8-16 X 1.00 4 722-040-080 Seat, Check Ball (seals required see item 40) 4 170-006-310 Capscrew, Hex HD 3/8-16 X 1.00 4 722-040-150 Seat, Check Ball (seals required see item 40) 4 171-059-330 Capscrew, Hex HD 3/8-16 X 1.00 4 722-040-150 Seat, Check Ball (seals required see item 40) 4 13 171-059-330 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-150 Seat, Check Ball (seals required see item 40) 4 14 196-167-156/157 Chamber, Outer 2 900-005-330 Washer, Lock 16 14 196-167-110 Chamber, Outer 2 910-038-330 Washer, Flat 5/16 4 196-168-110 Chamber, Inner 2 910-048-13 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-100 Chamber, Inner 2 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-100 Chamber, Inner (Stainless Steel Centers Only) 2 40 560-106-363 Seal (O-Ring) (See item 36) 8	12	171-053-115		4		722-040-363	Seat, Check Ball	4
(Stroke Indicator Only) 722-040-305 Sealt, Check Ball (seals required see item 40) 4 170-006-130 Capscrew, Hex HD 3/8-16 X 1.00 4 722-040-100 Seat, Check Ball (seals required see item 40) 4 13 171-059-115 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-600 Seat, Check Ball (seals required see item 40) 4 13 171-059-115 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-600 Seat, Check Ball (seals required see item 40) 4 14 196-167-156/157 Chamber, Outer 2 38 900-005-330 Washer, Look 16 196-167-110 Chamber, Outer 2 38 901-038-330 Washer, Flat 5/16 4 15 196-166-157 Chamber, Inner 2 39 901-048-330 Washer, Flat 3/2 (Stroke Indicator Only) 4 16 286-007-364 Diaphragm, One-Plece Bonded 2 560-106-364 Seal (O-Ring) (See item 36) 8 17 286-007-364 Diaphragm 2 560-106-364 Seal (O-Ring) (See item 36) 8 18 286-007-3		171 050 000		4		722-040-364	Seat, Check Ball	4
170-006-115 Capscrew, Hex HD 3/6-16 X 1.00 4 722-040-060 Selit, Otheck Ball (seals required see item 40) 4 13 171-059-115 Capscrew, Hex HD 3/6-16 X 1.02 4 722-040-150 Seat, Check Ball (seals required see item 40) 4 13 171-059-300 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-060 Seat, Check Ball (seals required see item 40) 4 14 196-167-156/157 Chamber, Outer 2 38 900-005-310 Washer, Lock 16 14 196-167-100 Chamber, Outer 2 38 901-038-315 Washer, Flat 5/16 4 196-167-110 Chamber, Outer 2 39 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 15 196-168-110 Chamber, Inner 2 9 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 16 286-007-364 Diaphragm, One-Piece Bonded 2 660-106-363 Seal (O-Ring) (See item 36) 8 17 286-007-364 Diaphragm 2 46 530-033-00 Metal Muffler (for other muffler options see pg. 24) 1 18 286-007-364		171-053-330		4		722-040-365		4
170-006-130 Capscrew, Hex HD 3/8-16 X 1.00 4 170-006-330 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-150 Seat, Check Ball (seals required see item 40) 4 13 171-059-115 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-150 Seat, Check Ball 4 171-059-115 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-060 Seat, Check Ball 4 171-059-115 Capscrew, Soc Hd 1/2-13 x 1.00 (Stainless Steel Centers Only) 8 37 900-005-115 Washer, Lock 16 14 196-167-150 Chamber, Outer 2 38 901-038-115 Washer, Flat 5/16 4 196-167-110 Chamber, Inner 2 39 901-048-30 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-100 Chamber, Inner 2 901-048-30 Washer, Flat 3/8 (Stroke Indicator Only) 4 16 286-020-604 Diaphragm, One-Piece Bonded 2 560-106-360 Seal (O-Ring) (See item 36) 8 17 286-007-360 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8 18 286-007-360 Diaphragm <td></td> <td>170 000 115</td> <td></td> <td>4</td> <td></td> <td>722-040-080</td> <td>Seat, Check Ball (seals required see item 40)</td> <td>4</td>		170 000 115		4		722-040-080	Seat, Check Ball (seals required see item 40)	4
13 171-059-115 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-630 Seat, Check Ball (seals required see item 40) 4 171-059-330 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-630 Seat, Check Ball (seals required see item 40) 4 171-011-115 Capscrew, Soc Hd 7/16-14 X 1.25 8 722-040-630 Seat, Check Ball (seals required see item 40) 4 14 196-167-106 Chamber, Outer 2 38 901-038-115 Washer, Lock 16 196-167-100 Chamber, Outer 2 39 901-048-115 Washer, Flat 5/16 4 196-168-010 Chamber, Inner 2 39 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-010 Chamber, Inner 2 40 560-106-360 Seal (O-Ring) (See item 36) 8 16 286-007-360 Diaphragm, Overlay 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-007-364 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-007-365 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8				4		722-040-110	Seat, Check Ball (seals required see item 40)	4
171-059-330 Capserew, Soc Hd 7/16-14 X 1.25 8 722-047-000 Seal, Orlex Ball 4 171-011-115 Capscrew, Soc Hd 7/2-13 x 1.00 (Stainless Steel Centers Only) 8 7 900-005-15 Washer, Lock 16 14 196-167-156/157 Chamber, Outer 2 38 901-038-330 Washer, Flat 5/16 4 196-167-10 Chamber, Outer 2 38 901-038-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-157 Chamber, Unner 2 39 901-048-13 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-10 Chamber, Inner 2 40 560-106-360 Seal (O-Ring) (See item 36) 8 16 286-020-604 Diaphragm, Overlay 2 560-106-364 Seal (O-Ring) (See item 36) 8 17 286-118-000 Diaphragm, One-Piece Bonded 560-106-365 Seal (O-Ring) (See item 36) 8 18 286-007-360 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-007-360 Diaphragm 2 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1	10			•		722-040-150	Seat, Check Ball (seals required see item 40)	4
171-011-115 Capscrew, Soc Hd 1/2-13 x 1.00 (Stainless Steel Centers Only) 8 37 900-005-330 Washer, Look 16 14 196-167-156/157 Chamber, Outer 2 38 901-038-115 Washer, Look 16 196-167-010 Chamber, Outer 2 38 901-038-330 Washer, Flat 5/16 4 196-167-100 Chamber, Outer 2 99 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-101 Chamber, Inner 2 99 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-101 Chamber, Inner (Stainless Steel Centers Only) 2 40 560-106-363 Seal (O-Ring) (See item 36) 8 17 286-107-360 Diaphragm, One-Piece Bonded 2 560-106-363 Seal (O-Ring) (See item 36) 8 286-007-361 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 286-007-363 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 286-007-364 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 28	13			-		722-040-600	Seat, Check Ball	4
14 196-167-156/157 Chamber, Outer 2 38 901-003-330 Washer, Flat 5/16 4 196-167-101 Chamber, Outer 2 38 901-038-330 Washer, Flat 5/16 4 15 196-167-100 Chamber, Outer 2 39 901-048-115 Washer, Flat 5/16 4 15 196-168-157 Chamber, Inner 2 39 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-100 Chamber, Inner 2 39 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-100 Chamber, Inner (Stainless Steel Centers Only) 2 40 560-106-360 Seal (O-Ring) (See item 36) 8 16 286-007-360 Diaphragm, One-Piece Bonded 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-007-360 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-007-365 Diaphragm 2 560-106-364 Seal (O-Ring) (See item 36) 8 286-007-365 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-0					37	900-005-115	Washer, Lock	16
14 196-167-156/157 Chamber, Outer 2 38 901-038-115 Washer, Flat 5/16 4 196-167-101 Chamber, Outer 2 39 901-038-330 Washer, Flat 5/16 4 196-167-110 Chamber, Outer 2 39 901-038-330 Washer, Flat 5/16 4 15 196-168-157 Chamber, Inner 2 39 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-100 Chamber, Inner 2 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-100 Chamber, Inner 2 40 560-106-360 Seal (O-Ring) (See item 36) 8 16 286-007-354 Diaphragm, One-Piece Bonded 560-106-364 Seal (O-Ring) (See item 36) 8 18 286-007-360 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 19 360-093-360 Gasket, Air Valve 2 720-060-608 Seal (O-Ring) (See item 36) 8 286-007-364 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 286-007-365 Diaphragm						900-005-330		16
196-167-010 Chamber, Outer 2 901-038-330 Washer, Flat 5/16 4 196-167-110 Chamber, Outer 2 39 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 15 196-168-157 Chamber, Inner 2 39 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-100 Chamber, Inner 2 40 560-106-360 Seal (O-Ring) (See item 36) 8 16 286-020-604 Diaphragm, Overlay 2 560-106-365 Seal (O-Ring) (See item 36) 8 17 286-118-000 Diaphragm, One-Piece Bonded 2 560-106-365 Seal (O-Ring) (See item 36) 8 18 286-007-360 Diaphragm 2 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 286-007-364 Diaphragm 2 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 199 360-093-360 Gasket, Air Valve 1 326-052-080 Metal Muffler (for other muffler options see pg. 24) 1 199 360-104-379 Gasket, Air Inlet 1 326-052-080	14				38			4
196-16/-110 Chamber, Unter 2 39 901-048-115 Washer, Flat 3/8 (Stroke Indicator Only) 4 15 196-168-157 Chamber, Inner 2 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-010 Chamber, Inner 2 40 560-106-360 Seal (O-Ring) (See item 36) 8 16 286-020-604 Diaphragm, Overlay 2 560-106-363 Seal (O-Ring) (See item 36) 8 17 286-118-000 Diaphragm, One-Piece Bonded 2 560-106-365 Seal (O-Ring) (See item 36) 8 18 286-007-354 Diaphragm 2 720-060-068 Seal (O-Ring) (See item 36) 8 286-007-363 Diaphragm 2 720-060-0608 Seal (O-Ring) (See item 36) 8 286-007-364 Diaphragm 2 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 19 360-033-360 Gasket, Air Valve 1 326-052-080 Mounting Bracket 2 20 360-103-360 Gasket, Air Inlet 1 334-115-110 2" Raised Face, 150# ANSI Flange 2 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>4</td></td<>								4
15 196-168-10 Chamber, Inner 2 901-048-330 Washer, Flat 3/8 (Stroke Indicator Only) 4 196-168-010 Chamber, Inner 2 40 560-106-360 Seal (O-Ring) (See item 36) 8 196-168-110 Chamber, Inner (Stainless Steel Centers Only) 2 40 560-106-363 Seal (O-Ring) (See item 36) 8 16 286-020-604 Diaphragm, Overlay 2 560-106-365 Seal (O-Ring) (See item 36) 8 17 286-118-000 Diaphragm, One-Piece Bonded 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-007-364 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 286-007-364 Diaphragm 2 4 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 286-007-365 Diaphragm 2 4 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 19 360-093-360 Gasket, Air Valve 1 326-052-080 Mounting Bracket 2 20 360-103-360 Gasket, Air Inlet 1 326-052-080 Mounting					39	901-048-115	Washer, Flat 3/8 (Stroke Indicator Only)	4
196-168-110 Chamber, Inner (Stainless Steel Centers Only) 2 40 500-106-360 Seal (0-Ring) (See item 36) 8 16 286-020-604 Diaphragm, Overlay 2 560-106-363 Seal (0-Ring) (See item 36) 8 17 286-118-000 Diaphragm, One-Piece Bonded 2 560-106-365 Seal (0-Ring) (See item 36) 8 18 286-007-360 Diaphragm 2 560-106-365 Seal (0-Ring) (See item 36) 8 286-007-363 Diaphragm 2 720-060-608 Seal (0-Ring) (See item 36) 8 286-007-363 Diaphragm 2 720-060-608 Seal (0-Ring) (See item 36) 8 286-007-365 Diaphragm 2 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 19 360-033-360 Gasket, Air Valve 1 326-052-080 Mounting Bracket 2 20 360-103-360 Gasket, Air Inlet 1 326-052-080 Mounting Bracket 2 21 360-104-379 Gasket, Air Inlet 1 338-024-110 Pipe Nipple 2" NPT x 2½" 2 22 360-105-360 <td>15</td> <td></td> <td></td> <td></td> <td></td> <td>901-048-330</td> <td></td> <td>4</td>	15					901-048-330		4
196-168-110 Chamber, Inner (Stanless Steel Centers Only) 2 560-106-363 Seal (O-Ring) (See item 36) 8 16 286-020-604 Diaphragm, Overlay 2 560-106-364 Seal (O-Ring) (See item 36) 8 17 286-118-000 Diaphragm, One-Piece Bonded 2 560-106-365 Seal (O-Ring) (See item 36) 8 18 286-007-354 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-007-363 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 286-007-363 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 286-007-363 Diaphragm 2 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 19 360-093-360 Gasket, Air Valve 1 326-052-080 Mounting Bracket 2 20 360-103-360 Gasket, Air Inlet 1 326-052-080 Mounting Bracket 2 21 360-104-379 Gasket, Air Inlet 1 538-024-110 Pipe Nipple 2" NPT x 2½" 2 22 360-105-360 Gasket,					40	560-106-360		8
16 286-020-604 Diaphragm, Overlay 2 560-106-364 Seal (O-Ring) (See item 36) 8 17 286-007-364 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8 18 286-007-360 Diaphragm 2 560-106-365 Seal (O-Ring) (See item 36) 8 286-007-363 Diaphragm 2 720-060-608 Seal (O-Ring) (See item 36) 8 286-007-363 Diaphragm 2 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 286-007-365 Diaphragm 2 46 530-033-000 Metal Muffler (for other muffler options see pg. 24) 1 19 360-093-360 Gasket, Air Valve 1 326-052-080 Mounting Bracket 2 20 360-103-360 Gasket, Air Inlet 1 326-052-080 Mounting Bracket 2 21 360-104-379 Gasket, Air Inlet 1 538-024-110 Pipe Nipple 2" NPT x 2½" 2 22 360-105-360 Gasket, Inner Chamber 2 538-024-110 Pipe Nipple 2" NPT x 2½" 2 23 518-145-156						560-106-363	Seal (O-Ring) (See item 36)	8
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20 360-103-360 Gasket, Pilot Valve 1 334-115-110 2" Raised Face, 150# ANSI Flange 2 21 360-104-379 Gasket, Air Inlet 1 538-024-110 Pipe Nipple 2" NPT x 2½" 2 22 360-105-360 Gasket, Inner Chamber 2 545-007-330 Hex Nut 4 23 518-145-156 Manifold, Suction 2" BSP Tapered 1 900-006-330 Elzt Washer 8				1				2
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22 360-105-360 Gasket, Inner Chamber 2 545-007-330 Hex Nut 4 23 518-145-156 Manifold, Suction 1 900-006-330 Lock Washer 4 518-145-156E Manifold, Suction 2" BSP Tapered 1 901-022-330 Elat Washer 8				1				2
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518-145-010 Manifold, Suction 1				1				8
		518-145-010	Manifold, Suction	1	331 OLL			~

Air Valve Servicing, Assembly Drawing & Parts List

(Use With Aluminum Centers Only)



AIR VALVE ASSEMBLY PARTS LIST

Item	Part Number	Description	Qty
1	031-173-000	Air Valve Assembly	1
1-A	095-109-157	Body, Air Valve	1
1-B	031-139-000	Sleeve and Spool Set	1
1-C	132-029-357	Bumper	2
1-D	560-020-360	O-Ring	10
1-E	165-127-157	Cap, End	2
1-F	170-032-330	Hex Head Capscrew 1/4-20 x .75	8
1-G	530-028-550	Muffler	1
1-H	165-096-551	Muffler Cap	1
1-J	706-026-330	Machine Screw	4

**AIR VALVE ASSEMBLY PARTS LIST

1	031-173-001	Air Valve Assembly	1
Consis	sts of all components ab	pove except:	
1-F	170-032-115	Hex Head Capscrew 1/4-20 x .75	8
1-J	706-026-115	Machine Screw	4

**Note: Pumps equipped with this valve assembly are not ATEX compliant

AIR DISTRIBUTION VALVE SERVICING

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

Step #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 9/16" wrench or socket, remove the four hex capscrews (items 12). Remove the air valve assembly from the pump.

Remove and inspect gasket (item 19) for cracks or damage. Replace gasket if needed.

Step #2: Disassembly of the air valve.

Using a 7/16" wrench or socket, remove the eight hex capscrews (items 1-F) that

fasten the end caps to the valve body. Next remove the two end caps (items 1-E). Inspect the two o-rings (items 1-D) on each end cap for damage or wear. Replace the bumpers as needed.

Remove the bumpers (items 1-C). Inspect the bumpers for damage or wear. Replace the bumpers as needed.

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

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B). Step #3: Reassembly of the air valve.

Install one bumper (item 1-C) and one end cap (item 1-E), with two o-rings (items 1-D), and fasten with four hex capscrews (items 1-F) to the valve body (item 1-A).

Remove the new sleeve an spool set (item 1-B) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-D) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body (item 1-A), align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Carefully insert the sleeve into the bumper and end cap (with o-rings) and fasten with the remaining hex capscrews. Fasten the air valve assembly (item 1) and gasket to the pump. Connect the compressed air line to the pump. The pump is now ready for operation.

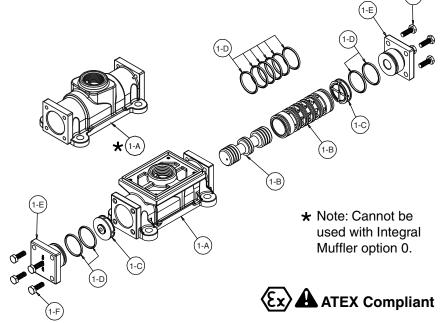


A IMPORTANT

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 Valve Servicing, Assembly Drawing & Parts List



AIR DISTRIBUTION VALVE SERVICING

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

Step #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 9/16" wrench or socket, remove the four hex capscrews (items 12). Remove the air valve assembly from the pump.

Remove and inspect gasket (item 19) for cracks or damage. Replace gasket if needed.

Step #2: Disassembly of the air valve.

Using a 7/16" wrench or socket, remove the eight hex capscrews (items 1-F) that fasten the end caps to the valve body. Next remove the two end caps (items 1-E). Inspect the two o-rings (items 1-D) on each end cap for damage or wear. Replace the o-rings as needed.

Remove the bumpers (items 1-C). Inspect the bumpers for damage or wear. Replace the bumpers as needed.

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

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B).

Step #3: Reassembly of the air valve.

Item

Install one bumper (item 1-C) and one end cap (item 1-E), with two o-rings (items 1-D), and fasten with four hex capscrews (items 1-F) to the valve body (item 1-A).

Remove the new sleeve an spool set (item 1-B) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-D) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body (item 1-A), align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Carefully insert the sleeve into the bumper and end cap (with o-rings) and fasten with the remaining hex capscrews.

Fasten the air valve assembly (item 1) and gasket to the pump. Connect the compressed air line to the pump. The pump is now ready for operation.



Qtv

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.

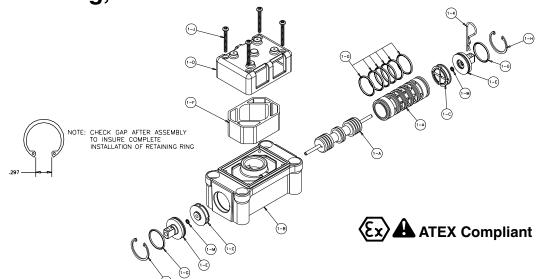
Part Number

Δ	nem	Fait Nullibel	Description	Gity
	1	031-183-000	Air Valve Assembly	1
	1-A	095-109-157	Body, Air Valve	1
	1-B	031-139-000	Sleeve and Spool Set	1
	1-C	132-029-357	Bumper	2
	1-D	560-020-360	O-Ring	10
	1-E	165-127-157	Cap, End	2
	1-F	170-032-330	Hex Head Capscrew 1/4-20 x .75	8
Δ		/E ASSEMBLY PARTS LIST		
	1	031-183-001	Air Valve Assembly	1
	Consists	of all components above excep	it:	
	1-F	170-032-115	Hex Head Capscrew 1/4-20 x .75	8
		/E ASSEMBLY PARTS LIST		
	(Use w/C	ast Iron and Stainless Steel	centers)	
	Item	Part Number	Description	Qty
•	1	031-179-000	Air Valve Assembly	1
	1-A	095-109-110 ★	Body, Air Valve	1
	1-B	031-139-000	Sleeve and Spool Set	1
	1-C	132-029-357	Bumper	2
	1-D	560-020-379	O-Ring	10
	1-E	165-127-110	Cap, End	2
	1-F	170-032-115	Hex Head Capscrew 1/4-20 x .75	8
			·	

AIR VALVE ASSEMBLY PARTS LIST (USE W/ALUMINUM CENTERS ONLY)

Description

Air Valve with Stroke Indicator Assembly Drawing, Parts List



AIR VALVE ASSEMBLY PARTS LIST

Item	Part Number	Description	Qty
4 1	031-146-000	Air Valve Assembly	1
1-A	031-143-000	Sleeve and Spool Set	1
1-B	095-094-559	Body, Air Valve	1
1-C	132-029-552	Bumper	2
1-D	165-096-559	Cap, Muffler	1
1-E	165-098-147	Cap, End	2
1-F	530-028-550	Muffler	1
1-G	560-020-360	O-Ring	8
1-H	675-044-115	Ring, Retaining	2
1-J	710-015-115	Screw, Self Tapping	4
1-K	210-008-330	Clip, Safety	1
1-M	560-029-360	O-Ring	2

For Pumps with Alternate Mesh, Sound Dampening Mufflers or Piped Exhaust:

1	031-147-000
	(includes all items

-000	Air Valve Assembly	1
s all items	on 031-146-000 minus 1-D. 1-F.	& 1-J).

AIR DISTRIBUTION VALVE WITH STROKE INDICATOR OPTION SERVICING

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

Step #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 5/16" Allen wrench, remove the four hex socket capscrews (item 12) and four flat washers (item 39). Remove the air valve assembly from the pump.

Remove and inspect gasket (item 19) for cracks or damage. Replace gasket if needed.

Step #2: Disassembly of the air valve.

To access the internal air valve components first remove the two retaining rings (item 1-H) from each end of the air valve assembly using clip ring pliers.

Next remove the two end caps (item 1-E). Inspect the o-ring (items 1-G) and 1-M) for cuts or wear. Replace the o-rings if necessary.

Remove the two bumpers (item 1-C). Inspect the bumpers for cut, wear or abrasion. Replace if necessary.

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

Inspect the inner diameter of the sleeve (part of item 1-A) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-A). Step #3: Reassembly of the air valve.

Install one bumper (item 1-C) and one end cap (item 1-E) with o-rings (item 1-G and 1-M) into one end of the air valve body (item 1-B). Install one retaining ring (item 1-H), into the groove on the same end. Insert the safety clip (item 1-K) through the smaller unthreaded hole in the endcap.

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

Fasten the air valve assembly (item 1) and gasket (item 19) to the pump.

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



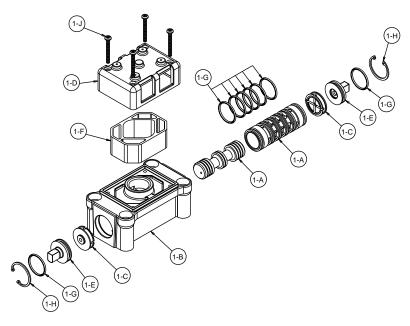
A IMPORTANT

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 Valve Assembly Drawing, Parts List

(Use With Cast Iron Centers Only)



AIR VALVE ASSEMBLY PARTS LIST

Item	Part Number	Description	Qty
**1	031-140-000	Air Valve Assembly	1
1-A	031-139-000	Sleeve and Spool Set	1
1-B	095-094-551	Body, Air Valve	1
1-C	132-029-552	Bumper	2
1-D	165-096-551	Cap, Muffler	1
1-E	165-115-552	Cap, End	2
1-F	530-028-550	Muffler	1
1-G	560-020-360	O-Ring	8
1-H	675-044-115	Ring, Retaining	2
1-J	710-015-115	Screw, Self Tapping	4

For Pumps with Alternate Mesh or Piped Exhaust:

** 1	031-141-000	Air Valve Assembly	
	(includes all items on	031-140-000 minus	1-D, 1-F, & 1-J)

**Note: Pumps equipped with this valve assembly are not ATEX compliant

AIR DISTRIBUTION VALVE OPTION SERVICING

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

Step #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 5/16" Allen wrench, remove the four hex socket capscrews (item 12) and four flat washers (item 39). Remove the air valve assembly from the pump.

Remove and inspect gasket (item 19) for cracks or damage. Replace gasket if needed.

Step #2: Disassembly of the air valve.

To access the internal air valve components first remove the two retaining rings (item 1-H) from each end of the air valve assembly using clip ring pliers.

Next remove the two end caps (item 1-E). Inspect the o-ring (items 1-G) for cuts or wear. Replace the o-rings if necessary.

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

Inspect the inner diameter of the sleeve (part of item 1-A) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-A). Step #3: Reassembly of the air valve.

Install one end cap (item 1-E) with o-ring (item 1-G) into one end of the air valve body (item 1-B). Install one retaining ring (item 1-H), into the groove on the same end.

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

Fasten the air valve assembly (item 1) and gasket (item 19) to the pump.

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



MPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain

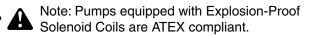
this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Solenoid Shifted Air Valve Drawing

SOLENOID SHIFTED AIR VALVE PARTS LIST

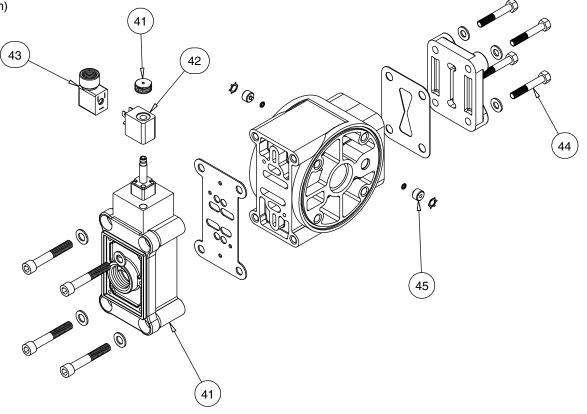
(Includes all items used on Composite Repair Parts List except as shown)

Item	Part Number	Description	Qty
41	893-097-000	Solenoid Valve, NEMA4	1
42	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
43	241-001-000	Connector, conduit	1
	241-003-000	Conduit Connector with	1
		Suppression Diode (DC Only)	
44	170-029-330	Capscrew, Hex HD 5/16-18 x 1.25	4
45	618-051-150	Plug	2



	For Explosion Proc	of Solenoid Valve
42	219-009-001	Solenoid Coil, 12

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



Note: Pumps equipped with Integral Solenoid Valves are not ATEX compliant

SOLENOID SHIFTED AIR DISTRIBUTION VALVE OPTION

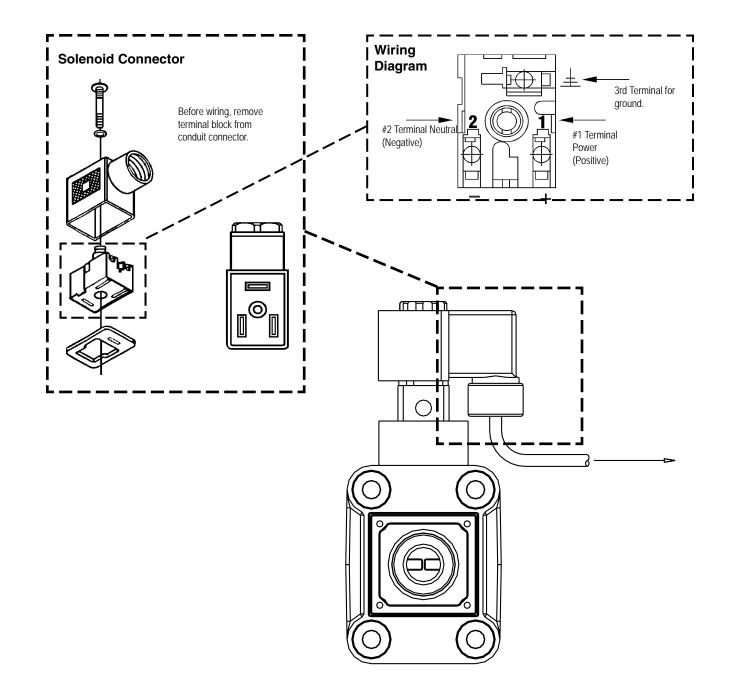
Warren Rupp's solenoid shifted, air distribution valve option utilizes electrical signals to precisely control your SANDPIPER's speed. The solenoid coil is connected to the Warren Rupp Solenoid Rate Controller/Batch Control, or a customer - supplied control. Compressed air provides the pumping power, 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

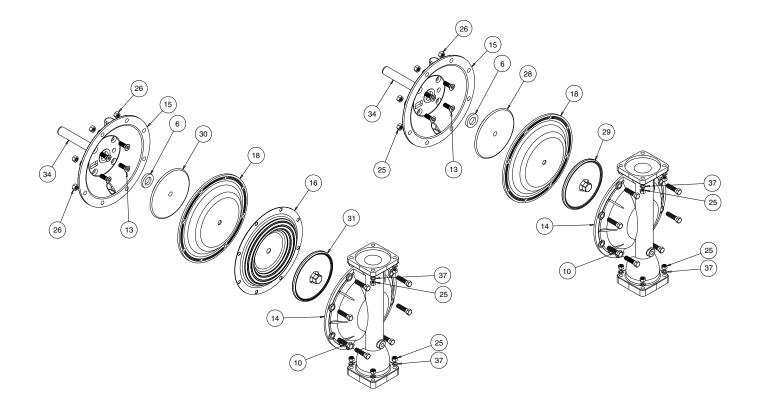
Before wiring the solenoid, make certain it is compatible with your system voltage.

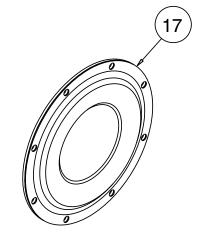


Diaphragm Service Drawing, with Overlay

Diaphragm Service Drawing, Non-Overlay

One-Piece Bonded *Diaphragm Service Drawing





*AVAILABLE FOR FIELD CONVERSION FROM OVERLAY TO ONE-PIECE BONDED DIAPHRAGM KITS:

Kit: 475-253-000

2 286-118-000 One-Piece Diaphragm

2 612-214-150 Inner Plates

DIAPHRAGM SERVICING

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

Step #1: See the pump assembly drawing, and the diaphragm servicing illustration.

Using a 9/16" wrench or socket, remove the 16 capscrews (item 9), hex nuts, and lockwashers that fasten the manifolds (items 23 & 24) to the outer chambers (item 14).

Step #2: Removing the outer chambers.

Using a 11/16" and a 5/8" wrench or socket, remove the 16 capscrews (item 10), and hex nuts that fasten the outer chambers, diaphragms, and inner chambers together.

Step #3: Removing the diaphragm assemblies.

Use a 1¹/₁₆" (27mm) 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 1/4-20 capscrew or set screw into the smaller tapped hole in the inner diaphragm plate (item 28 or 30). Insert the protruding stud and the 1/4-20 fastener loosely into a vise. Use a $1^{1}/_{16}$ " wrench or socket to remove the outer diaphragm plate (item 29 or 31) by turning counter-clockwise. Inspect the diaphragm (item 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 1/4-20 fastener back into the vise. Use a torque wrench to tighten the diaphragm assembly together to 480 in. lbs. (54.23 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 inner chamber (item 15).

Fasten the outer chamber (item 14) to the pump, using the capscrews (item 9), and hex 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 (item 15).

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

Step #6: Re-install the manifolds to the pump, using the capscrews (item 10), hex nuts and flat washers.

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 over the exterior of the standard TPE diaphragm (item 18).

One-Piece Bonded DIAPHRAGM SERVICING (Bonded PTFE with integral plate)

The one-piece bonded diaphragm (item 17) 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 diaphragms 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 diaphragms 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.



A IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain

this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Pilot Valve Servicing, Assembly Drawing & Parts List

PILOT VALVE ASSEMBLY PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
4	095-110-000	Pilot Valve Assembly	1
4-A	095-095-157	Valve Body	1
4-B	755-052-000	Sleeve (With O-rings)	1
4-C	560-033-360	O-ring (Sleeve)	6
4-D	775-055-000	Spool (With O-rings)	1
4-E	560-023-360	O-ring (Spool)	3
4-F	675-037-080	Retaining Ring	1

FOR PUMPS WITH CAST IRON CENTER SECTION

ITEM	PART NUMBER	DESCRIPTION	QTY
4	095-110-558	Pilot Valve Assembly	1
4-A	095-095-558	Valve Body	1
(include	es all other items use	ed on 095-110-000)	

FOR PUMPS WITH STAINLESS STEEL CENTER SECTION

ITEM	PART NUMBER	DESCRIPTION	QTY
4	095-110-110	Pilot Valve Assembly	1
4-A	095-095-110	Valve Body	1
(include	es all other items use	ed on 095-110-000)	

PILOT VALVE SERVICING

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

STEP #1: See pump assembly drawing.

Using a 1/2" wrench or socket, remove the four capscrews (item 11). Remove the air inlet cap (item 8) and air inlet gasket (item 21). The pilot valve assembly (item 4) can now be removed for inspection and service.

STEP #2: Disassembly of the pilot valve.

Remove the pilot valve spool (item 4-D). Wipe clean and inspect spool and o-rings for dirt, cuts or wear. Replace the o-rings and spool if necessary.

Remove the retaining ring (item 4-F) from the end of the sleeve (item 4-B) and remove the sleeve from the valve body (item 4-A). Wipe clean and inspect sleeve and o-rings for dirt, cuts or wear. Replace the o-rings and sleeve if necessary.

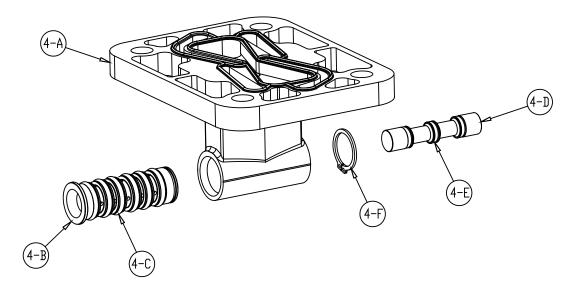
STEP #3: Re-assembly of the pilot valve.

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

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

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

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



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 1/2" wrench or socket, remove the four capscrews (items 11). Remove the air inlet cap (item 8) and air inlet gasket (item 21). The pilot valve assembly (item 4) can now be removed.

Step #2: Inspect the actuator plungers.

See ILLUSTRATION AT RIGHT.

The actuator plungers (items 32) can be reached through the pilot valve cavity in the intermediate assembly (item 5).

Remove the plungers (item 32) from the bushings (item 7) in each end of the cavity. Inspect the installed o-ring (items 27) for cuts and/or wear. Replace the o-rings if necessary. 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.

To remove the bushings (item 7), first remove the retaining rings (item 33) by using a flat screwdriver.

NOTE: It is recommended that new retaining rings be installed.

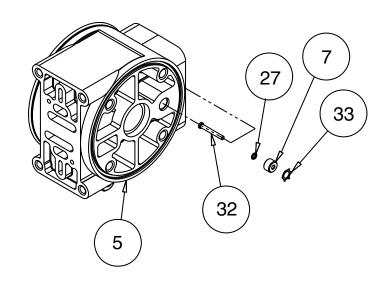
Step #3: Re-install the pilot valve assembly into the intermediate assembly.

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 21), air inlet cap (item 8) and capscrews (item 11).

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

Actuator Plunger Drawing





A 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 (item 23 or item 24 not shown). Use a 9/16" 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.

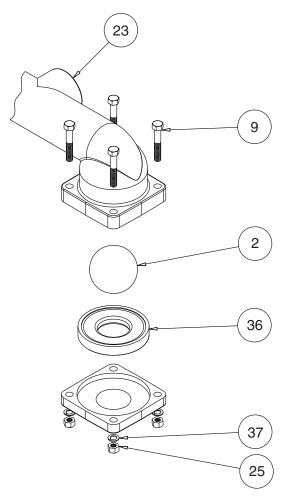
Re-assemble the check valve components. The seat should fit into the counter bore of the outer chamber.

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

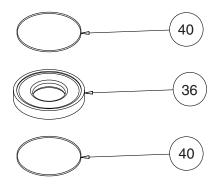
METALLIC SEATS

Two o-rings (or conductive PTFE seals) (item 40) are required for metallic seats.

Check Valve Drawing



with Non-Metallic Seats



with Metallic Seats

Optional Muffler Configurations, Drawing

OPTION 0 *

530-028-550 Integral Muffler uses (1) Cap and (4) 710-015-115 Self Tapping Screw to hold it in place.

OPTION 1

530-027-000 Sound Dampening Muffler screws directly into the Air Valve body. This muffler is equipped with a porous plastic element.

OPTION 2

530-010-000 Mesh Muffler screws directly into the Air Valve Body. This muffler is equipped with a metal element.



OPTION 6

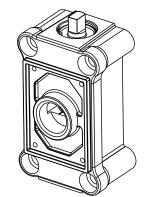
530-033-000 Metal Muffler screws directly into the Air Body.

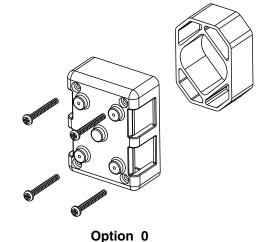




Option 6

★ Note: Cannot be used with Air Valve Assembly 031-179-000 used on models equipped with cast iron or stainless steel centers.







Option 1 and 2

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" (2.54 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

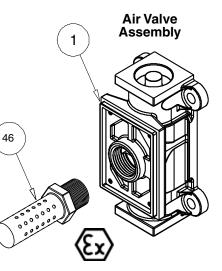
The following steps are necessary to convert the pump to pipe the exhaust air away from the pump.

Remove the muffler (item 46). The air distribution valve (item 1) has 1" NPT threads for piped exhaust.

IMPORTANT INSTALLATION

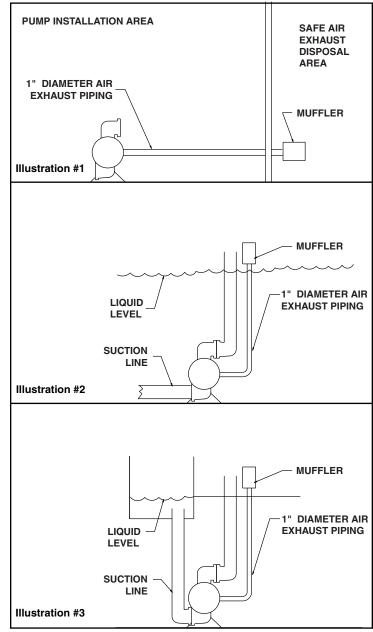
NOTE: The manufacturer recommends installing a flexible conductive hose or connection between the pump and any rigid plumbing. This reduces stresses on the molded threads of the air exhaust port. Failure to do so may result in damage to the air distribution valve body.

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.



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

CONVERTED EXHAUST ILLUSTRATION



Pulse Output Kit Drawing

PULSE OUTPUT KIT OPTION

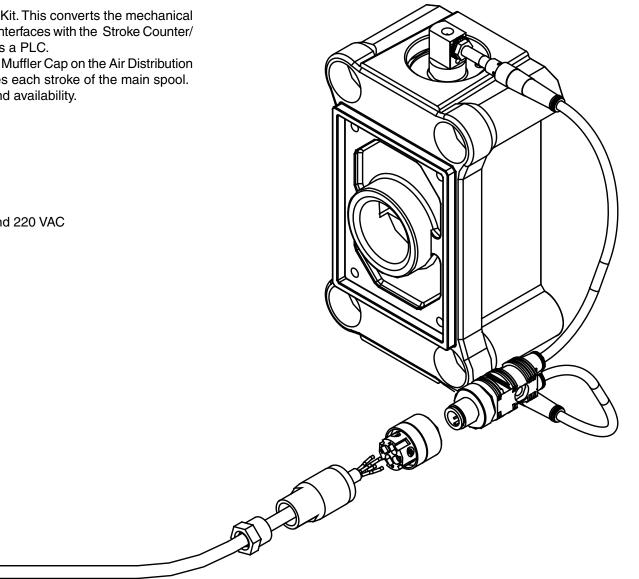
This pump can be fitted with a Pulse Output Kit. This converts the mechanical strokes of the pump to an electrical signal which interfaces with the Stroke Counter/ Batch Controller or user control devices such as a PLC.

The Pulse Output Kits mount directly onto the Muffler Cap on the Air Distribution Valve Assembly or onto the air valve and senses each stroke of the main spool.

Consult the factory for further information and availability.

Pulse Output Kits

475-244-001	10-30 VDC
475-244-002	110/220 VAC
475-244-003	10-30VDC, 110VAC and 220 VA



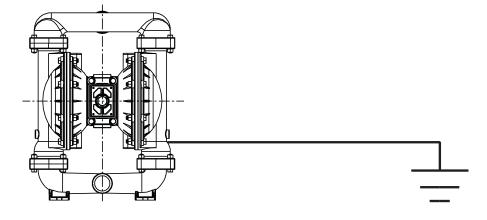
Grounding The Pump

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

One eyelet is fastened to the pump hardware.

One eyelet is installed to a true earth ground. (Requires a 5/16 or 8mm maximum diameter bolt) 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.



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Declaration of Conformity

Warren Rupp, Inc., 800 North Main Street, Mansfield, Ohio, certifies that Air-Operated Double Diaphragm 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

David Roseberry

Printed name of authorized person

Date of issue

October 20, 2005

Engineering Manager

Title

CE