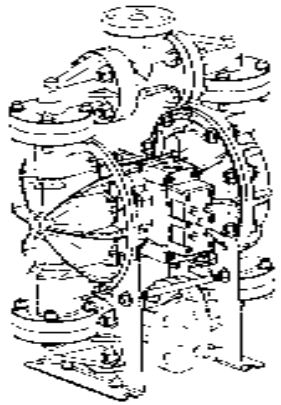
SERVICE & OPERATING MANUAL

SandPIPER II®

Model S1F Non-Metallic Design Level 1



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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

520-199-000 1/00

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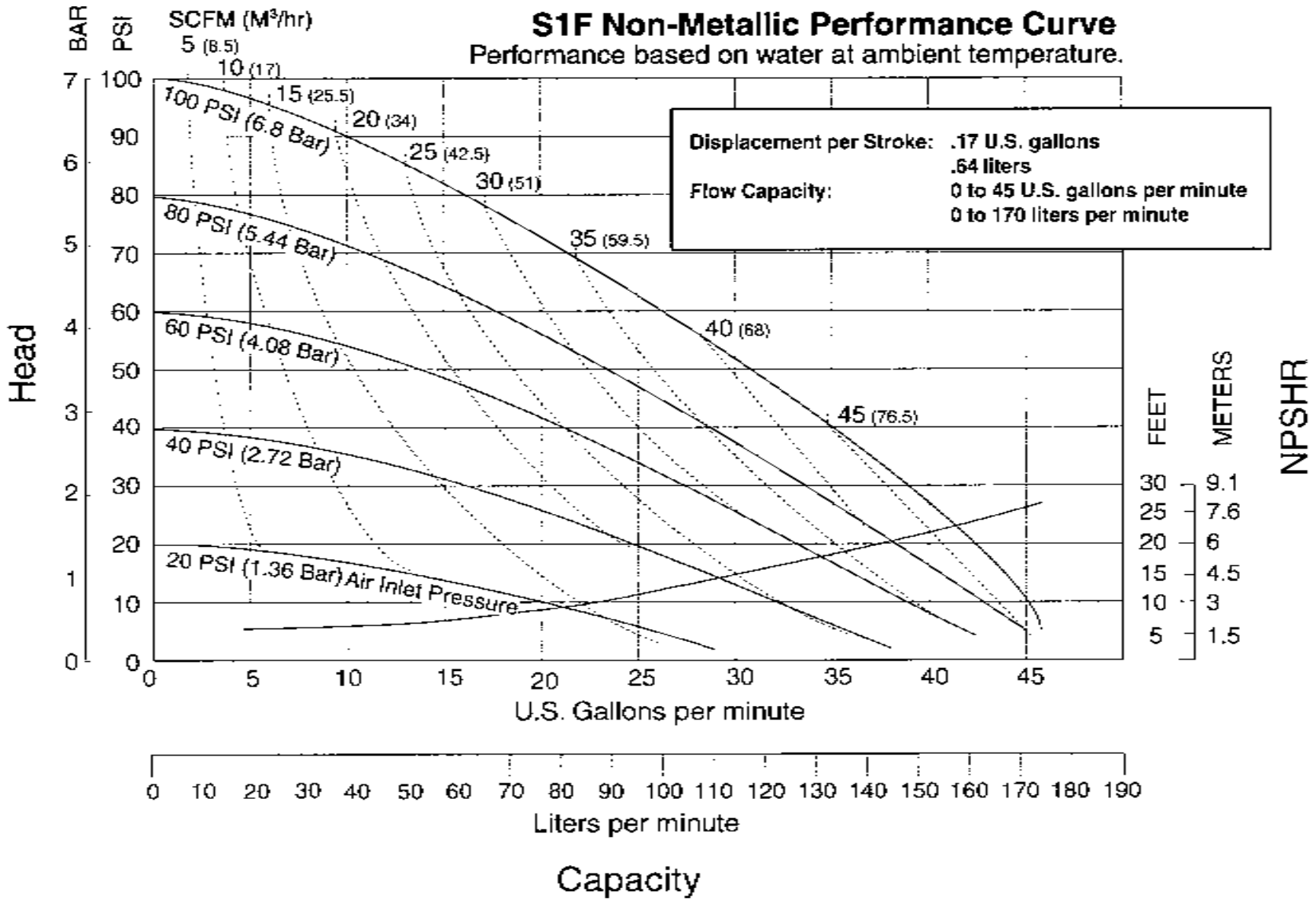
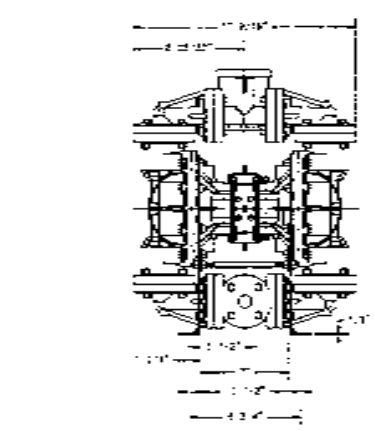
Performance Curve, Model S1F Non-Metallic
Design Level 1

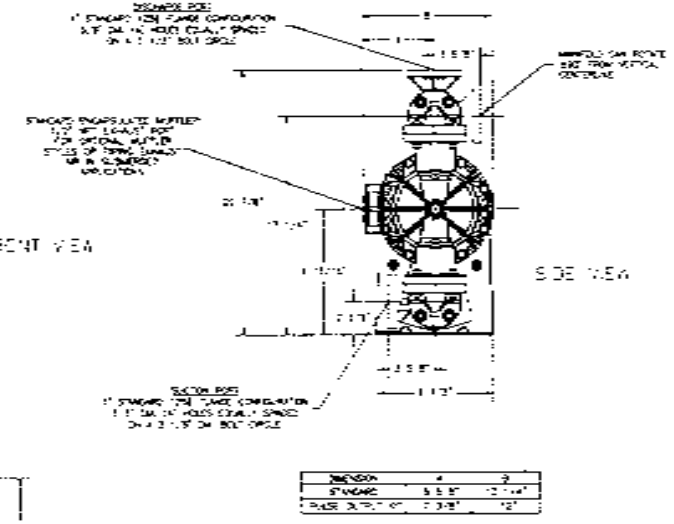


Dimensions: S1F Non-Metallic with Encapsulated Muffler

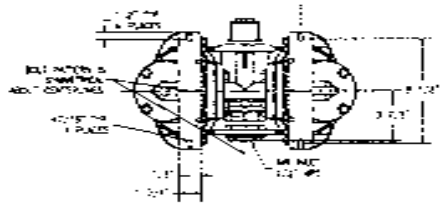
Dimensions in Inches
Dimensional tolerance: ± 1/8"



FRONT VIEW

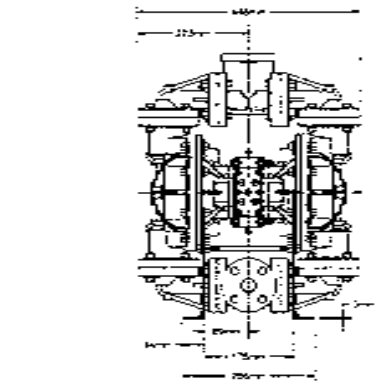


SIDE VIEW

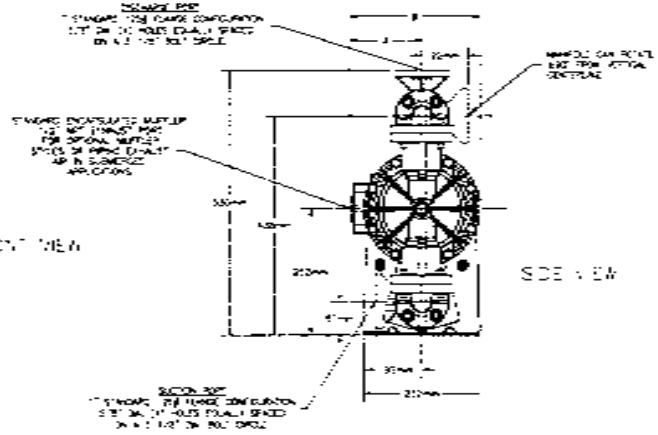


BOTTOM VIEW

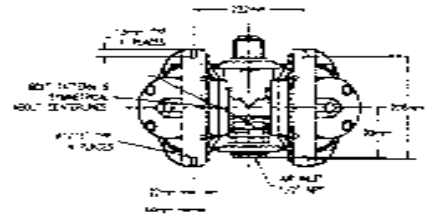
Dimensions in Millimeters
Dimensional tolerance: ±3mm



FRONT VIEW



SIDE VIEW

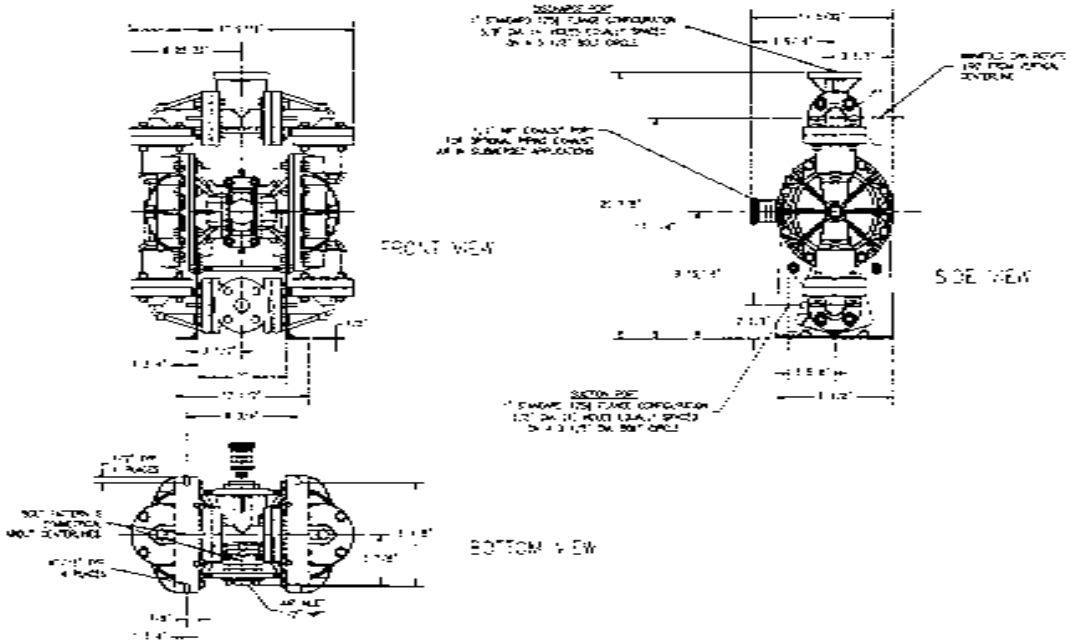


BOTTOM VIEW

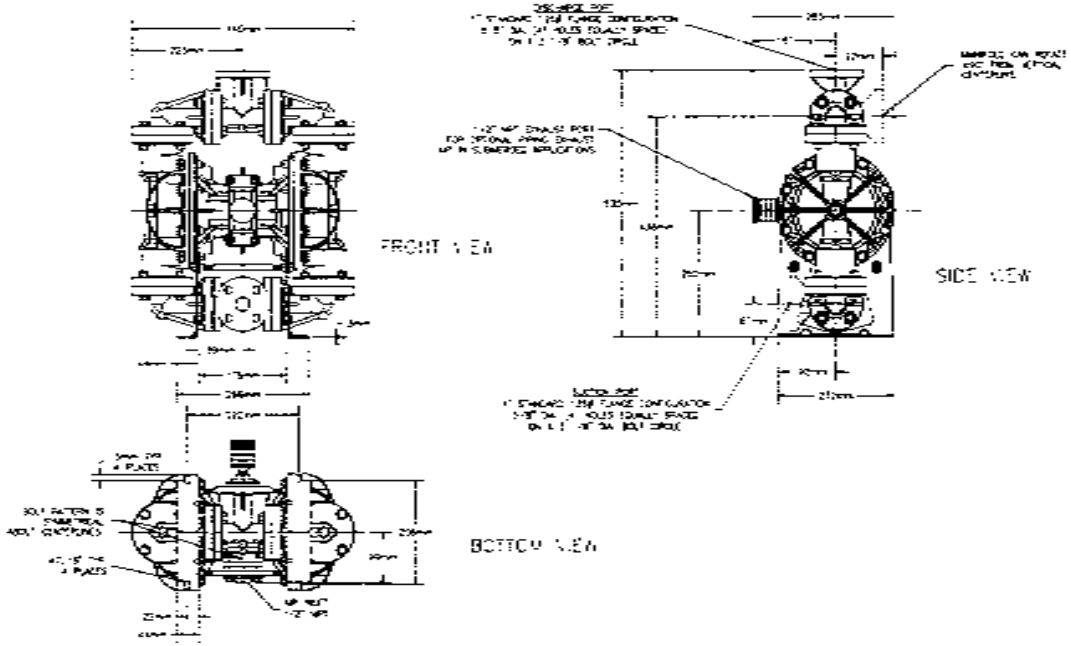
NOTE: Also available with 25mm DIN Porting Flanges.

Dimensions: S1F Non-Metallic with Mesh Muffler

Dimensions in Inches
Dimensional tolerance: ±1/8"



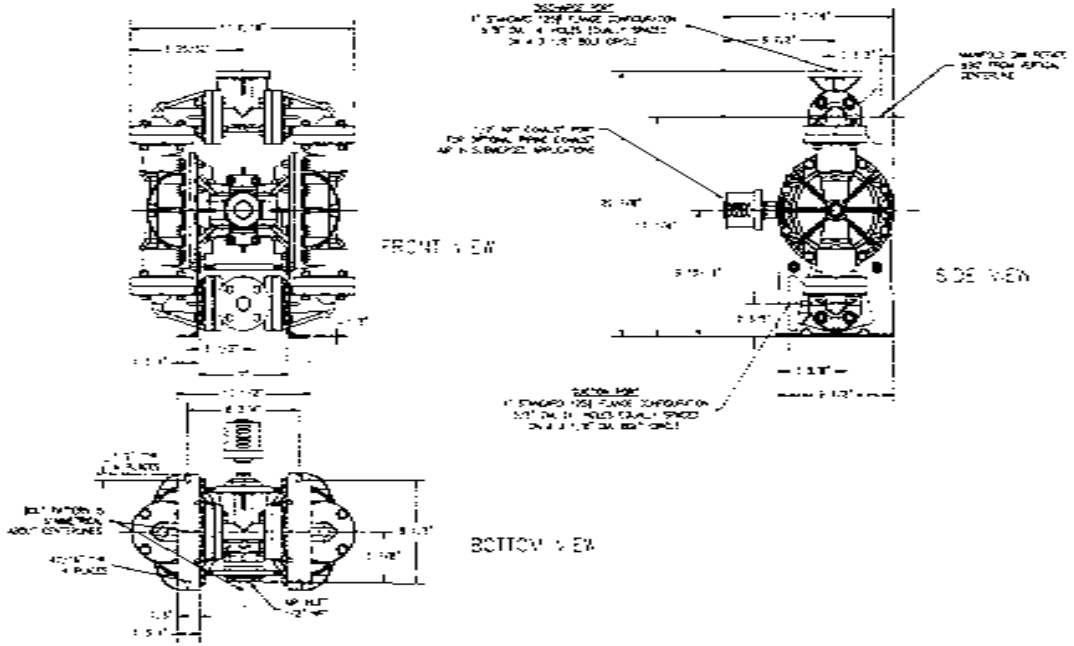
Dimensions in Millimeters
Dimensional tolerance: ±3mm



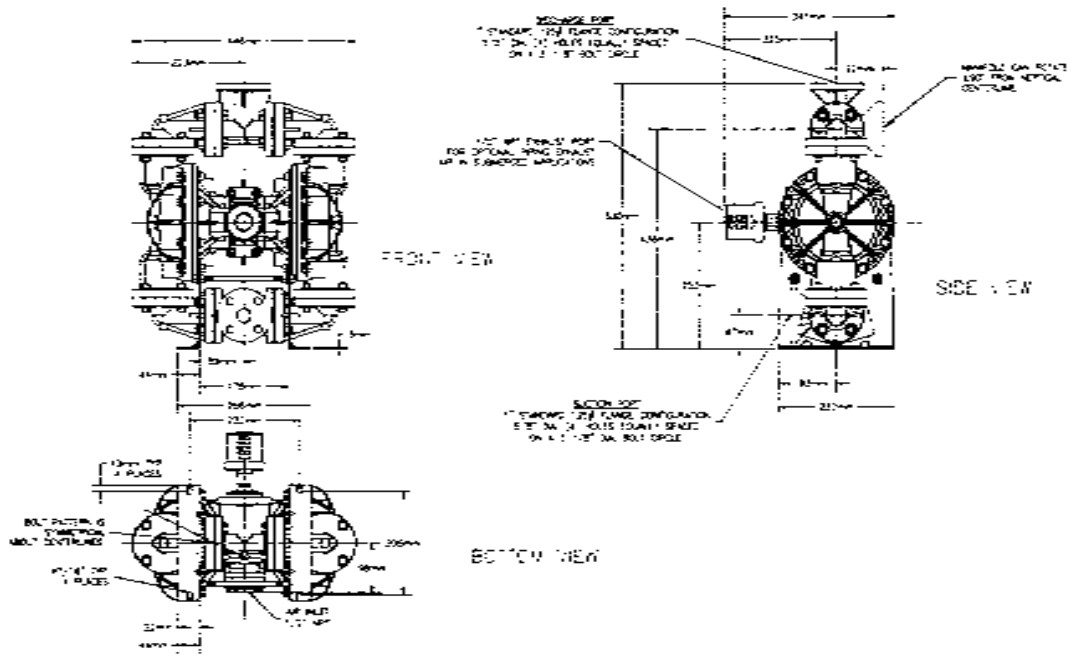
NOTE: Also available with 25mm DIN Porting Flanges.

Dimensions: S1F Non-Metallic with Sound Dampening Muffler

Dimensions in Inches
Dimensional tolerance: ±1/8"



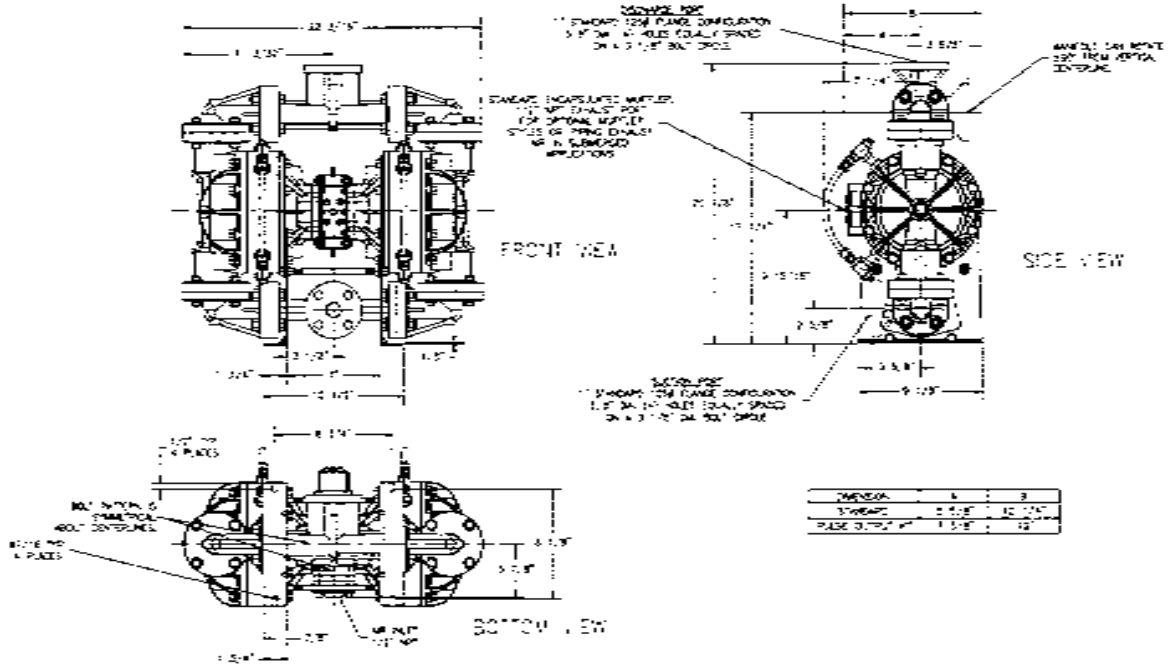
Dimensions in Millimeters
Dimensional tolerance: ±3mm



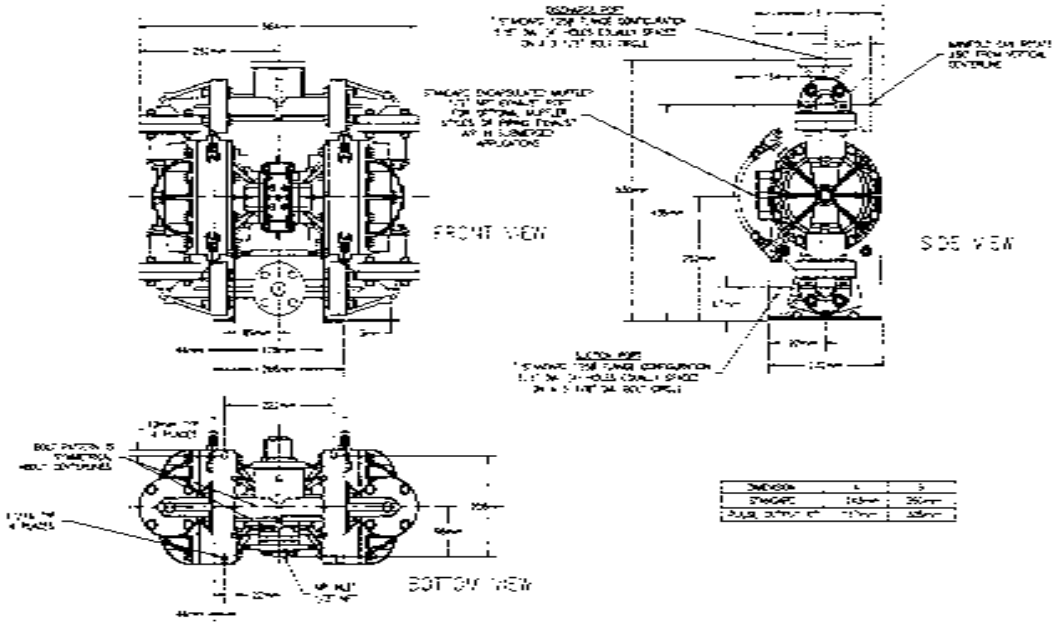
NOTE: Also available with 25mm DIN Porting Flanges.

Dimensions: S1F Non-Metallic with Spill Containment and Encapsulated Muffler

Dimensions in Inches
Dimensional tolerance: ±1/8"



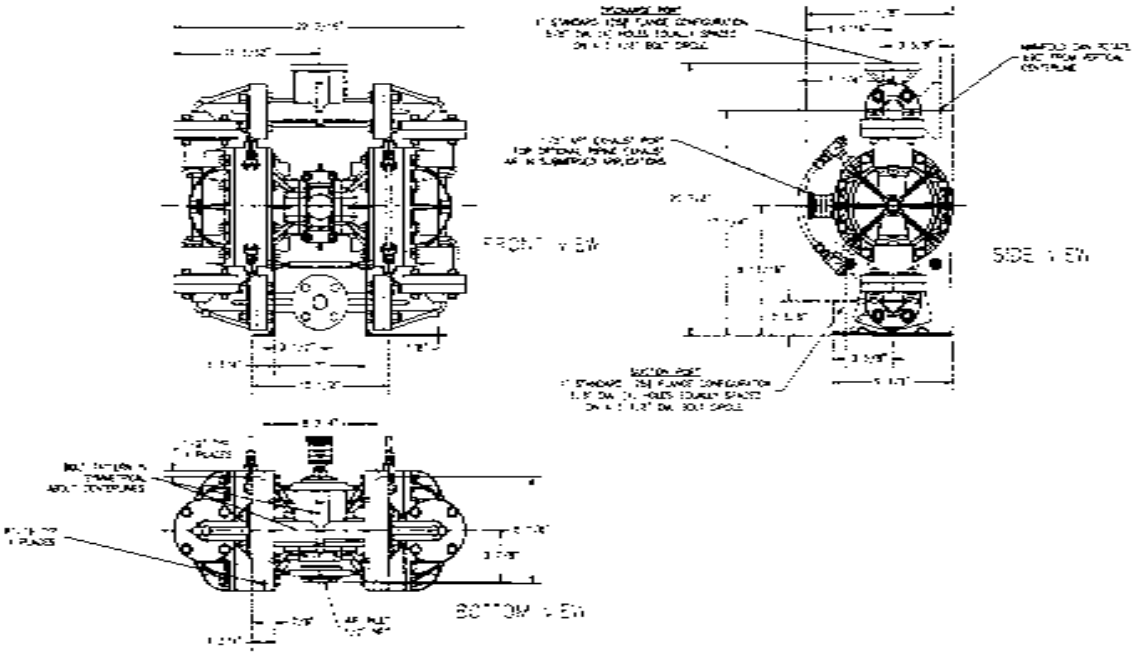
Dimensions in Millimeters
Dimensional tolerance: ±3mm



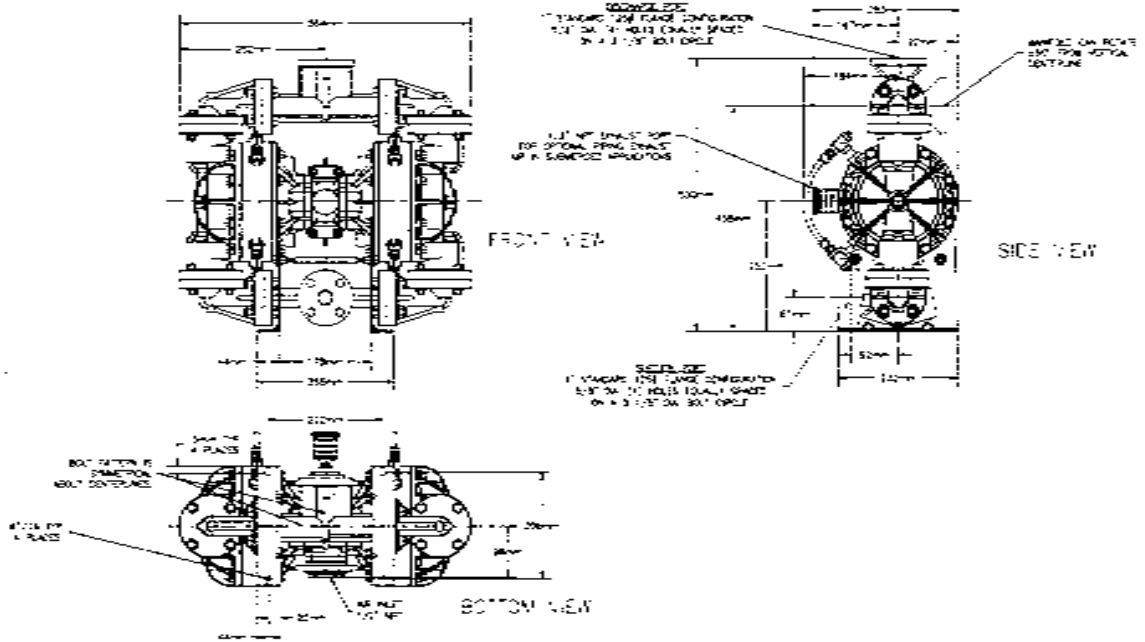
NOTE: Also available with 25mm DIN Porting Flanges.

Dimensions: S1F Non-Metallic with Spill Containment and Mesh Muffler

Dimensions in Inches
Dimensional tolerance: ±1/8"



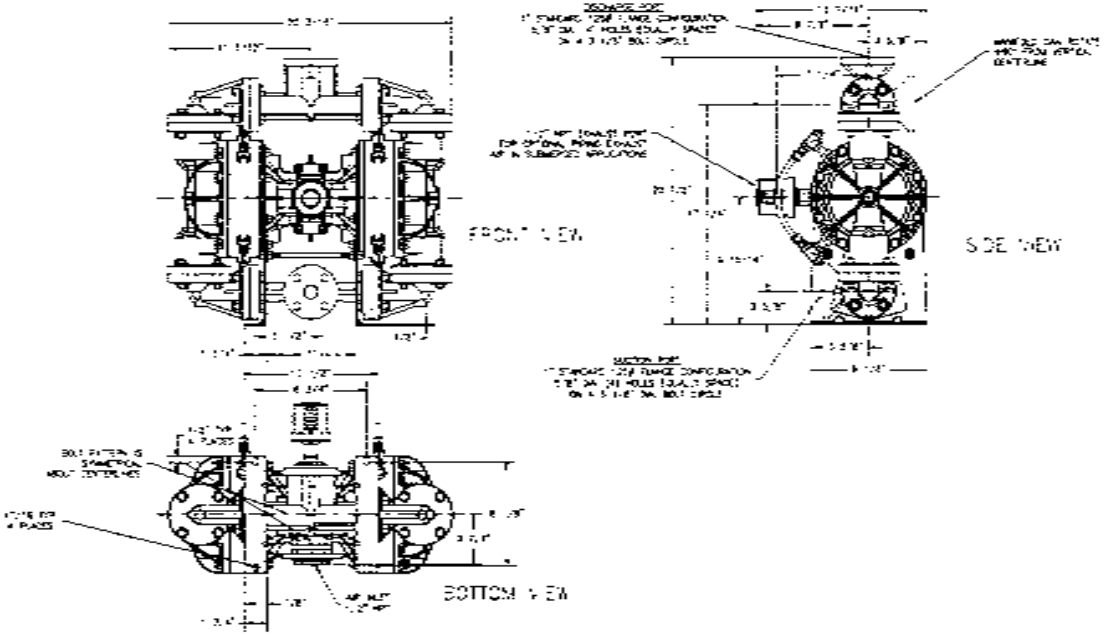
Dimensions in Millimeters
Dimensional tolerance: ±3mm



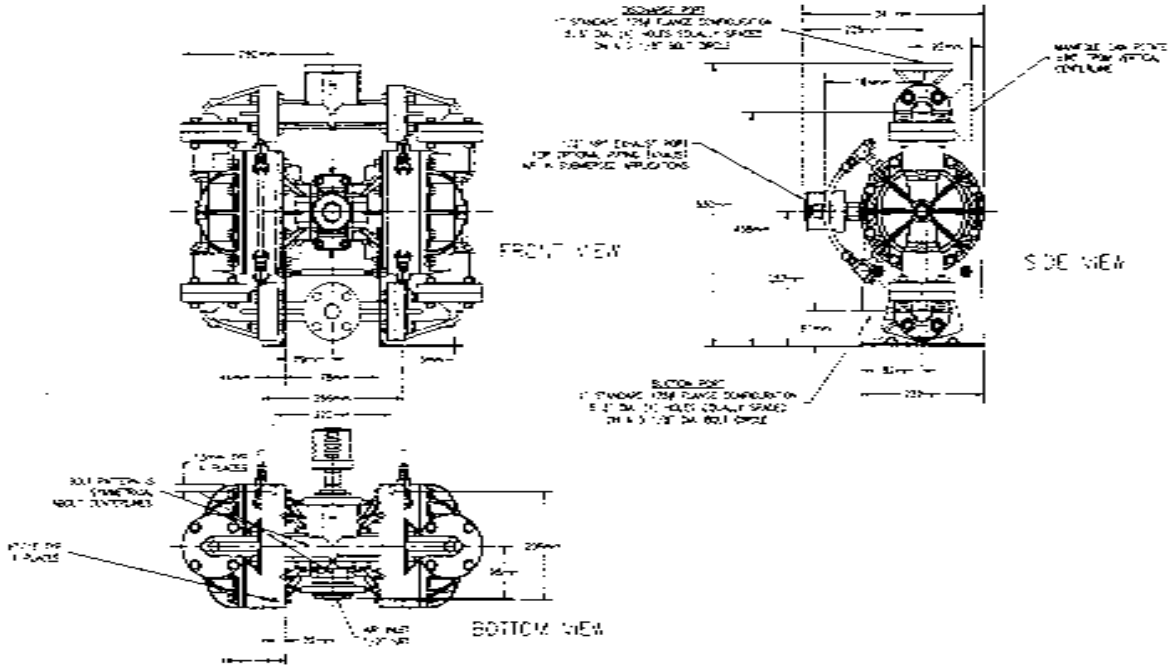
NOTE: Also available with 25mm DIN Porting Flanges.

Dimensions: S1F Non-Metallic with Spill Containment and Sound Dampening Muffler

Dimensions in Inches
Dimensional tolerance: ±1/8"



Dimensions in Millimeters
Dimensional tolerance: ±3mm



NOTE: Also available with 25mm DIN Porting Flanges.

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 100 psi (7 bar). Connect the pump air inlet to an air supply of sufficient capacity and pressure required for desired performance. When the air supply line is solid piping, use a short length of flexible hose not less than ½" (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 ½ to ¾ 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.

TROUBLESHOOTING

Possible Symptoms:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

What to Check: Entrained air or vapor lock in one or both pumping chambers.
Corrective Action: Purge chambers through tapped chamber vent plugs. PURGING THE CHAMBERS OF AIR CAN BE DANGEROUS! Contact the Warren Rupp Technical Services Department before performing this procedure. A model with top-ported discharge will reduce or eliminate problems with entrained air.

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

WARRANTY

This pump is warranted for a period of five years against defective material and workmanship.

IMPORTANT SAFETY INFORMATION

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

DANGER!

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.

BEFORE OPERATION

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

CAUTION!

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

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.

IMPORTANT!

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

CAUTION!

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.

MATERIAL CODES

The Last 3 Digits of Part Number

000 ..... Assembly, subassembly, and some purchased items
010 ... .. Cast Iron
012 ... . Powered Metal
015 ..... Ductile Iron
020 ... .. Ferritic Malleable Iron
025 ..... Music Wire
080 ..... Carbon Steel, AISI B-1112
100 ... .. Alloy 20
110 ..... Alloy Type 316 Stainless Steel
111 ..... Alloy Type 316 Stainless Steel, Electro Polished
112 ... . Alloy C (Hastelloy equivalent)
113 ... . Alloy Type 316 Stainless Steel (Hand Polished)
114 ... . 303 Stainless Steel
115 ... .. 302/304 Stainless Steel
117 ..... 440-C Stainless Steel (Martensitic)
120 ..... 416 Stainless Steel (Wrought Martensitic)
123 ..... 410 Stainless Steel (Wrought Martensitic)
148 ..... Hardcoat Anodized Aluminum
149 ..... 2024-T4 Aluminum
150 ... .. 6061-T6 Aluminum
151 ..... 6063-T6 Aluminum
152 ... .. 2024-T4 Aluminum (2023-T351)
154 ... . Almag 35 Aluminum
155 ... . 356-T6 Aluminum
156 ..... 356-T6 Aluminum
157 ..... Die Cast Aluminum Alloy #380
158 ..... Aluminum Alloy SR-319
159 ... . Anodized Aluminum
162 ..... Brass, Yellow Screw Machine Stock
165 ..... Cast Bronze 85-5-5-5
166 ..... Bronze, SAE 660
170 ..... Bronze Bearing Type, Oil Impregnated
175 ... .. Die Cast Zinc
180 . Copper Alloy
305 . Carbon Steel, Black Epoxy Coated
306 . Carbon Steel, Black Teflon® Coated
307 . Aluminum, Black Epoxy Coated
308 .. Stainless Steel, Black Teflon Coated
309 .. Aluminum, Black Teflon Coated
310 ... Kynar Coated
330 .... Zinc Plated Steel
331 ..... Chrome Plated Steel
332 ... .. Aluminum, Electroless Nickel Plated
333 ..... Carbon Steel, Electroless Nickel Plated
335 .. .. Galvanized Steel
336 . . Zinc Plated Yellow Brass
337 ... .. Silver Plated Steel
340 . . Nickel Plated
342 . Filled Nylon
350 . . Geolast; Color: Black
354 ..... Injection Molded #203-40 Santoprene - Duro 40D +/-5 Color: RED
355 ..... Thermal Plastic
356 ..... Hytrel
357 . ... Injection Molded Polyurethane
358 ..... Rubber (Urethane Rubber), Color coded: PURPLE (Some Applications); Compression Molded
359 . ... Urethane Rubber
360 . ... Buna-N Rubber, Color coded: RED
361 . ..... Buna-N
363 Viton (Fluorel), Color coded: YELLOW
364 EPDM Rubber, Color coded: BLUE
366 Neoprene Rubber, Color coded: GREEN
368 . Food Grade Nitrile
369 . ... Food Grade EPDM
370 ..... Butyl Rubber, Color coded: BROWN
371 ..... Philthane (Tuthane)
374 ..... Carboxylated Nitrile
375 ..... Fluorinated Nitrile
378 ..... High Density Polypropylene
405 ..... Cellulose Fibre
408 ... ... Cork and Neoprene
425 ..... Compressed Fibre
426 ... ... Blue Gard
440 ... .. Vegetable Fibre
465 ... .. Fibre
500 ..... Delrin 500
501 ..... Delrin 570
502 ... ... Conductive Acetal - ESD-800
503 ..... Conductive Acetal - Glass Filled
505 ..... Acrylic Resin Plastic
506 .. .... Delrin 150
520 ..... Injection Molded PVDF Natural color
540 ... ... Nylon
541 ... .. Nylon
542 ... .. Nylon
544 . . . Nylon Injection Molded
550 . . Polyethylene
551 . . . Glass Filled Polypropylene
552 . .. Unfilled Polypropylene
553 ... ... Unfilled Polypropylene
555 ..... Polyvinyl Chloride
556 ..... Black Vinyl
570 .. .... Pulon II
580 ..... Pyton
590 ..... Valox
591 .. ... Nylatron G-S
592 ... .. Nylatron NSB
600 .. .. Teflon (Virgin material) Tetrafluorocarbon (TFE)
601 ... .. Teflon (Bronze and moly filled)
602 Filled Teflon
603 Blue Gylon
604 Teflon
607 . Envelon
608 Teflon
610 . .. Teflon Encapsulated Silicon
611 . .. Teflon Encapsulated Viton
632 . .. Neoprene Hytrel
633 . . Viton/Teflon
634 . EPDM/Teflon
637 Teflon, Viton/Teflon
638 Teflon, Hytrel/Teflon
639 Buna-N/TFE
643 Santoprene®/EPDM
644 Santoprene®/Teflon

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

Gylon is a registered tradename of Garlock, Inc.

Nylatron is a registered tradename of Polymer Corp.

Santoprene is a registered tradename of Monsanto Corp.

Pulon II is a registered tradename of Dixon Industries Corp.

Hastelloy-C is a registered tradename of Cabot Corp.

Pyton is a registered tradename of Phillips Chemical Co.

Valox is a registered tradename of General Electric Co.

Warren Rupp, Pumpon, SandPIPER, SandPIPER I, PortaPump, Tranquilair and SludgeMaster are registered tradenames of Warren Rupp, Inc.

Model S1F Non-Metallic Composite Repair Parts Drawing

AVAILABLE SERVICE AND CONVERSION KITS

476-144-000 **AIR END KIT**
Wipers, Seals, O-rings, Gaskets, Retaining Rings, Air Valve Spool Assembly and Pilot Valve Assembly

476-162-000 **AIR END KIT** for Conductive Acetal
Wipers, Seals, O-rings, Gaskets, Retaining Rings, Air Valve Spool Assembly and Pilot Valve Assembly

476-145-354 **WETTED END KIT**
Santoprene Diaphragms, Santoprene Balls and TFE Seals

476-145-654 **WETTED END KIT**
Santoprene Diaphragms, TFE Overlay Diaphragms, TFE Balls and TFE Seals.

476-146-655 **WETTED END KIT**
Santoprene Diaphragms, TFE Overlay Diaphragms, TFE Pumping Diaphragms, TFE Balls and TFE Seals.

476-146-354 **WETTED END KIT**
Santoprene Diaphragms, Santoprene Pumping Diaphragms, Santoprene Check Balls & TFE Seals.

HARDWARE KITS

475-175-308 Teflon Coated Stainless Steel Capscrews, Hex Nuts, Washers and Support Rod
475-176-308 *(For use with Spill Containment Options)*

PULSE OUTPUT KITS

(For use with 530-007-000 and 530-025-000 Mufflers or piped exhaust)

475-153-016 DC Kit
475-153-017 DC Intrinsically Safe Kit
475-153-018 110/120VAC or 220/240VAC Kit
475-153-019 110/120VAC Intrinsically Safe Kit
475-153-020 220/240VAC Intrinsically Safe Kit

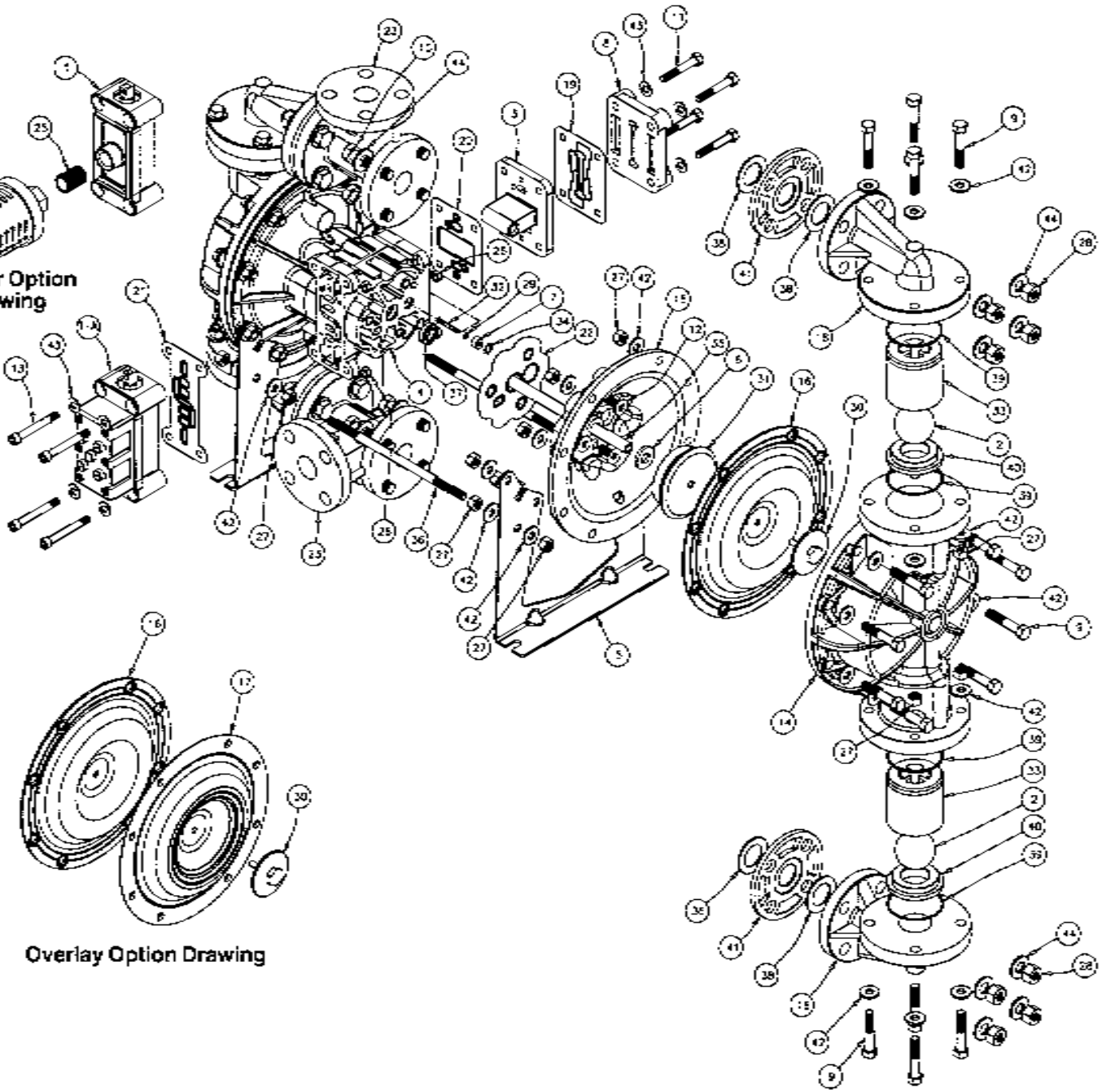
(For use with encapsulated 530-030-550 Muffler)

475-153-011 DC Kit
475-153-012 DC Intrinsically Safe Kit
475-153-013 110/120VAC or 220/240VAC Kit
475-153-014 110/120VAC Intrinsically Safe Kit
475-153-015 220/240VAC Intrinsically Safe Kit

ELECTRONIC LEAK DETECTOR KITS

032-033-000 110VAC
032-034-000 220VAC

Muffler Option Drawing



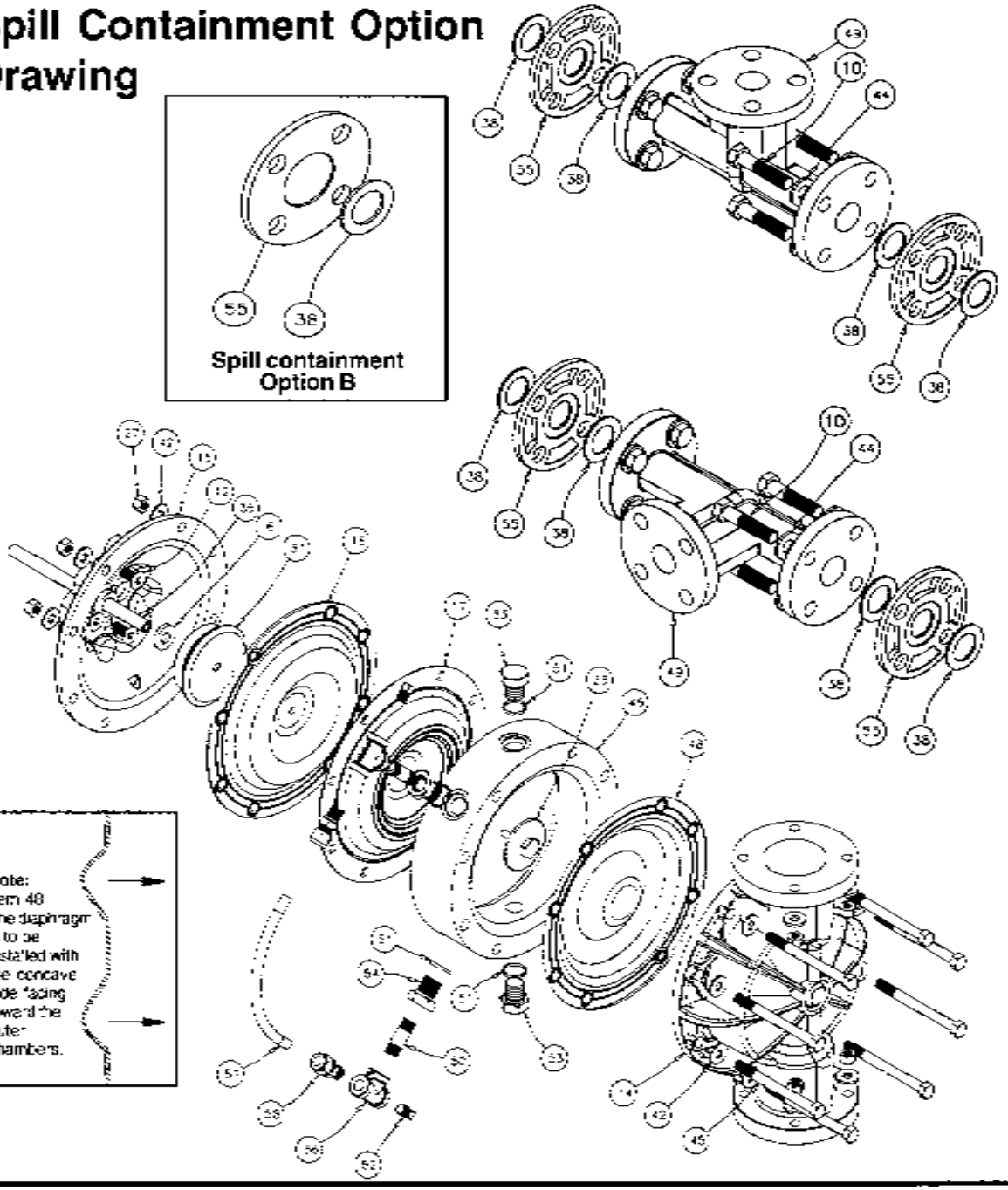
Overlay Option Drawing

Composite Repair Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	031-113-000	Air Valve Assembly	1
	031-113-001	Air Valve Assembly	1
	031-113-002	Air Valve Assembly	1
	031-124-000	Air Valve Assembly (No Encapsulated Muffler)	1
	031-124-001	Air Valve Assembly (No Encapsulated Muffler)	1
2	050-042-354	Ball, Check	4
	050-042-600	Ball, Check	4
3	095-090-000	Pilot Valve Assembly	1
	095-090-001	Pilot Valve Assembly	1
4	114-022-157	Intermediate Assembly	1
	114-022-307	Intermediate Assembly	1
	114-022-309	Intermediate Assembly	1
	114-022-332	Intermediate Assembly	1
5	115-139-080	Bracket, Mounting	2
	115-139-305	Bracket, Mounting	2
	115-139-306	Bracket, Mounting	2
	115-139-333	Bracket, Mounting	2
6	132-032-360	Bumper, Diaphragm	2
7	135-034-506	Bushing, Plunger	2
8	165-107-157	Cap, Air Inlet	1
	165-107-307	Cap, Air Inlet	1
	165-107-309	Cap, Air Inlet	1
	165-107-332	Cap, Air Inlet	1
9	170-020-115	Capscrew, Hex HD 3/8-16 x 2.00	32
	170-020-308	Capscrew, Hex HD 3/8-16 x 2.00	32
10	170-066-115	Capscrew, Hex HD 1/2-13 x 2.25	16
	170-066-308	Capscrew, Hex HD 1/2-13 x 2.25	16
11	170-085-115	Capscrew, Hex HD 5/16-18 x 2.00	4
	170-085-308	Capscrew, Hex HD 5/16-18 x 2.00	4
12	171-015-115	Capscrew, Soc HD 3/8-16 x .88	6
13	171-057-115	Capscrew, Soc HD 5/16-18 x 2.25	4
	171-057-308	Capscrew, Soc HD 5/16-18 x 2.25	4
14	196-157-502	Chamber, Outer	2
	196-157-520	Chamber, Outer	2
	196-157-542	Chamber, Outer	2
	196-157-552	Chamber, Outer	2
15	196-160-157	Chamber, Inner	2
	196-160-307	Chamber, Inner	2
	196-160-309	Chamber, Inner	2
	196-160-332	Chamber, Inner	2
16	286-091-354	Diaphragm	2
17	286-093-600	Diaphragm, Overlay	2
18	312-104-502	Elbow	4
	312-104-520	Elbow	4
	312-104-542	Elbow	4
	312-104-552	Elbow	4
19	360-094-360	Gasket, Air Inlet	1
20	360-095-360	Gasket, Pilot Valve	1
21	360-096-360	Gasket, Air Vale	1
22	360-097-360	Gasket, Inner Chamber	2
23	518-136-502	Manifold	2
	518-136-502E	Manifold, 25mm DIN	2
	518-136-520	Manifold	2
	518-136-520E	Manifold, 25mm DIN	2
	518-136-542	Manifold	2
	518-136-542E	Manifold, 25mm DIN	2
	518-136-552	Manifold	2
	518-136-552E	Manifold, 25mm DIN	2
24	530-007-000	Muffler (Mesh) (not shown)	1
	530-025-000	Muffler (Sound Dampening)	1
25	538-011-556	Nipple, Pipe	1
26	545-004-115	Nut, Hex 5/16-18	8
	545-004-308	Nut, Hex 5/16-18	8
27	545-005-115	Nut, Hex 3/8-16	40
	545-005-308	Nut, Hex 3/8-16	40
28	545-008-110	Nut, Hex 1/2-13	16
	545-008-308	Nut, Hex 1/2-13	16
29	560-001-360	O-ring	2
30	612-170-502	Assembly, Outer Diaphragm Plate	2
	612-170-520	Assembly, Outer Diaphragm Plate	2
	612-170-542	Assembly, Outer Diaphragm Plate	2
	612-170-552	Assembly, Outer Diaphragm Plate	2
31	612-171-157	Plate, Inner Diaphragm	2
32	620-018-115	Plunger, Actuator	2
33	670-048-502	Retainer, Ball	4
	670-048-520	Retainer, Ball	4
	670-048-542	Retainer, Ball	4
	670-048-552	Retainer, Ball	4
34	675-042-115	Ring, Retainer	2
35	685-054-120	Rod, Diaphragm	1
36	685-055-115	Rod, Support	2
	685-055-308	Rod, Support	2
37	720-012-360	Seal, Diaphragm Rod	2
38	720-044-600	Seal, Manifold Spacer	8
39	720-047-600	Seal, Check Valve	8
40	722-079-502	Seat, Check Valve	4
	722-079-520	Seat, Check Valve	4
	722-079-542	Seat, Check Valve	4
	722-079-552	Seat, Check Valve	4
41	770-062-502	Spacer, Manifold	4
	770-062-520	Spacer, Manifold	4
	770-062-542	Spacer, Manifold	4
	770-062-552	Spacer, Manifold	4
42	901-009-115	Washer, Flat 5/16"	72
	901-009-308	Washer, Flat 5/16"	72
43	901-038-115	Washer, Flat 5/16"	8
	901-038-308	Washer, Flat 5/16"	8
44	901-046-115	Washer, Flat 1/2"	32
	901-046-308	Washer, Flat 1/2"	32
NOT SHOWN:			
	535-069-000	Nameplate	

Spill Containment Option Drawing

Spill containment Option B



Note:
Item 48
The diaphragm is to be installed with the concave side facing toward the outer chambers.

S1F Spill Containment Option A, Repair Parts List

Item	Part Number	Description	Qty
45	170-114-115	Capscrew, Hex Hd 3/8-16 x 4.25 (replace 170-020-115, qty 16 of 32)	16
	170-114-308	Capscrew, Hex Hd 3/8-16 x 4.25 (replace 170-020-115, qty 16 of 32)	16
46	196-159-552	Chamber, Spill Containment	2
	196-159-600	Chamber, Spill Containment	2
48	286-094-600	Diaphragm, Pumping	2
49	518-137-520	Manifold, Spill Containment (replace 518-136-520)	2
	518-137-520E	Manifold, 25mm DIN	2
	518-137-542	Manifold, Spill Containment (replace 518-136-542)	2
	518-137-542E	Manifold, 25mm DIN	2
	518-137-552	Manifold, Spill Containment (replace 518-136-552)	2
	518-137-552E	Manifold, 25mm DIN	2
50	538-022-110	Nipple, Pipe	4
	538-022-308	Nipple, Pipe	4
51	560-078-611	O-Ring	8
52	618-003-110	Plug, Pipe	4
	618-003-308	Plug, Pipe	4
53	618-025-110	Plug, Boss	4
	618-025-308	Plug, Boss	4
54	618-031-110	Plug, Boss	4
	618-031-308	Plug, Boss	4
55	770-066-520	Spacer, Manifold (used w/overlay)	4
	770-066-542	Spacer, Manifold (used w/overlay)	4
	770-066-552	Spacer, Manifold (used w/overlay)	4
56	835-055-110	Tee, Pipe	4
	835-055-308	Tee, Pipe	4
57	860-056-606	Tube, Sight	2
58	866-060-110	Connector, Tube	4

S1F Spill Containment Option B, Repair Parts List

Uses all components shown in Option A, except:

Item	Part Number	Description	Qty
2	050-042-354	Ball, Check	4
17	286-093-600	Diaphragm, Overlay is not used.	2
48	286-092-354*	Diaphragm, Pumping (Replaces 286-094-600)	2
38	720-056-600	Seal, Manifold (Replaces 720-044-600)	4
	720-057-600	Seal, Manifold (PVDF only) (Replaces 720-044-600)	4
55	770-064-520	Spacer, Manifold (Replaces 770-062-520)	4
	770-064-552	Spacer, Manifold (Replaces 770-062-552)	4

*Note: The diaphragm is to be installed with the concave side facing toward the outer chambers. See drawing.

SPILL CONTAINMENT CONCEPT

The spill containment option prevents the air end components from being contaminated or damaged when a pumping diaphragm ruptures while pumping caustic or toxic materials. It also helps to protect the environment. With the installation of optional leak detectors (either mechanical or electronic) the diaphragm rupture can be detected. The pump can then be shut down and repaired before any caustic or toxic materials can enter the air end and be exhausted into the surrounding environment.

SPILL CONTAINMENT OPTION DIAPHRAGM SERVICING

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

Next, drain the fluid from the spill containment chambers. This can be done by removing the bottom plug (item 53) from each spill containment chamber.

After the fluid from the spill containment chambers has been drained, the wet end components can now be removed. See diaphragm servicing section for detailed instructions. The spill containment option has two additional pumping diaphragms (item 48). These diaphragms are installed with the natural convex curve toward the outer chamber (items 14 from the pump assembly drawing). The molded directional arrows on the diaphragms must point vertically.

FILLING SPILL CONTAINMENT CHAMBERS WITH LIQUID

THE CHAMBERS ARE FILLED WITH WATER AT THE FACTORY.

If you prefer to substitute another liquid, to prevent system contamination consult the factory first to determine compatibility of the substitute with pump construction.

Follow the steps listed here to replace the liquid in the pump after disassembly or liquid loss:

1. Drain the fluid in the spill containment chambers by removing the bottom two boss plugs (items 53). Replace the bottom two boss plugs after the fluid is drained.

2. Remove the eight capscrews (item 9) fastening the discharge manifold and elbows to the outer chambers (items 14). The discharge manifolds and elbows can now be removed.

3. Remove the top two boss plugs (items 53). The spill containment chambers are filled through the exposed ports.

4. Apply 5 to 10 psi (.34 to .69 bar) of air pressure to the air distribution valve. Install safety clip (item 1-F) into the smaller unthreaded hole in one end cap (item 1-D). This locks the valve spool to one side, keeping the pump from shifting.

5. Fill the spill containment chamber on the same side of the pump as the installed safety clip. The volume of fluid is 1198 ml (40.49 fl. oz.). It is important that the exact amount of fluid is used. Too little or too much fluid causes premature diaphragm failure and erratic pumping.

6. Loosely reinstall one boss plug (item 53) to the filled spill containment chamber.

7. Shut off air supply. Remove safety clip. Reapply air pressure at 5 to 10 psi (.34 to .69 bar). When the pump shifts to the opposite side, quickly install the safety clip.

8. With safety clip installed, loosen the top boss plug on the filled chambers. This allows fluid in the chamber to purge trapped air from the chamber. When fluid appears, quickly tighten the boss plug. Fluid loss of 1 to 2 ml is acceptable.

9. Tilt the pump so the uppermost pipe tee (item 56) is in the vertical position. Loosen the pipe plug (item 52). This will allow trapped air to purge through the pipe tee. When fluid appears at the tee opening, reinstall the pipe plug.

NOTE: If all air is not purged using this procedure, remove the check valve components from the top port of the outer chamber (item 14). Apply manual pressure to the pumping diaphragm by inserting a blunt instrument into the top port of the outer chamber and applying pressure to the diaphragm. Loosen the pipe plug (item 52) allowing the fluid to purge any remaining trapped air. Reinstall the plug.

10. Repeat steps 5 through 9 to fill opposite spill containment chamber.

11. Reinstall the check valve components, discharge manifold and elbows to the pump. The pump is now ready for operation.

⚠ 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.

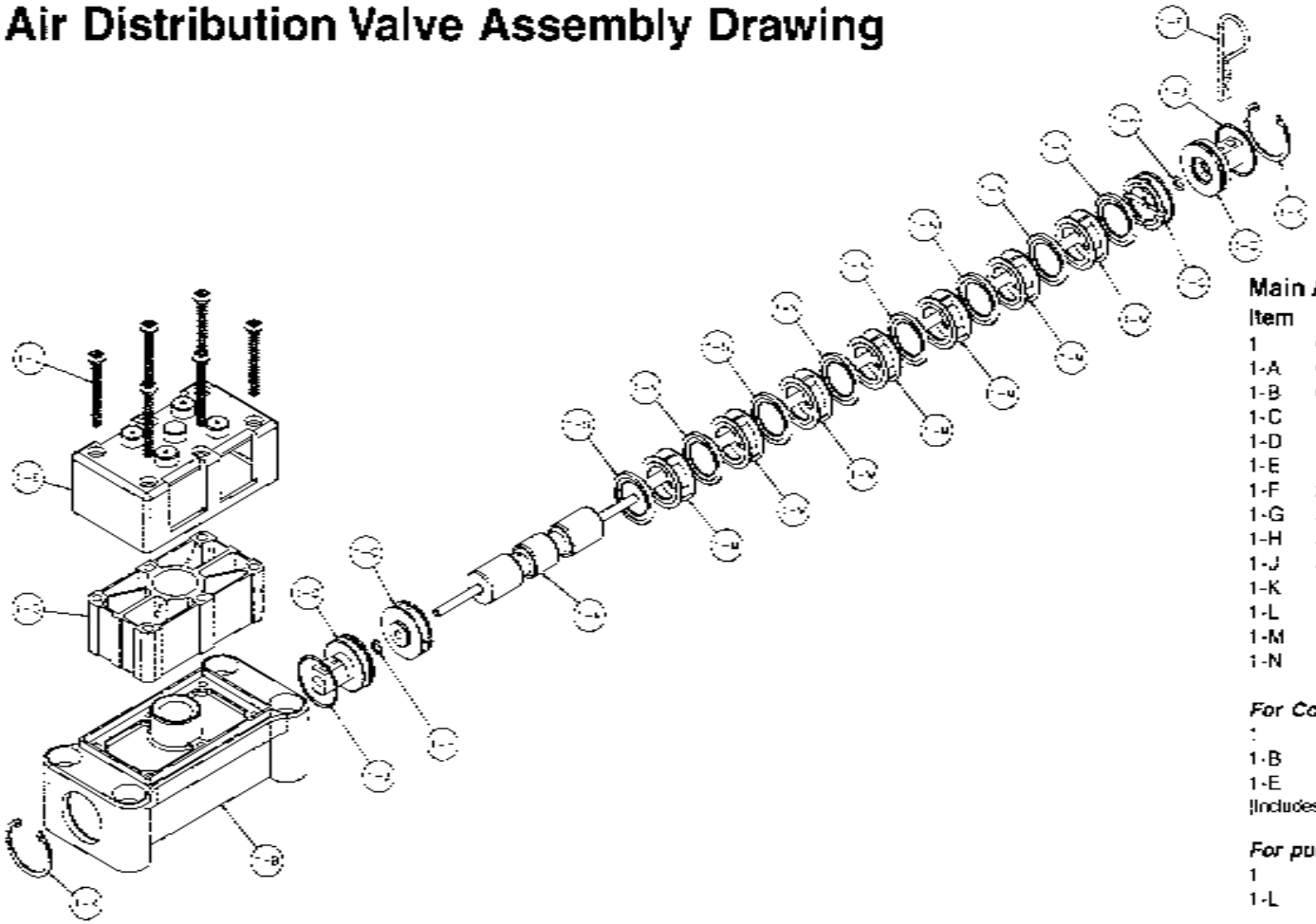
⚠ WARNING ⚠

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.

⚠ IMPORTANT ⚠

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.

Air Distribution Valve Assembly Drawing



Main Air Valve Assembly Parts List

Item	Part Number	Description	Qty
1	031-113-000	Main Air Valve Assembly	1
1-A	031-119-000	Spool Assembly	1
1-B	095-085-551	Body, Air Valve	1
1-C	132-031-353	Bumper	2
1-D	165-105-353	Cap, End	2
1-E	165-106-551	Cap, Muffler	1
1-F	210-008-330	Clip, Safety	1
1-G	530-030-550	Muffler	1
1-H	560-029-360	O-Ring	2
1-J	560-103-360	O-Ring	2
1-K	675-055-115	Ring, Retaining	2
1-L	710-015-115	Screw, Self-Tapping	6
1-M	770-049-175	Spacer	7
1-N	917-001-374	Wiper	8

For Conductive Acetal pumps:

1	031-113-001	Main Air Valve Assembly	1
1-B	095-085-503	Body, Main Air Valve	1
1-E	165-106-503	Cap, Muffler	1

(Includes all other items used on 031-113-000 above)

For pumps equipped with Teflon® coated hardware option:

1	031-113-002	Main Air Valve Assembly	1
1-L	710-015-308	Screw, Self-tapping	6

For pumps equipped with Teflon® coated hardware option:

1	031-113-002	Main Air Valve Assembly	1
1-L	710-015-308	Screw, Self-Tapping	6

For pumps with alternate Mesh or Sound Dampening mufflers or piped exhaust:

1	031-124-000	Main Air Valve Assembly	1

(Includes all items used on 031-113-000 above minus items 1-E, 1-G and 1-L)

For Conductive Acetal pumps with alternate Mesh or Sound Dampening mufflers or piped exhaust:

1	031-124-001	Main Air Valve Assembly	1
1-B	095-085-503	Body, Main Air Valve	1

(Includes all other items used on 031-124-000 above)

AIR DISTRIBUTION VALVE SERVICING

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

STEP #1: See PUMP ASSEMBLY DRAWING.

Using a 5/16" Allen wrench, remove the four hex socket capscrews (item 13) and four flat washers (item 43). Remove the air valve assembly (item 1) from the pump.

Remove and inspect gasket (item 21) 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-K) from each end of the air valve assembly using clip ring pliers.

Next remove the two end caps (item 1-D). Inspect the o-rings and (item 1-H and 1-J) for cuts or wear. Replace the o-rings if necessary. Pull on the actuator pin on one end of spool assembly (item 1-A). The bumper (item 1-C) on one end will pull out with the spool assembly. Wipe clean the spool assembly and inspect for dirt, scratches or wear. Replace the spool assembly if necessary.

Remove the eight spool wipers (items 1-N) and seven spacers (items 1-M) and the remaining bumper by gently pushing them out. Inspect the wipers for cuts and/or wear. Replace the wipers if necessary. Inspect the inner diameter of the air valve body (item 1-B) for scratches or cuts. Replace the valve body if necessary.

STEP #3: Reassembly of the air valve.

Apply a light coat of grease to the pin on one end of the spool assembly (item 1-A). Slide one bumper (item 1-C) over the greased pin until it is flush to the end of the spool. Slide one end cap (item 1-D) with installed o-rings (item 1-H and 1-J) over the greased pin. The counter bore in the end cap (item 1-D) aligns with the plug on the bumper (item 1-C).

Hold these parts, with the endcap and apply a light coating of grease to the outer diameters of the spool assembly (item 1-A). Install the eight wipers (items 1-N) and seven spacers (items 1-M) alternately over the spool assembly (item 1-A).

Apply a light coating of grease to the inner diameter of the air valve body (item 1-B). Holding the installed spool components by the end cap, insert into the air valve body. Be careful to align the slots in the spacers with the passages in the valve body.

Install the remaining bumper (item 1-C) and end cap (item 1-D) with installed o-rings into opposite end, aligning the pin of the spool assembly with the center o-ring in the end cap.

Adjust the valve components by grasping each installed end cap until both endcaps clear the grooves in the valve body. Install the retaining rings (item 1-K) using clip ring pliers.

Push the pin of the spool assembly all the way to one side until the tip of the pin clears the small unthreaded hole in the end cap. Install the safety clip (item 1-F) past the end of the pin. Fasten the air valve assembly (item 1) and gasket (item 21) to the pump. Remove safety clip.

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

⚠ 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.

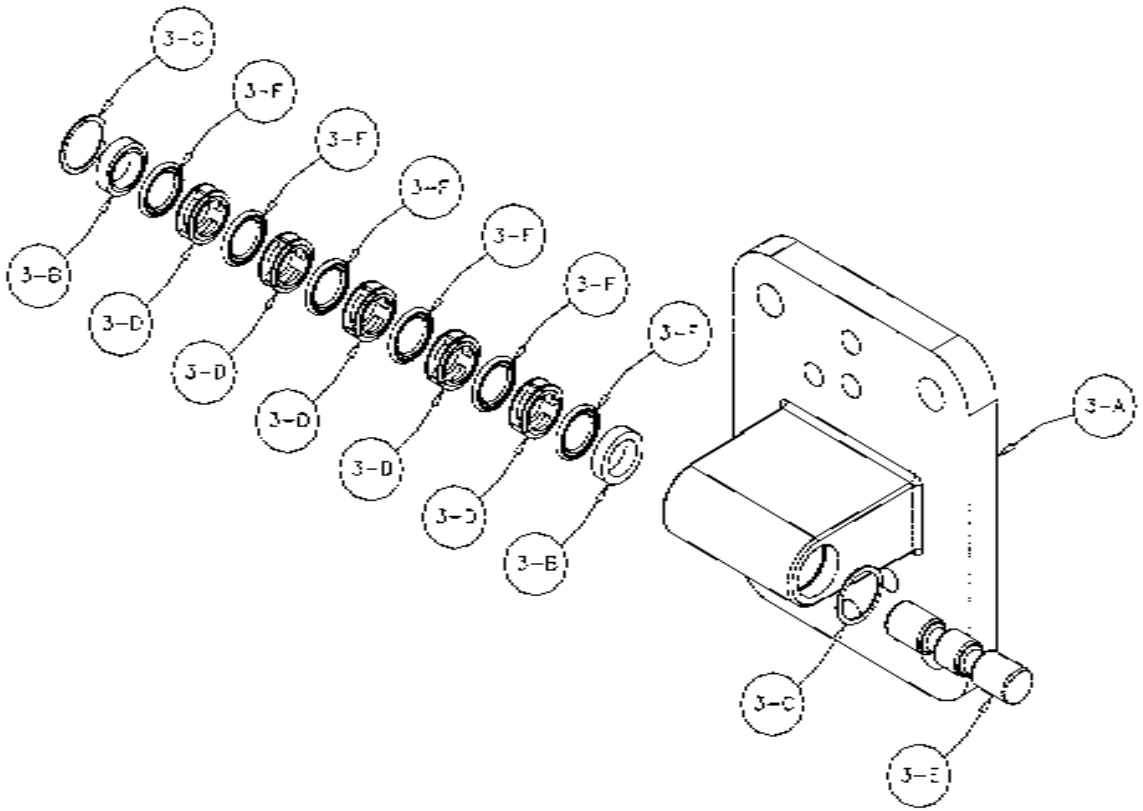
⚠ WARNING ⚠

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.

⚠ IMPORTANT ⚠

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.

Pilot Valve Assembly Drawing



Pilot Valve Assembly Parts List

Item	Part Number	Description	Qty
3	095-090-000	Pilot Valve Assembly	
3-A	095-084-551	Body, Pilot Valve	1
3-B	135-037-506	Bushing	2
3-C	675-057-115	Ring, Spiral Retaining	2
3-D	770-065-175	Spacer	5
3-E	775-041-506	Spool, Pilot	1
3-F	917-003-374	Wiper	6

for Conductive Acetal pumps:

3	095-090-001	Pilot Valve Assembly	1
3-A	095-084-503	Body, Pilot Valve	1

(Includes all other items used on 095-090-000 Pilot Valve above)

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. Insert the safety clip (item 1-F from Air Distribution Valve assembly drawing) into the smaller unthreaded holes in the end cap (item 1-D from air distribution valve assembly drawing).

Step #1: See PUMP ASSEMBLY DRAWING.

Using a $^{9}/_{16}$" wrench or socket, remove the four capscrews (items 11) and four flat washers (items 43). Remove the air inlet cap (item 8) and air inlet gasket (item 19). The pilot valve assembly (item 3) can now be removed for inspection or service.

Step #2: Disassembly of the pilot valve.

Remove the pilot valve spool (item 3-E). Wipe clean, and inspect for dirt, scratches or wear. Replace the spool if necessary.

Remove the two spiral retaining rings (items 3-C) from each end of the pilot valve body by inserting the tip of a small flat screw driver under the notch in the retaining ring. Lift and push the ring clockwise in a circular motion.

Remove the two pilot valve bushings (items 3-B), five spacers (items 3-D), and six spool wipers (items 3-F) by pushing gently from other end of the pilot valve body. Inspect the wipers for cuts and/or wear. Replace any wipers as necessary.

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

First install a spiral retaining ring to one end of the pilot valve body. Spread the spiral and insert one end into the groove in the pilot valve body. Twist the ring in a clockwise motion until the full ring is snapped into the groove. Install one bushing making sure the step side faces toward the wiper. Apply a light coating of grease to the outside diameter of each wiper. Next, gently push in the wipers and spacers until they are against the installed retaining ring in the opposite end of the pilot valve body. Install the remaining bushing making sure the step side faces the wiper. Install the remaining spiral retaining ring using the same method described.

Apply a light coating of grease to the inner diameter of each wiper. Also apply a light coating of grease to the outer diameter of the pilot valve spool and gently push the spool through each wiper.

Step #4: Inspect the actuator plungers.

See PUMP ASSEMBLY DRAWING.

The actuator plungers (items 32) can be reached through the stem cavity of the pilot valve in the intermediate assembly (item 4).

Remove the plungers (items 32) from the bushings (item 7) in each end of the cavity. Inspect the installed o-ring (items 29) 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.

Step #5: 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 19), air inlet cap (item 8), capscrews and washers (items 11 and 43).

Connect the air supply to the pump. Remove the safety clip (item 1-F) from the end cap (item 1-D). The pump is now ready for operation.

⚠ 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.

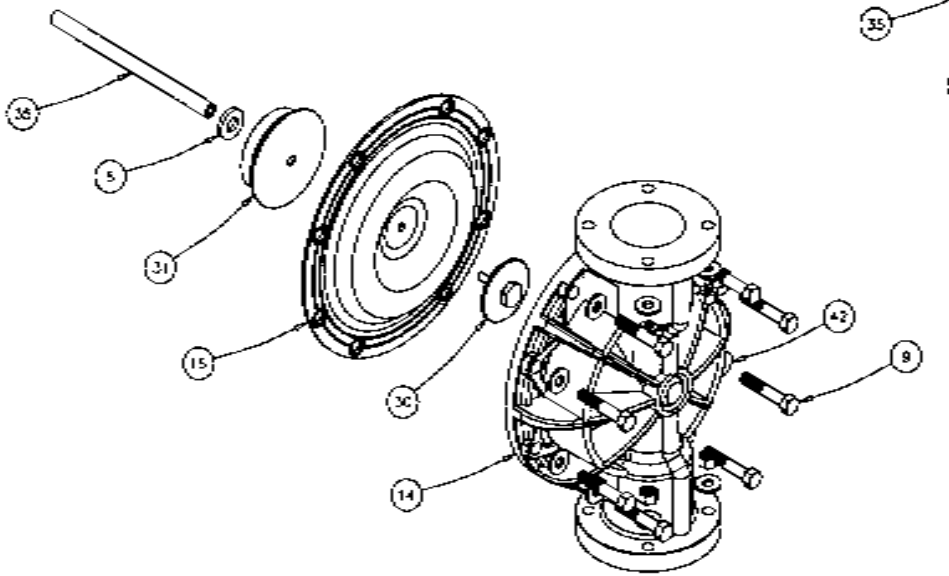
⚠ WARNING ⚠

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.

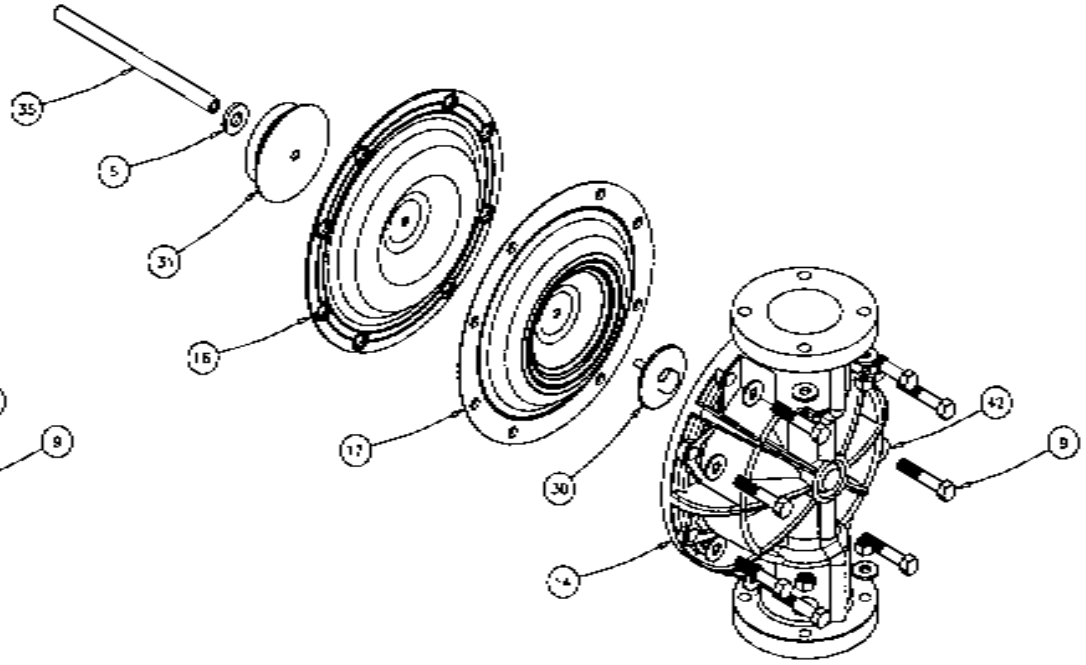
⚠ IMPORTANT ⚠

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.

Diaphragm Service Drawing, Non-Overlay



Diaphragm Service Drawing, with Overlay



DIAPHRAGM SERVICING

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

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

Using a 9/16" wrench or socket, remove the 16 capscrews (items 9), hex nuts and washers that fasten the elbows (items 18) to the outer chambers (items 14). Remove the elbows with the manifolds and spacers attached.

Step #2: Removing the outer chambers.

Using a 9/16" wrench or socket, remove the 16 capscrews (items 9), hex nuts and washers that fasten the outer chambers, diaphragms, and inner chambers (items 15) together.

Step #3: Removing the diaphragm assemblies.

Use a 1 3/8" (35mm) wrench or six pointed socket to remove the diaphragm assemblies (outer plate, diaphragm, and inner plate) from the diaphragm rod (item 35) by turning counterclockwise.

Insert a 1/4-20 capscrew or set screw into the smaller tapped hole in the inner diaphragm plate (item 31). Insert the protruding stud and the 1/4-20 fastener loosely into a vise. Use a 1 3/8" wrench or socket to remove the outer diaphragm plate (item 30) by turning counterclockwise. 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. Use a torque wrench to tighten the diaphragm assembly together to 20 ft. Lbs. (27.11 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 35) 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). Make sure the molded directional arrows on the diaphragm point vertically.

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

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

Thread the stud of the remaining diaphragm assembly clockwise into the tapped hole at the end of the diaphragm rod (item 35) as far as possible and still allow for alignment of the bolt holes in the diaphragm with the bolt pattern in the inner chamber. The molded directional arrows on the diaphragm must point vertically.

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

Step #6: Re-install the elbow/spacer/manifold assemblies to the pump, using the capscrews (items 9), 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 17) is designed to fit snugly over the exterior of the standard TPE diaphragm (item 16).

The overlay diaphragm has a protruding lip at each bolt hole which fits into the bolt holes of the TPE diaphragm. The molded directional arrows on the overlay diaphragm must point vertically.

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

⚠ 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.

⚠ 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.

⚠ IMPORTANT ⚠

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.

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.

Use a #8 Torx or flat screwdriver to remove the six self-tapping screws (item 1-L).

Remove the muffler cap and muffler (items 1-E and 1-G). The ½" NPT molded threads in the air distribution valve body (item 1-B).

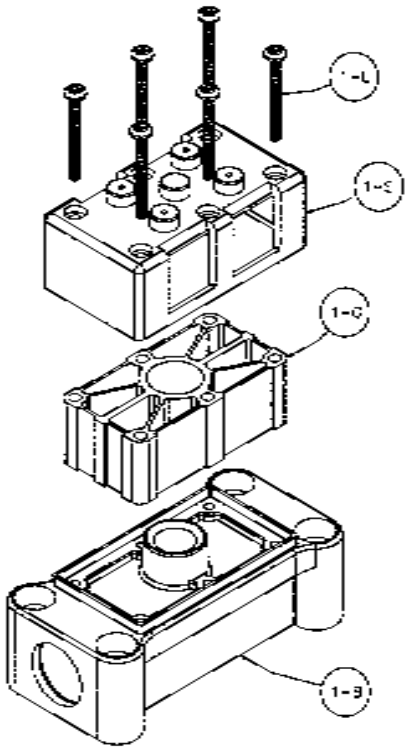
Piping or hose may now be installed.

IMPORTANT INSTALLATION

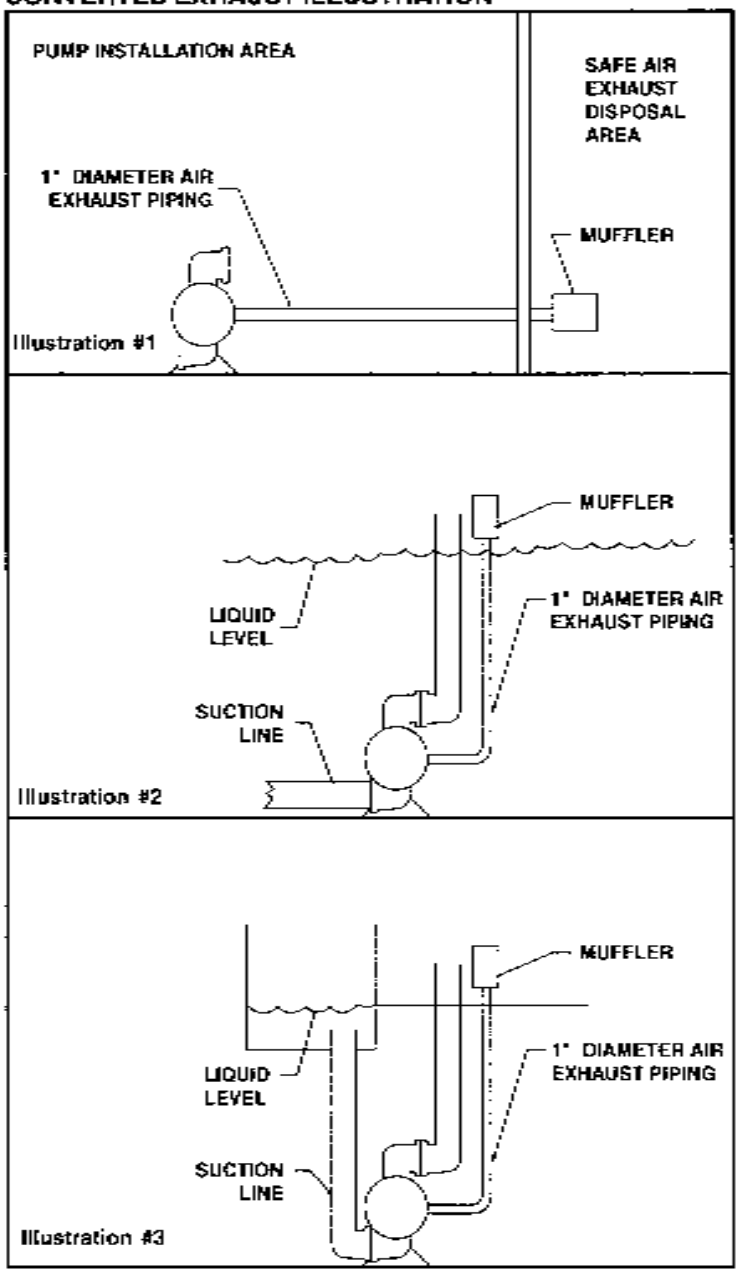
NOTE: The manufacturer recommends installing a flexible hose or connection between the pump and any rigid plumbing. This reduces stresses on the molded plastic threads of the air exhaust port. Failure to do so may result in damage to the air distribution valve body.

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

Exhaust Conversion Drawing



CONVERTED EXHAUST ILLUSTRATION



MODULAR CHECK VALVE SERVICING

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

To access the modular check valve, remove the elbows (items 18 from pump composite repair parts drawing). Use a $^{9}/_{16}$" wrench or socket to remove the fasteners. Once the elbows are removed, the modular check valves can be seen in the cavities of the outer chamber (items 14).

Next remove the check valve seal (item 39). Inspect the seal for cuts or pinched areas. Replace seal as needed.

Disassemble the component parts of each modular check valve. Inspect the check valve retainer (item 33) for cuts, abrasive wear, or embedded materials. Replace as needed.

Inspect the check balls (items 2) for wear, abrasion, or cuts on the spherical surface. The check valve seats (items 40) should be inspected for cuts, abrasive wear, or embedded material on the surfaces of both the external and internal chamfers. The spherical surface of the check balls must seat flush to the surface of the inner chamfer on the check valve seats for the pump to operate to peak efficiency. Replace any worn or damaged parts as necessary.

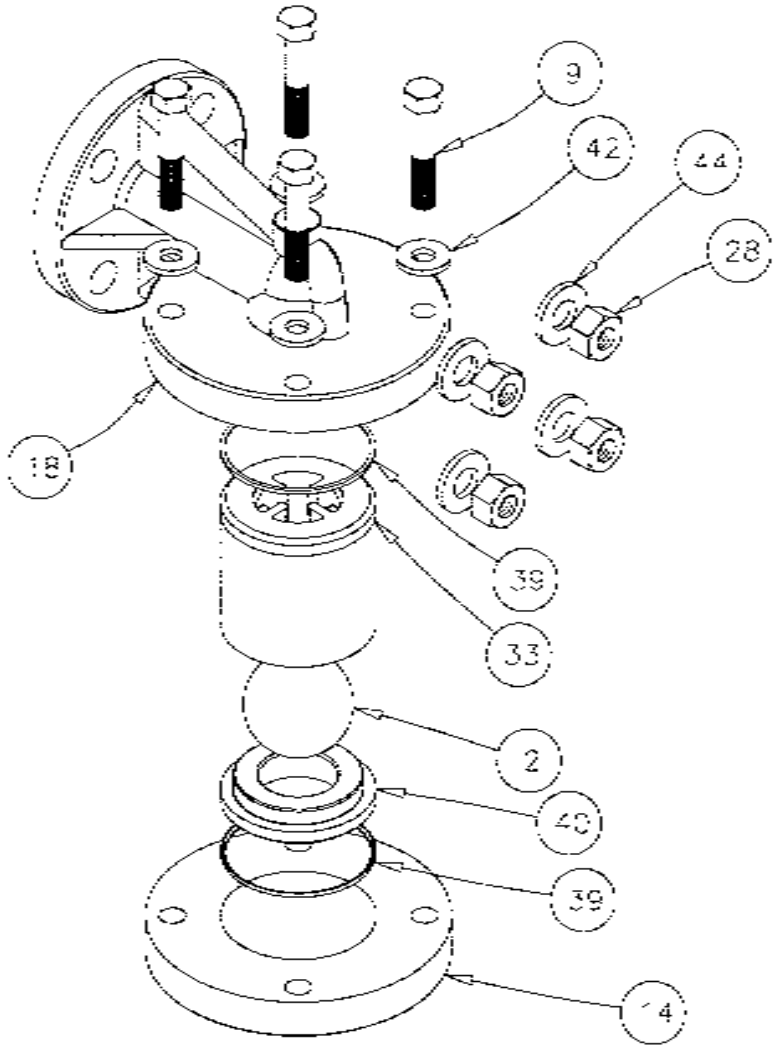
Remove the remaining check valve seal (item 39). Inspect the seal for cuts or pinched areas. Replace seal as needed.

Re-assemble the modular check valve. The seat should fit snugly into the retainer.

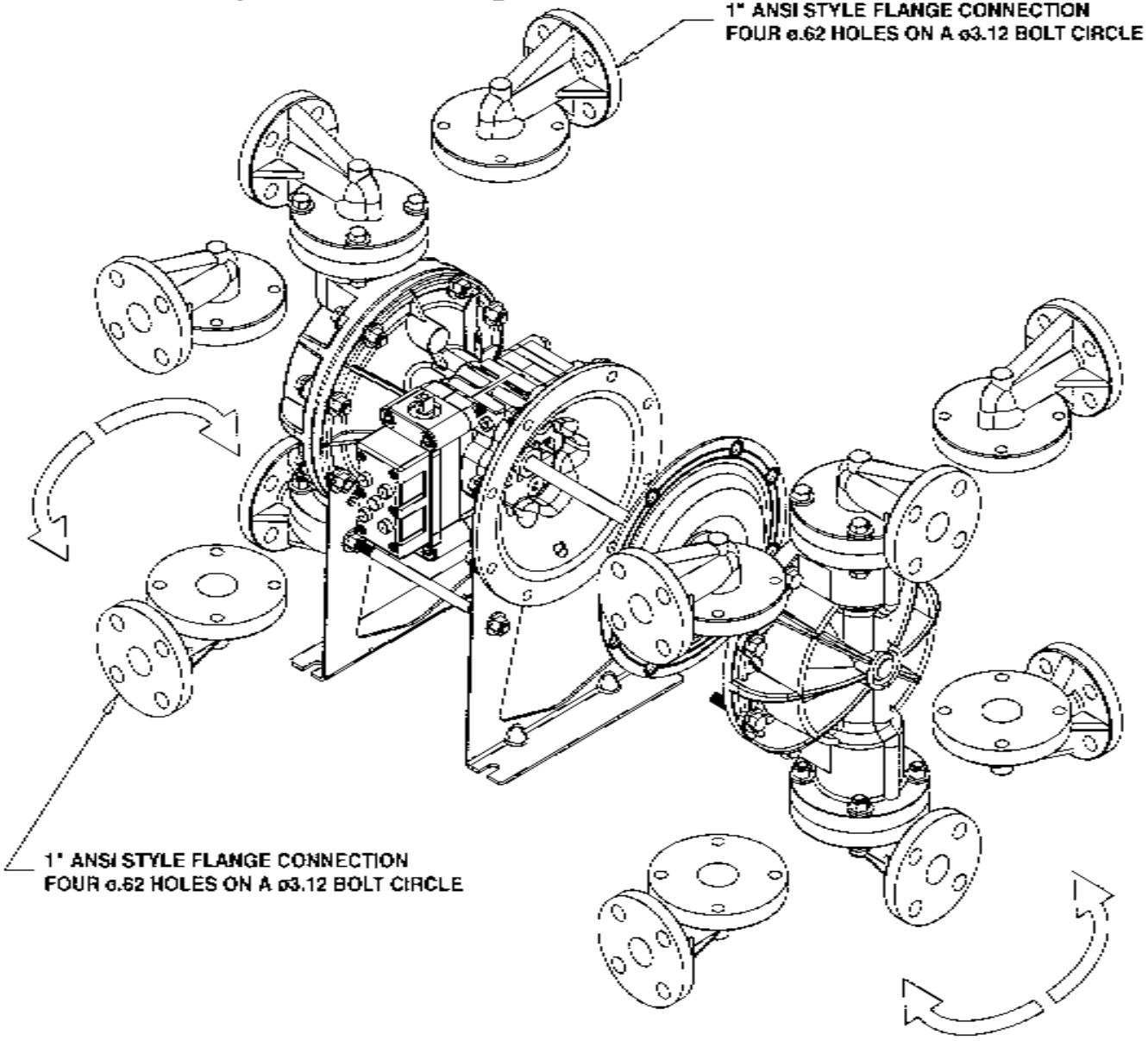
Place a check valve seal (item 39) into the cavity of the outer chamber (item 14). Make sure the chamfer side of the seal faces out. Insert the modular check valve into the outer chamber with the retainer facing up. Install a check valve seal (item 39). Make sure the chamfer side of the seal faces the chamfer on the check valve seat or retainer.

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

Modular Check Valve Drawing



Dual Port Option Drawing



DUAL PORTING OPTIONS

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

The above changes are possible because the porting flange of the elbows (items 18) are designed to mate with standard 125# ANSI style 4-bolt, 1" pipe flanges.

Dual porting of both suction and discharge ends of the pump

Converting the pump from the standard single suction and discharge porting configuration to dual porting at each end is easy. Simply remove the manifold seals, spacers, and manifolds (items 38, 41, and 23 from pump assembly drawing) from the pump.

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

Single porting of the suction and dual porting of the pump discharge

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

Dual porting of the suction and single porting of the pump discharge

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

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

⚠ 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.

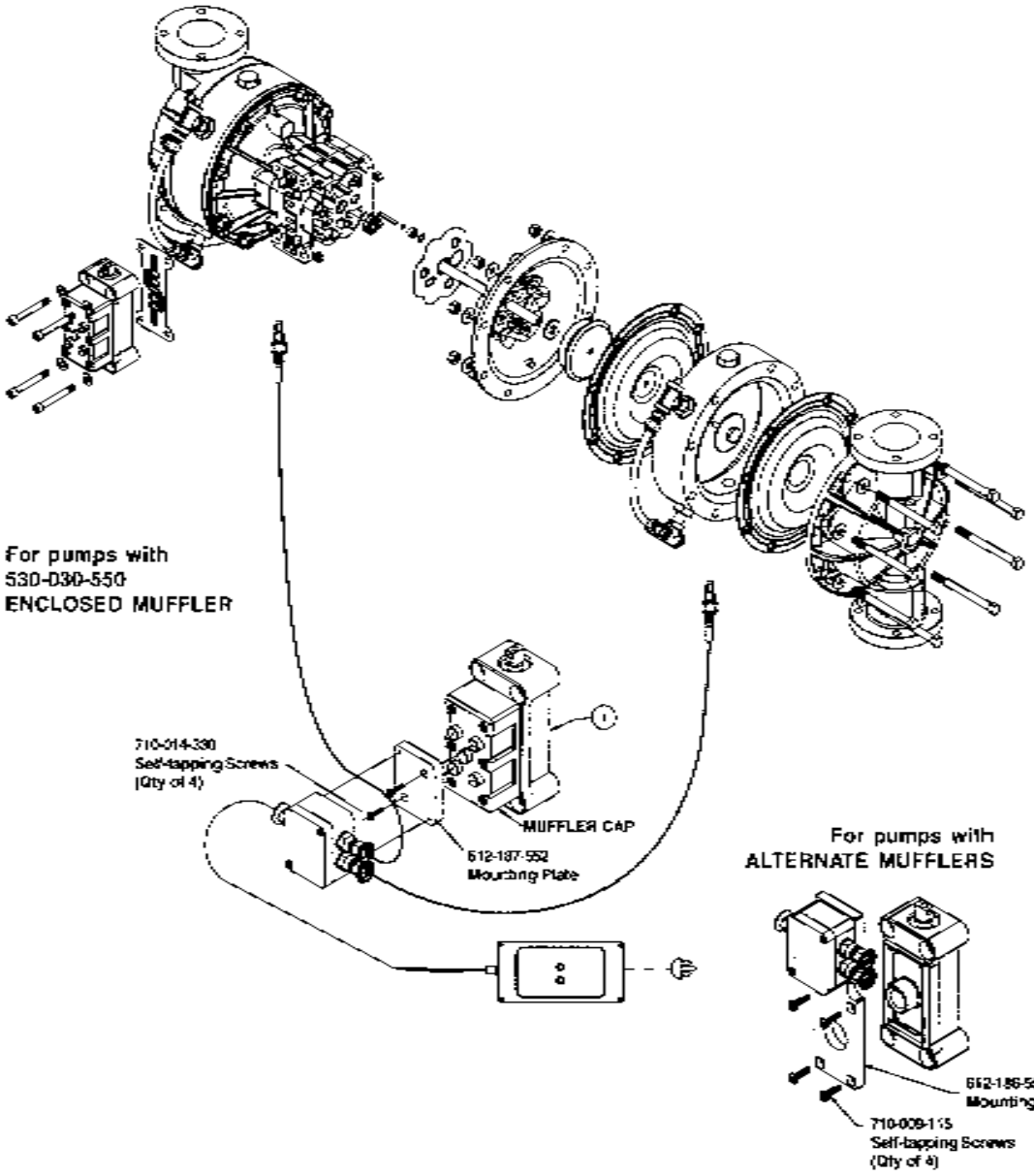
⚠ WARNING ⚠

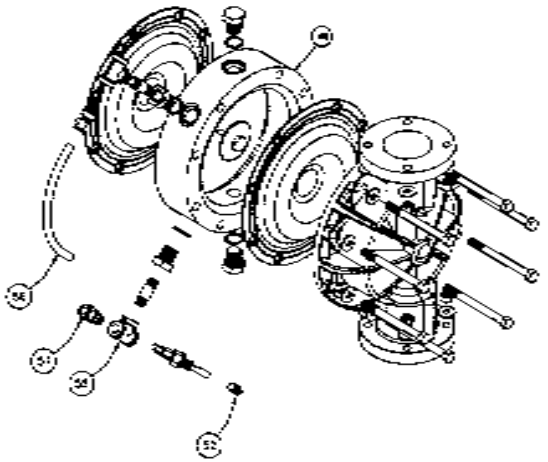
Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers or other miscellaneous equipment must be grounded.

⚠ IMPORTANT ⚠

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

Leak Detection Options Drawing





LEAK DETECTION OPTION A (ELECTRONIC)

Follow instructions found elsewhere in this manual, "Filling the Spill Containment Chambers" when installing leak detectors.

Electronic Leak Detector Installation

Kit 032-033-000 110VAC

Kit 032-034-000 220VAC

To install electronic leak detectors, remove the bottom ¼" NPT pipe plug on the visual sight tube (item 56). Insert leak detector into the ¼" pipe tee (item 55).

LEAK DETECTION OPTION B (MECHANICAL)

Follow instructions found elsewhere in this manual, "Filling the Spill Containment Chambers" when installing leak detectors.

Mechanical Leak Detector Installation

Kit 031-023-110

To install mechanical leak detectors, remove the bottom ¼" NPT pipe plug on the visual sight tube (item 56). Insert leak detector into the ¼" pipe tee (item 55).

Pulse Output Kit Drawing

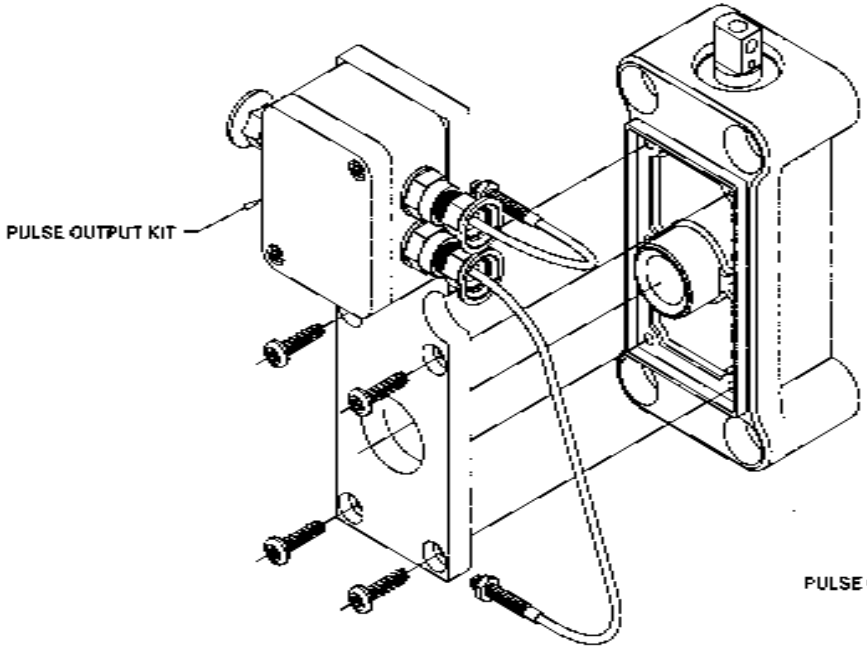
PULSE OUTPUT KIT OPTION

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

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

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

Exhaust Port or Auxiliary Muffler Setup



Integral Muffler Setup