



SERVICE & OPERATING MANUAL

Original Instructions

Certified Quality



Model F05

Non-Metallic
Design Level 2



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1: PUMP SPECS

2: INSTAL & OP

3: EXP VIEW

4: AIR END

5: WET END

6: OPTIONAL

Safety Information

⚠ IMPORTANT



Read the safety warnings and instructions in this manual before pump installation and start-up. Failure to comply with the recommendations stated in this manual could damage the pump and void factory warranty.



When the pump is used for materials that tend to settle out or solidify, the pump should be flushed after each use to prevent damage. In freezing temperatures the pump should be completely drained between uses.

⚠ CAUTION



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



Nonmetallic pumps and plastic components are not UV stabilized. Ultraviolet radiation can damage these parts and negatively affect material properties. Do not expose to UV light for extended periods of time.



WARNING
Pump not designed, tested or certified to be powered by compressed natural gas. Powering the pump with natural gas will void the warranty.

⚠ WARNING



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



Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. Be certain that approved eye protection and protective clothing are worn at all times. Failure to follow these recommendations may result in serious injury or death.



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



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



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



This pump is pressurized internally with air pressure during operation. Make certain that all fasteners and piping connections are in good condition and are reinstalled properly during reassembly.



Use safe practices when lifting

ATEX Pumps - Conditions For Safe Use

1. Ambient temperature range is as specified in tables 1 to 3 on the next page (per Annex I of DEKRA 18ATEX0094X)
2. ATEX compliant pumps are suitable for use in explosive atmospheres when the equipment is properly grounded in accordance with local electrical codes
3. **Non-Metallic ATEX Pumps only — See Explanation of Pump Nomenclature / ATEX Details Page**
Conductive Polypropylene, conductive Acetal or conductive PVDF pumps are not to be installed in applications where the pumps may be subjected to oil, greases and hydraulic liquids.
4. The optionally provided solenoids shall be protected by a fuse corresponding to its rated current (max $3 \cdot I_{rat}$ according to EN 60127) or by a motor protecting switch with short circuit and thermal instantaneous tripping (set to the rated current) as short circuit protection. For solenoids with a very low rated current, a fuse with the lowest current value according to the indicated standard will be sufficient. The fuse may be accommodated in the associated supply unit or shall be separately arranged. The rated voltage of the fuse shall be equal or greater than the stated rated voltage of the solenoid. The breaking capacity of the fuse shall be as high as or higher than the maximum expected short circuit current at the location of the installation (usually 1500 A). The maximum permissible ripple is 20% for all dc solenoids.
***Not applicable for all pump models — See Explanation of Pump Nomenclature / ATEX Details Page**
5. When operating pumps equipped with non-conductive diaphragms that exceed the maximum permissible projected area, as defined in EN ISO 80079-36 : 2016 section 6.7.5 table 8, the following protection methods must be applied
 - Equipment is always used to transfer electrically conductive fluids or
 - Explosive environment is prevented from entering the internal portions of the pump, i.e. dry running.
6. Pumps provided with the pulse output kit and used in the potentially explosive atmosphere caused by the presence of the combustible dust shall be installed in such a way that the pulse output kit is protected against impact
***Not applicable for all pump models — See Explanation of Pump Nomenclature / ATEX Details Page**

Temperature Tables

Table 1. Category 1 & Category 2 ATEX Rated Pumps

| Ambient Temperature Range [°C] | Process Temperature Range [°C] ¹ | Temperature Class | Maximum Surface Temperature [°C] |
|--------------------------------|---|-------------------|----------------------------------|
| -20°C to +60°C | -20°C to +80°C | T5 | T100°C |
| | -20°C to +108°C | T4 | T135°C |
| | -20°C to + 160°C | T3 | T200°C |
| | -20°C to +177°C | (225°C) T2 | |

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

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

| Ambient Temperature Range [°C] | Process Temperature Range [°C] | Temperature Class | Maximum Surface Temperature [°C] | Options | |
|--------------------------------|--------------------------------|-------------------|----------------------------------|------------------|-------------------|
| | | | | Pulse Output Kit | Integral Solenoid |
| -20°C to +60°C | -20°C to +100°C | T5 | T100 | X | |
| -20°C to +50°C | -20°C to +100°C | T5 | T100 | | X |

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

Table 3. Category M1 ATEX Rated Pumps for Mining

| Ambient Temperature Range [°C] | Process Temperature Range [°C] |
|--------------------------------|--------------------------------|
| -20°C to +60°C | -20°C to +150°C |

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

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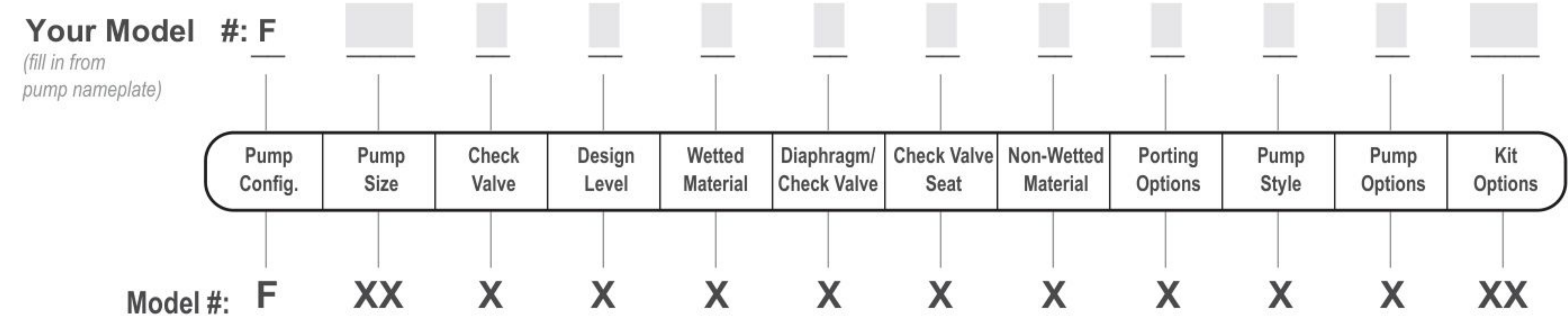
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EXPLANATION OF PUMP NOMENCLATURE



Pump Brand
F F T A

Pump Size
05 1/2"

Check Valve Type
B Solid Ball

Design Level
2 Design Level

Wetted Material
K PVDF
N Nylon
P Polypropylene

Diaphragm/Check Valve Materials
1 Santoprene/Santoprene
2 Virgin PTFE/Santoprene Backup/Virgin PTFE
B Nitrile/Nitrile
U Polyurethane/Polyurethane
Z One-Piece Bonded/PTFE

Check Valve Seat
P Polypropylene
S Stainless Steel
K PVDF

Non-Wetted Material Options
P Polypropylene
1 Polypropylene w/PTFE Coated Hardware

Porting Options

- N NPT Threads
- B BSP (Tapered) Threads
- 1 Dual Porting (NPT)
- 2 Top Dual Porting (NPT)
- 3 Bottom Dual Porting (NPT)
- 4 Dual Porting (BSP Tapered)
- 5 Top Dual Porting (BSP Tapered)
- 6 Bottom Dual Porting (BSP Tapered)

Pump Style

- S Standard
- I Inline Porting NPT Threads

Pump Options

- 0 None
- 6 Metal Muffler

Kit Options

- 00. None
- P0. 10.30VDC Pulse Output Kit
- P1. Intrinsically-Safe 5.30VDC, 110/120VAC 220/240 VAC 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

Kit Options (cont.)

- E4. Solenoid Kit with 110VAC Coil
- E5. Solenoid Kit with 110VAC Explosion-Proof Coil
- E6. Solenoid Kit with 220VAC Coil
- E7. Solenoid Kit with 220VAC Explosion-Proof Coil
- E8. Solenoid Kit with 110VAC, 50 Hz Explosion-Proof Coil
- E9. Solenoid Kit with 230VAC, 50 Hz Explosion-Proof Coil
- SP. Stroke Indicator Pins

- A1. Solenoid Kit with 12 VDC ATEX Compliant Coil
- A2. Solenoid Kit with 24 VDC ATEX Compliant Coil
- A3. Solenoid Kit with 110/120 VAC 50/60 Hz ATEX Compliant Coil
- A4. Solenoid Kit with 220/240 VAC 50/60 Hz ATEX Compliant Coil

FM

APPROVED

IEC EEX m T4

SA

Note: Pump models equipped with these explosion-proof solenoid kit options E1, E3, E5, E7, E8 or E9, are certified and approved by the above agencies. They are NOT ATEX compliant.

Your Serial #: (fill in from pump nameplate)

Special Conditions For Safe Use: Conductive polypropylene, conductive acetal, or conductive PVDF pumps are not to be installed in applications where the pumps may be subjected to oil, greases and hydraulic liquids

ATEX Detail

| | ATEX Details | Wetted Material Options | Non-Wetted Material Options | Pump Options | Kit Options |
|--------------------------|--|-------------------------|-----------------------------|--------------|----------------|
| <div><div>Ex</div></div> | II 1 G Ex h IIC T5...225°C (T2) Ga II 1D Ex h IIIC T100°C...T200°C Da I M1 Ex h I Ma | C, V | C | 6 | 00 |
| | II 2 G Ex h IIC T5...225°C (T2) Gb II 2 D Ex h IIIC T100°C...T200°C Db | C, V | C | 0, 6 | 00 |
| | II 2 G Ex h ia IIC T5 Gb II 2 D Ex h ia IIIC T100°C Db | C, V | C | 0, 6 | P1 |
| | II 2 G Ex h mb IIC T5 Gb II 2 D Ex h mb IIIC T100°C Db | C, V | C | 0, 6 | A1, A2, A3, A4 |
| | | | | | |

Performance

F05 NON-METALLIC

1: PUMP SPECS

SUCTION/DISCHARGE PORT SIZE

- 1/2" NPT (Internal) or 1/2" BSP (Tapered)
- 1" NPT (External) or 1" BSP (Tapered)

CAPACITY

- 0 to 14 gallons per minute
(0 to 52 liters per minute)

AIR DISTRIBUTION VALVE

- No-lube, no-stall design

SOLIDS-HANDLING

- Up to .125 in. (3mm)

HEADS UP TO

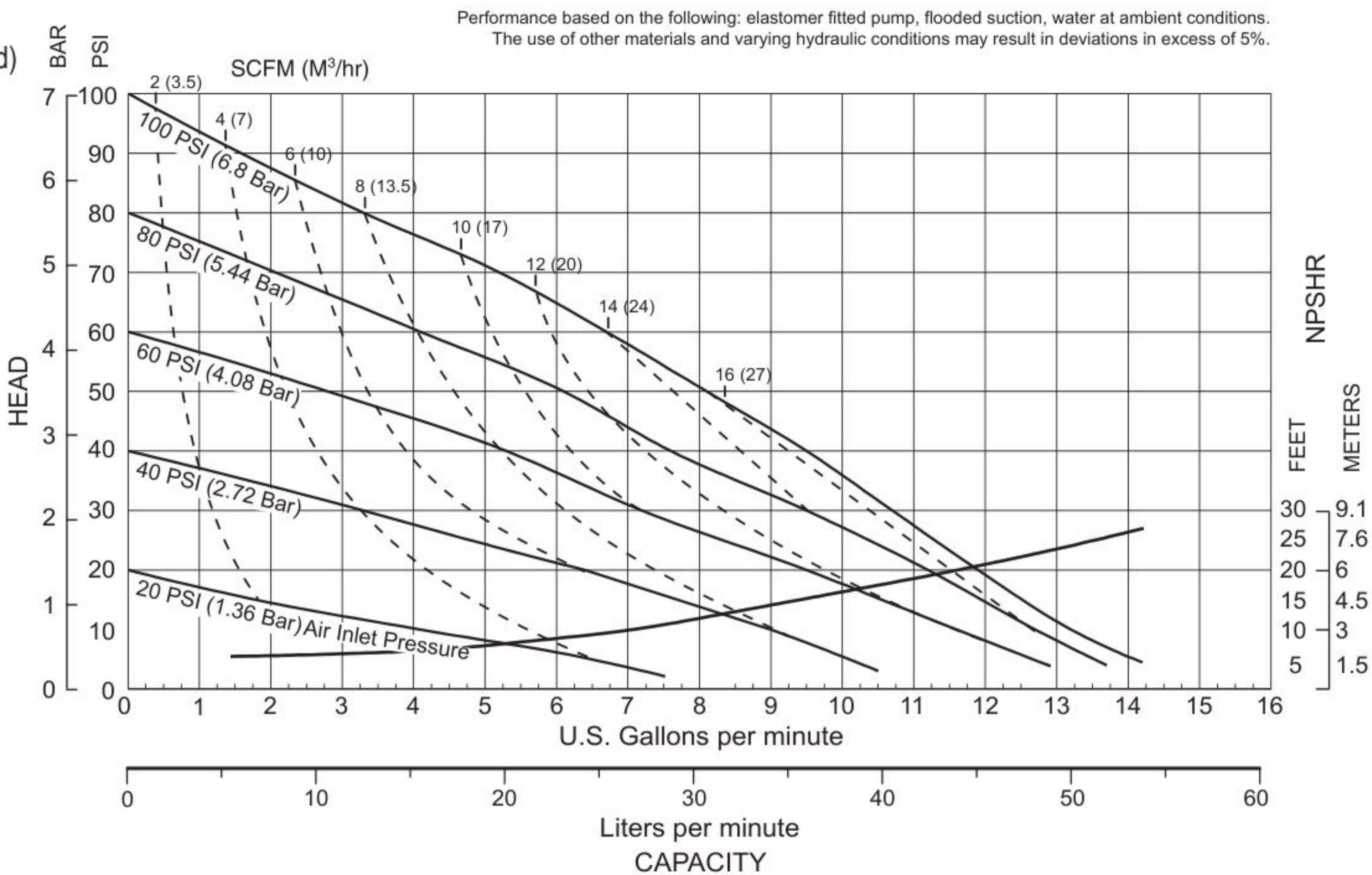
- 100 psi or 231 ft. of water
(7 bar or 70 meters)

DISPLACEMENT/STROKE

- .026 Gallon / .098 liter

SHIPPING WEIGHT

- Polypropylene 16 lbs. (8kg)
- PVDF 18 lbs. (9kg)



1: PUMP SPECS

Materials

| Material Profile: | Operating Temperatures: | |
|---|-------------------------|----------------|
| | Max. | Min. |
| CAUTION! Operating temperature limitations are as follows: | | |
| Conductive Acetal: Tough, impact resistant, ductile. Good abrasion resistance and low friction surface. Generally inert, with good chemical resistance except for strong acids and oxidizing agents. | 190°F 88°C | -20°F -29°C |
| EPDM: Shows very good water and chemical resistance. Has poor resistance to oils and solvents, but is fair in ketones and alcohols. | 280°F 138°C | -40°F -40°C |
| FKM: (Fluorocarbon) Shows good resistance to a wide range of oils and solvents; especially all aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegetable oils. Hot water or hot aqueous solutions (over 70°F) will attack FKM. | 350°F 177°C | -40°F -40°C |
| Hytrel®: Good on acids, bases, amines and glycols at room temperatures only. | 220°F 104°C | -20°F -29°C |
| Neoprene: All purpose. Resistance to vegetable oils. Generally not affected by moderate chemicals, fats, greases and many oils and solvents. Generally attacked by strong oxidizing acids, ketones, esters and nitro hydrocarbons and chlorinated aromatic hydrocarbons. | 200°F 93°C | -10°F -23°C |
| Nitrile: General purpose, oil-resistant. Shows good solvent, oil, water and hydraulic fluid resistance. Should not be used with highly polar solvents like acetone and MEK, ozone, chlorinated hydrocarbons and nitro hydrocarbons. | 190°F 88°C | -10°F -23°C |
| Nylon: 6/6 High strength and toughness over a wide temperature range. Moderate to good resistance to fuels, oils and chemicals. | 180°F 82°C | 32°F 0°C |

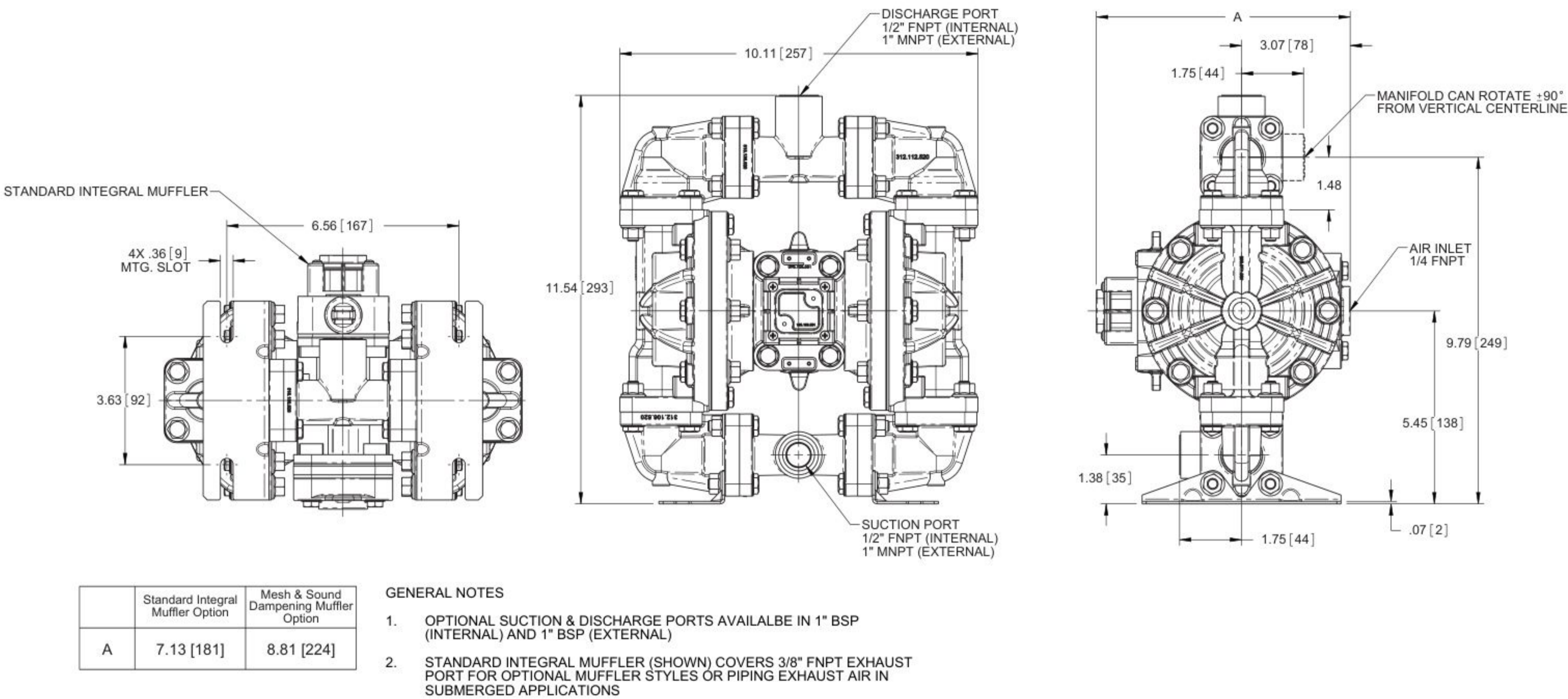
| | | |
|--|----------------|----------------|
| Polypropylene: A thermoplastic polymer. Moderate tensile and flex strength. Resists strong acids and alkali. Attacked by chlorine, fuming nitric acid and other strong oxidizing agents. | 180°F 82°C | 32°F 0°C |
| PVDF: (Polyvinylidene Fluoride) A durable fluoroplastic with excellent chemical resistance. Excellent for UV applications. High tensile strength and impact resistance. | 250°F 121°C | 0°F -18°C |
| Santoprene®: Injection molded thermoplastic elastomer with no fabric layer. Long mechanical flex life. Excellent abrasion resistance. | 275°F 135°C | -40°F -40°C |
| UHMW PE: A thermoplastic that is highly resistant to a broad range of chemicals. Exhibits outstanding abrasion and impact resistance, along with environmental stress-cracking resistance. | 180°F 82°C | -35°F -37°C |
| Urethane: Shows good resistance to abrasives. Has poor resistance to most solvents and oils. | 150°F 66°C | 32°F 0°C |
| Virgin PTFE: (PFA/TFE) Chemically inert, virtually impervious. Very few chemicals are known to chemically react with PTFE; molten alkali metals, turbulent liquid or gaseous fluorine and a few fluoro-chemicals such as chlorine trifluoride or oxygen difluoride which readily liberate free fluorine at elevated temperatures. | 220°F 104°C | -35°F -37°C |
| Maximum and Minimum Temperatures are the limits for which these materials can be operated. Temperatures coupled with pressure affect the longevity of diaphragm pump components. Maximum life should not be expected at the extreme limits of the temperature ranges. | | |
| Metals: | | |
| Alloy C: Equal to ASTM494 CW-12M-1 specification for nickel and nickel alloy. | | |
| Stainless Steel: Equal to or exceeding ASTM specification A743 CF-8M for corrosion resistant iron chromium, iron chromium nickel and nickel based alloy castings for general applications. Commonly referred to as 316 Stainless Steel in the pump industry. | | |

For specific applications, always consult the Chemical Resistance Chart.

Dimensional Drawings

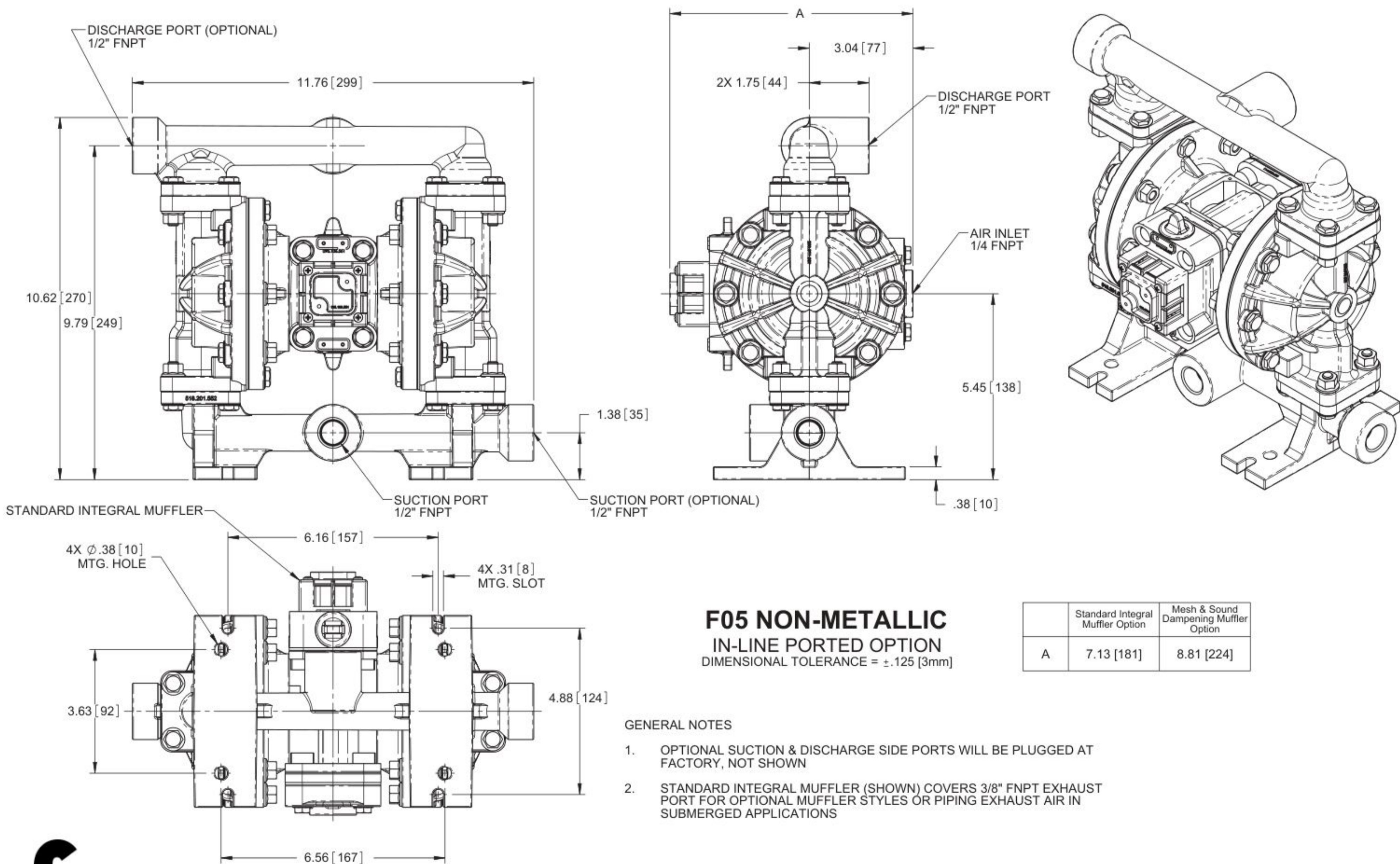
F05 Non-Metallic Center Ported Options

Dimensions in inches (metric dimensions in brackets). Dimensional Tolerance .125" (3mm).

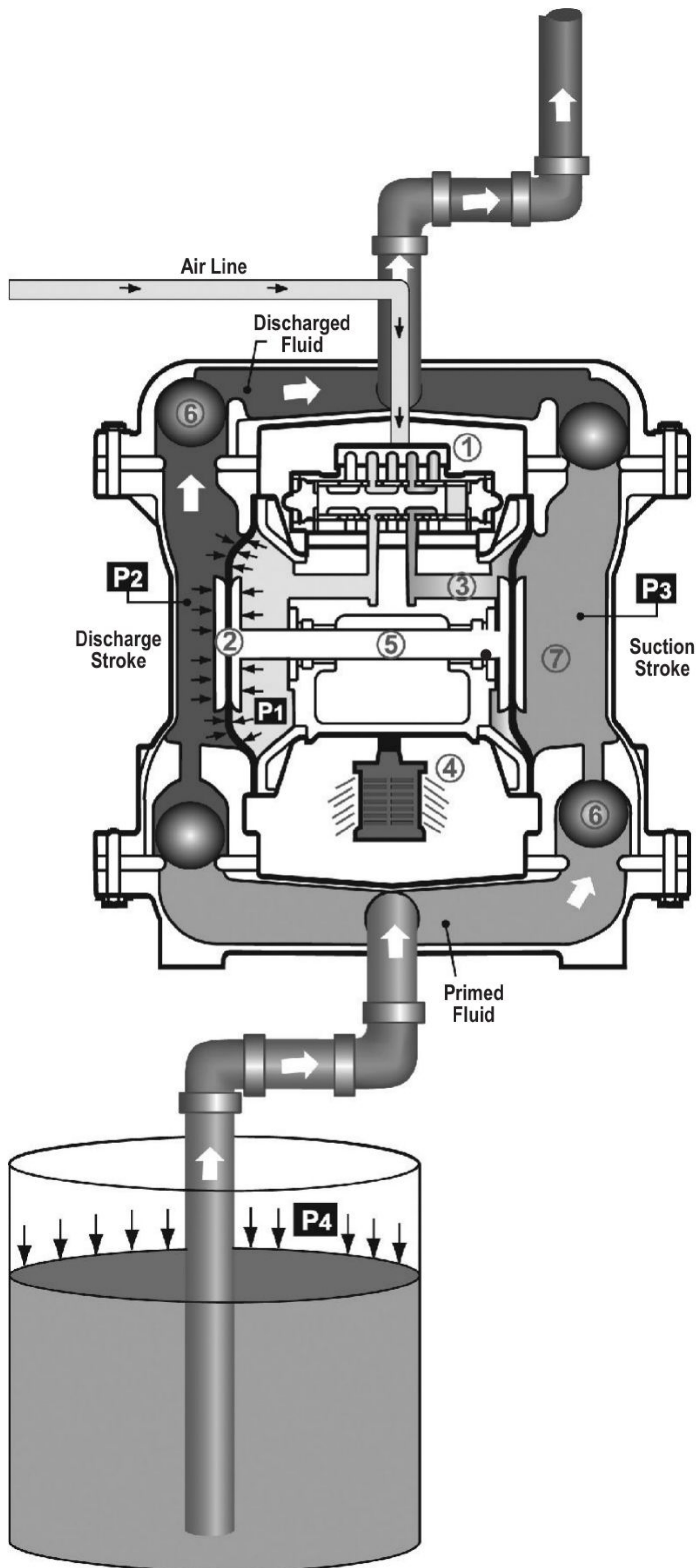


F05 Non-Metallic Inline Ported Options - (Polypropylene Wet End Models Only)

Dimensions in inches (metric dimensions in brackets). Dimensional Tolerance .125" (3mm).



Principle of Pump Operation



Air-Operated Double Diaphragm (AODD) pumps are powered by compressed air or nitrogen.

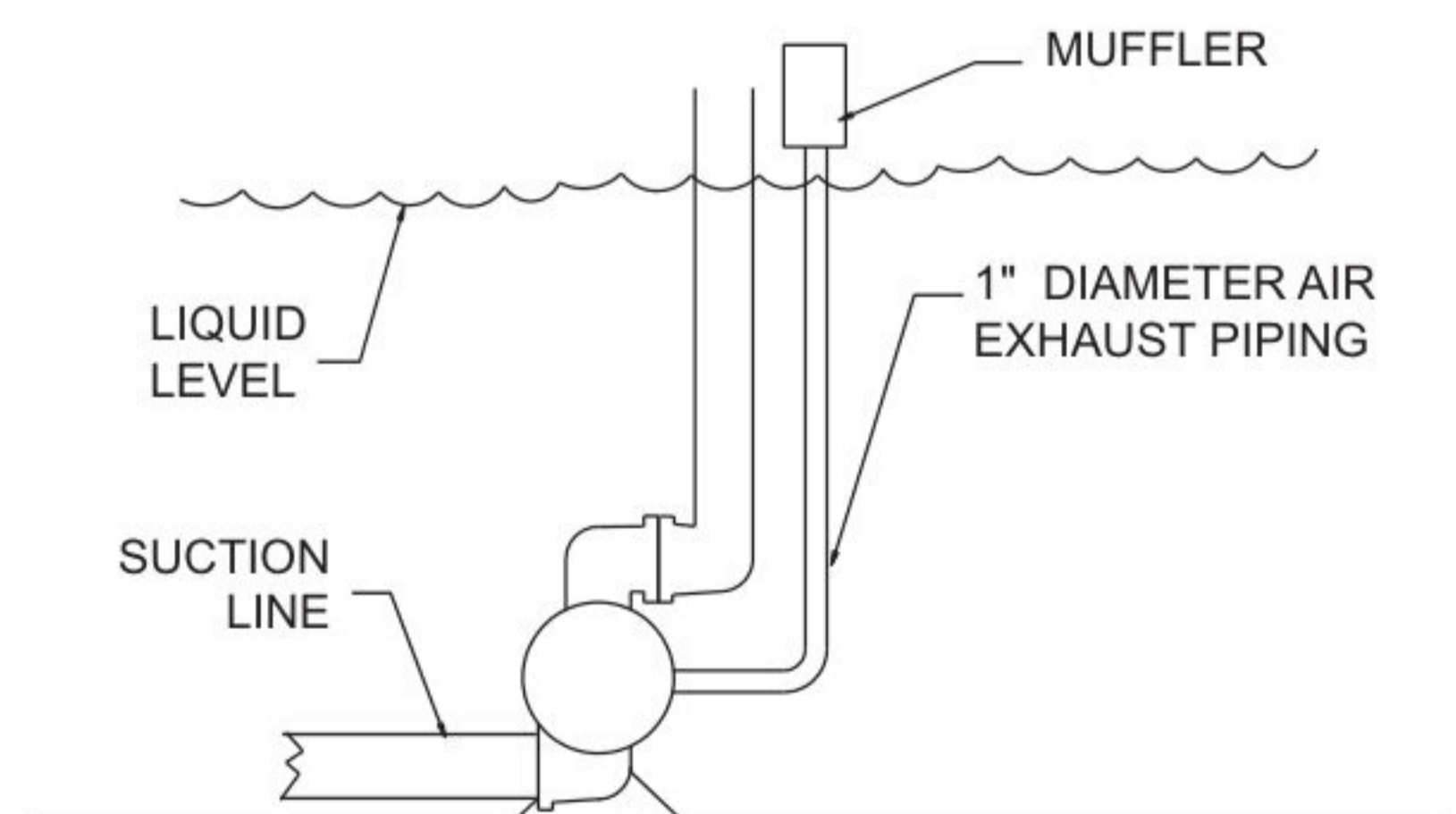
The main directional (air) control valve ① distributes compressed air to an air chamber, exerting uniform pressure over the inner surface of the diaphragm ②. At the same time, the exhausting air ③ from behind the opposite diaphragm is directed through the air valve assembly(s) to an exhaust port ④.

As inner chamber pressure (**P1**) exceeds liquid chamber pressure (**P2**), the rod ⑤ connected diaphragms shift together creating discharge on one side and suction on the opposite side. The discharged and primed liquid's directions are controlled by the check valves (ball or flap)⑥ orientation.

The pump primes as a result of the suction stroke. The suction stroke lowers the chamber pressure (**P3**) increasing the chamber volume. This results in a pressure differential necessary for atmospheric pressure (**P4**) to push the fluid through the suction piping and across the suction side check valve and into the outer fluid chamber ⑦.

Suction (side) stroking also initiates the reciprocating (shifting, stroking or cycling) action of the pump. The suction diaphragm's movement is mechanically pulled through its stroke. The diaphragm's inner plate makes contact with an actuator plunger aligned to shift the pilot signaling valve. Once actuated, the pilot valve sends a pressure signal to the opposite end of the main directional air valve, redirecting the compressed air to the opposite inner chamber.

SUBMERGED ILLUSTRATION



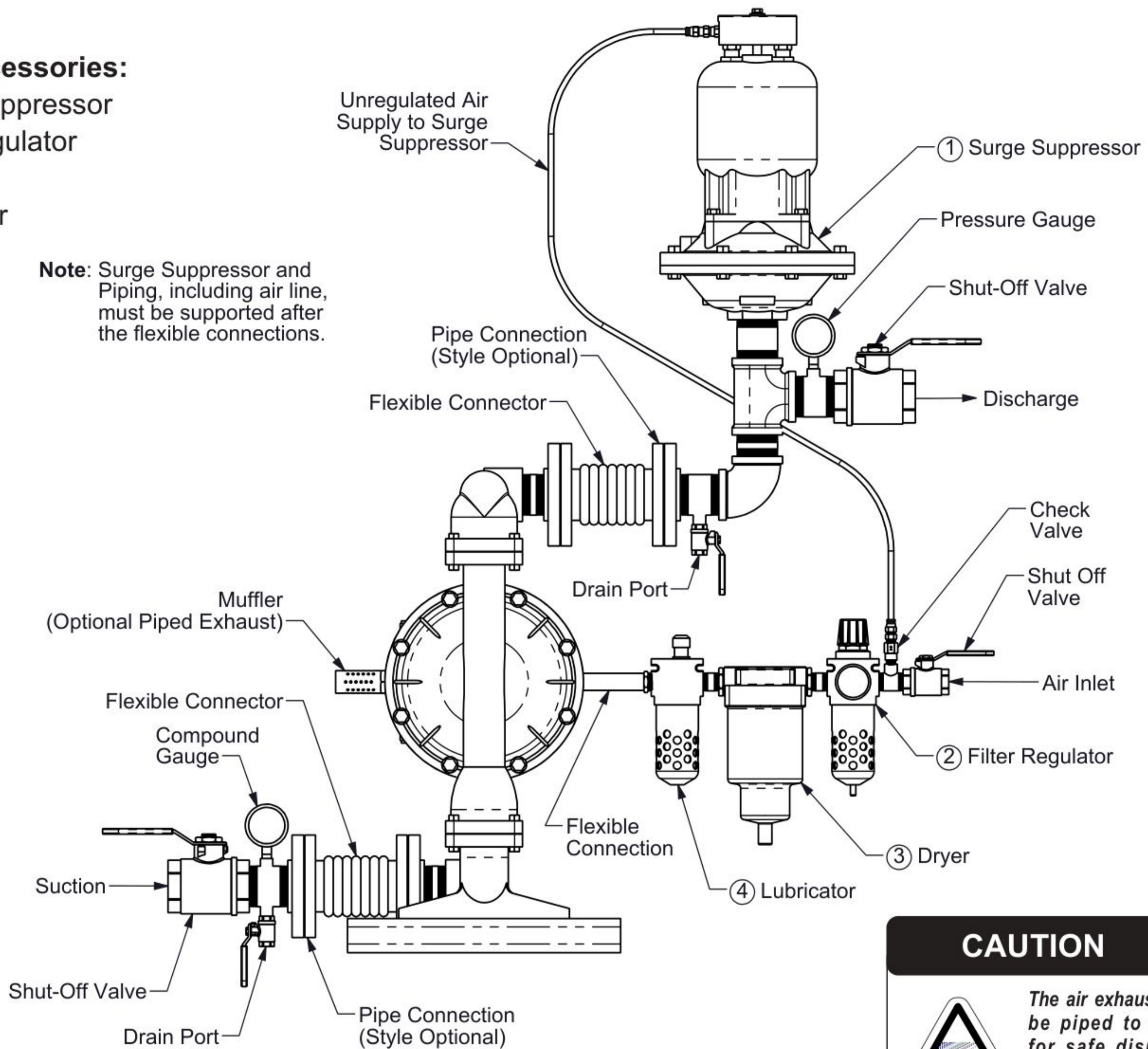
Pump can be submerged if the pump materials of construction are compatible with the liquid being pumped. The air exhaust must be piped above the liquid level. When the pumped product source is at a higher level than the pump (flooded suction condition), pipe the exhaust higher than the product source to prevent siphoning spills.

Recommended Installation Guide

Available Accessories:

1. Surge Suppressor
2. Filter/Regulator
3. Air Dryer
4. Lubricator

Note: Surge Suppressor and Piping, including air line, must be supported after the flexible connections.



CAUTION



The air exhaust should be piped to an area for safe disposition of the product being pumped, in the event of a diaphragm failure.

Installation And Start-Up

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

Air Supply

Connect the pump air inlet to an air supply with sufficient capacity and pressure to achieve desired performance. A pressure regulating valve should be installed to insure air supply pressure does not exceed recommended limits.

Air Valve Lubrication

The air distribution system is designed to operate WITHOUT lubrication. This is the standard mode of operation. If lubrication is desired, install an air line lubricator set to deliver one drop of SAE 10 non-detergent oil for every 20 SCFM (9.4 liters/sec.) of air the pump consumes. Consult the Performance Curve to determine air consumption.

Air Line Moisture

Water in the compressed air supply may cause icing or freezing of the exhaust air, causing the pump to cycle erratically or stop operating. Water in the air supply can be reduced by using a point-of-use air dryer.

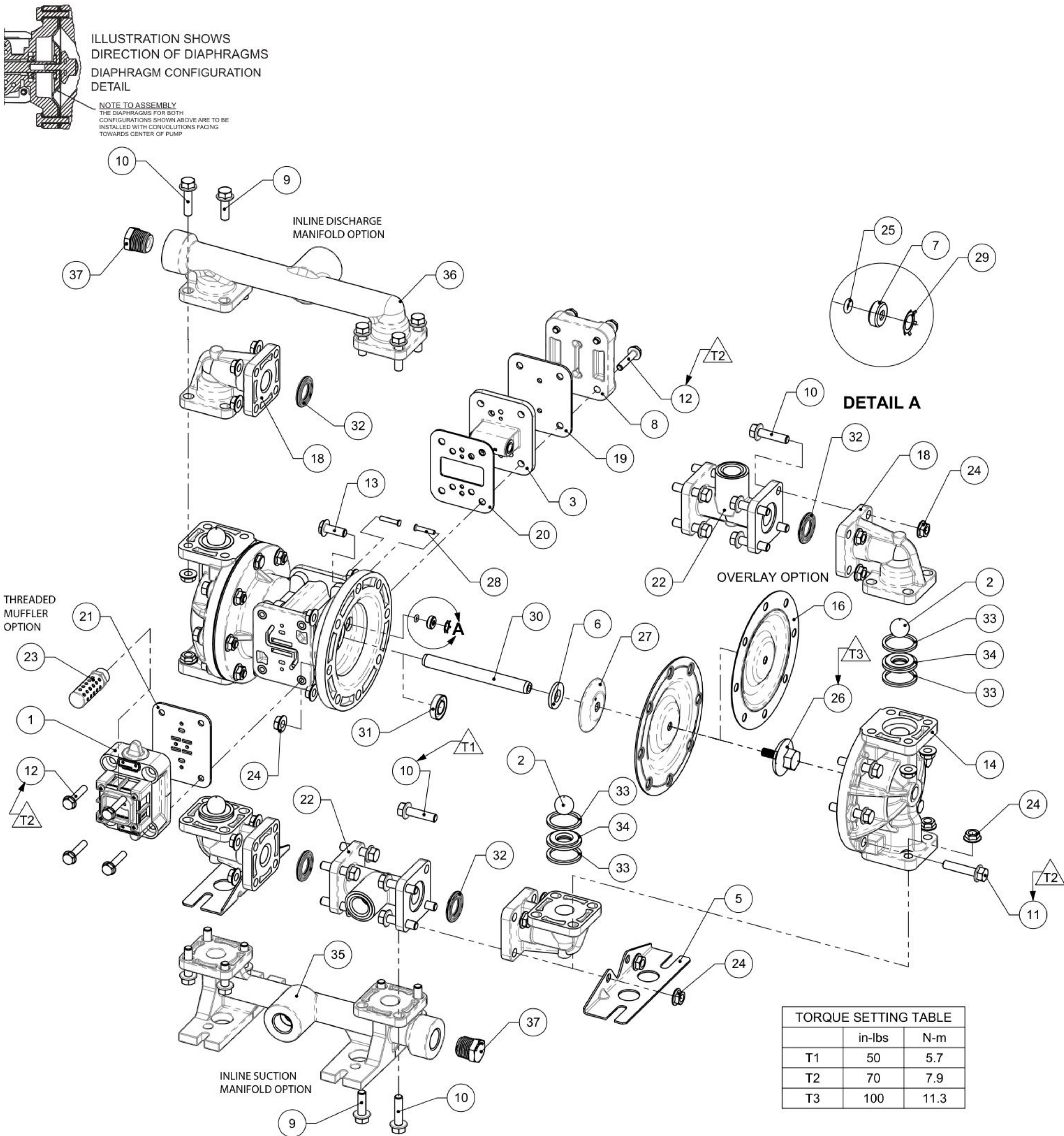
Air Inlet And Priming

To start the pump, slightly open the air shut-off valve. After the pump primes, the air valve can be opened to increase air flow as desired. If opening the valve increases cycling rate, but does not increase the rate of flow, cavitation has occurred. The valve should be closed slightly to obtain the most efficient air flow to pump flow ratio.

Troubleshooting Guide

| Symptom: | Potential Cause(s): | Recommendation(s): |
|---|---|--|
| Pump Cycles Once | Deadhead (system pressure meets or exceeds air supply pressure). | Increase the inlet air pressure to the pump. Pump is designed for 1:1 pressure ratio at zero flow. (Does not apply to high pressure 2:1 units). |
| | Air valve or intermediate gaskets installed incorrectly. | Install gaskets with holes properly aligned. |
| | Bent or missing actuator plunger. | Remove pilot valve and inspect actuator plungers. |
| Pump Will Not Operate / Cycle | Pump is over lubricated. | Set lubricator on lowest possible setting or remove. Units are designed for lube free operation. |
| | Lack of air (line size, PSI, CFM). | Check the air line size and length, compressor capacity (HP vs. CFM required). |
| | Check air distribution system. | Disassemble and inspect main air distribution valve, pilot valve and pilot valve actuators. |
| | Discharge line is blocked or clogged manifolds. | Check for inadvertently closed discharge line valves. Clean discharge manifolds/piping. |
| | Deadhead (system pressure meets or exceeds air supply pressure). | Increase the inlet air pressure to the pump. Pump is designed for 1:1 pressure ratio at zero flow. (Does not apply to high pressure 2:1 units). |
| | Blocked air exhaust muffler. | Remove muffler screen, clean or de-ice, and re-install. |
| | Pumped fluid in air exhaust muffler. | Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly. |
| | Pump chamber is blocked. | Disassemble and inspect wetted chambers. Remove or flush any obstructions. |
| Pump Cycles and Will Not Prime or No Flow | Cavitation on suction side. | Check suction condition (move pump closer to product). |
| | Check valve obstructed. Valve ball(s) not seating properly or sticking. | Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket. Clean out around valve ball cage and valve seat area. Replace valve ball or valve seat if damaged. Use heavier valve ball material. |
| | Valve ball(s) missing (pushed into chamber or manifold). | Worn valve ball or valve seat. Worn fingers in valve ball cage (replace part). Check Chemical Resistance Guide for compatibility. |
| | Valve ball(s) / seat(s) damaged or attacked by product. | Check Chemical Resistance Guide for compatibility. |
| | Check valve and/or seat is worn or needs adjusting. | Inspect check valves and seats for wear and proper setting. Replace if necessary. |
| | Suction line is blocked. | Remove or flush obstruction. Check and clear all suction screens or strainers. |
| | Excessive suction lift. | For lifts exceeding 20' of liquid, filling the chambers with liquid will prime the pump in most cases. |
| | Suction side air leakage or air in product. | Visually inspect all suction-side gaskets and pipe connections. |
| | Pumped fluid in air exhaust muffler. | Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly. |
| | Over lubrication. | Set lubricator on lowest possible setting or remove. Units are designed for lube free operation. |
| Pump Cycles Running Sluggish / Stalling, Flow Unsatisfactory | Icing. | Remove muffler screen, de-ice, and re-install. Install a point of use air drier. |
| | Clogged manifolds. | Clean manifolds to allow proper air flow. |
| | Deadhead (system pressure meets or exceeds air supply pressure). | Increase the inlet air pressure to the pump. Pump is designed for 1:1 pressure ratio at zero flow. (Does not apply to high pressure 2:1 units). |
| | Cavitation on suction side. | Check suction (move pump closer to product). |
| | Lack of air (line size, PSI, CFM). | Check the air line size, length, compressor capacity. |
| | Excessive suction lift. | For lifts exceeding 20' of liquid, filling the chambers with liquid will prime the pump in most cases. |
| | Air supply pressure or volume exceeds system hd. | Decrease inlet air (press. and vol.) to the pump. Pump is cavitating the fluid by fast cycling. |
| | Undersized suction line. | Meet or exceed pump connections. |
| | Restrictive or undersized air line. | Install a larger air line and connection. |
| | Suction side air leakage or air in product. | Visually inspect all suction-side gaskets and pipe connections. |
| | Suction line is blocked. | Remove or flush obstruction. Check and clear all suction screens or strainers. |
| | Pumped fluid in air exhaust muffler. | Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly. |
| | Check valve obstructed. | Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket. |
| | Check valve and/or seat is worn or needs adjusting. | Inspect check valves and seats for wear and proper setting. Replace if necessary. |
| | Entrained air or vapor lock in chamber(s). | Purge chambers through tapped chamber vent plugs. Purging the chambers of air can be dangerous. |
| | Diaphragm failure, or diaphragm plates loose. | Replace diaphragms, check for damage and ensure diaphragm plates are tight. |
| | Diaphragm stretched around center hole or bolt holes. | Check for excessive inlet pressure or air pressure. Consult Chemical Resistance Chart for compatibility with products, cleaners, temperature limitations and lubrication. |
| | Cavitation. | Enlarge pipe diameter on suction side of pump. |
| Premature Diaphragm Failure | Excessive flooded suction pressure. | Move pump closer to product. Raise pump/place pump on top of tank to reduce inlet pressure. Install Back pressure device (Tech bulletin 41r). Add accumulation tank or pulsation dampener. |
| | Misapplication (chemical/physical incompatibility). | Consult Chemical Resistance Chart for compatibility with products, cleaners, temperature limitations and lubrication. |
| | Incorrect diaphragm plates or plates on backwards, installed incorrectly or worn. | Check Operating Manual to check for correct part and installation. Ensure outer plates have not been worn to a sharp edge. |
| | Excessive suction lift. | For lifts exceeding 20' of liquid, filling the chambers with liquid will prime the pump in most cases. |
| Unbalanced Cycling | Undersized suction line. | Meet or exceed pump connections. |
| | Pumped fluid in air exhaust muffler. | Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly. |
| | Suction side air leakage or air in product. | Visually inspect all suction-side gaskets and pipe connections. |
| | Check valve obstructed. | Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket. |
| | Check valve and/or seat is worn or needs adjusting. | Inspect check valves and seats for wear and proper setting. Replace if necessary. |
| | Entrained air or vapor lock in chamber(s). | Purge chambers through tapped chamber vent plugs. |
| | Excessive suction lift. | For lifts exceeding 20' of liquid, filling the chambers with liquid will prime the pump in most cases. |

Composite Repair Parts Drawing



3: EXP VIEW

Composite Repair Parts List

| Item | Part Number | Description..... | Qty |
|------|-------------|--|-----|
| ① | 031.166.000 | Air Valve Assembly | 1 |
| | 031.166.002 | Air Valve Assembly (with PTFE Coated Hardware) | 1 |
| | 031.167.000 | Air Valve Assembly (with Stroke Indicator Pins) | 1 |
| | 031.167.002 | Air Valve Assembly | 1 |
| | | (with Stroke Indicator Pins and PTFE Coated Hardware) | |
| | 031.168.000 | Air Valve Assembly | 1 |
| | 031.169.000 | Air Valve Assembly (no muffler with Stroke Indicator Pins).. | 1 |
| ② | 050.027.354 | Ball, Check, Santoprene..... | 4 |
| | 050.027.357 | Ball, Check, Polyurethane | 4 |
| | 050.027.360 | Ball, Check, Nitrile | 4 |
| | 050.022.600 | Ball, Check, PTFE | 4 |
| ③ | 095.091.000 | Pilot Valve Assembly | 1 |
| 4 | 114.023.551 | Bracket, Intermediate | 1 |
| 5 | 115.140.115 | Bracket, Mounting..... | 2 |
| | 115.140.308 | Bracket, Mounting..... | 2 |
| ⑥ | 132.034.360 | Bumper, Diaphragm..... | 2 |
| ⑦ | 135.036.506 | Bushing, Plunger | 2 |
| 8 | 165.110.551 | Cap, Air Inlet..... | 1 |
| 9 | 171.062.115 | Capscrew, Flanged 5/16-18 X 1.00 | 8 |
| | 171.062.308 | Capscrew, Flanged 5/16-18 X 1.00 | 8 |
| 10 | 171.063.115 | Capscrew, Flanged 5/16-18 X 1.25 | 24 |
| | | Inline Option Only | 8 |
| | 171.063.308 | Capscrew, Flanged 5/16-18 X 1.25 | 24 |
| | | Inline Option Only | 8 |
| 11 | 171.064.115 | Capscrew, Flanged 5/16-18 X 1.50 | 12 |
| | 171.064.308 | Capscrew, Flanged 5/16-18 X 1.50 | 12 |
| 12 | 171.066.115 | Capscrew, Flanged 1/4-20 X 1.25 | 8 |
| | 171.066.308 | Capscrew, Flanged 1/4-20 X 1.25 | 8 |
| 13 | 171.075.115 | Capscrew, Flanged 5/16-18 X .88 | 4 |
| | 171.075.308 | Capscrew, Flanged 5/16-18 X .88 | 4 |
| 14 | 196.178.520 | Chamber, Outer, PVDF..... | 2 |
| | 196.178.552 | Chamber, Outer, Poly | 2 |
| ⑮ | 286.095.354 | Diaphragm, Santoprene | 2 |
| | 286.095.357 | Diaphragm, Polyurethane..... | 2 |
| | 286.095.360 | Diaphragm, Nitrile..... | 2 |

LEGEND:

○ = Items contained within Air End Kits

□ = Items contained within Wet End Kits

Note: Kits contain components specific to the material codes.

| | | | |
|----|--------------|---|----|
| | 286.116.000 | Diaphragm, One-Piece, PTFE..... | 2 |
| 16 | 286.096.600 | Diaphragm, Overlay, PTFE..... | 2 |
| 17 | 312.106.520 | Elbow, Suction, PVDF | 2 |
| | 312.106.552 | Elbow, Suction (not used with Inline option), Poly | 2 |
| 18 | 312.112.520 | Elbow, Discharge, PVDF | 2 |
| | 312.112.552 | Elbow, Discharge (not used with Inline option), Poly..... | 2 |
| 19 | 360.100.360 | Gasket, Air Inlet..... | 1 |
| 20 | 360.101.360 | Gasket, Pilot Valve | 1 |
| 21 | 360.102.360 | Gasket, Air Valve | 1 |
| 22 | 518.138.520 | Manifold, NPT, PVDF..... | 2 |
| | 518.138.520E | Manifold, BSP Tapered, PVDF | 2 |
| | 518.138.552 | Manifold, NPT (not used with Inline option), Poly..... | 2 |
| | 518.138.552E | Manifold, BSP Tapered, Poly..... | 2 |
| 23 | 530.035.000 | Muffler | 1 |
| 24 | 544.005.115 | Nut, Flanged 5/16-18..... | 36 |
| | | Inline Option Only | 20 |
| | 544.005.308 | Nut, Flanged 5/16-18..... | 36 |
| | | Inline Option Only | 20 |
| 25 | 560.001.360 | O-Ring | 2 |
| 26 | 612.091.520 | Plate, Outer Diaphragm,PVDF | 2 |
| | 612.091.552 | Plate, Outer Diaphragm, Poly..... | 2 |
| 27 | 612.177.330 | Plate, Inner Diaphragm..... | 2 |
| | 612.221.330 | Plate, Inner Diaphragm (use with 286.116.000) | 2 |
| 28 | 620.019.115 | Plunger, Actuator | 2 |
| 29 | 675.042.115 | Ring, Retaining | 2 |
| 30 | 685.056.120 | Rod, Diaphragm | 1 |
| 31 | 720.012.360 | Seal, Diaphragm Rod | 2 |
| 32 | 720.045.600 | Seal, Manifold (not used with Inline option)..... | 4 |
| 33 | 720.065.600 | Seal, Check Valve Seat | 8 |
| 34 | 722.100.520 | Seat, Check Valve, PVDF..... | 4 |
| | 722.100.552 | Seat, Check Valve, Polypropylene | 4 |
| | 722.100.110 | Seat, Check Valve, Stainless Steel | 4 |
| 35 | 518.201.552 | Inline Suction Manifold (Polypropylene ONLY)..... | 1 |
| 36 | 518.202.552 | Inline Discharge Manifold (Polypropylene ONLY) | 1 |
| 37 | 618.058.552 | Plug, 1/2" Pipe (Inline Option Polypropylene ONLY)..... | 2 |

Service & Repair Kits

| | |
|--------------------|--|
| 476.219.000 | AIR END KIT Seals, O-Ring, Gaskets, Retaining Rings, Air Valve Assembly and Pilot Valve Assembly |
| 476.220.000 | AIR END KIT (Air Valve with Stroke Indicator Pin) Seals, O-Ring, Gaskets, Retaining Rings, Air Valve Assembly Pilot Valve Assembly |
| 476.401.360 | WET END KIT (For Polypropylene) Nitrile Diaphragms & Check Balls, Polypropylene Seats & PTFE Seals |
| 476.401.365 | WET END KIT (For Polypropylene) Neoprene Diaphragms & Check Balls, Polypropylene Seats & PTFE Seals |
| 476.401.354 | WET END KIT (For Polypropylene) Santoprene Diaphragms & Check Balls, Polypropylene Seats & PTFE Seals |
| 476.401.357 | WET END KIT (For Polypropylene) Polyurethane Diaphragms, Santoprene Check Balls, Polypropylene Seats and PTFE Seals |
| 476.401.654 | WET END KIT (For Polypropylene) Santoprene Diaphragms, PTFE Overlay, PTFE Check Balls, Polypropylene Seats & PTFE Seals |

| | |
|--------------------|---|
| 476.401.659 | WET END KIT (For Polypropylene) One-Piece Bonded PTFE/Nitrile Diaphragm, PTFE Balls, Polypropylene Seats. |
| 476.402.360 | WET END KIT (For PVDF) Nitrile Diaphragms & Check Balls, PVDF Seats & PTFE Seals |
| 476.402.365 | WET END KIT (For PVDF) Neoprene Diaphragms & Check Balls, PVDF Seats & PTFE Seals |
| 476.402.354 | WET END KIT (For PVDF) Santoprene Diaphragms & Check Balls, PVDF Seats & PTFE Seals |
| 476.402.357 | WET END KIT (For PVDF) Polyurethane Diaphragms, Santoprene Check Balls, PVDF Seats and PTFE Seals |
| 476.402.654 | WET END KIT (For PVDF) Santoprene Diaphragms, PTFE Overlay, PTFE Check Balls, Seats & PTFE Seals |
| 476.402.659 | WET END KIT (For PVDF) One-Piece Bonded PTFE/Nitrile Diaphragm, PTFE Balls, PVDF Seats.. |

Material Codes - The Last 3 Digits of Part Number

000.....Assembly, sub-assembly;
and some purchased items

010.....Cast Iron

015.....Ductile Iron

020.....Ferritic Malleable Iron

080.....Carbon Steel, AISI B-1112

110.....Alloy Type 316 Stainless Steel

111.....Alloy Type 316 Stainless Steel
(Electro Polished)

112.....Alloy C

113.....Alloy Type 316 Stainless Steel
(Hand Polished)

114.....303 Stainless Steel

115.....302/304 Stainless Steel

117.....440-C Stainless Steel (Martensitic)

120.....416 Stainless Steel
(Wrought Martensitic)

148.....Hardcoat Anodized Aluminum

150.....6061-T6 Aluminum

152.....2024-T4 Aluminum (2023-T351)

155.....356-T6 Aluminum

156.....356-T6 Aluminum

157.....Die Cast Aluminum Alloy #380

158.....Aluminum Alloy SR-319

162.....Brass, Yellow, Screw Machine Stock

165.....Cast Bronze, 85-5-5-5

166.....Bronze, SAE 660

170.....Bronze, Bearing Type,
Oil Impregnated

180.....Copper Alloy

305.....Carbon Steel, Black Epoxy Coated

306.....Carbon Steel, Black PTFE Coated

307.....Aluminum, Black Epoxy Coated

308.....Stainless Steel, Black PTFE Coated

309.....Aluminum, Black PTFE Coated

313.....Aluminum, White Epoxy Coated

330.....Zinc Plated Steel

332.....Aluminum, Electroless Nickel Plated

333.....Carbon Steel, Electroless
Nickel Plated

335.....Galvanized Steel

337.....Silver Plated Steel

351.....Food Grade Santoprene®

353.....Geolast; Color: Black

354.....Injection Molded #203-40
Santoprene® Duro 40D +/-5;
Color: RED

356.....Hytrel®

357.....Injection Molded Polyurethane

358.....Urethane Rubber
(Some Applications)
(Compression Mold)

359.....Urethane Rubber

360.....Nitrile Rubber Color coded: RED

363.....FKM (Fluorocarbon)
Color coded: YELLOW

364.....EPDM Rubber
Color coded: BLUE

365.....Neoprene Rubber
Color coded: GREEN

366.....Food Grade Nitrile

368.....Food Grade EPDM

371.....Philthane (Tuftane)

374.....Carboxylated Nitrile

375.....Fluorinated Nitrile

378.....High Density Polypropylene

379.....Conductive Nitrile

408.....Cork and Neoprene

425.....Compressed Fibre

426.....Blue Gard

440.....Vegetable Fibre

500.....Delrin® 500

502.....Conductive Acetal, ESD-800

503.....Conductive Acetal, Glass-Filled

506.....Delrin® 150

520.....Injection Molded PVDF
Natural color

540.....Nylon

542.....Nylon

544.....Nylon Injection Molded

550.....Polyethylene

551.....Glass Filled Polypropylene

552.....Unfilled Polypropylene

555.....Polyvinyl Chloride

556.....Black Vinyl

557.....Unfilled Conductive Polypropylene

558.....Conductive HDPE

559.....Glass Filled - Conductive Polypropylene

570.....Rulon II®

580.....Ryton®

600.....PTFE (virgin material)
Tetrafluorocarbon (TFE)

603.....Blue Gylon®

604.....PTFE

606.....PTFE

607.....Envelon

608.....Conductive PTFE

610.....PTFE Encapsulated Silicon

611.....PTFE Encapsulated FKM

632.....Neoprene/Hytrel®

633.....FKM/PTFE

634.....EPDM/PTFE

635.....Neoprene/PTFE

637.....PTFE, FKM/PTFE

638.....PTFE, Hytrel®/PTFE

639.....Nitrile/TFE

643.....Santoprene®/EPDM

644.....Santoprene®/PTFE

656.....Santoprene® Diaphragm and
Check Balls/EPDM Seats

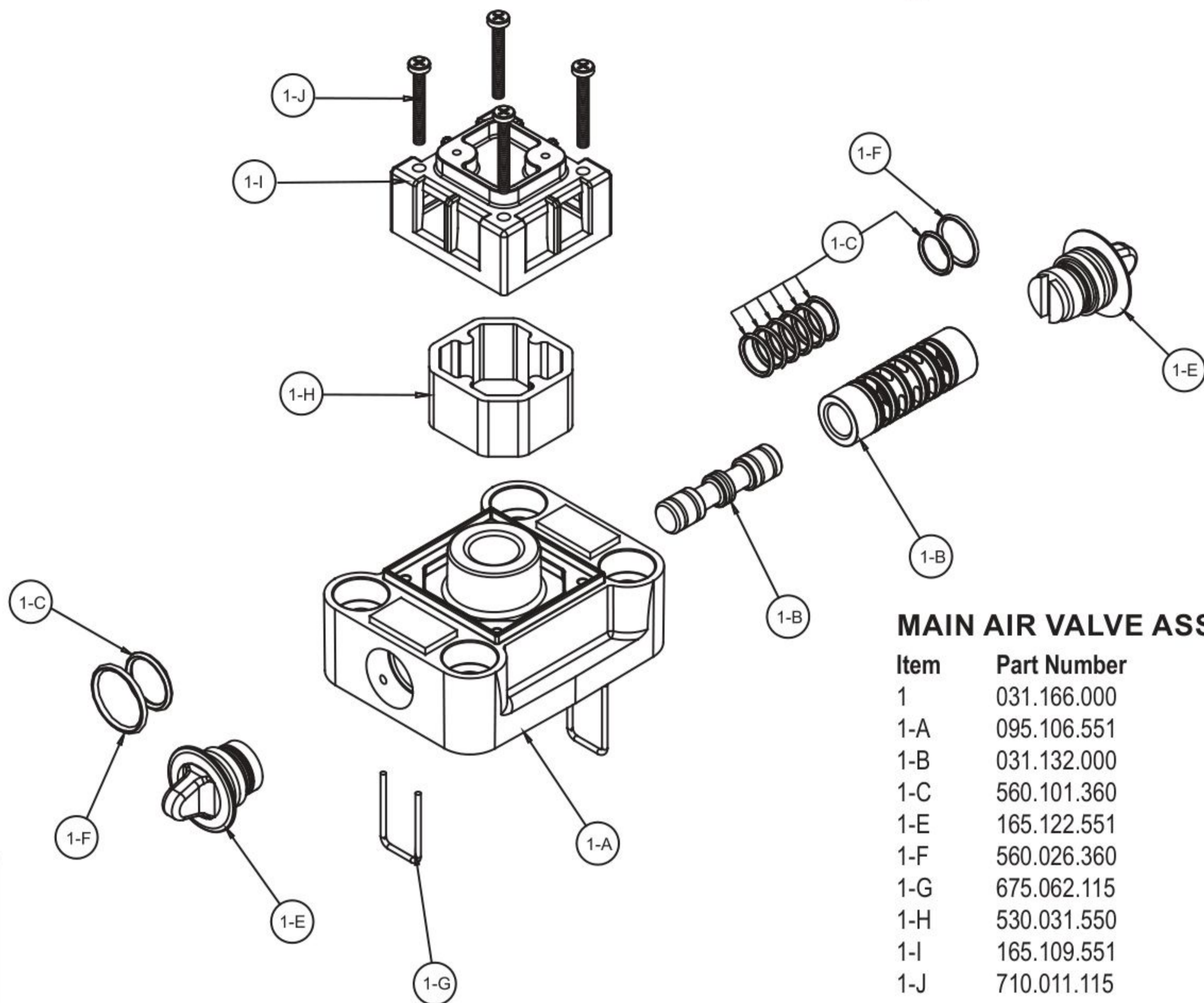
661.....EPDM/Santoprene®

666.....FDA Nitrile Diaphragm,
PTFE Overlay, Balls, and Seals

668.....PTFE, FDA Santoprene®/PTFE

- Delrin and Hytrel are registered tradenames of E.I. DuPont.
- Nylatron is a registered tradename of Polymer Corp.
- Gylon is a registered tradename of Garlock, Inc.
- Santoprene is a registered tradename of Exxon Mobil Corp.
- Rulon II is a registered tradename of Dixon Industries Corp.
- Ryton is a registered tradename of Phillips Chemical Co.
- Valox is a registered tradename of General Electric Co.

Air Distribution Valve Assembly



MAIN AIR VALVE ASSEMBLY PARTS LIST

| Item | Part Number | Description | Qty |
|------|-------------|----------------------|-----|
| 1 | 031.166.000 | Air Valve Assembly | 1 |
| 1-A | 095.106.551 | Body, Air Valve | 1 |
| 1-B | 031.132.000 | Sleeve and Spool Set | 1 |
| 1-C | 560.101.360 | O-Ring | 8 |
| 1-E | 165.122.551 | End Cap | 2 |
| 1-F | 560.026.360 | O-Ring | 2 |
| 1-G | 675.062.115 | End Cap Retainer | 2 |
| 1-H | 530.031.550 | Muffler | 1 |
| 1-I | 165.109.551 | Muffler Cap | 1 |
| 1-J | 710.011.115 | Self-Tapping Screw | 4 |

For Pumps with Virgin PTFE coated hardware:

| | | | |
|-----|-------------|--------------------|---|
| 1 | 031.166.002 | Air Valve Assembly | 1 |
| 1-G | 675.062.308 | End Cap Retainer | 2 |
| 1-J | 710.011.308 | Self Tapping Screw | 4 |

(Includes all other items used on 031.166.000 above)

For Pumps w/ alternate Mesh, Sound Dampening or Piped Exhaust:

| | | | |
|---|-------------|--------------------|---|
| 1 | 031.168.000 | Air Valve Assembly | 1 |
|---|-------------|--------------------|---|

(Includes all items used on 031.166.000 above minus 1.H, 1.I and 1.J)

MAIN AIR VALVE ASSEMBLY PARTS LIST

| Item | Part Number | Description | Qty |
|------|-------------|----------------------|-----|
| 1 | 031.166.003 | Air Valve Assembly | 1 |
| 1-A | 095.106.559 | Body, Air Valve | 1 |
| 1-B | 031.132.000 | Sleeve and Spool Set | 1 |
| 1-C | 560.101.360 | O-Ring | 8 |
| 1-E | 165.122.551 | End Cap | 2 |
| 1-F | 560.026.360 | O-Ring | 2 |
| 1-G | 675.062.115 | End Cap Retainer | 2 |
| 1-H | 530.031.550 | Muffler | 1 |
| 1-I | 165.109.559 | Muffler Cap | 1 |
| 1-J | 710.011.115 | Self-Tapping Screw | 4 |

For Pumps with alternate Mesh Muffler or Piped Exhaust:

| | | | |
|---|-------------|--------------------|---|
| 1 | 031.168.002 | Air Valve Assembly | 1 |
|---|-------------|--------------------|---|

(Includes all items used on 031.166.003 above minus 1.H, 1.I and 1.J)

For pumps with High Temperature Options:

| | | | |
|-----|-------------|----------------------|---|
| 1 | 031.194.000 | Air Valve Assembly | 1 |
| 1-B | 031.175.000 | Sleeve and Spool Set | 1 |

(Includes all the other items on 031.168.000 above)

| | | | |
|---|-------------|----------------------|---|
| 1 | 031.195.000 | Air Valve Assembly | 1 |
| 1 | 031.175.000 | Sleeve and Spool Set | 1 |

(Includes on other items on 031.166.000 above)

Air Distribution Valve Servicing

See repair parts drawing, remove screws.

Step 1: Remove end cap retainer (1-G).

Step 2: Remove end cap (1-E).

Step 3: Remove spool part of (1-B) (caution: do not scratch).

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

Step 5: Inspect O-Rings (1-C) and replace if necessary.

Step 6: Lightly lubricate O-Rings (1-C) on sleeve (1-B).

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

Step 8: Reassemble in reverse order, starting with step 3.

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

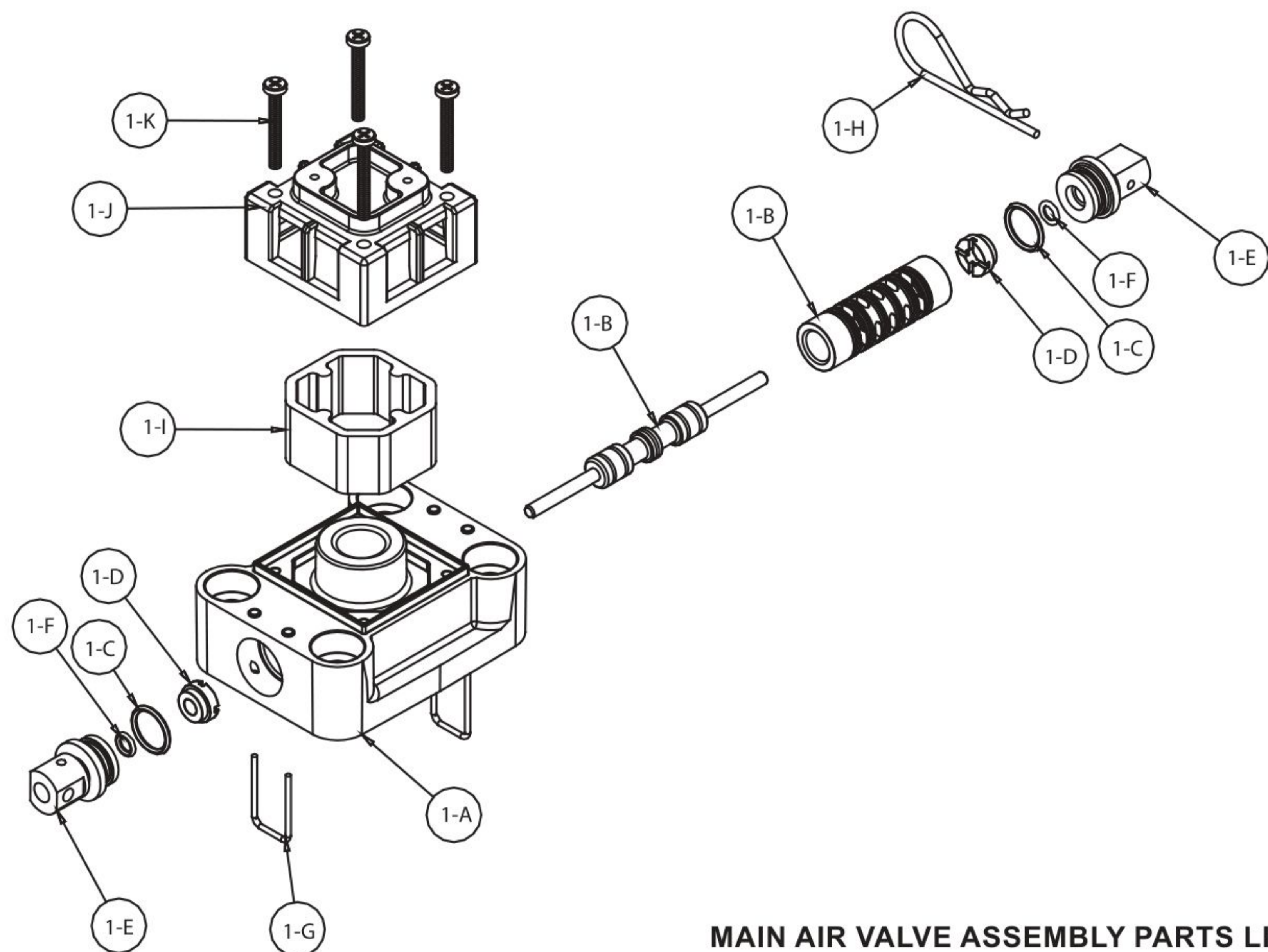
IMPORTANT



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 with Stroke Indicator Assembly

Parts List



Air Distribution Valve Servicing

See repair parts drawing, remove screws.

Step 1: Remove end cap retainer (1-G).

Step 2: Remove end cap (1-E), bumper (1-D).

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

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

Step 5: Inspect O-Rings (1-C) and replace if necessary.

Step 6: Lightly lubricate O-Rings (1-C) on sleeve (1-B).

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

Step 8: Reassemble in reverse order.

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

MAIN AIR VALVE ASSEMBLY PARTS LIST

| Item | Part Number | Description | Qty |
|------|-------------|----------------------|-----|
| ⚠ 1 | 031.167.000 | Air Valve Assembly | 1 |
| 1-A | 095.106.559 | Body, Air Valve | 1 |
| 1-B | 031.134.000 | Sleeve and Spool Set | 1 |
| 1-C | 560.101.360 | O-Ring | 8 |
| 1-D | 132.030.552 | Bumper | 2 |
| 1-E | 165.123.147 | End Cap | 2 |
| 1-F | 560.029.360 | O-Ring | 2 |
| 1-G | 675.062.115 | End Cap Retainer | 2 |
| 1-H | 210.008.330 | Safety Clip | 1 |
| 1-I | 530.031.550 | Muffler | 1 |
| 1-J | 165.109.559 | Muffler Cap | 1 |
| 1-K | 710.011.115 | Self-Tapping Screw | 4 |

For Pumps with Virgin PTFE coated hardware:

| | | | |
|-----|-------------|--------------------|---|
| 1 | 031.167.002 | Air Valve Assembly | 1 |
| 1-G | 675.062.308 | End Cap Retainer | 2 |
| 1-J | 710.011.308 | Self Tapping Screw | 4 |

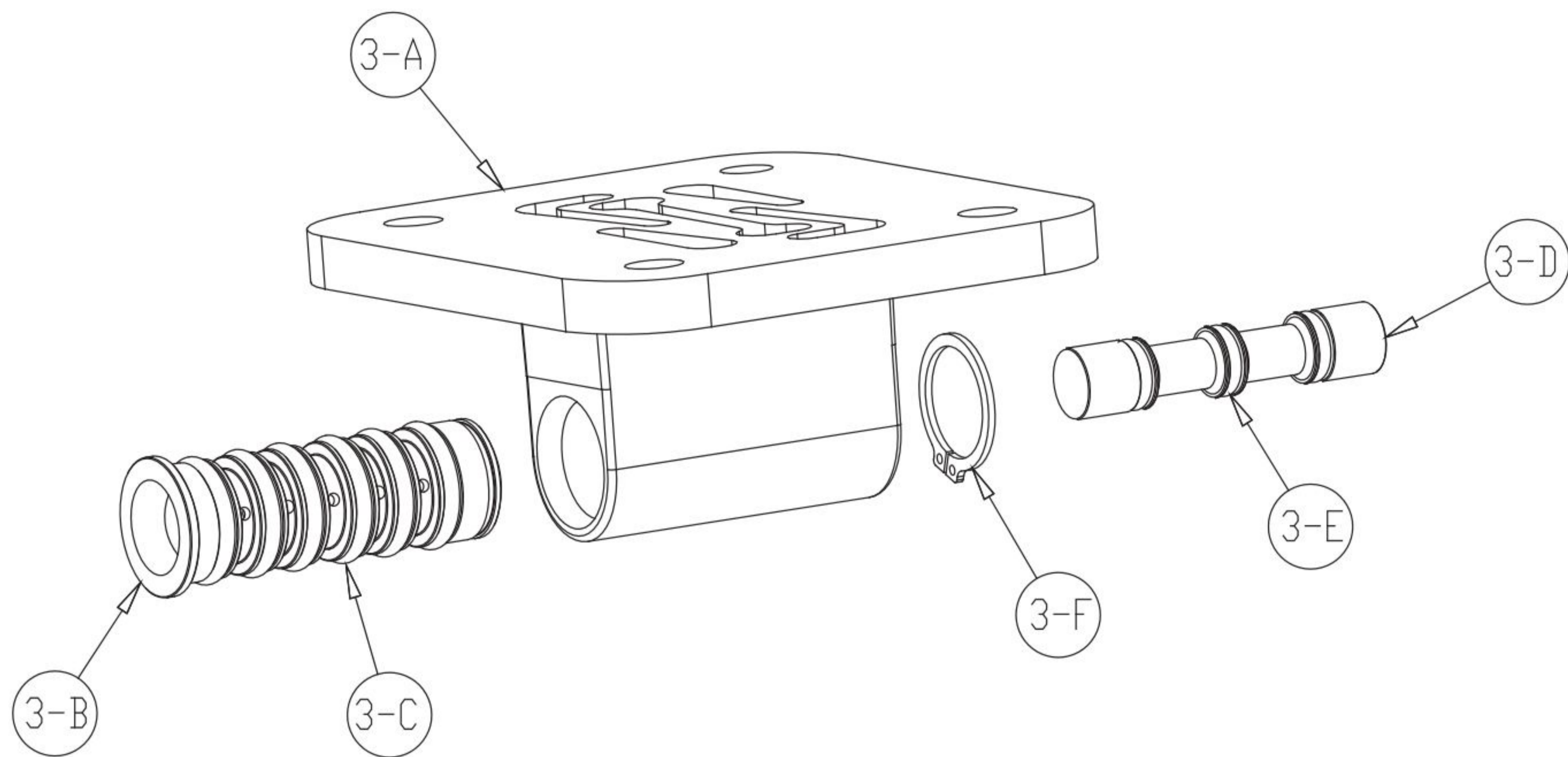
(Includes all other items used on 031.166.000 above)

For Pumps with alternate Mesh Muffler or Piped Exhaust:

| | | | |
|-----|-------------|--------------------|---|
| ⚠ 1 | 031.169.000 | Air Valve Assembly | 1 |
|-----|-------------|--------------------|---|

(Includes all items used on 031.167.000 above minus 1.H, 1.I and 1.J)

Pilot Valve Servicing, Assembly Drawing & Parts List



4: AIR END

Pilot Valve Servicing

With Pilot Valve removed from pump.

Step 1: Remove snap ring (3-F).

Step 2: Remove sleeve (3-B), inspect O-Rings (3-C), replace if required.

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


Step 4: Lightly lubricate O-Rings (3-C) and (3-E).

Reassemble in reverse order.

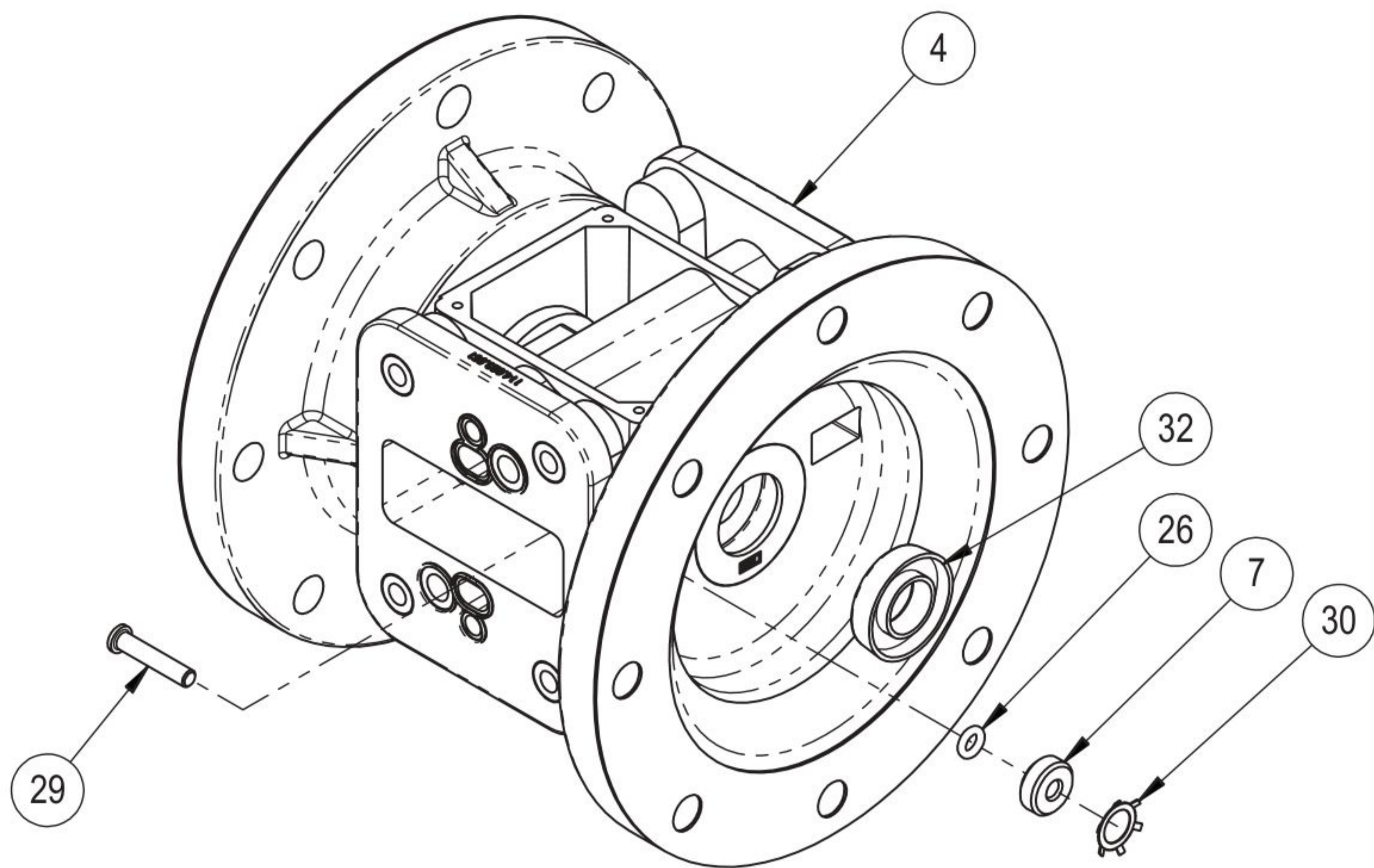
PILOT VALVE ASSEMBLY PARTS LIST

| Item | Part Number | Description | Qty |
|------|-------------|-----------------------|-----|
| 3 | 095.091.000 | Pilot Valve Assembly | 1 |
| 3-A | 095.087.551 | Valve Body | 1 |
| 3-B | 755.051.000 | Sleeve (With O-Rings) | 1 |
| 3-C | 560.033.360 | O-Ring (Sleeve) | 6 |
| 3-D | 775.055.000 | Spool (With O-Rings) | 1 |
| 3-E | 560.023.360 | O-Ring (Spool) | 3 |
| 3-F | 675.037.080 | Retaining Ring | 1 |

PILOT VALVE ASSEMBLY PARTS LIST

| Item | Part Number | Description | Qty |
|---|-------------|-----------------------|-----|
|  3 | 095.091.001 | Pilot Valve Assembly | 1 |
| 3-A | 095.087.558 | Pilot Valve Body | 1 |
| 3-B | 755.051.000 | Sleeve (With O-Rings) | 1 |
| 3-C | 560.033.360 | O-Ring (Sleeve) | 6 |
| 3-D | 775.055.000 | Spool (With O-Rings) | 1 |
| 3-E | 560.023.360 | O-Ring (Spool) | 3 |
| 3-F | 675.037.080 | Retaining Ring | 1 |

Intermediate Assembly Drawing




Intermediate Assembly Drawing

- Step 1:** Remove plunger, actuator (29) from center of intermediate pilot valve cavity.
- Step 2:** Remove Ring, Retaining (30), discard.
- Step 3:** Remove bushing, plunger (7), inspect for wear and replace if necessary with genuine parts.
- Step 4:** Remove O-Ring (26), inspect for wear and replace if necessary with genuine parts.
- Step 5:** Lightly lubricate O-Ring (26) and insert into intermediate.
- Step 6:** Reassemble in reverse order.
- Step 7:** Remove Seal, Diaphragm Rod (32).
- Step 8:** Clean seal area, lightly lubricate and install new Seal, Diaphragm Rod (32).

INTERMEDIATE REPAIR PARTS LIST

| Item | Part Number | Description | Qty |
|------|-------------|-----------------------|-----|
| 4 | 114.023.551 | Bracket, Intermediate | 1 |
| | 114.023.559 | Bracket, Intermediate | 1 |
| 7 | 135.036.506 | Bushing, Plunger | 2 |
| 26 | 560.001.360 | O-Ring | 2 |
| 29 | 620.019.115 | Plunger, Actuator | 2 |
| 30 | 675.042.115 | Ring, Retaining* | 2 |
| 32 | 720.012.360 | Seal, Diaphragm Rod | 2 |

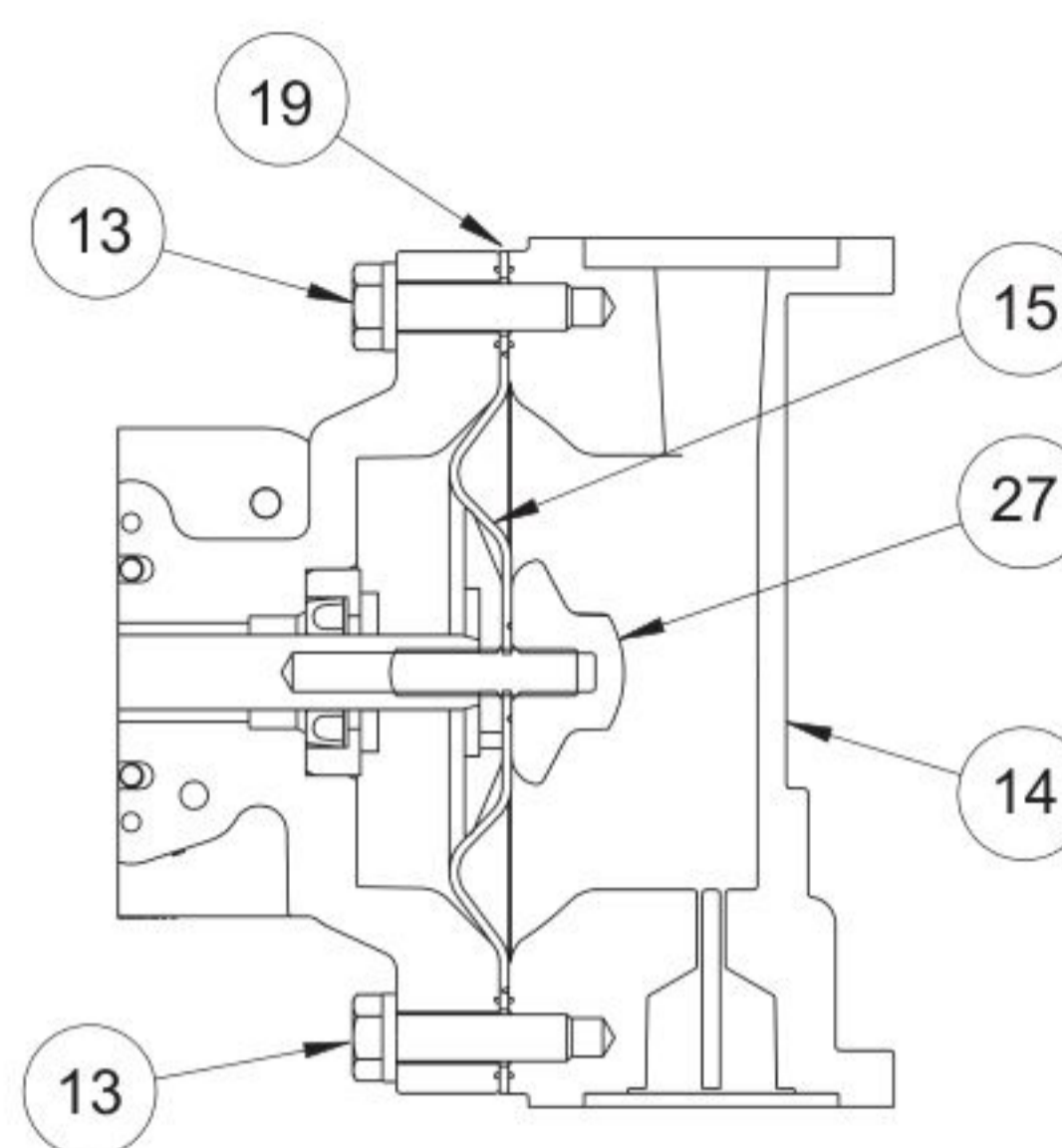
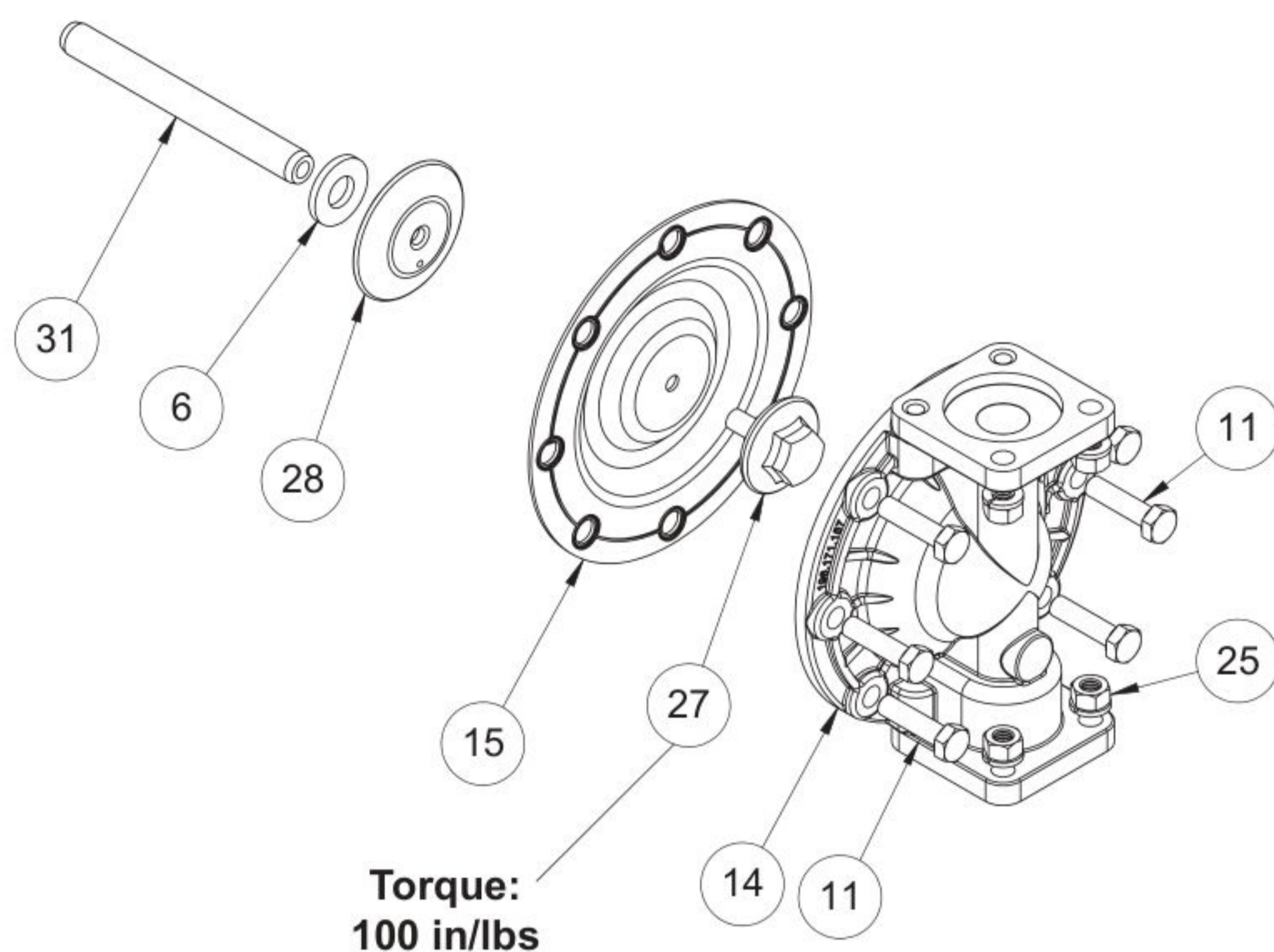
***Note:** It is recommended that when plunger components are serviced, new retaining rings be installed.



IMPORTANT

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. In the event of a diaphragm failure a complete rebuild of the center section is recommended.

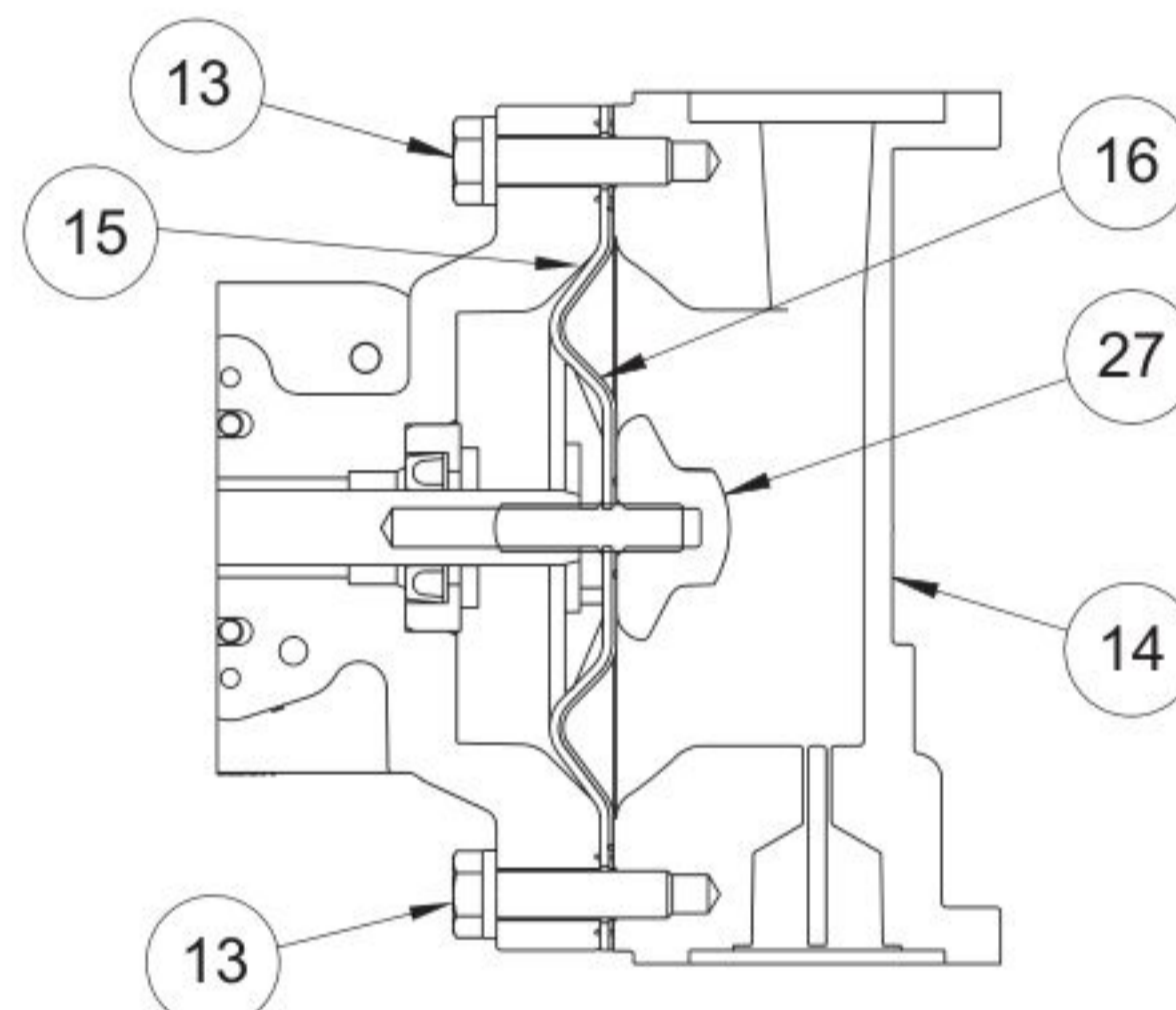
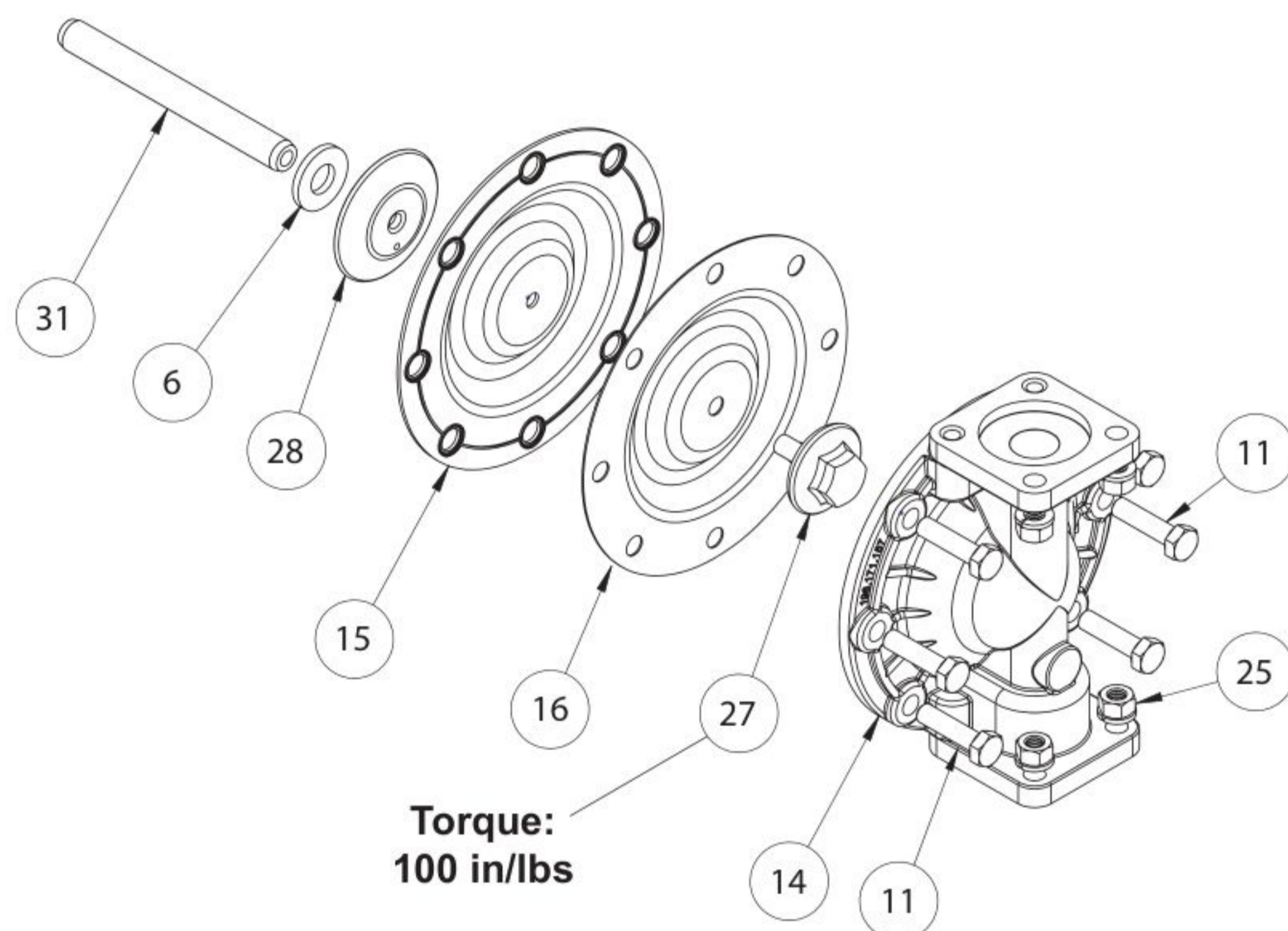
Diaphragm Service Drawing



Diaphragm Orientation

Install diaphragm and spacer as shown above.

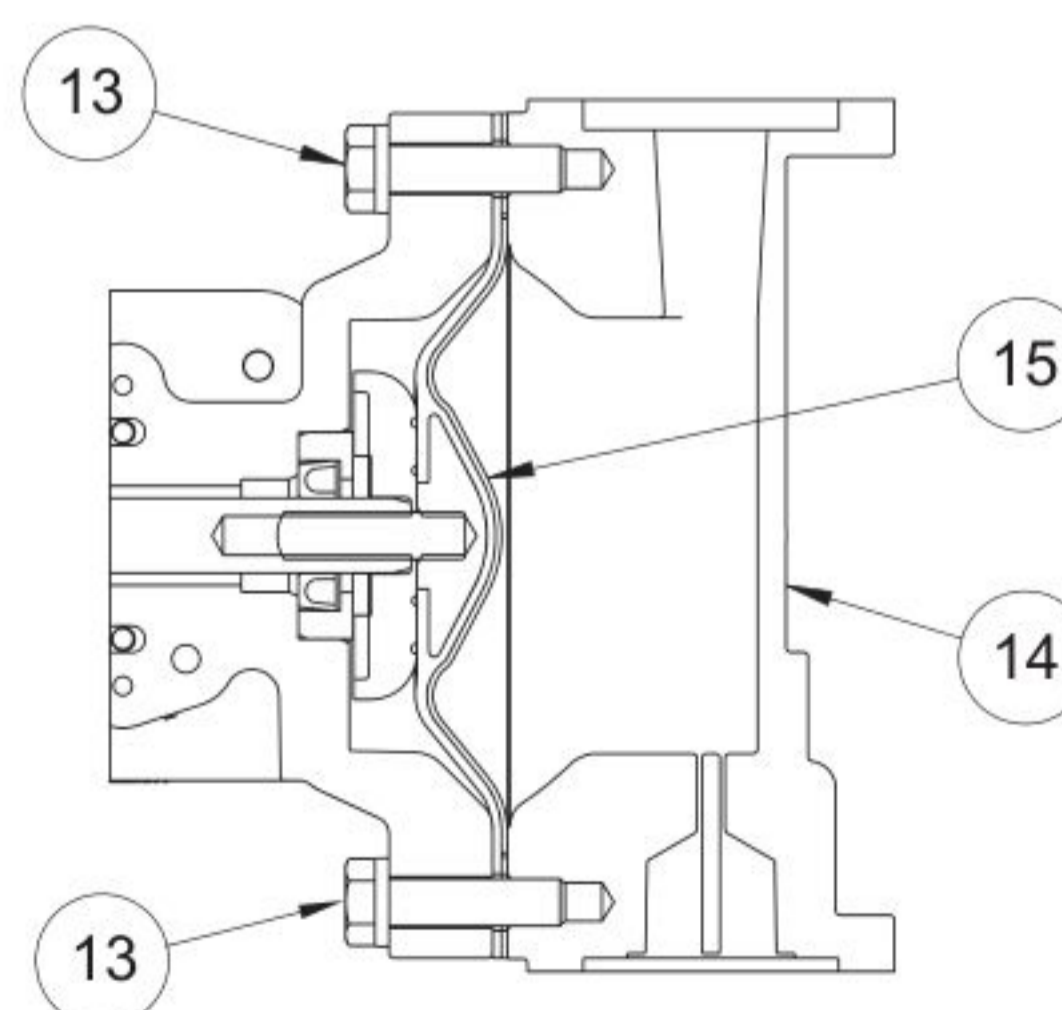
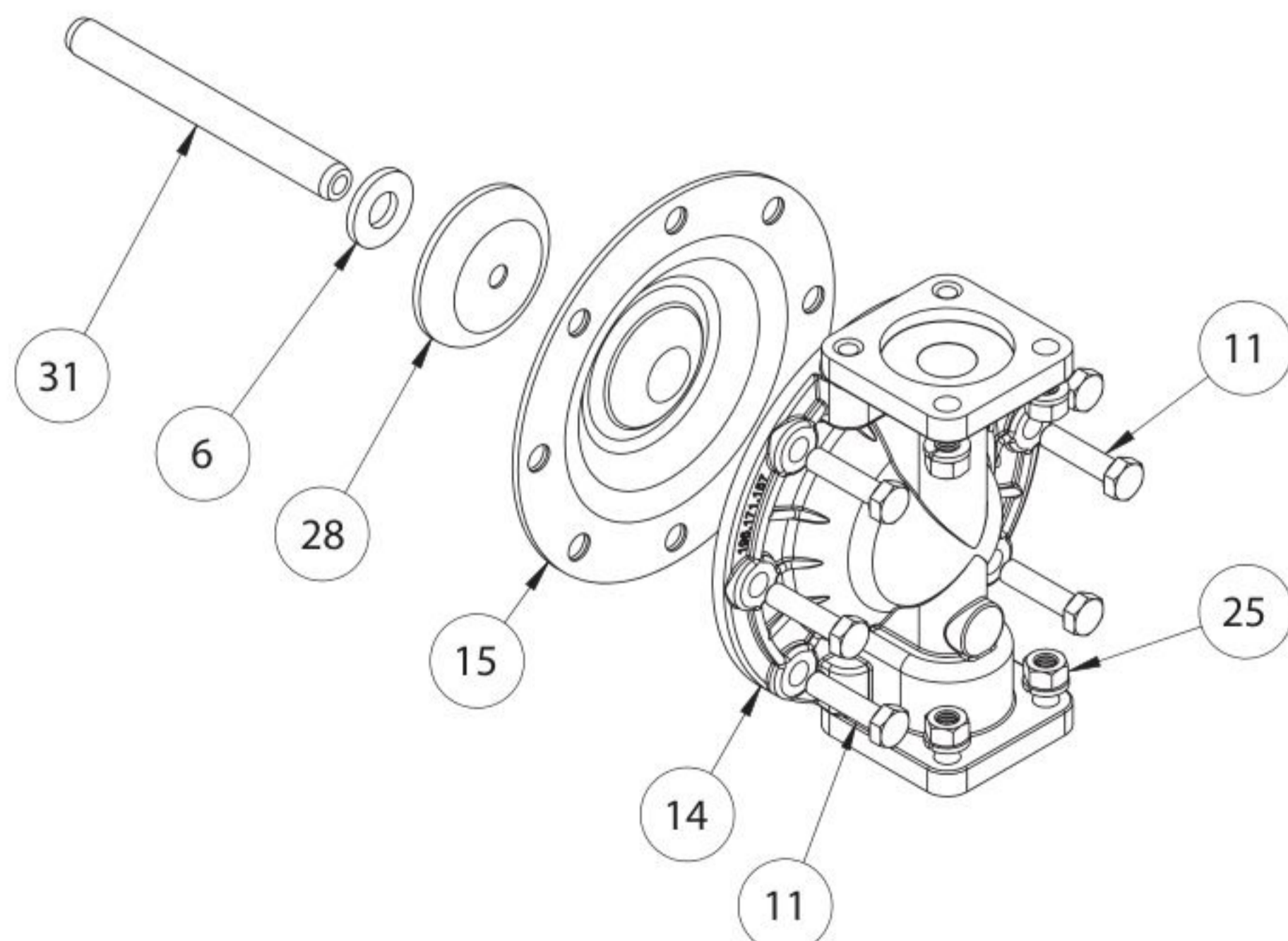
Diaphragm Service Drawing - with Overlay



Diaphragm Orientation

Install diaphragm and spacer as shown above.

Diaphragm Service Drawing - with One-Piece Bonded



Diaphragm Orientation

Install diaphragm as shown above.

Diaphragm Servicing

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

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

Always inspect diaphragms for wear cracks or chemical attack. Inspect inner and outer plates for deformities, rust scale and wear. Inspect intermediate bearings for elongation and wear. Inspect diaphragm rod for wear or marks.

Clean or repair if appropriate. Replace as required.

Step 2: Reassembly: There are two different types of diaphragm plate assemblies utilized throughout the FTA PUMP product line: Outer plate with a threaded stud, diaphragm, and a threaded inner plate.

Outer plate with a threaded stud, diaphragm, and an inner plate with through hole. Secure threaded inner plate in a vice. Ensure that the plates are being installed with the outer radius against the diaphragm.

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

Step 4: Push the threaded outer diaphragm plate through the center hole of the diaphragm. **Note:** Most diaphragms are installed with the natural bulge out towards the fluid side. F05, F07, and F10 non-metallic units are installed with the natural bulge in towards the air side.

Step 5: Thread or place, outer plate stud into the inner plate. For threaded inner plates use a torque wrench to tighten the assembly together. Torque values are called out on the exploded view.

Repeat procedure for second side assembly. Allow a minimum of 15 minutes to elapse after torquing then re-torque the assembly to compensate for stress relaxation in the clamped assembly.

Step 6: Thread one assembly onto the diaphragm rod with sealing washer (when used) and bumper.

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

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

Step 9: Complete assembly of entire unit.
One Piece Diaphragm Servicing (Bonded PTFE with integral plate) The One Piece diaphragm has a threaded stud installed in the integral plate at the factory. The inner diaphragm plate has a through hole instead of a threaded hole. Place the inner plate over the diaphragm stud and thread the first diaphragm / inner plate onto the diaphragm rod only until the inner plate contacts the rod. Do not tighten. A small amount of grease may be applied between the inner plate and the diaphragm to facilitate assembly. Insert the diaphragm / rod assembly into the pump and install the outer chamber. Turn the pump over and thread the second diaphragm / inner plate onto the diaphragm rod. Turn the diaphragm until the inner plate contacts the rod and hand tighten the assembly. Continue tightening until the bolt holes align with the inner chamber holes. **DO NOT LEAVE THE ASSEMBLY LOOSE.**

IMPORTANT



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

Dual Port Option Drawing

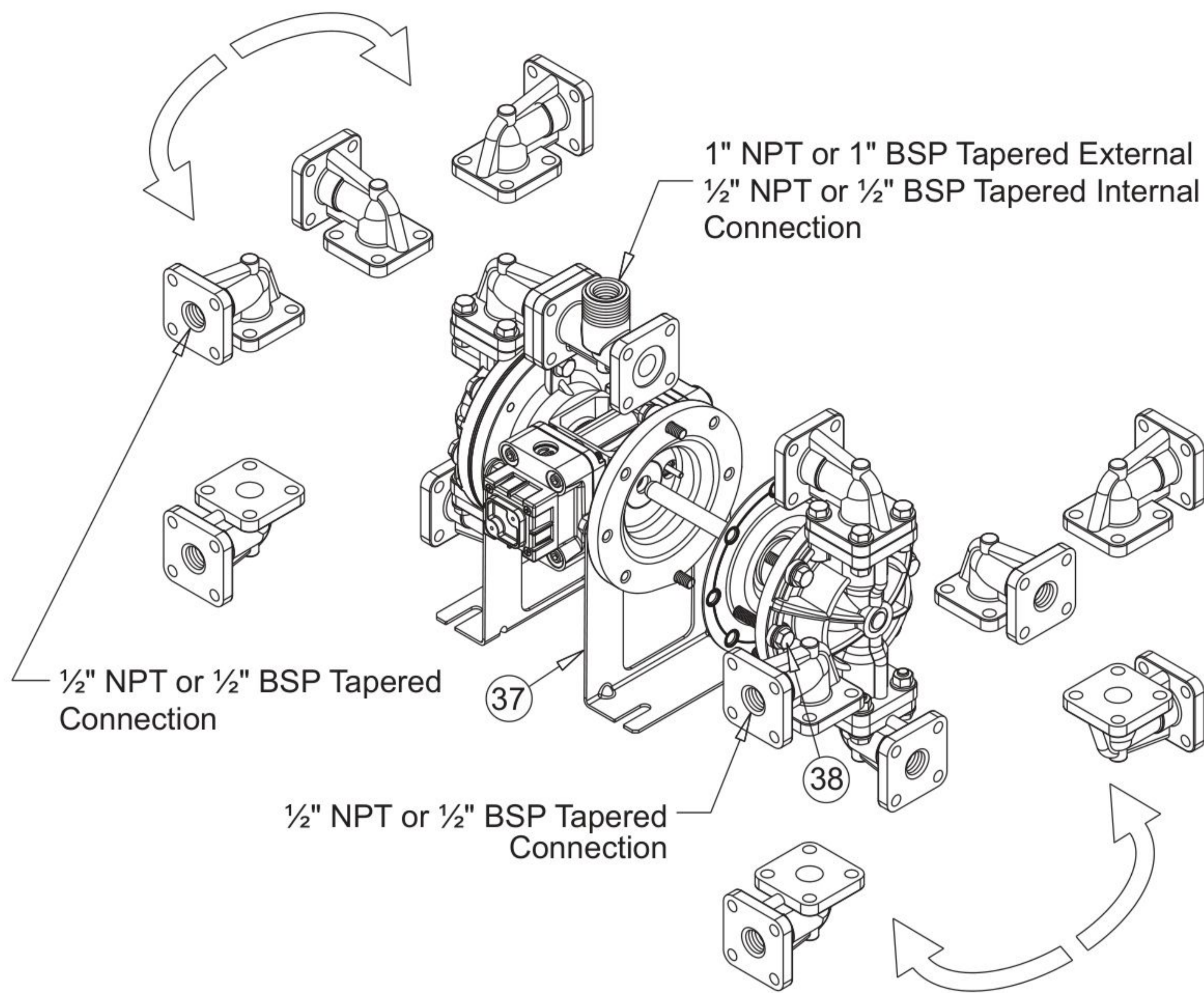


Illustration for Dual Port Suction and Single or Dual Port Discharge

*Dual suction/dual discharge = no manifold.

DUAL PORT SUCTION AND/OR DUAL PORT DISCHARGE REPAIR PARTS LIST

| Item | Part Number | Description | Qty |
|------|----------------|---|-----|
| 10* | 171.063.115 | Capscrew, Flanged 5/16-18 x 1.25 | 8 |
| | 171.063.308 | Capscrew, Flanged 5/16-18 x 1.25 | 8 |
| 11* | 171.064.115 | Capscrew, Flanged HD 5/16-18 X 1.50 | 4 |
| | 171.064.308 | Capscrew, Flanged HD 5/16-18 X 1.50 | 4 |
| 17 | ⚠ 312.106.520N | Elbow, 1/2" NPT (replaces 312.106.520) | 2 |
| | 312.106.521N | Elbow, 1/2" NPT (replaces 312.106.521) | 2 |
| | 312.106.542N | Elbow, 1/2" NPT (replaces 312.106.542) | 2 |
| | ⚠ 312.106.552N | Elbow, 1/2" NPT (replaces 312.106.552) | 2 |
| | 312.106.557N | Elbow, 1/2" NPT (replaces 312.106.557) | 2 |
| 18 | ⚠ 312.112.520N | Elbow, 1/2" NPT (replaces 312.112.520) | 2 |
| | 312.112.521N | Elbow, 1/2" NPT (replaces 312.112.521) | 2 |
| | 312.112.542N | Elbow, 1/2" NPT (replaces 312.112.542) | 2 |
| | ⚠ 312.112.552N | Elbow, 1/2" NPT (replaces 312.112.552) | 2 |
| | 312.112.557N | Elbow, 1/2" NPT (replaces 312.112.557) | 2 |
| 25* | 544.005.115 | Nut, Flanged 5/16-18 | 20 |
| | 544.005.308 | Nut, Flanged 5/16-18 | 20 |
| 37 | 115.144.115 | Bracket, Free Standing (replaces 115.140.115) | 2 |
| | 115.144.306 | Bracket, Free Standing (replaces 115.140.115) | 2 |
| 38 | 171.068.115 | Capscrew, Flanged 5/16-18 X 1.75 | 8 |
| | 171.068.308 | Capscrew, Flanged 5/16-18 X 1.75 | 8 |

*Hardware quantities are variable based on porting configurations

 **ATEX Compliant**

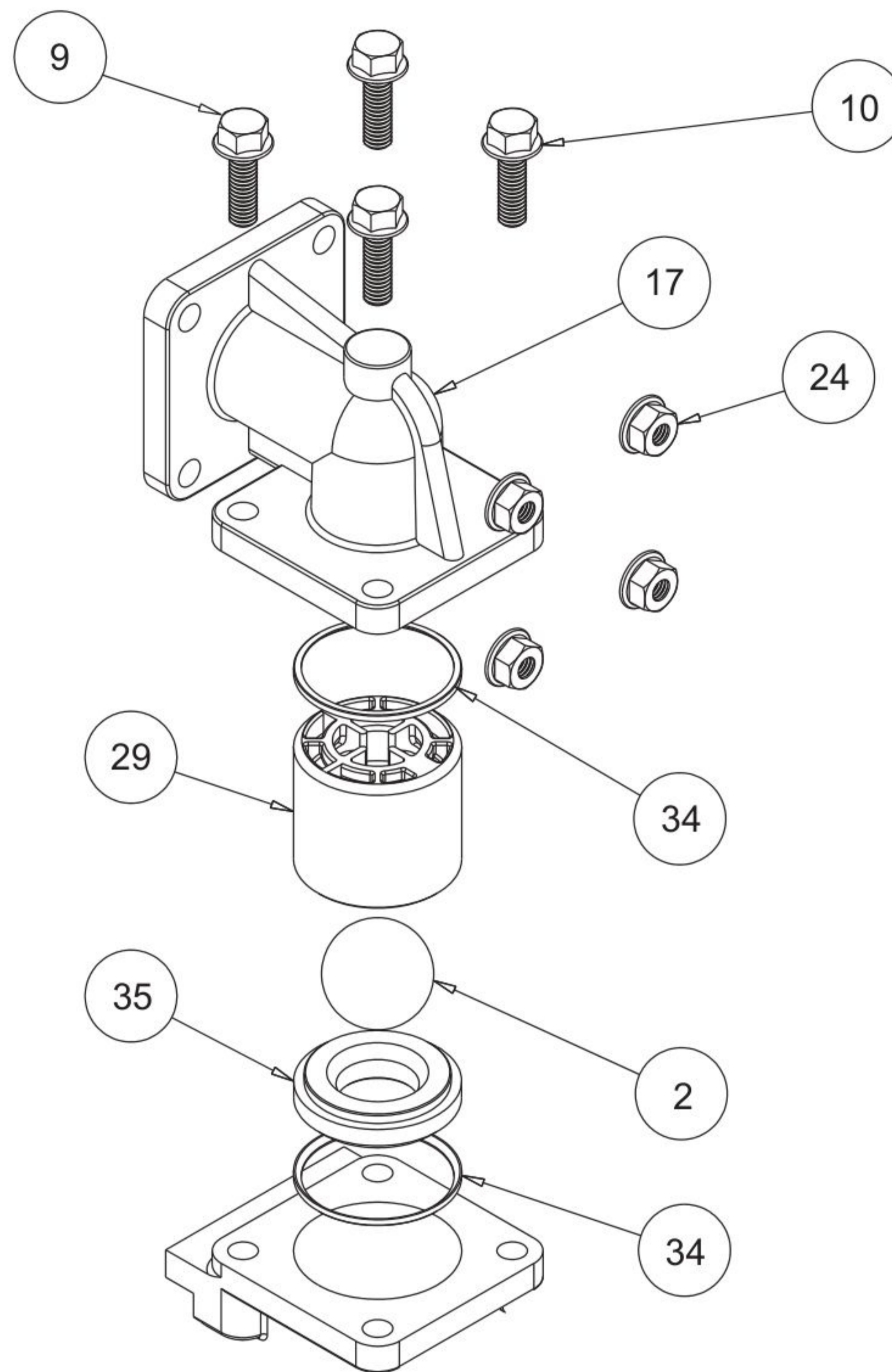
IMPORTANT



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.

6: OPTIONAL

Modular Check Valve Drawing



MODULAR CHECK BALL 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 17 from pump composite repair parts drawing). Use a 1/2" 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 34). 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 29) 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 35) 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 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 check valve seal (item 34). Inspect the seal for cuts or pinched areas. Replace seal as needed.

RE-ASSEMBLE THE MODULAR CHECK VALVES.

Place a check valve seal (item 34) 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 34). Make sure the chamfer side of the seals face the chamfer on the check valve seat or retainer.

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