

# SERVICE & OPERATING MANUAL

## Original Instructions

### Certified Quality



ISO 9001 Certified  
ISO 14001 Certified



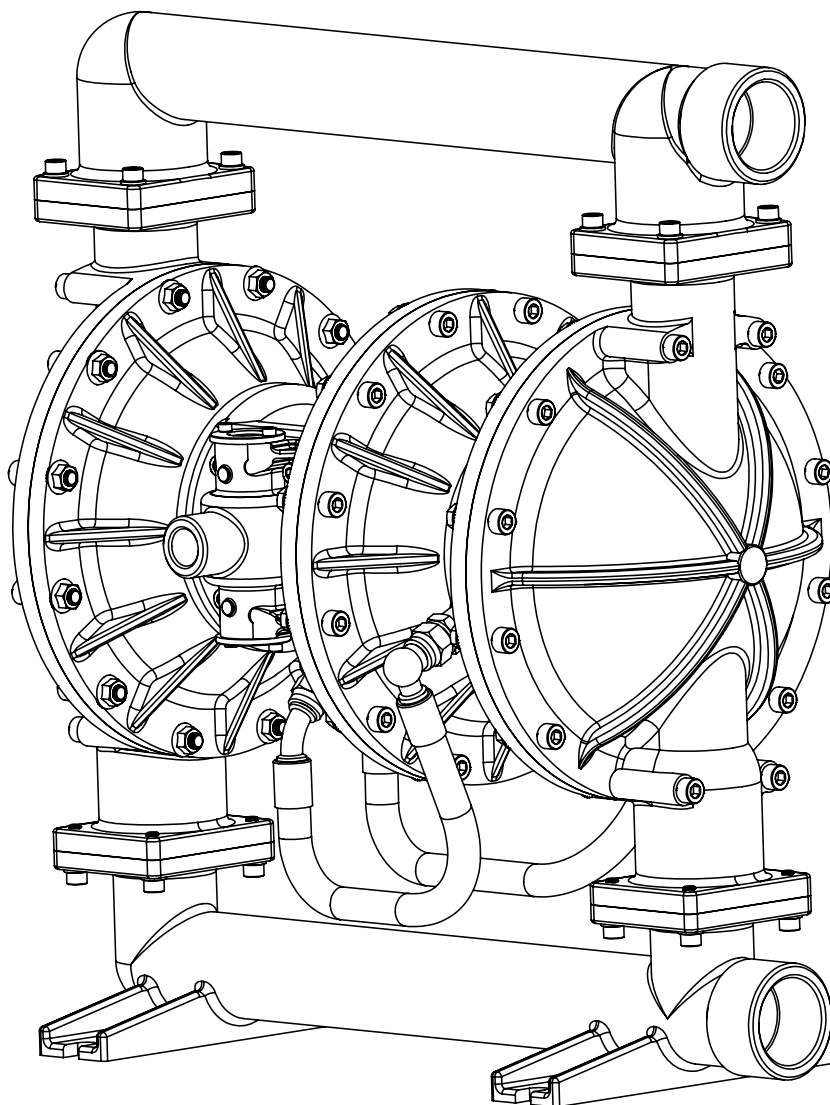
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## Model HP20

### Metallic - High Pressure Design Level 1



1: PUMP SPECS

2: INSTAL & OP

3: EXP VIEW

4: AIR END

5: WET END

6: OPTIONAL

7: WARRANTY

**SANDPIPER®**  
A WARREN RUPP, INC. BRAND

SANDPIPERPUMP.COM

# 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

The use of non-OEM replacement parts will void (or negate) agency certifications, including CE, ATEX, CSA, 3A and EC1935 compliance (Food Contact Materials). Warren Rupp, Inc. cannot ensure nor warrant non-OEM parts to meet the stringent requirements of the certifying agencies.

## ! 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] <sup>1</sup> | 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        |                                  |

<sup>1</sup>Per 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                 |

<sup>2</sup>ATEX 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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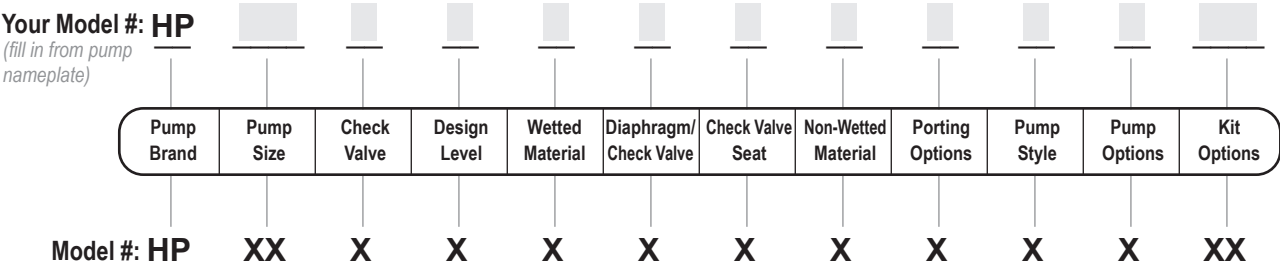
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# Explanation of Pump Nomenclature




- Pump Brand**  
HP SANDPIPER® High Pressure
- Pump Size**  
20 2"
- Check Valve Type**  
B Ball  
W Weighted Ball
- Design Level**  
1 Design Level
- Wetted Material**  
A Aluminum  
S Stainless Steel
- Diaphragm/Check Valve Materials**  
B Nitrile/Nitrile  
M Santoprene / PTFE  
N Neoprene/Neoprene  
T Neoprene-PTFE / PTFE

- Check Valve Seat**  
S Stainless Steel
- Non-Wetted Material Options**  
A Painted Aluminum
- Porting Options**  
N NPT Threads  
B BSP (Tapered) Threads
- Pump Style**  
I Inline Manifold
- Pump Options**  
6 Metal Muffler
- Kit Options**  
00. None



FM  
APPROVED


IEC EEX m T4



**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)* \_\_\_\_\_

## ATEX Detail

|  | ATEX Details   | Wetted Material Options | Non-Wetted Material Options | Pump Options | Kit Options |
|---|--|-------------------------|-----------------------------|--------------|-------------|
|   | II 2 G Ex h IIC T5...225°C (T2) Gb<br>II 2 D Ex h IIC T100°C...T200°C Db | A, S                    | A                           | 6            | 00          |

# Performance

## HP20 HIGH PRESSURE

### SUCTION/DISCHARGE PORT SIZE

- 2" NPT (internal)
- 2" BSP Tapered (internal)

### CAPACITY

- 0 to 92 gallons per minute  
(0 to 348 liters per minute)

### AIR DISTRIBUTION VALVE

- No-lube, no-stall design

### SOLIDS-HANDLING

- Up to .25 in. (6mm)

### HEADS UP TO

- 232 PSI (535 ft)  
16.0 BAR (163 meters)

### DISPLACEMENT/STROKE

- .51 Gallon / 1.9 liter

### MAXIMUM OPERATING PRESSURE

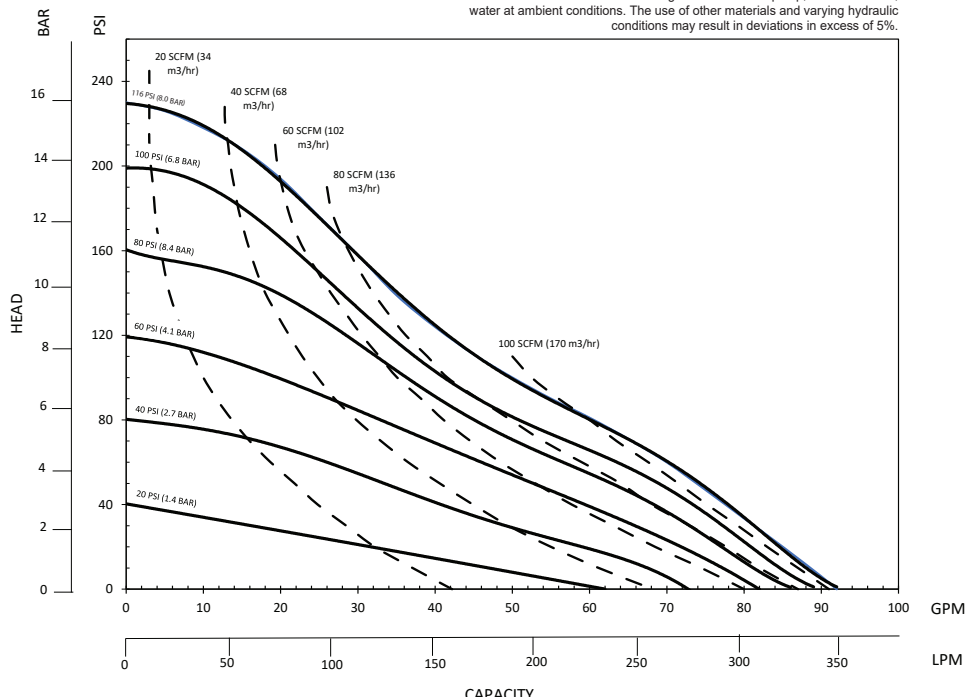
- 116 PSI (8.0 BAR)

### SHIPPING WEIGHT

- Aluminum 113.5 lbs. (51.5kg)
- Stainless Steel 165.3 lbs. (75kg)

## MODEL HP20 Performance Curve

Performance based on the following: elastomer fitted pump, flooded suction, water at ambient conditions. The use of other materials and varying hydraulic conditions may result in deviations in excess of 5%.



## Materials

### Material Profile:

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

### Operating Temperatures:

Max. Min.

**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(21°C)) 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.

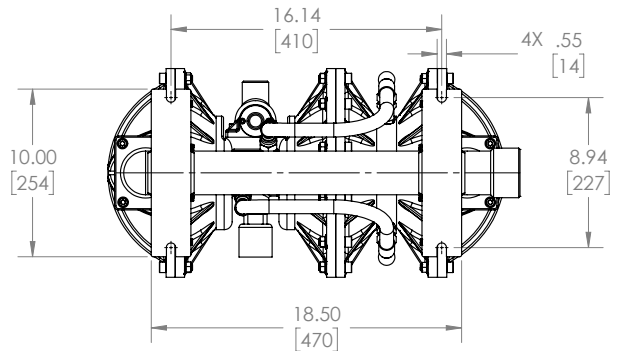
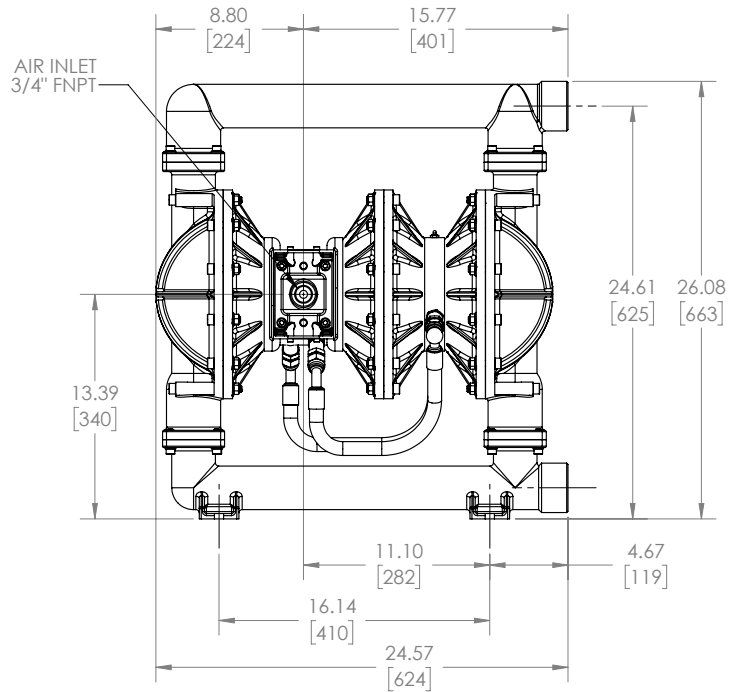
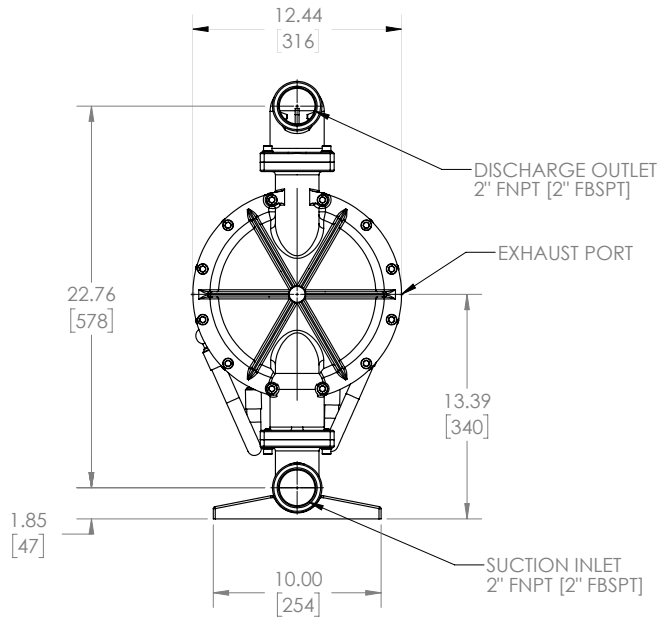
For specific applications, always consult the Chemical Resistance Chart.

# Dimensional Drawings

## HP20 High Pressure - Aluminum Model

Dimensions in inches (mm dimensions in brackets). Dimensional Tolerance:  $\pm 1/8"$  ( $\pm 3\text{mm}$ )

The dimensions on this drawing are for reference only. A certified drawing can be requested if physical dimensions are needed.



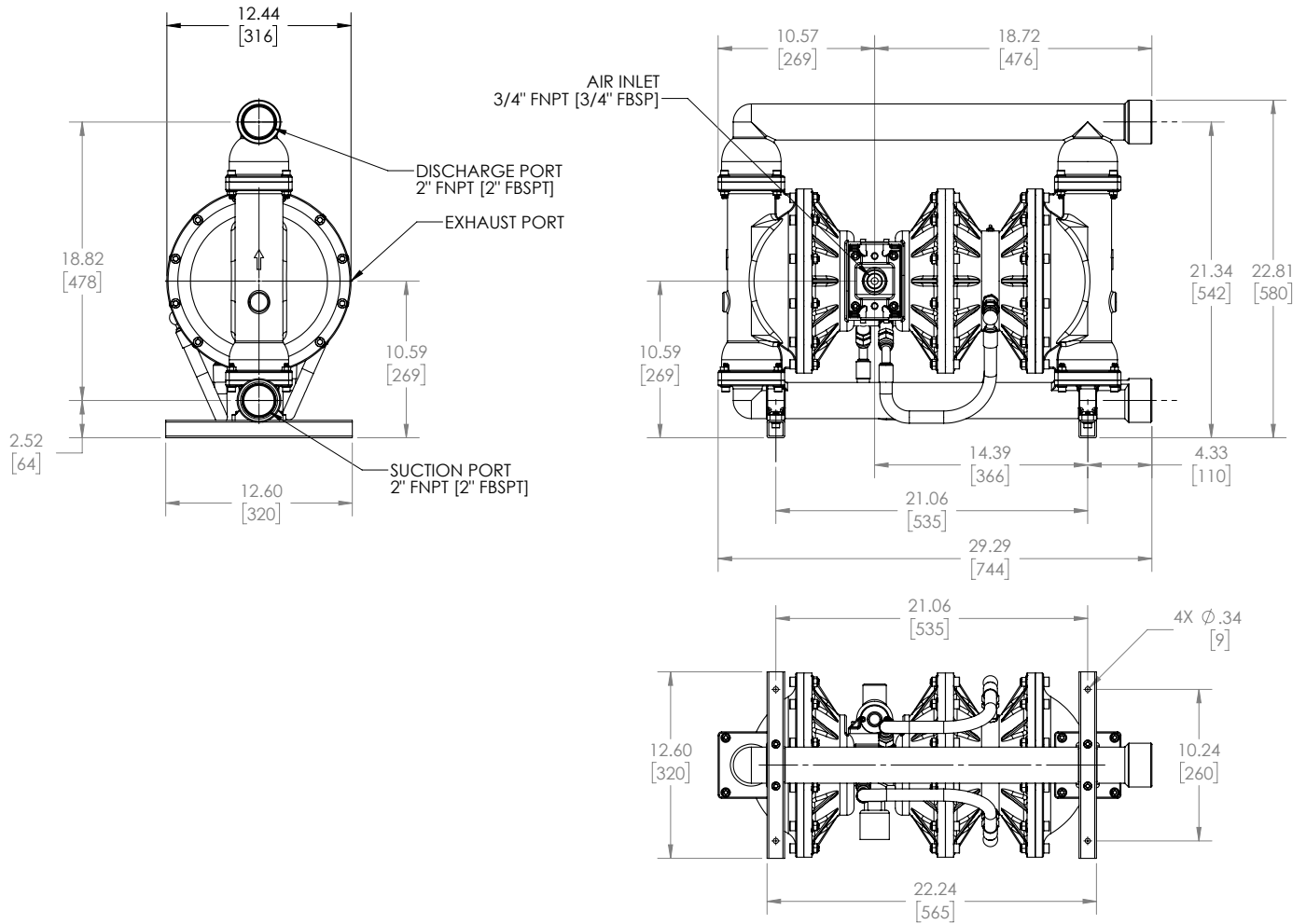


# Dimensional Drawings

## HP20 High Pressure - Stainless Model

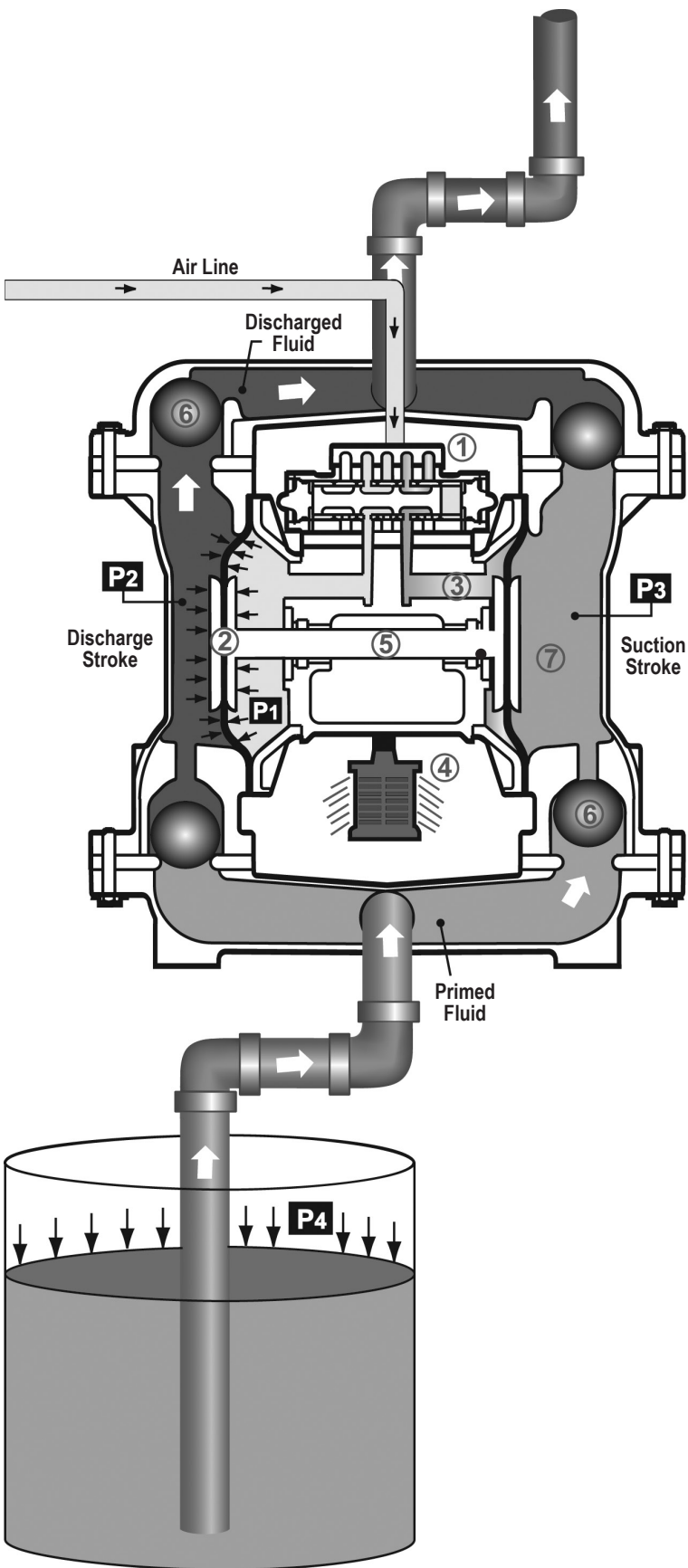
Dimensions in inches (mm dimensions in brackets). Dimensional Tolerance:  $\pm 1/8"$  ( $\pm 3\text{mm}$ )

The dimensions on this drawing are for reference only. A certified drawing can be requested if physical dimensions are needed.





# Principle of Pump Operation



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

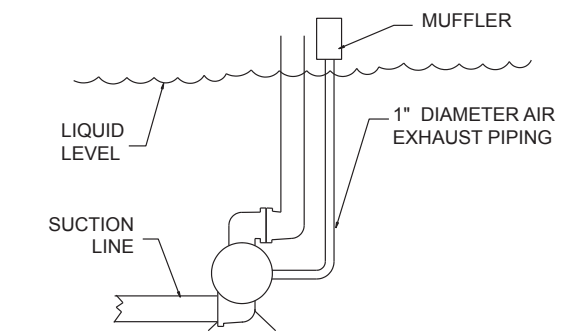
The main directional (air) control valve ① distributes compressed air to an air chamber, exerting uniform pressure over the inner surface of the diaphragm ②. At the same time, the exhausting air ③ from behind the opposite diaphragm is directed through the air valve assembly(s) to an exhaust port ④.

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



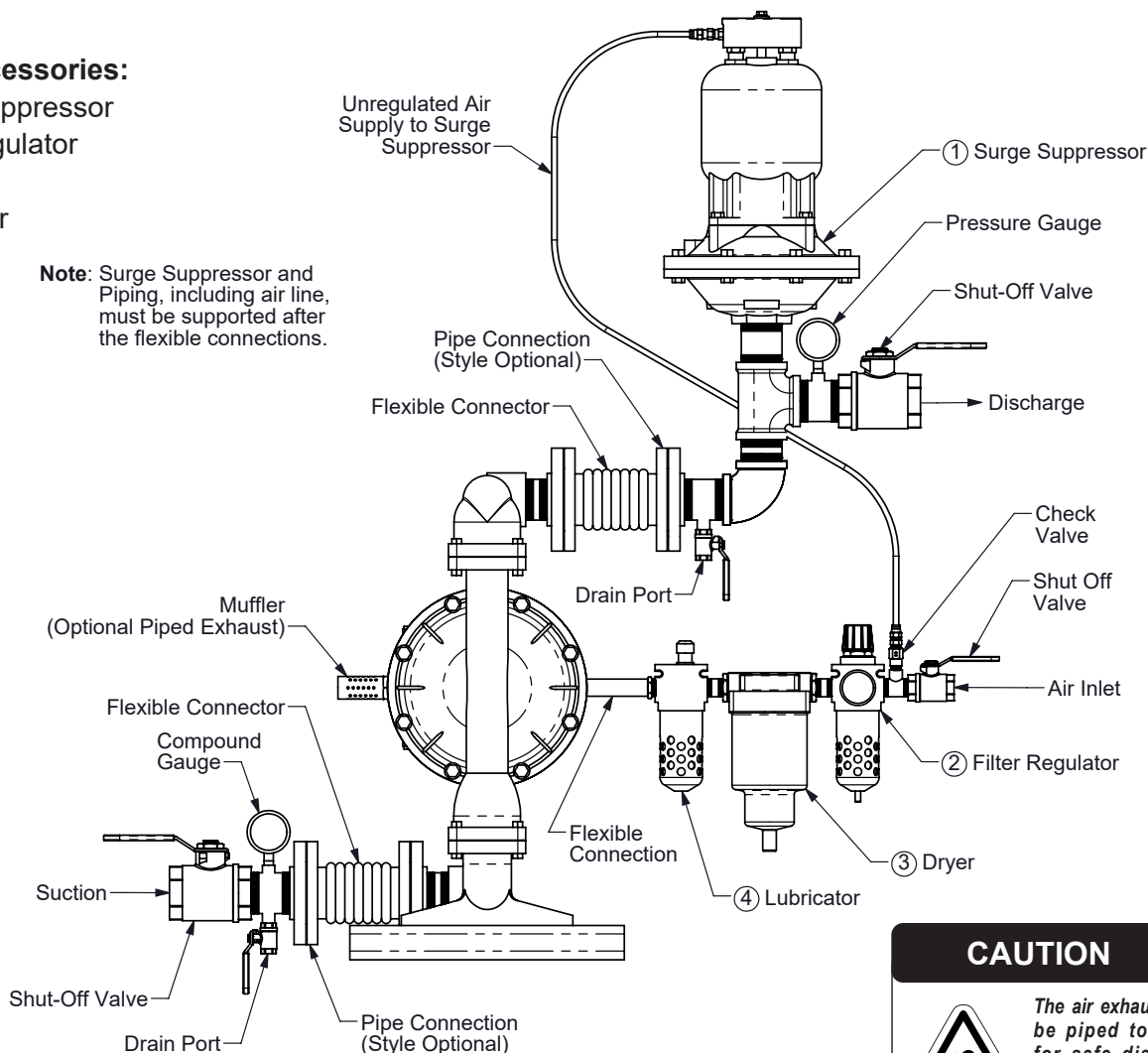
Pump can be submerged if the pump materials of construction are compatible with the liquid being pumped. The air exhaust must be piped above the liquid level. When the pumped product source is at a higher level than the pump (flooded suction condition), pipe the exhaust higher than the product source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

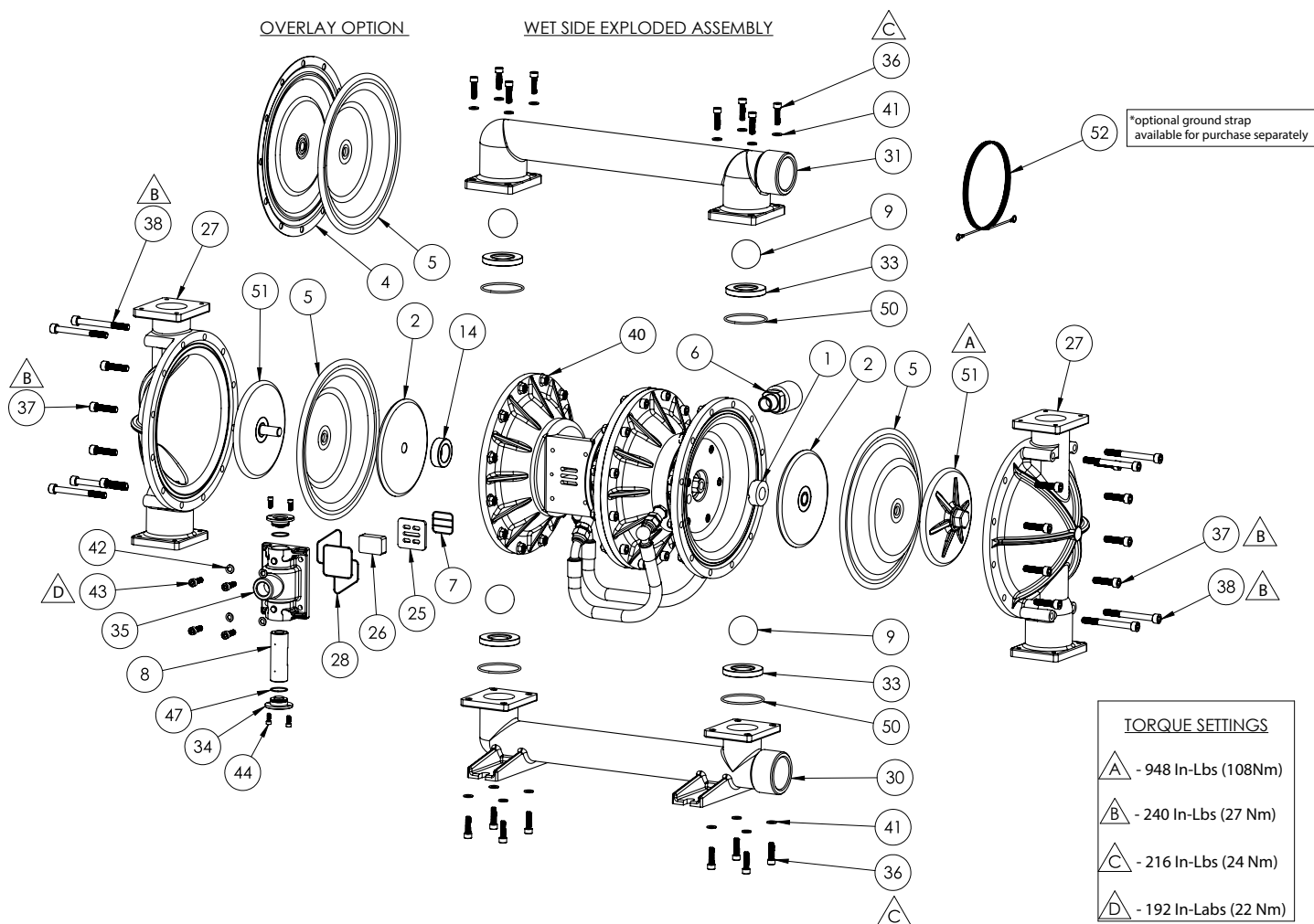
# Troubleshooting Guide

| Symptom:  | Potential Cause(s):   | Recommendation(s):   |
|---|---|--|
| <b>Pump Cycles Once</b>   | 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.  |
| <b>Pump Will Not Operate / Cycle</b>                                | 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.   |
| <b>Pump Cycles and Will Not Prime or No Flow</b>                    | 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.  |
| <b>Pump Cycles Running Sluggish / Stalling, Flow Unsatisfactory</b> | Over lubrication.   | Set lubricator on lowest possible setting or remove. Units are designed for lube free operation.   |
|   | 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.  |
| <b>Product Leaking Through Exhaust</b>                              | 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.  |
| <b>Premature Diaphragm Failure</b>                                  | Cavitation.   | Enlarge pipe diameter on suction side of pump.   |
|   | 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.   |
| <b>Unbalanced Cycling</b>   | Excessive suction lift.   | For lifts exceeding 20' of liquid, filling the chambers with liquid will prime the pump in most cases.   |
|   | 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.  |

For additional troubleshooting tips contact After Sales Support at [service.warrenrupp@idexcorp.com](mailto:service.warrenrupp@idexcorp.com) or 419-524-8388

# Composite Repair Parts Drawing -Aluminum Model

3: EXP VIEW

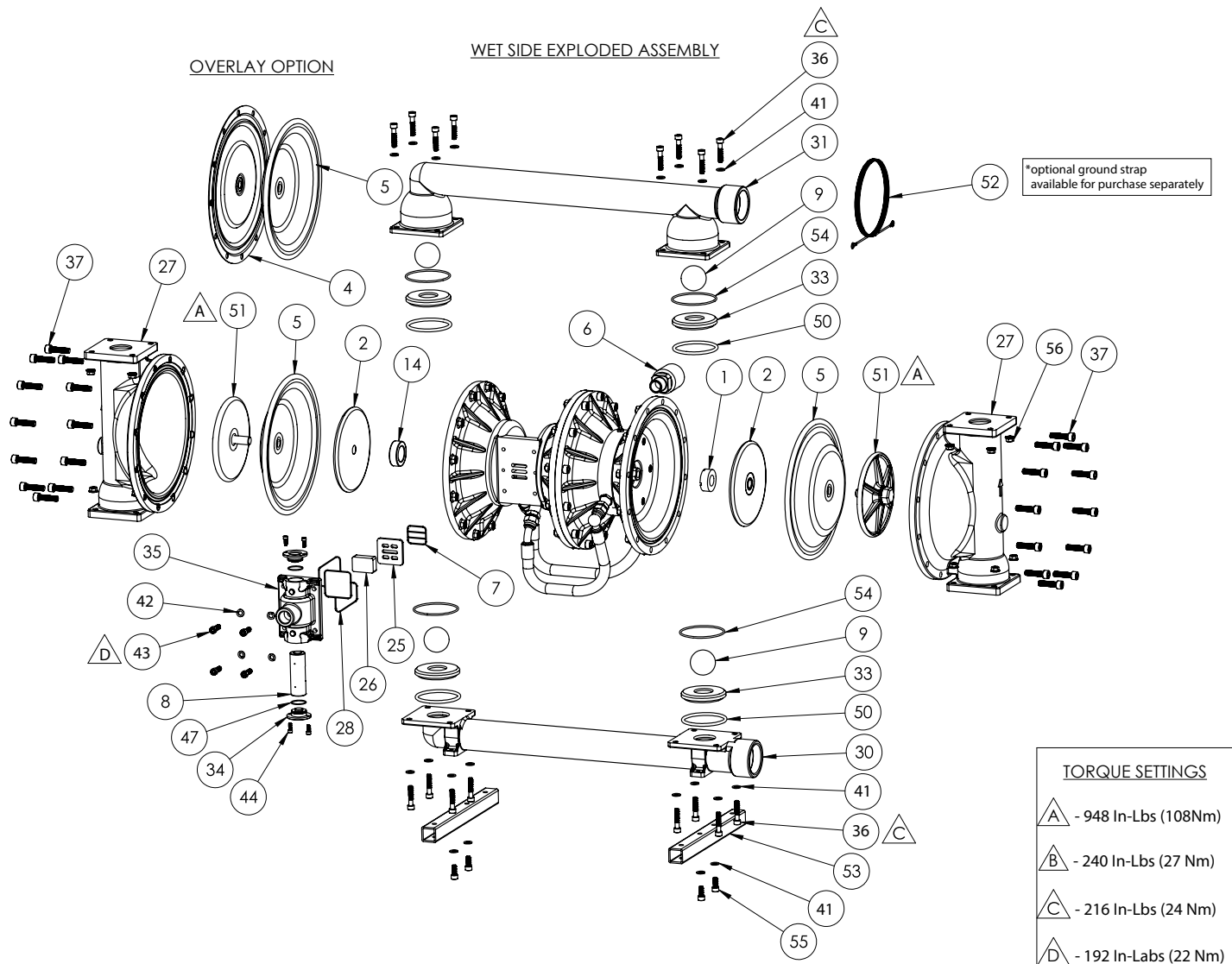


## Service & Repair Kits

### WET SIDE SERVICE KITS

- 476.393.360** WET END KIT - BUNA  
Buna Diaphragms, Buna Check Balls, Buna O-Rings
- 476.393.365** WET END KIT - NEOPRENE  
Neoprene Diaphragms, Neoprene Check Balls, Neoprene O-Rings
- 476.393.635** Wet End Kit - PTFE  
PTFE Diaphragms, Neoprene Backup Diaphragms, PTFE Check Balls, FEP O-Rings
- 476.393.644** Wet End Kit - SANTOPRENE/PTFE  
Santoprene Diaphragms, PTFE Check Balls, EPDM O-Rings

# Composite Repair Parts Drawing -Stainless Model



3: EXP VIEW

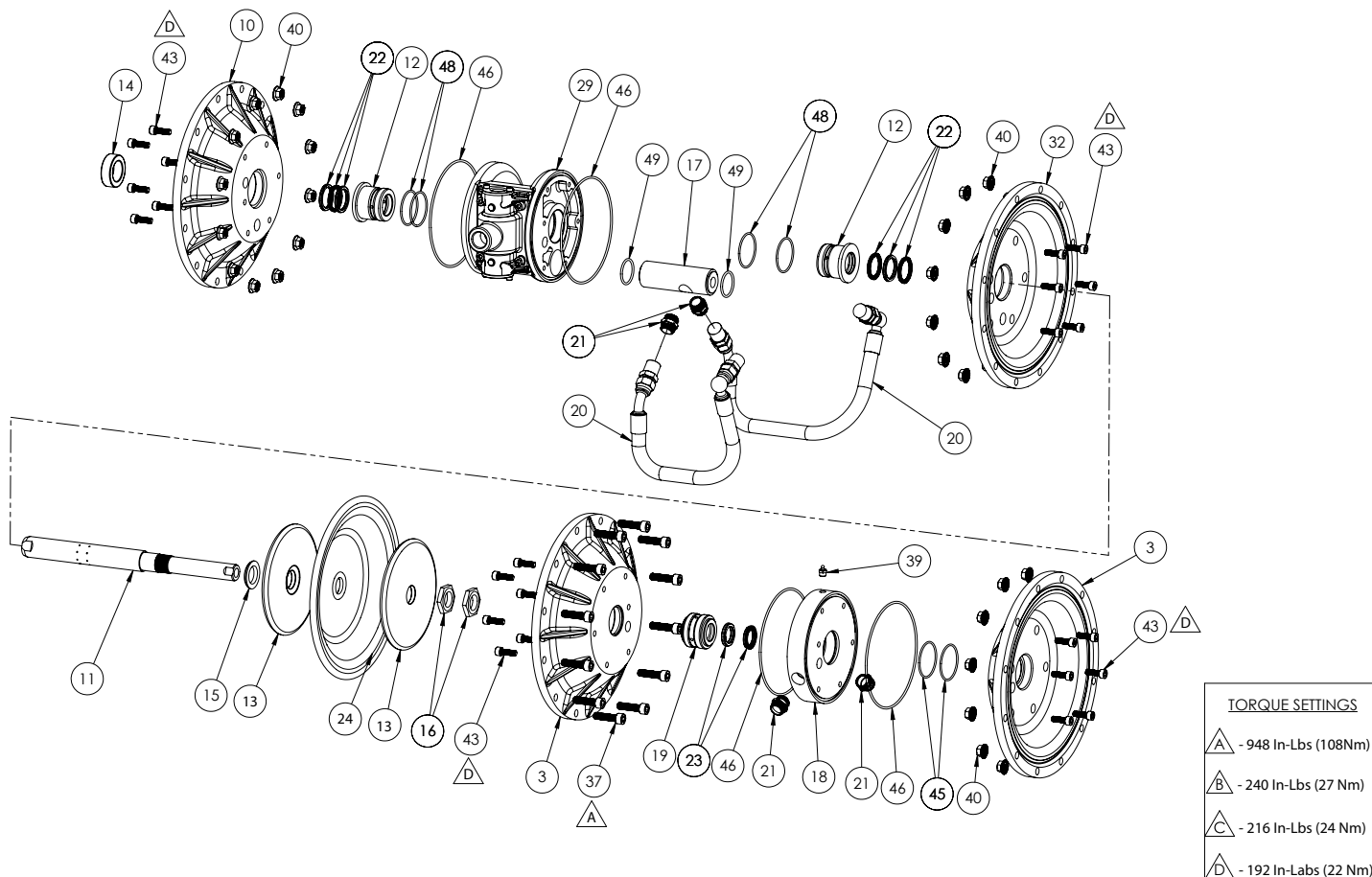
## Service & Repair Kits

### WET SIDE SERVICE KITS

- 476.394.360** WET END KIT - BUNA  
Buna Diaphragms, Buna Check Balls, Buna O-Rings
- 476.394.365** WET END KIT - NEOPRENE  
Neoprene Diaphragms, Neoprene Check Balls, Neoprene O-Rings
- 476.394.635** Wet End Kit - PTFE  
PTFE Diaphragms, Neoprene Backup Diaphragms, PTFE Check Balls, FEP O-Rings
- 476.394.644** Wet End Kit - SANTOPRENE/PTFE  
Santoprene Diaphragms, PTFE Check Balls, EPDM O-Rings

# Composite Repair Parts Drawing

3: EXP VIEW



## Service & Repair Kits

### WET SIDE SERVICE KITS

**476.395.360** AIR END KIT  
Air Side Diaphragm, Air Hoses, Seals and O-Rings



# Composite Repair Parts List

| Item | Part Number | Description                         | Qty | Item | Part Number | Description                               | Qty |
|------|-------------|-------------------------------------|-----|------|-------------|---|-----|
| 1    | 1B015       | BUMPER                              | 1   | 36   | A041        | CAPSCREW, SOCKET HD, M8 X 30 - AL PUMPS   | 16  |
| 2    | 1B021       | PLATE, INNER DIAPHRAGM              | 2   |      | A006S       | CAPSCREW, SOCKET HD, M8X40 SS PUMPS       | 16  |
| 3    | 1B026       | CHAMBER, INNER AIR                  | 2   | 37   | A063        | CAPSCREW, SOCKET HD, M10 X 40 - AL PUMPS  | 28  |
| 4    | 1B039       | DIAPHRAGM, OVERLAY                  | 2   |      | A063S       | CAPSCREW, SOCKET HD, M10 X 40 - SS PUMPS  | 36  |
| 5    | 1B004       | DIAPHRAGM, BUNA-N                   | 2   | 38   | A496        | CAPSCREW, SOCKET HD, M10 X 100-SS PUMPS   | 8   |
|      | 1B001       | DIAPHRAGM, NEOPRENE                 | 2   | 39   | AP5045      | FITTING, GREASE                           | 1   |
|      | 50-233      | DIAPHRAGM, SANTOPRENE               | 2   | 40   | B027        | NUT, FLANGED, M10 - AL - PUMPS            | 36  |
| 6    | 1B114       | MUFFLER                             | 1   |      | B027S       | NUT, FLANGED, M10 - SS - PUMPS            | 36  |
| 7    | 1B123       | SEAL, PORT                          | 1   | 41   | C013        | WASHER, FLAT, M8 - AL PUMPS               | 16  |
| 8    | 1B124       | CARRIER, VALVE                      | 1   |      | C013S       | WASHER, FLAT, M8 - SS PUMPS               | 20  |
| 9    | 1B079       | BALL, VALVE, BUNA-N                 | 4   | 42   | C165        | WASHER, LOCK, M8 - AL PUMPS               | 4   |
|      | 1B027       | BALL, VALVE, NEOPRENE               | 4   |      | C165S       | WASHER, LOCK, M8 - SS PUMPS               | 4   |
|      | 1B053       | BALL, VALVE, PTFE                   | 4   | 43   | D028        | CAPSCREW, SOCKET HD, M8 X 25 - AL PUMPS   | 28  |
| 10   | 50-194      | CHAMBER, INNER LEFT                 | 1   |      | D028S       | CAPSCREW, SOCKET HD, M8 X 25 - SS PUMPS   | 28  |
| 11   | 50-195      | ROD, DIAPHRAGM                      | 1   | 44   | D391        | CAPSCREW, SOCKET HD, M5 X 14 - AL - PUMPS | 4   |
| 12   | 50-196      | BUSHING, DIAPHRAGM SHAFT            | 2   |      | D391S       | CAPSCREW, SOCKET HD, M5 X 14 - SS - PUMPS | 4   |
| 13   | 50-197      | PLATE, INNER                        | 2   | 45   | G057        | O-RING                                    | 2   |
| 14   | 50-198      | BUMPER                              | 1   | 46   | G112        | O-RING                                    | 2   |
| 15   | 50-199      | WASHER, THRUST                      | 1   | 47   | G130        | O-RING                                    | 4   |
| 16   | 50-200      | NUT, LOCK                           | 2   | 48   | G167        | O-RING                                    | 4   |
| 17   | 50-201      | MANIFOLD, AIR DISTRIBUTION          | 1   | 49   | G270        | O-RING                                    | 2   |
| 18   | 50-202      | SPACER                              | 1   | 50   | G029        | O-RING, SEAT, BUNA - AL PUMPS             | 4   |
| 19   | 50-203      | BUSHING, SPACER                     | 1   |      | G149        | O-RING, SEAT, NEOPRENE - AL PUMPS         | 4   |
| 20   | 50-204      | ASSEMBLY, HOSE                      | 2   |      | G031        | O-RING, SEAT, EPDM - AL PUMPS             | 4   |
| 21   | 50-205      | ADAPTER, HEX                        | 4   |      | G111        | O-RING, SEAT, PTFE - AL PUMPS             | 4   |
| 22   | 50-206      | SEAL, SHAFT                         | 6   |      | G420        | O-RING, SEAT, BUNA - SS PUMPS             | 4   |
| 23   | 50-207      | SEAL, DIAPHRAGM SHAFT               | 2   |      | G426        | O-RING, SEAT, NEOPRENE - SS PUMPS         | 4   |
| 24   | 50-210      | DIAPHRAGM, AIR SIDE                 | 1   |      | G418        | O-RING, SEAT, EPDM - SS PUMPS             | 4   |
| 25   | 50-248      | PLATE, SLIDE VALVE                  | 1   |      | G416        | O-RING, SEAT, PTFE - SS PUMPS             | 4   |
| 26   | 50-251      | VALVE, SLIDE                        | 1   | 51   | SA10042     | PLATE, OUTER DIAPHRAGM ASSY - AL PUMPS    | 2   |
| 27   | 50-253      | CHAMBER, OUTER - AL                 | 2   |      | SA10044     | PLATE, OUTER DIAPHRAGM ASSY - SS PUMPS    | 2   |
|      | 50-052      | CHAMBER, OUTER - SS                 | 2   | 52*  | SA10528     | STRAP, GROUND                             | 1   |
| 28   | 50-261      | SEAL, VALVE BODY                    | 1   | 53   | 50-074      | BRACKET, FOOT - SS PUMPS                  | 2   |
| 29   | 50-279      | CENTER BLOCK                        | 1   | 54   | G457        | O-RING, SEAT, BUNA - SS PUMPS             | 4   |
| 30   | 50-286N     | MANIFOLD, SUCTION - AL PUMPS, NPT   | 1   |      | G458        | O-RING, SEAT, NEOPRENE - SS PUMPS         | 4   |
|      | 50-286B     | MANIFOLD, SUCTION - AL PUMPS, BSP   | 1   |      | G459        | O-RING, SEAT, EPDM - SS PUMPS             | 4   |
|      | 50-216N     | MANIFOLD, SUCTION - SS PUMPS, NPT   | 1   |      | G461        | O-RING, SEAT, PTFE - SS PUMPS             | 4   |
|      | 50-216B     | MANIFOLD, SUCTION - SS PUMPS, BSP   | 1   | 55   | D172S       | CAPSCREW, SOCKET HD, M8 X 20 - SS PUMPS   | 4   |
| 31   | 50-287N     | MANIFOLD, DISCHARGE - AL PUMPS, NPT | 1   | 56   | B003S       | NUT, FLANGED, M8 - SS PUMPS               | 16  |
|      | 50-287B     | MANIFOLD, DISCHARGE - AL PUMPS, BSP | 1   |      |             |   |     |
|      | 50-217N     | MANIFOLD, DISCHARGE - SS PUMPS, NPT | 1   |      |             |   |     |
|      | 50-217B     | MANIFOLD, DISCHARGE - SS PUMPS, BSP | 1   |      |             |   |     |
| 32   | 50-291      | CHAMBER, INNER RH                   | 1   |      |             |   |     |
| 33   | 50-292      | SEAT, CHECK VALVE - AL PUMPS        | 4   |      |             |   |     |
|      | 50-091      | SEAT, CHECK VALVE - SS PUMPS        | 4   |      |             |   |     |
| 34   | 50-341      | CAP, END                            | 2   |      |             |   |     |
| 35   | 50-345      | BODY, VALVE - NPT                   | 1   |      |             |   |     |
|      | 50-342      | BODY, VALVE - BSPT                  | 1   |      |             |   |     |

\* not included - can be purchased separately

## LEGEND:

○ = Items contained in 476.395.000 Air End Kits

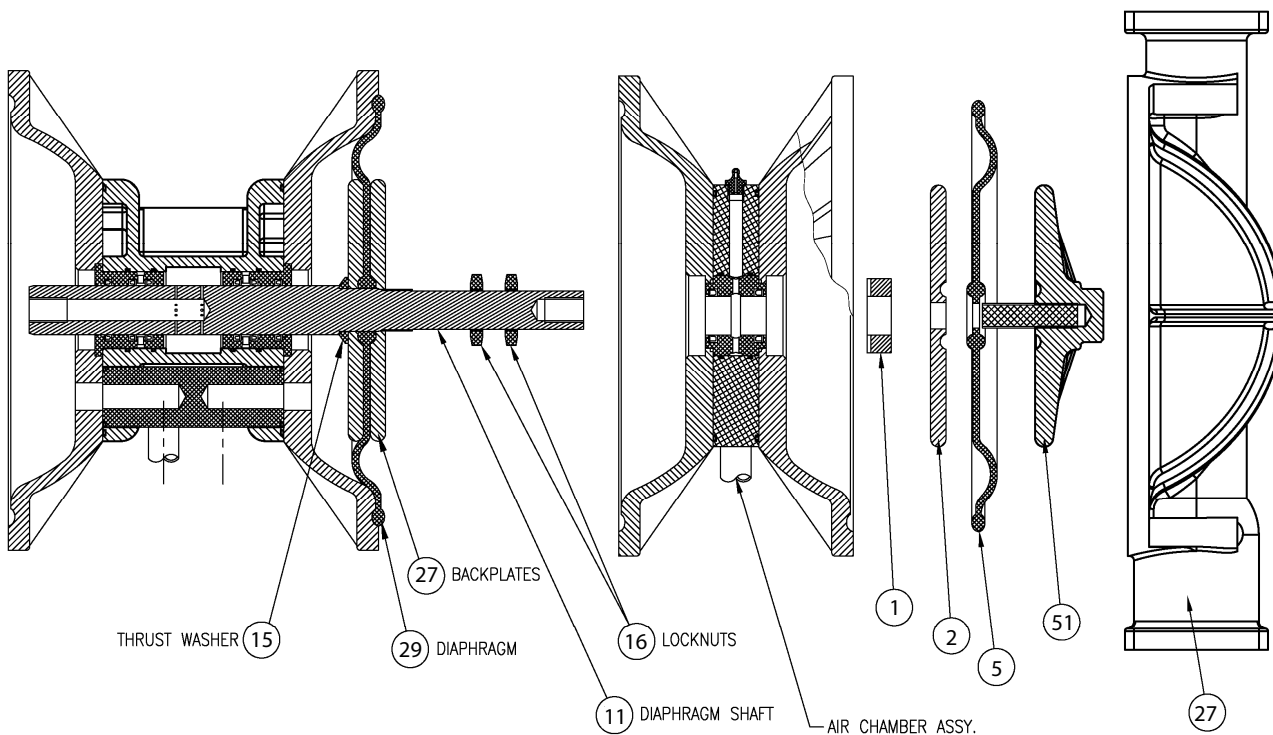
□ = Items contained in 476.393.XXX and 476.394.XXX Wet End Kits

**Note:** Kits contain components specific to the material codes.

**ATEX Compliant**



## TECHNICAL NOTES :-

Removal of Diaphragm Shaft :-

After first removing manifolds and air-hoses, remove both outer covers (27), followed by frontplates (51), diaphragms (5), back plates (2) and bumpstops. Remove air-chamber assy, by removing nuts & bolts. This allows access to locknuts (16) to remove air diaphragm, backplates & thrust washer (29), (27) & (15). Diaphragm Shaft can now be removed. Assembly is reverse of removal, applying a small amount of Loctite grade 242 to locknuts prior to refitting air-chamber assy.



## 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.

## SERVICE

The following sections give a general overview on how to service all models of BLAGDON Diaphragm Pumps. For details on individual part numbers, quantities, materials, etc., please consult the parts list supplied with the pump.

**NOTE :** *Before commencing any service or maintenance work on the pump, ensure that the air supply has been disconnected or isolated.*

### AIR VALVE SYSTEMS

**PNEUMATIC TYPE** Remove the 4 screws securing the valve block to the valve chest, together with any associated gaskets or seals.

Remove slide valve plate & slide valve from the valve block assembly. Clean all parts thoroughly and inspect for excessive wear, replacing where necessary.

The slide valve and valve plate contact faces should be flat and free from scratches. A light polishing on a flat surface with a fine abrasive paper will remove most scratches.

If excessive wear is suspected in the valve block bore or valve carrier, remove the valve block plugs and withdraw the valve carrier. Check valve block plug o-rings for wear or attack & replace where required.

Clean the valve carrier & valve block bore with white spirits to remove any oil films.

**NOTE :** *The nominal diametrical clearance between the valve carrier and the valve block bore should be 0.05 - 0.09mm. A clearance in excess of this will cause the valve system to run erratically.*

Apply a light grease to the valve block plug O-rings when re-assembling into the valve block bore. Any damage to the O-ring may cause

the valve system to malfunction.

Re-assemble the valve block assembly & re-torque in accordance to the settings shown in the parts list.

In the event of a complete air-side overhaul, the pump should be disassembled down to the centre section assembly as described later in the "Wet-Side Overhaul" section.

With the valve block assembly dismantled, remove the inner covers where appropriate.

A careful note of the position of all related seals and gaskets should be made to facilitate re-assembly.

Remove diaphragm shaft bushes, where appropriate, and check all seals and 'O' rings for wear or damage. If worn, replace immediately.

**NOTE:-** *The integrity of the diaphragm shaft seals is essential for the correct functioning of all pneumatically actuated valve systems.*

Check the diaphragm shaft for excessive wear as this will result in premature seal failure. Replace as required. Lubricate all components and re-assemble as detailed above, in reverse order. Ensure the correct position of all components detailed in all sectional assembly drawings.

### WET-SIDE OVERHAUL

#### REPLACING BALL VALVES

Remove discharge manifold from pump assembly together with associated valve balls, seats and 'O' rings.

**NOTE :-** *The orientation of the valve seat relative to the valve ball should be noted as incorrect positioning may result in a performance loss.*

Turn pump through 180° and remove the suction manifold. Clean and inspect the components. Check for any wear or damage and replace as required.

**NOTE :-** *Ball or valve seat wear may result in loss of performance and suction lift.*

Re-assemble the valve balls/seats and ensure manifolds are adequately torqued to the settings shown in the parts list.

#### REPLACING DIAPHRAGMS

Remove both suction and discharge manifolds as detailed in the previous section, removing all ball valves, seats and 'O' rings.

Loosen and remove both outer covers from the pump assembly. The orientation of the covers should be noted so as to facilitate re-assembly.

Holding one of the frontplates in a vice, ('soft jaws' should be fitted), or with an adjustable spanner, loosen and remove the frontplate from the opposite end. Remove the diaphragm, backplate and bumpstop from diaphragm shaft.

Carefully withdraw the diaphragm shaft from the centre section and hold the free end in a vice, holding between the flats machined on the end. Loosen and remove the frontplate and remove the diaphragm together with backplate and bumpstop (where fitted).

**NOTE :-** *Care should be taken with all plastic, coated and hygienic pumps, so that the surface of the frontplate is not damaged.*

Thoroughly clean all parts and check for wear, damage, swelling, cracking, delamination and chemical attack.

Replace components where required.

**NOTE :-** *Rubber diaphragms should be replaced if they are worn to such an extent that the fabric re-enforcing is evident on the surface of the diaphragm.*

For pumps fitted with PTFE diaphragms, a light coating of grease should be applied to the back-up diaphragm prior to re-assembly.

Before re-assembly, it is advisable to check the condition of the diaphragm shaft seal/'O' rings for wear or attack. If either is evident, it is recommended that they be replaced.

Assemble the diaphragms onto the shaft in a reverse sequence to their removal. Care should be taken as to the orientation of the diaphragm relative to the front and back plates. All diaphragms have "AIR SIDE" molded onto one side. The backplate must be fitted adjacent to the AIR SIDE of the diaphragm.

HG-CF-1194-A - 12.02.10

# 5 - YEAR Limited Product Warranty

Warren Rupp, Inc. ("Warren Rupp") warrants to the original end-use purchaser that no product sold by Warren Rupp that bears a Warren Rupp brand shall fail under normal use and service due to a defect in material or workmanship within five years from the date of shipment from Warren Rupp's factory. Warren Rupp brands include Warren Rupp®, SANDPIPER®, SANDPIPER Signature Series™, MARATHON®, Porta-Pump®, SludgeMaster™ and Tranquilizer®.

The use of non-OEM replacement parts will void (or negate) agency certifications, including CE, ATEX, CSA, 3A and EC1935 compliance (Food Contact Materials). Warren Rupp, Inc. cannot ensure nor warrant non-OEM parts to meet the stringent requirements of the certifying agencies.

~ See [sandpiperpump.com/content/warranty-certifications](http://sandpiperpump.com/content/warranty-certifications) for complete warranty, including terms and conditions, limitations and exclusions. ~

**WARREN  
RUPP, INC.**

## Declaration of Conformity

**Manufacturer: Warren Rupp, Inc., 800 N. Main Street  
Mansfield, Ohio, 44902 USA**

Certifies that Air-Operated Double Diaphragm Pump Series: HDB, HDF, M Non-Metallic, S Non-Metallic, M Metallic, S Metallic, T Series, G Series, U Series, EH and SH High Pressure, RS Series, W Series, F Series, SMA and SPA Submersibles, and Tranquilizer® Surge Suppressors comply with the European Community Directive 2006/42/EC on Machinery, according to Annex VIII.

This product has used Harmonized Standard EN809:2012, Pumps and Pump Units for Liquids - Common Safety Requirements, to verify conformance.

David Roseberry  
Signature of authorized person

October 20, 2005  
Date of issue

Authorised Representative:  
IDEX Pump Technologies  
R79 Shannon Industrial Estate  
Shannon, Co. Clare, Ireland

Director of Engineering  
Title

February 27, 2017  
Date of revision

Attn: Barry McMahon



Revision Level: F



# EU Declaration of Conformity

**Manufacturer:**


Warren Rupp, Inc.  
A Unit of IDEX Corporation  
800 North Main Street  
Mansfield, OH 44902 USA

Warren Rupp, Inc. declares that Air Operated Double Diaphragm Pumps (AODD) and Surge Suppressors listed below comply with the requirements of **Directive 2014/34/EU** and all applicable standards.

**Applicable Standards**

- EN ISO 80079-36: 2016
- EN ISO 80079-37: 2016
- EN ISO 60079-25: 2010


**1. AODD Pumps and Surge Suppressors** - Technical File No.: 20310400-1410/MERHazardous Location Applied:

II 2 G Ex h IIC T5...225°C (T2) Gb  
 II 2 D Ex h IIIC T100°C...T200°C Db  
II 2 G Ex h IIB T5...225°C (T2) Gb  
II 2 D Ex h IIIB T100°C...T200°C Db

- Metallic pump models with external aluminum components (S Series, HD Series, G Series, DMF Series, MSA Series, U Series, F Series, T Series, EH Series, SH Series, GH Series )
- Conductive plastic pump models with integral muffler (S Series, PB Series)
- Tranquilizer® surge suppressors

**2. AODD Pumps** - EU Type Examination Certificate No.: DEKRA 18ATEX0094X - DEKRA Certification B.V. (0344)Hazardous Location Applied:

Meander 1051  
6825 MJ Arnhem  
The Netherlands

I M1 Ex h I Ma  
II 1 G Ex h IIC T5...225°C (T2) Ga  
II 1 D Ex h IIIC T100°C...T200°C Da  
 II 2 G Ex h ia IIC T5 Gb  
II 2 D Ex h ia IIIC T100°C Db  
II 2 G Ex h mb IIC T5 Gb  
II 2 D Ex mb tb IIIC T100° Db

- Metallic pump models with no external aluminum (S series, HD Series, G series)
- Conductive plastic pumps equipped with metal muffler (S series, PB Series)
- ATEX pump models equipped with ATEX rated pulse output kit or solenoid kit

➤ See "ATEX Details" page in user's manual for more information  
➤ See "Safety Information" page for conditions of safe use

DATE/APPROVAL/TITLE:  
26 SEP 2018

  
David Roseberry, Director of Engineering