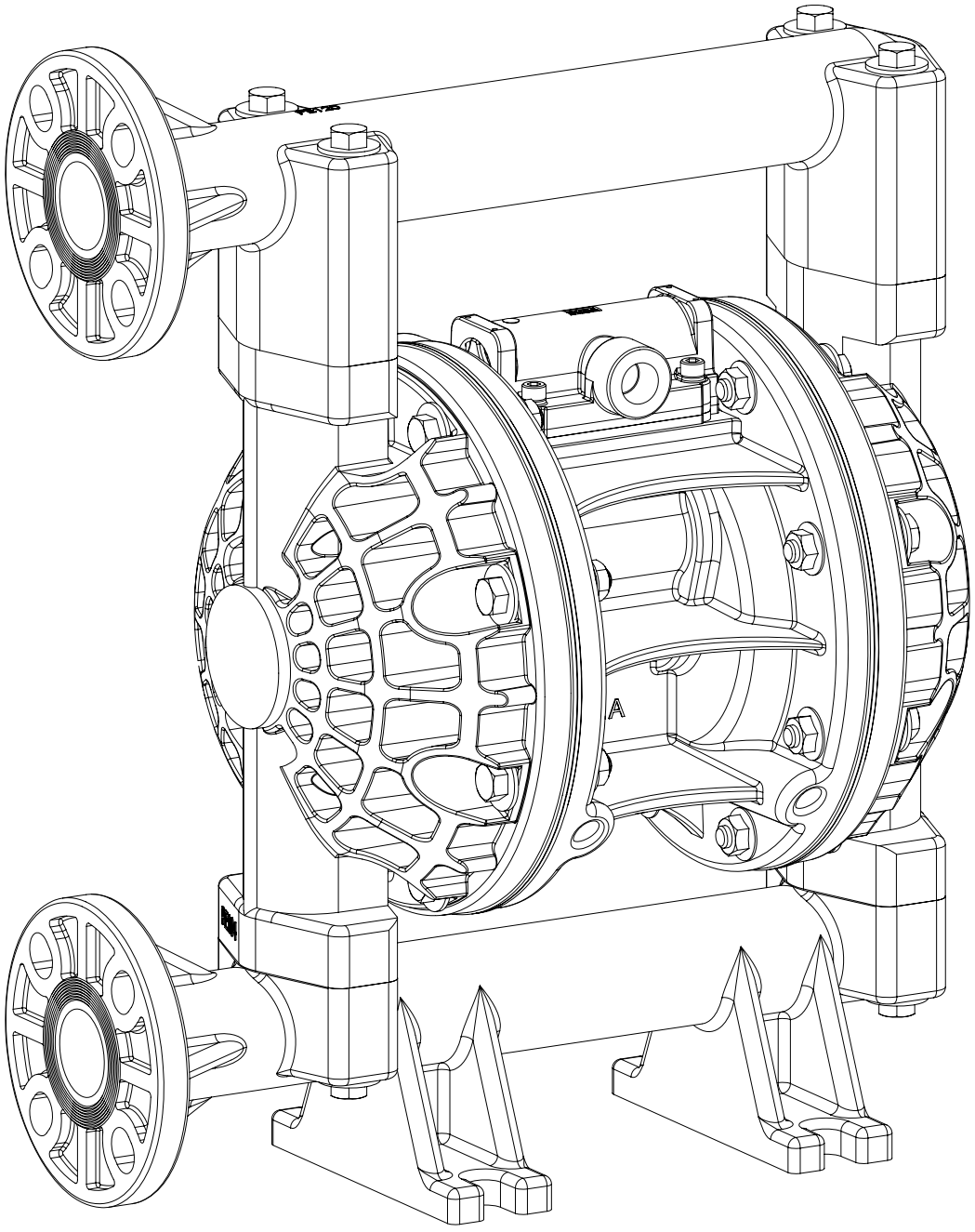
Balcrank SERVICE BULLETIN SB 1093

# 1" DEF Pump

Model 1120-021

1"



**OPERATION, INSTALLATION, MAINTENANCE AND REPAIR GUIDE**

# Operating and Service Manual
## 1" Model 1120-021 DEF Pump

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REVISED DATE -10/09

# Important Safety Information

## ⚠ IMPORTANT

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

## ⚠ CAUTION

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

## ⚠ WARNING

***Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. The discharge line may be pressurized and must be bled of its pressure.***

## ⚠ WARNING

***In the event of diaphragm rupture, pumped material may enter the air end of the pump, and be discharged into the atmosphere. If pumping a product which is hazardous or toxic, the air exhaust must be piped to an appropriate area for safe disposition.***

## ⚠ WARNING

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

## ⚠ WARNING

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

## ⚠ WARNING

***Before doing any maintenance on the pump, be certain all pressure is completely vented from the pump, suction, discharge, piping, and all other openings and connections. Be certain the air supply is locked out or made non-operational, so that it cannot be started while work is being done on the pump. Be certain that approved eye protection and protective clothing are worn all times in the vicinity of the pump. Failure to follow these recommendations may result in serious injury or death.***

## ⚠ WARNING

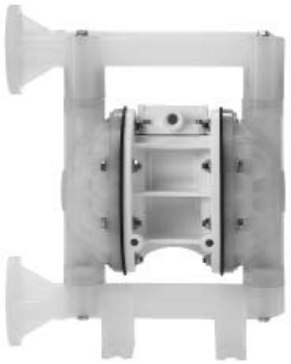
***Airborne particles and loud noise hazards.***

***Wear ear and eye protection.***

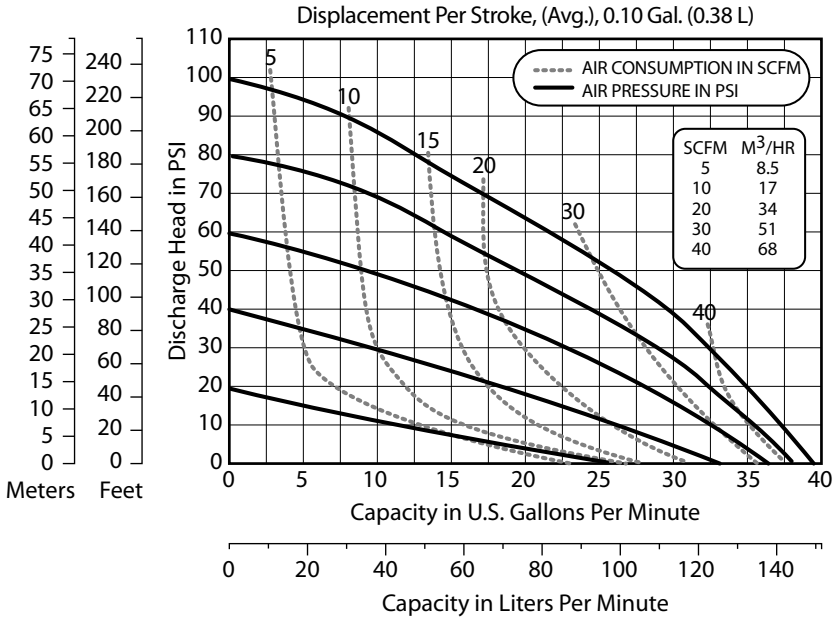
# MODEL 1120-021 SPECIFICATIONS & PERFORMANCE

## Specifications

**Material** . . . . . Polypropylene
**Wet End Diaphragm, Check Balls and O-ring**...Santoprene
**Flow Rate**
adjustable to . . . . . 0-35 gpm (132 lpm)
**Port Size**
Inlet and Discharge . . . . . 1" ANSI/DIN Flanged
**Air Inlet** . . . . . 3/8" NPT
**Air Exhaust** . . . . . 1/2" NPT
**Suction Lift** . . . . . 15' (4.57 m) Dry/25' (7.62 m) Wet
**Max. Particle Size** (Diameter) . . . . . 0.125" (3.mm)
**Shipping Weights**
Polypropylene . . . . . 24 lbs (10.89 kg)

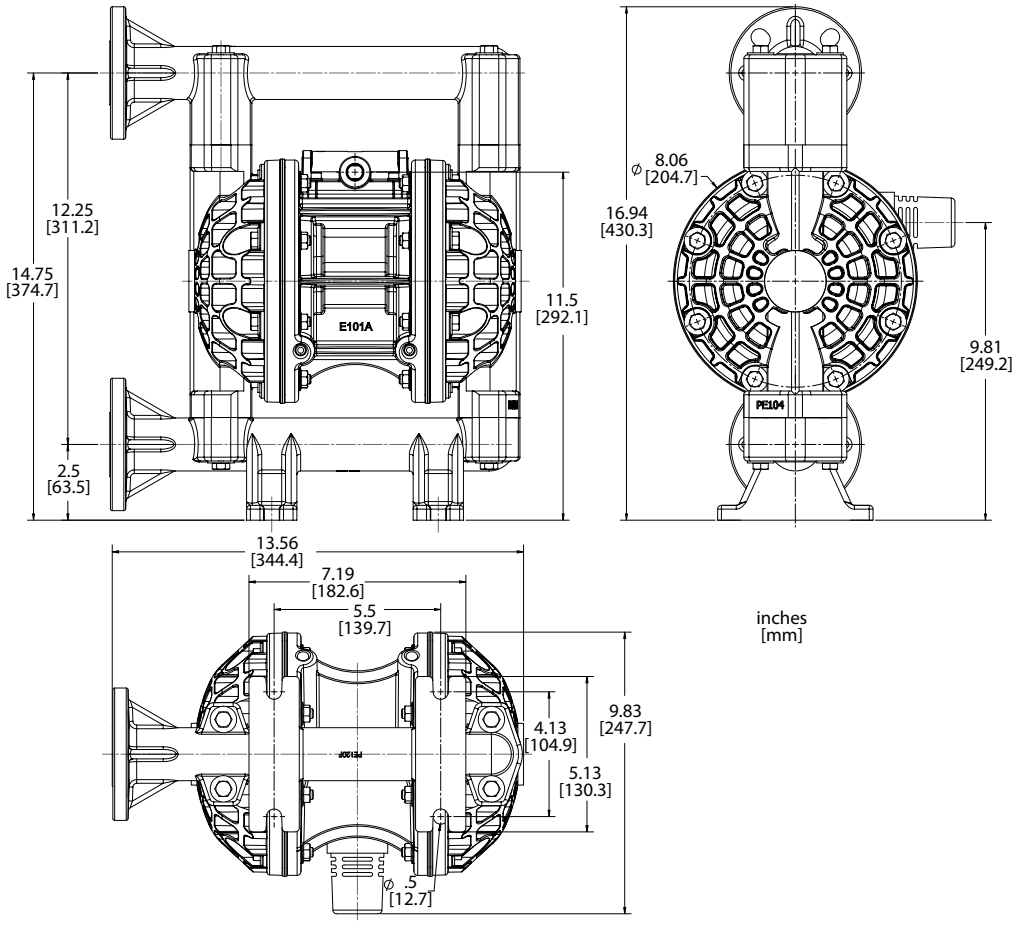


## Performance




**CAUTION:** Do not exceed 100 psig (6.9 bars) air supply or liquid pressure.

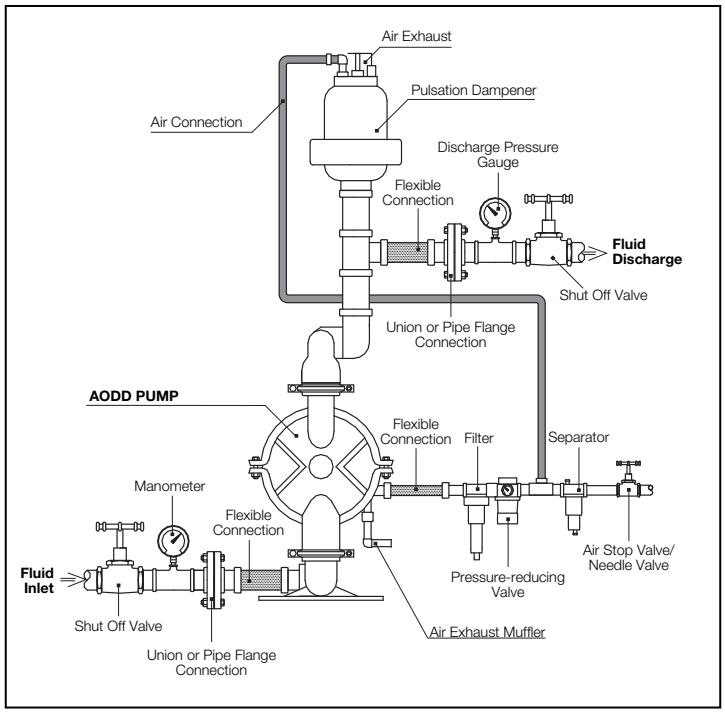
## Dimensions:



# INSTALLATION, OPERATION & MAINTENANCE

## Installation

The pump should be mounted in a vertical position. In permanent installations, the pump should be attached to plant piping using a flexible coupling on both the intake and discharge connections to reduce vibration to the pump and piping. To further reduce vibration, a surge suppressor next to the pump may be used.




Suction pipe size should be at least the same diameter as the inlet connection size, even larger if highly viscous fluid is to be pumped. If suction hose is used, it must be of a non-collapsible reinforced type. Discharge piping should be of at least the same diameter as the discharge connection. It is critical, especially on the suction side of the pump, that all fittings and connections are air tight or pumping efficiency will be reduced and priming will be difficult.

Make certain the air supply line and connections and compressor are capable of supplying the required pressure and volume of air to operate the pump at the desired flow rate. The quality of the compressed air source should be considered. Air that is contaminated with moisture and dirt may result in erratic pump performance and increased maintenance cost as well as frequent process “down time” when the pump fails to operate properly.

## Pump Operation

The pump is powered by compressed air. Compressed air is directed to the pump air chamber by the main air valve. The compressed air is separated from the fluid by a membrane called a diaphragm. The diaphragm in turn applies pressure on the fluid and forces it out of the pump discharge. While this is occurring, the opposite air chamber is depressurized and exhausted to atmosphere and fluid is drawn into the pump suction. The cycle again repeats, thus creating a constant reciprocating action which maintains flow through the pump. The flow is always in through the bottom suction connection and out through the top discharge connection. Since the air pressure acts directly on the diaphragms, the pressure applied to the fluid roughly approximates the air supply pressure supplied to the main air valve.

**Recommended Piping Connections**

| Pump Size | Minimum Air Line Size | Minimum Suction Line Size |
|---|---|---|
| 1/4" | 1/4" | 1/4" |
| 3/8" | 1/4" | 3/8" |
| 1/2" | 1/2" | 1/2" |
| 1" | 1/2" | 1" |
| 1-1/2" | 1/2" | 1-1/2" |
| 2" | 1/2" | 2" |
| 3" | 3/4" | 3" |

# TROUBLESHOOTING

| Symptom | Potential Cause(s) | Recommendation(s) |
|---|---|---|
| **Pump cycles once** | **1** Incorrect pilot o-ring placement<br>**2** Inner diaphragm plate installed backwards<br>**3** Deadhead (system pressure meets or exceeds air supply pressure)<br>**4** Air valve or center block gaskets installed incorrectly | **1** Reinstall pilot o-rings in correct positions<br>**2** Reinstall inner diaphragm plate correctly<br>**3** Check system for pressure ratio to pump<br>**4** Install gaskets with holes properly aligned |
| **Pump will not operate** | **1** Pump is over lubricated<br>**2** Lack of air (line size, PSI, CFM)<br>**3** Worn o-rings<br>**4** Wrong type of lubrication (attack on o-rings)<br>**5** Debris in air valve<br>**6** Clogged manifolds<br>**7** Incorrect o-ring placement<br>**8** Deadhead (system pressure meets or exceeds air supply pressure) | **1** Set lubricator on lowest possible setting or remove<br>• Elima-Matic is designed for lube free operation<br>**2** Check the air line size and length, compressor capacity (HP vs. cfm required)<br>**3** Replace o-rings<br>**4** Check compatibility of o-rings with lubrication<br>**5** Clean air valve/filter<br>**6** Clean suction or discharge manifolds/piping<br>**7** Reinstall o-rings in correct position<br>**8** Increase air supply pressure |
| **Pump cycles and will not prime or flow** | **1** Cavitation on suction side<br>**2** Valve ball(s) not seating properly or sticking<br>**3** Valve ball(s) missing (pushed into chamber)<br>**4** Valve ball(s)/seat(s) damaged or attacked by product<br>**5** Clogged suction line | **1** Check suction condition (move pump closer to product)<br>**2** Clean out around valve ball cage and valve seat area<br>• Replace valve ball or valve seat if damaged<br>• Use heavier valve ball material<br>**3** Worn valve ball or valve seat<br>• Worn fingers in valve ball cage (replace part)<br>**4** Check Chemical Resistance Guide for compatibility<br>**5** Clean suction manifold and/or piping |
| **Pump running sluggish/stalling** | **1** Over lubrication<br>**2** Icing<br>**3** Clogged manifolds<br>**4** Deadhead (system pressure meets or exceeds air supply pressure)<br>**5** Cavitation on suction side<br>**6** Lack of air (line size, PSI, CFM) | **1** Set lubricator on lowest possible setting or remove<br>• Elima-Matic is designed for lube free operation<br>**2** Clean or replace exhaust muffler<br>**3** Clean manifolds to allow proper air flow<br>**4** Check system to locate deadhead (equilibrium)<br>• Increase air supply pressure<br>**5** Check suction (move pump closer to product)<br>**6** Check the air line size, length, compressor capacity |
| **Product leaking through exhaust** | **1** Diaphragm failure, or diaphragm plates loose<br>**2** Diaphragm stretched around center hole or bolt holes<br>**3** Excessive air supply pressure | **1** Replace diaphragms, check for damage and ensure diaphragm plates are tight<br>**2** Check for excessive inlet pressure or air pressure<br>• Tighten bolts to recommended torque<br>**3** Check Operating Manual for recommendations |
| **Premature diaphragm failure** | **1** Cavitation<br>**2** Excessive flooded suction pressure<br>**3** Misapplication (chemical/physical incompatibility)<br>**4** Wrong type of lubrication (attack on air side)<br>**5** Incorrect diaphragm plates or plates on backwards<br>**6** Incorrect shaft with corresponding elastomer<br>**7** Start up at full air pressure | **1** Enlarge pipe diameter on suction side of pump<br>**1,2** Move pump closer to product<br>• Raise pump/place pump on top of tank to reduce inlet pressure<br>**2** Add accumulation tank or pulsation dampener as close to the pump as possible<br>**3,4** Consult Chemical Resistance Chart for compatibility with products, cleaners, temperature limitations and lubrication<br>**5,6** Check Operating Manual to check for correct part and installation<br>**7** Start up pump slowly (manually or with Smart Start) |
| **Breaking and bending shafts** | **1** Build up of solids in water chamber<br>**2** Loose diaphragm plates | **1** Flush pump, start pump slow<br>**2** Tighten diaphragm plates when replacing diaphragms |

# MODEL 1120-021 PARTS LIST

| AIR VALVE ASSEMBLY | | | |
|---|---|---|---|
| **Item** | **Description** | **Qty** | |
| | Air Valve Assembly | 1 | |
| | (includes Items 1-8) | | |
| 1 | Valve Body | 1 | |
| 2 | Valve Spool | 1 | |
| 3 | Valve Spool U-cup | 2 | |
| 4 | End Cap Assembly | 2 | |
| 5 | End Cap Staple | 2 | |
| 6 | Air Diverter | 1 | |
| 7 | Valve Insert | 1 | |
| 8 | Valve Gasket | 1 | |
| 9 | Valve Cap Screw | 4 | |

| AIR END ASSEMBLY | | | |
|---|---|---|---|
| **Item** | **Description** | **Qty** | |
| 15 | Center section | 1 | |
| 16 | Pilot Shaft | 1 | |
| 17 | Pilot Shaft Spacer | 5 | |
| 18 | Pilot Shaft O-Ring | 6 | |
| 19 | Nut | 2 | |
| 20 | Shaft Retainer | 2 | |
| 21 | Shaft Retainer Screw | 4 | |
| 22 | Muffler | 1 | |

| DIAPHRAGM ASSEMBLY | | | |
|---|---|---|---|
| **Item** | **Description** | **Qty** | **TPE Rugged** |
| 25 | Main Shaft O-Ring | 2 | P50-403 |
| 26 | Main Shaft | 1 | P50-107 |
| 27 | Inner Diaphragm Plate | 2 | V181C |
| 28 | Outer Diaphragm Plate | 2 | PE113 |
| 31 | Diaphragm* | 2 | V183TPEXL-1 |

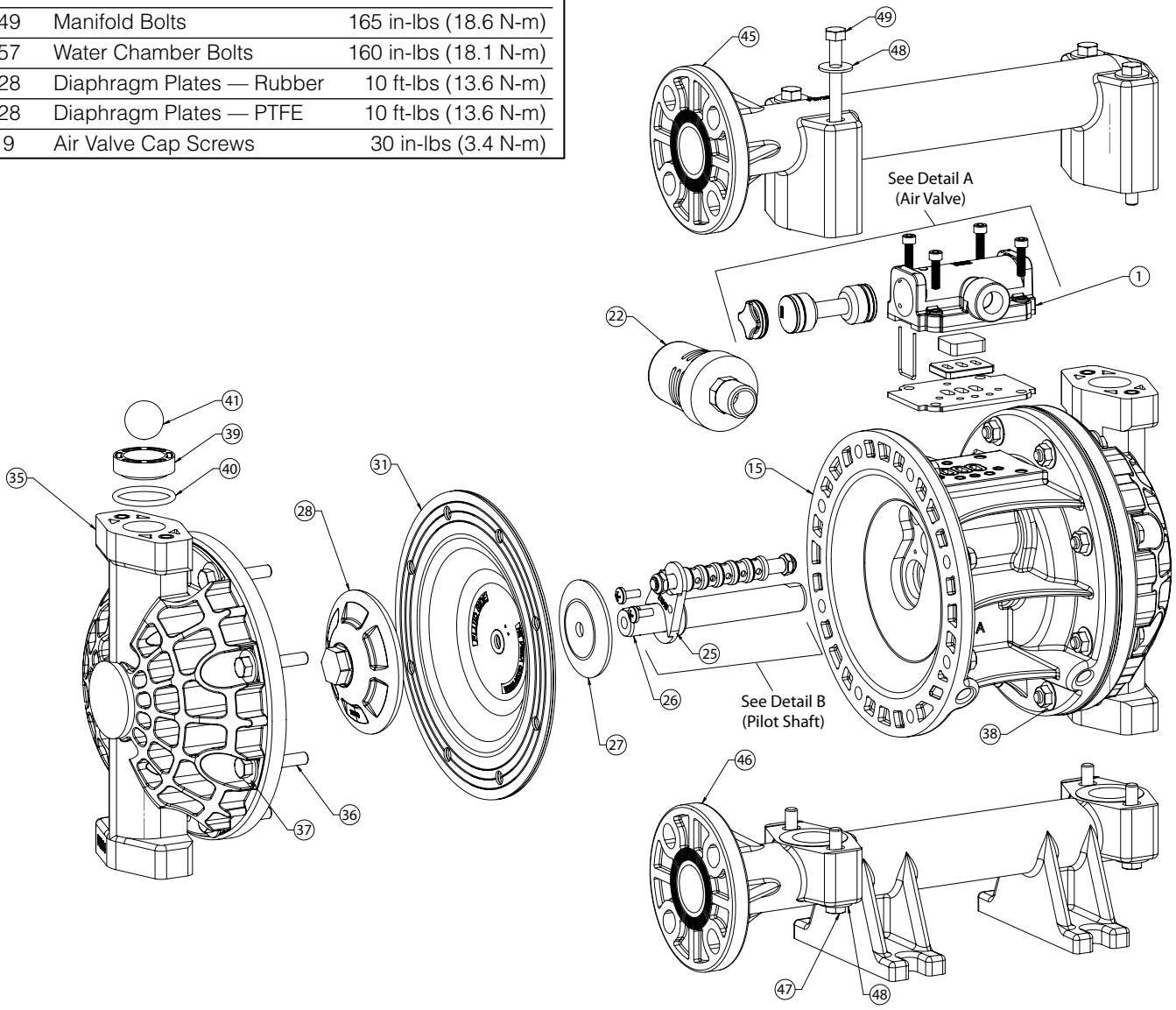
| WET END ASSEMBLY | | | |
|---|---|---|---|
| **Item** | **Description** | **Qty** | |
| 35 | Water Chamber | 2 | |
| 36 | Water Chamber Bolt | 16 | |
| 37 | Water Chamber Washer | 16 | |
| 38 | Water Chamber Nut | 16 | |
| 39 | Valve Seat | 4 | |
| 40 | Valve Seat O-Ring*** | 4 | |
| 41 | Valve Ball** | 4 | |
| 45 | Discharge Manifold | 1 | |
| 46 | Inlet Manifold | 1 | |
| 47 | Inlet Manifold Bolt | 8 | |
| 48 | Manifold Washer | 8 | |
| 49 | Discharge Manifold Bolt | 8 | |

| REPLACEMENT PARTS/REPAIR KITS | |
|---|---|
| **Description** | **Part Number** |
| Diaphragm | 832805 |
| Check Ball | 832806 |
| Check Valve Seat | 832807 |
| Check Valve O-Ring | 832808 |
| Muffler | 832809 |
| Wet End Kit | 832802 |
| Air End Kit | 832803 |
| Flange Adaptor Kit | 832804 |

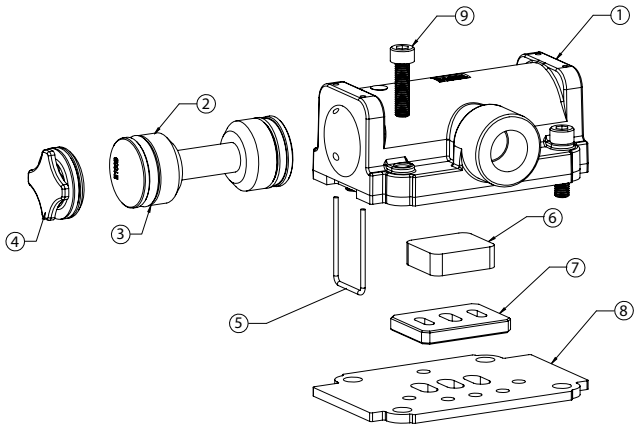
# EXPLODED VIEW

## Torque Settings

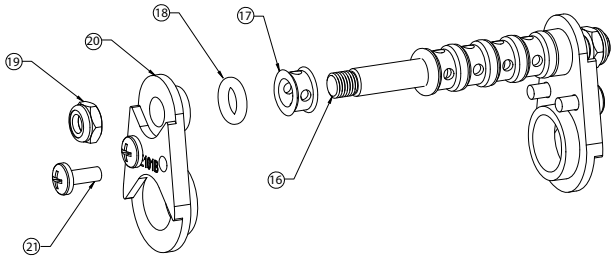
| ITEM | | |
|---|---|---|
| 49 | Manifold Bolts | 165 in-lbs (18.6 N-m) |
| 57 | Water Chamber Bolts | 160 in-lbs (18.1 N-m) |
| 28 | Diaphragm Plates — Rubber | 10 ft-lbs (13.6 N-m) |
| 28 | Diaphragm Plates — PTFE | 10 ft-lbs (13.6 N-m) |
| 9 | Air Valve Cap Screws | 30 in-lbs (3.4 N-m) |




## Detail A: Air Valve Assembly



## Detail B: Pilot Shaft Assembly



# TEMPERATURE LIMITS

## Temperature Limits

Maximum temperature limitations are based on mechanical stress only. Certain chemicals will reduce the maximum safe operating temperature of A.O.D. pumps. Consult your dealer or Chemical Resistance Guide for compatibility and temperature limits.

Polypropylene: 0°C (32°F) to 79°C (175°F)

Do NOT exceed the maximum temperature limits of the elastomer type (diaphragms, balls, seats) that are used in the pump.

Buna-N: -12°C (10°F) to 82°C (180°F)
XL TPE: -29°C (-20°F) to 149°C (300°F)

## Sound Level Ratings

1" Plastic pumps (model 1120-021) have a decibel reading of 78 dB(A) when equipped with a factory installed air exhaust muffler.

The decibel readings are obtained with a Pacer Industries model SL-120, sound level indicator “A” scale. Readings are made at a distance of 1 meter from the pump and at a height of 1.6 meters above the floor. It is assumed that the pumps will be installed at floor level.

## Moving Parts Hazard


The diaphragm plates (sometimes referred to as piston plates) located inside the pump on either side of the main shaft move when air pressure is supplied to the pump. Therefore, never attempt to operate the pump with the liquid chambers removed. Moving parts inside the pump can pinch or seriously injure fingers or other body parts.

**REVISION LOG**
SB 1093
10-09 Original Release

# Balcrank Lubrication Equipment Warranty Statement

All Balcrank equipment sold by authorized Balcrank distributors is warranted to their original customer to be free from defects in materials and workmanship for a period of one year from the date of sale to that customer. Selected Balcrank equipment carries warranty terms for a more extended period as defined in the Balcrank Lubrication Equipment & Accessories User Price List, wherein a "lifetime" warranty represents a warranty period of thirty years. Within the initial one-year warranty period, Balcrank will repair or replace all Balcrank equipment determined by Balcrank to have defective materials or workmanship. For equipment carrying more extended warranties, Balcrank will repair or replace the product including parts and labor during the first full year and will provide parts only for the remainder of the warranty period.

This warranty applies only to equipment installed and operated according to applicable Balcrank Service Bulletins and Installation Instructions.

Any equipment claimed to be defective must be returned, freight prepaid, to an Authorized Balcrank Service Center (ASC). Upon receiving candidate warranty equipment from a customer, ASC will: 1) diagnose to determine the warrantable condition of the equipment, 2) submit, prior to repair or replacement, a request to Balcrank for warranty authorization, then 3) in cooperation with Balcrank, proceed with repair locally or forward the equipment to Balcrank and obtain replacement. If the part(s) or equipment items are found defective upon inspection by Balcrank, they will be repaired or replaced, and then will be returned to the ASC. If Balcrank finds the claimed part(s) or equipment not to be defective, the ASC will receive written authorization from the original customer, and then repair them for a reasonable charge to the customer, which will include all applicable parts, labor, and return transportation costs.

Optionally, the customer may submit certain eligible products directly to Balcrank for warranty return by using Balcrank Lubrication Equipment Direct Service Warranty Procedure. Eligible products are defined in the Balcrank Lubrication Equipment & Accessories User Price List. Refer to the Balcrank web site www.balcrank.com for a copy.

Any equipment returned to Balcrank must have the Warranty Service Claim number (WSC#) clearly marked on the outside of the carton. Balcrank's sole responsibility is for defects in material and workmanship, and Buyer's sole and exclusive remedy hereunder, shall be limited to repair or replacement of the defective part or equipment.

This warranty does not cover, nor shall Balcrank be liable for repair or replacement of parts or equipment resulting from general wear and tear through use, or damage or failure caused by improper installation, abuse, misapplication, abrasion, corrosion, insufficient or improper maintenance, negligence, accident, alteration, or substitution of non-Balcrank parts.

Furthermore, the Warranty for Lubrication Equipment and Accessories does not cover the following specific conditions:

- Failure or damage to equipment caused by dirt or debris in compressed air lines and fluid lines. This includes, but is not limited to, clogged inlet filters, strainers, or regulators; fluid meters; control handles; fluid tips; and valves.
- Failure of normal wear parts including but not limited to: o-rings, packings, seals and valves unless originally improperly installed by the factory.
- Products placed in applications for which their use was not intended. Examples include but are not limited to Lubricant pump being used to pump solvents, or placing equipment intended strictly for indoor use outdoors
- Damage to equipment resulting from operation above and beyond Balcrank's recommendations.
- Leaks at air and fluid fittings and connections.
- Damage caused by thermal expansion whenever adequate pressure relief was not included in the system.
- Loose suction tubes on pumps.
- Incorrect hose reel spring tension, requiring adjustment.

THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL BALCRANK BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL, OR OTHER DAMAGES OF SIMILAR NATURE, INCLUDING BUT NOT LIMITED TO LOST PROFITS, LOST PRODUCTION, PROPERTY DAMAGE, PERSONAL INJURY, WHETHER SUFFERED BY BUYER OR ANY THIRD PARTY, IRRESPECTIVE OF WHETHER CLAIMS OR ACTIONS, LEGAL OR EQUITABLE, FOR SUCH DAMAGES ARE BASED UPON CONTRACTS, WARRANTY, NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE. ANY CLAIM OR ACTION FOR BREACH OF WARRANTY MUST BE BROUGHT WITHIN TWO (2) YEARS FROM THE DATE OF SALE TO THE ORIGINAL CUSTOMER.

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