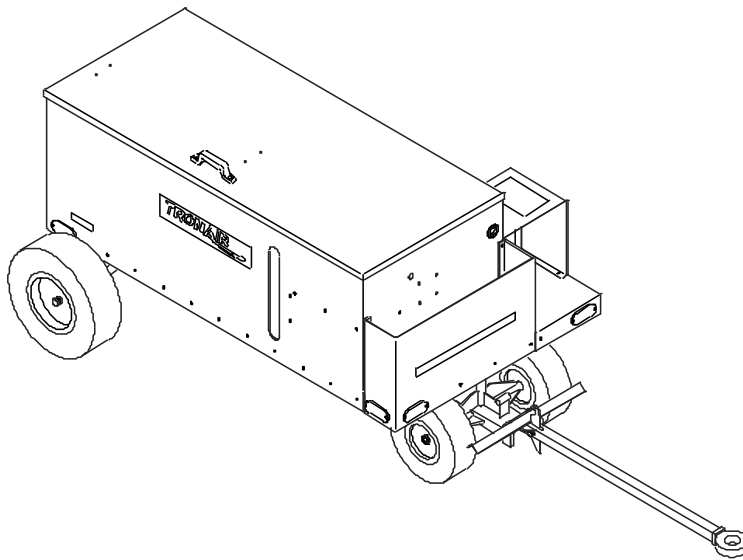




Operation & Service Manual



Model: 06-5025-X610 Reservoir Servicing Unit

06/1996 – Rev. 03

Includes Illustrated Parts List

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APPENDIX III	Harris Regulator Instruction Manual	

This product can not be modified without the written approval of Tronair, Inc. Any modifications done without written approval voids all warranties and releases Tronair, Inc., its suppliers, distributors, employees, or financial institutions from any liability from consequences that may occur. Only Tronair OEM replacement parts shall be used.

1.0 GENERAL DESCRIPTION

The Tronair Reservoir Service Unit is a compact unit primarily designed to provide a source of clean fluid for filling reservoirs. **It is not intended to perform any pressure testing tasks.**

2.0 SPECIFICATIONS

Model Number: 06-5025-X610
Fluid: Phosphate Ester
Maximum Pressure: 125 PSI
Filter (Micron): 2 and 15
Dimensions (Inches): 50 Wide x 73 Long x 50 High
Weight: 390 lbs
Pump Displacement: 5.0 GPM @ 90 PSI (Displacement will decrease with increase in back pressure.)

3.0 FEATURES

- 15 foot output hose
- 2 micron main filter with 15 micron inline filter at end of hose
- Adjustable Pressure Regulator
- 68 Gallon Fluid Reservoir
- Hose Compartment
- Pneumatic Tires
- Parking Brake
- Easy Loading of Nitrogen Bottle
- Pneumatic Pump driven by 230 cu. ft. Nitrogen Bottle (Customer Supplied)

4.0 OPTIONS

Option 06: Nitrogen Service
Option 07: Reservoir Filling
Option 08: Shop Air
Option 09: Output Hose with Wand

5.0 PREPARATION FOR USE



CAUTION!

Maximum towing speed is 10 MPH.

The unit is shipped fully assembled, and only the following steps are required to make it operational:

1. Install standard 230 cu. ft. nitrogen bottle onto unit. (See 6.0 Nitrogen Bottle Installation and Figure on following page.)
2. Fill 68 gallon fluid tank with desired mineral based hydraulic fluid.



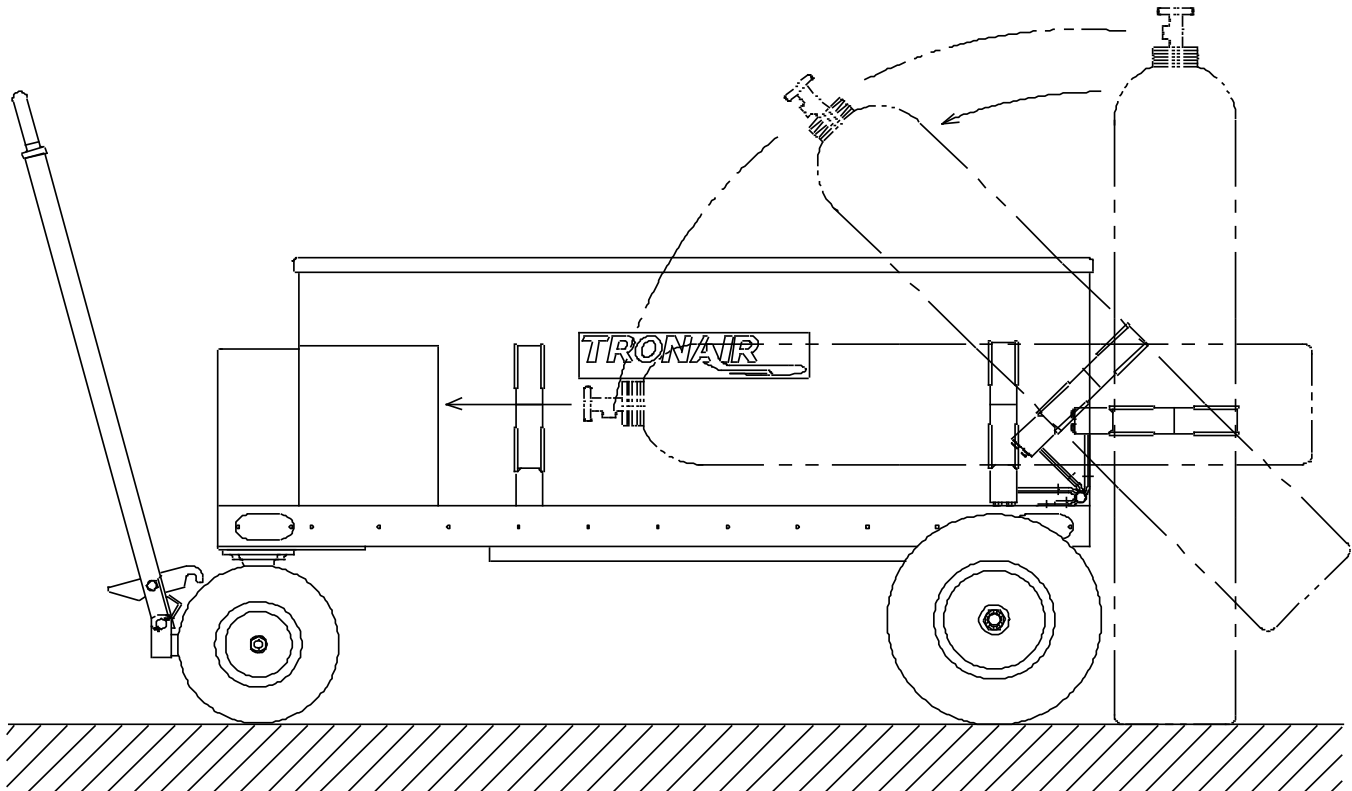
CAUTION!

Only use the type of fluid for which the unit is designed. Using other fluids will cause contamination and seal deterioration.

6.0 NITROGEN BOTTLE INSTALLATION

1. Position nitrogen bottle in front of bottle clamp.
2. Position bottle stop away from bottle clamp.
3. Rotate bottle clamp to vertical position and clamp securely around standard 230 cubic foot nitrogen bottle.
4. Rotate bottle to horizontal position on bottle supports.
5. Relieve clamp pressure and slide nitrogen bottle toward front of cart until bottle rests against the front stop. Rotate bottle until output valve is in line with cart nitrogen input line.
6. Re-secure bottle clamp and rotate rear bottle stop behind bottle.

Note: Due to minor variations in nitrogen bottle lengths, it may be necessary to adjust the location of the rear bottle stop. The stop has slotted holes, and can be adjusted simply by loosening mounting bolts and re-tightening them after adjusting.



Nitrogen Bottle Installation

7.0 OPERATION

Aircraft Fill Procedure:

1. If the unit is equipped with the reservoir filling option (Option 07 - See Page 14), make sure the selector valve is turned to the "Fill Aircraft Reservoir" position prior to servicing aircraft.
2. Connect output hose to aircraft reservoir.
3. Open nitrogen bottle valve, or connect shop air if unit has the shop air option (Option 08).
4. Set regulated nitrogen pressure to pneumatic pump. **DO NOT** exceed 125 PSI maximum.
5. Open output valve at aircraft end of output hose to fill the aircraft reservoir.
6. Close output valve when aircraft reservoir is full.
7. Close nitrogen supply valve.
8. Slowly disconnect output hose and remove from aircraft reservoir.

8.0 MAINTENANCE

Maintain 45-50 PSI tire pressure and grease wheel bearings quarterly.

8.1 FILTERS

The 2 micron hydraulic fluid filter is non-bypass. This means that, if the filter becomes clogged, no fluid will pass through it to the output hose. If this happens, service the filters. **DO NOT increase the input pressure as damage to components could result.**

8.2 SERVICE

The 15 micron hose end filter may be cleaned by removing and back flushing with clean hydraulic fluid or a neutral fluid. **DO NOT use chlorinated solvents for this purpose.** If desired, this filter may be replaced.

The main filter is replaceable and should be serviced annually or as necessary based on existing operating environment.

9.0 OPTION 06: NITROGEN SERVICE

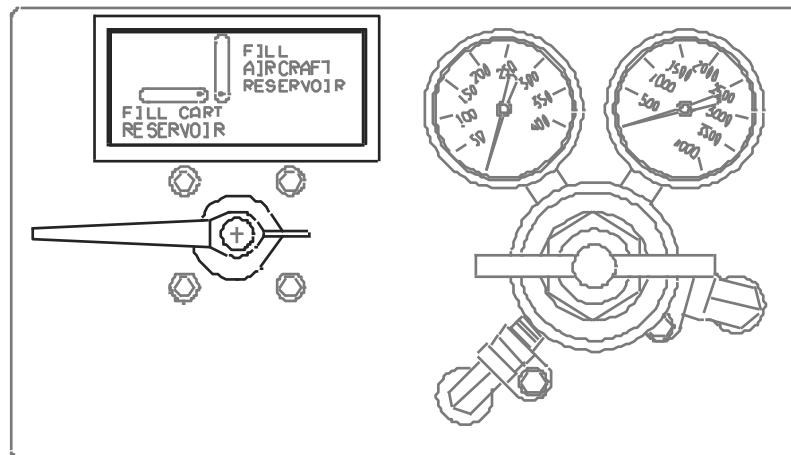
The Nitrogen Service Option (Option 06) allows the nitrogen bottle aboard the cart to be used to provide regulated bottle pressure (maximum 250 PSI) for external customer applications. This is accomplished by diverting the flow of nitrogen away from the pneumatic pump through an external hose assembly.

10.0 OPTION 07: RESERVOIR FILLING

The Reservoir Filling Option (Option 07) allows the cart to pump hydraulic fluid **into** the 68 gallon reservoir. A four-way valve assembly controls the direction of fluid flow (into the reservoir or out of the reservoir). Also, a bung fitting pickup tube assembly is included with this option for convenience.

Reservoir Filling Procedure:

1. Remove bung fitting assembly from underside of lid.
2. Remove dust cap on the end of the 120 inch long hose connected to the selector valve and install the bung fitting assembly to hose.
3. Secure the bung fitting assembly into container of desired clean hydraulic fluid.
4. Close ball valve at aircraft end of output hose.
5. Turn selector valve on cart to "Fill Cart Reservoir". (See Figure below.)



SELECTOR VALVE IN "FILL CART RESERVOIR" POSITION

6. Open nitrogen bottle valve/connect (Option 08 - See Page 15) shop air.
7. Set regulated input pressure to pneumatic pump. **DO NOT** exceed 125 PSI maximum.
8. Decrease input pressure regulator as reservoir becomes filled.
9. Close nitrogen bottle valve and disconnect or shut off supply shop air.
10. Remove bung fitting assembly from hydraulic fluid source and wipe clean.
11. Replace bung fitting assembly to holder under the lid.

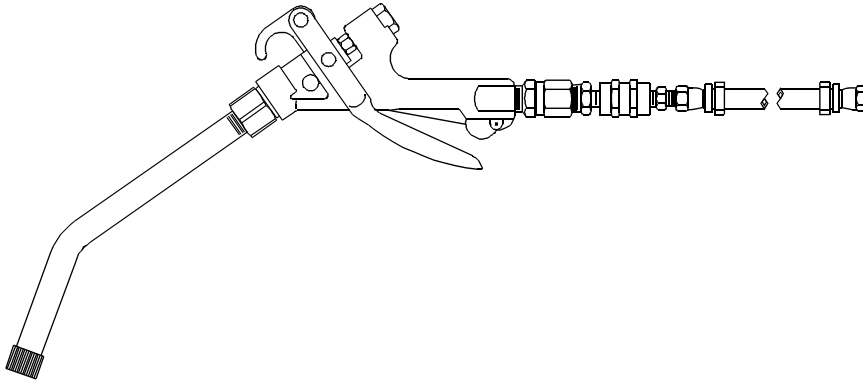
11.0 OPTION 08: SHOP AIR

The shop air option (Option 08) allows the unit to be powered by customer supplied shop air instead of the on-board nitrogen bottle. A quick disconnect air fitting is provided on the unit with this option for connecting shop air to the cart. A check valve assembly assures proper flow of the air through the regulator and, ultimately through the pneumatic pump. With this option, both the shop air and/or nitrogen can be used interchangeably.

NOTE: Both options, the Nitrogen Service (Option 06) and the Shop Air (Option 08), cannot be installed onto the same cart. Only one of these two options can be installed on a cart at one time.

12.0 OPTION 09: OUTPUT HOSE WITH WAND

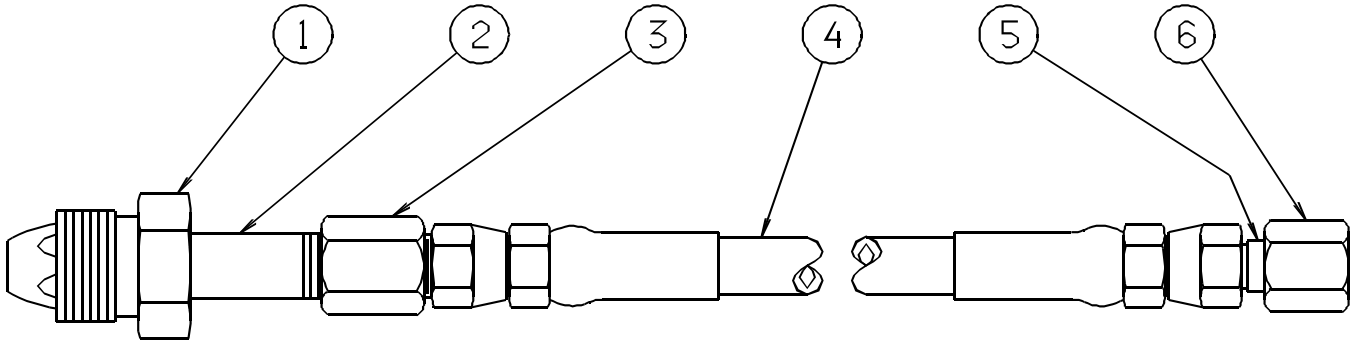
The optional output hose with wand (Option 09) is a special output hose with a pistol trigger. The same 15 micron nominal inline filter used with the standard output hose is used with this output hose assembly.



When using this hose assembly, simply depress the trigger to start flow of fluid, and release trigger to stop flow.

Z-2853 Input Hose Assembly

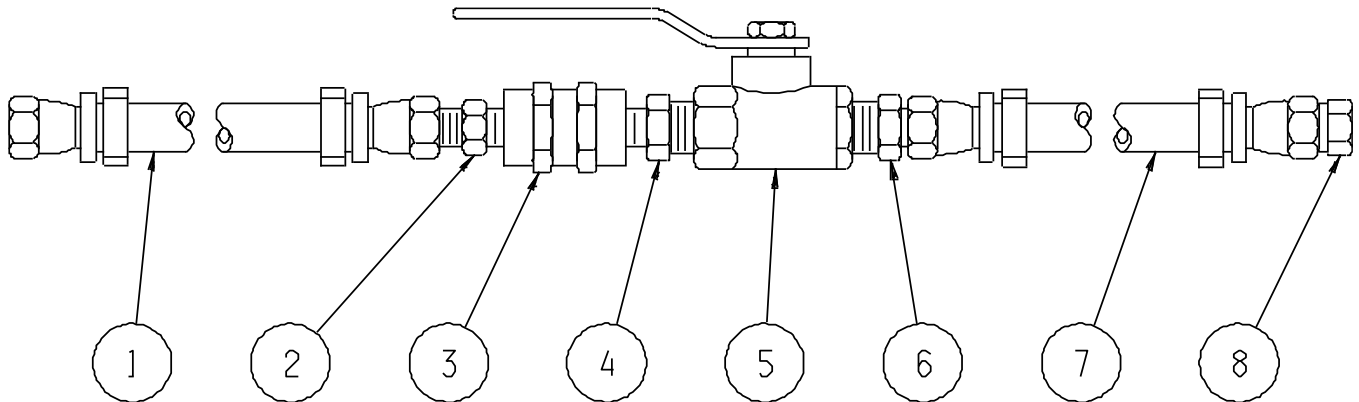
When ordering replacement parts/kits, please specify model & serial number of your unit.



ITEM	PART NUMBER	DESCRIPTION	QTY
1.....	PC-1001	Nut, Nitrogen	1
2.....	PC-1000	Nipple, Nitrogen	1
3.....	N-2010-04-S	Connector, Female.....	1
4.....	TF-1043-01*40.0	Assembly, Hose 40" long	1
5.....	N-2020-01-S	Reducer, Tube End	1
6.....	N-2000-05-S.....	Nut, 37° JIC flare	1

Z-2854 Output Hose Assembly

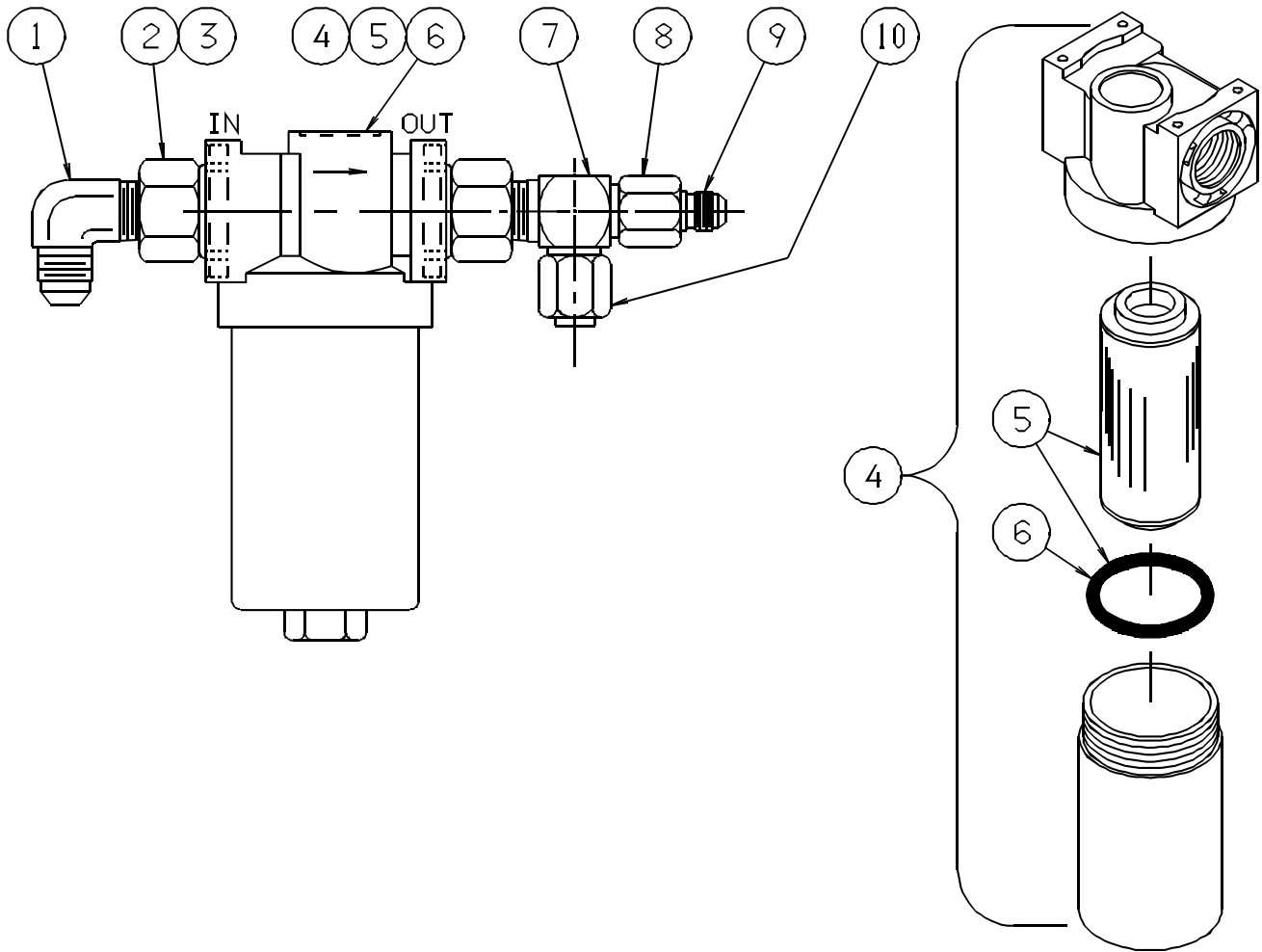
**** When ordering replacement parts/kits, please specify model & serial number of your unit. ****



ITEM	PART NUMBER	DESCRIPTION	QTY
1.....	TF-1084-01*180	Assembly, Hose (180" long)	1
2.....	N-2009-08-S	Connector, Male	1
3.....	HC-1484	Filter, Inline (15 micron).....	1
4.....	N-2203-06-S	Nipple, Pipe	1
5.....	HC-1425-02	Valve, Ball	1
6.....	N-2009-10-S	Connector, Male	1
7.....	TF-1084-01*25.0	Assembly, Hose (25" long)	1
8.....	N-2014-05-S	Plug	1

Z-2950 Filter Assembly

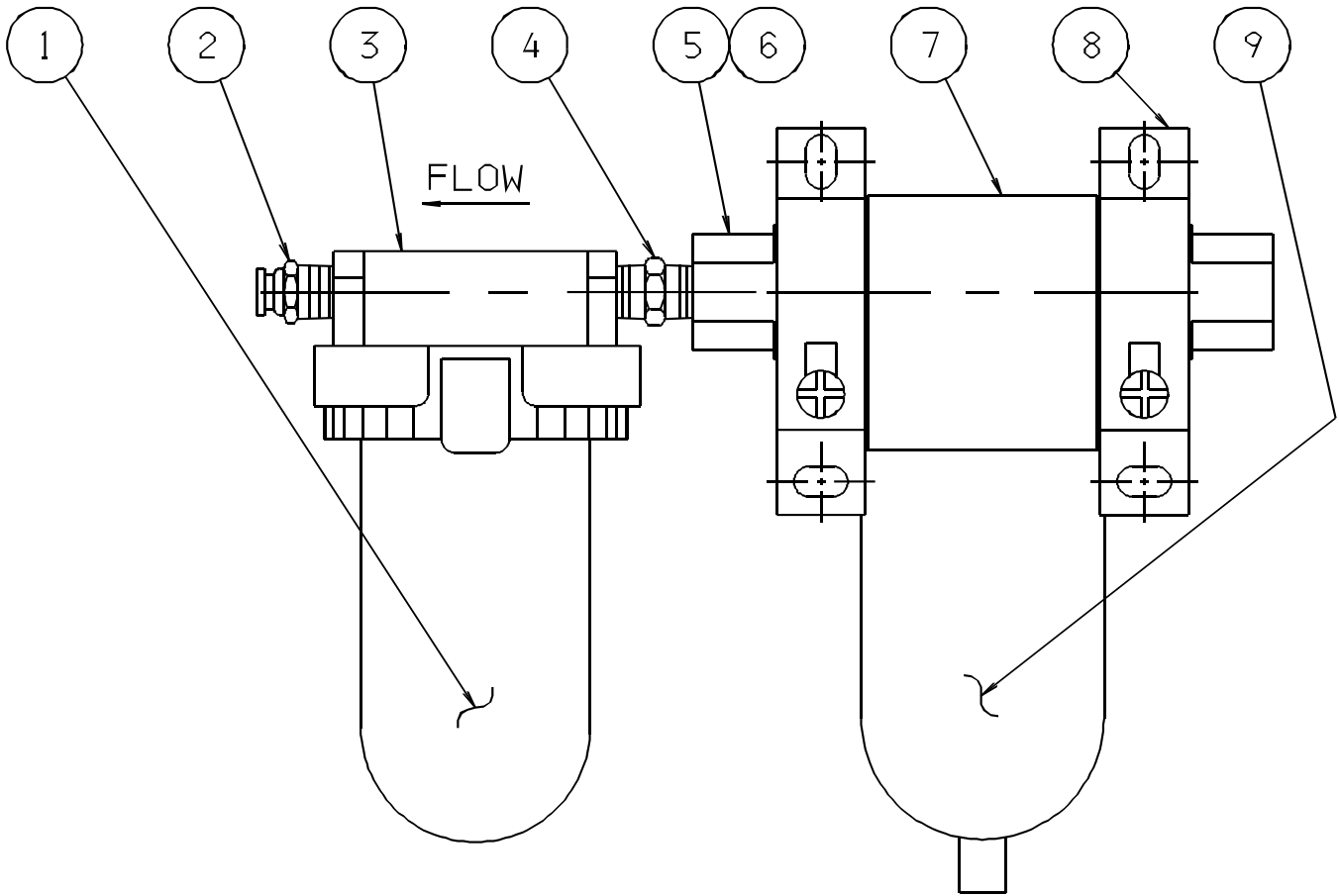
**** When ordering replacement parts/kits, please specify model & serial number of your unit. ****



ITEM	PART NUMBER	DESCRIPTION	QTY
1	N-2005-14-S	Elbow, Male	1
2	N-2202-09-S-E	Adaptor, Female Pipe	2
3	HC-2014-912	O-ring, Series 3	2
4	HC-1480	Assembly, Filter	1
5	HC-1483	Element, Filter	1
6	HC-2006-143	O-ring, Series 2	1
7	N-2017-14-S	Tee, Male Run	1
8	N-2000-06-S	Nut, 37° JIC Flare	1
9	N-2020-03-S	Reducer, Tube End	1
10	N-2008-06-S	Cap, 37° JIC Flare	1

Z-2949 Desiccant Filter Assembly

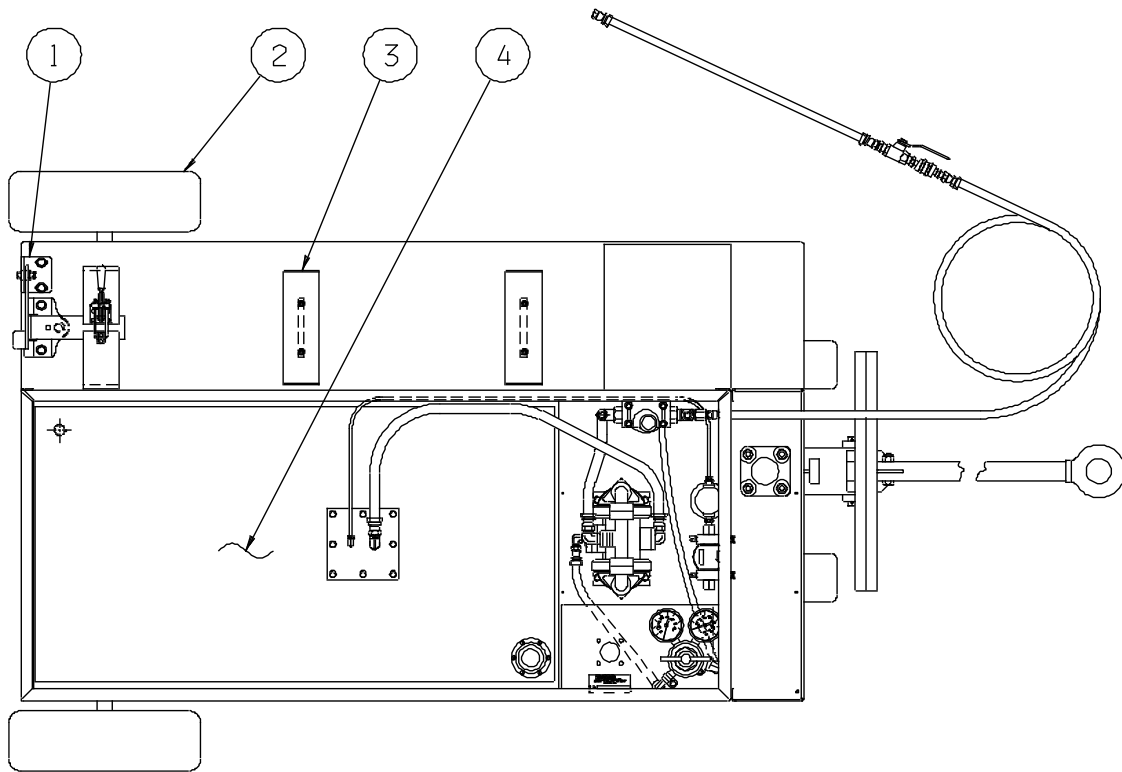
**** When ordering replacement parts/kits, please specify model & serial number of your unit.****



ITEM	PART NUMBER	DESCRIPTION	QTY
1.....	PC-1056	Desiccant, (3) 1/4 lb bags.....	1
2.....	N-2443-07.....	Connector, Male.....	1
3.....	PC-1053	Dryer, Desiccant.....	1
4.....	N-2203-04-B.....	Nipple, Pipe.....	1
5.....	PC-1055	End Block (Set of 2)	1
6.....	HC-2006-021	O-ring	2
7.....	PC-1052	Filter, Air.....	1
8.....	PC-1054	Bracket, Mount	2
9.....	PC-1059	Element, Filter	1

Parts List

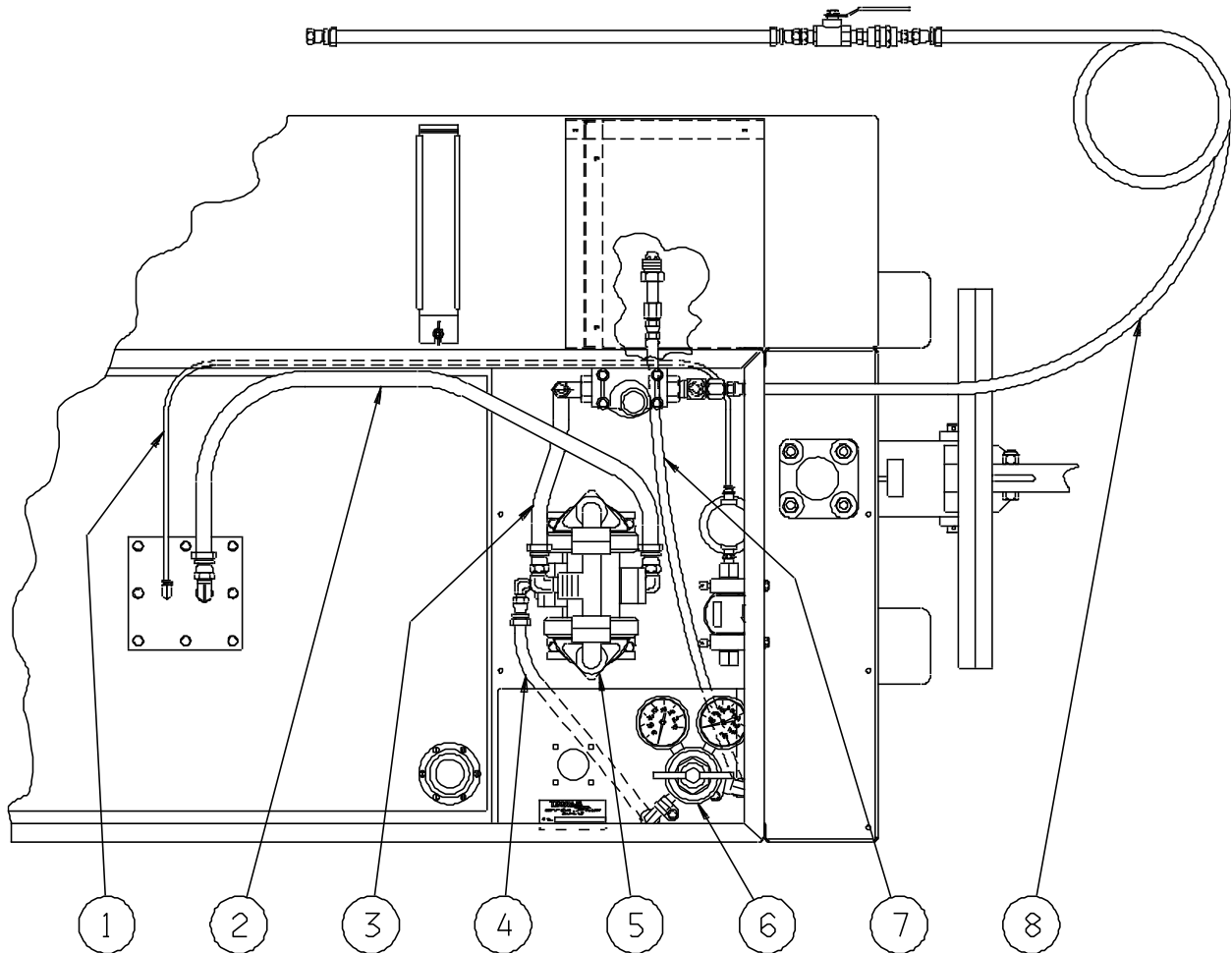
**** When ordering replacement parts/kits, please specify model & serial number of your unit.****



ITEM	PART NUMBER	DESCRIPTION	QTY
1	K-2284	Kit, Rear Bottle Stop Replacement:	
		Assembly, Lever	1
		Bolt	2
		Flatwasher	2
		Stopnut, Elastic	2
2	K-2285	Kit, Bottle Clamp Replacement:	
		Weldment, Clamp	1
		Bolt	3
		Flatwasher	3
		Stopnut, Elastic	3
3	Z-1217	Assembly, Tire:	
		Wheel	1
		Washer, Spindle	1
		Cotter Pin	1
		Nut, Axle	1
4	K-2286	Kit, Pillow Block Replacement:	
		Weldment, Pillow Block	1
		Bolt	2
		Flatwasher	2
		Lockwasher	2
5	K-2368	Kit, 68 Gallon Tank Replacement:	
		Nutsert, Closed End	8
		Tank, Machined	1

Parts List

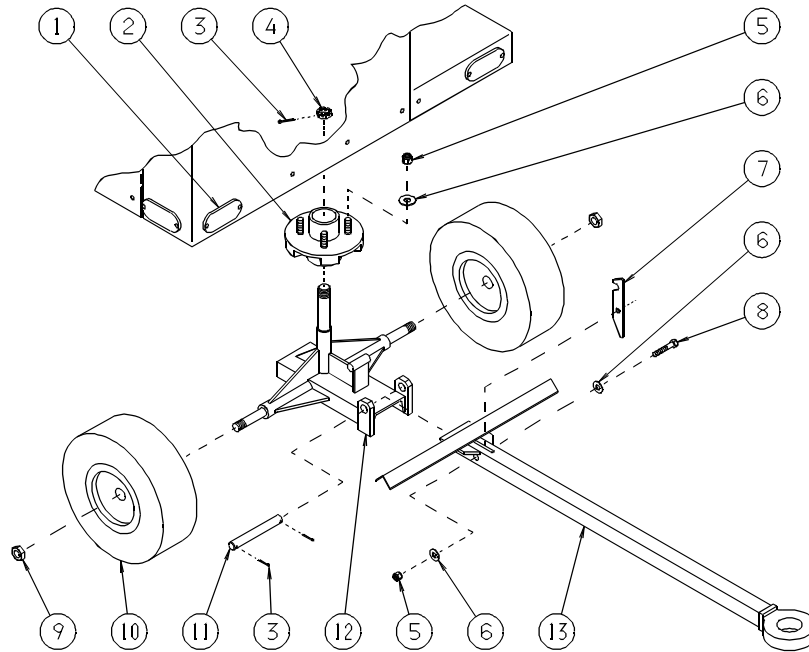
**** When ordering replacement parts/kits, please specify model & serial number of your unit.****



ITEM	PART NUMBER	DESCRIPTION	QTY
1.....	TF-1012*48.0.....	Hose, Polyethylene, 1/4" x 48" long	1
2.....	TF-1041-02*60.0	Assembly, Hose, Phosphate Ester, 60" long	1
3.....	TF-1041-02*20.0	Assembly, Hose, Phosphate Ester, 20" long	1
4.....	TF-1041-02*12.0	Assembly, Hose, Phosphate Ester, 12" long	1
5.....	H-2011.....	Pump, Pneumatic.....	1
6.....	H-1677.....	Regulator.....	1
7.....	Z-2853.....	Assembly, Input Hose	1
8.....	Z-2952.....	Assembly, Output Hose.....	1
9.....	N-2052-06.....	Expander, Tube.....	1

Parts List

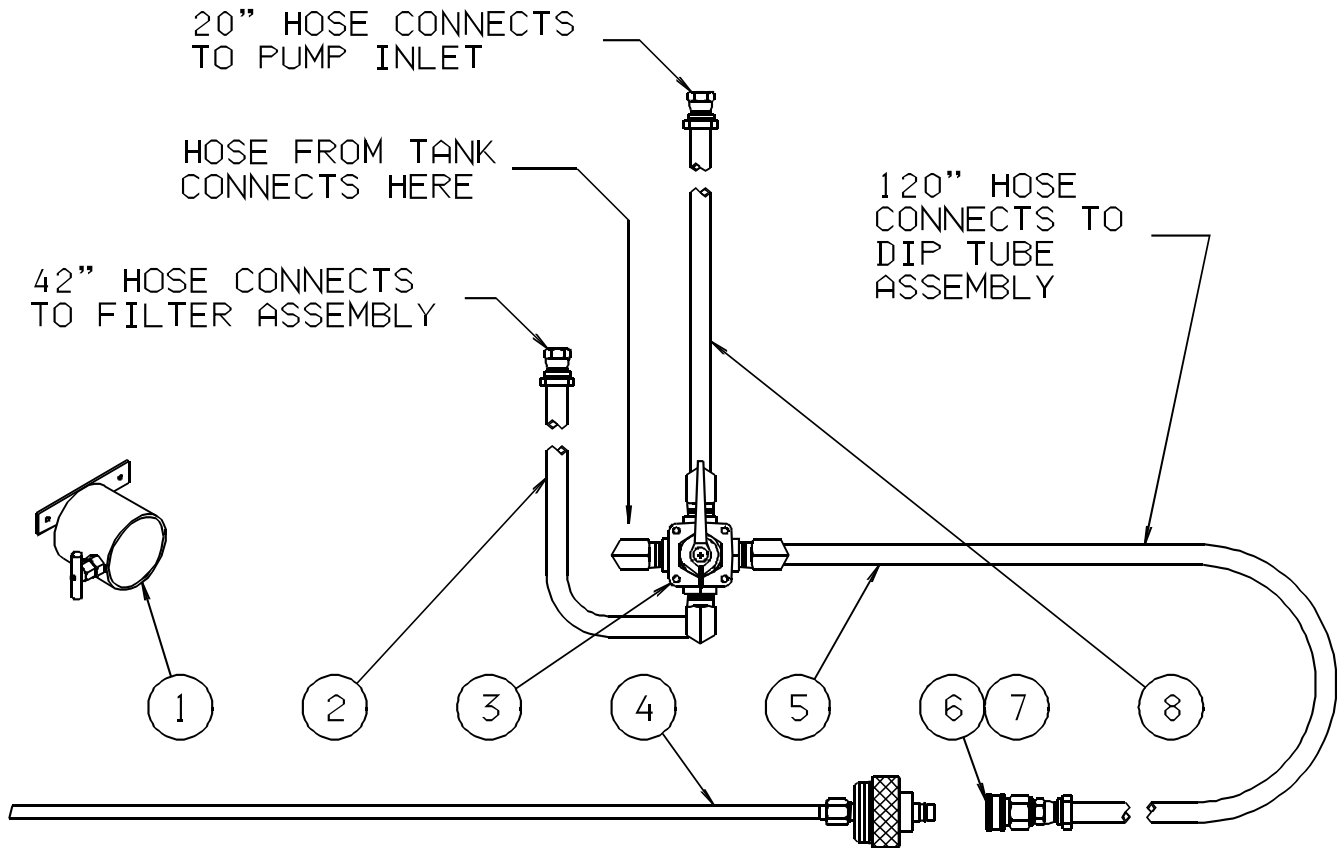
**** When ordering replacement parts/kits, please specify model & serial number of your unit.****



ITEM	PART NUMBER	DESCRIPTION	QTY
12	Z-4878-01	Weldment, Steering Axle	1
13	Z-4876-01	Weldment, Tongue	1
	K-2087	Kit, Amber Reflector Replacement:	
1		Reflector, Amber	1
		Rivet	2
	K-2086	Kit, Red Reflector Replacement (not shown):	
		Reflector, Red	1
		Rivet	2
	K-1255	Kit, Hub Replacement:	
2		Hub	1
3		Pin, Cotter	1
4		Nut, Axle	1
5		Stopnut, Elastic	4
6		Flatwasher	4
	K-1320	Kit, Lever Replacement:	
5		Stopnut, Elastic	1
6		Flatwasher	2
7		Lever	1
8		Bolt	1
	K-2084	Kit, Tire Replacement:	
9		Stopnut, Elastic	1
10		Wheel, Pneumatic Tired	1
	K-1249	Kit, Pin Replacement:	
3		Pin, Cotter	2
11		Pin	1

Option 07: Reservoir Filling

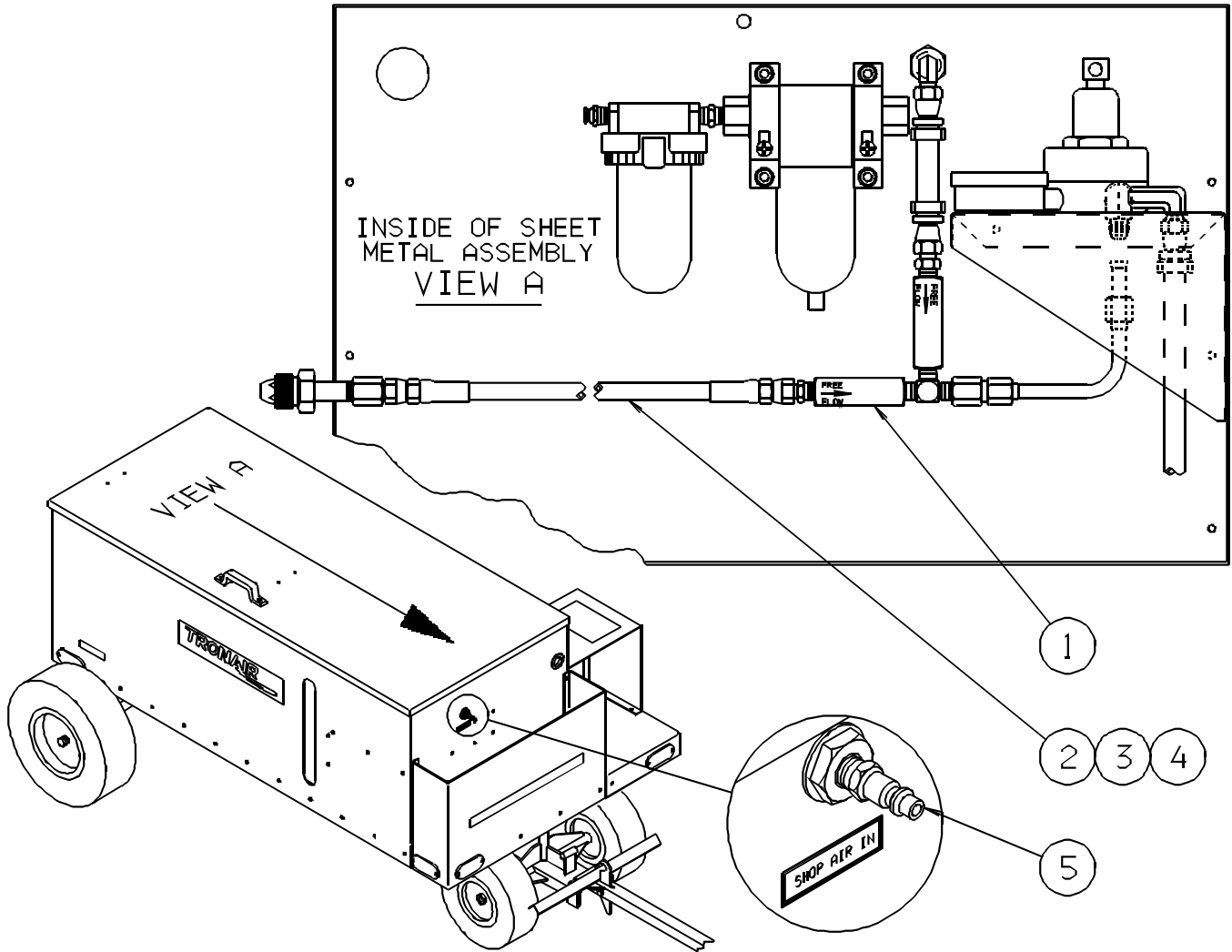
**** When ordering replacement parts/kits, please specify model & serial number of your unit.****



ITEM	PART NUMBER	DESCRIPTION	QTY
1	Z-2851	Assembly, Tube Mount	1
4	Z-2163-02	Assembly, Bung, Fitting (EPR)	1
	Z-2948	Assembly, Selector Valve:	
2	TF-1041-09*42.0	Assembly, Hose, 42" long	1
3	HC-1742	Valve, Selector, 3/4 (PE)	1
5	TF-1041-02*120	Assembly, Hose, 120" long	1
6	N-2430-0808	Coupling, Quick Disconnect	1
7	N-2438-02	Plug, Dust	1
8	TF-1041-02*20.0	Assembly, Hose, 20" long	1

Option 08: Z-2957 Check Valve Assembly

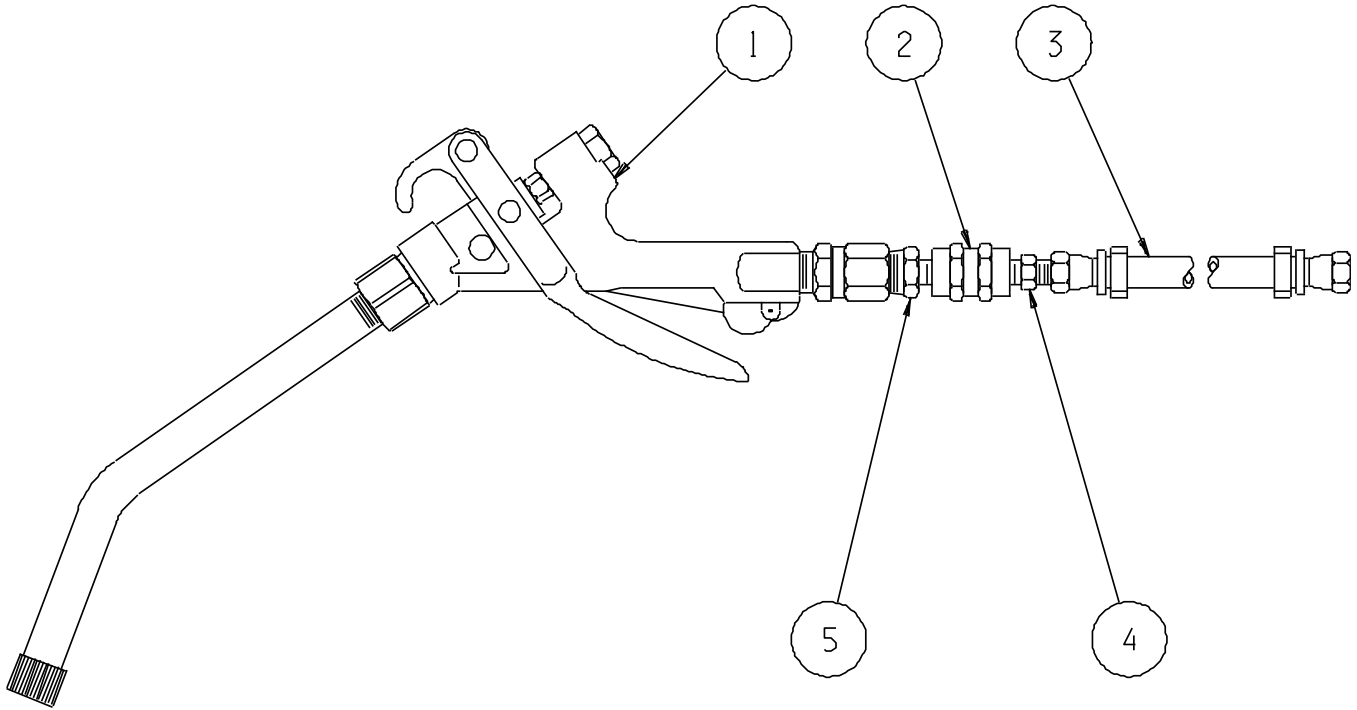
**** When ordering replacement parts/kits, please specify model & serial number of your unit.****



ITEM	PART NUMBER	DESCRIPTION	QTY
1.....	HC-1080	Valve, Check	2
2.....	TF-1043-02*22.0	Assembly, Hose 22" long	1
3.....	PC-1000	Nipple	1
4.....	PC-1001	Nut.....	1
5.....	PC-1058	Fitting, Air Quick Disconnect	1

Option 09: Z-2959 Output Hose Assembly

**** When ordering replacement parts/kits, please specify model & serial number of your unit. ****



ITEM	PART NUMBER	DESCRIPTION	QTY
1.....	HC-1635	Valve, Control.....	1
2.....	HC-1484	Filter, In-line, 15 micron.....	1
3.....	TF-1041-02*300	Assembly, Hose, 300" long	1



APPENDIX I

**Instrument
Certification
Notice**



Instrument Certification Notice

The gauge Certificates of Calibration supplied for the gauge(s) on this unit contain the calibration data for the actual instrument calibrated, along with the calibration date of the **STANDARD** used to perform the calibration check.

The due date for re-calibration of the instrument should be based upon the date the instrument was placed in service in your facility. Re-calibration should be done on a periodic basis as dictated by the end user's quality system or other overriding requirements.

Note that Tronair, Inc. does not supply certificates of calibration on flow meters or pyrometers unless requested at the time of placed order. These instruments are considered reference indicators only and are not critical to the test(s) being performed on the aircraft.

Tronair, Inc.

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Phone: (419) 866-6301 ! 800-426-6301

Fax: (419) 867-0634

Web Site: www.tronair.com E-mail Address: sales@tronair.com



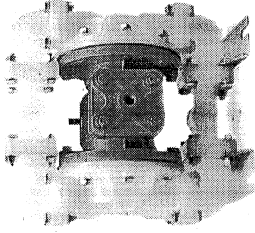
APPENDIX II

Lincoln Pump Service & Operating Manual

SERVICE & OPERATING MANUAL



**Models 85626, 85622, 85623
1/2" Air-Powered Diaphragm Pump**



CE

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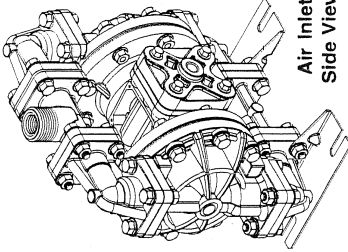


Models 85626, 85622, 85623

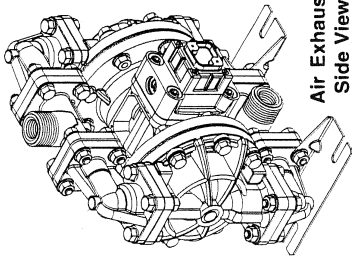
**Air-Powered
Double-Diaphragm Pump**

ENGINEERING, PERFORMANCE
& CONSTRUCTION DATA

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



Air Inlet
Side View

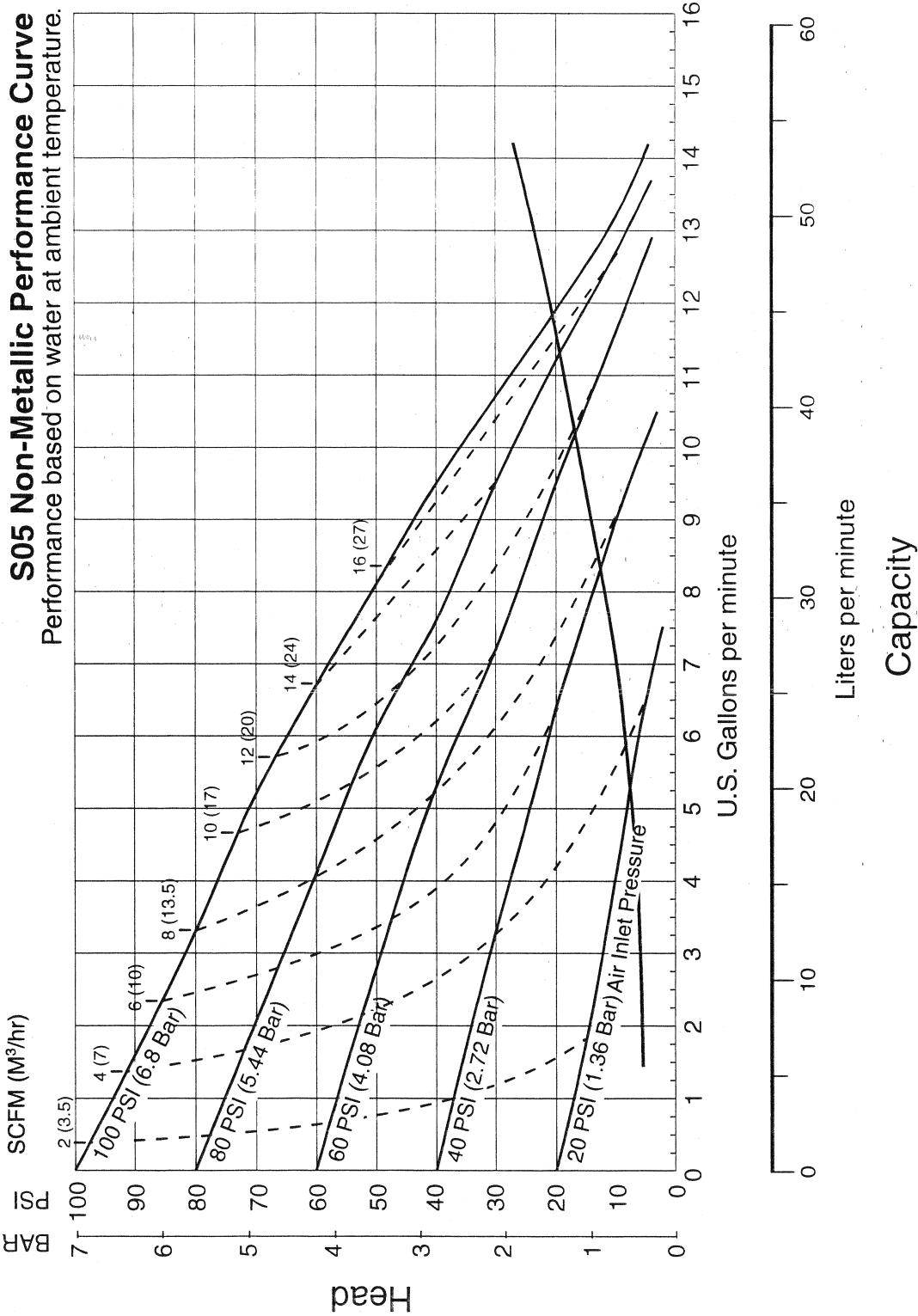


Air Exhaust
Side View

INTAKE/DISCHARGE PIPE SIZE 1/2" NPT (Internal) or 1/2" BSPT (Tapered) 1" NPT (External) or 1" BSPT (Tapered)	CAPACITY 0 to 14 gallons per minute (0 to 52 liters per minute)	AIR VALVE No-lube, no-stall design	SOLIDS-HANDLING Up to .125 in. (3mm)	HEADS UP TO 100 psi or 231 ft. of water (7 Kg/cm ² or 70 meters)	DISPLACEMENT/STROKE .026 Gallon / .098 liter
CAUTION! Operating temperature limitations are as follows:					
MATERIALS					
<p>Buna: 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.</p>					
<p>Conductive Acetal:</p>					
<p>Nylon:</p>					
<p>PVDF:</p>					
<p>Virgin PTFE: Chemically inert, virtually impervious. Very few chemicals are known to react chemically 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.</p>					
<p>Polyurethane: High tensile material with excellent abrasion resistance. A general purpose material with excellent resistance to most oils.</p>					
<p>Polpropylene:</p>					
<p>Santoprene®: Injection molded thermoplastic elastomer with no fabric layer. Long mechanical flex life. Excellent abrasion resistance.</p>					
<p>For specific applications, always consult "Chemical Resistance Chart" Technical Bulletin Lincoln pumps are designed to be powered only by compressed air.</p>					
			Operating Temperatures		
			Minimum*		Optimum**
			190° F 88° C	-10° F -23° C	50° to 140° F 10° to 60° C
			180° F 82° C	-20° F -28° C	
			120° F 48° C	32° F 0° C	
			200° F 93° C	10° F -13° C	50° to 212° F 10° to 100° C
			212° F 100° C	-35° F -37° C	50° to 212° F 24° to 100° C
			210° F 99° C	-40° F -40° C	-40° to 210° F -40° to 99° C
			150° F 65° C	40° F 5° C	
			212° F 100° C	-10° F -23° C	50° to 212° F 10° to 100° C

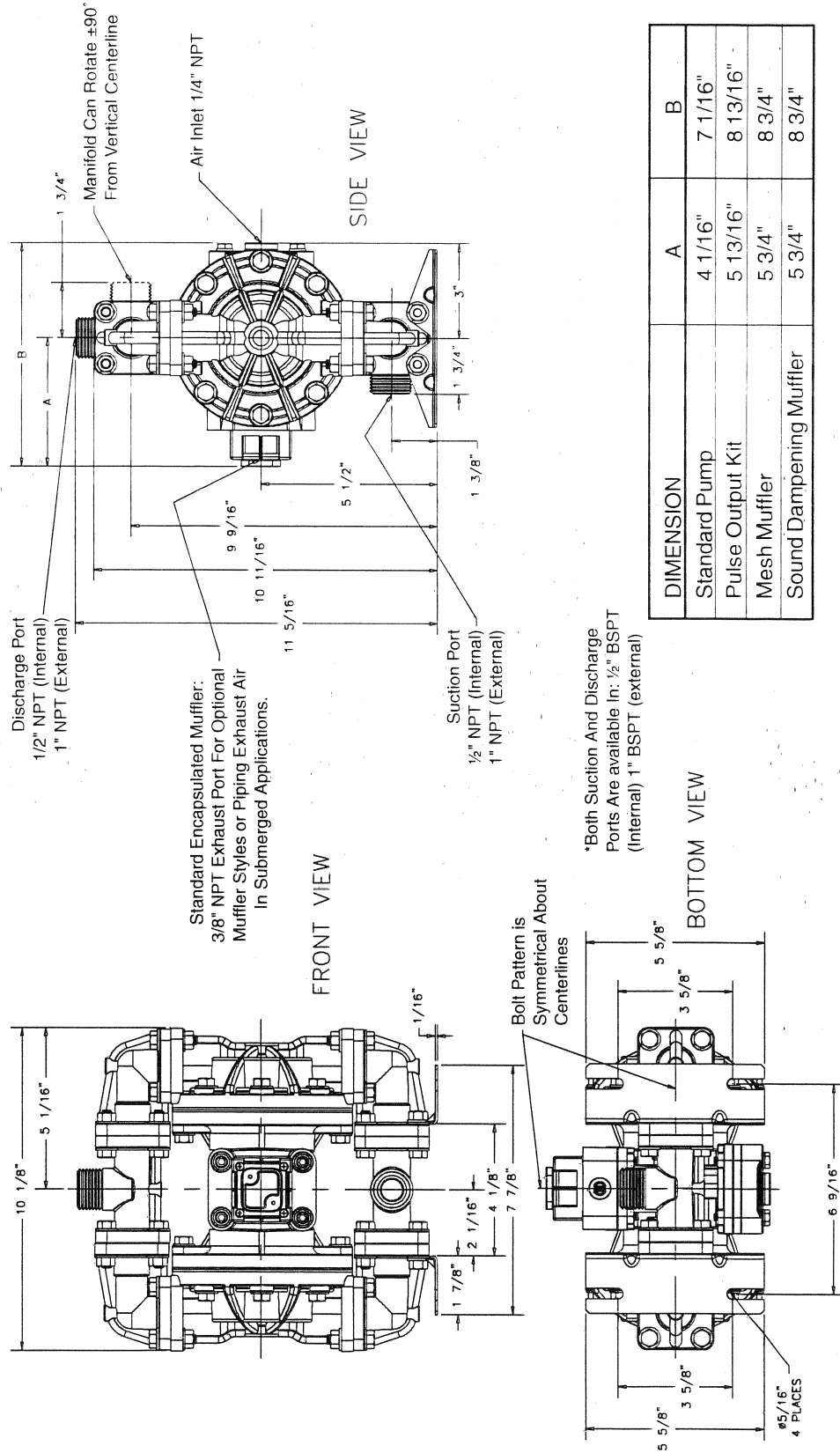
*Definite reduction in service life.
**Minimal reduction in service life at ends of range.

Performance Curve



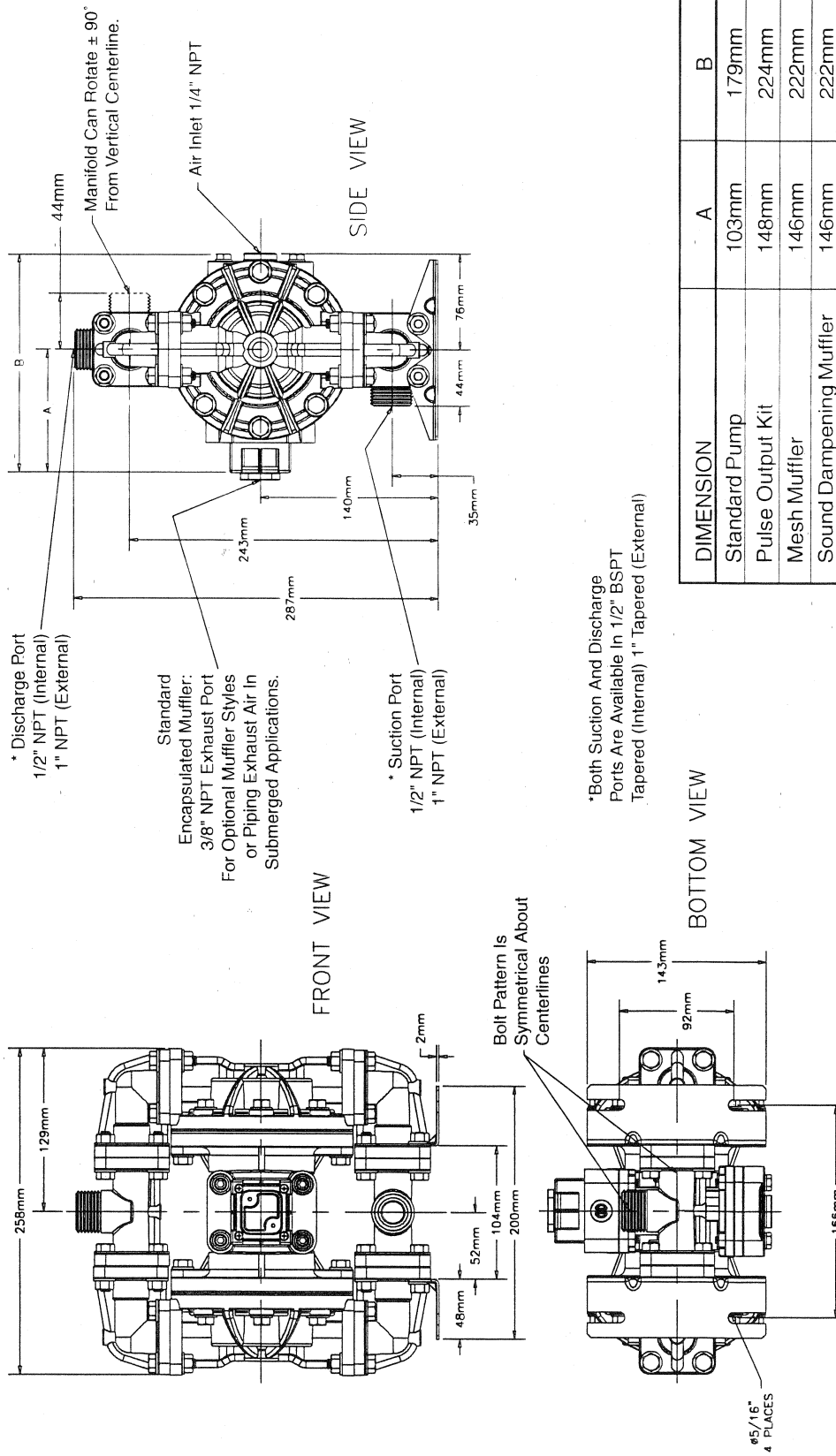
Dimensions:

Dimensions in Inches
Dimensional tolerance: $\pm 1/8"$



Metric Dimensions:

Dimensions in millimeters
Dimensional tolerance: ±3mm



PRINCIPLE OF PUMP OPERATION

This ball type check valve pump is powered by compressed air and is a 1:1 ratio design. The inner side of one diaphragm chamber is alternately pressurized while simultaneously exhausting the other inner chamber. This causes the diaphragms, which are connected by a common rod secured by plates to the centers of the diaphragms, to move in a reciprocating action. (As one diaphragm performs the discharge stroke the other diaphragm is pulled to perform the suction stroke in the opposite chamber.) Air pressure is applied over the entire inner surface of the diaphragm while liquid is discharged from the opposite side of the diaphragm. The diaphragm operates in a balanced condition during the discharge stroke which allows the pump to be operated at discharge heads over 200 feet (61 meters) of water.

For maximum diaphragm life, keep the pump as close to the liquid being pumped as possible. Positive suction head in excess of 10 feet of liquid (3.048 meters) may require a back pressure regulating device to maximize diaphragm life.

Alternate pressurizing and exhausting of the diaphragm chamber is performed by an externally mounted, pilot operated, four way spool type air distribution valve. When the spool shifts to one end of the valve body, inlet pressure is applied to one diaphragm chamber and the other diaphragm chamber exhausts. When the spool

shifts to the opposite end of the valve body, the pressure to the chambers is reversed. The air distribution valve spool is moved by a internal pilot valve which alternately pressurizes one end of the air distribution valve spool while exhausting the other end. The pilot valve is shifted at each end of the diaphragm stroke when an actuator plunger is contacted by the diaphragm plate. This actuator plunger then pushes the end of the pilot valve spool into position to activate the air distribution valve.

The chambers are connected with manifolds with a suction and discharge check valve for each chamber, maintaining flow in one direction through the pump.

INSTALLATION AND START-UP

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

For installations of rigid piping, short sections of flexible hose should be installed between the pump and the piping. The flexible hose reduces vibration and strain to the pumping system. A Warren Rupp Tranquilizer® surge suppressor is recommended to further reduce pulsation in flow.

AIR SUPPLY

Air supply pressure cannot exceed 125 psi (8.6 bar). Connect the pump air inlet to an air supply of sufficient capacity and pressure required for desired performance. When the air

supply line is solid piping, use a short length of flexible hose not less than 1/2" (13mm) in diameter between the pump and the piping to reduce strain to the piping. The weight of the air supply line, regulators and filters must be supported by some means other than the air inlet cap. Failure to provide support for the piping may result in damage to the pump. A pressure regulating valve should be installed to insure air supply pressure does not exceed recommended limits.

AIR VALVE LUBRICATION

The air distribution valve and the pilot valve are designed to operate WITHOUT lubrication. This is the preferred mode of operation. There may be instances of personal preference or poor quality air supplies when lubrication of the compressed air supply is required. The pump air system will operate with properly lubricated compressed air supply. Proper lubrication requires the use of an air line lubricator (available from Warren Rupp) set to deliver one drop of SAE 10 non-detergent oil for every 20 SCFM (9.4 liters/sec.) of air the pump consumes at the point of operation. Consult the pump's published Performance Curve to determine this.

AIR LINE MOISTURE

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

to supplement the user's air drying equipment. This device removes water from the compressed air supply and alleviates the icing or freezing problems.

AIR INLET AND PRIMING

To start the pump, open the air valve approximately 1/2" to 3/4" turn. After the pump primes, the air valve can be opened to increase air flow as desired. If opening the valve increases cycling rate, but does not increase the rate of flow, cavitation has occurred. The valve should be closed slightly to obtain the most efficient air flow to pump flow ratio.

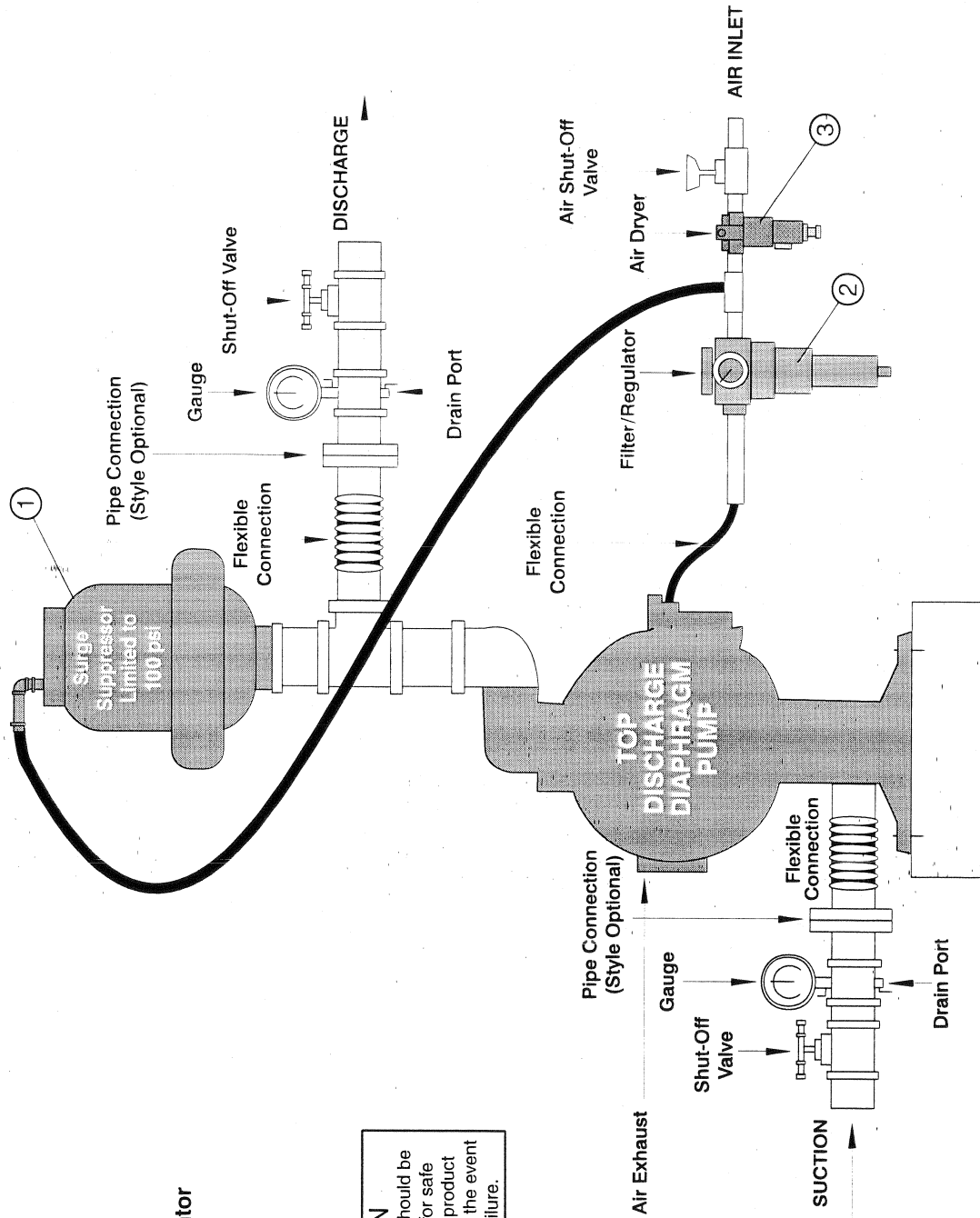
BETWEEN USES

When the pump is used for materials that tend to settle out or solidify when not in motion, the pump should be flushed after each use to prevent damage. (Product remaining in the pump between uses could dry out or settle out. This could cause problems with the diaphragms and check valves at restart.) In freezing temperatures the pump must be completely drained between uses in all cases.

Available from
Warren Rupp

- ① DA05 Surge Suppressor
- ② 020-049-000 Filter/Regulator
- ③ 020-049-001 Lubricator

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.



TROUBLESHOOTING

Possible Symptoms:

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

What to Check: Excessive suction lift in system.

Corrective Action: For lifts exceeding 20 feet (6 meters), filling the pumping chambers with liquid will prime the pump in most cases.

What to Check: Excessive flooded suction in system.

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

What to Check: System head exceeds air supply pressure.

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

What to Check: Air supply pressure or volume exceeds system head.

Corrective Action: Decrease inlet air pressure and volume to the pump as calculated on the published PERFORMANCE CURVE. Pump is cavitating the fluid by fast cycling.

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

What to Check: Restricted or undersized air line.

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

What to Check: Check ESADS, the Externally Serviceable Air Distribution System of the pump.

Corrective Action: Disassemble and inspect the main air distribution valve; pilot valve and pilot valve actuators. Refer to the parts drawing and air valve section of the SERVICE MANUAL. Check for clogged discharge or closed valve before reassembly.

What to Check: Rigid pipe connections to pump.

Corrective Action: Install flexible connectors and a Warren Rupp Tranquilizer® Surge Suppressor.

What to Check: Blocked air exhaust muffler.

Corrective Action: Remove muffler screen, clean or de-ice and reinstall. Refer to the Air Exhaust section of your pump SERVICE MANUAL.

What to Check: Pumped fluid in air exhaust muffler.

Corrective Action: Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly. Refer to the Diaphragm Replacement section of your pump SERVICE MANUAL.

What to Check: Suction side air leakage or air in product.

Corrective Action: Visually inspect all suction side gaskets and pipe connections.

What to Check: Obstructed check valve.

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

What to Check: Worn or misaligned check valve or check valve seat.

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

What to Check: Blocked suction line.

Corrective Action: Remove or flush obstruction. Check and clear all suction screens and strainers.

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

What to Check: Blocked pumping chamber.

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

What to Check: Entrained air or vapor lock in one or both pumping chambers.

Corrective Action: Purge chambers through tapped chamber vent plugs, PURGING THE CHAMBERS OF AIR CAN BE DANGEROUS! Contact the Technical Services Department before performing this procedure. Any model with top-ported discharge will reduce or eliminate problems with entrained air.

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

Recycling

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

Important Safety Information



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



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.

Material Codes

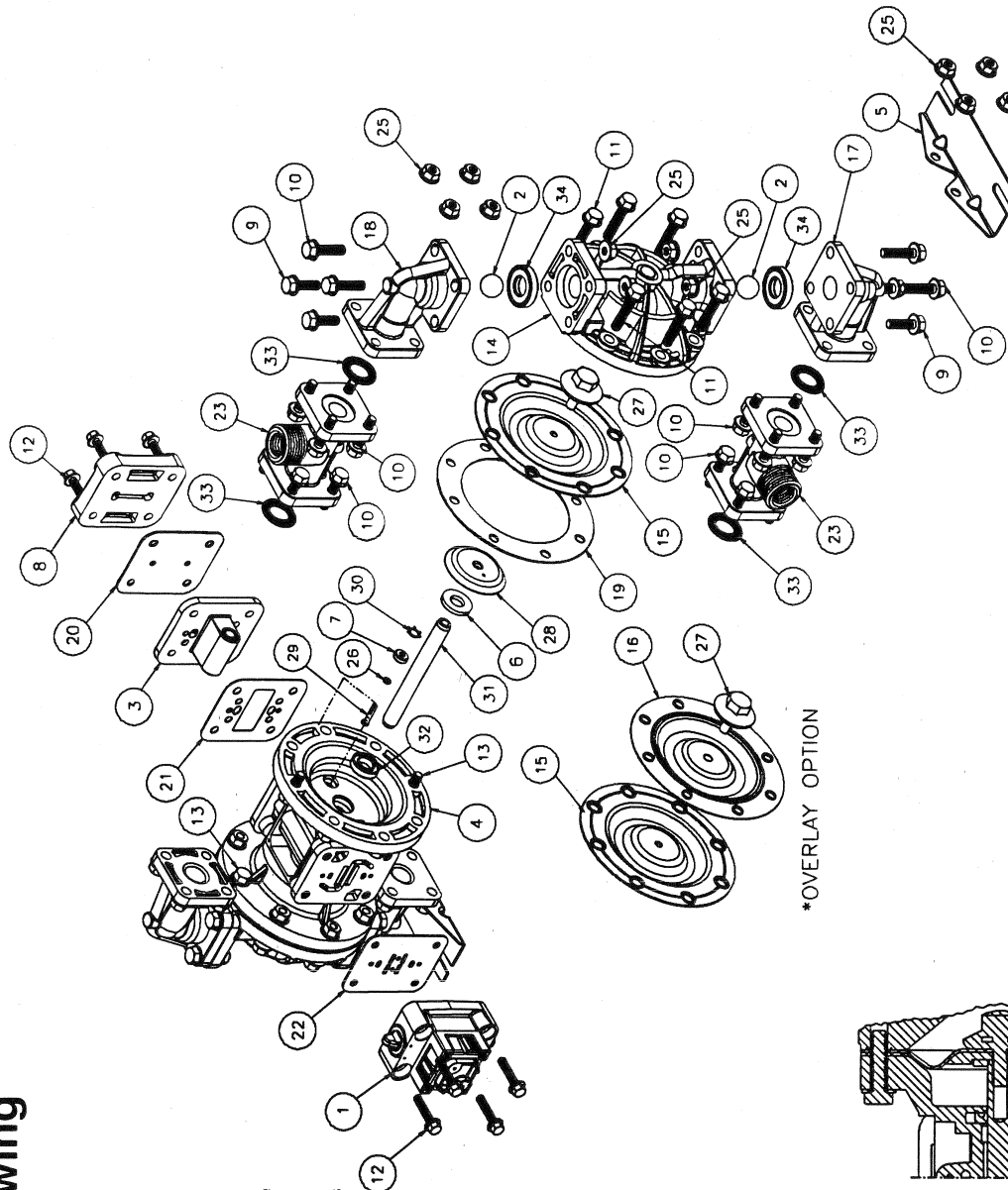
The Last 3 Digits of Part Number

000 Assembly, sub-assembly; and some purchased items	175 Die Cast Zinc	375 Fluorinated Nitrile	610 PTFE Encapsulated Silicon
010 Cast Iron	180 Copper Alloy	378 High Density Polypropylene	611 PTFE Encapsulated Viton
012 Powder Metal	305 Carbon Steel, Black Epoxy Coated	405 Cellulose Fibre	632 Neoprene/Hytrel
015 Ductile Iron	306 Carbon Steel, Black PTFE Coated	408 Cork and Neoprene	633 Viton/PTFE
020 Ferritic Malleable Iron	307 Aluminum, Black Epoxy Coated	425 Compressed Fibre	634 EPDM/PTFE
025 Music Wire	308 Stainless Steel, Black PTFE Coated	426 Blue Gard	635 Neoprene/PTFE
080 Carbon Steel, AISI B-1112	309 Aluminum, Black PTFE Coated	440 Vegetable Fibre	637 PTFE, Viton/PTFE
100 Alloy 20	310 Kynar Coated	465 Fibre	638 PTFE, Hytrel/PTFE
110 Alloy Type 316 Stainless Steel	330 Zinc Plated Steel	500 Delrin 500	639 Santoprene®/EPDM
111 Alloy Type 317 Stainless Steel	331 Chrome Plated Steel	501 Delrin 570	644 Santoprene®/PTFE
112 Alloy "C" (Hastelloy equivalent)	332 Aluminum, Electroless Nickel Plated	502 Conductive Acetal, ESD-800	656 Santoprene Diaphragm and Check Balls/EPDM Seats
113 Alloy Type 316 Stainless Steel (Electro Polished)	333 Carbon Steel, Electroless Nickel Plated	503 Conductive Acetal, Glass-Filled	661 EPDM/Santoprene
114 303 Stainless Steel (Hand Polished)	335 Galvanized Steel	505 Acrylic Resin Plastic	
115 302/304 Stainless Steel	336 Zinc Plated Yellow Brass	506 Delrin 150	
117 440-C Stainless Steel (Martensitic)	337 Silver Plated Steel	520 Injection Molded PVDF Natural color	
120 416 Stainless Steel (Wrought Martensitic)	340 Nickel Plated	540 Nylon	
123 410 Stainless Steel (Wrought Martensitic)	342 Filled Nylon	541 Nylon	Delrin, Viton and Hytrel are registered trademarks of E.I. DuPont.
148 Hardcoat Anodized Aluminum	353 Geolast; Color: Black	542 Nylon	Nylon is a registered trademark of Garlock, Inc.
149 2024-T4 Aluminum	354 Injection Molded #203-40 Santoprene- Duro 40D +/-5; Color: RED	544 Nylon Injection Molded	Nylatron is a registered trademark of Polymer Corp.
150 6061-T6 Aluminum	355 Thermal Plastic	550 Polyethylene	Santoprene is a registered trademark of Monsanto Corp.
151 6063-T6 Aluminum	356 Hytrel	551 Glass Filled Polypropylene	Rulon II is a registered trademark of Dixon Industries Corp.
152 2024-T4 Aluminum (2023-T351)	357 Injection Molded Polyurethane	552 Unfilled Polypropylene	Hastelloy-C is a registered trademark of Cabot Corp.
154 Almag 35 Aluminum	358 Urethane Rubber (Some Applications) (Compression Mold)	553 Unfilled Polypropylene	Ryton is a registered trademark of Phillips Chemical Co.
155 356-T6 Aluminum	359 Urethane Rubber	555 Polyvinyl Chloride	Valox is a registered trademark of General Electric Co.
156 356-T6 Aluminum	360 Buna-N Rubber. Color coded: RED	556 Black Vinyl	
157 Die Cast Aluminum Alloy #380	361 Buna-N	570 Rulon II	
158 Aluminum Alloy SR-319	363 Viton (Fluorel). Color coded: YELLOW	580 Ryton	
159 Anodized Aluminum	364 E.P.D.M. Rubber. Color coded: BLUE	590 Valox	
162 Brass, Yellow, Screw Machine Stock	365 Neoprene Rubber. Color coded: GREEN	591 Nylatron G-S	
165 Cast Bronze, 85-5-5-5	366 Food Grade Nitrile	592 Nylatron NSB	
166 Bronze, SAE 660	368 Food Grade EPDM	600 PTFE (virgin material)	
170 Bronze, Bearing Type, Oil Impregnated	370 Butyl Rubber. Color coded: BROWN	601 PTFE (Bronze and moly filled)	
	371 Phlithane (Tuftane)	602 Filled PTFE	
	374 Carboxylated Nitrile	603 Blue Gylon	
		604 PTFE	
		607 Envelon	
		606 PTFE	

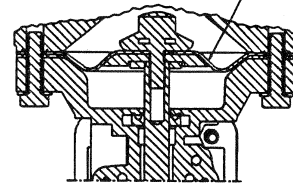
Composite Repair Parts Drawing

Available Service And Conversion Kits

- Updated TBA **AIR END KIT**
Seals, O-ring, Gaskets, Retaining Rings, Air Valve Assembly and Pilot Valve Assembly
- 271871 **WET END KIT**
Buna Diaphragms, Buna Check Balls, PTFE Seats and PTFE Seals
- 271873 **WET END KIT**
Santoprene Diaphragms Nitrile Spacer Gaskets, Santoprene Check Balls, PTFE Seats and PTFE Seals
- 271872 **WET END KIT**
Santoprene Diaphragms, PTFE Overlay Diaphragm, PTFE Check Balls, PTFE Seats and PTFE Seals



*OVERLAY OPTION



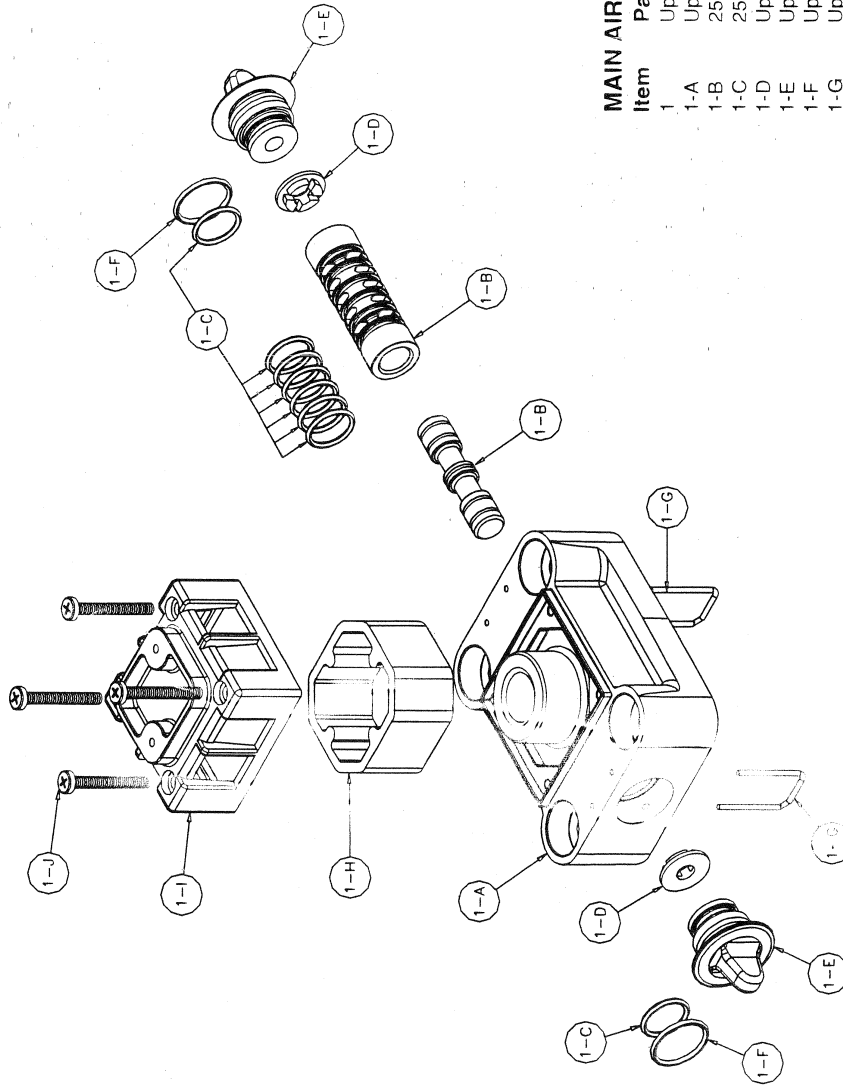
DIAPHRAGM CONFIGURATION DETAIL

NOTE TO ASSEMBLY FOR BOTH CONFIGURATIONS SHOWN ABOVE ARE TO BE INSTALLED WITH CONVOLUTIONS FACING TOWARDS CENTER OF PUMP

Composite Repair Parts List

ITEM	DESCRIPTION	QTY	MODEL 85623	MODEL 85622	MODEL 85626
1	Air Valve Assembly	1	Updated TBA	Updated TBA	Updated TBA
2	Ball, Check	4	252896 PTFE	252895 Santoprene	272208
3	Pilot Valve Assembly	1	252897	252897	252897
4	Intermediate Assembly	1	271986	271986	271986
5	Bracket, Mounting	2	271996	271996	271996
6	Bumper, Diaphragm	2	252900	252900	252900
7	Bushing, Plunger	2	252901	252901	252901
8	Cap, Air Inlet	1	271987	271987	271987
9	Capscrew, Flanged 5/16-18 x 1.00	8	271988	271988	271988
10	Capscrew, Flanged 5/16-18 x 1.25	24	271989	271989	271989
11	Capscrew, Flanged 5/16-18 x 1.50	12	271990	271990	271990
12	Capscrew, Flanged 1/4-20 x 1.25	8	271991	271991	271991
13	Capscrew, Flanged 5-16-18 x .88	4	271992	271992	271992
14	Chamber, Outer	2	271985	271985	271985
15	Diaphragm	2	252907	252907	271865
16	Diaphragm, Overlay	2	252908		
17	Elbow, Suction	2	252909	252909	252909
18	Elbow, Discharge	2	271994	271994	271994
19	Gasket, Spacer	2	252910	252910	252910
20	Gasket, Air Inlet	1	252911	252911	252911
21	Gasket, Pilot Valve	1	252912	252912	252912
22	Gasket, Air Valve	1	252913	252913	252913
23	Manifold	2	252914	252914	252914
25	Nut, Hex 5/16-13"	36	271993	271993	271993
26	O-Ring	2	240655	240655	240655
27	Plate, Outer Diaphragm	2	240768	240768	240768
28	Plate, Inner Diaphragm	2	252917	252917	252917
29	Plunger, Actuator	2	252918	252918	252918
30	Ring, Retaining	2	240717	240717	240717
31	Rod, Diaphragm	1	252920	252920	252920
32	Seal, Diaphragm Rod	2	252921	252921	252921
33	Seal, Manifold	4	252922	252922	252922
34	Seat, Check Valve	4	271995	271995	271995

Air Distribution Valve Assembly Drawing



MAIN AIR VALVE ASSEMBLY PARTS LIST

Item	Part Number	Description	Qty
1	Updated TBA	Air Valve Assembly	1
1-A	Updated TBA	Body, Air Valve	1
1-B	252929	Sleeve and Spool Set	1
1-C	252927	O-Ring	8
1-D	Updated TBA	Bumper	2
1-E	Updated TBA	End Cap	2
1-F	Updated TBA	O-Ring	2
1-G	Updated TBA	End Cap Retainer	2
1-H	Updated TBA	Muffler	1
1-I	252931	Muffler Cap	1
1-J	252932	Self-Tapping Screw	4

AIR DISTRIBUTION VALVE SERVICING

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

Step #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 3/8" wrench or socket, remove the four hex flanged capscrews (item 12). Remove the air valve assembly from the pump.

Step #2: Disassembly of the air distribution valve.

To access the internal air valve components first remove the two end cap retainers (item 1-G) by inserting a small flat screwdriver into the two slotted grooves on the valve body and gently lifting the retainers out.

Next remove the two end caps (item 1-E) by grasping the pull tab with finger and thumb or pliers and tugging. Inspect the two o-rings (items 1-C and 1-F) on each end cap for wear or cuts. Replace the o-rings if necessary.

Remove the two bumpers (items 1-D) and inspect for wear or damage. Be careful not to scratch or damage the outer diameter of the spool. Wipe spool with a soft cloth and inspect for scratches or wear.

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

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B). **Note:** The sleeve and spool set is match-ground to a specified clearance. Sleeves and spools cannot be interchanged.

Step #3: Reassembly of the air distribution valve.

Install one bumper (item 1-D) and one end cap with o-rings (items 1-E, 1-C, and 1-F) into one end of the air valve body (item 1-A). Insert one end cap retainer (item 1-G) into the two smaller holes, align with groove in the end cap, and push until the closed end of the retainer is below the flat surface of the valve body.

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

Install the remaining bumper, end cap with o-rings, and retainer.

Fasten the air valve assembly (item 1) and gasket (item 22) to the pump, using the four hex flanged capscrews (item 12).

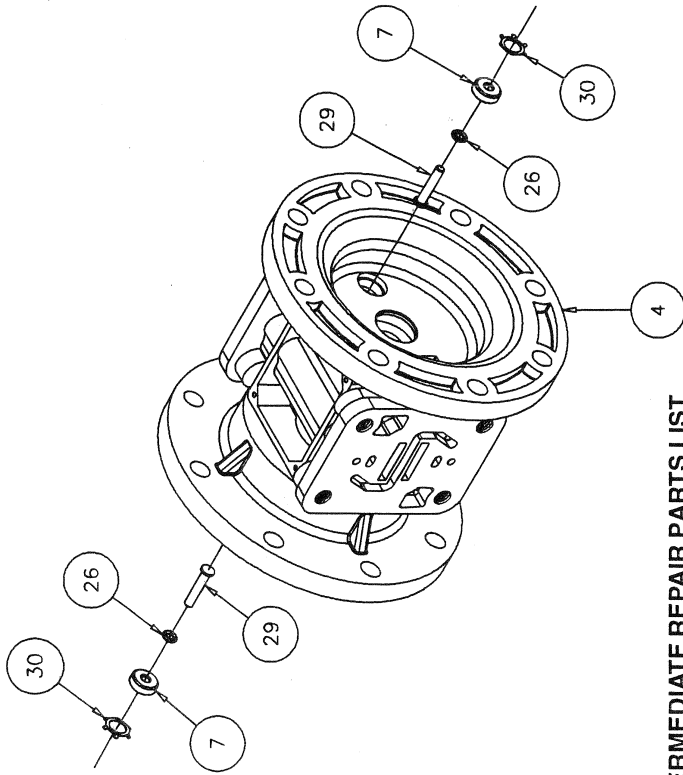
Connect the compressed air line to the pump. The pump is now ready for operation.



IMPORTANT

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

Intermediate Assembly Drawing



INTERMEDIATE REPAIR PARTS LIST

Item	Part Number	Description	Qty
4	271986	Bracket, Intermediate	1
7	252901	Bushing, Plunger	2
26	240655	O-Ring	2
29	252918	Plunger, Actuator	2
30	240717	Ring, Retaining*	2

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

Intermediate Assembly Servicing

ACTUATOR PLUNGER SERVICING

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

Step #1: See PUMP ASSEMBLY DRAWING.

Using a 3/8" wrench or socket, remove the four cap screws (items 12). Remove the air inlet cap (item 8) and air inlet gasket (item 20). The pilot valve assembly (item 3) can now be removed.

Step #2: Servicing the actuator plungers.

See PUMP ASSEMBLY DRAWING. The actuator plungers (items 29) can be reached through the stem cavity of the pilot valve in the intermediate bracket (item 4). To service bushings, o-rings and retaining rings, see Intermediate Drawing.

Remove the plungers (items 29) from the bushings (item 7) in each end of the intermediate cavity. Inspect for wear or damage. Replace plunger as needed. Apply a light coating of grease to each o-ring and re-install the plungers in to the bushings. Push the plungers in as far as they will go.

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

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

Re-install the gasket (item 20), air inlet cap (item 8) and cap screws (items 12).

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

PLUNGER BUSHING, O-RING, AND RETAINING RING SERVICING

To service the plunger bushing components first remove the two retaining rings (items 30) using a small flat screwdriver. *Note: It is recommended that new retaining rings be installed.

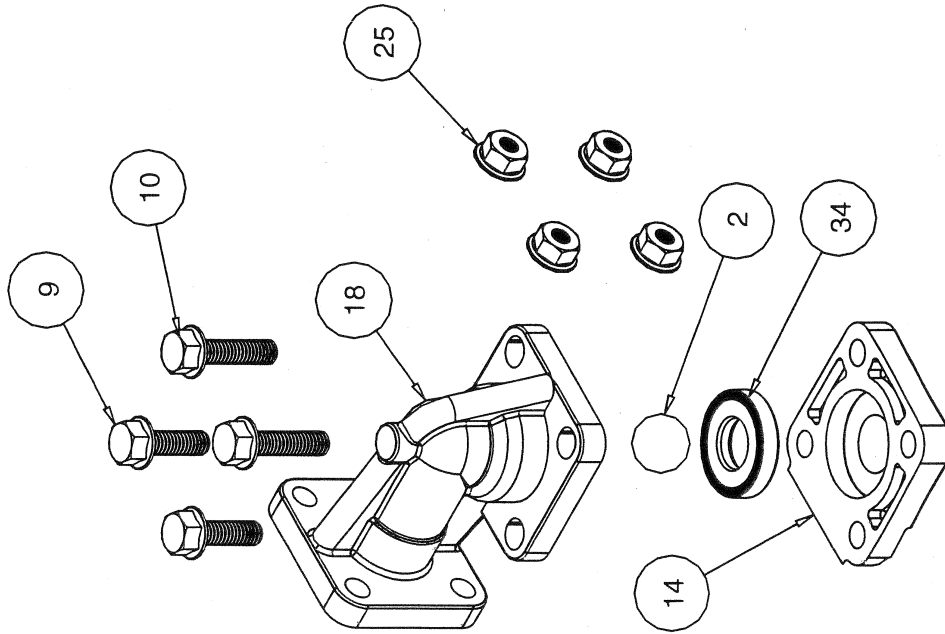
Next remove the two plunger bushings (items 7). Inspect the bushings for wear or scratches. Replace the bushings as necessary.

Inspect the two o-rings (26) for cuts and/or wear.



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

Check Ball 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 and 18 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).

Inspect the check balls (items 2) for wear, abrasion, or cuts on the spherical surface. The check valve seats (items 34) should be inspected for cuts, abrasive wear, or embedded material on the surfaces of both the external and internal chamfers. The spherical surface of the check balls must seat flush to the surface of the inner chamfer on the check valve seats for the pump to operate to peak efficiency. Replace any worn or damaged parts as necessary.

RE-ASSEMBLE THE CHECK VALVE

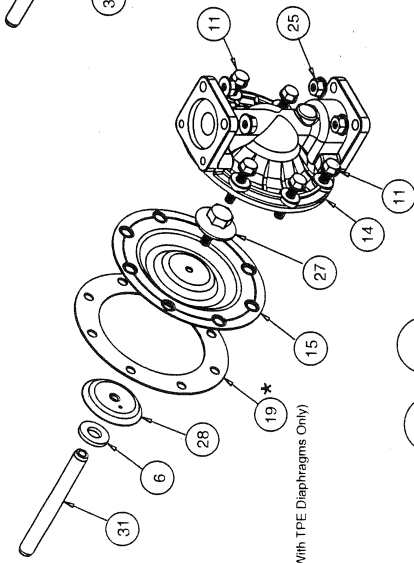
Place a check ball (item 2) in the ball cage of either the discharge elbow or the outer chamber. Install a check valve seat in the counter on each end of the chamber. Refasten the elbows to the chamber.

IMPORTANT

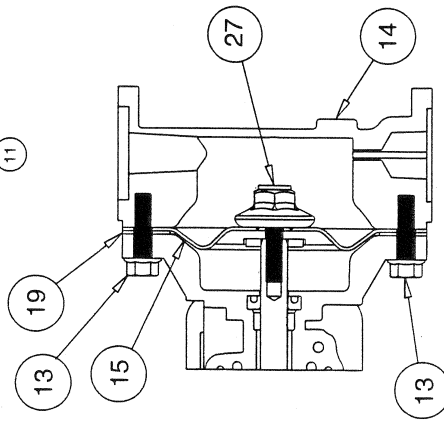


Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Diaphragm Service Drawing

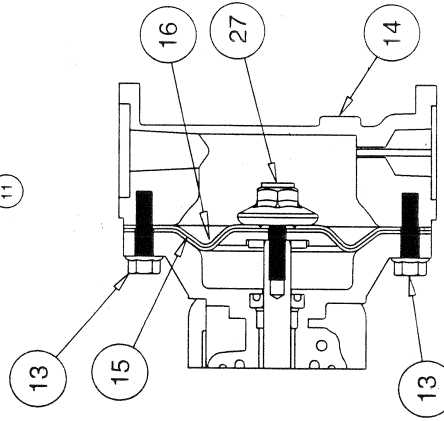
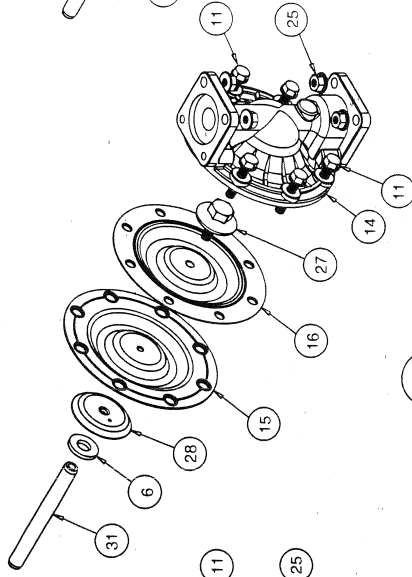


★ (Use With TPE Diaphragms Only)



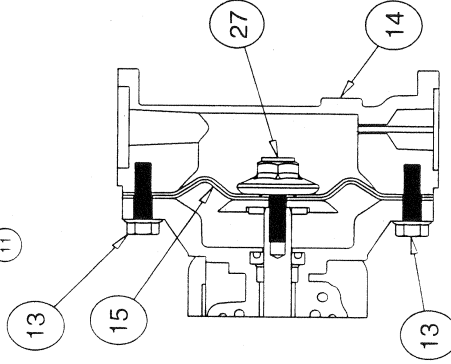
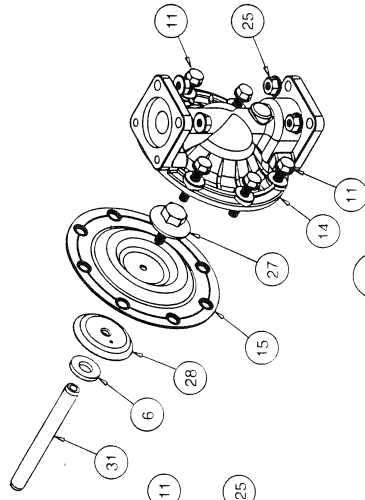
Diaphragm Orientation
Install diaphragm and spacer
as shown above.

**Diaphragm Service Drawing,
with Overlay**



Diaphragm Orientation
Install diaphragm and overlay
as shown above.

**Diaphragm Service Drawing
with uniRupp®**



Diaphragm Orientation
Install diaphragm (286-095-650 only)
as shown above.

DIAPHRAGM SERVICING

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

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

Using a 1/2" wrench or socket, remove the 16 capscrews (items 9 & 10), and flanged nuts that fasten the elbows (items 17 and 18) to the outer chambers (items 14). Remove the elbows with the manifolds and spacers attached.

Step #2: Removing the outer chambers.

Using a 1/2" wrench or socket, remove the 16 capscrews (items 11 and 13), and flanged nuts that fasten the outer chambers, diaphragms, and intermediate (item 4) together.

Step #3: Removing the diaphragm assemblies.

Use a 3/4" (19mm) wrench or six pointed socket to remove the diaphragm assemblies (outer plate, diaphragm, and inner plate) from the diaphragm rod (item 31) by turning counterclockwise.

Insert a 6-32 set screw into the smaller tapped hole in the inner diaphragm plate (item 28). Insert the protruding stud and the 6-32 fastener loosely into a vise. Use a 3/4" wrench or socket to remove the outer diaphragm

plate (item 27) by turning counterclockwise. Inspect the diaphragm (item 15) for cuts, punctures, abrasive wear or chemical attack. Replace the diaphragms if necessary.

Step #4: Installing the diaphragms. Push the threaded stud of the outer diaphragm plate through the center hole of the diaphragm. Thread the inner plate clockwise onto the stud. Insert the loose assembly with the above 6-32 fastener back into the vise. Use a torque wrench to tighten the diaphragm assembly together to 90 in lbs. (10.17 Newton meters) 120 in lbs. Santoprene (13.56 Newton meters). Allow a minimum of 15 minutes to elapse after torquing, then re-torque the assembly to compensate for stress relaxation in the clamped assembly.

Step #5: Installing the diaphragm assemblies to the pump.

Make sure the bumper (item 6) is installed over the diaphragm rod.

Thread the stud of the one diaphragm assembly clockwise into the tapped hole at the end of the diaphragm rod (item 31) until the inner diaphragm plate is flush to the end of the rod. Insert rod into pump.

Align the bolt holes in the diaphragm with the bolt pattern in the intermediate (item 4).

Fasten the outer chamber (item 14) to the pump, using the capscrews (items 11 and 13) and flanged nuts.

On the opposite side of the pump, pull the diaphragm rod out as far as

possible. Make sure the bumper (item 6) is installed over the diaphragm rod.

Thread the stud of the remaining diaphragm assembly clockwise into the tapped hole at the end of the diaphragm rod (item 31) as far as possible and still allow for alignment of the bolt holes in the diaphragm with the bolt pattern in the inner chamber. Install diaphragms with convolutions facing towards center of pump. See sectional view on previous page.

Fasten the remaining outer chamber (item 14) to the pump, using the capscrews (items 11 and 13) and flanged nuts.

Step #6: Re-install the elbow/spacer/manifold assemblies to the pump, using the capscrews (items 9 & 10) and flanged nuts.

The pump is now ready to be re-installed, connected and returned to operation.

OVERLAY DIAPHRAGM SERVICING

The overlay diaphragm (item 16) is designed to fit snugly over the exterior of the standard TPE diaphragm (item 15).

uniRupp® DIAPHRAGM SERVICING

Follow the same procedures described for the standard diaphragm for removal and installation. **Note:** The uniRupp diaphragm is installed in the direction as shown in the lower right illustration above.



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.

PUMPING HAZARDOUS LIQUIDS

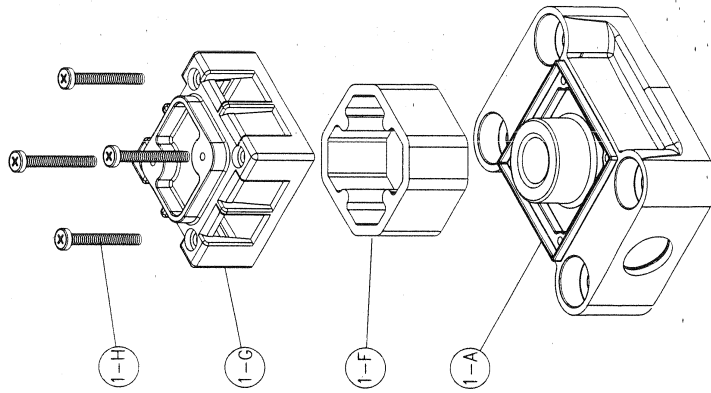
When a diaphragm fails, the pumped liquid or fumes enter the air end of the pump. Fumes are exhausted into the surrounding environment. When pumping hazardous or toxic materials, the exhaust air must be piped to an appropriate area for safe disposal. See illustration #1 at right.

This pump can be submerged if the pump materials of construction are compatible with the liquid being pumped. The air exhaust must be piped above the liquid level. See illustration #2 at right. Piping used for the air exhaust must not be smaller than 1" (2.54 cm) diameter. Reducing the pipe size will restrict air flow and reduce pump performance. When the pumped product source is at a higher level than the pump (flooded suction condition), pipe the exhaust higher than the product source to prevent siphoning spills. See illustration #3 at right.

IMPORTANT INSTALLATION NOTE:

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

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



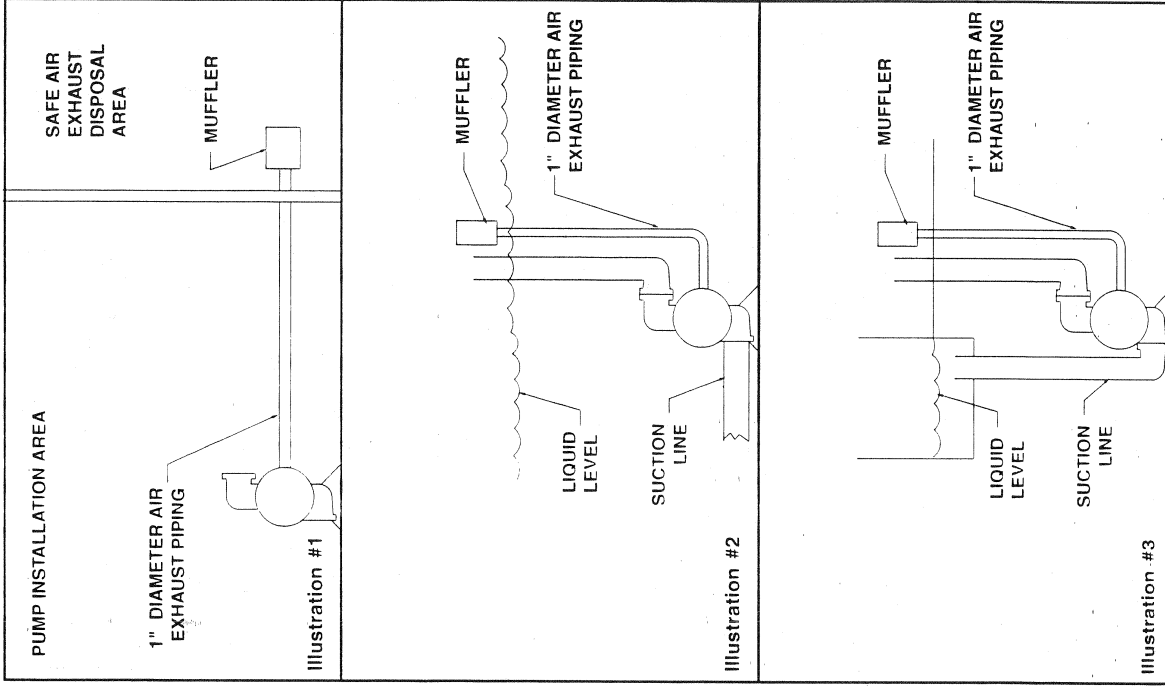
CONVERTING THE PUMP FOR PIPING THE EXHAUST AIR

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

Use a #8 Torx or flat screwdriver to remove the four self-tapping screws (item 1-J) (Plastic Valves). Use a Phillips screwdriver to remove four machine screws (item 1-I) (Aluminum Valves).

Remove the muffler cap and muffler. The air distribution valve body has 1" NPT threads for installation of alternate mesh or sound dampening mufflers or piped exhaust.

CONVERTED EXHAUST ILLUSTRATION





APPENDIX III

MSDS

GRACE Davison

W.R. Grace & Co.-Conn.
P.O. Box 2117
Ballimore, Maryland 21203
(410) 659-9000

MATERIAL SAFETY DATA SHEET

SAFETY DATA

REF. No. 5008

PRODUCT: DAVISON BLUE INDICATING GEL Wilkerson Corporation
DATE: June 15, 1995 Part # DRP-85-059

Emergency Contact:

J.H. Convey, Manager, Environment Control Telephone No. (Home) 410-874-2009
(Office) 410-659-9058

The following information includes safety data required by OSHA. The recipient of this safety data is responsible for passing the safety information on so that it reaches the ultimate user who may come in contact with the material.

TRADE NAME: DAVISON BLUE INDICATING GEL
GRADES 13, 42, 43, 44 & 45

**CHEMICAL NAME
FAMILY:** Synthetic Amorphous

SYNONYMS: Amorphous Silicon Dioxide, Silica Gel, Silicic Acid
TEL-TALE® Indicating Gel

**CHEMICAL NOTATION
OR STRUCTURE:** $\text{SiO}_2, x\text{H}_2\text{O} + \text{CoCl}_2$

INGREDIENTS: Amorphous Silica, Cobalt Chloride (CoCl_2)

Synthetic amorphous silica, not to be confused with crystalline silica such as quartz, cristobalite or tridymite or with diatomaceous earth or other naturally occurring forms of amorphous silica that frequently contain crystalline forms

CAS REGISTRY NO: Silica Gel: 63231-67-4 (Revised 1990 SiO_2 : 112926-00-8)
Cobalt Chloride: 7646-79-9

RTECS NO: VV7322000 (Silica Gel)
GF9800000 (Cobalt Chloride)

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83-037-000



HEALTH INFORMATION

PRECAUTIONS IN USE:

Avoid prolonged breathing of the dust or contact of dust with the skin. The drying action of this material can cause irritation of the mucous membranes of the nose and throat and irritation of the skin. If its use requires manual handling, wear long sleeves and close-weave cotton gloves with tight-fitting wristlets. If dusty conditions prevail, use of an approved NIOSH/MSHA dust mask is recommended.

When pouring into a container of flammable liquid, ground both containers electrically to prevent a static electric spark.

FIRST AID:

EYES: Immediately wash from eyes with large amounts of water, occasionally lifting upper & lower eye lids. If irritation occurs and persists, seek medical attention.

SKIN: Wash with soap & water.

INGESTION: Material will pass through body normally.

INHALATION: Remove to fresh air.

TOXICOLOGY

ANIMAL TOXICOLOGY

TESTS FOR DOT HAZARD CLASSIFICATION:

48-hour oral LD₅₀ (rat) est. > 31,600 mg/kg

48-hour dermal LD₅₀ (rabbit) est. > 2,000 mg/kg

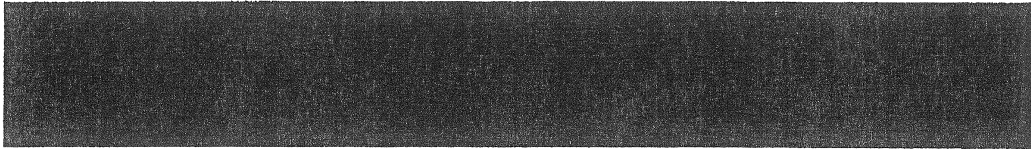
Not considered an ocular irritant.

TESTS FOR FDA APPROVAL FOR USE IN FOODS: Not a food-grade product.

Cobalt chloride is considered GRAS (generally recognized as safe) as a trace mineral added to animal feeds (approximately 10 PPM) by FDA

HUMAN TOXICOLOGY:

Silica gel is a synthetic amorphous silica not to be confused with crystalline silica. Epidemiological studies indicate low potential for adverse health effects. Silica gel is considered by Davison to be a nuisance dust. In the activated form, silica gel acts as a desiccant and can cause a drying irritation of the mucous membranes and skin in cases of severe exposure. Cobalt chloride can cause dermatitis and irritation of nasal passages and lungs. Davison knows of no medical conditions abnormally aggravated by exposure to this product. The primary route of entry is inhalation.

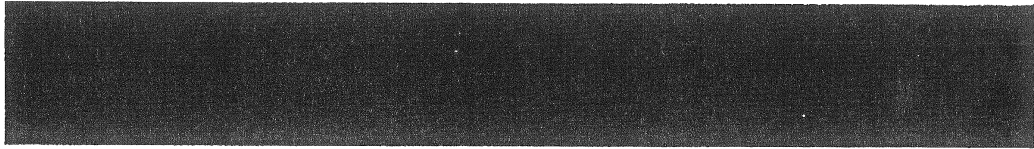


ENVIRONMENTAL DATA

Not known to have any adverse effect on the aquatic environment. The silica base is insoluble and nontoxic. Cobalt chloride may leach away if contacted with water.

TYPICAL CHEMICAL & PHYSICAL INFORMATION

APPEARANCE:	Clear blue granules
pH IN 5% SLURRY:	Approximately 6.5 -7.5
ODOR:	None
SPECIFIC GRAVITY:	2.1
BULK DENSITY:	Approximately 47-48 lbs/ft. ³
SOLUBILITY IN WATER:	Silica gel base insoluble Cobalt chloride may leach out.
APPROXIMATE ANALYSIS:	SiO ₂ (Ignited Basis) - 99.7 (CoCl ₂ sublimes) LOI @ 1760 F - 6.5% Crystalline Silica - Not detectable Cobalt Chloride - 0.9%
STABILITY:	Stable
REACTIVITY:	Reacts with HF
FIRE & EXPLOSION DATA:	Non-flammable



REGULATORY STATUS

OSHA-	Silica gel - PEL = 6 mg/m ³ Cobalt chloride - PEL = not listed in 29 CFR 1910.1000.
NIOSH-	Silica Gel - Animal tests conducted in 1976-78. 18 month exposure at 15 mg/m ³ showed silica deposition in respiratory macrophages and lymph nodes, minimis lung function impairment, and no silicosis.
EPA-	This product contains no toxic chemicals in excess of the applicable de minimis concentration as specified under § 313 of Title III SARA.
ACGIH-	Silica Gel - TLV = 10 mg/m ³ (Silica gel); Cobalt Chloride - TLV = not listed.
USDA-	Not applicable
FDA-	Not a food-grade product. For food or pharmaceutical use, FP grades of Syloid should be specified.
DOT-	Not classified as a hazardous material.

HANDLING INFORMATION

STORAGE AND TRANSPORTATION:	Keep containers tightly sealed to protect product quality.
DISPOSAL:	Dispose in an approved landfill according to federal, state and local regulations. Cover promptly to avoid blowing of dust.
SPILLAGE AND CLEANUP:	Sweep or vacuum up.
CONTAINERS:	Drums, cans.

SPECIAL INFORMATION

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