

# Graymills®

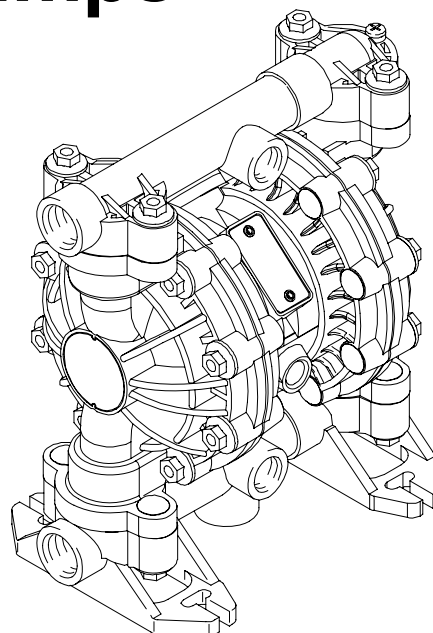
[www.graymills.com](http://www.graymills.com)

## Air Operated Double Diaphragm Pumps 1/2" Model

### Operations and Maintenance Instructions

#### WARNING/CAUTIONS

Read all these **SAFETY INSTRUCTIONS**  
**BEFORE** installing or using this equipment.  
Keep this manual handy for reference/train-  
ing.



DACT50 Acetal NPT Pumps\*  
PLHG50 Polypropylene Pumps  
PQHG50  
PLTG50  
PQTG50

\* These models are  certified.

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# Symbols

## Warning Symbol



This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

## Caution Symbol



This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

## Safety Alert Symbol



The safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

## WARNING



### HAZARDOUS FLUIDS

Improper handling of hazardous fluids or inhaling toxic vapors can cause extremely serious injury or death from splashing in the eyes, ingestion, or bodily contamination. Observe all the following precautions when you handle hazardous or potentially hazardous fluids.

- Know what fluid you are pumping and its specific hazards. Take precautions to avoid a toxic fluid spill.
- Always wear appropriate clothing and equipment, such as eye protection and breathing apparatus, to protect yourself.
- Store hazardous fluid in an appropriate, approved container. Dispose of it according to all Local, State, and Federal guidelines for hazardous fluids.
- Secure the fluid outlet hose tightly into the receiving container to prevent it from coming loose and improperly draining the fluid.
- Pipe and dispose of the exhaust air safely, away from people, animals, and food handling areas. If the diaphragm fails, the fluid is exhausted along with the air. See **Air Exhaust Ventilation** on page 7.
- Use static wire hoses when pumping flammables.
- Keep containers closed when not in use.

# ! WARNING



INSTRUCTIONS

## EQUIPMENT MISUSE HAZARD

Any misuse of the equipment or accessories, such as overpressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in splashing in the eyes or on the skin, other serious injury, or fire, explosion or property damage.

- This equipment is for professional use only. Observe all warnings. Read and understand all instruction manuals, warning labels, and tags before you operate this equipment. If you are not sure, or if you have questions about installation or operation, call Graymills Corporation.
- Never alter or modify any part of this equipment; doing so could cause it to malfunction.
- Check all equipment regularly and repair or replace worn or damaged parts immediately.
- Never exceed the recommended working pressure or the maximum air inlet pressure stated on your pump or in the **Technical Data** on page 4.
- Do not exceed the maximum working pressure of the lowest rated component in your system. This equipment has a **100 psi (0.7 MPa, 7 bar) maximum working pressure at 100 psi (0.7 MPa, 7 bar, ) maximum incoming air pressure.**
- Be sure that all fluids and solvents used are chemically compatible with the wetted parts shown in the **Technical Data** on page 4. Always read the manufacturer's literature before you use fluid or solvent in the pump.
- Never move or lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the **Pressure Relief Procedure** on page 10 before you move or lift the pump.



## FIRE AND EXPLOSION HAZARD

Static electricity is created by the flow of fluid through the pump and hose. If the equipment is not properly grounded, sparking may occur. Sparks can ignite fumes from solvents and the fluid being pumped, dust particles, and other flammable substances, whether you are pumping indoors or outdoors, and can cause a fire or explosion and serious injury and property damage.

- To reduce the risk of static sparking, ground the pump and all other equipment used or located in the work area. Check your local electrical code for detailed grounding instructions for your area and type of equipment. See **Grounding** on page 6.
- If you experience any static sparking or even a slight shock while using this equipment, **stop pumping immediately**. Check the entire system for proper grounding. Do not use the system again until you have identified and corrected the problem.
- Pipe and dispose of the exhaust air safely, away from all sources of ignition. If the diaphragm fails, the fluid is exhausted along with the air. See **Air Exhaust Ventilation** on page 7.
- Do not smoke in the work area. Do not operate the equipment near a source of ignition or an open flame, such as a pilot light.



# SAFETY PRECAUTIONS



## INSTRUCTIONS

### CAUTION

- Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substance being pumped, flushed or recirculated.
- The pump should not be used for the structural support of the piping system. Be certain system components are properly supported to prevent stress on the pump parts.
- Do not allow pump to operate dry for long periods of time; this may cause unnecessary wear or damage to the pump.
- Maximum temperature limits are based upon mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperatures. Consult Graymills for chemical compatibility and temperature limits.

United States Government safety standards have been adopted under the Occupational Safety and Health Act. You should consult these standards—particularly the General Standards, Part 1910, and the Construction Standards, Part 1926.

## Technical Data

Maximum fluid working pressure . . . . . 100 psi (0.7 MPa, 7 bar)  
Air pressure operating range . . . . .  
25 to 100 psi (0.18 to 0.7 MPa, 1.8 to 7 bar )  
Maximum air consumption . . . 28 scfm (0.672 cubic meters/min.)  
Maximum free flow delivery (1/2 in. ports) . . . 15 gpm (57 l/min)  
Maximum pump speed . . . . . 400 cpm  
Gallons (Liters) per cycle . . . . . 0.04 (0.15)  
Maximum suction lift (water w/buna balls) . . . . .  
15 ft (4.5 m) dry, 25 ft (7.6 m) wet  
Maximum size pumpable solids . . . . . 3/32 in. (2.5 mm)  
Sound power level (measured per ISO standard 9614-2)  
At 70 psig (0.48 MPa, 4.8 bar) at 50 cycles per minute . . . 77 dBa  
At 100 psig (0.7 MPa, 7 bar) at maximum cycles per minute 95 dBa  
Sound pressure level (measured 1 meter from pump)  
At 70 psig (0.48 MPa, 4.8 bar) at 50 cycles per minute . . . 67 dBa  
At 100 psig (0.7 MPa, 7 bar) at maximum cycles per minute 85 dBa

Air inlet size . . . . . 1/4 npt(f)  
Air exhaust port size . . . . . 3/8 npt(f)  
Fluid inlet size. . . . . 1/2 and 3/4 in. npt(f) or bspt(f)  
Fluid outlet size. . . . . 1/2 and 3/4 in. npt(f) or bspt(f)  
Wetted parts (in addition to ball, seat, duckbill, and diaphragm materials, which vary by pump)  
Polypropylene pumps . . . . . polypropylene, PTFE  
Non-wetted external parts polypropylene, stainless steel, polyester and aluminum (labels), nickel-plated brass  
Weight (approximate) . . . . . 6.5 lb (2.9 kg)

*Hytrel® is a registered trademark of the DuPont Company.*

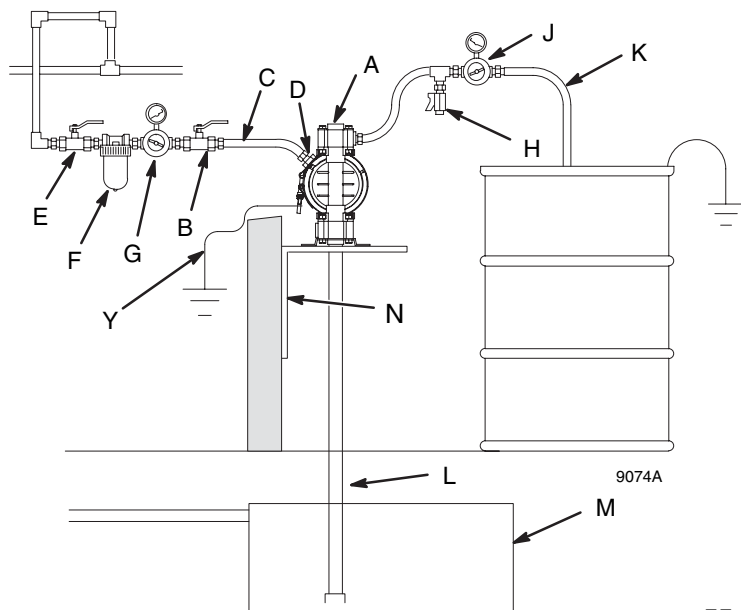
*Loctite® is a registered trademark of the Loctite Corporation.*

# Installation

The typical Installations in Figure 1 are only guides for selecting and installing system components. Contact Graymills or your distributor for assistance in planning a system to suit your needs.

**Figure 1**

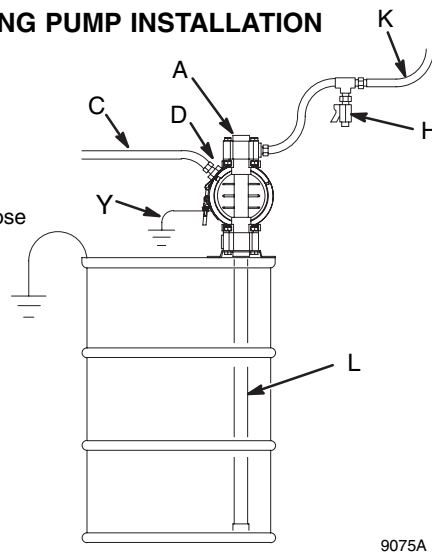
## ABOVE-GROUND TRANSFER INSTALLATION



### KEY

- A Pump
- B Bleed-type master air valve (required for pump)
- C Electrically conductive air supply line
- D Air line quick disconnect
- E Master air valve (for accessories)
- F Air line filter
- G Pump air regulator
- H Fluid drain valve (required)
- J Fluid regulator (optional)
- K Electrically conductive fluid supply hose
- L Fluid suction line
- M Underground storage tank
- N Wall mounting bracket
- Y Ground wire (required; see page 6 for installation instructions)

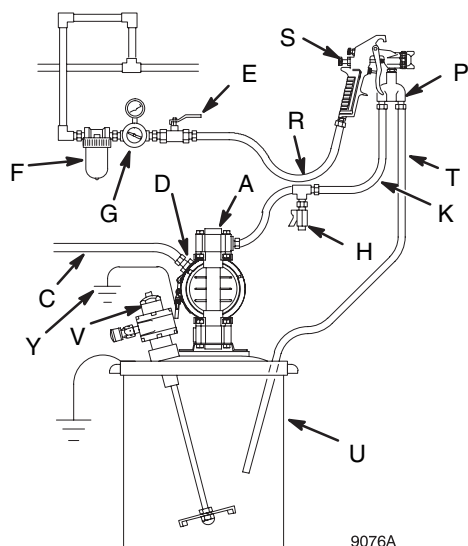
## 55-GALLON BUNG PUMP INSTALLATION



### KEY

- A Pump
- C Electrically conductive air supply line
- D Air line quick disconnect
- H Fluid drain valve (required)
- K Electrically conductive fluid supply hose
- L Fluid suction line
- Y Ground wire (required; see page 6 for installation instructions)

## AIR SPRAY INSTALLATION



### KEY

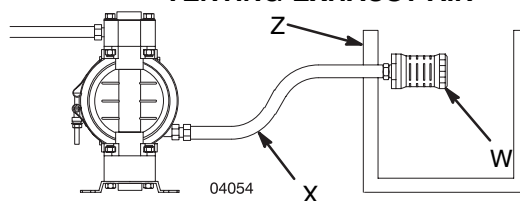
- A Pump
- C Electrically conductive air line to pump
- E Gun air line shutoff valve
- F Air line filter
- G Gun air regulator
- H Fluid drain valve (required)
- K Electrically conductive fluid supply hose
- P Circulating valve
- R Electrically conductive air line to gun
- S Air spray gun
- T Electrically conductive fluid return line
- U 5-gallon pail
- V Agitator
- Y Ground wire (required; see page 6 for installation instructions)

### KEY

- W Muffler
- X Electrically Conductive Air Exhaust Hose
- Z Container for Remote Air Exhaust

All wetted and non-wetted pump parts must be compatible with the fluid being pumped.

## VENTING EXHAUST AIR



# Installation

## Tightening Threaded Fasteners Before First Use

After unpacking the pump, and before using it for the first time, check and retorquer all external fasteners. See the **Service** section for torque specifications. After the first day of operation, retorquer the fasteners again. Although pump use varies, a general guideline is to retorquer fasteners every two months.

Use a compatible thread sealant on all male threads. Tighten all connections firmly to avoid air or fluid leaks.

### CAUTION

To avoid pump damage, do not overtighten the fittings to the pump.

## Grounding

### WARNING



#### FIRE AND EXPLOSION HAZARD

This pump must be grounded when using flammables. Before operating the pump, ground the system as explained below. Also read the section **Fire and Explosion Hazard** on page 3.

When pumping conductive flammable fluids, **always** ground the entire fluid system by making sure the fluid system has an electrical path to a true earth ground (see Fig. 2). **Never** use a polypropylene pump with non-conductive flammable fluids as specified by your local fire protection code.

US Code (NFPA 77 Static Electricity) recommends a conductivity greater than  $50 \times 10^{-12}$  Siemens/meter (mhos/meter) over your operating temperature range to reduce the hazard of fire. Consult your fluid supplier to determine the conductivity or resistivity of your fluid. The resistivity must be less than  $2 \times 10^{12}$  ohm-centimeters.

To reduce the risk of static sparking, ground the pump and all other equipment used or located in the pumping area. Check your local electrical code for detailed grounding instructions for your area and type of equipment.

Figure 2

## GROUNDING A PUMP

### KEY

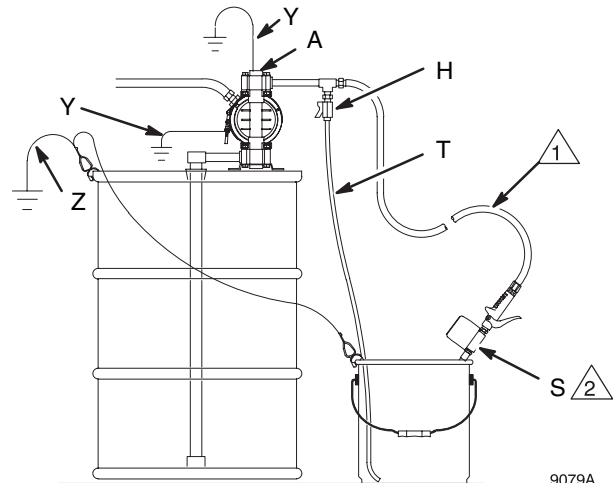
- A Pump
- H Fluid drain valve (required)
- S Dispense valve
- T Fluid drain line
- Y Fluid section grounding via grounding strip or grounding screw (required for metal and acetal pumps)
- Z Container ground wire (required)



Hose must be conductive.



Dispense valve nozzle must be in contact with container.



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Attaching the ground wire to the grounding screw (106) grounds the wetted parts. See grounding screw on page 16. Fig. 2 shows a recommended method of grounding flammable fluid containers during filling. Ground all of this equipment:

- **Pump:** Connect the non-clamp end of the ground wire to the grounding strip or grounding screw, and connect the clamp end of the ground wire to a true earth ground. To order a ground wire and clamp, order Part No. 790-100835.
- **Air and fluid hoses:** Use only electrically conductive hoses.
- **Air compressor:** Follow manufacturer's recommendations.
- **Solvent pails used when flushing:** Follow the local code. Use only grounded metal pails, which are conductive. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts the grounding continuity.
- **Fluid supply container:** Follow the local code. Dispense valve nozzle must be in contact with container.

# Installation

## Mountings

### CAUTION

The pump exhaust air may contain contaminants. If needed, ventilate to a remote area to reduce possible fluid contamination. See **Air Exhaust Ventilation** on this page.

- Be sure the mounting can support the weight of the pump, hoses, and accessories, as well as the stress caused during operation.
- For all mountings, be sure the pump is secured with screws and nuts.

### WARNING

To reduce the risk of serious injury, splashing in the eyes or on the skin, and toxic fluid spills, **never** move or lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the **Pressure Relief Procedure** on page 10 before you move or lift the pump.

## Air Exhaust Ventilation

### WARNING



#### TOXIC FLUID HAZARD

Read the **USING HAZARDOUS FLUIDS** and **FIRE AND EXPLOSION HAZARD** sections on page 2 before you operate this pump with flammable liquids.



Be sure the system is properly ventilated for your type of installation. You must vent the exhaust to a safe place, away from people, sources of ignition, animals or food handling areas when pumping flammable or hazardous fluids.



If the diaphragm ruptures, the fluid being pumped is exhausted with the air. Place a container at the end of the air exhaust line to catch fluid in case the diaphragm ruptures, and disconnect the pump.

The air exhaust port is 3/8 npt(f). Do not restrict the air exhaust port. Excessive exhaust restriction can cause erratic pump operation.

See Venting Exhaust Air in Fig. a. Exhaust to a remote location as follows:

1. Remove the muffler (W) from the pump air exhaust port.

2. Install an electrically conductive air exhaust hose (X) and connect the muffler to the other end of the hose. The minimum size for the air exhaust hose is 3/8" (10mm) ID. If a hose longer than 15 ft (4.57) is required, use a larger diameter hose. Avoid sharp bends or kinks in the hose.
3. Place a container (Z) at the end of the air exhaust line to catch fluid in case a diaphragm ruptures. See Fig. 1.

## Air Lines

### WARNING

#### Bleed-Type Master Air Valve and Fluid Drain Valve

A bleed-type master air valve and a fluid drain valve are required on your system.

The bleed-type master air valve relieves air trapped between itself and the pump. Trapped air can cause the pump to cycle unexpectedly, which could result in serious bodily injury, including splashing in the eyes, injury from moving parts, or contamination from hazardous fluids.

The fluid drain valve reduces the risk of serious bodily injury, including splashing in the eyes or on the skin, or contamination from hazardous fluids. Install the fluid drain valve close to the pump's fluid outlet to relieve pressure in the hose if the hose becomes plugged.

1. Mount the air line accessories on the wall or on a bracket. Be sure the air line supplying the accessories is grounded.
  - a. The pump speed can be controlled in one of two ways: To control it on the air side, install an air regulator (Order Graymills Part No. FRL-2). To control it on the fluid side, install a fluid valve near the outlet.
  - b. Install a bleed-type master air valve downstream from the air regulator, and use it to relieve trapped air. See the **Bleed-Type Master Air Valve and Fluid Drain Valve** warning on page 5. Locate another bleed-type master air valve upstream from all air line accessories, and use it to isolate the accessories during cleaning and repair.
  - c. The air line filter removes harmful dirt and moisture from the compressed air supply.
2. Install a flexible air hose between the accessories and the pump air inlet. Screw the air line fitting into the air inlet.
3. Do not restrict the exhaust port. Excessive exhaust restriction can cause erratic pump operation.



## Installation of Remote Pilot Air Lines

1. Refer to Parts Drawings. Connect air line to pump as in preceding steps.
2. Connect 1/4" O.D. tubing to push type connectors (16) on underside of pump.
3. NOTE: by replacing the push type connectors, other sizes or types of fittings may be used. The new fittings will require 1/8" npt threads.
4. Connect remaining ends of tubes to external air signal.
5. NOTE: the air pressure at the connectors must be at least 30% of the air pressure to the air motor for the pump to operate.

## Fluid Suction Line

Ground the fluid system. Read Grounding on page 6. The fluid inlet port is 1/2" or 3/4". At inlet fluid pressure greater than 15 psi (0.1 MPa, 1 bar), diaphragm life will be shortened.

- a. The fluid pressure can be controlled in either of two ways. To control it on the air side, install an air regulator (G). To control it on the fluid side, install a fluid regulator (J) near the pump fluid outlet (see Fig. 1).
  - b. Locate one bleed-type master air valve (B) close to the pump and use it to relieve trapped air. Read the **WARNING** on page 7. Locate the other master air valve (E) upstream from all air line accessories and use it to isolate them during cleaning and repair.
  - c. The air line filter (F) removes harmful dirt and moisture from the compressed air supply.
6. Install an electrically conductive, flexible air hose (C) between the accessories and the 1/4 npt(f) pump air inlet. Use a minimum 1/4" (6.3 mm) ID air hose. Screw an air line quick disconnect coupler (D) onto the end of the air hose (C), and screw the mating fitting into the pump air inlet snugly. Do not connect the coupler (D) to the fitting yet.

## Fluid Pressure Relief Valve

### ⚠ CAUTION

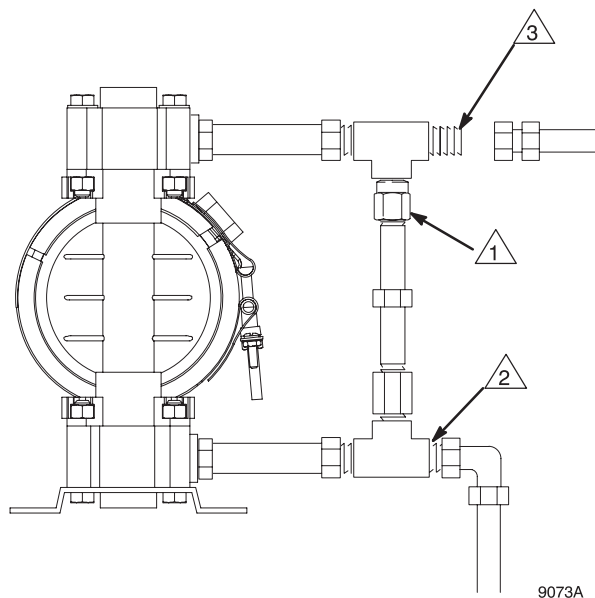
Some systems may require installation of a pressure relief valve at the pump outlet to prevent overpressurization and rupture of the pump or hose. See Fig. 3.

Thermal expansion of fluid in the outlet line can cause overpressurization. This can occur when using long fluid lines exposed to sunlight or ambient heat, or when pumping from a cool to a warm area (for example, from an underground tank).

Overpressurization can also occur if the pump is being used to feed fluid to a piston pump, and the intake valve of the piston pump does not close, causing fluid to back up in the outlet line.

Figure 3

- 1 Install valve between fluid inlet and outlet ports.
- 2 Connect fluid inlet line here.
- 3 Connect fluid outlet line here.




### ⚠ CAUTION

For solenoid operation, the pump must exhaust through the solenoid. Failure to exhaust through solenoid could cause the diaphragms to fail..



## Changing the Orientation of the Fluid Inlet and Outlet Ports

You can change the orientation of the fluid inlet and outlet ports by repositioning the manifolds.


1.  **Relieve the pressure.** See **Pressure Relief Procedure** on page 10.
2. Remove the four manifold nuts (109), Figure 4. For double diaphragm pumps with 2 inlets/2 outlets, remove two bolts (105), Figure 5.
3. Turn the manifold to the desired position, reinstall the nuts or bolts, and torque to 80 to 90 in-lb (9 to 10 N-m).

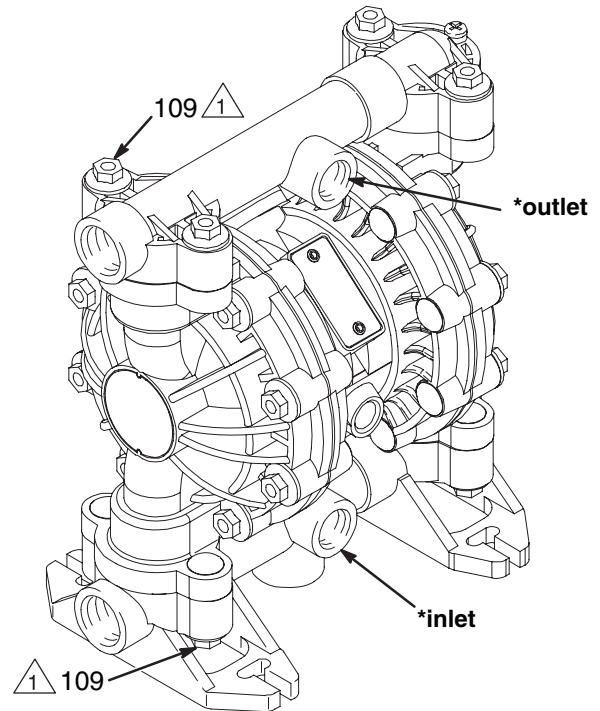
**NOTE:** Make sure all manifold o-rings are positioned correctly before you fasten the manifold.

4. To convert an existing pump with 1 inlet/1 outlet to 2 inlets/2 outlets, consult factory.

**\*NOTE:** Pump inlet is on the bottom for all duckbill pumps.


**Figure 4**

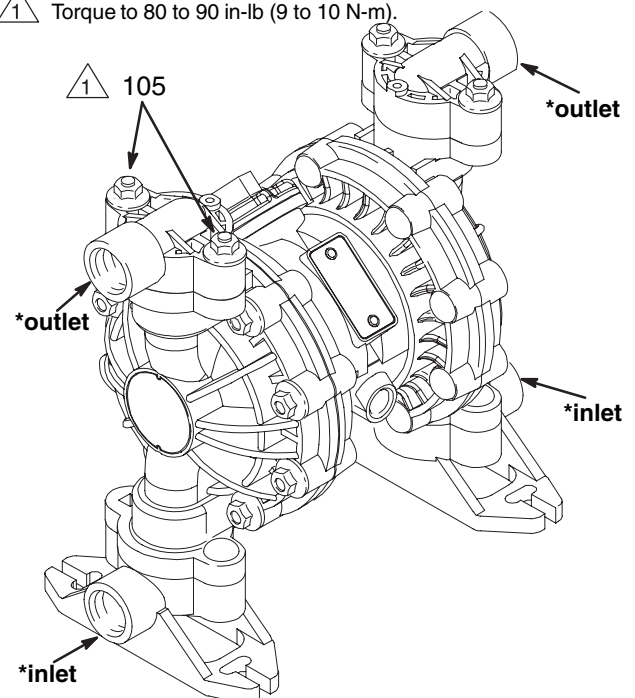
 Torque to 80 to 90 in-lb (9 to 10 N-m).



9065A

**Figure 5**

 Torque to 80 to 90 in-lb (9 to 10 N-m).



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# Operation

## Pressure Relief Procedure

### WARNING

#### PRESSURIZED EQUIPMENT HAZARD

The equipment stays pressurized until pressure is manually relieved. To reduce the risk of serious injury from pressurized fluid, accidental spray, or splashing fluid, follow this procedure whenever you







- Are instructed to relieve pressure
- Stop pumping
- Check, clean, or service any system equipment
- Install or clean fluid nozzles

1. Shut off the air to the pump.
2. Open the dispensing valve, if used.
3. Open the fluid drain valve to relieve all fluid pressure, and have a container ready to catch the drainage.

## Flush Pump Before First Use

The pump was tested in water. Prior to use, flush the pump thoroughly with a compatible liquid. Follow the steps under **Starting and Adjusting Pump**.

## Starting and Adjusting Pump

1.   Read **HAZARD FLUIDS** on page 2.
2.  If lifting the pump, follow the **Pressure Relief Procedure** above.
3.    Be sure the pump is properly grounded. Read **Fire and Explosion Hazard** on page 3.
4. Check all fittings to be sure they are tight. Use a compatible liquid thread sealant on all male threads. Tighten the fluid inlet and outlet fittings snugly. Do not overtighten the fittings into the pump.
5. Place the suction tube (if used) in the fluid to be pumped.

**NOTE:** If the inlet fluid pressure to the pump is more than 25% of the outlet working pressure, the ball check valves will not close fast enough, resulting in inefficient pump operation.

6. Place the end of the fluid hose (K) into an appropriate container. Refer to Figure 1 on page 5.
7. Close the fluid drain valve (H). See Fig. 1.
8. With the pump air regulator (G) closed, open all bleed-type master air valves (B, E). See Fig. 1.
9. If the fluid hose has a dispensing device, hold it open while continuing with the following step. **Slowly** open the air regulator (G) until the pump starts to cycle. Allow the pump to cycle slowly until all air is pushed out of the lines and the pump is primed. See Fig.1.

*If you are flushing, run the pump long enough to thoroughly clean the pump and hoses. Close the air regulator. Remove the suction tube from the solvent and place it in the fluid to be pumped.*

## Operation of Remote Piloted Pumps

1. Fig. 1 and Parts Drawings. Follow preceding steps 1 through 8 of **Starting and Adjusting Pump**.
2. Open air regulator (G). See Fig. 1.


### WARNING

The pump may cycle once before the external signal is applied. Injury is possible. If pump cycles, wait until end before proceeding.

3. Pump will operate when air pressure is alternately applied to push type connectors (16).

**NOTE:** Leaving air pressure applied to the air motor for extended periods when the pump is not running may shorten the diaphragm life. Using a 3-way solenoid valve to automatically relieve the pressure on the air motor when the metering cycle is complete prevents this from occurring.

## Pump Shutdown

-  At the end of the work shift, **relieve the pressure** as described in **Pressure Relief Procedure** at left.

# Maintenance

## Lubrication

The air valve is lubricated at the factory to operate without additional lubrication. If you want to provide additional lubrication, remove the hose from the pump air inlet and add two drops of machine oil to the air inlet every 500 hours of operation or every month.

### CAUTION

Do not over-lubricate the pump. Oil is exhausted through the muffler, which could contaminate your fluid supply or other equipment. Excessive lubrication can also cause the pump to malfunction

## Flushing and Storage

Flush the pump to prevent the fluid you are pumping from drying or freezing in the pump and damaging it. Use a compatible solvent.

Always flush the pump and **relieve the pressure** before you store it for any length of time.



Read **Pressure Relief Procedure** on page 10.

## Tightening Threaded Connections

Before each use, check all hoses for wear or damage and replace as necessary. Check to be sure all threaded connections are tight and leak-free.

Check and retorque all threaded connections, including manifold screws, clamps, and air valve screws, at least every two months. Although the recommended frequency for retorquing of fasteners varies with pump usage, a general guideline is to retorque every two months.

## Preventive Maintenance Schedule

Establish a preventive maintenance schedule, based on the pump's service history. This is especially important for prevention of spills or leakage due to diaphragm failure.

# Troubleshooting



Read **Pressure Relief Procedure** on page 10, and **relieve the pressure** before you check or service the equipment. Check all possible problems and causes before disassembling the pump.

| PROBLEM  | CAUSE  | SOLUTION   |
|--|--|--|
| Pump will not cycle, or cycles once and stops.           | Air valve is stuck or dirty.                   | Use filtered air.                                |
| Pump cycles at stall or fails to hold pressure at stall. | Leaky check valves or o-rings.                 | Replace.   |
|  | Worn check balls or duckbill valves or guides. | Replace.   |
|  | Check ball wedged in guide.                    | Repair or replace.                               |
|  | Worn diaphragm shaft seals.                    | Replace.   |
| Pump operates erratically.                               | Clogged suction line.                          | Inspect; clear.                                  |
|  | Sticky or leaking check valve balls.           | Clean or replace.                                |
|  | Diaphragm ruptured.                            | Replace.   |
| Air bubbles in fluid.                                    | Suction line is loose.                         | Tighten.   |
|  | Diaphragm ruptured.                            | Replace.   |
|  | Loose manifolds or damaged manifold o-rings.   | Tighten manifold bolts or nuts; replace o-rings. |
|  | Loose fluid side diaphragm plates.             | Tighten.   |
| Fluid in exhaust air.                                    | Diaphragm ruptured.                            | Replace.   |
|  | Loose fluid side diaphragm plates.             | Tighten.   |
|  | Worn diaphragm shaft seals.                    | Replace.   |
| Pump exhausts air from clamps (metal pumps).             | Loose clamps.                                  | Tighten clamp nuts.                              |
|  | Air valve o-ring is damaged.                   | Inspect; replace.                                |
| Pump leaks fluid from check valves.                      | Worn or damaged check valve o-rings.           | Inspect; replace.                                |

# Service

## Air Valve

**NOTE:** Air Valve Repair Kit 784-90611 is available. Parts included in the kit are marked with a dagger (†) in Fig. 6 and in the Parts Drawings and Lists. A tube of general purpose grease is supplied in the kit. Service the air valve as follows. See Fig. 6.



1. **Relieve the pressure.** See **Pressure Relief Procedure** on page 10.

2. Remove the cover (10) and the o-ring (4).
3. Remove the carriage plungers (7), carriages (8), carriage pins (9), and valve plate (14) from the center housing (11).

4. Clean all the parts, and inspect them for wear or damage.

**NOTE:** If you are installing the new Air Valve Repair Kit 784-90611, use all the parts in the kit.

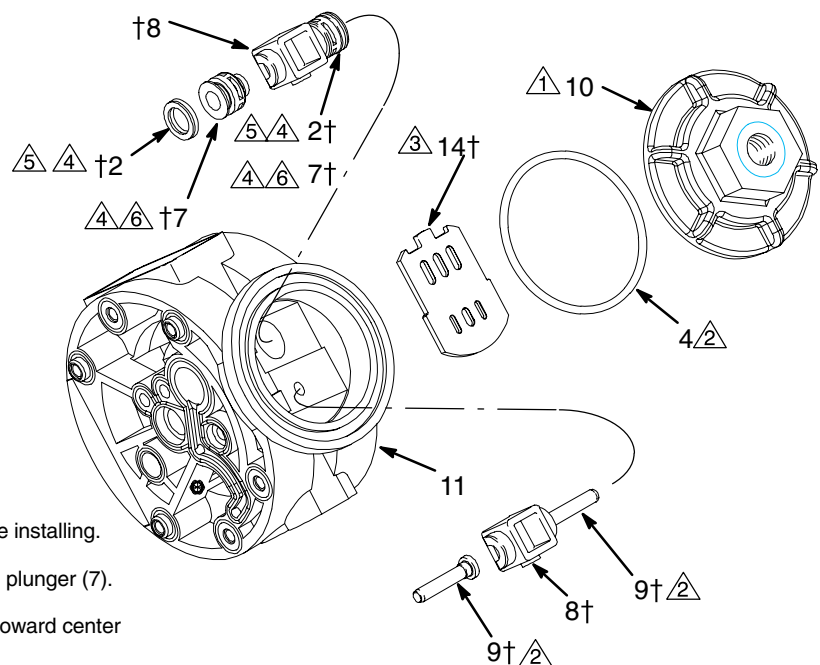
5. Grease the lapped surface of the valve plate (14), and install the valve plate with the lapped surface facing up.
6. Grease the bores of the center housing (11), install the u-cup packings (2) on the carriage plungers (7), and slide the carriage plungers into the carriage plunger bores. See the following important installation notes:

### NOTES:

- When you install each u-cup packing (2) on each carriage plunger (7), make sure the lips of the u-cup packing face toward the **clip end** (the smaller end) of the carriage plunger.
  - When you slide the carriage plungers (7) into the bores, slide them in with the clip ends (the smaller ends) facing toward the center of the center housing (11).
7. Grease the carriage pins (9), and slide the carriage pins into the carriage pin bores.
  8. Install the carriages (8). Make sure the carriages engage the clip ends of the carriage plungers (7) and carriage pins (9).
  9. Grease the o-ring (4), and seat it in the groove around the cover opening of the center housing (11).
  10. Screw the cover (10) into the center housing, and torque the cover to 80 to 100 in-lb (9.0 to 13.6 N-m).

**Figure 6**

**NOTE:** Center housing (11) is shown separated from the air covers, but it is not necessary to remove the air covers for this service. Leave the center housing and air covers assembled for this service.



† Included in Air Valve Repair Kit 784-90611

1. Torque to 80 to 100 in-lb (9.0 to 13.6 N-m).
2. Apply grease.
3. Apply grease to lapped face.
4. Apply grease to bores of center housing (11) before installing.
5. Seal lips face clip end (the smaller end) of carriage plunger (7).
6. Install with the clip ends (the smaller ends) facing toward center of center housing (11).

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# Service

## Ball or Duckbill Check Valves

**NOTE:** Use Fluid Section Repair Kit 784-90612 for Hytrel Diaphragm pumps and 784-90613 for PTFE Diaphragm pumps. General purpose grease and adhesive are supplied in the kits.



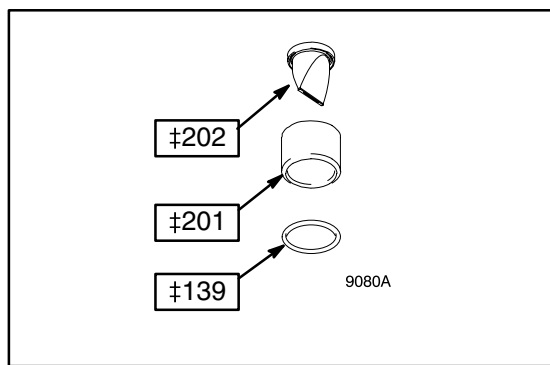
1. **Relieve the pressure.** See **Pressure Relief Procedure** on page 10.

2. Remove the top and bottom manifolds (102, 103).
3. Remove all parts shown with a dagger (†).
4. Clean all parts, and replace worn or damaged parts.
5. Reassemble the pump.

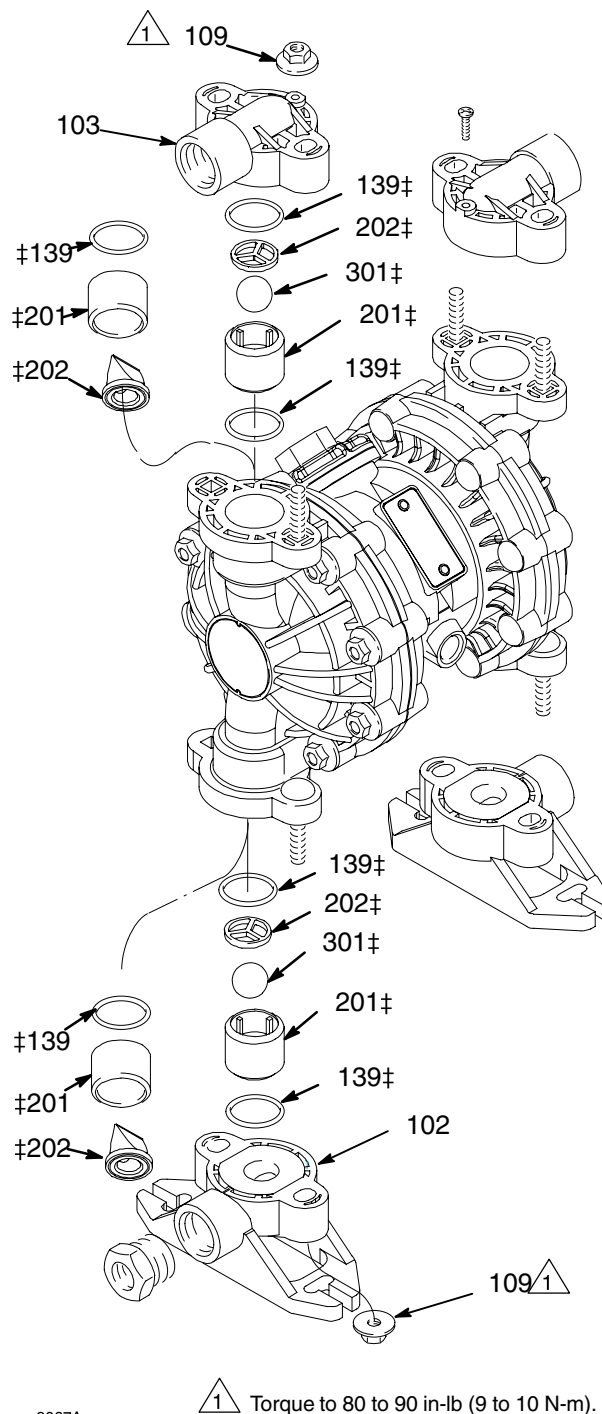
**NOTE:** Torque the manifold nuts (109) or bolts (105) to 80 to 90 in-lb (9 to 10 N-m).

## Inlet and Outlet for Pumps with Duckbill Check Valves

Pumps with duckbill check valves are shipped with the inlet manifold on bottom and the outlet manifold on the top. To make the inlet manifold on the top and the outlet manifold on the bottom, rotate each of the four duckbill assemblies vertically 180° as shown below. This may be necessary in applications where pump priming is problematic.



**Figure 7**  
**Split Manifold Pump**



**1** Torque to 80 to 90 in-lb (9 to 10 N-m).

# Service

## Diaphragms

**NOTE:** Fluid Section Repair Kit 784-90612 for Hytrel and 784-90613 for PTFE Diaphragms are available. Parts included in the kit are marked with a double dagger (‡) in Fig. 8 and in the Parts Drawings and Lists. General purpose grease and adhesive are supplied in the kit. Service the diaphragms as follows. See Fig. 8.

### Disassembly



1. **Relieve the pressure.** See **Pressure Relief Procedure** on page 10.

2. Remove manifolds (102 and 103) and fluid covers (101).

**NOTE:** Make sure all the check valve parts stay in place.

3. Remove one of the fluid-side diaphragm plates (105) (whichever one comes loose first when you use a wrench on the hex of each), and pull the diaphragm shaft out of the center housing (11).
4. Use a wrench on the flats of the diaphragm shaft (15) to remove the other fluid-side diaphragm plate (105) from the diaphragm shaft.
5. Remove the screws (106), remove the left (114) and right (113) air covers, and remove all old gasket (12) material from the ends of the center housing (11) and the surfaces of the air covers.
6. Remove the diaphragm shaft u-cups (16) and pilot pin o-rings (1).
7. Inspect all parts for wear or damage, and replace as necessary.

### Reassembly

1. Insert a diaphragm shaft u-cup (16) and a pilot pin o-ring (1) into the bores of the center housing (11).

**NOTE:** Make sure the lips of the u-cup face **out** of the center housing.

2. Line up the holes in the gasket (12) with the holes in the end of the center housing (11), and use six screws (106) to fasten an air cover (113 or 114) to the end of the center housing (11). Torque the screws to 35 to 45 in-lb (4.0 to 5.1 N-m).
3. Position the exhaust cover (13) and o-ring (4) on the center housing (11).
4. Repeat steps 1 and 2 for the other end of the center housing and the remaining air cover.
5. Apply medium-strength (blue) Loctite or equivalent to the threads of the fluid-side diaphragm plates (105). Install on one end of the diaphragm shaft (15) the following parts (see proper order in Fig. 8): air-side diaphragm plate (6) diaphragm (401), and fluid-side diaphragm plate (105).

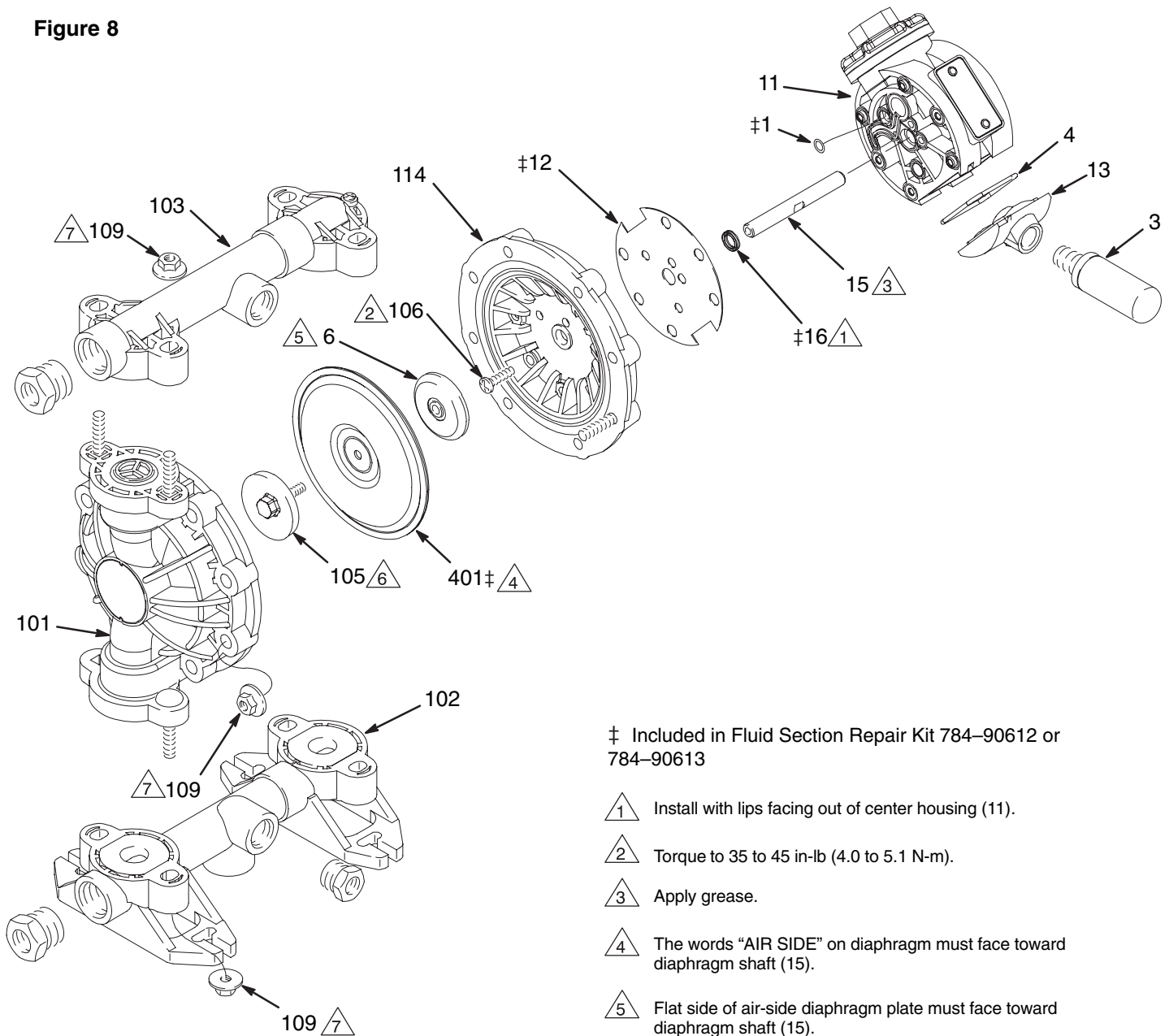
**NOTE:** The words “AIR SIDE” on the diaphragm (401) and the flat side of the air-side diaphragm plate (6) must face toward the diaphragm shaft (15)

6. Put grease on the diaphragm shaft (15), and carefully (do not damage the shaft u-cups) run the diaphragm shaft (15) through the center housing (11) bore.
7. Repeat step 5 for the other end of the diaphragm shaft (15), and torque the fluid-side diaphragm plates (105) to 80 to 90 in-lb (9 to 10 N-m) at 100 rpm maximum.
8. Install the muffler (3).
9. Make sure all the check valve parts are in place.
10. Reinstall the fluid covers (101) and manifolds (102 and 103), and torque the fluid cover and manifold nuts (109) to 80 to 90 in-lb (9 to 10 N-m).



# Service

Figure 8

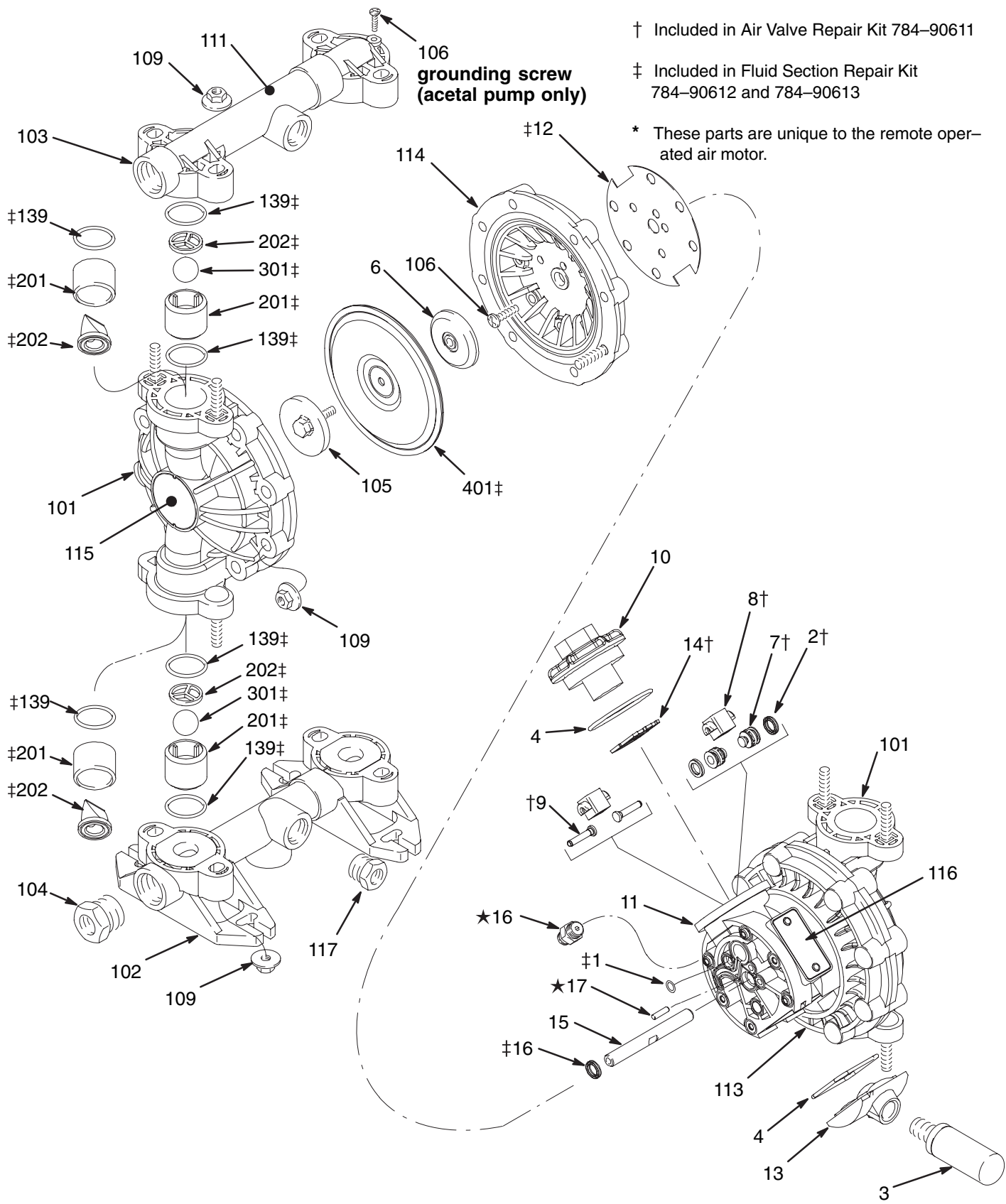


‡ Included in Fluid Section Repair Kit 784-90612 or 784-90613

- 1 Install with lips facing out of center housing (11).
- 2 Torque to 35 to 45 in-lb (4.0 to 5.1 N-m).
- 3 Apply grease.
- 4 The words "AIR SIDE" on diaphragm must face toward diaphragm shaft (15).
- 5 Flat side of air-side diaphragm plate must face toward diaphragm shaft (15).
- 6 Apply medium-strength (blue) Loctite® or equivalent to threads, and torque to 80 to 90 in-lb (9 to 10 N-m) at 100 rpm maximum.
- 7 Torque to 80 to 90 in-lb (9 to 10 N-m).

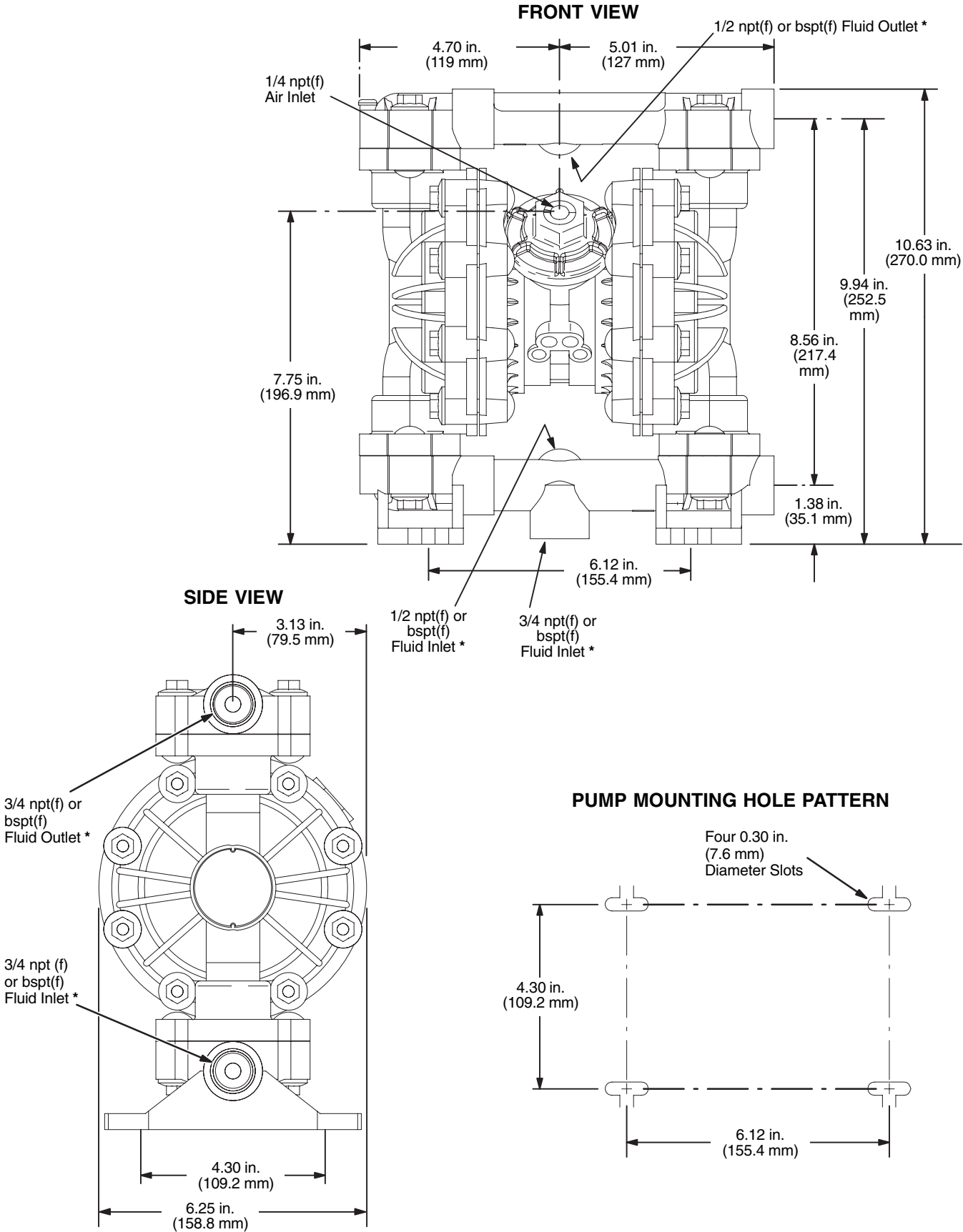
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# Parts Drawing



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# Dimensions

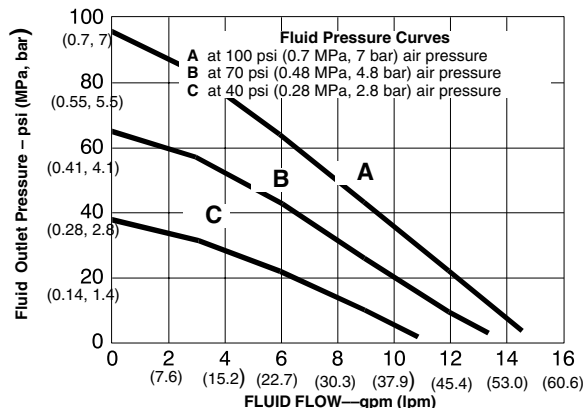


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# Performance Charts

## Fluid Outlet Pressure

Test Conditions: Pump tested in water with inlet submerged.

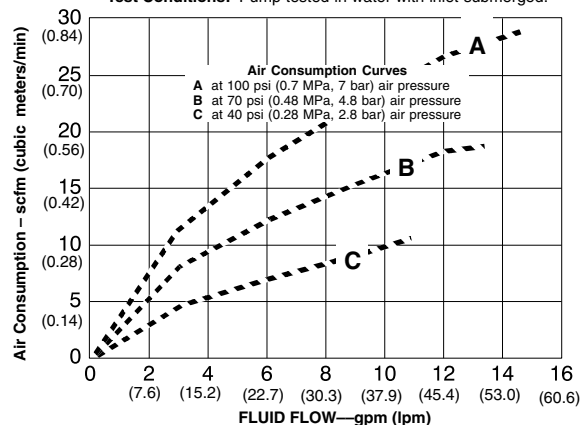


**To find Fluid Outlet Pressure (psi/MPa/bar) at a specific fluid flow (gpm/lpm) and operating air pressure (psi/MPa/bar):**

1. Locate fluid flow rate along bottom of chart.
2. Follow vertical line up to intersection with selected fluid outlet pressure curve.
3. Follow left to scale to read fluid outlet pressure.

## Air Consumption

Test Conditions: Pump tested in water with inlet submerged.



**To find Pump Air Consumption (scfm or m³/min) at a specific fluid flow (gpm/lpm) and air pressure (psi/MPa/bar):**

1. Locate fluid flow rate along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve.
3. Follow left to scale to read air consumption.

## WARRANTY

**Graymills Corporation** warrants that the equipment manufactured and delivered, when properly installed and maintained, shall be free from defects in workmanship and will function as quoted in the published specification. **Graymills** does not warrant process performance, nor assume any liability for equipment selection, adaptation, or installation.

Warranty does not apply to damages or defects caused by shipping, operator carelessness, mis-use, improper application or installation, abnormal use, use of add-on parts or equipment which damages or impairs the proper function of the unit and modifications made to the unit. Warranty does not apply to expendable parts needing replacement periodically due to normal wear and tear.

A new Warranty period shall not be established for repaired or replaced materials or products. Such items shall remain under Warranty for only the remainder of the Warranty period of the original materials or product.

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- a) Repairing or replacing (at **Graymills** sole discretion) any non-conforming or defective component within one year from the date of shipment from **Graymills**.
- b) Repairing or replacing (at **Graymills** sole discretion), components supplied by, but not manufactured by **Graymills**, to the extent of the warranty given by the original manufacturer.

Buyer must give **Graymills** prompt notice of any defect or failure.

If you believe that you have a Warranty claim, contact **Graymills** at (773)248-6825. Any return material must have an RMA number on the outside of the package and must be shipped prepaid or shipment will be refused. **Graymills** will promptly examine the material and determine if it is defective and within the Warranty period.

**Graymills Corporation** 3705 N. Lincoln Avenue Chicago, Illinois 60613 773/248-6825 FAX 773/477-8673 www.graymills.com

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EU-OVERENSSTEMMELSESERKLÆRING, EYILMOITUS YHTÄPITÄVYYDESTÄ, CE-DECLARATION DE CONFORMITE, EG-ÜBERENSTIMMUNG SERKLÄRUNG, DICHIARAZIONE DI CONFORMITÀ-CE, EG-VERKLARING VAN O VEREENSTEMMING, EC-DECLARACÃO DE CONFORMIDADE, EC-DECLARACIÓN DE CONFORMIDAD, EG-DECLARATION OM ÖVERENSSTÄMMELSE, ΔΗΛΩΣΗ ΣΥΜΜΟΡΦΩΣΗΣ-EK

### Model

Model, Malli, Modèle, Modell, Modello, Model, Modelo, Modelo, Model, Μοντέλο

1/2" Model

### Part No.

Part No., Osanro, Référence, Teile-Nr., Parte Codice, Part Nr., Peça No., Referencia, Part No., Ap. Ανταλλακτικού

DACT50

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98/37/EC Machinery Directive

94/9/EC ATEX Directive (Ex II 2 G T6)

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EN 292 EN 1127-1 EN 13463-1

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0359

### Approved By:

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Jerry Shields

PRESIDENT (Print)

### Date

Dato, Päiväys, Date, Datum, Data, Datum, Data, Jecha, Datum, Ημερομηνία

9-9-2005

### Date

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9-9-2005

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