795–90923
GM 3-07

Graymills

POLYPROPYLENE

Air Operated Double Diaphragm Pumps 3/8” Model

Air Valve Service Instructions

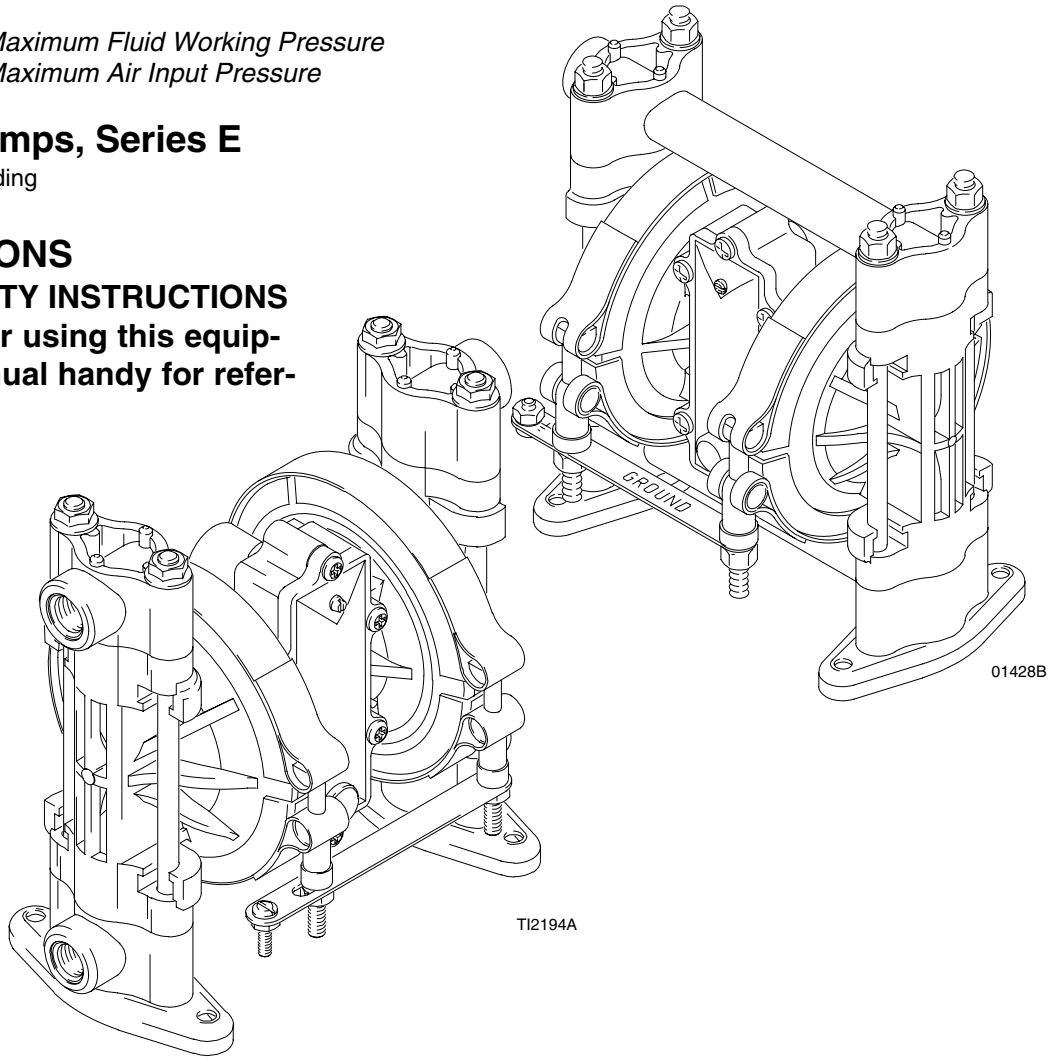
100 psi (0.7 MPa, 7 bar) Maximum Fluid Working Pressure
100 psi (0.7 MPa, 7 bar) Maximum Air Input Pressure

Polypropylene Pumps, Series E

US and Foreign Patents Pending

WARNING/CAUTIONS

Read all these SAFETY INSTRUCTIONS BEFORE installing or using this equipment. Keep this manual handy for reference/training.



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

⚠ WARNING

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 11 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 10.
- 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

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 For Pumps with Teflon® Diaphragms

Maximum fluid working pressure . . . . . 100 psi (0.7 MPa, 7 bar)
Air pressure operating range . . . . 20 to 100 psi (0.14 to 0.7 MPa, ... 1.4 to 7 bar)
Maximum air consumption . . . . . 5.5 scfm (see chart)
Maximum free flow delivery . . . . . 6.5 gpm (24.6 lpm)
Maximum pump speed . . . . . 330 cpm
Maximum suction lift . . . . . 7 ft (2.1 m) dry, 12 ft (3.7 m) wet
Maximum size pumpable solids . . . . . 1/16 in. (1.6 mm)
Sound power level,
at full flow at 100 psi (0.7 MPa, 7 bar) . . . . . 85 dBa
Sound power level,
at 70 psi (0.48 MPa, 4.8 bar) and 1 gpm (3.8 lpm) . . . 78 dBa
Operating temperature range . . . . . 40 to 150° F (4.4 to 65.5° C)
Air inlet size . . . . . 1/4 npt(f)
Fluid inlet and outlet size . . . . . 3/8" npt(f)
Wetted parts vary by models . . . . . See pages 28 and 30
Non-wetted external parts . . polyester (labels) glass–filled polypropylene with conductive SST fibers
Weight (approximate) . . . . . 4.75 lb (2.2 kg)

Sound power level measured per ISO standard 9614–2.

Viton®, Teflon®, and Hytrel® are registered trademarks of the DuPont Co.

Loctite® is a registered trademark of the Loctite Corporation.

Santoprene® is a registered trademark of the Monsanto Company.

Technical Data For Pumps with Hytrel® Diaphragms

Maximum fluid working pressure . . . . 100 psi (0.7 MPa, 7 bar)
Air pressure operating range . . . . 20 to 100 psi(0.14 to 0.7 MPa, ... 1.4 to 7 bar)
Maximum air consumption . . . . . 5.5 SCFM (see chart)
Maximum free flow delivery . . . . . 7 gpm (26.5 lpm)
Maximum pump speed . . . . . 330 cpm
Maximum suction lift . . . . . 12 ft (3.7 m) dry; 21 ft (6.4 m) wet
Maximum size pumpable solids . . . . . .1/16 in. (1.6 mm)
Sound power level,
at full flow at 100 psi (0.7 MPa, 7 bar) . . . . . 85 dBa
Sound power level,
at 70 psi (0.48 MPa, 4.8 bar) and 1 gpm (3.8 lpm) . . 78 dBa
Operating temperature range. 40 to 150° F (4.4 to 65.5° C)
Air inlet size . . . . . 1/4 npt(f)
Fluid inlet and outlet size. . . . . .3/8 npt(f)
Wetted Parts vary by model. . . . . See pages 27 and NO TAG.
Non-wetted external parts . . polyester (labels) glass–filled polypropylene with conductive SST fibers
Weight (approximate) . . . . . 4.75 lb (2.2 kg)

Sound power level measured per ISO standard 9614–2.

Viton®, Teflon®, and Hytrel® are registered trademarks of the DuPont Co.

Loctite® is a registered trademark of the Loctite Corporation.

Santoprene® is a registered trademark of the Monsanto Company.

Maintenance

Lubrication

The air valve is designed to operate unlubricated, however if lubrication is desired, every 500 hours of operation (or monthly) remove the hose from the pump air inlet and add two drops of machine oil to the air inlet.

⚠ 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

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 11.

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

Before storing the pump, always flush the pump and **relieve the pressure.**

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.

The recommended frequency for retorquing of fasteners varies with pump usage; a general guideline is to retorque every two months.

Tightening the Clamps

When tightening the clamps (111), apply thread lubricant to the bolts and ***be sure*** to torque the nuts (113) to 50 to 60 in-lb (5.6 to 6.8 N-m). See Fig. 9.

△1 Apply thread lube and torque nuts to 50 to 60 In-lb (5.6 to 6.8 N.m)

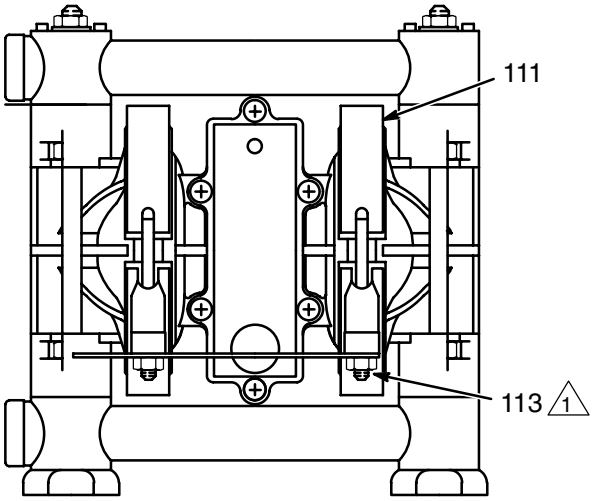


Fig. 9

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.

Operation

Pressure Relief Procedure

PRESSURIZED EQUIPMENT HAZARD

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from accidental spray from the gun, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you

- Are instructed to relieve the pressure
- Stop spraying
- Check or service any of the system equipment
- Install or clean the spray tips

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, having a container ready to catch the drainage.

Flush the Pump Before First Use

The pump was tested in water. If the water could contaminate the fluid you are pumping, flush the pump thoroughly with a compatible solvent. Follow the steps under **Starting and Adjusting the Pump.**

Starting and Adjusting the Pump

WARNING

TOXIC FLUID HAZARD

Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed. Do not lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the **Pressure Relief Procedure** above before lifting the pump.

1. Be sure the pump is properly grounded. Read **FIRE OR EXPLOSION HAZARD** on page 3.
2. Check all fittings to be sure they are tight. Be sure to use a compatible liquid thread sealant or Teflon® tape on all male threads. Tighten the fluid inlet and outlet fittings snugly. Do not overtighten the fittings into the pump.
3. Place the suction tube (if used) in the fluid to be pumped.
4. Place the end of the fluid hose (N) into an appropriate container. Close the fluid drain valve (J).
5. With the pump air regulator (H) closed, open all bleed-type master air valves (B, E).
6. If the fluid hose has a dispensing device, hold it open while continuing with the following step. Slowly open the air regulator (H) 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.

   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.

Pump Shutdown

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** at left.

At the end of the work shift, **relieve the pressure.**

Service

Replacing the Air Valve

Tools Required

- Torque wrench
- Phillips screwdriver
- O-ring pick

NOTE: Air Valve Kit ~~239952~~ is available. Parts included in the kit are marked with a dagger, for example (2†). A tube of general purpose grease (26†) is supplied in the kit. Install the kit as follows.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 11.

1. **Relieve the pressure.**

2. Unscrew the six mounting screws (15) and remove the air valve (A) from the pump. See Fig. 10.

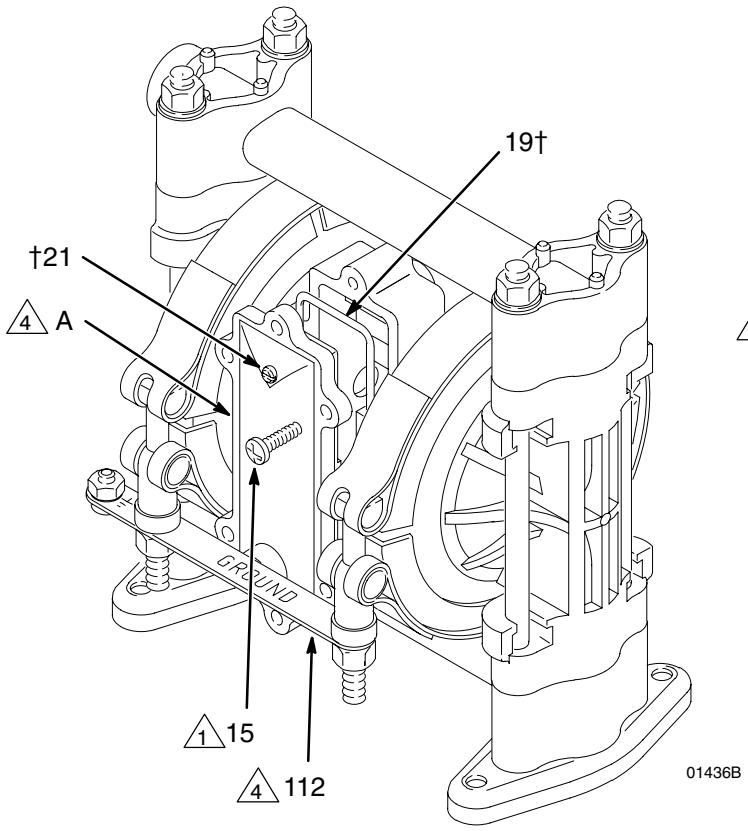
3. Refer to the Valve Plate Detail in Fig. 10. Remove the two screws (10) holding the valve plate (13) to the pump. Use an o-ring pick to remove the valve plate, seal (12), and bearing (9).

4. Apply grease (26†) to the bearing (9†). Install the bearing and the seal (12) in the pump housing (1). Install the valve plate (13) and secure with the two screws (10†), as shown. Torque the screws to 5 to 7 in-lb (0.6 to 0.8 N-m).

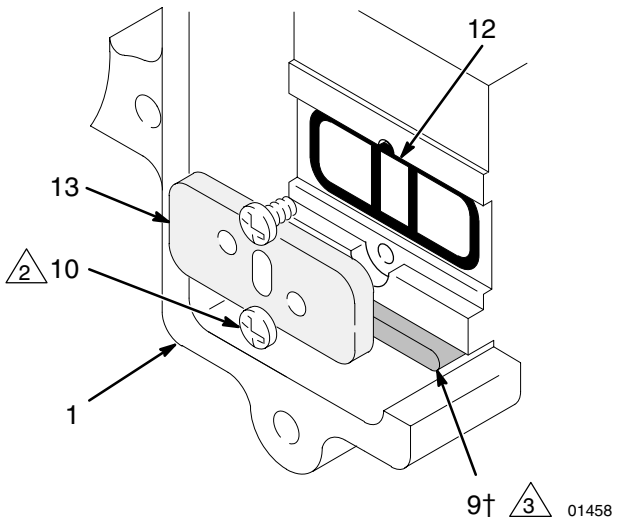
5. Make certain the o-ring (19†) is in place on the air valve cover (2†).

6. Apply grease (26†) where shown in Fig. 10.

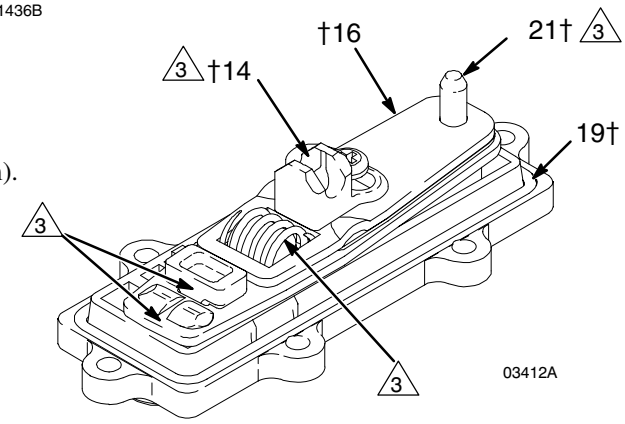
7. Align the new air valve assembly so the reset shaft (21†) is at the top. Install the valve on the pump, making sure the valve saddle (14†) engages the recessed area on the diaphragm shaft (23). Install the six screws (15) and torque oppositely and evenly, to 8 to 14 in-lb (0.9 to 1.6 N-m).



VALVE PLATE DETAIL



GREASE APPLICATION



1 Torque oppositely and evenly to 8 to 14 in-lb (0.9 to 1.6 N-m).

2 Torque to 5 to 7 in-lb (0.6 to 0.8 N-m).

3 Apply grease (26†).

Fig. 10

Service

Repairing the Air Valve

Tools Required

- Torque wrench
- Phillips screwdriver
- O-ring pick
- Rubber mallet

Disassembly

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 11.

1. **Relieve the pressure.**
2. Remove the air valve from the pump (see page 16).
3. Remove the screw (15) and shift saddle (14). See Fig. 11.
4. Disassemble the link assembly, consisting of the actuator link (16), spacer (17), detent link (22), spring (3), stop (4), and valve cup (5).
5. Remove the detent ball (8) and spring (6). The detent collar (7) is a press-fit and should not need removal; if it does require replacement, you should also replace the cover (2).
6. Remove the reset shaft (21), o-ring (20) and washer (18).
7. Clean all parts and inspect for wear or damage. Replace as needed. See **Reassembly,** page 19.

NOTE: ALL PARTS SHOWN ARE INCLUDED IN AIR VALVE KIT ~~239952~~.

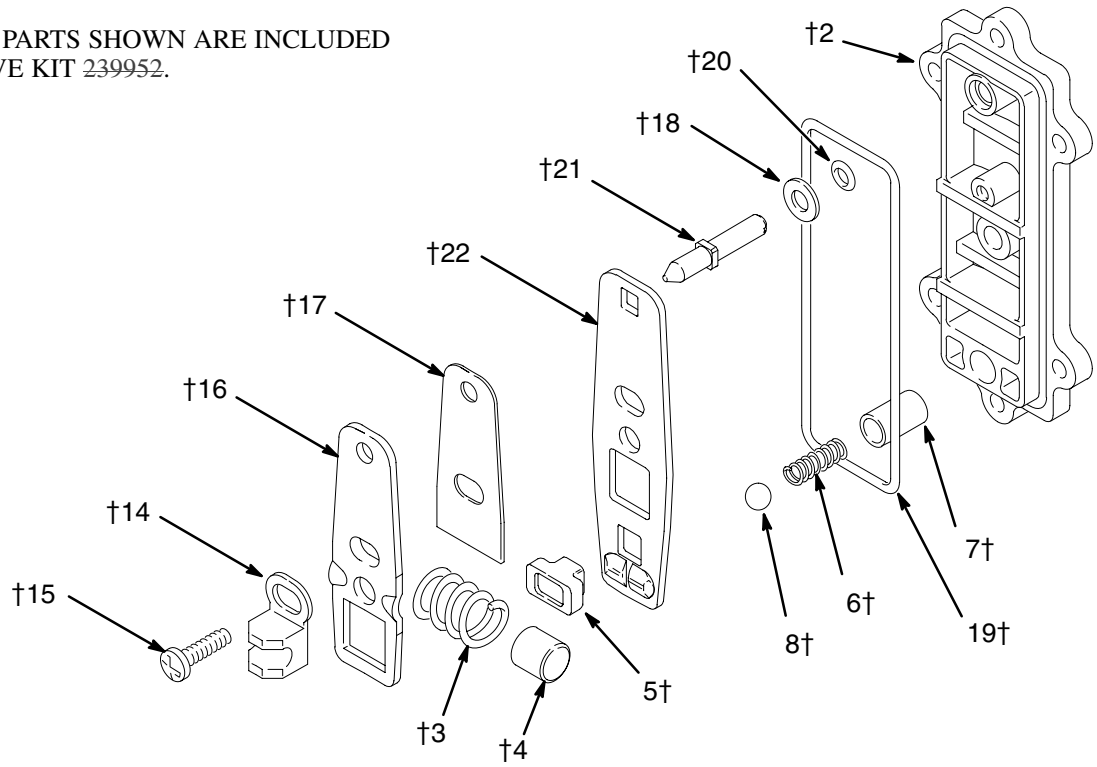


Fig. 11

Reassembly

1. *If the detent collar (7) was removed,* carefully install a new collar in a new cover (2), using a rubber mallet. See Fig. 12.

2. Grease the spring (6) and place it in the collar (7). Grease the ball (8) and set it on the spring.

3. Grease the o-ring (20) and install it in the hole (H) in the cover (2). See Fig. 12. Slide the washer (18) onto the blunt end of the reset shaft (21). Insert the shaft through the cover (2) until it seats.

4. Grease the spring (3). Place the link stop (4) inside the spring.

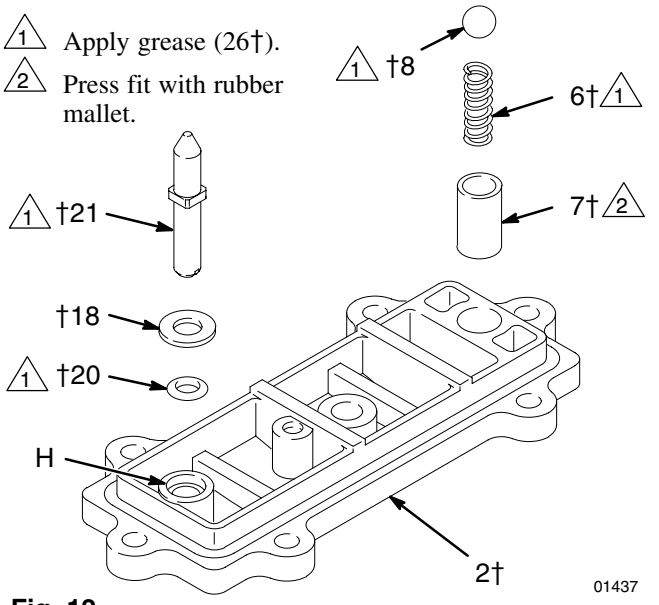


Fig. 12

5. Grease the detent link (22) and link spacer (17). Assemble the detent link, link spacer, and actuator link (16) as shown in Fig. 13. The raised bumps on the links (22 and 16) must face up.

6. Squeeze the spring (3) and install it and the stop (4) in the link assembly. The spring tension will hold all these parts together. Grease the valve cup (5) and install it in the link assembly as shown.

7. Install the link assembly on the cover (2) so the pointed end of the reset shaft (21) fits through the holes in the links and the square part of the shaft engages the square hole. Make certain the bumps on the detent link (22) engage the ball (8).

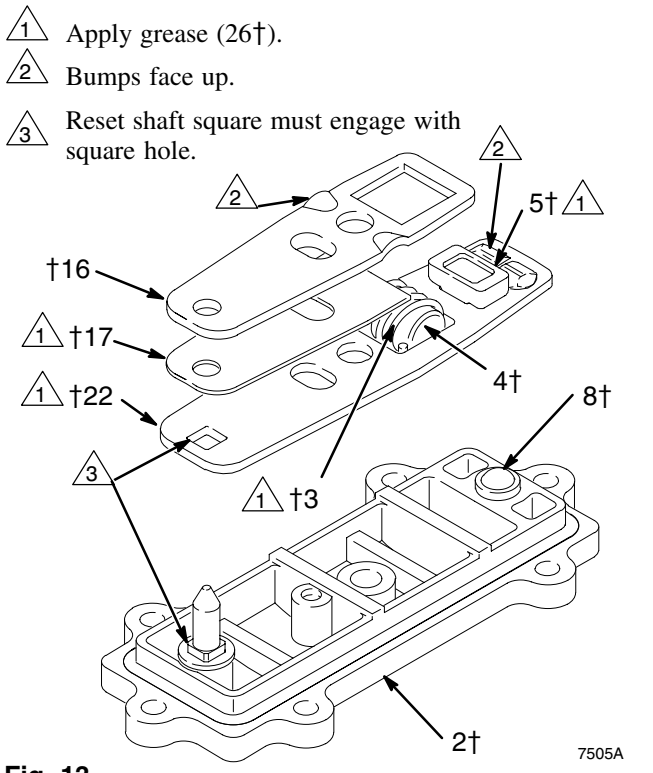


Fig. 13

8. Grease the inside surfaces of the shift saddle (14) and install it as shown in Fig. 14. Hold the link assembly firmly in place and install the screw (15). Torque to 7 to 9 in-lb (0.8 to 1.0 N-m). Install the o-ring (19) on the cover (2).

9. Reinstall the air valve as explained on page 16.

△1 Apply grease (26†).

△2 Torque to 7 to 9 in-lb (0.8 to 1.0 N-m).

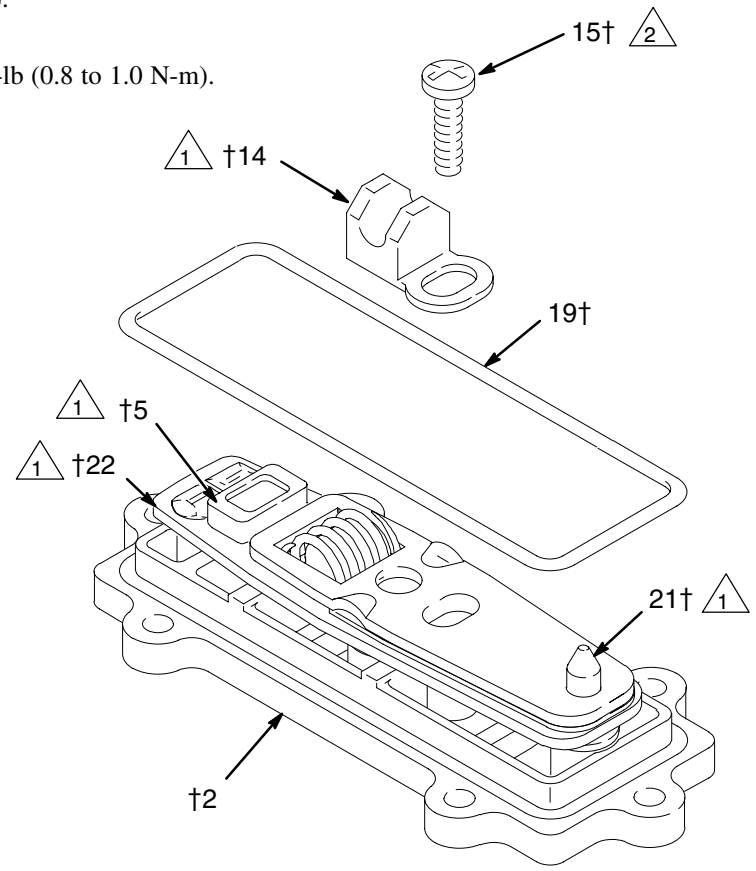


Fig. 14

⚠ CAUTION

Do not over-torque the manifold bolts (104). Doing so may cause the nuts (106) to spin in the housings, damaging the cover (101).

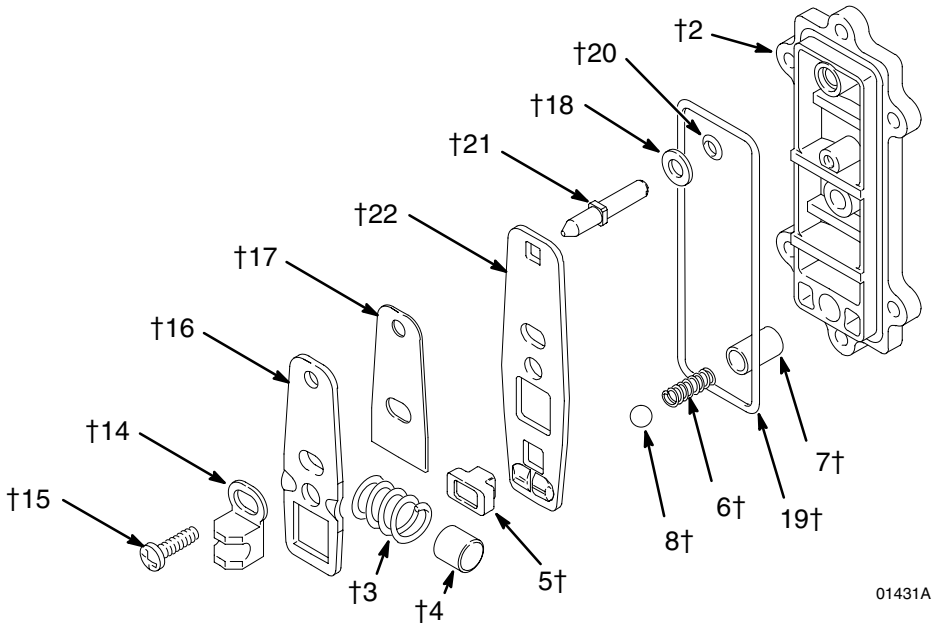
Parts

Air Motor Parts List (Matrix Column 2)

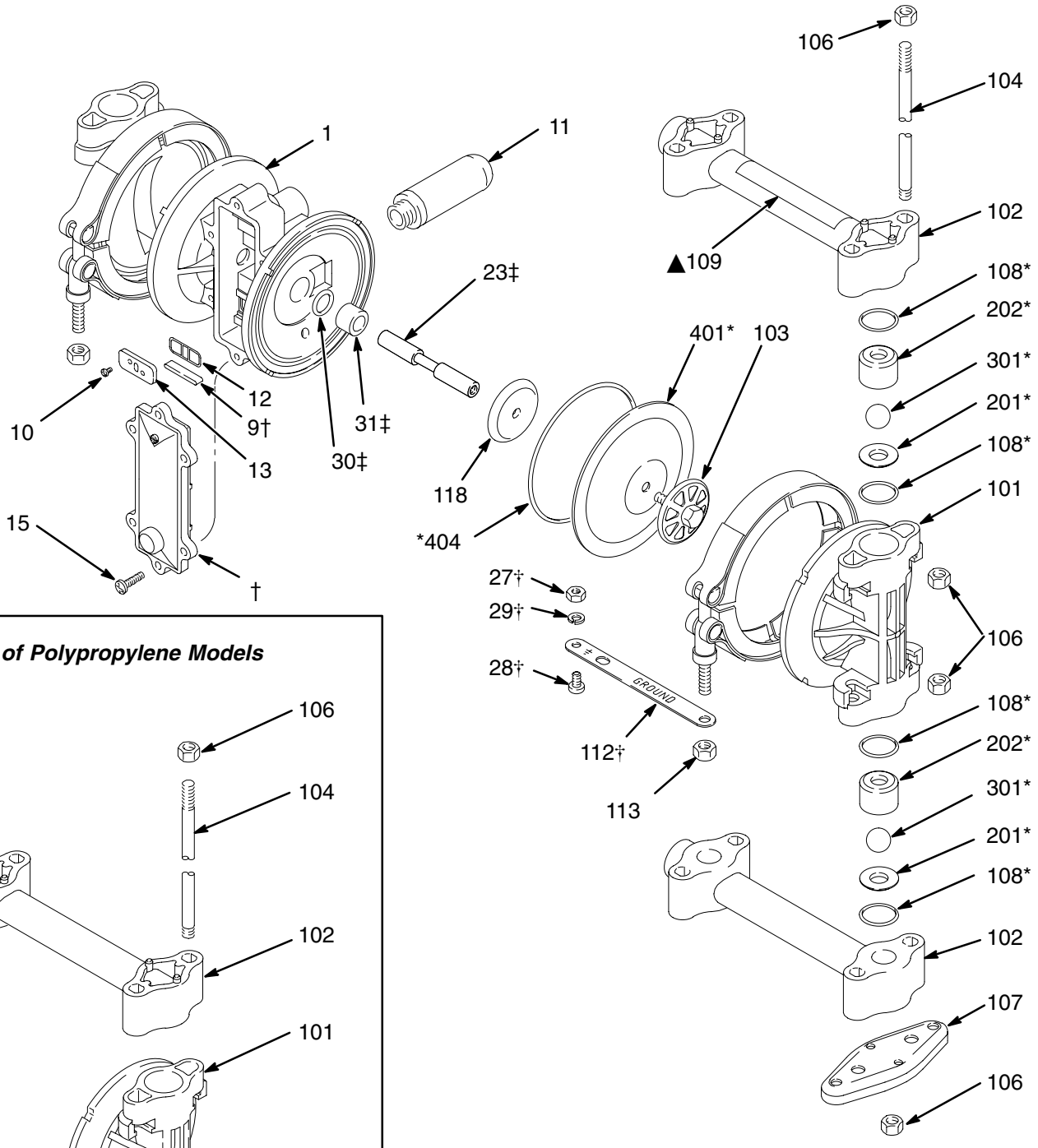
Digit	Ref. No.	Part No.	Description	Qty
3	1		HOUSING, center; polypropylene; see page 28	1
	2†		COVER, air valve; polypropylene	1
	3†		SPRING, compression; sst	1
	4†		STOP, link;	1
	5†		CUP, valve;	1
	6†		SPRING, compression; sst	1
	7†		COLLAR, detent; sst	1
	8†		BALL, detent; carbide	1
	9†		BEARING, link; see page 28	1
	10		SCREW, thread-forming; 1/4–20; 0.375 in. (9.5 mm) long; see page 28	2
	11		MUFFLER; see page 28	1
	12		SEAL, plate, valve; buna-N; see page 28	1
	13		PLATE, valve; sst; see page 28	1
	14†		SADDLE, shift;	1
	15†		SCREW, thread-forming; 10–14 size; 0.75 in. (19 mm) long; see below and page 28	7
	16†		LINK, actuator; sst	1
	17†		SPACER, link;	1
	18†		WASHER, plain; sst	1
	19†		O-RING; buna-N	1
	20†		O-RING; buna-N	1
	21†		SHAFT, reset; sst	1
	22†		LINK, detent; sst	1
	23‡		SHAFT, diaphragm; sst; see page 28	1
	26†		GREASE, general purpose; 0.375 oz. (10.5 g); not shown	1
	27		NUT, hex; 10–24; see page 28	1
	28		SCREW; 10–24; 0.75 in. (19 mm) long; see page 28	1
	29		LOCKWASHER, int. tooth; no. 10; see page 28	1
	30‡		PACKING, u-cup; Viton®	2
	31‡		BEARING;	2

† *These parts are included in Air Valve Kit ~~239952~~, which may be purchased separately. The kit includes only one screw (15), shown below, and a tube of grease (26).*

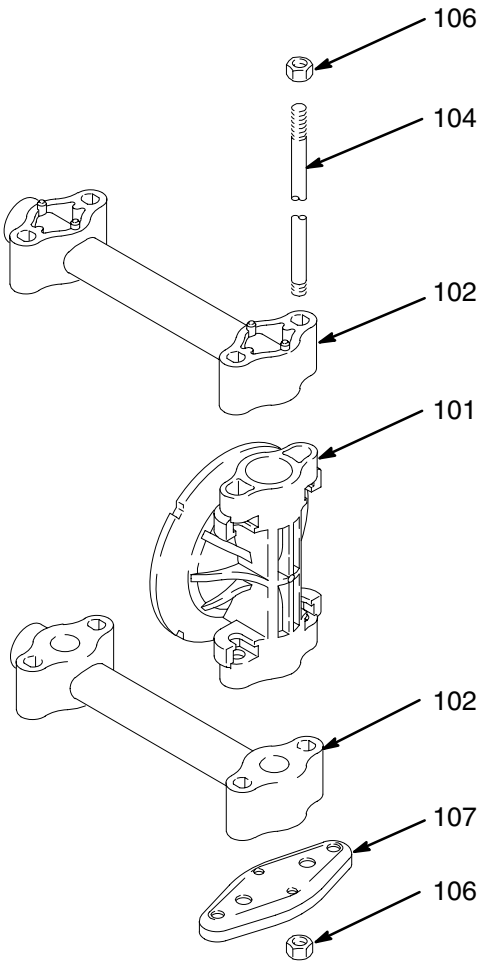
‡ *These parts are included in Diaphragm Shaft Kit ~~239014~~, which may be purchased separately.*



Parts



Detail of Polypropylene Models



* *Included in Pump Repair Kit, which may be purchased separately.*

† *Included in Air Valve Kit ~~239952~~, which may be purchased separately. See parts list on page 27.*

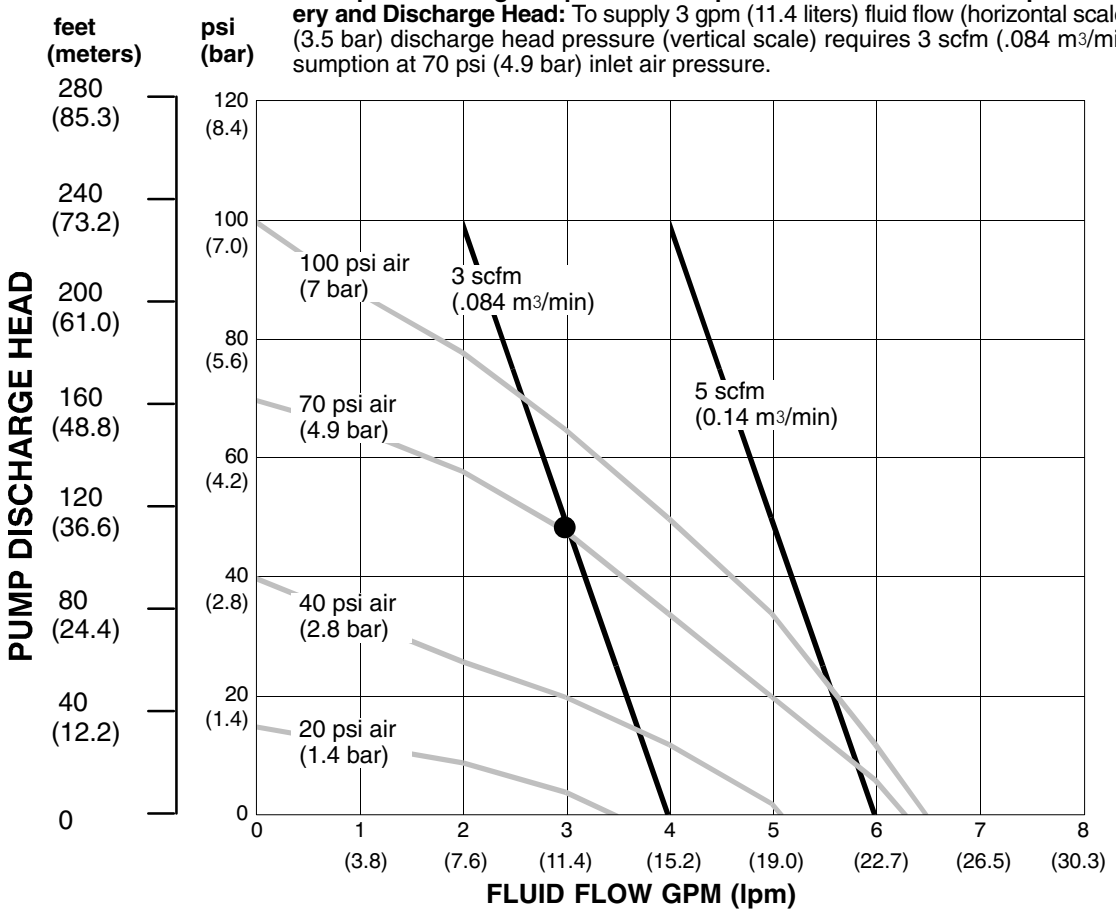
▲ *Replacement Danger and Warning labels, tags and cards are available at no cost.*

‡ *Included in Diaphragm Shaft Kit ~~239014~~, which may be purchased separately.*

† *Not supplied with Polypropylene pump.*

Performance Chart – pumps with Teflon Diaphragms

Example of Finding Pump Air Consumption and Air Pressure at a Specific Fluid Delivery and Discharge Head: To supply 3 gpm (11.4 liters) fluid flow (horizontal scale) at 50 psi (3.5 bar) discharge head pressure (vertical scale) requires 3 scfm (.084 m3/min) air consumption at 70 psi (4.9 bar) inlet air pressure.

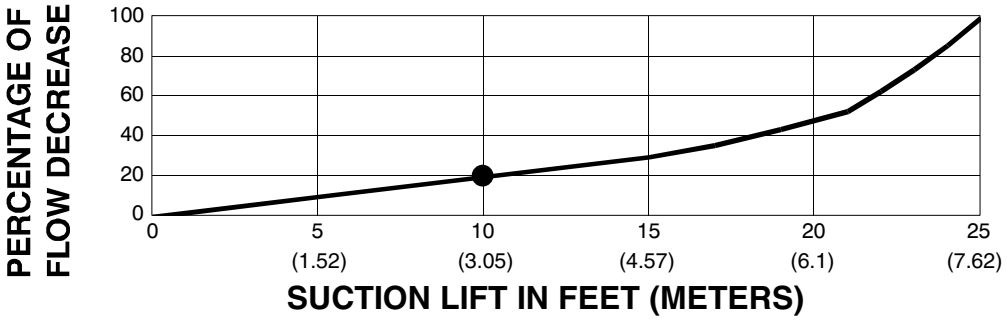


TEST CONDITIONS
Pump tested in water with inlet submerged.

KEY
FLUID PRESSURE AND FLOW
SCFM AIR CONSUMPTION

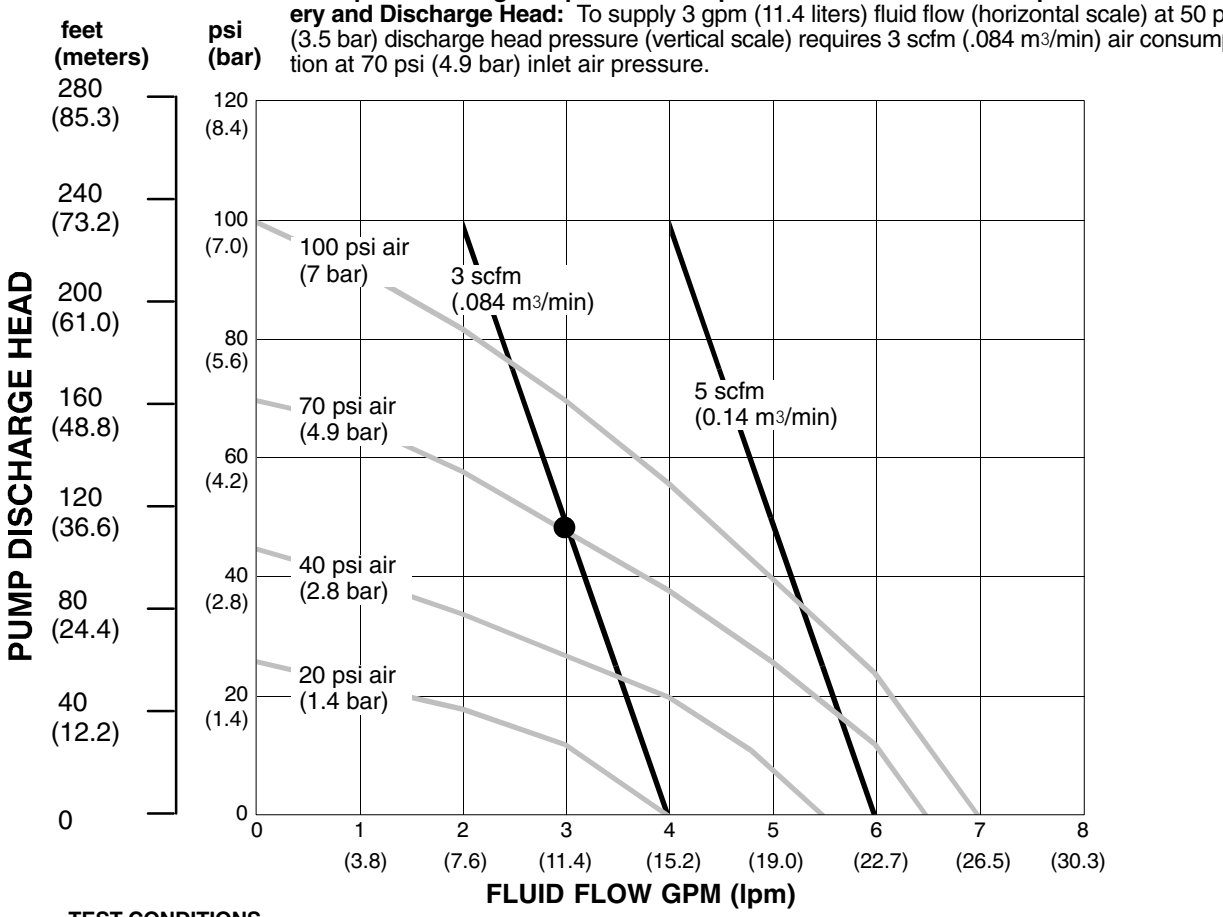
PUMPING RATE DECREASE AT DIFFERENT SUCTION LIFTS

EXAMPLE: At a suction lift of 10 ft (3.05 m), the pump flow rate will be decreased by 20 percent.



Performance Charts – pumps with Hytrel Diaphragms

Example of Finding Pump Air Consumption and Air Pressure at a Specific Fluid Delivery and Discharge Head: To supply 3 gpm (11.4 liters) fluid flow (horizontal scale) at 50 psi (3.5 bar) discharge head pressure (vertical scale) requires 3 scfm (.084 m3/min) air consumption at 70 psi (4.9 bar) inlet air pressure.

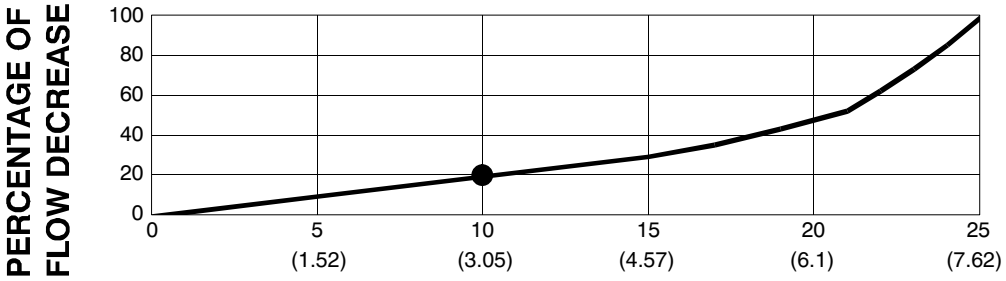


TEST CONDITIONS
Pump tested in water with inlet submerged.

KEY
FLUID PRESSURE AND FLOW
SCFM AIR CONSUMPTION

PUMPING RATE DECREASE AT DIFFERENT SUCTION LIFTS

EXAMPLE: At a suction lift of 10 ft (3.05 m), the pump flow rate will be decreased by 20 percent.



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.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESSED, IMPLIED OR STATUTORY. **GRAYMILLS CORPORATION** MAKES NO OTHER WARRANTY OF ANY KIND EXPRESS OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE A FORESTATED OBLIGATION ARE HEREBY DISCLAIMED BY **GRAYMILLS CORPORATION** AND EXCLUDED FROM THIS SALE. **Graymills** warranty obligations and Buyer remedies (except to title) are solely and exclusively stated herein. In no case will **Graymills** be liable for consequential damages, loss of production, or any other loss incurred due to interruption of service.

Graymills' obligation under this Warranty shall be limited to:

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