

# INSTRUCTIONS – PARTS LIST

**VERDER**

ALUMINIUM AND STAINLESS STEEL

**VERDERAIR VA 40**

## Air-Operated Diaphragm Pumps

**819.4334**

Rev. ZAP

EN

***For fluid transfer applications. For professional use only.***

8.3 bar Maximum Fluid Working Pressure

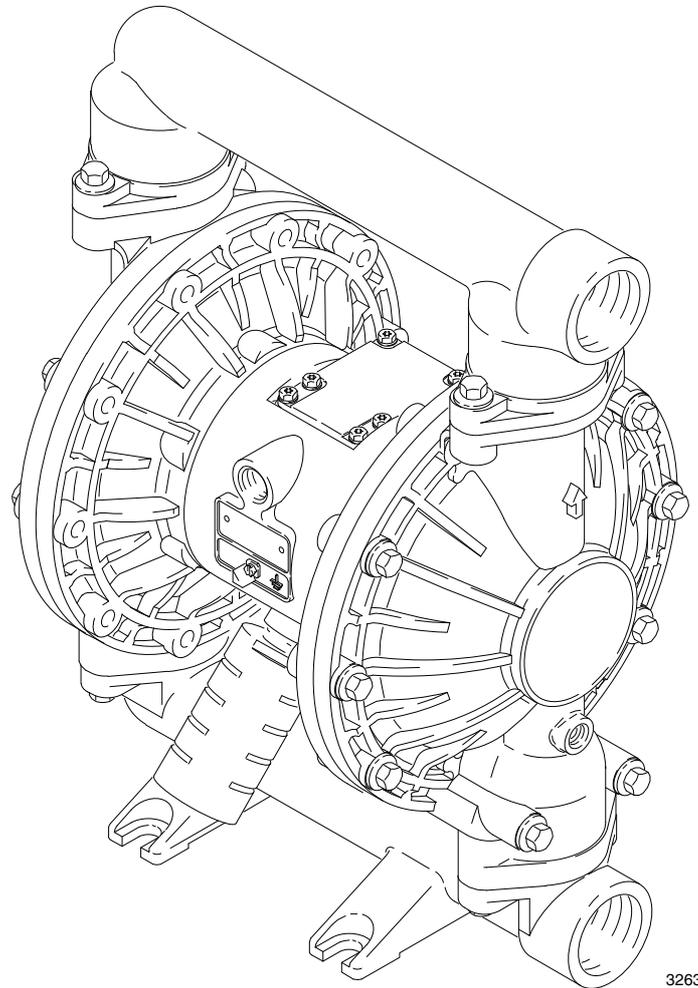
8.3 bar Maximum Air Input Pressure



### **Important Safety Instructions**

Read all warnings and instructions in this manual. Save these instructions.

Patent No.  
CN ZL94102643.4  
FR 9408894  
JA 3517270  
US 5,368,452



3263B

**CE**



II 2 GD

Ex h IIC 66°C...135°C Gb

Ex h IIC T135°C Db

ATEX T-code rating is dependent on the temperature of the fluid being pumped. Fluid temperature is limited by the materials of the pump interior wetted parts. See Technical Data for the maximum fluid operating temperature for your specific pump model.



**Aluminum Model Shown**

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# Configuration Number Matrix

Check the identification plate (ID) for the 16-digit Configuration Number of your pump. Use the following matrix to define the components of your pump.

Sample Configuration Number: VA40AA – SP TF TF TB 00

<b>VA40</b>	<b>A</b>	<b>A</b>	<b>SP</b>	<b>TF</b>	<b>TF</b>	<b>TB</b>	<b>00</b>
Pump Model	Fluid Section	Air Section	Seats	Balls	Diaphragms	Connections	Options

**NOTE:** Some combinations are not possible. Please check with your local supplier or on [www.verderair.com](http://www.verderair.com).

Pump Model (1 and 2)	Fluid Section Material (3)		Air Section Material (4)		Seats (5)		Balls (6)	
<b>VA40</b>	<b>A</b>	Aluminum	<b>A</b>	Aluminum	<b>BN</b>	Buna–n	<b>AC</b>	Acetal
	<b>S</b>	Stainless Steel	<b>S</b>	Stainless Steel	<b>GE</b>	Geolast	<b>BN</b>	Buna–n
					<b>HS</b>	Hardened Steel	<b>GE</b>	Geolast
					<b>HY</b>	TPE	<b>HS</b>	Hardened Steel
					<b>KY</b>	PVDF	<b>SP</b>	Santoprene
					<b>PP</b>	Polypropylene	<b>TF</b>	PTFE
					<b>SP</b>	Santoprene	<b>VT</b>	FKM
					<b>SS</b>	Stainless steel		
<b>VT</b>	FKM							

Diaphragm (7)		Connections (8)		Options (9)	
<b>BN</b>	Buna–n	<b>TB</b>	Threaded BSPT	<b>00</b>	Standard
<b>GE</b>	Geolast	<b>TN</b>	Threaded NPT	<b>RE</b>	Remote operation
<b>SP</b>	Santoprene				
<b>TF</b>	PTFE/Neoprene 2–Piece				
<b>TO</b>	PTFE 1–Piece				
<b>VT</b>	FKM				

# 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.

# Warning



INSTRUCTIONS

### EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call VERDER After Sales Service.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated component in your system. This equipment has an **8.4 bar maximum working pressure at 8.4 bar maximum incoming air pressure**.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in pressurized aluminum equipment. Such use could result in a chemical reaction, with the possibility of explosion.
- Do not use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose VERDER hoses to temperatures above 82°C or below -40°C.
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

# 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.

- Know the specific hazards of the fluid you are using.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state, and national guidelines.
- Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturer.
- 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 10.



## FIRE AND EXPLOSION HAZARD

Improper grounding, poor ventilation, open flames or sparks can cause a hazardous condition and result in a fire or explosion and serious injury.

- Ground the equipment. Refer to **Grounding** on page 6.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop pumping immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being sprayed.
- 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.
- Keep the work area free of debris, including solvent, rags, and gasoline.
- Electrically disconnect all equipment in the work area.
- Extinguish all open flames or pilot lights in the work area.
- Do not smoke in the work area.
- Do not turn on or off any light switch in the work area while operating or if fumes are present.
- Do not operate a gasoline engine in the work area.

# Installation

## General Information

1. The Typical Installation shown in Fig. 2 is only a guide for selecting and installing system components. Contact your VERDER Customer Service for assistance in planning a system to suit your needs.
2. Always use Genuine VERDER Parts and Accessories.
3. Reference numbers and letters in parentheses refer to the callouts in the figures and the parts lists on pages 24–25.
4. Lift the pump by grasping the outlet manifold (1) securely. See Fig. 3 on page 9.

### 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.

1. Read **TOXIC FLUID HAZARD** on page 5.
2. Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.

## Tightening Screws Before First Use

Before using the pump for the first time, check and retorque all external fasteners. See **Torque Sequence**, page 26.

After the first day of operation, retorque the fasteners. Although pump use varies, a general guideline is to retorque fasteners every two months.

## Grounding

### Warning



#### FIRE AND EXPLOSION HAZARD

This pump must be grounded. Before operating the pump, ground the system as explained below. Also, read the section **FIRE AND EXPLOSION HAZARD**, on page 5.

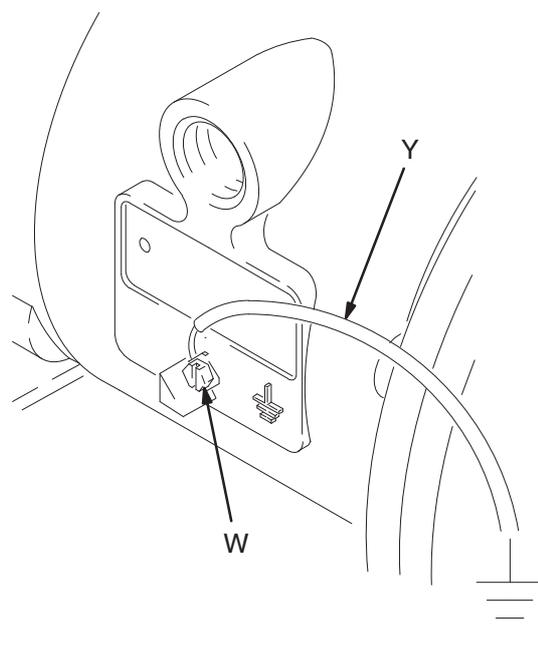


To reduce the risk of static sparking, ground the pump and all other equipment used or located in the pumping area. Check your local electrical code for detailed

grounding instructions for your area and type of equipment.

### Ground all of this equipment:

- *Pump:* Connect a ground wire and clamp as shown in Fig. 1. Loosen the grounding screw (W). Insert one end of a 1.5 mm<sup>2</sup> minimum ground wire (Y) behind the grounding screw and tighten the screw securely. Connect the clamp end of the ground wire to a true earth ground. Order Part No. 819.0157 Ground Wire and Clamp.



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Fig. 1

- *Air and fluid hoses:* Use only grounded hoses with a maximum of 150 m combined hose length to ensure grounding continuity.
- *Air compressor:* Follow the manufacturer's recommendations.
- *All solvent pails used when flushing,* according to local code. Use only 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.

# Installation

## Mountings

### Caution

The pump exhaust air may contain contaminants. Ventilate to a remote area if the contaminants could affect your fluid supply. See **Air Exhaust Ventilation** on page 10.

1. Be sure the mounting surface can support the weight of the pump, hoses, and accessories, as well as the stress caused during operation.
2. For all mountings, be sure the pump is bolted directly to the mounting surface.
3. For ease of operation and service, mount the pump so the air valve cover (2), air inlet, and fluid inlet and outlet ports are easily accessible.
4. Rubber Foot Mounting Kit 819.4333 is available to reduce noise and pump movement during operation.

## Air Line

### Warning

A bleed-type master air valve (B) is required in your system to relieve air trapped between this valve and the pump. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin, injury from moving parts, or contamination from hazardous fluids. See Fig. 2.

1. Install the air line accessories as shown in Fig. 2. Mount these accessories on the wall or on a bracket. Be sure the air line supplying the accessories is grounded.
  - a. Install an air regulator (C) and gauge to control the fluid pressure. The fluid outlet pressure will be the same as the setting of the air regulator.
  - b. Locate one bleed-type master air valve (B) close to the pump and use it to relieve trapped air. See the **Warning** above. 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.

2. Install a grounded, flexible air hose (A) between the accessories and the 1/2 npt(f) pump air inlet (N). See Fig. 3. Use a minimum 13 mm ID air hose. Screw an air line quick disconnect coupler (D) onto the end of the air hose (A), and screw the mating fitting into the pump air inlet snugly. Do not connect the coupler (D) to the fitting until you are ready to operate the pump.

## Fluid Suction Line

1. **Use grounded fluid hoses (G).** The pump fluid inlet (R) 1-1/2 in. bspt on pumps with connection Code 8=TB. The pump fluid inlet is 1-1/2 in. npt on pumps with connection Code 8=TN. Screw the fluid fitting into the pump inlet securely.
2. If the fluid inlet 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.
3. At inlet fluid pressures greater than 1.05 bar, diaphragm life will be shortened.
4. See the **Technical Data** on page 29 for maximum suction lift (wet and dry).

## Fluid Outlet Line

### Warning

A fluid drain valve (J) is required to relieve pressure in the hose if it is plugged. The drain valve reduces the risk of serious injury, including splashing in the eyes or on the skin, or contamination from hazardous fluids when relieving pressure. Install the valve close to the pump fluid outlet. See Fig. 2.

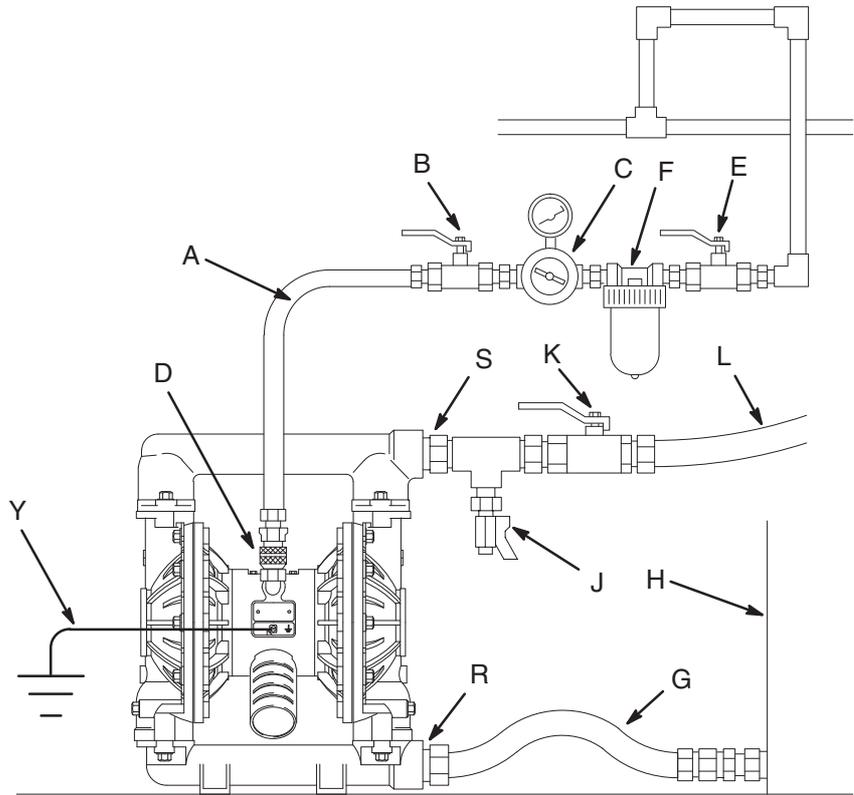
1. **Use grounded fluid hoses (L).** The pump fluid outlet (S) is 1-1/2 in. bspt on pumps with connection Code 8=TB. The pump fluid outlet is 1-1/2 in. npt on pumps with connection Code 8=TN. Screw the fluid fitting into the pump outlet securely.
2. Install a fluid drain valve (J) near the fluid outlet. See the **Warning** above.
3. Install a shutoff valve (K) in the fluid outlet line.

# Installation

## FLOOR MOUNT TYPICAL INSTALLATION

**KEY**

- A Air Supply Hose
- B Bleed-Type Master Air Valve (required for pump)
- C Air Regulator
- D Air Line Quick Disconnect
- E Master Air Valve (for accessories)
- F Air Line Filter
- G Fluid Suction Hose
- H Fluid Supply
- J Fluid Drain Valve (required)
- K Fluid Shutoff Valve
- L Fluid Hose
- R\* 1-1/2 in. bspt Fluid Inlet Port
- S\* 1-1/2 in. bspt Fluid Outlet Port
- Y Ground Wire (required; see page 6 for installation instructions)



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**Fig. 2.**

\* On pumps with connection Code 8=TB=bspt and on pumps with connection Code 8=TN=npt.

# Installation

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

The pump is shipped with the fluid inlet (R) and outlet (S) ports facing the same direction. See Fig. 3. To change the orientation of the inlet and/or outlet port:

1. Remove the screws (106) holding the inlet (102) and/or outlet (103) manifold to the covers (101).
2. Reverse the manifold and reattach. Install the screws and torque to 14–17 N•m. See **Torque Sequence**, page 26.

**KEY**

N	1/2 npt(f) Air Inlet Port	101	Covers
P	Muffler; Air Exhaust Port is 3/4 npt(f)	102	Fluid Inlet Manifold
R*	1-1/2 in. bspt Fluid Inlet Port	103	Fluid Outlet Manifold
S*	1-1/2 in. bspt Fluid Outlet Port	106	Manifold and Cover Screws
		112	Bottom Cover Screws

⚠<sup>1</sup> Torque to 14-17 N•m. See **Torque Sequence**, page 26.

⚠<sup>2</sup> Torque to 22-25 N•m. See **Torque Sequence**, page 26.

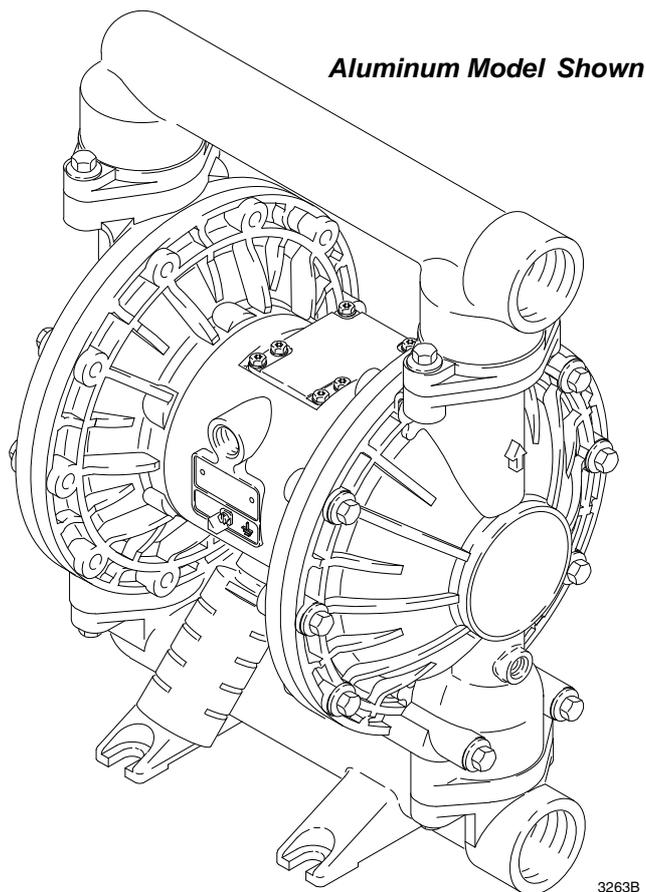


Fig. 3

## 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. 4.

Thermal expansion of fluid in the outlet line can cause over pressurization. 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.

**KEY**

R*	1-1/2 in. bspt Fluid Inlet Port
S*	1-1/2 in. bspt Fluid Outlet Port
V	Pressure relief valve (Order Part No. 819.0159)

⚠<sup>1</sup> Install valve between fluid inlet and outlet ports.

⚠<sup>2</sup> Connect fluid inlet line here.

⚠<sup>3</sup> Connect fluid outlet line here.

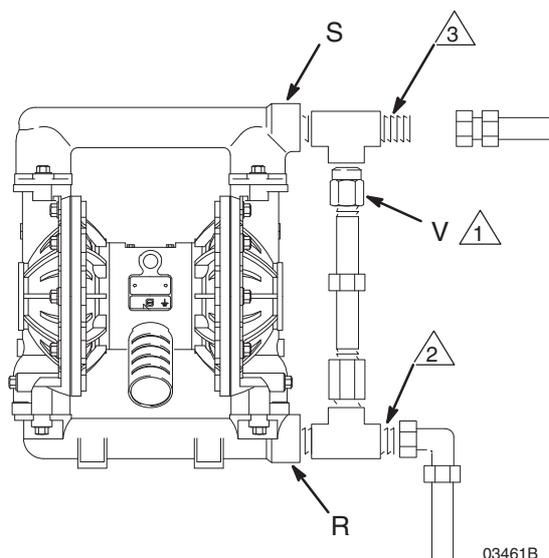


Fig. 4

\* On pumps with connection Code 8=TB=bspt and on pumps with connection Code 8=TN=npt.

# Installation

## Air Exhaust Ventilation

### Warning



#### FIRE AND EXPLOSION HAZARD

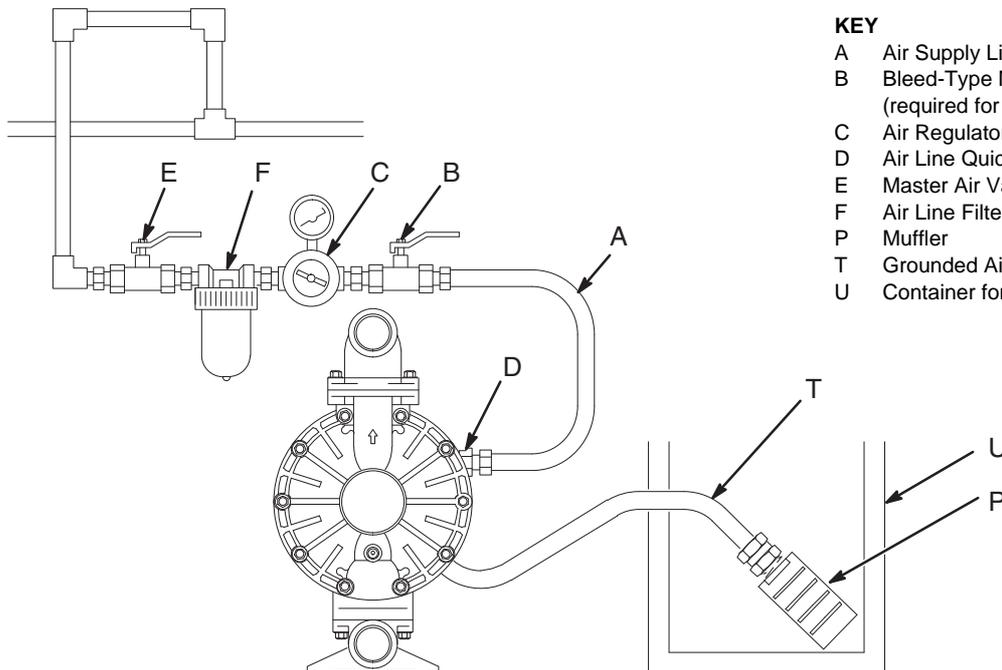
Be sure to read and follow the warnings and precautions regarding **TOXIC FLUID HAZARD**, and **FIRE AND EXPLOSION HAZARD** on page 5, before operating this pump.



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

Diaphragm failure will cause the fluid being pumped to exhaust with the air. Place an appropriate container at the end of the air exhaust line to catch the fluid. See Fig. 5.

## VENTING EXHAUST AIR



#### KEY

- A Air Supply Line
- B Bleed-Type Master Air Valve (required for pump)
- C Air Regulator
- D Air Line Quick Disconnect
- E Master Air Valve (for accessories)
- F Air Line Filter
- P Muffler
- T Grounded Air Exhaust Hose
- U Container for Remote Air Exhaust

The air exhaust port is 3/4 npt(f). Do not restrict the air exhaust port. Excessive exhaust restriction can cause erratic pump operation.

If the muffler (P) is installed directly to the air exhaust port, apply PTFE thread tape or anti-seize thread lubricant to the muffler threads before assembly.

To provide a remote exhaust:

1. Remove the muffler (P) from the pump air exhaust port.
2. Install a grounded air exhaust hose (T) and connect the muffler (P) to the other end of the hose. The minimum size for the air exhaust hose is 19 mm ID. If a hose longer than 4.57 m is required, use a larger diameter hose. Avoid sharp bends or kinks in the hose. See Fig. 5.
3. Place a container (U) at the end of the air exhaust line to catch fluid in case a diaphragm ruptures.

03267A

Fig. 5.

# 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 from the gun 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, having a container ready to catch the drainage.

## Flush the Pump Before First Use

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

## Starting and Adjusting the Pump

### Warning



#### TOXIC FLUID HAZARD

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** above before lifting the pump.

1. Be sure the pump is properly grounded. Refer to **Grounding** on page 6.
2. Check all fittings to be sure they are tight. Be sure to use a compatible liquid thread sealant on all male threads. Tighten the fluid inlet and outlet fittings securely.

3. Place the suction tube (if used) in the fluid to be pumped.

**NOTE:** If the fluid inlet 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.

4. Place the end of the fluid hose (L) into an appropriate container.
5. Close the fluid drain valve (J). See Fig. 2.
6. Close the pump air regulator (C). Open all bleed-type master air valves (B, E).
7. If the fluid hose has a dispensing device, hold it open while continuing with the following step.
8. Slowly open the air regulator (C) 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.

# 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 often enough 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 storing it for any length of time.

## 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 fasteners. Tighten or retorque as necessary. Although pump use varies, a general guideline is to retorque fasteners every two months. See **Torque Sequence**, page 26.

## 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

## 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 before checking or servicing the equipment.
2. Check all possible problems and causes before disassembling the pump.

PROBLEM	CAUSE	SOLUTION
Pump cycles at stall or fails to hold pressure at stall.	Worn check valve balls (301), seats (201) or o-rings (202).	Replace. See page 16.
Pump will not cycle, or cycles once and stops.	Air valve is stuck or dirty.	Disassemble and clean air valve. See pages 14–15. Use filtered air.
	Check valve ball (301) severely worn and wedged in seat (201) or manifold (102 or 103).	Replace ball and seat. See page 16.
	Check valve ball (301) is wedged into seat (201), due to overpressurization.	Install Pressure Relief Valve (see page 9).
	Dispensing valve clogged.	Relieve pressure and clear valve.
Pump operates erratically.	Clogged suction line.	Inspect; clear.
	Sticky or leaking balls (301).	Clean or replace. See page 16.
	Diaphragm ruptured.	Replace. See pages 17–19.
	Restricted exhaust.	Remove restriction.
Air bubbles in fluid.	Suction line is loose.	Tighten.
	Diaphragm ruptured.	Replace. See pages 17–19.
	Loose inlet manifold (102), damaged seal between manifold and seat (201), damaged o-rings (202).	Tighten manifold bolts (106) or replace seats (201) or o-rings (202). See page 16.
	Loose diaphragm shaft bolt (107).	Tighten or replace. See pages 17–19.
	Damaged o-ring (108).	Replace. See pages 17–19.
Fluid in exhaust air.	Diaphragm ruptured.	Replace. See pages 17–19.
	Loose diaphragm shaft bolt (107).	Tighten or replace. See pages 17–19.
	Damaged o-ring (108).	Replace. See pages 17–19.
Pump exhausts excessive air at stall.	Worn air valve block (7†■), o-ring (6†■), plate (8■), pilot block (18), u-cups (10†■), or pilot pin o-rings (17†■).	Repair or replace. See pages 14–15.
	Worn shaft seals (402).	Replace. See pages 17–19.
Pump leaks air externally.	Air valve cover (2) or air valve cover screws (3) are loose.	Tighten screws. See page 15.
	Air valve gasket (4†■) or air cover gasket (22) is damaged.	Inspect; replace. See pages 14–15, 20–21.
	Air cover screws (25) are loose.	Tighten screws. See pages 20–21.
Pump leaks fluid externally from ball check valves.	Loose manifolds (102, 103), damaged seal between manifold and seat (201), damaged o-rings (202).	Tighten manifold bolts (106) or replace seats (201) or o-rings (202). See page 16.

# Service

## Repairing the Air Valve

### Tools Required

- Torque wrench
- Torx (T20) screwdriver or 7 mm socket wrench
- Needle-nose pliers
- O-ring pick
- Lithium-base grease

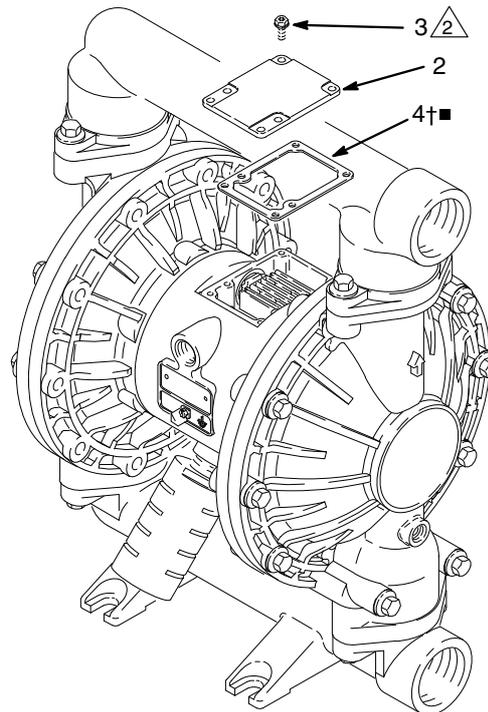
**NOTE:** Air Valve Repair Kits 819.4274 (aluminum center housing models) and 819.0249 (sst center housing models) are available. Refer to page 22. Parts included in the kit are marked with a symbol, for example (4†■). Use all the parts in the kit for the best results.

### 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. With a Torx (T20) screwdriver or 7 mm socket wrench, remove the six screws (3), air valve cover (2), and gasket (4). See Fig. 6.
3. Move the valve carriage (5) to the center position and pull it out of the cavity. Remove the valve block (7) and o-ring (6) from the carriage. Using a needle-nose pliers, pull the pilot block (18) straight up and out of the cavity. See Fig. 7.
4. Pull the two actuator pistons (11) out of the bearings (12). Remove the u-cup packings (10†■) from the pistons. Pull the pilot pins (16) out of the bearings (15). Remove the o-rings (17†■) from the pilot pins. See Fig. 8.
5. Inspect the valve plate (8■) in place. If damaged, use a Torx (T20) screwdriver or 7 mm socket wrench to remove the three screws (3). Remove the valve plate (8■) and, on aluminum center housing models, remove the seal (9†). See Fig. 9.
6. Inspect the bearings (12, 15) in place. See Fig. 8. The bearings are tapered and, if damaged, must be removed from the outside. This requires disassembly of the fluid section. See page 20.
7. Clean all parts and inspect for wear or damage. Replace as needed. Reassemble as explained on page 15.

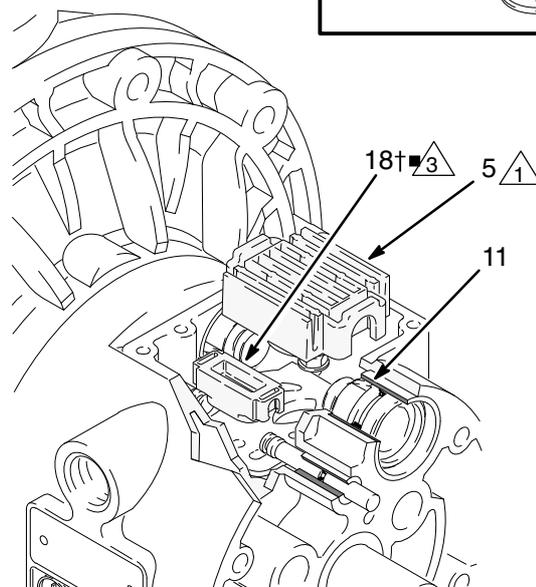
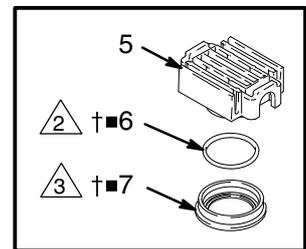


 Torque to 50-60 in-lb (5.6-6.8 N•m).

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**Fig. 6**

-  See Detail at right.
-  Grease.
-  Grease lower face.



**Fig. 7**

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# Service

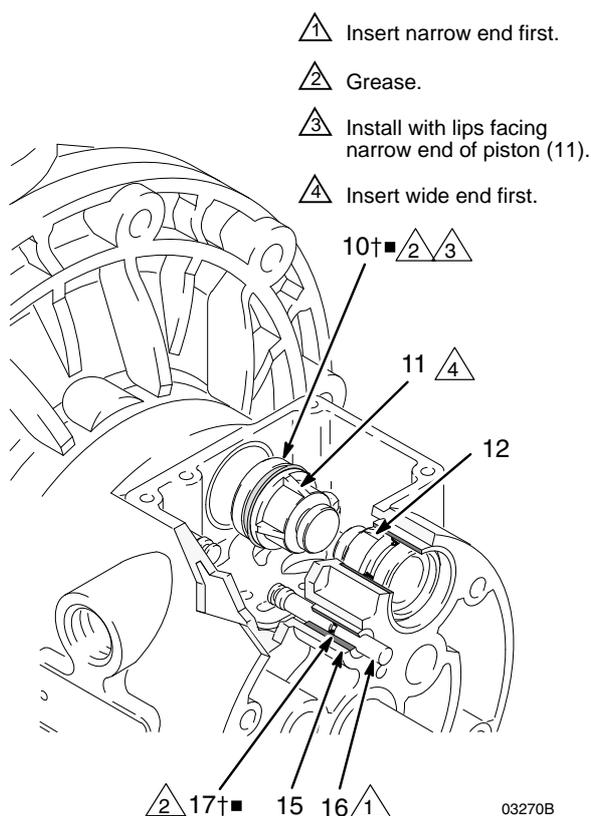


Fig. 8

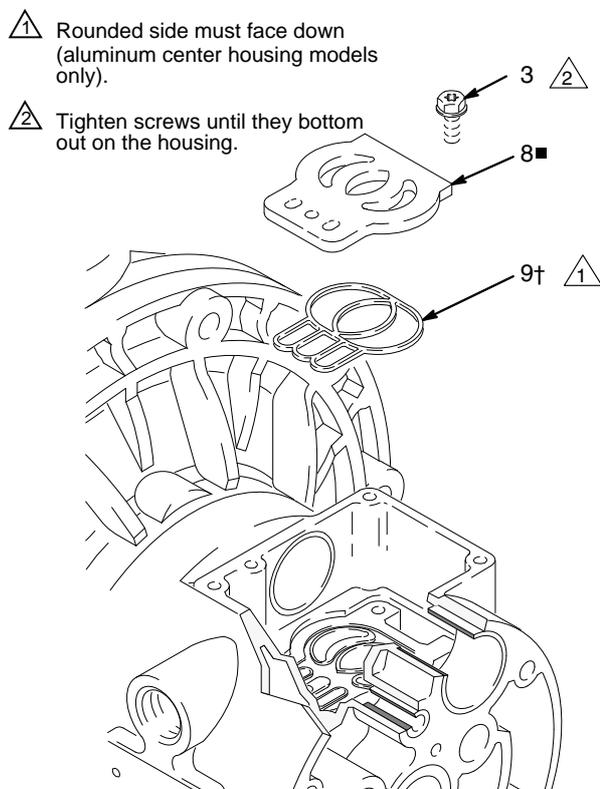


Fig. 9

## Reassembly

1. If you removed the bearings (12, 15), install new ones as explained on page 20. Reassemble the fluid section.
2. On aluminum center housing models, install the valve plate seal (9†) into the groove at the bottom of the valve cavity. The rounded side of the seal **must face down** into the groove. See Fig. 9.
3. Install the valve plate (8■) in the cavity. On aluminum center housing models, the plate is reversible, so either side can face up. Install the three screws (3), using a Torx (T20) screwdriver or 7 mm socket wrench. Tighten until the screws bottom out on the housing. See Fig. 9.
4. Install an o-ring (17†■) on each pilot pin (16). Grease the pins and o-rings. Insert the pins into the bearings (15), **narrow** end first. See Fig. 8.
5. Install a u-cup packing (10†■) on each actuator piston (11), so the lips of the packings face the **narrow** end of the pistons. See Fig. 8.
6. Lubricate the u-cup packings (10†■) and actuator pistons (11). Insert the actuator pistons in the bearings (12), **wide** end first. Leave the narrow end of the pistons exposed. See Fig. 8.
7. Grease the lower face of the pilot block (18†■) and install so its tabs snap into the grooves on the ends of the pilot pins (16). See Fig. 7.
8. Grease the o-ring (6†■) and install it in the valve block (7†■). Push the block onto the valve carriage (5). Grease the lower face of the valve block. See Fig. 7.
9. Install the valve carriage (5) so its tabs slip into the grooves on the narrow end of the actuator pistons (11). See Fig. 7.
10. Align the valve gasket (4†■) and cover (2) with the six holes in the center housing (1). Secure with six screws (3), using a Torx (T20) screwdriver or 7 mm socket wrench. Torque to 50–60 in-lb (5.6–6.8 N•m). See Fig. 6.

# Service

## Ball Check Valve Repair

### Tools Required

- Torque wrench
- 13 mm socket wrench
- O-ring pick

### Disassembly

**NOTE:** A Fluid Section Repair Kit is available. Refer to page 22 to order the correct kit for your pump. Parts included in the kit are marked with an asterisk, for example (201\*). Use all the parts in the kit for the best results.

**NOTE:** To ensure proper seating of the balls (301), always replace the seats (201) when replacing the balls. Also, on some models, replace the o-rings (202).

### 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. Disconnect all hoses.
2. Remove the pump from its mounting.
3. Using a 13 mm socket wrench, remove the four bolts (106) holding the outlet manifold (103) to the fluid covers (101). See Fig. 10.
4. Remove the o-rings (202, *not used on some models*), seats (201), and balls (301) from the manifold.
5. Turn the pump over and remove the inlet manifold (102). Remove the o-rings (202, *not used on some models*), seats (201), and balls (301) from the fluid covers (101).

### Reassembly

1. Clean all parts and inspect for wear or damage. Replace parts as needed.
2. Reassemble in the reverse order, following all notes in Fig. 10. Be sure the ball checks are assembled **exactly** as shown. The arrows (A) on the fluid covers (101) **must** point toward the outlet manifold (103).

-  Torque to 14-17 N•m. See **Torque Sequence**, page 26.
-  Arrow (A) must point toward outlet manifold (103).
-  Not used on some models.
-  Beveled seating surface must face ball (301).

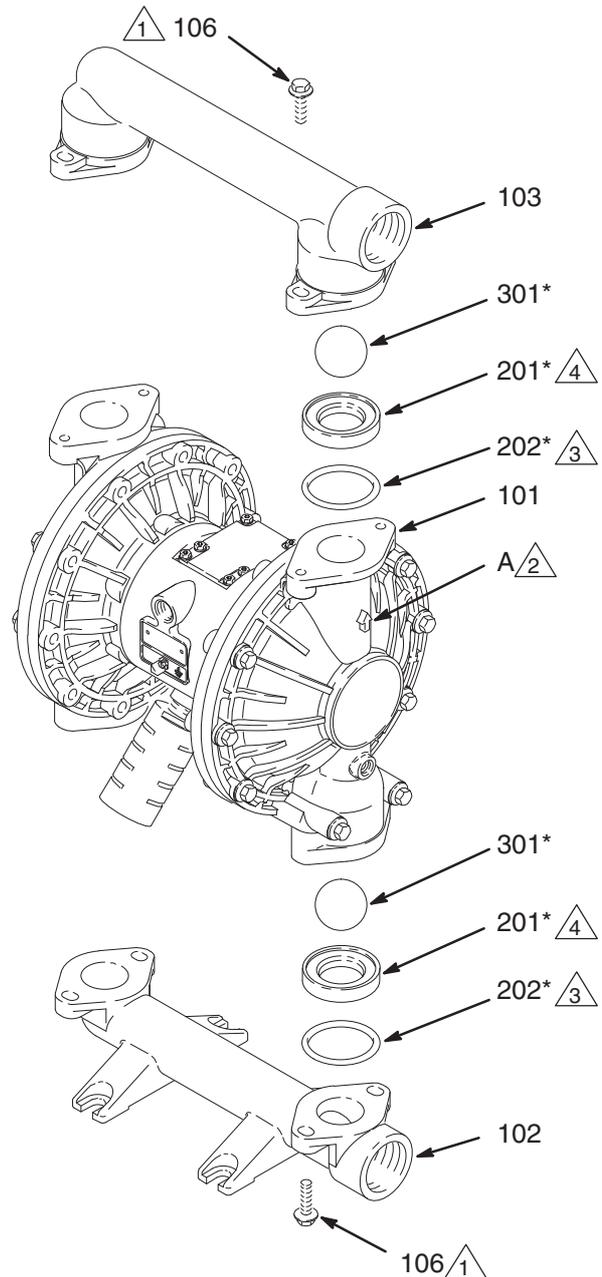


Fig. 10

03272B

# Service

## Diaphragm Repair

### Tools Required

- Torque wrench
- 13 mm open-end wrench
- 15 mm socket wrench (aluminum models) or 1 in. socket wrench (stainless steel models)
- 19 mm socket wrench
- O-ring pick
- Lithium-base grease

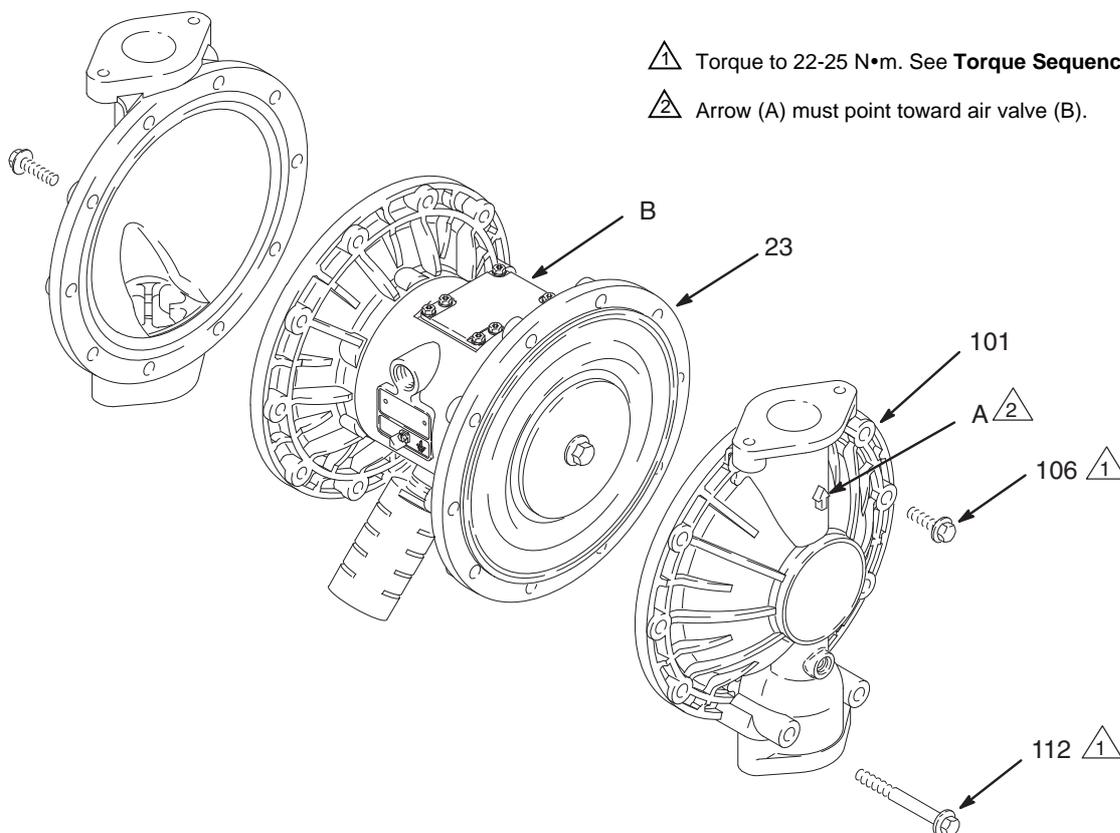
### Disassembly

**NOTE:** A Fluid Section Repair Kit is available. Refer to page 22 to order the correct kit for your pump. Parts included in the kit are marked with an asterisk, for example (401\*). Use all the parts in the kit for the best results.

### 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 manifolds and disassemble the ball check valves as explained on page 16.
3. Using a 13 mm socket wrench, remove the screws (106 and 112) holding the fluid covers (101) to the air covers (23). Pull the fluid covers (101) off the pump. See Fig. 11.



 Torque to 22-25 N•m. See **Torque Sequence**, page 26.

 Arrow (A) must point toward air valve (B).

Fig. 11

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## Service

4. Loosen but do not remove the diaphragm shaft bolts (107), using a 15 mm socket wrench (1 in. on stainless steel models) on both bolts.
5. Unscrew one bolt from the diaphragm shaft (24) and remove the o-ring (108), fluid side diaphragm plate (105), PTFE diaphragm (403, *used on PTFE models only*), diaphragm (401), and air side diaphragm plate (104). See Fig. 12

*For overmolded diaphragms:* Grip both diaphragms securely around the outer edge and rotate counterclockwise. One diaphragm assembly will come free and the other will remain attached to the shaft. Remove the freed diaphragm and air side plate..

6. Pull the other diaphragm assembly and the diaphragm shaft (24) out of the center housing (1). Hold the shaft flats with a 19 mm open-end wrench, and remove the bolt (107) from the shaft. Disassemble the remaining diaphragm assembly.

*For overmolded diaphragms:* Pull the other diaphragm assembly and the diaphragm shaft (24) out of the center housing (1). Hold the shaft flats with a 19 mm open-end wrench and remove the diaphragm and air side plate from the shaft.

7. Inspect the diaphragm shaft (24) for wear or scratches. If it is damaged, inspect the bearings (19) in place. If the bearings are damaged, refer to page 20.
8. Reach into the center housing (1) with an o-ring pick and hook the u-cup packings (402), then pull them out of the housing. This can be done with the bearings (19) in place.
9. Clean all parts and inspect for wear or damage. Replace parts as needed.

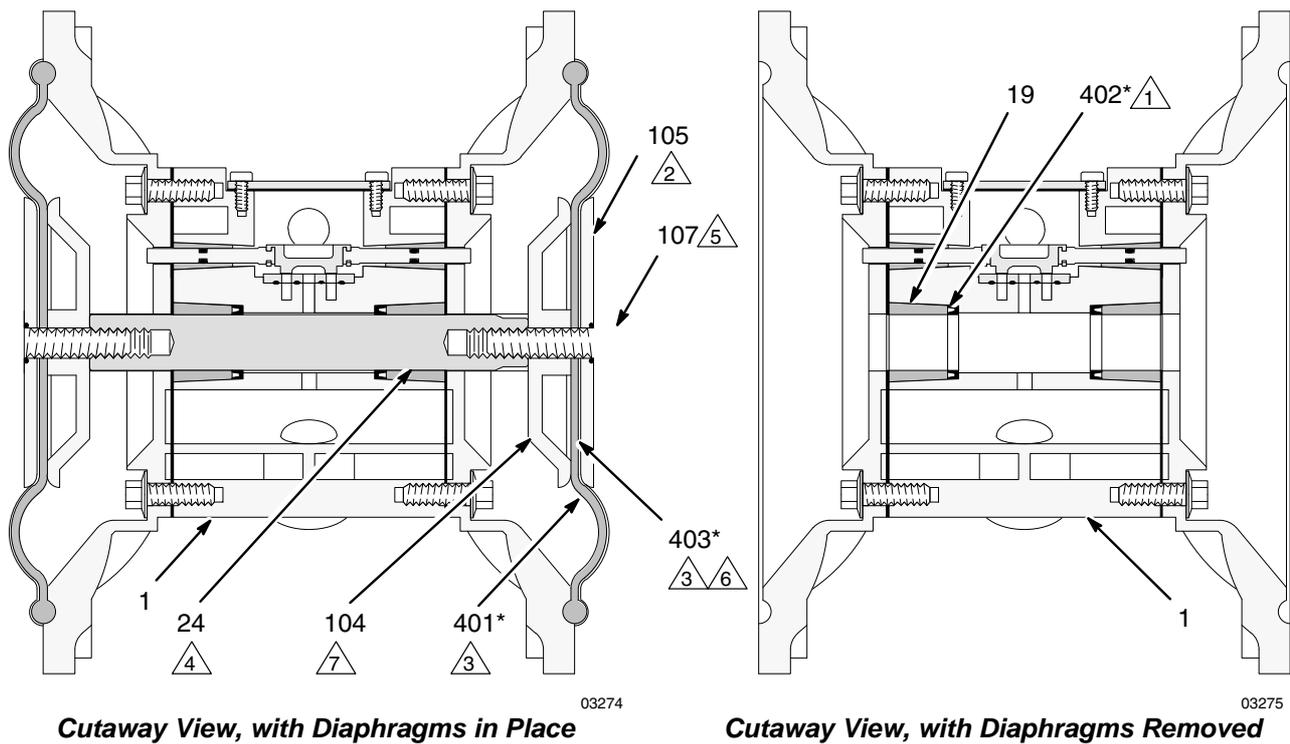
### Reassembly

1. Install the shaft u-cup packings (402\*) so the lips face **out** of the housing (1). Lubricate the packings. See Fig. 12.
2. Install the diaphragm assembly on one end of the shaft (24) as follows:
  - a. Install the o-ring (108\*) on the shaft bolt (107).

- b. Install the fluid side diaphragm plate (105) on the bolt so the rounded side faces in, toward the diaphragm (401).
- c. *On PTFE models only*, install the PTFE diaphragm (403\*). Make certain the side marked AIR SIDE faces the center housing (1).
- d. Install the diaphragm (401\*) on the bolt. Make certain the side marked AIR SIDE faces the center housing (1).
- e. Install the air side diaphragm plate (104) so the recessed side faces the diaphragm (401).
- f. Apply medium-strength Loctite® or equivalent to the bolt (107) threads. Screw the bolt (107) into the shaft (24) handtight.
- g. *For overmolded diaphragms:* Assemble the air side plate (104) onto the diaphragm (403). The wide, radiused side of the plate must face the diaphragm. Apply medium-strength (blue) Loctite or equivalent to the threads of the diaphragm assembly. Screw the assembly into the shaft (24) hand tight.

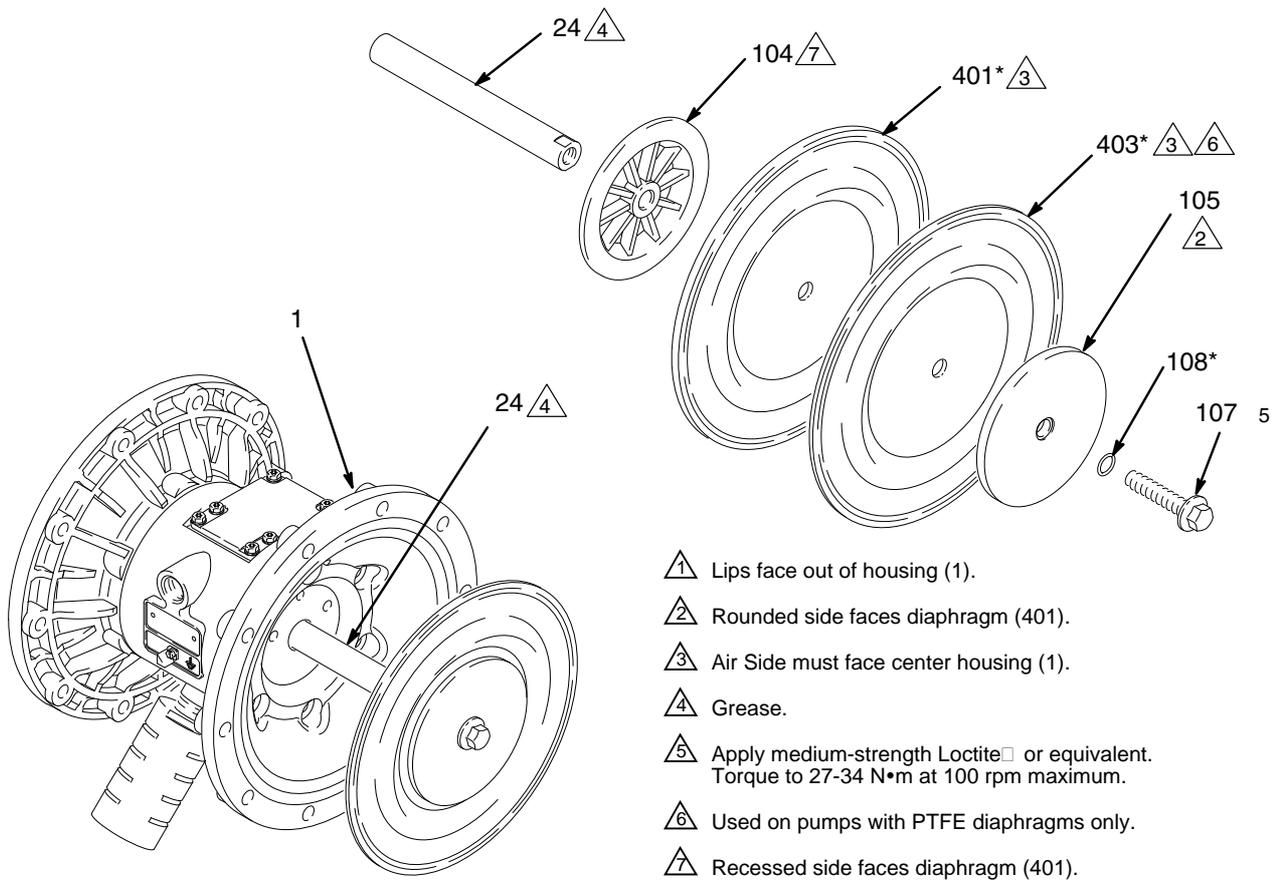
3. Grease the length and ends of the diaphragm shaft (24), and slide it through the housing (1).
4. Assemble the other diaphragm assembly to the shaft as explained in step 2.
5. Hold one shaft bolt (107) with a wrench and torque the other bolt to 27–34 N•m at 100 rpm maximum.
6. Align the fluid covers (101) and the center housing (1) so the arrows (A) on the covers face the same direction as the air valve (B). Secure the covers with the screws (106 and 112), handtight. Install the longer screws (112) in the bottom holes of the covers. See Fig. 11. Using a 13 mm socket wrench, torque the screws oppositely and evenly to 22–25 N•m. See **Torque Sequence**, page 26.
7. Reassemble the ball check valves and manifolds as explained on page 16.

# Service



**Cutaway View, with Diaphragms in Place**

**Cutaway View, with Diaphragms Removed**



**Fig. 12.**

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# Service

## Bearing and Air Gasket Removal

### Tools Required

- Torque wrench
- 10 mm socket wrench
- Bearing puller
- O-ring pick
- Press, or block and mallet

### Disassembly

**NOTE:** Do not remove undamaged bearings.



## 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 manifolds and disassemble the ball check valves as explained on page 16.
3. Remove the fluid covers and diaphragm assemblies as explained on page 17.

**NOTE:** If you are removing only the diaphragm shaft bearing (19), skip step 4.

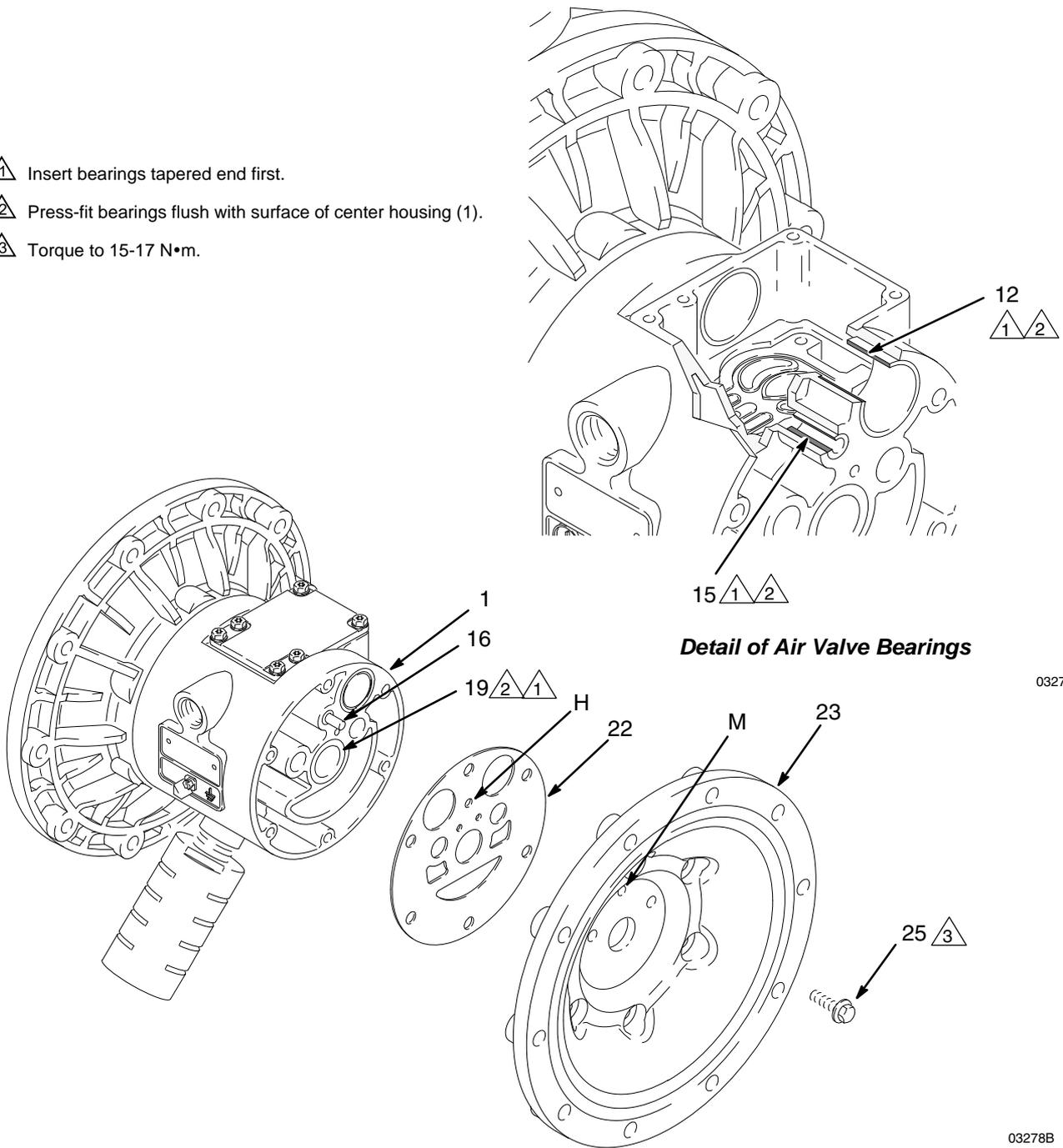
4. Disassemble the air valve as explained on page 14.
5. Using a 10 mm socket wrench, remove the screws (25) holding the air covers (23) to the center housing (1). See Fig. 13.
6. Remove the air cover gaskets (22). Always replace the gaskets with new ones.
7. Use a bearing puller to remove the diaphragm shaft bearings (19), air valve bearings (12) or pilot pin bearings (15). Do not remove undamaged bearings.
8. If you removed the diaphragm shaft bearings (19), reach into the center housing (1) with an o-ring pick and hook the u-cup packings (402), then pull them out of the housing. Inspect the packings. See Fig. 12.

### Reassembly

1. If removed, install the shaft u-cup packings (402\*) so the lips face **out** of the housing (1).
2. The bearings (12, 15, and 19) are tapered and can only be installed one way. Insert the bearings into the center housing (1), **tapered end first**. Using a press or a block and rubber mallet, press-fit the bearing so it is flush with the surface of the center housing.
3. Reassemble the air valve as explained on page 15.
4. Align the new air cover gasket (22) so the pilot pin (16) protruding from the center housing (1) fits through the proper hole (H) in the gasket.
5. Align the air cover (23) so the pilot pin (16) fits in the middle hole (M) of the three small holes near the center of the cover. Install the screws (25), handtight. See Fig. 13. Using a 10 mm socket wrench, torque the screws oppositely and evenly to 15–17 N•m.
6. Install the diaphragm assemblies and fluid covers as explained on page 17.
7. Reassemble the ball check valves and manifolds as explained on page 16.

# Service

- ① Insert bearings tapered end first.
- ② Press-fit bearings flush with surface of center housing (1).
- ③ Torque to 15-17 N•m.



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Fig. 13.

# Repair Kit Listing

## VERDERAIR VA 40 Aluminium and Stainless Steel Pumps, Series B

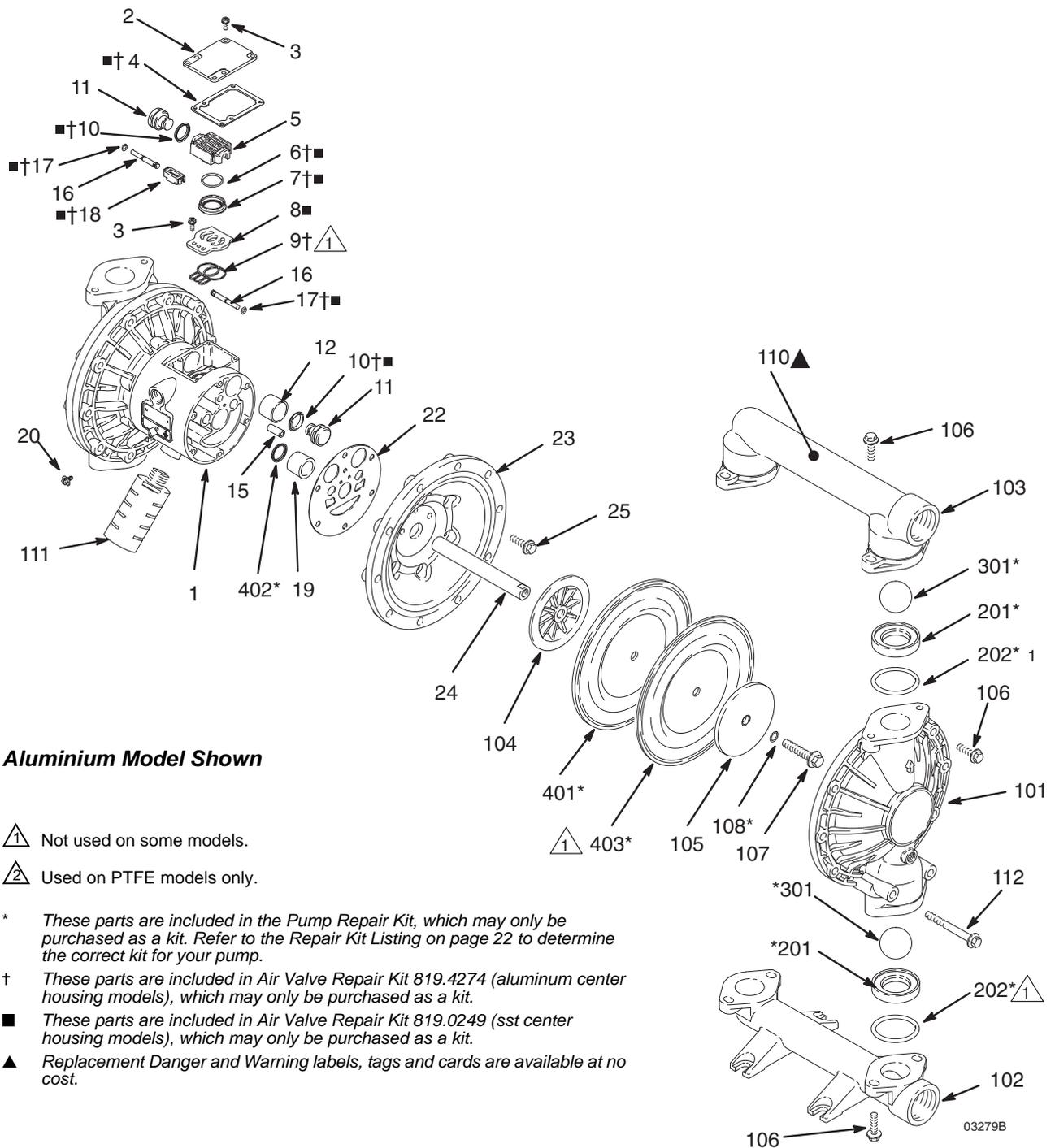
Repair Kits may only be ordered as kits. To repair the air valve, order Part No. 819.4274 for aluminum center housing models and Part No. 819.0249 for stainless steel center housing models (see page 24). Parts included in the Air Valve Repair Kit are marked with a symbol in the parts list, for example (4†■). The list of existing Repair Kits is below:

Part No.	Seats	Balls	Diaphragms	O-Rings
819.1965	BN	BN	BN	—
819.1966	SS	BN	BN	TF
819.2009	SS	TF	TF	TF
819.2010	SS	TF	HY	TF
819.2011	SS	TF	SP	TF
819.2012	SS	TF	VT	TF
819.2014	SS	AC	TF	TF
819.2019	SS	HS	TF	TF
819.2021	SS	HS	SP	TF
819.2022	SS	HS	VT	TF
819.2025	SS	HY	HY	TF
819.2031	SS	SP	SP	TF
819.2037	SS	VT	VT	TF
819.2044	HS	TF	TF	TF
819.2054	HS	HS	TF	TF
819.2056	HS	HS	SP	TF
819.2060	HS	HY	HY	TF
819.2066	HS	SP	SP	TF
819.2072	HS	VT	VT	TF
819.2079	HY	TF	TF	—
819.2080	HY	TF	HY	—
819.2085	HY	AC	HY	—
819.2087	HY	AC	VT	—
819.2089	HY	HS	TF	—
819.2090	HY	HS	HY	—
819.2095	HY	HY	HY	—
819.2100	HY	SP	HY	—
819.2101	HY	SP	SP	—

Part No.	Seats	Balls	Diaphragms	O-Rings
819.2107	HY	VT	VT	—
819.2114	SP	TF	TF	TF
819.2116	SP	TF	SP	TF
819.2130	SP	HY	HY	TF
819.2134	SP	SP	TF	TF
819.2136	SP	SP	SP	TF
819.2142	SP	VT	VT	TF
819.2149	VT	TF	TF	—
819.2171	VT	SP	SP	—
819.2177	VT	VT	VT	—
819.2184	PP	TF	TF	TF
819.2186	PP	TF	SP	TF
819.2187	PP	TF	VT	TF
819.2190	PP	AC	HY	TF
819.2191	PP	AC	SP	TF
819.2192	PP	AC	VT	TF
819.2200	PP	HY	HY	TF
819.2206	PP	SP	SP	TF
819.2212	PP	VT	VT	TF
819.2219	KY	TF	TF	TF
819.2221	KY	TF	SP	TF
819.2247	KY	VT	VT	TF
819.2253	SV	BN	BN	VT
819.2254	SV	VT	VT	VT
819.3801	SS	GE	GE	TF
819.3802	GE	GE	GE	TF
819.1320	SS	TF	TO	TF

For pump 810.0783, order diaphragm repair kit 819.1369.

# Parts Drawing



## Aluminium Model Shown

△ Not used on some models.

▴ Used on PTFE models only.

\* These parts are included in the Pump Repair Kit, which may only be purchased as a kit. Refer to the Repair Kit Listing on page 22 to determine the correct kit for your pump.

† These parts are included in Air Valve Repair Kit 819.4274 (aluminum center housing models), which may only be purchased as a kit.

■ These parts are included in Air Valve Repair Kit 819.0249 (sst center housing models), which may only be purchased as a kit.

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

# Parts

## Fluid Section Parts List

Fluid Section Material (Code 3)	Ref. No.	Part No.	Description	Qty
A	101	819.0226	COVER, fluid; aluminum	2
	102	819.6980	MANIFOLD, inlet; aluminum, bspt (Code 8= <b>TB</b> )	1
		819.4339	MANIFOLD, inlet; aluminum, npt (Code 8= <b>TN</b> )	1
	103	819.0228	MANIFOLD, outlet; aluminum, bspt (Code 8= <b>TB</b> )	1
		819.0227	MANIFOLD, outlet; aluminum, npt (Code 8= <b>TN</b> )	1
	104	819.0258	PLATE, air side; aluminum	2
	105	819.0331	PLATE, fluid side; carbon steel	2
	106	819.7052	SCREW; M10 x 1.5; 35 mm, sst	24
	107	819.4312	BOLT; M12 x 1.75; 55 mm; sst	2
	108*	819.4304	O-RING; PTFE	2
	110▲	819.6310	LABEL, warning	1
	111	819.7000	MUFFLER	1
	112	819.7053	SCREW; M10 x 1.50; 90 mm; CS	4
	S	101	819.7076	COVER, fluid; sst
102		819.9749	MANIFOLD, inlet; sst, bspt (Code 8= <b>TB</b> )	1
		819.7049	MANIFOLD, inlet, sst, npt (Code 8= <b>TN</b> )	1
103		819.9750	MANIFOLD, outlet; sst, bspt (Code 8= <b>TB</b> )	1
		819.7048	MANIFOLD, outlet; sst, npt (Code 8= <b>TN</b> )	1
104		819.0258	PLATE, air side; aluminum	2
105		819.4348	PLATE, fluid side; sst	2
106		819.4343	SCREW; M10 x 1.18; 30 mm; sst	24
107		819.4312	BOLT; M12 x 1.75; 55 mm; sst	2
108*		819.4304	O-RING; PTFE	2
110▲		819.6314	LABEL, warning	1
111		819.7000	MUFFLER	1
112		819.4307	SCREW; M10 x 1.50; 90 mm; sst	4

## Air Motor Parts List

Ref. No.	Part No.	Description	Qty
1	819.4275	HOUSING, center; alum, (Code 4= <b>A</b> )	1
	819.0247	HOUSING, center; stainless steel, (Code 4= <b>S</b> )	1
2	819.4276	COVER, air valve; alum. (Code 4= <b>A</b> )	1
	819.0259	COVER, air valve; stainless steel, (Code 4 = <b>S</b> )	1
3	819.0221	SCREW, mach, hex flange hd; M5 x 0.8; 12 mm	9
4†■	819.4278	GASKET, cover; Santoprene	1
5	819.4279	CARRIAGE; aluminum	1
6†■	819.4280	O-RING; nitrile	1
7†■	819.4281	BLOCK, air valve; acetal	1
8■	819.4282	PLATE, air valve (Code 4 = <b>A</b> )	1
	819.0248	PLATE, air valve (Code 4 = <b>S</b> )	1
9†	819.4283	SEAL, valve plate; buna-N (Code 4 = <b>A</b> )	1
	—	not used if Code 4 = <b>S</b>	—
10†■	819.4284	PACKING, u-cup; nitrile	2
11	819.4285	PISTON, actuator; acetal	2
12	819.4286	BEARING, piston; acetal	2
15	819.4287	BEARING, pin; acetal	2
16	819.4288	PIN, pilot; stainless steel	2
17†■	819.4289	O-RING; buna-N	2
18†■	819.4290	BLOCK, pilot; acetal	1
19	819.4291	BEARING, shaft; acetal	2
20	819.0220	SCREW, grounding	1
22	819.4294	GASKET, air cover; foam	2
	819.4336	COVER, air; aluminum (Code 4 = <b>A</b> )	2
23	819.7107	COVER, air; stainless steel (Code 4 = <b>S</b> )	2
	819.4337	SHAFT, diaphragm; sst	1
24	819.7051	SCREW; M8 x 1.25; 25 mm aluminum (Code 4 = <b>A</b> )	12
	819.4297	SCREW; M8 x 1.25; 25 mm, stainless steel (Code 4 = <b>S</b> )	12

# Parts

## Valve Seat Kits

Seat Material	Ref. No.	Kit No.	Description	Qty
BN	201	819.2252	VA40M BN,--,--,--	1
	202	Not required		
GE	201	819.2249	VA40M GE,--,--,TF	1
	202	Included in above kit		
HS	201	819.2038	VA40M HS,--,--,TF	1
	202	Included in above kit		
HY	201	819.2073	VA40M HY,--,--,--	1
	202	Included in above kit		
KY	201	819.2213	VA40M KY,--,--,TF	1
	202	Included in above kit		
PP	201	819.2178	VA40M PP,--,--,TF	1
	202	Included in above kit		
SP	201	819.2108	VA40M SP,--,--,TF	1
	202	Included in above kit		
SS	201	819.2003	VA40M SS,--,--,TF	1
	202	Included in above kit		
VT	201	819.2143	VA40M VT,--,--,--	1
	202	Not required		

## Diaphragm Kits

Diaphragm Material	Ref. No.	Kit No.	Description	Qty
TF	401	819.1969	VA40M --,--,TF,--	1
	402	Included in above kit		
	403	Included in above kit		
TO	401	819.1369	VA40M --,--,TO,--	1
	402	Included in above kit		
HY	401	819.1970	VA40M --,--,HY,--	1
	402	Included in above kit		
SP	401	819.1971	VA40M --,--,SP,--	1
	402	Included in above kit		
BN	401	819.2250	VA40M --,--,BN,--	1
	402	Included in above kit		
VT	401	819.1972	VA40M --,--,VT,--	1
	402	Included in above kit		
GE	401	819.2248	VA40M --,--,GE,--	1
	402	Included in above kit		
TS	401	819.0328	VA40M --,--,TS,--	1
	402	Not included		

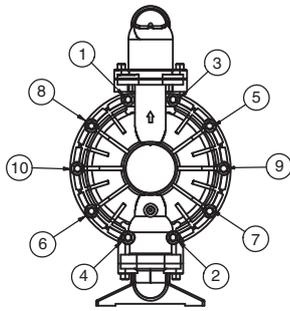
## Check Ball Kits

Ball Material	Ref. No.	Kit No.	Description	Qty
AC	301	819.1978	VA40M --,AC,--,--	1
BN	301	819.2251	VA40M --,BN,--,--	1
GE	301	819.1345	VA40M --,GE,--,--	1
HS	301	819.1983	VA40M --,HS,--,--	1
HY	301	819.1988	VA40M --,HY,--,--	1
SP	301	819.1993	VA40M --,SP,--,--	1
TF	301	819.1973	VA40M --,TF,--,--	1
VT	301	819.1998	VA40M --,VT,--,--	1

# Torque Sequence

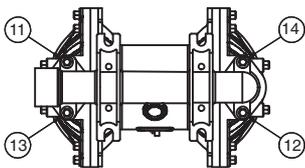
Always follow torque sequence when instructed to torque fasteners.

1. Left/Right Fluid Covers  
Torque bolts to 22-25 N•m.



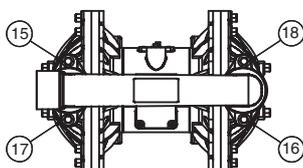
SIDE VIEW

2. Inlet Manifold  
Torque bolts to 14-17 N•m.



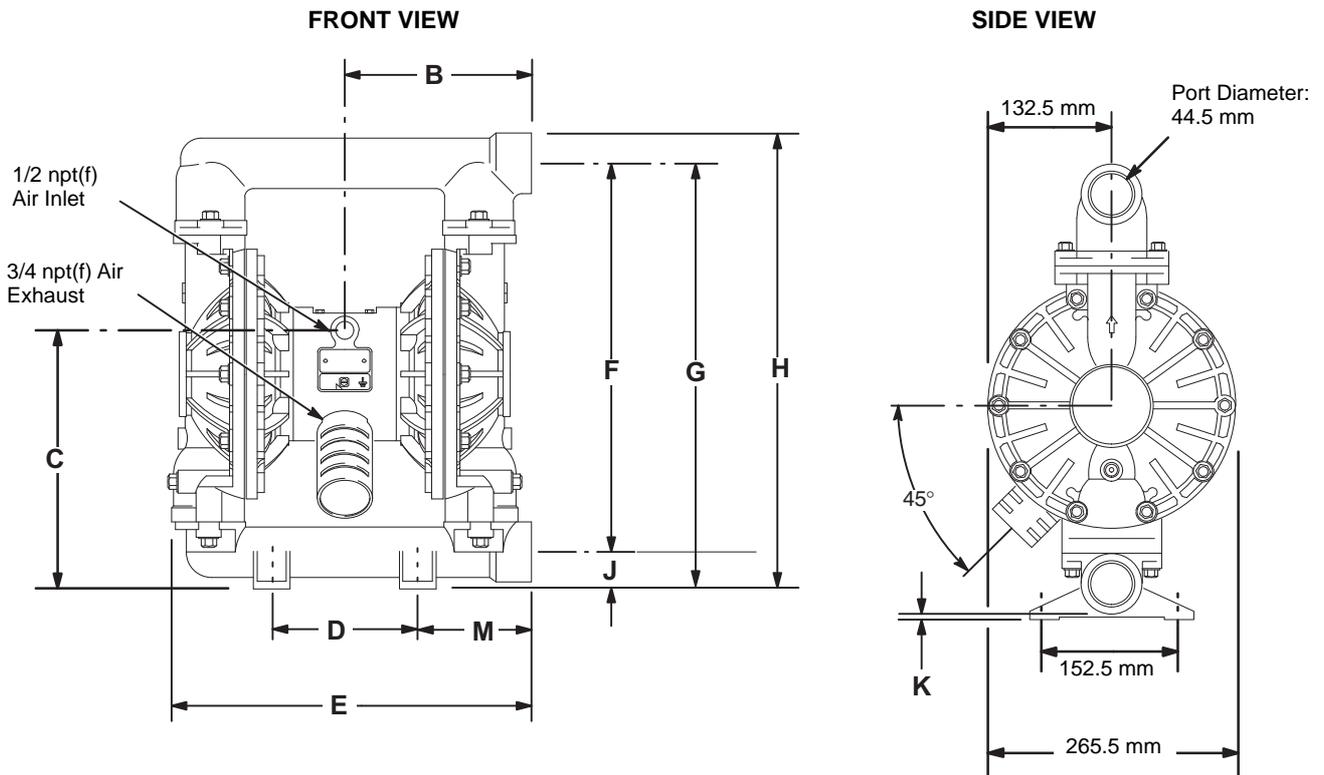
BOTTOM VIEW

3. Outlet Manifold  
Torque bolts to 14-17 N•m.



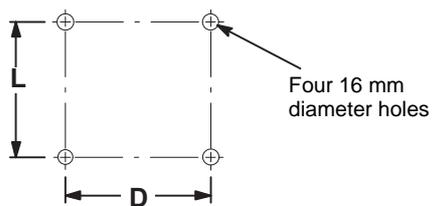
TOP VIEW

# Dimensions



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## PUMP MOUNTING HOLE PATTERN



Dimensions B, C, F, G, H and M can vary by up to 1/4 in. (6.3 mm) depending on the seat and diaphragm material fitted in the pump.

## Dimensions

Dimension	Aluminum Center Aluminum Cover		Aluminum Center SST Cover		SST Center Aluminum Cover		SST Center SST Cover	
	in.	mm	in.	mm	in.	mm	in.	mm
<b>B</b>	7.7	197	8.3	210	7.7	197	8.3	210
<b>C</b>	10.8	273	10.8	273	10.8	273	10.8	273
<b>D</b>	6.0	152	6.0	152	6.0	152	6.0	152
<b>E</b>	15.9	404	15.9	403	15.9	404	15.9	403
<b>F</b>	16.8	427	16.3	414	16.8	427	16.3	414
<b>G</b>	18.3	465	17.8	451	18.3	465	17.8	451
<b>H</b>	19.6	497	19.0	482	19.6	497	19.0	482
<b>J</b>	1.5	38	1.4	37	1.5	38	1.4	37
<b>K</b>	0.25	6	0.25	6	0.25	6	0.25	6
<b>L</b>	6.0	152	6.0	152	6.0	152	6.0	152
<b>M</b>	4.8	121	5.2	133	4.8	121	5.2	133

# Technical Data

Maximum Fluid Working Pressure ..... 8.4 bar  
 Air Pressure Operating Range† ..... 1.4-8.4 bar  
 Maximum Air Consumption ..... 4.9 Nm<sup>3</sup>/min  
 Air Consumption at 4.9 bar/  
 227 l/min ..... 1.68 Nm<sup>3</sup>/min (see chart)  
 Maximum Free Flow Delivery ..... 378.5 l/min  
 Maximum Pump Speed ..... 200 cpm  
 Liters per cycle ..... 1.9  
 Maximum Suction Lift ..... 5.48 m wet or dry  
 Maximum Size Pumpable Solids ..... 4.8 mm  
 \* Sound Pressure Level at 7 bar, full flow ..... 94 dBa  
 \* Sound Power Level at 7 bar, full flow ..... 108 dBa  
 \* Sound Pressure Level at 4.9 bar, 50 cycles/min ..... 72 dBa  
 Air Inlet Size ..... 1/2 npt(f)  
 †Fluid Inlet Size ..... 1-1/2 in. bspt

†Fluid Outlet Size ..... 1-1/2 in. bspt  
 Wetted Parts ..... Vary by Model. Refer to pages 23-25  
 Non-wetted External Parts ..... Aluminum, 302,  
 ..... 316 stainless Steel, Polyester (labels)  
 Weight ..... *Aluminium Pumps*: 15.2 kg  
 ..... *Stainless Steel Pumps with aluminium air motors*: 32.7kg  
 ..... *Stainless Steel Pumps with stainless steel air motors*: 40kg

Santoprene® is a registered trademark of the Monsanto Co.

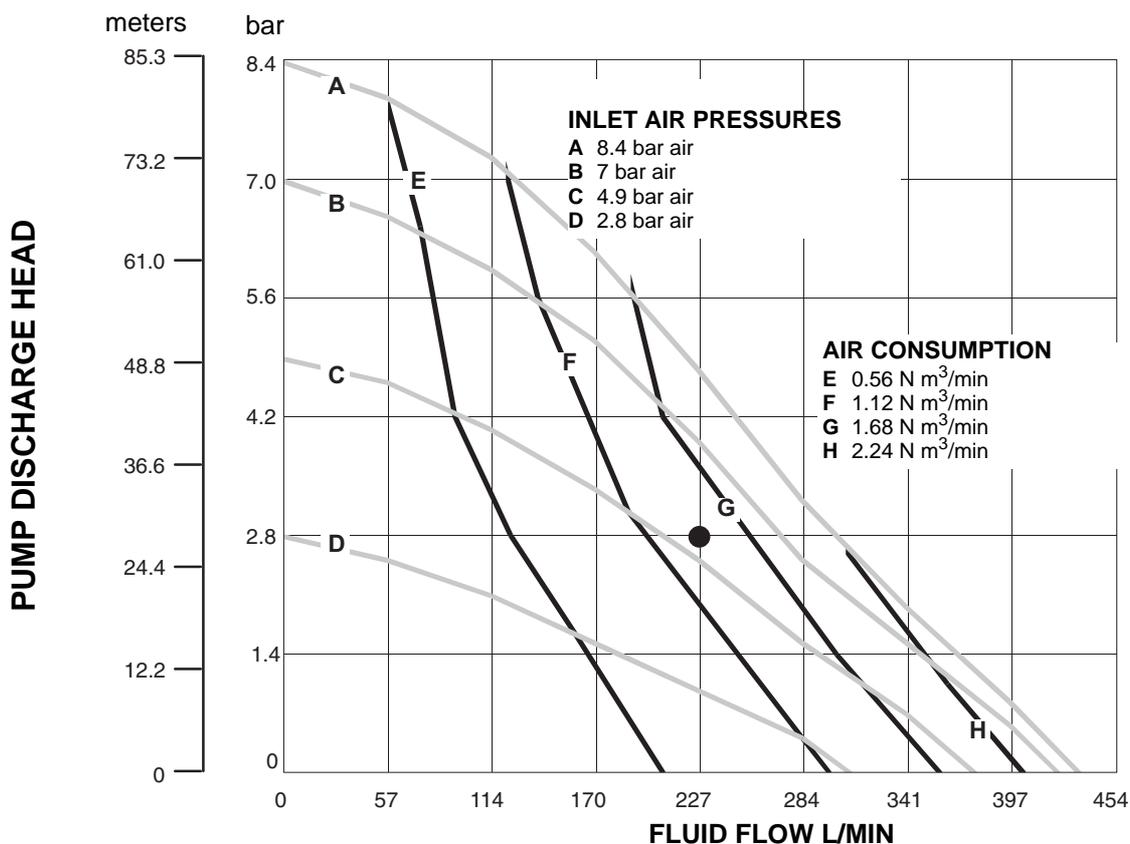
‡ Startup pressure may vary based on environmental conditions.

\* Sound pressure levels measured with the pump mounted on the floor, using Rubber Foot Kit 819.4333. Sound power measured per ISO Standard 9614–2.

† On pumps with connection Code 8=TB and on pumps with connection Code 8=TN.

### Example of Finding Pump Air Consumption and Air Pressure at a Specific Fluid Delivery and Discharge Head:

To supply 227 liters fluid flow (horizontal scale) at 2.8 bar discharge head pressure (vertical scale) requires approximately 1.40 N m<sup>3</sup>/min air consumption at 4.9 bar inlet air pressure.



**TEST CONDITIONS**  
 Pump tested in water with PTFE diaphragm and inlet submerged.

**KEY** ——— FLUID PRESSURE AND FLOW  
 ——— N M<sup>3</sup>/MIN AIR CONSUMPTION

# Technical Data

## Fluid Temperature Range

**NOTICE**

Temperature limits are based on mechanical stress only. Certain chemicals will further limit the fluid temperature range. Stay within the temperature range of the most-restricted wetted component. Operating at a fluid temperature that is too high or too low for the components of your pump may cause equipment damage.

Diaphragm/Ball/Seat Material	Fluid Temperature Range					
	Aluminum, Hastelloy, or Stainless Steel Pumps		Polypropylene or Conductive Polypropylene Pumps		PVDF Pumps	
	Fahrenheit	Celsius	Fahrenheit	Celsius	Fahrenheit	Celsius
Acetal (AC)	10° to 180°F	-12° to 82°C	32° to 150°F	0° to 66°C	10° to 180°F	-12° to 82°C
Buna-N (BN)	10° to 180°F	-12° to 82°C	32° to 150°F	0° to 66°C	10° to 180°F	-12° to 82°C
FKM Fluoroelastomer (FK)*	-40° to 275°F	-40° to 135°C	32° to 150°F	0° to 66°C	10° to 225°F	-12° to 107°C
Geolast® (GE)	-40° to 150°F	-40° to 66°C	32° to 150°F	0° to 66°C	10° to 150°F	-12° to 66°C
Polychloroprene overmolded diaphragm (CO) or Polychloroprene check balls (CR or CW)	0° to 180°F	-18° to 82°C	32° to 150°F	0° to 66°C	10° to 180°F	-12° to 82°C
Polypropylene (PP)	32° to 150°F	0° to 66°C	32° to 150°F	0° to 66°C	32° to 150°F	0° to 66°C
PTFE overmolded diaphragm (PO)	40° to 180°F	4° to 82°C	40° to 150°F	4° to 66°C	40° to 180°F	4.0° to 82°C
PTFE check balls or two-piece PTFE/EPDM diaphragm (PT)	40° to 220°F	4° to 104°C	40° to 150°F	4° to 66°C	40° to 220°F	4° to 104°C
PVDF (PV)	10° to 225°F	-12° to 107°C	32° to 150°F	0° to 66°C	10° to 225°F	-12° to 107°C
Santoprene® (SP)	-40° to 180°F	-40° to 82°C	32° to 150°F	0° to 66°C	10° to 180°F	-12° to 82°C
TPE (TP)	-20° to 150°F	-29° to 66°C	32° to 150°F	0° to 66°C	10° to 150°F	-12° to 66°C

\* The maximum temperature listed is based on the ATEX standard for T4 temperature classification. If you are operating in a non-explosive environment, FKM fluoroelastomer's maximum fluid temperature in aluminum or stainless steel pumps is 320°F (160°C).

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# Customer Services/Guarantee

## CUSTOMER SERVICES

If you require spare parts, please contact your local distributor, providing the following details:

- Pump Model
- Type
- Serial Number, and
- Date of First Order.

## GUARANTEE

All VERDER pumps are warranted to the original user against defects in workmanship or materials under normal use (rental use excluded) for two years after purchase date. This warranty does not cover failure of parts or components due to normal wear, damage or failure which in the judgement of VERDER arises from misuse.

Parts determined by VERDER to be defective in material or workmanship will be repaired or replaced.

## LIMITATION OF LIABILITY

To the extent allowable under applicable law, VERDER's liability for consequential damages is expressly disclaimed. VERDER's liability in all events is limited and shall not exceed the purchase price.

## WARRANTY DISCLAIMER

VERDER has made an effort to illustrate and describe the products in the enclosed brochure accurately; however, such illustrations and descriptions are for the sole purpose of identification and do not express or imply a warranty that the products are merchantable, or fit for a particular purpose, or that the products will necessarily conform to the illustration or descriptions.

## PRODUCT SUITABILITY

Many regions, states and localities have codes and regulations governing the sale, construction, installation and/or use of products for certain purposes, which may vary from those in neighbouring areas. While VERDER attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchasing and using a product, please review the product application as well as the national and local codes and regulations, and be sure that product, installation, and use complies with them.

Original instructions. This manual contains English.

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