

POLYPROPYLENE AND PVDF

Husky™ 1590 Air-Operated Diaphragm Pumps

308549ZAL

EN

**1.5-inch AODD pump for fluid transfer applications. For professional use only.
Not approved to European explosive atmosphere requirements. See Models on page 2 for a
list of pump models and descriptions.**

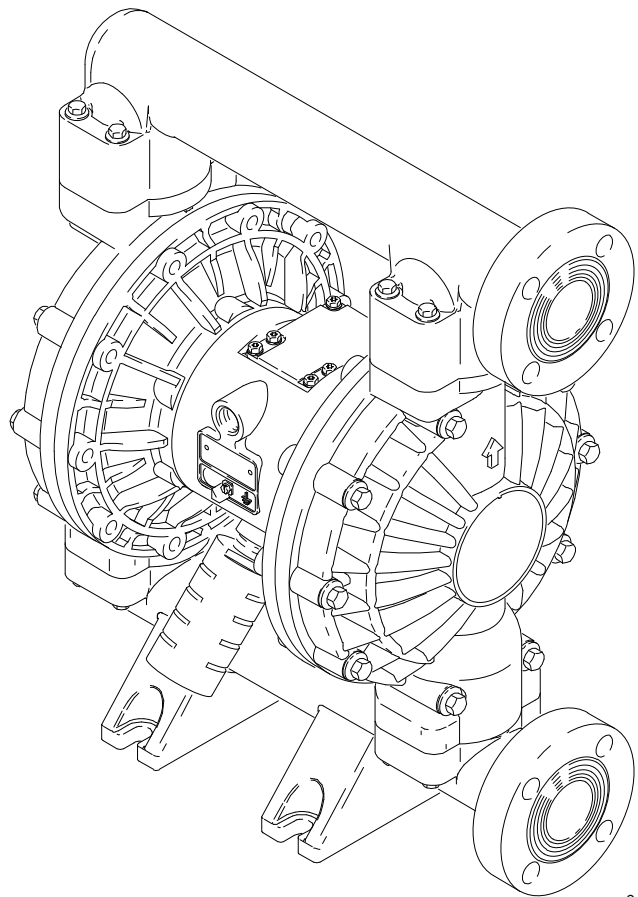
120 psi (0.84 MPa, 8.4 bar) Maximum Fluid Working Pressure

120 psi (0.84 MPa, 8.4 bar) Maximum Air Input Pressure



Important Safety Instructions

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



04700B



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Models

Model No.	Description
*DB2_____	Polypropylene Pumps
*DC2_____	Polypropylene Pumps, Remote
*DB5_____	PVDF Pumps
*DC5_____	PVDF Pumps, Remote
*DT2_____	Polypropylene Plus Pumps
*DU2_____	Polypropylene Plus Pumps, Remote
*DT5_____	PVDF Plus Pumps
*DU5_____	PVDF Plus Pumps, Remote
24B758	PVDF Plus Pump with overmolded diaphragms
24B759	Polypropylene Plus Pump with overmolded diaphragms
24B760	Polypropylene Pump with overmolded diaphragms
24B761	Polypropylene Pump with overmolded diaphragms and SST seats
24B832	PVDF Pump with overmolded diaphragms

* See the Pump Matrix on page 26 to determine the Model No. of your pump.

NOTE: Plus Models include stainless steel center sections.

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 Graco or your Graco distributor.
- 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 a **120 psi (0.84 MPa, 8.4 bar) maximum working pressure at 120 psi (0.84 MPa, 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 hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below -40°C (-40°F).
- Do not lift pressurized equipment.
- Wear hearing protection when operating this 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 11.



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.
- **Never** use a polypropylene or PVDF® pump with non-conductive flammable fluids as specified by your local fire protection code. Refer to **Grounding** on page 6 for additional information. Consult your fluid supplier to determine the conductivity or resistivity of your fluid.
- 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, dispensed, or transferred.
- 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 11.
- 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

- The Typical Installation shown in Fig. 2 is only a guide for selecting and installing system components. Contact your Graco distributor or Graco Technical Assistance (see back page) for assistance in planning a system to suit your needs.
- Always use Genuine Graco Parts and Accessories. Be sure all accessories are adequately sized and pressure-rated to meet the system's requirements.
- Reference numbers and letters in parentheses refer to the callouts in the figures and the parts lists on pages 30 to 31.
- Variations in color between the plastic components of this pump are normal. Color variation does not affect the performance of the pump.

Tighten Screws Before First Use

Before using the pump for the first time, check and retorque all external fasteners. See **Torque Sequence**, page 32. After the first day of operation, retorque the fasteners. Although pump use varies, a general guideline is to retorque fasteners every two months.

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 4.
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.

Installation

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 4.



Polypropylene and PVDF are **not** conductive. Attaching the ground wire to the grounding lug only grounds the air motor. When pumping conductive flammable fluids, **always** ground the entire fluid system by making sure the fluid has an electrical path to a true earth ground. See Fig. 1.

Never use a polypropylene or a PVDF 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 50×10^{-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 2×10^{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.

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 12 ga (1.5 mm²) 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. 237569 Ground Wire and Clamp.

NOTE: When pumping conductive flammable fluids with a polypropylene or a PVDF pump, **always** ground the entire fluid system. See the **WARNING** on page 6.

- **Air and fluid hoses:** Use only electrically conductive hoses.
- **Air compressor:** Follow the manufacturer's recommendations.
- **All solvent pails used when flushing:** Follow your 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 your local code.

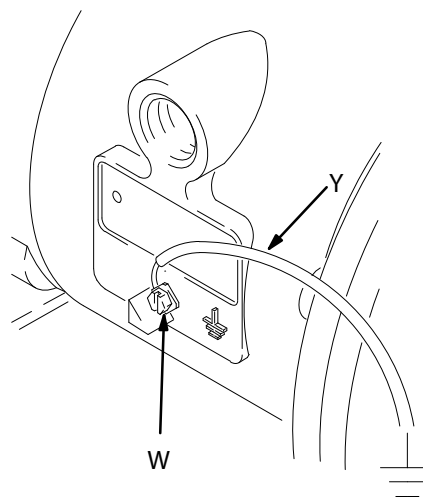


Fig. 1

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Installation

Air-Line

⚠ WARNING

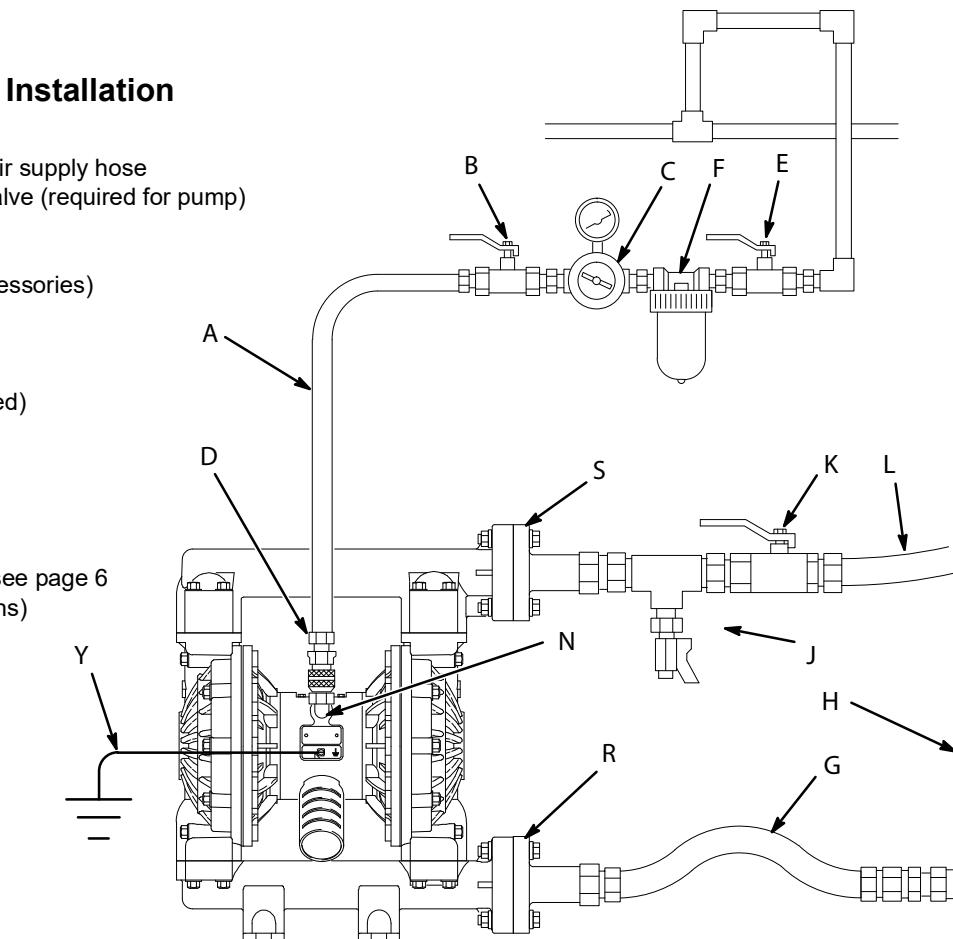
A bleed-type master air valve (B) is required in your system to relieve air trapped between this valve and the pump. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin, injury from moving parts, or contamination from 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 electrically conductive.
 - 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** at left. 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 an electrically conductive, flexible air hose (A) between the accessories and the 1/2 npt(f) pump air inlet (N). See Fig. 2. Use a minimum 1/2 inch (13 mm) ID air hose.
3. Screw an air-line quick disconnect coupler (D) onto the end of the air hose (A); be sure the coupler porting is large enough to not restrict the air flow, which will affect pump performance. 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.

Floor Mount Typical Installation

KEY

- A Electrically conductive 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
- N 1/2 npt(f) air inlet port
- R 1-1/2" fluid inlet flange
- S 1-1/2" fluid outlet flange
- Y Ground wire (required; see page 6 for installation instructions)



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Fig. 2.

Installation

Installation of Remote Pilot Air-Lines

1. Refer to Parts Drawings. Connect air-line to pump as in preceding steps.
2. Connect 1/4 in. O.D. tubing to push type connectors (14) on air motor of pump.

NOTE: by replacing the push type connectors, other sizes or types of fittings may be used. The new fittings will require 1/8 in. npt threads.

3. Connect remaining ends of tubes to external air signal, such as Graco's Cycleflo (P/N 195264) or Cycleflo II (P/N195265) controllers.

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.

Mounting

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 11.

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 236452 is available to reduce noise and vibration during operation.

WARNING

Prolonged exposure to UV radiation will degrade natural polypropylene components of the pumps. To prevent potential injury or equipment damage, do not expose pump or the plastic components to direct sunlight for prolonged periods.

Fluid Suction Line

1. Use a flexible fluid hose.
2. The pump fluid inlet (R) is a 1-1/2 in. raised face flange. Refer to **Flange Connections** on page 9.
3. 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. At inlet fluid pressures greater than 15 psi (0.1 MPa, 1 bar), diaphragm life will be shortened.
5. See the **Technical Data** on page 35 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 a flexible fluid hose.
2. The pump fluid outlet (S) is a 1-1/2 in. raised face flange. Refer to **Flange Connections** on page 9.
3. Install a fluid drain valve (J) near the fluid outlet. See the **WARNING** above.
4. Install a shutoff valve (K) in the fluid outlet line.

Installation

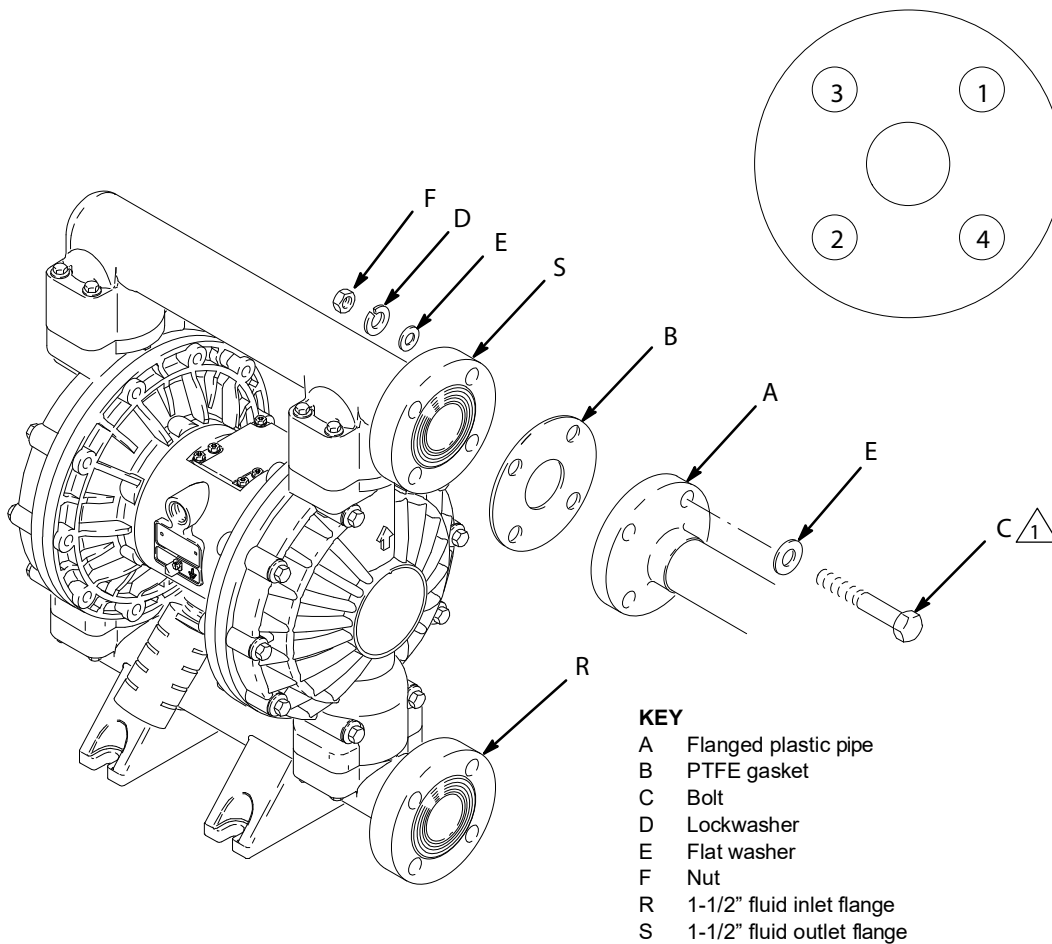
Flange Connections

The fluid inlet and outlet ports are 1-1/2 in. raised face, standard 150 lb class pipe flanges. Connect 1-1/2 in. flanged plastic pipe to the pump as follows. You will need:

- Torque wrench
- Adjustable wrench
- A 5 in. diameter, 1/8 in. thick PTFE gasket, with four 0.63 in. diameter holes on a 3.88 in. diameter bolt circle, and a 1.75 in. diameter center
- Four 1/2 in. x 3 in. bolts
- Four 1/2 in. spring lockwashers
- Eight 1/2 in. flat washers
- Four 1/2 in. nuts.

1. Place a flat washer (E) on each bolt (C). Refer to Fig. 3.
2. Align the holes in the gasket (B) and the pipe flange (A) with the holes in the pump outlet flange (S).
3. Lubricate the threads of the four bolts. Install the bolts through the holes and secure with the washers (E), lockwashers (D), and nuts (F).
4. Hold the nuts with a wrench. Refer to the tightening sequence in Fig. 3 and torque the bolts to 10 to 15 ft-lb (14 to 20 N•m). **Do not over-torque.**
5. Repeat for the pump inlet flange (R).

BOLT TIGHTENING SEQUENCE



04405

KEY

- A Flanged plastic pipe
- B PTFE gasket
- C Bolt
- D Lockwasher
- E Flat washer
- F Nut
- R 1-1/2" fluid inlet flange
- S 1-1/2" fluid outlet flange


 Lubricate threads. Torque to 10 to 15 ft-lb (14–20 N•m). Do not over-torque.

Fig. 3.

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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. 4. To change the orientation of the inlet and/or outlet port:

1. Remove the screws (106 and 112) and washers (113) 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 80 to 90 in-lb (9 to 10 N•m). See **Torque Sequence**, page 32.

KEY

N	1/2 npt(f) Air Inlet Port	101	Fluid Covers
P	Muffler; Air Exhaust Port is 3/4 npt(f)	102	Fluid Inlet Manifold
R	1-1/2" Fluid Inlet Flange	103	Fluid Outlet Manifold
S	1-1/2" Fluid Outlet Flange	106	Fluid Outlet Manifold Screws (Top)
		112	Fluid Outlet Manifold Screws (Bottom)

 Torque to 80 to 90 in-lb (9 to 10 N•m). See **Torque Sequence**, page 32.

 Not used on some models.

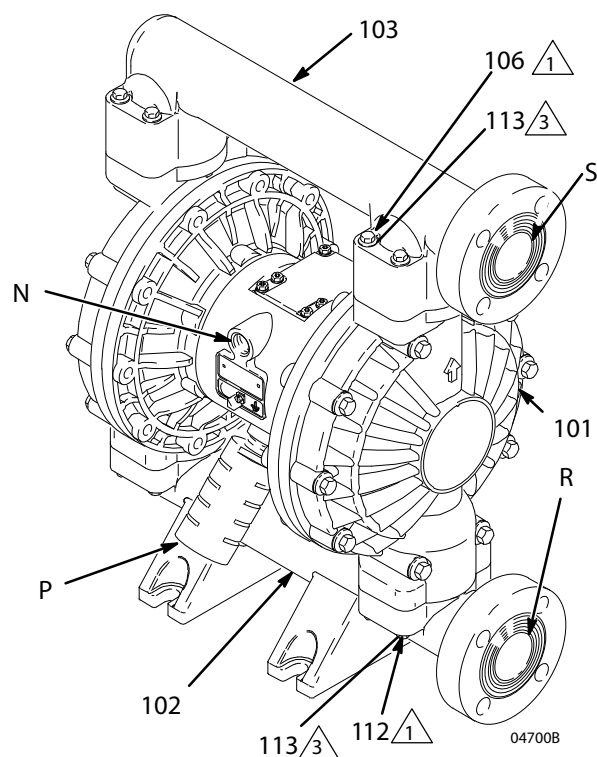


Fig. 4

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. 5.

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 Husky 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.

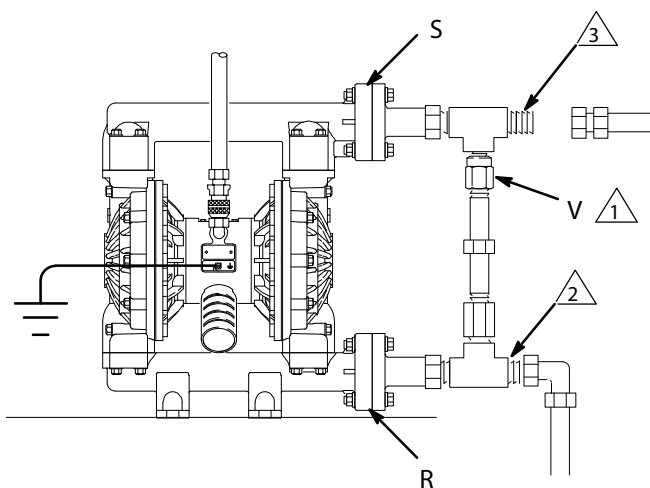
KEY

R	1-1/2" Fluid Inlet Flange
S	1-1/2" Fluid Outlet Flange
V	Pressure relief valve Part No. 112119 (stainless steel)

 Install valve between fluid inlet and outlet ports.

 Connect fluid inlet line here.

 Connect fluid outlet line here.



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Fig. 5

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 OR EXPLOSION HAZARD** on page 4, 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. 6.

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 an electrically conductive air exhaust hose (S) and connect the muffler (P) to the other end of the hose. The minimum size for the air exhaust hose is 3/4 in. (19 mm) ID. If a hose longer than 15 ft (4.57 m) is required, use a larger diameter hose. Avoid sharp bends or kinks in the hose. See Fig. 6.
3. Place a container (U) at the end of the air exhaust line to catch fluid in case a diaphragm ruptures.

Venting Exhaust Air

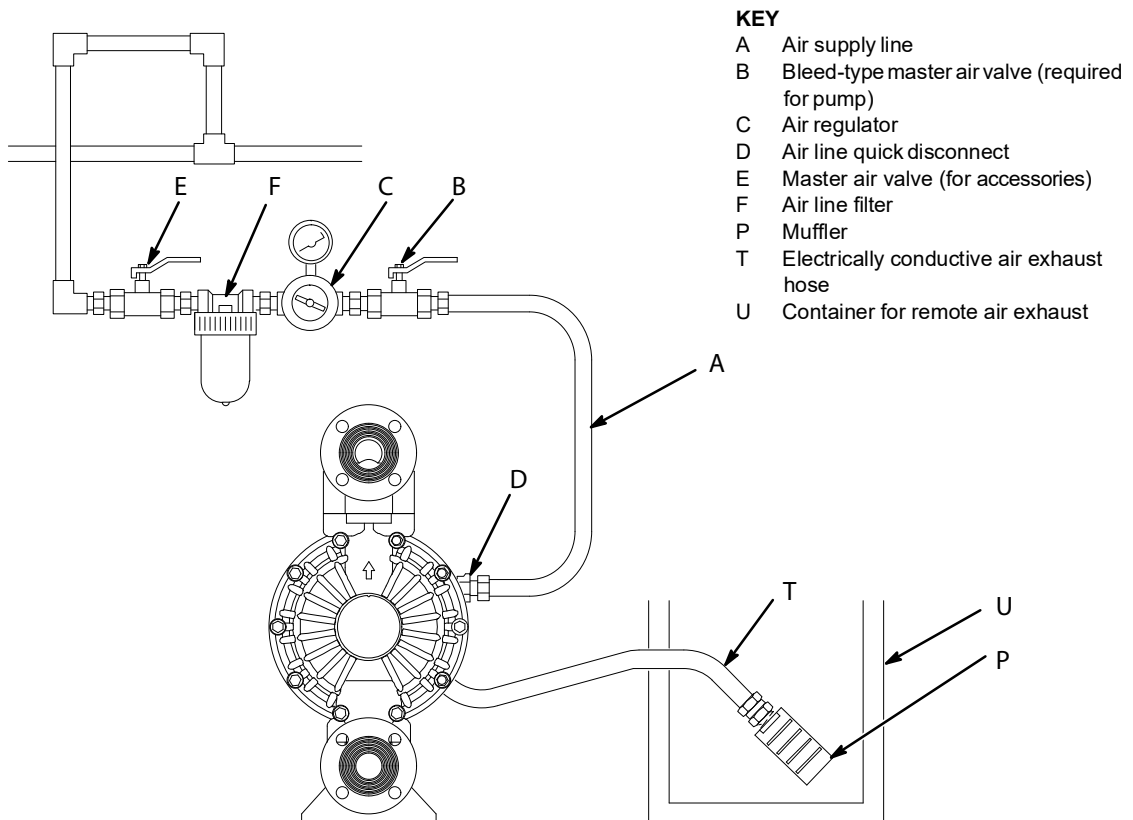


Fig. 6.

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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 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 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** 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. With the pump air regulator (C) closed, 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.

Operation

Operation of Remote Piloted Pumps

1. Follow preceding steps 1 through 7 of **Starting and Adjusting Pump**.
2. Open the air regulator (C).

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 and relieved to push type connectors (14).

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

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

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, 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 monthly).

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 12.

Flush the pump often enough to prevent the fluid you are pumping from drying or freezing in the pump and damaging it. Flush with a fluid that is compatible with the fluid you are pumping and with the wetted parts in your system. Check with your fluid manufacturer or supplier for recommended flushing fluids and flushing frequency.

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 32.

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 12.

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 18.
Pump will not cycle, or cycles once and stops.	Air valve is stuck or dirty.	Disassemble and clean air valve. See pages 16 to 17. 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 18.
	Check valve ball (301) is wedged into seat (201), due to over-pressurization.	Install Pressure Relief Valve (see page 10).
	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 18.
	Diaphragm ruptured.	Replace. See pages 19 to 22.
	Restricted exhaust.	Remove restriction.
Air bubbles in fluid.	Suction line is loose.	Tighten.
	Diaphragm ruptured.	Replace. See pages 19 to 22.
	Loose inlet manifold (102), damaged seal between manifold and seat (201), damaged O-rings (202).	Tighten manifold bolts (112) or replace seats (201) or O-rings (202). See page 18.
	Loose fluid side diaphragm plate (105).	Tighten or replace. See pages 19 to 22.

Troubleshooting

PROBLEM	CAUSE	SOLUTION
Fluid in exhaust air.	Diaphragm ruptured.	Replace. See pages 19 to 22.
	Loose fluid side diaphragm plate (105).	Tighten or replace. See pages 19 to 22.
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).	Inspect; replace. See pages 16 to 17.
	Worn shaft seals (402).	Replace. See pages 19 to 22.
Pump leaks air externally.	Air valve cover (2) or air valve cover screws (3) are loose.	Tighten screws. See page 17.
	Air valve gasket (4†) or air cover gasket (22) is damaged.	Inspect; replace. See pages 16 to 17 and 23 to 24.
	Air cover screws (25) are loose.	Tighten screws. See pages 23 to 24.
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 and 112) or replace seats (201) or O-rings (202). See page 18.

Service

Repairing the Air Valve

Tools Required

- Torque wrench
- Torx (T20) screwdriver or 7 mm (9/32 in.) socket wrench
- Needle-nose pliers
- O-ring pick
- Lithium base grease, part no. 111920 (Lubriplate 630AA or equivalent)

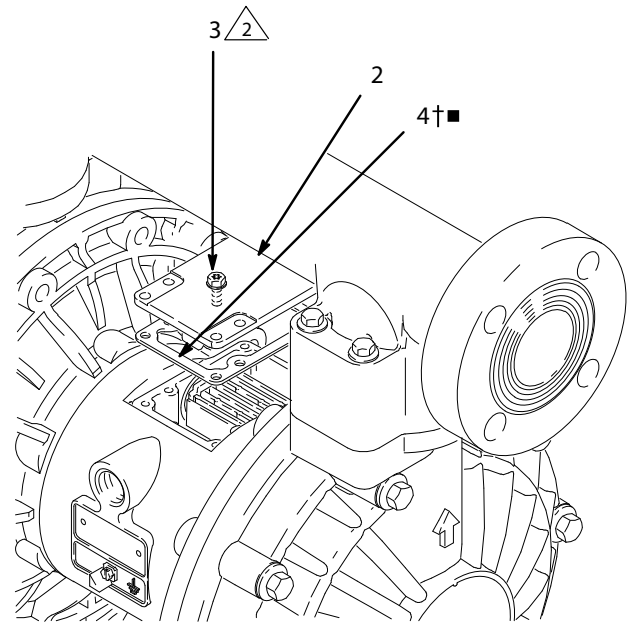
NOTE: Air Valve Repair Kits 236273 (aluminum center housing models) and 255061 (SST center housing models) are available. Refer to page 30. Parts included in the kit are marked with a symbol, for example (4†). Use all the parts in the kit for the best results.

Disassembly

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

1. **Relieve the pressure.**
2. With a Torx (T20) screwdriver or 7 mm (9/32 in.) socket wrench, remove the six screws (3), air valve cover (2), and gasket (4†). See Fig. 7.
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. 8.
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. 9.
5. Inspect the valve plate (8) in place. If damaged, use a Torx (T20) screwdriver or 7 mm (9/32 in.) 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. 10.
6. Inspect the bearings (12, 15) in place. See Fig. 9. The bearings are tapered and, if damaged, must be removed from the outside. This requires disassembly of the fluid section. See page 23.
7. Clean all parts and inspect for wear or damage. Replace as needed. Reassemble as explained on page 17.



⚠ Torque to 50–60 in-lb (5.6–6.8 N•m).

Fig. 7

04705B

- ⚠ 1 See Detail at right.
- ⚠ 2 Grease.
- ⚠ 3 Grease lower face.

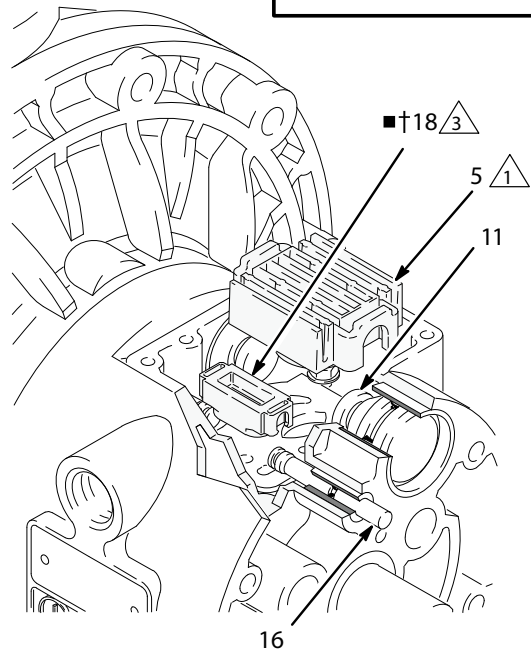
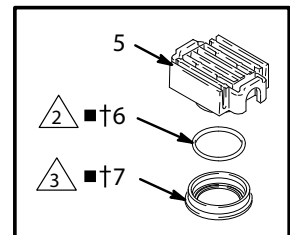
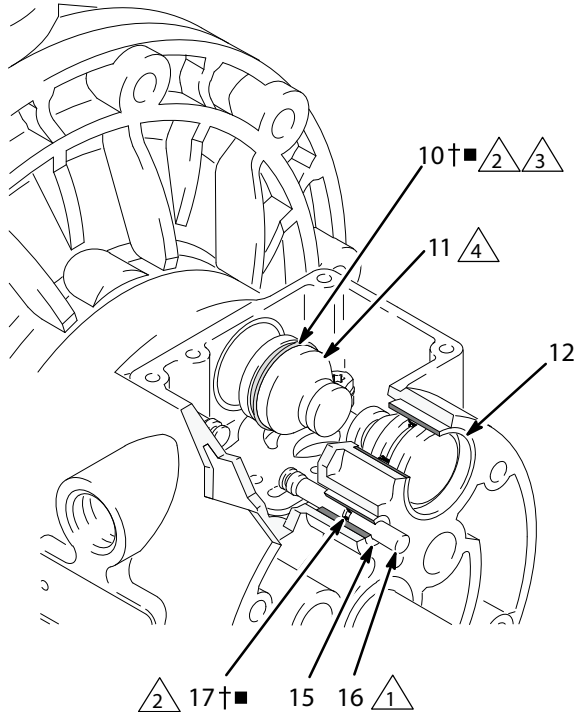


Fig. 8

04898

Service

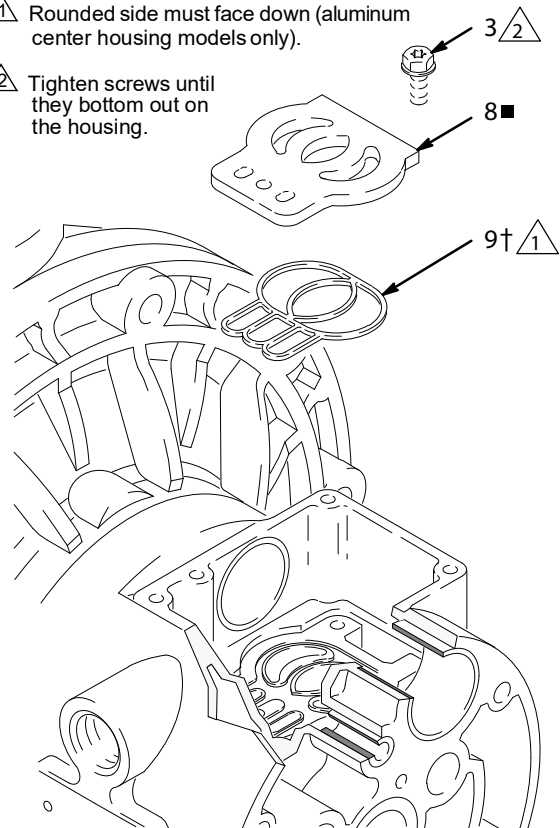
- △1 Insert narrow end first.
- △2 Grease.
- △3 Install with lips facing narrow end of piston (11).
- △4 Insert wide end first.



04899

Fig. 9

- △1 Rounded side must face down (aluminum center housing models only).
- △2 Tighten screws until they bottom out on the housing.



03271

Fig. 10

Reassembly

1. If you removed the bearings (12, 15), install new ones as explained on page 23. 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. 10.
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 (9/32 in.) socket wrench. Tighten until the screws bottom out on the housing. See Fig. 10.
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. 9.
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. 9.
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. 9.
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. 8.
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. 8.
9. Install the valve carriage (5) so its tabs slip into the grooves on the narrow end of the actuator pistons (11). See Fig. 8.
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 (9/32 in.) socket wrench. Torque to 50–60 in-lb (5.6–6.8 N•m). See Fig. 7.

Service

Ball Check Valve Repair

Tools Required

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

Disassembly

NOTE: A Fluid Section Repair Kit is available. Refer to page 27 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.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

1. **Relieve the pressure.** Disconnect all hoses.
2. Remove the pump from its mounting.
3. Using a 10 mm socket wrench, remove the eight bolts (106) and washers (113) holding the outlet manifold (103) to the fluid covers (101). See Fig. 11.
4. Remove the seats (201), balls (301), and O-rings (202) from the manifold.

NOTE: Some models do not use O-rings (202).

5. Turn the pump over and remove the bolts (112) and inlet manifold (102). Remove the seats (201), balls (301), and O-rings (202) 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. 11. 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 80 to 90 in-lb (9 to 10 N•m). See **Torque Sequence**, page 32.

⚠ Arrow (A) must point toward outlet manifold (103).

⚠ Not used on some models.

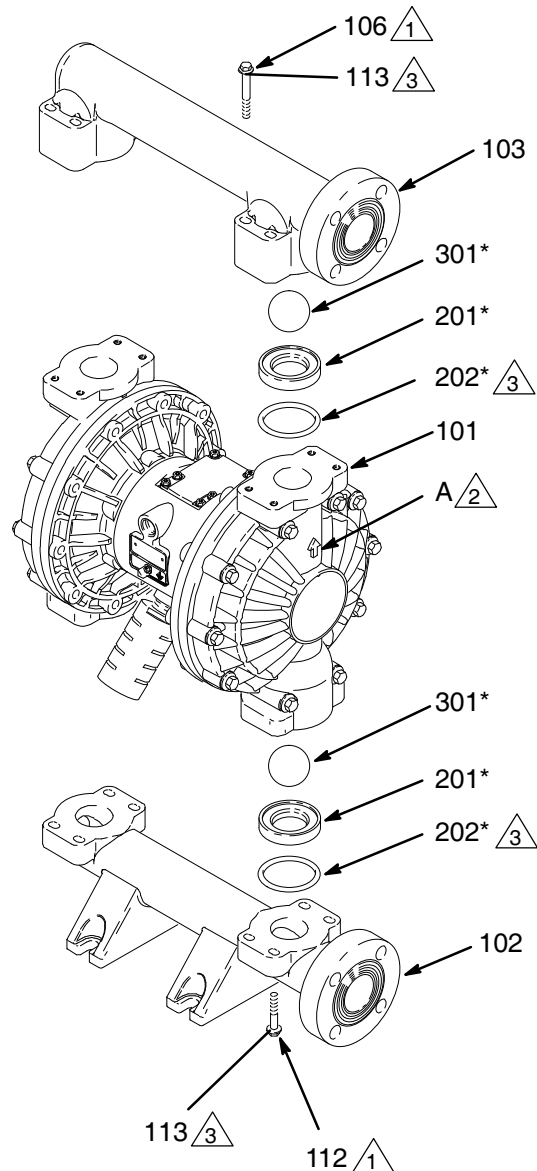


Fig. 11

04706B

Service

Diaphragm Repair

Tools Required

- Torque wrench
- 13 mm socket wrench
- Adjustable wrench
- 19 mm open-end wrench
- O-ring pick
- Lithium-base grease, part no. 111920 (Lubriplate 630AA or equivalent)

Disassembly

NOTE: A Fluid Section Repair Kit is available. Refer to page 27 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.

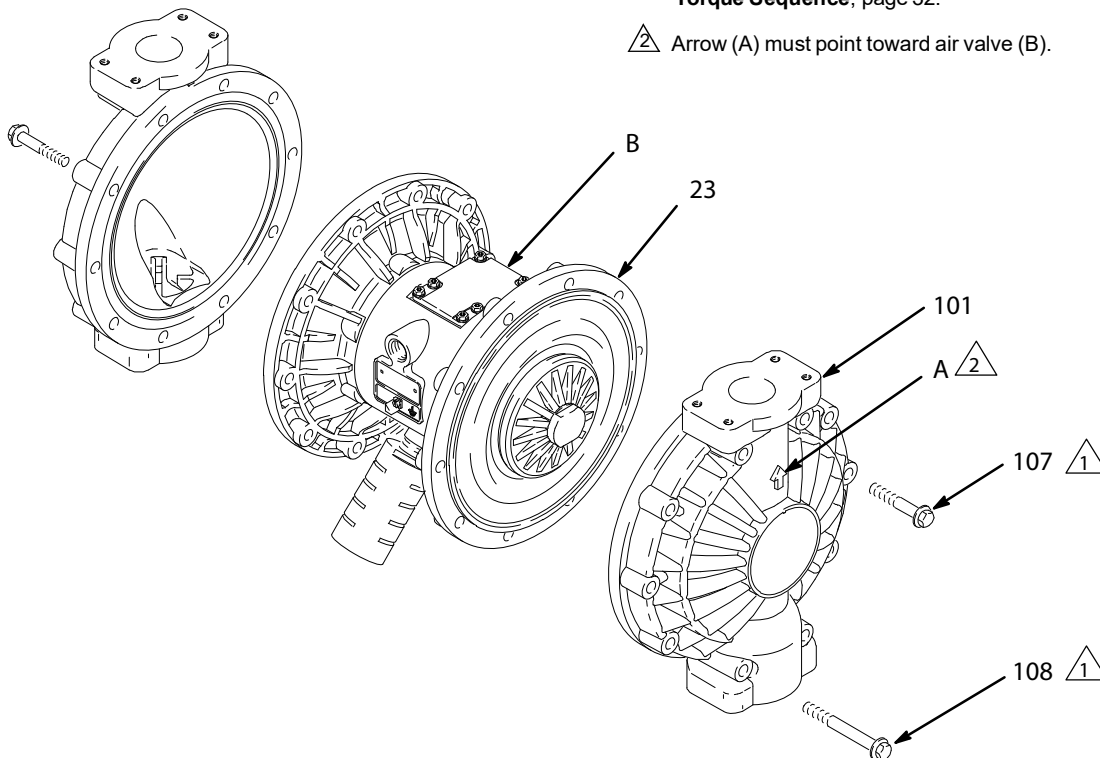
! WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

1. **Relieve the pressure.**
2. Remove the manifolds and disassemble the ball check valves as explained on page 18.
3. Using 13 mm socket wrenches, remove the screws (107 and 108) holding the fluid covers (101) to the air covers (23). Pull the fluid covers (101) off the pump. See Fig. 12.

⚠ You must torque the eight long screws (108) first, then the short screws (107). Torque to 190 to 220 in-lb (21 to 25 N•m). See **Torque Sequence**, page 32.

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



04707B

Fig. 12.

Service

4. Unscrew one outer plate (105) from the diaphragm shaft (24). Remove one diaphragm (401), and the inner plate (104). See Fig. 13.

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

NOTE: PTFE models include a PTFE diaphragm (403) in addition to the backup diaphragm (401).

5. 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 outer plate (105) 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.

6. 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 23.
7. 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.
8. Clean all parts and inspect for wear or damage. Replace parts as needed.

Reassembly – Standard Diaphragms

1. Grease the shaft u-cup packings (402) and install them so the lips face **out** of the housing (1). See Fig. 13.
2. Grease the length and ends of the diaphragm shaft (24) and slide it through the housing (1).
3. Assemble the inner diaphragm plates (104), diaphragms (401*), PTFE diaphragms (403*, if present), and outer diaphragm plates (105) **exactly** as shown in Fig. 13. These parts **must** be assembled correctly.
4. Apply medium-strength (blue) Loctite® or equivalent to the threads of the fluid-side plates (105). Hold one of the outer plates (105) with a wrench, and torque the other outer plate to 20 to 25 ft-lb (27 to 34 N•m) at 100 rpm maximum. Do not over-torque.
5. 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 (107 and 108) and tighten by hand. Install the longer screws (108) in the top and bottom holes of the covers. See Fig. 12.
6. First, using a 13 mm socket wrench, torque the longer screws (108) oppositely and evenly to 190–220 in-lb (21–25 N•m). Then torque the shorter screws (107). See **Torque Sequence**, page 32.
7. Reassemble the ball check valves and manifolds as explained on page 18

Reassembly – Overmolded Diaphragms

WARNING

To reduce the risk of serious injury, including amputation, do not put your fingers or hand between the air cover and the diaphragm.

1. Lubricate and install the shaft u-cup packings (402) so the lips face **out** of the housing (1). See Fig. 13.
2. 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) and tighten by hand.
3. Grease the length and ends of the diaphragm shaft (24). Insert the shaft/diaphragm assembly into one side of the pump. Align the fluid cover (101) and the center housing (1) so the arrow (A) faces the same direction as the air valve. Secure the cover with the screws (107 and 108) and tighten by hand.
4. Torque the longer screws (108) oppositely and evenly to 190–220 in-lb (21–25 N•m), using a 13mm socket wrench. Then torque the shorter screws (107). See **Torque Sequence**, page 32.

5. Assemble the other diaphragm assembly to the shaft as explained in step 2. This diaphragm will be lifted off the air cover at this point.
6. Supply the pump with low pressure air (less than 7 psi [0.05 MPa, 0.5 bar]). The diaphragm will very slowly pull onto the air cover. Find the pressure that keeps the diaphragm close enough to secure with the screws, but does not let it contact the pilot pin.

NOTE: Do not deform the diaphragm manually. The diaphragm needs uniform pressure to deform properly for maximum life.

7. Align the fluid cover (101) and the center housing (1) so the arrow (A) faces the same direction as the air valve. Secure the cover with two of the longer screws (108) and tighten by hand.

NOTE: If the diaphragm contacts the pilot pin and is forced away from the air cover, try Step 5 again. If necessary, return to Step 3.

8. Torque the longer screws (108) oppositely and evenly to 190–220 in-lb (21–25 N•m), using a 13mm socket wrench. Then torque the shorter screws (107). See **Torque Sequence**, page 32.
9. Reassemble the ball check valves and manifolds as explained on page 18.

Service

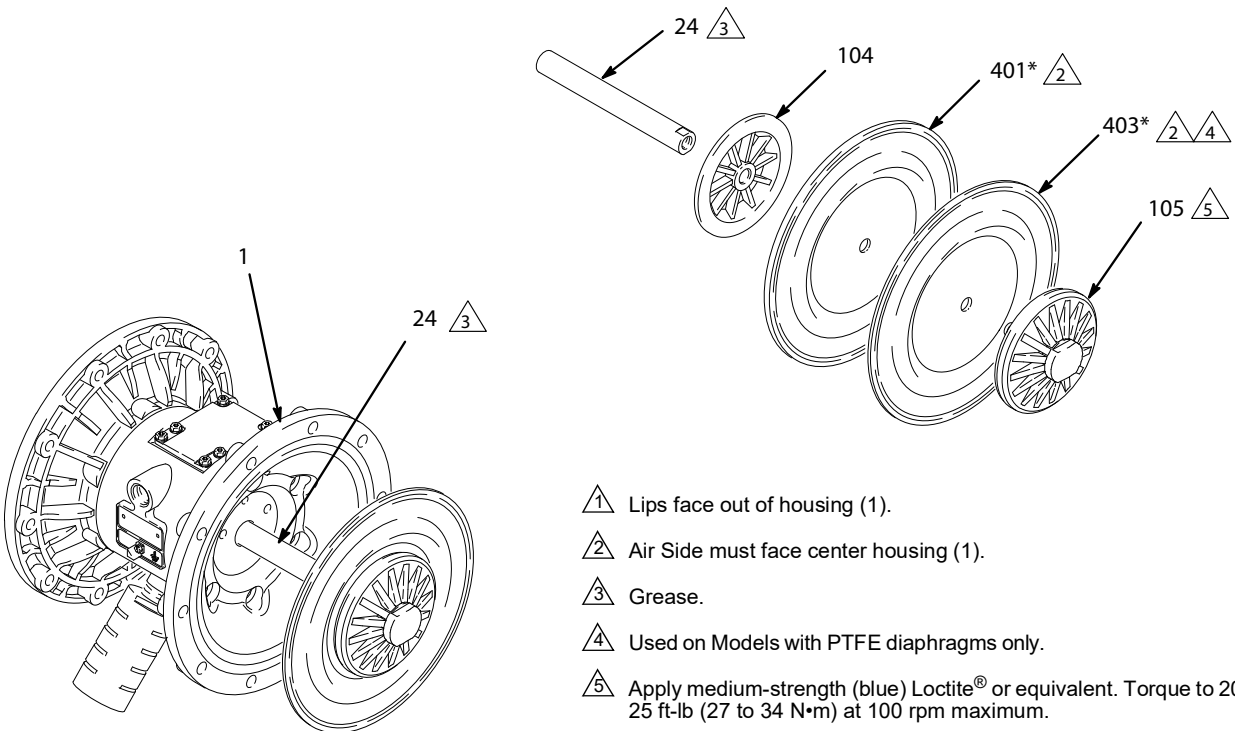
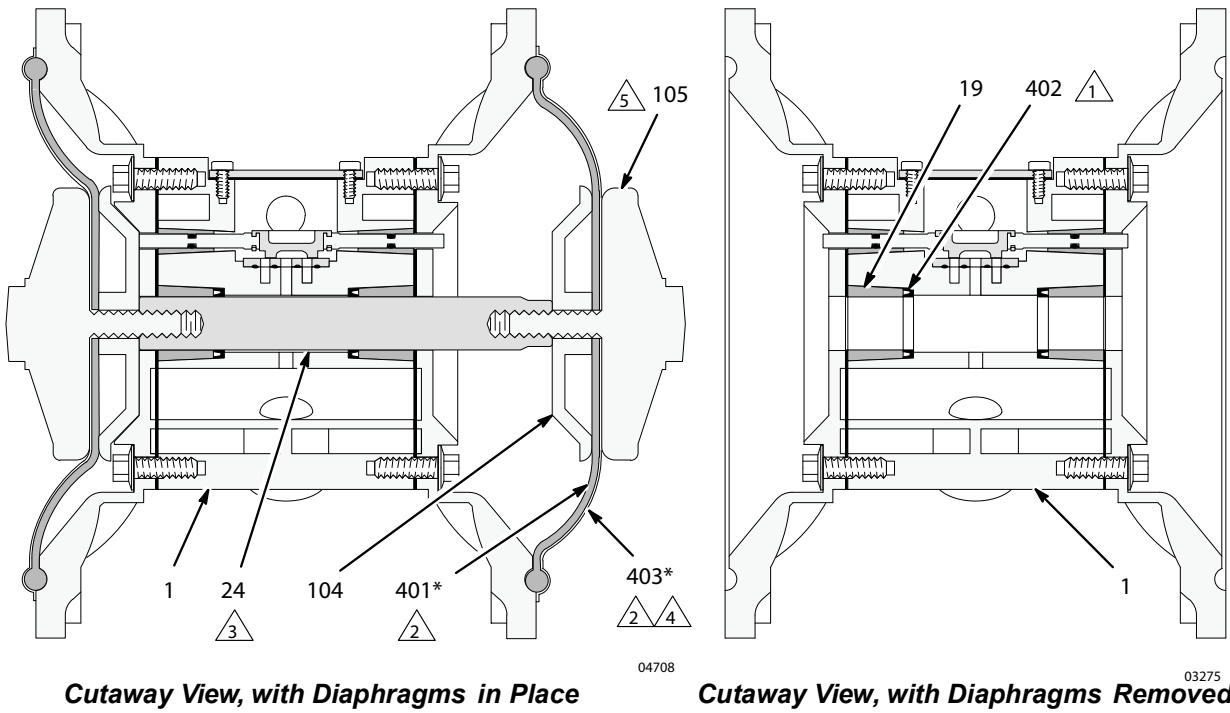


Fig. 13.

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 12.

1. **Relieve the pressure.**
2. Remove the manifolds and disassemble the ball check valves as explained on page 18.
3. Remove the fluid covers and diaphragm assemblies as explained on page 19.

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

4. Disassemble the air valve as explained on page 16.
5. Using a 10 mm socket wrench, remove the screws holding the air covers (23) to the center housing (1). See Fig. 14.
6. Remove the air cover gaskets (22). Always replace the gaskets with new ones.

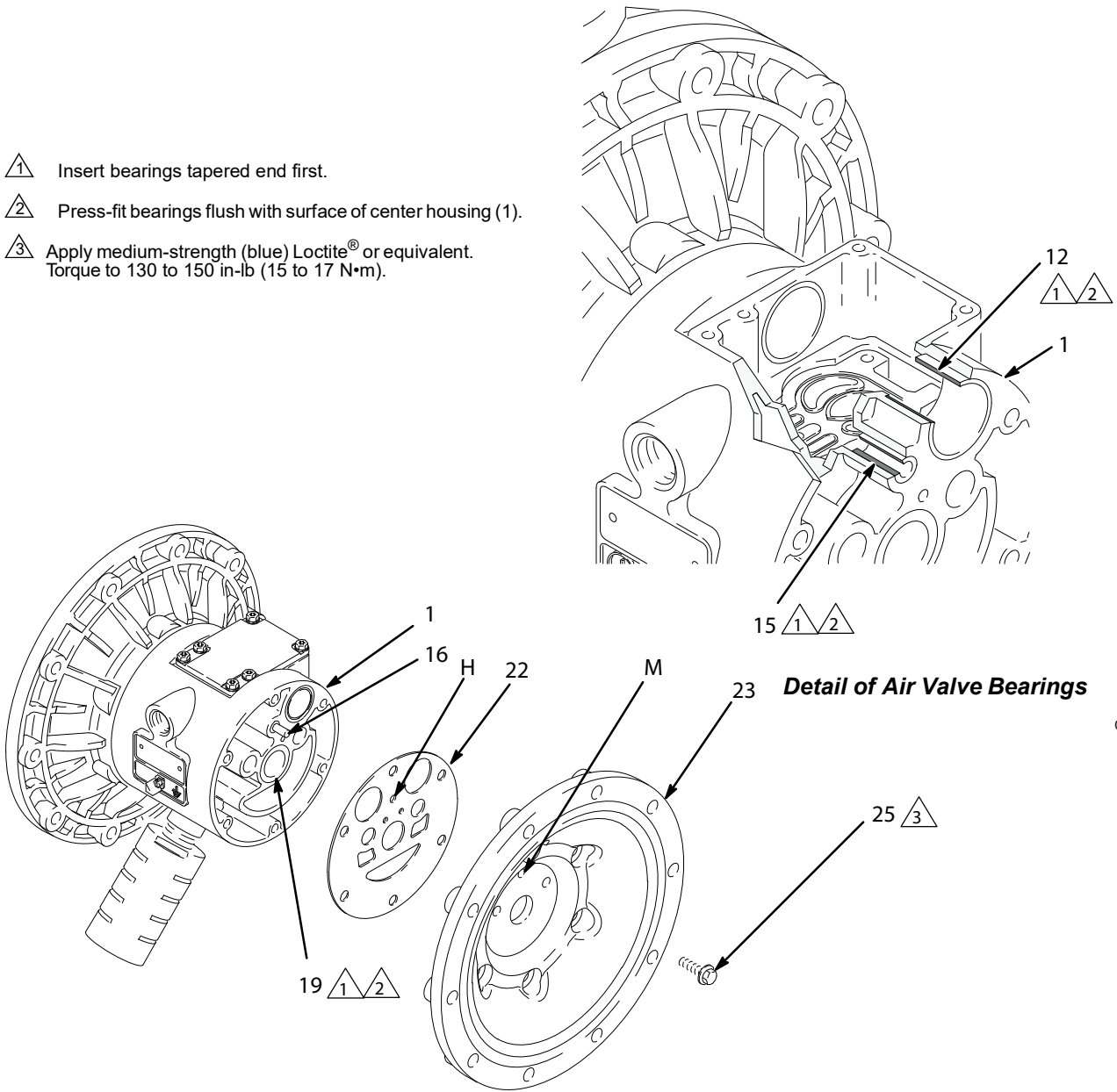
7. Use a bearing puller to remove the diaphragm shaft bearings (19), air valve bearings (12) or pilot pin bearings (15). Do not remove undamaged bearings.
8. If you removed the diaphragm shaft bearings (19), reach into the center housing (1) with an O-ring pick and hook the u-cup packings (402), then pull them out of the housing. Inspect the packings. See Fig. 13.

Reassembly

1. If removed, install the shaft u-cup packings (402) so the lips face **out** of the housing (1).
2. The bearings (19, 12, and 15) 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 17.
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. Apply medium-strength (blue) Loctite® or equivalent to the threads of screws (25). 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), tighten by hand. See Fig. 14. Using a 10 mm socket wrench, torque the screws oppositely and evenly to 130 to 150 in-lb (15 to 17 N•m).
6. Install the diaphragm assemblies and fluid covers as explained on page 19.
7. Reassemble the ball check valves and manifolds as explained on page 18.

Service

- ① Insert bearings tapered end first.
- ② Press-fit bearings flush with surface of center housing (1).
- ③ Apply medium-strength (blue) Loctite® or equivalent. Torque to 130 to 150 in-lb (15 to 17 N•m).



03277

Fig. 14.

Pump Matrix

Husky 1590 Polypropylene and PVDF Pumps, Series A

Your Model No. is marked on the pump's serial plate. To determine the Model No. of your pump from the following matrix, select the six digits which describe your pump, working from left to right. The first digit is always **D**, designating Husky diaphragm pumps. The remaining five digits define the materials of construction. For example, a pump with a Husky 1590 aluminum air motor, polypropylene fluid section, polypropylene seats, PTFE balls, and PTFE diaphragms is Model **D B 2 9 1 1**. To order replacement parts, refer to the part lists on pages 30 and 31. *The digits in the matrix do not correspond to the ref. nos. in the parts drawing and lists.*

Diaphragm Pump	Air Motor	Fluid Section	-	Seats	Balls	Diaphragms
D (for all pumps)	B Aluminum (standard)	1 (not used)	-	1 (not used)	1 (PTFE)	1 (PTFE)
24B758*	C Aluminum (remote)	2 (polypropylene)	-	2 (not used)	2 (acetal)	2 (not used)
24B759*	T SST (standard)	3 (Aluminum; see manual 308441)	-	3 (316 SST)	3 (not used)	3 (not used)
24B760*	U SST (remote)	4 (SST; see manual 308441)	-	4 (17-4 PH SST)	4 (440C SST)	4 (not used)
24B761*		5 (PVDF)	-	5 (TPE)	5 (TPE)	5 (TPE)
24B832*			-	6 (Santoprene®)	6 (Santoprene®)	6 (Santoprene®)
			-	7 (Buna-N)	7 (Buna-N)	7 (Buna-N)
			-	8 (fluoroelastomer)	8 (fluoroelastomer)	8 (fluoroelastomer)
			-	9 (polypropylene)		
			-	A (PVDF)		
			-	G (Geolast®)	G (Geolast®)	G (Geolast®)

These materials are FDA-compliant and meet the United States Code of Federal Regulations (CFR) Title 21, Section 177 or are of a corrosion resistant grade Stainless Steel. NOTE: Rubber and Rubber-like materials comply with CFR Title 21, Section 177, Part 177.2600; Plastic materials comply with CFR Title 21, Section 177, Parts 177.2600, 177.1520, 177.1550.

246451 Stainless Steel Air Motor Conversion Kit

Use kit 246451 and refer to instruction manual 309643 (included with kit) to convert from aluminum air motor to stainless steel air motor.

* 24B758 PVDF Plus Pump

This pump is the same as Model DT5A11 except for the serial plate and parts listed in the chart at right.

* 24B759 Polypropylene Plus Pump

This pump is the same as Model DT2911 except for the serial plate and parts listed in the chart at right.

* 24B760 Polypropylene Pump

This pump is the same as Model DB2911 except for the serial plate and parts listed in the chart at right.

* 24B761 Polypropylene Pump

This pump is the same as Model DB2311 except for the serial plate and parts listed in the chart below.

* 24B832 PVDF Pump

This pump is the same as Model DB5A11 except for the serial plate and parts listed in the chart below.

Ref. No.	Part No.	Description	Qty
104	15H810	PLATE, air side; alum.	2
105	---	not used	0
401	15G745	DIAPHRAGM, HD, overmolded; PTFE/EPDM	2

Repair Kit Matrix

For Husky 1590 Polypropylene and PVDF Pumps, Series A

Repair Kits may be ordered separately. To repair the air valve, order **Part No. 236273** for aluminum center housing models or **Part No. 255061** for stainless steel center housing models (see page 30). Parts included in the Air Valve Repair Kit are marked with a symbol in the parts list, for example: 4† .

To repair your pump, select the six digits which describe your pump from the following matrix, working from left to right. The first digit is always **D**, the second digit is always **0** (zero), and the third is always **C**. The remaining three digits define the materials of construction. Parts included in the kit are marked with an asterisk in the parts list, for example (201*). For example, if your pump has polypropylene seats, PTFE balls, and PTFE diaphragms, order Repair Kit **D 0 C 9 1 1**. If you only need to repair certain parts (for example, the diaphragms), use the 0 (null) digits for the seats and balls, and order Repair Kit **D 0 C 0 0 1**. *The digits in the matrix do not correspond to the ref. nos. in the parts drawing and lists on pages 30 and 31.*

Diaphragm Pump	Null	Fluid Section Material	-	Seats	Balls	Diaphragms	
D (for all pumps)	0 (for all pumps)	C (plastic)	-	0 (null)	0 (null)	0 (null)	
				-	1 (not used)	1 (PTFE)	1 (PTFE)
				-	2 (not used)	2 (acetal)	2 (not used)
				-	3 (316 SST)	3 (not used)	3 (not used)
				-	4 (17-4 PH SST)	4 (440C SST)	4 (not used)
				-	5 (TPE)	5 (TPE)	5 (TPE)
				-	6 (Santoprene®)	6 (Santoprene®)	6 (Santoprene®)
				-	7 (Buna-N)	7 (Buna-N)	7 (Buna-N)
				-	8 (fluoroelastomer)	8 (fluoroelastomer)	8 (fluoroelastomer)
				-	9 (polypropylene)		
				-	A (PVDF)		
				-	G (Geolast®)	G (Geolast®)	G (Geolast®)

Part No. 25P208: Husky 1590 HD Overmolded PTFE/EPDM Diaphragm Repair Kit.

Part No. 289225: Husky 1590 HD Overmolded PTFE/EPDM Diaphragm Repair Kit, with new air side diaphragm plates.

Part No. 24F397: Husky 1590 PTFE/Santoprene Backer Diaphragm Repair Kit, for plastic pumps.

Parts

Air Motor Parts List (Matrix Column 2)

Digit	Ref. No.	Part No.	Description	Qty
B	1	188838	HOUSING, center; aluminum	1
	2	188854	COVER, air valve; aluminum	1
	3	116344	SCREW, mach, hex flange hd; M5 x 0.8; 12 mm (0.47 in.)	9
	4††▪	188618	GASKET, cover; foam	1
	5	188855	CARRIAGE; aluminum	1
	6††▪	108730	O-RING; nitrile	1
	7††▪	188616	BLOCK, air valve; acetal	1
	8	188615	PLATE, air valve; SST	1
	9††	188617	SEAL, valve plate; Buna-N	1
	10†† ▪	112181	PACKING, u-cup; nitrile	2
	11	188612	PISTON, actuator; acetal	2
	12	188613	BEARING, piston; acetal	2
	13‡	104765	PLUG, pipe; headless	2
	14‡	115671	FITTING, connector; male	2
	15	188611	BEARING, pin; acetal	2
	16	188610	PIN, pilot; stainless steel	2
	17†† ▪	157628	O-RING; Buna-N	2
	18†† ▪	188614	BLOCK, pilot; acetal	1
	19	188609	BEARING, shaft; acetal	2
	20	116343	SCREW, grounding	1
	22	188603	GASKET, air cover; foam	2
	23	189400	COVER, air; aluminum	2
	24	189245	SHAFT, diaphragm; SST	1
	25	115643	SCREW; M8 x 1.25; 25 mm (1 in.), aluminum	12

Digit	Ref. No.	Part No	Description	Qty
C	Same as B with the following exceptions:			
	1	195921	HOUSING, center; remote, aluminum	1
	23	195919	COVER, air; remote, aluminum	2
T	Same as B with the following exceptions:			
	1	15K009	HOUSING, center; stainless steel	1
	2	15K696	COVER, air valve; stainless steel	1
	8▪	15H178	PLATE, air valve, stainless steel	1
	9	-	-	-
	23	15A739	COVER, air; stainless steel	2
	25	112178	SCREW; M8 x 1.25; 25 MM (1 in.) stainless steel	12
	U	Same as B with the following exceptions:		
1		15K011	HOUSING, center; remote, stainless steel	1
2		15K696	COVER, air valve; stainless steel	1
8▪		15H178	PLATE, air valve, stainless steel	1
9		-	-	-
23		15B795	COVER, air; remote, stainless steel	2
25		112178	SCREW; M8 x 1.25; 25 MM (1 in.) stainless steel	12

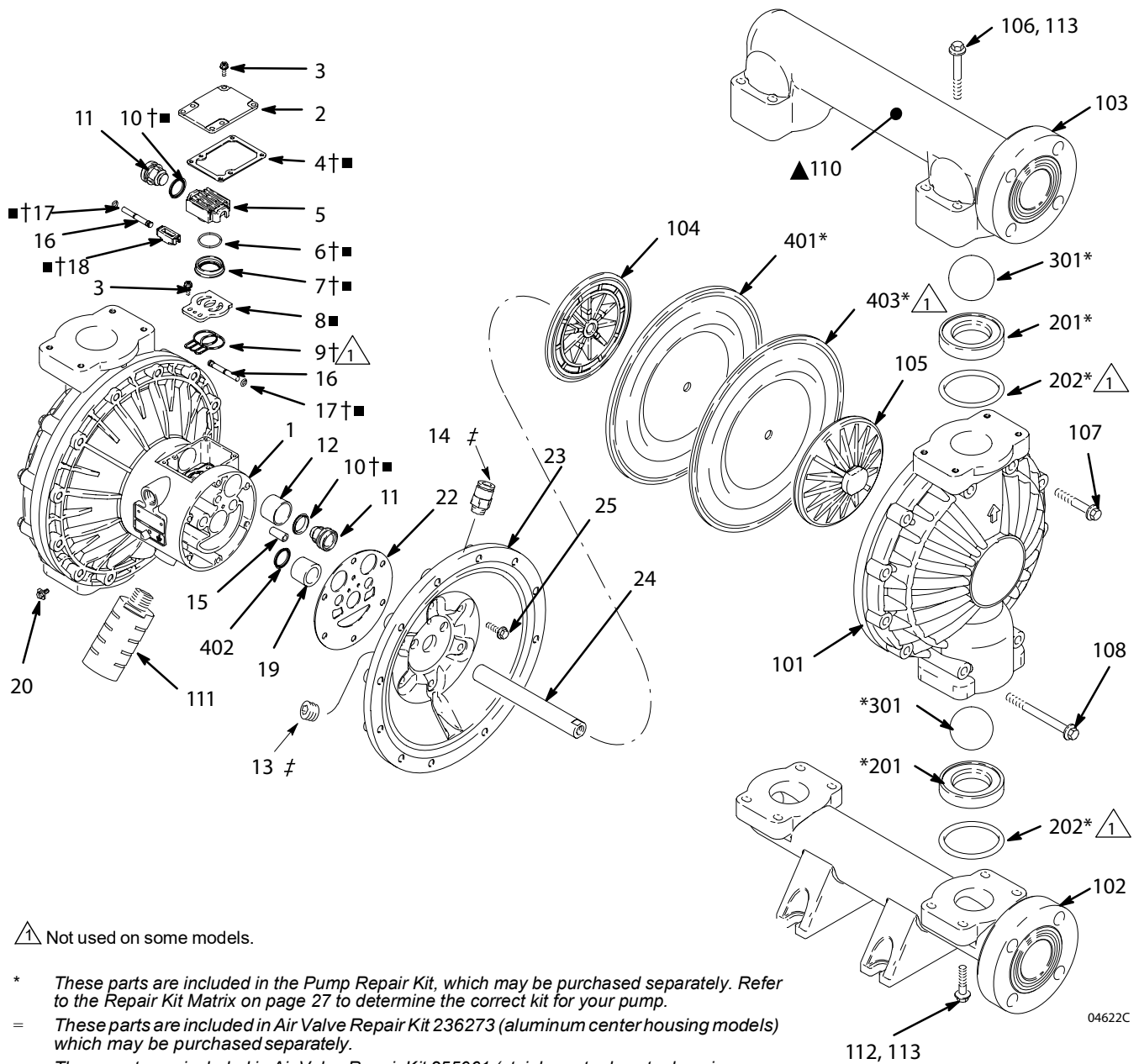
Parts

Fluid Section Parts List (Matrix Column 3)

Digit	Ref. No.	Part No.	Description	Qty
2	101	189739	COVER, fluid; polypropylene	2
	102	192072	MANIFOLD, inlet; polypropylene	1
	103	192074	MANIFOLD, outlet; polypropylene	1
	104	15K448	PLATE, air side; alum.	2
	105	189742	PLATE, fluid side; polypropylene	2
	106	112560	SCREW; M8 x 1.25; 70 mm (2.76 in.); SST	8
	107	112368	SCREW; M10 x 1.50; 60 mm (2.36 in.); SST	12
	108	114118	SCREW; M10 x 1.50; 90 mm (3.54 in.); SST	8
	110	188621	LABEL, warning	1
	111	102656	MUFFLER	1
	112	112559	SCREW; M8 x 1.25; 40 mm (1.57 in.); SST	8
	113	112914	WASHER, 3/8 in.	16

Digit	Ref. No.	Part No.	Description	Qty
5	101	189741	COVER, fluid; PVDF	2
	102	192073	MANIFOLD, inlet; PVDF	1
	103	192075	MANIFOLD, outlet; PVDF	1
	104	15K448	PLATE, air side; aluminum	2
	105	189744	PLATE, fluid side; PVDF	2
	106	112560	SCREW; M8 x 1.25; 70 mm (2.76 in.); SST	8
	107	112368	SCREW; M10 x 1.50; 60 mm (2.36 in.); SST	12
	108	114118	SCREW; M10 x 1.50; 90 mm (3.54 in.); SST	8
	110	188621	LABEL, warning	1
	111	102656	MUFFLER	1
	112	112559	SCREW; M8 x 1.25; 40 mm (1.57 in.); SST	8

Parts



△ Not used on some models.

* These parts are included in the Pump Repair Kit, which may be purchased separately. Refer to the Repair Kit Matrix on page 27 to determine the correct kit for your pump.

= These parts are included in Air Valve Repair Kit 236273 (aluminum center housing models) which may be purchased separately.

These parts are included in Air Valve Repair Kit 255061 (stainless steel center housing models) which may be purchased separately.

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

‡ These parts are unique to remote piloted air motor, DC—, DT—

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Parts

Seat Parts List (Matrix Column 4)

Digit	Ref. No.	Part No.	Description	Qty.
3	201*	D0BB00	SEAT; 316 stainless steel, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
4	201*	D0B400	SEAT; 17-4 stainless steel, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
5	201*	D0B500	SEAT; TPE, pkg. of 4	1
	202	None	Not Used	0
6	201*	D0B600	SEAT; Santoprene, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
7	201*	D0B700	SEAT; Buna-N, pkg. of 4	1
	202*	None	Not Used	0
8	201*	D0B800	SEAT; Fluoroelastomer, pkg. of 4	1
	202*	None	Not Used	0
9	201*	D0B900	SEAT; polypropylene, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
A	201*	D0BA00	SEAT; PVDF, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
G	201*	D0BG00	SEAT; Geolast, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1

--- Not sold separately

Seal/O-ring Parts List

Ref. No.	Part No.	Description	Qty.
202*	26B253	O-RING; PTFE, pkg. of 4	1
202*	26B254	O-RING; Fluoroelastomer, pkg. of 4	1

Ball Parts List (Matrix Column 5)

Digit	Ref. No.	Part No.	Description	Qty.
1	301*	D0B010	BALL; PTFE, pkg. of 4	1
2	301*	D0B020	BALL; acetal, pkg. of 4	1
4	301*	D0B040	BALL; 440C stainless steel, pkg. of 4	1
5	301*	D0B050	BALL; TPE, pkg. of 4	1
6	301*	D0B060	BALL; Santoprene, pkg. of 4	1
7	301*	D0B070	BALL; Buna-N, pkg. of 4	1
8	301*	D0B080	BALL; Fluoroelastomer, pkg. of 4	1
G	301*	D0B0G0	BALL; Geolast, pkg. of 4	1

Diaphragm Parts List (Matrix Column 6)

Digit	Ref. No.	Part No.	Description	Qty.
1	401*	Not sold separately	DIAPHRAGM, backup; polychloroprene (CR), pkg. of 2	1
	402	112181	PACKING, u-cup; nitrile, pkg. of 2	1
	403*	D0B001	DIAPHRAGM; PTFE, pkg. of 2	1
5	401*	D0B005	DIAPHRAGM; TPE, pkg. of 2	1
	402	112181	PACKING, u-cup; nitrile, pkg. of 2	1
6	401*	D0B006	DIAPHRAGM; Santoprene, pkg. of 2	1
	402	112181	PACKING, u-cup; nitrile, pkg. of 2	1
7	401*	D0B007	DIAPHRAGM; Buna-N, pkg. of 2	1
	402	112181	PACKING, u-cup; nitrile, pkg. of 2	1
8	401*	D0B008	DIAPHRAGM; Fluoroelastomer, pkg. of 2	1
	402	112181	PACKING, u-cup; nitrile, pkg. of 2	1
G	401*	D0B00G	DIAPHRAGM; Geolast, pkg. of 2	1
	402	112181	PACKING, u-cup; nitrile, pkg. of 2	1

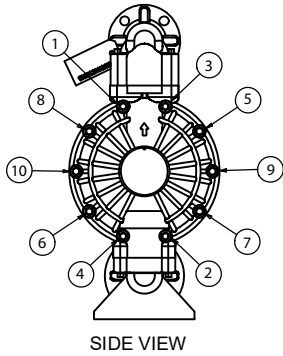
* These parts are included in the pump repair kit, purchased separately. See Repair Kit Matrix on page 27 to determine the correct kit for your pump.

Torque Sequence

Always follow torque sequence when instructed to torque fasteners.

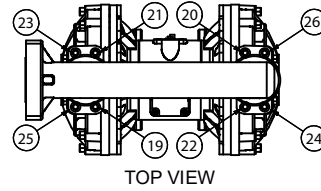
1. Left/Right Fluid Covers

Torque bolts to 190–220 in-lb (21–25 N•m)



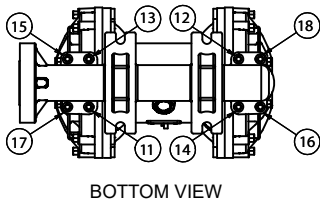
3. Outlet Manifold

Torque bolts to 80–90 in-lb (9–10 N•m)

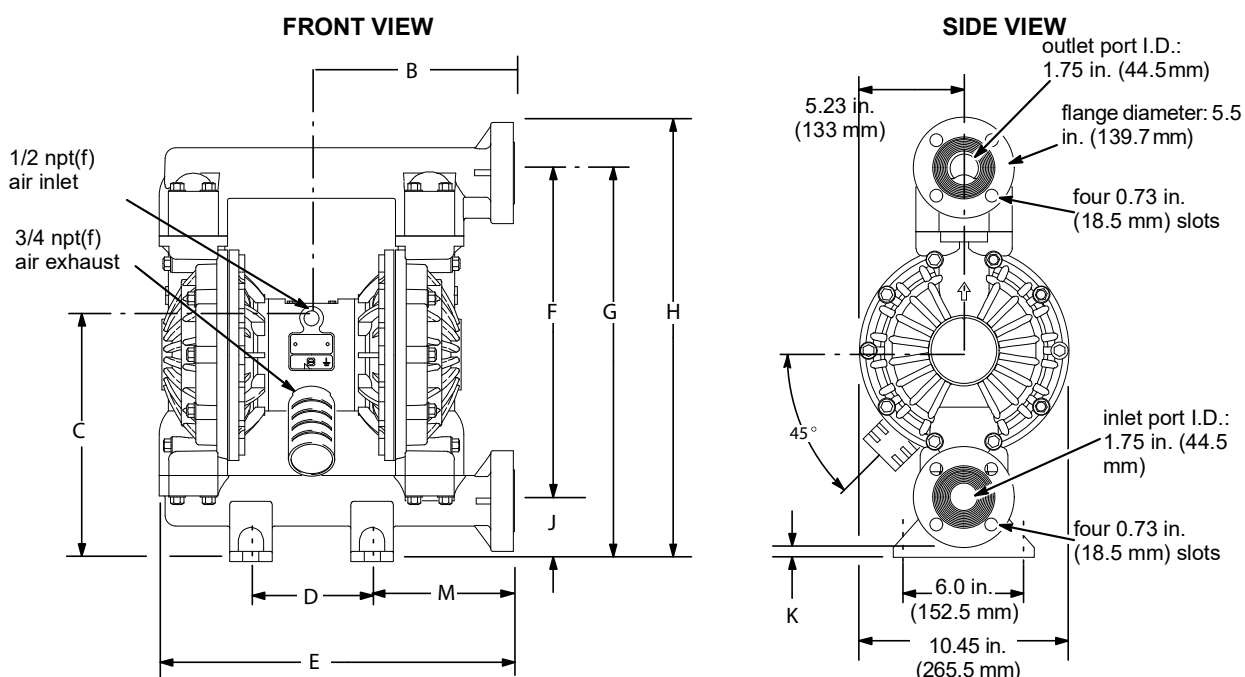


2. Inlet Manifold

Torque bolts to 80–90 in-lb (9–10 N•m)

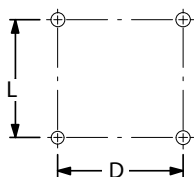


Dimensions



PUMP MOUNTING HOLE PATTERN

7439B



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.

Dimension	SST Center Polypropylene Cover		SST Center PVDF Cover		Aluminum Center Polypropylene Cover		Aluminum Center PVDF Cover	
	in.	mm	in.	mm	in.	mm	in.	mm
B	10.0	255	10.0	255	10.0	255	10.0	255
C	12.1	306	11.9	302	12.1	306	11.9	302
D	6.0	152	6.0	152	6.0	152	6.0	152
E	17.6	447	17.5	445	17.6	447	17.5	445
F	16.3	414	16.1	408	16.3	414	16.1	408
G	19.3	490	19.1	484	19.3	490	19.1	484
H	22.0	560	21.8	554	22.0	560	21.8	554
J	3.0	76	3.0	76	3.0	76	3.0	76
K	0.25	6	0.3	6	0.25	6	0.3	6
L	6.0	152	6.0	152	6.0	152	6.0	152
M	7.0	178	7.0	178	7.0	178	7.0	178

Technical Data

Maximum fluid working pressure 120 psi
 (0.84 MPa, 8.4 bar)
 Air pressure operating range 20 to 120 psi
 (1.4 to 8.4 bar, 0.14 to 0.84 MPa)
 Maximum air consumption 125 scfm
 Air consumption at 70 psi/60 gpm 50 scfm (see chart)
 Maximum free flow delivery 100 gpm (378.5 l/min)
 Maximum pump speed 200 cpm
 Gallons (liters) per cycle 0.5 (1.9)
 Maximum suction lift 18 ft (5.48 m) wet or dry
 Maximum size pumpable solids 3/16 in. (4.8 mm)
 * Maximum noise level at 100 psi, 50 cpm 94 dBA
 Sound power level 108 dBA
 * Noise level at 70 psi, 50 cycles/min 72 dBA
 Maximum operating temperature 150°F (65.5°C)
 Air inlet size 1/2 npt(f)
 Fluid inlet size 1-1/2 in. raised face flange
 Fluid outlet size 1-1/2 in. raised face flange
 Wetted parts Vary by model. See pages 28 to 31

Non-wetted external parts . . . aluminum, 302 and 316 stainless steel polyester (labels)
 Weight *Polypropylene Pumps:*
 with aluminum center section 35 lb (16 kg)
 *PVDF Pumps:*
 with aluminum center section 49 lb (22 kg)
 *Polypropylene Plus Pumps:*
 with stainless steel center section 49 lb (23 kg)
 *PVDF Pumps:*
 with stainless steel center section 63 lb (30 kg)

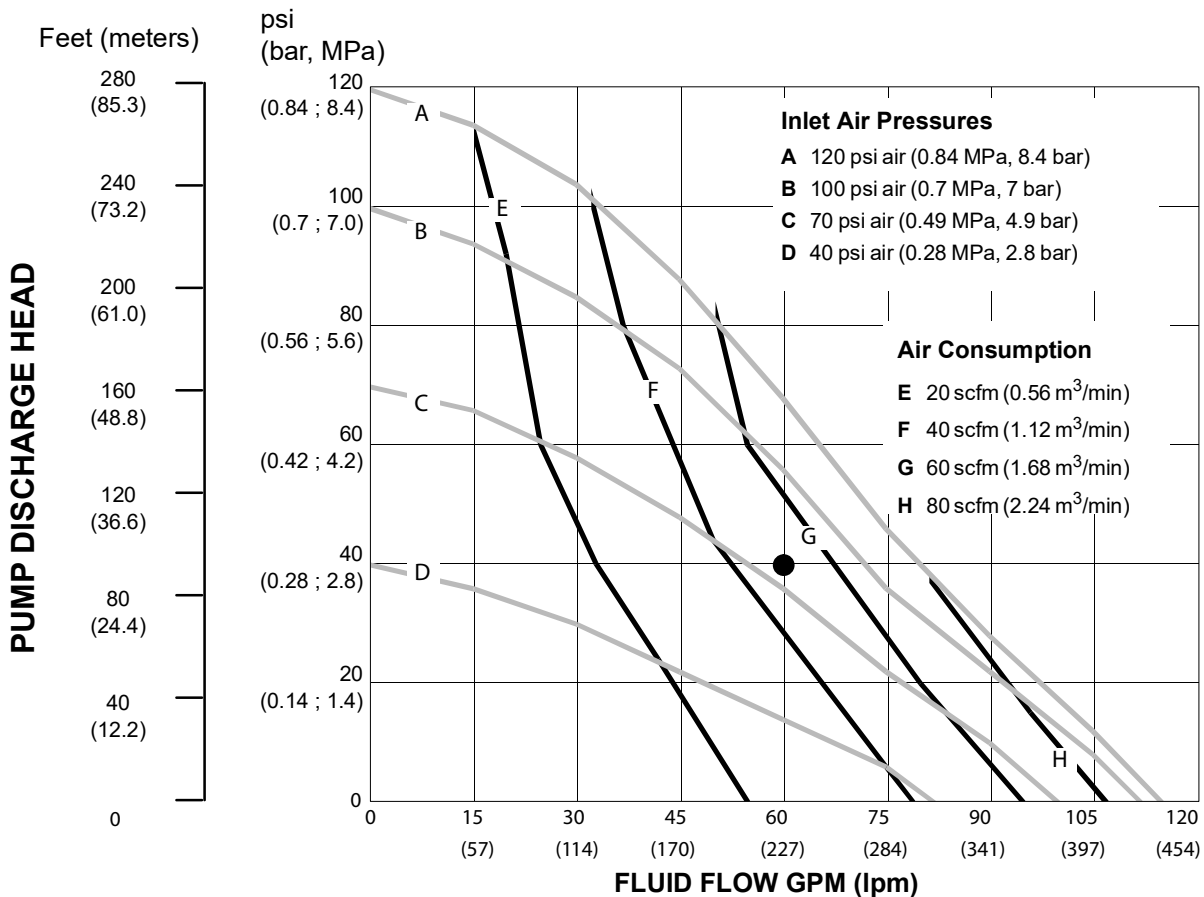
Geolast® and Santoprene® are registered trademarks of the Monsanto Co.

Loctite® is a registered trademark of the Loctite Corporation.

* Noise levels measured with the pump mounted on the floor, using Rubber Foot Kit 236452. Sound power measured per ISO Standard 9216.

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

To supply 60 gpm (227 liters) fluid flow (horizontal scale) at 40 psi (0.28 MPa, 2.8 bar) discharge head pressure (vertical scale) requires approximately 50 scfm (1.40 m³/min) air consumption at 70 psi (0.49 MPa, 4.9 bar) inlet air pressure.



California Proposition 65

CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm – www.P65warnings.ca.gov.

Graco Standard Husky Pump Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

FOR GRACO CANADA CUSTOMERS

The Parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés, à la suite de ou en rapport, directement ou indirectement, avec les procédures concernées.

Graco Information

For the latest information about Graco products, visit www.graco.com. For patent information, see www.graco.com/patents.

TO PLACE AN ORDER, contact your Graco distributor or call to identify the distributor closest to you:
Phone: 612-623-6921 or **Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

*All written and visual data contained in this document reflects the latest product information available at the time of publication.
Graco reserves the right to make changes at any time without notice.*

Original instructions. This manual contains English. MM 308549

Graco Headquarters: Minneapolis

International Offices: Belgium, China, Japan, Korea

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441

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www.graco.com

Revision ZAL, June 2022

Installation – Parts List



ALUMINUM AND STAINLESS STEEL

Husky™ 1590 Air-Operated Diaphragm Pumps

308441ZAU

EN

1.5-inch AODD pump for fluid transfer applications.
For professional use only.

See Models on page 3 for a list of pump models and descriptions.

120 psi (0.8 MPa, 8 bar) Maximum Fluid Working Pressure

120 psi (0.8 MPa, 8 bar) Maximum Air Input Pressure



Important Safety Instructions

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

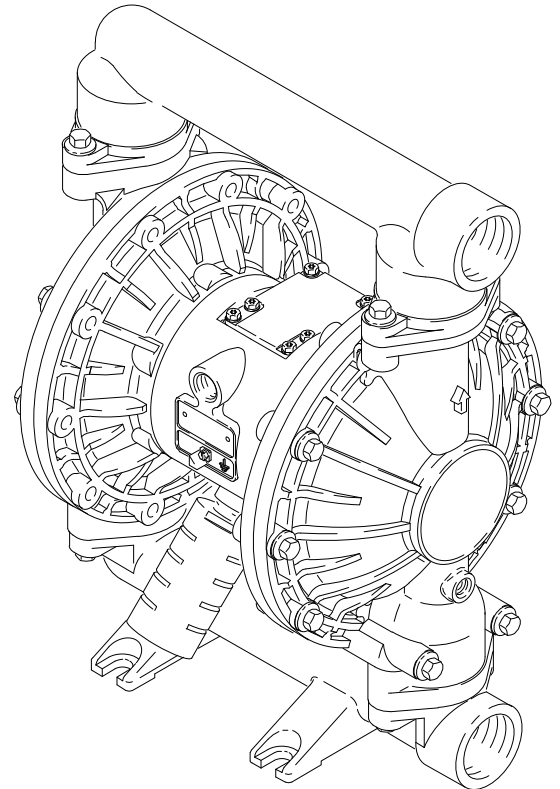


II 2 GD

Ex h IIC 66°...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.



Model No. DB3777 shown

03263B

PROVEN QUALITY. LEADING TECHNOLOGY.

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Models

Model No.	Description
*DB3_____	Aluminum Pumps
*DC3_____	Aluminum Pumps, Remote
*DB4_____	Stainless Steel Pumps
*DC4_____	Stainless Steel Pumps, Remote
*DBC_____	Aluminum BSPT Pumps
*DCC_____	Aluminum BSPT Pumps, Remote
*DBD_____	Stainless Steel BSPT Pumps
*DBP_____	Stainless Steel Pumps with Flanged Manifold Ports (Vertical Outlet)
*DBR_____	Stainless Steel Pumps with Flanged Manifold Ports (Horizontal Outlet)
*DCD_____	Stainless Steel BSPT Pumps, Remote
*DT4_____	Stainless Steel Plus Pumps
*DU4_____	Stainless Steel Plus Pumps, Remote
*DT7_____	Stainless Steel Pumps, Type 3.1 Certification
*DT8_____	Stainless Steel Pumps, Type 3.1-Advanced Certification
*DTD_____	Stainless Steel BSPT Plus Pumps
*DUD_____	Stainless Steel BSPT Plus Pumps, Remote
*DTP_____	Stainless Steel Pumps with Flanged Manifold Ports (Vertical Outlet)
*DTR_____	Stainless Steel Pumps with Flanged Manifold Ports (Horizontal Outlet)
253485	Aluminum Pump
232502	Private-Label Aluminum Pump
24B780	Stainless Steel Plus Pump with overmolded diaphragms
24B781	Stainless Steel Pump with overmolded diaphragms
26D450	Stainless Steel BSPT Pump with overmolded diaphragms
24G411	Aluminum BSPT Pump with overmolded diaphragms
24J358	Aluminum Pump with overmolded diaphragms
24J359	Aluminum Pump with overmolded diaphragms
25A017	Aluminum Pump with overmolded diaphragms, SST balls
25C654	Stainless Steel Pump with SST Center Section, Flanged Manifold Ports (Horizontal Outlet), and overmolded diaphragms
25C655	Stainless Steel Pump with Aluminum Center Section, Flanged Manifold Ports (Horizontal Outlet), and overmolded diaphragms
25C656	Stainless Steel Pump with SST Center Section, Flanged Manifold Ports (Vertical Outlet), and overmolded diaphragms
25C657	Stainless Steel Pump with Aluminum Center Section, Flanged Manifold Ports (Vertical Outlet), and overmolded diaphragms
26C239	Same as DB3321, except SST diaphragm fluid plates

* Refer to the Pump Matrix on page 24 to determine the Model No. of your pump.

NOTE: Plus Models include stainless steel center sections.

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



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 your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- 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 a 120 psi (0.8 MPa, 8 bar) maximum working pressure at **120 psi (0.8 MPa, 8 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 Graco hoses to temperatures above 82°C (180°F) or below -40°C (-40°F).
- 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 11.



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 **Installation** on page 7.
- 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 11.
- 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

- The typical installation shown in FIG. 1 is only a guide for selecting and installing system components. Contact your Graco distributor for assistance in planning a system to suit your needs.
- Always use Genuine Graco Parts and Accessories. Refer to Product Data Sheet 305646.
- Reference numbers and letters in parentheses refer to the callouts in the figures and the parts lists on pages 27-28.
- Lift the pump by grasping the outlet manifold (1) securely. See FIG. 3 on page 10.

⚠ WARNING



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 Instructions**, page 31. After the first day of operation, retorque the fasteners. Although pump use varies, a general guideline is to retorque fasteners every two months.

Tips to Reduce Cavitation

Cavitation in a diaphragm pump is the formation and collapse of bubbles in the pumped liquid. Frequent or excessive cavitation can cause serious damage, including pitting and early wear of fluid chambers, balls, and seats. It may result in reduced efficiency of the pump. Cavitation damage and reduced efficiency both result in increased operating costs.

Cavitation depends on the vapor pressure of the pumped liquid, the system suction pressure, and the velocity pressure. It can be reduced by changing any of these factors.

1. Reduce vapor pressure: Decrease the temperature of the pumped liquid.
2. Increase suction pressure:
 - a. Lower the installed position of the pump relative to the liquid level in the supply.
 - b. Reduce the friction length of the suction piping. Remember that fittings add friction length to the piping. Reduce the number of fittings to reduce the friction length.
 - c. Increase the size of the suction piping.
NOTE: Be sure the inlet fluid pressure does not exceed 25 % of the outlet working pressure.
3. Reduce liquid velocity: Slow the cyclic rate of the pump.


Pumped liquid viscosity is also very important but normally is controlled by factors that are process dependent and cannot be changed to reduce cavitation. Viscous liquids are more difficult to pump and more prone to cavitation.

Graco recommends taking all the above factors into account in system design. To maintain pump efficiency, supply only enough air pressure to the pump to achieve the required flow.

Graco distributors can supply site specific suggestions to improve pump performance and reduce operating costs.

Grounding

⚠ WARNING



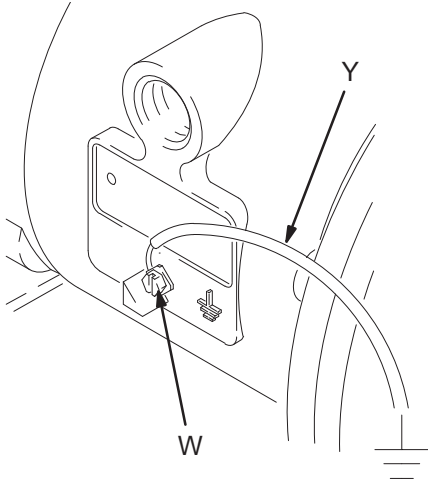
FIRE AND EXPLOSION HAZARD

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:**

Installation

- **Pump:** Connect a ground wire and clamp as shown in FIG. 1. Loosen the grounding screw (W). Insert one end of a 12 ga (1.5 mm²) 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. 222011 Ground Wire and Clamp.



02646B

FIG. 1

- **Air and fluid hoses:** Use only grounded hoses with a maximum of 500 ft (150 m) combined hose length to ensure grounding continuity.
- **Air compressor:** Follow the manufacturer's recommendations.
- **All solvent pails used when flushing:** Follow the 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.

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 11.

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 236452 is available to reduce noise and vibration 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 1/2 in. (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.

Installation

Installation of Remote Pilot Air Lines

1. Refer to Parts Drawing. Connect air line to pump as in preceding steps.
2. Connect 1/4 in. O.D. tubing to push type connectors (14) on air motor of pump.

NOTE: by replacing the push type connectors, other sizes or types of fittings may be used. The new fittings will require 1/8 in. npt threads.

3. Connect remaining ends of tubes to external air signal, such as Graco's Cycleflo (P/N 195264) or Cycleflo II (P/N195265) controllers.

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

1. **Use grounded fluid hoses (G).** The pump fluid inlet (R) is 1-1/2 in. npt(f). 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 15 psi (0.1 MPa, 1 bar), diaphragm life will be shortened.
4. See the **Technical Data** on page 35 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.

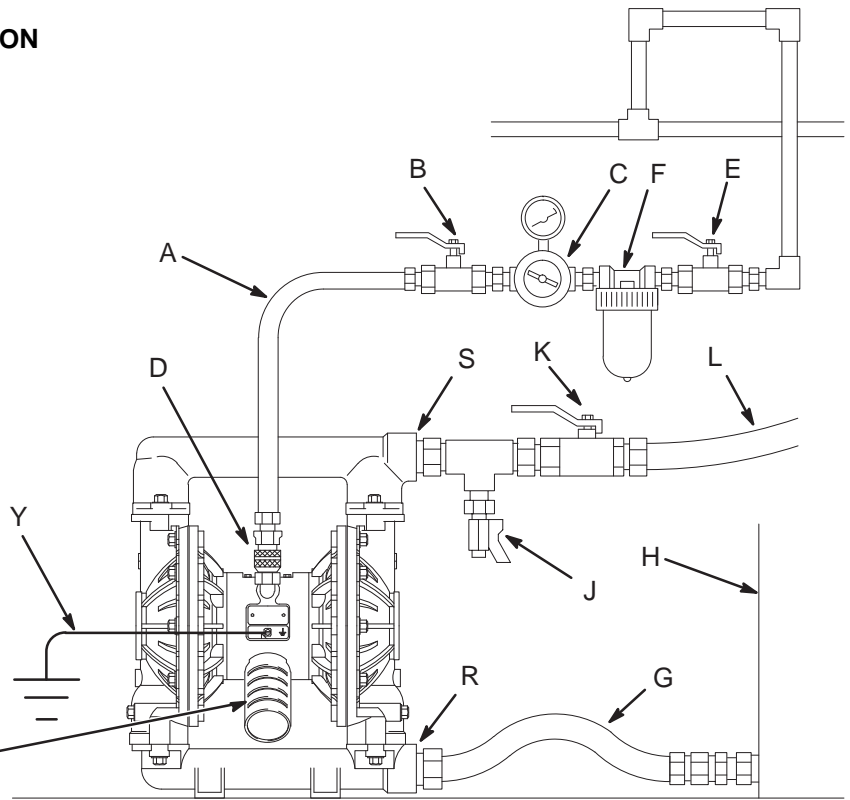
1. **Use grounded fluid hoses (L).** The pump fluid outlet (S) is 1-1/2 in. npt(f). Screw the fluid fitting into the pump outlet securely.
2. Install a fluid drain valve (J) near the fluid outlet. See the **WARNING** above.
3. Install a shutoff valve (K) in the fluid outlet line.

TYPICAL FLOOR-MOUNT 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 Fluid inlet port
- S Fluid outlet port
- Y Ground wire (required; see page 5 for installation instructions)

Muffler not included
on Model No. 253485



03265B

FIG. 2

Installation

Changing the Orientation of the Fluid Inlet and Outlet Ports

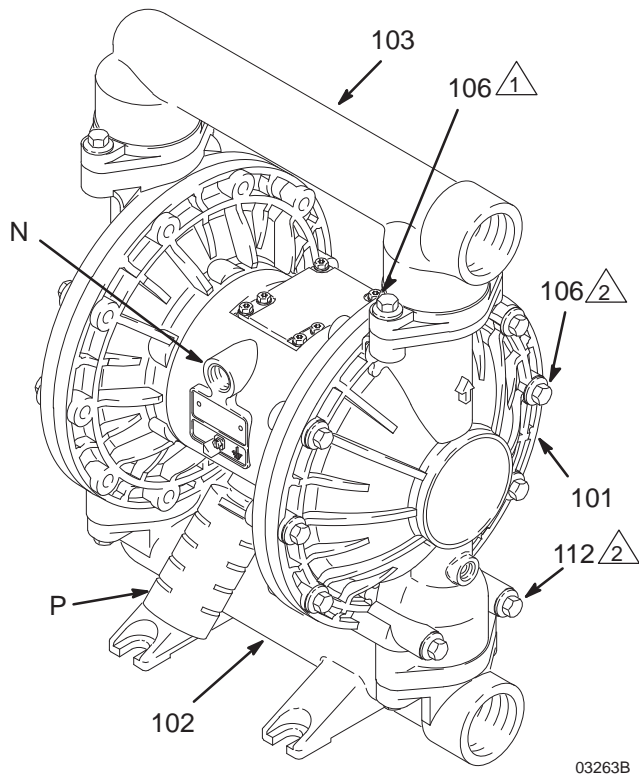
NOTE: Remove and rotate the center manifold(s) to change the orientation of inlet or outlet port(s). Follow the **Torque Instructions**, page 31.

KEY

▲ Apply medium-strength (blue) thread locker to the threads. See **Torque Instructions**, page 31.

▲ Apply medium-strength (blue) thread locker to the threads. See **Torque Instructions**, page 31.

N	1/2 in. npt(f) air inlet port	101	Covers
P	Muffler. (Not included on Model No. 253485)	102	Fluid inlet manifold
		103	Fluid outlet manifold
		106	Manifold and cover screws
		112	Bottom cover screws



Aluminum Model Shown

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 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 Husky 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 1.5 in. npt(f) fluid inlet port

S 1.5 in. npt(f) fluid outlet port

V Pressure relief valve (Order Part No. 112119 for stainless steel pumps)

▲1 Install valve between fluid inlet and outlet ports.

▲2 Connect fluid inlet line here.

▲3 Connect fluid outlet line here.

▲4 Muffler not included on Model No. 253485

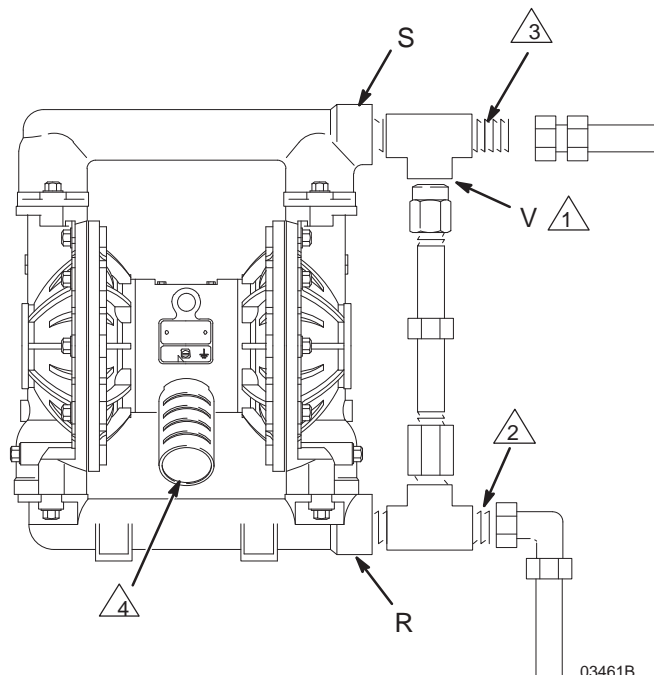


FIG. 4

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.

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 3/4 in. (19 mm) ID. If a hose longer than 15 ft (4.57 m) is required, use a larger diameter hose. Avoid sharp bends or kinks in the hose. See FIG. 4.
3. Place a container (U) at the end of the air exhaust line to catch fluid in case a diaphragm ruptures.

VENTING EXHAUST AIR

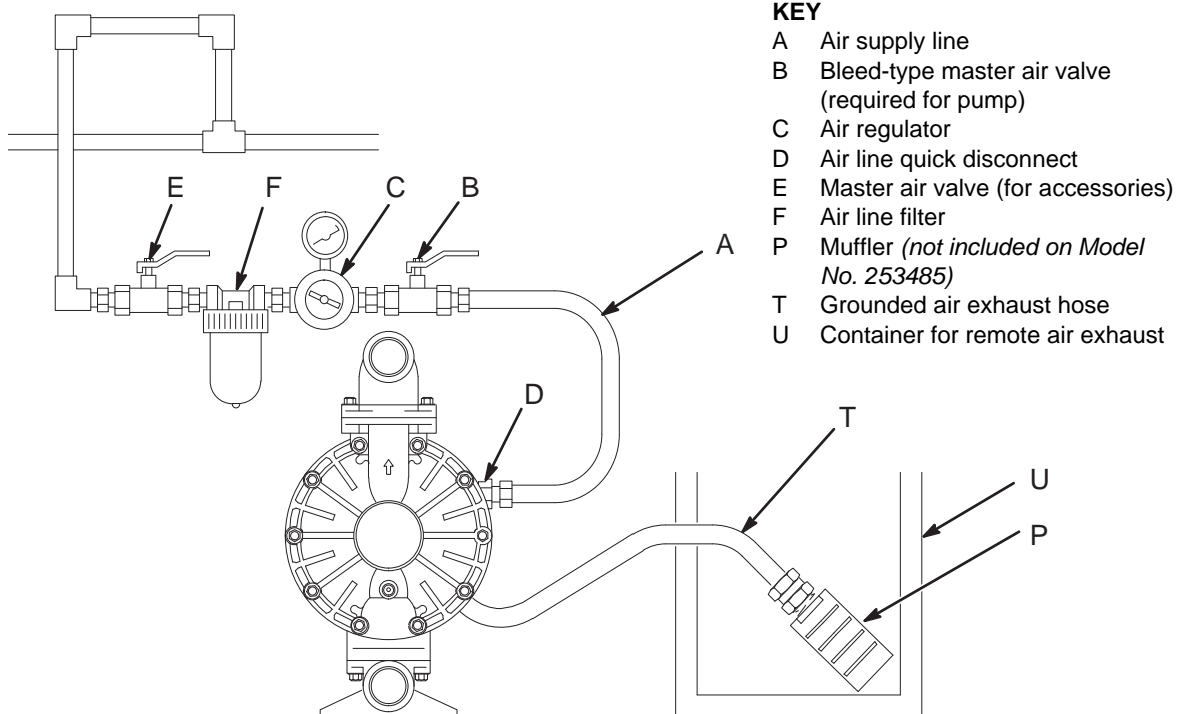


FIG. 5

03267A

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 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

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 **Installation** on page 7.
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.

Operation of Remote Piloted Pumps

1. Follow preceding steps 1 through 7 of **Starting and Adjusting the Pump**.
2. Open air regulator (C).

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 and relieved to push type connectors (14).

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

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.

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 Instructions**, page 31.

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 12.

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.

Troubleshooting

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

- Relieve the pressure before checking or servicing the equipment.
- 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 18.
Pump will not cycle, or cycles once and stops.	Air valve is stuck or dirty.	Disassemble and clean air valve. See pages 16-17. 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 18.
	Check valve ball (301) is wedged into seat (201), due to overpressurization.	Install Pressure Relief Valve (see page 10).
	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 18.
	Diaphragm ruptured.	Replace. See pages 19-21.
	Restricted exhaust.	Remove restriction.
Air bubbles in fluid.	Suction line is loose	Tighten.
	Diaphragm ruptured.	Replace. See pages 19-21.
	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 18.
	Loose diaphragm shaft bolt (107).	Tighten or replace. See pages 19-21.
	Damaged o-ring (108).	Replace. See pages 19-21.

Troubleshooting

PROBLEM	CAUSE	SOLUTION
Fluid in exhaust air.	Diaphragm ruptured.	Replace. See pages 19-21.
	Loose diaphragm shaft bolt (107).	Tighten or replace. See pages 19-21.
	Damaged o-ring (108).	Replace. See pages 19-21.
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 16-17.
	Worn shaft seals (402).	Replace. See pages 19-21.
Pump leaks air externally.	Air valve cover (2) or air valve cover screws (3) are loose.	Tighten screws. See page 17.
	Air valve gasket (4) or air cover gasket (22) is damaged.	Inspect; replace. See pages 16-17, 22-23.
	Air cover screws (25) are loose.	Tighten screws. See pages 22-23.
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 18.

Service

Repairing the Air Valve

Tools Required

- Torque wrench
- Torx (T20) screwdriver or 7 mm (9/32 in.) socket wrench
- Needle-nose pliers
- O-ring pick
- Lithium base grease

NOTE: Air Valve Repair Kits 236273 (aluminum center housing models) and 255061 (sst center housing models) are available. Refer to page 28. 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 12.

1. Relieve the pressure.
2. With a Torx (T20) screwdriver or 7 mm (9/32 in.) 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 (9/32 in.) socket wrench to remove the three screws (3). Remove the valve plate (8■) and, on aluminum center housing models only, 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 22.
7. Clean all parts and inspect for wear or damage. Replace as needed. Reassemble as explained on page 17.

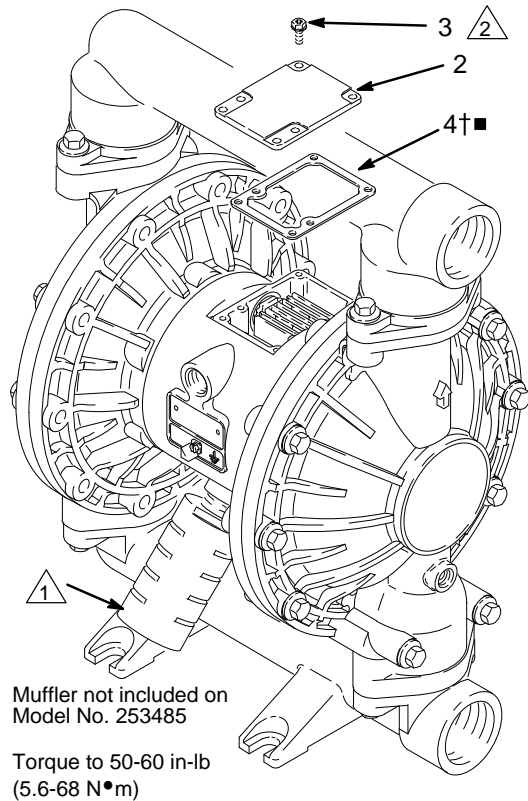


FIG. 6

03268B

- 1 See Detail at right.
- 2 Grease.
- 3 Grease lower face.

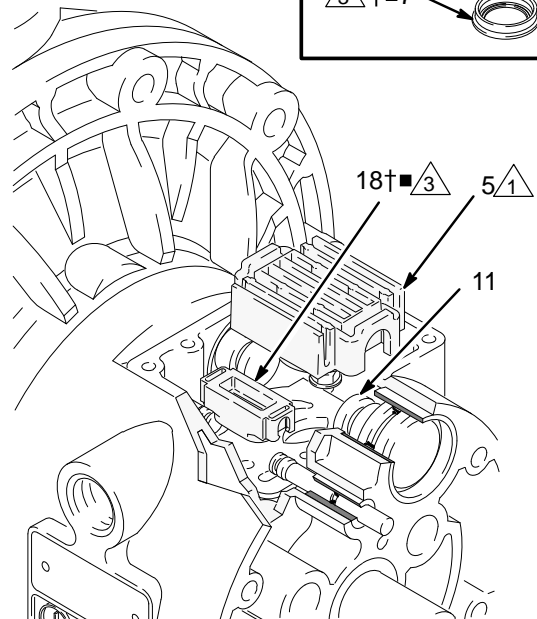
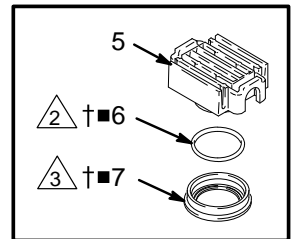


FIG. 7

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Service

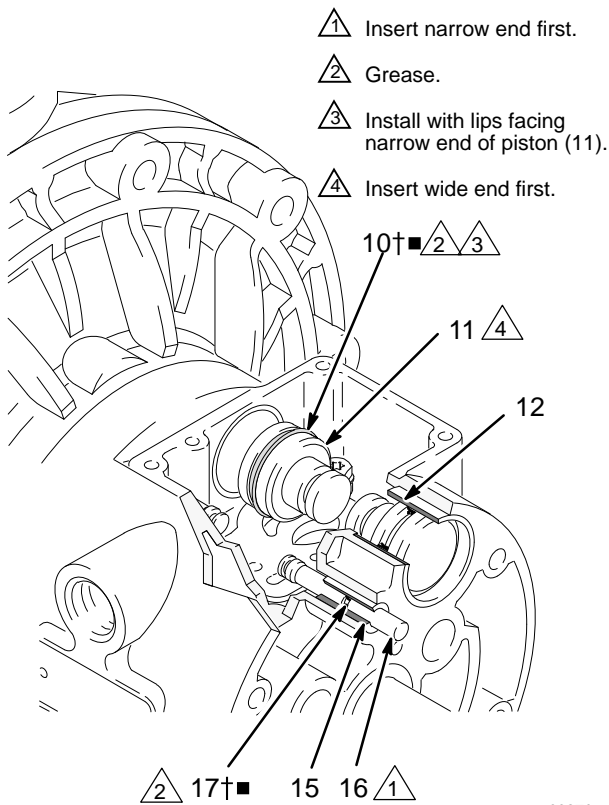


FIG. 8

03270

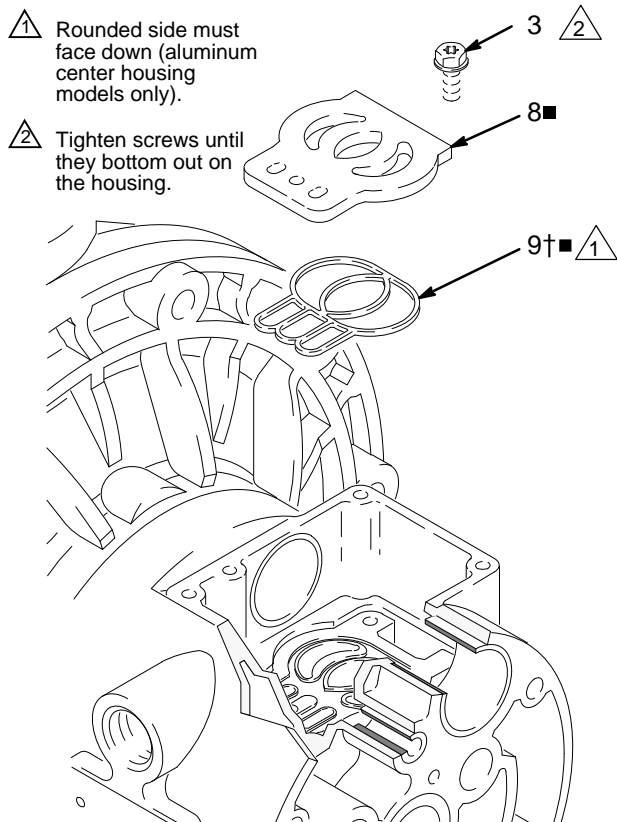


FIG. 9

03271

Reassembly

1. If you removed the bearings (12, 15), install new ones as explained on page 22. 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 (9/32 in.) 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 (9/32 in.) 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 26 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 12.

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).

- ⚠ 1 Apply medium-strength (blue) thread locker to the threads. Torque to 120-150 in-lb (14-17 N•m). See **Torque Instructions**, page 31.
- ⚠ 2 Arrow (A) must point toward outlet manifold (103).
- ⚠ 3 Not used on some models.
- ⚠ 4 Beveled seating surface must face ball (301).

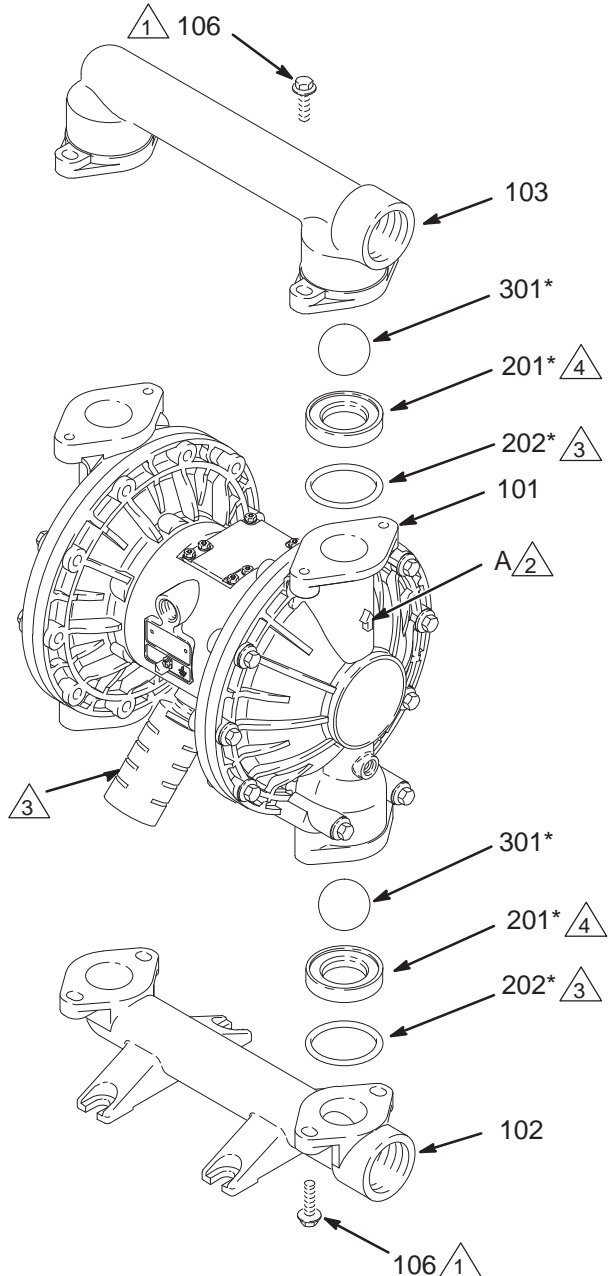


FIG. 10

03272B

Service

Diaphragm Repair

Tools Required

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

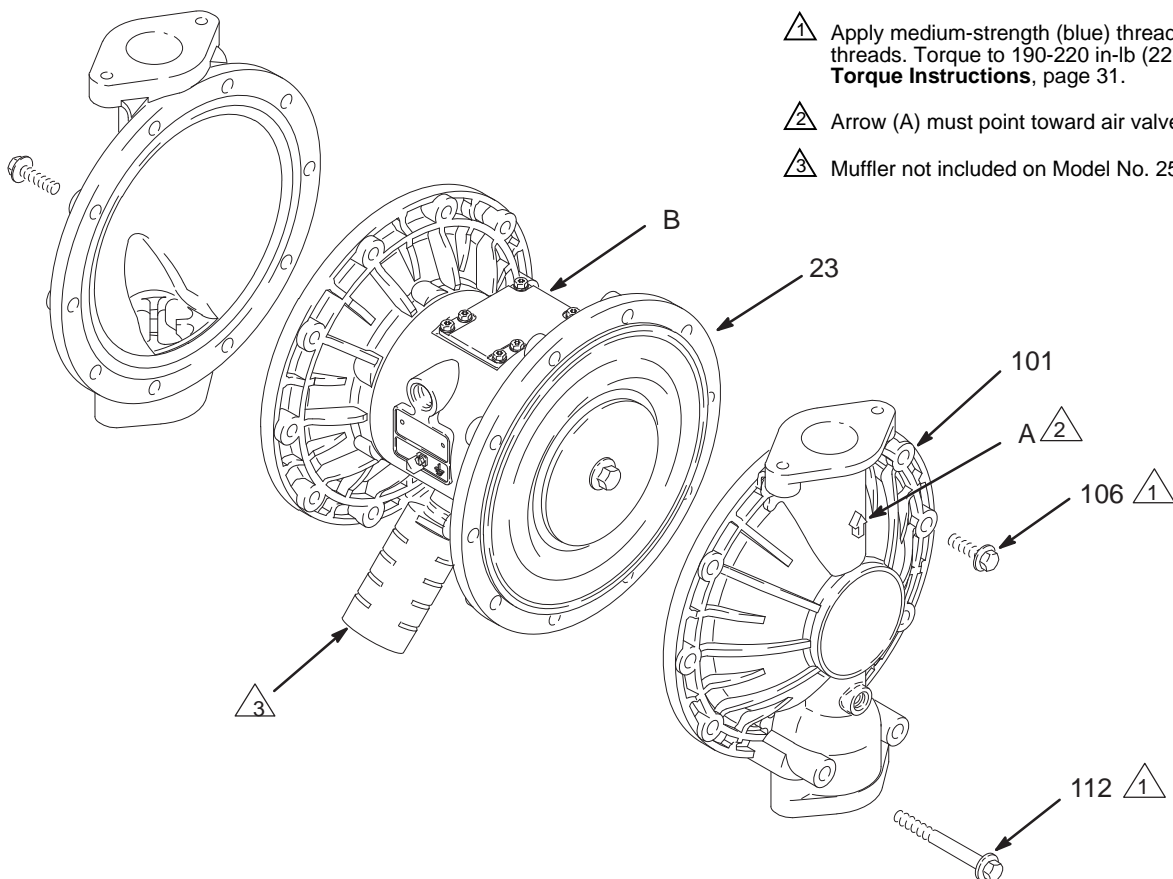
Disassembly

NOTE: A Fluid Section Repair Kit is available. Refer to page 23 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 12.

1. Relieve the pressure.
2. Remove the manifolds and disassemble the ball check valves as explained on page 18.
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.



! Apply medium-strength (blue) thread locker to the threads. Torque to 190-220 in-lb (22-25 N•m). See **Torque Instructions**, page 31.

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

! Muffler not included on Model No. 253485.

FIG. 11

03273C

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. *NOTE: This step does not apply to pumps with overmolded diaphragms.*
 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.

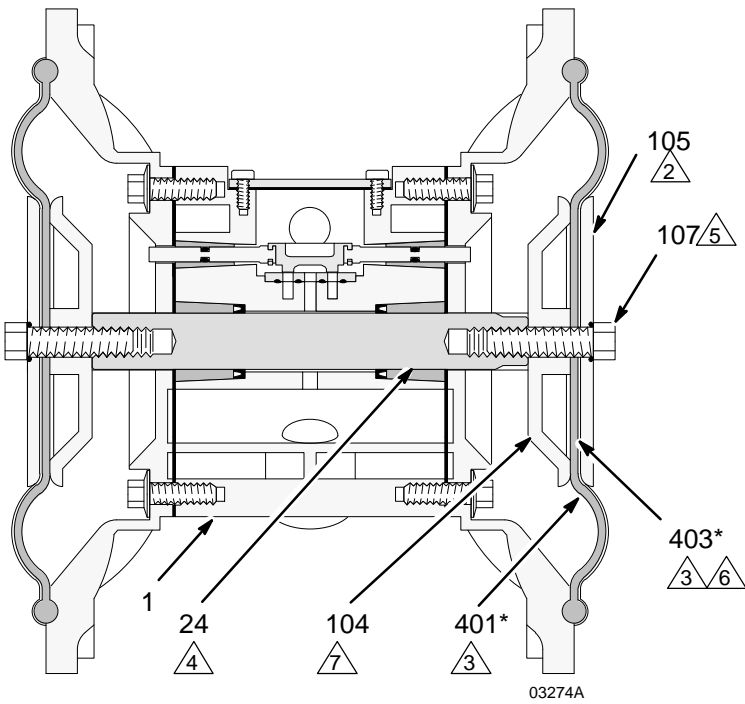
For overmolded diaphragms: Grip both diaphragms securely around the outer edge and rotate counterclockwise. One diaphragm assembly will come free and the other will remain attached to the shaft. Remove the freed diaphragm and air side plate.
 6. Pull the other diaphragm assembly and the diaphragm shaft (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 22.
 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.
- 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 (blue) thread locker to the bolt (107) threads. Screw the bolt (107) into the shaft (24) hand tight.
 - 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) thread locker 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 20-25 ft-lb (27-34 N•m) at 100 rpm maximum. *NOTE: This step does not apply to pumps with overmolded diaphragms.*
 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). Apply medium-strength (blue) thread locker to the threads of screws (106) and (112), and secure the covers with the screws 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 190-220 in-lb (22-25 N•m). See **Torque Instructions**, page 31.
 7. Reassemble the ball check valves and manifolds as explained on page 18.

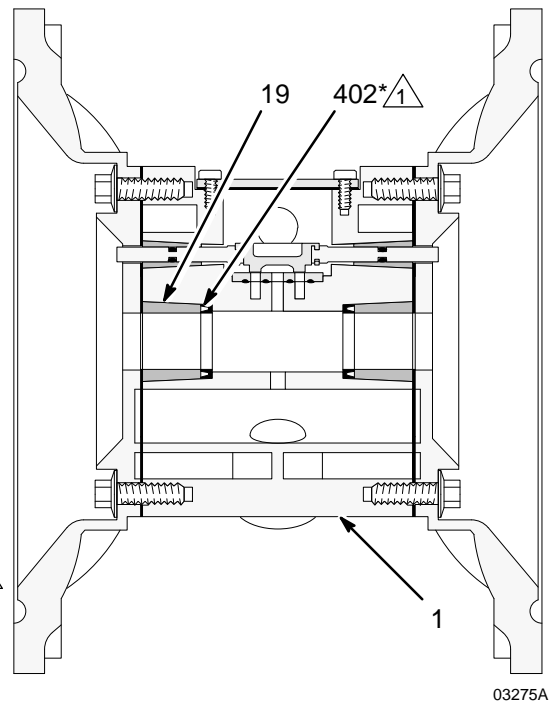
Reassembly

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. *For pumps with overmolded diaphragms, go directly to step g.*

Service



Cutaway View, with Diaphragms in Place



Cutaway View, with Diaphragms Removed

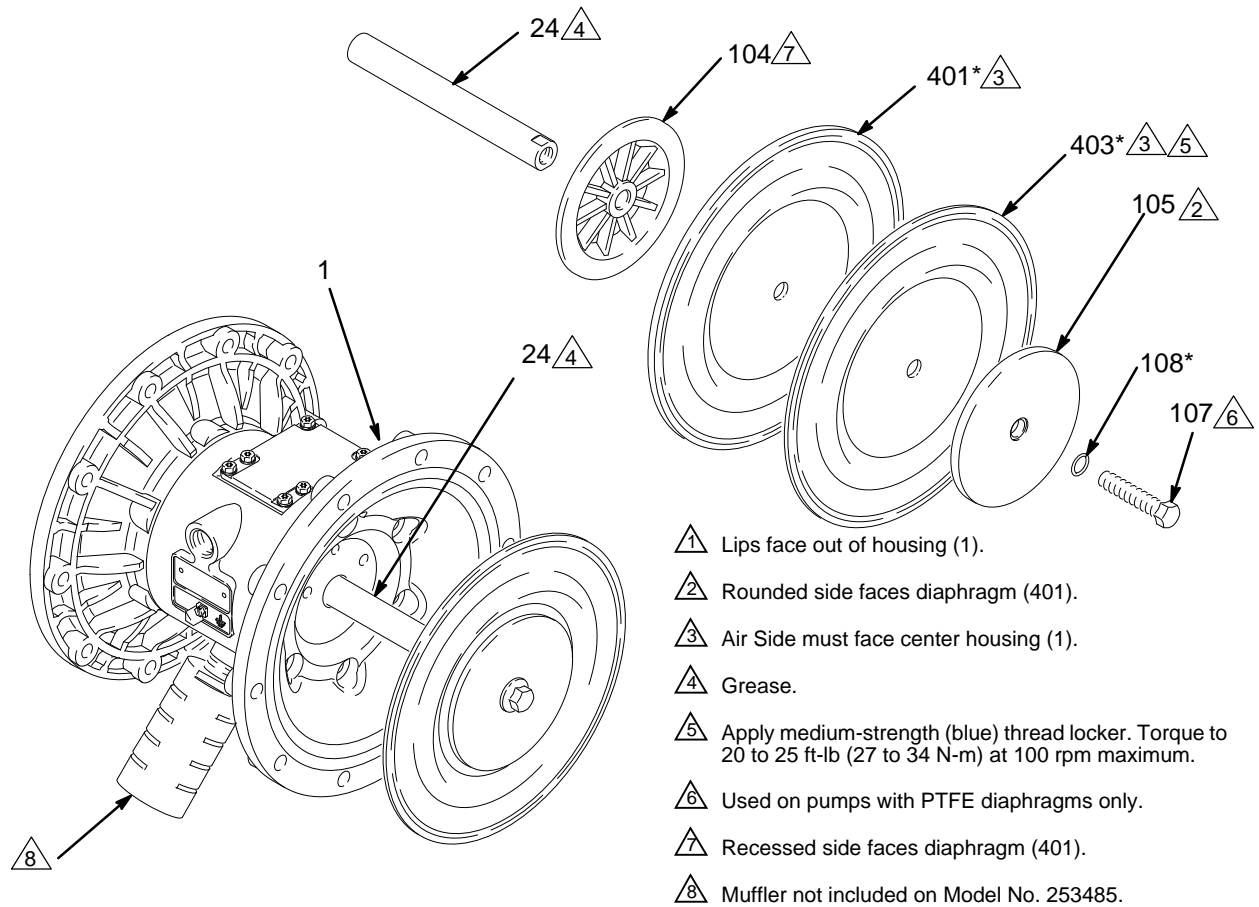


FIG. 12

03276C

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 12.

1. Relieve the pressure.
 2. Remove the manifolds and disassemble the ball check valves as explained on page 18.
 3. Remove the fluid covers and diaphragm assemblies as explained on page 19.
- NOTE:** If you are removing only the diaphragm shaft bearing (19), skip step 4.
4. Disassemble the air valve as explained on page 16.
 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 17.
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. Apply medium-strength (blue) thread locker to the threads of screws (25), and install the screws handtight. See FIG. 13. Using a 10 mm socket wrench, torque the screws oppositely and evenly to 130-150 in-lb (15-17 N•m).
6. Install the diaphragm assemblies and fluid covers as explained on page 19.
7. Reassemble the ball check valves and manifolds as explained on page 18.

Service

- 1 Insert bearings tapered end first.
- 2 Press-fit bearings flush with surface of center housing (1).
- 3 Apply medium-strength (blue) thread locker. Torque to 130-150 in-lb (15-17 N•m).
- 4 Muffler not included on Model No. 253485.

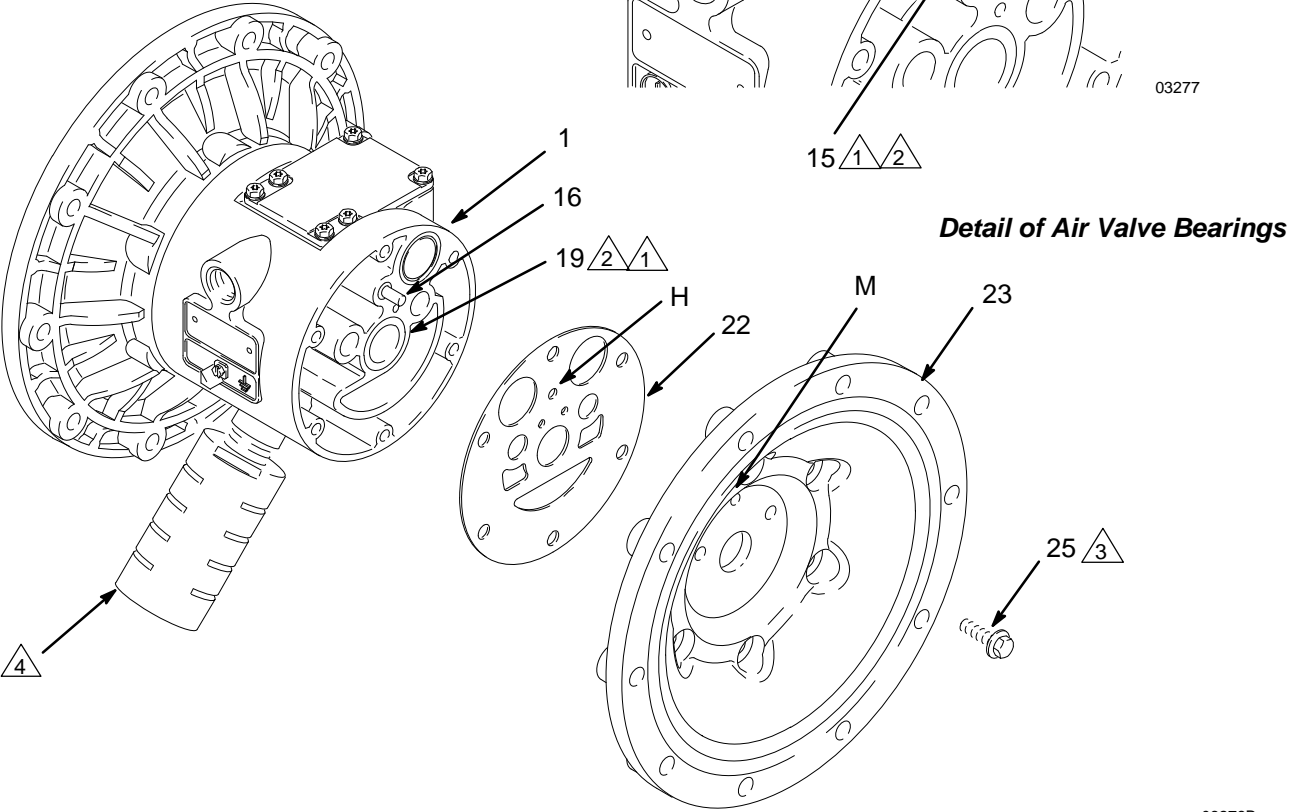
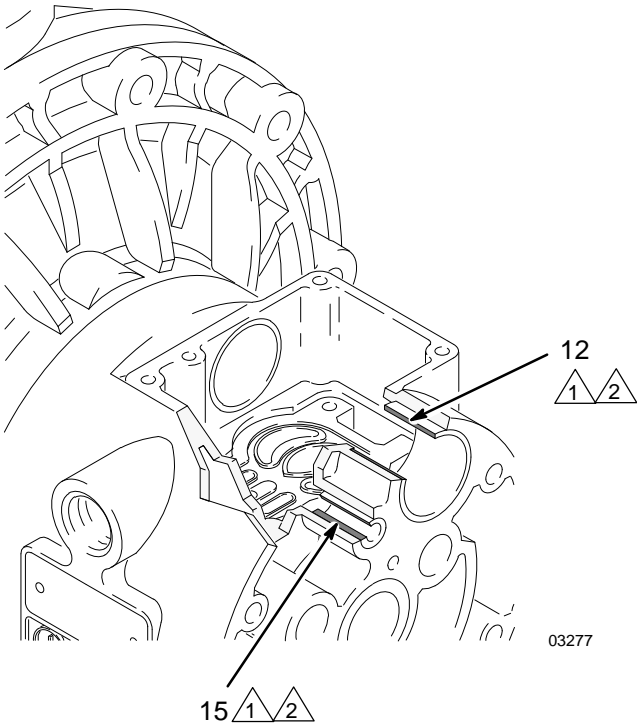


FIG. 13

Pump Matrix

Husky 1590 Aluminum and Stainless Steel Pumps, Series A

Your Model No. is marked on the pump's serial plate. To determine the Model No. of your pump from the following matrix, select the six digits which describe your pump, working from left to right. The first digit is always **D**, designating Husky diaphragm pumps. The remaining five digits define the materials of construction. For example, a pump with an aluminum air motor, aluminum fluid section, polypropylene seats, PTFE balls, and PTFE diaphragms is Model No.

D B 3 9 1 1. The same model with EN 10204 Type 3.1 certification would be DB3911C31. To order replacement parts, refer to the part lists on pages 27-28. *The digits in the matrix do not correspond to the ref. nos. in the parts drawing and lists.*

Diaphragm pump	Air Motor	Fluid Section	-	Seats	Balls	Diaphragms
232502*	aluminum	aluminum	-	TPE	acetal	TPE
253485*	aluminum	aluminum	-	Buna-N	Buna-N	Buna-N
25C654	sst	sst	-	sst	PTFE	PTFE/EPDM Overmolded
25C655	aluminum	sst	-	sst	PTFE	PTFE/EPDM Overmolded
25C656	sst	sst	-	sst	PTFE	PTFE/EPDM Overmolded
25C657	aluminum	sst	-	sst	PTFE	PTFE/EPDM Overmolded
D (for all pumps)	B aluminum (standard)	1 (not used)	-	1 (not used)	1 (PTFE)	1 (PTFE/polychloroprene)
		2 (not used)	-	2 (not used)	2 (acetal)	2 (not used)
24B780*	C aluminum (remote)	3 (aluminum)	-	3 (316 sst)	3 (not used)	3 (not used)
		4 (sst)	-	4 (17-4 PH sst)	4 (440C sst)	4 (not used)
24B781*	T sst (standard)	5 (not used)	-	5 (TPE)	5 (TPE)	5 (TPE)
		7 (sst 3.1 Cert.)	-	6 (Santoprene®)	6 (Santoprene®)	6 (Santoprene®)
24G411*	U sst (remote)	8 (sst 3.1 Adv. Cert.)	-	7 (Buna-N)	7 (Buna-N)	7 (Buna-N)
-			8 (Fluoroelastomer)	8 (Fluoroelastomer)	8 (Fluoroelastomer)	
26C239*		C (aluminum BSPT)	-	9 (polypropylene)	9 (not used)	9 (not used)
		D (sst BSPT)	-	A (PVDF)	A (not used)	A (not used)
		P (sst vertical center flange)	-	G (Geolast®)	G (Geolast®)	B (PTFE/Santoprene)
		R (sst horiz. center flange)	-			G (Geolast®)
						N (polychloroprene)

246451 Stainless Steel Air Motor Conversion Kit

Use kit 246451 and refer to manual 309643 (included with kit) to convert from aluminum air motor to stainless steel air motor.

*** 232502, Aluminum 1590 Pump, Series D**

Model No. 232502 is a private-label aluminum 1590 pump. This pump is the same as Model No. DB3525 except for the label and:

Ref. Nos. 10 and 402 are 115666 Packing, U-cup, Fluoroelastomer

Ref. No. 17 is 168518 O-ring, Fluoroelastomer

Use 243492 as the Air Valve Repair Kit

Ref. 106 is 112416 SCREW, SST; M10 x 1.5; 30 mm

Ref. 112 is 112417 SCREW, SST; M10 x 1.5; 90 mm

*** 253485, Aluminum 1590 Pump, Series A**

Model No. 253485 is an aluminum 1590 pump. This pump is the same as Model No. DB3777 except for the label and that 253485 does not include Ref. No. 111 Muffler.

*** 24B780 Stainless Steel Plus Pump**

This pump is the same as Model DT4311 except for the serial plate and parts listed in the chart below.

*** 24B781 Stainless Steel Pump**

This pump is the same as Model DB4311 except for the serial plate and parts listed in the chart below.

*** 24G411 Aluminum Pump**

This pump is the same as Model DBC311 except for the serial plate and parts listed in the chart below.

*** 24J358 Aluminum Pump**

This pump is the same as Model DB3311 except for the serial plate and parts listed in the chart below.

*** 24J359 Aluminum Pump**

This pump is the same as Model DB3321 except for the serial plate and parts listed in the chart below.

*** 25A017 Aluminum Pump**

This pump is the same as Model DB3341 except for the serial plate and parts listed in the chart below.

*** 25C654 Stainless Steel Pump**

This pump is the same as Model DTR315 except for the serial plate and parts listed in the chart below.

*** 25C655 Stainless Steel Pump**

This pump is the same as Model DBR315 except for the serial plate and parts listed in the chart below.

*** 25C656 Stainless Steel Pump**

This pump is the same as Model DTP315 except for the serial plate and parts listed in the chart below.

*** 25C657 Stainless Steel Pump**

This pump is the same as Model DBP315 except for the serial plate and parts listed in the chart below.

*** 26C239, Aluminum Pump**

This pump is the same as Model DB3321 except that the fluid side diaphragm plates are SST.

Ref. No.	Part No.	Description	Qty.
104	15H810	PLATE, air side; alum.	2
105	—	not used	0
107	—	not used	0
108	—	not used	0
401	253627	DIAPHRAGM, HD, overmolded; PTFE/EPDM	2

Repair Kit Matrix

For Husky 1590 Aluminum and Stainless Steel Pumps, Series A

Repair Kits may be ordered separately. To repair the air valve, order **Part No. 236273** for aluminum center housing models or **Part No. 255061** for stainless steel center housing models (see page 29). Parts included in the Air Valve Repair Kit are marked with a symbol in the parts list, for example (3).

To repair your pump, select the six digits which describe your pump from the following matrix, working from left to right. The first digit is always **D**, the second digit is always **0** (zero), and the third is always **B**. The remaining three digits define the materials of construction. Parts included in the kit are marked with an asterisk in the parts list, for example (201*). For example, if your pump has polypropylene seats, PTFE balls, and PTFE diaphragms, order Repair Kit **D 0 B 9 1 1**. If you only need to repair certain parts (for example, the diaphragms), use the 0 (null) digits for the seats and balls, and order Repair Kit **D 0 B 0 0 1**. *The digits in the matrix do not correspond to the ref. nos. in the parts drawing and lists on pages 27-28.*

Diaphragm pump	Null	Shaft O-ring	-	Seats	Balls	Diaphragms	
D (for all pumps)	0 (for all pumps)	B (PTFE)	-	0 (null)	0 (null)	0 (null)	
				-	1 (not used)	1 (PTFE)	1 (PTFE/ polychloroprene)
				-	2 (not used)	2 (acetal)	2 (not used)
				-	3 (316 sst)	3 (not used)	3 (not used)
				-	4 (17-4 PH sst)	4 (440C sst)	4 (not used)
				-	5 (TPE)	5 (TPE)	5 (TPE)
				-	6 (Santoprene®)	6 (Santoprene®)	6 (Santoprene®)
				-	7 (Buna-N)	7 (Buna-N)	7 (Buna-N)
				-	8 (Fluoroelastomer)	8 (Fluoroelastomer)	8 (Fluoroelastomer)
				-	9 (polypropylene)	9 (not used)	9 (not used)
				-	A (PVDF)	A (not used)	A (not used)
				-	G (Geolast®)	G (Geolast®)	B PTFE/Santoprene
						N (polychloroprene)	

Part No. 25P208: Husky 1590 HD Overmolded PTFE/EPDM Diaphragm Repair Kit.

Part No. 289225: Husky 1590 HD Overmolded PTFE/EPDM Diaphragm Repair Kit, with new air side diaphragm plates.

Part No. 24F398: Husky 1590 PTFE/Santoprene Backer Diaphragm Repair Kit, for metal pumps.

Parts

Air Motor Parts List (Matrix Column 2)

Digit	Ref. No.	Part No.	Description	Qty
B	1	188838	HOUSING, center; aluminum	1
	2	188854	COVER, air valve; aluminum	1
	3	116344	SCREW, mach, hex flange hd; M5 x 0.8; 12 mm (0.47 in.)	9
	4†■	188618	GASKET, cover; foam	1
	5	188855	CARRIAGE; aluminum	1
	6†■	108730	O-RING; nitrile	
	7†■	188616	BLOCK, air valve; acetal	1
	8	188615	PLATE, air valve; sst	1
	9†■	188617	SEAL, valve plate; buna-N	1
	10†■	112181	PACKING, u-cup; nitrile	2
	11	188612	PISTON, actuator; acetal	2
	12	188613	BEARING, piston; acetal	2
	13‡	104765	PLUG, pipe; headless	2
	14‡	115671	FITTING, connector; male	2
	15	188611	BEARING, pin; acetal	2
	16	188610	PIN, pilot; stainless steel	2
	17†■	157628	O-RING; buna-N	2
	18†■	188614	BLOCK, pilot; acetal	1
	19	188609	BEARING, shaft; acetal	2
	20	116343	SCREW, grounding	1
	22	188603	GASKET, air cover; foam	2
	23	189400	COVER, air; aluminum	2
	24	189245	SHAFT, diaphragm; sst	1
	25	115643	SCREW; M8 x 1.25; 25 mm (1 in.), aluminum	12

Digit	Ref. No.	Part No.	Description	Qty
C	Same as B with the following exceptions			
	1	195921	HOUSING, center; remote, aluminum	1
	23	195918	COVER, air; remote	2
T	Same as B with the following exceptions			
	1	15K009	HOUSING, center; stainless steel	1
	2	15K696	COVER, air valve; stainless steel	1
	8■	15H178	PLATE, air valve; stainless steel	1
	9	-	-	-
	23	15A739	COVER, air; stainless steel	2
	25	112178	SCREW; M8 x 1.25; 25 mm (1 in.), stainless steel	12
U	Same as B with the following exceptions			
	1	15K011	HOUSING, center; remote, stainless steel	1
	2	15K696	COVER, air valve; stainless steel	1
	8■	15H178	PLATE, air valve; stainless steel	1
	9	-	-	-
	23	15B795	COVER, air; remote, stainless steel	2
	25	112178	SCREW; M8 x 1.25; 25 mm (1 in.), stainless steel	12

Parts

Fluid Section Parts List (Matrix Column 3)

Digit	Ref. No.	Part No.	Description	Qty
3	101	15A615	COVER, fluid; aluminum	2
	102	189402	MANIFOLD, inlet; aluminum	1
	103	15A616	MANIFOLD, outlet; aluminum	1
	104	15K448	PLATE, air side; aluminum	2
	105	262026 189309	PLATE, fluid side; carbon steel sst	2
	106	115644	SCREW; M10 x 1.25; 35 mm (1.38 in.)	24
	107	189410	BOLT; M12 x 1.75; 55 mm (2.17 in.); 316 sst	2
	108*	104319	O-RING; PTFE	2
	110▲	188970	LABEL, warning	1
	111	102656	MUFFLER (<i>not used on Model No. 253485</i>)	1
	112	115645	SCREW; M10 x 1.50; 90 mm (3.54 in.)	4
	4	101	194169	COVER, fluid; sst
102		194170	MANIFOLD, inlet; sst	1
103		194221	MANIFOLD, outlet; sst	1
104		15K448	PLATE, air side; aluminum	2
105		189309	PLATE, fluid side; sst	2
106		112416	SCREW; M10 x 1.25; 30 mm (1.18 in.); sst	24
107		189410	BOLT; M12 x 1.75; 55 mm (2.17 in.); 316 sst	2
108*		104319	O-RING; PTFE	2
110▲		188621	LABEL, warning	1
111		102656	MUFFLER	1
112		112417	SCREW; M10 x 1.50; 90 mm (3.54 in.); sst	4
7		Same as 4 and includes certification		
8				

Digit	Ref. No.	Part No.	Description	Qty
C	101	15A615	COVER, fluid; aluminum	2
	102	192078	MANIFOLD, inlet; aluminum; BSPT	1
	103	15A658	MANIFOLD, outlet; aluminum; BSPT	1
	104	15K448	PLATE, air side; aluminum	2
	105	262026	PLATE, fluid side; carbon steel	2
	106	115644	SCREW; M10 x 1.25; 35 mm (1.38 in.)	24
	107	189410	BOLT; M12 x 1.75; 55 mm (2.17 in.); 316 sst	2
	108*	104319	O-RING; PTFE	2
	110▲	188970	LABEL, warning	1
	111	102656	MUFFLER	1
	112	115645	SCREW; M10 x 1.50; 90 mm (3.54 in.)	4
	D	101	194169	COVER, fluid; sst
102		195574	MANIFOLD, inlet; sst; BSPT	1
103		195575	MANIFOLD, outlet; sst; BSPT	1
104		15K448	PLATE, air side; aluminum	2
105		189309	PLATE, fluid side; sst	2
106		112416	SCREW; M10 x 1.25; 30 mm (1.18 in.); sst	24
107		189410	BOLT; M12 x 1.75; 55 mm (2.17 in.); 316 sst	2
108*		104319	O-RING; PTFE	2
110▲		188621	LABEL, warning	1
111		102656	MUFFLER	1
112		112417	SCREW; M10 x 1.50; 90 mm (3.54 in.); sst	4
113		114862	NUT, hex, M10, fhn	8
P		Same as D with the following exceptions		
	102	17N132	MANIFOLD, inlet, sst	1
	103	17N154	MANIFOLD, outlet, sst, vertical	1
R	Same as D with the following exceptions			
	102	17N132	MANIFOLD, inlet, sst	1
	103	17N133	MANIFOLD, outlet, sst, horizontal	1

Parts

Seat Parts List (Matrix Column 4)

Digit	Ref. No.	Part No.	Description	Qty.
3	201*	D0BB00	SEAT; 316 stainless steel, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
4	201*	D0B400	SEAT; 17-4 stainless steel, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
5	201*	D0B500	SEAT; TPE, pkg. of 4	1
	202	None	Not Used	0
6	201*	D0B600	SEAT; Santoprene, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
7	201*	D0B700	SEAT; Buna-N, pkg. of 4	1
	202*	None	Not Used	0
8	201*	D0B800	SEAT; Fluoroelastomer, pkg. of 4	1
	202*	None	Not Used	0
9	201*	D0B900	SEAT; polypropylene, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
A	201*	D0BA00	SEAT; PVDF, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1
G	201*	D0BG00	SEAT; Geolast, pkg. of 4	1
	202*	---	O-RING; PTFE, pkg. of 4	1

--- Not sold separately

Seal/O-ring Parts List

Ref. No.	Part No.	Description	Qty.
202*	26B253	O-RING; PTFE, pkg. of 4	1
202*	26B254	O-RING; Fluoroelastomer, pkg. of 4	1

Ball Parts List (Matrix Column 5)

Digit	Ref. No.	Part No.	Description	Qty.
1	301*	D0B010	BALL; PTFE, pkg. of 4	1
2	301*	D0B020	BALL; acetal, pkg. of 4	1
4	301*	DOB040	BALL; 440C stainless steel, pkg. of 4	1
5	301*	D0B050	BALL; TPE, pkg. of 4	1
6	301*	D0B060	BALL; Santoprene, pkg. of 4	1
7	301*	D0B070	BALL; Buna-N, pkg. of 4	1
8	301*	D0B080	BALL; Fluoroelastomer, pkg. of 4	1
G	301*	D0B0G0	BALL; Geolast, pkg. of 4	1

Diaphragm Parts List (Matrix Column 6)

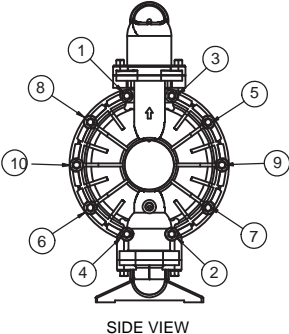
Digit	Ref. No.	Part No.	Description	Qty.
1	401*	Not sold separately	DIAPHRAGM, backup; polychloroprene (CR), pkg. of 2	1
	402*	112181	PACKING, u-cup; nitrile, pkg. of 2	1
	403*	D0B001	DIAPHRAGM; PTFE, pkg. of 2	1
5	401*	D0B005	DIAPHRAGM; TPE, pkg. of 2	1
	402*	112181	PACKING, u-cup; nitrile, pkg. of 2	1
6	401*	D0B006	DIAPHRAGM; Santoprene, pkg. of 2	1
	402*	112181	PACKING, u-cup; nitrile, pkg. of 2	1
7	401*	D0B007	DIAPHRAGM; Buna-N, pkg. of 2	1
	402*	112181	PACKING, u-cup; nitrile, pkg. of 2	1
8	401*	D0B008	DIAPHRAGM; Fluoroelastomer, pkg. of 2	1
	402*	112181	PACKING, u-cup; nitrile, pkg. of 2	1
B	401*	D0B006	DIAPHRAGM, Santoprene, pkg. of 2	1
	402*	112181	PACKING, u-cup; nitrile, pkg. of 2	1
	403*	D0B001	DIAPHRAGM; PTFE, pkg. of 2	1
G	401*	D0B00G	DIAPHRAGM; Geolast, pkg. of 2	1
	402*	112181	PACKING, u-cup; nitrile, pkg. of 2	1
N	401*	25P208	DIAPHRAGM; polychloroprene, pkg. of 2	1
	402*	112181	PACKING, u-cup; nitrile, pkg. of 2	1

* These parts are included in the pump repair kit, purchased separately. See Repair Kit Matrix on page 26 to determine the correct kit for your pump.

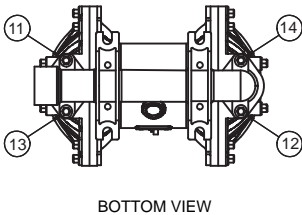
Torque Instructions

Always follow torque sequence when instructed to torque fasteners.

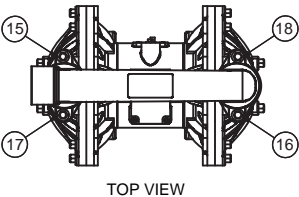
- 1. Left/Right Fluid Covers
Torque bolts to 190-220 in-lb (22-25 N•m).



- 2. Inlet Manifold
Torque bolts to 120-150 in-lb (14-17 N•m).

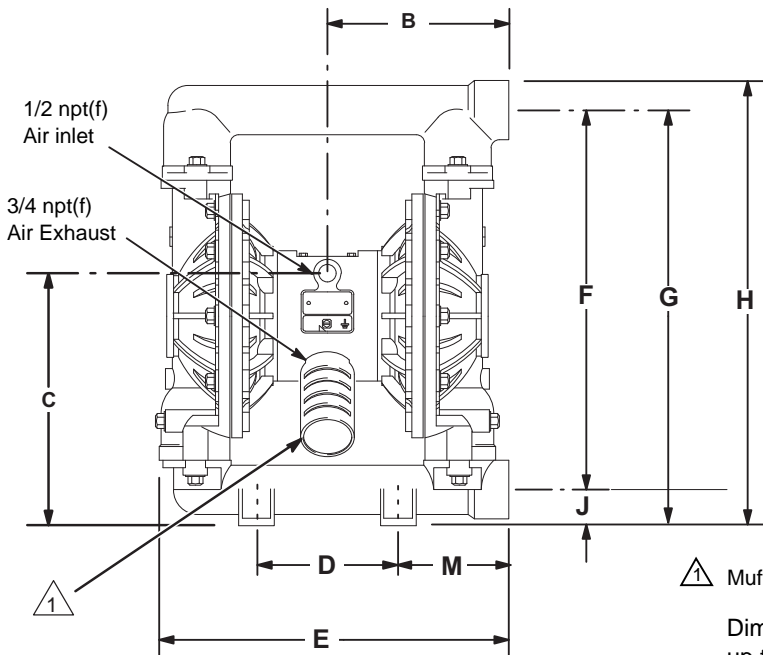


- 3. Outlet Manifold
Torque bolts to 120-150 in-lb (14-17 N•m).

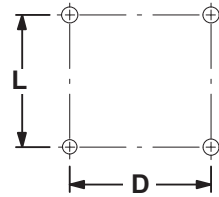


Dimensions

FRONT VIEW



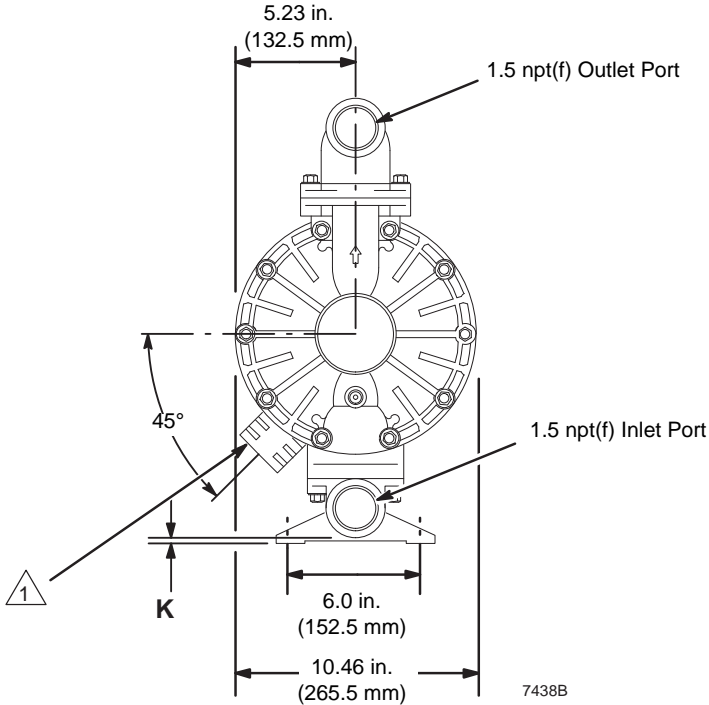
PUMP MOUNTING HOLE PATTERN



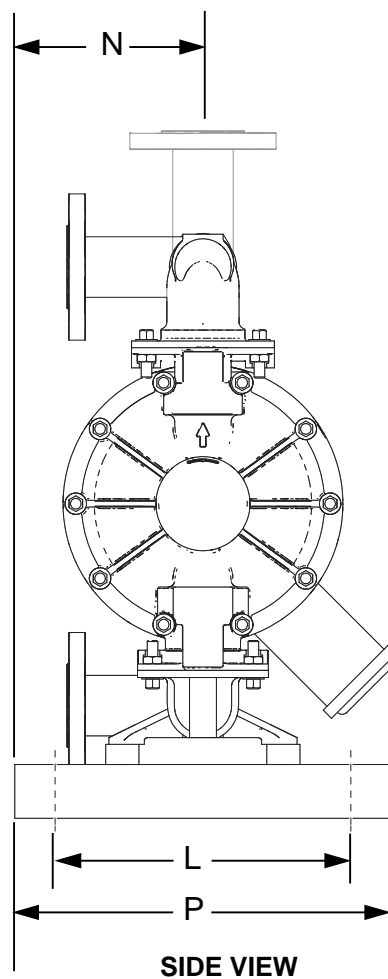
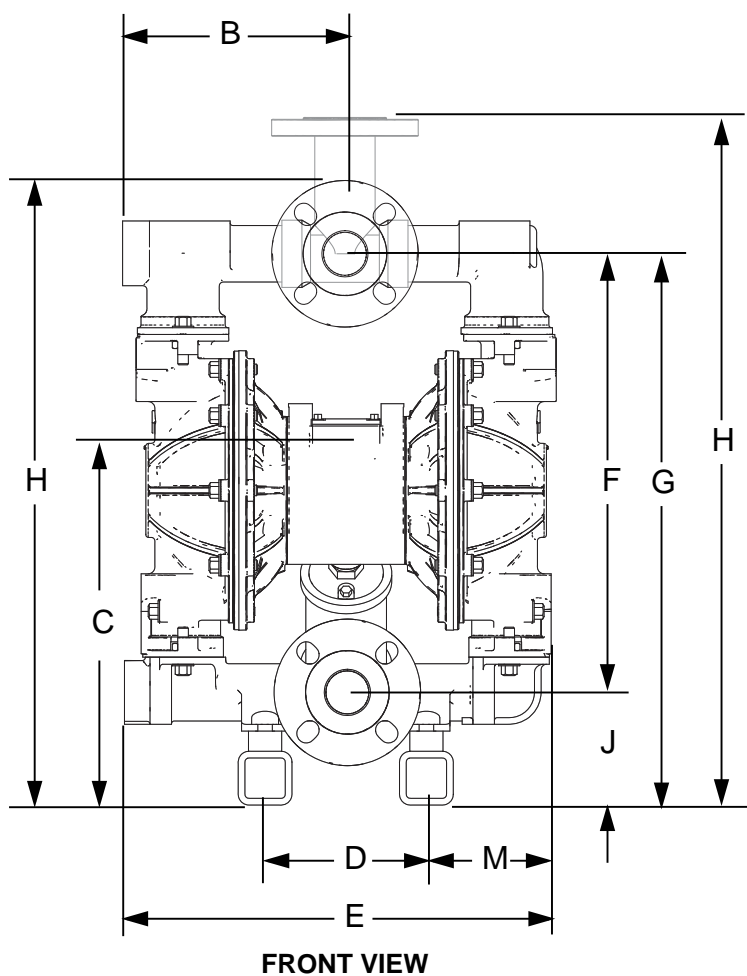
Muffler not included on Model No. 253485.

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.

SIDE VIEW



Pump with Stainless Steel Flanged Manifold Ports



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		Aluminum OR SST Center SST Cover Flanged Manifold Ports		SST Center Aluminum Cover		SST Center SST Cover	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
B	7.7	197	8.3	210	8.4	213	7.7	197	8.3	210
C	10.8	273	10.8	273	13.5	343	10.8	273	10.8	273
D	6.0	152	6.0	152	6.0	152	6.0	152	6.0	152
E	15.9	404	15.9	403	15.9	404	15.9	404	15.9	403
F	16.8	427	16.3	414	16.3	414	16.8	427	16.3	141
G	18.3	465	17.8	451	25.5	648	18.3	465	17.8	451
H	19.6	497	19.0	482	23.2/25.6	589/650	19.6	497	19.0	482
J	1.5	38	1.4	37	4.2	107	1.5	38	1.4	37
K	0.25	6	0.25	6	---	---	0.25	6	0.25	6
L	6.0	152	6.0	152	11.0	279	6.0	152	6.0	152
M	4.8	121	5.2	133	4.6	117	4.8	121	5.2	133
N	---	---	---	---	7.0	178	---	---	---	---
P	---	---	---	---	14.0	356	---	---	---	---

†Dimension H for flanged port manifolds represent both the horizontal and vertical outlet manifold port dimensions.

Technical Data

Maximum fluid working pressure	120 psi (0.8 MPa, 8 bar)
Air pressure operating range	20-120 psi (0.14 -0.8 MPa, 1.4-8 bar)
Maximum air consumption	125 scfm
Air consumption at 70 psi/60 gpm	50 scfm (see chart)
Maximum free-flow delivery	100 gpm (378.5 l/min)
Maximum pump speed	200 cpm
Gallons (Liters) per cycle	0.5 (1.9)
Maximum suction lift	18 ft (5.48 m) wet or dry
Maximum size pumpable solids	3/16 in. (4.8 mm)
* Maximum noise level at 100 psi, full flow	94 dBa
* Sound power level	108 dBa
* Noise level at 70 psi, 50 cycles/min	72 dBa
Air inlet size	0.5 npt(f)
Fluid inlet size	1.5 npt(f)
Fluid outlet size	1.5 npt(f)
Wetted parts	Vary by Model. See pages 24-27.
Non-wetted external parts	aluminum, 302, 316 stainless steel, polyester (labels)
Weight	
Aluminum pumps	.33.5 lb (15.2 kg)
Stainless steel pumps with aluminum center section	71 lb (32.7 kg)
Stainless steel pumps with aluminum center section and flanged port manifolds	96 lb (43.5 kg)
Stainless steel pumps with stainless steel center section	.86 lb (40 kg)
Stainless steel pumps with stainless steel center section and flanged port manifolds	.111lb (50.3 kg)

Geolast[®] is a registered trademarks of the ExxonMobil Chemical Co.

Santoprene[®] is a registered trademarks of the Monsanto Co.

* Noise levels measured with the pump mounted on the floor, using Rubber Foot Kit 236452. Sound power measured per ISO Standard 9216.

Fluid Temperature Range

CAUTION

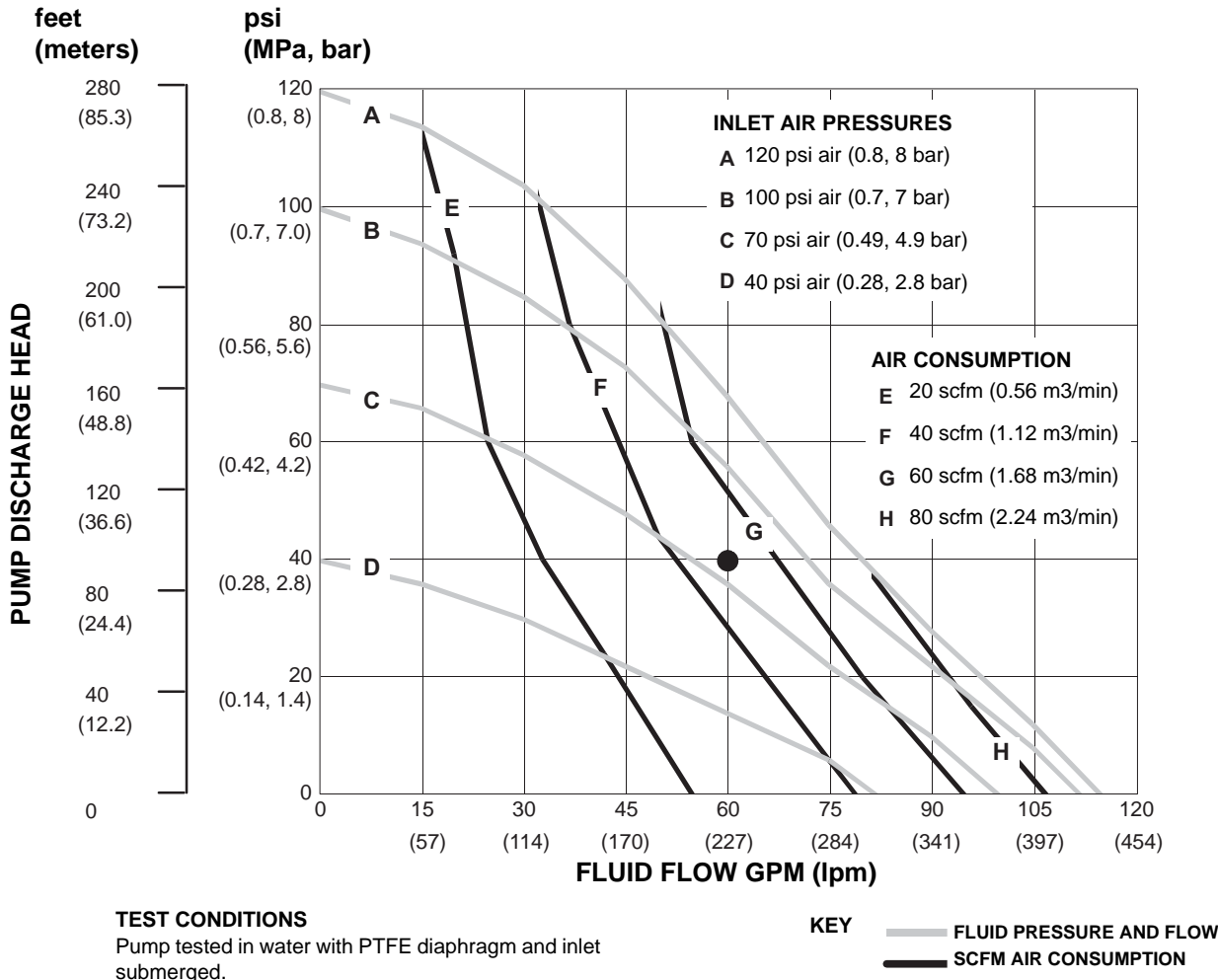
Temperature limits are based on mechanical stress only. Certain chemicals will further limit the fluid temperature range. Stay within the temperature range of the most-restricted wetted component. Operating at a fluid temperature that is too high or too low for the components of your pump may cause equipment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

Diaphragm/Ball/Seat Material	Fluid Temperature Range	
	Fahrenheit	Celsius
Acetal	-20 to 180	-29 to 82
Buna-N	10 to 180	-12 to 82
FKM Fluoroelastomer	-40 to 275	-40 to 135
Geolast	-40 to 180	-40 to 62
Polypropylene	32 to 175	0 to 79
PTFE	-40 to 180	-40 to 82
Santoprene	-40 to 180	-40 to 82
TPE	-20 to 150	-40 to 82
Polychloroprene	14 to 176	-10 to 80

Performance Chart

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

To supply 60 gpm (227 liters) fluid flow (horizontal scale) at 40 psi (0.28 MPa, 2.8 bar) discharge head pressure (vertical scale) requires approximately 50 scfm (1.40 m³/min) air consumption at 70 psi (0.49 MPa, 4.9 bar) inlet air pressure.



California Proposition 65

CALIFORNIA RESIDENTS

⚠ WARNING: Cancer and reproductive harm – www.P65warnings.ca.gov.

Graco Standard Husky Pump Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

FOR GRACO CANADA CUSTOMERS

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Graco Headquarters: Minneapolis

International Offices: Belgium, China, Japan, Korea

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441

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