Instructions - Parts List

SaniForce™ Diaphragm Pumps

1040, 1590, and 2150 Models

311879ZAC

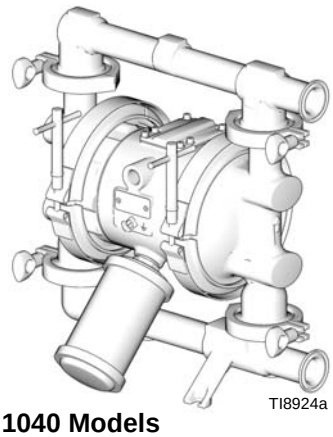
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For use in sanitary applications. For professional use only.

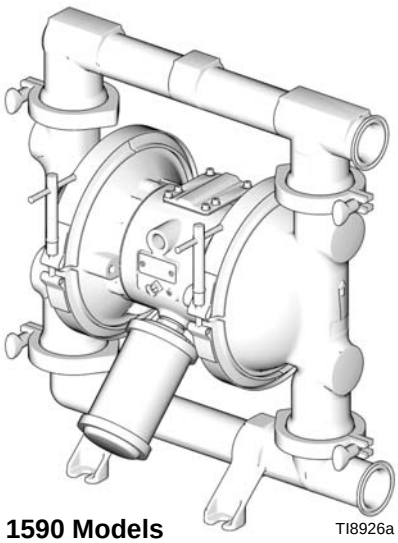
Important Safety Instructions
Read all warnings and instructions in this manual. Save these instructions.

Refer to the appropriate Pump Matrix on page 26, 34, or 42 to determine the model number of your pump. See page 3 for approval information.

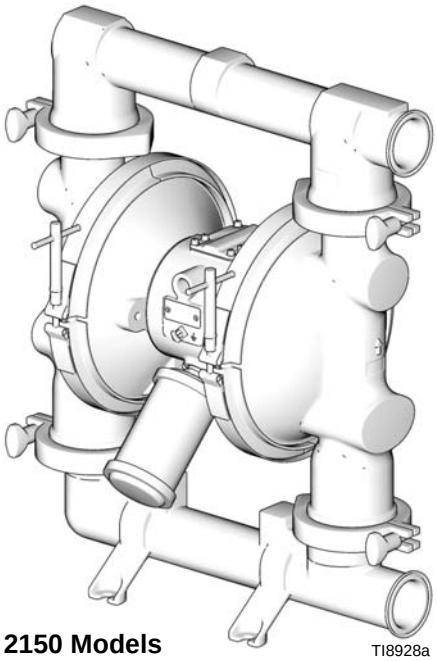
120 psi (0.8 MPa, 8 bar) Maximum Fluid Working Pressure
120 psi (0.8 MPa, 8 bar) Maximum Air Input Pressure


TI8924a

1040 Models


TI8926a

1590 Models


TI8928a

2150 Models

PROVEN QUALITY. LEADING TECHNOLOGY.

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Models

Model	Connections	Description	Approvals
FD1___	**Flange**	1040 AODD Pump	
FD7___	**DIN**		
***FA1___**	**Flange**		
***FA7___**	**DIN**		
FD2___	**Flange**	1590 AODD Pump	
FD8___	**DIN**		
***FA2___**	**Flange**		
***FA8___**	**DIN**		
FD3___	**Flange**	2150 AODD Pump	
FD9___	**DIN**		
***FA3___**	**Flange**		
***FA9___**	**DIN**		
24G743	**Flange**	2150 AODD Pump for Ram Mounting	
24G744	**Flange**		
***FA1111**	**Flange**	1040 AODD Pump	  
***FA7111**	**DIN**		
FD1111	**Flange**		
FD7111	**DIN**		
FD1211	**Flange**		
***FA2111**	**Flange**	1590 AODD Pump	
***FA8111**	**DIN**		
FD2111	**Flange**		
FD2113	**Flange**		
FD8111	**DIN**		
FD2211	**Flange**		
***FA3111**	**Flange**	2150 AODD Pump	
***FA9111**	**DIN**		
FD3111	**Flange**		
FD9111	**DIN**		
FD3211	**Flange**		

** FA pumps have painted aluminum center sections that may exhibit signs of corrosion depending on cleaning solutions used.*

Material Certification

Reference: SaniForce Product Family

Issue Date: November 1, 2011

All fluid contact materials in the SaniForce product family 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. This includes the below product groups:

1. SaniForce 515, 1040, 1590, 2150 Air-Operated Double Diaphragm Pumps
2. SaniForce 1590, 3150 HS Air-0perated Double Diaphragm Pumps
3. SaniForce 1590, 3150 HS 3-A Certified Air-Operated Double Diaphragm Pumps
4. SaniForce 5:1, 6:1 and 12:1 Air-Operated Piston Pumps
5. SaniForce Diaphragm Pump and Piston Pump Drum Unloaders
6. SaniForce Diaphragm Pump and Piston Pump Bin Evacuation Systems

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Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbol refers to procedure-specific risk. When these symbols appear in the body of this manual, refer back to these Warnings. Additional, product-specific warnings may be found throughout the body of this manual where applicable.

WARNING



FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. To help prevent fire and explosion:

- Use equipment only in well ventilated area.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).
- Keep work area free of debris, including solvent, rags and gasoline.
- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.
- Ground all equipment in the work area. See **Grounding** instructions.
- Use only grounded hoses.
- Hold gun firmly to side of grounded pail when triggering into pail.
- If there is static sparking or you feel a shock, **stop operation immediately.** Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.



PRESSURIZED EQUIPMENT HAZARD

Fluid from the gun/dispense valve, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.

- Follow the **Pressure Relief Procedure** when you stop spraying and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.

WARNING




EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Data** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure. Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.




TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read MSDSs to know the specific hazards of the fluids you are using.
- Route exhaust away from work area. If diaphragm ruptures, fluid may be exhausted into the air.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.



BURN HAZARD

Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:

- Do not touch hot fluid or equipment.



PERSONAL PROTECTIVE EQUIPMENT

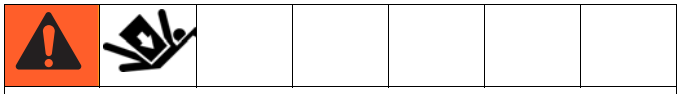
You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

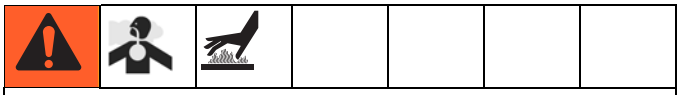
Installation

General Information

- FA pumps have painted aluminum center sections that may exhibit signs of corrosion depending on cleaning solutions used.
- The typical installations shown in Figs. 2-4 are only guides 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.
- Reference numbers and letters in parentheses refer to the callouts in the figures and the parts lists on pages 28-30, 36-38, and 44-46.



The pump is very heavy (see Technical Data on pages 32, 40, and 51 for specific weights). If the pump must be moved, follow the pressure relief procedure on page 12 and have two people to lift the pump by grasping the outlet manifold securely or use appropriate lifting equipment.

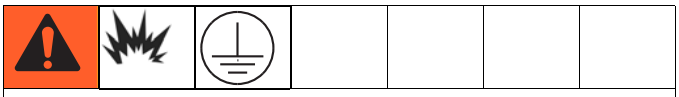


To reduce the risk of serious injury due to burns, insulate and/or label the pump before pumping hot fluids.

Tightening Clamps Before First Use

After you unpack the pump, and before you use it for the first time, check all clamps and tighten as necessary.

Grounding



The equipment must be grounded. Grounding reduces the risk of static and electric shock by providing an escape wire for the electrical current due to static build up or in the event of a short circuit.

- *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. 238909 Ground Wire and Clamp.

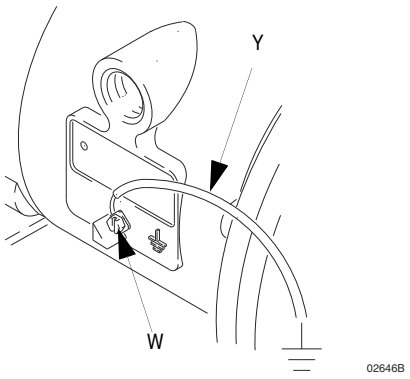


FIG. 1

- *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

NOTICE

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.

- Be sure the mounting surface can support the weight of the pump, hoses, and accessories, as well as the stress caused during operation.
- For all mountings, be sure the pump is bolted directly to the mounting surface.
- 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.

Air Line



A bleed-type master air valve (B) is required in the 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.



In the step below, do not connect the quick-disconnect coupler (D) on the air hose to the mating fitting on the pump until you are ready to operate the pump. Connecting the coupler too early can result in unintentional operation of the pump, leading to serious injury from moving parts, splashing fluid in the eyes or on the skin, and contact with hazardous fluids.

2. Install a grounded, flexible air hose (A) between the accessories and the 1/2 npt(f) pump air inlet (N). See Fig. 5. Use a minimum 3/8 in. (9.5 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.

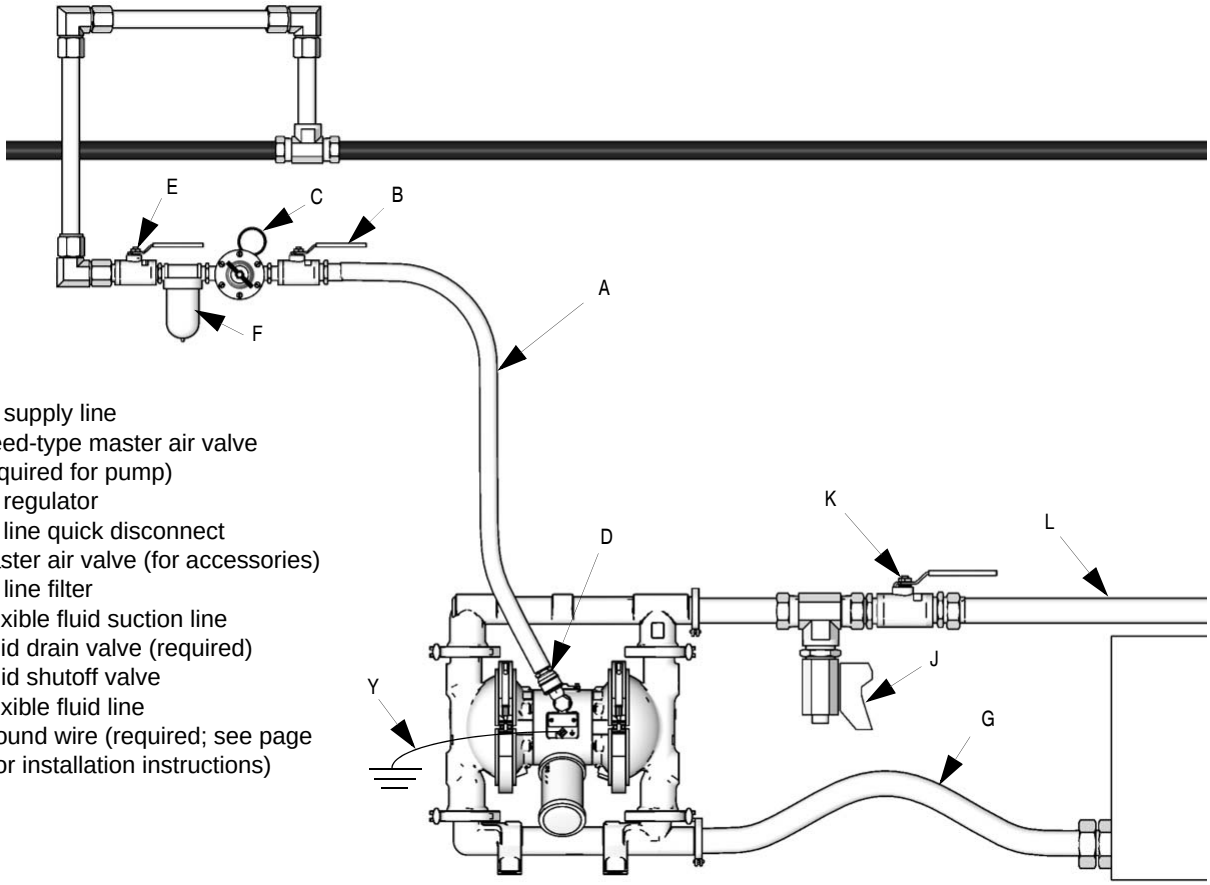
Fluid Suction Line

1. Use flexible, grounded fluid hoses.
2. For best sealing results, use a standard tri-clamp or DIN style sanitary gasket of a flexible material such as EPDM, Buna-N, fluoroelastomer, or silicon.
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 pages 32, 40, and 51 for maximum suction lift (wet and dry).

Fluid Outlet Line

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 flexible grounded fluid hoses (L).
2. For best sealing results, use a standard tri-clamp or DIN style sanitary gasket of a flexible material such as EPDM, Buna-N, fluoroelastomer, or silicon
3. Install a fluid drain valve (J) near the fluid outlet. See the **WARNING** above, and FIG. 2.
4. Install a shutoff valve (K) in the fluid outlet line.



Key:

A Air supply line
B Bleed-type master air valve (required for pump)
C Air regulator
D Air line quick disconnect
E Master air valve (for accessories)
F Air line filter
G Flexible fluid suction line
J Fluid drain valve (required)
K Fluid shutoff valve
L Flexible fluid line
Y Ground wire (required; see page 7 for installation instructions)

FIG. 2 Typical Floor-Mount Installation

Changing the Orientation of the Fluid Inlet and Outlet Ports

The pump is shipped with the ports facing the same direction. To reverse the orientation of the ports:

1. Remove the clamps holding the inlet and/or outlet manifold to the covers.
2. Reverse the manifold and reattach. Install and tighten clamps snugly.

Key:

N 1/2 npt(f) air inlet port
P Muffler (air exhaust port is 3/4 npt(f)
R Fluid inlet port
S Fluid outlet port
113 Manifold clamps
3 Air valve screws

⚠1 Torque to 28-30 in-lb (3.2-3.7 N•m)

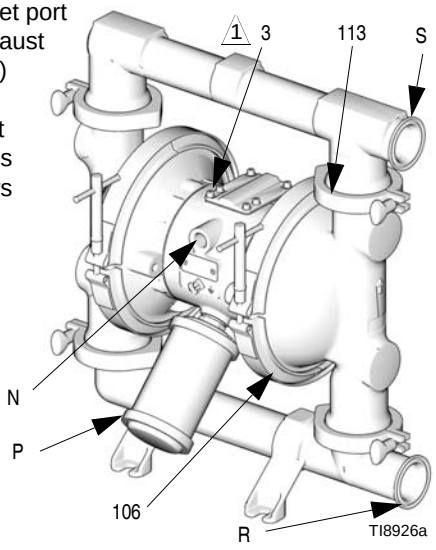


FIG. 3

Air Exhaust Ventilation

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

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. 4.

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

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.
3. Place a container (U) at the end of the air exhaust line to catch fluid in case a diaphragm ruptures. See FIG. 4.

Key:

A Air supply line
B Bleed-type master air valve (required for pump)
C Air regulator
D Air line quick disconnect
E Master air valve (for accessories)
F Air line filter
P Muffler
T Grounded air exhaust hose
U Container for remote air exhaust

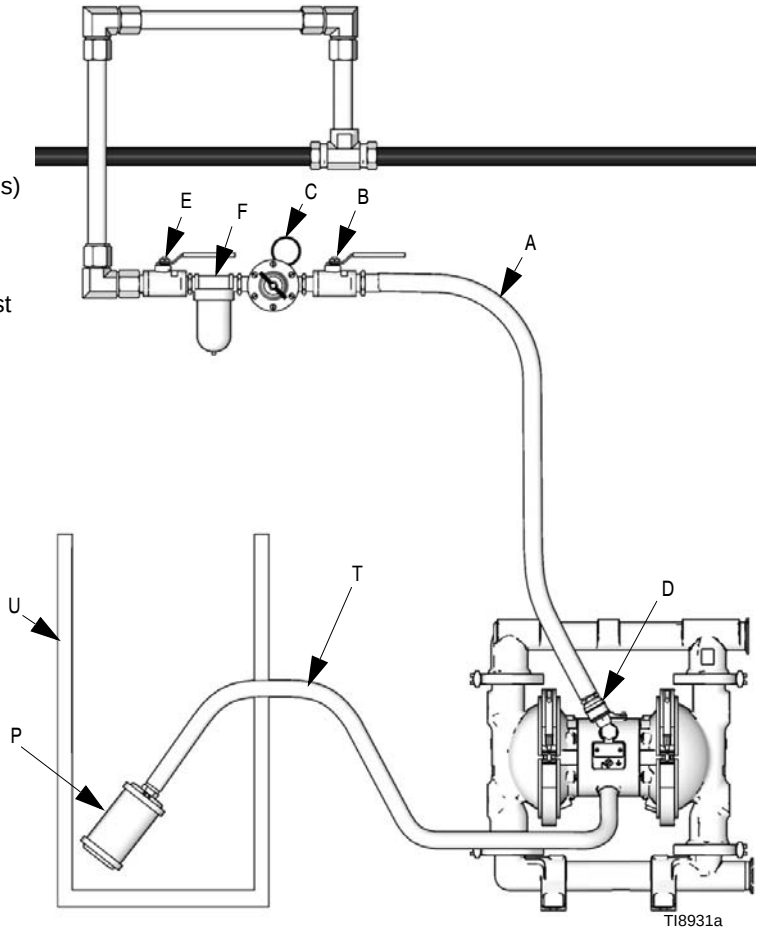


FIG. 4 Venting Exhaust Air

Operation

Pressure Relief Procedure

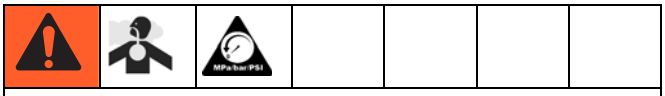


The equipment stays pressurized until pressure is manually relieved. To reduce the risk of serious injury from pressurized fluid or splashing fluid, follow this procedure whenever you stop pumping and before cleaning, checking, or servicing equipment.

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

Sanitize the Pump Before First Use

It is the user's responsibility to properly sanitize the pump before first use. It is up to the user whether this will include disassembling and cleaning individual parts or simply flushing pump with a sanitizing solution. As necessary, follow the steps under **Starting and Adjusting the Pump** below, under the **Service** section on page 16, or under **Flushing** on page 13.



Never move or lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the **Pressure Relief Procedure** before lifting the pump.

Starting and Adjusting the Pump

1. Be sure the pump is properly grounded. Refer to **Grounding** on page 4.
2. Check connections to be sure they are tight. Tighten fluid inlet and outlet connections securely.
3. Place the suction tube (if used) in fluid to be pumped.

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

4. Place the end of fluid hose (L) into an appropriate container.
5. Close the fluid drain valve (J).
6. Back out the air regulator (C) knob, and 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 increase air pressure with 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.

Pump Shutdown



At the end of the work shift, relieve 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.

NOTICE

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

Flushing



Insert suction tube into cleaning solution. Open air regulator to supply low pressure air to the pump. Run the pump long enough to thoroughly clean the pump and hoses. Close the air regulator. Remove the suction tube from the cleaning solution and drain pump. Place suction tube in the fluid to be pumped.

Flush the pump often enough to prevent the fluid you are pumping from drying or freezing in the pump and damaging it. Flushing schedule will be based on what the pump is being used for. Use a compatible cleaning solution and always cycle the pump during the entire flushing process.

Always flush the pump and relieve the pressure before storing it for any length of time.

Tightening Connections

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

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



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 18.
Pump will not cycle, or cycles once and stops.	Air valve is stuck or dirty.	Disassemble and clean air valve. See page 16. 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 clamps (113), or replace seats (201) or o-rings (202). See page 18.
	Loose diaphragm shaft bolt (107).	Tighten or replace (pages 19-21).
	Damaged o-ring (108).	Replace. See pages 19-21.
Chattering - noisy operation.	Check valve balls do not seat properly/cleanly due to imbalance between fluid inlet and outlet line sizing. Noise is accentuated with light viscosity fluids.	Reduce size/diameter of inlet line relative to outline line. Outlet line size should not exceed pump size.

PROBLEM	CAUSE	SOLUTION
Leak in inlet or outlet sanitary fitting.	Loose sanitary clamp.	Tighten clamp.
	Damaged or worn gasket.	Replace gasket.
	Misalignment of inlet/outlet hose or pipe.	Use flexible hoses at pump inlet and outlet.
	Gasket does not seal.	Use a standard sanitary gasket of flexible material such as EPDM, Buna-N, fluoroelastomer, or silicon.
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 page 16.
	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 16.
	Air valve gasket (4) or air cover gasket (22) is damaged.	Inspect; replace. See pages 16, 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 clamps (113), or replace seats (201) or o-rings (202). See page 18.

Service

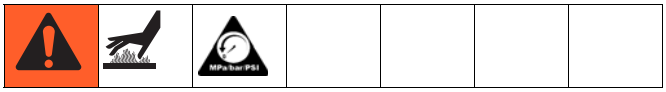
Repairing the Air Valve

Tool 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 are available. Order Kit 255061 for models with stainless steel center housing. Order Kit 236273 for models with aluminum center housing. Parts included in Kit 255061 are marked with †, and parts included in Kit 236273 are marked with ◆. Use all the parts in the kit for the best results.

Disassembly



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. 5.
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. 6.
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. 7.
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). See FIG. 8.
6. Inspect the bearings (12, 15) in place. See FIG. 7. The bearings are tapered and, if damaged, must be removed from the outside. This requires disassembly of the fluid section. See page 24.
7. Clean all parts and inspect for wear or damage. Replace as needed. Reassembly.

Reassembly

1. *If you replaced the bearings (12, 15),* reinstall as explained on page 24. Reassemble the fluid section.
2. On models with aluminum center housing, install the valve plate seal (55◆) into the groove at the bottom of the valve cavity. The rounded side of the seal ***must face down*** into the groove. See FIG. 8.
3. Install the valve plate (8†) in the cavity, seal down. 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. 8.
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. 7.
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. 7.
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. 7.
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. 6.
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. 6.
9. Install the valve carriage (5) so its tabs slip into the grooves on the narrow end of the actuator pistons (11). See FIG. 6.
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 52-60 in-lb (5.6-6.8 N•m). See FIG. 5.

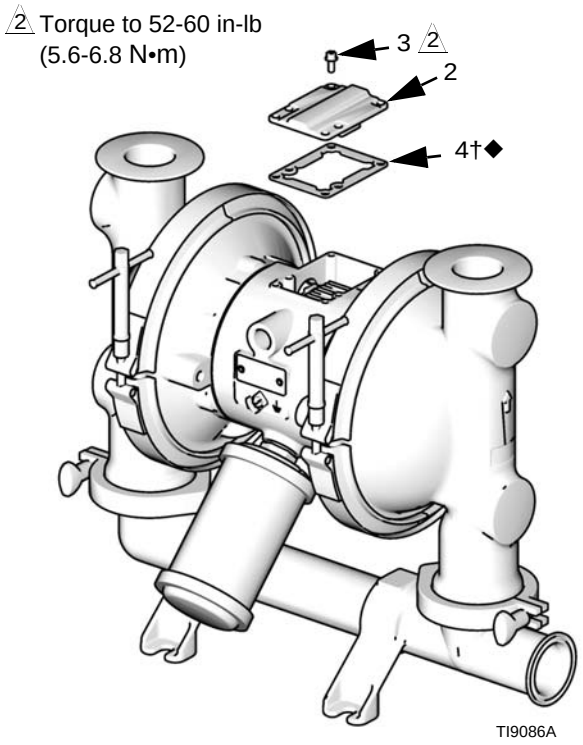


FIG. 5

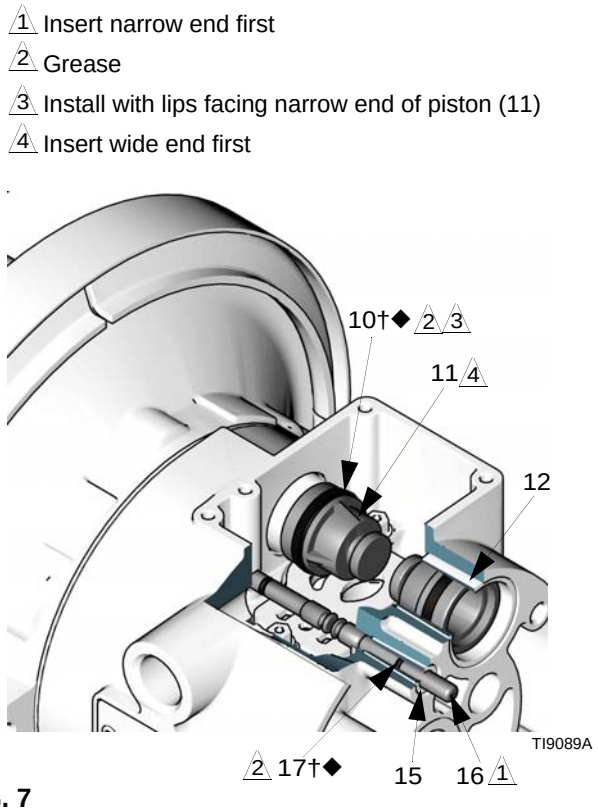


FIG. 7

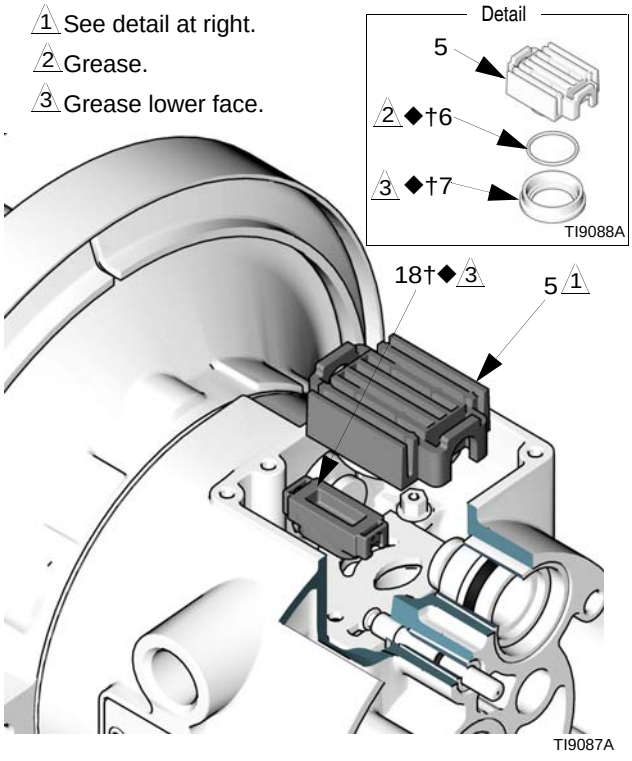


FIG. 6

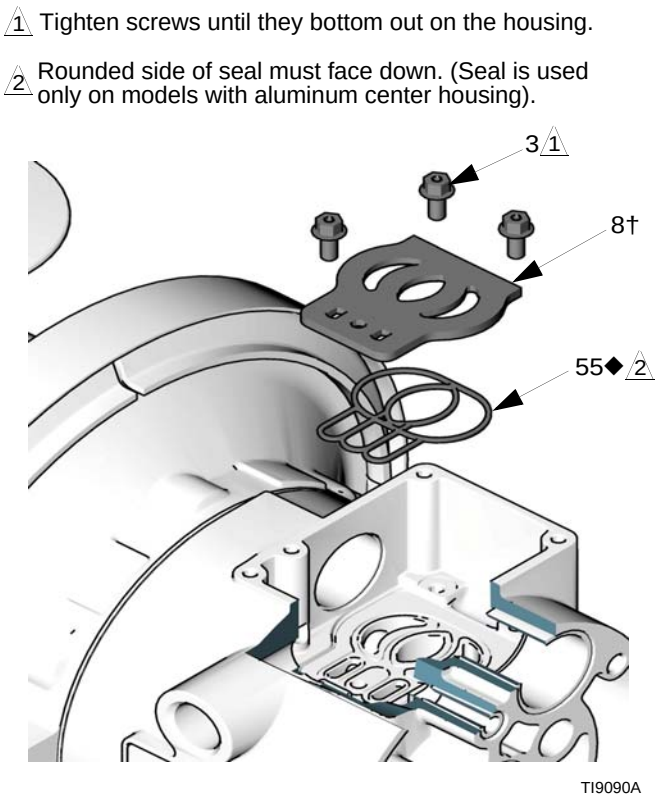


FIG. 8

Ball Check Valve Repair

Tools Required

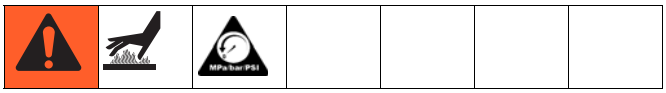
- O-ring pick

Disassembly

NOTE:

- A Fluid Section Repair Kit is available. Refer to the Repair Kit Matrix parts section for the appropriate pump size so that the correct kit for your pump is ordered. Parts included in the kit are marked with an asterisk, for example (202*). Use all the parts in the kit for the best results.

- To ensure proper seating of the balls (301), always inspect the seats (201) when replacing the balls. Replace seats as necessary if seating surface shows evidence of wear. Also, replace the o-rings (202) as necessary. PTFE o-rings should be replaced every time manifolds are removed.



1. Relieve the pressure. Disconnect all hoses.
2. Remove the pump from its mounting.
3. Remove the clamps (106) holding the outlet manifold (103) to the fluid covers (101). See FIG. 9.
4. Remove the o-rings (202), seats (201), and balls (301) from the manifold (103).
5. Turn the pump over and remove the inlet manifold (102). Remove the o-rings (202), 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. 9. Be sure the ball checks and manifolds are assembled **exactly** as shown. The arrows (A) on the fluid covers (101) **must** point toward the outlet manifold (103).

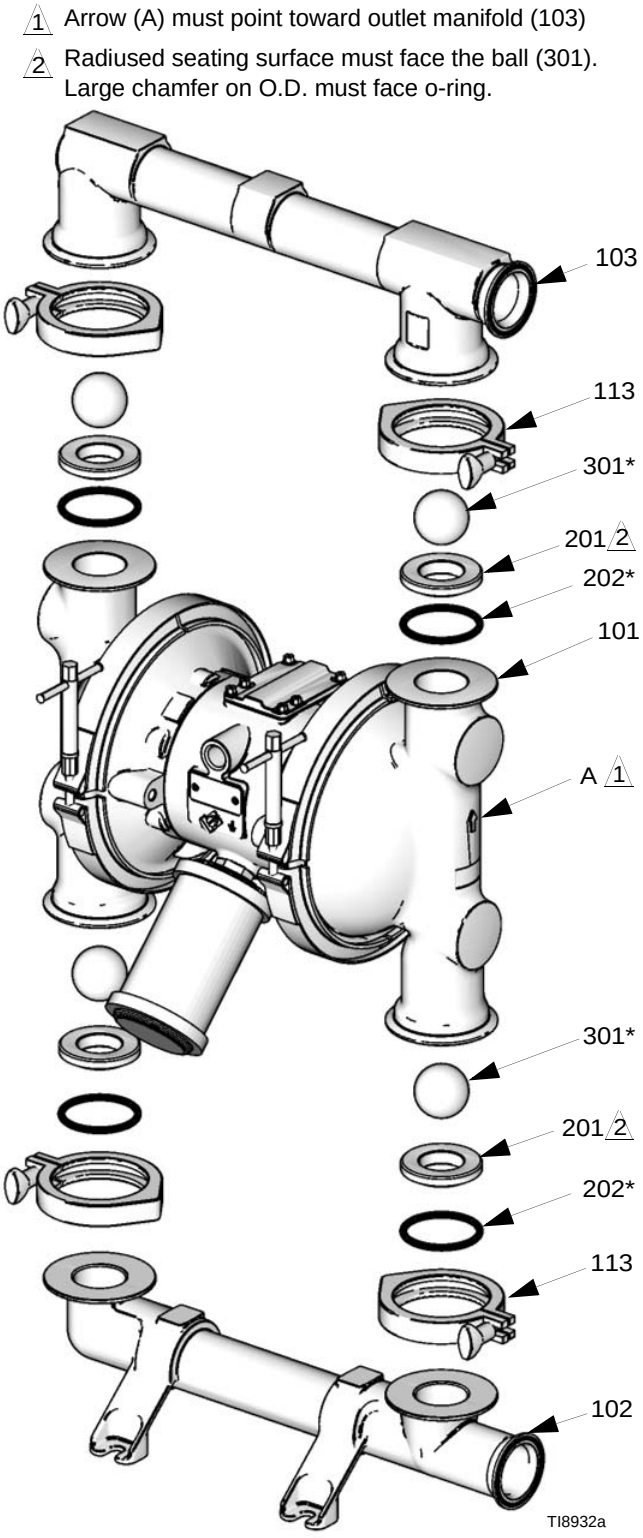


FIG. 9

Standard Diaphragm Repair

NOTE: If your pump uses overmolded diaphragms, see page 22.

Tools Required

- Torque wrench
- 15 mm socket wrench
- 19 mm open end wrench
- O-ring pick
- Lithium-base grease

Disassembly

NOTE: A Fluid Section Repair Kit is available. Refer to page 27, 35, or 43 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.

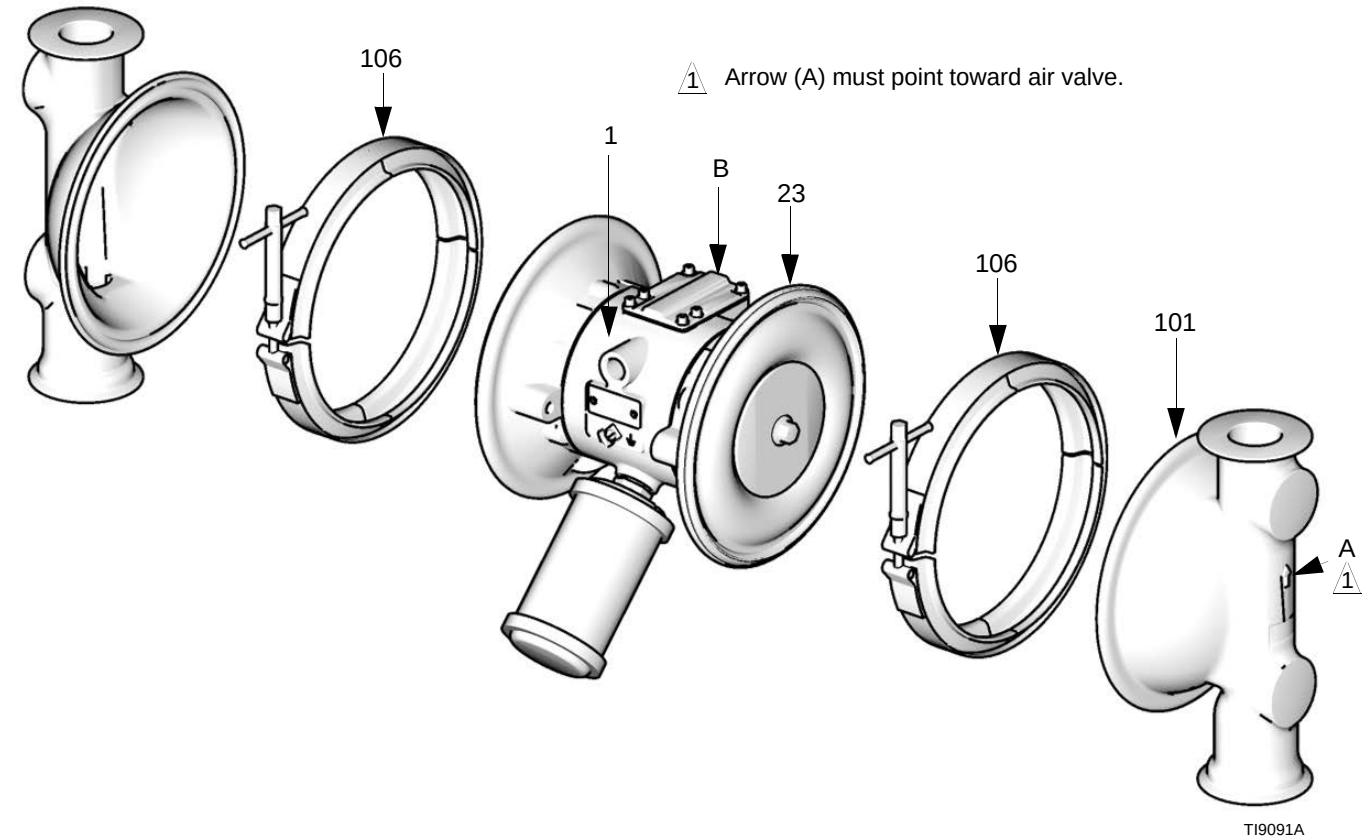


FIG. 10

1. Relieve the pressure.
2. Remove the manifolds and disassemble the ball check valves as explained on page 18.
3. Remove the clamps (106) holding the fluid covers (101) to the air covers (23). Pull the fluid covers (101) off the pump. See FIG. 10.

4. Loosen but do not remove the diaphragm shaft bolts (107), using a 15 mm socket wrench on both bolts. See FIG. 11.

5. Unscrew one bolt from the diaphragm shaft (24) and remove the o-ring (108), fluid side diaphragm plate (105), diaphragm (403), backer (401) used only on PTFE models, and air side diaphragm plate (104). See FIG. 11.

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.

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 24.

8. Reach into the center housing (1) with an o-ring pick and hook the u-cup packings (402), then pull them out of the housing. This can be done with the bearings (19) in place.

9. Clean all parts and inspect for wear or damage. Replace parts as needed.

Reassembly

1. Install the shaft u-cup packings (402*) so the lips face ***out*** of the housing (1). Lubricate the packings. See FIG. 11.

2. Install the diaphragm assembly on one end of the shaft (24) as follows:

   a. Install the o-ring (108*) on the shaft bolt (107).

   b. Install the fluid side diaphragm plate (105) on the bolt so the rounded side faces the diaphragm (401).

NOTE: The fluid side diaphragm plate (105) is stainless steel. This plate ***is not*** stamped with its part number. Be sure to install this plate on the fluid side of the diaphragm.

   c. Install the diaphragm (403*). Make certain the side marked AIR SIDE faces the center housing (1).

   d. On PTFE models only, install the backer (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 rounded side faces the diaphragm (401). This plate is stamped with its part number.

   f. Apply medium-strength (blue) Loctite® or equivalent to the bolt (107) threads. Screw the bolt into the shaft (24) hand tight.

3. Grease the length and ends of the diaphragm shaft (24), and slide it through the housing (1).

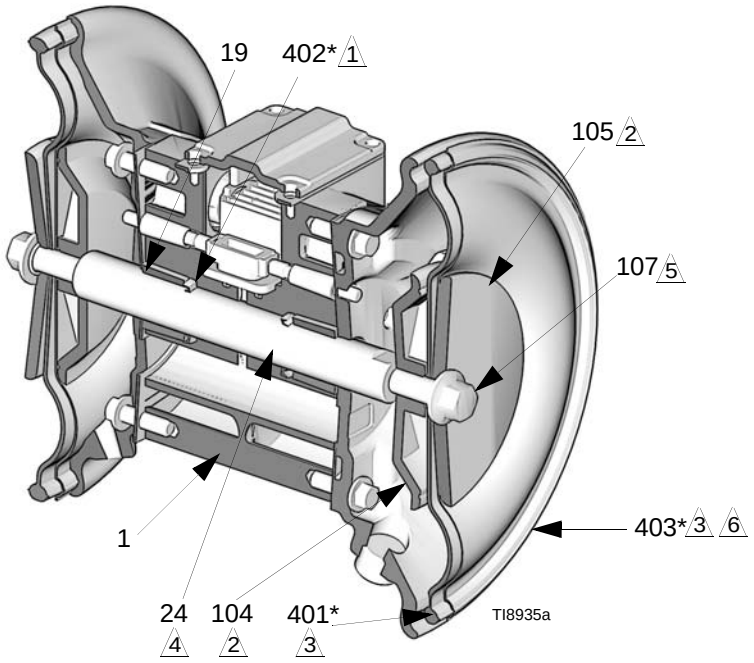
4. Assemble the other diaphragm assembly to the shaft as explained in step 2.

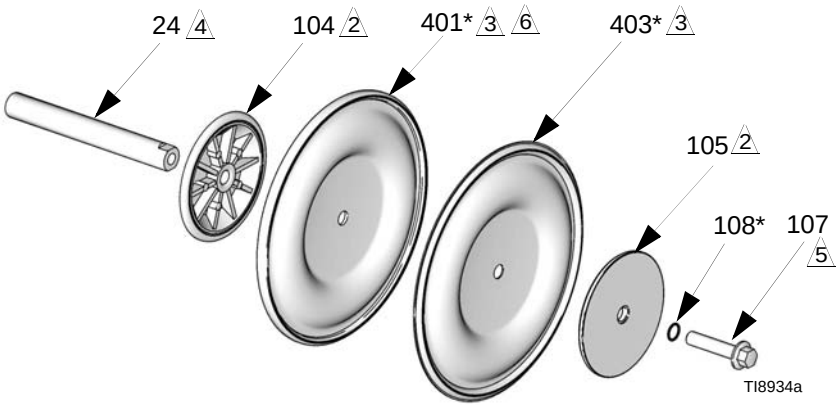
5. Hold one shaft bolt (107) with a wrench and torque the other bolt to 60-70 ft-lb (81-95 N•m) at 100 rpm maximum.

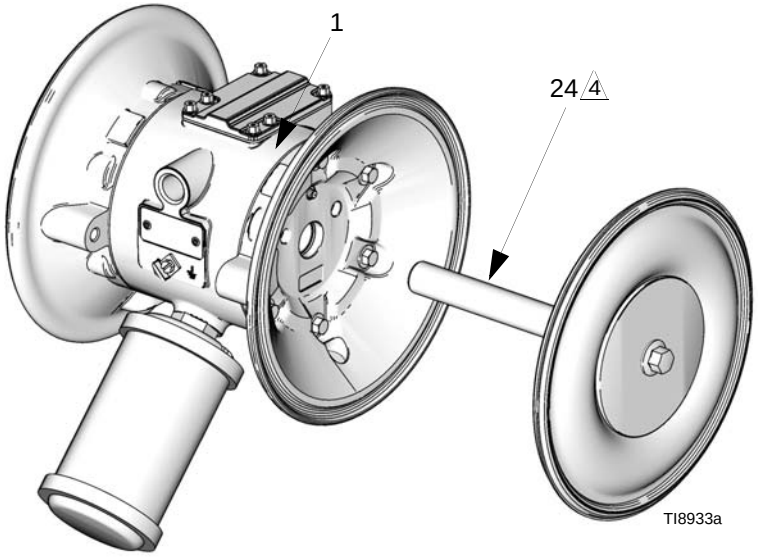
6. Align the fluid covers (101) and the center housing (1) so the arrows (A) on the covers face the same direction as the air valve (B). Secure covers with the clamps. See FIG. 10.

7. Reassemble the ball check valves and manifolds as explained on page 18.

Cutaway view, with diaphragms in place







1. Lips face out of housing (1).
2. Rounded side faces diaphragm (401).
3. Air side must face center housing (1).
4. Grease.
5. Apply medium strength (blue) Loctite® or equivalent. Torque to 60-70 ft-lb (81-95 N•m) at 100 rpm maximum.
6. Backer used on pumps with PTFE diaphragms only.

FIG. 11

Overmolded Diaphragm Repair

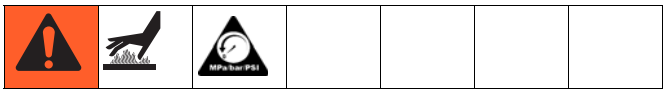
NOTE: If your pump uses standard diaphragms, see page 19.

Tools Required

- Torque wrench
- 19 mm open end wrench
- O-ring pick
- Lithium-base grease

Disassembly

NOTE: A Fluid Section Repair Kit is available. Refer to page 27, 35, or 43 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.



1. Relieve the pressure.
2. Remove the manifolds and disassemble the ball check valves as explained on page 18.
3. Remove the clamps (106) holding the fluid covers (101) to the air covers (23). Pull the fluid covers (101) off the pump. See FIG. 12.
4. Once the fluid covers are removed, the diaphragm on the side of the pump which was last pressurized with air will be separated from the center section/air cover. This allows you to grip the diaphragms.
5. Diaphragms are assembled handtight. To loosen, 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 (403) and air side plate (104).
6. Pull the opposite diaphragm assembly and 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 24.
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.

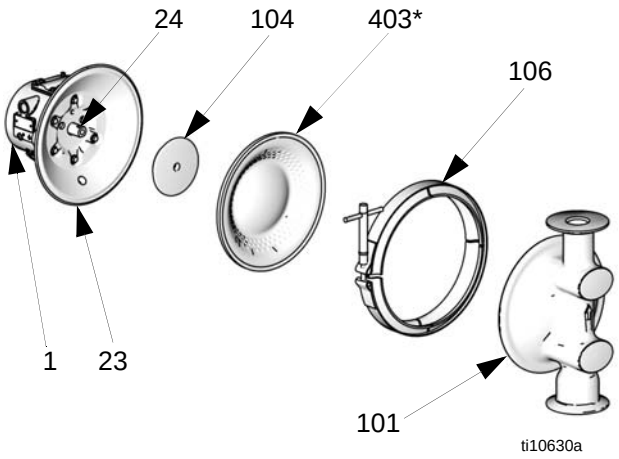


FIG. 12

Reassembly

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

1. Install the shaft u-cup packings (402*) so the lips face ***out*** of the housing (1). Lubricate the packings. 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) hand tight.

3. Grease the length and ends of the diaphragm shaft (24). Insert the shaft/diaphragm assembly into one side of the pump. Assemble the fluid cover (101) and clamp (106) so the arrow (A) on the cover faces the same direction as the air valve (B). Securely tighten the clamp.

4. 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.

5. Supply the pump with low pressure air (less than 7 psi [.05 MPa, 0.5 bar]). The diaphragm will very slowly pull onto the air cover (23). Find the pressure that keeps the diaphragm close enough to clamp, but does not let it contact the pilot pin.

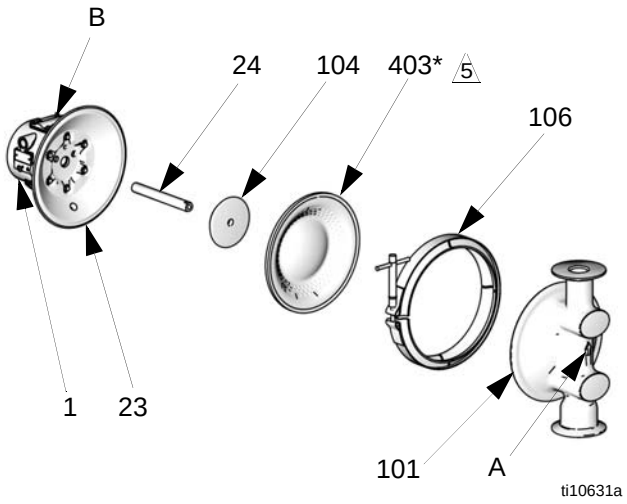
NOTICE

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

6. Assemble the fluid cover (101) and clamp (106) so the arrow (A) on the cover faces the same direction as the air valve (B). Securely tighten the clamp.

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.

7. Reassemble the ball check valves and manifolds as explained on page 18.



5 Apply medium strength (blue) Loctite® or equivalent to bolt (not shown).

FIG. 13

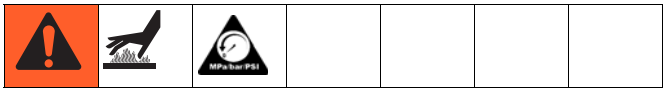
Bearing and Air Gasket Removal

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.



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. 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. 11.

Reassembly

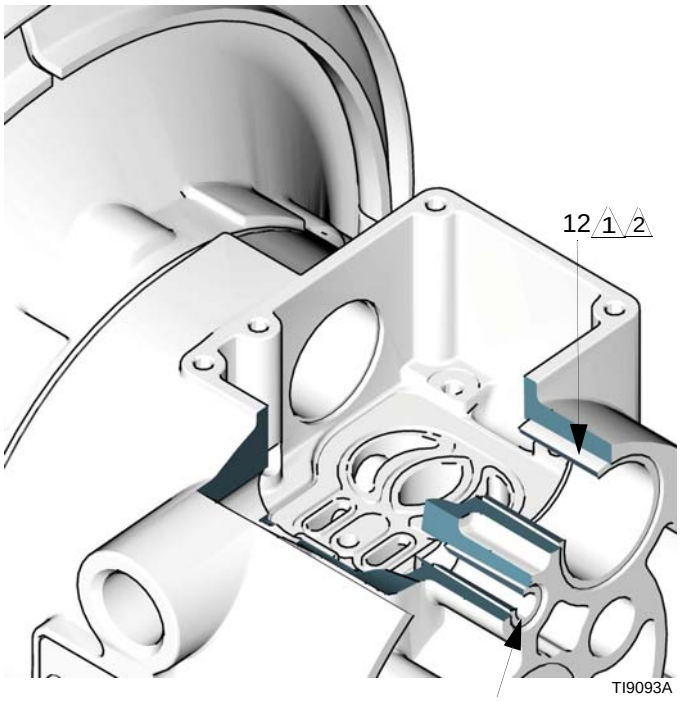
1. If removed, install the shaft u-cup packings (402*) so the lips face ***out*** of the housing (1). See FIG. 11.
2. The bearings (12, 15, and 19) are tapered and can only be installed one way. Insert the bearings into the center housing (1), ***tapered end first***. Using a press or a block and rubber 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 16.
4. Align the new air cover gasket (22) so the pilot pin (16) protruding from the center housing (1) fits through the proper hole (H) in the gasket.
5. Align the air cover (23) so the pilot pin (16) fits in the middle hole (M) of the three small holes near the center of the cover. Install the screws (25), hand-tight. Apply medium-strength (blue) Loctite® or equivalent to the threads of the screws (25). See FIG. 14. 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.

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 130-150 in-lb (15-17 N•m)

Detail of air valve bearings



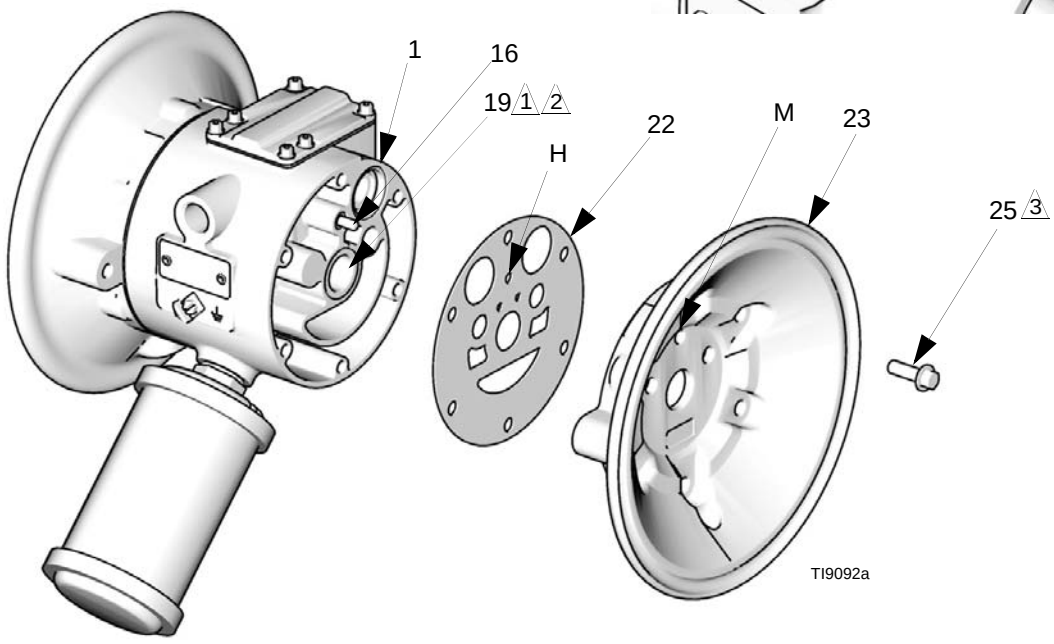


FIG. 14

Pump and Repair Kit Matrix - 1040 Models

SaniForce 1040 FDA-Compliant Sanitary Pumps

Your Model No. is marked on the pump's serial plate. The first three digits are always either FD1, FD7, FA1, or FA7, designating 1040 FDA-compliant sanitary pumps. The only difference between the FD and FA pumps is the air motor housing material: stainless for FD pumps and aluminum for FA pumps. The third digit defines the connection style, while the final three digits define the materials of construction of the wetted section parts. For example, a 1040 FDA pump with a stainless steel air motor, flange manifold connections, PTFE o-rings, stainless steel seats, PTFE balls, and PTFE diaphragms is Model **FD1111.** To order replacement parts, refer to the part lists on page 29.

Repair kits are numbered in the same manner. The first three digits are always FK1. Parts included in the kit are marked with an asterisk in the parts list, for example (201*). For example, if your pump has stainless steel seats, PTFE o-rings, PTFE balls, and PTFE diaphragms, order Repair Kit **FK1111.**

To repair the air valve, order **Kit 255061** for models with stainless steel center housing or **Kit 236273** for models with aluminum center housing. See page 29. Parts included in Kit 255061 are marked with †, and parts included in Kit 236273 are marked with ◆.

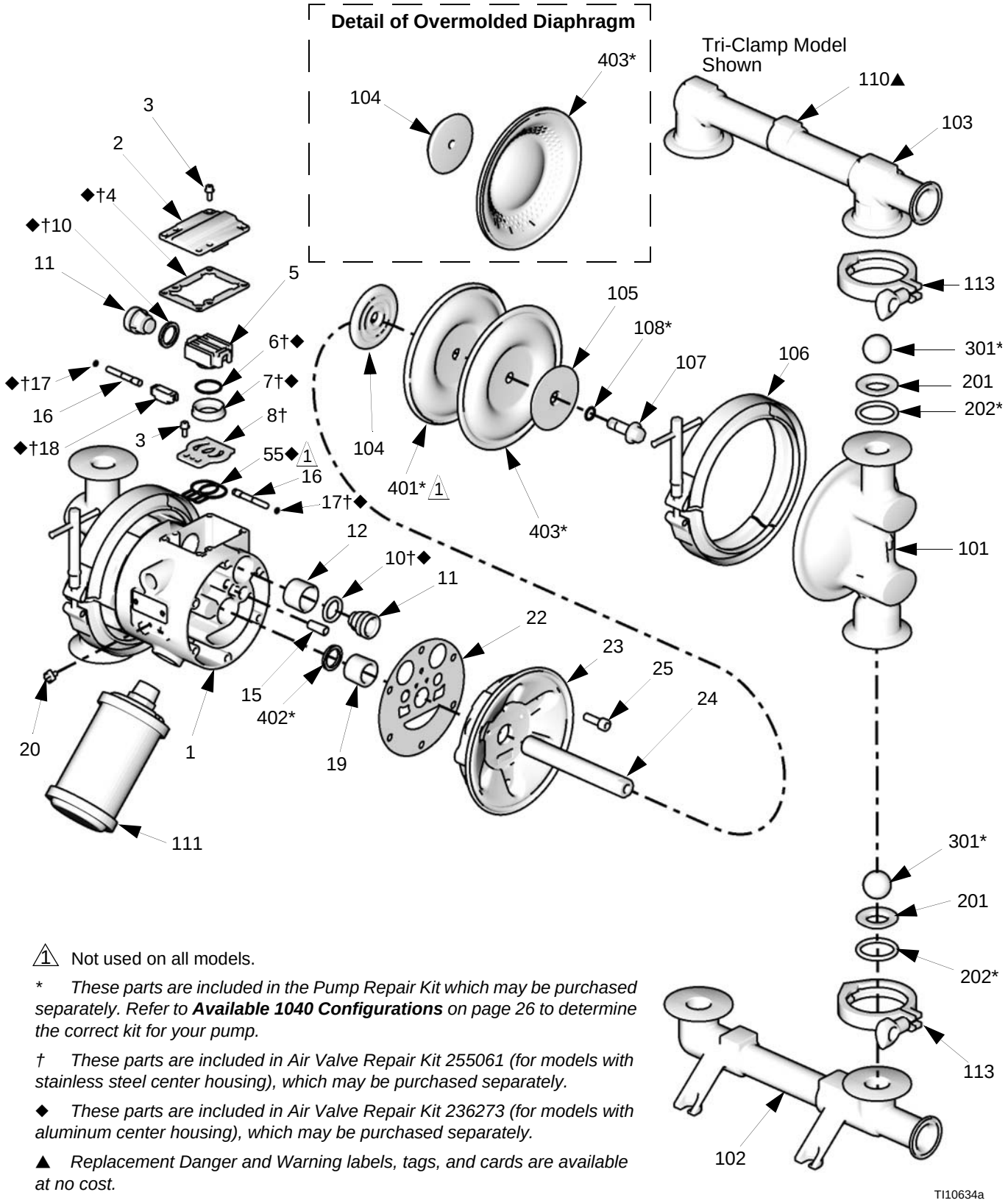
*The digits in the matrix **do not** correspond to the reference numbers in the parts drawings and parts lists.*

SaniForce Diaphragm Pump (Stainless Steel Fluid Sections)		**Connections**		**Seats and O-rings**		**Balls**		**Diaphragms**	
FD	All 1040 FDA-Compliant sanitary pumps with stainless steel air motor.	**1**	Flange	**1**	316 SST with PTFE o-rings	**1**	PTFE	**1**	PTFE
FA	All 1040 FDA-Compliant sanitary pumps with aluminum air motor.	**7**	DIN	**2**	316 SST with EPDM o-rings	**2**	Santoprene®	**2**	Santoprene®
FK1	All Repair Kits for 1040 FDA-Compliant sanitary pumps.	Flange or DIN				**3**	Polychloroprene with SST core	**3**	PTFE Overmolded

Available 1040 Configurations

Pump Model	Repair Kit	Description					
		Connections	Air Motor	Seats	O-rings	Balls	Diaphragms
FD1111	**FK1111**	**Flange**	316 Stainless Steel	316 SST	PTFE	PTFE	PTFE
FD7111	**FK1111**	**DIN**		316 SST	PTFE	PTFE	PTFE
FD1113	**FK1113**	**Flange**		316 SST	PTFE	PTFE	PTFE Overmolded
FD7113	**FK1113**	**DIN**		316 SST	PTFE	PTFE	PTFE Overmolded
FD1122	**FK1122**	**Flange**		316 SST	PTFE	Santoprene	Santoprene
FD7122	**FK1122**	**DIN**		316 SST	PTFE	Santoprene	Santoprene
FD1132	**FK1132**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	Santoprene
FD1133	**FK1133**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	PTFE Overmolded
FD1211	**FK1211**	**Flange**		316 SST	EPDM	PTFE	PTFE
FD1213	**FK1213**	**Flange**		316 SST	EPDM	PTFE	PTFE Overmolded
FD1222	**FK1222**	**Flange**		316 SST	EPDM	Santoprene	Santoprene
FD7222	**FK1222**	**DIN**		316 SST	EPDM	Santoprene	Santoprene
FD1232	**FK1232**	**Flange**		316 SST	EPDM	Polychloroprene with stainless steel core	Santoprene
FD7232	**FK1232**	**DIN**		316 SST	EPDM	Polychloroprene with stainless steel core	Santoprene
FA1111	**FK1111**	**Flange**	A380 aluminum	316 SST	PTFE	PTFE	PTFE
FD7111	**FK1111**	**DIN**		316 SST	PTFE	PTFE	PTFE
FA1113	**FK1113**	**Flange**		316 SST	PTFE	PTFE	PTFE Overmolded
FA1122	**FK1122**	**Flange**		316 SST	PTFE	Santoprene	Santoprene
FA7122	**FK1122**	**DIN**		316 SST	PTFE	Santoprene	Santoprene
FA1132	**FK1132**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	Santoprene
FA1133	**FK1133**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	PTFE Overmolded
FA1222	**FK1222**	**Flange**		316 SST	EPDM	Santoprene	Santoprene
FA1231	**FK1231**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	PTFE
FA1232	**FK1232**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	Santoprene
FA1233	**FK1233**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	PTFE Overmolded
FA7222	**FK1222**	**DIN**		316 SST	EPDM	Santoprene	Santoprene

Parts - 1040 Models



1 Not used on all models.

* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 1040 Configurations*** *on page 26 to determine the correct kit for your pump.*

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

◆ *These parts are included in Air Valve Repair Kit 236273 (for models with aluminum center housing), which may be purchased separately.*

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

Parts, 1040 Models, continued

Air Motor (Digit 2 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
D	1	15K009	HOUSING, center; SST	1
	2	15K696	COVER, air valve; SST	1
	8†	15H178	PLATE, air valve; SST	1
A	1	188838	HOUSING, center, aluminum	1
	2	188854	COVER, air valve; aluminum	1
	8	188615	PLATE, air valve, aluminum	1
	55◆	188617	SEAL, valve plate	1

Air Motor Common Parts

Ref.	Part No.	Description	Qty
3	116344	SCREW, mach, hex flange hd; M5 x 0.8; 12 mm (0.47 in.)	9
4†◆	188618	GASKET, cover	1
5	188855	CARRIAGE; aluminum	1
6†◆	108730	O-RING; nitrile	1
7†◆	188616	BLOCK, air valve; acetal	1
10†◆	112181	PACKING, u-cup; nitrile	2
11	188612	PISTON, actuator; acetal	2
12	188613	BEARING, piston; acetal	2
15	188611	BEARING, pin; acetal	2
16	188610	PIN, pilot; SST	2
17†◆	157628	O-RING; buna-N	2
18†◆	188614	BLOCK, pilot; acetal	1
19	188609	BEARING, shaft; acetal	2
20	116344	SCREW, grounding	1
22	188603	GASKET, air cover; foam	2
23	15G667	COVER, air, SST	2
24	188608	SHAFT, diaphragm; SST	1
25	112178	SCREW; M8 x 1.25; 25 mm (1 in.); stainless steel	12

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

◆ *These parts are included in Air Valve Repair Kit 236273 (for models with aluminum center housing), which may be purchased separately.*

Fluid Section

Ref.	Part No.	Description	Qty
101	277262	COVER, fluid; SST	2
102		MANIFOLD, inlet; SST	1
	277265	Flange	
	24U148	DIN	
103		MANIFOLD, outlet; SST	1
	277266	Flange	
	24U149	DIN	
106	15G698	CLAMP, diaphragm	2
110▲	188621	LABEL, warning	1
111	15G332	MUFFLER	1
113	620223	CLAMPS, sanitary	4

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

Seat (Digit 4 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
1	201	15H824	SEAT; 316 SST	4
	202*‡	15J280	O-RING; PTFE	4
2	201	15H824	SEAT; 316 SST	4
	202*‡	15H827	O-RING; EPDM	4

‡ An alternative of 4 PTFE o-rings encapsulated in fluoroelastomer is available in kit 24Z915, which may be purchased separately.

Ball (Digit 5 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
1	301*	112088	BALL; PTFE	4
2	301*	112092	BALL; Santoprene®	4
3	301*	15H832	BALL; polychloroprene/SST core	4

* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 1040 Configurations*** *on page 26 to determine the correct kit for your pump.*

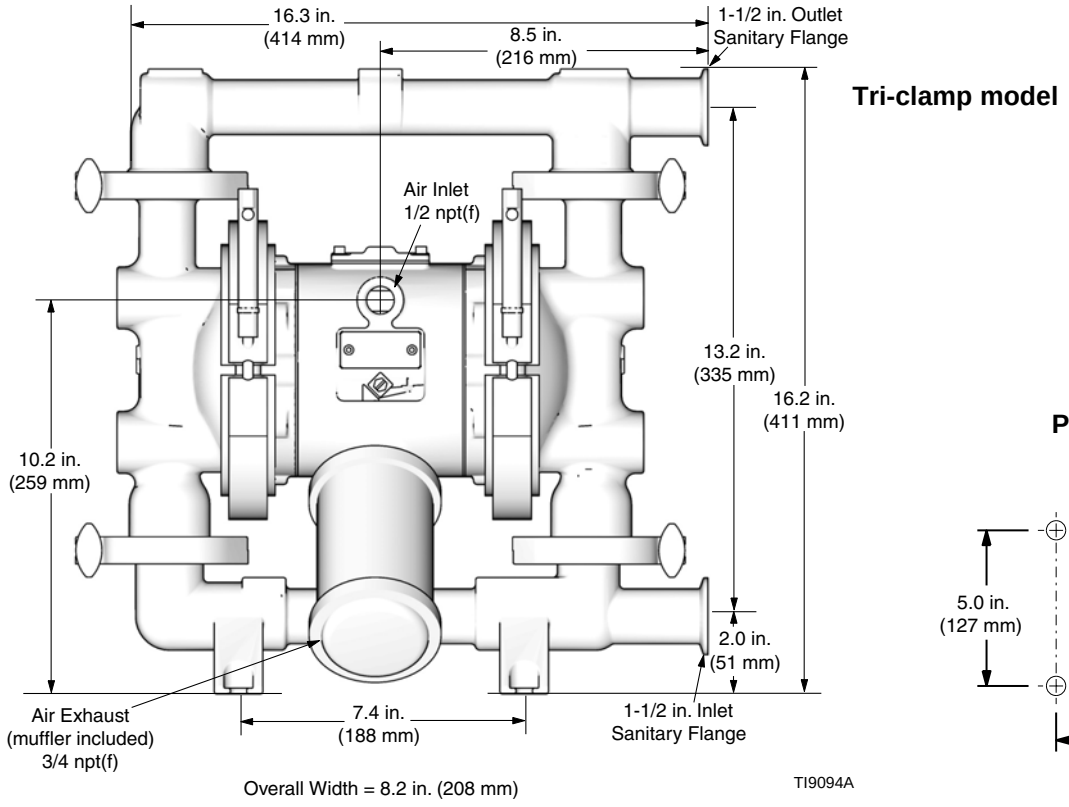
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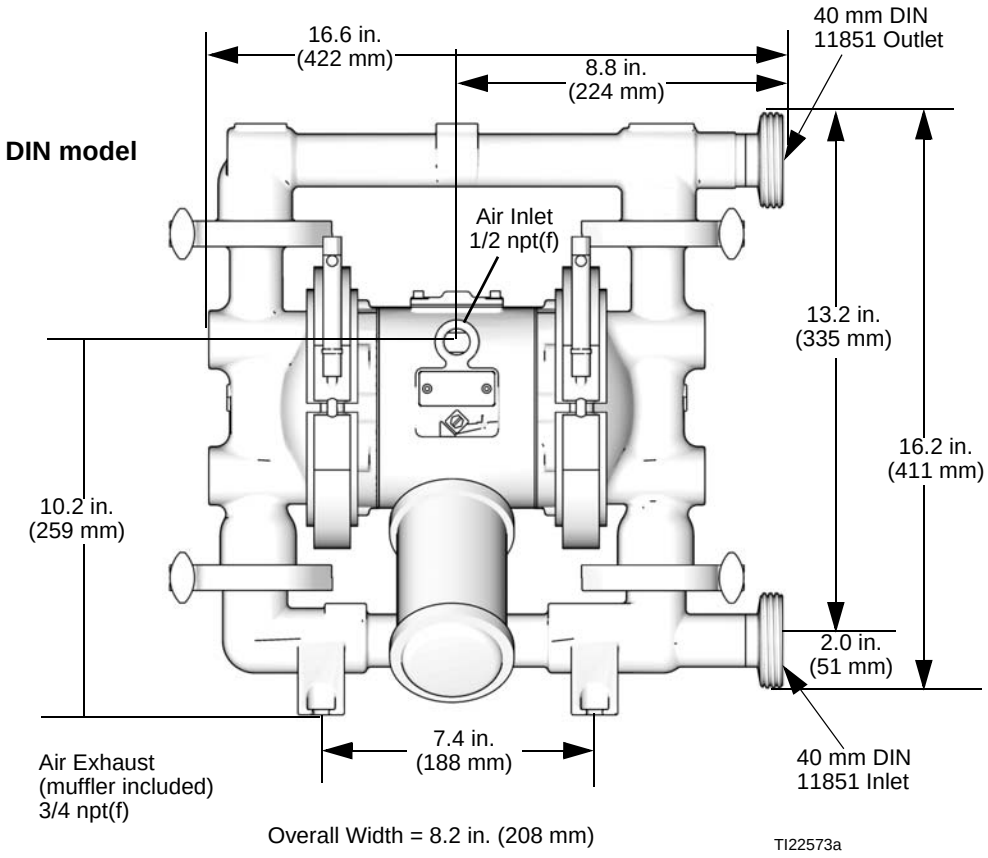
Diaphragm (Digit 6 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
1	401*		DIAPHRAGM; backer; EPDM	2
	402*	112181	PACKING; u-cup; nitrile	2
	403*	188605	DIAPHRAGM; PTFE	2
	104	188607	PLATE, air side; aluminum	2
	105	15C039	PLATE, fluid side; SST	2
	107	189044	BOLT; M12 x 1.75; 35 mm (1.38 in.); SST	2
	108*	104319	O-RING; PTFE	2
2	402*	112181	PACKING; u-cup; nitrile	2
	403*	188857	DIAPHRAGM; Santoprene	2
	104	188607	PLATE, air side; aluminum	2
	105	15C039	PLATE, fluid side; SST	2
	107	189044	BOLT; M12 x 1.75; 35 mm (1.38 in.); SST	2
	108*	104319	O-RING; PTFE	2
3	289224 Kit, overmolded diaphragm, PTFE; includes 403 and 104			
	402*	112181	PACKING; u-cup; nitrile	2
	403*	253626	DIAPHRAGM; Overmolded; PTFE; includes two diaphragms and two packings (402)	1
	104	15H809	PLATE, air side; aluminum	2

* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 1040 Configurations*** *on page 26 to determine the correct kit for your pump.*

Dimensional Drawing - 1040 Models





Technical Data - 1040 Models

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	50 scfm
Air consumption at 70 psi/20 gpm	18 scfm (see chart)
Maximum free-flow delivery	41 gpm (155.2 l/min)
Maximum pump speed	256 cpm
* Gallons (Liters) per cycle	0.16 (0.57)
Maximum suction lift	29 ft (8.83 m) wet, 16 ft (4.87 m) dry
Maximum size pumpable solids	1/8 in. (3.2 mm)
** Maximum Noise Level at 100 psi, full flow	92 dBa
** Sound Power Level	100 dBa
** Noise Level at 70 psi and 50 cpm	73 dBa
Maximum fluid operating temperature is based on the following maximum diaphragm, ball, and seat temperature ratings.	PTFE 220°F (104.4°C) Santoprene® 180°F (82.2°C) EPDM 275°F (135°C) Polychloroprene 200°F (93°C) Stainless steel 250°F (121.1°C)
Air inlet size	0.5 in. npt(f)
Fluid inlet size	1.5 in. sanitary flange or 40 mm DIN 11851
Fluid outlet size	1.5 in. sanitary flange or 40 mm DIN 11851

Wetted parts

***All fluid contact materials are FDA-compliant and meet the United States Code of Federal Regulations (CFR) Title 21, Section 177.

Wetted materials on all models	316 SST
Wetted materials depending on model	EPDM, Polychloroprene, PTFE, Santoprene®

CAUTION:

Santoprene® may be used only with non-fatty, non-oily foods or alcohols up to 15%.

Non-wetted external parts	300 series stainless steel, aluminum (A380), polyester (labels), LDPE foam (gasket)

Weight

FD1 Models	55 lb. (24.9 kg)
FA1 Models	49 lb. (22.2 kg)

Santoprene® is a registered trademark of the Monsanto Co.

Loctite® is a registered trademark of the Loctite Corporation.

* *Displacement per cycle may vary based on suction condition, discharge head, air pressure, and fluid type.*

** *Noise levels measured with the pump mounted to a solid surface. Sound power measured per ISO Standard 9614-1.*

*** *The pump user must verify that the construction materials meet their specific application requirements.*

Performance Chart - 1040 Models

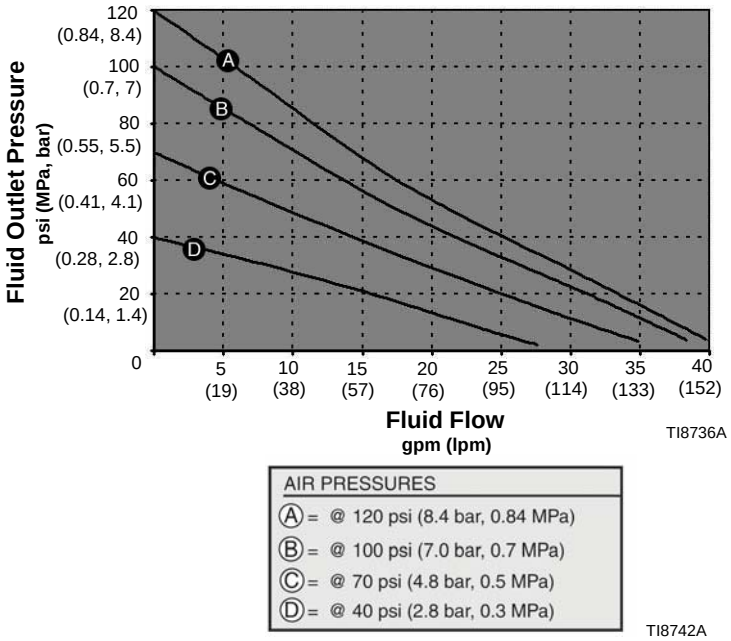
Test Conditions: Pump tested in water with inlet submerged

Fluid Pressure Curves

A at 120 psi (0.7 MPa, 7 bar) operating air pressure
B at 100 psi (0.7 MPa, 7 bar) operating air pressure
C at 70 psi (0.48 MPa, 4.8 bar) operating air pressure
D at 40 psi (0.28 MPa, 2.8 bar) operating air pressure

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

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

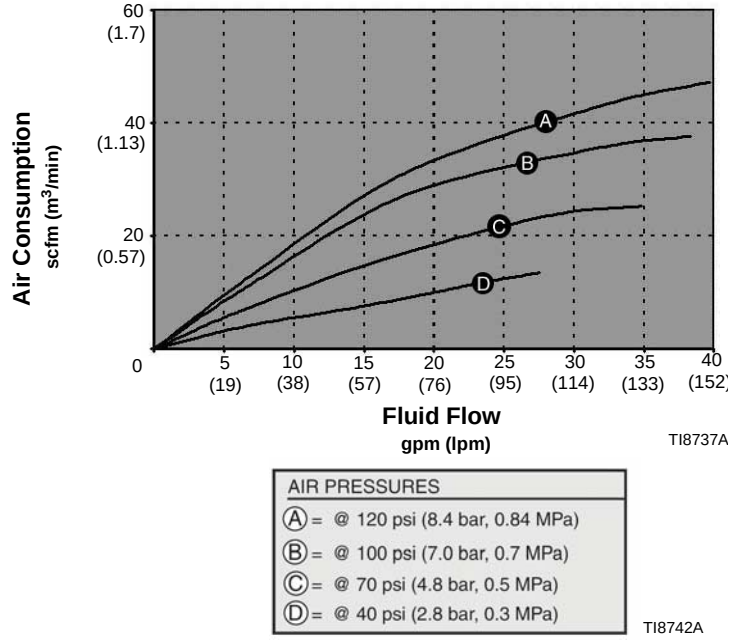


Air Consumption Curves

A at 120 psi (0.7 MPa, 7 bar) operating air pressure
B at 100 psi (0.7 MPa, 7 bar) operating air pressure
C at 70 psi (0.48 MPa, 4.8 bar) operating air pressure
D at 40 psi (0.28 MPa, 2.8 bar) operating air pressure

To find Pump Air Consumption
(scfm or m^3/min) at a specific fluid flow (gpm/lpm) and operating air pressure (psi/MPa/bar):

1. Locate fluid flow rate along bottom of chart.
2. Read vertical line up to intersection with selected operating air pressure curve.



Pump and Repair Kit Matrix - 1590 Models

SaniForce 1590 FDA-Compliant Sanitary Pumps

Your Model No. is marked on the pump's serial plate. The first three digits are always either FD2, FD8, FA2, or FA8, designating 1590 FDA-compliant sanitary pumps. The only difference between the FD and FA pumps is the air motor housing material: stainless for FD pumps and aluminum for FA pumps. The third digit defines the connection style, while the final three digits define the materials of construction of the wetted section parts. For example, a 1590 FDA pump with a stainless steel air motor, flange manifold connections, PTFE o-rings, stainless steel seats, PTFE balls, and PTFE diaphragms is Model **FD2111.** To order replacement parts, refer to the part lists on pages 37.

Repair kits are numbered in the same manner. The first three digits are always FK2. Parts included in the kit are marked with an asterisk in the parts list, for example (201*). For example, if your pump has stainless steel seats, PTFE o-rings, PTFE balls, and PTFE diaphragms, order Repair Kit **FK2111.**

To repair the air valve, order **Kit 255061** for models with stainless steel center housing or **Kit 236273** for models with aluminum center housing. See page 37. Parts included in Kit 255061 are marked with †, and parts included in Kit 236273 are marked with ◆.

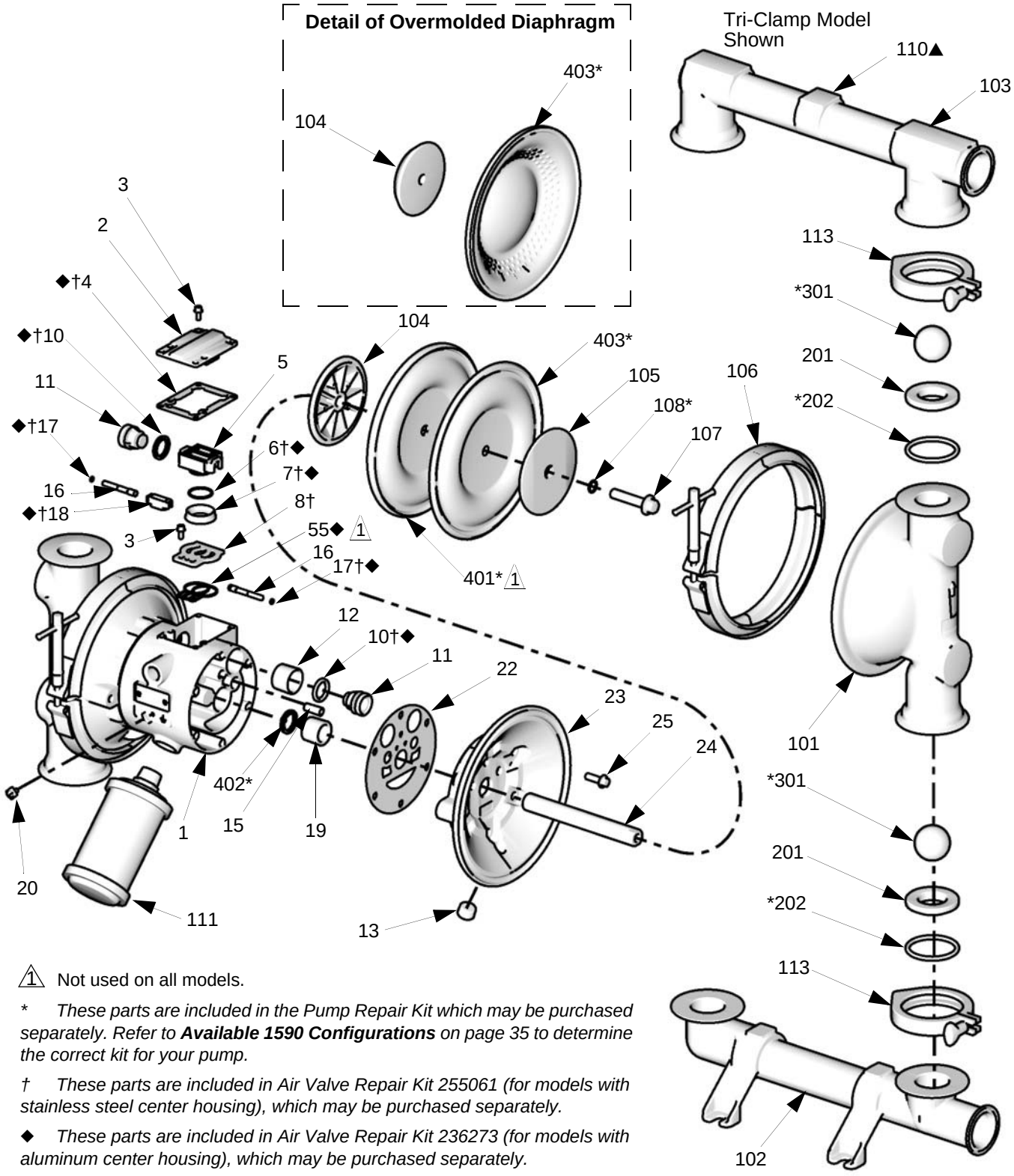
*The digits in the matrix **do not** correspond to the reference numbers in the parts drawings and parts lists.*

SaniForce Diaphragm Pump (Stainless Steel Fluid Sections)		**Connections**		**Seats and O-rings**		**Balls**		**Diaphragms**	
FD	All 1590 FDA-Compliant sanitary pumps with stainless steel air motor.	**2**	Flange	**1**	316 SST with PTFE o-rings	**1**	PTFE	**1**	PTFE
FA	All 1590 FDA-Compliant sanitary pumps with aluminum air motor.	**8**	DIN	**2**	316 SST with EPDM o-rings	**2**	Santoprene®	**2**	Santoprene®
FK2	All Repair Kits for 1590 FDA-Compliant sanitary pumps.	Flange or DIN				**3**	Polychloroprene with SST core	**3**	PTFE Overmolded

Available 1590 Configurations

Pump Model	Repair Kit	Description					
		Connection	Air Motor	Seats	O-rings	Balls	Diaphragms
FD2111	**FK2111**	**Flange**	316 Stainless Steel	316 SST	PTFE	PTFE	PTFE
FD8111	**FK2111**	**DIN**		316 SST	PTFE	PTFE	PTFE
FD2113	**FK2113**	**Flange**		316 SST	PTFE	PTFE	PTFE Overmolded
FD2122	**FK2122**	**Flange**		316 SST	PTFE	Santoprene	Santoprene
FD2132	**FK2132**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	Santoprene
FD2133	**FK2133**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	PTFE Overmolded
FD2211	**FK2211**	**Flange**		316 SST	EPDM	PTFE	PTFE
FD2213	**FK2213**	**Flange**		316 SST	EPDM	PTFE	PTFE Overmolded
FD2222	**FK2222**	**Flange**		316 SST	EPDM	Santoprene	Santoprene
FD8222	**FK2222**	**DIN**		316 SST	EPDM	Santoprene	Santoprene
FD2232	**FK2232**	**Flange**		316 SST	EPDM	Polychloroprene with stainless steel core	Santoprene
FA2111	**FK2111**	**Flange**	A380 Aluminum	316 SST	PTFE	PTFE	PTFE
FA8111	**FK2111**	**DIN**		316 SST	PTFE	PTFE	PTFE
FA2113	**FK2113**	**Flange**		316 SST	PTFE	PTFE	PTFE Overmolded
FA2122	**FK2122**	**Flange**		316 SST	PTFE	Santoprene	Santoprene
FA2132	**FK2132**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	Santoprene
FA2213	**FK2213**	**Flange**		316 SST	EPDM	PTFE	PTFE Overmolded
FA2222	**FK2222**	**Flange**		316 SST	EPDM	Santoprene	Santoprene
FA2231	**FK2231**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	PTFE
FA2232	**FK2232**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	Santoprene
FA2233	**FK2233**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	PTFE Overmolded

Parts - 1590 Models



1 Not used on all models.

* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 1590 Configurations*** *on page 35 to determine the correct kit for your pump.*

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

◆ *These parts are included in Air Valve Repair Kit 236273 (for models with aluminum center housing), which may be purchased separately.*

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

TI8927b

Parts, 1590 Models, continued

Air Motor (Digit 2 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
D	1	15K009	HOUSING, center; SST	1
	2	15K696	COVER, air valve; SST	1
	8†	15H178	PLATE, air valve; SST	1
A	1	188838	HOUSING, center, aluminum	1
	2	188854	COVER, air valve; aluminum	1
	8	188615	PLATE, air valve, aluminum	1
	55◆	188617	SEAL, valve plate	1

Air Motor Common Parts

Ref.	Part No.	Description	Qty
3	116344	SCREW, mach, hex flange hd; M5 x 0.8; 12 mm (0.47 in.)	9
4†◆	188618	GASKET, cover;	1
5	188855	CARRIAGE; aluminum	1
6†◆	108730	O-RING; nitrile	1
7†◆	188616	BLOCK, air valve; acetal	1
10†◆	112181	PACKING, u-cup; nitrile	2
11	188612	PISTON, actuator; acetal	2
12	188613	BEARING, piston; acetal	2
13	103778	PLUG, pipe	2
15	188611	BEARING, pin; acetal	2
16	188610	PIN, pilot; SST	2
17†◆	157628	O-RING; buna-N	2
18†◆	188614	BLOCK, pilot; acetal	1
19	188609	BEARING, shaft; acetal	2
20	116344	SCREW, grounding	1
22	188603	GASKET, air cover; foam	2
23	15G668	COVER, air; SST	2
24	189245	SHAFT, diaphragm; SST	1
25	112178	SCREW; M8 x 1.25; 25 mm (1 in.); stainless steel	12

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

◆ *These parts are included in Air Valve Repair Kit 236273 (for models with aluminum center housing), which may be purchased separately.*

Fluid Section

Ref.	Part No.	Description	Qty
101	277263	COVER, fluid; SST	2
102		MANIFOLD, inlet; SST	1
	277267	Flange	
	24U150	DIN	
103		MANIFOLD, outlet; SST	1
	277268	Flange	
	24U151	DIN	
106	15G699	CLAMP, diaphragm	2
110▲	188621	LABEL, warning	1
111	15G332	MUFFLER	1
113	15D475	CLAMP, sanitary	4

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

Seat (Digit 4 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
1	201	15H825	SEAT; 316 sst	4
	202*‡	15H830	O-RING; PTFE	4
2	201	15H825	SEAT; 316 sst	4
	202*‡	15H828	O-RING; EPDM	4

‡ An alternative of 4 PTFE o-rings encapsulated in fluoroelastomer is available in kit 24Z916, which may be purchased separately.

Ball (Digit 5 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
1	301*	112419	BALL; PTFE	4
2	301*	112421	BALL; Santoprene®	4
3	301*	15H833	BALL; polychloroprene/SST core	4

* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 1590 Configurations*** *on page 35 to determine the correct kit for your pump.*

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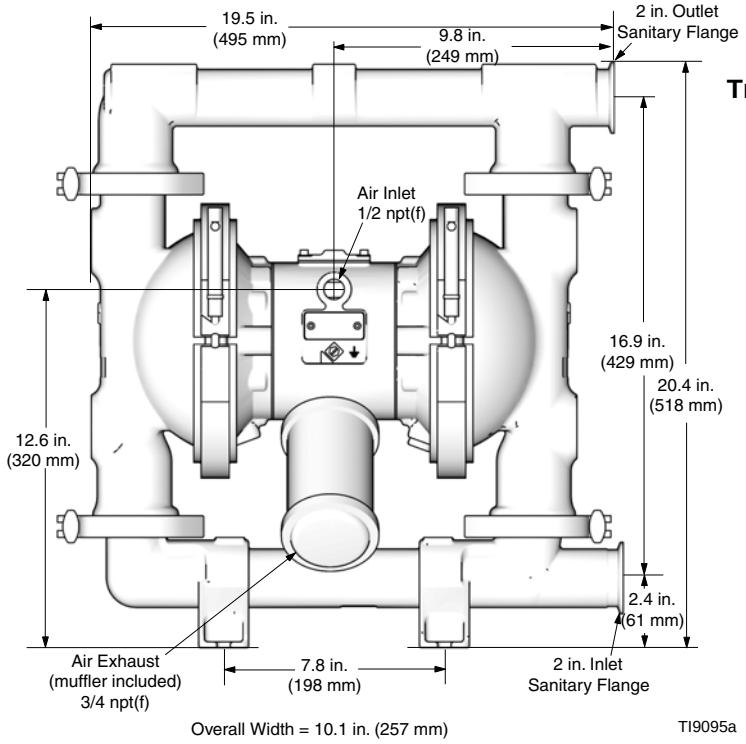
Diaphragm (Digit 6 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
1	401*		DIAPHRAGM; backer; EPDM	2
	402*	112181	PACKING; u-cup; nitrile	2
	403*	15K312	DIAPHRAGM; PTFE	2
	104	15K448	PLATE, air side; aluminum	2
	105	189309	PLATE, fluid side; SST	2
	107	189410	BOLT; M12 x 1.75; 35 mm (1.38 in.); SST	2
	108*	104319	O-RING; PTFE	2
2	402*	112181	PACKING; u-cup; nitrile	2
	403*	189426	DIAPHRAGM; Santoprene®	2
	104	15K448	PLATE, air side; aluminum	2
	105	189309	PLATE, fluid side; SST	2
	107	189410	BOLT; M12 x 1.75; 35 mm (1.38 in.); SST	2
	108*	104319	O-RING; PTFE	2
3	289225 Kit, overmolded diaphragm, PTFE; includes 403 and 104			
	402*	112181	PACKING; u-cup; nitrile	2
	403*	253627	DIAPHRAGM; Overmolded; PTFE; includes two diaphragms and two packings (402)	1
	104	15H810	PLATE, air side; aluminum	2

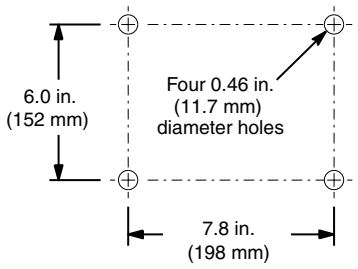
* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 1590 Configurations*** *on page 35 to determine the correct kit for your pump.*

Dimensional Drawing - 1590 Models

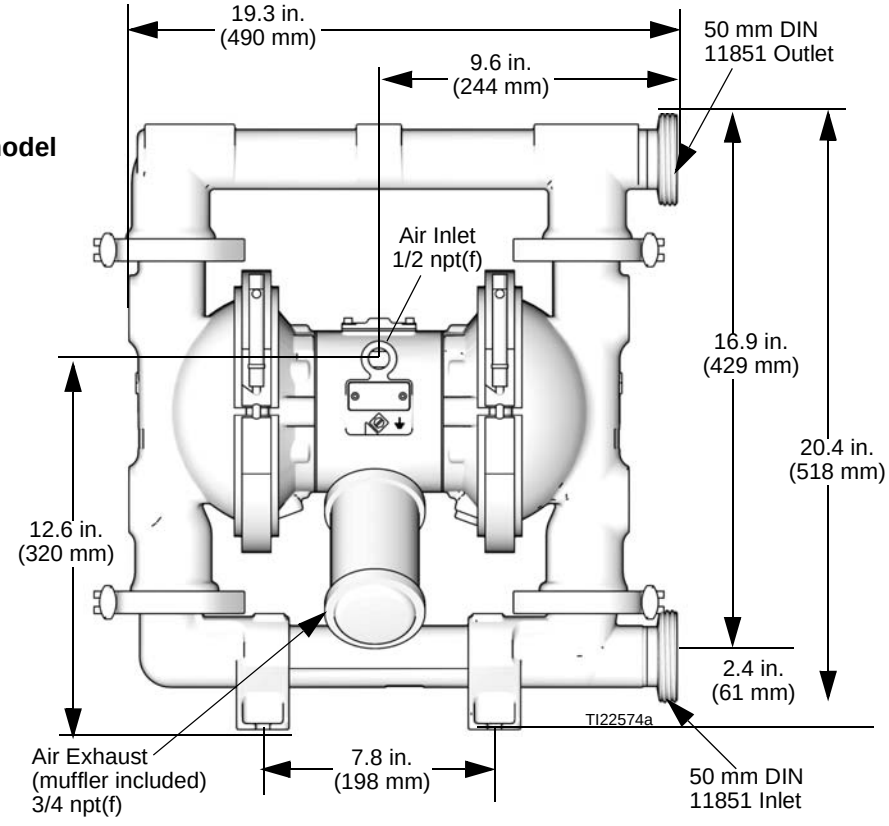
Tri-clamp model



Pump Mounting Hole Pattern



DIN model



Overall Width = 10.1 in. (257 mm)

Technical Data - 1590 Models

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	130 scfm
Air consumption at 70 psi/50 gpm	42 scfm (see chart)
Maximum free-flow delivery	100 gpm (379 l/min)
Maximum pump speed	200 cpm
* Gallons (Liters) per cycle	0.5 (1.9)
Maximum suction lift	29 ft (8.83 m) wet, 14 ft (4.26 m) dry
Maximum size pumpable solids	3/16 in. (4.8 mm)
** Maximum Noise Level at 100 psi, full flow	88 dBa
** Sound Power Level	95 dBa
** Noise Level at 70 psi and 50 cpm	79 dBa
Maximum fluid operating temperature is based on the following maximum diaphragm, ball, and seat temperature ratings.	PTFE 220°F (104.4°C) Santoprene® 180°F (82.2°C) Polychloroprene 200°F (93°C) EPDM 275°F (135°C) Stainless steel 250°F (121.1°C)
Air inlet size	0.5 in. npt(f)
Fluid inlet size	2.0 in. Sanitary flange or 50 mm DIN 11851
Fluid outlet size	2.0 in. Sanitary flange or 50 mm DIN 11851

Wetted parts

***All fluid contact materials are FDA-compliant and meet the United States Code of Federal Regulations (CFR) Title 21, Section 177.

Wetted materials on all models	316 SST
Wetted material depending on model	EPDM, Polychloroprene, PTFE, Santoprene®

CAUTION:

Santoprene® may be used only with non-fatty, non-oily foods or alcohols up to 15%.

Non-wetted external parts	300 series stainless steel, aluminum (A380), polyester (labels), LDPE foam (gasket)

Weight

FD2 Models	89 lb (40.3 kg)
FA2 Models	83 lb. (37.6 kg)

Santoprene® is a registered trademark of the Monsanto Co.

Loctite® is a registered trademark of the Loctite Corporation.

* *Displacement per cycle may vary based on suction condition, discharge head, air pressure, and fluid type.*

** *Noise levels measured with the pump mounted to a solid surface. Sound power measured per ISO Standard 9614-1.*

*** *The pump user must verify that the construction materials meet their specific application requirements.*

Performance Chart - 1590 Models

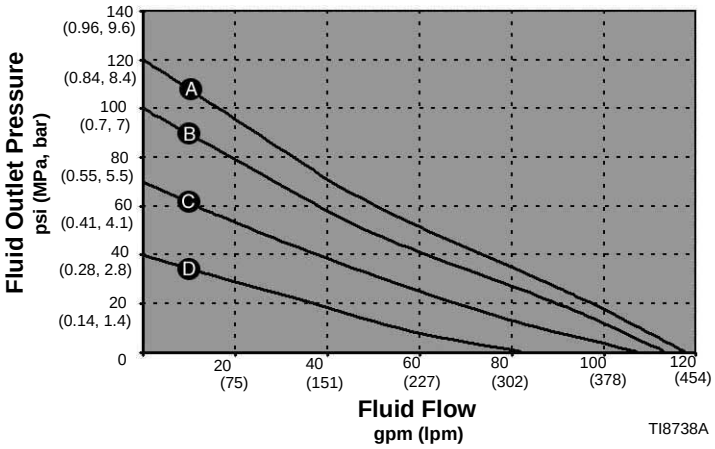
Test Conditions: Pump tested in water with inlet submerged

Fluid Pressure Curves

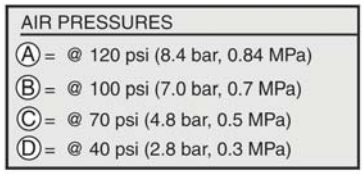
A at 120 psi (0.7 MPa, 7 bar) operating air pressure
B at 100 psi (0.7 MPa, 7 bar) operating air pressure
C at 70 psi (0.48 MPa, 4.8 bar) operating air pressure
D at 40 psi (0.28 MPa, 2.8 bar) operating air pressure

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

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



TI8738A



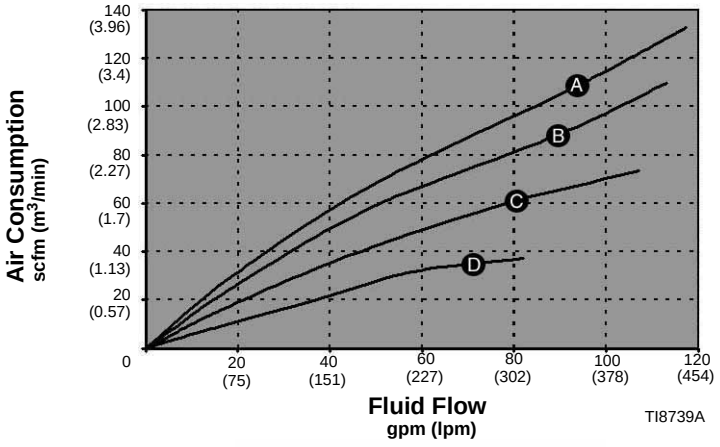
TI8742A

Air Consumption Curves

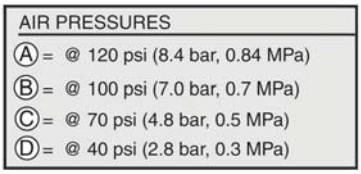
A at 120 psi (0.7 MPa, 7 bar) operating air pressure
B at 100 psi (0.7 MPa, 7 bar) operating air pressure
C at 70 psi (0.48 MPa, 4.8 bar) operating air pressure
D at 40 psi (0.28 MPa, 2.8 bar) operating air pressure

To find Pump Air Pressure
(scfm or m^3/min) at a specific fluid flow (gpm/lpm) and operating air pressure (psi/MPa/bar):

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



TI8739A



TI8742A

Pump and Repair Kit Matrix - 2150 Models

SaniForce 2150 FDA-Compliant Sanitary Pumps

Your Model No. is marked on the pump's serial plate. The first three digits are always either FD3, FD9, FA3, or FA9, designating 2150 FDA-compliant sanitary pumps. The only difference between the FD and FA pumps is the air motor housing material: stainless for FD pumps and aluminum for FA pumps. The third digit defines the connection style, while the final three digits define the materials of construction of the wetted section parts. For example, a 2150 FDA pump with a stainless steel air motor, flange manifold connections, PTFE o-rings, stainless steel seats, PTFE balls, and PTFE diaphragms is Model **FD3111.**To order replacement parts, refer to the part lists on page 45.

Repair kits are numbered in the same manner. The first three digits are always FK3. Parts included in the kit are marked with an asterisk in the parts list, for example (201*). For example, if your pump has stainless steel seats, PTFE o-rings, PTFE balls, and PTFE diaphragms, order Repair Kit **FK3111.**

To repair the air valve, order **Kit 255061** for models with stainless steel center housing or **Kit 236273** for models with aluminum center housing. See page 45. Parts included in Kit 255061 are marked with †, and parts included in Kit 236273 are marked with ◆.

The digits in the matrix **do not** correspond to the reference numbers in the parts drawings and parts lists.

SaniForce Diaphragm Pump (Stainless Steel Fluid Sections)		**Connections**		**Seats and O-rings**		**Balls**		**Diaphragms**	
FD	All 2150 FDA-Compliant sanitary pumps with stainless steel air motor.	**3**	Flange	**1**	316 SST with PTFE o-rings	**1**	PTFE	**1**	PTFE
FA	All 2150 FDA-Compliant sanitary pumps with aluminum air motor.	**9**	DIN	**2**	316 SST with EPDM o-rings	**2**	Santoprene®	**2**	Santoprene®
FK3	All Repair Kits for 2150 FDA-Compliant sanitary pumps.	Flange or DIN				**3**	Polychloroprene with SST core	**3**	PTFE Overmolded

Available 2150 Configurations

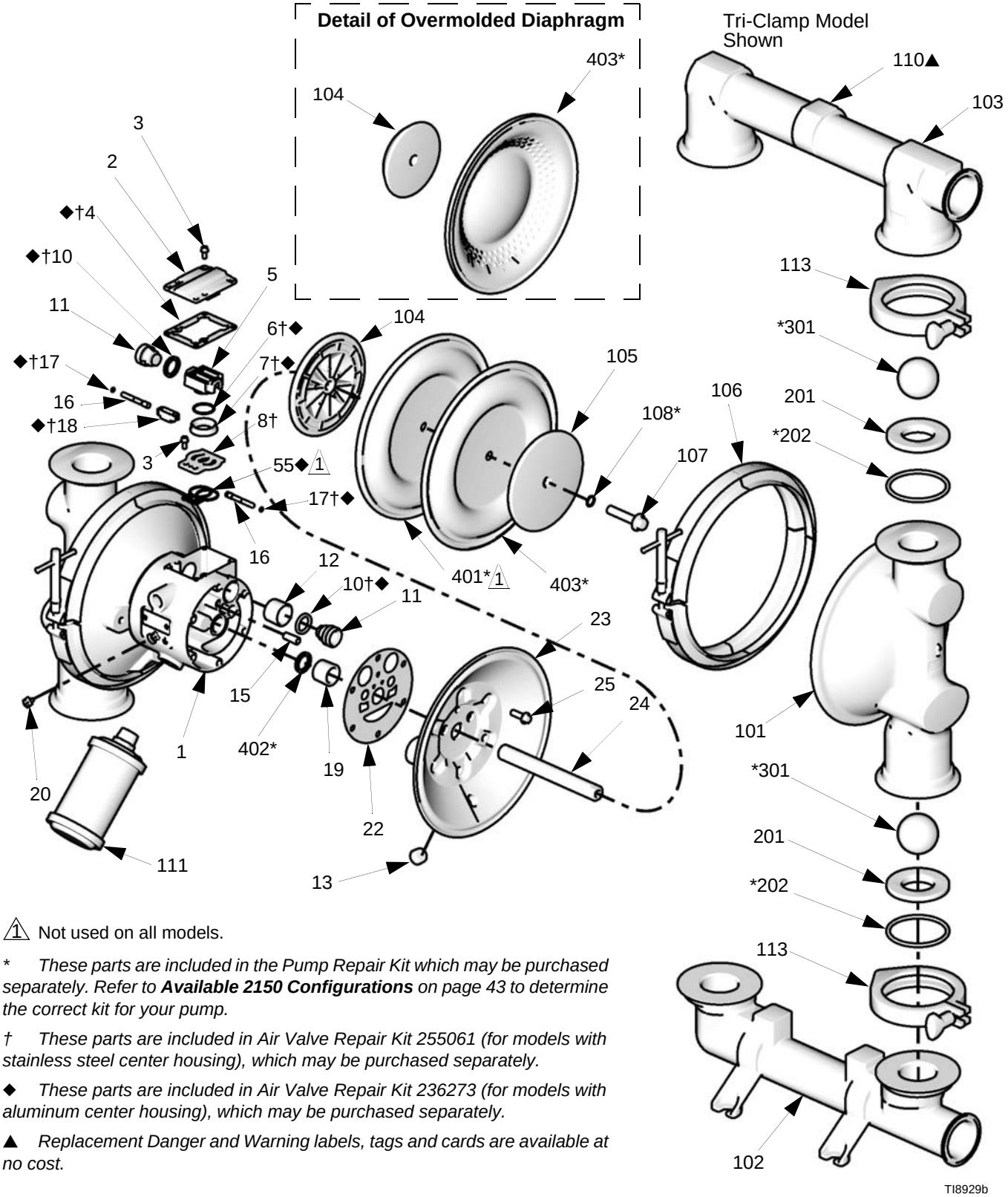
Pump Model	Repair Kit	Description					
		Connections	**Air Motor**	**Seats**	**O-rings**	**Balls**	**Diaphragms**
FD3111	**FK3111**	**Flange**	316 Stainless Steel	316 SST	PTFE	PTFE	PTFE
FD9111	**FK3111**	**DIN**		316 SST	PTFE	PTFE	PTFE
FD3113	**FK3113**	**Flange**		316 SST	PTFE	PTFE	PTFE Overmolded
FD3122	**FK3122**	**Flange**		316 SST	PTFE	Santoprene	Santoprene
FD3132	**FK3132**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	Santoprene
FD3133	**FK3133**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	PTFE Overmolded
FD3211	**FK3211**	**Flange**		316 SST	EPDM	PTFE	PTFE
FD3213	**FK3213**	**Flange**		316 SST	EPDM	PTFE	PTFE Overmolded
FD3222	**FK3222**	**Flange**		316 SST	EPDM	Santoprene	Santoprene
FD9222	**FK3222**	**DIN**		316 SST	EPDM	Santoprene	Santoprene
FD3232	**FK3232**	**Flange**		316 SST	EPDM	Polychloroprene with stainless steel core	Santoprene
FA3111	**FK3111**	**Flange**	A380 Aluminum	316 SST	PTFE	PTFE	PTFE
FA9111	**FK3111**	**DIN**		316 SST	PTFE	PTFE	PTFE
FA3113	**FK3113**	**Flange**		316 SST	PTFE	PTFE	PTFE Overmolded
FA3122	**FK3122**	**Flange**		316 SST	PTFE	Santoprene	Santoprene
FA3132	**FK3132**	**Flange**		316 SST	PTFE	Polychloroprene with stainless steel core	Santoprene
FA3222	**FK3222**	**Flange**		316 SST	EPDM	Santoprene	Santoprene
FA3231	**FK3231**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	PTFE
FA3232	**FK3232**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	Santoprene
FA3233	**FK3233**	**Flange**		316 SST	EPDM	Polychloroprene with Stainless Steel Core	PTFE Overmolded

Options for Ram Mounting

Pump Model	Repair Kit	Seats	O-rings	Balls	Diaphragms
24G743	**FK3113**	316 sst	PTFE	PTFE, white	PTFE Overmolded
24G744	**FK3132**	316 sst	PTFE	Polychloroprene with stainless steel core	Santoprene

Parts - 2150 Models

See page 47 for 2150 models designed for ram mounting.



1 Not used on all models.

* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 2150 Configurations*** *on page 43 to determine the correct kit for your pump.*

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

◆ *These parts are included in Air Valve Repair Kit 236273 (for models with aluminum center housing), which may be purchased separately.*

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

Parts, 2150 Models, continued

Air Motor (Digit 2 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
D	1	15K009	HOUSING, center; SST	1
	2	15K696	COVER, air valve; SST	1
	8†	15H178	PLATE, air valve; SST	1
A	1	188838	HOUSING, center, aluminum	1
	2	188854	COVER, air valve; aluminum	1
	8	188615	PLATE, air valve, aluminum	1
	55◆	188617	SEAL, valve plate	1

Air Motor Common Parts

Ref.	Part No.	Description	Qty
3	116344	SCREW, mach, hex flange hd; M5 x 0.8; 12 mm (0.47 in.)	10
4†◆	188618	GASKET, cover	1
5	188855	CARRIAGE; aluminum	1
6†◆	108730	O-RING; nitrile	1
7†◆	188616	BLOCK, air valve; acetal	1
10†◆	112181	PACKING, u-cup; nitrile	4
11	188612	PISTON, actuator; acetal	2
12	188613	BEARING, piston; acetal	2
13	103778	PLUG, pipe	2
15	188611	BEARING, pin; acetal	2
16	188610	PIN, pilot; SST	2
17†◆	157628	O-RING; buna-N	2
18†◆	188614	BLOCK, pilot; acetal	1
19	188609	BEARING, shaft; acetal	2
20	116344	SCREW, grounding	1
22	188603	GASKET, air cover; foam	2
23	15H859	COVER, air; SST	2
24	189304	SHAFT, diaphragm; SST	1
25	112178	SCREW; M8 x 1.25; 25 mm (1 in.); stainless steel	12

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

◆ *These parts are included in Air Valve Repair Kit 236273 (for models with aluminum center housing), which may be purchased separately.*

Fluid Section

Ref.	Part No.	Description	Qty
101	277264	COVER, fluid; SST	2
102		MANIFOLD, inlet; SST	1
	277269	Flange	
	24U152	DIN	
103		MANIFOLD, outlet; SST	1
	277270	Flange	
	24U153	DIN	
106	15H513	CLAMP, sanitary, diaphragm	2
110▲	188621	LABEL, warning	1
111	15G332	MUFFLER	1
113	510490	CLAMP, sanitary	4

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

Seat (Digit 4 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
1	201	15H826	SEAT; 316 SST	4
	202*‡	15H831	O-RING; PTFE	4
2	201	15H826	SEAT; 316 SST	4
	202*‡	15H829	O-RING; EPDM	4

‡ An alternative of 4 PTFE o-rings encapsulated in fluoroelastomer is available in kit 24Z917, which may be purchased separately.

Ball (Digit 5 of 6 in Pump Model Number)

Digit	Ref.	Part No.	Description	Qty
1	301*	112359	BALL; PTFE	4
2	301*	112361	BALL; Santoprene®	4
3	301*	15H834	BALL; polychloroprene/SST core	4

* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 2150 Configurations*** *on page 43 to determine the correct kit for your pump.*

Continued on next page.

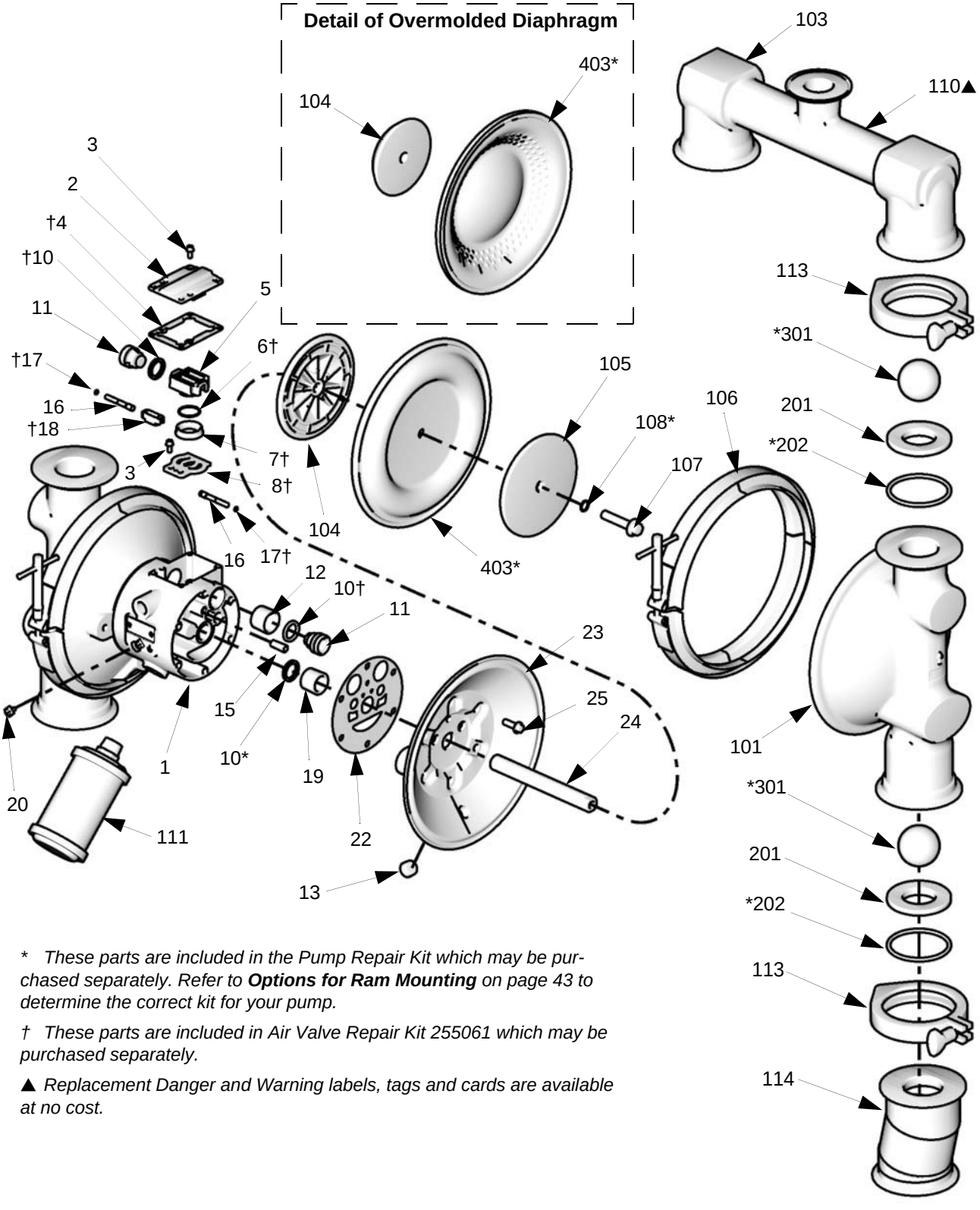
Diaphragm (Digit 6 of 6 in Pump Model Number

Digit	Ref.	Part No.	Description	Qty
1	401*		DIAPHRAGM; backer; EPDM	2
	402*	112181	PACKING; u-cup; nitrile	2
	403*	15K313	DIAPHRAGM; PTFE	2
	104	189298	PLATE, air side; aluminum	2
	105	189299	PLATE, fluid side; SST	2
	107	189410	BOLT; M12 x 1.75; 55 mm (2.16 in.); SST	2
	108*	104319	O-RING; PTFE	2
2	402*	112181	PACKING; u-cup; nitrile	2
	403*	189296	DIAPHRAGM; Santoprene®	2
	104	189298	PLATE, air side; aluminum	2
	105	189299	PLATE, fluid side; SST	2
	107	189410	BOLT; M12 x 1.75; 55 mm (2.16 in.); SST	2
	108*	104319	O-RING; PTFE	2
3	289226 Kit, overmolded diaphragm, PTFE; includes 403 and 104			
	402*	112181	PACKING; u-cup; nitrile	2
	403*	253628	DIAPHRAGM; Overmolded; PTFE; includes two diaphragms and two packings (402)	1
	104	15H811	PLATE, air side; aluminum	2

* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Available 2150 Configurations*** *on page 43 to determine the correct kit for your pump.*

Parts - 2150 Models for Ram Mounting

Models 24G743 and 24G744



* *These parts are included in the Pump Repair Kit which may be purchased separately. Refer to* ***Options for Ram Mounting*** *on page 43 to determine the correct kit for your pump.*

† *These parts are included in Air Valve Repair Kit 255061 which may be purchased separately.*

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

2150 Models 24G743 and 24G744 (for Ram Mounting)

Ref.	Part No.	Description	Qty
1	15K009	HOUSING, center; SST	1
2	15K696	COVER, air valve; SST	1
3	116344	SCREW, mach, hex flange hd; M5 x 0.8; 12 mm (0.47 in.)	9
4†	188618	GASKET, cover	1
5	188855	CARRIAGE; aluminum	1
6†	108730	O-RING; nitrile	1
7†	188616	BLOCK, air valve; acetal	1
8†	15H178	PLATE, air valve; SST	1
10†	112181	PACKING, u-cup; nitrile	4
11	188612	PISTON, actuator; acetal	2
12	188613	BEARING, piston; acetal	2
13‡	103778	PLUG, pipe	2
15	188611	BEARING, pin; acetal	2
16	188610	PIN, pilot; SST	2
17†	157628	O-RING; buna-N	2
18†	188614	BLOCK, pilot; acetal	1
19	188609	BEARING, shaft; acetal	2
20	116344	SCREW, grounding	1
22	188603	GASKET, air cover; foam	2
23	15H859	COVER, air; SST	2
24	189304	SHAFT, diaphragm; SST	1
25	112178	SCREW; M8 x 1.25; 25 mm (1 in.); stainless steel	12
101	277264	COVER, fluid; SST	2
103	16F257	MANIFOLD, outlet; SST	1
104	15H811	PLATE, air side; aluminum, for Model 24G743	2
	189298	PLATE, air side, aluminum, for Model 24G744	2
105	189299	PLATE, fluid side; SST, for Model 24G744	2
106	15H513	CLAMP, sanitary, diaphragm	2
107	189410	BOLT; M12 x 1.75; 55 mm (2.16 in.); SST, for Model 24G744	2
108*	104319	O-RING; PTFE	2
110▲	188621	LABEL, warning	1
113	510490	CLAMP, sanitary	4
114	24G855	ADAPTER, for ram plate	2
201	15H826	SEAT; 316 SST	4
202*‡	15H831	O-RING; PTFE	8
301*	112359	BALL; PTFE, for Model 24G743	4
	15H834	BALL; polychloroprene/SST core, for Model 24G744	4
403*	253628	DIAPHRAGM; Overmolded; PTFE; includes two diaphragms and two packings (10), for Model 24G743	1
	189296	DIAPHRAGM; Santoprene®, for Model 24G744	2

† These parts are included in Air Valve Repair Kit 255061 which may be purchased separately.

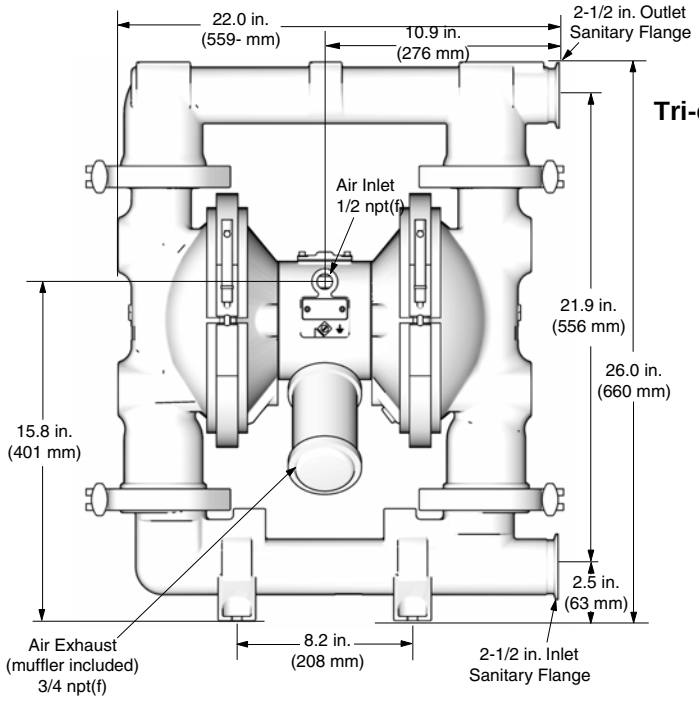
** These parts are included in the Pump Repair Kit which may be purchased separately. Order Kit FK3113 for Model 24G743. Order Kit FK3132 for Model 24G744.*

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

‡ An alternative of 4 PTFE o-rings encapsulated in fluoroelastomer is available in kit 24Z917, which may be purchased separately.

Dimensional Drawing - 2150 Models

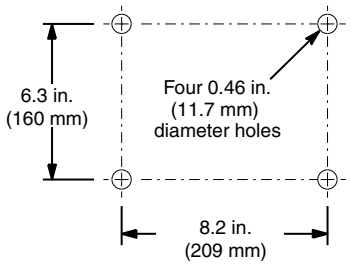
Tri-clamp model



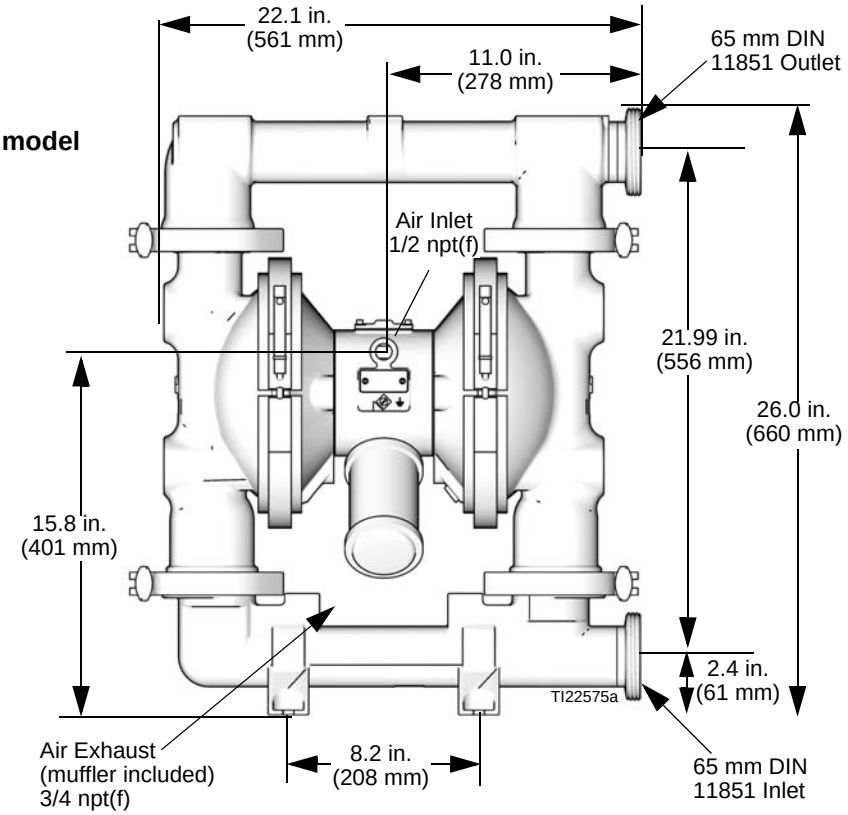
Overall Width = 12.3 in. (312 mm)

TI9096a

Pump Mounting Hole Pattern

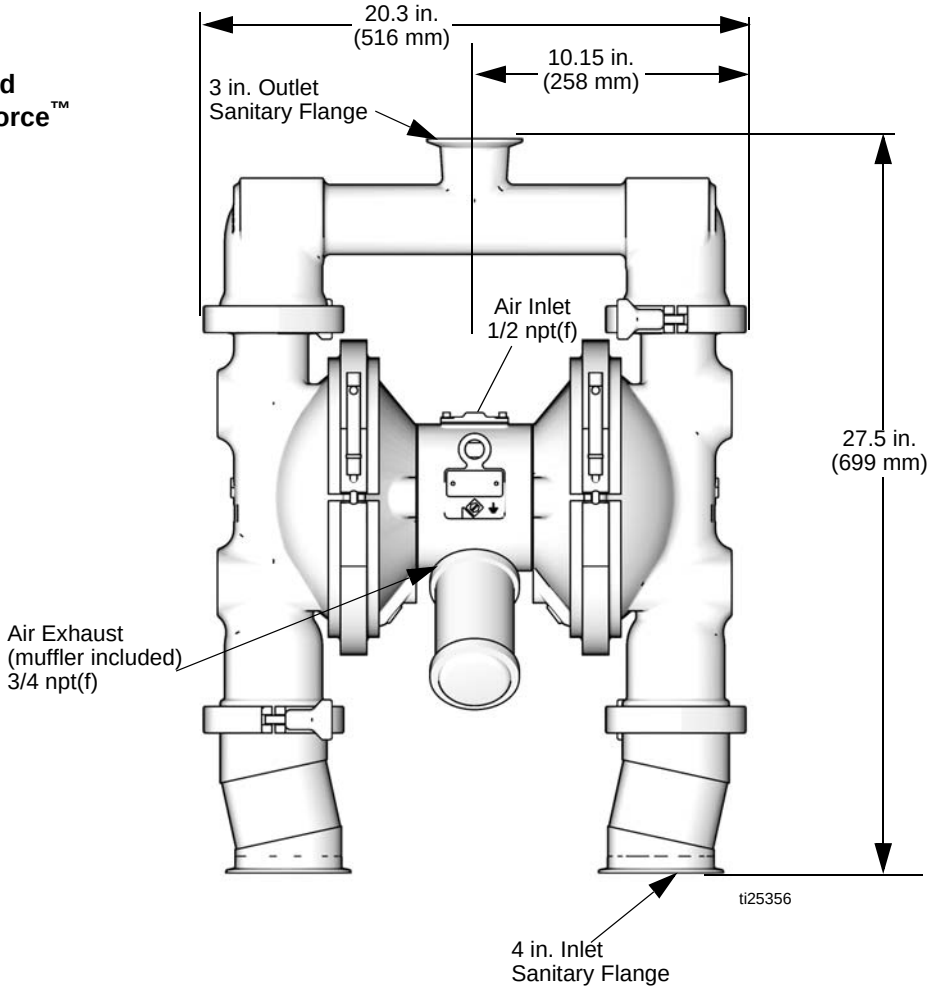


DIN model



Overall Width = 10.1 in. (257 mm)

Models 24G743 and 24G744 (for SaniForce™ Sanitary Ram)



Technical Data - 2150 Models

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	175 scfm
Air consumption at 70 psi/80 gpm	70 scfm (see chart)
Maximum free-flow delivery	160 gpm (568 lpm)
Maximum pump speed	165 cpm
* Gallons (Liters) per cycle	0.97 (3.67)
Maximum suction lift	29 ft (8.83 m) wet, 16 ft (4.87 m) dry
Maximum size pumpable solids	1/4 in. (6.3 mm)
** Maximum Noise Level at 100 psi, full flow	95 dBa
** Sound Power Level	102 dBa
** Noise Level at 70 psi and 50 cpm	84 dBa
Maximum fluid operating temperature is based on the following maximum diaphragm, ball, and seat temperature ratings.	PTFE 220°F (104.4°C) Santoprene® 180°F (82.2°C) Polychloroprene 200°F (93°C) EPDM 275°F (135°C) Stainless steel 250°F (121.1°C)
Air inlet size	0.5 in. npt(f)
Fluid inlet size	
Models 24G743 and 24G744 (for ram mounting)	4 in. sanitary flange
All other models	2.5 in. sanitary flange or 65 mm DIN 11851
Fluid outlet size	
Models 24G743 and 24G744 (for ram mounting)	3 in. sanitary flange
All other models	2.5 in. sanitary flange or 65 mm DIN 11851

Wetted parts

***All fluid contact materials are FDA-compliant and meet the United States Code of Federal Regulations (CFR) Title 21, Section 177.

Wetted materials on all models	316 SST
Wetted material depending on model	EPDM, Polychloroprene, PTFE, Santoprene®

CAUTION:

Santoprene® may be used only with non-fatty, non-oily foods or alcohols up to 15%.

Non-wetted external parts	300 series stainless steel, aluminum (A380), polyester (labels), LDPE foam (gasket)

Weight

FD3 Models	147 lb. (66.7 kg)
FA3 Models	141 lb. (64.0 kg)

Santoprene® is a registered trademark of the Monsanto Co.

Loctite® is a registered trademark of the Loctite Corporation.

* *Displacement per cycle may vary based on suction condition, discharge head, air pressure, and fluid type.*

** *Noise levels measured with the pump mounted to a solid surface. Sound power measured per ISO Standard 9614-1.*

*** *The pump user must verify that the construction materials meet their specific application requirements.*

Performance Chart - 2150 Models

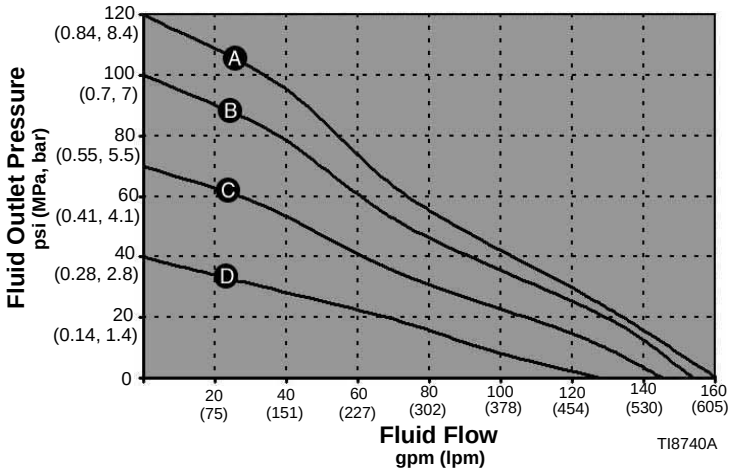
Test Conditions: Pump tested in water with inlet submerged

Fluid Pressure Curves

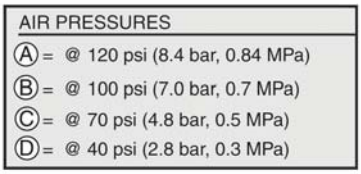
A at 120 psi (0.7 MPa, 7 bar) operating air pressure
B at 100 psi (0.7 MPa, 7 bar) operating air pressure
C at 70 psi (0.48 MPa, 4.8 bar) operating air pressure
D at 40 psi (0.28 MPa, 2.8 bar) operating air pressure

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

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



TI8740A



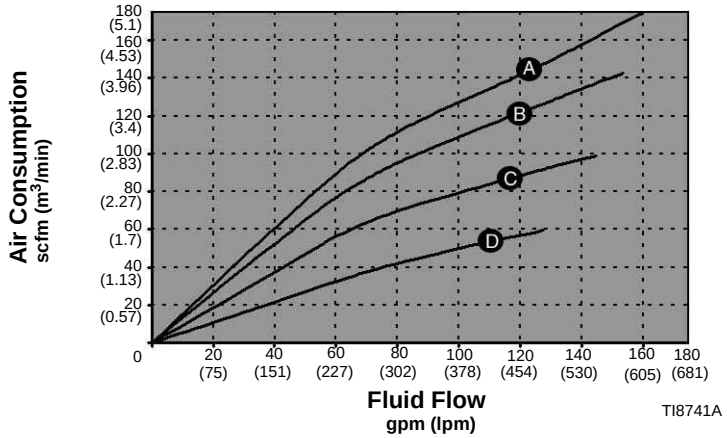
TI8742A

Air Consumption Curves

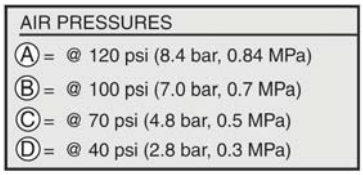
A at 120 psi (0.7 MPa, 7 bar) operating air pressure
B at 100 psi (0.7 MPa, 7 bar) operating air pressure
C at 70 psi (0.48 MPa, 4.8 bar) operating air pressure
D at 40 psi (0.28 MPa, 2.8 bar) operating air pressure

To find Pump Air Consumption
(scfm or m^3/min) at a specific fluid flow (gpm/lpm) and operating air pressure (psi/MPa/bar):

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



TI8741A



TI8742A

Graco Warranties

Graco Standard Pump Warranty

Graco warrants all equipment 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 five years 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 the 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 six 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.

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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 nearest distributor.
Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

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Graco reserves the right to make changes at any time without notice.

Original Instructions. This manual contains English. MM 311879

Graco Headquarters: Minneapolis
International Offices: Belgium, China, Japan, Korea

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