

## SaniForce® 1040e Electric - Operated Diaphragm Pump

3A3168M  
EN

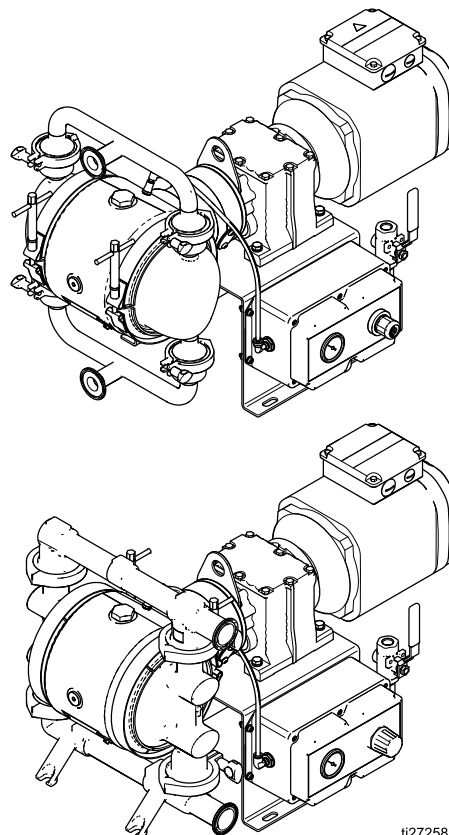
For fluid transfer in indoor sanitary applications. Not approved for use in explosive atmospheres or hazardous locations unless otherwise stated. See Approvals page for more information. For professional use only.



### Important Safety Instructions

Read all warnings and instructions in this manual and in your SaniForce 1040e Operation manual. **Save these instructions.**

*For maximum operating pressures, see the Performance Charts on pages 46–49 of the Operation manual. See pages 6–8 for model information, including approvals.*



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## Related Manuals









Manual Number	Title
3A3167	SaniForce 1040e Electric-Operated Diaphragm Pump, Operation

# 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 symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

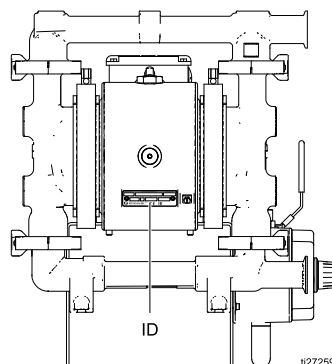
 <h2>WARNING</h2>	
 	<h3>ELECTRIC SHOCK HAZARD</h3> <p>This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.</p> <ul style="list-style-type: none"> <li>• Turn off and remove power before disconnecting any cables and before servicing or installing equipment. For cart-mounted models, unplug the power cord. For all other units, disconnect power at the main switch.</li> <li>• Connect only to grounded power source.</li> <li>• All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.</li> <li>• Wait five minutes for capacitor discharge before opening equipment.</li> <li>• For cart-mounted models, use only 3-wire extension cords.</li> <li>• For cart-mounted models, ensure ground prongs are intact on any power and extension cords.</li> <li>• For cart-mounted models, do not expose to rain. Store indoors.</li> <li>• Do not expose compressor box to washdown spray.</li> </ul>
    	<h3>FIRE AND EXPLOSION HAZARD</h3> <p>Flammable fumes, such as solvent and paint fumes, in <b>work area</b> can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> <li>• Use equipment only in well ventilated area.</li> <li>• Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).</li> <li>• Ground all equipment in the work area. See <b>Grounding</b> instructions.</li> <li>• Keep work area free of debris, including solvent, rags and gasoline.</li> <li>• Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.</li> <li>• Use only grounded hoses.</li> <li>• <b>Stop operation immediately</b> if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.</li> <li>• Keep a working fire extinguisher in the work area.</li> </ul> <p>Static charge may build up on plastic parts during cleaning and could discharge and ignite flammable vapors. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> <li>• Clean plastic parts only in well ventilated area.</li> <li>• Do not clean with a dry cloth.</li> <li>• Do not operate electrostatic guns in equipment work area.</li> </ul>

 <h1>WARNING</h1>	
 	<b>PRESSURIZED EQUIPMENT HAZARD</b> <p>Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.</p> <ul style="list-style-type: none"> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.</li> </ul>
 	<b>EQUIPMENT MISUSE HAZARD</b> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Do not operate the unit when fatigued or under the influence of drugs or alcohol.</li> <li>• Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See <b>Technical Data</b> in all equipment manuals.</li> <li>• Use fluids and solvents that are compatible with equipment wetted parts. See <b>Technical Data</b> in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheet (SDS) from distributor or retailer.</li> <li>• Turn off all equipment and follow the <b>Pressure Relief Procedure</b> when equipment is not in use.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.</li> <li>• Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.</li> <li>• Make sure all equipment is rated and approved for the environment in which you are using it.</li> <li>• Use equipment only for its intended purpose. Call your distributor for information.</li> <li>• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not kink or over bend hoses or use hoses to pull equipment.</li> <li>• Keep children and animals away from work area.</li> <li>• Comply with all applicable safety regulations.</li> </ul>
	<b>PRESSURIZED ALUMINUM PARTS HAZARD</b> <p>Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.</p> <ul style="list-style-type: none"> <li>• Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents.</li> <li>• Do not use chlorine bleach.</li> <li>• Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.</li> </ul>

 <h1>WARNING</h1>	
  	<b>THERMAL EXPANSION HAZARD</b> <p>Fluids subjected to heat in confined spaces, including hoses, can create a rapid rise in pressure due to the thermal expansion. Over-pressurization can result in equipment rupture and serious injury.</p> <ul style="list-style-type: none"> <li>• Open a valve to relieve the fluid expansion during heating.</li> <li>• Replace hoses proactively at regular intervals based on your operating conditions.</li> </ul>
 	<b>TOXIC FLUID OR FUMES HAZARD</b> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> <li>• Read SDS to know the specific hazards of the fluids you are using.</li> <li>• Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.</li> </ul>
	<b>BURN HAZARD</b> <p>Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:</p> <ul style="list-style-type: none"> <li>• Do not touch hot fluid or equipment.</li> </ul>
	<b>PERSONAL PROTECTIVE EQUIPMENT</b> <p>Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Protective eyewear, and hearing protection.</li> <li>• Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.</li> </ul>

# Configuration Number Matrix

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






Sample Configuration Number: **1040FGE-A04AS13SSPTPOPT**

<b>1040</b>	<b>FG</b>	<b>E</b>	<b>A</b>	<b>04A</b>	<b>S13</b>	<b>SS</b>	<b>PT</b>	<b>PO</b>	<b>PT</b>
Pump Model	Wetted Section Material	Drive	Center Section Material	Gear Box and Motor	Fluid Covers and Manifolds	Seats	Balls	Diaphragms	Manifold O-Rings

Pump	Wetted Section Material		Drive Type		Center Section Material		Motor and Gearbox	
<b>1040</b>	<b>FG</b>	Sanitary Stainless Steel	<b>E</b>	Electric	<b>A</b>	Aluminum	<b>04A</b>	Standard AC Induction Motor with Gearbox
	<b>HS</b>	High Sanitation			<b>S</b>	Stainless Steel	<b>04B</b>	Brushless DC Motor
	<b>PH</b>	Pharmaceutical					<b>04E</b>	NEMA 56 C Gearbox ‡
							<b>04F</b>	IEC 90 B5 Flange Gearbox ‡
							<b>05C</b>	Brushless DC Motor (configured for cart-mounted systems)

Fluid Covers and Manifolds		Seat Material		Ball Material		Diaphragm Material		Manifold O-Rings	
<b>S13</b>	TriClamp, FG	<b>SS</b>	316 Stainless Steel	<b>CW</b>	Polychloroprene Weighted	<b>PO</b>	PTFE/EPDM Overmold	<b>PT</b>	PTFE
<b>S14</b>	DIN, FG			<b>PT</b>	PTFE	<b>PT</b>	PTFE/EPDM 2-Piece	<b>EP</b>	EPDM
<b>SSA</b>	TriClamp, HS or PH			<b>SP</b>	Santoprene	<b>SP</b>	Santoprene		
<b>SSB</b>	DIN, HS or PH								

Approvals	
All Models are certified to:	
Models which do not contain Santoprene*:	

Approvals	
‡ Pumps with code 04E or 04F are certified to:	 II 2 G Ex h IIB T3 Gb
	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.

\* EC 1935/2004 compliant pumps may be subject to individual national provisions in addition to those specified in the EC regulation. It is the users responsibility to know and follow local laws.

# Overview

The product line offers electric-powered diaphragm pumps in a wide range of models. This section shows the structure of available models.

## Food Grade Pump Models

Center Section	Motor Type	Controller	Gearbox	Compressor	Approval Options	Cart
Aluminum or Stainless Steel	AC	VFD — not included. VFD Kits 16K911 (240V) and 16K912 (480V) are available.	Yes – part of motor	Yes-120V	None	No*
				Yes-240V	CE	No*
				No†		No*
	Brushless DC	Graco Motor Control – included	NEMA	Yes-120V	None	Yes
				Yes-240V	CE	Yes
				No†		No*
	None	None	NEMA	None	ATEX & CE	No*
			IEC			

\* Cart Kit 24Y923 is available.

†Compressor Kits 24Y921 (120V) and 24Y922 (240V) are available

## High Sanitation and Pharmaceutical Pump Models

Center Section	Motor Type	Controller	Gearbox	Compressor	Approval Options	Cart
Aluminum or Stainless Steel	AC	VFD — not included. VFD Kits 16K911 (240V) and 16K912 (480V) are available.	Yes – part of motor	No†	CE	No*
	Brushless DC	Graco Motor Control – included	NEMA			
	None	None	NEMA	None	ATEX & CE	
			IEC			

\* Cart Kit 24Y923 is available.

†Compressor Kits 24Y921 (120V) and 24Y922 (240V) are available

## Key Points:

- Pumps are available with an AC or Brushless DC (BLDC) motor, or with just a gearbox (for applications where a motor is already available).
- Graco recommends the use of a motor soft starter or a VFD (PN 16K911 or 16K912) in the electrical circuit for all installations. See the motor manufacturer's recommendations for proper installation when using either of these components. In all cases, make sure all products are installed in accordance with local codes and regulations.
- BLDC motors are controlled by the Graco Motor Control that is supplied with the pump.



# Troubleshooting

- Follow the [Pressure Relief Procedure, page 11](#), before checking or servicing the equipment.
- Check all possible problems and causes before disassembly.



See the Operation Manual (3A3167) for troubleshooting or error information on the Graco Motor Control.

Problem	Cause	Solution
Pump cycles but will not prime and/or pump.	Pump is running too fast, causing cavitation before prime.	Slow down the motor controller (VFD or Graco Motor Control)
	Center section has no air pressure, or air pressure is too low.	Apply air pressure to center section per your application requirements.
	Check valve ball is severely worn or wedged in seat or manifold.	Replace the ball and seat.
	Insufficient suction pressure	Increase suction pressure. See manual 3A3167.
	Seat is severely worn.	Replace the ball and seat.
	Outlet or inlet is restricted.	Remove the restriction.
	Inlet fittings or manifolds are loose.	Tighten.
	Manifold o-rings are damaged.	Replace o-rings.
The center section is excessively hot.	The drive shaft is broken.	Replace.
Pump fails to hold fluid pressure at stall.	Check valve balls, seats, or o-rings are worn.	Replace.
	Manifold clamps or fluid cover clamps are loose.	Tighten.
	Diaphragm shaft bolt is loose	Tighten.
Pump will not cycle.	Motor or controller is wired improperly.	Wire per manual.
	The leak detector (if installed) has tripped.	Check diaphragm for rupture or incorrect installation. Repair or replace.
Pump flow rate is erratic.	Suction line is clogged.	Inspect; clear.
	Check balls are sticky or leaking .	Clean or replace.
	Diaphragm (or backup) ruptured.	Replace.
Pump makes unusual noises.	Pump is operating near or at stall pressure.	Adjust air pressure or slow the pump speed.
Air consumption is higher than expected.	A fitting is loose.	Tighten. Inspect thread sealant.
	Loose or damaged o-rings or shaft seal.	Replace.
	Diaphragm (or backup) ruptured.	Replace.

## Troubleshooting

Problem	Cause	Solution
Air bubbles in fluid.	Suction line is loose.	Tighten.
	Diaphragm (or backup) ruptured.	Replace.
	Loose manifolds, damaged seats or o-rings.	Tighten manifold bolts or replace seats or o-rings.
	Loose diaphragm shaft bolt.	Tighten.
Pump leaks fluid externally from joints.	Loose manifold clamps or fluid cover clamps.	Tighten.
	Manifold o-rings worn out.	Replace o-rings.
The controller faults or shuts down.	A GFCI has tripped.	Remove the controller from the GFCI circuit.
	Supply power is poor.	Determine and fix the source of the power problem.
	Operational parameters are exceeded.	See manual 3A3167 for event codes.
<b>NOTE:</b> For problems with a Variable Frequency Device (VFD), see your VFD manual. For problems with the Graco Motor Control, see your Operation Manual.		

# Repair

## Pressure Relief Procedure

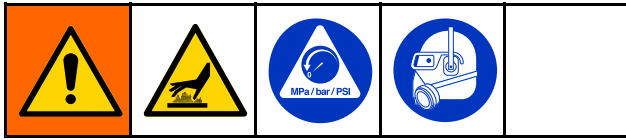


Follow the Pressure Relief Procedure whenever you see this symbol.

				
<p>This equipment stays pressurized until pressure is relieved manually. To help prevent serious injury from pressurized fluid, such as splashing in the eyes or on skin, follow the Pressure Relief Procedure when you stop pumping and before you clean, check, or service the equipment.</p>				

1. Remove power from the system.
2. Open the dispensing valve, if used.
3. Open the fluid drain valve to relieve fluid pressure. Have a container ready to catch the drainage.
4. Close the pump air inlet valve on the pneumatic enclosure.
5. **Units with a compressor:** Cycle the valve to bleed any remaining air.

## Check Valve Repair



**NOTE:** Kits are available for new check valve balls, diaphragms, and manifold o-rings in a range of materials. A seat and manifold o-ring kit is also available.

**NOTE:** To ensure proper seating of the check balls, always inspect the seats when replacing the balls. Replace seats as necessary if seating surface shows evidence of wear.

### Disassemble the Check Valves

1. Follow the [Pressure Relief Procedure, page 11](#). Remove power from the motor. Disconnect all hoses.
2. Remove the manifold clamps (6), then remove the outlet manifold (3).

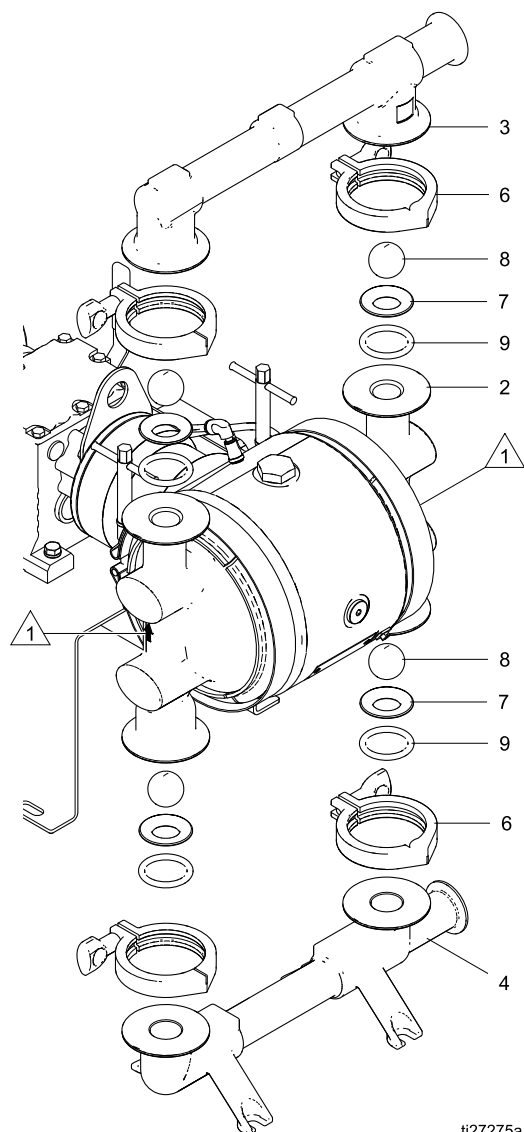
3. Remove the ball check assemblies:
  - a. On the 1040FG, remove the o-rings (9), seats (7), and balls (8).
  - b. On the 1040HS and 1040PH, remove the ball stops (8), gaskets (9), and balls (8).
4. Repeat for the inlet manifold (4), o-rings (9), seats (7), and balls (8).

To continue disassembly, see [Disassemble the Diaphragms, page 15](#).

### Reassemble the Check Valves

1. Clean all parts and inspect for wear or damage. Replace parts as needed.
2. Reassemble in the reverse order, following all notes in the illustration. Put the inlet manifold on first. Be sure the ball checks (7–9) and manifolds (3, 4) are assembled **exactly** as shown. The arrows on the fluid covers (2) **must** point toward the outlet manifold (3).

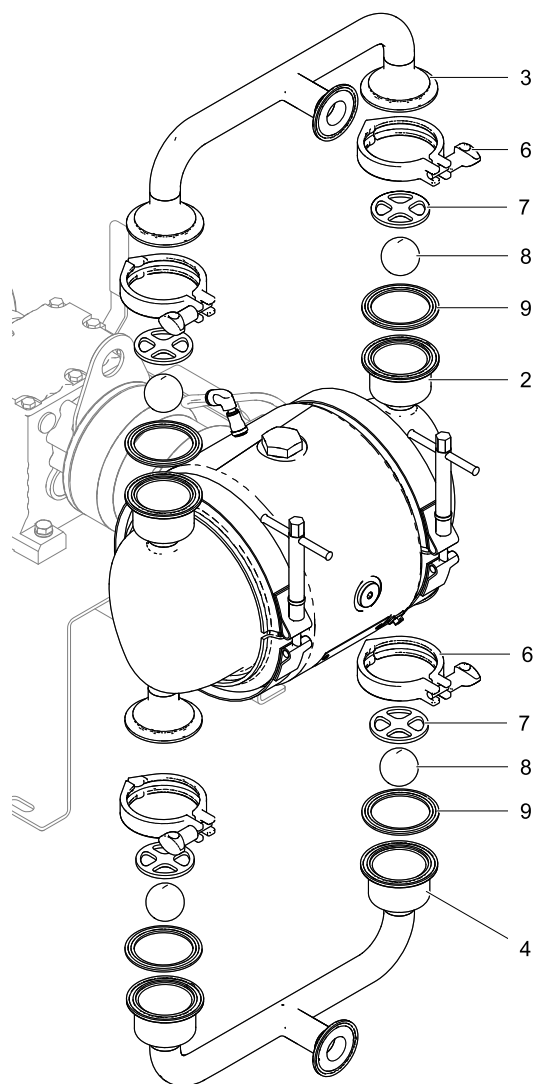
1040FG



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1 Arrow on both covers must point toward outlet manifold

1040HS or 1040PH

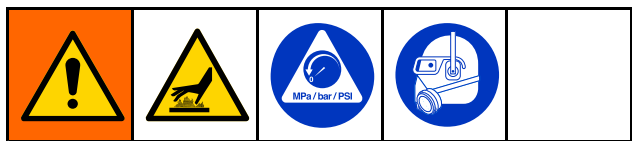


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## Notes

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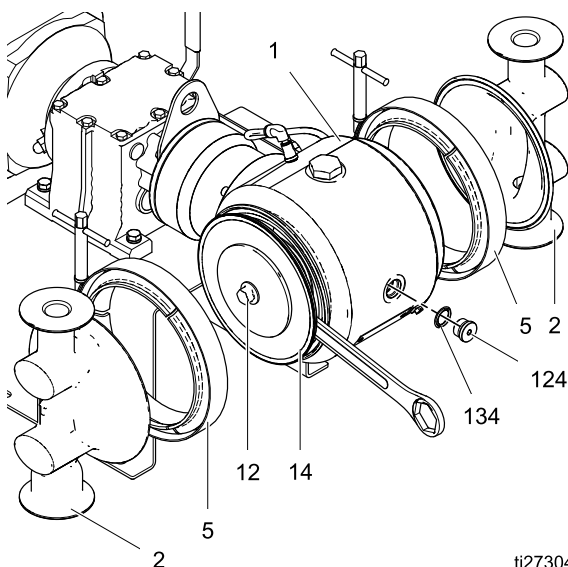
## Diaphragm Repair



### Disassemble the Diaphragms

**NOTE:** Diaphragm kits are available in a range of materials and styles. See Parts section.

1. Follow the [Pressure Relief Procedure, page 11](#). Remove power from the motor. Disconnect all hoses.
2. Remove the manifolds and disassemble the ball check valves as explained in [Check Valve Repair, page 12](#).
3. Remove the clamps (5) from the fluid covers, then pull the fluid covers off of the pump.



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4. Loosen the screws and remove the motor fan cover. Turn the motor fan by hand to move the piston fully to one side.

**NOTE:** If the pump is still attached to the motor, remove the plug (124) and o-ring (134). Use a 10 mm socket to rotate the shaft clockwise to shift the piston to one side. Socket should move easily [no more than 15 in-lb (1.7 N·m) of torque]. If more torque is required, stop. Remove the motor. See [Center Section Repair, page 18](#)

5. **Overmolded Diaphragms (PO models)**
  - a. Hold a 5/8 in. wrench on the wrench flats of the exposed piston shaft. The diaphragm (12) will screw off by hand. Remove the air side diaphragm plate (11).
  - b. Move the piston fully to one side by rotating the drive shaft. On AC Models, move the piston by hand turning the motor fan. (See instructions in step 4). Repeat step 5a.
6. **All Other Diaphragms**
  - a. Hold a 5/8 in. wrench on the wrench flats of the exposed piston shaft. Use a 15 mm wrench on the shaft bolt (15) to remove it. Then remove all parts of the diaphragm assembly.
  - b. Move the piston fully to one side by rotating the drive shaft. On AC Models, move the piston by hand turning the motor fan. (See instructions in step 4). Repeat step 6a.
7. To continue with disassembly, see [Disassemble the Center Section, page 18](#).

## Reassemble the Diaphragms

Follow all notes in the illustrations on page 17. These notes contain **important** information.

### NOTICE

After reassembly, allow the thread locker to cure for 12 hours, or per manufacturer's instructions, prior to operating the pump. Damage to the pump will occur if the diaphragm shaft bolt loosens.

**TIP:** If you are also repairing or servicing the center section (drive shaft, piston, etc.), see [Center Section Repair, page 18](#), before you put the diaphragms back on.

1. Clean all parts and inspect for wear or damage. Replace parts as needed. Be sure the center section is clean and dry.
2. **Overmolded Diaphragms (PO)**
  - a. If a diaphragm setscrew comes loose or is replaced, apply permanent (red) thread locker to diaphragm side threads. Screw into diaphragm until tight.
  - b. Assemble the air side plate (11) onto the diaphragm. The rounded side of the plate must face the diaphragm.
  - c. Clean the female threads of the piston shaft with a wire brush dipped in solvent to remove any residual thread locker. Apply thread-locking primer and allow it to dry.
  - d. Thoroughly clean, then apply medium-strength (blue) thread locker to the threads of the diaphragm assembly.
  - e. Hold a 5/8 in. wrench on the wrench flats of the piston shaft. Screw the assembly into the shaft as tight as possible by hand.
  - f. Move the piston fully to one side by rotating the drive shaft. On AC models, move the piston by hand turning the motor fan. See instructions in step 4 of [Disassemble the Diaphragms, page 15](#).
  - g. Repeat to install the other diaphragm assembly.

### 3. All Other Diaphragms-Metal Pumps

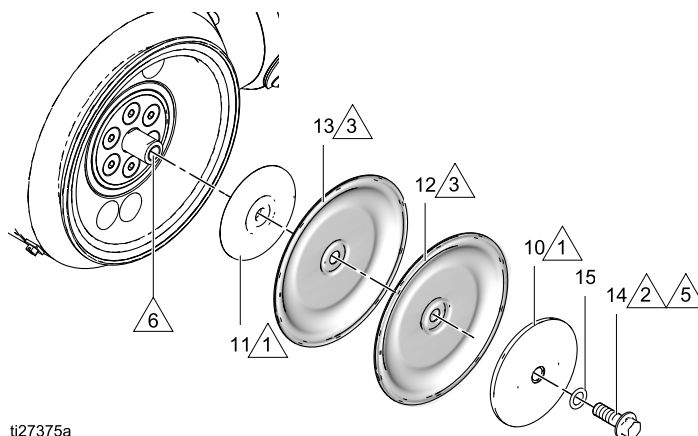
- a. Thoroughly clean or replace the diaphragm bolt (14). Install the o-ring (15).
  - b. Assemble the fluid side plate (10), the diaphragm (12), the backup diaphragm (13, if present), and the air side diaphragm plate (11) on the bolt exactly as shown.
  - c. Clean the female threads of the piston shaft with a wire brush dipped in solvent to remove any residual thread locker. Apply thread-locking primer and allow it to dry.
  - d. Apply medium-strength (blue) thread locker to the threads of the bolt.
  - e. Hold a 5/8 in. wrench on the wrench flats of the piston shaft. Screw the bolt onto the shaft and torque to 60–70 ft-lb (81–95 N•m).
  - f. Move the piston fully to one side by rotating the drive shaft. On AC models, move the piston by hand turning the motor fan. See instructions in step 4 of [Disassemble the Diaphragms, page 15](#).
  - g. Repeat to install the other diaphragm assembly.
4. Attach the fluid covers. The arrow on each fluid cover must point toward the outlet manifold. Tighten the mounting clamp (5).  
**NOTE:** A food grade anti-seize lubricant can be used on the clamp threads to aid assembly.



5. Reassemble the check valves and manifolds.  
See [Reassemble the Check Valves, page 12](#).

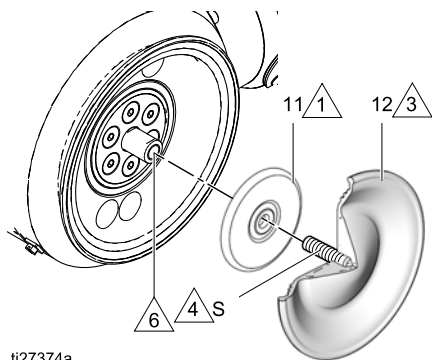
- 1 Rounded side faces diaphragm.
- 2 Apply medium-strength (blue) thread locker to the threads.
- 3 AIR SIDE markings on diaphragm must face the center housing.
- 4 If the screw comes loose or is replaced, apply permanent (red) thread locker to diaphragm side threads. Apply medium-strength (blue) thread locker to shaft side threads.
- 5 Torque to 60–70 ft-lb (81–95 N•m) at 100 rpm maximum.
- 6 Apply primer to the female threads. Allow to dry.

### 2-Piece (PT) Models



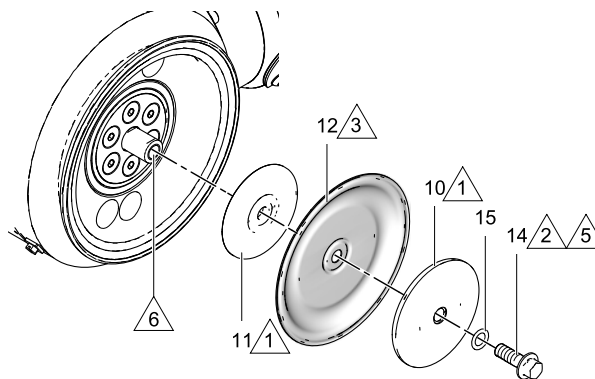
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### Overmolded (PO) Models



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### Standard (SP) Models

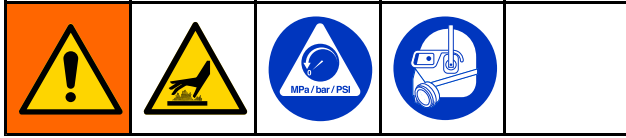


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## NOTICE

After reassembly, allow the thread locker to cure for 12 hours, or per manufacturer's instructions, prior to operating the pump. Damage to the pump will occur if the diaphragm shaft bolt loosens.

## Center Section Repair



### Disassemble the Center Section

See the illustrations on page 19.

1. Follow the [Pressure Relief Procedure, page 11](#). Remove power from the motor. Disconnect all hoses.
2. Remove the manifolds and check valve parts as directed in [Disassemble the Check Valves, page 12](#).
3. Remove the fluid covers and diaphragms as directed in [Disassemble the Diaphragms, page 15](#).  
**TIP:** Clamp the gear box bracket (27) to the bench. Leave the pump connected to the motor.
4. Use a 5 mm hex wrench to remove 4 bolts (117). Pull the pump off of the alignment housing (116).  
**TIP:** It may be necessary to tap the pump with a rubber mallet to disengage the coupler.
5. Use a 5/16 hex wrench to remove the plug (124). Use a 30 mm socket wrench to remove the bearing bolt (106) and the o-ring (108) from the top.

6. Turn the shaft so the groove (G) on the drive shaft (112) is at the top, in line with the alignment mark (A) on the center housing.
7. Use a 3/4–16 bolt, screwed into the hole for plug (124), to push out the drive shaft (112). You can also use the bearing bolt (106), but remove the bearing (107) first. Be sure that the groove on the drive shaft remains aligned with the markings in the center section.

### NOTICE

Proper alignment is essential. Do not apply more than about 10 in-lb (1.1 N•m) of torque. Excessive torque could strip the housing thread. If you encounter resistance, check drive shaft alignment or contact your distributor.

8. Remove the seal cartridge (110), the o-ring (109) and the radial seal (111) with o-ring (111a).
9. Slide the piston assembly (102) out of the center.
10. Leave the gearbox coupler (114) attached to the gearbox (118) shaft unless it is damaged. If you need to remove it, first remove the alignment housing (116). Use an 8 mm hex wrench to loosen the screw (115), then remove the gearbox coupler (114).

**NOTE:** If the coupler does not come off freely, use a bearing puller to remove it. Do not use any prying tools, as damage to the mounting flange on the gearbox could occur.

1 Apply medium-strength (blue) thread locker to threads.

2 Torque to 15–25 ft-lb (20–34 N•m).

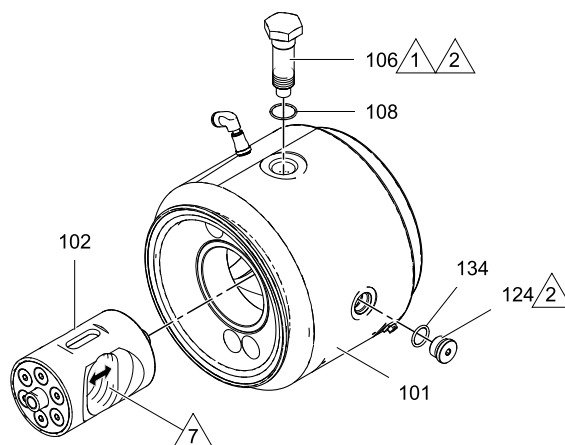
3 Lips must face **IN** toward the center.

4 Apply anti-seize lubricant liberally on the surfaces of the drive shaft assembly.

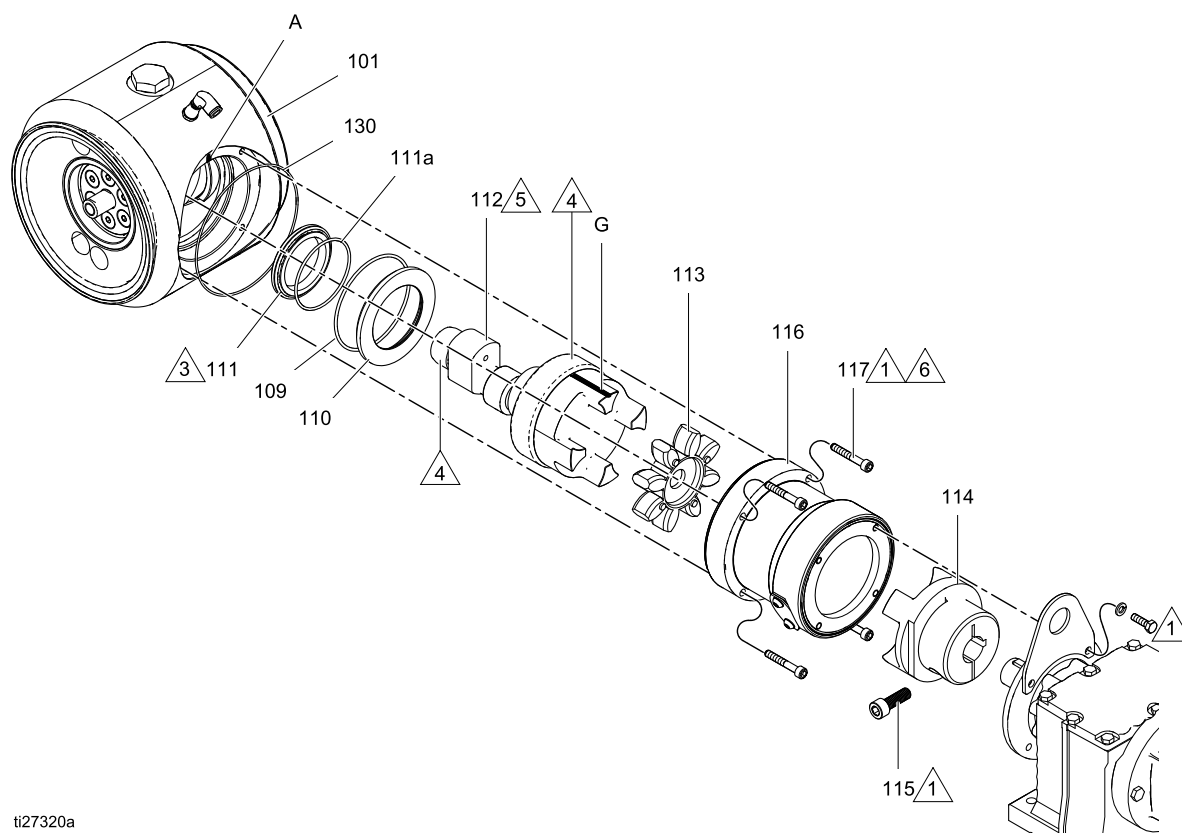
5 Install the drive shaft assembly with the groove facing up.

6 Tighten screws in a crisscross pattern, 5 turns at a time, to engage the coupler evenly. Torque to 130–160 in-lb (15–18 N•m).

7 Apply lubricant to inner mating surface.



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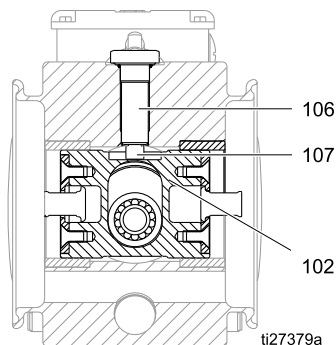


ti27320a

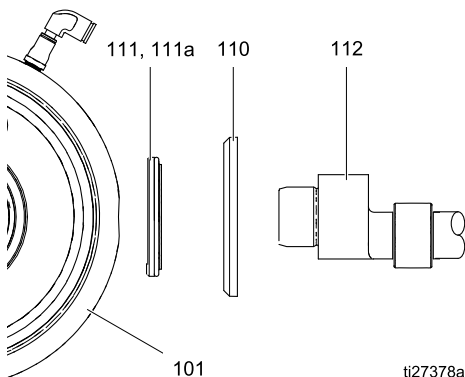
## Reassemble the Center Section

See the illustrations on page 19.

1. Clean and dry the center housing (101), the center of the piston (102) and the drive shaft (112).
2. Inspect the piston for excessive wear and replace if needed. Grease the piston as shown on page 18 and install it in the center section with the groove on the top, in line with the bearing bolt (106) hole in the center section.
3. Install the bearing (107 [if removed from the bearing bolt]), o-ring (108), and the bearing bolt (106). Apply medium-strength (blue) thread locker to the bearing bolt. Be sure that the bearing (107) is in the groove on the piston, as shown. Be sure that the piston moves freely. Torque the bolt to 15–25 ft-lb (20–34 N•m).



4. Be sure the sealing surface of the drive shaft (112) is clean. Install the seal cartridge (110†) and the radial seal (111†) on the drive shaft. Be sure the o-ring (111a†) is on the radial seal. The lips on the radial seal (111†) must face **IN** toward the center.

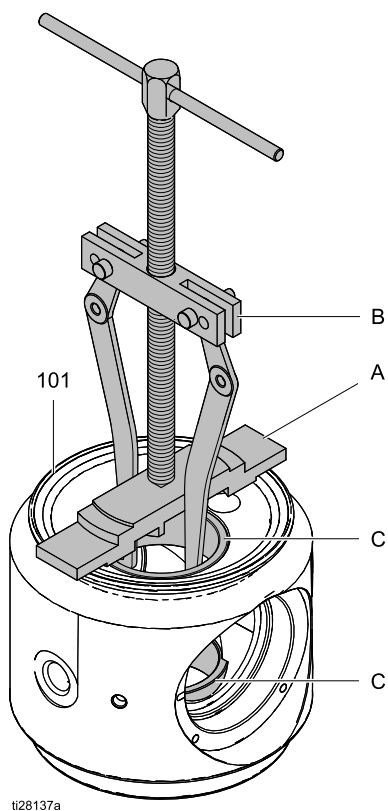


5. Install o-ring (109†).
6. Apply anti-seize lubricant on the mating surfaces of the drive shaft, as shown in the illustration, page 18.
7. Center the piston in the housing and install the drive shaft assembly (112), with the groove (G) facing up, into the center housing (101).
8. Inspect the shaft coupler (114) for wear and replace if needed. Install on the drive shaft.
9. If removed, install the gearbox coupler (114) on the shaft. Apply medium strength (blue) thread locker and install the screw (115). Torque to 35–45 ft-lb (47–61 N•m). Then install the alignment housing (116) and lifting bracket (139) on the gearbox using the screws (120, 122), washers (119). Torque to 130–160 in-lb (15–18 N•m).
10. Install the alignment housing o-ring (130) on the housing (101).
11. Be sure the gearbox coupler (114) is aligned properly. Turn by hand if needed. Connect the pump to the gearbox assembly, engaging the couplers.
12. Apply medium-strength (blue) thread locker and install the housing screws (117). Tighten each screw about 5 turns at a time, in a crisscross pattern, to fully engage the coupler. Torque to 130–160 in-lb (15–18 N•m).
13. Be sure o-ring (134) is on the plug (124). Install the plug and torque to 15–25 ft-lb (20–34 N•m).
14. See [Reassemble the Diaphragms, page 16](#), and [Reassemble the Check Valves, page 12](#).

## Replace Center Bearing

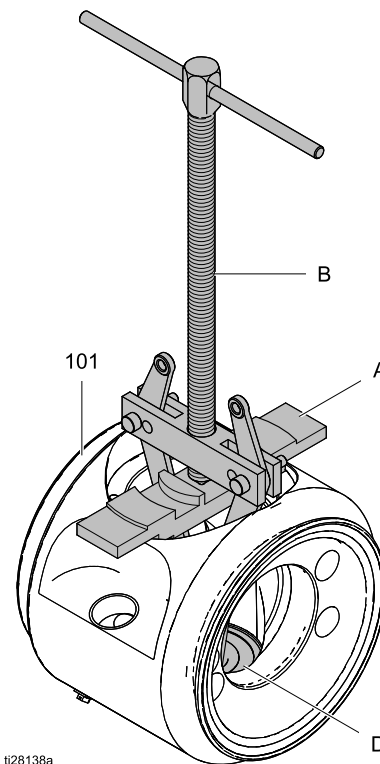
**NOTE:** Follow this procedure only if you suspect that the center bearing is damaged. It is not necessary to replace the bearing for normal pump service. You will need Center Section Repair Tool Kit 24Y627. You also will need Bearing Puller Kit 17J718. The tool (A) was designed to work with this bearing puller.

1. Follow all steps in [Disassemble the Center Section, page 18](#).
2. Clamp the center housing (101) in a vise, with one of the bushings facing up.
3. Place the repair tool (A) on the housing with the grooved side down.
4. Remove the bushing (C). Use the upper holes on the medium-sized jaw, and the inner holes on the puller. Be sure that the jaws engage the bottom rim of the bushing. When one bushing is out, turn the housing over and repeat for the other bushing.

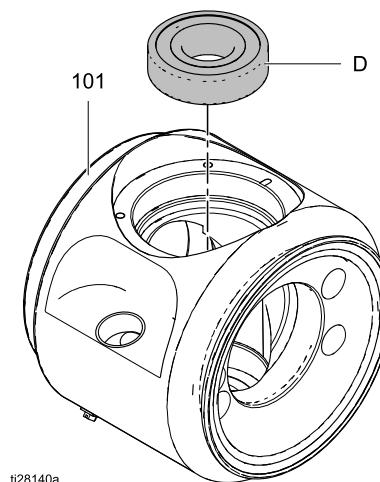


5. Place the center housing (101) in the vise with the bearing (D) side on the bottom.

6. Place the repair tool (A) on the housing with the stepped side down.
7. Remove the bearing (D). Use the lower holes on the medium-sized jaw, and the outer holes on the puller.

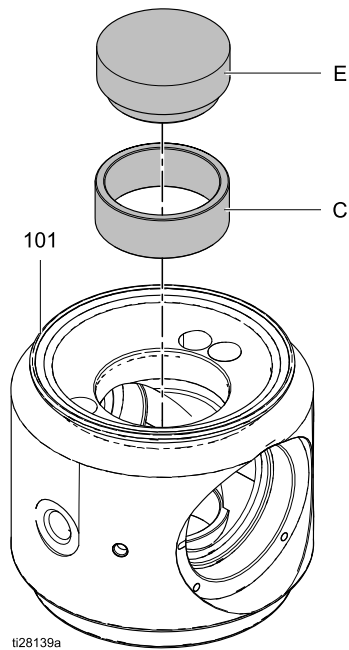


8. Use an arbor press to install the new bearing (D) into the center housing (101). Press the bearing to the shoulder in the center housing.



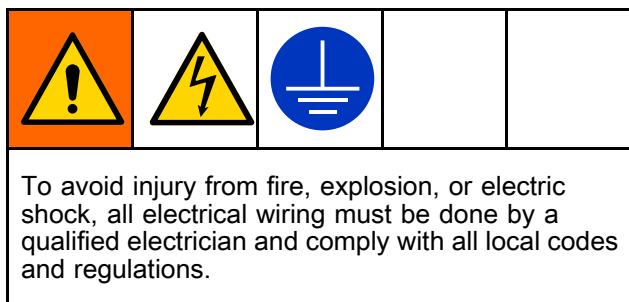
## Repair

9. Use an arbor press and the press-fit tool (E) to install the two bushings (C). Install the bushings flush with the center housing (101).

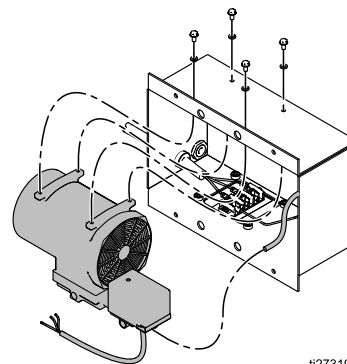


10. Follow all steps in [Reassemble the Center Section, page 20](#).

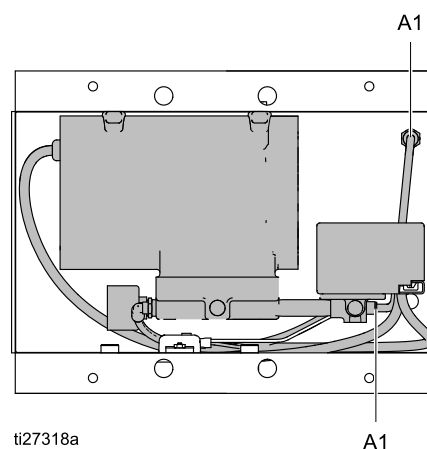
## Replace the Compressor



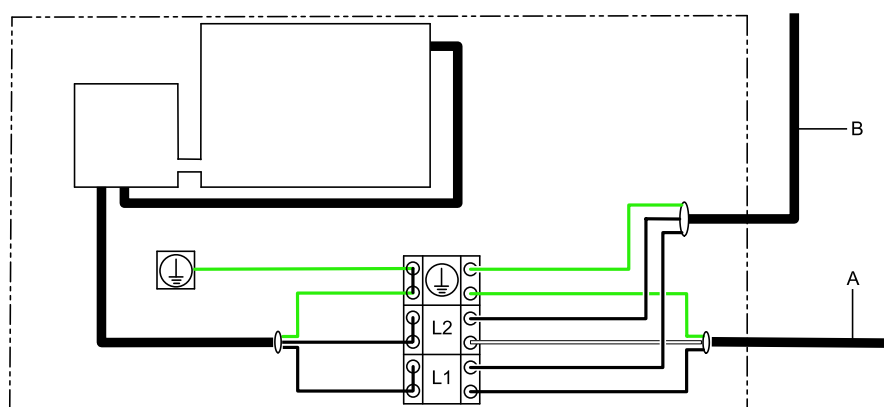
1. Remove the air line (A1) from the compressor. Disconnect the compressor wires at the terminal block (L1, L2, and ground). Remove the four bolts, and carefully pull the compressor out of the box.
2. Use the 4 bolts and 4 lock washers to install the new compressor. Apply medium-strength (blue) thread locker to the threads. Connect the air line from A1 to A1, as shown.
3. Connect the wires from the new compressor to the terminal block, as shown.
4. Return the pump to its mounting location. Secure it with the 8 bolts.
5. Return power to the pump.



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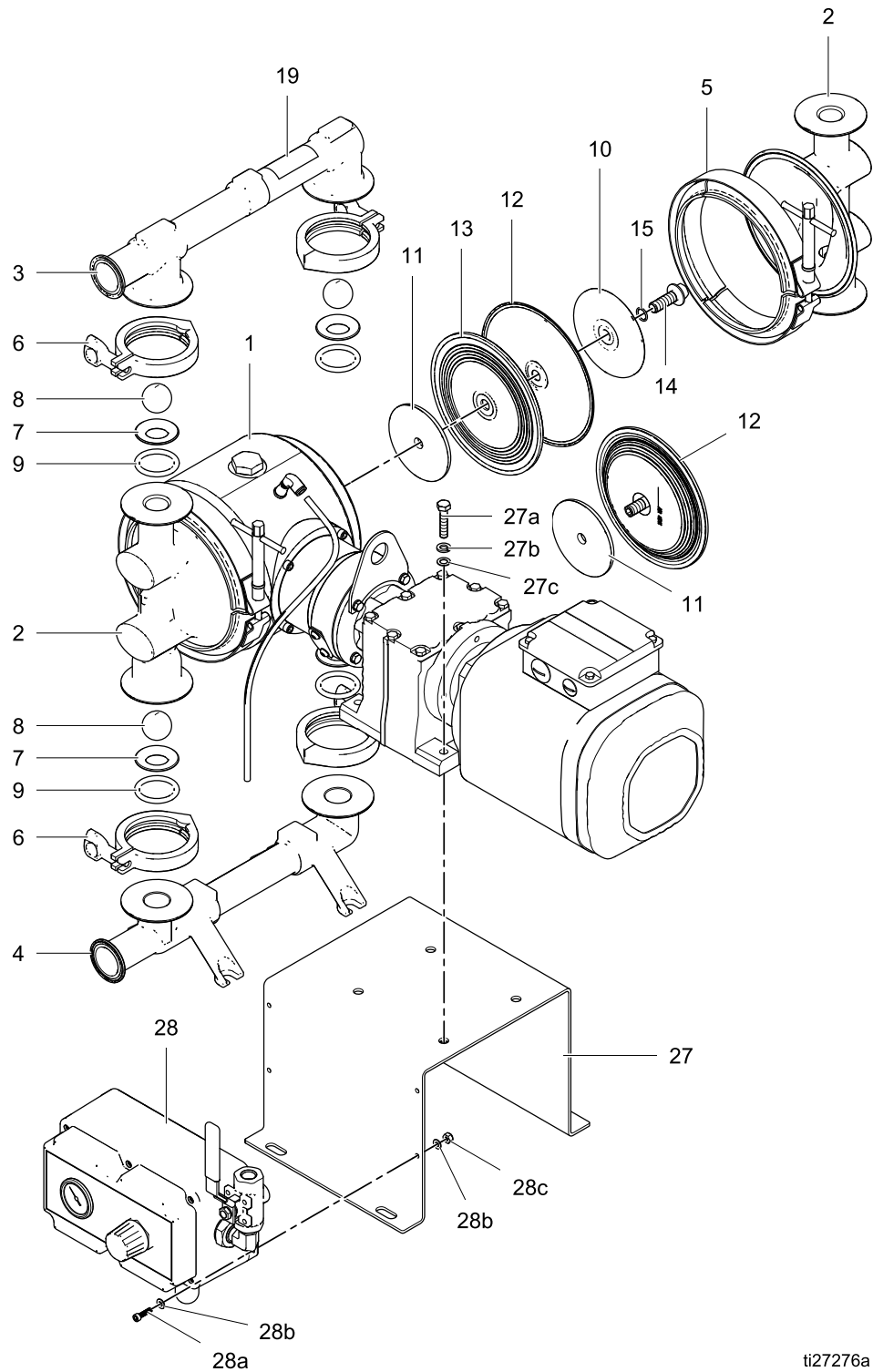


### KEY

A To power supply  
B To controller

# Parts

1040FG



ti27276a



## 1040FG Parts/Kits Quick Reference

Use this table as a quick reference for parts/kits. Go to the pages indicated in the table for a full description of kit contents.

Ref.	Part/Kit	Description	Qty.
1	— — —	MODULE, drive	1
2	277262	COVER, fluid	2
3	277266 24U581	MANIFOLD, outlet, SST Flange DIN	1
4	277265 24U580	MANIFOLD, inlet, SST Flange DIN	1
5	15G698	CLAMP, cover	2
6	620223	CLAMP, TriClamp	4
7	25A276	SEAT, includes o-rings (Ref. 9); see page 28	4
8	15H832 112088 112092	BALLS, check Polychloroprene weighted PTFE Santoprene	4
9	15J280* 15H827*	O-RING, manifold‡ PTFE EPDM	4
10	15C039	PLATE, fluid side, SST, for PT & SP diaphragms	2
11	188607 15H809	PLATE, air side, aluminum for PT & SP diaphragms for PO diaphragms	2
12	25A297 25A296 25A298	DIAPHRAGM, kit; see page 29 Santoprene Standard (SP) PTFE Overmolded (PO) PTFE/EPDM 2-Piece (PT)	1 kit

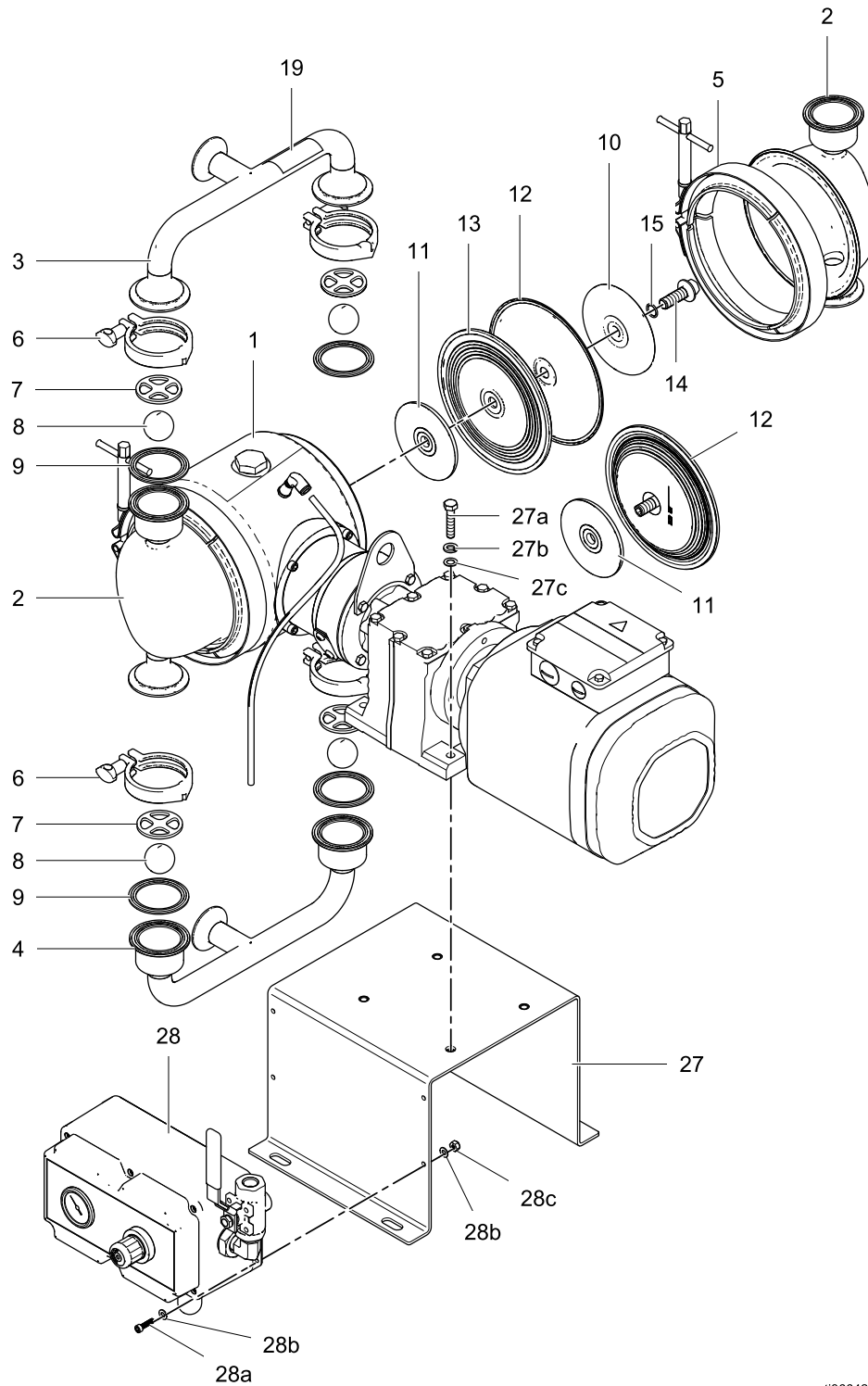
Ref.	Part/Kit	Description	Qty.
13	15H985	DIAPHRAGM, backup, included with PT diaphragm (Ref. 12).	2
14	24C099	BOLT, diaphragm; kit; includes o-ring (ref. 15)	2
15	104319 or none	PACKING, o-ring, for models with Santoprene or PTFE/EPDM 2-Piece diaphragm (Ref. 12)	2
19▲	17D277	LABEL, safety	1
27	24Y914	BRACKET, gearbox mounting, includes 27a, 27b, 27c	1
27a	17J526	SCREW, cap, hex head, 5/16–18 x 1.5 in.	4
27b	112904	WASHER, lock	4
27c	105473	WASHER, flat,	4
28	24Y986	ENCLOSURE, pneumatic, includes 28a, 28b, 28c	1
28a	17J085	SCREW, cap, socket head, 10–24 x 3/4 in.	4
28b	513505	WASHER	8
28c	17J079	NUT	4
33▲	17D278	LABEL, warning, multilingual; shipped loose	1

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

\* These parts are included in the fluid section repair kit which may be purchased separately.

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

# 1040HS and 1040PH



ti36642a

## 1040HS and 1040PH Parts/Kits Quick Reference

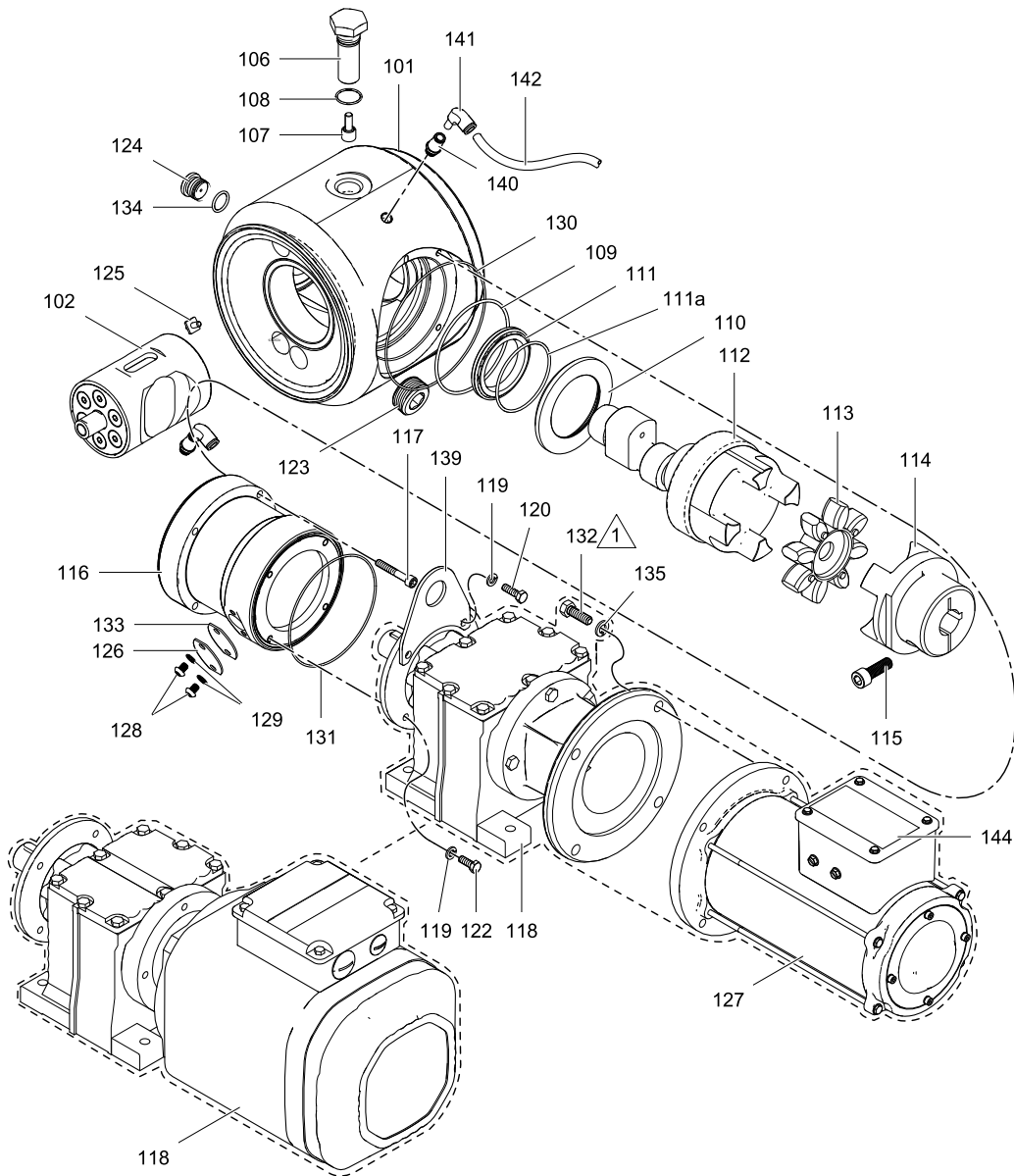
Use this table as a quick reference for parts/kits. Go to the pages indicated in the table for a full description of kit contents.

Ref.	Part/Kit	Description	Qty.
1	— — —	MODULE, drive	1
2	25N995 25P040	COVER, fluid HS PH	2
3	25P019 25P045	MANIFOLD, outlet HS PH	1
4	25P018 25P044	MANIFOLD, inlet HS PH	1
5	15G698	CLAMP, cover	2
6	500984	CLAMP, TriClamp	4
7	25P089	BALL STOP	4
8	15H832 112088 112092	BALLS, check Polychloroprene weighted PTFE Santoprene	4
9	25P060	GASKET, sanitary, EPDM, 2 in.; package of 4	1
10	15C039	PLATE, fluid side, SST, for PT & SP diaphragms	2
11	188607 15H809	PLATE, air side, aluminum for PT & SP diaphragms for PO diaphragms	2
12	25A297 25A296 25A298	DIAPHRAGM, kit; see page 29 Santoprene Standard (SP) PTFE Overmolded (PO) PTFE/EPDM 2-Piece (PT)	1 kit

Ref.	Part/Kit	Description	Qty.
13	15H985	DIAPHRAGM, backup, included with PT diaphragm (Ref. 12).	2
14	24C099	BOLT, diaphragm; kit; includes o-ring (ref. 15)	2
15	104319 or none	PACKING, o-ring, for models with Santoprene or PTFE/EPDM 2-Piece diaphragm (Ref. 12)	2
19▲	17D277	LABEL, safety	1
27	24Y914	BRACKET, gearbox mounting, includes 27a, 27b, 27c	1
27a	17J526	SCREW, cap, hex head, 5/16–18 x 1.5 in.	4
27b	112904	WASHER, lock	4
27c	105473	WASHER, flat,	4
28	24Y986	ENCLOSURE, pneumatic, includes 28a, 28b, 28c	1
28a	17J085	SCREW, cap, socket head, 10–24 x 3/4 in.	4
28b	513505	WASHER	8
28c	17J079	NUT	4
33▲	17D278	LABEL, warning, multilingual; shipped loose	1

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

## Drive Module



ti27277a



Apply medium-strength (blue) thread locker to threads.

Ref	Part	Description	Qty
101	24Y781 24Y899	HOUSING, center, assembly; includes items (Ref. 123, 124, 134) Aluminum ( <b>A</b> ) Stainless Steel ( <b>S</b> )	1
102	24Y565	PISTON, kit	1
106	24Y532 24Y533	BOLT, bearing; includes Ref. 107 and Ref. 108 for aluminum center housing ( <b>A</b> ) for stainless steel center housing ( <b>S</b> )	1
107	17B332	BEARING, cam follower. included with Ref. 106	1
108	116291	O-RING, Size 019, Fluoroelastomer; included with Ref. 106	1
109†	102769	O-RING, Size 153, Buna-N	1
110†	— — —	CARTRIDGE, seal	1
111†	— — —	SEAL, radial, includes o-ring (Ref. 111a)	1
111a†	— — —	O-RING, seal	1
112	24Y524	SHAFT, drive, assembly; includes o-ring (Ref. 109), cartridge (Ref. 110) and seal (Ref. 111 and 111a)	1
113	24Y522	COUPLER, shaft	1
114	24Y521	COUPLER, gearbox; Includes screw (ref. 115)	1
115	17F767	SCREW, socket head, M10 x 30 mm	1
116	25A273 25A272	HOUSING, alignment, assembly; includes screws (Refs. 117 and 128) and access cover (Ref. 126) Aluminum ( <b>A04x</b> ) Stainless steel ( <b>S04x</b> )	1
117	17J299	SCREW, socket head, M6 x 40 mm	4
118	24Y913 25C166 25C167	GEARBOX, for BLDC motor ( <b>A04B</b> , <b>S04B</b> ) NEMA ( <b>A04E</b> , <b>S04E</b> ) IEC ( <b>A04F</b> , <b>S04F</b> )	1

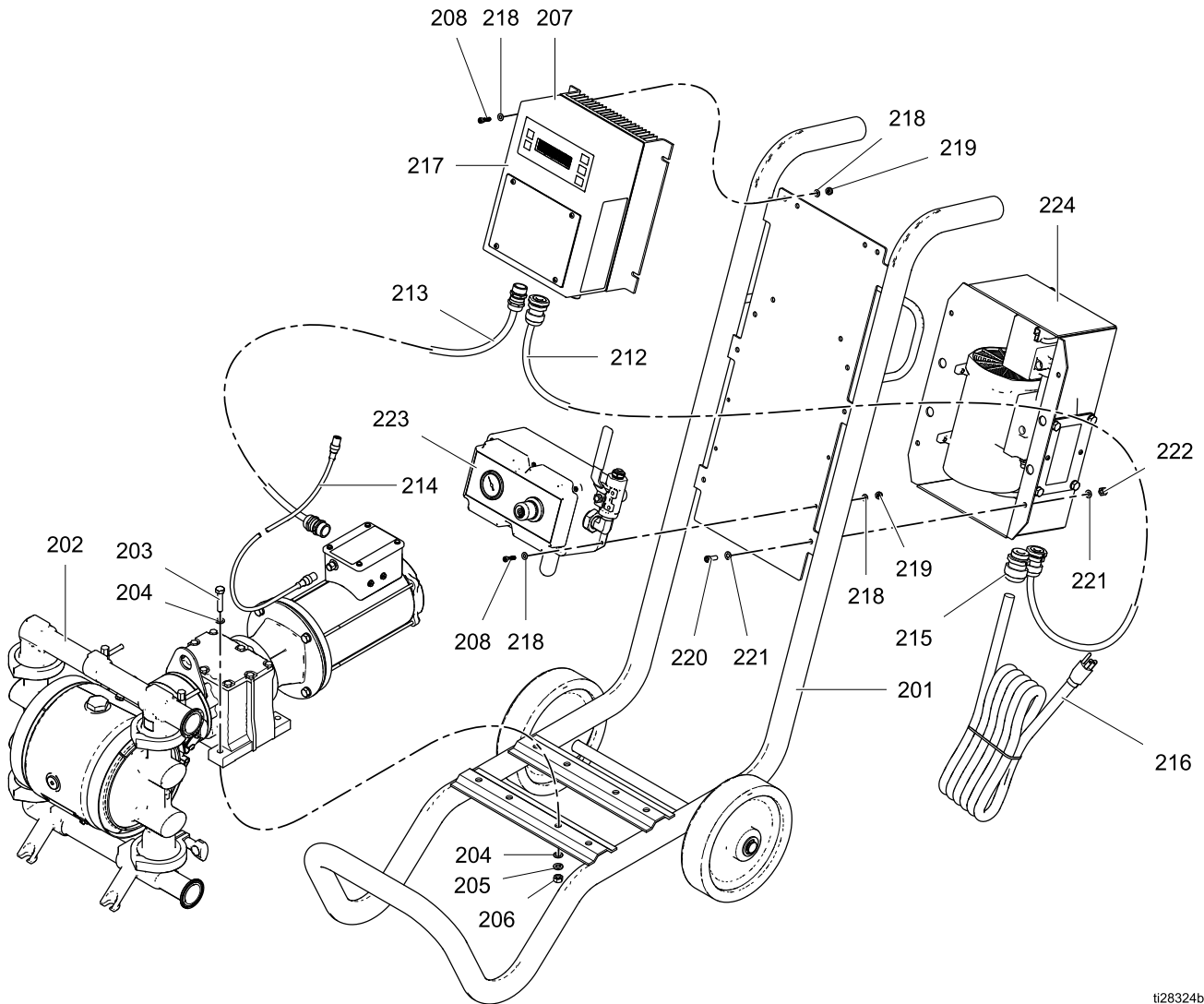
Ref	Part	Description	Qty
119	— — —	WASHER	4
120	— — —	SCREW, cap, hex head, M6 x 16 mm	2
122	— — —	SCREW, cap, hex head, M6 x 20 mm	2
123	24D735	PLUG, pipe, headless	1
124	24Y534	PLUG, front access includes o-ring (Ref. 134)	1
125	116343	SCREW, ground, M5 x 0.8	1
126	25F274	COVER, access; includes items (Ref. 128, 129, 133)	1
127	24Y780	MOTOR, BLDC	1
128	— — —	SCREW, button head, M6 x 6 mm	2
129	— — —	WASHER	2
130	120812	SEAL, o-ring, size 048, buna-n	1
131	112343	PACKING, o-ring	1
132‡	— — —	SCREW, cap, hex head, 3/8–16 x 1 in. (BLDC only)	4
133	— — —	GASKET	1
134	558730	O-RING	1
135‡	— — —	WASHER, lock, 5/16 in. (BLDC only)	4
139	17J099	RING, lift	1
140	17J467	FITTING, 1/8 npt	1
141	113308	FITTING, elbow	1
142	C12509	TUBE	1
143	24Y779	GEARMOTOR, AC; includes items (Ref. 119, 120, 122)	1
144▲	15J075	LABEL, warning	1

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

† Included in Shaft Seal Repair Kit 24Y536.

‡ Included in Motor Kit 24Y780.

## Cart-Mounted Models



ti28324b

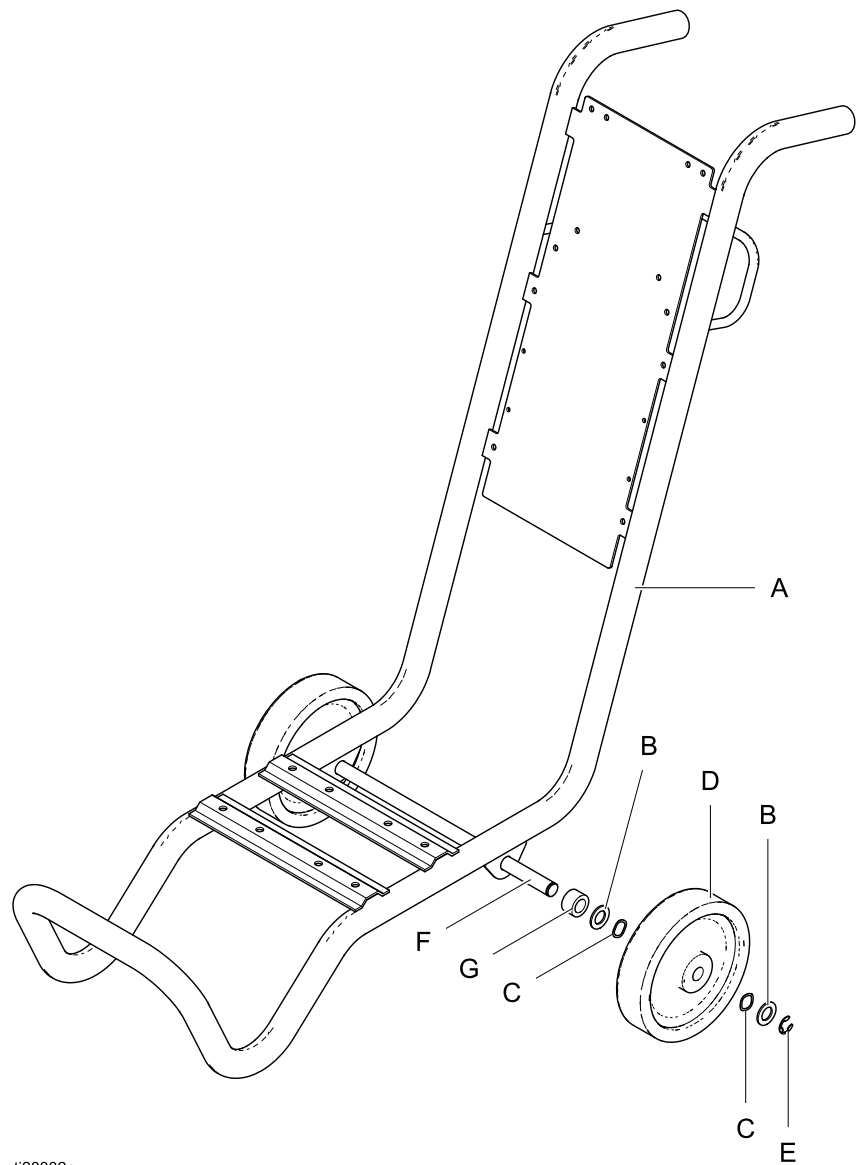
Ref	Part	Description	Qty
201	24Y923	CART (includes items a-g)	1
202	See table	PUMP	1
203	— — —	SCREW, hex cap 5/16	4
204	— — —	WASHER, plain 5/16	8
205	— — —	WASHER, split lock 5/16	4
206	— — —	NUT, hex 5/16	4
207	24Y514	CONTROLLER, Graco Motor	1
208	— — —	SCREW, socket hd cap #10	8
212	17L371	CABLE, Compressor	1
213	17L369	CABLE, Motor	1
214	17K777	CABLE, M12 Communication	1
215	— — —	STRAIN RELIEF, Power Cable	1
216	See table	CORD, Power, 120V	1
217▲	17B772	LABEL, warning	1
218	— — —	WASHER, plain #10	16
219	— — —	NUT, locking #10	8
220	— — —	SCREW, socket hd cap 1/4"	4
221	— — —	WASHER, plain 1/4"	8
222	— — —	NUT, locking 1/4"	4
223	24Y986	CONTROL, pneumatic	1
224	See table	COMPRESSOR	1

▲ Replacement warning labels, signs, tags, and cards are available at no cost.

Cart Model	Pump Model	Compressor	Power Cord
25A672	25A879	24Y921 – 120V	17G703
25A703	25A880	24Y921 – 120V	17G703
25A704	25A881	24Y921 – 120V	17G703
25A705	25A882	24Y921 – 120V	17G703
25A706	25A879	24Y922 – 240V	None
25A707	25A880	24Y922 – 240V	None
25A708	25A881	24Y922 – 240V	None
25A709	25A882	24Y922 – 240V	None

Cart

This parts breakdown reflects item 201.



ti28332a

Ref	Part	Description	Qty
A	— — —	FRAME, cart	1
B	— — — †	WASHER, flat	4
C	— — — †	WASHER, spring	4
D	— — — †	WHEEL	2
E	— — — †	E-RING	2
F	17H262	AXLE	1
G	— — — †	BEARING	2

† Parts are included in Wheel Kit 24Z092 (one side only).  
All parts are included in Cart Kit 24Y923.



## Seats

*Sample Configuration Number*

Pump Model	Wetted Section Material	Drive	Center Section Material	Gear Box and Motor	Fluid Covers and Manifolds	Seats	Balls	Diaphragms	Manifold O-Rings
1040	FG	E	A	04A	S13	SS	PT	PT	PT, EP

Seat Kits	
SS	25A276

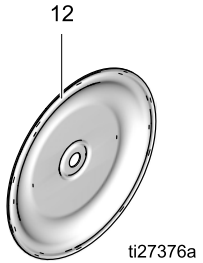
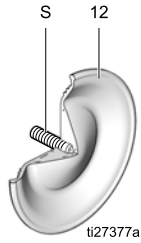
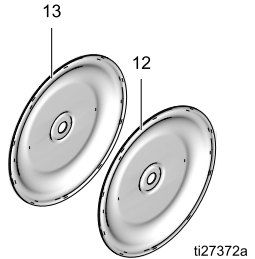
Kits include:

- 4 SST seats (7)
- 4 PTFE o-rings (9)
- 4 EPDM o-rings (9)

## Diaphragms

*Sample Configuration Number*

Pump Model	Wetted Section Material	Drive	Center Section Material	Gear Box and Motor	Fluid Covers and Manifolds	Seats	Balls	Diaphragms	Manifold O-Rings
1040	FG	E	A	04A	S13	SS	PT	PT	PT

	SP	<p>Santoprene Diaphragm Kit 25A297 includes:</p> <ul style="list-style-type: none"> <li>• Kits include: 2 diaphragms (12)</li> </ul>
	PO	<p>PTFE Overmolded Diaphragm Kit 25A296 includes:</p> <ul style="list-style-type: none"> <li>• 2 overmolded diaphragms (12) with set screws (S)</li> <li>• 1 packet anaerobic adhesive</li> <li>• 1 packet sealant</li> </ul>
	PT	<p>PTFE 2-Piece Diaphragm Kit 25A298 includes:</p> <ul style="list-style-type: none"> <li>• 2 diaphragms (12)</li> <li>• 2 backup diaphragms (13)</li> </ul>

## Kits and Accessories

### Motor Feedback Cables

M12, 8-pin (both ends)

Part	Description
17F709	1.0 ft; 0.3 m
15Y051	9.8 ft; 3.0 m
16X521	24.6 ft; 7.5 m
16P791	52.5 ft; 16 m

### Leak Sensor Kit 24Y661

Upgrade kit, to add a leak sensor to an existing system. Includes leak sensor and bushing.

**NOTE:** Also purchase a cable from the following selections. For systems using a Graco Motor Control, order an extension cable from the first section. For systems using a VFD, order a field-wireable cable from the second section.

### Leak Sensor/PLC Extension Cables

M8, 4-pin (both ends)

Part	Description
121683	9.8 ft; 3.0 m
17H349	24.6 ft; 7.5 m
17H352	52.5 ft; 16 m

### Leak Sensor Cables; Field Wireable (for VFDs)

M8, 4-pin (one end, flying leads on the other end)

Part	Description
17H389	9.8 ft; 3.0 m
17H390	24.6 ft; 7.5 m
17H391	52.5 ft; 16 m

### Compressor Kits 24Y544 (120V) and 24Y545 (240V)

Kit contains only a compressor.

### Compressor Upgrade Kits 24Y921 (120V) and 24Y922 (240V)

Upgrade kits include compressor, compressor box, brackets, and mounting hardware.

### Center Section Repair Tool Kit 24Y627

Includes tools needed to remove the bearing from the center section.

### Bearing Puller Kit 17J718

Includes an interchangeable bearing puller set.

### PLC Control Cable

M8, 4-pin (one end, flying leads on the other end)

### Part Description

17H365	9.8 ft; 3.0 m
17H366	24.6 ft; 7.5 m
17H367	52.5 ft; 16 m

### Controller-to-Motor Cables

Preassembled cable to wire the motor controller to the motor. Includes cable, strain reliefs, and terminals.

Part	Description
17L368	1.0 ft; 0.3 m
17S306	9.8 ft; 3.0 m

### Compressor-to-Controller Cables

Preassembled cable to wire the compressor to the motor controller. Includes cable, strain reliefs, and terminals.

Part	Description
17L370	2.0 ft; 0.6 m
17S308	9.8 ft; 3.0 m

### Graco Motor Control Kit 24Y514

Replacement kit includes Graco Motor Control with necessary software.

### Software Upgrade Kit 17H104

Upgrade kit includes software token and instructions.

**NOTE:** Also purchase Programming Cable Kit 24Y788.

### Sanitary Cart Kit 24Y923

Stainless steel cart with wheels.

### ATEX Motor Kit 25C081

(For European hazardous locations)

Kit contains motor and SST mounting hardware. Motor is ATEX rated II2 G Ex d IIB T3 Gb; IP55. Mounting flange is IEC90 B5 and fits pumps with gearbox 25C167 and pumps with gearbox and motor configuration codes [A04F](#) and [S04F](#).

### Explosion-Proof Motor Kit 25C082

(For North American hazardous locations)

Kit contains motor and SST mounting hardware. Motor is rated Class I Group C & D; Class II Group F & G; IP54. Mounting flange face dimensions are NEMA 56 C and fits gearbox 25C166 and pumps with gearbox and motor configuration codes [A04E](#) and [A04F](#).

### Optional Sanitary Gasket Kits

Part/Kit	Material
26A890	FKM
26A913	PTFE/EPDM Bonded

# Technical Data

	US	Metric
SaniForce 1040e Electric-Operated Double Diaphragm Pump		
Maximum fluid working pressure	70 psi	0.48 MPa, 4.8 bar
Air pressure operating range	20 to 80 psi	0.14 to 0.55 MPa, 1.4 to 5.5 bar
Air inlet size	3/8 in. npt(f)	
Maximum suction lift (reduced if balls don't seat well due to damaged balls or seats, lightweight balls, or extreme speed of cycling)	Wet: 29 ft Dry: 16 ft	Wet: 8.8 m Dry: 4.9 m
Maximum size pumpable solids	1/8 in.	3.2 mm
Ambient air temperature range for operation and storage. <b>NOTE:</b> Exposure to extreme low temperatures may result in damage to plastic parts.	32° F–104° F	0° C–40° C
Fluid displacement per cycle	0.10 gallons	0.38 liters
Maximum free-flow delivery	35 gpm*	132.5 lpm*
Maximum pump speed	280 cpm	
Fluid Inlet and Outlet Size		
Food Grade	1.5 in. sanitary flange or 40 mm DIN 11851	
High Sanitation or Pharmaceutical	1.0 in. sanitary flange or 25 mm DIN 11851	
Electric Motor		
AC, Standard CE (04A)		
Power	2 HP	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Gear Ratio	8.16	
Voltage	3-phase 230V / 3-Phase 460V	
BLDC (04B)		
Power	2.2 HP	
Speed	3600 rpm	
Gear Ratio	11.86	
Voltage	320 VDC	
Motorless Gearbox		
NEMA (04E)		
Mounting Flange	NEMA 56 C	
Gear Ratio	18.08	
IEC (04F)		
Mounting Flange	IEC 90	
Gear Ratio	18.08	
Noise Data		
Sound Power (measured per ISO-9614–2)		
at 70 psi fluid pressure and 50 cpm	71 dBA	
at 30 psi fluid pressure and 280 cpm (full flow)	94 dBA	

	US	Metric
Sound Pressure [tested 3.28 ft (1 m) from equipment]		
at 70 psi fluid pressure and 50 cpm	61 dBa	
at 30 psi fluid pressure and 280 cpm (full flow)	84 dBa	

\* Varies by pump model. See performance charts for your model.

## Weights

Pump Material		Motor/Gearbox							
Fluid Section	Center Section	AC		NEMA		IEC		BLDC+ NEMA	
		lb	kg	lb	kg	lb	kg	lb	kg
Food Grade	Aluminum	136	62	99	45	104	47	120	54
	Stainless Steel	166	75	129	58	134	61	150	68
High Sanitation or Pharmaceutical	Aluminum	147	67	110	50	115	52	131	59
	Stainless Steel	157	80	140	63	145	66	161	73

	US	Metric
<b>Weight</b>		
Compressor	28 lb	13 kg
Graco VFD	6 lb	3 kg
Graco Motor Control	10.5 lb	4.8 kg
Cart	33 lb	15 kg
<b>Wetted Parts</b>		
Wetted parts include stainless steel, plus material(s) chosen for seat, ball, and diaphragm options		
<b>Non-wetted parts</b>		
Aluminum	aluminum, coated carbon steel, bronze	
Stainless Steel	stainless steel, aluminum, coated carbon steel, bronze	

## Fluid Temperature Range

<b>NOTICE</b>
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
Polychloroprene check balls (CW)	40° to 200°F	4° to 90°C
PTFE overmolded diaphragm (PO)	40° to 220°F	4° to 104°C
PTFE check balls or two-piece PTFE/EPDM diaphragm (PT)	40° to 220°F	4° to 104°C
Santoprene® check balls or 2-piece PTFE/Santoprene diaphragm (SP)	-40° to 180°F	-40° to 82°C

# Technical Specifications for the Graco Motor Control

DC Power Supply	Class 2 Power Supply only	
Approvals	UL508C	
Conformity	CE-Low Voltage (2006/95/EC), EMC (2004/108/EC), and RoHS (2011/65/EU) Directives	
Ambient Temperature	-40°F – 104°F	-40°C – 40°C
Environment Rating	Type 4X, IP 66	
Overtemperature Sensing Specifications	0–3.3 VDC, 1mA maximum	
Input Specifications		
Input Line Voltage	120/240 VAC, line-to-line	
Input Line Phasing	Single Phase	
Input Line Frequency	50/60 Hz	
Input Current per Phase	16A	
Maximum Branch Circuit Protection Rating	20A, Inverse Time Circuit Breaker	
Short Circuit Current Rating	5 kA	
Output Specifications		
Output Line Voltage	0–264 VAC	
Output Line Phasing	Three Phase	
Output Current	0–12A	
Output Power	1.92 KW / 2.6 HP	
Output Overload	200% for 0.2 seconds	

Drive is provided with a means to accept and act upon a signal from a thermal sensor in the motor. Motor overtemperature sensing is required in order to provide the motor overload protection.

Current limit, set via the software, is provided as a secondary protection from motor overload.

All installations and wiring must comply with NEC and local electrical codes.

# Graco Standard 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](http://www.graco.com).  
For patent information, see [www.graco.com/patents](http://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

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 334188

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