INSTRUCTIONS–PARTS LIST

309040

Rev. B

First choice when quality counts. ™

This manual contains important warnings and information.
READ AND KEEP IT FOR REFERENCE.

PART NO. 232841

Regulus™ 3:1

AIR-OPERATED DIAPHRAGM PUMP

260 psi (1.8 MPa, 18 bar) Maximum Fluid Working Pressure

88 psi (0.6 MPa, 6 bar) Maximum Air Input Pressure

CE

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

Table of Contents

Warnings

Warning	⚠ Caution
A warning alerts you to the possibility of serious injury or death if you do not follow the instructions.	A caution alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

	Warnings
 INSTRUCTIONS	**EQUIPMENT MISUSE HAZARD** Any misuse of the equipment or accessories, such as overpressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in splashing in the eyes or on the skin, other serious injury, or fire, explosion or property damage. • This equipment is for professional use only. Observe all warnings. Read and understand all instruction manuals, warning labels, and tags before you operate this equipment. If you are not sure, or if you have questions about installation or operation, call your Graco distributor. • Never alter or modify any part of this equipment; doing so could cause it to malfunction. • Read all instruction manuals, warnings, tags, and labels before operating the equipment. • Check all equipment regularly and repair or replace worn or damaged parts immediately. • Never exceed the recommended working pressure or the maximum air inlet pressure stated on your pump or in the **Technical Data** section on page 24. • Do not exceed the maximum working pressure of the lowest rated component in your system. This equipment has a 260 psi (1.8 MPa, 18 bar) maximum working pressure at 88 psi (0.6 MPa, 6 bar) maximum incoming air pressure. • Be sure that all fluids and solvents are chemically compatible with the wetted parts shown in the **Technical Data** section on page 24. Always read the manufacture's literature before you use fluid or solvent in the pump. • Never move or lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the **Pressure Relief Procedure** on page 11 before you move or lift the pump.

Warnings

INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

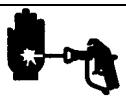
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not expose Graco hoses to temperatures above 82°C (180°F) or below -40°C (-40°F).
- Wear hearing protection when operating this equipment.
- Comply with applicable local, state, and national fire, electrical, and other safety regulations.
- Do not lift pressurized equipment.
- **To reduce the risk of splashing fluid,** follow the pressure relief procedure for your equipment before servicing.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Equipment misuse can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

TOXIC FLUID HAZARD

Improper handling of hazardous fluids or inhaling toxic vapors an cause extremely serious injury or death from splashing in the eyes, ingestion, or bodily contamination. Observe all the following precaution when you handle hazardous or potentially hazardous fluids.

- Know what fluid you are pumping and its specific hazards. Take precautions to avoid a toxic fluid spill.
- Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.
- Store hazardous fluid in an appropriate, approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Secure the fluid outlet hose tightly into the receiving container to prevent it from coming loose and improperly draining the fluid.
- If the diaphragm fails, the fluid is exhausted along with the air. Read **Air Exhaust Ventilation** on page 9. When pumping hazardous fluids, place the pump in an appropriate container to catch the fluid in the event of a diaphragm rupture.

Warnings



INJECTION HAZARD

Spray from the gun/valve, hose leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.

FIRE AND EXPLOSION HAZARD

Static electricity is created by the flow of fluid through the pump and hose. If the equipment is not properly grounded, sparking may occur. Sparks can ignite fumes from solvents and the fluid being pumped, dust particles, and other flammable substances, whether you are pumping indoors or outdoors, and can cause a fire or explosion and serious injury and property damage.

- To reduce the risk of static sparking, ground the pump and all other equipment used or located in the work area. Check your local electrical code for detailed grounding instructions for your area and type of equipment. See **Grounding** on page 9.
- If you experience any static sparking or even a slight shock while using this equipment, **stop pumping immediately.** Check the entire system for proper grounding. Do not use the system again until you have identified and corrected the problem.
- If the diaphragm fails, the fluid is exhausted along with the air.
- Do not smoke in the work area. Do not operate the equipment near a source or ignition or an open flame, such as a pilot light.

United States Government safety standard have been adopted under the Occupational Safety and Health Act. You should consult these standards–particularly the General Standards, Part 1910, and the Construction Standards, Part 1926.

Scope

This instruction manual contains the installation, operation, troubleshooting instructions, replacement parts list, and all necessary information about diaphragm pump 232841.

Diaphragm pump 232841 is a compressed air-driven, double-action, pump that is recommended for coating and process materials.

Installation

General Information

- The functional diagram shown in Figure 1 is only a guide for installing diaphragm pump 232841.
- Contact Graco distributor or Graco Technical Assistance (1–800–543–0339) for assistance in planning a system to suit your needs.
- Always use Genuine Graco Parts and Accessories. Refer to Product Data Sheet 305–996.
- Reference numbers and letters in parentheses refer to the reference numbers in the figures and the parts lists on pages 21 and 22.

WARNING

TOXIC FLUID HAZARD
Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed.

1. Read **TOXIC FLUID HAZARD** on page 4.
2. Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.

Air Line

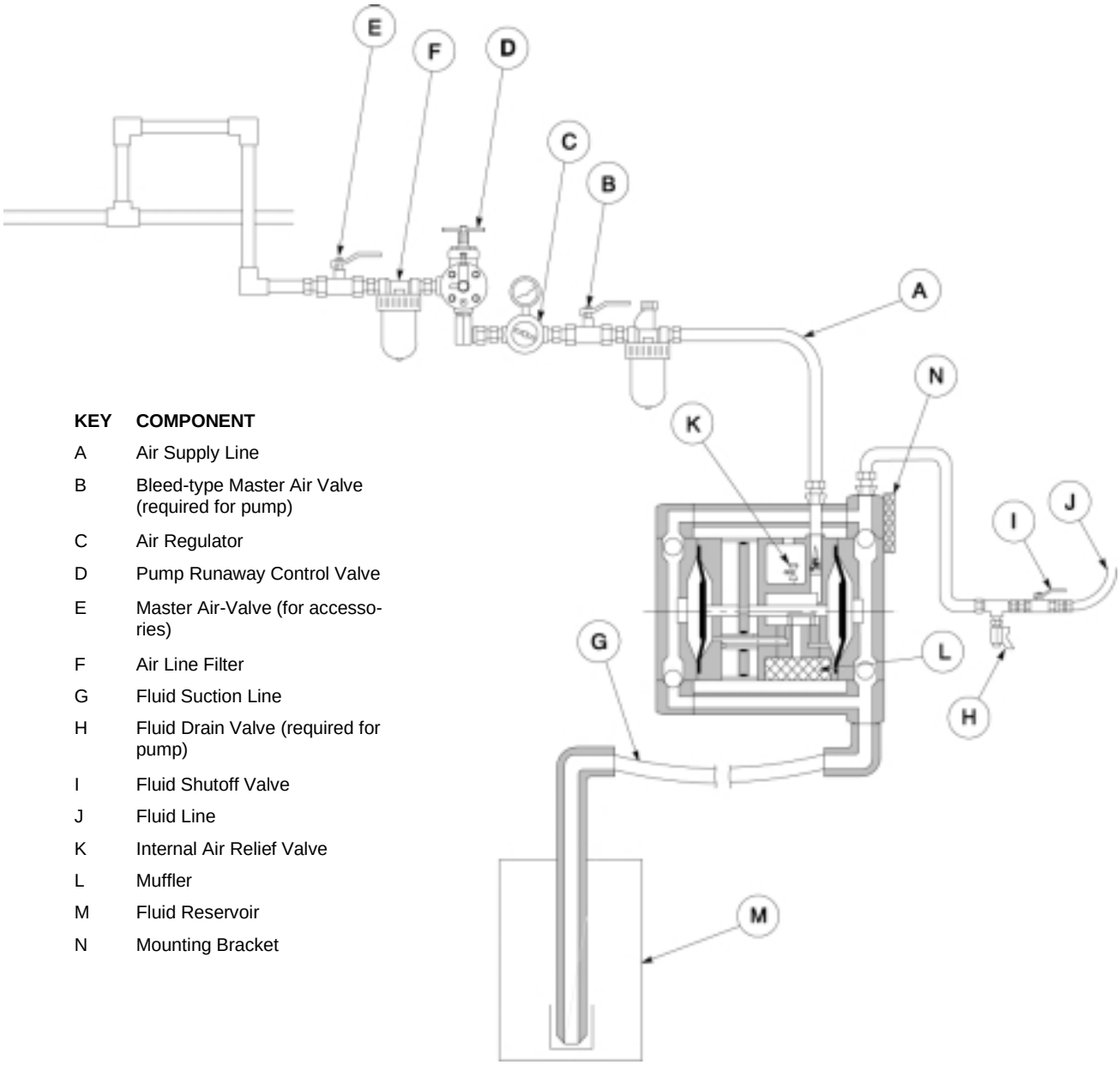
WARNING

Figure 1 shows a bleed-type master air valve (B) is required in your system to relieve air trapped between this valve and the pump. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin, injury from moving parts, or contaimination from hazardous fluids.

1. Install the air line accessories as shown in Figure 1. 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 up to three times the setting of the air regulator.
   b. Locate on bleed-type master air valve (B) close to the pump and use it to relieve trapped air. **Read the above WARNING.**
   c. The air line filter (F) removes harmful dirt and moisture from the compressed air supply.
   d. The pump runaway valve (D) shuts off the air to the pump if the pump speed exceeds your pre-adjusted setting. Running a pump too fast can damage it.
2. Install a grounded, flexible air hose (A) between the accessories and the ½ npt(f) pump air inlet. Use a minimum ½" (13 mm) ID air hose. See Figure 1.
3. Screw an air line quick disconnect coupler onto the end of the air hose (A), and screw the mating fitting into the pump air inlet snugly. Do not connect the coupler to the fitting until you are ready to operate the pump.

Installation

Figure 1 provides a typical installation of diaphragm pump 232841.



KEY	COMPONENT
A	Air Supply Line
B	Bleed-type Master Air Valve (required for pump)
C	Air Regulator
D	Pump Runaway Control Valve
E	Master Air-Valve (for accessories)
F	Air Line Filter
G	Fluid Suction Line
H	Fluid Drain Valve (required for pump)
I	Fluid Shutoff Valve
J	Fluid Line
K	Internal Air Relief Valve
L	Muffler
M	Fluid Reservoir
N	Mounting Bracket

Figure 1. Typical Installation

Installation

Mountings

WARNING

The pump exhaust air may contain contaminants. Ventilate area if the contaminants could affect your fluid supply. See **Air Exhaust Ventilation** on page 9.

WARNING

EQUIPMENT MISUSE HAZARD

The pump weighs 92 lb. (42 kg.) and should never be moved or lifted by one person. To prevent equipment damage or personal injury, engage an adequate number of personnel and use support devices, if necessary, such as a forklift, hand truck, and hoist when moving and installing the pump.

Wall-Mount Pump Installation

To wall-mount the pump, do the following:

1. Be sure the mounting surface can support the weight of the pump, hoses and accessories, as well as the stress caused during operation.
2. For all mountings, be sure the pump is bolted directly to the mounting surface. Use 5/8” lag screws or bolts for mounting, depending upon the application. See Figure 2.
3. For ease of operation and service, mount the pump so the air inlet, fluid inlet, and outlet ports are easily accessible.

Note: The diaphragm pump can only be operated in a horizontal position to ensure proper operation. When installing the pump, the inlet port connection must point down and the outlet port connection must point up.

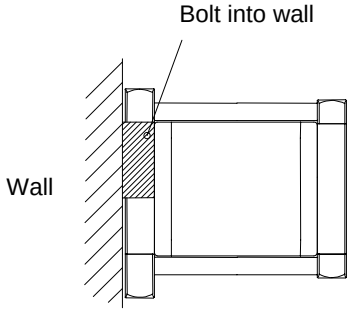


Figure 2. Wall-Mounted Pumps

Floor Stand Pump Installation

As an option, the Regulus™ 3:1 pump can be mounted on a floor stand (part no. 243261) as shown in Figure 3. For more information about the floor stand, refer to Product Data Sheet 305–996.

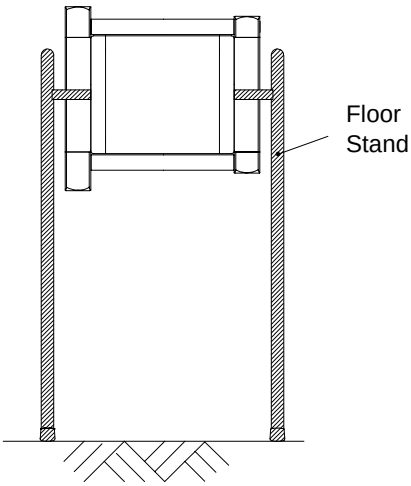


Figure 3. Floor Stand Pump Installation

Fluid Suction Line

- Use conductive hoses (G). See **Grounding** on page 9.
- The pump fluid inlet is a 1” NPT female fitting.
- ***Do not*** pressure feed the pump; diaphragm life will be shortened.
- For maximum suction lift (wet and dry) information, see **Technical Data** on page 24.

Fluid Outlet Line

WARNING

A fluid drain valve 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.

At the fluid outlet line, do the following:

1. Use grounded fluid hoses (G). The pump fluid outlet is a 1” NPT female fitting.
2. Install a fluid drain valve (H) near the fluid outlet. See the **WARNING** above.
3. Install a shutoff valve (I) in the fluid outlet line.

Installation

Grounding

WARNING

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

Attaching the ground wire to the grounding connector will ground the air motor and the wetted parts.

US Code (NFPA 77 Static Electricity) recommends a conductivity greater than 50 x 10^{-12} Siemans/meter (mho/meter) over your operating temperature range to reduce the hazard of fire. Consult your fluid supplier to derminine the conductivity or resistivity must be less than 2 x 10^{-12} ohm-centimeters.

Note: When pumping conductive flammable fluids, ***always*** ground the fluid system. See the **WARNING** above.

Ground all of this equipment:

- *Pump:* use a ground wire and clamp. See Figure 4. Loosen the grounding screw (X). Insert one end of a 12 ga (1.5 mm²) minimum ground wire (Y) under the clamp (Z) and tighten the screw securely. Connect the other end of the wire to a true earth ground. For a ground wire and clamp, order Part No. 222011.
- *Air and fluid hoses:* Use only electrically conductive hoses.
- *Air compressor:* Follow manufacturer's recommendations.

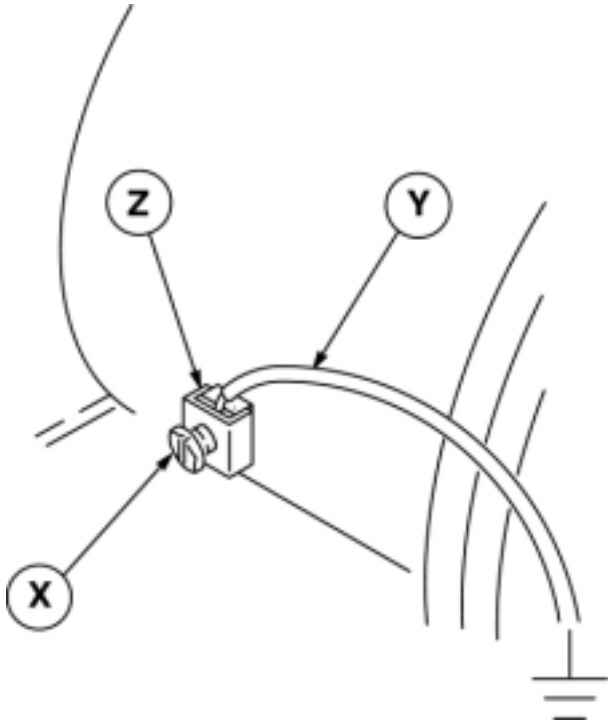


Figure 4. Grounding

- *Fluid supply drum:* Follow your local code.
- *All solvent pails used when flushing:* Follow your local code. Use only metal pails, which are conductive, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts the grounding continuity.

Air Exhaust Ventilation

WARNING

TOXIC FLUID HAZARD
Read the **USING HAZARDOUS FLUIDS** on page 3 and **FIRE AND EXPLOSION HAZARD** on page 5 before you operate this pump.

Diaphragm failure will cause the fluid being pumped to exhaust with the air.

Notes

Operation

Pressure Relief Procedure

WARNING

PRESSURIZED EQUIPMENT HAZARD
The equipment stays pressurized until pressure is manually relieved. To reduce the risk of serious injury from pressurized fluid, accidental spray from the gun or splashing fluid, follow this procedure whenever you

- Are instructed to relieve the pressure
- Stop pumping
- Check, clean, or service any system equipment
- Install or clean fluid nozzles

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

Flushing the Pump Before First Use

The pump was tested in 10W oil. If the oil could contaminate the fluid you are pumping, flush the pump thoroughly with a compatible solvent. Follow the steps under **Starting and Adjusting the Pump.**

Starting and Adjusting the Pump

WARNING

TOXIC FLUID HAZARD
Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed. always follow the **Pressure Relief Procedure** on page 11 before lifting the pump.

1. Be sure the pump is properly grounded. Refer to **Grounding** on page 9.
2. Check all fittings to be sure they are tight. Be sure to use a compatible liquid thread sealant on all male threads. Tighten the fluid inlet and outlet fittings securely. Re-torque all fasteners before start-up. Place the suction tube (if used) in the fluid to be pumped.
3. Place the end of the fluid hose (G) into an appropriate container.
4. Close the fluid drain valve (H).
5. With the pump air regulator (C) closed, open the bleed-type master air valve (B).
6. If the fluid hose has a dispensing device, hold it open while continuing with the following step.
7. Slowly open the air regulator (C) until the pump starts to cycle. Allow the pump to cycle slowly until all air is pushed out of the lines and the pump is primed.
8. Adjust the pump runaway valve (D) according to the instructions supplied with it.

   If you are flushing, run the pump long enough to thoroughly clean the pump and hoses. Close the air regulator. Remove the suction tube from solvent and place it in the fluid to be pumped.

   Note: Do not operate the pump dry for long periods of time to avoid reducing diaphragm life.

Pump Shutdown

WARNING

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

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

Short Term Shut-down

1. Cut off the compressed air supply.
2. Relieve the diaphragm pump of pressure by opening the dispense valve or fluid valve. Have a container ready to catch the overflow.

Maintenance

Lubrication

CAUTION

Lubrication of the pump is not required. Oil is exhausted thorugh the muffler, which could contaminate your fluid supply or other equipment. Excessive lubrication can also cause the pump to malfunction.

Flushing and Storage

Flush the pump often enough to prevent the fluid you are pumping from curing, drying, or freezing in the pump and damaging it. Follow the **Pressure Relief Procedure** on page 11 before storing it for any length of time. Use a compatible solvent.

Long Term Shut-down

1. Flush out diaphragm pump thoroughly.
2. Leave compatible solvent in the diaphragm pump.
3. Shutoff the compressed air supply to the pump.
4. Relieve the diaphragm pump of pressure.

Tightening Threaded Connections

1. Before each use, check all hoses for wear or damage, and replace as necessary.
2. Check to be sure all threaded connections are tight and leak-free.
3. Check and re-torque all threaded connections at least every two months. Re-torque the fluid cover screws first, followed by the manifold screws.

Preventative Maintenance Schedule

- Establish a preventive maintenance schedule, based on the service history of the pump. This is especially important for prevention of spills or leakage due to diaphragm failure.
- Periodically clean the internal air filter on the air inlet of the pump.

Troubleshooting

WARNING

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

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

Table 1. Troubleshooting

PROBLEM	CAUSE	SOLUTION
Pump cycles at stall or fails to hold pressure at stall.	Worn check valve balls (25 and 30), seats (26 and 31) or ball guides (24 and 29).	Replace. See page 18.
Pump will not cycle, or cycles once and stops.	Air valve is stuck or dirty.	Disassemble and clean air valve. See page 17. Use filtered air.
	Check valve ball (25 and 30) severely worn and wedged in seat (26 and 31).	Replace ball and seat. See page 18.
	Check valve ball (25 and 30) is wedged into seat (26 and 31), due to overpressurization.	Replace. See page 18.
	Fluid dispensing valve clogged.	Relieve pressure and clear valve.
	Hose line pinched.	Check lines.
Pump operates erratically	Clogged suction line.	Inspect; clear.
	Sticky or leaking balls (25 and 30).	Clean or replace. See page 18.
	Diaphragm (3) ruptured.	Replace. See page 16.
	Restricted exhaust.	Remove restriction.
Air bubbles in fluid.	Suction line is loose.	Tighten.
	Diaphragm (3) ruptured.	Replace. See page 16.
Pump running irregular. Stroke frequency dropping, coming to standstill.	Parts are worn.	Replace worn parts, check compressed air supply.
	Icing caused by: compressed air too moist, stroke frequency too high, local temperature too low.	Remove ice, change operating conditions.
Air escapes continually from air muffler.	Flat air valve slide (16) or close sliding seat (15) damaged.	Replace defective part, check compressed air filter.
	Foreign matter inside pump.	
Pump does not start, pressure fluctuations.	Worn seats (26 and 31).	Replace seats.
	Inlet strainer blocked, maximum suction exceeded, hose or seal defective.	Clean strainer. Replace defective parts.
	Material contaminated. Pump is setup incorrectly or used incorrectly.	Check material supply and installation and operation instructions.

Service

When the pump requires service, a qualified technician should make the repair. After disassembly, all parts that are reused should be cleaned thoroughly.

Fault Indications

Never perform any service on a diaphragm pump that is under pressure. ***Always*** check the diaphragm pump during operation for abnormalities such as:

- major pressure fluctuations
- changes in running sound
- irregular running

These are normal indications that the diaphragm and control components are in an advanced state of wear. Servicing the pump in a timely manner to replace worn parts helps prevent additional damage.

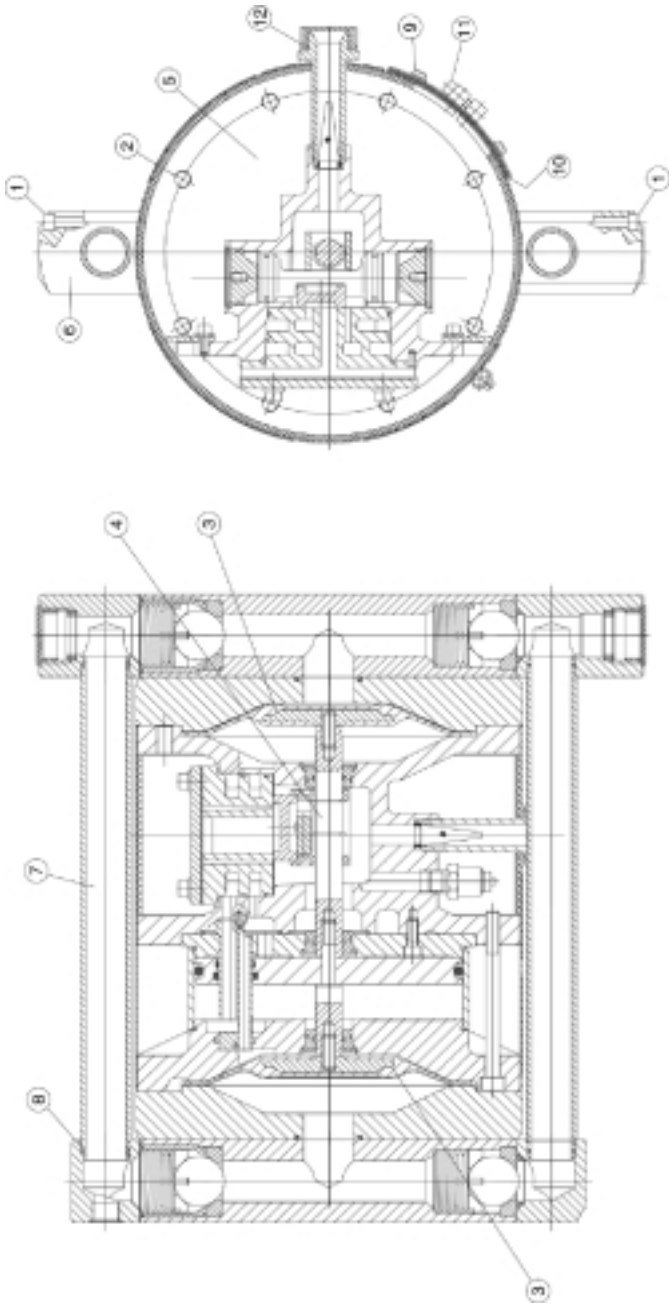
When servicing the pump, only use replacement parts supplied by an authorized Graco distributor. For additional information, see the service procedures in this manual.

General Service Practices

It is the customer's responsibility to conform to the following list of notes, cautions, warnings, and conditions when servicing the pump:

- The compressed air supply to diaphragm pump must be shutoff and the pump pressure relieved before the pump can be disassembled and serviced.
- Do not damage sealing surfaces when servicing the pump.
- When wear is visible on running or sealing surfaces, the components affected must be replaced.
- Check all polyethylene sealing rings thoroughly for damage; replace if necessary. Always replace any o-rings removed from the pump.
- Apply lubricant to all threads and fittings before reassembling.
- Never use silicone or grease containing silicone as a lubricant.

Figure 5. Servicing the Diaphragm Pump



Sectional Side-veiw and Front View of Diaphragm Pump 232841

Service

Replacing the Pump Diaphragms

To replace the pump diaphragms, do the following:

WARNING

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

Tools Required

- 5 mm Allen wrench
- 8 mm Allen wrench
- 13 mm open end wrench

Removal Procedure

Note: Refer to Figure 5, “Servicing the Diaphragm Pump” on page 15 while performing the following procedures.

1. Using the 5 mm Allen wrench, remove the 16 socket head cap screws (1) that attach the inlet and outlet manifold assemblies to the pump.
2. Using the 8 mm Allen wrench, remove the 16 socket head cap screws (2) that attach the fluid (5) covers onto the main body of the pump.
3. Push on one of the two diaphragms (3) to shift the main shaft (4) of the pump all the way to one side.
4. At the end of the pump with the extended diaphragm, use the 13 mm open end wrench to keep the main shaft (4) from rotating.
5. Loosen and remove the diaphragm (3) by hand, rotating it counter-clockwise.

Replacement Procedure

WARNING

Do not use pliers or other hand tools to perform step 6 as damage to the diaphragms may result.

6. Assemble both new diaphragms (3), screwing them clockwise onto the main shaft (4).
7. Replace the fluid covers (5) on the pump. Torque the screws (2) to 9ft-lb (12N•m).
8. Pull the connecting blocks (6) off the tubular manifold sections (7).
9. Remove the four o-rings (8) from each end of the two tubular sections (7).
10. Replace the four o-rings (8) that were removed in step 9 at each end of the two tubular sections (7).
11. Using the appropriate grease, lubricate the socket in the blocks (6) that connect the tubular section.
12. Press the tubular sections (7) back into the connecting blocks (6).
13. Reassemble the completed manifolds. Torque the 16 screws (1) to 8ft-lb (10N•m).

Service

Replacing the Air Valve

To replace the air valve, do the following:

WARNING

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

Tools Required

- Two flat blade screw drivers
- #2 Phillips screw driver
- Internal snap ring pliers
- 28 mm (1-1/16") open-end wrench, or adjustable wrench
- 4 mm and 5 mm Allen wrenches

Removal Procedure

Note: Refer to Figure 6, on page 17 while performing the following procedures.

1. Using the 5 mm Allen wrench, remove the 16 socket head cap screws (1) that attach the inlet and outlet manifold assemblies to the pump.

2. Remove the four head screws (9) that hold the exhaust screen onto the shroud of the pump.

3. Remove the felt filter (10).

4. Using the 4 mm Allen wrench, remove the two socket head cap screws that clamp the ends of the metal shroud together.

5. Using the 1-1/16 or 28 mm open end wrench (or the adjustable wrench), remove the main air supply fitting (12), pulling it out through the shroud.

6. Slide the shroud off the pump.

7. Using the 5 mm Allen wrench, remove the four socket head cap screws (13) and the air valve cover (14) from the pump housing.

8. Using two flat blade screwdrivers, pry the air valve plate (15) out of the pump housing. When prying, place the screwdriver tips in the two recesses on the air valve plate.

9. Remove the valve block (16).

10. Using the internal snap-ring pliers, remove the snap rings (17) from both ends of the valve carriage (18).

11. Install two of the four socket head cap screws (13) partially into the tapped holes that are located in the center of the two carriage covers (19). Pull the covers out.

12. Using the internal snap pliers, remove the snap rings (20) that hold the diaphragm shaft bushings (21) in place.

13. Press the bushings (21) out of the air valve cavity from the inside.

14. With the needle nosed pliers, remove the two snap rings (17) from the main diaphragm shaft.

15. Push the carriage (18) out of its bore.

Replacement Procedure

16. Reassemble the pump in reverse order of removal.

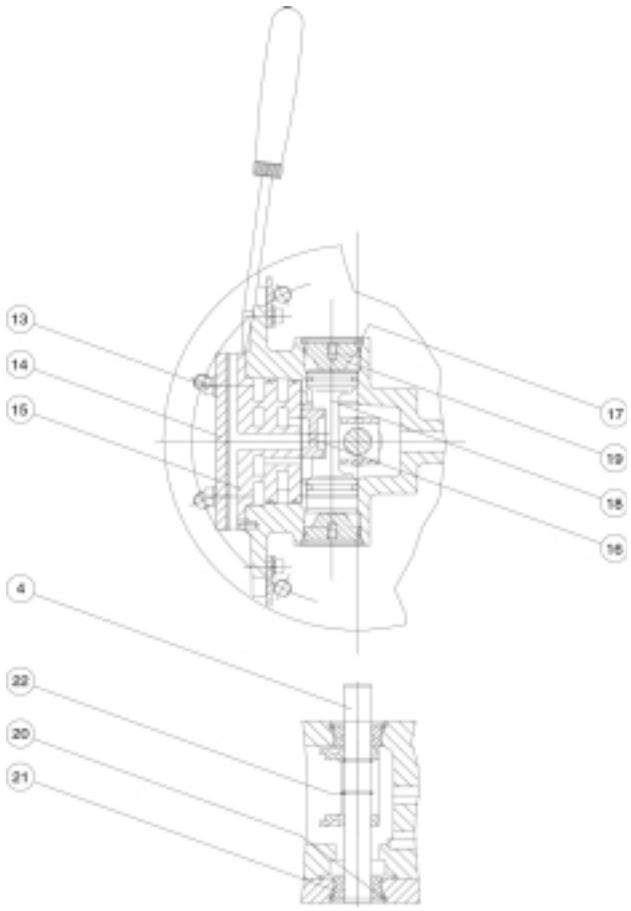


Figure 6

Service

Replacing the Check Valves

To replace the check valves, do the following:

WARNING

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

Tools Required

- 5 mm Allen wrench
- Flat blade screw driver
- Dowel rod (wooden or plastic)

Removal Procedure

Note: Refer to Figure 7, on page 18 while performing the following procedures.

1. Using the 5 mm Allen wrench, remove the 16 socket head cap screws (1) that attach the inlet and outlet manifold assemblies to the pump.

2. Remove the two check valve springs (23), two ball followers (24), and two balls (25) from the outlet checks.

   Note: If necessary, use the flat blade screw driver to pry a ball loose that sticks to the valve seat as shown in the figure.

   Note: Some of the parts will be reused when the pump is reassembled. Exercise care to avoid dropping and losing the parts when they are removed from the pump.

3. Insert the dowel (wooden or plastic) through the outlet check seat. Press the inlet valve parts (28 through 31) out of the pump.

4. At the inlet check side of the manifold, use the dowel to press the outlet check valve seat (26) and retaining sleeve (27) out of the pump.

Replacement Procedure

5. Install the polyethylene seat seals (32) on the seats of the pump.

6. Reassemble the pump in reverse order of removal.

7. Re-torque all fasteners before startup.

Note: The bent end of the check valve springs (E) must face the ball followers as shown below.

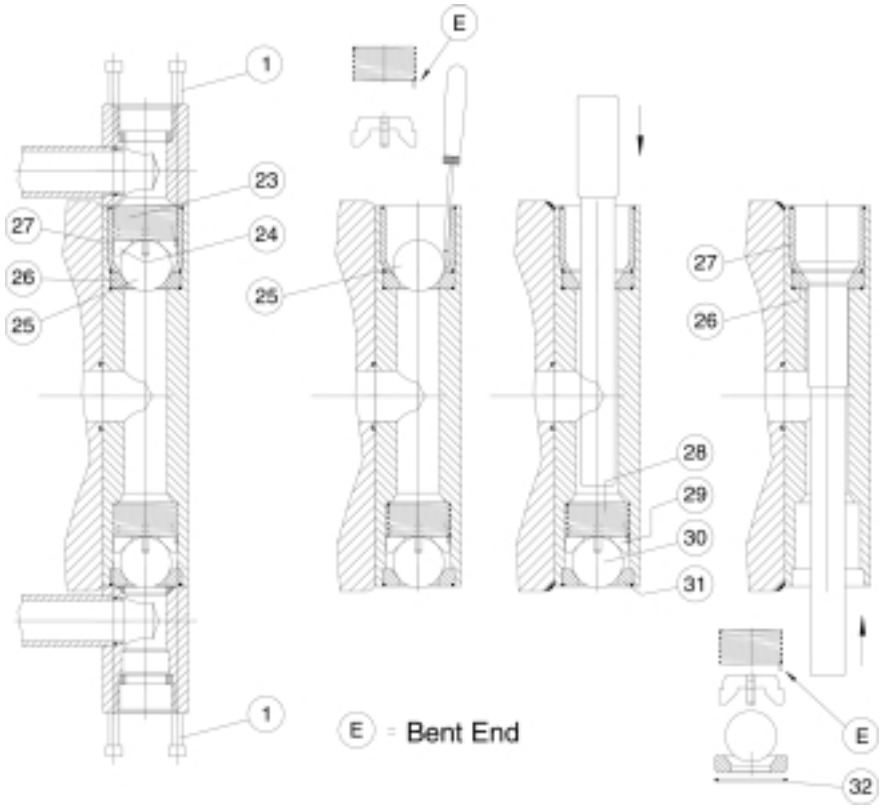


Figure 7

Service

Replacing the Air Piston Seals

To replace the air piston seals, do the following:

WARNING

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

Tools Required

- #2 Phillips screw driver
- O-ring pick
- 28 mm (1-1/16”) open-end wrench, or adjustable wrench
- 13 mm (1/2”) open-end wrench
- 4 mm, 5mm, 6 mm and 8 mm Allen wrenches

Removal Procedure

Note: Refer to Figure 5, “Servicing the Diaphragm Pump” on page 15 and, Figure 8, “Replacing the Air Piston Seals” on page 20 while performing the following procedures.

1. Using the 5 mm Allen wrench, remove the 16 socket head cap screws (1) that attach the inlet and outlet manifold assemblies to the pump.

2. Remove the four Phillips head screws that hold the exhaust screen onto the shroud of the pump.

3. Remove the felt filter (10).

4. Using the 4 mm Allen wrench, remove the two socket head cap screws (11) that clamp the ends of the sheet metal shroud together.

5. Using the 28 mm open-end wrench or an adjustable wrench, unscrew the main air supply fitting (12) and pull it through the shroud. Slide the shroud off the pump.

6. Using the 8 mm Allen wrench, remove the 16 socket head cap screws that hold the fluid covers (6) on the main body of the pump.

7. Push one of the diaphragms (3) to shift the main shaft (4) of the pump all the way to one side.

8. At the end of the pump with the extended diaphragm, use the 13 mm open-end wrench to keep the main shaft (4) from rotating. Loosen and remove the diaphragm by hand (rotate counter-clockwise).

9. Push the main shaft (4) all the way to the other side. Repeat step 8 to remove the remaining diaphragm.

10. Using the 8 mm Allen wrench, remove the four tie rod screws (33) that hold the diaphragm housing (34) to the center section of the pump.

11. Pull the diaphragm housing (34) off the main shaft (4).

12. Using the 13 mm open-end wrench, loosen the cylinder shaft (35). Remove the cylinder shaft by pulling it through the air piston (36).

13. Pull the outer cylinder (37) off the air piston (36).

14. Remove the o-rings (38) that seal each end of the outer cylinder (37).

15. Replace both of the old o-rings (38) with new o-rings.

16. Using the o-ring pick, remove the large o-ring (39) from the outside diameter of the air piston (36), the connecting tube seal (40), and the bearing (41) from the small off-center hole in the air piston (36).

17. Replace the o-ring (39), tube seal (40), and bearing (41) with new parts from the Repair Kit.

Replacement Procedure

18. Reassemble the pump in reverse order of removal.

Replacing the Air Piston Seals *(continued)*

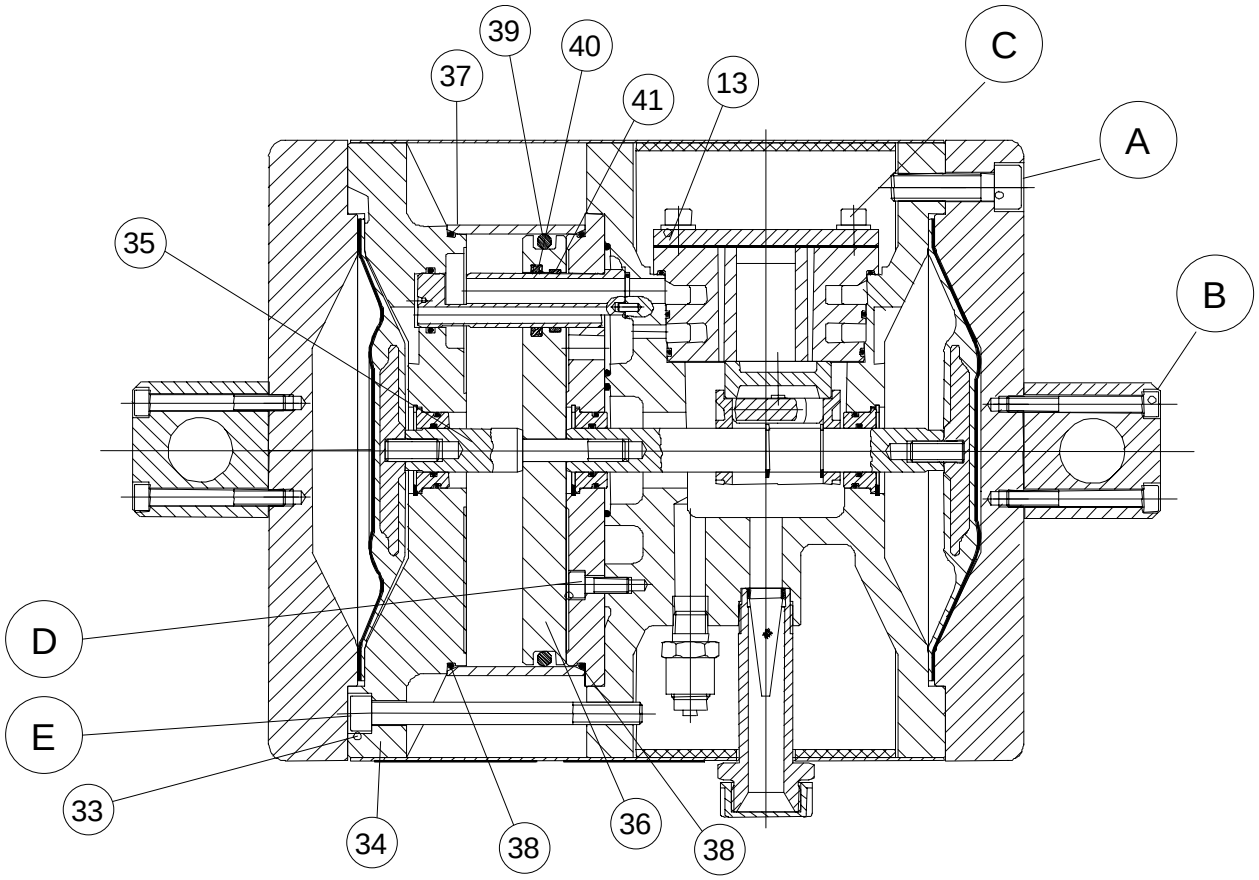


Figure 8

Fastener Torque Requirements

Position	A	B	C	D	E
Thread Size	M10	M6	M6	M6	M8
Torque	12N•m 9ft-lbs	10N•m 8 ft-lbs	6N•m 4.5-ft lbs	8N•m 6 ft-lbs	15N•m 11 ft-lbs

Notes

Parts – Repair Kits

Repair Kits for Diaphragm Pump 232841

Part No. 243152, Repair Kit, Diaphragm

Ref. No.	Description	Qty.
3	Molded PTFE diaphragm	2
8	O-ring	4

Part No. 243153, Repair Kit, Air Valve

Ref. No.	Description	Qty.
15	Close sliding seat	1
16	Flat slide, 39.5 x 29 mm	1
18	Drive Pin, D 30 x L 75 mm	1
42	O-ring, 26 x 2.5 mm	2
43	O-ring, 16 x 2 mm	3
44	O-ring, 23 x 2 mm	3
45	O-ring, 30 x 2 mm	2
46	O-ring, 67 x 2 mm	2
47	O-ring, 79 x 2 mm	1
48	Flat packing, 105 x 83 x 0.75	1

Part No. 243154, Repair Kit, Check Valves

Ref. No.	Description	Qty.
23 and 28	Spring	4
24 and 29	Ball guide	4
25 and 30	Ball, 30 mm (1.18 in.)	4
26 and 31	Valve seat, D 23	4

Part No. 243155, Repair Kit, Pneumatic Cylinder

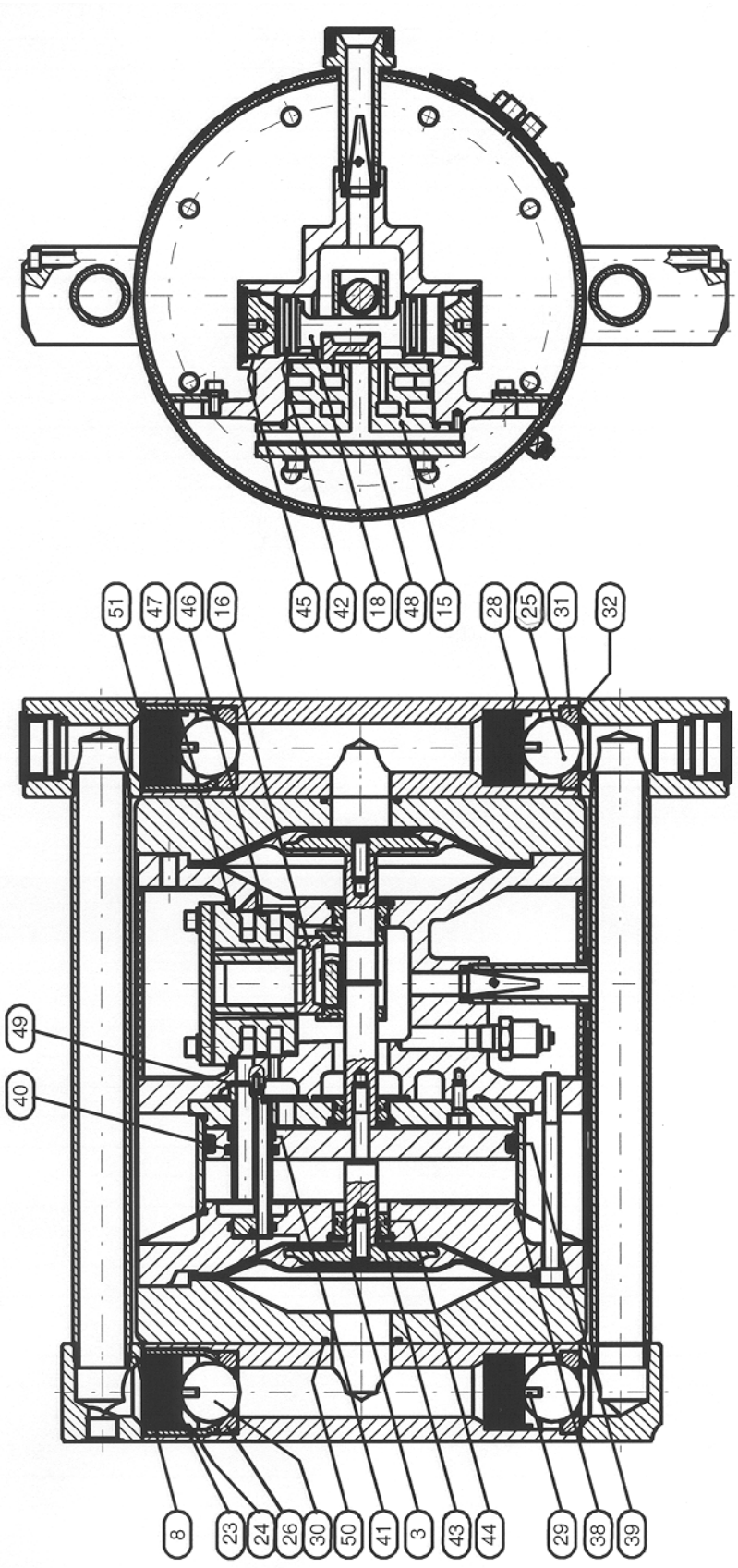
Ref. No.	Description	Qty.
38	O-ring, 150 x 3 mm	2
39	O-ring, 145 x 6 mm	1
40	X-ring, 20.22 x 3.55 mm	1
41	Drive band, 4 x 1,55 x 64 mm	1
49	O-ring, 10 x 2 mm	1

Part No. 243156, Repair Kit, Sealing Rings

Ref. No.	Description	Qty.
50	Profile sealing ring, 35 x 40 x 3.2 mm	2
32	Sealing ring, 39 x 42 x 1.6 mm	4
51	Sealing ring, 41 x 44x 1.6 mm	2

Parts – Repair Kit

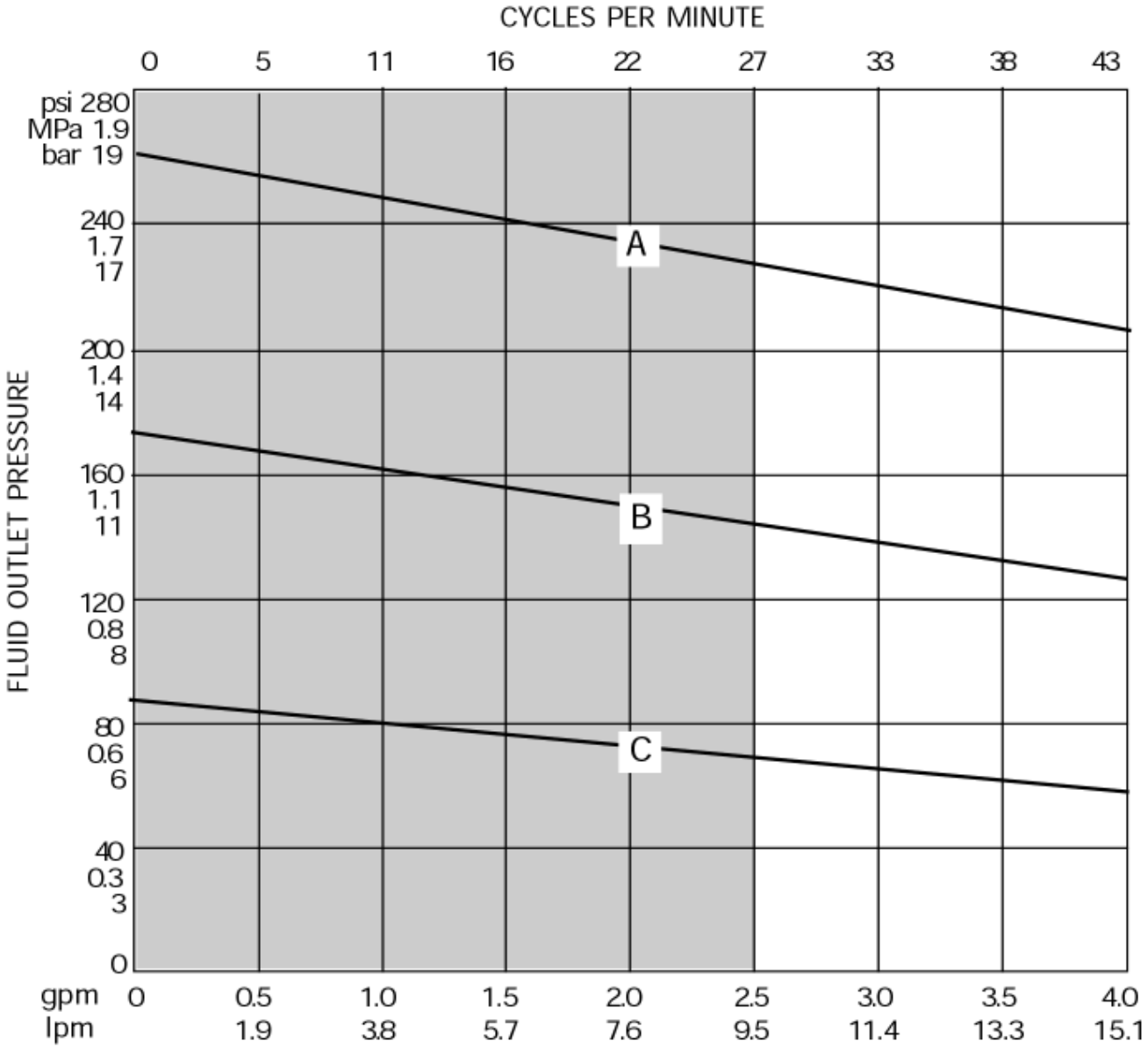
Repair Kits for Diaphragm Pump 232841 ***(continued)***



Sectional Side-veiw and Front View of Diaphragm Pump 232841

Technical Data

Recommended Performance



Air Pressures:
A = 88 psi (0.6 MPa, 6 bar)
B = 60 psi (0.4 Mpa, 4 bar)
C = 30 psi (0.2 Mpa, 2 bar)

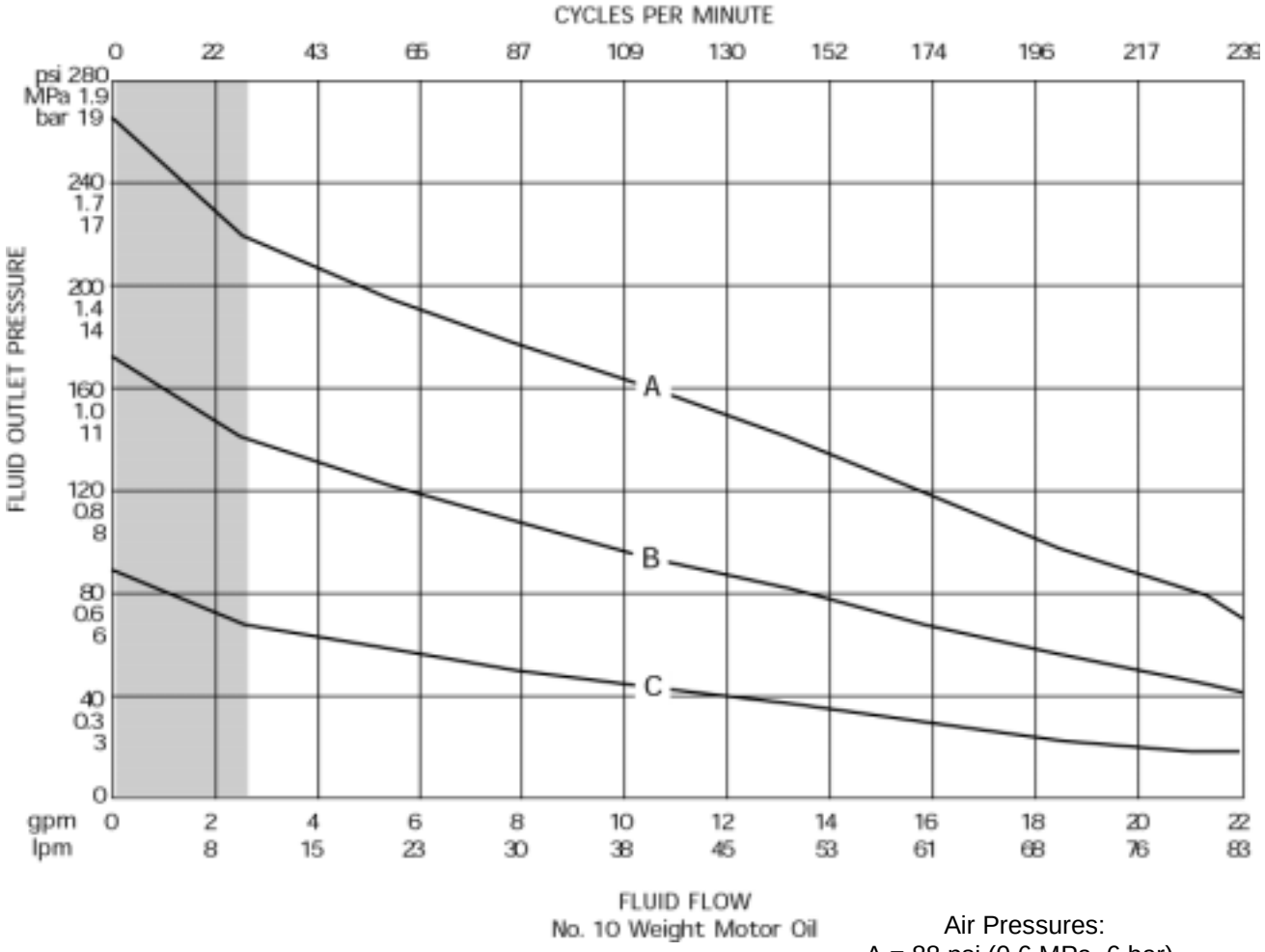
Recommended Continuous Performance Range 0-2.5 gpm (0-10 lpm)

Flow rates exceeding 2.5 gpm (10 lpm) are achievable, but recommended for intermittent duty only.

Note: pump life expectancy decreases when operating above 2.5 gpm (10 lpm) continuously for extended periods of time.

Technical Data

Fluid Pressure



Air Pressures:
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C = 30 psi (0.2 Mpa, 2 bar)

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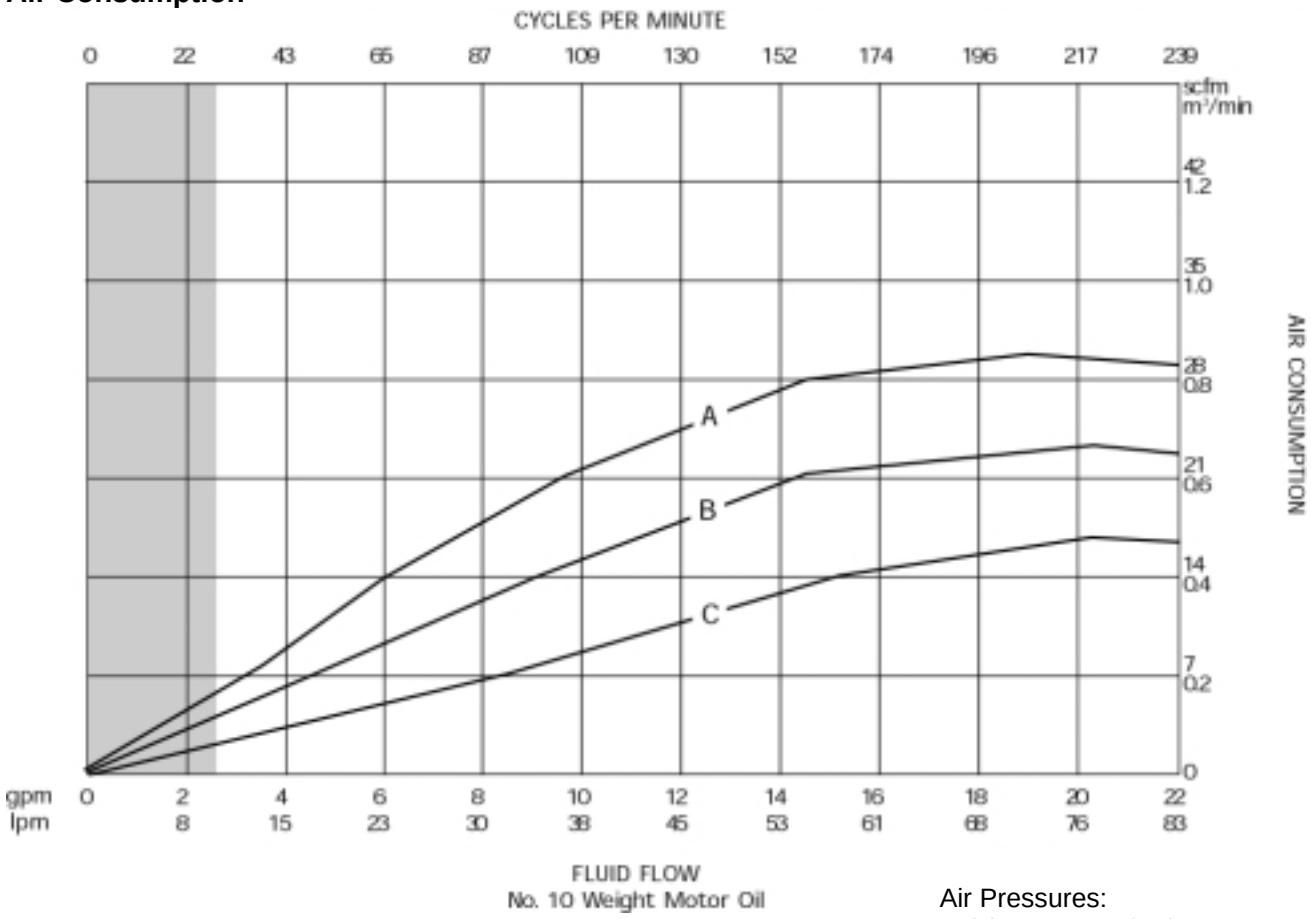
Flow rates exceeding 2.5 gpm (10 lpm) are achievable, but recommended for intermittent duty only.

Note: pump life expectancy decreases when operating above 2.5 gpm (10 lpm) continuously for extended periods of time.

Technical Data

Air Consumption



Air Pressures:
A = 88 psi (0.6 MPa, 6 bar)
B = 60 psi (0.4 Mpa, 4 bar)
C = 30 psi (0.2 Mpa, 2 bar)

Recommended Continuous Performance Range 0-2.5 gpm (0-10 lpm)

Flow rates exceeding 2.5 gpm (10 lpm) are achievable, but recommended for intermittent duty only.

Note: pump life expectancy decreases when operating above 2.5 gpm (10 lpm) continuously for extended periods of time.

Technical Data

Pump ratio	3:1
Maximum fluid working pressure	260 psi (1.8 MPa , 18 bar)
Maximum recommended flow rate (continuous duty)	2.5 gpm (10 lpm)
Minimum air inlet pressure	7.25 psi (0.005 MPa, 0.5 bar)
Maximum air inlet pressure	88 psi (0.6 MPa, 6 bar)
Maximum material flow rate	32 gpm (114 l/min)
Material volume per cycle (double stroke)	.09 gallon/cycle (330 cc/cycle)
Temperature range	50-176º F (10-80º C)
Dry suction lift	8.2 feet (2.5 m)
Wet suction lift	22 feet (6.7 m)
Air inlet size	½ NPT(f)
Fluid inlet size	1” NPT(f)
Fluid outlet size	1” NPT(f)
Noise level at 15 cpm, 88 psi (0.6 MPa, 6 bar) air inlet pressure Tested per ISO 9614-2	66 dBA, Sound Pressure
Wetted parts	316 stainless steel, PTFE, polyethylene (high density), acetal, fluorocarbon.
Weight (approximate)	92 lb. (42 kg.)

Dimensions

Figure 9 shows the dimensions of diaphragm pump 232841.

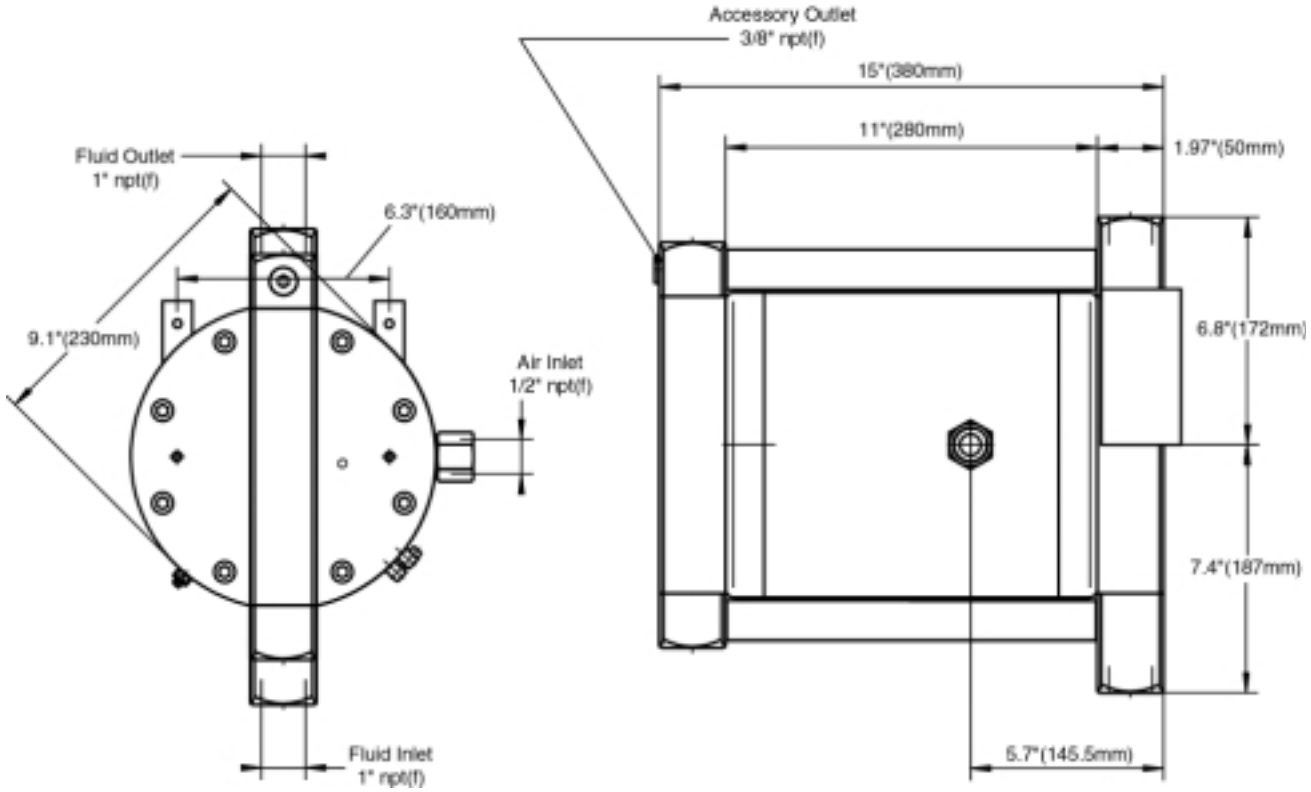


Figure 9

Notes

Graco Standard Warranty

+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 by an authorized Graco distributor 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.

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