



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

INSTRUCTIONS

*First choice when quality counts.™*

## STAINLESS STEEL

# Check-Mate™ 200 Pumps

## WITH PRIMING PISTON, AND SEVERE-DUTY ROD AND CYLINDER

### Model 222839, Series A

#### 23:1 Ratio Monark® Pump

*180 psi (1.2 MPa, 12 bar) Maximum Air Input Pressure*

*4140 psi (29 MPa, 285 bar) Maximum Fluid Working Pressure*

### Model 222907, Series A

#### 46:1 Ratio President® Pump

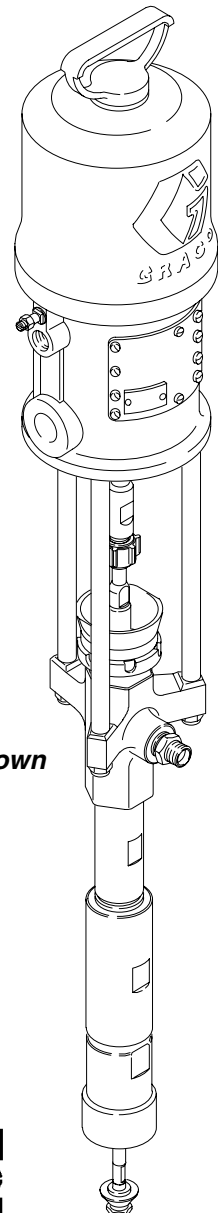
*100 psi (0.7 MPa, 7 bar) Maximum Air Input Pressure*

*4600 psi (32 MPa, 317 bar) Maximum Fluid Working Pressure*

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**Model 222907 Shown**



01057

# Symbols

## Warning Symbol



This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

## Caution Symbol



This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

## WARNING



INSTRUCTIONS

### EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure stated on the equipment or in the **Technical Data** for your equipment. Do not exceed the maximum working pressure of the lowest rated component in your system.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below -40°C (-40°F).
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

# WARNING



## INJECTION HAZARD

Spray from the spray gun/dispense 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.

- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate medical attention.**
- Do not point the gun/valve at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip/nozzle.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the tip guard and the trigger guard on the spray gun when spraying.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun/valve trigger safety operates before spraying/dispensing.
- Lock the gun/valve trigger safety when you stop spraying/dispensing.
- Follow the **Pressure Relief Procedure** on page 8 whenever you: are instructed to relieve pressure; stop spraying/dispensing; clean, check, or service the equipment; and install or clean the spray tip/nozzle.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.
- Use only Graco approved hoses. Do not remove any spring guard that is used to help protect the hose from rupture caused by kinks or bends near the couplings.



## MOVING PARTS HAZARD

Moving parts, such as the priming piston, can pinch or amputate your fingers.

- Keep clear of all moving parts when starting or operating the pump.
- Keep hands and fingers away from the priming piston during operation and whenever the pump is charged with air.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 8 to prevent the equipment from starting unexpectedly.

# WARNING



## FIRE AND EXPLOSION HAZARD

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

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



## TOXIC FLUID HAZARD

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

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

# Installation

## General Information

**NOTE:** Reference numbers and letters in parentheses in the text refer to the callouts in the figures and the parts drawings.

**NOTE:** If you supply your own accessories, be sure they are adequately sized and pressure-rated to meet the system's requirements.

Fig. 2 is only a guide for selecting and installing system components and accessories. Contact your Graco distributor for assistance in designing a system to suit your particular needs.

## System Accessories

### WARNING

Two accessories are required in your system: a bleed-type master air valve (J) and a fluid drain valve (N). These accessories help reduce the risk of serious bodily injury including fluid injection, splashing in the eyes or on the skin, and injury from moving parts if you are adjusting or repairing the pump.

The bleed-type master air valve relieves air trapped between this valve and the pump after the air is shut off. Trapped air can cause the pump to cycle unexpectedly. Locate the valve close to the pump.

The fluid drain valve assists in relieving fluid pressure in the displacement pump, hose, and gun. Triggering the gun to relieve pressure may not be sufficient.

## Air and Fluid Hoses

Be sure all air and fluid hoses are properly sized and pressure-rated for your system. Use only grounded air and fluid hoses. Fluid hoses must have a braided stainless steel cover (or have spring guards on both ends).

## Mounting Accessories

Mount the pump (A) to suit the type of installation planned. The pump dimensions and mounting hole layouts are shown on pages 28 and 29.

The Typical Installation on page 7 shows the pump (A) mounted on a pneumatic elevator cart (B). The pump may also be mounted on a 19 liter (5 gal.) pail ram. In either case, it is used with a wiper plate (C). Refer to the separate manuals for the cart, ram, and wiper plate for further information.

Kits 223881 and 224829 are available to mount the pump on a 200 liter (55 gallon) ram. Refer to the separate manuals included with the kits for further information.

## Air Line Accessories

Install the following accessories as shown in Fig. 2, using adapters as necessary:

- **A pump runaway valve (G)** senses when the pump is running too fast and automatically shuts off the air to the motor. A pump which runs too fast can be seriously damaged. Install closest to the pump air inlet.
- **An air line lubricator (H)** provides automatic air motor lubrication.
- **A bleed-type master air valve (J)** is required in your system to relieve air trapped between it and the air motor when the valve is closed (see the **WARNING** at left). Be sure the bleed valve is easily accessible from the pump, and is located **downstream** from the air regulator.
- **An air regulator (K)** controls pump speed and outlet pressure by adjusting the air pressure to the pump. Locate the regulator close to the pump, but **upstream** from the bleed-type master air valve.
- **An air line filter (L)** removes harmful dirt and moisture from the compressed air supply.
- **A second bleed-type air valve (M)** isolates the air line accessories for servicing. Locate upstream from all other air line accessories.
- **An air line quick disconnect coupler (F)** is required for pumps mounted on the pneumatic elevator cart. The female coupler attaches to the end of the air hose (D), and the male coupler screws into the air manifold (E). See the separate cart manual for further information.

# Installation

## Fluid Line Accessories

Install the following accessories in the positions shown in Fig. 2, using adapters as necessary:

- **A fluid drain valve (N)** is required in your system to relieve fluid pressure in the hose and gun (see the **WARNING** at left). Screw the drain valve into the open branch of a tee mounted in the fluid line. Install the drain valve pointing down, but so the handle points up when opened.
- **A fluid regulator (P)** controls fluid pressure to the gun/valve, and dampens pressure surges.
- **A gun or valve (S)** dispenses the fluid. The gun shown in the Typical Installation is a dispensing gun for highly viscous fluids.
- **A gun swivel (T)** allows freer gun movement.

## Grounding

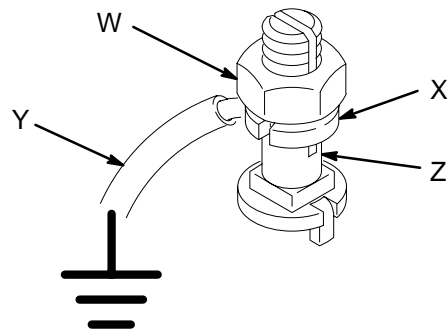
### **WARNING**



#### **FIRE AND EXPLOSION HAZARD**

Before operating the pump, ground the system as explained below. Also read the section **FIRE AND EXPLOSION HAZARD** on page 4.

1. **Pump:** use a ground wire and clamp. See Fig. 1. Loosen the grounding lug locknut (W) and washer (X). Insert one end of a 1.5 mm<sup>2</sup> (12 ga) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. Connect the other end of the wire to a true earth ground. Order Part No. 237569 Ground Wire and Clamp.



0864

**Fig. 1**

2. **Air and fluid hoses:** use only electrically conductive hoses.
3. **Air compressor:** follow manufacturer's recommendations.
4. **Spray gun/dispense valve:** ground through connection to a properly grounded fluid hose and pump.
5. **Fluid supply container:** follow your local code.
6. **Object being sprayed:** follow your local code.
7. **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.
8. **To maintain grounding continuity when flushing or relieving pressure,** always hold a metal part of the gun/valve firmly to the side of a grounded *metal* pail, then trigger the gun/valve.

# Installation

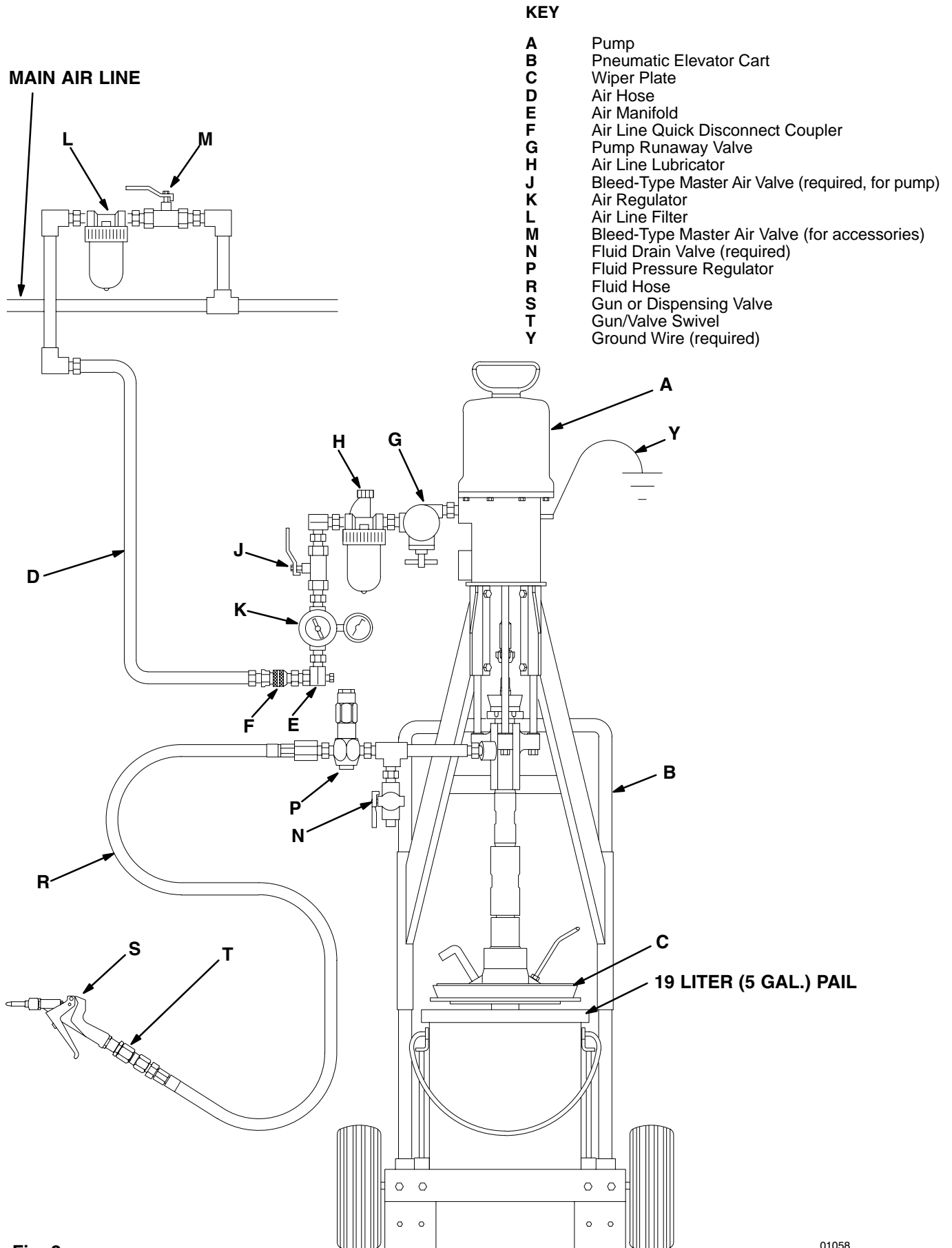


Fig. 2

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# Operation

## Pressure Relief Procedure

### WARNING



#### INJECTION HAZARD

The system pressure must be manually relieved to prevent the system from starting or dispensing accidentally. Fluid under high pressure can be injected through the skin and cause serious injury. To reduce the risk of an injury from injection, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure,
- stop spraying/dispensing,
- check or service any of the system equipment,
- or install or clean the spray tip/nozzle.

1. Lock the gun/valve trigger safety.
2. Close the pump's bleed-type air valve (required in your system).
3. Shut off the master air bleed valve (required in your system).
4. Unlock the gun/valve trigger safety.
5. Hold a metal part of the gun/valve firmly to the side of a grounded metal pail, and trigger the gun/valve to relieve pressure.
6. Lock the gun/valve trigger safety.
7. Open the drain valve (required in your system), having a container ready to catch the drainage.
8. Leave the drain valve open until you are ready to spray/dispense again.

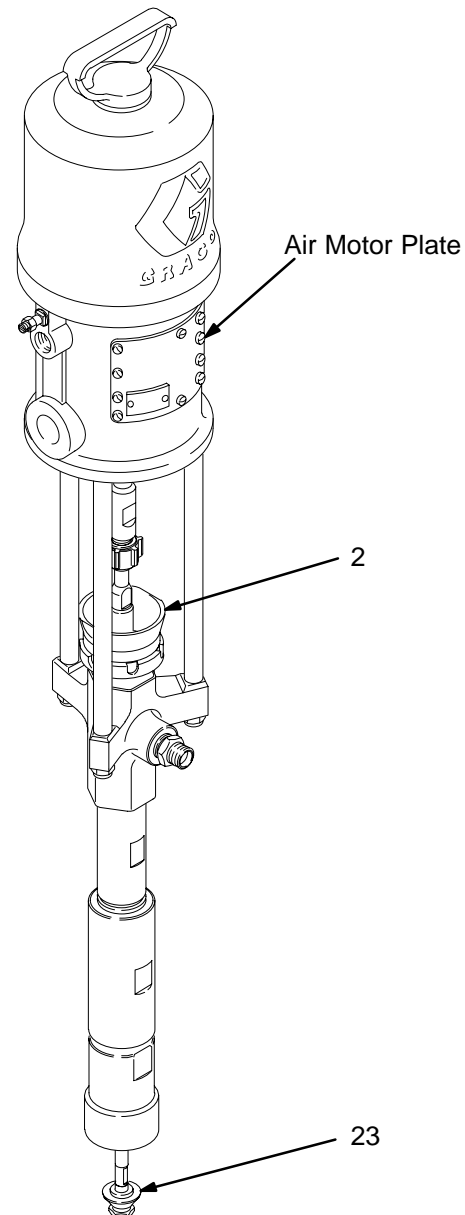
*If you suspect that the spray tip/nozzle or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, very slowly loosen the tip guard retaining nut or hose end coupling and relieve pressure gradually, then loosen completely. Now clear the tip/nozzle or hose.*

## Packing Nut/Wet-Cup

Before starting, fill the packing nut (2) 1/3 full with Graco Throat Seal Liquid (TSL) or compatible solvent. See Fig. 3. Adjust the packing nut weekly so it is just snug; do not overtighten.

### WARNING

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



**Fig. 3**

01057



# Operation

## Flush the Pump Before First Use

The pump is tested with lightweight oil, which is left in to protect the pump parts. If the fluid you are using may be contaminated by the oil, flush it out with a compatible solvent. See **Flushing** on page 10.

## Starting and Adjusting the Pump

### **WARNING**



#### **MOVING PARTS HAZARD**

See Fig. 3. The priming piston (23) and the air motor piston (located behind the air motor plates) move during operation.

Keep hands and fingers away from the priming piston (23) during operation and whenever the pump is charged with air. The priming piston extends beyond the intake cylinder (20) to pull material into the pump and can amputate a hand or finger caught between it and the intake cylinder. Follow the **Pressure Relief Procedure** on page 8, before checking, clearing, or cleaning the priming piston to prevent the pump from starting accidentally.

Never operate the pump with the air motor plates removed.

See the **Installation** on page 7. If you are using a pneumatic elevator cart or 19 liter (5 gallon) ram with the pump, refer to the separate instructions for those components for set-up and operation instructions.

Lower the pump into a fluid container. Be sure the air regulator (K) and bleed-type master air valve (J) are closed. Then open the bleed valve (J). Hold a metal part of the spray gun/dispensing valve (S) firmly to the side of a grounded metal pail and hold the trigger open. Now slowly open the air regulator until the pump starts.

Cycle the pump slowly until all the air is pushed out and the pump and hoses are fully primed. Release the spray gun/dispensing valve trigger and engage the safety latch. The pump should stall against pressure when the trigger is released.

If the pump fails to prime properly, open the bleeder valve (33) slightly. See Fig. 7 on page 16. Use the bleeder hole (on the underside of the valve housing) as a priming valve until the fluid appears at the hole. Close the bleeder valve.

**NOTE:** When changing fluid containers with the hose and gun already primed, be sure to open the bleeder valve (33), to assist in priming the pump and venting air before it enters the hose. Close the valve when all air has been eliminated.

### **WARNING**

#### **INJECTION HAZARD**

To reduce the risk of fluid injection, **do not** use your hand or fingers to cover the bleed hole on the underside of the bleeder valve body when priming the pump. Use a crescent wrench to open and close the bleeder plug. Keep your hands away from the bleed hole.

With the pump and lines primed, and with adequate air pressure and volume supplied, the pump will start and stop as the spray gun/dispensing valve is opened and closed.

Use the air regulator (K) to control the pump speed and the fluid pressure. Always use the lowest air pressure necessary to get the desired results. Higher pressures cause premature tip/nozzle and pump wear.

### **WARNING**

To reduce the risk of overpressurizing the system, which could result in component rupture and cause serious injury, **NEVER** exceed the specified maximum incoming air pressure to the pump (see the **Technical Data** on pages 24–27).

### **CAUTION**

Do not allow the pump to run dry. It will quickly accelerate to a high speed, causing damage. A pump runaway valve (G), which shuts off the air supply to the pump if the pump accelerates beyond the pre-set speed, is available. See the Typical Installation in Fig. 2. If your pump accelerates quickly, or is running too fast, stop it immediately and check the fluid supply. If the supply container is empty and air has been pumped into the lines, refill the container and prime the pump and the lines with fluid, or flush and leave it filled with a compatible solvent. Be sure to eliminate all air from the fluid system.

# Operation

## Shutdown and Care of the Pump

For overnight shutdown, stop the pump at the bottom of the stroke to prevent fluid from drying on the exposed displacement rod and damaging the throat packings. Relieve the pressure.

Always flush the pump before the fluid dries on the displacement rod. Refer to **Flushing** below.

## Flushing

### **WARNING**



#### **FIRE AND EXPLOSION HAZARD**

Before operating the pump, read the section **FIRE AND EXPLOSION HAZARD** on page 4. Be sure the entire system and flushing pails are properly grounded. Refer to **Grounding** on page 6.

Flush with a fluid that is compatible with the fluid you are pumping and with the wetted parts in your system. Check with your fluid manufacturer or supplier for recommended flushing fluids and flushing frequency. Always flush the pump before fluid dries on the displacement rod.

### **WARNING**

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

1. Relieve the pressure.
2. Remove the spray tip/nozzle from the gun/valve.
3. Hold a metal part of the gun/valve firmly to the side of a grounded *metal* pail.
4. Start the pump. Always use the lowest possible fluid pressure when flushing.
5. Trigger the gun/valve.
6. Flush the system until clear solvent flows from the gun/valve.
7. Relieve the pressure.

# Troubleshooting



## WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

1. Relieve the pressure.
2. Check all possible problems and causes before disassembling the pump.

| PROBLEM   | CAUSE   | SOLUTION   |
|---|---|--|
| Pump fails to operate.                            | Restricted line or inadequate air supply                        | Clear*; see <b>Technical Data</b> on pages 24–27.  |
|   | Obstructed fluid hose or gun/valve; fluid hose ID is too small. | Clear*; use a hose with a larger ID.   |
|   | Fluid dried on the displacement rod.                            | Clean; see <b>Service</b> on pages 12–19.  |
|   | Dirty or worn air motor parts.                                  | Clean or repair; see separate air motor manual.  |
| Pump operates, but output is low on both strokes. | Restricted line or inadequate air supply.                       | Clear*; see <b>Technical Data</b> on pages 24–27.  |
|   | Obstructed fluid hose or gun/valve; fluid hose ID is too small. | Clear*; use a hose with a larger ID.   |
|   | Bleeder valve is open.  | Close.   |
|   | Air is leaking into the supply container.                       | Check wiper plate seal.  |
|   | Fluid is too heavy for pump priming.                            | Use bleeder valve (see page 9); use wiper plate with ram or pneumatic elevator cart.     |
|   | Worn packings in displacement pump.                             | Replace packings.  |
| Pump operates, but output is low on down-stroke.  | Fluid too heavy for pump priming.                               | Use bleeder valve (see page 9); use wiper plate with ram or pneumatic elevator cart.     |
|   | Held open or worn intake valve or seals.                        | Clear valve; replace seals.  |
| Pump operates, but output is low on up-stroke.    | Held open or worn piston valve or seals.                        | Clear valve; replace seals.  |
| Erratic or accelerated pump speed.                | Exhausted fluid supply.   | Refill and prime.  |
|   | Fluid is too heavy for pump priming.                            | Use the bleeder valve (see page 9); use wiper plate with ram or pneumatic elevator cart. |
|   | Held open or worn piston valve or seals.                        | Clear valve; replace seals.  |
|   | Held open or worn priming piston.                               | Clear; service.  |
|   | Worn packings in displacement pump.                             | Replace packings.  |

\* To determine if the fluid hose or gun is obstructed, follow the **Pressure Relief Procedure** on page 8. Disconnect the fluid hose and place a container at the pump fluid outlet to catch any fluid. Turn on the air just enough to start the pump (about 20–40 psi [0.14–0.3 MPa, 1.4–2.8 bar]). If the pump starts when the air is turned on, the obstruction is in the fluid hose or gun.

**NOTE:** If you experience air motor icing, contact your Graco distributor for assistance.

# Service

## Required Tools

- Torque wrench
- Bench vise, with soft jaws
- Rubber mallet
- Hammer
- Razor or other sharp tool
- 8 mm (5/16 in.) dia. brass rod
- 8 mm, 11 mm, 15 mm, 25 mm, 3/4 in., and 7/8 in. open-end wrenches
- 17 mm box or socket wrench
- 22 mm crow's-foot wrench
- Adjustable wrenches
- 24 in. adjustable wrench
- Thread lubricant
- Anaerobic thread sealant

## Disconnecting the Displacement Pump

1. Flush the pump, if possible. Stop the pump at the bottom of its stroke.

### WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

Keep hands and fingers away from the priming piston during operation and whenever the pump is charged with air. On the pump downstroke the priming piston extends beyond the intake cylinder to pull the material into the pump. The priming piston works under extreme force. During operation and whenever the pump is charged with air, the priming piston can severely injure or amputate a hand or finger, or break a tool, caught between it and the intake cylinder.

The air motor piston (located behind the air motor plates) also moves when air is supplied to the motor. NEVER operate the pump with the air motor plates removed.

2. Relieve the pressure.
3. Disconnect the air hose. Hold the fluid outlet fitting (7) with an adjustable wrench to keep it from being loosened while you disconnect the fluid hose. Remove the pump from its mounting. Note the relative position of the pump's fluid outlet to the air inlet.
4. Using an adjustable wrench, unscrew the coupling nut (104) from the connecting rod (103). Remove the coupling collars (105). Take care not to lose or drop them. See Fig. 4.
5. Hold the tie rod flats with an 11 mm wrench to keep them from turning. Use the wrench (113) provided with the pump (or a 17 mm box or socket wrench) to unscrew the locknuts (106) from the tie rods (102). Carefully pull the displacement pump (107) off the air motor (101).
6. Refer to page 14 for displacement pump service. To service the air motor, refer to the separate air motor manual, supplied.

# Service

## Reconnecting the Displacement Pump

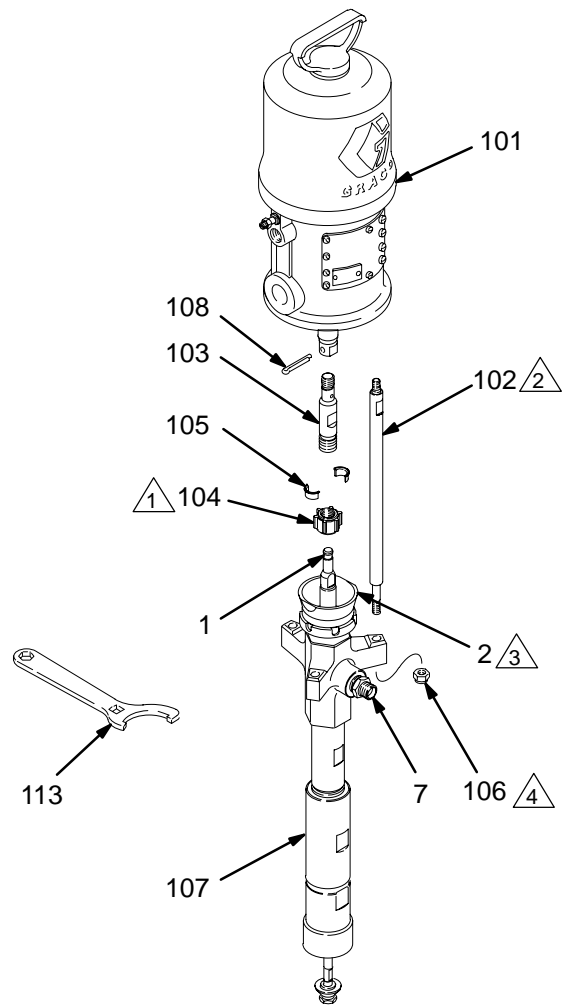
### **WARNING**





To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

1. Orient the pump's fluid outlet to the air motor's air inlet as was noted in step 3 under **Disconnecting the Displacement Pump**. Position the displacement pump (107) on the tie rods (102). See Fig. 4.

**NOTE:** If you removed the tie rods (102) from the air motor (101) or air motor adapter plate, reinstall them using an 11 mm wrench. Torque the rods to 20-25 N.m (15-18 ft-lb) on Model 222907, and 34-41 N.m (25-30 ft-lb) on Model 222839.

2. Screw the locknuts (106) onto the tie rods (102) and torque to 34-41 N.m (25-30 ft-lb), using the wrench (113) provided (or a 17 mm box or socket wrench).
3. Place the coupling nut (104) on the displacement rod (1), then place the collars (105) in the nut. Screw the nut onto the connecting rod (103) loosely. Hold the connecting rod flats with an adjustable wrench to keep it from turning. Using an adjustable wrench, torque the nut to 41-48 N.m (30-35 ft-lb).
4. Using a torque wrench in the square hole of the supplied wrench (113), torque the packing nut (2) to 27-34 N.m (20-25 ft-lb).
5. Mount the pump and reconnect all hoses. Reconnect the ground wire if it was disconnected during repair. Turn on the air and run the pump slowly.
6. Fill the packing nut/wet-cup 1/3 full of Graco Throat Seal Liquid or compatible solvent.



-  Torque to 30-35 ft-lb (41-48 N•m).
-  Torque to 15-18 ft-lb (20-25 N•m) on model 222907; 25-30 ft-lb (34-41 N•m) on model 222839.
-  Torque to 20-25 ft-lb (27-34 N•m).
-  Torque to 25-30 ft-lb (34-41 N•m).

01059

**Fig. 4**

# Service

## Disassembly

When disassembling the pump, lay out all removed parts in sequence, to ease reassembly. Refer to Fig. 7.

**NOTE:** Repair Kit 222784 is available separately to replace the piston and intake valve seals. For the best results, use all the new parts in the kit. Kit parts are marked with one asterisk, for example (8\*). See **Displacement Pump Parts** on page 23.

Repair Kit 222785 is available to replace the throat packings. For the best results, use all the new parts in the kit. Kit parts are marked with a check mark, for example (3✓).

1. Disconnect the displacement pump from the air motor as explained on page 12.
2. Place the pump in a vise, with the jaws on the outlet housing (9).
3. Hold the flats of the priming piston rod (21) with an 8 mm wrench. Using a 3/4 in. wrench, unscrew the priming piston nut (22) from the rod. Slide the priming piston (23) and priming piston guide (24) off the rod. Inspect the surfaces of the guide (24) and piston (23) for scoring, wear, or other damage.
4. Loosen the packing nut (2) using the packing nut wrench (113, supplied), or a hammer and brass rod.
5. Remove the intake cylinder (20), using a 24 in. adjustable wrench. Remove the seal (19) and seat (18) from the intake valve housing (16); always replace the seal with a new one.
6. Unscrew the intake valve housing (16) from the cylinder (11), using a 24 in. adjustable wrench. Pull the housing off the pump. The intake check valve assembly (U) should slide down the priming piston rod (21) as you remove the housing; if it does not slide easily, loosen it by firmly tapping the top of the housing (16) with a rubber mallet. Take care not to drop the assembly (U) as it comes free. Set the check valve assembly aside for disassembly later.
7. Inspect the rod guide (17) while in place in the housing (16). Remove the rod guide **only** if it is visibly damaged. Using a hammer and brass rod, gently tap around the **outer edge** of the guide to loosen it.
8. Push the displacement rod (1) down as far as possible, then pull it and the priming piston rod (21) out of the outlet housing (9) and cylinder (11).
9. Remove the packing nut (2) and throat packings from the outlet housing (9). **Do not** remove the fluid outlet nipple (7) and o-ring (8) unless damaged.
10. Unscrew the plug (AA) of the bleeder valve (33) completely from the valve housing (BB). Do not unscrew the valve housing from the outlet housing (9), because the threads may gall. Clean the valve threads and the bleed hole on the underside of the valve housing.
11. Use a 24 in. adjustable wrench on the pump cylinder (11) flats to unscrew it from the housing (9). Remove the o-rings (10). Inspect the inside of the cylinder for damage by holding it up to the light at an angle or running a finger over the surface.
12. Inspect the surface of the displacement rod (1) and priming piston rod (21) for wear, scoring or other damage by running a finger over the surface.
13. Use a vise with soft jaws to hold the displacement rod (1) by its flats. Place a 15 mm wrench on the piston flats and unscrew the piston (13) and priming piston rod (21) from the displacement rod (1). Remove the piston guide assembly (V) from the piston (13), and set aside for disassembly later.
14. It is not necessary to remove the priming piston rod (21) from the piston (13) unless you see scoring, wear, or other damage to either part. To disassemble, place the piston flats in a vise. Using an 8 mm wrench on the rod flats, unscrew the rod.

# Service

15. To disassemble the piston guide assembly (V), place the flats of the piston seat (15) in a vise. Close the jaws just tight enough to hold the part; it can be damaged by squeezing it too tightly. Using an 8 mm (5/16 in.) dia. brass rod, unscrew the piston guide (12) from the piston seat (15). See Fig. 5. Remove the piston seal (14); always replace with a new one. Inspect the mating surfaces of the piston (13) and piston seat (15) for nicks, scoring or wear.

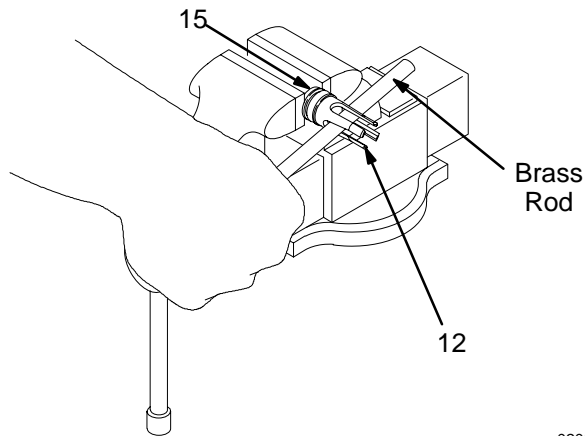


Fig. 5

16. To disassemble the intake check valve assembly (U), place the nut (27) in a vise and unscrew the intake valve body (25) from the nut, using a 25 mm wrench. See Fig. 6. Remove the seal (30) from the nut (27) and the other seal (26) from the valve body; always replace them with new ones. Inspect the mating surfaces of the intake valve body (25) and seat (18) for wear, scoring, or other damage.

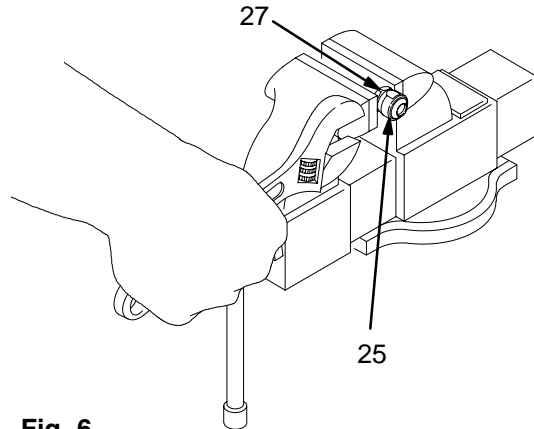


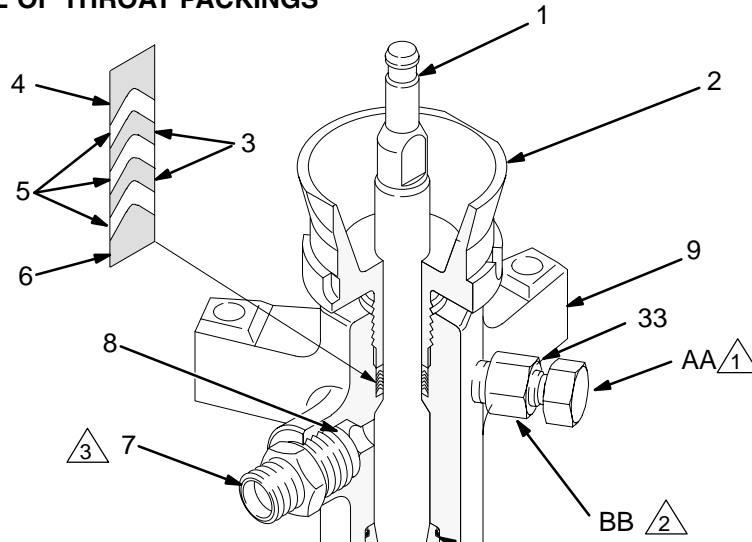
Fig. 6

**NOTE:** The seal (30) is press-fit in the nut (27), and may require cutting with a razor to ease removal.

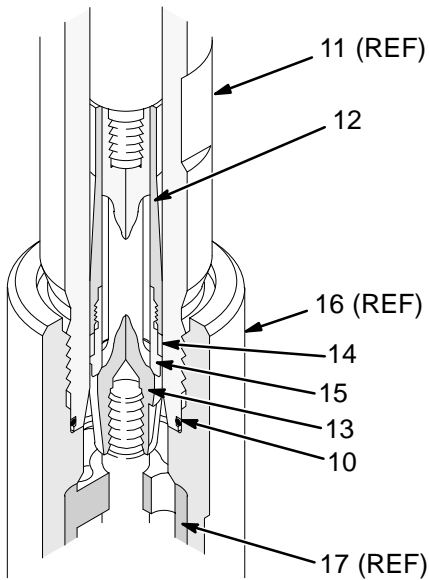
17. Inspect all parts and threads, and clean with a compatible solvent. To reassemble, see page 17.

# Service

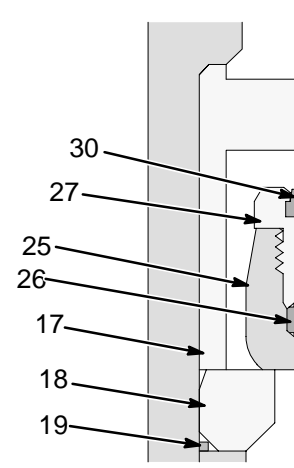
## DETAIL OF THROAT PACKINGS



## DETAIL OF PISTON CHECK VALVE



## DETAIL OF INTAKE CHECK VALVE



- △1 Remove.
- △2 Leave installed; clean bleed hole on underside.
- △3 Remove only if damaged.

Fig. 7

01060



# Service

## Reassembly

Refer to Fig. 8 for reassembly.

1. Place an 8 mm (5/16 in.) dia. brass rod lengthwise in a vise. Install a new piston seal (14\*) on the piston seat (15). Apply thread lubricant to the threads of the piston guide (12). Place the piston guide (12) securely on the brass rod. Using a 22 mm crow's-foot, screw the piston seat (15) into the piston guide. Torque to 35–41 N.m (26–30 ft-lb).
2. If it was necessary to remove the priming piston rod (21) from the piston (13), apply thread lubricant to the female threads of the piston. Place the flats of the piston (13) in a vise. Hold the flats of the rod with an 8 mm wrench, and screw the rod into the piston. Torque to 35–41 N.m (26–30 ft-lb). Be careful not to create burrs on the flats of the rod.
3. Use a vise with soft jaws to hold the flats of the displacement rod (1). Install the assembled piston guide/seat on the piston (13). Apply thread lubricant to the female threads of the piston, and screw the piston assembly onto the rod, using a 15 mm wrench on the piston flats. Torque to 35–41 N.m (26–30 ft-lb). There will be a small gap between the top of the piston (13) and the shoulder of the rod (1).

4. Place the outlet housing (9) in a vise. If the bleeder valve housing (BB) was removed, apply PTFE tape to the threads and reinstall it in the outlet housing (9), making sure the bleed hole faces toward the bottom of the outlet housing. Then screw the valve plug (AA) fully into the valve housing (BB).

**NOTE:** The bleeder valve plug (AA) has two sets of threads. When reassembling, be sure the plug is fully screwed into the valve housing (BB).

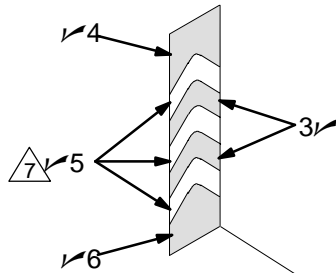
**NOTE:** It is not ordinarily necessary to remove the outlet nipple (7) and o-ring (8\*). However, if they were replaced because of damage, lubricate the o-ring (8\*) and place it on the nipple (7). Screw the nipple into the outlet housing (9). Torque to 60–84 N.m (44–62 ft-lb).

# Service

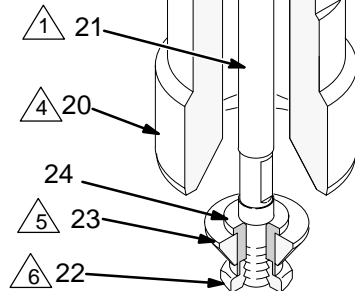
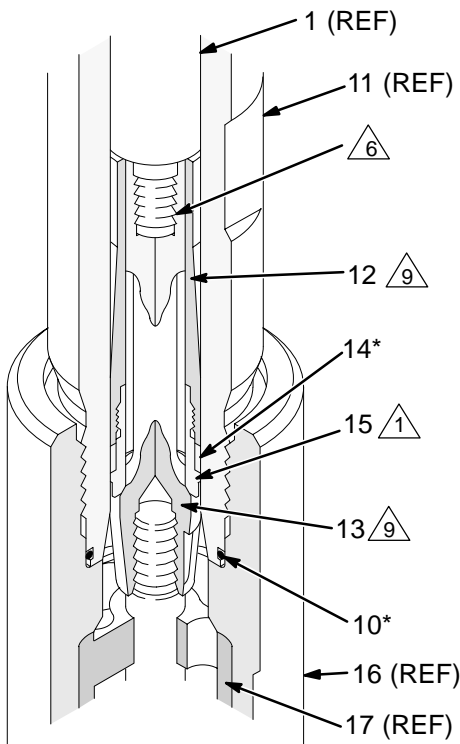
5. Lubricate the o-rings (10\*) and install them on the cylinder (11). Apply thread lubricant to the top threads of the cylinder. Using a 24 in. adjustable wrench on the flats of the cylinder, screw it into the outlet housing (9). Torque to 159–221 N.m (117–163 ft-lb).
6. Lubricate the throat packings and glands, and install them in the outlet housing (9) one at a time in the following order, **with the lips of the v-packings facing down**: male gland (6✓), UHMWPE v-packing (5✓), PTFE v-packing (3✓), UHMWPE (5✓), PTFE (3✓), UHMWPE (5✓), and female gland (4✓). Apply thread lubricant to the packing nut (2) and install it loosely in the outlet housing.
7. Carefully insert the displacement rod (1) into the bottom of the cylinder (11). Push the rod up into the cylinder and through the outlet housing (9), until it protrudes from the packing nut (2). Be careful not to damage the piston seal (14\*) while performing this step.
8. Apply thread lubricant to the bottom threads of the cylinder (11). Be sure the o-ring (10\*) is in place on the cylinder. Guide the intake valve housing (16) up onto the priming piston rod (21). Screw the valve housing onto the cylinder, using a 24 in. adjustable wrench. Torque to 159–221 N.m (117–163 ft-lb).
9. If the rod guide (17) was removed from the intake valve housing (16), reinstall it with the open end facing down toward the pump intake.
10. With the beveled side facing up, press the seal (30\*) into the recess of the intake packing nut (27) until it snaps into place. The nose of the seal should be flush with or slightly recessed into the face of the packing nut. With the threads facing down toward the pump intake, slide the nut up onto the priming piston rod (21) until it clears the flats of the rod.
11. Lubricate a new intake valve seal (26\*) and slide it onto the rod, being careful not to damage the seal when passing over the flats of the rod. Slide the seal up until it reaches the packing nut (27). Apply thread lubricant to the female threads of the intake valve body (25), and slide it onto the rod until it reaches the nut (27).
12. Place a 7/8 in. wrench on the hex of the packing nut (27) and a 25 mm wrench on the flats of the valve body (25). Screw the nut into the body, making certain they remain in position above the flats of the rod (21). Torque to 35–41 N.m (26–30 ft-lb). Slide the assembled intake check valve (U) up the priming piston rod and into the rod guide (17) as far as possible; this may be difficult due to high friction between the seal (26\*) and rod (21).
13. Position the intake valve seat (18) so its large beveled side faces down toward the pump intake. Slide the seat (18) onto the priming piston rod (21) and into the intake valve housing (16) until it seats on the rod guide (17). Lubricate a new seal (19\*) and push it up into the beveled gap around the bottom outer edge of the seat (18). Be sure the seal is fully and uniformly positioned in the gap.
14. Apply thread lubricant to the threads of the intake cylinder (20) and screw the cylinder into the intake valve housing (16), using a 24 in. adjustable wrench. Torque to 159–221 N.m (117–163 ft-lb). Installation of the intake cylinder (20) will seat the parts of the intake valve assembly (U) securely in the proper position.
15. Slide the priming piston guide (24) onto the rod (21) until it stops. Then install the priming piston (23), with the flat side facing up toward the pump. Apply thread lubricant to the female threads of the priming piston nut (22). Hold the rod (21) steady with an 8 mm wrench on the flats, and screw the priming piston nut (22) onto the rod with a 3/4 in. wrench. Torque to 35–41 N.m (26–30 ft-lb).
16. Reconnect the displacement pump to the air motor as explained on page 13.

# Service

## DETAIL OF THROAT PACKINGS



## DETAIL OF PISTON CHECK VALVE



- 1 Torque to 35–41 N•m (26–30 ft-lb).
- 2 If removed, apply PTFE tape to threads.
- 3 Bleed hole must face toward bottom of outlet housing (9).
- 4 Torque to 159–221 N•m (117–163 ft-lb).
- 5 Flat side must face up.
- 6 Apply thread lubricant and torque to 35–41 N•m (26–30 ft-lb).
- 7 Lips of V-packings must face down.
- 8 Remove only if damaged. Torque to 60–84 N•m (44–62 ft-lb).
- 9 Apply lubricant to female threads.
- 10 Apply lubricant to threads.
- 11 Large bevel must face down.

## DETAIL OF INTAKE CHECK VALVE

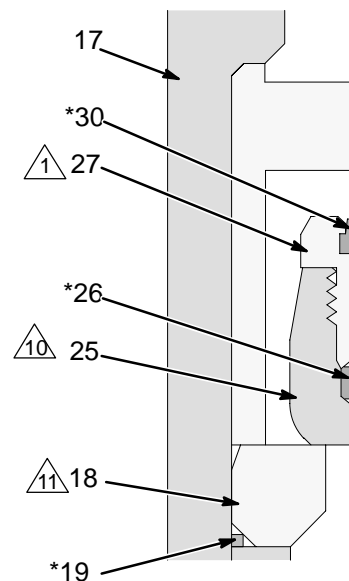


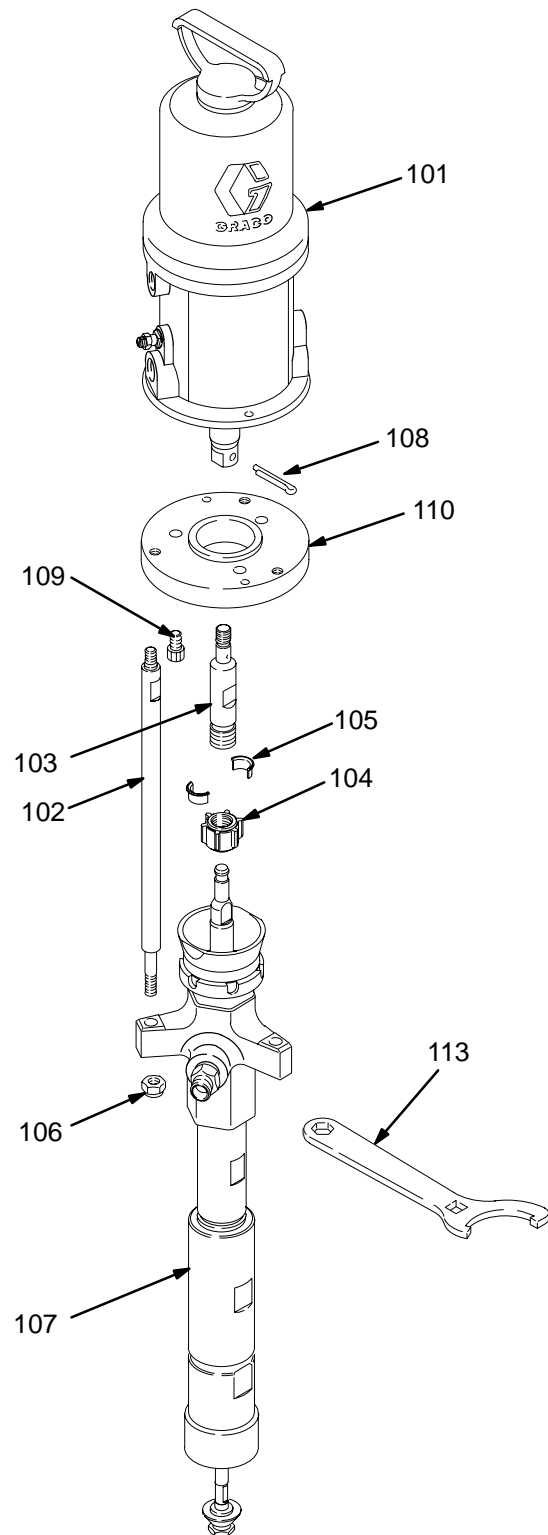
Fig. 8

01060

# Parts

## Model 222839, Series A 23:1 Ratio Monark Pump (includes items 101–113)

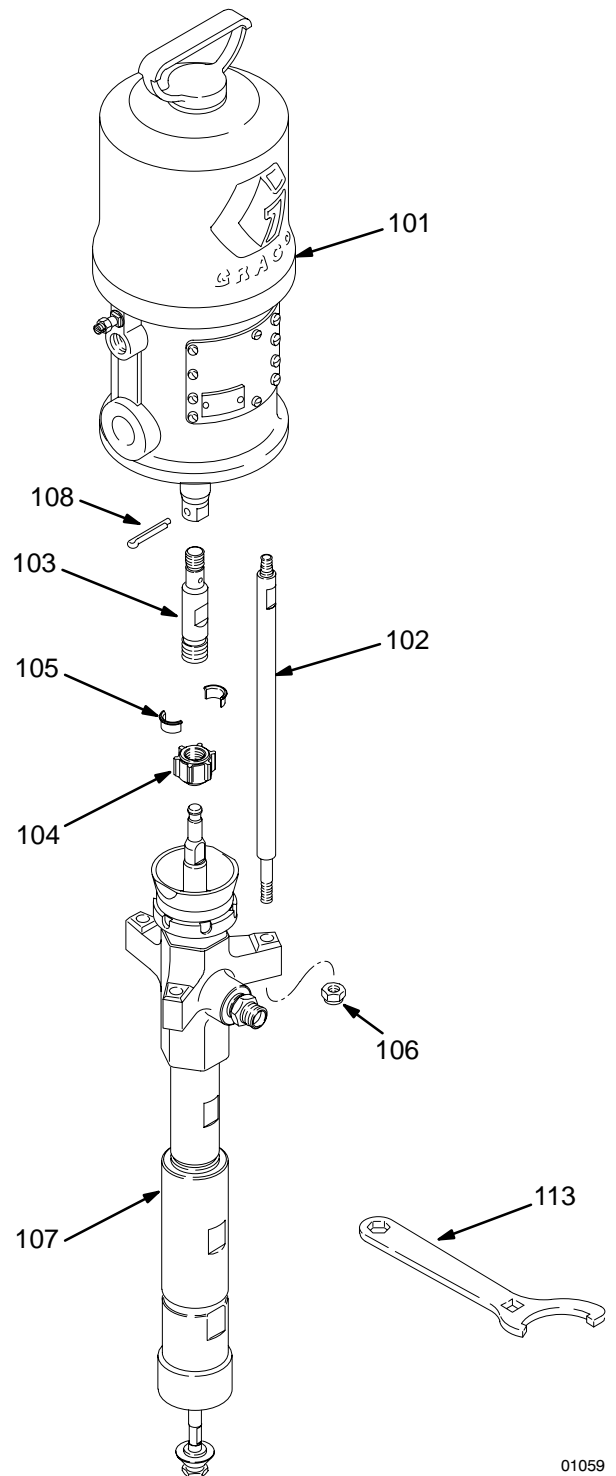
| Ref.<br>No. | Part No. | Description   | Qty. |
|-------------|----------|---|------|
| 101         | 222791   | AIR MOTOR, Monark<br>(see 307043 for parts)             | 1    |
| 102         | 184076   | ROD, tie; 295 mm (11.61")<br>shoulder to shoulder       | 3    |
| 103         | 184162   | ROD, adapter  | 1    |
| 104         | 184100   | NUT, coupling   | 1    |
| 105         | 184131   | COLLAR, coupling  | 2    |
| 106         | 109209   | NUT, hex, self-locking; with<br>nylon insert; M10 x 1.5 | 3    |
| 107         | 222814   | PUMP, displacement<br>(see pages 23–22 for parts)       | 1    |
| 108         | 101946   | PIN, cotter   | 1    |
| 109         | 109212   | SCREW, cap, socket hd;<br>3/8–16 unc–3a x 0.75" (19 mm) | 3    |
| 110         | 184077   | PLATE, adapter  | 1    |
| 113         | 184119   | WRENCH, packing nut                                     | 1    |



# Parts

## Model 222907, Series A 46:1 Ratio President Pump (includes items 101–113)

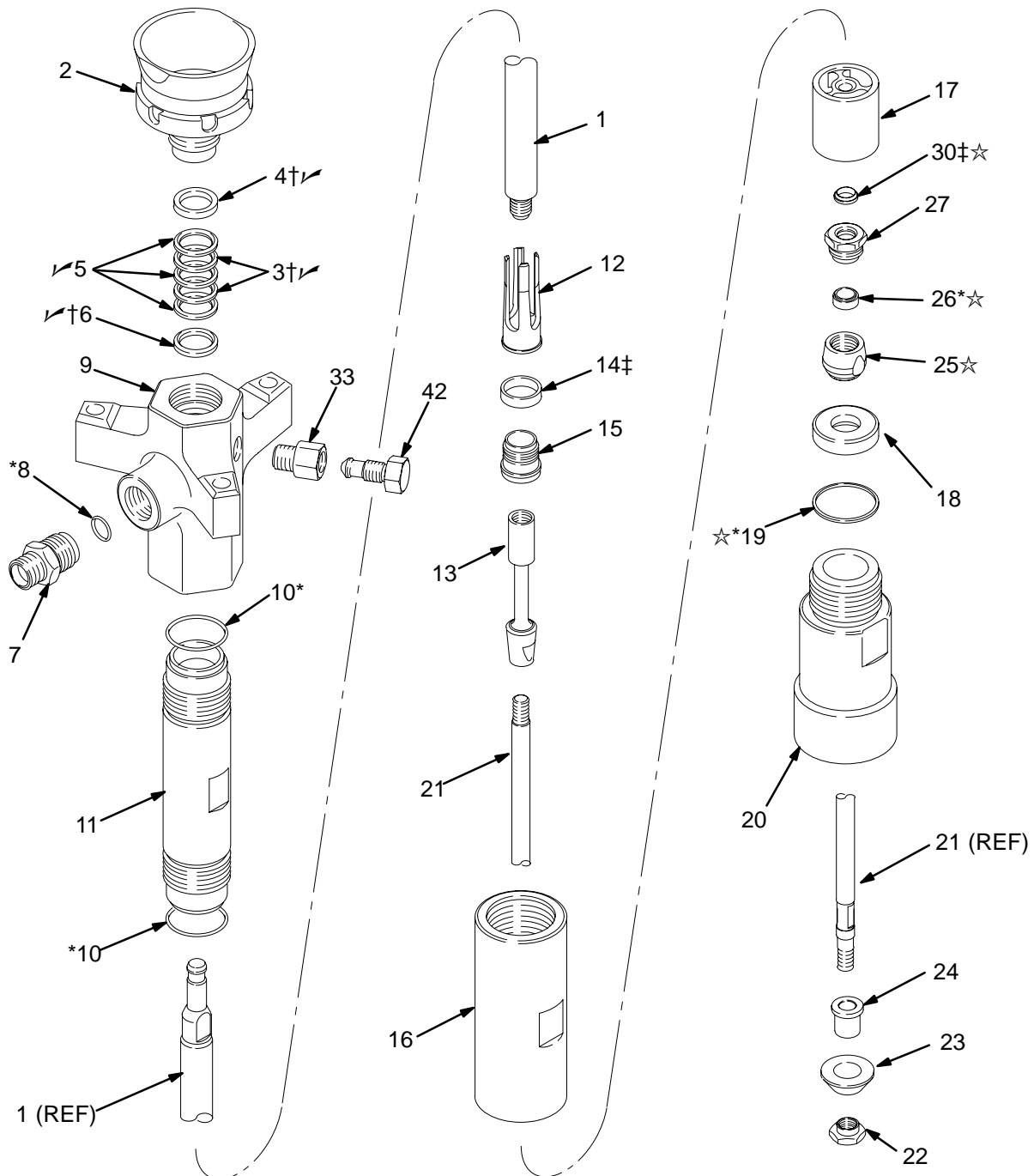
| Ref.<br>No. | Part No. | Description   | Qty. |
|-------------|----------|---|------|
| 101         | 222772   | AIR MOTOR, President<br>(see 306982 for parts)          | 1    |
| 102         | 184076   | ROD, tie; 295 mm (11.61")<br>shoulder to shoulder       | 3    |
| 103         | 184160   | ROD, adapter  | 1    |
| 104         | 184100   | NUT, coupling   | 1    |
| 105         | 184131   | COLLAR, coupling  | 2    |
| 106         | 109209   | NUT, hex, self-locking; with<br>nylon insert; M10 x 1.5 | 3    |
| 107         | 222814   | PUMP, displacement<br>(see pages 23–22 for parts)       | 1    |
| 108         | 101946   | PIN, cotter   | 1    |
| 113         | 184119   | WRENCH, packing nut                                     | 1    |



01059

# Displacement Pump Parts

**Model 222814, Series A**  
**Displacement Pump**  
 (includes items 1–33)



01062B

# Displacement Pump Parts

## Model 222814, Series A Displacement Pump (includes items 1–42)

| Ref.<br>No. | Part No. | Description                                       | Qty. | Ref.<br>No.  | Part No. | Description  | Qty. |
|-------------|----------|---|------|--|----------|--|------|
| 1           | 184101   | ROD, displacement; sst                            | 1    | 24   | 184438   | GUIDE, priming piston; sst                         | 1    |
| 2           | 184423   | NUT, packing; sst                                 | 1    | 25☆  | 184433   | VALVE BODY, intake; sst                            | 1    |
| 3†✓         | 109301   | V-PACKING, PTFE                                   | 2    | 26*☆   | 184114   | SEAL, intake valve; PTFE                           | 1    |
| 4†✓         | 184171   | GLAND, female; sst                                | 1    | 27   | 184432   | NUT, packing, intake valve; sst                    | 1    |
| 5✓          | 109251   | V-PACKING, UHMWPE                                 | 3    | 30‡☆   | 184553   | SEAL, valve; PTFE                                  | 1    |
| 6†✓         | 184221   | GLAND, male; sst                                  | 1    | 33   | 184392   | HOUSING, valve; sst; 3/8–18 npt<br>x 1/2–20 unf–2b | 1    |
| 7           | 184424   | FITTING, outlet; M27 x 1.5(m);<br>1/2 npt(m); sst | 1    | 42   | 190293   | PLUG, valve; sst; 1/2–20 unf–2a                    | 1    |
| 8*          | 109450   | O-RING; PTFE                                      | 2    | * These parts are included in Seal Repair Kit 222784,<br>which may be purchased separately.                      |          |  |      |
| 9           | 184422   | HOUSING, outlet; sst                              | 1    |  |          |  |      |
| 10*         | 109451   | O-RING, PTFE                                      | 2    | † These parts are included in Throat Packing Conver-<br>sion Kit 222786, which may be purchased sepa-<br>rately. |          |  |      |
| 11          | 184106   | CYLINDER, pump; sst                               | 1    |  |          |  |      |
| 12          | 184425   | GUIDE, piston; sst                                | 1    | ✓ These parts are included in Throat Packing Repair<br>Kit 222785, which may be purchased separately.            |          |  |      |
| 13          | 184426   | PISTON; sst                                       | 1    |  |          |  |      |
| 14‡         | 184554   | SEAL, piston; PTFE                                | 1    | ☆ These parts are included in Intake Valve Repair Kit<br>222908, which may be purchased separately.              |          |  |      |
| 15          | 184428   | SEAT, piston; sst                                 | 1    |  |          |  |      |
| 16          | 184430   | HOUSING, intake valve; sst                        | 1    | ‡ Keep these spare parts on hand to reduce down<br>time.   |          |  |      |
| 17          | 184431   | GUIDE, rod; sst                                   | 1    |  |          |  |      |
| 18          | 184435   | SEAT, intake valve; sst                           | 1    |  |          |  |      |
| 19*☆        | 184296   | SEAL; Delrin®                                     | 1    |  |          |  |      |
| 20          | 184437   | CYLINDER, intake; sst                             | 1    |  |          |  |      |
| 21          | 184117   | ROD, priming piston; sst                          | 1    |  |          |  |      |
| 22          | 184440   | NUT, priming piston; sst                          | 1    |  |          |  |      |
| 23          | 184439   | PISTON, priming; sst                              | 1    |  |          |  |      |

# Technical Data (222839 Monark)

## WARNING

Be sure that all fluids and solvents used are chemically compatible with the Wetted Parts listed below. Always read the manufacturer's literature before using fluid or solvent in this pump.

| Category  | Data   |
|---|--|
| Maximum fluid working pressure                          | 4140 psi (29 MPa, 285 bar)   |
| Maximum air input pressure                              | 180 psi (1.2 MPa, 12 bar)  |
| Pump cycles per 3.8 liters (1 gal.)                     | 130  |
| Maximum recommended pump speed for continuous operation | 40 cycles/min  |
| Maximum recommended pump speed                          | 60 cycles/min  |
| Maximum flow at 60 cycles/min                           | 1.74 liters/min (0.46 gpm)   |
| Air motor effective diameter                            | 76 mm (3")   |
| Stroke length   | 76 mm (3")   |
| Displacement pump effective area                        | 2 cm <sup>2</sup> (0.310 in. <sup>2</sup> )  |
| Maximum pump operating temperature                      | 65.5°C (150°F)   |
| Air inlet size  | 3/8 npt (f)  |
| Fluid outlet size                                       | 1/2 npt (m)  |
| Weight  | 19.5 kg (43 lb)  |
| Wetted parts  | AISI 304, 316, PH 13–8 MO, and 17–4 PH grades of Stainless Steel; Chrome; PTFE; Glass-Filled PTFE; Delrin®; Ultra-High Molecular Weight Polyethylene; Molybdenum Disulfide |

Delrin® is registered trademark of the DuPont Co.

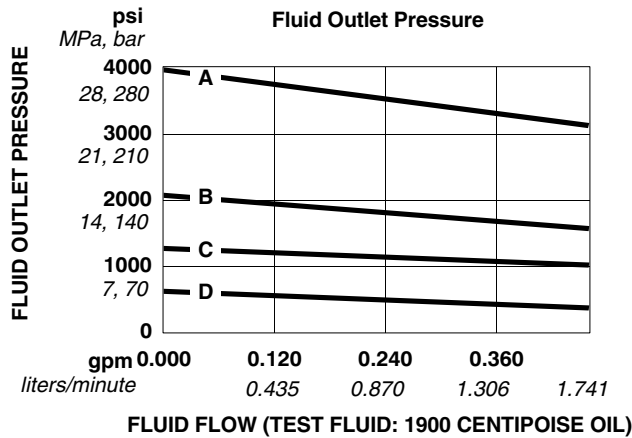


# Technical Data (222839 Monark)

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

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

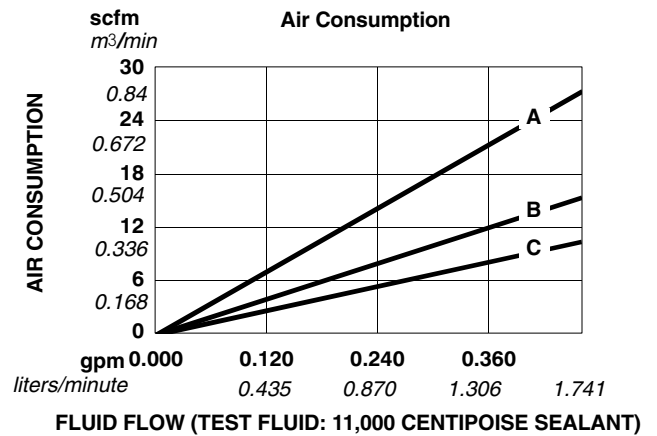
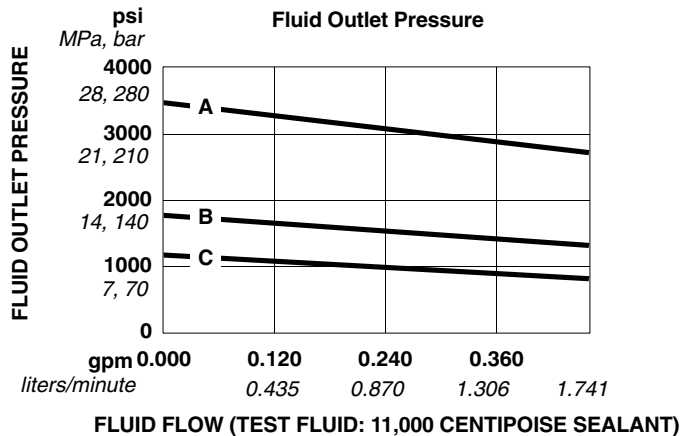
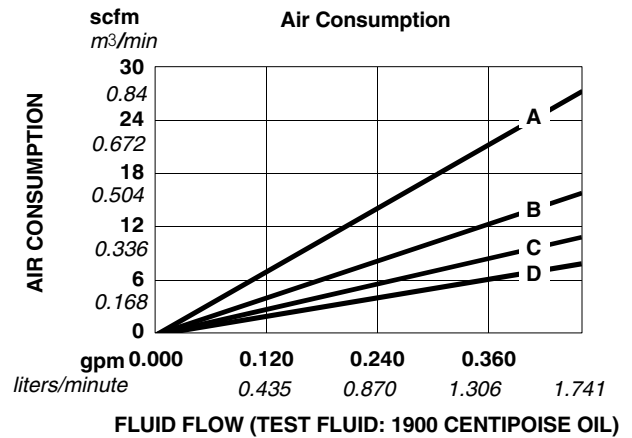
- A** 180 psi (1.25 MPa, 12.5 bar) air pressure  
**B** 100 psi (0.7 MPa, 7 bar) air pressure  
**C** 70 psi (0.49 MPa, 4.9 bar) air pressure  
**D** 40 psi (0.28 MPa, 2.8 bar) air pressure



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

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

- A** 180 psi (1.25 MPa, 12.5 bar) air pressure  
**B** 100 psi (0.7 MPa, 7 bar) air pressure  
**C** 70 psi (0.49 MPa, 4.9 bar) air pressure  
**D** 40 psi (0.28 MPa, 2.8 bar) air pressure



# Technical Data (222907 President)

## WARNING

Be sure that all fluids and solvents used are chemically compatible with the Wetted Parts listed below. Always read the manufacturer's literature before using fluid or solvent in this pump.

| Category  | Data   |
|---|--|
| Maximum fluid working pressure                          | 4600 psi (32 MPa, 317 bar)   |
| Maximum air input pressure                              | 100 psi (0.7 MPa, 7 bar)   |
| Pump cycles per 3.8 liters (1 gal.)                     | 100  |
| Maximum recommended pump speed for continuous operation | 40 cycles/min  |
| Maximum recommended pump speed                          | 60 cycles/min  |
| Maximum flow at 60 cycles/min                           | 2.28 liters/min (0.6 gpm) at 60 cycles/min   |
| Air motor effective diameter                            | 108 mm (4.25")   |
| Stroke length   | 102 mm (4")  |
| Displacement pump effective area                        | 2 cm <sup>2</sup> (0.310 in. <sup>2</sup> )  |
| Maximum pump operating temperature                      | 65.5°C (150°F)   |
| Air inlet size  | 1/2 npt (f)  |
| Fluid outlet size                                       | 1/2 npt (m)  |
| Weight  | 21.8 kg (48 lb)  |
| Wetted parts  | AISI 304, 316, PH 13–8 MO, and 17–4 PH grades of Stainless Steel; Chrome; PTFE; Glass-Filled PTFE; Delrin®; Ultra-High Molecular Weight Polyethylene; Molybdenum Disulfide |

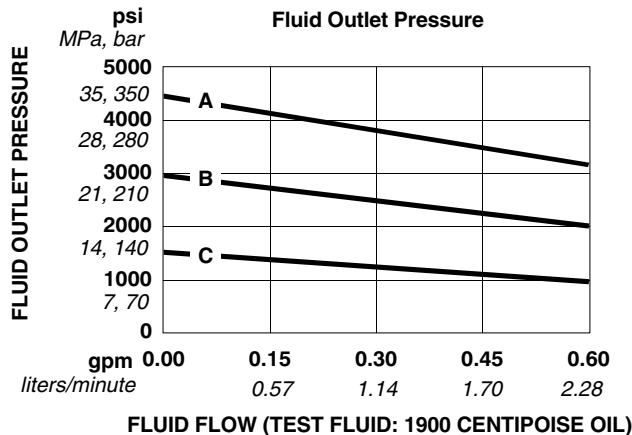
Delrin® is a registered trademark of the DuPont Co.

# Technical Data (222907 President)

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

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

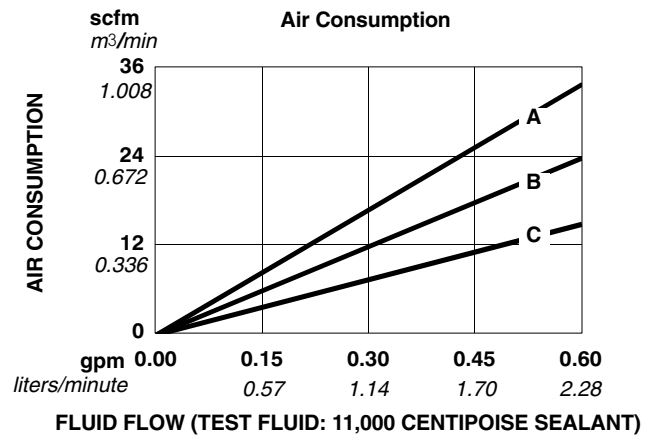
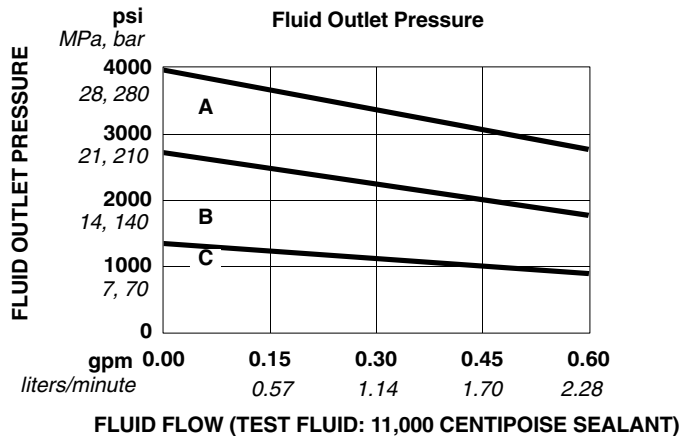
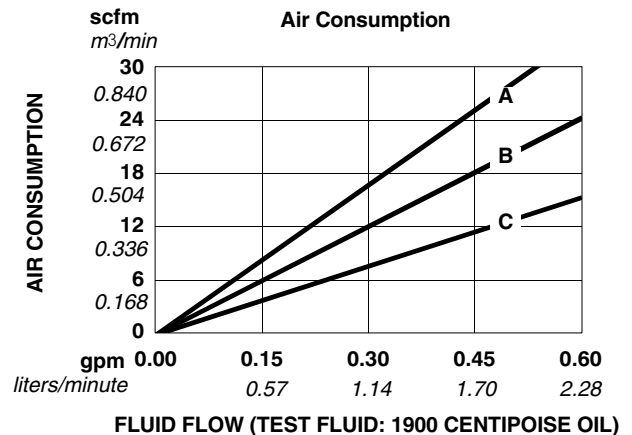
**A** 100 psi (0.7 MPa, 7 bar) air pressure  
**B** 70 psi (0.49 MPa, 4.9 bar) air pressure  
**C** 40 psi (0.28 MPa, 2.8 bar) air pressure



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

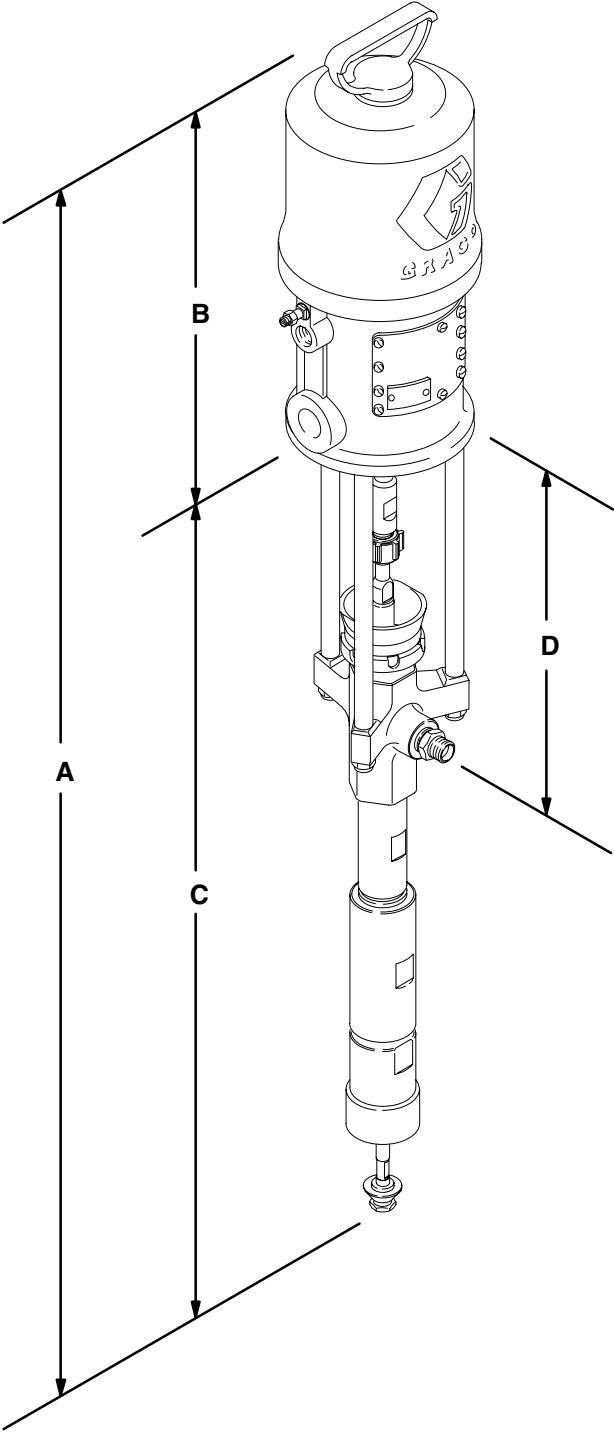
1. Locate fluid flow rate along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve.
3. Follow left to scale to read air consumption.

**A** 100 psi (0.7 MPa, 7 bar) air pressure  
**B** 70 psi (0.49 MPa, 4.9 bar) air pressure  
**C** 40 psi (0.28 MPa, 2.8 bar) air pressure



# Dimensions

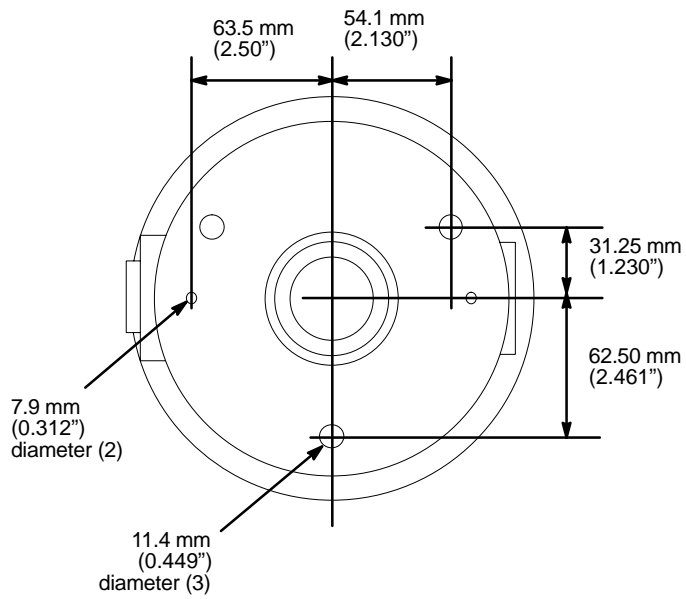
Model 222907 Shown



| Pump Model | A                     | B                     | C                    | D                    |
|------------|-----------------------|-----------------------|----------------------|----------------------|
| 222-839    | 1147 mm<br>(45.2 in.) | 365 mm<br>(14.35 in.) | 782 mm<br>(30.8 in.) | 328 mm<br>(12.9 in.) |
| 222-907    | 1207 mm<br>(47.5 in.) | 418 mm<br>(16.45 in.) | 789 mm<br>(31.0 in.) | 328 mm<br>(12.9 in.) |

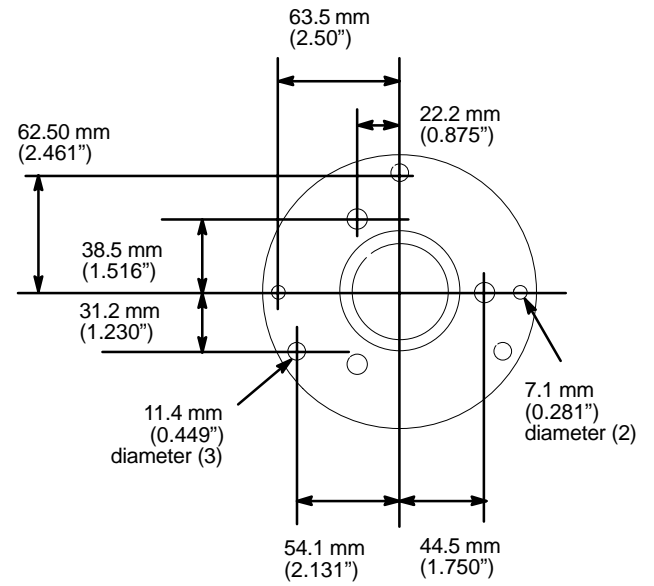
# Mounting Hole Layout

**Model 222907 PRESIDENT PUMP**



0213

**Model 222839 MONARK PUMP**



0214

# Graco Standard Warranty

Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale 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.

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 Phone Numbers

**TO PLACE AN ORDER**, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you:

**1-800-367-4023 Toll Free**

**612-623-6921**

**612-378-3505 Fax**

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**Sales Offices:** Minneapolis, Detroit  
**International Offices:** Belgium, Korea, Hong Kong, Japan

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