

Check–Mate™ 200 Pumps

308080J

With Priming Piston and Severe–Duty Rod and Cylinder

Model 222782

23:1 Ratio Monark® Pump

29 MPa 285 bar (4140 psi) MAXIMUM FLUID WORKING PRESSURE

1.2 MPa 12.5 bar (180 psi) MAXIMUM AIR INPUT PRESSURE

Model 222783 and 237205

46:1 Ratio President® Pump

32 MPa 320 bar (4600 psi) MAXIMUM FLUID WORKING PRESSURE

0.7 MPa 7 bar (100 psi) MAXIMUM AIR INPUT PRESSURE

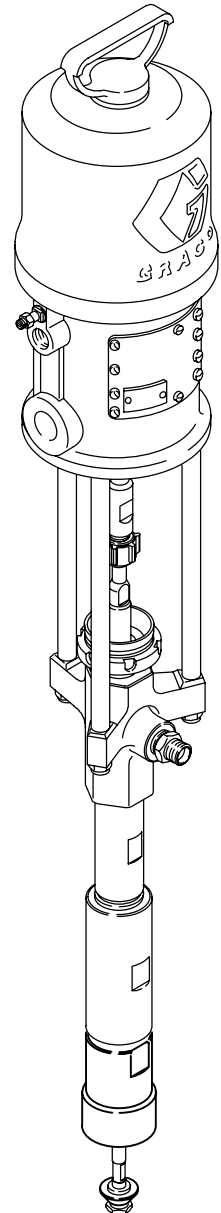


Important Safety Instructions

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

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Model 222783 Shown

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



SKIN 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 surgical treatment.**
- 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 7.
- 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

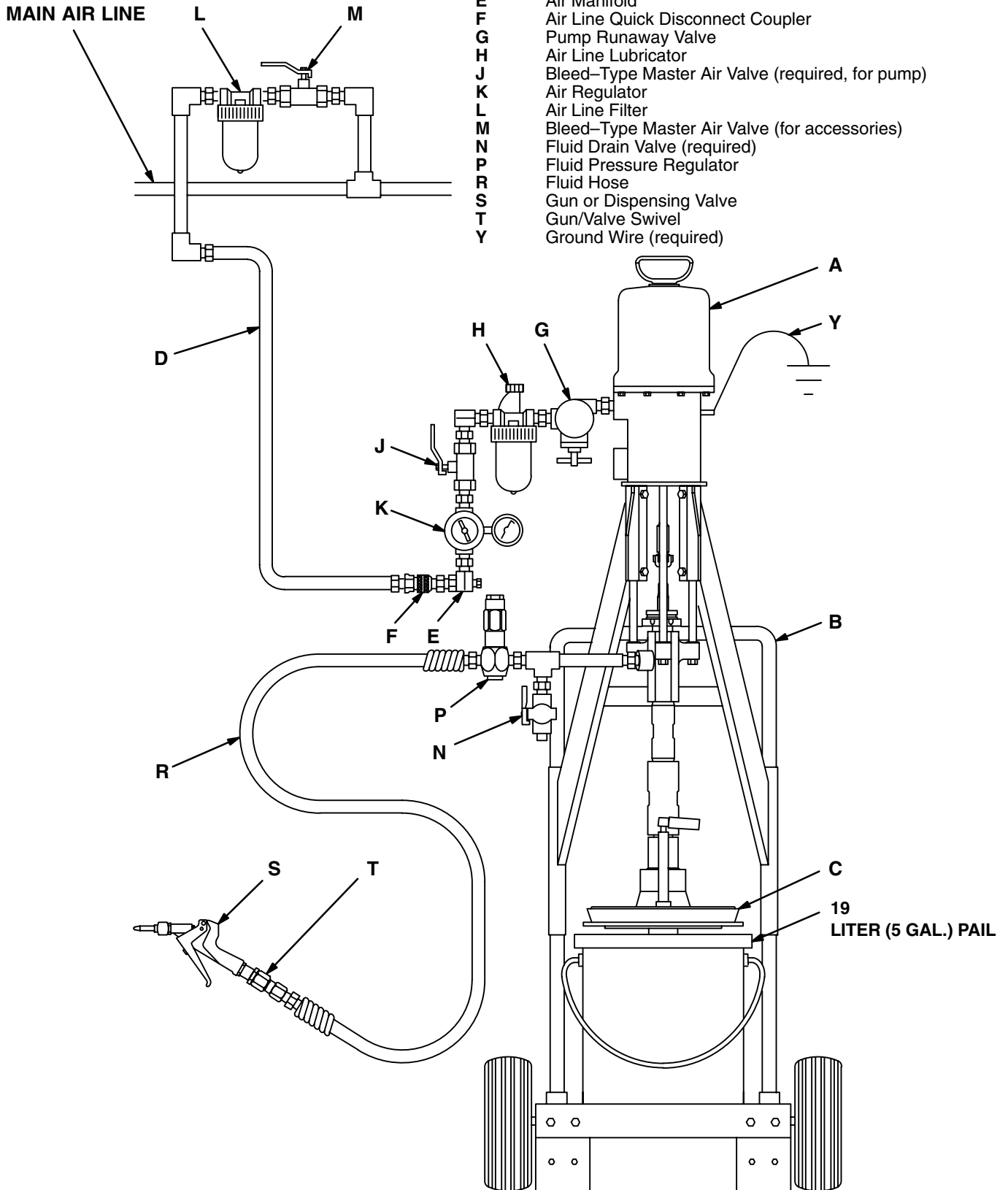
Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed.

- 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

KEY

- A Pump
- B Pneumatic Elevator Cart
- C Wiper Plate
- D Air Hose
- E Air Manifold
- F Air Line Quick Disconnect Coupler
- G Pump Runaway Valve
- H Air Line Lubricator
- J Bleed-Type Master Air Valve (required, for pump)
- K Air Regulator
- L Air Line Filter
- M Bleed-Type Master Air Valve (for accessories)
- N Fluid Drain Valve (required)
- P Fluid Pressure Regulator
- R Fluid Hose
- S Gun or Dispensing Valve
- T Gun/Valve Swivel
- Y Ground Wire (required)



Installation

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

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

The Typical Installation shown on page 5 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.

Refer to the Typical Installation drawing on page 5.

Air and Fluid Hoses

Be sure all air and fluid hoses are properly sized and pressure-rated for your system. Use only electronically conductive air and fluid hoses. Fluid hoses must 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 32 and 33.

The Typical Installation on page 5 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 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 separate manuals included with the kits for further information.

Air Line Accessories

Install the following accessories in the order shown in the Typical Installation, 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 the Typical Installation, using adapters as necessary:

- **A fluid drain valve (N)** is required in your system to relieve fluid pressure in the hose and gun, see **WARNING** on page 6. 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 mm² (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 a ground wire and clamp Part No. 237569.

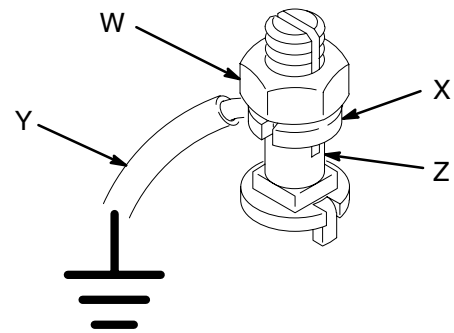


Fig. 1

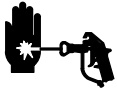
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2. *Air and fluid hoses:* use only electrically conductive hoses.
3. *Air compressor:* follow manufacturer's recommendations.
4. *Spray gun/dispense valve:* ground through connection to a properly grounded fluid hose and pump.
5. *Fluid supply container:* 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.

Operation

Pressure Relief Procedure

WARNING



SKIN 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. Engage the spray gun/dispensing valve safety latch.
2. Shut off the air to the pump.
3. Close the bleed-type master air valve (required in your system).
4. Disengage the gun/valve safety latch.
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. Engage the gun/valve safety latch.
7. Open the drain valve (required in your system) and/or the pump bleeder valve, 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 or hose.

Packing Nut/Wet-Cup

WARNING

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

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

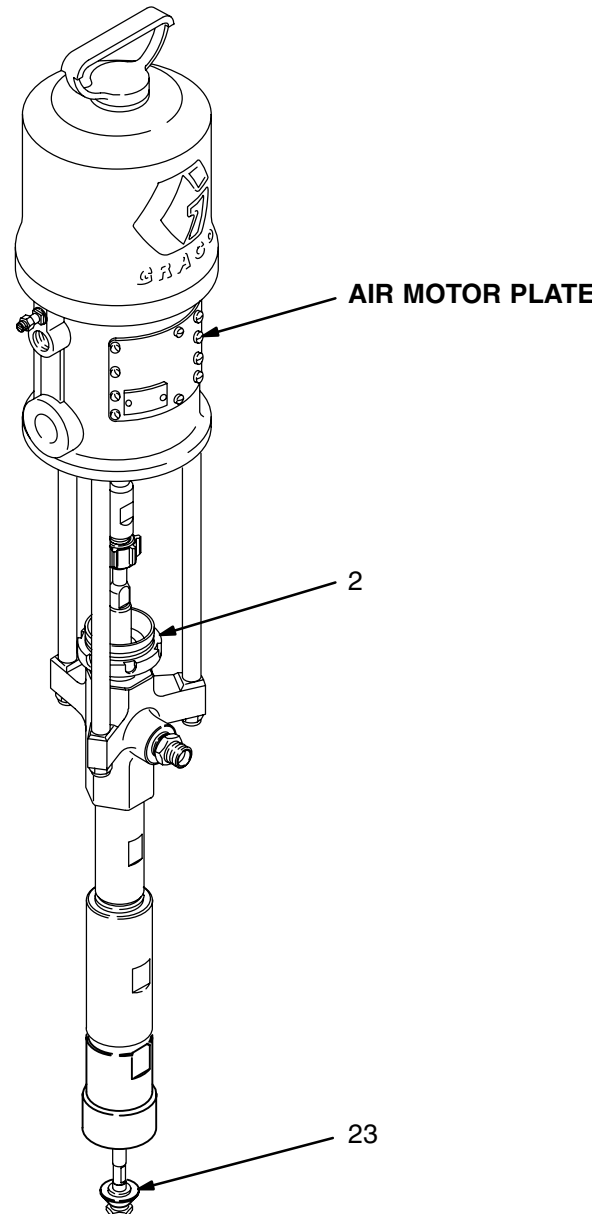


Fig 2

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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 before using the pump.

Starting and Adjusting the Pump

WARNING

Moving Parts Hazard



Moving parts can pinch or amputate your fingers or other body parts. When the pump is operating, the priming piston (23) (located at the pump intake) and the air motor piston (located behind the air motor plates) move. See Fig. 2. Therefore, NEVER operate the pump with the air motor plates removed, and keep your fingers and hands away from the priming piston.

Before attempting to clear an obstruction from the priming piston (23) or service the pump, follow the **Pressure Relief Procedure** to prevent the pump from starting accidentally.

See the **TYPICAL INSTALLATION** on page 5. 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.

1. Lower the pump into a fluid container. Be sure the air regulator (K) and bleed-type master air valve (J) are closed.
2. 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.
3. Slowly open the air regulator until the pump starts.
4. Cycle the pump slowly until all the air is pushed out and the pump and hoses are fully primed.
5. Release the spray gun/dispensing valve trigger and engage the safety latch. The pump should stall against pressure when the trigger is released.
6. If the pump fails to prime properly, open the bleeder valve (33) slightly. See Fig 6. Use the bleeder hole (on the underside of the valve housing) as a priming valve until the fluid appears at the hole.
7. Close the bleeder valve.
8. 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.
9. 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.

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 bleeder valve when all air has been eliminated.

WARNING

To reduce the risk of fluid injection, DO NOT use your hand or fingers to cover the bleeder hole when priming the pump.

WARNING

COMPONENT RUPTURE HAZARD



To reduce the risk of overpressurizing your system, which could cause component rupture and serious injury, *never exceed the Maximum Incoming Air Pressure to the pump* (see the **Technical Data** on page 26).

CAUTION

Do not allow the pump to run dry. It will quickly accelerate to a high speed, causing damage. If your pump is running too fast, stop it immediately and check the fluid supply. If the container is empty and air has been pumped into the lines, refill the container and prime the pump and the lines, or flush and leave it filled with a compatible solvent. Eliminate all air from the fluid system.

NOTE: 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 on page 5.

Operation

Shutdown and Care of the Pump

WARNING

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

1. For overnight shutdown, follow the **Pressure Relief Procedure Warning** on page 8.
2. Always stop the pump at the bottom of the stroke to prevent the fluid from drying on the exposed displacement rod and damaging the throat packings.
3. Always flush the pump before the fluid dries on the displacement rod. Never leave water or water-based fluid in the pump overnight. See **Flushing**.

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 7.

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.

CAUTION

Never leave water or water-base fluid in the pump overnight. If you are pumping water-base fluid, flush with water first, then with a rust inhibitor such as mineral spirits. Relieve the pressure, but leave the rust inhibitor in the pump to protect the parts from corrosion.

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 Technical Data .
	Obstructed fluid hose or gun/valve; fluid hose ID is too small	Clear*; use hose with larger ID.
	Fluid dried on the displacement rod	Clean. See Service .
	Dirty or worn air motor parts	Clean or repair. See air motor manual, supplied.
Pump operates, but output low on both strokes	Restricted line or inadequate air supply	Clear; see Technical Data .
	Obstructed fluid hose or gun/valve; fluid hose ID is too small	Clear*; use hose with larger ID.
	Bleeder valve open	Close.
	Air leaking into supply container	Check wiper plate seal.
	Fluid too heavy for pump priming	Use bleeder valve (see page 6); use wiper plate with ram or pneumatic elevator cart.
	Worn packings in displacement pump	Replace packings.
Pump operates, but output 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 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 too heavy for pump priming	Use 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. If the pump starts when the air is turned on, the obstruction is in the fluid hose or gun.

Service

Required Tools

- Torque wrench
- Bench vise, with soft jaws
- Hammer
- Rubber mallet
- 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

WARNING



KEEP HANDS AND FINGERS AWAY FROM THE PRIMING PISTON DURING OPERATION AND WHENEVER THE PUMP IS CHARGED WITH AIR to

reduce the risk of injury! On the pump down-stroke 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.

To reduce the risk of an injury from injection, splashing fluid, or moving parts, follow the **Pressure Relief Procedure**, on page 8 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. Flush the pump if possible. Stop the pump at the bottom of its stroke. Follow the **Pressure Relief Procedure Warning** on page 8.
2. 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 motor's air inlet.
3. Models 222782 and 222783: 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 3.
Models 237205: Unscrew rod adapter with coupling nut (103) from displacement rod (21). See parts drawing on pages 21 and 23.
4. 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 tie rod locknuts (106) from the tie rods (102). Carefully pull the displacement pump (107) off the air motor (101).
5. 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

1. Orient the pump's fluid outlet to the air motor's air inlet as was noted in step 2 under **Disconnecting the Displacement Pump**. Position the displacement pump (107) on the tie rods (102). See Fig 3.

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 Models 222783 and 237205, and 41–48 N.m (30–35 ft–lb) on Model 222782.

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. Models 222782 and 222783: Place the coupling nut (104) on the displacement rod, then place the coupling collars (105) in the nut. Screw the coupling 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).

Model 237205: Screw rod adapter with coupling nut (103) onto displacement rod (21) and tighten securely. See part drawing on pages 21 and 23.

4. Using a torque wrench in the square hole of the supplied wrench (113), torque the packing nut (2) to 27–41 N.m (20–30 ft–lb).
5. Mount the pump and reconnect all hoses. Reconnect the ground wire if it was disconnected during repair. Turn on the air to the motor and run the pump slowly.

6. Fill the packing nut/wet-cup 1/3 full of Graco Throat Seal Liquid or compatible solvent.

Model 222783 shown

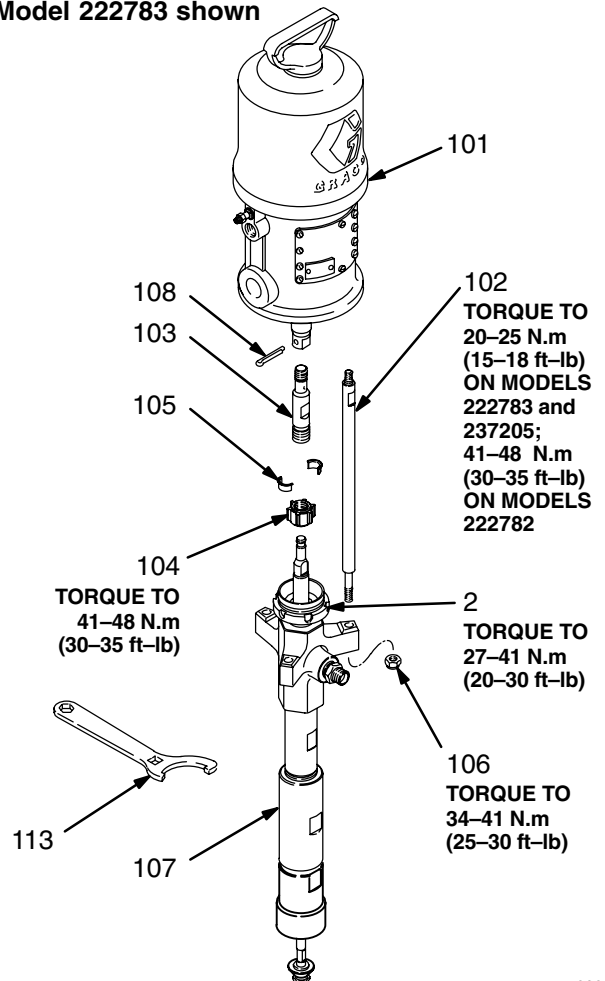


Fig 3

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Service

Displacement Pump Service

Disassembly

When disassembling the pump, lay out all removed parts in sequence, to ease reassembly. Refer to Fig 6.

NOTE: Repair Kit 222784 is available to replace the piston and intake valve seals. For the best results, use all the new parts in the kit. Parts included are denoted with one asterisk, for example (8*).

Repair Kit 222785 is available to replace the throat packings. For the best results, use all the new parts in the kit. Parts included are denoted with two asterisks, for example (3**).

1. Remove the displacement pump from the air motor as explained on page 9.
2. Place the displacement 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 outer surface of the guide (24) and the inner and outer surfaces of the 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), throat packings (3, 5) and glands (4, 6) from the outlet housing (9). **DO NOT** remove the fluid outlet nipple (7) and o-ring (8) from the outlet housing unless they need replacement.
10. Unscrew the plug (34) completely from the bleeder valve housing (33). It is not necessary to remove the valve housing from the outlet housing (9). Clean the bleed hole in the valve body (33) and the valve threads.

Service

11. Use a 24 in. adjustable wrench on the flats of the pump cylinder (11) and unscrew the cylinder from the outlet housing (9). Remove the o-rings (10). Inspect the inside surface of the cylinder for wear, scoring or other 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 flats of the piston and unscrew the piston (13) and priming piston rod (21) from the displacement rod (1). Remove the piston guide assembly (12, 14, 15) 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 your inspection reveals 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.
 15. Place the flats of the piston seat (15) in a vise. Using an 8 mm (5/16 in.) dia. brass rod, unscrew the piston guide (12) from the piston seat (15). See Fig 4. 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.
 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 5. Remove the seal (41) 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.
- NOTE:** The seal (41) is press-fit in the nut (27), and may require cutting with a razor to ease removal.
17. Inspect all parts for damage. Clean all parts and threads with a compatible solvent. Reassemble as explained on page 17.

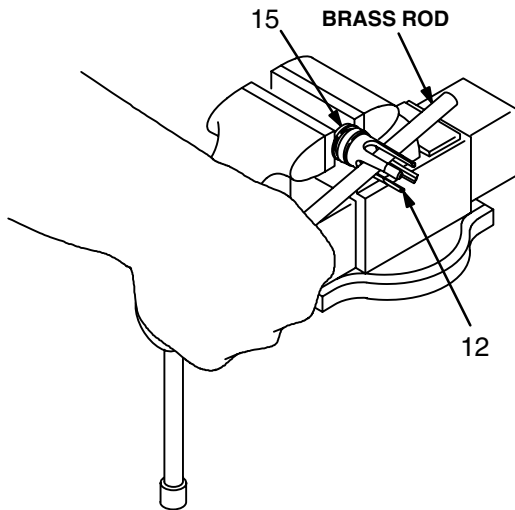


Fig 4

0205

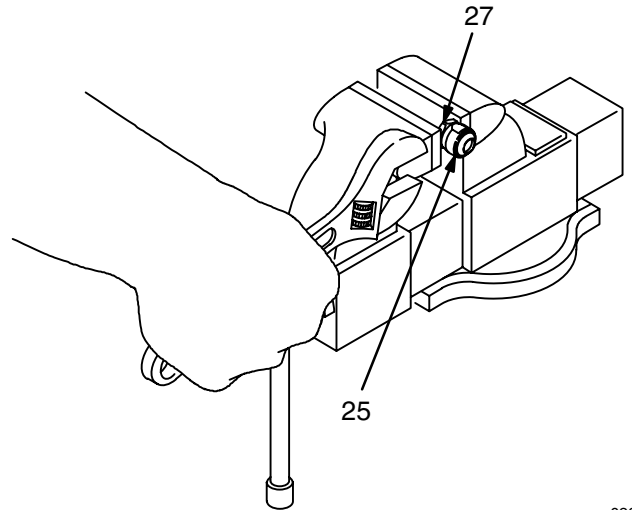
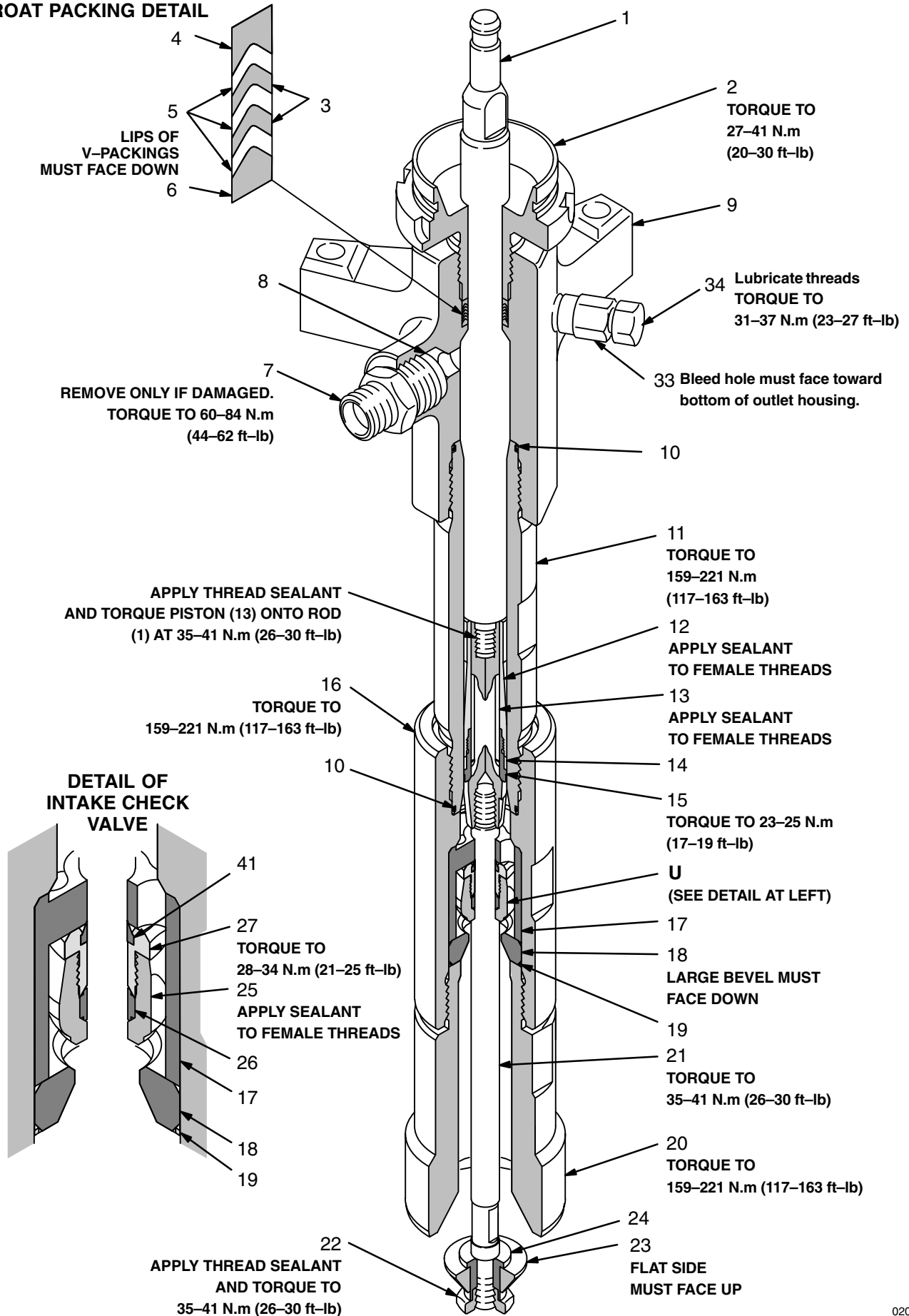


Fig 5

0206

THROAT PACKING DETAIL



0207A

Fig 6

Service

Reassembly

Refer to Fig 7 for reassembly.

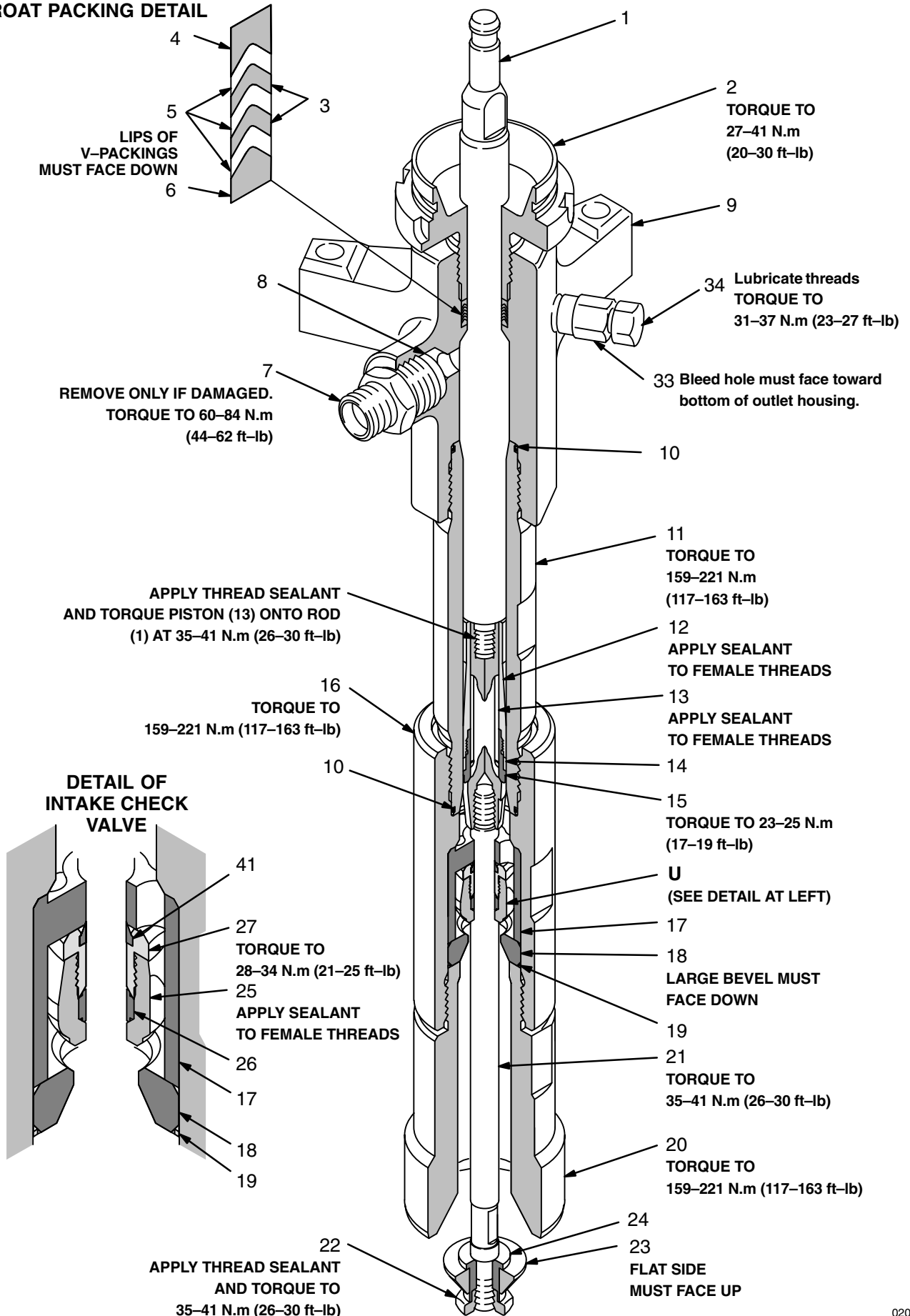
1. Place an 8 mm (5/16 in.) dia. brass rod lengthwise in a vise. Install a new piston seal (14*) on the piston seat (15). Apply thread sealant to the threads of the piston guide (12). Place the piston guide (12) securely on the brass rod. Using a 22 mm crow's-foot, screw the piston seat (15) into the piston guide. Torque to 23–25 N•m (17–19 ft–lb).
 2. If it was necessary to remove the priming piston rod (21) from the piston (13), apply thread sealant 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 displacement rod (1) by its flats. Install the assembled piston guide/seat on the piston (13). Apply thread sealant to the female threads of the piston, and screw the piston assembly onto the rod, using a 15 mm wrench on the flats of the piston. 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. Lubricate the threads of the bleeder valve plug (34). The plug has two sets of threads. When reassembling, be sure to screw the plug fully into the valve housing (33) Torque to 31–37 N.m (23–27 ft–lb) .
- 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).
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 the packing nut 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 (41*) 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 sealant 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 28–34 N.m (21–25 ft–lb). Slide the assembled intake check valve 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).

Service

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 of the priming piston (23) facing up toward the pump. Apply thread sealant 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 9.
17. Allow 2 hours for the thread sealant to cure before returning the pump to service.

THROAT PACKING DETAIL

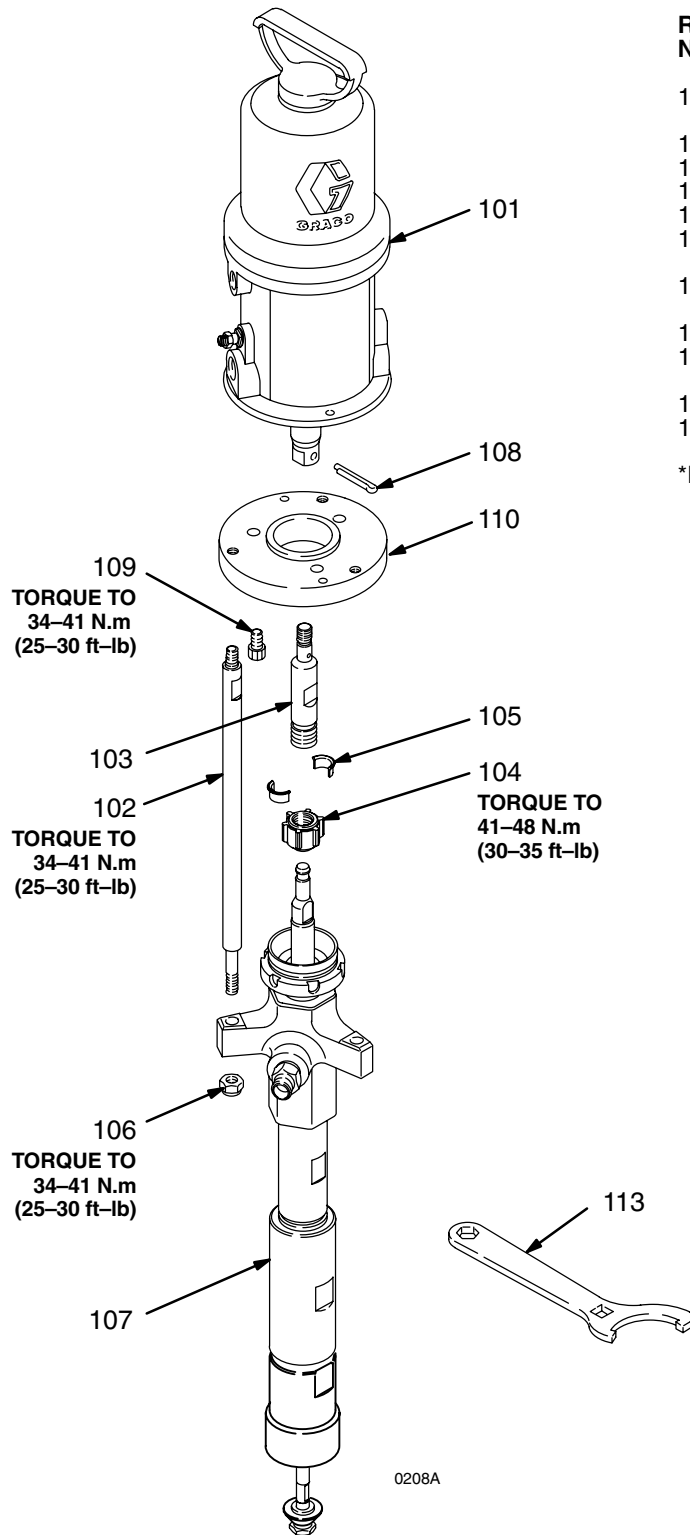


0207A

Fig 6

Parts

Model 222782 Series A
23:1 Ratio Monark Pump
 Includes items 101–113



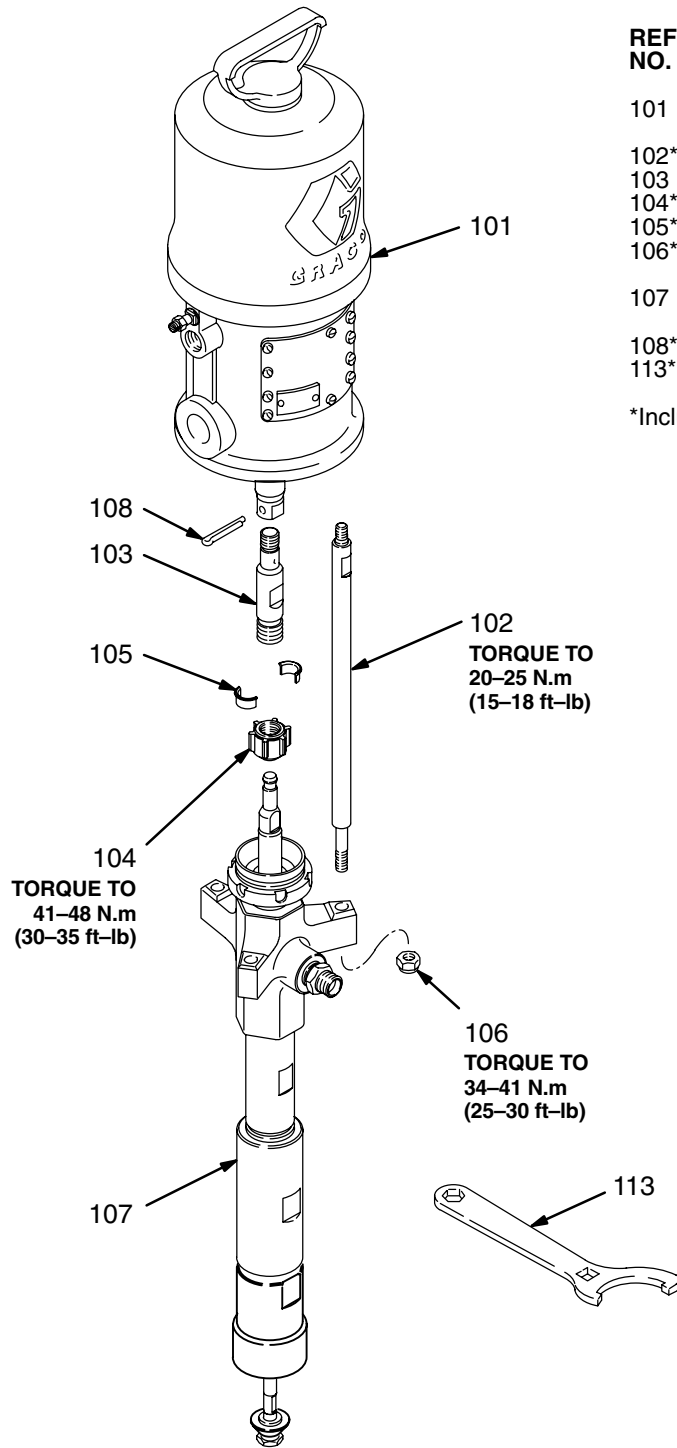
REF NO.	PART NO.	DESCRIPTION	QTY
101	222791	AIR MOTOR, Monark See 307043 for parts	1
102*	24B190	KIT, tie rod	3
103	184162	ROD, adapter	1
104*	184100	NUT, coupling	1
105*	184131	COLLAR, coupling	2
106*	109209	NUT, hex, self-locking; with nylon insert; M10 x 1.5	3
107	222771	PUMP, displacement See pages 16 & 17 for parts	1
108*	101946	PIN, cotter	1
109*	109212	SCREW, cap, socket hd; 3/8–16 unc–3a x 0.75" (19 mm)	3
110	184077	PLATE, adapter	1
113*	184119	WRENCH, packing nut	1

*Included in Connection Kit 236071.

Model 222782

Parts

Model 222783 Series A
46:1 Ratio President Pump
 Includes items 101–113



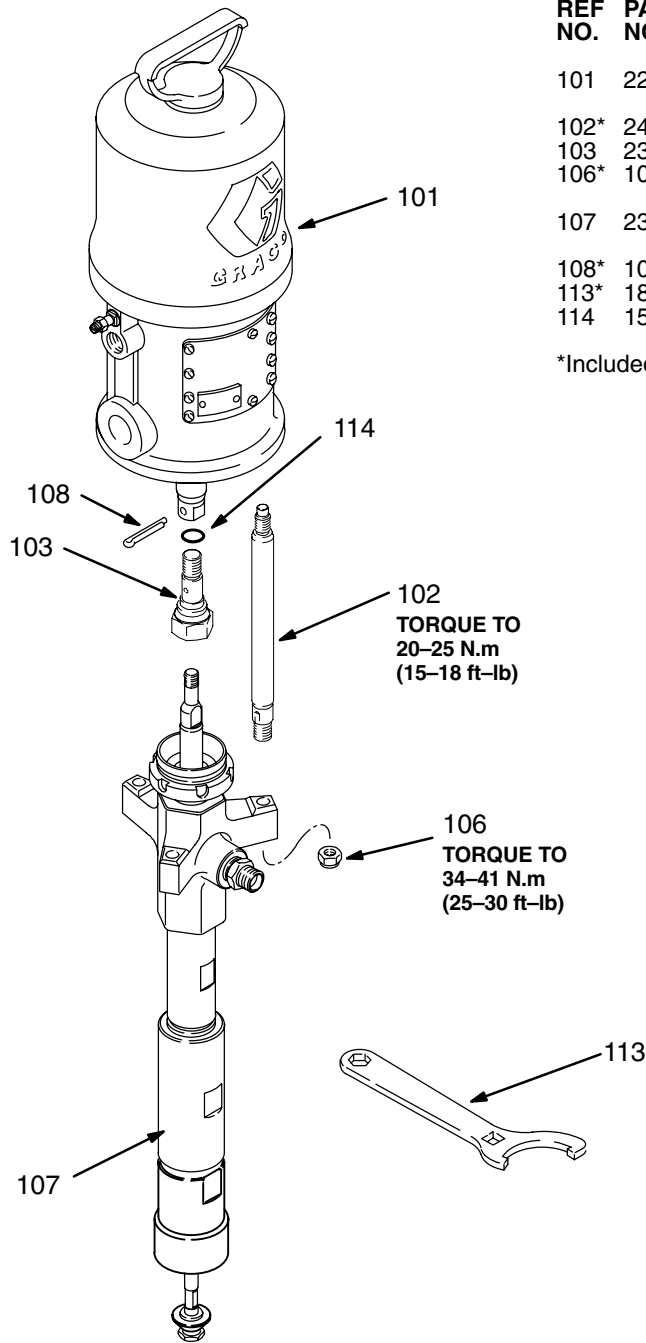
REF NO.	PART NO.	DESCRIPTION	QTY
101	222772	AIR MOTOR, President See 306982 for parts	1
102*	24B190	KIT, tie rod	3
103	184160	ROD, adapter	1
104*	184100	NUT, coupling	1
105*	184131	COLLAR, coupling	2
106*	109209	NUT, hex, self-locking; with nylon insert; M10 x 1.5	3
107	222771	PUMP, displacement See pages 16 & 17 for parts	1
108*	101946	PIN, cotter	1
113*	184119	WRENCH, packing nut	1

*Included in 236071 connection kit.

Model 222783

Parts

Model 237205 Series A
46:1 Ratio President Pump
 Includes items 101–114

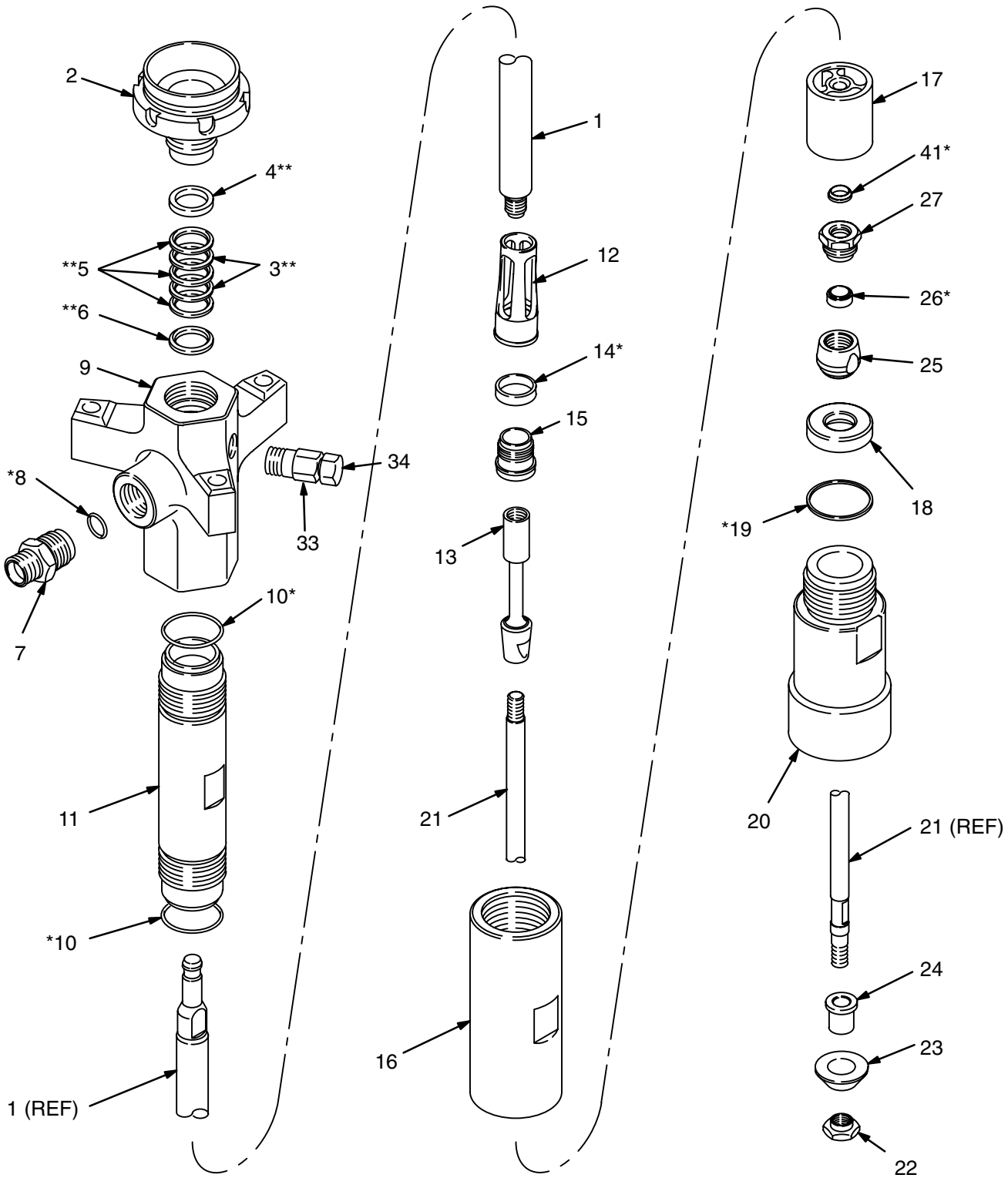


REF NO.	PART NO.	DESCRIPTION	QTY
101	222772	AIR MOTOR, President See 306982 for parts	1
102*	24B191	KIT, tie rod	3
103	237251	ROD, adapter with coupling nut	1
106*	109209	NUT, hex, self-locking; with nylon insert; M10 x 1.5	3
107	237202	PUMP, displacement See pages 16 & 17 for parts	1
108*	101946	PIN, cotter	1
113*	184119	WRENCH, packing nut	1
114	156082	O-RING	1

*Included in 236071 connection kit.

Model 222783

Parts



0209A

Parts

Model 222771 and 237202

Displacement Pump

Includes items 1–41

REF NO.	PART NO.	DESCRIPTION	QTY
1	184101	ROD, displacement; sst	1
	190160	ROD, displacement; sst (Model 237202 only)	
2	184102	NUT, packing; carbon steel	1
3	109301**	V-PACKING; PTFE	2
4	184171**	GLAND, female; sst	1
5	109251**	V-PACKING; UHMWPE	3
6	184221**	GLAND, male; sst	1
7	184104	FITTING, outlet; M27 x 1.5(m); 1/2 npt(m); carbon steel	1
8	109450*	O-RING; PTFE	1
9	184105	HOUSING, outlet; ductile iron	1
10	109451*	O-RING; PTFE	2
11	184106	CYLINDER, pump; sst	1
12	15K690	GUIDE, piston; sst	1
13	184107	PISTON; alloy steel	1
14	184109*	SEAL, piston; UHMWPE	1
15	184110	SEAT, piston; alloy steel	1
16	184111	HOUSING, intake valve; ductile iron	1
17	184152	GUIDE, rod; alloy steel	1
18	184115	SEAT, intake valve; alloy steel	1
19	184296*	SEAL; acetal	1
20	187571	CYLINDER, intake; ductile iron	1
21	184117	ROD, priming piston; sst	1
22	184158	NUT, priming piston; alloy steel	1
23	187572	PISTON, priming; carbon steel	1
24	184157	GUIDE, priming piston; alloy steel	1
25	184113	VALVE BODY, intake; alloy steel	1
26	184114*	SEAL, intake valve; PTFE	1
27	184112	NUT, packing, intake valve; carbon steel	1
33	165702	VALVE, bleeder; carbon steel	1
34	190128	PLUG, valve	1
41	184445*	SEAL, valve; UHMWPE	1

* Supplied in Seal Repair Kit 222784.

** Supplied in Throat Packing Repair Kit 222785.

222784 SEAL REPAIR KIT

Must be purchased separately. Consists of:

Ref No.	Qty
8	1
10	2
14	1
19	1
26	1
41	1

222785 THROAT PACKING REPAIR KIT

Must be purchased separately. Consists of:

Ref No.	Qty
3	2
4	1
5	3
6	1

222786 THROAT PACKING CONVERSION KIT

To convert the pump throat to all PTFE packings.
Must be purchased separately. Consists of:

Ref No.	Qty
3	5
4	1
6	1

222798 INTAKE VALVE REPAIR KIT

To replace the intake valve and seals.
Must be purchased separately. Consists of:

Ref No.	Qty
18	1
19	1
25	1
26	1
41	1

Technical Data

Model 222782

Maximum fluid working pressure	29 MPa, 285 bar (4140 psi)
Maximum air input pressure	1.2 MPa, 12.5 bar (180 psi)
Pump cycles per 3.8 liters (1 gal.)	130
Maximum recommended pump speed for continuous operation	40 cycles per min
Maximum recommended pump speed	60 cycles per min
Maximum flow	1.74 liters/min (0.46 gpm) at 60 cycles/min
Air motor effective diameter	76 mm (3")
Stroke length	76 mm (3")
Displacement pump effective area	2 cm ² (0.310 in. ²)
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	Carbon Steel; E52100, 41L40, and 4140 Alloy Steel; Ductile Iron; AISI 304, 316, and 17-4 PH grades of Stainless Steel; Chrome, Zinc, and Nickel Plating; PTFE; Glass-Filled PTFE; Acetal; Ultra-High Molecular Weight Polyethylene

Technical Data

Model 223782

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

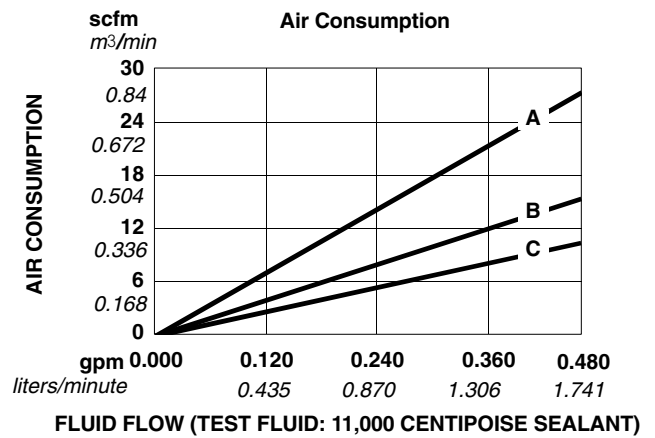
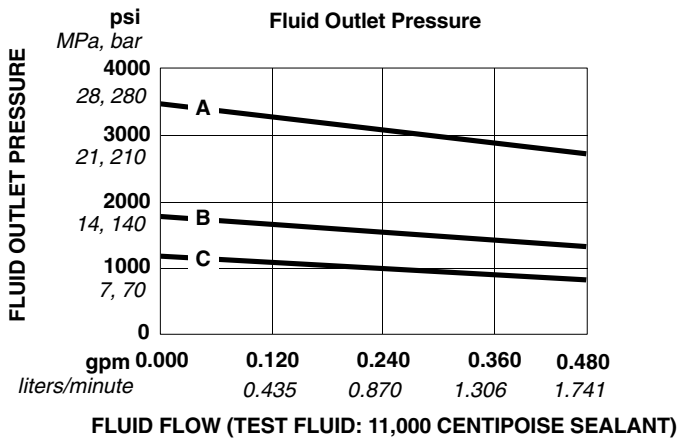
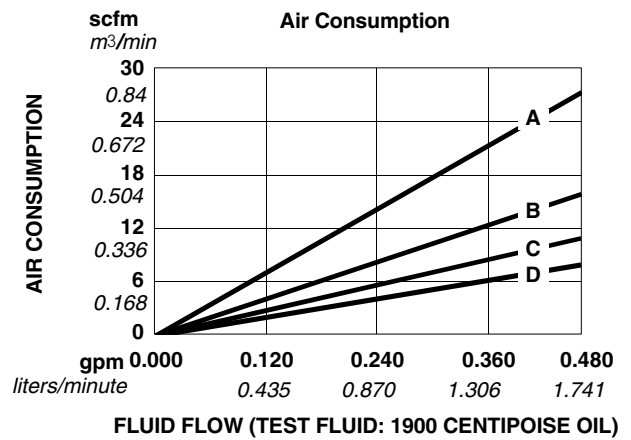
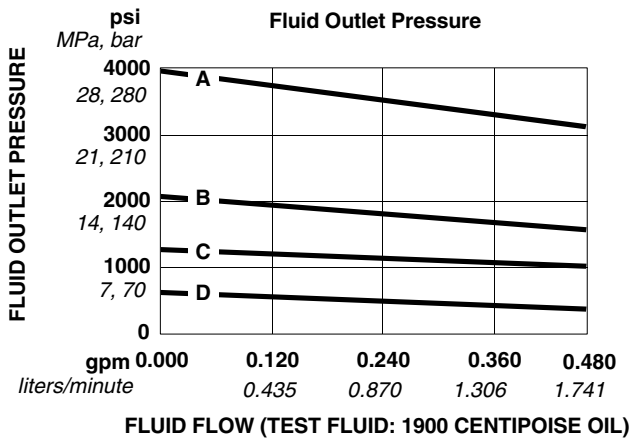
1. Locate fluid flow rate along bottom of chart.
2. Follow vertical line up to intersection with selected fluid outlet pressure curve.
3. Follow left to scale to read fluid outlet pressure.

- 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 (m³/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

Models 222783 and 237205

Maximum fluid working pressure	32 MPa, 320 bar (4600 psi)
Maximum air input pressure	0.7 MPa, 7 bar (100 psi)
Pump cycles per 3.8 liters (1 gal.)	100
Maximum recommended pump speed for continuous operation	40 cycles per min
Maximum recommended pump speed	60 cycles per min
Maximum flow	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 ² (0.310 in. ²)
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	Carbon Steel; E52100, 41L40, and 4140 Alloy Steel; Ductile Iron; AISI 304, 316, and 17-4 PH grades of Stainless Steel; Chrome, Zinc, and Nickel Plating; PTFE; Glass-Filled PTFE; Acetal; Ultra-High Molecular Weight Polyethylene

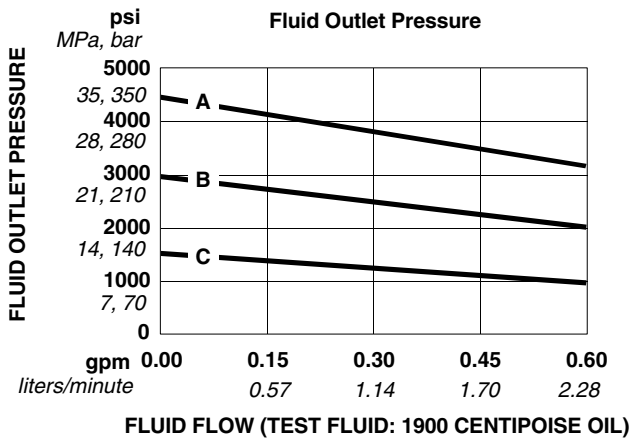
Technical Data

Models 222783 and 237205

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.

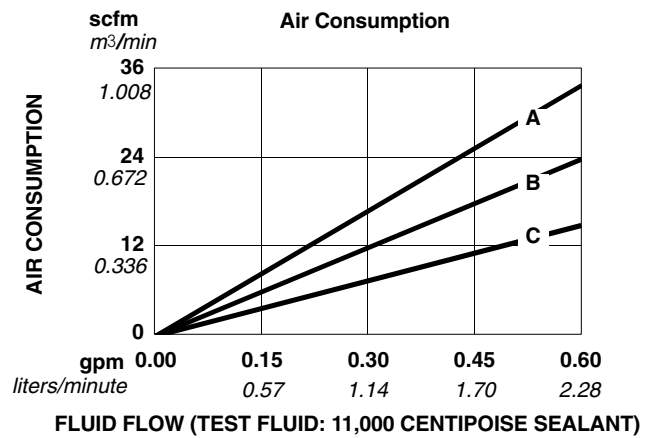
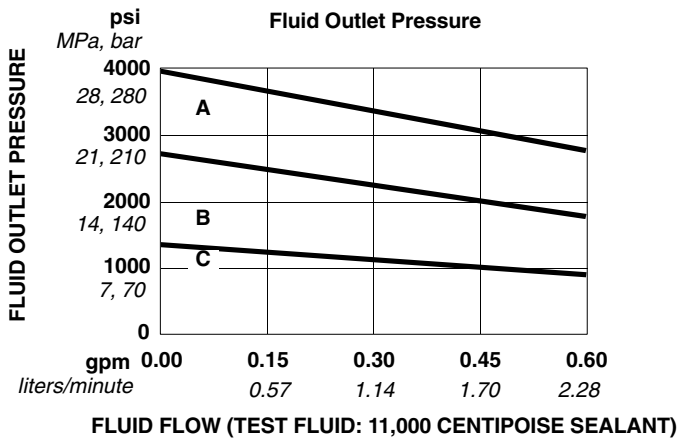
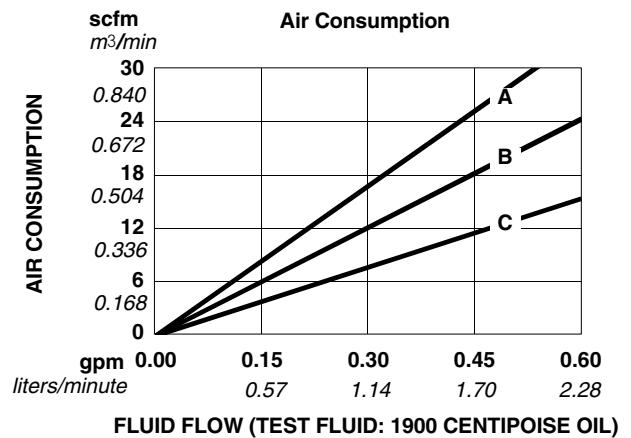
- A 100 psi (0.7 MPa, 7 bar) air pressure
- B 70 psi (0.49 MPa, 4.9 bar) air pressure
- C 40 psi (0.28 MPa, 2.8 bar) air pressure



To find Pump Air Consumption (m³/min or scfm) at a specific fluid flow (lpm/gpm) and air pressure (psi/MPa/bar):

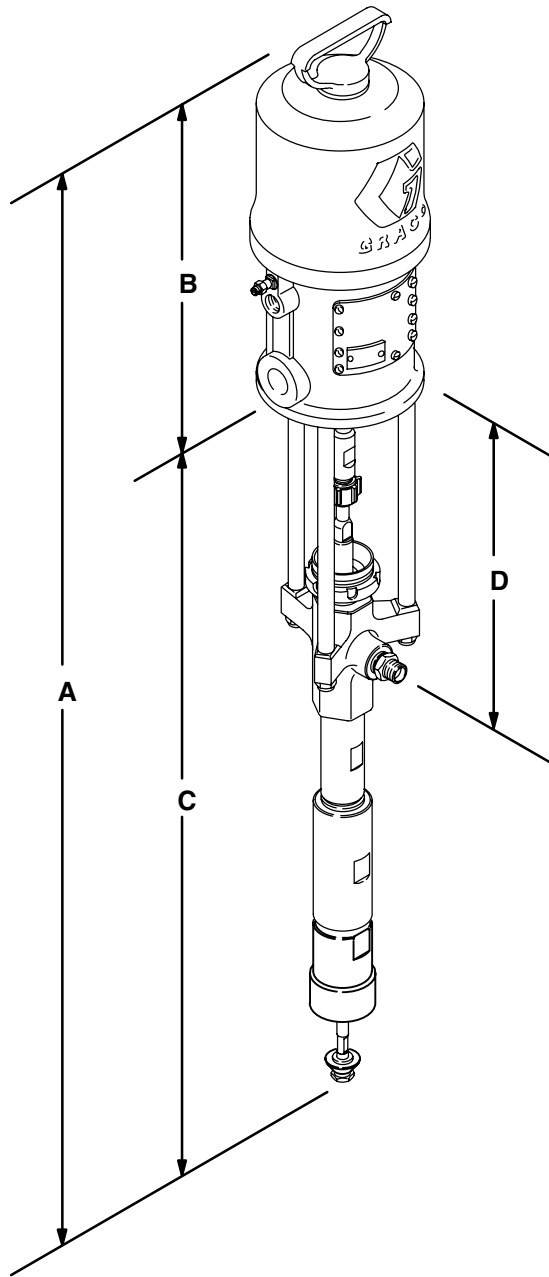
1. Locate fluid flow rate along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve.
3. Follow left to scale to read air consumption.

- 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 222783 Shown

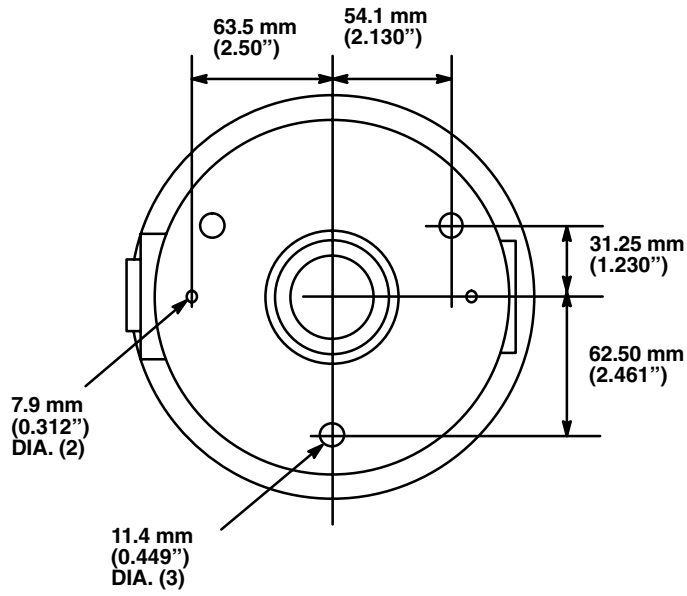


0202A

Pump Model	A	B	C	D
222782	1147 mm (45.2 in.)	365 mm (14.35 in.)	782 mm (30.8 in.)	328 mm (12.9 in.)
222783	1207 mm (47.5 in.)	418 mm (16.45 in.)	789 mm (31.0 in.)	328 mm (12.9 in.)
237205	1075 mm (42.4 in.)	418 mm (16.45 in.)	657 mm (25.9 in.)	196 mm (7.7 in.)

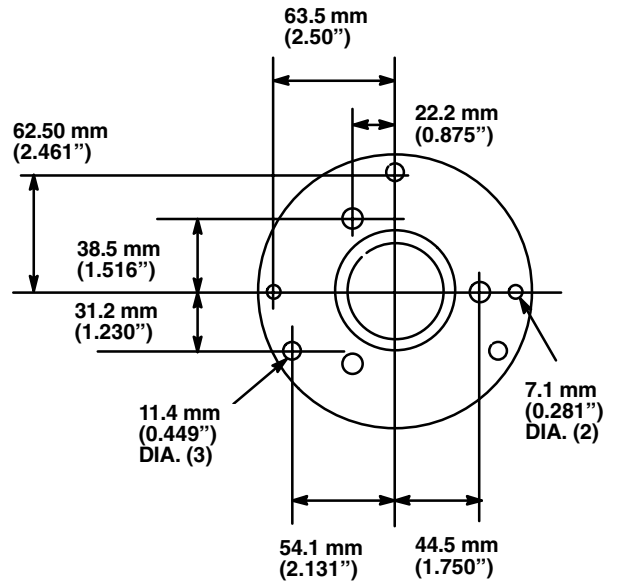
Mounting Hole Layout

President Pump



0213

Monark Pump



0214

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Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of 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.

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