

This manual contains **IMPORTANT WARNINGS AND INSTRUCTIONS**
READ AND RETAIN FOR REFERENCE

Check-Mate™ 450 Pumps

With Priming Piston, and Severe-Duty Rod and Cylinder

Model 222-770, Series A, 10:1 Ratio Monark® Pump
125 bar (1800 psi) **MAXIMUM FLUID WORKING PRESSURE**
12.5 bar (180 psi) **MAXIMUM AIR INPUT PRESSURE**

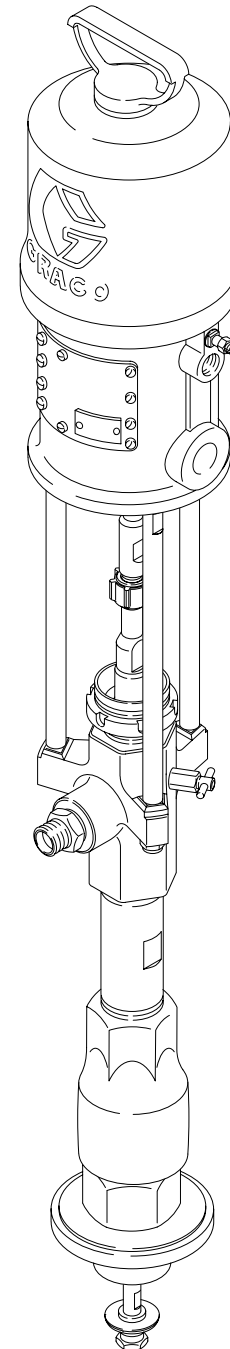
Model 222-768, Series A, 20:1 Ratio President® Pump
250 bar (3600 psi) **MAXIMUM FLUID WORKING PRESSURE**
12.5 bar (180 psi) **MAXIMUM AIR INPUT PRESSURE**

Model 222-769, Series A, 34:1 Ratio Senator® Pump
238 bar (3400 psi) **MAXIMUM FLUID WORKING PRESSURE**
7 bar (100 psi) **MAXIMUM AIR INPUT PRESSURE**

Model 224-660, Series A, 34:1 Ratio Quiet Senator® Pump
238 bar (3400 psi) **MAXIMUM FLUID WORKING PRESSURE**
7 bar (100 psi) **MAXIMUM AIR INPUT PRESSURE**

Model 222-778, Series A, 55:1 Ratio Bulldog® Pump
347 bar (4950 psi) **MAXIMUM FLUID WORKING PRESSURE**
6.3 bar (90 psi) **MAXIMUM AIR INPUT PRESSURE**

Model 222-813, Series A, 55:1 Ratio Quiet Bulldog® Pump
347 bar (4950 psi) **MAXIMUM FLUID WORKING PRESSURE**
6.3 bar (90 psi) **MAXIMUM AIR INPUT PRESSURE**



**Model
222-768
Shown**

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SAFETY WARNINGS

HIGH PRESSURE FLUID CAN CAUSE SERIOUS INJURY. FOR PROFESSIONAL USE ONLY.
OBSERVE ALL WARNINGS. Read And Understand All Instruction Manuals Before Operating Equipment.

MOVING PARTS HAZARD

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 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. Always follow the **Pressure Relief Procedure**, below, before checking, clearing, cleaning, flushing or servicing any part of the pump.

The air motor piston (located behind the air motor plates or shield) also moves when air is supplied to the motor. NEVER operate the pump with the air motor plates or shield removed. Before servicing the pump, follow the **Pressure Relief Procedure** below to prevent the pump from starting accidentally.

FLUID INJECTION HAZARD

General Safety

This equipment generates very high fluid pressure. Spray from the spray gun/dispensing valve, leaks or ruptured components can inject fluid through your skin and into your body and cause extremely serious bodily injury, including the need for amputation. Also, fluid injected or splashed into the eyes or on the skin can cause serious damage.

NEVER point the spray gun/dispensing valve at anyone or at any part of the body. NEVER put hand or fingers over the spray tip/nozzle.

ALWAYS have the tip guard in place on the spray gun when spraying.

ALWAYS follow the **Pressure Relief Procedure**, right, before cleaning or removing the spray tip/nozzle or servicing any system equipment.

NEVER try to stop or deflect leaks with your hand or body.

Be sure all equipment safety devices are operating properly before each use.

Medical Alert—Airless Spray Wounds

If any fluid appears to penetrate your skin, get **EMERGENCY MEDICAL CARE AT ONCE. DO NOT TREAT AS A SIMPLE CUT.** Tell the doctor exactly what fluid was injected.

Note to Physician: *Injection in the skin is a traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the blood stream. Consultation with a plastic surgeon or reconstructive hand surgeon may be advisable.*

Spray Gun/Dispensing Valve Safety Devices

Be sure all spray gun/dispensing valve safety devices are operating properly before each use. Do not remove or modify any part of the gun/valve; this can cause a malfunction and result in serious bodily injury.

Safety Latch

Whenever you stop spraying/dispensing, even for a moment, always set the spray gun/dispensing valve safety latch in the closed or "safe" position, making the gun/valve inoperative. Failure to set the safety latch can result in accidental triggering of the gun/valve.

Trigger Guard (if present)

Never operate the spray gun/dispensing valve with the trigger guard removed. This guard helps prevent the gun/valve from triggering accidentally if it is dropped or bumped.

Diffuser (only on spray guns)

The spray gun diffuser breaks up spray and reduces the risk of fluid injection when the tip is not installed. Check the diffuser operation regularly. Follow the **Pressure Relief Procedure**, to the right, then remove the spray tip. Aim the spray gun into a grounded metal pail, holding the spray gun firmly to the pail. Using the lowest possible pressure, trigger the spray gun. If the fluid emitted is not diffused into an irregular stream, replace the diffuser immediately.

Tip Guard (only on spray guns)

ALWAYS have the tip guard in place on the spray gun while spraying. The tip guard alerts you to the fluid injection hazard and helps reduce, **but does not prevent**, the risk of accidentally placing your fingers or any part of your body close to the spray tip.

Spray Tip/Nozzle Safety

Use extreme caution when cleaning or changing spray tips/nozzles. If the spray tip/nozzle clogs while spraying/dispensing, engage the spray gun/dispensing valve safety latch immediately. ALWAYS follow the **Pressure Relief Procedure** and then remove the spray tip/nozzle to clean it.

NEVER wipe off build-up around the spray tip/nozzle until pressure is fully relieved and the spray gun/dispensing valve safety latch is engaged.

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin, or injury from moving parts, always follow this procedure whenever you shut off the pump, when checking or servicing any part of the spray/dispensing system, when installing, cleaning or changing spray tips/nozzles, and whenever you stop spraying/dispensing.

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/nozzle or hose.

EQUIPMENT MISUSE HAZARD

General Safety

Any misuse of the spray/dispensing equipment or accessories, such as overpressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in fluid injection, splashing in the eyes or on the skin, or other serious bodily injury, or fire, explosion or property damage.

NEVER alter or modify any part of this equipment; doing so could cause it to malfunction.

CHECK all spray/dispensing equipment regularly and repair or replace worn or damaged parts immediately.

Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

HOSE SAFETY

High pressure fluid in the hoses can be very dangerous. If the hose develops a leak, split or rupture due to any kind of wear, damage or misuse, the high pressure spray emitted from it can cause a fluid injection injury or other serious bodily injury or property damage.

ALL FLUID HOSES MUST HAVE SPRING GUARDS ON BOTH ENDS! The spring guards help protect the hose from kinks or bends at or close to the coupling which can result in hose rupture.

TIGHTEN all fluid connections securely before each use. High pressure fluid can dislodge a loose coupling or allow high pressure spray to be emitted from the coupling.

NEVER use a damaged hose. Before each use, check the entire hose for cuts, leaks, abrasion, bulging cover, or damage or movement of the hose couplings. If any of these conditions exist, replace the hose immediately. DO NOT try to recouple high pressure hose or mend it with tape or any other device. A repaired hose cannot safely contain the high pressure fluid.

FIRE OR EXPLOSION HAZARD

Static electricity is created by the high velocity flow of fluid through the pump and hose. If every part of the spray/dispensing equipment is not properly grounded, sparking may occur, and the system may become hazardous. Sparking may also occur when plugging in or unplugging a power supply cord. Sparks can ignite fumes from solvents and the fluid being sprayed/dispensed, dust particles and other flammable substances, whether you are spraying/dispensing indoors or outdoors, and can cause a fire or explosion and serious bodily injury and property damage. Do not plug in or unplug any power supply cords in the spray/dispensing area when there is any chance of igniting fumes still in the air.

If you experience any static sparking or even a slight shock while using this equipment, **STOP SPRAYING/DISPENSING IMMEDIATELY.** Check the entire system for proper grounding. Do not use the system again until the problem has been identified and corrected.

Grounding

To reduce the risk of static sparking, ground the pump, object being sprayed, and all other spray/dispensing equipment used or located in the spray/dispensing area. CHECK your local electrical code for detailed grounding instructions for your area and type of equipment. BE SURE to ground all of this spray/dispensing equipment:

1. *Pump:* use a ground wire and clamp. See Fig 1.
2. *Air hoses:* use only grounded air hoses.
3. *Fluid hoses:* use only grounded fluid hoses.
4. *Air compressor:* follow manufacturer's recommendations.
5. *Spray gun or dispensing valve:* grounding is obtained through connection to a properly grounded fluid hose and pump.
6. *Fluid supply container:* according to your local code.
7. *Object being sprayed:* according to your local code.
8. *All solvent pails used when flushing,* according to 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.

System Pressure

NEVER exceed the recommended working pressure or the maximum air inlet pressure stated on your pump or in the **TECHNICAL DATA** on pages 24-29.

Be sure that all spray/dispensing equipment and accessories are rated to withstand the maximum working pressure of the pump. DO NOT exceed the maximum working pressure of any component or accessory used in the system.

Fluid Compatibility

BE SURE that all fluids and solvents used are chemically compatible with the wetted parts shown in the **TECHNICAL DATA** on pages 24-29. Always read the manufacturer's literature before using fluid or solvent in this pump.

HANDLE AND ROUTE HOSES CAREFULLY. Do not pull on hoses to move equipment. Do not use fluids which are not compatible with the inner tube and cover of the hose. DO NOT expose Graco hoses to temperatures above 82°C (180°F) or below -40°C (-40°F).

Hose Grounding Continuity

Proper hose grounding continuity is essential to maintaining a grounded spray/dispensing system. Check the electrical resistance of your air and fluid hoses at least once a week. If your hose does not have a tag on it which specifies the maximum electrical resistance, contact the hose supplier or manufacturer for the maximum resistance limits. Use a resistance meter in the appropriate range for your hose to check the resistance. If the resistance exceeds the recommended limits, replace it immediately. An ungrounded or poorly grounded hose can make your system hazardous. Also, read **FIRE OR EXPLOSION HAZARD**, below.

9. *To maintain grounding continuity when flushing or relieving pressure,* always hold a metal part of the spray gun/dispensing valve firmly to the side of a grounded metal pail, then trigger the gun/valve.

To ground the pump:

To ground the pump, 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. See Fig 1. Connect the other end of the wire to a true earth ground. See the ACCESSORIES section to order a ground wire and clamp.

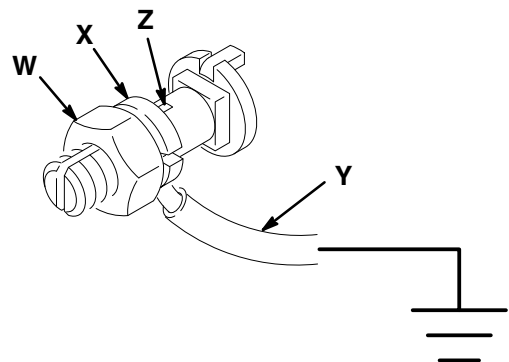


Fig 1

Flushing Safety

Before flushing, be sure the entire system and flushing pails are properly grounded. Refer to **Grounding**, above. Follow the **Pressure Relief Procedure** on page 2, and remove the spray tip/nozzle from the spray gun/dispensing valve. Always use the lowest possible fluid pressure, and maintain firm metal-to-metal contact between the gun/valve and the pail during flushing to reduce the risk of fluid injection injury, static sparking and splashing.

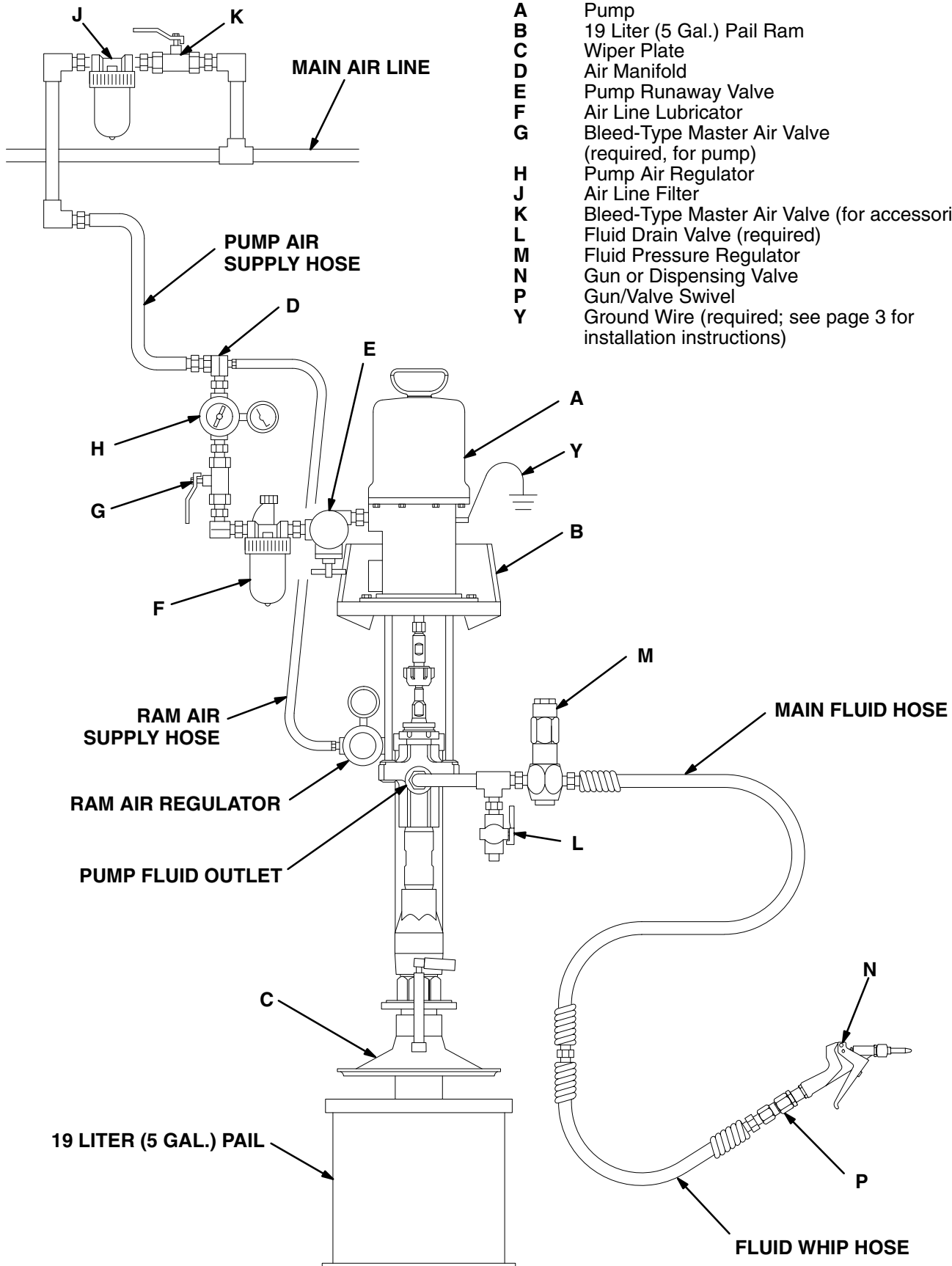
IMPORTANT

United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards – particularly the General Standards, Part 1910, and the Construction Standards, Part 1926 – should be consulted.

TYPICAL INSTALLATION

KEY

- A Pump
- B 19 Liter (5 Gal.) Pail Ram
- C Wiper Plate
- D Air Manifold
- E Pump Runaway Valve
- F Air Line Lubricator
- G Bleed-Type Master Air Valve (required, for pump)
- H Pump Air Regulator
- J Air Line Filter
- K Bleed-Type Master Air Valve (for accessories)
- L Fluid Drain Valve (required)
- M Fluid Pressure Regulator
- N Gun or Dispensing Valve
- P Gun/Valve Swivel
- Y Ground Wire (required; see page 3 for installation instructions)



INSTALLATION

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

See pages 22 and 23 for accessories available from Graco. 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 4 is only a guide for selecting and installing system components and accessories. Contact your Graco representative or Graco Technical Assistance (see back page) for assistance in designing a system to suit your particular needs.

SYSTEM ACCESSORIES

Refer to the Typical Installation drawing on page 4.

WARNING

A bleed-type master air valve (G) and a fluid drain valve (L) are required in your system. These accessories help reduce the risk of serious bodily injury including 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 spring guards on both ends. Use of a short whip hose between the main fluid hose and the gun allows freer gun movement.

Mounting Accessories

Mount the pump (A) to suit the type of installation planned. The pump dimensions and mounting hole layouts are shown on pages 30 and 31.

If you are mounting the pump on a ram (B), refer to the manual supplied with the ram unit for installation and operation instructions. The ram shown in the Typical Installation is a 222-781 19 liter (5 gal.) pail ram, used with a wiper plate (C). The ram shown includes an air regulator. It also requires an air supply hose and an air manifold (D), which divides the main air supply into separate lines for the pump and the ram.

By using Pump Mounting Kit 222-776, you can also mount the pump on Floor Stand 222-780, 200 liter (55 gal.) Ram 223-634, or Inductor 222-635. See Accessories 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 (E) 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 (F) provides automatic air motor lubrication.

A bleed-type master air valve (G) 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 (H) 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 (J) removes harmful dirt and moisture from the compressed air supply.

A second bleed-type air valve (K) isolates the air line accessories for servicing. Locate upstream from all other air line accessories.

Fluid Line Accessories

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

A fluid drain valve (L) 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 the valve is opened.

A fluid regulator (M) controls fluid pressure to the gun/valve, and dampens pressure surges.

A gun or valve (N) dispenses the fluid. The gun shown in the Typical Installation is a dispensing gun for highly viscous fluids.

A gun swivel (P) allows freer gun movement.

GROUNDING

WARNING

Before operating the pump, ground the system as explained under **FIRE OR EXPLOSION HAZARD** and **Grounding** on page 3.

WARNING

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin, or injury from moving parts, always follow this procedure whenever you shut off the pump, when checking or servicing any part of the spray/dispensing system, when installing, cleaning or changing spray tips/nozzles, and whenever you stop spraying/dispensing.

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

Fill the packing nut/wet-cup (2) 1/3 full with Graco Throat Seal Liquid (TSL) or compatible solvent. See Fig. 2. Adjust the packing nut weekly so it is just snug; do not over-tighten. Follow the **Pressure Relief Procedure Warning** above before adjusting the packing nut.

Flushing the Pump

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.

WARNING

For your safety, read the warning section, **FIRE OR EXPLOSION HAZARD** on page 3 before flushing, and follow all recommendations given there.

Starting and Adjusting the Pump

See the **TYPICAL INSTALLATION** on page 4. If you are using a ram or wiper plate 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 (H) and pump's bleed-type master air valve (G) are closed. Then open the bleed valve (G). Hold a metal part of the spray gun/dispensing valve (N) firmly to the side of a grounded metal pail and hold the trigger open. Now slowly open the air regulator until the pump starts.

WARNING

Moving parts can pinch or amputate your fingers or other body parts. When the pump is operating, the priming piston (25) (located at the pump intake) and the air motor piston (located behind the air motor plates or shield) move. See Fig. 2. Therefore, **NEVER** operate the pump with the air motor plates or shield removed, and keep your fingers and hands away from the priming piston.

Before attempting to clear an obstruction from the priming piston (25) or service the pump, follow the **Pressure Relief Procedure Warning** at left to prevent the pump from starting accidentally.

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 (35) slightly. Use the bleed hole (R), on the underside of the valve, as a priming valve until the fluid appears at the hole. See Fig 2. Close the bleeder valve.

NOTE: When changing fluid containers with the hose and gun already primed, open the bleeder valve (35), 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 (R) when priming the pump.

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

Use the air regulator (H) 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

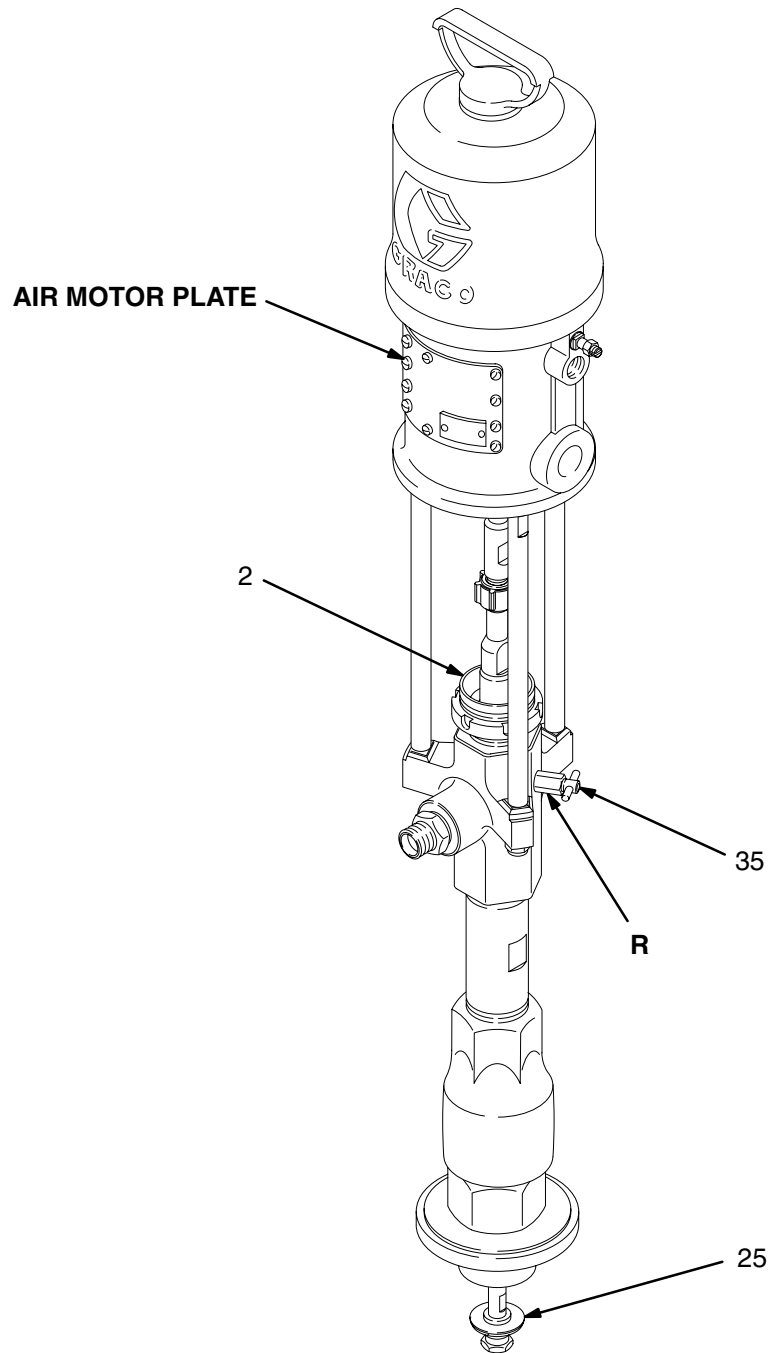
To reduce the risk of overpressurizing your system, which could result in component rupture and cause serious bodily injury, **NEVER exceed the specified MAXIMUM INCOMING AIR PRESSURE to the pump** (see the Technical Data on pages 24-29).

Never allow the pump to run dry of the fluid being pumped. A dry pump will quickly accelerate to a high speed, possibly damaging itself. A pump runaway valve (E), 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 4 and **ACCESSORIES** on pages 22 and 23. 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.

Shutdown and Care of the Pump

For overnight shutdown, follow the **Pressure Relief Procedure Warning** on page 6. 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.

Always flush the pump before the fluid dries on the displacement rod. Never leave water or water-based fluid in the pump overnight. First, flush with water or a compatible solvent, then with mineral spirits. Relieve the pressure, but leave the mineral spirits in the pump to protect the parts from corrosion.



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Fig 2

TROUBLESHOOTING CHART

PROBLEM	CAUSE	SOLUTION
Pump fails to operate	Restricted line or inadequate air supply	Clear; see TECHNICAL DATA on pages 24-29.
	Obstructed fluid hose or gun/valve; fluid hose ID is too small	Open, clear*; use hose with larger ID.
	Fluid dried on the displacement rod	Clean; always stop pump at bottom of stroke; keep wet-cup 1/3 filled with compatible solvent.
	Dirty, worn, or damaged 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 on pages 24-29.
	Obstructed fluid hose or gun/valve; fluid hose ID is too small	Open, clear*; use hose with larger ID.
	Bleeder valve open	Close.
	Air leaking into supply container	Check wiper plate or ram plate seal.
	Fluid too heavy for pump priming	Use bleeder valve (see page 6). Use inductor or ram. Remove piston spacer (33).**
	Worn packings in displacement pump	Replace packings.
Pump operates, but output low on downstroke	Fluid too heavy for pump priming	Use bleeder valve (see page 6). Use inductor or ram. Remove piston spacer (33).**
	Held open or worn intake valve or seals	Clear valve; replace seals.
Pump operates, but output low on upstroke	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 6). Use inductor or ram. Remove piston spacer (33).**
	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 Warning** below. 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 1.4-2.8 bar [20-40 psi]).. If the pump starts when the air is turned on, the obstruction is in the fluid hose or gun.

** Remove the piston spacer (33) only as a last resort, as the pump may not perform well without it.

NOTE: If you experience air motor icing, call Graco Technical Assistance (1-800-543-0339).

WARNING

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin, or injury from moving parts, always follow this procedure whenever you shut off the pump, when checking or servicing any part of the spray/dispensing system, when installing, cleaning or changing spray tips/nozzles, and whenever you stop spraying/dispensing.

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.

REQUIRED TOOLS

- Torque wrench
- Bench vise, with soft jaws
- Hammer
- Rubber mallet
- 13 mm (1/2") dia. brass rod
- O-ring pick
- 11 mm, 12 mm, 19 mm, 22 mm, 26 mm, and 28 mm open-end wrenches
- 17 mm box or socket wrench
- 32 mm crow's-foot wrench
- 400 mm adjustable wrench
- Set of adjustable wrenches
- 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 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. Always follow the **Pressure Relief Procedure Warning** on page 8, before checking, clearing, cleaning, flushing or servicing any part of the pump.

The air motor piston (located behind the air motor plates or shield) also moves when air is supplied to the motor. NEVER operate the pump with the air motor plates or shield removed. Before servicing the pump, follow the **Pressure Relief Procedure Warning** on page 8, to prevent the pump from starting accidentally.

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 (8) with a 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. Using an adjustable wrench, unscrew the coupling nut (104) from the connecting rod (103). Remove the coupling collars (105). See Fig 3.
4. Hold the tie rod flats with a wrench to keep them from turning. Use the wrench 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 10 for displacement pump service. To service the air motor, refer to the separate air motor manual, supplied.

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 President pumps, and 36-45 N.m (27-33 ft-lb) on all other pumps.

2. Screw the locknuts (106) onto the tie rods (102) and torque to 27-34 N.m (20-25 ft-lb), using the wrench provided (or a 17 mm box or socket wrench).
3. 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 a wrench to keep it from turning. With an adjustable wrench, torque the coupling nut to 50-61 N.m (37-45 ft-lb).
4. Using a torque wrench in the square hole of the supplied wrench (110), torque the packing nut (2) to 45-53 N.m (33-39 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.

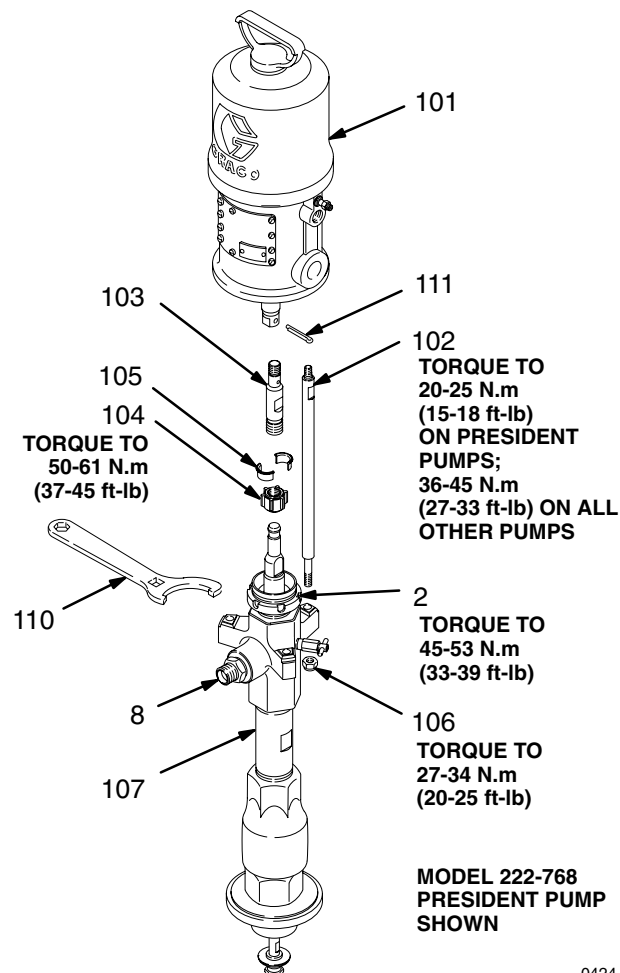


Fig 3

0424

DISPLACEMENT PUMP SERVICE

Disassembly

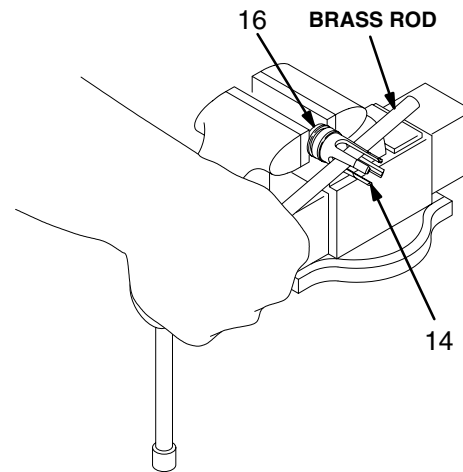
When disassembling the pump, lay out all removed parts in sequence, to ease reassembly. Refer to Fig 6.

NOTE: Repair Kit 222-773 is available 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 (11*).

Repair Kit 222-774 is available to replace the throat packings. For the best results, use all the new parts in the kit. Kit parts are marked with two asterisks, for example (3**).

1. Remove the displacement pump from the air motor as explained on page 9. Place the pump in a vise, with the jaws on the outlet housing (10).
2. Hold the flats of the priming piston rod (24) with a 12 mm wrench. Using a 22 mm wrench, unscrew the priming piston nut (30). Slide the priming piston (25) and piston guide (31) off the rod. Inspect the surfaces of the guide (31) and piston (25) for scoring, wear, or other damage.
3. Loosen the packing nut (2) using the wrench (1 10) supplied, or a hammer and brass rod. Remove the intake cylinder (23), using an adjustable wrench.
4. Unscrew the intake valve housing (17) from the cylinder (12), using an adjustable wrench. Pull the housing off the pump. The intake check valve assembly (S) should slide down the priming piston rod (24) as you remove the housing; if it does not slide easily, firmly tap on the top of the housing (17) with a rubber mallet to loosen.
5. Use an o-ring pick to remove the seal (21) from the intake valve housing (17). Discard the seal; use a new one for reassembly. Pull the intake valve seat (22) out the bottom of the housing (17). If the seat is difficult to remove, insert a hammer and brass rod through the top of the housing and drive the seat out. Take care not to drop the check valve assembly (S) as it comes free, and set it aside for later.
6. Push the displacement rod (1) down as far as possible, then pull it and the priming piston rod (24) out of the outlet housing (10) and cylinder (12).
7. Remove the packing nut (2), throat packings (3, 5) and glands (4, 6) from the outlet housing (10). **DO NOT** remove the fluid outlet nipple (8) and o-ring (9) from the housing unless they need replacement.
8. Unscrew the handle of the bleeder valve (35) from its housing. Clean the threads and the bleed hole in the valve housing. It is not necessary to remove the valve housing from the outlet housing (10).
9. Use a 400 mm adjustable wrench on the flats of the pump cylinder (12) and unscrew the cylinder from the outlet housing (10). Remove the o-rings (11). 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.

10. Inspect the outer surfaces of the displacement rod (1) and priming piston rod (24) for wear, scoring or other damage by holding them up to the light at an angle or running a finger over the surface.
11. Use a vise with soft jaws to hold the displacement rod (1) by its flats. Place a 19 mm wrench on the flats of the piston and unscrew the piston (13) and priming piston rod (24) from the displacement rod (1). Remove the spacer (33). Disassemble the piston guide (14) from the piston (13).
12. It is not necessary to remove the priming piston rod (24) 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 and unscrew the rod, using a 12 mm wrench on the flats.
13. Place the flats of the piston seat (16) in a vise. Using a 13 mm (1/2 in.) dia. brass rod, unscrew the piston guide (14) from the piston seat (16). See Fig 4. Remove the piston seal (15); always replace with a new one. Inspect the mating surfaces of the piston (13) and piston seat (16) for nicks, scoring or wear.

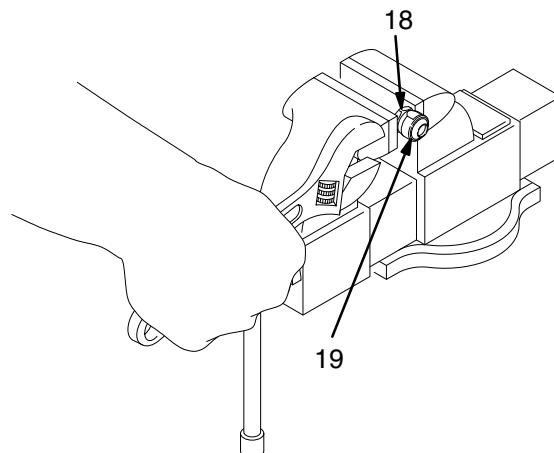


0205

Fig 4

14. To disassemble the intake check valve (S), place the nut (18) in a vise and unscrew the intake valve body (19), using a 28 mm wrench. See Fig 5. Remove the seals (42, 20) from the nut and from the valve body; always replace them with new ones. Inspect the mating surfaces of the intake valve body (19) and seat (22) for wear, scoring, or other damage.

NOTE: The seal (42) is press-fit in the nut (18) and may require cutting to ease removal.

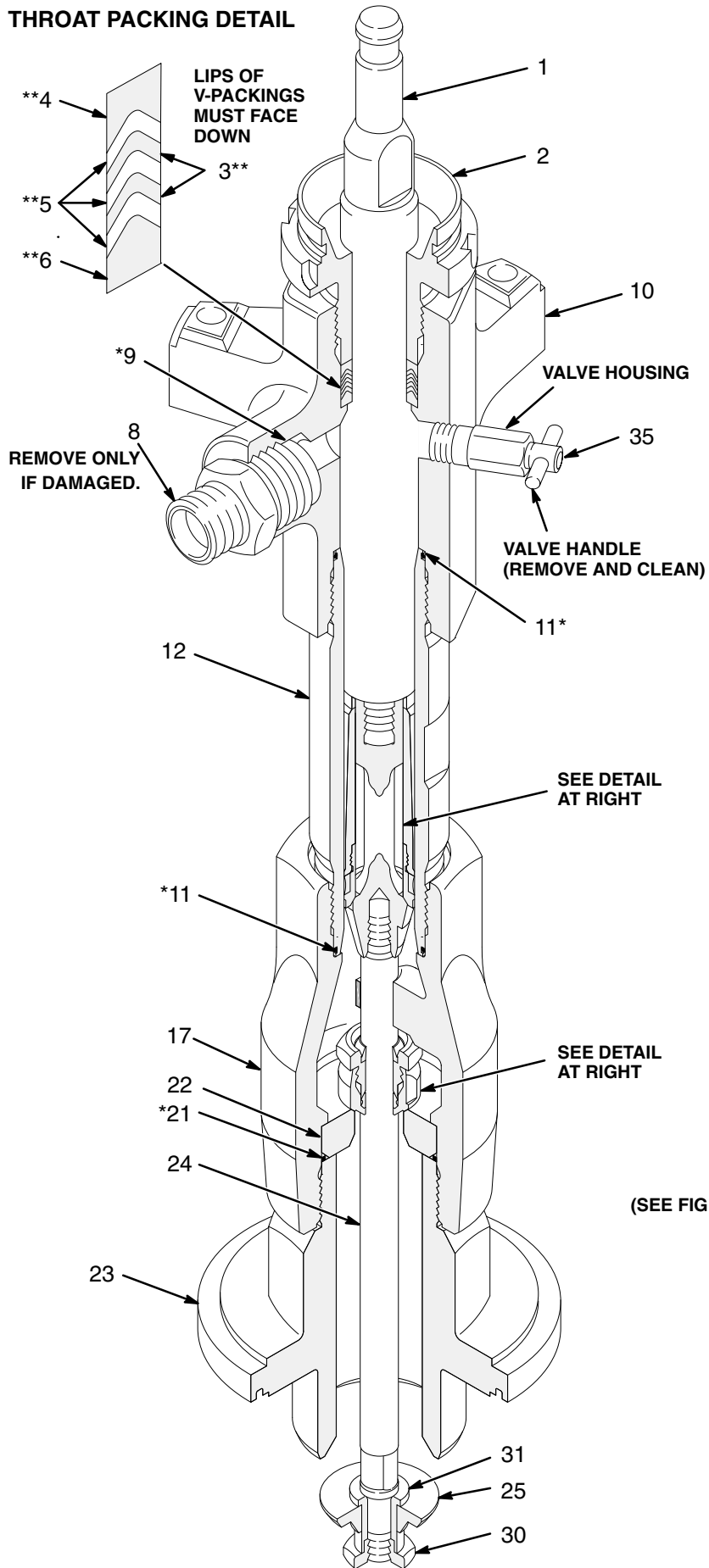


0206

Fig 5

15. Inspect all parts for damage and clean with a compatible solvent. To reassemble, refer to page 12.

THROAT PACKING DETAIL



DETAIL OF PISTON AND INTAKE CHECK VALVE

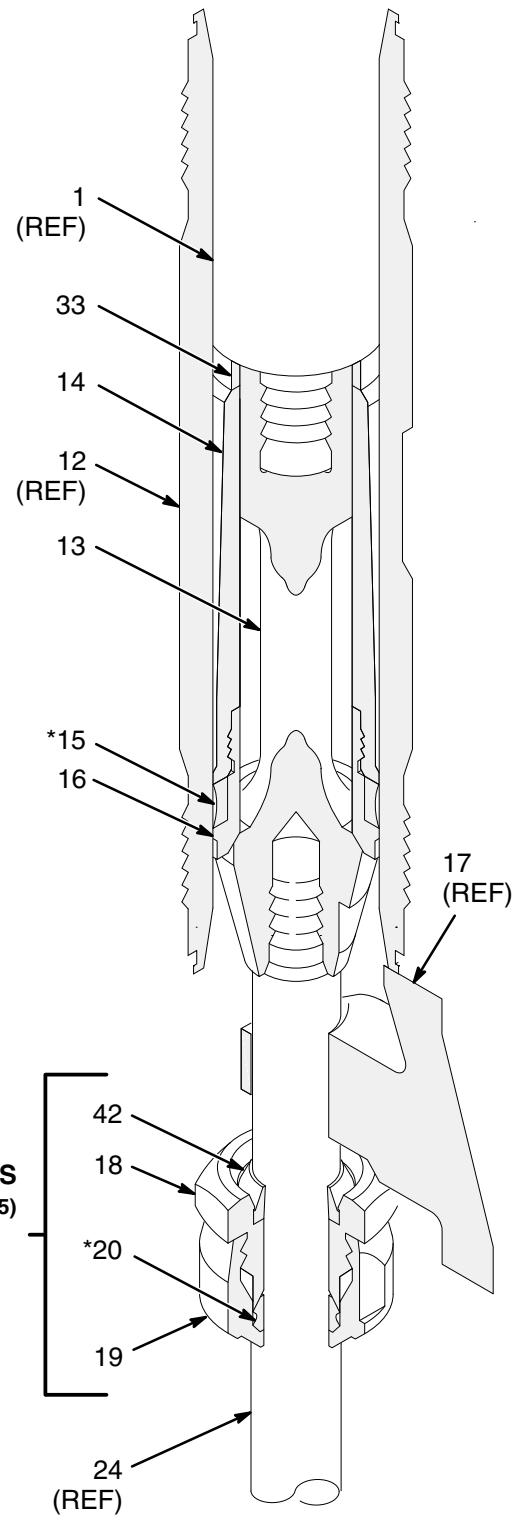


Fig 6

0425A

Reassembly (Refer to Fig 7)

1. Place a 13 mm (1/2 in.) dia. brass rod lengthwise in a vise. Install a new piston seal (15*) on the piston seat. Apply thread sealant to the threads of the piston seat. Place the piston guide (14) securely on the brass rod. Using a 32 mm crow's-foot, screw the piston seat (16) into the piston guide. Torque to 27-34 N.m (20-25 ft-lb).
2. If it was necessary to remove the priming piston rod (24) from the piston (13), apply thread sealant to the threads of the rod. Place the flats of the piston (13) in a vise. Hold the flats of the rod with a 12 mm wrench, and screw the rod into the piston. Torque to 45-53 N.m (33-39 ft-lb).
3. Use a vise with soft jaws to hold the displacement rod (1) by its flats. Install the spacer (33, see the following note) on the rod. Install the assembled piston guide/seat on the piston (13). Apply thread sealant to the threads of the displacement rod, and screw the piston assembly onto the rod, using a 19 mm wrench on the flats of the piston. Torque to 120-130 N.m (88-95 ft-lb). There will be a small gap between the top of the piston (13) and the shoulder of the rod (1).

NOTE: The piston spacer (33) is not required when pumping fluids with a viscosity greater than 1 million centipoise.

4. Screw the handle of the bleeder valve (35) into the valve housing. The handle has two sets of threads. When reassembling, be sure to screw the handle fully into the valve housing.

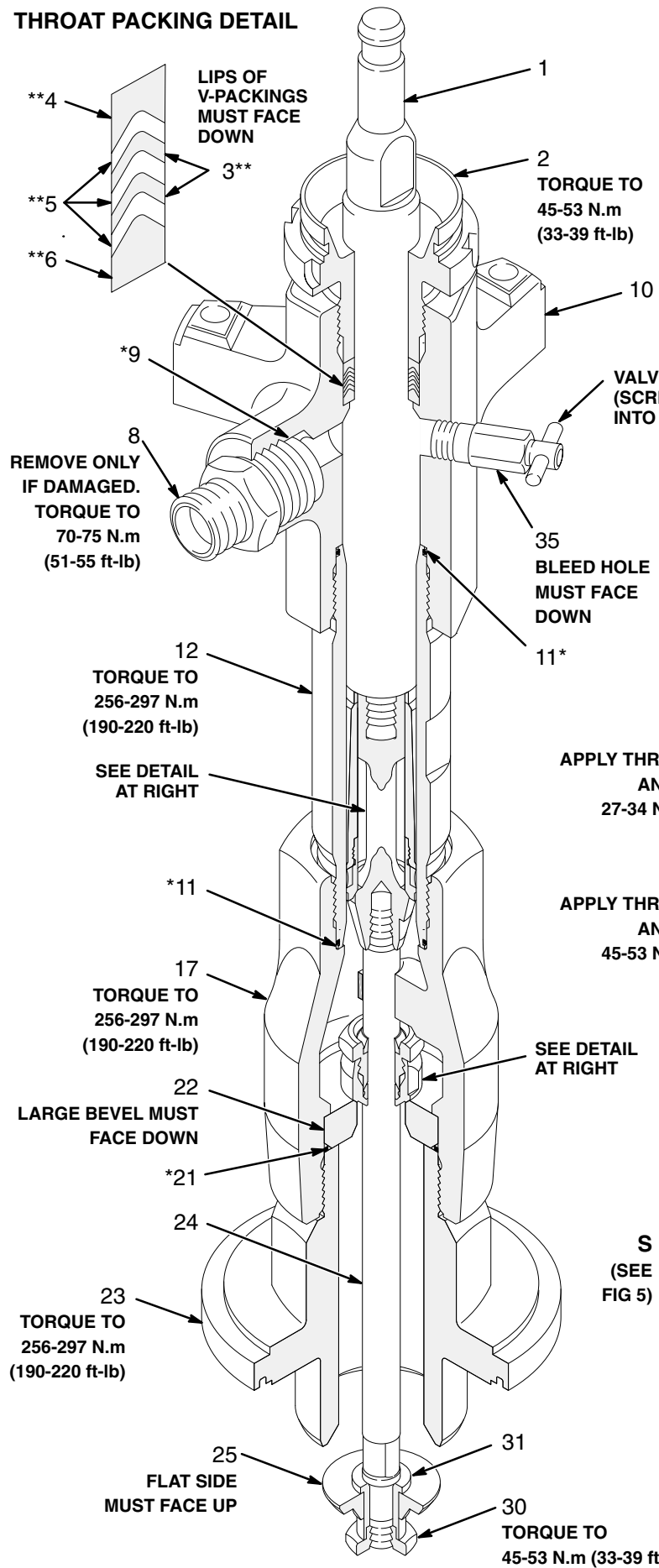
NOTE: It is not ordinarily necessary to remove the outlet nipple (8) and o-ring (9*). However, if they were replaced because of damage, lubricate the o-ring (9*) and place it on the nipple (8). Screw the fitting into the outlet housing (10). Torque to 70-75 N.m (51-55 ft-lb).

5. Lubricate the o-rings (11*) and install them on the cylinder (12). Apply thread lubricant to the top threads of the cylinder. Using a 400 mm wrench on the flats of the cylinder, screw it into the outlet housing (10). Torque to 256-297 N.m (190-220 ft-lb).
6. Lubricate the throat packings and glands, and install them in the outlet housing (10) 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 nut loosely in the outlet housing.
7. Carefully insert the displacement rod (1) into the bottom of the cylinder (12). Push the rod up into the cylinder and through the outlet housing (10), until it protrudes from the packing nut (2). Be careful not to

damage the piston seal (15*) while performing this step.

8. Apply thread lubricant to the bottom threads of the cylinder (12). Be sure the o-ring (11*) is in place on the cylinder. Guide the intake valve housing (17) up onto the priming piston rod (24) and screw it onto the cylinder, using an adjustable wrench. Torque to 256-297 N.m (190-220 ft-lb).
9. With the beveled side facing up, press the seal (42) into the recess of the intake packing nut (18) until it snaps into place. The nose of the seal should be flush with or slightly recessed into the face of the packing nut.
10. Apply sealant to the threads of the intake packing nut (18). With the threads facing down toward the pump intake, slide the nut up onto the priming piston rod (24) until it clears the flats of the rod.
11. Lubricate a new intake valve seal (20*) 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 (18). Apply sealant to the female threads of the intake valve body (19), and slide it onto the rod until it reaches the nut (18).
12. Place a 26 mm wrench on the flats of the packing nut (18) and a 28 mm wrench on the flats of the valve body (19). Screw the nut into the body, making certain they remain in position above the flats of the rod (24). Torque to 45-53 N.m (33-39 ft-lb). Slide the assembled intake check valve up the priming piston rod until it reaches the stop (T); this may be difficult due to high friction between the seal and rod.
13. Position the intake valve seat (22) so its large beveled side faces down toward the pump intake. Slide the seat (22) onto the priming piston rod (24) and into the intake valve housing (17) until it seats on the lower lip of the housing. Lubricate a new seal (21*) and push it up into the gap around the bottom outer edge of the seat (22).
14. Apply thread lubricant to the threads of the intake cylinder (23) and screw the cylinder into the intake valve housing (17), using an adjustable wrench. Torque to 256-297 N.m (190-220 ft-lb).
15. Slide the priming piston guide (31) onto the rod (24) until it stops. Then install the priming piston (25) with the flat side of the priming piston (25) facing up toward the pump. Apply thread sealant to the threads of the priming piston rod (24). Hold the rod steady with a 12 mm wrench on the flats, and screw the priming piston nut (30) onto the rod with a 22 mm wrench. Torque to 45-53 N.m (33-39 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



DETAIL OF PISTON AND INTAKE CHECK VALVE

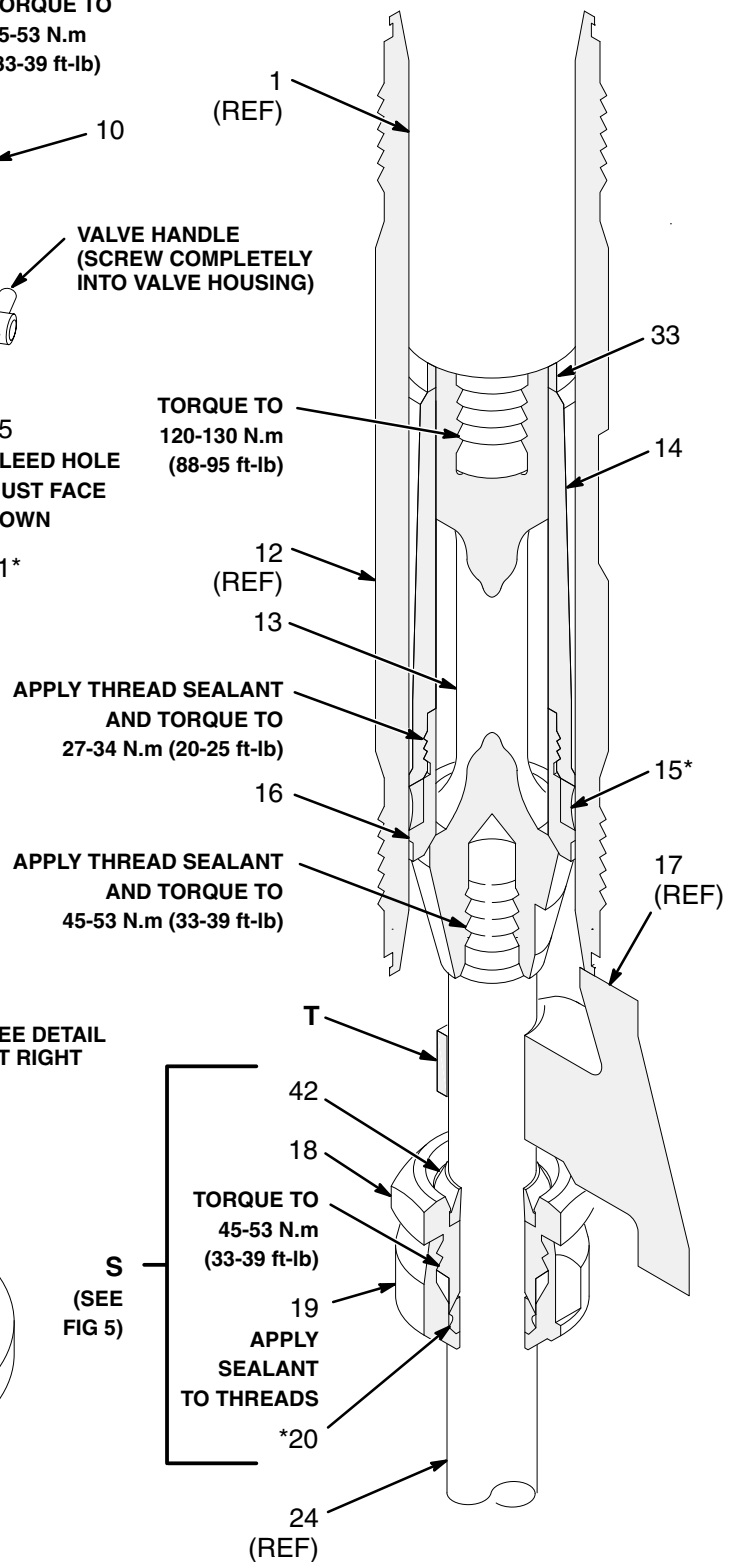


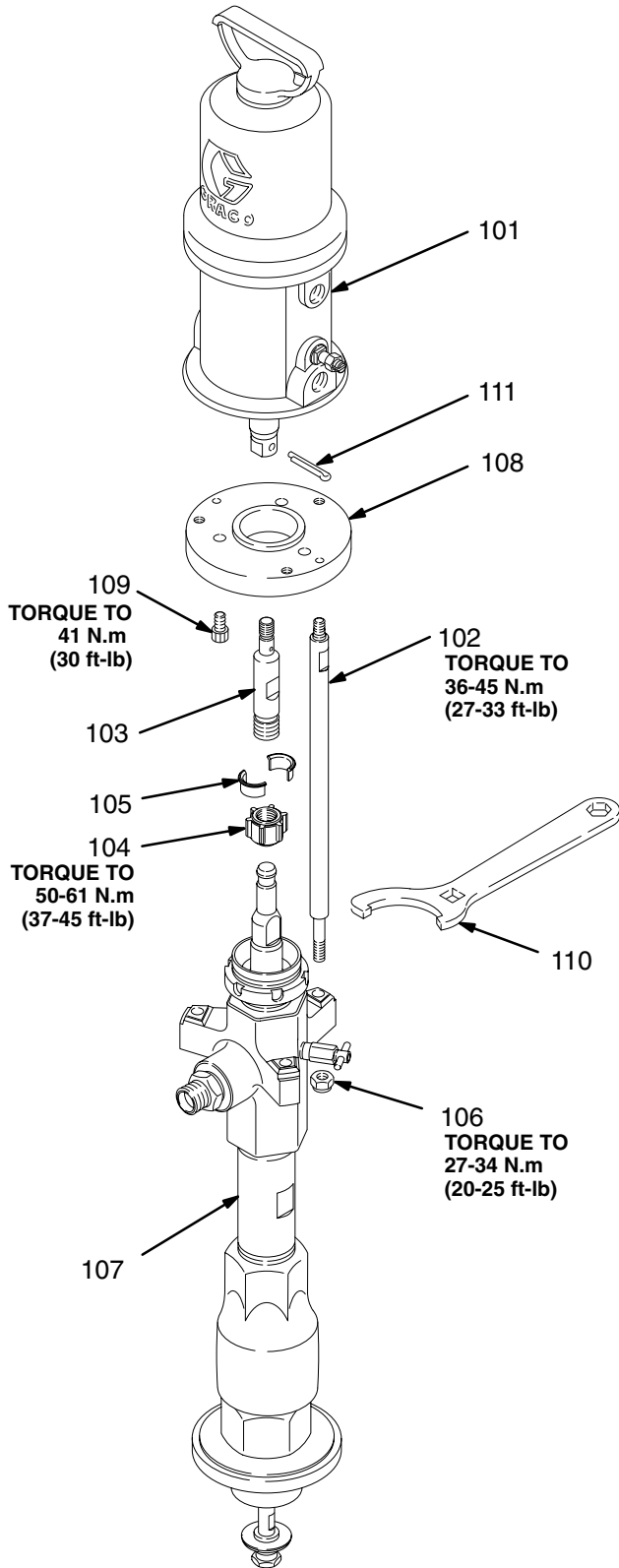
Fig 7

0425A

PARTS DRAWINGS AND PARTS LISTS

PARTS DRAWING AND LIST

Model 222-770, Series A
10:1 Ratio Monark Pump
 Includes items 101-111



REF NO.	PART NO.	DESCRIPTION	QTY
101	222-791	AIR MOTOR, Monark See 307-043 for parts	1
102	184-076	ROD, tie; 295 mm (11.61") shoulder to shoulder	3
103	184-092	ROD, adapter	1
104	184-059	NUT, coupling	1
105	184-128	COLLAR, coupling	2
106	109-209	NUT, hex, self-locking; with nylon insert; M10 x 1.5	3
107	222-790	PUMP, displacement See pages 18 & 19 for parts	1
108	184-077	PLATE, adapter	1
109	109-212	SCREW, cap, socket hd; 3/8-16 unc-3a x 0.75" (19 mm)	3
110	184-119	WRENCH, packing nut	1
111	101-946	PIN, cotter	1

PUMP MOUNTING KIT 222-776
(Must be ordered separately)

Use to mount the pump on a 200 liter (55 gal.) Ram 223-634, Floor Stand 222-780, or Inductor 222-635. Includes instructions.

Consists of:

Part No.	Description	Qty
276-025	Lug	4
102-637	Bolt	4
184-086	Gasket	1

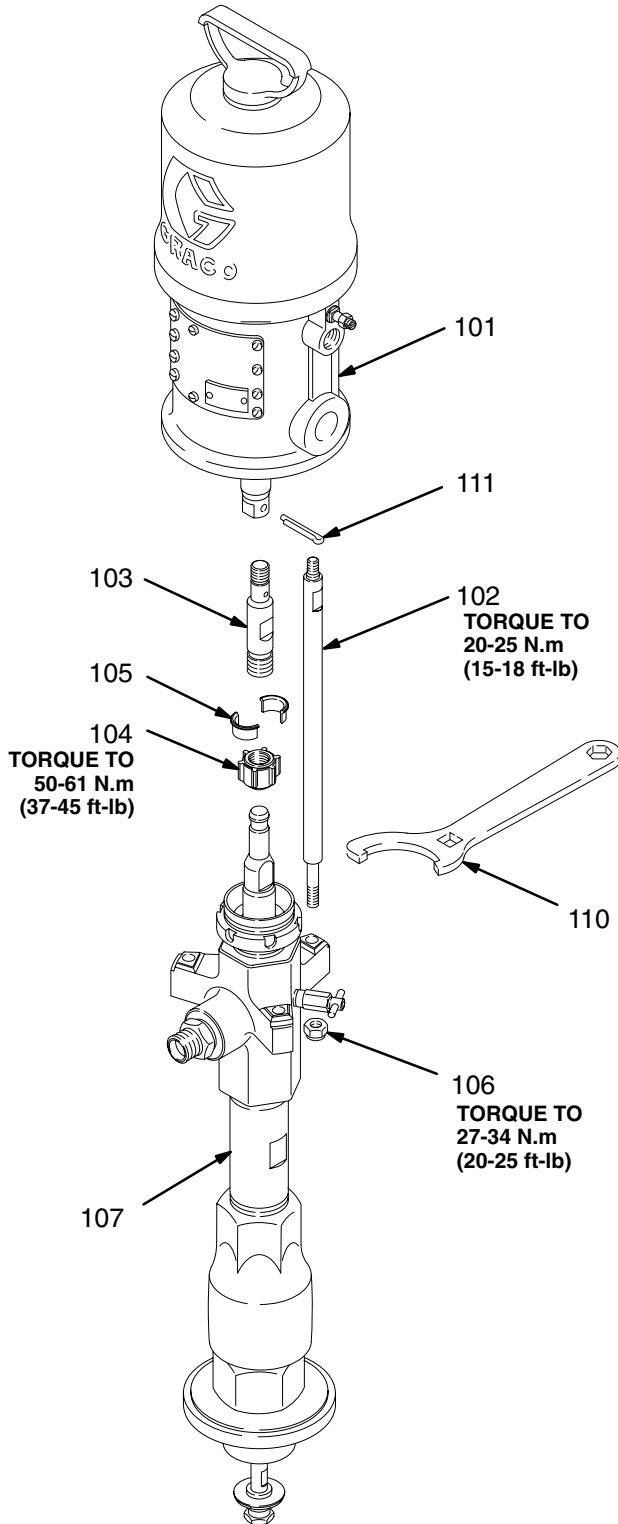
HOW TO ORDER PARTS

1. To be sure you receive the correct replacement parts, kits, or accessories, always give all of the information requested in the chart below.
2. Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
3. Order all parts from your nearest Graco distributor.

6 digit Part Number	Qty	Part Description

PARTS DRAWING AND LIST

Model 222-768, Series A
20:1 Ratio President Pump
 Includes items 101-111



REF NO.	PART NO.	DESCRIPTION	QTY
101	222-772	AIR MOTOR, President See 306-982 for parts	1
102	184-076	ROD, tie; 295 mm (11.61") shoulder to shoulder	3
103	184-091	ROD, adapter	1
104	184-059	NUT, coupling	1
105	184-128	COLLAR, coupling	2
106	109-209	NUT, hex, self-locking; with nylon insert; M10 x 1.5	3
107	222-790	PUMP, displacement See pages 18 & 19 for parts	1
110	184-119	WRENCH, packing nut	1
111	101-946	PIN, cotter	1

PUMP MOUNTING KIT 222-776
(Must be ordered separately)

Use to mount the pump on a 200 liter (55 gal.) Ram 223-634, Floor Stand 222-780, or Inductor 222-635. Includes instructions.

Consists of:

Part No.	Description	Qty
276-025	Lug	4
102-637	Bolt	4
184-086	Gasket	1

HOW TO ORDER PARTS

- To be sure you receive the correct replacement parts, kits, or accessories, always give all of the information requested in the chart below.
- Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
- Order all parts from your nearest Graco distributor.

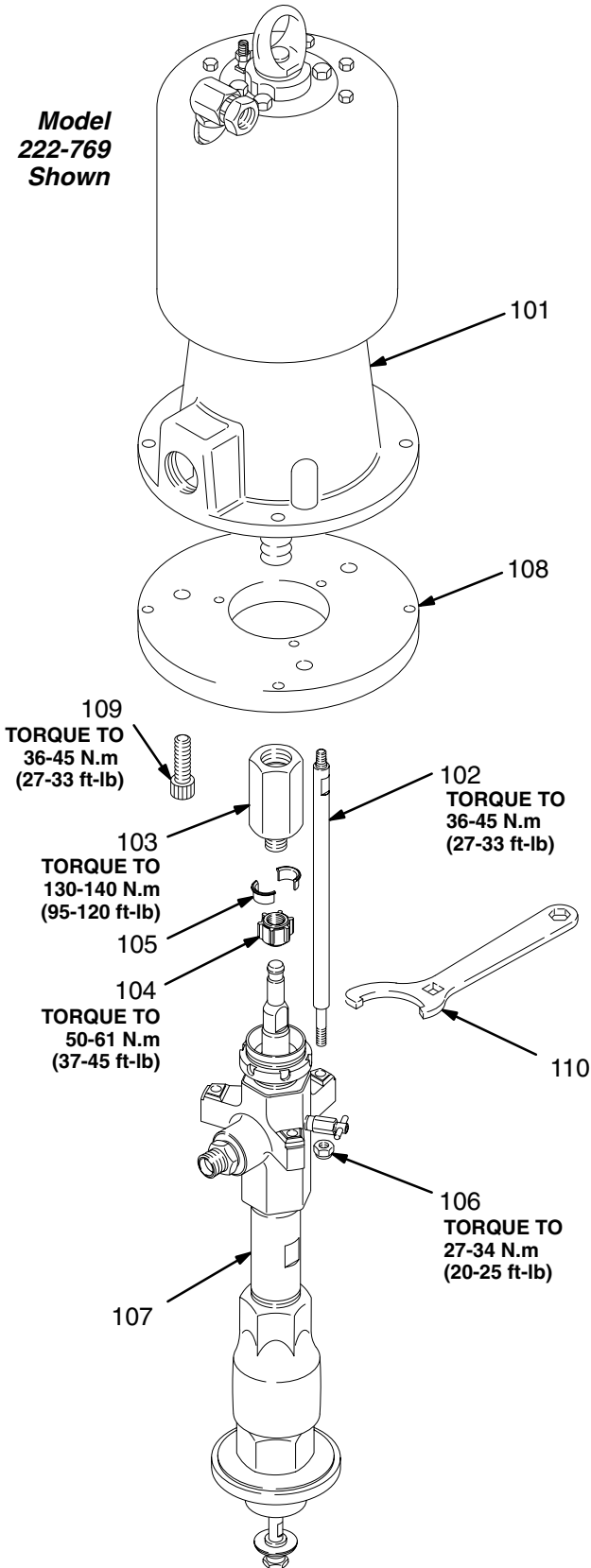
6 digit Part Number	Qty	Part Description

PARTS DRAWING AND LIST

Model 222-769, Series A
34:1 Ratio Senator Pump
 With Standard Air Motor
 Includes items 101-110

Model 224-660, Series A
34:1 Ratio Senator Pump
 With Quiet Air Motor
 Includes items 101-110

**Model
 222-769
 Shown**



REF NO.	PART NO.	DESCRIPTION	QTY
101	217-540	AIR MOTOR, Senator, standard <i>Used on Model 222-769;</i> See 307-592 for parts	1
	220-571	AIR MOTOR, Senator, quiet <i>Used on Model 224-660;</i> See 307-592 for parts	1
102	184-076	ROD, tie; 295 mm (11.61") shoulder to shoulder	3
103	184-127	ROD, adapter	1
104	184-059	NUT, coupling	1
105	184-128	COLLAR, coupling	2
106	109-209	NUT, hex, self-locking; with nylon insert; M10 x 1.5	3
107	222-790	PUMP, displacement See pages 18 & 19 for parts	1
108	184-094	PLATE, adapter	1
109	109-211	SCREW, cap, socket hd; 5/8-11 unc-2a x 2" (51 mm)	3
110	184-119	WRENCH, packing nut	1

PUMP MOUNTING KIT 222-776
(Must be ordered separately)

Use to mount the pump on a 200 liter (55 gal.) Ram 223-634, Floor Stand 222-780, or Inductor 222-635. Includes instructions.
 Consists of:

Part No.	Description	Qty
276-025	Lug	4
102-637	Bolt	4
184-086	Gasket	1

HOW TO ORDER PARTS

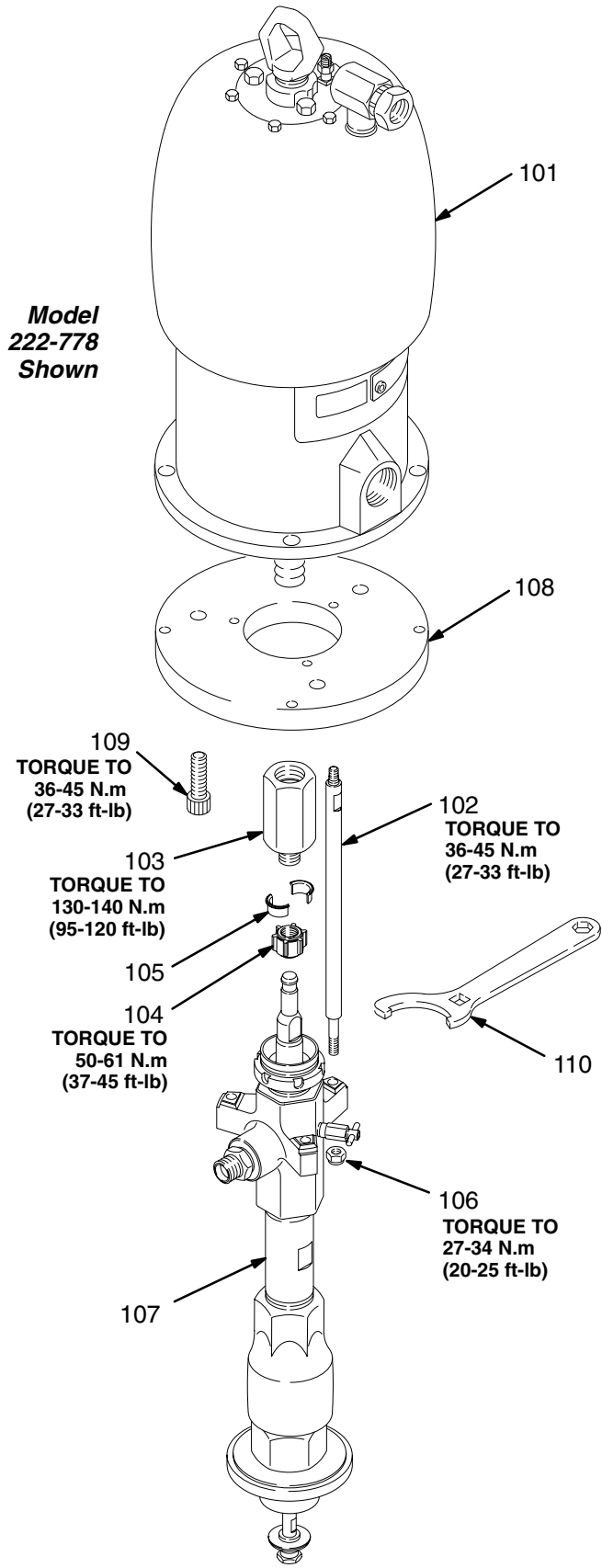
- To be sure you receive the correct replacement parts, kits, or accessories, always give all of the information requested in the chart below.
- Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
- Order all parts from your nearest Graco distributor.

6 digit Part Number	Qty	Part Description

PARTS DRAWING AND LIST

Model 222-778, Series A
55:1 Ratio Bulldog Pump
 With Standard Air Motor
 Includes items 101-110

Model 222-813, Series A
55:1 Ratio Bulldog Pump
 With Quiet Air Motor
 Includes items 101-110



REF NO.	PART NO.	DESCRIPTION	QTY
101	208-356	AIR MOTOR, Bulldog, standard <i>Used on Model 222-778</i>	1
	215-255	See 307-049 for parts AIR MOTOR, Bulldog, quiet <i>Used on Model 222-813</i>	1
102	184-076	ROD, tie; 295 mm (11.61") shoulder to shoulder	3
103	184-127	ROD, adapter	1
104	184-059	NUT, coupling	1
105	184-128	COLLAR, coupling	2
106	109-209	NUT, hex, self-locking; with nylon insert; M10 x 1.5	3
107	222-790	PUMP, displacement See pages 18 & 19 for parts	1
108	184-094	PLATE, adapter	1
109	109-211	SCREW, cap, socket hd; 5/8-11 unc-2a x 2" (51 mm)	3
110	184-119	WRENCH, packing nut	1

PUMP MOUNTING KIT 222-776
(Must be ordered separately)

Use to mount the pump on a 200 liter (55 gal.) Ram 223-634, Floor Stand 222-780, or Inductor 222-635. Includes instructions.
 Consists of:

Part No.	Description	Qty
276-025	Lug	4
102-637	Bolt	4
184-086	Gasket	1

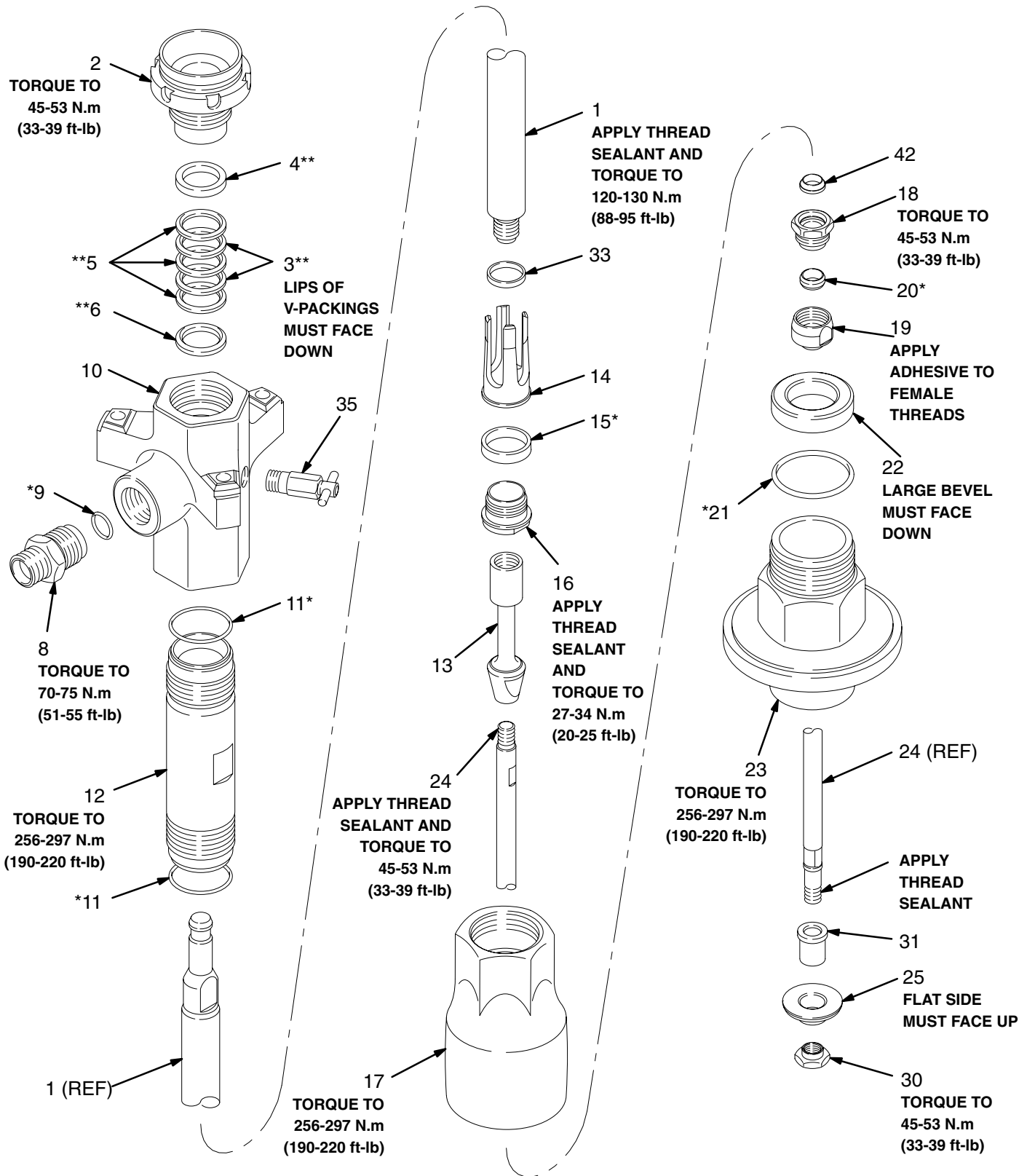
HOW TO ORDER PARTS

- To be sure you receive the correct replacement parts, kits, or accessories, always give all of the information requested in the chart below.
- Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
- Order all parts from your nearest Graco distributor.

6 digit Part Number	Qty	Part Description

PARTS DRAWING

Model 222-790, Series B Displacement Pump
Includes items 1-42



PARTS LIST

Model 222-790, Series B Displacement Pump

Includes items 1-42

REF NO.	PART NO.	DESCRIPTION	QTY
1	184-041	ROD, displacement; sst	1
2	184-039	NUT, packing; carbon steel	1
3	109-302**	V-PACKING;PTFE®	2
4	184-058**	GLAND, female; sst	1
5	109-252**	V-PACKING; UHMWPE	3
6	184-126**	GLAND, male; sst	1
8	184-037	NIPPLE, outlet; M30 x 1.5(m); 3/4 npt(m); carbon steel	1
9	110-135*	O-RING;PTFE®	1
10	184-038	HOUSING, outlet; ductile iron	1
11	109-205*	O-RING;PTFE®	2
12	184-040	CYLINDER, pump; sst	1
13	184-042	PISTON; alloy steel	1
14	184-043	GUIDE, piston; alloy steel	1
15	184-053*	SEAL, piston; UHMWPE	1
16	184-052	SEAT, piston; alloy steel	1
17	184-044	HOUSING, intake valve; ductile iron	1
18	184-493	NUT, packing, intake valve; carbon steel	1
19	184-050	VALVE BODY, intake; alloy steel	1
20	184-049*	SEAL, intake valve;PTFE®	1
21	187-860*	SEAL; acetal	1
22	184-046	SEAT, intake valve; alloy steel	1
23	187-859	CYLINDER, intake; ductile iron	1
24	187-858	ROD, priming piston; sst	1
25	184-051	PISTON, priming; carbon steel	1
30	184-121	NUT, priming piston; alloy steel	1
31	184-122	GUIDE, priming piston; alloy steel	1
33	184-124	SPACER, piston; sst	1
35	206-256	VALVE, bleeder; carbon steel	1
42	184-469	SEAL, intake valve; UHMWPE	1

* Supplied in Seal Repair Kit 222-773.

** Supplied in Throat Packing Repair Kit 222-774.

222-773 SEAL REPAIR KIT

Must be purchased separately. Consists of:

Ref No.	Qty
9	1
11	2
15	1
20	1
21	1

222-774 THROAT PACKING REPAIR KIT

Must be purchased separately. Consists of:

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

222-793 INTAKE SEAT REPAIR KIT

To replace the intake seat and seal.

Must be purchased separately. Consists of:

Ref No.	Qty
19	1
20	1
21	1
22	1
42	1

222-775 THROAT PACKING CONVERSION KIT

To convert the pump throat to allPTFE packings.

Must be purchased separately. Consists of:

Ref No.	Qty
3	5
4	1
6	1

222-777 PRESIDENT MOUNTING KIT

To mount Displacement Pump 222-790 to a President Air Motor, Model 207-352.

Must be purchased separately. Includes instructions.

Consists of:

Part No.	Description	Qty
184-076	ROD, tie	3
184-141	PLATE, adapter	1
184-142	ROD, adapter	1
109-453	SCREW, cap, socket hd	3
184-059	NUT, coupling	1
184-128	COLLAR, coupling	2
109-209	NUT, lock	3
101-946	PIN, cotter	1

HOW TO ORDER PARTS

- To be sure you receive the correct replacement parts, kits, or accessories, always give all of the information requested in the chart below.
- Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
- Order all parts from your nearest Graco distributor.

6 digit Part Number	Qty	Part Description

SERVICE INFORMATION

Listed below by the assembly changed are Old, New, and Added parts.

Assembly Changed	Status	Ref No.	Part No.	Name
Displ. Pump 222-790, to Series B	Old		184-048	Packing Nut
	New	18	184-493	Packing Nut
	Old		184-169	Seal
	New	21	187-860	Seal
	Old		184-163	Cylinder
	New	23	187-859	Cylinder
	Old		184-047	Rod
	New	24	187-858	Rod
	Added	42	184-469	Seal

INTERCHANGEABILITY NOTE: New parts replace the Old parts listed directly above them.

ACCESSORIES

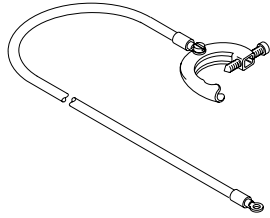
USE GENUINE GRACO PARTS AND ACCESSORIES

Must be purchased separately.

GROUNDING CLAMP 103-538

GROUND WIRE 208-950

7.6 m (25 ft) long,
1.5 mm² (12 gauge)



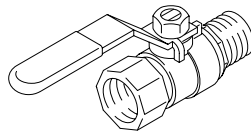
BLEED-TYPE MASTER AIR VALVE

21 bar (300 psi) MAXIMUM WORKING PRESSURE

107-141 3/4 npt(m) inlet x 3/4 npt(f) outlet

107-142 1/2 npt(m) inlet x 1/2 npt(f) outlet

Relieves air trapped in the air line between the pump air inlet and this valve when closed.

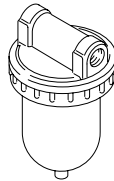


AIR LINE FILTER

17.5 bar (250 psi) MAXIMUM WORKING PRESSURE

106-149 1/2 npt(f) inlet and outlet

106-150 3/4 npt(f) inlet and outlet



AIR LINE LUBRICATOR

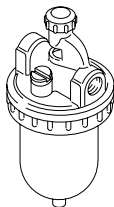
17.5 bar (250 psi) MAXIMUM WORKING PRESSURE

214-848 0.24 liter (8 oz) bowl capacity.

1/2 npt(f) inlet and outlet

214-849 0.48 liter (16 oz) bowl capacity.

3/4 npt(f) inlet and outlet



AIR REGULATOR

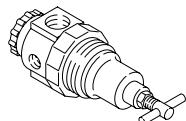
21 bar (300 psi) MAXIMUM WORKING PRESSURE

104-266 For President and Monark pumps.

0-18 bar (0-250 psi) Regulated Pressure Range; 1/2 npt(f) inlet and outlet.

206-197 For Senator and Bulldog pumps.

0-9 bar (0-125 psi) Regulated Pressure Range; 1/2 npt(f) inlet and outlet.



AIR PRESSURE REGULATOR KITS

Kits include air regulator and gauge, bleed-type master air valve, manifold with swivel inlet, and attaching parts.

Model 205-712 (Shown)

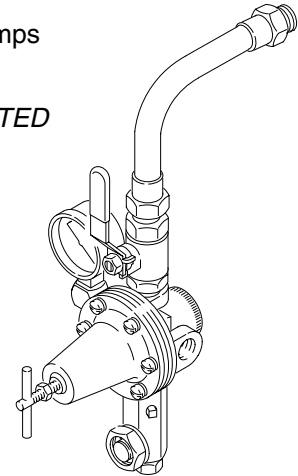
For Senator and Bulldog Pumps

21 bar (300 psi) MAXIMUM

WORKING PRESSURE

0-9 bar (0-125 psi) REGULATED

PRESSURE RANGE



Model 223-815

For Monark and President Pumps

21 bar (300 psi) MAXIMUM

WORKING PRESSURE

0-18 bar (0-250 psi)

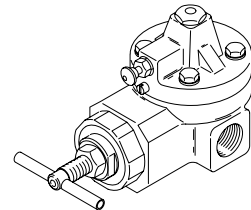
REGULATED PRESSURE RANGE

0764

PUMP RUNAWAY VALVE 215-362

12 bar (180 psi) MAXIMUM WORKING PRESSURE

Shuts off air supply to the pump if the pump accelerates beyond the pre-adjusted setting due to an empty supply container, interrupted fluid supply to the pump, or excessive cavitation. 3/4 npt(f) inlet and outlet.



GROUNDED 19 mm (3/4 in.) BUNA-N AIR HOSE

12 bar (175 psi) MAXIMUM WORKING PRESSURE

Part No.	ID	Length	Thd. Size
208-610	19 mm (3/4")	1.8 m (6 ft)	3/4 npt(m)
205-548	19 mm (3/4")	4.5 m (15 ft)	3/4 npt(m)
208-611	19 mm (3/4")	7.6 m (25 ft)	3/4 npt(m)
208-612	19 mm (3/4")	15.2 m (50 ft)	3/4 npt(m)

GROUNDED 13 mm (1/2 in.) BUNA-S AIR HOSE

12 bar (175 psi) MAXIMUM WORKING PRESSURE

Part No.	ID	Length	Thd. Size
205-418	13 mm (1/2")	1.8 m (6 ft)	1/2 npt(m)
205-216	13 mm (1/2")	4.5 m (15 ft)	1/2 npt(m)
205-273	13 mm (1/2")	7.6 m (25 ft)	1/2 npt(m)
208-594	13 mm (1/2")	15.2 m (50 ft)	1/2 npt(m)

ACCESSORIES

USE GENUINE GRACO PARTS AND ACCESSORIES

Must be purchased separately.

NYLON FLUID HOSE

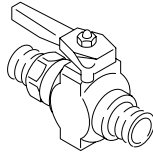
184-138 3/4 npt (mbe); 4.8 m (15 ft) long
276 bar (4000 psi) **MAXIMUM WORKING PRESSURE**

184-139 1/2 npt (mbe); 1.5 m (5 ft) long
184-156 1/2 npt (mbe); 6.1 m (20 ft) long
350 bar (5000 psi) **MAXIMUM WORKING PRESSURE**

FLUID DRAIN VALVE

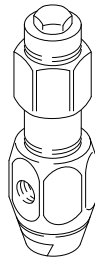
350 bar (5000 psi) **MAXIMUM WORKING PRESSURE**
Open to relieve fluid pressure in hose and gun/valve.

210-657 1/4 npt (mbe)
210-658 3/8 npt (mbe)
210-659 1/4 npt x 3/8 npt (mbe)



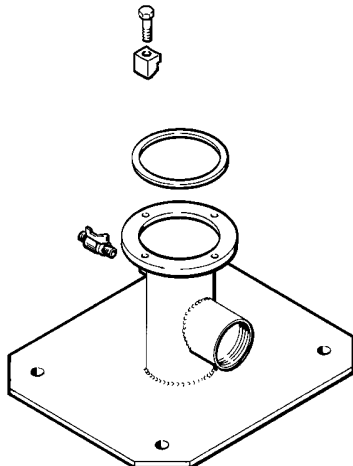
FLUID REGULATOR 903-958

350 bar (5000 psi) **MAXIMUM WORKING PRESSURE**
Regulates fluid pressure to the gun or dispensing valve, and dampens pressure surges. Spring operated, for highly viscous fluids. 3/4 npt(f) inlet, two 3/4 npt(f) outlets. See instruction manual 307-517.



FLOOR STAND KIT 222-780

Provides secure floor mounting for pump when used with bulk fluid containers. 3" npt fluid inlet. Includes floor stand, ball valve, pump mounting kit 222-776 and instructions.



200 LITER (55 gallon) RAM 223-634

For extruding highly viscous fluids from open 200 liter (55 gallon) drums. Requires pump mounting kit 222-776.

200 LITER (55 gallon) INDUCTOR 222-635

Assists pumping of medium viscosity fluids from open 200 liter (55 gallon) drums. Requires pump mounting kit 222-776.

PUMP MOUNTING KIT 222-776

Allows mounting of pump on 223-634 Ram, 222-780 Floor Stand, and 222-635 Inductor.

SINGLE POST 19 LITER (5 gallon) RAM 222-781

For extruding highly viscous fluids from 19 liter (5 gallon) pails. Use with wiper plate 222-812.

PNEUMATIC ELEVATOR CART 224-137

Portable cart for use with Monark and President pumps when pumping from 19 liter (5 gallon) pails. Pneumatic elevator raises pump from pail. Requires wiper plate 222-812 and Cart Accessory Kit 224-376.

CART ACCESSORY KIT 224-376

Allows mounting of Monark or President Pump on 224-137 Pneumatic Elevator Cart.

19 LITER (5 GAL.) WIPER PLATE 222-812

For use with 19 liter (5 gal.) rams and pneumatic elevator cart. Applies pressure on surface of highly viscous fluids, to force fluid into the pump intake and assist priming.

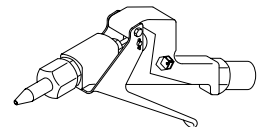
PLASTIC SHIELD KITS

Covers the ram plate, to keep it clean. Package of 10 shields.

223-689 For 19 liter (5 gal.) wiper plate
222-792 For 200 liter (55 gal.) ram plate

EXTRUSION FLO GUN 207-945

420 bar (6000 psi) **MAXIMUM WORKING PRESSURE**
Pistol-type trigger. 1/2 npt(f) inlet.



GUN SWIVELS

420 bar (6000 psi) **MAXIMUM WORKING PRESSURE**
To connect the fluid hose to the gun, and allow freer gun movement. For non-abrasive fluids.

207-947 Straight swivel; 1/2 npt(f) x 1/2 npt(m)
207-948 Zee swivel; 1/2 npt(f) x 1/2 npt(m)

GRACO THROAT SEAL LIQUID

Non-evaporating liquid for wet cup

206-995 0.95 liter (1 quart)
206-996 3.8 liter (1 gallon)

TECHNICAL AND PERFORMANCE DATA (MODEL 222-770)

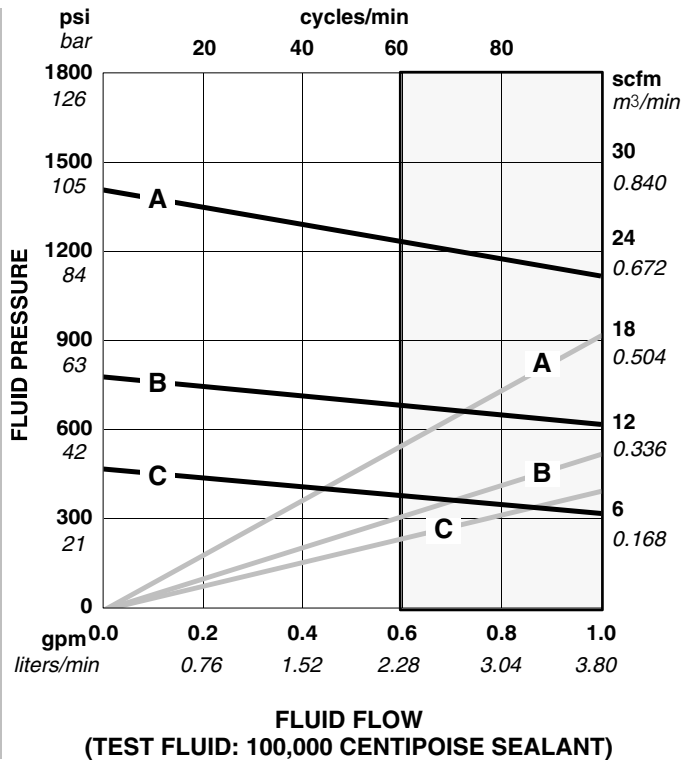
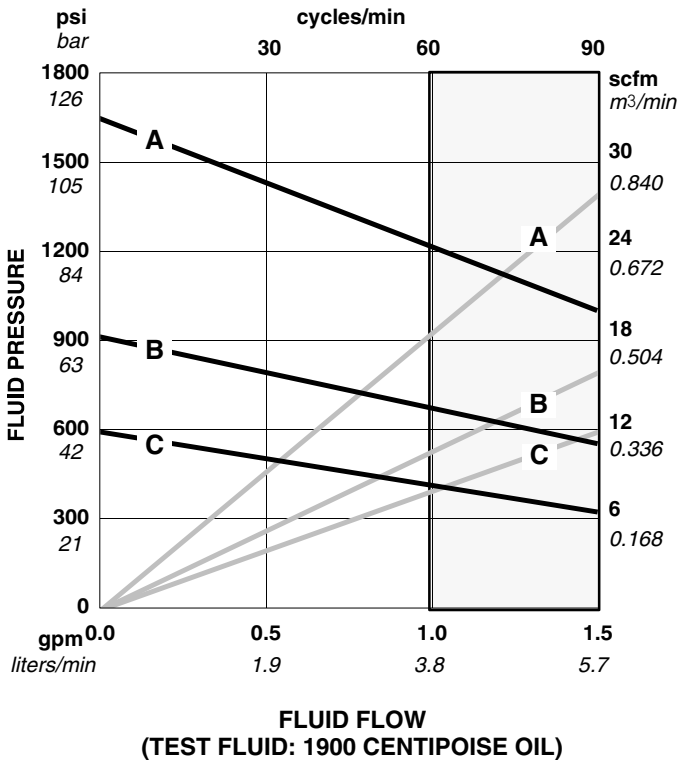
Ratio	10:1 (Monark Air Motor)
Maximum fluid working pressure	125 bar (1800 psi)
Maximum air input pressure	12.5 bar (180 psi)
Pump cycles per 3.8 liters (1 gal.)	60
Recommended pump speed for continuous operation	40 cycles per min
Maximum recommended pump speed	60 cycles per min
Maximum flow	3.8 liters/min (1.0 gpm) at 60 cycles/min
Air motor effective diameter	76 mm (3")
Stroke length	76 mm (3")
Displacement pump effective area	4.5 cm ² (0.697 in. ²)
Maximum pump operating temperature	65.5°C (150°F)
Air inlet size	3/8 npt(f)
Fluid outlet size	3/4 npt(m)
Weight	21 kg (45 lb)
Wetted parts	Carbon Steel; E52100, 41L40, and 4140 Alloy Steel; Acetal; 304, 316 and 17-4 PH Grades of Stainless Steel; Ductile Iron; Zinc and Nickel Plating; PTFE®; Ultra-High Molecular Weight Polyethylene

PTFE

KEY: Fluid Outlet Pressure – Black Curves
Air Consumption – Gray Curves

A 12.5 bar (180 psi) Air Pressure
B 7 bar (100 psi) Air Pressure
C 4.9 bar (70 psi) Air Pressure

NOTE: Recommended pump speed for continuous operation: 40 cpm
Maximum recommended pump speed (to shaded area): 60 cpm



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

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

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

1. Locate desired flow along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve (gray). Follow right to scale to read air consumption.

TECHNICAL AND PERFORMANCE DATA (MODEL 222-768)

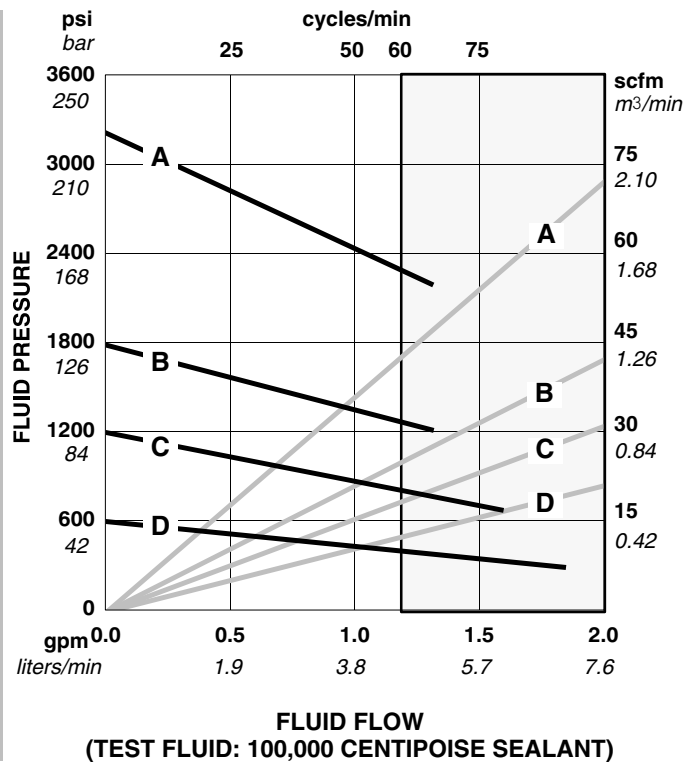
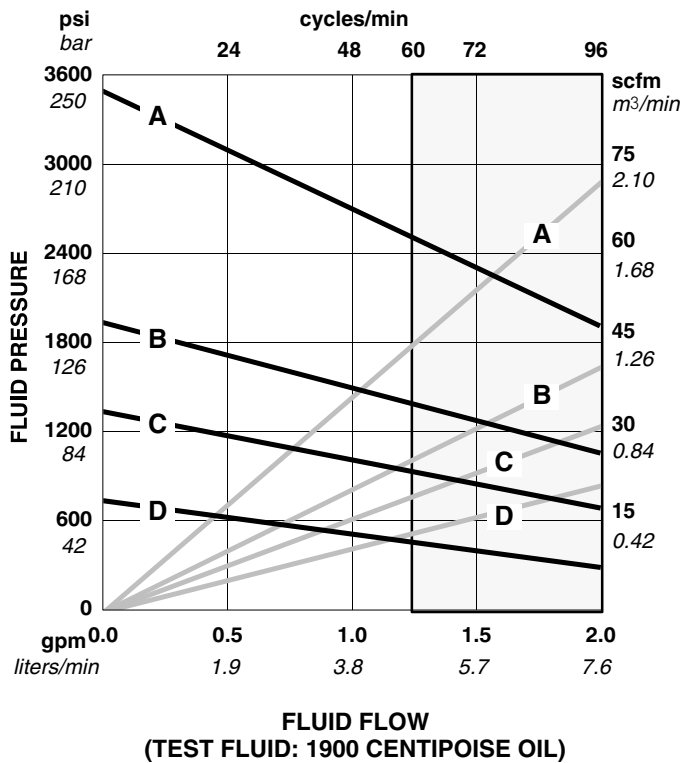
Ratio	20:1 (President Air Motor)
Maximum fluid working pressure	250 bar (3600 psi)
Maximum air input pressure	12.5 bar (180 psi)
Pump cycles per 3.8 liters (1 gal.)	48
Recommended pump speed for continuous operation	40 cycles per min
Maximum recommended pump speed	60 cycles per min
Maximum flow	4.5 liters/min (1.2 gpm) at 60 cycles/min
Air motor effective diameter	108 mm (4.25")
Stroke length	102 mm (4")
Displacement pump effective area	4.5 cm ² (0.697 in. ²)
Maximum pump operating temperature	65.5°C (150°F)
Air inlet size	1/2 npt(f)
Fluid outlet size	3/4 npt(m)
Weight	22.7 kg (50 lb)
Wetted parts	Carbon Steel; E52100, 41L40, and 4140 Alloy Steel; Acetal; 304, 316 and 17-4 PH Grades of Stainless Steel; Ductile Iron; Zinc and Nickel Plating; PTFE®; Ultra-High Molecular Weight Polyethylene

PTFE

KEY: Fluid Outlet Pressure – Black Curves
Air Consumption – Gray Curves

- A** 12.5 bar (180 psi) Air Pressure
- B** 7 bar (100 psi) Air Pressure
- C** 4.9 bar (70 psi) Air Pressure
- D** 2.8 bar (40 psi) Air Pressure

NOTE: Recommended pump speed for continuous operation: 40 cpm
Maximum recommended pump speed (to shaded area): 60 cpm



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

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

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

1. Locate desired flow along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve (gray). Follow right to scale to read air consumption.

TECHNICAL AND PERFORMANCE DATA (MODEL 222-769)

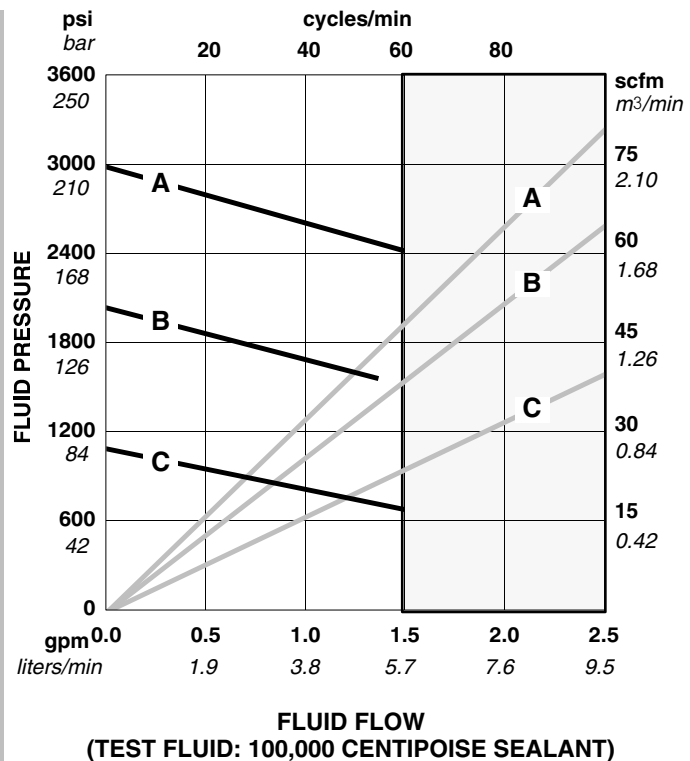
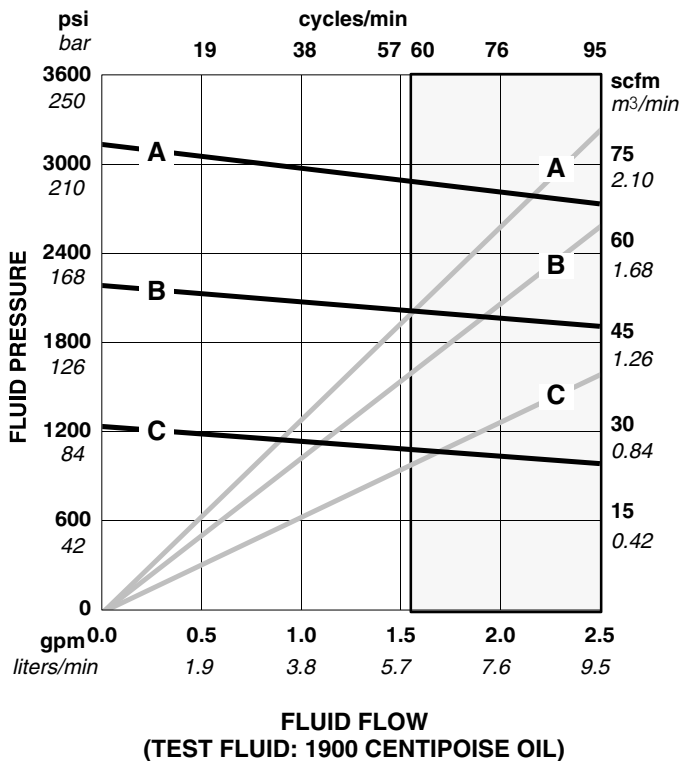
Ratio	34:1 (Standard Senator Air Motor)
Maximum fluid working pressure	238 bar (3400 psi)
Maximum air input pressure	7 bar (100 psi)
Pump cycles per 3.8 liters (1 gal.)	38
Recommended pump speed for continuous operation	40 cycles per min
Maximum recommended pump speed	60 cycles per min
Maximum flow	6 liters/min (1.6 gpm) at 60 cycles/min
Air motor effective diameter	146 mm (5.75")
Stroke length	120 mm (4.7")
Displacement pump effective area	4.5 cm ² (0.697 in. ²)
Maximum pump operating temperature	65.5°C (150°F)
Air inlet size	3/4 npsm(f)
Fluid outlet size	3/4 npt(m)
Weight	45.5 kg (100 lb)
Wetted parts	Carbon Steel; E52100, 41L40, and 4140 Alloy Steel; Acetal; 304, 316 and 17-4 PH Grades of Stainless Steel; Ductile Iron; Zinc and Nickel Plating; PTFE®; Ultra-High Molecular Weight Polyethylene

PTFE

KEY: Fluid Outlet Pressure – Black Curves
Air Consumption – Gray Curves

A 7 bar (100 psi) Air Pressure
B 4.9 bar (70 psi) Air Pressure
C 2.8 bar (40 psi) Air Pressure

NOTE: Recommended pump speed for continuous operation: 40 cpm
Maximum recommended pump speed (to shaded area): 60 cpm



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

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

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

1. Locate desired flow along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve (gray). Follow right to scale to read air consumption.

TECHNICAL AND PERFORMANCE DATA (MODEL 224-660)

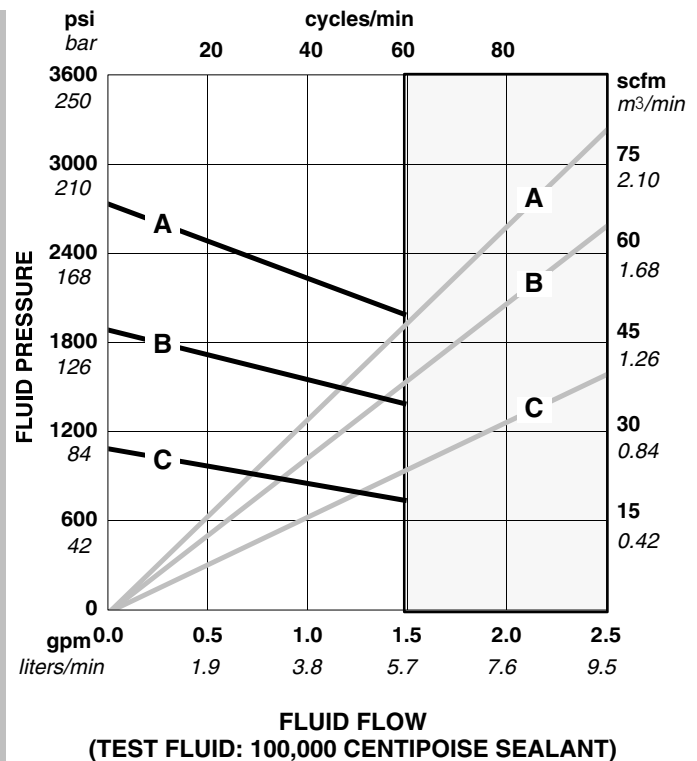
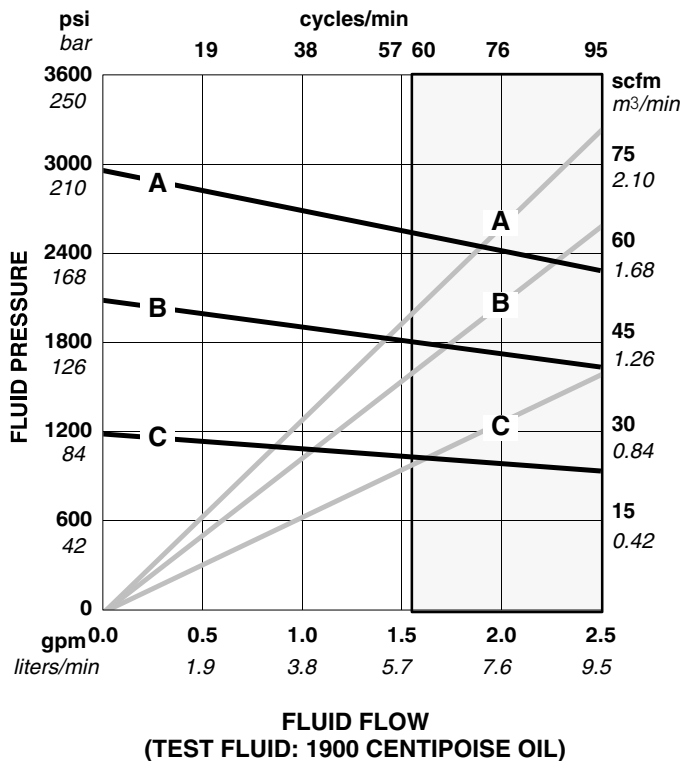
Ratio	34:1 (Quiet Senator Air Motor)
Maximum fluid working pressure	238 bar (3400 psi)
Maximum air input pressure	7 bar (100 psi)
Pump cycles per 3.8 liters (1 gal.)	38
Recommended pump speed for continuous operation	40 cycles per min
Maximum recommended pump speed	60 cycles per min
Maximum flow	6 liters/min (1.6 gpm) at 60 cycles/min
Air motor effective diameter	146 mm (5.75")
Stroke length	120 mm (4.7")
Displacement pump effective area	4.5 cm ² (0.697 in. ²)
Maximum pump operating temperature	65.5°C (150°F)
Air inlet size	3/4 npsm(f)
Fluid outlet size	3/4 npt(m)
Weight	45.5 kg (100 lb)
Wetted parts	Carbon Steel; E52100, 41L40, and 4140 Alloy Steel; Acetal; 304, 316 and 17-4 PH Grades of Stainless Steel; Ductile Iron; Zinc and Nickel Plating; PTFE®; Ultra-High Molecular Weight Polyethylene

PTFE

KEY: Fluid Outlet Pressure – Black Curves
Air Consumption – Gray Curves

A 7 bar (100 psi) Air Pressure
B 4.9 bar (70 psi) Air Pressure
C 2.8 bar (40 psi) Air Pressure

NOTE: Recommended pump speed for continuous operation: 40 cpm
Maximum recommended pump speed (to shaded area): 60 cpm



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

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

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

1. Locate desired flow along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve (gray). Follow right to scale to read air consumption.

TECHNICAL AND PERFORMANCE DATA (MODEL 222-778)

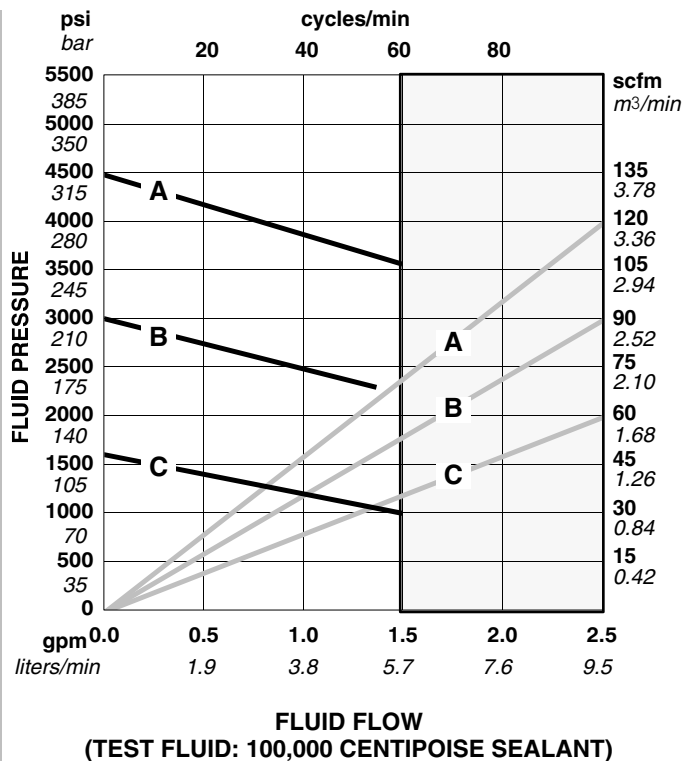
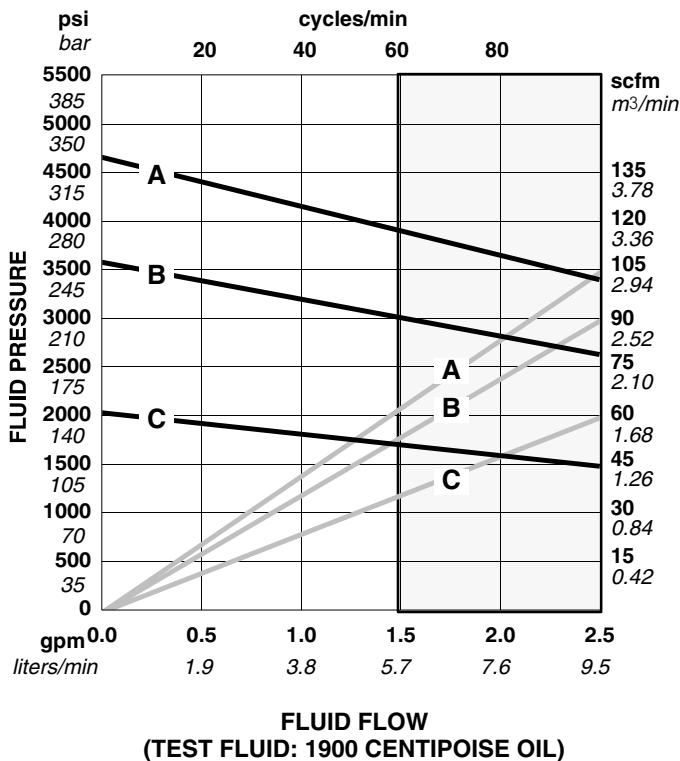
Ratio	55:1 (Standard Bulldog Air Motor)
Maximum fluid working pressure	347 bar (4950 psi)
Maximum air input pressure	6.3 bar (90 psi)
Pump cycles per 3.8 liters (1 gal.)	40
Recommended pump speed for continuous operation	40 cycles per min
Maximum recommended pump speed	60 cycles per min
Maximum flow	5.7 liters/min (1.5 gpm) at 60 cycles/min
Air motor effective diameter	146 mm (5.75")
Stroke length	120 mm (4.7")
Displacement pump effective area	4.5 cm ² (0.697 in. ²)
Maximum pump operating temperature	65.5°C (150°F)
Air inlet size	3/4 npsm(f)
Fluid outlet size	3/4 npt(m)
Weight	45.5 kg (100 lb)
Wetted parts	Carbon Steel; E52100, 41L40, and 4140 Alloy Steel; Acetal; 304, 316 and 17-4 PH Grades of Stainless Steel; Ductile Iron; Zinc and Nickel Plating; PTFE®; Ultra-High Molecular Weight Polyethylene

PTFE

KEY: Fluid Outlet Pressure – Black Curves
Air Consumption – Gray Curves

A 6.3 bar (90 psi) Air Pressure
B 4.9 bar (70 psi) Air Pressure
C 2.8 bar (40 psi) Air Pressure

NOTE: Recommended pump speed for continuous operation: 40 cpm
Maximum recommended pump speed (to shaded area): 60 cpm



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

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

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

1. Locate desired flow along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve (gray). Follow right to scale to read air consumption.

TECHNICAL AND PERFORMANCE DATA (MODEL 222-813)

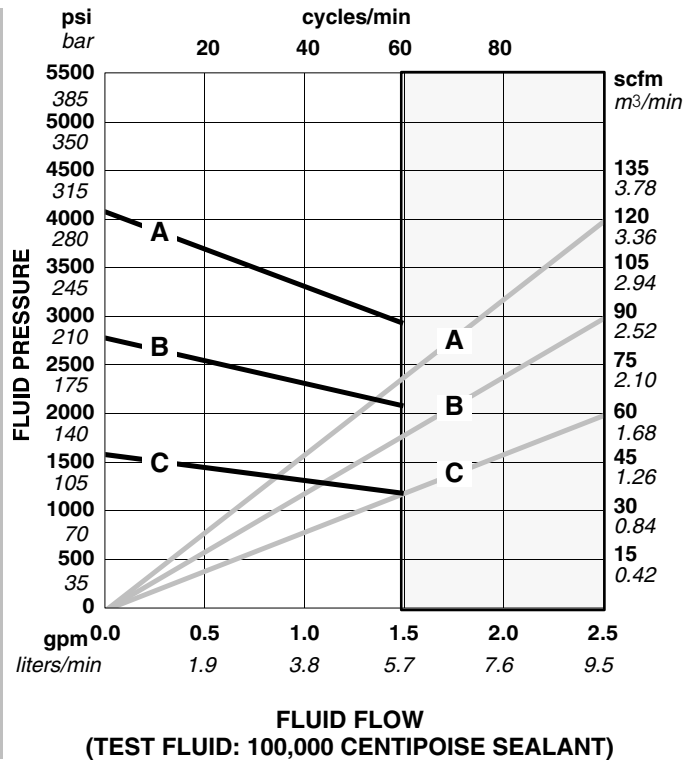
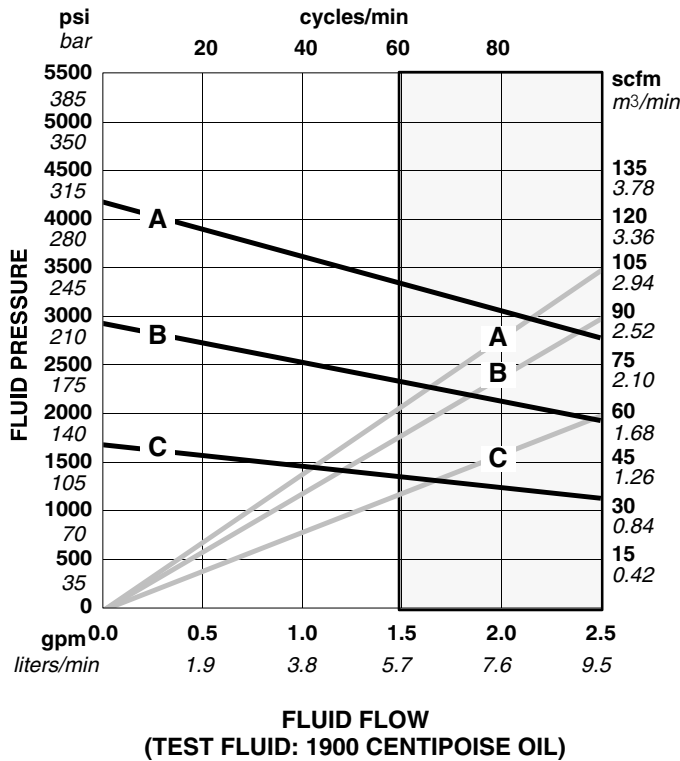
Ratio	55:1 (Quiet Bulldog Air Motor)
Maximum fluid working pressure	347 bar (4950 psi)
Maximum air input pressure	6.3 bar (90 psi)
Pump cycles per 3.8 liters (1 gal.)	40
Recommended pump speed for continuous operation	40 cycles per min
Maximum recommended pump speed	60 cycles per min
Maximum flow	5.7 liters/min (1.5 gpm) at 60 cycles/min
Air motor effective diameter	146 mm (5.75")
Stroke length	120 mm (4.7")
Displacement pump effective area	4.5 cm ² (0.697 in. ²)
Maximum pump operating temperature	65.5°C (150°F)
Air inlet size	3/4 npsm(f)
Fluid outlet size	3/4 npt(m)
Weight	45.5 kg (100 lb)
Wetted parts	Carbon Steel; E52100, 41L40, and 4140 Alloy Steel; Acetal; 304, 316 and 17-4 PH Grades of Stainless Steel; Ductile Iron; Zinc and Nickel Plating; PTFE®; Ultra-High Molecular Weight Polyethylene

PTFE

KEY: Fluid Outlet Pressure – Black Curves
Air Consumption – Gray Curves

A 6.3 bar (90 psi) Air Pressure
B 4.9 bar (70 psi) Air Pressure
C 2.8 bar (40 psi) Air Pressure

NOTE: Recommended pump speed for continuous operation: 40 cpm
Maximum recommended pump speed (to shaded area): 60 cpm



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

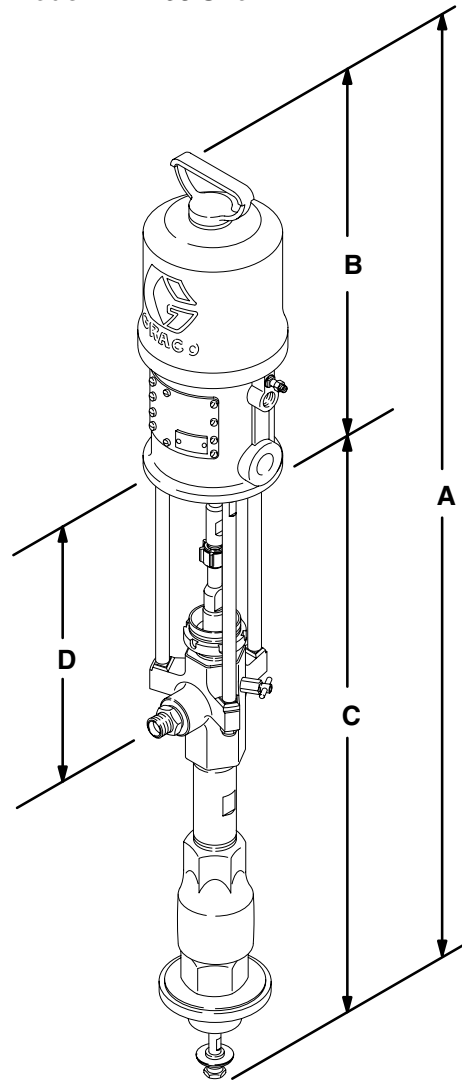
1. Locate desired flow along bottom of chart.
2. Follow vertical line up to intersection with selected fluid outlet pressure curve (black). Follow left to scale to read fluid outlet pressure.

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

1. Locate desired flow along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve (gray). Follow right to scale to read air consumption.

DIMENSIONAL DRAWING

Model 222-768 Shown

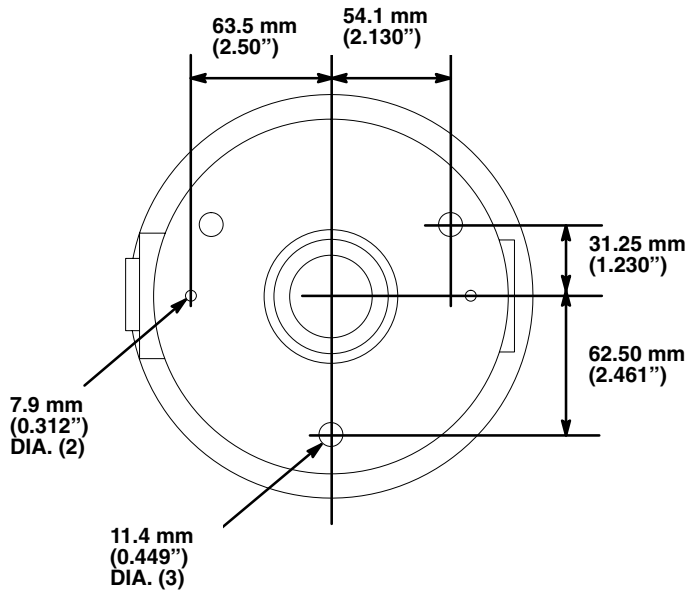


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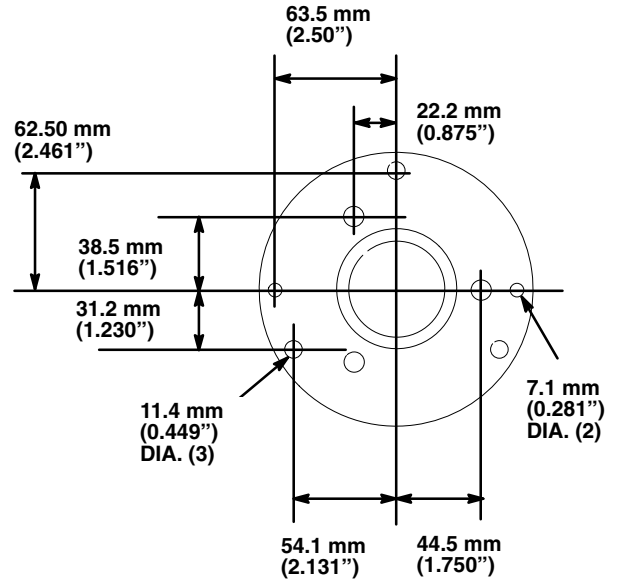
Pump Model	A	B	C	D
222-770	1188 mm (46.75 in.)	365 mm (14.35 in.)	826 mm (32.5 in.)	328 mm (12.9 in.)
222-768	1251 mm (49.25 in.)	418 mm (16.45 in.)	832 mm (32.75 in.)	328 mm (12.9 in.)
222-769, 224-660	1400 mm (55.1 in.)	570 mm (22.4 in.)	830 mm (32.7 in.)	322 mm (12.7 in.)
222-778, 222-813	1400 mm (55.1 in.)	570 mm (22.4 in.)	830 mm (32.7 in.)	322 mm (12.7 in.)

MOUNTING HOLE LAYOUTS

MODEL 222-768 PRESIDENT PUMP



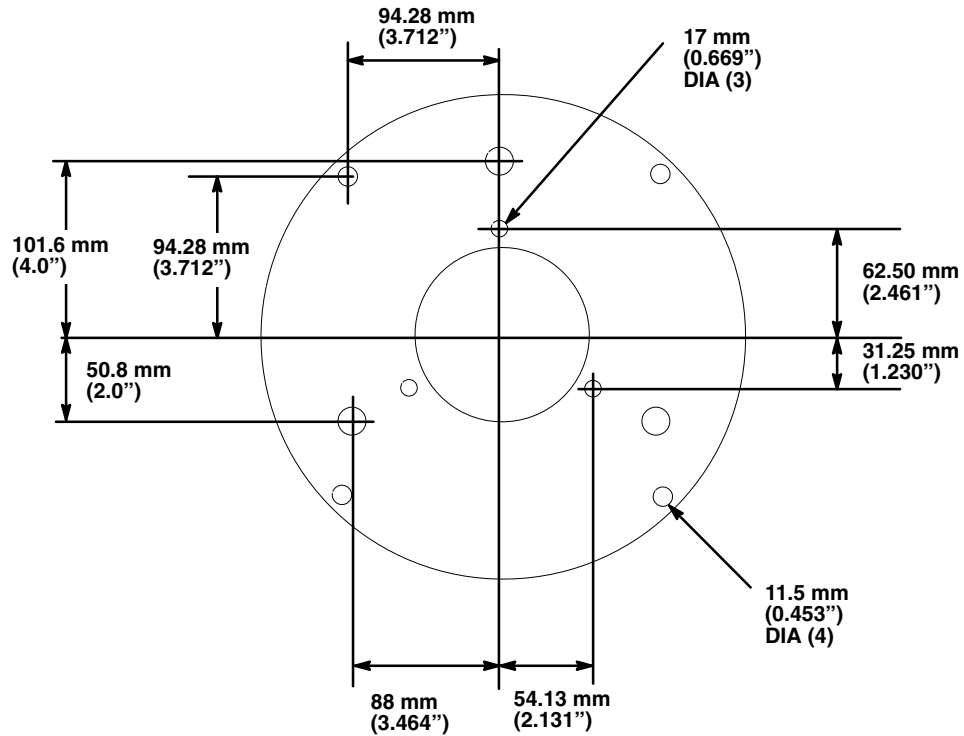
MODEL 222-770 MONARK PUMP



0213

0214

MODEL 222-769 & 224-660 SENATOR, AND MODEL 222-778 & 222-813 BULLDOG PUMPS



0431

THE GRACO WARRANTY AND DISCLAIMERS

WARRANTY

Graco warrants all equipment manufactured by it 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. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment proven 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, 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 with Graco equipment of 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 claim. 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.

DISCLAIMERS AND LIMITATIONS

THE TERMS OF THIS WARRANTY CONSTITUTE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND ARE IN LIEU OF ANY OTHER WARRANTIES (EXPRESS OR IMPLIED), INCLUDING WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY NON-CONTRACTUAL LIABILITIES, INCLUDING PRODUCT LIABILITIES, BASED ON NEGLIGENCE OR STRICT LIABILITY. EVERY FORM OF LIABILITY FOR DIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSS IS EXPRESSLY EXCLUDED AND DENIED. IN NO CASE SHALL GRACO'S LIABILITY EXCEED THE AMOUNT OF THE PURCHASE PRICE. ANY ACTION FOR BREACH OF WARRANTY MUST BE BROUGHT WITHIN TWO (2) YEARS OF THE DATE OF SALE.

EQUIPMENT NOT COVERED BY GRACO WARRANTY

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ACCESSORIES, EQUIPMENT, MATERIALS, OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motor, 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.

IMPORTANT PHONE NUMBERS

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you: **1-800-328-0211 Toll Free**

FOR TECHNICAL ASSISTANCE, service repair information or assistance regarding the application of Graco equipment: **1-800-543-0339 Toll Free**

Factory Branches: Atlanta, Chicago, Dallas, Detroit, Los Angeles, Mt. Arlington (N.J.)

Subsidiary and Affiliate Companies: Canada; England; Switzerland; France; Germany; Hong Kong; Japan; Korea

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