INSTRUCTIONS–PARTS LIST

GRACO

306–981
Rev P
Supersedes N

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

HYDRA-SPRAY®

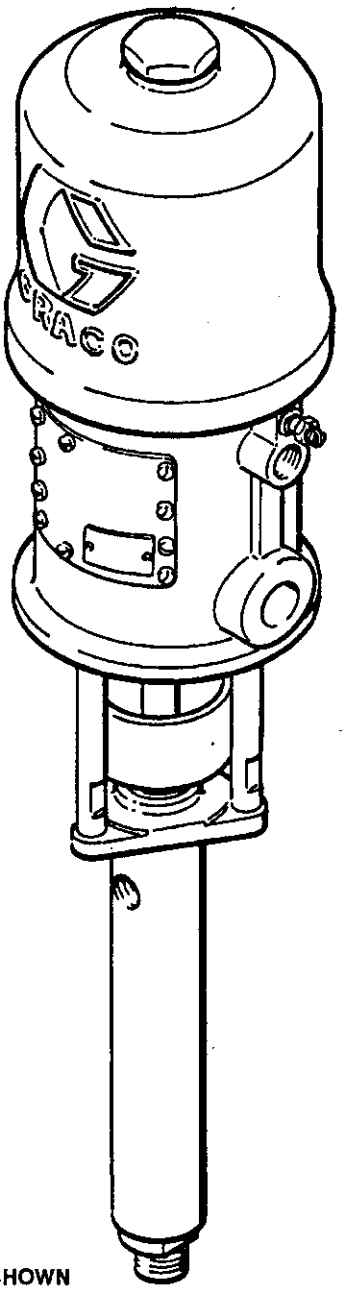
30:1 RATIO PRESIDENT® PUMP

3600 psi (250 bar) MAXIMUM WORKING PRESSURE
120 psi (8 bar) MAXIMUM AIR INPUT PRESSURE

Model 221–075, Series B
55 Gallon (200 Liter) Size, with Severe–Duty Displacement Pump* and Stainless Steel Glands, Intake Housing, Piston Valve and Ball Stop

Model 217–578, Series B
10 Gallon (38 Liter) Size, with Severe–Duty Displacement Pump* and Stainless Steel Glands, Intake Housing, Piston Valve and Ball Stop

* Severe–Duty Displacement Pumps have an abrasion–resistant displacement rod and sleeve. Refer to **Technical Data** on page 18 for Wetted Parts information.



MODEL 217–578 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.

FLUID INJECTION HAZARD

General Safety

This equipment generates very high fluid pressure. Spray from the spray gun, 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 at anyone or at any part of the body. NEVER put hand or fingers over the spray tip.

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 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 Safety Devices

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

Safety Latch

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

Trigger Guard

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

Diffuser

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**, below, 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

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 Safety

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

NEVER wipe off build-up around the spray tip until pressure is fully relieved and the spray gun 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 system, when installing, cleaning or changing spray tips, and whenever you stop spraying.

1. Engage the spray gun 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 safety latch.
5. Hold a metal part of the gun firmly to the side of a grounded metal pail, and trigger the gun to relieve pressure.
6. Engage the gun safety latch.
7. Open the drain valve (required in your system), having a grounded metal container ready to catch the drainage.
8. Leave the drain valve open until you are ready to spray again.

If you suspect that the spray tip 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.

EQUIPMENT MISUSE HAZARD

General Safety

Any misuse of the spray 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 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.

System Pressure

The 30:1 ratio pump develops *3600 psi (250 bar) MAXIMUM WORKING PRESSURE* at 120 psi (8 bar) air pressure. NEVER exceed 120 psi (8 bar) air supply pressure to the pump.

Be sure that all spray 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 page 18. Always read the manufacturer's literature before using fluid or solvent in this pump.

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 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, dust particles and other flammable substances, whether you are spraying 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 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 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 equipment used or located in the spray 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 equipment:

1. *Pump:* use a ground wire and clamp. See Fig 1.
2. *Air and fluid hoses:* use only grounded hoses with a maximum of 500 ft (150 m) combined hose length to ensure grounding continuity. Refer to **Hose Grounding Continuity.**
3. *Air compressor:* follow manufacturer's recommendations.
4. *Spray gun or dispensing valve:* grounding is obtained through connection to a properly grounded fluid hose and pump.
5. *Object being sprayed:* according to your local code.
6. *Fluid supply container:* according to your local code.
7. *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.
8. *To maintain grounding continuity when flushing or relieving pressure,* always hold a metal part of the spray gun 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 12 ga (1.5 mm²) 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.

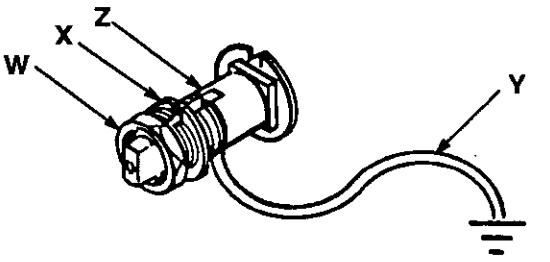


Fig 1

Flushing Safety

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

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.

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 180°F (82°C) or below -40°F (-40°C).

Hose Grounding Continuity

Proper hose grounding continuity is essential to maintaining a grounded spray 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**, above.

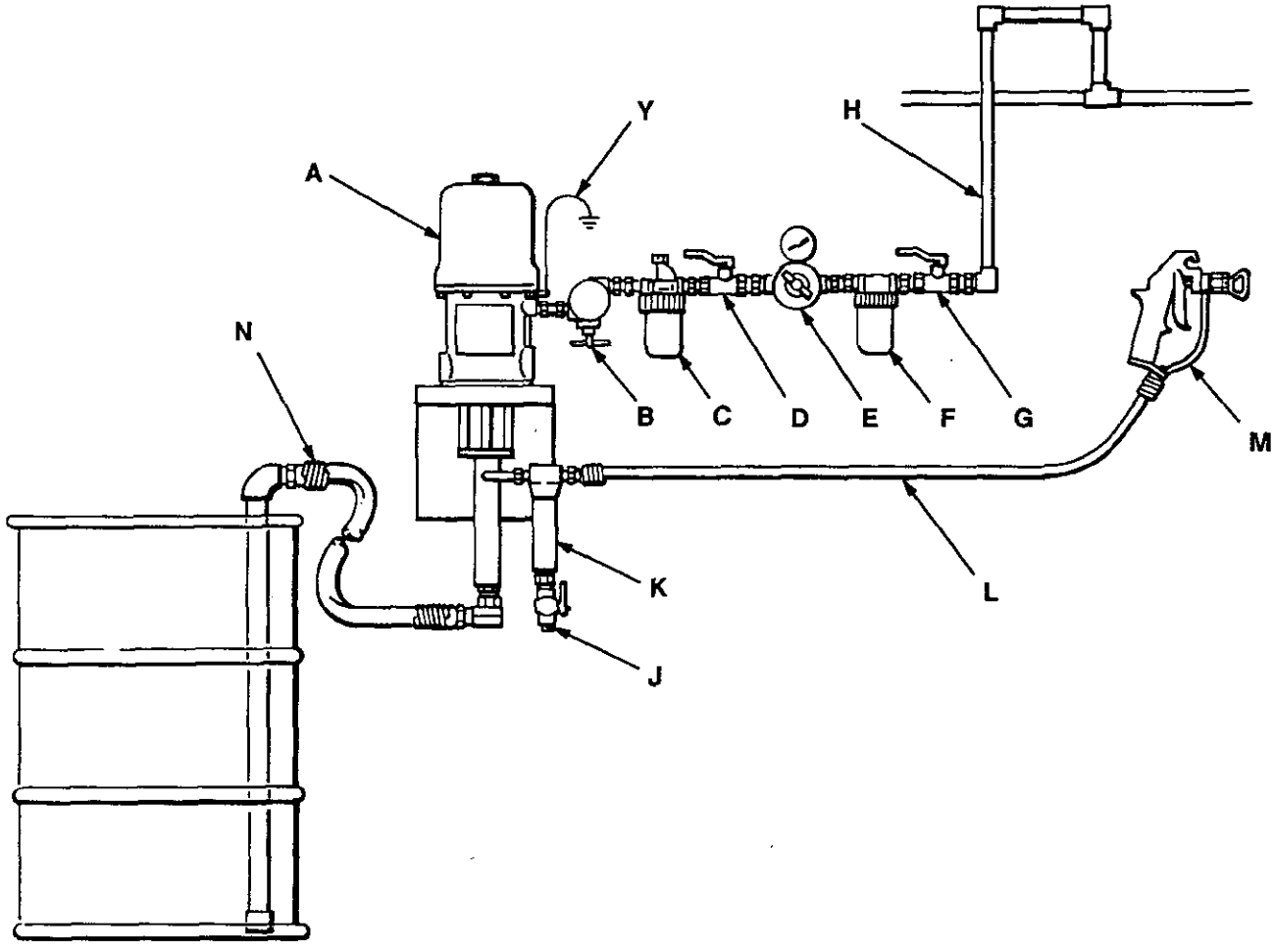
MOVING PARTS HAZARD

Moving parts can pinch or amputate your fingers or other body parts. The air motor piston (located behind the air motor plates) moves when air is supplied to the motor. Therefore, NEVER operate the pump with the air motor plates removed. KEEP CLEAR of moving parts when starting or operating the pump. Before servicing the pump, follow the **Pressure Relief Procedure** on page 2 to prevent the pump from starting accidentally.

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	Pump Runaway Valve
C	Air Line Lubricator
D	Bleed-Type Master Air Valve (required, for pump)
E	Pump Air Regulator
F	Air Line Filter
G	Bleed-Type Master Air Valve (for accessories)
H	Air Supply Hose
J	Fluid Drain Valve (required)
K	Fluid Filter
L	Fluid Supply Hose
M	Spray Gun
N	Fluid Suction Hose
Y	Ground Wire

INSTALLATION

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

See pages 16 and 17 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 for assistance in designing a system to suit your particular needs.

SYSTEM ACCESSORIES

Refer to the Typical Installation drawing on page 4.

WARNING

Two accessories are required in your system: a bleed-type master air valve (D) and a fluid drain valve (J). 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.

Mounting Accessories

Mount the pump (A) to suit the type of installation planned. The pump dimensions and mounting hole layouts are shown on page 19.

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.

Connect a grounded fluid hose (L) to the pump's 3/8 npt(f) fluid outlet. Use of a short whip hose between the main fluid hose (L) and the gun (M) allows freer gun movement.

Connect a fluid suction hose or tube (N) to the pump's 3/4 npt(m) fluid intake.

Use a grounded 1/2 in. I.D. (minimum) air hose (H) to supply air to the pump.

Air Line Accessories

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

A pump runaway valve (B) 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 (C) provides automatic air motor lubrication.

A bleed-type master air valve (D) 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 (E) 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 (F) removes harmful dirt and moisture from the compressed air supply.

A second bleed-type air valve (G) 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 (J) is required in your system to relieve fluid pressure in the hose and gun (see the **WARNING** at left). Install the drain valve pointing down, but so the handle points up when the valve is opened.

A fluid filter (K) filters harmful particles from the fluid.

A spray gun (M) dispenses the fluid. The gun shown in the Typical Installation is an airless spray gun.

GROUNDING

WARNING

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

OPERATION/MAINTENANCE

WARNING

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 system, when installing, cleaning or changing spray tips, and whenever you stop spraying.

1. Engage the spray gun 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 safety latch.
5. Hold a metal part of the gun firmly to the side of a grounded metal pail, and trigger the gun to relieve pressure.
6. Engage the gun safety latch.
7. Open the drain valve (required in your system), having a container ready to catch the drainage.
8. Leave the drain valve open until you are ready to spray again.

If you suspect that the spray tip 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.

WARNING

Moving parts can pinch or amputate your fingers or other body parts. When air is supplied to the motor, the air motor piston (located behind the air motor plates) moves. See Fig. 2. Therefore, NEVER operate the pump with the air motor plates removed.

Flush the Pump Before Using

The pump is tested with lightweight motor 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. If the pump is being used to supply a circulating system, allow the solvent to circulate until the pump is thoroughly flushed.

WARNING

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

Starting and Adjusting the Pump

See the **TYPICAL INSTALLATION** on page 4. Be sure the air regulator (E) and bleed-type master air valve (D) are closed. *DO NOT INSTALL THE SPRAY TIP YET!*

Connect a suction hose (N) to the pump's fluid inlet. Hold a metal part of the spray gun (M) firmly to the side of a grounded metal pail and hold the trigger open. Then open the pump's bleed-type master air valve (D). Now slowly open the air regulator until the pump starts, about 40 psi (3 bar).

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

Follow the **Pressure Relief Procedure Warning** at left, then install the spray tip in the gun.

With the pump and lines primed, and with adequate air pressure and volume supplied, the pump will start and stop as the spray gun is opened and closed. In a circulating system, the pump will run continuously and will speed up or slow down as supply demands until the air supply is shut off.

Use an adequately sized air regulator (E) to control the pump speed and the fluid pressure. See ACCESSORIES on page 16. Always use the lowest air pressure necessary to get the desired results. Higher pressures waste fluid and cause premature wear of the pump packings and spray tip.

WARNING

To reduce the risk of overpressurizing your system, which could result in component rupture and cause serious bodily injury, NEVER exceed 120 psi (8 bar) *MAXIMUM INCOMING AIR PRESSURE* to the pump.

Keep the packing nut/wet-cup (36) filled with Graco Throat Seal Liquid (TSL) or compatible solvent, to help prolong the packing life. Adjust the packing nut weekly so it is just tight enough to prevent leakage; do not overtighten. See Fig. 2. Always follow the **Pressure Relief Procedure Warning** above before adjusting the packing nut.

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 (B), 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 page 16. 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.

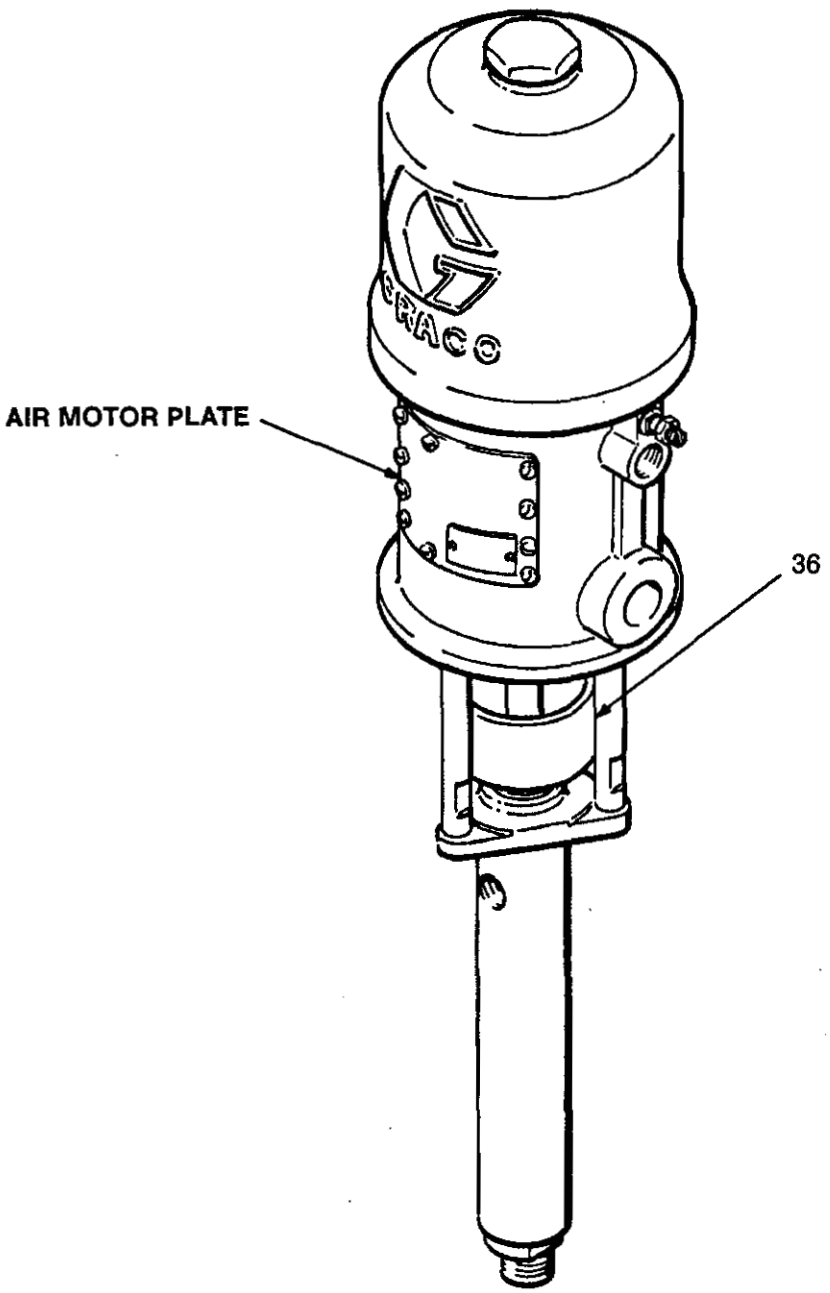


Fig 2

TROUBLESHOOTING CHART

NOTE: CHECK ALL POSSIBLE PROBLEMS AND SOLUTIONS BEFORE DISASSEMBLING PUMP.

PROBLEM	CAUSE	SOLUTION
Pump fails to operate	Restricted line or inadequate air supply	Clear; increase air supply
	Insufficient air pressure; closed or clogged air valves, etc.	Open, clean
	Exhausted fluid supply	Refill; purge all air from pump and fluid lines
	Damaged air valving mechanism; stalling	Service air motor (see 306-982)
	Dried fluid seizure of displacement rod (26)	Clean, check or replace throat packings (18, 23); always stop pump at bottom of stroke and keep wet-cup filled with compatible solvent
Pump operates but output low on both strokes	Restricted line or inadequate air supply	Clear; increase air supply
	Insufficient air pressure; closed or clogged air valves, etc.	Open, clean
	Exhausted fluid supply	Refill; purge all air from pump and fluid lines
	Clogged fluid line, valves, etc.	Clear*
	Packing nut (36) too tight	Loosen (see page 6)
	Loose packing nut or worn throat packings (18, 23)	Tighten packing nut (see page 6); replace throat packings
Pump operates but output low on down stroke	Held open or worn intake valve	Clear; service
Pump operates but output low on up stroke	Held open or worn fluid piston valve or packings (18, 23)	Clear; service
Erratic or accelerated operation	Exhausted fluid supply	Refill; purge all air from pump and fluid lines
	Held open or worn intake valve	Clear; service
	Held open or worn fluid piston valve or packings (18, 23)	Clear; service

- 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 20-40 psi [1.4-2.8 bar]). If the pump starts when the air is turned on, the obstruction is in the fluid hose or gun.

WARNING

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 system, when installing, cleaning or changing spray tips, and whenever you stop spraying.

1. Engage the spray gun 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 safety latch.
5. Hold a metal part of the gun firmly to the side of a grounded metal pail, and trigger the gun to relieve pressure.
6. Engage the gun safety latch.
7. Open the drain valve (required in your system), having a container ready to catch the drainage.
8. Leave the drain valve open until you are ready to spray again.

If you suspect that the spray tip 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.

DISCONNECTING THE DISPLACEMENT PUMP

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 and fluid hoses. Remove the pump from its mounting. Note the relative position of the pump's fluid outlet to the air motor's air inlet.
3. Unscrew the tie rod locknuts (4) from the tie rods (12). Remove the cotter pin (3). Unscrew the displacement rod (26) from the air motor (14) or connecting rod (37, Model 221-075 only). Carefully pull the displacement pump (15) off the air motor (14). See Fig 3.
4. Refer to page 10 for displacement pump service. To service the air motor, refer to the separate air motor manual 306-982, 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 (15) on the tie rods (12). See Fig 3.
2. Screw the locknuts (4) onto the tie rods (12) loosely. Screw the displacement rod (26) into the base of the air motor (14) or the connecting rod (37, Model 221-075 only). Install the cotter pin (3).
3. Mount the pump and reconnect all hoses. Reconnect the ground wire if it was disconnected during repair. Torque the packing nut/wet-cup (36) to 18-20 ft-lb (24-27 N.m). Fill the wet-cup with Graco Throat Seal Liquid or compatible solvent.
4. Tighten the tie rod locknuts (4) evenly, and torque to 20-30 ft-lb (27-41 N.m).
5. Start the pump and run it at about 40 psi (3 bar) air pressure, to check the tie rods for signs of binding. Adjust the tie rods as necessary to eliminate binding.

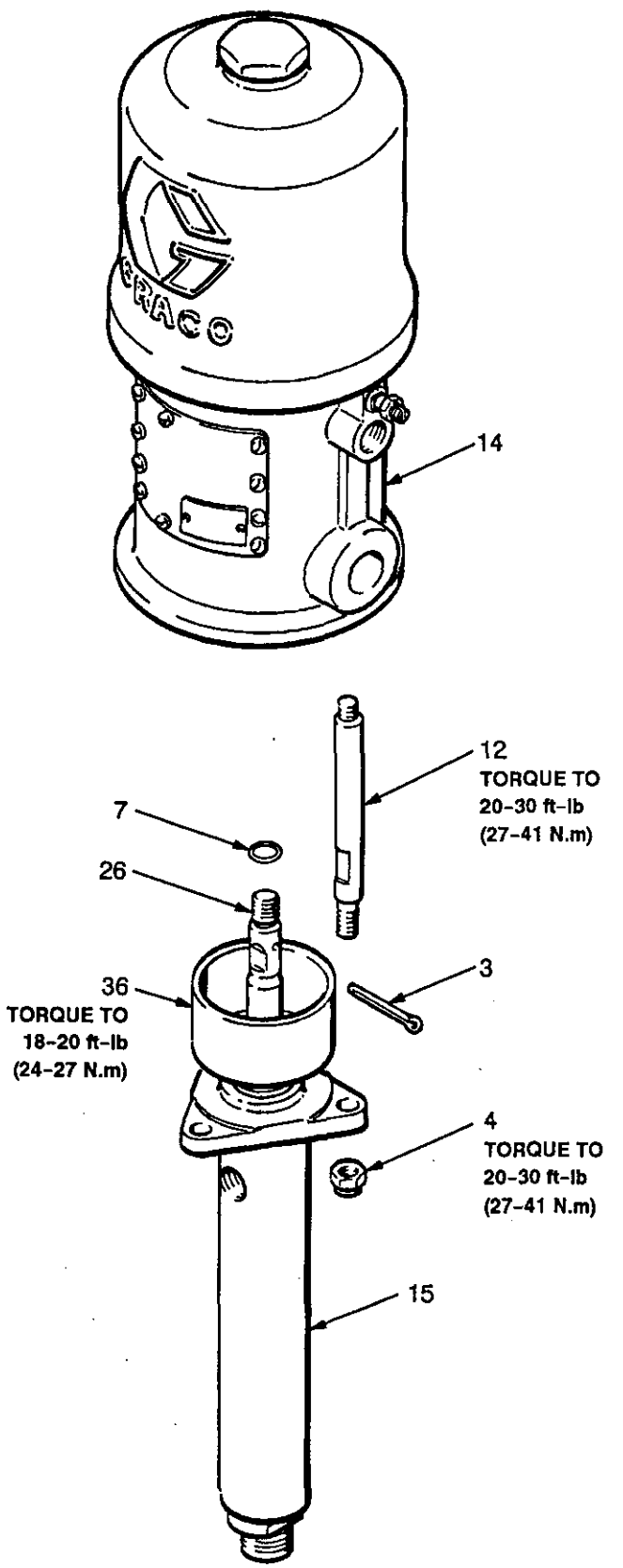


Fig 3

DISPLACEMENT PUMP SERVICE

Disassembly

When disassembling the pump, lay out all removed parts in sequence, to ease reassembly. Refer to Fig 4.

NOTE: Repair Kit 223-675 is available. For the best results, use all the new parts in the kit. Parts included in the kit are denoted with one asterisk, for example (17*).

Clean all the parts thoroughly when disassembling. Check them carefully for damage or wear, replacing parts as needed.

1. Remove the displacement pump from the air motor as explained on page 9.
2. Unscrew the intake valve housing (33) from the outlet housing (35). If it is difficult to remove, squirt penetrating oil around the threads and *gently* tap around the valve housing with a plastic hammer to loosen it. See Fig 4.
3. Remove the ball stop pin (29), o-ring retainer (31), o-ring (30), guide (32) and ball (28) from the intake valve housing (33).
4. Loosen the packing nut (36). Push the displacement rod (26) down as far as possible, then pull it out the bottom of the outlet housing (35).
5. Secure the flats of the displacement rod (26) in a vise. Screw the piston stud (34) out of the rod. Remove the ball (17), retainer (22), packings (18, 23) and glands (24, 25).
6. Remove the packing nut (36), throat packings (18, 23) and glands (24, 25) from the outlet housing (35).
7. Inspect all parts for damage. Clean all parts and threads with a compatible solvent before reassembling. Inspect the polished surfaces of the displacement rod (26) and sleeve (20) for scratches, scoring or other damage, which can cause premature packing wear and leaking. To check, run a finger over the surface or hold the part up to the light at an angle. Be sure the ball seats of the piston (34) and intake valve housing (33) are not chipped or nicked. Replace any worn or damaged parts.

NOTE: If the sleeve (20) needs replacement and is hard to remove, contact your nearest Graco Factory Branch or Graco Technical Service (see back page).

Reassembly

1. Lubricate the throat packings and install them in the outlet housing (35) one at a time as follows, *with the lips of the v-packings facing down:* the male gland (24*), one UHMWPE v-packing (23*), two leather v-packings (18*), one UHMWPE (23*), one leather (18*), one UHMWPE (23*), and the female gland (25*). Install the packing nut (36) loosely. See Fig 4.
2. If you removed the sleeve (20), reinstall it in the outlet housing (35), making sure to replace the gasket (19*). *Be sure the tapered end of the sleeve faces down.*
3. Lubricate the piston packings and install them onto the piston stud (34) one at a time in the following order, *with the lips of the v-packings facing up:* the female gland (25*), one UHMWPE v-packing (23*), two leather v-packings (18*), one UHMWPE (23*), one leather (18*), one UHMWPE (23*), the male gland (24*), and the packing retainer (22). See Fig 4.
4. Use thread sealant on the piston stud. Install the piston ball (17*) on the piston and screw the piston valve assembly into the displacement rod (26). Torque to 65-75 ft-lb (88-102 N.m).
5. Insert the displacement rod (26) into the bottom of the outlet housing (35), being careful not to scratch the sleeve (20). Push the rod straight up until it protrudes from the packing nut (36).
6. Install the ball (28*), guide (32), o-ring (30*), retainer (31), and ball stop pin (29) in the intake valve housing (33). Screw the intake housing into the outlet housing (35). Torque to 75-100 ft-lb (102-136 N.m).
7. Reconnect the displacement pump to the air motor as explained on page 9.

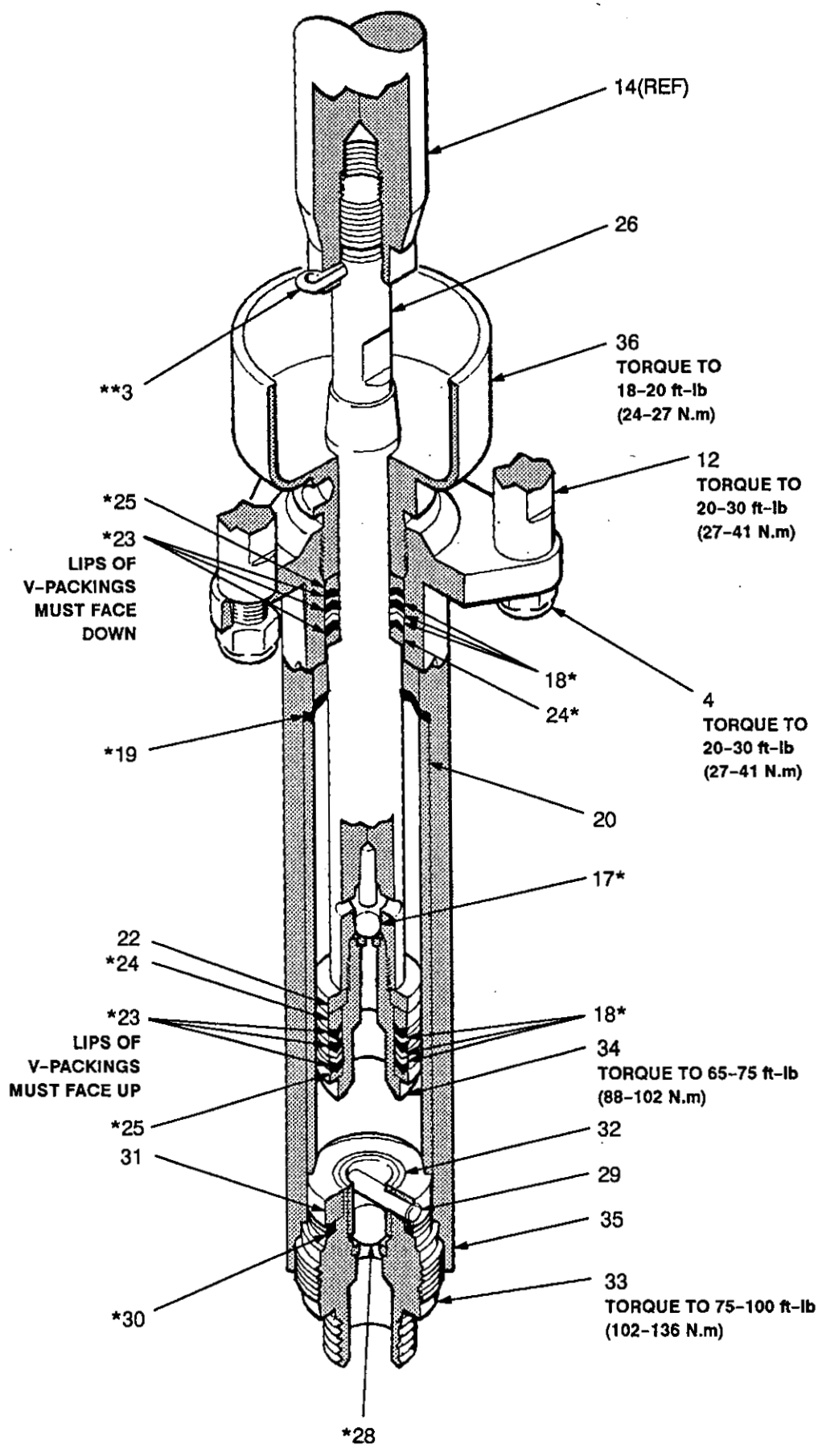
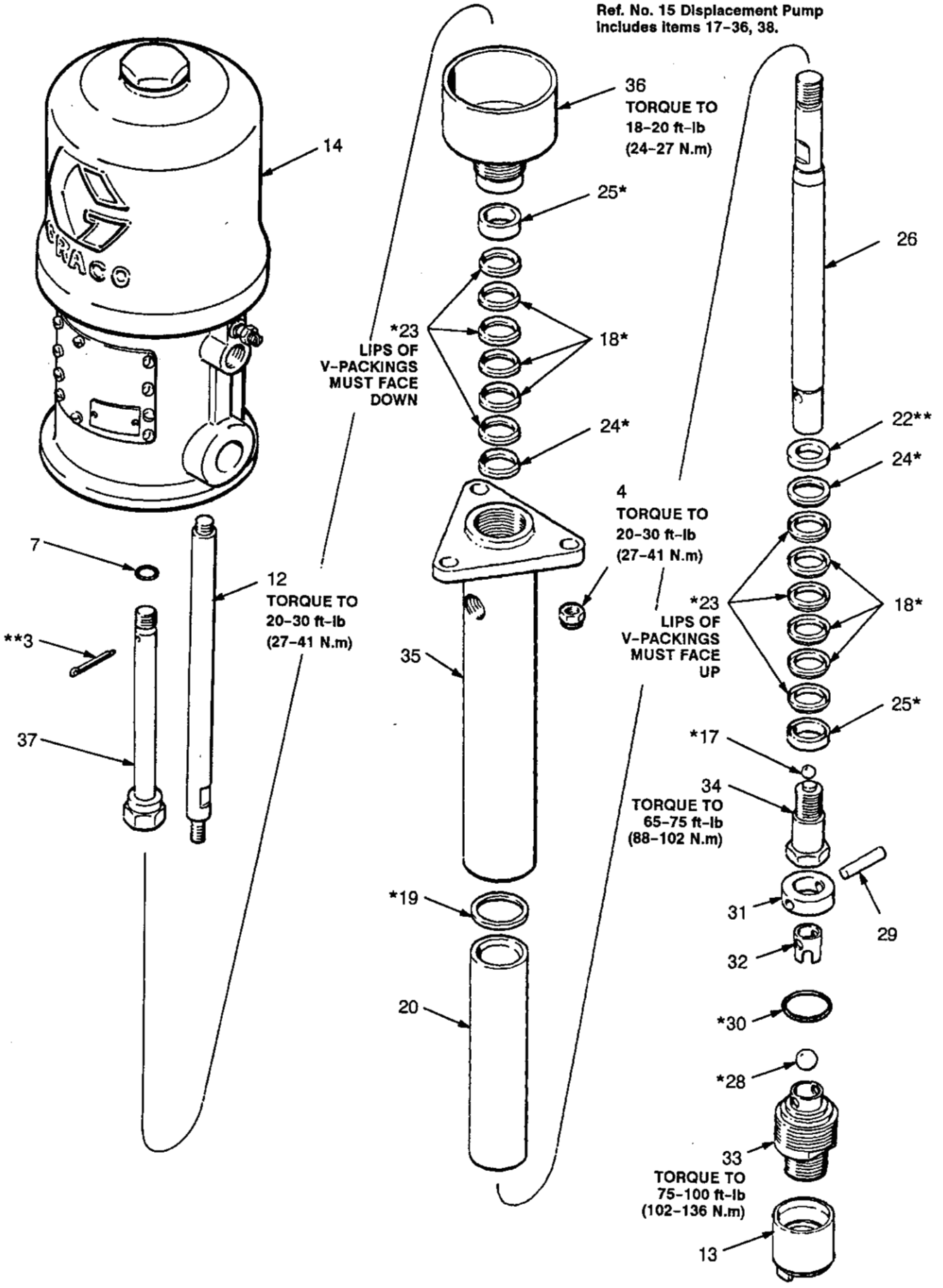

14(REF)
26
**3
36
TORQUE TO
18–20 ft–lb
(24–27 N.m)
12
TORQUE TO
20–30 ft–lb
(27–41 N.m)
*25
*23
LIPS OF
V–PACKINGS
MUST FACE
DOWN
18*
24*
4
TORQUE TO
20–30 ft–lb
(27–41 N.m)
*19
20
17*
22
*24
*23
LIPS OF
V–PACKINGS
MUST FACE UP
18*
34
TORQUE TO 65–75 ft–lb
(88–102 N.m)
*25
32
31
29
35
33
TORQUE TO 75–100 ft–lb
(102–136 N.m)
*30
*28

Fig 4

PARTS DRAWING

Model 221-075, Series B
55 gal. (200 liter) Size
Includes items 3-38



PARTS LIST

Model 221-075, Series B
55 gal. (200 liter) Size
Includes items 3-38

REF NO.	PART NO.	DESCRIPTION	QTY
3	101-946**	PIN, cotter; stainless steel; 0.12" (3.2 mm) x 1.5" (38 mm)	1
4	101-566	NUT, lock; 3/8-16	3
7	156-082	SEAL, o-ring; nitrile rubber	1
12	168-220	ROD, tie; carbon steel; 20" (508 mm), shoulder-to-shoulder	3
13	168-222	TUBE, intake extension; aluminum	1
14	207-352	AIR MOTOR See 306-982 for parts	1
15	223-587	DISPLACEMENT PUMP ASSY Series A Includes items 17-36, 38	1
17	102-119*	. BALL, piston; stainless steel; 0.31" (7.9 mm) dia.	1
18	164-477*	. V-PACKING; leather	6
19	164-480*	. GASKET, flat; Teflon®	1
20	178-902	. SLEEVE, housing; stainless steel	1
22	186-184**	. RETAINER, packing; stainless steel	1
23	108-453*	. V-PACKING; UHMWPE	6
24	186-182*	. GLAND, packing, male; stainless steel	2
25	186-181*	. GLAND, packing, female; stainless steel	2
26	223-589	. ROD, displacement; stainless steel	1
28	101-750*	. BALL, intake; stainless steel; 0.5" (13 mm) dia.	1
29	186-179	. PIN, ball stop; stainless steel	1
30	165-052*	. SEAL, o-ring; Teflon®	1
31	186-183	. RETAINER, o-ring; stainless steel	1
32	186-187	. GUIDE, ball; stainless steel	1
33	223-593	. HOUSING, valve, intake; stainless steel with tungsten carbide seat	1
34	223-565	. STUD, piston; stainless steel with tungsten carbide seat	1
35	207-011	. HOUSING, outlet; carbon steel	1
36	207-731	. PACKING NUT/WET-CUP; carbon steel	1
37	207-698	ROD, connecting; carbon steel	1
38	172-479	TAG, warning (not shown)	1

• *Included in Repair Kit 223-675.*

** *Recommended "tool box" spare parts. Keep on hand to reduce downtime.*

306 and 307 numbers in descriptions refer to separate instruction manuals, supplied.

223-675 REPAIR KIT
(Must be purchased separately)
Consists of:

Ref No.	Qty
17	1
18	6
19	1
23	6
24	2
25	2
28	1
30	1

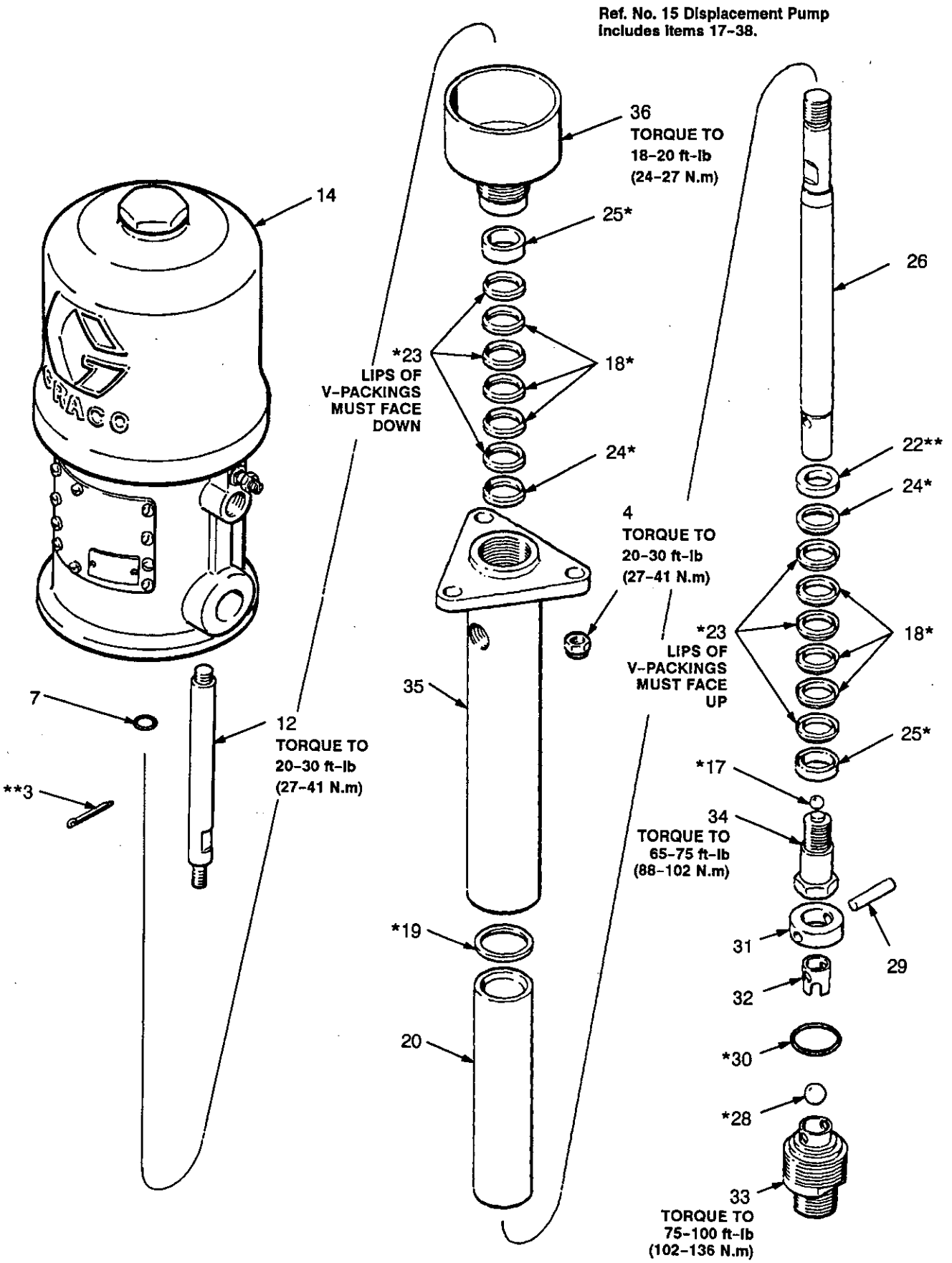
HOW TO ORDER PARTS

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

Model 217-578, Series B
10 gal. (38 liter) Size
Includes items 3-38



PARTS LIST

Model 217-578, Series B
10 gal. (38 liter) Size
Includes items 3-38

REF NO.	PART NO.	DESCRIPTION	QTY
3	101-946**	PIN, cotter; stainless steel; 0.12" (3.2 mm) x 1.5" (38 mm)	1
4	101-566	NUT, lock; 3/8-16	3
7	156-082	SEAL, o-ring; nitrile rubber	1
12	168-221	ROD, tie; carbon steel; 4.5" (114 mm), shoulder-to-shoulder	3
14	207-352	AIR MOTOR See 306-982 for parts	1
15	223-587 Series A	DISPLACEMENT PUMP ASSY Includes items 17-38	1
17	102-119*	. BALL, piston; stainless steel; 0.31" (7.9 mm) dia.	1
18	164-477*	. V-PACKING; leather	6
19	164-480*	. GASKET, flat; Teflon®	1
20	178-902	. SLEEVE, housing; stainless steel	1
22	186-184**	. RETAINER, packing; stainless steel	1
23	108-453*	. V-PACKING; UHMWPE	6
24	186-182*	. GLAND, packing, male; stainless steel	2
25	186-181*	. GLAND, packing, female; stainless steel	2
26	223-589	. ROD, displacement; stainless steel	1
28	101-750*	. BALL, intake; stainless steel; 0.5" (13 mm) dia.	1
29	186-179	. PIN, ball stop; stainless steel	1
30	165-052*	. SEAL, o-ring; Teflon®	1
31	186-183	. RETAINER, o-ring; stainless steel	1
32	186-187	. GUIDE, ball; stainless steel	1
33	223-593	. HOUSING, valve, intake; stainless steel with tungsten carbide seat	1
34	223-565	. STUD, piston; stainless steel with tungsten carbide seat	1
35	207-011	. HOUSING, outlet; carbon steel	1
36	207-731	. PACKING NUT/WET-CUP; carbon steel	1
38	172-479	. TAG, warning (not shown)	1

• *Included in Repair Kit 223-675.*

** *Recommended "tool box" spare parts. Keep on hand to reduce downtime.*

306 and 307 numbers in descriptions refer to separate instruction manuals, supplied.

223-675 REPAIR KIT
(Must be purchased separately)
Consists of:

Ref No.	Qty
17	1
18	6
19	1
23	6
24	2
25	2
28	1
30	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.

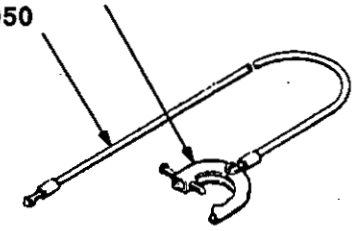
6 digit Part Number	Qty	Part Description

ACCESSORIES

USE GENUINE GRACO PARTS AND ACCESSORIES

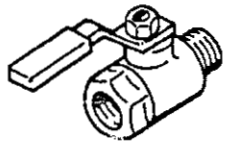
Must be purchased separately.

GROUNDING CLAMP 103-538
GROUND WIRE 208-950
25 ft (7.6 m) long,
12 gauge (1.5 mm²)

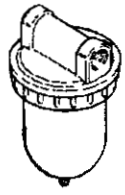


BLEED-TYPE MASTER AIR VALVE
300 psi (21 bar) MAXIMUM WORKING PRESSURE
107-142 1/2 npt(m) inlet x 1/2 npt(f) outlet

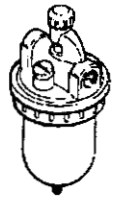
Relieves air trapped in the air line between the pump air inlet and this valve when closed.



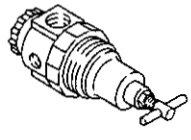
AIR LINE FILTER
250 psi (17.5 bar) MAXIMUM WORKING PRESSURE
106-149 1/2 npt(f) inlet and outlet



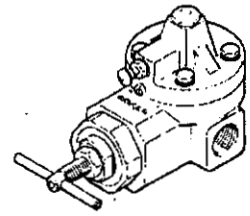
AIR LINE LUBRICATOR
250 psi (17.5 bar) MAXIMUM WORKING PRESSURE
214-848 8 oz (0.24 liter) bowl capacity.
1/2 npt(f) inlet and outlet



AIR REGULATOR
300 psi (21 bar) MAXIMUM WORKING PRESSURE
104-266 0-250 psi (0-18 bar) Regulated Pressure Range; 1/2 npt(f) inlet and outlet.



PUMP RUNAWAY VALVE 215-362
180 psi (12 bar) 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.

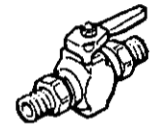


GROUNDED 1/2 in. (13 mm) BUNA-S AIR HOSE
175 psi (12 bar) MAXIMUM WORKING PRESSURE

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

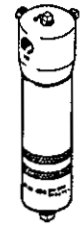
FLUID DRAIN VALVE
5000 psi (350 bar) MAXIMUM WORKING PRESSURE
Open to relieve fluid pressure in hose and gun/valve.

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



FLUID FILTER
5000 psi (350 bar) MAXIMUM WORKING PRESSURE
60 mesh (250 micron) screen.

Model 218-029 Carbon steel bowl and support
Model 223-160 Stainless steel bowl and polyethylene support



GROUNDED NYLON FLUID HOSE
5000 psi (350 bar) MAXIMUM WORKING PRESSURE

Part No.	ID	Length	Thd. Size
214-914	1/4" (6.3 mm)	25 ft (7.6 m)	1/4 npsm(f) swivel
214-915	1/4" (6.3 mm)	50 ft (15.2 m)	1/4 npsm(f) swivel
215-244	3/8" (9.5 mm)	25 ft (7.6 m)	3/8 npt(m)
215-245	3/8" (9.5 mm)	50 ft (15.2 m)	3/8 npt(m)
215-246	3/8" (9.5 mm)	100 ft (30.4 m)	3/8 npt(m)

ACCESSORIES (Continued)

USE GENUINE GRACO PARTS AND ACCESSORIES

Must be purchased separately.

WALL BRACKET 206-778
For mounting the President Pump to a wall.

SUCTION HOSE 214-961
500 psi (35 bar) MAXIMUM WORKING PRESSURE
6 ft (1.8 m) long, coupled 3/4 npt (mbe), neoprene. Spring guard both ends.

55 GAL. (200 LITER) SUCTION TUBE 206-266
Use with Suction Hose 214-961 to draw fluid from a 55 gal. (200 liter) drum.

DRUM COVER AND AGITATOR 207-199
Fits a 55 gal. (200 liter) drum.

GRACO THROAT SEAL LIQUID
Non-evaporating solvent for wet-cup.

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

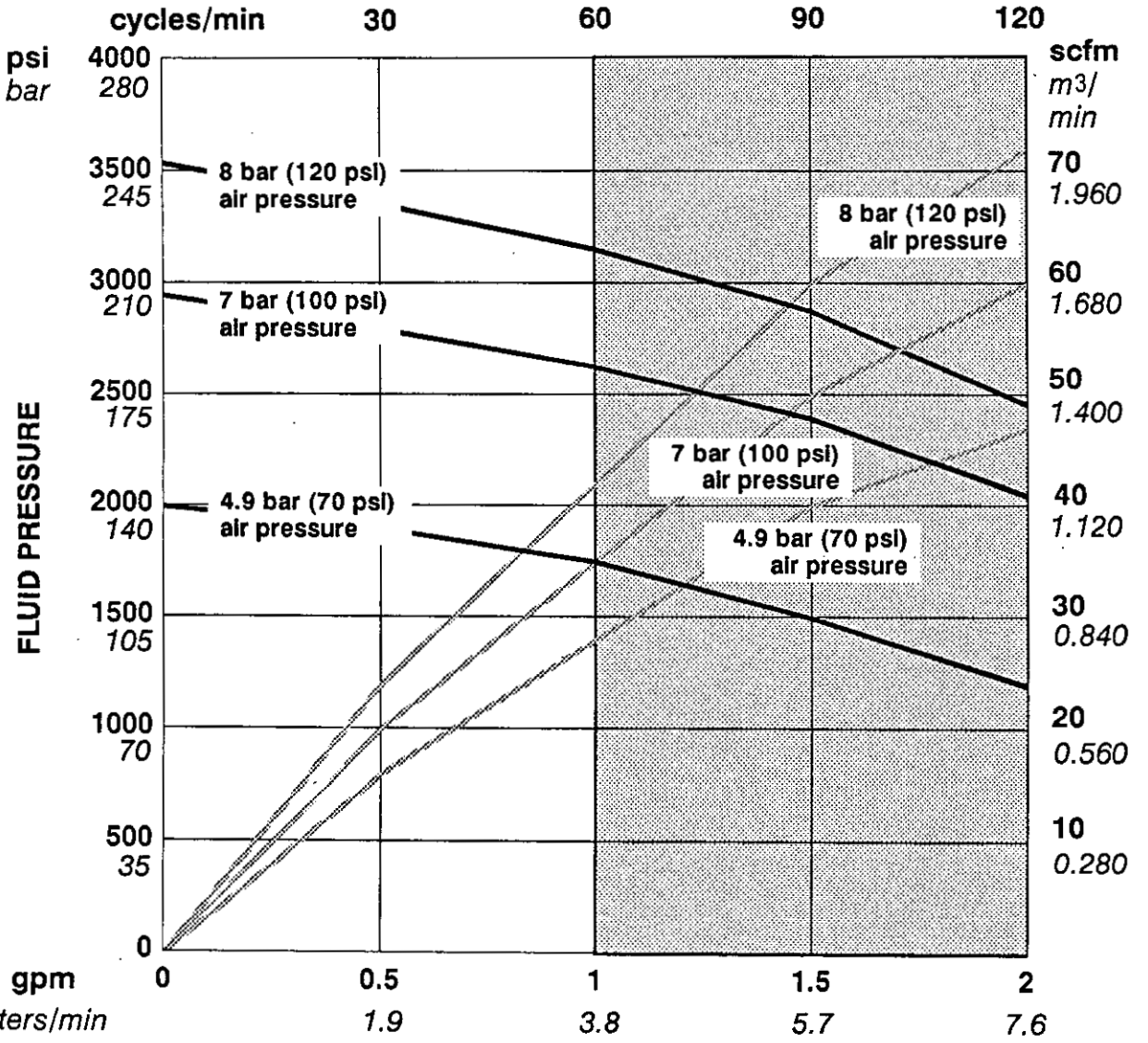
TECHNICAL AND PERFORMANCE DATA

Maximum fluid working pressure	3600 psi (250 bar)
Maximum air input pressure	120 psi (8 bar)
Pump cycles per 1 gallon (3.8 liters)	60
Maximum recommended pump speed for continuous operation	60 cycles per min
Maximum flow at continuous duty	1 gallon (3.8 liters) at 60 cycles/min
Recommended speed for optimum pump life	15–25 cycles/min; 0.25 to 0.42 gpm (0.94 to 1.58 liters/min)
Air consumption	approx. 35 scfm (0.98 m³/min) at 1 gpm (3.8 liters/min) at 100 psi (7 bar) air pressure
Weight	*Model 221-075:* approx. 30 lb (14 kg) *Model 217-578:* approx. 24 lb (11 kg)
Wetted parts	Carbon Steel; Chrome and Zinc Plating; AISI 304, 316, 420, and 17-4 PH grades of Stainless Steel; Tungsten Carbide; Teflon®; Leather; Ultra-High Molecular Weight Polyethylene

Teflon® is a registered trademark of the DuPont Co.

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

NOTE: Pump may be operated continuously to shaded area.



FLUID FLOW (TEST FLUID: NO. 10 WEIGHT OIL)

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

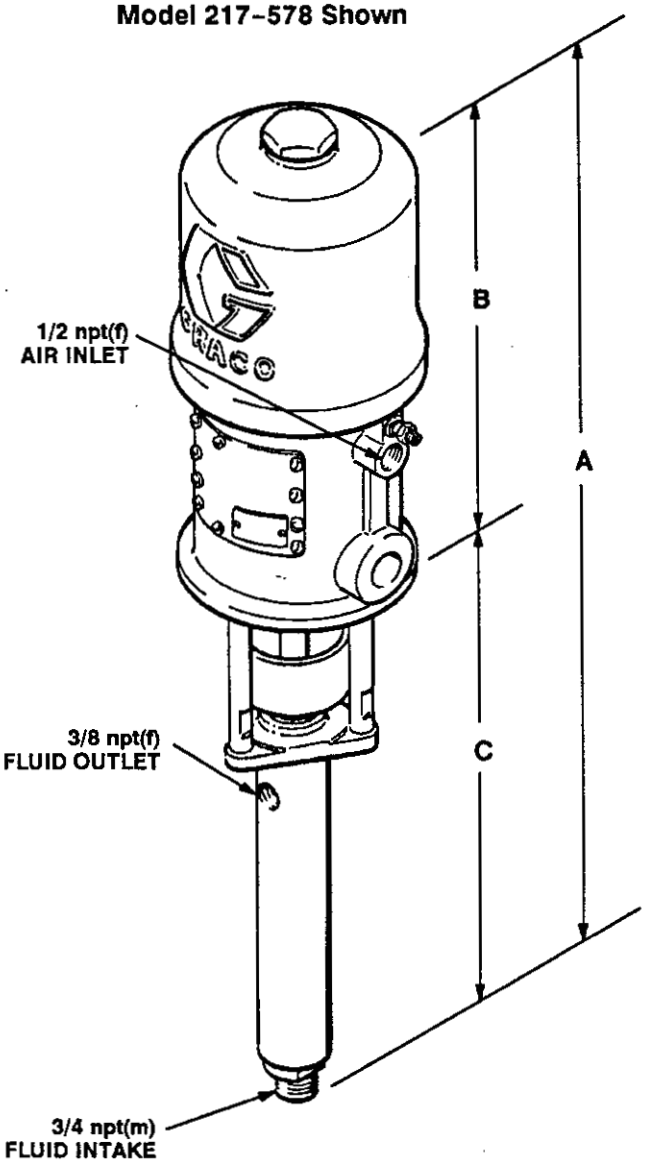
1. Locate desired flow along bottom of chart.
2. Follow vertical line up to intersection with selected fluid outlet pressure curve (black). Follow left to scale to read fluid outlet pressure.

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.

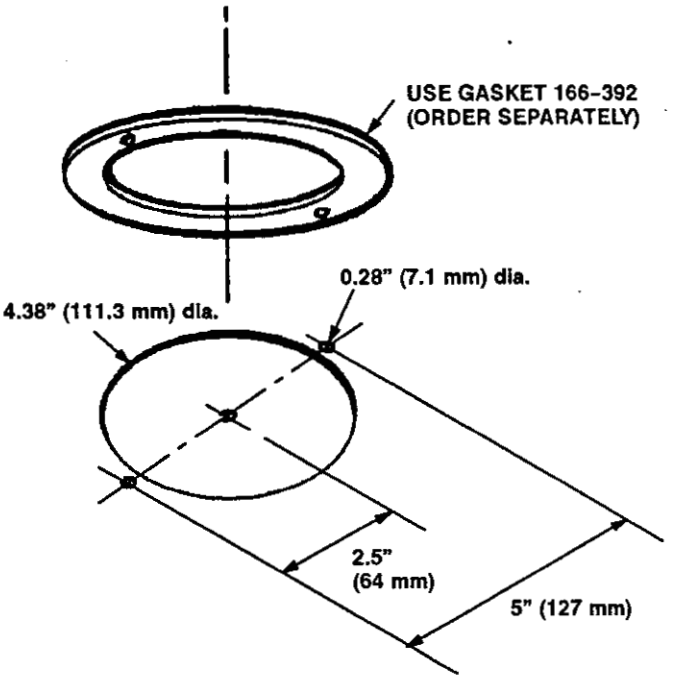
DIMENSIONAL DRAWING

Model 217-578 Shown



Pump Model	A	B	C
217-578	30 in. (762 mm)	15 in. (381 mm)	15 in. (381 mm)
221-075	47 in. (1194 mm)	15 in. (381 mm)	32 in. (810 mm)

MOUNTING HOLE LAYOUT



SERVICE INFORMATION

Listed below by the assembly changed are OLD and NEW parts.

Assembly Changed	Status	Ref No.	Part No.	Name
Models 217-578 & 221-075 Pumps, to Series B	Old		217-528	Displ. Pump
	New	15	223-587	Displ. Pump

INTERCHANGEABILITY NOTE: NEW parts replace the OLD parts listed directly above them.

OBSOLETE MODELS NOTE: Pump Model 223-586 is obsolete and has been deleted from the manual. Displacement Pump 217-528 is obsolete (see above). Repair Kit 220-397 is obsolete, replaced by 223-675.

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, West Caldwell (N.J.)
Subsidiary and Affiliate Companies: Canada; England; Switzerland; France; Germany; Hong Kong; Japan; Korea

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

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