

INSTRUCTIONS—PARTS LIST



307-928

Rev F
Supersedes E

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

PORTABLE

30:1 Ratio President® Hydra-Spray® Pumps

100 psi (7 bar) MAXIMUM AIR INLET PRESSURE
3000 psi (210 bar) MAXIMUM FLUID WORKING PRESSURE

Model 224-625, Series A
For cold spray applications
Includes pump and portable cart

Model 231-163
For cold spray applications
Includes pump, portable cart, hose, gun and tip

Model 224-630, Series A
For heated spray applications
Includes pump, portable cart, Viscon²™ heater,
heater mounting kit 222-262, and circulating kit 222-261

Model 231-160
For heated spray applications
Includes pump, portable cart, Viscon²™ heater,
heater mounting kit 222-262, circulating kit 222-261,
hose, gun and tip

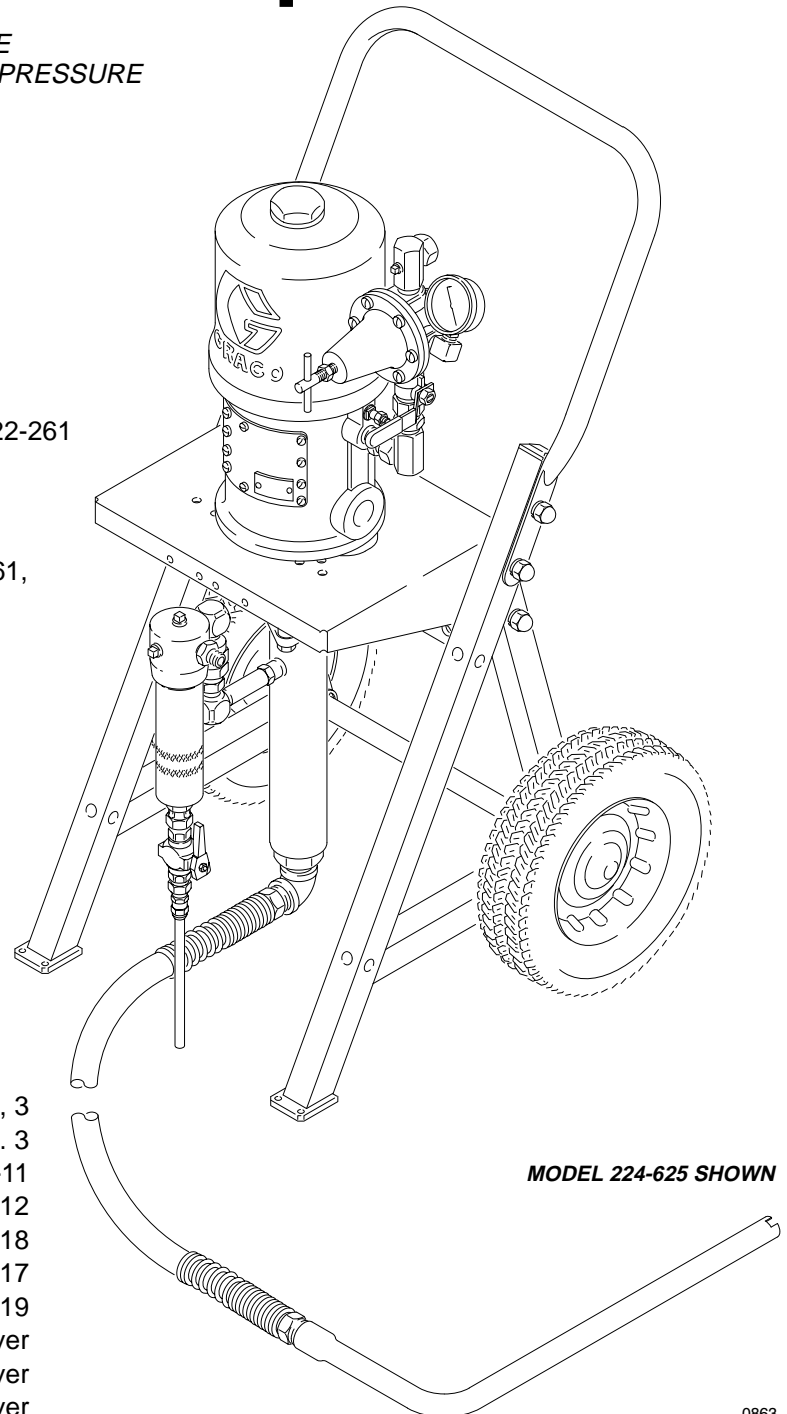


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GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441

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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. NEVER try to “blow back” paint; this is NOT an air spray system.

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 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 spray 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 spray gun inoperative. Failure to set the safety latch can result in accidental triggering of the spray 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.

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.

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 main power to the heater, if used. Circulate the fluid for at least 10 minutes to allow it and the heater to cool.
3. Shut off the air to the pump.
4. Close the bleed-type master air valve (supplied in your system).
5. Disengage the spray gun safety latch.
6. Hold a metal part of the spray gun firmly to the side of a grounded metal pail, and trigger the spray gun to relieve pressure.
7. Engage the spray gun safety latch.
8. Open the drain valve (supplied in your system), having a container ready to catch the drainage.
9. 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.

System Pressure

The 30:1 ratio President pump can develop 3000 psi (210 bar) MAXIMUM WORKING PRESSURE at 100 psi (7 bar) MAXIMUM INCOMING AIR PRESSURE. NEVER exceed 100 psi (7 bar) air 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 the back page or in the separate component manuals. Always read the manufacturer's literature before using fluid or solvent in this pump.

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 or solvents 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).

FIRE OR EXPLOSION HAZARD

Static electricity is created by the 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 as shown in Fig 1.
2. *Air hoses:* use only grounded air hoses.
3. *Fluid hoses:* use only grounded fluid hoses.
4. *Heater (if used):* refer to the Viscon² Heater manual, 307–805.
5. *Air compressor:* follow manufacturer's recommendations.
6. *Spray gun:* grounding is obtained through connection to a properly grounded fluid hose and pump.
7. *Fluid supply container:* according to your local code.
8. *Object being sprayed:* according to your local code.
9. *All solvent pails used when flushing,* according to 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.

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**, below.

MOVING PARTS HAZARD

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

10. *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 spray gun.

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. Refer to page 19 to order a ground wire and clamp. Connect the other end of the ground wire to a true earth ground.

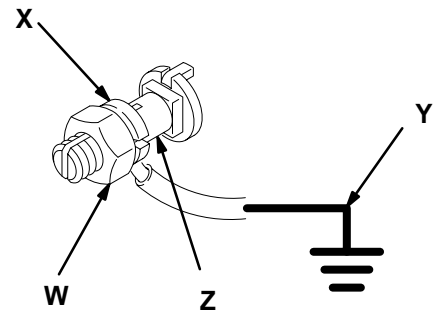


Fig 1

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Flushing Safety

Before flushing, be sure the entire system and flushing pails are properly grounded. Refer to **Grounding**, at the 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 spray gun 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.

TERMS

WARNING Alerts user to avoid or correct conditions that could cause bodily harm.

CAUTION Alerts user to avoid or correct conditions that could cause damage to or destruction of equipment.

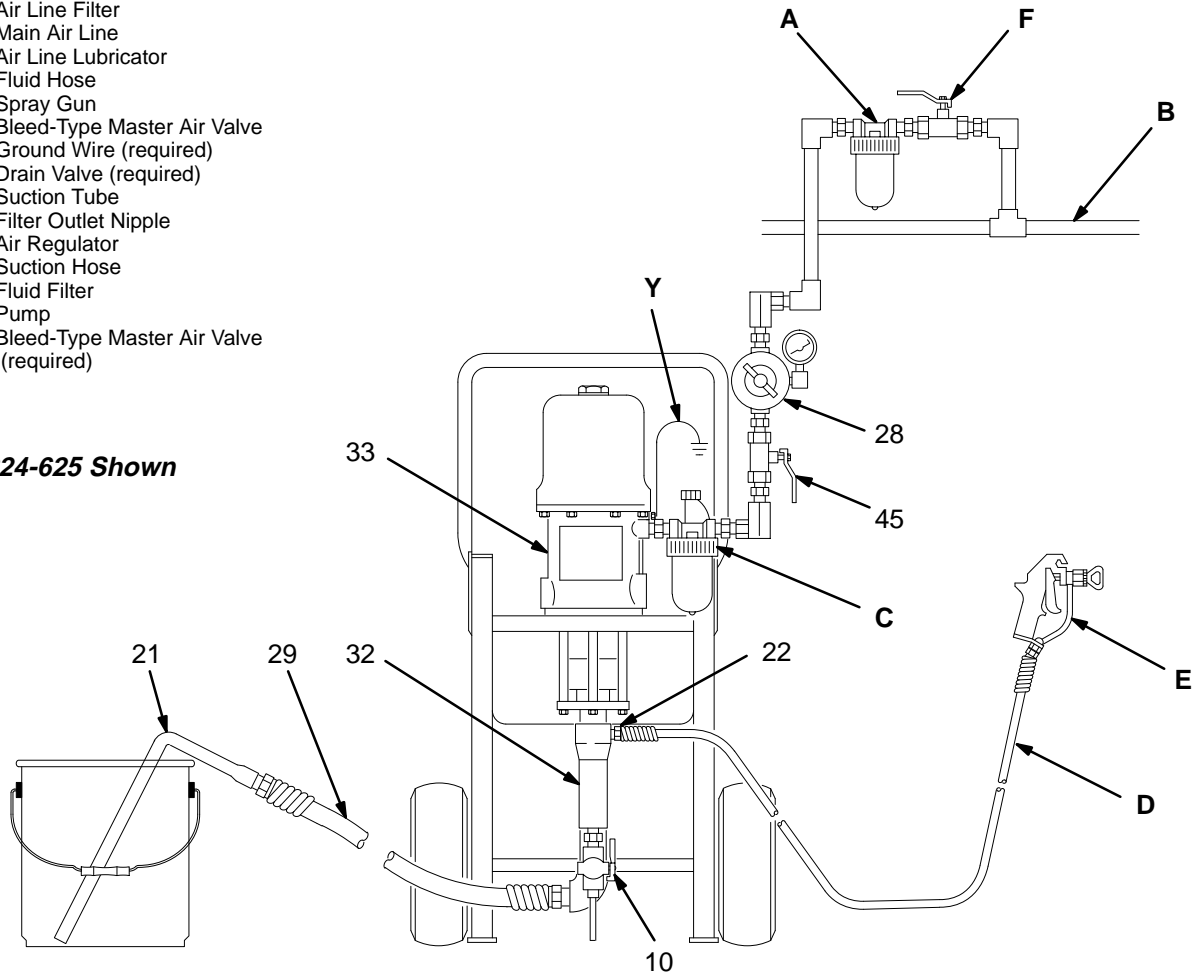
NOTE Identifies essential procedures or helpful information.

TYPICAL INSTALLATION

KEY

- A** Air Line Filter
- B** Main Air Line
- C** Air Line Lubricator
- D** Fluid Hose
- E** Spray Gun
- F** Bleed-Type Master Air Valve
- Y** Ground Wire (required)
- 10** Drain Valve (required)
- 21** Suction Tube
- 22** Filter Outlet Nipple
- 28** Air Regulator
- 29** Suction Hose
- 32** Fluid Filter
- 33** Pump
- 45** Bleed-Type Master Air Valve (required)

Model 224-625 Shown



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INSTALLATION

Be sure that all operators read and understand this entire manual and the separate manuals supplied with components and accessories before using this equipment.

Reference numbers and letters in parentheses refer to the Typical Installation drawing, Figs. 1-5, and the parts drawings and lists on pages 13-18.

Accessories mentioned are available from your Graco distributor (see page 19). If you supply your own accessories, be sure they are adequately sized to meet your system's requirements.

The Typical Installation above is only an example. For assistance in designing a system to meet your particular needs, contact your Graco representative or Graco Technical Assistance (see back page).

SYSTEM ACCESSORIES

Install an air line filter (A) in the main air line (B), to remove harmful dirt and moisture from the compressed air supply. To provide automatic lubrication of the air motor, install an air line lubricator (C) downstream from the bleed-type master air valve (45). Install a second bleed valve (F) in the main air line, to isolate the accessories for servicing.

WARNING

The bleed-type master air valve (45) and the fluid drain valve (10) are **supplied** with your pump, to help reduce the risk of serious bodily injury including fluid injection, splashing in the eyes or on the skin, or 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. The valve is located downstream from the air regulator.

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.

HOSE AND GUN CONNECTIONS

Refer to the Typical Installation drawing on page 4. Assemble the suction hose (29) and suction tube (21) to the pump fluid intake.

Connect one end of the fluid hose (D) to the filter outlet nipple (22) and the other to the fluid inlet of the gun (E). DO NOT install the spray tip in the gun yet. To use a second gun with the sprayer, refer to pages 10 and 11.

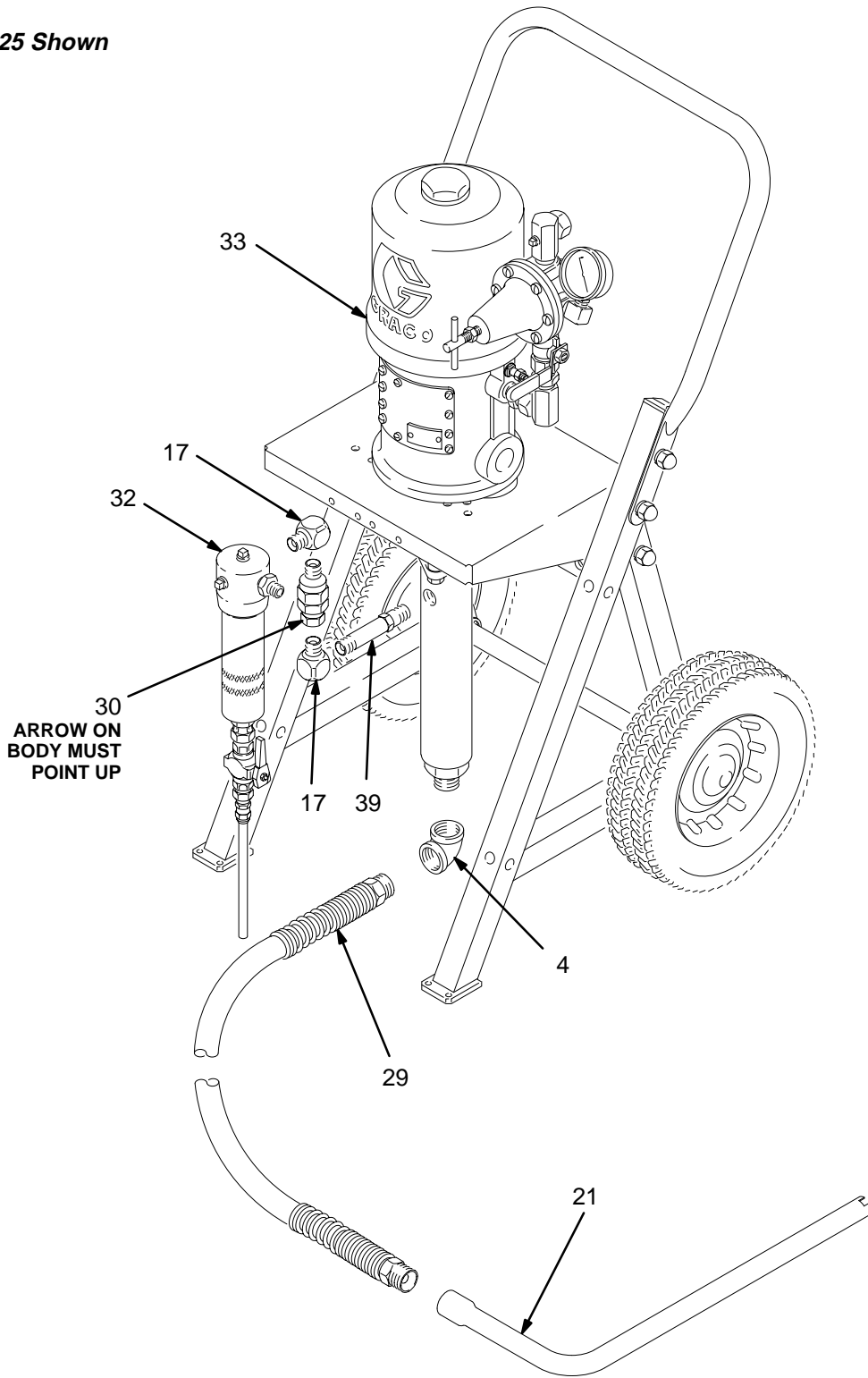
Close the bleed-type master air valve (45) and the air regulator (28). Connect the main air line (B) to the 1/2 npt(f) air regulator inlet.

GROUNDING

WARNING

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

Model 224-625 Shown



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Fig. 2

CONVERTING THE PUMP TO A HEATED CIRCULATING SYSTEM

To convert pump Models 224-625 or 231-163 to a heated circulating unit, order the following:

- Viscon² Fluid Heater, Model 220-522
- Heater Mounting Kit 222-262
- Circulating Kit 222-261
- Hose Kit 222-263

WARNING

The Viscon² Heater must be installed by a qualified electrician in compliance with all state and local codes and regulations, to reduce the risk of electric shock or other serious bodily injury during installation or operation.

The heater requires a 120 VAC, single-phase, 16.7 Amp power supply. Refer to the Viscon² Heater Manual, 307-805, for further information.

DO NOT plug or unplug the power cord in any area containing flammable materials or fumes, to avoid fire or explosion resulting in serious bodily injury.

Installing Heater Mounting Kit 222-262

WARNING

Before installing the heater, heater mounting kit and circulating kit, follow the **Pressure Relief Procedure** on page 2. Disconnect all hoses from the pump.

NOTE: Reference numbers marked with an asterisk (for example, 61*) are included in kit 222-262.

Apply 110-110 pipe sealant (included in the kit) to all male threads, except at swiveling connections.

1. Remove the cover from the electrical box (G) at the back of the heater. Screw the bushing (66*) into the inlet of the electrical box. Install the cord grip elbow (67*) in the bushing. See Fig. 3.
2. Thread the cord (68*) through the elbow (67*) and into the electrical box. Attach the black lead to the leftmost terminal, the white lead to the center terminal, and the green ground wire to the rightmost terminal. Tighten all terminal nuts to 30 in-lb (3.4 N.m). Tighten the nut on the cord grip elbow (67*) to secure the cord. See Fig. 3.

WARNING

The electrical cord (68*) is rated for 105°C (221°F). Do not substitute a lower temperature rated, generally available cord.

NOTE: Mount the heater (58) on the back of the cart as follows. Two people are required to perform this operation.

3. Align the heater (58) mounting posts with the four holes at the back of the cart's pump support bracket (H). See Fig. 4. Secure the heater to the bracket with the M8 x 1.25 screws and lockwashers supplied with the heater.
4. Remove the fluid filter (32) from the pump (33). Remove and discard the two elbows (17), check valve (30), and long 3/8 npt nipple (39) from the pump fluid outlet. See Fig. 2.

Refer to page 8 to continue the procedure.

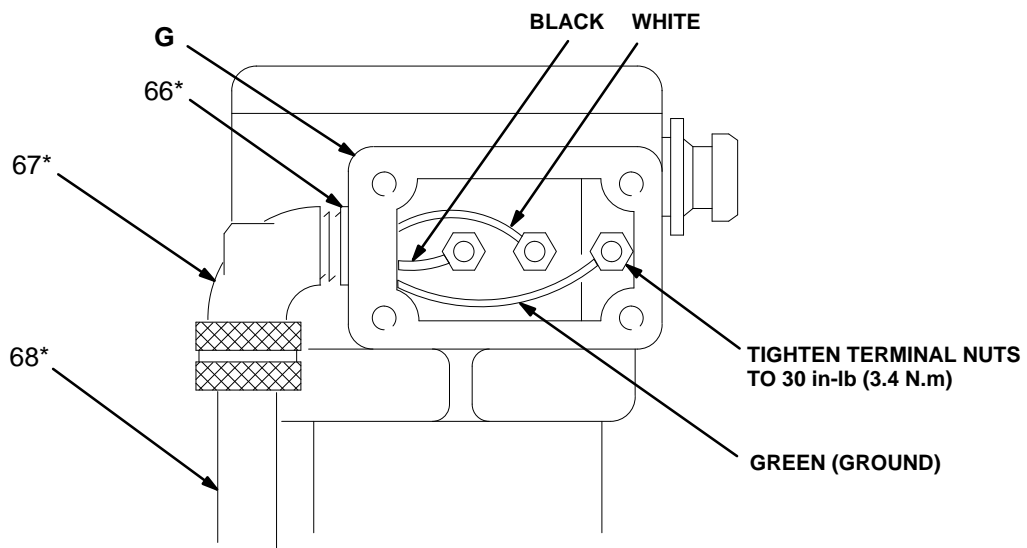


Fig. 3

5. Screw the check valve (62*) into the pump's fluid outlet, making certain that the arrow on the check valve points away from the pump. Screw the rigid end of the adapter (63*) onto the check valve. See Fig. 4.
6. Install the 3/8 npt nipple (61*) in the heater outlet. Screw the male end of the 90° swivel (23*) into the inlet of the fluid filter (32). Screw the female end of the swivel (23*) onto the nipple (61*) at the heater outlet, and tighten securely. When properly assembled, the filter's outlet nipple (22) will face toward the back of the cart.
7. Screw the elbow (64*) into the heater's inlet. Attach the 1/2" x 3' (0.9 m) hose (65*) to the elbow. Attach the other end of the hose to the swivel of the adapter (63*) at the pump outlet.

Installing Circulating Kit 222-261

WARNING

Before installing the heater, heater mounting kit and circulating kit, follow the **Pressure Relief Procedure** on page 2. Disconnect all hoses from the pump.

NOTE: Reference numbers marked with a symbol (for example, 69†), are included in kit 222-261.

Apply 110-110 pipe sealant (included in the kit) to all male threads, except at swiveling connections.

1. Unscrew the suction hose (29) from the pump intake elbow (4) and set the hose aside. Remove the elbow (4) from the pump intake and discard. See Fig. 2.
2. Screw the rigid end of the manifold (69†) onto the pump intake, and attach the suction hose (29) to the swivel end of the manifold. See Fig. 4.
3. Place a washer (73†) and insulator (74†) on each of the screws (75†). Insert the screws through the

mounting holes on the left side of the pump support bracket (H), working from the inside. Place another insulator (74†) on each of the screws on the outside of the bracket. Use the screws to attach the back pressure regulator (76†) to the pump support bracket.

4. Screw one of the nipples (22†) into the outlet in the base of the back pressure regulator (76†), then screw one of the elbows (44†) onto the nipple so the male end of the elbow faces forward. Install another elbow (44†) in the inlet of the back pressure regulator, then install another nipple (22†) in the elbow.
5. Screw an elbow (44†) into the open port of the pump fluid intake manifold (69†), so the female end of the elbow faces left. Install the CIRC end of the three-way ball valve (70†) in the elbow, so the valve handle is at the front.
6. Screw a second elbow (44†) onto the IN branch of the three-way valve (70†), so the elbow points upward. Connect one end of the hose (72†) to the elbow, and the other end to the nipple (22†) at the outlet of the back pressure regulator.
7. Connect the drain hose (71†) to the DRAIN end of the three-way valve (70†).
8. Connect the fluid return line to the nipple (22†) at the inlet of the back pressure regulator.
9. Connect the air and fluid hoses and gun as explained on page 5.

GROUNDING

WARNING

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

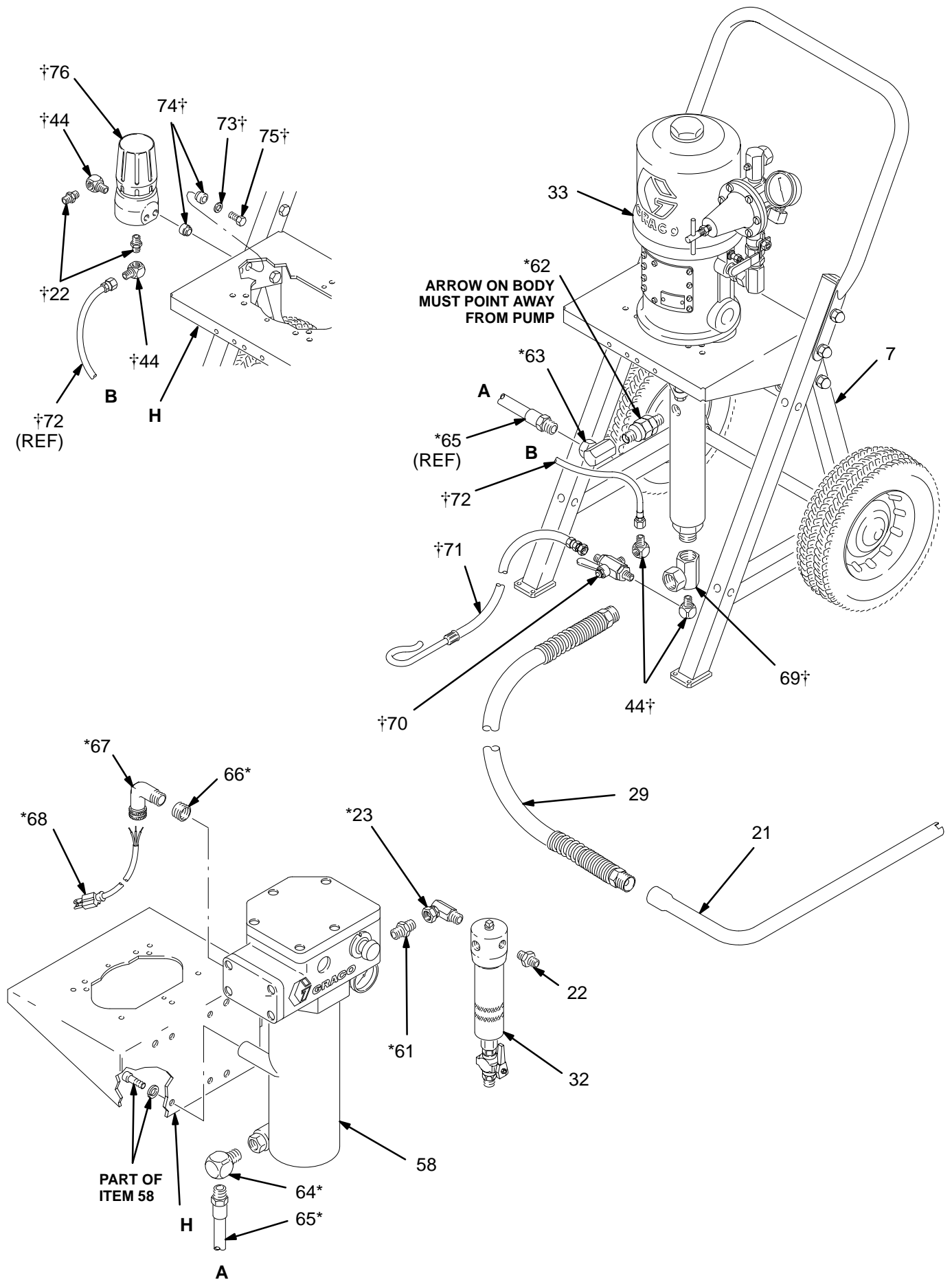


Fig. 4

CONVERTING TO A TWO-GUN SYSTEM

To convert your sprayer to a two-gun system, refer to the following applicable paragraph for your model. Order the parts listed, and perform the assembly procedure.

Models 224-625 and 231-163 (Refer to Fig 5 and the Parts Drawing on page 14)

WARNING

Before performing this procedure, follow the **Pressure Relief Procedure** on page 2. Disconnect all hoses from the pump.

NOTE: For Model 224-625, order all of the following parts. For Model 231-163, which includes a gun, swivel and fluid hose, order only one of each of the following parts.

PART NO.	DESCRIPTION	QTY
162-453	NIPPLE; 1/4 npt x 1/4 npsm	1
208-663	GUN, airless spray	2
204-940	SWIVEL, straight; 1/4 npt(m) x 1/4 npsm(f)	2
210-540	HOSE, fluid; nylon; 1/4" (6 mm) I.D.; 1/4 npsm(fbe); 25 ft (7.6 m) long	2

1. Remove the plug (16) from the optional outlet port of the fluid filter (32). Install a 162-453 Nipple (K) in its place. See Detail A of Fig 5.
2. Screw the first fluid hose (D) onto a swivel (L), then screw the swivel onto the fluid inlet of the gun (E). See Detail B of Fig 5. Repeat for the other hose, swivel and gun.
3. Screw the first hose onto one outlet nipple (22) of the fluid filter (32). Screw the second hose onto the other outlet nipple (K) of the fluid filter. See Detail A.

Model 224-630 and 231-160 (Refer to Fig 5 and the Parts Drawing on page 16)

WARNING

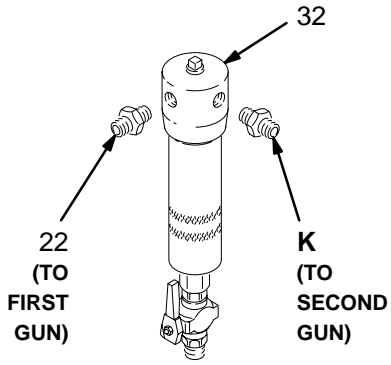
Before performing this procedure, follow the **Pressure Relief Procedure** on page 2. Disconnect all hoses from the pump.

NOTE: For Model 224-630, order all of the following parts. For Model 231-160, which includes a gun and hose kit, order two 162-453 nipples and only one of each of the other parts.

PART NO.	DESCRIPTION	QTY
162-453	NIPPLE; 1/4 npt x 1/4 npsm	2
100-840	ELBOW, street, 90°; 1/4 npt (m x f)	1
208-327	GUN, airless spray	2
222-263	HOSE KIT, fluid, insulated; nylon; 1/4" ID; cpld 1/4 npsm (fbe); 25 ft (7.6 m) long	2

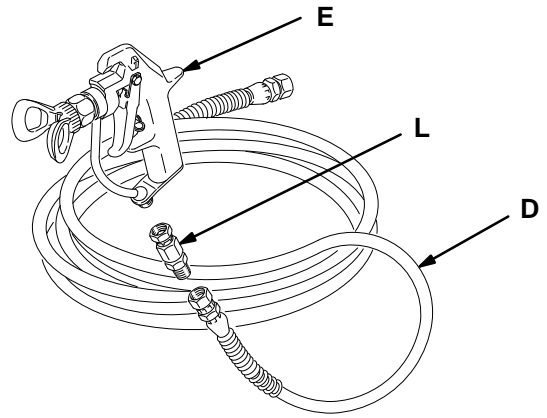
1. Remove the plug (16) from the optional outlet port of the fluid filter (32). Install a 162-453 Nipple (K) in its place. See Detail A of Fig 5.
2. Install the 100-840 Elbow (M) in the optional inlet of the back pressure regulator (76). Screw a 162-453 Nipple (K) into the elbow (M). See Detail C of Fig 5.
3. Screw the first insulated fluid hose kit (N) onto the fluid inlet of the gun (E). Repeat for the other hose kit and gun. See Detail D.
4. Connect the fluid supply line of the first hose kit (N) to the outlet nipple (22) of the fluid filter (32). Connect the fluid supply line of the second hose kit to the other outlet nipple (K). See Detail A. Similarly, connect the return lines of the hose kits (N) to the inlet nipples (22 and K) of the back pressure regulator (76). See Detail C.

DETAIL A: HOSE CONNECTIONS AT FLUID FILTER (ALL MODELS)



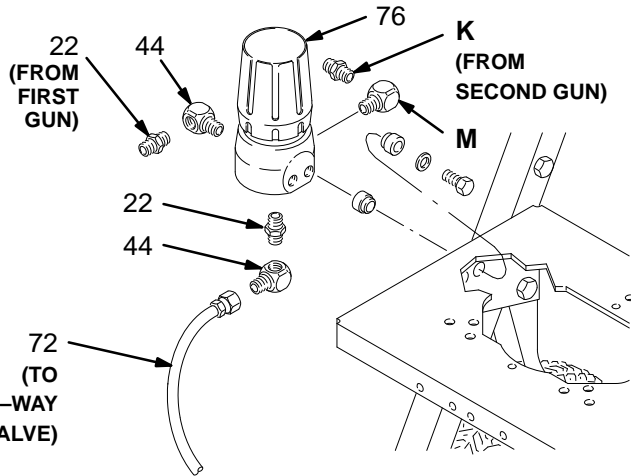
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DETAIL B: ASSEMBLY OF HOSE AND GUN (MODELS 224-625 AND 231-163)



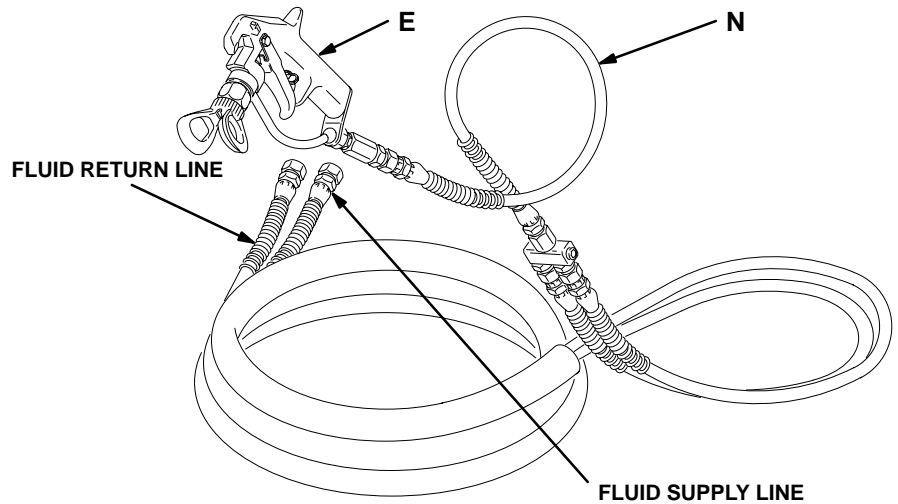
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DETAIL C: FLUID RETURN CONNECTIONS AT BACK PRESSURE VALVE (MODELS 224-630 AND 231-160 ONLY)



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DETAIL D: ASSEMBLY OF HOSE KIT AND GUN (MODELS 224-630 AND 231-160)



0872

Fig 5

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

1. Engage the spray gun safety latch.
2. Shut off the main power to the heater, if used. Circulate the fluid for at least 10 minutes to allow it and the heater to cool.
3. Shut off the air to the pump.
4. Close the bleed-type master air valve (supplied in your system).
5. Disengage the spray gun safety latch.
6. Hold a metal part of the spray gun firmly to the side of a grounded metal pail, and trigger the spray gun to relieve pressure.
7. Engage the spray gun safety latch.
8. Open the drain valve (supplied in your system), having a container ready to catch the drainage.
9. 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

For your safety, before operating the equipment be sure all operators have read and fully understand all the warnings, cautions and instructions in this manual and all manuals supplied with each component or accessory.

Flush the Pump Before Using

Pumps are tested with lightweight oil which is left in to protect the pump parts. To prevent contamination of the fluid, flush the pump with a compatible solvent before using it.

WARNING

Before flushing, be sure the entire system and flushing pails are properly grounded. Refer to **Grounding** on page 3. Follow the **Pressure Relief Procedure Warning** above, and *remove the spray tip from the 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, static sparking, and splashing in the eyes or on the skin.

Starting and Adjusting the Pump

Be sure the air regulator and bleed-type master air valve are closed. **DO NOT INSTALL THE SPRAY TIP YET!**

Place the suction tube (21) in the fluid pail. Open the drain valve (10) for priming. Open the bleed-type master air

valve. Hold a metal part of the spray gun firmly to the side of a grounded metal pail and trigger the gun. Slowly open the air regulator until the pump starts. Allow the pump to cycle slowly until all the air is pushed out of the fluid lines. Release the gun trigger and engage the safety latch; the pump will stall against the pressure.

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 triggered and released.

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

Use the air regulator to control the pump speed and fluid pressure. Always use the lowest pressure necessary to achieve the desired results. Higher pressures waste fluid and cause premature wear of the pump packings and spray tip.

Keep the wet-cup filled with Graco Throat Seal Liquid (TSL) to help prolong the packing life. Check the tightness of the packing nut weekly. The packing nut should be tight enough to prevent leakage – no tighter. Always follow the **Pressure Relief Procedure Warning** at left 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. 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 supply container and prime the pump and lines with fluid, being sure to eliminate all air from the fluid system, or flush the pump as described in “Shutdown and Care,” below.

Heated Systems

Operating instructions for a heated circulating system are provided in the Viscon² Heater manual, 307-805. Read and understand all warnings and instructions in the heater manual before operating a heated system.

In circulating systems, adjust the back pressure regulator (76) and pump air pressure regulator (28) to obtain proper spray pressure at the gun and maintain sufficient circulation flow to prevent fluid settling.

The three-way ball valve (70) selects either fluid circulation or draining. To circulate fluid back to the pump, turn the handle toward the CIRC end of the valve. To drain fluid, turn the handle toward the DRAIN end.

Shutdown and Care

Always follow the **Pressure Relief Procedure Warning** at left, whenever you shut off the pump. Stop the pump at the bottom of its stroke to keep fluid from drying on the exposed displacement rod and damaging throat packings.

Always flush the pump with a compatible solvent before the fluid can dry on the displacement rod, and at the end of each day. If you are pumping water-based fluid, flush first with water and then with mineral spirits. If you are pumping oil-based fluids, flush with mineral spirits only.

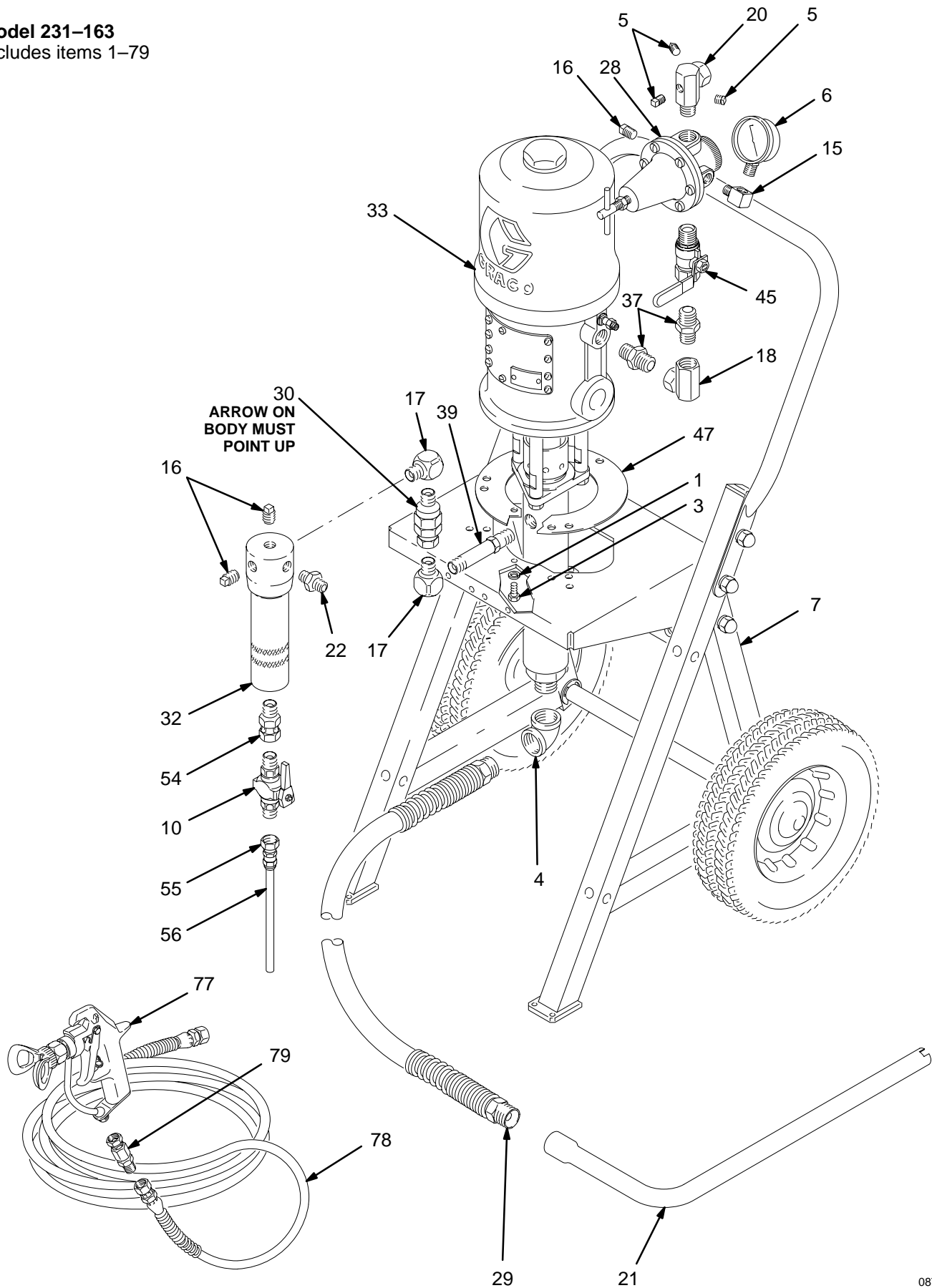
Relieve pressure and leave the mineral spirits in the pump to prevent corrosion.

**PARTS DRAWINGS
AND
PARTS LISTS**

PARTS DRAWING

Model 224-625, Series A
Includes items 1-56

Model 231-163
Includes items 1-79



0873A

PARTS LIST

Model 224–625, Series A
Includes items 1–56

Model 231–163
Includes items 1–79

REF NO.	PART NO.	DESCRIPTION	QTY	REF NO.	PART NO.	DESCRIPTION	QTY
1	100–016	LOCKWASHER, spring; 1/4"	2	30	206–831	CHECK VALVE	
3	100–270	CAPSCREW, hex hd; 1/4–20 x 5/8" long				See 306–861 for parts	1
4	100–349	ELBOW, 90°; 3/4 npt(fbe)	2	31	206–994	THROAT SEAL LIQUID;	
5	100–403	PLUG, pipe, sq hd; 1/8 npt	1			1 pint (0.5 liter); not shown	1
6	101–180	PLUG, pipe, sq hd; 1/8 npt	3	32	218–029	FLUID FILTER	
7	224–044	GAUGE, air pressure; 0–200 psi (0–14 bar)	1	33	223–586	See 307–273 for parts	1
		CART, portable				30:1 PRESIDENT PUMP	
		See 308–136 for parts				See 306–981 for parts	1
10	210–658	BALL VALVE; 3/8 npt(mbe)	1	37	158–491	NIPPLE; 1/2 npt	2
		See 306–861 for parts		39	160–790	NIPPLE; 3/8 npt	1
15	187–357	ELBOW, street, 90°; 1/4 npt (m x f)	1	45	107–142	VALVE, air, bleed–type; 1/2 npt (m x f)	1
16	100–509	PLUG, pipe, sq hd; 1/4 npt	3	47	188–595	MOUNTING BRACKET, pump	1
17	155–699	ELBOW, 90°; 3/8 npt (m x f)	2	54	155–665	UNION, adapter; 3/8 npt(m) x 3/8 npsm(f) swivel	1
18	157–416	UNION, 90°; 1/2 npt(f) x 1/2 npsm(f) swivel	1	55	205–448	COUPLING, hose; 3/8 npsm(f)	1
20	162–376	MANIFOLD; 1/2 npt (m x f) 90° swivel; 3 holes (1/8 npt) in body	1	56	185–973	HOSE, nylon; 1/4" (6 mm) ID; 28" (711 mm) long	1
21	165–767	SUCTION TUBE; 3/8 npt; 18" (457 mm) long	1	77	208–663	HYDRA–SPRAY GUN	
22	162–453	NIPPLE; 1/4 npt x 1/4 npsm	1			See 307–046 for parts	1
28	206–197	AIR REGULATOR 1/2 npt(f) inlet and outlet; 0–125 psi (0–9 bar) range	1	78	223–540	HOSE, fluid; nylon; 1/4" (6 mm) ID; coupled 1/4 npsm (fbe); 25' (7.6 m) long	1
29	214–960	HOSE, suction; 3/4" ID; nylon; coupled 3/4 npt (mbe); 3.5' (1 m) long, w/spring guard	1	79	204–940	SWIVEL See 306–861 for parts	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

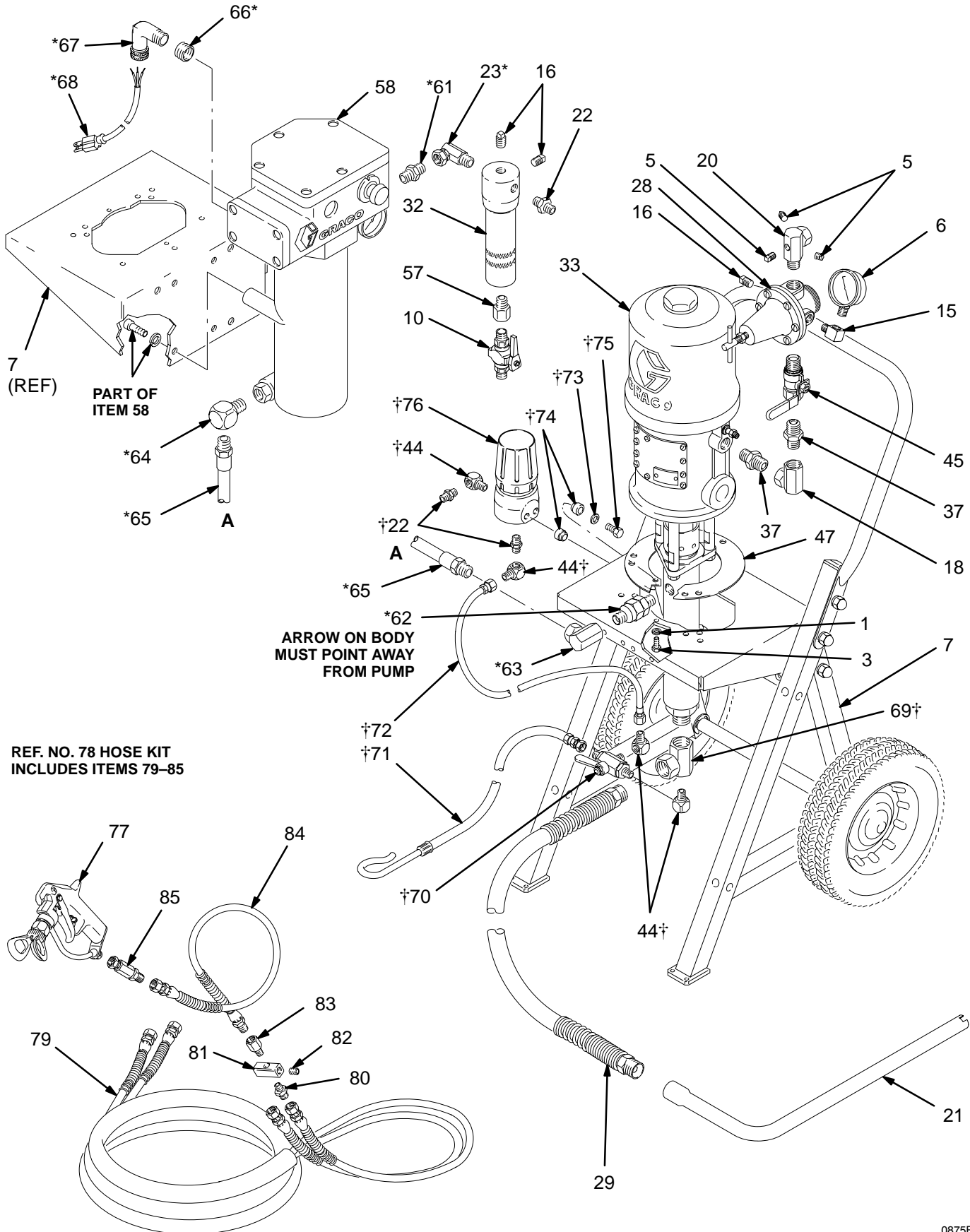
PARTS DRAWING

Model 224-630, Series A

Includes items 1-76

Model 231-160

Includes items 1-85



PARTS LIST

Model 224–630, Series A

Includes items 1–76

Model 231–160

Includes items 1–85

REF NO.	PART NO.	DESCRIPTION	QTY	REF NO.	PART NO.	DESCRIPTION	QTY
1	100–016	LOCKWASHER, spring; 1/4"	2	70	214–711†	BALL VALVE, three-way; 1/4 npt(m)	1
3	100–270	CAPSCREW, hex hd; 1/4–20 x 5/8" long	2	71	206–965†	HOSE, drain; nylon; 1/4" ID; cpld 1/4 npsm(f)	1
5	100–403	PLUG, pipe, sq hd; 1/8 npt	3	72	206–966†	HOSE; PTFE; 1/4" ID; cpld 1/4 npsm (fbe) swivel; 18" (457 mm) long	1
6	101–180	GAUGE, pressure, air; 0–200 psi (0–14 bar)	1	73	100–527†	WASHER, wrought; 1/4"	2
7	224–044	CART, portable	1	74	167–002†	INSULATOR, heat	4
10	210–658	DRAIN VALVE; 3/8 npt(mbe)	1	75	102–254†	SCREW, hex hd; 1/4–20 x 7/8" (19 mm) long	2
15	187–357	ELBOW, street, 90°; 1/4 npt (m x f)	1	76	206–819†	REGULATOR, back pressure	1
16	100–509	PLUG, pipe, sq hd; 1/4 npt	3	77	208–327	GUN, airless spray	1
18	157–416	UNION, 90°; 1/2 npt(f) x 1/2 npsm(f) swivel	1	78	222–263	HOSE KIT	1
20	162–376	MANIFOLD; 1/2 npt (m x f) 90° swivel; 3 holes (1/8 npt) in body	1	79	223–759	Includes items 79–85 HOSE, fluid, insulated; nylon; 1/4" ID; cpld 1/4 npsm (fbe) swivel; 25 ft (7.6 m) long	1
21	165–767	SUCTION TUBE; 3/8 npt; 18" (457 mm) long	1	80	169–797	NIPPLE; 1/4 npsm x 1/8 npt	2
22	162–453†	NIPPLE; 1/4 npt x 1/4 npsm	3	81	169–795	MANIFOLD; 1/8 npt(f)	1
23	155–494*	ADAPTER, union, 90°; 3/8 npt(m) x 3/8 npt(f) swivel	1	82	100–139	PLUG, hex socket; 1/8 npt	1
28	206–197	AIR REGULATOR 1/2 npt(f) inlet and outlet; 0–125 psi (0–9 bar) range	1	83	159–840	ADAPTER; 1/8 npt(m) x 1/4 npt(f)	1
29	214–960	HOSE, suction; 3/4" ID; nylon; coupled 3/4 npt (mbe); 3.5' (1 m) long, w/spring guard	1	84	214–701	HOSE, fluid; nylon; 3/16" ID; cpld 1/4 npt(m) x 1/4 npsm(f) swivel; 3 ft (0.9 m) long	1
31	206–994	THROAT SEAL LIQUID; 1 pint (0.5 liter); not shown	1	85	210–500	FILTER, fluid, in-line; 100 mesh; 1/4 npsm(m) x 1/4 npsm(f) swivel	1
32	218–029	FLUID FILTER	1				
33	223–586	30:1 PRESIDENT PUMP	1				
37	158–491	NIPPLE; 1/2 npt	2				
44	100–840†	ELBOW, street, 90°; 1/4 npt (m x f)	4				
45	107–142	VALVE, air, bleed-type; 1/2 npt (m x f)	1				
47	188–595	MOUNTING BRACKET, pump	1				
57	150–286	ADAPTER; 3/8 npt (m x f)	1				
58	220–522	VISCON ² HEATER (120V)	1				
61	156–849*	NIPPLE; 3/8 npt	1				
62	206–962*	CHECK VALVE; 3/8 npt (mbe)	1				
63	159–801*	UNION, adapter, 90°; 3/8 npt(f) x 1/2 npsm(f) swivel	1				
64	158–683*	ELBOW, 90°; 1/2 npt (m x f)	1				
65	235–022*	HOSE, fluid; nylon; 1/2" ID; cpld 1/2 npt (mbe); 3' (0.9 m) long	1				
66	107–219*	BUSHING; 3/4 npt(m) x 1/2 npt(f)	1				
67	102–363*	ELBOW, cord grip, 90°; 1/2 npt (m); includes nut, washer, and grommet	1				
68	110–160*	CORD ASSY, heater; 12 AWG; 600V; 20 AMP; 105°C (221°F); 6.5 ft (2 m) long	1				
69	166–998†	MANIFOLD, inlet; 1/4 npt(f) x 3/4 npt(f) x 3/4 npsm(f) swivel	1				

* Included in Heater Mounting Kit 222–262. See page 18.

† Included in Circulating Kit 222–261. See page 18.

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

HEATER MOUNTING KIT 222-262

Required to convert Models 224-625 and 231-163 to heated units. Consists of:

Ref. No.	Qty	Ref. No.	Qty
23	1	65	1
61	1	66	1
62	1	67	1
63	1	68	1
64	1		

Includes 6 ml supply of sst pipe sealant 110-110.

CIRCULATING KIT 222-261

Required to convert Models 224-625 and 231-163 to circulating units. Consists of:

Ref. No.	Qty	Ref. No.	Qty
22	2	72	1
44	4	73	2
69	1	74	4
70	1	75	2
71	1	76	1

Includes 6 ml supply of sst pipe sealant 110-110.

MANUAL CHANGE SUMMARY

Listed below by the assembly changed are ADDED parts.

Assembly Changed	Status	Ref No.	Part No.	Name
All Models	ADDED	47	188-595	Bracket

ACCESSORIES

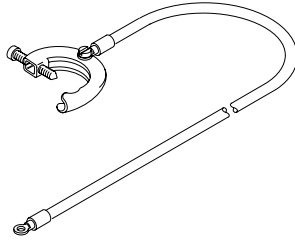
USE GENUINE GRACO PARTS AND ACCESSORIES

Must be purchased separately.

GROUNDING CLAMP 103-538

GROUND WIRE 208-950

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

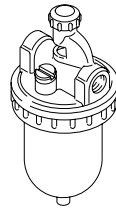


AIR LINE LUBRICATOR

250 psi (17.5 bar) MAXIMUM WORKING PRESSURE

214-848 1/2 npt inlet and outlet

214-849 3/4 npt inlet and outlet

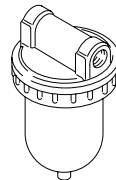


AIR LINE FILTER

250 psi (17.5 bar) MAXIMUM WORKING PRESSURE

106-149 1/2 npt inlet and outlet

106-150 3/4 npt inlet and outlet



GROUNDING BUNA-N AIR SUPPLY 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 m)	1/2 npt(m)

BACK PRESSURE REGULATOR 206-819

3000 psi (210 bar) MAXIMUM WORKING PRESSURE

Use in circulating system fluid return line to regulate back pressure to gun and maintain proper circulating pressure.

FLUID PRESSURE REGULATOR 206-661

3000 psi (210 bar) MAXIMUM WORKING PRESSURE

Use at each gun drop in multiple gun systems, to regulate fluid pressure to each gun.

GROUNDING NYLON FLUID HOSE

3000 psi (210 bar) MAXIMUM WORKING PRESSURE

Part No.	ID	Length	Thd. Size
214-700	3/16" (4.8 mm)	2 ft (610 mm) (fbc) swivel	1/4 npsm
214-701	3/16" (4.8 mm)	3 ft (914 mm)	1/4 npt(m) x 1/4 npsm(f) swivel
210-540	1/4" (6.4 mm)	25 ft (7.6 m)	1/4 npsm (fbc) swivel
210-541	1/4" (6.4 mm)	50 ft (15.2 m) (fbc) swivel	1/4 npsm
214-703	3/8" (9.5 mm)	25 ft (7.6 m)	3/8 npt (mbe)
214-705	3/8" (9.5 mm)	50 ft (15.2 m)	3/8 npt (mbe)
214-920	3/8" (9.5 mm)	100 ft (30.4 m)	3/8 npt (mbe)

STAINLESS STEEL AIRLESS SPRAY GUN

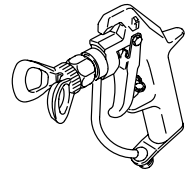
5000 psi (350 bar) MAXIMUM WORKING PRESSURE

208-327 .037" orifice, 2-finger trigger

208-663 .090" orifice, 2-finger trigger

208-664 .090" orifice, 4-finger trigger

220-954 .090" orifice, 2-finger trigger, RAC™ IV Drip-Less™ tip guard



VISCON² FLUID HEATER 220-522

4000 psi (276 bar) MAXIMUM WORKING PRESSURE

Reduces fluid viscosity for easier spraying. 120 V, single-phase, 16.7 Amp. Stainless steel. Refer to Instruction Manual 307-805.

WARNING: Not for use in hazardous areas containing flammable materials or fumes.

INSULATED HOSE KIT 222-263

3000 psi (210 bar) MAXIMUM WORKING PRESSURE

25 ft. (7.6 m) nylon fluid hose for use with heated systems. Includes in-line fluid filter, circulating manifold, and 3 ft. (0.9 m) whip hose.

HEATER CONVERSION KITS

Use to convert pump Models 224-625 and 231-163 to a heated circulating spray system. See pages 16-18 for parts. The Viscon² Heater 220-522 and Insulated Hose Kit 222-263 are also required, and must be ordered separately (see above).

222-262 Heater Mounting Kit

222-261 Circulating Kit

SST PIPE SEALANT 110-110

Apply to all non-swiveling pipe connections.

6 ml supply.

TECHNICAL DATA

Maximum working pressure	3000 psi (210 bar)
Maximum incoming air pressure	100 psi (7 bar)
Ratio	30:1
Maximum recommended pump speed	60 cpm (1.0 gpm [3.8 liters/min]) at continuous operation
Air consumption	approx. 23 scfm (0.79 m ³ /min) at 1.0 gpm (3.8 liter/min) flow rate at 70 psi (4.8 bar) air pressure
Wetted parts	See separate component instruction manuals
PTFE	<i>is a registered trademark</i>

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**

Sales Offices: Atlanta, Dallas, Detroit, Los Angeles, Mt. Arlington (N.J.)
Foreign Offices: Canada; England; Switzerland; France; Germany; Hong Kong; Japan; Korea

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

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Parts Change Notice

Some parts in Rev. F of manual 307-928 have changed but have not yet been changed in the instruction manual. Please note the changes below and mark them in your manual or keep this sheet with your manual.

Assembly No.	Series Letter Change	Part That Changed	Ref No.	Part Description	Description of Change
Model 231-163 only	B	100-403	5	Plug	Replaced by Part No. 100-139 Plug.
		101-180	6	Gauge	Replaced by Part No. 100-960 Gauge.
		206-197	28	Air Regulator	Replaced by Part No. 104-266 Air Regulator. See 308-167 for parts.
		208-663	77	Airless Spray Gun	Replaced by Part No. 235-460 Airless Spray Gun. See 308-236 for parts.
Model 231-160		208-327	77	Airless Spray Gun	Replaced by Part No. 235-462 Airless Spray Gun. See 308-236 for parts.

Other Changes

Page 15: Add the following note after the parts list:

* These parts are included in Regulator Kit 238-898, used on Model 231-163.

- * 100-139 Plug (ref. no. 5), quantity 3
- * 100-960 Gauge (ref. no. 6), quantity 1
- * 187-357 Elbow (ref. no. 15), quantity 1
- * 100-509 Plug (ref. no. 16), quantity 1
- * 162-376 Manifold (ref. no. 20), quantity 1
- * 104-266 Air Regulator (ref. no. 28), quantity 1.

