



 INSTRUCTIONS	This manual contains important warnings and information. READ AND RETAIN FOR REFERENCE
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80:1 Ratio Fire-Ball® Pumps

6400 psi (442 bar) Maximum Fluid Working Pressure

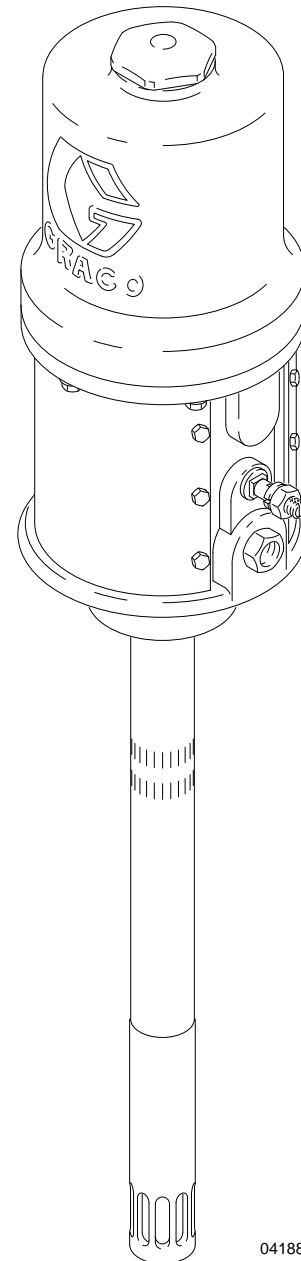
80 psi (5.5 bar) Maximum Air Input Pressure

CHASSIS LUBE PUMPS

With Lifetime Guarantee*

1. This guarantee is offered to the original purchaser for his entire lifetime. It covers all Fire-Ball and President Series lubrication pumps manufactured by Graco Inc., USA, when used in pumping non-corrosive and non-abrasive lubricants and greases.
2. Graco will repair or replace such pumps free of charge when inspection by Graco reveals defective materials or workmanship. Normal wear of packings and seals is not considered to be defective workmanship.
3. Graco will repair or replace such pumps at a reasonable charge if inspection by Graco reveals that damage was the result, in whole or in part, of causes other than defective materials or workmanship.
4. Pumps for which guarantee claims are made must be returned prepaid to the factory, factory branch or service agency accompanied by proof of purchase, establishing the owner as the original purchaser.
5. The foregoing is in lieu of all other warranties, expressed or implied, and the manufacturer neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with said equipment.

*30 years to corporations and purchasers other than natural persons.



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WARNING

These systems are designed to be used only in pumping non-corrosive and non-abrasive lubricants and greases. Any other use of the system can cause unsafe operating conditions and result in component rupture, fire, or explosion, which can cause serious injury, including fluid injection.

See page 6 for available models.

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Terms

Be sure you read and understand each of these terms before reading the rest of the manual.

FLEXIBLE EXTENSION: A flexible rubber hose extending from the dispensing valve, to which a grease fitting coupler is attached.

RIGID EXTENSION: A rigid tube extending from the dispensing valve, to which a grease fitting coupler is attached.

GREASE FITTING COUPLER: The device at the end of the flexible or rigid extension which connects to the parts to be lubricated.

Symbols

Warning Symbol





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

Caution Symbol



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

 WARNING	
 INSTRUCTIONS	<p>EQUIPMENT MISUSE HAZARD</p> <p>Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.</p> <ul style="list-style-type: none">• This equipment is for professional use only.• Read all instruction manuals, tags, and labels before operating the equipment.• Use the equipment only for its intended purpose. If you are not sure, call Graco Technical Assistance at 1-800-543-0339.• Do not alter or modify this equipment.• Check equipment daily. Repair or replace worn or damaged parts immediately.• Do not exceed the maximum working pressure of the lowest rated component in your system. This equipment has a 6400 psi (442 bar) maximum working pressure at 80 psi (5.5 bar) maximum air input pressure.• Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the Technical Data section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.• Handle hoses carefully. Do not pull on hoses to move equipment.• Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below -40°C (-40°F).• Do not lift pressurized equipment.• Comply with all applicable local, state, and national fire, electrical, and safety regulations.

WARNING



INJECTION HAZARD

Spray from the dispensing valve, leaks or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate medical attention.**
- Do not point the dispensing valve at anyone or at any part of the body.
- Do not put your hand or fingers over the end of the dispensing valve.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Use only extensions and grease fitting couplers which are designed for use with your dispensing valve.
- Do not use a low pressure flexible nozzle with this equipment.
- Follow the **Pressure Relief Procedure** on page 10 if the grease fitting coupler clogs and before cleaning, checking or servicing the equipment.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn or damaged parts immediately. Do not repair high pressure couplings; you must replace the entire hose.
- Fluid hoses must have spring guards on both ends, to help protect them from rupture caused by kinks or bends near the couplings.



TOXIC FLUID HAZARD

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

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

WARNING



FIRE AND EXPLOSION HAZARD

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

- Ground the equipment and the object being lubricated. Refer to **Grounding** on page 9.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop dispensing immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being sprayed.
- Keep the spray area free of debris, including solvent, rags, and gasoline.
- Before operating this equipment, electrically disconnect all equipment in the dispensing area.
- Before operating this equipment, extinguish all open flames or pilot lights in the dispensing area.
- Do not smoke in the dispensing area.
- Do not turn on or off any light switch in the dispensing area while dispensing or while there are any fumes in the air.
- Do not operate a gasoline engine in the dispensing area.

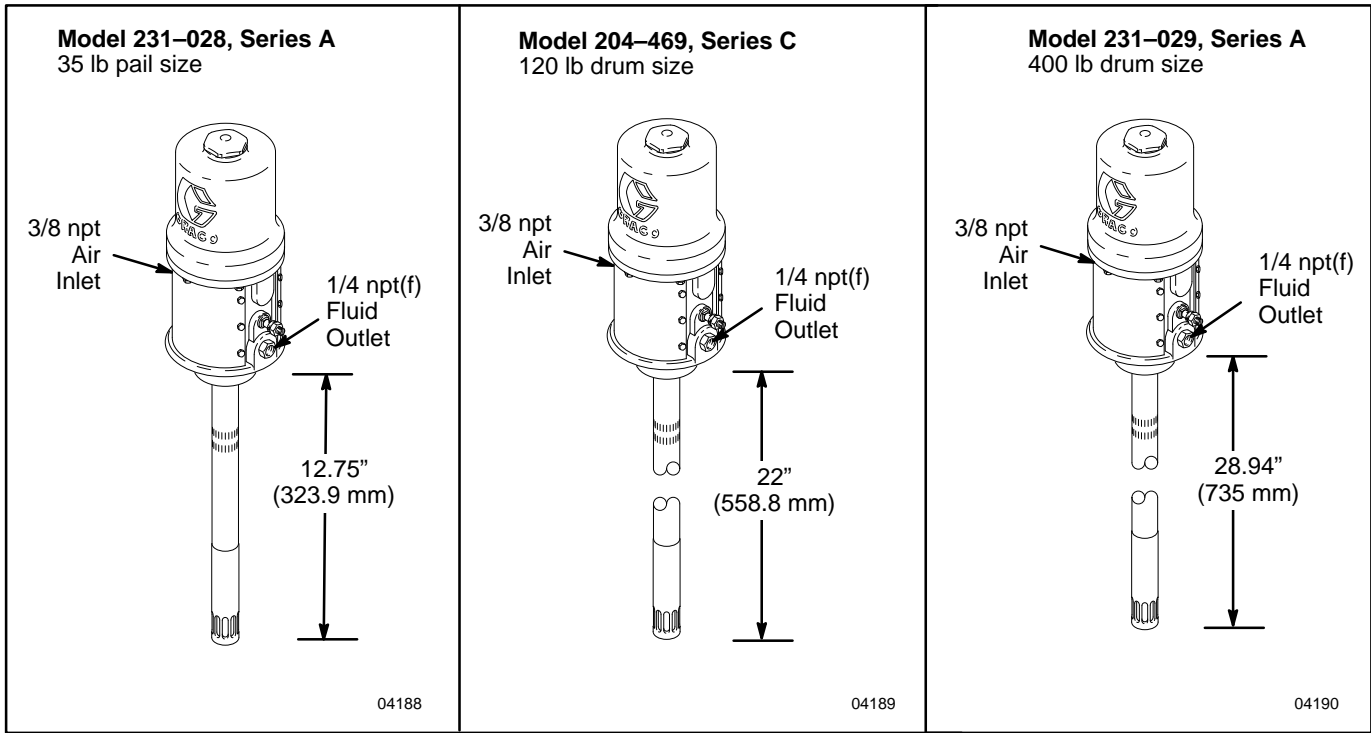


MOVING PARTS HAZARD

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

- Keep hands and fingers away from the priming piston during operation, and whenever the pump is charged with air.
- Do not operate the pump with the air motor plates removed.
- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 10 to prevent the equipment from starting unexpectedly.

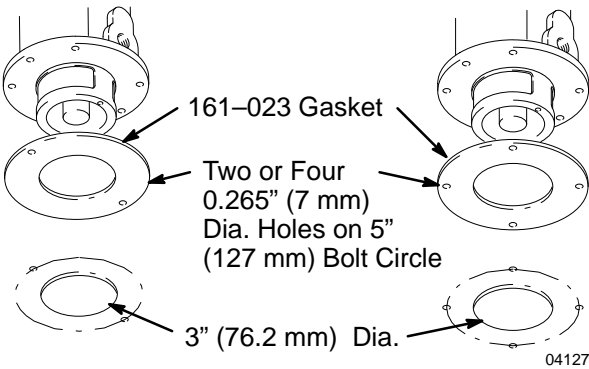
Dimensional Drawings



Mounting Hole Layout

2 Hole Mounting Pattern

4 Hole Mounting Pattern



Technical Data

Maximum Working Pressure	6400 psi (442 bar)
Fluid pressure ratio	80:1
Air pressure range	40 to 80 psi (2.8 to 5.5 bar)
Air consumption	18 cfm (approx) at 70 psi air pressure
Maximum pump delivery	0.10 gal (0.38 liter) per min. delivers 1 gal. (3.8 liters) every 750 cycles
Recommended max. pump speed	75 cycles/min
Wetted parts	Steel, Brass, Aluminum, Nylon, Nitrile rubber
Approximate weight	20 lb (9 kg)

Installation

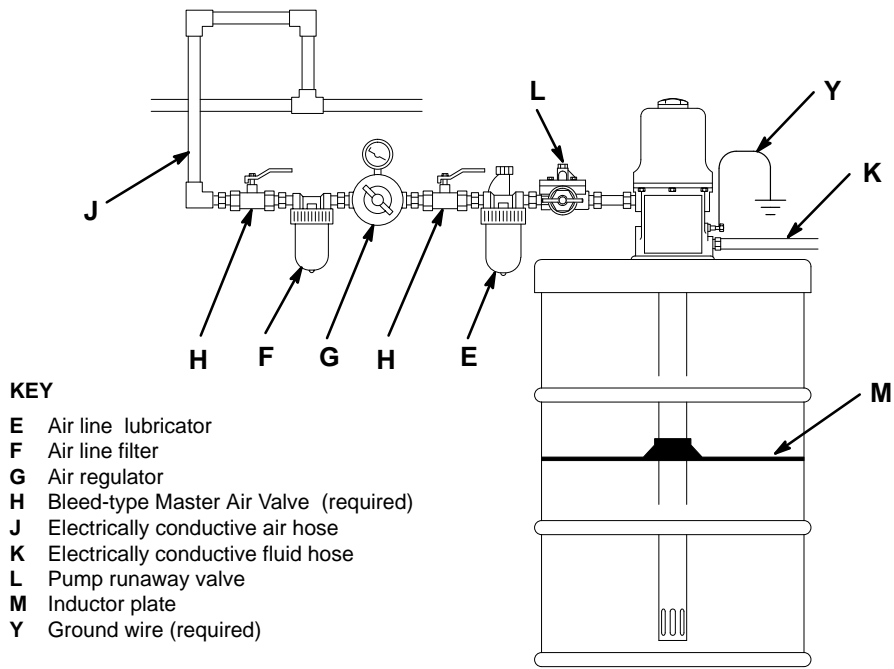


Fig. 1

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

Figure 1 is only a guide to selecting and installing optional and required accessories. For help in designing a system to suit your needs, contact your Graco representative or Graco Technical Assistance (1-800-543-0339).

Mounting

Mount the pump to suit the type of installation planned. Very heavy lubricants may require an inductor plate (M). Refer to page 6 for dimensions and mounting hole layout.

System Accessories

NOTE: Install the accessories in the order shown in Figure 1.

- **An air regulator (G)** controls pump speed. Install it at the air line inlet.
- **A bleed-type master air valve (H)** relieves air trapped between it and the motor when the valve is closed. Install the valve downstream from the air regulator, within easy reach of the pump. Install a second bleed valve upstream from all air line accessories, to isolate them for service.
- **An air line lubricator (E)** provides automatic air motor lubrication. Install it downstream from the air regulator.
- **An air filter (F)** removes harmful dirt and moisture from the compressed air supply. Install it upstream from the air regulator.
- **A pump runaway valve (L)** shuts off air to the motor if the pump starts running too fast. A pump which runs too fast can be seriously damaged.

Connecting the Hoses

1. Connect an electrically conductive air supply hose (J) to the 3/8 npt air inlet or the air regulator. Make sure the hose is properly sized to deliver an adequate supply of air to the motor.
2. Connect an electrically conductive fluid dispensing hose (K) to the 1/4 npt(f) fluid outlet. Install an appropriate dispensing valve or gun to the hose.

⚠ WARNING

The bleed-type master air valve is required to shut off and relieve air pressure that may be trapped in the air motor. Trapped air could cause the pump to cycle unexpectedly and cause serious injury, including amputation. Order Part Number 107-142, Bleed-type Master Air Valve.

Installation

Grounding

Proper grounding is an essential part of maintaining a safe system.

To reduce the risk of static sparking, ground the pump and all other components used or located in the dispensing area. Check your local electrical code for detailed grounding instructions for your area and type of equipment. Be sure to ground all of this equipment:

1. *Pump*: use a ground wire and clamp as shown in Fig. 2.
2. *Air and fluid hoses*: use only electrically conductive hoses.
3. *Air compressor*: follow manufacturer's recommendations.
4. *Dispensing valve*: obtain grounding through connection to a properly grounded fluid hose and pump.
5. *All solvent pails used when flushing or relieving pressure*: always hold a metal part of the valve firmly to the side of a grounded metal pail, then trigger the 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. Connect the other end of the wire to a true earth ground. Order Part No. 222-011, Ground Wire and Clamp.

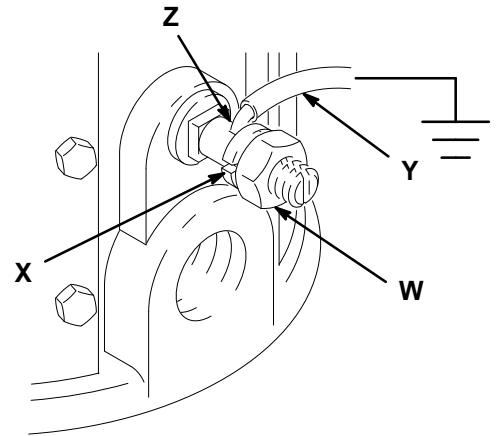


Fig. 2

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Operation

Pressure Relief Procedure

WARNING



INJECTION HAZARD

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

- are instructed to relieve the pressure,
- stop dispensing,
- check or service any of the system equipment,
- or install or clean dispensing devices.

1. Close the pump air regulator and the bleed-type master air valve (required in your system).
2. Hold a metal part of the dispensing valve firmly to a grounded metal waste container and trigger the valve to relieve the fluid pressure.

If you suspect that the dispensing valve, extension or grease fitting coupler is clogged, or that pressure has not been fully relieved after following the steps above, **very slowly** loosen the coupler or hose end coupling and relieve pressure gradually, then loosen completely. Now clear the clog.

Startup

1. Make sure the bleed-type master air valve and the air regulator are closed.
2. Open the bleed-type air valve.
3. Hold a metal part of the dispensing valve firmly to the side of a grounded metal pail and trigger the valve.
4. Slowly open the air regulator until the pump starts.
5. Run the pump slowly until all air is pushed out and the pump and hoses are fully primed.
6. Release the valve trigger. The pump should stall against pressure. The pump will start and stop as the valve is opened and closed.

7. 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.

NOTE: A pump runaway valve (L) can be installed on the air line to automatically shut off air to the motor if the pump is running too fast.

8. If the supply container is empty and air has been pumped into the lines, prime the pump and lines with fluid, or flush it and leave it filled with a compatible solvent. Be sure to eliminate all air from the fluid system.
9. Use the air regulator (G) to control pump speed and fluid pressure. Always use the lowest pressure necessary to obtain the desired results.

WARNING



COMPONENT RUPTURE HAZARD

The maximum working pressure of each component in the system may not be the same. To reduce the risk of overpressurizing any component in the system, be sure you know the maximum working pressure of each component. **Never** exceed the maximum working pressure of the lowest rated component in the system. Overpressurizing any component can result in rupture, fire, explosion, property damage, and serious injury.

To determine the fluid output pressure using the air regulator reading, multiply the ratio of the pump by the air pressure shown on the regulator gauge. For example:

$$80 \text{ (:1) ratio} \times 80 \text{ psi air} = 6400 \text{ psi fluid output}$$

$$[80 \text{ (:1) ratio} \times 5.5 \text{ bar air} = 442 \text{ bar fluid output}]$$

Limit the air to the pump so that no air line or fluid line component or accessory is overpressurized.

10. When you are done using the pump for the day, always follow the **Pressure Relief Procedure** at the left.

Operation

Lubrication

An air line lubricator (E) will provide automatic air motor lubrication. For daily manual lubrication:

1. Disconnect the air regulator (G).
2. Place about 15 drops of light machine oil in the air inlet.
3. Reconnect the regulator.
4. Turn on the air supply to blow oil into the motor.

Troubleshooting

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 10.

Relieve pressure before you check or service any system equipment.

NOTE: Check all other possible problems and solutions before disassembling the pump.

⚠ WARNING



MOVING PARTS HAZARD

Never operate the pump with the warning plate or the identification plate removed. These plates protect your fingers from pinching or amputation by moving parts in the air motor.

When the pump is operating, the priming piston (located at the pump intake) and the air motor piston (located behind the air motor plates) move. Keep your fingers and hands away from the priming piston and other moving parts.

Before you service the pump or attempt to clear an obstruction from the priming piston, follow the **Pressure Relief Procedure** on page 10 to prevent the pump from starting accidentally.

Problem	Cause	Solution
Pump fails to operate	Inadequate air supply pressure or restricted air lines	Increase air supply; clear
	Closed or clogged valves	Open; clean
	Clogged fluid lines, hoses, valves, etc.	Clear*
	Damaged air motor	Service air motor
	Exhausted fluid supply	Refill and reprime or flush
Continuous air exhaust	Worn or damaged air motor gasket, packing, seal, etc.	Service air motor
Erratic pump operation	Exhausted fluid supply	Refill and reprime or flush
	Held open or worn intake valve or piston packings	Clear; service
Pump operates, but output low on up stroke	Held open or worn piston packings	Clear; service
Pump operates, but output low on down stroke	Held open or worn intake valve	Clear; service
Pump operates, but output low on both strokes	Inadequate air supply pressure or restricted air lines	Increase air supply; clear*
	Closed or clogged valves	Open; clean
	Exhausted fluid supply	Refill and reprime or flush
	Clogged fluid lines, hoses, valves, etc.	Clear*
	Packing nut too tight	Loosen
	Loose packing nut or worn packings	Tighten; replace

*Follow the **Pressure Relief Procedure** on page 10 and disconnect the fluid line. If the pump starts when the air is turned on again, the line, etc., is clogged.

Air Motor and Throat Service

Before you start:

1. To reduce downtime, be sure you have all necessary repair parts on hand. Recommended “tool box” spare parts are listed in the parts list with a checkmark (✓).
2. **Air Motor Repair Kit 206–728** includes repair parts for the motor. Use all the parts in the kit for the best results. Parts included in the kit are marked with an asterisk, for example (12*).
3. To avoid damaging the surfaces of some parts, use **Padded Pliers, Part No. 207–579**.
4. An **Adjustment Gauge, Part No. 171–818**, is available to measure the clearance between the valve poppets and the seats.
5. To reseal the balls (37) in the intake and piston valves, reverse the seats (43).
6. Whenever you replace the packings, also replace the glands and bearing.
7. When cleaning parts, use a compatible solvent. Inspect parts for wear or damage and replace as necessary. Scoring or irregular surfaces on the priming tube (53) or smooth inner surface of the displacement cylinder (58) cause premature packing wear and leaking. Check these parts by rubbing a finger on the surface or by holding them up to the light at a slight angle.
8. Use light, waterproof grease whenever grease is mentioned.

Disassembly

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 10.

1. Flush the pump.
2. Relieve the pressure before proceeding.
3. Disconnect all air and fluid hoses.
4. Remove the pump from its mounting and clamp the air motor base in a vise.
5. Use a pipe wrench on the knurled part of the displacement cylinder (58) to screw it out of the air motor base (3).
6. Pull the connecting rod (46) down as far as it will go. Use a hammer and punch to remove the pin (39) from the piston rod (24). Then screw the connecting rod out of the piston rod.

CAUTION

Do not damage the plated surface of the trip rod. Damaging the surface of the trip rod can result in erratic air motor operation. Use Padded Pliers, Part No. 207–579, to grasp the rod.

7. Manually push on the piston rod to move the piston (15) up as far as it will go. Unscrew the cylinder cap nut (30). Pull the nut up. Grip the trip rod (2) with padded pliers and screw the nut off the rod.

CAUTION

To avoid damaging the highly polished cylinder wall, always lift the cylinder straight up off the piston. Never tilt the cylinder as it is being removed.

8. Remove the six screws (5) holding the cylinder (14) to the base. Then carefully pull the cylinder straight up off the piston (15).

Continued on next page.

Air Motor and Throat Service

! WARNING

To reduce the risk of pinching or amputating your fingers, **always** keep fingers clear of the toggle assemblies (L). See Fig. 3.

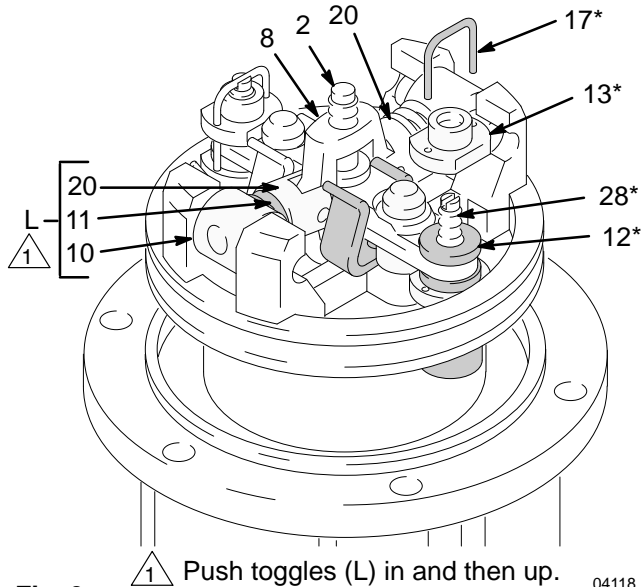


Fig. 3 Push toggles (L) in and then up. 04118

9. Use a screwdriver to push down on the trip rod yoke (8) and snap the toggles down. See Fig. 3. Remove the lockwires (17*) from the adjusting nuts (13*). Screw the top nuts off. Screw the stems (28*) out of the grommets (12*) and bottom nuts. Take the valve poppets (35*) off the stems and squeeze them firmly to check for cracks.
10. Grip the toggle rockers (10) with a pliers. Compress the springs (11) up away from the piston lugs, and remove the parts. Check to see that the valve actuator (18) is supported by the spring clips (16), but slides easily into them. Remove the trip rod yoke (8), actuator (18), and trip rod (2). Check the exhaust valve poppets (36*) for cracks.

NOTE: To remove the exhaust valve poppets (36), stretch them out and cut them with a sharp knife.

11. Remove one of the air motor plates (23 or 59). Pull the piston (15) up out of the base (3). Remove the throat packing nut (25) and take out the flat packing (27), back-up washer (26), bearing (33), packings (31), and gland (32).

Reassembly

1. Clean all the parts carefully in a compatible solvent and inspect for wear or damage. Use all the repair kit parts during reassembly and replace other parts as necessary.
2. Check the polished surfaces of the piston (15), piston rod (24), and cylinder (14) wall for scratches or wear. A scored rod will cause premature packing wear and leaking.
3. Lubricate all parts with a light, waterproof grease.
4. Install the flat packing (27), back-up washer (26), bearing (33), packings (31) and gland (32), in the same order as before and with the lips of the v-packings facing down. Screw the packing nut (25) into the base loosely.
5. Slide the piston rod (24) down through the packings and lower the piston (15) into the base. Be sure the o-rings (21, 22) are in place.
6. Pull the exhaust valve poppets (36*) into the valve actuator (18) and clip off the top part shown with dotted lines. See Fig. 4.

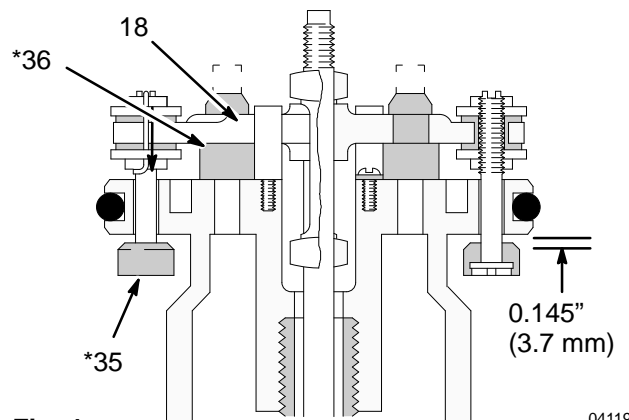


Fig. 4 04119

7. Install the transfer valve grommets (12*), then reassemble the valve mechanism. Before installing the lockwires (17*) in the adjusting nuts (13*), use the adjustment gauge, 171–818, to adjust the transfer valve so there is 0.145 in. (3.7 mm) clearance between the poppets (35*) and the seats when they are open. See Fig. 4. Snap the toggles to the up position.
8. Reassemble the air motor and assemble it to the displacement pump. Before putting the air motor plate back on, tighten the throat packing nut (25) just snug — do not overtighten.
9. Before remounting the pump, connect an air hose and run the pump slowly [at about 40 psi (3 bar)] to see that it operates smoothly.
10. Reconnect the ground wire before regular operation of the pump.

Displacement Pump Service

Before you start:

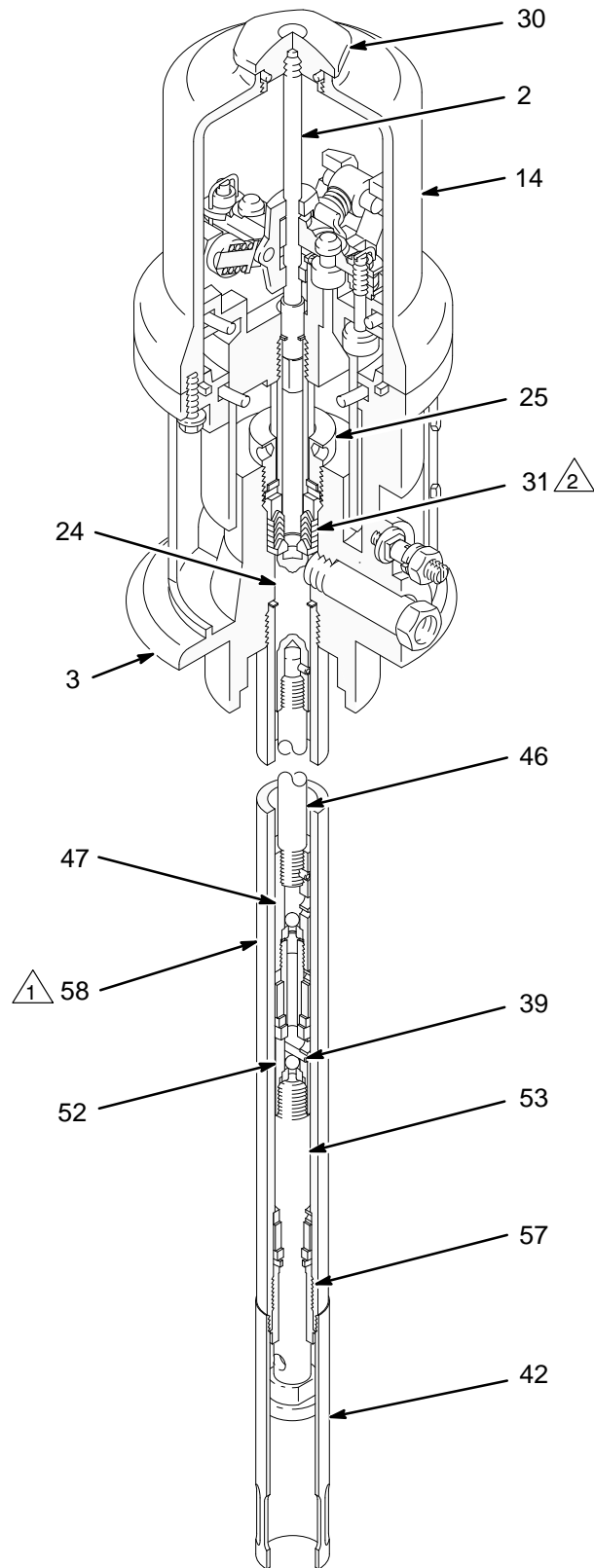
1. Have all the necessary parts on hand. Whenever you replace the packings, also replace the gland (Ref. No. 32) and bearing (Ref. No. 33). If you are using a repair kit, use all the parts for the best results. See the parts page to order repair kits.
2. **Displacement Pump Repair Kit 236–599** is available. Parts included in the kit are marked with a cross, for example, (27†), in the text and drawings.


Parts Replacement Procedure

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 10.

1. Flush the pump.
2. Relieve the pressure before proceeding.
3. Disconnect all air and fluid hoses.
4. Remove the pump from its mounting and clamp the air motor base in a vise.
5. Screw the intake cylinder (42) off the displacement cylinder (58). See Fig. 5.



 Torque to 75–85 ft-lb.

 Lips of v-packings must face down.

Fig. 5

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Continued on next page.

Displacement Pump Service

6. Hold the priming tube (53) with a 0.25 in. (6.4 mm) diameter rod (M). See Fig. 6. Use a wrench to screw the priming piston (41) off the priming tube.
7. Use a pipe wrench at the knurled part of the displacement cylinder (58) to screw it out of the base (3). Screw the packing retainer (57) out of the cylinder. Remove the seal (45), bearings (54, 56) and packing (55).

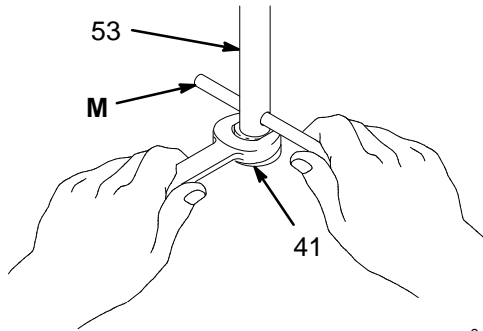


Fig. 6

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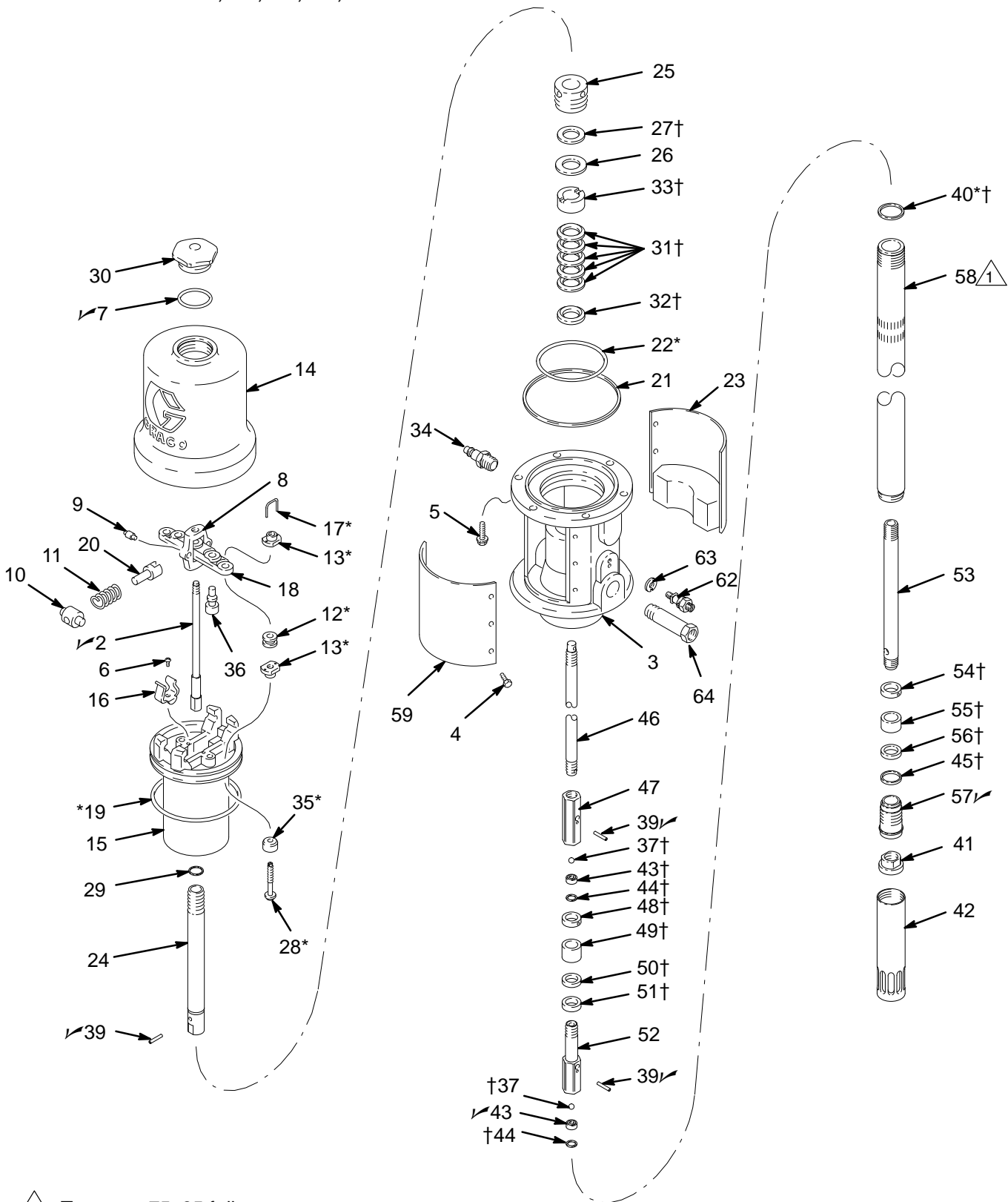
9. Screw the piston housing (52) out of the coupling (47). Remove the upper gasket (44), seat (43) and ball (37). Also remove the bearing (48), packing (49) and seal (50). Do not remove the press-fit brass bearing (51), unless it needs replacing.
- NOTE:** If the pressed-fit brass bearing (51) does need replacing, clamp it in a vise and drive the piston housing (52) out with a plastic hammer. The new guide must be started onto the piston housing squarely.
10. Clean all the parts in a compatible solvent and inspect them for wear or damage. Replace parts as necessary.
 11. The check ball seats (43) can be turned over to provide new seats.
 12. Lubricate the parts with light waterproof grease and reassemble the pump.
 13. If the grounding wire was disconnected before servicing, be sure to reconnect it before operating the pump.

Parts

Ref. No. 1

Air Motor, Series P

Includes items 2-36, 59, 62, 63, 64



1 Triangle symbol Torque to 75-85 ft-lb.

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Parts

Model 204-469

80:1 Fire-Ball Pump; 120 lb size

Includes items 1-64

Model 231-028

80:1 Fire-Ball Pump; 35 lb size

Includes items 1-64

Model 231-029

80:1 Fire-Ball Pump; 400 lb size

Includes items 1-64

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	203-964	AIR MOTOR ASSY,		45†	160-681	SEAL, packing retainer; nylon	1
	Series P	Includes items 2-36, 59, 62, 63, 64	1	46	160-684	ROD, connecting; 12" (304.8 mm) long; Used on Model 204-469 only	1
2✓	203-965	.TRIP ROD	1		160-686	ROD, connecting; 2-3/4" (69.9 mm) long; Used on Model 231-028 only	1
3	204-896	.BASE	1		160-688	ROD, connecting; 18-15/16" (481 mm) long; Used on Model 231-029 only	1
4	100-078	.SCREW, rd hd mach; 8-32 x 3/8"	12	47	160-669	COUPLING, piston	1
5	101-578	.SCREW, hex hd cap; 5/16-18 x 7/8"	6	48†	161-231	BEARING, upper piston guide; brass	1
6	102-975	.SCREW, rd hd mach, sems; 6-32 x 1/4"	2	49†	161-232	PACKING, upper piston block; nitrile rubber	1
7✓	156-698	.O-RING, nitrile rubber	1	50†	161-233	SEAL, back-up; nylon	1
8	158-360	.YOKE, rod, trip	1	51†	161-234	BEARING, lower piston guide	1
9	158-362	.PIN, toggle	2	52	160-676	HOUSING, piston	1
10	158-364	.ROCKER, toggle	2	53	161-236	TUBE, priming	1
11	167-585	.SPRING, helical compression	2	54†	161-237	BEARING, upper priming tube guide; brass	1
12*	158-367	.GROMMET, air intake; rubber	2	55†	161-238	PACKING, priming rod	1
13*	160-261	.NUT, adjusting	4	56†	161-239	BEARING, lower priming tube guide; nylon	1
14	160-613	.CYLINDER (white color)	1	57✓	161-240	RETAINER, packing	1
15	160-614	.PISTON, air motor	1	58	161-241	CYLINDER; 22" (558.8 mm) long; Used on Model 204-469 only	1
16	172-866	.CLIP, spring	2		181-340	CYLINDER; 12-3/4" (323.9 mm) long; Used on Model 231-028 only	1
17*	160-618	.WIRE, lock	2		181-341	CYLINDER; 28-15/16" (735 mm) long; Used on Model 231-029 only	1
18	172-867	.ACTUATOR, valve	1	59	222-499	PLATE, designation (with muffler)	1
19*	160-621	.O-RING, nitrile rubber	1	60	104-088	RIVET, blind	2
20	160-623	.ARM, toggle	2	61	185-220	PLATE, serial	1
21	160-624	.PACKING, square; buna-N	1	62	104-029	LUG, grounding	1
22*	160-625	.O-RING, nitrile rubber	1	63	104-582	WASHER	1
23	222-501	.PLATE, warning (with muffler)	1	64	162-718	ADAPTER; 3/8 npt(m) x 1/4 npt(f)	1
24	160-639	.ROD, piston	1				
25	160-640	.NUT, packing	1				
26	160-641	.WASHER, back-up	1				
27†	160-644	.PACKING, flat; rubber	1				
28*	160-896	.STEM, valve	2				
29	160-932	.GASKET, copper	1				
30	161-435	.NUT, cap	1				
31†	162-391	.V-PACKING, leather	5				
32†	168-851	.GLAND, male	1				
33†	168-852	.BEARING	1				
34	169-971	.FITTING, air line	1				
35*	170-708	.POPPET, valve	2				
36*	170-709	.POPPET, valve	2				
37†	100-069	BALL, steel; 1/4" dia.	2				
39✓	101-579	PIN, spring; 1/8" dia; 3/4" long	4				
40*†☞	150-694	GASKET; copper	1				
41	160-667	PISTON, priming	1				
42	160-668	CYLINDER, intake	1				
43✓	160-670	SEAT, valve; reversible	2				
44†	160-671	GASKET; copper	2				

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

* These parts are included in Repair Kit 206-728, which may be purchased separately.

† These parts are included in Repair Kit 236-599, which may be purchased separately.

☞ Replace gasket every time the cylinder is removed for repair.

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.

Graco Phone Numbers

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you: **1-800-367-4023 Toll Free**

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

Manual Change Summary

This manual was revised to include the following changes:

Displacement Pump Repair Kit, Part No. 236-599, is now available. Parts included in the kit are marked with a cross (†) by the reference number in the parts list.

Part Number 150-694, gasket (qty. 1), was added to Repair Kit 206-728. Replace the gasket every time the cylinder is removed for repair.

A four hole mounting pattern was added to the mounting hole layout on page 6.

A torque requirement of 75-85 ft-lb. was added to the cylinder (Ref. No. 58) on pages 16 and 18.

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

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PRINTED IN U.S.A. 306-554 7/55 Revised 2/95