

Instructions



# 43:1 Bulldog Hydraulic Supply Pump

307714H

EN

Supplies hydraulic oil to the accumulators in an oil rig blow-out prevention system.

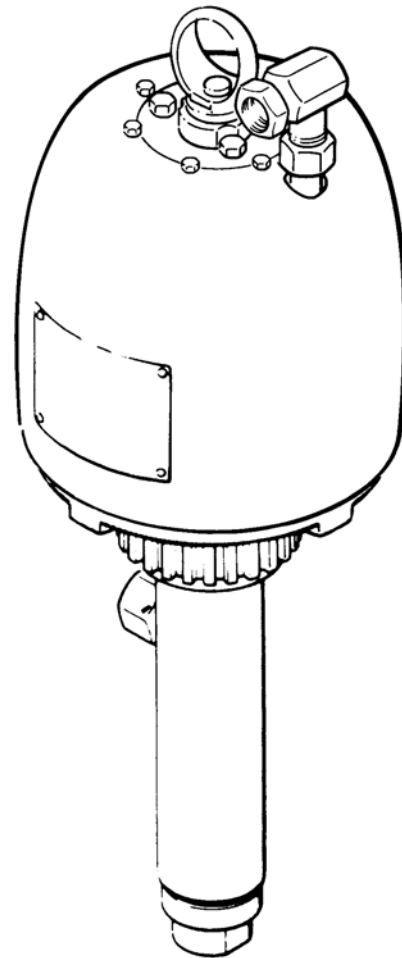
## Model 218334, Series A

*4300 psi (301 bar, 30.1 MPa) Maximum Working Pressure*






### Important Safety Instructions

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








# Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

 <h2 style="margin: 0;">WARNING</h2>	
	<p><b>SKIN INJECTION HAZARD</b></p> <p>High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. <b>Get immediate surgical treatment.</b></p> <ul style="list-style-type: none"> <li>• Do not point dispensing device at anyone or at any part of the body.</li> <li>• Do not put your hand over the fluid outlet.</li> <li>• Do not stop or deflect leaks with your hand, body, glove, or rag.</li> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop dispensing and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses and couplings daily. Replace worn or damaged parts immediately.</li> </ul>
	<p><b>FIRE AND EXPLOSION HAZARD</b></p> <p>When flammable fluids are present in the work area, such as gasoline and windshield wiper fluid, be aware that flammable fumes can ignite or explode. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> <li>• Use equipment only in well ventilated area.</li> <li>• Eliminate all ignition sources, such as cigarettes and portable electric lamps.</li> <li>• Keep work area free of debris, including rags and spilled or open containers of solvent and gasoline.</li> <li>• Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.</li> <li>• Ground all equipment in the work area.</li> <li>• Use only grounded hoses.</li> <li>• <b>Stop operation immediately</b> if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.</li> <li>• Keep a working fire extinguisher in the work area.</li> </ul>

# ! WARNING

 	<p><b>EQUIPMENT MISUSE HAZARD</b></p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Do not operate the unit when fatigued or under the influence of drugs or alcohol.</li> <li>• Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See <b>Technical Data</b> in all equipment manuals.</li> <li>• Use fluids and solvents that are compatible with equipment wetted parts. See Technical Data in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.</li> <li>• Do not leave the work area while equipment is energized or under pressure.</li> <li>• Turn off all equipment and follow the <b>Pressure Relief Procedure</b> when equipment is not in use.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.</li> <li>• Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.</li> <li>• Make sure all equipment is rated and approved for the environment in which you are using it.</li> <li>• Use equipment only for its intended purpose. Call your distributor for information.</li> <li>• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not kink or over bend hoses or use hoses to pull equipment.</li> <li>• Keep children and animals away from work area.</li> <li>• Comply with all applicable safety regulations.</li> </ul>
 	<p><b>MOVING PARTS HAZARD</b></p> <p>Moving parts can pinch, cut or amputate fingers and other body parts.</p> <ul style="list-style-type: none"> <li>• Keep clear of moving parts.</li> <li>• Do not operate equipment with protective guards or covers removed.</li> <li>• Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the <b>Pressure Relief Procedure</b> and disconnect all power sources.</li> </ul>
	<p><b>PERSONAL PROTECTIVE EQUIPMENT</b></p> <p>Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Protective eyewear, and hearing protection.</li> <li>• Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer</li> </ul>

# Typical Installation

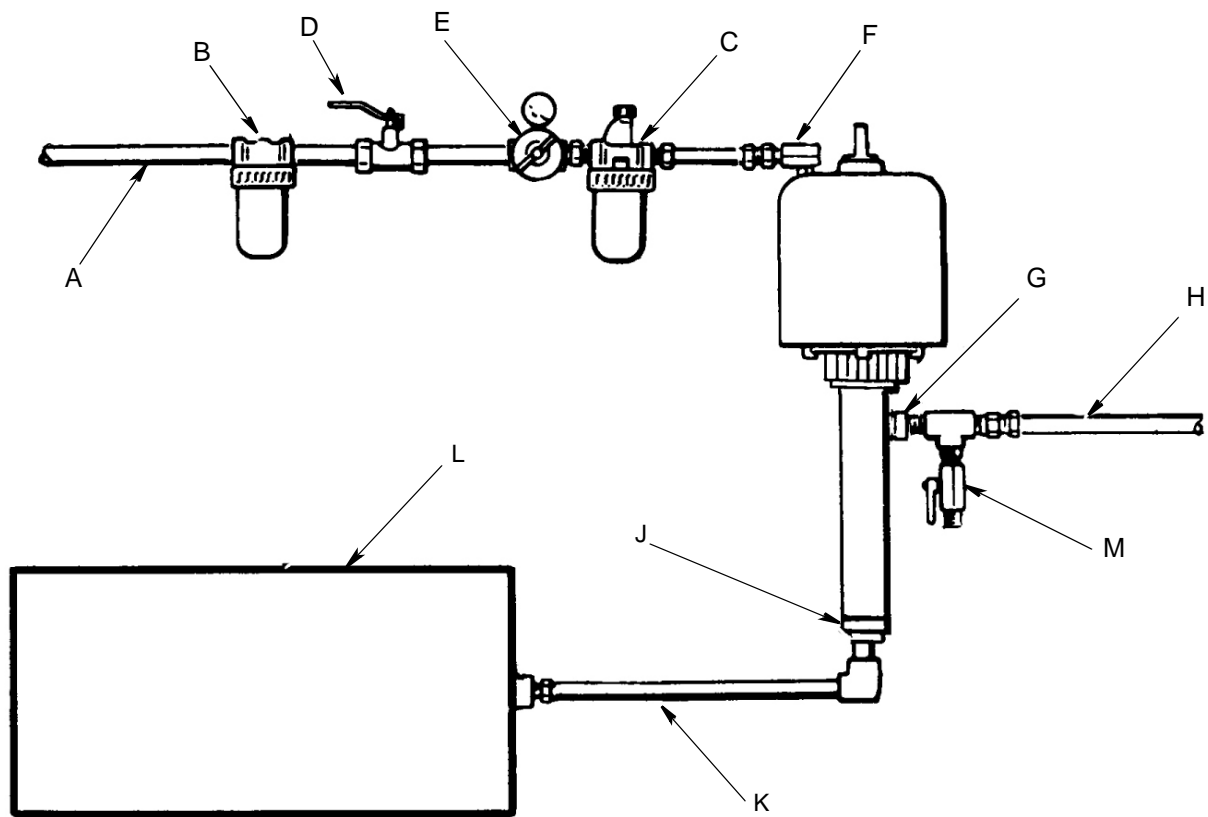


FIG. 1

- A Grounded Air Supply Line
- B Air Filter
- C Air Line Oiler
- D Bleed-Type Master Air Valve
- E Air Regulator
- F Air Inlet
- G Fluid Outlet
- H Grounded Fluid Line
- J Fluid Inlet
- K Grounded Fluid Supply Line
- L Fluid Reservoir
- M Fluid Drain Valve

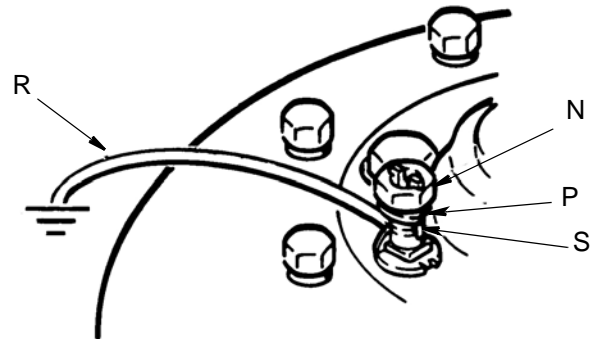
# Installation

The pump is designed to supply hydraulic oil to the accumulators in an oil rig blow-out prevention system.

The Typical Installation shown in FIG. 1, page 4 is only a guide. Contact your Graco representative for assistance in designing a system to meet your needs.

Mount the pump to suit your type of installation. The Dimension Drawing on page 18 gives measurements needed for installing the pump.

Reference numbers and letter in the text refer to the call-out on the drawings.



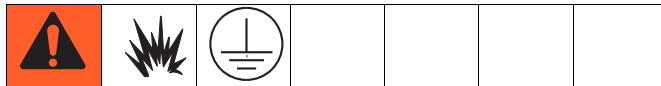
**FIG. 2**

The following instructions refer to FIG. 2.

To ground the pump:

1. Loosen the grounding lug locknut (N) and washer (P).
2. Insert one end of a 12 gauge (1.5 mm<sup>2</sup>) minimum ground wire (R) into the slot in lug (S) and tighten the locknut securely.
3. Connect the other end of the wire to a true earth ground such as a steel building column or water pipe. Check local code.

## Grounding



The equipment must be grounded to reduce the risk of static sparking. Static sparking can cause fumes to ignite or explode. Grounding provides an escape wire for the electric current.

- Proper hose and plumbing line grounding continuity is essential to maintaining a grounded system. Check the electrical resistance of your air and fluid hoses or plumbing line 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 or plumbing line can make your system hazardous.

## System Accessories

The following instructions refer *Typical Installation*, FIG. 1, page 4.

Install the following accessories in the order shown in *Typical Installation* (FIG. 1) using adapters as necessary.

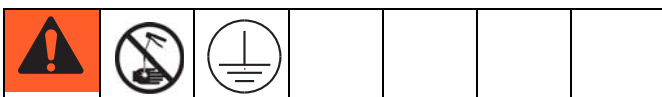
To ensure maximum pump performance, be sure that any accessory used is properly sized to meet your system requirements.



- **A bleed-type master air valve (C) and Fluid Drain Valve (M)** are required in your system to reduce the risk of serious bodily injury from moving parts, injection or splashing in the eyes or on the skin when shutting of the pump. The bleed-type master air valve relieves air trapped between the air valve and pump, after the pump is shut off. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury from splashing or moving parts. Be sure the valve is easily accessible from the pump and located downstream from the air regulator.
- On the **air line (A)** install an **air regulator (D)** near the **pump air inlet (E)** to control pump speed and outlet pressure and an **air line oiler (C)** downstream from the regulator to provide automatic lubrication to the air motor.
- Use an adequately sized air regulator to control pump speed and fluid pressure.
- Upstream from the oiler, install an **air filter (F)** to remove harmful dirt and moisture from the compressed air supply.

## Hose and Plumbing Lines

The following instructions refer to *Typical Installation*, FIG. 1, page 4.



In this system, fluid and air lines may be either hoses or hard plumbed. All lines must be grounded (see Grounding, page 5).

- **ALL FLUID HOSES MUST HAVE SPRING GUARDS!** 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 or plumbing component. Before each use, check the entire hose or plumbing line for cuts, leaks, abrasion, bulging cover, damage or movement of couplings. If any of these conditions exist, replace the hose or defective components immediately. **DO NOT** try to recouple high pressure hoses or mend it with a tape or any other device. A repaired hose cannot contain the high pressure fluid.



### Connecting Lines

1. Connect the **air supply (A)** to the 3/4 npsm(f) **air inlet (F)**.
2. Connect the **fluid supply line (K)** to the 1 inch npt(f) **fluid intake (J)** and the **fluid line (H)** to the 3/4 npt(f) **fluid outlet (G)**.

### Flush Before Using Equipment

The equipment was tested with lightweight oil, which is left in the fluid passages to protect parts. To avoid contaminating your fluid with oil, flush the equipment with a compatible solvent before using the equipment.

# Operation

						
<p>Never exceed 100 psi (7 bar, 0.7 MPa) air input pressure to the pump, to reduce the risk of component rupture which can cause serious bodily injury, including injection or splashing of fluids in the eyes or on the skin and to avoid damage to the pump.</p>						

## Starting and Adjusting the Pump

1. Open the fluid supply shut off valve and the system drain valve.
2. Open the bleed-type master air valve (C).
3. Slowly open the air regulator (D) until the pump starts to cycle - about 40 psi (2.8 bar, 0.28 MPa).
4. Allow pump to cycle slowly until all air is purged from the lines.

**NOTE:** The lines are purged when the fluid emitted from the drain valve is flowing in a steady stream.

5. With the lines purged, close the system **drain valve (M)**.

**NOTE: The pump will stall against pressure.**

- With the pump and lines primed and with adequate air pressure and volume supplied, the pump will start and stop as supply demands or until the bleed-type master air valve (C) is shut off.

<b>NOTICE</b>
<p>Always use the lowest air pressure necessary to give you the result you want. Higher pressure causes premature pump wear.</p>

- 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, prime the pump and lines with fluid or flush and leave filled with compatible solvent.

<b>NOTICE</b>
<p>Never allow the pump to run dry of fluid being pumped. A dry pump will quickly accelerate to a high speed, possibly damaging itself.</p>






- Be sure to eliminate all air from fluid system to prevent corrosion.

<b>NOTICE</b>
<p>Water or even moist air can cause pump corrosion. To prevent corrosion, NEVER leave the pump filled with water or air. After normal flushing, flush the pump again with water or mineral spirits or oil-based solvent, <b>relieve pressure</b> (see Pressure Relief Procedure, below) and leave the mineral spirits in the pump.</p>

## Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.

						
<p>This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop pumping and before cleaning, checking, or servicing the equipment.</p>						

1. Shut off air to the pump.
2. Close the bleed-type master air valve.
3. Open all fluid drain valves in the system, having a waste container ready to catch drainage. Keep your hands away from the end of any drain valve when opening it.
4. Leave drain valve(s) open until you are ready to pump again.
5. If you suspect the hose is clogged or plumbing line is clogged or that pressure has not been fully relieved after following the steps above, VERY SLOWLY loosen the hose or line end coupling to relieve pressure gradually, then loosen completely. Clear the obstruction.

# Maintenance and Repair

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Never operate the pump with the air motor shield removed. The shield encloses the air valve housing, which moves during operating and can pinch or amputate your fingers.

## Throat Packing Nut

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1. **Relieve pressure** following pressure relief procedure (page 7).
2. Check tightness of throat packing nut, weekly. The nut should be tight enough to prevent leakage - no tighter.

## Locating Air Leaks

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Air leaks can generally be detected by listening when the pump is not running. To locate where the air is leaking:

1. Turn off air supply.
2. Relieve pressure, page 7.
3. Disconnect the air hose.
4. Screw the inlet union (117) out of the manifold (87).
5. Remove the air motor shield (73) and screw the inlet union (117) back into the manifold (87).
6. Connect the air hose and turn the air on. **DO NOT EXCEED 40 psi (2.8 bar, 0.28 MPa) inbound pressure.**
7. Use the checking methods listed in the Air Leak Check Chart to find where the air is leaking. Replace parts as necessary.

## Air Leak Check Chart

Stroke Position	Check Points (FIG. 3)	Checking Method	Cause
Down	A - air manifold	By feel	Blown air manifold gasket (91)
	B - between cylinder and base	By feel	Blown air cylinder gasket (103)
	C - weep hole	By feel	Blown base bearings, upper o-ring or cup seal
Up	D - trip rod	Squirt oil around bearing (98)	Worn trip rod packing (71) or bearing (98)
	E - air director valves	Squire oil around air valves (92)	Worn air valve (92) or their packings (93)
Both	F - exhaust holes	Hold paper strip over exhaust holes	Worn air piston o-ring (69)

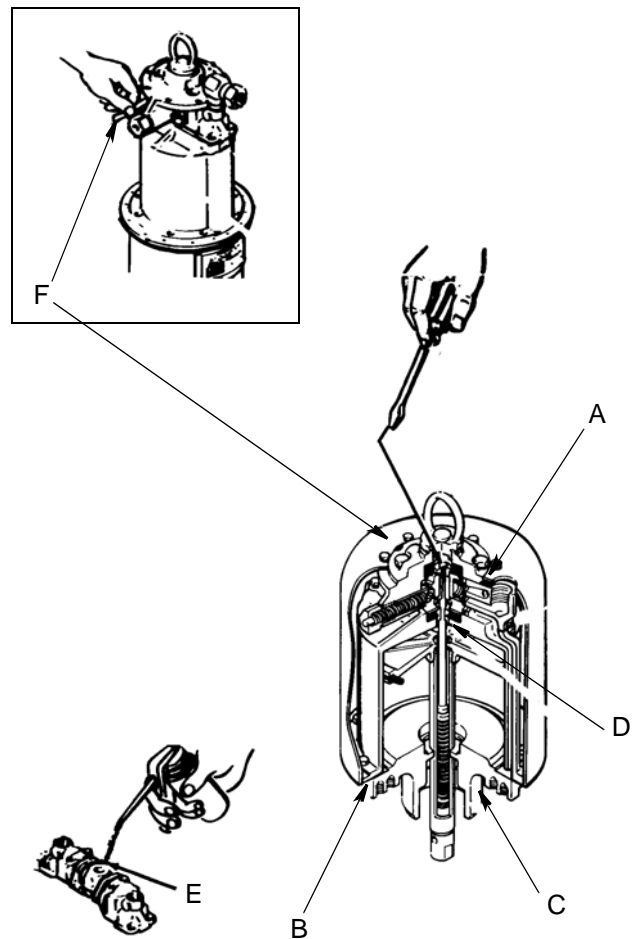


FIG. 3



## Fluid Leaks

If the pump continues to operate when the hydraulic outlet valve is closed, the packings are worn or the ball check valves are leaking.

If anything more than a light film of fluid is detected at the weep hole, the base bearings gasket (100) or both the gasket and the base bearing (98) need to be replaced.

## Air Motor Service

### Stalled Air Motor



A stalled air motor may be caused by icing due to unusual environmental conditions such as:

- operating at a high cycle rate under hot, high humidity conditions
- long operation under cold, arctic conditions

If a motor stalling is not caused by environment conditions, try filling the air lubricator with non-detergent, SAE #10 oil to prevent stalling.

To start a stalled motor, either turn off the air and allow the ice to melt (if stalling is due to icing) or follow this procedure:

- Turn off the air supply.
- Remove the lift ring (74).

						
Do not use your fingers to disengage the air valve housing. Moving parts in the air motor can pinch or amputate your fingers.						

- Push down the air valve housing (102) with a screw driver. **DO NOT** use your fingers!
- Screw the lift ring (74) back on.
- Turn on the air supply.

## Air Motor Disassembly

Reference numbers used in the following instructions refer to FIG. 4 on page 10.



- Turn off air supply
- Relieve pressure**, page 7.
- Disconnect all hoses, tubes, controls, etc. from the air motor to provide ease in servicing.
- Remove lift ring (74).
- Remove the swivel adapter (117). Remove the eight cap screws (75). Then lift the air motor shield (73) off the air motor.
- Remove the air inlet spring cap (107) and the detent spring retainers (77).

<b>NOTICE</b>
Handle springs carefully. Scratches or nicks will cause early spring failure.

- Take out the compression springs (78), spring guides (79), and the plungers (80). Inspect the parts for wear or damage and replace them as necessary.
- Remove the four screws (82) and lock washers (83) holding the detent housing (81). Lift the housing up, off the air manifolds (87) while holding the detent rollers (89) in the housing.
- Remove the detent rollers (89), axles (90), thrust washer (96) and dampening pad (97) from the detent housing (81). Inspect the parts for wear and damage. If either the roller or axle is worn or damaged, replace both; that are a matched set.
- Remove the caps crews (85) and lockwashers (86).
- The air director valves (92) are spring compressed between the air valve housing (102) and the manifold valve plates (101). **CAREFULLY** remove both air manifolds. Check the air director valves (92), o-rings (93) and springs (94) for wear or damage. Replace if necessary.
- Remove the four screws (88) in each manifold plate (101). Check the manifold plates and seals (42) for

wear or damage. Remove the air manifold gaskets (91). Replace any worn parts.

13. Remove the trip rod nut (106) and the lock washer (86) from the trip rod (43a). Pull the air valve housing (102) up off the trip rod.
14. Pull the trip rod and piston assembly (43) up as far as possible.
15. Grip the trip rod (43a) below the bushing (95) with a padded pliers, and screw the bushing off the trip rod.



**NOTE:** Special care to avoid damaging the plated surface of the trip rod must be taken. A padded pliers, part number 207579 is available from Graco.

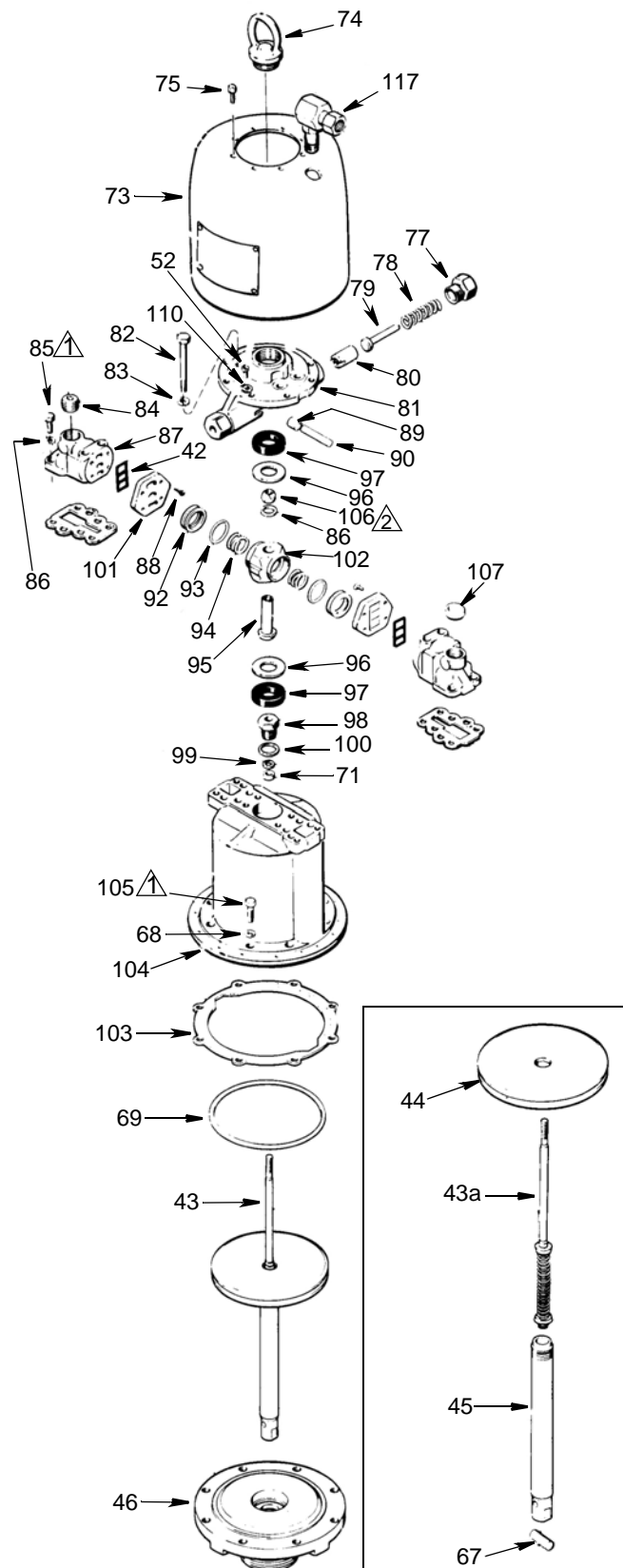
16. Remove the thrust washer (96) and dampening pad (97) from the air motor cylinder (104).
17. Remove the eight screws (105) and lockwashers (68) holding the air motor cylinder to the base (46).
18. **Carefully** pull the air motor cylinder (104) straight up off the air motor base (46) and trip rod and piston assembly (43a).

**NOTE:** Be careful not to tilt the cylinder as this could damage the smooth inner surface.

19. Check piston o-ring (69) for wear or damage and replace if necessary. The diameter of the o-ring is larger than that of the piston. Inspect the cylinder gasket (103) and replace as necessary.

**FIG. 4 Torque Key**

	Torque to 25 ft. lbs (34 N.m)
	Torque to 20-25 ft. lbs (27-34 N.m)



**FIG. 4**

## Air Motor Assembly

Reference numbers used in the following instructions refer to FIG. 4 on page 10.

1. Install the piston o-ring (69) on the piston (44) using heavy petroleum grease. Be sure the slots in the gasket (103) align with the air passages in the motor cylinder (104). Since the diameter of the o-ring is greater than the piston, gather the excess o-ring to one side of the piston and tuck it into one of the two indented areas of the air motor cylinder.
2. Secure the cylinder (104) with the eight screws (105) and washers (68). Torque to 25 ft-lbs (34 N.m).
3. Be sure the back-up washer (99) and v-packing (71) are in place on the trip rod bearing (98).
4. Place the copper gasket (100) over the trip rod (43a) and attach trip rod bearing (98) to the trip rod.
5. Reinstall the dampening pad (97) and thrust washer (96).
6. Place the valve plate seals (42) between the air manifold (87) and the valve plates (101) with the rounded side of the valve plates out. Screw four manifold plate screws (88) into both air manifolds.
7. Before installing the air manifolds (87) pull the trip rod and piston assembly up as far as possible. Line up the air manifolds with the gaskets (91) and loosely screw the two rear manifold screws (85) with lockwashers (86) into both air manifolds.
8. Position the alignment tool (see Accessories page X) between the two air manifolds. Hold the two air manifolds against the alignment tool and torque the screw (85) in each manifold to 25 ft. lbs (34 N.m). Screw another screw into each manifold. Remove the alignment tool.
 

**NOTE:** If an alignment tool is not available, complete the following steps 9 & 10. Then measure and set the space at 1.8 inch (45.7 mm) between the two air manifolds and the air valve housing (102).
9. Screw the trip rod bushing (95) onto the trip rod (43a). Hold the trip rod with padded pliers.
 

**NOTE:** Special care to avoid damaging the plated surface of the trip rod must be taken. A padded pliers, part number 207579 is available from Graco.
10. Place the air valve housing (102) over the trip rod bushing (95).
11. Secure the air valve house (102) with the trip rod nut (106) and lockwasher (86). Torque the nut to 20-25 ft-lbs (27-34 N.m) until .031 in. (about the thickness of a US dime) of the trip rod (43a) extends above the nut.
12. Place the o-rings (93) around each director valve (92).
13. Place the two compression springs (94) in each side of the air valve housing (102).
14. With the air valve housing (102) pushed all the way down against the air motor cylinder (104), place the air director valves (92) against the springs (94) and compress them into the air valve housing (102).
15. Install the dampening rod (97) and thrust washer (96) in the detent housing (91). Use a heavy petroleum base grease to hold them in position.
16. Coat the plungers (80), spring guides (79), and compression springs (78) with heavy petroleum grease and install them in the detent housing.
17. Engage the threads of the detent spring retainers (77) one turn into the detent housing (81).
18. Place the detent axle (90) and roller (89) into the detent housing (81), using heavy petroleum grease.
19. Place the detent housing (81) on the air manifolds (87) while holding the detent axles (90) and rollers (89) in position with your fingers from the top of the housing.
20. Before install the four detent housing screws (82) and lockwashers (83), be sure the detent axles (90) and rollers (89) align correctly with the valve housing (102). Tighten the detent spring retainers (77) as required to properly align the rollers (89).
21. Screw the four detent housing screws (82) with lockwashers (83) into the housing (81).
22. Position the spring cap (107) on the air manifold.
23. Place the air motor shield (73) over the air motor and secure it with the eight shield retaining screws (75).
24. Reinstall the swivel adapter (117). Screw in the lift ring (74).

# Displacement Pump Service

## Pump Disassembly

Reference numbers used in the following instructions refer to FIG. 5 on page 13.



1. Turn off air supply
2. **Relieve pressure**, page 7.
3. Disconnect all hoses, tubes, controls, etc. from the pump to provide ease in servicing.
4. Loosen, but do not remove, the intake valve housing (62) while the displacement pump is still assembled to the air motor base (46).
5. Remove the outlet adapter (56). Inspect the o-ring (720 and replace if necessary.
6. Remove the cylinder coupling nut (57).
7. Insert a 3/4 npt pipe nipple or extension into the outlet of the cylinder (55). Use this as a handle to turn and remove the cylinder.
8. Remove the intake housing (62) from the cylinder (55). Inspect the ball stop pin (58), guide (59), ball (60), and o-ring (61) for wear or damage, and replace as necessary.
9. Unscrew the piston and valve seat housing (54) from the trip rod and piston assembly (43). Remove the ball (48) from its seat and then remove the washer (49), spring (50), male gland (51), v-packings (111, 112), and female gland (53). Inspect the parts for wear or damage and replace as necessary.
10. Remove the packing housing (47) from the air motor base (46). Take out the parts and clean all except the seals with a compatible solvent. Clean the seals with a soft cloth. Check the packing housing for wear or damage and replace if necessary.
 

**NOTE:** As a preventive maintenance procedure, replace all the seals every five years or sooner if necessary.
11. Inspect the piston shaft (45) for scoring or wear. The piston shaft is a part of the trip rod and piston assembly (43) which must be replaced as one

piece. Do NOT break loose the epoxy fitting.

**NOTE:** Replacing this assembly requires disassembly of the air motor, as described in the previous section.

Scoring or irregular surfaces on the piston shaft or polished inner wall of the cylinder (55) causes premature packing wear and leaking. Check these parts by rubbing a finger over the surface or holding the part up to the light at an angle. Replace worn or damaged parts as needed.

## Pump Assembly

Reference numbers used in the following instructions refer to FIG. 5 on page 13.

1. Carefully slide the packing housing (47) onto the piston shaft (45).
2. Insert the packing housing (47) into the air motor base (46) by tapping lightly on the housing.
3. Insert the packings into the packing housing (47) from the bottom and push them up toward the air motor. Be sure the lips of the v-packings are facing DOWN against the fluid pressure. The packings should be inserted in the following order:
  - female gland
  - white v-packing
  - black v-packing
  - white v-packing
  - black v-packing
  - male gland
  - compression spring
  - washer
  - retaining ring
4. Place the piston packing onto the piston and valve seat housing (54) in the following order with the lips of the v-packing facing UP against fluid pressure:
  - female gland (53)
  - white v-packing (112)
  - black v-packing (111)
  - white v-packing (112)
  - black v-packing (111)
  - male gland (51)
  - spring (50)
  - washer (49)
5. Apply Loctite® 27 sealant or equivalent to the housing (54) threads.

6. Place the check ball (48) onto the seat of the piston and valve seat housing (54) and screw the housing into the piston shaft (45). Torque the housing to 137-143 ft-lbs (186-194 N.m).
7. Slide the pump cylinder (55) into the air motor base (46).
8. Screw the cylinder coupling nut (57) onto the air motor base (46), securing the pump cylinder (55).
9. With the o-ring (72) in place, screw the outlet adapter (56) into the pump cylinder.
10. Place the ball stop pin (58) into the upper set of the holes of the ball guide (59).
11. Place the check ball (60) into the intake housing (62). Insert the ball guide (59) containing the stop pin into the intake valve housing.
12. Put the o-ring (61) in place and screw the intake valve housing (62) into the base of the pump cylinder (55). Tighten securely.
13. Reconnect all hoses, plumbing, etc. to restore the pump to operation. Reconnect the ground wire if it was disconnected.

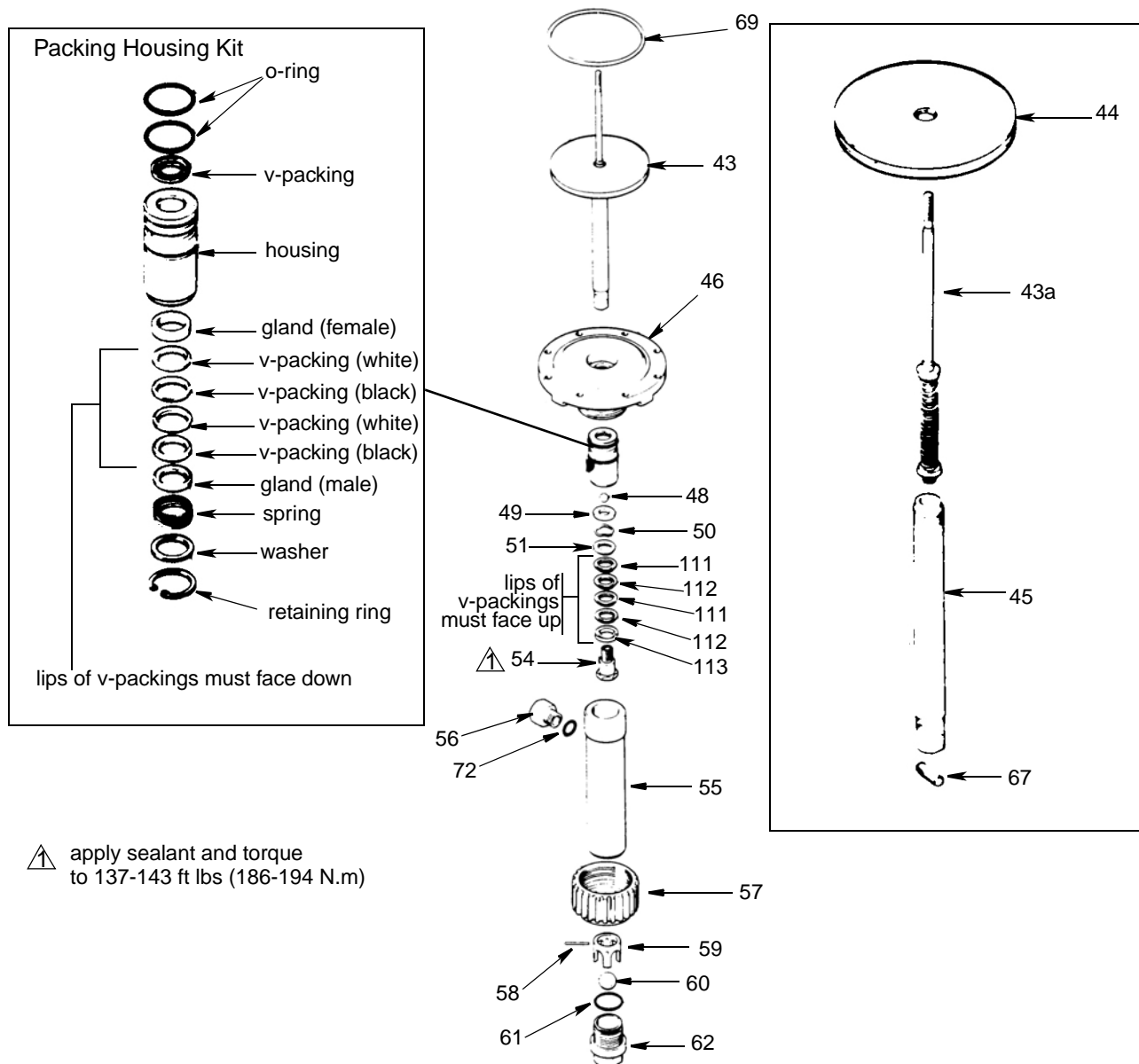
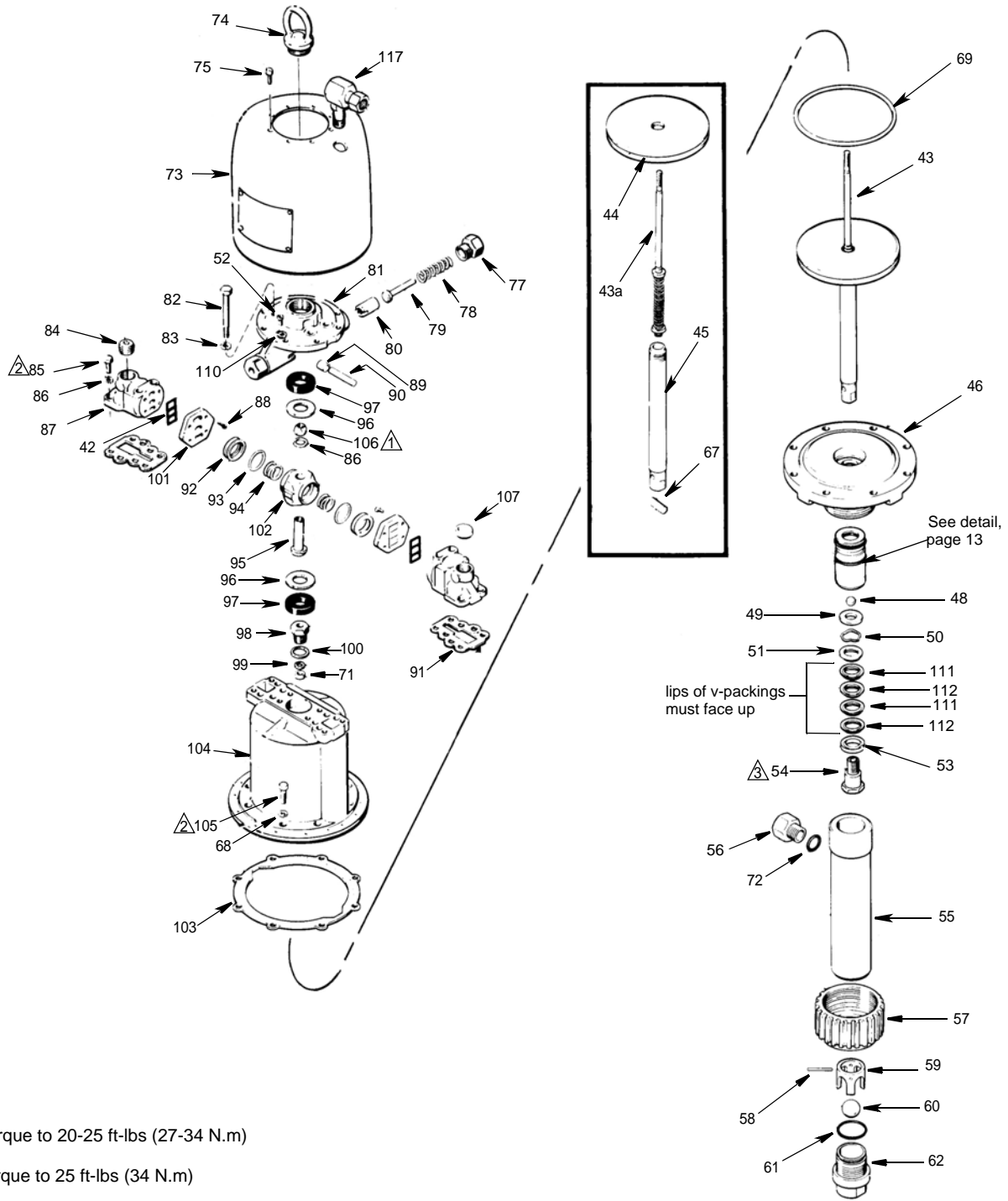


FIG. 5

# Parts



▲ Torque to 20-25 ft-lbs (27-34 N.m)

▲ Torque to 25 ft-lbs (34 N.m)

▲ Apply sealant and torque to 137-143 ft-lbs (186-194 N.m)

## Parts

Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
				99†		WASHER, backup; leather	1
				100†		GASKET, brass	1
42†		SEAL, valve plate	2	101†		PLATE, valve	2
43		PISTON, trip	1	102†		HOUSING, air valve	1
43a		ROD, trip	1	103†		GASKET	1
44		PISTON, air motor	1	104		CYLINDER, air motor	1
45		SHAFT, piston	1	105		CAPSCREW, hex head; 1/2-13 x 1"	8
46		BASE, air motor	1	106†		NUT, trip rod	1
47❖		HOUSING, packing	1	107†		CAP, spring	1
48❖		BALL, stainless steel; 5/8"	1	108†		SLEEVE	1
49❖		WASHER, backup	1	110		WASHER, tab	1
50❖		SPRING, wave	1	111❖		V-PACKING, rubber	2
51❖		GLAND, male, brass	1	112❖		V-PACKING, UHMWPE	2
52		CLAMP, grounding	1	117		UNION, adapter; 90° swivel; 3/4 npsm(f)	1
53❖		GLAND, female; brass	1	118▲	290331	LABEL, warning	1
54❖		HOUSING, piston and valve seat	1	119▲	189991	LABEL, warning, crush	1
55		CYLINDER, pump	1				
56❖		ADAPTER, outlet; 3/4 npt(f) x 1-1/16-12 un	1				
57		NUT, coupling	1				
58❖		PIN, ball stop	1				
59❖		GUIDE, ball	1				
60❖		BALL, stainless steel	1				
61❖		O-RING, buna-n	1				
62❖		HOUSING, intake; 1" npt(f)	1				
67		PIN, ball stop	1				
68		LOCKWASHER, spring; 1/2"	1				
69†		O-RING, piston; buna-n	1				
71†		V-PACKING; polyurethane	1				
72❖		O-RING, buna-n	1				
73		SHIELD, air motor	1				
74		LIFT RING	1				
75		SCREW, flange, 1/4-20 x 1/2"	8				
77		RETAINER, detent spring	2				
78†		SPRING, compression	2				
79†		GUIDE, spring	2				
80†		PLUNGER, detent	2				
81		HOUSING, detent	1				
82		CAPSCREW, hex-head; 7/15-14 x 3"	4				
83		LOCKWASHER, spring; 7/16"	4				
84		PLUG, pipe, socket-head; 3/4 npt	1				
85		CAPSCREW, hex head; 3/8-16 x 1"	4				
86		LOCKWASHER, spring; 3/8"	5				
87		MANIFOLD, air	2				
88		SCREW, flathead, machine; No.10-24 x 1/2"	8				
89†		ROLLER, detent	2				
90†		AXLE, detent	2				
91†		GASKET, air manifold; buna-n	2				
92†		VALVE, air director	2				
93†		O-RING, buna-n	2				
94†		SPRING, compression	2				
95†		BUSHING, trip rod	1				
96†		WASHER, thrust	2				
97†		PAD, dampening	1				
98†		BEARING	1				

▲ Replacement Danger and Warning labels, tags, and cards are available at no cost.

❖ Parts are included in Pump Repair Kit 24U227, sold separately.

† Parts are included in Air Motor Repair Kit 24U228, sold separately.

NOTE: Pump and Air Motor Repair Kit 24W515 includes all parts in Repair Kits 24U227 and 24U228, sold separately.

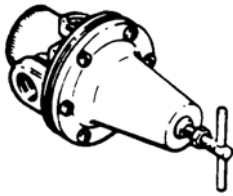
# Kits and Accessories

## Air Pressure Regulator

300 psi (21 bar, 2.1 MPa) Maximum Working Pressure

### Part No. Description

- 206197 1/2 npt inlet and outlet
- 207755 3/4 npt inlet and outlet

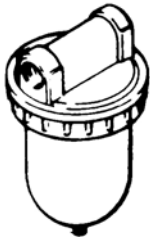


## Air Line Filter

250 psi (17.5 bar, 1.75 MPa) Maximum Working Pressure

### Part No. Description

- 106149 1/2 npt inlet and outlet
- 106150 3/4 npt inlet and outlet



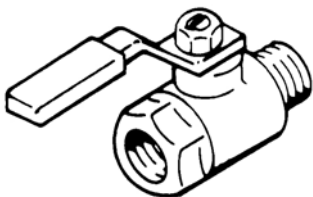
## Bleed-Type Master Air Valve

Used to relieve air trapped in the air line between the pump air inlet and this valve when closed.

300 psi (21 bar, 2.1 MPa) Maximum Working Pressure

### Part No. Description

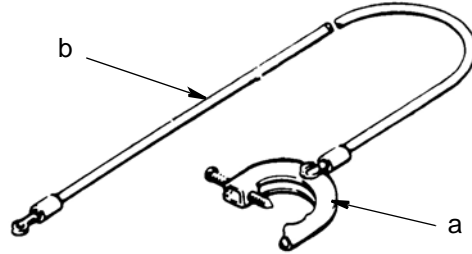
- 107142 1/2 npt inlet and outlet



## Grounding Clamp and Wire

### Ref Part No. Description

- a 103538 Grounding Clamp
- b 222011 Ground Wire

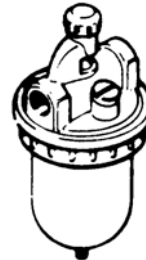


## Air Line Lubricator

250 psi (17.5 bar, 1.75 MPa) Maximum Working Pressure

### Part No. Description

- 214848 1/2 npt inlet and outlet
- 214849 3/4 npt inlet and outlet



## Special Tools

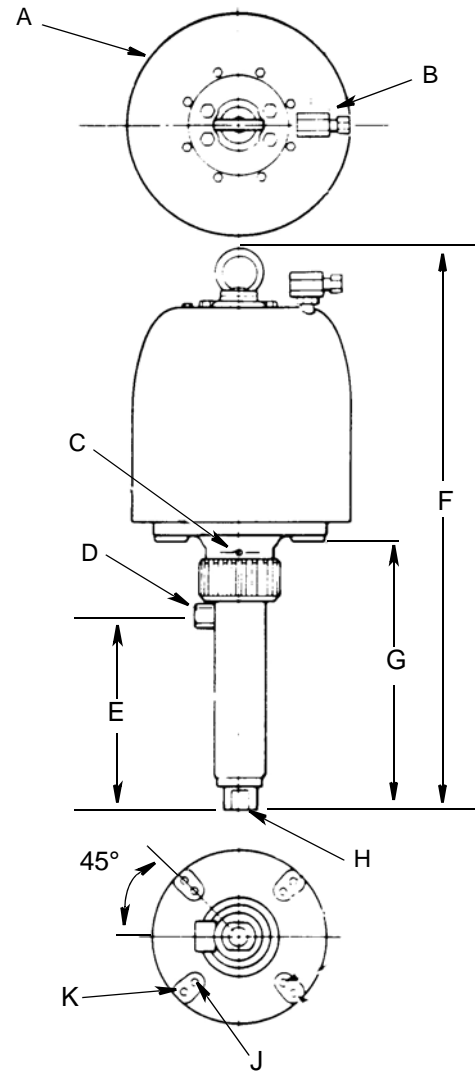
### Part No. Description

- 207579 Padded Pliers
- 168513 Alignment Tool



# Dimensions

- A Diameter 11 in. (279.4 mm)
- B Air Inlet 3/4 npsm
- C Weep Hole - NOTE: Fluid fitting is 90° from weep hole
- D Fluid Outlet 3/4 npt
- E 10.5 in. (266.7 mm)
- F 29.5 in. (0.75 m)
- G 14.7 in. (373.4 mm)
- H Fluid Intake 1 in. npt
- J Diameter Bolt Circle 7.25 in. (184 mm) 1/2 -13 UNC-2B
- K Diameter Bolt Circle 8.84 in. (224 mm) 1/2 -13 UNC 2B



# Technical Data

<b>43:1 Bulldog Hydraulic Supply Pump</b>		
	<b>US</b>	<b>Metric</b>
Maximum working pressure	4300 psi	30.1 MPa, 301 bar
Maximum air input pressure	100 psi	0.7 MPa, 7 bar
Air inlet	3/4 npsm(f)	
Fluid inlet	1 in. npt(f)	
Fluid outlet	3/4 npt(f)	
<b>Materials of Construction</b>		
Wetted materials on all models	carbon steel, stainless steel, chrome plating, zinc plating, nickel plating, brass, buna-n	
<b>Notes</b>		
<i>Loctite® is a registered trademark of the Loctite Corporation.</i>		



# Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

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This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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**TO PLACE AN ORDER**, contact your Graco distributor or call to identify the nearest distributor.

**Phone:** 612-623-6928 **or Toll Free:** 1-800-533-9655, **Fax:** 612-378-3590

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Original instructions. This manual contains English. MM 307714

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