

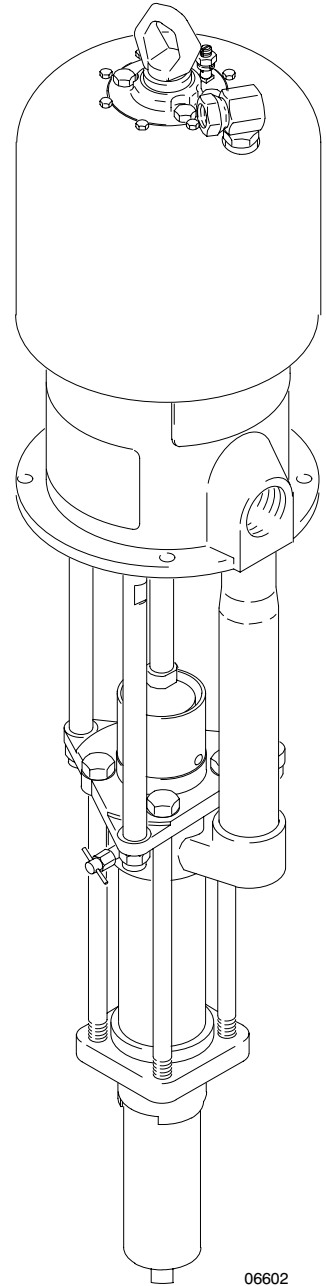
5:1 Ratio Bulldog[®] Pump 306582H

500 psi (35 bar, 3.5 MPa) Maximum Working Pressure

Part No. 204286, Series H



Read warnings and instructions.
See page 2 Table of Contents.



06602

PROVEN QUALITY. LEADING TECHNOLOGY.

Table of Contents

Warnings	2	Parts	12
Installation	6	Technical Data	13
Operation	8	Mounting Hole Layout	14
Troubleshooting	9	Dimensional Drawings	14
Service	6	Graco Standard Warranty	16
		Graco Information	16

Symbols

Caution Symbol



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

Warning Symbol



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

! WARNING



INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- 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 your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure stated on the equipment or in the **Technical Data** for your equipment. Do not exceed the maximum working pressure of the lowest rated component in your system.
- 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 use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 66°C (150°F) or below -40°C (-40°F).
- Wear hearing protection when operating this equipment.
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

WARNING



INJECTION HAZARD

Spray from the gun, 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 gun at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the tip guard and the trigger guard on the gun when spraying.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun trigger safety operates before spraying.
- Close the gun ball valves when you stop spraying.
- Lock the gun trigger safety when you stop spraying.
- Follow the **Pressure Relief Procedure** on page 6 if the spray tip 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.



MOVING PARTS HAZARD

Moving parts can pinch or amputate your fingers.

- Keep clear of all moving parts when starting or operating the pump.
- Before checking or servicing the equipment, follow the **Pressure Relief Procedure** on page 6 to prevent the equipment from starting unexpectedly.

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 sprayed. Refer to **Grounding** on page 6.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop spraying 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 spray area.
- Before operating this equipment, extinguish all open flames or pilot lights in the spray area.
- Do not smoke in the spray area.
- Do not turn on or off any light switch in the spray area while operating or if fumes are present.
- Do not operate a gasoline engine in the spray area.
- Never use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents, or fluids containing such solvents in the pump. Such use could result in a serious chemical reaction, with the possibility of explosion, which could cause death, serious bodily injury and/or substantial property damage.



TOXIC FLUID HAZARD

Hazardous fluid 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.

Installation

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 spraying,
- check or service any of the system equipment,
- or install or clean the spray tips.

1. Shut off the air to the pump.
2. Close the bleed-type master air valve (required in your system).
3. Hold a metal part of the gun to the side of a grounded metal pail and trigger the gun to relieve pressure.

*If you suspect that the spray tip or hose is clogged or that fluid pressure is not fully relieved after following the steps above, **very slowly** loosen the tip guard retaining nut or hose end coupling and relieve pressure gradually. Clear the tip or hose obstruction.*

Grounding

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

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

- *Pump*: use a ground wire and clamp as shown below.
- *Air and fluid hoses*: use only electrically conductive hoses with a maximum 500 ft (150 m) combined hose length to ensure grounding continuity.
- *Spray gun*: grounding is obtained through connection to a properly grounded fluid hose and pump.
- *Object being sprayed*: follow your local code.
- *Fluid supply container*: follow your local code.
- *All solvent pails used when flushing or relieving pressure*, always hold a metal part of the gun firmly to the side of a grounded metal pail, then trigger the gun.

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. 237569, Ground Wire and Clamp.

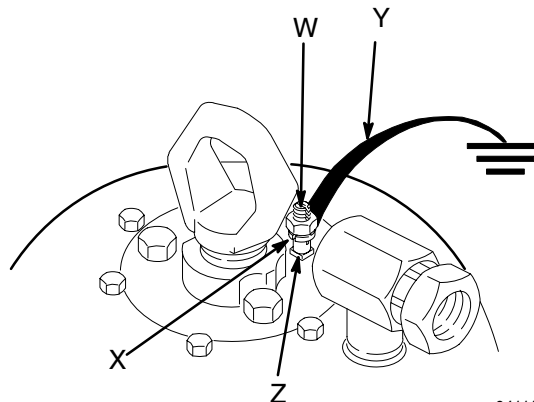


Fig. 1

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Installation

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

Mount the pump to suit the type of installation planned. The pump dimensions and mounting hole layout are shown on page 14.

Install accessories as explained in the following sections, in the order shown in Fig. 2. If you are supplying your own accessories, ensure that they are adequately sized for your system.

System Accessories

⚠ WARNING

Two accessories, the bleed-type master air valve (E), and the fluid drain valve (M) are required for your system to reduce the risk of serious injury from moving parts, splashing, or fluid injection when shutting off the pump.

The Bleed-Type Master Air Valve (Part No. 107141) relieves air trapped between the valve and the pump, after the pump is shut off. Trapped air can cause the pump to cycle unexpectedly and result in serious bodily injury if you are adjusting or repairing the pump.

The Fluid Drain Valve helps relieve fluid pressure in the displacement pump, hose, and gun/dispersing valve when shutting off the pump. Triggering the gun/dispersing valve may not be sufficient, especially if there is a clog in the hose, gun/dispersing valve, or tip/nozzle.

Near the pump air inlet, install an air line lubricator (F) to automatically lubricate the air motor. Adjust the lubricator so it dispenses about one drop per minute (check through the sight glass).

Upstream from the lubricator, install an air regulator and gauge (G) to control pump speed and fluid pressure, and compressed air supply. Install the bleed-type master air valve upstream from the filter and regulator, but within easy reach of the pump, to relieve air trapped between the valve and the pump.

Downstream from the pump, in the fluid line, install a fluid filter (K) and a drain valve (M).

Connect a grounded air supply hose (J) to the 3/4 npt(f) air inlet. Connect the fluid hose (L) to the 1-1/2 npt fluid outlet, using a suitable adapter.

KEY

- E Bleed-type Master Air Valve
- F Air Line Lubricator
- G Air Regulator and Gauge
- H Air Line Filter
- J Grounded Air Supply Hose
- K Fluid Filter
- L Grounded Fluid Hose
- M Fluid Drain Valve

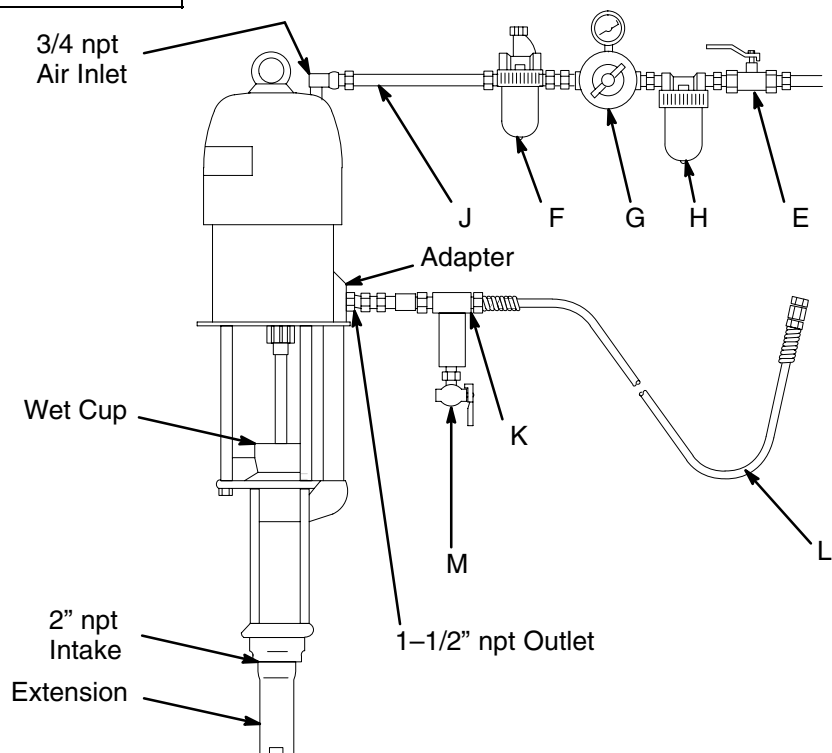


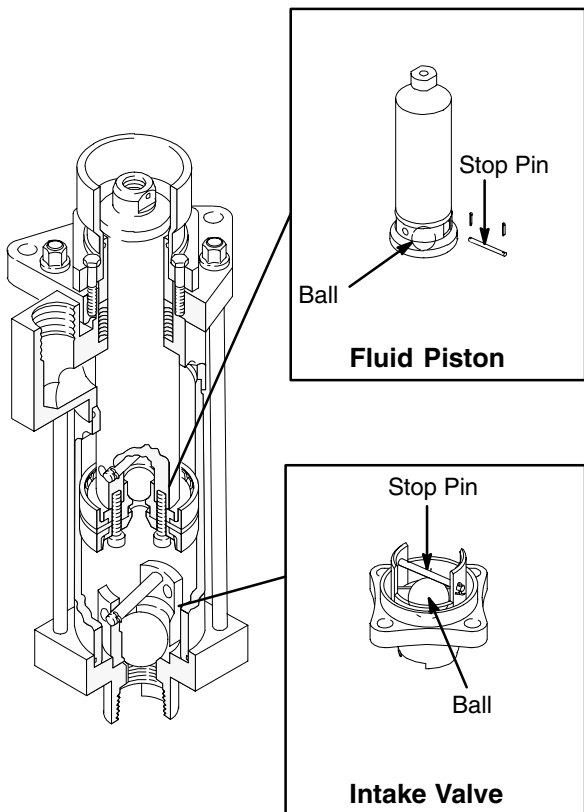
Fig. 2

Operation

Flush the pump before using it for the first time to remove the lightweight oil which is left in after factory testing to protect the pump from corrosion. Be sure the solvent used is compatible with the fluid to be sprayed and the wetted parts of the pump.

Check Valve Adjustment

The fluid piston and intake valves are factory set for high volume pumping of heavy spray viscosity fluids. For lighter fluids or lower volume requirements, decrease ball travel by moving pins to a lower set of holes. See Fig. 3. Decreasing ball travel minimizes the surge at stroke changeover. Too short a ball travel restricts the flow and slows down the pump. Refer to page 10 for pump disassembly procedure.



06605

Fig. 3

Starting and Adjusting the Pump

If the pump is not immersed, fill the wet-cup half full with Graco Throat Seal Liquid (TSL). Open the dispensing valve and slowly open the air supply valve until the pump starts. Allow the pump to cycle slowly, at about 40 psi (3 bar) air pressure, until all the air is pushed out of the lines. Close the dispensing valve – the pump will stall against the pressure.

In a direct supply system, when the pump is supplied with sufficient air pressure and volume (see the Technical Data on page 13), it will start and stop automatically when the fluid valve is opened or closed. In a circulating system, it will run continuously and speed up or slow down as supply demands until the air supply is shut off.

Use an air regulator to control pump speed and pressure. Always use the lowest pressure necessary to obtain the desired results.

Lubrication and Care

For automatic air motor lubrication, install an air line lubricator as explained on page 7.

Keep the wet/cup 1/2 full with TSL or compatible solvent to prolong the life of the packings.

Always flush the pump before the fluids dry in the pump and hoses. At the end of each day, if you are pumping water based fluids, first flush with water, then with a compatible solvent to protect the pump parts.

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 has been exhausted and air has been pumped into the lines, refill the supply container and prime the pump and lines with fluid, or flush the pump and leave it filled with a compatible solvent, being sure to eliminate all air from the system.

Shutdown and Care of the Pump

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 6.

Always stop the pump at the bottom of its stroke to prevent fluid from drying on the rod and damaging the throat packings.

⚠ CAUTION

Water, or even moist air, can cause your pump to corrode. To help prevent corrosion, never leave the pump filled with water or air. After normal flushing, flush the pump again with a compatible solvent, **relieve the pressure**, and leave the solvent in the pump.

Troubleshooting



WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 6.

Relieve the Pressure before you check or service any system equipment.

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

Problem	Cause	Solution
Pump fails to operate	Exhausted fluid supply	Refill
	Restricted line, or inadequate air supply	Clear; see Technical Data on page 13.
	Insufficient air pressure; closed or clogged air valves, etc.	Open; clean
	Obstructed fluid hose or gun	Clear*
	Dried fluid built up on displacement rod	Clean; see Service on page 10
	Dirty or worn air motor parts; damaged air valves	Clean; service (see manual 307–049)
Pump operates, but output low on both strokes	Exhausted fluid supply	Refill
	Restricted line or inadequate air supply	Clear; see Technical Data, page 13.
	Insufficient air pressure; closed or clogged air valves, etc.	Open; clean
	Obstructed fluid hose or gun	Clear*
	Open or worn bleeder valve	Close; replace
	Air leaking into fluid pressure chamber of ram	Check ram plate seal, etc.
	Fluid too heavy for pump to prime	If using ram or inductor, vent using the ram/inductor bleeder valve
	Loose packing plate or worn throat packings in displacement pump	Tighten, service
Pump operates, but output low on down stroke	Fluid too heavy for pump to prime	If using ram or inductor, vent using the ram/inductor bleeder valve
	Damaged cylinder seals	Replace
	Held open or worn intake valve	Clear; service
Pump operates, but output low on up stroke	Held open or worn piston valve or packings	Clear; service
	Damaged cylinder seals	Replace
Erratic or accelerated pump operation	Exhausted fluid supply	Refill
	Fluid too heavy for pump to prime	If using ram or inductor, vent using the ram/inductor bleeder valve
	Held open or worn piston valve or packings	Clear; service
	Held open or worn intake valve	Clear; service
	Loose packing plate or worn throat packings in displacement pump	Tighten; service

*Follow the **Pressure Relief Procedure** on page 6. Disconnect the fluid hose. If the pump starts when the air is turned on again, the hose or gun is clogged.

Service

General Information

- If you are using a repair kit to service the pump, use all the new parts, even if the old ones look good. Numbers marked with an asterisk (for example, 19*) are part of repair kit 206930.
- If possible, have the necessary replacement parts ready before you begin disassembling.
- When replacing the displacement rod (4*) or the cylinder, always replace all the pump packings and glands to ensure a good seal.
- Optional Throat Packing Kit 166692 is available. This kit contains 3 rubber v-packings for use when pumping water-based and extremely abrasive fluids.

Disassembly

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 6.

1. Flush the pump with a compatible solvent, **relieve the pressure**, and stop the pump at the bottom of its stroke.
2. Disconnect the hoses from the pump. Remove the pump from its mounting and clamp it in a vise.
3. Remove the upper cotter pin (28) and unscrew the connecting rod coupling nut (37) and three tie rod locknuts (30). See Fig. 4. Detach the displacement pump from the air motor. The riser tube (25) slides out of the air motor as the pump is detached.
4. Remove the lower cotter pin (28), loosen the locknut (32), and unscrew the connecting rod (41) from the displacement rod (4)

Intake Valve

1. Clamp the displacement pump intake valve upright in a vise as shown in Fig. 4.
2. Unscrew the four tie plate bolts (9) from the intake valve housing (2) and lift the rest of the pump off the valve.

3. Disassemble the valve. Clean and inspect all parts for wear and damage, replacing them as necessary.

NOTE: When disassembling the intake valve, note the position of the ball stop pin (13). Reinstall the pin in the proper holes, or make adjustments as explained on page 8.

1 ⚠ Torque to 40–50 ft-lb (54–68 N•m)

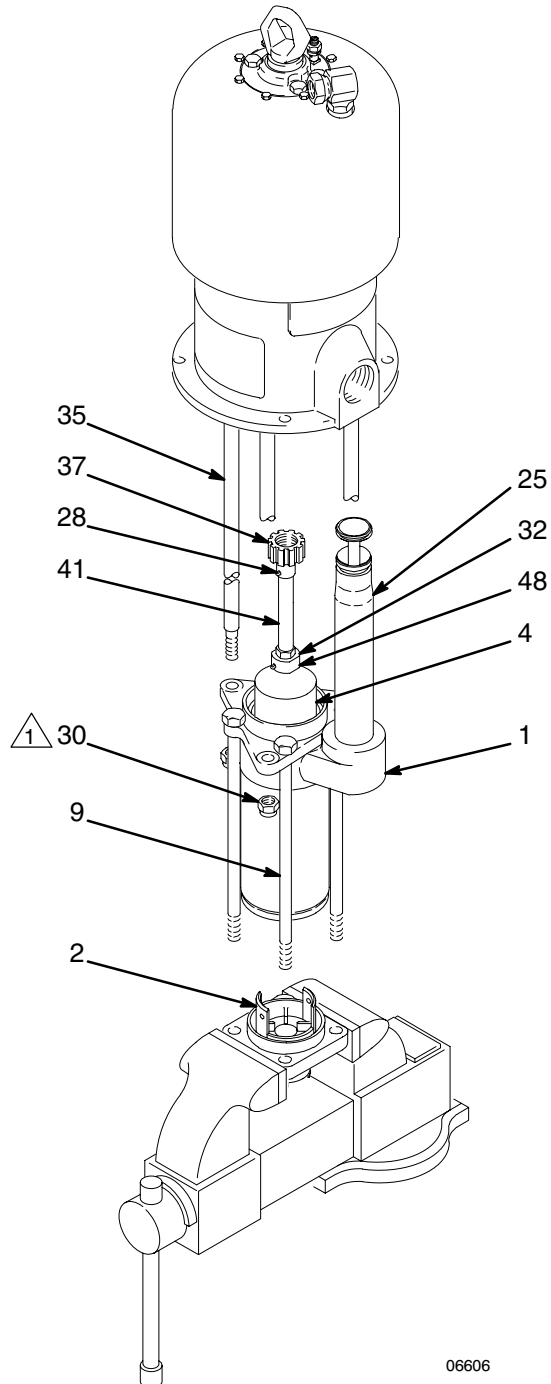


Fig. 4

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Service

Piston and Throat Packings

1. Remove the intake valve as explained in the preceding section.
2. Unscrew the four throat packings screws (10). Remove the tie plate (14) and outlet housing (16). Remove the glands (19*, 20*) and packings (23*, 24*) from the throat cavity in the outlet housing.
3. Pull the displacement rod (4) out of the cylinder (15). See Fig. 5. Unscrew the four piston retainer screws (11) from the piston retainer (3) and remove the piston valve parts.
4. Clean and inspect all parts carefully for damage or wear, and replace as necessary.

NOTE: Replace the glands (19*, 20*) whenever the throat packings (23*, 24*) are replaced, and the packing expanders (17*) whenever piston packings (22*) are replaced.

Reassembly

1. Lubricate the packings, glands, cylinder, and the displacement rod before reassembling the pump.
2. Place on the piston retainer (3) an expander (17*) and cup packing (22*) with the lips facing down, the spacer (18), a cup packing (22*) and expander (17*) with the lips facing up, the gasket (21*), and the ball (7). Install the piston assembly on the displacement rod (4). Apply sealant to the four piston retainer screws (11) and torque them uniformly to 20–30 ft-lb (27–40 N•m).
3. Place the male gland (19*), two leather v-packings (23*), a PTFE v-packing (24*), and female gland (20*) in the throat cavity in the outlet housing (16). *Be sure the lips of the v-packings face down in the housing.*
4. Reinstall the outlet housing (16) and tie plate (14).

NOTE: Tighten the four throat packing screws (10) uniformly, just enough to prevent leakage. Do not overtighten.

5. Guide the displacement rod (4) into the bottom of the cylinder (15) and carefully through the throat packings.
6. Reassemble the intake valve and replace it in the cylinder.

7. Install the tie plate bolts (9) through the tie plate (14) and into the intake valve housing (2). Torque the bolts evenly to 50–60 ft-lb (68–82 N•m).
8. Reconnect the connecting rod (41) to the displacement rod (4). Tighten the locknut (32). Replace the cotter pin (28).
9. Reattach the air motor to the displacement pump. Tighten the connecting rod coupling nut (37). Replace the cotter pin (28). Leave the three tie rod locknuts (30) slightly loose at this point.
10. Reconnect the hoses to the pump.
11. Start the pump, and with it running slowly, torque the tie rod locknuts (30) evenly to 40–50 ft-lb (54–68 N•m). Make sure there is no binding, this ensures proper alignment.

- △ 1 Apply Sealant
Torque to 20–30 ft-lb (27–40 N•m)
- △ 2 Torque to 50–60 ft-lb (68–82 N•m)
- △ 3 PTFE on top

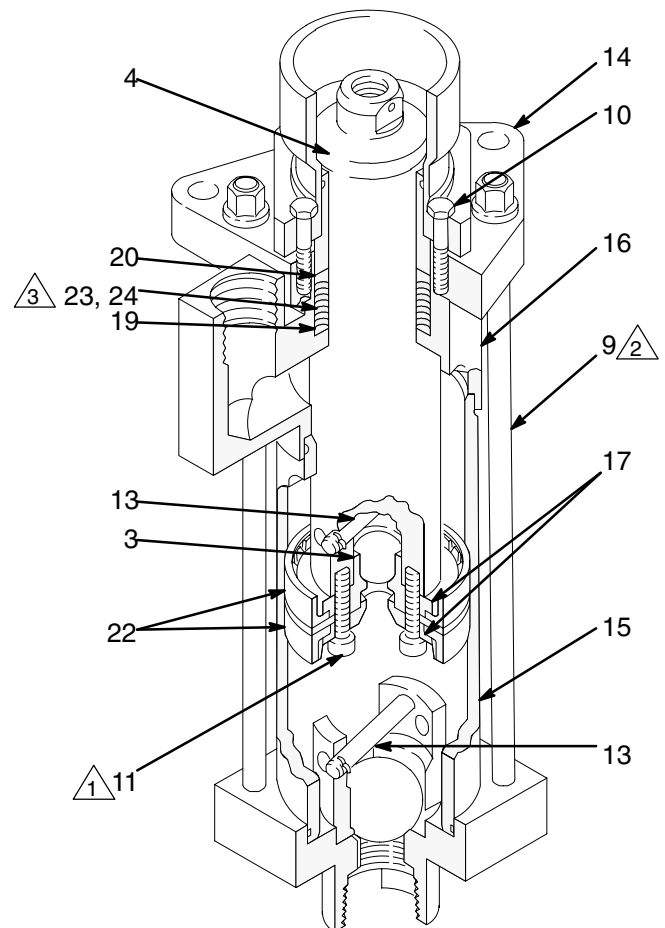


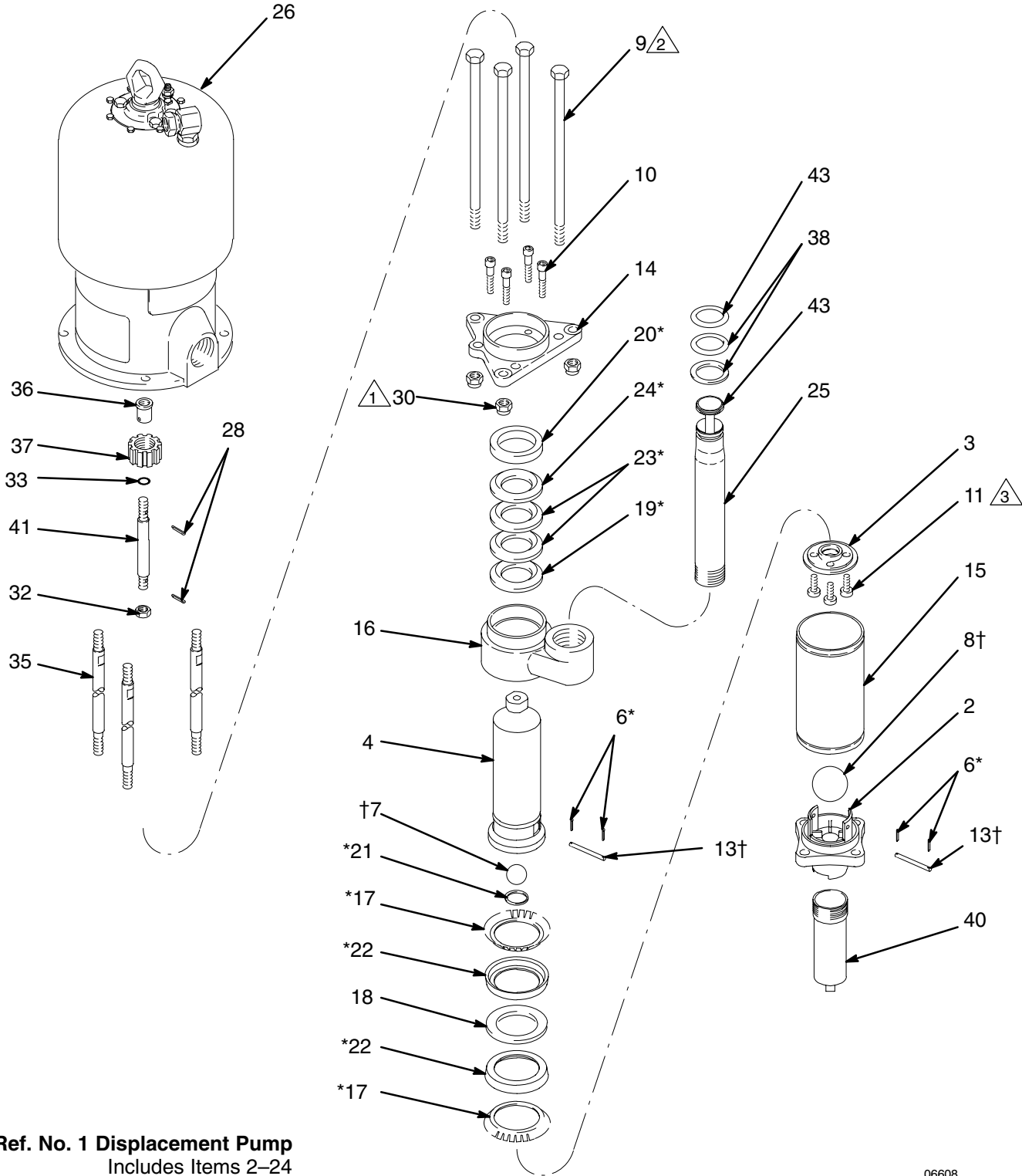
Fig. 5

Parts

1 Torque to 40–50 ft-lb (54–68 N•m)

2 Torque to 50–60 ft-lb (68–82 N•m)

3 Torque to 20–30 ft-lb (27–40 N•m)



Ref. No. 1 Displacement Pump
Includes Items 2–24

06608

Parts

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
1	206190	DISPLACEMENT PUMP ASSY.		25	206793	TUBE, riser	1
	Series D	Includes items 2–24	1	26	208356	AIR MOTOR ASSEMBLY	
2	206771	. HOUSING, intake valve	1			See manual 307–049 for parts	1
3	206772	. RETAINER, piston	1	28	100103	PIN, cotter; 1/8 dia; 1–1/2" long	2
4	220044	. ROD, displacement	1	30	101712	LOCKNUT, nylon 5/8–11	3
6*	100579	. PIN, cotter; 7/64 dia x 1" long	4	32	101936	LOCKNUT, hex; 3/4–10	1
7†	101178	. BALL, 1–1/4" dia	1	33	158674	SEAL, o-ring; nitrile rubber	1
8†	101718	. BALL, 2" dia	1	35	161541	ROD, tie; 13–1/2" long	3
9	101720	. BOLT, hex hd mach; 5/8–11 x 14"	4	36	161543	SOCKET, coupling	1
10	102303	. SCREW, fillister hd mach; 1/4–20 x 2"	4	37	161544	NUT, coupling	1
11	102304	. SCREW, hex hd cap; 1/2–13 x 3/4"	4	38	108832	PACKING, o-ring; Viton®	2
13†	161599	. PIN, ball stop	2	40	161612	TUBE, intake extension	1
14	166589	. PLATE, tie	1	41	164444	ROD, connecting; 7–3/8" long	1
15	181270	. CYLINDER	1	43	166626	WASHER, backup; leather	2
16	166595	. HOUSING, outlet	1	44	172477	TAG, instruction (not shown)	1
17*	166596	. EXPANDER, cup packing	2			<i>* Included in Repair Kit 206930</i>	
18	166597	. SPACER, packing	1				
19*	166598	. GLAND, male	1				
20*	166599	. GLAND, female	1				
21*	166601	. GASKET, PTFE	1				
22*	166602	. PACKING, cup; leather	2				
23*	166603	. V-PACKING, leather	2				
24*	166770	. V-PACKING, PTFE	1				

** Included in Repair Kit 206930*

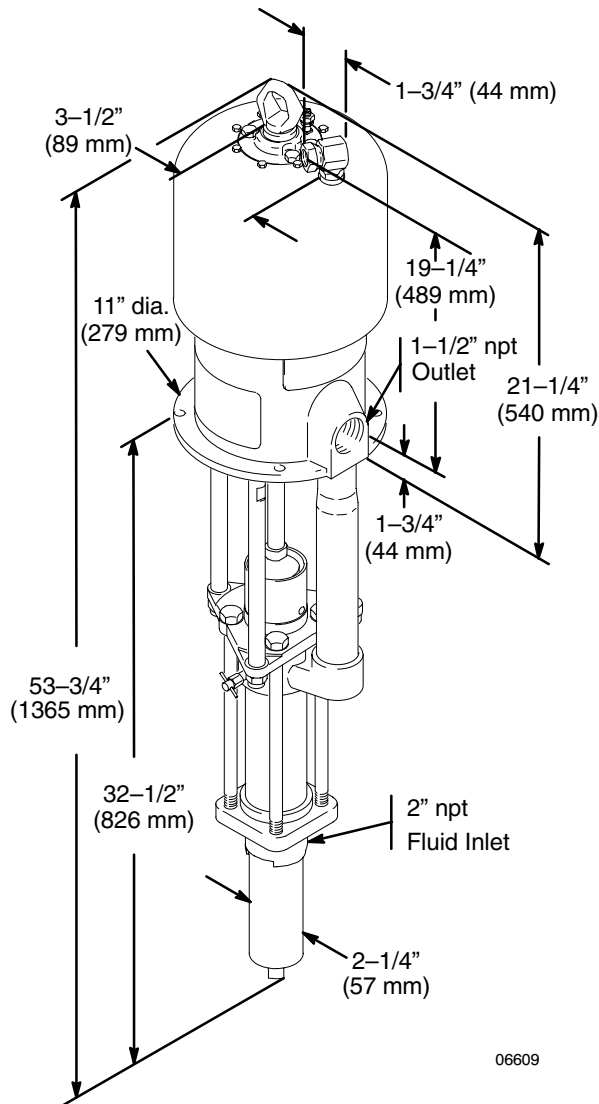
† *Recommended Tool Box spare parts. Keep these spare parts on hand to reduce down time.*

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Technical Data

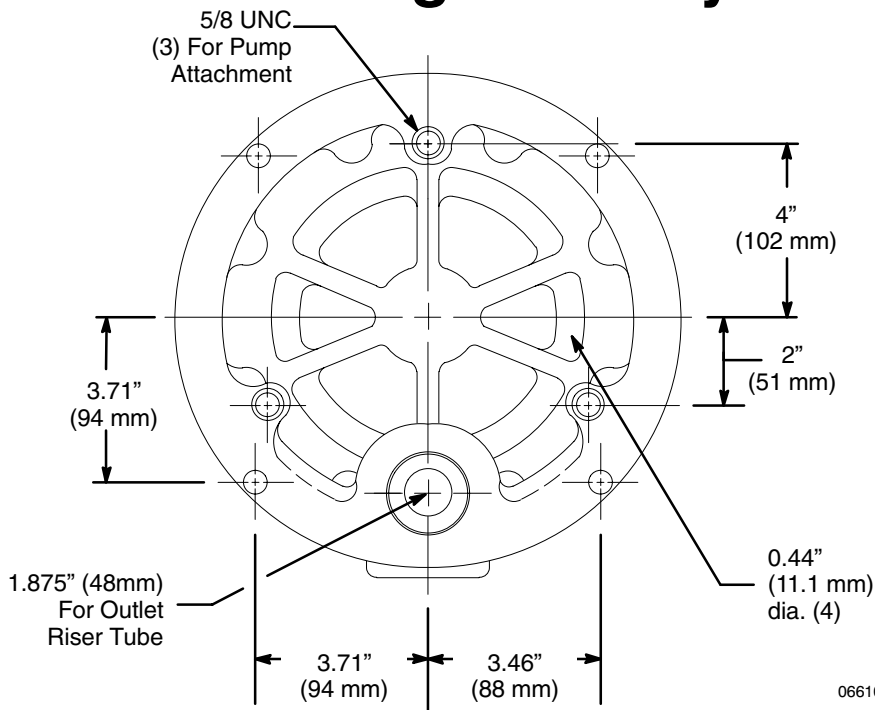
Air operating range	40 psi (2.72 bar) min. to 100 psi (6.8 bar) max.
Maximum fluid pressure	500 psi (34 bar) with max, 100 psi (6.8 bar) air pressure
Air Consumption	6 to 60 cfm per gallon delivery
Cycles per gallon	4
Maximum recommended speed	60 cycles/min.
Air inlet size	3/4 npt
Wetted parts	Chrome-plated Nitralloy Steel, Aluminum, Bronze, Leather, PTFE, Stainless Steel

Dimensions



06609

Mounting Hole Layout



06610

Graco Standard Warranty

Graco warrants all equipment manufactured by Graco 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. 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.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or 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 of Graco equipment with 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 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.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

Graco makes no warranty, and disclaims all implied warranties of merchantability and fitness for a particular purpose in connection with accessories, equipment, materials or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motors, 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.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

FOR GRACO CANADA CUSTOMERS

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Graco Information

TO PLACE AN ORDER, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you:

1-800-367-4023 Toll Free

612-623-6921

612-378-3505 Fax

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Sales Offices: Minneapolis, Detroit
International Offices: Belgium, Korea, Hong Kong, Japan

www.graco.com

PRINTED IN USA 306582 03/1957, Revised 10/2003