



INSTRUCTIONS

This manual contains important warnings and information.
READ AND KEEP FOR REFERENCE.

Viscount[®] II 4500 Pump

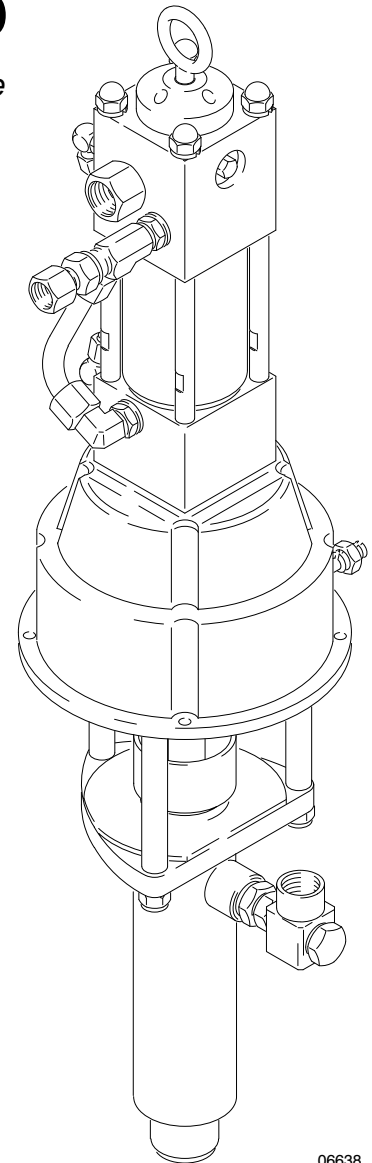
1500 psi (100 bar, 10 MPa) Maximum Hydraulic Input Pressure

4500 psi (310 bar, 31 MPa) Maximum Working Pressure

Model 221-066, Series B

With Severe-Duty Displacement Pump*
and Quiet Hydraulic Motor

* Severe-Duty displacement pumps have an abrasion and corrosion-resistant displacement rod and cylinder. Refer to the Technical Data section of the separate pump manual for "Wetted Parts" information.



06638

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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

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.
- 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 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 66°C (150°F) or below -40°C (-40°F).
- Wear hearing protection when operating this equipment.
- Do not move or lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

! WARNING



INJECTION HAZARD

Spray from the gun/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 gun/valve at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip/valve nozzle.
- 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/valve when spraying/dispensing.
- Be sure the gun/valve trigger safety operates before spraying/dispensing.
- Lock the gun/valve trigger safety when you stop spraying/dispensing.
- Follow the **Pressure Relief Procedure** on page 8 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, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.



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 8 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 5.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop spraying/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/dispensed.
- Keep the spray/dispense area free of debris, including solvent, rags, and gasoline.
- Before operating this equipment, electrically disconnect all equipment in the spray/dispense area.
- Before operating this equipment, extinguish all open flames or pilot lights in the spray/dispense area.
- Do not smoke in the spray/dispense area.
- Do not turn on or off any light switch in the spray/dispense area while spraying/dispensing or while operating if fumes are present.
- Do not operate a gasoline engine in the spray/dispense area.



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

General Information


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

NOTE: Always use Genuine Graco Parts and Accessories, available from your Graco distributor.

Grounding

⚠ WARNING

FIRE AND EXPLOSION HAZARD
Before operating the pump, ground the system as explained below. Also read the section **FIRE OR EXPLOSION HAZARD** on page 4.



1. *Pump:* use a ground wire and clamp as shown in Fig. 1. 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 number 222-011 Grounding Clamp and Wire.
2. *Fluid and hydraulic hoses:* use only grounded hoses with a maximum of 500 ft (150 m) combined hose length to ensure grounding continuity.
3. *Hydraulic Power Supply:* according to manufacturer's recommendations.

4. *Spray gun:* ground through connection to a properly grounded fluid hose and sprayer.
5. *Object being sprayed:* follow your local code.
6. *Fluid supply container:* follow your local code.
7. *Solvent pails used when flushing:* follow your local code. Use only metal pails, which are conductive, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts the grounding continuity.
8. *To maintain grounding continuity when flushing or relieving pressure,* hold a metal part of the spray gun firmly to the side of a grounded *metal* pail, then trigger the gun.

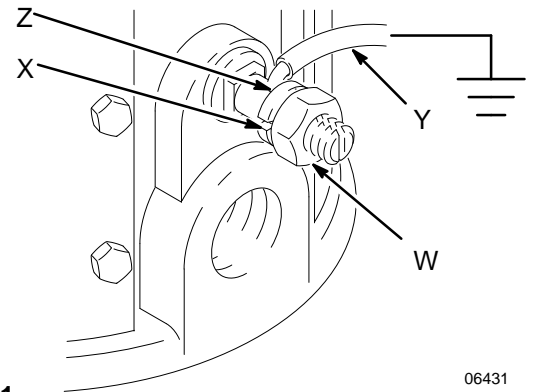
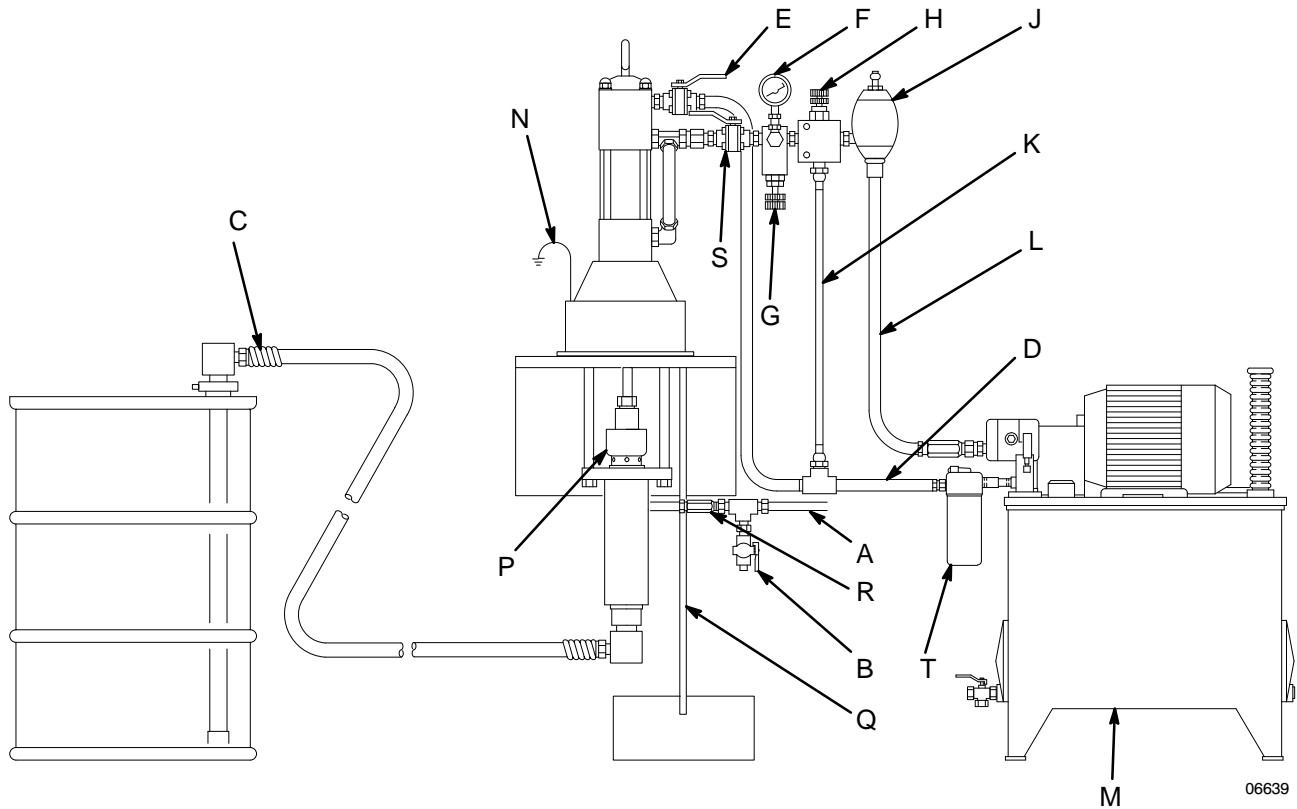


Fig. 1

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Installation



Key

- | | |
|--|--|
| A Fluid Hose to Gun | K Drain Line (from pressure reducing valve) |
| B Fluid Drain Valve | L Hydraulic Supply Line |
| C Suction Hose | M Hydraulic Power Supply |
| D Hydraulic Return Line | N Ground Wire |
| E Hydraulic Return Line Shutoff Valve | P Wet-Cup |
| F Pressure Gauge | Q Drain Line (from motor drip pan) |
| G Flow Control Valve | R Check Valve |
| H Pressure Reducing Valve | S Hydraulic Supply Line Shutoff Valve |
| J Accumulator | T Return Line Filter |

Fig. 2

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

⚠ CAUTION

It is very important to keep the hydraulic supply system clean at all times. Be sure that all hydraulic fluid lines are absolutely clean. Blow out the lines with air and flush thoroughly with solvent before connecting to the hydraulic motor to avoid introducing harmful contaminants into the motor.

Filters

Be sure that your hydraulic power supply is equipped with a suction filter to the hydraulic pump and a system return line filter of 10 micron size.

Carefully follow the manufacturer's recommendations on reservoir and filter cleaning, and periodic changes of hydraulic fluid. Use only Graco-approved hydraulic oil.

Installation

Hydraulic Lines

The motor has a 3/4 npt(f) hydraulic oil supply fitting, and a 1" npt(f) hydraulic oil return fitting. Use a minimum 1/2 in. ID hydraulic supply line and a minimum 7/8 in. ID, return line.

On the hydraulic supply side (C), install the following accessories shown in Fig. 2, using adapters as necessary.

- **A shutoff valve (E)** isolates the pump for service.
- **A fluid pressure gauge (F)** to monitor hydraulic oil pressure to the motor and to avoid overpressurizing the motor or displacement pump, and **a pressure- and temperature-compensated flow control valve (G)** to prevent the motor from running too fast and possibly damaging itself.
- **A pressure reducing valve (H), with a drain line (K)** running directly to the hydraulic return line (D).
- **An accumulator (J)** to reduce the hammering effect caused by the motor reversing direction.
- **A shutoff valve (E)** isolates the pump for service.

CAUTION

Do not exceed 10 gpm (37.8 liter/minute) volume to avoid pump stalling.

Operating Temperature

Keep the hydraulic oil temperature below 130° F (54° C) for maximum pump performance.

Drip Pan

The hydraulic motor is equipped with a drip pan to collect any leakage that might occur. Connect a 1/4 in. ID drain hose (Q) to the barbed hose fitting on the drip pan.

Drain Valve

Install a high pressure fluid drain valve (B) near the pump outlet to relieve fluid pressure in the displacement pump and hose during shutdown. See Fig. 2.

WARNING

The fluid drain valve (B) is required in your system to help reduce the risk of serious injury, including fluid injection and splashing in the eyes or on the skin if you are adjusting or repairing any part of the system. Triggering the gun to relieve pressure may not be sufficient.

Fluid Lines

Connect a grounded fluid supply line to the 1 in. npt fluid outlet on the displacement pump.

Attach a suction nose to the 1-1/2 in. npt pump fluid intake.

Operation

Pressure Relief Procedure

WARNING



INJECTION HAZARD

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/dispensing,
- check or service any of the system equipment,
- or install or clean the spray tips/nozzles.

1. Lock the spray gun or dispensing valve trigger safety latch and any other equipment safety latches.
2. Shut off the power supply to the hydraulic motor.
3. Unlock the gun/valve trigger safety, and trigger the gun into a grounded metal waste container, holding a metal part of the gun firmly to the side of the container until pressure is relieved.
4. Lock the trigger safety.
5. Open all system drain valves, having a container ready to catch the drainage.

*If you suspect that the spray tip or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, **very slowly** loosen the tip guard retaining nut or hose end coupling and relieve pressure gradually, then loosen completely. Now clear the tip or hose.*

Hydraulic Fluid

Check the hydraulic fluid level, and add fluid as necessary to the fill lines before each use.

Wet-Cup

If the pump is not immersed, fill the displacement pump wet-cup (P) 1/3 full of Graco Throat Seal Liquid (TSL) or compatible solvent to prevent fluid from drying on the displacement rod and damaging the pump packings. See Fig. 2.

Flushing

Flush the pump before using it for the first time to remove the light oil which was 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 pump wetted parts shown (see manual 307-728). Flush until clean solvent comes from the gun, or in a circulating system, flush long enough to clean the entire system.

WARNING

Be sure the entire system and flushing pails are properly grounded before flushing. Always use the lowest possible fluid pressure, and maintain firm metal to metal contact between the gun and pail to reduce the risk of static sparking and splashing. See page 5.

Operation

WARNING

COMPONENT RUPTURE HAZARD



To reduce the risk of overpressurizing your system, which could cause component rupture and serious injury, *never exceed the specified Maximum Incoming Air Pressure to the pump* (see the **Technical Data** on page 15).

To prevent overpressurizing the hydraulic motor or its seals, always shut off the supply line valve (S) *first*, then shut off the return line valve (E).

Pump Operation

To operate the pump, turn on the hydraulic power supply. Open the return line shutoff valve first, then slowly open the hydraulic supply shutoff valve. Use the lowest possible pressure to obtain the desired results. Higher pressures will increase tip wear and pump wear.

In a direct supply system, the pump will start when the gun or valve is opened, and stall when it is closed. In a circulating system, the pump will operate continuously until the hydraulic power supply is turned off.

WARNING

To reduce the risk of overpressurizing the pump, which can cause a rupture, fire or explosion and result in serious injury including fluid injection, always follow these precautions.

Never exceed 1500 psi (100 bar, 10 MPa), or 3.3 gpm (12.5 liter/min) hydraulic input to the motor.

Never exceed 4500 psi (310 bar, 3.1 MPa) maximum pump outlet pressure.

CAUTION

Do not allow the hydraulic oil temperature to exceed 130° F (54° C). The pump seals will wear faster and leakage may occur if the pump is operated at higher oil temperatures.

Maintenance

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

Keep the wet-cup (P) 1/3 filled with Graco Throat Seal Liquid (TSL)

Check the tightness of the packing nut weekly. Before adjusting, **relieve the pressure**. The packing nut should be tight enough to stop leakage, but no tighter. Overtightening will compress and damage the packings and result in pump leaking. Place a pin in one of the holes of the packing nut to adjust it.

Carefully monitor the fluid supply. If the pump empties the supply container, air will be drawn into the pump, causing it to run too fast and to be damaged. If the pump runs too fast, shut it off immediately. Fill the supply container and prime the pump and hoses to remove all air, or flush the pump and hoses with a compatible solvent and leave it filled with an oil-base solvent or mineral spirits.

Always flush the pump before the fluid can dry in it. Always stop the pump at the bottom of its stroke to prevent the fluid from drying on the displacement rod.

Corrosion Protection for Carbon Steel

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

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 mineral spirits or oil-based solvent, **relieve the pressure**, and leave the mineral spirits 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 8.

Before servicing this equipment, always make sure to **relieve the pressure**.

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

Problem	Cause	Solution
Pump operates, but output low on both strokes	Restricted lines or inadequate hydraulic supply	Clear lines; increase hydraulic supply. Open flow control
	Insufficient hydraulic pressure; Closed or clogged valves, etc.	Open; clean.
	Exhausted fluid supply	Refill & reprime, or flush*
	Clogged fluid line, valves, etc.	Clear**
	Packing nut too tight	Loosen
	Loose packing nut or worn packings	Tighten; replace. See manual 307-728
Pump operates, but output low on down stroke	Held open or worn intake valve	Clear, service. See manual 307-728
Pump operates, but output low on up stroke	Held open or worn piston or packings	Clear; service. See manual 307-728
Erratic pump operation	Exhausted fluid supply	Refill and reprime, or flush*
	Held open or worn intake valve or piston packings	Clear; service. See manual 307-728
	Excessive hydraulic fluid supply volume	Lower
Pump fails to operate	Restricted lines or inadequate hydraulic supply	Clear; increase
	Insufficient hydraulic pressure; closed or clogged valves, etc.	Open, clean
	Exhausted fluid supply	Refill and reprime, or flush*
	Clogged fluid line, valves, etc.	Clear**
	Damaged hydraulic motor	Service. See manual 307-158
	Dried fluid seizure of displacement rod	Service***

* Stop the pump immediately if it is running too fast; check the fluid supply. If empty, refill and reprime the pump being sure to eliminate all air from the system, or flush the pump and store it with an oil-based solvent, such as mineral spirits, to prevent corrosion.

** **Relieve the pressure**, and then disconnect the fluid line. If the pump starts when the hydraulic power is restored, line, etc. is clogged.

*** Always stop the pump at the bottom of its stroke, and keep the packing nut/wet-cup 1/3 full of TSL to help prevent displacement rod seizure.

Service

Disconnecting the Hydraulic Motor

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

Relieve the pressure.

Close the hydraulic supply line shutoff valve first, and then the return line shutoff valve. Disconnect the hydraulic supply, return, and drain lines from the motor.


Remove the cotter pin (1) and unscrew the connecting rod coupling nut (7). See the Parts Drawing on page 13.

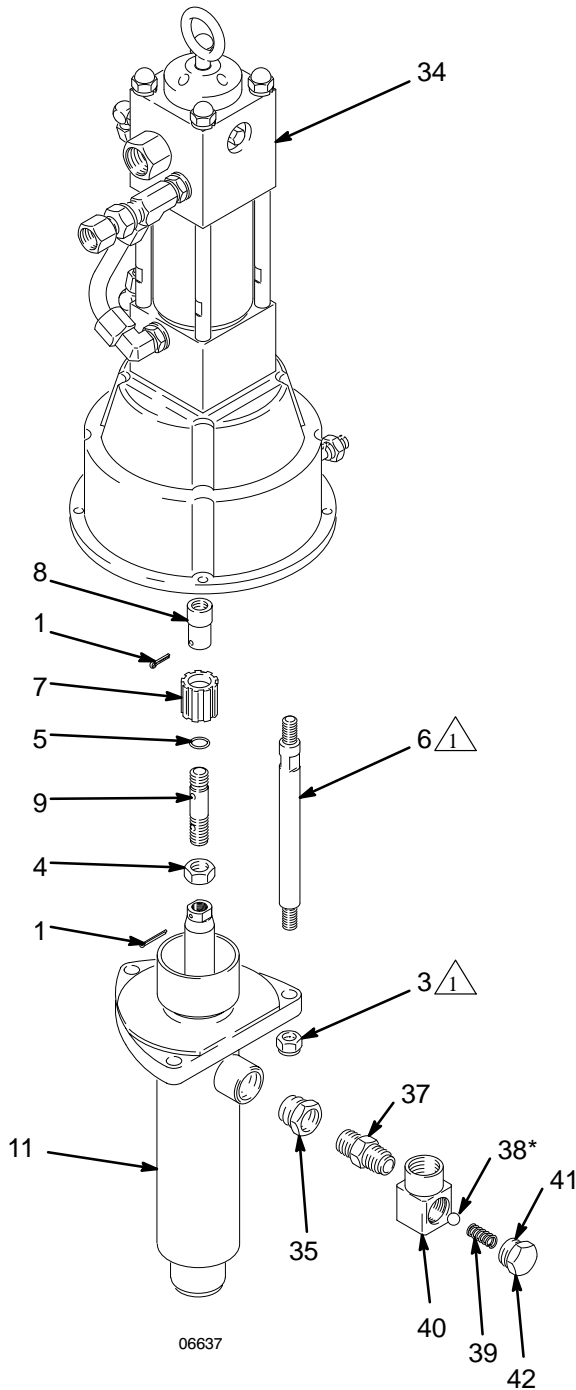
Remove the tie rod lock nuts (3), then unscrew the tie rods (6) from the hydraulic motor base. See the parts drawing on page 13.

See separate instruction manual 307–158 for hydraulic motor service instructions, and 307–728 for the displacement pump.

When reconnecting the motor to the displacement pump, be sure the pump outlet is 90° counterclockwise (looking at the top of the motor) from the motor inlet and outlet. Refer to the illustration on the front cover. Use locking compound and tighten the tie rods (6) securely into the hydraulic motor base, torquing the 40–50 ft-lb (54–68 N•m). Torque the tie rod locknuts (3) to 40–50 ft-lb (54–68 N•m).

Parts

 Torque to 40–50 ft-lb (54–68 N•m)

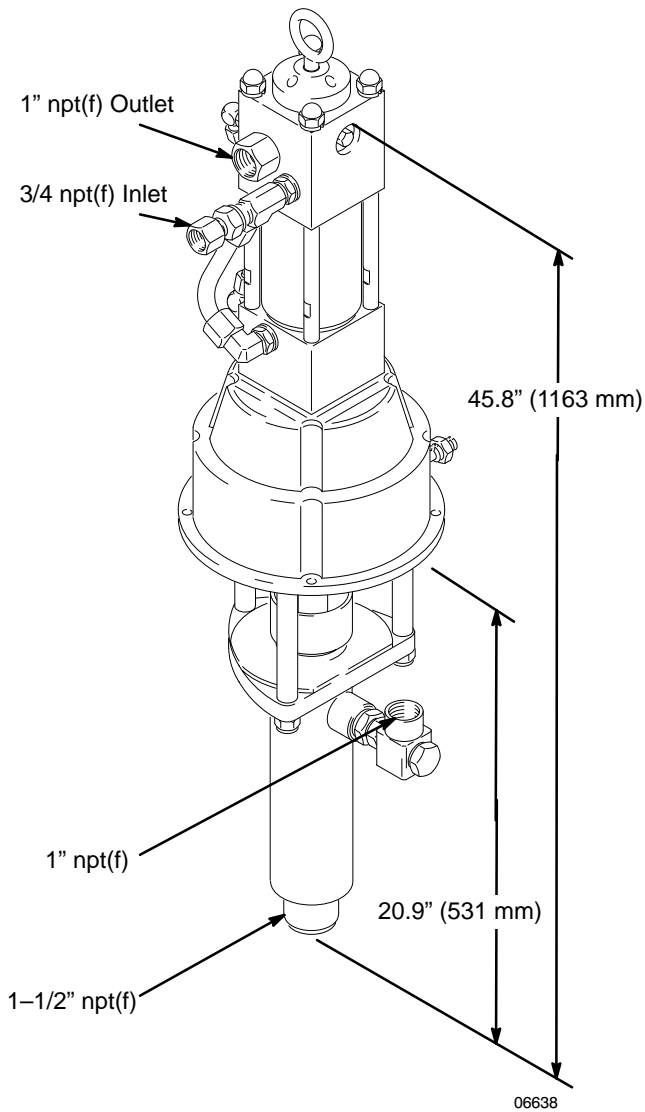


Ref. No.	Part No.	Description	Qty.
1	100–103	PIN, cotter; 0.125" (3.18 mm) x 1.50" (38.1 mm); steel	2
3	101–712	NUT, lock; 5/8–11	3
4	101–936	NUT, hex jam; 3/4–10	1
5	158–674	O-RING; nitrile rubber	1
6	167–911	ROD, tie	3
7	168–210	NUT, coupling	1
8	168–211	COUPLING, connecting rod	1
9	168–212	ROD, connecting	1
11	217–527	DISPLACEMENT PUMP	1
34	221–168	HYDRAULIC MOTOR See manual 307–728 for parts	1
35	158–586	BUSHING, pipe	1
36	203–916	CHECK VALVE ASSEMBLY Includes items 37–42	1
37	203–921	. SEAT	1
38*	101–454	. BALL, steel; 5/8" dia.	1
39	151–220	. SPRING, compression	1
40	160–494	. HOUSING	1
41	160–516	. O-RING; Viton®	1
42	162–289	. PLUG	1

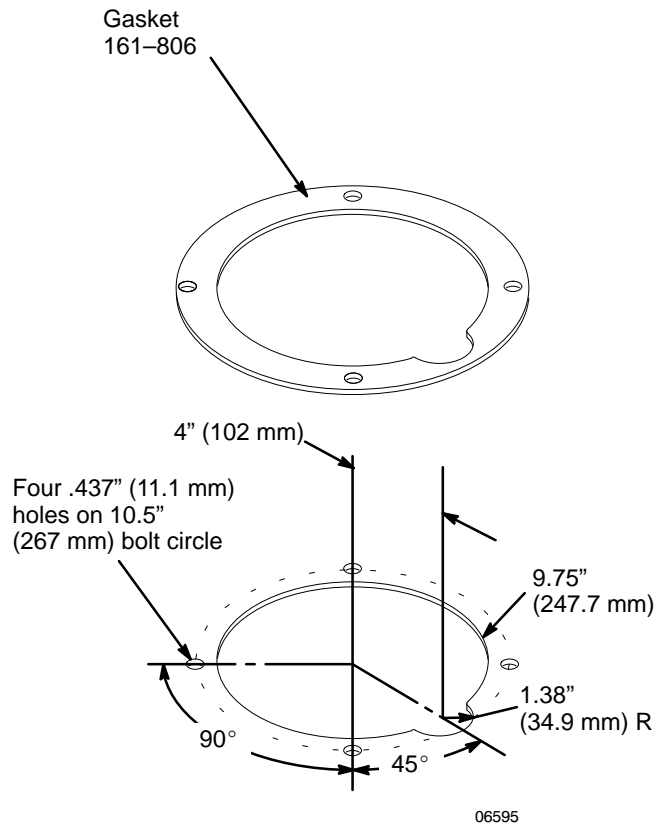
**Recommended Tool Box spare parts. Keep these spare parts on hand to reduce down time.*

Viton® is a registered trademark of the DuPont Company.

Dimensions



Mounting Hole Layout



Accessories

HYDRAULIC FLUID, Graco-Approved
207-428 1 gallon (3.8 liter)
169-236 5 gallons (19 liters)

POLYETHYLENE TUBE 054-106
 0.25 in. (6.4 mm) ID; 0.375 in. (9.5 mm) OD.
 Connect to barbed hose fitting on hydraulic motor drip pan. Order desired length.

Technical Data

Maximum hydraulic input pressure 1500 psi (100 bar, 10.0 MPa)
 Maximum pump output pressure 4500 psi (310 bar, 31.0 MPa)
 Maximum recommended pump speed 50 cycles per minute – 3.3 gpm (12.5 liter/min)
 Hydraulic fluid consumption 0.2 gal (0.76 liter) per cycle
 Wetted parts See manual 307–728

Viton® is a registered trademark of the Loctite Corporation.

Pump Performance Charts

Pump Pressure Developed

Hydraulic Input Pressure	Pump Outlet Pressure
100 psi (7 bar, .7 MPa)	300 psi (21 bar, 2.1 MPa)
200 psi (14 bar, 1.4 MPa)	600 psi (41 bar, 4.1 MPa)
300 psi (21 bar, 2.1 MPa)	900 psi (62 bar, 6.2 MPa)
400 psi (28 bar, 2.8 MPa)	1200 psi (83 bar, 8.3 MPa)
500 psi (34 bar, 3.4 MPa)	1500 psi (104 bar, 10.4 MPa)
600 psi (41 bar, 4.1 MPa)	1800 psi (124 bar, 12.4 MPa)
700 psi (48 bar, 4.8 MPa)	2100 psi (145 bar, 14.5 MPa)
800 psi (55 bar, 5.5 MPa)	2400 psi (166 bar, 16.6 MPa)
900 psi (62 bar, 6.2 MPa)	2700 psi (187 bar, 18.7 MPa)
1000 psi (69 bar, 6.9 MPa)	3000 psi (208 bar, 20.8 MPa)
1100 psi (76 bar, 7.6 MPa)	3300 psi (229 bar, 22.9 MPa)
1200 psi (83 bar, 8.3 MPa)	3600 psi (250 bar, 25.0 MPa)
1300 psi (90 bar, 9.0 MPa)	3900 psi (271 bar, 27.1 MPa)
1400 psi (97 bar, 9.7 MPa)	4200 psi (292 bar, 29.2 MPa)
1500 psi (104 bar, 10.4 MPa)	4500 psi (313 bar, 31.3 MPa)

Pump Output

Pump Speed (Cycles/min)	Hydraulic Fluid Required		Pump Output	
	gpm	liter/min	gpm	liter/min
5	1.0	3.8	0.33	1.1
10	2.0	7.6	0.66	2.5
15	3.0	11.4	0.99	3.7
20	4.0	15.1	1.32	5.0
25	5.0	18.9	1.65	6.3
30	6.0	22.7	1.98	7.5
35	7.0	26.5	2.31	8.7
40	8.0	30.3	2.65	10.0
45	9.0	34.1	2.97	11.2
50	10.0	37.8	3.30	12.5

Manual Change Summary

The following changes have been added to this manual since the last revision:

- The entire manual was updated electronically.

The Graco Warranty and Disclaimers

WARRANTY

Graco warrants all equipment listed in this manual which is 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. 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.

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LIMITATION OF LIABILITY

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or for 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.

Graco Phone Number

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.

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

PRINTED IN U.S.A. 307-159 May 1975, Revised August 1996