Instructions–Parts List

Displacement Pump

307983L

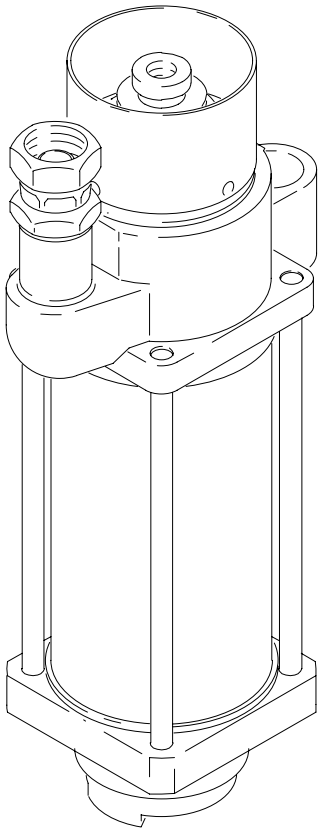
For supply and circulation of finishing materials.

Important Safety Instructions
Read all warnings and instructions in this manual.
Save these instructions.

*400 psi (28 bar) Maximum Working Pressure**

* The maximum safe working pressure is determined by the motor to which this displacement pump is connected.

Part No. 223177, Series D
Carbon Steel, UHMWPE and Leather Packed Pump



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Symbols

Warning Symbol

⚠ WARNING

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

Caution Symbol

⚠ CAUTION

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 of the lowest rated system component. Refer to the **Technical Data** on page 11 for the maximum working pressure of this equipment.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** on page 11, and in all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- 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 82°C (180°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

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** in your separate pump manual.
- 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.
- Electrically disconnect all equipment in the spray area.
- 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.

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.

MOVING PARTS HAZARD

Moving parts can pinch or amputate your fingers.

- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 4 to prevent the equipment from starting unexpectedly.

Service

Pressure Relief Procedure

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD
The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from accidental spray from the gun, 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 nozzle.

1. Shut off the air or hydraulic power supply to the pump.

2. Close the bleed-type master air valve (required in air-powered systems).

3. Hold a metal part of the gun firmly to the side of a grounded metal pail, and trigger the gun to relieve pressure.

4. Open the drain valve (required in your system), having a container ready to catch the drainage.

5. Leave the drain valve open until you are ready to spray again.

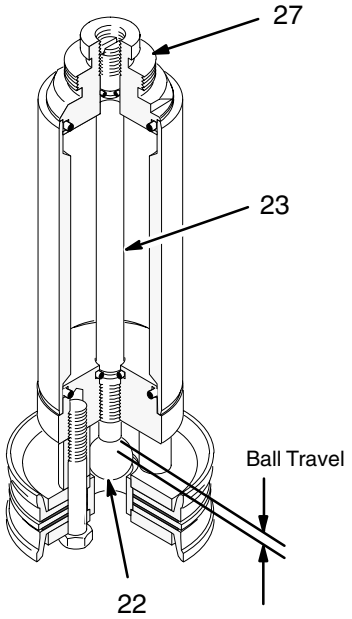
If you suspect that the spray nozzle or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, very slowly loosen the nozzle retaining ring or hose end coupling and relieve pressure gradually, then loosen completely. Now clear the nozzle or hose.

Piston and Intake Valve Adjustment

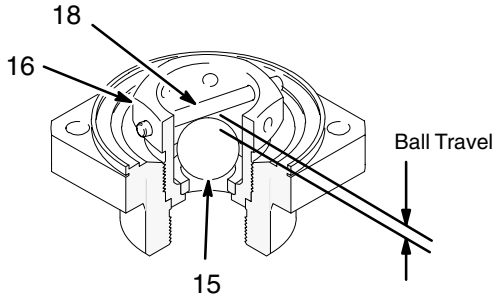
See Fig. 1. The fluid piston and intake check valves are factory-set for pumping medium viscosity fluids. The ball stop pin (18) in the intake valve is in the lowest set of holes. The piston ball travel is set at 0.204 in. (5.2 mm), measured from the end of the adjustable plunger rod (23) to the top of the ball (22). This distance represents four complete turns of the rod (23) from the top of the ball.

1. ***If you are pumping heavy viscosity fluid and erratic pump operation develops,*** disassemble the pump as explained on page 5. *To increase the ball travel in the intake valve,* move the pin (18) to the center or upper set of holes. *To increase the ball travel in the piston valve,* place the piston in a vise, loosen the upper cap (27) to relieve tension on the plunger rod (23), and turn the plunger rod counterclockwise two complete turns beyond its factory-set position, or enough to set the total ball travel to 0.306 in. (7.8 mm).

2. ***If you are pumping lighter viscosity fluid and surging develops,*** disassemble the pump as explained on page 5. *To decrease the ball travel in the intake valve,* place the pin (18) in the lowest set of holes. *To decrease the ball travel in the piston valve,* place the piston in a vise, loosen the upper cap (27) to relieve tension on the plunger rod (23), and turn the plunger rod clockwise two complete turns beyond its factory-set position, or enough to set the total ball travel to 0.102 in. (2.6 mm).



Piston Valve



Intake Valve

Fig. 1 06081

Service

Before you start:

1. Have all necessary repair parts on hand. Recommended spare parts are marked in the parts list with a check mark, for example (3✓).

2. Packing Repair Kits are available for some pumps. See the parts list for your pump to order the correct kit. Use all the new parts in the kit for the best results. Kit parts are indicated in the parts list with an asterisk, for example (5*).

3. Always replace the glands when replacing the packings, whether or not you use a repair kit.

4. Use a compatible solvent to clean parts. Inspect for wear or damage and replace parts as needed.

5. Use light, waterproof grease wherever lubrication is recommended.

Disassembly (See Fig. 2)

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 4.

1. Flush the pump, if possible. **Relieve the pressure.**

2. Disconnect the air and fluid lines. Remove the pump from its mounting and clamp it in a vise. Disconnect the displacement pump from the motor as explained in your separate pump manual.

3. Loosen the packing nut/wet-cup (1). Unscrew and remove the four tie bolts (30) and lockwashers (31). Pull the intake valve housing (14) off the pump.

4. Remove and inspect the intake valve gasket (17). Unscrew the retainer and seat assembly (16) from the intake valve housing (14). Remove the ball stop pin (18), noting which holes it is in. Remove the intake valve ball (15). *Handle the ball carefully as it can be easily damaged*.

5. Clean all parts of the intake valve and inspect carefully for wear or damage. Inspect the seat (C) of the retainer and seat assembly (16), but do not attempt to remove it. If the seat is worn or damaged, replace the entire retainer and seat assembly.

6. Pull the pump cylinder (9) straight off the outlet housing (24), being careful not to tilt it until it is clear of the displacement rod (8) and piston assembly (B).

7. Inspect the polished inner surface of the cylinder (9) for scoring, wear or damage by running a finger over the surface or holding the part up to a light at an angle. Replace if necessary.

8. Remove the three screws (19) and washers (20), and disassemble the piston. *Be very careful when handling the ball (22) and seat (13) as they can be very easily damaged.* Clean all parts and inspect carefully for wear or damage. See Fig. 4.

9. Unscrew the packing nut/wet-cup (1) from the outlet housing (24). Pull the displacement rod (8) down out of the outlet housing. Remove and inspect the outlet housing gasket (7).

10. Push the throat packings and glands (A) out of the outlet housing (24). Clean the outlet housing and throat packings, and inspect for wear or damage.

11. Inspect the polished outer surface of the displacement rod (8) for scoring, wear or damage by running a finger over the surface or holding the part up to a light at an angle. Replace if necessary.

12. **Do not disassemble the displacement rod assembly unless necessary.** Before disassembling, carefully measure how far the adjustable plunger rod (23) protrudes from the lower cap (10). This determines the amount of piston ball (22) travel. Screw the plunger rod (23) out of the displacement rod assembly, and inspect the o-rings (3) in place. Disassemble the upper and lower caps (27, 10) from the displacement rod (8). Inspect the o-rings (4) in place.

△1 See Fig. 3.

△2 See Fig. 4.

△3 Apply thread sealant.

△4 Lubricate threads and torque to 20–24 ft–lb (27–33 N.m).

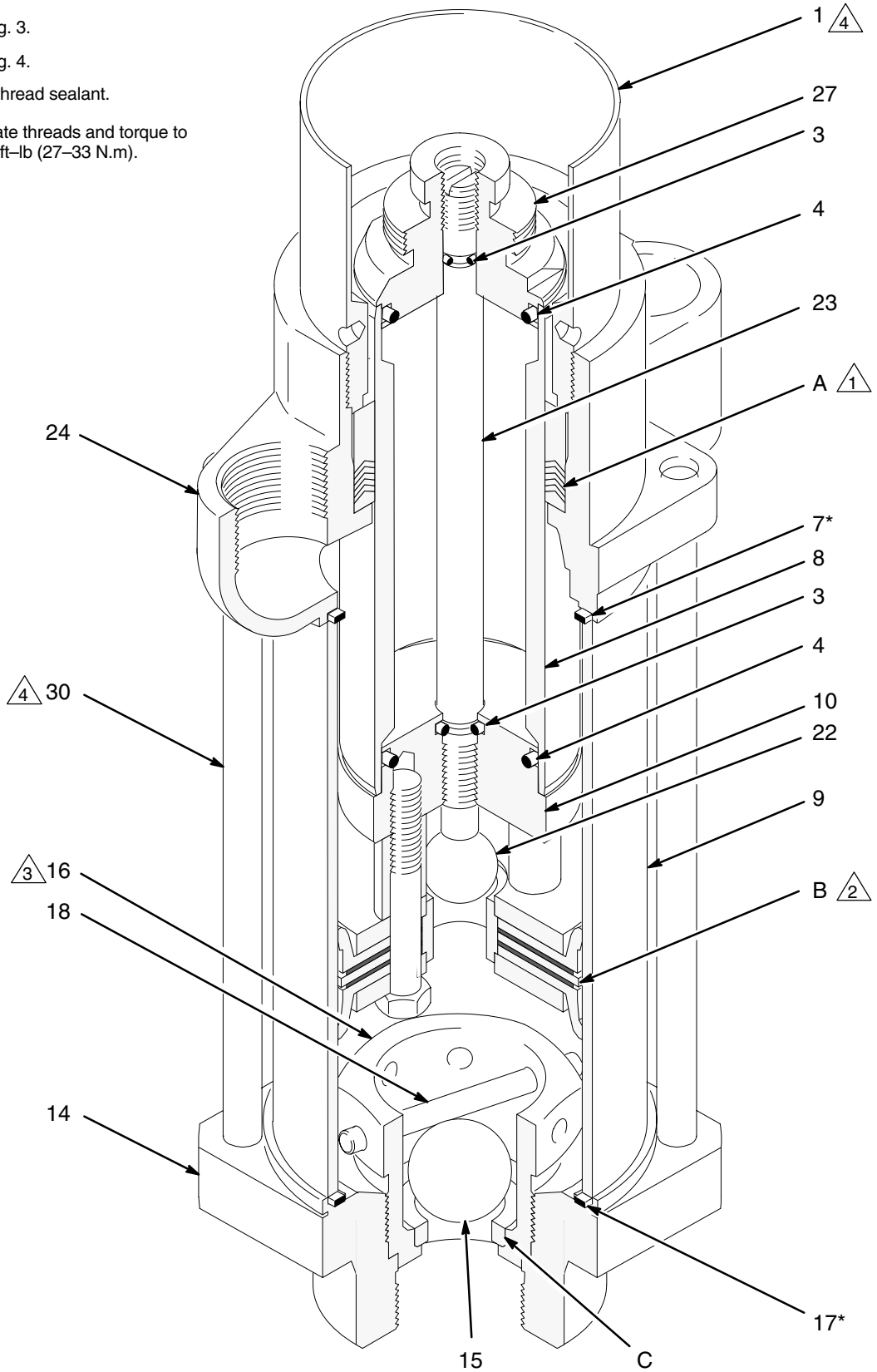


Fig. 2

Service

Reassembly (See Fig. 2)

1. Lubricate the packing nut threads and all packings and seals with silicone-free lubricant, such as no. 2 lithium-base grease, before reassembling.

2. If it was necessary to disassemble the displacement rod assembly, reassemble the upper and lower caps (27, 10) and the plunger rod (23) to the displacement rod (8). Screw the plunger rod through the lower cap until it protrudes the required distance as was recorded in step 12 of **Disassembly.**

3. Install the male gland, v-packings, and female gland in the outlet housing (24), as shown for your pump model (see Fig. 3). Install the v-packings one at a time, with the lips facing down.

4. Install the gasket (7*) in the outlet housing (24). Loosely install the packing nut/wet-cup (1). Insert the displacement rod assembly in the bottom of the outlet housing and push it up until the threads of the upper cap (27) are roughly level with the top of the packing nut/wet-cup. (This makes it easier to connect the coupling nut when the displacement pump is reinstalled on the motor.)

△1 Apply sealant to male threads and torque to 80–90 ft–lb (108–122 N.m).

△2 Lips of v-packings must face down.

△3 Lubricate threads and torque to 20–24 ft–lb (27–33 N.m).

△4 Lubricate.

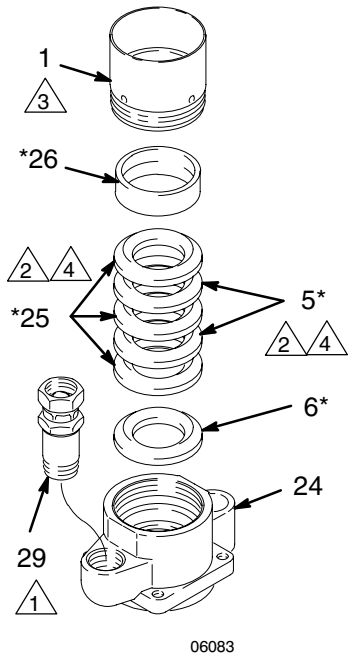


Fig. 3

5. Place a washer (20) on each of the three screws (19). Assemble the piston as shown for your pump model (see Fig. 4). Place the piston valve seat (13) in the center of the piston assembly so its lip bottoms out. Continue stacking the parts on the screws (19) as shown. Place the piston ball (22) on the seat (13).

6. Place a piston spacer (42) on each of the screws (19). Apply thread sealant to the screws and screw the piston assembly into the lower cap (10). Torque the screws (19) to 240–300 in-lb (27–34 N.m). See Fig. 4.

7. Carefully guide the cylinder (9) over the piston assembly and displacement rod until it seats in the outlet housing (24). See Fig. 2.

8. Apply thread sealant and screw the retainer and seat assembly (16) into the intake valve housing (14). Install the gasket (17*) on the intake valve housing.

9. Place the intake valve ball (15) on the seat of the retainer and seat assembly (16). Install the ball stop pin (18) in the same set of holes from which it was removed. (To readjust ball travel, see **Piston and Intake Valve Adjustment** on page 4.)

10. Lubricate the tie bolts (30) and install a lockwasher (31) on each. Install the tie bolts through the intake valve housing (14) and up into the outlet housing (24). Torque oppositely and evenly to 20–24 ft-lb (27–33 N.m).

11. Torque the packing nut/wet-cup (1) 20–24 ft-lb (27–33 N.m); do not overtighten or you may damage the packings. Reconnect the displacement pump to the motor as explained in your separate pump manual. Reconnect the ground wire if it was disconnected during service.

12. Fill the packing nut/wet-cup (1) 1/2 full of Graco Throat Seal Liquid or a compatible solvent. Reconnect all hoses and return the pump to operation.

△1 Apply thread sealant and torque to 240–300 in–lb (27–34 N.m).

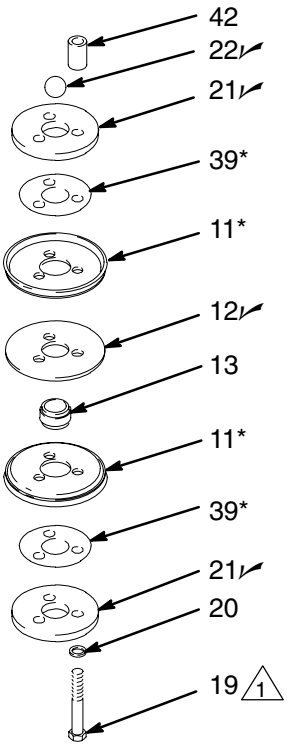


Fig. 4

Parts

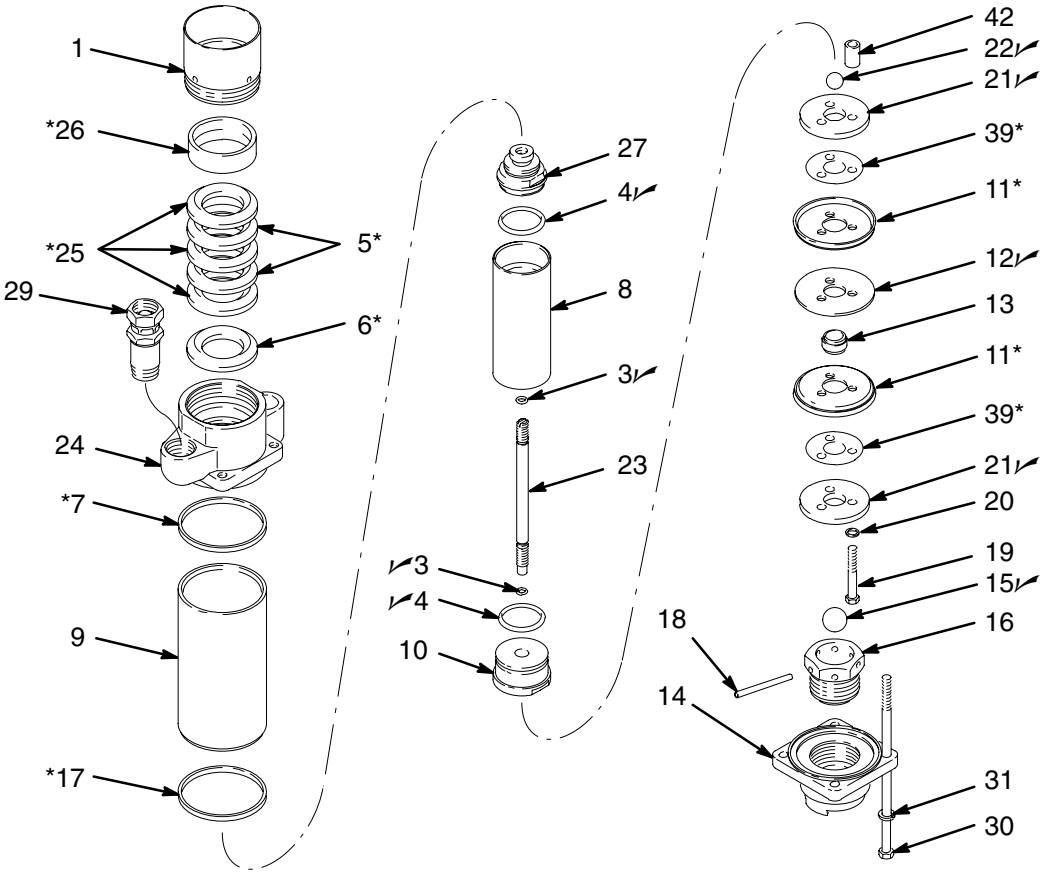
Model 223177, Series D
UHMWPE and Leather Packed

Ref No.	Part No.	Description	Qty
1	180949	PACKING NUT/WET-CUP	1
3✓	106555	O-RING; fluoroelastomer	2
4✓	108832	O-RING; fluoroelastomer	2
5*	166489	V-PACKING; leather	2
6*	185662	GLAND, male	1
7*	171168	GASKET; nylon	1
8	185650	ROD, displacement	1
9	24C503	CYLINDER, pump	1
10	161743	CAP, rod, lower	1
11*	185630	PACKING, cup; UHMWPE	2
12✓	160019	WASHER, back-up	1
13	180944	SEAT, piston valve	1
14	180930	HOUSING, intake valve	1
15✓	101178	BALL, intake; steel; 1–1/4" (31.8 mm) diameter	1
16	205061	RETAINER and SEAT, intake valve	1
17*	171177	GASKET; nylon	1
18	160006	PIN, straight	1
19	101529	SCREW, hex hd; 3/8–16 x 2–3/4" (70 mm) long; w/nylon locking patch	3
20	171163	WASHER, flat	3
21✓	185964	WASHER, piston	2
22✓	100279	BALL, piston; steel; 7/8" (22 mm) diameter	1
23	185651	ROD, plunger, adjustable	1
24	180932	HOUSING, outlet, pump	1
25*	185647	V-PACKING; UHMWPE	3
26*	185648	GLAND, female	1
27	190067	CAP, rod, upper	1
29	190176	UNION, adapter, straight; 1" npt(m) x 1" npsm(f) swivel	1
30	110349	BOLT, hex hd; 3/8–16 unc–2a x 9" (229 mm) long	4
31	100133	LOCKWASHER; 3/8" (10 mm) size	4
39*	185917	GASKET, piston; cellulose fiber	2
40▲	172479	TAG, warning (not shown)	1
42	160016	SPACER, piston	3
44▲	179761	TAG, warning (not shown)	1

* *These parts are included in Repair Kit 223320, which may be purchased separately.*

✓ *Keep these spare parts on hand to reduce down time.*

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



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Conversion Kit

223321 CONVERSION KIT
(Must be purchased separately)
Converts the pump to PTFE throat packings.

Part No.	Description	Qty
185648	Female Gland	1
185662	Male Gland	1
166165	V-Packing; PTFE	5
185630	Cup Packing; UHMWPE	2
171168	Gasket; nylon	1
171177	Gasket; nylon	1
185917	Gasket; cellulose fiber	2

Technical Data

Category	Data
Maximum Working Pressure	400 psi (28 bar)
Wetted Parts:	Ductile Iron; Carbon Steel; 17–4 PH and 304 Stainless Steel; Cadmium, Zinc, and Nickel Plating; Nitralloy; fluoroelastomer; Cellulose Fiber; Leather; Ultra-High Molecular Weight Polyethylene

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 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.

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Graco Information

For the latest information about Graco products, visit www.graco.com.

TO PLACE AN ORDER, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you:
1–800–328–0211 Toll Free
612–623–6921
612–378–3505 Fax

All written and visual data contained in this document reflects the latest product information available at the time of publication. Graco reserves the right to make changes at any time without notice.

This manual contains English. MM 307983

Graco Headquarters: Minneapolis
International Offices: Belgium, China, Japan, Korea

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