Instructions – Parts List

Power–Star ™

308391 rev.G

Used to pump high volumes of petroleum and synthetic based oils.

Hydraulic Reciprocator & Pump

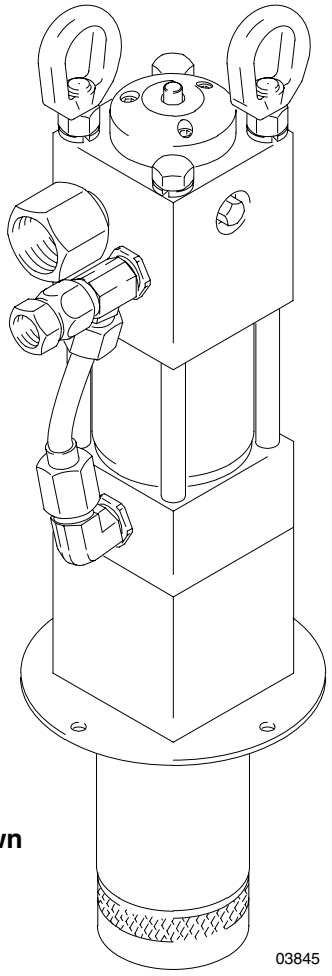
1500 psi (10 MPa, 103 bar) Maximum Hydraulic Input Pressure
1500 psi (10 MPa, 103 bar) Maximum Fluid Outlet Pressure

Model 236754, Series A
1:1 Ratio Universal Pump and Reciprocator

Model 236752, Series A
Reciprocator Only

Patent No. 4,383745
Foreign Patents Pending
Patent 1984 Canada
Brevete 1984

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



03845

Model 236754 shown

⚠ WARNING

This pump is designed to be used only in pumping non–corrosive and non–abrasive oils and lubricants. Any other use of the system can cause unsafe operating conditions and result in component rupture, fire, or explosion which can cause serious injury, including fluid injection.

PROVEN QUALITY. LEADING TECHNOLOGY.

CE

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

Table of Contents

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

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 uncertain about usage, 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 that 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

SKIN INJECTION HAZARD

Fluid dispensed from the valve, hose 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 is a serious injury. The injury may look like just a cut, but it is a serious injury. **Get immediate surgical treatment.**
- Do not point the valve at anyone or at any part of the body.
- Do not put your hand or fingers over the 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 valve when dispensing.
- Be sure the valve trigger safety operates before dispensing.
- Lock the valve trigger safety when you stop dispensing.
- Follow the **Pressure Relief Procedure** on page 8 if the nozzle 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 lubricates.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop dispensing immediately.** Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being dispensed.
- Keep the dispense area free of debris, including solvent, rags, and gasoline.
- Do not smoke in the dispense area.
- Do not turn on or off any light switch in the area while dispensing or while operating if fumes are present.
- Do not operate a gasoline engine in the dispense area.

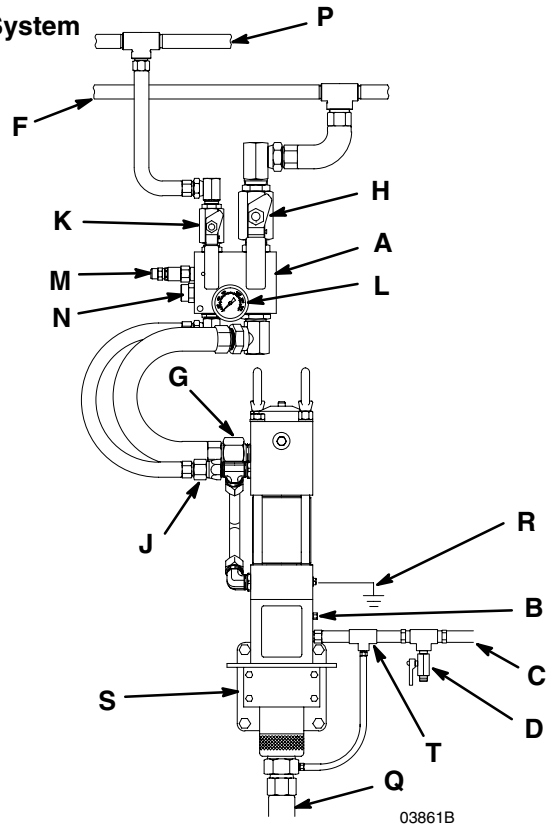
TOXIC FLUID HAZARD

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

Typical Installation – Suction Feed System



KEY

- **A** Hydraulic Control, 236865 (See Manual 308395)
- **B** Porous Plug (Weep tube optional)
- **C** Fluid Dispenser Outlet
- **D** Drain Valve, 210658 (required)
- **F** Hydraulic Return Line
- **G** Hydraulic Outlet, 1 1/4 npt
- **H** Return Line Shutoff Valve
- **J** Hydraulic Inlet, 3/4 npt
- **K** Hydraulic Supply Line Shutoff Valve
- **L** Pressure Gauge
- **M** Pressure Reducing Valve
- **N** Flow Control Valve
- **P** Hydraulic Supply Line (Use only GRACO hydraulic power supply)
- **Q** Dispensed Material Supply Suction Hose Kit, 236054
- **R** Ground Wire (required) Part No. 222011
- **S** Wall Mounting Bracket 236778 (See Manual 308394)
- **T** Thermal Relief Kit (required) Part No. 237904

The installation shown above is only a guide. For assistance in designing a system to suit your needs, contact your Graco representative.

Mount the pump to suit the type of installation planned.

Installation

⚠ WARNING

Maximum Working Pressure of Accessories
To reduce the risk of serious injury including fluid injection and splashing in the eyes or on the skin, which may be caused by component ruptures, all accessories added to the reciprocator power supply side or the pump fluid outlet side must have at least a 1500 psi (103 bar, 10 MPa) maximum working pressure.

Pump Accessories

Suction Tube Kit: A suction tube kit is available for siphoning from 55 gallon containers.

Intake Tube: To install, apply PTFE tape to the female threads at the top of the tube (Q). Screw the tube tightly into the intake housing of the stubby pump.

Low-Level Cutoff Valve: To install, screw the low-level cutoff valve into the bottom of the pump intake tube or the suction tube. This valve closes the pump intake when the fluid level is low, causing the pump to stall to avoid running dry.

⚠ WARNING

A pump outlet drain valve is required in your system. This valve helps relieve pressure in the displacement pump and hose when shutting down the system and in case of a clogged outlet hose. Install the valve close to the pump outlet.

Pump Outlet Drain Valve: Install a drain valve (D) close to the pump fluid outlet to assist in relieving fluid pressure in the pump, hose, and dispense valve when the pump is shut off.

Thermal Relief Kit: Install a Thermal Relief Kit (T) at the pump fluid outlet. *To order a 1600 psi (11 MPa, 110 bar) Thermal Relief Kit, order Part No. 237904.*

General Information

NOTE: Reference numbers and letters in parentheses in the text refer to the callouts in the Installation and Parts drawings.

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 AND EXPLOSION HAZARD** on page 4.

1. *Pump:* Use a ground wire and clamp as shown at the right. Remove the ground screw (Z) and insert through the eye of the ring terminal at end of ground wire (Y). Fasten the ground screw back onto the pump and tighten securely. Connect the other end of the ground wire to a true earth ground. See Fig. 1. *To order a ground wire and clamp, order Part No. 222011.*

2. *Hydraulic hoses and fluid outlet hoses:* Use only electrically conductive hoses.

3. *Hydraulic power supply:* Follow manufacturer's recommendations.

4. *Any pails used when flushing:* Use only metal, grounded pails when flushing. Make firm metal to metal contact between the metal part of the dispense valve and the pail. Use the lowest possible pressure.

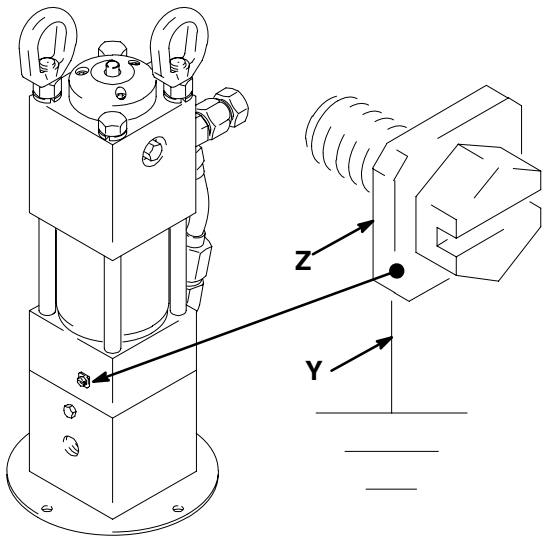


Fig. 1

Installation

⚠ WARNING

To avoid serious injury, do not move this unit without the use of lifting equipment.

Hydraulic Power Supply

⚠ WARNING

To reduce the risk of overpressurizing the hydraulic reciprocator, which could cause a rupture and serious injury, including fluid injection, you must limit the incoming hydraulic pressure to a maximum of 1500 psi (103 bar, 10 MPa).

⚠ CAUTION

Keep the hydraulic system clean
To reduce the risk of damaging the hydraulic power supply, blow out all hydraulic lines with air, flush thoroughly with solvent, and then blow out with air again before connecting the lines to the motor.

Always plug the hydraulic inlets, outlets, and lines when disconnecting them to avoid introducing dirt and other contaminants to the system.

Carefully follow the manufacturers recommendations on reservoir and filter cleaning, and periodic changes of the hydraulic fluid.

Hydraulic Components

⚠ WARNING

Always turn off the hydraulic supply side valve (K) first to avoid possible serious injury or component damage. See the Typical Installation on page 5.

Drain Line: remove the plug (24) from the pump adapter, and install a 1/8 in. diameter weep tube, ending in a waste container. Monitor the weepage of hydraulic fluid. If it seems excessive or increases suddenly, the reciprocator or pump throat seals may need to be changed. See Fig. 2.

Hydraulic Fluid Control: The hydraulic fluid control provides pressure regulation, and pump isolation. See the Typical Installation on page 5.

Pressure Regulation:
The hydraulic fluid control reduces the hydraulic oil pressure to the operating pressure required for the application.

Flow Regulation:
The hydraulic fluid control limits the maximum amount of oil flow to the motor to keep the hydraulic motor within the cycle rate limit. This prevents pump runaway. The limit on the Power-Star™ is 66 cpm.

Pump Isolation:
The hydraulic fluid control has ball valves on the supply and return sides of the manifold. The ball valves isolate the hydraulic fluid control and pump for servicing without stopping the hydraulic power supply.

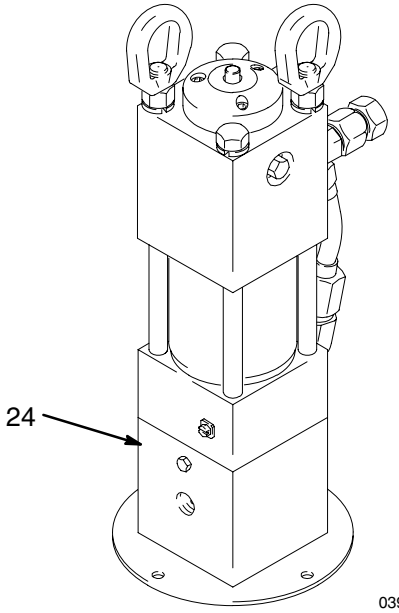


Fig. 2

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,
- shut off the pump,
- check or service any of the system equipment,
- install or change the nozzles

1. Close the supply line shutoff valve, and then the return line shutoff valve.

2. Open the dispensing valve to relieve pressure.

3. Place a container under the drain valve to catch any drainage. Open the pump outlet drain valve.

4. Leave the drain valve open until you are ready to dispense again.

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

Before Starting the Pump

⚠ CAUTION

Recommended Hydraulic Oil
Use a Graco-approved Hydraulic Oil or a premium, ISO grade 46 petroleum-based hydraulic oil containing rust and oxidation inhibitors and anti-wear agents.

Before using any other type of oil in this motor, contact you Graco distributor. Unauthorized use of lesser grade oil or substitutes may void the warranty.

Hydraulic Oil Working Temperature
The recommended hydraulic oil operating temperature is 80–115° F (27–45° C). The motor seals will wear faster and leakage may occur if the pump is operated at higher oil temperatures.

If the hydraulic oil temperature approaches 130° F (54° C), check the hydraulic fluid supply cooling system, filters, etc. and clean or repair as needed.

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

2. Flush the pump before using it for the first time to remove the light oil that was left in after factory testing to protect the pump from corrosion. Be sure the solvent used is compatible with the fluid to be pumped and the pump's wetted parts. See the Technical Data on page 19. Flush until clean solvent comes from the outlet hose.

Operation

To Start the Pump

⚠ WARNING

Maximum Working Pressures
To reduce the risk of serious injury including fluid injection and splashing in the eyes or on the skin, which may be caused if a component ruptures:

Never exceed 1500 psi (103 bar, 10 MPa) Maximum Hydraulic Pressure to the reciprocator.

Never exceed 1500 psi (103 bar, 10 MPa) Maximum Fluid Pressure from the displacement pump.

Be sure all accessories added to the reciprocator power supply side or the pump fluid outlet side have at least a 1500 psi (103 bar, 10 MPa) Maximum Working Pressure.

The maximum working pressure of the displacement pump is directly proportional to the pressure at which the reciprocator is operated. Therefore, if the hydraulic fluid supplied to the reciprocator is 1000 psi (70 bar, 7.0 MPa), the pump fluid outlet pressure will also be 1000 psi (70 bar, 7.0 MPa).

1. Turn on the hydraulic power supply.

2. Open the return line shutoff valve (H) first, and slowly open the hydraulic supply line shutoff valve (K). See the Typical Installation on page 5.

3. Adjust the hydraulic inlet pressure from 500 to 1500 psi (35 to 103 bar, 3.5 to 10 MPa) with the regulator control adjustment (M) on the hydraulic fluid control (A). Increasing the inlet pressure increases the outlet pressure. Decreasing the inlet pressure decreases the outlet pressure.

4. Always use the lowest pressure possible to obtain the desired results. This reduces pump wear.

5. Never allow a pump to run dry of the fluid being pumped. A dry pump quickly speeds up and can damage itself. If it speeds up, shut off the power supply to the reciprocator immediately. Refill the supply container and prime the pump to eliminate air.

NOTE: To prevent the pump from running dry, use a low-level cutoff valve.

Shutdown & Care

⚠ WARNING

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

At the end of the work shift or when the pump is unattended, always **relieve the pressure.**

Emergency Stop Procedure

Close the supply line shutoff valve marked STOP.

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.

NOTE: Relieve the pressure before you check or service any of the system equipment.

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

Problem	Cause	Solution
Pump will not run	Closed dispense valve	Pump only runs with valve open.
	Pressure too low	Increase supply pressure using the pressure adjusting valve.
	Insufficient hydraulic fluid supply	Check hydraulic power supply. Adjust to a maximum of 12 gpm (45.4 lpm) flow
	Clogged fluid outlet line, intake valve, dispense valve, suction line.	Check; clear obstructions.
	Motor stalled	Press reciprocator reset button (39). Pump should start immediately. See the Parts Drawing on page 16.
	Reciprocator damaged	Repair. See pages 11 through 15.
Pump speeds up or runs erratically	Pump piston and/or intake valve worn	Check and repair. See Page 15.
	Empty supply container	Refill and reprime. Do not allow pump to run dry. Monitor closely or use a low-level cutoff valve.
Pump runs, but output low on up and/or down stroke.	Pump piston and/or intake valve worn	Check and repair. See page 15.
	Insufficient material fluid supply	Refill fluid supply container.
	Pressure too low	Increase supply pressure using the pressure adjustment on the control.
	Clogged fluid outlet line, intake valve, dispense valve, suction line.	Check; clear obstructions.
Excessive weepage from porous plug (B)	Worn throat seals	Repair. See Page 11.
Hydraulic oil leaks from seal nuts in the upper housing or cap (36, 43)	Seal nuts (19) are loose, worn or damaged.	Tighten the seal nuts. If leaking persists, change the seal nuts.
Pump runs slowly with dispense valve closed	Pump/dispense line leakage	If system is OK, rebuild the pump. Use Kits 220457 and 236862.

Service

⚠ WARNING

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

NOTES:

- Spool Valve Repair Kit 220457 is available to replace the gaskets (29), spring retaining plugs (31), springs (21), spool (38), trip rod (33) and piston stop (37). The spool, plugs, and springs must be replaced as a group.
- Clean all parts as you disassemble them, and inspect for wear or damage. Replace parts as necessary. Use Loctite® TL–242 thread sealant, or the equivalent, when thread sealant is specified.
- Pump repair kit 236862 is available to replace the gasket (29), o-rings (11, 12, 105, 108), seals (17), packing (107), and piston rings (15).
- A dagger by a reference number , (29†) for example, indicates that the part is included in 236862 repair kit.

Disassembly

⚠ WARNING

To avoid serious injury, do not move this unit without the use of lifting equipment. Keep the hoist attached for steps 1 through 15.

⚠ WARNING

Hydraulic fluid under high pressure may cause serious injury, including fluid injection, injury from moving parts, and splashing in the eyes or on the skin.

1. **Relieve the pressure,** and stop the pump at the bottom of its stroke.

⚠ CAUTION

Avoid getting dust or dirt in the motor during repair. Cleanliness is essential when repairing a hydraulic motor.

2. Disconnect the displacement pump hoses. Disconnect the hydraulic hoses and plug all hydraulic connections and lines to prevent contamination.
3. Place the hydraulic motor horizontally in a bench vise at the pump adapter (42) and bottom cylinder cap (43).
4. Remove the displacement pump with a strap wrench.
5. Remove the capscrews (25) and the mounting plate (46).
6. Remove the hydraulic motor from the vise.
7. Place the piston (110) flats in the vise.
8. Loosen, but do not remove the piston rod (44) with a wrench.
9. Remove the piston (110) flats from the vise.
10. Place the motor vertically in the vise at the pump adapter (42) and the bottom cylinder cap (43).
11. Remove the piston (110), ball (103) and seal (107†).

⚠ CAUTION

To prevent damage to the spool (38) and the upper housing (36), remove the detent parts (31, 21, 29†, 30, and 7) before removing the end cap (40).

NOTE: The socket screws (9), cap screws (22), and retainer (32) are fastened with Loctite® TL–242. Heat may be used sparingly to soften the adhesive during disassembly.

12. Remove one detent assembly retaining plug (31), spring (21), gasket (29†), ball guide (30) and ball (7). If the ball or other parts stick in the upper housing (36), use a magnet to extract the parts. Do not allow the parts to fall into the motor. Repeat the procedure for the other detent assembly.
13. Unscrew the top and bottom flare nuts on the hydraulic tube (49), and remove the tube. Allow the oil to drain from the motor into a pan.
14. Remove the socket screws (9), and remove the end cap (40).
15. Remove the bolts (23), but do not remove the tie rods (47).

⚠ CAUTION

With the bolts removed, the assembly may separate at the joints between the cylinder (35) and the upper housing (36) and bottom cylinder cap (43).

16. Remove the stop plug (39) from the upper housing (36). Pull the upper housing about 3 inches off the cylinder (35). Shim the housing with 3/4 in. flat stock to keep an opening. The cylinder can stay in the lower housing (43).

17. Hold the trip rod (33) steady with a trip rod pliers (207579) on the rod, and remove the top hex nut (16) from the trip rod.

18. Remove the upper housing (36). Remove the valve spool (38) from the upper housing (36). Save the spring collars (41), the springs (34), and the parts remaining inside the upper housing.

19. Inspect the bore in the upper housing (36) and the outside diameter of the valve spool (38) for wear. Replace parts if damaged. Inspect the trip rod (33) above the shoulder for damage. There must be no reduction in diameter.

20. Pull the trip rod and piston rod (44) from the lower housing (43) and cylinder (35).

21. The seals (17†) must be replaced if they are leaking. Remove seals from the adapter (42).

22. Perform steps 23 and 24 if parts inspected in step 19 are damaged.

23. Place the piston rod (44) in a vise; tighten the vise on the flats of the piston rod. Use a spanner wrench to remove the retainer (32). Remove the trip rod (33) from the piston rod (44).

24. Remove the trip rod nut (10) and piston stop (37). If the piston rod is replaced, remove the compression springs (18), and compression rings (15†) to use on the new piston rod.

Reassembly (See Fig. 3)

1. Place the pump adapter (42) in the vise. Grease the new seal (17†) from the Repair Kit (236862). Install a seal in the pump adapter (42) with the lip facing down. Install the rod guide (45) and install the second seal, with the lip facing up in the pump adapter. Install the bottom cylinder cap (43). Ensure all fluid ports are facing the same direction.

2. Install the piston rod (44) into the pump adapter (42) and the bottom cylinder cap (43). Lubricate the piston rings (15†) and install on the piston rod (44) with the openings on the rings opposed 180°.

3. Only perform steps 4 and 5 if steps 23 and 24 of **Disassembly** were performed.

4. Install the compression spring (18) inside the piston rod. Install the trip rod nut (10) and piston stop (37) on the trip rod (33).

5. Install the trip rod (33) in the piston rod (44). Apply thread sealant to the retainer (32). With the piston flats in a vise, tighten the retainer until it is flush or below the piston surface. This is important to prevent the retainer from backing out during operation and damaging the motor.

6. Install the o-ring (12†) on cylinder (35). Install the cylinder over the piston and rings.

7. Install the upper housing (36). Install a 3/4 in. flat stock shim between the upper housing and the cylinder. Install the trip rod guide (41), the spring (34), valve spool (38), and the remaining parts from the inside of the upper housing. See the Parts Drawing on page 16.

8. Hold the trip rod (33) steady with trip rod pliers (207579) on the rod, and install the top hex nut (16) on the trip rod.

9. Replace the o-ring (11†) on the stop plug (39). Install the stop plug in the upper housing (36).

10. Install tie rods (47) and bolts (23); hand tighten.

11. Install the two lock nuts (5) and washers (6).

12. Apply thread sealant to the socket screws (9). Install the end cap (40) with the socket screws.

⚠ CAUTION

To avoid damaging the internal parts, install detent parts (31, 21, 29†, 30, and 7) after installing the end cap (40).

13. Install one detent assembly: retaining plug (31), spring (21), gasket (29†), ball guide (30) and ball (7). Repeat for the other detent assembly.

14. Align the tie rods (47) and bolts (23) and torque to 70–80 ft-lb (95–108 N•m). Install eyelet (26). Attach hoist to the eyelet.

15. Screw the top and bottom flare nuts on the hydraulic tube (49), and install the tube.

16. Place the motor horizontally in a vise at the pump adapter (42) and the bottom cylinder cap (43).

17. Apply thread sealant to the threads of the piston (110) and install the piston, ball (103), and the seal (107†) with the lips facing up.

18. Remove the hydraulic motor from the vise.

19. Place the piston (110) flats in a vise.

20. Tighten the piston rod (44) with a wrench.

21. Remove the piston from the vise.

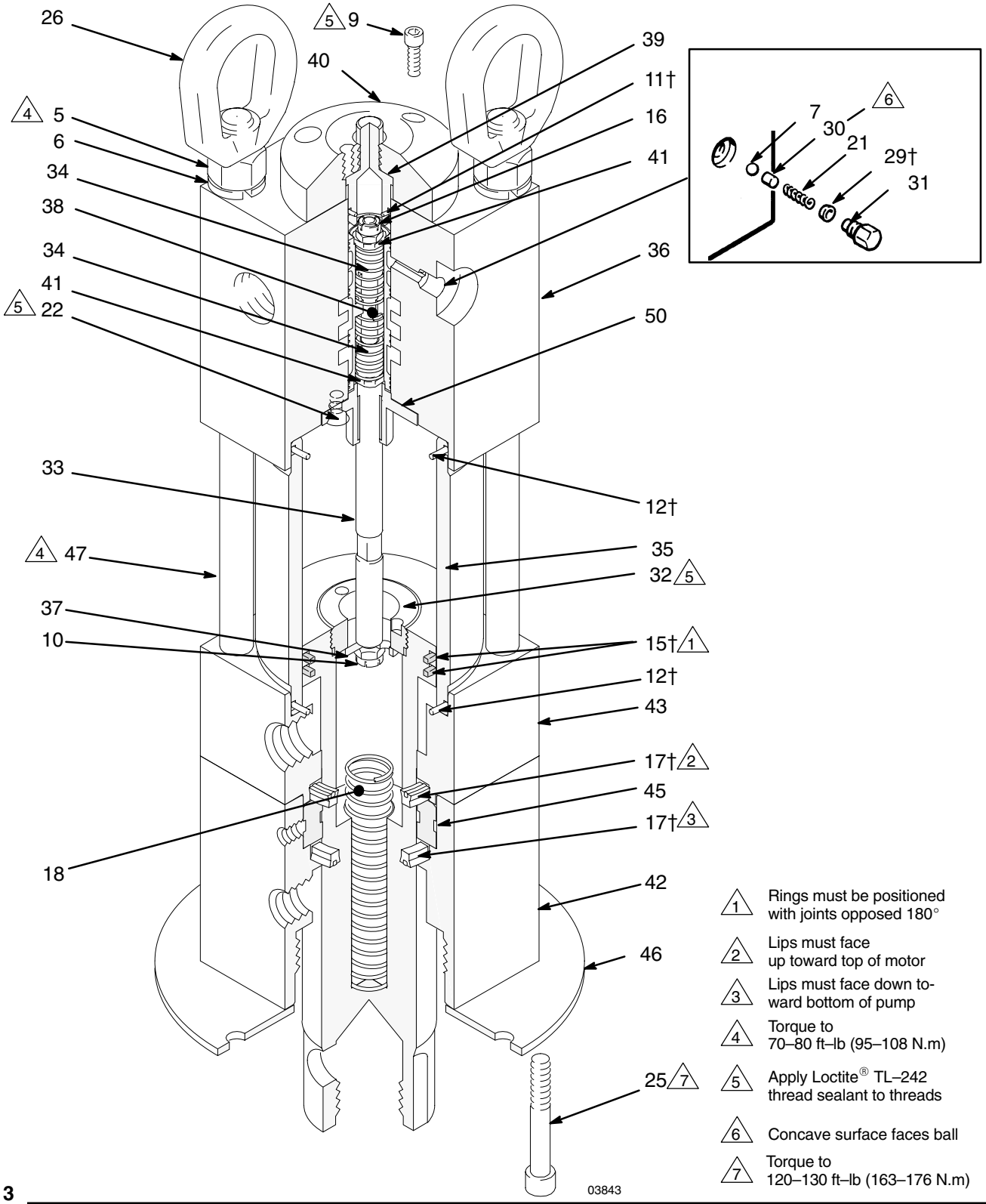
22. Place the pump horizontally in the vise.

23. Install the displacement pump with a strap wrench.

24. Remove the hydraulic motor from the bench vise.

25. Unplug all hydraulic connections and lines and connect the hydraulic hoses. Connect the displacement pump hoses.

26. Flush the displacement pump if possible. **Relieve the pressure.**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31
1 Rings must be positioned with joints opposed 180°
2 Lips must face up toward top of motor
3 Lips must face down toward bottom of pump
4 Torque to 70–80 ft–lb (95–108 N.m)
5 Apply Loctite® TL–242 thread sealant to threads
6 Concave surface faces ball
7 Torque to 120–130 ft–lb (163–176 N.m)

Fig. 3

Service

Intake Valve (See Fig. 4)

⚠ WARNING

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

1. **Relieve the pressure.**
2. Unscrew the valve body (112). Remove the o-ring (105†), ball (104), and retainer (113).
3. Inspect the parts for wear or damage. If the ball is nicked, replace it. Reassemble, using grease on the male threads.

Displacement Pump (See Fig. 4)

⚠ WARNING

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

NOTE: Clean and inspect all parts for wear of damage as you disassemble them. Replace parts as needed. For the best results, always replace all the o-rings and packings when you disassemble the pump.

1. **Relieve the pressure.**
2. Remove the piston (110). Follow steps 1 through 11 of **Disassembly**.
3. Carefully inspect the smooth inner surface of the cylinder (111) for scoring or irregular surfaces. Such damage causes premature seal wear and leaking. Replace the part as needed.
4. Grease the new piston seal and install with the lips facing up as shown in Fig. 4.
5. Reconnect the reciprocator and displacement pump as described in steps 16 through 26 of **Reassembly.**

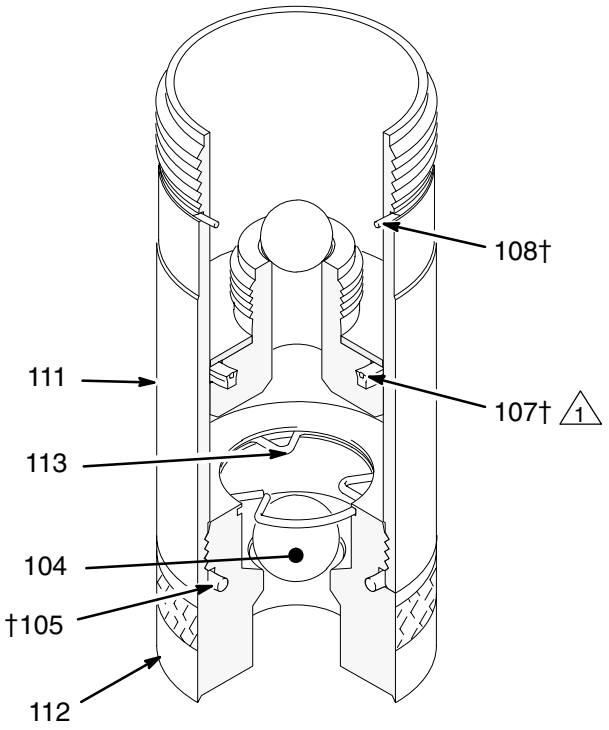
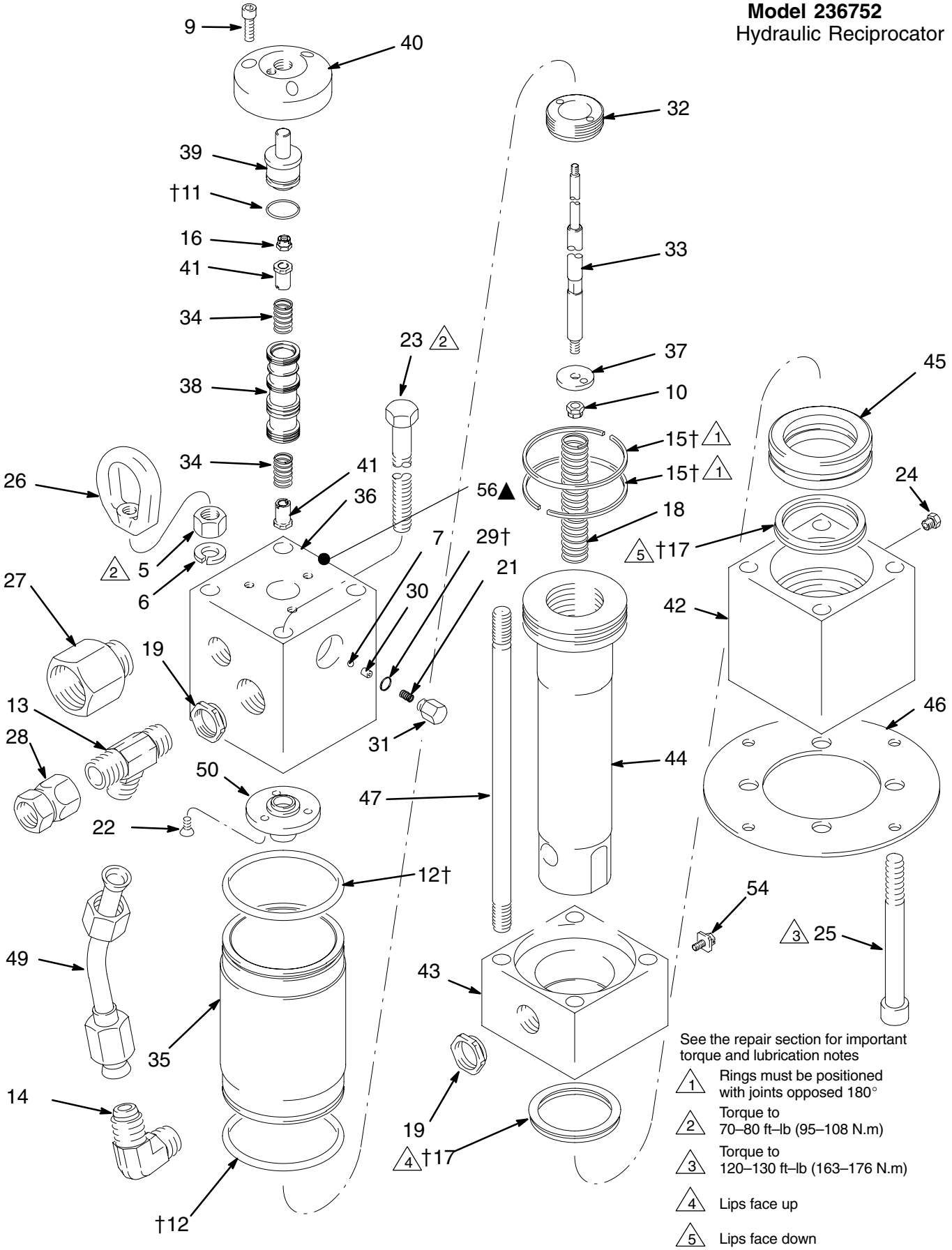


Fig. 4

Parts

Model 236752
Hydraulic Reciprocator



See the repair section for important torque and lubrication notes

1. Rings must be positioned with joints opposed 180°
2. Torque to 70–80 ft–lb (95–108 N.m)
3. Torque to 120–130 ft–lb (163–176 N.m)
4. Lips face up
5. Lips face down

03789

Parts

Ref. No.	Part No.	Description	Qty.
5	100127	NUT, mscr, hex, 5/8–11 unc-2B	2
6	100128	LOCKWASHER, spring, 5/8 in. size	4
7	101701	BALL, 1/4 in. dia.	2
8	101754	PLUG, pipe, 3/8 npt(f)	1
9	101864	CAPSCREW, soc hd, 5/16–18 x 1 in.	3
10	103450	NUT, hex, self locking, 5/16–18	1
11†	104093	O–RING, nitrile rubber	1
12†	104095	O–RING, nitrile rubber	2
13	104098	TEE, tube, for 3/4 in. (19 mm) tube)	1
14	104099	ELBOW, 90°, for 3/4 in. (19 mm) tube	1
15†	104103	RING, piston, compression	2
16	104105	NUT, hex lock, 1/4–20	1
17†	104203	SEAL, v–block, polyurethane	2
18	104664	SPRING, compression	1
19	105429	NUT, seal, 3/4–14 npt	2
20	105430	NUT, seal, 1 in. npt *supplied in a plastic bag*	1
21	108522	SPRING, helical compression	2
22	108538	SCREW, soc flat hd, self locking, 1/4–20 x 1/2 in.	3
23	109203	BOLT, hex hd	2
24	110064	PLUG, pipe, vented	1
25	112570	SCREW, cap, soc hd	4
26	112571	NUT, eye	2
27	112573	ADAPTER, pipe, female	1
28	112574	UNION, swivel	1
29†	150111	GASKET, plug	2
30	167210	GUIDE, ball	2
31	167431	PLUG, spring retaining	2
32	171398	RETAINER	1
33	171407	ROD, trip	1
34	171411	SPRING, compression	2
35	171412	CYLINDER	1
36	172814	HOUSING, upper	1
37	181243	STOP, piston	1
38	181874	SPOOL, valve	1
39	183252	PLUG, stop	1
40	183290	CAP, end	1
41	183659	GUIDE, trip shaft	2
42	189714	ADAPTER, pump	1
43	189715	CAP, cylinder, bottom	1
44	189716	PISTON, rod, hydraulic	1
45	189717	GUIDE, rod	1
46	189718	PLATE, mounting	1
47	189719	ROD, tie	2
48	189720	LABEL, identification	1
49	210108	TUBE	1
50	210292	BEARING and GUIDE	1
54	116343	SCREW, ground	1
56▲	290331	LABEL, instruction, English	1

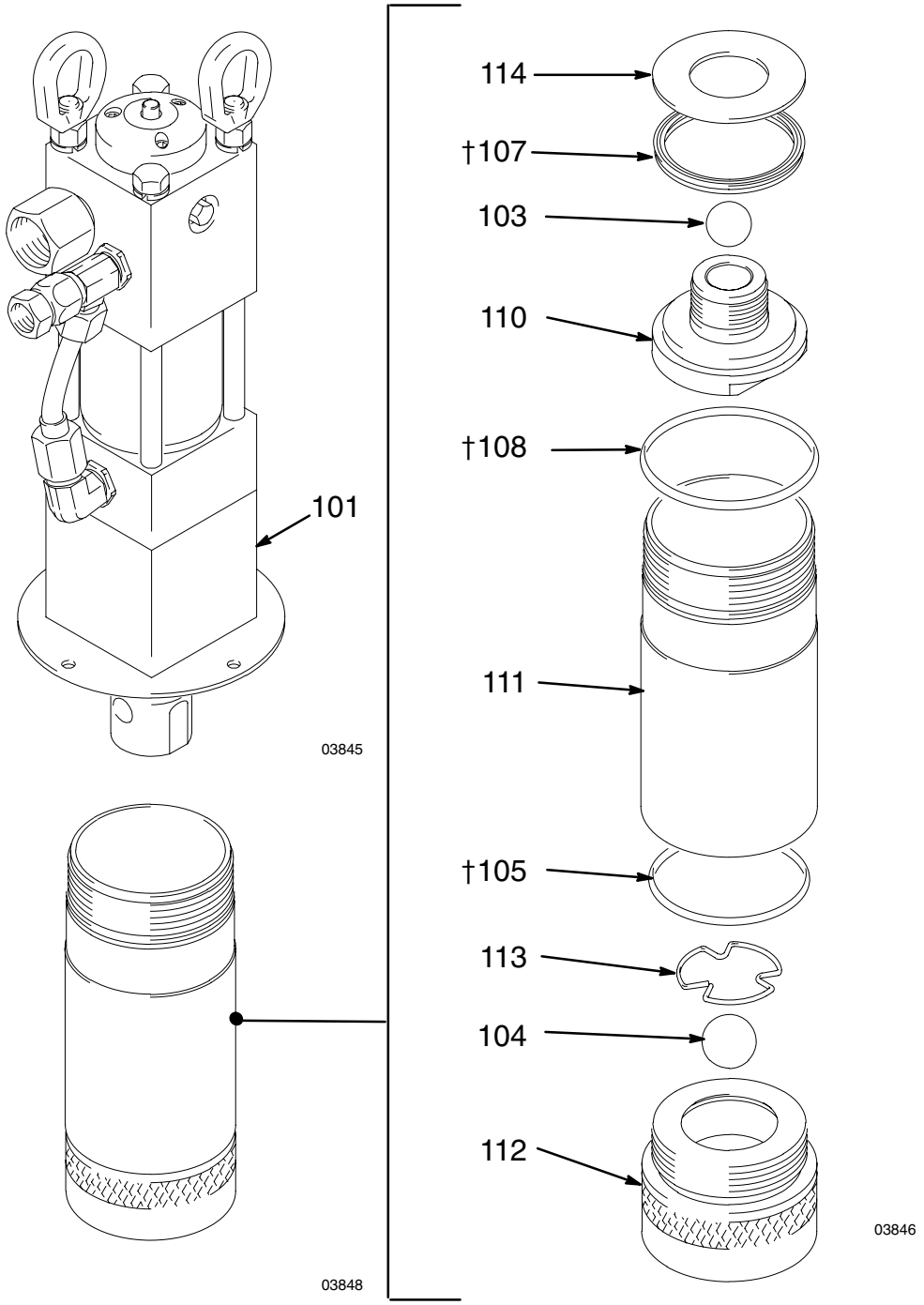
† *These parts are included in the Pump Repair Kit 236862, which may be purchased separately.*

▲ *Replacement Danger and Warning labels, tags and cards are available at no cost. Label 290331 is also available in the following languages:*
German (Part No. 290396)
French (Part No. 290397)
Spanish (Part No. 290398).

Parts

REF NO.	PART NO.	DESCRIPTION	QTY
101	236752	RECIPROCATOR, hydra, Power-Star see parts on page 16	1
103	101178	BALL, metallic	1
104	108001	BALL, metallic, sst	1
105†	110828	PACKING, o-ring	1
107†	112565	SEAL, block vee	1
108†	166071	PACKING, o-ring	1
110	189707	PISTON, fluid	1
111	189708	CYLINDER, pump	1
112	189709	VALVE, housing	1
113	189710	RETAINER, ball	1
114	189711	WASHER, piston	1

† *These parts are included in the Pump Repair Kit 236862, which may be purchased separately.*

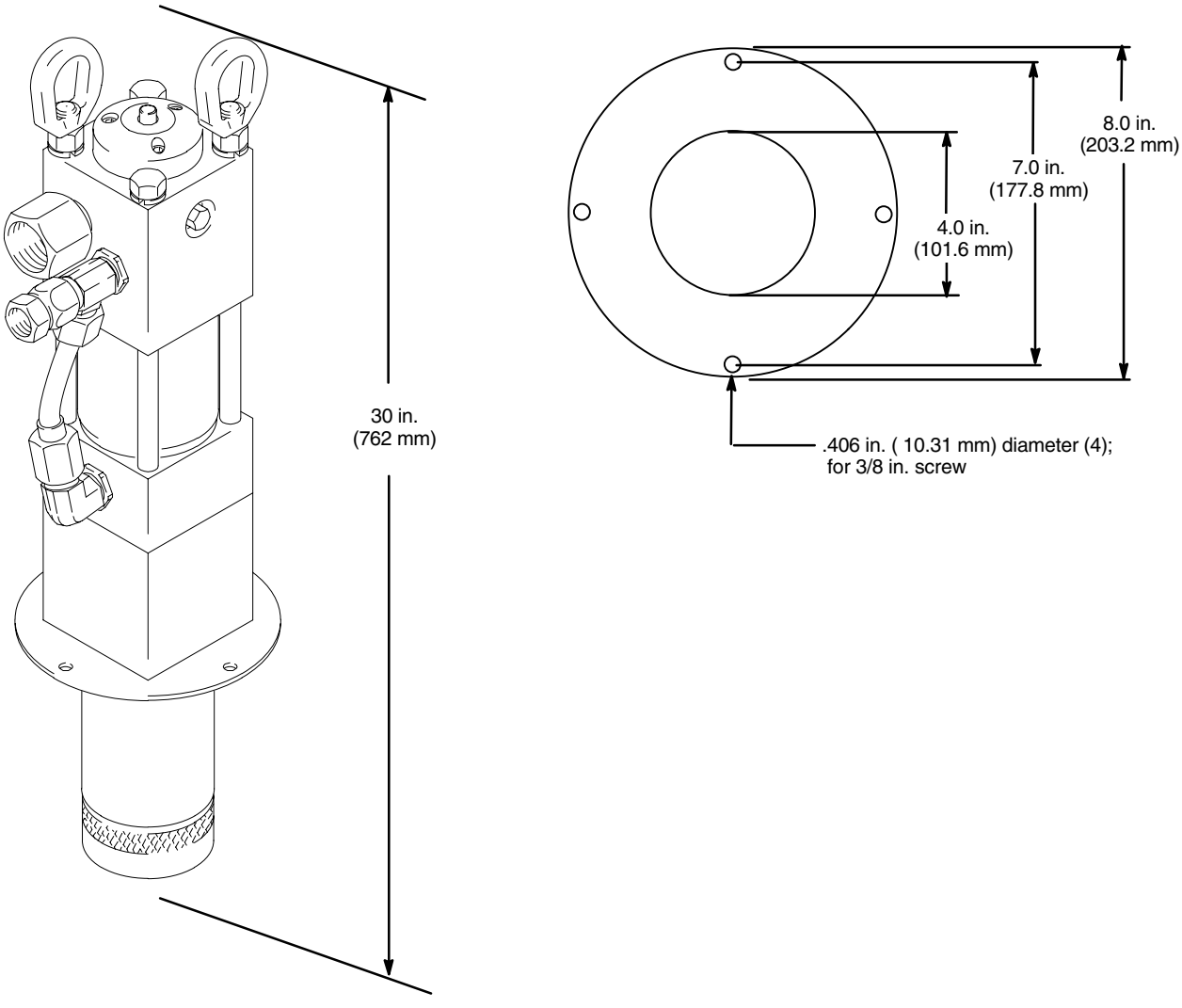


Technical Data

Fluid Ratio	1:1
Output Flow (Max)	12.0 gpm (45.4 lpm)
Output Pressure (Max)	1500 psi (103 bar, 10 MPa)
Input Flow (Max)	12.0 gpm (45.4 lpm)
Max. hydraulic fluid input pressure	1500 psi (103 bar, 10 MPa)
Maximum input fluid temperature	130°F (55°C)
Pressure reducing adjustment range	300 – 1500 psi (20.7 – 103 bar, 2.07 to 10 MPa)
Weight	100 lb (45.4 kg)
Rod Seals	Nitrile
Piston Seals	Polyurethane
Displacement pump wetted parts	Iron, Steel, SST Nitrile, Polyurethane
Sound Pressure	78 dB(A)*

* Sound pressure reading taken with pump operating at 60 cycles per minute. Sound pressure measured per CAGI-PNEUROP, 1971.

Dimensional Drawing and Mounting Hole Layout



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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.

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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.

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1–800–533–9655 Toll Free
612–623–6928
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