

Instructions



Dyna-Star™ 1/4:1 Ratio Universal Pump and Reciprocator

308390L

EN

For lubricating fluids only. For professional use only.

Model 236753

Series C, Stubby length

Model 239884

Series A, Reciprocator only

1500 psi (10 MPa, 120 bar) Maximum Hydraulic Inlet Pressure

375 psi (2.6 MPa, 26 bar) Maximum Fluid Outlet Pressure

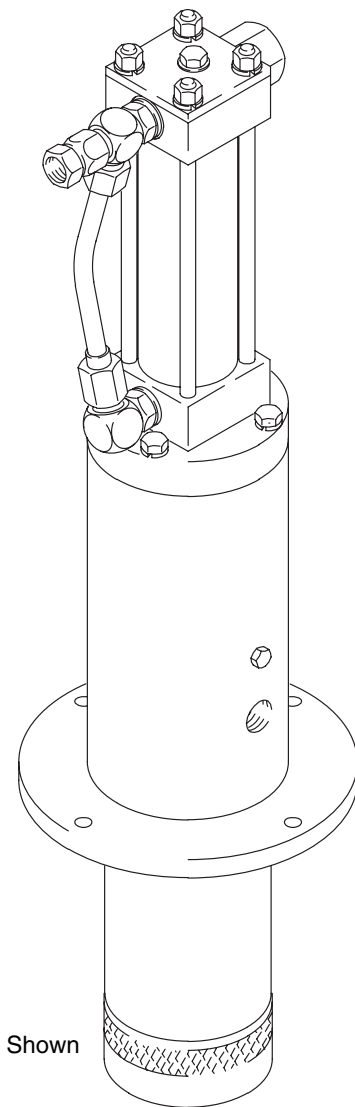


Important Safety Instructions

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



The pump is designed to dispense lube products only. Any other fluids can cause unsafe operating conditions and result in component rupture, fire or explosion which could cause serious injury, including fluid injection.



Model 236753 Shown






Contents








Warnings	3
Installation	5
Grounding	5
Accessories	5
Hydraulic System	6
Hydraulic Power Supply	7
Hydraulic Lines	7
Operation	8
Pressure Relief Procedure	8
Before Starting the Pump	8
Starting the Pump	8
If the Reciprocator Leaks at the Fluid Fittings ...	9
Shutdown	9
Troubleshooting	10
Repair	11
Replacing the Throat Seals	11
Disconnecting Reciprocator and Displacement Pump and Replacing Throat Seals	11
Assembly After Replacing Throat Seals	12
Reciprocator Repair	12
Displacement Pump Repair	17
Parts	18
Technical Data	21
Dimensions	21
Graco Standard Warranty	22

Warnings

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





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

WARNING

 	<p>EQUIPMENT MISUSE HAZARD</p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> • Do not operate the unit when fatigued or under the influence of drugs or alcohol. • Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See Technical Data in all equipment manuals. • Use fluids and solvents that are compatible with equipment wetted parts. See Technical Data in all equipment manuals. Read fluid and solvent manufacturer’s warnings. For complete information about your material, request MSDS from distributor or retailer. • Do not leave the work area while equipment is energized or under pressure. • Turn off all equipment and follow the Pressure Relief Procedure when equipment is not in use. • Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer’s replacement parts only. • Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards. • Make sure all equipment is rated and approved for the environment in which you are using it. • Use equipment only for its intended purpose. Call your distributor for information. • Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces. • Do not kink or over bend hoses or use hoses to pull equipment. • Keep children and animals away from work area. • Comply with all applicable safety regulations.
	<p>TOXIC FLUID OR FUMES HAZARD</p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> • Read MSDSs to know the specific hazards of the fluids you are using. • Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines. • Always wear chemically impermeable gloves when spraying, dispensing, or cleaning equipment.
	<p>PRESSURIZED ALUMINUM PARTS HAZARD</p> <p>Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.</p> <ul style="list-style-type: none"> • Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents. • Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.
 	<p>MOVING PARTS HAZARD</p> <p>Moving parts can pinch, cut or amputate fingers and other body parts.</p> <ul style="list-style-type: none"> • Keep clear of moving parts. • Do not operate equipment with protective guards or covers removed. • Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure and disconnect all power sources.
	<p>PERSONAL PROTECTIVE EQUIPMENT</p> <p>Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> • Protective eyewear, and hearing protection. • Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer

Installation

Grounding

						
<p>The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current.</p>						

Pump: Use ground wire and clamp as shown in FIG. 1. To order a Grounding Wire and Clamp kit, order Part No. 222011.

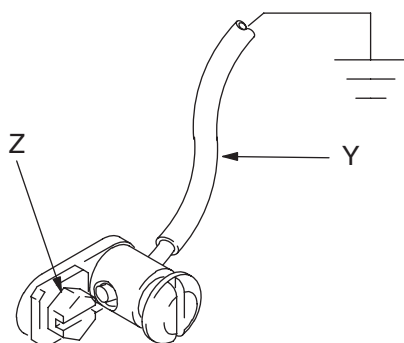


FIG. 1

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

Hydraulic power supply: Follow manufacturer's recommendations.

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.

To grounding the pump: Remove the ground screw (Z) and insert through the eye of the ring terminal at the 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.

Accessories

Suction Hose Kit, Part No. 236054

A suction tube kit is available for siphoning from 55-gallon containers

Intake Tube (not shown)

To install, apply PTFE tape to the female threads at the top of the tube. Screw the tube tightly onto the intake housing of the stubby pump.

Low-level Cutoff Valve, Part No. 203688

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.

Ground Wire, Part No. 222011

A ground wire is required.

Pump Outlet Drain Valve, Part No. 210658

Install a drain valve (C) close to the pump fluid outlet to assist in relieving fluid pressure in the pump when the pump is shut off.

NOTICE

Pump Outlet Drain Valve

A pump outlet drain valve (C) is required in the 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.

Thermal Relief Kit, Part No. 235998

Install a Thermal Relief Kit (S) at the pump fluid outlet.

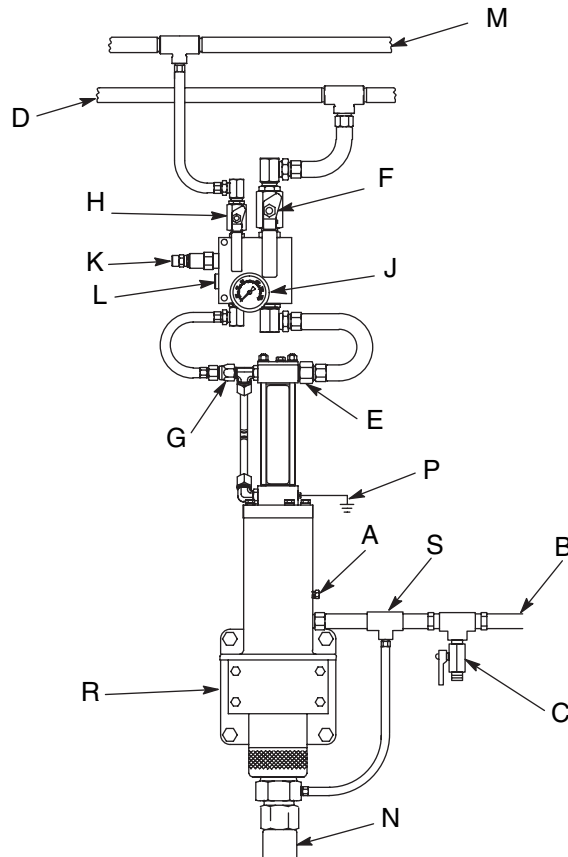


FIG. 2: Typical Installation

Key:

- A Porous plug (weep tube optional)
- B Fluid dispenser outlet
- C Drain valve (required)
- D Hydraulic return line, minimum 3/4 in I.D. (required)
- E Hydraulic outlet, 3/4 npt
- F Return line shutoff valve, minimum 3/4 in. (required)
- G Hydraulic inlet, 3/8 npt
- H *Supply line shutoff valve
- J *Pressure gauge
- K *Pressure reducing valve (required in systems over 1500 psi [10 MPa, 102 bar])
- L *Flow control valve (required in systems over 3 gpm [11 lpm])
- M Hydraulic supply line (use only Graco hydraulic power supply)
- N Material supply
- P Ground wire (required)
- R Wall mounting bracket, P/N 236778 (see manual 308394)
- S Thermal Relief Kit (required)




Hydraulic System

Keep the hydraulic system clean. The hydraulic supply system must be kept clean at all times to reduce the risk of damaging the reciprocator hydraulic power supply. Blow out all the hydraulic lines with air, flush thoroughly with solvent, and then blow out with air again before connecting the lines to the reciprocator.

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

Carefully follow the manufacturer's recommendations on reservoir and filter cleaning, and periodic changes in hydraulic fluid.

Hydraulic Power Supply

						
<p>Limit Fluid Flow to Reciprocator To reduce risk of over pressurizing the hydraulic reciprocator, which could cause a rupture and serious injury, including fluid injection, the hydraulic system must have a means to limit the incoming fluid flow to the reciprocator to a maximum of 3 gpm (11 lpm) and 1500 psi (10 MPa, 102 bar).</p>						

The hydraulic power supply system must have a pressure reducing valve and a pressure-compensated flow control. A flow control valve (L) is required to limit the incoming flow to the reciprocator to a maximum of 3 gpm (11 lpm).

A supply line shutoff valve (H), pressure gauge (J), pressure reducing valve (K), and flow control valve (L) are included in the Hydraulic Fluid Control Kit, Part No. 236864, which can be ordered separately.

Hydraulic Lines

Refer to FIG. 2 to locate the part mentioned below.

Shutoff Valves (F and H) are installed in the hydraulic supply and return lines.

Drain Line. Remove the plug (A) from the pump adapter and install a 1/8-27 npt(f) tube fitting and weep tube, ending in a waste container. Monitor the weepage of hydraulic fluid. If it seems excessive or increases suddenly, the reciprocator/pump seals may need to be changed. See page 12.

Hoses. Use a minimum 1/2 in. supply line (M) and minimum 3/4 in. return line (D) on the reciprocator. Contact your Graco representative for details of line sizing.

A pressure reducing valve (K) circulates excess hydraulic fluid pressure back to the hydraulic power supply. Install this valve in the hydraulic supply line (M) with a drain hose teed into the hydraulic return line (D). Limit supply pressure to a maximum of 1500 psi (10 MPa, 102 bar).

A fluid-filled pressure gauge (L), Part No. 112567, monitors hydraulic pressure to the reciprocator during startup. Use the gauge for initial adjustment of the reciprocator. It can be removed after adjustment is made.

NOTE: A supply line shutoff valve (H), pressure gauge (J), pressure reducing valve (K), and flow control valve (L) are included in the Hydraulic Fluid Control Kit, Part No. 236864, which can be ordered separately.

Operation

Pressure Relief Procedure



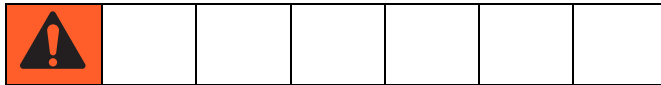
Follow the Pressure Relief Procedure whenever you see this symbol.



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

1. Shut off the hydraulic power supply.
2. Close the supply line shutoff valve (H).
3. Open the dispensing valve to relieve pressure.
4. Open the pump outlet drain valve (C) and have a container ready to catch the drainage.
5. Close the return line shutoff valve (F).
6. Leave the drain valve open until you are ready to dispense again.

NOTE: If you suspect that the nozzle or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, **very slowly** loosen the hose end coupling to relieve pressure, then clear the obstruction.



Be sure you **always** shut off the hydraulic supply line shutoff valve (H) before you close the return shutoff valve (F). This is to prevent over pressurizing the motor or its seals. When starting up the hydraulic system, open the return line shutoff valve first.

Before Starting the Pump

1. Check all 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 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 pumped and the pump wetted parts. See Technical Data, page 20. Flush until clean solvent comes from the outlet hose.

Starting the Pump



1. Turn on the hydraulic power supply.
2. Open the return line shutoff valve (F) and slowly open the hydraulic supply line shutoff valve (H).
3. Adjust the flow control valve (L) to limit the hydraulic flow to no more than 3 gpm (11 lpm), which is approximately 60 cycles per minute.

NOTE: If Graco Part No. 236864 hydraulic fluid control is used, no adjustment is necessary.

4. By adjusting the pressure reducing valve control adjustment (K), increase the hydraulic inlet pressure from 500-1500 psi (3.4-10 MPa, 34-102 bar). Increasing the inlet pressure increases the outlet pressure. Decreasing the inlet pressure decreases the outlet pressure.
5. Always use the lowest pressure possible to obtain the desired results. This reduces pump wear.

NOTICE

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

If the Reciprocator Leaks at the Fluid Fittings

Tighten the fittings (16, 17, 25), which are self-sealing and have replaceable o-rings. If leaking persists change the o-rings. (FIG. 3)

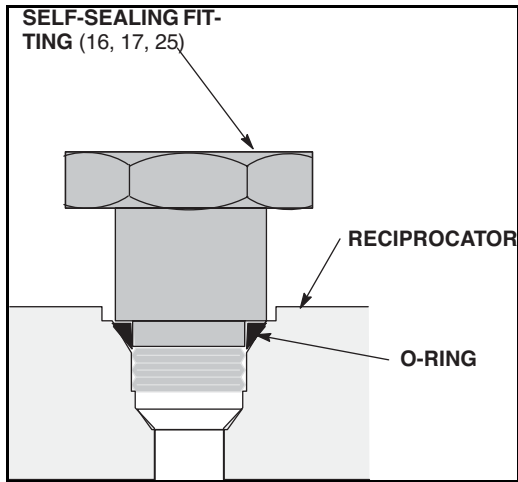


FIG. 3

Shutdown



Relieve the pressure whenever shut down. See Pressure Relief Procedure on page 8.

Troubleshooting



1. Follow **Pressure Relief Procedure**, page 8.
2. Check all possible problems and causes before disassembling gun.

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 supply. Adjust to a maximum of 3 gpm (11 lpm) flow
	Clogged fluid outlet line, intake valve, dispense valve, suction line.	Relieve pressure. Check; clear obstructions
	Reciprocator damaged.	Repair, See page 12 or 17.
Pump speeds up or runs erratically	Pump piston and/or intake valve worn	Relieve pressure. Check and repair. See page 17.
	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	Relieve pressure. Check and repair. See page 17.
Pump runs but output low on both strokes	Insufficient hydraulic fluid supply	Check hydraulic supply
	Pressure too low	Increase supply pressure using the pressure adjustment on the control
	Clogged fluid outlet line, intake valve, dispense valve, suction line	Relieve pressure. Check; clear obstruction
Excessive weepage from porous plug (A)	Worn throat seals	Repair. See page 11
Hydraulic oil leaks from fittings in the upper or lower reciprocator blocks (53, 47)	Fittings (16, 17, 25) are loose, or their o-rings are worn or damaged	Tighten the self-sealing fittings. If leaking persists, change o-rings

Repair

Replacing the Throat Seals

Refer to FIG. 4 for the following instructions.

NOTE: Replace these seals if fluid leaks excessively through the porous plug (107), see FIG. 5. This procedure can be done without disassembling the entire reciprocator.



1. Relieve the pressure. See Pressure Relief Procedure on page 8.
2. Disconnect the reciprocator from the pump. See Disconnecting Reciprocator and Displacement Pump and Replacing Throat Seals section on page 11.
3. Remove the four capscrews (24) and washers (12) from the bottom of the retainer housing (56). Tap the retainer housing to loosen it and pull it off the bottom cap (47).
4. Remove the seal (22) and sleeve bearing (34) from the top of the retainer housing (56).
5. Lubricate the sleeve bearing (34) and install the seal and sleeve bearing in the retainer housing (56) in the order shown in FIG. 4.
6. Reassemble. Torque the capscrews (24) to 28-32 ft-lbs (38-43 N.m). Install the displacement pump. Follow Step 22 on page 16.

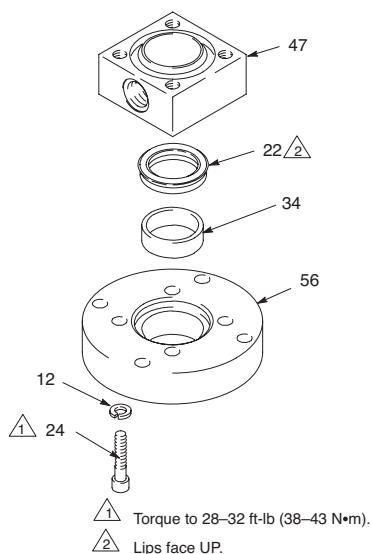


FIG. 4

Disconnecting Reciprocator and Displacement Pump and Replacing Throat Seals



NOTICE

Keep the Hydraulic System Clean

It is essential to keep the hydraulic oil system clean and free of contaminants to reduce the risk of damaging the hydraulic reciprocator. Always install a plug in each tube fitting and on each hose end whenever fluid lines are disconnected to prevent contamination.

1. Flush the pump if possible and stop it with the piston rod in the lowest position.
 2. Relieve the pressure. See Pressure Relief Procedure on page Pressure Relief Procedure 8.
 3. Disconnect the outlet hose from the displacement pump.
 4. Slowly loosen the hydraulic hoses to the supply (26) and return (25) fittings to relieve any pressure and then remove the hose. Install plugs on the tube fittings and in the hose ends. Check the o-ring (13) on the fitting and replace if worn or damaged. See FIG. 4 and the Parts Drawing on page 18.
 5. Using a strap wrench on the pump cylinder (118) screw it out of the base (115) and remove it.
 6. Place the piston (117) in a vise and loosen the piston rod (116).
 7. Remove bolts (105) and washers (103).
- NOTE:** Be care not to scratch the outside of the piston rod.
8. Push the piston rod (116) up through the base (115) and remove it.
 9. Remove the throat seal (110).

Assembly After Replacing Throat Seals

Refer to FIG. 5 for the following instructions.

1. Apply fresh grease to new throat seal (110) and mating groove in base (115). Install new throat seal.

NOTE: Be careful not to scratch the outside of the piston rod.

2. Push the piston rod (116) down through the base (115) and install.
3. Install the bolts (105) and washer (103). Torque to 20-25 ft-lbs (27-34 N.m).
4. Apply Loctite® 609 to the threads on the piston (117). Install the ball (104). Screw the piston into the piston rod (116).
5. Place the piston (117) in a vise and tighten the piston rod (116). Torque to 155-175 ft-lbs (210-237 N.m).
6. Apply fresh grease and install a new o-ring (112) on the pump cylinder (118).
7. Using a strap wrench on the pump cylinder (118) screw it tightly into the base (115).

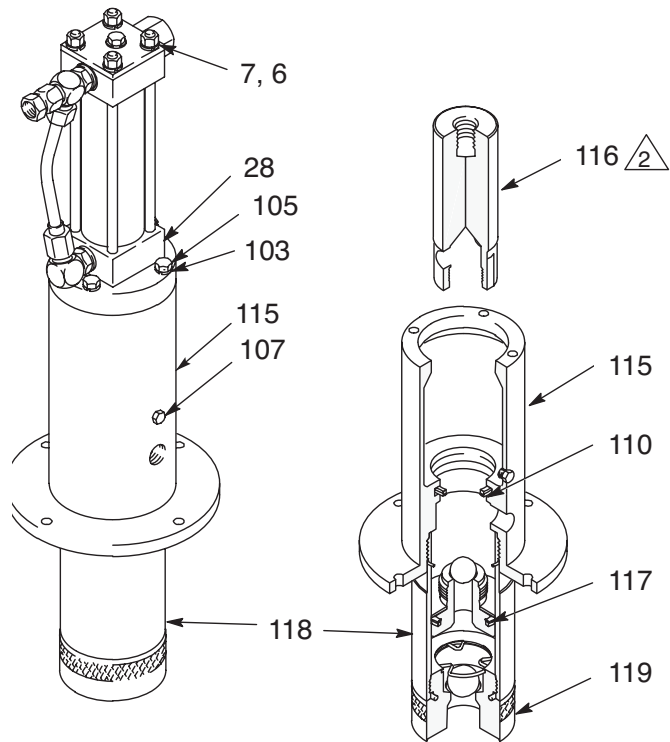


FIG. 5

Reciprocator Repair

NOTE:

- Clean and inspect all parts for wear or damage. Replace parts as needed. For the best results, always replace all the o-rings and seals when you disassemble the pump.
- Assembly Tool 189305 is required for reassembling the reciprocator.
- For step 9 and 10, Loctite 242® thread sealant and Loctite Primer T or Perma-Loc® 115 thread sealant and Perma-Bond® surface conditioner are required. Be sure their shelf life is within the manufacturer's recommendations.

Before beginning, drain the oil out of the reciprocator as follows:

- a. Place the reciprocator in a drain pan.
- b. Push the piston all the way up/in, then all the way down/out.

1. Loosen both nuts on the inlet tube (57). Use a wrench to rotate the tube fittings (16 and 17) to the

side, and then remove the tube (57). Install plugs in the fittings to prevent contamination. See the Parts Drawing on page 18.

- Remove the capscrew (14), nuts (7), and lockwashers (6) on the top of the reciprocator. (FIG. 6)

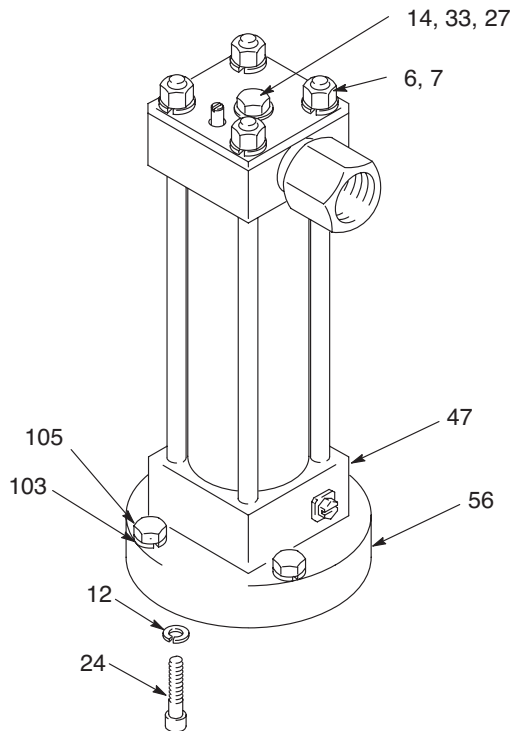


FIG. 6

- Remove the four capscrews (24) and the retainer housing (56). Tap the retainer housing with a plastic mallet to loosen it and pull it off the bottom cap (47). (FIG. 6) If needed, replace the throat seals as described on page 11.

Refer to FIG. 8 for Steps 4-13, except where noted.

- Tap on the bottom of displacement rod (54) with a plastic mallet to loosen the motor cylinder (39).
- Grasp the valve spool (31) and pull it off the cylinder and tie rods (49). Pull the cylinder and piston off the bottom cap (47). It is not necessary to remove the tie rods from the bottom cap.
- Lay the assembly on its side. Place a clean rag around the yoke (43) to prevent losing the detent balls. Slide the yoke (43) sideways off the valve sleeve (32) while holding the balls (5) and spring (20) in place.

- Slide the cylinder (39) off the displacement rod (54). Hold the hex end of the displacement rod in a vise and use a spanner wrench in the pin holes of the piston (35) to screw it off the rod.

NOTE: Be careful not to scratch the outside of the displacement rod or the inside of the cylinder.

- Visually inspect the spring (36). If there is wear or damage, proceed with this step. Remove the nut (19), spring (36), and retainers (55) from the trip rod (40). Reassemble with a retainer (55) on each end of the new spring (36). Thread the nut onto the rod until it runs out of thread so that it bottoms out on the shoulder of the rod. (FIG. 7)

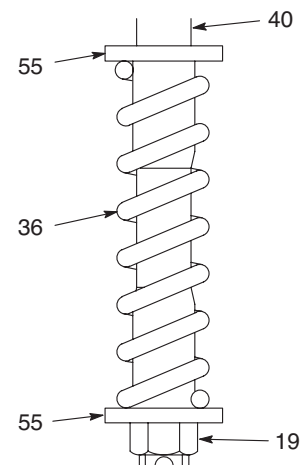


FIG. 7

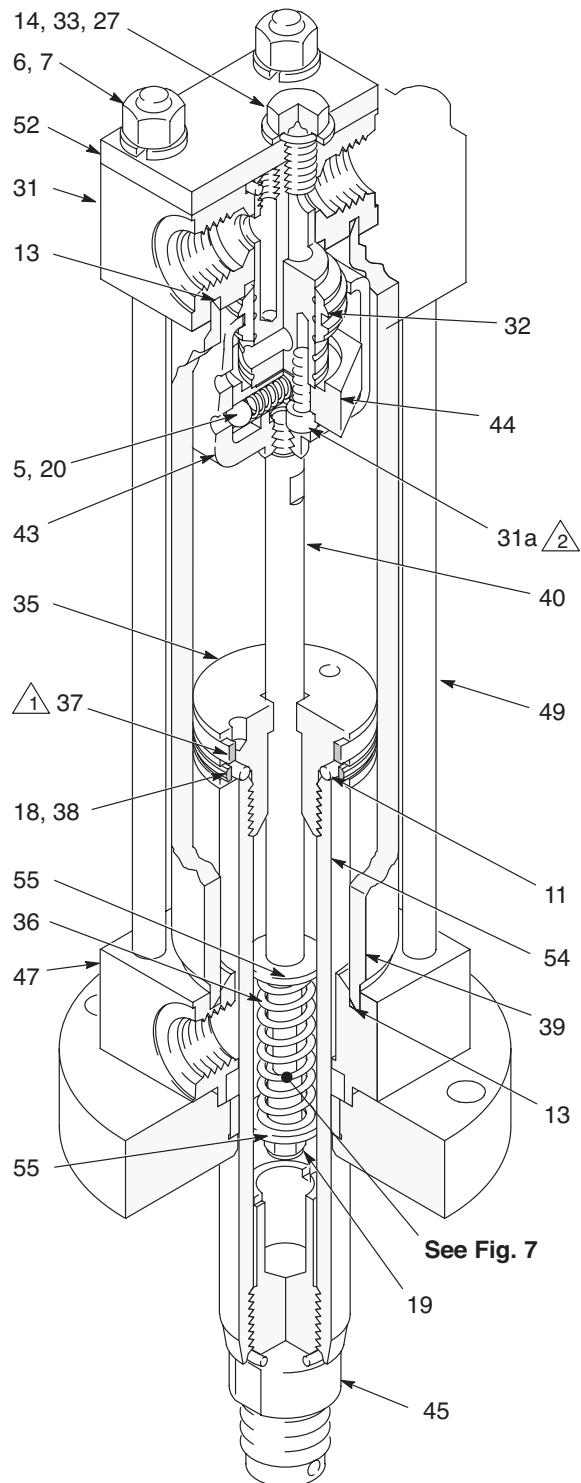
NOTE:

- If any of these parts are being reused, use a surface cleaner such as chlorinated solvent on the threads and blow with compressed air. A 1/4-28 UNF-2A tap can be used to remove adhesive from the internal threads of the yoke (43).
 - Thread sealant and primer are required. For step 9 and 10, Loctite 242[®] thread sealant and Loctite[®] Primer T or Perma-Loc[®] 115 thread sealant and Perma-Bond[®] surface conditioner are required. Be sure their shelf life is within the manufacturer's recommendations.
- Apply fresh thread sealant to the first two or three internal threads of the yoke (43). Apply primer to the external threads of the rod (40). Let dry for three or four minutes. Assemble and torque the rod to 96-100 in-lb (10.8-11.2 N.m). Remove excess sealant. Allow 24 hours for the primer to cure before you operate the reciprocator.

10. Clean all sealant from the threads of any part being reused and apply thread sealant to the first two or three internal threads of the valve assembly (44). **If you removed the capscrew (31a)**, apply primer to its external threads, let it dry for four minutes and torque the cap screw to 42-45 in-lb (4.7-5.1 N.m). Remove excess sealant. Allow 24 hours for the thread sealant to cure before you operate the reciprocator.
11. Use a spanner wrench to screw the piston (35) onto the displacement rod (54). Torque to 30-40 ft-lb (41-54 N.m).
12. Install the o-ring (18) in the deep lower groove of the piston (35) and install the seal (38) over the o-ring. Install the piston bearing (37) around the upper groove of the piston. Holding the piston bearing in place to avoid damage, slide the cylinder over the piston and press it down.

NOTICE

When inserting the piston into the cylinder, carefully guide the piston seal (38) and bearing (37) to prevent damaging these parts.



△1 Torque to 30–40 ft-lb (41–54 N•m).

△2 Apply thread adhesive, and torque to 42–45 in-lb (4.7–5.1 N•m).

FIG. 8

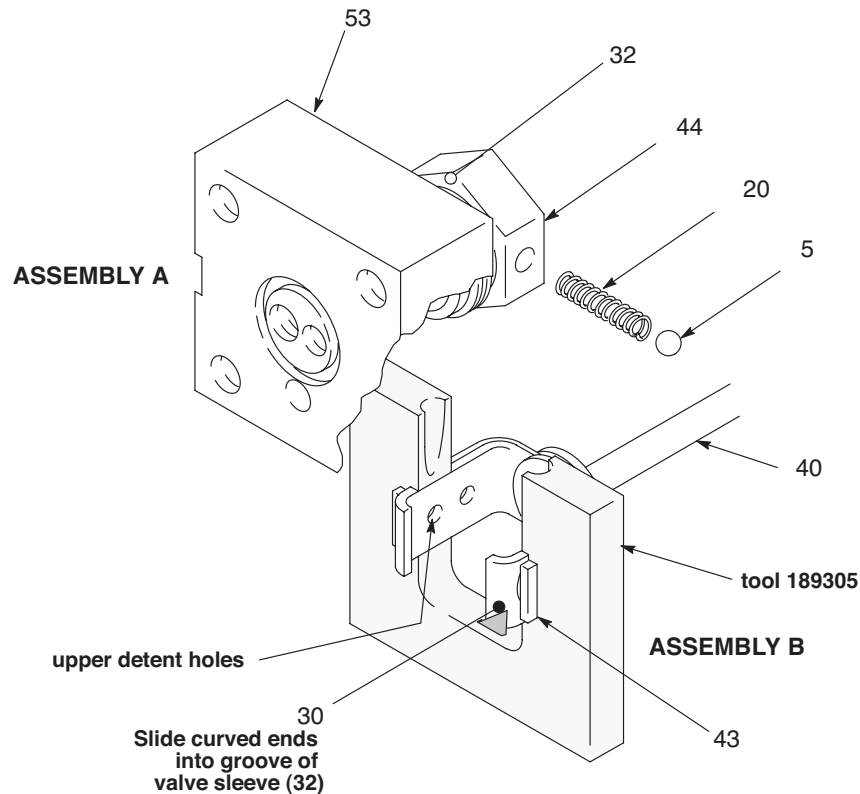


FIG. 9

13. Lay Assembly A and Assembly B on the work bench. (FIG. 9)
14. Slide Assembly B into the center of the tool. Align the upper detent holes of the guide yoke (43) with the center line of the tool. (FIG. 9)
15. Insert the spring (20) and one ball (5) into the valve stop (44) of Assembly A. Tilt the valve stop and start guiding it into the tool, making sure the ball is sliding into the rounded slot in the tool. Place the other ball at the other end of the spring and push it in with your thumb while rotating the valve stop (44) until the spring is horizontal and the balls are in place. Continue holding this assembly together. (FIG. 9)
16. Slide the valve stop assembly down into the tool. Make sure the balls (5) snap into the upper set of holes in the yoke (43), and the curved ends of the guide clamp have engaged the valve sleeve (32) groove. Slide the tool back over the rod (40) to remove it. (FIG. 9)

Refer to FIG. 10 for Steps 17-23

17. If the tie rods (49) were removed, reinstall them with the short threaded end up. The other end should be

screwed about 9/16" into the bottom cylinder cap (47).

NOTE: When reinstalling the cylinder (39, Step 18), be sure the "P" port in the valve spool (31) and the port in the bottom cylinder cap (47) are in line with each other. Be sure the o-rings (13) are in place in both cylinder caps.


18. Slide the cylinder (39) with the piston/displacement rod already installed in it, into the groove in the bottom cylinder cap (47). Position the spool valve (31) over the cylinder and press down firmly.
19. Install the capscrew (14), o-ring (33), and washer (27). Install the lockwashers (6) and nuts (7). Torque the nuts to 28-32 ft-lb (36-43 N.m).

NOTICE

Never install the fluid tube (57) before torquing the tie rods. Doing so could cause misalignment and damage the reciprocator when it is operated.

20. Reinstall the fluid tube (57) and fittings (16, 17). Torque the fittings to 25-35 ft-lb (34-48 N.m). See the Parts Drawing on page 18.

21. Pull the displacement rod (54) in and out to be sure it moves easily with only a little resistance from the rod seal.
22. To reconnect the reciprocator and pump, screw the connecting rod (45) into the piston rod (116) and torque to 75-85 ft-lb (102-115 N.m). Pushing the connected assembly down through the base (115). Clean piston (117) threads and apply Loctite® 242. Install ball (104). Screw piston (117) into the piston rod (116). Place assembly in a vise and torque to 155-175 ft-lb (210-237 N.m). Make sure the o-ring (112) in the outside groove of the pump cylinder (9118) is in good condition. Push the cylinder up into the adapter and engage the threads. Screw in the pump using a strap wrench for the final tightening.
23. Connect the hydraulic supply hose to fitting (26) and return hose to fitting (25).

						
<p>To reduce the risk of static sparking, be sure to reconnect the ground wire before operating pump.</p>						

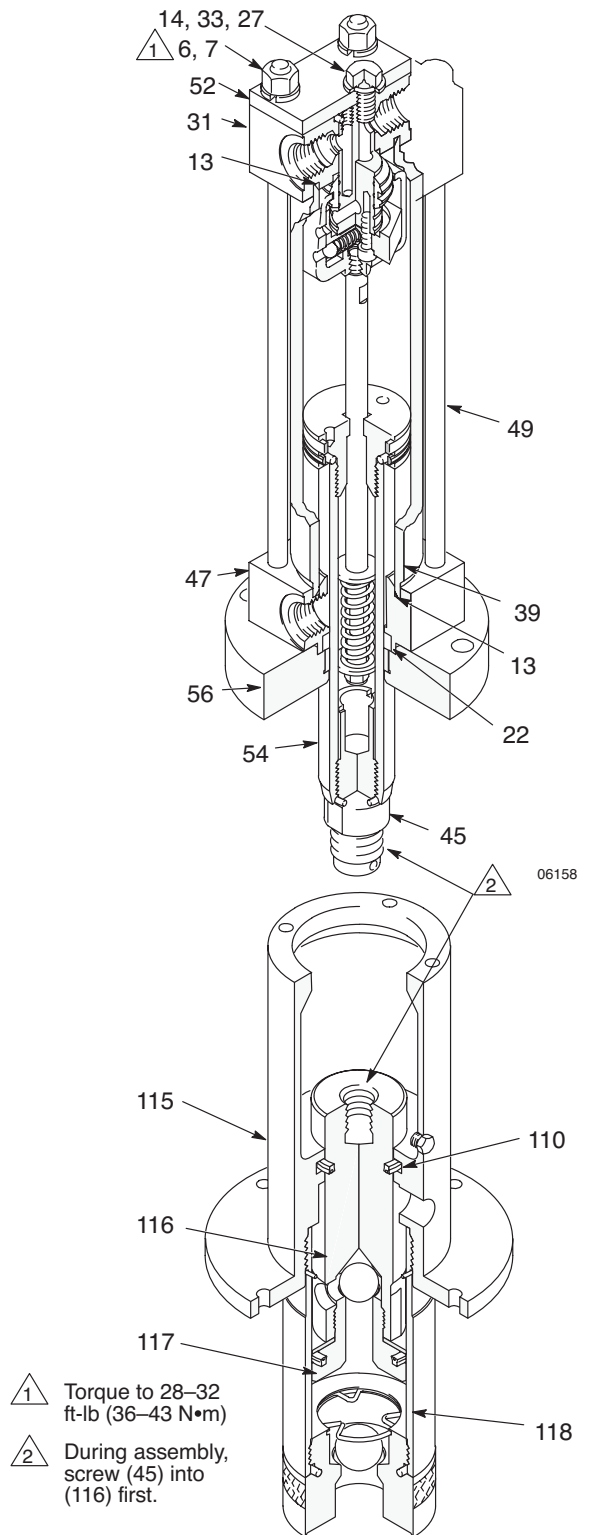


FIG. 10

Displacement Pump Repair



Intake Valve

Refer to FIG. 11 for the following instructions.

1. If possible, flush the pump.
2. Relieve pressure. See Pressure Relief Procedure on page 8.
3. Unscrew the valve body (119). Remove the o-ring (108), ball (106), and retainer (120).
4. Inspect the parts for wear or damage. If the ball is nicked, replace it. Reassemble, using grease on the male threads.

Displacement Pump

Refer to FIG. 11 for the following instructions.

NOTE: Clean and inspect all parts for wear or damage as you disassemble them. Replace parts as needed. For the best results always replace the o-rings and packings when you disassemble the pump. The parts list on page 19 gives the recommended parts to keep on hand.

1. If possible, flush the pump.
2. Relieve pressure. See Pressure Relief Procedure on page 8.
3. Follow Disconnecting the Reciprocator and Displacement Pump on page 11. Remove the intake valve.
4. Carefully inspect the smooth inner surface of the cylinder (118) for scoring or irregular surfaces. Such damage causes premature seal wear and leaking, so replace parts as needed.
5. Grease the new piston seal and install with the lips facing up. Place the washer (121) and ball (104) on the piston.
6. Reconnect reciprocator and displacement pump per steps 1 through 6 of Replacing Throat Seals on page 11.

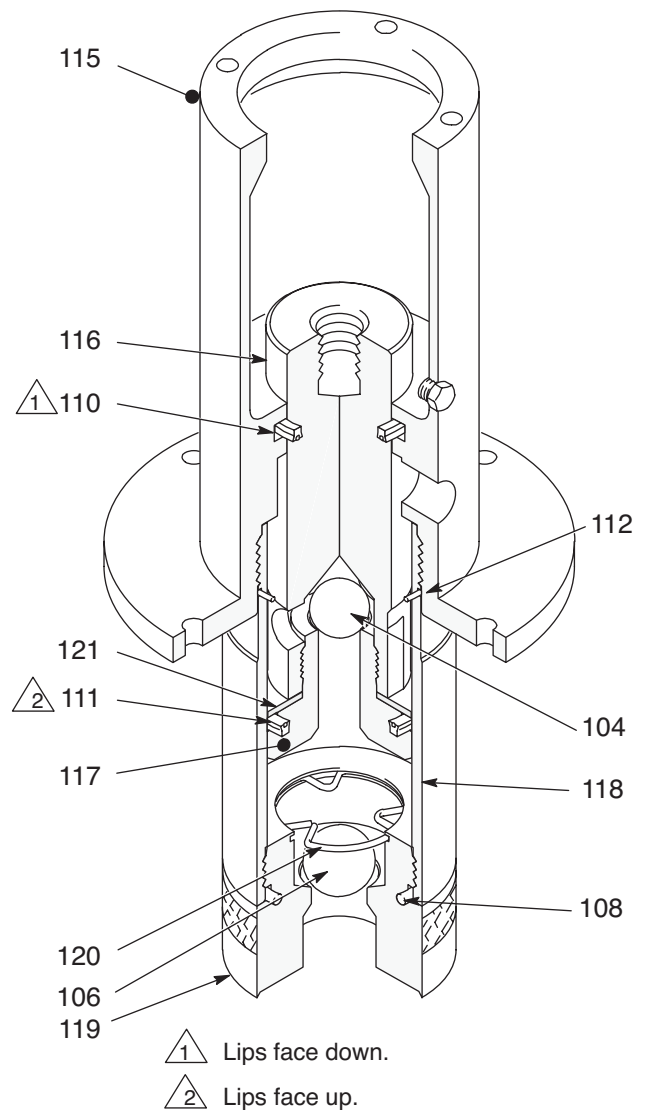
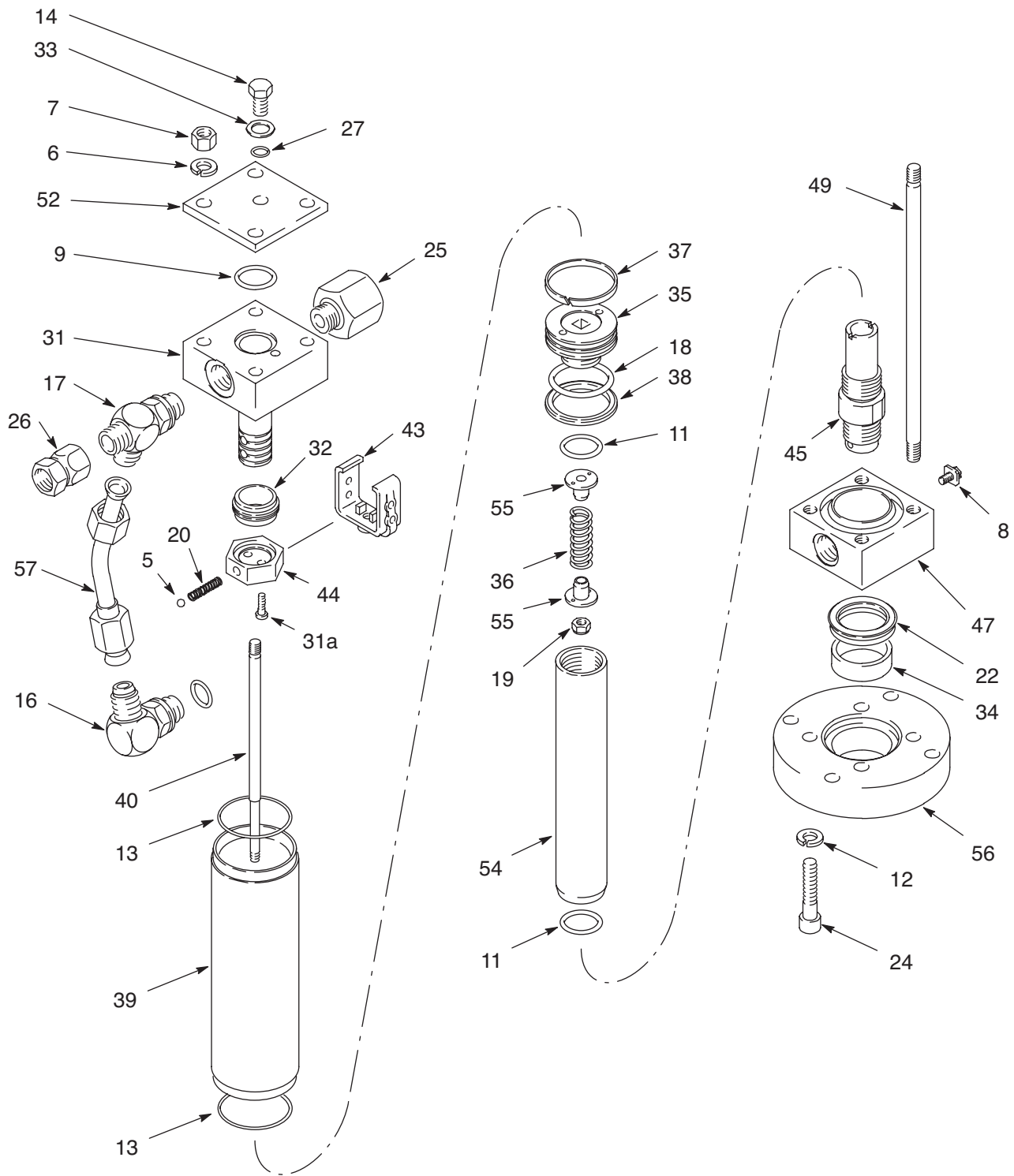


FIG. 11

Parts



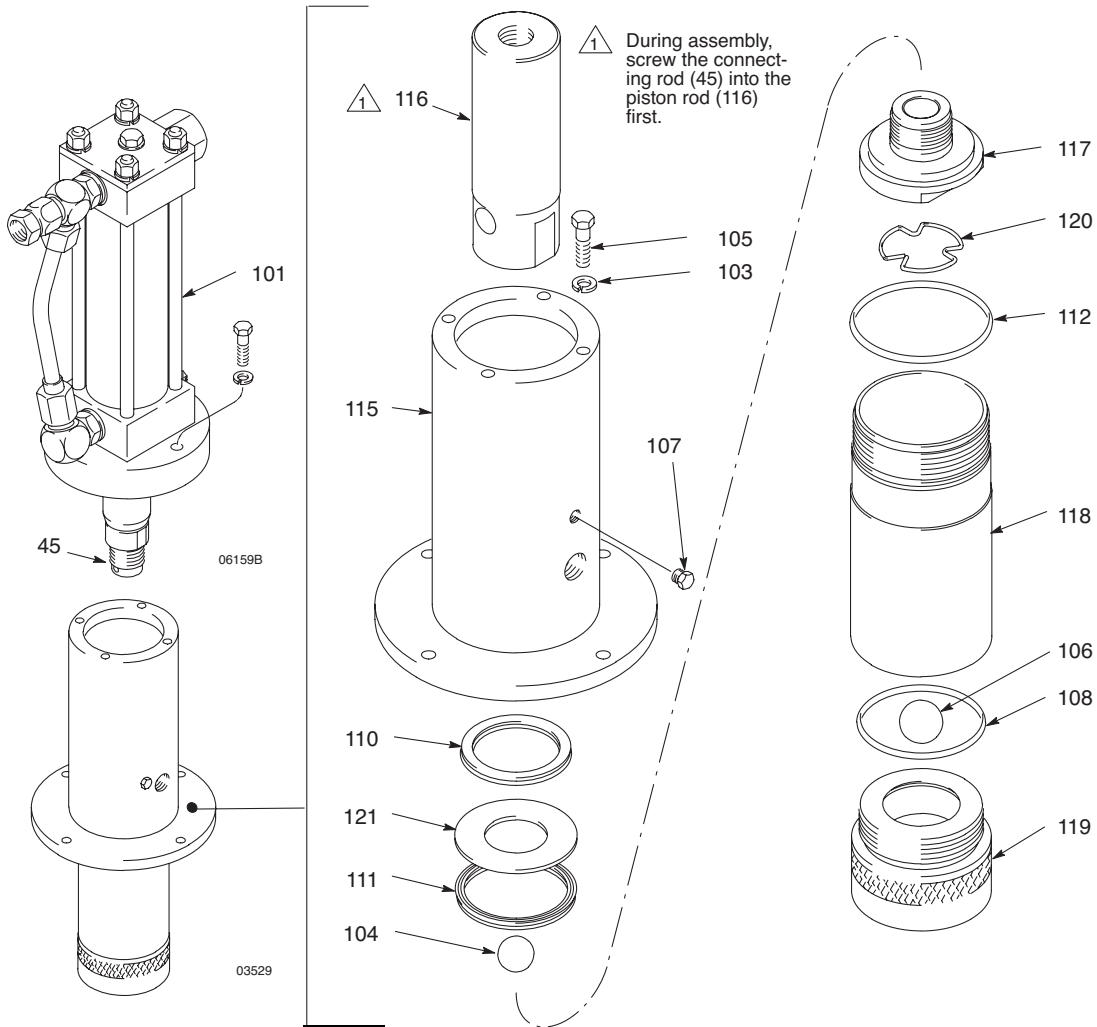
Model 239884, Series A
Hydraulic Reciprocator
Includes Items 5-57

Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
5	100069	BALL	2	36	178189	SPRING, compression	1
6	100133	WASHER, lock	4	37◆	178207	BEARING, piston	1
7	100307	NUT, full, hex, 3/8-16 unc-2b	4	38◆	178226	SEAL, piston	1
8	116343	SCREW, ground	1	39	178229	CYLINDER, motor	1
9	104093	PACKING, o-ring	1	40	192657	ROD, trip	1
11◆	105765	PACKING, o-ring	2	41▲	179885	LABEL, warning (not shown)	1
12	106115	WASHER, lock, spring	4	43	189077	YOKE, valve	1
13◆	106274	PACKING, o-ring	2	44	192654	STOP, valve	1
14	106276	SCREW, cap, hex, 3/8-24 unfc-2a	1	45	183671	ROD, connecting	1
16	106470	ELBOW, str thd, 37° flare	1	47	186225	CAP, cylinder, bottom	1
17	107197	TEE, run, str thd, 37° flare	1	49	187405	ROD, tie	4
18◆	108014	PACKING, o-ring, buna-N	1	52	178181	PLATE, cap	1
19	114231	NUT, lock, hex	1	54	188078	ROD, displacement	1
20	108437	SPRING, compression	1	55	192655	RETAINER, spring	1
22◆	108952	PACKING, block, v	1	56	189712	RETAINER, housing	1
24	112566	SCREW, cap, socket hd	4	57	217221	TUBE, inlet	1
25	112568	ADAPTER, pipe, female	1				
26	112569	UNION, swivel	1				
27◆	155685	PACKING, o-ring	1				
31	239874	VAVLE SPOOL ASSY, includes item 31a	1				
31a	104092	CAPSCREW, sch, 10-24 unrc-3a x 5/8"	2				
32	189072	SLEEVE, valve	1				
33	178179	WASHER, sealing	2				
34◆	178185	BEARING, sleeve	1				
35	192656	PISTON	1				

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

◆ Parts included in Kit 236861 (purchase separately).

Assembly Tool 189305 required for repairing the reciprocator.



Model 236753

Series C, 1/4:1 Ratio Pump

Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
101	239884	RECIPROCATOR, Dyna-Star. See Parts on page X	1	112†	166071	PACKING, o-ring	1
103	100133	WASHER, lock, 3/8	4	115	189705	BASE, motor, hydraulic	1
104	101178	BALL, metallic	1	116	189706	ROD, piston	1
105	102637	SCREW, cap, hex hd, 3/8-16 x 1-1/2	4	117	189707	SEAT, valve	1
106	108001	BALL, metallic, sst	1	118	189708	CYLINDER, pump	1
107	110064	PLUG, pipe, vented, 1/8-27 npt(f)	1	119	189709	VALVE, housing	1
108†	110828	PACKING, o-ring	1	120	189710	RETAINER, ball	1
110†	112130	SEAL, block vee	1	121	189711	WASHER, piston	1
111†	112565	SEAL, block vee	1				

† Parts included in Kit 236861 (purchase separately).

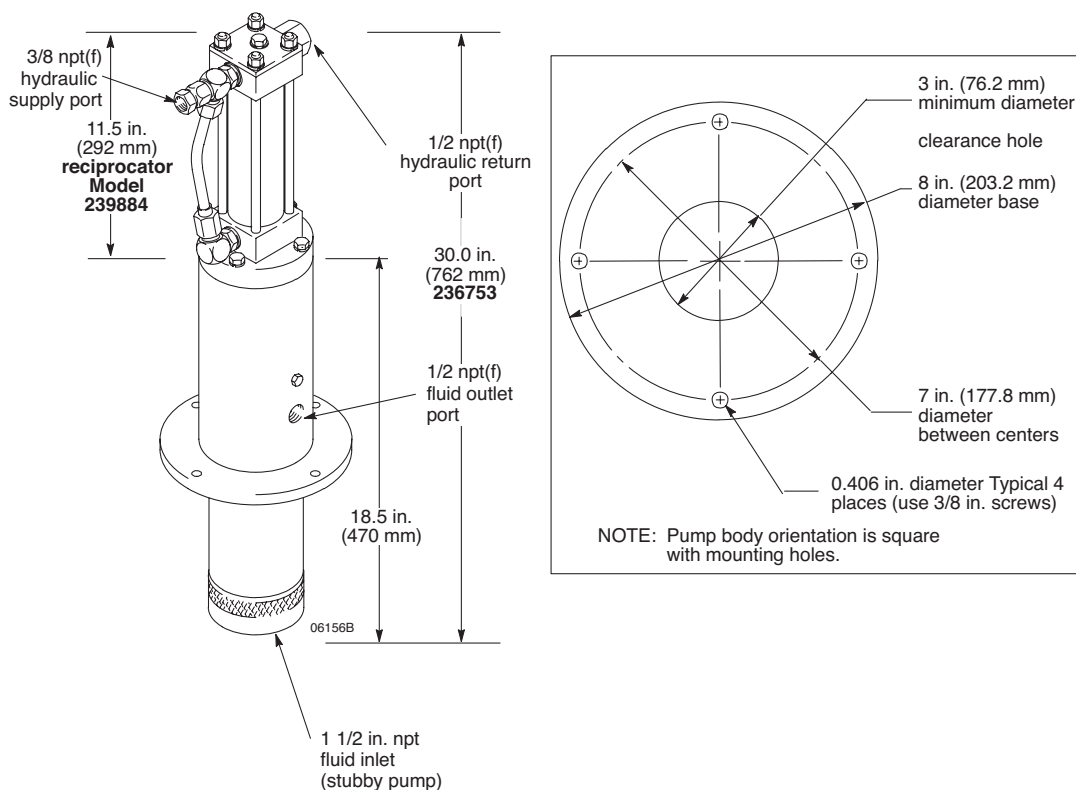
Technical Data

Dyna-Star 1/4:1 Ratio Universal Pump and Reciprocator		
	US	Metric
Fluid Ratio	1/4:1	
Maximum Output Flow	10 gpm	45.42 lpm
Maximum Output Pressure	375 psi	2.6 MPa, 26 bar
Maximum Input Flow	3 gpm	11.4 lpm
Maximum Hydraulic Input Pressure	1500 psi	10 MPa, 102 bar
Maximum Fluid Outlet Pressure	375 psi	2.6 MPa, 26 bar
Maximum Input Fluid Temperature	130°F	55°C
Maximum Suction Lift	13 ft	4 m
Weight	48 lb	22 kg
Rod Seals	Nitrile	
Piston Seals	Polyurethane	
Displacement Pump Wetted Parts	Aluminum, Steel, Nitrile, Polyurethane	
Sound Pressure *	77 dB(A)	

* Sound pressure reading taken with pump operating at 66 cycles per minute. Sound pressure measured per CAGI- PNEUROP, 1971.

Loctite® is a registered trademark of the Loctite Corporation.

Dimensions



Graco Standard Warranty

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

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

The Parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés, à la suite de ou en rapport, directement ou indirectement, avec les procédures concernées.

Graco Information

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

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

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

*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.*

For patent information, see www.graco.com/patents.

Original instructions. This manual contains English. MM 308390

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

GRACO INC. AND SUBSIDIARIES • P.O. BOX 1441 • MINNEAPOLIS MN 55440-1441 • USA

Copyright 1994, Graco Inc. All Graco manufacturing locations are registered to ISO 9001.

www.graco.com

Revised December 2012