



INSTRUCTIONS

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

220 VAC, 50 HZ, 12A

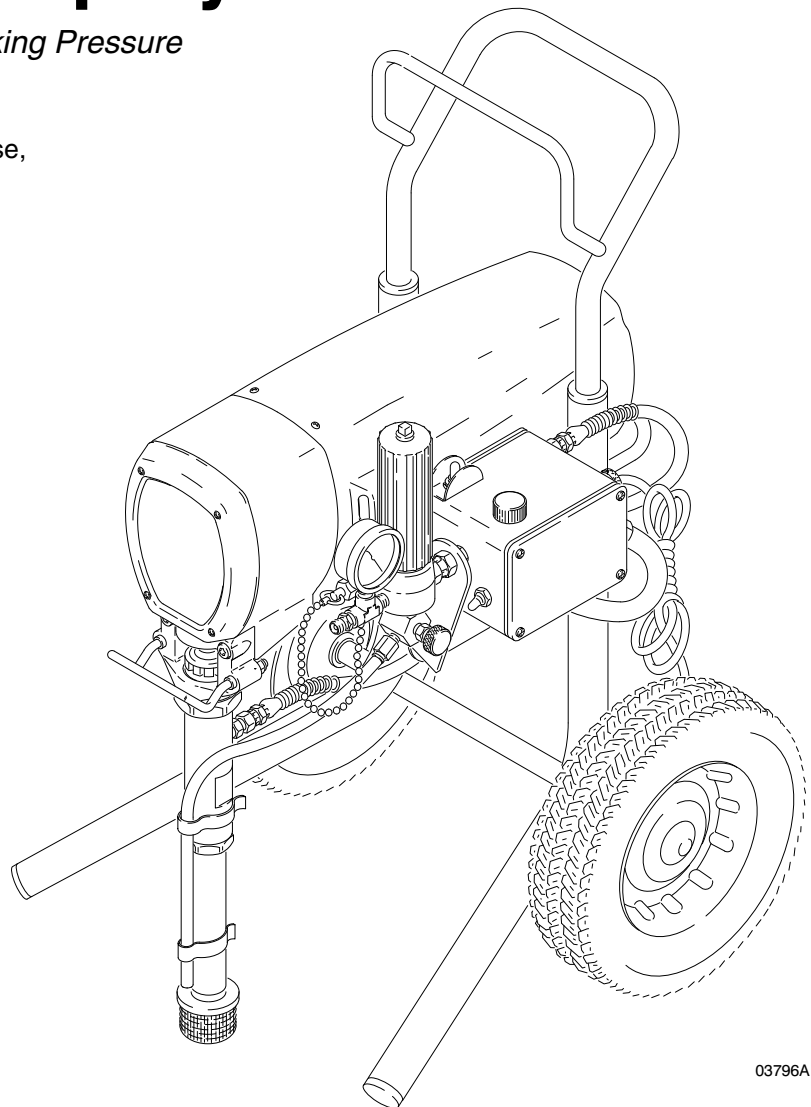
## ULTRA<sup>®</sup> Plus+ 1500 Airless Paint Sprayer

*210 bar (3000 psi) Maximum Working Pressure*

### Model 231—321, Series A

Complete sprayer on upright cart with hose,  
gun, RAC IV<sup>®</sup>, DripLess<sup>™</sup> Tip Guard  
and SwitchTip<sup>™</sup>

Patents Pending



03796A

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## Symbols

### Warning Symbol



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

### Caution Symbol



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

## ! WARNING



INSTRUCTIONS

### EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call Graco Technical Assistance at 1-800-543-0339.
- 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 24 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** section of 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).
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

# WARNING



## INJECTION HAZARD

Spray from the gun, leaks or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin is a serious injury. The injury may look like just a cut, but it is a serious injury. Get immediate medical attention.
- Do not point the gun at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the tip guard and the trigger guard on the gun when spraying.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun trigger safety operates before spraying.
- Lock the gun trigger safety when you stop spraying.
- Follow the **Pressure Relief Procedure** on page 10 if the spray tip clogs and before cleaning, checking or servicing the equipment.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn or damaged parts immediately. Do not repair high pressure couplings; you must replace the entire hose.
- Fluid hoses must have spring guards on both ends, to help protect them from rupture caused by kinks or bends near the couplings.



## 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.

# ! 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.

- 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.



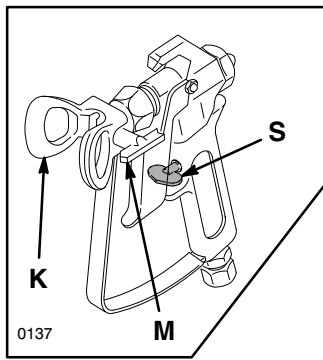
## MOVING PARTS HAZARD

Moving parts can pinch or amputate your fingers.

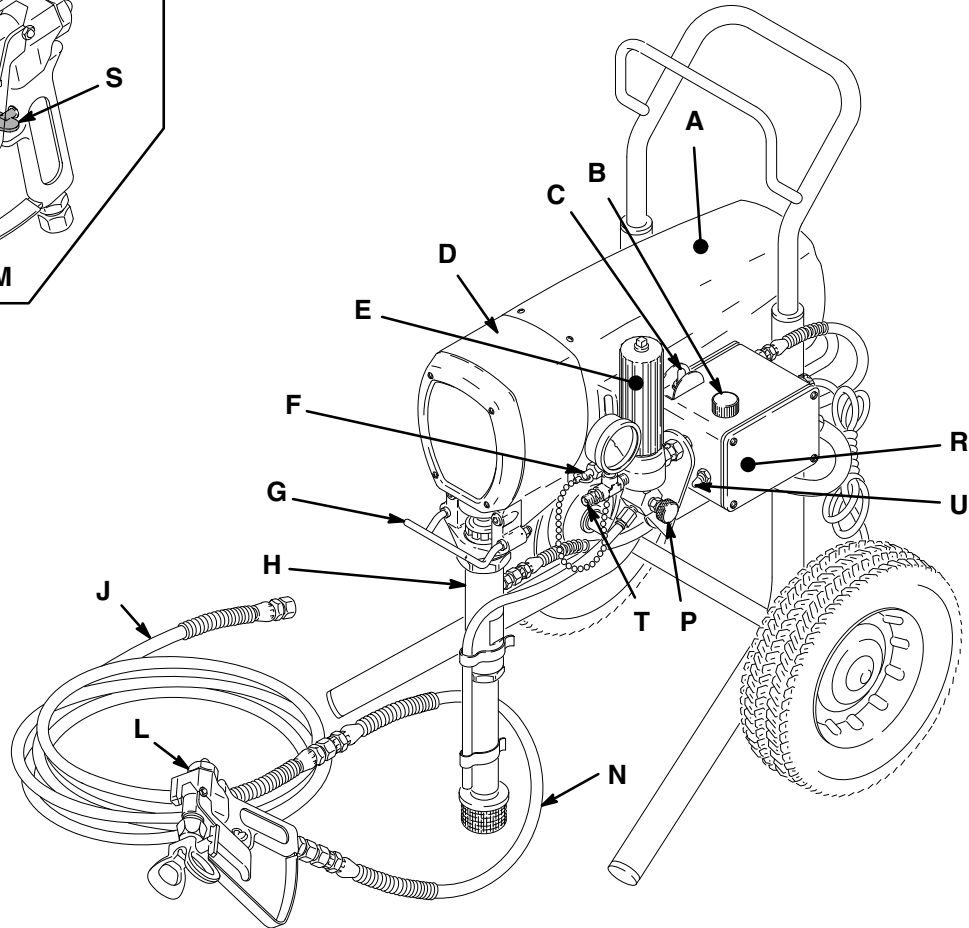
- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 10 to prevent the equipment from starting unexpectedly.

**NOTE:** This is an example of the DANGER label on your sprayer.  
This label is available in other languages, free of charge. See page 23 to order.

<div></div> <div>DANGER</div> <div></div>	
<div></div> <div>FIRE AND EXPLOSION HAZARD</div>	<div></div> <div>SKIN INJECTION HAZARD</div>
<p>Spray painting, flushing or cleaning equipment with flammable liquids in confined areas can result in fire or explosion.</p> <p>Use outdoors or in extremely well ventilated areas. Ground equipment, hoses, containers and objects being sprayed.</p> <p>Avoid all ignition sources such as static electricity from plastic drop cloths, open flames such as pilot lights, hot objects such as cigarettes, arcs from connecting or disconnecting power cords or turning light switches on and off.</p> <p>Failure to follow this warning can result in death or serious injury.</p>	<p>Liquids can be injected into the body by high pressure airless spray or leaks – especially hose leaks.</p> <p>Keep body clear of the nozzle. Never stop leaks with any part of the body. Drain all pressure before removing parts. Avoid accidental triggering of gun by always setting safety latch when not spraying.</p> <p>Never spray without a tip guard.</p> <p>In case of accidental skin injection, seek immediate “Surgical Treatment”.</p> <p>Failure to follow this warning can result in amputation or serious injury.</p>
READ AND UNDERSTAND ALL LABELS AND INSTRUCTION MANUALS BEFORE USE	



## Major Components



**Fig. 1**

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<b>A</b>	Motor (Under shield shown)	DC motor, 120 Vac, 12A, 1 phase
<b>B</b>	Pressure Adjusting Knob	Controls fluid outlet pressure
<b>C</b>	ON/OFF Switch, Circuit Breaker	Power switch that controls 120 Vac power to sprayer; with circuit breaker
<b>D</b>	Drive Assembly	Transfers power from DC motor to the displacement pump
<b>E</b>	Fluid Filter	Filter of fluid between source and spray gun
<b>F</b>	Secondary Fluid Outlet	Second spray gun operation is connected here
<b>G</b>	Pail Hanger	Container for fluid to be sprayed may be hung here
<b>H</b>	Displacement Pump	Pressures fluid to be sprayed through spray gun
<b>J</b>	50 ft (15 m) Main Hose	1/4 in. ID, grounded, nylon hose with spring guards on both ends
<b>K</b>	RAC IV Tip Guard	Reverse-A-Clean (RAC) tip guard reduces the risk of fluid injection injury
<b>L</b>	Contractor Gun	High pressure spray gun with gun safety latch
<b>M</b>	RAC IV SwitchTip®	RAC SwitchTip atomizes fluid and removes clogs from spray tip without removing tip from spray gun
<b>N</b>	3 ft (0.9 m) Hose	3/16 in. ID, grounded, nylon hose used between 50 ft hose and spray gun to allow more flexibility when spraying
<b>P</b>	Pressure Drain Valve	Relieves fluid pressure when open
<b>R</b>	Pressure Control	Controls motor speed to maintain fluid pressure. Works with pressure adjusting knob.
<b>S</b>	Spray Gun Safety Latch	Inhibits accidental triggering of spray gun
<b>T</b>	Primary Fluid Outlet	Hose and spray gun is connected here
<b>U</b>	10/12 Amp Switch	Allows sprayer to operate on 10A service with reduced performance

# Setup

## ⚠ WARNING



### FIRE AND EXPLOSION HAZARD

Proper electrical grounding is essential to reduce the risk of fire or explosion which can result in serious injury and property damage. Also read **FIRE OR EXPLOSION HAZARD** on page 4.

## ⚠ WARNING

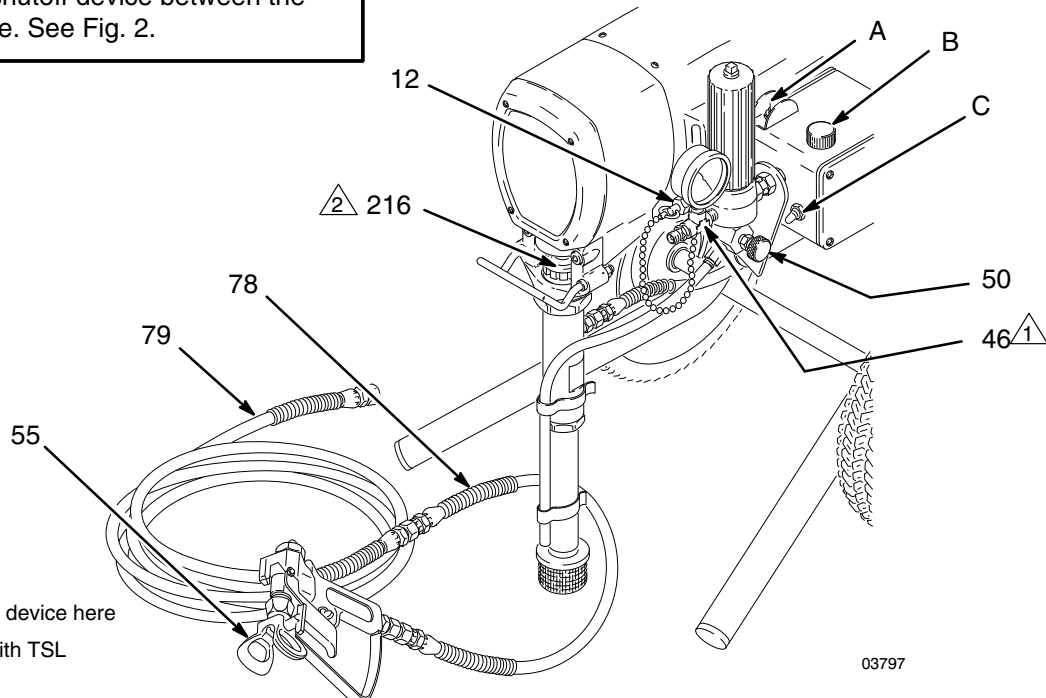
If you supply your own hoses and spray gun, be sure the hoses are electrically conductive, that the gun has a tip guard, and that each part is rated for at least *3000 psi (210 bar) Working Pressure*. This is to reduce the risk of serious injury caused by static sparking, fluid injection or over-pressurization and rupture of the hose or gun.

## ⚠ CAUTION

To avoid damaging the pressure control, which may result in poor equipment performance and component damage, follow these precautions:

1. Always use a nylon spray hose at least 50 ft. (15 m) long.
2. Never use a wire braid hose as it is too rigid to act as a pulsation dampener.
3. Never install any shutoff device between the pump and the hose. See Fig. 2.

1. **Connect the gun, 1 m hose (78) and 15 m hose (79).** Don't install the spray tip yet.
2. **Two gun hookup.** Remove the cap (12) from the 1/4 npsm(m) secondary hose outlet and attach a minimum 15 m long hose. For more flexible gun movement, install a 3/16 in. ID, 1 m whip hose between the main hose and the gun.
3. **Fill the packing nut/wet-cup (216)** 1/3 full with Graco Throat Seal Liquid (TSL), supplied.
4. **Check the electrical service.** Be sure the electrical service is 220 V, 50 Hz. Use a properly grounded outlet. Have a licensed electrician attach an appropriate plug to the power supply cord. Do not remove the grounding prong of the power supply cord. Do not use an adapter. Extension cords must have 3 wires of a minimum 2.5 mm (12 gauge) size. Long extension cords reduce sprayer performance. Set the 10/12 Amp switch to the appropriate setting.
5. **With the the ON/OFF switch (A) OFF, plug the cord into a grounded electrical outlet** located at least 6 m (20 ft.) away from the spray area.
6. **Flush the pump** to remove the lightweight oil which was left in to protect pump parts after factory testing. See page 9.





- ⚠ 1 Do not install any shutoff device here  
⚠ 2 Fill packing nut 1/3 full with TSL

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Fig. 2

# Operation

**WARNING**


**INJECTION HAZARD**


To reduce the risk of serious injury, whenever you are instructed to relieve pressure, follow the **Pressure Relief Procedure** on page 10.

## Startup

Always use this procedure to help ensure the sprayer is ready to operate and that you start it safely.

1. **For a first time startup**, flush the sprayer. See page 9.
2. **Close the pressure drain valve (50).**
3. **Don't install the spray tip until the pump is primed!**
4. **Put the suction tube into the paint container.**
5. **Lower the pressure setting** by turning the pressure adjusting knob (B) all the way counterclockwise.
6. **Disengage the gun safety latch.** See Fig. 3.

 Gun safety latch shown engaged

 Gun safety latch shown disengaged

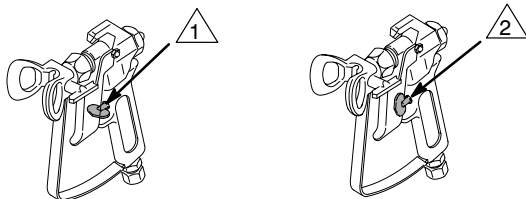




Fig. 3

**CAUTION**

Do not run the sprayer dry for more than 30 seconds to avoid damaging the pump packings.

7. **To prime the pump**, hold a metal part of the gun firmly against into a metal waste container. See Fig. 4. Squeeze the trigger and hold it open, turn the ON/OFF switch to ON, and slowly increase the pressure setting until the sprayer starts. Keep the gun triggered until all air is forced out of the system and the paint flows freely from the gun. Release the trigger and engage the gun safety latch.
8. **Check all fluid connections for leaks.** If any leaks are found, relieve pressure before tightening the connections.
9. **Install the spray tip and tip guard.** Engage the gun safety latch. Install the spray tip. If you are using the RAC IV tip guard, refer to manual 307–848 for installation instructions.
10. **Adjust the pressure.**
  - a. Turn the pressure adjusting knob clockwise just until spray from the gun is completely atomized. To avoid excessive overspray and fogging, and to decrease tip wear and extend the life of the sprayer, always use the lowest possible pressure needed to get the desired results.
  - b. If more coverage is needed, use a larger tip rather than increasing the pressure.
  - c. Test the spray pattern. To adjust the direction of the spray pattern: engage the gun safety latch, loosen the retaining nut, position the tip guard horizontally for a horizontal pattern or vertically for a vertical pattern and tighten the retaining nut.

 Maintain firm metal-to-metal contact between gun and grounded pail when flushing

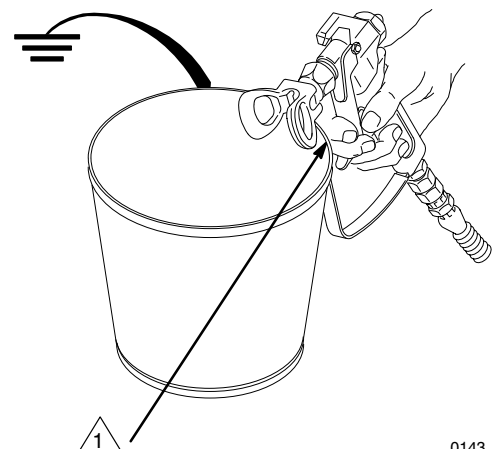



Fig. 4

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# Operation

## Cleaning a Clogged Tip





**WARNING**

**INJECTION HAZARD**

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, follow the **Pressure Relief Procedure** on page 10.

1. If the spray tip does clog, release the gun trigger, engage the gun safety latch, and rotate the RAC IV handle 180°. See Fig. 5.
2. Disengage the gun safety latch and trigger the gun into a waste container. Engage the gun safety latch again.
3. Return the handle to the original position, disengage the gun safety latch, and resume spraying.
4. If the tip is still clogged, engage the gun safety latch, shut off and unplug the sprayer, and open the pressure drain valve to relieve pressure. Clean the spray tip as shown in manual 307–848, supplied with the RAC IV.

-  Tip handle shown in spraying position; turn handle 180°, disengage safety latch and trigger gun to clear clog.
-  Trigger safety latch shown engaged.

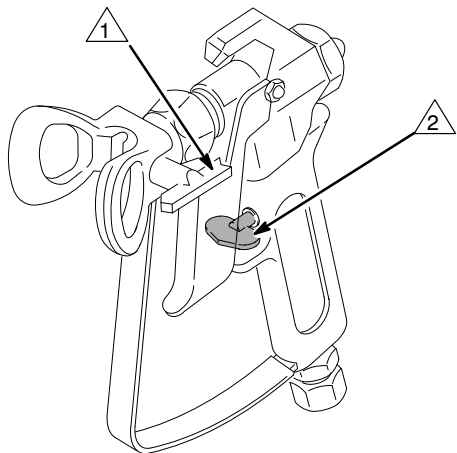



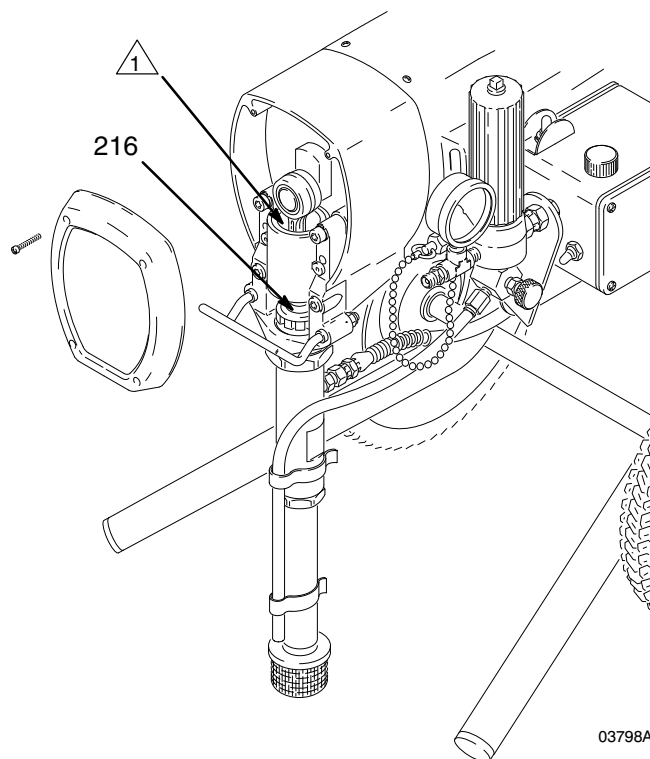
Fig. 5

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## Shutdown and Care

1. **Check the packing nut/wet-cup daily.** Relieve the pressure. Keep the packing nut/wet-cup 1/3 full with TSL at all times to help prevent fluid build-up on the piston rod and premature wear of packings. Tighten the packing nut just enough to stop leakage. Overtightening may cause binding and excessive packing wear. Use a screwdriver and light hammer to adjust the nut. See Fig. 8.
2. **Clean the fluid filter often** and whenever the sprayer is stored. First relieve pressure. See manual 307–273 for the cleaning procedure.
3. **Fill the connecting rod cavity** with motor oil every 100 hours of operation. Relieve pressure. Remove the front cover. See Fig. 6.

-  Fill connecting rod cavity with motor oil after every 100 hours of operation



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Fig. 6

4. **For very short shutoff periods,** leave the suction tube in the paint, relieve pressure, and clean the spray tip.
5. **Coil the hose and hang it on the hose rack** when storing it, even for overnight, to help protect the hose from kinking, abrasion, coupling damage, etc.



# Flushing

## When to Flush

1. **New Sprayer.** The sprayer was factory tested in lightweight oil which was left in to protect pump parts.  
*Before using water-base paint,* flush with mineral spirits, then warm, soapy water, and then clean water.  
*Before using oil-base paint,* flush with mineral spirits.
2. **Changing Colors.** Flush with a compatible solvent.
3. **Changing from water-base to oil-base paint.** Flush with warm, soapy water, then mineral spirits.
4. **Changing from oil-base to water-base paint.** Flush with mineral spirits, then warm, soapy water, and then clean water.
5. **Storage.** Flush as indicated below, shut off the sprayer, open the pressure drain valve to relieve pressure and leave it open.  
*Water-base paint:* flush with water, then mineral spirits. Leave the system filled with mineral spirits.  
*Oil-base paint:* flush with mineral spirits.

## CAUTION

Never allow water to freeze in the pressure control. Doing so prevents the sprayer from being started and causes serious damage to the pressure control. Push the water out with mineral spirits.

6. **Startup after storage.** Before using water-base paint, flush out mineral spirits with soapy water and then clean water. When using oil-base paint, flush out the mineral spirits with the paint to be sprayed.

## How to Flush

1. Relieve pressure.
2. Remove the filter bowl (A) and screen (B); see manual 307–273. Clean the screen separately and install the bowl without the screen to flush it. See Fig. 7.
3. Close the pressure drain valve.
4. Pour 2 liters of compatible solvent into a grounded metal pail. Put the suction tube in the pail.
5. Remove the spray tip from the gun, if it is installed.

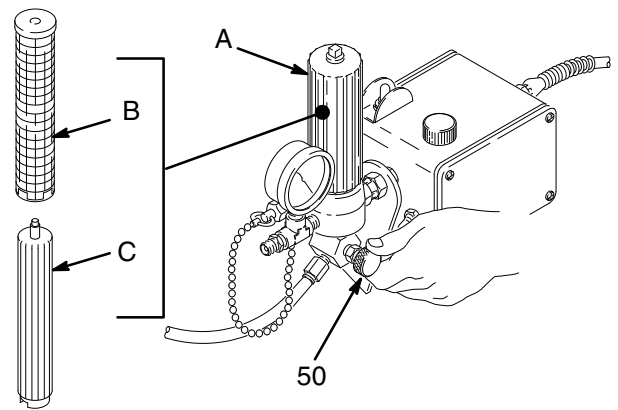


Fig. 7

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6. Turn the pressure adjusting knob all the way counterclockwise to lower the pressure setting.

## WARNING



### FIRE AND EXPLOSION HAZARD

To reduce static sparking and splashing, always remove the spray tip from the gun, and hold a metal part of the gun firmly to the side of a grounded metal pail when flushing.

7. Hold a metal part of the gun firmly against a metal waste container. See Fig. 4. Hold the trigger open, turn on the sprayer, and slowly increase the pressure just until the sprayer starts. Keep the gun triggered until all air is forced out of the system and the solvent flows freely from the gun. Release the trigger and engage the gun safety latch.

**NOTE:** If the pump is hard to prime, open the drain valve. When fluid comes from the valve, close it. Proceed as in Step 7.

8. Remove the suction tube from the pail. Disengage the gun safety latch and trigger the gun to force solvent from the hose. Do not run the pump dry for more than 30 seconds to avoid damaging the pump packings! Relieve pressure.
9. Leave the pressure drain valve open until you are ready to use the sprayer again. If the screen was removed, unscrew the filter bowl and reinstall the clean screen. Reinstall the bowl, hand tight only.
10. If you flushed with mineral spirits and are going to use a water-base paint, flush with soapy water and then clean water. Relieve pressure.

# Troubleshooting

## Pressure Relief Procedure

To reduce the risk of serious injury, including fluid injection, injury from splashing fluid or solvent in the eyes or on the skin, moving parts or electric shock, always follow this procedure whenever you shut off the sprayer, when checking or servicing any part of the spray system, when installing, cleaning or changing spray tips, and whenever you stop spraying.

1. Engage the gun safety latch.
2. Turn the ON/OFF switch to OFF.
3. Unplug the power supply cord.
4. Disengage the gun safety latch. Hold a metal

part of the gun firmly to a grounded metal pail. Trigger the gun to relieve pressure.

5. Engage the gun safety latch.
6. Open the pressure drain valve. Leave the pressure drain valve open until you are ready to spray again.

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

Check everything in the guide before disassembling the sprayer.

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Building circuit breaker opens	Check all electrical wiring for damaged insulation.	Replace any damaged wiring.
	Check for other electrical appliances on circuit.	Shutdown other electrical appliances on circuit.
	Check position of 10–12 (Lo–High) amp switch.	Put switch in 10 amp (LO) position.
Sprayer circuit breaker opens	Check for locked motor rotor. Unplug cord and try to turn fan blades with a screwdriver.	Repair gear train or pump, if damaged. Thaw the sprayer, if frozen; See NOTE 1. Replace the pressure control, if damaged.
	Check for shorted motor. Use ohmmeter to check for shorts between motor leads or between motor leads and motor frame.	Inspect for damage to motor brush leads. Replace motor, if necessary.
	Check electrical supply with voltmeter. Meter should read 210–250 VAC.	Connect to outlet of correct voltage.
Sprayer will not run	Check pressure control knob setting. Motor will not run if it is at minimum setting (fully counterclockwise).	Slowly increase pressure setting to see if motor starts.
	Check for a clogged spray tip. Refer to separate gun or tip instruction manual.	Relieve pressure. Refer to separate gun or tip instruction manual for tip cleaning.
	Check extension cord for visible damage. Use a volt meter or test lamp at extension cord outlet to check.	Replace extension cord.
	Check sprayer power supply cord for visible damage such as broken insulation or wires.	Replace power supply cord.
	Check electrical supply with volt meter. Meter should read 210–250 VAC.	Reset building circuit breaker; replace building fuse. Try another outlet.
	Check for motor damage. Remove drive housing assembly. See page 17. Try to rotate fan by hand.	Replace motor (1) if fan won't turn.
Poor spray pattern	Check for worn spray tip.	Relieve pressure and then replace the tip. See the separate gun or tip manual.

# Troubleshooting

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Motor runs and pump strokes, but output is low or there is no output.	Check extension cord size and length.	Replace cord with a larger size, grounding type extension cord.
	Check paint supply.	Refill and reprime pump.
	Check for clogged intake strainer.	Remove and clean strainer and reinstall.
	Check for loose suction tube or loose fittings.	Tighten; use thread sealant or sealing tape on threads, if necessary.
	Check for worn spray tip.	Follow <b>Pressure Relief Procedure Warning</b> , then replace tip. See your separate gun or tip manual.
	Check motor brushes; check for loose leads and terminals, minimum 13 mm brush length, broken or misaligned springs, or brushes binding in holders. See page 10.	Replace parts as needed. See page 10.
	Check motor armature for shorts by using an armature tester (growler).	Replace motor. See page 15.
	Check to see if pump continues to stroke when gun trigger is released. With pump on and primed, trigger gun momentarily, then release and engage safety latch. Relieve pressure, turn off and unplug sprayer.	Service pump. See pages 11–13.
	Check to see if intake valve ball and piston ball are seating properly.	Remove intake valve and clean. Check balls and seats for nicks; replace if necessary. See page 12. Strain paint before using to remove particles that could clog the pump.
	Check for leaking around throat packing nut which may indicate worn or damaged packings.	Replace packings. See page 12. Also check piston valve seat for hardened paint or nicks and replace if necessary. Tighten the packing nut/wetcup.
Motor runs but pump does not stroke.	Check displacement pump connecting rod pin (20). See page 11.	Replace pin, if missing. Be sure retainer spring (35) is fully in groove all around connecting rod. See page 11.
	Check for frozen or hardened paint in the pump (39).	Thaw. See NOTE 1. Plug in sprayer and turn on. Slowly increase pressure setting to see if motor starts.
	Be sure crank in drive housing rotates; plug in sprayer and turn on briefly to check. Turn off and unplug sprayer.	Check drive housing assembly for damage and replace if necessary. See page 17.
Motor is hot and runs intermittently.	Determine if sprayer was operated at high pressure with small tips, which causes low motor RPM and excessive heat build up.	Decrease pressure setting or increase tip size.
	Be sure ambient temperature where sprayer is located is no more than 32°C and sprayer is not located in direct sun.	Move sprayer to shaded, cooler area, if possible.
	Determine if sprayer was turned on, pressurized, but not operating for long periods of time.	Turn off sprayer whenever you stop spraying for a while and relieve fluid pressure.

**NOTE 1:** Thaw the sprayer if water or water-based paint has frozen in it, by placing it in a warm area. Do not try to start the sprayer until it has thawed completely. If paint hardened (dried) in the sprayer, replace the pump packings. See page 11.

# Motor Brush Replacement

**NOTE:** Replace the brushes when they have worn to less than 10 mm. See Fig. 10. Always replace both brushes at the same time. A Brush Repair Kit, p/n 222–157, and spring clip, p/n 110–816, are available.

**NOTE:** Replacement brushes may last only half as long as the original ones. To maximum brush life, break in new brushes by operating the sprayer with no load (remove the pump connecting rod pin) for at least one hour.

## ⚠ WARNING



### INJECTION HAZARD

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, follow the **Pressure Relief Procedure** on page 10.

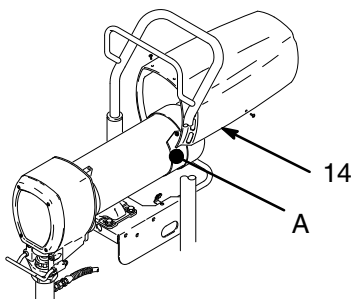


Fig. 8 03799

1. Remove the motor cover (14) and both inspection covers (A). See Fig. 8.
2. Push in the spring clip (D) to unhook it, and then pull it out. See Fig. 9.
3. *Loosen* the terminal screw (F). Pull the brush lead (E) away, leaving the motor lead (G) in place. Remove the brush (C) and spring (B). See Fig. 10.
4. Inspect the commutator for excessive pitting, burning or gouging. A black color on the commutator is normal. Have the commutator resurfaced by a qualified motor repair shop if the brushes seem to wear too fast.
5. Install the new brush (C) so its lead is in the long slot (H) of the holder. See Fig. 11. Slide the terminal (E) under the terminal screw washer. Make sure the motor lead (G) is still connected at the screw. Tighten the screw (F). See Fig. 10.
6. Place the spring (B) on the brush as shown in Fig. 11. The spring must coil as shown.
7. Push in and hook the spring clip (D). See Fig. 11.
8. Repeat for the other side.

9. Test the brushes. Remove the connecting rod pin (20). See Fig. 13, page 13. With the sprayer off, turn the pressure control knob fully counterclockwise to minimum pressure. Plug in the sprayer. Turn the sprayer on. Slowly increase the pressure until the motor is at full speed. Inspect the brush and commutator contact area for excessive arcing. Arcs should not “trail” or circle around the commutator surface.

## ⚠ CAUTION

Do not touch the brushes, leads, springs or brush holders while the sprayer is plugged in, to reduce the risk of electric shock and serious bodily injury.

10. Install the brush inspection plates, gaskets and covers.
11. Break in the brushes. Operate the sprayer for at least one hour with no load. Then reinstall the connecting rod pin (20).

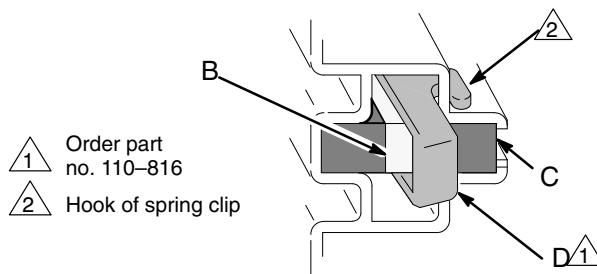


Fig. 9 01227

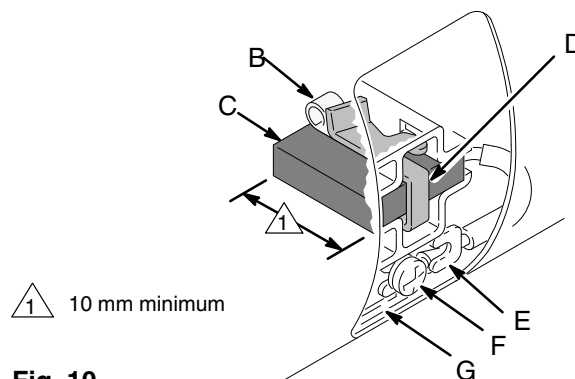


Fig. 10 01227

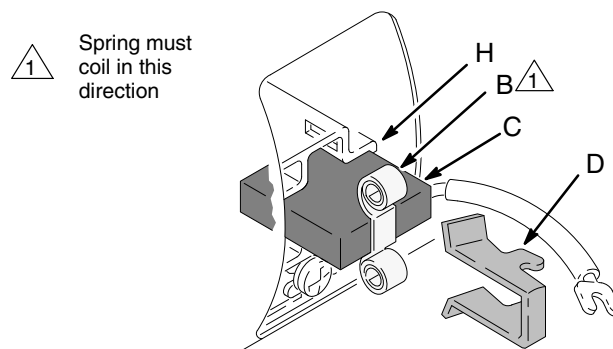
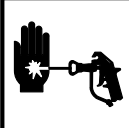


Fig. 11 01227

# Removing and Installing Pump

## ⚠ WARNING



### INJECTION HAZARD

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, follow the **Pressure Relief Procedure** on page 10.

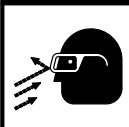
## Removal See Fig. 12.

1. Flush the pump, if possible, and relieve pressure again. Stop the pump with the piston rod in its lowest position, if possible.
2. Disconnect the drain tube (101) from the pump (39) and suction tube (42).
3. Remove the suction tube (42); hold the wrench on the pump intake valve (223) to keep the pump from loosening.
4. Remove the hose (47).
5. Push the retaining spring (35) up and push out the pin (20).
6. Loosen the locknut (38) and unscrew the pump from the bearing housing (27).

## Installation See Fig. 12 and 13.

1. Screw the displacement pump into the bearing housing (27) until the pin hole in the connecting rod assembly (29) and the displacement rod (224) align. Install the pin (20).
2. Continue to screw the pump into the bearing housing until the top threads of the pump cylinder are flush with the face of the bearing housing and the outlet nipple (75) is straight back. Push the retaining spring (35) into the groove all the way around the connecting rod. Tighten the locknut (38) to 95 N.m (70 ft-lb).

## ⚠ WARNING



### MOVING PARTS HAZARD

Be sure the retaining spring (35) is firmly in the groove of the connecting rod, all the way around, to prevent it from working loose due to vibration.

If the pin works loose, it or other parts could break off due to the force of the pumping action. These parts could be projected through the air and result in serious bodily injury or property damage, including damage to the pump, connecting rod or bearing housing.

## ⚠ CAUTION

If the locknut (38) loosens during operation, the threads of the bearing housing (27) will be damaged. Be sure to tighten the locknut firmly.

3. Tighten the packing nut/ wet-cup just enough to stop leakage, but no tighter. Fill the wet-cup/packing nut 1/3 full with Graco TSL.

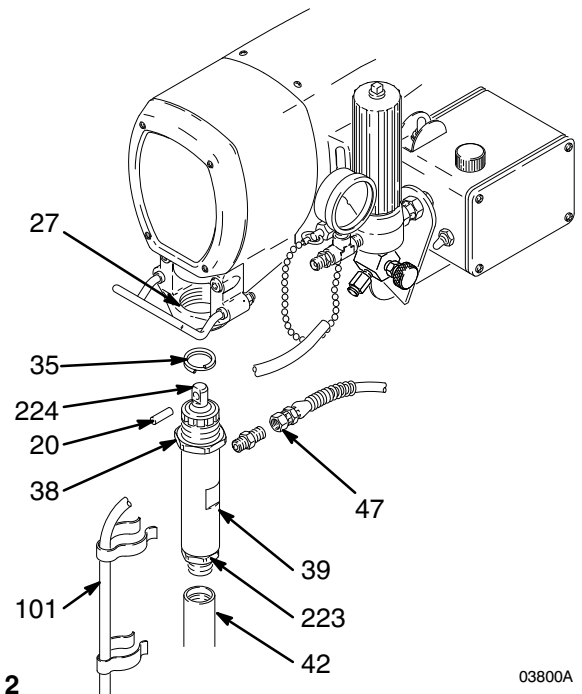


Fig. 12

03800A

- 1 Face of bearing housing
- 2 Torque to 95 N.m (70 ft-lb)

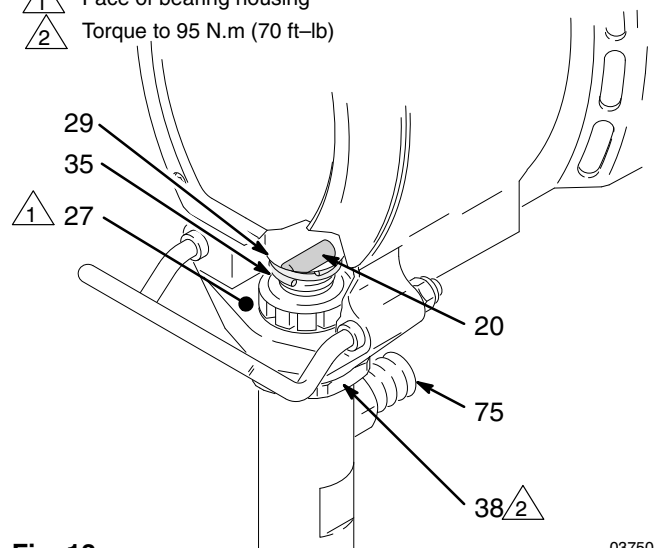


Fig. 13

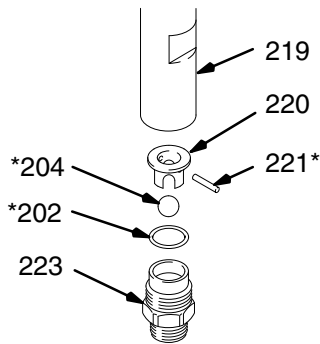
03750

# Displacement Pump Repair

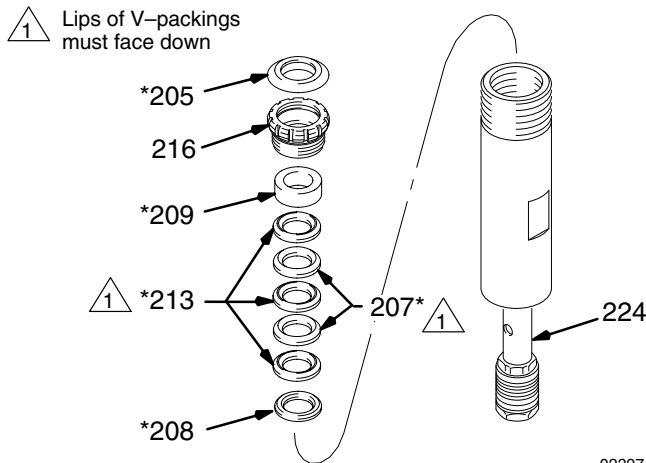


**Procedure** on page 10.

**NOTE:** Packing Repair Kit 222–877 is available. Parts included in the kit are marked with an asterisk (\*) in the text. Use all the new parts in the kit. Clean all parts. Inspect the non-kit parts for wear or damage, and replace them as needed.



**Fig. 14** 03801

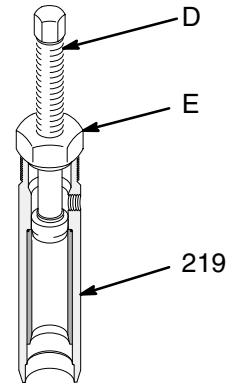


**Fig. 15** \_\_\_\_\_ 02397

## Disassembling the Pump

1. Remove the intake valve (223), o-ring (202), ball guide (220), stop pin (221) and ball (204). Clean the parts. See Fig. 14.
2. Always install a new o-ring (202\*). If no further service is needed, reassemble the intake valve.
3. Remove the packing nut (216) and plug (205). See Fig. 15.
4. Tap the piston rod (224) down with a plastic mallet, and then pull the rod out the bottom of the cylinder.
5. Remove the throat packings (207, 213) and glands (208, 209). See Fig. 15.

- To use the tool: screw the large nut (E) of the tool into the top of the cylinder (219). Screw down the rod (D) to push the sleeve out. Remove the tool. See Fig. 16.



**Fig. 16**  0028

7. Clamp the piston rod (224) in a vise. Loosen the jam nut (211). Unscrew the piston valve (222). See Fig. 17-3.
8. Remove all parts from the piston valve (222).

## Reassembling the Pump

**NOTE:** Alternate leather and plastic packings. The lips of the throat “V” packings must face down. The lips of the piston “V” packings must face up. The lips of the U-cup seal (203) face down. Incorrect installation damages the packings and results in pump leaking.

**NOTE:** Soak leather packings in oil before reassembling the pump.

1. Check the outside of the piston rod (224) and the inside of the sleeve (218) for wear. If the parts are worn, new packings will not seal properly. Replace these parts if needed.
2. Stack these parts onto the piston valve (222): the backup washer (214), seal (203\*), female gland (215\*), alternate the three plastic packings (212\*) and the two leather packings (206\*), and the male gland (210\*). See Fig. 17.
3. Tighten the packing retaining nut (211) onto the piston valve (222) to 0.35 N.m (4 in-lb). See Fig. 18.
4. Place the ball (225) on the piston valve (222).
5. Apply one drop of adhesive, supplied, to the piston valve threads. Hand tighten the valve assembly into the piston rod (224) just until the nut (211) contacts the rod.

**NOTE:** Note the alignment of the piston (222) to the nut (211), and maintain it through Steps 6 and 7. Use two wrenches to maintain the alignment.

6. Place the flats at the top of the rod in a vise.
7. Using two wrenches, **CAREFULLY** tighten the jam nut (211) against the piston rod (224) to 26 N.m (19 ft-lb). See Fig. 19.

# Displacement Pump Repair

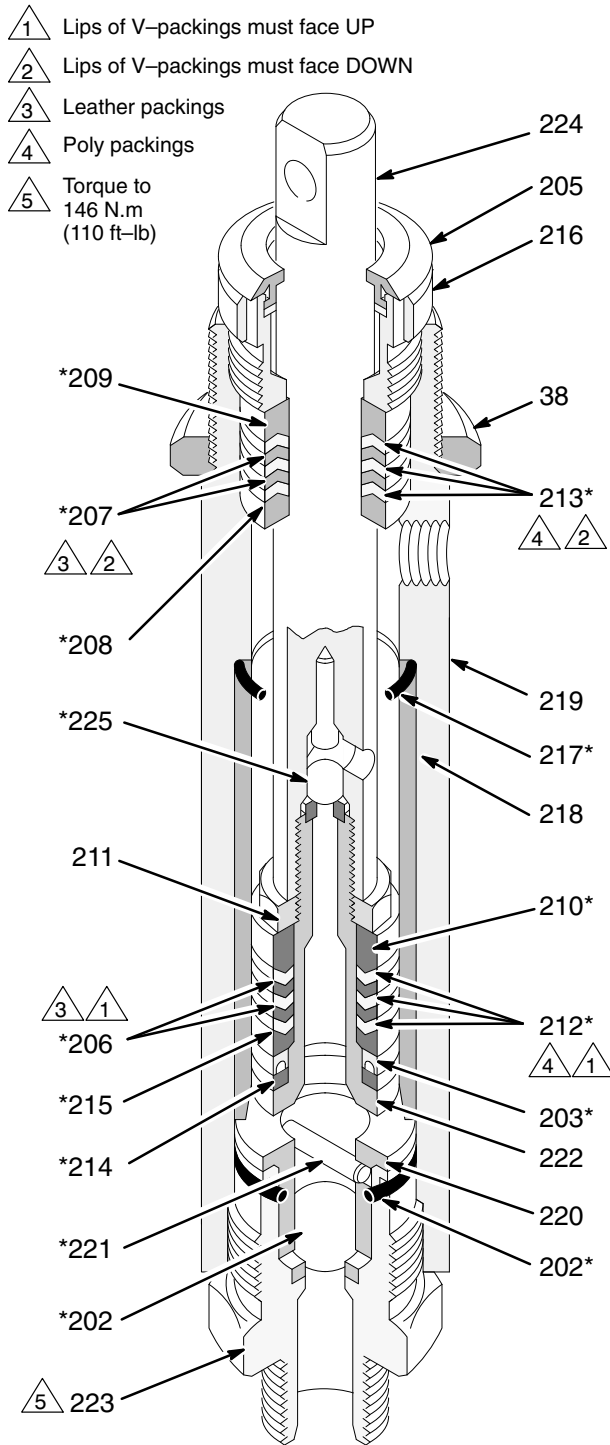


Fig. 17

01197

8. Place a new seal (217\*) into the cylinder and coat with oil. See Fig. 17.
9. Install these parts in the top of the cylinder (219): the male gland (208\*), alternate the three plastic packings (213\*) and the two leather packings (207\*), and then install the female gland (209). See Fig. 17.
10. Loosely install the packing nut (216) and plug (205). See Fig. 17.

11. Coat the piston rod and packings with oil. Carefully slide the assembly **into the top of the sleeve** (218).
12. Slide the sleeve/piston rod assembly (A) **into the bottom of the cylinder** (219). See Fig. 20.
13. Screw down the cylinder locknut (38) until it is finger tight at the bottom of the external cylinder threads.
14. Place the intake valve (223) in a vise. Install a new o-ring (202\*). Screw the pump cylinder onto the intake valve. Torque to 146 N.m (110 ft-lb). See Fig. 17.
15. See page 11 to reinstall the pump.

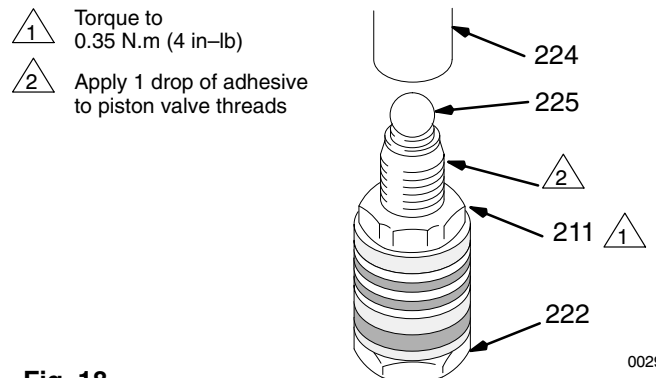


Fig. 18

0029

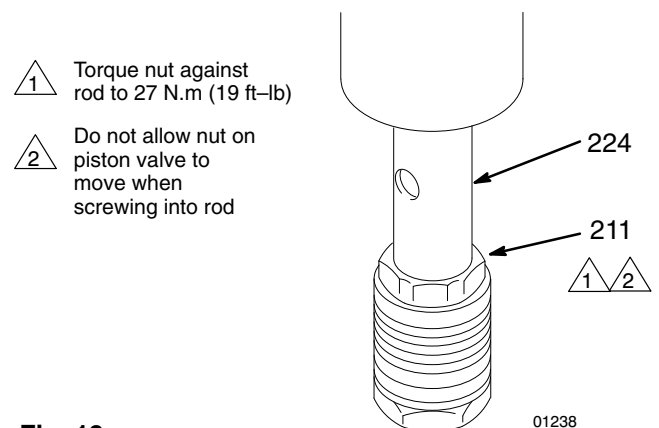


Fig. 19

01238

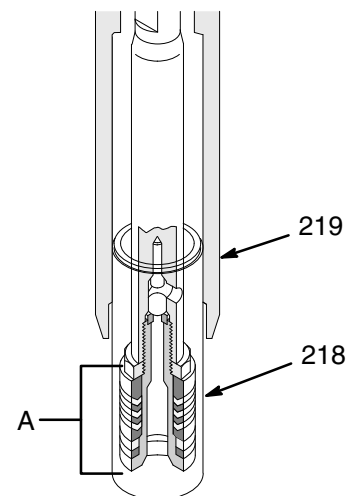


Fig. 20

0030

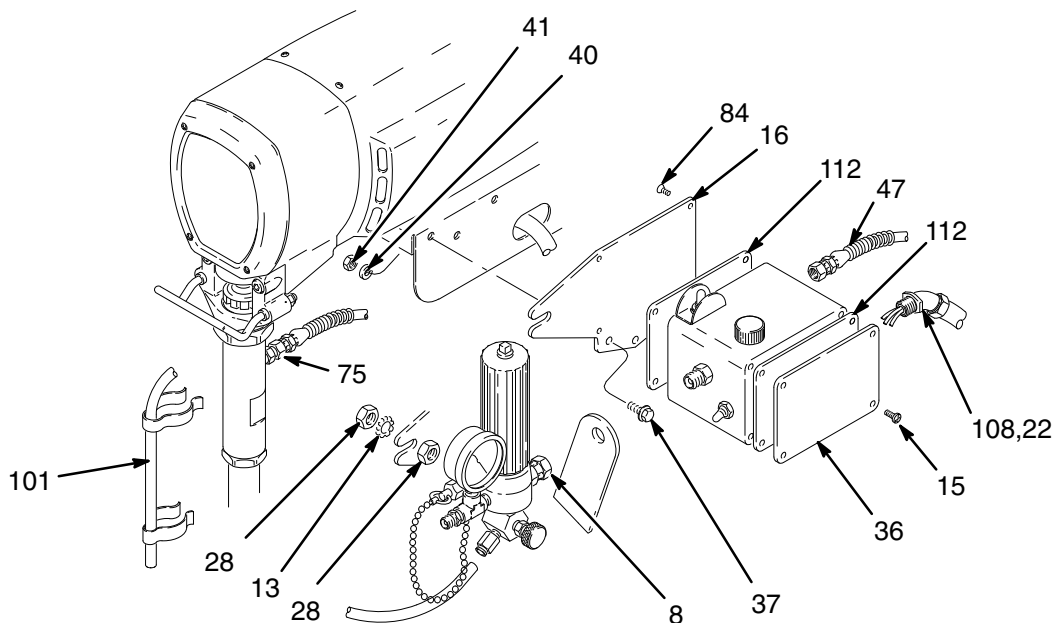


Fig. 21

03802A

## ⚠ WARNING



### INJECTION HAZARD

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, follow the **Pressure Relief Procedure** on page 10.

**NOTE:** Refer to Fig. 21 except where noted.

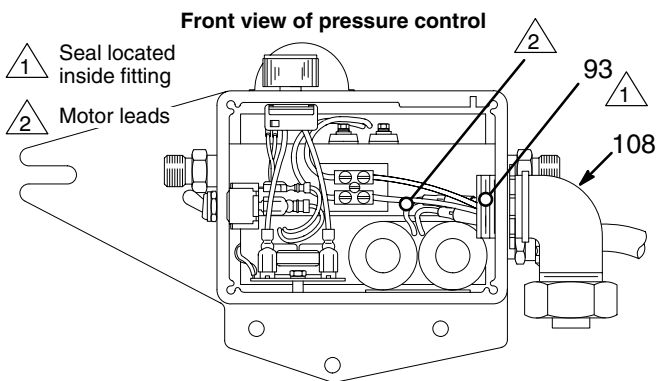


Fig. 22

## Pressure Control

1. Follow the **Pressure Relief Procedure**.
2. Disconnect the main hose (47).
3. Disconnect the drain tube (101) from the pump (39) and suction tube.
4. Loosen the filter bracket nut (28). Remove the filter.
5. Remove the pressure control cover (36). Disconnect the four motor leads. See Fig. 22.
6. Unscrew the connector from the pressure control. Loosen the nut on the connector (108) and pull the conduit (22) and motor leads out of the pressure control.
7. Remove the pressure control mounting screws (37). Remove the pressure control. Install the connector (108) on the new pressure control.
8. Install the new pressure control. Place the seals (93) around the motor leads and push the seals into the connector (108). Be sure to install the gas-kets (108). See Fig. 22.

**NOTE:** A replacement circuit breaker (109) is available.

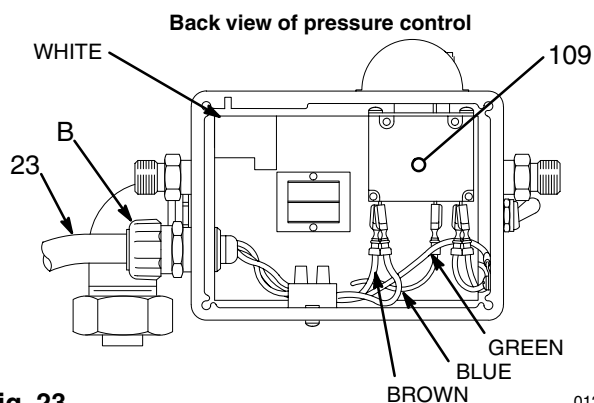


Fig. 23

0127

## Power Supply Cord

1. Follow the **Pressure Relief Procedure**.
2. Remove the back pressure control plate (16).
3. Remove the terminal block from the pressure control. Disconnect the power supply cord leads from the terminal block, taking note of their locations.
4. Loosen the strain relief bushing (B). Remove the power supply cord (23). See Fig. 23.
5. Install the new cord, connecting the leads to their original locations.



# Motor Replacement

## ⚠ WARNING



### INJECTION HAZARD

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, follow the **Pressure Relief**

**Procedure** on page 10.

**NOTE:** Refer to Fig. 24 for this procedure.

1. Remove the motor shield (14). Remove the front cover (31). Disconnect the hose (47) at the pump. Disconnect the drain hose (101) from the pump (39).
2. Remove the pressure control cover (36). Disconnect the four motor leads.
3. Unscrew the connector from the pressure control. Loosen the nut on the connector (108) and pull the motor leads out of the connector.
4. Unscrew the connector (54) from the motor and remove the conduit (22).
5. Remove the screws (51) from the recess of the drive housing.
6. Remove the screws (21 and 30) from the motor bell (F).
7. Use a plastic mallet to tap the displacement pump (39) from the rear to loosen the drive housing (18) from the motor bell (F). Pull off the drive housing.
8. Remove the screws (37) holding the motor to the frame. Lift off the motor.
9. Mount the new motor on the frame.
10. Slide the connector (54) over the leads of the new motor and screw two or three threads of it into the motor. Tighten the locknut up to the motor.
11. Liberally grease the gear cluster (9) and pinion gear (G) and pack all bearings in the motor bell. Be sure the thrust balls (10) are in place. (One ball is included with a replacement drive housing.)
12. Place the bronze-colored washer (18b) and THEN the silver-colored washer (18a) on the shaft protruding from the big gear in the drive housing (18).
13. Align the gears and push the drive housing (18) straight onto the motor bell (F) and locating pins.
14. Continue to reassemble the sprayer.

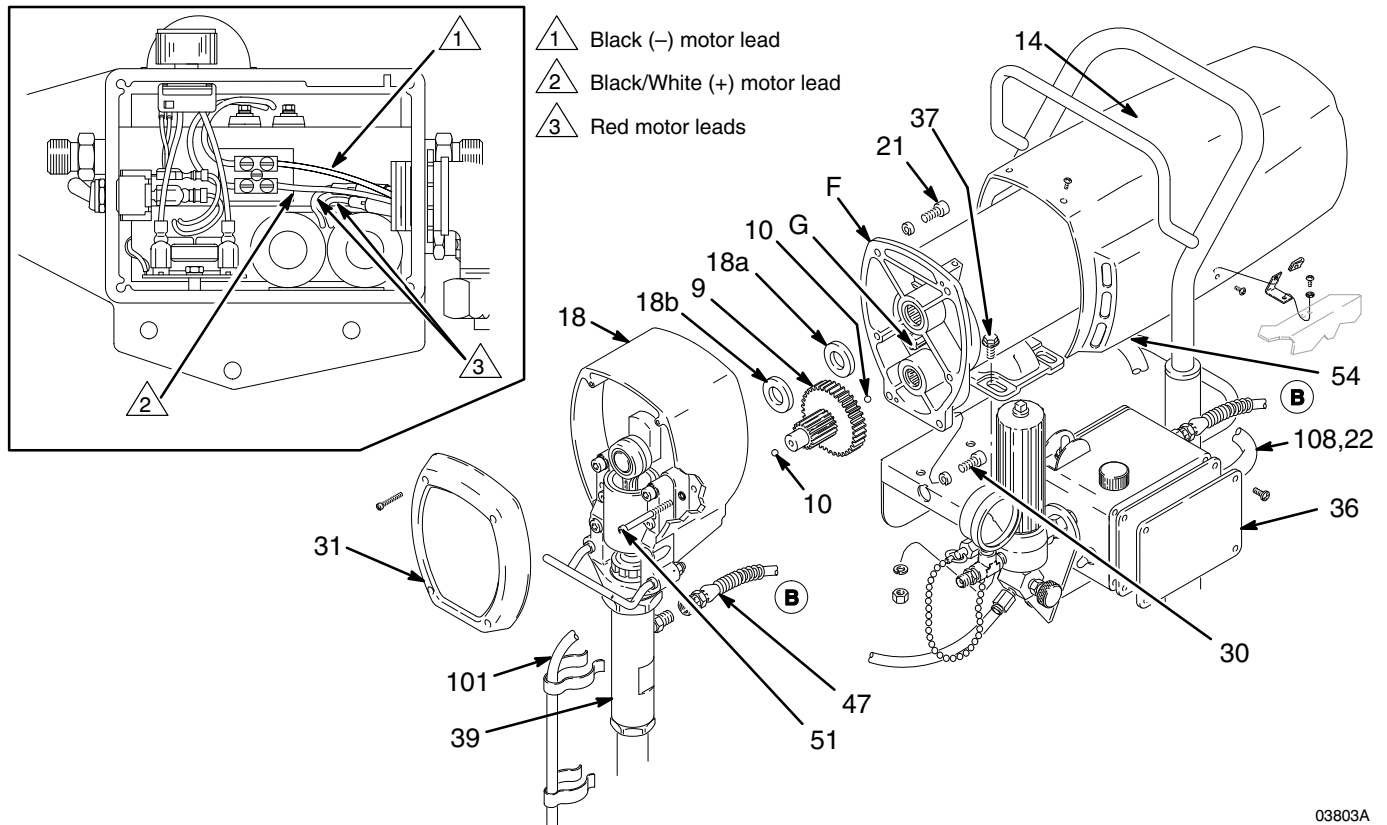


Fig. 24

03803A

# Bearing Housing and Connecting Rod

## ⚠ WARNING

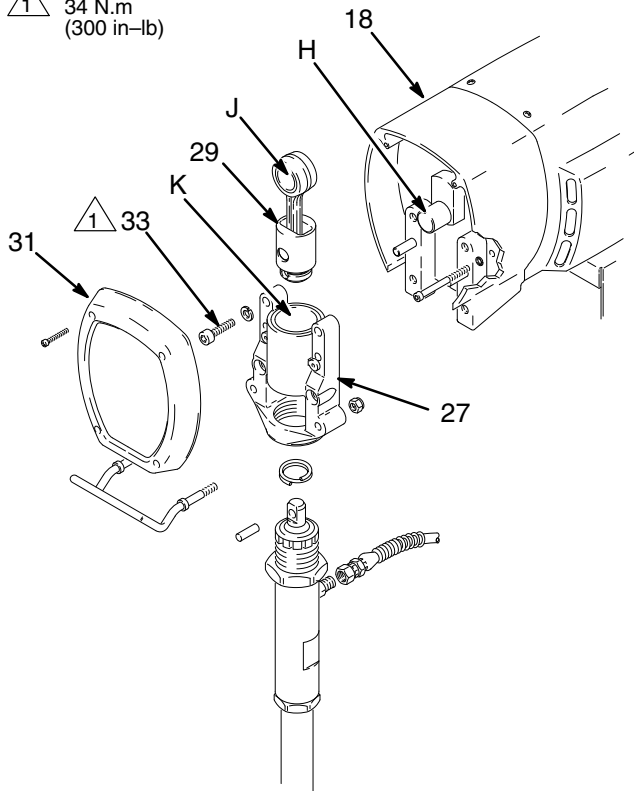


### INJECTION HAZARD

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, follow the **Pressure Relief Procedure** on page 10.

**Procedure** on page 10.

1 Torque to  
34 N.m  
(300 in-lb)



**NOTE:** Stop the sprayer at the bottom of its stroke to get the crank (H) in its lowest position. To lower the crank manually, rotate the blades of the motor fan with a screwdriver.

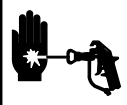
1. Remove the pump. See page 13.
2. Remove the front cover (31). Remove the bearing housing screws (33).
3. Tap the lower rear of the bearing housing (27) with a plastic mallet to loosen it from the drive housing (18). Pull the bearing housing and the connecting rod (29) straight off the drive housing.
4. Remove the pail bracket assembly (L) and reinstall it on the new bearing housing.
5. Inspect the crank (H) for excessive wear and replace parts as needed.
6. Evenly lubricate the inside of the bronze bearing (K) with motor oil. Liberally pack the roller bearing (J) with bearing grease.
7. Assemble the connecting rod (29) and bearing housing (27).
8. Clean the mating surfaces of the bearing and drive housings.
9. Align the connecting rod with the crank (H) and align the locating pins in the drive housing with the holes in the bearing housing (27). Push the bearing housing onto the drive housing or tap it into place with a plastic mallet.
10. Install the bearing housing screws (33). Torque evenly to 34 N.m (300 in-lb).
11. Reinstall all parts. See page 13 to install the pump.

Fig. 25

03804

# Drive Housing Replacement

## ⚠ WARNING



### INJECTION HAZARD

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, follow the **Pressure Relief Procedure** on page 10.

**NOTE:** Stop the sprayer at the bottom of its stroke to get the crank (H) in its lowest position. To lower it manually, carefully rotate the blades of the fan with a screwdriver.

1. Remove the front cover (31). Remove the motor shield (14).
2. Disconnect the pump outlet hose (47).
3. Remove the screws (33) from the bearing housing.
4. Lightly tap the lower rear of the bearing housing (27) with a plastic mallet to loosen it from the drive housing (18). Pull the bearing housing and connecting rod assembly straight off the drive housing.
5. Remove the screws (51) from the recess of the drive housing.
6. Remove the screws (30 and 21) from the motor bell (F).
7. Tap the drive housing (18) with a plastic mallet to loosen it from the motor bell, then pull it straight off.
8. Use approximately 175 cc of the bearing grease supplied with the drive housing replacement kit to grease the gear cluster (9). Check to be sure the thrust balls (10) are in place.
9. Place the bronze-colored washer (18b) and THEN the silver-colored washer (18a) on the shaft protruding from the big gear in the drive housing (18).
10. Align the gears and push the new drive housing straight onto the motor bell and locating pins.
11. Continue to reassemble the sprayer. Torque the screws (33) to 34 N.m (300 in-lb).

1 Torque to 34 N.m (300 in-lb)

2 Bronze color

3 Apply 175 cc bearing grease to this gear

4 Silver color

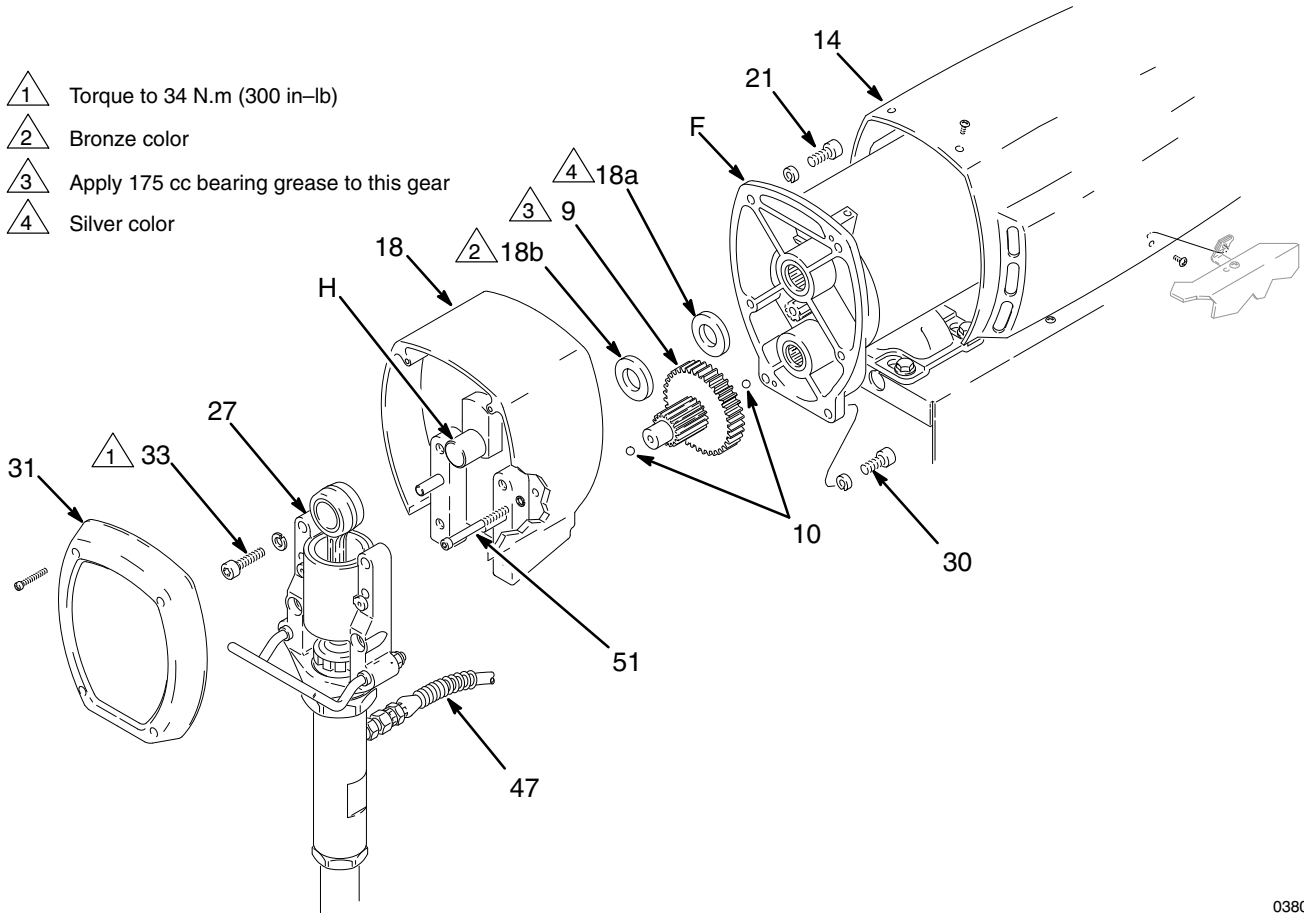


Fig. 26

03805



# Sprayer Parts List

## Model 231–321, Series A

Includes items 1–115

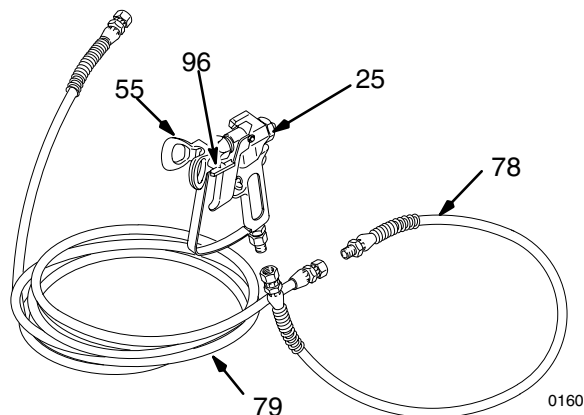
**NOTE:** Items 25, 55, 78, 79, and 96 are shown on page 22.

Ref No.	Part No.	Description	Qty	Ref. No.	Part No.	Description	Qty.
1	235–726	MOTOR KIT	1	48	214–570	FLUID FILTER	
2	290–058	LABEL, identification, motor cover	1			<i>see manual 307–273 for parts</i>	
3	290–059	LABEL, identification, motor cover	1			<i>includes one of items 46 and 85</i>	1
4	290–057	LABEL, identification, front cover	1	49	106–115	LOCKWASHER, spring; 3/8"	4
6	220–636	CART	1	50	221–077	PRESSURE DRAIN VALVE	1
7	181–072	STRAINER	1	51	108–849	CAPSCREW, sch; 1/4–20 x 3"	2
8	155–665	UNION, adapter; 3/8" npsm swivel		52	110–243	RING, retaining	2
		x 3/8 npt(m)	1	53	108–691	PLUG, tubing	2
9	220–637	GEAR REDUCER	1	54	108–460	CONNECTOR	1
10	100–069	BALL, steel; 1/4" dia.	1	57▲	178–034	TAG, WARNING	1
11	104–811	HUBCAP	2	58	101–242	RING, retaining	2
12	220–285	CAP	1	59	206–994	THROAT SEAL LIQUID, 0.27 liter	1
13	100–322	LOCKWASHER, ext., 7/16"	1	60	179–811	WHEEL	2
14	223–153	MOTOR SHIELD KIT	1	61	220–633	HANDLE, cart	1
15	110–885	SCREW, pnh; 10–24 type C x 3/8"	4	62	187–603	SLEEVE, cart handle	2
16	185–539	BRACKET, mounting	1	63	105–510	LOCKWASHER, spring, 1/4"	6
17	111–590	BUTTON, snap	2	64	108–865	SCREW, mach, pnh; 8–32 x 3/8"	10
18	220–879	DRIVE HOUSING KIT		69	110–814	NUT, retainer	2
		<i>Includes items 18 a and 18b,</i>		71▲	177–762	LABEL, WARNING	1
		<i>and one of item 10</i>	1	75	183–461	ADAPTER; 3/8 npsm x 1/4 npt	1
18a	183–209	.BEARING, thrust	1	77	290–060	LABEL, identification	1
18b	106–227	.SPACER	1	80	109–032	SCREW, mach, pnh; 10–24 x 1/4"	4
19	186–227	HANGER, pail	1	81	185–384	BRACKET	2
20	183–210	PIN, straight, 3/8 x 1–1/8"	1	82	110–240	NUT	2
21	100–644	SCREW, soc head, no. 1/4–20 x 3/4"	2	83	183–350	WASHER, flat; 7/8" ID	2
22	065–099	CONDUIT, electrical		84	106–078	SCREW, flat hd; 10–24 x 3/8"	4
		<i>specify length when ordering</i>	296 mm	85	100–040	PLUG	1
23	224–263	POWER SUPPLY CORD	1	87	108–295	BUSHING, strain relief	1
24	107–264	TERMINAL, female	2	88	185–565	LABEL, control	1
26	154–636	WASHER	2	89	100–035	SCREW, mach, pnh; 8–32 x 5/16"	
27	220–639	BEARING HOUSING KIT	1			<i>inside pressure control</i>	1
28	150–513	NUT, jam; 7/16"	2	90	157–021	LOCKWASHER, internal, No. 8	
29	220–640	CONNECTING ROD KIT	1			<i>inside pressure control</i>	1
30	100–643	SCREW, socket head, no. 1/4–20 x 1"	2	91	100–020	LOCKWASHER, .194" ID	2
31	183–168	COVER, housing	1	93	107–447	SEAL	2
32	108–850	SCREW, mach, filh; no. 8–32 x 1–1/4"	4	94	109–547	LABEL, 12/10 amp	1
33	110–141	CAPSCREW, sch; 3/8–16 x 1–1/5"	4	95	178–035	LABEL, Caution	1
34	187–003	ADAPTER, elbow, special;		97▲	185–951	LABEL, WARNING	1
		1/4–18 npt(m x f)	1	98▲	185–952	LABEL, WARNING	1
35	183–169	SPRING, retaining	1	100	186–490	CLIP, spring	1
36	186–918	COVER, pressure control	1	101	186–495	TUBE, drain	1
37	110–963	CAPSCREW, flange head,		102	181–102	CLIP, spring	1
		5/16–18 x 3/4"	7	108	102–932	FITTING, conduit, 90°	1
38	183–170	NUT, HEX, 1 13/16 unc–2b	1	109	113–605	BOOT, circuit breaker	1
39	220–872	DISPLACEMENT PUMP		110	105–679	SWITCH, toggle	1
		<i>see parts on page 24</i>	1	111	105–659	BOOT, toggle	1
40	100–214	LOCKWASHER, spring; 5/16"	7	112	187–656	GASKET, pressure control	2
41	100–188	NUT, heavy hex; 5/16–18 unc–2a	7	114	102–814	GAUGE, pressure	1
42	183–423	TUBE, INTAKE	1	115	106–228	TEE, street	1
43	224–385	PRESSURE CONTROL KIT		116	112–153	SWITCH, circuit breaker, 240V	1
		<i>includes replaceable items 16, 23, 4 of 84</i>	1				
46	162–453	NIPPLE, hex; 1/4 npsm x 1/4 npt,					
		1–3/16" long	2				
47	235–542	HOSE, 3/8 npsm(f) x 14–1/2"	1				

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

# Hose and Gun Parts Drawing and List

Ref No.	Part No.	Description	Qty
25	222-667	SPRAY GUN <i>see manual 307-614 for parts</i>	1
55	220-422	TIP GUARD, RAC IV <i>see manual 307-848</i>	1
78	214-701	HOSE, grounded, nylon; 3/16" ID; cpld 1/4 npsm(f); 3 ft. (9 m); spring guards both ends	1
79	223-541	HOSE, grounded, nylon; 1/4" ID; cpld 1/4 npsm(f); 50 ft (15 m); spring guards both ends	1
96	221-621	TIP, RAC IV, size 621	1



# Displacement Pump Parts Drawing and List

## Model 220-872, Series A

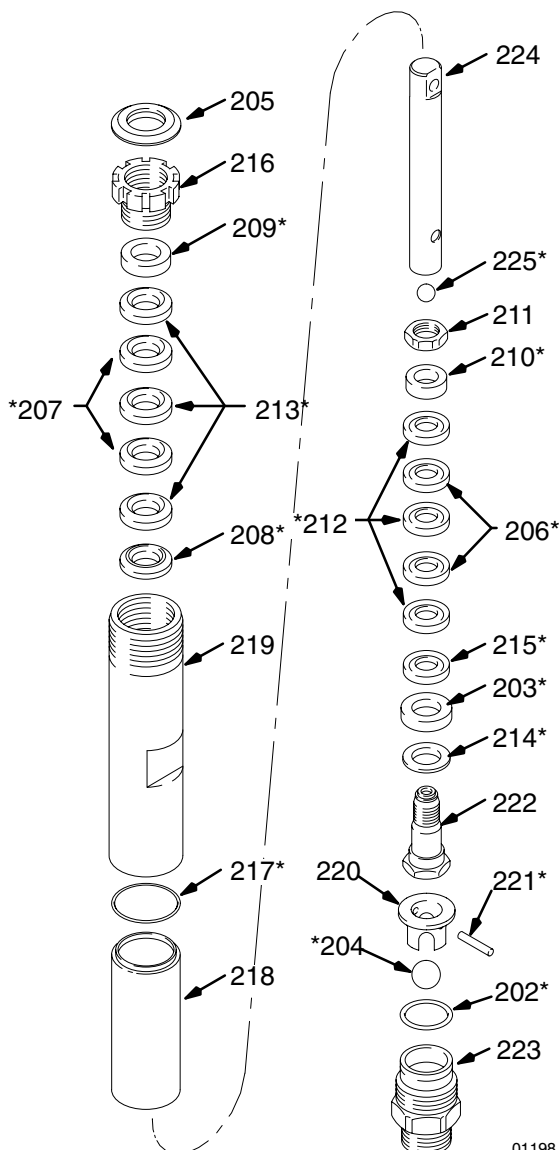
Includes items 202 to 225

Ref No.	Part No.	Description	Qty
202*	107-098	SEAL, sleeve	1
203*	108-690	SEAL, u-cup, polyurethane	1
204*	108-775	BALL; sst	1
205	183-171	PLUG 1	
206*	183-174	V-PACKING, leather	2
207*	183-175	V-PACKING, leather	2
208*	183-176	GLAND, male	1
209*	183-177	GLAND, female	1
210*	183-178	GLAND, male	1
211	183-179	NUT, hex, retaining	1
212*	183-182	V-PACKING, plastic	3
213*	183-183	V-PACKING, plastic	3
214*	183-184	WASHER, backup	1
215*	183-185	GLAND, female	1
216	183-186	NUT, packing	1
217*	183-172	O-RING, PTFE®	1
218	183-361	SLEEVE, cylinder	1
219	183-181	CYLINDER	1
220	183-180	GUIDE, ball	1
221*	183-173	PIN, ball stop	1
222	220-631	VALVE, piston	1
223	220-629	VALVE, intake	1
224	220-630	ROD, piston	1
225*	101-947	BALL	1

\* These parts are also included in Repair Kit 220-877, which may be purchased separately.

## Sleeve Removal Tool 224-788

Required to remove a pump sleeve.  
Purchase separately.



# Accessories

*Use Only Genuine Graco Parts and Accessories*

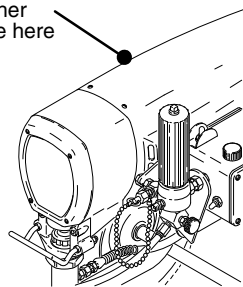
## DANGER LABELS

The English language DANGER label shown on page 1 is also on your sprayer. If you have painters who do not read English, order one of the following labels to apply to your sprayer. The drawing below shows the best placement of these labels for good visibility.

Order the labels directly from your Graco distributor.

**French** 185-955  
**Spanish** 185-962  
**German** 186-042  
**Greek** 186-046  
**Korean** 186-050

Apply other  
language here



## Motor Brush Kit

222-157

## Displacement Pump Packing Kit 220-877

See contents on page 20. Repair instructions are provided in this manual and are also supplied with the kit.

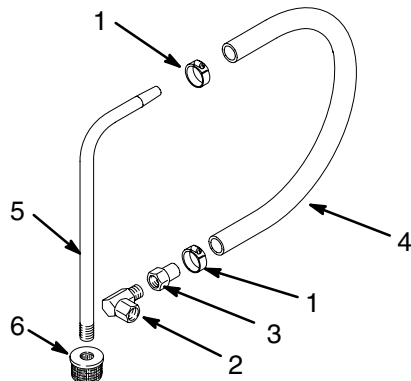
## Sleeve Removal Tool 224-788

Required to remove a pump sleeve.

## 5 Gallon (19 Liter) Suction Tube Kit 208-920

Includes:

Ref No.	Part No.	Description	Qty
1	101-818	CLAMP, hose	2
2	160-327	UNION, 90° swivel; 3/4 npt(m x f)	1
3	170-705	ADAPTER, intake	1
4	170-706	HOSE, 1" ID x 48"; nylon	1
5	170-957	TUBE, suction	1
6	181-072	STRAINER	1

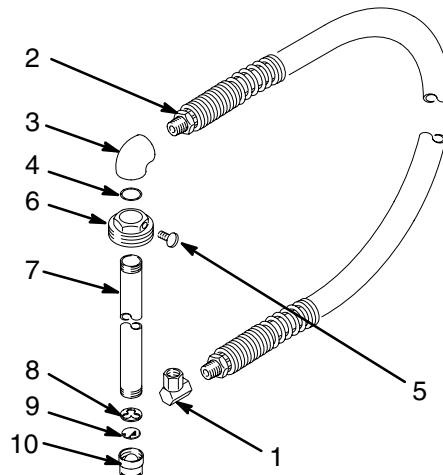


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## 55 Gallon (200 Liter) Suction Tube Kit 208-259

Includes:

Ref No.	Part No.	Description	Qty
1	156-589	UNION, 90° ADAPTER, 3/4 npt(f) x 3/4 npsm(f) swivel	1
2	214-961	HOSE, coupled 3/4 npt(mbe) 3/4" ID; nylon, 6 ft (1.8 m); spring guard one end	1
3	156-591	ELBOW, 90°; 3/4 npt x 1-1/2 - 24 NS	1
4	156-593	PACKING, o-ring, nitrile rubber	1
5	100-220	THUMBSCREW, 5/16-18 x 1"	1
6	176-684	ADAPTER, bung	1
7	156-592	TUBE, riser	1
8	159-100	RETAINER, screen	1
9	161-377	SCREEN, filter	1
10	159-101	NUT, screen retainer	1



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# Technical Data

Power Requirements (full output) . . . . 220 VAC, 50Hz,  
1 phase, 12 Amp minimum  
Working Pressure Range . . . . 0 – 210 bar (0–3000 psi)  
Cycles/Liter (gallon) . . . . . 27.5 (104)  
Power Cord . . . . 2.5 mm<sup>2</sup> (12 AWG), 3 wire, 3 m (10')  
Inlet Paint Strainer . . . . . 16 mesh (1190 micron)  
Stainless Steel Screen, reusable  
Outlet Paint Filter . . . . . 60 mesh (250 micron)  
Stainless Steel Screen, reusable  
Pump Inlet Size . . . . . 3/4 npt(m)  
Fluid Outlet Size . . . . . 1/4 npsm from fluid filter  
Wetted Parts:  
Displacement Pump . . . Carbon steel, Polyurethane,  
Polyethylene, PTFE® Delrin®, Leather  
Filter . . . . . Aluminum, Carbon steel, Stainless Steel,

**NOTE:** PTFE® and Delrin® are a registered trade-marks of the Company.

# Dimensions

Weight (w/o packaging, hose or gun) . . . . 55.5 kg (122 lb)  
Height . . . . . 813 mm (32 in.)  
Length . . . . . 616 mm (24.25 in.)  
Width . . . . . 572 mm (22.5 in.)

## Graco Phone Numbers

**TO PLACE AN ORDER**, contact your Graco distributor, or call this number to identify the distributor closest to you: **1-800-367-4023 Toll Free**

**FOR TECHNICAL ASSISTANCE**, service repair information or assistance regarding the application of Graco equipment: **1-800-543-0339 Toll Free**

## The Graco Warranty and Disclaimers

### WARRANTY

Graco warrants all equipment manufactured by it 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. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the Ultra equipment proven defective, with the exception of defects in parts on the drive train/gear box, which will be repaired or replaced for forty-eight months from the date of sale and the electric motor (excluding brush replacement, which is routine maintenance) or pressure control assembly which will be repaired or replaced for twenty-four months from the date of sale. 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, 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 with Graco equipment of 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 claim. 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.

### DISCLAIMERS AND LIMITATIONS

The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose**, and of any non-contractual liabilities, including product liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. In no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

### EQUIPMENT NOT COVERED BY GRACO WARRANTY

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

*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.*

**Sales Offices:** Atlanta, Chicago, Detroit, Los Angeles  
**Foreign Offices:** Belgium, Canada, England, Korea, Switzerland, France, Germany, Hong Kong, Japan

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