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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



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.
- Use only with a grounded outlet that matches the grounded plug of this equipment.

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 11 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.



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 11 to prevent the equipment from starting unexpectedly.

! WARNING



INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call your distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts.
- 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 27 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 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in pressurized aluminum equipment. Such use could result in a chemical reaction, with the possibility of explosion.
- 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.

NOTE: This is an example of the DANGER label on your sprayer. This label is available in other languages, free of charge. See page 27 to order.

! DANGER !			
	FIRE AND EXPLOSION HAZARD		SKIN INJECTION HAZARD
<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	

Setup

WARNING

To reduce the risk of serious bodily injury caused by static sparking, fluid injection or over-pressurization and rupture of the hose or gun, all hoses must be electrically conductive, the gun must have a tip guard, and each part must be rated for at least *2750 psi (190 bar, 19 MPa) Working Pressure*.

CAUTION

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

1. Always use grounded, flexible spray hose (85) 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 filter (15) and the main hose. See Fig. 1.

WARNING



FIRE AND EXPLOSION HAZARD

Proper electrical grounding is essential to reduce the risk of fire or explosion which can result in serious bodily injury and property damage. See the warning section **FIRE OR EXPLOSION HAZARD** on page 2 for more detailed grounding instructions.



1. **Connect the hoses and gun to the sprayer.** Use a 1/4 in. ID, 50 ft (15 m) long (minimum) main hose (85). For more flexible gun movement, install a 3/16 in. ID, 3 ft (0.9 m) hose (86) between the main hose and the gun (87). Don't use thread sealant, and don't install the spray tip yet!
2. **Fill the packing nut/wet-cup (221)** 1/3 full with Throat Seal Liquid (TSL), supplied.
3. **Check the electrical service.**
 - a. Electrical requirements: 120 VAC, 60 Hz, 15A (minimum).
 - b. Use a grounded electrical outlet located at least 20 ft (6 m) from the spray area.
 - c. Do not remove the grounding prong of the power supply cord, and do not use an ungrounded adapter.
 - d. Extension cord specifications: 15A, 3 wires, grounding type. Note that long lengths reduce sprayer performance. A maximum extension cord length of 200 ft (60 m) is recommended.
4. **Flush the pump** to remove the oil left in to protect pump parts after factory testing. See **Flushing** on page 9.
5. **Prepare the paint.** Remove any paint skin. Stir the paint thoroughly. Strain the paint through a fine nylon mesh bag to remove particles that could clog the filter, if used, or the spray tip.

Setup

- ⚠ 1 Keep 1/3 full with TSL at all times
- ⚠ 2 Never install any shutoff device here

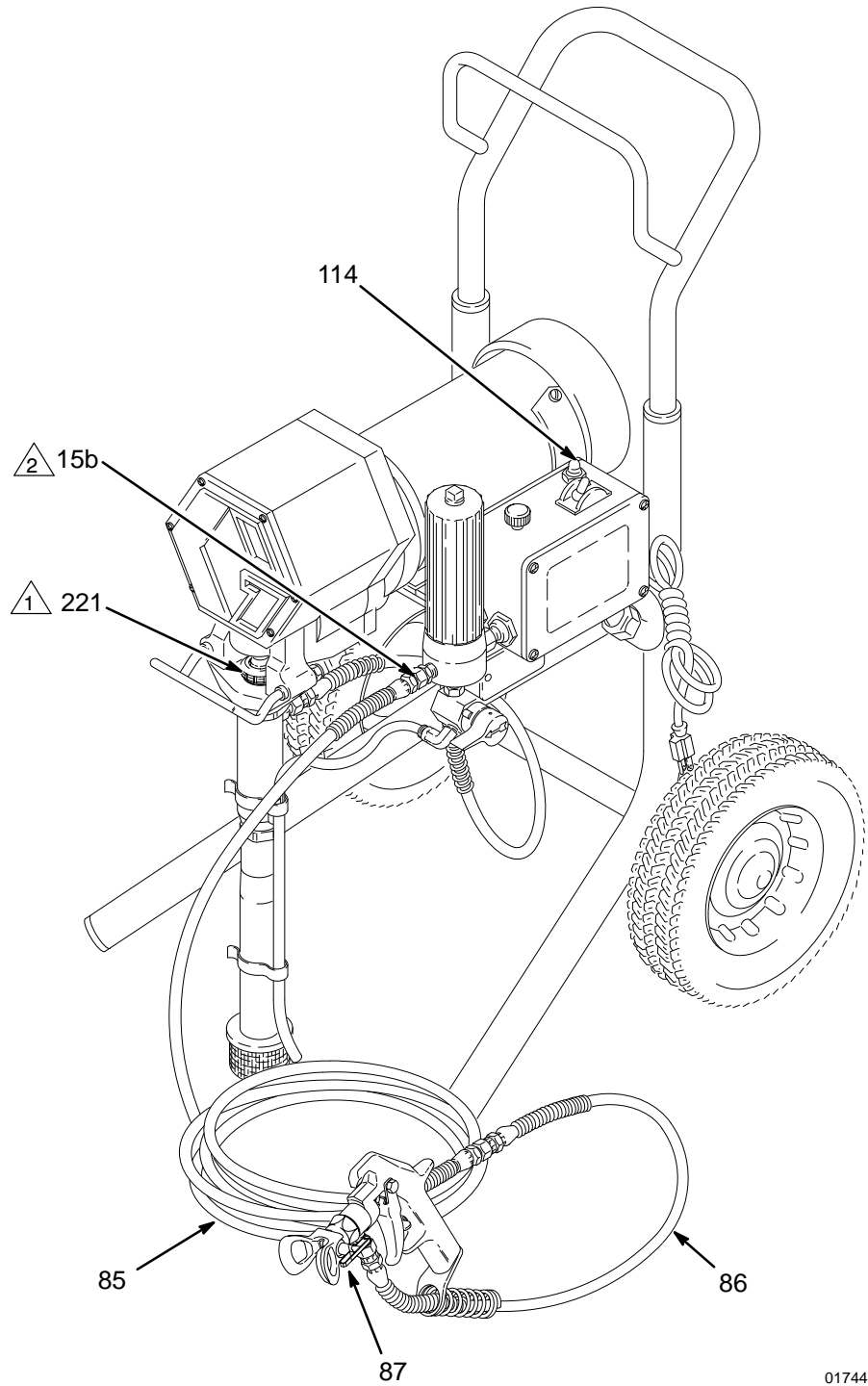


Fig. 1

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Startup

Use this procedure to help you start and operate the sprayer properly and safely.

⚠ WARNING

INJECTION HAZARD
To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

NOTE: Flush the sprayer if this is a first-time startup. See page 9.

NOTE: See Fig. 3 except where noted.

1. **Turn the pressure adjusting knob (A) fully counterclockwise to minimum pressure.**
2. **Put the intake tube (3) in the fluid container.**
3. **Plug in the sprayer.**

⚠ CAUTION

Do not run the pump without fluid in it for more than 30 seconds to avoid damage to the displacement pump packings.

⚠ WARNING

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

4. **Prime the pump.**
 - a. Open the pressure drain valve (44). Turn on the sprayer switch (105a). Slowly turn the pressure adjusting knob (A) clockwise until the sprayer starts. When fluid comes from the valve close it.
 - b. Disengage the trigger safety latch. See Fig. 2. Holding a metal part of the gun firmly against a grounded metal pail, trigger the gun until all air is forced out of the system and the paint flows freely from the gun.
 - c. Release the trigger and engage the trigger safety latch.

5. **Check all fluid connections for leaks.** Follow the **Pressure Relief Procedure** on page 11 before tightening connections.
6. **Install the spray tip and tip guard.** Engage the trigger safety latch. Install the spray tip according to the instructions supplied with it.
7. **Adjust the spray pattern.**
 - a. Increase the pressure slowly just until spray from the gun is completely atomized. Use the lowest pressure needed to get the desired results. This reduces overspray and fogging, decreases tip wear and extends sprayer life.
 - b. If more coverage is needed, use a larger tip rather than increasing the pressure.
 - c. Test the spray pattern. Adjust the spray tip pattern according to the instructions supplied with the gun or tip.

- 1 Trigger safety latch shown engaged (SAFE)
2 Trigger safety latch shown disengaged (OFF SAFE)

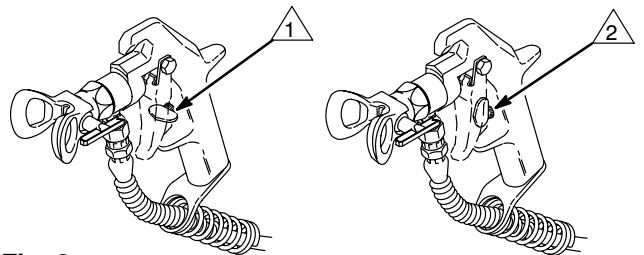


Fig. 2

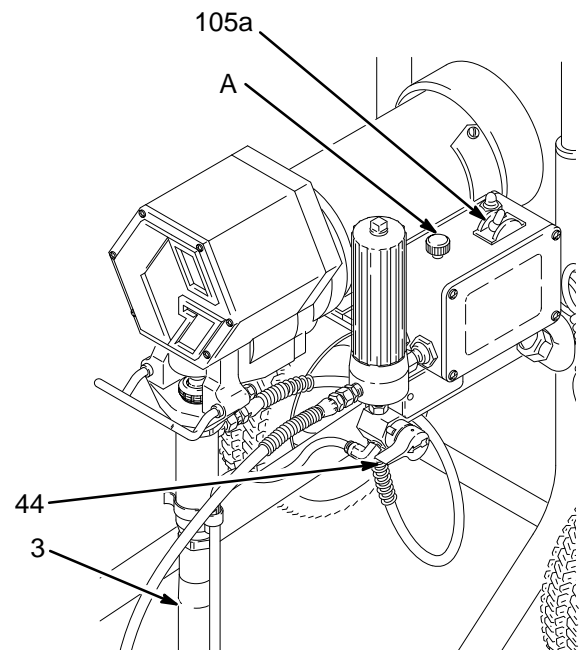


Fig. 3

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Maintenance

⚠ WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

Cleaning a Clogged Tip

⚠ WARNING

To reduce the risk of serious bodily injury from from fluid injection:

NEVER operate the spray gun with the tip guard removed.

DO NOT hold your hand, body, or a rag in front of the spray tip when cleaning or checking for a clog. Always point the gun toward the ground or into a pail.

DO NOT try to “blow back” paint; this is NOT an air spray sprayer.

1. Clean the front of the tip frequently. Follow the **Pressure Relief Procedure**, page 11, first.
2. Follow the cleaning instructions given in your separate gun or spray tip instruction manual.

Shutdown and Care

1. **Keep the packing nut/wet-cup (221) 1/3 full of TSL** (Throat Seal Liquid, supplied) at all times to help prevent fluid buildup on the piston rod and premature wear of packings. Follow the **Pressure Relief Procedure**, page 11, before adding TSL.
2. **Keep the packing nut/wet-cup just tight enough to stop leakage.** See Fig. 5. Overtightening causes binding and excessive packing wear. Follow the **Pressure Relief Procedure**, page 11. Then use a round punch or brass rod and light hammer to adjust the nut.
3. **Clean the fluid filter (15) often**, and whenever the sprayer is stored. Follow the **Pressure Relief Procedure**, page 11, before cleaning the filter.
4. **Lubricate the bearing housing (A) after every 100 hours of operation.** Follow the **Pressure Relief Procedure**, page 11. Remove the front cover. Fill the bearing housing cavity with SAE 10 non-detergent oil. See Fig. 4.

5. **For very short shutoff periods**, leave the suction tube in the paint, relieve pressure, and clean the spray tip.
6. **Flush the sprayer at the end of each work day** and fill it with mineral spirits to help prevent pump corrosion and freezing. See page 9.

⚠ CAUTION

To prevent pump corrosion, and to reduce the chance of fluid freezing in the pump or pressure control in cold weather, never leave water or any type of paint in the sprayer when it is not in use. Freezing can seriously damage the sprayer or result in a loss of pressure or stalling.

7. **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.

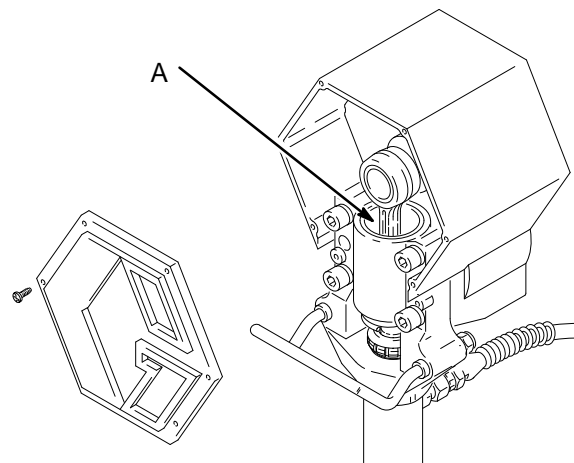


Fig. 4

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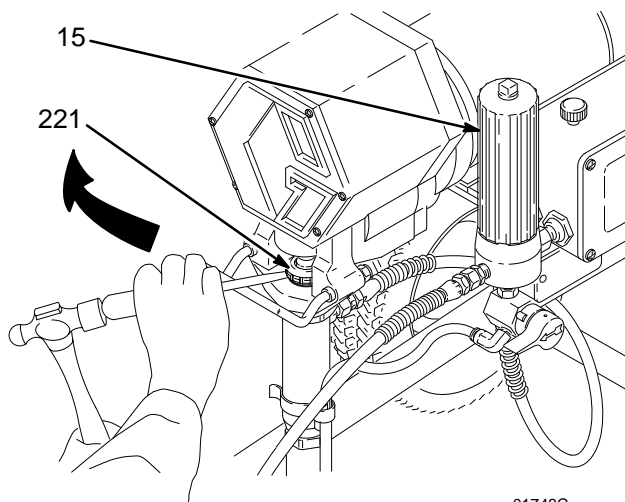


Fig. 5

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Flushing

NOTE: Several flushes may be required to clean the system and prepare it for the next fluid or storage. Use this chart to determine the required flushes and use the procedure below for flushing.

*Use this category for flushing a brand new sprayer and flushing after storage.

System has this fluid in it:	Next fluid to be sprayed:	Flushing order			Before you spray or store sprayer:
		Flush 1	Flush 2	Flush 3	
*Oil-based solvent or paint	Oil-based paint – new color	Mineral spirits	none	none	Prime with oil
Oil-based solvent or paint	Water-based paint	Mineral spirits	Warm soapy water	Clean water	Prime with water
Oil-based solvent or paint	Prepare for storage	Mineral spirits	none	none	Relieve pressure Leave drain valve open
Water or water-based paint	Water-based paint – new color	Warm soapy water	Clean water	none	Prime with water
Water or water-based paint	Oil-based paint	Warm soapy water	Clean water	Mineral spirits	Prime with oil
Water or water-based paint	Prepare for storage	Warm soapy water	Clean water	Mineral spirits	Relieve pressure Leave drain valve open

⚠ WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

⚠ CAUTION

NEVER allow water or water-base material to freeze in the pressure control. Doing so prevents the sprayer from being started and causes serious damage to the pressure control. Pump the water out with mineral spirits.

⚠ WARNING



FIRE AND EXPLOSION HAZARD

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

1. Relieve pressure. Engage the trigger safety latch.
2. Remove the filter bowl (B) and screen (C). Reinstall the bowl and support (D) only. Clean the screen separately.
3. Turn the pressure adjusting knob (A) fully counter-clockwise to the minimum pressure.

4. Remove the spray tip from the gun.
5. Put the suction tube into a grounded metal pail with 1/2 gallon of compatible solvent.
6. Start the sprayer. See page 7. To save the fluid in the sprayer as you start to flush, trigger the gun into another container until the next fluid appears, then trigger the gun back into the fluid you are pumping. Circulate the flushing fluid a couple of minutes to thoroughly clean the system.
7. Raise the suction tube 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.
8. Remove the suction tube and clean separately.
9. Install the filter screen. Hand tighten the bowl.

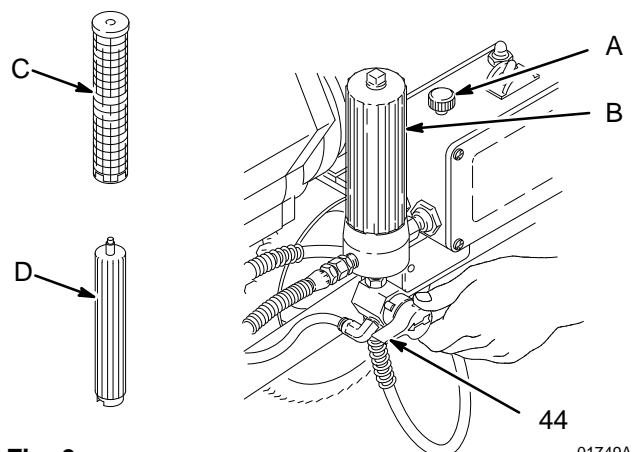


Fig. 6

Application Methods

Hold the gun perpendicular to the surface. Keep the gun at an even 12 to 14 in. (300 to 356 mm) from the surface you are spraying. See Fig. 7.

Begin moving the gun horizontally at a steady rate. Start the spray stroke off the target surface and pull the trigger as the gun is moving. Then, while the gun is still moving, and as you approach the other edge of the surface, release the trigger. This method avoids excess paint buildup at the end of each stroke.

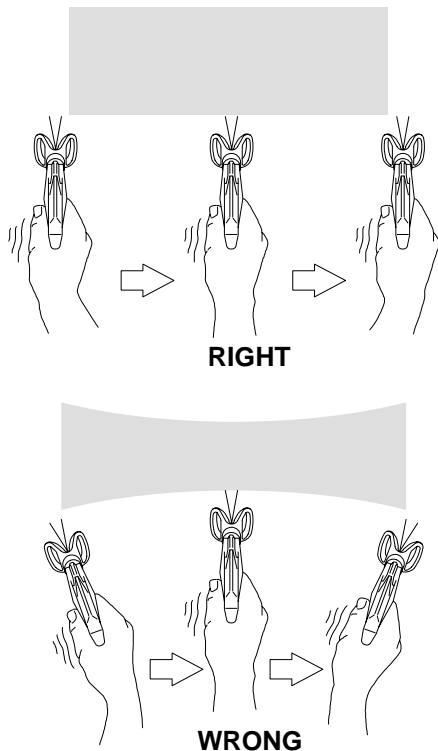


Fig. 7 0072

Move the gun at a speed that provides a full, wet coating to be applied without runs or sags. Lap each stroke 50% over the previous stroke to produce a uniform paint thickness. Spray in a uniform pattern from right to left and then left to right for a professional finish. See Fig. 8.

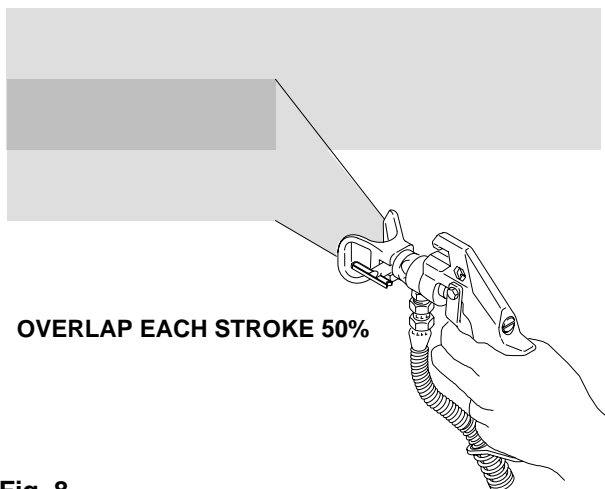


Fig. 8 0672

The best way to control the rate of coverage is with the gun tip size. A small tip orifice applies less paint. A larger tip orifice applies more paint. The width of the pattern depends on the fan pattern of the tip you choose.

Do not try to increase coverage by increasing the fluid pressure! Use the lowest pressure needed for good results. This prolongs the life of your sprayer and reduces paint lost by overspray.

For interior corners aim the gun toward the center of the corner to be sprayed. By dividing the spray pattern this way, the edges on both sides are sprayed evenly. See Fig. 9.

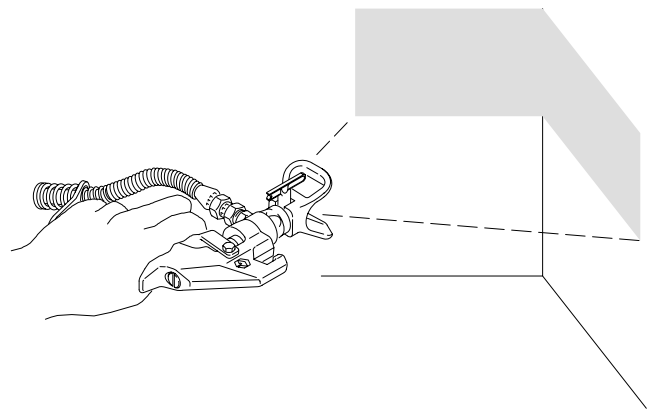


Fig. 9 0673

If there is a wind, angle the spray pattern into the wind to minimize drifting. Paint from the ground to the roof.

Shrubs. Tie back shrubs with rope and stakes. Cover them with a dropcloth as the painter approaches the area. Remove the dropcloth as soon as the area is painted to prevent damage.

Concrete walks. If the walkways will be walked on, cover them with a canvas dropcloth to avoid slipping. Otherwise a plastic cloth can be used.

Electrical outlets and lamps. Protect electrical outlets with masking tape. Cover lamps with plastic bags secured with masking tape.

Nearby objects. Move portable objects upwind of the surface to be sprayed. If there is a nearby home, make a protective barrier by hanging plastic drop cloths between two long poles.

Troubleshooting

⚠ WARNING

Pressure Relief Procedure

To reduce the risk of serious bodily injury always follow this procedure before checking or repairing the sprayer.

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 the side of a grounded metal pail, and trigger the gun to relieve pressure.

5. Engage the gun safety latch.

6. Open the pressure drain valve. Leave the 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.

Check everything in the chart before disassembling the sprayer.

PROBLEM	CAUSE	SOLUTION
Electric motor won't run	Power cord or extension cord unplugged or damaged, or building circuit breaker or fuse has tripped	Check, reset or replace.
	Motor overload switch ¹ has opened	Unplug sprayer, relieve pressure, allow motor to cool, decrease pressure.
	Pressure setting too low	Increase pressure.
	Pressure control frozen or damaged by over-pressurization	Try to thaw ² , or replace pressure control.
Electric motor stops while spraying	Power cord or extension cord unplugged, or damaged, or building circuit or fuse is blown	Check, reset or replace.
	Motor overload switch ¹ has opened	Unplug sprayer, relieve pressure, allow motor to cool, clear motor air passages of dirt and overspray; decrease pressure.
	Pressure setting too low	Increase pressure.
	Spray tip plugged	Remove and clean.
	Wrong type extension cord	Use maximum 200 ft (61 m), 3 wire, 12 gauge, grounded extension cord.
Electric motor runs, but low paint output or no paint output, and pump is not stroking See the PROBLEM , "Not enough paint pressure", on page 12, also.	Piston ball check not seating	Service pump. See page 14.
	Piston packings worn or damaged	Replace piston. See page 14.
	Intake valve ball check not seating	Service pump. See page 14.
	Pump is frozen	Thaw ²
	Pressure control frozen or damaged by overpressurization ³	Try to thaw ² , or replace pressure control.
	Drive assembly damaged	Replace drive housing. See page 16.
	Pump worn or damaged	Replace pump. See page 14.
Sprayer is not primed.	Follow the procedure on page 7 again.	

Troubleshooting

PROBLEM	CAUSE	SOLUTION
Paint leaks into wet-cup	Packing nut is loose	Tighten. See page 8.
	Throat packings are worn or damaged	Replace packings. See page 14.
Excessive surging from spray gun	Spray tip or fluid filter is plugged	Disassemble and clean.
	Spray tip too big or worn	Change spray tip.
	Paint too viscous	Thin the paint.
	Wrong type hose	Use minimum 50 ft (15 m), grounded, flexible hose (wire braid hose is unacceptable).
Not enough paint pressure	Pressure setting too low	Increase the pressure.
	Spray tip too big or worn	Change the spray tip.
	Pressure control frozen or damaged by overpressurization ³	Try to thaw ² , or replace pressure control.
	Pump worn or damaged	Replace pump. See page 14.
Tails or fingers in spray pattern	Pressure setting too low	Increase pressure.
	Fluid outlet filter (if used) is dirty or clogged	Clean filter. See instructions supplied with it.
	Spray tip too big or worn	Change spray tip.
	Fluid supply is low or empty	Refill and prime pump. Check fluid supply often to prevent running pump dry.
	Paint too viscous	Thin paint.
	Wrong type hose	Use minimum 50 ft (15 m), grounded, flexible hose (wire braid hose is unacceptable).
Paint runs or sags	Spray tip too big or worn	Change spray tip.
Spitting from gun	Air in fluid pump or hose	Check for loose connections at pump intake and tighten. Then prime pump.
	Spray tip is partially clogged	Clear tip. See page 8.
	Fluid supply is low or empty	Refill and prime pump. Check fluid supply often to prevent running pump dry.
Static sparking from gun	Spray or work being sprayed is not properly grounded	Correct problem before continuing. Follow the warning section, FIRE OR EXPLOSION HAZARD on page 2.

¹ The electric motor has an over-temperature switch which automatically resets upon cooling. If it opens and the electric motor shuts itself off, unplug the power supply cord and let the sprayer cool for 30 to 60 minutes. Always use the lowest pressure setting needed when spraying. Prevent overspray from restricting the motor air passages; check and clean often.

² Freezing results from failure to replace the water-base paint or flushing water with mineral spirits, and usually causes permanent damage to the pressure control.

³ Over-pressurization results from (1) using less than 50 ft (15 m) of flexible spray hose, (2) from using a wire braid spray hose, (3) from adding a shutoff device between the pump outlet and the spray gun, (4) from attaching a spray hose to the pressure drain valve, or (5) from using a clogged or incorrectly assembled filter, if used.

Motor Brush Replacement

NOTE: Replace the brushes when they have worn to less than 10 mm. See Fig. 12. Always replace both brushes at the same time. A Brush Repair Kit, 220–853, and spring clip, 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.

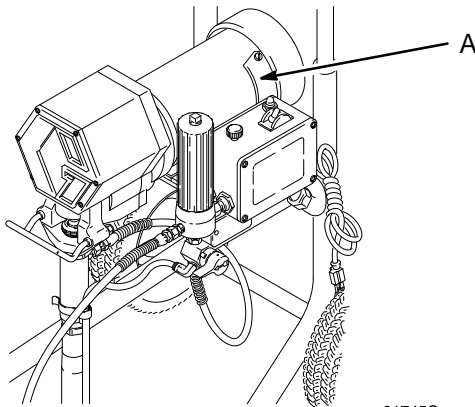


Fig. 10

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⚠ WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

1. Remove both inspection covers (A). See Fig. 10.
2. Push in the spring clip (E) to unhook it, and then pull it out. See Fig. 11.
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. 12.
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. 13. Slide the terminal (E) under the terminal screw washer. Make sure the motor lead (G) is still connected the at the screw. Tighten the screw (F). See Fig. 12.
6. Place the spring (B) on the brush as shown in Fig. 13. The spring must coil as shown.
7. Push in and hook the spring clip (D). See Fig. 13.
8. Repeat for the other side.

9. Test the brushes. Remove the connecting rod pin (50). See 15, page 14. 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 (50).

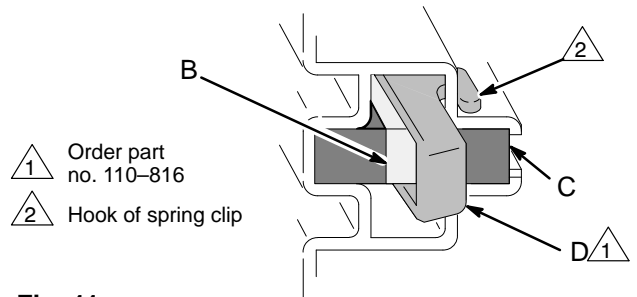


Fig. 11

01227

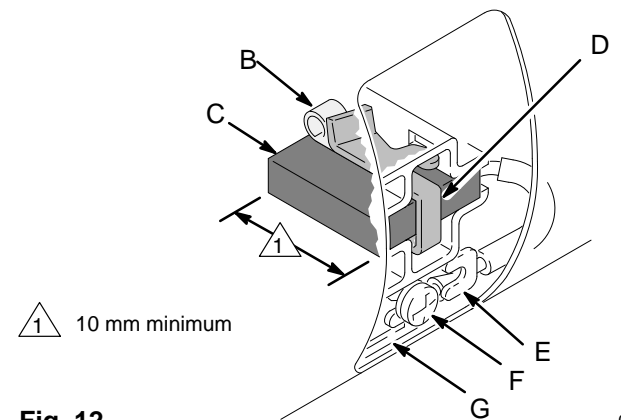


Fig. 12

01227

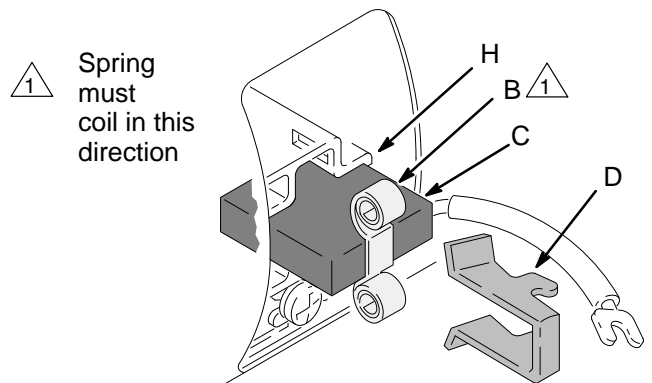


Fig. 13

Displacement Pump

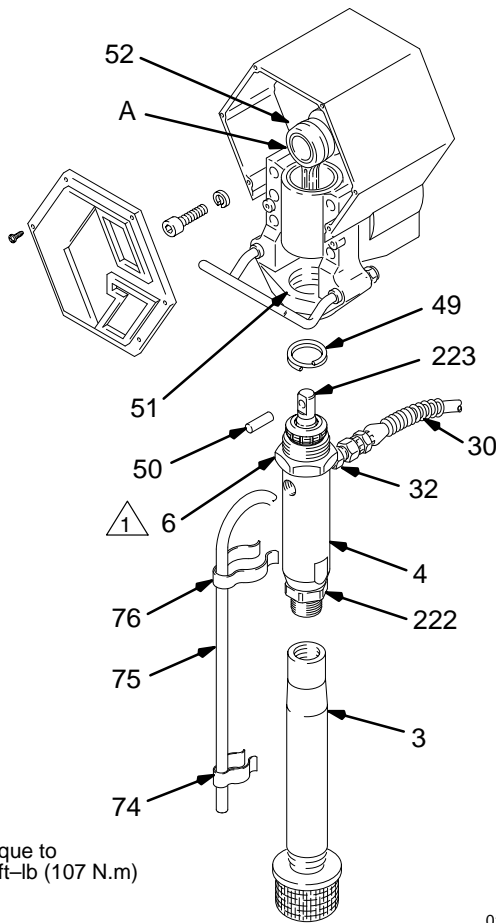
Repairing the pump

See manual 307–806 for pump repair instructions.

Reinstalling the pump

See Fig. 14 and 15.

1. Rotate the crankshaft (A) so the connecting rod is in its lowest position.
2. The pump piston rod (223) should protrude about 1 in. (25 mm) above the pump cylinder.
3. Screw the pump into the bearing housing (51) until its pin hole is aligned with the connecting rod (52) pin hole. Insert the pin (50). Position the spring (49) so it covers the ends of the pin. See Fig. 15.



1 Torque to 80 ft-lb (107 N.m)

Fig. 14

01746B

! WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

! WARNING

Be sure the retaining spring (49) is firmly and completely in the groove of the connecting rod to prevent the pin (50) 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, resulting in serious bodily injury, pump or property damage.

4. Adjust the pump so the cylinder's top threads are flush with the face (B) of the bearing housing and the outlet nipple (32) is straight back. See Fig. 15.
5. Torque the locknut (6) to 80 ft-lb (107 N.m).
6. Reassemble the remaining parts, in the reverse order of removal.

Removing the pump

See Fig. 14.

1. Flush the sprayer. Relieve pressure.
2. Remove the clips (74,76) and drain hose (75).
3. Hold the intake valve (222) steady with a wrench and unscrew the suction tube (3).
4. Use a screwdriver to push the retaining spring (49) up, and then push out the pin (50).
5. Loosen the locknut (6). Unscrew the pump (4).

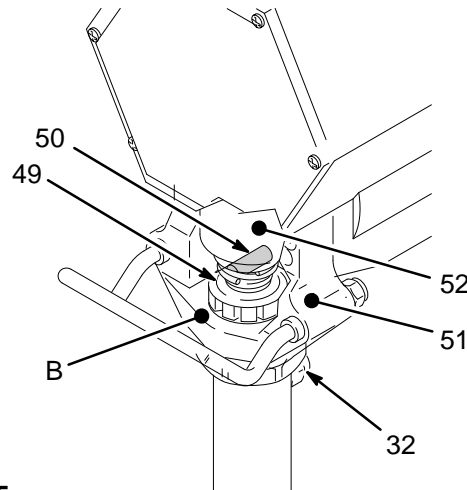


Fig. 15

01751A

Connecting Rod and Bearing Housing

⚠ WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

NOTE: Refer to Fig. 16.

1. Remove the pail hanger (7).
2. Remove the front cover (12).
3. Remove the pump as described on page 14.
4. Remove the four screws (9) and lockwashers (10). Pull the bearing housing (51) and connecting rod assembly (52) off the crankshaft (C).
5. Clean and inspect the crankshaft (C). Wipe it clean with a rag (don't use solvent). If the crankshaft is badly worn, replace the drive assembly (14). See page 21.
6. Clean and inspect the bearing housing (51) and connecting rod (52), including the needle bearing (A). Replace both parts if either is worn or damaged. See Detail A.
7. Clean the mating surfaces of the bearing and drive housings.

⚠ CAUTION

To extend the service life of the connecting rod bearing, lubricate it properly. After every 100 hours of operation, or whenever servicing the pump (whichever comes first), fill the cavity (B) in the connecting rod with SAE non-detergent motor oil. See Detail A.

8. Coat the surfaces of the connecting rod and bearing with SAE non-detergent motor oil. Liberally pack the needle bearing (A) with industrial grade, heavy duty, extreme pressure, lithium soap grease. See Detail A.
9. Assemble the connecting rod (52) and bearing housing (51).

10. Align the connecting rod (52) with the crank (C) and push the bearing housing (51) onto the drive housing (14).

11. Assemble the remaining parts. Refer to page 14 to reinstall the pump.

Detail A

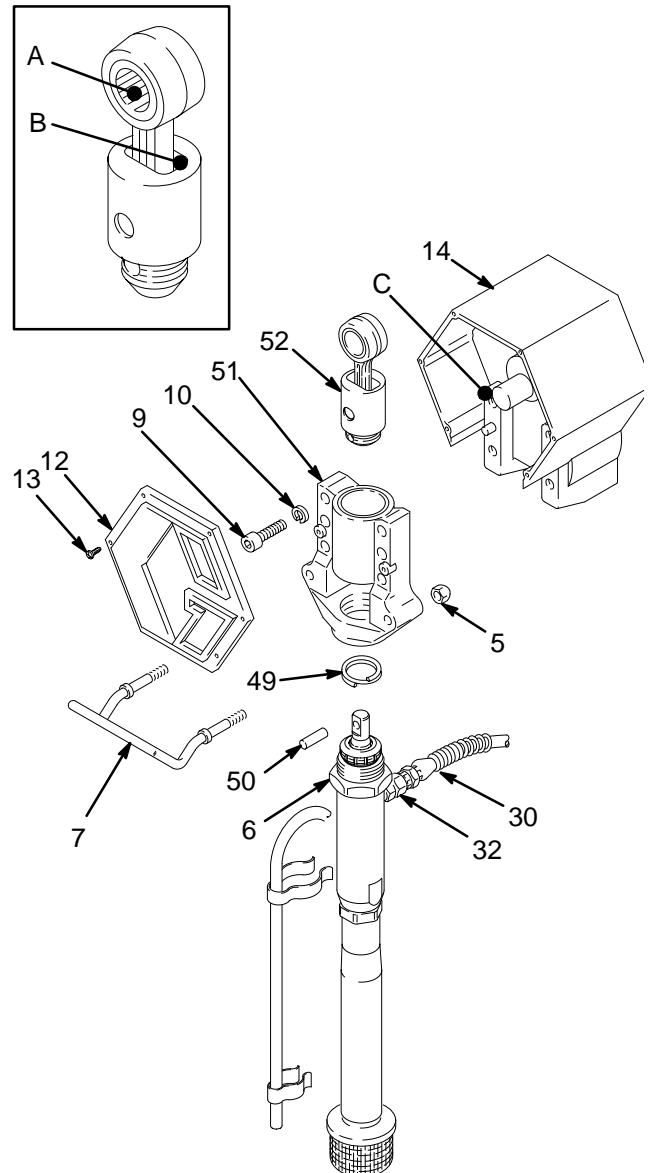


Fig. 16

01750B

Drive Housing

⚠ WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

NOTE: Refer to Fig. 17 for this procedure.

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

1. Remove the front cover (12).
2. Remove the four screws (9). Lightly tap the lower rear of the bearing housing (51) with a plastic mallet to loosen it from the drive housing (14). Pull the bearing housing/connecting rod/pump assembly off the drive housing (14).
3. Remove the screws (42) from the recess of the drive housing (14). Remove the screws (72,53) from the rear of the motor's front end bell.
4. Remove the screws (53) from the rear of the motor's front end bell.

5. Lightly tap the lower rear of the drive housing (14) with a plastic mallet to loosen it from the motor (16). Pull the drive housing (14) off the motor.

⚠ CAUTION

DO NOT drop the gear cluster (56) when removing the drive housing (14). The gear may stay engaged in the motor or drive housing.

DO NOT lose the thrust balls (14c, 16b), or allow them to fall between the gears. The balls, heavily covered with grease, usually stay in the shaft recesses, but could become dislodged. If caught between gears and not removed, the balls will seriously damage the drive housing. If they are not in place, the bearings will wear prematurely.

6. Liberally apply bearing grease to the gear cluster (56). Be sure the thrust balls (14c,16b) are in place.
7. Place the dark washer (14b) and then the light one (14a) on the shaft protruding from the big gear in the drive housing. Align the gears and push the new drive housing straight onto the motor and its locating pins.
8. Continue reassembling the sprayer.

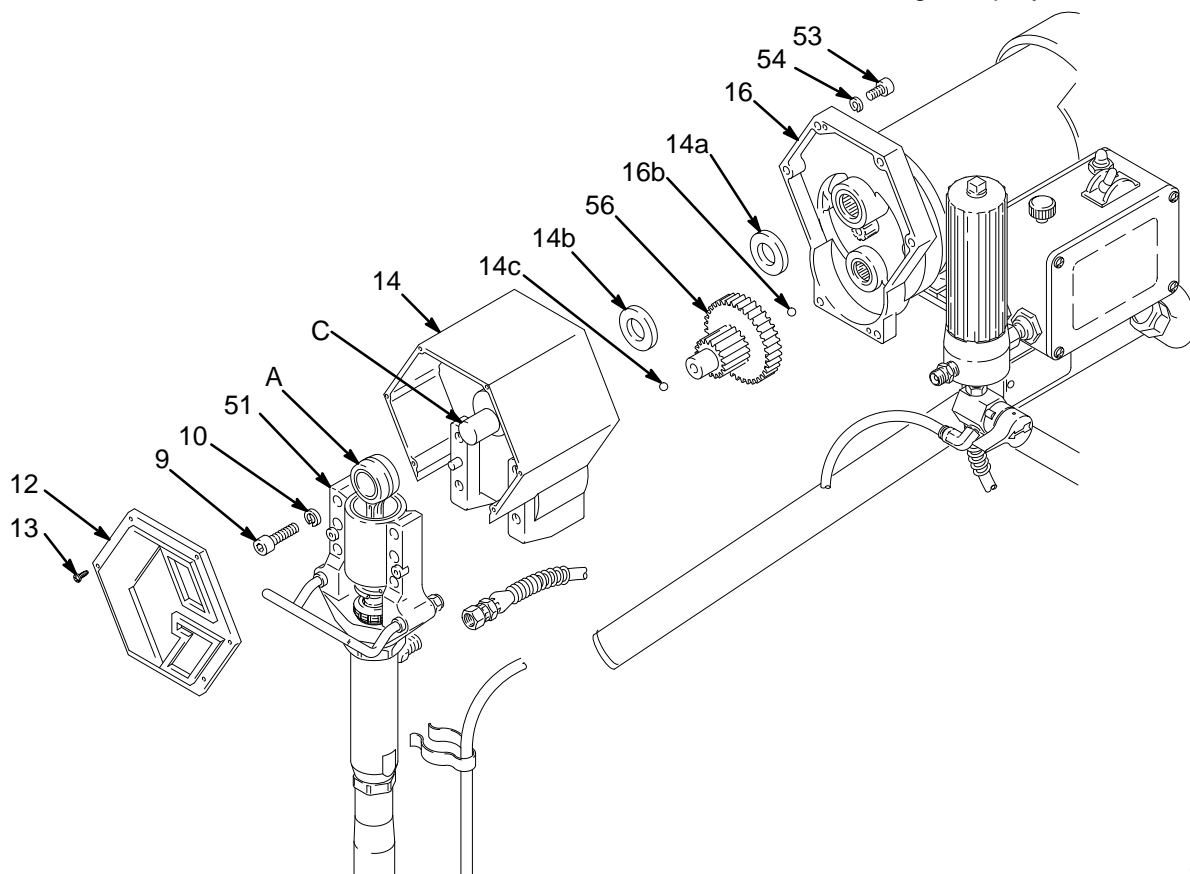


Fig. 17

01752C

Motor

WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

NOTE: Refer to Fig. 18.

1. Remove the four screws (13) and front cover (12). Disconnect the hose (30) and drain hose (80).
2. Remove the pressure control cover (21). Disconnect the four motor leads.
3. Unscrew the connector nut (103) at the pressure control. Swing the conduit (27) away from the connector.
4. Remove the conduit seal (18) from around the wires in the pressure control. Pull the motor leads through the elbow, one at a time.

CAUTION

Always pull the motor leads one at a time to avoid loosening the terminals.

5. Loosen the nut of the connector (25) at the motor. Pull the conduit (27) away from the motor and then pull the wires through the conduit, one at a time.
6. Remove the connector (25) elbow from the motor, and then pull the wires through it one at a time.
7. Remove the screws (42) from the recess of the drive housing (14). Remove the screws (72) and washers (54) from the rear of the motor's front end bell.
8. Remove the screws (53) and washers (54) from the rear of the motor's front end bell.
9. Lightly tap the lower rear of the drive housing (14) with a plastic mallet to loosen the assembly from the motor (16). Pull the drive housing assembly off the motor.

CAUTION

DO NOT drop the gear cluster (56) when removing the drive housing (14). The gear may stay engaged in the motor or drive housing.

DO NOT lose the thrust balls (14c, 16b), or allow them to fall between the gears. The balls, heavily covered with grease, usually stay in the shaft recesses, but could become dislodged. If caught between gears and not removed, the balls will seriously damage the drive housing. If they are not in place, the bearings will wear prematurely.

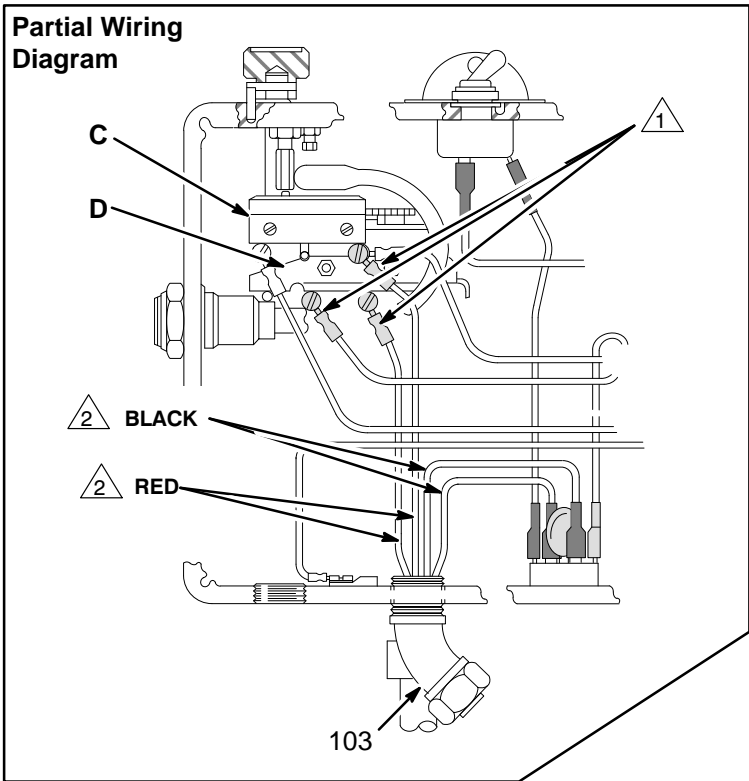
10. While supporting the motor to keep the sprayer from tipping, remove the capscrews (35) which hold the motor to the cart. Lift the motor off the cart.
11. Mount the new motor to the cart.
12. Liberally apply bearing grease to the gear cluster (56). Be sure the thrusts balls (14c, 16b) are in place.
13. Place the dark washer (14b) and then the light one (14a) on the shaft protruding from the big gear in the drive housing. Align the gears and push the new drive housing straight onto the motor and its locating pins.
14. Continue reassembling the sprayer. Follow the NOTE and WARNING, below.

NOTE: Use a turning motion on the conduit when feeding wires through it.

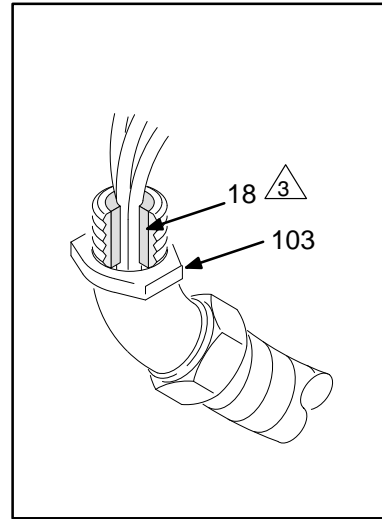
WARNING

All wires connected to the over-pressure switch (C) and the pressure switch (D) must be insulated at the terminals to reduce the risk of electric shock if someone touches these parts when the power is on. When installing the new pressure control, be sure these terminals are covered with shrink tubing or electrical tape.

Motor



Conduit Seal Detail



1 All wires to the over-pressure switch (C) and the pressure switch (D) must be insulated with shrink tubing or electrical tape.

2 Motor leads

3 Conduit seal (18) shown installed in conduit connector (103)

4 See Detail above

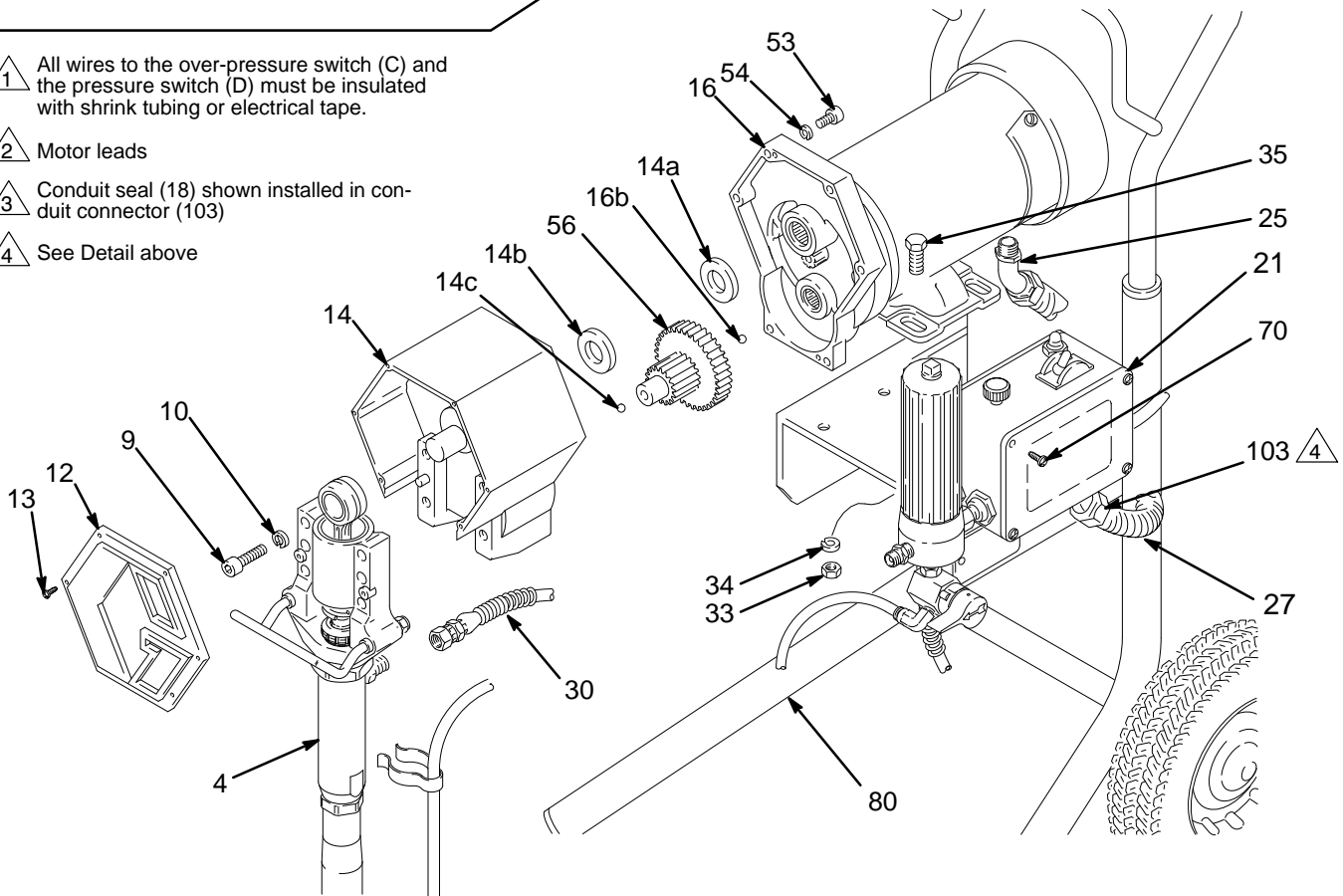


Fig. 18

01754C

Pressure Control

⚠ WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

⚠ CAUTION

Do not remove the nipple (105e) or elbow (105d) from the pressure control unless they are damaged. Twisting or jarring these fittings could alter the factory setting of the control or permanently damage it. If they must be removed, use extreme care. Hold the corresponding hex (B) steady with a wrench and then remove the part.

⚠ WARNING

All wires connected to the over-pressure switch (C) and the pressure switch (D) must be insulated at the terminals to reduce the risk of electric shock if someone touches these parts when the power is on. When installing the new pressure control, be sure these terminals are covered with shrink tubing or electrical tape. See Fig. 20.

1. Disconnect the spray hose. Hold the nut (B) steady with a wrench and unscrew the filter (15).
2. Hold the elbow (105d) steady with a wrench and disconnect the hose (30). Disconnect the drain hose (80).
3. Remove the pressure control cover (21).
4. Disconnect the three power supply cord leads. See Fig. 20.
5. Disconnect the four motor leads. See Fig. 20.
6. Unscrew the conduit nut (103). See Fig. 19. Pull the pressure control away from the conduit while carefully guiding the wires through the connector.
7. Loosen the knurled part of the strain relief bushing (101) and unscrew the fitting from the pressure control. See Fig. 19.

8. Remove the mounting screws (35) and pull the pressure control away from the sprayer. See Fig. 19.
9. Remove the mounting plate (11) and secure it to the new pressure control. See Fig. 19.
10. Reassemble the new pressure control in the reverse order of disassembly.
11. **Adjust the pressure control.** See page 21.

⚠ CAUTION

Failure to observe the following precautions may cause poor performance or excessive pressure and permanent damage to the pressure control.

- Always use at least 50 ft (15.2 m) of grounded, flexible spray hose.
- Never use a wire braid spray hose.
- Never add any type of shutoff device between the pump outlet and the spray gun.
- Check the filter (if used) for clogging or incorrect assembly if tip clogging frequency increases.
- Never allow flushing water or water base paint to freeze in the system.

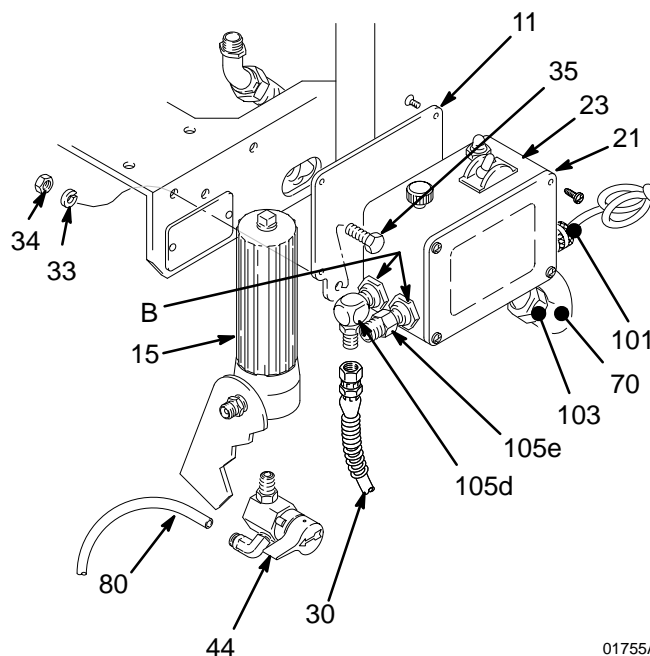


Fig. 19

01755A

Pressure Control

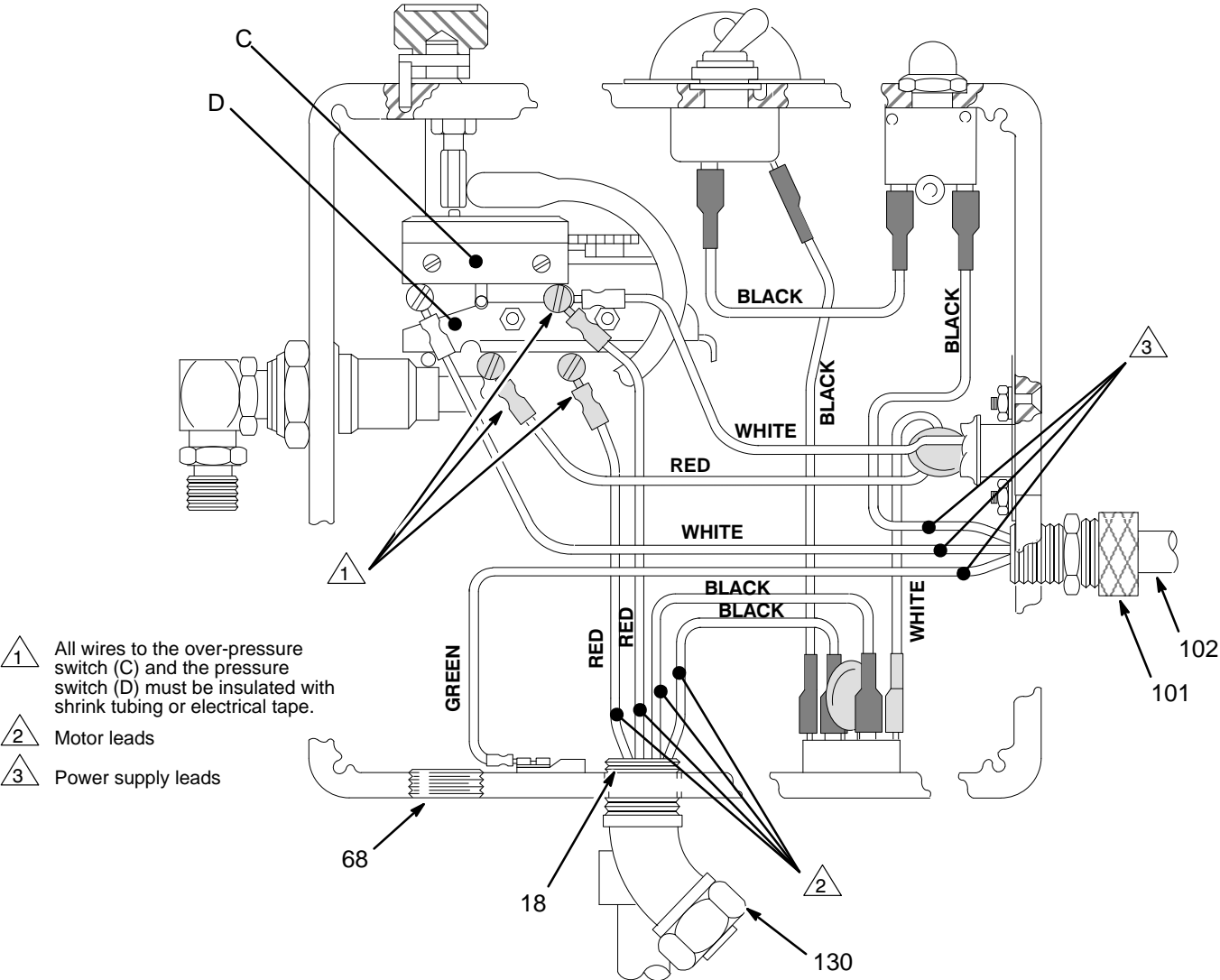


Fig. 20

01314

Pressure Control Adjustment

⚠ WARNING

USE EXTREME CAUTION WHEN PERFORMING THIS ADJUSTMENT PROCEDURE to reduce the risk of a fluid injection injury or other serious bodily injury, which can result from component rupture, electric shock, fire, explosion or moving parts.

This procedure sets the sprayer to 2750 psi (190 bar) **MAXIMUM WORKING PRESSURE**.

Perform this procedure whenever the microswitch or pressure control assembly is reinstalled or replaced.

Improper calibration can cause the sprayer to over-pressurize, resulting in component rupture, fire or explosion. It may also prevent the sprayer from obtaining the maximum working pressure, resulting in poor sprayer performance.

NEVER attempt to increase the sprayer's maximum working pressure by performing these adjustments in any other way. Normal operation of the sprayer at higher pressures may result in component rupture, fire or explosion. To perform this adjustment, however, the sprayer pressure must be *temporarily* increased above the normal working pressure.

Use a *new* 50 foot (15.2 m) spray hose, rated for at least 3000 psi (210 bar) **MAXIMUM WORKING PRESSURE**, when performing this procedure. A used, under-rated hose could develop a high pressure leak or rupture.

Service Tools Needed

See Fig. 21.

- **NEW** 50 foot, 3000 psi (minimum) grounded, flexible airless spray hose (A), 223–541
- Nipple (B), 1/4 npt x 1/4 npsm, 162–453
- Swivel (C), 1/4 npt(m) x 1/4 npsm swivel, 156–823
- Tee (D), 1/4 npt(m), 104–984
- 0–5000 psi fluid-filled pressure gauge (E), 1/4 npt, 102–814
- Needle valve, 102–715 or 103–067
- 3/8 in. open end wrench
- Mineral spirits
- 5 gallon pail and water

Procedure

⚠ WARNING



INJECTION HAZARD

To reduce the risk of serious bodily injury, follow the **Pressure Relief Procedure Warning** on page 11 before checking or repairing any part of the spray system.

1. Remove the old spray hose. Install the new hardware and hose as shown in Fig. 21. On the other end of the hose install the needle valve.

Procedure continued on page 22

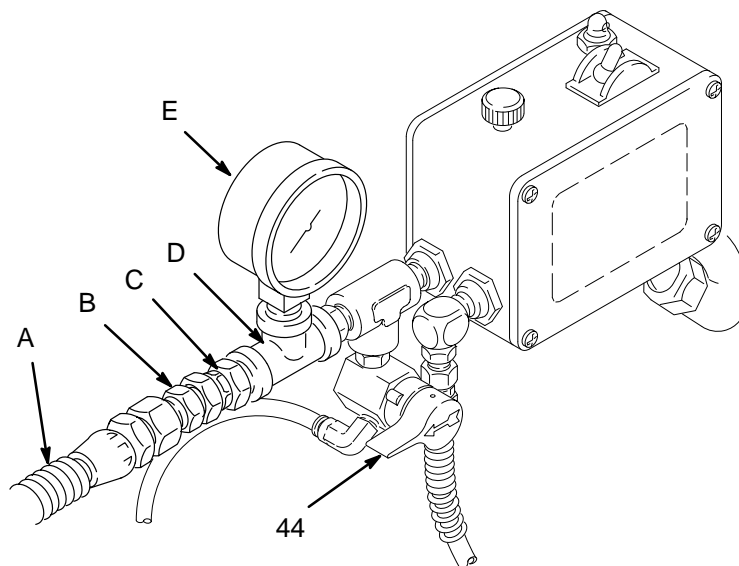


Fig. 21

01315

Pressure Control Adjustment

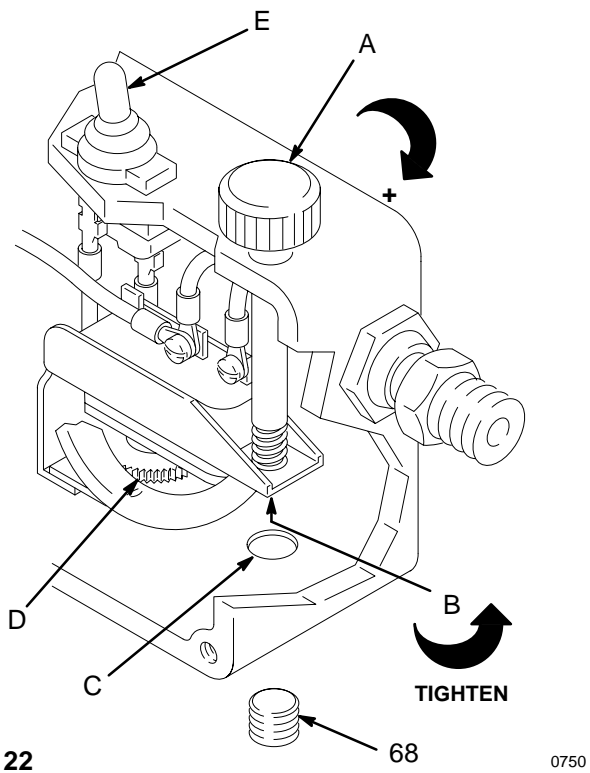


Fig. 22

68

0750

NOTE: Refer to Fig. 22 for the remainder of this procedure.

2. Remove the plug (68).
3. Open the needle valve slightly. Turn the pressure adjusting knob (A) to the minimum setting.
4. Plug in the sprayer and turn the switch (E) ON. Increase the pressure just enough to start the sprayer. Fully prime the hose, being sure to eliminate all air from the system.
5. Open the needle valve a just enough to allow the pump to run continuously, and turn the pressure adjusting knob to maximum. Very slowly start to close the needle valve. Observe the pressure at which the pump stalls, which should be approximately 2750 psi (190 bar).

6. If the pressure is lower than 2750 psi (190 bar): Unplug the sprayer and relieve pressure. Insert the wrench through the hole (C) and tighten the adjustment nut (B) 1/8 turn or less. Repeat steps 5 and 6.

If the pressure is higher than 2750 psi (190 bar): Unplug the sprayer and relieve pressure. Insert the wrench through the hole (C) and loosen the pressure adjustment nut (B) 1/8 turn or less. Repeat steps 5 and 6. Repeat this procedure until the proper stall pressure is obtained.

7. Now check to see at what pressure the sprayer starts to run again after it stalls. Plug in the sprayer, turn it on, close the needle valve, and set the pressure at maximum. Allow the sprayer to run until it stalls.

NOTE: In Step 8, the slower the pressure is raised, the easier it is to note the exact stall pressure. Closing the needle valve quickly causes the pressure to rise too fast which gives a false reading.

8. Open the needle valve very slowly while observing the pressure gauge. Check to see if the pressure drops to approximately 2350 psi (161 bar) before the sprayer starts again.
9. If the pressure is not approximately 2350 psi (161 bar): Shut off and unplug the sprayer, but do not relieve pressure. Turn the differential wheel (D) just one notch and repeat Steps 5 and 6. Check the pressure drop again, and repeat if necessary.

NOTE: If you adjust the differential wheel, recheck the stall pressure (steps 5 and 6) to be sure the it has not changed.

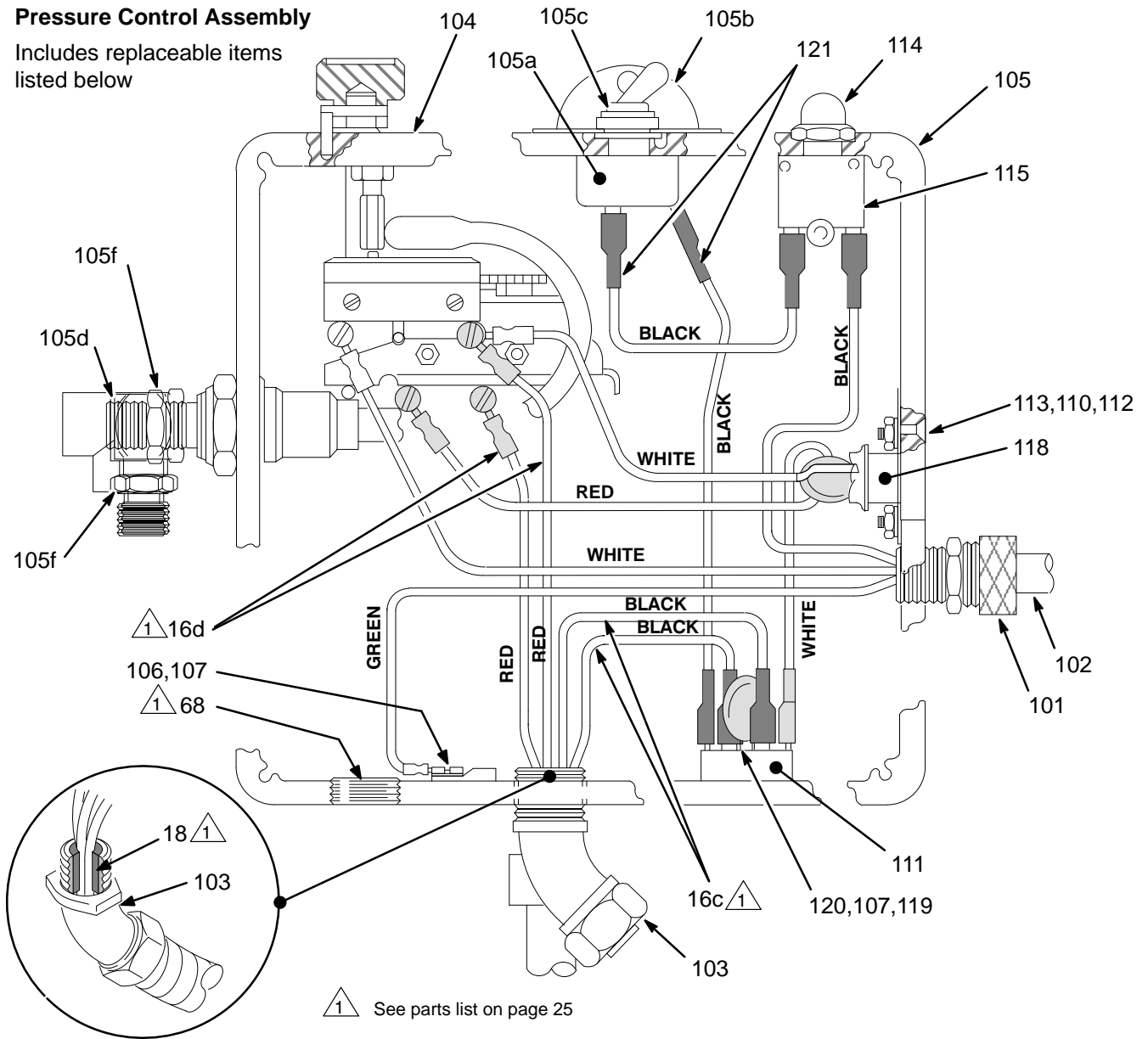
10. Relieve pressure. Flush the water out with mineral spirits. Relieve pressure. Install the plug (68). Remove the test equipment.

Parts – Pressure Control

Part No. 220-858

Pressure Control Assembly

Includes replaceable items listed below



Ref No.	Part No.	Description	Qty
101	108-295	STRAIN RELIEF BUSHING	1
102	220-945	POWER SUPPLY CORD, 8.5'	1
103	108-460	45° CONDUIT CONNECTOR	1
104▲	183-466	LABEL, Warning	1
105	220-905	PRESSURE CONTROL BOX, bare Includes replaceable items 105a to 105f	1
105a	105-679	.ON/OFF SWITCH	1
105b	107-255	.GUARD	1
105c	105-659	.BOOT, on/off switch	1
105d	100-840	.ELBOW, street, 1/4 npt(m x f)	1
105e	157-350	.TEE, (2) 1/4 npt(f) x 1/4 npt (m)	1
105f	162-453	.NIPPLE, 1/4 npt(m) x 1/4 nspr	1
106	100-035	SCREW, pan hd, no. 8 x 5/16"	1
107	157-021	LOCKWASHER, no. 8 internal	2

Ref No.	Part No.	Description	Qty
110	100-072	NUT, hex, No. 6-32	2
111	220-924	VARIATOR/RECTIFIER	1
112	103-181	LOCKWASHER, no. 6	2
113	107-070	SCREW, flat hd, no. 6-32 x 5/8"	2
114	107-254	BOOT, circuit breaker	1
115	107-256	CIRCUIT BREAKER	1
118	218-916	TRIAC	1
119	108-783	SCREW, fil hd, no. 8-32 x 13/16"	1
120	100-284	NUT, hex, no. 8-32	1
121	218-168	JUMPER WIRE	2

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

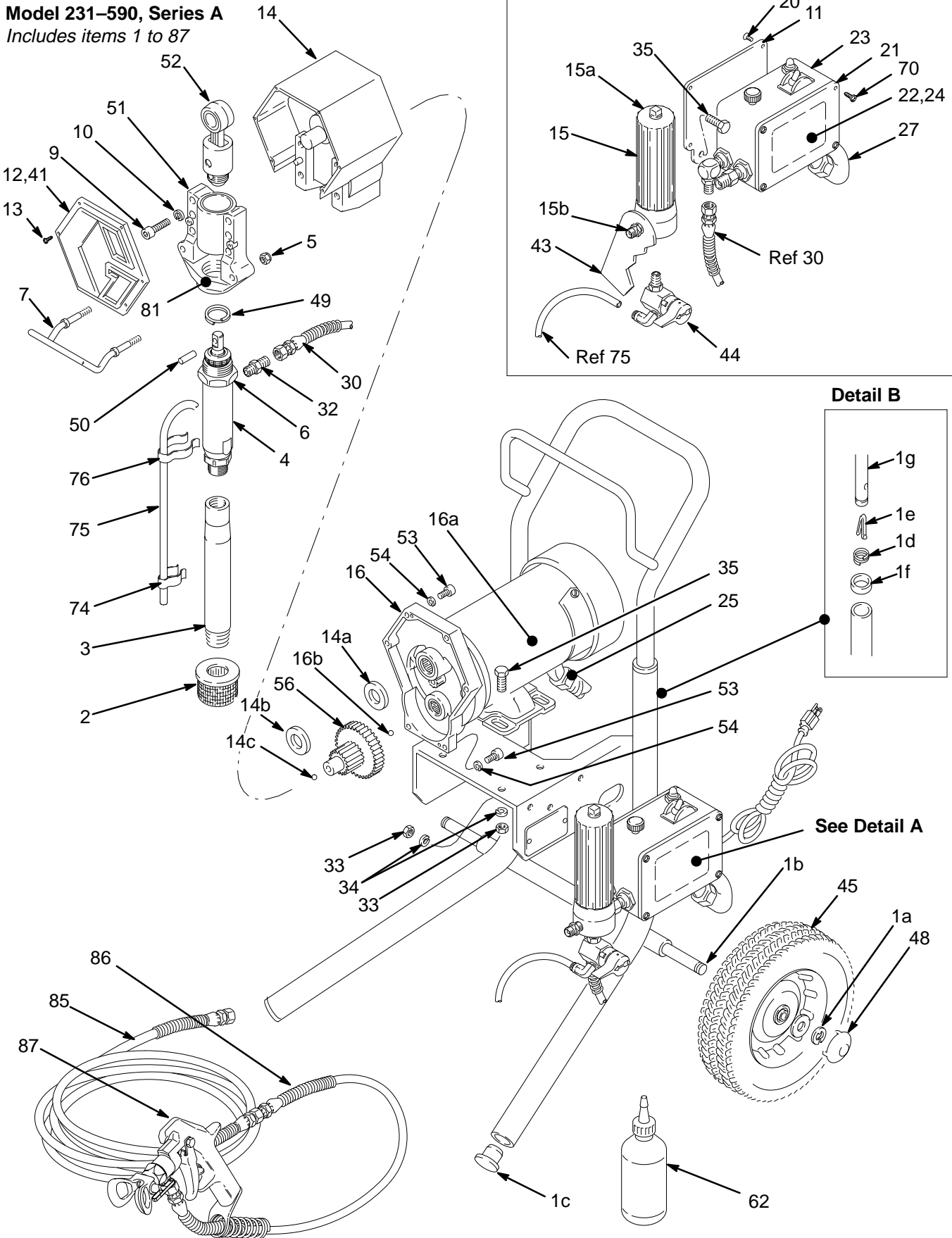
Parts – Upright Sprayer

Model 220–856, Series D

Includes items 1 to 81

Model 231–590, Series A

Includes items 1 to 87



Parts – Upright Sprayer

Model 220–856, Series D

Includes items 1 to 81

Model 231–590, Series A

Includes items 1 to 87

Ref No.	Part No.	Description	Qty	Ref. No.	Part No.	Description	Qty.
1	220–365	CART ASSEMBLY Includes items 1a – 1g	1	27	065–099	ELECTRICAL CONDUIT <i>specify length when ordering</i>	9.5 in.
1a	101–242	.RETAINING RING	2	30	223–766	HOSE, nylon, 1/4" ID, cpld 1/4 npsm (fbe), 29" (740 mm) long, spring guards both ends	1
1b	176–884	.WASHER, plain, 5/8"	2				
1c	107–310	.PLUG, plastic	2				
1d	102–070	.SPRING	2	32	162–453	NIPPLE, 1/4 npsm x 1/4 npt	1
1e	111–590	.SNAP BUTTON	2	33	100–188	NUT, hex, 5/16–18	7
1f	179–781	.SLEEVE	2	34	100–214	LOCKWASHER, spring, 3/8"	7
1g	220–347	.CART HANDLE	1	35	110–963	CAPSCREW, hex hd, 5/16–18 x 7/8"	7
2	181–072	KIT, strainer	1	41	183–510	LABEL, identification	1
3	180–573	INTAKE TUBE	1	43	178–034	TAG, caution	1
4	222–580	DISPLACEMENT PUMP See manual 307–806 for parts	1	44	237–677	PRESSURE RELIEF VALVE	1
5	112–746	RETAINER NUT	2	45	106–062	WHEEL, semi–pneumatic	2
6	178–941	NUT, hex	1	48	104–811	HUBCAP	2
7	189–918	PAIL HANGER	1	49	176–817	RETAINING SPRING	1
9	107–210	CAPSCREW, sch, 1/4–20 x 1"	4	50	176–818	PIN, hdless, 5/16" dia x 1"	1
10	106–115	LOCKWASHER, spring, 3/8"	4	51	218–035	BEARING HOUSING	1
11	183–536	MOUNTING BRACKET	1	52	218–034	CONNECTING ROD	1
12	183–333	DRIVE HOUSING COVER	1	53	100–643	CAPSCREW, sch, 1/4–20 x 1"	6
13	107–156	SCREW, ovh, 8–32 x 3/8"	6	54	105–510	LOCKWASHER, 1/4"	6
14	220–859	DRIVE HOUSING Includes items 14a–14d	1	56	179–961	GEAR REDUCER	1
14a	178–967	.WASHER, silver–colored	1	62	206–994	THROAT SEAL LIQUID, 8 oz.	1
14b	107–089	.WASHER, bronze–colored	1	68	101–754	PLUG (See page 23)	1
14c	100–069	.BALL, 1/4" sst	1	70	110–037	SCREW	4
14d	110–293	.GREASE	1	74	181–102	SPRING CLIP, large	1
15	214–570	FLUID FILTER Includes items 15a and 15b See manual 307–273 for parts	1	75	186–495	DRAIN HOSE	1
15a	100–040	.PLUG	1	76	186–494	SPRING CLIP, small	1
15b	162–453	.NIPPLE, 1/4 npsm x 1/4 npt	1	79	186–126	LABEL	1
16	220–855	MOTOR Includes items 16a–16d	1	80▲	185–955	LABEL, Danger	1
16a▲	185–954	.LABEL, Danger	1	81▲	187–959	LABEL, Danger	1
16b	100–069	.BALL, sst, 1/4"	1	85	223–541	HOSE, grounded, nylon, 1/4" ID, cpld 1/4 npsm(f), 50 ft (15 m) spring guards both ends	1
16c	107–263	.TERMINAL	2				
16d	102–799	.TERMINAL	2				
18	107–447	CONDUIT SEAL (see page 23)	1	86	214–701	HOSE, grounded, nylon, 3/16" ID, cpld 1/4 npsm(f), 3 ft (0.9 m) long, spring guards both ends	1
20	106–078	SCREW, ovh, 10–24 x 3/8"	6				
21	185–000	PRESSURE CONTROL COVER	1	87	235–459	SPRAY GUN See manual 308–235 for parts Includes RAC IV DripLess Tip Guard and 517 size SwitchTip	1
22	183–371	LABEL, identification	1				
23	220–858	PRESSURE CONTROL See page 23 for parts	1				
24▲	177–762	LABEL, Warning	1				
25	108–460	45° CONDUIT CONNECTOR	1				

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

Technical Data

Electric Motor	.....	3/4 HP, DC
Electric Cord	.....	14 AWG, 3 wire
Power Requirements	.....	120 VAC, 60 Hz, 15A
Maximum Working Pressure	.....	2750 psi (190 bar)
Maximum Delivery	.....	0.75 gpm (2.8 lpm)
Cycles/Gallon (liter)	.....	260 (70)
Tip Size	.....	one gun to 0.025 tip with latex at 2000 psi (138 bar)
Generator	.....	4000W minimum
Wetted Parts		
Filter	.....	See manual 307-273
Displacement Pump	.....	See manual 307-806
Sprayer	.....	Zinc-plated Carbon Steel, Stainless Steel
Fluid Inlet	.....	3/4 npt(m) with 30° ID chamfer
Fluid Outlet Size	.....	1/4 npsm(m)
Dimensions	<i>Weight</i>	95 lb (43 kg)
	<i>Height</i>	41 in. (1041 mm)
	<i>Length</i>	20.5 in. (521 mm)
	<i>Width</i>	20.5 in. (521 mm)

NOTE: Delrin® is a registered trademark of the DuPont Co.

Graco Phone Number

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you: **1-800-328-0211 Toll Free.**

Accessories

Must Be Purchased Separately

Displacement Pump Repair 222-588

See contents in manual 307-806. Repair instructions are included with the kit.

Motor Brush Replacement Kit, 220-853

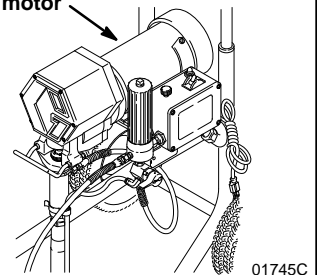
See procedure on page 16.

DANGER LABELS

The English language DANGER label shown on page 4 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, free of charge, by calling: 1-800-328-0211

Apply other language in this area
on other side of motor

French	185-955
Spanish	185-962
German	186-042
Greek	186-046
Korean	186-050
English	185-954



01745C

Graco Warranty

Graco warrants all equipment listed in this manual which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. 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.

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, gas engines, 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

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ADDITIONAL WARRANTY COVERAGE

Graco does provide extended warranty and wear warranty for products described in the "Graco Contractor Equipment Warranty Program".

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