



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

INSTRUCTIONS

Model PRO 4500sc™ Electrostatic Air Spray Gun

85 kV, MANUAL GUN

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

For use with Class 2, Group D paint spray materials

Part No. 224200, Series B

Air Spray Gun with two-finger trigger

With 0.059 in. (1.5 mm) spray nozzle

Part No. 224400, Series B

Air Spray Gun with four-finger trigger

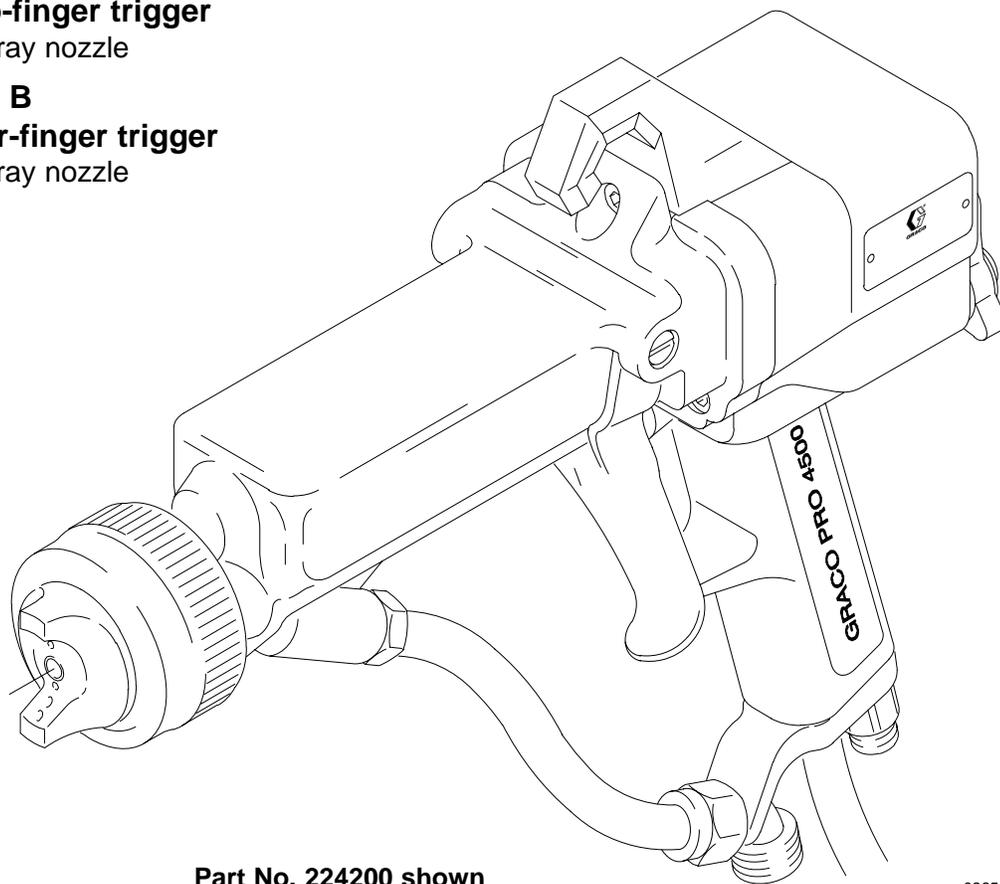
With 0.059 in. (1.5 mm) spray nozzle

**Factory
Mutual
System**

Approved



HO03



Part No. 224200 shown

0365

NOTE: Any modification of genuine Graco parts or replacement of parts with non-Graco parts will void agency approvals.

U.S. PATENT NO. 4,290,091; 4,219,865; 4,497,447; 4,462,061; 4,660,774; 5,063,350; 5,080,289; D350,387

Patented 1986, 1987 Canada

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Other U.S. and Foreign Patents Pending

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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 corresponding instructions.



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WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in a fire, explosion, or electric shock.



- Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements stated in this instruction manual.
- Ground the equipment, personnel in or close to the spray area, the object being sprayed, and all other electrically conductive objects in the spray area. See **Ground the System** on page 8.
- Check the spray gun resistance daily. See **Test Gun Resistance**, page 20.
- If there is any static sparking while using the equipment, **stop spraying immediately**. Identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable or toxic vapors. Interlock the gun turbine air supply to prevent operation of the power supply unless the ventilating fans are on. See **Ventilate the Spray Booth** on page 7.
- When flushing or purging electrostatic equipment, use solvents with a flash point equal to or greater than that of the fluid being sprayed.
- To clean the exterior of the electrostatic equipment, use solvents with a flash point higher than 100°F (38°C).
- Use only non-sparking tools to clean residue from the booth and hangers.
- Do not flush the system with the gun electrostatics turned on.
- Do not turn on the gun electrostatics until all solvent is removed from the system.
- Extinguish all open flames or pilot lights in the spray area.
- Keep the spray area free of debris, including solvent, rags, and gasoline.
- Do not store any flammable fluids 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 smoke in the spray area.
- Do not operate a gasoline engine in the spray area.



TOXIC FLUID HAZARD

Hazardous fluids or toxic fumes can cause a serious injury or death if splashed in the eyes or on the skin, swallowed, or inhaled.

- Know the specific hazards of the fluid you are using. Read the fluid manufacturer's warnings.
- Store hazardous fluid in an approved container. Dispose of the hazardous fluid according to all applicable local, state, and national guidelines.
-  appropriate protective clothing, gloves, eyewear, and respirator.

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⚠ WARNING



PRESSURIZED EQUIPMENT HAZARD

Spray from the gun, hose leaks, or ruptured components can splash fluid in the eyes or on the skin and cause serious injury.

- Do not point the spray gun at anyone or any part of the body.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** on page 11 whenever you: are instructed to relieve the pressure; stop spraying; clean, check, or service the equipment; and install or clean the fluid nozzle.
- Tighten all the fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.



INSTRUCTIONS



EQUIPMENT MISUSE HAZARD

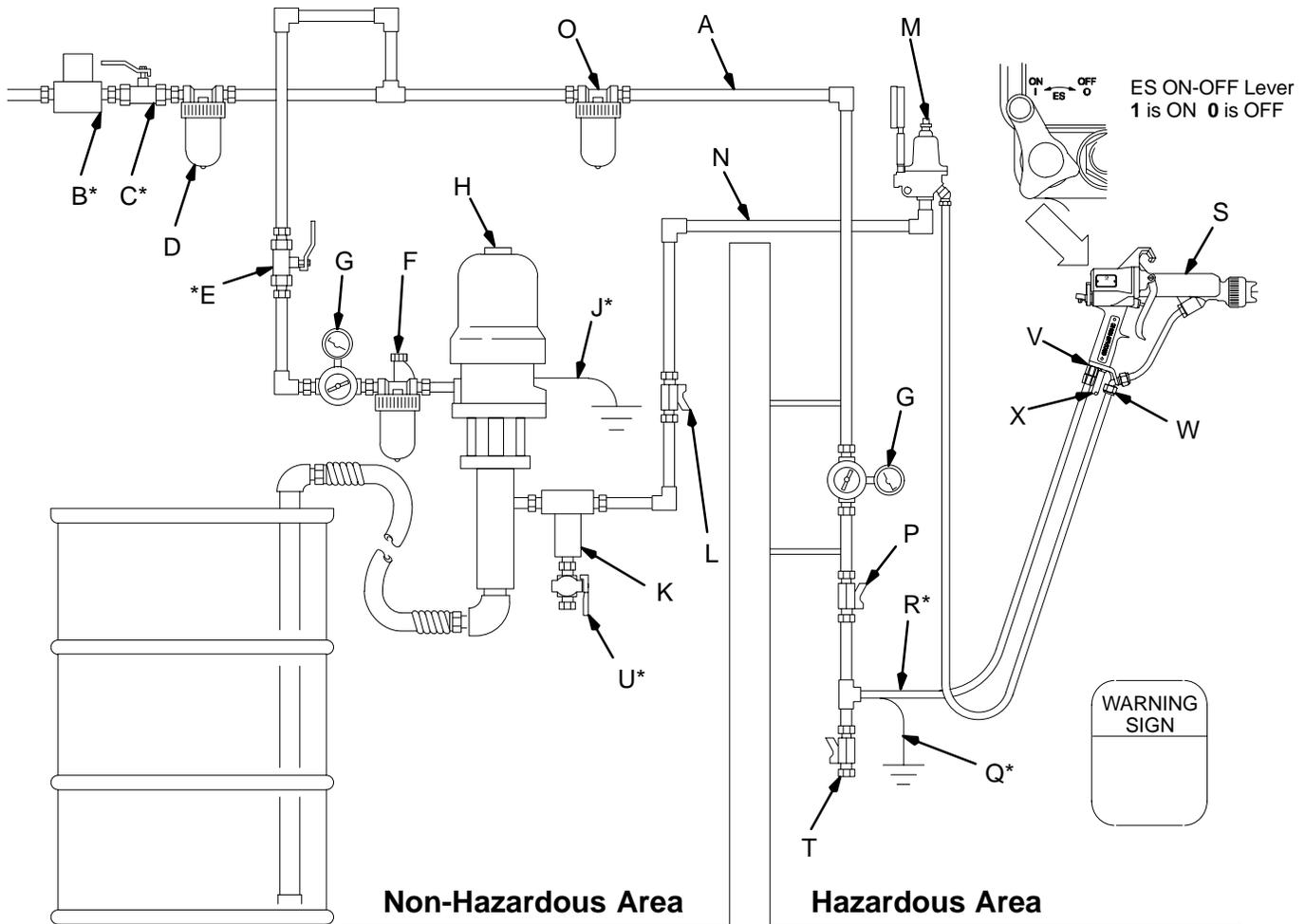
Equipment misuse can cause the equipment to rupture, malfunction, or start unexpectedly and result in a serious injury.

- This equipment is for professional use only.
- Read all the instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated system component. This equipment has a **100 psi (7 bar, 0.7 MPa) maximum working air and fluid pressure**.
- Use fluids that are compatible with the equipment wetted parts. See the **Technical Data** section of all the equipment manuals. Read the fluid manufacturer's warnings.
- Route the hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180°F (82°C) or below -40°F (-40°C).
- Do not use the hoses to pull equipment.
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.



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Installation



The air supply to the gun must be electrically interlocked with the ventilators to prevent the power supply from operating without ventilating fans on.

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KEY

- | | | |
|--|--|-------------------------------|
| A Main Air Supply Line | K Fluid Filter | T Air Line Drain Valve |
| B* Ventilation Fan Interlock Solenoid Valve | L Fluid Supply Line Shutoff Valve | U* Fluid Drain Valve |
| C* Main Air Supply Shutoff Valve (bleed-type) | M Fluid Pressure Regulator | V Gun Air Inlet |
| D Air & Water Separator | N Fluid Supply Line | W Gun Fluid Inlet |
| E* Pump Air Supply Shutoff Valve (bleed-type) | O Air Filter (20 micron) | X Gun Exhaust Tube |
| F Air Line Lubricator | P Air Supply Line Shutoff Valve | |
| G Air Pressure Regulator | Q* Air Hose Ground Wire | |
| H Pump | R* Graco Electrically Conductive Air Hose | |
| J* Pump Ground Wire | S Electrostatic Spray Gun | |

* Required for safe operation. Must purchase separately. See Accessories.
NOTE: Solenoid Valve (B) is not offered as a Graco accessory.

Fig. 1



Installation

Installing the System

⚠ WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

Installing and servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly.

- Do not install or service this equipment unless you are trained and qualified.
- Be sure your installation complies with National, State and Local codes for the installation of electrical apparatus in a Class I, Group D Hazardous Location.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.

Fig. 1 shows a typical electrostatic air spray system. It is not an actual system design. The particular type and size system for your operation must be custom designed for your needs. For assistance in designing a system, contact your Graco distributor.

Warning Signs

Mount warning signs in the spray area where they can easily be seen and read by all operators. An English Warning Sign is provided with the gun. Additional English, French, German, and Spanish signs are available at no charge. See **Accessories** to order them.

Ventilate the Spray Booth

⚠ WARNING



FLAMMABLE OR TOXIC VAPOR HAZARD

Provide fresh air ventilation to avoid the buildup of flammable or toxic vapors. Do not operate the gun unless ventilation fans are operating.

Electrically interlock the gun air supply with the ventilators to prevent gun operation without ventilating fans operating. Check and follow all National, State, and Local codes regarding air exhaust velocity requirements.

NOTE: High velocity air exhaust will decrease the operating efficiency of the electrostatic system. Air exhaust velocity of 100 ft/min (31 linear meters/minute) should be sufficient.

Connect the Air Line (Refer to Fig. 1)

⚠ WARNING



ELECTRIC SHOCK HAZARD

To reduce the risk of electric shock or other serious injury, the air supply hose must be electrically connected to a true earth ground. **Use Only Graco Electrically Conductive Air Supply Hose.**

1. Connect the Graco Electrically Conductive Air Supply Hose (R) between the air supply line and the gun's air inlet (V). *The gun air inlet fitting has a left hand thread.* Connect the air supply hose ground wire to a true earth ground.
2. Install an air line filter (O) and an air and water separator (D) on the air line to ensure a dry, clean air supply to the gun. Dirt and moisture can ruin the appearance of your finished workpiece and can cause the gun to malfunction.
3. Install a bleed-type air regulator (G) on the pump and gun air supply lines to control air pressure to the pump and gun.
4. Install a bleed-type air shutoff valve on the main air line (C) and the pump air line (E) to shut off air to the pump. Install an additional bleed-type valve on each pump air supply line to relieve air trapped between this valve and the pump after the air regulator is shut off.

⚠ WARNING



PRESSURIZED EQUIPMENT HAZARD

The bleed-type air shutoff valve is required in your system to relieve air trapped between this valve and the pump after the air regulator is closed. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin.

5. Install an air line lubricator (F) as close to the pump (H) as possible.
6. Install an air shutoff valve (P) on each gun air supply line to shut off air to the gun(s).

Installation

Connect the Exhaust Tube

Press the exhaust tube (provided) onto the barbed adapter on the bottom of the gun handle. Secure the tube with the clamp provided. Refer to page 34.

Connect the Fluid Line (Refer to Fig. 1, page 6)

1. Before connecting the fluid line (N), blow it out with air and flush it with solvent. Use solvent which is compatible with the fluid to be sprayed.
2. Install a fluid regulator (M) on the fluid line to control fluid pressure to the gun.
3. Install a fluid filter (K) and drain valve (U) at the pump outlet.

WARNING

PRESSURIZED EQUIPMENT HAZARD

The fluid drain valve (U) is required in your system to assist in relieving fluid pressure in the displacement pump, hose and gun; triggering the gun to relieve pressure may not be sufficient. Install a drain valve close to the pump's fluid outlet. The drain valve reduces the risk of serious injury, including splashing in the eyes or on the skin.

4. Connect the fluid line to the 3/8–18.6(m) gun fluid inlet (W).
5. Before running any paint through the spray gun, flush it out with a compatible solvent.

Ground the System

WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

When operating the electrostatic device, any ungrounded objects in the spray area, such as people, containers, tools, equipment, or surfaces, can become electrically charged. If grounding can result in static discharge, which can cause a fire, explosion, or electric shock. Follow the grounding instructions below.



The following are minimum grounding requirements for a basic electrostatic system. Your system may include other equipment or objects which must be grounded. Check your local electrical code for detailed grounding instructions. Your system must be connected to a true earth ground.

1. *Pump*: ground the pump by connecting a ground wire and clamp as described in your separate pump instruction manual.
2. *Air compressors and hydraulic power supplies*: ground the equipment according to the manufacturer's recommendations.
3. *Electrostatic Air Spray Gun*: ground the gun by connecting the Graco Electrically Conductive Air Hose and connecting the air hose ground wire to a true earth ground. Check the electrical grounding of the gun as instructed on page 9.
4. *All air and fluid lines* must be properly grounded. Use only grounded hoses with a maximum of 500 feet (150 m) combined hose length to ensure grounding continuity.
5. *All electric cables* must be properly grounded.
6. *All persons entering the spray area*: their shoes must have conductive soles, such as leather, or personal grounding straps must be worn. Rubber or plastic soles are not conductive. The operator must not wear gloves that insulate the hand from the spray gun. The gloves must be conductive or modified as shown in Fig. 3, page 11.
7. *Object being sprayed*: keep the workpiece hangers clean and grounded at all times. Contact points must be sharp points or like knife edges.
8. *The floor of the spray area*: must be electrically conductive and grounded. Do not cover the floor with cardboard or any non-conductive material which would interrupt grounding continuity.
9. *Flammable liquids in the spray area*: must be kept in approved, grounded containers. Do not store more than the quantity needed for one shift.
10. *All electrically conductive objects or devices in the spray area*: including fluid containers and wash cans, must be properly grounded.

Installation

Check the Electrical Grounding (See Fig. 2)

⚠ WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD
Megohmmeter P/N 241079 (AA-see Fig. 2) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

- The gun has been removed from the hazardous area;
- Or all spraying devices in the hazardous area are turned off, ventilation fans in the hazardous area are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).

Failure to follow this warning could cause fire, explosion, electric shock and result in serious injury and property damage.

1. Have a qualified electrician check the electrical grounding continuity of the spray gun and air hose.
2. Turn the ES ON-OFF Lever to OFF. See Fig. 4, page 12, for the location of the lever.
3. Turn off the air and fluid supply to the gun. The fluid hose must not have any fluid in it.
4. Make sure the air hose (R) is connected and the hose ground wire is connected to a true earth ground.
5. Measure the resistance between the gun handle (BB) and a true earth ground (CC).

- a. *If using a black or grey air hose, use a megohmmeter (AA) to measure the resistance. Use an applied voltage of 500 minimum to 1000 volts maximum. The resistance should not exceed 2 megohms.*
 - b. *If using a red turbine air hose, use an ohmmeter to measure the resistance. Resistance should not exceed 100 ohms.*
6. If the resistance is greater than the maximum reading specified above for your hose, check the tightness of the ground connections and be sure the air hose ground wire is connected to a true earth ground. If the resistance is still too high, replace the air hose.

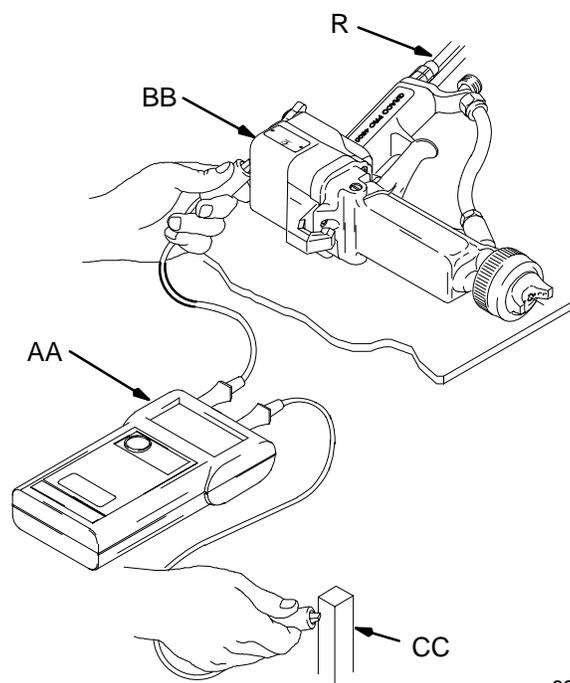


Fig. 2

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Notes



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Operation

Pressure Relief Procedure

WARNING

PRESSURIZED EQUIPMENT HAZARD

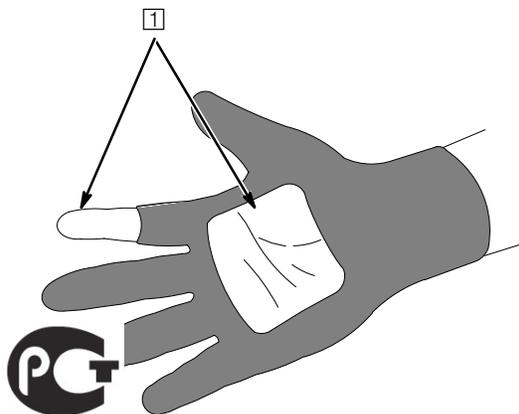
The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from electric shock, accidental spray from the gun, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure,
- stop spraying,
- check or service any of the system equipment,
- or install or clean the fluid nozzle.

1. Turn the ES ON-OFF Lever to OFF.
2. Turn off the air and fluid supply to the gun.
3. Trigger the gun into a grounded metal waste container to relieve fluid pressure.
4. Open the pump drain valve, having a waste container ready to catch the drainage.
5. Leave the pump drain valve open until you are ready to spray again.

Filter the Fluid

Filter the fluid to remove coarse particles and sediment which could clog the spray nozzle.



1 HO03
3 in. (76 mm) square cut out and finger of glove cut off

NOTE: If gloves are worn, they must be conductive or modified as shown so they do not interfere with operator grounding through the gun.

Fig. 3

06445

Operating Checklist

Check the following list daily, before starting to operate the system, to help ensure safe, efficient operation.

- ___ 1. All the operators are properly trained to safely operate an electrostatic air spray system as instructed in this manual.
- ___ 2. All the operators are trained how to properly relieve pressure as instructed at left.
- ___ 3. The system is thoroughly grounded and the operator and all persons entering the spray area are properly grounded. See **Ground the System**, page 8.
- ___ 4. The operator is not wearing gloves which insulate the hand from the spray gun. If worn, gloves must be conductive or modified as shown in Fig. 3 so as not to interfere with the operator grounding through the gun.
- ___ 5. The condition of the electrical components of the spray gun has been checked as instructed in **Electrical Tests**, page 20.
- ___ 6. The ventilation fans are operating properly.
- ___ 7. The workpiece hangers are clean and grounded. Contact points must be sharp points or like knife edges.
- ___ 8. All the debris, including flammable liquids and rags, is removed from the spray area.
- ___ 9. All flammable liquids in the spray booth are in approved, grounded containers.
- ___ 10. All conductive objects in the spray area are electrically grounded and the floor of the spray area is electrically conductive and grounded.

Operation

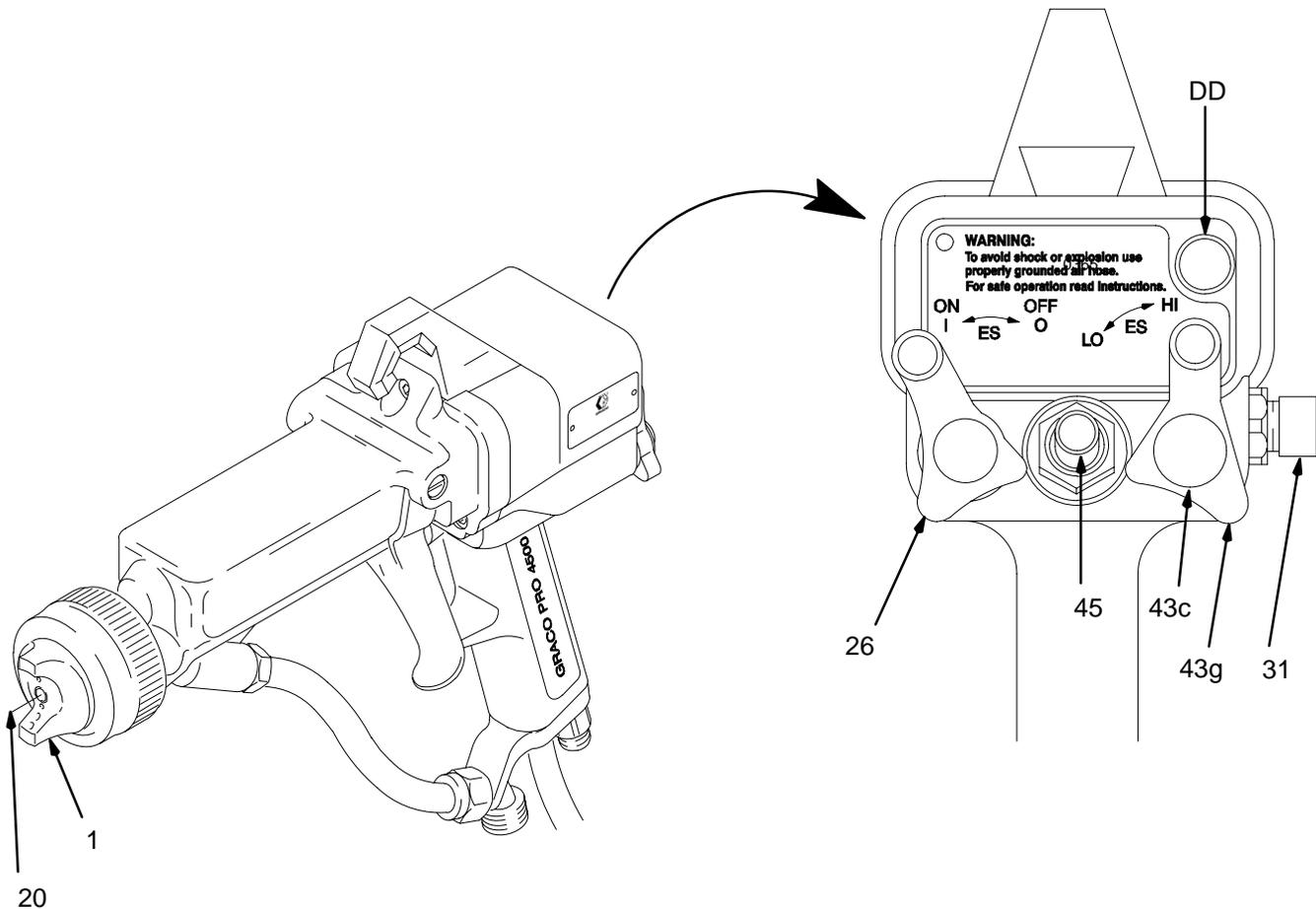


Fig. 4

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Selecting a Fluid Nozzle and Air Cap

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 11 before removing or installing a fluid nozzle and/or air cap.

The gun is supplied with a 0.059 in. (1.5 mm) fluid nozzle, P/N 1111 and air cap, P/N 193033. If your application requires a different nozzle and air cap combination, refer to the operation manual 307803 or consult your authorized distributor to select the appropriate fluid nozzle and air cap. Install the air cap and fluid nozzle into the gun barrel as instructed in **Air Cap/Nozzle/Resistor Stud Replacement**, page 22.

Operating the Spray Gun

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 11 whenever you stop spraying and whenever you are instructed to relieve pressure.

⚠ WARNING

COMPONENT RUPTURE HAZARD



To reduce the risk of component rupture, which can cause serious injury, do not exceed the maximum working pressure of the lowest rated system component. This equipment has a 100 psi (7 bar, 0.7 MPa) maximum working air and fluid pressure.

Follow the steps on page 13 to establish the correct fluid flow and air flow. **Do not** turn the ES ON-OFF lever to ON yet.

Operation

Operating the Spray Gun (continued)

1. Follow the **Operating Checklist** on page 11.
2. To adjust the air cap for a vertical or horizontal spray pattern, first make sure the pressure is relieved. Then loosen the air cap retaining nut, and rotate the air cap as directed in Fig. 5. Tighten the retaining nut until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.

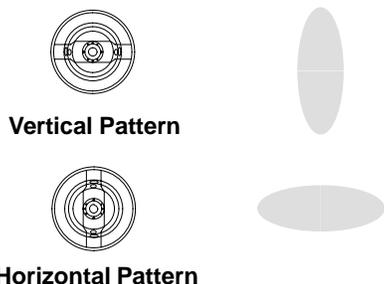


Fig. 5

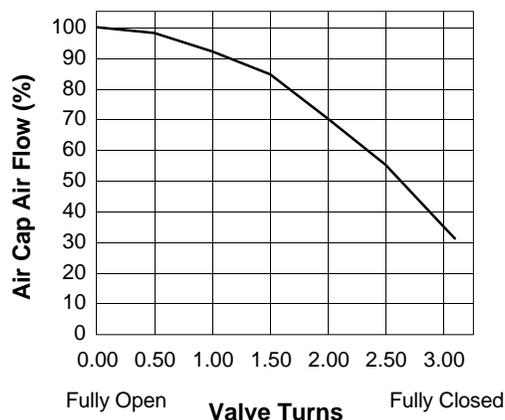
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3. Adjust the fluid flow by using the fluid line pressure regulator. Refer to instruction manual 307803 to set the fluid pressure for various fluid flows, according to the size of the fluid nozzle being used.
4. If necessary, further adjust the fluid flow rate with the fluid adjustment knob (45). See Fig. 4.
5. Fully open the fan air valve (43c).
6. Set the air pressure with the air pressure regulator. The following chart shows the air hose inlet pressure required to get full voltage from the power supply. To avoid shortening the turbine life, do not exceed the recommended air pressures.

Air Hose Length ft. (m)	Dynamic pressure at air hose inlet required for full voltage psi (kPa, bar)
 HO03	45 to 50 (314 to 345, 3.1 to 3.4)
	50 to 55 (345 to 379, 3.4 to 3.7)
	60 to 65 (410 to 444, 4.1 to 4.4)
	68 to 73 (465 to 501, 4.5 to 5.0)
100 (30.5)	75 to 80 (514 to 550, 5.1 to 5.5)

7. Set the atomizing air valve (31) about 1.5 turns out for most applications. The **Atomizing Air Valve Adjustment** chart shows the effect of the atomizing air valve adjustment on the air cap air flow.
8. Adjust the pattern width with the fan air valve (43c).

Atomizing Air Valve Adjustment



Fine Adjustments of the Spray Gun

- To improve the atomization, open the atomizing air valve further (31). If more atomizing air is needed beyond the fully open position of the valve, increase the air hose inlet pressure.

Use the lowest air flow settings needed for acceptable atomization. The slower particle velocity will improve the electrostatic effect.

- To reduce the atomization air and minimize any overspray, turn the atomizing air valve in.

NOTE: See the **Spray Pattern Troubleshooting** chart on page 16 to correct spray pattern problems.

9. Turn the ES ON-OFF lever to ON to begin spraying with the electrostatics. When spraying, the ES indicator light (DD) should glow, indicating the electrostatic charge.

NOTE: To verify if you have enough air for full voltage, the Remote Spraying Voltage Readout (SVR™) monitor can be used. See **Accessories**. Watch the SVR display while increasing the air pressure to see if more air will increase the voltage.

10. Use the ES HI-LO lever (43g) to change to either full voltage (HI) or a lower voltage level (LO). The lower voltage setting is factory set to 60 kilovolts at zero microamperes. To change this setting, see page 27.

CAUTION

Always hang the gun with its nozzle pointing down when it is not being used to avoid having fluid run into the gun air passages. Fluid in the gun air passages can cause poor atomization and excessive current demands and damage the gun.

Operation

Shutdown

WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 11 whenever you stop spraying and whenever you are instructed to relieve pressure.

1. Relieve the pressure.
2. Flush and clean the equipment. Follow the instruction in **Maintenance**.

Maintenance

Daily Care and Cleaning

WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 11 when you stop spraying, before cleaning or flushing the spray gun, and whenever you are instructed to relieve the pressure.

1. Clean the fluid and air line filters daily.
2. Clean the outside of the gun daily with a soft cloth dampened in a compatible solvent.
3. Clean the air cap and fluid nozzle daily, minimum. See page 15. Some applications require more frequent cleaning. Replace the fluid nozzle and air cap if they are damaged. See page 22.
4. Check the electrode wire. Straighten it if it is bent, and replace it if it is broken or damaged. See page 23.
5. Check for fluid leakage from the gun and fluid hoses. Tighten fittings or replace equipment as needed.
6. Check all of the work hangers for build-up of material; clean them if necessary.
7. Flush the gun before changing colors and whenever you are done operating the gun. See page 15.

WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock, turn the ES ON-OFF lever OFF before flushing the gun.

NOTE: A Gun Washer Kit, P/N 236681, is available for use with a Graco Gun Washer. See **Accessories**.

8. Place the gun in its hanging bracket, with the nozzle pointing down as shown in Fig. 6, until it is used again.

CAUTION

Fluid left in gun air passages could result in a poor quality paint finish and may draw current and reduce the electrostatic effect. Fluid in the power supply cavity can reduce the alternator life.

- Immersing the gun in fluid is not recommended.
- Do not use a cleaning method which may allow fluid to the gun air passages. Point the gun down while cleaning to prevent fluid from flowing into the air passages. See Fig. 7.
- Hang the gun with its nozzle pointing down when it is not being used, as shown in Fig. 6.

Clean all parts with a non-conductive, compatible solvent. Conductive solvents can cause the gun to malfunction.

Methylene chloride is not recommended as a flushing or cleaning solvent with this gun as it will damage nylon components.

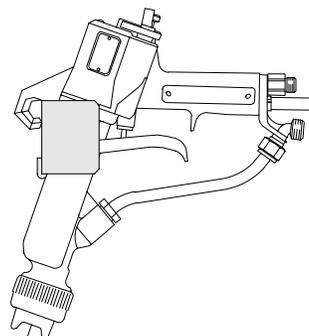


Fig. 6

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Maintenance

Clean the Air Cap and Fluid Nozzle

⚠ CAUTION

Do not use metal tools to clean the air cap or spray tip holes as this could scratch them, and make sure the electrode wire is not damaged. Scratches in the air cap or spray tip or a damaged electrode wire can distort the spray pattern.

Equipment needed:

- Soft bristle brush
- Compatible solvent

Procedure:

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 11 whenever you stop spraying, before installing or cleaning the fluid nozzle, and whenever you are instructed to relieve the pressure.

1. Relieve the pressure.
2. Remove the air cap assembly.
3. With the front of the gun pointed down, clean the air cap, fluid nozzle, and front of the gun, using a soft bristle brush and compatible solvent. See Fig. 7.
4. Carefully re-install the air cap assembly. Avoid bending the electrode. Tighten the retaining nut until it is snug, allowing the air cap to turn with resistance.



5. Resistance as instructed on page 20.

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Flush the Spray Gun

⚠ WARNING



ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock, turn the ES ON-OFF lever OFF before flushing the gun.

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 11 whenever you stop spraying and whenever you are instructed to relieve the pressure.

1. Relieve the pressure.
2. Disconnect and plug the fluid line.
3. Connect the solvent supply to the gun.
4. Flush the gun with compatible solvent into a grounded container until it is clean.
5. Relieve the pressure.
6. Disconnect and plug the solvent line.
7. Trigger the gun into a grounded container to drain out the solvent remaining in the gun.
8. Place the gun in its hanging bracket, with the nozzle pointing down as shown in Fig. 6, until it is used again.
9. When ready to spray again, reconnect the fluid supply line.
10. Turn on the fluid and air supplies.
11. Make sure the ES ON-OFF lever is OFF.
12. Trigger the gun until it is clear of solvent.

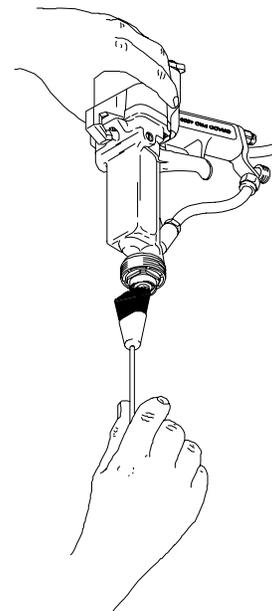


Fig. 7

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Troubleshooting

⚠ WARNING



ELECTRIC SHOCK HAZARD

Installing and servicing this equipment requires access to parts which may cause an electric shock or other serious injury if the work is not performed properly. Do not install or service this equipment unless you are trained and qualified.

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 11 before checking or servicing any part of the system and whenever you are instructed to relieve the pressure.

NOTE: Check all possible remedies in the Troubleshooting Chart before disassembling the gun.

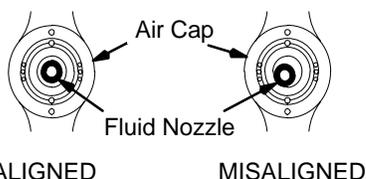
Spray Pattern Troubleshooting

NOTE: Some spray pattern problems are caused by the improper balance between air and fluid.

Problem	Cause	Solution
Fluttering or spitting spray 	The fluid supply is insufficient.	Adjust the fluid regulator, or fill the fluid supply.
	The fluid nozzle is loose, or the fluid nozzle taper seat is damaged.	Tighten or replace the fluid nozzle; see page 22.
	There is dirt between the fluid nozzle, taper seat, and gun body.	Clean the parts; see page 15.
	The coupler at the fluid inlet is loose or cracked.	Tighten or repair the coupler.
	Loose fluid tube in tank.	Tighten.
Improper spray pattern 	There is fluid build-up on the air cap; partially clogged horn holes; or full air pressure from the clean horn hole forces the fan pattern toward the clogged end.	Clean the air cap with a soft implement or submerge it in water and wipe it clean; see page 15.
	The electrode is bent.	Straighten the electrode.
	The fluid nozzle or air cap holes are damaged.	Replace the damaged part; see page 22.
	There is fluid buildup on the perimeter of the fluid nozzle orifice, or a partially clogged fluid nozzle orifice.	Remove the obstruction; never use wire or hard instruments; see page 15.
	The electrode is bent.	Straighten the electrode wire.
	The fan air pressure is too high.	Reduce the fan air pressure.
	The fluid is too thin.	Increase the fluid viscosity.
	There is not enough fluid pressure.	Increase the fluid pressure.
	The fan air pressure is too low.	Increase the fan air pressure.
	The fluid is too thick.	Reduce the fluid viscosity.
	There is too much fluid.	Reduce the fluid flow. Reduce fluid pressure on pressure feed guns and/or adjust the fluid adjusting screw until proper pattern is obtained.
Streaks 	The last coat of fluid is applied too wet.	Apply a drier finish using multiple strokes.
	There is too much air pressure.	Decrease the air pressure.
	The air pressure is insufficient.	Increase the air pressure.
	The spray pattern is non-uniform.	Clean or replace the air cap; see page 15 or 22.

Troubleshooting

Gun Operation Troubleshooting

Problem	Cause	Solution
Fluid leakage from the fluid packing area	The needle packings or shaft are worn.	Replace the packings or shaft; see page 26.
Air leakage from the front of the gun	The air valve is not seating properly.	Clean and service the air valve; see page 30.
	The air valve o-ring is sticking.	Lubricate the o-ring; see page 30.
Fluid leakage from the front of the gun	The needle is worn or damaged.	Replace the needle; see page 26.
	The fluid seat is worn.	Replace the fluid nozzle and/or electrode needle; see pages 22 to 23.
	The resistor stud is loose.	Tighten the resistor stud; see page 22.
	The fluid nozzle is loose.	Tighten the fluid nozzle; see page 22.
	The resistor stud o-ring is damaged.	Replace the o-ring; see page 22.
"Orange Peel" finish	The air pressure is insufficient for good atomization.	Increase the air cap air pressure by opening the atomizing air valve more or increasing the gun air inlet pressure; use the least air pressure needed for good results.
	The fluid is poorly mixed or filtered.	Remix or refilter the fluid.
	An improper thinner is being used.	Use the proper thinner.
Excessive spray fog	The air pressure is too high.	Reduce the air cap air pressure by closing the atomizing air valve more or decreasing the gun air inlet pressure; use the least air pressure needed for good results. Do not reduce below minimum pressure needed for full voltage. See page 13.
	The fluid is thinned too much.	Properly thin the fluid.
No fluid sprays from the gun	The fluid supply is low.	Check the fluid supply; add fluid if necessary.
	The air cap is damaged.	Replace the air cap; see page 22.
	The fluid nozzle is dirty or clogged.	Clean the fluid nozzle; see page 15.
	The fluid nozzle is damaged.	Replace the fluid nozzle; see page 22.
	The fluid adjustment valve is damaged.	Replace the o-ring; see page 30.
The equipment is covered with fluid	The exhaust air flow is insufficient or not directed properly.	Check for the proper CFM; check the baffles and direction of the air flow.
	The distance between the gun and work-piece is incorrect.	Adjust the spraying distance to 8 to 12 inches (203 to 305 mm).
The air cap is dirty 	The air cap and fluid nozzle are misaligned. 	Check the air cap and fluid nozzle seat for fluid buildup. Clean or replace parts as needed; see page 15 or 22.

Troubleshooting

Electrical Troubleshooting

Problem	Cause	Solution
Poor wrap-around	The ES ON-OFF lever is in the OFF (O) position.*	Turn the lever to ON (1).
	The distance between the gun and workpiece is incorrect.	Adjust the spraying distance to 8 to 12 inches (203 to 305 mm)
	The parts are poorly grounded.	Clean the workpiece hangers. Check for proper grounding on the conveyer or track.
	The booth exhaust velocity is too high.	Reduce exhaust velocity within code limits.
	The atomizing air pressure is too high.	Reduce the atomizing air pressure.
	The fluid pressure is too high.	Reduce the fluid pressure.
	The fluid viscosity is not right for electrostatic spray.	Check with the supplier for proper fluid viscosity for electrostatic spray.
	The fluid resistivity is too low.	Check the fluid resistivity with a paint meter and probe.
	The turbine alternator is not operating.*	Check if the ES ON-OFF lever is ON (1). Check the air supply to the gun. Check for dirt or moisture in the turbine. See page 28.
	The gun resistance is faulty.	Check the gun resistance. See page 20.
	Fluid leaks from the needle packing and causes a short.	Clean the needle cavity. Replace the fluid needle. See page 26.
	The turbine alternator is faulty.	Be sure the plug is in place on the back of the turbine alternator housing. Remove and test the turbine alternator. See page 28.
The KV HI-LO lever is on LO.	Check the lever actuation; replace if needed.	
Operator gets a mild shock	The operator is not properly grounded or is near an ungrounded object.	Be sure the floor and the operator are properly grounded. See Ground the System , page 8.
	The gun is not properly grounded.	See Check the Electrical Grounding , page 9.
Operator gets a shock when touching the workpiece	The workpiece is not properly grounded.	Clean workpiece hangers. Check for proper grounding on the conveyor or track.

* ES indicator light is not on when the gun is triggered.



Troubleshooting

Electrical Troubleshooting with SVR

NOTE: Additional gun troubleshooting can be done using the Remote Spraying Voltage Readout (SVR™). See **Accessories** to order the SVR and the RF transmitting power supply.

Problem	Cause	Solution
Lower than normal voltage output	Insufficient air pressure to the turbine alternator.	Increase the air pressure to the gun.
	Faulty turbine alternator.	Replace the turbine alternator. See page 28.
	Improper distance between gun and workpiece.	Adjust the spraying distance to 8–12 in. (203–305 mm).
	Fluid resistivity is too low.	Check the fluid resistivity with a paint meter and probe.
	Dirty gun.	Clean the gun. See page 14.
Higher than normal voltage output	Faulty gun resistance.	Check the gun resistance. See page 20.
	Fluid resistivity higher than normal.	Check the fluid resistivity with a paint meter and probe.



Electrical Tests

The performance and safety of the spray gun are directly affected by the condition of the electrical components contained inside the gun. The electrical tests below can be used to determine the condition of the power supply (18) and the resistor stud (22) as well as the continuity of the electrical path between the components.

Use megohmmeter P/N 241079 (A) and an applied voltage of 500 volts to complete these electrical tests. Connect the leads as shown.

Measure the resistance between the end of the electrode (20) and the air fitting (17). The resistance should be between 329 to 401 megohms. If the resistance is outside the specified range, go to the next test. If the resistance is correct, refer to **Electrical Troubleshooting** on page 18 for other possible causes of poor performance.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

Megohmmeter P/N 241079 (A-see Fig. 8) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the megohmmeter to do the electrical tests unless:

- The gun has been removed from the hazardous area;
- Or all spraying devices in the hazardous area are turned off, ventilation fans in the hazardous area are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).

Failure to follow this warning could cause fire, explosion, electric shock and result in serious injury and property damage.

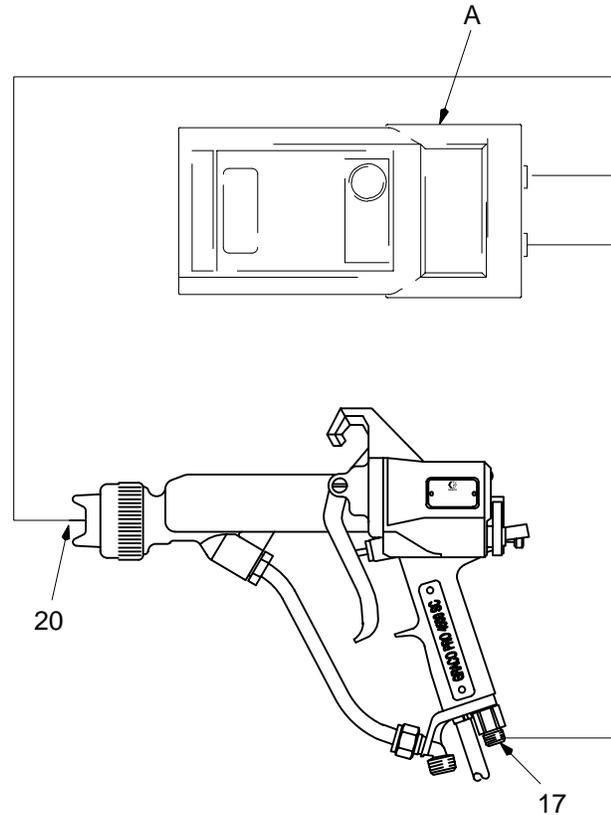


Fig. 8 0371B

Test Gun Resistance (See Fig. 8)

NOTE: The fluid passage must be flushed and dried to get an accurate reading.



Electrical Tests

Test Power Supply Resistance (See Fig. 9)

Remove the power supply (18) from the gun. See **Power Supply Removal and Replacement**, page 27.

Remove the turbine alternator from the power supply. See **Turbine Alternator Removal and Replacement**, page 28.

Measure the resistance from the power supply's ground contact point (EE) to the contact inside of the power supply seal (B) [the conductive rubber contact may be slightly recessed into the seal].

The resistance should be 297 to 363 megohms. If the resistance is outside the specified range, the power supply is defective and must be replaced. If the resistance of the power supply is correct, proceed to the next test.

If you still have problems, refer to **Electrical Troubleshooting** for other possible causes of poor performance, or contact the nearest authorized service agency.

NOTE: Be sure the seal (B) is in place on the end of the power supply before installing the power supply back into the gun.

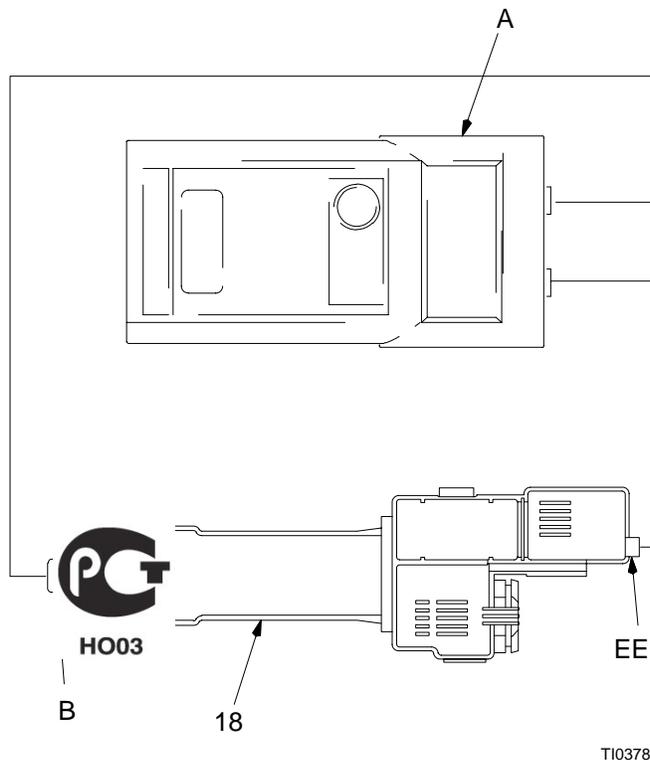


Fig. 9

Test Resistor Stud Resistance (See Fig. 10)

Remove the resistor stud (22). See **Air Cap/Nozzle/Resistor Stud Replacement**, page 22. Check the resistance between the black resistor stud contact ring (D) and the needle contact ring (E). You may have to press down on the contact ring (D) in several places to get a good reading.

The resistance should be 21 to 29 megohms. If the resistance is correct, make sure the metal contact in the gun barrel and the needle contact ring (E) are clean. If the resistance is outside the specified range, the resistor is defective and the resistor stud (2) must be replaced. See **Air Cap/Nozzle/Resistor Stud Replacement**.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

The resistor stud contact ring (D) is a conductive contact ring, **not** a sealing o-ring. See Fig. 10. To reduce the risk of sparking or electric shock, **do not** remove the resistor stud contact ring (D) or operate the gun without the contact ring in place. Do not replace the resistor stud (22) with anything but a genuine Graco part.

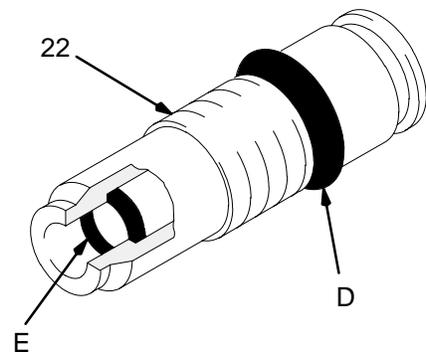


Fig. 10

0442

Service

Prepare the Gun for Service

WARNING



ELECTRIC SHOCK HAZARD

Installing and servicing this equipment requires access to parts that may cause electric shock or other serious injury if the work is not performed properly. Do not install or service this equipment unless you are trained and qualified.

WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of injury, follow the **Pressure Relief Procedure** on page 11 before checking or servicing any part of the system and whenever you are instructed to relieve the pressure.

NOTE:

- Check all possible remedies in **Troubleshooting** before disassembling the gun.
- If the plastic parts of the gun must be held securely, always clamp them in padded vice jaws to prevent damage to the parts.
- Lightly lubricate o-rings and seals with petroleum jelly. Do not over-lubricate.
- Only use genuine Graco parts. Do not mix or use parts from other PRO Gun models. See page 35.

1. Flush the gun as instructed in **Flush the Spray Gun**, page 15.
2. Relieve the pressure.
3. Disconnect the air and fluid lines from the gun.

4. Remove the gun from the worksite for service or repair. The worksite or repair area must be clean.



Air Cap/Nozzle/Resistor Stud Replacement

CAUTION

Hold the front end of the gun up and trigger the gun while removing the nozzle and resistor stud to help drain the gun and prevent any paint or solvent left in the gun from entering the air passages.

1. Prepare the gun for service as instructed at left.
2. Remove the air cap assembly. Point front end of the gun up and squeeze the trigger while removing the fluid nozzle/resistor stud (21, 22) assembly with the multi-tool (62). See Fig.11, page 23.

NOTE: If the resistor stud remains in the gun when the fluid nozzle is removed, start the nozzle thread onto the stud and pull the stud out.

3. Unscrew and remove the resistor stud (22) with the multi-tool (62). See Fig. 12.

WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD



The resistor stud contact ring (D) is a conductive contact ring, **not** a sealing o-ring. See Fig. 11. To reduce the risk of sparking or electric shock, **do not** remove the resistor stud contact ring (D) except to replace it and never operate the gun without the contact ring in place. Do not replace the contact ring with anything but a genuine Graco part.

To install the resistor stud:

4. Lightly lubricate the o-ring (25) with petroleum jelly and install it on the resistor stud (22).
5. Using the multi-tool (62), install the resistor stud (22) in the fluid nozzle (21). Tighten to 10 in-lb (1.12 N•m).

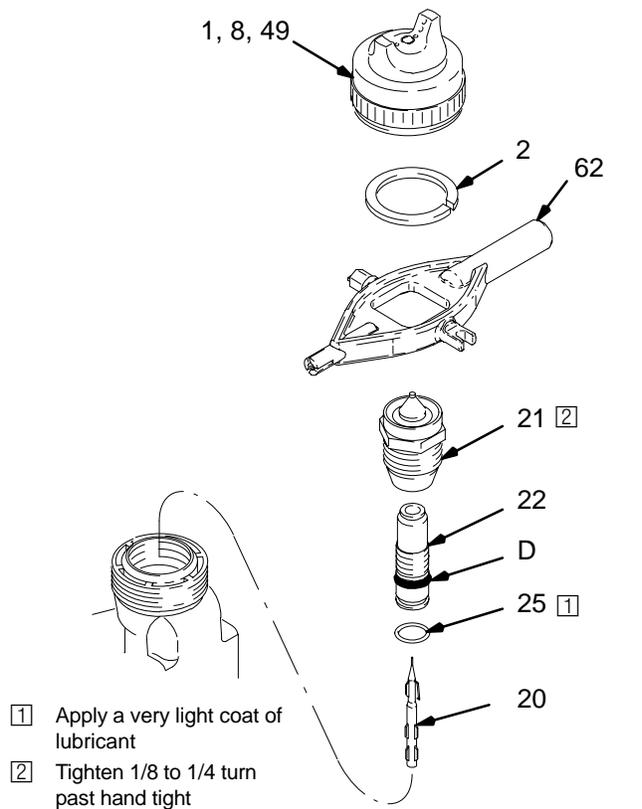
NOTE: Make sure the electrode needle (20) is tightened properly, as shown in Fig. 13.

Continued on the next page.

Service

Air Cap/Nozzle/Resistor Stud Replacement (continued)

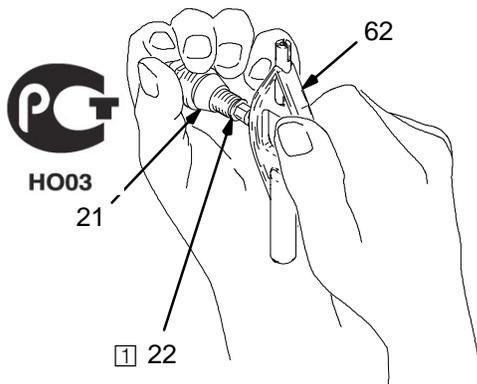
6. Trigger the gun while installing the fluid nozzle (21) and resistor stud (22) assembly with the multi-tool (62). Tighten until the fluid nozzle seats in the gun barrel (1/8 to 1/4 turn past hand tight).
7. Install air cap assembly (1, 8, 49) and retaining ring (2). Test gun resistance as instructed on page 20.



- 1 Apply a very light coat of lubricant
- 2 Tighten 1/8 to 1/4 turn past hand tight

05154A

Fig. 11



- 1 Torque to 10 in-lbs (1.12 N•m)

0444A

Fig. 12

Electrode Needle Replacement

1. Prepare the gun for service as instructed on page 22.
2. Remove the air cap, nozzle and resistor stud as instructed on page 22.
3. Unscrew and remove the electrode needle (20) with the multi-tool (62). Hold the fluid rod end to prevent it from turning. See Fig. 13.

CAUTION

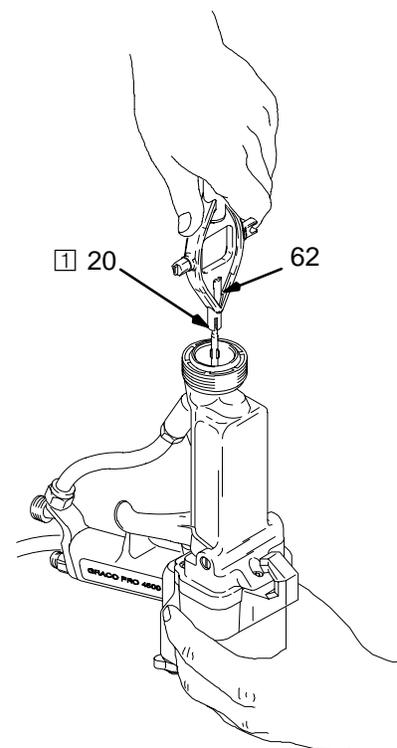
Be careful not to damage the contact wire when removing the electrode from the gun.

4. Apply low-strength (*purple*) Loctite® or equivalent thread sealant to the electrode needle and fluid rod threads. Install the electrode needle finger-tight. Do not over-tighten it.

CAUTION

To avoid damaging the plastic threads or contact wire, be very careful when installing the electrode.

5. Install the fluid nozzle, resistor stud, and air cap assembly as instructed at left.
6. Test the gun resistance as instructed on page 20.



- 1 Apply low-strength (*purple*) Loctite or equivalent to fluid rod threads

Fig. 13

0378A

Service

Barrel Removal

1. Prepare the gun for service as instructed on page 22.
2. Carefully loosen the nut (14) from the bracket/fluid fitting (16). Pull the tube (12) out of the fitting. Make sure both ferrules and the nut stay with the tube. See Fig. 14.
3. Using the wrench (63) supplied, loosen the three socket head cap screws (5).
4. Hold the gun handle (7) with one hand and pull the barrel (3) straight away from the handle to remove it. See Fig. 15.

CAUTION

To avoid damaging the power supply (18), pull the gun barrel straight away from the gun handle. If necessary, gently move the gun barrel from side to side to free it from the gun handle.

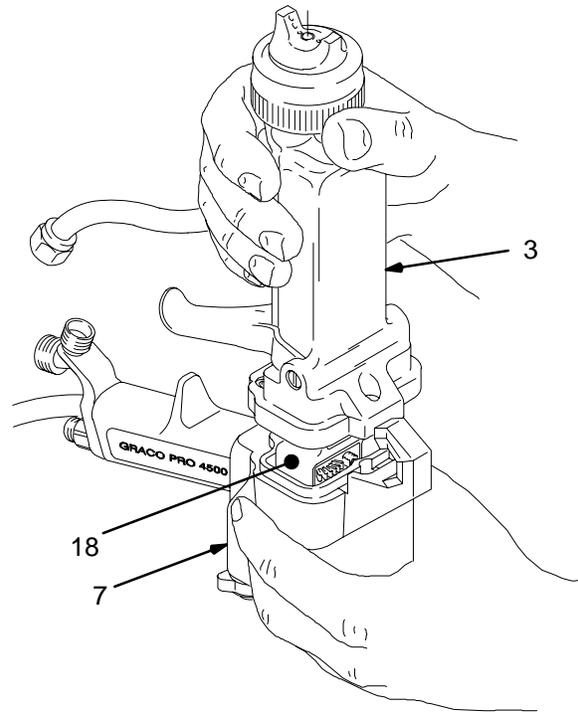


Fig. 15

0380

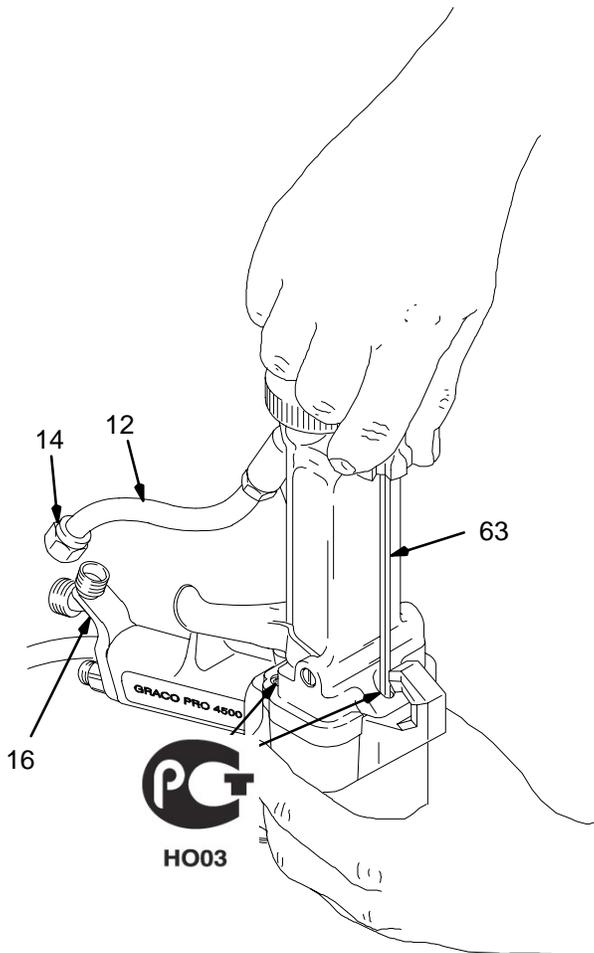


Fig. 14

0379

Service

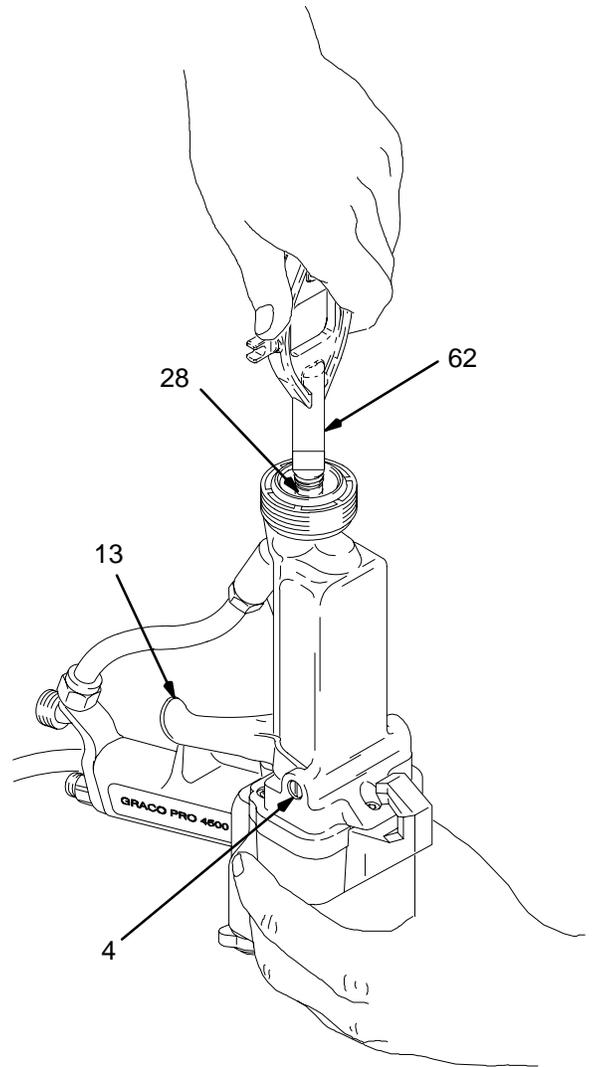
Fluid Packing Removal

1. Prepare the gun for service as instructed on page 22.
2. Remove the air cap assembly, fluid nozzle and resistor stud and electrode as instructed on page 23.
3. Loosen the trigger screws (4) far enough to remove the trigger (13).
4. Remove the needle assembly (28), using the multi-tool (62). See Fig. 16.

⚠ CAUTION

Clean all parts in non-conductive solvent compatible with the fluid being used, such as xylol or mineral spirits. Use of conductive solvents can cause the gun to malfunction.

5. Check all the parts for wear or damage and replace if necessary.



0382A

Fig. 16



Service

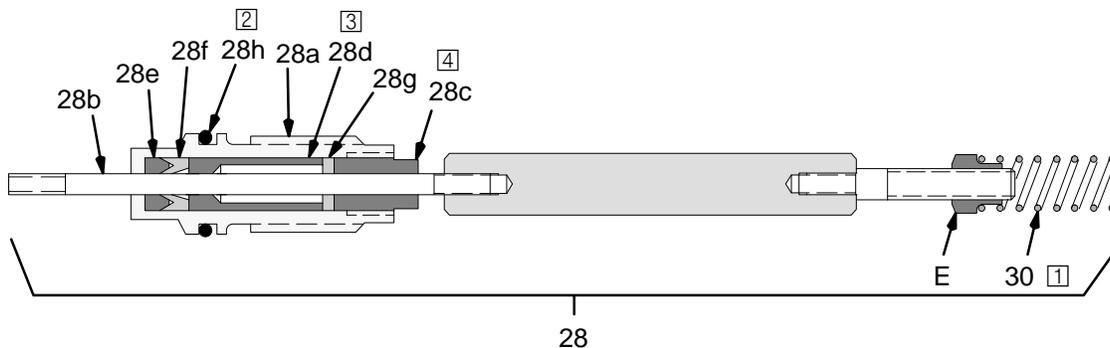
Fluid Packing Rod Repair

The fluid packing rod can be replaced as individual parts or as an assembly. The overall assembly is pre-adjusted at the factory.

NOTE: Before installing the fluid packing rod into the gun barrel, make sure the internal surfaces of the barrel are clean. Remove any residue with a soft brush or cloth. Check the inside of the barrel for marks from high voltage arcing. If the marks are present, replace the barrel.

If the parts are purchased separately, assemble them as instructed below and as shown in Fig. 17.

1. Place the packing nut (28c) and o-ring (28g) on the fluid rod (28b). Flats on the packing nut must be facing toward the back of the fluid rod.
2. Fill the entire inner cavity of the spacer (28d) with petroleum jelly. Place the spacer on the fluid rod (28b) in the direction shown in Fig. 17. Generously apply petroleum jelly to the outside of the spacer.
3. Place the fluid packing (28f), needle packing (28e), and housing (28a) on the fluid rod (28b) as shown in Fig. 17.
4. Lightly tighten the packing nut (28c). The packing nut is properly tightened when there is 2 lbs. (9 N) of drag force when sliding the packing housing (28a) assembly along the shaft. Tighten or loosen the packing nut as needed.
5. Install the o-ring (28h) on the outside of housing (28a) and lubricate the o-ring.
6. Make sure the spring (30) is installed against the nut (E) as shown in Fig. 17.
7. Install the fluid packing rod assembly (28) into the gun barrel. Using the multi-tool (62), tighten the assembly until just snug, then check the drag on the fluid rod.
8. Install the trigger (13) and tighten the trigger screws (4).
9. Install the electrode needle, nozzle and resistor stud assembly and the air cap assembly as instructed on page 23.
10. Test the gun resistance as instructed on page 20.

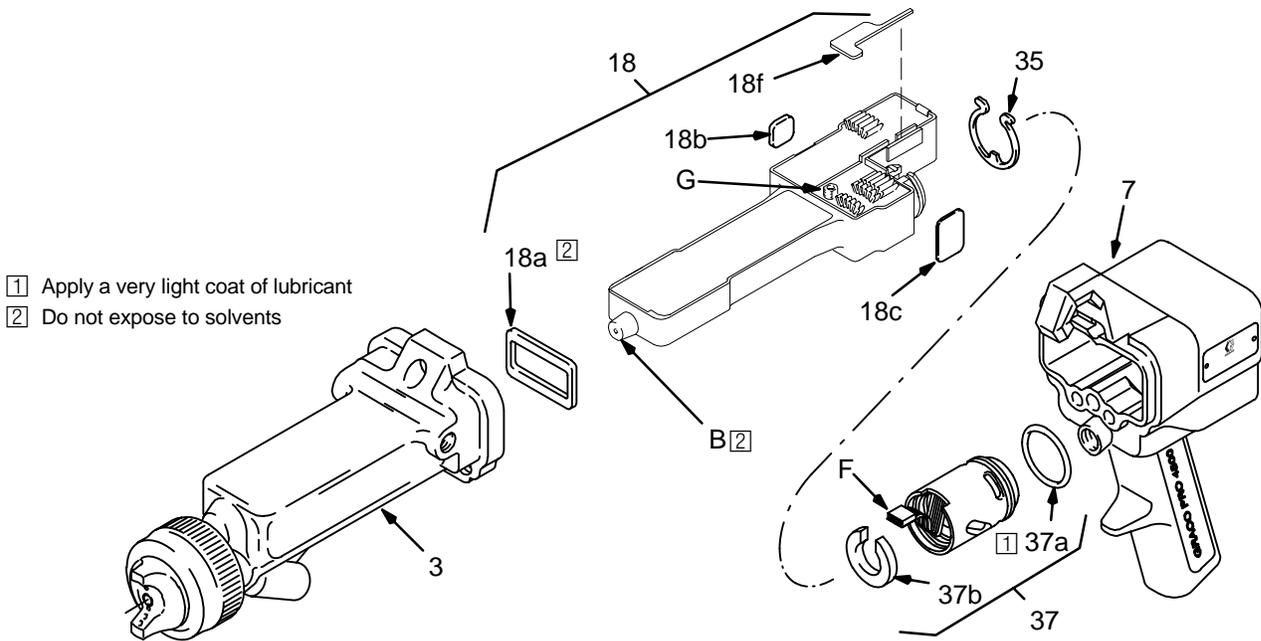


- 1 Item 30 is not included with the Packing/Needle Assy. (28)
- 2 Apply a very light coat of lubricant
- 3 Fill entire inner spacer cavity with petroleum jelly and generously lubricate outside of spacer
- 4 Tighten packing nut (28c) until there is 2 lbs. (9 N) of drag force

Fig. 17  HO03

0383

Service



- 1 Apply a very light coat of lubricant
- 2 Do not expose to solvents

0384B

Fig. 18

Power Supply Removal and Replacement

NOTES:

- To avoid a loss in electrostatic performance, inspect the gun handle power supply cavity for dirt or moisture. Clean the cavity with a clean, dry rag.
- Do not expose seal (B) or gasket (18a) to solvents as solvent will damage them.

1. Prepare the gun for service as instructed on page 22.
2. Remove the barrel as instructed on page 24.

 CAUTION
<p>Be careful when handling the power cartridge to avoid damaging it.</p>

3. Grasp the power supply (18) with your hand. With a gentle side to side motion, pull the power supply from the gun handle (7), then pull it straight out (Fig. 18).
4.  Inspect the power supply for any physical damage. Measure the power supply electrical resistance as instructed on page 21. If needed, replace the power supply.

Before installing the power supply, inspect the seal (18e) for any damage or swelling; replace it if necessary. Make sure the gaskets/pads (18a–18f) are in place.

5. Lubricate the o-ring (37a) and insert the power supply in the gun handle.
6. Install the barrel on the handle as instructed on page 28.
7. Test the gun resistance as instructed on page 20.

Power Supply Adjustment

The KV HI/LO switch, on the back of the gun manifold, enables you to switch between full voltage and a lower voltage output. The lower voltage is factory set at 60 kV, but can be adjusted.

The power supply may be equipped with either a potentiometer or a two position jumper pin. If you have the jumper pin style, place the pin in either the 45 kV or 60 kV position. If you have the potentiometer style, follow the directions below.

To adjust the low voltage setting, use a small blade end screw driver to turn the potentiometer (G), clockwise to increase the voltage or counterclockwise to decrease the voltage; fully clockwise is 80 kV, fully counterclockwise is 45 kV.

Service

Turbine Alternator Removal and Replacement

NOTE: Replace turbine bearings after 2000 hours of operation. See your authorized Graco representative.

1. Prepare the gun for service as instructed on page 22.
2. Remove the power supply from the gun handle as instructed on page 27.
3. Squeeze the two ends of the retaining ring (35) together and carefully pull the alternator (37) away from the power supply (18) until the 3-wire connector (F) disengages. See Fig. 18, page 27.
4. Use an ohmmeter to test the turbine alternator coil. Measure the resistance between the two outer terminals of the 3-wire connector (F). The resistance should be 3 to 5 ohms. If the reading varies from this value, replace the alternator.
5. Measure the resistance between each outer terminal of the 3-wire connector and the turbine alternator housing. The resistance should be infinite. If the resistance is not infinite, replace the alternator.
6. Connect the 3-wire connector to the 3 prongs in the power supply. Push the alternator (37) onto the power supply (18) until the retaining ring (35) engages with the alternator.
7. Install the power supply in the gun handle as described on page 27.

Barrel Installation

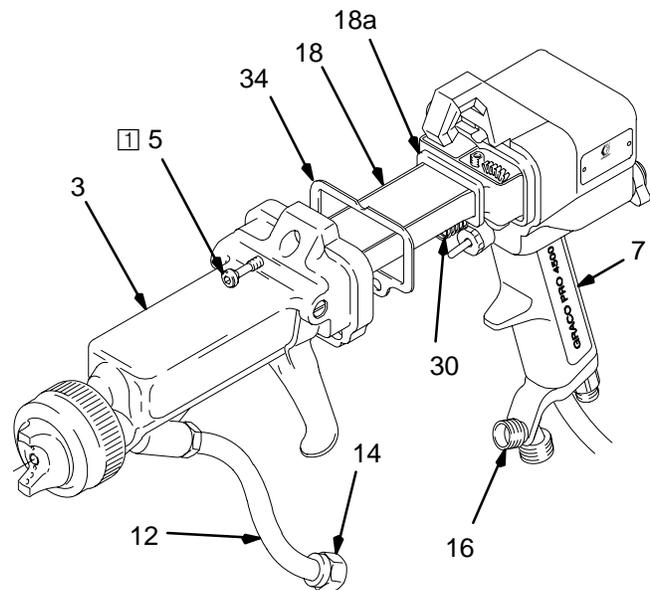
1. Be sure the gaskets (34 & 18a) and spring (30) are in place. See Fig. 13. Replace if damaged.
2. Place the barrel (3) over the power supply (18) and onto the gun handle (7). Make sure the fluid rod spring (30) is seated properly.

3. Tighten the three socket head cap screws (5) oppositely and evenly to 18 in-lbs (2 N•m) maximum (about a half turn past snug) with the wrench (63) supplied.

⚠ CAUTION

To avoid damaging the gun, do not over-tighten the cap screws (5).

4. Assemble the fluid tube (12) back into the fluid fitting (16).
5. Test the gun resistance as instructed on page 20.



ⓘ Tighten to 18 in-lbs (2 N•m) **maximum** (about half turn past snug), using wrench provided.

Fig. 19

0381



Service

Fan Air Adjustment Valve Repair

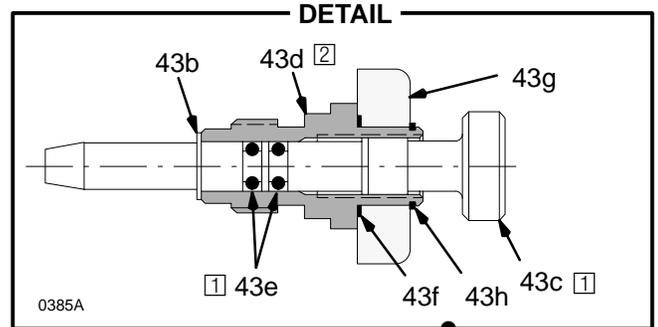
1. Prepare the gun for service as instructed on page 22.
2. Place a wrench on the flats of the valve housing and remove it from the handle. See Fig. 20.

NOTE: The fan air valve (43) can be replaced as an assembly or as individual parts.

To disassemble the fan air valve:

1. Rotate the adjustment knob (43c) counterclockwise, backing out until it stops. Remove the retaining ring (43h) and back off the KV HI-LO lever (43g) from the valve housing (43d). See Fig. 20.
2. Using a standard wrench, remove the valve housing (43d) from the gun.
3. Remove the retaining ring (43b).
4. Rotate the adjustment knob (43c) counterclockwise until it is disengaged from the valve housing threads (43d). Pull the fan valve from the housing. The KV HI-LO lever (43g) and the wave spring (43f) can be removed if necessary.
5. Clean all the parts and inspect them for wear or damage.
6. When reassembling the fan air valve (43), lubricate the o-rings (43e) and the threads on the adjustment knob (43c) with petroleum jelly.
7. Apply low strength (*purple*) Loctite or equivalent thread sealant to the threads of the valve housing (43d). Start the valve housing threads into the handle by turning the adjustment knob (43c). Once the threads are started, rotate the knob (43c) fully counterclockwise. Torque the valve housing (43d) to 10–12 in-lb (1.1–1.4 N•m).

8. Reposition the KV HI-LO lever (43g) back onto the valve housing (43d) in correct orientation. Reinstall the retaining ring (43h) into the groove on the valve housing.



- 1 Lubricate o-rings (43e) and top knob threads (43c) with petroleum jelly
- 2 Apply low strength (purple) Loctite or equivalent to housing (43d) threads; Torque to 10–12 in-lb (1.1–1.4 N.m)

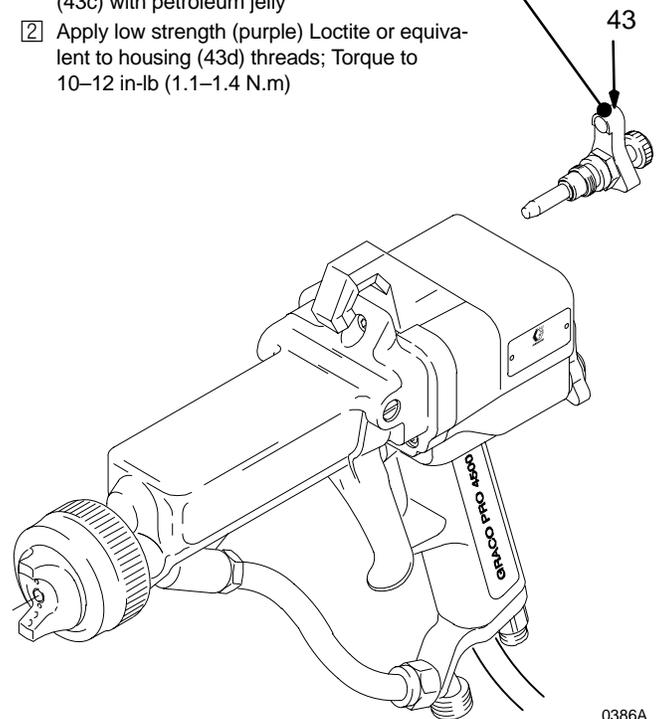


Fig. 20

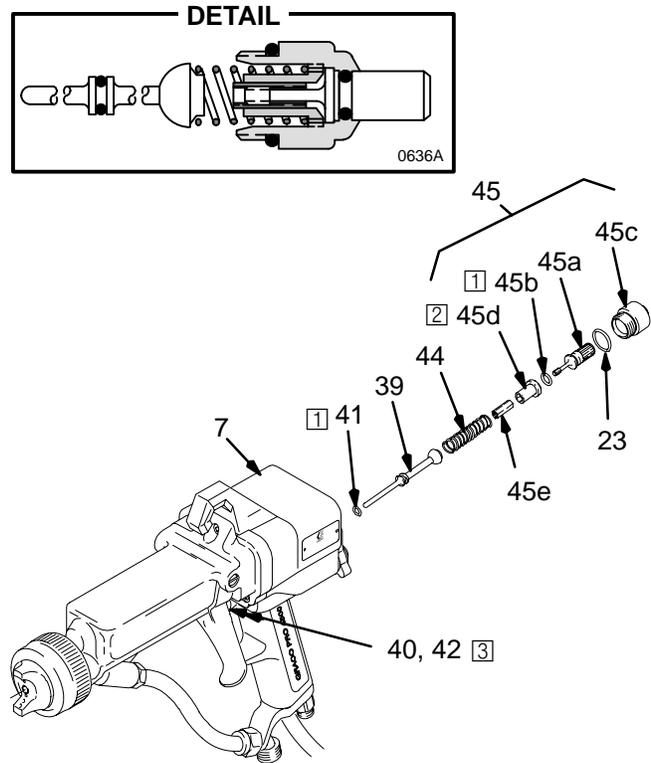
0386A



Service

Fluid Adjustment Assembly Repair

1. Prepare the gun for service as instructed on page 22.
2. Using a 14 mm socket wrench, remove the fluid adjustment assembly (45). See Fig. 21.
3. Turn the stem (45a) fully *clockwise* and remove the sleeve stop (45e).
4. To completely disassemble the fluid adjustment assembly, the sleeve stop (45e) must be assembled back on to the stem (45a). Turn the stem until the sleeve is protruding about 0.4 inches (10 mm).
5. To remove the sleeve (45d), hold the cap (45c) and turn the sleeve stop (45e) counterclockwise with a wrench.
6. Remove the stem (45a) and o-ring (45b).
7. Repair or replace any damaged parts. Lubricate the o-ring (45b) with petroleum jelly.
8. Carefully apply low strength (*purple*) Loctite or equivalent thread sealant to the sleeve (45d) external threads. Turn the sleeve in with the sleeve stop (45e) until it bottoms out, then back it out 1/8 turn.



- 1 Lubricate o-rings with petroleum jelly
- 2 Carefully apply low strength (purple) Loctite or equivalent to sleeve (45d) external thread. Turn sleeve in with sleeve stop (45e) until it bottoms out, then back out 1/8 turn. Allow Loctite to cure overnight.
- 3 Do not remove u-cup (42) unless damaged. Install with lips facing into handle. Tighten packing nut (40) until it bottoms.

Fig. 21

0387A

CAUTION

Do not allow Loctite to get onto the stem (45a) during assembly or the stem will not turn after assembly.

9. Place the fluid adjustment assembly on the workbench with its threaded end facing down and allow the Loctite to cure over night.
10. After the Loctite has cured, install the fluid adjustment assembly into the gun. Tighten the adjustment knob (45c) with the 14 mm socket wrench.



Service

Air Trigger Valve Repair

1. Prepare the gun for service as instructed on page 22.
2. Using a 14 mm socket wrench, remove the fluid adjustment assembly (45), o-ring (23) and spring (44). See Fig. 21.

⚠ CAUTION

Clean all parts in non-conductive solvent compatible with the fluid being used, such as xylol or mineral spirits. Use of conductive solvents can cause the gun to malfunction.

3. Loosen the air valve packing nut (40) one full turn. Remove the air valve shaft (39) with a pliers.

⚠ CAUTION

When removing the air valve shaft (39) be careful not to damage the seat area.

4. Check the o-rings (41, 23) for damage and replace if necessary. Apply petroleum jelly to the o-rings.

⚠ CAUTION

Do not over-lubricate parts. Excessive lubricant on the o-ring (41) and air valve shaft (39) can be pushed into the gun air passage and blemish the finish on the workpiece.

5. Unscrew the packing nut (40) to check the u-cup (42). Do not remove the u-cup unless it is damaged.
6. Install the air valve shaft (39), with the o-ring (41), and spring (44), into the back of the gun handle (7). *If the u-cup (42) was removed*, install the air valve shaft (39) before installing the u-cup. Install with its lips facing into the gun handle.
7.  fluid adjustment assembly (45), with the HO03). Tighten the adjustment knob (45c) with the 14 mm socket wrench. Tighten the air valve packing nut (40) until it bottoms.

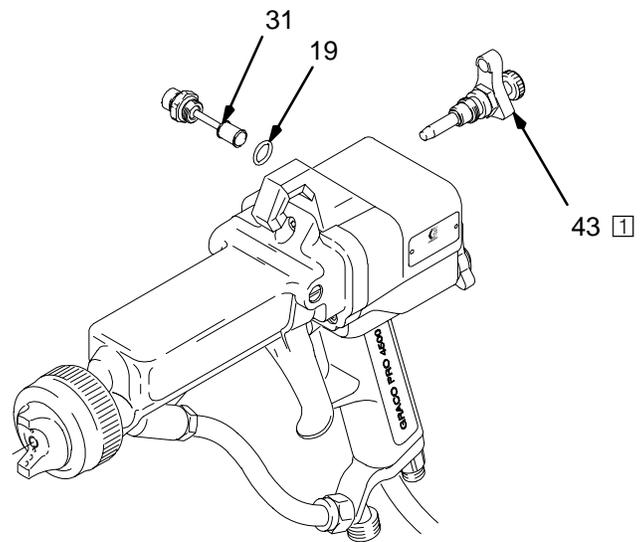
Atomizing Air Valve Removal and Replacement

1. Prepare the gun for service as instructed on page 22.
2. Remove the fan air valve (43). See Fig. 22.

⚠ CAUTION

To avoid damaging the atomizing air valve (31), the fan air valve (43) must be removed before removing the atomizing air valve.

3. Remove the atomizing air valve (31) from the gun handle. Inspect the o-ring (19) and replace if necessary.
4. Install a new atomizing air valve (31).
5. Apply low strength (*purple*) Loctite or equivalent thread sealant to the fan air valve (43) housing threads. Start the valve housing threads into the handle by turning the fan air valve knob. Once the threads are started, rotate the knob (43c) fully counterclockwise. Torque the valve housing (43d) to 10–12 in-lb (1.1–1.4 N•m).



- 1 Apply low strength (*purple*) Loctite or equivalent to fan air valve housing threads; Torque to 10–12 in-lb (1.1–1.4 N.m)

Fig. 22

0386A

Service

ES ON-OFF Valve Repair

1. Prepare the gun for service as instructed on page 22.
2. Loosen the set screw (24) with the 2 mm hex key (69) provided. Remove the lever (26) from the valve. See Fig. 23.

⚠ WARNING



MOVING PARTS HAZARD

To reduce the risk of eye injury, be sure to wear safety glasses when removing or installing the retaining ring (47) as the retaining ring could slip off the tool when compressed.

3. Use internal snap ring pliers to remove the retaining ring (47) from the handle. Align the holes in the retaining ring with the flat on the spacer (32) to ease assembly and disassembly.
4. Remove the valve body (38) from the handle; be careful not to drop the regulator disk (46) and spacer (32).
5. Clean and inspect the parts for damage. Replace if necessary. Lubricate the o-ring (36) with petroleum jelly.

⚠ CAUTION

Do not over-lubricate parts. Excessive lubricant on the o-ring (36) can be pushed into the gun air passage and blemish the finish on the workpiece.

6. Install the regulator disk (46) in the valve (38) with its bevelled side facing toward the valve.



HO03

⚠ CAUTION

Be sure the regulator disk (46) is installed correctly. A missing or incorrectly installed regulator disc can cause severe damage to the power supply.

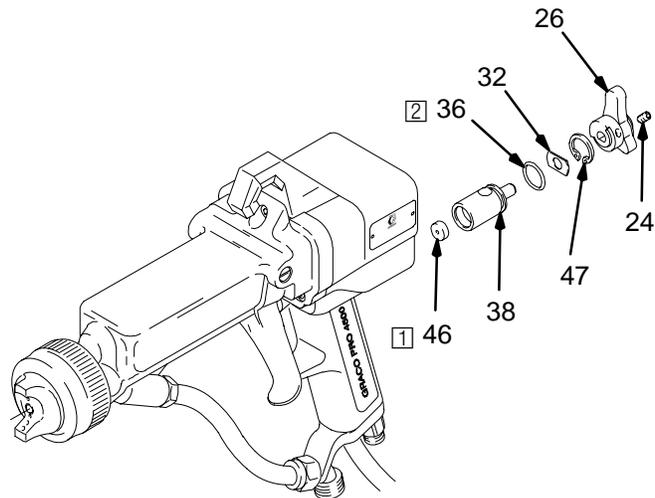
7. Install the valve (38) with the regulator disk (46) and o-ring (36) into the gun handle. Install the spacer (32) on the valve.
8. Install the retaining ring (47) into the groove in the handle. Install the lever (26) and tighten the set screw (24).

⚠ WARNING



MOVING PARTS HAZARD

Make sure that the retaining ring (47) is engaged in the groove in the gun handle when installing the ES ON-OFF Valve. If the retaining ring is missing or improperly installed, the valve assembly can be propelled out of the gun when air pressure is applied and cause serious injury.



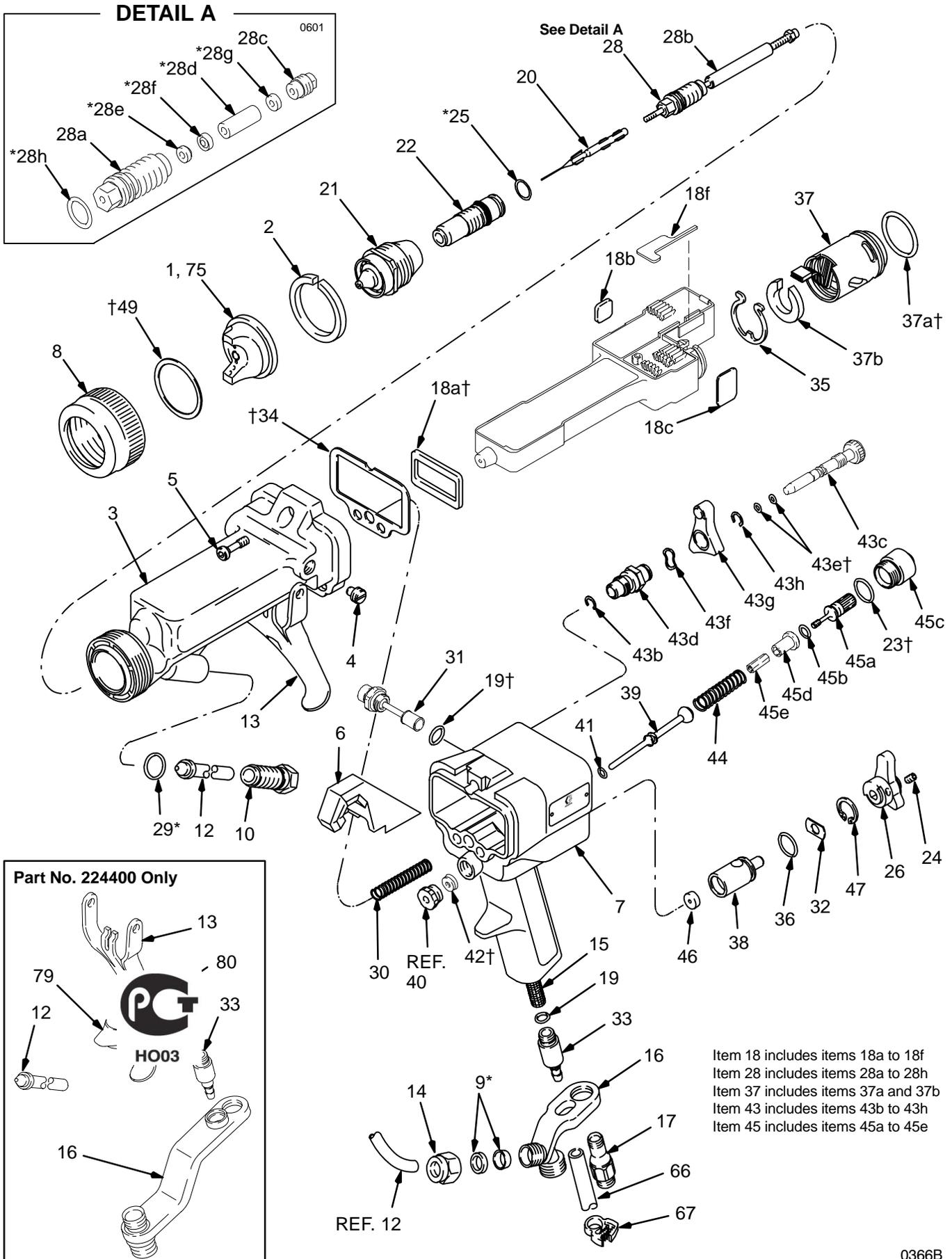
1 Bevelled side of disk (46) faces toward valve (38)

2 Lubricate o-rings with petroleum jelly

0388

Fig. 23

Parts



Parts

WARNING

Some PRO 4500sc Gun replacement parts look similar to other PRO Gun parts but are not interchangeable! **When servicing, do not mix or use other PRO Gun parts!** Use of parts other than those specified in the parts list below could alter the grounding continuity of the gun, cause parts to leak or rupture, or cause the gun to malfunction and result in serious injury, fire, explosion or property damage.

Part No. 224200, Series B

Electrostatic Air Spray Gun, with two-finger trigger

Part No. 224400, Series B

Electrostatic Air Spray Gun, with four-finger trigger

Ref. No.	Part No.	Description	Qty.
1	193033	AIR CAP; See Manual 307803 for available air caps	1
2	176930	RING, retaining	1
3	223940	BARREL, gun	1
4	186654	SCREW, trigger	2
5	185096	SCREW, cap, relieved; M5 x 0.8	3
6	185097	HOOK	1
7	224851	HANDLE, gun	1
8	187423	NUT, air cap	1
9*	110077	FERRULES, fluid tube	1
10	186621	FITTING, fluid tube	1
11▲	179791	TAG, warning	1
12	224367	TUBE ASSY, fluid; 224200 only	1
	224910	TUBE ASSY, fluid; 224400 only	1
13	186791	TRIGGER; 224200 only	1
	189034	TRIGGER; 224400 only	1
14	110079	NUT, fluid tube	1
15	185122	MUFFLER (flame arrestor)	1
16	185104	BRACKET, gun fitting; 224200 only	1
	236120	BRACKET, gun fitting; 224400 only	1
17	185105	FITTING, air	1
18	236039	POWER SUPPLY ASSY; 85 KV	1
	Series B	Includes items 18a–18f	1
18a†	186840	• GASKET, power supply	1
18b	185099	• PAD	1
18c	185145	• PAD	2
18f	192361	• PAD	1
19†	106555	O-RING; Viton®	2
20	190933	NEEDLE, electrode	1
21	185158	NOZZLE, fluid, See Manual 307803 for available nozzles	1
22		STUD, resistor	1
23†		O-RING, PTFE	1
24		SET SCREW, lever; M4 x 0.7	1
25*	HO03	O-RING; fluoroelastomer	1
26	186839	LEVER, ES valve	1
28	224747	PACKING ROD ASSY	1
		Includes items 28a–28h	1
28a	185495	• HOUSING, packing	1
28b	223981	• ROD, fluid	1
28c	185488	• NUT, packing	1
28d*	186069	• SPACER, packing	1
28e*	178763	• PACKING, needle	1
28f*	178409	• PACKING, fluid	1



Ref. No.	Part No.	Description	Qty.
28g*	111504	• O-RING, fluoroelastomer	1
28h*	111316	• O-RING, fluoroelastomer	1
29*	102982	O-RING; Viton	1
30	185111	SPRING, compression	1
31	238927	VALVE, atomizing air	1
32	185119	SPACER, lever	1
33	185112	ADAPTER; 224200 only	1
	188878	ADAPTER; 224400 only	1
34†	185113	GASKET, manifold; polyethylene	1
35	185114	RING, retainer, alternator	1
36	113746	O-RING, CV75	1
37	222319	ALTERNATOR, turbine	1
		Includes items 37a & 37b	1
37a†	110073	• O-RING, Viton	1
37b	185124	• CUSHION	1
38	185118	VALVE, electrostatic	1
39	224194	SHAFT ASSY., air valve	1
40	185115	NUT, packing	1
41	111508	O-RING, trigger valve; fluoroelastomer	1
42†	105452	U-CUP, PTFE	1
43	223978	VALVE ASSY, fan air	1
		Includes items 43b–43h	1
43b	105681	• RING, retaining	1
43c	191806	• KNOB, fan air adjustment	1
43d	186837	• HOUSING, valve	1
43e†	168518	• O-RING, Viton	2
43f	111221	• SPRING, wave	1
43g	224196	• LEVER, voltage adjustment	1
43h	111510	• RING, external retaining	1
44	185116	SPRING, compression, air valve	1
45	238895	VALVE ASSY., fluid adjustment	1
		Includes items 45a–45e	1
45a	186826	• STEM, fluid adjustment	1
45b	111516	• O-RING, CV 75	1
45c	186822	• KNOB	1
45d	191794	• SLEEVE, guide	1
45e	191795	• STOP, sleeve	1
46	107107	REGULATOR, disc	1
47	110082	RING, retaining	1
49†	186848	GASKET, air cap nut	1
62	191744	TOOL, multi	1
63	107460	WRENCH, barrel	1
66	185103	TUBE, exhaust; polyurethane	1
67	110231	CLAMP, exhaust tube	1
69	110086	TOOL, hex key, allen wrench; 2 mm	1
71▲	180060	SIGN, warning, English	1
		See Accessories for additional signs	1
72	180209	COVER, gun; Order Part No. 218374 for package of 10	1
73	235300	BRACKET, gun hanging	1
77†	185079	PLUG, optional, to install in place of item 31	1
79	189023	TAB, four-finger; 224400 only	1
80	112324	SCREW, mach.; 4–40 x 0.25"; 224400 only	1

* These parts are included in Fluid Seal Repair Kit 224634, which may be purchased separately.

† These parts are included in Air Seal Repair Kit 224633, which may be purchased separately.

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

☞ Parts not shown.

Accessories

AIR LINE ACCESSORIES

Conductive Air Supply Hose; black

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

FM Approved; Color coded black; 0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

220444	6 ft (1.8 m)
218100	15 ft (5 m)
218101	25 ft (8 m)
218102	36 ft (11 m)
218103	50 ft (15 m)
220119	75 ft (23 m)
220120	100 ft (30.5 m)

Conductive Air Supply Hose; gray

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

FM Approved; Color coded gray; More flexible than black hose; 0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

223068	6 ft (1.8 m)
223069	15 ft (5 m)
223070	25 ft (8 m)
223071	36 ft (11 m)
223072	50 ft (15 m)
223073	75 ft (23 m)
223074	100 ft (30.5 m)

Conductive Air Supply Hose; red

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

Meets CENELEC EN 50 050 requirement for metallic ground path; Color coded red; Stainless steel braid ground path; 0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

235068	6 ft (1.8 m)
235069	15 ft (5 m)
235070	25 ft (8 m)
235071	36 ft (11 m)
235072	50 ft (15 m)
235073	75 ft (23 m)
235074	100 ft (30.5 m)

Air Swivel Fitting 236129

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

Replaces standard fitting (item 17 in Parts List); 1/4 npsm(m) left-hand thread

Extended Air Fitting 189191

Replaces standard fitting (item 17 in Parts List) to provide an extended handle grip area.



Air Shutoff Valve 224754

150 psi (10 bar, 1.0 MPa) Maximum Working Pressure

For turning air to gun off or on. 1/4 npsm(m) x 1/4 npsm(f) left-hand thread



Air Adapter Nipple 185493

For connecting two or more grounded gun air supply hoses. 1/4 npt x 1/4 npsm left-hand thread

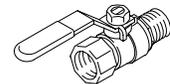
Quick Disconnect Swivel Coupling Assy. 112534

Includes a quick disconnect coupling insert, which replaces air inlet fitting 185105, and a swivel shut-off coupling body (left-hand thread), which connects to the grounded air hose.

Bleed-type Master Air Valve 107141

300 psi (21 bar, 2.1 MPa) Maximum Working Pressure

Relieves air trapped in the air line between the paint pump air motor and this valve when closed. 3/4 npt



HO03

Accessories

FLUID LINE ACCESSORIES

Fluid Hose Assemblies (Nylon)

225 psi (14 bar, 1.4 MPa) Maximum Working Pressure

FM Approved; 1/4 in. (6.35 mm) ID, 3/8 npsm(fbe)

215637 25 ft (8 m)

215638 50 ft (15 m)

Fluid Hose Assemblies (Nylon)

500 psi (35 bar, 3.5 MPa) Maximum Working Pressure

FM Approved; 1/4 in. (6.35 mm) ID, 3/8 npsm(fbe)

216076 25 ft (8 m)

216077 50 ft (15 m)

216079 100 ft (30 m)

Fluid Shutoff/Drain Valve

500 psi (35 bar, 3.5 MPa) Maximum Working Pressure

For turning fluid off or on to the gun and for relieving fluid line pressure at the pump

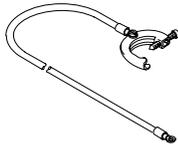
208630 1/2 npt(m) x 3/8 npt(f); carbon steel and PTFE; for non-corrosive fluids



MISCELLANEOUS ACCESSORIES

Grounding Clamp and Wire 222011

12 ga, 25 ft (7.6 m) wire



Megohmmeter 241079

500 Volt output; 0.01–2000 megohms.

Not for use in Hazardous areas.



HO03

Paint Resistance Meter 722886

Used with 722860 Paint Probe to measure resistance of paint. **Not for use in Hazardous areas.**

Paint Probe 722860

Used with 722886 Paint Resistance Meter to measure resistance of paint. **Not for use in Hazardous areas.**

Safety Warning Signs

FM Approved; Available at no charge from Graco. Must be ordered separately.

180060 Warning Sign (English)

GUN ACCESSORIES

Gun Washer Kit Part No. 236681

For use with a Graco Gun Washer to clean the PRO 3500 and PRO 4500 Electrostatic Spray Guns.

Snap Ring Pliers 110090

For removing the ES ON-OFF Valve Retaining Ring (item 47 in Parts List).

ES ON/OFF Valve Conversion Kit 223976

FM Approved; Converts the ES ON/OFF Valve to a constant on setting. A ball valve is included for complete air shut-off at the gun.

Push-Pull Pattern Adjustment Valve 224720

FM Approved; Pattern adjustment valve that allows quick adjustment of the pattern width between two adjustable settings.

Four-Finger Trigger Conversion Kit 224884

FM Approved; Converts gun from a two-finger to a four-finger trigger.

Gun Power Supply with RF Transmitter 224100

Power supply with transmitter capability for spraying voltage readout (SVR).

Accessories

GUN SYSTEMS

Gun System 224637

With 36 ft (11 m) conductive air hose. Includes:

Part No.	Description	Qty
224200	PRO 4500sc ES Spray Gun	1
223071	Conductive Air Hose, 36 ft (11 m)	1
206199	Air Regulator with Gauge	1
106149	Air Filter	1
158491	Hex Nipple	1
158212	Bushing	1
164672	Hex Red. Nipple	1

Gun System 224638

With 50 ft (15.25 m) conductive air hose. Includes:

Part No.	Description	Qty
224200	PRO 4500sc ES Spray Gun	1
223072	Conductive Air Hose, 50 ft (15.25 m)	1
206199	Air Regulator with Gauge	1
106149	Air Filter	1
158491	Hex Nipple	1
158212	Bushing	1
164672	Hex Red. Nipple	1

Gun System 224640

With 25 ft (7.6 m) conductive air hose. Includes:

Part No.	Description	Qty
224200	PRO 4500sc ES Spray Gun	1
223070	Conductive Air Hose, 25 ft (7.6 m)	1
206199	Air Regulator with Gauge	1
106149	Air Filter	1
158491	Hex Nipple	1
158212	Bushing	1
164672	Hex Red. Nipple	1

Gun System 224639

Includes:

Part No.	Description	Qty
224200	PRO 4500sc ES Spray Gun	1
223070	Conductive Air Hose, 25 ft (7.6 m)	1
216076	Fluid Hose, 25 ft (7.6 m)	1
106148	Air Filter	1



HO03

Technical Data

Category	Data
Gun Weight	34.3 oz (974 g)
Gun Length	11.1 in (283 mm)
Maximum Working Pressure	100 psi (7 bar, 0.7 MPa)
Air Pressure Operating Range	0–100 psi (0–7 bar, 0–0.7 MPa)
Fluid Pressure Operating Range	0–100 psi (0–7 bar, 0–0.7 MPa)
Voltage Output	0–85 kV
Short Circuit Current Output	120 mA
Paint Resistivity Range	3 megohm-cm to infinity☆
Air Inlet	1/4 npsm(m) left-hand
Fluid Inlet	3/8 npsm(m)
Typical Noise Level at 40 psi (2.8 bar, 0.28 MPa)*	Sound Pressure † 91 Db(A) Sound Power ‡ 90.7 Db(A)
Maximum Noise Level at 100 psi (7 bar, 0.7 MPa)**	Sound Pressure † 100.5 Db(A) Sound Power ‡ 105.3 Db(A)
Wetted Parts	Stainless Steel, Nylon, Acetal, Ultra High Molecular Weight Polyethylene, Ceramic, Epoxy, Fluoroelastomer, PEEK, Music Wire, Polyethylene

Radio Frequency Transmitter Approval (only applies when accessory power supply 224100 is installed)

FCC ID: JHI1

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1.) This device may not cause harmful interference, and 2.) This device must accept any interference received, including interference that may cause undesired operation.

Changes or modification to this equipment, not expressly approved by the party responsible for compliance, could void the user's authority to operate this equipment.

This equipment complies with (DOC) GRR II 6. (4)
En conformite avec (MDC) RGR II 6. (4).

* Noise levels measured with a 40 psi (2.8 bar) air supply at the gun air inlet and typical gun air flow settings.

** Noise levels measured with a 100 psi (7 bar) air supply at the gun air inlet and maximum gun air flow settings.

† Sound pressure was measured per Cagi Pneurop, 1969.

‡ Sound power was measured per ISO-3744, 1981.

☆ This is the allowable paint resistivity range for this gun. Note that electrostatic effect may drop off below about 25 megohm cm.

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Chemraz® is a registered trademark of the Green, Tweed, & Co.

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Manual Change Summary

This manual has been changed per ECO's V6099, V5645, V5457, V4871, and V389201.



HO03

Graco Standard Warranty

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

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

Graco makes no warranty, and disclaims all implied warranties of merchantability and fitness for a particular purpose in connection with accessories, equipment, materials or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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