



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

INSTRUCTIONS

Model PRO 4500scTM Electrostatic Air Spray Gun

85 kV, MANUAL GUN

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

For use with Class I, Group D paint spray materials

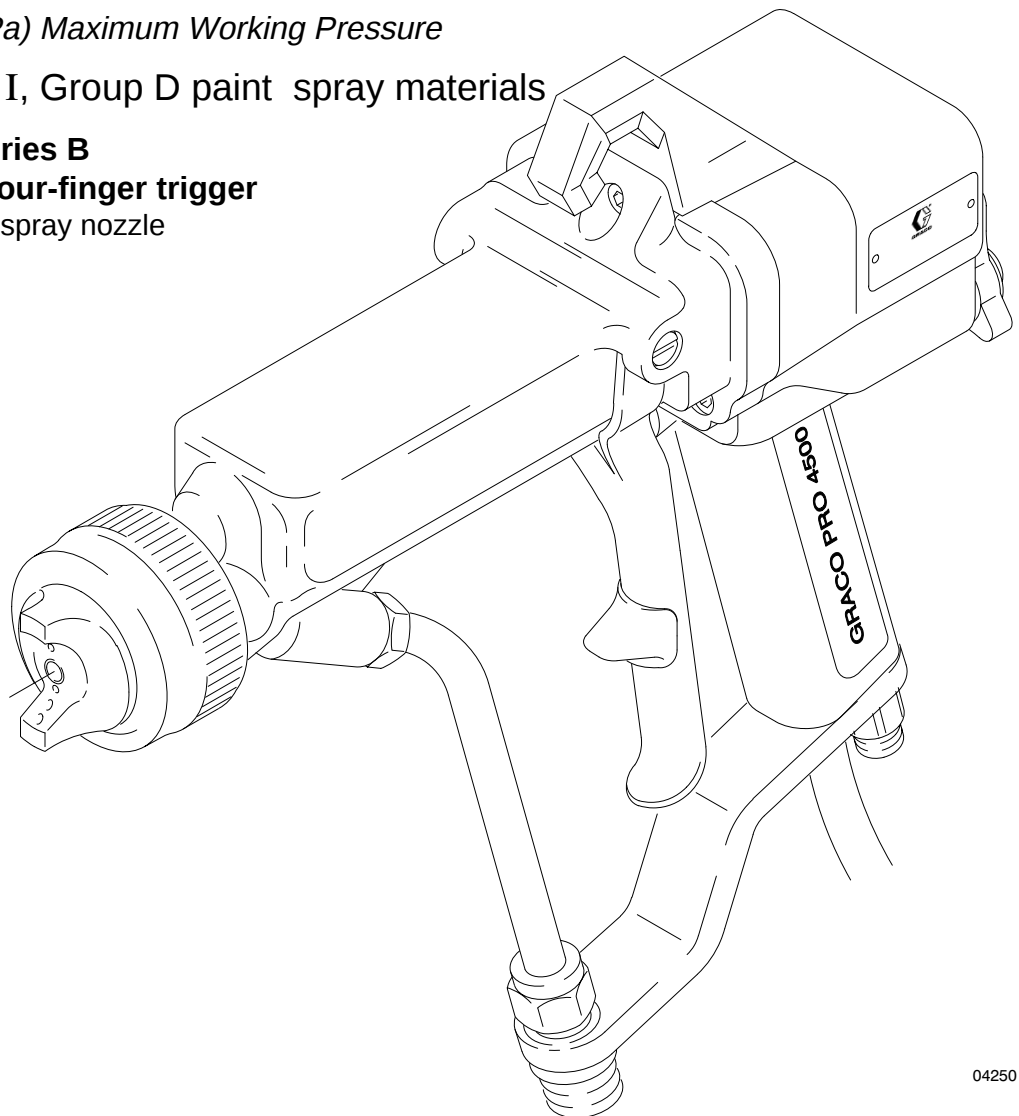
Part No. 956-623, Series B

Air Spray Gun with four-finger trigger

With 0.059 in. (1.5 mm) spray nozzle

**Factory
Mutual
System**

Approved



04250

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

Patented 1986, 1987 Canada

Brevete 1986, 1987

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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.

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 cleaning, flushing, or purging electrostatic equipment, use solvents that comply with your local regulations. *For countries following the U.S. National Fire Protection Association (NFPA) 33 requirements*, use solvents with a flash point higher than 100° F (38° C) or a solvent normally used in spray operations. *For European Countries complying with EN 50053*, use solvents with a flash point as high as possible and higher than the ambient temperatures.
- 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 local, state, and national guidelines.
- Wear appropriate protective clothing, gloves, eyewear, and respirator.

! 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 stop or deflect fluid leaks with your hand, body, glove, or rag.
- Do not point the spray gun at anyone or any part of the body.
- 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

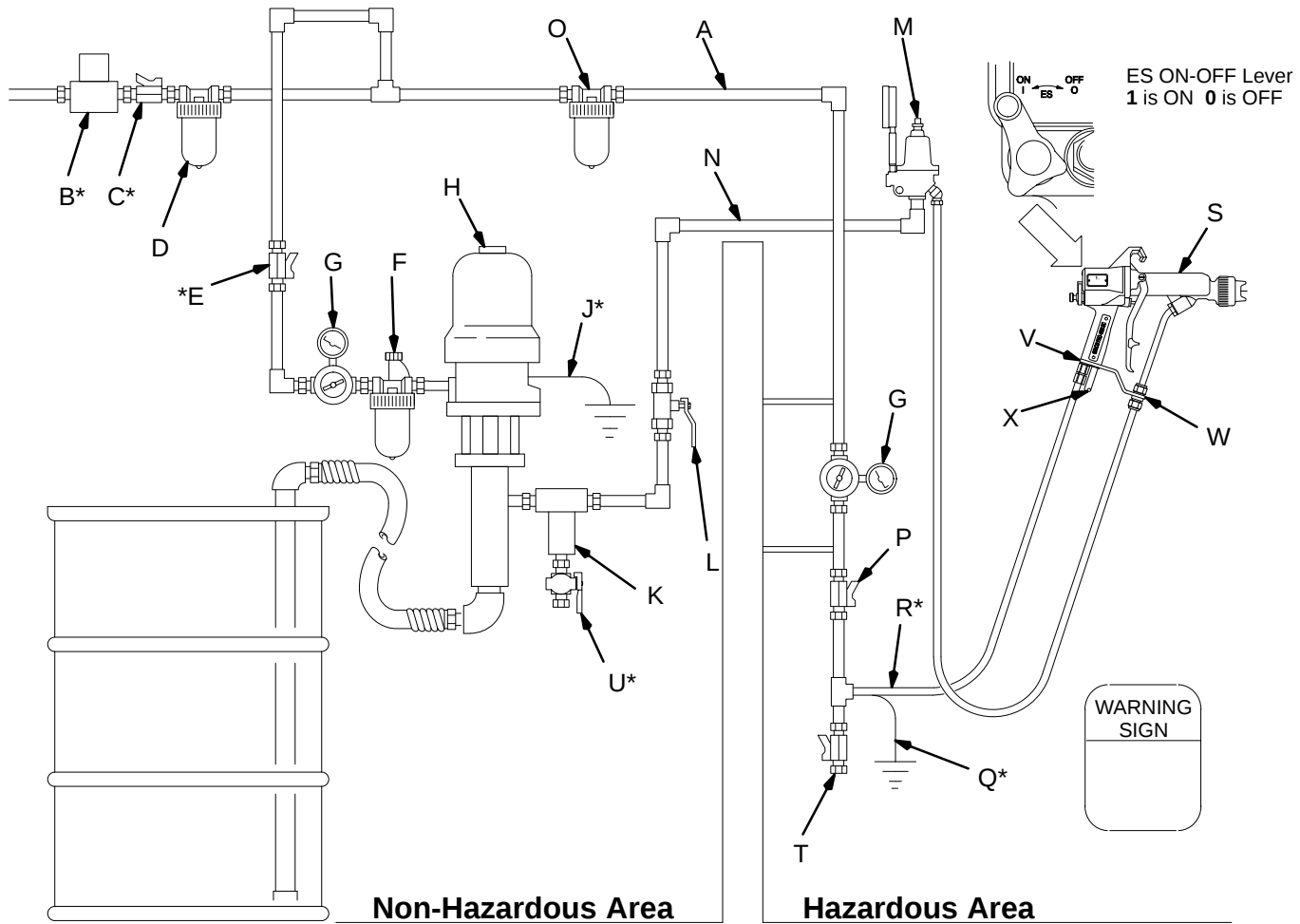


EQUIPMENT MISUSE HAZARD

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.

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.

04267

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 32.

Connect the Fluid Line (See 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 solvent that is compatible with the fluid to be sprayed.

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, etc.) can become electrically charged. Improper grounding can result in static sparking, 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.
11. *Air compressors and hydraulic power supplies*: ground according to the manufacturer's recommendations.

Installation

Check the Electrical Grounding (See Fig. 2)

**WARNING**



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD
Megohmmeter P/N 218-979 (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.

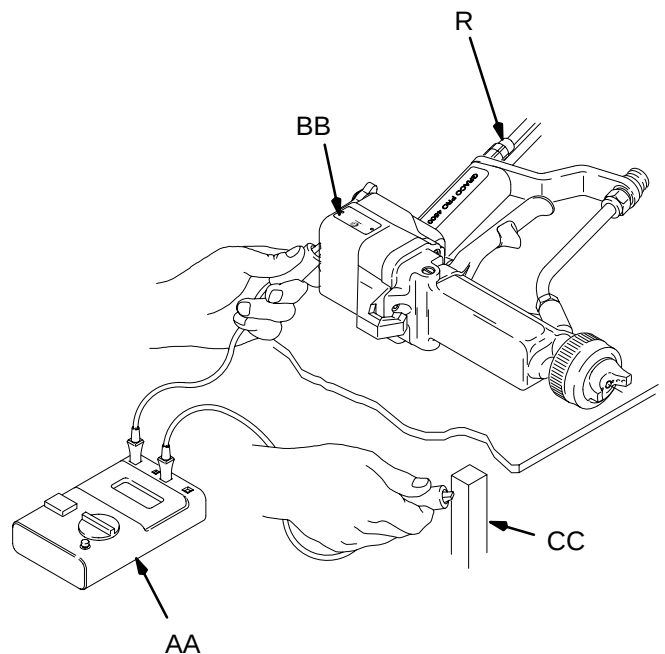


Fig. 2

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Operation

Pressure Relief Procedure

WARNING

PRESSURIZED EQUIPMENT HAZARD

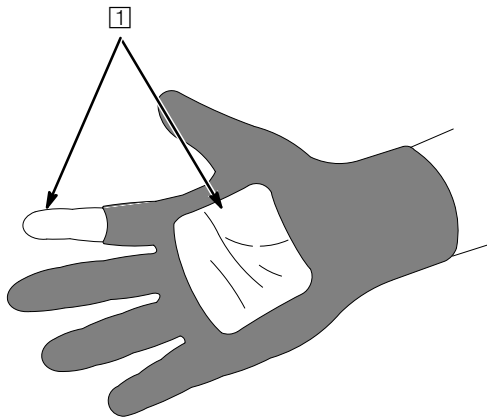
The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from electric shock, accidental spray from the gun, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

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

1. Turn the ES ON-OFF lever 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.



 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

- ____ 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

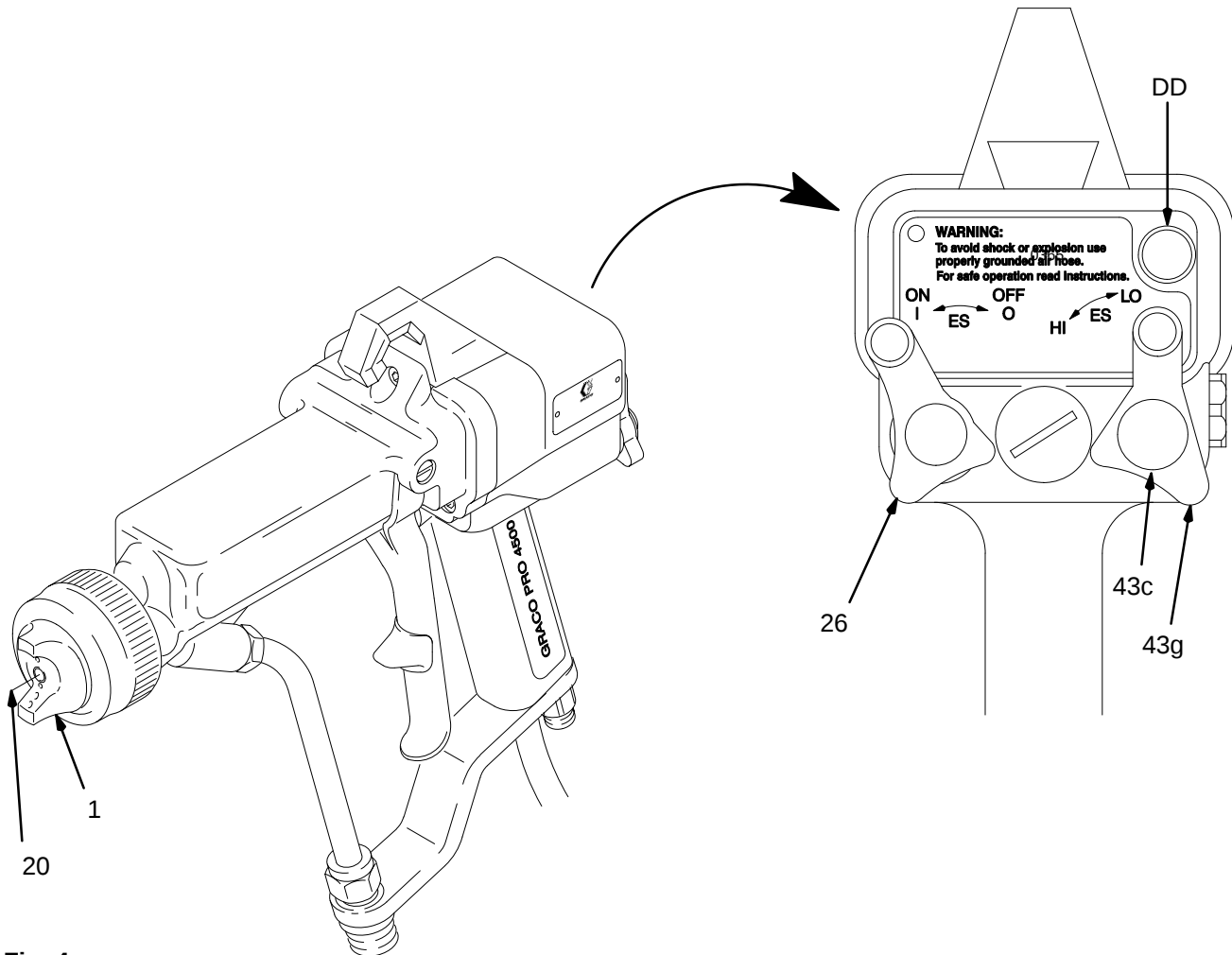


Fig. 4

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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 191–833, and air cap, P/N 193–033. If your application requires a different nozzle and air cap combination, use instruction manual 307–803 or consult your authorized Graco 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.

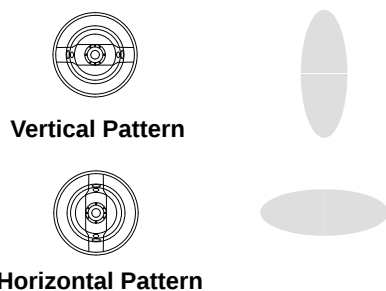


Fig. 5

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3. Adjust the fluid flow by using the fluid line pressure regulator. Refer to instruction manual 307–803 to set the fluid pressure for various fluid flows, according to the size of the fluid nozzle being used.
4. Fully open the fan air valve (43c).
5. 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.

NOTE: If the pressures listed in the following chart result in too much flow to the air cap, an atomizing air valve, part no 238–927, can be ordered and installed to limit air cap flow while maintaining full turbine air pressure.

Air Hose Length ft. (m)	Dynamic pressure at air hose inlet required for full voltage psi (bar, MPa)
15 (4.6)	45 to 50 (3.1 to 3.5, 0.31 to 0.35)
25 (7.6)	50 to 55 (3.5 to 3.8, 0.35 to 0.38)
50 (15.3)	60 to 65 (4.2 to 4.5, 0.42 to 0.45)
75 (22.9)	68 to 73 (4.7 to 5.0, 0.47 to 0.50)
100 (30.5)	75 to 80 (5.2 to 5.5, 0.52 to 0.55)

6. Adjust the atomization with the air pressure regulator.

NOTE: Use the lowest air pressure setting needed for acceptable atomization. The slower particle velocity will improve the electrostatic effect.

7. Adjust the pattern width with the fan air valve (43c).

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

8. 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.

9. 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 any 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.

⚠ 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 any cleaning method which may allow solvent into the gun air passages. Point the gun down while cleaning to prevent fluid from running 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.

NOTE: A Gun Washer Kit, P/N 236–681, 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.

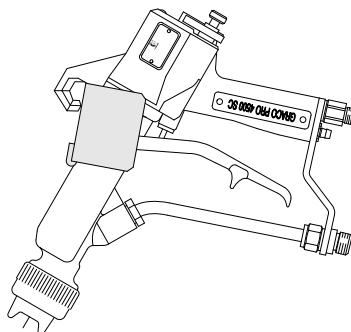


Fig. 6

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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. Test gun resistance as instructed on page 20.

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.

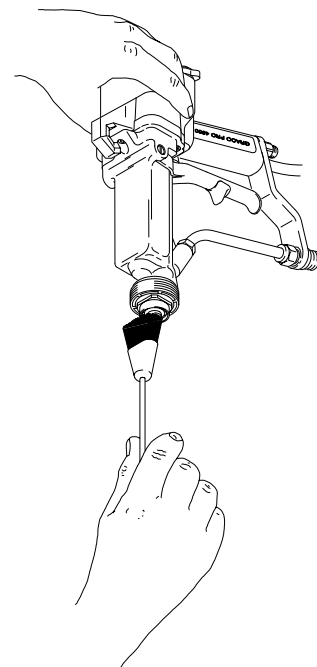


Fig. 7

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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

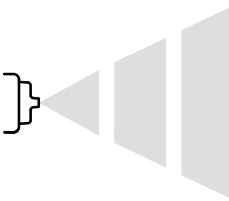
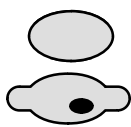
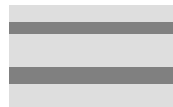
PRESSURIZED EQUIPMENT HAZARD

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.

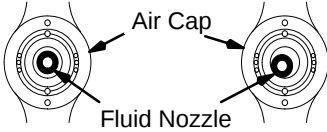
Spray Pattern Troubleshooting

NOTE: Some improper patterns 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.	Reduce 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

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 29.
	The air valve o-ring is sticking.	Lubricate the o-ring; see page 29.
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 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 29.
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.  ALIGNED 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 218-979 (A) and an applied voltage of 500 volts to complete these electrical tests. Connect the leads as shown.

**WARNING**



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD
Megohmmeter P/N 218-979 (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.

Test Gun Resistance (See Fig. 8)

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

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.

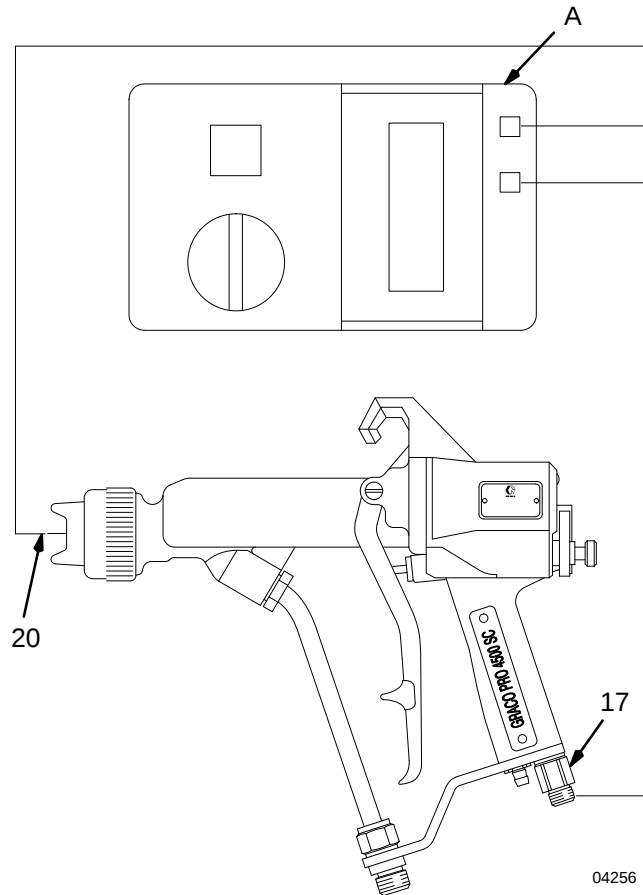


Fig. 8

04256

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 (18e) *[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 (18e) is in place on the end of the power supply before installing the power supply back into the gun.

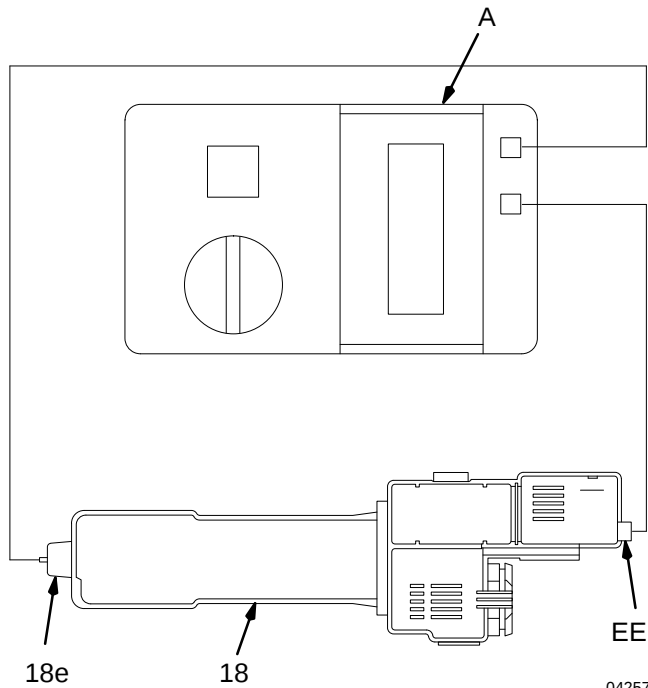


Fig. 9

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 ring contact (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.

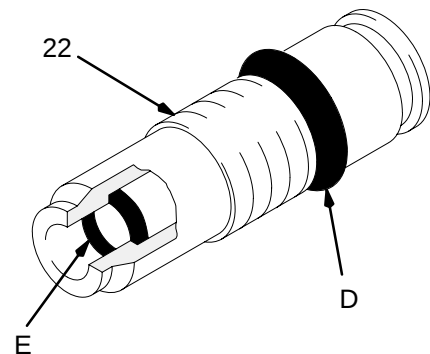


Fig. 10

0373

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 33.

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 spray gun from the worksite for service or repair. Service or repair area must be clean.

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).

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 the 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) or operate the gun without the contact ring in place. Do not replace the resistor stud (22) 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.

7. Install air cap assembly (1, 8, 49) and retaining ring (2). Test gun resistance as instructed on page 20.

Service

Air Cap/Nozzle/Resistor Stud Replacement (continued)

8. 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).
9. Install air cap assembly (1, 8, 49) and retaining ring (2). Test gun resistance as instructed on page 20.

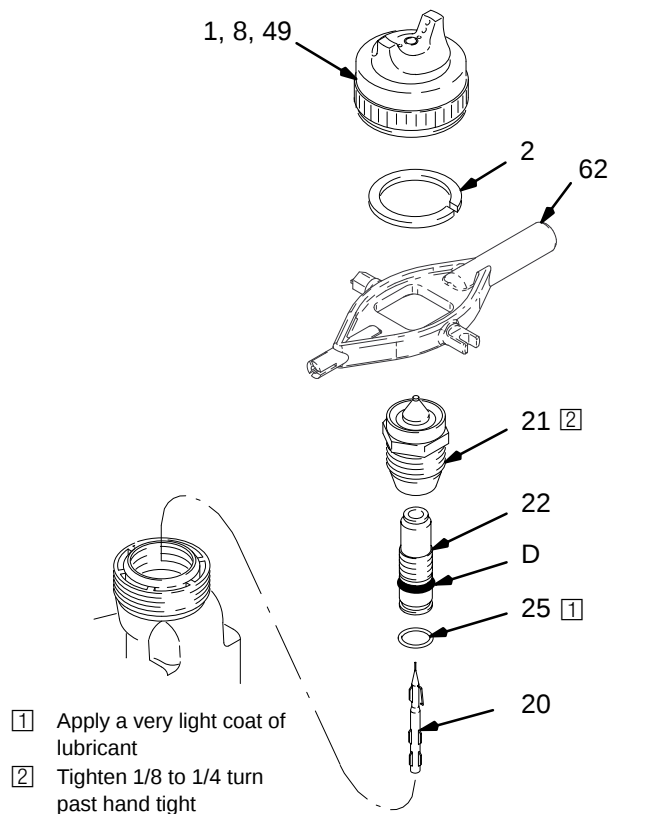


Fig. 11

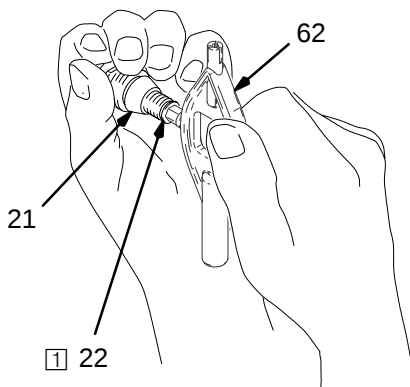


Fig. 12

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) provided. 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 the electrode needle.

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 as described in **Air Cap/Nozzle/Resistor Stud Replacement**, on page 22.
6. Test the gun resistance as instructed on page 20.

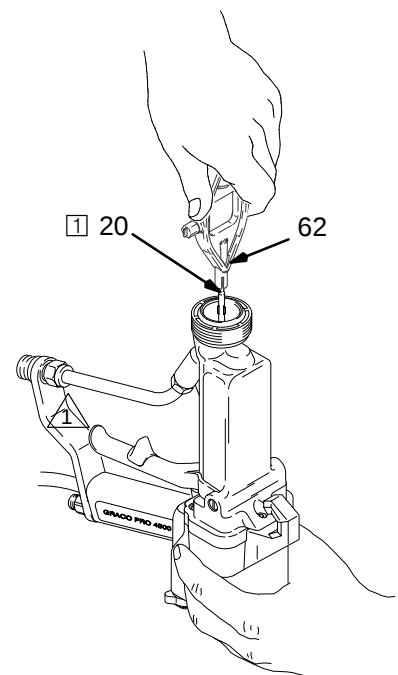


Fig. 13

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), always pull the gun barrel straight away. If necessary, gently move the gun barrel from side to side to free it from the gun handle.

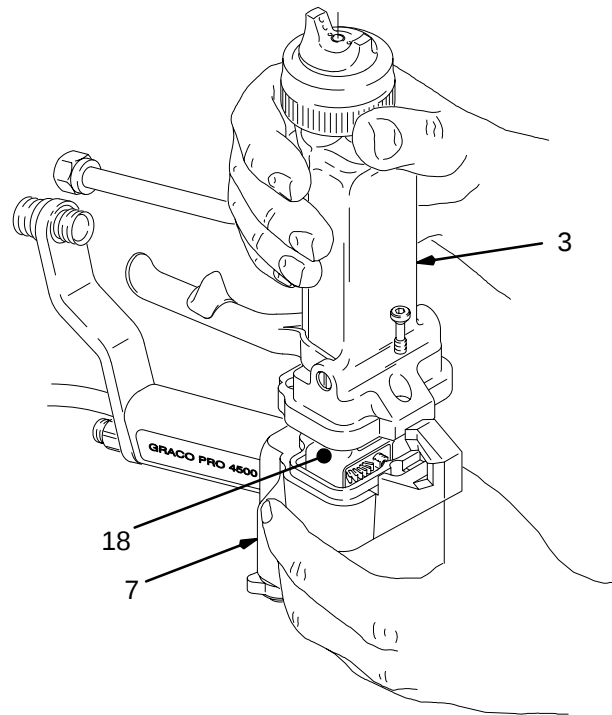


Fig. 15

04260

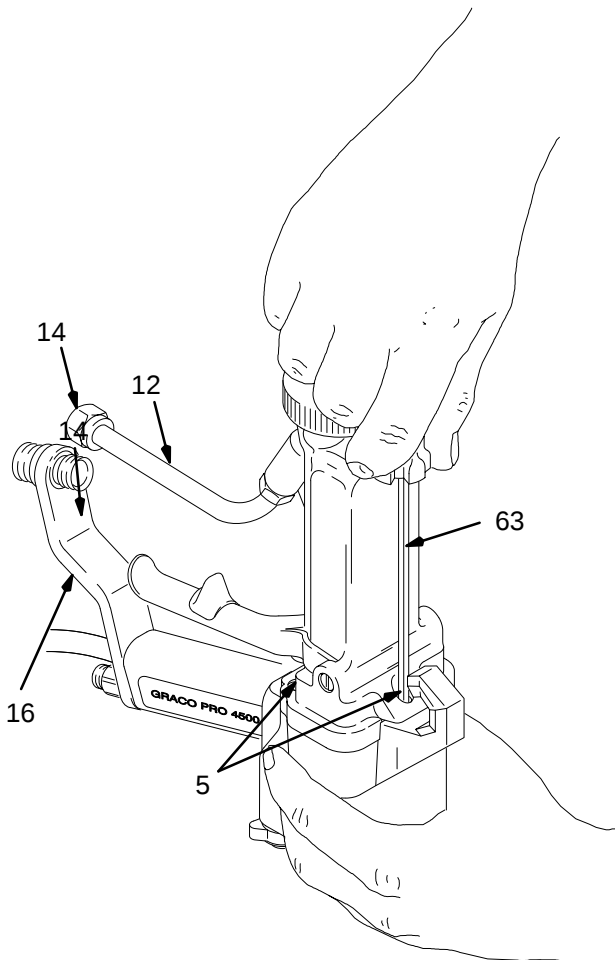


Fig. 14

04259

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. Remove the trigger screws (4) and the trigger (13) 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.

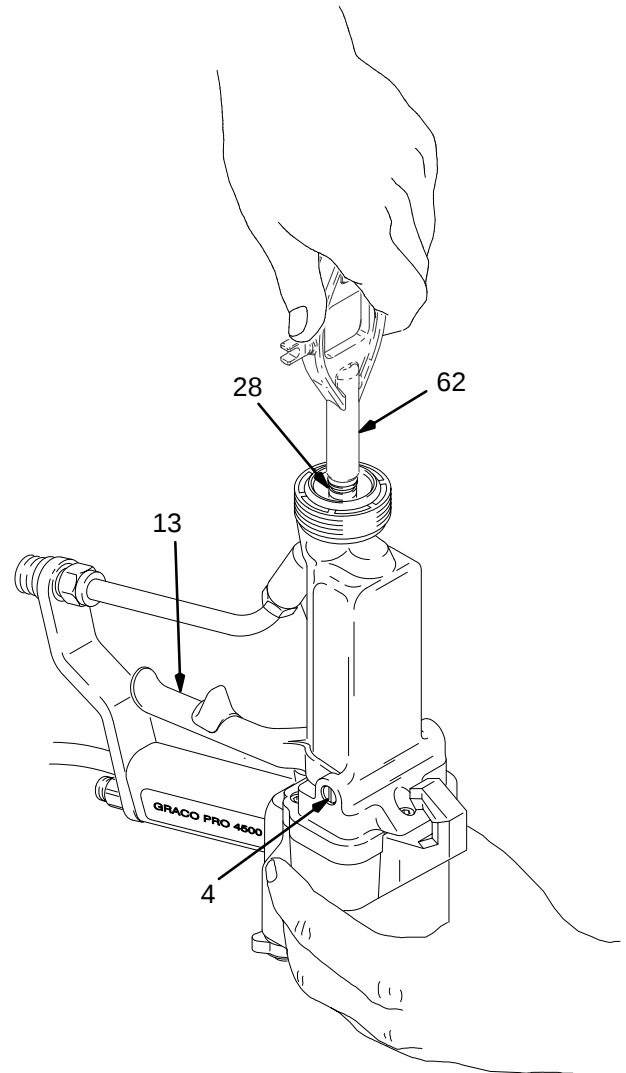


Fig. 16

04262A

Service

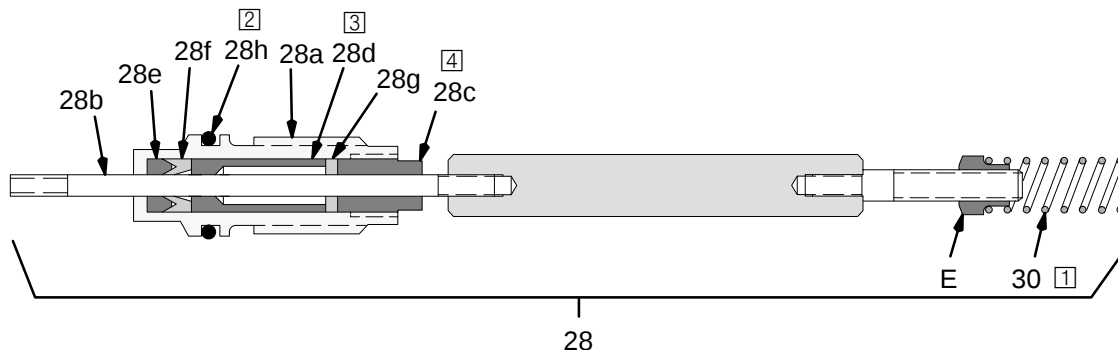
Fluid Packing Rod Repair

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 to 2 lbs (9 N) of drag force

Fig. 17

0383

Service

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

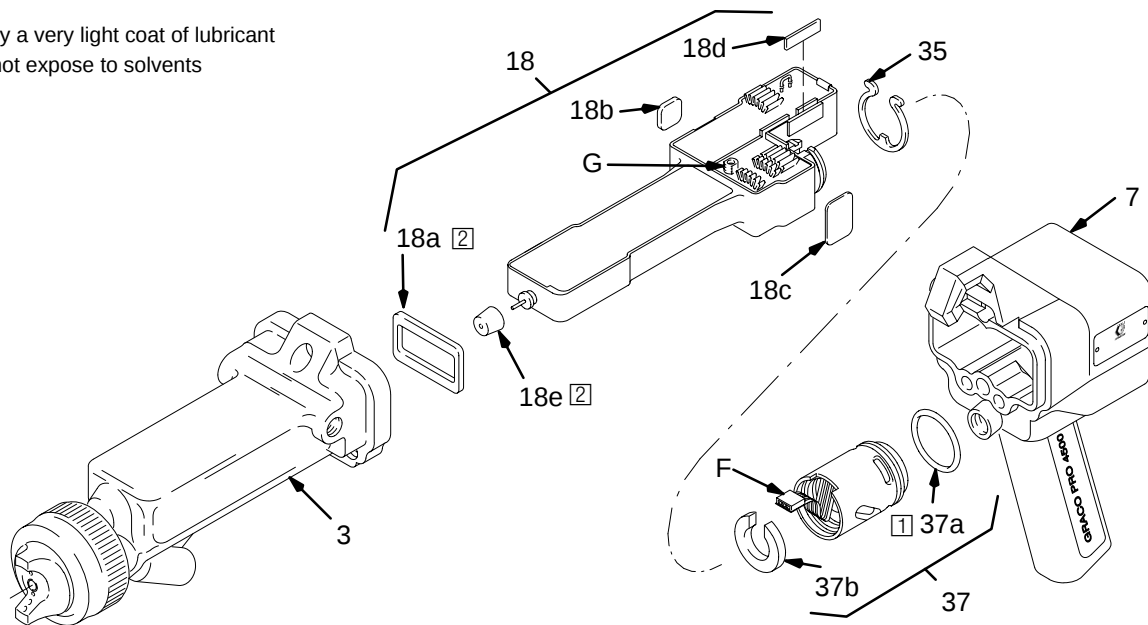


Fig. 18

04263

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 (18e) or gasket (18a) to solvents as it will damage them.

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

CAUTION

Be careful when handling the power cartridge to avoid damaging it.

3. Grasp the power supply (18) with your hand. With a gentle side to side motion, pull the power supply free from the gun handle (7), then pull it straight out. See Fig. 18.
4. Inspect the power supply for any physical damage. Check 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–18e) 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 between 45 and 80 kV.

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 it; 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 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). 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

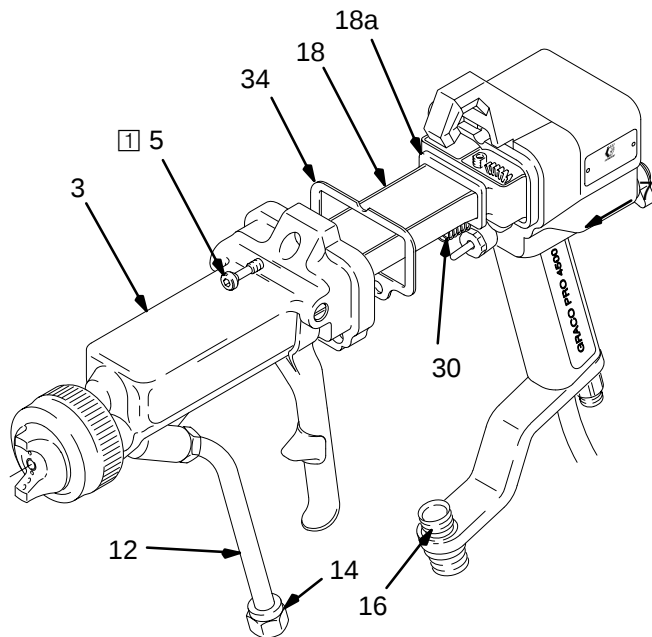
1. Be sure the gaskets (34 & 18a) and spring (30) are in place. See Fig. 13. Replace if damaged.

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 18.



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

Fig. 19

04261

0381

Service

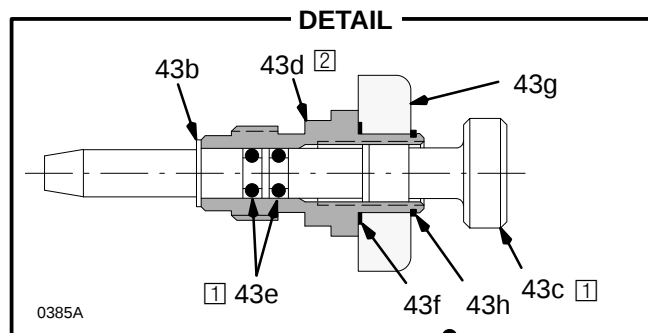
Fan Air Adjustment Valve Repair

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. Reassemble the retaining ring.
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)

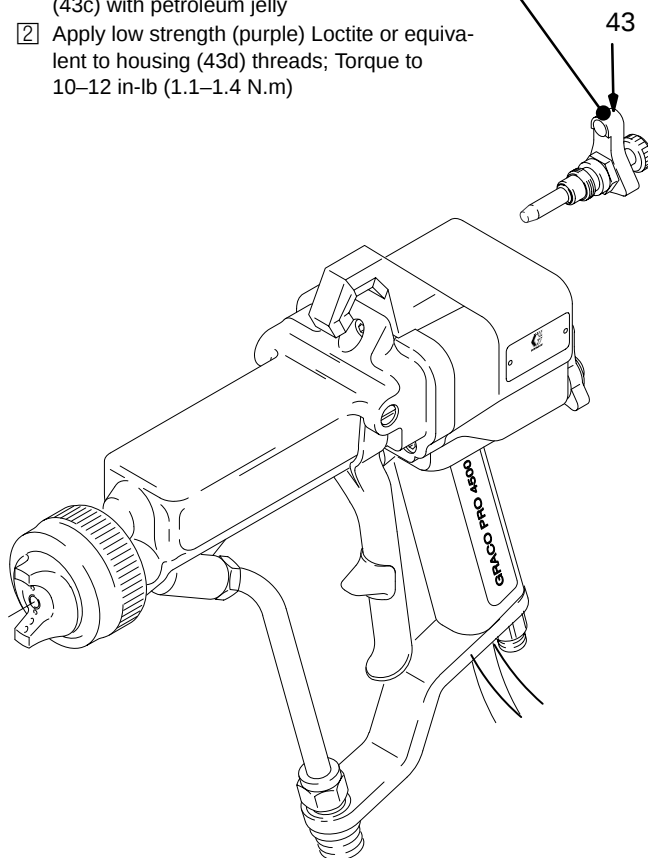


Fig. 20

04264A

Service

Air Trigger Valve Repair

1. Prepare the gun for service as instructed on page 22.
2. Using a screwdriver, remove the cap (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.

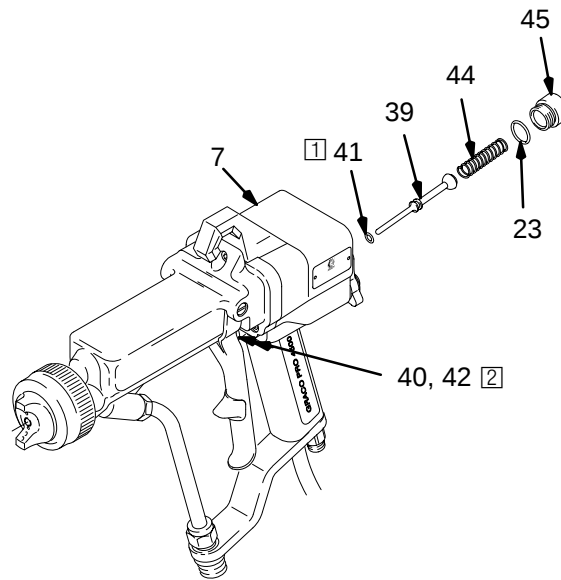
4. Check the o-rings (41, 23) for damage and replace if necessary. Apply petroleum jelly to the o-rings.

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 the u-cup with its lips facing into the gun handle.
7. Install the cap (45), with the o-ring (23). Tighten the adjustment knob (45c) with the 14 mm socket wrench. Tighten the air valve packing nut (40) until it bottoms.



- 1 Lubricate o-rings with petroleum jelly
- 2 Do not remove u-cup (42) unless damaged. Install with lips facing into handle. Tighten packing nut (40) until it bottoms.

Fig. 21

04265

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. 22.

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 in toward the valve.

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.

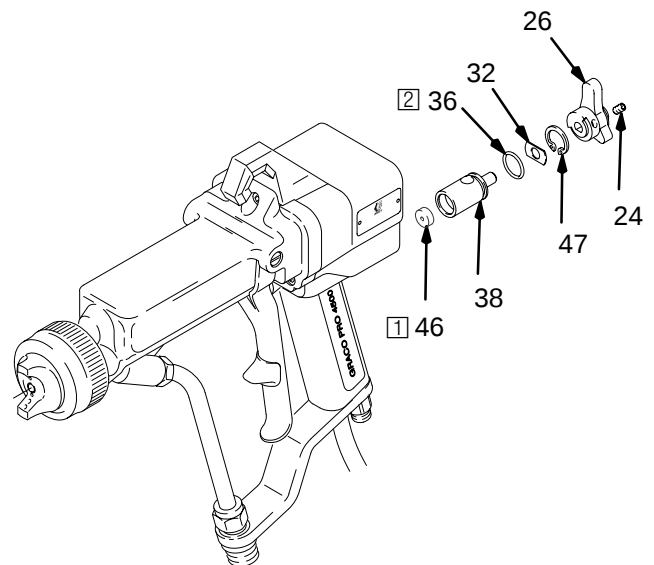
7. Install the valve (38) with the regulator disk (46) and o-ring (36) into the gun handle. Install the spacer (32) on the valve.
8. Install the retaining ring (47) into the groove in the handle. Install the lever (26) and tighten the set screw (24).

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.



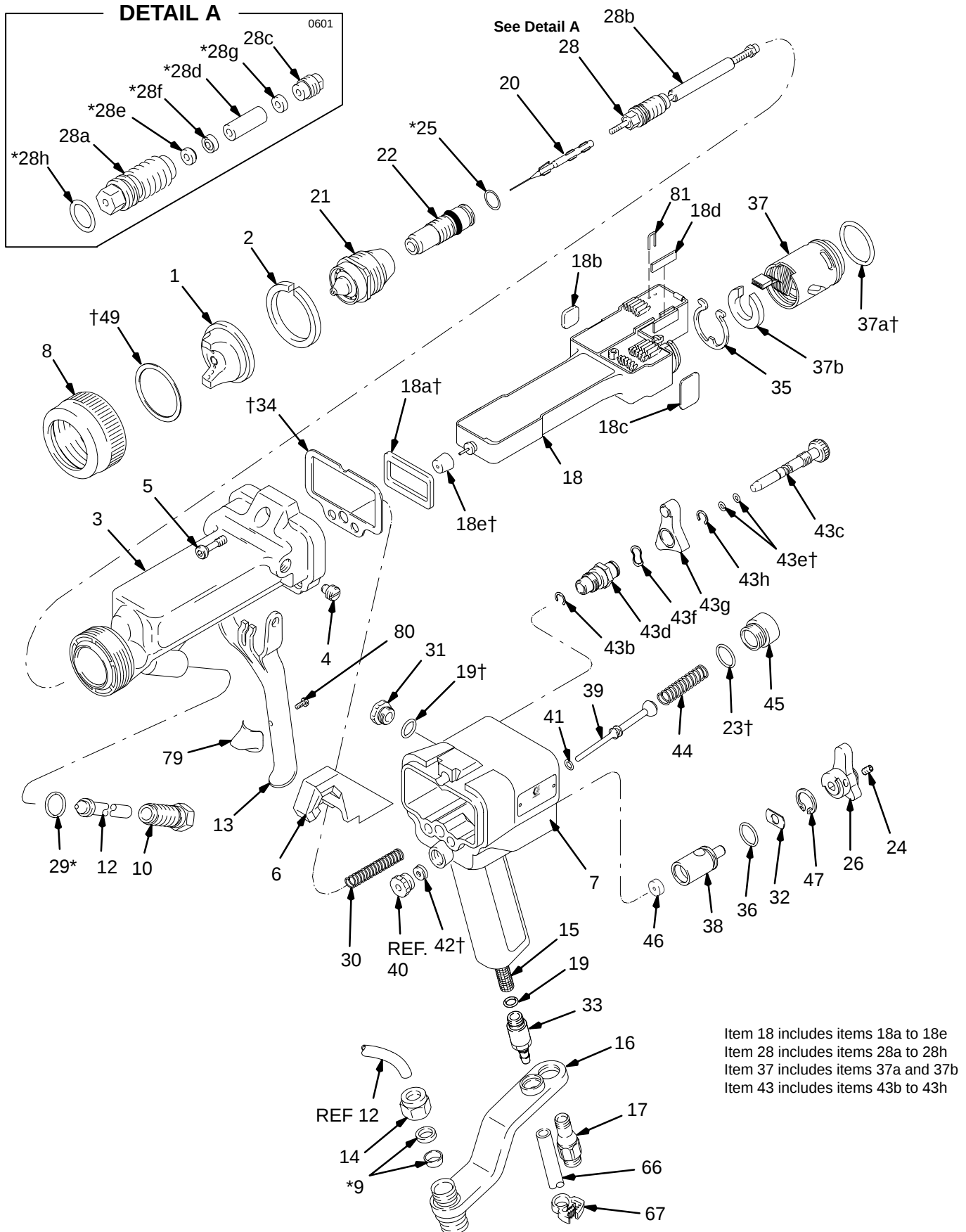
1 Bevelled side of disk (46) faces toward valve (38)

2 Lubricate o-rings with petroleum jelly

Fig. 22

04266

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. 956–623, Series B

Electrostatic Air Spray Gun, with four-finger trigger

Ref. No.	Part No.	Description	Qty.
1	193–033	AIR CAP; See Manual 307–803 for available air caps	1
2	176–930	RING, retaining	1
3	223–940	BARREL, gun	1
4	186–654	SCREW, trigger	2
5	185–096	SCREW, cap, relieved; M5 x 0.8	3
6	187–492	HOOK	1
7	185–345	HANDLE, gun	1
8	187–423	NUT, air cap	1
9	110–077	FERRULES, fluid tube	1
10	186–621	FITTING, fluid tube	1
11▲	179–791	TAG, warning	1
12	224–910	TUBE ASSY, fluid	1
13	189–034	TRIGGER	1
14	110–079	NUT, fluid tube	1
15	185–122	MUFFLER (flame arrestor)	1
16	236–120	BRACKET, gun fitting	1
17	185–105	FITTING, air	1
18	224–100	POWER SUPPLY ASSY; 85 KV Includes items 18a–18e	1
18a†	186–840	• GASKET, power supply	1
18b	185–099	• PAD	1
18c	185–145	• PAD	1
18d	185–141	• CUSHION	1
18e†	186–637	• SEAL	1
19†	106–555	O-RING; Viton®	2
20	190–933	NEEDLE, electrode	1
21	191–833	NOZZLE, fluid, See Manual 307–803 for available nozzles	1
22	223–977	STUD, resistor	1
23†	110–099	O-RING, Teflon®	1
24	110–083	SET SCREW, lever; sch; M4 x 0.7	1
25*	111–507	O-RING; fluoroelastomer	1
26	186–839	LEVER, ES valve	1
28	224–747	PACKING ROD ASSY Includes items 28a–28h	1
28a	185–495	• HOUSING, packing	1
28b	223–981	• ROD, fluid	1
28c	185–488	• NUT, packing	1
28d*	186–069	• SPACER, packing	1
28e*	178–763	• PACKING, needle	1
28f*	178–409	• PACKING, fluid	1
28g*	111–504	• O-RING, fluoroelastomer	1
28h*	111–316	• O-RING, fluoroelastomer	1
29*	102–982	O-RING; Viton	1
30	185–111	SPRING, compression	1
31	185–079	PLUG	1
32	185–119	SPACER, lever	1
33	188–878	ADAPTER	1
34†	185–113	GASKET, manifold; polyethylene	1
35	185–114	RING, retainer, alternator	1
36	113–746	O-RING, CV 75	1
37	222–319	ALTERNATOR, turbine Includes items 37a & 37b	1
37a†	110–073	• O-RING, Viton	1
37b	185–124	• CUSHION	1
38	185–118	VALVE, electrostatic	1
39	224–194	SHAFT ASSY., air valve	1
40	185–115	NUT, packing	1
41	111–508	O-RING, trigger valve; fluoroelastomer	1
42†	105–452	U-CUP, Teflon	1
43	223–978	VALVE ASSY, fan air Includes items 43b–43h	1
43b	105–681	• RING, retaining	1
43c	191–806	• KNOB, fan air adjustment	1
43d	186–837	• HOUSING, valve	1
43e†	168–518	• O-RING, Viton	2
43f	111–221	• SPRING, wave	1
43g	224–196	• LEVER, voltage adjustment	1
43h	111–510	• RING, external retaining	1
44	185–116	SPRING, compression, air valve	1
45	188–486	CAP	1
46	107–107	REGULATOR, disc	1
47	110–082	RING, retaining	1
49†	186–848	GASKET, air cap nut	1
62	191–744	TOOL, multi	1
63	107–460	WRENCH, barrel	1
66	185–103	TUBE, exhaust; polyurethane	1
67	110–231	CLAMP, exhaust tube	1
69	110–086	TOOL, hex key, allen wrench; 2 mm	1
71▲	180–060	SIGN, warning, English See Accessories for additional sign	1
72	180–209	COVER, gun; Order Part No. 218–374 for package of 10	1
73	235–300	BRACKET, gun hanging	1
79	189–023	TAB, four-finger	1
80	112–324	SCREW, mach.; 4–40 x 0.25"	1
81	110–409	WIRE, jumper	1

* These parts are included in Fluid Seal Repair Kit 224–634, which may be purchased separately.

† These parts are included in Air Seal Repair Kit 224–633, 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

220-444	6 ft (1.8 m)
218-100	15 ft (5 m)
218-101	25 ft (8 m)
218-102	36 ft (11 m)
218-103	50 ft (15 m)
220-119	75 ft (23 m)
220-120	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

223-068	6 ft (1.8 m)
223-069	15 ft (5 m)
223-070	25 ft (8 m)
223-071	36 ft (11 m)
223-072	50 ft (15 m)
223-073	75 ft (23 m)
223-074	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

235-068	6 ft (1.8 m)
235-069	15 ft (5 m)
235-070	25 ft (8 m)
235-071	36 ft (11 m)
235-072	50 ft (15 m)
235-073	75 ft (23 m)
235-074	100 ft (30.5 m)

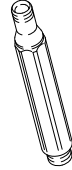
Air Swivel Fitting 236-129

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

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

Extended Air Inlet Fitting 189-191

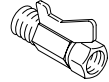
Replaces gun air inlet fitting (item 17 in Parts List) to provide an extended handle grip area.



Air Shutoff Valve 224-754

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 185-493

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

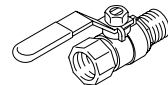
Quick Disconnect/Swivel Coupling Assy. 112-534

Includes a quick disconnect coupling insert, which replaces air inlet fitting 185-105, and a swivel shut-off coupling body (left-hand thread), which connects to the conductive air hose.

Bleed-type Master Air Valve 107-141

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



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)

215-637	25 ft (8 m)
215-638	50 ft (15 m)
215-639	75 ft (23 m)
215-640	100 ft (30 m)
215-641	150 ft (46 m)

Fluid Hose Assemblies (Nylon)

FM Approved

500 psi (35 bar) Maximum Working Pressure

0.25 in. (6.35 mm) ID, 3/8 npsm(fbe)

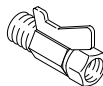
216-076	25 ft (8 m)
216-077	50 ft (15 m)
216-078	75 ft (23 m)
216-079	100 ft (30 m)
216-080	150 ft (46 m)

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

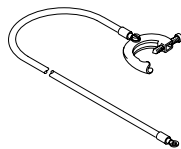
208-630	1/2 npt(m) x 3/8 npt(f); carbon steel and Teflon; for non-corrosive fluids
210-071	3/8 npt(m) x 3/8 npt(f); stainless steel and Teflon; for corrosive fluids



MISCELLANEOUS ACCESSORIES

Grounding Clamp and Wire 222-011

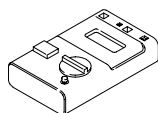
12 ga, 25 ft (7.6 m) wire



Megohmmeter 218-979

500 Volt output; 0.01-2000 megohms.

Not for use in Hazardous areas.



Paint Resistance Meter 722-886

Used with 722-860 Paint Probe to measure resistance of paint. **Not for use in Hazardous areas.**

Paint Probe 722-860

Used with 722-886 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.

180-060	Warning Sign (English)
180-061	Warning Sign (French)
180-062	Warning Sign (German)
180-063	Warning Sign (Spanish)

GUN ACCESSORIES

Gun Washer Kit Part No. 236-681

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

Gun High Voltage Probe & Meter 217-452

For direct measurement of gun output voltage.

Snap Ring Pliers 110-090

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

ES ON/OFF Valve Conversion Kit 223-976

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 224-720

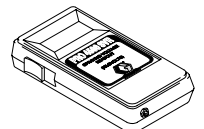
FM Approved; Pattern adjustment valve that allows quick adjustment of the pattern width between two adjustable settings.

Air Atomizing Valve 238-927

Replaces item 31 in parts list. Use to limit air cap flow while maintaining full turbine air pressure.

Remote Spraying Voltage Readout (SVR™) 224-388

For monitoring the gun voltage during operation. Battery operated, intrinsically safe (Class I, Group D), hand-held unit. See Manual 308-183.



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)
Wetted Parts	Stainless Steel, Nylon, Acetal, Ultra High Molecular Weight Polyethylene, Ceramic, Epoxy, Fluoroelastomer, PEEK, Music Wire, Polyethylene

* 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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Loctite® is a registered trademark of the Loctite Corporation.

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

Eveready® Energizer® is a registered trademark of the Eveready Battery Co., Inc.

Radio Frequency Transmitter Approval

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).

Manual Change Summary

The manual was updated to change air cap part no. 173–033 to 193–033.

[illegible]

[illegible]

[illegible]

The Graco Warranty and Disclaimers

WARRANTY

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months or two thousand hours of operation from time of sale, repair or replace any part of the equipment proven defective. However, any deficiency in the barrel, handle, trigger, hook, internal power supply, and alternator (excluding turbine bearings) will be repaired or replaced for thirty six months or six thousand hours of operation from time of sale. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

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

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

DISCLAIMERS AND LIMITATIONS

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

EQUIPMENT NOT COVERED BY GRACO WARRANTY

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

Graco Phone Number

TO PLACE AN ORDER, contact your Graco distributor, or call Graco: **1-800-367-4023 Toll Free**

*All written and visual data contained in this document reflects the latest product information available at the time of publication.
Graco reserves the right to make changes at any time without notice.*

Sales Offices: Atlanta, Chicago, Detroit, Los Angeles

Foreign Offices: Belgium, Canada, England, Korea, Switzerland, France, Germany, Hong Kong, Japan

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