



INSTRUCTIONS

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

Model PRO 3500hcTM Electrostatic Air Spray Gun

65 kV, HIGH CONDUCTIVITY, MANUAL GUN

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

For use with electrically conductive, solvent based coatings, including metal flake paint

Part No. 222625, Series B

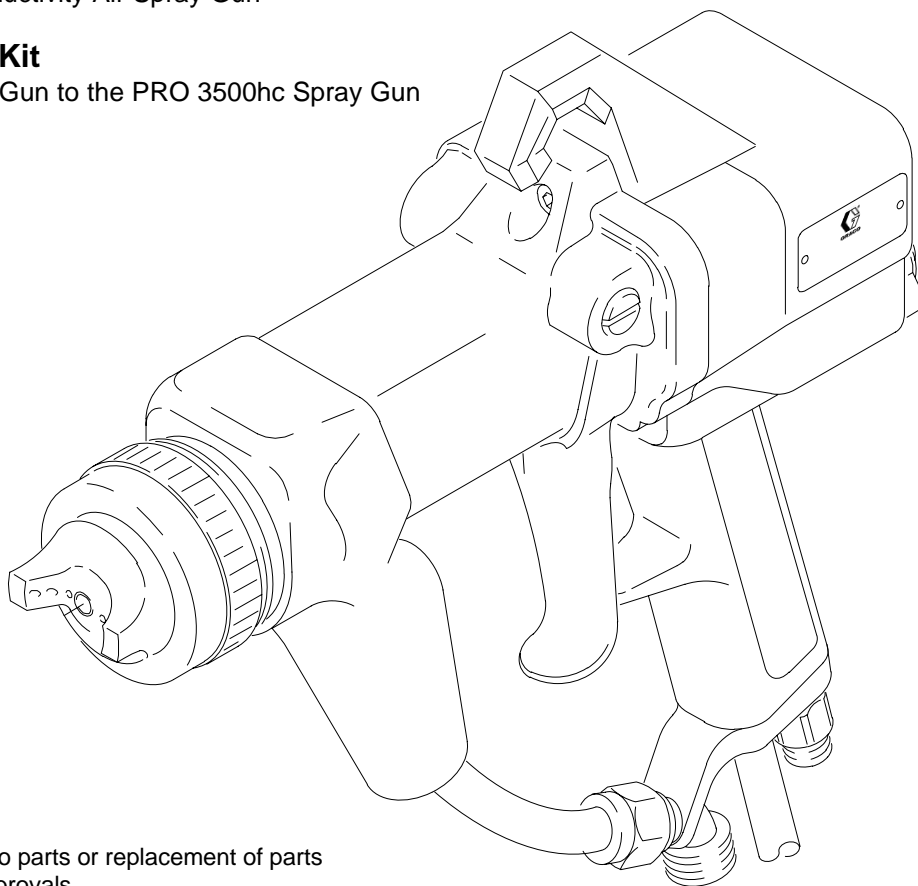
PRO 3500hc Electrostatic High Conductivity Air Spray Gun

Part No. 223451 Conversion Kit

To change the PRO 3500scTM Spray Gun to the PRO 3500hc Spray Gun



Approved



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

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French Patent No. 89 16305

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 **Grounding** on page 10.
- Check the spray gun resistance daily. See **Test Gun Resistance**, page 21.
- 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 9.
- 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 a 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 13 whenever you: are instructed to relieve the pressure; stop spraying; clean, check, or servicing the equipment; and install or clean the fluid nozzles.
- 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 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.

Introduction

How the Electrostatic Air Spray Gun Works

The air hose supplies air to the spray gun. Part of the air operates the turbine and the rest of the air atomizes the fluid being sprayed. The turbine generates power, which is converted by the power cartridge, to supply high voltage current to the gun's ionizing electrode.

The pump supplies fluid to the hose and gun, where the fluid is electrostatically charged as it passes the electrode. The charged fluid is attracted to the grounded workpiece, wrapping around and evenly coating all surfaces.

Converting a PRO 3500sc Gun to a PRO 3500hc Gun

NOTE: See page 38 to order Conversion Kit 223451.

1. Remove the air cap, nozzle/resistor stud, and electrode as described in **Electrode Replacement** (page 25).

2. Remove the fluid seal (A), fitting (B), tube (C), nut (D), and ferrules (E) from the gun. See Fig. A.

CAUTION

To ensure proper installation of the new parts, make sure that the fluid seal (A) does not remain in the gun barrel.

3. Using a soft brush and solvent, carefully clean area inside of the barrel where the fluid seal (A) used to be.

4. Remove the trigger (M).

5. Replace the existing fluid packing cartridge (K) with the new cartridge (28) supplied with Conversion Kit 223451. See Fig. D.

6. Install the threaded fitting, located on the tube assembly (12), into the gun barrel. See Fig. D. Turn the fitting until the o-ring (12b) is compressed.

7. Wrap the tube around the barrel. See Fig. D.

8. Slide the shroud (10) up the fluid tube (12), as shown in Fig. B.

9. Pull the shroud upward as you press it onto the barrel, as shown in Fig. C. Be sure the hose is completely inside the shroud before pressing the shroud onto the barrel.

10. Install the trigger (M).

11. Install the electrode, nozzle/resistor stud, and air cap as described in **Electrode Replacement** (page 25).

Converting a PRO 3500sc Gun to a PRO 3500hc Gun

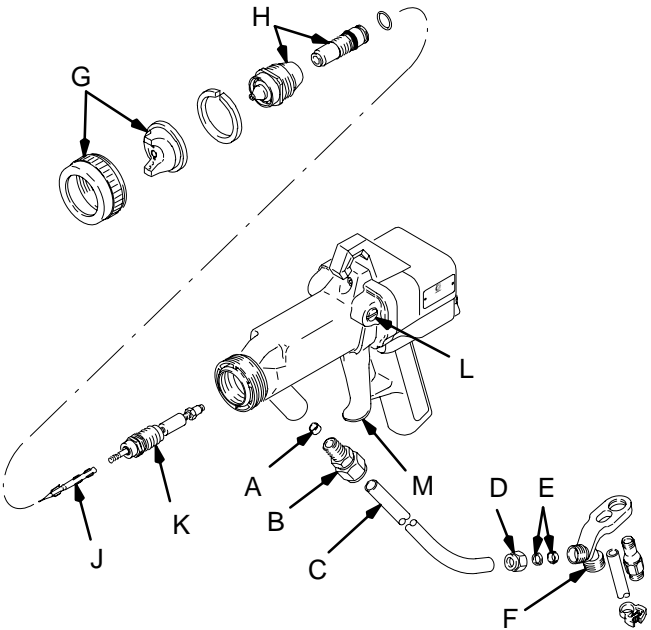


Fig. A 06616

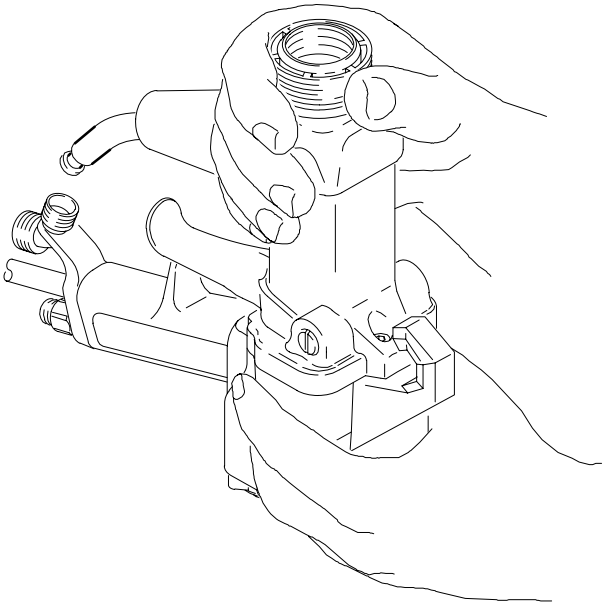


Fig. C 06619

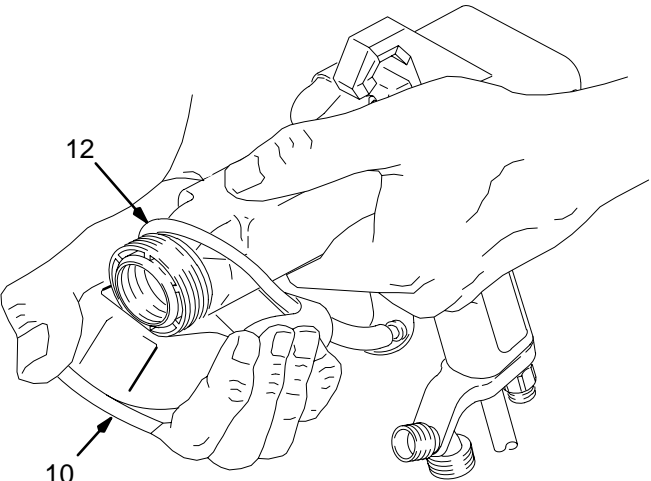


Fig. B 06618

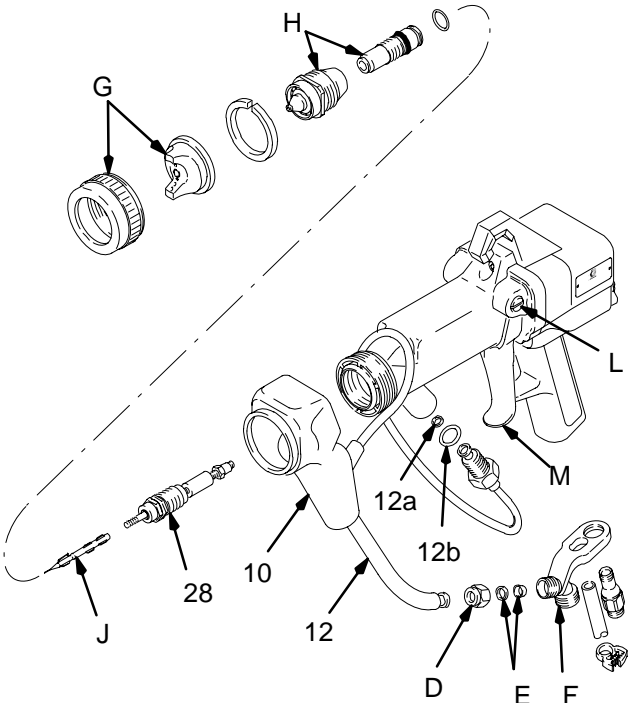
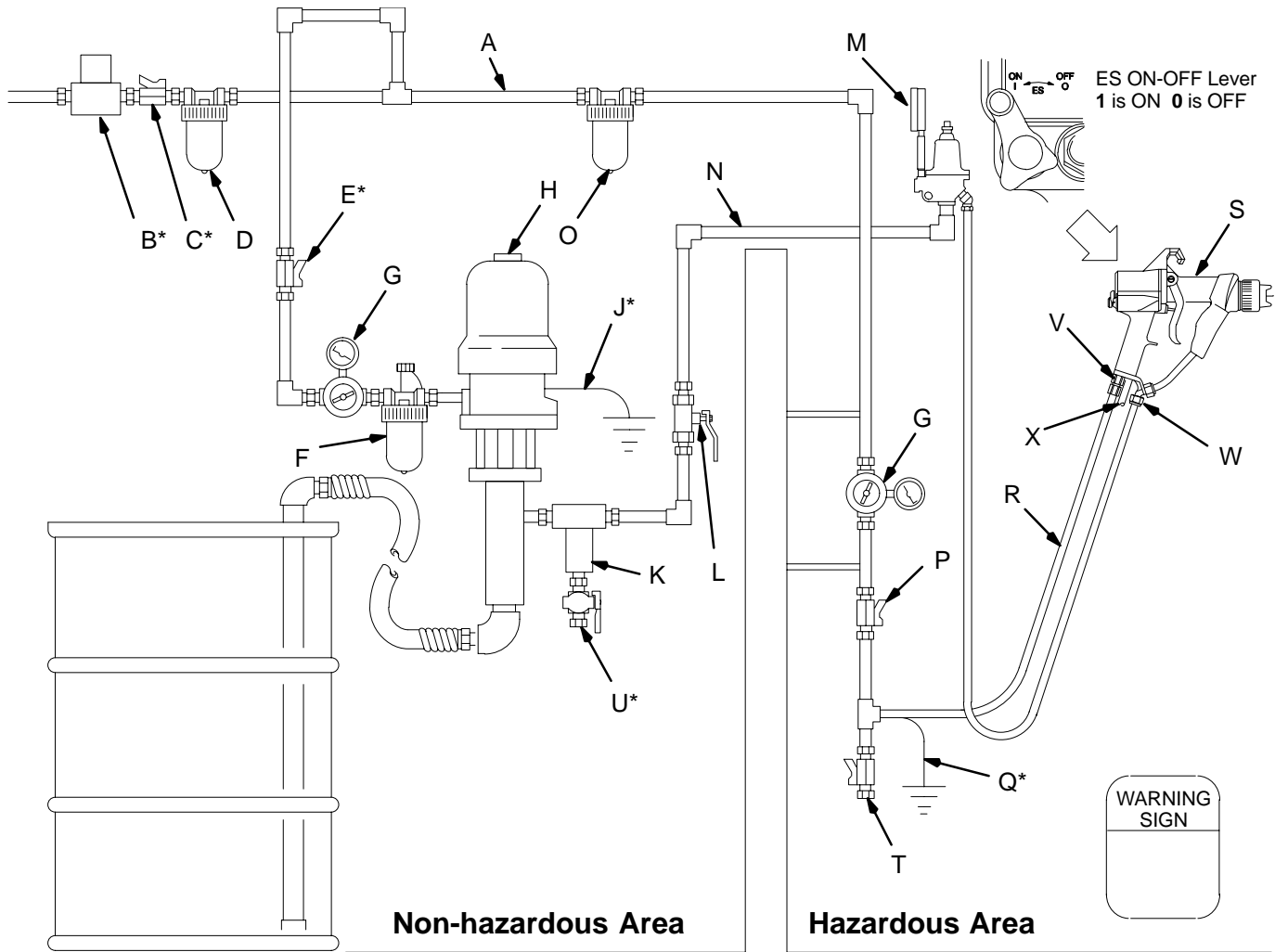


Fig. D 06617

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.

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

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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 36.

Connect the Fluid Line (Refer to Fig. 1)

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, 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 11.
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 13.
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 14, 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.

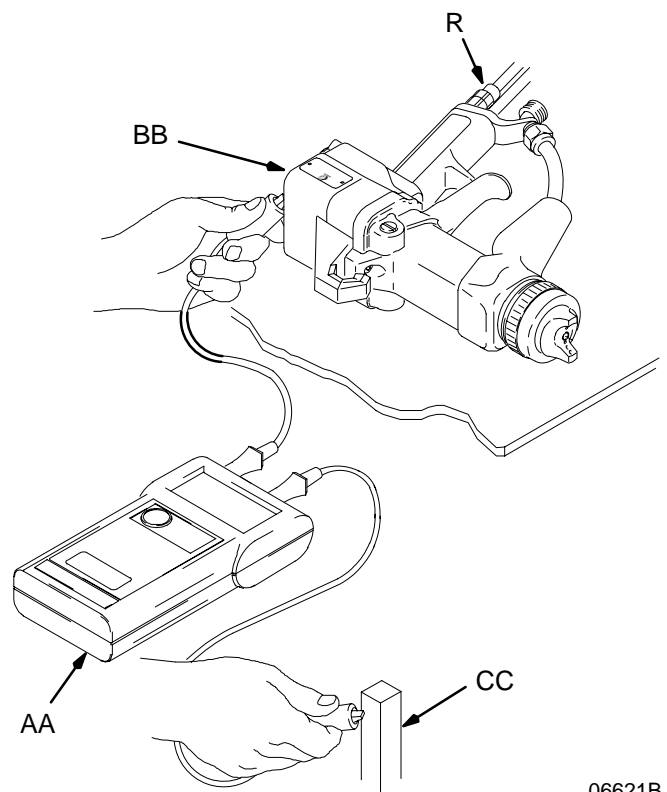


Fig. 2

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Operation

Pressure Relief Procedure

WARNING

PRESSURIZED EQUIPMENT HAZARD

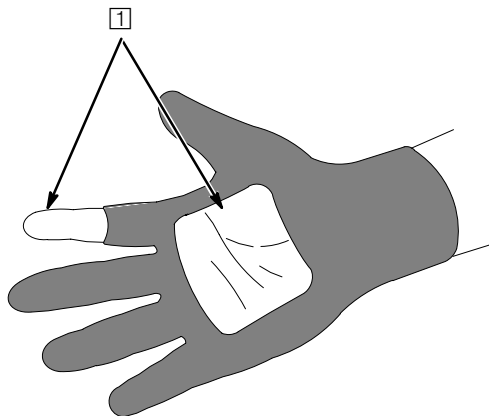
The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from electric shock, accidental spray from the gun, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

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

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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 10.
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 21.
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

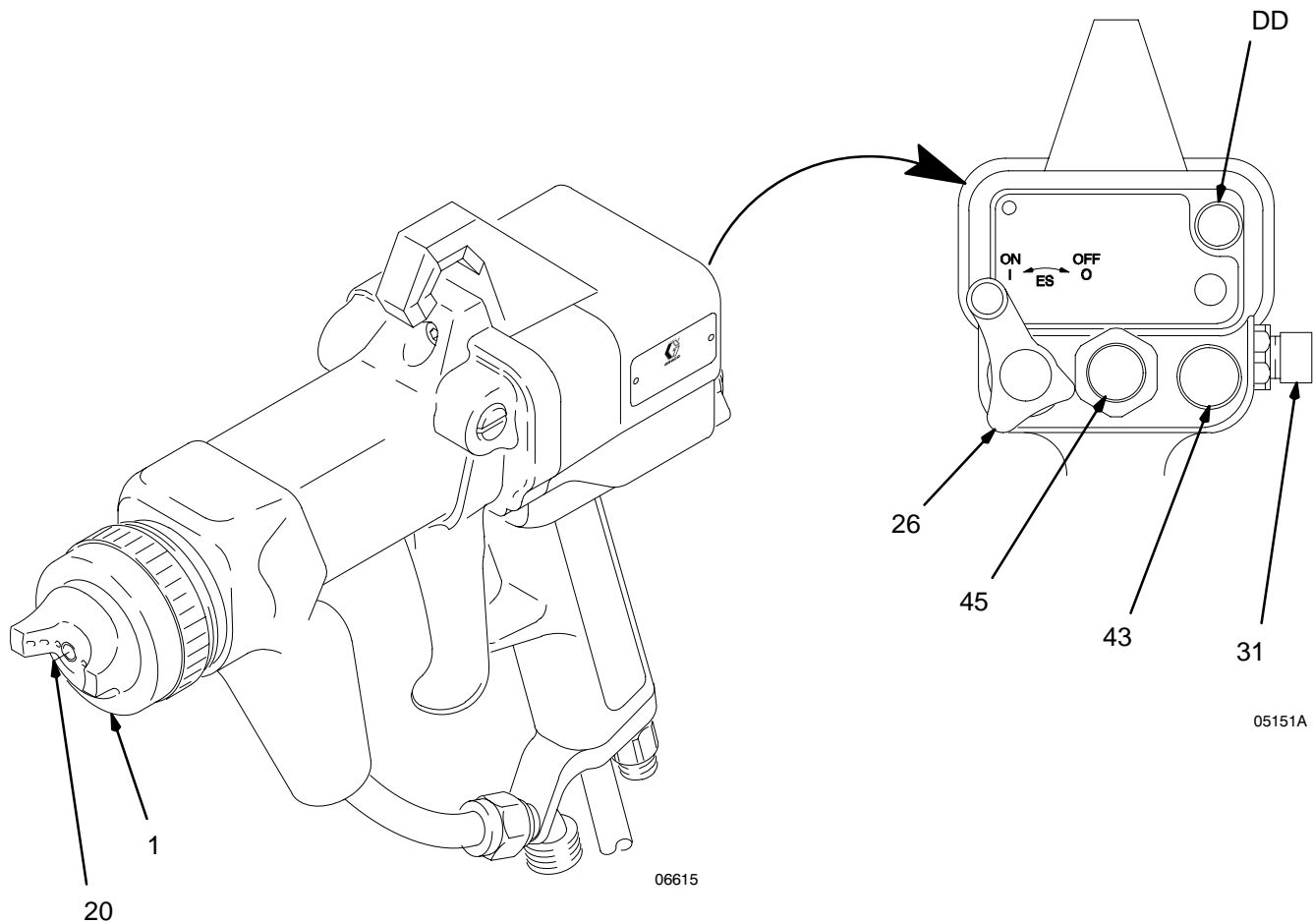


Fig. 4

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 13 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 185158, and air cap, P/N 193033. If your application requires a different nozzle and air cap combination, use instruction manual 307803 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 24.

Operating the Spray Gun

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 13 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 15 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 13.
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.

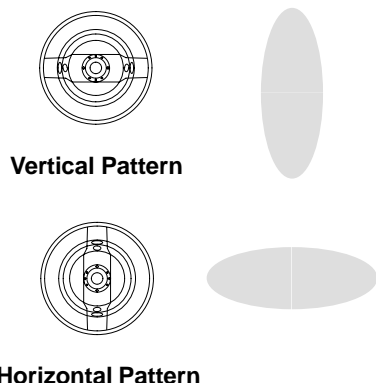


Fig. 5

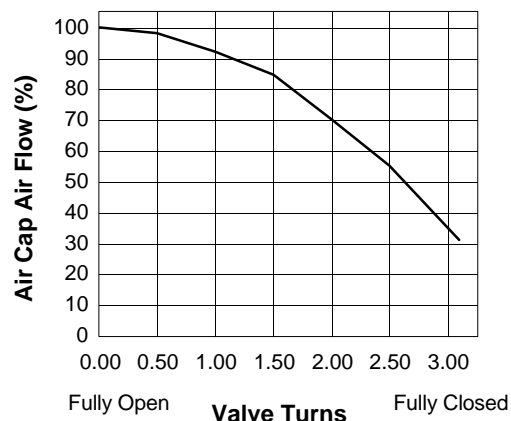
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3. Adjust the fluid flow by using the fluid line pressure regulator. Refer to instruction manual 307803 to set the fluid pressure for various fluid flows, according to the size of the fluid nozzle being used.
4. If necessary, further adjust the fluid flow rate with the fluid adjustment knob (45). See Fig. 4.
5. Fully open the fan air valve (43).
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 (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)

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 (43).

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 18 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.

CAUTION

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 13 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 13 when you stop spraying, before cleaning or flushing the spray gun, and whenever you are instructed to relieve the pressure.

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. 6.
- Hang the gun with its nozzle pointing down when it is not being used.

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.

CAUTION

To avoid contaminating the fluid to be sprayed, make sure that any solvent that is inside the shroud is allowed to drain out through the hole at the shroud base before spraying.

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 17. Some applications require more frequent cleaning. Replace the fluid nozzle and air cap if they are damaged. See page 24.
4. Check the electrode wire. Straighten it if it is bent, and replace it if it is broken or damaged. See page 25.
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 before changing colors and whenever you are done operating the gun. See page 17.

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 13 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. 6.
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 the gun resistance as instructed on page 21.

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 13 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, 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.

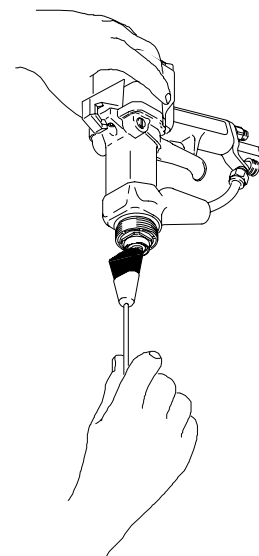


Fig. 6

06622

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

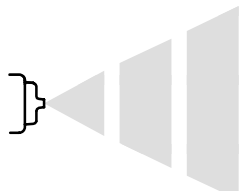


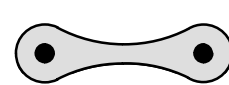
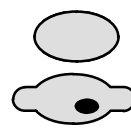
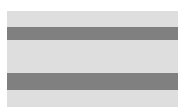
PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 13 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.

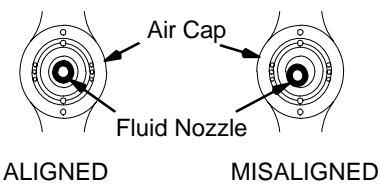
Spray Pattern Troubleshooting

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 24.
	There is dirt between the fluid nozzle, taper seat, and gun body.	Clean the parts; see page 17.
	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 17.
	The electrode is bent.	Straighten the electrode.
	The fluid nozzle or air cap holes are damaged.	Replace the damaged part; see page 24.
	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 17.
	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 17 or 24.

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 28.
	The packing nut is loose	Tighten the packing nut; see page 28.
Air leakage from the front of the gun	The air valve is not seating properly.	Clean and service the air valve; see page 31.
	The air valve o-ring is sticking.	Lubricate the o-ring; see page 31.
Fluid leakage from the front of the gun	The needle is worn or damaged.	Replace the needle; see page 28.
	The fluid seat is worn.	Replace the fluid nozzle and/or electrode needle; see pages 25 to 28.
	The fluid packing is too tight.	Lubricate and adjust the packing nut; see page 28.
	The resistor stud is loose.	Tighten the resistor stud; see page 24.
	The fluid nozzle is loose.	Tighten the fluid nozzle; see page 24.
	The resistor stud o-ring is damaged.	Replace the o-ring; see page 24.
"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 15.
	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 24.
	The fluid nozzle is dirty or clogged.	Clean the fluid nozzle; see page 17.
	The fluid nozzle is damaged.	Replace the fluid nozzle; see page 24.
	The fluid adjustment valve is damaged.	Replace the o-ring; see page 32.
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	<p>The air cap and fluid nozzle are misaligned.</p>  <p>ALIGNED MISALIGNED</p>	<p>Check the air cap and fluid nozzle seat for fluid buildup.</p> <p>Clean or replace parts as needed; see page 17 or 24.</p>

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 work-piece 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 conveyor 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 30.
	The gun resistance is faulty.	Check the gun resistance. See page 21.
	Fluid leaks from the needle packing and causes a short.	Clean the needle cavity. Replace the fluid needle. See page 28.
	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 30.
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 10.
	The gun is not properly grounded.	See Check the Electrical Grounding , page 11.
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.

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.

**WARNING**



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD
Megohmmeter P/N 241079 (A-see Fig. 7) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the megohmmeter to do 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

Check the resistance with the gun triggered and with the trigger released. 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 gun air fitting (17). See Fig. 7. The resistance should be between 180 to 220 megohms. If the resistance is outside the specified range, go to the next test. If the resistance is correct, refer to the **Electrical Troubleshooting** chart on page 20 for other possible causes of poor performance.

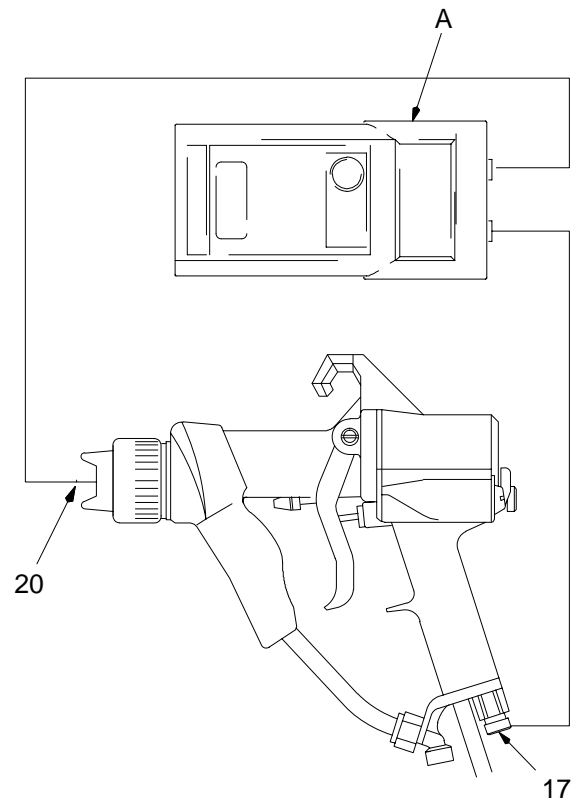


Fig. 7

06423B

Continued on the next page.

Electrical Tests

Test Power Supply Resistance

Remove the power cartridge (18) from the gun handle. See **Power Cartridge Replacement** on page 29.

Remove the turbine alternator from the power cartridge. See **Turbine Alternator Removal** on page 30.

Measure the resistance from the power supply's ground contact point (EE) to the contact spring (18c) on the other end of the power supply. See Fig. 8.

The resistance should be 157.5 to 192.5 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 the **Electrical Troubleshooting** chart on page 20 for other possible causes of poor performance, or contact the nearest authorized service agency.

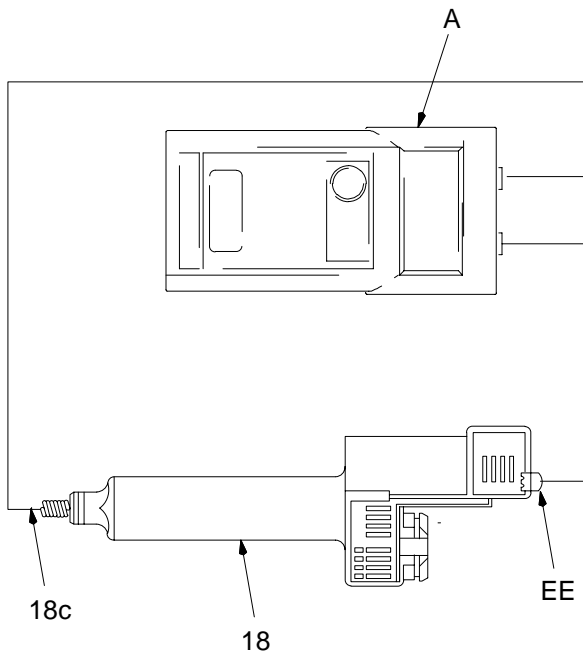


Fig. 8

03566B

Test Resistor Stud Resistance

Insert a conductive rod (B) into the gun barrel (removed for the power supply test) and against the metal contact (C) in the front of the barrel. See Fig. 9.

Measure the resistance between the conductive rod (B) and the gun electrode (20). The resistance should be 21 to 29 megohms. If the resistance is correct, refer to the **Electrical Troubleshooting** chart on page 20 for other possible causes of poor performance or contact the nearest authorized service agency.

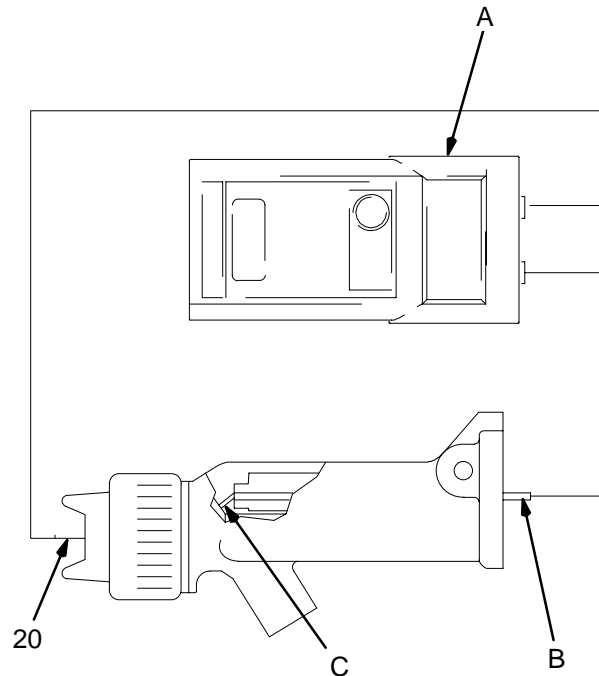


Fig. 9

06448B

Continued on the next page.

Electrical Tests

Test Resistor Stud Resistance (continued)

If the resistance is outside the specified range, remove the resistor stud (22). See **Air Cap/Nozzle/Resistor Stud Replacement** on page 24. Check the resistance between the black resistor stud contact ring (D) and the needle contact ring (E). Refer to Fig. 10. 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 (C) in the barrel and the needle contact wire (E) are clean. If the resistance is outside the specified range, the resistor is defective and the resistor stud (22) must be replaced. See **Air Cap/Nozzle/Resistor Stud Replacement** on page 24.

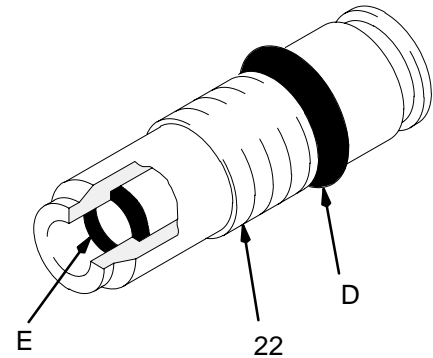


Fig. 10

0442

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.

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 13 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 37.
1. Flush the gun as instructed in **Flush the Spray Gun**, page 17.
 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.

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 fluid 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 25.

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).

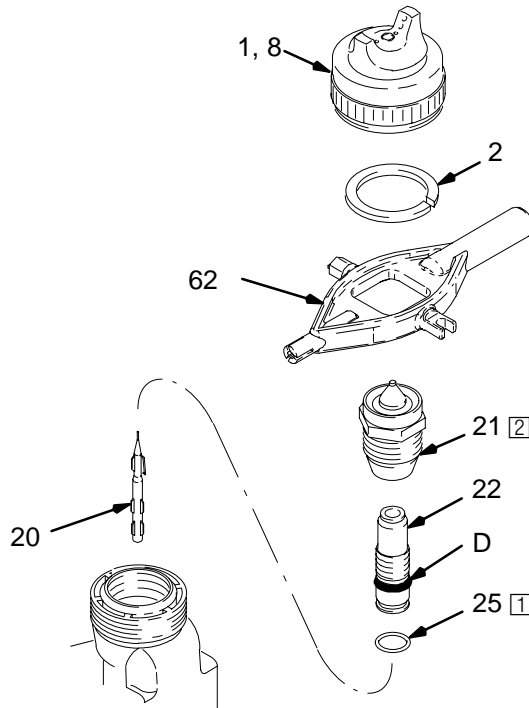
NOTE: Make sure the electrode (20) is tightened properly, as shown in Fig. 13.

Continued on the next page.

Service

Air Cap/Nozzle/Resistor Stud Replacement (continued)

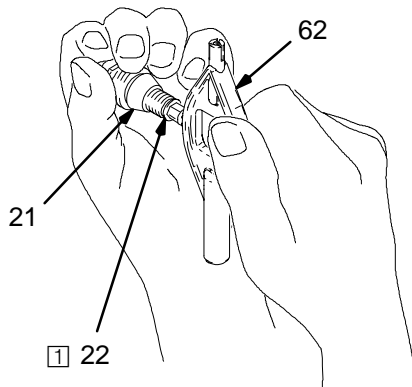
6. Trigger the gun while installing the fluid nozzle (21) and resistor stud (22) assembly with the multi-tool (62). Tighten until the fluid nozzle seats in the gun barrel.
7. Install the air cap assembly (1, 2, 8). Test the gun resistance as instructed on page 21.



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

Fig. 11

06449



- 1 Torque to 10 in-lbs (1.12 N•m)

Fig. 12

0444A

Electrode Replacement

1. Prepare the gun for service as instructed on page 24.
1. Remove the air cap, nozzle and resistor stud as instructed on page 24.
2. Unscrew and remove the fluid needle/electrode (20) with the multi-tool (62). Hold the needle shaft end to prevent it from turning. See Fig. 13.

CAUTION

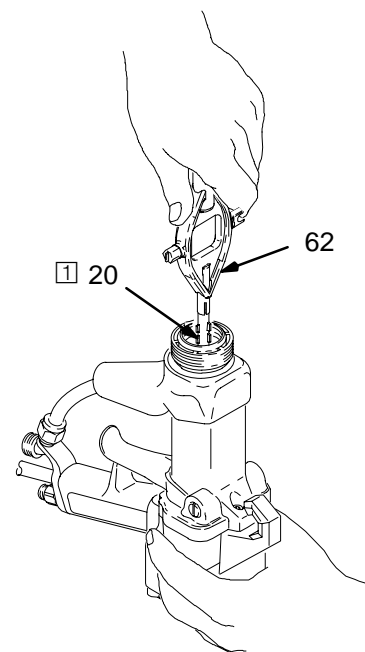
Be careful not to damage the contact wire when removing the electrode from the gun.

3. Apply low-strength (*purple*) Loctite® or equivalent thread sealant to the electrode and needle shaft threads. Install the electrode finger-tight. Do not overtighten it.

CAUTION

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

4. Install the fluid nozzle, resistor stud, and air cap assembly as instructed at left.
5. Test the gun resistance as instructed on page 21.



- 1 Apply low-strength (*purple*) Loctite or equivalent to needle shaft threads

Fig. 13

06624

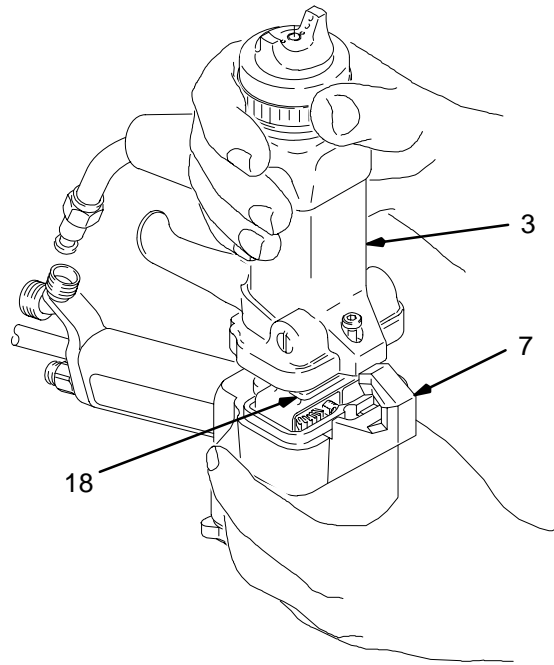
Service

Barrel Removal

1. Prepare the gun for service as instructed on page 24.
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.

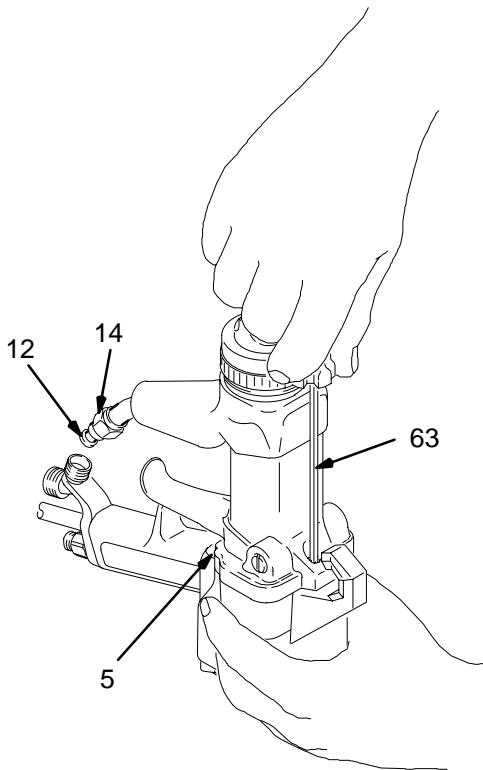
CAUTION

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.



06626

Fig. 15



06625

Fig. 14

Service

Fluid Packing Removal

1. Prepare the gun for service as instructed on page 24.
2. Remove the air cap assembly, fluid nozzle and resistor stud, and electrode as instructed on page 25.
3. Loosen the trigger screws (4) far enough to remove the trigger (13).
4. Remove the packing cartridge and 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.

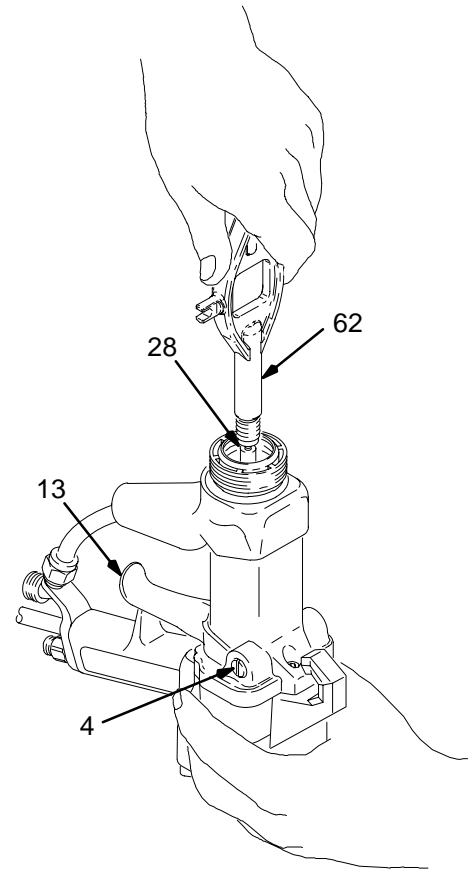


Fig. 16

06628

Service

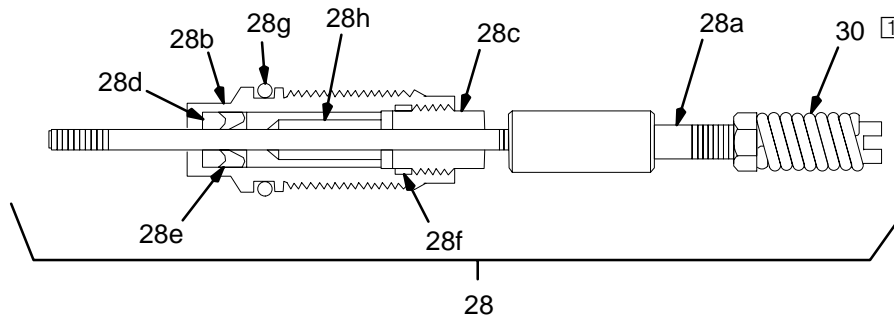
Fluid Packing and Needle Repair

The fluid packings and needle can be replaced as individual parts or as assemblies. The overall assembly is pre-adjusted at the factory.

NOTE: Before installing the packing and needle assembly 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 (28f) on the fluid needle (28a). Flats on the packing nut must be facing toward the back of the fluid needle.
2. Fill the entire inner cavity of the spacer (28h) with petroleum jelly. Place the spacer on the fluid needle (28a) in the direction shown in Fig. 17. Generously apply petroleum jelly to the outside of the spacer.
3. Place the fluid packing (28e), needle packing (28d), and housing (28b) on the fluid needle (28a) as shown in Fig. 17.
4. Lubricate the o-ring (28g) on the outside of the packing housing (28b).
5. Make sure the spring (30) is installed against the nut as shown in Fig. 17.
6. Install the packing and needle assembly into the gun barrel. Using the multi-tool (62), tighten the assembly until just snug, then check the drag on the needle.
7. Tighten the packing nut to 2 lbs. (9 N) of drag force when sliding the needle through the packing cartridge.
8. Install the trigger (13) and tighten the trigger screws (4).
9. Install the electrode, nozzle and resistor stud assembly and the air cap assembly as instructed on page 25.
10. Test the gun resistance as instructed on page 21.

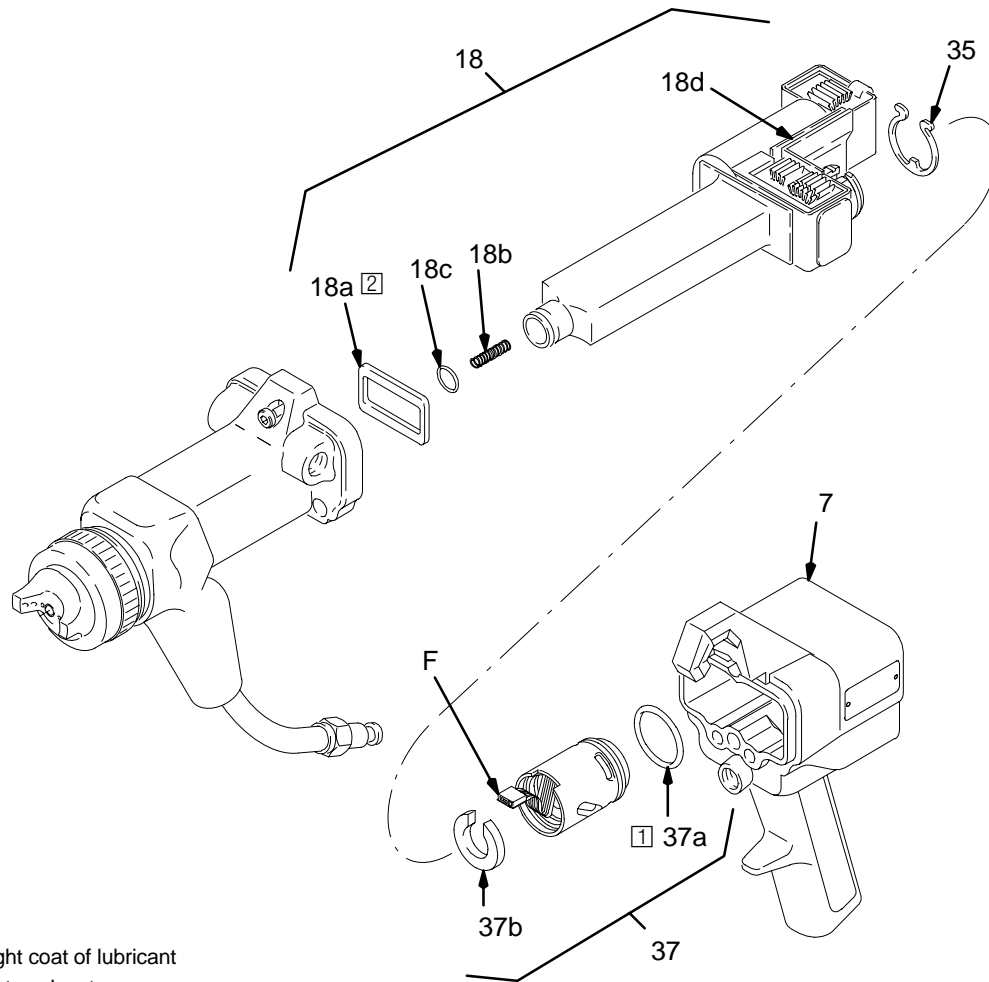


1 Item 30 is not included with the Packing/Needle Assy. (28)

03559

Fig. 17

Service



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

06629

Fig. 18

Power Cartridge Replacement

NOTE: The power cartridge consists of the alternator (37), power supply (18) and retaining ring (35). See Fig. 18.

1. Prepare the gun for service as instructed on page 24.
2. Remove the barrel as instructed on page 26.

⚠ CAUTION

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

3. Grasp the power cartridge with your hand. With a gentle side to side motion, pull it free from the gun handle (7). Then pull the power cartridge straight out of the handle.

⚠ CAUTION

To avoid a loss in electrostatic performance, inspect the power cartridge cavity in the handle for dirt or moisture. Clean out the cavity with a clean, dry rag if necessary.

Lightly lubricate the o-rings (18b, 37a) on the new power cartridge with petroleum jelly. All the o-rings and the compression spring (18c) must be in place or the gun will malfunction.

4. Insert the new power cartridge in the gun handle. Be sure the gasket (18a) is in place.
5. Install the barrel on the handle as instructed on page 30.
6. Test the gun resistance as instructed on page 21.

Service

Turbine Alternator Replacement

NOTE: Replace turbine bearings after 2,000 hours of operation. See your authorized Graco distributor.

1. Prepare the gun for service as instructed on page 24.
2. Remove the power cartridge from the gun handle as instructed on page 29.
3. Squeeze the two ends of the retaining ring (35) together and carefully pull the alternator (37) away from the power supply until the 3-wire connector (F) disengages. See Fig.18, page 29.
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 onto the power supply until the retaining ring engages with the alternator.
7. Install the power cartridge in the gun handle as instructed on page 29.

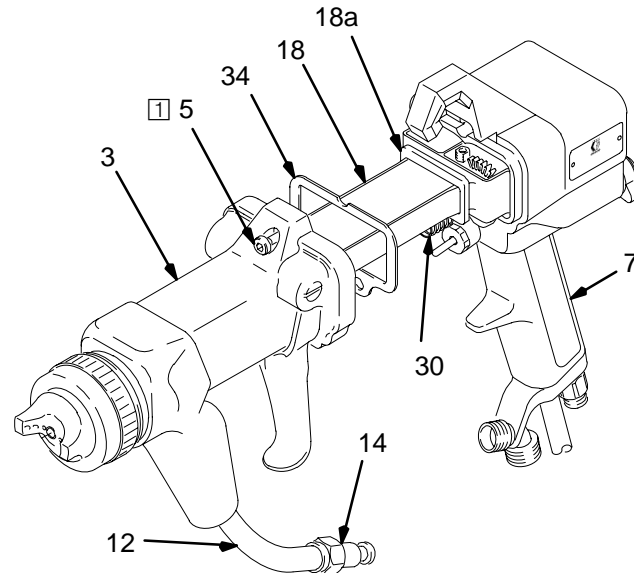
Barrel Installation

1. Be sure the gaskets (34 & 18a) and spring (30) are in place. See Fig. 19. Replace if damaged.
2. Place the barrel (3) over the power cartridge (18) and onto the gun handle (7). Make sure the fluid needle 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.
5. Test the gun resistance as instructed on page 21.



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

Fig. 19

06627

Service

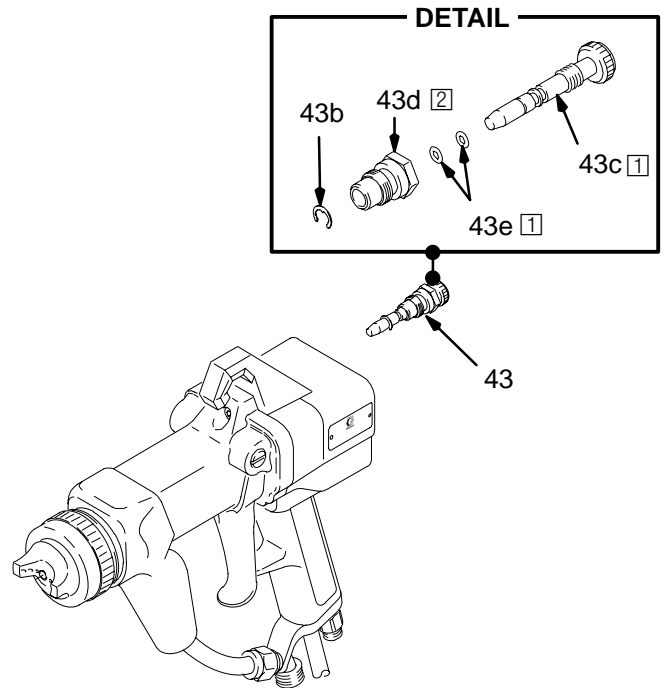
Fan Air Adjustment Valve Repair

1. Prepare the gun for service as instructed on page 24.
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 valve:

3. Remove the retaining ring (43b). Rotate the air adjustment knob (43c) counterclockwise until it is disengaged from the valve housing threads (43d). Pull the adjustment knob out of the valve housing.
4. Clean all the parts and inspect them for wear or damage.
5. When reassembling the fan air valve (43), lubricate the o-rings (43e) and the adjustment knob threads (43c) with petroleum jelly.
6. After the retaining ring (43b) is installed on the adjustment knob (43c), back the adjustment knob out of the valve housing (43d) until it bottoms out against the retaining ring.
7. Apply Teflon paste to the threads of the valve housing (43d) and install it in the handle. Torque the housing to 10 to 12 in-lb (1.1 to 1.4 N•m).



- 1 Lubricate o-rings (43e) and top knob threads (43c) with petroleum jelly
- 2 Apply Teflon paste to the valve housing threads (43d); Torque to 10–12 in-lb (1.1–1.4 N•m)

Fig. 20

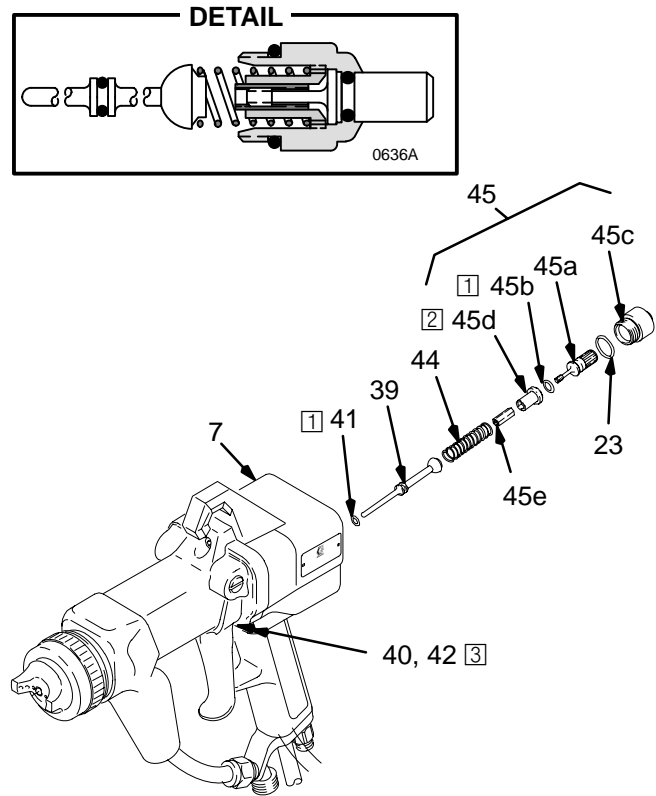
06630

Service

Fluid Adjustment Assembly Repair

1. Prepare the gun for service as instructed on page 24.
 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.
- ⚠ 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, assemble the fluid adjustment assembly into the gun.



- 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

06631

Service

Air Trigger Valve Repair

1. Prepare the gun for service as instructed on page 24.
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 the u-cup with its lips facing into the gun handle.
7. Install the fluid adjustment assembly (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.

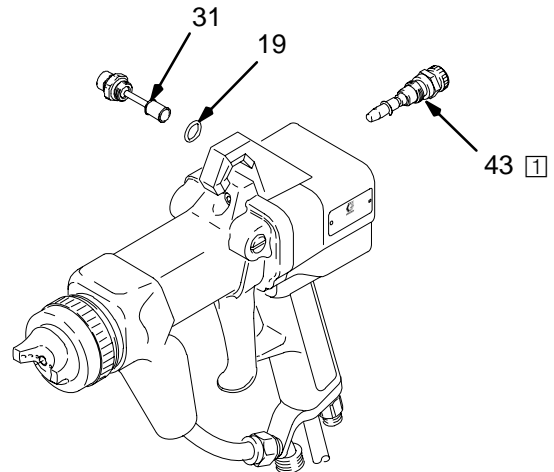
Atomizing Air Valve Removal and Replacement

1. Prepare the gun for service as instructed on page 24.
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 Teflon paste to the fan air valve (43) housing threads and install the valve in the handle. Torque the housing to 10 to 12 in-lb (1.1 to 1.4 N•m).



1 Apply Teflon paste to the valve housing threads (43d); Torque to 10–12 in-lb (1.1–1.4 N•m)

Fig. 22

06630

Service

ES ON-OFF Valve Repair

1. Prepare the gun for service as instructed on page 24.
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.

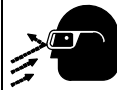
6. Install the regulator disk (46) in the valve (38) with its bevelled side facing in toward the valve.

CAUTION

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

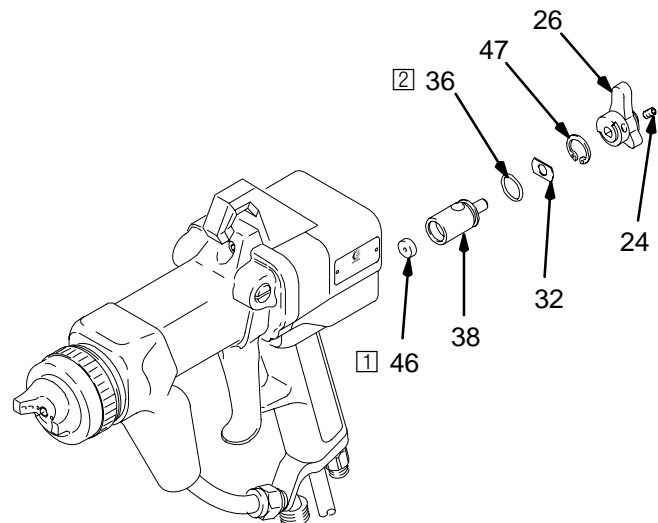
7. Install the valve (38) with the regulator disk (46) and o-ring (36) into the gun handle. Install the spacer (32) on the valve.
8. Install the retaining ring (47) into the groove in the handle. Install the lever (26) and tighten set screw (24).

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. 23

06632

Service

Tube and Shroud Removal/Replacement

1. Prepare the gun for service as instructed on page 24.
2. Remove the air cap, nozzle and resistor stud, and electrode as instructed on page 29.
3. Loosen the nut (14) and disconnect the fluid tube (12) from the bracket/fluid fitting (16). See the **Parts Drawing** on page 36.
4. Remove the trigger (13) for ease of disassembly.
5. Pull the shroud (10) forward, away from the gun barrel (3), until the shroud opening passes over the gun barrel threads.
6. Continue to remove the shroud (10) by grasping the bottom as shown in Fig. 24 and pushing up towards the barrel (3) while twisting the shroud off.
7. Remove the ferrules (9) and nut (14) from the tube assembly (12). See the **Parts Drawing** on page 36.
8. Slide the shroud (10) off the fluid tube (12).
9. Loosen the fluid tube fitting from the gun barrel.
10. Replace any worn or damaged parts.
11. Reassemble the gun as instructed in **Converting a PRO 3500SC Spray Gun to a PRO 3500HC Spray Gun** on page 6.

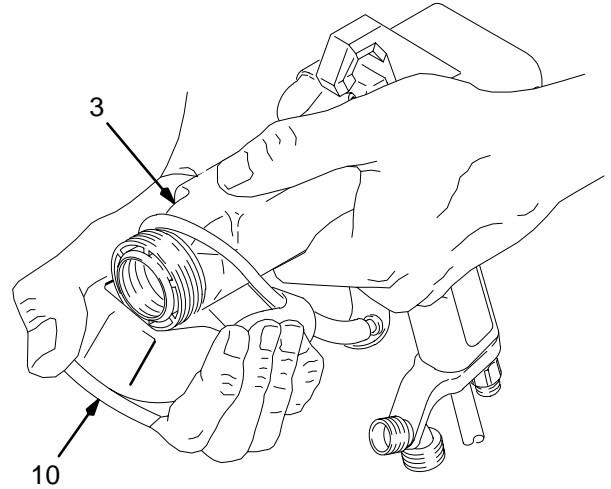
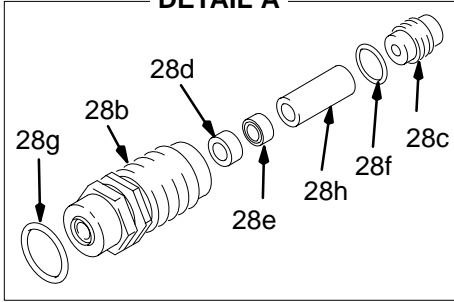


Fig. 24

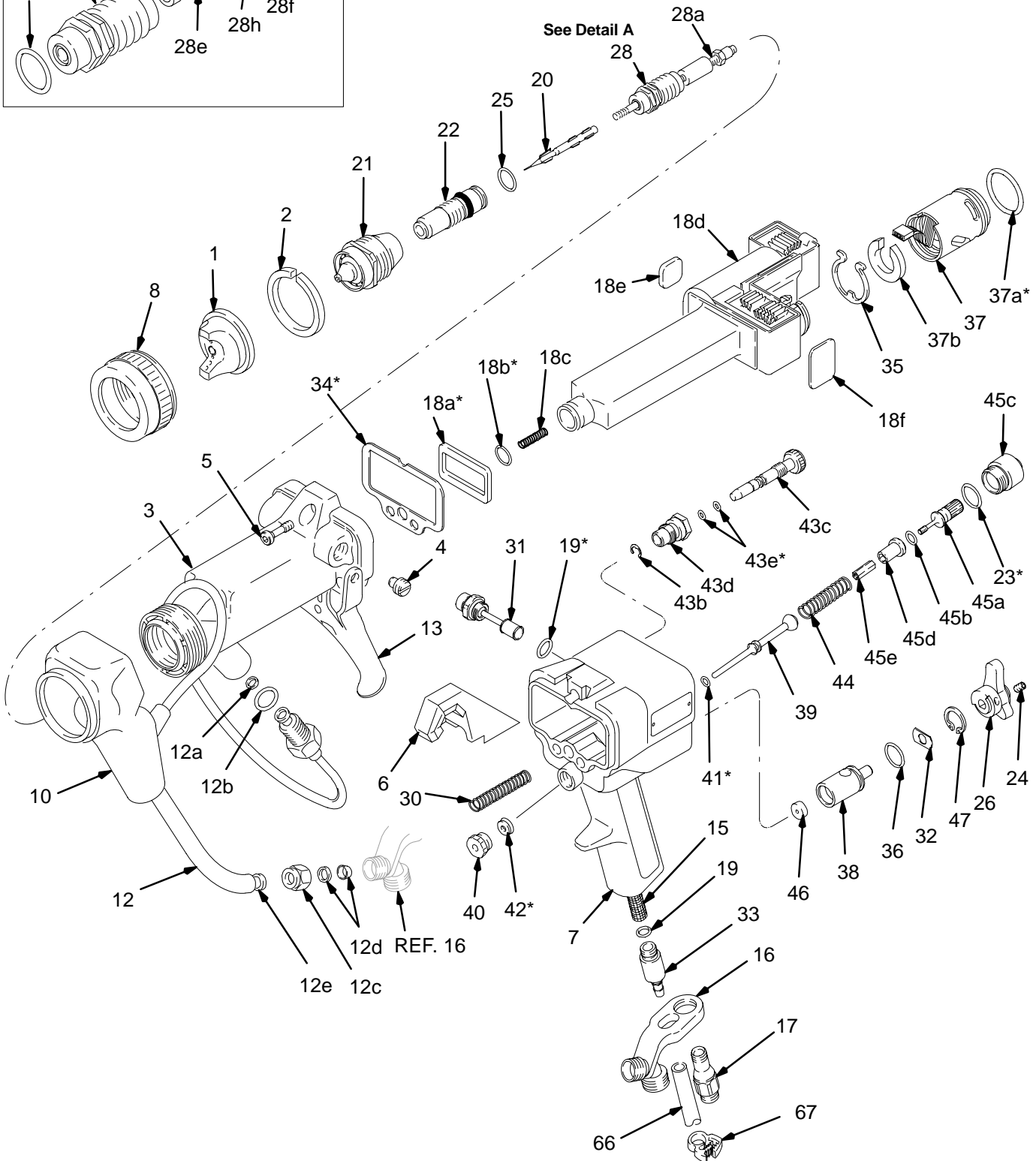
06618

Parts

DETAIL A



Item 12 includes items 12a to 12e
 Item 18 includes items 18a to 18f
 Item 28 includes items 28a to 28h
 Item 37 includes items 37a and 37b
 Item 43 includes items 43b to 43e
 Item 45 includes items 45a to 45e



Parts

WARNING

Some PRO 3500hc 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. 222625, Series B, Electrostatic High Conductivity Air Spray Gun

Ref No.	Part No.	Description	Qty
1	193033	AIR CAP; See Manual 307803 for available air caps	1
2	176930	RING, retaining	1
3	222314	BARREL, gun	1
4	185095	SCREW, trigger	2
5	185096	SCREW, cap, relieved; M5 x 0.8	3
6	185097	HOOK	1
7	222666	HANDLE, gun	1
8	187423	NUT, air cap	1
10	186102	SHROUD	1
11▲‡	179791	TAG, warning	1
12	223450	TUBE, fluid; Includes items 12a–12e	1
12a	111450	• O-RING; fluoroelastomer	1
12b	110749	• O-RING; fluoroelastomer	1
12c	110079	• NUT, fluid tube	1
12d	110077	• FERRULES, fluid tube	1
12e	111450	• O-RING; fluoroelastomer	1
13	191904	TRIGGER, 2 finger	1
15	185122	MUFFLER (flame arrestor)	1
16	185104	BRACKET, gun fitting	1
17	185105	FITTING, air	1
18	222333	POWER CARTRIDGE, 65 kV Includes items 18a–18f	1
18a*	185134	• GASKET, power supply	1
18b*	106555	• O-RING, Viton®	1
18c	110098	• SPRING, compression	1
18d	185141	• CUSHION, power supply	1
18e	185099	• PAD	1
18f	185145	• 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	223977	STUD, resistor	1
23*	109450	O-RING, Teflon®	1
24	110083	SET SCREW, lever; M4 x 0.7	1
25	111507	O-RING; fluoroelastomer	1
26	186839	LEVER, ES valve	1
28	223444	FLUID PACKING & NEEDLE ASSY Includes items 28a–28h	1
28a	223024	• NEEDLE, fluid	1
28b	185495	• HOUSING, packing	1
28c	185488	• NUT, packing	1
28d	178763	• PACKING, needle	1
28e	178409	• PACKING, fluid	1
28f	111504	• O-RING, fluoroelastomer	1
28g	111316	• O-RING, fluoroelastomer	1
28h	186069	• SPACER	1
30	185111	SPRING, compression	1
31	238927	VALVE, atomizing air	1
32	185119	SPACER, lever	1
33	185112	ADAPTER, exhaust hose	1
34*	185113	GASKET, manifold; polyethylene	1
35	185114	RING, retainer, alternator	1
36	113746	O-RING, CV75	1
37	222319	ALTERNATOR, turbine 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, Teflon	1
43	222321	VALVE ASSY, fan air Includes items 43b–43e	1
43b	105681	• RING, retaining	1
43c	191805	• KNOB, fan air adjustment	1
43d	185090	• HOUSING, valve	1
43e*	103557	• O-RING, Viton	2
44	185116	SPRING, compression, air valve	1
45	238895	VALVE ASSY., fluid adjustment Includes items 45a–45e	1
45a	186826	• STEM, fluid adjustment	1
45b	111516	• O-RING, CV75	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
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 See Accessories for additional signs	1
72‡	180209	COVER, gun; Order Part No. 218374 for package of 10	1
75‡	235300	BRACKET, gun hanging	1
77‡	185079	PLUG, optional, to install in place of item 31	1

* These parts are included in Air Seal Repair Kit 223021, which may be purchased separately.

‡ Parts not shown.

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

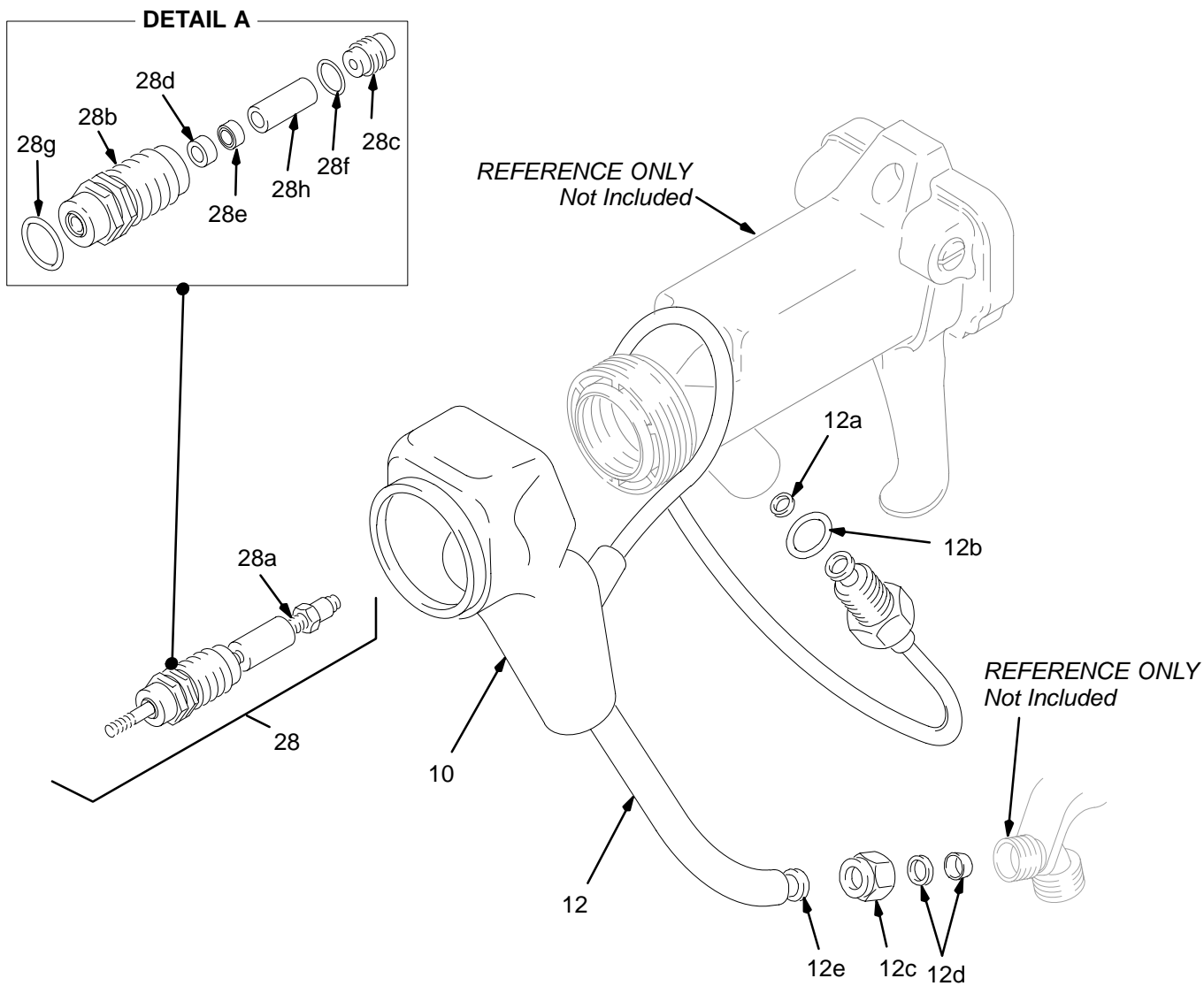
☆ Optional plug 185079 is provided with the gun.

Parts

Part No. 223451 Conversion Kit

Kit must be purchased separately.

Ref				Ref			
No.	Part No.	Description	Qty	No.	Part No.	Description	Qty
10	186102	SHROUD	1	28a	223024	• NEEDLE, fluid	1
12	223450	TUBE, fluid	1	28b	185495	• HOUSING, packing	1
		Includes items 12a–12e	1	28c	185488	• NUT, packing	1
12a	111450	• O-RING; fluoroelastomer	1	28d	178763	• PACKING, needle	1
12b	110749	• O-RING; fluoroelastomer	1	28e	178409	• PACKING, fluid	1
12c	110079	• NUT, fluid tube	1	28f	111504	• O-RING, fluoroelastomer	1
12d	110077	• FERRULES, fluid tube	1	28g	111316	• O-RING, fluoroelastomer	1
12e	111450	• O-RING; fluoroelastomer	1	28h	186069	• SPACER	1
28	223444	FLUID PACKING & NEEDLE ASSY	1				
		Includes items 28a–28h	1				



06633

Accessories

Use Only Genuine Graco Parts and 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

Air Adapter Nipple 185493

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

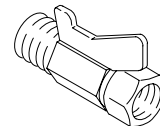
Quick Disconnect/Swivel Coupling Assy. 112534

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

Air Shutoff Valve 224754

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

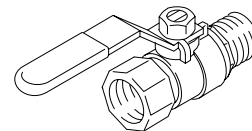
For turning air to gun off or on; 1/4 npsm(m) x 1/4 npsm(f) left-hand thread



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



Accessories

Use Only Genuine Graco Parts and 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 Tube (Teflon) 185806

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

For reducing flushing time. Replaces item 12 in parts list. 0.078 in. (1.98 mm) ID, 0.375 in. (9.53 mm) OD, 5.50 in. (139 mm) long

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 Teflon; for non-corrosive fluids



MISCELLANEOUS ACCESSORIES

Snap Ring Pliers 110090

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

Paint Resistance Meter 722886

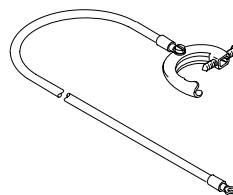
Used with 722860 Paint Probe to measure resistance of paint. **Not for use in Hazardous areas.**

Paint Probe 722860

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

Grounding Clamp and Wire 222011

12 ga, 25 ft (7.6 m) wire



Safety Warning Signs

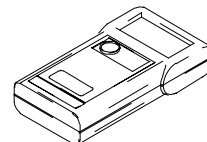
FM Approved; Available at no charge from Graco. Must be ordered separately.

180060 Warning Sign (English)

Megohmmeter 241079

500 Volt output; 0.01–2000 megohms.

Not for use in Hazardous areas.



TI0377

ES ON/OFF Valve Conversion Kit 223976

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 224883

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

Technical Data

Category	Data
Gun Weight	1.89 lb (0.86 kg)
Gun Length	9.5 in. (240 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	0–65 kV
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 † 87 Db(A) Sound Power ‡ 90.4 Db(A)
Maximum Noise Level at 100 psi (7 bar, 0.7 MPa)**	Sound Pressure † 99 Db(A) Sound Power ‡ 105.4 Db(A)

Category	Data
Wetted Parts	Stainless Steel, Polyethylene, Nylon, Acetal, Teflon®, Ultra High Molecular Weight Polyethylene, Ceramic, Fluoroelastomer, Music Wire

* 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.

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Loctite® is a registered trademark of the Loctite Corporation.

Chemraz® is a registered trademark of the Green, Tweed and Company.

Manual Change Summary

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

[illegible]

[illegible]

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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Graco Phone Number

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