Instructions/Parts List

AUTOMATIC ELECTROSTATIC AIR-ASSISTED SPRAY GUN

PRO™ Auto Xs AA

309298 Rev.D

Part No. 244592, Series A

100 psi (0.7 MPa, 7 bar) Maximum Air Inlet Pressure

3000 psi (21 MPa, 210 bar) Maximum Working Fluid Pressure

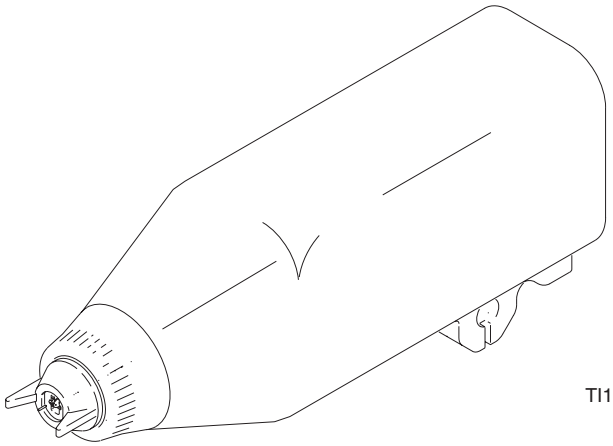
U.S. Patent Pending

For use with Class I Group D spray materials.

FM APPROVED

For use with Group II Category 2 G spray materials.

Ex 0.24 mJ



TI1713A

PROVEN QUALITY. LEADING TECHNOLOGY.

Graco Inc. P.O. Box 1441 Minneapolis, MN 55440-1441

CE

Table of Contents

Symbols

Warning Symbol

⚠ WARNING

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

Caution Symbol

⚠ CAUTION

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

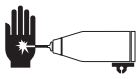
⚠ WARNING

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 in this manual.
- Ground the equipment, all personnel in or close to the spray area, the object being sprayed, and all conductive objects in the spray area. See **Grounding**, page 15.
- Check gun resistance daily. See **Test Gun Resistance** on page 29.
- If there is any static sparking while using the equipment, **stop spraying immediately.** Identify and correct the problem.
- Provide fresh air ventilation to avoid buildup of flammable or toxic vapors. Interlock the gun air supply to prevent operation unless ventilating fans are on. See **Ventilate the Spray Booth** on page 9.
- Use solvents that comply with local regulations. Flash point should be higher than 100°F (38°C).
- Do not flush with the gun electrostatics on. Do not turn on the gun electrostatics until all solvent is removed from the system.
- Keep the spray area free of debris and rags. Do not store solvent and flammable fluids in the spray area.
- Eliminate all ignition sources such as pilot lights, cigarettes, and static arcs from plastic drop cloths. Do not plug in or unplug power cords or turn lights on or off in the spray area.
- Use only non-sparking tools to clean residue from the booth and hangers.

WARNING



Fluid Injection Hazard

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

- Fluid injected into the skin might look like just a cut, but is a serious injury. **Get immediate medical attention.**
- Do not point the gun at anyone or at any part of the body. Do not put your hand or fingers over the spray tip. Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Never spray without the tip guard in place.
- Follow the steps under **Prepare the Gun for Service**, page 35, when you stop spraying and before cleaning, checking, or repairing equipment.
- Check the hoses and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.
- Tighten all fluid connections before each use.

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

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 manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain, call your Graco distributor.
- Do not alter or modify 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. Maximum working fluid pressure of this equipment is **3000 psi (21 MPa, 210 bar).**
- Use fluids and solvents that are compatible with the equipment wetted parts. See the **Technical Data** section of all equipment manuals. Read the fluid and solvent 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).
- 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 AA Spray Gun Works

⚠ WARNING

Fluid Injection Hazard

Remember, this is not an air spray gun. For your safety, read and follow all Warnings in this manual.

The air-assisted spray gun combines airless and air spraying concepts. The spray tip shapes the fluid into a fan pattern, as does a conventional airless spray tip. Air from the air cap further atomizes the fluid and completes the atomization of the fluid tails to produce a uniform pattern.

The high working fluid pressure of this gun provides the power needed to atomize higher solids materials.

Operating the Spray Function

Applying a minimum of 50 psi (0.35 MPa, 3.5 bar) air pressure to the gun manifold's cylinder air fitting (CYL) will retract the gun piston, which opens the air valves and a short time later opens the fluid needle. This provides the proper air lead and lag when triggering the gun. A spring returns the piston when the cylinder air is shut off.

Operating the Electrostatics

To operate the electrostatics, apply air pressure to the gun manifold's turbine air fitting (TA) through a Graco grounded air hose. The air enters the manifold and is directed to the inlet of the power supply turbine. The air spins the turbine, which then provides electrical power to the internal high voltage power supply. The fluid is charged by the spray gun electrode. The charged fluid is attracted to the nearest grounded object, wrapping around and evenly coating all surfaces.

The turbine air is exhausted into the shroud and out the back of the manifold through the exhaust fitting (EXH). The exhaust air helps keep contaminants out and helps keep the gun clean.

Gun Features and Options

- The gun is designed for use with a reciprocator, and can be mounted directly on a 1/2 in. (13 mm) rod. With additional brackets, the gun can be mounted for robotic applications.
- The gun's quick-disconnect design enables its removal without disconnecting the air lines to the gun.
- Gun functions are activated from a separate controller that sends the appropriate signal to the actuating solenoids.
- The optional fiber optic readout system can be installed to monitor the gun's spraying voltage. A fiber optic cable connected to the gun manifold carries the signal from the gun to a remote display module. Part No. 224117 Display Module displays the gun's spraying voltage and current. Battery-operated Display Module 189762 displays the gun's spraying voltage only.

Changing the kV Setting

The gun's full voltage setting is 85 kV. Three lower voltage settings are possible by actuating the KV1 and KV2 switches. Supply 50 psi (0.35 MPa, 3.5 bar) air pressure to the KV1 and KV2 ports. Turn the air on or off as shown in Table 1 to set the desired voltage.

The solenoid valves used to activate the KV1 and KV2 switches must bleed the air out of the lines for the switches to draw back to the higher voltage setting.

Table 1: KV1 and KV2 Switch Settings

KV1 Air	KV2 Air	Output Voltage (kV)

Table 1: KV1 and KV2 Switch Settings

OFF	OFF	85
OFF	ON	70
ON	OFF	60
ON	ON	45

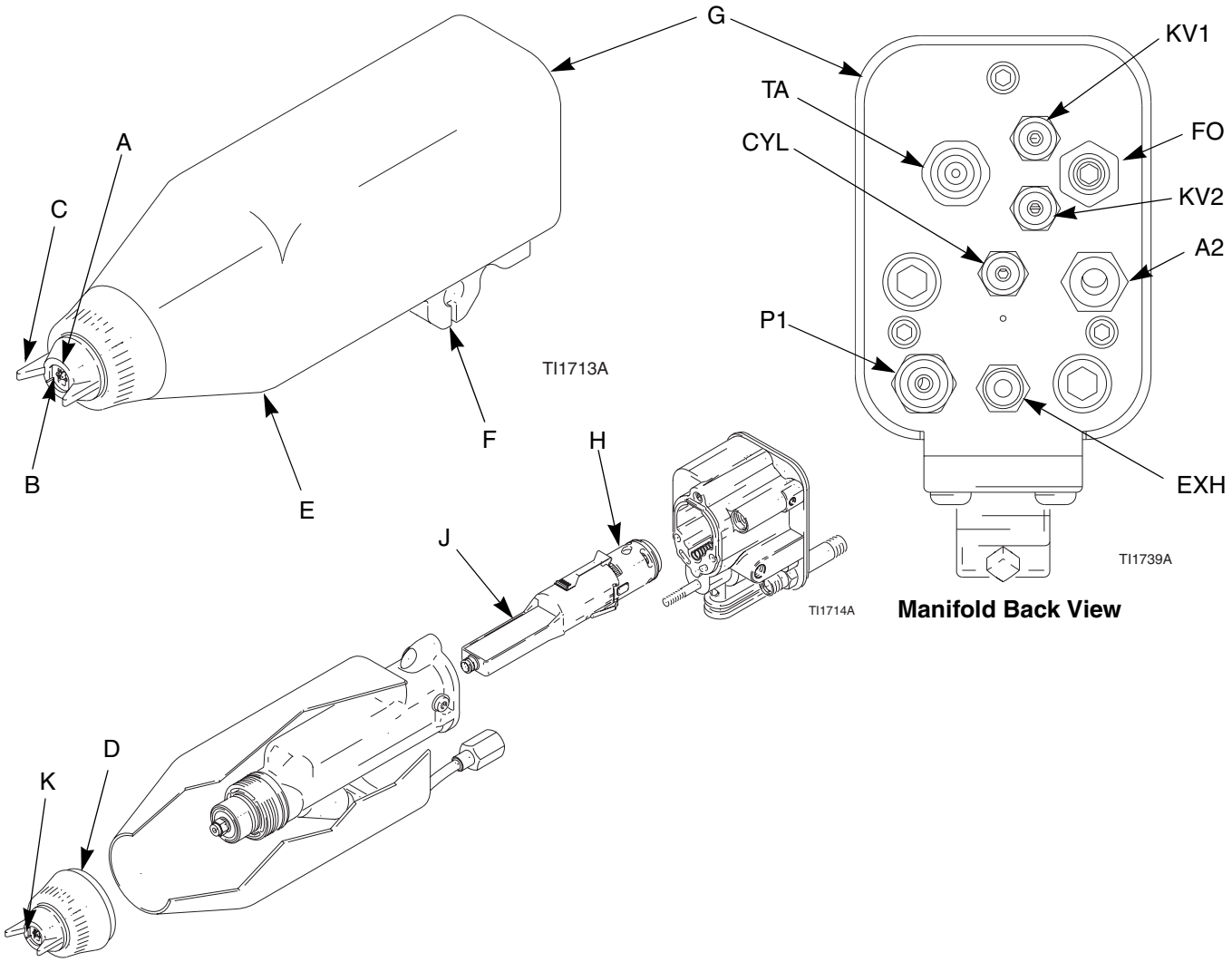


Fig. 1. Gun Overview

Key

A	Air Cap
B	Spray Tip
C	Tip Guard
D	Retaining Ring
E	Shroud
F	Mounting Bracket
G	Manifold
H	Turbine
J	Power Supply
K	Electrode

Manifold Markings

A1	not used
A2	Atomization Air Inlet Fitting
CYL	Cylinder Air Inlet Fitting
EXH	Shroud Exhaust Outlet Fitting
FO	Fiber Optic Fitting
KV1	kV Switch 1 Air Inlet
KV2	kV Switch 2 Air Inlet
P1	Fluid Supply Inlet Fitting
P2	not used
TA	Turbine Air Inlet Fitting

Installation

Install 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 or a Group II Category 2 G Hazardous Location.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.

FIG. 2. shows a typical electrostatic air-assisted spray system, and FIG. 3. shows possible system options. It is not an actual system design. For assistance in designing a system to suit your particular needs, contact your Graco distributor.

Key to FIG. 2. and FIG. 3.

A	Air Hose Ground Wire
B	Graco Grounded Turbine Air Hose (TA)
C	Atomizing Air Hose, 3/8 in. (10 mm) OD (A2)
E	Cylinder Air Hose, 5/32 in. (4 mm) OD (CYL)
F	Fluid Hose, 1/4-18 npsm gun fluid inlet (P1)
G	To Fluid Supply
H	Auto PRO Xs Air-Assisted Spray Gun
J	Mounting Bracket for 1/2 in. (13 mm) rod
K	Solenoid Valve, requires quick exhaust port
L	Bleed-Type Master Air Valve
M	Air Pressure Regulator
N	True Earth Ground
P	24 Volt Power Supply
Q	4-20 microampere Outputs
R	Full Feature ES Display Module
S	kV Only ES Display Module (battery operated)
T	Fiber Optic Y Cable
U	Bulkhead
V	Fiber Optic Cable
W	Main Air Line
X	kV Switch Air Hose, 5/32 in. (4 mm) OD (optional; plug KV1 fitting if not used)
Y	kV Switch Air Hose, 5/32 in. (4 mm) OD (optional; plug KV2 fitting if not used)

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.

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 turbine 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.

High velocity air exhaust will decrease the operating efficiency of the electrostatic system. The minimum allowable air exhaust velocity is 60 ft/minute (19 linear meters/minute).

NOTE:
* The turbine air supply (TA) must be electrically interlocked with the spray booth ventilation fans to prevent the power supply from operating without ventilating fans on.

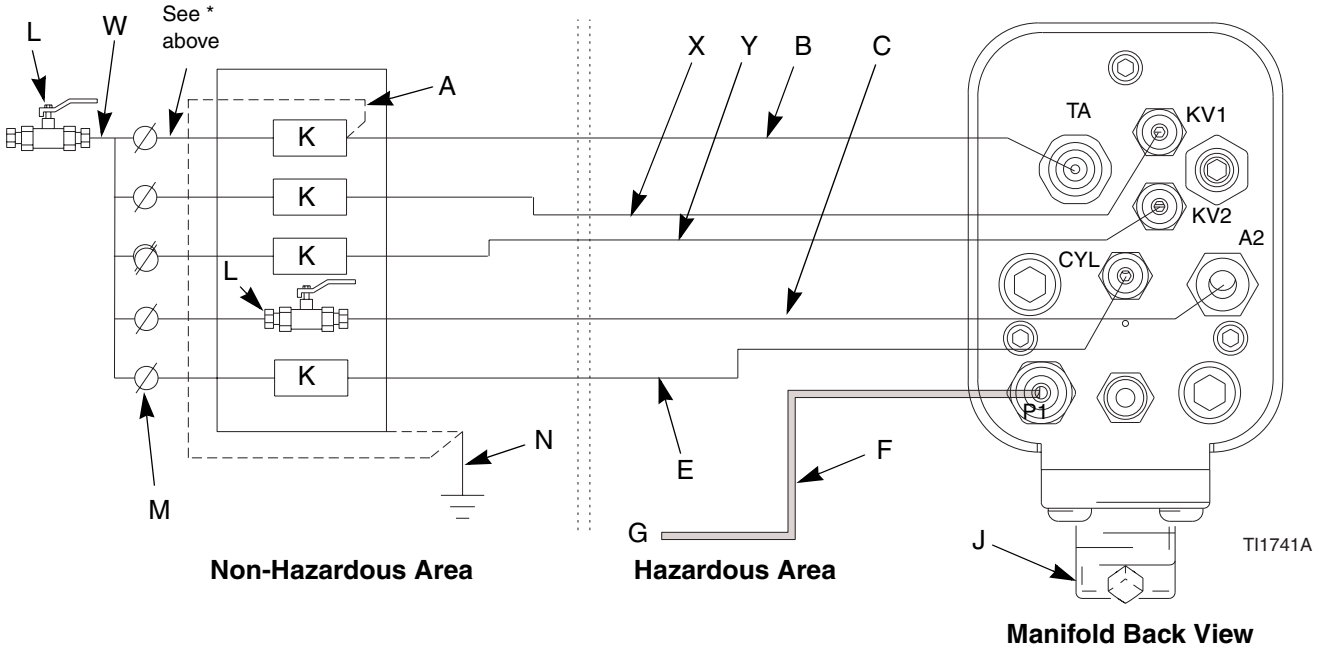


Fig. 2. Typical Installation

NOTE:

** A maximum of two splices with a total of 108 ft (33 m) of cable can be used. For the strongest light signals, use a minimum number of bulkhead splices. See **Accessories** on page 53.

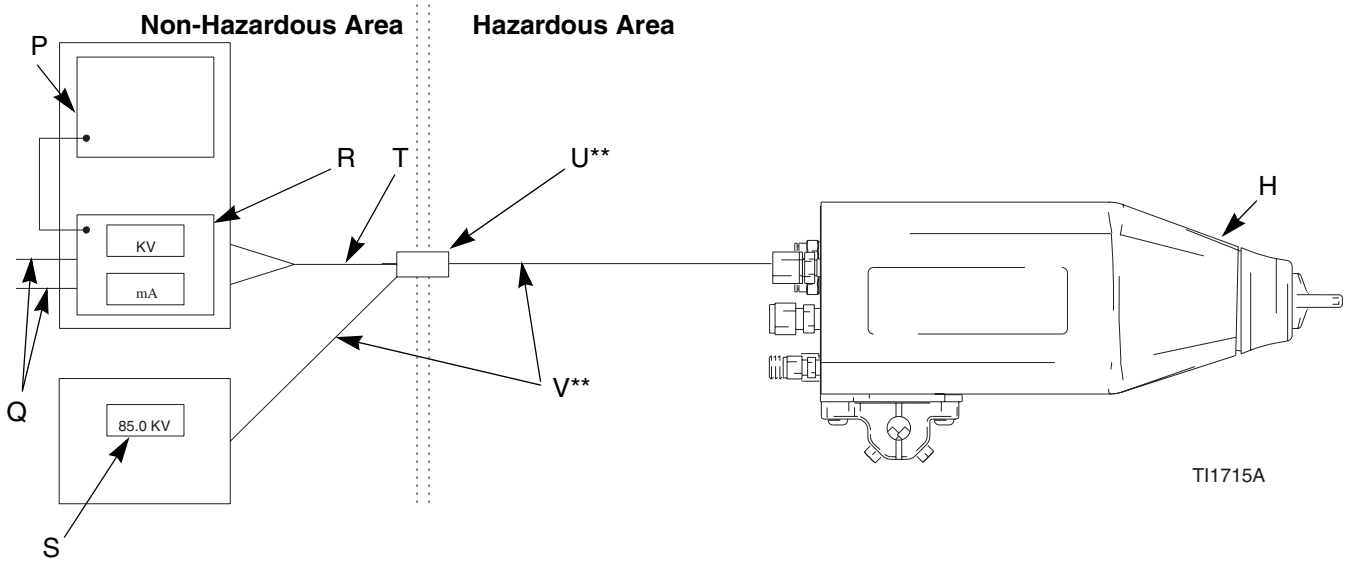


Fig. 3. Optional Fiber Optic Connection

Install the Air Line Accessories

⚠ WARNING

Component Rupture Hazard

To reduce the risk of serious injury due to component rupture:

The pump pressure must be limited by the pump air regulator. Do not rely on the gun fluid regulator to limit the fluid pressure to the gun.

The fluid supply pump must be prevented from producing a fluid pressure greater than the 3000 psi (21 MPa, 210 bar) *Maximum Working Fluid Pressure* of the gun. For example, the air supply pressure to a 30:1 ratio pump must not exceed 100 psi (0.7 MPa, 7 bar).

Be sure that all spray equipment and accessories added to the spray system are properly rated to withstand the maximum working pressure of your system.

1. Install a bleed-type master air valve (L) on the main air line (W) to shut off all air to the gun (H).

2. Install an air line filter/water separator on the gun 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 (M) on each of the air supply lines (B, C, E, X, Y) to control air pressure to the gun.

4. Install a solenoid valve (K) on the cylinder air line (E) to actuate the gun. The solenoid valve must have a quick exhaust port.

5. Install a bleed-type master air valve (L) on each pump air line to shut off all air to the pump (H).

⚠ WARNING

Fluid Injection Hazard

Trapped air can cause the gun to spray unexpectedly, which can result in serious injury, including injecting fluid through the skin. The solenoid valves (K) must have a quick exhaust port so trapped air will be relieved between the valve and gun when the solenoids are shut off. The bleed-type master air valve (L) is required on the pump air line so trapped air will be relieved between the valve and the pump after the valves or regulator are closed.

Install the Fluid Line Accessories

1. Install a fluid filter and drain valve at the pump outlet. Filtering the fluid will help remove coarse particles and sediment that could clog the spray tip.

   The gun includes an inline fluid filter (20) for additional filtration.

⚠ WARNING

Fluid Injection Hazard

The fluid drain valve 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 fluid injection and splashing in the eyes or on the skin.

2. Install a fluid regulator on the fluid line to control fluid pressure to the gun.

Install the Gun and Mounting Bracket

1. Loosen the mounting bracket's two set screws (103) and slide the bracket (102) onto a 1/2 in. (13 mm) mounting rod. See FIG. 4..

2. Position the gun and tighten the two set screws. For added positioning reliability, insert a 1/8 in. (3 mm) locating pin into the slot (NN) in the bracket and through a hole in the rod. See the detail in FIG. 4..

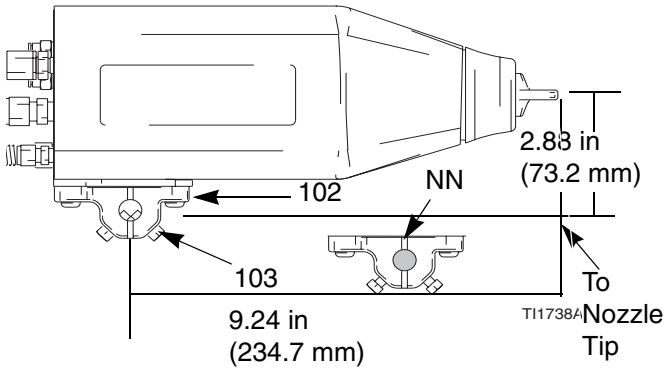


Fig. 4. Mounting Bracket

Connect the Air and Fluid Lines

FIG. 3. shows a schematic of air and fluid line connections, and FIG. 5. shows the manifold connections. Connect the air and fluid lines as instructed.

⚠ 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 Grounded Air Supply Hose.**

1. Connect the Graco Grounded Turbine Air Supply Hose (B) to the gun's turbine air inlet (TA) and connect the hose ground wire (A) to a true earth ground (N). The gun turbine air inlet fitting has a left-hand thread to prevent connecting another type of air hose to the turbine air inlet. See **Accessories** on page 53 for further information about the hose.

2. Check the electrical grounding of the gun as instructed on page 16.

3. Before connecting the fluid line (P1), blow it out with air and flush it with solvent. Use solvent which is compatible with the fluid to be sprayed.

Manifold Connections

A1	**Not Used**
A2	**Atomization Air Inlet Fitting** Connect a 3/8 in. (10 mm) OD tube between this fitting and the air supply.
CYL	**Cylinder Air Inlet Fitting** Connect a 5/32 in. (4 mm) OD tube between this fitting and the solenoid. For quicker response, use the shortest hose length possible.
EXH	**Shroud Exhaust Outlet Fitting** Connect a 1/4 in. (6 mm) OD x 4 ft (1.22 m) long tube to this fitting.
FO	**Fiber Optic Fitting (Optional)** Connect the Graco Fiber Optic cable (see page 14).
KV1	**kV Switch 1 Air Inlet Fitting** Connect a 5/32 in. (4 mm) OD tube between this fitting and the solenoid.
KV2	**kV Switch 2 Air Inlet Fitting** Connect a 5/32 in. (4 mm) OD tube between this fitting and the solenoid.
P1	**Fluid Supply Inlet Fitting** Connect a 1/4 npsm swivel fitting between this fitting and the fluid supply.
P2	**Not Used**
TA	**Turbine Air Inlet Fitting** Connect the Graco Electrically Conductive Air Hose between this fitting (left-hand thread) and the solenoid. Connect the air hose ground wire to a true earth ground.

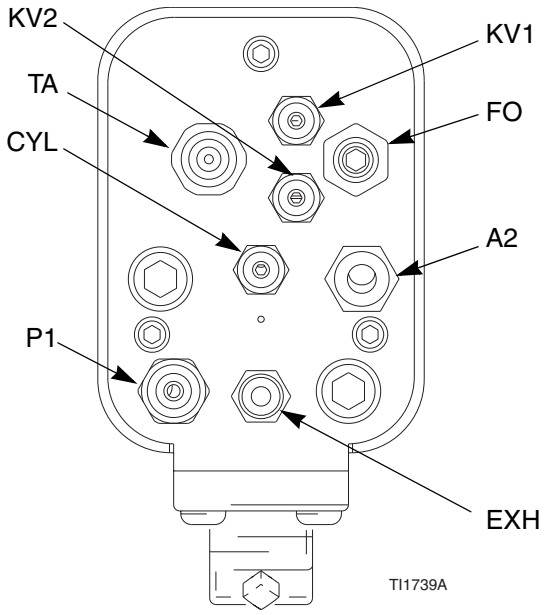


Fig. 5. Manifold Connections

Optional Fiber Optic Cable Connection

An optional fiber optic fitting is shipped unassembled with the gun. If an ES (kV) display module is used, install the fitting in the FO port of the manifold. See FIG. 3., page 10, for a schematic of the fiber optic connections.

1. Remove the plug (120) from the fiber optic port, and install the fiber optic fitting (5, shipped loose with the gun). See FIG. 6..

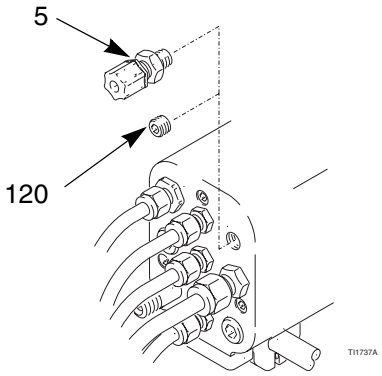


Fig. 6. Fiber Optic Fitting

2. Remove the nut (AA) from the fiber optic fitting (5) and slide the nut over the end of the fiber optic cable (BB). See FIG. 7..

3. Push the cable (BB) into the fitting (5) until it bottoms out. Tighten the nut (AA) to secure the cable.

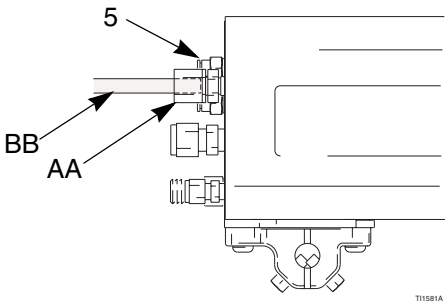


Fig. 7. Fiber Optic Cable

Most of the fiber optic light transmission loss occurs at the bulkhead splices. For the strongest light signals, use a minimum number of bulkhead splices. A maximum of two splices, with a total of 108 ft (33 m) of cable, is recommended.

4. See manual 308265 to install a Graco ES Display Module.

Grounding

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

When operating the electrostatic gun, any ungrounded objects in the spray area (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.

- *Pump:* ground the pump by connecting a ground wire and clamp as described in your separate pump instruction manual.
- *Electrostatic Air-Assisted Spray Gun:* ground the gun by connecting the Graco Grounded Air Hose to the turbine air inlet and connecting the air hose ground wire to a true earth ground. See **Check Electrical Grounding,** page 16.
- *Air compressors and hydraulic power supplies:* ground the equipment according to the manufacturer's recommendations.
- *All air and fluid lines* must be properly grounded.
- *All electrical cables* must be properly grounded.
- *All persons entering the spray area:* shoes must have conductive soles, such as leather, or personal grounding straps must be worn. Do not wear shoes with non-conductive soles such as rubber or plastic.
- *Object being sprayed:* keep the workpiece hangers clean and grounded at all times. Resistance must not exceed 1 megohm.
- *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.
- *Flammable liquids in the spray area:* must be kept in approved, grounded containers. Do not use plastic containers. Do not store more than the quantity needed for one shift.
- *All electrically conductive objects or devices in the spray area:* including fluid containers and wash cans, must be properly grounded.

Check Electrical Grounding

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

Megohmmeter Part No. 241079 (AA-see FIG. 8.) 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, and 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 turbine air hose.

2. Make sure the turbine air hose (B) is connected and the hose ground wire is connected to a true earth ground.

3. Turn off the air and fluid supply to the gun.

4. Measure the resistance between the turbine air inlet fitting (TA) and a true earth ground (N).

   a. *If using a black or grey turbine air hose,* use a megohmmeter to measure the resistance. Use an applied voltage of 500 minimum to 1000 volts maximum. The resistance should not exceed 1 megohm.

   b. *If using a red turbine air hose,* use an ohmmeter to measure the resistance. The resistance should not exceed 100 ohms.

3. 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 turbine air hose ground wire is connected to a true earth ground. If the resistance is still too high, replace the turbine air hose.

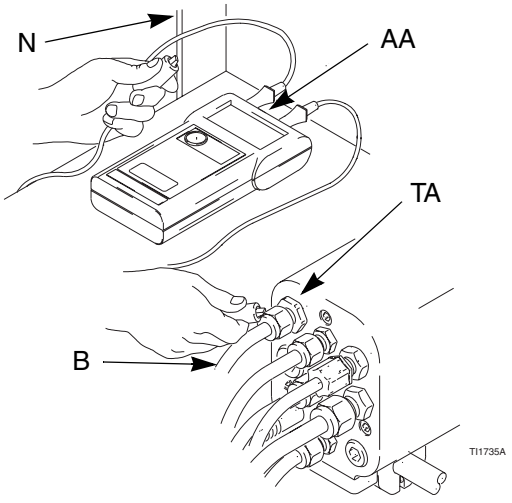


Fig. 8. Check Gun Grounding

Check Fluid Resistivity

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

Check the fluid resistivity in a non-hazardous area only. Resistance Meter 722886 and Probe 722860 are not approved for use in a hazardous area.

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

Graco Part No. 722886 Resistance Meter and 722860 Probe are available as accessories to check that the resistivity of the fluid being sprayed meets the requirements of an electrostatic air spray system.

Follow the instructions included with the meter and probe. Readings of 25 megohms-cm and above provide the best electrostatic results.

Check Fluid Viscosity

To check fluid viscosity you will need:

- a viscosity cup
- a stopwatch.

1. Completely submerge the viscosity cup in the fluid. Lift the cup out quickly, starting the stopwatch as soon as the cup is completely removed.
2. Watch the stream of fluid coming from the bottom of the cup. As soon as there is a break in the stream, shut off the stopwatch.
3. Record the fluid type, elapsed time, and size of the viscosity cup.
4. If the viscosity is too high or too low, contact the material supplier. Adjust as necessary.

Install the Fabric Cover

1. Install a fabric cover (XX) over the front of the gun and slide it back to cover the exposed tubing and hoses at the back of the manifold. See FIG. 9..
2. Route the exhaust tube (YY) outside the cover. This enables you to monitor the exhaust tube for the presence of any paint or solvent. See **Check for Fluid Leakage** on page 28. Strap down the exhaust tube to prevent it from moving around.

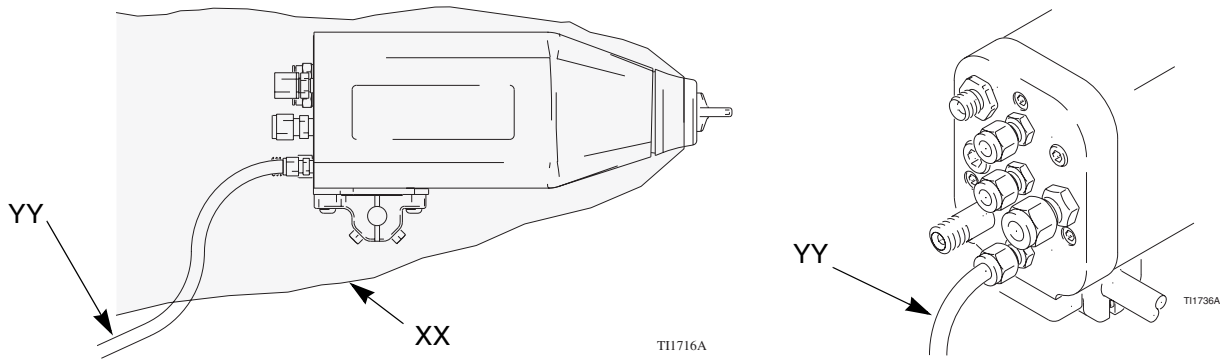


Fig. 9. Fabric Cover

Operation

Pressure Relief Procedure

⚠ WARNING

Fluid Injection Hazard

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. Fluid under high pressure can be injected through the skin and cause serious injury. To reduce the risk of an injury from fluid injection, splashing fluid, or electric shock, 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 tip.

1. Turn off all the air to the spray gun except the cylinder air, which triggers the gun.
2. Turn off the fluid supply to the gun.
3. Trigger the gun into a grounded metal waste container to relieve the fluid pressure.
4. Open the pump drain valve and all other drain valves in the system, having a waste container ready to catch the drainage. Triggering the gun to relieve pressure may not be sufficient. Leave the drain valve open until you are ready to spray again
5. Relieve fluid pressure in the fluid supply equipment as instructed in its instruction manual.
6. Close the bleed-type master air valve on the main air supply line to shut off the air. Leave the valve closed until you are ready to spray again.
7. If you suspect that the spray tip or hose is still clogged or that pressure is not fully relieved after following the steps above, very slowly loosen the hose end coupling and relieve pressure gradually, then loosen completely. Now clear the tip or hose obstruction.

Operating Checklist

Check the following list daily, before operating the system, to help ensure you of safe, efficient operation.

- ☐ All operators are properly trained to safely operate an automatic electrostatic air-assisted spray system as instructed in this manual.
- ☐ All operators are trained in the **Pressure Relief Procedure** at left.
- ☐ The warning sign provided with the gun is mounted in the spray area where it can be easily seen and read by all operators.
- ☐ The system, the operator, and all persons entering the spray area are properly grounded. See **Grounding** on page 15.
- ☐ The condition of the gun's electrical components has been checked as instructed in **Electrical Tests** on page 29.
- ☐ Ventilation fans are operating properly.
- ☐ Workpiece hangers are clean and grounded.
- ☐ All debris, including flammable fluids and rags, is removed from the spray area.
- ☐ All flammable fluids in the spray booth are in approved, grounded containers.
- ☐ All conductive objects in the spray area are electrically grounded. The floor of the spray area is electrically conductive and grounded.
- ☐ The manifold exhaust tubes have been checked for the presence of any fluid. See **Check for Fluid Leakage** on page 28.

Select a Spray Tip

The fluid output and pattern width depend on the size of the spray tip, the fluid viscosity, and the fluid pressure. Use the **Spray Tip Selection Chart**, page 52, as a guide for selecting the appropriate spray tip for your application.

Install the Spray Tip

⚠ WARNING

Fluid Injection Hazard

To reduce the risk of a fluid injection injury, always follow the **Pressure Relief Procedure** on page 18, before removing or installing the spray tip, air cap, or tip guard.

1. Relieve the pressure.
2. Place the spray tip (4) in the air cap (40), aligning the tab on the tip with the groove in the air cap. Be careful not to damage the electrode (40a).

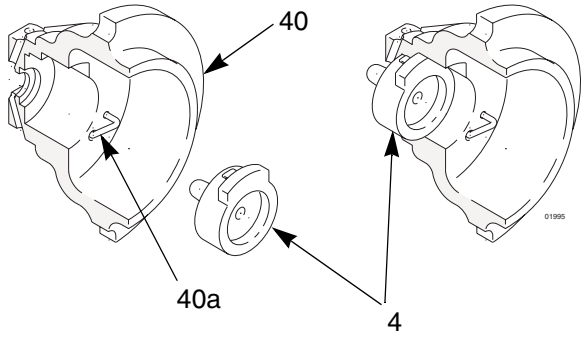


Fig. 10. Install Spray Tip

3. Install the spray tip and air cap, tip guard (3), shroud (2), and retaining ring (1) onto the gun. Be sure the electrode (40a) is in place. Tighten the retaining ring firmly.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, never operate the gun with a damaged electrode.

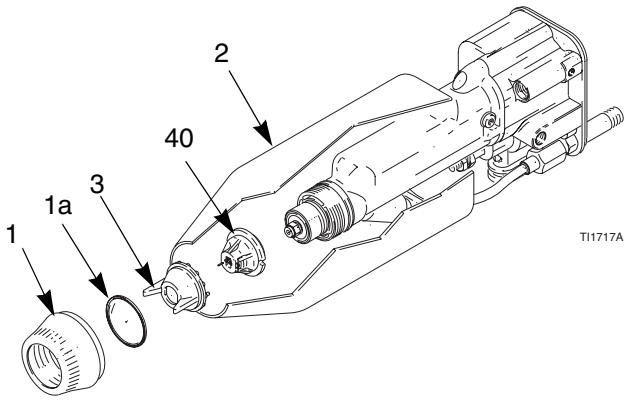


Fig. 11. Install Air Cap Assembly

Set the Atomization Fluid Pressure

Atomization fluid pressure will vary based on the viscosity of the fluid, flow rate desired, and other system characteristics.

1. Turn off the turbine air (TA) and atomization air (A2).
2. Start the pump. Set the fluid regulator to 400 psi (2.8 MPa, 28 bar).
3. With the turbine air (TA) and atomization air (A2) turned off, spray a test pattern, holding the gun 12 in. (305 mm) from the surface. Examine the particle size. Do not be concerned about the presence of tails; they will be removed in step 6.
4. Increase the fluid pressure in small increments. Spray another pattern and compare the particle size. Smaller particle size indicates improved atomization.

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, never exceed the maximum working pressure of the lowest rated system component. Maximum working fluid pressure of this equipment is **3000 psi (21 MPa, 210 bar).**

5. Continue to increase the fluid pressure and spray test patterns. Do not exceed 3000 psi (21 MPa, 210 bar) fluid pressure. When the particle size remains constant, the fluid is being atomized at the lowest possible fluid pressure.

For improved atomization at lower fluid flow rates, change to a smaller tip orifice size.

6. Turn on the atomization air (A2) and adjust the air pressure until the tails disappear.

See **Spray Pattern Troubleshooting** on page 32 to correct spray pattern problems.

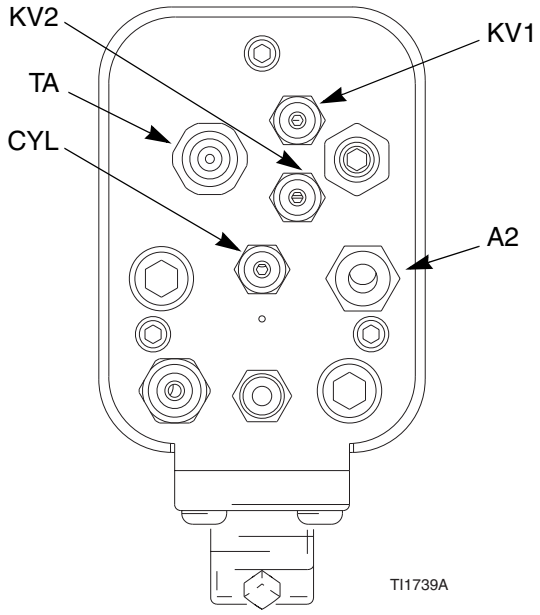


Fig. 12. Manifold Air Connections

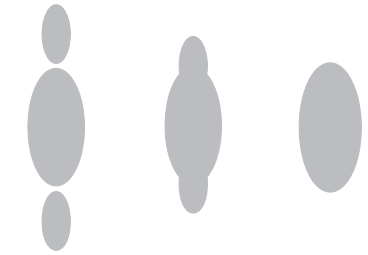


Fig. 13. Eliminating Tails

Adjust the Electrostatics

1. Shut off the fluid supply.

1. Trigger the gun, then turn on the turbine air (TA). See FIG. 12..

2. Refer to Table 2 to set the proper pressure at the turbine air hose inlet *when air is flowing*. Do not exceed these pressures as there is no added benefit and turbine life could be reduced.

Table 2: Dynamic Turbine Air Pressures

Turbine Air Hose Length ft (m)	**Air pressure at turbine air hose inlet for full voltage** psi (bar, MPa)
15 (4.6)	54 (3.8, 0.38)
25 (7.6)	55 (3.85, 0.38)
36 (11)	56 (3.9, 0.39)
50 (15.3)	57 (4.0, 0.40)
75 (22.9)	59 (4.1, 0.41)
100 (30.5)	61 (4.3, 0.43)

3. Check the voltage output of the gun using a high voltage probe and meter or by reading the ES (kV) Display Module.

The gun's normal high voltage reading is 60-70 kV. If a ball end high voltage measurement probe is used, the gun voltage will rise to about 85 kV. This will happen with all resistive electrostatic guns.

See **Electrical Troubleshooting** on page 34 to correct voltage problems.

Spraying

⚠ WARNING

Electric Shock Hazard

To reduce the risk of electric shock, do not touch the gun electrode or come within 4 in. (10 cm) of the nozzle during gun operation.

1. Apply a minimum of 50 psi (3.5 bar, 0.35 MPa) air pressure to the cylinder air fitting (CYL) to activate the on/off sequence of atomization air (A2) and fluid (P1). See FIG. 12..
2. Turn the gun functions off and on by using the air solenoid valves on the cylinder (CYL) and turbine (TA) air supply lines.
3. To change to a lower voltage setting, activate the solenoids controlling the KV1 and KV2 ports. See **Changing the kV Setting** on page 6.

⚠ WARNING

Fire and Explosion Hazard

If any fluid leakage from the gun is detected, stop spraying immediately. Fluid leakage into the gun shroud could cause fire or explosion and result in serious injury and property damage. See **Check for Fluid Leakage** on page 28.

Triggering the Fluid Alone

1. Shut off and relieve the air pressure to the atomization (A2) air line, using the bleed-type air shutoff valve.
2. Apply 50 psi (3.5 bar, 0.35 MPa) air pressure to the cylinder air fitting (CYL) to trigger the fluid.

Shutdown

⚠ WARNING

Fluid Injection Hazard

To reduce the risk of a fluid injection injury, always follow the **Pressure Relief Procedure** on page 18 when you stop spraying and whenever you are instructed to relieve the pressure.

1. Relieve the pressure.
2. Flush and clean the equipment. See **Maintenance** on page 23.

Maintenance

Daily Care and Cleaning

⚠ CAUTION

- Clean all parts with a non-conductive, compatible solvent. Conductive solvents can cause the gun to malfunction.
- Do not use methylene chloride as a flushing or cleaning solvent with this gun as it will damage nylon components.
- Fluid in the air passages could cause the gun to malfunction and could draw current and reduce the electrostatic effect. Fluid in the power supply cavity can reduce the alternator life. Whenever possible, point the gun down when cleaning it. Do not use any cleaning method which could allow fluid into the gun air passages.

Do not immerse the gun in fluid.

Do not point the gun up while cleaning it.

Do not wipe the gun with a cloth that is heavily saturated; wring out the excess fluid.

Daily Care and Cleaning, continued

⚠ WARNING

Fluid Injection Hazard

To reduce the risk of a fluid injection injury, always follow the **Pressure Relief Procedure** on page 18 when you stop spraying and whenever you are instructed to relieve the pressure.

- Clean the fluid and air line filters daily.
- Clean the outside of the gun daily with a soft cloth dampened in a compatible solvent.
- Clean the air cap, spray tip, and tip guard daily, minimum. Some applications require more frequent cleaning. Replace the parts if they are damaged. See **Clean the Spray Gun**, page 26.
- Check the electrode and replace if broken or damaged. See **Electrode Replacement** on page 39.
- Check for fluid leakage from the gun and fluid hoses. See **Check for Fluid Leakage** on page 28. Tighten fittings or replace equipment as needed.
- Check all work hangers for fluid buildup; clean if necessary.
- Flush the gun before changing colors and whenever you are done operating the gun.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, turn off the turbine air (TA) before flushing the gun or any part of the system.

Flush the Spray Gun

⚠ WARNING

Fluid Injection Hazard

To reduce the risk of a fluid injection injury, always follow the **Pressure Relief Procedure** on page 18 when you stop spraying and whenever you are instructed to relieve the pressure.

1. Relieve the pressure.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, turn off the turbine air (TA) before flushing the gun or any part of the system.

2. Be sure the turbine air (TA) is turned off.

3. Remove the retaining ring (1), tip guard (3), air cap (40), spray tip (4), and gun shroud (2). See FIG. 14.. Clean these parts and set them aside.

4. Turn on the solvent supply. Use the lowest possible fluid pressure when flushing.

5. Turn on the cylinder air (CYL) to trigger the gun.

6. Flush the gun, spraying into a grounded metal container until clean solvent comes from the gun.

7. Turn off the solvent supply.

8. Relieve the pressure.

9. Install the spray tip (4) and air cap (40), tip guard (3), shroud (2), and retaining ring (1) onto the gun. Tighten the retaining ring firmly.

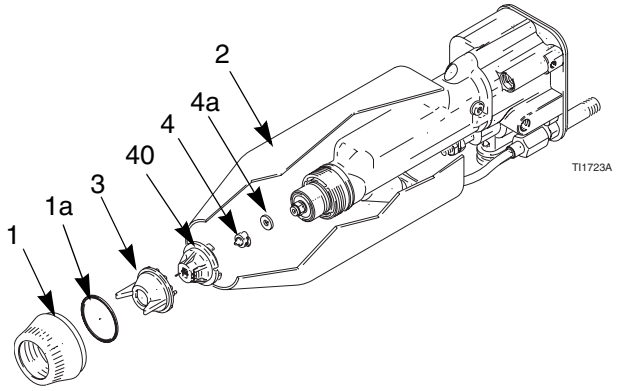


Fig. 14. Remove Spray Tip Before Flushing

Clean the Spray Gun

Equipment Needed

- soft bristle brush
- compatible solvent

Procedure

⚠ WARNING

Fluid Injection Hazard

To reduce the risk of a fluid injection injury, always follow the **Pressure Relief Procedure** on page 18 when you stop spraying and whenever you are instructed to relieve the pressure.

1. Relieve the pressure.
2. Be sure the turbine air (TA) is turned off.
3. Remove the retaining ring (1), tip guard (3), air cap (40), spray tip (4), and gun shroud (2). See page 19.
4. Dip the end of a soft bristle brush into compatible solvent. clean the front of the gun with the brush. Avoid getting any solvent into the air passages. Whenever possible, point the gun down when cleaning it. See FIG. 15..

If it appears that there is paint inside the air passages, remove the gun from the line for servicing.

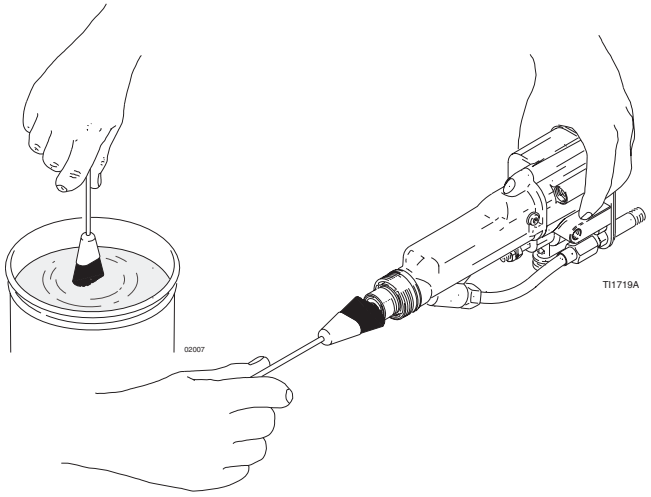


Fig. 15. Clean Front of Gun

5. Dampen a soft cloth with solvent and wring out the excess. Wipe the exterior of the gun and shroud clean. See FIG. 16..

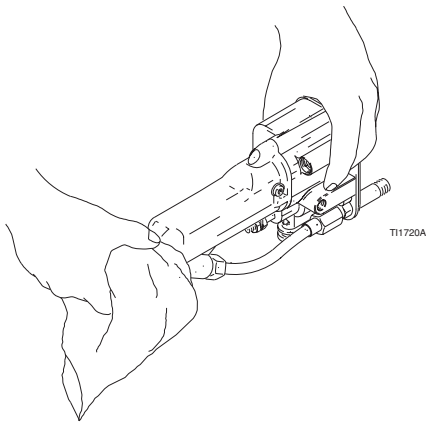


Fig. 16. Clean Gun Body

6. Remove the bottom fluid tube fitting (P) and fluid filter (20). See FIG. 17.. Clean the filter in compatible solvent.
7. Reinstall the filter (20) and fitting (P). Do not overtighten the fitting, and make sure the top fitting (Q) remains tight.

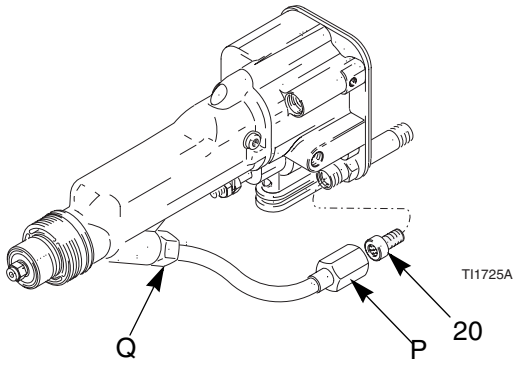


Fig. 17. Clean the Inline Fluid Filter

8. Clean the retaining ring (1), tip guard (3), air cap (40), and spray tip (4) with a soft brush daily, minimum. Replace any damaged parts. Be careful not to damage the electrode (40a).

⚠ 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 is not damaged. Scratches in the air cap or spray tip or a damaged electrode can distort the spray pattern.

9. Wipe off the parts with a dry cloth. Be careful not to damage the electrode.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, never operate the gun with a damaged electrode.

10. Check the electrode (40a). Replace if damaged.

11. Install the spray tip, page 19.

12. Install the spray tip and air cap, tip guard, shroud, and retaining ring, page 19. Be sure the electrode (40a) is in place.

13. Test gun resistance, page 29.

Check for Fluid Leakage

⚠ WARNING

Fire and Explosion Hazard

If any fluid leakage from the gun is detected, stop spraying immediately. Fluid leakage into the gun shroud could cause fire or explosion and result in serious injury and property damage.

⚠ WARNING

Fluid Injection Hazard

To reduce the risk of a fluid injection injury, always follow the **Pressure Relief Procedure** on page 18 when you stop spraying and whenever you are instructed to relieve the pressure.

During operation, periodically check the manifold exhaust tube (YY) and both ends of the gun shroud (ZZ) for the presence of fluid. See FIG. 18.. Fluid in these areas indicates leakage into the shroud, which could be caused by leaks at the fluid tube connections or fluid packing leakage.

If fluid is seen in these areas, stop spraying immediately. Relieve the pressure, then remove the gun for repair.

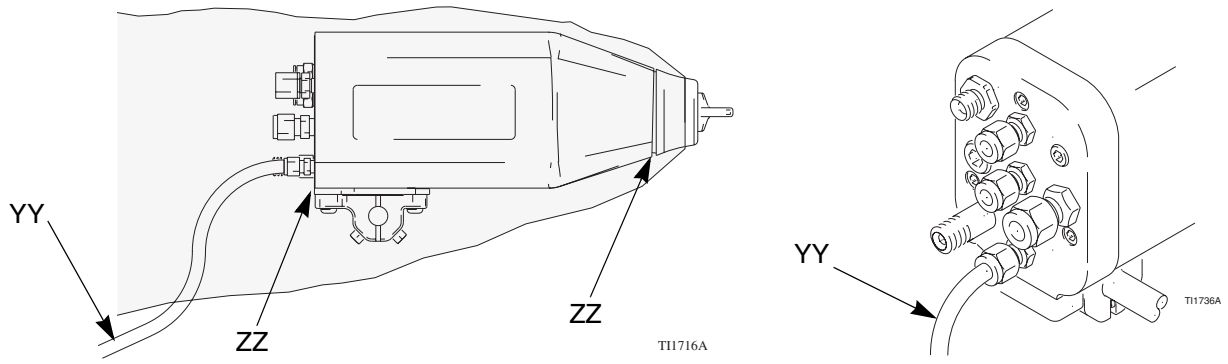


Fig. 18. Check for Fluid Leakage

Electrical Tests

Electrical components inside the gun affect performance and safety. The following procedures test the condition of the power supply (12) and barrel (6), and electrical continuity between components.

⚠ CAUTION

The barrel resistor cartridge is part of the barrel and is not replaceable. To avoid destroying the gun barrel, do not attempt to remove the barrel resistor.

Use megohmmeter Part No. 241079 (AA) and an applied voltage of 500 V. Connect the leads as shown.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

Megohmmeter Part No. 241079 (AA-see FIG. 19.) 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, and electric shock and result in serious injury and property damage.

Test Gun Resistance

1. Flush and dry the fluid passage.
2. Measure resistance between the electrode needle tip (40a) and the turbine air inlet fitting (TA); it should be 156-180 megohms. If outside this range, relieve pressure and remove the air cap (page 37). Inspect the electrode (40a) and the barrel conductive ring (6a) for damage and proper position, to ensure that the electrode makes contact with the conductive ring. Reinstall the air cap and repeat the measurement. If it is still outside this range, remove the gun for service.

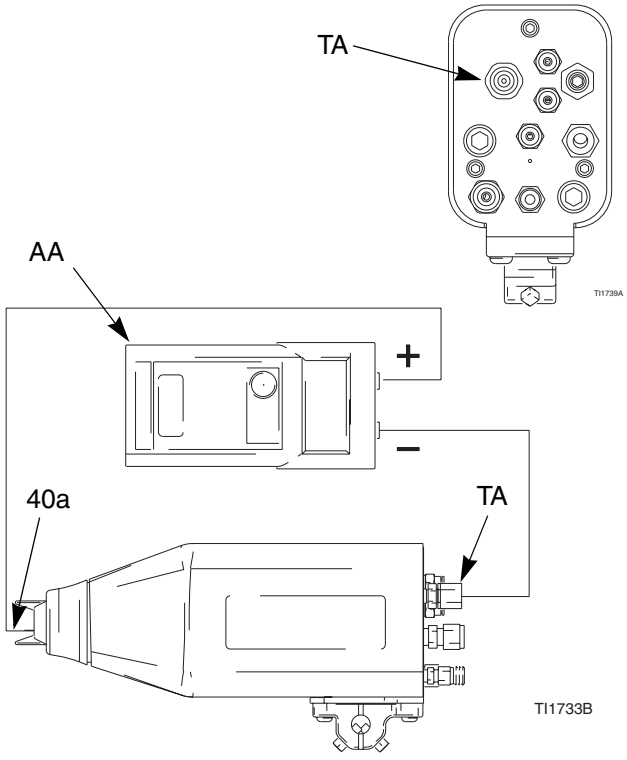


Fig. 19. Test Gun Resistance

Test Power Supply Resistance

1. Remove the power supply (12), page 46.

2. Remove the turbine alternator (13) from the power supply, page 47.

3. Measure resistance from the power supply's ground strips (EE) to the spring (12b). See FIG. 20..

4. The resistance should be 135-150 megohms. If outside this range, replace the power supply. If in range, proceed to the next test.

5. If you still have problems, refer to **Electrical Troubleshooting** on page 34 for other possible causes of poor performance, or contact your Graco distributor.

6. Be sure the spring (12b) is in place before reinstalling the power supply.

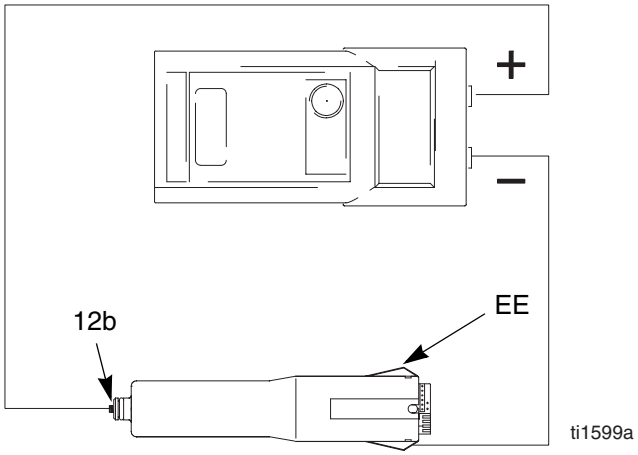


Fig. 20. Test Power Supply Resistance

Test Barrel Resistance

1. 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.

2. Measure the resistance between the conductive rod (B) and the barrel contact ring (6a). See FIG. 21.. The resistance should be 19-29 megohms. If the resistance is incorrect, make sure the metal contact (C) in the barrel and the barrel contact ring (6a) are clean and undamaged.

3. If the resistance is still outside the range, remove the barrel contact ring (6a) and measure the resistance between the conductive rod (B) and the wire lead at the bottom of the contact ring groove.

4. If the resistance is in range, replace the contact ring (6a) with a new one. Press the contact ring firmly into the groove on the front of the barrel.

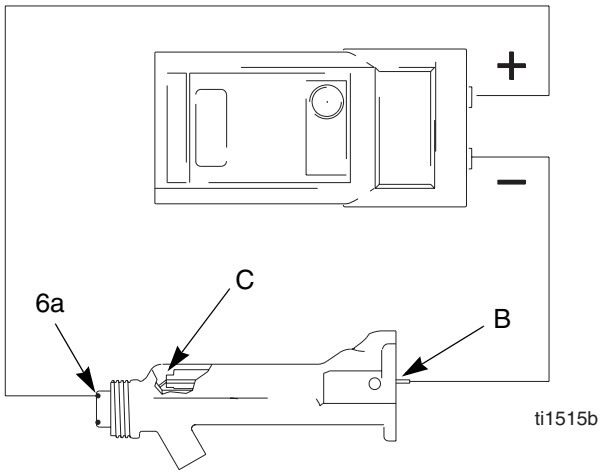


Fig. 21. Test Barrel Resistance

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

The barrel contact ring (6a) is a conductive contact ring, not a sealing o-ring. To reduce the risk of sparking or electric shock, do not remove the barrel contact ring (6a) 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.

5. If the resistance is still outside the range, replace the barrel.

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 repair this equipment unless you are trained and qualified.

⚠ WARNING

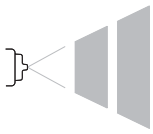
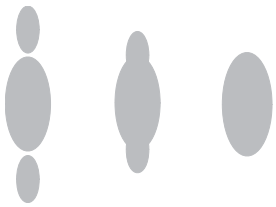
Fluid Injection Hazard

To reduce the risk of a fluid injection injury, always follow the **Pressure Relief Procedure** on page 18 before doing any maintenance or service on this gun or system.

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

Spray Pattern Troubleshooting

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

Problem	Cause	Solution
Fluttering or spitting spray. 	No fluid.	Refill supply.
	Air in fluid supply.	Check fluid source. Refill.
Irregular pattern. 	Fluid buildup; partially plugged tip.	Clean. See page 26.
	Worn/damaged tip or air cap holes.	Clean or replace.
Pattern pushed to one side; air cap gets dirty.	Air cap holes plugged.	Clean. See page 26.
Tails in pattern. 	Atomization air pressure too low.	Increase atomization air pressure.
	Fluid pressure too low.	Increase.
Fluid buildup on air cap/tip guard.	Atomization air pressure too high.	Decrease.
	Fluid pressure too low.	Increase.

Gun Operation Troubleshooting

Problem	Cause	Solution
Excessive spray fog.	Atomization air pressure too high.	Decrease air pressure as low as possible.
	Fluid too thin.	Increase viscosity.
“Orange Peel” finish.	Atomization air pressure too low.	Increase air pressure; use lowest pressure necessary.
	Spray tip (4) too large.	Use smaller tip; see page 52.
	Poorly mixed or filtered fluid.	Remix or refilter fluid.
	Fluid too thick.	Reduce viscosity.
Fluid leaks from the fluid packing area	Worn fluid needle packings or shaft.	Replace fluid needle assembly (8); see page 41.
Air leaks from the air cap	Worn piston stem o-rings (34e, 34f).	Replace; see page 42.
Fluid leakage from the front of the gun	Worn or damaged fluid needle (8).	Replace; see page 41
	Worn fluid seat housing (5).	Replace; see page 37.
	Loose spray tip (4).	Tighten retaining ring (1); see page 37.
	Damaged tip seal (4a).	Replace; see page 37.
Gun does not spray	Low fluid supply.	Add fluid if necessary.
	Dirty or clogged spray tip (4).	Clean; see page 37.
	Damaged spray tip (4).	Replace; see page 37.
	Damaged fluid needle (8).	Replace; see page 41.
	Piston (34) not actuating.	Check cylinder air. Check piston u-cup (34d); see page 48.
	Actuator arm (29) is out of position.	Check actuator arm and nuts. See page 43.
Paint buildup on air cap	Atomization air pressure too high.	Reduce.
	Dirty air cap.	Clean; see page 37.
Air leaks from manifold	Manifold is not tight.	Tighten manifold screws (106).
	Worn or missing o-rings.	Replace o-rings. See page 43.
Fluid doesn’t shut off properly.	Seat housing (5) too tight.	Replace; see page 37.
	Fluid buildup on fluid needle (8).	Replace needle; see page 41.
	Piston sticking.	Clean or replace o-rings. See page 43.

Electrical Troubleshooting

Problem	Cause	Solution
Poor wrap.	Turbine air is not turned on.	Turn on.
	Booth exhaust velocity is too high.	Reduce velocity to within code limits.
	Atomization air pressure too high.	Decrease.
	Fluid pressure too high.	Decrease.
	Incorrect distance from gun to part.	Should be 8-12 in. (200-300 mm).
	Poorly grounded parts.	Resistance must be 1 megohm or less. Clean workpiece hangers.
	Faulty gun resistance.	See **Test Gun Resistance** on page 29.
	Low fluid resistivity.	Check fluid resistivity, page 17.
	Fluid leaks from the packing (8d) and causes a short.	Clean the packing rod cavity. Replace the packing rod. See page 41.
	Faulty turbine alternator.	Be sure the plug is in place on the back of the turbine alternator housing. Remove and test the turbine alternator. See page 47.
	The KV switch is stuck on low.	Check the switch actuation; replace if needed.
	No power.	Replace power supply. See page 46.
No voltage or low voltage reading on the gun ES display module	Damaged fiber optic cable or connection.	Check; replace damaged parts.
	Turbine air is not turned on.	Turn on.
	Poor wrap.	See causes and solutions under Poor Wrap, above.
Operator gets mild shock.	Operator not grounded or is near ungrounded object.	See **Grounding** on page 15.
	Gun not grounded.	See **Check Electrical Grounding** on page 16 and **Test Gun Resistance** on page 29.
Operator gets shock from workpiece.	Workpiece not grounded.	Resistance must be 1 megohm or less. Clean workpiece hangers.

Repair

Prepare the Gun for Service

- Check all possible remedies in **Troubleshooting** before disassembling the gun.
- Use a vise with padded jaws to prevent damage to plastic parts.
- Lubricate the power supply o-ring (12a), some fluid needle parts (8), and certain fluid fittings with Part No. 116553 Dielectric Grease, as specified in the text.
- Lightly lubricate o-rings and seals with non-silicone grease. Order Part No. 111265 Lubricant. Do not over-lubricate.
- Only use genuine Graco parts. Do not mix or use parts from other PRO Gun models.

⚠ WARNING

Electric Shock Hazard

Installing and repairing 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

Fluid Injection Hazard

To reduce the risk of a fluid injection injury, always follow the **Pressure Relief Procedure** on page 18 when you stop spraying, before servicing the gun, and whenever you are instructed to relieve the pressure.

1. Flush and clean the gun, page 23.
2. Relieve the pressure, page 18.
3. Remove the gun from the manifold, page 36.
4. Remove the gun from the worksite. Repair area must be clean.

Remove the Gun from the Manifold

1. Remove the fluid supply hose from the fluid fitting (22).

2. Loosen the bottom gun screw (31) until the gun sits loosely in the mounting bracket slot (A). See FIG. 22..

⚠ CAUTION

The piston return spring (105) is compressed between the manifold and the gun body when they are assembled. To avoid sudden movement of the gun, loosen the bottom gun screw (31) before loosening the three manifold screws (106). This allows the gun to move forward gradually as the manifold screws are loosened. Hold the gun firmly in hand while loosening the manifold screws.

3. Holding the gun firmly in hand, loosen the three screws (106) from the back of the manifold.

4. Remove the gun from the manifold and take it to the service area.

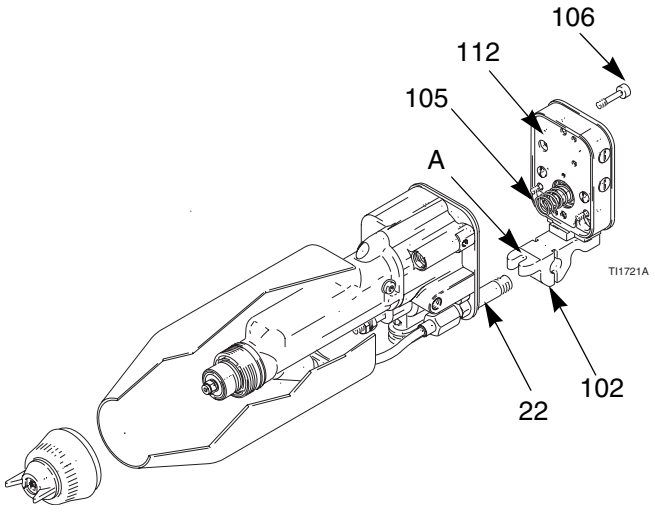


Fig. 22. Remove Gun from Manifold

Install the Gun on the Manifold

1. Make sure the gasket (112) and spring (105) are in place on the manifold. See FIG. 22.. Inspect the parts for damage and replace them as needed.

2. Secure the gun to the manifold by tightening the three screws (106).

3. Secure the gun to the mounting bracket (102) by tightening the bottom screw (31).

Tip Guard, Air Cap, Spray Tip, or Seat Housing Replacement

1. Prepare gun for service, page 35.

2. Remove the retaining ring (1), tip guard (3), air cap (40), spray tip (4), and shroud (2). You may have to turn the air cap with the tip guard to remove it. See FIG. 23..

3. Remove the seat housing (5) with the tool (37) provided. See FIG. 24..

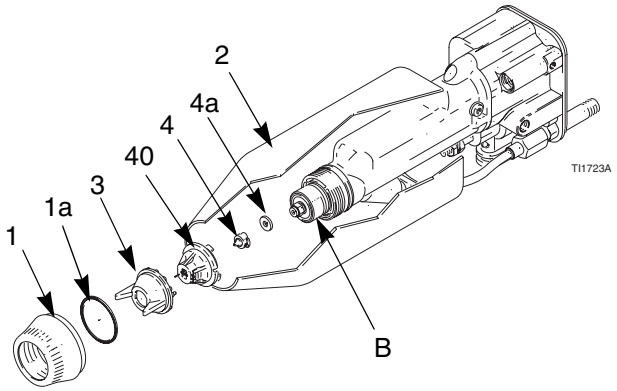


Fig. 23. Tip Guard, Air Cap, and Spray Tip Replacement

⚠ CAUTION

The barrel resistor cartridge (B) is part of the barrel and is not replaceable. To avoid destroying the gun barrel, do not attempt to remove the barrel resistor.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

The barrel contact ring (6a) is a conductive contact ring, not a sealing o-ring. To reduce the risk of sparking or electric shock, do not remove the barrel contact ring (6a) 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.

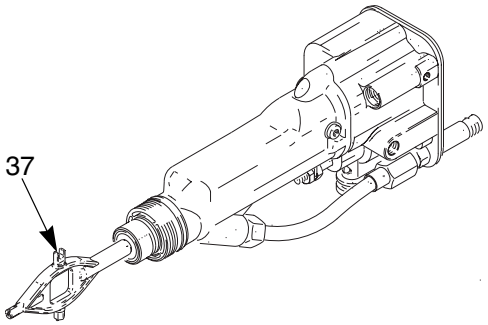


Fig. 24. Seat Housing Replacement

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, never operate the gun with a missing or damaged electrode.

4. Make sure the electrode (40a) is not damaged or missing. See page 39 to install the electrode.

5. Install the seat housing (5) with the tool (14) provided. Tighten until snug, then 1/4 turn more; do not overtighten. See FIG. 24..

⚠ CAUTION

To avoid damaging the seat housing and gun barrel, never overtighten the seat housing. Overtightening may affect the fluid shutoff.

6. Place the spray tip (4) in the air cap (40). Align the tab of the tip with the groove in the air cap. Be careful not to damage the electrode (40a).

7. Slide the shroud (2) onto the gun.

8. Install the spray tip (4) and air cap (40), tip guard (3), shroud (2), and retaining ring (1) onto the gun. Make sure the u-cup (1a) is in place on the retaining ring (1). The lips must face forward. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.

9. Test gun resistance, page 29.

10. Install the gun onto the manifold and bracket. See page 36.

Electrode Replacement

⚠ WARNING

Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, do not operate the spray gun without the electrode installed in the air cap.

1. Prepare the gun for service, page 35.
2. Remove the air cap assembly, page 37.
3. Pull the electrode (40a) out of the back of the air cap, using a needle-nose pliers.
4. Push the new electrode through the air cap hole. Make sure the short end (BB) of the electrode engages the hole (CC) in the back of the air cap. Press the electrode in place firmly with your fingers. See FIG. 25..
5. Install the air cap assembly, page 37.
6. Test gun resistance, page 29.

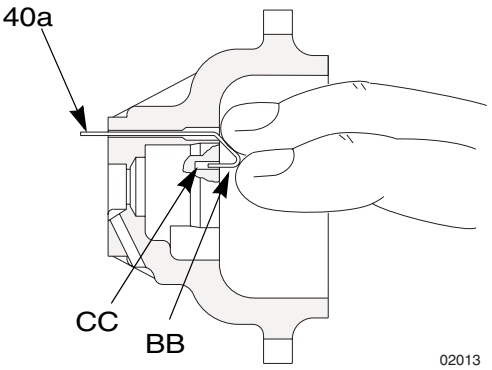


Fig. 25. Electrode Replacement

Fluid Tube Replacement

There are no replaceable parts in the fluid tube assembly. Only remove when necessary.

1. Prepare the gun for service, page 35.
2. Remove the air cap assembly, page 37. Remove the shroud (2).
3. Disconnect the bottom fluid tube nut (C). See FIG. 26..
4. Carefully unscrew the top fluid tube nut (D).

⚠ CAUTION

Be careful not to damage the fluid tube assembly (19) when cleaning or installing it, especially the sealing surface (E). If the sealing surface is damaged, the entire fluid tube assembly must be replaced.

5. Apply Part No. 116553 dielectric grease to the entire length of the plastic extension on the end of the fluid tube (19).
6. Apply low strength thread sealant to the fluid tube nut threads.
7. Install the fluid tube into the gun barrel and tighten the top nut (D) hand-tight, then 1/4 to 1/2 turn with a wrench. There will be a gap between the nut and barrel. Do not overtighten the nut.
8. Make sure the fluid filter (20) is in place. Tighten the bottom nut (C) onto the fitting (22) and torque to 20-30 in-lb (2.3-3.4 N•m). Make sure the top nut remains tight.
9. Reinstall the shroud and air cap assembly, page 37.
10. Test gun resistance, page 29.

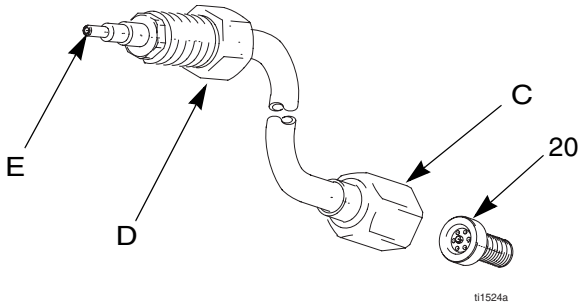


Fig. 26. Fluid Tube Replacement

Fluid Filter Removal

1. Prepare the gun for service, page 35.
2. Remove the air cap assembly, page 37. Remove the shroud (2).
3. Disconnect the bottom fluid tube nut (C).
4. Remove the fluid filter (20). Clean or replace the filter, as needed.

Replacement filters are available in 100 mesh (standard) or 60 mesh sizes. See page 53.

5. Install the fluid filter. Tighten the bottom nut (C) onto the fitting (22) and torque to 20-30 in-lb (2.3-3.4 N•m). Make sure the top nut (D) remains tight.

⚠ CAUTION

Be sure the fluid tube (19) is not twisted after tightening the bottom nut (C).

6. Reinstall the shroud and air cap assembly, page 37.
7. Test gun resistance, page 29.

Fluid Needle Replacement

1. Prepare the gun for service, page 35.
2. Remove the air cap assembly and seat housing, page 37.
3. Remove the barrel (6), page 44.
4. Remove the spring cap (45) and the spring (8a) from the barrel. See FIG. 27..
5. Be sure the seat housing (5) is removed. Place the 2 mm ball end wrench (44) in the back of the fluid needle assembly. Push the tool in and turn it counterclockwise about 12 full turns to unthread the needle.
6. Using the multi-tool (37), pull back on the packing nut (N) to remove the fluid needle assembly. See FIG. 28..
7. Install the fluid needle assembly in the gun barrel. Push in on the needle with the 2 mm ball end wrench (44) and tighten. See FIG. 29..
8. Install the spring (8a).
9. Install the spring cap (45), making sure the grounding spring (25) is in place. Tighten until snug. **Do not overtighten.**
10. Install the barrel (6), page 45.

⚠ CAUTION

To avoid damaging the seat housing and gun barrel, never overtighten the seat housing. Overtightening may result in improper fluid shutoff.

11. Install the seat housing and air cap, page 37.
12. Test gun resistance, page 29.

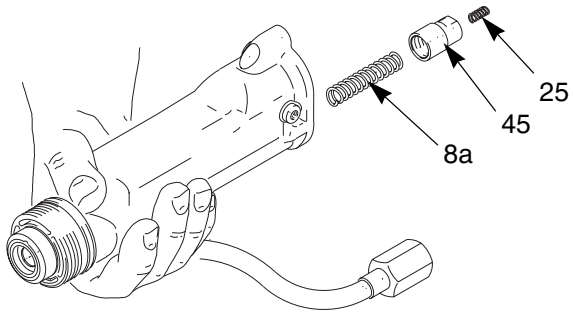


Fig. 27. Spring Cap and Springs

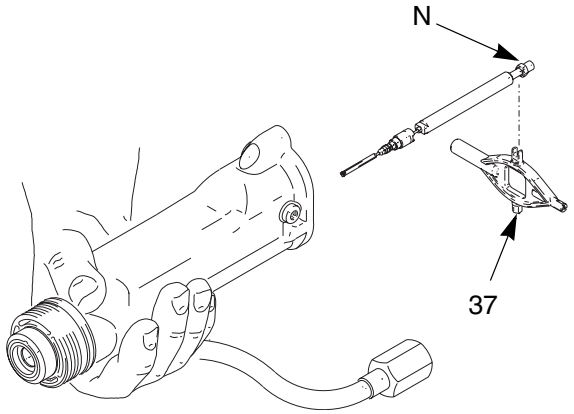


Fig. 28. Fluid Needle Removal

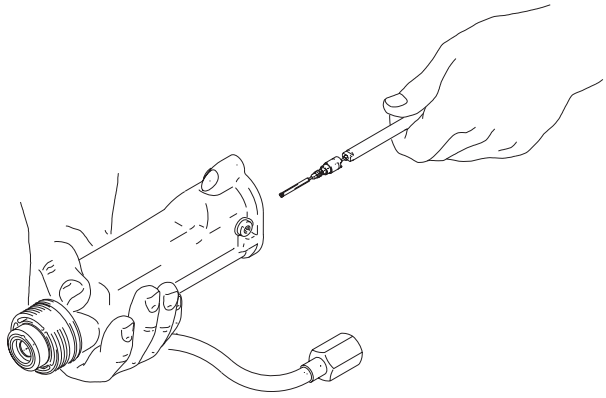


Fig. 29. Fluid Needle Replacement

Piston Repair

1. Prepare the gun for service, page 35.

2. Remove the air cap, page 37. Remove the gun shroud (2).

3. Remove the jam nut (28), actuator arm (29), and adjustment nut (30). See FIG. 30..

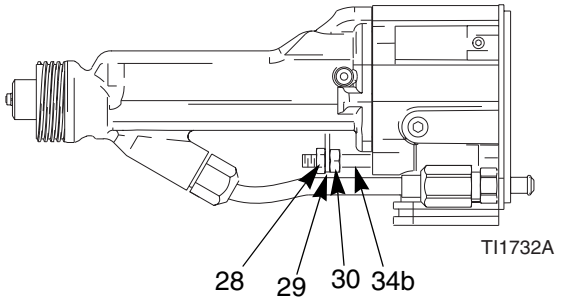


Fig. 30. Actuator Arm

4. Push on the piston rod (34b) to push the piston out the back of the gun.

5. Inspect the o-rings (34e, 34f, 34g) and u-cup packing (34d) for damage. See Table 3 and FIG. 31..

6. Lubricate the o-rings (34e, 34f, 34g) and u-cup packing (34d) with non-silicone grease, Part No. 111265. Do not over-lubricate.

7. Align the two stems (34c) with the holes in the gun body and press the piston assembly into the back of the gun until it bottoms.

8. Install and adjust the actuator arm, page 43.

Table 3: Piston O-Rings

Description	Function
Shaft O-Ring (34g)	Seals cylinder air along the piston rod (34b). Replace if air leaks along rod.
Front O-Ring (34e)	Air shutoff seal. Replace if air leaks from air cap when gun is de-triggered.
Back O-Ring (34f)	Separates cylinder air from atomizing air.
U-Cup (34d)	Replace if air leaks from small vent hole at back of manifold when gun is triggered.

Table 3: Piston O-Rings

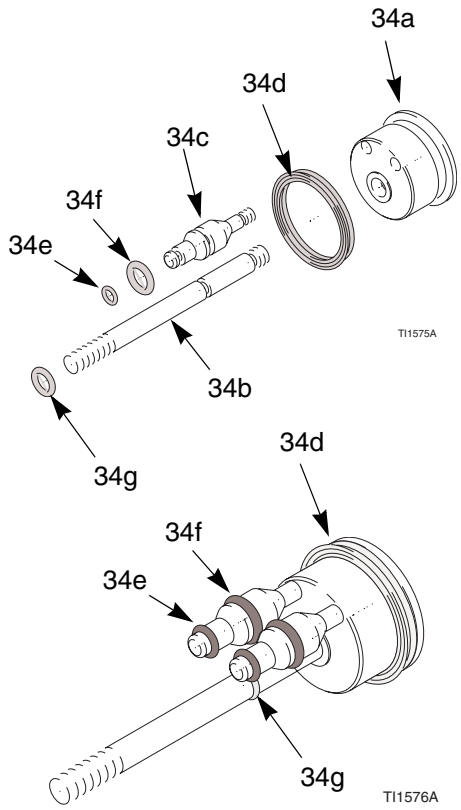


Fig. 31. Piston O-Rings

Adjust the Actuator Arm

1. Install the adjustment nut (30), actuator arm (29), and jam nut (28) onto the piston rod (34b). Note that the jam nut (28) has a slightly larger hex and a thinner profile than the adjustment nut (30). See FIG. 30. on page 42.

2. Position the parts so there is a 0.125 in. (3 mm) gap between the actuator arm (29) and the fluid packing rod nut (U), which allows the atomizing air to actuate before the fluid. See FIG. 32..

3. Tighten the adjustment nut (30) against the actuator arm (29). Check that the 0.125 in. (3 mm) gap has been maintained. See FIG. 32..

4. Test gun resistance, page 29.

5. Install the gun shroud (2) and air cap, page 37.

6. Install the gun onto the manifold and bracket. See page 36.

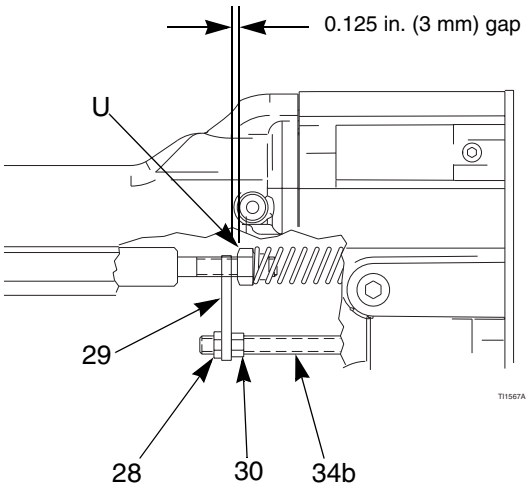


Fig. 32. Actuator Arm Adjustment

Barrel Removal

1. Prepare the gun for service, page 35.
2. Remove the air cap, page 37. Remove the gun shroud (2).
3. Disconnect the fluid tube nut (C).
4. Remove the jam nut (28) and actuator arm (29). See page 42.
5. Loosen the three screws (10, 33). See FIG. 33..

⚠ CAUTION

To avoid damaging the power supply (12), pull the gun barrel (6) straight away from the gun body (32). If necessary, gently move the gun barrel from side to side to free it from the gun body.

6. Hold the gun body (32) with one hand and pull the barrel (6) straight off the body. See FIG. 33..

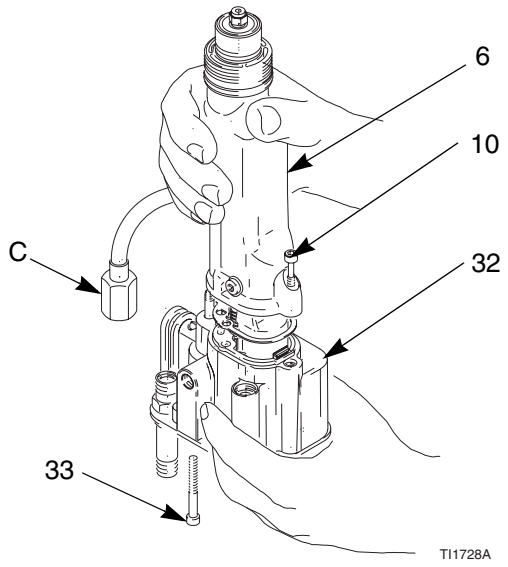


Fig. 33. Barrel Removal

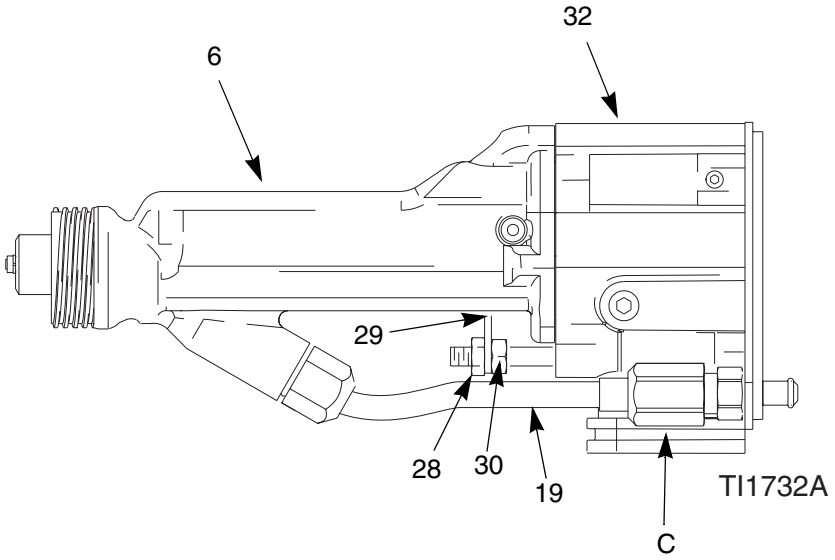


Fig. 34. Disconnect Fluid Tube

Barrel Installation

1. Be sure the gasket (11) and grounding spring (25) are in place. Make sure the air holes are aligned properly. Replace if damaged. See FIG. 35..
2. Place the barrel (6) over the power supply (12) and onto the gun body (32).
3. Tighten the three screws (10, 33) oppositely and evenly (about a half turn past snug).

⚠ CAUTION

Do not over-tighten the screws (10, 33).

4. Make sure the fluid filter (20) is in place. Tighten the bottom nut (C) onto the fitting (22) and torque to 20-30 in-lb (2.3-3.4 N•m). Make sure the top nut (D) remains tight.
5. Install and adjust the actuator arm (29) and jam nut (28). See page 43.
6. Test gun resistance, page 29.
7. Install the gun shroud (2) and air cap, page 37.
8. Install the gun onto the manifold and bracket. See page 36.

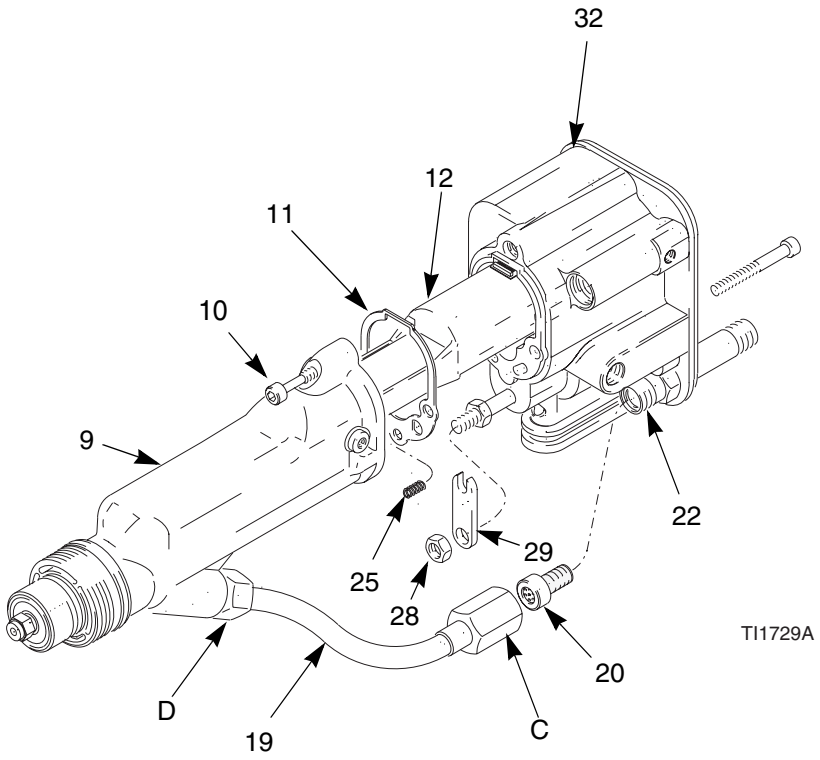


Fig. 35. Barrel Installation

Power Supply Removal and Replacement

- Inspect the gun body power supply cavity for dirt or moisture. Clean with a clean, dry rag.
- Do not expose gasket (11) to solvents.

1. Prepare gun for service, page 35.
2. Remove the barrel (9), page 44.

⚠ CAUTION

Be careful when handling the power supply (12) to avoid damaging it.

3. Grasp the power supply (12) with your hand. With a gentle side to side motion, free the power supply/alternator assembly from the gun body (32), then carefully pull it straight out. Disconnect the flexible circuit (23) from the socket at the top of the body (32). See FIG. 36..
4. Disconnect the 3-wire connector (GG) from the power supply. Slide the alternator up and off the power supply. Inspect the power supply and alternator for damage. Disconnect the 6-pin flexible circuit (23) from the power supply.
5. Check the power supply resistance, page 30. Replace if necessary.

Before installing the power supply, make sure the o-rings (12a, 13a), spring (12b), and pads (13e) are in place.

6. Connect the 6-pin flexible circuit (23) to the power supply.
7. Connect the 3-wire connector (GG). Slide the alternator (13) down onto the power supply (12).
8. Lubricate the alternator o-ring (13a) with non-silicone grease, Part No. 111265. Do not over-lubricate.
9. Lubricate the power supply o-ring (12a) with dielectric grease.
10. Insert the power supply/alternator assembly in the gun body (32). Make sure the ground strips make contact with the body. Connect the flexible circuit (23) to the socket at the top of the body. Push the 6-pin connector into the socket to ensure it is properly connected.
11. Install the barrel (6), page 45.
12. Test gun resistance, page 29.

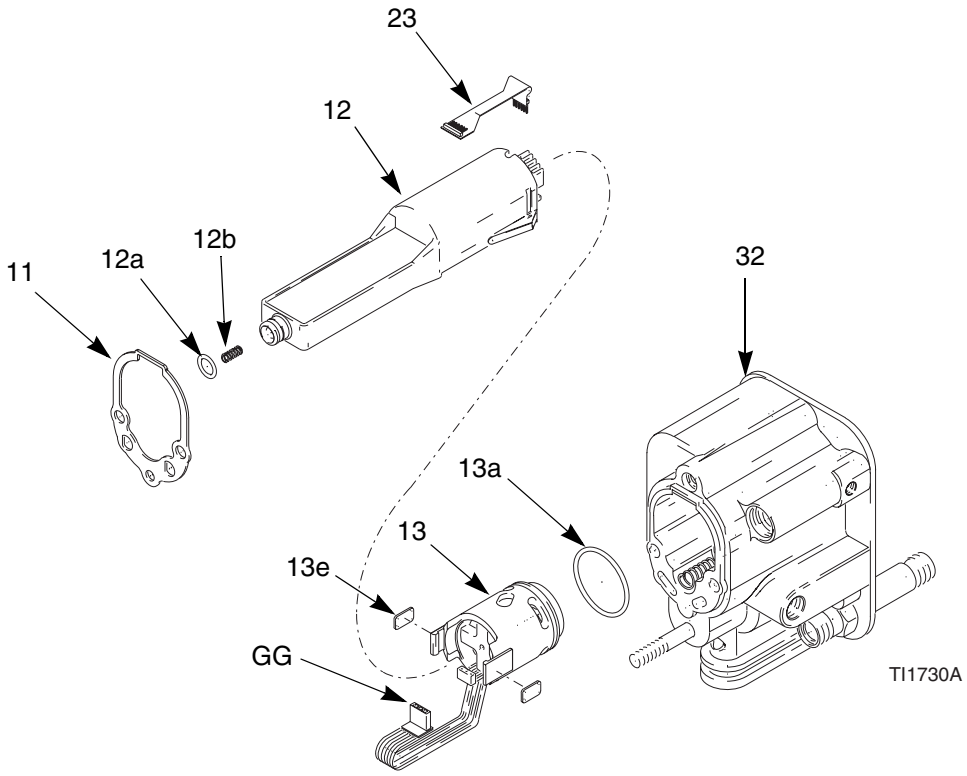


Fig. 36. Power Supply

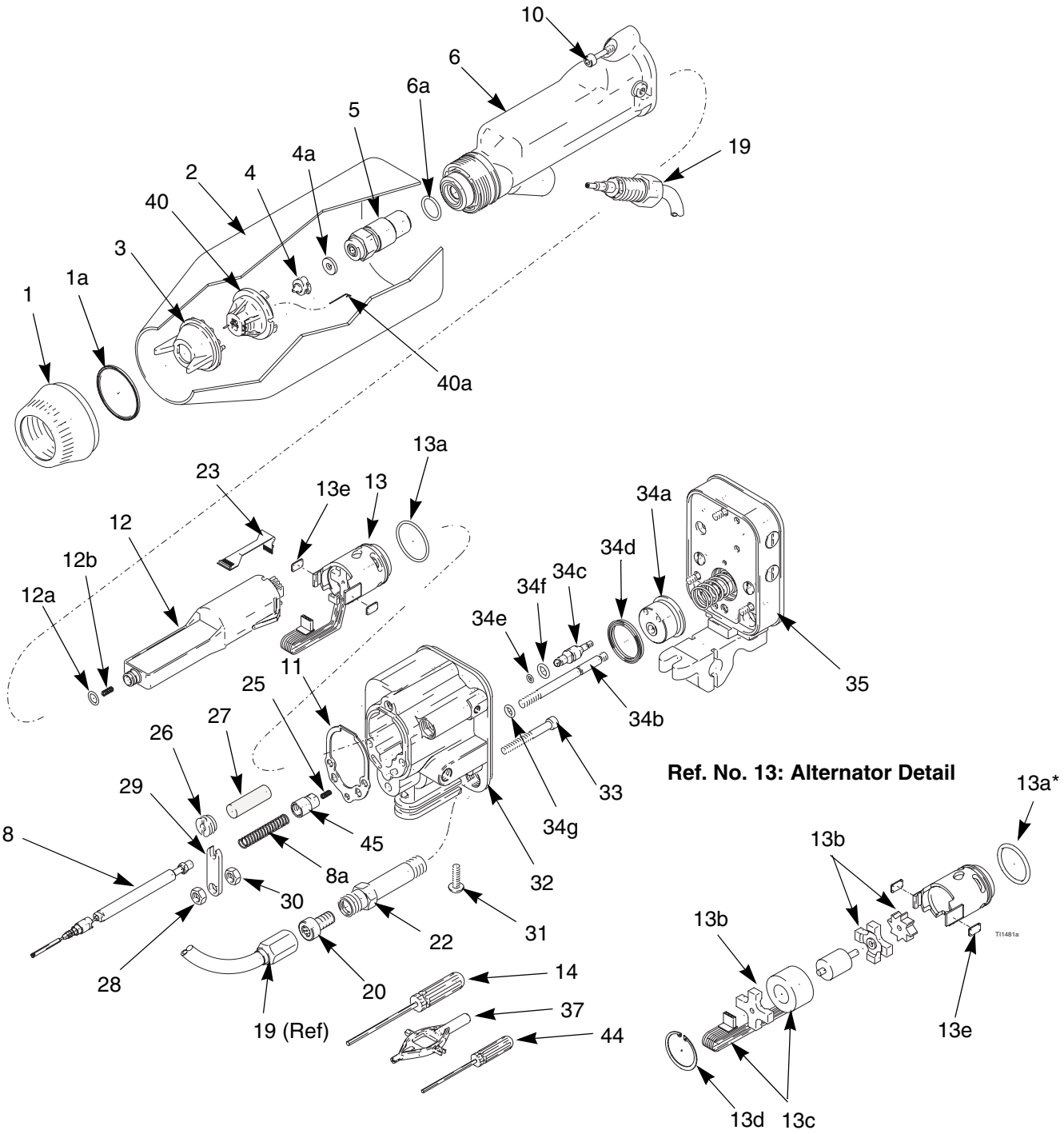
Turbine Alternator Removal and Replacement

Replace turbine alternator bearings after 2000 hours of operation. Order Part No. 223688 Bearing Kit.

1. Prepare gun for service, page 35.
2. Remove the power supply/alternator assembly, page 46.
3. Disconnect the alternator from the power supply, page 46.
4. Measure resistance between the two outer terminals of the 3-wire connector (GG); it should be 2.5-3.5 ohms. If outside this range, replace the alternator coil.
5. Follow the bearing replacement procedure in the bearing kit manual 308034.
6. Install the alternator on the power supply, page 46.
7. Install the power supply/alternator assembly, page 46.

Parts

Part No. 244592 PRO Auto Xs AA Electrostatic Gun, Series A



Ref. No. 13: Alternator Detail

Part No. 244592 PRO Auto Xs AA Electrostatic Gun, Series A

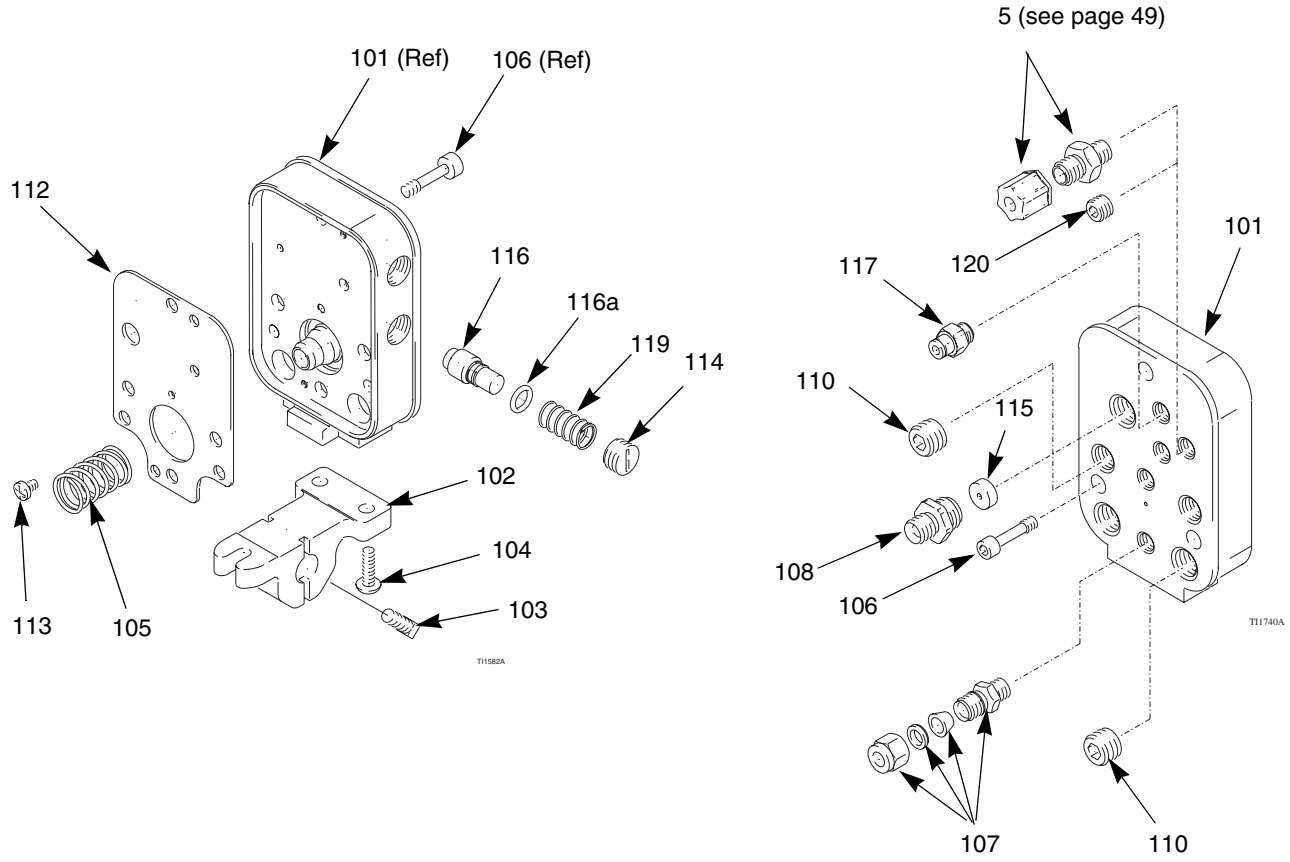
Ref. No.	Part No.	Description	Qty
1	244950	RING, retaining, air cap; includes 1a	1
1a*†	198307	. U-CUP	1
2	197916	SHROUD	1
3	276767	TIP GUARD	1
4	GG3XXX	SPRAY TIP (customer's choice); includes item 4a	1
4a	183459	. SEAL, spray tip	1
5	245280	HOUSING, seat	1
6	244531	BARREL, gun; includes item 6a	1
6a	197486	. O-RING; conductive	1
8	244714	NEEDLE, fluid; includes item 8a	1
8a	112691	. SPRING, compression	1
10	197518	SCREW; socket-hd; 10-24 x 3/4 in. (19 mm)	1
11*†	197517	GASKET, barrel	1
12	244541	POWER SUPPLY, 85 kV; includes 12a-12b	1
12a*†	103337	. O-RING; Viton®	1
12b	197624	. SPRING, compression	1
13	244555	TURBINE, alternator; includes 13a-13e	1
13a*†	110073	. O-RING; Viton®	1
13b	223688	. BEARING KIT; includes front and rear bearings and fan	1
13c	244577	. COIL	1
13d	111745	. RING, retaining	1
13e	198821	. PAD, pressure	2
14	107460	WRENCH, ball end; 4 mm	1
15	179791	TAG, warning (not shown); replacement available at no cost	1
16	180060	SIGN, warning (not shown); replacement available at no cost	1
17	239945	COVER, gun; box of 10 (not shown)	1
19	235843	TUBE, fluid	1
20	205264	FILTER, fluid, inline	1
22	189366	FITTING, fluid	1
23	245265	CIRCUIT, flexible	1
25	197624	SPRING, grounding	1
26	189367	CAP, exhaust	1
27	185122	MUFFLER	1
28	101324	NUT, jam, hex	1
29	197919	ARM, actuator	1
30	102025	NUT, hex	1
31	112689	SCREW, button-hd	1
32	245662	BODY, gun	1
33	116575	SCREW, cap, socket-hd	2
34	244702	PISTON; includes 34a-34g	1
34a	197920	. PISTON	1
34b	189754	. ROD, piston	1
34c	189355	. STEM, piston	2
34d†	189752	. PACKING, u-cup	1
34e†	111504	. O-RING	2
34f†	112319	. O-RING	2
34g†	111508	. O-RING	1
35	244843	MANIFOLD; see separate parts list on page 51	1
37	276741	MULTI-TOOL	1
39	198486	CONNECTOR, tube	1
40	245276	AIR CAP; includes 40a	1
40a	244917	. ELECTRODE (kit of 5)	1
44	112080	TOOL, needle; 2 mm	1
45	198516	CAP, spring	

* Recommended spare parts. Keep on hand to reduce downtime.

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

† Included in repair kit 15D592.

Part No. 244843 Manifold, Series A, for standard and high conductivity coatings



Ref. No.	Part No.	Description	Qty
101	198220	MANIFOLD	1
102	189581	BRACKET, reciprocator	1
103	110465	SCREW, set	2
104	112689	SCREW, button-hd	2
105	112640	SPRING, compression	1
106	197518	SCREW; socket-hd; 10-24 x 3/4 in. (19 mm)	3
107	111157	FITTING, tube	1
108	186845	FITTING, turbine	1
109	110078	FITTING, tube	2
110	112646	PLUG	1

Ref. No.	Part No.	Description	Qty
112†	197925	GASKET, manifold	1
113	108290	SCREW, machine	2
114	189365	CAP, kV, HI/LO	2
115	198764	RESTRICTOR	1
116	244772	PISTON; includes 116a	2
116a†	112085	. O-RING	1
117	114263	FITTING, connector	3
119	116621	SPRING, compression	2
120	112645	PLUG	1

† Included in repair kit 15D592.

Spray Tip Selection Chart

Part No.	Fan Width at 10 in. (250 mm) in. (mm)	Orifice Size in. (mm)
GG3107	2-4 (50-100)	0.007 (0.178)
GG3207	4-6 (100-150)	
GG3307	6-8 (150-200)	
GG3209	4-6 (100-150)	0.009 (0.229)
GG3309	6-8 (150-200)	
GG3409	8-10 (200-250)	
GG3211	4-6 (100-150)	0.011 (0.279)
GG3311	6-8 (150-200)	
GG3411	8-10 (200-250)	
GG3511	10-12 (250-300)	
GG3611	12-14 (300-350)	
GG3213	4-6 (100-150)	0.013 (0.330)
GG3313	6-8 (150-200)	
GG3413	8-10 (200-250)	
GG3513	10-12 (250-300)	
GG3613	12-14 (300-350)	
GG3215	4-6 (100-150)	0.015 (0.381)
GG3315	6-8 (150-200)	
GG3415	8-10 (200-250)	
GG3515	10-12 (250-300)	
GG3615	12-14 (300-350)	

Part No.	Fan Width at 10 in. (250 mm) in. (mm)	Orifice Size in. (mm)
GG3217	4-6 (100-150)	0.017 (0.432)
GG3317	6-8 (150-200)	
GG3417	8-10 (200-250)	
GG3517	10-12 (250-300)	
GG3617	12-14 (300-350)	
GG3319	6-8 (150-200)	0.019 (0.483)
GG3419	8-10 (200-250)	
GG3519	10-12 (250-300)	
GG3619	12-14 (300-350)	
GG3719	14-16 (350-400)	
GG3421	8-10 (200-250)	0.021 (0.533)
GG3521	10-12 (250-300)	
GG3621	12-14 (300-350)	
GG3721	14-16 (350-400)	
GG3821	16-18 (400-450)	
GG3423	8-10 (200-250)	0.023 (0.584)
GG3523	10-12 (250-300)	
GG3623	12-14 (300-350)	
GG3723	14-16 (350-400)	
GG3823	16-18 (400-450)	
GG3425	8-10 (200-250)	0.025 (0.635)
GG3525	10-12 (250-300)	
GG3625	12-14 (300-350)	
GG3725	14-16 (350-400)	
GG3825	16-18 (400-450)	

Accessories

Gun Accessories

Electrode Replacement Kit

244917 Includes five electrodes.

Inline Fluid Filters

238561 100 mesh filter. Set of three.
238563 60 mesh filter. Set of three.

Round Pattern Kit

Provides higher level of performance to electrostatic spraying.

245298 Includes tip of choice.

Gun Valve Lubricant

111265 4 oz (113 g) tube of sanitary (non-silicone) lubricant for fluid seals and wear areas.

Alternator Bearing Kit

223688 To repair the turbine alternator.

Cleaning Brush

105749 For cleaning air cap and fluid nozzle.

Air Line Accessories

AirFlex™ Flexible Grounded Air Hose

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

0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

244963 6 ft (1.8 m)
244964 15 ft (4.6 m)
244965 25 ft (7.6 m)
244966 36 ft (11 m)
244967 50 ft (15 m)
244968 75 ft (23 m)
244969 100 ft (30.5 m)

Standard Grounded Air Hose (Grey)

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

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 (4.6 m)
223070 25 ft (7.6 m)
223071 36 ft (11 m)
223072 50 ft (15 m)
223073 75 ft (23 m)
223074 100 ft (30.5 m)

Bleed-Type Master Air Valve

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

Relieves air trapped in the air line between this valve and the pump air motor when closed.

107141 3/4 npt

Air Line Shutoff Valve

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

For turning air to gun on or off.

224754 1/4 npsm(m) x 1/4 npsm(f) left-hand thread.

Fluid Line Accessories

Nylon Fluid Hose

3000 psi (210 bar, 21 MPa) Maximum Working Pressure

223540 1/4 in. (6 mm) ID x 25 ft (7.6 m), 1/4 npsm
223541 1/4 in. (6 mm) ID x 50 ft (15.2 m), 1/4 npsm

Fluid Shutoff/Drain Valve

5000 psi (350 bar, 35 MPa) Maximum Working Pressure

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

210657 1/2 npt(m), Viton seals
210658 3/8 npt(m), Viton seals
210659 3/8 npt x 1/4 npt(m), Viton seals
214037 1/4 npt(m), PTFE seals

Miscellaneous Accessories

Ground Wire and Clamp

222011 For grounding pump and other components and equipment in the spray area. 12 gauge, 25 ft (7.6 m).

Megohmmeter

241079 500 Volt output; 0.01-2000 megohms. ***Not for use in hazardous areas.***

Paint Resistance Meter

722886 Use with 722860 Paint Probe to measure resistance of paint.
Not for use in hazardous areas.

Paint Probe

722860 Use with 722886 Paint Resistance Meter to measure resistance of paint.
Not for use in hazardous areas.

Safety Warning Signs

180060 English Warning Sign. FM Approved. Available at no charge from Graco.

ES Display Module

224117 Receives fiber optic transmission from the PRO Auto Xs gun and displays the gun's output voltage and current. Mounts in a standard 19 in. DIN rack. See 308265.

Fiber Optic Y Cables

For use with 224117 Display Module only. Connect gun manifold and display module, or bulkhead connector and display module. See 308265.

224682 25 ft (7.6 m)
224684 50 ft (15 m)
224686 100 ft (30.5 m)

Power Supply

235301 Supplies low voltage DC power to 224117 Display Module. See 308265.

Remote Voltage Display

189762 Battery-operated meter displays actual spraying voltage. remote mount outside hazardous area. Connects to gun via fiber optic cable. See 308265.

Fiber Optic Cables

Connect gun manifold and remote display, bulkhead connector and remote display, or gun manifold and bulkhead connector. See 308265.

224672 25 ft (7.6 m)
224674 50 ft (15 m)
224676 100 ft (30.5 m)

Remote Voltage Display Kits

Include 189762 Remote Voltage Display and fiber optic cable.

236917 25 ft (7.6 m)
236919 50 ft (15 m)
236921 100 ft (30.5 m)

Bulkhead Connector

189870 For connecting two fiber optic cables.

Technical Data

Category	Data
Maximum Working Fluid Pressure	3000 psi (21 MPa, 210 bar)
Maximum Working Air Pressure	100 psi (0.7 MPa, 7 bar)
Maximum Fluid Operating Temperature	120°F (48°C)
Paint Resistivity Range	3 megohm/cm to infinity
Short Circuit Current Output	125 microamperes
Voltage Output	40-85 kV
Sound Power (measured per ISO Standard 9216)	at 40 psi (0.28 MPa, 2.8 bar): 90.4 dB(A) at 100 psi (0.7 MPa, 7 bar): 105.4 dB(A)
Sound Pressure (measured 1 m from gun)	at 40 psi (0.28 MPa, 2.8 bar): 87 dB(A) at 100 psi (0.7 MPa, 7 bar): 99 dB(A)
Turbine air inlet fitting, left-hand thread	1/4 npsm(m)
Atomizing air inlet fitting	3/8 in. OD nylon tube
Cylinder air inlet fitting	5/32 in. OD nylon tube
Hi/Lo voltage selector air inlet fittings	5/32 in. OD nylon tube
Fluid inlet fitting	1/4-18 npsm(m)
Gun Weight	3.52 lb (1.6 kg)
Gun Length	12.25 in. (31.1 cm)
Wetted Parts	Stainless Steel; Nylon, Acetal, Ultra-High Molecular Weight Polyethylene, Fluoroelastomer, PEEK, Tungsten Wire, Polyethylene

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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 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 or two thousand hours of operation from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. However, any deficiency in the gun barrel, gun body, manifold, mounting bracket, internal power supply, and alternator (excluding turbine bearings) will be repaired or replaced for thirty-six months or six thousand hours of operation from the date of sale. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for 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.

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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.

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Printed in USA 309298D Revised 11/2003