Instructions/Parts List

GRACO

AUTOMATIC ELECTROSTATIC AIR SPRAY GUN

PRO™ Auto Xs

309297L
EN

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

For use in Class I, Div. I hazardous locations using Group D spray materials.

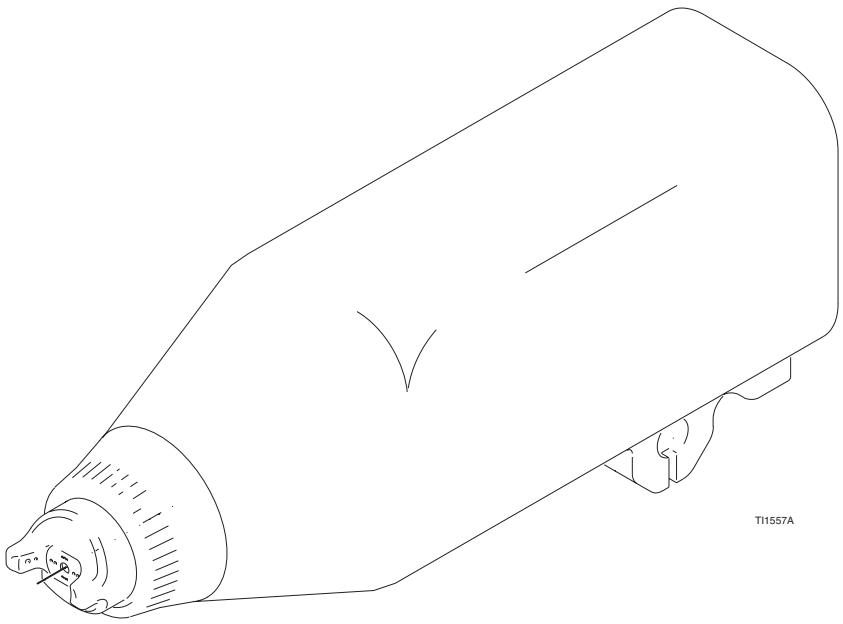
FM C US APPROVED

For use in Group II, Zone 1 areas using Group IIA spray materials.

CE Ex **II 2 G EEx 0.24 mJ**

For Professional Use ONLY.

U.S. Patent 7,226,004



Important Safety Instructions
Read all warnings and instructions in this manual.
Save these instructions.

See page 2 for **Table of Contents** and page 3 for **List of Models**.

Table of Contents

List of Models

Part No.	Model	Voltage	Type of Coatings	
			Standard	High Conductivity
244589	PRO Auto Xs	40-85 kV	X	
244590	PRO Auto Xs	40-85 kV		X

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

Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. To help prevent fire and explosion:

- Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements of this manual.
- Ground equipment, personnel, object being sprayed, and conductive objects in work area. See **Grounding** instructions.
- Only use grounded Graco conductive air supply hoses.
- Check gun and hose resistance and electrical grounding daily.
- Use and clean equipment only in well ventilated area.
- Interlock the gun air supply to prevent operation unless ventilating fans are on.
- Use cleaning solvents with highest possible flash point when flushing or cleaning equipment. To comply with EN50050 requirements, cleaning solvents must have a flash point at least 5°C above ambient temperature.
- Always turn the electrostatics off when flushing, cleaning or servicing equipment.
- If there is static sparking or you feel a shock, **stop operation immediately.** Do not use equipment until you identify and correct the problem.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).
- Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.
- Keep work area free of debris, including solvent, rags and gasoline.
- Keep a working fire extinguisher in the work 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

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 air and fluid pressure of this equipment is 100 psi (0.7 MPa, 7.0 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.

Pressurized Equipment Hazard

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

- Do not point the spray gun at anyone or at any part of the body.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Follow the steps under **Prepare the Gun for Service**, page 32, when you stop spraying and before cleaning, checking, or repairing equipment.
- Check hoses and couplings daily. Replace worn, damaged, or loose parts immediately.
- Tighten all fluid connections before each use.

Introduction

How the Electrostatic Air Spray Gun Works

The automatic electrostatic air spray gun operates very similar to a traditional air spray gun. The atomization and fan air are emitted from the air cap. The atomization air breaks up the fluid stream and controls the droplet size. The fan air controls the shape and width of the spray pattern. The fan and atomization air can be adjusted independently.

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 fluid and 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)
OFF	OFF	85
OFF	ON	70
ON	OFF	60
ON	ON	45

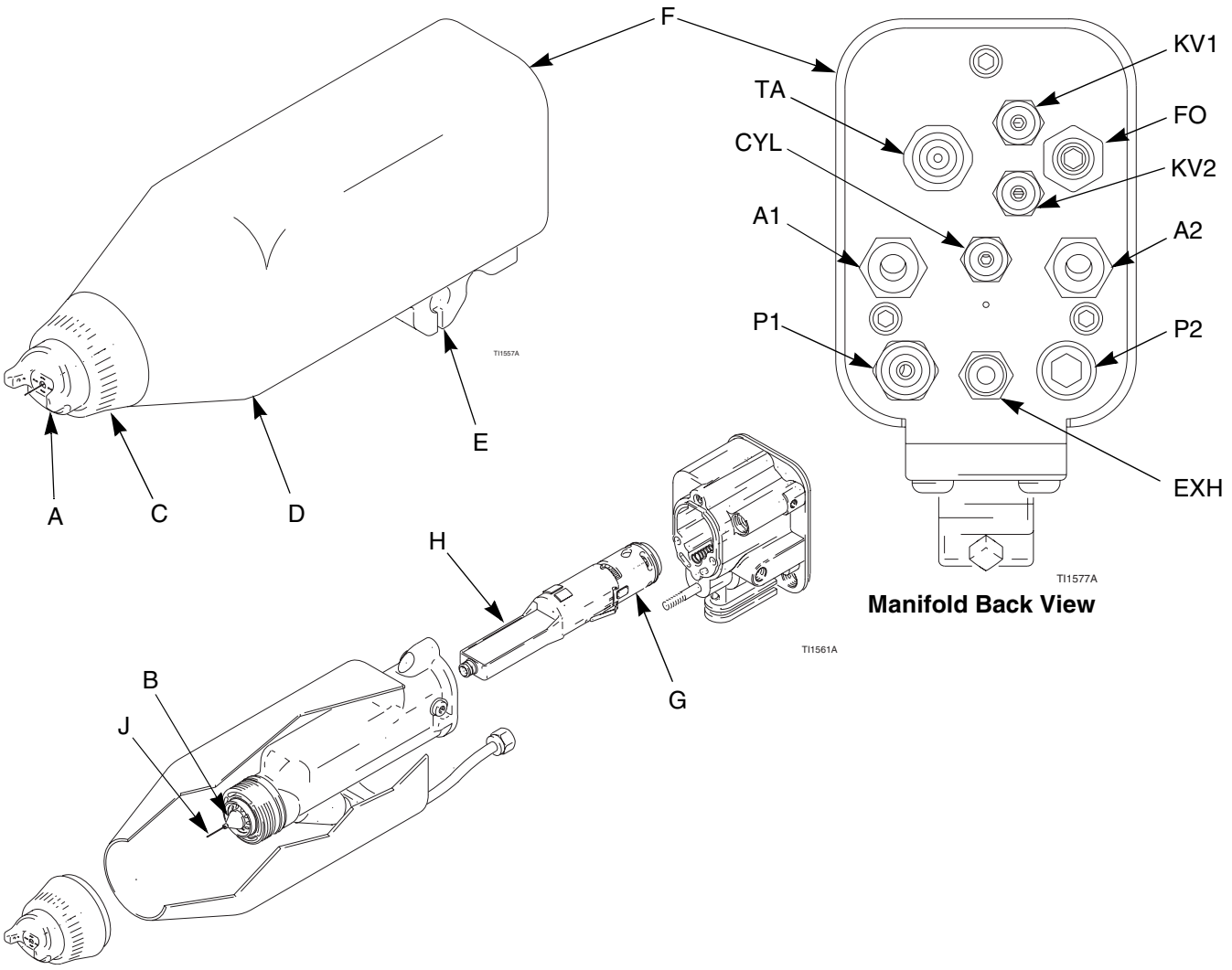


Fig. 1: Gun Overview

Key

A	Air Cap
B	Fluid Nozzle
C	Retaining Ring
D	Shroud
E	Mounting Bracket
F	Manifold
G	Turbine
H	Power Supply
J	Electrode

Manifold Markings

A1	Atomization Air Inlet Fitting
A2	Fan Air Inlet Fitting
CYL	Cylinder Air Inlet Fitting
EXH	Shroud Exhaust Outlet Fitting
FO	Fiber Optic Fitting (shipped unassembled)
KV1	kV Switch 1 Air Inlet
KV2	kV Switch 2 Air Inlet
P1	Fluid Supply Inlet Fitting
P2	Fluid Return Inlet Fitting (optional)
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, Div. I, Group D or a Group II, Category 2G Hazardous Location.

- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.

FIGURE 2 shows a typical electrostatic air spray system, and FIGURE 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.

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 when spraying, flushing, or cleaning the gun. Do not operate the gun unless ventilation fans are operating.

Electrically interlock the gun turbine air supply (B) 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).

Key to FIGURE 2 and FIGURE 3

A	Air Hose Ground Wire
B	Graco Grounded Turbine Air Hose (TA)
C	Atomizing Air Hose, 3/8 in. (10 mm) OD (A1)
D	Fan 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 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)

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.

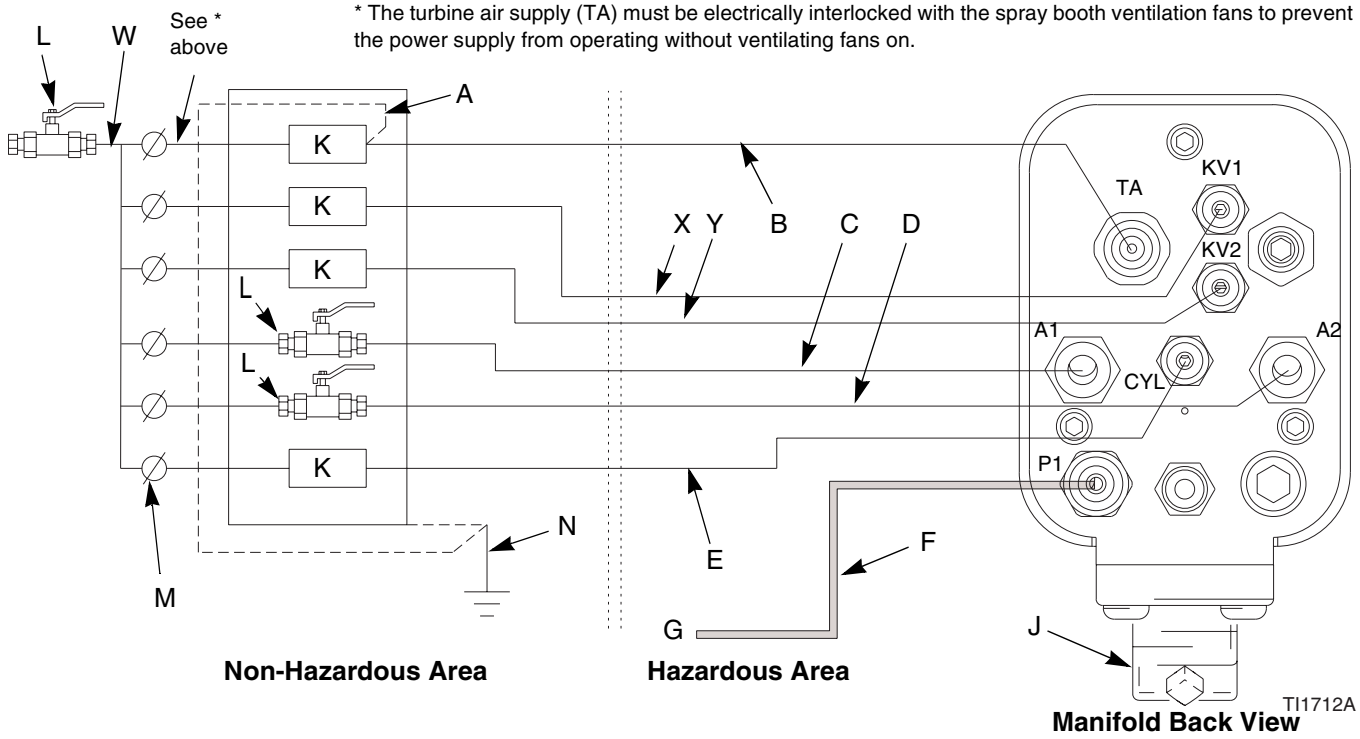


Fig. 2: Typical Installation

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.

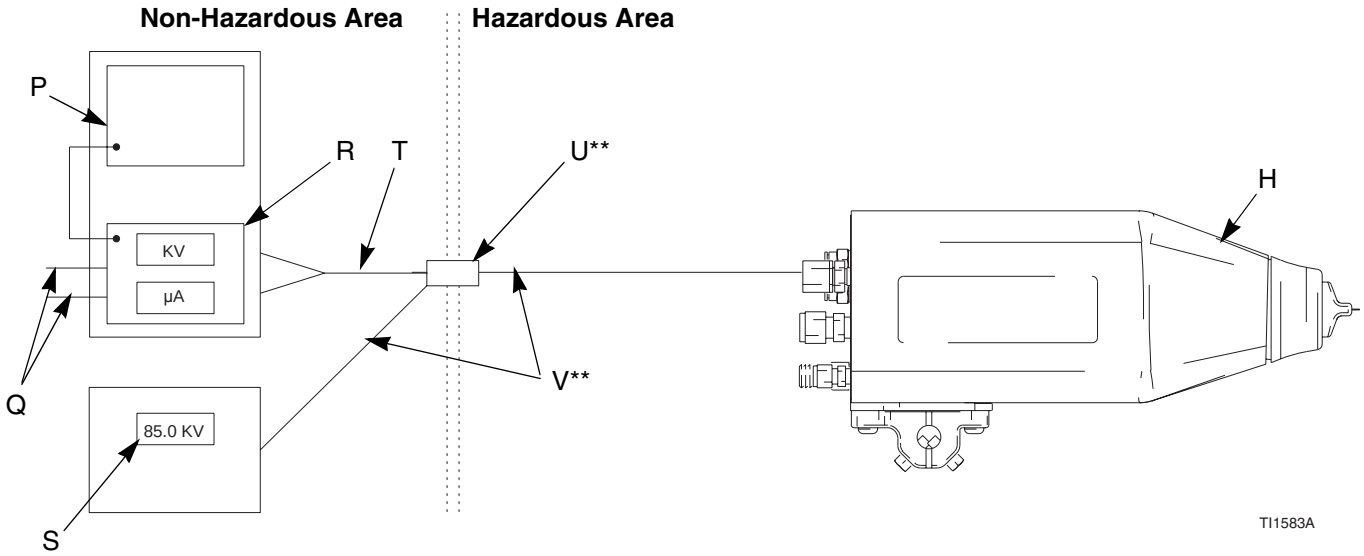


Fig. 3: Optional Fiber Optic Connection to Voltage Display Module

Install the Air Line Accessories

1. Install a bleed-type 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, D, 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.

⚠ WARNING

Pressurized Equipment Hazard

Trapped air can cause the gun to spray unexpectedly, which can result in serious injury, including splashing fluid in the eyes or on 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.

Install the Fluid Line Accessories

1. Install a fluid filter and drain valve at the pump outlet.

⚠ WARNING

Pressurized Equipment 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 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 FIGURE 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 FIGURE 4.

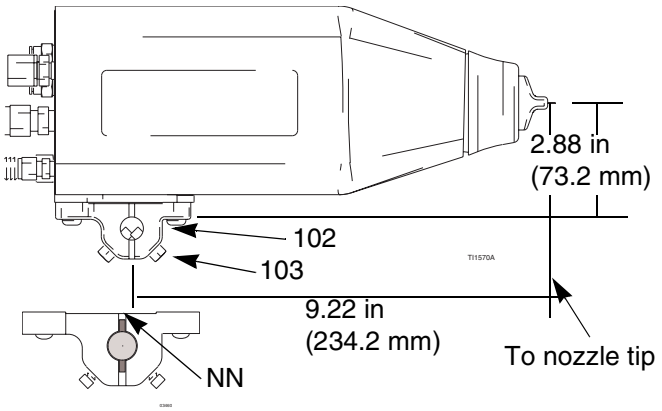


Fig. 4: Mounting Bracket

Connect the Air and Fluid Lines

FIGURE 3 shows a schematic of air and fluid line connections, and FIGURE 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 turbine air supply hose must be electrically connected to a true earth ground. **Use only Graco Grounded Air Supply Hose.**

1. Connect the Graco Grounded 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 left-hand threads to prevent connecting another type of air hose to the turbine air inlet. See **Accessories** on page 52 for further information about the hose.

2. Check the electrical grounding of the gun as instructed on page 14.

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	**Atomization Air Inlet Fitting** Connect a 3/8 in. (10 mm) OD tube between this fitting and the air supply.
A2	**Fan 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 11).
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	**Fluid Return Inlet Fitting (optional)** Order Part No. 233676 Fluid Recirculation Kit.
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.

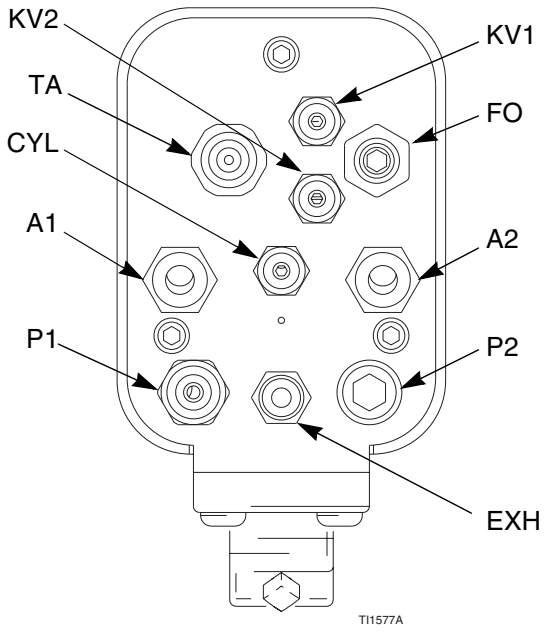


Fig. 5: Manifold Connections

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 FIGURE 3, page 9, 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 FIGURE 6.

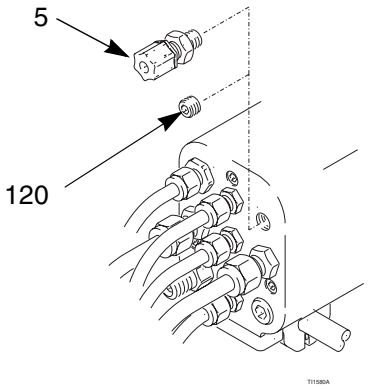


Fig. 6: Fiber Optic Fitting

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 FIGURE 7.

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

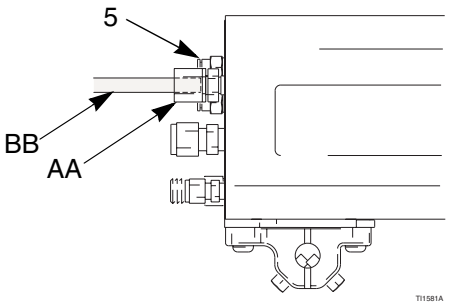


Fig. 7: Fiber Optic Cable

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 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 14.
- *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 FIGURE 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. The fluid hose must not have any fluid in it.

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.

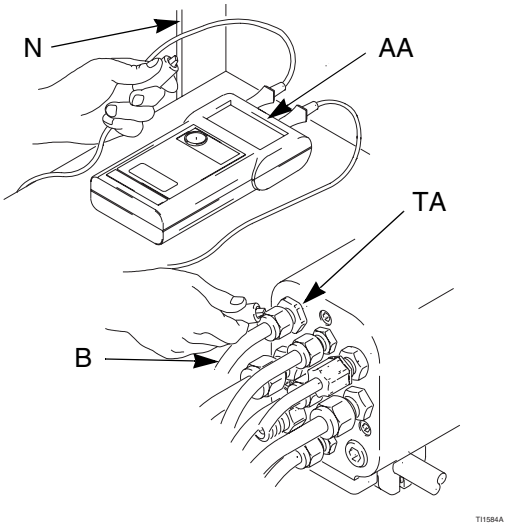


Fig. 8. Check Gun Grounding

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 FIGURE 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 25. Strap down the exhaust tube to prevent it from moving around.

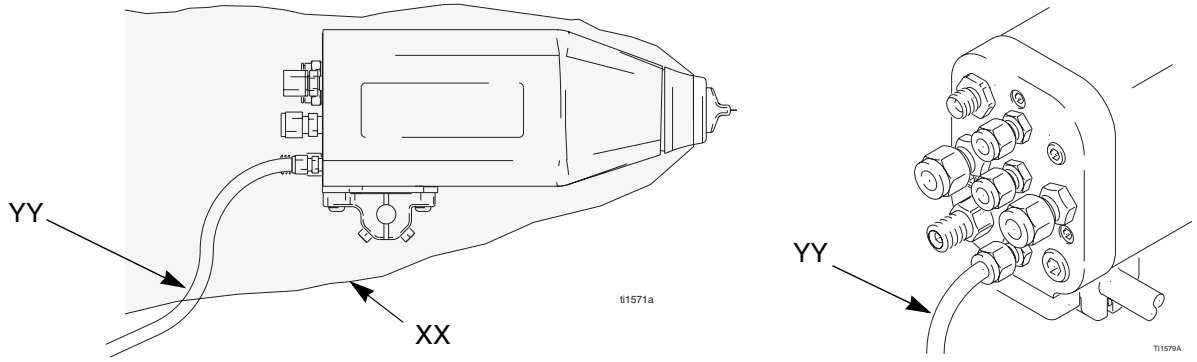


Fig. 9. Fabric Cover

245324 HC Conversion Kit

Part No. 245324 Conversion Kit is available to convert PRO Auto Xs standard coating guns (Part No. 244589) to high conductivity guns (244590).

The kit is for use with fluids with low resistivity values.

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 17 before installing this kit.

1. Turn the turbine air (TA) off.
2. Flush the gun.
3. Relieve the pressure.
4. Remove the retaining ring (1), air cap (3), and shroud (2).
5. Refer to the parts drawing for Model 244589 on page 45. Loosen the two nuts (20) and remove the fluid tube (19) and ferrules (21, 22). Remove the other parts (14, 15, 16, 17, 18) at the gun barrel inlet.
6. Slide the loops of the hc tube (19) onto the gun barrel (9).
7. Make sure the barrel threads are clean and dry. Apply Graco Part No. 116553 dielectric grease to the fluid fitting (19d) threads and o-rings. Thread the fitting into the barrel inlet. See FIGURE 10.
8. Slide the nut (20) and ferrules (21, 22) onto the coiled tube (19). Insert the end of the tube into the fitting (23). Make sure the ferrules seat in the fitting. Tighten the nut (20).

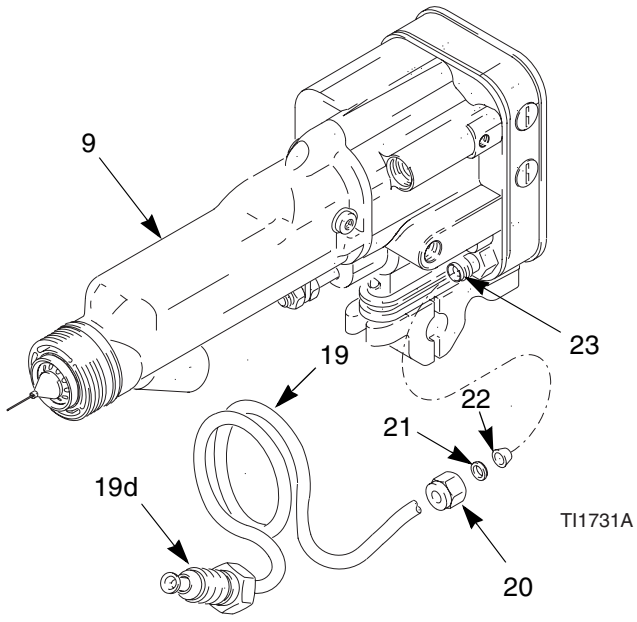


Fig. 10. HC Conversion Kit

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 off all the air to the spray gun except the cylinder air, which triggers the gun. If an air pilot fluid regulator is used in the system, the air pressure is needed at the regulator air inlet.
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. If an air pilot fluid regulator is used, turn off the air pressure at the regulator air inlet.
5. Relieve fluid pressure in the fluid supply equipment as instructed in its instruction manual.
6. Turn off the main air supply by closing the bleed-type master air valve on the main air supply line. Leave the valve closed until you are ready to spray again.

Operating Checklist

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

- ☐ All operators are properly trained to safely operate an automatic electrostatic air spray system as instructed in this manual.
- ☐ All operators are trained in the **Pressure Relief Procedure** on page 17.
- ☐ 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 is thoroughly grounded and the operator and all persons entering the spray area are properly grounded. See **Grounding** on page 13.
- ☐ The condition of the gun's electrical components has been checked as instructed in **Electrical Tests** on page 26.
- ☐ 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 and the floor of the spray area is electrically conductive and grounded.
- ☐ The manifold exhaust tubes have been checked for the presence of any fluid as instructed in **Check for Fluid Leakage** on page 25.

Select a Fluid Nozzle and Air Cap

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 17 before removing or installing a fluid nozzle and/or air cap.

The gun is supplied with Part No. 197266 Nozzle and 24A438 Air Cap. If you require a different size, refer to Table 2 and Table 3 , and instruction manual 309419, or consult with your Graco distributor. See **Air Cap/Nozzle Replacement** on page 34.

Table 2: Fluid Nozzles

Part No.	Size, mm (in.)	Part No.	Size, mm (in.)
197263	0.75 (.030)	197266	1.5 (.055)
197264	1.0 (.042)	197267	1.8 (.070)
197265	1.2 (.047)	197268	2.0 (.080)

Table 3: Air Caps

Part No.	Pattern Shape and Length in. (mm)	Recommended Fluids and Production Rates
24A438	Round end; 15-17 (381-432)	Light to medium viscosity. Up to 15 oz/min (450 cc/min)
24A279	Round end; 14-16 (356-406)	Medium to high viscosity and high solids. Up to 15 oz/min (450 cc/min)
24A376*	Tapered end; 17-19 (432-483)	Light to medium viscosity. Up to 15 oz/min (450 cc/min)
24A274	Tapered end; 12-14 (305-356)	Light to medium viscosity. Up to 15 oz/min (450 cc/min)
24A439	Round end; 11-13 (279-330)	Medium to high viscosity and high solids. Up to 15 oz/min (450 cc/min) For use with 2.0 mm nozzle.

* Also available in the following colors: 24A276 - blue, 24A277 - red, 24A278 - green

Adjust the Spray Pattern

Follow the steps below to establish the correct fluid flow and air flow. **Do not** turn on the turbine air (TA) yet.

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 17 whenever you are instructed to relieve the pressure.

1. Relieve the pressure.

2. Loosen the air cap retaining ring, and rotate the air cap for a vertical or horizontal spray pattern. See FIGURE 11. 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.

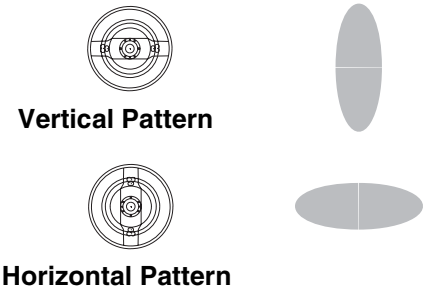


Fig. 11. Air Cap Positions

3. Adjust the fluid flow with the fluid pressure regulator. Refer to instruction manual 309419 to set the fluid pressure for various fluid flows, according to the size of the fluid nozzle being used.

4. Use the air pressure regulator on the atomization air supply line (A1) to adjust the degree of atomization. See FIGURE 12. For example, for a fluid flow rate of 10 ounces per minute (0.3 liters per minute), a typical atomization pressure would be 20-30 psi (1.4-2.1 bar, 0.14-0.21 MPa) at the gun manifold.

5. Use the air pressure regulator on the fan air supply line (A2) to adjust the pattern size.

- For the most efficiency, always use the lowest air pressure possible.
- When increasing to a wide, flat pattern, it may be necessary to increase the supply of fluid to the gun to maintain the same amount of coverage over a large area.
- See **Spray Pattern Troubleshooting** on page 29 to correct spray pattern problems.

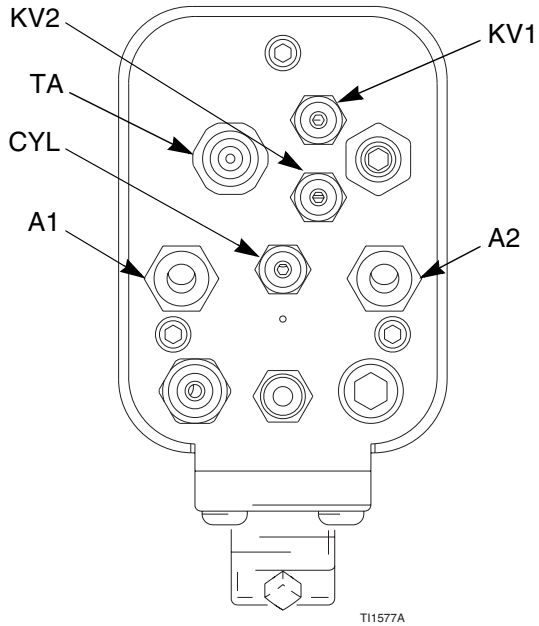


Fig. 12. Manifold Air Connections

Adjust the Electrostatics

1. Shut off the fluid supply.

2. Trigger the gun, then turn on the turbine air (TA). See FIGURE 12.

3. Refer to Table 4 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 4: 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)

4. 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 31 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 (A1), fan air (A2), and fluid (P1). See FIGURE 12.

2. Turn the gun functions on and off 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 25.

Triggering the Fluid Alone

1. Shut off and relieve the air pressure to the atomization (A1) and fan (A2) air lines, using the bleed-type air shutoff valves.

2. Apply 50 psi (3.5 bar, 0.35 MPa) air pressure to the cylinder air fitting (CYL) to trigger the fluid.

Shutdown

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 17 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 22.

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

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 17 before doing any maintenance on the gun or system.

- 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 and fluid nozzle daily, minimum. Some applications require more frequent cleaning. Replace the fluid nozzle and air cap if they are damaged. See **Clean the Air Cap and Fluid Nozzle**, page 24.
- Check the electrode and replace if broken or damaged. See **Electrode Replacement** on page 35.
- Check for fluid leakage from the gun and fluid hoses. See **Check for Fluid Leakage** on page 25. Tighten fittings or replace equipment as needed.
- 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.

Clean the Air Cap and Fluid Nozzle

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 17 when you stop spraying and whenever you are instructed to relieve the pressure.

1. Relieve the pressure.
2. Remove the air cap assembly (1, 3) and shroud (2). See FIGURE 13.
3. Wipe the fluid nozzle (4), shroud (2), and exterior of the gun clean with a cloth dampened in solvent. Avoid getting any solvent into the air passages. Whenever possible, point the gun down when cleaning it.
4. If it appears that there is paint inside the fluid nozzle (4) air passages, remove the gun from the line for servicing.
5. Clean the air cap (3) with the soft bristle brush and solvent or submerge the air cap in suitable solvent and wipe it clean.

⚠ CAUTION

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

6. Slide the shroud (2) onto the gun.
7. Carefully install the air cap (3). Be sure to insert the electrode (7) through the center hole of the air cap. Rotate the air cap to the desired position.
8. 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 26.

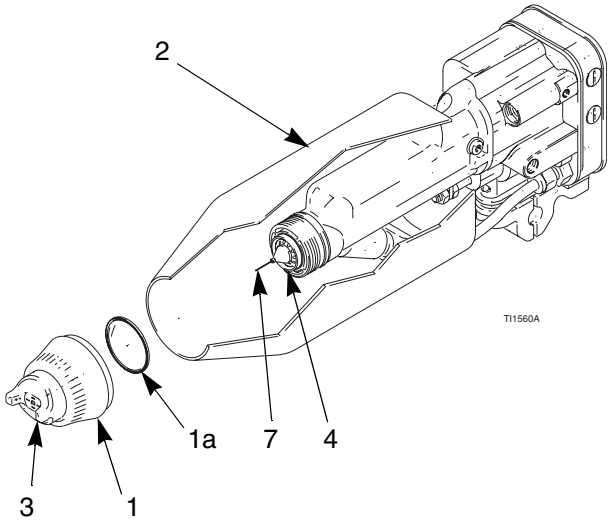


Fig. 13. Clean Air Cap and Fluid Nozzle

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

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 17 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 FIGURE 14. 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.

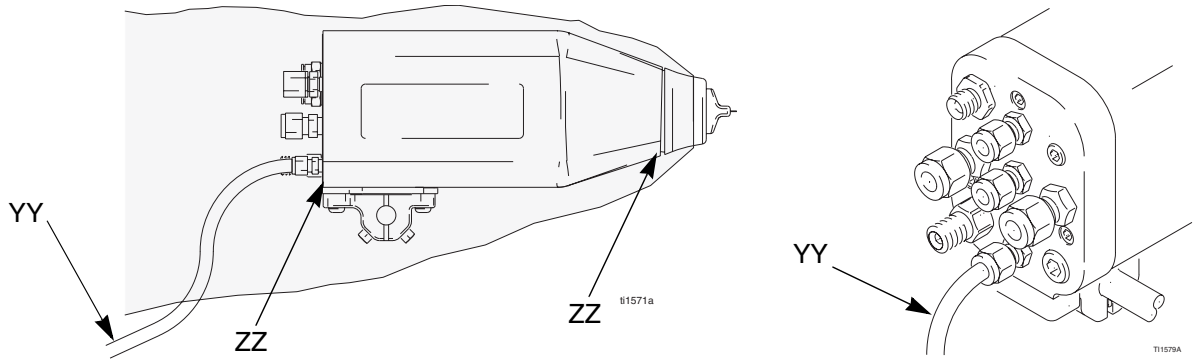


Fig. 14. Check for Fluid Leakage

Electrical Tests

Electrical components inside the gun affect performance and safety. The following procedures test the condition of the power supply (12) and electrode (7), and electrical continuity between components.

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

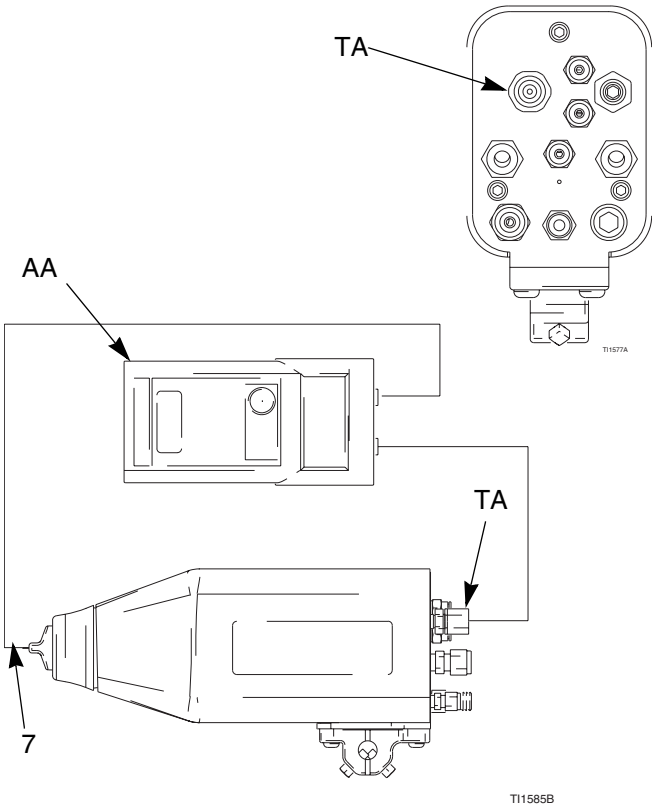


Fig. 15. Test Gun Resistance

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

Megohmmeter Part No. 241079 (AA-see FIGURE 15) 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 (7) and the gun body (32) or the turbine air inlet fitting (TA); it should be 156-180 megohms. If outside this range, remove the gun for service (page 32) and go to the next test. If in range, refer to **Electrical Troubleshooting** on page 31 for other possible causes of poor performance.

Test Power Supply Resistance

1. Remove the power supply (12), page 42.

2. Remove the turbine alternator (13) from the power supply, page 43.

3. Measure resistance from the power supply's ground strips (EE) to the spring (12b). See FIGURE 16.

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 31 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.

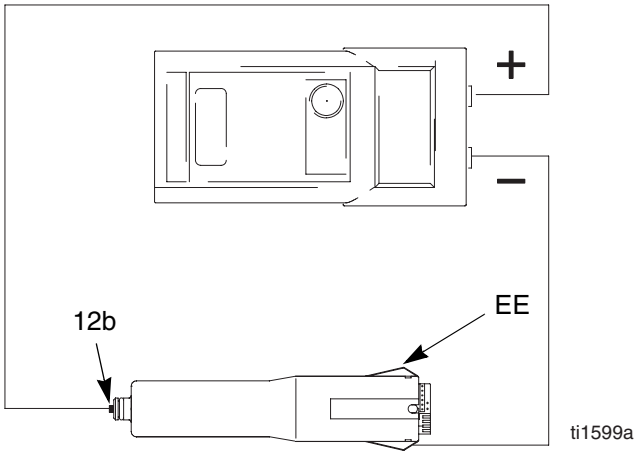


Fig. 16. Test Power Supply Resistance

Test Electrode 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 electrode (7). The resistance should be 20-30 megohms. See FIGURE 17.

3. If in range, refer to **Electrical Troubleshooting** on page 31 for other possible causes of poor performance, or contact your Graco distributor.

4. Remove the electrode (7), page 35. Measure the resistance between the contact (E) and the electrode wire (F). The resistance should be 20-30 megohms. If out of range, replace the electrode. See FIGURE 18.

5. Make sure the metal contact (C) in the barrel, the nozzle contact ring (4a, FIGURE 19), and the electrode contacts (E) are clean and undamaged.

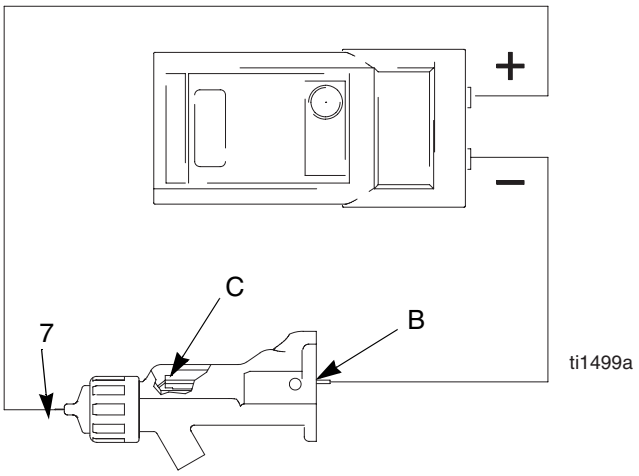


Fig. 17. Test Electrode Resistance

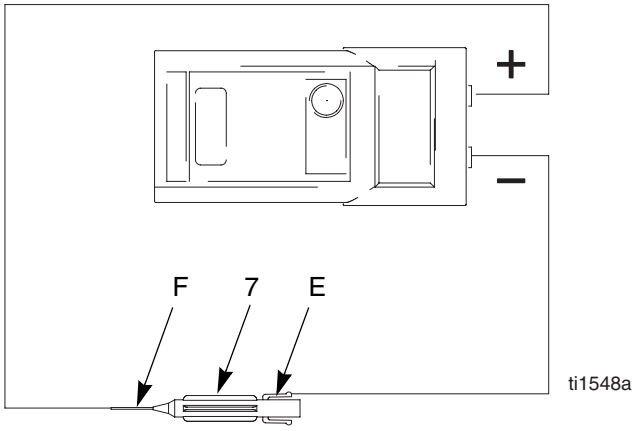


Fig. 18. Electrode

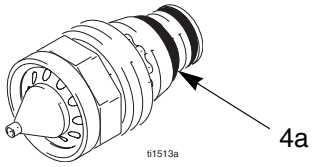


Fig. 19. Nozzle Conductive O-Ring

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

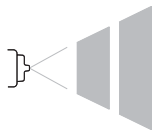
Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 17 whenever you are instructed to relieve the pressure.

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.
	Loose, dirty, damaged nozzle/seat.	Clean or replace nozzle, page 34.
	Air in fluid supply.	Check fluid source. Refill.
Improper spray pattern. 	Damaged nozzle or air cap.	Replace, page 34.
	Fluid buildup on air cap or nozzle.	Clean. See page 24.
	Fan air pressure too high.	Decrease.
	Fluid too thin.	Increase viscosity.
	Fluid pressure too low.	Increase.
	Fan air pressure too low.	Increase.
	Fluid too thick.	Reduce viscosity.
	Too much fluid.	Decrease flow.
Streaks.	Did not apply 50% overlap.	Overlap strokes 50%.
	Dirty or damaged air cap.	Clean or replace, page 34.

Gun Operation Troubleshooting

Problem	Cause	Solution
Excessive spray fog.	Atomizing air pressure too high.	Decrease air pressure as low as possible.
	Fluid too thin.	Increase viscosity.
“Orange Peel” finish.	Atomizing air pressure too low.	Increase air pressure; use lowest air pressure necessary.
	Poorly mixed or filtered fluid.	Remix or refilter fluid.
	Fluid too thick.	Reduce viscosity.
Fluid leaks from the fluid packing area	Worn packings or rod.	Replace packings or rod; see pages 36 or 37.
Air leaks from the air cap	Worn piston stem o-rings (34e, 34f).	Replace; see page 38.
Fluid leakage from the front of the gun	Worn or damaged packing rod (8).	Replace; see page 36
	Worn fluid seat.	Replace fluid nozzle (4) and/or electrode needle (7); see pages 34 to 35.
	Loose fluid nozzle (4).	Tighten; see page 34.
	Damaged nozzle o-ring (4b).	Replace; see page 34.
Gun does not spray	Low fluid supply.	Add fluid if necessary.
	Damaged air cap (3).	Replace; see page 34.
	Dirty or clogged fluid nozzle (4).	Clean; see page 34.
	Damaged fluid nozzle (4).	Replace; see page 34.
	Piston (34) not actuating.	Check cylinder air. Check piston u-cup (34d); see page 38.
	Actuator arm (29) is out of position.	Check actuator arm and nuts. See page 39.
Dirty air cap	Misaligned air cap (3) and fluid nozzle (4).	Clean fluid buildup off air cap and fluid nozzle seat; see page 24.
	Damaged nozzle orifice.	Replace nozzle (4); see page 34.
	Fluid is coming on before the air.	Check actuator arm and nuts. See page 39.
Air leaks from manifold	Manifold is not tight.	Tighten manifold screws (106).
Fluid leaks at the quick-disconnect.	Manifold is not tight.	Tighten manifold screws (106).
	Fluid hose o-rings are worn or missing.	Inspect or replace o-rings.

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.
	Atomizing 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 26.
	Low fluid resistivity.	Check fluid resistivity, page 15.
	Fluid leaks from the packing (8d) and causes a short.	Clean the packing rod cavity. Replace the packing rod. See page 37.
	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 43.
	The KV switch is stuck on low.	Check the switch actuation; replace if needed.
	No power.	Replace power supply. See page 42.
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 13.
	Gun not grounded.	See **Check Electrical Grounding** on page 14 and **Test Gun Resistance** on page 26.
Operator gets shock from workpiece.	Workpiece not grounded.	Resistance must be 1 megohm or less. Clean workpiece hangers.

Repair

Prepare the Gun for Service

⚠ 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

Pressurized Equipment Hazard

To reduce the risk of injury, follow the **Pressure Relief Procedure** on page 17 before checking or servicing any part of the system and whenever you are instructed to relieve the pressure.

- 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 packing rod 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.

1. Flush and clean the gun, page 22.
2. Relieve the pressure, page 17.
3. Remove the gun from the manifold, page 33.
4. Remove the gun from the worksite. Repair area must be clean.

Remove the Gun from the Manifold

1. Loosen the bottom gun screw (31) until the gun sits loosely in the mounting bracket slot (A). See FIGURE 20.

⚠ 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.

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

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

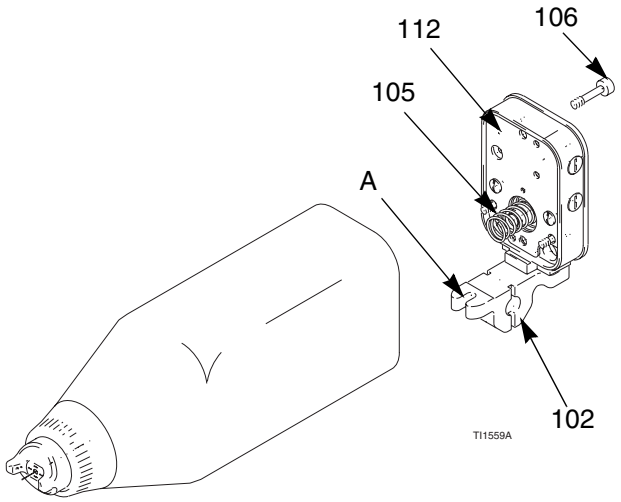


Fig. 20. Remove Gun from Manifold

Install the Gun on the Manifold

1. Make sure the gasket (112) and spring (105) are in place on the manifold. See FIGURE 20. 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).

Air Cap/Nozzle Replacement

⚠ CAUTION

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

1. Prepare gun for service, page 32.
2. Remove the retaining ring (1) and air cap (3). See FIGURE 21.
3. Point gun up while removing the fluid nozzle (4) assembly with the multi-tool (40).

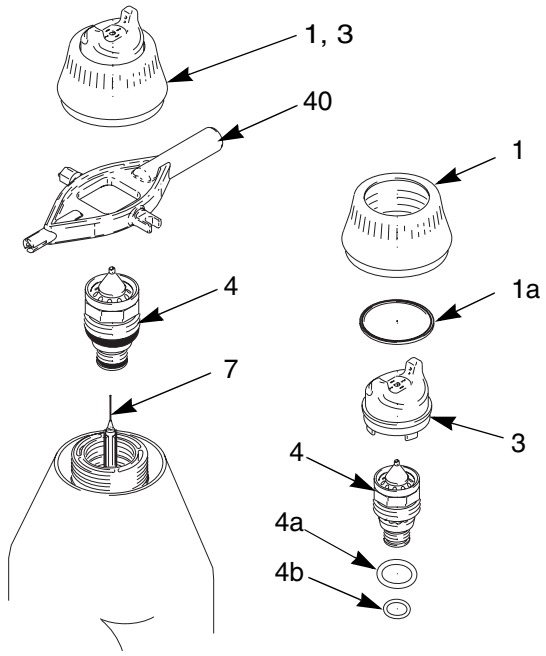


Fig. 21. Air Cap/Nozzle Replacement

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

The nozzle contact ring (4a) is a conductive contact ring, not a sealing o-ring. To reduce the risk of sparking or electric shock, do not remove the nozzle contact ring (4a) 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.

Use non-silicone grease, Part No. 111265, on the small o-ring (4b). Do not over-lubricate. Do not lubricate the contact ring (4a).

4. Lightly lubricate the o-ring (4b). Install it and the contact ring (4a) on the nozzle (4).

Make sure the electrode needle (7) is finger- tight (page 35).

5. Install the fluid nozzle (4) with the multi-tool (40). Tighten until the fluid nozzle seats in the gun barrel (1/8 to 1/4 turn past hand-tight).
6. Carefully install the air cap (3). Be sure to insert the electrode (7) through the center hole of the air cap. Rotate the air cap to the desired position.
7. 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.
8. Test gun resistance, page 26.
9. Install the gun onto the manifold and bracket. See page 33.

Electrode Replacement

1. Prepare the gun for service, page 32.
2. Remove the air cap and nozzle, page 34. Remove the gun shroud (2).
3. Unscrew the electrode (7) with the multi-tool (40). Hold the packing rod end (8h) to prevent it from turning, FIGURE 22.

⚠ CAUTION

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

4. Apply low-strength (purple) Loctite® or equivalent thread sealant to the electrode and packing rod threads. Install the electrode finger-tight. Do not overtighten.
5. Install the fluid nozzle, page 34.
6. Test gun resistance, page 26.
7. Install the gun shroud (2) and air cap, page 34.
8. Install the gun onto the manifold and bracket. See page 33.

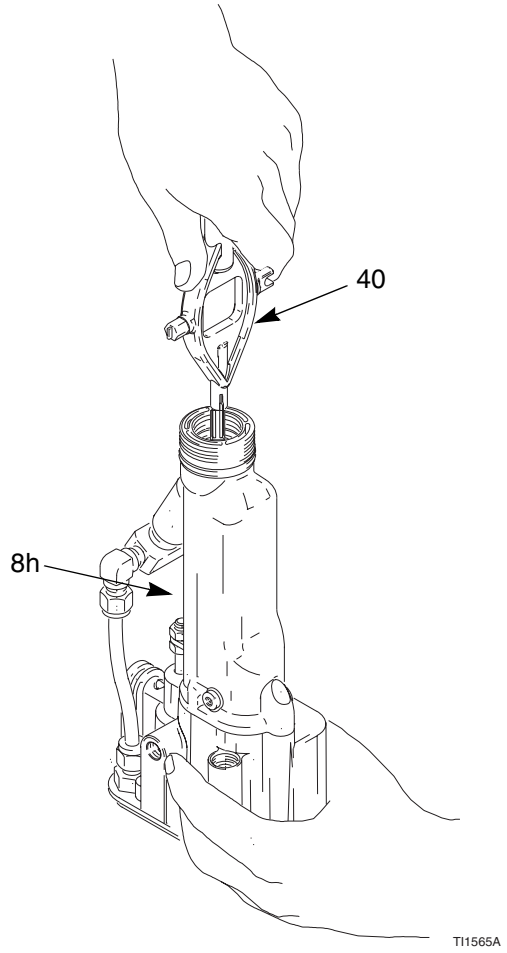


Fig. 22. Electrode Replacement

Fluid Packing Removal

You may replace the packing rod as an assembly, as described below, or as individual parts (see page 37). The assembly is pre-adjusted at the factory.

1. Prepare the gun for service, page 32.

2. Remove the air cap, page 34. Remove the gun shroud (2).

3. Remove the jam nut (28) and actuator arm (29). See page 38.

The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

4. Remove the fluid nozzle (4) and electrode (7). See pages 34 and 35.

5. Remove the packing rod (8), using the multi-tool (40).

⚠ 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.

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

Before installing the packing rod, clean the internal surface of the barrel (9) with a soft cloth or brush. Check for marks from high voltage arcing. If marks are present, replace the barrel.

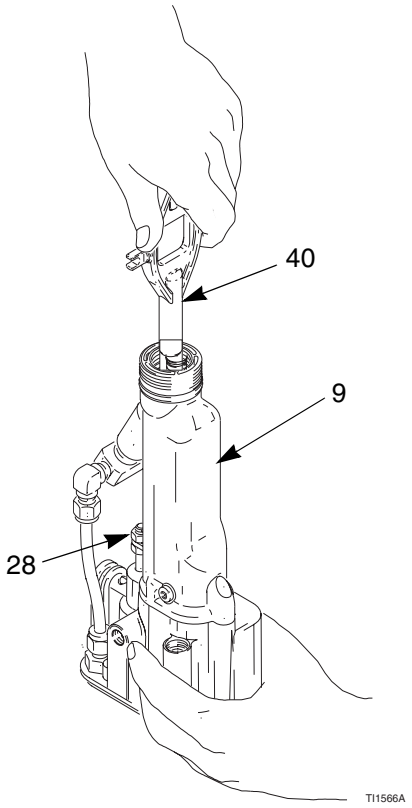


Fig. 23. Fluid Packing Removal

Packing Rod Repair

You may replace the packing rod as individual parts, as described below, or as an assembly (see page 36). The assembly is pre-adjusted at the factory.

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

To assemble the individual parts:

1. Place the packing nut (8e) and seal (8b) on the fluid rod (8h). Flats on the packing nut must face the back of the fluid rod. The seal o-ring must face away from the packing nut. See FIGURE 24.

2. Fill the inner cavity of the spacer (8g) with dielectric grease. Place the spacer on the fluid rod (8h) in the direction shown. Generously apply dielectric grease to the outside of the spacer.

3. Place the rod packing (8d), packing spreader (8c), and housing (8f) on the packing rod (8h).

4. Lightly tighten the packing nut (8e). The packing nut is properly tightened when there is 3 lb (13.3 N) of drag force when sliding the packing housing (8f) assembly along the rod. Tighten or loosen the packing nut as needed.

5. Install the o-ring (8a) on the outside of housing (8f). Lubricate the o-ring with non-silicone grease, Part No. 111265. Do not over-lubricate.

6. Install the spring (25) against the nut (E) as shown.

7. Install the packing rod assembly (8) into the gun barrel. Using the multi-tool (40), tighten the assembly until just snug.

8. Install the electrode, page 35 and nozzle, page 34.

9. Install and adjust the actuator arm (29) and jam nut (28). See page 39.

10. Test gun resistance, page 26.

11. Install the gun shroud (2) and air cap, page 34.

12. Install the gun onto the manifold and bracket. See page 33.

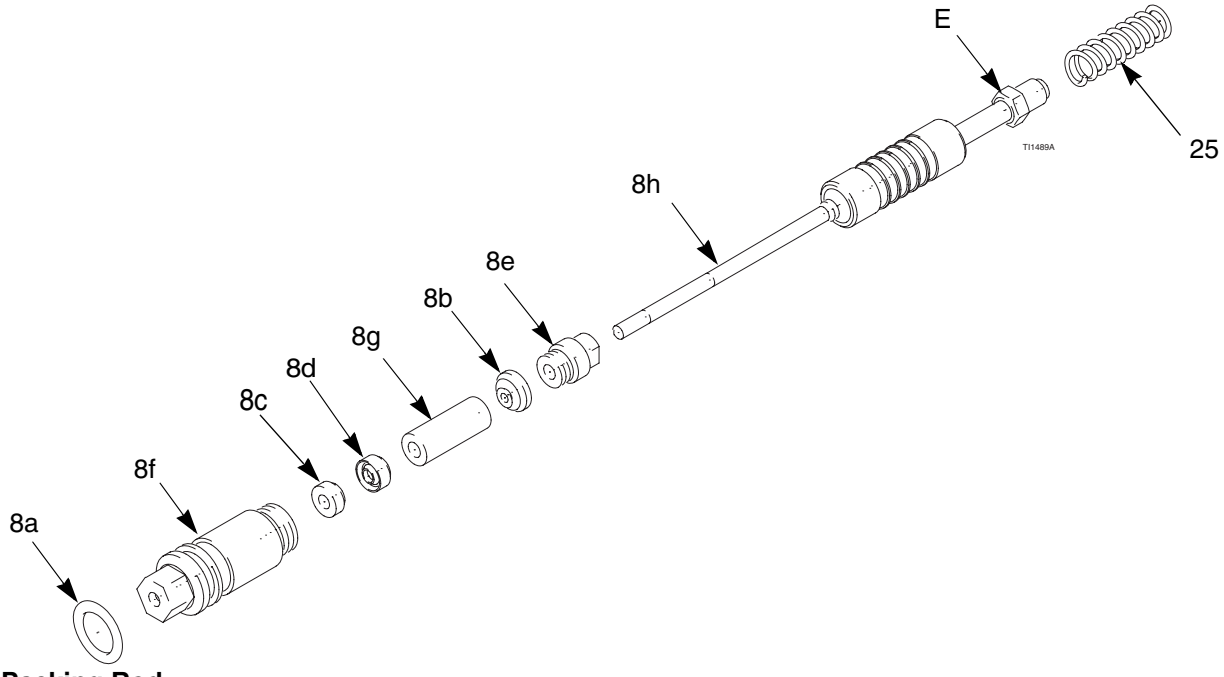


Fig. 24. Packing Rod

Piston Repair

1. Prepare the gun for service, page 32.

2. Remove the air cap, page 34. Remove the gun shroud (2).

3. Remove the jam nut (28), actuator arm (29), and adjustment nut (30). See FIGURE 25.

The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

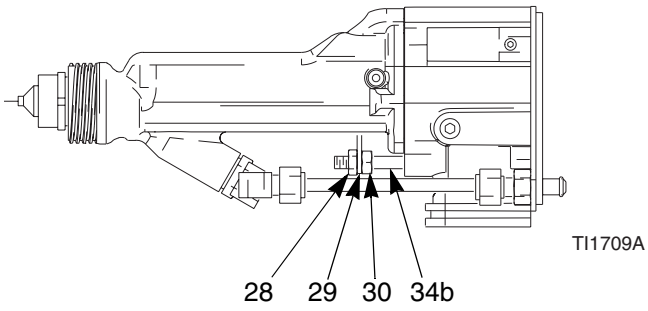


Fig. 25. Actuator Arm

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 5 and FIGURE 26.

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 39.

Table 5: 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 fan and atomizing air.
U-Cup (34d)	Replace if air leaks from small vent hole at back of manifold when gun is triggered.

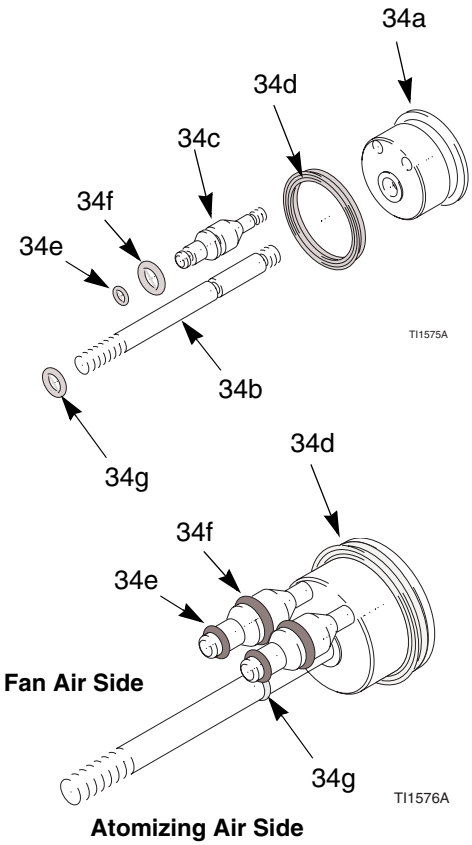


Fig. 26. Piston O-Rings

Adjust the Actuator Arm

The fluid nozzle (4) must be in place when removing or installing the jam nut and 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 FIGURE 25 on page 38.

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 (E), which allows the atomizing air to actuate before the fluid. See FIGURE 27.

3. Tighten the adjustment nut (30) against the actuator arm (29). Check that the 0.125 in. (3 mm) gap has been maintained. In addition, there should be 3-4 mm of electrode needle travel when the gun is triggered. Adjust the jam nut position to obtain these dimensions.

4. Test gun resistance, page 26.

5. Install the gun shroud (2) and air cap (3), page 34.

6. Install the gun onto the manifold and bracket. See page 33.

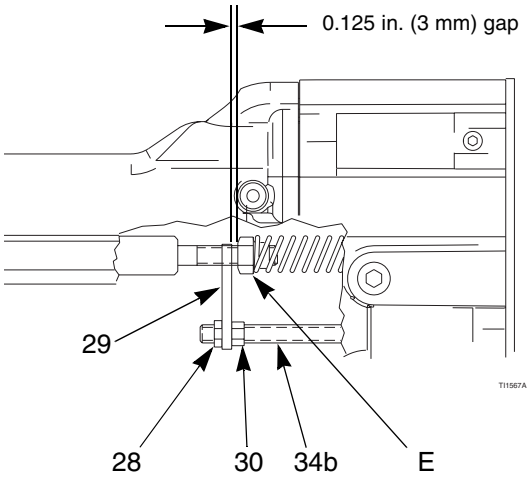


Fig. 27. Actuator Arm Adjustment

Barrel Removal

1. Prepare the gun for service, page 32.
2. Remove the air cap, page 34. Remove the gun shroud (2).
3. Carefully loosen the fluid fitting nut (20). Pull the tube (19) out of the fitting (23). Make sure both ferrules (21, 22) and the nut stay with the tube.
4. Remove the jam nut (28) and actuator arm (29). See page 38.
5. Loosen the three screws (10, 33). See FIGURE 28.

⚠ CAUTION

To avoid damaging the power supply (12), pull the gun barrel (9) 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 (9) straight off the body. See FIGURE 28.

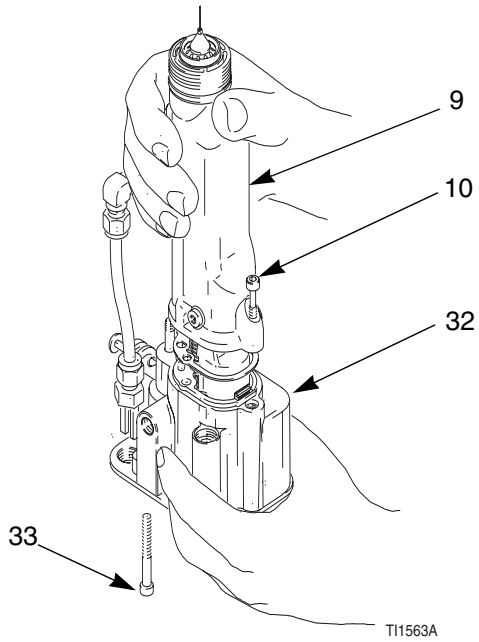


Fig. 28. Barrel Removal

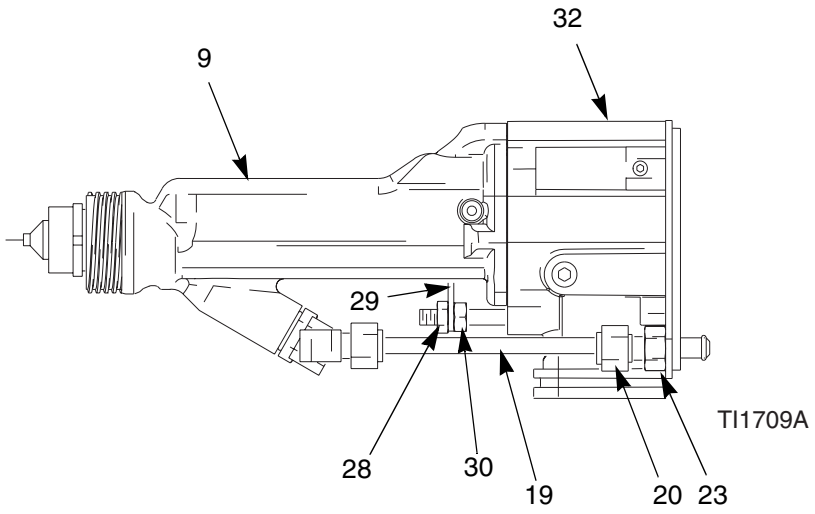


Fig. 29. Disconnect Fluid Tube

Barrel Installation

1. Be sure the gasket (11) and grounding spring (51) are in place. Make sure the air holes are aligned properly. Replace if damaged. See FIGURE 30.

2. Place the barrel (9) 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. Assemble the fluid tube (19) into the fluid fitting (23). Ensure that the ferrules (21, 22) are in place. Tighten the nut (20).

5. Install and adjust the actuator arm (29) and jam nut (28). See page 39.

6. Test gun resistance, page 26.

7. Install the gun shroud (2) and air cap, page 34.

8. Install the gun onto the manifold and bracket. See page 33.

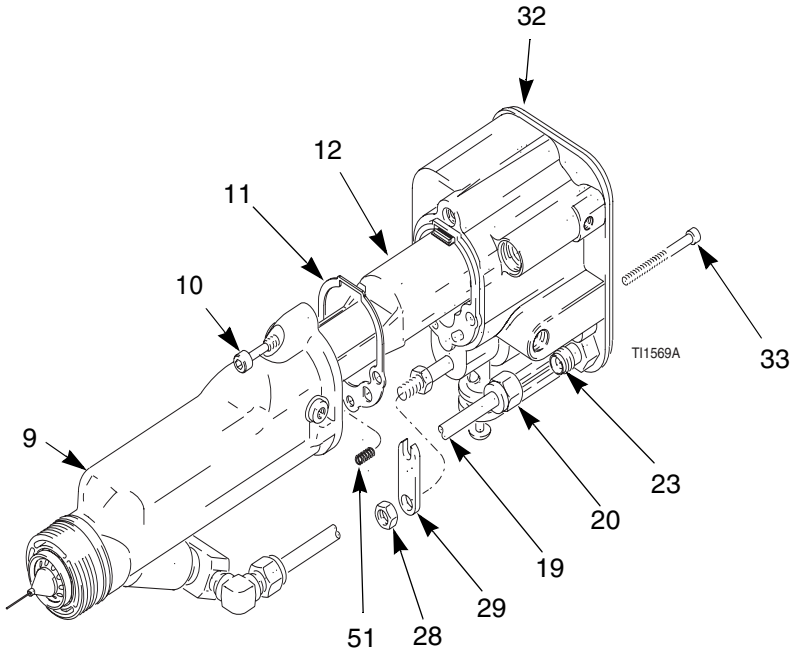


Fig. 30. Barrel Installation

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 32.
2. Remove the barrel (9), page 40.

⚠ 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 (39) from the socket at the top of the body (32). See FIGURE 31.
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 (39) from the power supply.
5. Check the power supply resistance, page 27. 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 (39) 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 (39) 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 (9), page 41.
12. Test gun resistance, page 26.

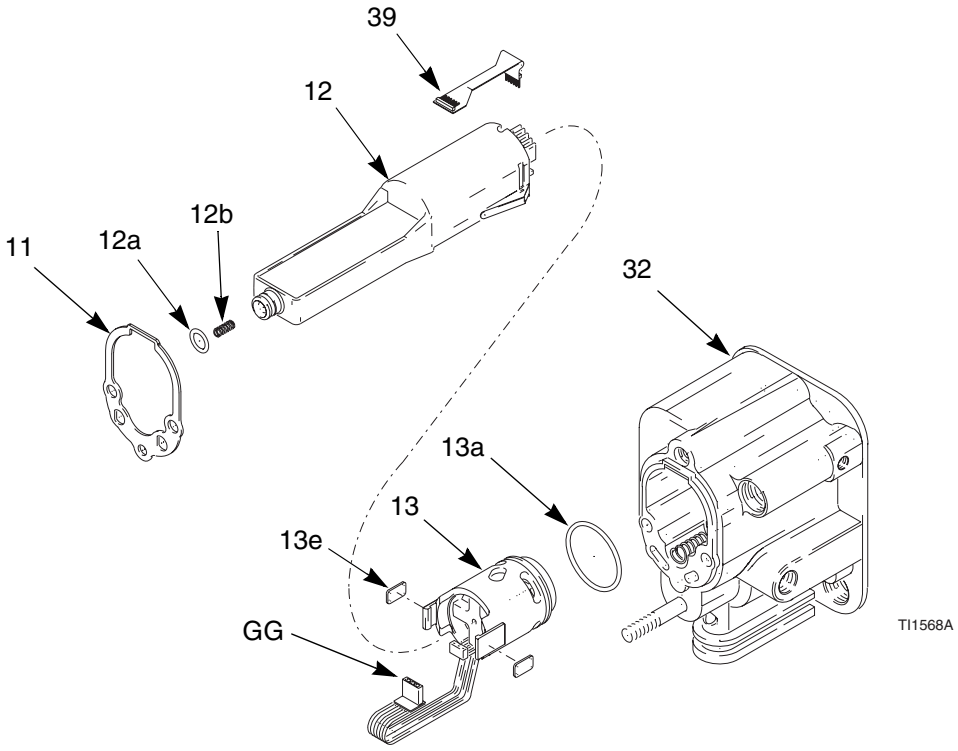


Fig. 31. Power Supply

Turbine Alternator Removal and Replacement

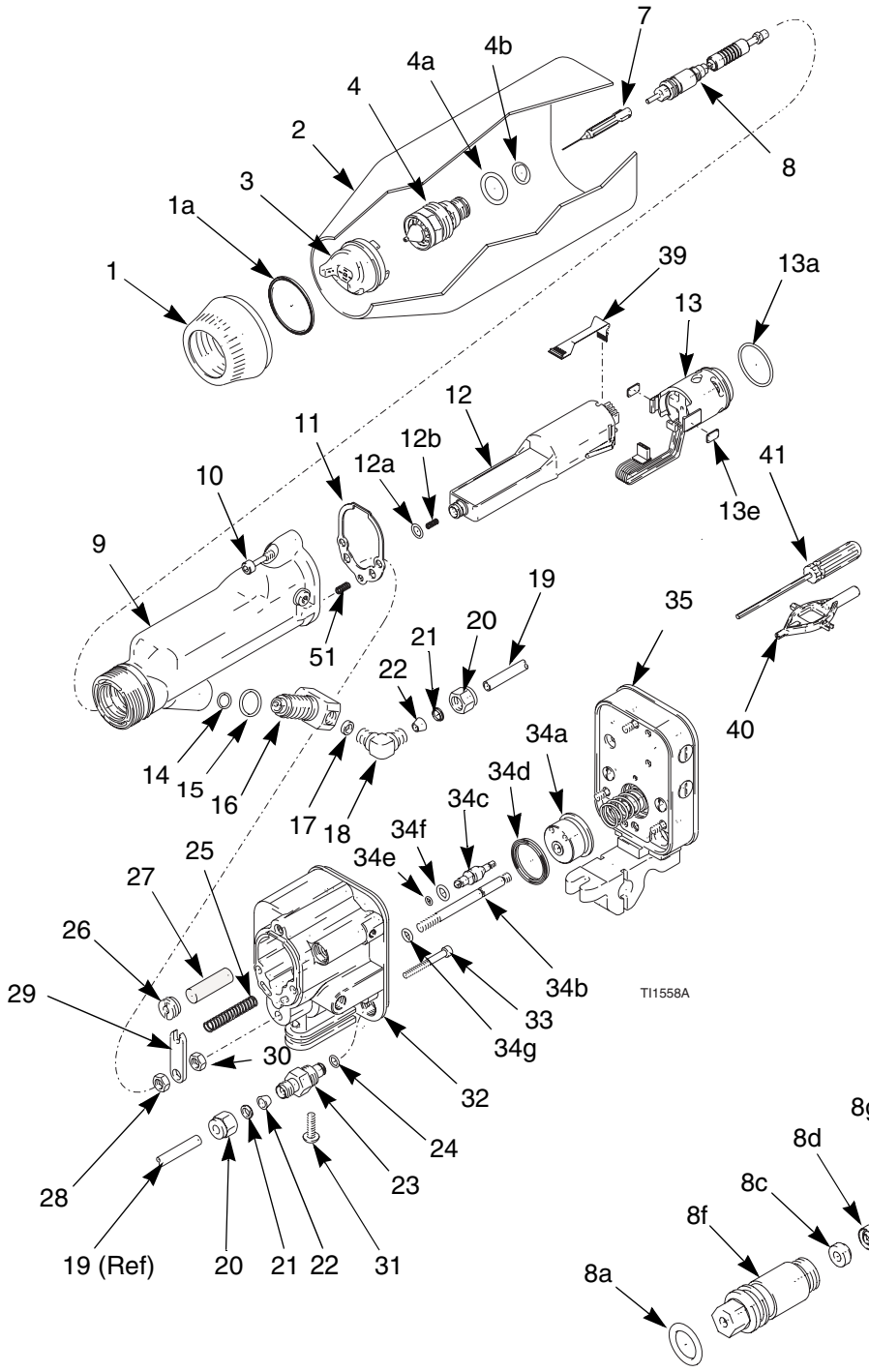
Replace turbine alternator bearings after 2000 hours of operation. Order Part No. 223688 Bearing Kit.

1. Prepare gun for service, page 32.
2. Remove the power supply/alternator assembly, page 42.
3. Disconnect the alternator from the power supply, page 42.
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 42.
7. Install the power supply/alternator assembly, page 42.

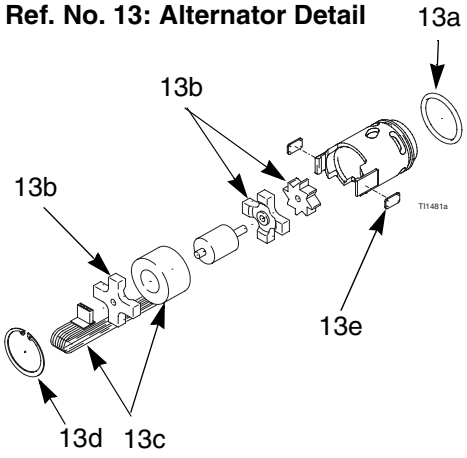
Notes

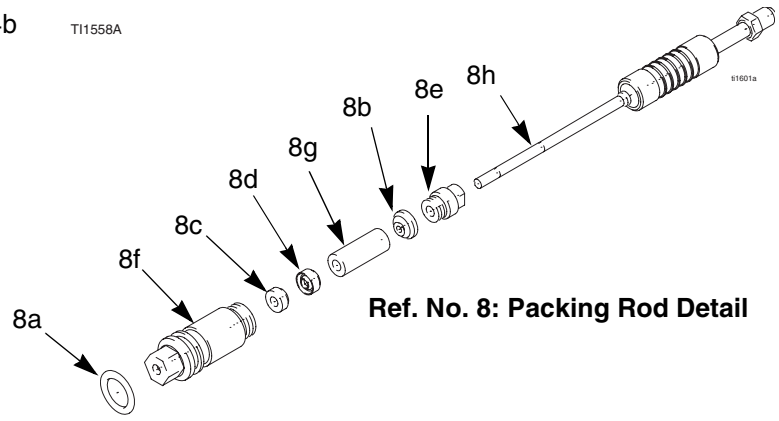
Parts

Part No. 244589 PRO Auto Xs Electrostatic Gun, Series B, for standard coatings



Ref. No. 13: Alternator Detail





Ref. No. 8: Packing Rod Detail

Part No. 244589 PRO Auto Xs Electrostatic Gun, Series B, for standard coatings

Ref. No.	Part No.	Description	Qty
1	244950	RING, retaining, air cap; includes 1a	1
1a*†	198307	. U-CUP	1
2	245312	SHROUD	1
3	24A438	AIR CAP	1
4	197266	NOZZLE; 1.5 mm orifice; includes 4a and 4b	1
4a	111261	. O-RING, conductive	1
4b	111507	. O-RING; fluoroelastomer	1
5	198486	CONNECTOR, tube, fiber optic; pictured on page 51 (unassembled)	1
7	276697	NEEDLE, electrode	1
8	244521	ROD, packing; includes 8a-8h	1
8a*	111316	. O-RING; fluoroelastomer	1
8b*	116905	. SEAL	1
8c*	178409	. SPREADER, packing; uhmwpe	1
8d*	178763	. PACKING, rod; acetal	1
8e	197641	. NUT, packing	1
8f	185495	. HOUSING, packing	1
8g*	186069	. SPACER, packing; acetal	1
8h	244696	. ROD, packing	1
9	244394	BARREL, gun	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; fluoroelastomer	1
12b	197624	. SPRING, compression	1
13	244555	TURBINE, alternator; includes 13a-13e	1
13a*†	110073	. O-RING; fluoroelastomer	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*	111316	O-RING	1
15*	102982	O-RING	1
16	189757	FITTING, fluid	1
17	112642	SPACER	1
18	111370	CONNECTOR, elbow; includes items 20, 21, 22	1
19	198043	TUBE, fluid	1
20	112644	NUT	1
21*	111285	FERRULE, back	1
22*	111286	FERRULE, front	1
23	189549	FITTING, fluid, quick-disconnect	1
24*	111450	O-RING	1
25	185111	SPRING, compression	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; 1/4-20 x 3/4 in. (19 mm)	1
32	245662	BODY, gun	1

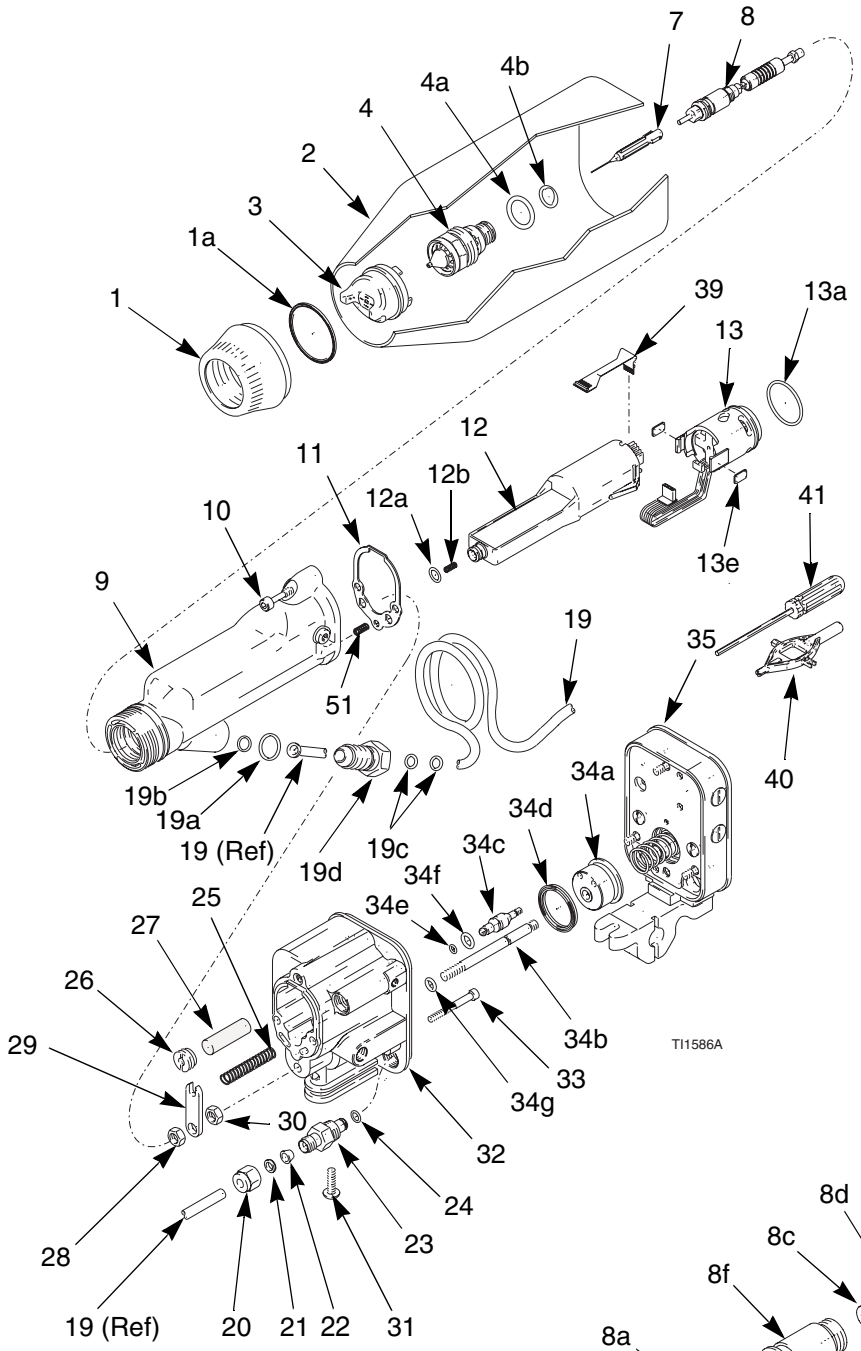
Ref. No.	Part No.	Description	Qty
33	116575	SCREW, cap, socket-hd; 10-24; 3 in. (76 mm)	2
34	244702	PISTON; includes 34a-34g	1
34a	197920	. PISTON	1
34b	189754	. ROD, piston	1
34c	189355	. STEM, piston	2
34d*†	189752	. PACKING, u-cup	1
34e*†	111504	. O-RING	2
34f*†	112319	. O-RING	2
34g*†	111508	. O-RING	1
35	244586	MANIFOLD; see separate parts list on page 51	1
39	245265	CIRCUIT, flexible	1
40	276741	MULTI-TOOL	1
41	107460	WRENCH, ball end; 4 mm	1
42	179791	TAG, warning (not shown); replacement available at no cost	1
43	180060	SIGN, warning (not shown); replacement available at no cost	1
44	239945	COVER, gun; box of 10 (not shown)	1
51	197624	SPRING, grounding	1

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

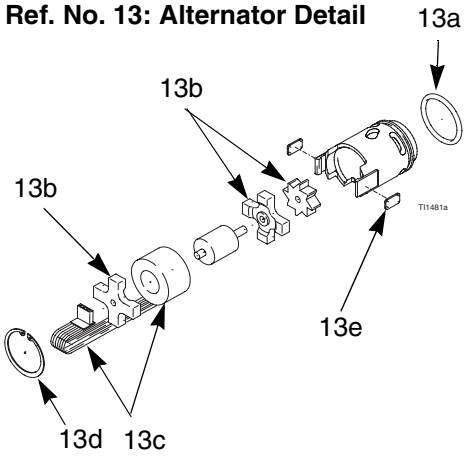
† Included in repair kit 15D592.

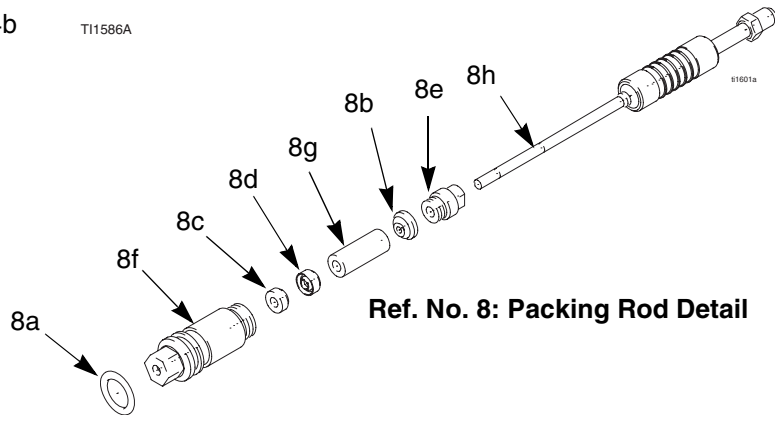
Replacement Warning labels, signs, tags, and cards are available at no cost.

Part No. 244590 PRO Auto Xs Electrostatic Gun, Series B, for high conductivity coatings



Ref. No. 13: Alternator Detail





Ref. No. 8: Packing Rod Detail

Part No. 244590 PRO Auto Xs Electrostatic Gun, Series B, for high conductivity coatings

Ref. No.	Part No.	Description	Qty
1	244950	RING, retaining, air cap; includes 1a	1
1a*†	198307	. U-CUP	1
2	245312	SHROUD	1
3	24A438	AIR CAP	1
4	197266	NOZZLE; 1.5 mm orifice; includes 4a and 4b	1
4a	111261	. O-RING, conductive	1
4b	111507	. O-RING; fluoroelastomer	1
5	198486	CONNECTOR, tube, fiber optic; pictured on page 51 (unassembled)	1
7	276697	NEEDLE, electrode	1
8	244521	ROD, packing; includes 8a-8h	1
8a*	111316	. O-RING; fluoroelastomer	1
8b*	116905	. SEAL	1
8c*	178763	. SPREADER, packing; uhmwpe	1
8d*	178409	. PACKING, rod; acetal	1
8e	197641	. NUT, packing	1
8f	185495	. HOUSING, packing	1
8g*	186069	. SPACER, packing; acetal	1
8h	244696	. ROD, packing	1
9	244394	BARREL, gun	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; fluoroelastomer	1
12b	197624	. SPRING, compression	1
13	244555	TURBINE, alternator; includes 13a-13e	1
13a*†	110073	. O-RING; fluoroelastomer	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
19	237297	TUBE, fluid; coiled; includes 19a-19d	1
19a*	102982	. O-RING	1
19b*	111450	. O-RING	1
19c*	103337	. O-RING	2
19d	186818	. FITTING	1
20	112644	NUT	1
21*	111285	FERRULE, back	1
22*	111286	FERRULE, front	1
23	189549	FITTING, fluid, quick-disconnect	1
24*	111450	O-RING	1
25	185111	SPRING, compression	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; 1/4-20 x 3/4 in. (19 mm)	1
32	245662	BODY, gun	1
33	116575	SCREW, cap, socket-hd; 10-24; 3 in. (76 mm)	2

Continued on page 50.

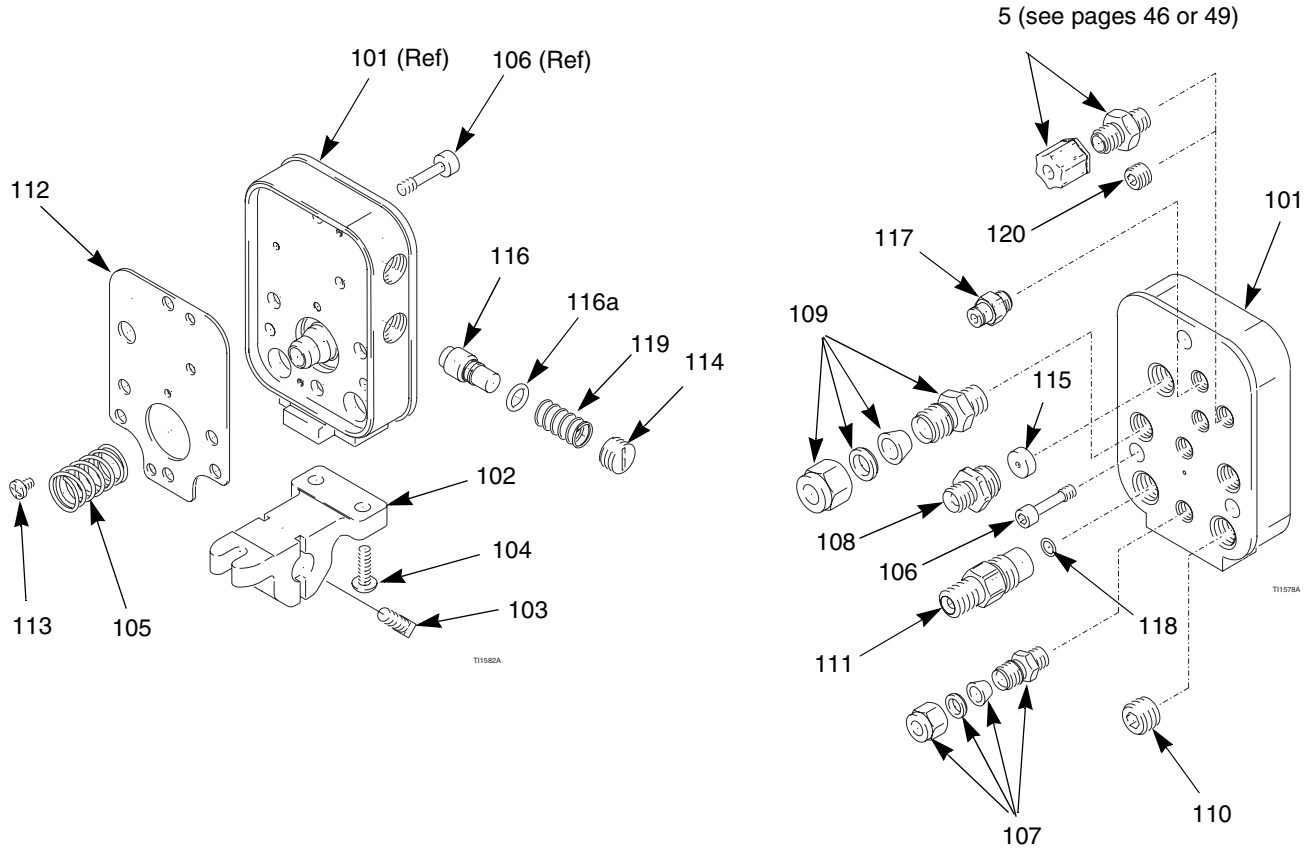
Ref. No.	Part No.	Description	Qty
34	244702	PISTON; includes 34a-34g	1
34a	197920	. PISTON	1
34b	189754	. ROD, piston	1
34c	189355	. STEM, piston	2
34d*†	189752	. PACKING, u-cup	1
34e*†	111504	. O-RING	2
34f*†	112319	. O-RING	2
34g*†	111508	. O-RING	1
35	244586	MANIFOLD; see separate parts list on page 51	1
39	245265	CIRCUIT, flexible	1
40	276741	MULTI-TOOL	1
41	107460	WRENCH, ball end; 4 mm	1
42	179791	TAG, warning (not shown); replacement available at no cost	1
43	180060	SIGN, warning (not shown); replacement available at no cost	1
44	239945	COVER, gun; box of 10 (not shown)	1
51	197624	SPRING, grounding	1

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

† Included in repair kit 15D592.

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

Part No. 244586 Manifold, Series A



Ref. No.	Part No.	Description	Qty
101	198216	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, exhaust	1
108	186845	FITTING, turbine, air	1
109	110078	FITTING, tube, air	2
110	112646	PLUG	1
111	189551	FITTING, quick-disconnect, fluid	1
112†	197925	GASKET, manifold	1
113	108290	SCREW, machine	2

Ref. No.	Part No.	Description	Qty
114	189365	CAP, kV, HI/LO	2
115	198764	RESTRICTOR	1
116	244772	PISTON; includes 116a	2
116a†	112085	. O-RING (1 per piston)	2
117	114263	FITTING, tube, air	3
118	111450	O-RING	1
119	116621	SPRING, compression	2
120	112645	PLUG	1

† Included in repair kit 15D592.

Accessories

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

Fluid Hose

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

FM Approved; nylon; 3/8 npsm(fbe)

215637 1/4 in. (6 mm) ID x 25 ft (7.6 m)
215638 1/4 in. (6 mm) ID x 50 ft (15.2 m)

Fluid Shutoff/Drain Valve

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

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

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

Drain Valve

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

236853 Mounts directly to gun manifold for faster flushing and color changes. Must be used with 233676 Fluid Recirculation Kit.

Fluid Recirculation Kit

233676 Converts standard gun to a recirculating gun. Requires 236853 Drain Valve.

Gun Mounted Fluid Regulator

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

236854 Air-piloted fluid regulator mounts directly to gun manifold for precise fluid control.

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

See item T in FIGURE 3 on page 9. 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)

Fiber Optic Cables

See item V in FIGURE 3 on page 9. Connect gun manifold and remote voltage display, bulkhead connector and remote display, or bulkhead connector and gun manifold. See 308265.

224672 25 ft (7.6 m)
224674 50 ft (15 m)
224676 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.

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.

Gun Accessories

Round Pattern Kits

Consists of fluid tip, diffuser and air cap.

245217 4-6 in. (102-152 mm) diameter
245219 8-10 in. (203-254 mm) diameter

Dielectric Grease

116553 1 oz (28 g) tube of dielectric grease for the power supply o-ring (12a), some packing rod parts (8), and certain fluid fittings.

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.

HC Conversion Kit

245324 Converts PRO Auto Xs standard coating gun (Part No. 244589) to high conductivity gun (244590). The kit is for use with fluids with low resistivity values. See page 16.

Technical Data

Category	Data
Maximum Working Fluid Pressure	100 psi (0.7 MPa, 7 bar)
Maximum Working Air Pressure	100 psi (0.7 MPa, 7 bar)
Minimum Air Pressure at Gun Inlet	40 psi (0.28 MPa, 2.8 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
Fan 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

Loctite® is a registered trademark of the Loctite Corporation.

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.

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.

FOR GRACO CANADA CUSTOMERS

The parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés à la suite de ou en rapport, directement ou indirectement, avec les procedures concernées.

Graco Information

For the latest information about Graco products, visit www.graco.com.

For patent information, see www.graco.com/patents.

TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.
Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

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

Original instructions. This manual contains English. MM 309297

Graco Headquarters: Minneapolis
International Offices: Belgium, China, Japan, Korea

GRACO INC. AND SUBSIDIARIES • P.O. BOX 1441 • MINNEAPOLIS MN 55440-1441 • USA

www.graco.com
Rev L, 12/2014