



Pro Xp™ Electrostatic Air Spray Gun

3A2494A
EN

For use in Class I, Div. I Hazardous Locations using Group D spray materials.
For use in Group II, Zone 1 Explosive Atmosphere Locations using Group IIA spray materials. For professional use only.



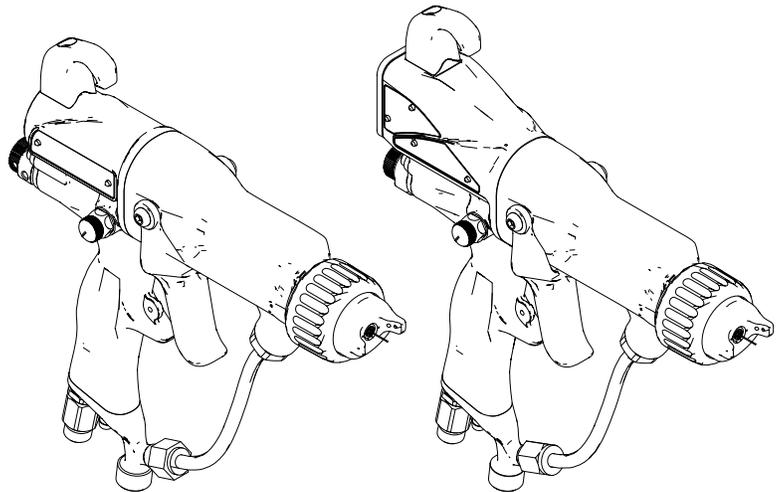
Important Safety Instructions

Read all warnings and instructions in this manual. **Save these instructions.**

100 psi (0.7 MPa, 7.0 bar) Maximum
Fluid Working Pressure

100 psi (0.7 MPa, 7.0 bar) Maximum
Air Working Pressure

See page 3 for model part numbers
and approval information.



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Models

Part No.	kV	Nozzle			Standard Display	Smart Display	Standard Coatings	High Conductivity/ High Wear	Increased Transfer Efficiency
		1.5 mm	1.2 mm	Round Spray					
L40T10	40	✓			✓		✓		
L40T14	40	✓			✓		✓		✓
L40T15	40	✓			✓			✓	✓
L40T16	40	✓			✓			✓	
L60T10	60	✓			✓		✓		
L60T11	60			✓	✓		✓		
L60T12	60		✓		✓		✓		
L60T16	60	✓			✓			✓	
L60M10	60	✓				✓	✓		
L60M12	60		✓			✓	✓		
L60M16	60	✓				✓		✓	
L85T10	85	✓			✓		✓		
L85T16	85	✓			✓			✓	
L85M10	85	✓				✓	✓		
L85M16	85	✓				✓		✓	



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Warnings

The following warnings are for the setup, use, grounding, maintenance and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbol refers to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

 WARNING	
    	<p>FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD</p> <p>Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. To help prevent fire, explosion, and electric shock:</p> <ul style="list-style-type: none">• Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements of this manual.• Ground all equipment, personnel, object being sprayed, and conductive objects in or close to spray area. Resistance must not exceed 1 megohm. See Grounding instructions.• Only use grounded Graco conductive air supply hoses.• Do not use pail liners unless they are conductive and grounded.• Stop operation immediately if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.• Check gun resistance, 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 clean the exterior of the equipment, 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.• 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 spray area free of debris, including solvent, rags and gasoline.• Keep a working fire extinguisher in the work area.



WARNING



PRESSURIZED EQUIPMENT HAZARD

Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.

- Follow the **Pressure Relief Procedure** when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.



PLASTIC PARTS CLEANING SOLVENT HAZARD

Many solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.



- Use only compatible water-based solvents to clean plastic structural or pressure-containing parts.
- See **Technical Data** in this and all other equipment instruction manuals. Read fluid and solvent manufacturer's MSDSs and recommendations.



TOXIC FLUID OR FUMES

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

- Read MSDS's to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.



PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.



WARNING



EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Data** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

Gun Overview

How the Electrostatic Spray Gun Works

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

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

Controls, Indicators, and Components

The electrostatic gun includes the following controls, indicators, and components (see Fig. 1). For information on Smart guns, also see [Smart Guns, page 9](#).

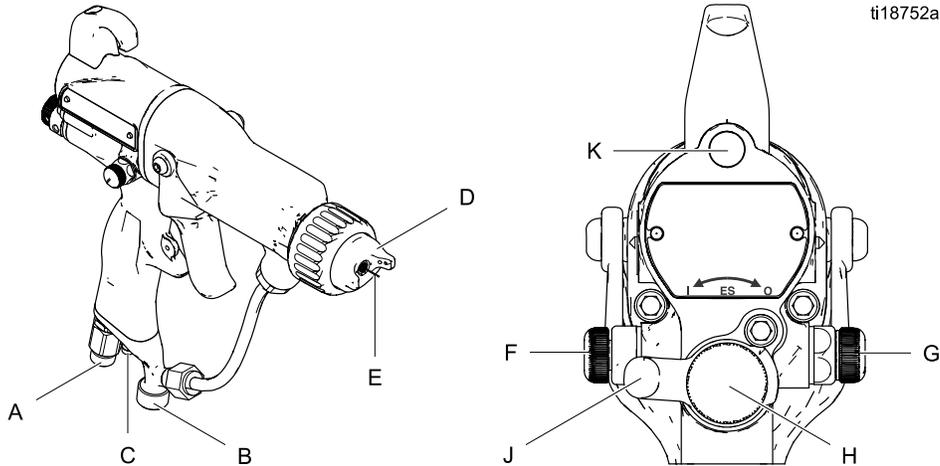


Figure 1 Gun Overview

Item	Description	Purpose
A	Air Swivel Inlet	1/4 npsm(m) left-hand thread, for Graco grounded air supply hose.
B	Fluid Inlet	3/8 npsm(m), for fluid supply hose.
C	Turbine Air Exhaust	Barbed fitting, for supplied exhaust tube.
D	Air Cap and Nozzle	See Air Caps and Fluid Nozzles, page 68 , for available sizes.
E	Electrode Needle	Supplies electrostatic charge to the fluid.
F	Fan Air Adjustment Valve	Adjusts fan size and shape. Can be used to decrease pattern width.
G	Atomizing Air Restrictor Valve	Restricts air cap air flow. Replace with plug (included) if desired.

Item	Description	Purpose
H	Fluid Adjustment Knob	Adjusts fluid flow by limiting fluid needle travel. Use only in low flow conditions, to reduce wear.
J	ES On-Off Valve	Turns electrostatics ON (I) or OFF (O).
K	ES Indicator (standard gun only; for Smart gun indicator, see Operating Mode, page 9)	Lit when ES is ON (I). Color indicates alternator frequency. See the LED indicator table in the Gun Setup Checklist, page 18 .

Smart Guns

The Smart Gun module displays spraying voltage, current, alternator speed, and the voltage setting (low or high). It also allows the user to change to a lower spraying voltage. The module has two modes:

- Operating Mode
- Diagnostic Mode

Operating Mode

Bar Graph

See Fig. 2, and Table 1 on page 10. The Operating Mode displays gun data during normal spraying. The display uses a bar graph to show the voltage level in kiloVolts (kV) and the current level in microAmperes (μ A). The bar graph range is from 0 to 100% for each value.

If the bar graph LEDs are blue, the gun is ready to spray. If the LEDs are yellow or red, the current is too high. The fluid may be too conductive, or see [Electrical Troubleshooting, page 35](#) for other possible causes.

Hz Indicator

The Hz indicator functions the same as the ES indicator on standard guns. The indicator lights to show the alternator speed status, and has three colors:

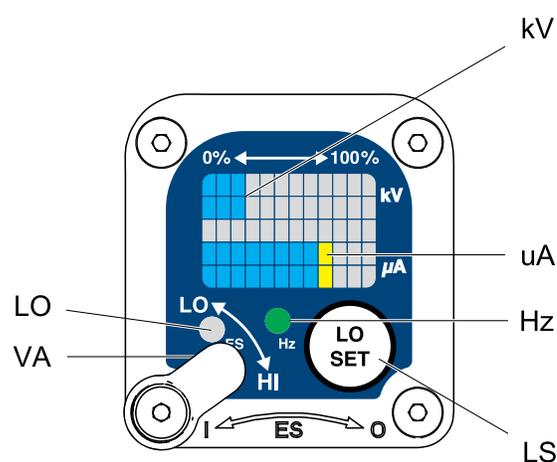
- Green indicates the alternator speed is correct.
- If the indicator changes to amber after 1 second, increase the air pressure.
- If the indicator changes to red after 1 second, reduce the air pressure.

Voltage Adjustment Switch

The voltage adjustment switch (VA) allows the operator to change from low to high voltage.

- The high voltage setting is determined by the maximum voltage of the gun and is not adjustable.
- The low voltage indicator (LO) lights when the switch is set to LO. The low voltage setting is user adjustable. See [Adjusting the Low Voltage Setting, page 10](#).

NOTE: If the Error display appears, the Smart module has lost communication with the power supply. See [Error Display, page 10](#), for further information.



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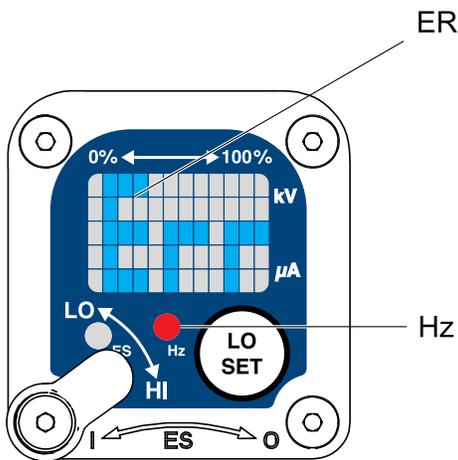
Figure 2 Smart Gun Module in Operating Mode

Error Display

If the Smart module loses communication with the power supply, the Error display appears, the Hz indicator turns red, and the Smart module is disabled. See Fig. 3, and Table 1 on page 10. This can occur in Operating Mode or Diagnostic Mode. See [Electrical Troubleshooting, page 35](#). Communication must be restored to make the Smart module functional.

NOTE: It takes 8 seconds for the Error display to appear. If the gun has been disassembled, wait 8 seconds before spraying to ensure that an Error condition has not occurred.

NOTE: If there is no power to the gun, the Error display will not appear.



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Figure 3 Error Display

Adjusting the Low Voltage Setting

The low voltage setting is user adjustable. To access the low voltage setting screen when in Operating Mode, press the LO SET button (LS) momentarily. The screen will display the current low voltage setting. See Fig. 4, and Table 1 on page 10. The possible ranges are:

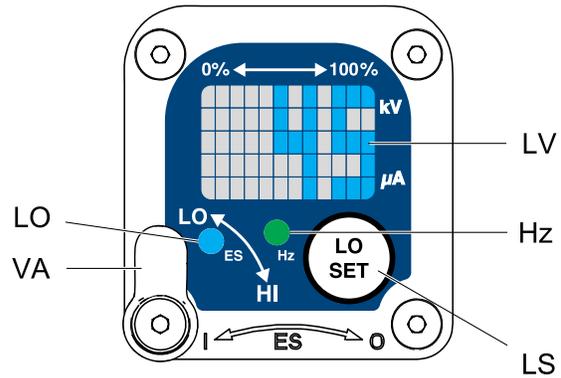
- 85 kV guns: 40–85 kV
- 60 kV guns: 30–60 kV

Set the Voltage Adjustment switch (VA) to LO. Press the LO SET button repeatedly to increase the setting in increments of 5. When the display reaches the maximum setting it will return to the minimum setting

for your gun. Continue pressing the button until you reach the desired setting.

NOTE: After 2 seconds of inactivity the display will return to the Operating Screen.

NOTE: The low voltage setting may be locked. See [Lock Symbol, page 10](#).

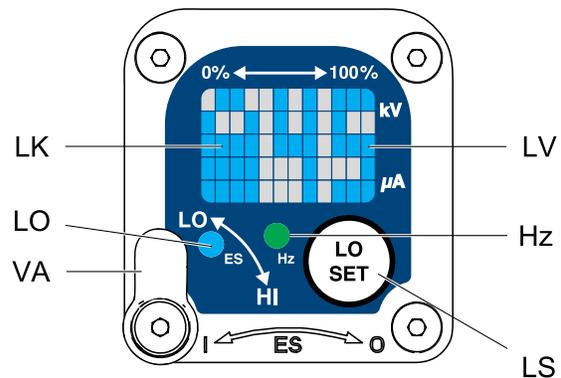


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Figure 4 Low Voltage Setting Screen (Unlocked)

Lock Symbol

The low voltage setting may be locked. When locked, an image (LK) appears on the screen. See Fig. 5, and Table 1 on page 10.

- When in HI mode, the low voltage setting is **always** locked. The lock symbol will appear when the LO SET button is pressed.
- When in LO mode, the lock symbol will **only** appear if the lock is enabled. See [Low Voltage Lock Screen, page 14](#), to lock or unlock the low voltage setting.



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Figure 5 Low Voltage Setting Screen (Locked)

Table 1 . Key for Figs. 2–9.

Item	Description	Purpose
VA	Voltage Adjustment Switch	Two-position switch sets smart gun voltage to low setting (LO) or high setting (HI). This switch is functional in Operating Mode and in Diagnostic Mode.
LO	Low Voltage Mode Indicator	Lights (blue) when the smart gun is set to Low Voltage.
kV	Voltage (kV) Display	Displays actual spraying voltage of the gun, in kV. In Operating Mode, display is a bar graph. In Diagnostic Mode, voltage is displayed as a number.
uA	Current (uA) Display	Displays actual spraying current of the gun, in uA. In Operating Mode, display is a bar graph. In Diagnostic Mode, current is displayed as a number.
LS	LO SET button	<p>Press momentarily to enter the Low Voltage Setting screen.</p> <p>Press and hold for approximately 5 seconds to enter or exit Diagnostic Mode.</p> <p>While in Diagnostic Mode, press momentarily to advance through screens.</p> <p>While on the Low Voltage Lock Screen (in Diagnostic Mode), press and hold to turn the lock on or off.</p>
LV	Low Voltage Display	Displays the low voltage setting as a number. The setting can be changed. See Fig. 4.
LK	Low Voltage Locked	Appears if the low voltage setting is locked. See Fig. 5 and Fig. 9.

Item	Description	Purpose
LD	LO Display	Appears on the Low Voltage Lock Screen. See Fig. 9.
ER	Error Display	Appears if the Smart module loses communication with the power supply. See Fig. 3.
VI	Voltage Indicator	In Diagnostic Mode, the two top right LEDs of the screen light, indicating that the value displayed is in kV. See Fig. 6.
CI	Current Indicator	In Diagnostic Mode, the two bottom right LEDs of the screen light, indicating that the value displayed is in uA. See Fig. 7.
AS	Alternator Speed Display	In Diagnostic Mode, Hz level is displayed as a number. See Fig. 8.
Hz	Alternator Speed Indicator	<p>In Operating Mode, indicator color varies to show the alternator speed status:</p> <ul style="list-style-type: none"> • green indicates the alternator speed is at the correct level. • If the indicator changes to amber after 1 second, the alternator speed is too low. • If the indicator changes to red after 1 second, the alternator speed is too high. The indicator will also turn red if the Error display appears. <p>In Diagnostic Mode, the indicator is green when in the Alternator Speed (Hertz) screen.</p>

Diagnostic Mode

Diagnostic Mode includes four screens which display gun data:

- Voltage (kiloVolts) Screen
- Current (microAmperes) Screen
- Alternator Speed (Hertz) Screen
- Low Voltage Lock Screen

NOTE: You must be in Operating Mode to adjust the low voltage setting; the setting is not adjustable in Diagnostic Mode. However, the voltage adjustment switch (VA) can be set to HI or LO in Operating Mode and in Diagnostic Mode.

To enter Diagnostic Mode, press and hold the LO SET (LS) button for approximately 5 seconds. The display will go to the [Voltage \(kiloVolts\) Screen, page 13](#).

To advance to the next screen, press the LO SET button again.

To exit Diagnostic Mode, press and hold the LO SET button for approximately 5 seconds. The screen will return to Operating Mode.

NOTE: If the gun is detripped while in Diagnostic Mode, the last screen viewed will be displayed when the gun is retriggered.

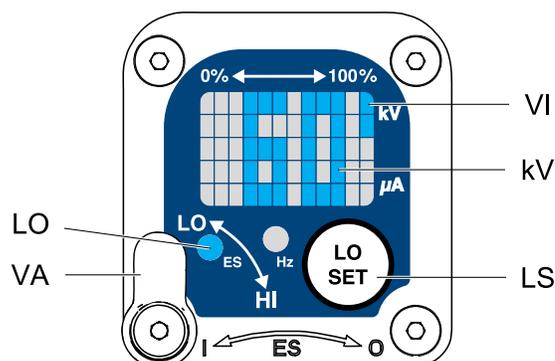
NOTE: Diagnostic Mode cannot be exited from the Low Voltage Lock Screen. See [Low Voltage Lock Screen, page 14](#) for details.

Voltage (kiloVolts) Screen

The Voltage (kiloVolts) Screen is the first screen to appear after entering Diagnostic Mode. See Fig. 6, and Table 1 on page 10. To enter this screen, press and hold the LO SET button for approximately 5 seconds while in the Operating Mode.

This screen displays the spraying voltage of the gun as a number (kV), rounded to the nearest 5 kV. The two top right LEDs (VI) of the display panel light, indicating that the Voltage (kiloVolts) Screen is displayed. The display is a readout and cannot be changed.

Press the LO SET button to advance to the [Current \(microAmperes\) Screen, page 13](#). Press and hold for approximately 5 seconds to return to Operating Mode.



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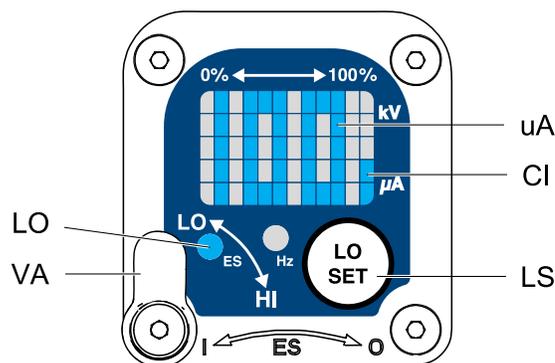
Figure 6 Voltage (kiloVolts) Screen

Current (microAmperes) Screen

The Current (microAmperes) Screen is the second screen in the Diagnostic Mode. See Fig. 7, and Table 1 on page 10. To enter this screen, press the LO SET button while in the Voltage (kiloVolts) Screen.

This screen displays the spraying current of the gun as a number (uA), rounded to the nearest 5 uA. The two bottom right LEDs (CI) of the display panel light, indicating that the Current (microAmperes) Screen is displayed. The display is a readout and cannot be changed.

Press the LO SET button to advance to the [Alternator Speed \(Hertz\) Screen, page 14](#). Press and hold for approximately 5 seconds to return to Operating Mode.



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Figure 7 Current (microAmperes) Screen

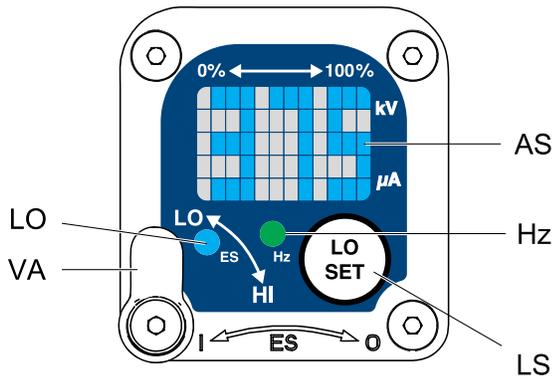
Alternator Speed (Hertz) Screen

The Alternator Speed (Hertz) Screen is the third screen in the Diagnostic Mode. See Fig. 8, and Table 1 on page 10. To enter this screen, press the LO SET button while in the Current (microAmperes) Screen.

This screen displays the alternator speed as a 3 digit number (AS), rounded to the nearest 10 Hz. The display is a readout and cannot be changed. If the alternator speed is greater than 999 Hz, the display will show 999.

The Hz indicator lights green to show that you are viewing the Alternator Speed (Hertz) Screen.

Press the LO SET button to advance to the [Low Voltage Lock Screen, page 14](#). Press and hold for approximately 5 seconds to return to Operating Mode.



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Figure 8 Alternator Speed (Hertz) Screen

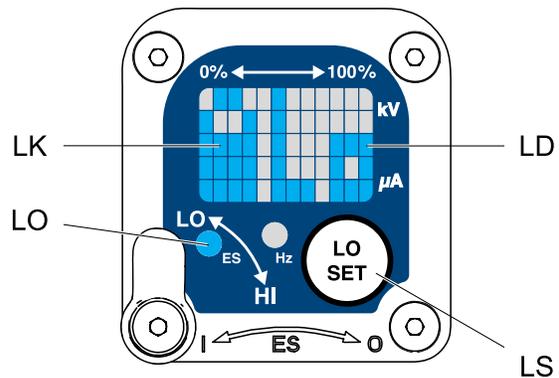
Low Voltage Lock Screen

The Low Voltage Lock Screen is the fourth screen in the Diagnostic Mode. See Fig. 9, and Table 1 on page 10. To enter this screen, press the LO SET button while in the Alternator Speed (Hertz) Screen.

This screen displays the status of the Low Voltage Lock. If the setting is locked, the lock image (LK) appears to the left of the Lo display (LD). If the setting is unlocked, the lock image does not appear.

To change the lock status, press and hold the LO SET button until the lock image appears or disappears. If the lock is set, the image will also appear on the Low Voltage Setting Screen when in low voltage mode (see Fig. 4).

NOTE: Diagnostic Mode cannot be exited from this screen, because pressing and holding the LO SET button is used to turn the lock on or off. To exit, press LO SET momentarily to return to the Voltage (kiloVolts) Screen, then exit Diagnostic Mode from there.



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Figure 9 Low Voltage Lock Screen

Installation

				
<p>Installing and servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly.</p> <ul style="list-style-type: none"> • Do not install or service this equipment unless you are trained and qualified. • Be sure your installation complies with local, state, and national codes for the installation of electrical apparatus in a Class I, Div. I, Hazardous Location or a Group II, Zone I Explosive Atmosphere Location. • Comply with all applicable local, state, and national fire, electrical, and other safety regulations. 				

Fig. 10 shows a typical electrostatic air spray system. It is not an actual system design. For assistance in designing a system to suit your particular needs, contact your Graco distributor.

Warning Sign

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

				
<p>Provide fresh air ventilation to reduce the risk of fire or explosion caused by the buildup of flammable or toxic vapors when spraying, flushing, or cleaning the gun. Do not operate the gun unless ventilation fans are operating.</p>				

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

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

Air Supply Line

				
<p>To reduce the risk of electric shock, the air supply hose must be electrically connected to a true earth ground. Use only Graco Grounded Air Supply Hose.</p>				

1. See Fig. 10. Use the Graco Grounded Air Supply Hose (AH) to supply air to the gun. The gun air inlet fitting has a left-hand thread. The air supply hose ground wire (AG) must be connected to a true earth ground. Do not connect the air supply hose to the gun air inlet yet.
2. Install an air line filter/water separator (AF) 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 bleed-type air regulators (PR, GR) on the pump and gun air supply lines to control air pressure to the pump and gun.

				
<p>Trapped air can cause the pump to cycle unexpectedly, which can result in serious injury, including splashing fluid in the eyes or on the skin. Do not operate the equipment without the bleed-type air valve (BV) installed.</p>				

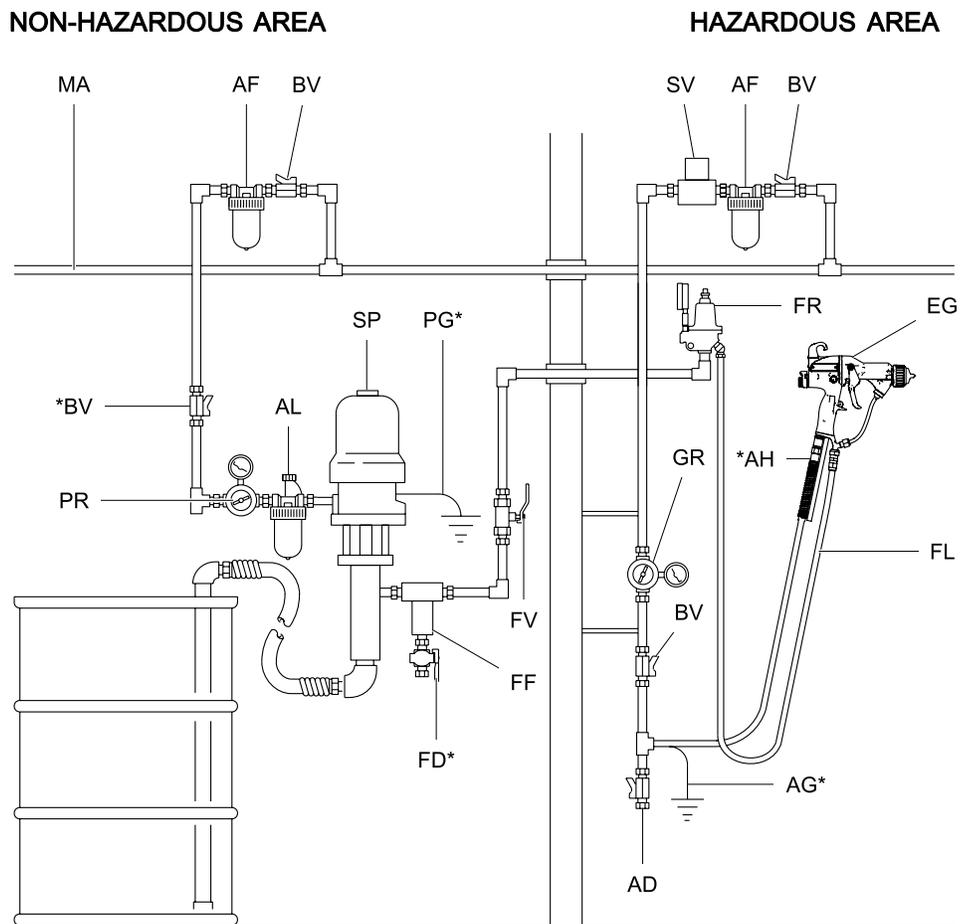
4. Install a bleed-type air valve (BV) on the pump air supply line. The bleed-type air valve (BV) is required in your system to shut off air to the pump and relieve air trapped between the valve and the pump after the air regulator is shut off. Install an additional bleed-type air valve on the main air line (MA) to isolate the accessories for servicing.
5. Install an air bleed valve (BV) on each gun air supply line to shut off air to the gun(s) and relieve air trapped between the valve and the gun after the air regulator is shut off.

Fluid Supply Line

1. Blow out the fluid line (FL) with air and flush it with solvent. Use solvent which is compatible with the fluid to be sprayed. Do not connect the fluid supply line to the gun fluid inlet yet.
2. Install a fluid regulator (FR) on the fluid line to control fluid pressure to the gun.
3. Install a fluid filter (FF) near the pump outlet, to remove particles and sediment which could clog the spray nozzle.

				
<p>To reduce the risk of serious injury, including splashing fluid in the eyes or on the skin, do not operate equipment without the fluid drain valve (FD) installed.</p>				

4. The fluid drain valve (FD) 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.



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Figure 10 Typical Installation

Typical Installation Key

Item	Description
AD	Air Line Drain Valve
AF	Air Filter/Water Separator
AG*	Gun Air Hose Ground Wire
AH*	Graco Grounded Air Hose (left-hand threads)
AL	Pump Air Line Lubricator
BV*	Pump Bleed-Type Air Shutoff Valve
EG	Electrostatic Air Spray Gun
FD*	Fluid Drain Valve
FF	Fluid Filter
FL	Fluid Supply Line
FR	Fluid Pressure Regulator

Item	Description
FV	Fluid Shutoff Valve
GR	Gun Air Pressure Regulator
MA	Main Air Supply Line
PG*	Pump Ground Wire
PR	Pump Air Pressure Regulator
SP	Supply Pump
SV*	Ventilation Fan Interlock Solenoid Valve. NOTE: The solenoid valve is not offered as a Graco accessory.

* These items are required for safe operation. They must be purchased separately.

Gun Setup

Gun Setup Checklist

See Fig. 11 to locate the electrostatic gun controls.

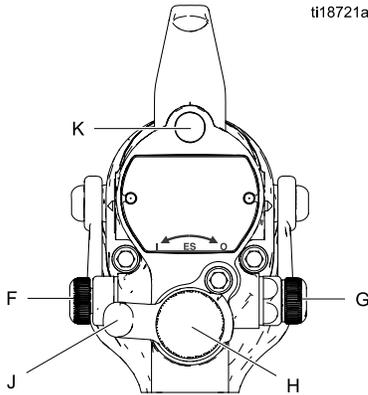
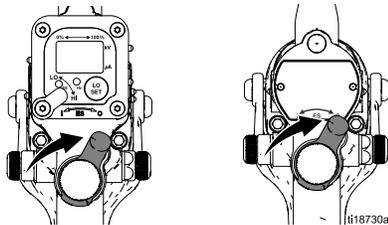


Figure 11 Electrostatic Gun Controls

1. The gun is shipped with the fluid nozzle and air cap installed. Check that the retaining ring is tight.

NOTE: To select a different size fluid nozzle or air cap, see [Fluid Nozzle Selection Chart, page 68](#) and [Air Cap Selection Chart, page 70](#). To install the nozzle and air cap, see [Air Cap and Nozzle Replacement, page 38](#).

2. Turn OFF (O) the ES On-Off switch (J).

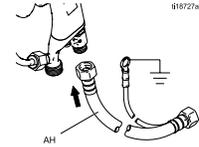


3. Shut off the air bleed valve to the gun.



4. Check gun resistance. See [Test Gun Resistance, page 31](#).

5. Connect the Graco grounded air hose to the gun air inlet. The gun air inlet fitting has left-hand threads.



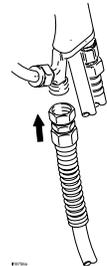
6. Follow all steps under [Grounding, page 21](#).
7. Follow all steps under [Check Gun Electrical Grounding, page 25](#). Reading must be less than 1 megohm.

8. Verify that the material resistivity meets requirements for electrostatic spray. See [Check Fluid Resistivity, page 26](#).

9. Connect the exhaust tube and secure with the clamp provided.

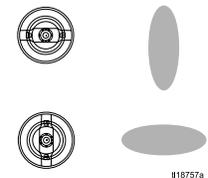


10. Connect the fluid hose to the gun fluid inlet.

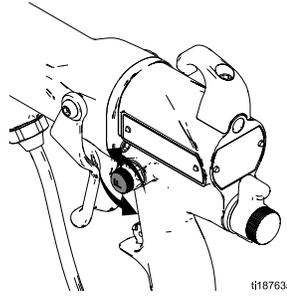


11. Flush if needed, see [Flushing, page 28](#).

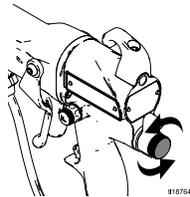
12. Position the air cap as desired.



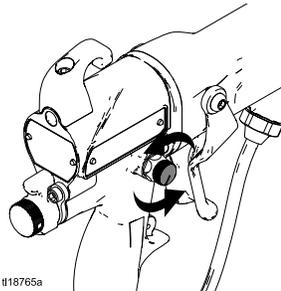
13. Fully open the fan air adjustment valve (F) counterclockwise.



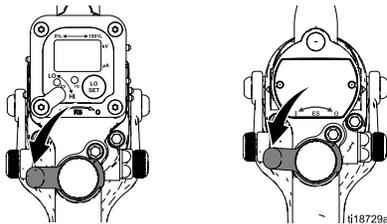
14. Fully open the fluid adjustment valve (H) counterclockwise.



15. Fully open the atomizing air restrictor valve (G) counterclockwise.



16. Turn ON (I) the ES On-Off switch (J).



17. Set the gun air regulator to deliver a minimum 45 psi (0.32 MPa, 3.2 bar) at the gun when triggered, to ensure full spraying voltage. See the table below.



Table 2 . Pressure Drop

Air Hose Length in ft (m) (using 5/16 in. [8 mm] diameter hose)	Air Regulator Setting in psi (MPa, bar) [with gun triggered]
15 (4.6)	55 (0.38, 3.8)
25 (7.6)	65 (0.45, 4.5)
50 (15.3)	80 (0.56, 5.6)

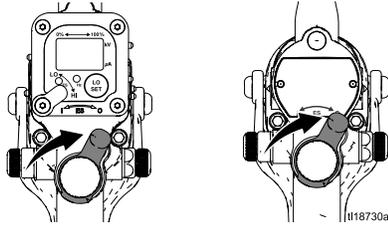
18. Check that the ES indicator (K) [Hz indicator on Smart guns] is lit. See the following table.

Table 3 . LED Indicator Colors

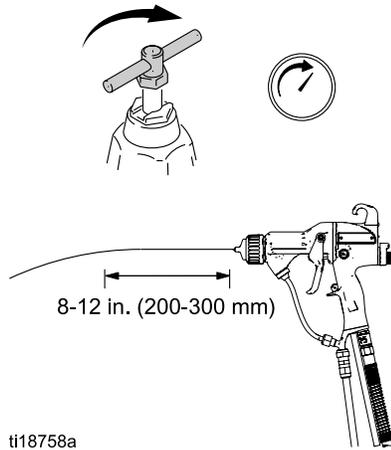
Indicator Color	Description
Green	When spraying, the indicator should remain green, indicating sufficient air pressure to the alternator turbine.
Amber	If the indicator changes to amber after 1 second, the air pressure is too low. Increase air pressure until the indicator is green.
Red	If the indicator changes to red after 1 second, the air pressure is too high. Decrease air pressure until the indicator is green.

Gun Setup

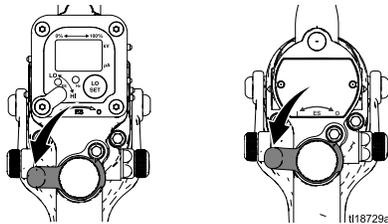
19. Shut off the air to the gun. Turn OFF (O) the ES On-Off switch (J).



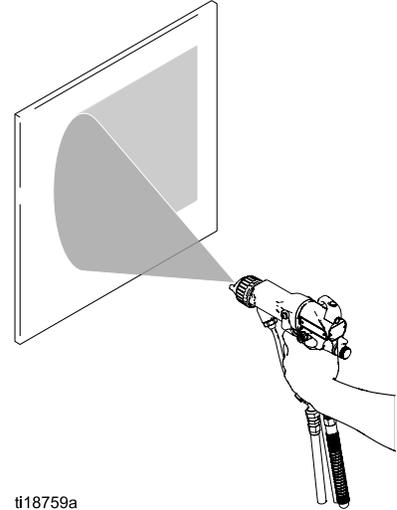
20. Start the pump. Adjust the fluid regulator until the stream from the gun travels 8-12 in. (200-300 mm) before falling off. Typically, if fluid pressure is below 5 psi (.04 MPa, 0.4 bar), a change of nozzle size is recommended.



21. Turn on the air to the gun. Turn ON (I) the ES On-Off switch (J).

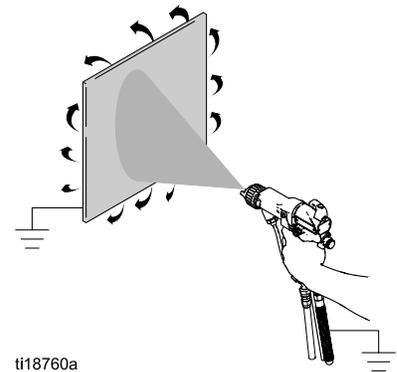


22. Spray a test pattern. Check the atomization. If over-atomization occurs at minimum pressure, adjust the restrictor valve. If atomization is inadequate, increase air pressure or decrease fluid flow.



23. Adjust the fan air adjustment valve: clockwise for a narrower pattern, counterclockwise for a wider pattern.

24. Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 33](#).

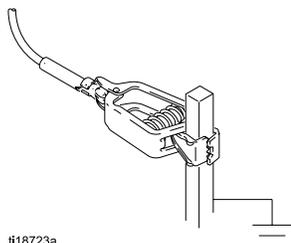


Grounding

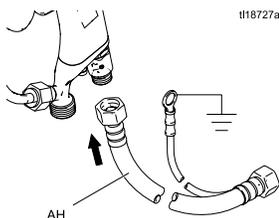
				
<p>When operating the electrostatic gun, any ungrounded objects in the spray area (people, containers, tools, etc.) can become electrically charged. Improper grounding can result in static sparking, which can cause a fire, explosion, or electric shock. Ground all equipment, personnel, object being sprayed, and conductive objects in or close to the spray area. Resistance must not exceed 1 megohm. Follow the grounding instructions below.</p>				

The following are minimum grounding requirements for a basic electrostatic system (see Figs. 12–15). 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.

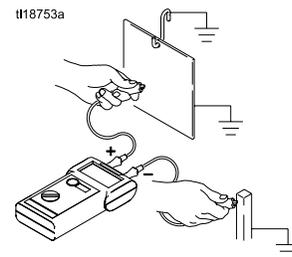
- *Pump/fluid source:* ground the pump/fluid source by connecting its ground wire to a true earth ground.



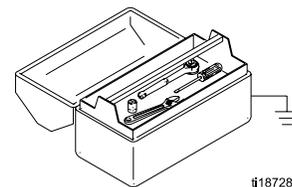
- *Electrostatic Air Spray Gun:* ground the gun by connecting the Graco Grounded Air Hose (AH) to the gun, and connecting the air hose ground wire to a true earth ground. See [Check Gun Electrical Grounding, page 25](#).



- *Object being sprayed:* keep the workpiece hangers clean and grounded at all times.



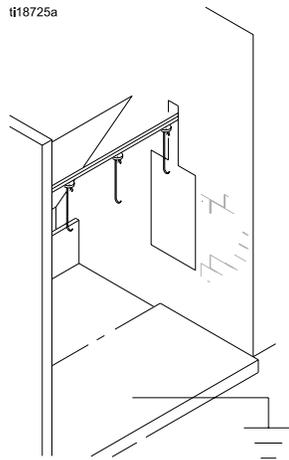
- *All electrically conductive objects or devices in the spray area:* must be properly grounded.



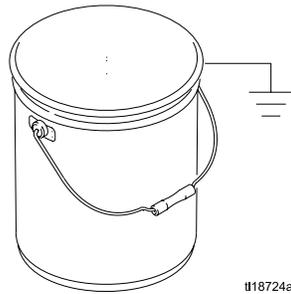
- *Fluid and waste containers:* ground all fluid and waste containers in the spray area. Do not use pail liners unless they are conductive and grounded. When flushing the spray gun, the container used to catch the excess fluid must be electrically conductive and grounded.
- *Air compressors:* ground the equipment according to the manufacturer's recommendations.
- *All air and fluid lines* must be properly grounded. Use only grounded hoses with a maximum of 100 feet (30.5 m) combined hose length to ensure grounding continuity.

Gun Setup

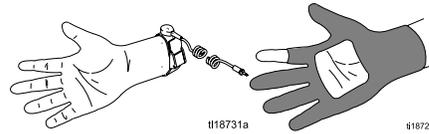
- *The floor of the spray area:* must be electrically conductive and grounded. Do not cover the floor with cardboard or any non-conductive material which would interrupt grounding continuity.



- *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 persons entering the spray area:* must wear shoes having conductive soles such as leather, or wear personal grounding straps. Do not wear shoes with non-conductive soles such as rubber or plastic. If gloves are necessary, wear the conductive gloves supplied with the gun. If non-Graco gloves are worn, cut off fingers or palm area of gloves to ensure your hand contacts the grounded gun handle.



Key to Figs. 12–15

Fig. 12	Operator is grounded through bare skin contact with the gun handle and conductive shoes. A conductive glove can also be used.
Fig. 13	Object being sprayed is grounded through contact with the hanger and conveyor system.
Fig. 14	Gun is grounded through the conductive air hose.
Fig. 15	Fluid supply line and source must be grounded.

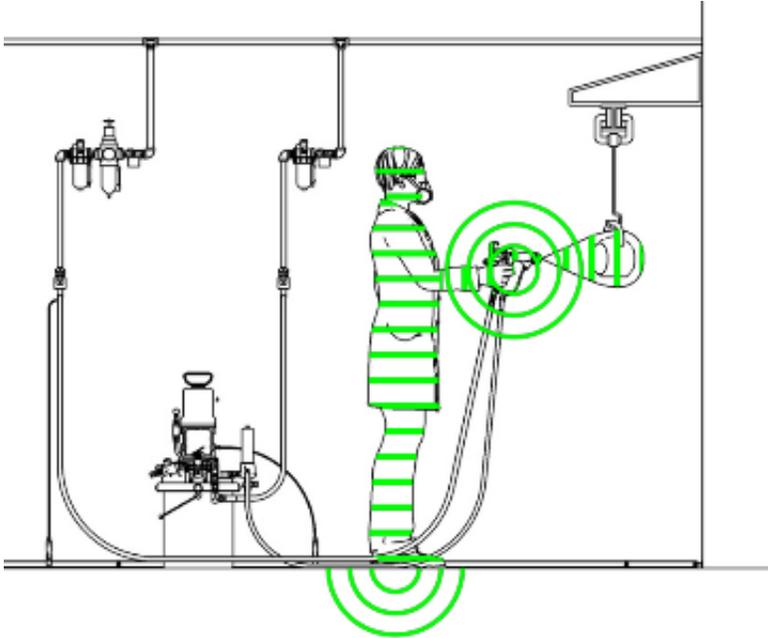


Figure 12 Ground the Operator

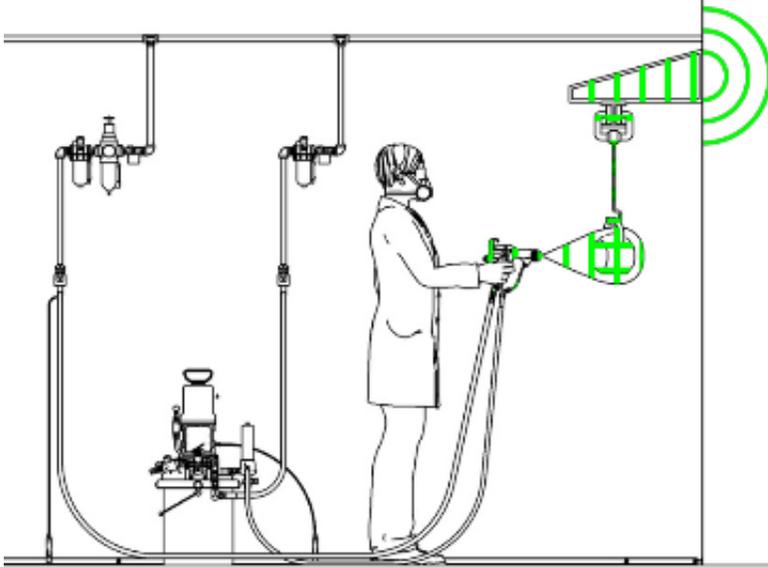


Figure 13 Ground the Object Being Sprayed

Gun Setup

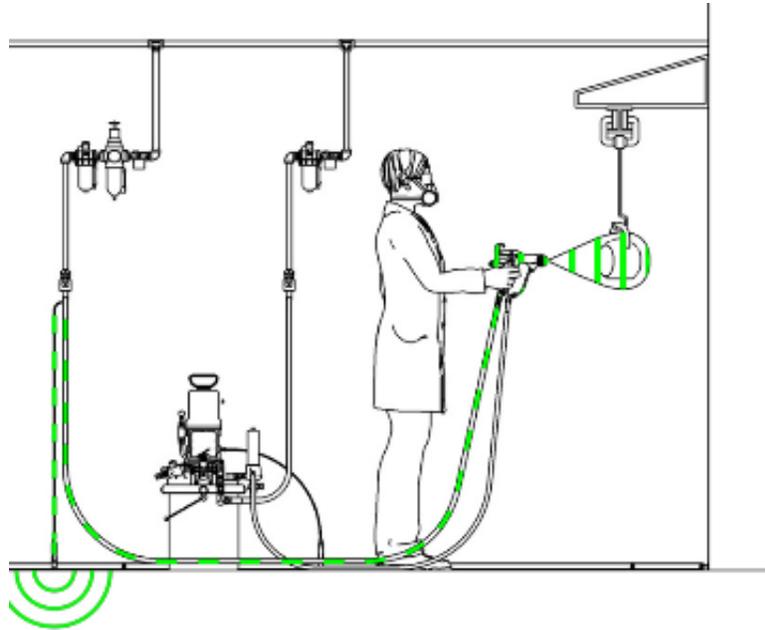


Figure 14 Ground the Gun

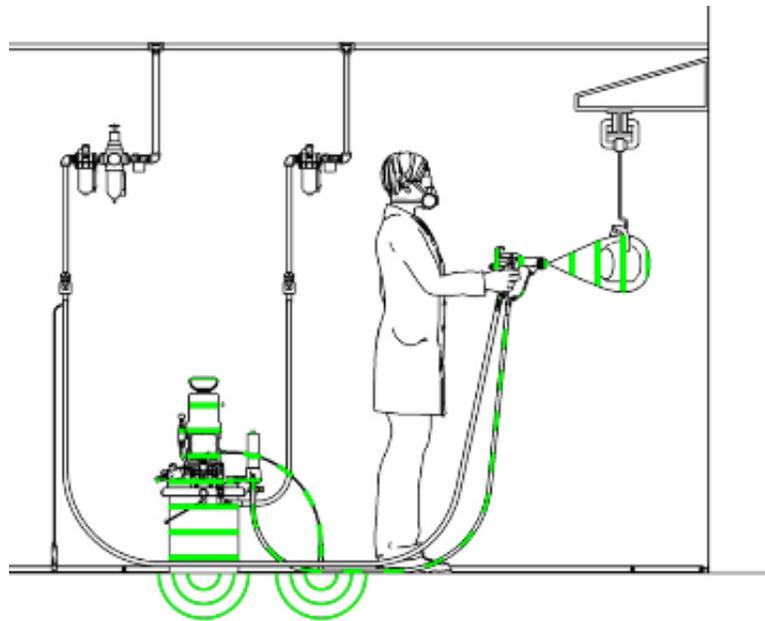


Figure 15 Ground the Fluid Supply

Check Gun Electrical Grounding

				
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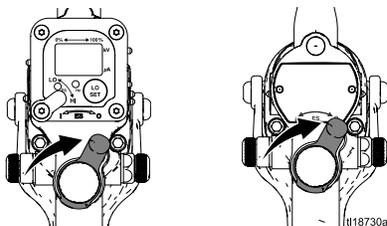
Megohmmeter Part No. 241079 (AA-see Fig. 16) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

- 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.

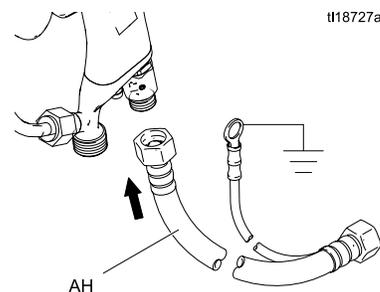
Graco Part No. 241079 Megohmmeter is available as an accessory to check that the gun is properly grounded.

1. Have a qualified electrician check the electrical grounding continuity of the spray gun and air hose.
2. Turn OFF (O) the ES On-Off switch.

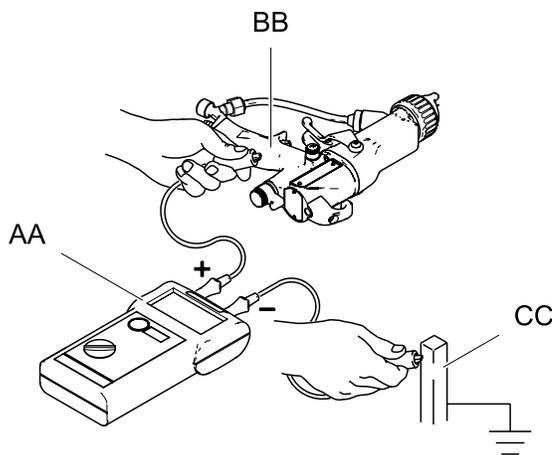


3. Turn off the air and fluid supply to the gun. Follow the [Pressure Relief Procedure, page 27](#).
4. Disconnect the fluid hose.

5. Make sure the grounded air hose (AH) is connected and the hose ground wire is connected to a true earth ground.



6. Measure the resistance between the gun handle (BB) and a true earth ground (CC). Use an applied voltage of 500 minimum to 1000 volts maximum. The resistance should not exceed 1 megohm. See Fig. 16.
7. If the resistance is greater than 1 megohm, check the tightness of the ground connections and be sure the air hose ground wire is connected to a true earth ground. If the resistance is still too high, replace the air hose.



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Figure 16 Check Gun Electrical Grounding

Check Fluid Resistivity

			
<p>To reduce the risk of fire, explosion, or electric shock, 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.</p> <p>Failure to follow this warning could cause fire, explosion, or electric shock and result in serious injury and property damage.</p>			

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.

A high conductivity kit or high conductivity hose may be required for readings less than 25 megohm-cm.

Table 4 . Fluid Resistivity Levels

Megohms-cm			
1-7	7-25	25-200	200-2000
High Con- ductivity Kit recom- mended	High Con- ductivity Kit may be needed	Best elec- trostatic results	Good elec- trostatic 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.

Flush Before Using Equipment

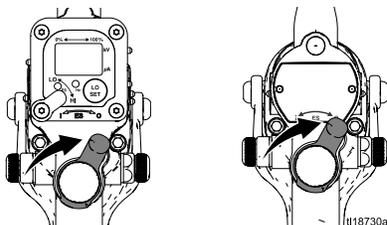
The equipment was tested in fluid at the factory. To avoid contaminating your fluid, flush the equipment with a compatible solvent before using the equipment.

Operation

Pressure Relief Procedure



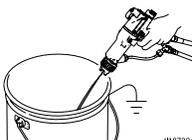
1. Turn OFF (O) the ES On/Off switch.



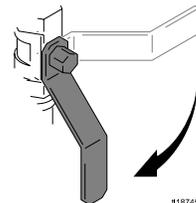
2. Turn off the air bleed valves to the fluid source and to the gun.



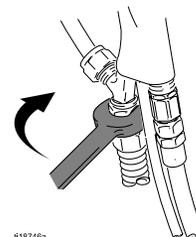
3. Trigger the gun into a grounded metal waste container to relieve the fluid pressure.



4. Open the pump drain valve, having a waste container ready to catch the drainage. Leave the pump drain valve open until you are ready to spray again.



5. If the nozzle or hose is completely clogged or pressure is not fully relieved, slowly loosen the hose end coupling. Now clear the nozzle or hose.

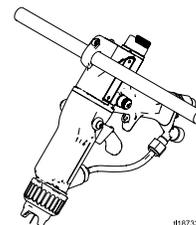


Startup

Follow all steps under [Gun Setup Checklist](#), page 18.

Shutdown

1. Flush the gun, see [Flushing](#), page 28.
2. Follow the [Pressure Relief Procedure](#), page 27.
3. Hang the gun from its hook, with the nozzle pointing down.



Maintenance

Flushing

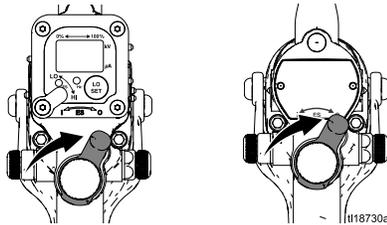
- Flush before changing fluids, before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
- Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts.

				
To reduce the risk of fire, explosion, or electric shock, turn OFF (O) the ES On-Off switch before flushing the gun.				

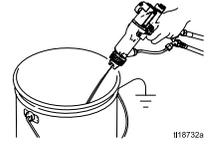
NOTICE

Do not use methylene chloride as a flushing or cleaning solvent with this gun as it will damage nylon components.

1. Turn OFF (O) the ES On-Off switch.

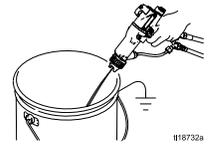


2. Follow the [Pressure Relief Procedure, page 27](#).

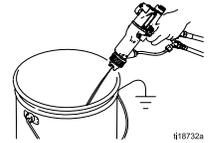


3. Change the fluid source to solvent, or disconnect the fluid line and connect a solvent supply line to the gun.

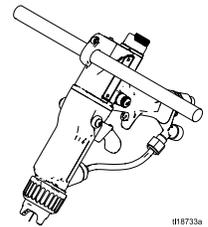
4. Point the gun into a grounded metal pail. Flush until clean solvent flows from the gun.



5. Follow the [Pressure Relief Procedure, page 27](#).



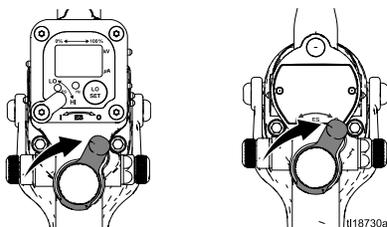
6. Shut off or disconnect the solvent line.
7. Hang the gun from its hook, with the nozzle pointing down.



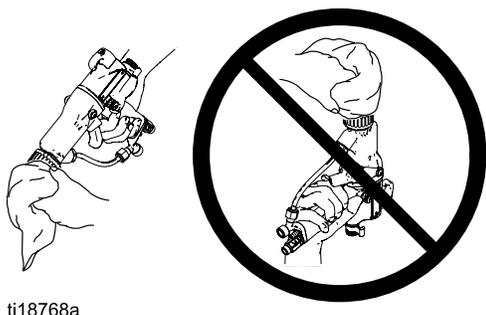
8. When ready to spray again, reconnect the fluid supply line. Follow the [Gun Setup Checklist, page 18](#).

Clean the Gun Daily

1. Turn OFF (O) the ES On-Off switch.



2. Flush the gun. See [Flushing, page 28](#).
3. Follow the [Pressure Relief Procedure, page 27](#).
4. Clean the outside of the gun with a compatible solvent. Use a soft cloth. Point the gun down to prevent solvent from entering the gun passages. Do not immerse the gun.



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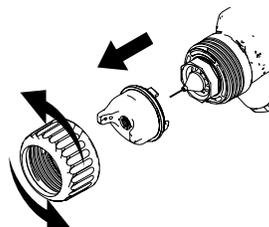


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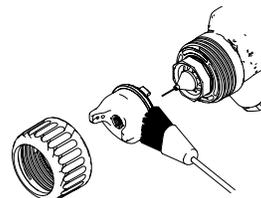
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5. Remove the air cap.



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6. Clean the air cap, retaining ring, and nozzle with a soft brush and compatible solvent.



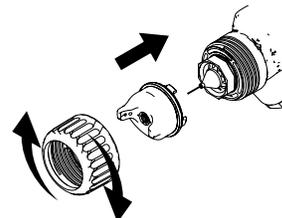
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7. If necessary, use a toothpick or other soft tool to clean the air cap holes. Do not use metal tools.



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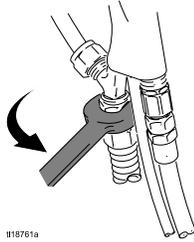
8. Reinstall the air cap. Tighten securely.



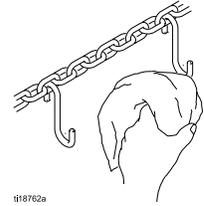
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Daily System Care

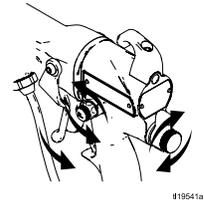
1. Follow the [Pressure Relief Procedure, page 27](#).
2. Clean the fluid and air filters.
3. Check for fluid leaks. Tighten all fittings.



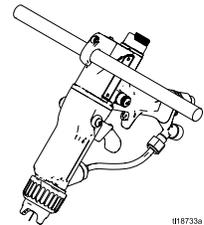
4. Clean workpiece hangers. Use non-sparking tools.



5. Check the movement of the trigger and valves. Lubricate if necessary.



6. [Check Gun Electrical Grounding, page 25](#).
7. Hang the gun from its hook, with the nozzle pointing down.



Electrical Tests

Use the following procedures to test the condition of the power supply and gun body, and electrical continuity between components.

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

				
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Megohmmeter Part No. 241079 (AA-see Fig. 17) 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. **For Model L40T14 and L40T15 guns only:** Test the barrel continuity to verify that the metal pin in the barrel is properly grounded. Measure resistance between the metal pin (GP) and the air swivel (21). The resistance should be less than 100 ohms. If the resistance is 100 ohms or more, replace the gun body.
3. **For all guns:** Trigger the gun and measure resistance between the electrode needle tip (3) and the air swivel (21). The resistance should be:
 - 75–120 megohms for 40kV guns
 - 104–148 megohms for 60kV guns
 - 148–193 megohms for 85kV guns

If outside this range, test the gun untriggered. If still outside this range, go to [Test Power Supply Resistance, page 32](#). If in range, see [Electrical Troubleshooting, page 35](#) for other possible causes of poor performance.

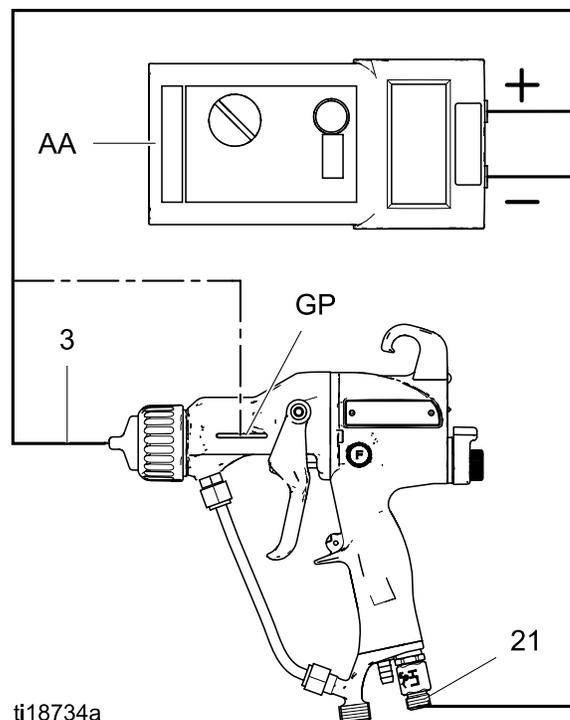
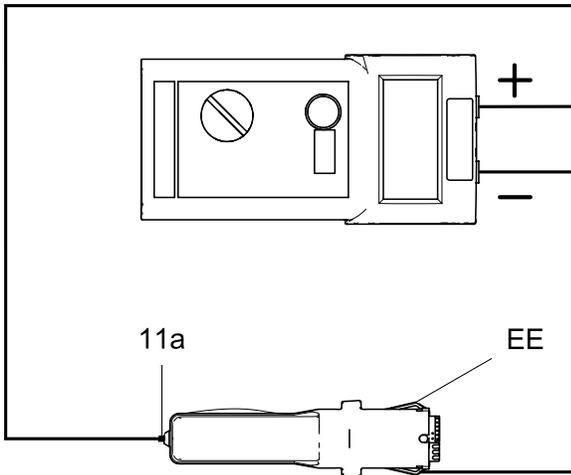


Figure 17 Test Gun Resistance

Test Power Supply Resistance

1. Remove the power supply (11). See [Power Supply Removal and Replacement, page 43](#).
2. Remove the alternator (15) from the power supply. See [Alternator Removal and Replacement, page 44](#).
3. Measure resistance from the power supply's ground strips (EE) to the spring (11a). The resistance should be:
 - 60–85 megohms for 40kV guns
 - 86–110 megohms for 60kV guns
 - 130–160 megohms for 85kV guns
4. If outside this range, replace the power supply. If in range, go to [Test Electrode Resistance, page 32](#).
5. If you still have problems, refer to [Electrical Troubleshooting, page 35](#) for other possible causes of poor performance, or contact your Graco distributor.
6. Be sure the spring (11a) is in place before reinstalling the power supply.



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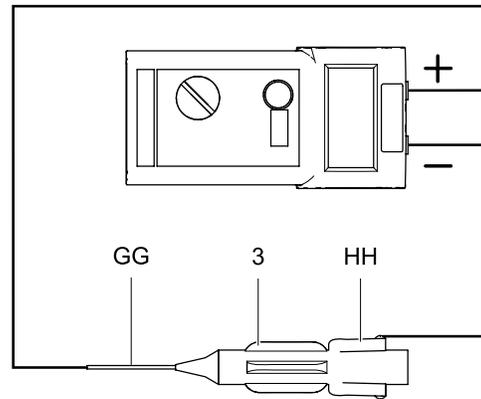
Figure 18 Test Power Supply Resistance

Test Electrode Resistance

Remove the electrode (3). See [Electrode Replacement, page 39](#). Measure the resistance between the contact (HH) and the electrode wire (GG). The resistance should be 8-30 megohms. If out of range, replace the electrode.

NOTE: If the gun resistance is still out of range after testing the power supply and electrode:

- Check that the conductive o-ring (4a) is making contact with the barrel pin.
- Check that the power supply spring (11a) is making contact with the barrel pin.



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Figure 19 Test Electrode Resistance

Troubleshooting

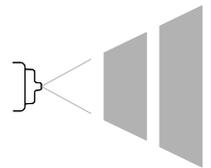
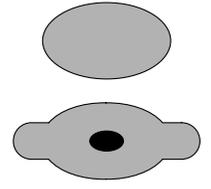
				
<p>Installing and servicing this equipment requires access to parts which may cause an electric shock or other serious injury if the work is not performed properly. Do not install or repair this equipment unless you are trained and qualified.</p>				

				
<p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 27, whenever you are instructed to relieve the pressure.</p>				

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, see Clean the Gun Daily, page 29 , or Air Cap and Nozzle Replacement, page 38 .
	Air in fluid supply.	Check fluid source. Refill.
Improper spray pattern. 	Damaged or dirty nozzle or air cap.	Clean or replace. See Air Cap and Nozzle Replacement, page 38 .
	Fluid buildup on air cap or nozzle.	Clean. See Clean the Gun Daily, page 29 .
	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 air cap. See Clean the Gun Daily, page 29 , or Air Cap and Nozzle Replacement, page 38 .

Gun Operation Troubleshooting

Problem	Cause	Solution
Excessive spray fog.	Atomizing air pressure too high.	Close restrictor valve part way, or decrease air pressure as low as possible; minimum 45 psi (0.32 MPa, 3.2 bar) needed at gun for full voltage.
	Fluid too thin, or fluid flow is too low.	Increase viscosity or increase fluid flow rate.
"Orange Peel" finish.	Atomizing air pressure too low.	Open atomizing air valve more or increase gun air inlet pressure; use lowest air pressure necessary.
	Poorly mixed or filtered fluid.	Remix or refill fluid.
	Fluid too thick.	Reduce viscosity.
Fluid leaks from the fluid packing area.	Worn packings or rod.	See Packing Rod Repair, page 40 .
Air leaks from the front of the gun.	Air valve is not seating properly.	See Air Valve Repair, page 50 .
Fluid leakage from the front of the gun.	Worn or damaged fluid packing rod or electrode.	Replace packing rod (2e) or electrode (3). See Packing Rod Repair, page 40 or Electrode Replacement, page 39 .
	Worn fluid nozzle seat.	Replace nozzle (4). See Air Cap and Nozzle Replacement, page 38 .
	Loose fluid nozzle.	Tighten.
	Damaged nozzle o-ring.	See Air Cap and Nozzle Replacement, page 38 .
Gun does not spray.	Low fluid supply.	Add fluid if necessary.
	Dirty or clogged fluid nozzle.	Clean. See Clean the Gun Daily, page 29 .
	Closed or damaged fluid adjustment valve.	Open valve, or see ES On-Off and Fluid Adjustment Valve Repair, page 49 .
Dirty air cap.	Misaligned air cap and fluid nozzle.	Clean fluid buildup off air cap and fluid nozzle seat. See Clean the Gun Daily, page 29 .

Electrical Troubleshooting

Problem	Cause	Solution
Poor wrap.	ES On/Off switch is OFF (O).	Turn ON (I).
	Gun air pressure too low (ES indicator is amber).	Check air pressure to gun; minimum 45 psi (0.32 MPa, 3.2 bar) needed at gun for full voltage.
	Atomizing air 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, page 31 .
	Low fluid resistivity.	See Check Fluid Resistivity, page 26 .
	Fluid leaks from the packing (2c) and causes a short.	See Packing Rod Repair, page 40 .
	Faulty alternator.	See Alternator Removal and Replacement, page 44 .
ES or Hz indicator is not lit.	ES On/Off switch is OFF (O).	Turn ON (I).
	No power.	Check power supply, alternator, and alternator ribbon cable. See Power Supply Removal and Replacement, page 43 and Alternator Removal and Replacement, page 44 .
Operator gets mild shock.	Operator not grounded or is near ungrounded object.	See Grounding, page 21 .
	Gun not grounded.	See Check Gun Electrical Grounding, page 25 , and Test Gun Resistance, page 31 .
Operator gets shock from workpiece.	Workpiece not grounded.	Resistance must be 1 megohm or less. Clean workpiece hangers.

Troubleshooting

Problem	Cause	Solution
Voltage/current display stays red (smart guns only).	Gun is too close to the part being sprayed.	Gun should be 8–12 in. (200–300 mm) from the part.
	Check fluid resistivity.	See Check Fluid Resistivity, page 26.
	Dirty gun.	See Clean the Gun Daily, page 29.
ES or HZ indicator is amber.	Alternator speed is too low.	Increase air pressure until indicator is green. To avoid over-atomization, use the atomizing air restrictor valve to reduce the atomizing air to the air cap.
ES or Hz indicator is red.	Alternator speed is too high.	Decrease air pressure until indicator is green.
Error display appears and Hz indicator is red (Smart guns only).	Smart module has lost communication with the power supply.	Check for good connections between the Smart Module and the power supply. See Smart Module Replacement, page 51 and Power Supply Removal and Replacement, page 43.

Repair

Prepare the Gun for Service

				
<p>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.</p>				

- Check all possible remedies in [Troubleshooting, page 33](#) before disassembling the gun.
 - Use a vise with padded jaws to prevent damage to plastic parts.
 - Lubricate some packing rod parts (2) and certain fluid fittings with dielectric grease (44), 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.
 - Air Seal Repair Kit 24N789 is available. The kit must be purchased separately. Kit parts are marked with an asterisk, for example (6a*).
 - Fluid Seal Repair Kit 24N790 is available. The kit must be purchased separately. Kit parts are marked with a symbol, for example (2a‡).

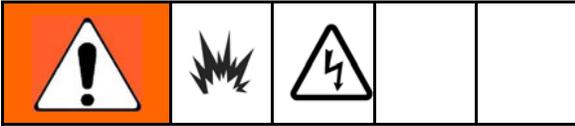
1. Flush the gun. See [Flushing, page 28](#).
2. Relieve the pressure. See [Pressure Relief Procedure, page 27](#).
3. Disconnect the gun air and fluid lines.
4. Remove the gun from the worksite. Repair area must be clean.

Air Cap and Nozzle Replacement

NOTICE

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. See [Prepare the Gun for Service, page 37](#).
2. Remove the retaining ring (6) and air cap (5).
3. Trigger the gun while removing the fluid nozzle (4) assembly with the multi-tool (41).



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.

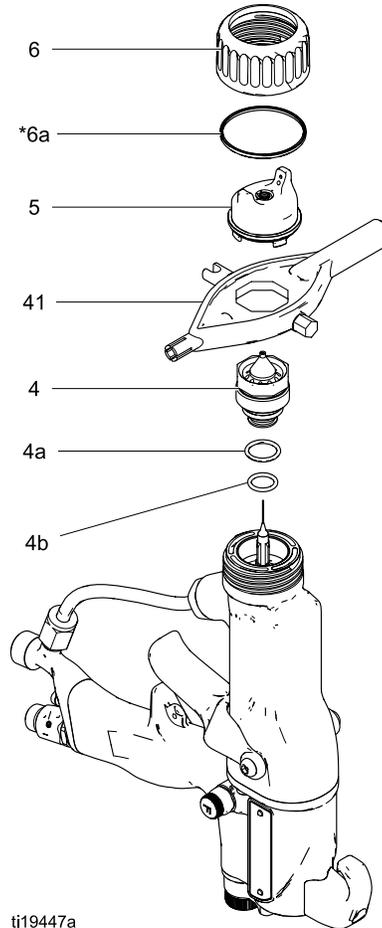
NOTICE

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

4. Make sure the conductive contact ring (4a) and the small o-ring (4b) are in place on the nozzle (4). Lightly lubricate the small o-ring (4b).
- NOTE:** The conductive contact ring (4a) may show some wear at the point where it makes contact with the barrel pin. This is normal and does not require replacement.
5. Make sure the electrode needle (3) is finger-tight.
 6. Trigger the gun while installing the fluid nozzle (4) with the multi-tool (41). Tighten until the fluid

nozzle seats in the gun barrel (1/8 to 1/4 turn past hand-tight).

7. Install the air cap (5) and retaining ring (6). Make sure the u-cup (6a*) is in place with the lips facing forward.
8. See [Test Gun Resistance, page 31](#).



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Figure 20 Air Cap and Nozzle Replacement

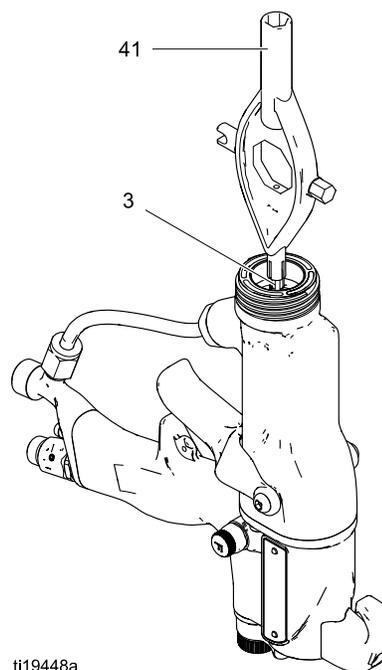
Electrode Replacement

1. See [Prepare the Gun for Service, page 37](#).
2. Remove the air cap and nozzle. See [Air Cap and Nozzle Replacement, page 38](#).
3. Unscrew the electrode (3) with the multi-tool (41).

NOTICE

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 and air cap. See [Air Cap and Nozzle Replacement, page 38](#).
6. See [Test Gun Resistance, page 31](#).



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Figure 21 Electrode Replacement

Fluid Packing Rod Removal

1. See [Prepare the Gun for Service, page 37](#).
2. Remove the air cap and fluid nozzle. See [Air Cap and Nozzle Replacement, page 38](#).
3. Remove the electrode. See [Electrode Replacement, page 39](#).
4. Loosen the trigger screws (13) and remove the trigger (12).
5. Remove the packing rod (2), using the multi-tool (41). Remove the spring (17).
6. Check all parts for wear or damage and replace if necessary.

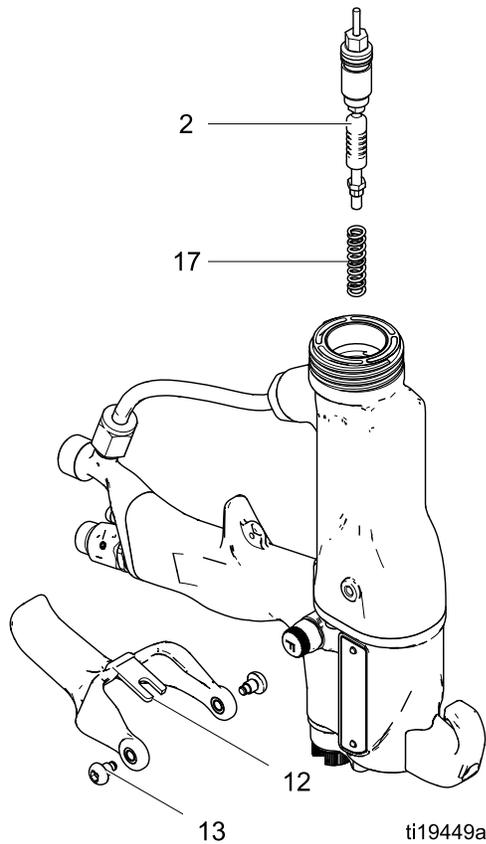


Figure 22 Fluid Packing Rod Removal

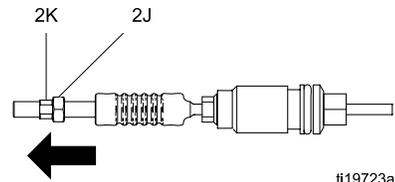
Packing Rod Repair

NOTE: You may replace the packing rod as individual parts or as an assembly.

Adjust the Air Flow Lead and Lag

NOTE: The gun begins emitting air before the fluid is discharged and the fluid stops before the air flow stops. The packing rod assembly is pre-adjusted at the factory for proper air lead and lag. Adjust only if necessary, as follows.

1. Remove the spring (17) from the nut (2k).
2. Use a hex wrench to hold the end of the packing rod. Turn both adjustment nuts (2j, 2k) out to increase the lead/lag time for the air flow. The recommended adjustment is one half turn and not more than one full turn.

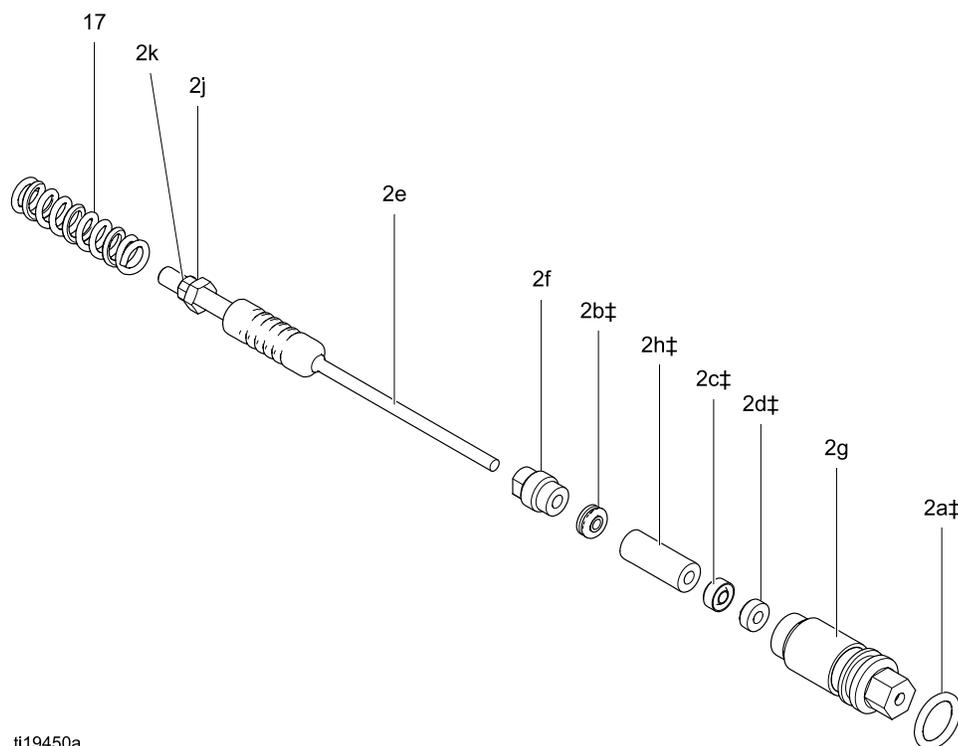


3. Tighten the nuts together to fix them in the new position.

Assemble the Packing Rod

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

1. Place the packing nut (2f) and seal (2b†) on the fluid rod (2e). Flats on the packing nut must face the back of the fluid rod. The seal o-ring must face away from the packing nut.
2. Fill the inner cavity of the spacer (2h†) with dielectric grease (44). Place the spacer on the fluid rod (2e) in the direction shown. Generously apply dielectric grease to the outside of the spacer.
3. Place the fluid packing (2c†) on the packing rod (2e) with its lips facing the front of the rod. Install the needle packing (2d†) with the male end toward the fluid packing, then install the housing (2g).
4. Lightly tighten the packing nut (2f). The packing nut is properly tightened when there is 3 lb (13.3 N) of drag force when sliding the packing housing (2g) assembly along the rod. Tighten or loosen the packing nut as needed.
5. Install the o-ring (2a†) on the outside of housing (2g). Lubricate the o-ring with non-silicone grease, Part No. 111265. Do not over-lubricate.
6. Install the spring (17) against the nut (2j) as shown.
7. Install the packing rod assembly (2) into the gun barrel. Using the multi-tool (41), tighten the assembly until just snug.
8. Install the electrode. See [Electrode Replacement, page 39](#).
9. Install the nozzle and air cap. See [Air Cap and Nozzle Replacement, page 38](#).
10. Install the trigger (12) and screws (13).
11. See [Test Gun Resistance, page 31](#).



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Figure 23 Packing Rod

Barrel Removal

1. See [Prepare the Gun for Service, page 37](#).
2. Carefully loosen the nut (N) from the bracket fluid fitting (20). Pull the tube (T) out of the fitting. Make sure both ferrules (7, 8) and the nut stay with the tube.
3. Loosen the two screws (27).

NOTICE

To avoid damaging the power supply (11), pull the gun barrel (1) straight away from the gun handle (16). If necessary, gently move the gun barrel from side to side to free it from the gun handle.

4. Hold the gun handle (16) with one hand and pull the barrel (1) straight off the handle.

NOTE: If the power supply remains in the barrel, remove the alternator/power supply assembly from the barrel.

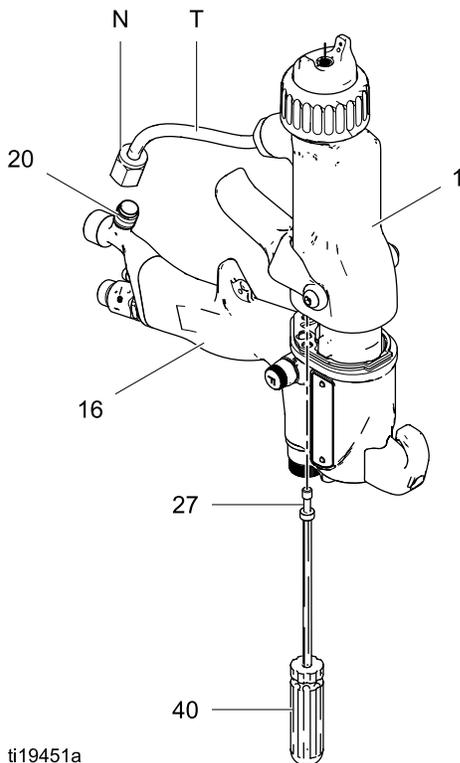


Figure 24 Barrel Removal

Barrel Installation

1. Be sure the gasket (28*) and grounding spring (18) are in place. Make sure the gasket air holes are aligned properly. Replace the gasket if damaged.
2. Make sure the spring (11a) is in place on the tip of the power supply (11). **Liberal**ly apply dielectric grease (44) to the tip of the power supply. Place the barrel (1) over the power supply and onto the gun handle (16).
3. Tighten the two screws (27) oppositely and evenly (about a half turn past snug). Do not over-tighten the screws (27).
4. Assemble the fluid tube (T) into the bracket fitting (20). Ensure that the ferrules (7, 8) are in place. Tighten the nut (N) securely onto the fitting. Make sure the top fitting remains tight.
5. See [Test Gun Resistance, page 31](#).

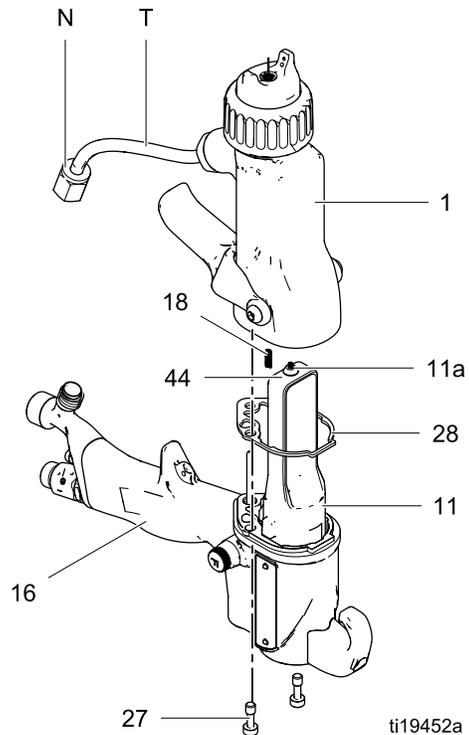


Figure 25 Barrel Installation

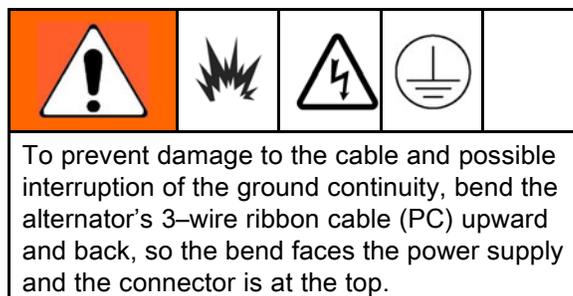
Power Supply Removal and Replacement

- Inspect the gun handle power supply cavity for dirt or moisture. Clean with a clean, dry rag.
 - Do not expose gasket (28) to solvents.
1. See [Prepare the Gun for Service, page 37](#).
 2. See [Barrel Removal, page 42](#).

NOTICE

Be careful when handling the power supply (11) to avoid damaging it.

3. Grasp the power supply (11) with your hand. With a gentle side to side motion, free the power supply/alternator assembly from the gun handle (16), then carefully pull it straight out. *On Smart Models only*, disconnect the flexible circuit (24) from the socket at the top of the handle.
4. Inspect the power supply and alternator for damage.
5. To separate the power supply (11) from the alternator (15), disconnect the 3-wire ribbon connector (PC) from the power supply. *On Smart Models only*, disconnect the 6-pin flexible circuit (24) from the power supply. Slide the alternator up and off the power supply.
6. See [Test Power Supply Resistance, page 32](#). Replace the power supply if necessary. To repair the alternator, see [Alternator Removal and Replacement, page 44](#).



7. *Smart models only*: connect the 6-pin flexible circuit (24) to the power supply.
8. Connect the 3-wire ribbon connector (PC) to the power supply. Tuck the ribbon forward, under the power supply. Slide the alternator (15) down onto the power supply (11).

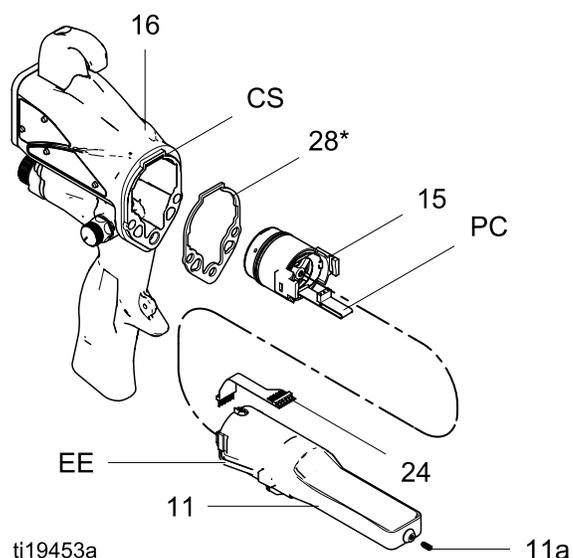


Figure 26 Power Supply

Repair

9. Insert the power supply/alternator assembly in the gun handle (16). Make sure the ground strips (EE) make contact with the handle. On Smart models, align the connector of the 6-pin flexible circuit (24) with the socket (CS) at the top of the handle. Push the connector securely into the socket as you slide the power supply/alternator assembly into the handle.

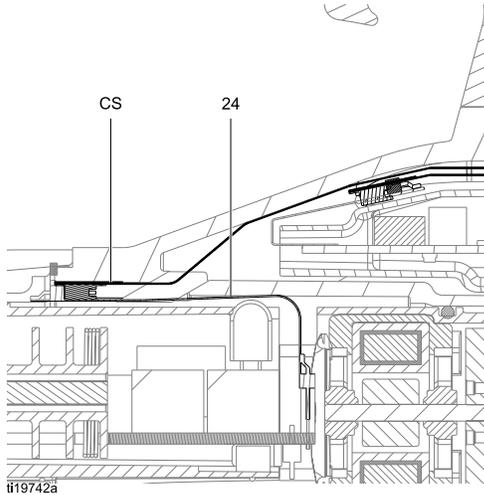


Figure 27 Connect Flexible Circuit

10. Make sure the gasket (28*), ground spring (18), and power supply spring (11a) are in place. Assemble the barrel (1) to the handle (16). See [Barrel Installation, page 42](#).
11. See [Test Gun Resistance, page 31](#).

Alternator Removal and Replacement

NOTE: Replace alternator bearings after 2000 hours of operation. Order Part No. 24N706 Bearing Kit. Parts included in the kit are marked with a symbol (◆).

1. See [Prepare the Gun for Service, page 37](#).
2. Remove the power supply/alternator assembly and disconnect the alternator. See [Power Supply Removal and Replacement, page 43](#).
3. Measure resistance between the two outer terminals of the 3-wire connector (PC); it should be 2.0–6.0 ohms. If outside this range, replace the alternator coil (15a).
4. To replace the bearings, remove the clip (15h) and the cap (15f).
5. If necessary, rotate the fan (15e) so its blades clear the four bearing tabs (T) of the housing (15d).

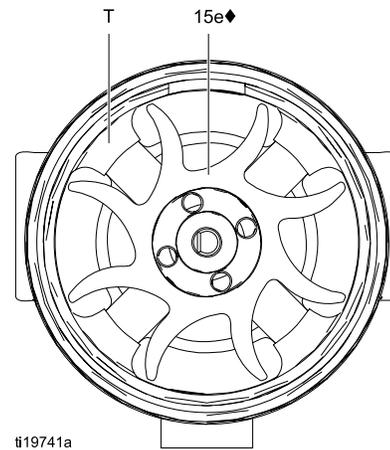
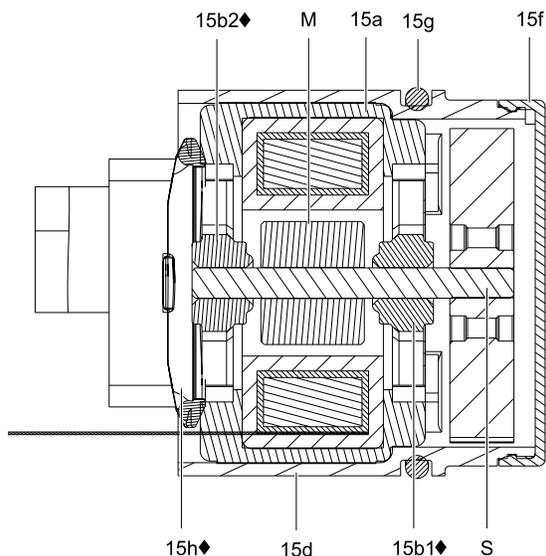


Figure 28 Fan Orientation

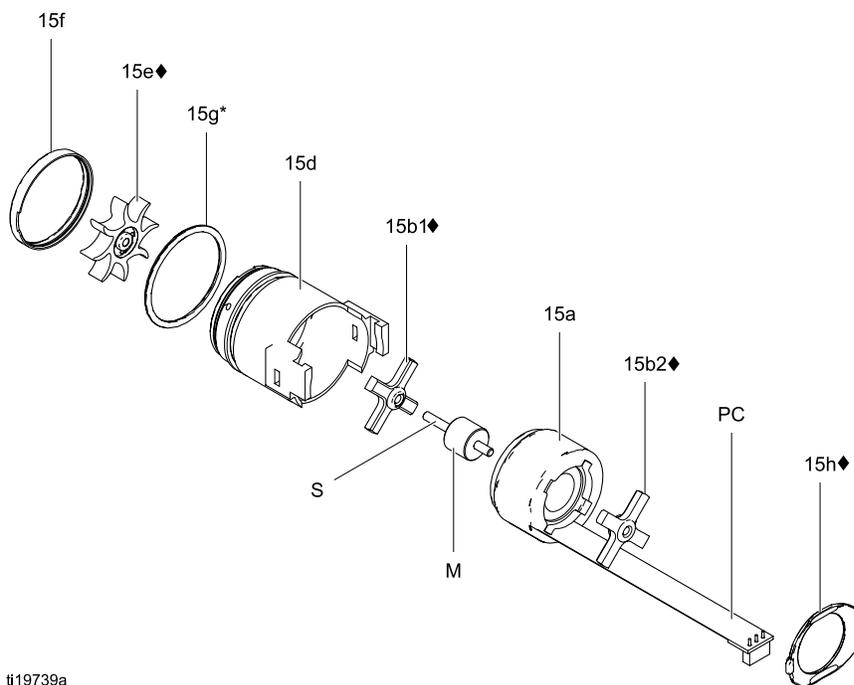
6. Push the fan and coil assembly (15a) out the front of the housing (15d).



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Figure 29 Alternator Cross-Section

7. Remove the top bearing (15b2).
8. Press the fan (15e) off the shaft (S).
9. Remove the bottom bearing (15b1).
10. Install the bottom bearing (15b1) on the long portion of the shaft (S). The flatter side of the bearing must face away from the magnet (M).
11. Press the fan (15e) onto the shaft (S). The fan blades must be oriented as shown in Fig. 28.
12. Press the top bearing (15b2) into the coil (15a). The flatter side of the bearing must face away from the coil.
13. Press the shaft/bearing/fan assembly into the coil (15a). Rotate the fan (15e) so its blades clear the four bearing tabs (T). Ensure that the bottom bearing (15b1) aligns with the tabs.
14. Press the coil into the housing (15d) and secure with the clip (15h).
15. Install the o-ring (15g*) and cap (15f).
16. Install the alternator on the power supply, and install both parts in the handle. See [Power Supply Removal and Replacement, page 43](#).



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Figure 30 Alternator

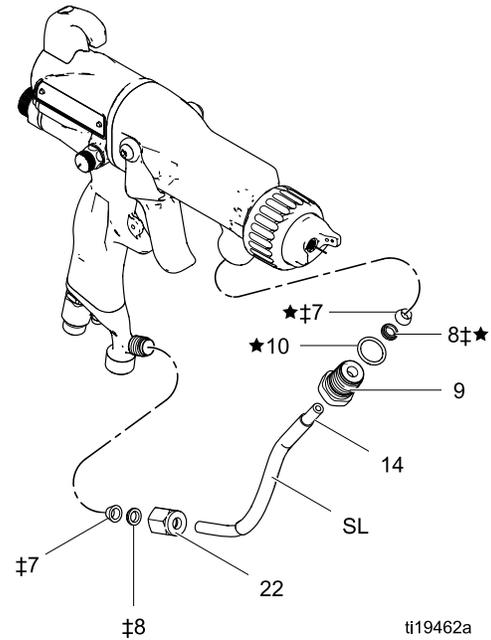
Fluid Tube Removal and Replacement

1. Remove the nut (22) from the bracket (20).
2. Loosen the fitting (9) to remove the fluid tube (14) from the barrel (1).
3. Apply dielectric grease (44) to the threads of the fitting (9) and the o-ring (10). Ensure the ferrules (7, 8) are in place.

NOTE: On 40 kV guns, the o-ring (10★) is not used, and ferrules (7★) and (8★) are part of the top fitting (9).

NOTE: On 60 and 85 kV guns, check that the sleeve (SL) is in place near the top of the fluid tube.

4. Slide the fitting (9) onto the fluid tube (14) and thread the fitting into the barrel (1). Torque to 25–35 in-lb (2.8–3.9 N•m).
5. With the ferrules (7, 8) seated to the bracket (20), screw the nut (22) securely onto the bracket. Make sure the top fitting remains tight.



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Figure 31 Fluid Tube

Fan Air Adjustment Valve Repair

1. See [Prepare the Gun for Service](#), page 37.
2. Place a wrench on the flats of the valve housing (30a) and unscrew the valve from the handle (16).

NOTE: You may replace the valve as an assembly (go to step 9) or replace only the o-ring (steps 3-9).

3. Remove the retaining ring (30d).
4. Turn the valve shaft (30b) counterclockwise until it comes free from the valve housing (30a).
5. Inspect the o-ring (30c). Remove if damaged.
6. Clean all parts and inspect for wear or damage.

NOTE: Use non-silicone grease, Part No. 111265. Do not over-lubricate.

7. When reassembling the fan air valve (30), lightly lubricate the valve threads and screw the shaft (30b) fully into the housing (30a) until bottomed. Install the o-ring (30c*), lubricate, and unscrew the valve stem until the o-ring enters the housing.

8. Reassemble the retaining ring (30d). Unscrew the valve stem from the housing until it is stopped by the retaining ring.
9. Screw the valve assembly (30) into the gun handle (16), using a wrench on the flats of the housing. Torque to 15 in-lb (1.7 N•m).

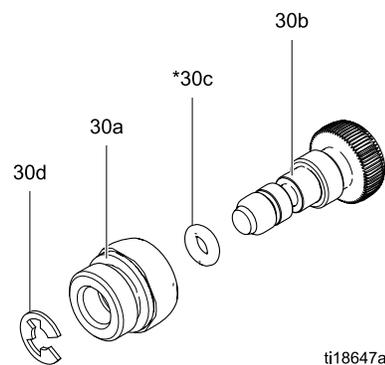


Figure 32 Fan Air Adjustment Valve

Atomizing Air Restrictor Valve Repair

1. See [Prepare the Gun for Service, page 37](#).
2. Place a wrench on the flats of the valve housing (29a) and unscrew the valve from the handle (16).

NOTE: You may replace the valve as an assembly (go to step 9) or replace only the o-rings (steps 3-9).

3. Remove the retaining ring (29d).
4. Turn the valve shaft (29b) counterclockwise until it comes free from the valve housing (29a).
5. Inspect the o-rings (29c). Remove if damaged.
6. Clean all parts and inspect for wear or damage.

NOTE: Use non-silicone grease, Part No. 111265. Do not over-lubricate.

7. When reassembling the atomizing air restrictor valve (29), lightly lubricate the valve threads and screw the shaft (29b) fully into the housing (29a) until bottomed. Install the o-rings (29c*), lubricate, and unscrew the valve stem until the o-rings enter the housing.
8. Reassemble the retaining ring (29d).

9. Screw the valve assembly (29) into the gun handle (16), using a wrench on the flats of the housing. Torque to 15 in-lb (1.7 N•m).

NOTE: If the atomizing air restrictor valve is not desired, install the supplied plug (42).

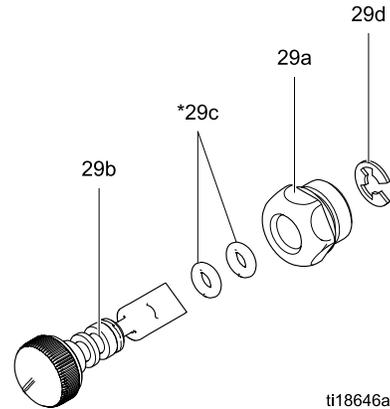


Figure 33 Atomizing Air Restrictor Valve

ES On-Off and Fluid Adjustment Valve Repair

1. See [Prepare the Gun for Service](#), page 37.
2. Loosen the captive screw (26p). Remove the valve (26) from the handle.
3. Lubricate the o-rings (26b* and 26m*) with non-silicone grease, Part No. 111265. Do not over-lubricate.

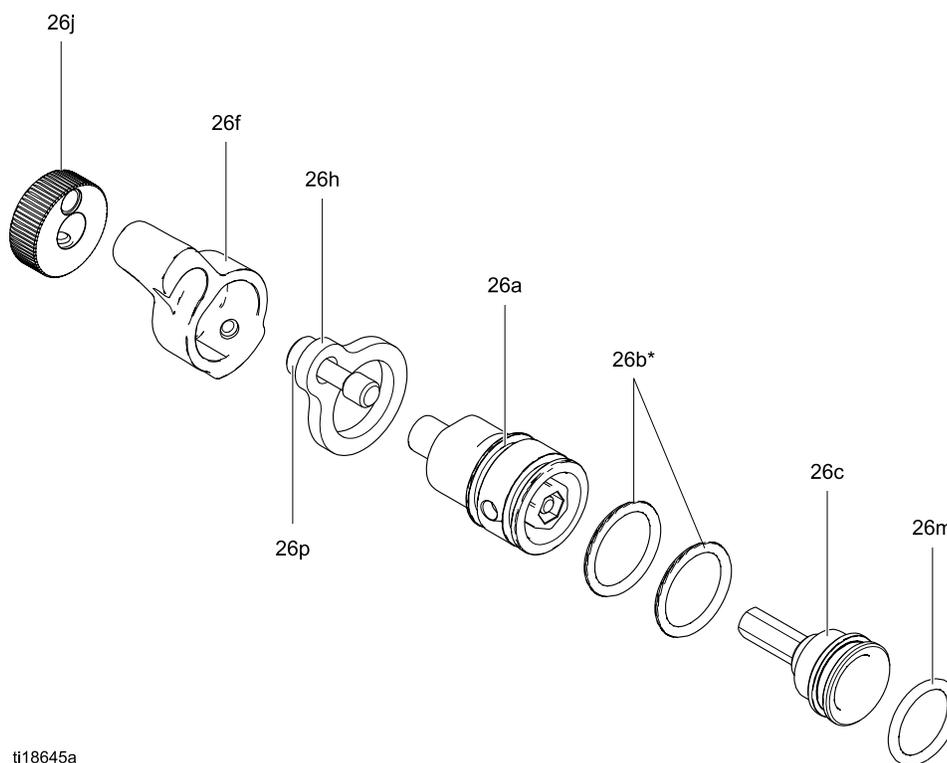
NOTE: Do not over-lubricate parts. Excessive lubricant on the o-rings can be pushed into the

gun air passage and blemish the finish on the workpiece.

4. Clean and inspect parts for damage. Replace if necessary.

NOTE: The protrusion on the retainer plate (26h) must point upward.

5. Reinstall the valve. Torque the screw (27) to 15-25 in-lb (1.7-2.8 N•m).

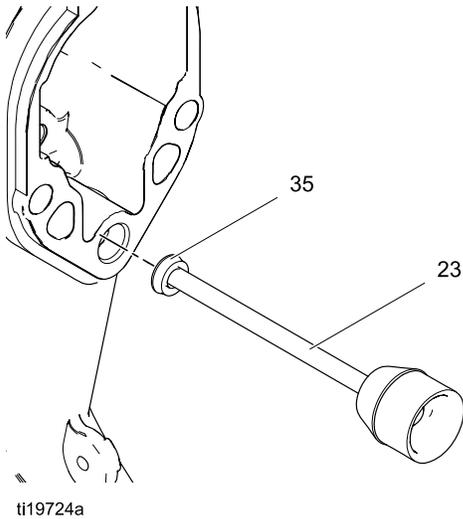


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Figure 34 ES On-Off and Fluid Adjustment Valve

Air Valve Repair

1. See [Prepare the Gun for Service, page 37](#).
2. See [Barrel Removal, page 42](#).
3. Remove the screws (13) and trigger (12).
4. Remove the ES On-Off Valve. See [ES On-Off and Fluid Adjustment Valve Repair, page 49](#).
5. Remove the spring (34).
6. Push on the front of the air valve shaft to force it out the back of the handle. Inspect the rubber seal (23a*) and replace if damaged.
7. Inspect the u-cup (35). Do not remove the u-cup unless damaged. If removed, install the new one with its lips facing into the gun handle (16). Place the u-cup on the shaft of the air valve to help seat it in the gun handle.



8. Install the air valve (23) and spring (34) into the gun handle (16).
9. Install the ES On-Off Valve. See [ES On-Off and Fluid Adjustment Valve Repair, page 49](#).
10. Install the trigger (12) and screws (13).
11. See [Barrel Installation, page 42](#).

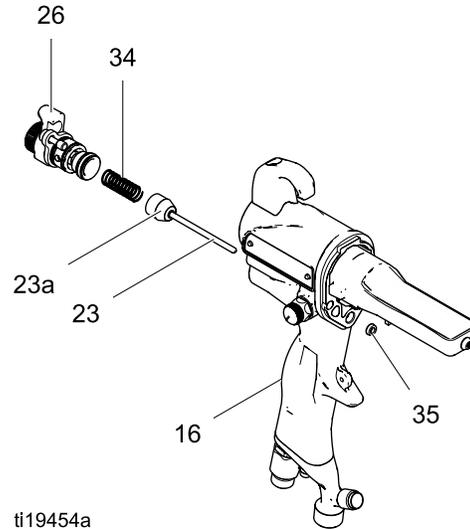


Figure 35 Air Valve

Smart Module Replacement

If the Error display appears, the Smart Module has lost communication with the power supply. Check for good connections between the Smart Module and the power supply.

If the module's LEDs are not lighting, replace the module.

1. See [Prepare the Gun for Service, page 37](#).
2. Remove the pivot screw (31e), o-ring (31f), and ES HI/LO switch (31c) at the bottom left corner of the Smart Module cartridge (31a).
3. Remove the remaining three screws (31d) from the cartridge.
4. Pull the Smart Module out the back of the gun. Disconnect the ribbon cable (RC) from the connector (GC) in the gun handle.
5. Remove the gasket (31b).
6. Install a new gasket (31b) on the new cartridge (31a). Make sure the notched corners of the gasket are at the top.
7. Align the module's ribbon cable (RC) with the connector (GC) in the gun handle and slide it

back toward the module to connect. Tuck the connected cables into the recess of the gun handle. Install the module flush to the back of the gun handle.

8. Install the pivot screw (31e), o-ring (31f), and ES HI/LO switch (31c) in the bottom left corner of the cartridge (31a).
9. Install the three remaining screws (31d). Torque to 7–9 in-lb (0.8–1.0 N•m).

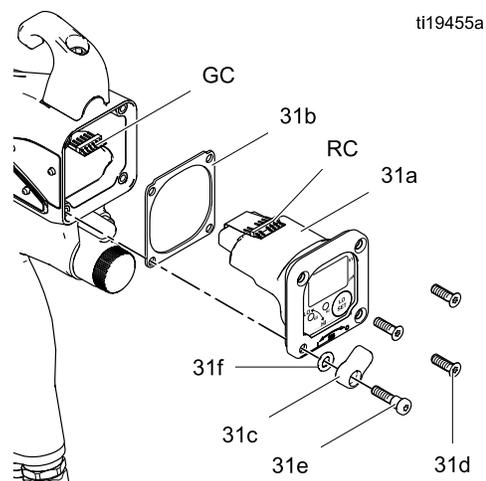
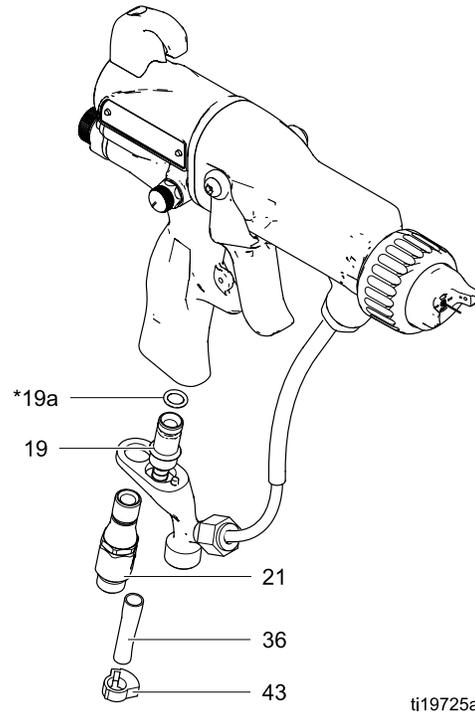


Figure 36 Smart Module

Air Swivel and Exhaust Valve Replacement

1. See [Prepare the Gun for Service, page 37](#).
2. To replace the air exhaust valve:
 - a. Remove the clamp (43) and the exhaust tube (36).
 - b. Unscrew the swivel (21) from the gun handle (16). The swivel is a left-hand thread. Remove the bracket (20).
 - c. Pull the exhaust valve (19) from the handle (16). Inspect the o-ring (19a) and replace if necessary.
 - d. Install the o-ring (19a*) on the exhaust valve (19). Lubricate the o-ring with a light coating of non-silicone grease.
 - e. Install the exhaust valve (19) in the handle (16).
 - f. Apply thread sealant to the top threads of the swivel (21). Position the bracket (20) and screw the swivel into the gun handle (16). Torque to 75–85 in-lb (8.4–9.6 N•m).
 - g. Install the tube (36) and clamp (43).
3. To replace the air inlet swivel:
 - a. Unscrew the swivel (21) from the gun handle (16). The swivel is a left-hand thread.

- b. Apply thread sealant to the top threads of the swivel. Screw the swivel into the gun handle. Torque to 75–85 in-lb (8.4–9.6 N•m).



ti19725a

Figure 37 Air Inlet Fitting and Air Exhaust Valve

Parts

Standard Air Spray Gun Assembly

Part No. L40T10 40 kV Electrostatic Air Spray Gun, Series A

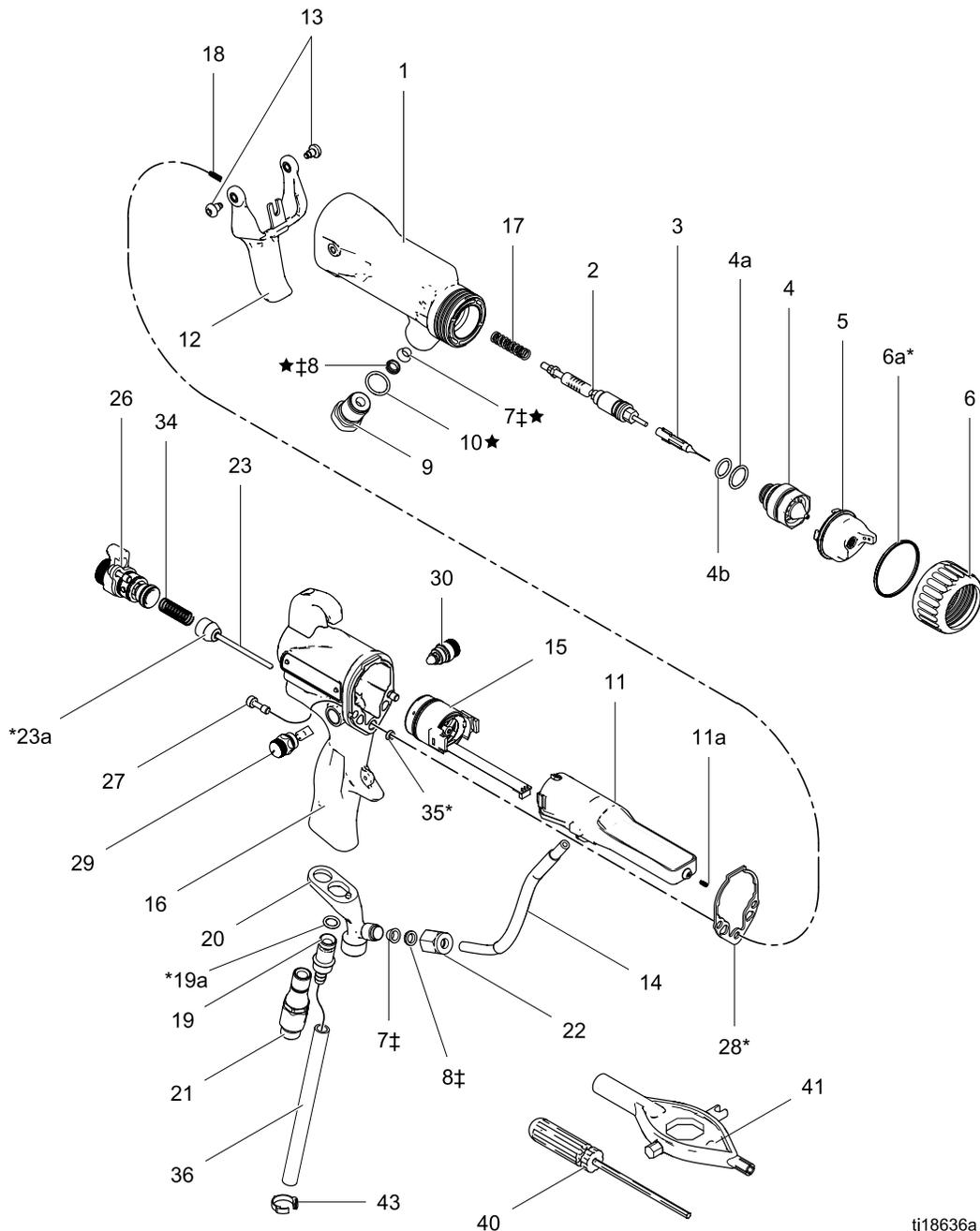
Part No. L40T14 40 kV High Efficiency Electrostatic Air Spray Gun, Series A

Part No. L60T10 60 kV Electrostatic Air Spray Gun, Series A

Part No. L60T11 60 kV Electrostatic Round Spray Gun, Series A

Part No. L60T12 60 kV Electrostatic Air Spray Gun, Series A, with 1.2 mm Nozzle

Part No. L85T10 85 kV Electrostatic Air Spray Gun, Series A



ti18636a

Parts

Part No. L40T10 40 kV Electrostatic Air Spray Gun, Series A

Part No. L40T14 40 kV High Efficiency Electrostatic Air Spray Gun, Series A

Part No. L60T10 60 kV Electrostatic Air Spray Gun, Series A

Part No. L60T11 60 kV Electrostatic Round Spray Gun, Series A; see [Round Spray Assembly, page 55](#)

Part No. L60T12 60 kV Electrostatic Air Spray Gun, Series A, with 1.2 mm Nozzle

Part No. L85T10 85 kV Electrostatic Air Spray Gun, Series A

Ref. No.	Part No.	Description	Qty
1	24N665	BODY, gun; 40 kV gun	1
	24N666	BODY, gun; 60 kV gun	1
	24N667	BODY, gun; 85 kV gun	1
	24N668	BODY, gun; 40 kV high efficiency gun	1
2	See Packing Rod Assembly, page 62		1
3	24N651	NEEDLE, electrode	1
4	24N616	NOZZLE, 1.5 mm; includes 4a and 4b	1
	24N615	NOZZLE, 1.2 mm; includes 4a and 4b	1
	24N729	NOZZLE, round spray; includes 4a and 4b; see Round Spray Assembly, page 55	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	24N477	AIR CAP	1
	24N731	AIR CAP, round spray; see Round Spray Assembly, page 55	1
6	24N644	RING, retainer; includes 6a	1
6a*	198307	PACKING, u-cup; UHMWPE	1
7†★	111286	FERRULE, front; 40 kV gun	1
	111286	FERRULE, front; 60 and 85 kV guns	2
8†★	111285	FERRULE, back; 40 kV gun	1
	111285	FERRULE, back; 60 and 85 kV guns	2
9	24N656	FITTING, fluid; 40 kV gun	1
	24N657	FITTING, fluid; 60 kV gun	1
	24N658	FITTING, fluid; 85 kV gun	1
10★	102982	PACKING, o-ring; 60 and 85 kV guns only	1
11	24N659	POWER SUPPLY, 40 kV gun	1
	24N660	POWER SUPPLY, 60 kV gun	1
	24N661	POWER SUPPLY, 85 kV gun	1
11a	24N979	SPRING	1
12	24N663	TRIGGER; includes item 13	1

Ref. No.	Part No.	Description	Qty
13	24A445	SCREW, trigger; package of 2	1
14	24N695	TUBE, fluid; 40 kV gun	1
	24N696	TUBE, fluid, with sleeve; 60 kV gun	1
	24N697	TUBE, fluid, with sleeve; 85 kV gun	1
15	24N664	See Alternator Assembly, page 63	1
16	24N751	HANDLE; 40 kV gun	1
	24N752	HANDLE; 60 kV gun	1
	24N753	HANDLE; 85 kV gun	1
17	185111	SPRING, compression	1
18	197624	SPRING, compression	1
19	249323	VALVE, exhaust	1
19a*	112085	O-RING	1
20	24N741	BRACKET	1
21	24N626	SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread	1
22	112644	NUT	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1
26	24N630	See ES On-Off and Fluid Adjustment Valve, page 64	1
27	24N740	SCREW, hex socket; sst; package of 2	1
28*	24N699	GASKET, barrel	1
29	24N635	See Atomizing Air Restrictor Valve Assembly, page 65	1
	24N733	For round spray gun only; see Atomizing Air Restrictor Valve Assembly, page 65	1
30	24N634	See Fan Air Adjustment Valve Assembly, page 65	1
	24N732	For round spray gun only; see Fan Air Adjustment Valve Assembly, page 65	1
34	185116	SPRING, compression	1
35*	188749	PACKING, u-cup	1

Ref. No.	Part No.	Description	Qty
36	185103	TUBE, exhaust; 1/4 in. (6 mm) ID (shipped loose)	1
40	107460	TOOL, wrench, ball end; 4 mm (shipped loose)	1
41	276741	MULTI-TOOL (shipped loose)	1
42	24N786	PLUG, restrictor (shipped loose; for use instead of item 29)	1
43	110231	CLAMP, exhaust tube (shipped loose)	1
44	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
45	117824	GLOVE, conductive, medium; package of 12; also available in small (117823) and large (117825)	1

Ref. No.	Part No.	Description	Qty
46	24N603	COVER, gun, 40 and 60 kV guns; package of 10	1
	24N604	COVER, gun, 85 kV guns; package of 10	1
47▲	179791	TAG, warning (not shown)	1
48▲	16P802	SIGN, warning (not shown)	1
49	24N730	DIFFUSER, for round spray gun only; see Round Spray Assembly, page 55	1

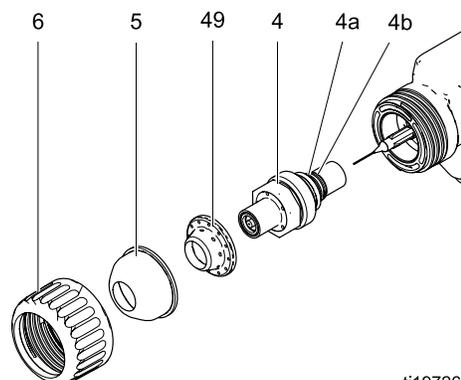
▲ Replacement Danger and Warning labels, tags, and cards are available at no cost.

* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

‡ These parts are included in Fluid Seal Repair Kit 24N790 (purchase separately).

NOTE: On 40 kV guns, the o-ring (10★) is not used, and ferrules (7★) and (8★) are part of the top fitting (9).

Round Spray Assembly



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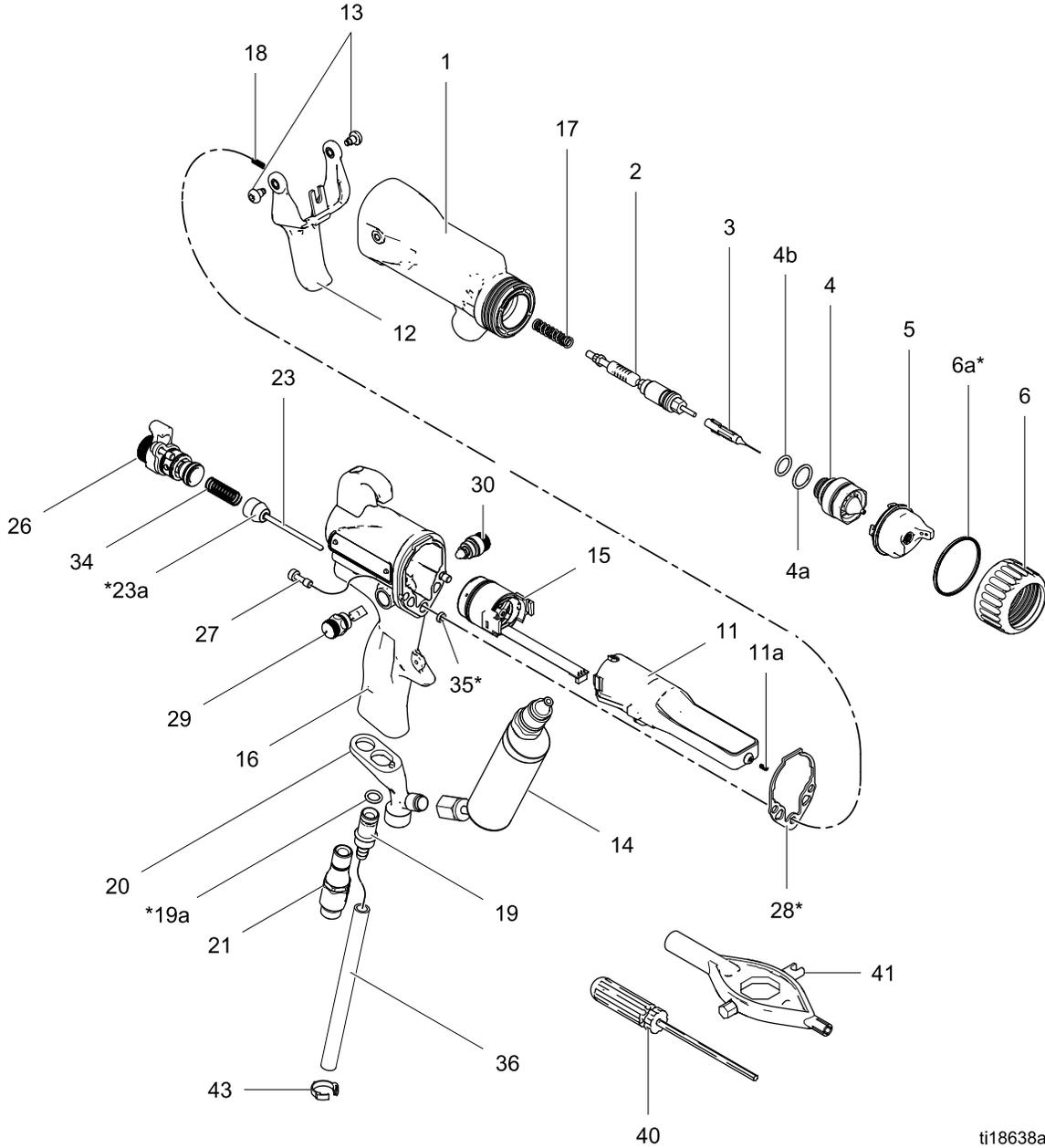
Standard High Conductivity Air Spray Gun Assembly

Part No. L40T16 40 kV Electrostatic High Conductivity Air Spray Gun, Series A

Part No. L40T15 40 kV High Efficiency Electrostatic Air Spray Gun, Series A

Part No. L60T16 60 kV Electrostatic High Conductivity Air Spray Gun, Series A

Part No. L85T16 85 kV Electrostatic High Conductivity Air Spray Gun, Series A



ti18638a

Part No. L40T16 40 kV Electrostatic High Conductivity Air Spray Gun, Series A

Part No. L40T15 40 kV High Efficiency Electrostatic Air Spray Gun, Series A

Part No. L60T16 60 kV Electrostatic High Conductivity Air Spray Gun, Series A

Part No. L85T16 85 kV Electrostatic High Conductivity Air Spray Gun, Series A

Ref. No.	Part No.	Description	Qty
1	24N665	BODY, gun; 40 kV gun	1
	24N666	BODY, gun; 60 kV gun	1
	24N667	BODY, gun; 85 kV gun	1
	24N668	BODY, gun; 40 kV high efficiency gun	1
2	See Packing Rod Assembly, page 62		1
3	24N704	NEEDLE, electrode	1
4	24N623	NOZZLE; includes 4a and 4b	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	24N477	AIR CAP	1
6	24N644	RING, retainer; includes 6a	1
6a*	198307	PACKING, u-cup; UHMWPE	1
11	24N659	POWER SUPPLY, 40 kV gun	1
	24N660	POWER SUPPLY, 60 kV gun	1
	24N661	POWER SUPPLY, 85 kV gun	1
11a	24N979	SPRING	1
12	24N663	TRIGGER; includes item 13	1
13	24A445	SCREW, trigger; package of 2	1
14	See High Conductivity Fluid Tube Assembly, page 67		1
15	24N664	See Alternator Assembly, page 63	1
16	24N751	HANDLE; 40 kV gun	1
	24N752	HANDLE; 60 kV gun	1
	24N753	HANDLE; 85 kV gun	1
17	185111	SPRING, compression	1
18	197624	SPRING, compression	1
19	249323	VALVE, exhaust	1
19a*	112085	O-RING	1
20	24N741	BRACKET	1

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

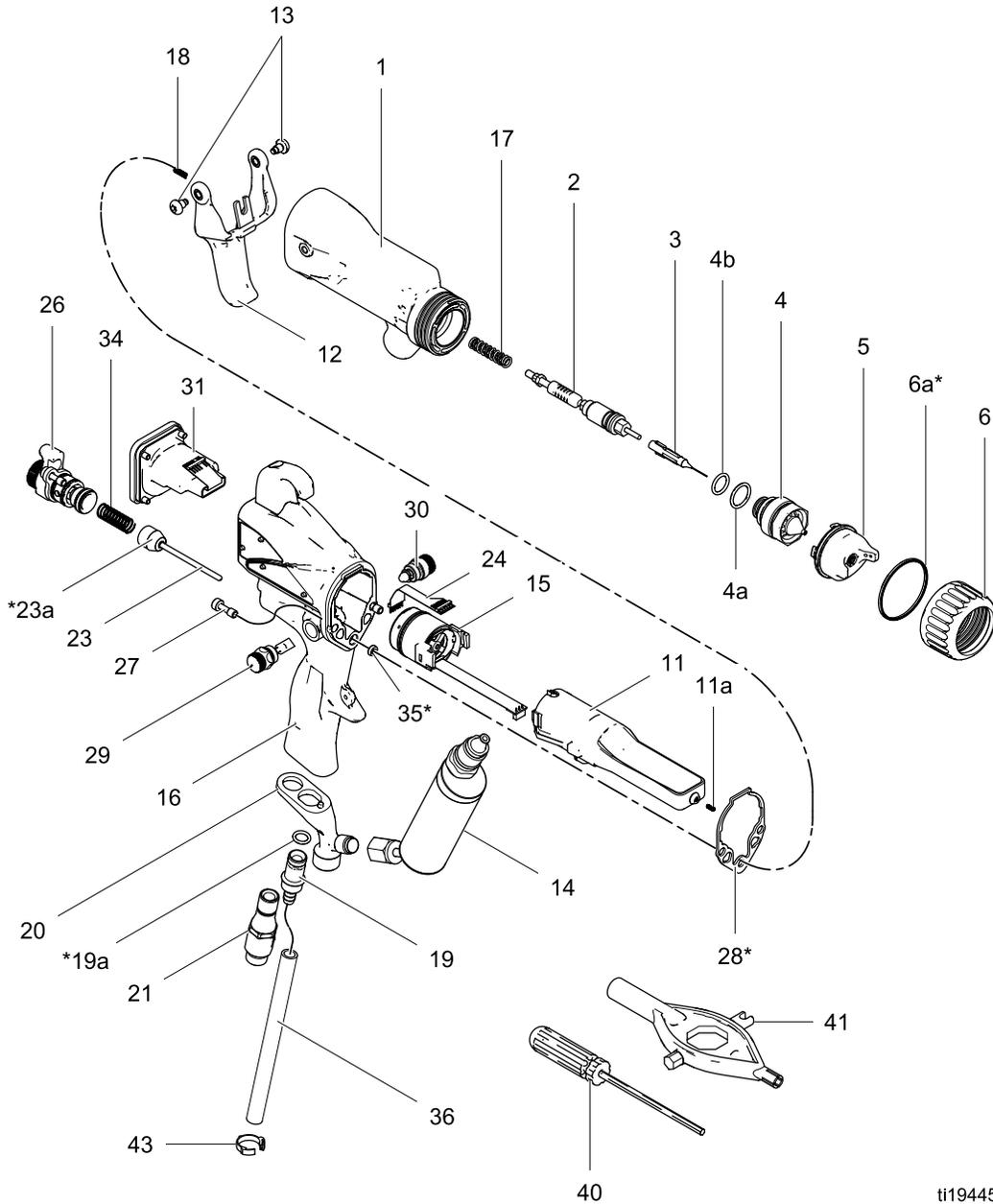
Ref. No.	Part No.	Description	Qty
21	24N626	SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1
26	24N630	See ES On-Off and Fluid Adjustment Valve, page 64	1
27	24N740	SCREW, hex socket; sst; package of 2	1
28*	24N699	GASKET, barrel	1
29	24N635	See Atomizing Air Restrictor Valve Assembly, page 65	1
30	24N634	See Fan Air Adjustment Valve Assembly, page 65	1
34	185116	SPRING, compression	1
35*	188749	PACKING, u-cup	1
36	185103	TUBE, exhaust; 1/4 in. (6 mm) ID (shipped loose)	1
40	107460	TOOL, wrench, ball end; 4 mm (shipped loose)	1
41	276741	MULTI-TOOL (shipped loose)	1
42	24N786	PLUG, restrictor (shipped loose; for use instead of item 29)	1
43	110231	CLAMP, exhaust tube (shipped loose)	1
44	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
45	117824	GLOVE, conductive, medium; package of 12; also available in small (117823) and large (117825)	1
46	24N603	COVER, gun, 40 and 60 kV guns; package of 10	1
	24N604	COVER, gun, 85 kV guns; package of 10	1
47▲	179791	TAG, warning (not shown)	1
48▲	16P802	SIGN, warning (not shown)	1

* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

Smart High Conductivity Air Spray Gun Assembly

Part No. L60M16 60 kV Electrostatic High Conductivity Air Spray Gun, Series A

Part No. L85M16 85 kV Electrostatic High Conductivity Air Spray Gun, Series A



ti19445a

Part No. L60M16 60 kV Electrostatic High Conductivity Air Spray Gun, Series A
 Part No. L85M16 85 kV Electrostatic High Conductivity Air Spray Gun, Series A

Ref. No.	Part No.	Description	Qty
1	24N666	BODY, gun; 60 kV gun	1
	24N667	BODY, gun; 85 kV gun	1
2	See Packing Rod Assembly, page 62		1
3	24N704	NEEDLE, electrode	1
4	24N623	NOZZLE; includes 4a and 4b	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	24N477	AIR CAP	1
6	24N644	RING, retainer; includes 6a	1
6a*	198307	PACKING, u-cup; UHMWPE	1
11	24N660	POWER SUPPLY, 60 kV gun	1
	24N661	POWER SUPPLY, 85 kV gun	1
11a	24N979	SPRING	1
12	24N663	TRIGGER; includes item 13	1
13	24A445	SCREW, trigger; package of 2	1
14	See High Conductivity Fluid Tube Assembly, page 67		1
15	24N664	See Alternator Assembly, page 63	1
16	24N754	HANDLE, smart; 60 kV gun	1
	24N755	HANDLE, smart; 85 kV gun	1
17	185111	SPRING, compression	1
18	197624	SPRING, compression	1
19	249323	VALVE, exhaust	1
19a*	112085	O-RING	1
20	24N741	BRACKET	1
21	24A626	SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1

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

Ref. No.	Part No.	Description	Qty
24	245265	CIRCUIT, flexible	1
26	24N630	See ES On-Off and Fluid Adjustment Valve, page 64	1
27	24N740	SCREW, hex socket; sst; package of 2	1
28*	24N699	GASKET, barrel	1
29	24N635	See Atomizing Air Restrictor Valve Assembly, page 65	1
30	24N634	See Fan Air Adjustment Valve Assembly, page 65	1
31	24N756	See Smart Module Assembly, page 66	1
34	185116	SPRING, compression	1
35*	188749	PACKING, u-cup	1
36	185103	TUBE, exhaust; 1/4 in. (6 mm) ID (shipped loose)	1
40	107460	TOOL, wrench, ball end; 4 mm (shipped loose)	1
41	276741	MULTI-TOOL (shipped loose)	1
42	24N786	PLUG, restrictor (shipped loose; for use instead of item 29)	1
43	110231	CLAMP, exhaust tube	1
44	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
45	117824	GLOVE, conductive, medium; package of 12; also available in small (117823) and large (117825)	1
46	24N603	COVER, gun, 60 kV guns; package of 10	1
	24N604	COVER, gun, 85 kV guns; package of 10	1
47▲	179791	TAG, warning (not shown)	1
48▲	16P802	SIGN, warning (not shown)	1

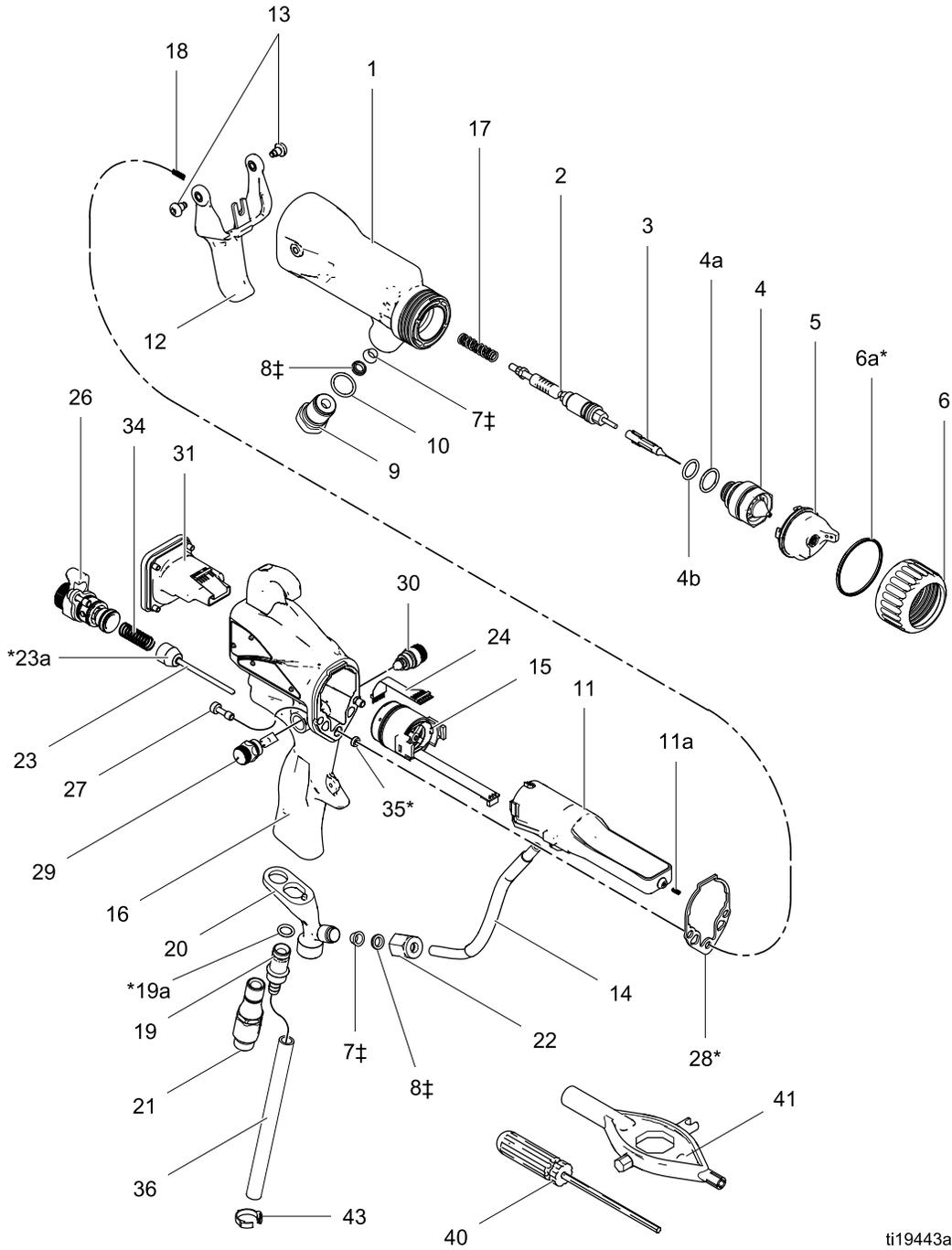
* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

Smart Air Spray Gun Assembly

Part No. L60M10 60 kV Electrostatic Air Spray Gun, Series A

Part No. L60M12 60 kV Electrostatic Air Spray Gun, Series A, with 1.2 mm Nozzle

Part No. L85M10 85 kV Electrostatic Air Spray Gun, Series A



ti19443a

Part No. L60M10 60 kV Electrostatic Air Spray Gun, Series A

Part No. L60M12 60 kV Electrostatic Air Spray Gun, Series A, with 1.2 mm Nozzle

Part No. L85M10 85 kV Electrostatic Air Spray Gun, Series A

Ref. No.	Part No.	Description	Qty
1	24N666	BODY, gun; 60 kV gun	1
	24N667	BODY, gun; 85 kV gun	1
2	See Packing Rod Assembly, page 62		1
3	24N651	NEEDLE, electrode	1
4	24N616	NOZZLE, 1.5 mm; includes 4a and 4b	1
	24N615	NOZZLE, 1.2 mm; includes 4a and 4b	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	24N477	AIR CAP	1
6	24N644	RING, retainer; includes 6a	1
6a*	198307	PACKING, u-cup; UHMWPE	1
7‡	111286	FERRULE, front	2
8‡	111285	FERRULE, back	2
9	24N657	FITTING, fluid; 60 kV gun	1
	24N658	FITTING, fluid; 85 kV gun	1
10	102982	PACKING, o-ring	1
11	24N660	POWER SUPPLY, 60 kV gun	1
	24N661	POWER SUPPLY, 85 kV gun	1
11a	24N979	SPRING	1
12	24N663	TRIGGER; includes item 13	1
13	24A445	SCREW, trigger; package of 2	1
14	24N696	TUBE, fluid, with sleeve; 60 kV gun	1
	24N697	TUBE, fluid, with sleeve; 85 kV gun	1
15	24N664	See Alternator Assembly, page 63	1
16	24N754	HANDLE, smart; 60 kV gun	1
	24N755	HANDLE, smart; 85 kV gun	1
17	185111	SPRING, compression	1
18	197624	SPRING, compression	1
19	249323	VALVE, exhaust	1
19a*	112085	O-RING	1
20	24N741	BRACKET	1

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

* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

Ref. No.	Part No.	Description	Qty
21	24N626	SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread	1
22	112644	NUT	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1
24	245265	CIRCUIT, flexible	1
26	24N630	See ES On-Off and Fluid Adjustment Valve, page 64	1
27	24N740	SCREW, hex socket; sst; package of 2	1
28*	24N699	GASKET, barrel	1
29	24N635	See Atomizing Air Restrictor Valve Assembly, page 65	1
30	24N634	See Fan Air Adjustment Valve Assembly, page 65	1
31	24N756	See Smart Module Assembly, page 66	1
34	185116	SPRING, compression	1
35*	188749	PACKING, u-cup	1
36	185103	TUBE, exhaust; 1/4 in. (6 mm) ID (shipped loose)	1
40	107460	TOOL, wrench, ball end; 4 mm (shipped loose)	1
41	276741	MULTI-TOOL (shipped loose)	1
42	24N786	PLUG, restrictor (shipped loose; for use instead of item 29)	1
43	110231	CLAMP, exhaust tube (shipped loose)	1
44	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
45	117824	GLOVE, conductive, medium; package of 12; also available in small (117823) and large (117825)	1
46	24N603	COVER, gun, 60 kV guns; package of 10	1
	24N604	COVER, gun, 85 kV guns; package of 10	1
47▲	179791	TAG, warning (not shown)	1
48▲	16P802	SIGN, warning (not shown)	1

‡ These parts are included in Fluid Seal Repair Kit 24N790 (purchase separately).

Packing Rod Assembly

Part No. 24N653 40 kV Packing Rod Assembly

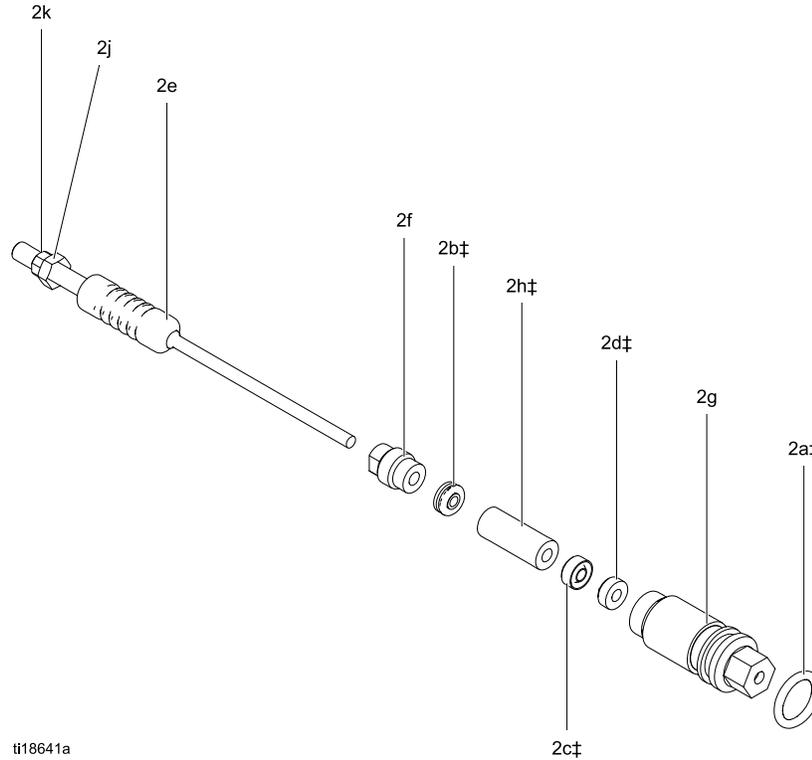
Includes items 2a-2k

Part No. 24N654 60 kV Packing Rod Assembly

Includes items 2a-2k

Part No. 24N655 85 kV Packing Rod Assembly

Includes items 2a-2k



Ref. No.	Part No.	Description	Qty
2a‡	111316	O-RING	1
2b‡	116905	SEAL	1
2c‡	178409	PACKING, fluid	1
2d‡	178763	PACKING, needle	1
2e	24N701	ROD, packing, 40 kV guns (includes items 2j and 2k)	1
	24N702	ROD, packing, 60 kV guns (includes items 2j and 2k)	1
	24N703	ROD, packing, 85 kV guns (includes items 2j and 2k)	1

Ref. No.	Part No.	Description	Qty
2f	197641	NUT, packing	1
2g	185495	HOUSING, packing	1
2h‡	186069	SPACER, packing	1
2j♦	— — —	NUT, trigger adjustment (part of item 2e)	1
2k♦	— — —	NUT, trigger adjustment (part of item 2e)	1

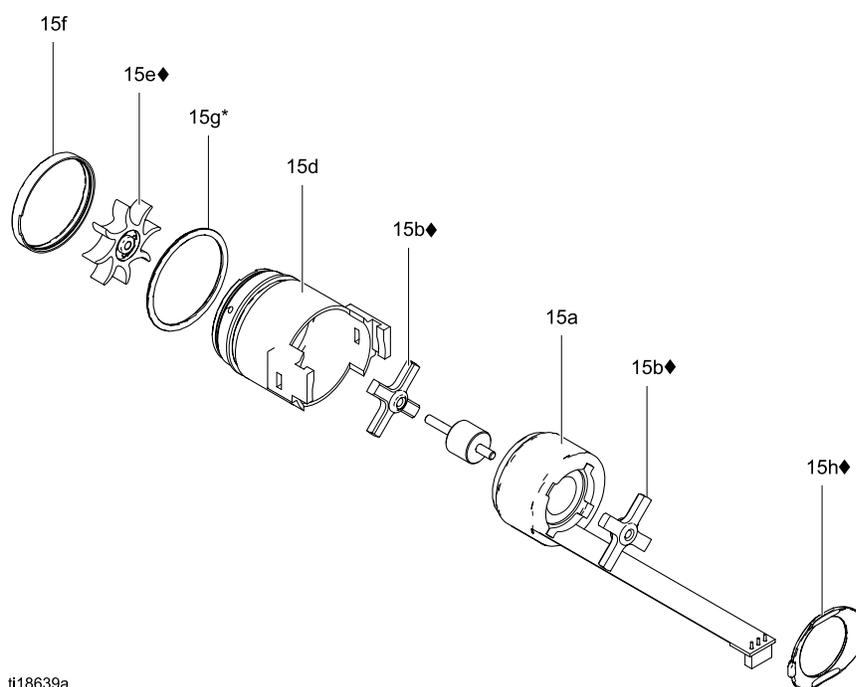
‡ These parts are included in Fluid Seal Repair Kit 24N790 (purchase separately).

♦ These parts are included in Trigger Adjustment Nut Kit 24N700 (purchase separately).

Parts labeled — — — are not available separately.

Alternator Assembly

Part No. 24N664 Alternator Assembly



ti18639a

Ref. No.	Part No.	Description	Qty
15a	24N705	COIL, alternator	1
15b◆	24N706	BEARING KIT (includes two bearings, item 15e fan, and one item 15h clip)	1
15d	24N707	HOUSING; includes item 15f	1
15e◆	— — —	FAN; part of item 5b	1

Ref. No.	Part No.	Description	Qty
15f	— — —	CAP, housing; part of item 5d	1
15g*	110073	O-RING	1
15h◆	24N709	CLIP; package of 5 (one clip included with item 5b)	1

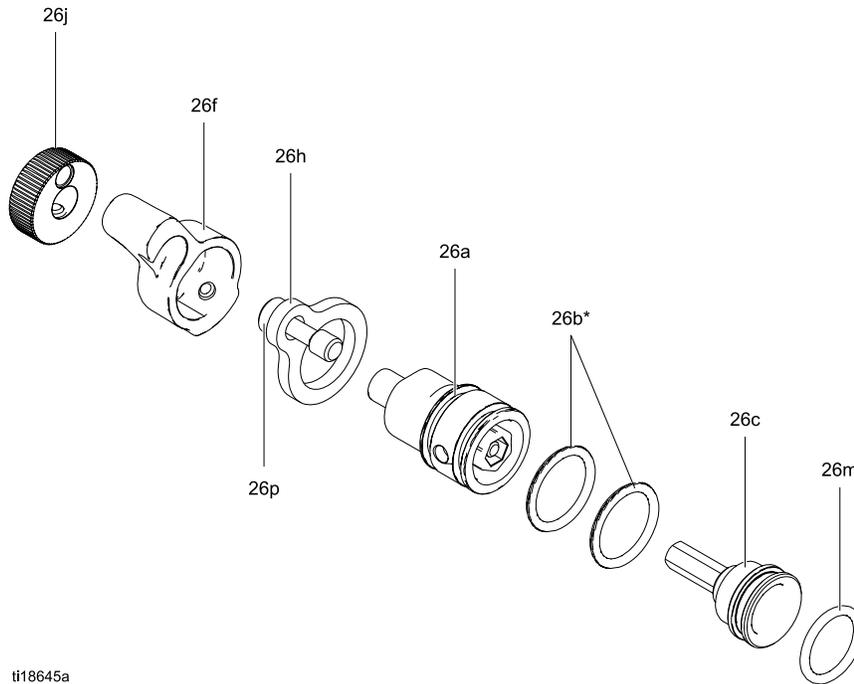
* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

◆ These parts are included in Bearing Kit 24N706 (purchase separately).

Parts labeled — — — are not available separately.

ES On-Off and Fluid Adjustment Valve

Part No. 24N630 ES On-Off and Fluid Adjustment Valve



ti18645a

Ref. No.	Part No.	Description	Qty
26a	— — —	HOUSING, valve	1
26b*	15D371	O-RING	4
26c	— — —	PISTON, valve	1
26f	24N649	LEVER, ES on-off	1
26g	— — —	SCREW, set, socket head	2

* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

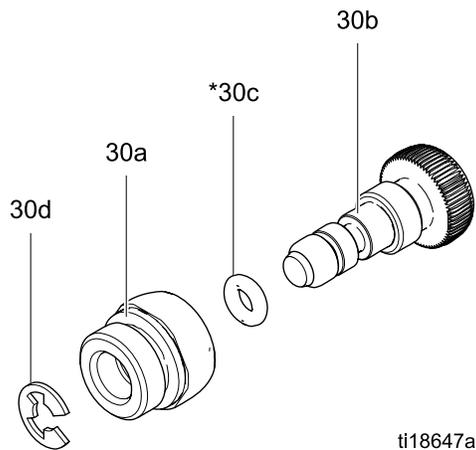
Ref. No.	Part No.	Description	Qty
26h	24N631	PLATE, retaining	1
26j	24N648	KNOB, adjustment, fluid	1
26m*	113746	O-RING	2
26p	— — —	SCREW, captive	1

Parts labeled — — — are not available separately.

Fan Air Adjustment Valve Assembly

Part No. 24N634 Fan Air Adjustment Valve Assembly (shown)

Part No. 24N732 Fan Air Adjustment Valve Assembly (for round spray guns, not shown)



Ref. No.	Part No.	Description	Qty
30a	---	NUT, valve	1
30b	---	STEM, valve	1
	---	STEM, valve; round spray only	1
30c*	111504	O-RING	1
30d	24N646	RING, retaining; package of 6	1

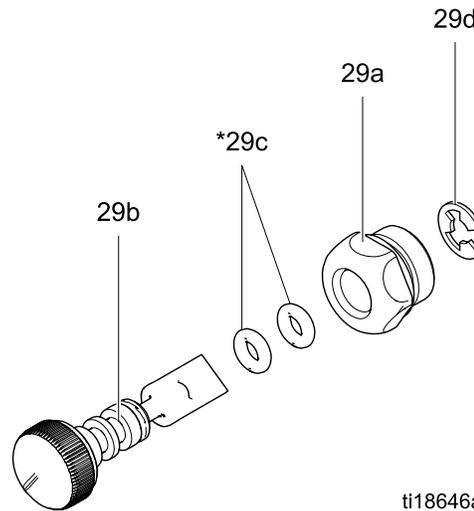
* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

Parts labeled --- are not available separately.

Atomizing Air Restrictor Valve Assembly

Part No. 24N635 Atomizing Air Restrictor Valve Assembly (shown)

Part No. 24N733 Atomizing Air Restrictor Valve Assembly (for round spray guns, not shown)



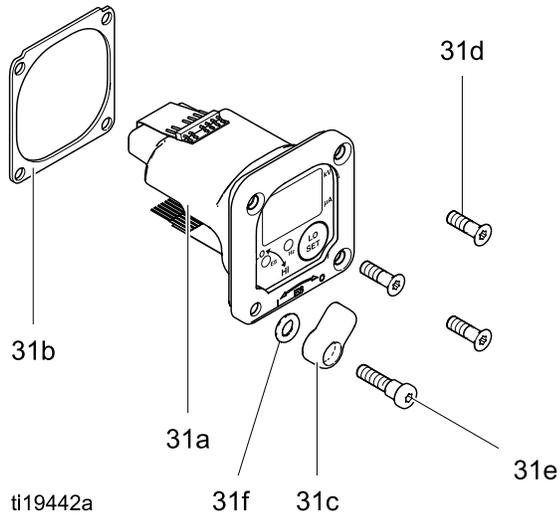
Ref. No.	Part No.	Description	Qty
29a	---	HOUSING, valve	1
29b	---	SHAFT, valve	1
	---	SHAFT, valve; round spray only	1
29c*	111504	O-RING	2
29d	24N646	RING, retaining; package of 6	1
29e	---	KNOB, shaft; round spray only	1
29f	---	SETSCREW, knob; round spray only	1

* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

Parts labeled --- are not available separately.

Smart Module Assembly

Part No. 24N756 Smart Module Assembly



Ref. No.	Part No.	Description	Qty
31a	— — —	CARTRIDGE	1
31b	24P433	GASKET	1
31c	24N787	SWITCH, ES HI/LO	1
31d◆	— — —	SCREW	3
31e◆	— — —	SCREW, pivot	1
31f	112319	O-RING	1

Parts labeled — — — are not available separately.

◆ These parts are included in Smart Module Screw Kit 24N757 (purchase separately).

High Conductivity Fluid Tube Assembly

Part No. 24N627 40 kV High Conductivity Fluid Tube Assembly

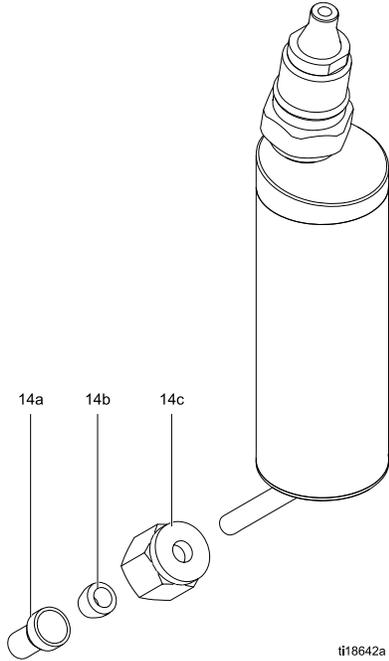
Includes items 14a-14c

Part No. 24N628 60 kV High Conductivity Fluid Tube Assembly

Includes items 14a-14c

Part No. 24N629 85 kV High Conductivity Fluid Tube Assembly

Includes items 14a-14c



Ref. No.	Part No.	Description	Qty
14a**	— — —	ADAPTER, bracket, handle	1
14b**	— — —	FERRULE	2
14c**	— — —	NUT, bracket, handle	1

** Included in 24N735 HC Adapter Kit.

Parts labeled — — — are not available separately.

Table 5 . Orifice Size: 0.75 mm (0.030 in.)

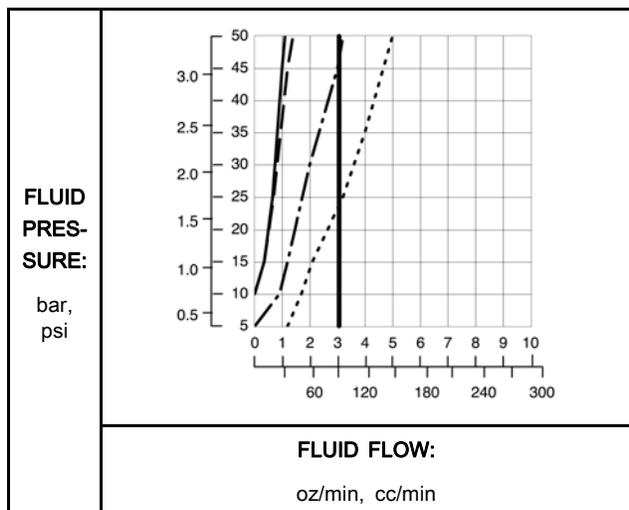


Table 8 . Orifice Size: 1.5 mm (0.059 in.)

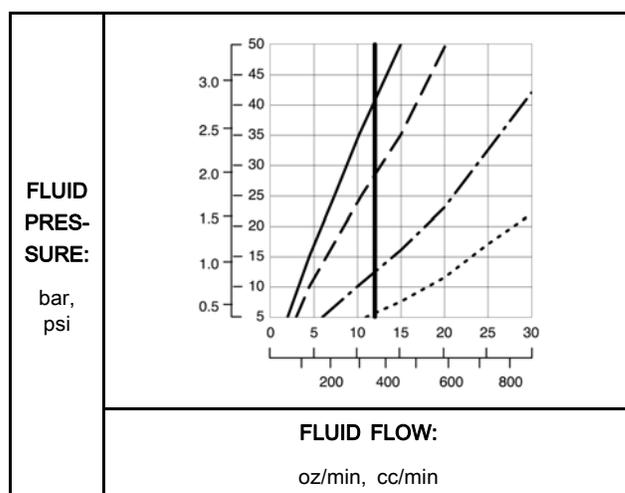


Table 6 . Orifice Size: 1.0 mm (0.040 in.)

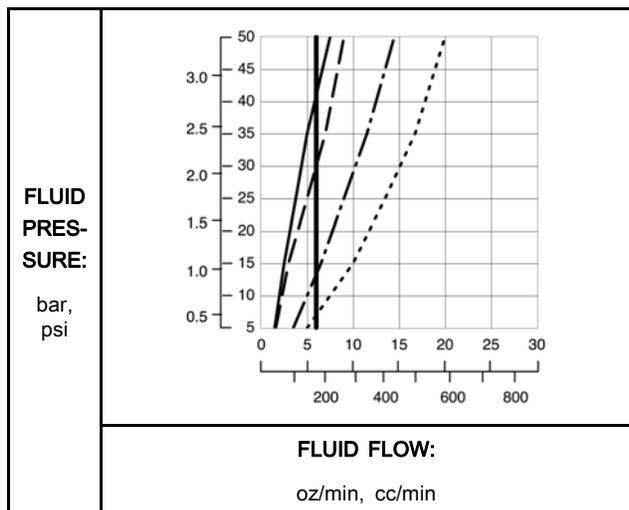


Table 9 . Orifice Size: 1.8 mm (0.070 in.)

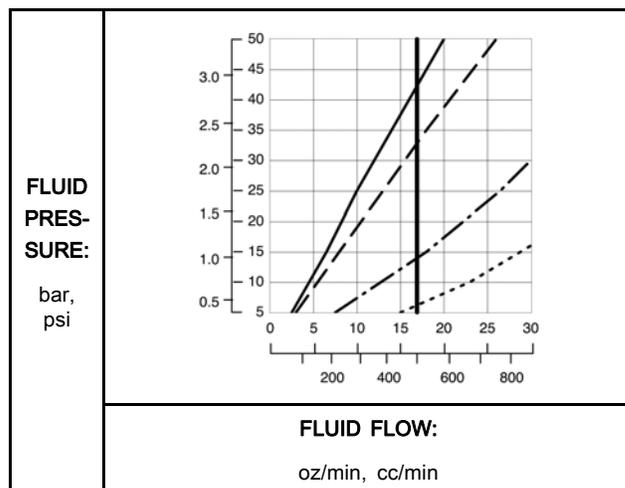


Table 7 . Orifice Size: 1.2 mm (0.047 in.)

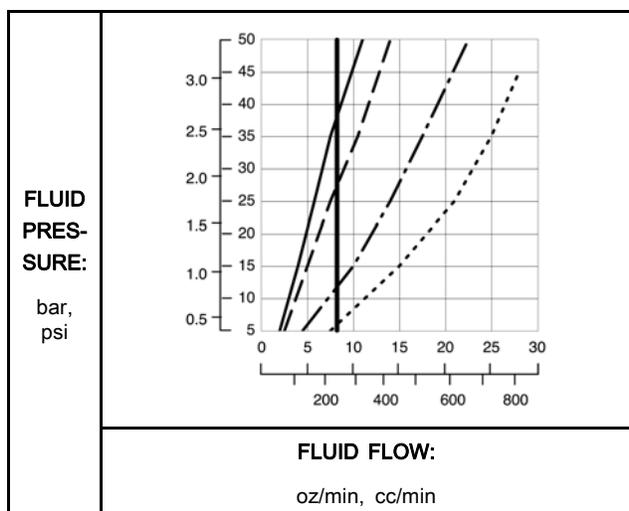
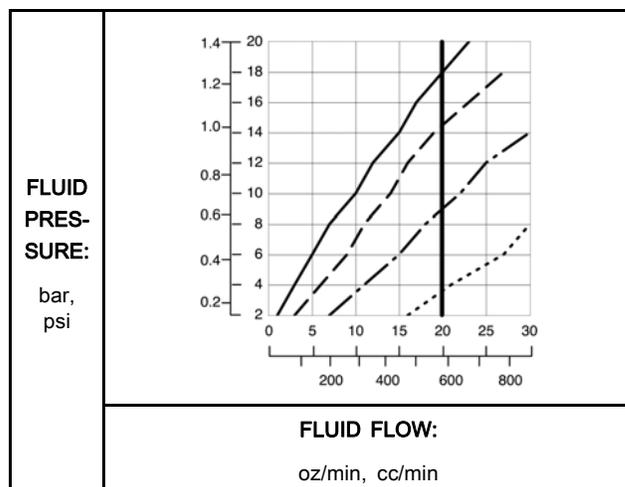


Table 10 . Orifice Size: 2.0 mm (0.080 in.)



Air Cap Selection Chart

			
To reduce the risk of an injury, follow the Pressure Relief Procedure, page 27 , before removing or installing a fluid nozzle and/or air cap.			

NOTE: All air cap pattern shapes and lengths in the following chart were measured under the following conditions. Pattern shape and length are material dependent.

- *Distance to target:* 10 in. (254 mm)
- *Inlet air pressure:* 50 psi (34 kPa, 3.4 bar)
- *Fan air:* adjusted for maximum width
- *Fluid flow rate:* 10 oz/min (300 cc/min)

Part No. (color)	Pattern Shape	Length in. (mm)	Recommended Fluid Viscosity, in centipoise (cp) at 70°F (21°C)◆	Recommended Production Rates	Transfer Efficiency	Atomiza- tion	Cleanli- ness
24N438 (black)	Round end	15-17 (381- 432)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Best	Good
24N279 (black)	Round end	14-16 (356- 406)	Medium to heavy (70-260 cp), and high solids (360+ cp)	Up to 15 oz/min (450 cc/min)	Better	Better	Good
24N376 (black) 24N276 (blue) 24N277 (red) 24N278 (green)	Tapered end	17-19 (432- 483)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Best	Better	Better
24N274 (black)	Tapered end	12-14 (305- 356)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Good	Good	Best
24N275 (black)	Tapered end	14-16 (356- 406)	Light to medium (20-70 cp), and high solids (360+ cp), aerospace coatings	Up to 25 oz/min (750 cc/min)	Best	Good	Best
24N439 (black)	Tapered end	11-13 (279- 330)	For use with 2.0 mm nozzles. Medium to heavy (70-260 cp), and high solids (360+ cp)	Up to 20 oz/min (600 cc/min)	Good	Best	Better
24N477 (black)	Round end	15-17 (381- 432)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Best	Good
24N453 (black)	Round end	14-16 (356- 406)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Better	Good
◆ Centipoise = centistokes x fluid specific gravity.							

Air Consumption Charts

Key to Air Consumption Charts

TEST CONDITIONS: Fan valve fully open; 85 kV gun.

5/16 in. x 25 ft (8 mm x 7.6 m) hose	
5/16 in. x 50 ft (8 mm x 15.2 m) hose	

Table 11 . 24N438 Air Cap

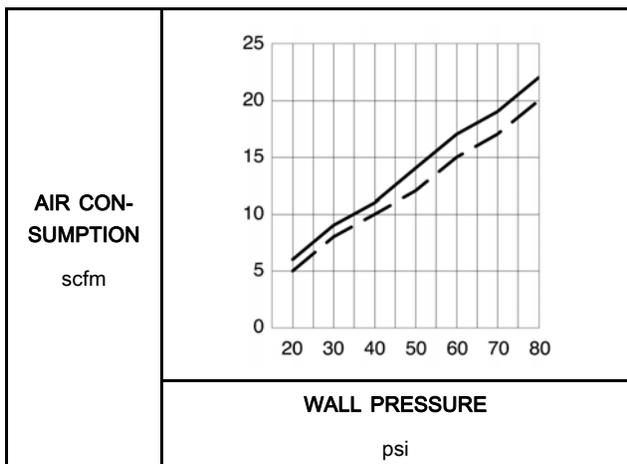


Table 13 . 24N439 Air Cap

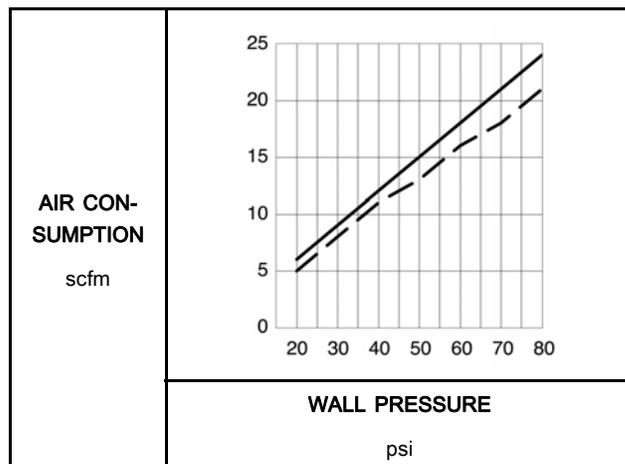


Table 12 . 24N376, 24N276, 24N277, and 24N278 Air Caps

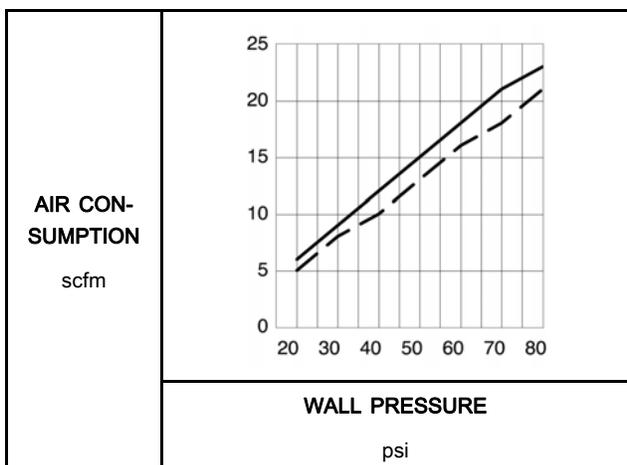


Table 14 . 24N279 Air Cap

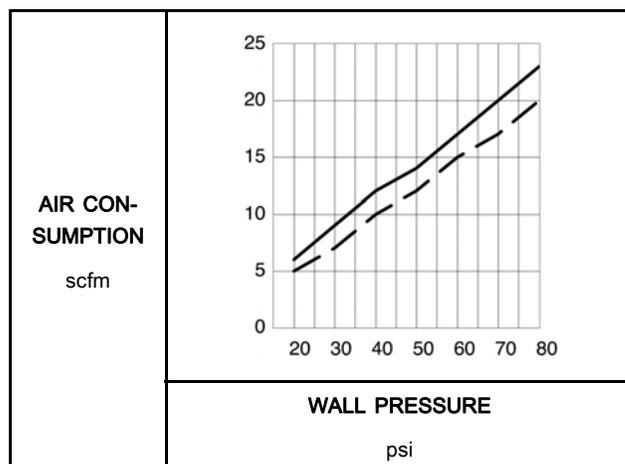


Table 15 . 24N274 Air Cap

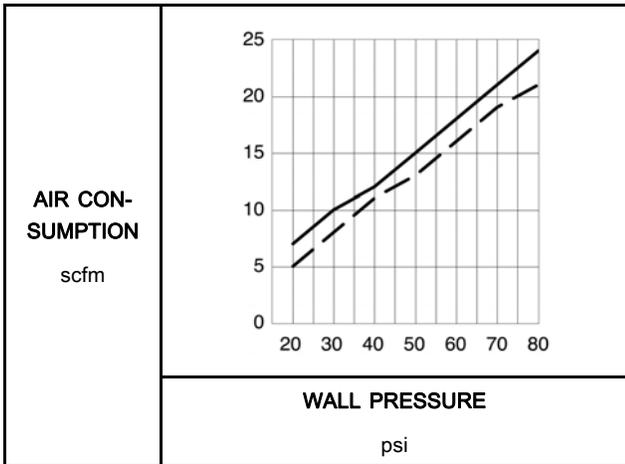


Table 17 . 24N453 Air Cap

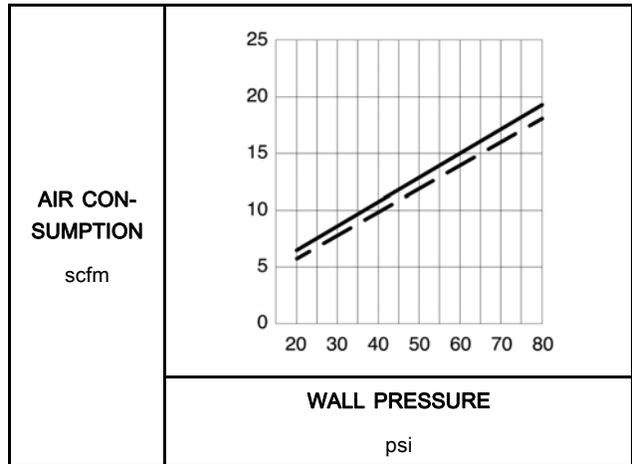


Table 16 . 24N275 Air Cap

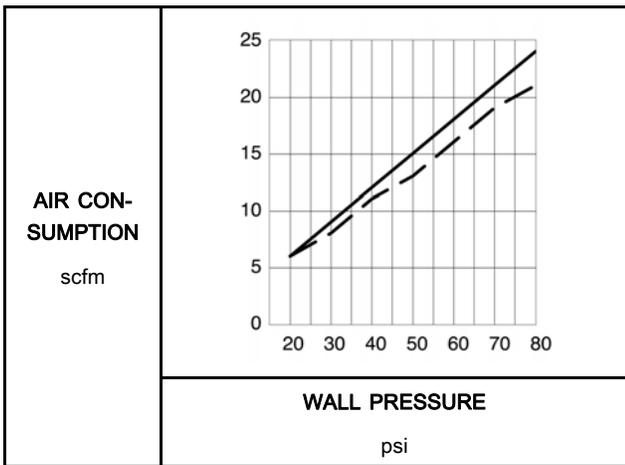
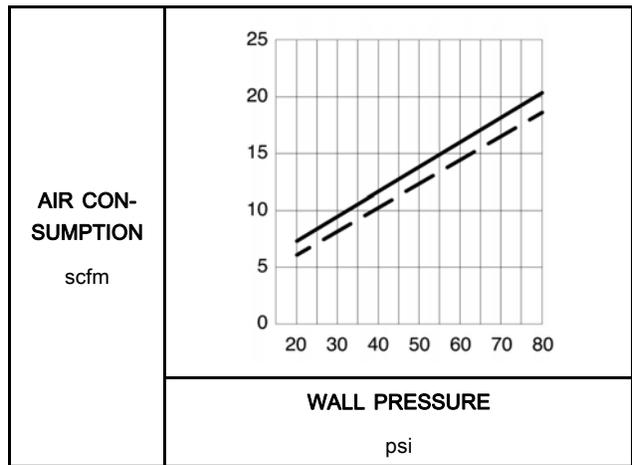


Table 18 . 24N477 Air Cap



Repair Kits, Related Manuals, and Accessories

Gun Part No.	Description	Manual Description	Repair Kits	Repair Kit Description
All guns in this manual.	40 kV, 60 kV, and 85 kV Air Spray Guns	Electrostatic Air Spray Guns, Instructions-Parts	24N789	Air Seal Repair Kit
			24N790	Fluid Seal Repair Kit
			24N706	Alternator Bearing Repair Kit

Gun Accessories

Part No.	Description
105749	Cleaning Brush.
111265	Non-silicone Lubricant, 4 oz (113 g).
116553	Dielectric Grease. 1 oz (30 ml)
24N318	Round Spray Kit. To convert a standard air spray gun to a round spray air cap. See manual 3A2498.
24N603	Gun Covers. For 40 kV and 60 kV guns. Box of 10.
24N604	Gun Covers. For 85 kV guns. Box of 10.
24N642	Ball Swivel, for gun air inlet. 1/4 npsm (left-hand thread)
24N704	Electrode Replacement Needle for Abrasive Materials. Blue.
24N758	Display Covers. Keeps Smart display clean. Package of 5.
24P170	Metal Trigger Kit.

Part No.	Description
24P171	Four Finger Trigger Kit. To convert Pro Xp air spray guns to a four finger trigger.
24P172	Quick Adjust Valve. For quick change of fan size.
185105	Non-swivel Air Inlet; 1/4–18 npsm(m) (left-hand thread)
24K451	Air Inlet Ball Swivel; 1/4–18 npsm(m) (left-hand thread)
185493	Air Hose Adapter; 1/4 npt(m) x 1/4–18 npsm(m) (left-hand thread)
112534	Air Line Quick Disconnect Fitting.
24N627, 24N628, 24N629	High Conductivity Conversion Kits. To convert a standard Pro Xp air spray gun to an HC gun. See High Conductivity Fluid Tube Assembly , page 67.

Operator Accessories

Part No.	Description
117823	Conductive Gloves, box of 12 (small)
117824	Conductive Gloves, box of 12 (medium)
117825	Conductive Gloves, box of 12 (large)
24N520	Comfort Grip. Snap-on grip increases handle size to reduce operator fatigue. Medium size.
24N521	Comfort Grip. Snap-on grip increases handle size to reduce operator fatigue. Large size.

System Accessories

Part No.	Description
222011	Ground Wire and Clamp.
16P802	English Warning Sign. Available at no charge from Graco.
16P798	English Daily Care Sign.
16P799	English Setup Sign
24N528	Gun Flush Box Adapter for 60 and 85 kV guns. To convert existing gun flush boxes to hold Pro Xp guns.
24N529	Gun Flush Box Adapter for 40 kV guns. To convert existing gun flush boxes to hold Pro Xp guns.
24P312	Gun Washer Kit. To convert existing gun washers to clean Pro Xp guns.

Test Equipment

Part No.	Description
241079	Megohmmeter. 500 V output, 0.01–2000 megohms. Use for ground continuity and gun resistance tests. Not for use in hazardous areas.
722886	Paint Resistance Meter. Use for fluid resistivity test. See manual 307263. Not for use in hazardous areas.
722860	Paint Probe. Use for fluid resistivity test. See manual 307263. Not for use in hazardous areas.
245277	Test Fixture, High Voltage Probe, and kV Meter. Use to test the electrostatic voltage of the gun, and the condition of the alternator and power supply when being serviced. See manual 309455.

Hoses

Grounded Air Hoses

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

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

Part No.	Description
AirFlex Flexible Grounded Air Hose (Gray)	
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)

Part No.	Description
Standard Grounded Air Hose (Gray)	
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)

Part No.	Description
Grounded Air Hose with stainless steel braid ground path (Red)	
235068	6 ft (1.8 m)
235069	15 ft (4.6 m)
235070	25 ft (7.6 m)
235071	36 ft (11 m)
235072	50 ft (15 m)
235073	75 ft (23 m)
235074	100 ft (30.5 m)

Fluid Hoses

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

1/4 in. (6 mm) ID; 3/8 npsm(fbe); nylon; FM approved.

Part No.	Description
215637	25 ft (7.6 m)
215638	50 ft (15 m)

High Conductivity Fluid Hose

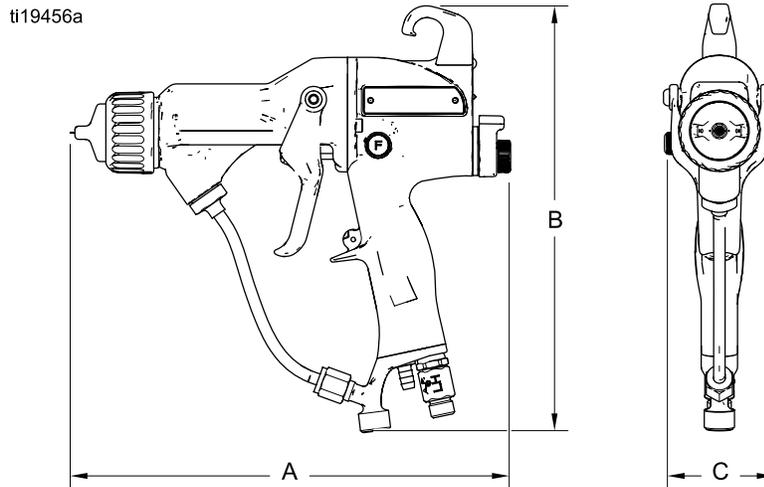
For high viscosity materials. **For 60 kV guns only.**

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

1/4 in. (6 mm) ID; 3/8 npsm(f) x 5/8–20(m); ptfe; FM approved.

Part No.	Description
24N993	26.8 ft (8.2 m)

Dimensions



Gun Model	A, in. (mm)	B, in. (mm)	C, in. (mm)	Weight, oz (g)
L40T10	8.7 (221)	9.2 (234)	2.4 (61)	19.8 (562)
L40T14	8.7 (221)	9.2 (234)	2.4 (61)	20.0 (568)
L40T15	8.7 (221)	9.2 (234)	2.4 (61)	20.5 (582)
L40T16	8.7 (221)	9.2 (234)	2.4 (61)	20.5 (582)
L60T10	9.5 (241)	9.2 (234)	2.4 (61)	21.1 (600)
L60T11	8.7 (221)	9.2 (234)	2.4 (61)	21.1 (600)
L60T12	9.5 (241)	9.2 (234)	2.4 (61)	21.1 (600)
L60T16	9.5 (241)	9.2 (234)	2.4 (61)	22.6 (642)
L60M10	9.5 (241)	10 (254)	2.4 (61)	23.7 (673)
L60M12	9.5 (241)	10 (254)	2.4 (61)	23.7 (673)
L60M16	9.5 (241)	10 (254)	2.4 (61)	25.4 (720)
L85T10	10.5 (267)	9.2 (234)	2.4 (61)	23.8 (676)
L85T16	10.5 (267)	9.2 (234)	2.4 (61)	25.5 (725)
L85M10	10.5 (267)	10 (254)	2.4 (61)	26.3 (746)
L85M16	10.5 (267)	10 (254)	2.4 (61)	28.0 (794)

Technical Data

Electrostatic Air Spray Guns		
	U.S.	Metric
Maximum Working Fluid Pressure	100 psi	0.7 MPa, 7.0 bar
Maximum Working Air Pressure	100 psi	0.7 MPa, 7.0 bar
Minimum Air Pressure at Gun Inlet	45 psi	0.32 MPa, 3.2 bar
Maximum Fluid Operating Temperature	120°F	48°C
Paint Resistivity Range	3 megohm/cm to infinity. For a table of electrostatic results at different resistance levels, see Check Fluid Resistivity, page 26 .	
Air Inlet Fitting	1/4 npsm(m) left-hand thread	
Fluid Inlet Fitting	3/8 npsm(m)	
Output Voltage	Pro Xp40 Models: 40 kV Pro Xp60 Models: 60 kV Pro Xp85 Models: 85 kV	
Maximum Current Draw	125 microamperes	
Sound Power (measured per ISO Standard 9216)	at 40 psi: 90.4 dB(A) at 100 psi: 105.4 dB(A)	at 0.28 MPa, 2.8 bar: 90.4 dB(A) at 0.7 MPa, 7.0 bar: 105.4 dB(A)
Sound Pressure (measured 1 m from gun)	at 40 psi: 87.0 dB(A) at 100 psi: 99.0 dB(A)	at 0.28 MPa, 2.8 bar: 87.0 dB(A) at 0.7 MPa, 7.0 bar: 99.0 dB(A)
Wetted Parts	PEEK, UHMWPE, FEP, PTFE, acetal, nylon, polyethylene	

Graco Pro Xp Warranty

Graco warrants all equipment referenced in this document which is 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 from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. However, any deficiency in the barrel, handle, trigger, hook, internal power supply, and alternator (excluding turbine bearings) will be repaired or replaced for thirty-six months 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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Phone: 612-623-6921 or **Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

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Original Instructions. This manual contains English, MM 3A2494

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