

## Pro Xp™ Electrostatic Air Spray Gun

3A2494<sup>T</sup><sub>EN</sub>

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

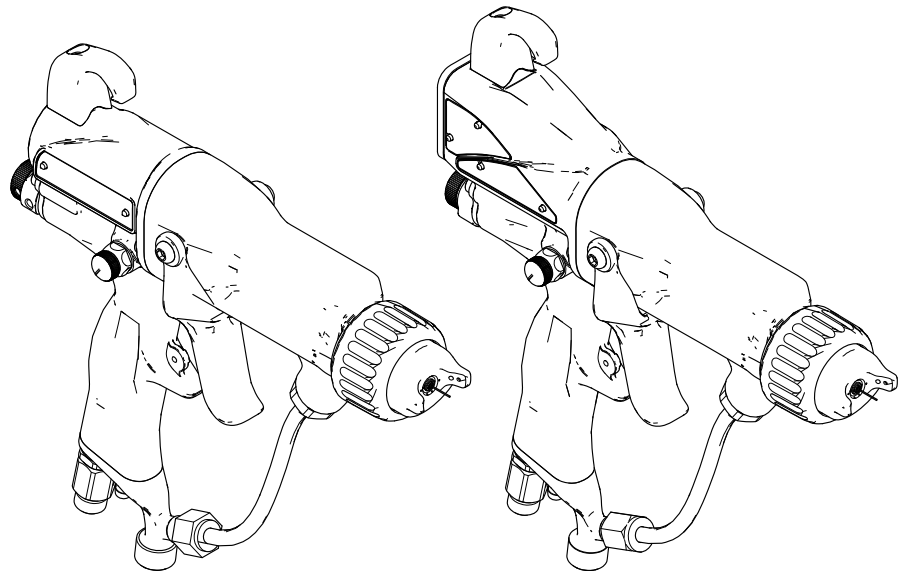


### Important Safety Instructions

This equipment could present hazards if not operated according to the information in this manual. Read all warnings and instructions in this manual before using the equipment. **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

## General Gun Models

Equipped with standard electrode, nozzle, air cap and fluid tube. For applying a Class A finish with standard and specialty coatings.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L40M10	A	40	Smart	Std	1.5 Std	Std	Std
L40T10	C	40	Std	Std	1.5 Std	Std	Std
L40T12	A	40	Std	Std	1.2 Std	Std	Std
L60M10	C	60	Smart	Std	1.5 Std	Std	Std
L60M12	C	60	Smart	Std	1.2 Std	Std	Std
L60T10	C	60	Std	Std	1.5 Std	Std	Std
L60T12	C	60	Std	Std	1.2 Std	Std	Std
L60T21	A	60	Std	Std	1.0 Std	Std	Std
L85M10	C	85	Smart	Std	1.5 Std	Std	Std
L85M12	A	85	Smart	Std	1.2 Std	Std	Std
L85T10	C	85	Std	Std	1.5 Std	Std	Std
L85T12	A	85	Std	Std	1.2 Std	Std	Std
L85T50*	A	85	Std	Std	1.5 Std	Std	Std

\*Equipped with a quick-adjust fan valve

## High Conductivity Gun Models

Equipped with a longer High Conductivity fluid tube for spraying lower resistivity material. Most models are also equipped with high wear electrode, precision high wear nozzle, and standard air cap. For applying a class A finish with abrasive and metallic coatings.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L40M16	A	40	Smart	HW	1.5 PHW	Std	HC
L40T13	B	40	Std	HW	1.5 Std	Std	HC
L40T16	C	40	Std	HW	1.5 PHW	Std	HC
L40T26	A	40	Std	HW	1.2 PHW	Std	HC
L60M26	A	60	Smart	HW	1.2 PHW	Std	HC
L60M16	C	60	Smart	HW	1.5 PHW	Std	HC
L60T26	A	60	Std	HW	1.2 PHW	Std	HC
L60T13	B	60	Std	HW	1.5 Std	Std	HC
L60T16	C	60	Std	HW	1.5 PHW	Std	HC
L85M16	C	85	Smart	HW	1.5 PHW	Std	HC
L85M26	A	85	Smart	HW	1.2 PHW	Std	HC
L85T16	C	85	Std	HW	1.5 PHW	Std	HC
L85T26	A	85	Std	HW	1.2 PHW	Std	HC
L85T56*	A	85	Std	HW	1.5 PHW	Std	HC

\*Equipped with a quick-adjust fan valve

## kV Booster Gun Models

The 40 kV Booster provides the transfer efficiency of a 60 kV gun in a smaller, more compact size.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L40M14	A	40	Smart	Std	1.5 Std	Std	Std
L40M15	A	40	Smart	HW	1.5 PHW	Std	HC
L40T14	C	40	Std	Std	1.5 Std	Std	Std
L40T15	C	40	Std	HW	1.5 PHW	Std	HC

## Round Spray Gun Models

Equipped with round spray nozzle and air cap. For round spray pattern applications.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L40T31	A	40	Std	Std	Small Pattern		Std
L40T32	A	40	Std	Std	Medium Pattern		Std
L60T11	C	60	Std	Std	Large Pattern		Std
L60T31	A	60	Std	Std	Small Pattern		Std
L60T32	A	60	Std	Std	Medium Pattern		Std
L85T31	A	85	Std	Std	Small Pattern		Std
L85T32	A	85	Std	Std	Medium Pattern		Std

## Soft Spray Gun Models

Equipped with soft spray air cap. For applying a class A finish to small, lightweight parts.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L40T71	A	40	Std	Std	1.0 Std	Soft Spray	Std
L60M71	A	60	Smart	Std	1.0 Std	Soft Spray	Std
L60M72	A	60	Smart	Std	1.2 Std	Soft Spray	Std
L60T71	A	60	Std	Std	1.0 Std	Soft Spray	Std
L60T72	A	60	Std	Std	1.2 Std	Soft Spray	Std
L85M71	A	85	Smart	Std	1.0 Std	Soft Spray	Std
L85T71	A	85	Std	Std	1.0 Std	Soft Spray	Std

## Aerospace Gun Models

Equipped with aerospace air cap, high wear electrode, and precision high wear nozzle. For applying high solids and aerospace coatings.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L85T73	A	85	Std	HW	1.2 PHW	AERO	Std
L85T75	A	85	Std	HW	1.5 PHW	AERO	Std
L85T78	A	85	Std	HW	1.8 PHW	AERO	Std

## HVLP Gun Models

Equipped with HVLP air cap.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L40M77	A	40	Smart	Std	1.5 Std	HVLP	Std
L40T77	A	40	Std	Std	1.5 Std	HVLP	Std
L60M77	A	60	Smart	Std	1.5 Std	HVLP	Std
L60T77	A	60	Std	Std	1.5 Std	HVLP	Std
L85M77	A	85	Smart	Std	1.5 Std	HVLP	Std
L85T77	A	85	Std	Std	1.5 Std	HVLP	Std

## High Air Flow Gun Models

Equipped with ES On-Off with Air Restrictor and Fluid Adjustment Valve, which limits air flow to the turbine. For applications that require high air flow at the air cap.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L60M57	A	60	Smart	Std	1.5 Std	Std	Std
L60T57	A	60	Std	Std	1.5 Std	Std	Std
L85M57	A	85	Smart	Std	1.5 Std	Std	Std
L85T57	A	85	Std	Std	1.5 Std	Std	Std

## Fixed Fluid Flow Gun Models

Equipped with ES On-Off and Fixed Fluid Valve, which extends electrode and nozzle life. For applications with abrasive, metallic, and extremely abrasive materials.

Part No.	Series	kV	Display	Electrode	Nozzle (mm)	Air Cap	Fluid Tube
L60T98	A	60	Std	Short	1.5 PHW	Std	Std
L60T99	A	60	Std	Short	1.5 PHW	Std	HC
L85T90	A	85	Std	HW	1.5 PHW	Std	Std
L85T96	A	85	Std	HW	1.5 PHW	Std	HC

## Approvals



0.24 mJ T6

FM12ATEX0068

FM21UKEX0125

EN 50050-1







Ta 0°C – 50°C

## Related Manuals









Manual No.	Description
3A2498	Round Spray Kit, Instructions (large pattern)
3A6929	Round Spray Kit, Instructions (small and medium pattern)
3A7005	Quick Adjust Fan Valve Kit, Instructions
3A6833	HVLP Verification Kit, Instructions
307263	Probe and Meter, Instructions
308393	Gun Washer Kit, Instructions
309227	Gun Flush Box Module, Instructions
309455	Test Fixture, High Voltage Probe, and kV Meter, Instructions
406999	Voltage Tester Conversion Kit, Instructions

# 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 symbols refer 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.

 <h2 style="margin: 0;">WARNING</h2>	
    	<p><b>FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD</b></p> <p>Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire, explosion, and electric shock:</p> <ul style="list-style-type: none"> <li>• Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements of this manual.</li> <li>• Ground all equipment, personnel, object being sprayed, and conductive objects in or close to spray area. Resistance must not exceed 1 megohm. See <b>Grounding</b> instructions.</li> <li>• Only use grounded Graco conductive air supply hoses.</li> <li>• Do not use pail liners unless they are conductive and grounded.</li> <li>• <b>Stop operation immediately</b> if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.</li> <li>• Check gun resistance, hose resistance, and electrical grounding daily.</li> <li>• Use and clean equipment only in well ventilated area.</li> <li>• Interlock the gun air and fluid supply to prevent operation unless ventilation air flow is above the minimum required value.</li> <li>• Use only Group IIA or Group D materials.</li> <li>• Use cleaning solvents with highest possible flash point when flushing or cleaning equipment.</li> <li>• Never spray or flush solvent at high pressure.</li> <li>• To clean the exterior of the equipment, cleaning solvents must have a flash point at least 15° C or 59° F above ambient temperature. Non-ignitable fluids are preferred.</li> <li>• Always turn the electrostatics off when flushing, cleaning or servicing equipment.</li> <li>• Eliminate all ignition sources such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking).</li> <li>• Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.</li> <li>• Keep work area free of debris, including solvent, rags and gasoline.</li> <li>• Keep the spray area clean at all times. Use non-sparking tools to clean residue from the booth and hangers.</li> <li>• Keep a working fire extinguisher in the work area.</li> </ul>



 <h1 style="margin: 0;">WARNING</h1>	
  	<p><b>PRESSURIZED EQUIPMENT HAZARD</b> Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.</p> <ul style="list-style-type: none"> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.</li> </ul>
 	<p><b>EQUIPMENT MISUSE HAZARD</b> Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Do not operate the unit when fatigued or under the influence of drugs or alcohol.</li> <li>• Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See <b>Technical Specifications</b> in all equipment manuals.</li> <li>• Use fluids and solvents that are compatible with equipment wetted parts. See <b>Technical Specifications</b> in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request a Safety Data Sheet (SDS) from your distributor or retailer.</li> <li>• Do not leave the work area while equipment is energized or under pressure.</li> <li>• Turn off all equipment and follow the <b>Pressure Relief Procedure</b> when equipment is not in use.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.</li> <li>• Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.</li> <li>• Make sure all equipment is rated and approved for the environment in which you are using it.</li> <li>• Use equipment only for its intended purpose. Call your distributor for information.</li> <li>• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not kink or over bend hoses or use hoses to pull equipment.</li> <li>• Keep children and animals away from work area.</li> <li>• Comply with all applicable safety regulations.</li> </ul>
 	<p><b>PLASTIC PARTS CLEANING SOLVENT HAZARD</b> Many cleaning solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.</p> <ul style="list-style-type: none"> <li>• Use only compatible solvents to clean plastic structural or pressure-containing parts.</li> <li>• See <b>Technical Specifications</b> in all equipment manuals for materials of construction. Consult the solvent manufacturer for information and recommendations about compatibility.</li> </ul>



# WARNING



## TOXIC FLUID OR FUMES HAZARD

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

- Read Safety Data Sheet (SDS) 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.

# 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, see [Smart Guns, page 13](#).

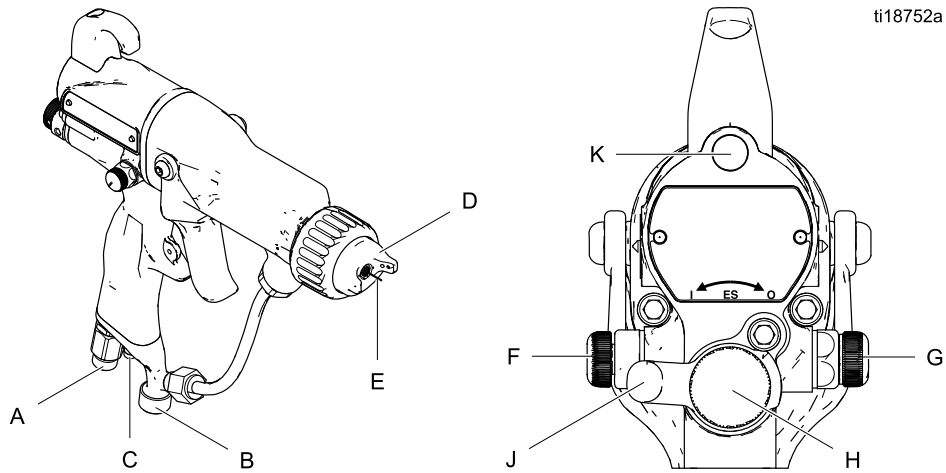


Figure 1 Gun Overview

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	Shapes the spray pattern. See <a href="#">Air Caps, page 83</a> and <a href="#">Fluid Nozzles, page 80</a> for available sizes.
E	Electrode Needle	Supplies electrostatic charge to the fluid. See <a href="#">Electrode Selection Chart, page 89</a> .
F	Fan Air Adjustment Valve	Adjusts fan size and shape. Can be used to decrease pattern length.
G	Atomizing Air Restrictor Valve	Restricts air cap air flow. Replace with plug (included) if desired.
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 <a href="#">Operating Mode, page 13</a> )	Lit when ES is ON (I). Color indicates alternator frequency. See the LED indicator table in the <a href="#">Gun Setup Procedure, page 25</a> .

## 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 [Smart Gun Key, page 15](#). 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 ( $\mu$ 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 47](#) 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:

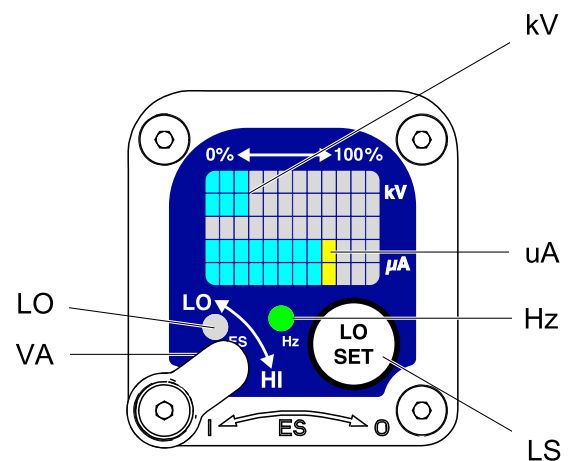
- Green indicates the alternator speed is correct.
- If the indicator changes to amber after one second, increase the air pressure.
- If the indicator changes to red after one second, the air pressure is too high. Decrease air pressure until the indicator is green. To maintain a higher air pressure, install ES On/Off Valve Restrictor Kit 26A160. Then, adjust the pressure as needed to ensure the indicator remains green.

### 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 14](#).

**NOTE:** If the Error display appears, the Smart module has lost communication with the power supply. See [Error Display, page 14](#), for further information.



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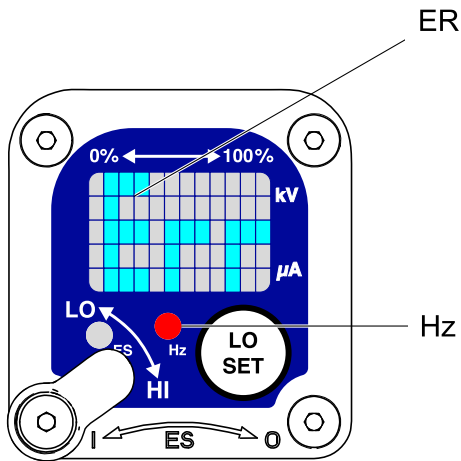
Figure 2 Smart Gun Module in Operating Mode

## 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 [Smart Gun Key, page 15](#). This can occur in Operating Mode or Diagnostic Mode. See [Electrical Troubleshooting, page 47](#). 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 [Smart Gun Key, page 15](#). The possible ranges are:

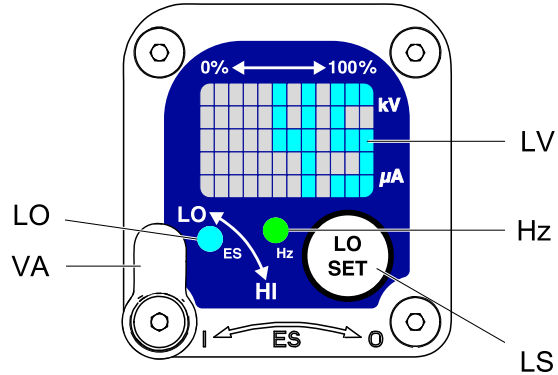
- 85 kV guns: 40–85 kV
- 60 kV guns: 30–60 kV
- 40 kV guns: 20–40 kV

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 14](#).



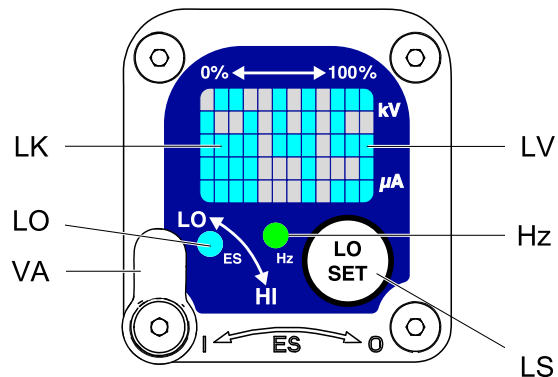
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Figure 4 Low Voltage Setting Screen (Unlocked)

## Lock Symbol

The low voltage setting may be locked. When locked, an image (LK) appears on the screen. See Fig. 5 and [Smart Gun Key, page 15](#).

- 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 17](#), to lock or unlock the low voltage setting.



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Figure 5 Low Voltage Setting Screen (Locked)

## Smart Gun Key

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	Press momentarily to enter the Low Voltage Setting screen. Press and hold for approximately 5 seconds to enter or exit Diagnostic Mode. While in Diagnostic Mode, press momentarily to advance through screens. While on the Low Voltage Lock Screen (in Diagnostic Mode), press and hold to turn the lock on or off.
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.
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	In Operating Mode, indicator color varies to show the alternator speed status: <ul style="list-style-type: none"> <li>• Green indicates the alternator speed is at the correct level.</li> <li>• If the indicator changes to amber after one second, the alternator speed is too low.</li> <li>• If the indicator changes to red after one second, the alternator speed is too high. The indicator also turns red if the Error display appears.</li> </ul> In Diagnostic Mode, the indicator is green when in the Alternator Speed (Hertz) screen.

## 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 16](#).

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 dettriggered while in Diagnostic Mode, the last screen viewed will be displayed when the gun is retriggered.

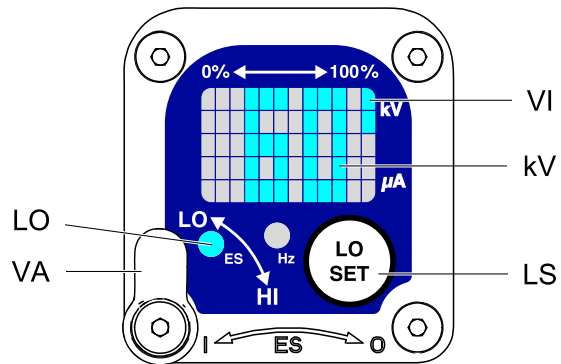
**NOTE:** Diagnostic Mode cannot be exited from the Low Voltage Lock Screen. See [Low Voltage Lock Screen, page 17](#) for details.

### Voltage (kiloVolts) Screen

The Voltage (kiloVolts) Screen is the first screen to appear after entering Diagnostic Mode. See Fig. 6 and [Smart Gun Key, page 15](#). 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 16](#). Press and hold for approximately 5 seconds to return to Operating Mode.



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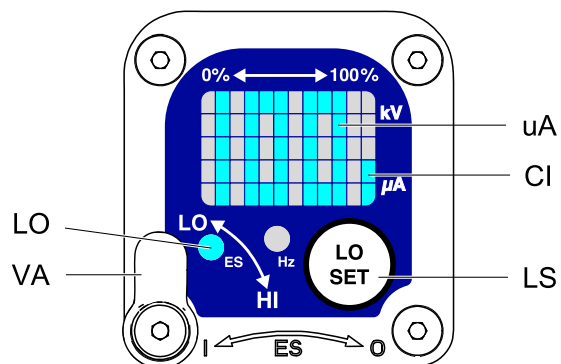
Figure 6 Voltage (kiloVolts) Screen

### Current (microAmperes) Screen

The Current (microAmperes) Screen is the second screen in the Diagnostic Mode. See Fig. 7 and [Smart Gun Key, page 15](#). 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 17](#). Press and hold for approximately 5 seconds to return to Operating Mode.



ti19124a

Figure 7 Current (microAmperes) Screen



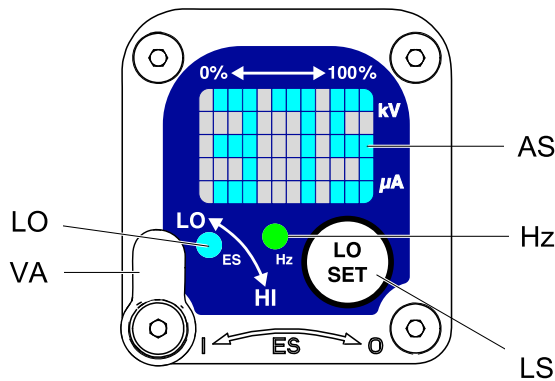
### Alternator Speed (Hertz) Screen

The Alternator Speed (Hertz) Screen is the third screen in the Diagnostic Mode. See Fig. 8 and [Smart Gun Key, page 15](#). 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 17](#). Press and hold for approximately 5 seconds to return to Operating Mode.



ti19125a

Figure 8 Alternator Speed (Hertz) Screen

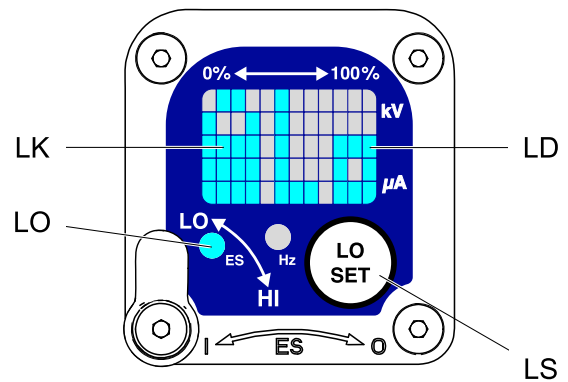
### Low Voltage Lock Screen

The Low Voltage Lock Screen is the fourth screen in the Diagnostic Mode. See Fig. 9 and [Smart Gun Key, page 15](#). 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.



ti19339a

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"><li>• Do not install or service this equipment unless you are trained and qualified.</li><li>• 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.</li><li>• Comply with all local codes and regulations.</li></ul>				

Fig. 10 (Typical Installation) 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>Do not operate the gun unless ventilating air flow is above the minimum required value. Provide fresh air ventilation to avoid the buildup of flammable or toxic vapors when spraying, flushing, or cleaning the gun. Interlock the gun air and fluid supply to prevent operation unless ventilating air flow is above the minimum required value.</p>				

The spray booth must have a ventilation system.




Electrically interlock the gun air and fluid supply with the ventilators to prevent gun operation any time that the ventilation air flow falls below minimum values. Check and follow all local codes and regulations regarding air exhaust velocity requirements. Verify the operation of the interlock at least once a year.

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

## Air Supply Line

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

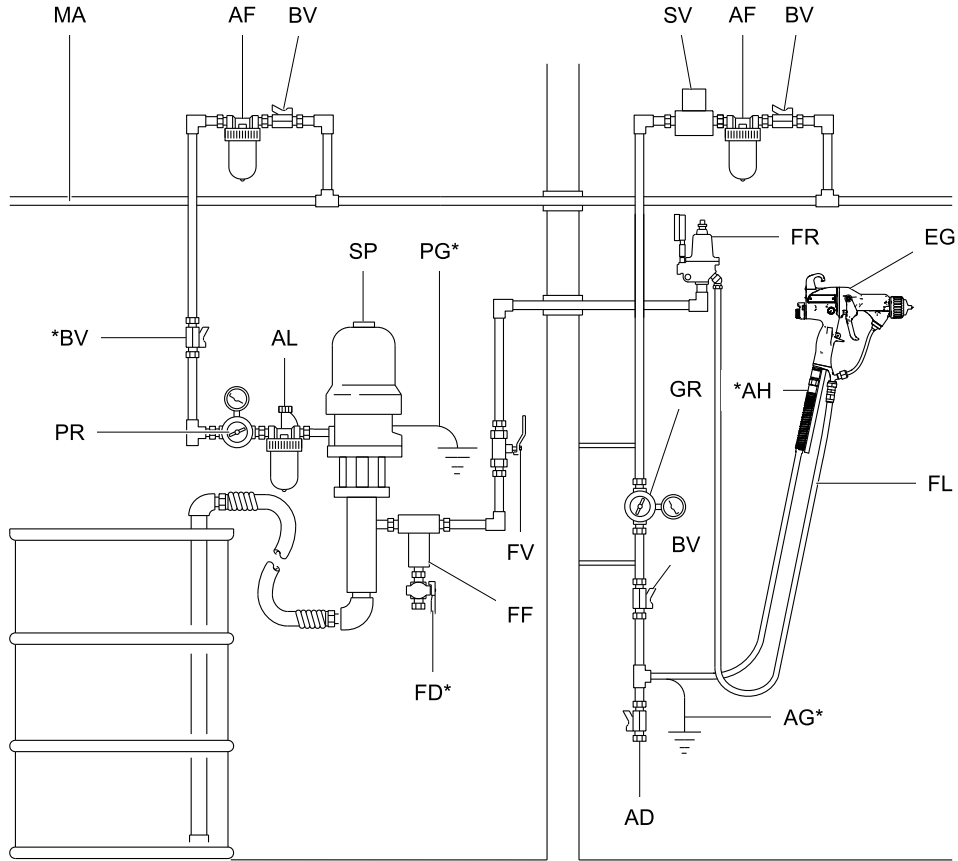
1. Blow out the fluid line (FL) with air and flush it with solvent. Use solvent which is compatible with the fluid to be sprayed. Do not connect the fluid supply line to the gun fluid inlet yet.
2. Install a fluid regulator (FR) on the fluid line to control fluid pressure to the gun.
3. Install a fluid 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.

**NON-HAZARDOUS LOCATION**

**HAZARDOUS LOCATION**



ti18782a





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. <b>NOTE:</b> The solenoid valve is not offered as a Graco accessory.
* These items are required for safe operation. They must be purchased separately.	

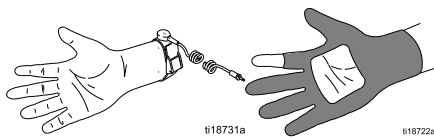
## Grounding

				
<p>The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Ground all equipment, personnel, objects being sprayed, and conductive objects in or close to the spray area. The resistance must not exceed 1 megohm. Grounding provides an escape wire for the electric current.</p>				

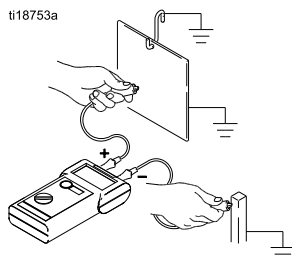
When operating the electrostatic gun, any ungrounded objects (such as people, containers, and tools) in the spray location can become electrically charged.

The following are minimum grounding requirements for a basic electrostatic system. Your system may include other equipment or objects which must be grounded. Your system must be connected to a true earth ground. Check ground connections daily. Check your local electrical codes and regulations for detailed grounding instructions.

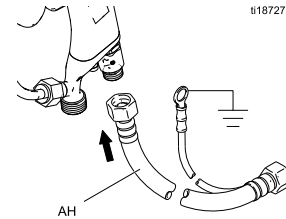
- *All persons entering the spray area* must wear shoes having conductive soles such as leather, or wear personal grounding straps. Do not wear shoes with non-conductive soles such as rubber or plastic. If gloves are necessary, wear the conductive gloves supplied with the gun. If non-Graco gloves are worn, cut off fingers or palm area of gloves to ensure your hand contacts the grounded gun handle. Conductive gloves and footwear must not exceed 100 megohm per EN ISO 20344, EN 1149-5.



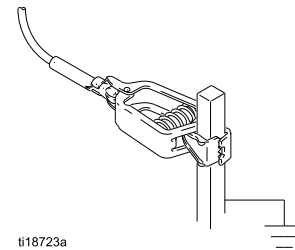
- *Object being sprayed:* Keep the workpiece hangers clean and grounded at all times.



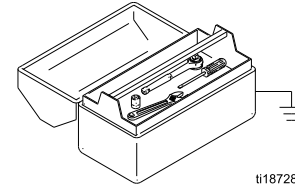
- *Electrostatic Air Spray Gun:* Ground the gun by connecting the Graco Grounded Air Hose (AH) to the gun, and connecting the air hose ground wire to a true earth ground. See [Check Gun Electrical Grounding, page 35](#).



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



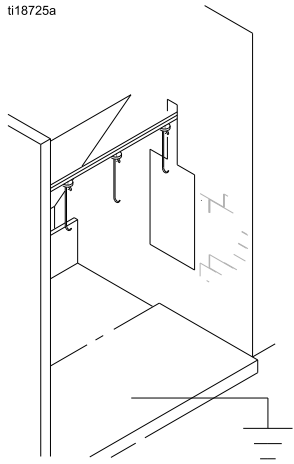
- *All electrically conductive objects or devices in the spray area* must be properly grounded.



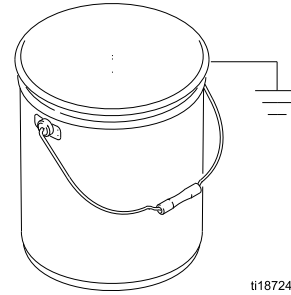
- *Fluid and waste containers:* Ground all fluid and waste containers in the spray area. Do not use pail liners unless they are conductive and grounded. When flushing the spray gun, the container used to catch the excess fluid must be electrically conductive and grounded.
- *Air compressors:* Ground 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.

## Installation

- *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 solvent pails: Use only approved, grounded metal containers, which are conductive. Do not use plastic containers. Use only non-flammable solvents. Do not store more than the quantity needed for one shift.*

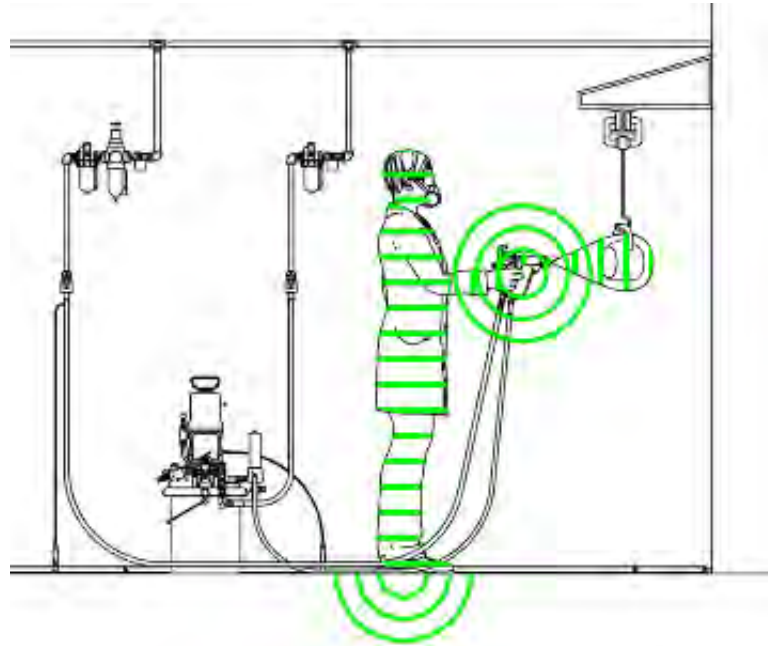


Figure 11 Ground the Operator

Operator is grounded through bare skin contact with the gun handle and conductive shoes. A conductive glove can also be used.

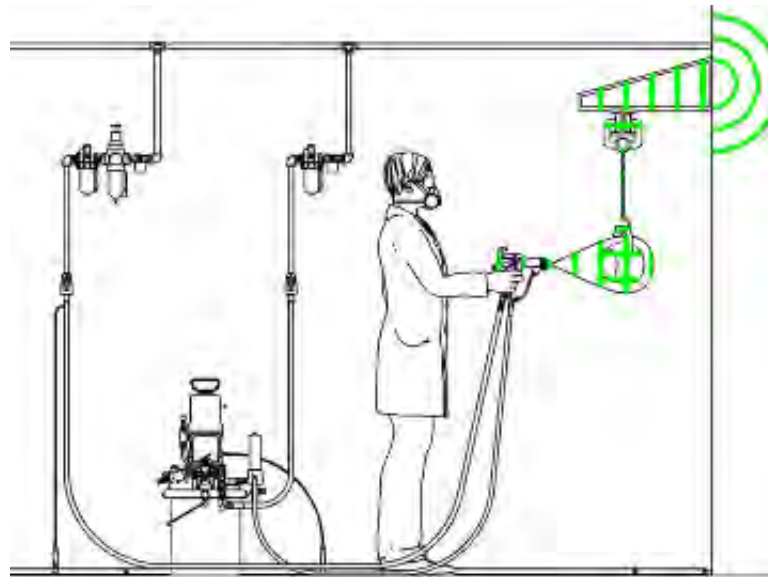


Figure 12 Ground the Object Being Sprayed

Object being sprayed is grounded through contact with the hanger and conveyor system.

Installation

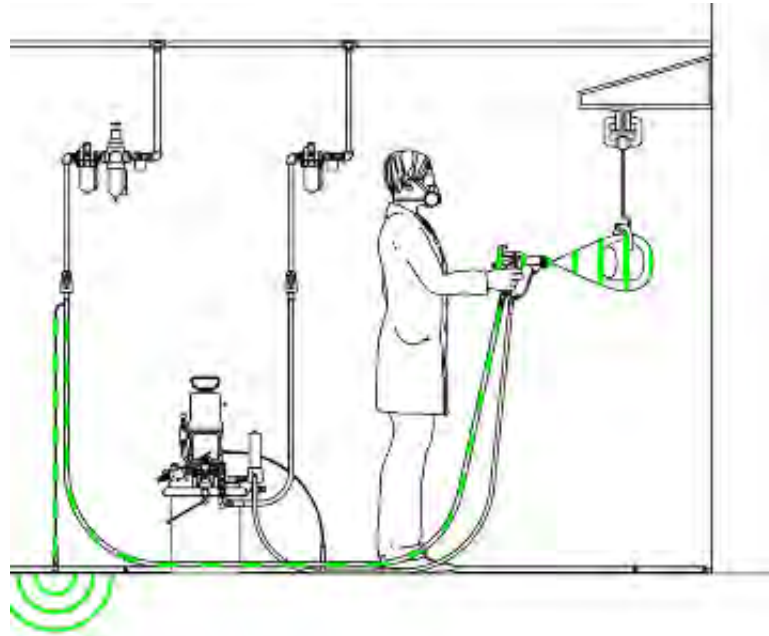


Figure 13 Ground the Gun

Gun is grounded through the conductive air hose.

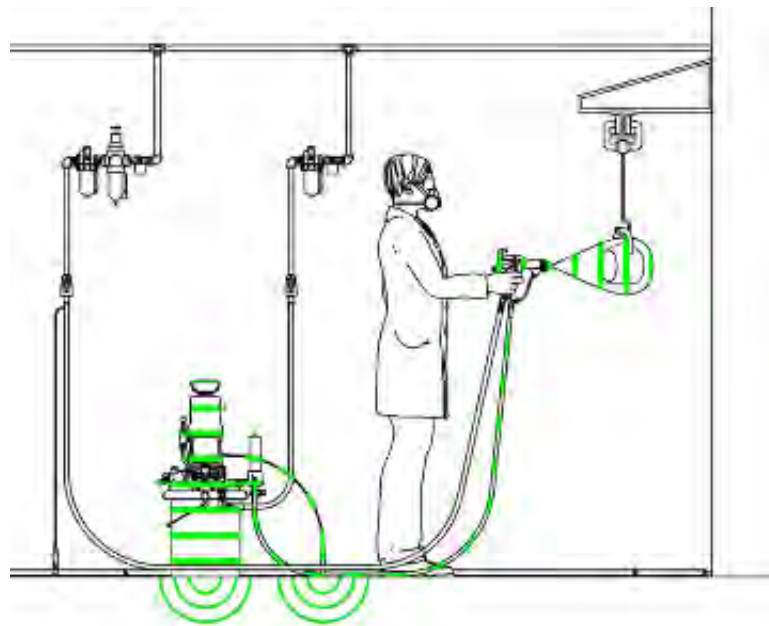


Figure 14 Ground the Fluid Supply

Fluid supply line and source must be grounded.



# Gun Setup

## Gun Setup Procedure

For additional steps to set up specialty guns, see [Soft Spray Gun Setup Procedure, page 29](#), [Round Spray Gun Setup Procedure, page 32](#), [HVLP Gun Setup Procedure, page 30](#), and [Abrasive Material Gun Setup Procedure, page 34](#).

See the figure below to locate the electrostatic gun controls.

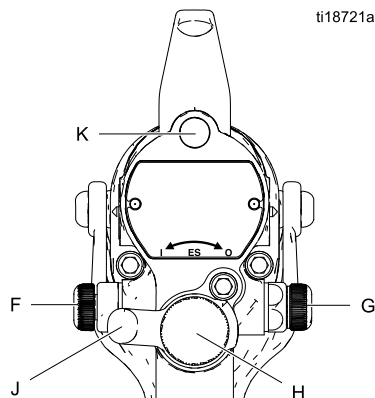
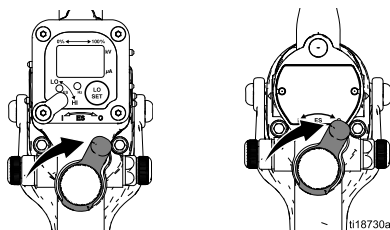


Figure 15 Electrostatic Gun Controls

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 80](#) and [Air Cap Selection Guide, page 83](#). To install the nozzle and air cap, see [Air Cap and Nozzle Replacement, page 49](#).

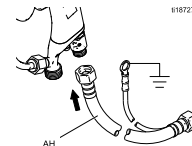
2. Turn OFF (O) the ES On-Off switch (J).



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



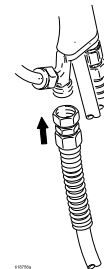
4. Check gun resistance. Follow the steps in [Test Gun Resistance, page 43](#).
5. Connect the Graco grounded air hose to the gun air inlet. The gun air inlet fitting has left-hand threads.



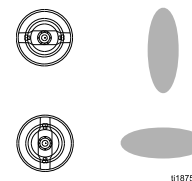
6. Follow all steps in [Grounding, page 21](#).
7. Follow all steps in [Check Gun Electrical Grounding, page 35](#). Reading must be less than 1 megohm.
8. Verify that the material resistivity meets requirements for electrostatic spray. See [Check Fluid Resistivity, page 36](#).
9. Connect the exhaust tube and secure with the clamp provided.



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

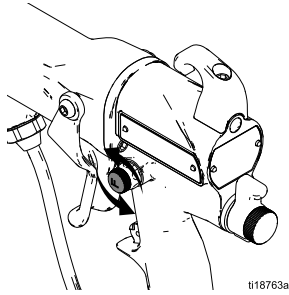


11. Flush if needed. See [Flushing, page 39](#).
12. Position the air cap as needed.



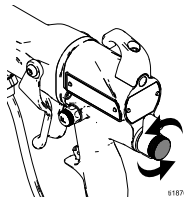
## Gun Setup

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



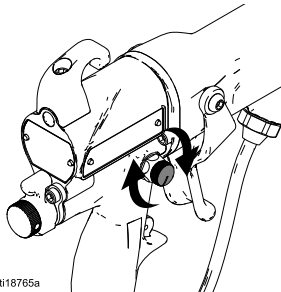
t118763a

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



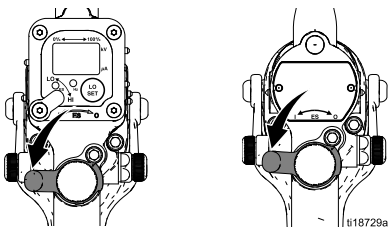
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15. Fully open the atomizing air restrictor valve (G) clockwise.



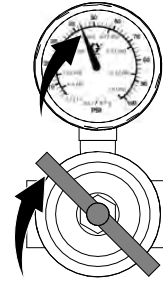
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16. Turn ON (I) the ES On-Off switch (J).



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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.

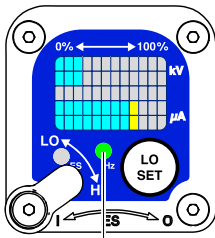


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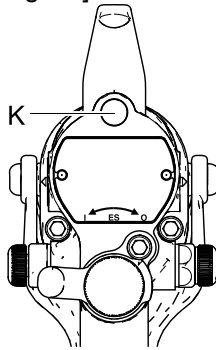
**Table 2 . Pressure Drop**

Air Hose Length in ft (m) using 5/16 inch (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)

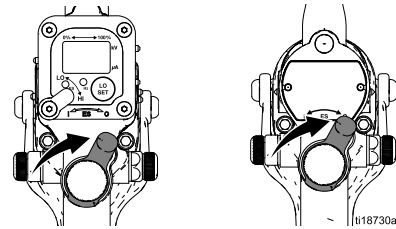
18. Verify that the ES indicator (K) [Hz indicator on Smart guns] is lit.



ti41432a

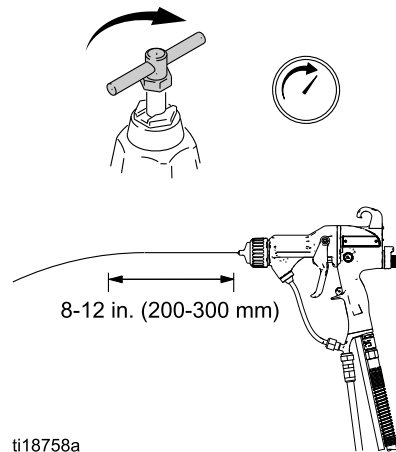


19. Shut off the air to the gun. Turn OFF (O) the ES On-Off switch (J).



ti18730a

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) or above 30 psi (0.21 MPa, 2.1 bar), a change of nozzle size is recommended.

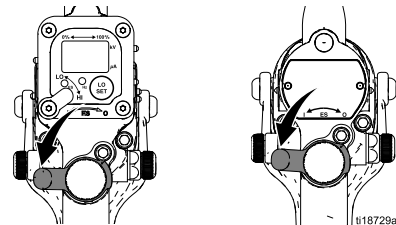


ti18758a

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 one second, the air pressure is too low. Increase air pressure until the indicator is green.
Red	If the indicator changes to red after one second, the air pressure is too high. Decrease air pressure until the indicator is green. To maintain a higher application air pressure, install ES On/Off Valve Restrictor Kit 26A160. Adjust the pressure as needed to ensure the indicator remains green.

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

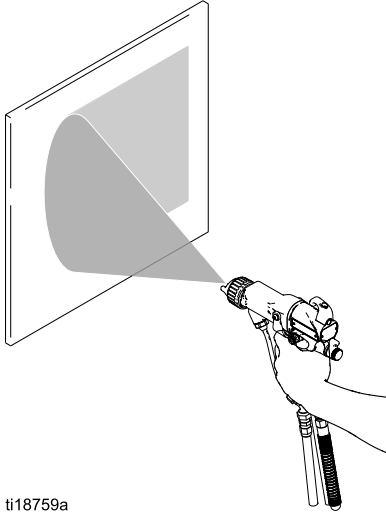


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## Gun Setup

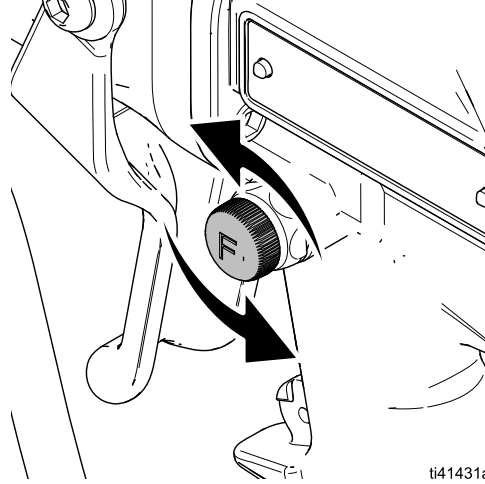
22. Spray a test pattern. Check the atomization.

- If over-atomization occurs at minimum pressure, adjust the atomizing air restrictor valve.
- If atomization is inadequate, increase air pressure or decrease fluid flow.

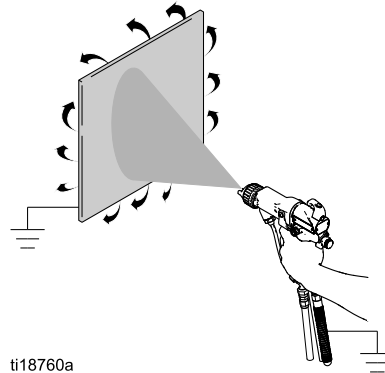


23. Adjust the fan air adjustment valve.

- Fully open the fan air adjustment valve, counterclockwise, for the longest pattern.
- Turn the valve clockwise to restrict the fan air and create a shorter pattern.



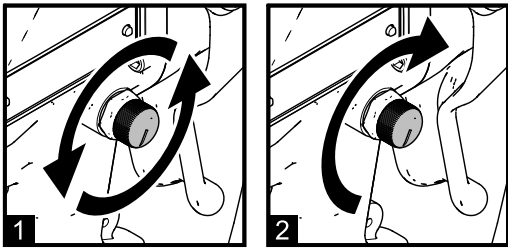
24. Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 45](#).



## Soft Spray Gun Setup Procedure

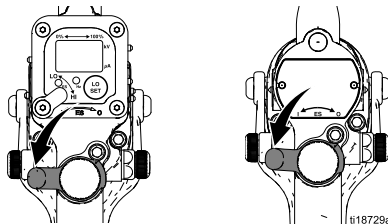
To achieve a soft spray pattern for small or lightweight parts, do the following:

1. Select a soft spray gun model. See [Soft Spray Gun Models, page 5](#) .
  - To convert a gun for soft spray, install a soft spray air cap. See [Air Cap Selection Guide, page 83](#).
  - For best results, install a 1.0 mm or 1.2 mm nozzle. See [Fluid Nozzle Selection Chart, page 80](#).
2. Follow steps 1–14 in the [Gun Setup Procedure, page 25](#).
3. Adjust the atomizing air. Fully close the atomizing air restrictor valve (G) counterclockwise. Then, open the atomizing air restrictor valve (G) one half turn to one turn.



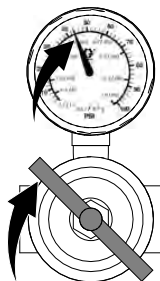
ti35815a

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



ti18729a

5. 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.



ti18706a

Table 4 . Pressure Drop

Air Hose Length in ft (m) using 5/16 inch (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)

6. Verify that the ES indicator (K) [Hz indicator on Smart guns] is lit.

Table 5 . 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 one second, the air pressure is too low. Increase air pressure until the indicator is green.
Red	If the indicator changes to red after one second, the air pressure is too high. Decrease air pressure until the indicator is green. To maintain a higher application air pressure, install ES On/Off Valve Restrictor Kit 26A160. Adjust the pressure as needed to ensure the indicator remains green.

7. Continue with steps 19–24 in the [Gun Setup Procedure, page 25](#).

**NOTE:** The soft spray air cap is optimized for a production rate of 3.5 oz/min (100 cc/min). For best soft spray results, limit the production rate to 7 oz/min (200 cc/min) or less.

**NOTE:** If the object being sprayed is moving too much, adjust the atomizing air restrictor valve (G) counterclockwise slightly to limit the air flow. To improve atomization, adjust the atomizing air restrictor valve (G) clockwise slightly to increase the air flow or decrease the fluid flow.

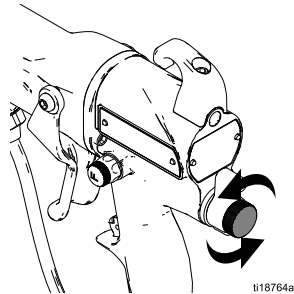
## HVLP Gun Setup Procedure

Most air quality authorities accept electrostatic spraying as the most efficient process and a means to comply with environmental regulation. Follow the [Gun Setup Procedure, page 25](#) when spraying electrostatically with an HVLP air cap. When electrostatic spraying cannot be effectively used on certain parts or materials, an HVLP gun can be used to comply with environmental regulations in most areas. To be in compliance the air pressures at the air cap must be less than 10 psi. Follow the procedure below to set up the spray gun for non-electrostatic HVLP operation.

1. Select an HVLP gun model. See [HVLP Gun Models, page 6](#).

To convert a gun for HVLP, install an HVLP air cap. See [Air Cap Selection Guide, page 83](#).

2. Follow steps 1–12 in the [Gun Setup Procedure, page 25](#).
3. Fully open the fluid adjustment valve (H) counterclockwise.



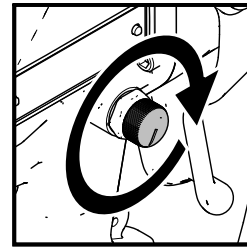
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4. Adjust the air in the air cap.
  - a. Fully open the fan air adjustment valve (F) counterclockwise.



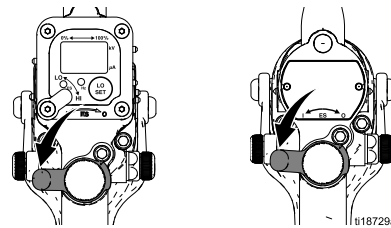
ti35880b

- b. Fully open the atomizing air restrictor valve (G) clockwise.



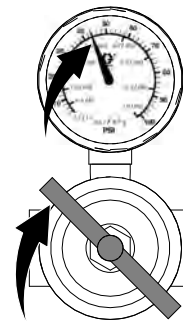
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- c. Turn OFF(I) the ES On-Off switch (J).



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- d. Set the gun air regulator to deliver 30 psi (0.21 MPa, 2.1 bar) at the gun when triggered.



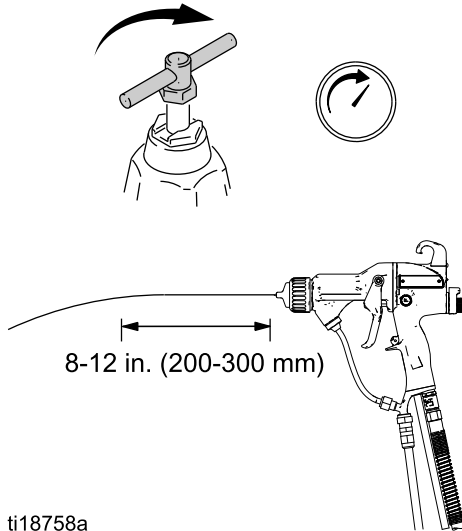
ti18766a

Table 6 Pressure Drop

Air Hose Length in ft (m) using 5/16 inch (8 mm) diameter hose	Air Regulator Setting in psi (MPa, bar) with gun triggered
15 (4.6)	43 (0.29, 3)
25 (7.6)	50 (0.34, 3.4)
50 (15.3)	70 (0.48, 4.8)

5. Shut off the air to the gun.

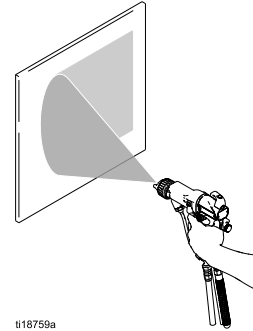
6. Start the pump. Adjust the fluid regulator until the stream from the gun travels 8-12 in. (200-300 mm) before falling off. Typically, if fluid pressure is below 5 psi (.04 MPa, 0.4 bar) or above 30 psi (0.21 MPa, 2.1 bar), a change of nozzle size is recommended.



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7. Turn on the air to the gun.

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

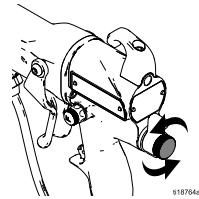


9. Adjust the fan air adjustment valve.
  - If desired, turn the valve clockwise to restrict the fan air and create a shorter pattern.
10. Verify that the air cap pressures meet HVLP requirements of 10 PSI (0.07 MPa, 0.7 bar) or less using the HVLP verification kit 25E919. See manual 3A6833. Adjust the fan air adjustment valve (F) and atomizing air restrictor valve to achieve 10 PSI or less as needed.

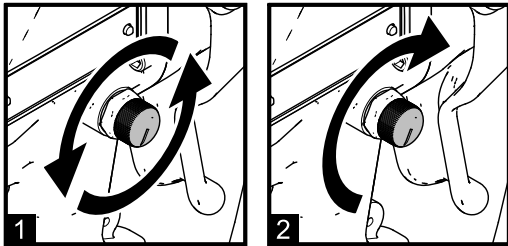
## Round Spray Gun Setup Procedure

To achieve a round spray pattern, do the following:

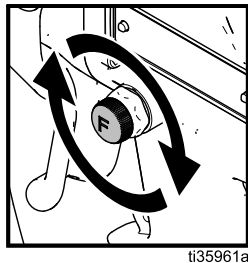
1. Select a round spray gun model or convert an existing gun to round spray.
  - To select a round spray gun model, see [Round Spray Gun Models, page 5](#).
  - To convert a gun for round spray, install a round spray kit. See Round Spray Accessories in [Gun Accessories, page 90](#).
  - To achieve a soft pattern for small parts or increased transfer efficiency, select the medium pattern or small pattern models.
2. Follow steps 1–11 in the [Gun Setup Procedure, page 25](#).
3. Fully open the fluid adjustment valve (H) counterclockwise.



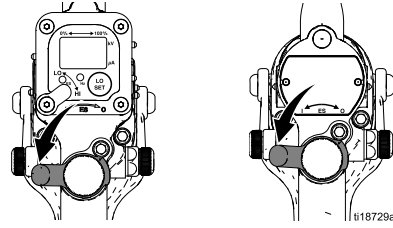
4. Adjust the air in the air cap.
  - a. Fully close the atomizing air restrictor valve (G) counterclockwise. Then, open the atomizing air restrictor valve (G) one turn.



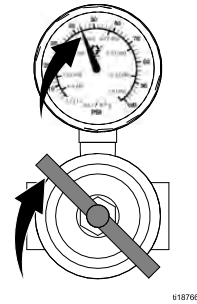
- b. Fully close the fan air adjustment valve (F) clockwise.



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



6. 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.



**Table 7 . Pressure Drop**

Air Hose Length in ft (m) using 5/16 inch (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)

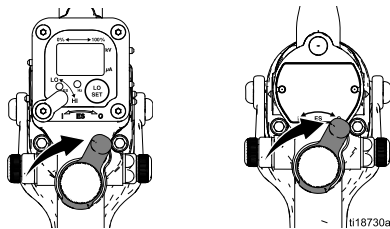


- Verify that the ES indicator (K) [Hz indicator on Smart guns] is lit.

Table 8 . LED Indicator Colors

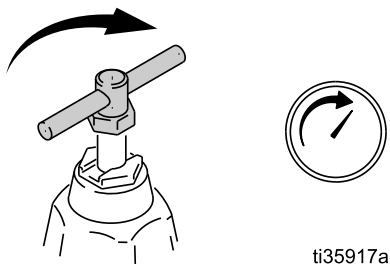
Indicator Color	Description
Green	When spraying, the indicator should remain green, indicating sufficient air pressure to the alternator turbine.
Amber	If the indicator changes to amber after one second, the air pressure is too low. Increase air pressure until the indicator is green.
Red	If the indicator changes to red after one second, the air pressure is too high. Decrease air pressure until the indicator is green. To maintain a higher application air pressure, install ES On/Off Valve Restrictor Kit 26A160. Adjust the pressure as needed to ensure the indicator remains green.

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

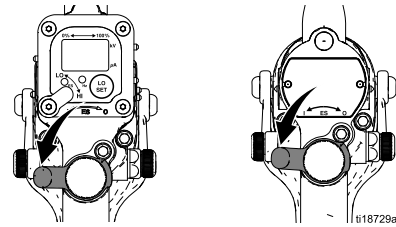


- Start the pump. Adjust the fluid regulator to achieve the production rate that you want.

**NOTE:** The round spray air cap is optimized for a production rate of 5 oz/min (150 cc/min). For best round spray results, limit the production rate to 10 oz/min (300 cc/min) or less.

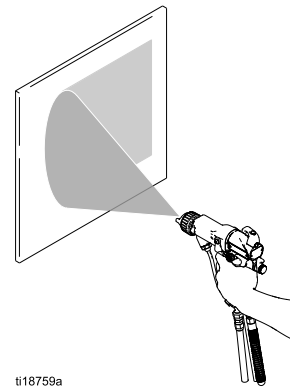


- Turn on the air to the gun. Turn ON (I) the ES On-Off switch (J).



- Spray a test pattern. Check the atomization.

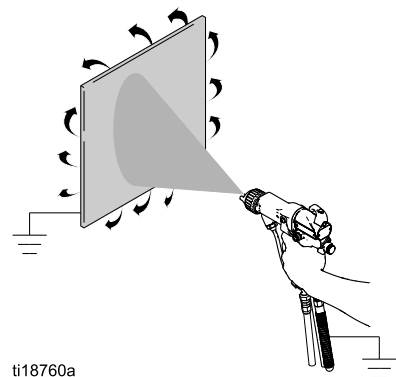
**NOTE:** If the atomization is too fine, or if the object being sprayed is moving too much, adjust the atomizing air restrictor valve (G) counterclockwise slightly to limit the air flow. To improve atomization, adjust the atomizing air restrictor valve (G) clockwise slightly to increase the air flow or decrease the fluid flow.



- Adjust the pattern size.

- For the largest spray pattern, fully close the fan air adjustment valve (F) clockwise.
- For the smallest spray pattern, fully open the fan air adjustment valve (F) counterclockwise.

- Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 45](#).



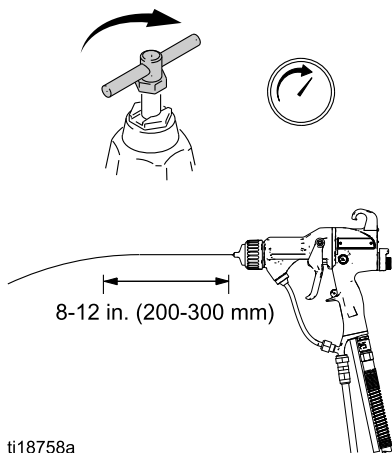
## Abrasive Material Gun Setup Procedure

**NOTE:** To extend wear life, perform the following tasks each day:

- Clean the gun. See [Clean the Gun Daily, page 41](#).
- Inspect the electrode and replace if damaged. See [Electrode Replacement, page 50](#).

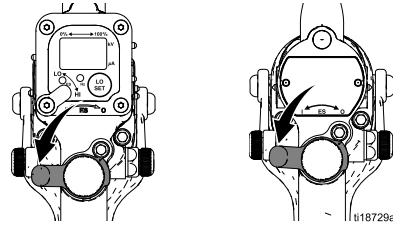
To extend wear life with abrasive, metallic, and extremely abrasive materials, do the following:

1. Select a high conductivity or fixed fluid flow gun model. See [High Conductivity Gun Models, page 4](#) and [Fixed Fluid Flow Gun Models, page 6](#).
2. To convert a gun for abrasive materials:
  - Select a high wear, short, or hardened electrode. See [Electrode Selection Chart, page 89](#).
  - Select a precision high wear or high wear nozzle. See [Fluid Nozzle Selection Chart, page 80](#). Size the nozzle properly to reduce fluid pressure below 30 psi (0.21 MPA, 2.1 bar), producing an 8-12 in (200-300 mm) fluid stream.
  - Use 24N632 ES On-Off and Fixed Fluid Valve.
3. Follow steps 1–19 in the [Gun Setup Procedure, page 25](#).
4. 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) or above 30 psi (0.21 MPa, 2.1 bar), a change of nozzle size is recommended.

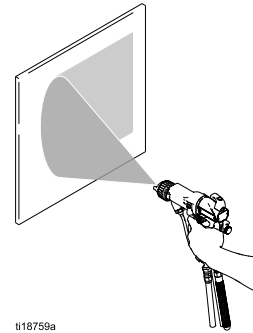


**NOTE:** Operate the gun with the fluid adjustment knob in the full flow position at all times or install 24N632 ES On-Off and Fixed Fluid Valve. Always use an external fluid regulator. Do not use the fluid adjustment knob to set the fluid pressure.

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



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

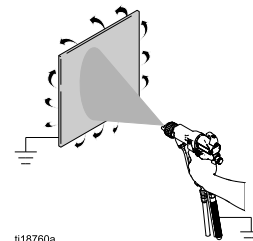


**NOTE:** Use the minimum atomizing air pressure to extend electrode wire wear life. Reduce the gun inlet air pressure or adjust the atomizing air restrictor valve (G) counterclockwise to reduce atomizing air when the application allows.

7. Adjust the fan air adjustment valve.
  - Fully open the fan air adjustment valve, counterclockwise, for the longest pattern.
  - Turn the valve clockwise to restrict the fan air and create a shorter pattern.

**NOTE:** Use the minimum fan air pressure to extend electrode wire wear life. Reduce the gun inlet air pressure or adjust the fan air adjustment valve (F) clockwise to reduce fan air when the application allows.

8. Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 45](#).



## Check Gun Electrical Grounding

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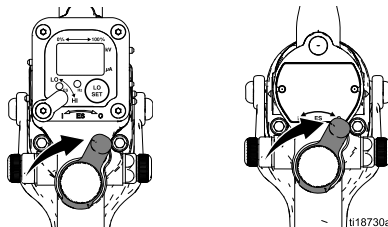
Megohmmeter Part No. 241079 (AA-see Fig. 16) is not approved for use in a hazardous location. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

- The gun has been removed from the hazardous location;
- Or all spraying devices in the hazardous location are turned off, ventilation fans in the hazardous location 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.

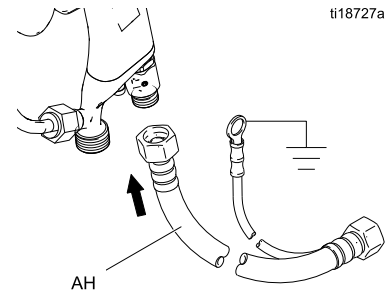
Graco Part No. 241079 Megohmmeter is available as an accessory to check that the gun is properly grounded.

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.

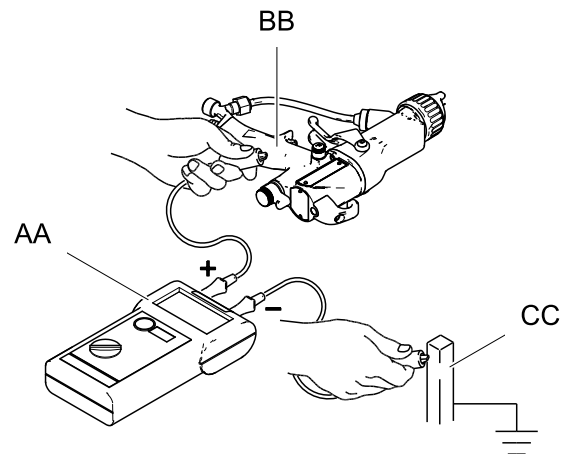


3. Turn off the air and fluid supply to the gun. Follow the [Pressure Relief Procedure, page 37](#).
4. Disconnect the fluid hose.

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 location only. Resistance Meter 722886 and Probe 722860 are not approved for use in a hazardous location.</p>				

Check that the resistivity of the fluid being sprayed meets the requirements for an electrostatic air spray system. Graco Part No. 722886 Resistance Meter and 722860 Probe are available as accessories. Follow the instructions included with the meter and probe.

Fluid resistivity readings of at least 20 megohms-cm generally provide the best electrostatic results and are recommended.

A high conductivity kit or high conductivity hose may be required for readings less than 20 megohm-cm.

**Table 9 . Fluid Resistivity Levels**

Megohms-cm			
1-7	7-20	20-200	200-2000
High Conductivity Kit recommended	High Conductivity Kit may be needed	Best electrostatic results	Good electrostatic results

## Check Fluid Viscosity

A viscosity cup and stopwatch are needed to check fluid viscosity.





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

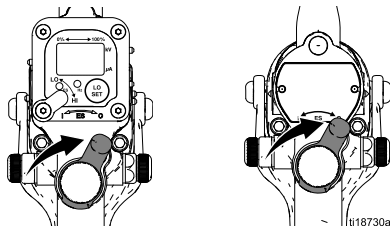
The equipment was tested in fluid at the factory. To avoid contaminating your fluid, flush the equipment with a compatible solvent before using the equipment. See [Flushing, page 39](#).

# Operation

## Pressure Relief Procedure

				
<p>This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment.</p>				

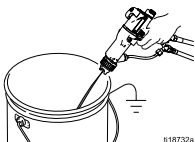
1. Turn OFF (O) the ES On/Off switch.



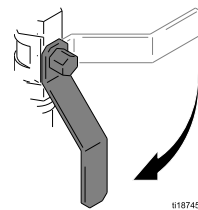
2. Turn off the air bleed valves to the fluid source and to the gun.



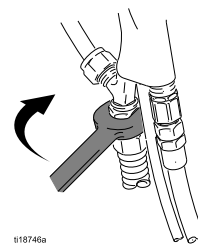
3. Trigger the gun into a grounded metal waste container to relieve the fluid pressure.



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 Procedure, page 25](#).

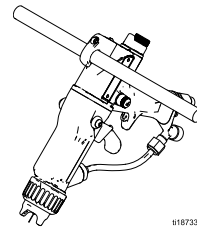
Before operating the system, check the following list daily to ensure safe, efficient operation.

- All operators are properly trained to safely operate an electrostatic air spray system as instructed in this manual.
- All operators are trained in the [Pressure Relief Procedure, page 37](#).
- The warning sign provided with the gun is mounted in the spray area where it can be easily seen and read by all operators.
- The system is thoroughly grounded and the operator and all persons entering the spray area are properly grounded. See [Grounding, page 21](#).
- The condition of the gun's electrical components has been checked as instructed in [Electrical Tests, page 43](#).
- Ventilation fans are operating properly.
- Workpiece hangers are clean and grounded.
- All debris (including flammable fluids and rags) is removed from the spray area.
- All flammable fluids in the spray booth are in approved, grounded containers.
- All conductive objects in the spray area are electrically grounded and the floor of the spray area is electrically conductive and grounded.



## Shutdown

				
To reduce the risk of an injury, follow the <a href="#">Pressure Relief Procedure, page 37</a> whenever you are instructed to relieve the pressure.				

1. Flush the gun. Follow the steps in [Flushing, page 39](#).
2. Follow the [Pressure Relief Procedure, page 37](#).
3. Hang the gun from its hook, with the nozzle pointing down.



# Maintenance

				
<p>To reduce the risk of an injury, follow the <a href="#">Pressure Relief Procedure, page 37</a>, whenever you are instructed to relieve the pressure.</p>				







## Daily Care and Cleaning Checklist

Check the following list daily upon completion of equipment usage.

- Flush the gun. See [Flushing, page 39](#).
- Clean the fluid and air line filters.
- Clean the outside of the gun. See [Clean the Gun Daily, page 41](#).
- Clean the air cap and fluid nozzle daily, at a minimum. Some applications require more frequent cleaning. Replace the spray tip and air cap if they are damaged. See [Clean the Gun Daily, page 41](#).
- Check the electrode and replace if broken or damaged. See [Electrode Replacement, page 50](#).
- Check for fluid leakage from the gun and fluid hoses. Tighten fittings or replace equipment as needed.
- Check electrical grounding. See [Check Gun Electrical Grounding, page 35](#).

## Flushing

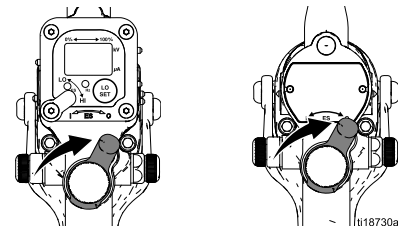
- Flush before changing fluids, before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
- Flush with a fluid that is compatible with the fluid being dispensed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

				
				
<p>To reduce the risk of fire, explosion, or electric shock:</p> <ul style="list-style-type: none"> <li>• Turn OFF (O) the ES On-Off switch before flushing the gun.</li> <li>• Always ground equipment and waste containers.</li> <li>• Flush equipment only in a well-ventilated area.</li> <li>• Use only Group IIA flushing materials. Non-ignitable fluids are preferred.</li> <li>• To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.</li> </ul>				

**NOTICE**

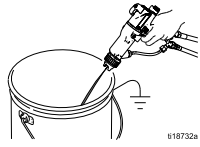
Do not use methylene chloride as a flushing or cleaning solvent with this gun as it will damage nylon components.

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

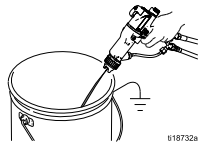


## Maintenance

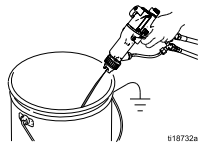
2. Follow the [Pressure Relief Procedure, page 37](#).



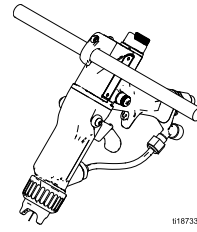
3. Change the fluid source to solvent, or disconnect the fluid line and connect a solvent supply line to the gun.
4. Point the gun into a grounded metal pail. Flush until clean solvent flows from the gun.



5. Follow the [Pressure Relief Procedure, page 37](#).



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 Procedure, page 25](#).

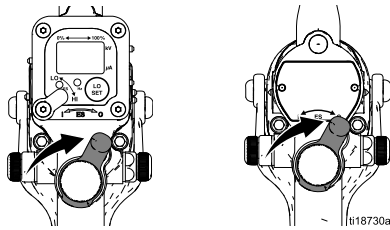


## Clean the Gun Daily

### NOTICE

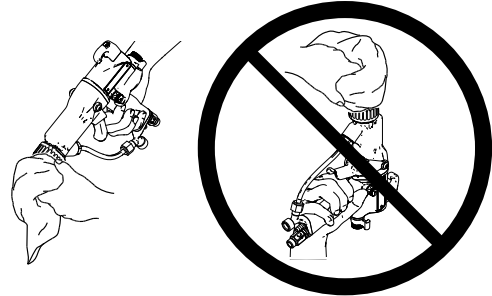
- Clean all parts with a non-conductive, compatible solvent. Conductive solvents can cause the gun to malfunction.
- Fluid in the air passages could cause the gun to malfunction and could draw current and reduce the electrostatic effect. Fluid in the power supply cavity can reduce the turbine life. Whenever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

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



2. Flush the gun. Follow the steps in [Flushing, page 39](#).
3. Follow the [Pressure Relief Procedure, page 37](#).

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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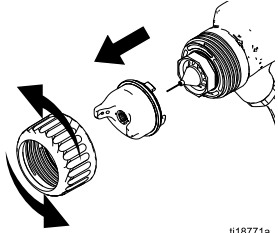


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## Maintenance

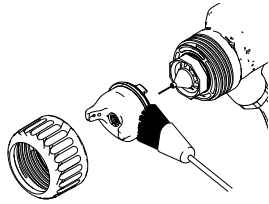
### 5. Clean the air cap.

- a. Remove the air cap.



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



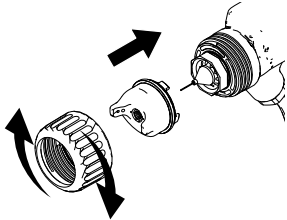
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- c. If necessary, use a toothpick or other soft tool to clean the air cap holes. Do not use metal tools.



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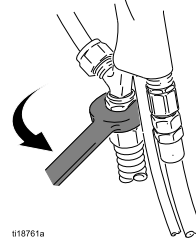
- d. Reinstall the air cap. Tighten securely.



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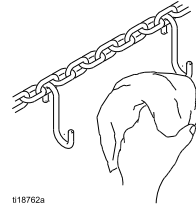
## Daily System Care

1. Follow the [Pressure Relief Procedure, page 37](#).
2. Clean the fluid and air filters.
3. Check for fluid leaks. Tighten all fittings.



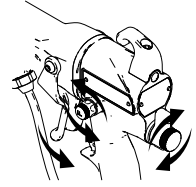
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4. Clean workpiece hangers. Use non-sparking tools.



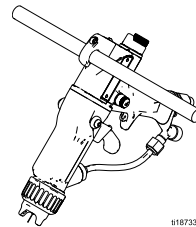
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5. Check the movement of the trigger and valves. Lubricate if necessary.



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6. [Check Gun Electrical Grounding, page 35](#).
7. Hang the gun from its hook, with the nozzle pointing down.






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# Electrical Tests

Electrical components inside the gun affect performance and safety. 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 location. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

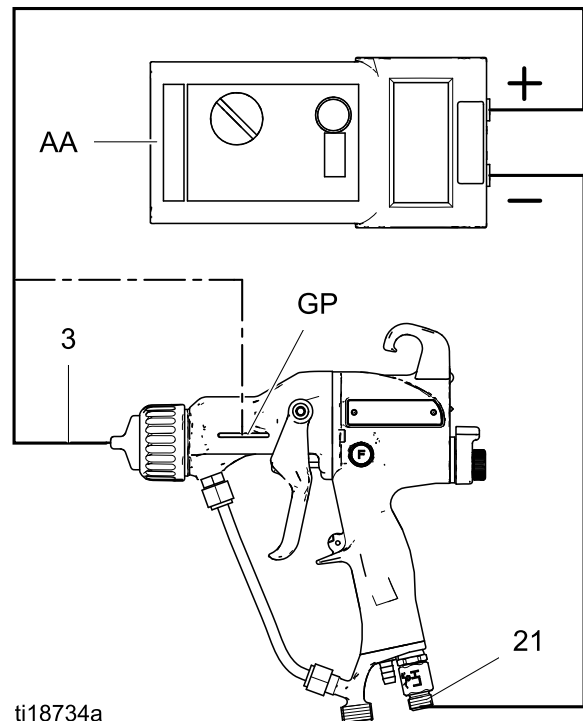
- The gun has been removed from the hazardous location;
- Or all spraying devices in the hazardous location are turned off, ventilation fans in the hazardous location are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).

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 L40M14, L40T14, L40M15, 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 40 kV guns
  - 104–148 megohms for 60 kV guns
  - 148–193 megohms for 85 kV guns

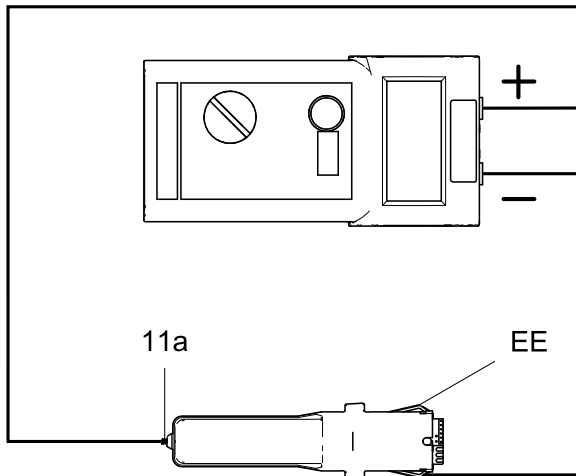
If outside this range, test the gun untriggered. If still outside this range, go to [Test Power Supply Resistance, page 44](#). If in range, see [Electrical Troubleshooting, page 47](#) for other possible causes of poor performance.



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Figure 17 Test Gun Resistance

## Test Power Supply Resistance

1. Remove the power supply (11). Follow the steps in [Power Supply Removal and Replacement, page 54](#).
2. Remove the alternator (15) from the power supply. See [Alternator Removal and Replacement, page 55](#).
3. Measure resistance from the power supply's ground strips (EE) to the spring (11a). The resistance should be:
  - 60–85 megohms for 40 kV guns
  - 86–110 megohms for 60 kV guns
  - 130–160 megohms for 85 kV guns
4. If outside this range, replace the power supply. If in range, go to [Test Electrode Resistance, page 44](#).
5. If you still have problems, refer to [Electrical Troubleshooting, page 47](#) 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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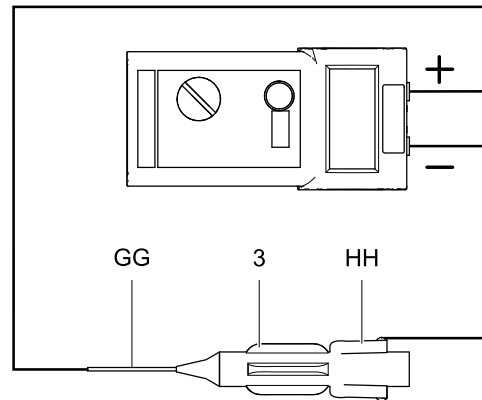
Figure 18 Test Power Supply Resistance

## Test Electrode Resistance

Remove the electrode (3). See [Electrode Replacement, page 50](#). 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

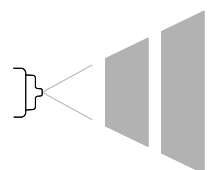



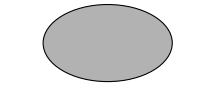
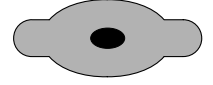
				
<p>Installing and servicing this equipment requires access to parts which may cause an electric shock or other serious injury if the work is not performed properly. Do not install or repair this equipment unless you are trained and qualified.</p>				

				
<p>To reduce the risk of an injury, follow the <a href="#">Pressure Relief Procedure, page 37</a>, 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 <a href="#">Clean the Gun Daily, page 41</a> , or <a href="#">Air Cap and Nozzle Replacement, page 49</a> .
	Air in fluid supply.	Check fluid source. Refill.
Improper spray pattern. 	Damaged or dirty nozzle or air cap.	Clean or replace. See <a href="#">Air Cap and Nozzle Replacement, page 49</a> .
	Fluid buildup on air cap or nozzle.	Clean. See <a href="#">Clean the Gun Daily, page 41</a> .
	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.
	Dirty or damaged air cap.	Clean or replace air cap. See <a href="#">Clean the Gun Daily, page 41</a> , or <a href="#">Air Cap and Nozzle Replacement, page 49</a> .

## 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 refilter fluid.
	Fluid too thick.	Reduce viscosity.
Fluid leaks from the fluid packing area.	Worn packings or rod.	Replace packings. See <a href="#">Packing Rod Repair, page 51</a> .
Air leaks from the front of the gun.	Air valve is not seating properly.	Replace air valve. See <a href="#">Air Valve Repair, page 61</a> .
Fluid leakage from the front of the gun.	Worn or damaged fluid packing rod or electrode.	Replace packing rod (2e) or electrode (3). See <a href="#">Packing Rod Repair, page 51</a> or <a href="#">Electrode Replacement, page 50</a> .
	Worn fluid nozzle seat.	Replace nozzle (4). See <a href="#">Air Cap and Nozzle Replacement, page 49</a> .
	Loose fluid nozzle.	Tighten.
	Damaged nozzle o-ring.	Replace o-ring. See <a href="#">Air Cap and Nozzle Replacement, page 49</a> .
Gun does not spray.	Low fluid supply.	Add fluid if necessary.
	Dirty or clogged fluid nozzle.	Clean. See <a href="#">Clean the Gun Daily, page 41</a> .
	Closed or damaged fluid adjustment valve.	Open valve, or see <a href="#">ES On-Off and Fluid Adjustment Valve Repair, page 60</a> .
Dirty air cap.	Misaligned air cap and fluid nozzle.	Clean fluid buildup off air cap and fluid nozzle seat. See <a href="#">Clean the Gun Daily, page 41</a> .
Excessive paint wrap back to operator.	Poor grounding.	See <a href="#">Grounding, page 21</a> .
	Incorrect distance from gun to part.	Should be 8–12 in. (200–300 mm).

## 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 <a href="#">Test Gun Resistance, page 43</a> .
	Low fluid resistivity.	See <a href="#">Check Fluid Resistivity, page 36</a> .
	Fluid leaks from the packing (2c) and causes a short.	See <a href="#">Packing Rod Repair, page 51</a> .
	Faulty alternator.	See <a href="#">Alternator Removal and Replacement, page 55</a> .
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 <a href="#">Power Supply Removal and Replacement, page 54</a> and <a href="#">Alternator Removal and Replacement, page 55</a> .
Operator gets mild shock.	Operator not grounded or is near ungrounded object.	See <a href="#">Grounding, page 21</a> .
	Gun not grounded.	See <a href="#">Check Gun Electrical Grounding, page 35</a> , and <a href="#">Test Gun Resistance, page 43</a> .
Operator gets shock from workpiece.	Workpiece not grounded.	Resistance must be 1 megohm or less. Clean workpiece hangers.
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 <a href="#">Check Fluid Resistivity, page 36</a> .
	Dirty gun.	See <a href="#">Clean the Gun Daily, page 41</a> .
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 <a href="#">Smart Module Replacement, page 62</a> and <a href="#">Power Supply Removal and Replacement, page 54</a> .

# Repair

## Prepare the Gun for Service

				
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.				

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

- Check all possible remedies in [Troubleshooting, page 45](#) 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. Follow the steps in [Flushing, page 39](#).
  2. Relieve the pressure. Follow the [Pressure Relief Procedure, page 37](#).
  3. Disconnect the gun air and fluid lines.
  4. Remove the gun from the worksite. Repair area must be clean.

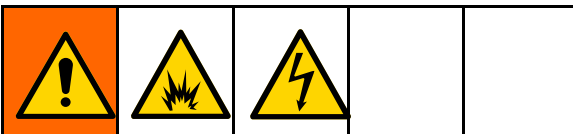


## Air Cap and Nozzle Replacement

### 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. Follow the steps in [Prepare the Gun for Service, page 48](#).
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.

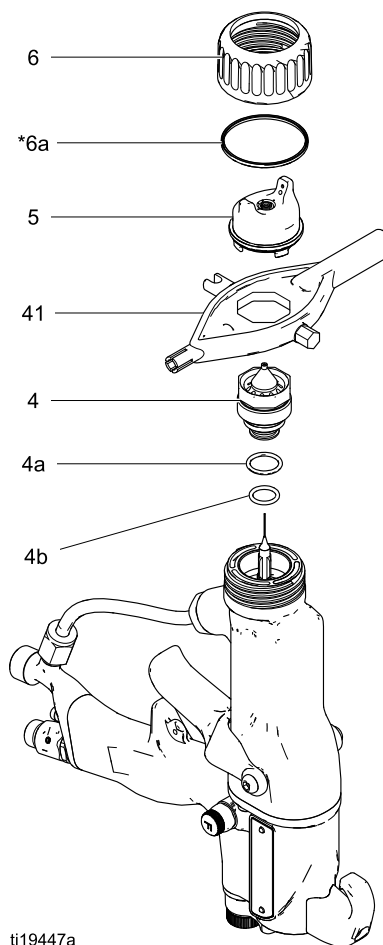
**NOTE:** Use non-silicone grease, Part No. 111265, on the small o-ring (4b). Do not over-lubricate. Do not lubricate the conductive contact ring (4a). Excessive grease can mix with paint and blemish the finish on the workpiece.

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. Follow the steps in [Test Gun Resistance, page 43](#).



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Figure 20 Air Cap and Nozzle Replacement

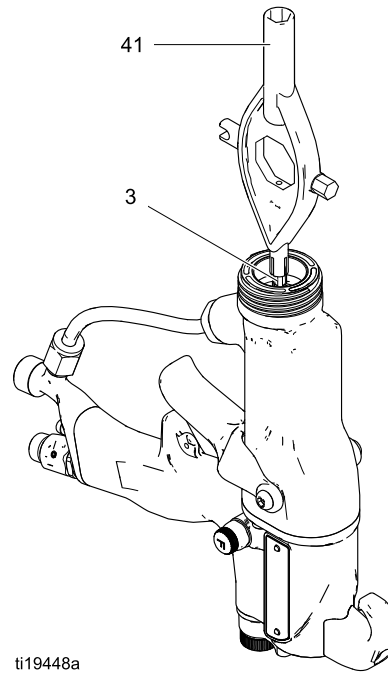
## Electrode Replacement

1. Follow the steps in [Prepare the Gun for Service, page 48](#).
2. Remove the air cap and nozzle. See [Air Cap and Nozzle Replacement, page 49](#).
3. Unscrew the electrode (3) with the multi-tool (41).
4. Apply low-strength (purple) threadlocker 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 49](#).

### **NOTICE**

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

6. Follow the steps in [Test Gun Resistance, page 43](#).



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Figure 21 Electrode Replacement

## Fluid Packing Rod Removal

1. Follow the steps in [Prepare the Gun for Service, page 48](#).
2. Remove the air cap and fluid nozzle. See [Air Cap and Nozzle Replacement, page 49](#).
3. Remove the electrode. See [Electrode Replacement, page 50](#).
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.

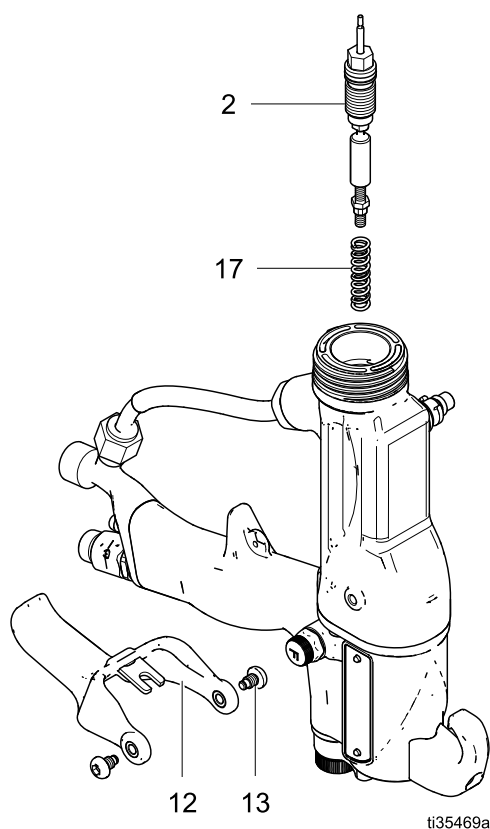


Figure 22 Fluid Packing Rod Removal

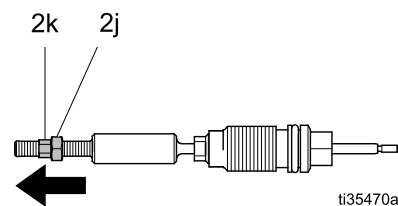
## Packing Rod Repair

**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.

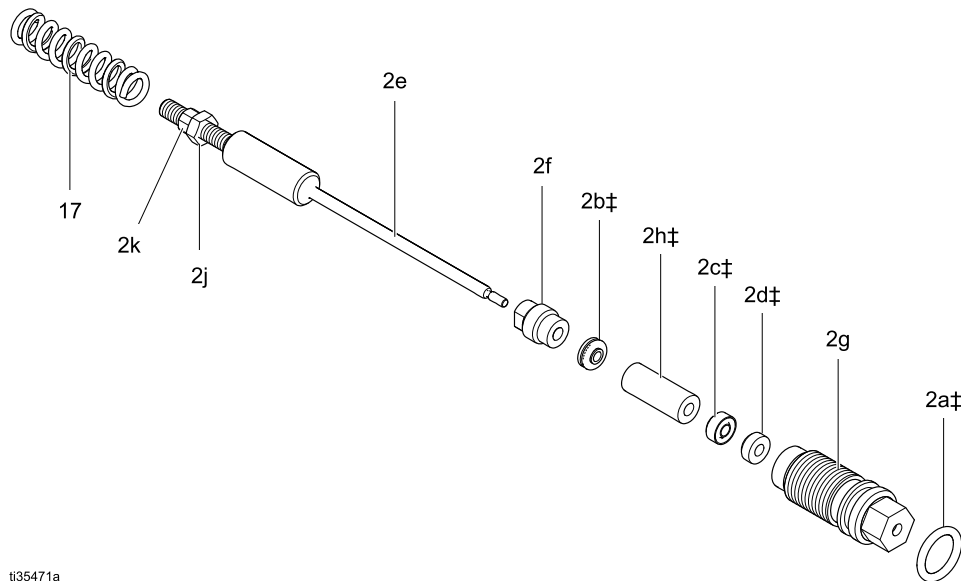


3. Tighten the nuts together to fix them in the new position.

## Reassemble 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 50](#), step 4.
9. Install the nozzle and air cap. See [Air Cap and Nozzle Replacement, page 49](#), steps 5–7.
10. Install the trigger (12) and screws (13).
11. Follow the steps in [Test Gun Resistance, page 43](#).



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Figure 23 Packing Rod

## Barrel Removal

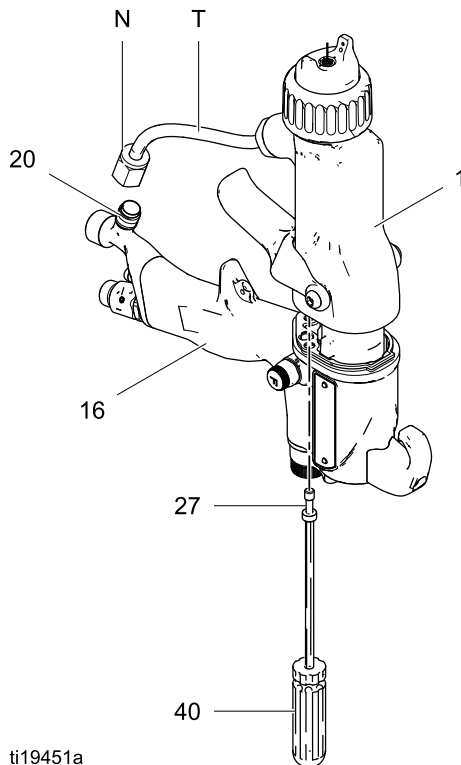
1. Follow the steps in [Prepare the Gun for Service, page 48](#).
2. Carefully loosen the nut (N) from the bracket fluid fitting (20). Pull the tube (T) out of the fitting. Make sure both ferrules (7, 8) and the nut stay with the tube.
3. Loosen the two screws (27).

### 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.



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Figure 24 Barrel Removal

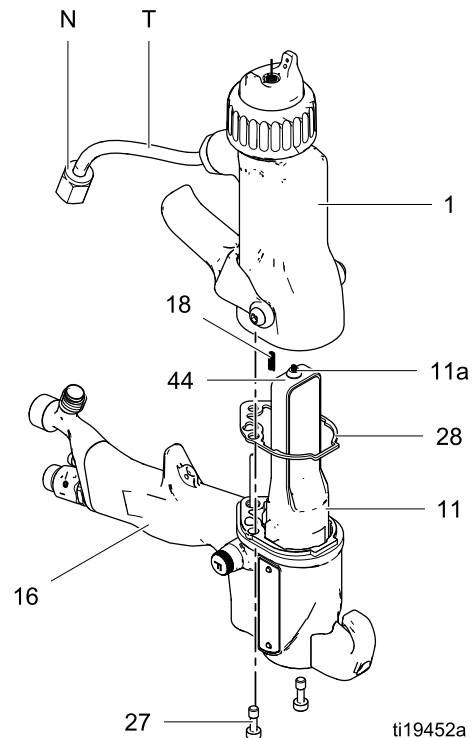
## Barrel Installation

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 or 15–25 in-lb, 1.7–2.8 N•m).

### NOTICE

To avoid damaging the gun barrel, 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. Follow the steps in [Test Gun Resistance, page 43](#).



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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. Replace the gasket if damaged.
1. Follow the steps in [Prepare the Gun for Service, page 48](#).
  2. Follow the steps in [Barrel Removal, page 53](#).

**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. Follow the steps in [Test Power Supply Resistance, page 44](#). Replace the power supply if necessary. To repair the alternator, see [Alternator Removal and Replacement, page 55](#).

**NOTICE**

To prevent damage to the cable and possible interruption of the ground continuity, bend the alternator's 3-wire ribbon cable (PC) upward and back, so the bend faces the power supply and the connector is at the top.

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).

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.

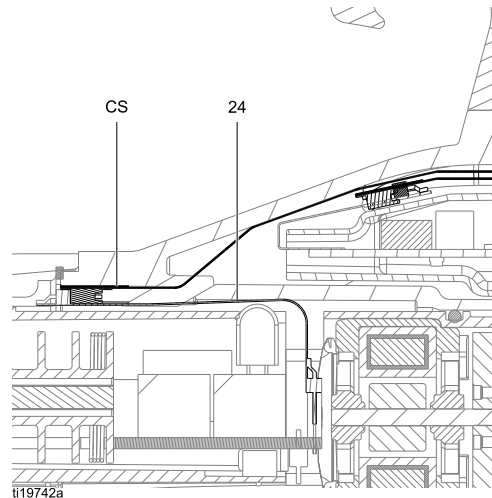


Figure 26 Connect Flexible Circuit

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 53](#).
11. Follow the steps in [Test Gun Resistance, page 43](#).

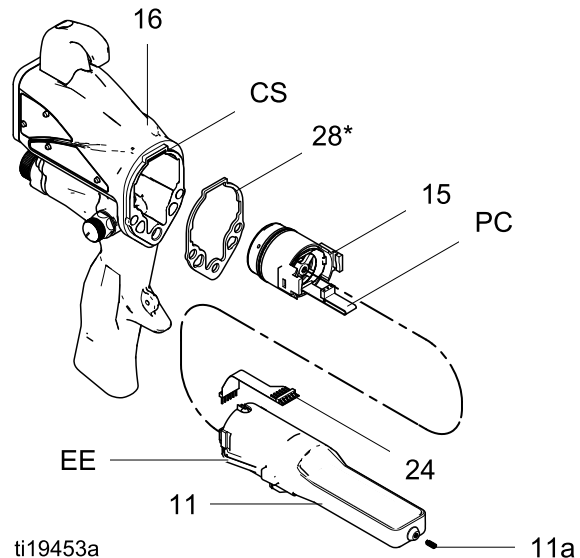


Figure 27 Power Supply

## 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. Follow the steps in [Prepare the Gun for Service, page 48](#).
2. Remove the power supply/alternator assembly and disconnect the alternator. See [Power Supply Removal and Replacement, page 54](#).
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. Using a flat blade screwdriver, pry the clip (15h) off the housing (15d). Remove the cap (15f), using a thin blade or screwdriver.
5. If necessary, rotate the fan (15e) so its blades clear the four bearing tabs (T) of the housing (15d).

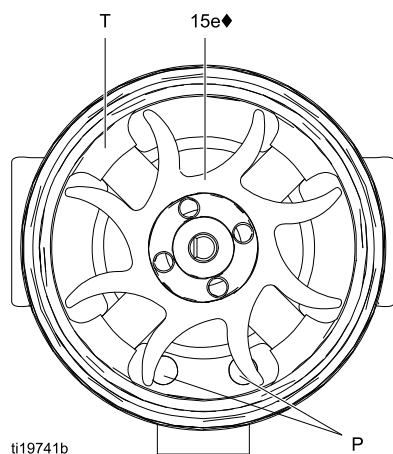


Figure 28 Fan Orientation

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

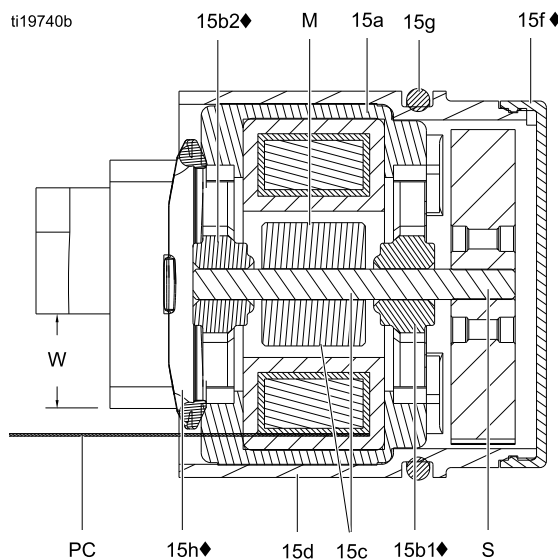


Figure 29 Alternator Cross-Section

(Ref. 28◆ is not shown in the figure.)

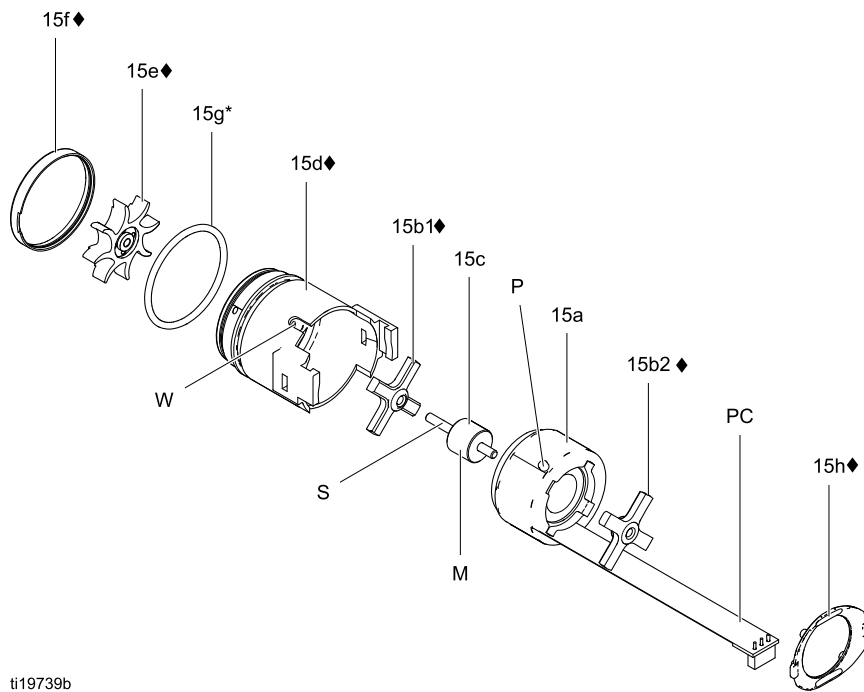
### NOTICE

Do not scratch or damage the magnet (M) or shaft (S). Do not pinch or damage the 3-wire connector (PC) when disassembling and reassembling the bearings.

7. Hold the coil assembly (15a) on a workbench with the fan end facing up. Using a wide blade screwdriver, pry the fan (15e) off the shaft (S).
8. Remove the top bearing (15b2).
9. Remove the bottom bearing (15b1).
10. Install the new bottom bearing (15b1◆) on the long end of the shaft (S). The flatter side of the bearing must face away from the magnet (M). Install in the coil (15a) so the bearing blades are flush with the surface of the coil.
11. Press the new top bearing (15b2◆) onto the short end of the shaft so the bearing blades are flush with the surface of the coil (15a). The flatter side of the bearing must face away from the coil.

## Repair

12. Hold the coil assembly (15a) on a workbench with the fan end facing up. Press the fan (15e♦) onto the long end of the shaft (S). The fan blades must be oriented as shown.
13. Carefully press the coil assembly (15a) into the front of the housing (15d♦) while aligning the pin on the coil with the slot in the housing. The 3-wire connector (PC) must be positioned below the wider notch (W) of the housing tabs, as shown in Fig. 45. Be sure the coil alignment pins (P) are positioned as shown in Fig. 44.
14. Rotate the fan (15e) so its blades clear the four bearing tabs (T) at the back of the housing. Ensure that the blades of the bottom bearing (15b1♦) align with the tabs.
15. Seat the coil fully into the housing (15d♦). Secure with the clip (15h♦), ensuring that its tabs engage the slots in the housing.
16. Ensure that the o-ring (15g) is in place. Install the cap (15f♦).
17. Install the alternator on the power supply, and install both parts in the handle. See [Power Supply Removal and Replacement, page 54](#).



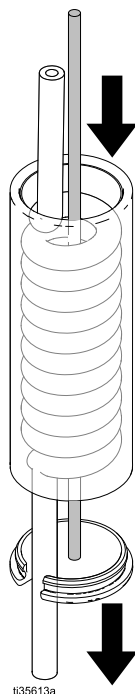
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Figure 30 Alternator



## Fluid Tube Removal and Replacement

1. Follow the [Pressure Relief Procedure](#), page 37.
2. Remove the nut (22) from the bracket (20).
3. Inspect the tube and fittings for damage. Replace as needed.
4. Loosen the fitting (9) to remove the fluid tube (14) from the barrel (1).
5. Optionally, on high conductivity models, the cap and cover can be removed. Use a long rod down the center of the coiled tube to force the cap off the cover, then slide the cover off the coil.



6. Apply dielectric grease (44) to the threads of the fitting (9) and the o-ring (10), and along the inside diameter of the fitting (9). Slide the fitting (9) onto the fluid tube (14)

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

7. Verify that the ferrules (7★) and (8★) are in place. Push the fluid tube into the barrel inlet and hold it in place while threading the fitting into the barrel (1). Torque to 25–35 in-lb (2.8–3.9 N•m).

8. 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.

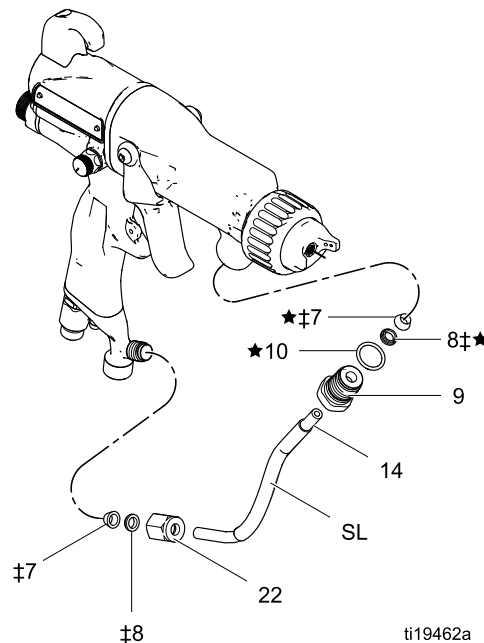


Figure 31 Fluid Tube

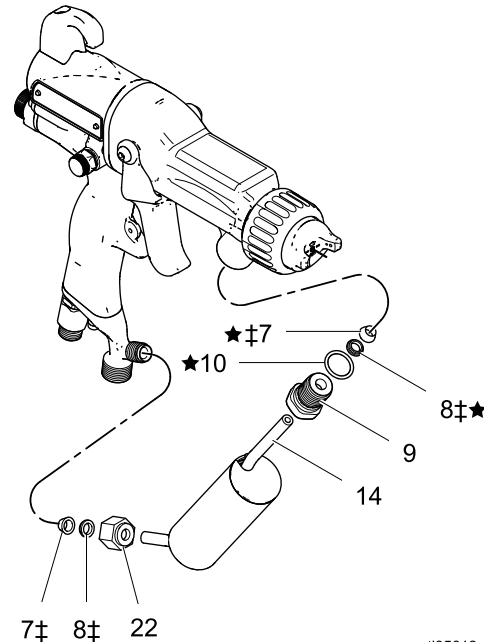


Figure 32 Fluid Tube, HC Models

## Fan Air Adjustment Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 48](#).
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).

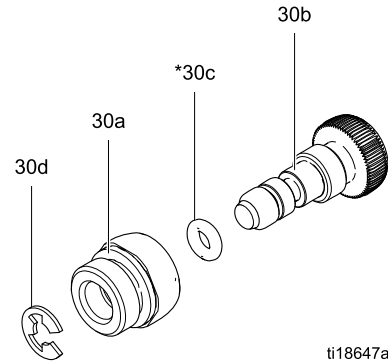


Figure 33 Fan Air Adjustment Valve

## Atomizing Air Restrictor Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 48](#).
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-ring (steps 3–9).
3. Unscrew the valve stem (29e). Remove the retaining ring (29d).
4. Turn the valve body (29b) counterclockwise until it comes free from the valve housing (29a).
5. Inspect the o-ring (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 o-ring (29c) and push the valve body (29b) fully into the housing (29a) until bottomed.
8. Reassemble the retaining ring (29d). Thread the valve stem (29e) halfway into the valve body (29b).
9. Align the slot (S) in the valve stem with the rib (R) in the gun handle. 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).

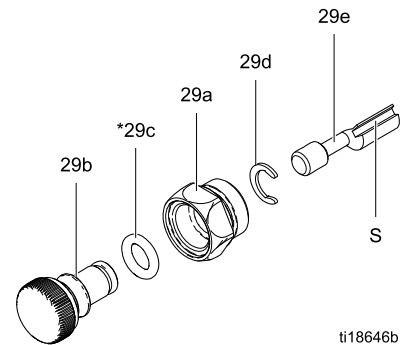


Figure 34 Atomizing Air Restrictor Valve

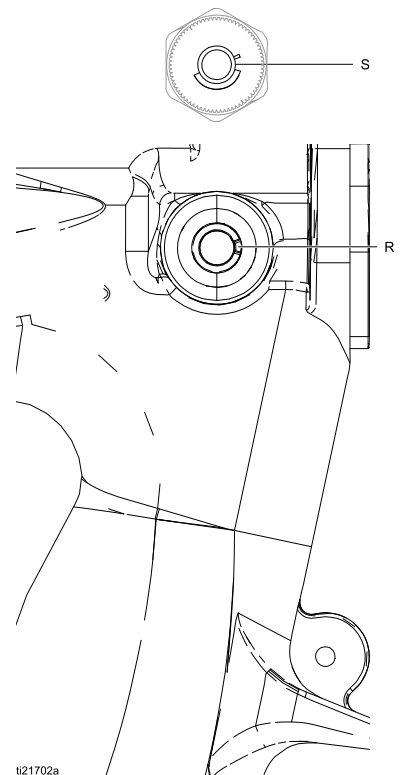


Figure 35 Align Valve Stem

## ES On-Off and Fluid Adjustment Valve Repair

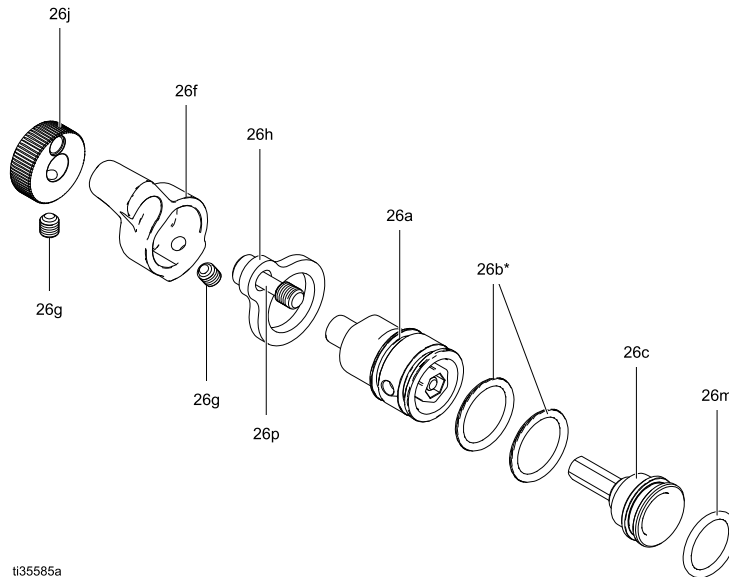
1. Follow the steps in [Prepare the Gun for Service, page 48](#).
2. Loosen the captive screw (26g). Remove the valve (26) from the handle.
3. Lubricate the o-rings (26b\* and 26m\*) with non-silicone grease, Part No. 111265. Do not over-lubricate.

**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.

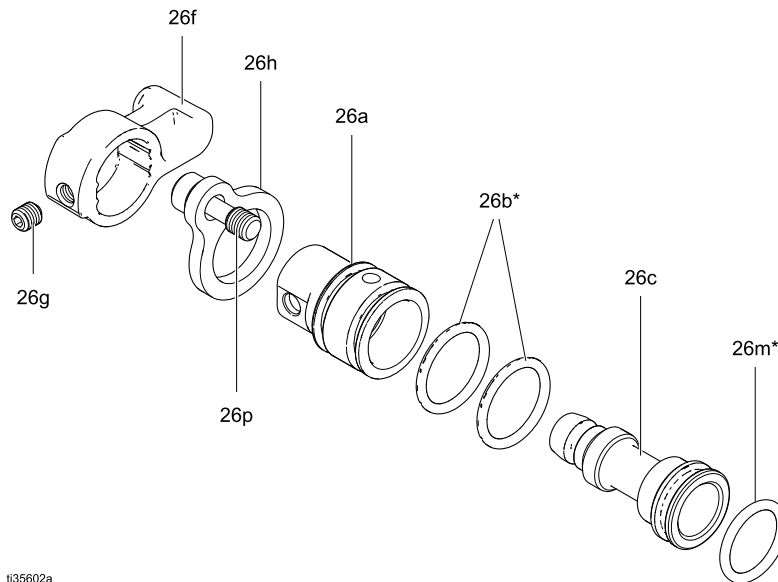
**NOTE:** The protrusion on the retainer plate (26h) must point upward.

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



ti35585a

Figure 36 ES On-Off Valve Repair, 24N630 and 26A160



ti35602a

Figure 37 ES On-Off Valve Repair, 24N632

## Air Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 48](#).
2. Follow the steps in [Barrel Removal, page 53](#).
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 60](#), steps 1 and 2.
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 60](#), steps 3 and 5.
10. Install the trigger (12) and screws (13).
11. Follow the steps in [Barrel Installation, page 53](#).

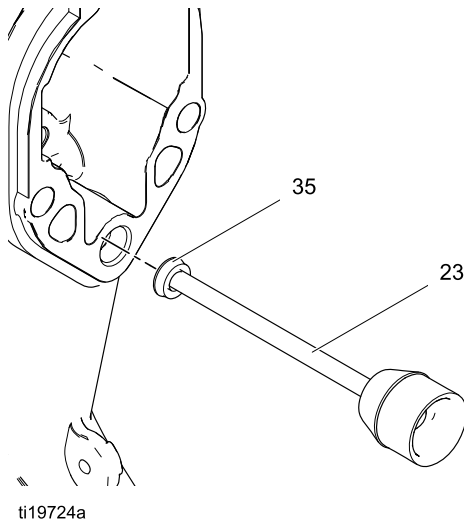


Figure 38 Install U-Cup

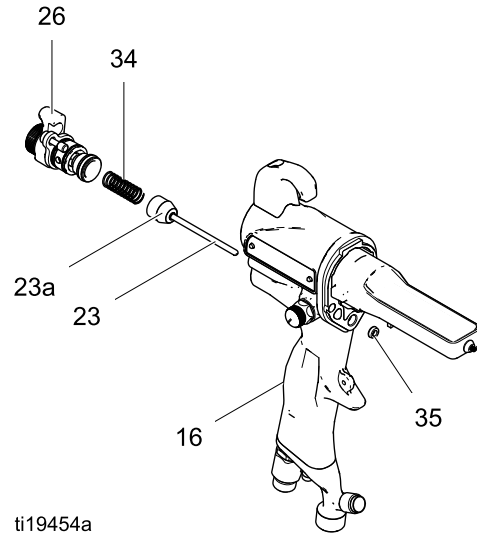


Figure 39 Air Valve

## 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. Follow the steps in [Prepare the Gun for Service, page 48](#).
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 gun's cable (GC) and slide them securely together, as shown. 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 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).

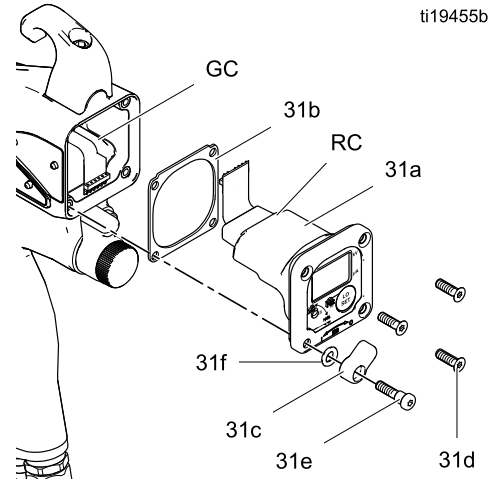


Figure 40 Smart Module

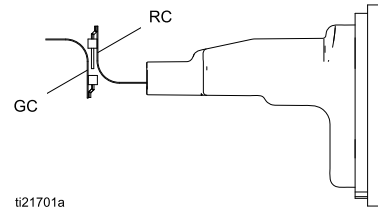
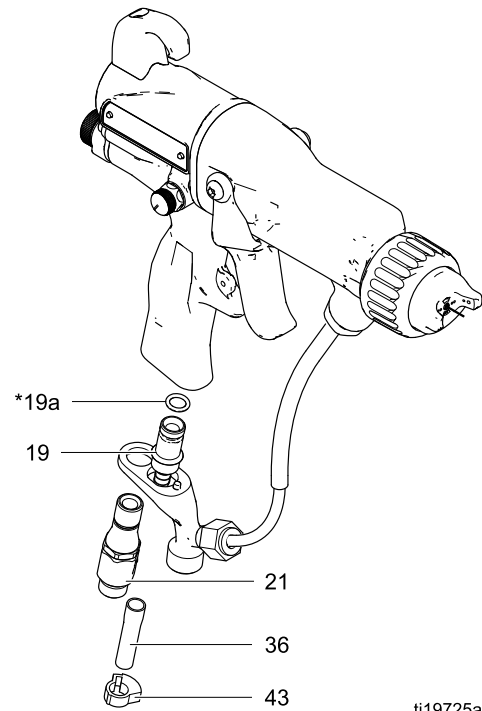


Figure 41 Align Ribbon Cables

## Air Swivel and Exhaust Valve Replacement

1. Follow the steps in [Prepare the Gun for Service, page 48](#).
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).

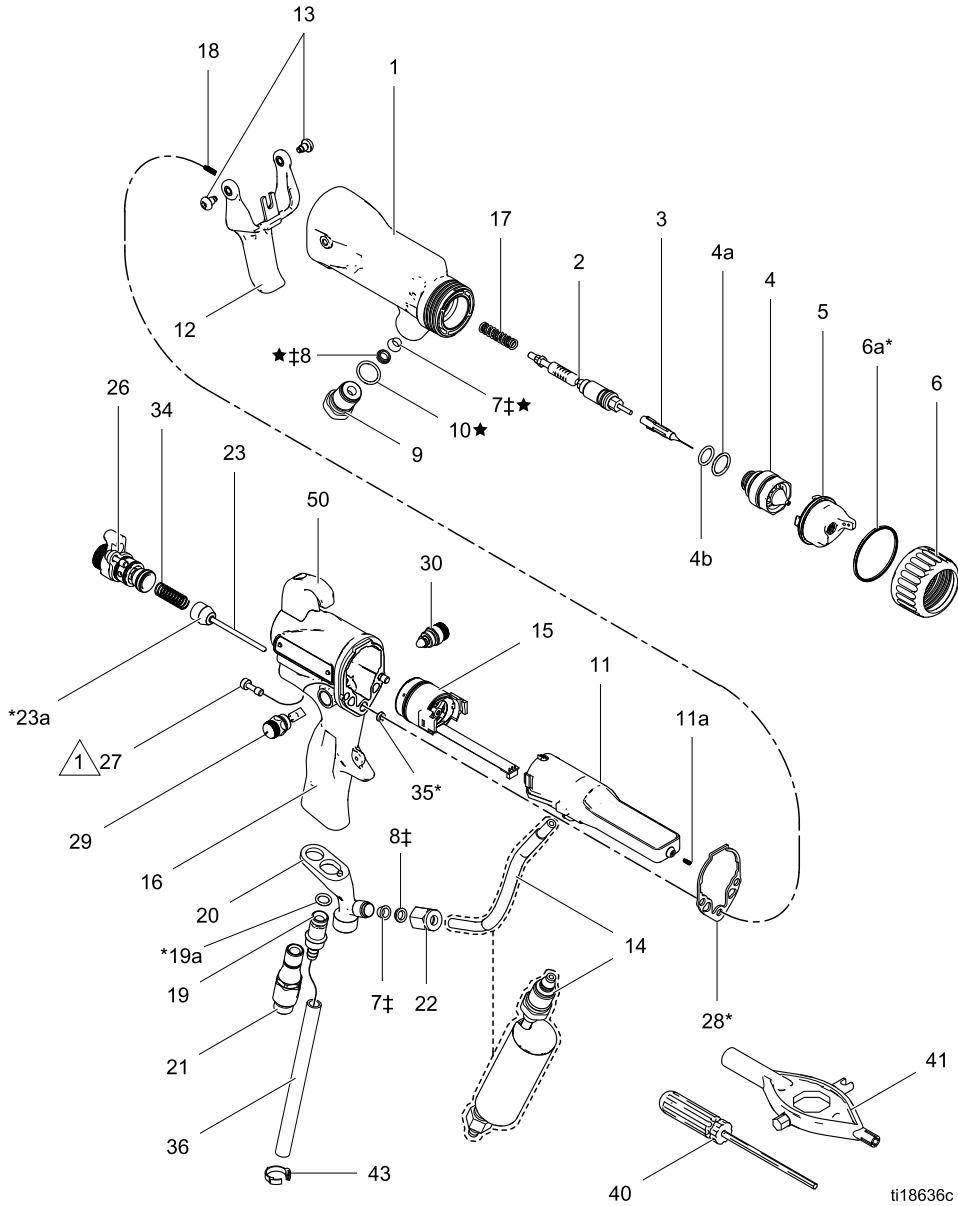


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Figure 42 Air Inlet Fitting and Air Exhaust Valve

# Parts

## Gun Models with Standard Display



1 Torque to 20 in-lb (2 N•m).



## Gun Models with Standard Display

To identify components, see [Models, page 3](#).

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 booster gun	1
2	See <a href="#">Packing Rod Assembly, page 70</a>		1
3	See <a href="#">Electrode Selection Chart, page 89</a>		
	24N651	ELECTRODE, standard	1
	24N704	ELECTRODE, high wear	1
	25N856	ELECTRODE, short	1
4	NOZZLE; includes 4a and 4b. See <a href="#">Fluid Nozzle Selection Chart, page 80</a> .		
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	See <a href="#">Air Cap Selection Guide, page 83</a> .		
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
	25N852	FITTING, fluid; 60 kV gun, HC fluid tube	1
	25N851	FITTING, fluid; 85 kV gun, HC fluid tube	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

Ref. No.	Part No.	Description	Qty
11a	24N979	SPRING	1
12	24N663	TRIGGER; includes item 13	1
13	24A445	SCREW, trigger; package of 2	1
14	24N695	TUBE, fluid, STD; 40 kV gun	1
	24N696	TUBE, fluid, STD, with sleeve; 60 kV gun	1
	24N697	TUBE, fluid, STD, with sleeve; 85 kV gun	1
	25N844	TUBE, fluid; HC, 40 kV gun with cover; includes 7,8,9,10,22; see <a href="#">High Conductivity Fluid Tube Assembly: 60 kV and 85 kV, page 79</a> .	1
	25N843	TUBE, fluid; HC, 60 kV gun with cover; includes 7,8,9,10,22; see <a href="#">High Conductivity Fluid Tube Assembly: 60 kV and 85 kV, page 79</a> .	1
	25N842	TUBE, fluid; HC, 85 kV gun with cover; includes 7,8,9,10,22; see <a href="#">High Conductivity Fluid Tube Assembly: 60 kV and 85 kV, page 79</a> .	1
15	24N664	See <a href="#">Alternator Assembly, page 71</a>	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	24N698	NUT	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1

Parts

Ref. No.	Part No.	Description	Qty
26	See <a href="#">ES On-Off and Fluid Adjustment Valve, page 72</a>		
	24N630	VALVE, ES On/Off and Fluid Adjustment Valve; for all models except as noted	1
	26A160	VALVE, ES On-Off with Air Restrictor and Fluid Adjustment Valve; for High Air Flow gun models	1
	24N632	VALVE, ES On-Off and Fixed Fluid Valve; for Fixed Fluid Flow models	1
27	24N740	SCREW, hex socket; sst; package of 2	1
28*	25N921	GASKET, barrel	1
29	See <a href="#">Atomizing Air Restrictor Valve Assembly, page 74</a>		
	24T304	VALVE, air restrictor; for all other guns	1
	24N733	VALVE, air restrictor; for L60T11	1
30	See <a href="#">Fan Air Adjustment Valve Assembly, page 73</a>		
	24N634	VALVE, fan air; for all other guns	1
	24N732	VALVE, fan air; for L60T11	1
	25N919	VALVE, fan air; quick adjust with spring return	1

Ref. No.	Part No.	Description	Qty
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
50	24N783	HOOK; includes screw	1

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

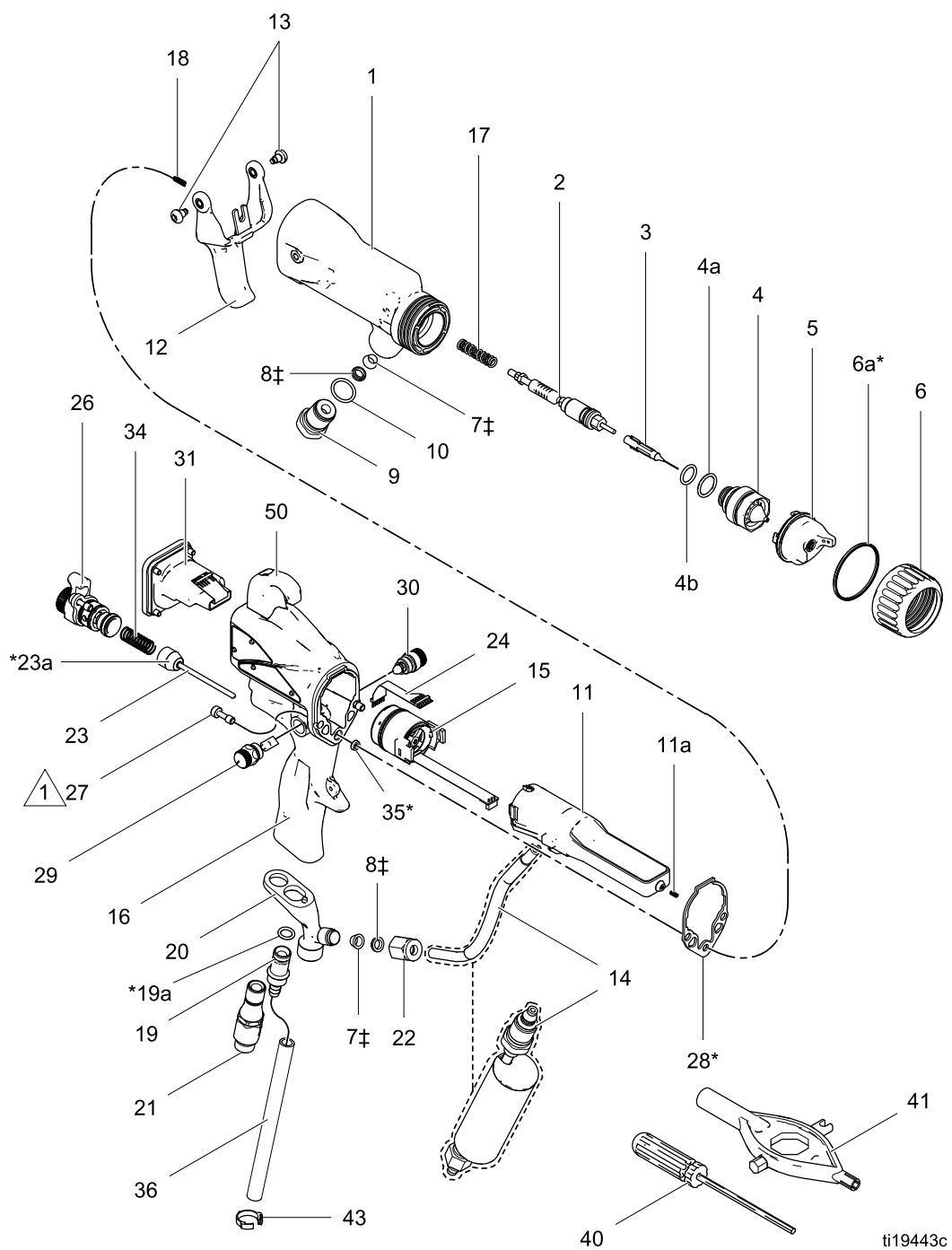
\* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

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

■ Gun bodies (Ref. 1) include the barrel gasket (Ref. 28).

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

# Gun Models with Smart Display



1 Torque to 20 in-lb (2 N•m).

**Gun Models with Smart Display**

To identify components, see [Models, page 3](#).

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 booster gun	1
2	See <a href="#">Packing Rod Assembly, page 70</a>		1
3	See <a href="#">Electrode Selection Chart, page 89</a>		
	24N651	ELECTRODE, standard	1
	24N704	ELECTRODE, high wear	1
4	NOZZLE; includes 4a and 4b. See <a href="#">Fluid Nozzle Selection Chart, page 80</a> .		
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	AIR CAP; see <a href="#">Air Cap Selection Guide, page 83</a>		
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	24N656	FITTING, fluid; 40 kV gun	1
	24N657	FITTING, fluid; 60 kV gun	1
	24N658	FITTING, fluid; 85 kV gun	1
	25N852	FITTING, fluid; 60 kV gun, HC fluid tube	1
	25N851	FITTING, fluid; 85 kV gun, HC fluid tube	1
10	102982	PACKING, o-ring	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

Ref. No.	Part No.	Description	Qty
14	See <a href="#">High Conductivity Fluid Tube Assembly: 60 kV and 85 kV, page 79</a>		
	24N695	TUBE, fluid, STD; 40 kV gun	1
	24N696	TUBE, fluid, STD, with sleeve; 60 kV gun	1
	24N697	TUBE, fluid, STD, with sleeve; 85 kV gun	1
	25N844	TUBE, fluid; HC, 40 kV gun with cover; includes 7,8,9,10,22; see <a href="#">High Conductivity Fluid Tube Assembly: 60 kV and 85 kV, page 79</a> .	1
	25N843	TUBE, fluid; HC, 60 kV gun with cover; includes 7,8,9,10,22; see <a href="#">High Conductivity Fluid Tube Assembly: 60 kV and 85 kV, page 79</a> .	1
	25N842	TUBE, fluid; HC, 85 kV gun with cover; includes 7,8,9,10,22; see <a href="#">High Conductivity Fluid Tube Assembly: 60 kV and 85 kV, page 79</a> .	1
15	24N664	See <a href="#">Alternator Assembly, page 71</a>	1
16	25N850	HANDLE, smart; 40 kV gun	1
	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	24N626	SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread	1
22	24N698	NUT	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1
24	245265	CIRCUIT, flexible	1
26	24N630	See <a href="#">ES On-Off and Fluid Adjustment Valve, page 72</a>	1
	26A160	See <a href="#">ES On-Off and Fluid Adjustment Valve, page 72</a>	1
27	24N740	SCREW, hex socket; sst; package of 2	1

Ref. No.	Part No.	Description	Qty
28*	25N921	GASKET, barrel	1
29	24T304	See <a href="#">Atomizing Air Restrictor Valve Assembly, page 74</a>	1
30	24N634	See <a href="#">Fan Air Adjustment Valve Assembly, page 73</a>	1
31	24N756	See <a href="#">Smart Module Assembly, page 75</a>	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

▲ 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
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
50	24N783	HOOK; includes screw	1

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

■ Gun bodies (Ref. 1) include the barrel gasket (Ref. 28).

## Packing Rod Assembly

**Part No. 24N653 40 kV Packing Rod Assembly**

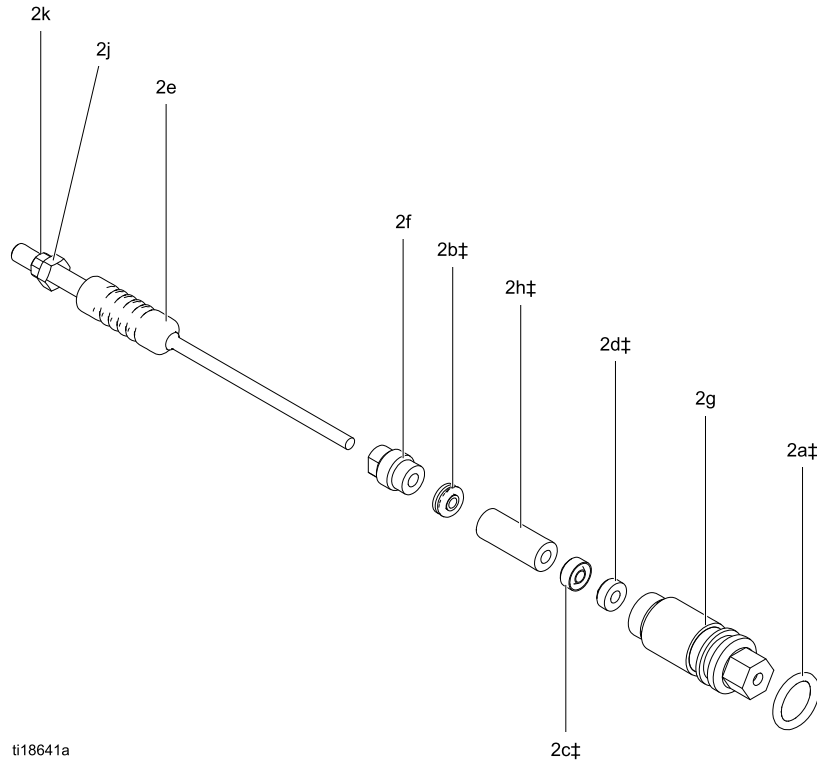
Includes items 2a-2k

**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

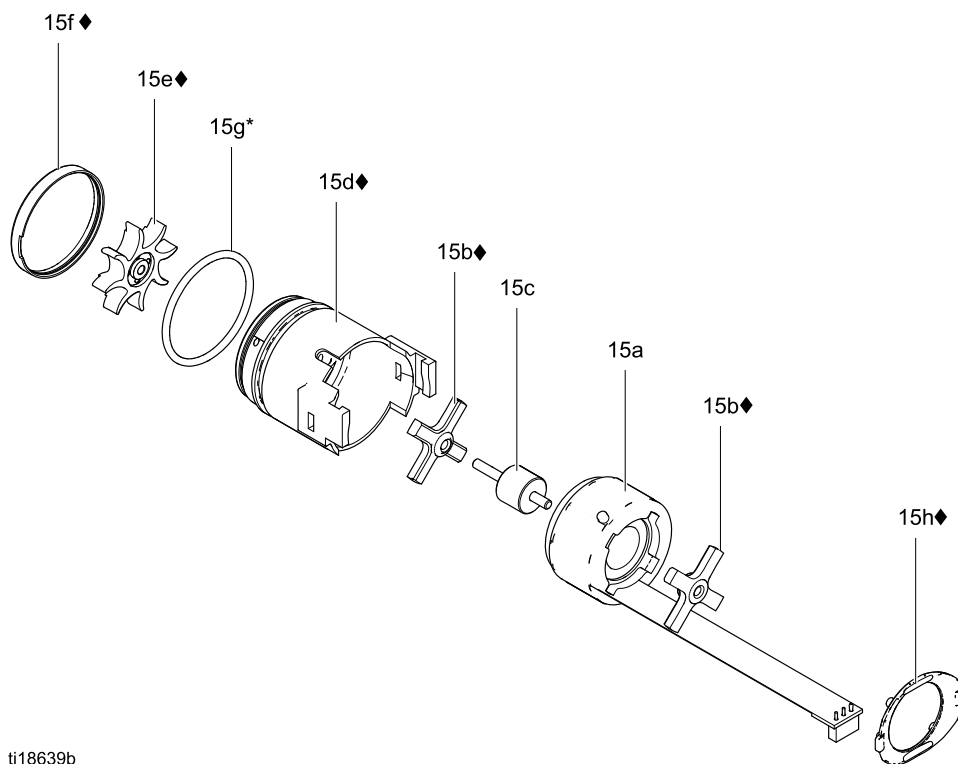
‡ These parts are included in Fluid Seal Repair Kit 24N790 (purchase separately).

♦ 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



ti18639b

Ref. No.	Part No.	Description	Qty
15a	24N705	COIL, alternator	1
15b◆	24N706	BEARING KIT (includes two bearings, item 15d housing, item 15e fan, item 15f cap, and one item 15h clip)	1
15c	24Y264	SHAFT KIT (includes shaft and magnet)	1
15d◆	24N707	HOUSING; includes item 15f	1

Ref. No.	Part No.	Description	Qty
15e◆	— — —	FAN; part of item 15b	1
15f◆	— — —	CAP, housing; part of item 15d	1
15g*	110073	O-RING	1
15h◆	24N709	CLIP; package of 5 (one clip included with item 15b)	1
28◆*	25N921	GASKET, barrel (not shown)	1

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

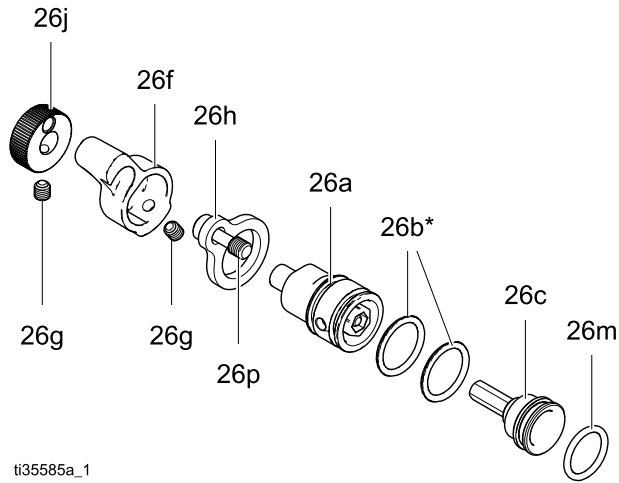
◆ These parts are included in Bearing Kit 24N706 (purchase separately).

Parts labeled — — — are not available separately.

## ES On-Off and Fluid Adjustment Valve

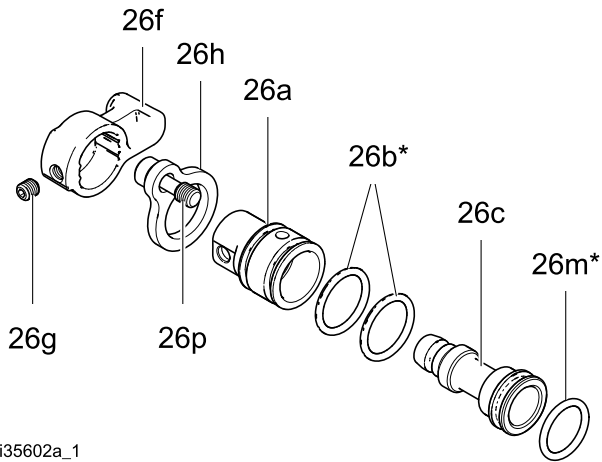
**Part No. 24N630 ES On-Off and Fluid Adjustment Valve**

**Part No. 26A160 ES On-Off with Air Restrictor and Fluid Adjustment Valve**



ti35585a\_1

**Part No. 24N632 ES On-Off and Fixed Fluid Valve**



ti35602a\_1

Ref. No.	Part No.	Description	Qty
26a	— — —	HOUSING, valve; black for models 24N630 and 24N632, blue for restricted model 26A160	1
26b*	15D371	O-RING	2
26c	— — —	PISTON, valve	1
26f	24N649	LEVER, ES on-off; includes 26g; models 24N630 and 26A160	1
	24N650	LEVER, ES on-off; includes 26g; model 24N632	1
26g	GC2082	SCREW, set, socket head	2
26h	24N631	PLATE, retaining	1
26j	24N648	KNOB, adjustment, fluid, black; includes 26g; model 24N630	1
	25E767	KNOB, adjustment, fluid; blue; includes 26g; model 26A160	1
26m*	113746	O-RING	1
26p	24N740	SCREW, captive; pack of 2	1

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

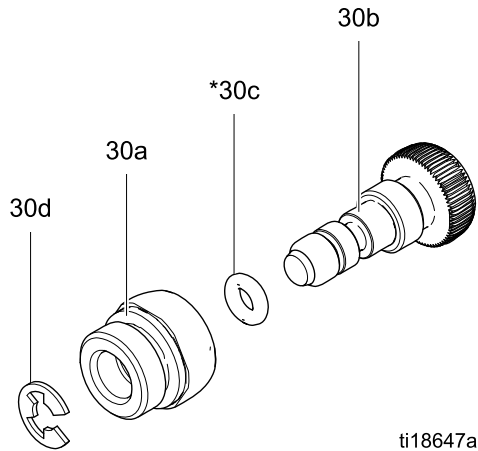
Parts labeled — — — are not available separately.



## Fan Air Adjustment Valve Assembly

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

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



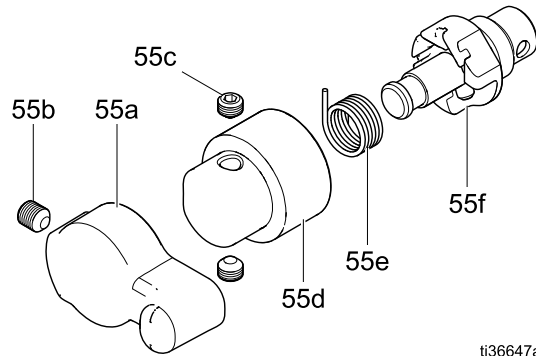
Ref. No.	Part No.	Description	Qty
30a	---	NUT, valve	1
30b	---	STEM, valve	1
	---	STEM, valve; round spray only	1
30c*	111504	O-RING	1
30d	24N646	RING, retaining; package of 6	1

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

Parts labeled --- are not available separately.

## Quick Adjust Fan Valve Assembly

Part No. 25N919 Quick Adjust Fan Valve with spring return.

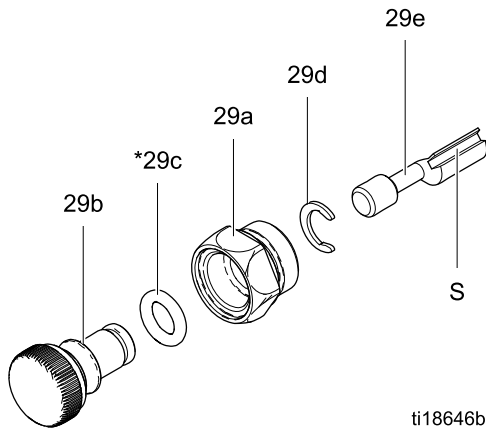


Ref. No.	Part No.	Description	Qty
55a	24N650	LEVER	1
55b	GC2081	SCREW, set	1
55c	GC2080	SCREW, set	2
55d	25P399	KIT, lever adapter	1
55e	25P398	KIT, spring	1
55f	25P397	KIT, shaft assembly	1

## Atomizing Air Restrictor Valve Assembly

Part No. 24T304 Atomizing Air Restrictor Valve Assembly (shown)

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



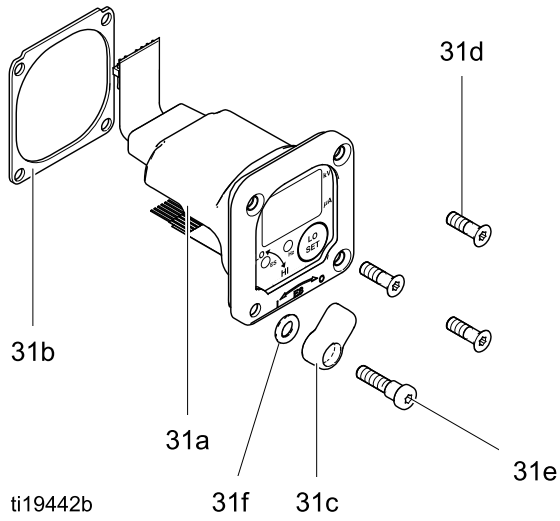
Ref. No.	Part No.	Description	Qty
29a	— — —	HOUSING, valve	1
29b	— — —	BODY, valve	1
	— — —	BODY, valve; round spray only	1
29c*	111516	O-RING	1
29d	118907	RING, retaining	1
29e	— — —	STEM, valve	1
29f	— — —	KNOB, shaft; round spray only	1
29g	— — —	SETSCREW, knob; round spray only	1

\* 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

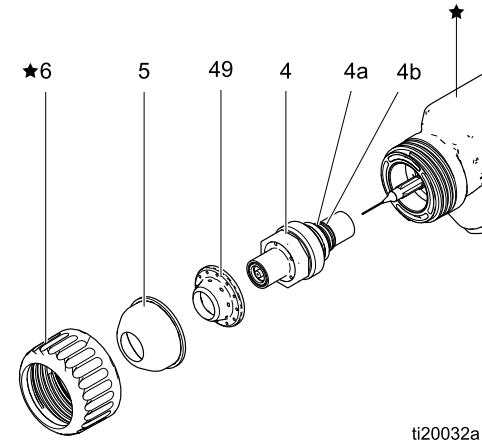
Parts labeled --- are not available separately.

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

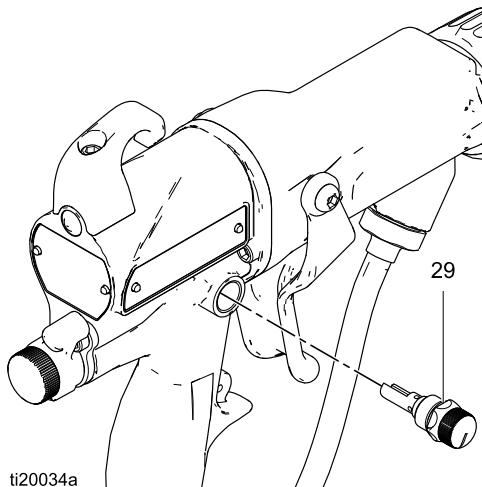
## Round Spray Assembly

### Part No. 24N318 large pattern

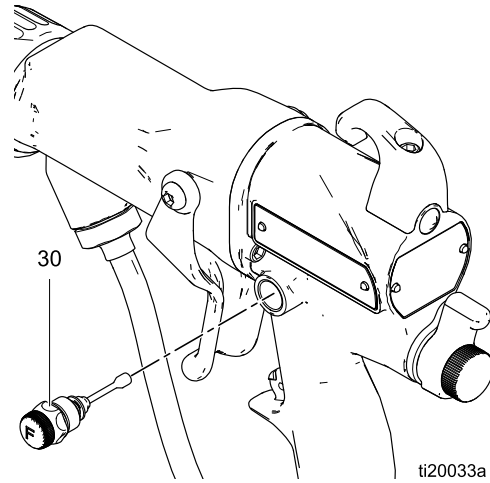
**NOTE:** Items marked with a ★ are shown for reference and are not included in the kit.



ti20032a



ti20034a



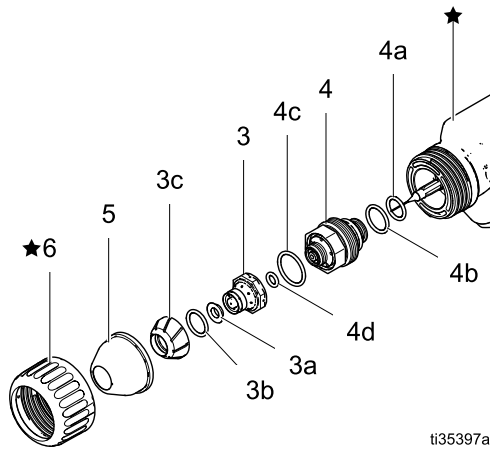
ti20033a

Ref. No.	Part No.	Description	Qty
4	24N729	NOZZLE, round spray; includes 4a and 4b. See <a href="#">Fluid Nozzle Selection Chart, page 80.</a>	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	24N731	AIR CAP, round spray. See <a href="#">Air Cap Selection Guide, page 83.</a>	1
29	24N733	ATOMIZING AIR RESTRICTOR VALVE, round spray	1
30	24N732	FAN AIR ADJUSTMENT VALVE, round spray	1
49	24N730	DIFFUSER, round spray	1

Part No. 25N836 small pattern

Part No. 25N837 medium pattern

NOTE: Items marked with a ★ are shown for reference and are not included in the kit.

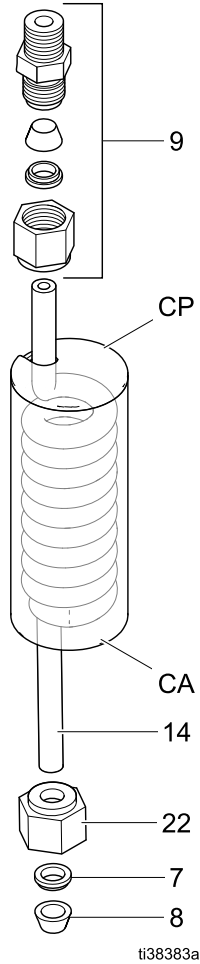


Ref. No.	Part No.	Description	Qty
3	25N838	AIR CAP, inner, small pattern; includes 3a-3c	1
	25N839	AIR CAP, inner, medium pattern; includes 3a-3c	1
3a	25N938	DEFLECTOR, small pattern	1
	25N939	DEFLECTOR, medium pattern	1
3b	113137	O-RING, small pattern	1
	113746	O-RING, medium pattern	1
3c	---	DIFFUSER, small pattern	1
	---	DIFFUSER, medium pattern	1
4	25N835	NOZZLE, round spray; includes 4a-4d	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
4c	117610	O-RING	1
4d	111516	CONDUCTIVE CONTACT RING	1
5	25N840	AIR CAP, small pattern	1
	25N841	AIR CAP, medium pattern	1
6	---	RETAINING RING	1

## High Conductivity Fluid Tube Assembly: 40 kV

Part No. 25N844 40 kV High Conductivity Fluid Tube Assembly, with cover

Part No. 25N937 40 kV High Conductivity Fluid Tube Assembly, no cover



ti38383a

Ref. No.	Part No.	Description	Qty
7	111285	FERULE	1
8	111286	FERRULE	1
9	24N656	FITTING, Fluid; 40 kV	1
14	---	Coil Fluid Tube	1
22	24N656	NUT	1
CP	---	CAP; included in cover kit 25N943	1
CA	25N943	Cover, 40 kV HC fluid tube	1

Parts labeled --- are not available separately.

\* High conductivity gun models include a high conductivity fluid tube assembly with a cover. High conductivity fluid tube assemblies with no cover are available as an accessory only.

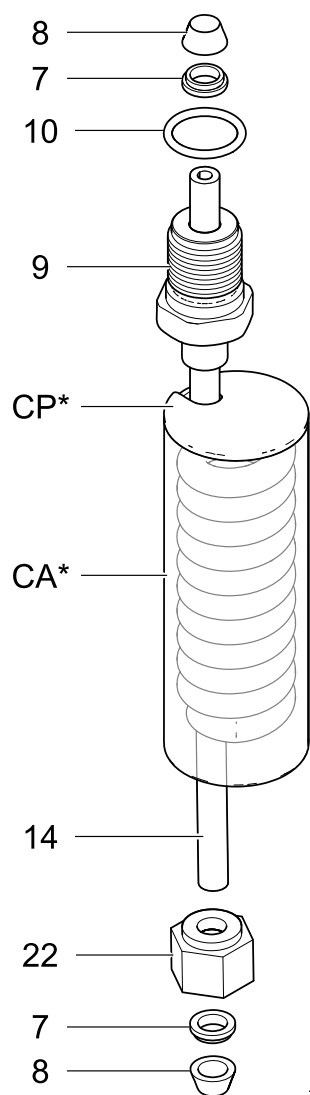
## High Conductivity Fluid Tube Assembly: 60 kV and 85 kV

Part No. 25N843 60 kV High Conductivity Fluid Tube Assembly, with cover

Part No. 25N842 85 kV High Conductivity Fluid Tube Assembly, with cover

Part No. 25N936 60 kV High Conductivity Fluid Tube Assembly, no cover

Part No. 25N935 85 kV High Conductivity Fluid Tube Assembly, no cover



ti35611a

Ref. No.	Part No.	Description	Qty
7	111285	FERRULE	2
8	111286	FERRULE	2
9	25N852	FITTING, fluid; 60 kV (shown)	1
	25N851	FITTING, fluid; 85 kV	1
10	102982	O-RING	1
14	— — —	COILED FLUID TUBE	1
22	24N698	NUT	1
CP	— — —	CAP; included in cover kits 25N941 and 25N942	1
CA *	COVER		
	25N942	Cover, 60 kV HC fluid tube (25N843)	1
	25N941	Cover, 85 kV HC fluid tube (25N842)	1

Parts labeled — — — are not available separately.

\* High conductivity gun models include a high conductivity fluid tube assembly with a cover. High conductivity fluid tube assemblies with no cover are available as an accessory only.

# Fluid Nozzles

## Fluid Nozzle Selection Chart



To reduce the risk of an injury, follow the [Pressure Relief Procedure, page 37](#), before removing or installing a fluid nozzle and/or air cap.

Fluid Nozzle Part No.	Orifice Size mm (in.)	Color	Description
24N619	0.55 (.022)	Black	<b>Standard nozzles (STD)</b> for standard coatings
24N613	0.75 (.029)	Black	
26D094	0.9 (.035)	Black	
25N895	1.0 (.042)	Green	
25N896	1.2 (.047)	Gray	
24N616	1.5 (.055)	Black	
25N897	1.8 (.070)	Brown	
24N618	2.0 (.079)	Black	
25N831	1.0 (.042)	Green	<b>Precision high wear nozzles (PHW)</b> with hardened SST seat and damage resistant SST tip; for standard coatings, abrasives, and metallics
25N832	1.2 (.047)	Gray	
25N833	1.5 (.055)	Black	
25N834	1.8 (.070)	Brown	
24N620	0.75 (.029)	Blue	<b>High wear nozzles (HW)</b> with hardened ceramic seat, for abrasives and metallics
24N621	1.0 (.042)		
24N622	1.2 (.047)		
24N623	1.5 (.055)		
24N624	1.8 (.070)		
24N625	2.0 (.079)		
24N729	— — —	Black	<b>Round spray large pattern nozzle</b> for use with large pattern round spray air cap only
25N835	— — —	Black	<b>Round Spray medium or small pattern nozzle</b> for use with medium or small pattern round spray air caps only







## Fluid Nozzle Performance Charts

Use the following procedure to select the proper fluid nozzle for your application.

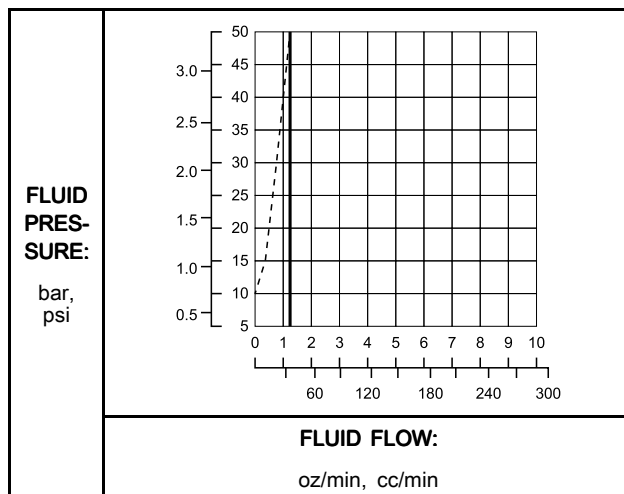
1. For each fluid nozzle chart, find the point on the graph corresponding to your desired flow rate and viscosity. Mark the point on each graph with a pencil.
2. The thick vertical line in each graph represents the target flow rate for that nozzle size. Find the graph that has the marked point closest to the thick vertical line. This is the recommended nozzle size for your application. Significantly exceeding the target flow rate may result in lower spray performance due to excessive fluid velocity.
3. From the marked point, move across to the vertical scale to find the required fluid pressure. If the required pressure is too high, use the next largest nozzle size. If the fluid pressure is too low (< 0.35 bar, 3.5 kPa, 5 psi), use the next smallest nozzle size.

### Key to Fluid Nozzle Performance Charts

**NOTE:** Fluid pressures are measured at the spray gun inlet.

260 Centipoise Fluid	
160 Centipoise Fluid	
70 Centipoise Fluid	
20 Centipoise Fluid	

**Table 10 . Orifice Size: 0.55 mm (0.022 in.)**



**Table 11 . Orifice Size: 0.75 mm (0.030 in.)**

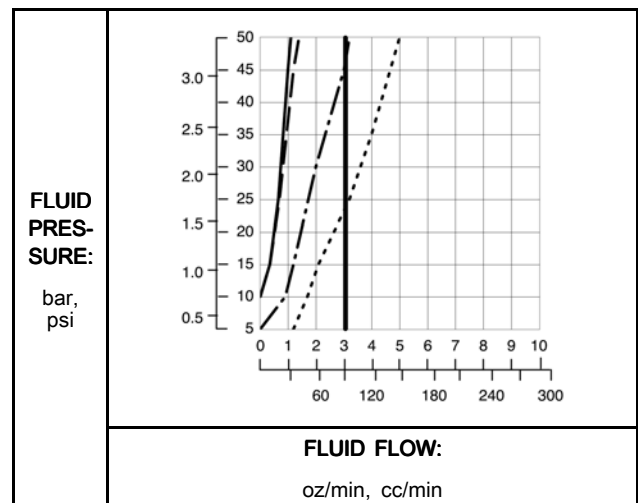


Table 12 . Orifice Size: 1.0 mm (0.040 in.)

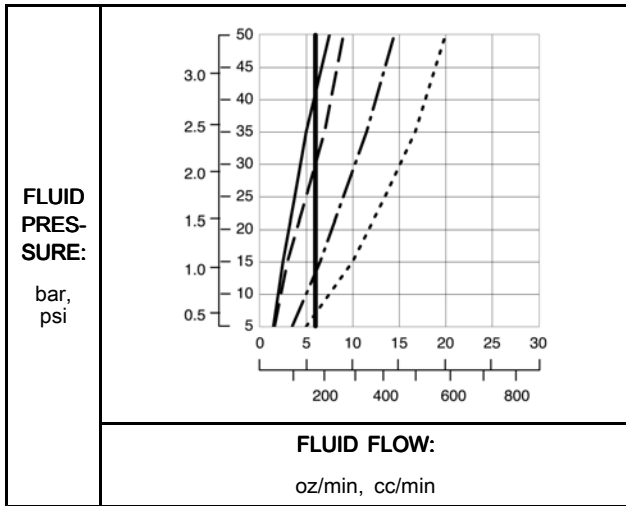


Table 15 . Orifice Size: 1.8 mm (0.070 in.)

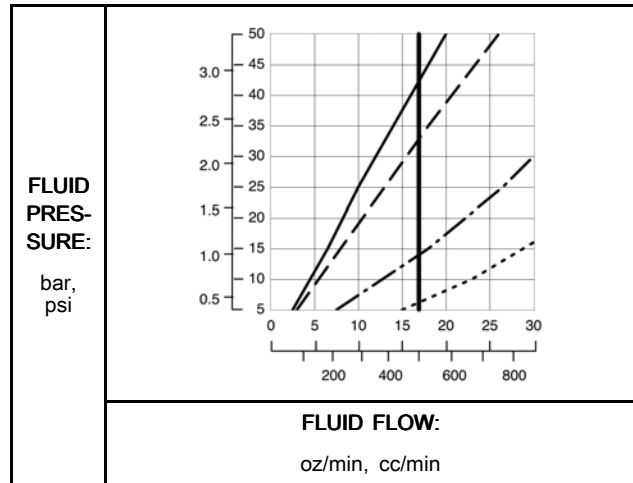


Table 13 . Orifice Size: 1.2 mm (0.047 in.)

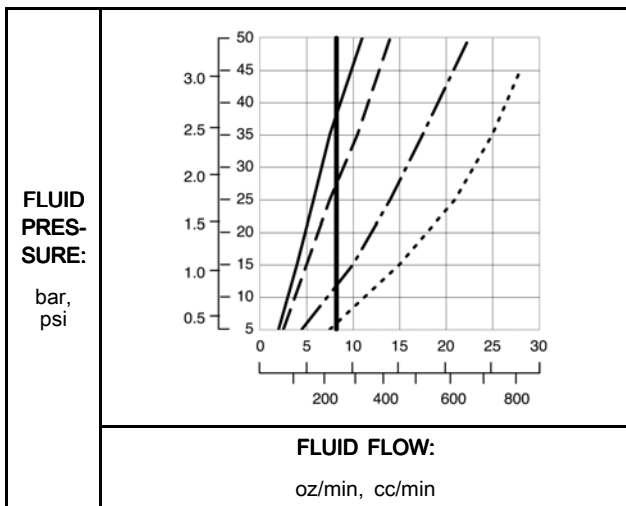


Table 16 . Orifice Size: 2.0 mm (0.080 in.)

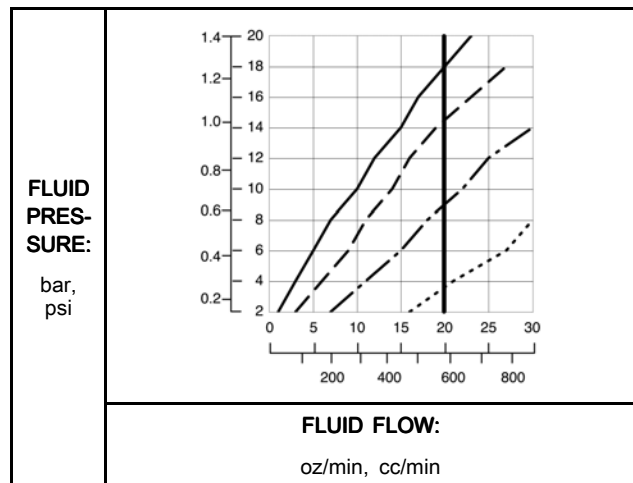
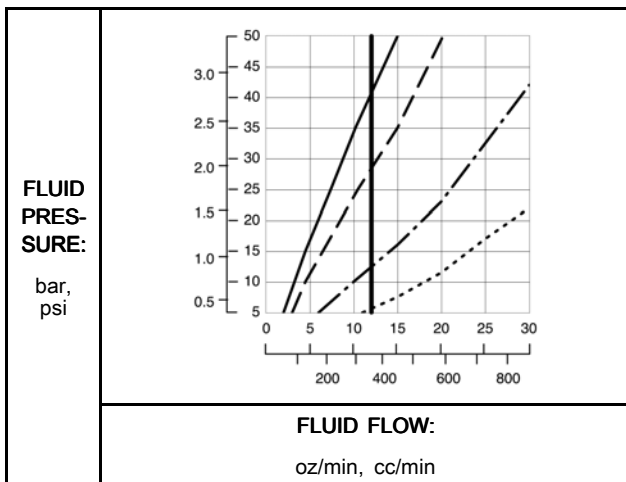





Table 14 . Orifice Size: 1.5 mm (0.059 in.)



# Air Caps

## Air Cap Selection Guide

				
<p>To reduce the risk of an injury, follow the <a href="#">Pressure Relief Procedure, page 37</a>, before removing or installing a fluid nozzle and/or air cap.</p>				

The charts in this section can assist you in selecting an air cap.

- Keep in mind that more than one air cap can meet your finish requirements.
- When selecting an air cap, consider coating properties, part geometry, pattern shape, pattern size, and operator preferences.

### Measurements

All air cap pattern shapes and lengths in the following charts were measured under the following conditions, unless otherwise noted:

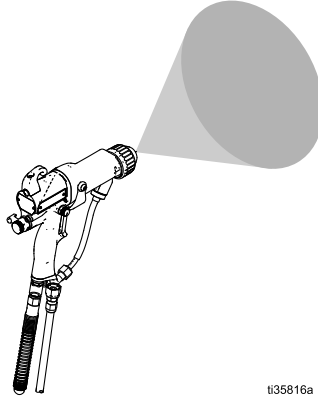
**NOTE:** Pattern shape and length are material-dependent.

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

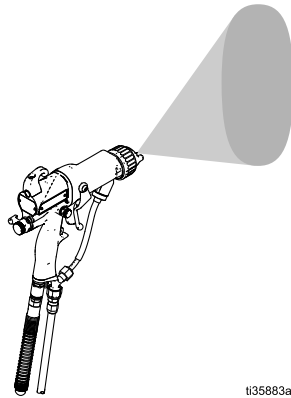
**Pattern Shape**

NOTE: Pattern shapes are influenced by the material viscosity, flow rate, and air pressure settings. The gun may not maintain the intended design shape under all conditions.

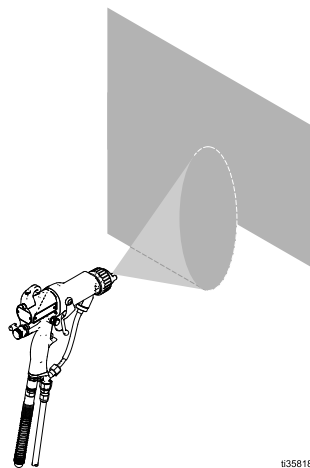
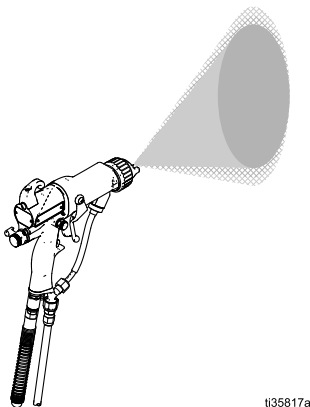
- **Round patterns** have a swirling, slow, round cone pattern for excellent finish and transfer efficiency.



- **Fan patterns** have two styles: round ends and tapered ends.
  - **Fan patterns with round ends** are versatile. They can be used in any application and are often the best option for smaller parts or cut-in painting.



- **Fan patterns with tapered ends** are best for achieving even coating thickness with overlapping paint passes.



## General Fan Pattern Air Caps: Descriptions

Part No.	Color	Description	Guidelines for Use
24N477	Black	Standard	Most versatile air cap. Recommended for most materials and applications. Class A finish.
24W279	Green		
24N438	Black	Alternate	Similar to the standard air cap with an alternate arrangement of atomizing air.
24N376	Black	Long Pattern	Longest spray pattern, optimized for painting large parts with overlapping paint passes.
24N276	Blue		
24N277	Red		
24N278	Green		
24N274	Black	Short Pattern	Shorter pattern, optimized for painting with overlapping passes.

## General Fan Pattern Air Caps: Specifications

Part No.	Color	Description	Pattern Shape	Nominal Pattern Length in. (mm)	Recommended Fluid Viscosity*	Recommended Production Rates**	Atomization	Cleanliness
24N477	Black	Standard	Round end	15-17 (381-432)	Light to medium	Standard	Best	Good
24W279	Green							
24N438	Black	Alternate	Round end	15-17 (381-432)	Light to medium	Standard	Best	Good
24N376	Black	Long Pattern	Tapered end	17-19 (432-483)	Light to medium	Standard	Better	Better
24N276	Blue							
24N277	Red							
24N278	Green							
24N274	Black	Short Pattern	Tapered end	12-14 (305-356)	Light to medium	Standard	Good	Best

<p>*Fluid Viscosity, in centipoise (cp) at 70°F (21°C). Centipoise = centistokes x fluid specific gravity.</p> <p>Light to medium    20–70 cp</p> <p>Medium to heavy    70–360 cp</p> <p>High solids            360+ cp</p>	<p>**Recommended Production Rates</p> <p>Standard            300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)</p> <p>Low                    100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)</p> <p>High                    500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)</p> <p>Very High            600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)</p>
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**Specialty Fan Pattern Air Caps: Descriptions**

Part No.	Color	Description	Guidelines for Use
25E670	Black	Soft Spray	For painting small, lightweight parts with a slow-moving spray pattern. Optimized for low production rates.
24N275	Black	Aerospace	Optimized for aerospace coatings. <ul style="list-style-type: none"> <li>• Class A finish</li> <li>• Light, medium, and heavy viscosity, and high solid coatings</li> <li>• Very high production rates</li> </ul>
24N279	Black	Solids	Optimized for medium and heavy viscosity and high solid coatings at standard production rates.
24N439	Black	Solids High Flow	Required for use with 2.0 mm nozzles. Optimized for medium and heavy viscosity and high solid coatings at high production rates.
25E671	Black	HVLP	For applications where HVLP is required.

**Specialty Fan Pattern Air Caps: Specifications**

Part No.	Color	Description	Pattern Shape	Nominal Pattern Length in. (mm)	Recommended Fluid Viscosity*	Recommended Production Rates**	Atomization	Cleanliness
25E670	Black	Soft Spray	Round end	10-12 (254-305)***	Light to medium	Low	Better	Good
24N275	Black	Aerospace	Tapered end	14-16 (356-406)	Light, medium, and heavy viscosity, and high solids	Very High	Good	Best
24N279	Black	Solids	Round end	14-16 (356-406)	Medium to heavy viscosity and high solids	Standard	Better	Good
24N439	Black	Solids High Flow	Tapered end	11-13 (279-330)	Medium to heavy viscosity and high solids	High	Best	Better
25E671	Black	HVLP	Round end	11-13 (279-330)	Light to medium	Standard	Good	Good

<p>*Fluid Viscosity, in centipoise (cp) at 70°F (21°C). Centipoise = centistokes x fluid specific gravity.</p> <p>Light to medium    20–70 cp</p> <p>Medium to heavy    70–360 cp</p> <p>High solids            360+ cp</p>	<p>**Recommended Production Rates</p> <p>Standard            300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)</p> <p>Low                    100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)</p> <p>High                    500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)</p> <p>Very High            600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)</p>
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\*\*\*The soft spray air cap was measured with the fluid flow rate adjusted to 3.5 oz/min (100 cc/min).

## Round Pattern Air Caps: Descriptions

Part No.	Color	Description	Guidelines for Use
24N318	Black	Large Pattern	Conventional round pattern design for larger patterns up to 8 in (20 cm). Swirling, slow, round cone pattern for excellent finish and transfer efficiency.
25N837	Black	Medium Pattern	Dual inner and outer atomizing air design for improved atomization at low air flows. For medium patterns up to 6 inches (15cm). Swirling, slow, round cone pattern for excellent finish and transfer efficiency.
25N836	Black	Small Pattern	Dual inner and outer atomizing air design for improved atomization at low air flows. For small patterns up to 4 inches (10cm). Swirling, slow, round cone pattern for excellent finish and transfer efficiency.

## Round Pattern Air Caps: Specifications

Part No.	Color	Description	Pattern Shape	Nominal Pattern Diameter in. (mm)	Recommended Fluid Viscosity*	Recommended Production Rates**	Atomization	Cleanliness
24N318	Black	Large Pattern	Round end	8 (203)	Light to medium	Low	Good	Good
25N837	Black	Medium Pattern	Round end	6 (152)	Light to medium	Low	Better	Good
25N836	Black	Small Pattern	Round end	4 (102)	Light to medium	Low	Better	Good


<p>*Fluid Viscosity, in centipoise (cp) at 70°F (21°C). Centipoise = centistokes x fluid specific gravity.</p> <p>Light to medium    20–70 cp</p> <p>Medium to heavy    70–360 cp</p> <p>High solids            360+ cp</p>	<p>**Recommended Production Rates</p> <p>Standard            300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)</p> <p>Low                    100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)</p> <p>High                   500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)</p> <p>Very High            600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)</p>
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## Air Consumption Charts

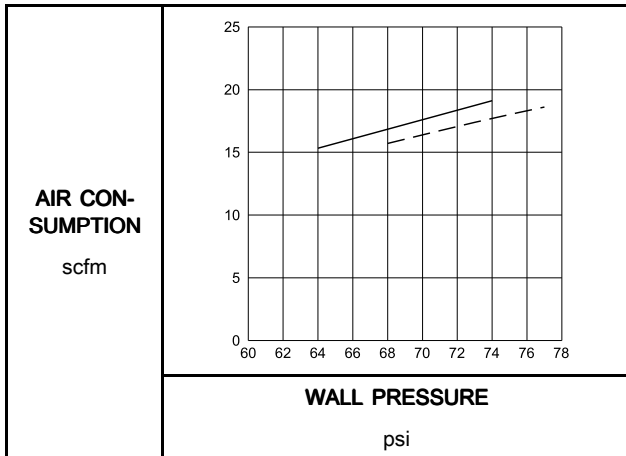
**NOTE:** Air consumption applies to the complete gun.

### Key to Air Consumption Charts

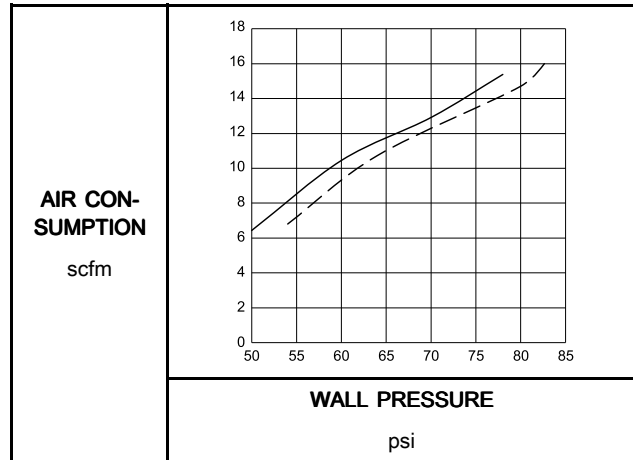
**TEST CONDITIONS:** Fan valve fully open (unless otherwise noted), atomization valve fully open (unless otherwise noted), 85kv gun, ES on.

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 17 . 24N477, 24W279, 24N279, 24N376, and 24N438 Air Cap**

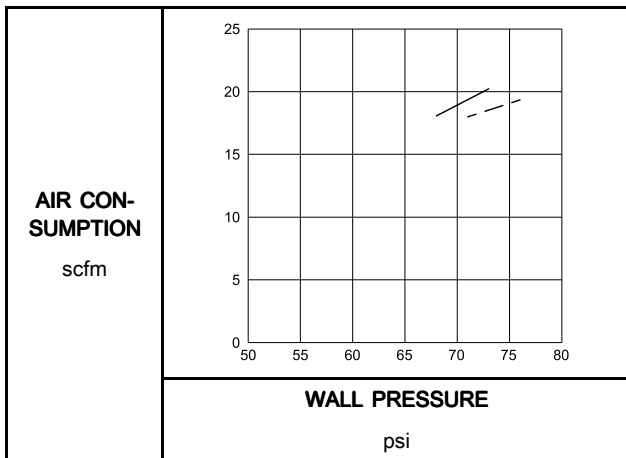


**Table 19 . 25E670 Air Cap**

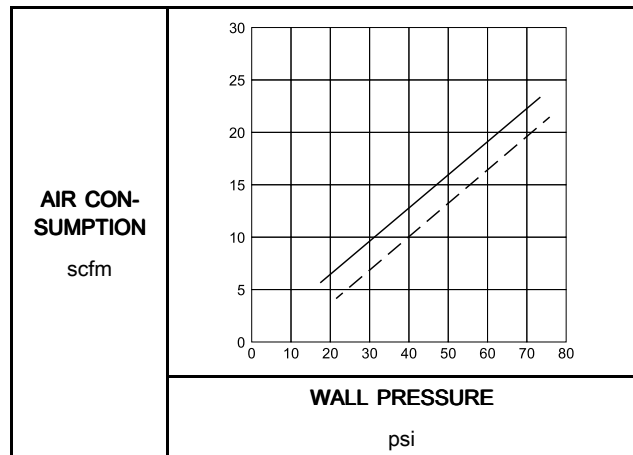


**NOTE:** 25E670: Atomization valve opened one turn from close according to soft spray gun setup. See [Soft Spray Gun Setup Procedure, page 29](#).

**Table 18 . 24N274, 24N275, and 24N439 Air Cap**






**Table 20 25E671 Air Cap**





# Electrode Selection Chart

				
To reduce the risk of an injury, follow the <a href="#">Pressure Relief Procedure, page 37</a> , before removing or installing an electrode.				

Electrode Part No.	Color	Description	Guidelines for Use
24N651	Gray	Standard (STD)	<p>Electrode assembly with a flexible snap-back wire.</p> <p>The standard wire is resistant to abrasive fluid wear and also resistant to handling damage.</p>
25N856	Gray	Short	<p>Electrode assembly with a short snap-back wire.</p> <p>The short wire has a low-profile design that positions the wire closer to the air cap for convenience.</p> <p>Use the short wire to extend wear life of the electrode wire in extremely abrasive materials.</p>
24N704	Blue	High wear (HW)	<p>Electrode assembly with a hard wire.</p> <p>The hard wire can bend and does not snap back if it is damaged by handling.</p> <p>Use the high wear electrode to extend wear life of the wire with abrasive materials.</p>
25N857	Brown	Hardened	<p>Electrode assembly with a hardened carbide wire.</p> <p>The hardened wire is easier to break with handling than the standard or high wear wires.</p> <p>Use the hardened electrode to extend wear life of the wire with extremely abrasive materials.</p>

# Repair Kits and Accessories

## Repair Kits

Part No.	Description
24N789	Air Seal Repair Kit
24N790	Fluid Seal Repair Kit
24N706	Alternator Bearing Repair Kit

## Gun Accessories

### General Accessories

Part No.	Description
111265	Non-silicone Lubricant, 4 oz (113 g)
116553	Dielectric Grease, 1 oz (30 ml)
24N603	Gun Covers, for 40 kV and 60 kV guns (box of 10)
24N604	Gun Covers, for 85 kV guns (box of 10)
24N758	Display Covers. Keeps Smart display clean (package of 5).

### Trigger and Grip Accessories

Part No.	Description
24N663	Plastic Trigger Kit
24P170	Metal Trigger Kit
24P171	Four Finger Trigger Kit, to convert Pro Xp air spray guns to a four finger trigger
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.

### Atomizing Air Valve Accessories

Part No.	Description
24N636	Low Profile Atomizing Air Restrictor Valve (adjusted with a hex tool)

### High Conductivity Accessories

Part No.	Description
25N844	40 kV High Conductivity Fluid Tube Kit, with cover. To convert a 40 kV gun from a standard fluid tube to an HC fluid tube.
25N843	60 kV High Conductivity Fluid Tube Kit, with cover. To convert a 60 kV gun from a standard fluid tube to an HC fluid tube.
25N842	85 kV High Conductivity Fluid Tube Kit, with cover. To convert an 85 kV gun from a standard fluid tube to an HC fluid tube.
25N937	40 kV High Conductivity Fluid Tube Kit, no cover
25N936	60 kV High Conductivity Fluid Tube Kit, no cover
25N935	85 kV High Conductivity Fluid Tube Kit, no cover

### Adapter and Fitting Accessories

Part No.	Description
112534	Air Line Quick Disconnect Fitting
185105	Non-swivel Air Inlet; 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)
24N642	Ball Swivel, for gun air inlet; 1/4 npsm (left-hand thread)
224754	Valve, ball 1/4 npsm (left-hand thread)

**ES On/Off and Fluid Adjustment Valve Accessories**

Part No.	Description
26A160	ES On/Off Valve Restrictor for high atomizing air applications. Use this accessory if the turbine light indicator is red and you want to maintain a higher application air pressure. Install the kit, then adjust the pressure as needed to ensure the indicator remains green.
24P634	ES Always ON and fluid adjustment valve kit. When this valve is installed, the electrostatics are on anytime air pressure is supplied to the gun. Fluid adjustment is possible. See manual 3A6840.
24N630	ES On-Off and Fluid Adjustment Valve
24N632	ES On-Off and Fixed Fluid Valve. Use to extend electrode and nozzle life in applications with abrasive, metallic, and extremely abrasive materials.

**Fan Air Adjustment Valve Accessories**

Part No.	Description
24N634	Standard fan air adjustment valve
24N732	Fan air adjustment valve for large pattern round spray
24P172	Quick adjust fan valve for quick change of fan size
25N919	Quick adjust fan valve with spring return. See manual 3A7005.

**Round Spray Accessories**

Part No.	Description
24N318	Round Spray Kit, large pattern, to convert a standard air spray gun to a round spray air cap. See manual 3A2498.
25N837	Round Spray Kit, medium pattern, to convert a standard air spray gun to a round spray air cap. See manual 3A6829.
25N836	Round Spray Kit, small pattern, to convert a standard air spray gun to a round spray air cap. See manual 3A6829.

**Inline Fluid Filter Kit Accessories**

Part No.	Description	Qty.
915921	Filter Housing 3/8 npsm(f) x 3/8 npsm (m) with 100 mesh filter 238562.	1

Filter Size	Description	Filter Color	Qty.
60 mesh	224453	Black	5
	238563	Black	3
	238564	Black	1
100 mesh	238561	Black	3
	238562	Black	1
150 mesh	25N891	Red	1
	25N892	Red	3
200 mesh	25N893	Yellow	1
	25N894	Yellow	3

**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)

**System Accessories**

Part No.	Description
222011	Ground Wire and Clamp
24N528	Gun Flush Box Adapter for 60 kV and 85 kV guns. To convert existing gun flush boxes to hold Pro Xp guns. See manual 309227.
24N529	Gun Flush Box Adapter for 40 kV guns. To convert existing gun flush boxes to hold Pro Xp guns. See manual 309227.
24P312	Gun Washer Kit. To convert existing gun washers to clean Pro Xp guns. See manual 308393.

## Signs

Part No.	Description
16P802	English Warning Sign, available at no charge from Graco
16P798	English Daily Care Sign
16P799	English Setup Sign

## Test Equipment

Part No.	Description
241079	Megohmmeter. 500 V output, 0.01–2000 megohms. Use for ground continuity and gun resistance tests. <b>Not for use in hazardous locations.</b>
722886	Paint Resistance Meter. Use for fluid resistivity test. See manual 307263. <b>Not for use in hazardous locations.</b>
722860	Paint Probe. Use for fluid resistivity test. See manual 307263. <b>Not for use in hazardous locations.</b>
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. Also requires 24R038 Conversion Kit.
24R038	Voltage Tester Conversion Kit. Converts the 245277 Test Fixture for use with the Pro Xp Gun alternator. See manual 406999.
25E919	HVLP Air Cap Verification Kit. Use to verify air pressures in air caps in HVLP applications. For use with 25E671 air cap. See manual 3A6833.

## 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
<b>AirFlex Flexible Grounded Air Hose (Gray)</b>	
244963	6 ft (1.8 m)
244964	15 ft (4.6 m)
244965	25 ft (7.6 m)
24J138	31 ft (9.4 m)
24N736	25 ft (7.6 m), with 112534 Quick Disconnect
244966	36 ft (11 m)
24N737	36 ft (11 m), with 112534 Quick Disconnect
244967	50 ft (15 m)
24N738	50 ft (15 m), with 112534 Quick Disconnect
244968	75 ft (23 m)
244969	100 ft (30.5 m)

Part No.	Description
<b>Standard Grounded Air Hose (Gray)</b>	
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)
<b>0.375 in. (10 mm) ID; 3/8 npsm(f) x 1/4 npsm(f) left-hand thread</b>	
24A225	50 ft (15 m)
24A226	75 ft (23 m)

Part No.	Description
<b>Grounded Air Hose with stainless steel braid ground path (Red)</b>	
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)

### Air Whip Hoses

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

0.188 in. (5 mm) ID; 1/4 npsm(m) x 1/4 npsm(f) left-hand thread

Part No.	Description
<b>Air Whip Hose with stainless steel braid ground path (Red)</b>	
236130	3 ft (0.9 m)
236131	6 ft (1.8 m)

### Fluid Hoses

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

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

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

### High Conductivity Fluid Hose

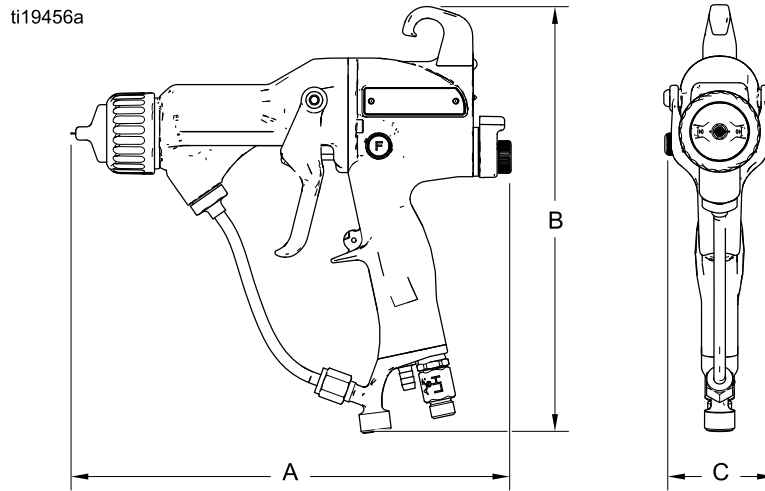
For low resistivity, high viscosity materials. **For 60 kV guns only.**

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

Part No.	Description
24N994	26.8 ft (8.2 m)

# Dimensions



KV	Display	Fluid Tube	Dimensions			Weight, oz (g)
			A, in. (mm)	B, in. (mm)	C, in. (mm)	
40	Standard	Standard	8.7 (221)	9.2 (234)	2.4 (61)	19.8 (562)
40	Standard	HC	8.7 (221)	9.2 (234)	2.4 (61)	20.5 (620)
40	Smart	Standard	8.7 (221)	10 (254)	2.4 (61)	22.3 (632)
40	Smart	HC	8.7 (221)	10 (254)	2.4 (61)	24.3 (690)
60	Standard	Standard	9.5 (241)	9.2 (234)	2.4 (61)	21.1 (600)
60	Standard	HC	9.5 (241)	9.2 (234)	2.4 (61)	23.3 (660)
60	Smart	Standard	9.5 (241)	10 (254)	2.4 (61)	23.7 (673)
60	Smart	HC	9.5 (241)	10 (254)	2.4 (61)	25.9 (733)
85	Standard	Standard	10.5 (267)	9.2 (234)	2.4 (61)	23.8 (676)
85	Standard	HC	10.5 (267)	9.2 (234)	2.4 (61)	26.2 (743)
85	Smart	Standard	10.5 (267)	10 (254)	2.4 (61)	26.3 (746)
85	Smart	HC	10.5 (267)	10 (254)	2.4 (61)	28.7 (813)

See [Models, page 3](#) for gun part numbers.

# Technical Specifications

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
Air Consumption		
Required turbine air flow	6 scfm	170 l/min
Range of total air flow under normal spraying conditions	15–20 scfm	425–565 l/min
Maximum Fluid Operating Temperature	120°F	48°C
Ambient Temperature	41°–122°F	5°–50°C
Paint Resistivity Range	3 megohm/cm to infinity. For a table of electrostatic results at different resistance levels, see <a href="#">Check Fluid Resistivity, page 36</a> .	
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, stainless steel	

## California Proposition 65

### CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm — [www.P65warnings.ca.gov](http://www.P65warnings.ca.gov).

# 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.

**THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

**GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO.** These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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## Graco Information

For the latest information about Graco products, visit [www.graco.com](http://www.graco.com).

For patent information, see [www.graco.com/patents](http://www.graco.com/patents).

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**Phone:** 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

All written and visual data contained in this document reflects the latest product information available at the time of publication.

Graco reserves the right to make changes at any time without notice.

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