

WB100 Isolation System and Pro Xp™ 60 WB Gun

3A2496H
EN

Air spray system for use when electrostatically spraying conductive, waterborne fluids that meet at least one of the conditions for non-flammability listed on page 3.
For professional use only.

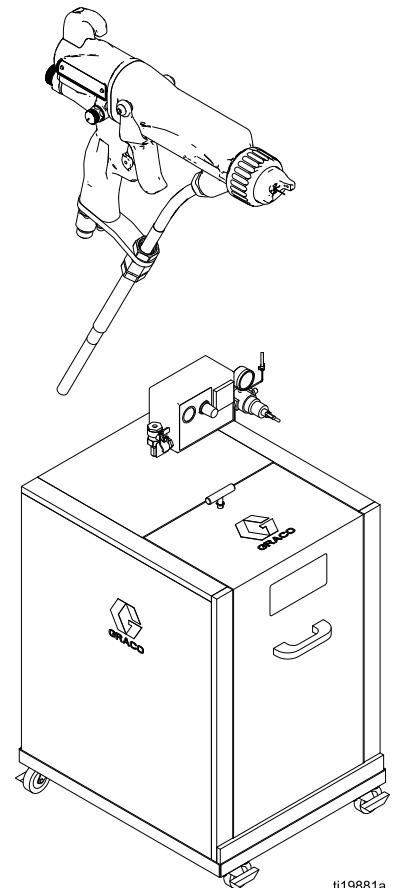


Important Safety Instructions

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

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

*See pages 3 and 4 for model part
numbers and approval information.*




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Models

	<p>FM approved for use with fluids that meet the following condition:</p> <ul style="list-style-type: none"> Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.
<p>0.35 J, with 50 ft hose max FM12ATEX0080 EN 50059 Ta 0°C – 50°C</p>	<p>Models Compliant with EN 50059 when used with fluids that meet the following criteria:</p> <ul style="list-style-type: none"> Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500 mJ.

Part No	Model	Description
24N580	WB100	Waterborne Isolation Enclosure 233825 with standard electrostatic air spray gun L60T17, grounded air hose 235070, and shielded waterborne fluid hose 24M732.
24P629	WB100	Waterborne Isolation Enclosure 233825 with smart electrostatic air spray gun L60M17, grounded air hose 235070, and shielded waterborne fluid hose 24M732.
24P630	WB100	Waterborne Isolation Enclosure 246511 with standard electrostatic air spray gun L60T18, grounded air hose 235070, and unshielded waterborne fluid hose 24M733.
24P631	WB100	Waterborne Isolation Enclosure 246511 with smart electrostatic air spray gun L60M18, grounded air hose 235070, and unshielded waterborne fluid hose 24M733.
233825	WB100	Waterborne Isolation Enclosure for shielded hoses. Does not include hoses and gun.
24P734	WB100	Waterborne Isolation Enclosure 246511 with MRG smart electrostatic air spray gun L60M19, grounded air hose 235070, and unshielded waterborne fluid hose 24M733.
246511	WB100	Waterborne Isolation Enclosure for unshielded hoses. Does not include hoses and gun.
L60T17	Pro Xp 60 WB	Standard Electrostatic Air Spray Gun, for waterborne coatings.
L60M17	Pro Xp 60 WB	Smart Electrostatic Air Spray Gun, for waterborne coatings.
L60T18	Pro Xp 60 WB	Standard Electrostatic Air Spray Gun, for waterborne coatings.
L60M18	Pro Xp 60 WB	Smart Electrostatic Air Spray Gun, for waterborne coatings.
L60M19	Pro Xp 60 WB MRG	Smart Electrostatic Air Spray Gun, for mold release applications.
24M732	- — —	Shielded Waterborne Fluid Hose Assembly, 25 ft (7.6 m).
24M733	- — —	Unshielded Waterborne Fluid Hose Assembly, 25 ft (7.6 m).
25N916	- — —	Shielded Waterborne Fluid Hose Assembly, 50 ft (15.2 m).
25N917	- — —	Unshielded Waterborne Fluid Hose Assembly, 50 ft (15.2 m).














Related Manuals








Manual No.	Description
3A2498	Round Spray Kit, Instructions
307263	Probe and Meter, 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>FIRE AND EXPLOSION HAZARD</p> <p>Combustible dust in work area can ignite or explode. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> • Fluids used must meet the following flammability requirements: <ul style="list-style-type: none"> • FM, FMc Approved: Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206. • CE-EN 50059 Compliant: Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500mJ. • Stop operation immediately if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem. • Check gun resistance, hose resistance, and electrical grounding daily. • Use and clean equipment only in well ventilated area. • Interlock the gun air supply to prevent operation unless ventilation air flow is above the minimum required value. • Only use non-flammable solvents when flushing or cleaning equipment. • Always turn the electrostatics off when flushing, cleaning or servicing equipment. • Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc). • Do not plug or unplug power cords or turn lights on or off when flammable fumes are present. • Keep spray area free of debris, including solvent, rags and gasoline. • Keep a working fire extinguisher in the work area.

 <h1>WARNING</h1>	
 	<h3>ELECTRIC SHOCK HAZARD</h3> <p>Improper grounding, setup, or usage of an isolated waterborne system can result in electric shock. To help prevent electric shock:</p> <ul style="list-style-type: none"> • Ground all equipment, personnel, object being sprayed, and conductive objects in or close to spray area. See Grounding instructions. • Connect the electrostatic gun to a voltage isolation system that will discharge the system voltage when not in use. • All components of the isolation system that are charged to high voltage must be contained within an isolation enclosure that prevents personnel from making contact with the high voltage components before the system voltage is discharged. • Follow the Fluid Voltage Discharge and Grounding Procedure when instructed to discharge the voltage; before cleaning, flushing, or servicing the system; before approaching the front of the gun; and before opening the isolation enclosure for the isolated fluid supply. • Do not enter a high voltage or hazardous area until all high voltage equipment has been discharged. • Do not touch the gun nozzle or electrode, or come within 4 in. (102 mm) of the electrode during gun operation. Follow the Fluid Voltage Discharge and Grounding Procedure. • Interlock the gun air supply with the voltage isolation system to shut off the air supply anytime the isolation system enclosure is opened. • Only use the red-colored Graco electrically conductive gun air hose with this gun. Do not use black or gray-colored Graco air hoses. • Do not splice hoses together. Install only one continuous Graco waterborne fluid hose between the isolated fluid supply and the spray gun.
  	<h3>PRESSURIZED EQUIPMENT HAZARD</h3> <p>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"> • Follow the Pressure Relief Procedure when you stop spraying/dispensing and before cleaning, checking, or servicing equipment. • Tighten all fluid connections before operating the equipment. • Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.

 <h1>WARNING</h1>	
 	<p>EQUIPMENT MISUSE HAZARD Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> • Do not operate the unit when fatigued or under the influence of drugs or alcohol. • Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See Technical Specifications in all equipment manuals. • Use fluids and solvents that are compatible with equipment wetted parts.. See Technical Specifications 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. • Do not leave the work area while equipment is energized or under pressure. • Turn off all equipment and follow the Pressure Relief Procedure when equipment is not in use. • Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only. • Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards. • Make sure all equipment is rated and approved for the environment in which you are using it. • Use equipment only for its intended purpose. Call your distributor for information. • Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces. • Do not kink or over bend hoses or use hoses to pull equipment. • Keep children and animals away from work area. • Comply with all applicable safety regulations.
 	<p>PLASTIC PARTS CLEANING SOLVENT HAZARD Many 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"> • Use only compatible water-based solvents to clean plastic structural or pressure-containing parts. • See Technical Specifications in all equipment manuals for materials of construction. Consult the solvent manufacturer for information and recommendations about compatibility.
	<p>TOXIC FLUID OR FUMES Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> • 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.
	<p>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:</p> <ul style="list-style-type: none"> • 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.

Spraying Waterborne Fluids Electrostatically

This electrostatic air spray gun is designed to spray **only** waterborne fluids which meet the following flammability requirements:

- **FM, FMc Approved:**
Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.

- **CE-EN 50059 Compliant:**
Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500mJ.

When connected to a voltage isolation system, all of the fluid in the spray gun, fluid hose, and isolated fluid supply is charged to high voltage, which means that the system has more electrical energy than a solvent-based system. Therefore, only non-flammable fluids (as defined under [Models, page 3](#)) can be sprayed with the system or be used to clean, flush, or purge the system.

Precautions must be taken when using electrostatic waterborne equipment to avoid potential shock hazards. When the spray gun charges the isolated fluid to high voltage, it is similar to charging a capacitor or a battery. The system will store some of the energy while spraying and retain some of that energy after the spray gun is shut off. Do not touch the gun nozzle or come within 4 in. (102 mm) of the electrode until the stored energy is discharged. The amount of time it takes to discharge the energy depends on the system design. Follow the [Fluid Voltage Discharge and Grounding Procedure, page 39](#), before approaching the front of the gun.

NOTE: The Graco warranty and approvals are void if the electrostatic spray gun is connected to a non-Graco voltage isolation system or if the gun is operated above 60 kV.

Controls, Indicators, and Components

The electrostatic gun includes the following controls, indicators, and components. For information on Smart guns, also see [Smart Guns, page 10](#).

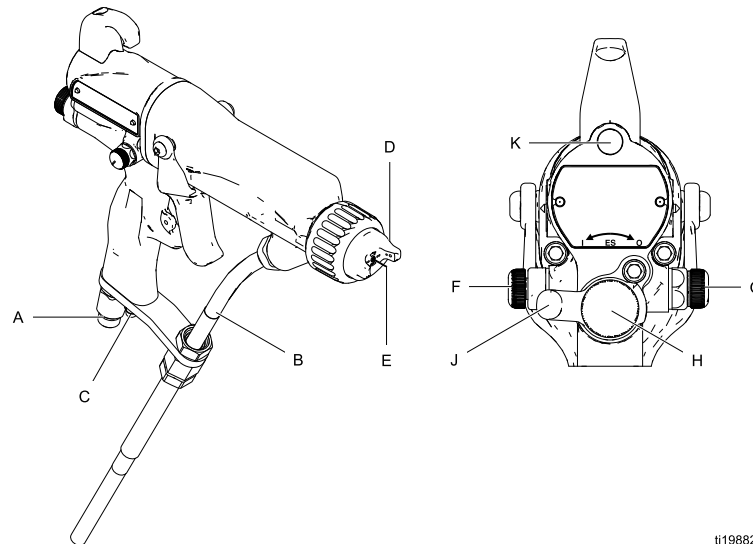


Figure 1 Gun Overview

Item	Description	Purpose
A	Air Swivel Inlet	1/4 npsm(m) left-hand thread, for Graco red-colored grounded air supply hose.
B	Fluid Inlet	Graco waterborne fluid supply hose
C	Turbine Air Exhaust	Barbed fitting, for supplied exhaust tube.
D	Air Cap and Nozzle	See Air Caps, page 96 and Fluid Nozzles, page 93 for available sizes.
E	Electrode Needle	Supplies electrostatic charge to the fluid.
F	Fan Air Adjustment Valve	Adjusts fan size and shape. Can be used to decrease pattern width.
G	Atomizing Air Restrictor Valve	Restricts air cap air flow. Replace with plug (included) if desired.
H	Fluid Adjustment Knob	Adjusts fluid flow by limiting fluid needle travel. Use only in low flow conditions, to reduce wear.
J	ES On-Off Valve	Turns electrostatics ON (I) or OFF (O).
K	ES Indicator (standard gun only; for Smart gun indicator, see Operating Mode, page 10)	Lit when ES is ON (I). Color indicates alternator frequency. See the LED indicator table on page 36.

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 12](#). 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 (uA). 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 56](#) 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 11](#).

NOTE: If the Error display appears, the Smart module has lost communication with the power supply. See [Error Display, page 11](#) for further information.

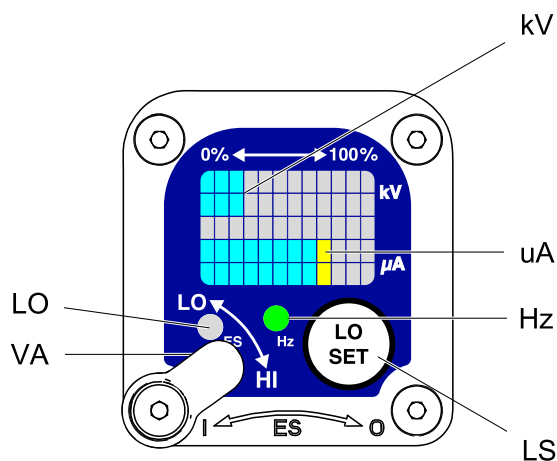


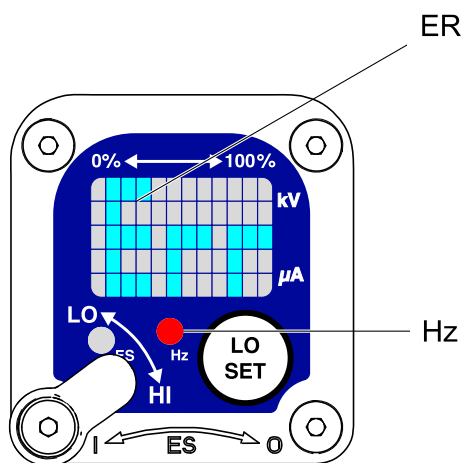
Figure 2 Smart Gun Module in Operating Mode

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 12](#). This can occur in Operating Mode or Diagnostic Mode. See [Electrical Troubleshooting, page 56](#). 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

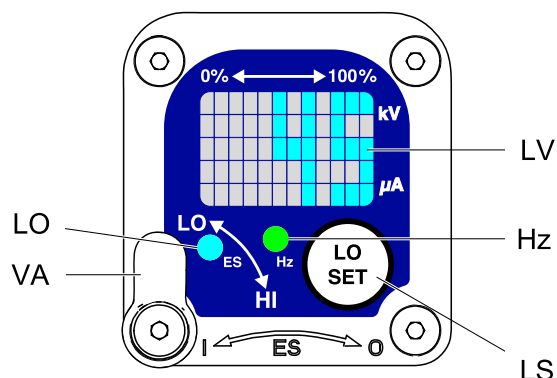
Adjusting the Low Voltage Setting

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 12](#). The range is 30–60 kV.

Set the Voltage Adjustment switch (VA) to LO. Press the LO SET button repeatedly to increase the setting in increments of 5. When the display reaches the maximum setting (60 kV) it will return to the minimum setting (30 kV). 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 11](#).



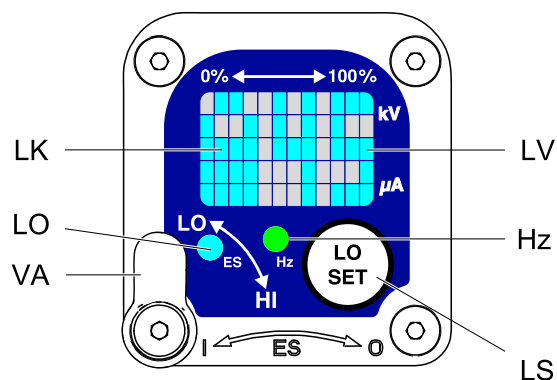
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Figure 4 Low Voltage Setting Screen (Unlocked)

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 12](#).

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



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Figure 5 Low Voltage Setting Screen (Locked)

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"> • Green indicates the alternator speed is at the correct level. • If the indicator changes to amber after one second, the alternator speed is too low. • 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. 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 Diagnostic Mode.

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

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

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

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

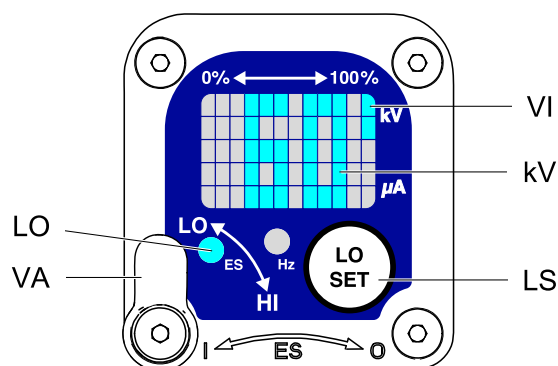
NOTE: Diagnostic Mode cannot be exited from the Low Voltage Lock Screen. See [Low Voltage Lock Screen, page 14](#) for details.

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 12](#). To enter this screen, press and hold the LO SET button for approximately 5 seconds while in the Operating Mode.

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

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



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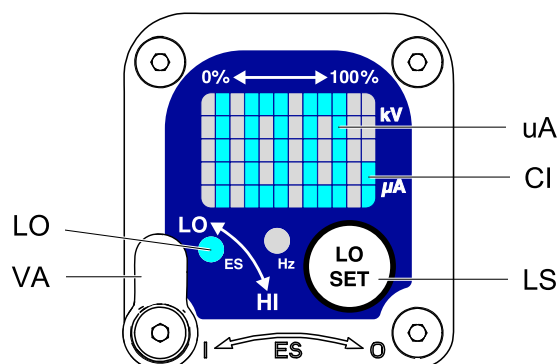
Figure 6 Voltage (kiloVolts) Screen

Current (microAmperes) Screen

The Current (microAmperes) Screen is the second screen in the Diagnostic Mode. See Fig. 7 and [Smart Gun Key, page 12](#). To enter this screen, press the LO SET button while in the Voltage (kiloVolts) Screen.

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

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



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Figure 7 Current (microAmperes) Screen

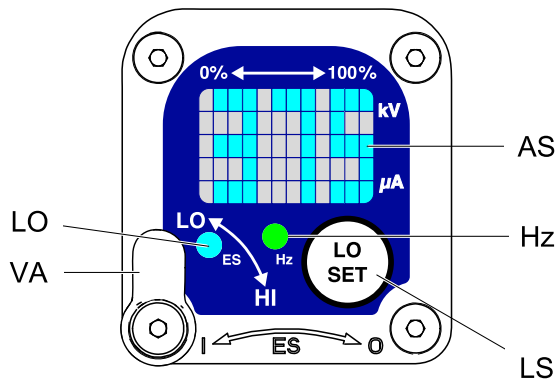
Alternator Speed (Hertz) Screen

The Alternator Speed (Hertz) Screen is the third screen in the Diagnostic Mode. See Fig. 8 and [Smart Gun Key, page 12](#). 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 5 Hz. The display is a readout and cannot be changed. If the alternator speed is greater than 999 Hz, the display will show 999.

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

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



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Figure 8 Alternator Speed (Hertz) Screen

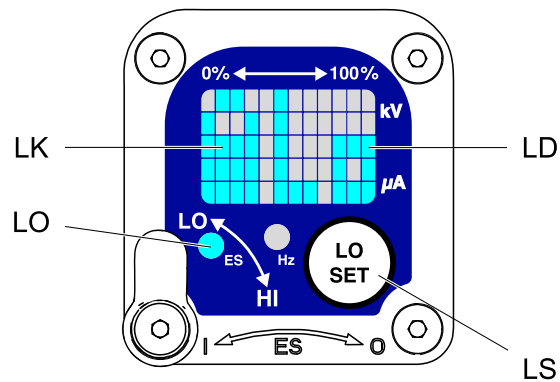
Low Voltage Lock Screen

The Low Voltage Lock Screen is the fourth screen in the Diagnostic Mode. See Fig. 9 and [Smart Gun Key, page 12](#). To enter this screen, press the LO SET button while in the Alternator Speed (Hertz) Screen.

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

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

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






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Figure 9 Low Voltage Lock Screen

Installation

System Requirements

				
<p>The use of multiple guns with one isolation cabinet may cause electric shock, fire, or explosion. To help prevent injury or equipment damage, use only one gun per isolation cabinet.</p>				

A Graco voltage isolation system must have the following features:

- An isolation enclosure that prevents persons from making contact with the high voltage components before the system voltage is discharged. All components of the isolation system that are charged to high voltage must be contained within the enclosure.
- A bleed resistor to drain off the system voltage when the spray gun is not in use. A metal part of the fluid supply unit must be electrically connected to the bleed resistor.
- A safety interlock that automatically discharges the system voltage when anyone opens the isolation enclosure.

NOTICE

The system should not have any severe arcing occurring when the isolation mechanism opens and closes. Severe arcing will shorten the life of the system components.

NOTE: The Graco warranty and approvals are void if the electrostatic spray gun is connected to a non-Graco voltage isolation system or if the gun is operated above 60 kV.

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.

Install the System







				
<p>Installing and servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly.</p> <ul style="list-style-type: none"> • Do not install or service this equipment unless you are trained and qualified. • Comply with all local codes and regulations 				

Fig. 19 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.

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. Use only Graco Grounded Air Supply Hose.</p> <p>To reduce the risk of electric shock or other serious injury, you must use the red-colored Graco Electrically Conductive Air Hose for the gun air supply, and you must connect the hose ground wire to a true earth ground. Do not use the black or gray-colored Graco air hoses.</p>				

1. See Fig. 19. Install an air line filter/water separator (M) on the main air supply 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.
2. The WB100 system includes a bleed-type air regulator (N) on the gun air supply line (P), to control air pressure to the gun.
3. Connect the red-colored Graco Electrically Conductive Air Hose (P) between the gun air regulator (N) and the gun's air inlet. The gun air inlet fitting has a left-hand thread. Connect the air supply hose ground wire (Q) to a true earth ground.

				
<p>Trapped air can cause the fluid supply unit 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 (B) installed.</p>				

4. The WB100 system includes a bleed-type air valve (B). The bleed-type air valve is required to shut off all air to the system and relieve air trapped between the valve and the fluid supply unit after the air regulator is shut off. Connect the main air supply line (A) to the bleed valve.
5. Install an additional bleed-type air valve (CC) upstream of the air filter (M) to isolate the filter for servicing.



Ground the Cabinet

Connect the main ground wire (V) to a true earth ground.

Connect the Waterborne Fluid Hose

Always use a Graco waterborne fluid hose between the voltage isolation system fluid outlet and the gun fluid inlet. The waterborne fluid hose (101) consists of an inner PTFE tube (T) and an abrasion-resistant outer jacket (J). Shielded hose 24M732 also has a conductive layer (C). The conductive layer is connected to ground at the gun fitting bracket (104).

Before connecting the waterborne fluid hose to the gun, blow it out with air and flush with water to remove contaminants. Flush the gun before using it.

				
<p>To reduce the risk of electric shock, install only one continuous Graco waterborne hose between the isolated fluid supply and the gun. Do not splice hoses together.</p>				

1. Remove the gun air inlet fitting (21).

NOTE: In a shielded hose system, if a hose failure occurs where high voltage arcs through the inner tube, voltage will be discharged to ground through the conductive hose layer. When properly installed, the conductive hose layer is grounded through its connection to the grounded enclosure.

Using unshielded fluid hoses minimizes the system capacitance, resulting in faster response times and a large reduction in the energy stored in the system, as compared to shielded hoses. However, without the ground shield, a weak static charge can occasionally build up on the outer surface of the hose. To minimize any static charge felt on the hose surface, bundle the air and fluid hose together, and wrap with a protective cover, as shown.

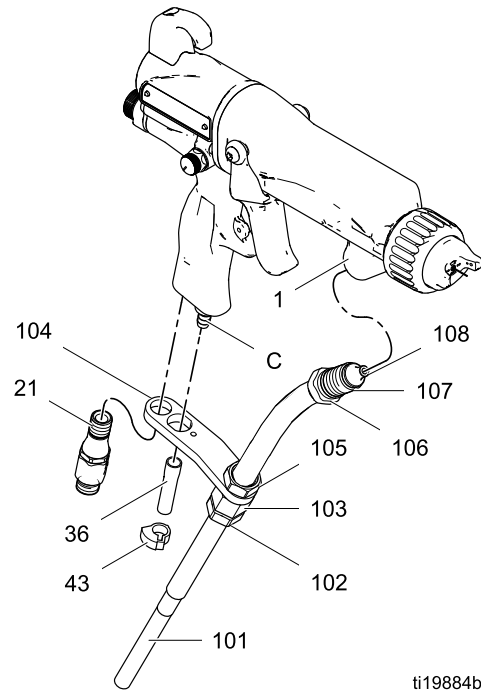


Figure 10 Connect the Fluid Hose

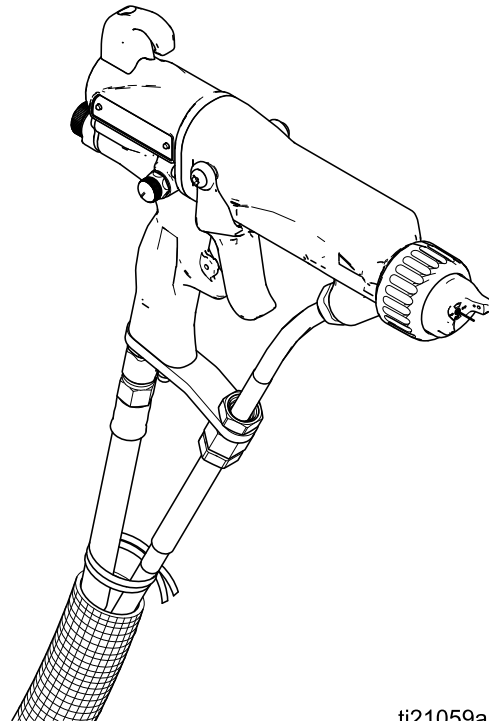


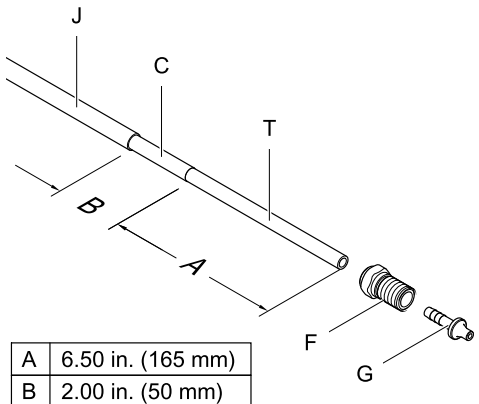
Figure 11 Bundling the Air and Fluid Hoses

Installation

- For the fluid hose to fit properly, it must be stripped and assembled to the dimensions shown in Fig. 12. Apply dielectric grease to the inner tube (T) of the hose. Slide the fitting (F) onto the tube (T). Press the barbed fitting (G) into the tube until its shoulder bottoms on the tube. A new Graco waterborne fluid hose comes fully assembled to these dimensions.

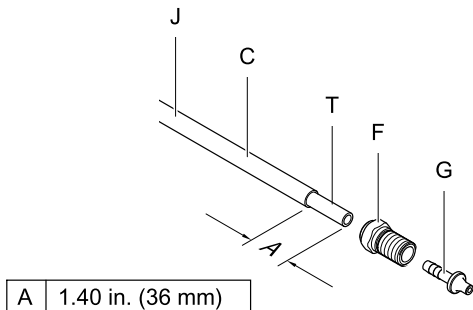
NOTICE

Be careful not to cut into the inner tube (T) of the hose when stripping the hose. Nicks or cuts in the PTFE tube will cause premature hose failure.



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Figure 12 Shielded Hose 24M732 Dimensions at Gun



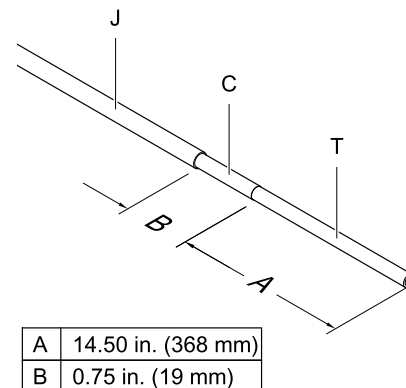
ti19886a

Figure 13 Unshielded Hose 24M733 Dimensions at Gun

- Generously apply dielectric grease (44) to the o-ring (107) and the threads of the fitting (106). Pull the fitting back 1-1/2 in. (38 mm) and apply grease to the exposed PTFE hose to fill the area between the hose and the fitting. Make sure the barrel inlet is clean and dry, then screw the fitting into the fluid inlet of the gun barrel (1).

- Loosen the strain relief nut (102) so the bracket can move freely on the hose.
- Align the bracket (104) holes with the air inlet and exhaust outlet. Secure with the air inlet fitting (21). Tighten the strain relief nut (102) to secure the hose.
- Check that the nut (105) is tightened securely to the ferrule housing (103).
- Press the exhaust tube (36) onto the exhaust valve barb (C). Secure with the clamp (43).
- Connect the other end of the hose to the isolated fluid supply as follows:
 - Graco WB100 Enclosure:* Slide hose through the strain relief fitting (W). Ensure conductive layer (C) has passed through fitting. Tighten to 55 in-lb (6.2 N•m). Pull back on hose to check it is secure.

<p>For Shielded Hose Systems:</p> <p>Conductive hose layer (C) must be grounded through its connection to the isolation system's grounded enclosure (L) or grounded fence. To maintain grounding continuity, the conductive hose layer (C) must be engaged in the ferrule when the strain relief nut is tightened. Failure to properly install the hose in the strain relief could result in an electric shock.</p>			



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Figure 14 Shielded Hose 24M732 Dimensions at WB100 Enclosure

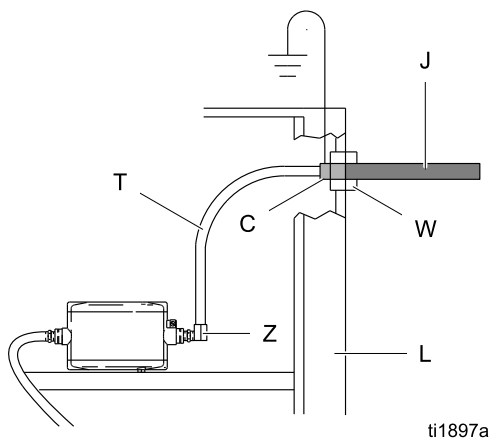


Figure 15 Shielded Hose 24M732 Connection at WB100 Enclosure

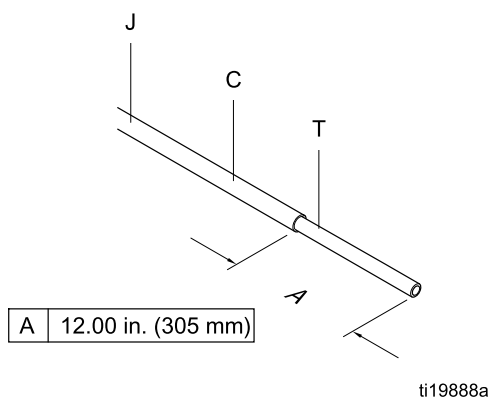


Figure 16 Unshielded Hose 24M733 Dimensions at WB100 Enclosure

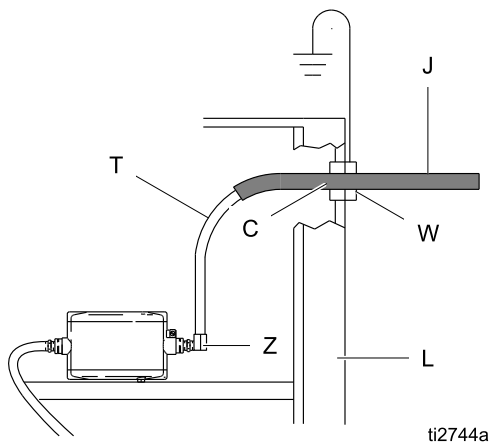


Figure 17 Unshielded Hose 24M733 Connection at WB100 Enclosure

- b. *Non-Graco Isolated Enclosure:* Connect hose as instructed in the isolation system manual.

<p>For Shielded Hose Systems:</p> <p>Conductive hose layer (C) must be grounded through its connection to the isolation system's grounded enclosure (L) or grounded fence. To maintain grounding continuity, the conductive hose layer (C) must be engaged in the ferrule when the strain relief nut is tightened. Failure to properly install the hose in the strain relief could result in an electric shock.</p>			

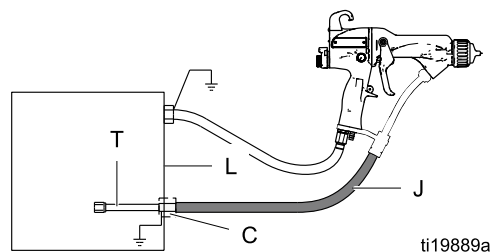
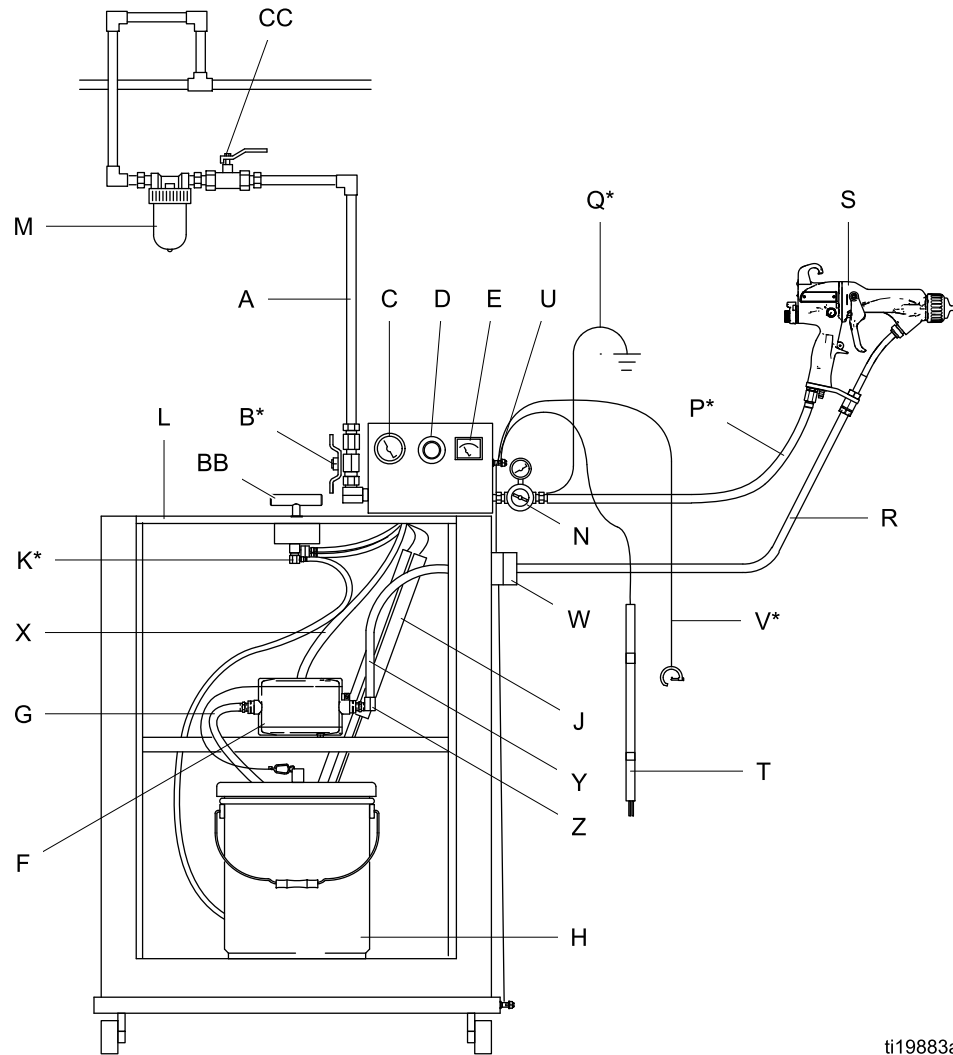


Figure 18 Shielded Fluid Hose Connection at Non-Graco Isolation Enclosure

- c. Connect the end of the tube (T) to the pump fluid outlet fitting (Z).

NOTE: The Graco warranty and approvals are void if the electrostatic spray gun is connected to a non-Graco voltage isolation system or if the gun is operated above 60 kV.







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Figure 19 Typical Installation, Pro Xp WB100 Waterborne System

Typical Installation Key

Item	Description
A	Main Air Supply Line
B*	Bleed-Type Air Shutoff Valve
C	Pump Air Pressure Gauge
D	Pump Air Pressure Regulator
E	kV Meter
F	Pump
G	Pump Suction Hose
H	Paint Container
J*	Bleed Resistor
K*	Enclosure Safety Interlock
L	Isolated Enclosure
M	Gun Air Line Filter
N	Gun Air Pressure Regulator
P*	Graco Red Grounded Air Hose (left-hand threads)
Q*	Gun Air Hose Ground Wire
R	Graco Waterborne Fluid Hose
S	Waterborne Electrostatic Air Spray Gun
T	Grounding Rod
U	Ground Terminal
V*	Main Ground Wire
W	Strain Relief Fitting
X	Pump Air Supply Line
Y	Grounding Cylinder
Z	Pump Fluid Outlet Fitting
AA	Isolated Enclosure Door (not shown, to illustrate internal components. Door must be closed and locked to operate system).
BB	Enclosure T-Handle Locking Screw (part of door assembly)
CC	Accessory Bleed-Type Air Shutoff Valve
* These items are required for safe operation. They are included with the WB100 system.	

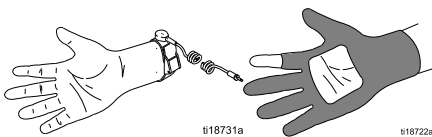
Grounding

				
<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>				

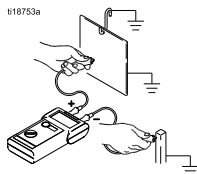
When operating the electrostatic gun, any ungrounded objects (such as people, containers, and tools) in the spray location can become electrically charged.

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.

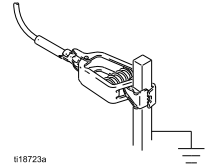
- *All persons entering the spray area:* must wear shoes having conductive soles such as leather, or wear personal grounding straps. Do not wear shoes with non-conductive soles such as rubber or plastic. If gloves are necessary, wear the conductive gloves supplied with the gun. If non-Graco gloves are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



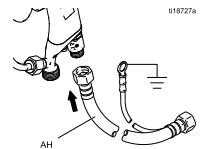
- *Object being sprayed:* Keep the workpiece hangers clean and grounded at all times.



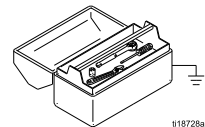
- *Voltage Isolation System:* Electrically connect the voltage isolation system to a true earth ground. See [Ground the Cabinet, page 16](#).



- *Electrostatic Air Spray Gun:* Ground the gun by connecting the red-colored Graco Grounded Air Hose to the gun, and connecting the air hose ground wire to a true earth ground. See [Check Gun Electrical Grounding, page 38](#).

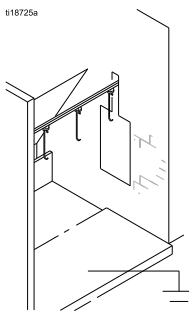


- *Graco Shielded Waterborne Fluid Hose (24M732):* The hose is grounded through the conductive layer. Install as instructed under [Connect the Waterborne Fluid Hose, page 17](#).
- *All electrically conductive objects or devices in the spray area:* must be properly grounded.

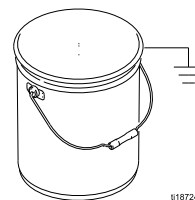


- *Fluid and waste containers:* Ground all fluid and waste containers in the spray area. Do not use pail liners unless they are conductive and grounded. When flushing the spray gun, the container used to catch the excess fluid must be electrically conductive and grounded.
- *Air compressors:* Ground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

- *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.



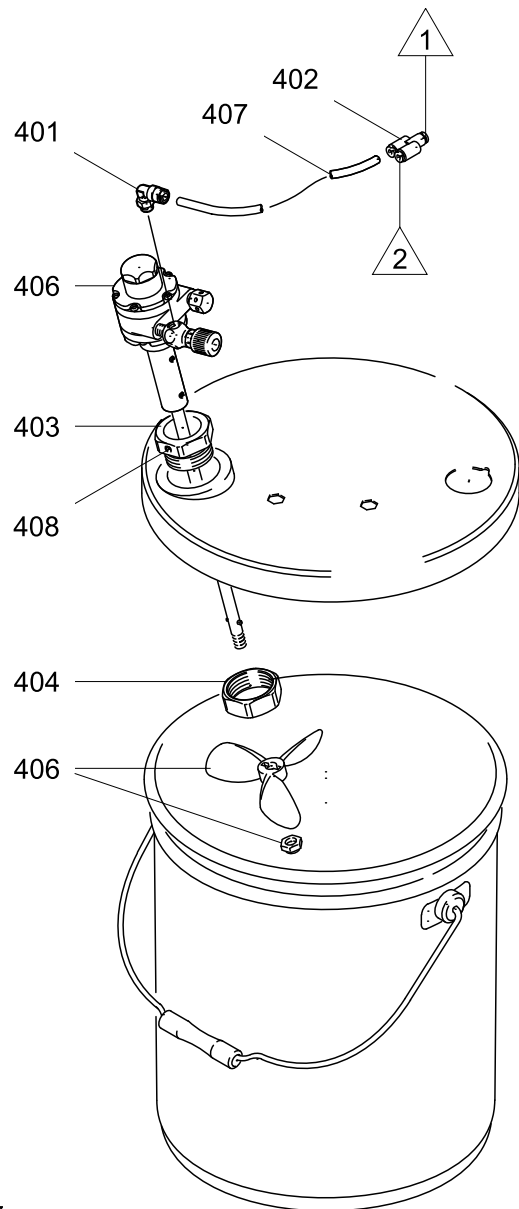
- *All solvent pails:* Use only approved, grounded metal containers, which are conductive. Do not use plastic containers. Use only non-flammable solvents. Do not store more than the quantity needed for one shift.



Agitator Kit Accessory

To add an agitator to the Graco isolation system, order Part No. 245895. See [245895 Agitator Kit, page 108](#), for the kit parts list.

1. Discharge the system voltage (see [Fluid Voltage Discharge and Grounding Procedure, page 39](#)).
2. Relieve the pressure (see [Pressure Relief Procedure, page 39](#)).
3. Open the isolated enclosure door.
4. Remove the back of the control box (258).
5. Remove tube (A2) from elbow (282) at the air manifold; see [Tubing and Wiring, page 84](#). Install the Y fitting (402) into the elbow. Install tubes (A2) and (407) into the Y fitting. Route the agitator tube (407) into the cabinet.
6. Replace the back of the control box (258).
7. Assemble the other parts of the kit as shown. Secure the agitator with the setscrew (408).
8. Return the system to service.



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Figure 20 245895 Agitator Kit

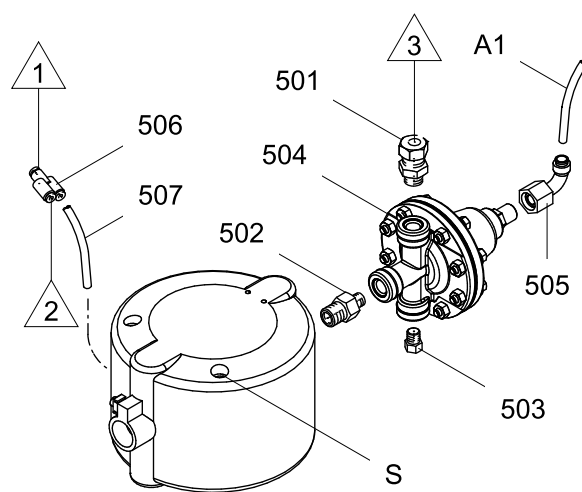
Fluid Regulator Kit Accessory

To add a fluid regulator to the Graco isolation system, order Part No. 245944. See [245944 Fluid Regulator Kit, page 108](#) for the kit parts list.

1. Discharge the system voltage (see [Fluid Voltage Discharge and Grounding Procedure, page 39](#)).
2. Relieve the pressure (see [Pressure Relief Procedure, page 39](#)).
3. Open the isolated enclosure door.
4. Remove the 1/4 in. (6 mm) OD tube (A1) from the pump air inlet; see [Tubing and Wiring, page 84](#).
5. Remove the waterborne fluid hose from the pump fluid outlet fitting (231) and remove the fitting.
6. Unscrew the two pump mounting screws (S) and remove the pump from the isolation enclosure.
7. Remove the back of the control box (258).
8. Remove tube (A2) from elbow (282) at the air manifold; see [Tubing and Wiring, page 84](#). Install the Y fitting (506) in the elbow. Install tubes (A2) and (507) into the Y fitting. Route the tube (507) into the cabinet.
9. Replace the back of the control box (258).
10. Assemble the fluid regulator kit as shown.
11. Reinstall the pump in the isolation enclosure. Use the two mounting holes to the left of the holes used previously, to allow clearance for the fluid regulator.

12. Connect tube (A1) to the air inlet of fluid regulator (504). Connect tube (507) to the pump air inlet.
13. Connect the waterborne fluid hose to the fluid regulator outlet fitting (501).
14. Return the system to service.

NOTE: The cabinet air regulator and gauge (216, 217) will now operate the air piloted fluid regulator (504). The pump will now operate at the inlet air pressure.







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Figure 21 245944 Fluid Regulator Kit




Gun Setup

Gun Setup Procedure

				
<p>To reduce the risk of fire and explosion, fluids used must meet the following flammability requirements:</p> <ul style="list-style-type: none"> • FM, FMc Approved: Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206. • CE-EN 50059 Compliant: Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500mJ. 				

				
<p>Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 4 in. (102 mm) of the front of the gun during operation or until performing the Fluid Voltage Discharge and Grounding Procedure, page 39.</p> <p>Follow the Fluid Voltage Discharge and Grounding Procedure, page 39 when you stop spraying and whenever you are instructed to discharge the voltage.</p>				

				
<p>To reduce the risk of component rupture, which can cause serious injury, do not exceed the maximum working pressure of the lowest rated system component. This equipment has a 100 psi (0.7 MPa, 7 bar) maximum working air and fluid pressure.</p>				

				
<p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 39 whenever you are instructed to relieve the pressure.</p>				

For additional steps to set up specialty guns, see [Soft Spray Gun Setup Procedure](#), page 30, [Round Spray Gun Setup Procedure](#), page 33, [HVLP Gun Setup Procedure](#), page 31, [Abrasive Material Gun Setup Procedure](#), page 35, and [Mold Release Gun Setup Procedure](#), page 36.

See the figure below to locate the electrostatic gun controls.

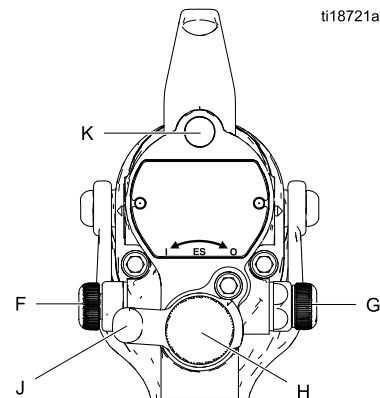
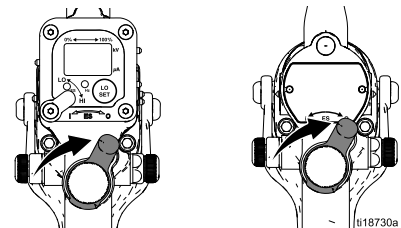


Figure 22 Electrostatic Gun Controls

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 93 and [Air Cap Selection Guide](#), page 96. To install the nozzle and air cap, see [Air Cap and Nozzle Replacement](#), page 59.

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

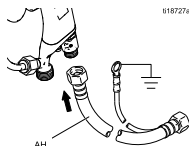


3. Shut off the air bleed valve to the gun.



4. Check gun resistance. Follow the steps in [Test Gun Resistance](#), page 47.

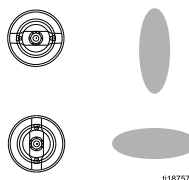
5. Connect the waterborne hose. Follow the steps in [Connect the Waterborne Fluid Hose, page 17](#).
6. Connect the red Graco grounded air hose to the gun air inlet. The gun air inlet fitting has left-hand threads. See [Air Supply Line, page 16](#).



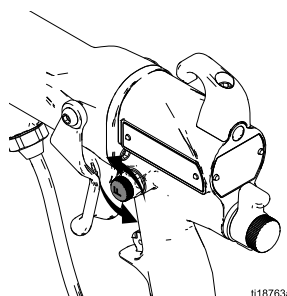
7. Follow all steps in [Grounding, page 22](#).
8. Follow all steps in [Check Gun Electrical Grounding, page 38](#). Reading must be less than 100 ohms.
9. Connect the exhaust tube and secure with the clamp provided.



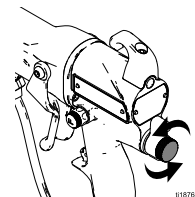
10. Flush if needed. See [Flushing, page 42](#).
11. Position the air cap as needed.



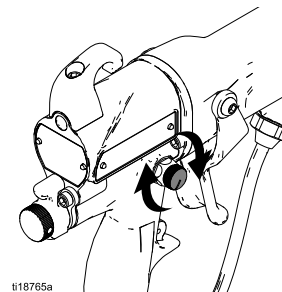
12. Fully open the fan air adjustment valve (F) counterclockwise.



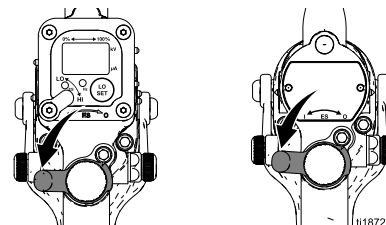
13. Fully open the fluid adjustment valve (H) counterclockwise.



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



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



<p>When the ES On-Off switch is turned ON (I), the fluid supply is charged with high voltage until the voltage is discharged. Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 4 in. (102 mm) of the front of the gun during operation.</p>				

Gun Setup

16. 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.

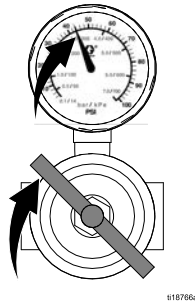


Table 2 . Pressure Drop

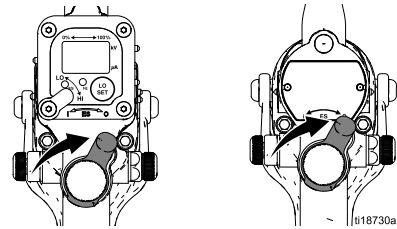
Air Hose Length in ft (m) using 5/16 inch (8 mm) diameter hose	Air Regulator Setting in psi (MPa, bar) with gun triggered
15 (4.6)	55 (0.38, 3.8)
25 (7.6)	65 (0.45, 4.5)
50 (15.3)	80 (0.56, 5.6)

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

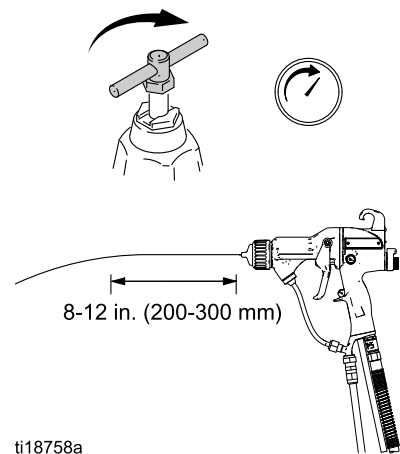
Table 3 . LED Indicator Colors

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.

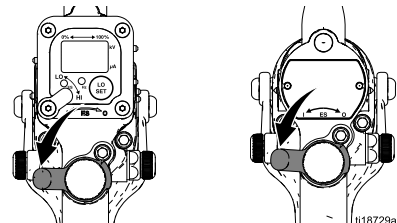
18. Shut off the air to the gun. Turn OFF (O) the ES On-Off switch (J).



19. 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.

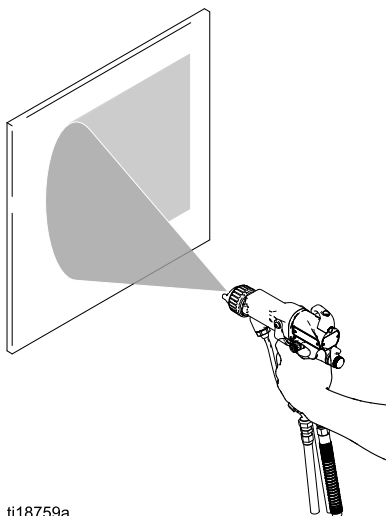


20. Turn on the air to the gun. Turn ON (I) the ES On-Off switch (J).



21. Spray a test pattern. Check the atomization.

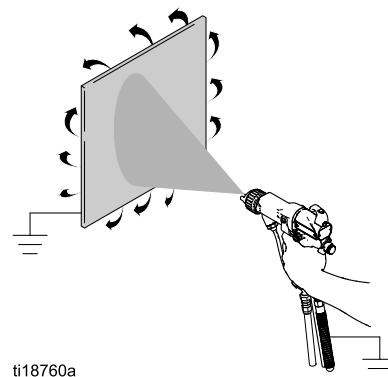
- If over-atomization occurs at minimum pressure, adjust the atomizing air restrictor valve.
- If atomization is inadequate, increase air pressure or decrease fluid flow.



22. 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.

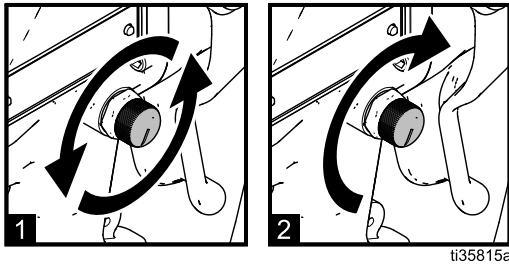
<p>When the ES On-Off switch is turned ON (I), the fluid supply is charged with high voltage until the voltage is discharged. Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 4 in. (102 mm) of the front of the gun during operation.</p>				

23. Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 51](#).

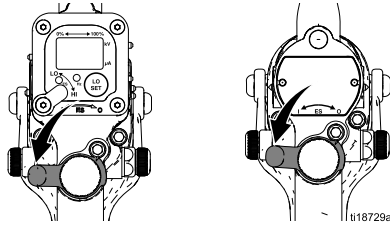
Soft Spray Gun Setup Procedure

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

1. Install a soft spray air cap. See [Air Cap Selection Guide, page 96](#).
2. For best results, install a 1.0 mm or 1.2 mm fluid nozzle. See [Fluid Nozzle Selection Chart, page 93](#).
3. Follow steps 1–13 in the [Gun Setup Procedure, page 26](#).
4. 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.



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.

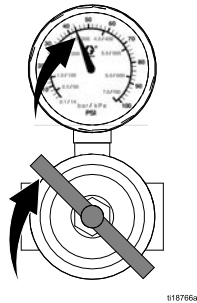


Table 4 . Pressure Drop

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)

7. 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.

8. Continue with steps 18–23 in the [Gun Setup Procedure, page 26](#).

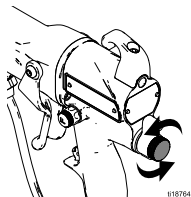
NOTE: The soft spray air cap is optimized for a production rate of 3.5 oz/min (100 cc/min). For best soft spray results, limit the production rate to 7 oz/min (200 cc/min) or less.

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.

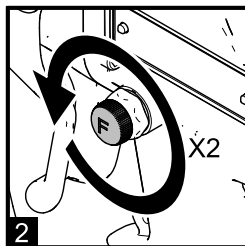
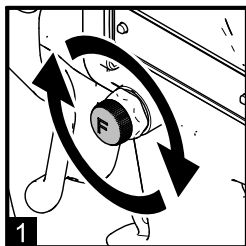
HVLP Gun Setup Procedure

To spray HVLP, air pressure at the air cap must be 10 PSI (0.07 MPa, 0.7 bar) or less. To set up an HVLP gun, do the following:

1. Install an HVLP air cap. See [Air Cap Selection Guide, page 96](#).
2. Follow steps 1–11 in the [Gun Setup Procedure, page 26](#).
3. Fully open the fluid adjustment valve (H) counterclockwise.

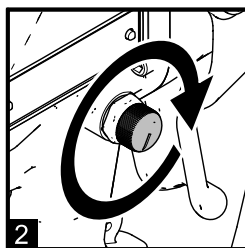
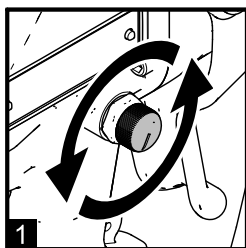


4. Adjust the air in the air cap.
 - a. Fully close the fan air adjustment valve (F) clockwise, then open it counterclockwise two turns.



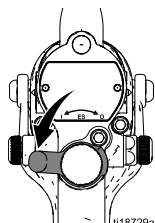
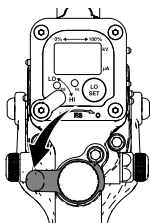
ti35880a

- b. Fully close the atomizing air restrictor valve (G) counterclockwise, then open it clockwise one turn.



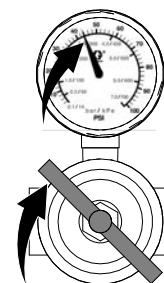
ti35879a

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



ti18729a

- d. 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.



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)	55 (0.38, 3.8)
25 (7.6)	65 (0.45, 4.5)
50 (15.3)	80 (0.56, 5.6)

NOTE: The HVLP air cap requires a high volume of air to atomize paint at low pressure. Gun air regulator static pressure settings of 70 PSI or higher are typically required. To achieve the required gun air pressures, use a shorter length air hose or a larger diameter air hose. See Grounded Air Hoses in [Hoses, page 107](#).

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

Table 7 . 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.

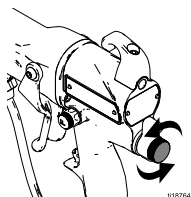
Gun Setup

- f. 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.
 - g. Verify that the ES indicator (K) [Hz indicator on Smart guns] remains green.
5. Continue with steps 18–23 in the [Gun Setup Procedure, page 26](#).

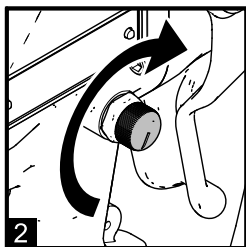
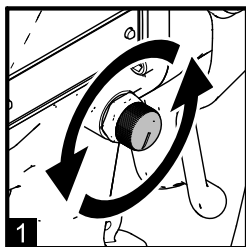
Round Spray Gun Setup Procedure

To achieve a round spray pattern, do the following:

1. Install a round spray kit. See Round Spray Accessories in [Gun Accessories, page 105](#). 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 26](#).
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.



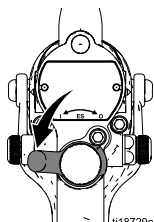
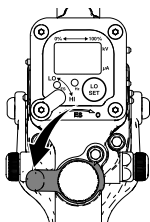
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- b. Fully close the fan air adjustment valve (F) clockwise.



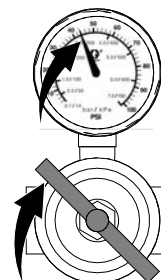
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5. Turn ON (I) the ES On-Off switch (J).



ti18729a

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.



ti18766a

Table 8 . 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)

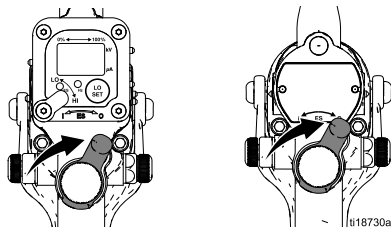
7. Verify that the ES indicator (K) [Hz indicator on Smart guns] is lit.

Table 9 . 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.

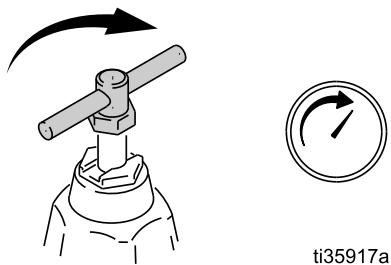
Gun Setup

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

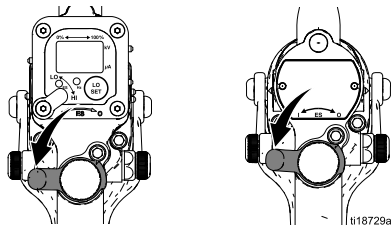


9. Start the pump. Adjust the fluid regulator to achieve the production rate that you want.

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.

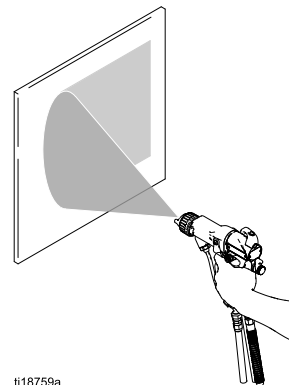


10. Turn on the air to the gun. Turn ON (I) the ES On-Off switch (J).



11. Spray a test pattern. Check the atomization.

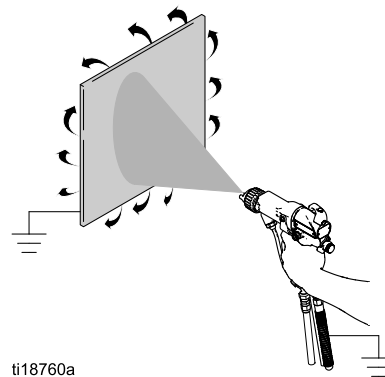
NOTE: If the atomization is too fine, or if the object being sprayed is moving too much, adjust the atomizing air restrictor valve (G) counterclockwise slightly to limit the air flow. To improve atomization, adjust the atomizing air restrictor valve (G) clockwise slightly to increase the air flow or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



12. 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.

13. Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 51](#).



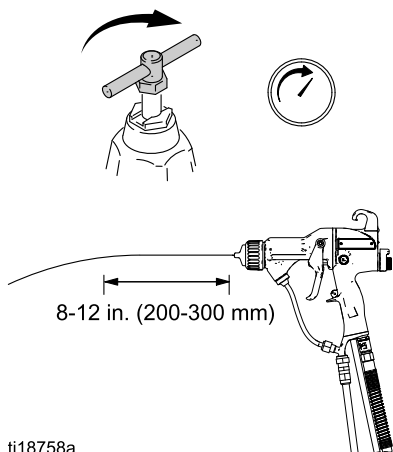
Abrasive Material Gun Setup Procedure

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

- Clean the gun. See [Clean the Gun Daily, page 44](#).
- Inspect the electrode and replace if damaged. See [Electrode Replacement, page 61](#).

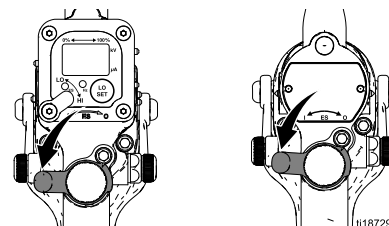
To extend wear life with abrasive, metallic, and extremely abrasive materials, do the following:

1. To convert a gun for abrasive materials:
 - Select a precision high wear or high wear nozzle. See [Fluid Nozzle Selection Chart, page 93](#). 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.
2. Follow steps 1–18 in the [Gun Setup Procedure, page 26](#).
3. 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.

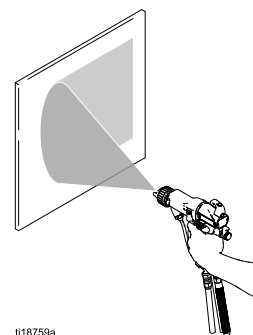


NOTE: Operate the gun with the fluid adjustment knob in the full flow position at all times or install 24N632 ES On-Off and Fixed Fluid Valve. Always use an external fluid regulator. Do not use the fluid adjustment knob to set the fluid pressure.

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



5. 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.

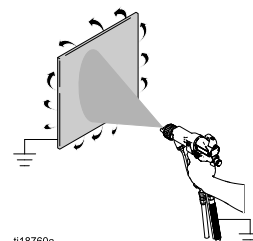


NOTE: Use the minimum atomizing air pressure to extend electrode wire wear life. Reduce the gun inlet air pressure or adjust the atomizing air restrictor valve (G) counterclockwise to reduce atomizing air when the application allows.

6. 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.

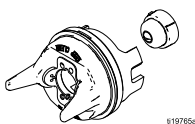
7. Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 51](#).



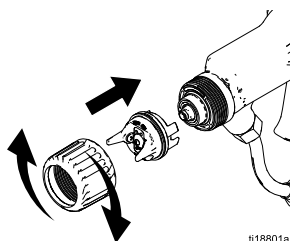
Mold Release Gun Setup Procedure

To set up a mold release gun, do the following:

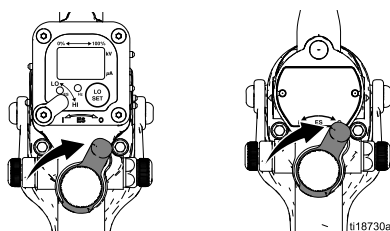
1. Model L60M19 Mold Release Gun is supplied with Part No. 24N748 Nozzle, 24N727 Air Cap, and a spray tip of choice. If you require a different size spray tip, see [Spray Tip Selection Chart \(Model L60M19 MRG Gun Only\)](#), page 102, or consult with your Graco distributor. To install the tip, see [Air Cap, Spray Tip, and Nozzle Replacement \(Model L60M19\)](#), page 60.
2. Follow steps 2–10 in the [Gun Setup Procedure](#), page 26.
3. The fluid output and pattern width depend on the size of the spray tip, the fluid viscosity, and the fluid pressure. Use the [Spray Tip Selection Chart \(Model L60M19 MRG Gun Only\)](#), page 102, as a guide for selecting the appropriate spray tip for your application.
4. Align the spray tip tab with the groove in the air cap. Install the tip.



5. Install the air cap and retaining ring. Orientate the air cap and tighten the retaining ring securely.

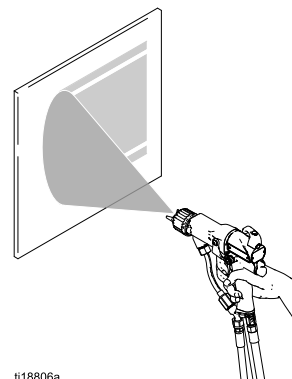


6. Close the atomizing air adjustment valve (G) and the fan air adjustment valve (F).
7. Check that the ES On-Off switch is OFF (O).

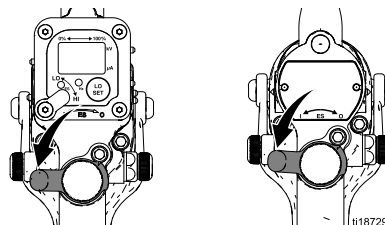


8. Start the pump. Set the fluid regulator to 400 psi (2.8 MPa, 28 bar).

9. Spray a test pattern. Examine the particle size in the center of the pattern (tails will be removed in step 21). Increase the pressure in small increments. Spray another pattern. Compare particle size. Continue increasing pressure until the particle size remains constant. Do not exceed 3000 psi (21 MPa, 210 bar).



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



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

Table 10 . 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 26A294. Adjust the pressure as needed to ensure the indicator remains green.

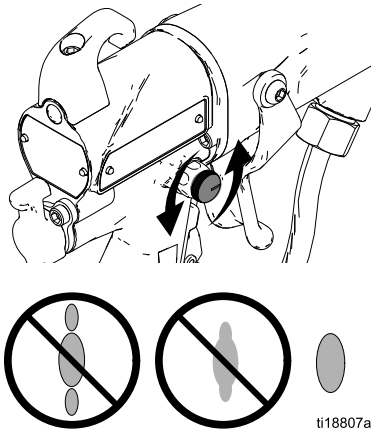
12. Set the gun air regulator to deliver a minimum of 45 psi (0.32 MPa, 3.2 bar) at the gun when triggered, to ensure full spraying voltage. See the table below.



Table 11 . Pressure Drop

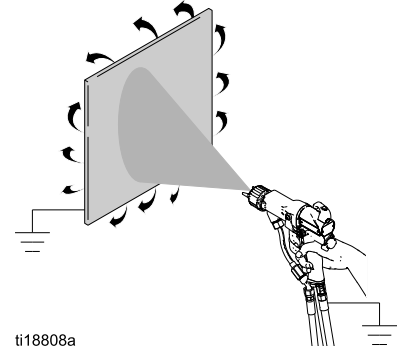
Air Hose Length in ft (m) (using 5/16 in. [8 mm] diameter hose)	Air Regulator Setting in psi (MPa, bar) [with gun triggered]
15 (4.6)	52 (0.36, 3.6)
25 (7.6)	57 (0.40, 4.0)
50 (15.3)	68 (0.47, 4.7)
75 (22.9)	80 (0.56, 5.6)
100 (30.5)	90 (0.63, 6.3)

13. Turn the atomizing air adjustment valve counterclockwise until any tails disappear.



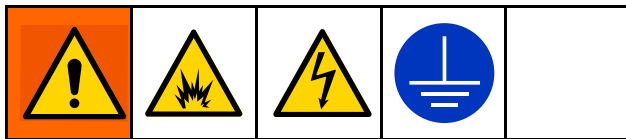
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14. If desired atomization is not achieved, change the tip size. The smaller the tip orifice, the finer the atomization.
15. Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 51](#).



NOTE: If a narrower pattern is needed occasionally, open the fan air adjustment valve slightly. (Excessive fan air flow can cause paint buildup on the air cap.)

Check Gun Electrical Grounding



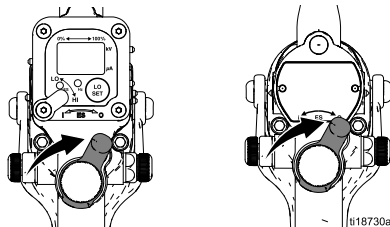
Megohmmeter Part No. 241079 (AA-see Fig. 21) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

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

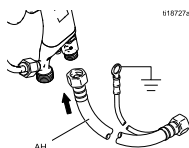
Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury and property damage.

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

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



3. Turn off the air and fluid supply to the gun. Follow the [Pressure Relief Procedure, page 39](#). The fluid hose must not have any fluid in it.
4. Disconnect the fluid hose.
5. Make sure the red-colored 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 100 ohms. See Fig. 22.

7. If the resistance is greater than 100 ohms, 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.

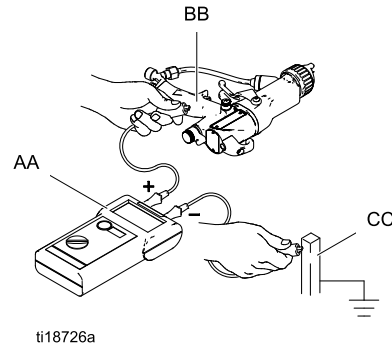


Figure 23 Check Gun Electrical Grounding

8. Using an ohmmeter (AA) measure the resistance between the cabinet ground lug (214) and a true earth ground (CC). The resistance must be less than 100 ohms.

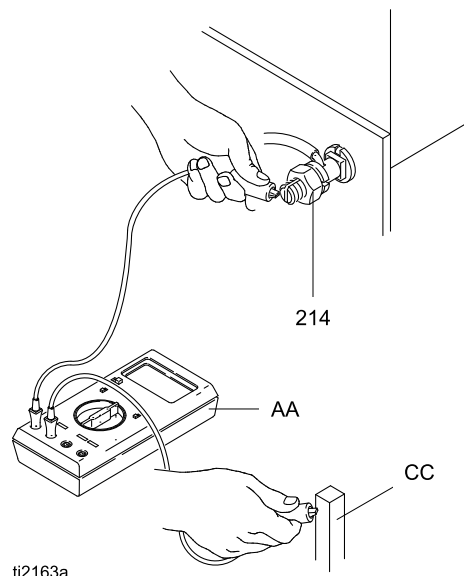


Figure 24 Check Cabinet Grounding

Flush Before Using Equipment

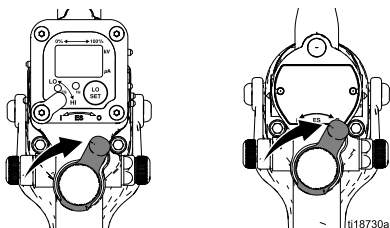
The equipment was tested in fluid at the factory. To avoid contaminating your fluid, flush the equipment with a compatible solvent before using the equipment. See [Flushing, page 42](#).

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>				

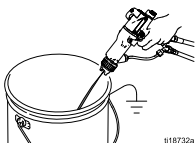
1. Turn OFF (O) the ES On/Off switch.



2. Follow the [Fluid Voltage Discharge and Grounding Procedure](#), page 39.
3. Turn off the air bleed valves to the fluid source and to the gun.



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

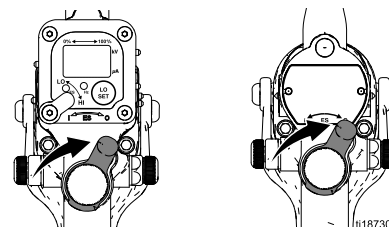


5. Relieve fluid pressure in the fluid supply unit as instructed in your fluid supply unit manual.

Fluid Voltage Discharge and Grounding Procedure

<p>The fluid supply is charged with high voltage until the voltage is discharged. Contact with the charged components of the voltage isolation system or spray gun electrode will cause an electric shock. To avoid an electric shock, follow the Fluid Voltage Discharge and Grounding Procedure:</p> <ul style="list-style-type: none"> • whenever you are instructed to discharge the voltage • before cleaning, flushing, or servicing the system equipment • before approaching the front of the gun • or before opening the isolation enclosure for the isolated fluid supply. 				

1. Turn the ES ON/OFF valve OFF and wait 30 seconds.



2. Fully unscrew the door T-handle locking screw. This will shut off the air to the gun and trigger the grounding cylinder to discharge any remaining electrical charge.
3. Use the grounding rod to touch the pump and supply pail. If you see any arcs, see [Electrical Troubleshooting](#), page 56.

Fill the Fluid Supply

1. Follow the [Fluid Voltage Discharge and Grounding Procedure, page 39](#).
2. Follow the [Pressure Relief Procedure, page 39](#).
3. Open the isolated enclosure door.
4. Remove the pail cover from the pail, holding a rag over the suction tube strainer to prevent any fluid from dripping into the isolated enclosure. Place the cover and suction tube outside the enclosure.
5. Remove the supply pail from the enclosure.

NOTICE

Be sure to wipe up all fluid spills in the isolated enclosure. Fluid can create a conductive path and cause the system to short out.

6. Clean up any fluid spills in the enclosure, using a soft cloth and a non-flammable, compatible solvent.
7. Fill the supply pail with fluid and return it to the enclosure. Clean up any spills.
8. Reinstall the pail cover, holding a rag over the suction tube strainer to prevent fluid spills while you place the pump suction tube in the pail.
9. Close the isolated enclosure door and fasten securely with the T-handle locking screw.




Startup

Follow all steps under [Gun Setup Procedure, page 26](#).

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

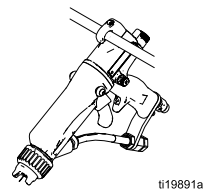
- ☐ All operators are properly trained to safely operate an electrostatic waterborne air spray system as instructed in this manual.
- ☐ All operators are trained in the [Pressure Relief Procedure, page 39](#).
- ☐ The electrostatics are turned off and system voltage is discharged according to the [Fluid Voltage Discharge and Grounding Procedure, page 39](#), before any person enters the isolation enclosure, before cleaning, and before performing any maintenance or repair.
- ☐ 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 22](#).
- ☐ The Graco waterborne fluid hose is in good condition with no cuts or abrasions of the PTFE layer. Replace hose if damaged.
- ☐ The condition of the gun's electrical components has been checked as instructed in [Electrical Tests, page 47](#).
- ☐ 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.
- ☐ Fluids used must meet the following flammability requirements:
 - **FM, FMc Approved:**
Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.
 - **CE-EN 50059 Compliant:**
Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500mJ.

Shutdown





				
<p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 39 whenever you are instructed to relieve the pressure.</p>				

1. Discharge the system voltage, see [Fluid Voltage Discharge and Grounding Procedure, page 39](#).
2. Flush the gun, see [Flushing, page 42](#)
3. Follow the [Pressure Relief Procedure, page 39](#).

4. Hang the gun from its hook, with the nozzle pointing down. Be sure to keep the gun from grounding out.



Maintenance

				
<p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 39, 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 42](#).
- ☐ Clean the fluid and air line filters.
- ☐ Clean the outside of the gun. See [Clean the Gun Daily, page 44](#).
- ☐ 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 44](#).
- ☐ Check the electrode and replace if broken or damaged. See [Electrode Replacement, page 61](#).
- ☐ 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 38](#).

Flushing

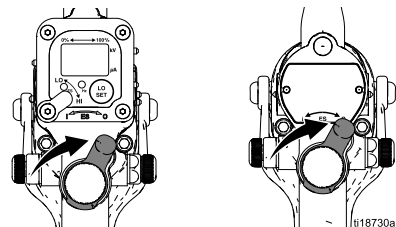
- Flush before changing fluids, before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.

				
<p>To reduce the risk of fire, explosion, or electric shock, turn OFF (O) the ES On-Off switch before flushing the gun.</p> <p>Follow the Fluid Voltage Discharge and Grounding Procedure, page 39, before flushing.</p> <p>Only flush, purge, or clean the gun with fluids that meet the following flammability requirements:</p> <ul style="list-style-type: none"> • FM, FMc Approved: Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206. • CE-EN 50059 Compliant: Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500mJ. 				

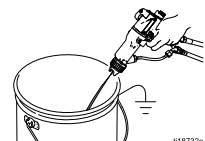
NOTICE

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. Wait 30 seconds for the voltage to bleed off.



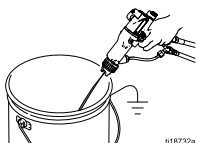
2. Discharge the system voltage. See [Fluid Voltage Discharge and Grounding Procedure, page 39](#).
3. Follow the [Pressure Relief Procedure, page 39](#).



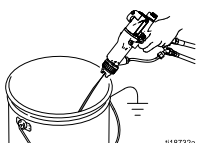
4. Change the fluid source to solvent.

NOTE: For Model L60M19 Mold Release Gun, remove the spray tip before flushing. See [Air Cap, Spray Tip, and Nozzle Replacement \(Model L60M19\)](#), page 60.

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

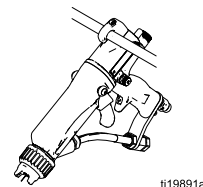


6. Follow the [Pressure Relief Procedure](#), page 39.



7. Open the isolated enclosure door. Leave the flushing fluid in the system until you are ready to spray again.

8. Hang the gun from its hook, with the nozzle pointing down. Be sure to keep the gun from grounding out.



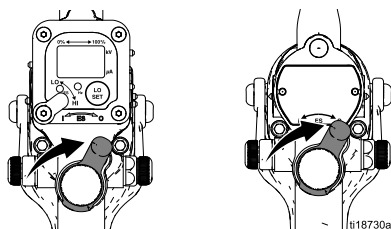
9. Before using the system electrostatically again, make sure no flammable vapors are present.

Clean the Gun Daily

NOTICE

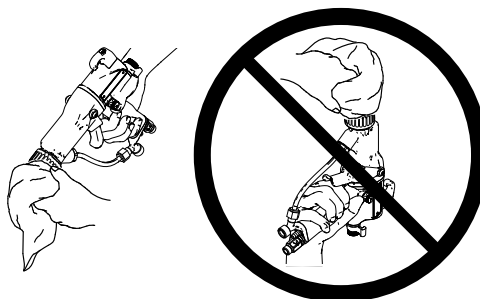
- Clean all parts with a compatible solvent. Conductive solvents can cause the gun to malfunction.
- Fluid in the air passages could cause the gun to malfunction and could draw current and reduce the electrostatic effect. Fluid in the power supply cavity can reduce the turbine life. Whenever possible, 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. See [Flushing, page 42](#).
3. Follow the [Pressure Relief Procedure, page 39](#).

4. Clean the outside of the gun with a non-flammable solvent, as defined under [Flushing, page 42](#). Use a soft cloth. Point the gun down to prevent solvent from entering the gun passages. Do not immerse the gun.



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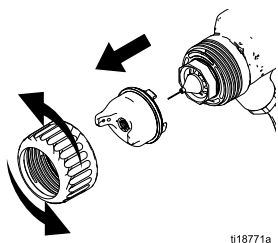


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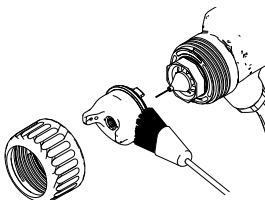
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5. Remove the air cap.



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



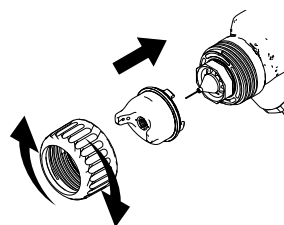
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7. If necessary, use a toothpick or other soft tool to clean the air cap holes. Do not use metal tools.



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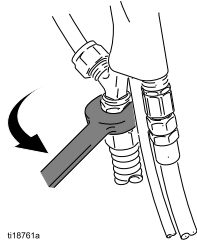
8. Reinstall the air cap. Tighten securely.



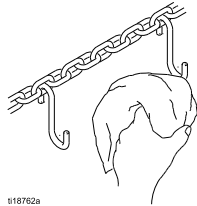
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Daily System Care

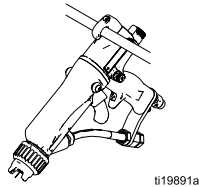
1. Follow the [Pressure Relief Procedure, page 39](#).
2. Clean the fluid and air filters.
3. Check for fluid leaks. Tighten all fittings.



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

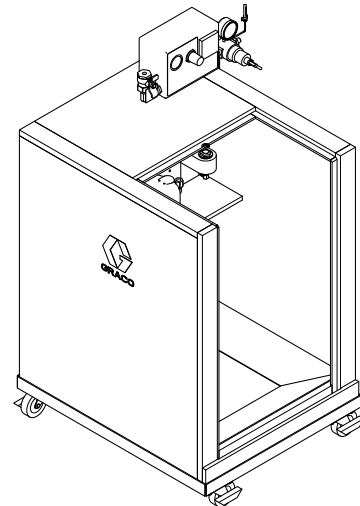


5. Check the movement of the trigger and valves. Lubricate if necessary.
6. [Check Gun Electrical Grounding, page 38](#).
7. Hang the gun from its hook, with the nozzle pointing down. Be sure to keep the gun from grounding out.



8. Clean the cabinet:

- Inspect the cabinet and clean up any spilled paint. Conductive paint residue allowed to contact grounded parts may short out the electrostatics.
- Keep the inside of the cabinet clean, for proper operation.
- Inspect the door T-handle locking screw regularly, to ensure the threads are well greased. Apply silicone-free grease to the threads when necessary.
- Visually inspect the ground strip (240) for damage. Replace if needed. Measure the resistance weekly. See [Test Ground Strip Resistance, page 50](#).






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.

[Power Supply Removal and Replacement, page 66.](#)

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

				
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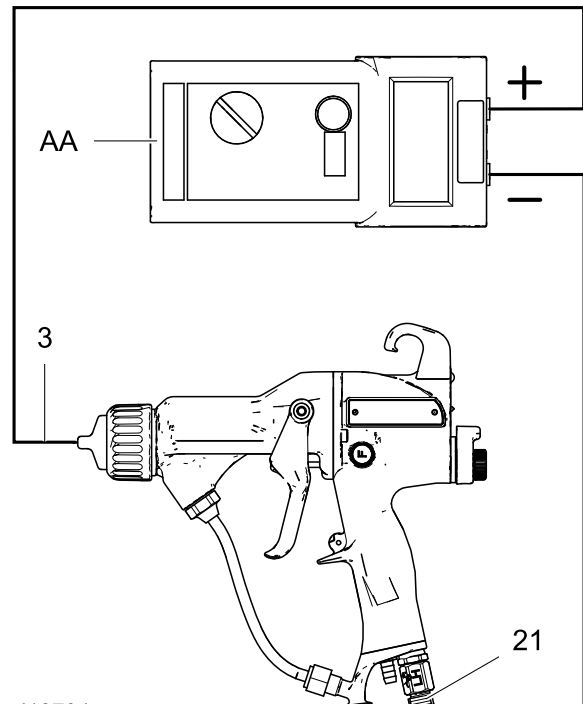
Megohmmeter Part No. 241079 (AA-see Fig. 25) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

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

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

Test Gun Resistance

1. Follow the steps under [Prepare the Gun for Service, page 58.](#)
2. Trigger the gun and measure resistance between the electrode needle tip (3) and the air swivel (21). The resistance should be 104–150 megohms (90–120 megohms for Model L60M19). If outside this range, go to [Test Power Supply Resistance, page 48.](#) If in range, see [Voltage Loss Troubleshooting, page 51](#) for other possible causes of poor performance, or contact your Graco distributor.

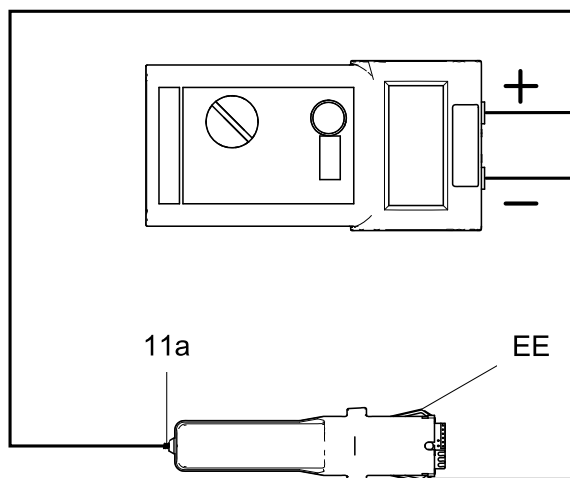


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Figure 25 Test Gun Resistance

Test Power Supply Resistance

1. Follow the steps under [Prepare the Gun for Service, page 58](#).
2. Remove the power supply (11).
3. Remove the turbine alternator (15) from the power supply.
4. Measure resistance from the power supply's ground strips (EE) to the spring (11a). The resistance should be 90–115 megohms. If outside this range, replace the power supply. If in range, go to [Test Electrode Resistance, page 49](#).
5. Be sure the spring (11a) is in place before reinstalling the power supply.

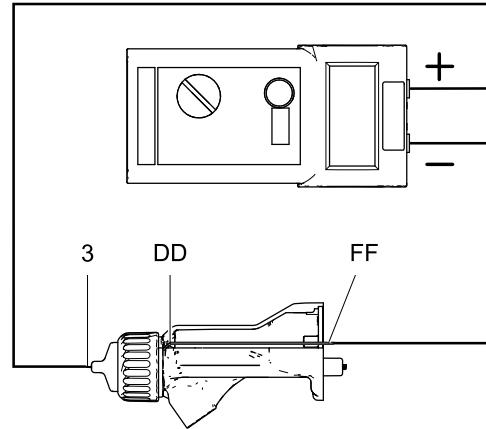


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Figure 26 Test Power Supply Resistance

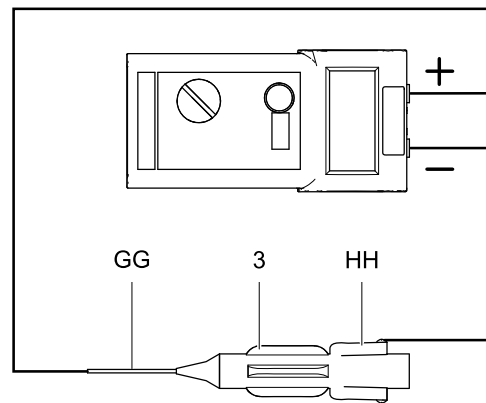
Test Electrode Resistance

1. Follow the steps under [Prepare the Gun for Service, page 58](#).
2. Insert a conductive rod (FF) into the gun barrel (which was removed for the power supply test) and against the metal contact (DD) in the front of the barrel.
3. Measure the resistance between the conductive rod (FF) and the electrode (3). The resistance should be 10–30 megohms (less than 5 megohms for Model L60M19).
4. If in range, go to [Electrical Troubleshooting, page 56](#), for other possible causes of poor performance, or contact your Graco distributor.
5. Remove the electrode (3), see [Electrode Replacement, page 61](#). Measure the resistance between the contact (HH) and the electrode wire (GG). The resistance should be 10–30 megohms. If out of range, replace the electrode.
6. Make sure the metal contact ring (DD) in the barrel, the nozzle contact ring (4a), and the electrode contact (HH) are clean and undamaged.



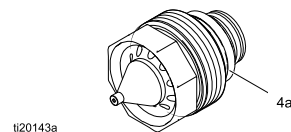
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Figure 27 Test Electrode Resistance



ti18736a

Figure 28 Electrode



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Figure 29 Nozzle Conductive O-Ring

Test Ground Strip Resistance

Using an ohmmeter, measure the resistance between the latch housing (206) and the ground lug (214). The ground strip is grounded through the cart back to the ground lug. Resistance must be less than 100 ohms. If greater than 100 ohms, replace the ground strip (240).

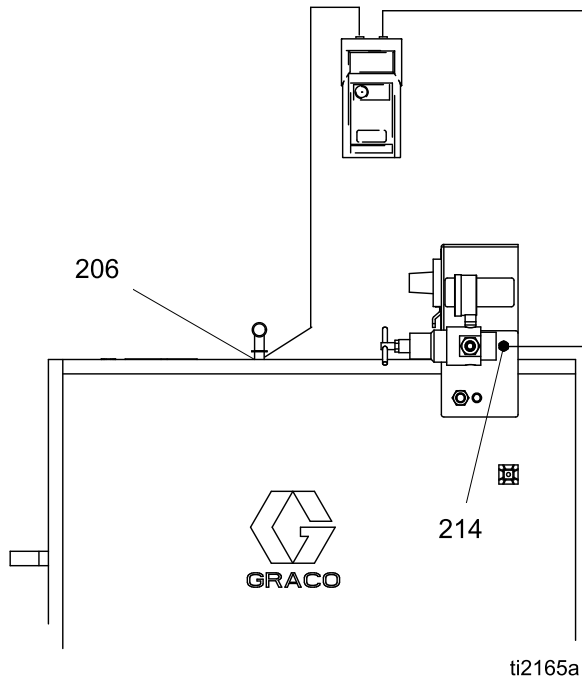


Figure 30 Test Ground Strip Resistance

Test Cylinder Resistance

Remove the enclosure door. Using an ohmmeter, measure the resistance from the pump (209) to the ground lug (214). Resistance must be less than 100 ohms. If greater than 100 ohms, replace the grounding cylinder (227).

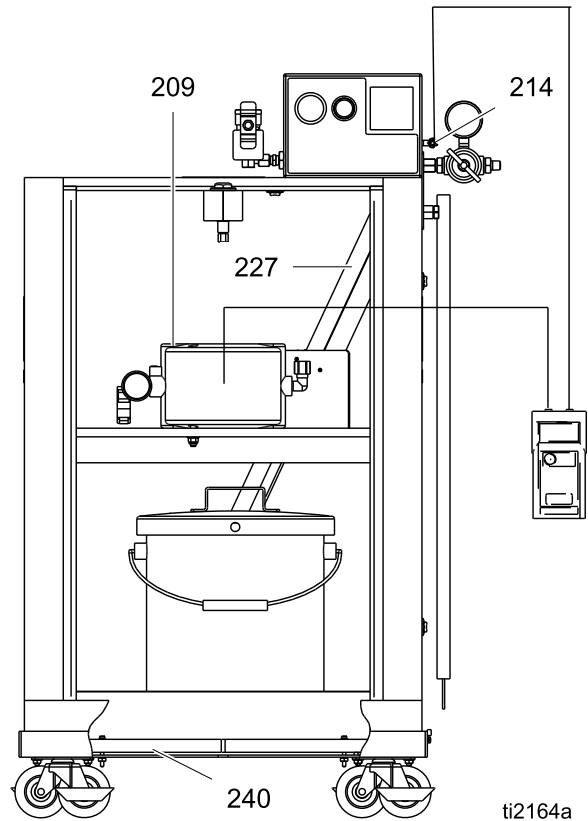







Figure 31 Test Cylinder Resistance

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>Follow the Fluid Voltage Discharge and Grounding Procedure, page 39 before checking or servicing the system and whenever you are instructed to discharge the voltage.</p>				

				
<p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 39, whenever you are instructed to relieve the pressure.</p>				

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

Voltage Loss Troubleshooting

Normal spraying voltage for a system using the waterborne gun is 45-55 kV. The system voltage is lower due to spraying current demands and voltage isolation system losses.

A loss of spraying voltage can be caused by a problem with the spray gun, fluid hose, or voltage isolation system, since all of the system components

are electrically connected through the conductive, waterborne fluid.

Before troubleshooting or servicing the voltage isolation system itself, you need to determine which component in the system is most likely causing a problem. Possible causes include the following:

Spray Gun

- Fluid leakage
- Dielectric breakdown at the fluid hose connection or fluid packings
- Not enough air pressure for the alternator turbine
- Faulty power supply
- Excessive overspray on gun surfaces
- Fluid in the air passages

Waterborne Fluid Hose

- Dielectric failure of the hose (pin-hole leak in the PTFE layer)
- Air gap in the fluid column between the gun and the isolated fluid supply, causing a low voltage reading on the isolation system voltage meter.

Voltage Isolation System

- Fluid leakage
- Dirty interior

Visual Checks

First, check the system for any visible faults or errors to help isolate whether the spray gun, fluid hose or voltage isolation system has failed. A voltage probe and meter, part no. 245277, is helpful for diagnosing voltage problems and is required for some of the troubleshooting tests that follow.

1. Check that all of the air and fluid tubes and hoses are properly connected.
2. Check that the voltage isolation system valves and controls are properly set for operation.
3. Check that the interior of the isolated enclosure is clean.
4. Check that the spray gun and voltage isolation system have sufficient air pressure.
5. Check that the gun ES ON/OFF valve is in the ON position and that the gun ES indicator light is on. If the ES indicator light is not on, remove the spray gun for service and complete the [Electrical Tests, page 47](#).
6. Check that the voltage isolation system's enclosure door is closed and that any safety interlocks are engaged and working properly.
7. Make sure the voltage isolation system is in the "isolate" mode, where it is isolating the fluid voltage from ground.
8. To eliminate air gaps in the fluid column, spray enough fluid to purge the air out between the voltage isolation system and the spray gun. An air gap in the fluid hose can break the electrical continuity between the spray gun and the isolated fluid supply and cause a low voltage reading on a voltage meter connected to the isolated fluid supply.
9. Check the spray gun cover and barrel for accumulated overspray. Excessive overspray can create a conductive path back to the grounded gun handle. Install a new gun cover and clean the exterior of the gun.
10. Inspect the entire system for any visible fluid leakage and repair any fluid leaks that are found. Pay special attention to the following areas:
 - Packing area of the spray gun.
 - Fluid hose: check for leakage or any bulges in the outer cover, which may indicate an internal leak.
 - Internal voltage isolation system components

Tests

If you still have no voltage, separate the spray gun and hose from the voltage isolation system and check whether the gun and hose alone will hold voltage with the following test.

1. Flush the system with water and leave the lines filled with water.
2. Discharge the system voltage (see [Fluid Voltage Discharge and Grounding Procedure, page 39](#)).
3. Follow the [Pressure Relief Procedure, page 39](#).
4. Disconnect the fluid hose from the voltage isolation system.

Avoid allowing any water to leak out of the fluid hose as that could cause a significant air gap in the fluid column up to the gun electrode, which can break the conductivity path and conceal a potential failure area.

5. Position the end of the hose as far as possible away from any grounded surface. The end of the hose must be at least 1 ft. (0.3 m) from any ground. Make sure that no one is within 3 ft. (0.9 m) of the end of the hose.
6. Turn the ES ON/OFF valve to ON and trigger the gun just enough to turn on the air to the gun but not the fluid. Measure the voltage at the gun electrode with a voltage probe and meter.
7. Discharge the system voltage by waiting 30 seconds and then touching the gun electrode with a grounded rod.
8. Check the meter reading:
 - If the meter reading is 45 to 55 kV, the gun and fluid hose are okay, and the problem is in the voltage isolation system.
 - If the meter reading is below 45 kV, the problem is in the gun or fluid hose.
9. Flush the fluid hose and gun with enough air to dry out the fluid passages.
10. Turn the ES ON/OFF valve to ON and trigger the gun. Measure the voltage at the gun electrode with a voltage probe and meter.
 - If the meter reading is 45-55 kV, the gun power supply is okay, and there is probably a dielectric breakdown somewhere in the fluid hose or gun. Continue with step 11.
 - If the meter reading is below 45 kV, do the [Electrical Tests, page 47](#), to check the gun and power supply resistance. If those tests show the gun and power supply are okay, continue with step 11.

11. A dielectric breakdown is most likely in one of the following three areas. Repair or replace the component that is failing.
 - a. Fluid hose:
 - Check for leakage or any bulges in the outer cover, which may indicate a pin-hole leak through the PTFE layer. Disconnect the fluid hose from the gun, and look for signs of fluid contamination on the outside of the PTFE portion of the fluid tube.
 - Inspect the end of the hose connected to the voltage isolation system. Look for cuts or nicks.
 - Make sure the hose is properly stripped (see [Connect the Waterborne Fluid Hose, page 17](#)). Restrip or replace the hose.
 - b. Fluid packings:

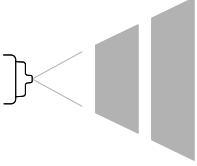



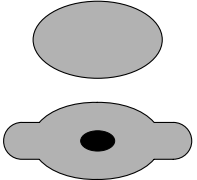
Remove the packing assembly from the gun (see [Fluid Packing Rod Removal, page 62](#)), and look for signs of fluid leakage or any blackened areas, which would indicate arcing is occurring along the packing rod.
 - c. Fluid hose connection to the spray gun:

A breakdown at the fluid hose connection joint would be caused by fluid leaking past the o-ring seals on the end of the hose. Remove the hose at the gun connection and look for signs of fluid leakage along the PTFE tube.
12. Before reassembling the gun, clean and dry the gun fluid inlet tube. Repack the inner spacer of the fluid packing rod with dielectric grease and reassemble the gun.
13. Reconnect the fluid hose.
14. Check the gun voltage with the voltage probe and meter before filling the gun with fluid.

Spray Pattern Troubleshooting

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

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/seal.	Clean or replace nozzle, see Clean the Gun Daily, page 44 , or Air Cap and Nozzle Replacement, page 59 .
	Air in fluid supply.	Check fluid source. Refill.
Improper spray pattern. 	Damaged or dirty nozzle or air cap.	Clean or replace. See Air Cap and Nozzle Replacement, page 59 .
	Fluid buildup on air cap or nozzle.	Clean. See Clean the Gun Daily, page 44 .
	Fan air pressure too high.	Decrease.
	Fluid too thin.	Increase viscosity.
	Fluid pressure too low.	Increase.
	Fan air pressure too low.	Increase.
	Fluid too thick.	Reduce viscosity.
	Too much fluid.	Decrease flow.
Streaks.	Did not apply 50% overlap.	Overlap strokes 50%.
	Dirty or damaged air cap.	Clean or replace air cap. See Clean the Gun Daily, page 44 , or Air Cap and Nozzle Replacement, page 59 .

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 Packing Rod Repair, page 63 .
Air leaks from the front of the gun.	Air valve is not seating properly.	Replace air valve. See Air Valve Repair, page 72 .
Fluid leakage from the front of the gun.	Worn electrode.	Replace electrode. See Electrode Replacement, page 61 .
	Worn fluid nozzle seat.	Replace nozzle. See Air Cap and Nozzle Replacement, page 59 .
	Loose fluid nozzle.	Tighten.
	Damaged nozzle o-ring.	Replace o-ring. See Air Cap and Nozzle Replacement, page 59 .
Gun does not spray.	Low fluid supply.	Add fluid if necessary.
	Dirty or clogged fluid nozzle.	Clean. See Clean the Gun Daily, page 44 .
	Closed or damaged fluid adjustment valve.	Open valve, or see ES On-Off and Fluid Adjustment Valve Repair, page 71 .
Dirty air cap.	Misaligned air cap and fluid nozzle.	Clean fluid buildup off air cap and fluid nozzle seat. See Clean the Gun Daily, page 44 .
Excessive paint wrap back to operator.	Poor grounding.	See Grounding, page 22 .
	Incorrect distance from gun to part.	Should be 8–12 in. (200–300 mm).








Electrical Troubleshooting

Problem	Cause	Solution
Voltage still present at gun after following the Fluid Voltage Discharge and Grounding Procedure, page 39 .	ES On/Off switch is not turned OFF (O).	Turn OFF (O).
	Did not wait long enough for voltage to discharge.	Wait longer before touching electrode with grounding rod. Check for bleed resistor failure.
	Air pocket in fluid line leaves fluid near gun isolated.	Determine cause and correct. Purge air from fluid line.
	Voltage isolation system failed.	Service voltage isolation system.
	Grounding cylinder not operating.	See Test Cylinder Resistance, page 50 . Replace if needed.
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.
	Fluid pressure too high.	Decrease.
	Incorrect distance from gun to part.	Should be 8-12 in. (200-300 mm).
	Poorly grounded parts.	Resistance must be 1 megohm or less. Clean workpiece hangers.
	Faulty gun resistance.	See Test Gun Resistance, page 47 .
	Fluid leaks from the packing (2c) and causes a short.	Clean the packing rod cavity, or replace the packing rod. See Packing Rod Repair, page 63 .
	Faulty alternator.	See Alternator Removal and Replacement, page 67 .
	ES HI/LO switch is on LO (Smart guns only)	Check switch actuation; replace if needed.
	Spilled paint, dried paint, or other contaminants inside the WB100 Enclosure, causing a short circuit.	Clean interior of enclosure.
ES or Hz indicator is not lit.	ES On/Off switch is OFF (O).	Turn ON (I).
	No power.	Check power supply, alternator, and alternator ribbon cable. See Power Supply Removal and Replacement, page 66 .

Problem	Cause	Solution
Operator gets mild shock.	Operator not grounded or is near ungrounded object.	See Grounding , page 22.
	Gun not grounded.	See Check Gun Electrical Grounding , page 38, and Test Gun Resistance , page 47.
	A weak static charge has built up on the surface of an unshielded fluid hose. This is a charge on the hose surface, not a failure of the hose insulation.	Bundle and wrap the air and fluid hoses together. See Connect the Waterborne Fluid Hose , page 17.
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.
	Dirty gun.	See Clean the Gun Daily , page 44.
ES or Hz indicator is amber.	Alternator speed is too low.	Increase air pressure until indicator is green. To avoid over-atomization, use the atomizing air restrictor valve to reduce the atomizing air to the air cap.
ES or Hz indicator is red.	Alternator speed is too high.	Decrease air pressure until indicator is green.
Error display appears and Hz indicator is red (Smart guns only).	Smart module has lost communication with the power supply.	Check for good connections between the Smart Module and the power supply. See Smart Module Replacement , page 73 and Power Supply Removal and Replacement , page 66.

Repair

Prepare the Gun for Service

				
<p>Installing and repairing this equipment requires access to parts that may cause electric shock or other serious injury if the work is not performed properly. Do not install or service this equipment unless you are trained and qualified. To reduce the risk of fire, explosion, or electric shock, before flushing the gun:</p> <ul style="list-style-type: none"> Follow the Fluid Voltage Discharge and Grounding Procedure, page 39, and turn OFF (O) the ES On-Off switch before flushing, checking, or servicing the system and whenever you are instructed to discharge the voltage. Clean all parts with a non-flammable fluid as defined under Models, page 3. Do not touch the gun nozzle or come within 4 in. (102 mm) of the nozzle during gun operation or until you perform the Fluid Voltage Discharge and Grounding Procedure, page 39. 				
				
<p>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.</p>				

- Check all possible remedies in [Troubleshooting, page 51](#) 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†).
- Follow the [Fluid Voltage Discharge and Grounding Procedure, page 39](#).
 - Flush the gun. See [Flushing, page 42](#).
 - Blow the fluid lines dry with air.
 - Relieve the pressure. See [Pressure Relief Procedure, page 39](#).
 - Disconnect the gun air and fluid lines at the isolation system.
 - 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 58](#).
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.

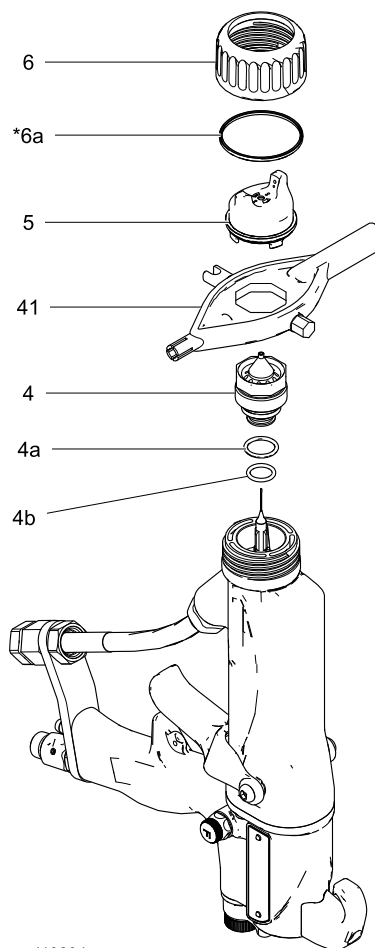
NOTE: Use non-silicone grease, Part No. 111265, on the small o-ring (4b). Do not over-lubricate. Do not lubricate the conductive contact ring (4a). Excessive grease can mix with paint and blemish the finish on the workpiece.

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.



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Figure 32 Air Cap and Nozzle Replacement

Air Cap, Spray Tip, and Nozzle Replacement (Model L60M19)

1. See [Prepare the Gun for Service, page 58](#).
2. Remove the retainer ring (6) and air cap/tip guard assembly (5).

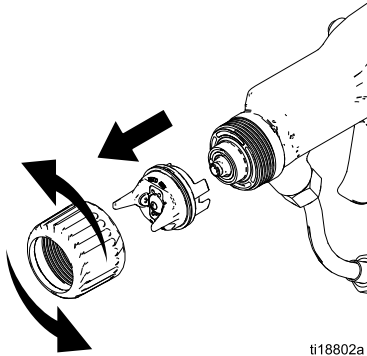
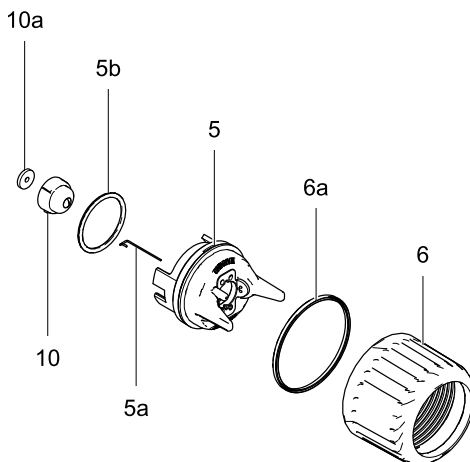


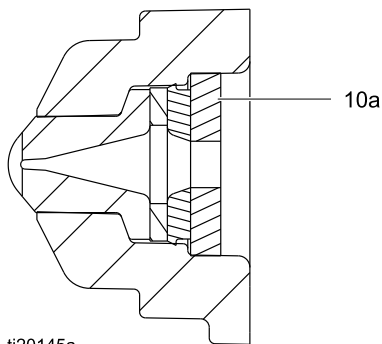
Figure 33 Remove Air Cap

3. Disassemble the air cap assembly. Check the condition of the u-cup (6a), electrode (5a), o-ring (5b), and tip gasket (10a). Replace any damaged parts.



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Figure 34 Disassemble Air Cap Assembly



ti20145a

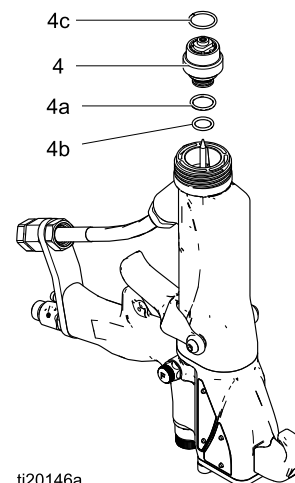
Figure 35 Tip Gasket

4. To replace the electrode (5a), pull the it out of the back of the air cap, using a needle-nose pliers. Push the new electrode through the air cap hole. Make sure the short end of the electrode engages the hole in the back of the air cap. Press the electrode in place firmly with your fingers.

NOTICE

The conductive ring (4c) is a conductive metal contact ring, not a sealing o-ring. For best performance and to avoid potential damage to the spray gun, do not remove the conductive ring (4c) except to replace it and never operate the gun without the conductive ring in place. Do not replace the conductive ring with anything but a genuine Graco part.

5. Trigger the gun and remove the nozzle (4), using an adjustable wrench.



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Figure 36 Replace Nozzle

NOTICE

Do not overtighten the nozzle (4). Overtightening may damage the housing and the gun barrel, resulting in improper fluid shutoff.

6. Ensure that the o-rings (4a, 4b, and 9) are in place on the nozzle. Trigger the gun and install the nozzle (4). Tighten until snug, then 1/4 turn more.
7. Check that the spray tip gasket (10a) is in place. Align the spray tip tab with the groove in the air cap (5). Install the spray tip (10) in the air cap.
8. Make sure that the electrode (5a) is installed correctly in the air cap.
9. Check that the air cap o-ring (5b) is in place.

10. Check that the u-cup (6a) is in place on the retaining ring (6). The lips of the u-cup must face forward.

NOTICE

To avoid damaging the tip guard, orient the air cap assembly (5) before tightening the retaining ring (6). Do not turn the air cap when the retaining ring is tight.

11. Orientate the air cap and tighten the retaining ring securely.
12. See [Test Gun Resistance, page 47](#).

Electrode Replacement

1. Follow the steps in [Prepare the Gun for Service, page 58](#).
2. Remove the air cap and nozzle. See [Air Cap and Nozzle Replacement, page 59](#).
3. Unscrew the electrode (3) with the multi-tool (41).

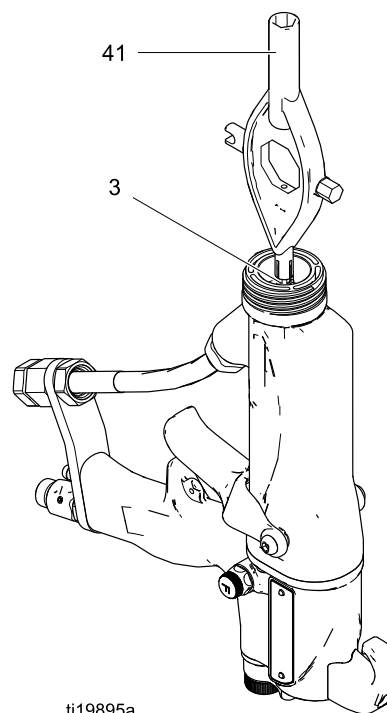
NOTICE

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

4. Apply low-strength purple 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 59](#).

NOTICE

To avoid equipment damage, use only the electrode needle available in kit 26A416. Alternate electrodes are not acceptable for use and do not fit the packing rod threads.

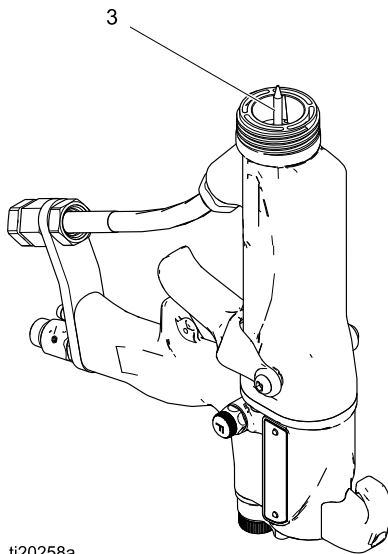


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Figure 37 Electrode Replacement

Needle Replacement (Model L60M19)

1. See [Prepare the Gun for Service, page 58](#).
2. Remove the air cap and nozzle. See [Air Cap, Spray Tip, and Nozzle Replacement \(Model L60M19\), page 60](#).
3. Unscrew the needle (3).
4. Apply low-strength (purple) Loctite® or equivalent thread sealant to the needle and packing rod threads. Install the needle finger-tight. Do not overtighten.
5. Install the fluid nozzle and air cap. See [Air Cap, Spray Tip, and Nozzle Replacement \(Model L60M19\), page 60](#).
6. See [Test Gun Resistance, page 47](#).

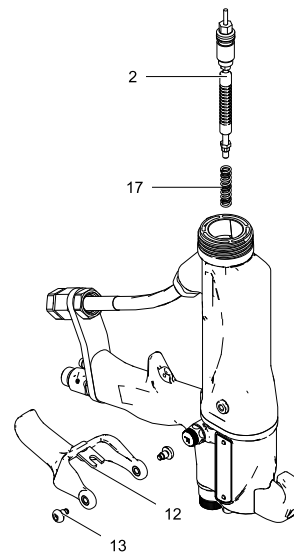


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Figure 38 Electrode Replacement

Fluid Packing Rod Removal

1. Follow the steps in [Prepare the Gun for Service, page 58](#).
2. Remove the air cap and fluid nozzle. See [Air Cap and Nozzle Replacement, page 59](#).
3. Remove the electrode. See [Electrode Replacement, page 61](#).
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.



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Figure 39 Fluid Packing Rod Removal

Packing Rod Repair

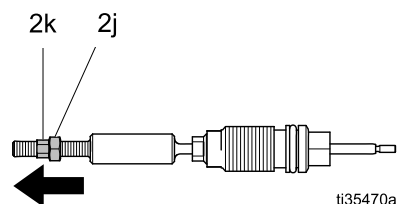
NOTE: You may replace the packing rod as individual parts or as an assembly.

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.

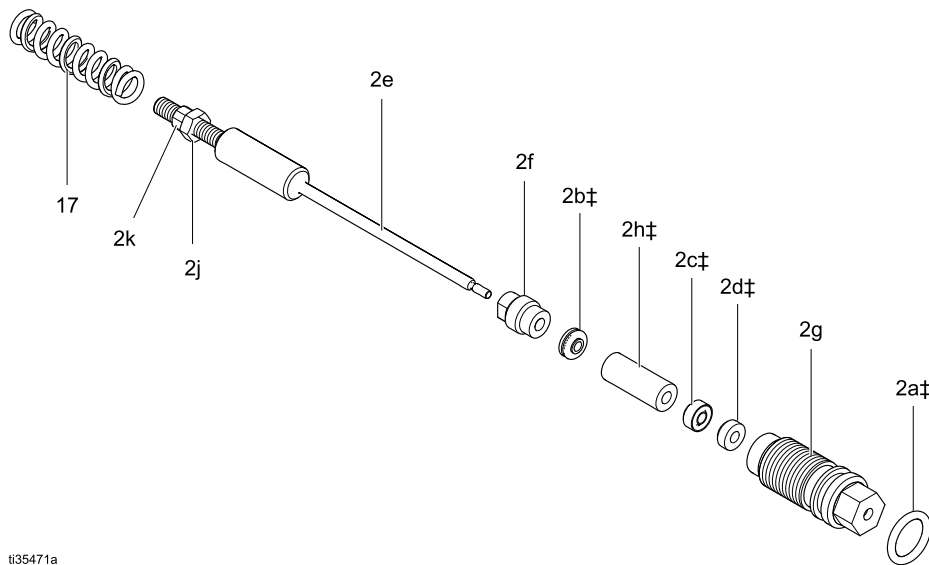


3. Tighten the nuts together to fix them in the new position.

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 61](#), step 4.
9. Install the nozzle and air cap. See [Air Cap and Nozzle Replacement, page 59](#), steps 5–7.
10. Install the trigger (12) and screws (13).



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Figure 40 Packing Rod

Barrel Removal

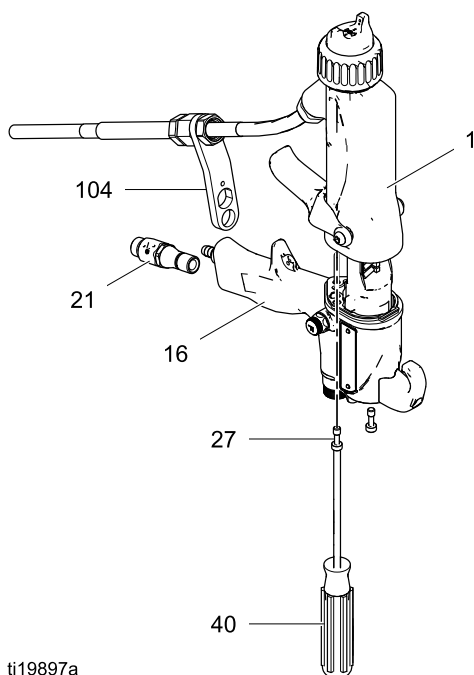
1. Follow the steps in [Prepare the Gun for Service, page 58](#).
2. Remove the air inlet fitting (21) and take the bracket (104) off the gun handle (16).
3. Loosen the two screws (27).

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 41 Barrel Removal

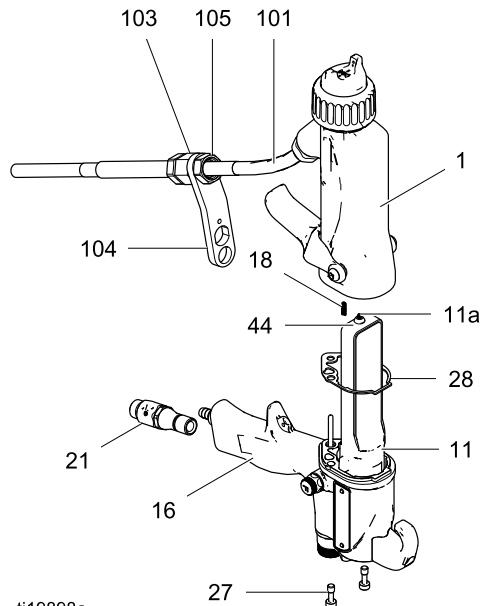
Barrel Installation

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 20 in-lb., 2 N•m).

NOTICE

To avoid damaging the gun barrel, do not over-tighten the screws (27).

4. Position the bracket (104) on the gun handle (16) and secure with the air inlet fitting (21).
5. Apply dielectric grease (44) to the exposed inner tube of the fluid hose (101).
6. Check that the nut (105) is tight on the ferrule housing (103).
7. Follow the steps in [Test Gun Resistance, page 47](#).



ti19898a

Figure 42 Barrel Installation

Power Supply Removal and Replacement

- Inspect the gun handle power supply cavity for dirt or moisture. Clean with a clean, dry rag.
 - Do not expose gasket (28) to solvents.
1. Follow the steps in [Prepare the Gun for Service, page 58](#).
 2. Follow the steps in [Barrel Removal, page 65](#).

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 48](#). Replace the power supply if necessary. To repair the alternator, see [Alternator Removal and Replacement, page 67](#).

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.

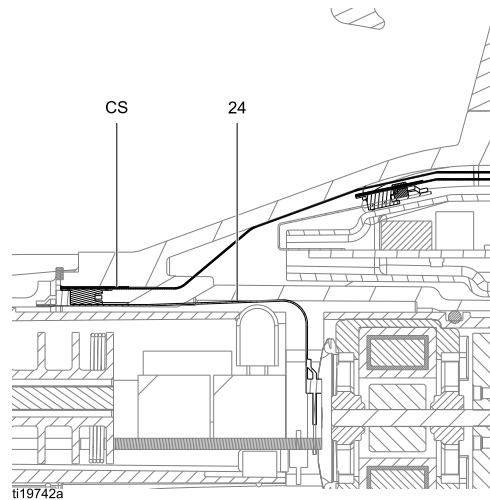


Figure 43 Connect Flexible Circuit

10. Make sure the gasket (28*), ground spring (18), and power supply spring (11a) are in place. Replace gasket (28*) if damaged. Assemble the barrel (1) to the handle (16). See [Barrel Installation, page 65](#).
11. Follow the steps in [Test Gun Resistance, page 47](#).

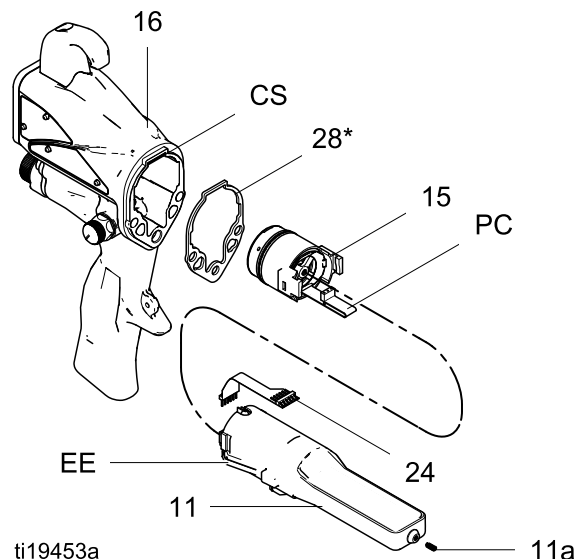


Figure 44 Power Supply

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 58](#).
2. Remove the power supply/alternator assembly and disconnect the alternator. See [Power Supply Removal and Replacement, page 66](#).
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).

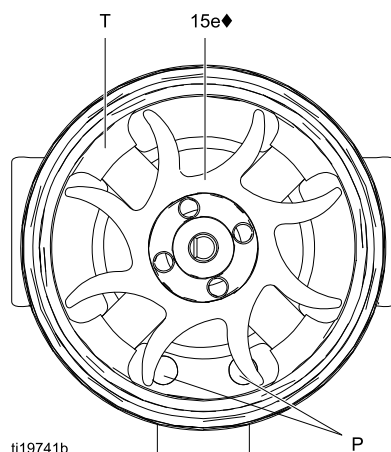


Figure 45 Fan Orientation

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

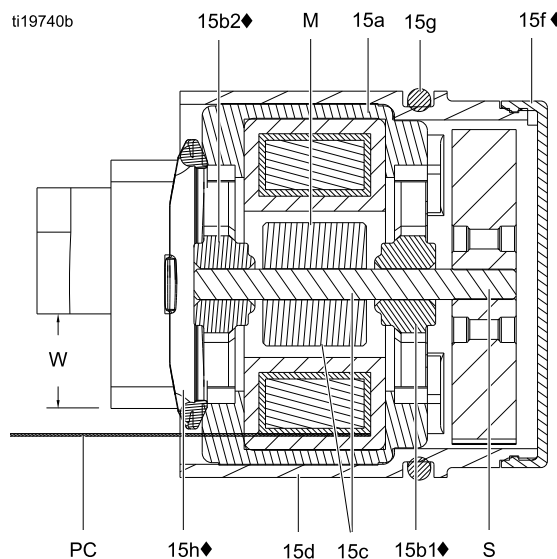


Figure 46 Alternator Cross-Section

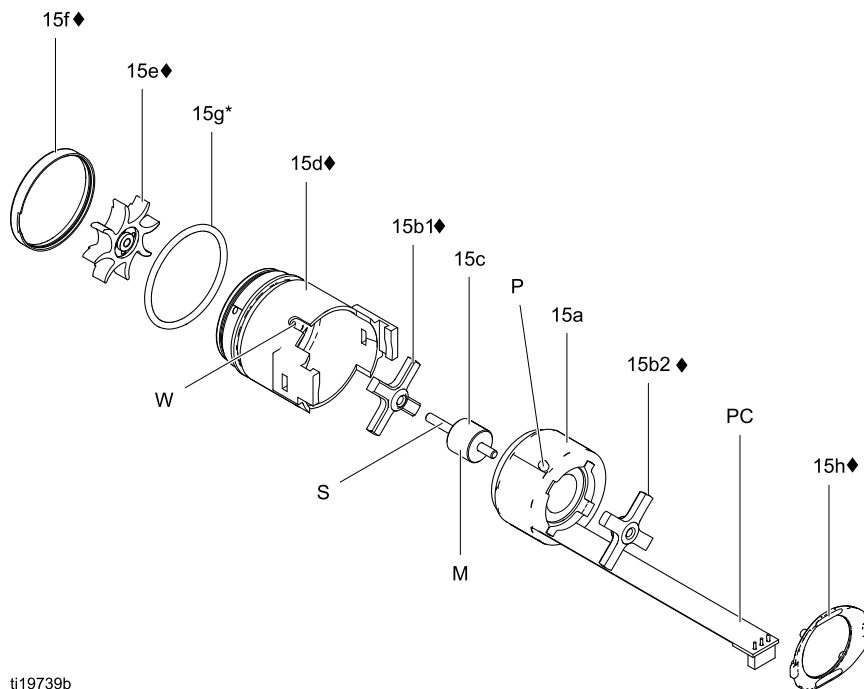
◆28 is not shown in illustration.

NOTICE

To prevent damage, 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.

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. 46. Be sure the coil alignment pins (P) are positioned as shown in Fig. 45.
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 66](#).



ti19739b

Figure 47 Alternator

Fan Air Adjustment Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 58](#).
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).

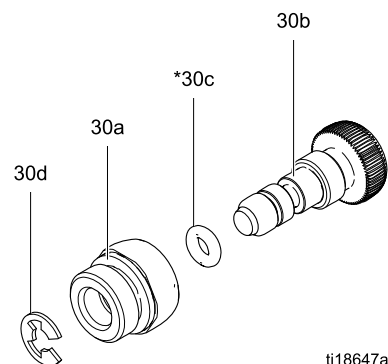


Figure 48 Fan Air Adjustment Valve

Atomizing Air Restrictor Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 58.](#)
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).

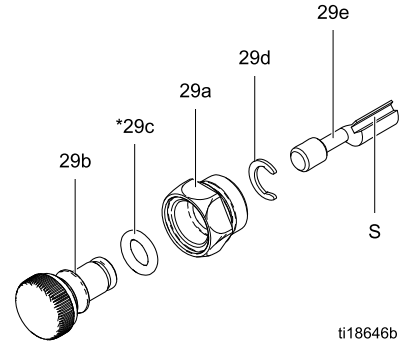


Figure 49 Atomizing Air Restrictor Valve

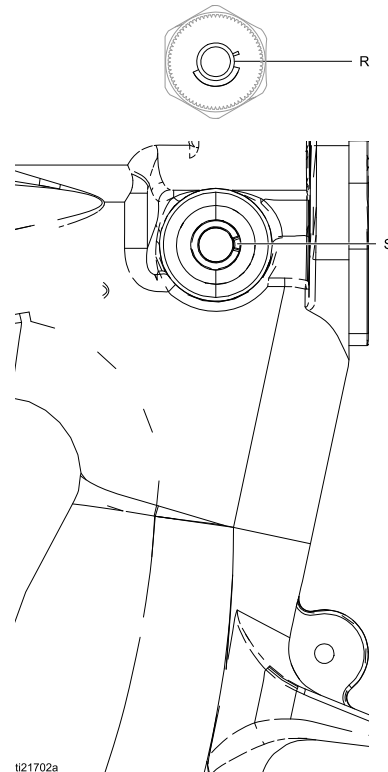
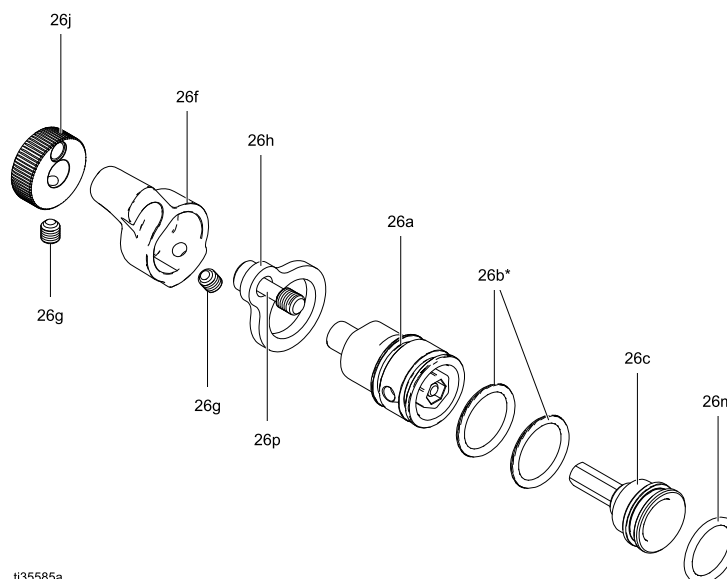


Figure 50 Align Valve Stem

ES On-Off and Fluid Adjustment Valve Repair

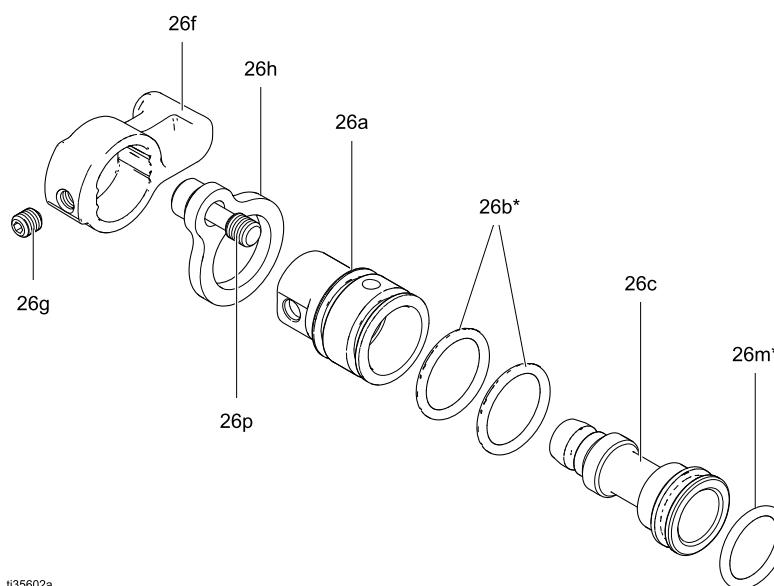
1. Follow the steps in [Prepare the Gun for Service, page 58](#).
2. Loosen the captive screw (26p). Remove the valve (26) from the handle.
3. Lubricate the o-rings (26b* and 26m*) with non-silicone grease, Part No. 111265. Do not over-lubricate.
4. Clean and inspect parts for damage. Replace if necessary.
5. Reinstall the valve. Torque the screw (27) to 15-25 in-lb (1.7-2.8 N•m).

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.



ti35585a

Figure 51 ES On-Off Valve Repair, 24N630 and 26A160



ti35602a

Figure 52 ES On-Off Valve Repair, 24N632

Air Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 58](#).
2. Follow the steps in [Barrel Removal, page 65](#).
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 71](#).
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.

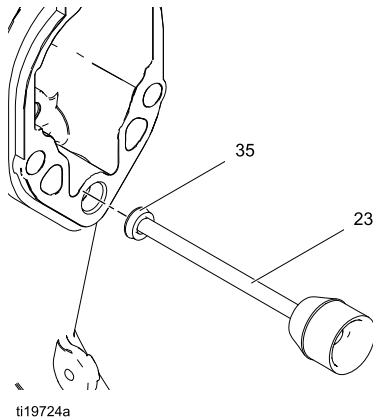


Figure 53 Install U-Cup

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 71](#).
10. Install the trigger (12) and screws (13).
11. Follow the steps in [Barrel Installation, page 65](#).

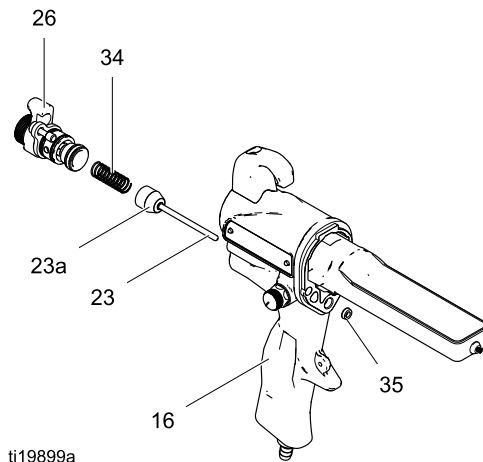


Figure 54 Air Valve

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 58](#).
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 (31c) in the bottom left corner of the cartridge (31a).
9. Install the three remaining screws (31d). Torque to 7–9 in-lb (0.8–1.0 N•m).

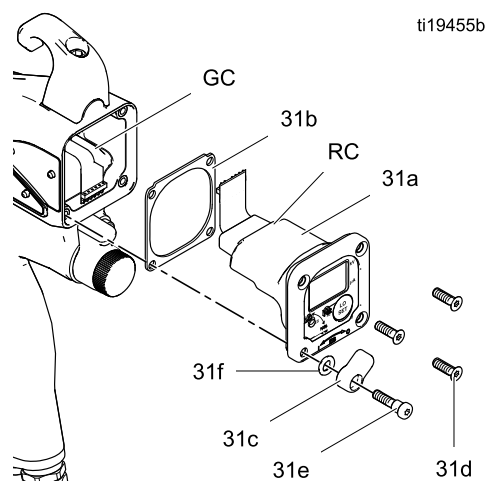


Figure 55 Smart Module

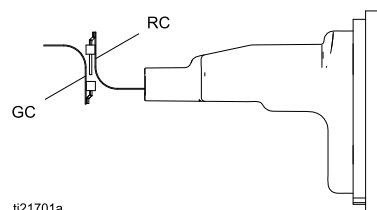


Figure 56 Align Ribbon Cables

Air Swivel and Exhaust Valve Replacement

1. Follow the steps in [Prepare the Gun for Service, page 58](#).
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 (104).
 - 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 (104) and screw the swivel into the gun handle (16). Torque to 75–85 in-lb (8.4–9.6 N•m).
 - g. Check that the nuts (102, 105) are tight.
 - h. 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).

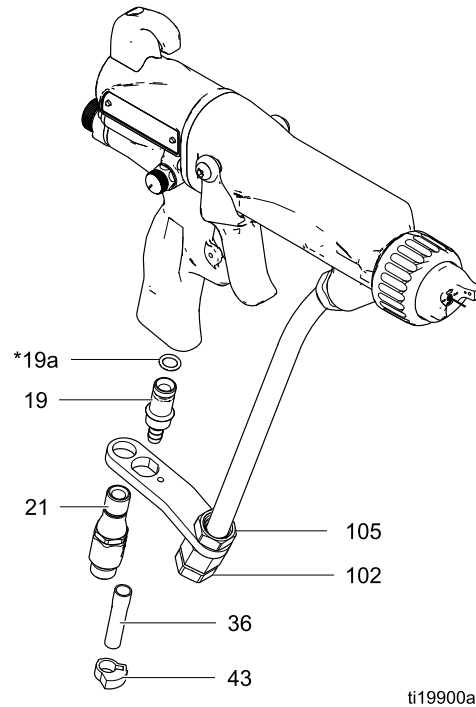


Figure 57 Air Inlet Fitting and Air Exhaust Valve

Parts

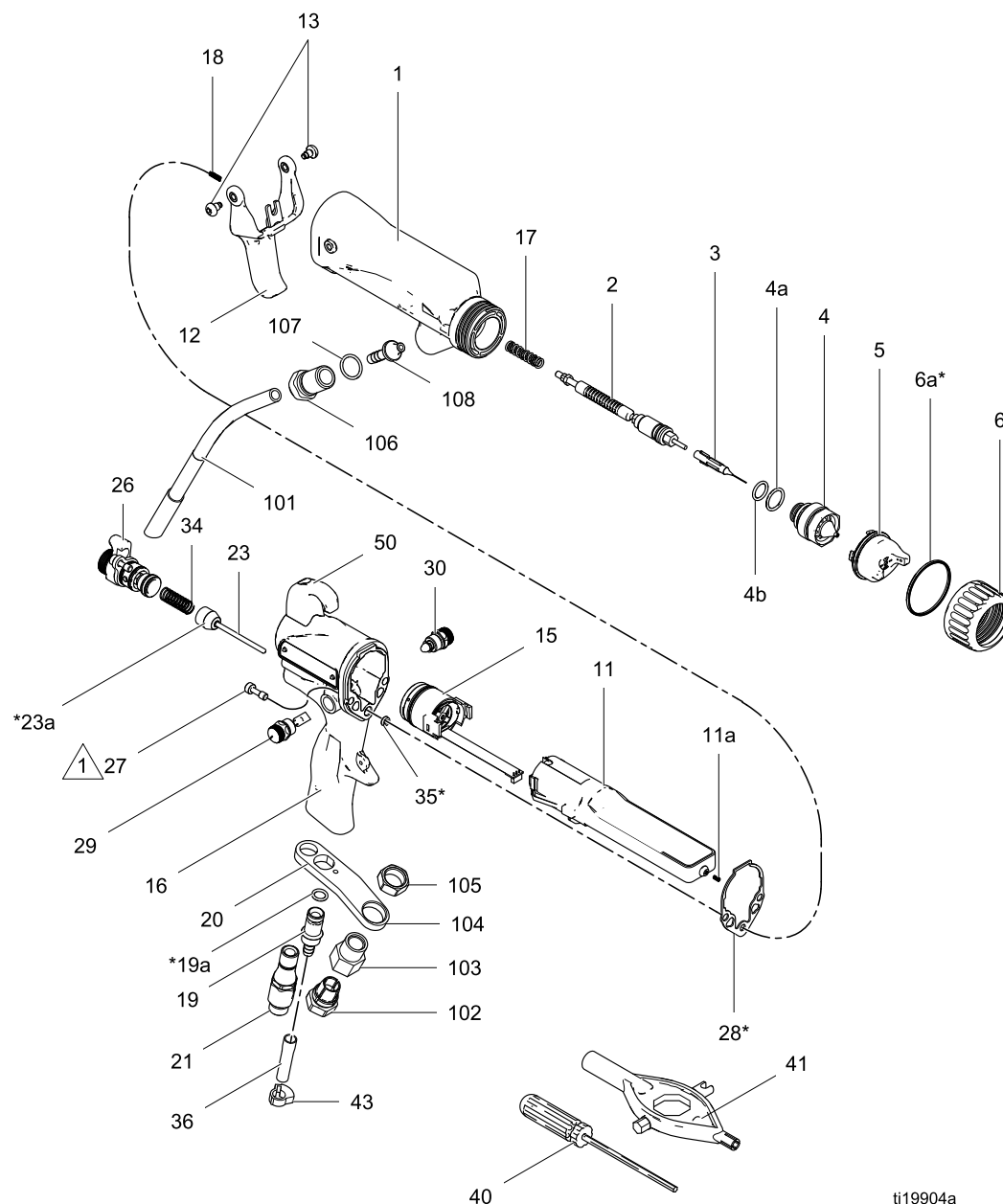
Standard Waterborne Air Spray Gun Assembly

Part No. L60T17 60 kV Electrostatic Waterborne Air Spray Gun, Series C includes items 1–48

Part No. L60T18 60 kV Electrostatic Waterborne Air Spray Gun, Series C includes items 1–48

Part No. 24M732 Shielded Waterborne Fluid Hose (101), sold separately for gun model L60T17

Part No. 24M733 Unshielded Waterborne Fluid Hose (101), sold separately for gun model L60T18



1 Torque to 20 in-lb (2 N•m).

Part No. L60T17 60 kV Electrostatic Waterborne Air Spray Gun, Series C includes items 1–48

Part No. L60T18 60 kV Electrostatic Waterborne Air Spray Gun, Series C includes items 1–48

Part No. 24M732 Shielded Waterborne Fluid Hose (101), sold separately for gun model L60T17

Part No. 24M733 Unshielded Waterborne Fluid Hose (101), sold separately for gun model L60T18

Ref. No.	Part No.	Description	Qty
1	24N667	BODY, gun (includes ref. 28)	1
2	24N655	See Packing Rod Assembly, page 86	1
3	24N652	NEEDLE, electrode, black	1
4	24N616	NOZZLE, 1.5 mm; includes 4a and 4b	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	24N477	AIR CAP	1
6	24P892	RING, retainer; includes 6a	1
6a*	198307	PACKING, u-cup; UHMWPE	1
11	24N662	POWER SUPPLY, 60 kV gun	1
11a	24N979	SPRING	1
12	24N663	TRIGGER	1
13	24A445	SCREW, trigger; package of 2	1
15	24N664	See Alternator Assembly, page 87	1
16	24P744	HANDLE; for gun model L60T17	1
	24P743	HANDLE; for gun model L60T18	1
17	185111	SPRING, compression	1
18	197624	SPRING, compression	1
19	24P036	VALVE, exhaust	1
19a*	112085	O-RING	1
21	24N626	SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1
26	24N630	See ES On-Off and Fluid Adjustment Valve, page 88	1
27	24N740	SCREW, hex socket; 10–24 x 0.53 in.; sst; package of 2	1
28*	25N921	GASKET, barrel	1
29	24T304	See Atomizing Air Restrictor Valve Assembly, page 89	1
30	24N634	See Fan Air Adjustment Valve Assembly, page 89	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

Ref. No.	Part No.	Description	Qty
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	24N604	COVER, gun; package of 10	1
48▲	186118	SIGN, warning (not shown)	1
50	24N783	HOOK; includes screw	1
101	24M732	HOSE, shielded, waterborne fluid, 25 ft (7.6 m); for gun model L60T17; includes 102–108; sold separately	1
	24M733	HOSE, unshielded, waterborne fluid, 25 ft (7.6 m); for gun model L60T18; includes 102–108; sold separately	1
	25N916	HOSE, shielded, waterborne fluid, 50 ft (15.2 m); for gun model L60T17; includes 102–108; sold separately	1
	25N917	HOSE, unshielded, waterborne fluid, 50 ft (15.2 m); for gun model L60T18; includes 102–108; sold separately	1
102	198663	FERRULE, for shielded hose	1
	190863	FERRULE, for unshielded hose	1
103	185547	HOUSING, ferrule, for shielded hose	1
	15B932	HOUSING, ferrule, for unshielded hose	1
104	197954	BRACKET, fluid fitting	1
105	185548	NUT	1
106	16N953	FITTING, barrel	1
107	102982	O-RING	1
108	16N916	FITTING, seal	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).

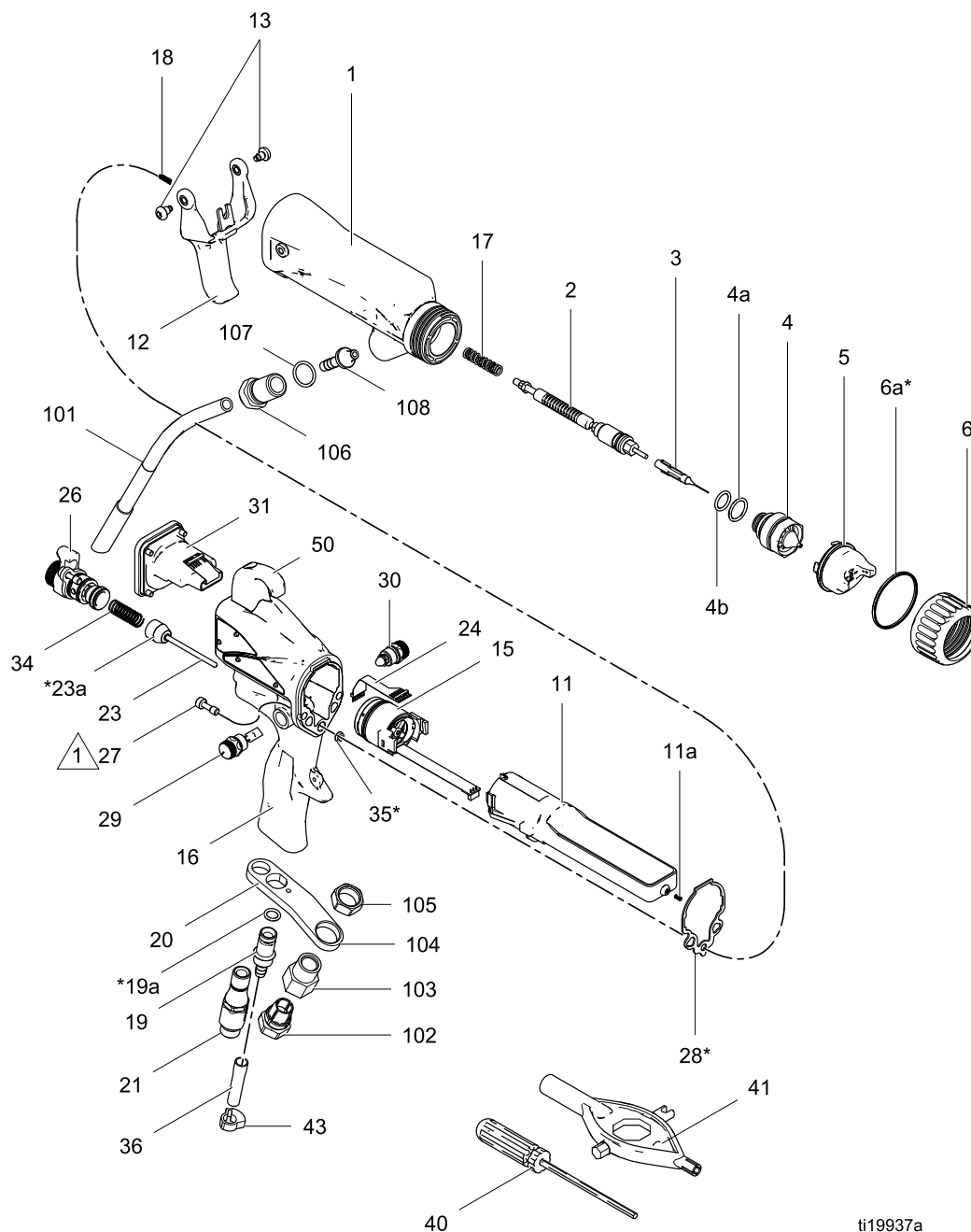
Smart Waterborne Air Spray Gun Assembly

Part No. L60M17 60 kV Electrostatic Waterborne Air Spray Gun, Series C

Part No. L60M18 60 kV Electrostatic Waterborne Air Spray Gun, Series C

Part No. 24M732 Shielded Waterborne Fluid Hose (101), sold separately for gun model L60M17

Part No. 24M733 Unshielded Waterborne Fluid Hose (101), sold separately for gun model L60M18



1 Torque to 20 in-lb (2 N•m).

ti19937a

Part No. L60M17 60 kV Electrostatic Waterborne Air Spray Gun, Series C

Part No. L60M18 60 kV Electrostatic Waterborne Air Spray Gun, Series C

Part No. 24M732 Shielded Waterborne Fluid Hose (101), sold separately for gun model L60M17

Part No. 24M733 Unshielded Waterborne Fluid Hose (101), sold separately for gun model L60M18

Ref. No.	Part No.	Description	Qty
1	24N667	BODY, gun (Includes ref. 28)	1
2	24N655	See Packing Rod Assembly, page 86	1
3	24N652	NEEDLE, electrode, black	1
4	24N616	NOZZLE, 1.5 mm; includes 4a and 4b	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	24N477	AIR CAP	1
6	24P892	RING, retainer; includes 6a	1
6a*	198307	PACKING, u-cup; UHMWPE	1
11	24N662	POWER SUPPLY, 60 kV gun	1
11a	24N979	SPRING	1
12	24N663	TRIGGER	1
13	24A445	SCREW, trigger; package of 2	1
15	24N664	See Alternator Assembly, page 87	1
16	24P742	HANDLE, smart; for gun model L60M17	1
	24P741	HANDLE, smart; for gun model L60M18	1
17	185111	SPRING, compression	1
18	197624	SPRING, compression	1
19	24P036	VALVE, exhaust	1
19a*	112085	O-RING	1
21	24N626	SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1
24	245265	CIRCUIT, flexible	1
26	24N630	See ES On-Off and Fluid Adjustment Valve, page 88	1
27	24N740	SCREW, hex socket; 10–24 x 0.53 in.; sst; package of 2	1
28*	25N921	GASKET, barrel	1
29	24T304	See Atomizing Air Restrictor Valve Assembly, page 89	1
30	24N634	See Fan Air Adjustment Valve Assembly, page 89	1
31	24N756	See Smart Module Assembly, page 90	1
34	185116	SPRING, compression	1

Ref. No.	Part No.	Description	Qty
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	24N604	COVER, gun; package of 10	1
48▲	186118	SIGN, warning (not shown)	1
50	24N783	HOOK; includes screw	1
101	24M732	HOSE, shielded, waterborne fluid, 25 ft (7.6 m); for gun model L60M17; includes 102–108; sold separately	1
	24M733	HOSE, unshielded, waterborne fluid, 25 ft (7.6 m); for gun model L60M18; includes 102–108; sold separately	1
	25N916	HOSE, shielded, waterborne fluid, 50 ft (15.2 m); for gun model L60M17; includes 102–108; sold separately	1
	25N917	HOSE, unshielded, waterborne fluid, 50 ft (15.2 m); for gun model L60M18; includes 102–108; sold separately	1
102	198663	FERRULE, for shielded hose	1
	190863	FERRULE, for unshielded hose	1
103	185547	HOUSING, ferrule, for shielded hose	1
	15B932	HOUSING, ferrule, for unshielded hose	1
104	197954	BRACKET, fluid fitting	1
105	185548	NUT	1
106	16N953	FITTING, barrel	1
107	102982	O-RING	1
108	16N916	FITTING, seal	1

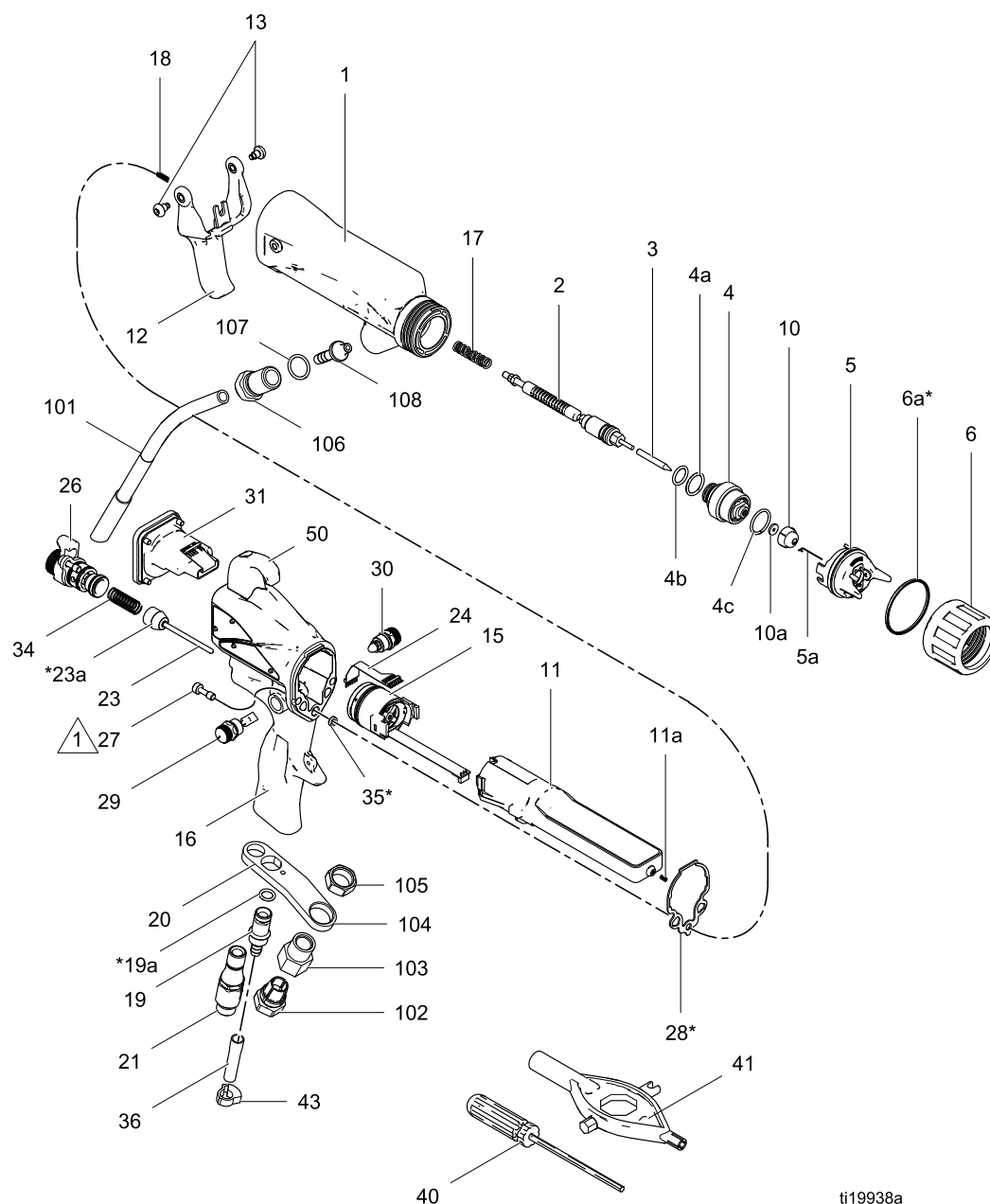
▲ Replacement Danger and Warning labels, tags, and cards are available at no cost.


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

Mold Release Smart Air Spray Gun Assembly

Part No. L60M19 60 kV Electrostatic Mold Release Air Spray Gun, Series C

Part No. 24M733 Unshielded Waterborne Fluid Hose (101), sold separately



 Torque to 20 in-lb (2 N•m).

ti19938a

Part No. L60M19 60 kV Electrostatic Mold Release Air Spray Gun, Series C
Part No. 24M733 Unshielded Waterborne Fluid Hose (101), sold separately

Ref. No.	Part No.	Description	Qty
1	24N667	BODY, gun (includes ref. 28)	1
2	24N655	See Packing Rod Assembly, page 86	1
3	24N749	NEEDLE	1
4	24N748	NOZZLE, seat; includes 4a-4c	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
4c	24P893	RING, conductive	1
5	24N727	See Air Cap Assembly, page 90	1
5a	24N643	ELECTRODE; package of 5	1
6	245790	RING, retainer; includes 6a	1
6a*	198307	PACKING, u-cup; UHMWPE	1
10	AEMxxx AEFxxx	TIP ASSEMBLY; customer's choice; includes item 27a	1
10a	183459	GASKET, tip	1
11	24N662	POWER SUPPLY, 60 kV gun	1
11a	24N979	SPRING	1
12	24N663	TRIGGER	1
13	24A445	SCREW, trigger; package of 2	1
15	24N664	See Alternator Assembly, page 87	1
16	24P741	HANDLE, smart	1
17	185111	SPRING, compression	1
18	197624	SPRING, compression	1
19	24P036	VALVE, exhaust	1
19a*	112085	O-RING	1
21	24N626	SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread	1
23	24N633	VALVE, air	1
23a*	276733	SEAL, air valve	1
24	245265	CIRCUIT, flexible	1
26	24N630	See ES On-Off and Fluid Adjustment Valve, page 88	1
27	24N740	SCREW, hex socket; 10–24 x 0.53 in.; sst; package of 2	1
28*	25N921	GASKET, barrel	1

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

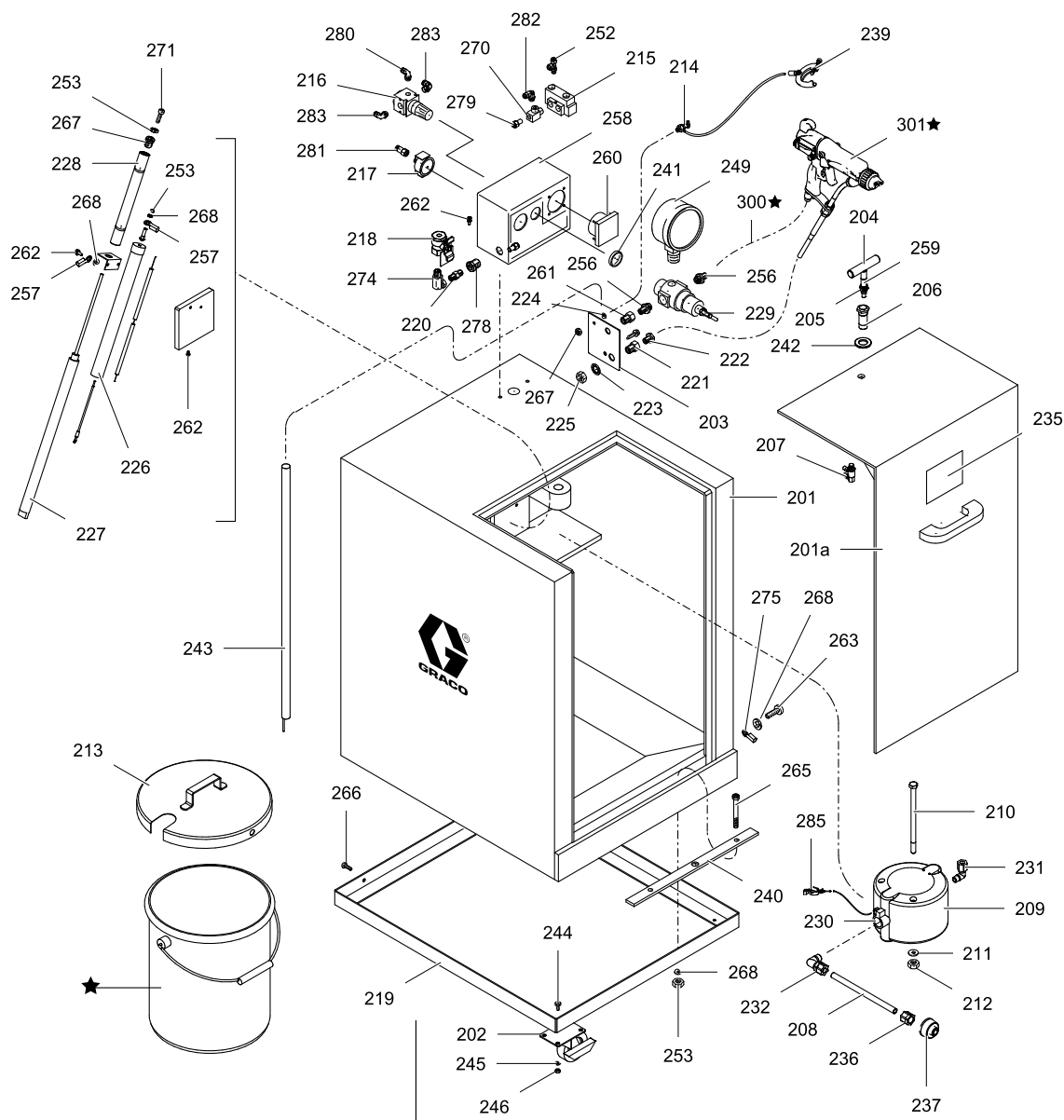
Ref. No.	Part No.	Description	Qty
29	24N792	ATOMIZING AIR ADJUSTMENT VALVE	1
30	24N634	See Fan Air Adjustment Valve Assembly, page 89	1
31	24N756	See Smart Module Assembly, page 90	1
34	185116	SPRING, compression	1
35*	188749	PACKING, u-cup	1
36	185103	TUBE, exhaust; 1/4 in. (6 mm) ID (shipped loose)	1
40	107460	TOOL, wrench, ball end; 4 mm (shipped loose)	1
41	276741	MULTI-TOOL (shipped loose)	1
42	24N786	PLUG, restrictor (shipped loose; for use instead of item 29)	1
43	110231	CLAMP, exhaust tube (shipped loose)	1
44	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
45	117824	GLOVE, conductive, medium; package of 12; also available in small (117823) and large (117825)	1
46	24N604	COVER, gun; package of 10	1
48▲	186118	SIGN, warning (not shown)	1
50	24N783	HOOK; includes screw	1
101	24M733	HOSE, unshielded, waterborne fluid, 25 ft (7.6 m); includes 102–108; sold separately	1
	25N917	HOSE, unshielded, waterborne fluid, 50 ft (15.2 m); includes 102–108; sold separately	1
102	190863	FERRULE	1
103	15B932	HOUSING, ferrule	1
104	197954	BRACKET, fluid fitting	1
105	185548	NUT	1
106	16N953	FITTING, barrel	1
107	102982	O-RING	1
108	16N916	FITTING, seal	1

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

Isolation Enclosure

Part No. 233825 Waterborne Isolation Enclosure, for use with shielded waterborne fluid hose

Part No. 246511 Waterborne Isolation Enclosure, for use with unshielded waterborne fluid hose



ti19902a

Parts

Ref. No.	Part No.	Description	Qty
201	— — —	CABINET, enclosure; includes 201a	1
201a	15A947	DOOR, cabinet	1
202	116993	CASTER, brake	4
203	15A660	PLATE	1
204	15A551	T-HANDLE, latch	1
205	15A545	STEM, handle, door	1
206	15A524	HOUSING, latch	1
207	113061	SWITCH, push, air	1
208	— — —	TUBE; 1/2 in. (13 mm) OD; polyethylene	A/R
209	233501	PUMP, diaphragm; sst; see 309303	1
210	— — —	SCREW, hex hd cap; 5/16–18 x 5.5 in. (140 mm)	2
211	— — —	WASHER, plain; 0.344 in. ID	2
212	— — —	NUT, lock; 5/16–18	2
213	241005	COVER, pail	1
214	104029	LUG, ground	1
215	116989	VALVE, air	1
216	111804	REGULATOR, air	1
217	113060	GAUGE, air; 1/8 npt	1
218	116473	NIPPLE; 1/4 npt x 1/4 npsm	1
221	185547	FERRULE, housing; for 24N580, 24P629, and 233825	1
	15B932	FERRULE, housing; for 24P630, 24P631, and 246511	1
222	198663	FERRULE; for 24N580, 24P629, and 233825	1
	190863	FERRULE; for 24P630, 24P631, and 246511	1
223	101390	WASHER, lock, internal tooth	1
224	154636	WASHER, plain; 0.625 in. ID	2
225	185548	NUT	1
226	190410	RESISTOR, bleed	1
227	116988	CYLINDER ROD	1
228	15A518	HOUSING, cylinder rod	1
229	104267	REGULATOR, air	1
230	— — —	BUSHING; plastic; 3/4 x 1/2 npt	1
231	114456	ELBOW, tube; 3/8 npt x 3/8 in. (10 mm) OD tube	1
232	116315	ELBOW, tube; 3/8 npt x 1/2 in. (13 mm) OD tube	1
235▲	15A682	LABEL, warning	1
236	116316	FITTING, tube; 1/2 npt x 1/2 in. (13 mm) OD tube	1
237	218798	STRAINER, 16 mesh; sst	1
238	114958	STRAP, tie	3

Ref. No.	Part No.	Description	Qty
239	222011	GROUND WIRE; 25 ft (7.6 m)	1
240	234018	STRIP, grounding; aluminum	1
241	110209	NUT, regulator	11
242	114051	WASHER, shim, ;atch	1
243	210084	ROD, ground	1
244	— — —	SCREW, hex hd; 1/4–20 x 5/8 in. (16 mm)	16
245	— — —	WASHER, plain; 1/4 in. (6 mm)	16
246	— — —	NUT, hex; 1/4–20	16
247	107257	SCREW, thread-forming	1
248	— — —	TUBE; 1/4 in. (6 mm) OD; nylon	A/R
249	160430	GAUGE, air	1
251	— — —	WIRE, 10 gauge; green with yellow stripe	1
252	— — —	CONNECTOR, swivel tee; 1/8 npt x 5/32 in. (4 mm) tube	1
253	— — —	NUT, hex; 10–32	1
256	162449	NIPPLE, reducing; 1/2 npt x 1/4 npt	2
257	101874	TERMINAL, ring	5
258	116990	BOX, control	1
259	113983	RING, retaining; 1/2 in. (13 mm)	1
260	237933	METER, 0–90 kV	1
261	113336	ADAPTER; 1/4 npt	1
262	— — —	SCREW, pan hd; 10–32 x 5/8 in. (16 mm)	4
263	— — —	SCREW, pan hd; 10–32 x 1/4 in. (6 mm)	1
264	— — —	HOLDER, tie	3
265	— — —	SCREW, button hd; 10–24 x 1.5 in. (38 mm)	2
266	— — —	SCREW, button hd; 10–32 x 1.0 in. (25 mm)	2
267	— — —	NUT, hex; M5 x 0.8	2
268	— — —	WASHER, lock; no. 10	9
270	116991	TEE, run, manifold	1
271	203953	SCREW, hex hd cap with patch; 10–24 x 3/8 in. (10 mm)	1
272	— — —	WIRE, 14 gauge; red	A/R
273	— — —	WIRE, ground, 14 gauge; green with yellow stripe	A/R
274	155541	UNION, swivel; 1/4 npt	1
275	114261	TERMINAL, ring; no. 10	1
276	15A780	PLUG, hex hd	1
278	117314	BULKHEAD CONNECTOR; 1/4 npt	1
279	113319	CONNECTOR, tube; 1/4 npt x 3/8 in. (10 mm) OD tube	2

Ref. No.	Part No.	Description	Qty
280	— — —	ELBOW, tube	1
281	— — —	FITTING, tube; 1/8 npt x 5/32 in. (4 mm) OD tube	1
282	— — —	SWIVEL, tube; 1/4 npt x 1/4 in. (6 mm) OD tube	4
283	— — —	SWIVEL, tube; 1/8 npt x 5/32 in. (4 mm) OD tube	2
285	112791	CLAMP	1
286	— — —	TUBE; 3/8 in. (10 mm) OD	A/R
300★	235070	HOSE, air, grounded; 0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread; red cover with stainless steel braid ground path; 25 ft (7.6 m) long	1

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

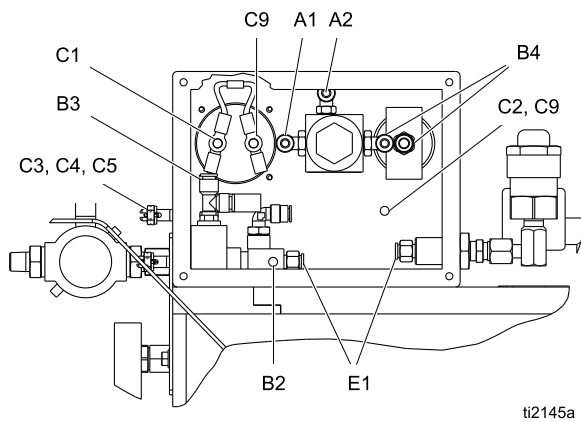
★ The air hose (300) and gun (301) are not included with 233825 and 246511 Isolation Enclosures. They are shown for illustrative purposes only. See pages 3 and 4 for listings of models which include an air hose and gun.

The pail is shown for illustrative purposes but is not included.

Ref. No.	Part No.	Description	Qty
301★	L60T17 L60T18	GUN; see Standard Waterborne Air Spray Gun Assembly, page 75	1
	L60M19 L60M18	GUN; see Smart Waterborne Air Spray Gun Assembly, page 77	1
	L60M19	GUN; see Mold Release Smart Air Spray Gun Assembly, page 79	1

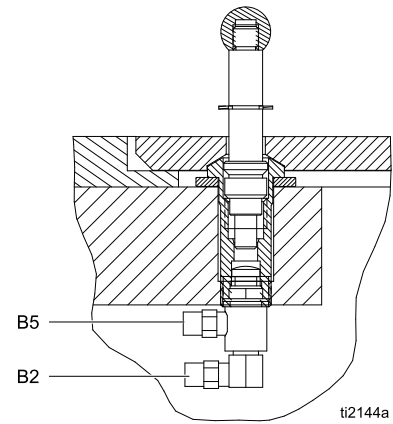
Tubing and Wiring

Detail Views of Control Box

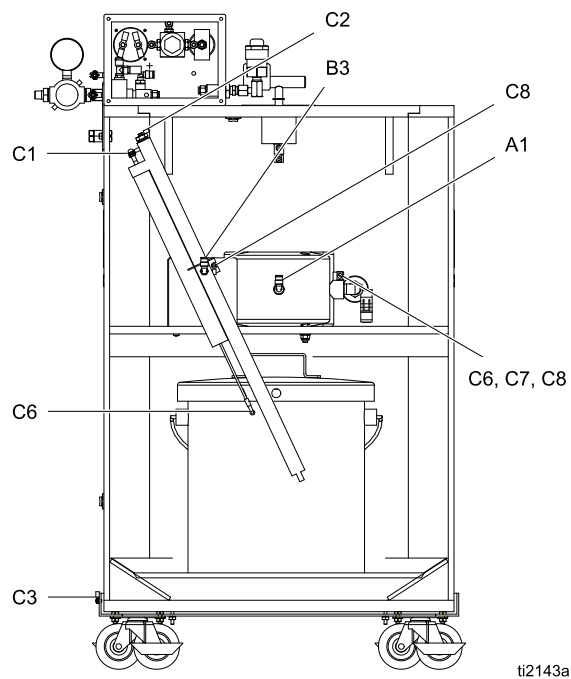


ti2145a

Detail View of Door Interlock Switch



ti2144a



ti2143a

Tubing and Wiring Chart

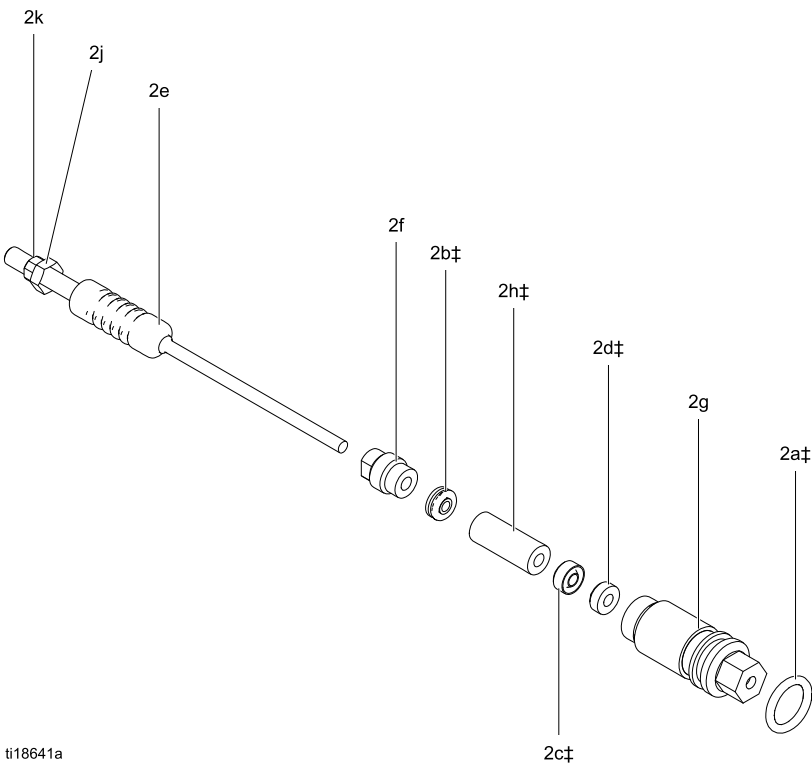
Use the diagrams to find the connection points for the tubing and wiring listed below.

Code	Ref. No.	Length in. (mm)	Description
A1	248	20 (508)	1/4 OD tube, regulator (216) to pump
A2	248	9 (229)	1/4 OD tube, regulator (216) to manifold
B2	249	17 (432)	5/32 OD tube, manifold air to door interlock switch
B3	249	20 (508)	5/32 OD tube, valve tee to cylinder
B4	249	5 (127)	5/32 OD tube, regulator (216) to gauge (217)
B5	249	22 (559)	5/32 OD tube, valve tee to door interlock switch
C1	272	9 (229)	red 14 gauge wire from top of bleed resistor to meter
C2	251	8 (204)	green/yellow 14 gauge wire from internal box ground lug to cylinder cap
C3	273	34 (864)	green/yellow 10 gauge wire from external ground lug to cart

Code	Ref. No.	Length in. (mm)	Description
C4	239	n/a	green/yellow 25 ft (7.6 m) ground wire with clamp, from external ground lug to true earth ground
C5	243	n/a	green/yellow 10 gauge wire from external ground lug to ground probe
C6	226	n/a	red wire from bleed resistor to pump
C7	272	16 (407)	red 14 gauge wire from pump to pail cover with clamp
C8	272	12 (305)	red 14 gauge wire from pump (209) to ground on cylinder bracket
C9	251	n/a	green/yellow 10 gauge wire from meter (+) to internal box ground lug
E1	286	4 (102)	3/8 OD tube, bulkhead to manifold

Packing Rod Assembly

Part No. 24N655 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	24N703	ROD, packing (includes items 2j and 2k)	1
2f	197641	NUT, packing	1

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

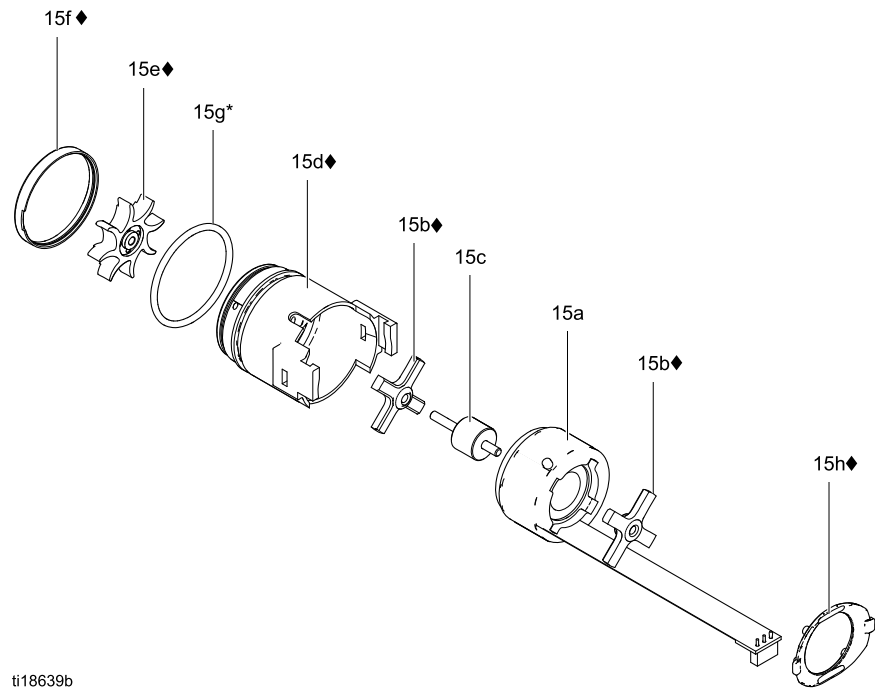
♦ These parts are included in Trigger Adjustment Nut Kit 24N700 (purchase separately).

Ref. No.	Part No.	Description	Qty
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

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).

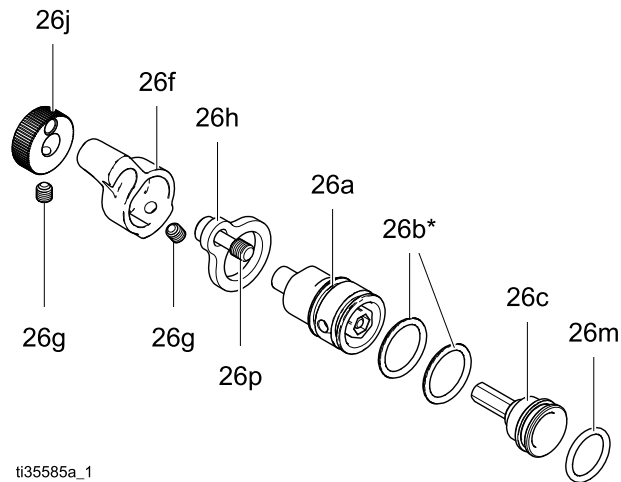
♦ These parts are included in Bearing Kit 24N706 (purchase separately).

Parts labeled — — — are not available separately.

ES On-Off and Fluid Adjustment Valve

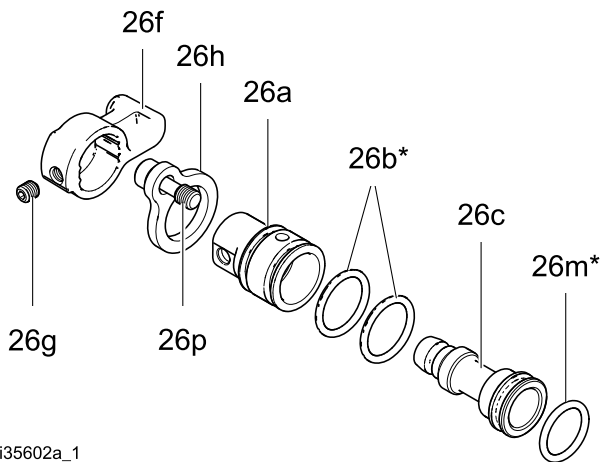
Part No. 24N630 ES On-Off and Fluid Adjustment Valve

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

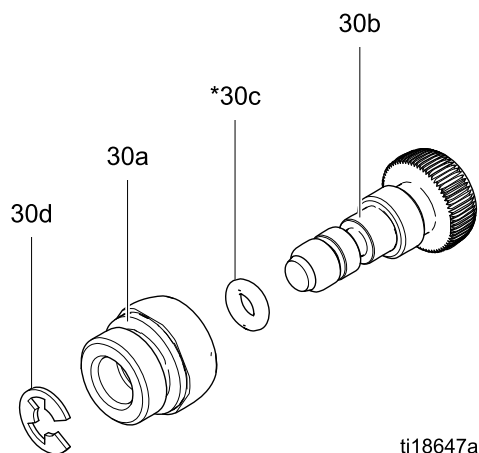
Ref. No.	Part No.	Description	Qty
26a	— — —	HOUSING, valve; black for standard model 24N630, blue for restricted model 26A160	1
	— — —	HOUSING, valve; model 24N632	1
26b*	15D371	O-RING	2
26c	— — —	PISTON, valve	1
26f	24N649	LEVER, ES on-off; includes 26g; models 24N630 and 36A160	1
	24N650	LEVER, ES on-off; includes 26g; model 24N632	1
26g	— — —	SCREW, set, socket head	2
26h	24N631	PLATE, retaining	1
26j	24N648	KNOB, adjustment, fluid; includes 26g; models 24N630 and 36A160	1
	25E767	KNOB, adjustment, fluid; blue; includes 26g; models 24N630 and 36A160	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)



ti18647a

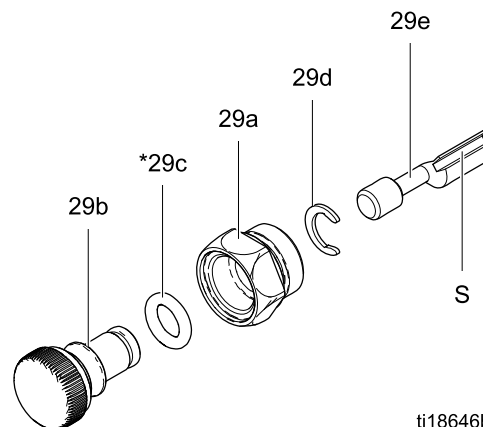
Ref. No.	Part No.	Description	Qty
30a	— — —	NUT, valve	1
30b	— — —	STEM, valve	1
30c*	111504	O-RING	1
30d	24N646	RING, retaining; package of 6	1

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

Parts labeled — — — are not available separately.

Atomizing Air Restrictor Valve Assembly

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



ti18646b

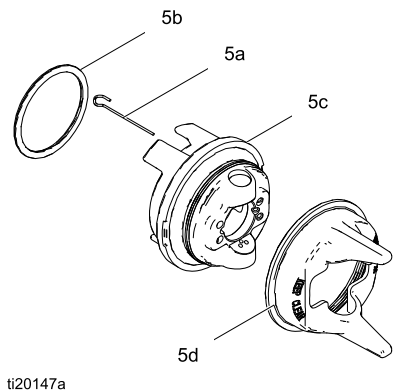
Ref. No.	Part No.	Description	Qty
29a	— — —	HOUSING, valve	1
29b	— — —	BODY, valve	1
	— — —	BODY, valve; round spray only	1
29c*	111516	O-RING	1
29d	118907	RING, retaining	1
29e	— — —	STEM, valve	1
29f	— — —	KNOB, shaft; round spray only	1
29g	— — —	SETSCREW, knob; round spray only	1

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

Parts labeled — — — are not available separately.

Air Cap Assembly

Part No. 24N727 Air Cap Assembly

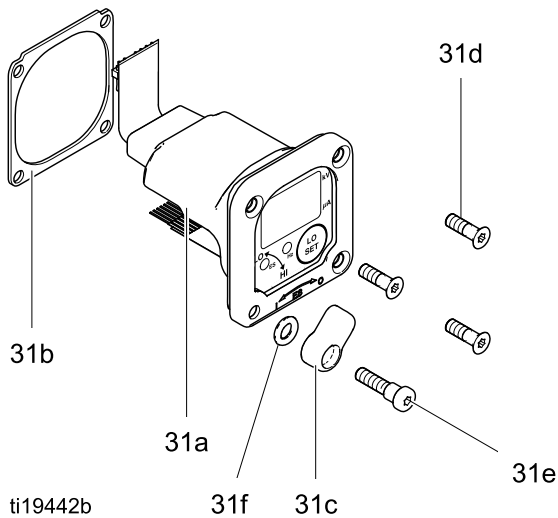


Ref. No.	Part No.	Description	Qty
5a	24N643	ELECTRODE; package of 5	1
5b	24N734	O-RING; ptfe; package of 5 (also available in package of 10; order 24E459)	1
5c	— — —	AIR CAP	1
5d	24N726	GUARD, tip, orange	1
10a	183459	GASKET, tip (not shown)	5

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

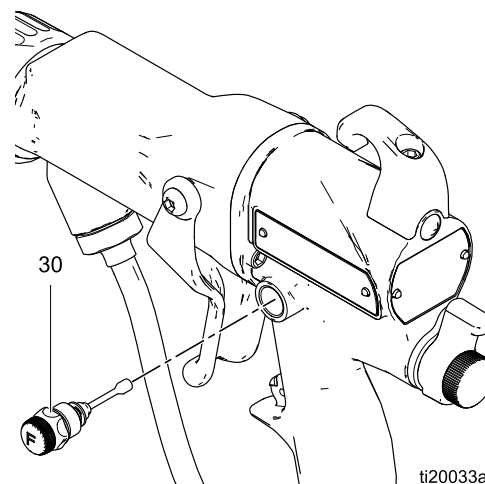
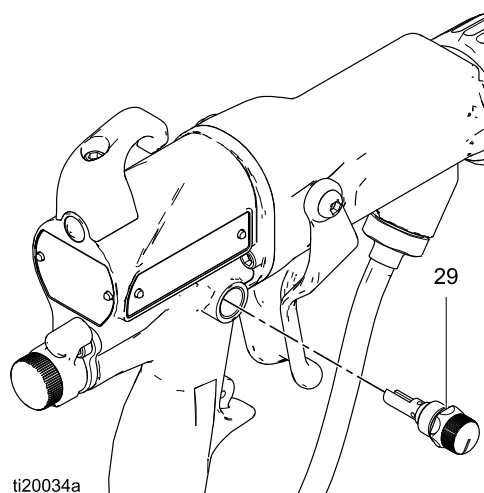
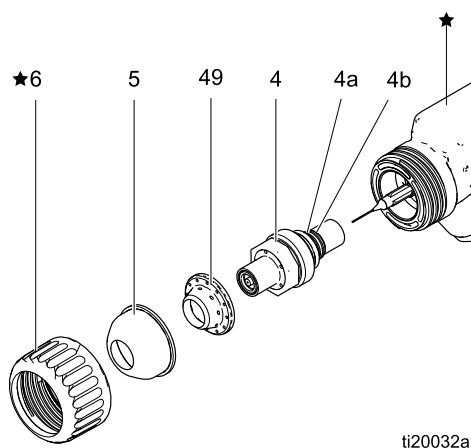
Parts labeled — — — are not available separately.

♦ 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.

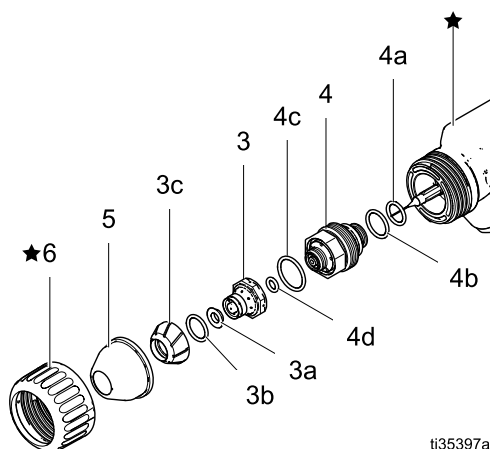


Ref. No.	Part No.	Description	Qty
4	24N729	NOZZLE, round spray; includes 4a and 4b. See Fluid Nozzle Selection Chart, page 93.	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	24N731	AIR CAP, round spray. See Air Cap Selection Guide, page 96.	1
29	24N733	ATOMIZING AIR RESTRICTOR 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

Fluid Nozzles

Fluid Nozzle Selection Chart

				
To reduce the risk of an injury, follow the Pressure Relief Procedure, page 39 , 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	Standard nozzles (STD) for standard coatings
24N613	0.75 (.029)	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	Precision high wear nozzles (PHW) 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	High wear nozzles (HW) 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)		

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 12 . Orifice Size: 0.55 mm (0.022 in.)

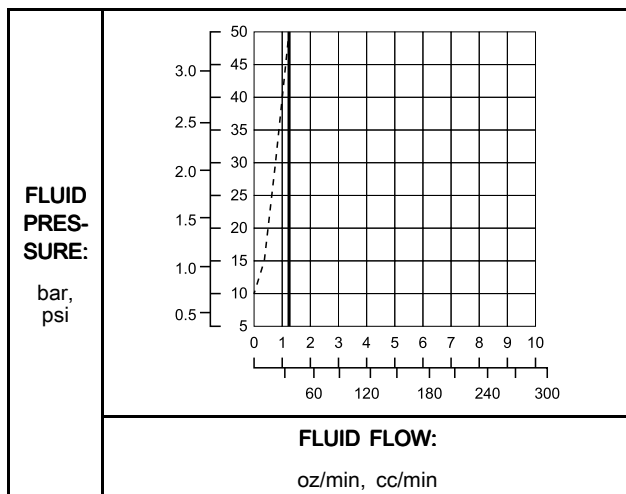


Table 13 . Orifice Size: 0.75 mm (0.030 in.)

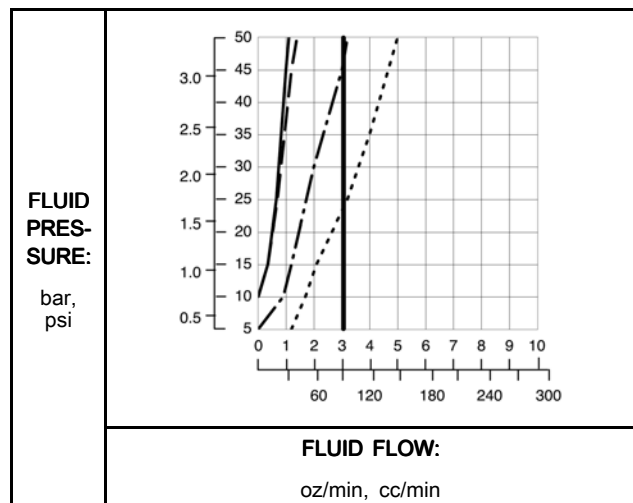


Table 14 . Orifice Size: 1.0 mm (0.040 in.)

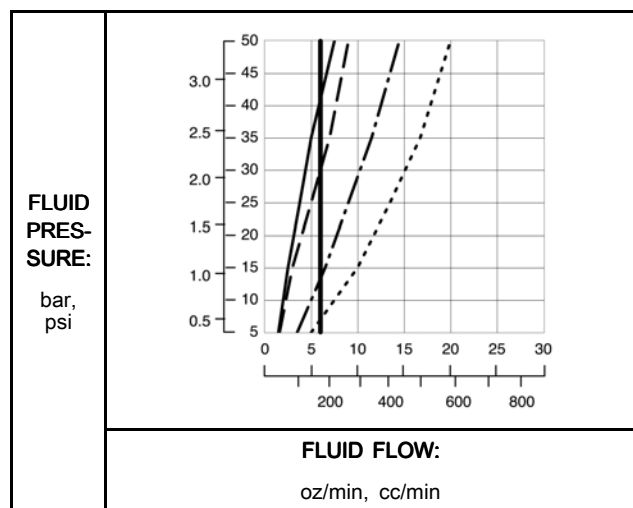


Table 17 . Orifice Size: 1.8 mm (0.070 in.)

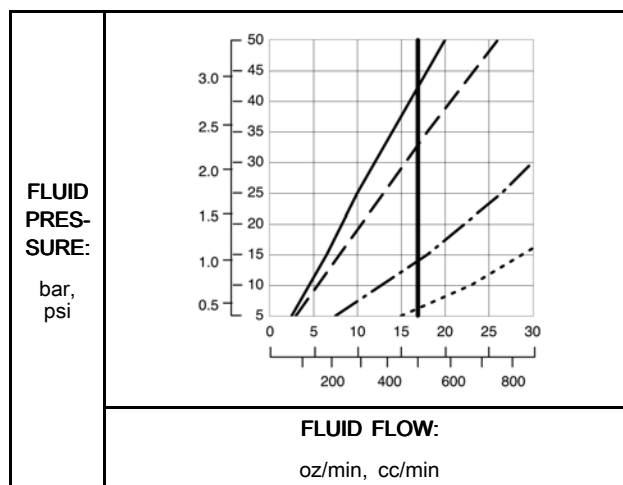


Table 15 . Orifice Size: 1.2 mm (0.047 in.)

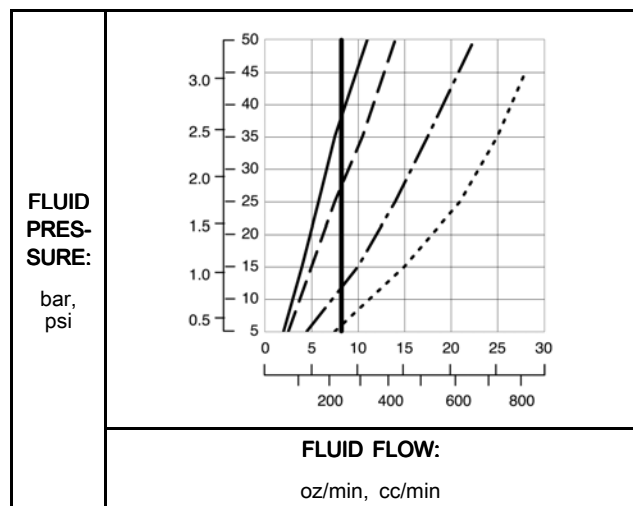


Table 18 . Orifice Size: 2.0 mm (0.080 in.)

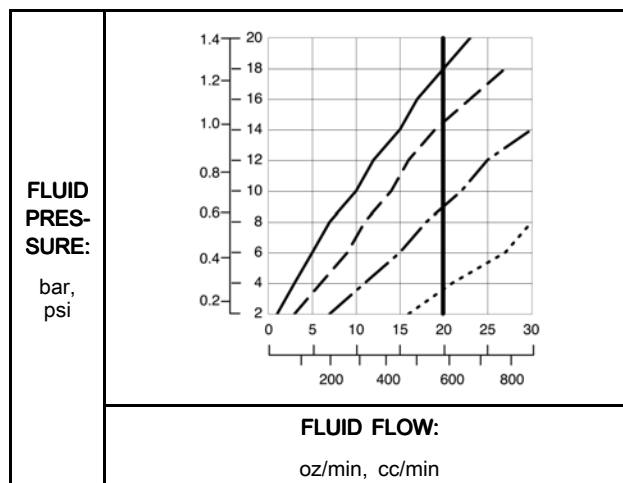
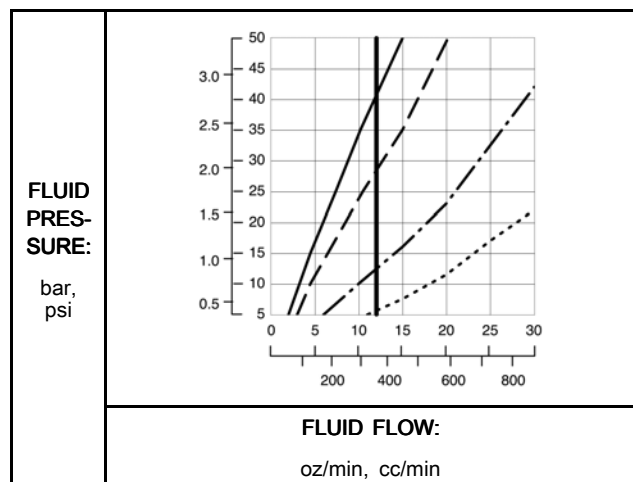





Table 16 . Orifice Size: 1.5 mm (0.059 in.)



Air Caps

Air Cap Selection Guide

				
<p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 39, 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:

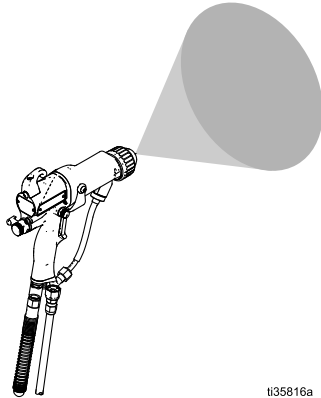
NOTE: Pattern shape and length are material-dependent.

- 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

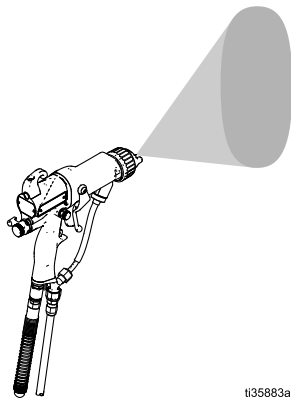
NOTE: Pattern shapes are influenced by the material viscosity, flow rate, and air pressure settings. The gun may not maintain the intended design shape under all conditions.

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

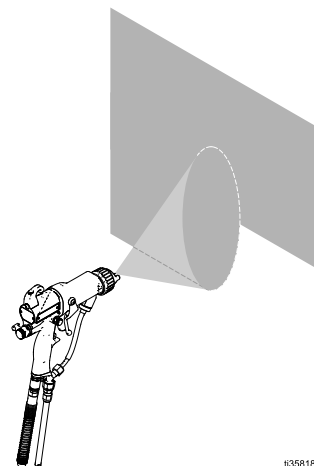
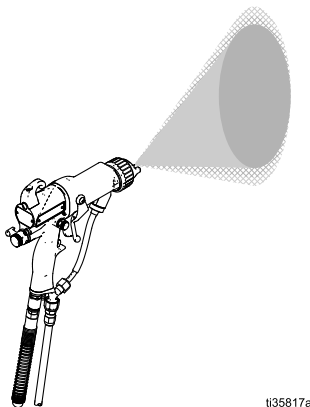


- **Fan patterns** have two styles: round ends and tapered ends.

- **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. Often used in waterborne applications.
24W479	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. Often used in waterborne applications.
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
24W479	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

*Fluid Viscosity, in centipoise (cp) at 70°F (21°C).
Centipoise = centistokes x fluid specific gravity.

Light to medium 20–70 cp

Medium to heavy 70–360 cp

High solids 360+ cp

**Recommended Production Rates

Standard 300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)

Low 100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)

High 500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)

Very High 600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)

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"> • Class A finish • Light, medium, and heavy viscosity, and high solid coatings • Very high production rates
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**	Atom-ization	Clean-liness
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

*Fluid Viscosity, in centipoise (cp) at 70°F (21°C).
Centipoise = centistokes x fluid specific gravity.

Light to medium 20–70 cp

Medium to heavy 70–360 cp

High solids 360+ cp

**Recommended Production Rates

Standard 300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)

Low 100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)

High 500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)

Very High 600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)

***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

*Fluid Viscosity, in centipoise (cp) at 70°F (21°C).
Centipoise = centistokes x fluid specific gravity.

Light to medium 20–70 cp

Medium to heavy 70–360 cp

High solids 360+ cp

**Recommended Production Rates

Standard 300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)

Low 100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)

High 500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)

Very High 600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)

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.

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 19 . 24N477, 24W279, 24N279, 24N376, and 24N438 Air Cap

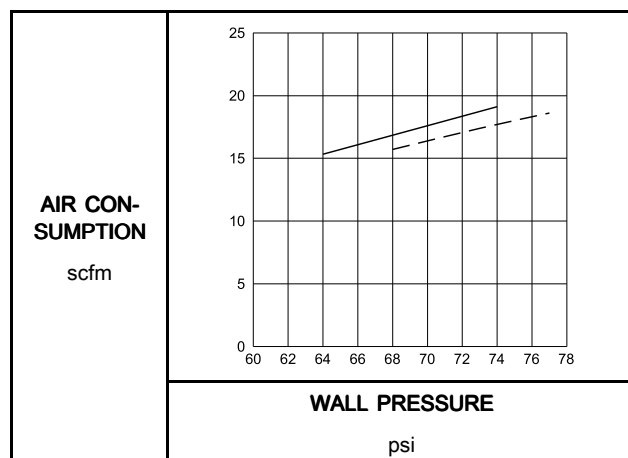
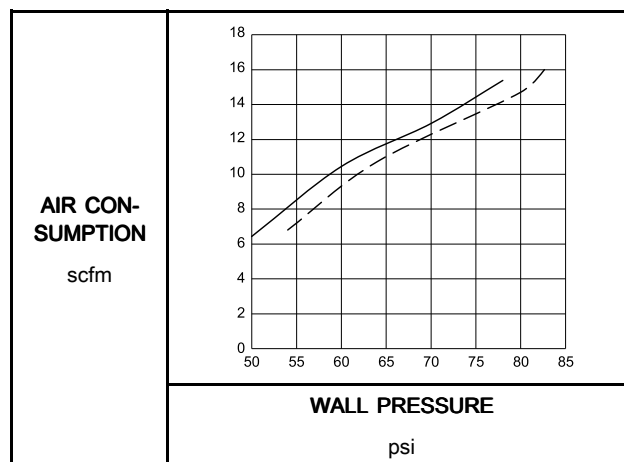


Table 21 . 25E670 and 25E671 Air Cap

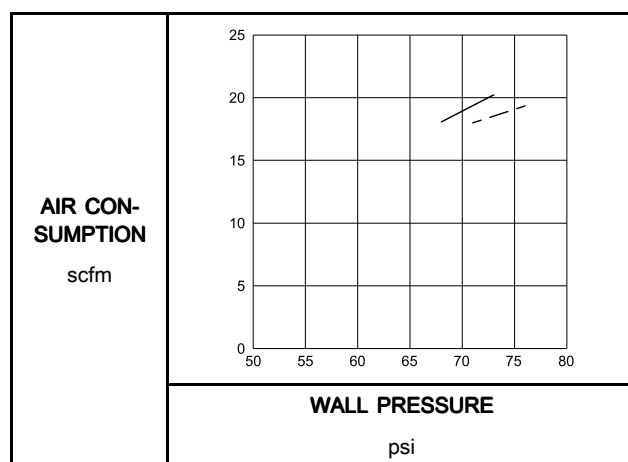


NOTE:

25E670: Atomization valve opened one turn from close according to soft spray gun setup. See [Soft Spray Gun Setup Procedure, page 30](#).

25E671: Fan valve opened two turns from close. Atomization valve opened one turn from close according to HVLP gun setup. See [HVLP Gun Setup Procedure, page 31](#).

Table 20 . 2N274, 24N275, and 24N439 Air Cap



Spray Tip Selection Chart (Model L60M19 MRG Gun Only)

AEM Fine Finish Spray Tips

Recommended for high finish quality applications at low and medium pressures. Order desired tip, **Part No. AEMxxx**, where xxx = 3-digit number from the matrix below.

Orifice Size in. (mm)	Fluid Output fl oz/min (l/min)		Maximum Pattern Width at 12 in. (305 mm) in. (mm)							
	at 600 psi (4.1 MPa, 41 bar)	at 1000 psi (7.0 MPa, 70 bar)	2-4 (50- 100)	4-6 (100- 150)	6-8 (150- 200)	8-10 (200- 250)	10-12 (250- 300)	12-14 (300- 350)	14-16 (350- 400)	16-18 (400- 450)
	Spray Tip									
0.007 (0.178)	4.0 (0.1)	5.2 (0.15)	107	207	307					
0.009 (0.229)	7.0 (0.2)	9.1 (0.27)		209	309	409	509	609		
0.011 (0.279)	10.0 (0.3)	13.0 (0.4)		211	311	411	511	611	711	811
0.013 (0.330)	13.0 (0.4)	16.9 (0.5)		213	313	413	513	613	713	813
0.015 (0.381)	17.0 (0.5)	22.0 (0.7)		215	315	415	515	615	715	815
0.017 (0.432)	22.0 (0.7)	28.5 (0.85)		217	317	417	517	617	717	
0.019 (0.483)	28.0 (0.8)	36.3 (1.09)			319	419	519	619	719	
0.021 (0.533)	35.0 (1.0)	45.4 (1.36)				421	521	621	721	821
0.023 (0.584)	40.0 (1.2)	51.9 (1.56)				423	523	623	723	823
0.025 (0.635)	50.0 (1.5)	64.8 (1.94)				425	525	625	725	825
0.029 (0.736)	68.0 (1.9)	88.2 (2.65)								829
0.031 (0.787)	78.0 (2.2)	101.1 (3.03)				431		631		831
0.033 (0.838)	88.0 (2.5)	114.1 (3.42)								833
0.037 (0.939)	108.0 (3.1)	140.0 (4.20)							737	
0.039 (0.990)	118.0 (3.4)	153.0 (4.59)					539			

* Tips are tested in water.

Fluid output (Q) at other pressures (P) can be calculated by this formula: $Q = (0.041) (QT) \sqrt{P}$ where QT = fluid output (fl oz/min) at 600 psi from the above table for the selected orifice size.

AEF Fine Finish Pre-Orifice Spray Tips

Recommended for high finish quality applications at low and medium pressures. AEF tips have a pre-orifice that assists in atomizing sheer thinning materials, including lacquers.

Order desired tip, **Part No. AEFxxx**, where xxx = 3-digit number from the matrix below.

Orifice Size in. (mm)	Fluid Output fl oz/min (l/min)		Maximum Pattern Width at 12 in. (305 mm) in. (mm)					
	at 600 psi (4.1 MPa, 41 bar)	at 1000 psi (7.0 MPa, 70 bar)	6-8 (150- 200)	8-10 (200-250)	10-12 (250-300)	12-14 (300-350)	14-16 (350-400)	16-18 (400-450)
			Spray Tip					
0.008 (0.203)	5.6 (0.17)	7.7 (0.22)				608		
0.010 (0.254)	9.5 (0.28)	12.5 (0.37)	310	410	510	610	710	810
0.012 (0.305)	12.0 (0.35)	16.0 (0.47)	312	412	512	612	712	812
0.014 (0.356)	16.0 (0.47)	21.0 (0.62)	314	414	514	614	714	814
0.016 (0.406)	20.0 (0.59)	26.5 (0.78)		416	516	616	716	
* Tips are tested in water.								
Fluid output (Q) at other pressures (P) can be calculated by this formula: $Q = (0.041) (QT) \sqrt{P}$ where QT = fluid output (fl oz/min) at 600 psi from the above table for the selected orifice size.								

Round Spray Tips

To convert the gun to a round spray pattern, use round spray conversion kit 24N391. See manual 3A2499.

Part No.	Size No.	Approximate Flow Rates for Light to Medium Viscosity Coatings (20–40 centipoise)*		
		300 psi (2.1 MPa, 21 bar)	600 psi (4.2 MPa, 42 bar)	1200 psi (8.4 MPa, 84 bar)
236836	4A	2.5 oz/min (73 cc/min)	4.1 oz/min (120 cc/min)	5.7 oz/min (170 cc/min)
236837	6A	2.9 oz/min (86 cc/min)	5.1 oz/min (150 cc/min)	7.4 oz/min (220 cc/min)
236838	7A	3.2 oz/min (95 cc/min)	5.4 oz/min (160 cc/min)	7.8 oz/min (230 cc/min)
236839	5B	5.4 oz/min (160 cc/min)	7.8 oz/min (230 cc/min)	11.0 oz/min (330 cc/min)
236840	7B	7.1 oz/min (210 cc/min)	9.1 oz/min (270 cc/min)	14.2 oz/min (420 cc/min)
236841	9B	8.8 oz/min (260 cc/min)	11.8 oz/min (350 cc/min)	17.9 oz/min (530 cc/min)
236842	11B	11.8 oz/min (350 cc/min)	16.2 oz/min (480 cc/min)	23.7 oz/min (700 cc/min)
* Flows are based on white acrylic, enamel paint.				

Repair Kits and Accessories

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
105749	Cleaning Brush
111265	Non-silicone Lubricant, 4 oz (113 g)
116553	Dielectric Grease. 1 oz (30 ml)
24N604	Gun Covers, box of 10
24N758	Display Covers. Keeps Smart display clean. Package of 5.

Trigger and Grip Accessories

Part No.	Description
24N633	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)

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. When this valve is installed, the electrostatics are on anytime air pressure is supplied to the gun. Fluid adjustment is possible. Must be used with 224754 ball valve installed at the gun air inlet. 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

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.

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)

Signs

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

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.

Test Equipment

Part No.	Description
241079	Megohmmeter. 500 V output, 0.01–2000 megohms. Use for ground continuity and gun resistance tests. Not for use in hazardous areas.
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.
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
Grounded Air Hose with stainless steel braid ground path (Red)	
235068	6 ft (1.8 m)
235069	15 ft (4.6 m)
235070	25 ft (7.6 m)
235071	36 ft (11 m)
235072	50 ft (15 m)
235073	75 ft (23 m)
235074	100 ft (30.5 m)

Fluid Hoses

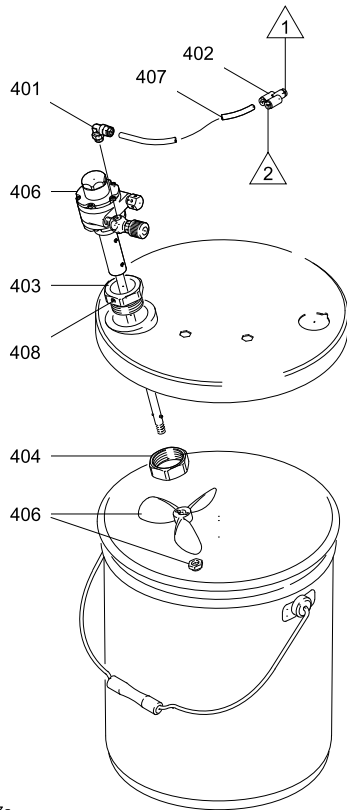
225 psi (1.4 MPa, 14 bar) Maximum Working Pressure

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

Part No.	Description
24M732	Shielded Waterborne Fluid Hose, 25 ft (7.6 m), sold separately for gun model L60T17
24M733	Unshielded Waterborne Fluid Hose, 25 ft (7.6 m), sold separately for gun model L60T18
25N916	Shielded Waterborne Fluid Hose Assembly, 50 ft (15.2 m)
25N917	Unshielded Waterborne Fluid Hose Assembly, 50 ft (15.2 m)

245895 Agitator Kit

To keep fluid mixed and prevent settling out. Includes items 401–408.

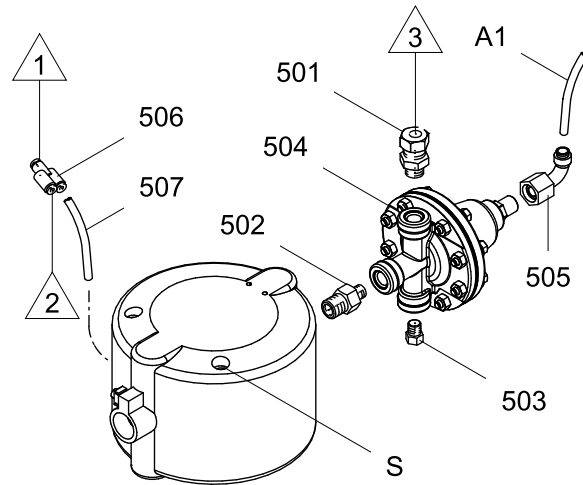


ti2137a

Ref. No.	Part No.	Description	Qty
401	112698	ELBOW, swivel; 1/8 npt(m) x 1/4 in. (6 mm) OD tube	1
402	114158	FITTING, adapter, Y; 1/4 in. (6 mm) OD tube; mxxfx	1
403	193315	COLLAR, mounting, agitator	1
404	193316	NUT, collar, agitator	1
405	197298	COVER, pail; 5 gal. (19 liter)	1
406	224571	AGITATOR; see manual 306565	1
407	purchase locally	TUBE, nylon; 1/4 in. (6 mm) OD; 4 ft (1.22 m)	1
408	110272	SCREW, set, socket hd; 1/4-20 x 1/4 in. (6 mm)	1

245944 Fluid Regulator Kit

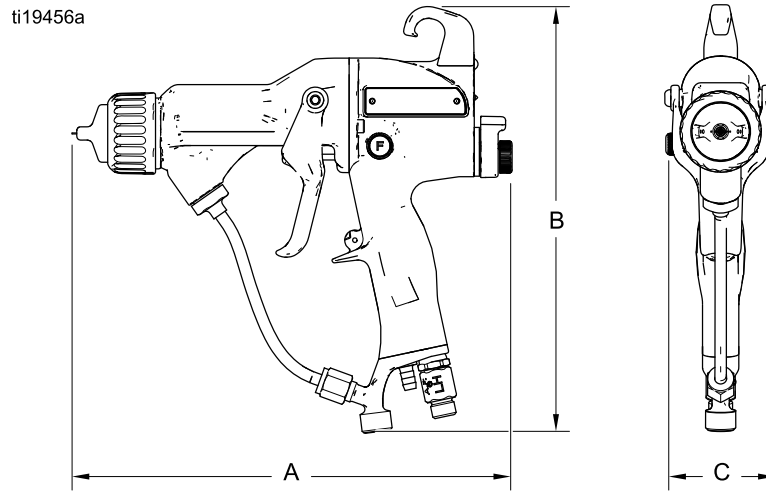
To allow precise fluid pressure regulation at the gun. Includes items 501–507.



ti2149a

Ref. No.	Part No.	Description	Qty
501	110078	FITTING, tube, fluid; 1/4 npt(m) x 3/8 in. (10 mm) tube	1
502	113070	NIPPLE, reducer; 3/8 npt x 1/4 npt	1
503	113576	PLUG; 1/4 npt	1
504	236281	REGULATOR, fluid; see manual 308325	1
505	C20350	ELBOW, 90°; 1/4 npt(f) x 1/4 in. (6 mm) OD tube	1
506	114158	FITTING, adapter, Y; 1/4 in. (6 mm) OD tube; mxmxf	1
507	purchase locally	TUBE, nylon; 1/4 in. (6 mm) OD; 4 ft (1.22 m)	1

Dimensions



Gun Model	A, in. (mm)	B, in. (mm)	C, in. (mm)	Weight without bracket, oz (g)
L60T17	10.5 (267)	8.9 (226)	2.4 (61)	21.7 (617)
L60T18	10.5 (267)	8.9 (226)	2.4 (61)	21.7 (617)
L60M18	10.5 (267)	9.6 (244)	2.4 (61)	24.2 (687)
L60M19	10.8 (274)	9.7 (246)	2.4 (61)	22.2 (628)

Notes

[illegible]

Technical Specifications

Electrostatic Air Spray Waterborne 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
Gun 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
Short Circuit Current Output	125 microamperes	
Voltage Output Energy	0.35 J with fluid hose 24M733 installed. L60T17 and L60T18: 60 kV L60M17, L60M18, and L60M19: 30–60 kV	
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)
Air Inlet Fitting	1/4 npsm(m) left-hand thread	
Fluid Inlet Fitting	Custom inlet for Graco waterborne fluid hose.	
Isolation Enclosure Air Inlet Fitting	1/4 npt	
Isolation Enclosure Fluid Inlet Fitting	3/8 in. OD tube fitting	10 mm OD tube fitting
Wetted Parts	Gun: Stainless Steel, PEEK, UHMWPE, Fluoroelastomer, Acetal, Nylon, Polyethylene, Tungsten Wire Waterborne Fluid Hose: PTFE Suction Tube: Polyethylene, Stainless Steel Triton Pump: See manual 309303.	

Graco Pro Xp Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. However, any deficiency in the barrel, handle, trigger, hook, internal power supply, and alternator (excluding turbine bearings) will be repaired or replaced for thirty-six months from the date of sale. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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Original Instructions. This manual contains English, MM 3A2496

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Revision H, 2019-03