

Pro Xp™ 60 AA WB Gun

3A7503B

EN

An air-assisted spray gun 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.

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

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

See page 3 for model part numbers and approval information.



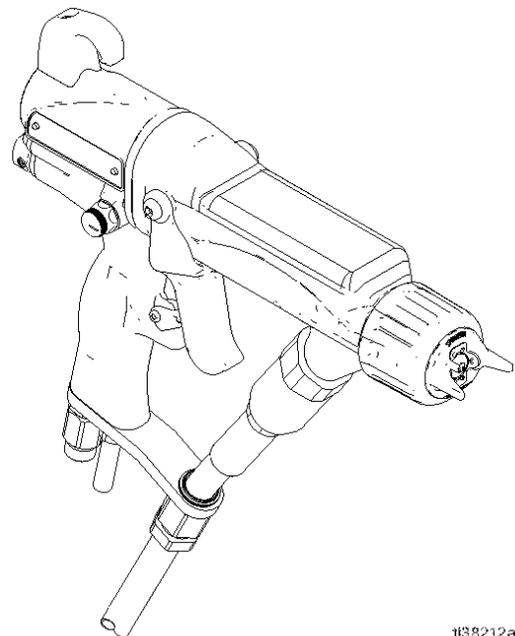
Important Safety Instructions

Read all warnings and instructions in this manual before using the equipment.
Save these instructions.



Important Medical Information

Read the medical alert card provided with the gun. It contains injection injury treatment information for a doctor. Keep it with you when operating the equipment.



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Models

| | |
|---|--|
|  | <p>Condition for non-flammability:</p> <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>Condition for non-flammability:</p> <p>Models are compliant with EN 50059 when used with fluids that meet the following criteria:</p> <ul style="list-style-type: none"> • Material is classified as non-ignitable as defined by EN 50059: 2018. <p>For more information, see Ignitability of Coating Materials, page 61.</p> |

| Part No | Model | Description |
|---------|--------------------|---|
| H60T18 | Pro Xp 60 AA WB | Standard Electrostatic Air-Assisted Spray Gun, for waterborne coatings. |
| H60M18 | Pro Xp 60 AA WB | Smart Electrostatic Air-Assisted Spray Gun, for waterborne coatings. |

Related Manuals

| Manual No. | Description |
|------------|--|
| 3A2499 | 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 |
| 3A7370 | HydroShield™ Air-Assisted Batch Waterborne Isolation Systems |
| 3A2497 | WB3000 Isolation System and Pro Xp 60 AA WB Gun |

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.

|  WARNING | |
|---|---|
|     | <p>FIRE AND EXPLOSION HAZARD</p> <p>Combustible dust or flammable fumes, such as solvent and paint fumes, 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 appropriate 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: Material is classified as non-ignitable as defined by EN 50059: 2018.• Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements of this manual.• 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.• 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 use pail liners unless they are conductive and grounded.• 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 work area free of debris, including solvent, rags and gasoline.• Keep a working fire extinguisher in the work area. |



WARNING



ELECTRIC SHOCK HAZARD

Improper grounding, setup, or usage of an isolated waterborne system can result in electric shock. To help prevent electric shock:



- 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.



SKIN INJECTION HAZARD

High-pressure fluid from gun, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. **Get immediate surgical treatment.**



- Do not spray without tip guard installed.
- Engage trigger lock when not spraying.
- Do not point gun at anyone or at any part of the body.
- Do not put your hand over the spray tip.
- Do not stop or deflect leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** when you stop spraying and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses and couplings daily. Replace worn or damaged parts immediately.



WARNING

| | |
|--|--|
|   | <p>EQUIPMENT MISUSE HAZARD</p> <p>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 Safety Data Sheets (SDSs) from distributor or retailer. • Do not leave the work area while equipment is energized or under pressure. • Turn off all equipment and follow the Pressure Relief Procedure when equipment is not in use. • Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only. • Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards. • Make sure all equipment is rated and approved for the environment in which you are using it. • Use equipment only for its intended purpose. Call your distributor for information. • Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces. • Do not kink or over bend hoses or use hoses to pull equipment. • Keep children and animals away from work area. • Comply with all applicable safety regulations. |
|   | <p>PLASTIC PARTS CLEANING SOLVENT HAZARD</p> <p>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 Data in this and all other equipment instruction manuals. Read fluid and solvent manufacturer's MSDSs and recommendations. |
|  | <p>TOXIC FLUID OR FUMES</p> <p>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 MSDSs 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</p> <p>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 AA Spray Gun Works



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

As the gun is triggered, part of the regulated air operates the alternator turbine and the rest of the air helps atomize 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 gun's internal power supply provides high voltage. 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.

The regulated air that is directed to the air cap can be further controlled using the gun's atomizing air adjustment valve. This valve can be used to restrict air flow to the air cap while maintaining sufficient air flow to the alternator. The atomizing air adjustment valve does not control pattern width. To change pattern width, use a new tip size, or use the fan adjustment to narrow the pattern width.

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

Note

For airless atomization, if desired, turn the gun's atomizing air adjustment valve completely off. Closing this valve does not affect alternator operation.

Spraying Waterborne Fluids Electrostatically

This electrostatic air-assisted 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:**

Material is classified as non-ignitable as defined by EN 50059: 2018.

For more information, see [Ignitability of Coating Materials, page 61](#).

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 above and in [Models, page 3](#)) can be sprayed with the system or be used to clean, flush, or purge the gun.

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. Because it takes some time for that stored energy to discharge, it is important to read the instructions, including the [Fluid Voltage Discharge and Grounding Procedure, page 24](#), and [Grounding, page 17](#), to understand when you can approach or touch the gun nozzle.

The amount of time it takes to discharge the energy depends on the system design. Follow the [Fluid Voltage Discharge and Grounding Procedure, page 24](#), before approaching the front of the gun.

Controls, Indicators, and Components

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

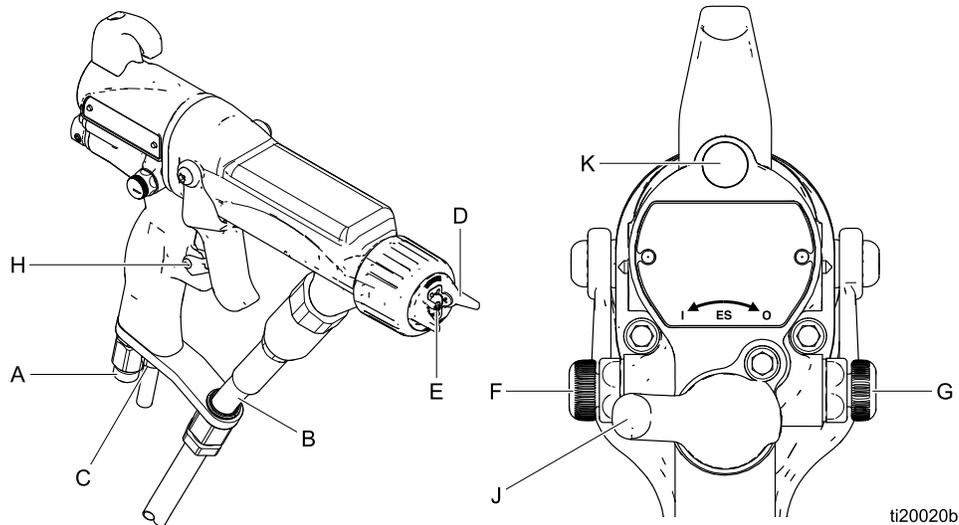


Figure 1 Gun Overview

| Item | Description | Purpose |
|------|--|--|
| A | Air Swivel Inlet | 1/4 npsm(m) left-hand thread, for Graco red-colored grounded air supply hose. |
| B | Fluid Hose | Graco waterborne fluid hose |
| C | Turbine Air Exhaust | Barbed fitting, for supplied exhaust tube. |
| D | Air Cap/Tip Guard and Spray Tip | See Spray Tip Selection Chart, page 57 , for available sizes. |
| E | Electrode | 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 Adjustment Valve | Adjusts atomizing air flow. |
| H | Trigger Safety Lock | Locks trigger to prevent gun from spraying. |
| J | ES On-Off Valve | Turns electrostatics ON (I) or OFF (O). |
| K | ES Indicator (standard gun only; for Smart gun indicator, see Operating Mode, page 9) | Lit when ES is ON (I). Color indicates alternator frequency. See the LED indicator table in Gun Setup, page 19 . |

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 Figure 2 and [Smart Gun Key, page 11](#). 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 uA bar graph LEDs are blue, the gun is ready to spray. If the LEDs are yellow or red, the current is too high. See [Electrical Troubleshooting, page 36](#).

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, reduce the air pressure. Decrease air pressure until the indicator is green. To maintain a higher air pressure, install ES On/Off Valve Restrictor Kit 26A294. Then, adjust the pressure as needed to ensure that 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 10](#).

Note

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

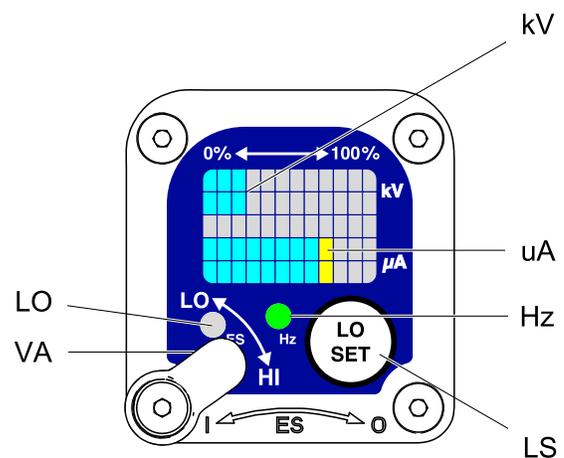


Figure 2 Smart Gun Module in Operating Mode

Error Display

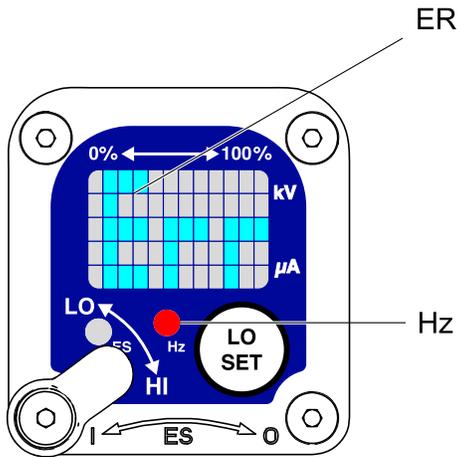
If the Smart module loses communication with the power supply, the Error display appears, the Hz indicator turns red, and the Smart module is disabled. See the following figure and [Smart Gun Key, page 11](#). This can occur in Operating Mode or Diagnostic Mode. See [Electrical Troubleshooting, page 36](#). 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 the following figure and [Smart Gun Key, page 11](#). The range is 30–60 kV.

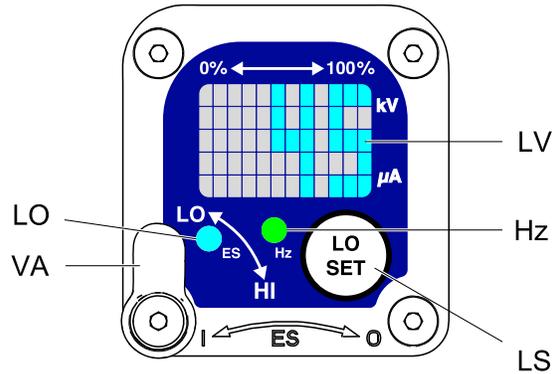
Set the Voltage Adjustment switch (VA) to LO. Press the LO SET button repeatedly to increase the setting in increments of 5. When the display reaches the maximum setting (60 kV) it will return to the minimum setting (30 kV). Continue pressing the button until you reach the desired setting.

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 10](#).



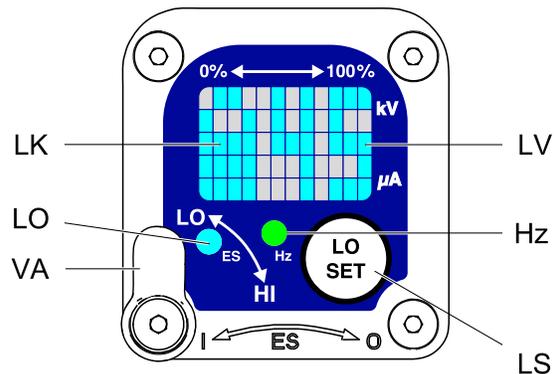
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Figure 4 Low Voltage Setting Screen (Unlocked)

Lock Symbol

The low voltage setting may be locked. When locked, an image (LK) appears on the screen. See the following figure and [Smart Gun Key, page 11](#).

- 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 13](#), 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 Figures 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 Figure 4. |
| LK | Low Voltage Locked | Appears if the low voltage setting is locked. See Figure 5 and Figure 9. |
| LD | LO Display | Appears on the Low Voltage Lock Screen. See Figure 9. |
| ER | Error Display | Appears if the Smart module loses communication with the power supply. See Figure 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 Figure 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 Figure 7. |
| AS | Alternator Speed Display | In Diagnostic Mode, Hz level is displayed as a number. See Figure 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 12](#).

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 trigger is released while in Diagnostic Mode, the last screen viewed will be displayed when the gun is triggered again.

Note

Diagnostic Mode cannot be exited from the Low Voltage Lock Screen. For details, see [Low Voltage Lock Screen, page 13](#).

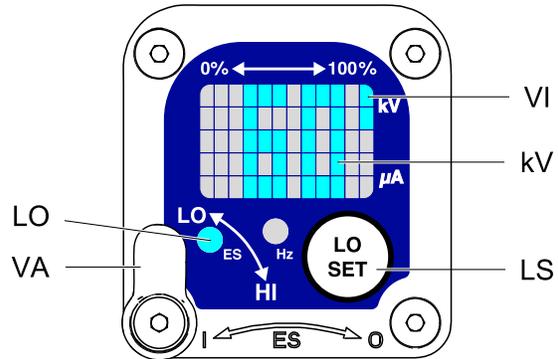
Voltage (kiloVolts) Screen

The Voltage (kiloVolts) Screen is the first screen to appear after entering Diagnostic Mode. See the following figure and [Smart Gun Key, page 11](#). 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 12](#). Press

and hold for approximately 5 seconds to return to Operating Mode.



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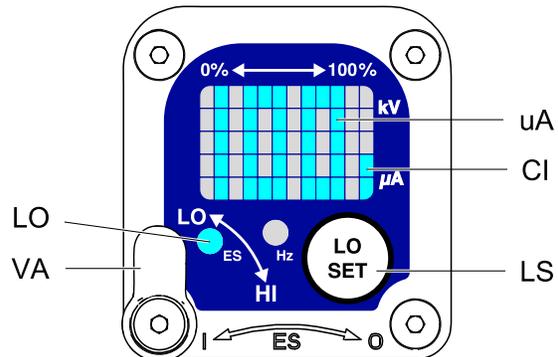
Figure 6 Voltage (kiloVolts) Screen

Current (microAmperes) Screen

The Current (microAmperes) Screen is the second screen in the Diagnostic Mode. See the following figure and [Smart Gun Key, page 11](#). 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 13](#). Press and hold for approximately 5 seconds to return to Operating Mode.



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Figure 7 Current (microAmperes) Screen

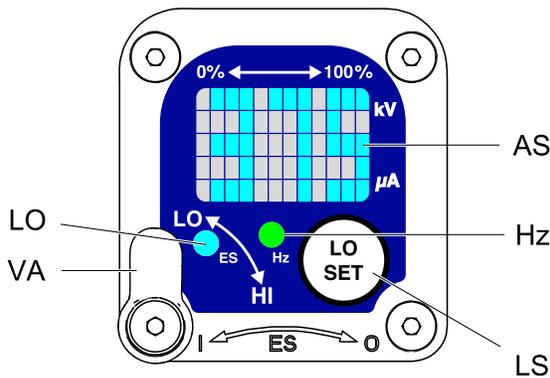
Alternator Speed (Hertz) Screen

The Alternator Speed (Hertz) Screen is the third screen in the Diagnostic Mode. See the following figure and [Smart Gun Key, page 11](#). 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 13](#). 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

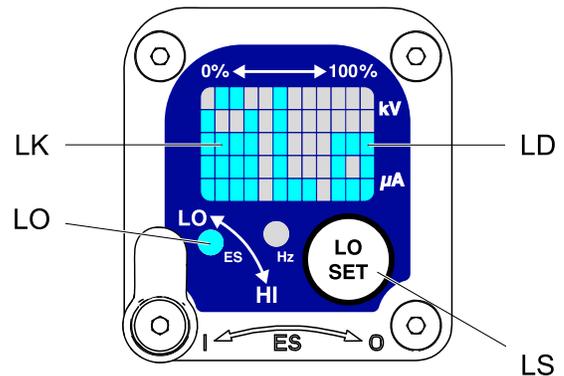
The Low Voltage Lock Screen is the fourth screen in the Diagnostic Mode. See the following figure and [Smart Gun Key, page 11](#). To enter this screen, press the LO SET button while in the Alternator Speed (Hertz) Screen.

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 the figure in [Adjusting the Low Voltage Setting, page 10](#).)

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> | | | | |

To spray with electrostatics, the spray gun must be connected to a voltage isolation system such as a Graco HydroShield or WB3000.

A 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.

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. | | | | |

[Installation, page 14](#) shows a typical electrostatic air-assisted spray system. It is not an actual system design. For assistance in designing a system to suit your particular needs, contact your Graco distributor.

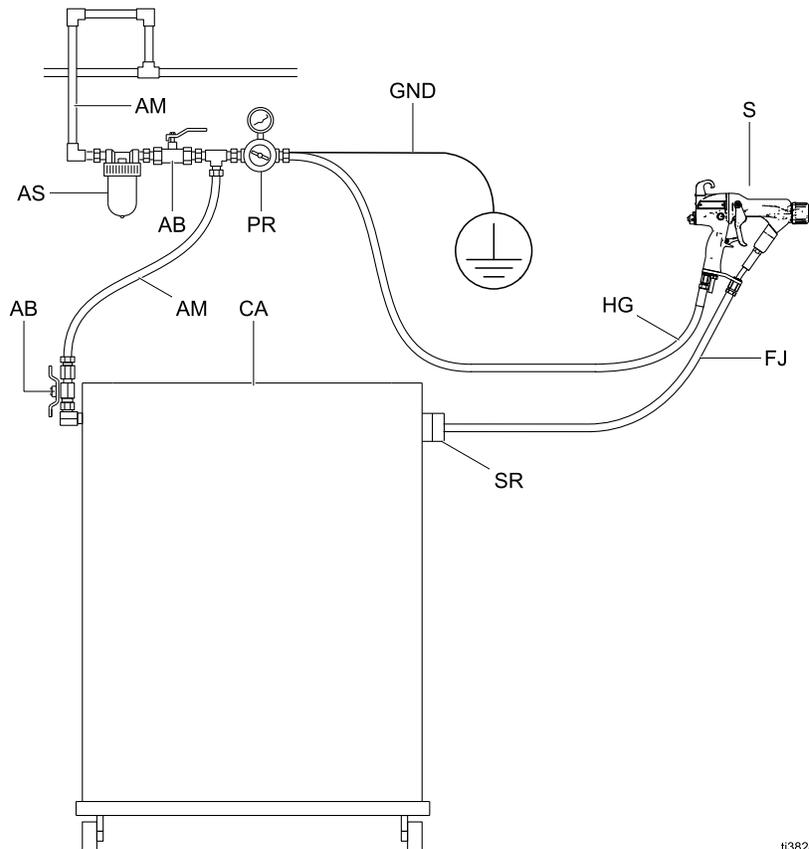
Ventilate the Spray Booth

| | | | | |
|---|--|---|--|--|
|  |  |  | | |
| <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.

Typical Installation



t138245a

Figure 10 Typical Installation, Pro Xp Air-Assisted Waterborne System

Key

| Item | Description |
|------|--|
| S | Pro Xp 60 Air-Assisted Waterborne Gun |
| AM | Main Air Supply Line |
| AB* | Bleed-Type Air Shutoff Valve |
| HG* | Graco Red Grounded Air Hose (left-hand threads) |
| CA* | High Pressure Isolation System, such as HydroShield Air-Assisted or WB3000 |

| Item | Description |
|------|-----------------------------|
| PR | Gun Air Pressure Regulator |
| AS | Gun Air Line Filter |
| GND* | Gun Air Hose Ground Wire |
| SR | Strain Relief Fitting |
| FJ* | Graco Waterborne Fluid Hose |

* These items are required for safe operation.

Connect the Waterborne Fluid Hose

Always use a Graco waterborne fluid hose between the voltage isolation system fluid outlet and the gun fluid inlet.

Before connecting the waterborne fluid hose to the gun, flush it 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).

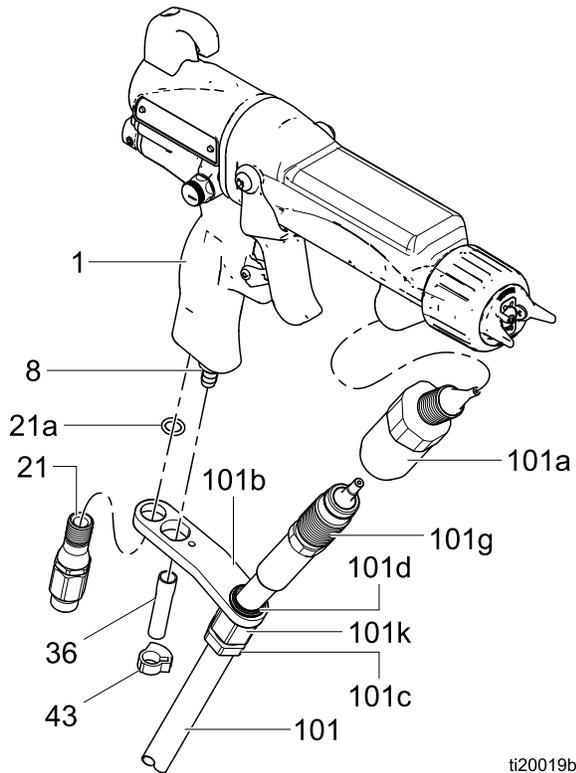


Figure 11 Connect the Fluid Hose

2. Remove the o-ring (21a) and assemble the inlet fitting through the bracket (101b). Reassemble the o-ring.

3. Make sure the barrel fluid inlet is clean and dry. Apply dielectric grease to the threads and front of the barrel connector (101n) and screw it into the fluid inlet just until snug. Then continue to tighten the fitting a minimum of 1/2 turn and continue to rotate until the fitting is oriented as shown. The gap between the fitting and the barrel must be less than .125 in (3.2 mm).

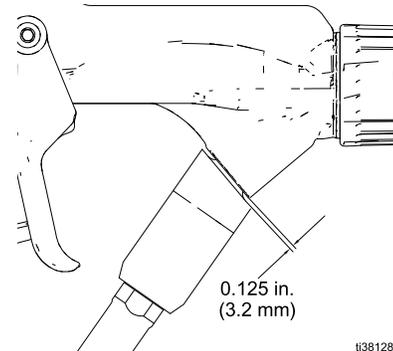


Figure 12 Orientation of Fitting and Barrel

4. Loosen the strain relief nut (101c).
5. Apply dielectric grease to the threads of the hose connector (101g). Pull the connector back and apply grease to the outside diameter of the hose. Thread it into the barrel connector (101n) until snug and then a minimum of 1/2 turn more. Use a wrench to hold the barrel connector when tightening.
6. Align the bracket (101b) holes with the air inlet and exhaust outlet. Secure with the air inlet fitting (21).
7. Tighten the strain relief nut (101c).
8. Press the exhaust tube (36) onto the exhaust valve. Secure with the clamp (43).

Note

Whenever possible, keep the fluid hose assembled to the gun barrel. To remove the barrel, disconnect the hose bracket at the gun handle.

9. Connect the other end of the hose to the isolated fluid supply as instructed in the isolation system manual.

Air Supply Line

| | | | | |
|---|---|--|--|--|
|  |  | | | |
| <p>To reduce the risk of electric shock or other serious injury, you must:</p> <ul style="list-style-type: none"> • Use the electrically conductive red-colored Graco Grounded Air Hose for the gun air supply. • Do not use the black or gray-colored Graco air hoses. • Connect the hose ground wire to a true earth ground. | | | | |

1. Install an air line filter/water separator (AS) on the main air supply line to ensure a dry, clean air supply to the gun.

Note

Dirt and moisture can ruin the appearance of your finished workpiece and can cause the gun to malfunction. See [Typical Installation, page 15](#).

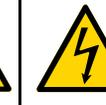
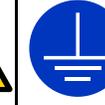
2. Install a bleed type air shut-off valve (AB) and air regulator (PR) on the gun air supply line to control air pressure to the gun.
3. Connect the red-colored Graco Electrically Conductive Air Hose (HG) between the gun air regulator (PR) and the gun's air inlet. The gun air inlet fitting has a left-hand thread. Connect the air supply hose ground wire (GND) to a true earth ground.

Note

Some isolation systems provide controls to regulate the air to the spray gun. Consult the isolation system manual for proper installation.

| | | | | |
|--|---|---|---|--|
|  |  |  |  | |
| <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> | | | | |

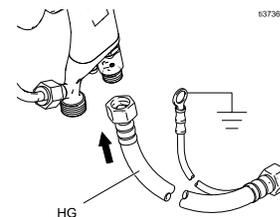
Grounding

| | | | | |
|---|--|---|---|--|
|  |  |  |  | |
| <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 100 ohms. Grounding provides an escape wire for the electric current.</p> | | | | |

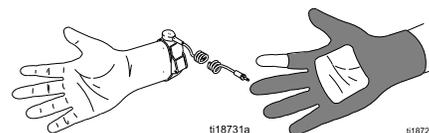
When operating the electrostatic gun, any ungrounded objects (such as people, containers, and tools) in the spray location can become electrically charged.

The following are minimum grounding requirements for a basic electrostatic waterborne 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.

- *Electrostatic Air-Assisted 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 22](#).

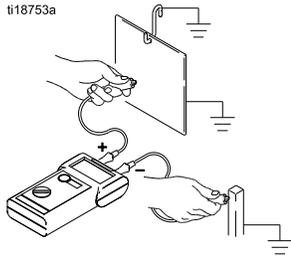


- *All persons entering the spray area:* must wear shoes having conductive soles such as leather, or wear personal grounding straps. Do not wear shoes with non-conductive soles such as rubber or plastic. If gloves are necessary, wear the conductive gloves supplied with the gun. If non-Graco gloves are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

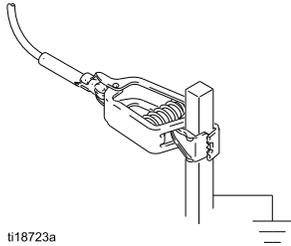


Installation

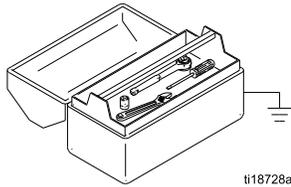
- **Object being sprayed:** Keep the workpiece hangers clean and grounded at all times.



- **Voltage Isolation System:** Electrically connect the voltage isolation system to a true earth ground. See your isolation system manual.



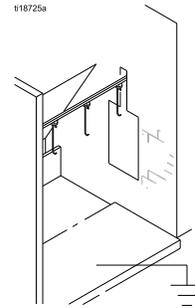
- **All electrically conductive objects or devices in the spray area:** must be properly grounded.



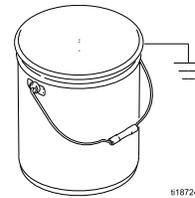
- **Fluid and waste containers:** Ground all fluid and waste containers in the spray area. Do not use pail liners unless they are conductive and grounded. When flushing the spray gun, the container used

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. Only use non-flammable solvents. Do not store more than the quantity needed for one shift.



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: Material is classified as non-ignitable as defined by EN 50059: 2018. For more information, see Ignitability of Coating Materials, page 61. | | | | |

| | | | | |
|--|--|--|--|--|
|  |  | | | |
| <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 electrode during operation or until performing the Fluid Voltage Discharge and Grounding Procedure, page 24.</p> <p>Follow the Fluid Voltage Discharge and Grounding Procedure, page 24 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 air working pressure and a 3000 psi (21 MPa, 210 bar) maximum fluid working pressure.</p> | | | | |

| | | | | |
|--|--|---|--|--|
|  |  |  | | |
| <p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 23 whenever you are instructed to relieve the pressure.</p> | | | | |

See the following figure to locate the electrostatic gun controls. The controls are described in [Controls, Indicators, and Components, page 8](#).

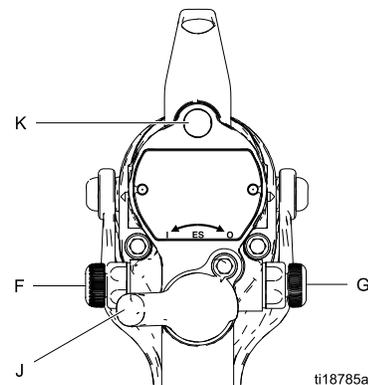
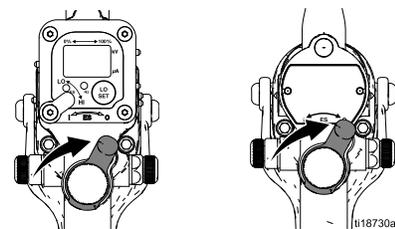
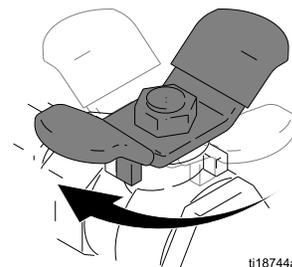


Figure 13 Electrostatic Gun Controls

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



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



Gun Setup

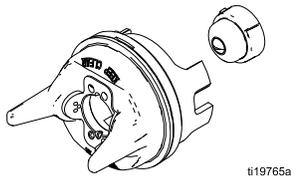
- Check gun resistance. See [Test Gun Resistance, page 30](#).
- Follow all steps under [Grounding, page 17](#).
- Follow all steps under [Check Gun Electrical Grounding, page 22](#). Reading must be less than 100 ohms.
- Connect the exhaust tube (35) and secure with the clamp (36) provided.



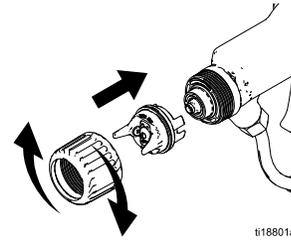
- Flush if needed. See [Flushing, page 26](#).

| | | | |
|---|--|--|--|
| | | | |
| <p>To reduce the risk of a skin injection injury, always follow the Pressure Relief Procedure, page 23, before removing or installing the spray tip, air cap, or tip guard.</p> | | | |

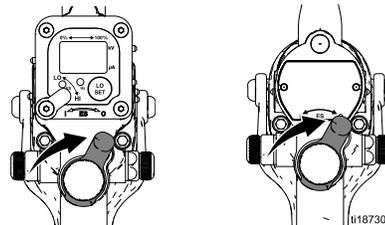
- The fluid output and pattern width depend on the size of the spray tip, the fluid viscosity, and the fluid pressure. Use the [Spray Tip Selection Chart, page 57](#), as a guide for selecting the appropriate spray tip for your application.
- Align the spray tip tab with the groove in the air cap. Install the tip.



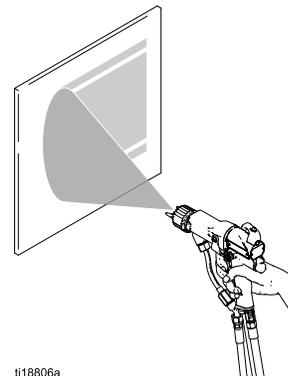
- Install the air cap and retaining ring. Orientate the air cap and tighten the retaining ring securely.



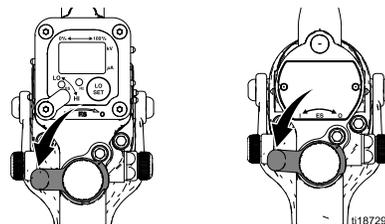
- Close the atomizing air adjustment valve (G) and the fan air adjustment valve (F).
- Check that the ES On-Off switch is OFF (O).



- Start the pump. Set the fluid regulator to 400 psi (2.8 MPa, 28 bar).
- Spray a test pattern. Examine the particle size in the center of the pattern (tails will be removed in step 18). 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).



- Turn ON (I) the ES On-Off switch at the gun and set the isolation system to isolate voltage.



16. Check that the ES indicator (Hz indicator on Smart guns) is lit, or check that the kV indicator on the isolated enclosure reads 30–50 kV. The actual spraying voltage for AA waterborne systems is 40–50 kV, but because the charging electrode does not directly contact the fluid, the voltage measured by the kV meter will be 5–10 kV lower. See the following table.

Table 2 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 turns amber after 1 second, the air pressure is too low. Increase air pressure until the indicator is green. |
| Red | If the indicator turns red after 1 second, the air pressure is too high. Decrease air pressure until the indicator is green. |

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

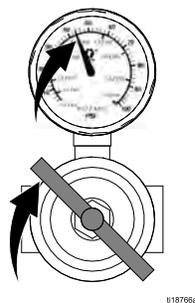
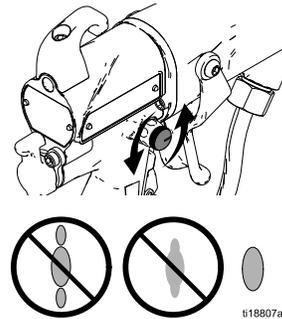


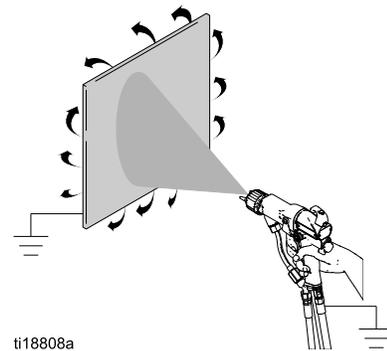
Table 3 Pressure Drop

| 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) |

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



19. If desired atomization is not achieved, change the tip size. The smaller the tip orifice, the finer the atomization.
20. Spray a test piece. Examine the edges for coverage. If wrap is poor, see [Troubleshooting, page 32](#).



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

| | | | | |
|---|---|---|--|--|
|  |  |  | | |
|---|---|---|--|--|

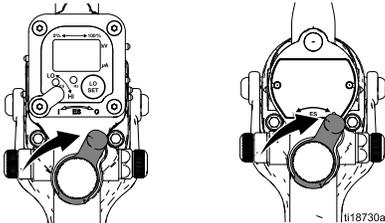
Megohmmeter Part No. 241079 is not approved for use in a hazardous area. (In Figure 16, item AA.) To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

- 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.

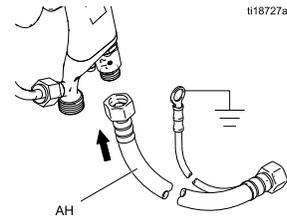
Graco Part No. 241079 Megohmmeter is available as an accessory to check that the gun is properly grounded.

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. Use air to purge all fluid from the fluid line.
4. Turn off the air and fluid supply to the gun. Follow the [Pressure Relief Procedure](#), page 23.

5. Make sure the grounded air hose 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.

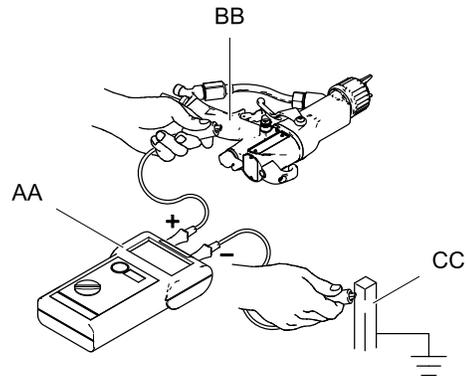


Figure 14 Check Gun Electrical Grounding

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.

Flush Before Using Equipment

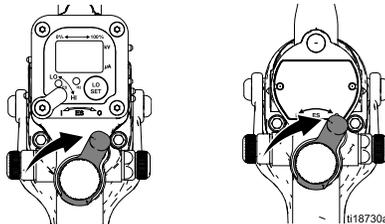
The equipment was tested in fluid at the factory. To avoid contaminating your fluid, flush the equipment with a compatible solvent before using the equipment. See [Flushing](#), page 26.

Operation

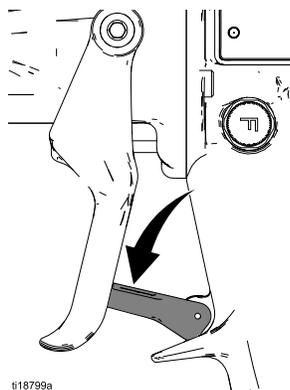
Pressure Relief Procedure

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

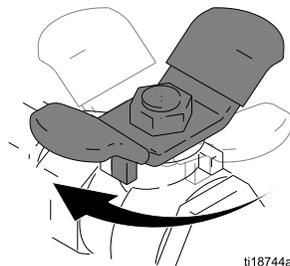
1. Turn OFF (O) the ES On/Off switch.



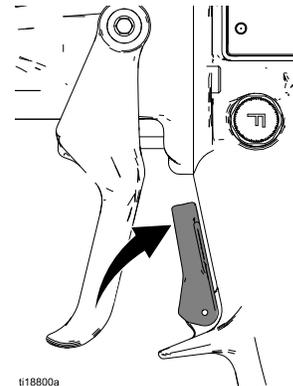
2. Follow the [Fluid Voltage Discharge and Grounding Procedure](#), page 24.
3. Engage the trigger lock.



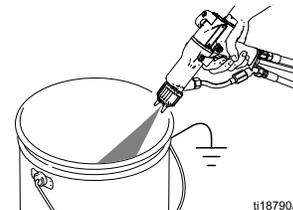
4. Turn off the air bleed valves to the fluid source and to the gun.



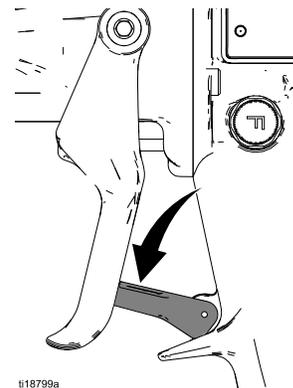
5. Disengage the trigger lock.



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

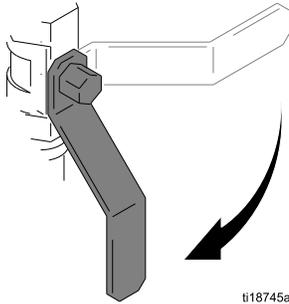


7. Engage the trigger lock.



Operation

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

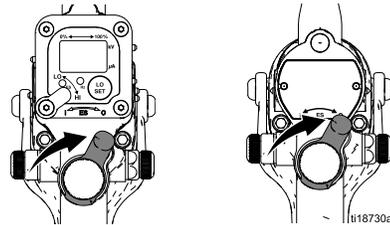


- If the spray tip or hose is completely clogged or pressure is not fully relieved, slowly loosen the hose end coupling. Now clear the spray tip or hose.

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 voltagebefore cleaning, flushing, or servicing the system equipmentbefore approaching the front of the gunor before opening the isolation enclosure for the isolated fluid supply. | | | | |

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



- Follow the instructions in your isolation system manual for discharging and grounding the fluid supply.

Startup

Follow all steps under [Gun Setup Procedure, page 19](#).

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

- 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:**

Material is classified as non-ignitable as defined by EN 50059: 2018.

For more information, see [Ignitability of Coating Materials, page 61](#).

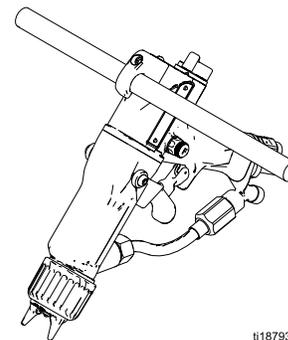
- All operators are properly trained to safely operate an electrostatic waterborne air-assisted system as instructed in this manual.
- All operators are trained in the [Pressure Relief Procedure, page 23](#).
- The electrostatics are turned off and system voltage is discharged according to the [Fluid Voltage Discharge and Grounding Procedure, page 24](#), 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 17](#).
- 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 30](#).

- Ventilation fans are operating properly.
- Workpiece hangers are clean and grounded.
- All debris (including flammable fluids and rags) is removed from the spray area.
- All flammable fluids in the spray booth are in approved, grounded containers.
- All conductive objects in the spray area are electrically grounded and the floor of the spray area is electrically conductive and grounded.

Shutdown

| | | | | |
|--|---|---|---|--|
|  |  |  |  | |
| <p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 23 whenever you are instructed to relieve the pressure.</p> | | | | |

1. Discharge the system voltage. See [Fluid Voltage Discharge and Grounding Procedure, page 24](#).
2. Flush the gun. See [Flushing, page 26](#).
3. Follow the [Pressure Relief Procedure, page 23](#).
4. Hang the gun from its hook, with the nozzle pointing down.



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Maintenance

| | | | | |
|---|---|---|---|--|
|  |  |  |  | |
| <p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 23, whenever you are instructed to relieve the pressure.</p> | | | | |

Daily Care and Cleaning Checklist

Check the following list daily upon completion of equipment usage.

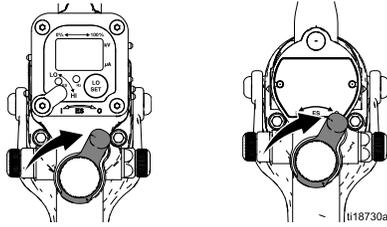
- Flush the gun. See [Flushing, page 26](#).
- Clean the fluid and air line filters.
- Clean the outside of the gun. See [Clean the Gun Daily, page 28](#).
- Clean the air cap and spray tip daily, at a minimum. Some applications require more frequent cleaning. Replace the spray tip and air cap if they are damaged. See [Clean the Gun Daily, page 28](#).
- Check the electrode and replace if broken or damaged. See [Electrode Replacement, page 39](#).
- 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 22](#).

Flushing

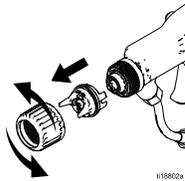
- Flush before changing fluids, before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
- Flush with a non-flammable solvent that is compatible with the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

| | | | | |
|--|--|---|---|---|
|  |  |  |  |  |
|  | | | | |
| <p>To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.</p> <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 24, 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: Material is classified as non-ignitable as defined by EN 50059: 2018. <p>For more information, see Ignitability of Coating Materials, page 61.</p> | | | | |

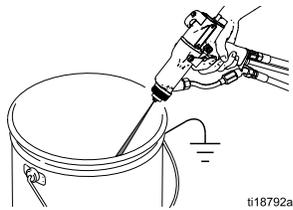
1. Turn OFF (O) the ES On-Off switch. Wait 30 seconds for the voltage to bleed off.



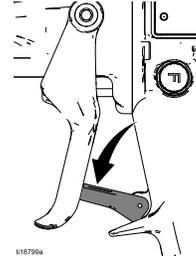
2. Discharge the system voltage. See [Fluid Voltage Discharge and Grounding Procedure, page 24](#).
3. Follow the [Pressure Relief Procedure, page 23](#).
4. Remove and clean the air cap and spray tip.



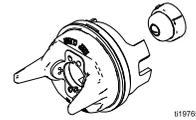
5. Change the fluid source to non-flammable solvent.
6. Point the gun into a grounded metal pail. Flush until clean solvent flows from the gun. Use the lowest fluid pressure possible to avoid splashing.



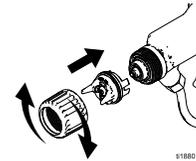
7. Follow the [Pressure Relief Procedure, page 23](#). Engage the trigger lock.



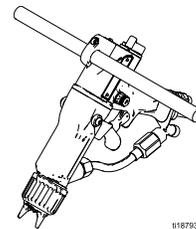
8. Align the spray tip tab with the groove in the air cap. Install the tip.



9. Reinstall the air cap, tip guard, and retaining ring.



10. Hang the gun from its hook, with the nozzle pointing down.



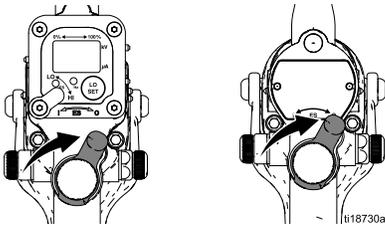
11. Before using the system electrostatically again, make sure no flammable vapors are present.

Clean the Gun Daily

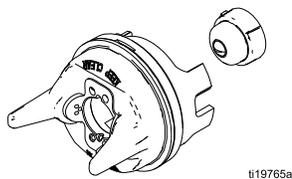
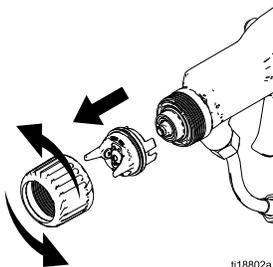
NOTICE

- 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.

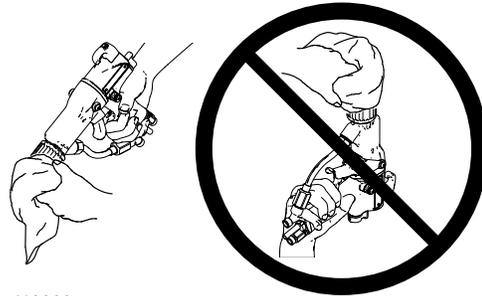


2. Discharge the system voltage. See [Fluid Voltage Discharge and Grounding Procedure, page 24](#).
3. Follow the [Pressure Relief Procedure, page 23](#).
4. Remove the air cap/tip guard and spray tip.



5. Flush the gun, see [Flushing, page 26](#).
6. Follow the [Pressure Relief Procedure, page 23](#).

7. Clean the outside of the gun with a non-flammable solvent, as defined under [Flushing, page 26](#). Use a soft cloth. Point the gun down to prevent solvent from entering the gun passages. Do not immerse the gun.



ti18809a

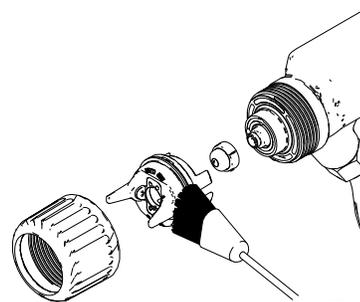


ti18810a



ti18811a

8. Clean the air cap/tip guard and spray tip with a soft brush and non-flammable solvent.



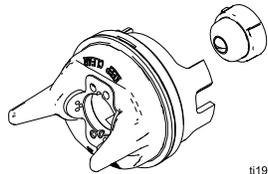
ti19539a

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



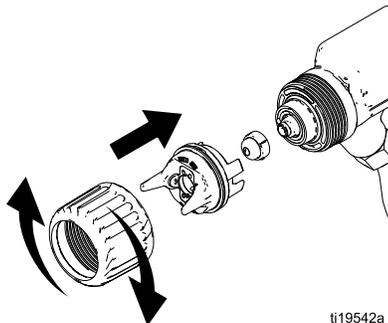
ti18773a

10. Align the spray tip tab with the groove in the air cap. Install the tip.



ti19765a

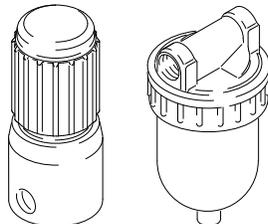
11. Install the air cap and retaining ring. Orientate the air cap and tighten the retaining ring securely.



ti19542a

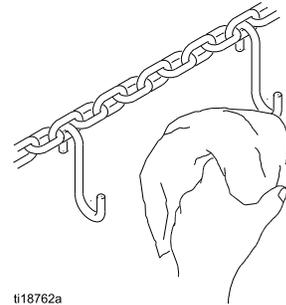
Daily System Care

1. Follow the instructions under [Clean the Gun Daily, page 28](#). Follow the [Pressure Relief Procedure, page 23](#).
2. Clean the fluid and air filters.



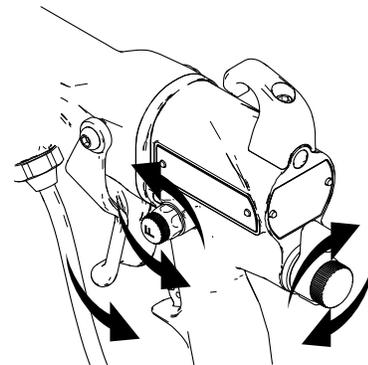
ti19540a

3. Check for fluid leaks. Tighten all fittings.
4. Clean workpiece hangers. Use non-sparking tools.



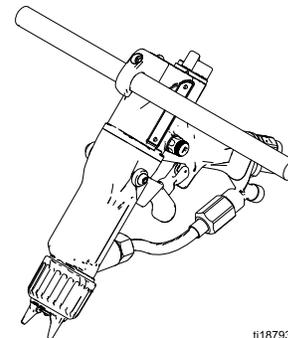
ti18762a

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



ti19541a

6. [Check Gun Electrical Grounding, page 22](#).
7. Hang the gun from its hook, with the nozzle pointing down.



ti18793a

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.

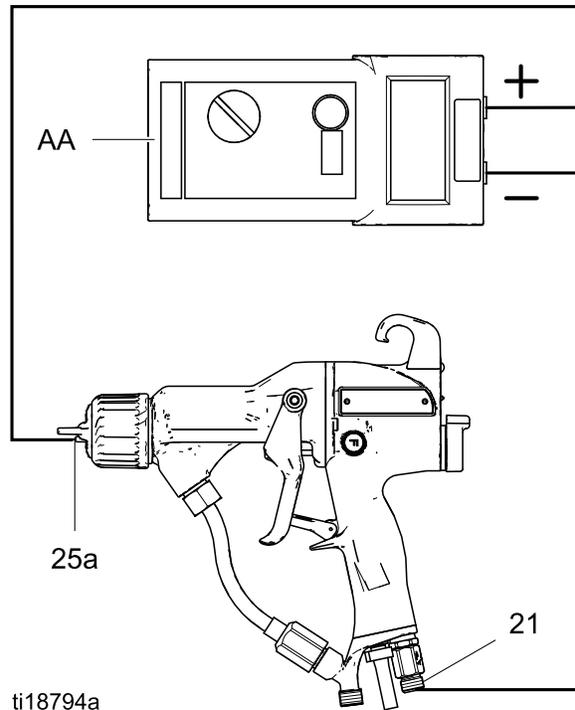
| |
|---|
| NOTICE |
| The gun body resistor cartridge is part of the body and is not replaceable. To avoid destroying the gun body, do not attempt to remove the body resistor. |

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

| | | | | |
|--|--|--|--|--|
| | | | | |
| <p>Megohmmeter Part No. 241079 is not approved for use in a hazardous area. (In Figure 18, item AA.) To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:</p> <ul style="list-style-type: none"> • 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). <p>Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury and property damage.</p> | | | | |

Test Gun Resistance

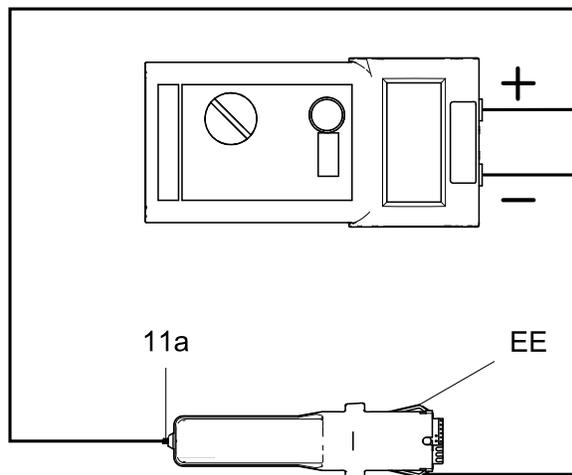
1. Follow the steps under [Prepare the Gun for Service, page 38](#).
2. Flush and dry the fluid passage.
3. Measure resistance between the electrode needle tip (25a) and the air swivel (21). The resistance should be 104–150 megohms. If outside this range, go to [Test Power Supply Resistance, page 31](#). If in range, see [Electrical Troubleshooting, page 36](#) for other possible causes of poor performance, or contact your Graco distributor.



ti18794a
Figure 15 Test Gun Resistance

Test Power Supply Resistance

1. Follow the steps under [Prepare the Gun for Service, page 38](#).
2. Remove the power supply (11). See [Power Supply Removal and Replacement, page 42](#).
3. Remove the alternator (15) from the power supply. See [Alternator Removal and Replacement, page 43](#).
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 Gun Barrel Resistance, page 31](#).
5. Be sure the spring (11a) is in place before reinstalling the power supply.

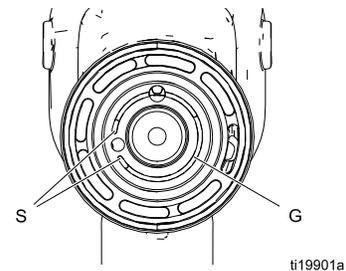


ti18735a
Figure 16 Test Power Supply Resistance

Test Gun Barrel Resistance

1. Insert a conductive rod (B) into the gun barrel (which was removed for the power supply test) and against the metal contact (C) in the front of the barrel.
2. Measure the resistance between the conductive rod (B) and the conductive ring (9). The resistance should be 10–30 megohms. If the resistance is incorrect, make sure the metal contact (C) in the barrel and the conductive ring (9) are clean and undamaged.

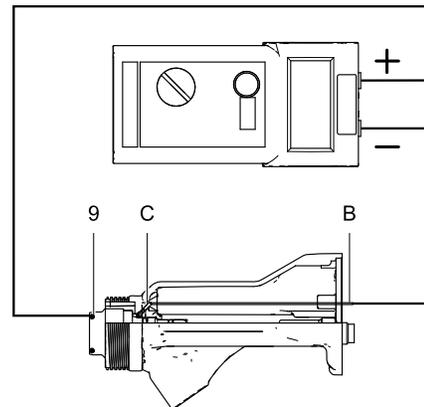
3. If the resistance is still outside the range, remove the conductive ring (9) and measure the resistance between the conductive rod (B) and the wire lead at the bottom of the conductive ring groove.
4. If the resistance is in range, replace the conductive ring (9) with a new one. Insert the ends of the conductive ring into the slots (S) at the front of the barrel, then press the ring firmly into the groove (G).



NOTICE

The conductive ring (9) 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 (9) 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. If the resistance is still outside the range, replace the gun barrel.



ti19544a
Figure 17 Test Gun Barrel 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 service this equipment unless you are trained and qualified.</p> <p>Follow the Fluid Voltage Discharge and Grounding Procedure, page 24 before checking or servicing the system and whenever you are instructed to discharge the voltage.</p> | | | | |

| | | | | |
|--|---|---|---|--|
|  |  |  |  | |
| <p>To reduce the risk of a skin injection injury, always follow the Pressure Relief Procedure, page 23, whenever you are instructed to relieve the pressure.</p> | | | | |

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

Voltage Loss Troubleshooting

Normal spraying voltage for a system using the waterborne gun is 40–50 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 inner 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 number 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 30](#).
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 24](#)).
3. Follow the [Pressure Relief Procedure, page 23](#).
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 40 to 50 kV, the gun and fluid hose are okay, and the problem is in the voltage isolation system.
 - If the meter reading is below 40 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 40-50 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 40 kV, do the [Electrical Tests, page 30](#), 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 inner layer. Disconnect the fluid hose from the gun, and look for signs of fluid contamination on the outside of the inner portion of the fluid tube.
 - Inspect the end of the hose connected to the voltage isolation system. Look for cuts or nicks.
 - b. Fluid needle:

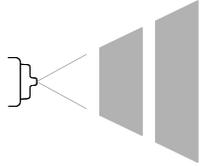
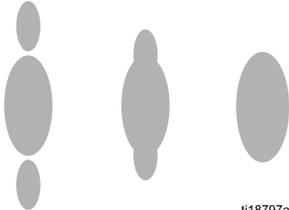
Remove the fluid needle from the gun (see [Fluid Needle Replacement, page 41](#)), and look for signs of fluid leakage or any blackened areas, which would indicate arcing is occurring along the packing rod.
 - c. Fluid hose connection to the spray gun:

A breakdown at the fluid hose connection joint would be caused by fluid leaking past the hose fittings. Remove the hose at the gun connection and look for signs of fluid leakage.
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

Note

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

| Problem | Cause | Solution |
|--|---------------------------------------|--|
| Fluttering or spitting spray.  | No fluid. | Refill supply. |
| | Air in fluid supply. | Check fluid source. Refill. |
| Irregular pattern.  <small>ti18798a</small> | Fluid buildup; partially plugged tip. | Clean. See Clean the Gun Daily, page 28. |
| | Worn/damaged tip or air cap holes. | Clean or replace. |
| Pattern pushed to one side; air cap gets dirty. | Air cap holes plugged. | Clean. See Clean the Gun Daily, page 28. |
| Tails in pattern.  <small>ti18797a</small> | Air pressure too low. | Open atomizing air adjustment valve. |
| | Fluid pressure too low. | Increase. |
| Fluid buildup on air cap/tip guard. | Air pressure too high. | Decrease. |
| | Fluid pressure too low. | Increase. |
| | Air cap holes plugged. | Clean. See Clean the Gun Daily, page 28. |

Gun Operation Troubleshooting

| Problem | Cause | Solution |
|--|--------------------------------------|---|
| Excessive spray fog. | Atomizing air pressure too high. | Close atomizing air 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. | Increase viscosity. |
| "Orange Peel" finish. | Atomizing air pressure too low. | Open atomizing air valve more or increase gun air inlet pressure; use lowest air pressure necessary. |
| | Spray tip is too large. | Use smaller tip. See Spray Tip Selection Chart, page 57 . |
| | Poorly mixed or filtered fluid. | Remix or refilter fluid. |
| | Fluid too thick. | Reduce viscosity. |
| Fluid leaks from the fluid packing area. | Worn fluid needle packings or rod. | Replace packings. See Fluid Needle Replacement, page 41 . |
| Air leaks from the front of the gun. | Air valve is not seating properly. | Replace air valve. See Air Valve Repair, page 47 . |
| Fluid leakage from the front of the gun. | Worn or damaged fluid needle ball. | See Fluid Needle Replacement, page 41 . |
| | Worn fluid seat housing. | See Air Cap, Spray Tip, and Fluid Seat Housing Replacement, page 38 . |
| | Loose spray tip. | Tighten retaining ring. |
| | Damaged tip seal. | See Air Cap, Spray Tip, and Fluid Seat Housing Replacement, page 38 . |
| Gun does not spray. | Low fluid supply. | Add fluid if necessary. |
| | Damaged spray tip. | Replace. |
| | Dirty or clogged spray tip. | Clean. See Clean the Gun Daily, page 28 . |
| | Damaged fluid needle. | See Fluid Needle Replacement, page 41 . |
| Dirty air cap. | Damaged or plugged air cap. | Clean air cap. See Clean the Gun Daily, page 28 . |
| Excessive paint wrap back to operator. | Poor grounding. | See Grounding, page 17 . |
| | 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 24. | 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. |
| 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 30. |
| | Fluid leaks from the packing (2c) and causes a short. | Clean the packing rod cavity, or replace the packing rod. |
| | Faulty alternator. | See Alternator Removal and Replacement, page 43. |
| | 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 isolation 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 42. |

| Problem | Cause | Solution |
|--|--|---|
| Operator gets mild shock. | Operator not grounded or is near ungrounded object. | See Grounding, page 17 . |
| | Gun not grounded. | See Check Gun Electrical Grounding, page 22 , and Test Gun Resistance, page 30 . |
| 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 28 . |
| 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 48 and Power Supply Removal and Replacement, page 42 . |

Repair

Prepare the Gun for Service

| | | | | |
|---|---|---|--|--|
|  |  |  | | |
| <p>Installing and repairing this equipment requires access to parts that may cause electric shock or other serious injury if the work is not performed properly. Do not install or service this equipment unless you are trained and qualified.</p> | | | | |

| | | | | |
|--|---|---|---|---|
|  |  |  |  |  |
| <p>To reduce the risk of injury, follow the Pressure Relief Procedure, page 23, 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 32](#), before disassembling the gun.
- Use a vise with padded jaws to prevent damage to plastic parts.
- Lubricate the some needle assembly parts (20) and certain fluid fittings with dielectric grease (57), 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 (3*).

1. Flush the gun. See [Flushing, page 26](#).
2. Relieve the pressure. Follow the [Pressure Relief Procedure, page 23](#).
3. Disconnect the gun air and fluid lines.
4. Remove the gun from the worksite. Repair area must be clean.

Air Cap, Spray Tip, and Fluid Seat Housing Replacement

1. Follow the steps in [Prepare the Gun for Service, page 38](#).
2. Remove the retainer ring (22) and air cap/tip guard assembly (25).

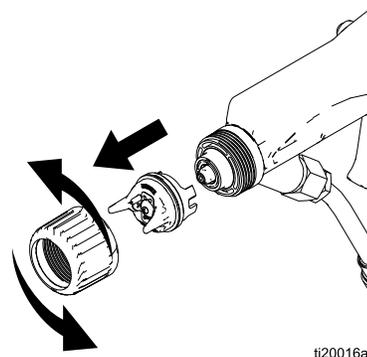
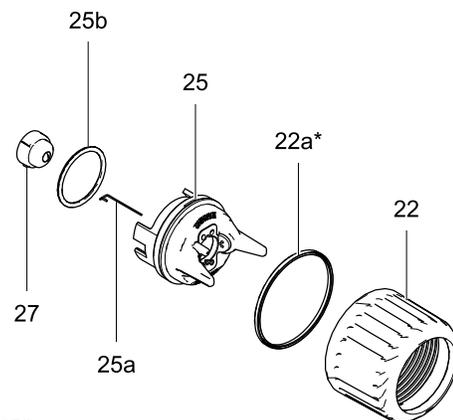


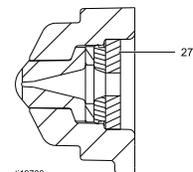
Figure 18 Remove Air Cap

3. Disassemble the air cap assembly. Check the condition of the u-cup (22a), o-ring (25b), and tip gasket (27a). Replace any damaged parts.



ti19521a

Figure 19 Disassemble Air Cap Assembly



ti19766a

Figure 20 Tip Gasket

- To replace the electrode (25a), see [Electrode Replacement, page 39](#).

NOTICE

The conductive ring (9) 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 (9) 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.

- Trigger the gun and remove the fluid seat housing (24), using the multi-tool (61).

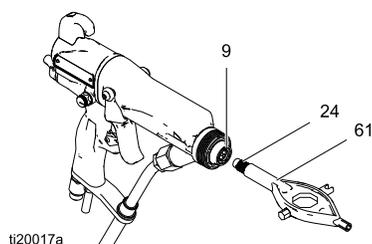


Figure 21 Replace Fluid Seat Housing

NOTICE

Do not overtighten the fluid seat housing (24). Overtightening may damage the housing and the gun barrel, resulting in improper fluid shutoff.

- Trigger the gun and install the fluid seat housing (24). Tighten until snug, then 1/4 turn more.
- Check that the spray tip gasket (27a) is in place. Align the spray tip tab with the groove in the air cap (25). Install the spray tip (27) in the air cap.
- Make sure that the electrode (25a) is installed correctly in the air cap.
- Check that the air cap o-ring (25b) is in place.
- Check that the u-cup (22a) is in place on the retaining ring (22). The lips of the u-cup must face forward.

NOTICE

To avoid damaging the tip guard, orient the air cap assembly (25) before tightening the retaining ring (22). Do not turn the air cap when the retaining ring is tight.

- Orientate the air cap and tighten the retaining ring securely.
- See [Test Gun Resistance, page 30](#).

Electrode Replacement

NOTICE

For best performance and to avoid potential damage to the spray gun, do not operate the spray gun without the electrode installed in the air cap.

NOTICE

To avoid equipment damage, use only the electrode needle available in kit 24N781. Alternate electrodes are not acceptable for use and do not fit the packing rod threads.

- Follow the steps in [Prepare the Gun for Service, page 38](#).
- Remove the air cap assembly (25). See [Air Cap, Spray Tip, and Fluid Seat Housing Replacement, page 38](#).
- Pull the electrode (25a) 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 (BB) of the electrode engages the hole (CC) in the back of the air cap. Press the electrode in place firmly with your fingers.
- Install the air cap assembly.
- Follow the steps in [Test Gun Resistance, page 30](#).

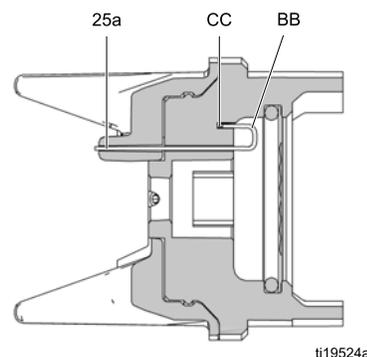


Figure 22 Replace Electrode

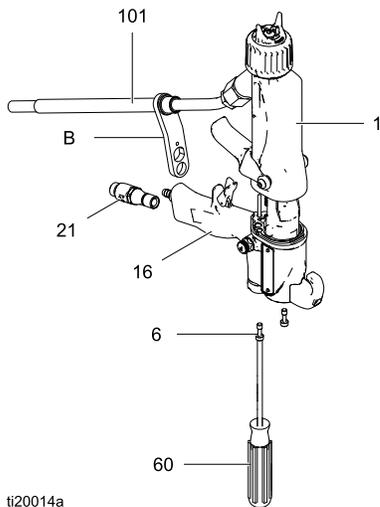
Gun Barrel Removal

1. Follow the steps in [Prepare the Gun for Service, page 38](#).
2. Remove the air inlet fitting (21) and take the bracket (B) off the gun handle (16).
3. Loosen the two screws (6).

NOTICE

To avoid damaging the power supply (11), pull the gun barrel straight away from the gun handle. 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.



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Figure 23 Gun Barrel Removal

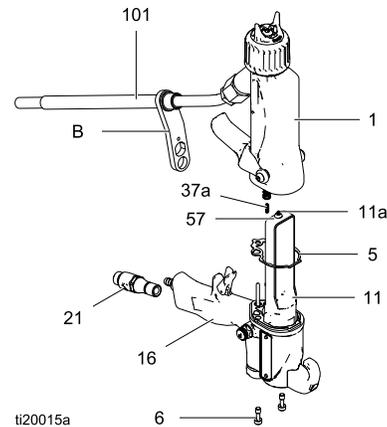
Gun Barrel Installation

1. Be sure the gasket (5*) and grounding spring (37a) 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). **Liberally** apply dielectric grease (57) to the tip of the power supply. Place the gun barrel (1) over the power supply and onto the gun handle (16).
3. Tighten the two screws (6) oppositely and evenly (about a half turn past snug).

NOTICE

To avoid damaging the gun barrel, do not over-tighten the screws (6).

4. Position the bracket (B) on the gun handle (16) and secure with the air inlet fitting (21).
5. Follow the steps in [Test Gun Resistance, page 30](#).



ti20015a

Figure 24 Gun Barrel Installation

Fluid Needle Replacement

1. Follow the steps in [Prepare the Gun for Service, page 38](#).
2. Remove the air cap assembly and fluid seat housing. See [Air Cap, Spray Tip, and Fluid Seat Housing Replacement, page 38](#).
3. Remove the gun barrel. See [Gun Barrel Removal, page 40](#).
4. Remove the trigger screws (13) and trigger (12).
5. Unscrew the spring cap (37). Remove the spring (20a).
6. Be sure the seat housing (24) is removed. Place the 2 mm ball end wrench (60) in the back of the fluid needle assembly. Push the tool forward so the two segments of the needle engage, and turn it counterclockwise about 12 full turns to unthread the needle.
7. Using the external hex end of the plastic multi-tool (61), carefully push straight on the fluid needle ball from the front of the barrel until the fluid seals release from the bore.

NOTICE

To prevent needle assembly separation or damage, be certain needle is disengaged before removing.

8. Remove the fluid needle assembly from the back of the gun barrel.
9. Install the fluid needle assembly in the gun barrel. Push in on the needle with the driver (60) and tighten.
10. Install the spring (20a).
11. Install the spring cap (37). Make sure the grounding spring (37a) is in place.
12. Install the trigger (12) and screws (13).
13. Install the gun barrel. See [Gun Barrel Installation, page 40](#).
14. Install the seat housing and air cap assembly. See [Air Cap, Spray Tip, and Fluid Seat Housing Replacement, page 38](#).
15. Follow the steps in [Test Gun Resistance, page 30](#).

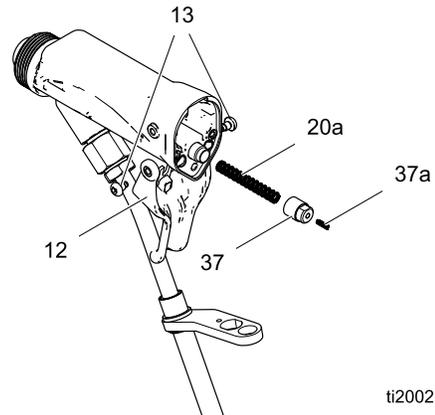


Figure 25 Remove Cap and Springs

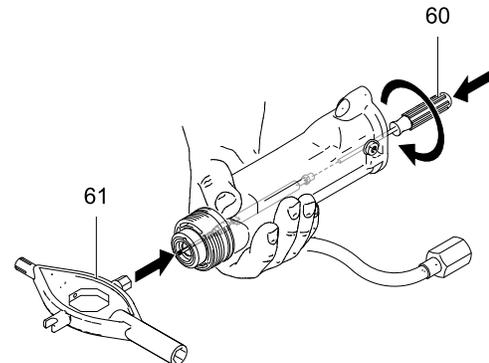


Figure 26 Remove Fluid Needle

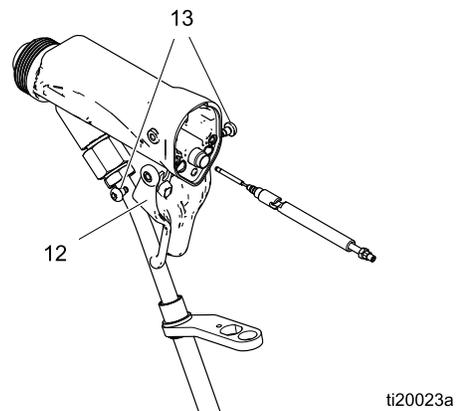


Figure 27 Replace Fluid Needle

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 (5) to solvents.
1. Follow the steps in [Prepare the Gun for Service, page 38](#).
 2. Follow the steps in [Gun Barrel Removal, page 40](#).

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 (40) 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 (40) from the power supply. Slide the alternator up and off the power supply.
6. See [Test Power Supply Resistance, page 31](#). Replace the power supply if necessary. To repair the alternator, see [Alternator Removal and Replacement, page 43](#).
7. *Smart models only*: connect the 6-pin flexible circuit (40) to the power supply.

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.

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 make contact with the handle. On Smart models, align the connector of the 6-pin flexible circuit (40) 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.

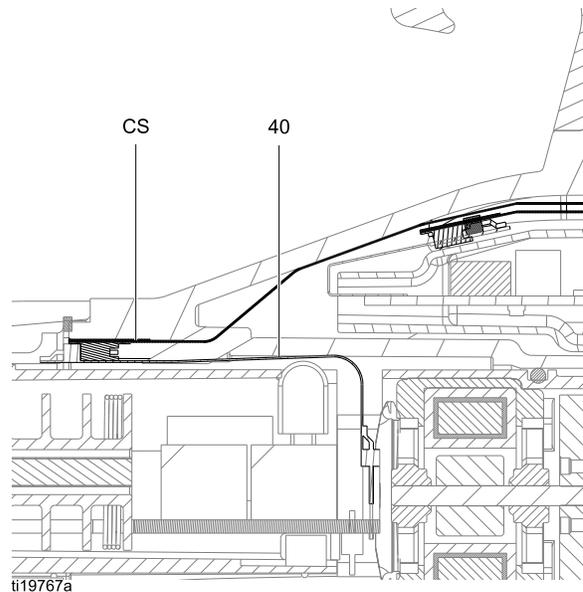


Figure 28 Connect Flexible Circuit

10. Make sure the gasket (5*), ground spring (37a), and power supply spring (11a) are in place. Assemble the barrel (1) to the handle (16). See [Gun Barrel Installation, page 40](#).
11. Follow the steps in [Test Gun Resistance, page 30](#).

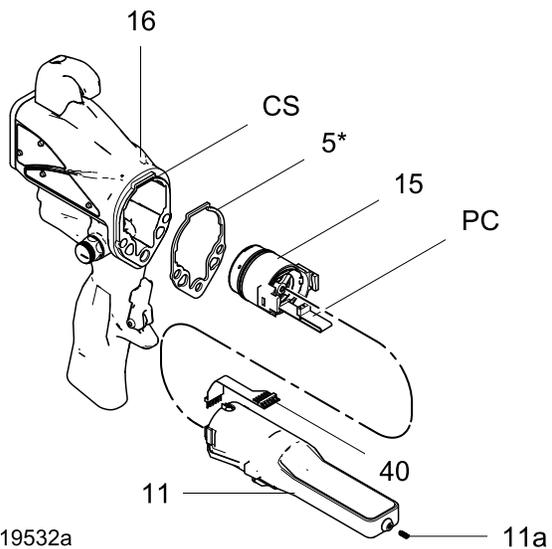


Figure 29 Power Supply

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 38](#).
2. Remove the power supply/alternator assembly and disconnect the alternator. See [Power Supply Removal and Replacement, page 42](#).
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).

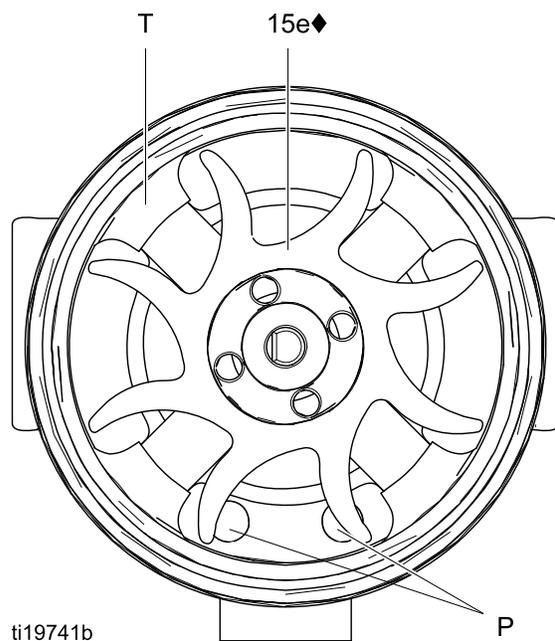


Figure 30 Fan Orientation

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

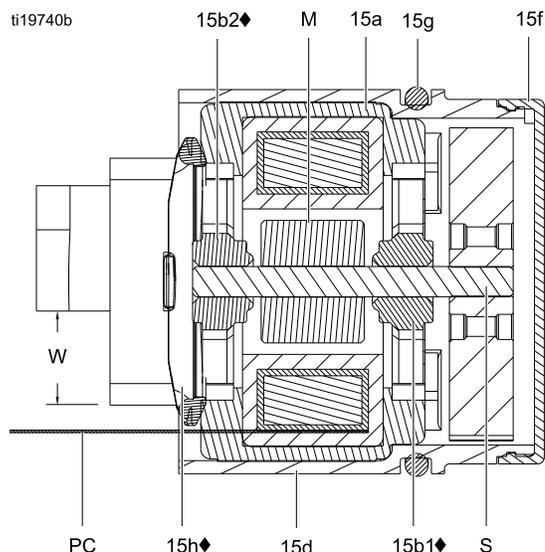


Figure 31 Alternator Cross-Section

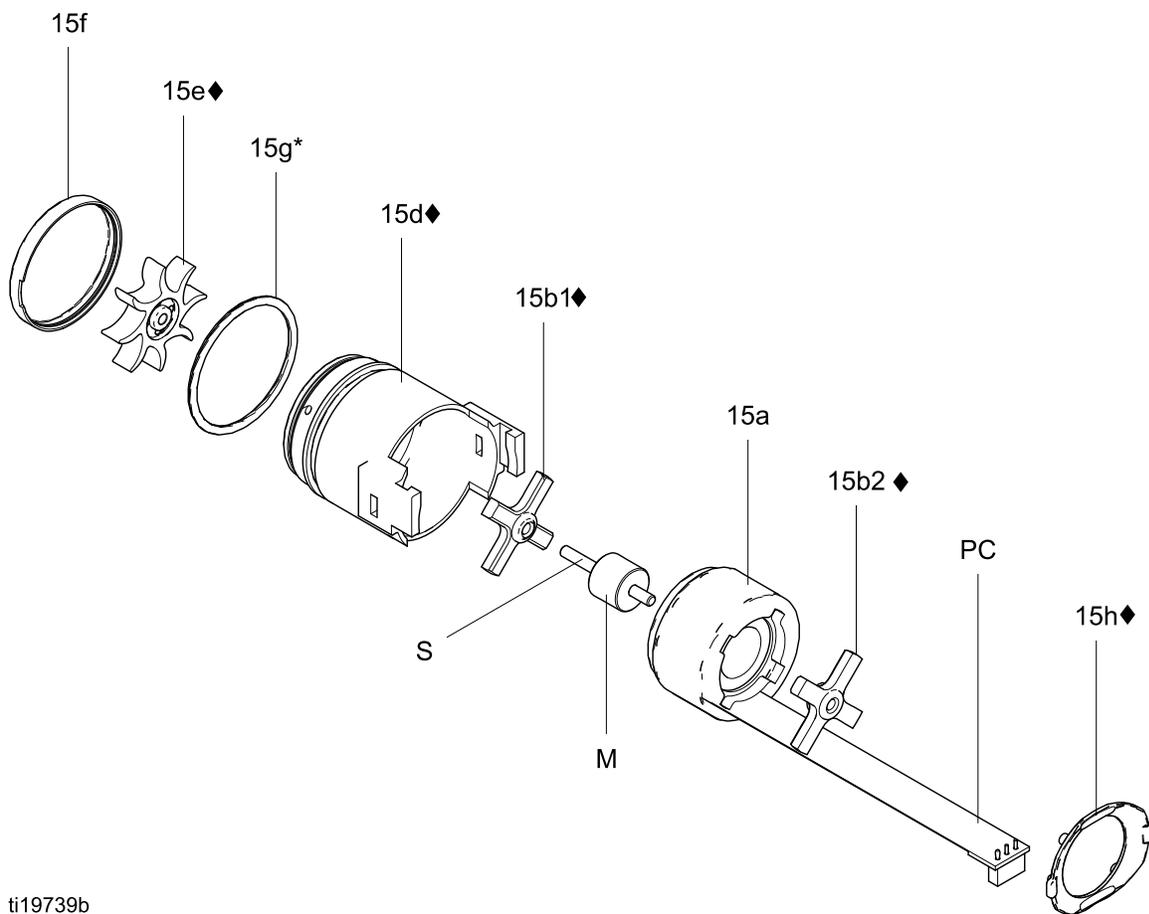
NOTICE

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

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

Repair

12. Hold the coil assembly (15a) on a workbench with the fan end facing up. Press the fan (15e♦) onto the long end of the shaft (S). The fan blades must be oriented as shown.
13. Carefully press the coil assembly (15a) into the front of the housing (15d♦). The 3-wire connector (PC) must be positioned below the wider notch (W) of the housing tabs, as shown in Figure [Alternator Cross-Section](#). Be sure the coil alignment pins (P) are positioned as shown in Figure [Fan Orientation](#).
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 42](#).



ti19739b

Figure 32 Alternator

Fan Air Adjustment Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 38](#).
2. Place a wrench on the flats of the valve assembly (30) and unscrew it from the handle (16).

Note

You may replace the valve as an assembly (go to step 9) or as individual parts (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. Remove the o-ring (30c).
6. Clean all parts and inspect for wear or damage.

Note

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

7. When reassembling the fan air valve (30), lightly lubricate the valve threads and screw the shaft (30b) fully into the housing (30a) until bottomed. Install the o-ring (30c*), lubricate, and unscrew the valve stem until the o-ring enters the housing.
8. Reassemble the retaining ring (30d). Unscrew the valve stem from the housing until it is stopped by the retaining ring.
9. Screw the valve assembly (30) into the gun handle (16), using a wrench on the flats of the housing. Torque to 15 in-lb (1.7 N•m).

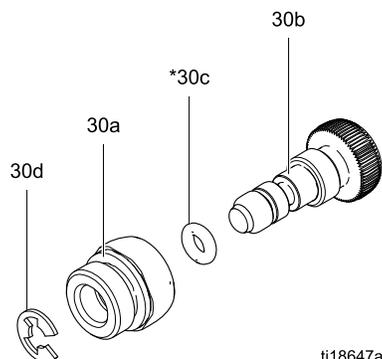
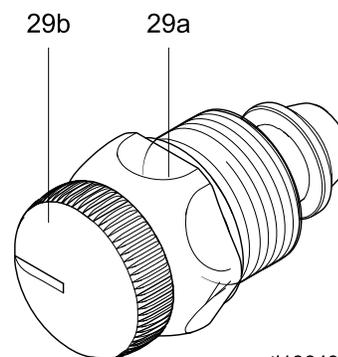


Figure 33 Fan Air Adjustment Valve

ti18647a

Atomizing Air Adjustment Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 38](#).
2. Place a wrench on the flats of the valve assembly (29) and unscrew it from the handle (16).
3. Inspect the valve assembly. If damaged, install a new valve (29).
4. Before installing the valve assembly in the handle, unscrew the valve stem (29b) from the housing (29a) until it stops.
5. Install the valve assembly into the gun handle. Torque the valve housing (29a) to 15 in-lb (1.7 N•m).



ti18649a

Figure 34 Atomizing Air Adjustment Valve

ES On-Off Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 38](#).
2. Loosen the captive screw (26p). Remove the valve (26) from the handle.
3. Lubricate the o-rings (26b* and 26g*) with non-silicone grease, Part No. 111265. Do not over-lubricate.

Note

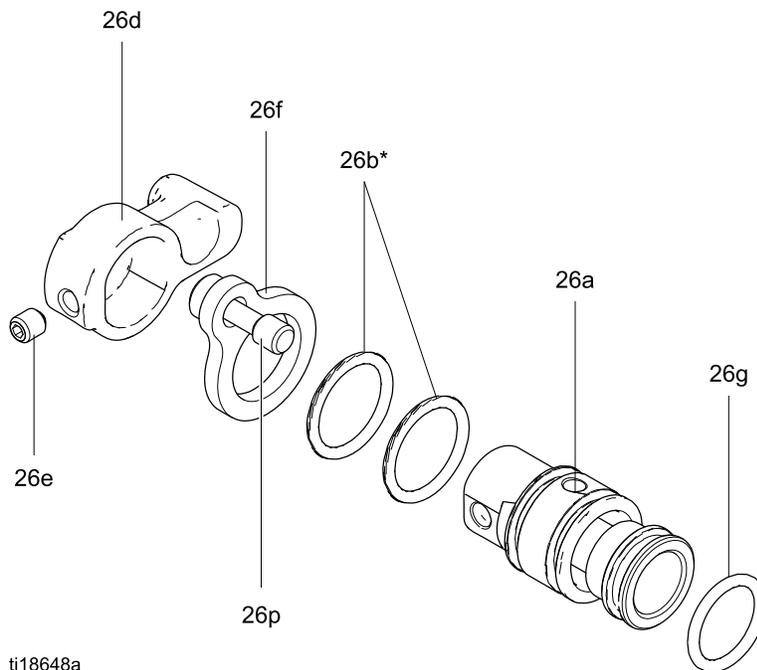
Do not over-lubricate parts. Excessive lubricant on the o-rings can be pushed into the gun air passage and blemish the finish on the workpiece.

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

Note

The protrusion on the retainer plate (26f) must point upward.

5. Reinstall the valve. Torque the screw (26p) to 15-25 in-lb (1.7-2.8 N•m).



ti18648a

Figure 35 ES On-Off Valve

Air Valve Repair

1. Follow the steps in [Prepare the Gun for Service, page 38](#).
2. Follow the steps in [Gun Barrel Removal, page 40](#).
3. Remove the screws (13) and trigger (12).
4. Remove the ES On-Off Valve. See [ES On-Off Valve Repair, page 46](#).
5. Remove the spring (2).
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 (3). Do not remove the u-cup unless damaged. If removed, install the new one with its lips facing into the gun handle (16). Place the u-cup on the shaft of the air valve to help seat it in the gun handle.
8. Install the air valve (23) and spring (2) into the gun handle (16).
9. Install the ES On-Off Valve. See [ES On-Off Valve Repair, page 46](#).
10. Install the trigger (12) and screws (13).
11. Follow the steps in [Gun Barrel Installation, page 40](#).

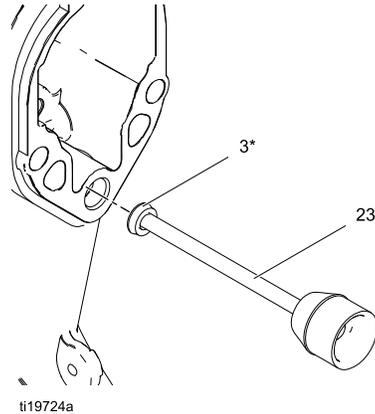


Figure 36 Install U-Cup

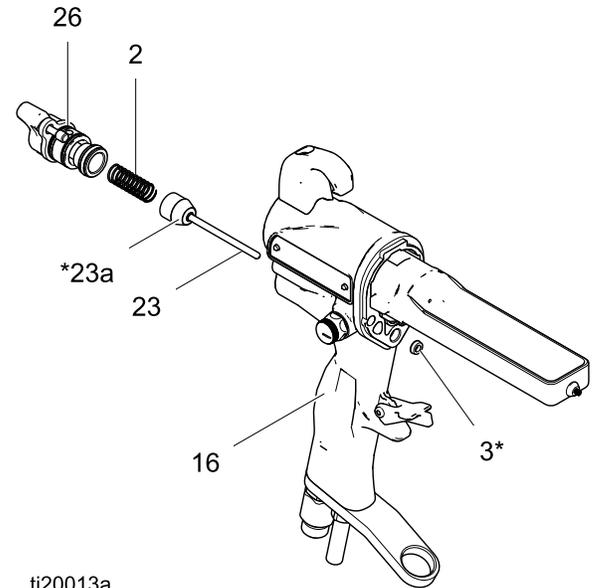


Figure 37 Air Valve

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 38](#).
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).

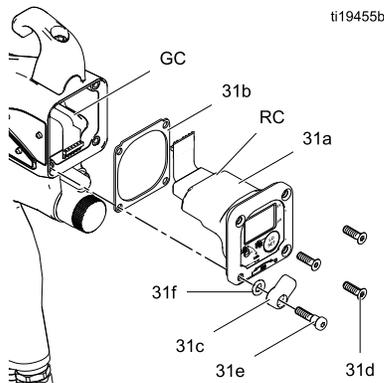


Figure 38 Smart Module

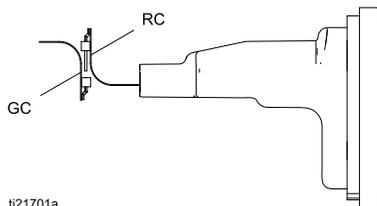


Figure 39 Align Ribbon Cables

Air Swivel and Exhaust Valve Replacement

1. Follow the steps in [Prepare the Gun for Service, page 38](#).
2. To replace the air exhaust valve:
 - a. Remove the clamp (36) and the exhaust tube (35).
 - b. Unscrew the swivel (21) from the gun handle (16). The swivel is a left-hand thread. Loosen the strain relief nut and move the bracket out of the way.
 - c. Pull the exhaust valve (8) from the handle (16). Inspect the o-ring (8a) and replace if necessary.
 - d. Install the o-ring (8a*) on the exhaust valve (8). Lubricate the o-ring with a light coating of non-silicone grease.
 - e. Install the exhaust valve (8) in the handle (16).
 - f. Apply thread sealant to the top threads of the swivel (21). Position the bracket and screw the swivel into the gun handle (16). Torque to 75–85 in-lb (8.4–9.6 N•m). Tighten the strain relief nut.
 - g. Install the tube (36) and clamp (43).
3. To replace the air inlet swivel:
 - a. Unscrew the swivel (21) from the gun handle (16). The swivel is a left-hand thread.
 - b. Apply thread sealant to the top threads of the swivel. Screw the swivel into the gun handle. Torque to 75–85 in-lb (8.4–9.6 N•m).

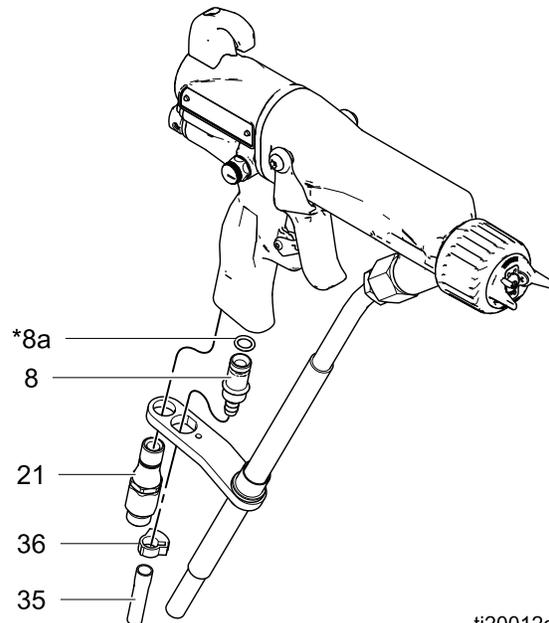


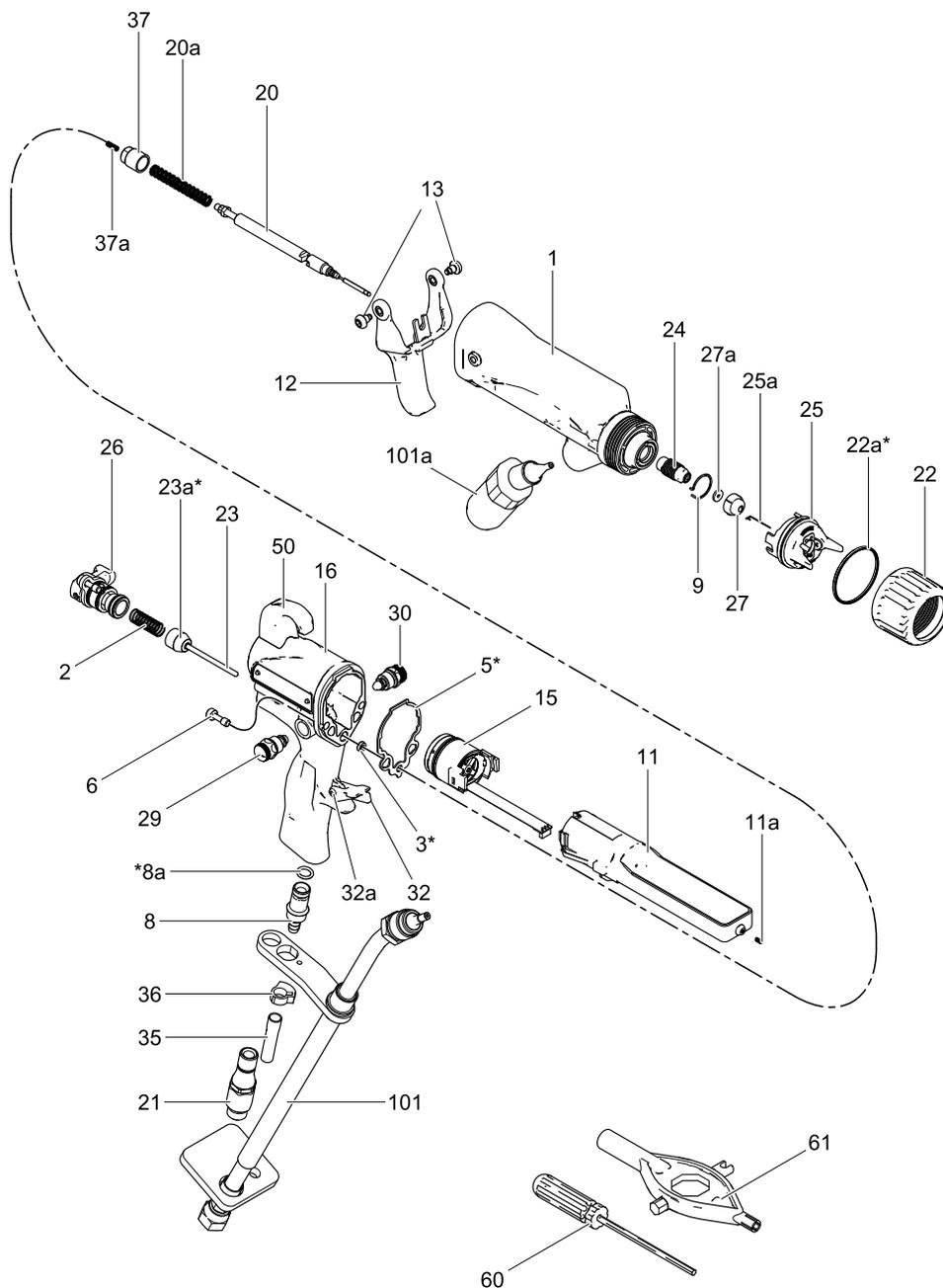
Figure 40 Air Inlet Fitting and Air Exhaust Valve

Parts

Standard Air-Assisted Spray Gun Assembly

Part No. H60T18 60 kV Electrostatic Air-assisted Spray Gun, Series D, includes items 1–61.

Part No. 25R012 Waterborne Fluid Hose (101), sold separately.



ti19996b

Parts

Part No. H60T18 60 kV Electrostatic Air-Assisted Spray Gun, Series D, includes items 1–61.

Part No. 25R012 Waterborne Fluid Hose (101), sold separately.

| Ref. No. | Part No. | Description | Qty |
|----------|------------------|--|-----|
| 1 | 24N745 | BODY, gun | 1 |
| 2 | 185116 | SPRING, compression | 1 |
| 3* | 188749 | PACKING, u-cup | 1 |
| 5* | 25N921 | GASKET, body | 1 |
| 6 | 24N740 | SCREW, hex socket; package of 2 | 1 |
| 7 | 24N742 | BRACKET | 1 |
| 8 | 249323 | VALVE, exhaust | 1 |
| 8a* | 112085 | O-RING | 1 |
| 9 | 24N747 | RING, conductive | 1 |
| 11 | 24N662 | POWER SUPPLY, 60 kV gun | 1 |
| 11a | 24N979 | SPRING | 1 |
| 12 | 24N663 | TRIGGER; includes item 13 | 1 |
| 13 | 24A445 | SCREW, trigger; package of 2 | 1 |
| 15 | 24N664 | See Alternator Assembly, page 53 | 1 |
| 16 | 24P746 | HANDLE; 60 kV AA gun | 1 |
| 20 | 24N781 | NEEDLE ASSEMBLY; includes item 20a | 1 |
| 20a | 24N782 | SPRING, fluid needle | 1 |
| 21 | 24N626 | SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread | 1 |
| 21a | 111710 | O-ring | 1 |
| 22 | 24N793 | RING, retainer; includes 22a | 1 |
| 22a* | 198307 | PACKING, u-cup; UHMWPE; part of 22 | 1 |
| 23 | 24N633 | VALVE, air | 1 |
| 23a* | 276733 | SEAL | 1 |
| 24 | 24N725 | HOUSING, seat | 1 |
| 25 | 24N727 | See Air Cap Assembly, page 56 | 1 |
| 25a | 24N643 | ELECTRODE; package of 5 | 1 |
| 26 | 24N632 | See ES On-Off Valve Assembly, page 54 | 1 |
| 27 | AEMxxx AEFxxx | TIP ASSEMBLY; customer's choice; includes item 27a | 1 |

| Ref. No. | Part No. | Description | Qty |
|-----------------|----------|---|-----|
| 27a | 183459 | GASKET, tip | 1 |
| 29 | 24N792 | ATOMIZING AIR ADJUSTMENT VALVE | 1 |
| 30 | 24N634 | See Fan Air Adjustment Valve Assembly, page 55 | 1 |
| 32 | 24E404 | STOP, trigger; includes item 32a | 1 |
| 32a | — — — | PIN, dowel | 1 |
| 35 | 185103 | TUBE, exhaust; 1/4 in. (6 mm) ID (shipped loose) | 1 |
| 36 | 110231 | CLAMP | 1 |
| 37 | 24N785 | CAP, spring; includes item 37a | 1 |
| 37a | 197624 | SPRING, compression | 1 |
| 38 | 24N786 | PLUG, fan control; option, shipped loose for use in place of item 29 | 1 |
| 50 | 24N783 | HOOK; includes screw | 1 |
| 51 | 112080 | TOOL, needle (shipped loose) | 1 |
| 54 | 24N604 | COVER, gun; package of 10 | 1 |
| 55 [▲] | 222385 | CARD, warning (not shown) | 1 |
| 56 [▲] | 186118 | SIGN, warning (not shown) | 1 |
| 57 | 116553 | GREASE, dielectric; 1 oz (30 ml) tube (not shown) | 1 |
| 58 | 117824 | GLOVE, conductive, medium; package of 12; also available in small (117823) and large (117825) | 1 |
| 60 | 107460 | TOOL, wrench, ball end (shipped loose) | 1 |
| 61 | 276741 | MULTI-TOOL (shipped loose) | 1 |
| 21 | 24N626 | SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread | 1 |
| 101 | 25R012 | HOSE, waterborne fluid; 25 ft., includes 101a | 1 |
| 101a | — — — | CONNECTOR, barrel | 1 |

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

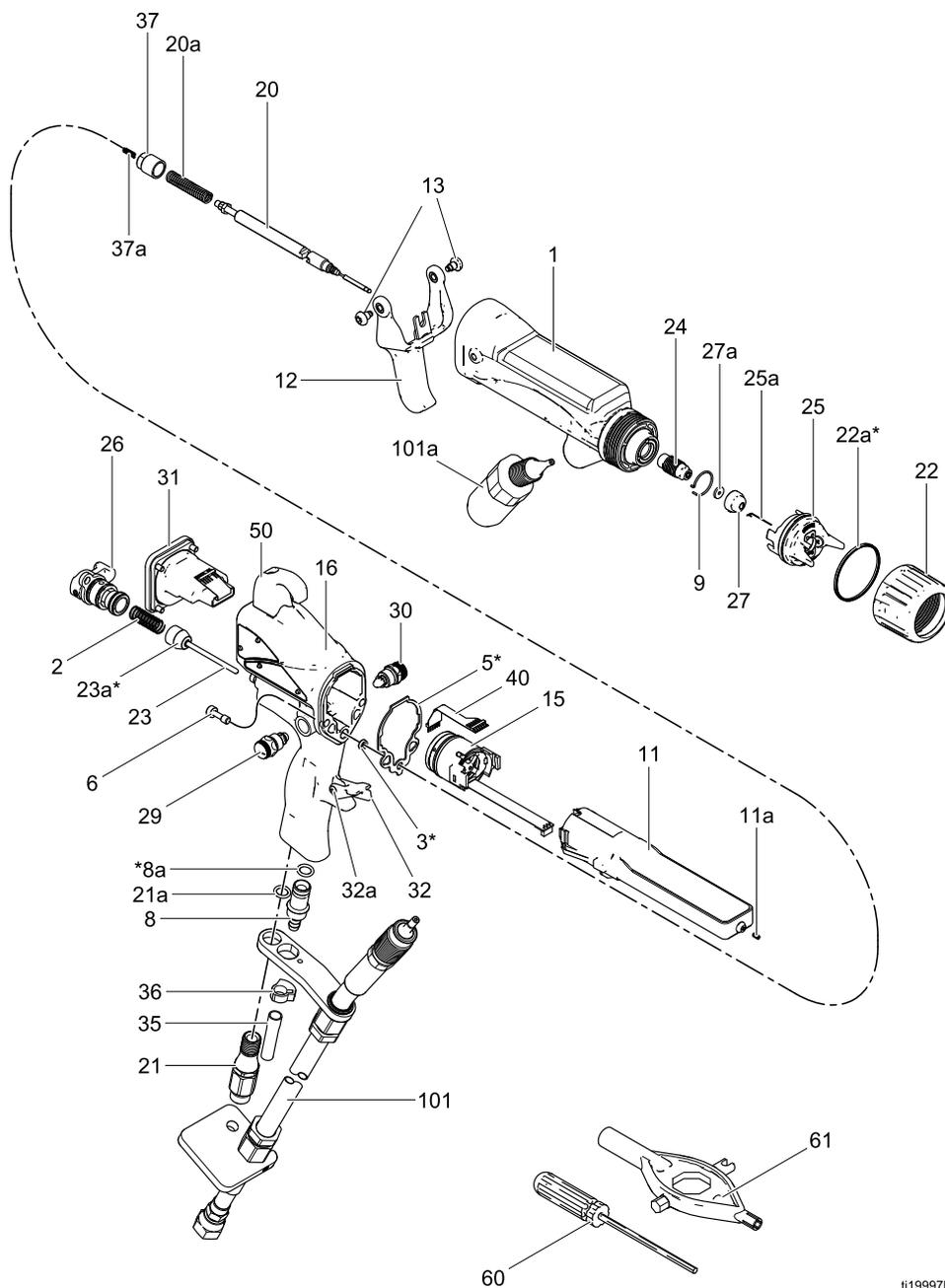
* These parts are included in Air Seal Repair Kit 24N789 (purchase separately).

Parts labeled — — — are not available separately.

Smart Air-Assisted Spray Gun Assembly

Part No. H60M18 60 kV Electrostatic Air-assisted Spray Gun, Series D, includes items 1–61.

Part No. 25R012 Waterborne Fluid Hose (101), sold separately.



ti19997b

Parts

Part No. H60M18 60 kV Electrostatic Air-Assisted Spray Gun, Series D, includes items 1–61.

Part No. 25R012 Waterborne Fluid Hose (101), sold separately.

| Ref. No. | Part No. | Description | Qty |
|----------|------------------|--|-----|
| 1 | 24N745 | BODY, gun | 1 |
| 2 | 185116 | SPRING, compression | 1 |
| 3* | 188749 | PACKING, u-cup | 1 |
| 5* | 25N921 | GASKET, body | 1 |
| 6 | 24N740 | SCREW, hex socket; package of 2 | 1 |
| 7 | 24N742 | BRACKET | 1 |
| 8 | 249323 | VALVE, exhaust | 1 |
| 8a* | 112085 | O-RING | 1 |
| 9 | 24N747 | RING, conductive | 1 |
| 11 | 24N662 | POWER SUPPLY, 60 kV gun | 1 |
| 11a | 24N979 | SPRING | 1 |
| 12 | 24N663 | TRIGGER; includes item 13 | 1 |
| 13 | 24A445 | SCREW, trigger; package of 2 | 1 |
| 15 | 24N664 | See Alternator Assembly, page 53 | 1 |
| 16 | 24P745 | HANDLE, smart; 60 kV AA gun | 1 |
| 20 | 24N781 | NEEDLE ASSEMBLY; includes item 20a | 1 |
| 20a | 24N782 | SPRING, fluid needle | 1 |
| 21 | 24N626 | SWIVEL, air inlet; M12 x 1/4 npsm(m); left-hand thread | 1 |
| 21a | | O-ring | 1 |
| 22 | 24N793 | RING, retainer; includes 22a | 1 |
| 22a* | 198307 | PACKING, u-cup; UHMWPE; part of 22 | 1 |
| 23 | 24N633 | VALVE, air | 1 |
| 23a* | 276733 | SEAL | 1 |
| 24 | 24N725 | HOUSING, seat | 1 |
| 25 | 24N727 | See Air Cap Assembly, page 56 | 1 |
| 25a | 24N643 | ELECTRODE; package of 5 | 1 |
| 26 | 24N632 | See ES On-Off Valve Assembly, page 54 | 1 |
| 27 | AEMxxx AEFxxx | TIP ASSEMBLY; customer's choice; includes item 27a | 1 |

| Ref. No. | Part No. | Description | Qty |
|----------|----------|---|-----|
| 27a | 183459 | GASKET, tip | 1 |
| 29 | 24N792 | ATOMIZING AIR ADJUSTMENT VALVE | 1 |
| 30 | 24N634 | See Fan Air Adjustment Valve Assembly, page 55 | 1 |
| 31 | 24N756 | See Smart Module Assembly, page 56 | 1 |
| 32 | 24E404 | STOP, trigger; includes item 32a | 1 |
| 32a | — — — | PIN, dowel | 1 |
| 35 | 185103 | TUBE, exhaust; 1/4 in. (6 mm) ID (shipped loose) | 1 |
| 36 | 110231 | CLAMP | 1 |
| 37 | 24N785 | CAP, spring; includes item 37a | 1 |
| 37a | 197624 | SPRING, compression | 1 |
| 38 | 24N786 | PLUG, fan control; option, shipped loose for use in place of item 29 | 1 |
| 40 | 245265 | CIRCUIT, flexible | 1 |
| 50 | 24N783 | HOOK; includes screw | 1 |
| 51 | 112080 | TOOL, needle (shipped loose) | 1 |
| 54 | 24N604 | COVER, gun; package of 10 | 1 |
| 55▲ | 222385 | CARD, warning (not shown) | 1 |
| 56▲ | 186118 | SIGN, warning (not shown) | 1 |
| 57 | 116553 | GREASE, dielectric; 1 oz (30 ml) tube (not shown) | 1 |
| 58 | 117824 | GLOVE, conductive, medium; package of 12; also available in small (117823) and large (117825) | 1 |
| 60 | 107460 | TOOL, wrench, ball end (shipped loose) | 1 |
| 61 | 276741 | MULTI-TOOL (shipped loose) | 1 |
| 101 | 25R012 | HOSE, waterborne fluid; 25 ft., includes 101a Hoses, page 60. | 1 |
| 101a | — — — | CONNECTOR, barrel | 1 |

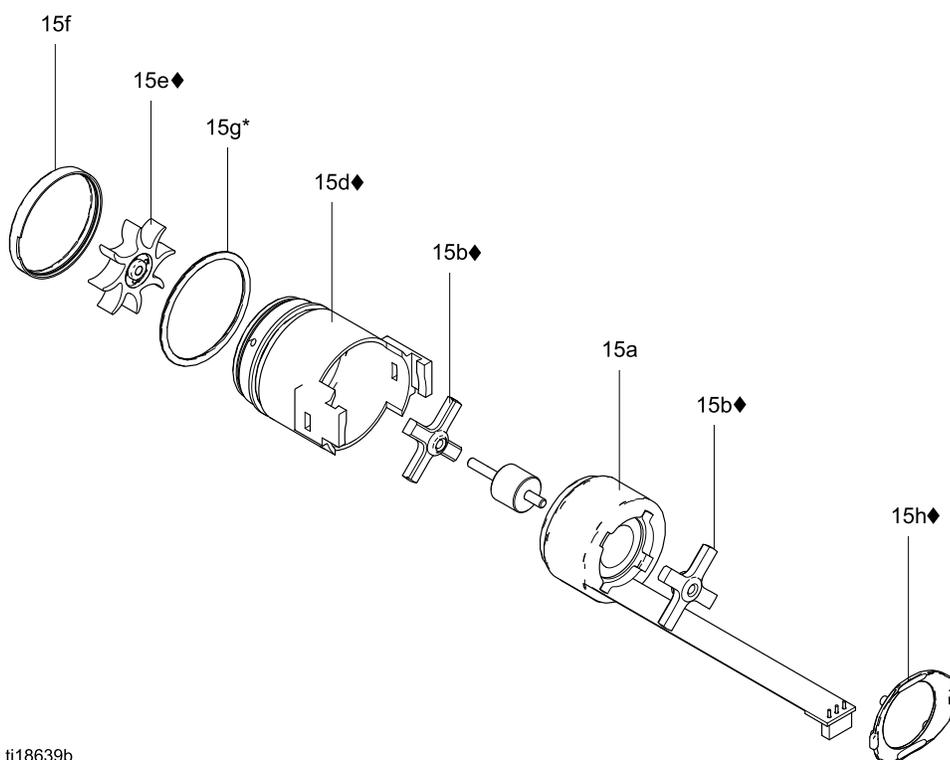
▲ Replacement Safety labels, tags, and cards are available at no cost.

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

Parts labeled — — — are not available separately.

Alternator Assembly

Part No. 24N664 Alternator Assembly



ti18639b

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

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

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

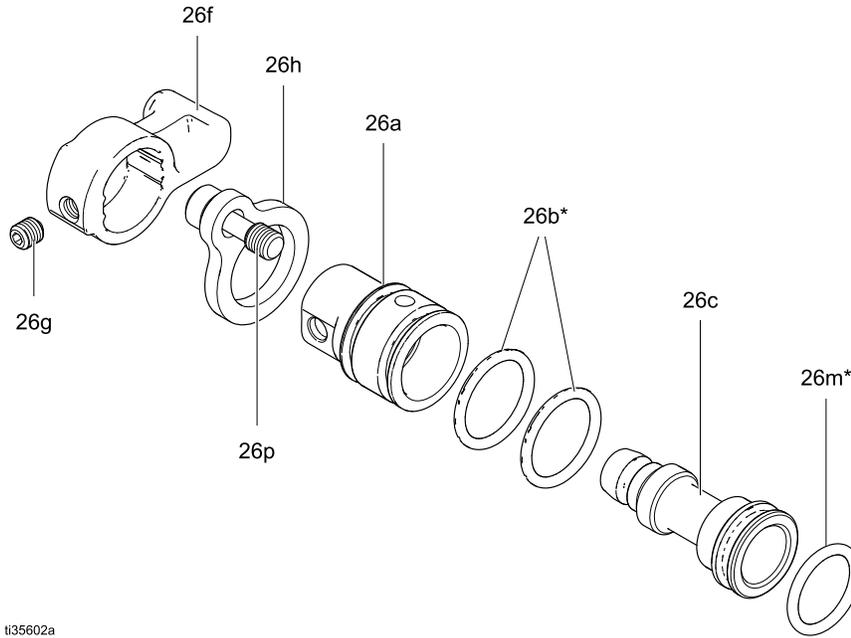
◆ These parts are included in Bearing Kit 24N706 (purchase separately).

Parts labeled — — — are not available separately.

ES On-Off Valve Assembly

Part No. 24N632 ES On-Off Valve Assembly

Part No. 26A294 ES On-Off Valve with Air Restrictor Assembly



ti35602a

| Ref. No. | Part No. | Description | Qty |
|----------|----------|----------------------------------|-----|
| 26a | — — — | HOUSING, valve | 1 |
| 26b* | 15D371 | O-RING | 2 |
| 26c | — — — | PISTON, valve | 1 |
| 26f | 24N650 | LEVER, ES on-off; for kit 24N632 | 1 |
| | 278481 | LEVER, ES on-off; for kit 26A294 | 1 |
| 26g | — — — | SCREW, set, socket head | 1 |

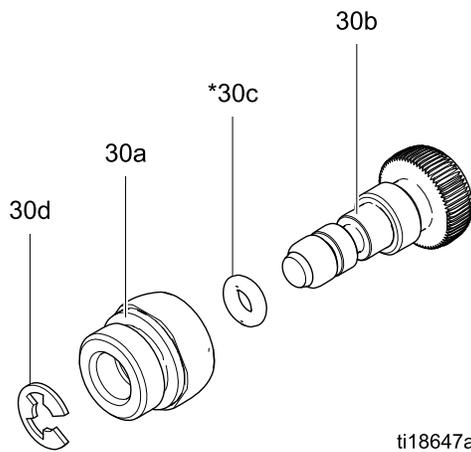
| Ref. No. | Part No. | Description | Qty |
|----------|------------|---|-----|
| 26h | 24N631 | PLATE, retaining; for kit 24N632 | 1 |
| | 16J578 | PLATE, retaining; for kit 26A294 | |
| 26m* | 113746 | O-RING | 1 |
| 26p | 24N740 | SCREW, captive; pack of 2; for kit 24N632 | 1 |
| | GC208 1 | SCREW, captive; pack of 2; for kit 26A294 | 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 Valve Adjustment Assembly



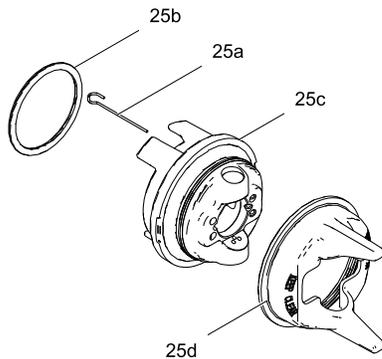
| Ref. No. | Part No. | Description | Qty |
|----------|----------|-------------------------------|-----|
| 30a | — — — | NUT, valve | 1 |
| 30b | — — — | STEM, valve | 1 |
| 30c* | 111504 | O-RING | 1 |
| 30d | 24N646 | RING, retaining; package of 6 | 1 |

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

Parts labeled — — — are not available separately.

Air Cap Assembly

Part No. 24N727 Air Cap Assembly



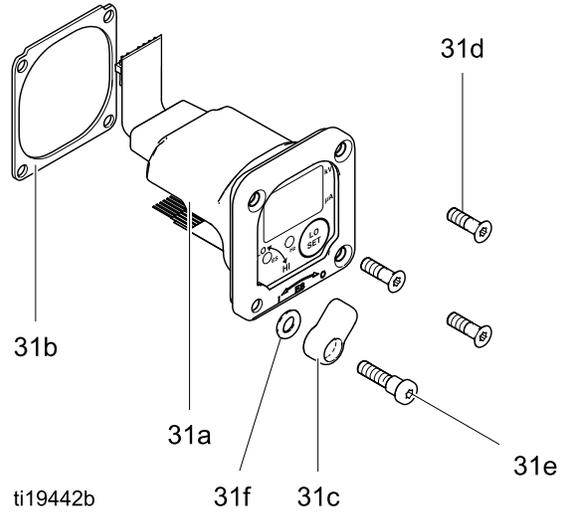
ti18652a

| Ref. No. | Part No. | Description | Qty |
|----------|----------|--|-----|
| 25a | 24N643 | ELECTRODE; package of 5 | 1 |
| 25b | 24N734 | O-RING; ptfе; package of 5 (also available in package of 10; order 24E459) | 1 |
| 25c | — — — | AIR CAP | 1 |
| 25d | 24N726 | GUARD, tip, orange | 1 |

Parts labeled — — — are not available separately.

Smart Module Assembly

Part No. 24N756 Smart Module Assembly



ti19442b

| 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).

Spray Tip Selection Chart

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) |
| 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 shear 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 |
| 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. |

Round Spray Accessories

| Part No. | Description |
|----------|--|
| 24N319 | Round Spray Kit. To convert a standard air-assisted spray gun to a round spray air cap. See manual 3A2499. |

Trigger and Grip Accessories

| Part No. | Description |
|----------|---|
| 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. |
| 24N633 | Plastic Trigger Kit (included in gun models) |
| 24P170 | Metal Trigger Kit |

Fan Valve Accessories

| Part No. | Description |
|----------|------------------------------------|
| 24N634 | Fan Valve (included in gun models) |

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 Valve Accessories

| Part No. | Description |
|----------|--|
| 24N632 | ES On-Off Valve (included in H60M10, H60T10, H85M10, H85T10) |
| 26A294 | ES On/Off Valve with Air Restrictor for high atomization 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. |

Operator Accessories

| Part No. | Description |
|----------|---------------------------------------|
| 117823 | Conductive Gloves, box of 12 (small) |
| 117824 | Conductive Gloves, box of 12 (medium) |
| 117825 | Conductive Gloves, box of 12 (large) |

System Accessories

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

Signs

| Part No. | Description |
|----------|---|
| 16P802 | English Warning Sign, available at no charge from Graco |
| 16P800 | English Daily Care Sign |
| 16P801 | English Setup Sign |

Test Equipment

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

Hoses

Grounded Air Hoses

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

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

| Part No. | Description |
|---|-----------------|
| 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) |

Waterborne Fluid Hoses

3000 psi (20.7 MPa, 206.8 bar) Maximum Working Pressure

.16 in (4mm) ID

| Part No. | Description |
|----------|-----------------|
| 25R012 | 25 ft (7.6 m) |
| 25R013 | 36 ft (11 m) |
| 25R014 | 50 ft (15 m) |
| 25R015 | 75 ft (23 m) |
| 25R016 | 100 ft (30.5 m) |

Ignitability of Coating Materials

Per EN 50059

From the Physikalisch-Technische Bundesanstalt, Braunschweig, Germany, June 26, 2019.

General

The fire and explosion protection of spraying systems can be facilitated considerably when processing coating materials with a low portion of solvents and a high flash point (generally water-based paints), provided that the spray cloud of the coating materials are considered to be non-ignitable. Substantial research has shown that the ignitability of spray clouds depends on the composition of the coating materials made mainly of water, solvents, and solids. The following classification has been established:

Non-ignitable coating materials

Coating materials of this group have the following composition:

$$[\% \text{H}_2\text{O}] > 1,70 + [\% \text{LM}] + 0,96 \times [\% \text{ORG}], \text{ (all in \% by weight)}$$

where

H₂O: water;

LM: the entire liquid phase, including liquids with flash points above 60 °C and those liquids **not** listed in the safety data sheet, in which case the entire liquid phase is ignitable in the sprayed state;

ORG: solid phase which is ignitable in the sprayed state (ignitable inorganic or ignitable organic solids) including the solids which have an ignitable inorganic or ignitable organic coating.

Non-ignitable coating materials act like water in the liquid phase and in the sprayed state. If the rinsing and thinner liquids correspond to this category, too, no explosion protection is necessary. Coating materials of this group are classified as being non-ignitable liquid coating material.

A fire extinguishing equipment is not required for spraying systems processing coating materials which are classified to be non-ignitable. However, this does not affect the fire protection as a whole. Even these coating materials may resume ignitability after being partially dried. Moreover, water-based coating materials will burn when strongly exposed to a fire which had been initiated by other sources, and thus present a certain fire load.

Dimensions

ti19533a

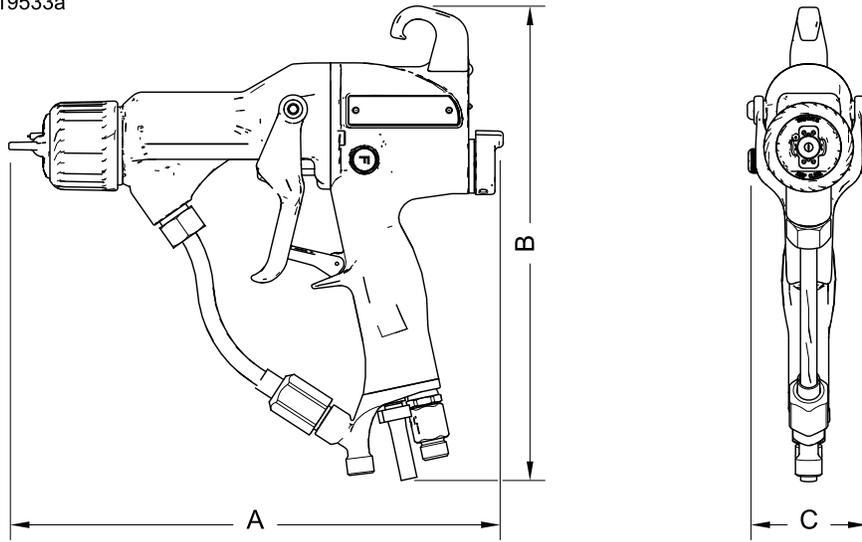


Figure 41

| Gun Model | A, in. (mm) | B, in. (mm) | C, in. (mm) | Weight without bracket, oz (g) |
|-----------|-------------|-------------|-------------|--------------------------------|
| H60T18 | 10.7 (272) | 8.9 (226) | 2.4 (61) | 22.0 (623) |
| H60M18 | 10.8 (274) | 9.6 (244) | 2.4 (61) | 24.4 (692) |

Technical Specifications

| Electrostatic Air-Assisted Spray Waterborne Guns | | |
|---|--|--|
| | U.S. | Metric |
| Maximum Working Fluid Pressure | 3000 psi | 21 MPa, 210 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 Range of total air flow under normal spraying conditions | 6 scfm 7.5–14 scfm | 170 l/min 220–400 l/min |
| Maximum Fluid Operating Temperature | 120°F | 48°C |
| Short Circuit Current Output | 125 microamperes | |
| Voltage Output | H60T18: 60 kV H60M18: 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 | |
| Wetted Parts | Stainless Steel, PEEK, UHMWPE, Fluoroelastomer, Acetal, Nylon, Polyethylene, Tungsten Wire Waterborne Fluid Hose: FEP | |
| Fluid Hose | Ø .16 in (4 mm) I.D., 100 ft. maximum | |

California Proposition 65

CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm — www.P65warnings.ca.gov.

Graco Pro Xp Warranty

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

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

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

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

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

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

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To place an order, contact your Graco Distributor or call to identify the nearest distributor.

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Original Instructions. This manual contains English, MM 3A7503

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