

# Encore<sup>®</sup> Manual Porcelain Enamel Powder Spray Systems

Customer Product Manual

Part 1604193-03

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# Section 1

## Safety

### Introduction

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to all persons operating or servicing equipment.

### Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

### Intended Use

Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

### Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

All phases of equipment installation must comply with all federal, state, and local codes.

## Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- Obtain and read Safety Data Sheets (SDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

## Fire Safety

To avoid a fire or explosion, follow these instructions.

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material SDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

## Grounding



**WARNING:** Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program. If you receive even a slight electrical shock or notice static sparking or arcing, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.

Grounding inside and around the booth openings must comply with NFPA requirements for Class II, Division 1 or 2 Hazardous Locations. Refer to NFPA 33, NFPA 70 (NEC articles 500, 502, and 516), and NFPA 77, latest conditions.

- All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 megohm as measured with an instrument that applies at least 500 volts to the circuit being evaluated.
- Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator platforms, hoppers, photoeye supports, and blow-off nozzles. Personnel working in the spray area must be grounded.
- There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as an operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.
- Operators must maintain skin-to-handle contact between their hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If gloves must be worn, cut away the palm or fingers, wear electrically conductive gloves, or wear a grounding strap connected to the gun handle or other true earth ground.
- Shut off electrostatic power supplies and ground gun electrodes before making adjustments or cleaning powder spray guns.
- Connect all disconnected equipment, ground cables, and wires after servicing equipment.

## Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out electrical power. Close pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the equipment.

## Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

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## Section 2

# Description

## Introduction

See Figure 2-1. This manual covers all versions of the Encore PE Manual Powder Spray System:

- Mobile system with feed hopper
- Rail-mount system



Figure 2-1 Encore PE Manual Powder Systems

## Mobile System Components

Mobile systems include:

- Encore LT manual controller
- Encore PE manual spray gun
- Encore PE powder feed pump
- 50-lb Encore round feed hopper with PE pump mount assembly
- 1/2 in. powder hose, air tubing, spiral wrap, and Velcro straps

The components are mounted on a sturdy two-wheeled dolly.

## Rail-Mount System Components

Rail-mount systems include:

- Encore LT manual controller
- Encore PE manual spray gun
- Encore PE powder feed pump
- PE pump mount assembly for use with feed hoppers
- Rail-mount bracket kit
- Grounding kit
- 1/2 in. powder hose, air tubing, spiral wrap, and Velcro straps
- Air filter kit

## Specifications

Model	Input Rating	Output Rating
ENCORE Applicator	+/- 19 VAC, 1 A	100 KV, 100 $\mu$ A
ENCORE Controller	100–250 VAC, 50/60 Hz	N/A

- Input Air: 4.0–7.6 bar (58–110 psi), <5 $\mu$  particulates, dew point <10 °C (50 °F)

- Max Relative Humidity: 95% non-Condensing
- Ambient Temperature Rating: +15 to +40 °C (59–104 °F)
- Dust Ingress Protection: IP6X

This applicator and controller are used with Porcelain Enamel powders which are non-flammable.

## Mobile System with 50Lb. Feed Hopper

Height:	995 mm (35.2 in.)
Length:	812 mm (32 in.)
Wheel Base:	598.5 mm (23.5 in.)
Weight:	51.5 kg (114 lbs)



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## Section 3

# System Setup

### Controller Rail Mounting

See Figure 2-1. Rail mount systems are shipped with a bracket kit, small parts tray kit, and bus-bar grounding kit.

1. Install the controller bracket (1) on the bottom of the controller with four M5 x 12 black pan head screws (2) and one #10 dished lock washer (9).
2. Install the controller bracket (1) on the rail bracket (5) with two M8 split lock washers (7) and two M8 x 70 hex head cap screws (8).
3. Thread the two M8 jam nuts (4) onto the two M8 x 40 screws (3), then thread the two screws into the holes in the rail bracket.

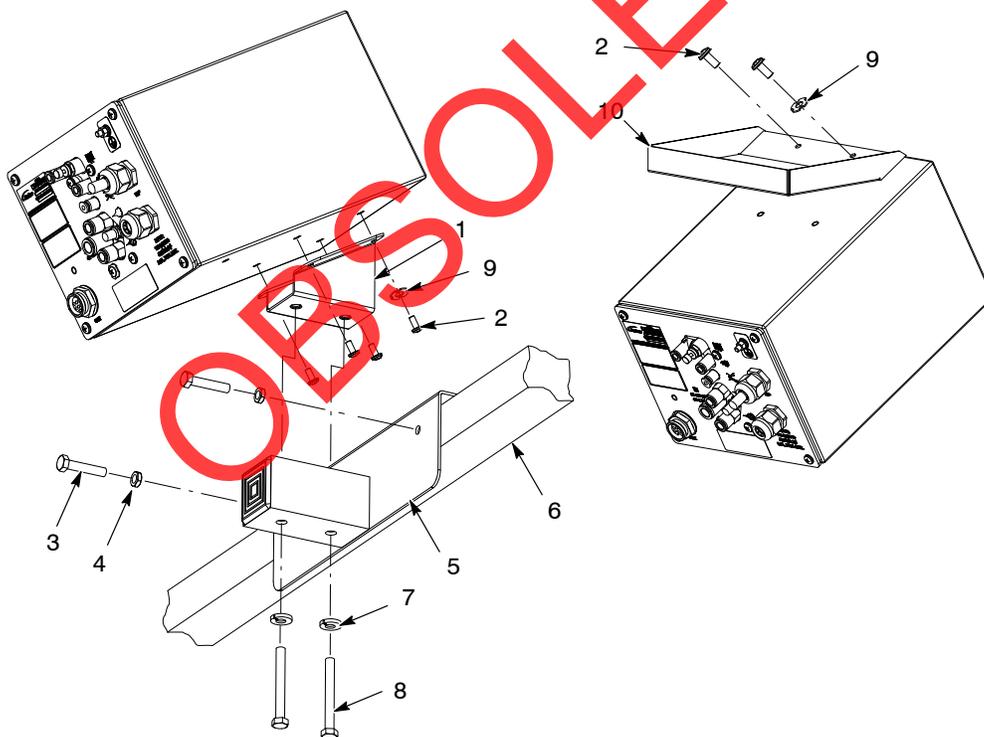


Figure 3-1 Rail Mount Kit and Parts Tray Installation

- |                       |                    |                           |
|-----------------------|--------------------|---------------------------|
| 1. Controller bracket | 5. Rail bracket    | 8. M8 x 70 screws         |
| 2. M5 x 12 screws     | 6. Rail            | 9. #10 dished lock washer |
| 3. M8 x 40 screws     | 7. M8 lock washers | 10. Parts tray            |
| 4. M8 jam nuts        |                    |                           |

## Controller Rail Mounting *(contd)*

4. Install the rail bracket over the operator platform railing (6), tighten the screws (3) against the rail, then tighten the jam nuts (4) up against the rail bracket to prevent the screws from loosening.
5. Install the parts tray (10) in the front two holes on top of the controller using two of the M5 screws (2) in the controller top, and one #10 dished lock washer (9) included in the kit.
6. Use the bus-bar grounding kit to connect the controller ground stud to the booth base, as described in the grounding kit instructions.

## System Connections

### System Diagram



**WARNING:** This diagram does not show all system grounds. All conductive equipment in the spray area must be connected to a true earth ground.

**NOTE:** The input air filter shown in this diagram is mounted behind the front panel of mobile system dollies. For rail-mount systems, the filter and mounting bracket are shipped in a kit for mounting at the customer's plant.

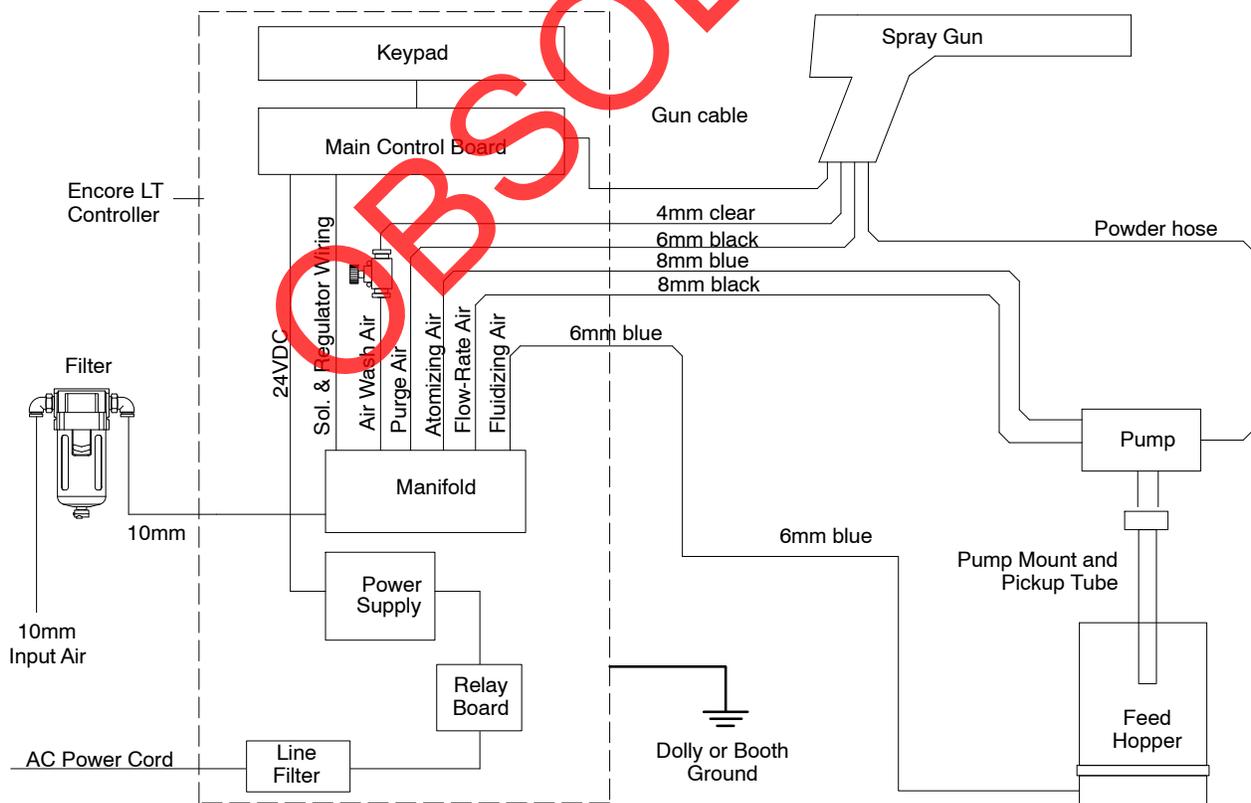


Figure 3-2 Encore PE Manual Powder System Block Diagram

# System Setup and Connections

## Controller Connections Overview

The rear panel of the controller provides connections for power, ground, gun, pump, and feed hopper fluidizing air.

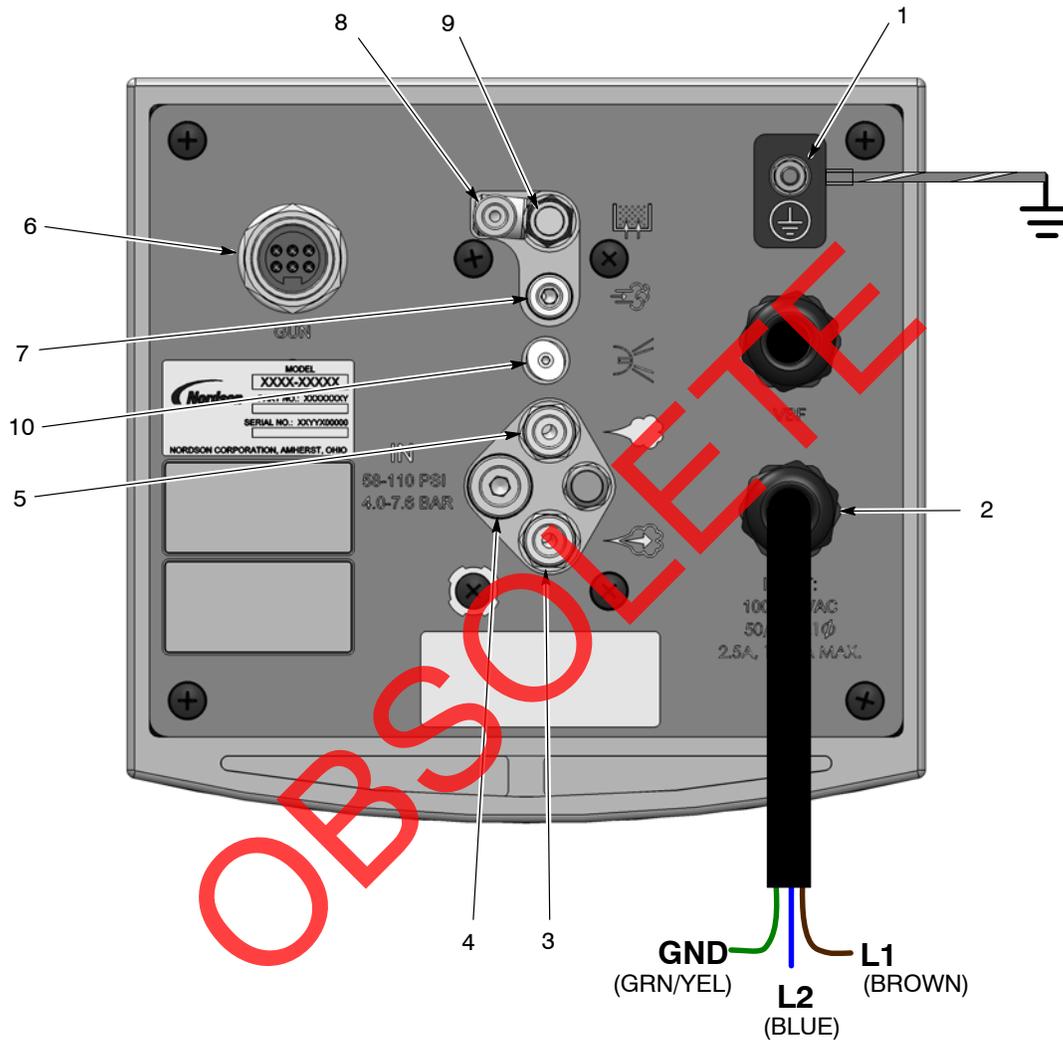


Figure 3-3 Encore LT Gun Controller Connections

- |  |                                |  |
|--|--------------------------------|--|
| 1. Electrostatic ground (to cart or booth) | 5. Flow air (black, 8mm, pump) | 8. Fluidizing air (blue, 6mm)            |
| 2. Power cord (15ft)                       | 6. Gun cable                   | 9. Fluidizing air needle valve           |
| 3. Atomizing air (blue, 8mm, pump)         | 7. Purge air (black, 6mm, gun) | 10. Electrode air wash (clear, 4mm, gun) |
| 4. Air supply (blue, 10mm)                 |                                |  |

## Spray Gun Connections

Unpack the spray gun. Uncoil the cable, the 4-mm clear and 6-mm black air tubing, and the 1/2 in. powder hose. Make the following connections:

### Gun Cable

See Figure 2-4.

1. Connect the gun cable to the GUN receptacle on the rear panel of the controller. The cable plug and receptacle are keyed.
2. Thread the cable nut onto the receptacle and tighten the nut securely.
3. Secure the cable strain relief to the rear panel with one of the existing panel screws.

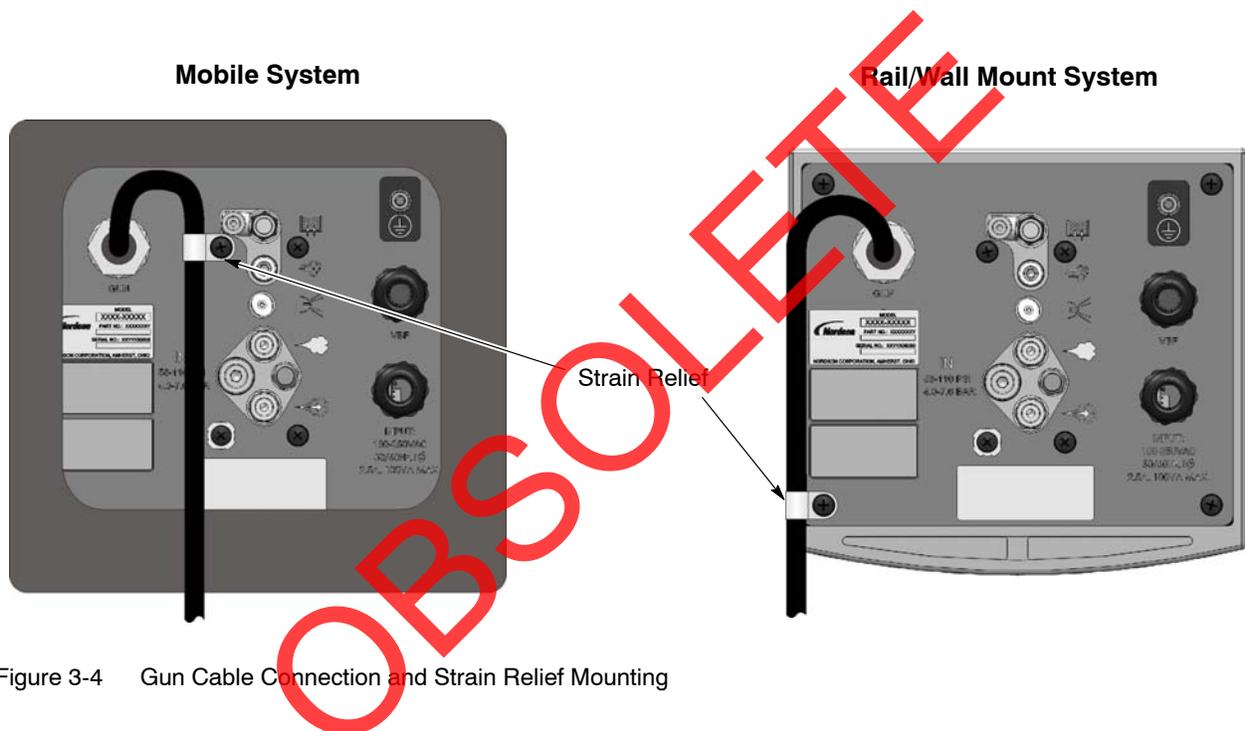


Figure 3-4 Gun Cable Connection and Strain Relief Mounting

## Air Tubing and Powder Hose

1. See Figure 2-5. Connect the 6-mm black air tubing to the quick-disconnect fitting in the gun handle.
2. Connect the 4-mm clear electrode air wash tubing to the barbed fitting in the gun handle.

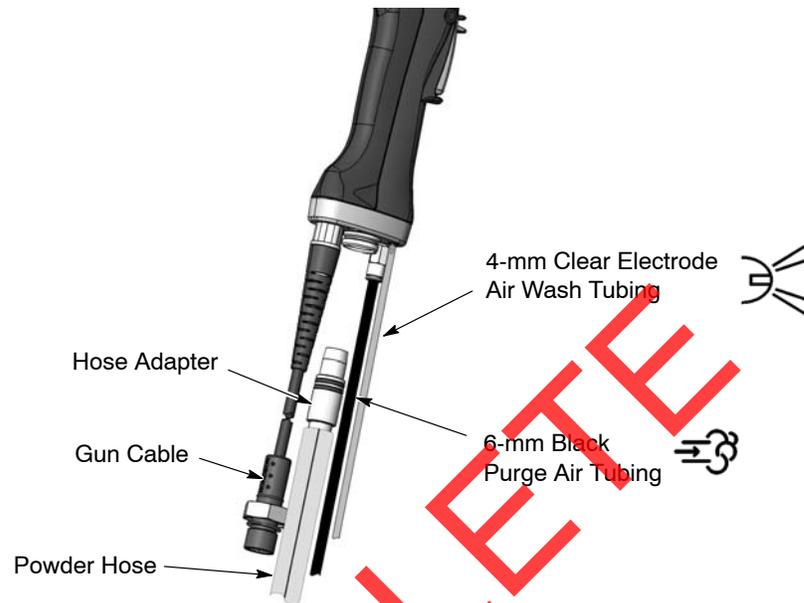


Figure 3-5 Gun Connections

3. Connect the powder hose to the hose adapter, then plug the hose adapter into the handle.
4. Route the air tubing to the rear panel of the gun controller.
5. See Figure 2-3. Connect the 6-mm black tubing to the purge air quick-disconnect fitting (8).
6. See Figure 2-6. Connect the 4-mm clear tubing and the flow control valve supplied with the system to the air wash connector on the rear panel as shown. The flow control valve can be located anywhere desired. Use a tubing cutter to make sure the tube ends are square.

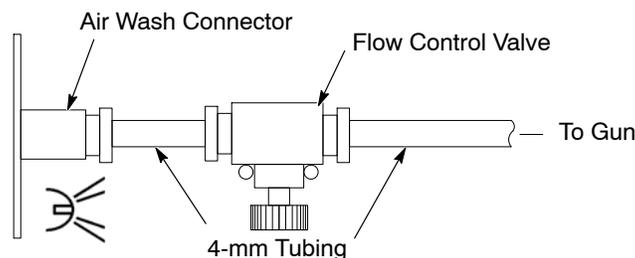


Figure 3-6 Flow Control Valve and Air Wash Tubing Connection

## Pump and Hopper Connections

This procedure applies to mobile systems and rail mount systems supplied with powder from a feed hopper.

1. Unclamp the hopper lid and take out the vent hose and hose clamps. Leave the lid off.
2. Unpack the pump mount assembly, pump, powder hose (1/2 in. ID clear tubing), black and blue air tubing, clamps, and Velcro straps shipped with the system.
3. See Figure 2-3. Plug the following into the controller:
  - 8-mm blue atomizing air tubing (3)
  - 8-mm black flow air tubing (5)
  - 6-mm blue fluidizing air tubing (8)
4. **Mobile systems:** See Figure 2-7.
  - a. Route the atomizing air (4) and flow air tubing (6) through the grommet (12) on the front panel of the cart tower.
  - b. Route the fluidizing air (8) tubing through the tower and out the bottom front.
  - c. Install the hopper on the cart platform, in between the retainer tabs.
5. **All systems:** See Figure 2-7. Install the pump (7) into the pump mount (5) with a slight twisting motion.
6. Connect the black 8-mm flow air tubing to the center fitting (F) on the pump. Connect the blue 8-mm atomizing air tubing to the upper fitting (A) on the pump.

**NOTE:** The pump is equipped with quick-connect couplings that allow you to quickly disconnect the air tubing when cleaning or repairing the pump. Pull back on the knurled coupling rings to uncouple them.
7. Connect the 10-mm x 6-mm reducer (10) to the 10-mm elbow fitting on the hopper fluidizing drum. Connect the fluidizing air tubing (8) to the reducer.
8. Connect the ring-tong terminal on the green/yellow ground wire (9) to the ground stud on the side of the fluidizing pan, then either plug the ground wire into the grounding socket on the cart base, or connect it to a true earth ground.
9. Install a hose clamp (3) over the end of the vent hose (1) and connect the hose to the vent stack on the lid. Tighten the clamp to secure the hose. Route the other end of the vent hose into the spray booth.
10. Refer to *Connecting the Powder Hose to the Pump* on page 3-8 for instructions.

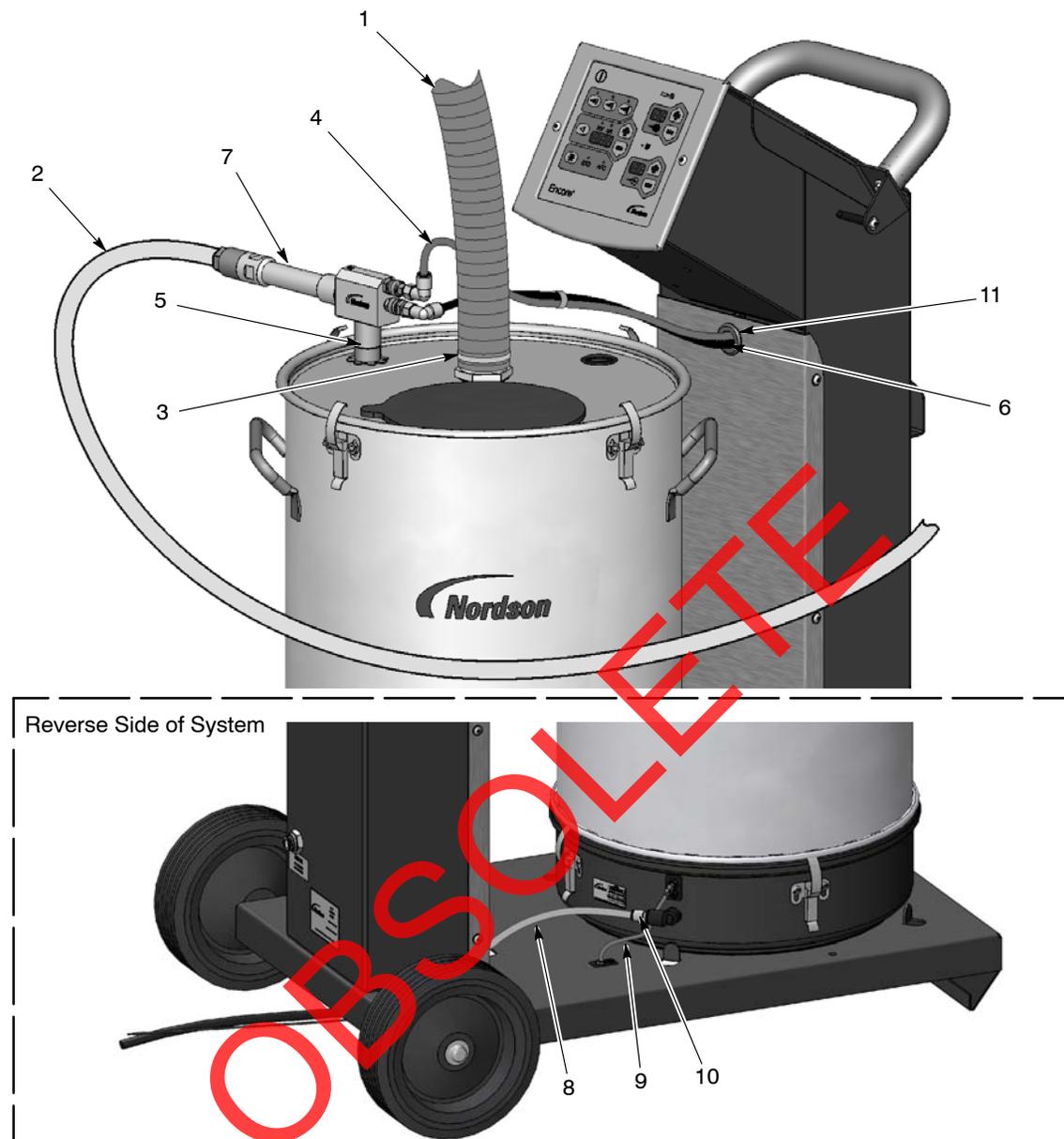


Figure 3-7 Encore PE Mobile System with Hopper – Hopper and Pump Installation

- |                              |                               |                               |
|------------------------------|-------------------------------|-------------------------------|
| 1. Vent hose                 | 5. Pump mount                 | 9. Ground wire                |
| 2. Powder hose               | 6. Black flow air tubing      | 10. 10 x 6 mm reducer fitting |
| 3. Vent hose clamp           | 7. Pump                       | 11. Grommet                   |
| 4. Blue atomizing air tubing | 8. Blue fluidizing air tubing |                               |

## Connecting the Powder Hose to the Pump

1. Remove the nut (4) and sleeve (3) from the throat holder (2). Slide them both over the end of the powder hose (1). Make sure the end of the powder hose is cut straight.
2. Insert the powder hose into the throat holder until it bottoms out on the ceramic sleeve inside the holder.
3. While holding the hose in place, slide the sleeve and nut down the hose and start threading the nut onto the throat holder.
4. Use a 12-point 15/16 in. flare nut wrench to tighten the nut until it bottoms out against the throat holder. Refer to *Optional Tools* for the wrench part number.

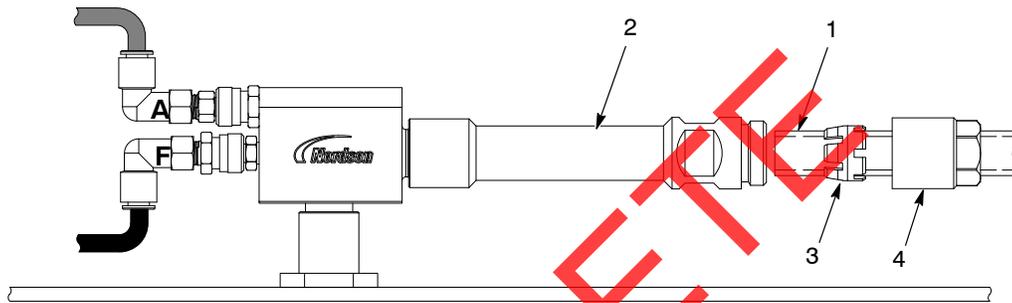


Figure 3-8 Connecting the Powder Hose to the Pump

- |                  |           |        |
|------------------|-----------|--------|
| 1. Powder hose   | 3. Sleeve | 4. Nut |
| 2. Throat holder |           |        |

## Bundling Tubing and Cable

Use the sections of black spiral-cut tubing supplied with the system to bundle together the spray gun cable, air tubing, and powder hose. Coil the bundled tubing and cable and hang the coil on the hook at the back of the cart tower.

## System Air Connections

### System Air Supply

Compressed air should be supplied from an air drop equipped with a self-relieving shutoff valve. The air must be clean and dry. A refrigerant or desiccant-type air drier and air filters are recommended.

All systems are shipped with a 0.3-micron air filter. It is important that the filter be used to prevent contamination of the system pneumatic components and the powder supply.

Supply air pressure should be 4.0–7.6 bar (58–110 psi).

To provide air to your system, an input air kit with connectors, couplings, and 10-mm air tubing (15-ft for dolly systems, 25-ft for rail mount systems) is available.

Refer to the *Parts* section for filter kits, replacement elements, and input air kit part numbers and ordering information.

## Mobile Systems

Connect 10-mm air tubing from your compressed air supply to the air input fitting on the rear panel of the dolly.

## Rail Mount Systems

See Figure 2-9.

1. Use the mounting bracket (4) as a template to mark and drill mounting holes in the selected mounting surface. Make sure there is sufficient clearance to connect air tubing and change the filter element.
2. Install the two male connectors (2) included in the kit in the filter input and output ports.
3. Install the mounting bracket on the filter, using the included M5 screws (3), on the side of the filter opposite the release latch (6).
4. Mount the filter with customer-supplied fasteners (7).
5. Note the orientation of the flow indicator (5) on the top of the filter. Cut 10-mm blue air tubing to the required lengths to connect the air supply to the filter and the filter to the controller, then connect the tubing.

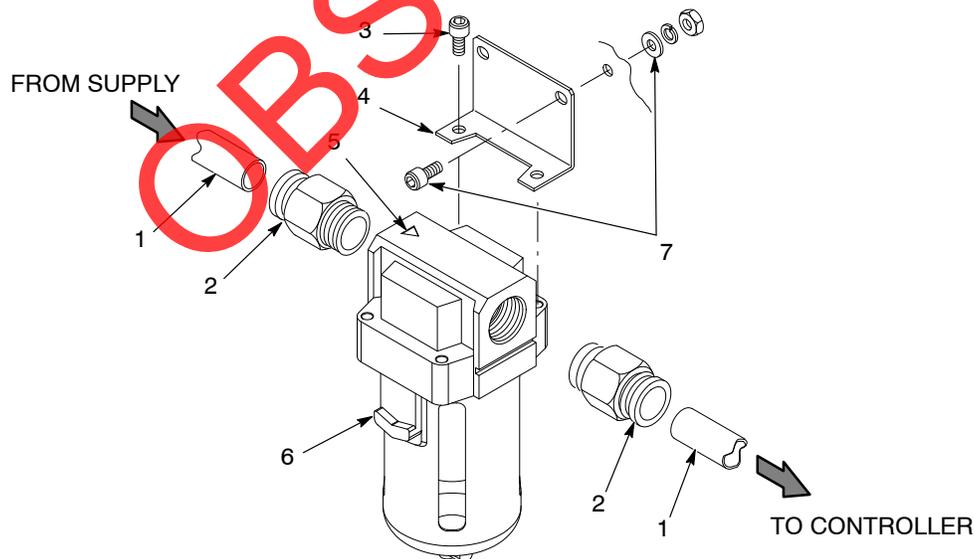


Figure 3-9 Air Filter Installation – Wall and Rail Mount Systems

- |                                     |                   |                                |
|-------------------------------------|-------------------|--------------------------------|
| 1. 10-mm air tubing (blue)          | 4. Bracket        | 6. Release latch               |
| 2. 10-mm tube x 1/2 male connectors | 5. Flow indicator | 7. Customer-supplied fasteners |
| 3. M5 screws                        |                   |                                |

# System Electrical Connections

## Power Supply

The spray gun controller is rated for 100–240 Vac at 50/60 Hz, single phase, and is marked as such.

Wire the system power cord to a customer-supplied three-prong plug. Connect the plug to a receptacle that supplies the correct voltage.

Wire Color	Function
Blue	N (neutral)
Brown	L (hot)
Green/Yellow	GND (ground)

## System Ground

**Mobile Systems:** See Figure 2-10. Connect the ground cable attached to the controller ground stud to a true earth ground.

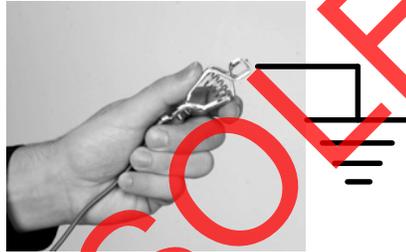


Figure 3-10 System Ground Connection

**Rail Mount Systems:** Locate the ESD grounding block kit. Follow the kit instructions to install the grounding block to the grounded spray booth base. Connect the flat braided ground cable from the controller ground stud to the grounding block.

# Controller Configuration

## Power Up Sequence

When power is applied to the system, the controller goes through the following sequence:

1. All displays and LEDs light for 3 seconds.
2. The main control board configuration is displayed on the KV/ $\mu$ A panel:  
**A:** Auto (refer to troubleshooting to change the jumper if A is displayed)  
**H:** Manual
3. The controller software and hardware version are displayed on the KV/ $\mu$ A panel in the form **N.NN** for 1 second.

**NOTE:** If the spray gun is triggered on during power-up or wake up from disable, the trigger LED blinks at a fast rate. Release the trigger and repeat the sleep/wake up cycle.

## Entering Configuration Mode

To enter configuration mode:

- Controller Power OFF – Press and hold the Plus and Minus buttons on the kV/uA panel while turning on power.
- Controller Power ON – Press and hold the Plus and Minus buttons while pressing the Enable/Disable button.

After 1 second all panels flash **CF** for 3 seconds. After 3 seconds the kV/uA panel displays **F – 1** for function 1. The controller is now in configuration mode.

To save your settings and exit Configuration Mode, press the Enable/Disable button.

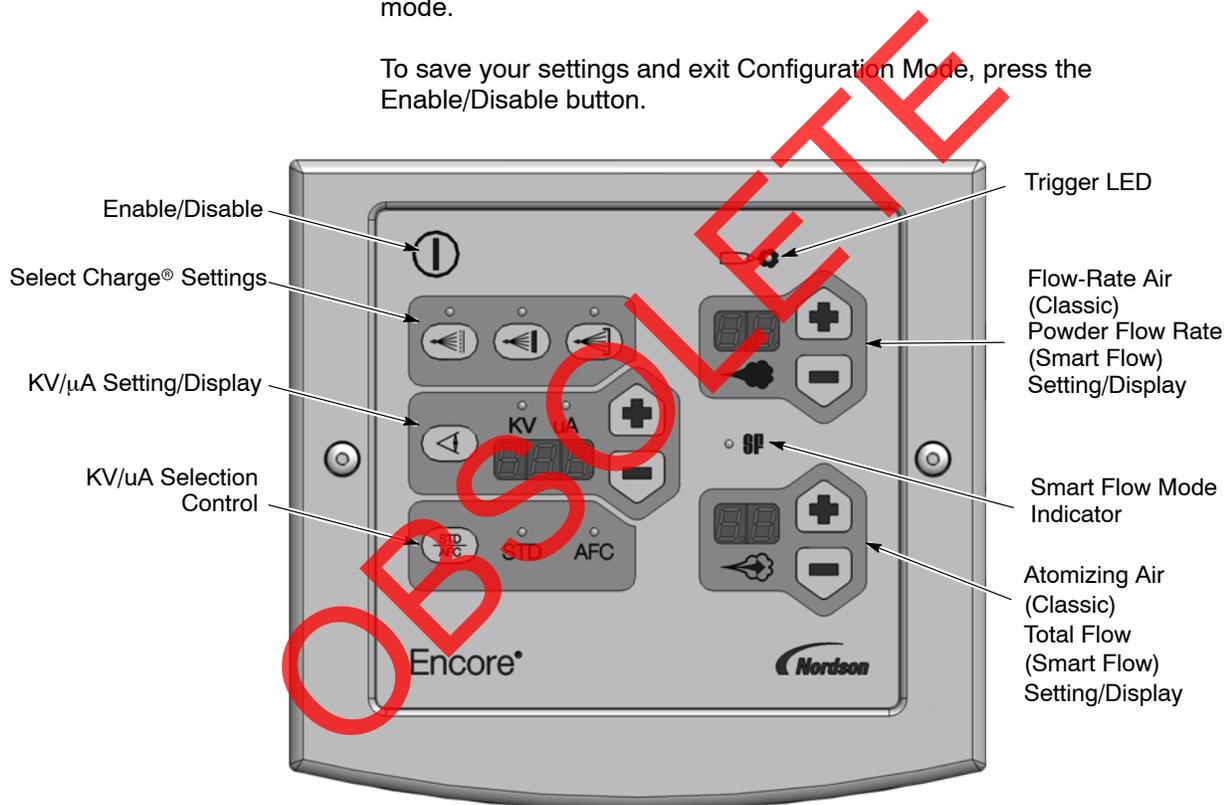


Figure 3-11 Controller Interface

## Function Settings

To change functions, press the Plus or Minus buttons on the kV/ $\mu$ A panel.  
To change function values press the Plus or Minus buttons on the Flow Air panel.

Function No.	Name	Settings	Default
1	Gun Type	0 = Encore	0
2	Fluidizing	0 = Hopper, 1 = Box, 3 = Disable	0
3	Electrostatic Control	0 = Custom, 1 = Classic	0
4	Powder Flow Control	0 = Smart, 1 = Classic	0
5	Cable Length	0 = 6 meters, 1 = 12 meters, 2 = 18 meters	0

**NOTE:** Refer to the Operation section for explanations of the differences in Electrostatic Control and Powder Flow Control modes.

## Exiting Configuration Mode

To accept all function values and exit Configuration Mode, press the Enable/Disable button. The controller can now be operated normally.

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## Section 4

# Operation



**WARNING:** Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.



**WARNING:** This equipment can be dangerous unless it is used accordance with the rules laid down in this manual.



**WARNING:** All electrically conductive equipment in the spray area must be grounded. Ungrounded or poorly grounded equipment can store an electrostatic charge which can give personnel a severe shock or arc and cause a fire or explosion.

## Controller Interface

See Figure 3-1. Use the controller interface to make spray settings and monitor system operation. Refer to *Setup* for configuration settings.

## Low Power Mode

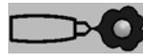
Pressing the **Enable/Disable** button for three seconds puts the controller to sleep (low power mode). The displays and LEDs turn off. To wake the controller press the button again.

The system hibernates automatically if no activity is detected for approximately 15 minutes. Pulling the gun trigger, pressing the purge switch, or pressing a button on the controller interface wakes the controller.



Figure 4-1 Controller Interface

## Displays and LEDs



When the gun is triggered the Trigger LED lights. Actual kV/μA outputs are displayed. When the gun is not triggered the kV/μA setpoints are displayed.



When the controller is configured for Smart Flow mode, the Smart Flow LED is lit.

The air flow displays always show the setpoints.

## Electrostatic Settings

Electrostatic output can set in Select Charge mode, Custom mode, or Classic mode. Custom or Classic mode is chosen when the controller is configured. Set the electrostatic output depending on the shape and type of product being coated and the type of powder used.

### Select Charge® Mode

The Select Charge modes are non-adjustable electrostatic settings. The LEDs above the Select Charge mode buttons indicate the selected mode.

The electrostatic setpoints for the Select Charge Modes are:

Re-Coat	100 kV, 15 μA
Metallics	50 kV, 50 μA
Deep Recesses	100 kV, 60 μA

**NOTE:** Pressing the + or – keys have no effect when a Select Charge mode is selected.

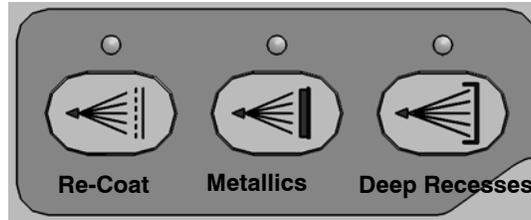


Figure 4-2 Select Charge Modes

**NOTE:** If you press the STD/AFC selection button while using a Select Charge mode, the controller switches to Classic or Custom mode.

## Custom Electrostatic Mode

**Custom Mode** is the factory default electrostatic mode.

In Custom mode, both kV output and microampere ( $\mu\text{A}$ ) output limits can be adjusted independently. Both the kV and AFC LEDs light to indicate that the controller is in this mode.

Use the View button  to toggle the display between kV and  $\mu\text{A}$ . Press the + or – buttons to select the desired setpoints. The longer a button is pressed the faster the units change.

- The valid AFC range is 5–100  $\mu\text{A}$ .
- The valid STD range is 0 or 25–100 kV.

## Classic Electrostatic Mode

**Classic Mode** is the optional electrostatic mode. The controller must be configured to use this mode; refer to page 3-11 for configuration instructions.

In Classic mode you can choose to control kV (STD) output or  $\mu\text{A}$  (AFC) output, but not both at the same time.

### Classic Standard (STD) Mode

See Figure 3-3. Use the **STD** mode to set the no-load output voltage (kV).

1. Press the STD/AFC button  to toggle between STD and AFC. The LEDs light to show which is selected. Select STD. The STD LED will light.

2. Press the View button  to toggle the display between kV and  $\mu\text{A}$ . Press the + or – buttons to select the desired kV setpoint. The longer a button is pressed the faster the units change.

The valid STD range is 0 or 25–100 kV.

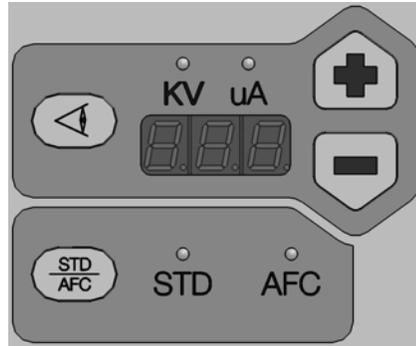


Figure 4-3 kV/  $\mu$ A Display and STD/AFC Selection for Classic Mode

### Classic AFC Mode

See Figure 3-3. Use the **AFC** mode to set  $\mu$ A output limits. In AFC mode kV automatically defaults to 100 kV. When current output increases, kV output and electrostatic charging decreases. The closer the gun comes to the part, the greater the current draw.

1. Press the STD/AFC button to toggle between STD and AFC. The AFC LED lights when AFC is selected.
2. Press the View button  to toggle the display between kV and  $\mu$ A. Select  $\mu$ A, then press the + or - buttons to select the desired  $\mu$ A setpoint. The longer a button is pressed the faster the units change.

The valid AFC range is 5–100  $\mu$ A.

### Encore LT Nano Feedback Control Mode (NFC)

To configure the controller for the NFC function, set the Electrostatic Control (Function 3) to the custom mode (Custom= 0).

When the controller is in NFC mode, the electrostatic settings will allow the user to control both kV and  $\mu$ A (custom mode).

See Function Settings on page 3–12 of the System Setup section.

#### $\mu$ A NFC Range and Settings

NFC mode allows the user to adjust the  $\mu$ A setting in increments of 0.1  $\mu$ A below the value of 10.0  $\mu$ A.

For example, the user can set the  $\mu$ A settings from 12, 11, 10, 9.9, 9.8, 9.7, ..... through 0.1.

#### kV NFC Range and Settings

NFC mode allows the user to adjust the kV setting in increments of 1 kV below the value of 25 kV.

For example, the user can set the kV settings from 25, 24, 23, 22, ..... through 0.

**NOTE:** kV and  $\mu$ A will now allow the user to adjust the kV independently of  $\mu$ A when below the value of 25 kV.

## Powder Flow Settings

The controller varies the flow and atomizing air to a venturi-type powder pump depending on the settings. Flow air controls the amount and velocity of the powder; atomizing air dilutes the powder flow and increases the velocity. Since the air flow values are continuously monitored and adjusted, a slight high frequency pulsation in the air lines is normal.

Two modes of pump air control are available:

**Smart Flow** – This is the factory default mode. In this mode, you set Total Flow and Flow Air %. If you decrease the flow air %, the flow air pressure decreases, but the atomizing air pressure increases, so that the result is that the powder velocity remains the same. The Smart Flow LED lights when the controller is configured for Smart Flow mode.

**Classic Flow** – This is the traditional method of controlling powder flow and velocity. In this mode you set flow and atomizing air separately and balance them manually for optimum results. When the controller is configured for Classic Flow mode, the Smart Flow LED is off.

**NOTE:** Refer to page 3-11 for a list of the mode defaults and configuration instructions.

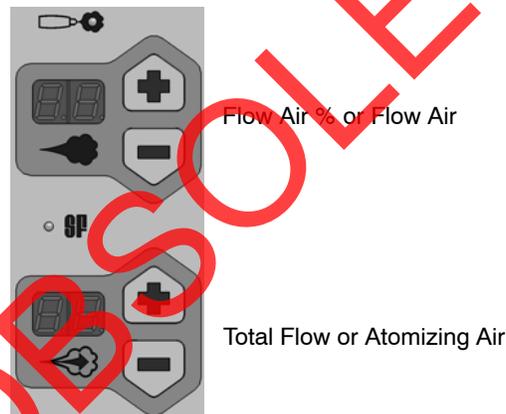


Figure 4-4 Flow Setting Panels

## Smart Flow Mode Settings



sets the powder flow rate (Flow Air %).



sets the powder velocity (Total Flow).

Setting values for both are 0–99% of maximum output. Press the + and – buttons to enter the desired setpoint. The longer a button is pressed the faster the units change.

When making Smart Flow settings, set the Total Flow setpoint first to obtain the desired pattern size and velocity, then set the Flow Air % setpoint for the desired powder flow.

At 7 bar (100 psi) supply pressure:

Total Flow Setting %	Flow Air Setting %	Flow Air Pressure bar (psi)	Atomizing Air Pressure bar (psi)
50	50	1.7 (25)	1.7 (25)
50	25	0.86 (12.5)	2.6 (37.5)

In other words,

If Total Flow = 50%, Flow Air = 50%, then  
 Flow air = 1.7 bar (25 psi) or 1/2 of 3.4 bar (50 psi), and  
 Atomizing air = 1.7 bar (25 psi) or 1/2 of 3.4 bar (50 psi).

If Total Flow = 50%, Flow Air = 25%, then  
 Flow air = 0.86 bar (12.5) psi or 1/4 of 3.4 bar (50 psi), and  
 Atomizing air = 2.6 bar (37.5 psi) or 3/4 of 3.4 bar (50 psi).

**NOTE:** If either Total Flow or Flow Air % are set to 0% then the controller will not output any air when triggered and no powder will be pumped.

Powder velocity is inversely related to transfer efficiency; the higher the velocity, the lower the transfer efficiency. High powder flow rates can result in faster wear of the powder contact parts.

## Classic Flow Mode Settings

To use Classic Flow mode, the controller must be configured for it. Refer to page 3-11 for a list of the mode defaults and configuration instructions.



sets the flow air pressure



sets the atomizing air pressure.

Setting values for both are 0–99% of maximum air pressure. Press the + and – buttons to enter the desired setpoint. The longer a button is pressed the faster the units change.

At 7 bar (100 psi) supply pressure:

Flow Setting %	Atomizing Setting %	Flow Air Pressure bar (psi)	Atomizing Air Pressure bar (psi)
25	25	1.7 (25)	1.7 (25)
40	10	2.7 (40)	0.689 (10)

In other words,

If Flow air = 25%, Atomizing air = 25%, then  
Flow air = 1.7 bar (25 psi), Atomizing air = 1.7 bar (25 psi).

If Flow air = 40%, Atomizing = 10%, then  
Flow air = 2.7 bar (40 psi), Atomizing air = 0.689 bar (10 psi).

Refer to your pump manual for typical operating values for Flow and Atomizing air.

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## Spray Gun Operation

To spray powder, pull the spray trigger.

To purge the spray gun, release the spray trigger and press down on the purge trigger. If using a vibratory box feeder, fluidizing air is shut off while the gun is being purged. **P** is displayed on the flow display.

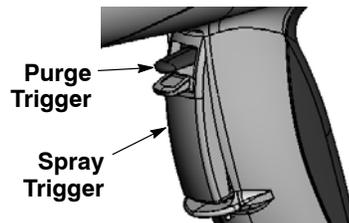


Figure 4-5 Gun Controls

## Electrode Air Wash Operation

Electrode air wash air continually washes the spray gun electrode to prevent powder from collecting on it. Electrode air wash air is turned on and off automatically when the spray gun is triggered on and off.

## Daily Operation

### Startup

1. Turn on the spray booth exhaust fan.
2. Turn on the system air supply and power.
3. Fill the powder hopper 2/3 full of powder. When fluidized, the powder volume will expand. Do not overfill.
4. Install the hopper filled with powder on the cart. Connect the hopper ground cable and fluidizing air. Install the pump on the pickup tube or connect the air tubing to the pump.
5. Make sure the spray gun is not triggered, then turn on controller power. The displays and icons on the controller interface should light.

**NOTE:** If the spray gun is triggered on when the controller is powered up, a fault will occur and the Trigger LED will blink fast. To clear the fault, release the trigger and press the Disable/Enable button to put the controller to sleep, then press the button again to wake it up.

6. Make sure the powder in the hopper is being fluidized properly. The powder should boil gently, without any fountains. Adjust fluidizing air pressure if necessary, using the needle valve on the rear panel of the controller. Fluidizing air is on continuously as long as the controller is on.
7. Point the spray gun into the booth and press the trigger to start spraying powder.

- Adjust the controller to achieve the desired spray pattern and powder flow rate.

The controller interface displays actual kV or  $\mu\text{A}$  output when the gun is spraying and setpoints when the gun is off. The air flow displays always show the setpoints.

**On Initial Startup:** With the gun triggered, air set to zero, and no parts in front of the gun, record the  $\mu\text{A}$  output for each gun in the system. Monitor the  $\mu\text{A}$  output daily, under the same conditions. A significant increase in  $\mu\text{A}$  output indicates a probable short in the gun resistor. A significant decrease indicates a resistor or voltage multiplier requiring service.

## Purging

When purge air is turned on, the electrostatic voltage and pump air is turned off and **P** appears on the flow display.

Purge the gun periodically to keep the powder path inside the spray gun clean. The purge length and frequency needed depend on the application and powder.

**NOTE:** The purge air only cleans the spray gun powder path. To purge the powder hose, disconnect it from the pump and the gun, place the gun end inside the booth, and blow it out from the pump end with compressed air.

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## Cleaning Conical Nozzles and Deflectors

1. Purge the spray gun and press the Enable/Disable button to put the controller to sleep and prevent accidental gun triggering.



**CAUTION:** You must remove the deflector cap (1) and deflector (2) before unscrewing and removing the nozzle nut, nozzle, and pattern adjuster. If the deflector is not removed first, you will damage the electrode support (8).

2. See Figure 3-6. Hold the deflector (2) with your finger while unscrewing the deflector cap (1). Gently pull the deflector off the electrode holder (6).
3. Unscrew the nozzle nut (5) counterclockwise, and remove the nut, nozzle (4), and pattern adjuster (3) from the gun.
4. Pull the electrode support assembly (6–9) out of the gun. Use low-pressure compressed air to clean the assembly. Inspect the sleeve inside the support and replace it if worn or damaged. Refer to *Electrode Support Repair* in the *Repair* section.
5. Clean all parts with low-pressure compressed air. Inspect all parts and replace any that are worn or damaged.
6. Inspect the electrode holder (6). If the electrode holder is worn or damaged, unscrew it from the ceramic spider (9), then remove the electrode (5). Install the electrode in the new holder, then screw the holder into the ceramic spider.
7. Screw the nozzle nut onto the spray gun.
8. Install a new deflector on the electrode holder. Do not bend the end of the electrode.
9. Screw the deflector cap onto the electrode holder until tight.
10. Press the Enable/Disable button to wake up the controller and resume operation.

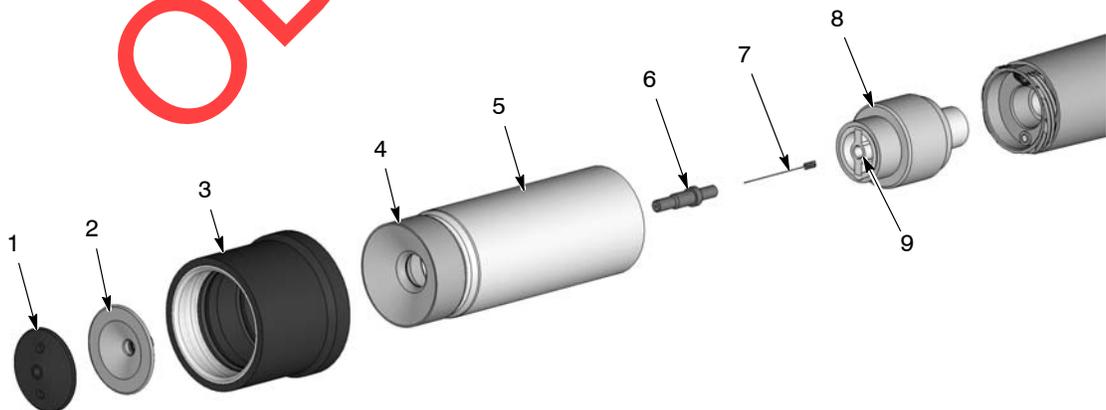


Figure 4-6 Cleaning a Conical Nozzle

- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| 1. Deflector cap    | 4. Ceramic Nozzle   | 7. Electrode         |
| 2. Deflector        | 5. Nozzle nut       | 8. Electrode support |
| 3. Pattern adjuster | 6. Electrode holder | 9. Ceramic spider    |

*Note:* Electrode holder used on conical spray nozzles is not interchangeable with flat and corner nozzle electrode holder.

## Cleaning Flat and Corner Spray Nozzles



**WARNING:** Release the spray gun trigger, put the controller to sleep, and ground the electrode before performing this procedure. Failure to observe this warning could result in a severe electrical shock.

1. Purge the spray gun and press the Enable/Disable button to put the controller to sleep and prevent accidental gun triggering.
2. See Figure 3-7. Unscrew the nozzle nut (1) counterclockwise.
3. Pull the nozzle nut and flat spray nozzle (2) off gun. Remove the nozzle from the nut and clean both with low-pressure air and clean cloths. Replace if worn or damaged.
4. Pull the electrode support assembly (3–7) out of the gun. Use low-pressure compressed air to clean the assembly. Inspect the sleeve inside the support and replace it if worn or damaged. Refer to *Electrode Support Repair* in the *Repair* section.
  - d. Unscrew the electrode holder and sleeve from from the ceramic spider (7).
  - e. Install the new electrode (5) in the new holder, then screw the holder into the ceramic spider. Slide the sleeve over the electrode holder.
6. Install the nozzle onto the electrode support (6), then screw the nozzle nut onto the gun body clockwise until finger-tight.
7. Press the Enable/Disable button to wake up the controller and resume operation.

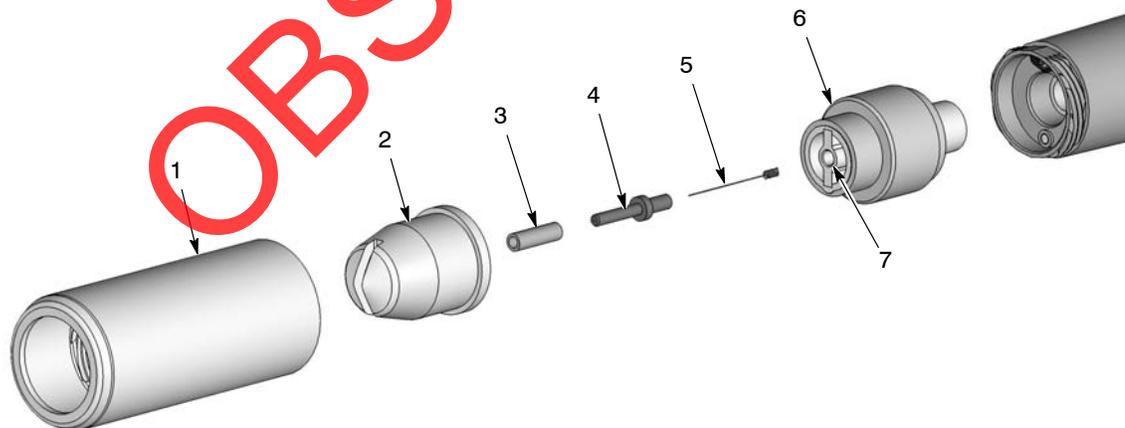


Figure 4-7 Cleaning Flat and Corner Spray Nozzles

- |                              |                     |                      |
|------------------------------|---------------------|----------------------|
| 1. Nozzle nut                | 4. Electrode holder | 6. Electrode support |
| 2. Nozzle (flat spray shown) | 5. Electrode        | 7. Ceramic spider    |
| 3. Sleeve                    |                     |                      |

*Note:* Electrode holder used on flat and corner spray nozzles is not interchangeable with conical nozzle electrode holder.

## Changing From Conical to Flat or Corner Spray Nozzle

See Figure 3-7. To change from the standard conical nozzle to a flat or corner spray nozzle, you will need to order:

- the nozzle desired (2)
- a new nozzle nut (1)
- a flat spray electrode holder kit (items 3, 4, and 5).

Refer to *Parts* for optional nozzles, nozzle nut, and electrode holder kit.



**WARNING:** Turn off the spray gun and ground the electrode before performing this procedure. Failure to observe this warning could result in a severe electrical shock.



**CAUTION:** See Figure 3-6. The deflector cap (1) and deflector (2) must be removed before removing the nozzle nut from the gun. If they are not removed first, the electrode support (8) will be damaged.

1. With your finger, hold the deflector (2) from turning while you unscrew the deflector cap (1).
2. Pull the deflector off the conical electrode holder (6).
3. Unscrew the nozzle nut (5) and remove it along with the pattern sleeve (3) and conical nozzle (4) from the gun.
4. Remove the electrode support assembly (6–9) and clean it with a blow gun.
5. Unscrew the conical electrode holder (6) from the electrode support. Remove the electrode (7).
6. See Figure 3-7. Insert the new electrode (5) into the flat electrode holder (4).
7. Screw the flat electrode holder into the ceramic spider (7).
8. Install the wear sleeve (3) over the flat electrode holder.
9. Install the flat or corner spray nozzle (2) onto the electrode support (6), then screw the nozzle nut (1) onto the spray gun.

## Shutdown

1. Purge the spray gun by pressing the Purge button until no more powder is blown from the gun.
2. Press the Enable/Disable button to turn off the spray gun and put the controller to sleep.
3. Turn off the system air supply and relieve the system air pressure.
4. If shutting down for the night or a longer period of time, disconnect power to the controller.
5. Perform the *Daily Maintenance* procedures on page 4-13.

## Maintenance



**WARNING:** Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.



**WARNING:** Turn off the electrostatic voltage and ground the gun electrode before performing the following tasks. Failure to observe this warning could result in a severe shock.

### Daily Maintenance

**NOTE:** Depending on your application, you may not need to perform this procedure every day.

1. Purge the spray gun, then press the Enable/Disable button on the controller to put it to sleep.
2. See Figures 3-7 and 3-6. Remove the nozzle from the gun:
 

**Flat or Corner Spray Nozzle:** Unscrew the nozzle nut (1) and remove it along with the nozzle (2) from the gun.

**Conical Nozzle:** Unscrew the deflector cap (1), then remove the deflector (2). Unscrew the nozzle nut (5) and remove it along with the nozzle (4) and pattern sleeve (3) from the gun.
3. Pull the electrode support out of the gun.
4. Pull the powder hose adapter out of the gun. Place the end of the powder hose in the booth. Disconnect the hose from the pump. Blow out the hose from the pump end. Check the hose adapter and powder hose for wear and replace if worn or damaged.
5. Blow out the gun from the powder hose connector toward the front end.
6. If you are using a conical nozzle, pull the pattern sleeve (3) off the nozzle nut and nozzle. Clean all parts removed with a low-pressure blow gun. Wipe the parts with a clean, dry cloth.
7. Inspect the ceramic nozzles, pattern sleeve, and electrode support and holder for wear. Replace worn or damaged parts.

Make sure the system is securely connected to a true earth ground before spraying powder.

### Weekly Maintenance

Check the resistance of the power supply and electrode support assembly with a megohm meter, as described in the troubleshooting procedures. Replace the power supply or electrode support, if the resistance readings do not fall within the specified ranges.

Check the system air filter. Drain the filter and change the filter element as needed. Refer to *Parts* for the replacement element part number.

Check all system ground connections.

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## Section 5

# Troubleshooting



**WARNING:** Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.



**WARNING:** Before making repairs to the controller or spray gun, shut off system power and disconnect the power cord. Shut off the compressed air supply to the system and relieve the system pressure. Failure to observe this warning could result in personal injury.

These troubleshooting procedures cover only the most common problems. If you cannot solve a problem with the information given here, contact your contact Nordson technical support at (800) 433-9319 or your local Nordson representative for help.

## Controller Faults

Problem	Possible Cause	Corrective Action
1. Trigger LED blinks, gun does not spray	Gun was triggered on when the controller was powered up or woken up	Release the trigger. Press the Enable/Disable button to put the controller to sleep, then press the button again to wake it up.
	Shorted trigger switch or cable	Check the gun cable and trigger switch.
2. KV/ $\mu$ A display blinks, no KV when gun is triggered	Gun is shorted	Check gun cable, cable extension, and gun power supply.

## General Troubleshooting Chart

Problem	Possible Cause	Corrective Action
<b>1. Uneven pattern, unsteady or inadequate powder flow</b>	Blockage in spray gun, powder hose, or pump	<ol style="list-style-type: none"> <li>1. Purge the spray gun. Remove and clean the nozzle and electrode assembly.</li> <li>2. Disconnect the powder hose from the spray gun. Blow out the spray gun with an air gun.</li> <li>3. Disconnect the powder hose from the pump and gun and blow out the hose. Replace the hose if it is clogged with powder.</li> <li>4. Disassemble and clean the pump.</li> <li>5. Disassemble the spray gun. Remove and clean the inlet and outlet tubes and elbow. Replace components as necessary.</li> </ol>
	Nozzle, deflector, or electrode assembly worn, affecting pattern	Remove and clean the nozzle, deflector, and electrode assembly. Replace worn parts as necessary. If excessive wear or impact fusion is a problem, reduce the flow and atomizing air.
	Damp powder	Check the powder supply, air filters, and dryer. Replace the powder supply if contaminated.
	Low atomizing or flow air pressure	Increase the atomizing and/or flow air flow.
	Improper fluidization of powder in hopper	Increase the fluidizing air pressure. If the problem persists, remove the powder from the hopper. Clean or replace the fluidizing plate if contaminated.
<b>2. Voids in powder pattern</b>	Worn nozzle or deflector	Remove and inspect the nozzle or deflector. Replace worn parts.
	Plugged electrode assembly or powder path	Remove and clean the electrode assembly. Remove and clean the spray gun powder path (inlet tube, elbow, and outlet tube) if necessary.

Continued...

Problem	Possible Cause	Corrective Action
<b>3. Loss of wrap, poor transfer efficiency</b>	Low electrostatic voltage	Increase the electrostatic voltage.
	Poor electrode connection	Remove the nozzle and electrode assembly. Clean the electrode and check for carbon tracking or damage. Check the electrode resistance as shown on page 5-6. If the electrode assembly is good, remove the gun power supply and check its resistance as shown on page 5-6.
	Poorly grounded parts	Check the conveyor chain, rollers, and part hangers for powder buildup. The resistance between the parts and ground must be 1 megohm or less. For best results, 500 ohms or less is recommended.
<b>4. No kV output from the spray gun (kV=0), powder is spraying</b>	Damaged gun cable	Perform the <i>Gun Cable Continuity Checks</i> on page 5-7. If an open or short is found, replace the cable.
	Spray gun power supply shorted	Perform the <i>Power Supply Resistance Test</i> on page 5-6.
<b>5. No kV output from the spray gun (<math>\mu\text{A}=0</math>), powder is spraying</b>	Spray gun power supply open	Perform the <i>Power Supply Resistance Test</i> on page 5-6.
	Damaged gun cable	Perform the <i>Gun Cable Continuity Test</i> on page 5-7. If an open or short is found, replace the cable.
<b>6. No kV output and no powder output</b>	Malfunctioning trigger switch or cable	Check the trigger LED on the controller interface. If the LED is not lit, check the switch connection to the gun cable. Perform the <i>Gun Cable Continuity Test</i> on page 5-7. If the cable and connections are good, replace the switch.
	Controller configured for automatic operation	Cycle controller power. If <b>A</b> appears on the kV/uA display, remove the main control board and move the JP1 jumper to the Manual position.
<b>7. Powder build up on the electrode tip</b>	Insufficient electrode air wash flow due to low input pressure or blockage in manifold orifice	Check input air pressure. Remove electrode air wash connector and check manifold orifice for blockage. Orifice size is .25-.3 mm. Clean with an appropriate tool.

Continued...

Problem	Possible Cause	Corrective Action
<b>8. No purge air when gun purge switch is pressed down</b>	Malfunctioning spray gun trigger switch or cable, or controller manifold purge solenoid valve; no air pressure, or kinked air tubing	<p>If the controller interface does not display <b>P</b> when the purge switch is pressed, the gun trigger switch may be defective.</p> <p>Perform the <i>Gun Cable Continuity Test</i> on page 5-7. If the cable is good, replace the trigger switch.</p> <p>If the interface displays <b>P</b> when the purge switch is pressed, check the purge air tubing and purge manifold solenoid valve.</p>
<b>9. Low powder flow or powder flow surging</b>	Low supply air pressure	Input air must be greater than 4.1 bar (60 psi).
	Supply air filter plugged or filter bowl full—water contamination of controller	Remove the filter bowl and drain water/dirt. Replace the filter element if necessary. Clean the system, replace components as necessary.
	Flow air valve plugged	Remove the valve and check the manifold passages. If the manifold is clean, replace the valve.
	Air tubing kinked or plugged	Check the flow and atomizing air tubing for kinks.
	Pump throat worn	Replace the pump throat.
	Pump not assembled correctly	Check the pump.
	Pick-up tube blocked	Check for debris blocking pick-up tube.
	Fluidizing air too high	If fluidizing air is set too high the ratio of powder to air will be too low.
	Fluidizing air too low	If fluidizing air is set too low the pump will not operate at peak efficiency.
	Powder hose plugged or kinked	Check for kinks in hose, blow out with compressed air.
	Gun powder path plugged	Check the inlet tube, elbow, outlet tube, and electrode support for impact fusion or debris. Clean as necessary with compressed air.
	Flow and atomizing air tubing connections reversed	Check flow and atomizing air tubing routing and switch if incorrect.
<b>10. No KV when gun is triggered On, powder flow OK</b>	KV set to zero	Set KV to a non-zero value.
<b>11. No powder flow when gun is triggered On, kV OK</b>	Flow Air or Total Flow set to zero	Change settings to a non-zero number.
	Input air turned OFF	Make sure air is being supplied to the controller.

Problem	Possible Cause	Corrective Action
<p><b>12. More than one key on the keypad quits working when pressed</b></p>	<p>Flex connection from the keypad to the main board is not seated properly</p>	<p>Loosen and re-seat the flex circuit on the main board, making sure the flex cable is fully inserted into the connector.</p> <p>To loosen the flex circuit, gently pull the black bar on the cable connector away from the white connector. This will allow you to adjust the flex cable to ensure proper seating. The cable should be inserted past the white line marked towards the end of the cable.</p> <p>Push the black bar back into the white connector to secure.</p>

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## Spray Gun Power Supply Resistance Test

Use a megohm meter to check the resistance of the power supply, from the J2-3 feedback terminal at the connector to the contact pin inside the front end. The resistance should be between 280–320 megohms. If the reading is infinite, switch the meter probes. If the resistance falls outside this range, replace the power supply.

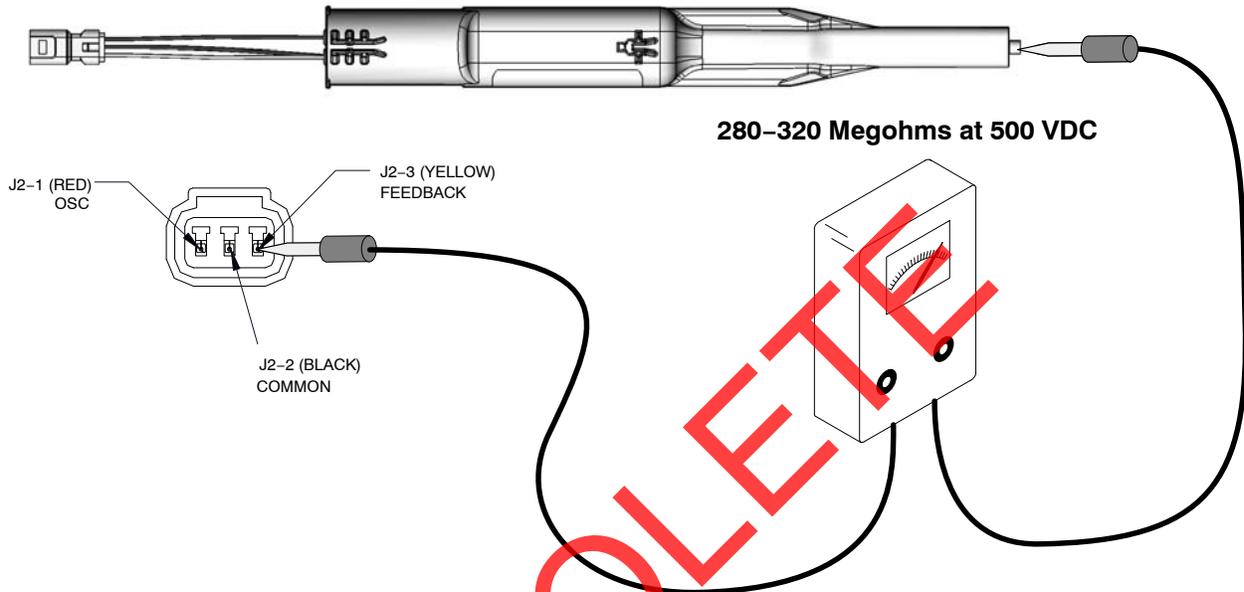


Figure 5-8 Power Supply Resistance Test

## Electrode Support Resistance Test

Use a megohm meter to measure the resistance of the electrode assembly from the contact ring on the back to the antenna wire in the front. The resistance should be 19–21 megohms. If the resistance is out of this range replace the electrode assembly.

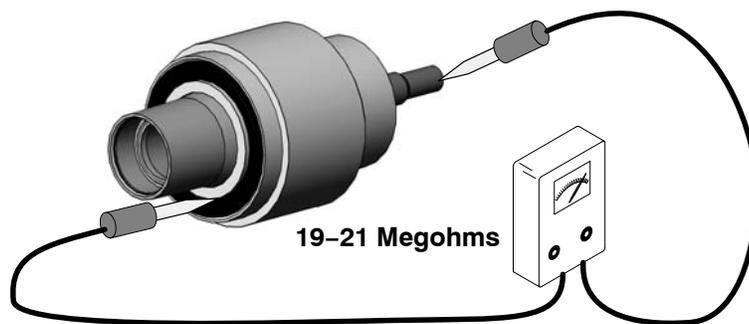


Figure 5-9 Electrode Support Resistance Test

# Gun Cable Continuity Test

Test for continuity as follows:

- J1-1 and J3-2
- J1-2 and J2-2, J3-5
- J1-3 and J2-1
- J1-4 and J3-4
- J1-5 and J2-3
- J1-6 and J3-3, ground terminal

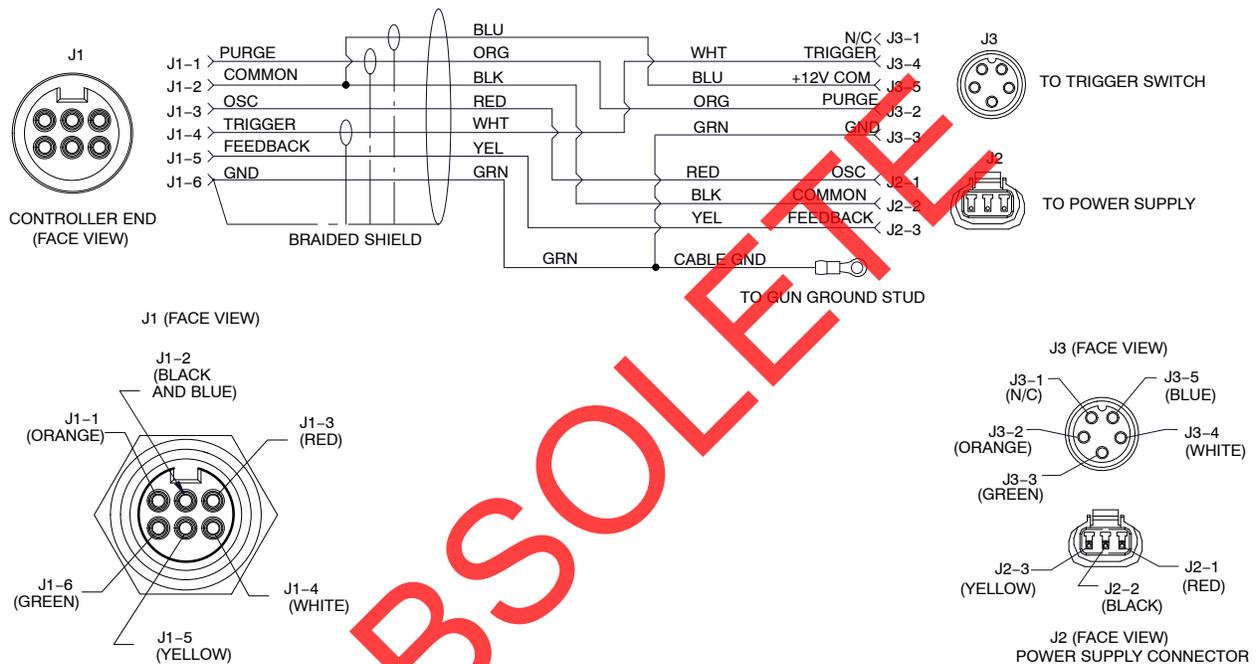


Figure 5-10 Gun Cable Wiring

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## Section 6

# Repair



**WARNING:** Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

## Spray Gun Repair

**NOTE:** All item numbers in the spray gun repair illustrations are the same as the item numbers in the spray gun parts list.

### Power Supply and Powder Path Replacement

#### Gun Disassembly

1. Remove the nozzle nut, nozzle, and electrode support as described in the *Operation* section on pages 4-11 and 4-10.
2. Remove the screws (31A, 31B) and hook, cover, and housing (28, 29, 30).
3. Pull the power supply harness out of the bulkhead, and separate the connectors. You may need to insert a small flat-bladed screwdriver into the recess in the top of the connector to release the catch.



Figure 6-1 Gun Disassembly

28. Housing cover  
29. Display housing

30. Hook  
31A. M3 x 30 screw

31B. M3 x 20 screw

4. See Figure 6-2. Remove the black nylon screw (44) from the gun body.
5. Grasp the handle (40) in one hand and the gun body (20) in the other. Press the thumbs of each hand together while pulling in opposite directions to separate the gun body from the handle.
6. Tilt the back of the gun body up and forward to slide it off the powder outlet tube. The air wash tubing (20A) will prevent a complete separation of the gun body and handle.

**NOTE:** The powder outlet tube (22) is Pyrex glass. Use care while removing the gun body from the handle.

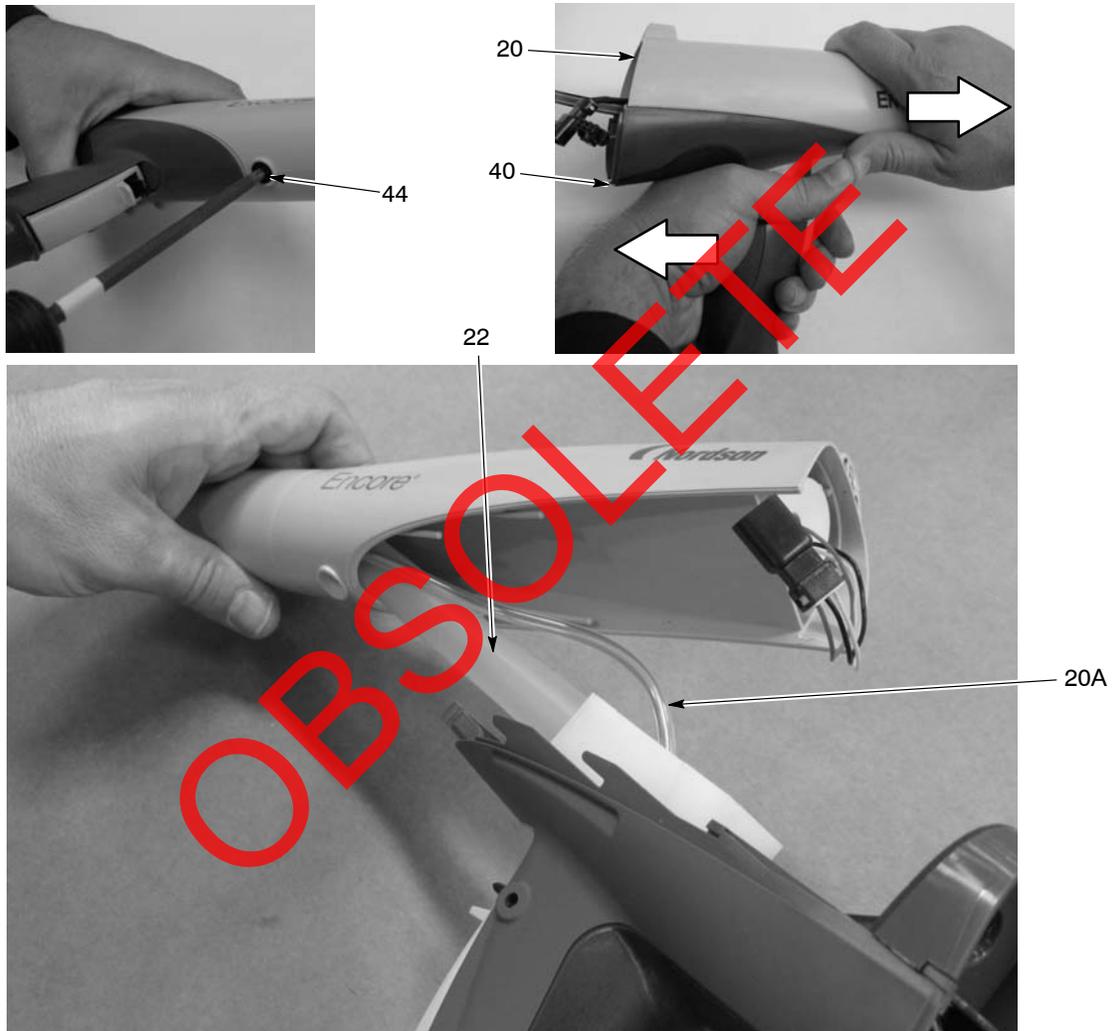


Figure 6-2 Removing the Gun Body from the Handle

20. Gun body

22. Powder outlet tube

44. Black nylon M5 screw

20A. Air wash tubing (filter assembly)

40. Handle

## Power Supply Replacement

**NOTE:** If replacing the powder path, skip this procedure.

1. Slide the power supply (21) out of the gun body.
2. Check the gasket (23) on the back of the bulkhead (24). Replace it if it is damaged. The gasket is secured to the bulkhead with pressure-sensitive adhesive.

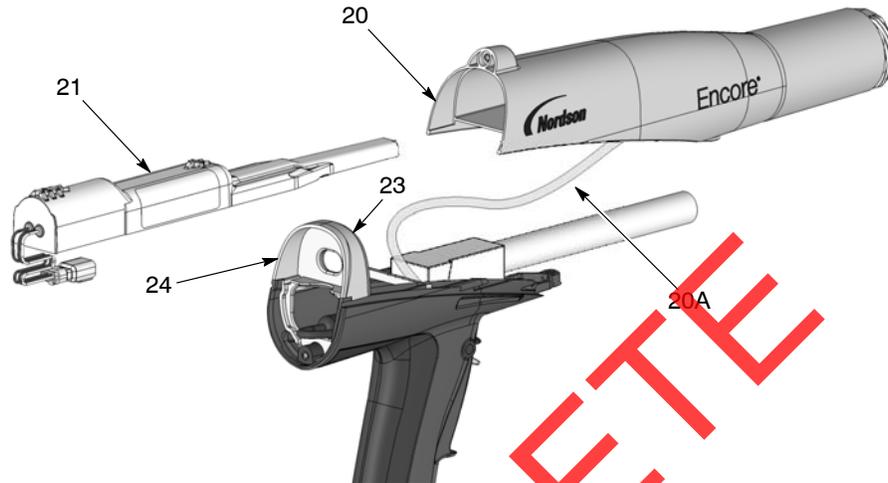


Figure 6-3 Removing the Power Supply from the Gun Body

20. Gun body	21. Power supply	24. Bulkhead
20A. Air wash tubing (filter assembly)	23. Gasket	

3. Slide the new power supply into the upper cavity of the gun body, guiding the gun body ribs between the raised grooves on the top of the power supply.
4. Press on the end of the power supply to ensure that the power supply contact tip is firmly seated against the brass contact inside the gun body.
5. Route the power supply harness connector through the top hole in the bulkhead.
6. If not replacing the powder path or cable, skip the next procedure and go to page 6-5 to reassemble the gun.

## Powder Path Replacement

**NOTE:** Skip these steps if not replacing the powder path or cable. Go to page 6-5 to reassemble the spray gun.

1. See Figure 6-4. Remove the outlet tube (22) from the inlet tube. The elbow portion of the outlet tube is held onto the inlet tube with a tight O-ring fit; wiggle the elbow back and forth to pull it free.
2. Remove the two M3 x 20 screws (31B) from the handle base (39).
3. Pull the base away from the handle, swing the bottom of the ground pad (27) up and away from the handle, then remove it. Leave the ground wire connected to the ground pad.

## Powder Path Replacement (contd)

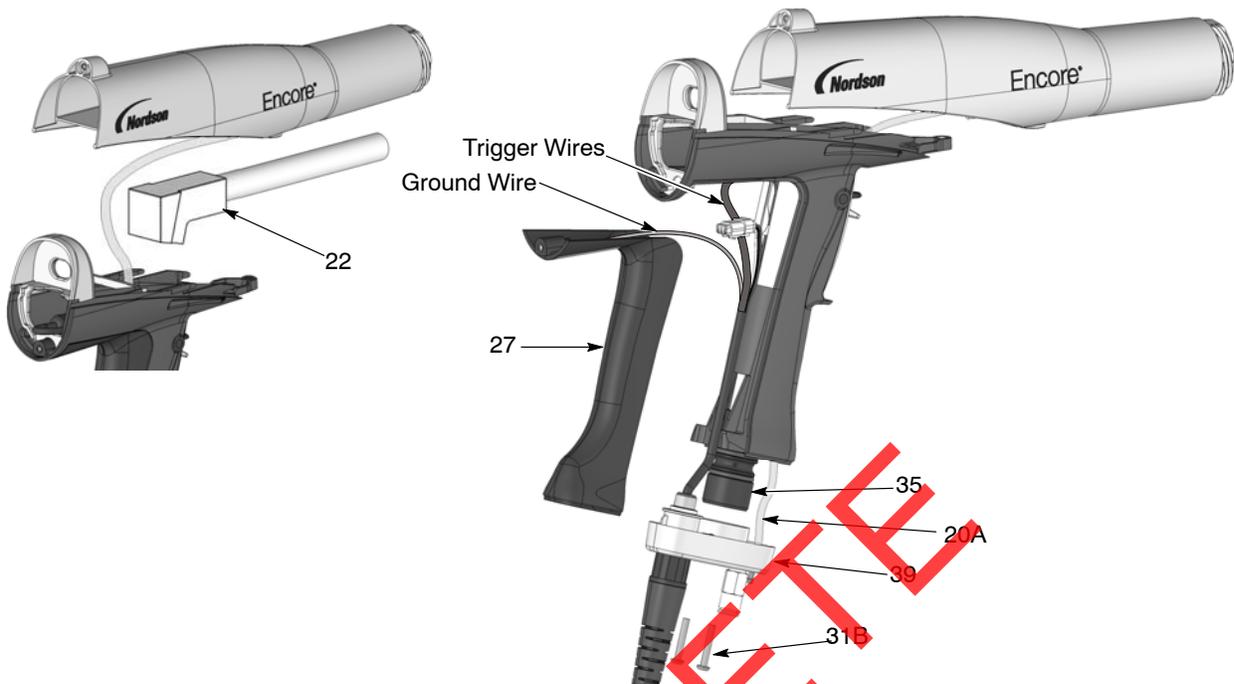


Figure 6-4 Removing the Powder Path from the Spray Gun

20A. Air wash tubing (filter assembly)  
22. Powder outlet tube

27. Ground pad  
31B. M3 x 20 screws

35. Powder inlet tube  
39. Handle base

4. Push the inlet tube (35) up and out of the base, then move the base out of the way and pull the inlet tube out of the handle.
5. Blow off the inlet tube and outlet tube, and replace them if they are worn or damaged. If re-installing either tube, make sure the O-rings are undamaged. The outlet tube has an O-ring in the elbow, the inlet tube has two O-rings on its base.

### Powder Path Installation

1. See Figure 6-4. Install the inlet tube (35) up into the handle.



**CAUTION:** Use care when pushing the inlet tube past the trigger switch ribbon cable. Do not damage the ribbon cable.

2. Insert the end of the inlet tube into the handle base (39) and seat it.
3. Push the handle base close to the handle, then hook the top end of the ground pad (27) into the body and rotate it onto the handle. Make sure the cable wires are not pinched or trapped during re-assembly.
4. Install the handle base onto the handle and ground pad and secure it with the two M3 x 20 screws (31B).

5. Press the outlet tube elbow (22) onto the end of the inlet tube, with the outlet end oriented toward the front of the gun as shown.
6. Before proceeding, make sure the elbow is seated on the inlet tube. The distance from the top of the elbow to the top of the bulkhead bracket should be approximately 4 mm.

### Gun Reassembly

1. Install the power supply in the gun body as described in *Power Supply Replacement*, if not already done.
2. See Figure 6-5. Insert the end of the outlet tube into the gun body, route the power supply connector through the top hole in the bulkhead, and coil the air wash tubing around the elbow as shown.

**NOTE:** Make sure that the power supply harness is not pinched between the bulkhead and the power supply.

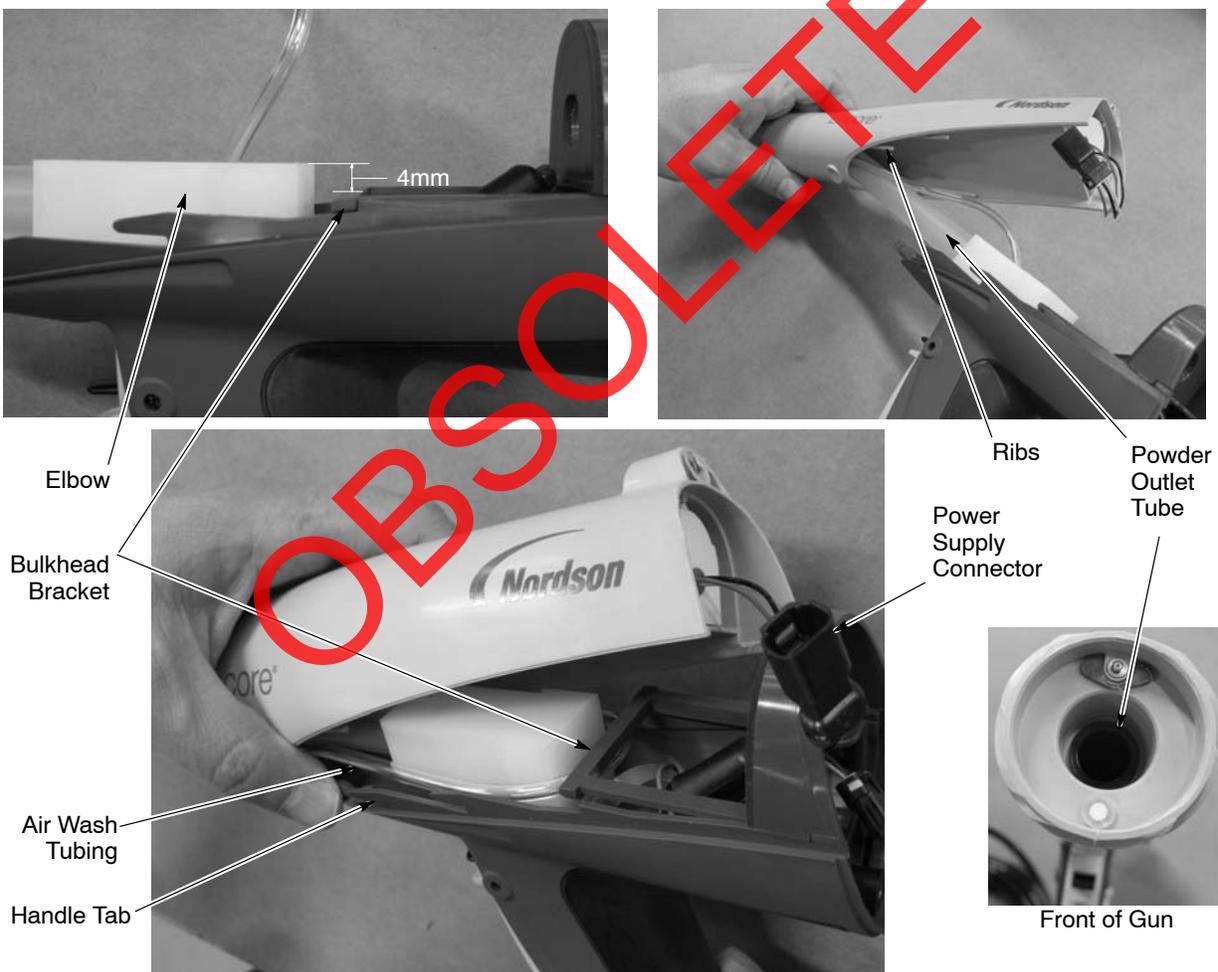


Figure 6-5 Installing the Gun Body on the Handle

3. Align the gun body with the handle and slide them together, engaging the internal ribs of the gun body with the handle tabs. While pushing the body and handle together, use your finger to make sure the end of the outlet tube fits into the hole in the front of the gun body.

### **Gun Reassembly** *(contd)*

4. Connect the power supply harness to the gun cable, then tuck both through the bottom hole in the bulkhead, into the gun body.
5. See Figure 6-1. Install the cover, housing, and hook as shown.
6. Install the electrode support into the front of the gun body, then screw the nozzle and nozzle nut onto the gun body.

## ***Cable Replacement***

### **Cable Removal**

1. Disconnect the gun cable from the controller.
2. See Figure 6-1. Remove the bottom screw (31B) from the housing (29).
3. See Figure 6-6, View A. Loosen the two M3 x 20 screws (31B) securing the handle base (39) to the handle.
4. Pull the base away from the handle enough to free the bottom edge of the ground pad (27) from the base.
5. Pull the bottom edge of the ground pad out and away from the handle.
6. See Figure 6-6, View B. Remove the M3 x 6 screw (25), lock washer (26), and ground terminal from the ground pad.
7. Remove the E-ring (32) from the cable.
8. See Figure 6-6, View C. Pull the cable connectors out of the bottom of the handle. Disconnect the power supply connector from the gun cable connector by inserting a small flat-bladed screw driver in the slot of the power supply connector to release the catch.
9. Carefully disconnect the round trigger connector from the trigger switch connector.
10. Pull the cable out of the handle base, feeding the connectors through the base one at a time.

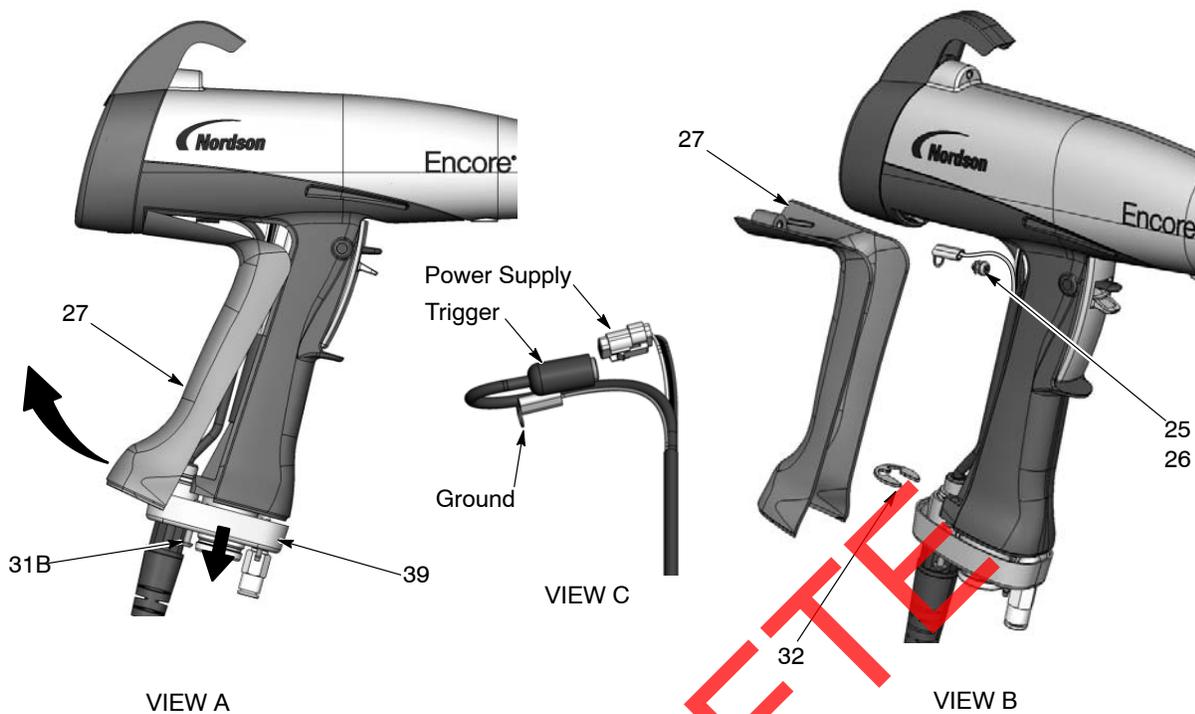


Figure 6-6 Cable Replacement

- 25. M3 x 6 screw
- 26. M3 lock washer

- 27. Ground pad
- 31B. M3 x 20 screws

- 32. E-ring
- 39. Handle base

### Cable Installation

1. See Figure 6-6. Feed a new cable through the handle base, then install the E-ring (32) on the cable to hold it in place.
2. Connect the cable to the trigger switch and power supply.
3. Connect the cable terminal to the ground pad (27) with the M3 x 6 screw and lock washer (25, 26).
4. Tuck the cable connectors and ground wire into the gun, below the multiplier.
5. Hook the top of the ground pad into the gun body, then rotate it into position on the handle.
6. Push the handle base (39) up against the handle and ground pad, and tighten securely the two M3 x 20 screws (31B) in the base.
7. See Figure 6-1. Install the bottom M3 x 20 screw (31B) in the housing (29) and tighten it securely.

## Trigger Switch Replacement

### Switch Removal

1. See Figure 6-6. Remove the ground pad as described in *Cable Removal* steps 1–5 . You do not have to disconnect the ground cable from the ground pad.
2. Pull out the round trigger connectors out of the handle and disconnect them.
3. See Figure 6-7. Place the spray gun on a solid surface so the small diameter end of the trigger axle (41A) is oriented upward.
4. Using a small, flat-ended punch or Allen key, apply light downward pressure to the small diameter end of the trigger axle (41A) and lightly tap to remove.
5. Remove the spray trigger (41), actuator (42, not shown), and purge trigger (43) from the handle.



Figure 6-7 Removing the Axle and Trigger from the Handle

6. See Figure 6-8. Insert a small flat-bladed screwdriver behind the clear pull tab at the top of the switch, then grasp the pull tab with a finger and gently pull it away from the handle.



Figure 6-8 Removing the Trigger Switch from the Handle

7. To remove the switch, cut the ribbon cable, or feed the bottom of the switch through the slot in the trigger recess and remove it from the handle.

### Switch Installation

1. See Figure 6-9. Orient the new switch with the grid facing away from the inlet tube, then carefully feed the square bottom end of the switch around the left side of the inlet tube and through the slot in the trigger recess.
2. Peel off the small piece of tape holding the ribbon cable against switch.



Figure 6-9 Installing the Trigger Switch – Steps 1 and 2

3. See Figure 6-10. Straighten the ribbon cable, then bend the pull tab at the top of the switch so that it is perpendicular to the switch.

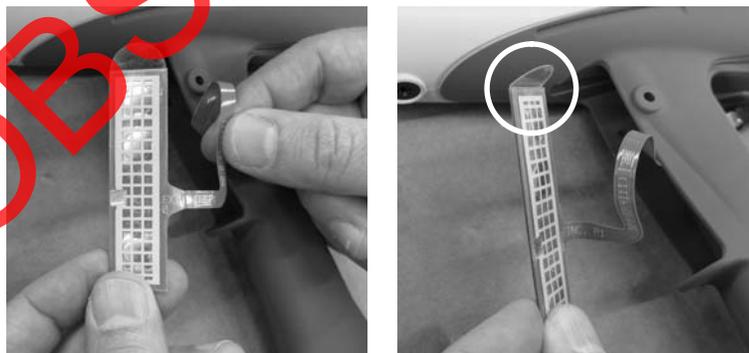


Figure 6-10 Installing the Trigger Switch – Step 3

4. See Figure 6-11. Peel the adhesive release liner from the switch.
5. Carefully install the switch, pull tab up, against the bottom and right edges of the trigger recess.
6. Make sure the ribbon cable is not trapped or pinched, then press the switch against the back of the recess. Run your finger up and down on the switch to ensure it is securely adhered to the handle.

## Switch Installation *(contd)*

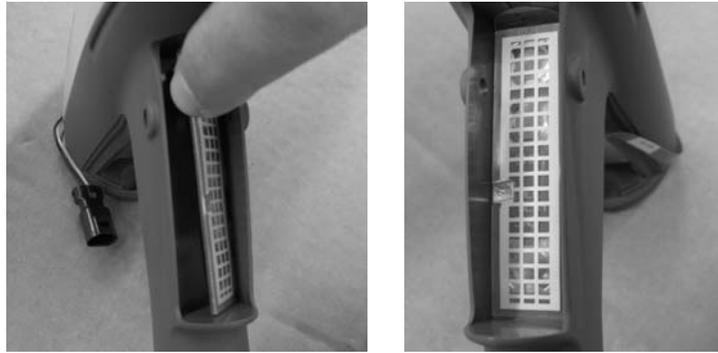


Figure 6-11 Installing the Trigger Switch – Step 4

7. See Figure 6-12. Install the purge trigger (43) into the spray trigger (41) with the gusset oriented upward as shown. **Do not install the purge trigger upside down.**
8. Verify that the actuator (42) is installed over the post.
9. Position the triggers in the handle and hold them in place while pressing the axle (41A) through the handle and triggers until the head of the axle is flushed with the handle. The axle will snap into place when properly installed.



Figure 6-12 Reinstalling the Trigger and Axle

10. Reconnect the trigger switch connector to the round cable connector, then tuck the connectors back up to the handle.
11. Reinstall the ground cover as described in *Cable Installation* steps 5–7 on page 6-7.

## Controller Repair



**WARNING:** Shut off the controller and disconnect the power cord or disconnect and lock out power at a breaker or disconnect ahead of the controller before opening the controller enclosure. Failure to observe this warning could result in a severe electrical shock and personal injury.



**CAUTION:** Electrostatic sensitive device. To avoid damaging the controller circuit boards, wear a grounding wrist strap and use proper grounding techniques when making repairs.

### Front Panel Components

Refer to *Section 5, Troubleshooting*, for the controller electrical schematic and harness connections. Refer to *Section 7, Parts* for repair kits.

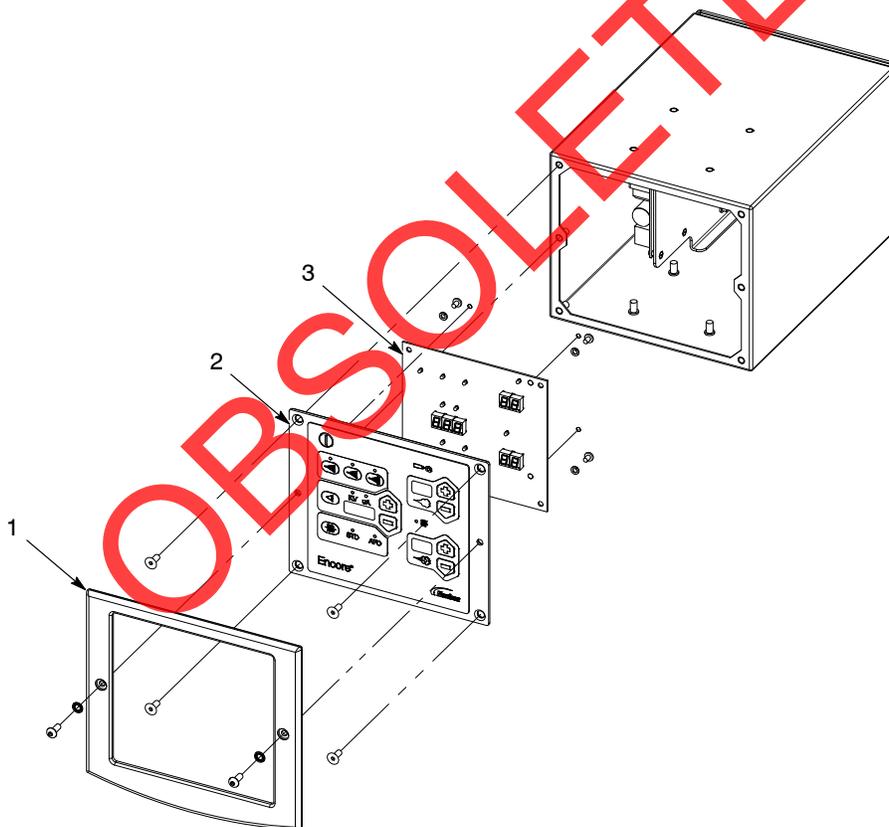


Figure 6-13 Controller Front Panel

1. Bezel

2. Keypad

3. Main control board

## Rear Panel Components

Figure 6-14 is an exploded view of the components of the rear panel. Refer to the following when making repairs:

- *Section 7, Parts* for parts and service kits.
- *Section 5, Troubleshooting*, for wiring diagrams and circuit board connections.

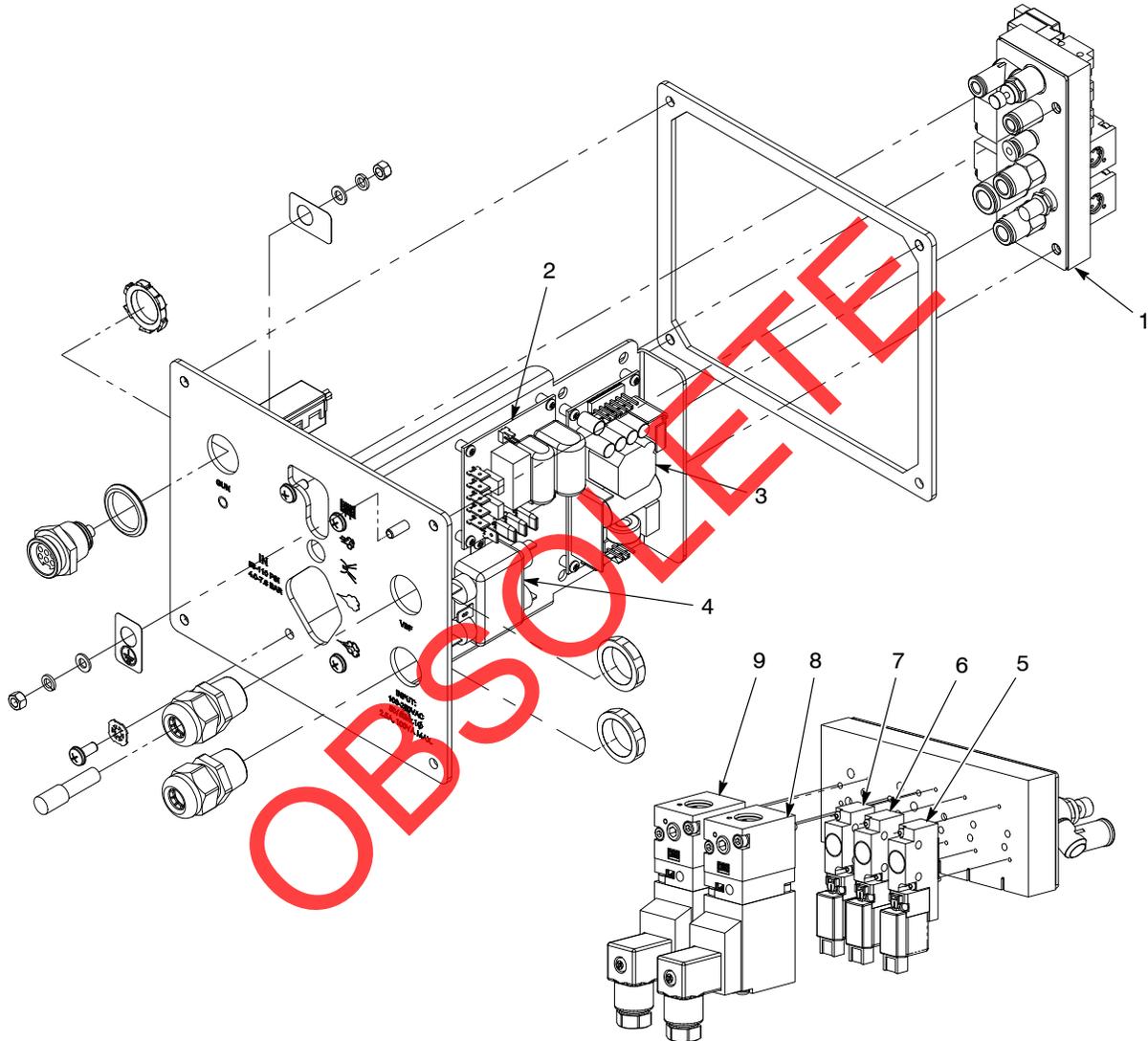


Figure 6-14 Sub Panel Parts Replacement

- |                      |                                  |                                |
|----------------------|----------------------------------|--------------------------------|
| 1. Manifold assembly | 4. Line filter                   | 7. Air wash air solenoid valve |
| 2. Relay board       | 5. Fluidizing air solenoid valve | 8. Flow-rate air regulator     |
| 3. Power supply      | 6. Purge air solenoid valve      | 9. Atomizing air regulator     |

## Section 7

# Parts

## Introduction

To order parts, call the Nordson Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

This section covers parts for the Encore PE spray gun, controller, system components and parts, powder and air tubing, and options.

Refer to the following manuals for additional information and optional equipment.

**Encore LT Manual System Operator Card:** 1108213  
**Encore Porcelain Enamel Powder Feed Pump:** 1602273  
**Encore Porcelain Enamel 50-lb Feed Hopper:** 1604293

These manuals can be downloaded from:  
<http://emanuals.nordson.com/finishing/>  
 (click on Powder-US, then Encore Systems)

## System Part Numbers

Use these part numbers to order complete systems.

Part	Description	Note
1604189	SYSTEM, dolly with hopper, 50 lb, Encore PE	
1604190	SYSTEM, rail mount, Encore PE	

## Spray Gun Parts

### *Spray Gun Parts Illustration*

See Figure 7-1.

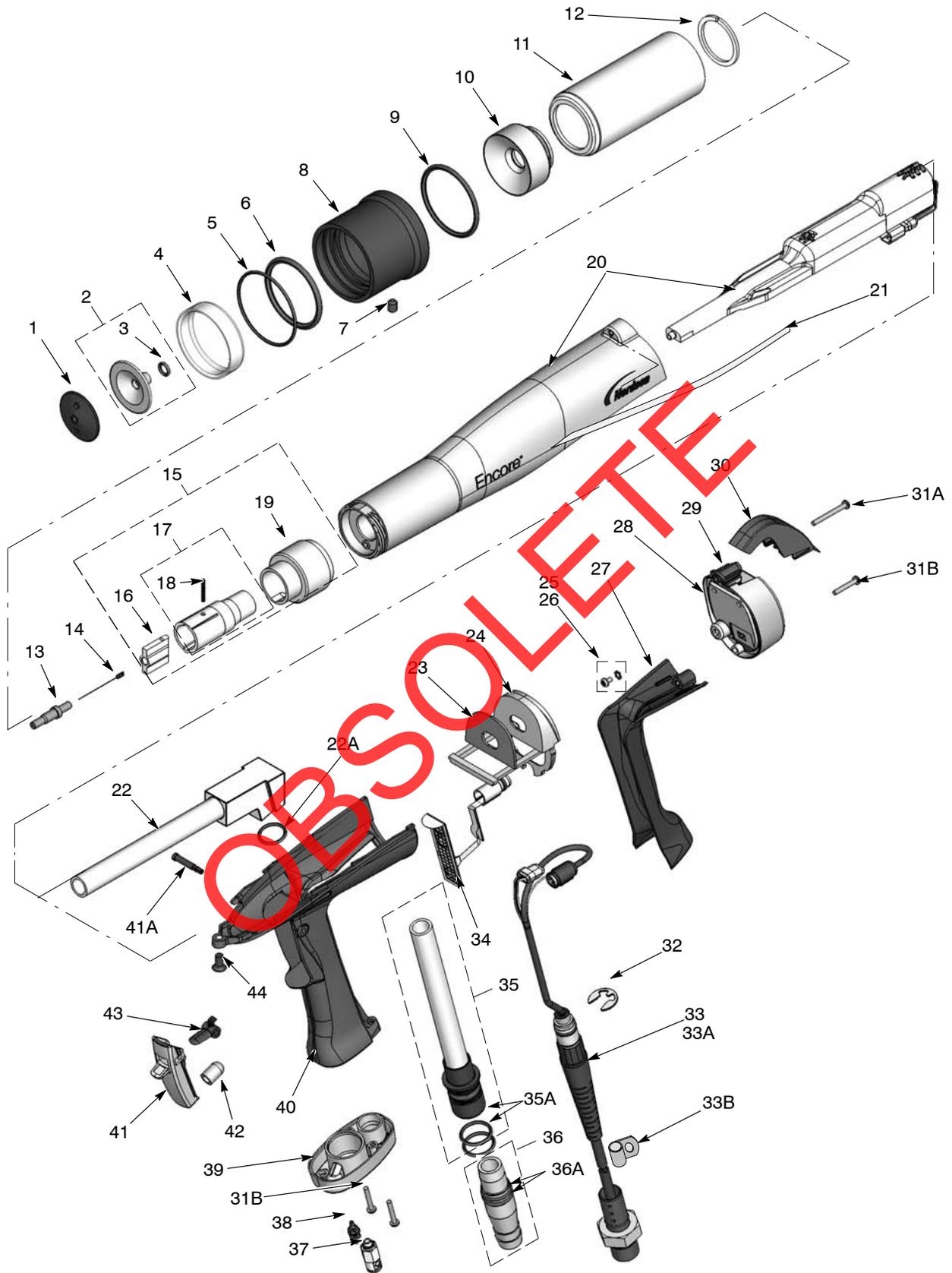


Figure 7-1 Exploded View of Encore PE Manual Spray Gun Parts

See Figure 7-1.

Item	Part	Description	Quantity	Note
–	1601416	SPRAY GUN, manual, Encore PE	1	
1	1601811	• RETAINER, deflector, 38 mm, Encore PE	1	
2	245523	• DEFLECTOR, 38 mm diameter, ceramic	1	
3	945016	• • O-RING, silicone, 0.251 x 0.40 x 0.074 in.	1	
4	246578	• INSERT, Pyrex	1	
5	940331	• O-RING, silicone, 2.00 x 2.175 x 0.063 in.	1	
6	942240	• O-RING, hotpaint, 1.75 x 2.00 x 0.125 in.	1	
7	982455	• SCREW, SET, M6 x 1.0 x 8, nylon, black	1	
8	1601433	• SLEEVE, pattern adjuster, Encore PE	1	
9	1602039	• O-RING, Buna-N, 46 x 3, 70 duro	1	
10	1601430	• NOZZLE, conical, Encore PE	1	
11	1601431	• NUT, nozzle, Encore PE	1	
12	1601422	• RING, retaining, nozzle, Encore PE	1	
13	1601814	• HOLDER, electrode, conical, Encore PE	1	
14	1602041	• ELECTRODE, spring contact, Encore PE	1	
15	1601423	• SUPPORT assembly, electrode, Encore PE	1	
16	1601428	• • SPIDER, ceramic, Encore PE	1	
17	1602193	• • KIT, sleeve, Encore PE	1	
18	1601429	• • • SPRING, compression, 0.088 x 0.75 long	1	
19	1602192	• • KIT, electrode support, Encore PE	1	
20	1608280	• KIT, negative power supply/manual body, Encore	1	A
21	1088558	• • FILTER assembly, handgun	1	
22	1601437	• ELBOW assembly, spray gun, Encore PE	1	
22A	940163	• • O-RING, silicone, 0.625 x 0.75 x 0.063 in.	1	
23	1088502	• GASKET, multiplier cover, handgun, Encore	1	
24	1106872	• BULKHEAD, multiplier, handgun, Encore LT/XT	1	
25	982427	• MACHINE SCREW, panhead, M3 x 6, zinc	1	
26	983520	• WASHER, lock, internal, M3, steel, zinc	1	
27	1106871	• HANDLE, ground pad, handgun, Encore LT/XT	1	
28	1087559	• COVER, gun display housing, Encore	1	
29	1087558	• HOUSING, gun display, Encore	1	
30	1087760	• HOOK, handgun, Encore	1	
31A	1078075	• SCREW, Phillips head, M3 x 30, zinc plate	1	
31B	760580	• SCREW, Phillips head, M3 x 20, zinc plate	3	
32	1081777	• RETAINING RING, external, 10 mm, E-ring	1	
33	1106756	• CABLE ASSEMBLY, spray gun, Encore LT/XT, 6 meter	1	
33A	940129	• • O-RING, silicone, conductive, 0.375 x 0.50in.	1	
33B	1604500	• • CLAMP, cable, 0.25 ID x 0.05 thick, white	1	
34	1108095	• KIT, trigger switch, Encore	1	

Continued...

**7-4** Parts

Item	Part	Description	Quantity	Note
35	1601439	• INLET assembly, powder, Encore PE	1	
35A	1084773	• • O-RING, silicone, 18 mm ID x 2 mm W, 70 duro	2	
36	1601756	• ADAPTER assembly, hose, spray gun, M, Encore PE	1	
36A	940157	• • O-RING, Viton, black, 0.563 x 0.688, 10415	2	
37	1081617	• CHECK VALVE, male, M5 x 6 mm tube	1	
38	1081616	• FITTING, bulkhead, barbed, dual, 10–32 x 4 mm tubing		
39	1087762	• BASE, handle, handgun, Encore	1	
40	1106870	• HANDLE, handgun, Encore LT/XT	1	
41	1606999	• KIT, trigger w\ axle, Encore	1	
41A	-----	• • AXLE, trigger, solid, spray gun, Encore	1	
42	1106892	• • ACTUATOR, switch, trigger, Encore LT/XT	1	
43	1081540	• TRIGGER, purge, setting, handgun	1	
44	1088601	• SCREW, flat head, recessed, M5 x 10, nylon	1	
NS	900617	• TUBE, polyurethane, 4 mm OD, clear	AR	B
NS	900741	• TUBING, polyurethane, 6/4 mm, black	AR	B
NS	900620	• TUBING, poly, spiral cut, 3/8 in ID	AR	B
<p>NOTE A: Application Specific: Order part number 1609053 if a positive power supply is needed. The positive power supply is sold separately from the gun body (1088506).</p> <p>B: Refer to Powder Hose and Air Tubing on page 7-11 for minimum order quantities.</p>				

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# Spray Gun Options

## Cable Extension

Item	Part	Description	Quantity	Note
NS	1085168	CABLE, 6 meter extension, shielded, Encore manual	1	
NS: Not Shown				

## Optional Flat and Corner Spray Nozzles

Spray guns are shipped with a conical nozzle. If replacing the conical nozzle with an optional flat or corner spray nozzle, order a new nozzle nut and flat spray electrode holder kit along with a nozzle.

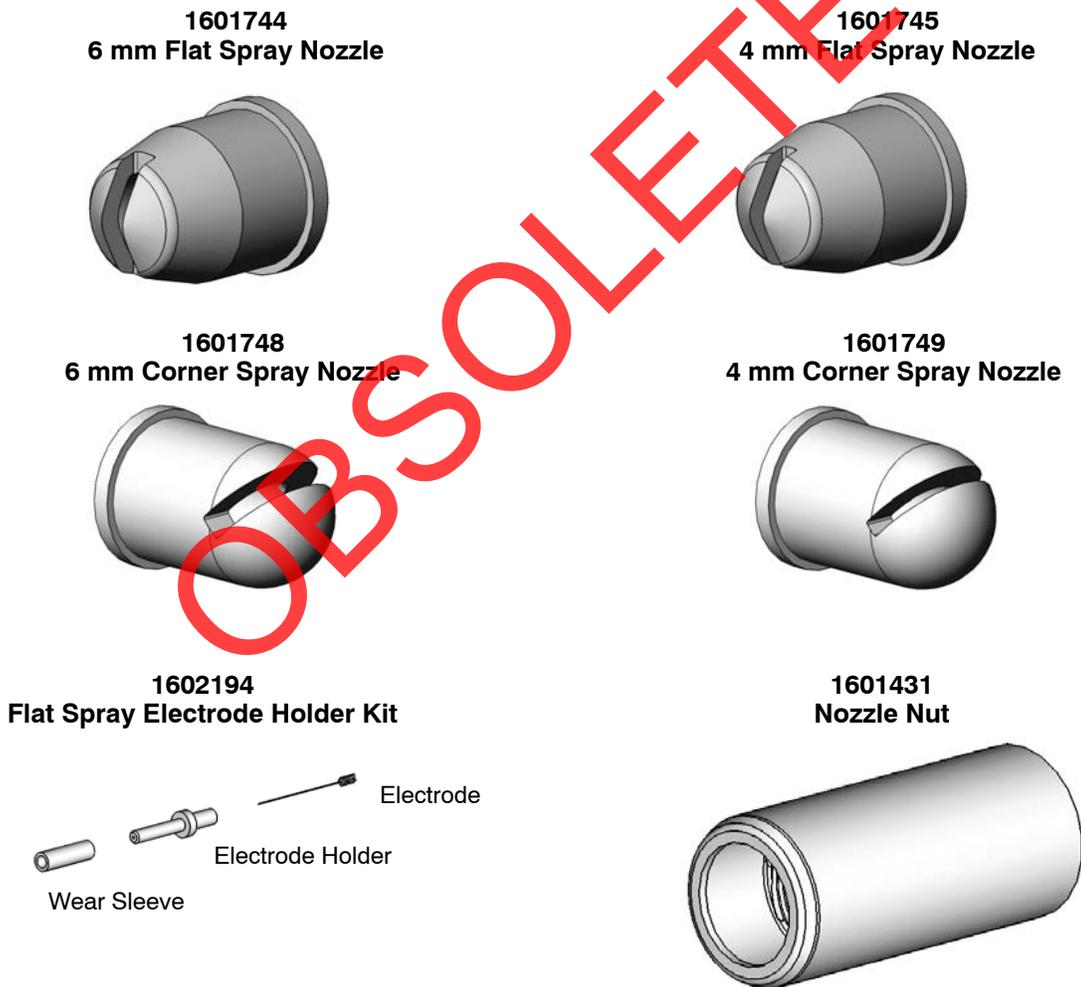


Figure 7-2 Optional Flat and Corner Spray Nozzles

# Controller Parts

## Front Panel and Internal Cabinet Ground Parts Illustration

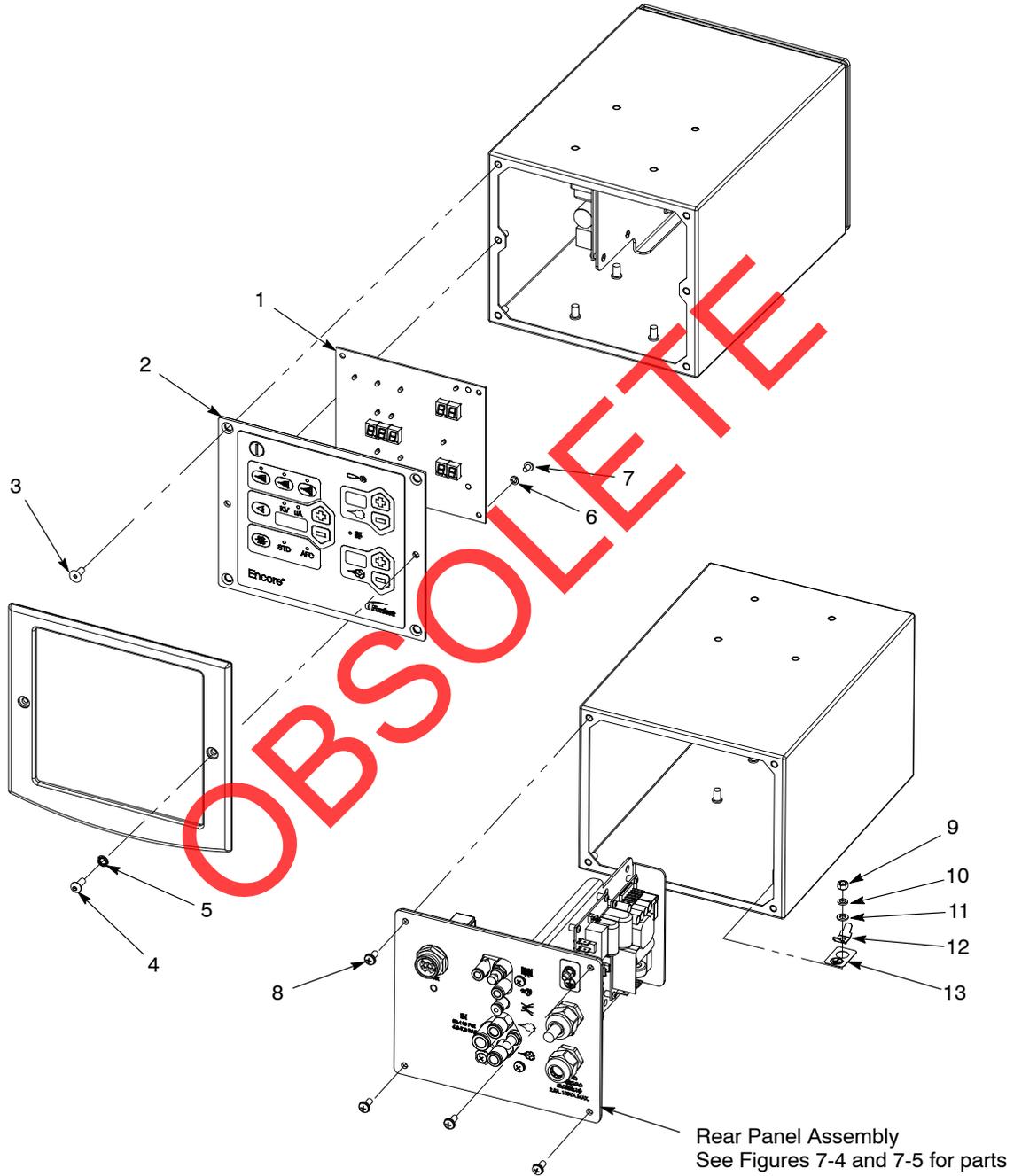


Figure 7-3 Controller Parts

## Front Panel and Internal Cabinet Ground Parts List

Refer to Figure 7-3.

Item	Part	Description	Quantity	Note
-	1107552	CONTROLLER ASSY, manual, Encore LT, packaged	1	
1	1108279	• KIT, PCA, control, Encore LT	1	
2	1108312	• PANEL, keypad, Encore LT/auto controller, packaged	1	
3	982916	• SCREW, flat, socket, M5 x 10, black	4	
4	982636	• SCREW, button, socket, M5 x 12, zinc	2	
5	983127	• WASHER, lock, internal, M5, zinc	2	
6	983403	• WASHER, lock, split, M4, steel, zinc	4	
7	982881	• SCREW, pan head, recessed, M4 x 6, zinc	2	
8	1045837	• SCREW, pan head, recessed, M5 x 12 w/lockwasher, black	2	
9	984702	• NUT, hex, M5, brass	1	
10	983401	• WASHER, lock, split, M5, steel, zinc	1	
11	983021	• WASHER, flat, 0.203 x 0.406 x 0.040, brass	1	
12	933469	• LUG, 90, double, 0.250, 0.438 in.	1	
13	240674	• TAG, ground	1	

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**Rear Panel Parts List**

Refer to Figure 7-4.

Item	Part	Description	Quantity	Note
14	984526	• NUT, lock, 1/2 in. conduit	1	A
15	939122	• SEAL, conduit fitting, 1/2 in., blue	1	
16	1107539	• RECEPTACLE, gun, Encore LT	1	
17	1045837	• SCREW, pan head, recessed, M5 x 12, with lockwasher, black	4	
18	1068715	• WASHER, lock, dished, #10	1	
19	972930	• PLUG, push in, 8 mm tubing, plastic	1	
20	972808	• CONNECTOR, strain relief, 1/2 in. NPT	2	
21	984192	• NUT, lock, 1/2 in. NPT, nylon	2	
22	1107549	• GASKET, panel, rear, Encore LT controller	1	
23	982824	• SCREW, pan head, recessed, M3 x 8, with lockwasher, black	10	
24	1107696	• FILTER, line, RFI power, 3A, with 0.250 OD	1	
25	1606835	• KIT, PCA, relay board, Encore LT-HD	1	
26	1107695	• POWER SUPPLY, 24VDC, 60W	1	

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## Manifold Illustration and Parts List

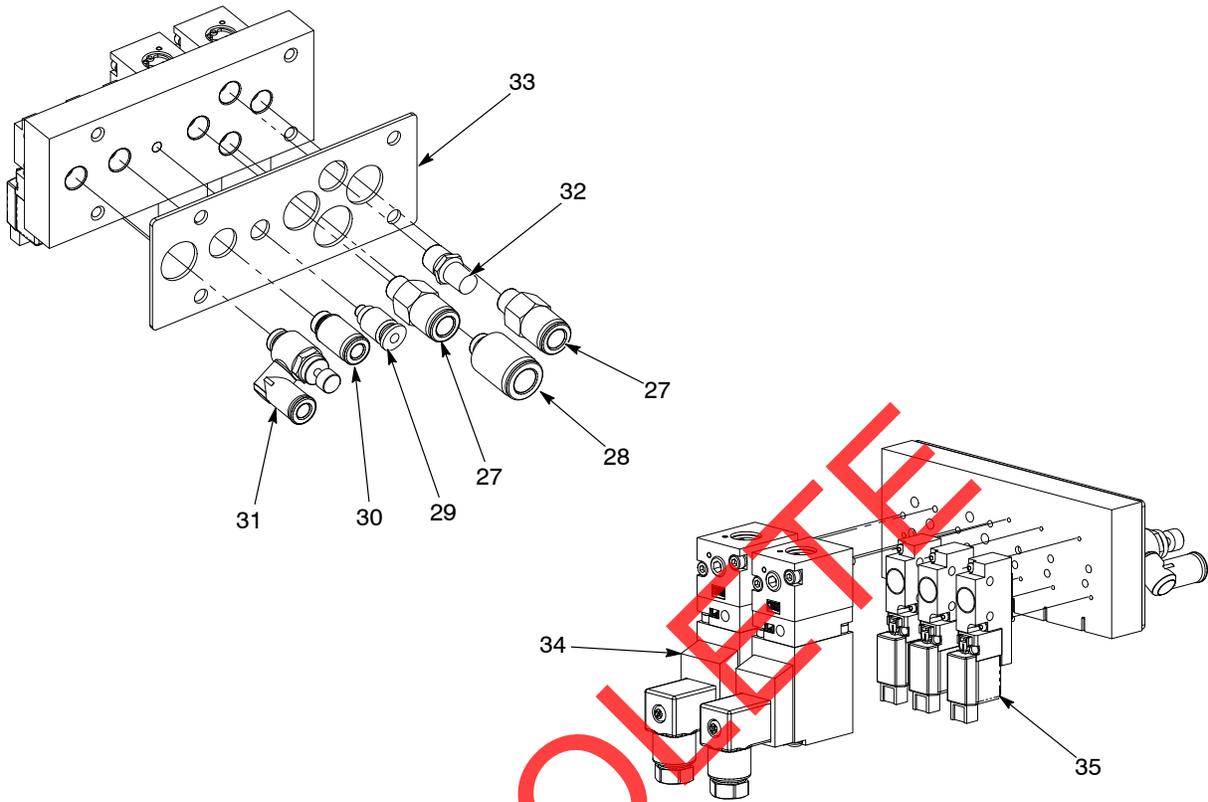


Figure 7-5 Manifold Parts

Item	Part	Description	Quantity	Note
27	1030873	• VALVE, check, M8 x R1/8, M input	2	
28	1107596	• CONNECTOR, male, with internal hex, 10 mm tube x 1/8 unithread	1	
29	1062009	• CONNECTOR, male, with internal hex, oval collar, 4 mm tube x M5	1	
30	972399	• CONNECTOR, male, with internal hex, 6 mm tube x 1/8 unithread	1	
31	1604486	• VALVE, flow control, 6 mm x 1/8 unithread	1	
32	1108313	• MUFFLER, exhaust, R1/8	1	
33	1107593	• GASKET, manifold, controller, Encore LT	1	
34	1107597	• REGULATOR, electro-pneumatic	2	
35	1099281	• VALVE, solenoid, 3 port, 24V, 0.35W	3	

# System Components and Parts

## System Components and Kits

Item	Part	Description	Quantity	Note
NS	1602269	ASSEMBLY, pickup tube, Encore PE	1	
NS	1604292	HOPPER assembly, NHR Encore PE, 50 lb, packaged	1	
NS	1107552	CONTROLLER, manual, Encore LT, packaged	1	
NS	1602268	PUMP assembly, 90°, Encore PE	1	
NS	1107913	KIT, rail mount, Encore LT	1	
NS	1067694	KIT, ground bus bar, ESD, 6 position, w/hardware	1	
NS	1600658	HANGER, gun, Encore LT	1	
NS	1600566	KIT, filter, Encore LT	1	A
NS	1600608	• FILTER, mist separator, 0.3 micron, 1/2 in. NPT	1	
NS	1600609	• • FILTER ELEMENT, separator, 0.3 micron	1	
NS	1604487	VALVE, flow control, 4-mm tube x 4-mm tube	1	B

NOTE A: Filter kit includes fittings and mounting bracket.  
 C: Connect to air wash connector on controller rear panel to control air flow.  
 NS: Not Shown

## Powder Hose and Air Tubing

Note the minimum quantity of tubing before ordering.

Part	Description	Note
900617	Air tubing, polyurethane, 4 mm, clear	A
900742	Air tubing, polyurethane, 6 mm, blue	A
900741	Air tubing, polyurethane, 6 mm, black	
900618	Air tubing, polyurethane, 8 mm, blue	A
900619	Air tubing, polyurethane, 8 mm, black	A
900740	Air tubing, polyurethane, 10 mm, blue	A
900724	Tubing, powder, polyurethane, 0.485, clear	B
900517	Tubing, poly, spiral cut, 0.62 in. ID	
301841	Strap, Velcro, w/buckle, 25 x 3 cm	

NOTE A: Minimum order quantity is 50 ft. (15.24 m).  
 D: Powder feed hose. Minimum order is 25 ft. (7.62 m).

**System Options**

Part	Description	Quantity	Note
1091429	KIT, input air, Encore manual systems	1	
972841	• CONNECTOR, male, 10 mm tube x 1/4 in. unithread	1	
971102	• CONNECTOR, male, 10 mm tube x 3/8 in. unithread	1	
973500	• COUPLING, pipe, hydraulic, 1/4 in., steel, zinc	1	
973520	• COUPLING, pipe, hydraulic, 3/8 in., steel, zinc	1	
900740	• TUBING, polyurethane, 10 mm, blue	20 ft	A
NOTE A: Replacement tubing has a minimum order quantity of 50 ft.			

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*Section 8*  
**Wiring Diagram**

**OBSOLETE**

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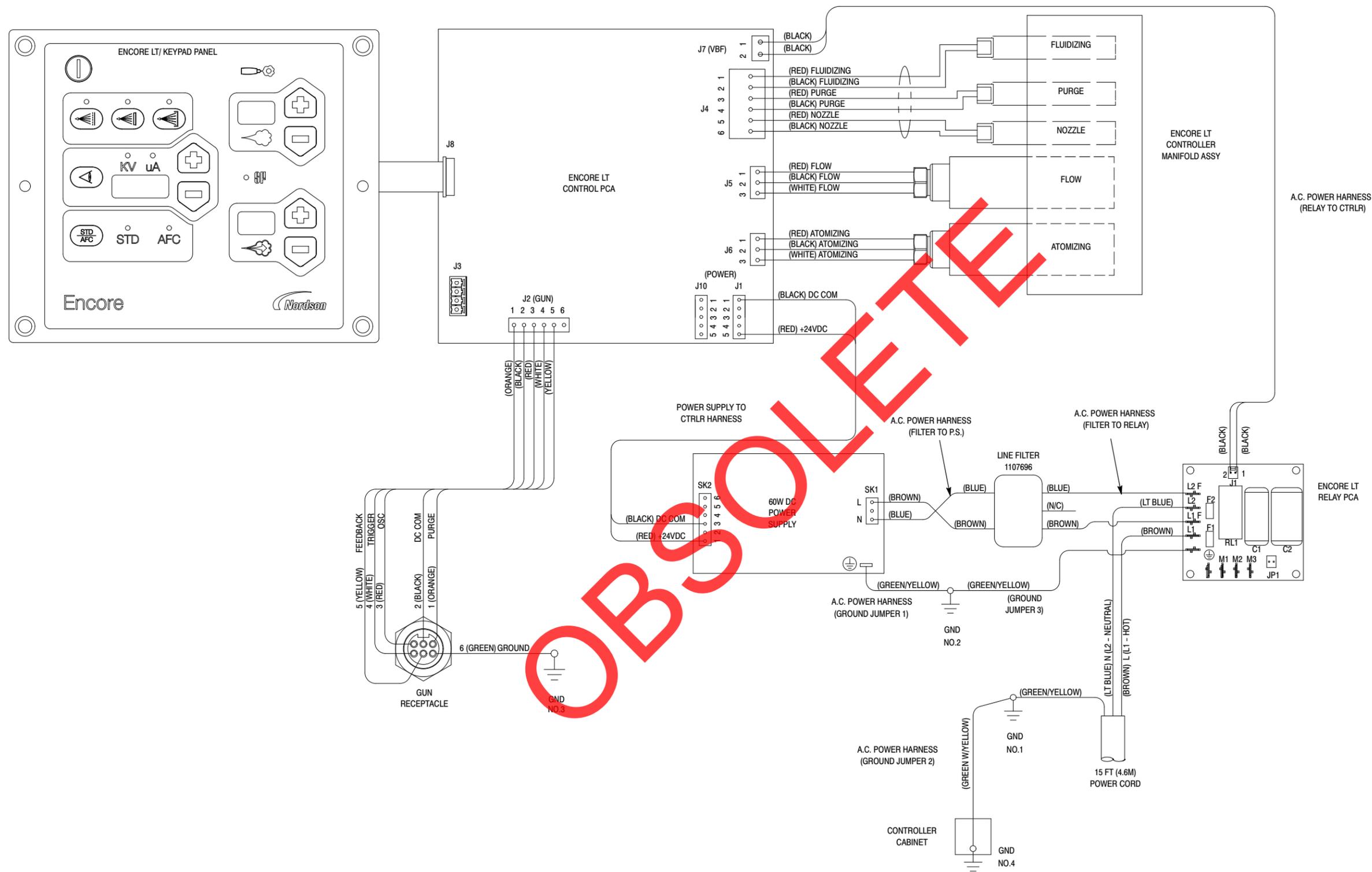


Figure 7-1 Encore LT Manual Controller Wiring Diagram