

# Encore® HD Manual Powder Spray System

Customer Product Manual

Part 1605707-04

Issued 07/18

**For parts and technical support, call the Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.**

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# Change Record

Revision	Date	Change
01	10/15	New release
02	02/18	Added mobile system components to manual.
03	04/18	Added illustrations showing the Encore HD pump.
04	07/18	Added HD, HD+, and HXD System part numbers, added nLighten information



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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.



## Section 2

# Description

## Introduction

See Figure 2-1. This manual covers all versions of the Encore® HD manual powder spray systems:

- Mobile Dolly System with Vibratory Box Feeder (VBF)
- Mobile Dolly System with Feed Hopper
- Standalone Systems – Single and Dual Configurations
- Rail Mount and Wall Mount Systems

**Vibratory Box Feeder**



**Feed Hopper**



**Standalone**



**Rail/Wall Mount**

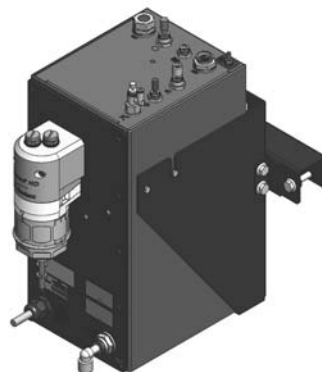


Figure 2-1 Encore HD Manual Powder Systems

## **Mobile System Components**

See Figure 2-2.

Mobile Systems include:

- Encore HD manual system controller
- Encore HD manual spray gun and cable
- Encore HD powder feed pump
- Encore HD pump control unit
- Encore pump pickup tube
- One of the following, based on system version:
  - Vibratory table and motor – up to 50 lb (25.0 kg) box of powder
  - 50 lb (25.0 kg) Encore round feed hopper – fluidizes powder with low-pressure compressed air
- Factory installed powder hose oriented under the base of the dolly.  
**NOTE:** The powder hose should always be oriented in a 3 m diameter, horizontal to the ground.
- 8-mm powder hose, 4-mm air tubing, spiral wrap, Velcro<sup>®</sup> straps, barbed fitting
- Air filter
- Accessories for future use:
  - Bracket
  - Grounding block
  - Adapter

The components are mounted on a sturdy wheeled dolly.

## Standalone and Rail/Wall System Components

See Figure 2-2.

Standalone and Rail/Wall Systems include:

- Encore HD manual system controller
- Encore HD manual spray gun and cable
- Encore HD powder feed pump
- Encore HD pump control unit
- Pump adapter kit and coupling for use on HR/NHR feed hoppers

**NOTE:** Hoppers are sold separately.

- Stand included with standalone systems
- Rail/Wall mount brackets for rail/wall systems
- Grounding kit
- 8-mm powder hose, 4-mm air tubing, spiral wrap, Velcro straps
- Air filter kit included with standalone only.

**NOTE:** Order separately for rail/wall systems.

**Encore HD  
Powder Spray Gun**



**Encore HD Manual  
System Controller**



**Pump Control Unit  
with Powder Feed Pump**



Figure 2-2 Common System Components (NOTE: Not all system configuration components shown)

## Specifications

Model	Input Rating	Output Rating
Encore HD Applicator	+/- 19 VAC, 1 A	100 KV, 100 $\mu$ A
Encore HD Interface Control Unit	24 VDC, 2.0 A	+/- 19 VAC, 1A
Encore HD Controller Power Unit	100–240 VAC, 50/60 Hz, 125 VA	24 VDC, 2.5 A
Vibratory Motor 50 Hz	230 VAC, +/- 10%	NA
Vibratory Motor 60 Hz	115 VAC, +/- 10%	NA

Input Air:	6.0–7.6 bar (87–110 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)
Hazardous Location Rating for Applicator:	Zone 21 or Class II, Division 1
Hazardous Location Rating for Controls:	Zone 22 or Class II, Division 2
Dust Ingress Protection:	IP6X
Vibrator Table Capacity:	25 kg (50 lb) box of powder
Hopper Capacity:	11.3 or 22.7 kg (25 or 50 lb)

### ***Mobile System with VBF***

Height:	1078 mm (42.5 in.)
Wheel Base:	620 (24.4) L x 511.5 (20.1) W
Weight:	50.8 kg (112 lbs)

### ***Mobile System with 50 lb. Feed Hopper***

Height:	1078 mm (42.5 in.)
Wheel Base:	620 (24.4) L x 511.5 (20.1) W
Weight:	54.4 kg (120 lbs)

**Applicator Certification Label**

1603105-02

**Controller Certification Label**

1606122-02

**Power Unit Certification Label**

1606121-02





## Section 3

# Installation



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

### Required Installation Tools

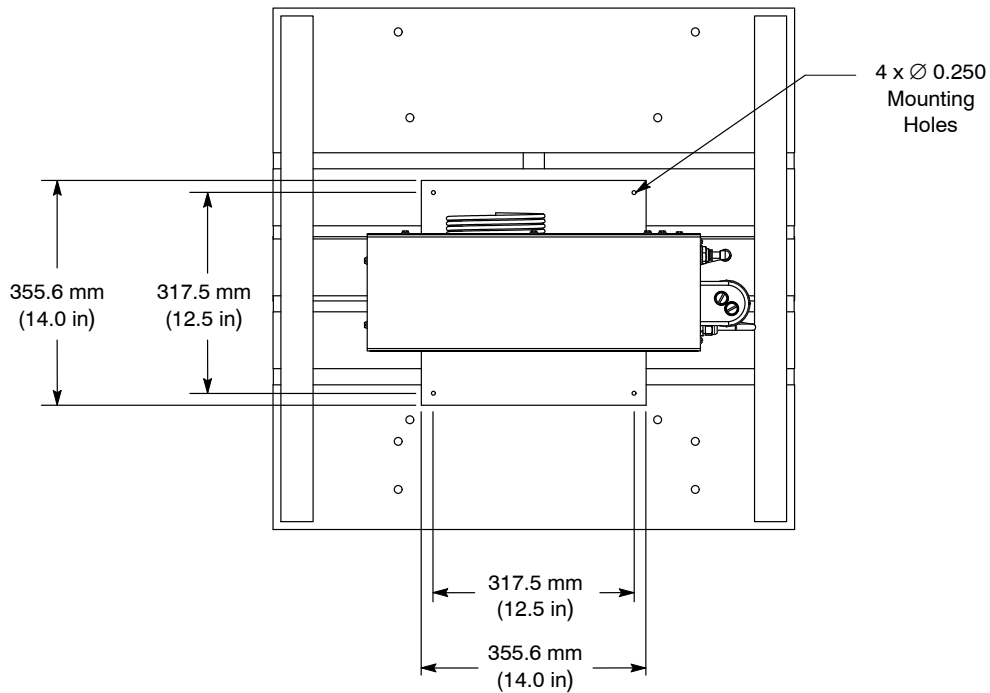
- Flathead screw driver
- Scissors
- Tube cutters
- Wrench
- Pliers
- Drill
- Masonry drill bit included in anchoring kit (Standalone systems only)
- Tapcon<sup>®</sup> screws included in anchoring kit (Standalone systems only)

# Standalone System

## Anchoring Stand

**NOTE:** Masonry bit and Tapcon screws provided with anchoring kit.

1. See Figure 3-1 Using masonry bit, drill holes in platform or floor using the dimensions shown.
2. Anchor the stand to floor or platform using Tapcon screws supplied with kit.



10013908

Figure 3-1 Anchoring Stand

## Hopper Installation for Feed Hopper System

1. See Figure 3-2. Unclamp the hopper lid and remove the vent hose and hose clamps.
2. Place the hopper on the dolly platform so that the bottom of the fluidizing pan fits into the cutout in the dolly platform.
3. Connect the 10-mm stem x 6-mm tube reducer to the 10-mm elbow fitting on the fluidizing pan.
4. Connect the 6-mm blue fluidizing air tubing to the reducer.
5. Connect the ring-tong terminal on the 1-ft green/yellow ground cable shipped with the system to the ground stud on the side of the fluidizing pan, then plug the cable into the grounding socket on the dolly base.
6. Install the hose clamp over the end of the vent hose and connect the hose to the vent stack on the lid. Tighten the clamp to secure the hose.
7. Route the suction line from the pump to the pickup tube from the hopper.

**NOTE:** Before turning on the controller interface, route the other end of the vent hose to a vent stub on a color module or into the spray booth. This prevents the very fine powder particles in the vented fluidizing air from contaminating the spray room.

**NOTE:** On VBF mobile systems, all pneumatic connections are factory installed.

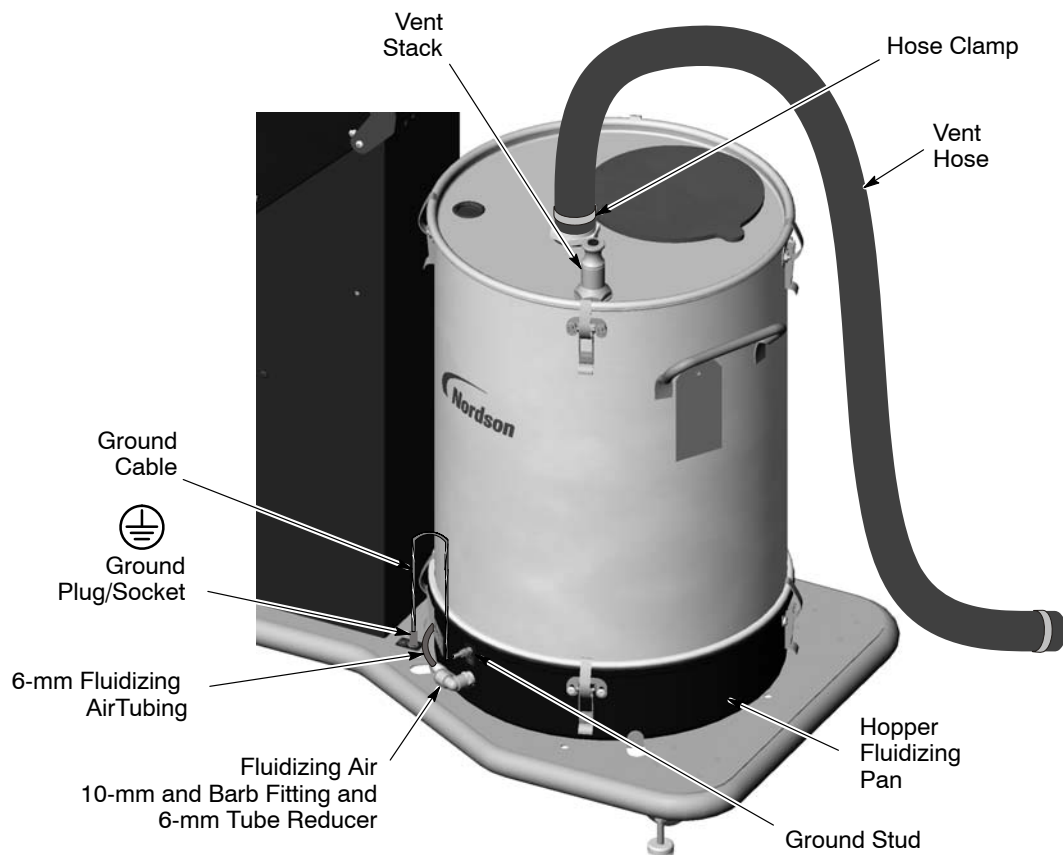


Figure 3-2 Hopper Installation on Mobile System Dolly

## Setup Common to All Manual Systems

### Controller Connections

See Figures 3-3 and 3-4. The controls for the system consist of a two piece unit connected by a network/power cable.

- Pump control unit: houses a 24Vdc power supply, circuit board, and iFlow® air control manifold.
- Spray System Controller: houses the controller interface panel, which contains the displays and controls used to make controller function settings and spray settings.

Connect the gray 3 m (10 ft) network cable to the net/auxiliary receptacles on the system controller and pump control unit. See the *Spray Gun Connections* section for additional information on the gun cable installation.

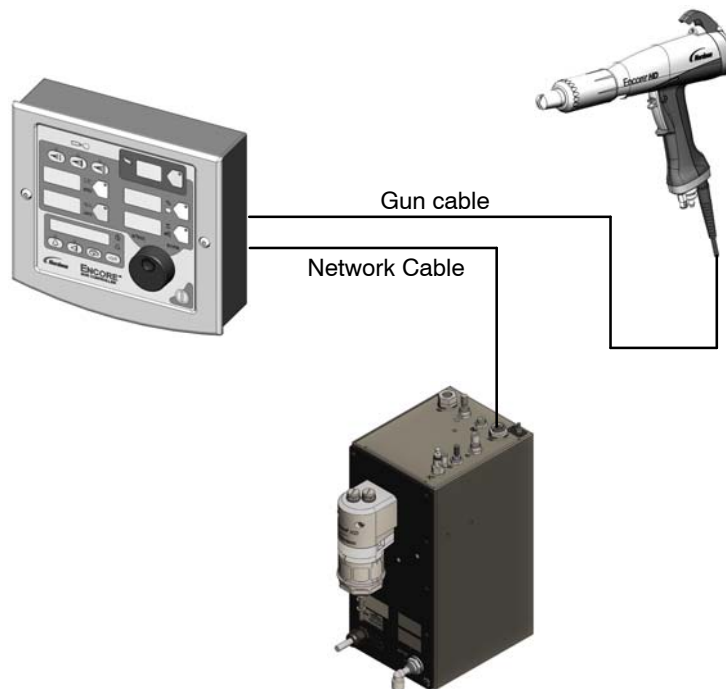


Figure 3-3 Controller Connections

### Spray Gun Connections

Unpack the spray gun. Uncoil the spray gun cable and the included clear 4-mm and blue 6-mm air tubing. Connect the gun cable and air tubing as described in the following procedures.

## Spray Gun Cable

1. Mobile System: See Figure 3-4. Feed the spray gun cable into the back of the dolly tower and up through the top front. This will allow the user to bundle the cable with the pattern and electrode air wash tubing.
2. Connect the cable to the spray system controller receptacle labeled *GUN*. The cable plug and receptacle are keyed.
3. Thread the cable nut onto the receptacle and tighten the nut securely.

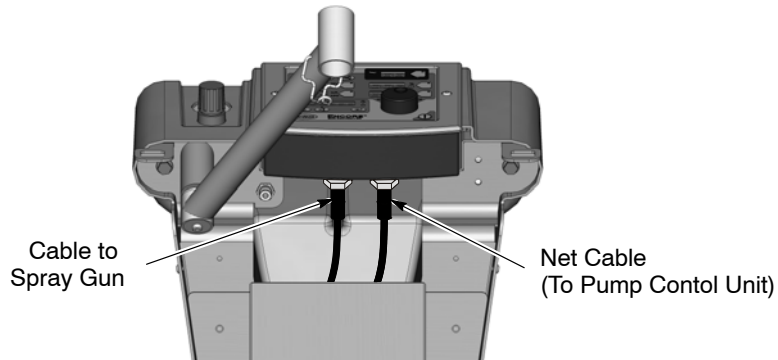


Figure 3-4 Spray Gun Cable Connection to System Controller – Mobile System Shown

## Air Tubing and Powder Hose

**NOTE:** Prior to cutting tubing to length, measure to the same length as the spray gun cable.

See Figure 3-5.

1. Connect the 6-mm blue pattern air tubing to the quick-disconnect fitting in the gun handle. Connect the other end to the pattern air fitting on the pump control unit. Cut the air tubing to required system length.
2. Connect the 4-mm clear electrode air wash tubing to the barbed fitting in the gun handle. Connect the other end to the gun air fitting on the pump control unit. Cut the air tubing to required system length.
3. Push the barbed hose adapter into the end of the powder hose, then plug the adapter into the powder inlet tube in the bottom of the spray gun handle.
4. For hopper pickup tubes, place barb into push-to-connect fittings on pickup tube. Install the powder hose.

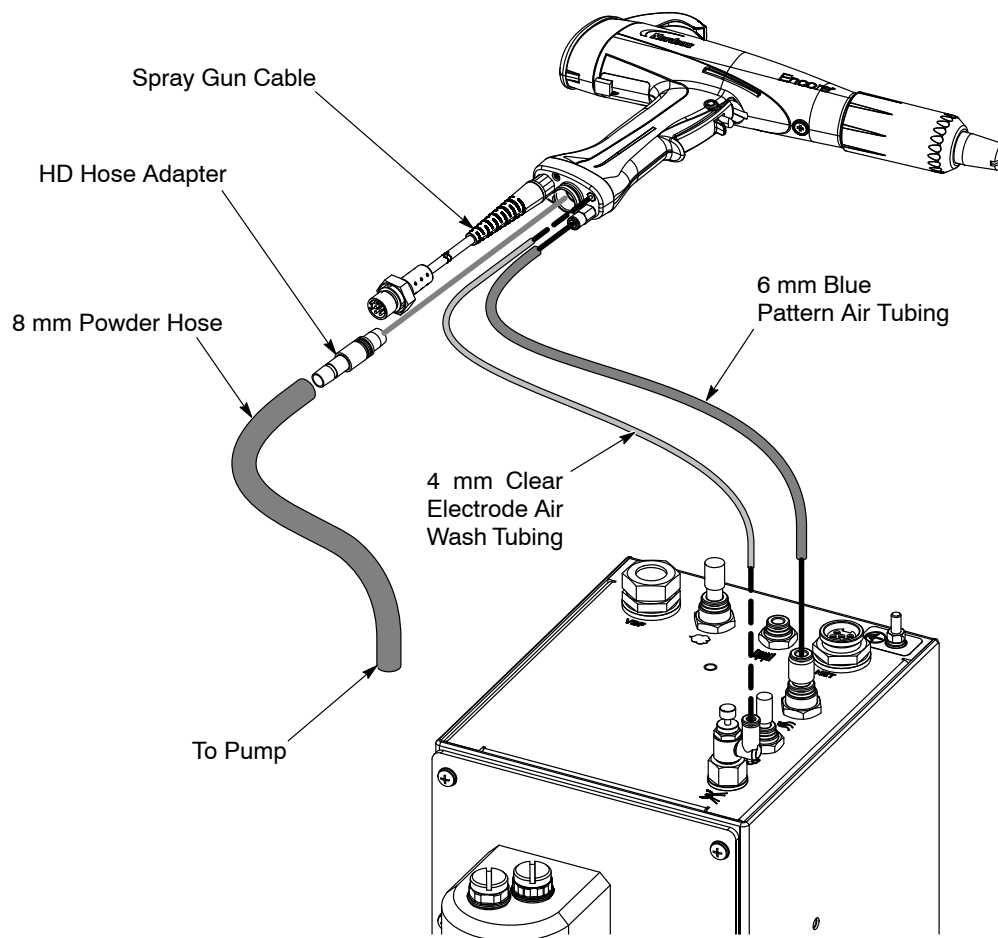


Figure 3-5 Spray Gun Connections

**NOTE:** See Figure 3-6. The minimum powder hose length is 60 ft.

**For the Mobile Systems:** The tubing is coiled under the dolly platform. If additional distance from dolly is required, open the tube holders and uncoil to the required length. Close the tube holders, being careful not to over tighten.

**For Standalone and Rail/Wall systems:** The tubing must be coiled in a 3 ft diameter in a horizontal orientation.

### Bundling Tubing and Cable

See Figure 3-6. Use the sections of black spiral wrap supplied with the system to bundle together the spray gun cable, air tubing, and powder hose.

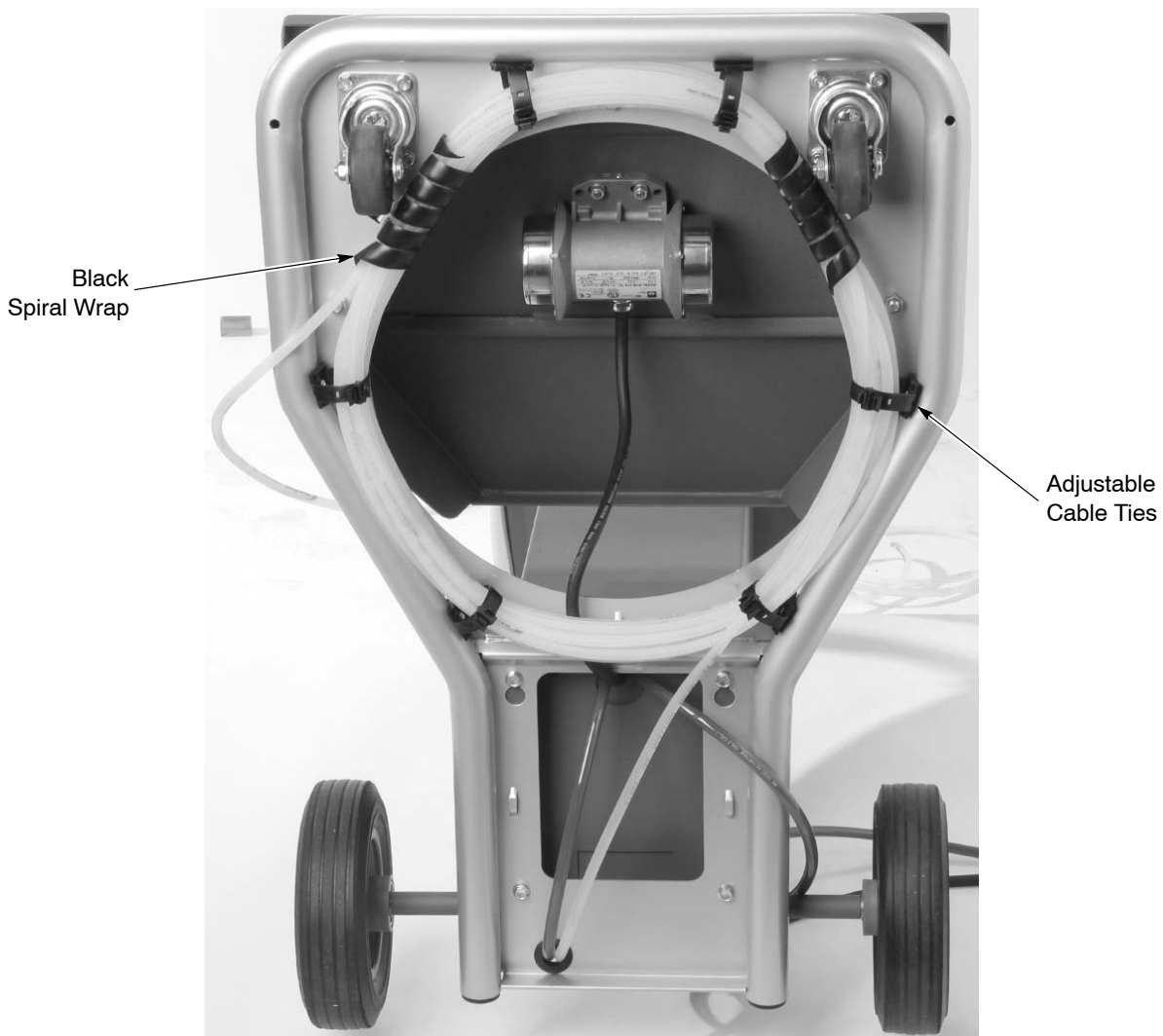


Figure 3-6 Bundling Tubing (Shown with Mobile System)

## Main System Air and Electrical Connections

### Main System Air Supply

See Figure 3-7. The air supply pressure should be 6.0–7.6 bar (87–110 psi).

For rail/wall mount systems, an optional input air kit with connectors, couplings, and 20 ft of 10 mm tubing is available. Refer to the *Parts* section for the kit contents and ordering information.

**NOTE:** 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.

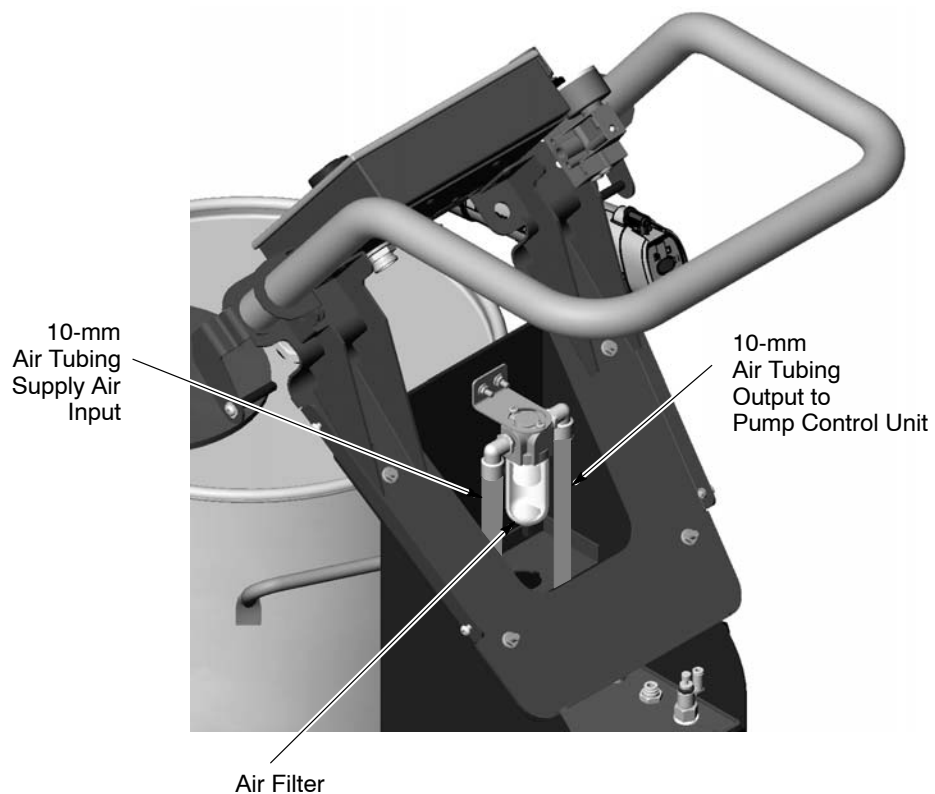


Figure 3-7 System Air Supply Connection (Shown with Mobile System)



## Standalone, Rail Mount, and Wall Mount System Air Supply

See Figure 3-8.

1. Note the orientation of the flow indicator (5) on the top of the filter.

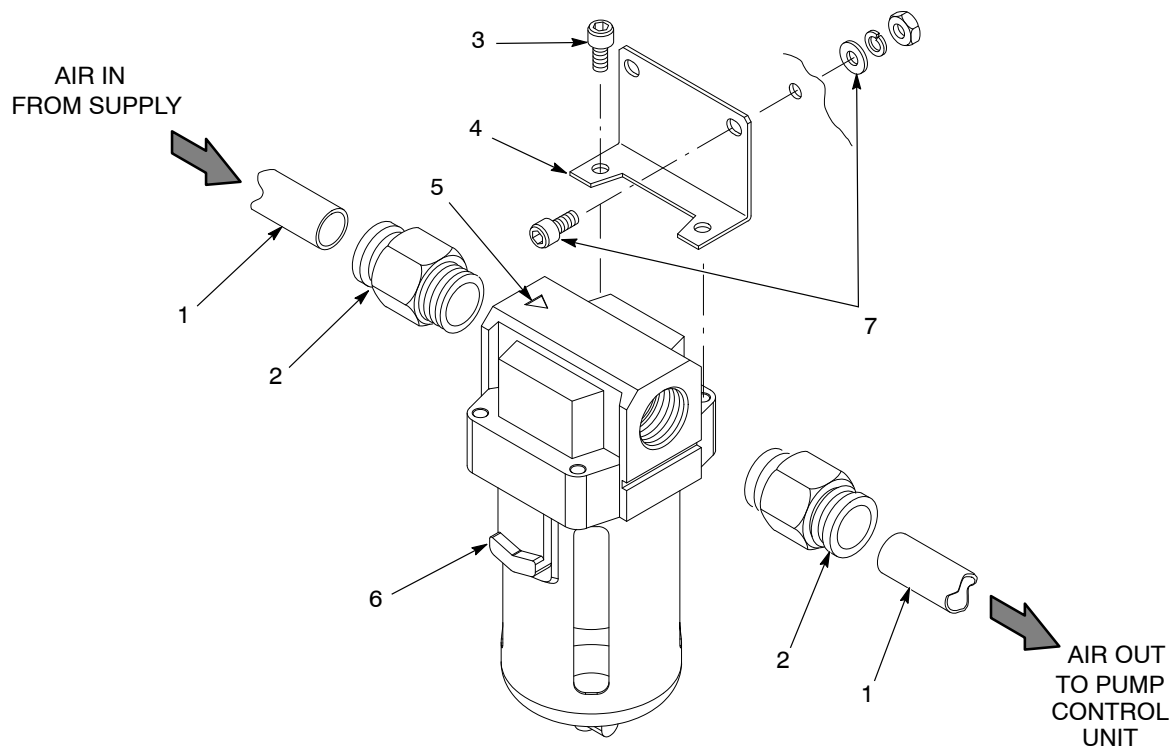


Figure 3-8 Air Filter Installation – Standalone and Rail/Wall Mount Systems

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

## Main Electrical Connection



**CAUTION:** If you are setting up a vibratory box feeder system, check the system identification plate for the correct voltage. Connecting a system with a 115 Vac vibrator motor to 230 Vac could damage the vibrator motor.

**NOTE:** The spray gun system controller is rated for 100–240 Vac at 50/60 Hz, single phase, and is marked as such, but the power supplied to the system must match the vibrator motor rating.

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

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

## System Ground



**WARNING:** All conductive system components in the spray area must be connected to a true earth ground. Failure to observe this warning could result in an electrostatic discharge strong enough to cause a fire or explosion.

## Mobile Systems

See Figure 3-9. Connect the ground cable attached to the pump control unit ground stud to a true earth ground.

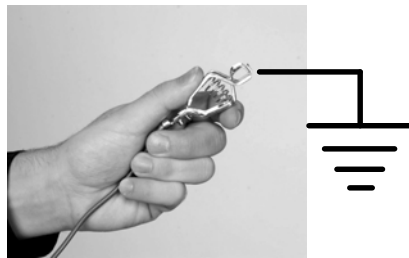


Figure 3-9 System Ground Connection

## Standalone and Rail/Wall Mount Systems

Use the ESD ground bus bar kit included with the system to connect the pump control unit ground stud to the grounded spray booth or a true earth ground. Refer to the instructions included with the kit.

## 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.

## European Union, ATEX, Special Conditions for Safe Use

1. The Encore HD manual applicator shall only be used with the associated Encore XT/HD interface control unit and the Encore HD controller power unit, over the ambient temperature range of +15 °C to +40 °C.
2. Equipment may only be used in areas of low impact risk.
3. Caution should be taken when cleaning plastic surfaces of the Encore HD controller and interface. There is a potential for static electricity build up on these components.

## VBF Powder Box Installation

**NOTE:** The vibrator table can hold a maximum 25 kg (50 lb) box of powder.



**WARNING:** The fluidizing tubing supplied with this system is conductive and also supplies the grounding path. Use only the tubing supplied with this system. Use of non-conductive tubing could lead to a shock hazard, fire, or serious injury.

1. See Figure 4-1. Lift the pickup tube up and swing the tube catch down and under the pickup tube end to hold it in place on the arm.
2. See Figure 4-2. Place a box of powder on the vibrator table.
3. Fold back the box flaps and open the plastic bag containing the powder coating. Fold the bag over the box flaps to keep the flaps out of the way.

**NOTE:** Do not force the end of the pickup tube into the powder. Vibration and gravity will cause the pickup tube to sink into the powder.

4. Swing the pickup tube catch out from under the pickup tube and slide the tube down into the powder.
5. To prevent accidental powder spills, wrap the plastic bag around the pickup tube and loosely secure the bag with a tie wrap.

**NOTE:** See page 4-4 for recommended pressure at startup.

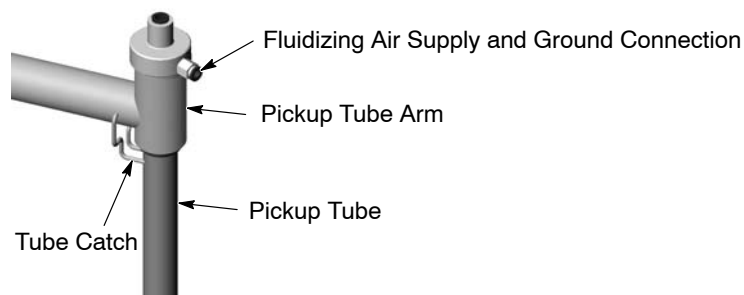


Figure 4-1 Pickup Tube Bracket Use

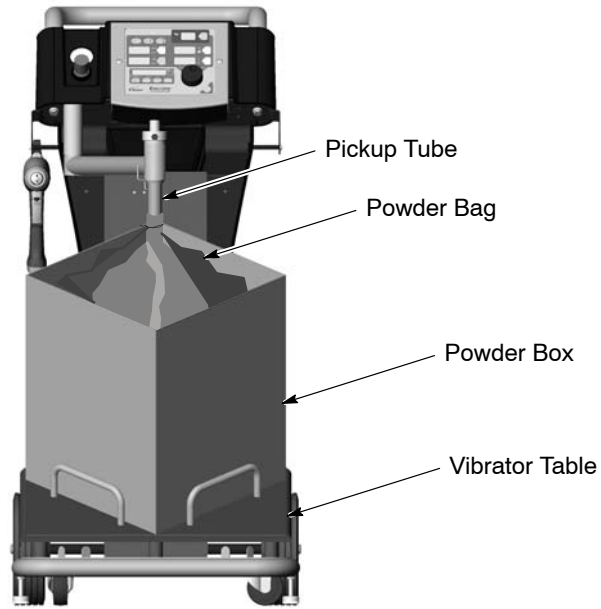


Figure 4-2 Powder Box Startup

## Feed Hopper Filling Startup

Remove the rubber plug from the hopper lid and fill the hopper 1/2 full of powder. Do not overfill, as the powder volume will increase when fluidizing air is turned on. Make sure the vent hose is connected to the powder booth, so that vented fine powder dust does not contaminate the spray room.

**NOTE:** See page 4-4 for recommended pressure at startup.

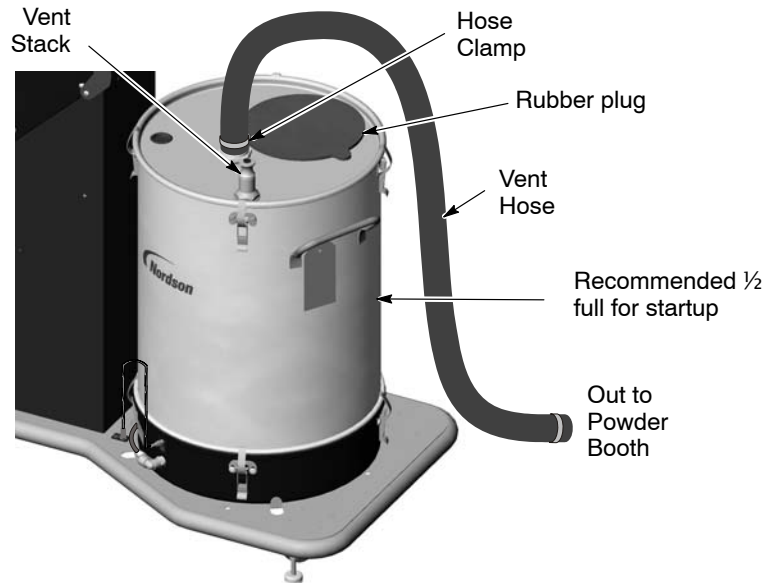


Figure 4-3 Powder Feed Hopper Startup

## Fluidizing Air Operation

### *Powder Feed Hopper*

If the system controller is configured for a powder feed hopper, then turning on the interface power turns on fluidizing air to the hopper. Adjust the fluidizing air pressure to 0.3–0.7 bar (5–10 psi). The pressure should be just enough so the powder in the hopper “boils” gently. The fluidizing air causes the powder to increase in volume.

Fluidize the powder for 5–10 minutes to make sure it is evenly fluidized and no clumps are left before spraying.

**NOTE:** Over or under fluidization is a common cause of inconsistent delivery.

### *Vibratory Box Feeder*

If the controller is configured for a vibratory box feeder, then the fluidizing air is turned on and off when the spray gun is triggered on and off.

Adjust the fluidizing air pressure to 0.3–0.7 bar (psi – as low as possible; approximately 1 psi). The pressure should fluidize the powder just around the pickup tube. The powder should not boil violently or fountain out of the box. Over fluidization can cause loss of powder flow.

When the spray gun is triggered off, the vibrator motor remains on for a configurable delay. This delay prevents rapid on/off motor cycling every time you trigger the gun off and on and prolongs the life of the motor. The default delay time is 30 seconds.

The vibrator motor can also be set to continuous operation. If set this way, press and release the spray gun trigger to start the motor. To turn off the motor, set the interface to Standby or turn off the system controller power.

To configure the system for a vibratory box feeder, change the VBF delay time, or set the vibrator motor to continuous operation, refer to *Controller Configuration* in the system controller operator manual.

**NOTE:** Over or under fluidization is a common cause of inconsistent delivery.

## 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 turns on and off automatically when the spray gun is triggered on and off.

The air flow needle valve on the power unit is set at the factory for the most common applications ( $1\frac{1}{2}$  turns CCW from fully closed position), but can be adjusted if needed.

**NOTE:** Excessive electrode air wash will create a void in the center of the spray pattern.

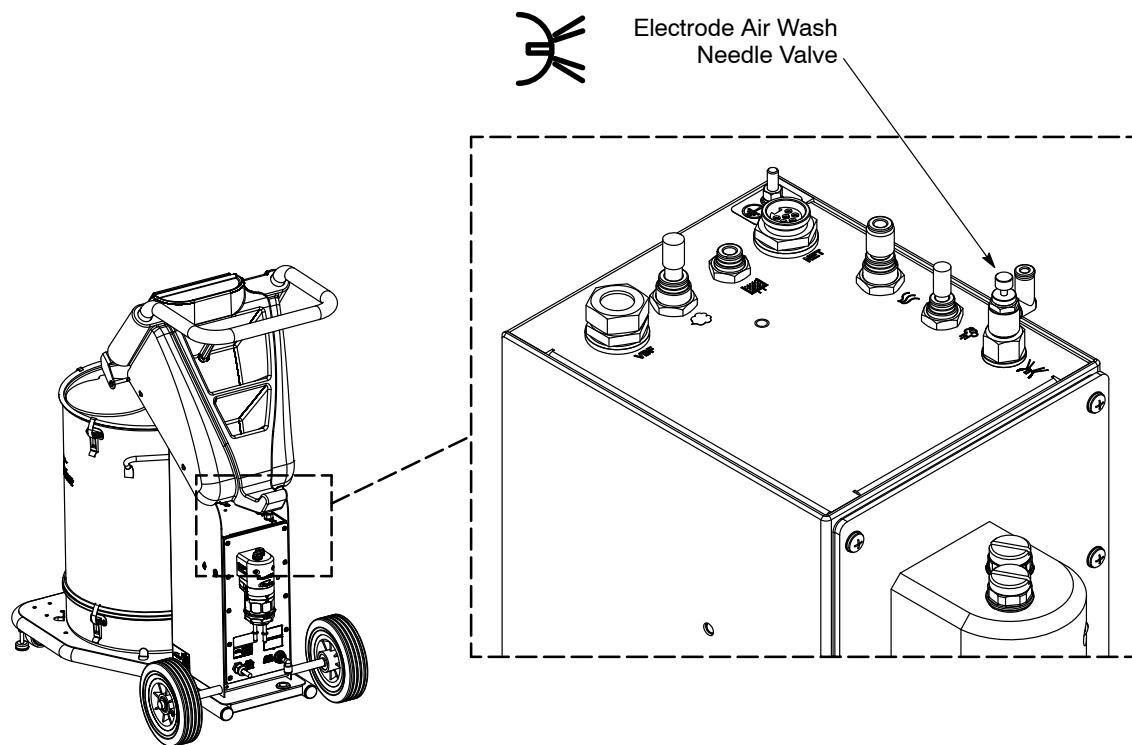


Figure 4-4 Electrode Air Wash Valve Location

## Daily Operation



**WARNING:** All conductive equipment in the spray area must be connected to a true earth ground. Failure to observe this warning may result in a severe shock.

**NOTE:** The controller is shipped with a default configuration that will allow the user to start spraying powder as soon as the user finishes setting up the system. Refer to *Controller Configuration* in the system controller operator manual for a list of the defaults and instructions on how to change them.

### Initial Startup

With the fluidizing and powder flow set to zero, and no parts in front of the gun, trigger the gun and record the  $\mu\text{A}$  output. 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.

### System Startup

1. Turn on the spray booth exhaust fan.
2. Turn on the system air supply.
3. Install a box of powder or a hopper filled with powder on the cart. Refer to *Powder Box Installation* on page 4-2 for instructions.
4. See Figure 3-5. Make sure the spray gun is not triggered, then turn on system controller power. The displays and icons on the controller interface and gun interface should light.

**Feed hoppers:** Turning on the controller power turns on the fluidizing air. Adjust the fluidizing air pressure to 0.3–0.7 bar (5–10 psi). The pressure should be just enough so the powder in the hopper “boils” gently. Fluidize the powder for 5–10 minutes before spraying powder.

5. Point the spray gun into the booth and press the spray trigger to start spraying powder.

**Vibratory box feeders:** Adjust the fluidizing air so that the powder around the pickup tube is being fluidized without blowing powder out of the box. Triggering the spray gun turns on the vibrator motor. Depending on the vibrator motor function setting, the motor will:

- turn off after a delay when the trigger is released, or
- continue to operate until the Standby button is pressed or system controller power is turned off.

Refer to *Controller Configuration* in the system controller operator manual for information on changing the motor function setting.

6. Select the desired preset and start production. Refer to *Presets* in the system controller operator manual for preset programming instructions.



The system controller interface displays actual output when the gun is spraying and the current preset setpoints when the gun is off.



Figure 4-5 System Controls

## ***Standby Button***

Use the **Standby** button shown in Figure 4-5 to shut off the interface and disable the spray gun during breaks in production. When the system controller interface is off the spray gun cannot be triggered, and the spray gun interface is disabled.

## **Shutdown**

1. Purge the spray gun by pressing the *Purge* button until no more powder is blown from the gun.
2. Press the *Standby* button to turn off the spray gun and interface.
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, turn off the power disconnect to the unit.
5. Perform the appropriate maintenance steps listed in *Maintenance Procedures* on page 5-2.



## Section 5

# Maintenance



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



**WARNING:** Before performing the following tasks, turn off the system controller and disconnect system power. Relieve system air pressure and disconnect the system from its input air supply. Failure to observe this warning may result in personal injury.

Refer to the individual component manuals for more information, and for spare parts.

## Recommended Cleaning Procedure for Powder Contact Parts

Nordson Corporation recommends using an ultrasonic cleaning machine and Oakite® BetaSolv emulsion cleaner to clean spray gun nozzles and powder path parts.

**NOTE:** Do not immerse the electrode assembly in solvent. It cannot be disassembled; cleaning solution and rinse water will remain inside the assembly.

1. Fill an ultrasonic cleaner with BetaSolv or an equivalent emulsion cleaning solution at room temperature. Do not heat the cleaning solution.
2. Remove the parts to be cleaned from the gun. Remove the O-rings. Blow off the parts with low-pressure compressed air.

**NOTE:** Do not allow the O-rings to come in contact with the cleaning solution.

3. Place the parts in the ultrasonic cleaner and run the cleaner until all parts are clean and free of impact fusion.
4. Rinse all parts in clean water and dry before re-assembling the spray gun. Inspect the O-rings and replace any that are damaged.

**NOTE:** Do not use sharp or hard tools that will scratch or gouge the smooth surfaces of powder contact parts. Scratches will cause impact fusion.

## Maintenance Procedures

Component	Procedure
Spray Gun (Daily)	<ol style="list-style-type: none"> <li>1. Point the spray gun into the booth. Remove the suction line from the hopper or box feeder and point them in the booth, as well. Push the <i>Color Change</i> button on the system controller and purge the powder delivery system.</li> <li>2. Remove the nozzle and electrode assembly and clean them with low pressure compressed air and clean cloths. Check them for wear, and replace them if necessary.</li> <li>3. Blow off the gun and wipe it down with a clean cloth.</li> </ol>
Pump (Daily)	<ol style="list-style-type: none"> <li>1. Visually inspect pinch valves through the clear housing.</li> <li>2. Replace any worn or damaged parts if the powder is present in the the housing.</li> </ol>
System Controller and Pump Control Unit (Daily)	Blow off the pump control unit and system controller with a blow gun. Wipe powder off the system controller with a clean cloth.
System Air Filter (Periodically)	Check the system air filter/regulator. Drain the filter and change the filter element as needed.
System Grounds	<p>Daily: Make sure the system is securely connected to a true earth ground before spraying powder.</p> <p>Periodically: Check all system ground connections.</p>

## Section 6

# 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 system 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 Nordson technical support at (800) 433-9319 or your local Nordson representative for help.

## Help Code Troubleshooting

The Help icon in the Function/Help display lights if a problem occurs that the system controller can sense.



Figure 6-1 Displaying and Clearing Help Codes

### Viewing Help Codes



Press the *Help* button to display the Help codes. The controller retains the last 5 codes in memory. Rotate the knob to scroll through the codes. The display will go blank if there is no activity for 5 seconds.

### Clearing Help Codes



To clear the help codes, press the *Help* button, then scroll through them until *CLr* is displayed, then press the *Enter* button. The Help icon will stay lit until the controller clears the codes.

## Help Code Troubleshooting Chart

Code	Message	Correction
H00	No Gun Number	Gun cannot be set to 0, must be a number from 1–4. Refer to Setup for more information on gun numbers.
H01	EEPROM Read Failed	Reset the fault (press the Nordson key to open the fault screen). This fault will sometimes occur when the software is upgraded.
H07	Gun Open	Trigger the gun and check the display. If the $\mu\text{A}$ feedback is 0, check for a loose gun cable connection at the gun receptacle. Check for a loose connection to the power supply inside the gun. Perform <i>Gun Cable Continuity Tests</i> as described in the spray gun manual. If the cable and the connections are okay, check the spray gun high voltage power supply.
H10	Gun Output Stuck Low	With the gun triggered on and the kV set to maximum, use a multimeter set for VRMS to check for voltage between J4 pins 1 and 2 on the main control board. If no voltage is present replace the main control board.
H11	Gun Output Stuck High	Make sure kV is set to 0 and the gun is triggered OFF. The $\mu\text{A}$ display should read 0. If the $\mu\text{A}$ display is greater than 0, replace the main control board. Make sure the trigger icon on the interface is not lit.
H12	Communications Fault CAN Bus	<p>Check that the gun number is set correctly. See F20 in the <i>Configuration</i> section of the controller manual.</p> <p>Check the DIP switch setting.</p> <p>Check the interface interconnect cable. Make sure the cable connections are secure and the cable is not damaged. Refer to <i>Gun Cable Continuity Tests</i> in your spray gun manual.</p> <p>Check the connections from the cable receptacle to the J1 terminal block on the main control board.</p> <p>If all connections are secure but the fault persists replace the cable. Route the network cable away from sources of electrostatics (hopper, gun cables, powder hose). Verify proper grounding. Verify network terminations are set correctly for non-standard systems.</p>
H15	Over Current Fault (Cable or Gun Short)	<p>This fault can occur if the gun tip touches a grounded part while spraying. This fault turns the electrostatic output off. Release the trigger to reset the fault and resume spraying.</p> <p>If the fault reoccurs, disconnect the spray gun high voltage power supply from the gun cable inside the gun (J2) and trigger the gun on. Refer to the <i>Power Supply Replacement</i> procedure in the spray gun manual.</p> <p>If the H15 code does not reappear, then check the high voltage power supply for issues.</p> <p>If the help code reappears, check the gun cable continuity and replace it if shorted. Perform <i>Gun Cable Continuity Tests</i> as described in your spray gun manual.</p>
H19	Gun Maintenance Timer Expired	The Maintenance Timer has exceeded its setting. Perform the scheduled maintenance, then reset the maintenance timer. Refer to the system controller manual for reset instructions (F07-02).

Continued...

Code	Message	Correction
H20	Pump Maintenance Timer Expired	The Pump Maintenance Timer has exceeded its setting. Perform the scheduled maintenance, then reset the maintenance timer. Refer to the system controller manual for reset instructions (F21-02).
H21	Pattern Air Valve Fault	Refer to the controller wiring diagrams in the pump control unit manual. Check the wiring harness connection (J8) to the proportional valve solenoid. Check the solenoid operation. Replace the valve if the solenoid is not working.
H22	Conveyance Air Valve Fault	Refer to the controller wiring diagrams in the pump control unit manual. Check the wiring harness connection (J7) to the proportional valve solenoid. Check the solenoid operation. Replace the valve if the solenoid is not working.
H23	<p>Conveyance Air Flow Low Fault</p> <p>Flow is lower than setpoint. System cannot reach setpoint.</p>	<p>Check if input pressure is greater than 90 psi (6.2 bar).            Make sure and correct H49 or H50 faults if present.            Check for blocked powder delivery line to spray gun.            Check for blocked powder tubes.            Check if internal regulator is set to 85 psi (5.7 bar) with gun triggered ON.            Check for blockage in proportional valve.            Check for oil/water contamination.            Perform the <i>Conveyance Air Flow Verification</i> procedure on page 6-12.            Check for water and/or oil contamination in the transducer filters by removing the board from the flow manifold. Replace filters with 1604436.</p>
H24	Pattern Airflow Low Fault	<p>Check if input pressure is greater than 90 psi (6.2 bar).            Check for blocked airline to spray gun.            Check if internal regulator is set to 85 psi (5.7 bar) with gun triggered ON.            Check for blockage in proportional valve.            Check for oil/water contamination.            Use the flow verification tool (1039881) with its instructions and connect to the pattern air output.            Check for water and/or oil contamination in the transducer filters by removing the board from the flow manifold. Replace filters with 1604436.</p>

Continued...

Code	Message	Correction
H25	<p>Conveyance Air Flow High Fault</p> <p>Flow is higher than setpoint. System unable to turn it down.</p>	<p>Check if input pressure is less than 110 psi (7.6 bar).</p> <p>Check if internal regulator is set to 85 psi (5.7 bar) with the spray gun triggered ON.</p> <p>Check for contamination in the proportional valve.</p> <p>Check for oil/water contamination.</p> <p>Trigger the spray gun OFF and reset the fault. If the fault returns without triggering the spray gun ON, remove the 8 mm tube plug from the pump control unit labeled flow.</p> <p>Check that no air is leaking from the port. If air is leaking, remove the proportional valve and clean it. If air is not leaking, plug the 8 mm port and perform the <i>Re-Zero Procedure</i> on page 6-12.</p> <p>Perform the <i>Conveyance Air Flow Verification</i> procedure on page 6-12.</p> <p>Check for water and/or oil contamination in the transducer filters by removing the board from the flow manifold. Replace filters with 1604436.</p>
H26	<p>Pattern Air Flow High Fault</p>	<p>Check if input pressure is less than 110 psi (7.6 bar).</p> <p>Check if the internal regulator is set to 85 psi (5.7 bar) with the spray gun triggered ON.</p> <p>Check for contamination in the proportional valve.</p> <p>Check for oil/water contamination.</p> <p>Trigger the spray gun OFF and reset the fault. If the fault returns without triggering the spray gun ON, remove the 6 mm blue tubing and check for air leaks. Make sure the system controller is triggered OFF.</p> <p>Check that no air is leaking from the port of the pump control unit. If air is leaking, remove the proportional valve and clean it. If air is not leaking, plug the 6 mm pattern port and perform the <i>Re-Zero Procedure</i> on page 6-12.</p> <p>Use the flow verification tool 1039881.</p> <p>Check for water and/or oil contamination in the transducer filters by removing the board from the flow manifold. Replace filters with 1604436.</p>

Continued...



Code	Message	Correction
H27	Trigger On during Power Up Fault	This code appears if the gun was triggered ON when the interface was turned on. Turn off the interface, wait for several seconds, then turn the interface back on, making sure the spray gun is not triggered on. If the fault reoccurs, check for a bad trigger switch.
H28	EEPROM Data Version Changed	Software version has been changed. This code appears after a software update. Clear the fault. It should not reappear.
H29	System Configuration Mismatch	Main gun control and pump configurations do not match. One is venturi and the other is HDLV/COD. Check F18 and confirm settings.
H30	Calibration Invalid	Pump calibration values for A or C are out of range. Refer to your pump control unit manual for more information.
H31	Boost Valve Fault	Check J6 wiring diagram pump board.
H32	Electrode Airwash Fault	Check J4 wiring diagram pump board.
H33	Fluidizing Air Valve Fault	Check J5 wiring diagram pump board.
H34	Purge Air Valve Fault	Check J10 wiring diagram pump board.
H35	Vibratory Motor Relay Fault	Check J9 wiring diagram pump board.
H36	LIN BUS Communication Fault (Gun Cable)	Perform <i>Gun Cable Continuity Tests</i> in the spray gun manual, to check J3 connection. If an open or short is found, replace the cable. If the gun cable is okay, replace the gun display module.
H41	24V Fault	Check the DC power supply located in the pump control unit. If the voltage is less than 22 Vdc replace the power supply in the pump control unit. Turn on the pump control unit for this test.
H42	Main Board Fault (Interface)	Clear the fault and make sure KV is set to maximum 100 kV, then trigger the gun ON. If the code re-appears, check for a defective gun power supply or a gun cable. If the cable and the gun power supply are OK, replace the main board.
H43	$\mu$ A Feedback Fault	<p>Make sure KV is set to maximum 100 kV, trigger the gun ON and check the <math>\mu</math>A display. If the <math>\mu</math>A display always reads <math>&gt;75 \mu</math>A, even when the gun is more than 3 ft from a grounded surface, check the gun cable or the gun high voltage power supply.</p> <p>If the <math>\mu</math>A display reads 0 with the gun triggered on and close to a part, check the gun cable or the gun high voltage power supply. When the gun is triggered on and kV is set <math>&gt;0</math>, the <math>\mu</math>A display should always read <math>&gt;0</math>.</p>
H44	Robot Heartbeat Missing	System controller is configured for External Mode, and cannot detect the Prodigy PLC Gateway heartbeat. Check CAN cable. Make sure Gateway is configured properly. Refer to the Prodigy PLC Gateway manual.

Continued...

<b>Code</b>	<b>Message</b>	<b>Correction</b>
H45	Pinch Valve 1 Fault	Check J11-1 for loose harness connection. Check Valve 1 for loose connection.
H46	Pinch Valve 2 Fault	Check J11-2 for loose harness connection. Check Valve 2 for loose connection.
H47	Pinch Valve 5 Fault	Check J11-5 for loose harness connection. Check Valve 5 for loose connection.
H48	Pinch Valve 6 Fault	Check J11-6 for loose harness connection. Check Valve 6 for loose connection.
H49	Delivery Tube A Valve 3 Fault	Check J11-3 for loose harness connection. Check Valve 3 for loose connection.
H50	Delivery Tube B Valve 4 Fault	Check J11-4 for loose harness connection. Check Valve 4 for loose connection.
H51	Vacuum Valve 7 Fault	Check J11-7 for loose harness connection. Check Valve 7 for loose connection.
H52	Purge Valve 9 Fault	Check J12-3 for loose harness connection. Check Valve 8 for loose connection.
H53	Purge Pinch Pressure Select Valve 8 Fault	Check J12-2 for loose harness connection. Check Valve 8 for loose connection.

# General Troubleshooting Chart

Problem	Possible Cause	Corrective Action
<b>1. Uneven pattern</b>	Blockage in spray gun	<ol style="list-style-type: none"> <li>1. Purge the spray gun. Remove the nozzle and electrode assembly and clean them.</li> <li>2. Disconnect the powder feed hose from the spray gun and blow out the gun with an air gun.</li> <li>3. Disassemble the spray gun. Remove the inlet and outlet tubes and elbow and clean them. Replace components as necessary.</li> </ol>
	Nozzle, deflector, or electrode assembly worn, affecting pattern	Remove, clean, and inspect the nozzle, deflector, and electrode assembly. Replace worn parts as necessary.  If excessive wear or impact fusion is a problem, reduce the flow rate and pattern air flow.
	Damp powder	Check the powder supply, air filters, and dryer. Replace the powder supply if contaminated.
	Low pattern air pressure	Increase the pattern air.
	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.
	iFlow module out of calibration	Perform the Re-Zero Procedure on page 6-12.
<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 the electrode assembly and clean it. Remove powder path if necessary and clean it.
	Electrode air wash flow too high	Adjust the needle valve at the power unit to decrease the electrode air wash flow.
		<i>Continued...</i>

Problem	Possible Cause	Corrective Action
<b>3. Low powder flow or powder flow surging</b>	Assist air too high/low	Adjust assist air as needed. Refer to vacuum measurement troubleshooting in the pump control unit manual.
	Fluidizing too high/low	
	Air tubing kinked or plugged (H24 or H25)	Check pattern air tubing for kinks.
	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	Perform color change
	Powder hose kinked	Checked for a kinked powder hose.
	Gun powder path plugged	Check powder inlet tube, elbow, and electrode support for impact fusion or debris. Clean as necessary with compressed air.
	Pick-up tube blocked	Check for debris or bag (VBF units) blocking pick-up tube.
	Vibratory box feeder disabled (VBF units only)	Set the Custom Function F01 for a box feeder (F01-01). See <i>Controller Configuration</i> in the system controller operator manual.
	Low supply air pressure	Input air must be greater than 5.86 bar (85 psi).
	Air pressure regulator set too low	Adjust the input regulator so that the pressure is greater than 5.86 bar (85 psi).
	Supply air filter plugged or filter bowl full – water contamination of flow controller	Remove bowl and drain water/dirt. Replace filter element if necessary. Clean system, replace components if necessary.
Flow valve plugged (H24 or H25)	Refer to <i>Proportional Valve Cleaning</i> in the pump control unit manual.	

Continued...

Problem	Possible Cause	Corrective Action
<b>4. Loss of wrap, poor transfer efficiency</b>	<b>NOTE:</b> Before checking possible causes, check the help code on the system controller and perform the corrective actions recommended in this section.	
	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. If the electrode assembly is good, remove the gun power supply and check its resistance. Refer to your spray gun product manual for instructions.
<b>5. No kV output from the spray gun (display shows 0 kV when gun triggered), but powder is spraying</b>	<b>NOTE:</b> Before checking possible causes, check the help code on the controller and perform the corrective actions recommended in this section.	
	Damaged gun cable	Perform the <i>Gun Cable Continuity Checks</i> as described in your spray gun manual. If an open or short is found, replace the cable.
	Spray gun power supply shorted	Perform the <i>Power Supply Resistance Test</i> as described in the pump control unit manual.
<b>6. Powder build up on the electrode tip</b>	Insufficient electrode air wash flow	Adjust the electrode air wash needle valve on the pump control panel to increase the electrode air wash flow.
<b>7. No kV output from the spray gun (display shows voltage or <math>\mu</math>A output), but powder is spraying</b>	<b>NOTE:</b> Before checking possible causes, check the help code on the controller and perform the corrective actions recommended in this section.	
	Spray gun power supply open	Perform the <i>Power Supply Resistance Test</i> as described in your spray gun manual.
	Damaged gun cable	Perform the <i>Gun Cable Continuity Test</i> as described in your spray gun manual.  If an open or short is found, replace the cable.
<i>Continued...</i>		

Problem	Possible Cause	Corrective Action
8. No kV output and no powder output	Malfunctioning trigger switch, display module, or cable	<p>Check the <i>Gun Triggered ON</i> icon at the top center of the controller interface. If the icon is not lit, check for a H36 help code. Check the trigger switch connections to the display module, replace the switch if necessary.</p> <p>Perform the <i>Gun Cable Continuity Test</i> as described in your spray gun manual.</p> <p><b>NOTE:</b> It may be possible to use the settings trigger as the spray trigger until repairs are made. Set Function F08 to F08-05. Refer to the system controller manual.</p>
9. No purge air when Purge button is pressed	Malfunctioning spray gun display module, gun cable, or iFlow module purge solenoid valve; no air pressure, or kinked air tubing	<p>If display module does not show <i>PU</i> when <i>Purge</i> button is pressed, then module membrane switch is defective. Replace display module.</p> <p>If display module shows <i>PU</i>:</p> <p>Check the purge air tubing and solenoid valve on the iFlow manifold.</p> <p>Perform the <i>Gun Cable Continuity Test</i> as described in your spray gun manual.</p>
10. Gun display module shows CF	Loose gun display connection	Refer to the system controller manual. Check connector J3 (cable/display module) inside the gun. Check for loose or bent pins.
	Defective gun cable or gun display module (H36 code)	Perform the <i>Gun Cable Continuity Test</i> as described in your spray gun manual. Replace cable if damaged. Replace gun display module if cables and connections are good.
11. Preset cannot be changed from the spray gun	Settings trigger disabled	Check Custom Function F08 and set to enabled (F08-00). Check F05 (lockout) function settings. Refer to the <i>Controller Configuration</i> in the system controller manual.
	No programmed preset available	Presets with no set values for flow rate and electrostatics are automatically skipped.
	Loose or defective trigger switch	Check for a loose trigger switch connection. The trigger switch is plugged into the gun display module.

Continued...

Problem	Possible Cause	Corrective Action
<b>12. Powder flow cannot be changed from the spray gun</b>	Settings trigger disabled	Check Custom Function F08 and set to enabled (F08-00). Check F05 (lockout) function settings. Refer to the <i>Controller Configuration</i> in the system controller manual.
	Loose or defective trigger switch	Refer to spray gun manual. Check for a loose trigger switch connection. The trigger switch is plugged into the gun display module.
<b>13. VBF doesn't turn ON and Off with the gun trigger</b>	VBF turned off	Set the Custom Function F01 for a box feeder (F01-01). See <i>Controller Configuration</i> in the system controller manual.  Check for loose cable on pump control unit.
<b>14. Fluidizing Air is on all the time even when the gun is triggered Off</b>	System is setup for a hopper	Set the Custom Function F01 for a box feeder (F01-01). Refer to the <i>Controller Configuration</i> in the system controller manual.
<b>15. No KV when gun is triggered ON, powder flow OK</b>	KV set to zero	Set KV to a non-zero value.
	Check for Help Codes and follow the procedures	
<b>16. No powder flow when gun is triggered ON, kV OK</b>	Powder flow set to zero	Change powder flow to a non-zero number.
	Input air turned OFF	Check the gauge on the filter regulator and make sure the air is turned ON.
	Check for Help Codes and follow the procedures	

## Re-Zero Procedure

Perform this procedure if the system controller interface indicates air flow when the spray gun is not triggered on, or if a Flow Air or Pattern Air Flow High Help code (H25 or H26) appears.

Before performing a re-zero procedure:

- Make sure the air pressure being supplied to the system is higher than the minimum 5.86 bar (85 psi).
  - Make sure no air is leaking through the module output fittings or from around the solenoid valves or proportional valves. Re-zeroing modules with leaks will result in additional errors.
1. At the pump control panel, disconnect the 6 mm pattern air tubing and install 8-mm plugs in the output fittings.
  2. Press the *Nordson* button for 5 seconds to display the controller functions. F00-00 is displayed.
  3. Rotate the knob until F10-00 is displayed.
  4. Press the *Enter* button, then rotate the knob to display F10-01.
  5. Press the *Enter* button. The system controller will re-zero the flow and pattern air and reset the function display to F10-00.
  6. Remove the plugs from the pattern air output fittings and reconnect the air tubing.

## Conveyance Air Flow Verification

**NOTE:** Perform a color change and verify that all powder is removed from the pump before starting this procedure.

1. Use the flow verification tool (1039881) and connect to the delivery port of the pump with 10 ft of 8 mm tubing.
2. Set the delivery to 100% and set assist air to 00% and trigger the pump ON. The monometer should read 4.0-5.0 psi (0.2-0.3 bar).
3. Increase the assist air to +50% and trigger the pump ON. The monometer should read 7.0-8.0 psi (0.5-0.6 bar).
4. Decrease the assist air to -50% and trigger the pump ON. The monometer should read 1.0-3.0 psi (0.1-0.2 bar).



# 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.

### Reference Documentation

For additional information related to other components in the system, reference the following documentation:

Document Title	Document Part Number
Encore HD Pump	<a href="#">1605708</a>
Encore HD Pump Control Unit	<a href="#">1606783</a>
Encore HD Spray Gun	<a href="#">1604869</a>
Encore HD System Controller	<a href="#">1604870</a>
NHR-X-XX Encore Feed Hopper	<a href="#">1609826</a>

## Encore HD Manual Powder Spray Systems

With nLighten™ Option	Standard System	System Description
1613900	1605588	Encore HD 115 V VBF Mobile
1613901	1605589	Encore HD 230 V VBF Mobile
1613899	1605587	Encore HD 50 lb Hopper Mobile
1613902	1605590	Encore HD Single Stand Alone
1613904	1606815	Encore HD Dual Stand Alone
1613903	1605594	Encore HD Rail/Wall Mount

## Encore HD+ Manual Powder Spray Systems

With nLighten™ Option	Standard System	System Description
1613905	1611076	Encore HD+ 115 V VBF Mobile
1613906	1611079	Encore HD+ 230 V VBF Mobile
1613910	1611246	Encore HD+ 50 lb. Hopper Mobile
1613907	1611080	Encore HD+ Single Stand Alone
1613908	1611081	Encore HD+ Dual Stand Alone
1613909	1611085	Encore HD+ Rail/Wall Mount

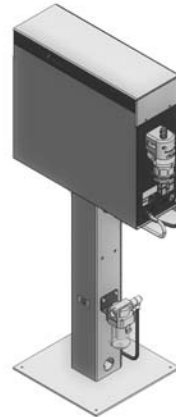
**VBF Mobile**



**Hopper Mobile**



**Standalone**



**Rail/Wall Mount**

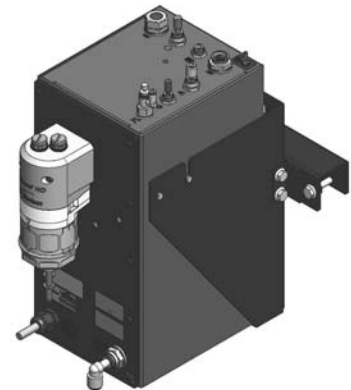


Figure 7-1 Encore HD Manual Powder Systems

## Mobile System Components

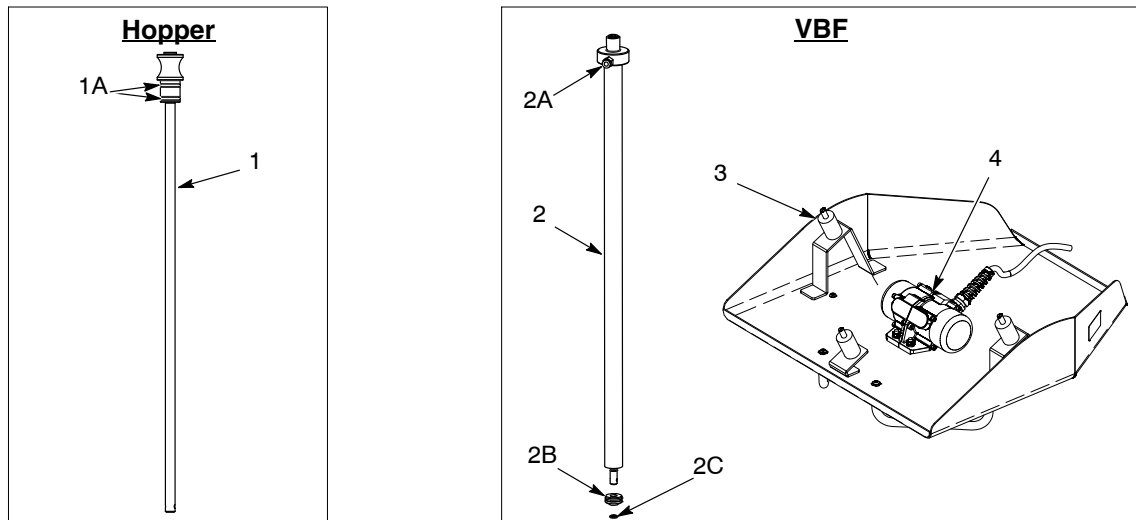


Figure 7-2 Miscellaneous Mobile System Parts

See Figure 7-2.

Item	Part	Description	Quantity	Note
<b>Hopper</b>				
1	1608300	TUBE, pickup, HDLV hopper	1	
1A	941145	• O-RING, silicone, cond, 0.625 x 0.812	2	
<b>VBF</b>				
2	1606300	TUBE, Encore powder pickup, VBF	1	
2A	1096788	• CONNECTOR, 6mm tube x R 1/8, dia 0.7mm orifice	1	E
2B	1606230	• DISC, fluidizing, powder box lance	1	
2C	940117	• O-RING, silicone, 0.312 x 0.438 x 0.063	1	
NS	1103081	ARM ASSEMBLY, pickup tube, Encore MPS, packaged	1	
3	1084760	ISOLATOR, vibration, 1.0 dia x 1.5 x 5/16 studs	3	
4	1080952	VIBRATOR, electric, 115V, 60 Hz, w/connector	1	A, B
4	1080950	VIBRATOR, electric, 230V, 50 Hz, w/connector	1	A
NS	1101127	• FILTER ELEMENT, air, coalescing, 0.3 micron	1	
NS	972286	REDUCER, 8 mm stem x 6 mm tube	1	C
NS	148256	PLUG, 10 mm, tubing	1	D
NS	1096787	UNION, bulkhead, conductive, 6 mm tube	1	E
NS	1067694	KIT, ground bus bar, ESD, 6 position, with hardware	1	
NS	1080718	CABLE, interface/controller, 10 ft.	1	
NOTE A: Order the correct vibrator motor for your system.				
B: For motors with a model number of MVE21M, a 4.0 $\mu$ F capacitor (1600471) must be used in the controller power unit. If the motor model number is MVE20, then a 2.0 $\mu$ F capacitor (1083021) is acceptable.				
C: Installed in power unit fluidizing air output fitting.				
D: Plugs unused port in system air filter/regulator output fitting.				
E: Conductive fitting. Do not replace this fitting with a non-conductive fitting.				
NS: Not Shown				

## Grounding Equipment

Part	Description
1067694	KIT, grounding block