Model NPE-4AH Automatic Electrostatic Powder Spray Gun

Part 108 249B

NORDSON CORPORATION • AMHERST, OHIO • USA

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Notice

Trademarks

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Model NPE-4AH Automatic Electrostatic Powder Spray Gun

1. Safety

This section contains general safety instructions for using your Nordson equipment. Task- and equipment-specific warnings are included in other sections of this manual where appropriate. Note all warnings and follow all instructions carefully. Failure to do so may result in personal injury, death, or property damage.

To use this equipment safely,

- read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.
- read and carefully follow the instructions given throughout this manual for performing specific tasks and working with specific equipment.
- store this manual within easy reach of personnel installing, operating, maintaining, or repairing this equipment.
- follow all applicable safety procedures required by your company, industry standards, and government or other regulatory agencies. Refer to the National Fire Protection Association (NFPA) standard 33 and to federal, state, regulatory agency, and local codes for rules and regulations covering installation and operation of powder spray systems.
- obtain and read Material Safety Data Sheets (MSDS) for all materials used.

Safety Symbols

Become familiar with the safety symbols presented in this section. These symbols will alert you to safety hazards and conditions that may result in personal injury, death, or property and equipment damage.

WARNING: Failure to observe this warning may result in personal injury, death, or equipment damage.

Safety Symbols *(contd.)*

WARNING: Risk of electrical shock. Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING: Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING: Risk of explosion or fire. Fire, open flames, and smoking prohibited.

WARNING: Wear protective clothing, safety goggles, and approved respiratory protection. Failure to observe may result in serious injury.

WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.

CAUTION: Failure to observe may result in equipment damage.

Qualified Personnel

"Qualified personnel" is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations, and have been trained to safely install, operate, maintain, and repair the equipment. It is the responsibility of the company operating the equipment to see that its personnel meet these requirements.

Intended Use

WARNING: Use of this equipment in ways other than described in this manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in this manual.

Nordson Corporation cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death, or property damage. Unintended uses may result from taking the following actions:

- making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine Nordson replacement parts
- failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards
- using materials or auxiliary equipment that are inappropriate or incompatible with your Nordson equipment
- allowing unqualified personnel to perform any task

Installation

Read the installation section of all system component manuals before installing your equipment. A thorough understanding of system components and their requirements will help you install the system safely and efficiently.

- Allow only qualified personnel to install Nordson and auxiliary equipment.
- Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Follow all instructions for installing components and accessories.
- Install all electrical, pneumatic, gas, and hydraulic connections to local code.

Installation *(contd.)*

- Install locking, manual, shutoff valves in the air supply lines to the system. This allows you to relieve air pressure and lock out the pneumatic system before undertaking maintenance and repairs.
- Install a locking disconnect switch or breaker in the service line ahead of any electrical equipment.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Ground all electrically conductive equipment within 10 feet (3 meters) of the spray area. Ungrounded conductive equipment can store a static charge which could ignite a fire or cause an explosion if a hot spark is discharged.
- Route electrical wiring, electrostatic cables, and air hoses and tubing along a protected path. Make sure they will not be damaged by moving equipment. Do not bend electrostatic cables around a radius of less than 6 in. (152 mm).
- Install safety interlocks and approved, fast-acting fire detection systems. These shut down the spray system if the booth exhaust fan fails, a fire is detected, or other emergency situation develops.
- Make sure the spray area floor is conductive to ground and that the operator's platform is grounded.
- Use only designated lifting points or lugs to lift and move heavy equipment. Always balance and block loads when lifting to prevent shifting. Lifting devices must be inspected, certified, and rated for a greater weight than the equipment being lifted.
- Protect components from damage, wear, and harsh environmental conditions.
- Allow ample room for maintenance, material supply container drop-off and loading, panel accessibility, and cover removal.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.

Operation

Only qualified personnel, physically capable of operating the equipment and with no impairments to their judgement or reaction times, should operate this equipment.

Read all component manuals before operating a powder spray system. A thorough understanding of all components and their operation will help you operate the system safely and efficiently.

- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.

- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.

- Know where EMERGENCY STOP buttons, shutoff valves, and fire extinguishers are located. Make sure they work. If a component malfunctions, shut down and lock out the equipment immediately.

- Before operating, make sure all conductive equipment in the spray area is connected to a true earth ground.

- Never operate equipment with a known malfunction or leak.

- Do not attempt to operate electrical equipment if standing water is present.

- Never touch exposed electrical connections on equipment while the power is ON.

- Do not operate the equipment at pressures higher than the rated maximum working pressure of any component in the system.

- Know the pinch points, temperatures, and pressures for all equipment that you are working with. Recognize potential hazards associated with these and exercise appropriate caution.

- Wear shoes with conductive soles, such as leather, or use grounding straps to maintain a connection to ground when working with or around electrostatic equipment.

Operation *(contd.)*

- Do not wear or carry metallic objects (jewelry or tools) while working with or around electrostatic equipment. Ungrounded metal can store a static charge and cause harmful shocks.

- Maintain skin-to-metal contact between your hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If wearing gloves, cut away the palm or fingers.

- Keep parts of the body or loose clothing away from moving equipment or parts. Remove personal jewelry and cover or tie back long hair.

- Wear National Institute of Occupational Safety and Health (NIOSH) approved respirators, safety glasses or goggles, and gloves, and while handling powder containers, filling hoppers, operating spray equipment, and performing maintenance or cleaning tasks. Avoid getting powder coatings on your skin.

- Never point manual guns at yourself or other persons.

- Do not smoke in the spray area. A lit cigarette could ignite a fire or cause an explosion.

- If you notice electrical arcing in a spray area, shut down the system immediately. An arc can cause a fire or explosion.

- Shut off electrostatic power supplies and ground gun electrodes before making adjustments to powder spray guns.

- Shut off moving equipment before taking measurements or inspecting workpieces.

- Wash exposed skin frequently with soap and water, especially before eating or drinking. Do not use solvents to remove coating materials from your skin.

- Do not use high-pressure compressed air to blow powder off your skin or clothes. High-pressure compressed air can be injected under the skin and cause serious injury or death. Treat all high-pressure fittings and hoses as if they could leak and cause injury.

Less-Obvious Dangers

Operators should also be aware of less-obvious dangers in the workplace that often cannot be completely eliminated:

- exposed surfaces on the equipment which may be hot or have sharp edges and cannot be practically safeguarded
- electrical equipment which may remain energized for a period of time after the equipment has been shut off
- vapors and materials which may cause allergic reactions or other health problems
- automatic hydraulic, pneumatic, or mechanical equipment or parts that may move without warning
- unguarded, moving mechanical assemblies

Action in the Event of a System or Component Malfunction

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.

- Disconnect and lock out electrical power. Close and lock out hydraulic and pneumatic shutoff valves and relieve pressures.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component.

Maintenance and Repair

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Always wear appropriate protective devices and use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Use only genuine Nordson replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.

Maintenance and Repair *(contd.)*

- Disconnect, lock out, and tag electrical power at a disconnect or breaker in the service line ahead of electrical equipment before servicing.
- Do not attempt to service electrical equipment if there is standing water present. Do not service electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.
- Do not attempt to service a moving piece of equipment. Shut off the equipment and lock out power. Secure equipment to prevent uncontrolled movement.
- Relieve air pressures before servicing equipment. Follow the specific instructions in this manual.
- Make sure that the room where you are working is sufficiently ventilated.
- If a “power on” test is required, perform the test carefully and then shut off and lock out power as soon as the test is over.
- Connect all disconnected equipment ground cables and wires after servicing the equipment. Ground all conductive equipment.
- Service lines connected to panel disconnect switches may still be energized unless they are disconnected. Make sure the power is off before servicing. Wait 5 minutes for capacitors to discharge after shutting off the electrical power.
- Turn off the electrostatic power supply and ground the gun electrode before adjusting or cleaning.
- Keep high-voltage connection points clean and insulated with dielectric grease or oil.
- Check all ground connections periodically with a standard ohmmeter. Resistance to ground must not exceed one megohm. If arcing occurs, shut down the system immediately.

Maintenance and Repair (contd.)

- Check interlock systems periodically to ensure their effectiveness.

WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program.

- Do not store flammable materials in the spray area or room. Keep containers of flammable materials far enough away from spray booths to prevent their inclusion in a booth fire. If a fire or explosion occurs, flammable materials in the area will increase the chances and the extent of personal injuries and property damage.

- Practice good housekeeping procedures. Do not allow dust or powder coatings to accumulate in the spray area or booth or on electrical equipment. Read this information carefully and follow instructions.

Disposal

Dispose of equipment and materials used in operation and cleaning according to your local regulations.

2. Description

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

See Figure 1. The Model NPE-4AH Powder Spray Gun is used in high volume powder coating applications such as pipe coating.

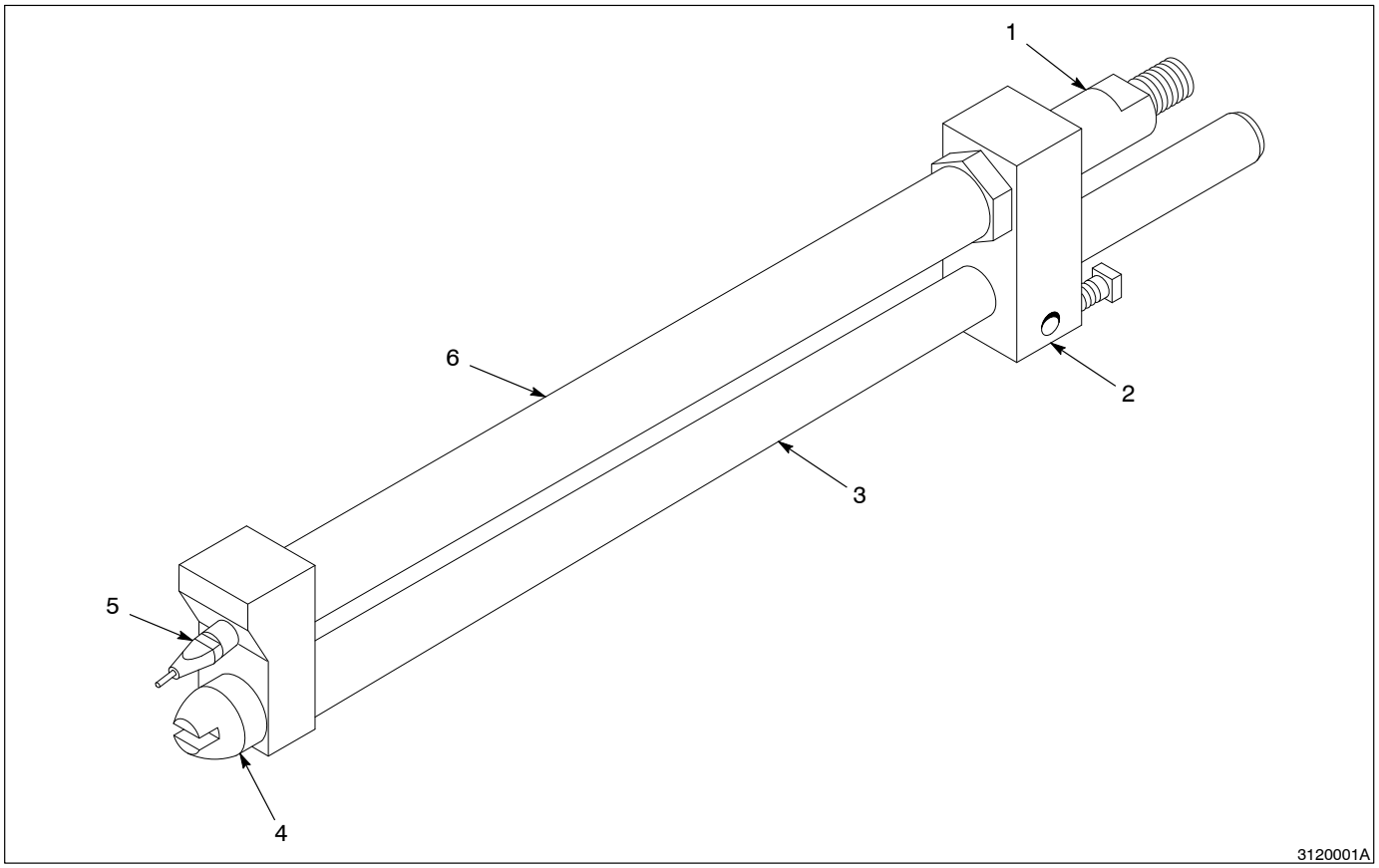

Fig. 1 Model NPE-4AH

1. Cable adapter
2. Mounting Block
3. Powder tube
4. Nozzle
5. Electrode and support
6. Resistor tube

3. Installation

See Figure 2.

Mounting the Gun

1. Unpack the gun and install it on a $^1/_2$-in. diameter mounting bar.
2. Tighten the square head screw (9) to hold the gun in a fixed position.

NOTE: Design the stationary gun stands so you can adjust the gun vertically and horizontally. If mounted on a gun mover, mount the gun on a bar which can then be attached to the gun mover arm.

Routing the Electrostatic Cable

WARNING: The electrostatic cable is the high voltage link between the power unit and the gun. If not properly installed or cared for, the cable could be subject to electrical breakdowns such as burn through and carbon tracking. Protect electrostatic cables from mechanical damage and strong solvents, and inspect frequently. A damaged cable used in a hazardous environment can cause a fire or explosion, resulting in personal injury and property damage.

1. Remove the electrostatic cable from the shipping box and carefully unroll. Establish a protected path for the cable from the electrostatic power unit to the gun. The power unit end of the cable has a brass ball, and a metal tag.

NOTE: Do not bend the cable around a radius of less than 6 in. at stationary point or 8 in. at flexing points.

2. Secure the cable to the mounting bar and other supports so that it is not run over or damaged by moving equipment. Make sure to leave enough slack to prevent any strain on the cable.

Installing the Cable in the Gun

1. Make sure the cable ends are clean and dry. You can use a solvent such as isopropyl alcohol to clean the cable ends.

WARNING: Contaminants on the cable ends can cause arcing between the voltage source and the ground causing damage to the cable and creating a hazardous situation.

Installing the Cable in the Gun *(contd.)*

2. Make sure the insulating tube (10) is packed with dielectric grease. Insert the gun end of the cable into the threaded cable adapter (1) until it bottoms out against the barrel resistor (11) or spring.

WARNING: The cable end and resistor spring must be completely embedded in dielectric grease. Air pockets could cause dangerous arcing and burn-through.

3. Thread the jam nut (3) onto the cable adapter and hand tighten.

Installing Cable in the Power Unit

Use the following steps to install cable in the power unit.

1. Remove the dust cap from the power unit cable well.
2. Remove the shipping spacer from the well and fill cable well with dielectric oil.
3. Make sure the cable end is clean and dry. Insert the cable end into the well until it bottoms out. Thread the jam nut (3) onto the cable and hand tighten. Wipe up any spilled oil.

Installing the Power Feed Tubing

WARNING: All equipment in the spray area must connect to a true earth ground. Ungrounded metallic objects will store an electrical charge, which, when discharged, could generate a spark hot enough to cause a fire or explosion.

1. Locate the spiral cut tubing and snap clamp furnished with the gun. Slide the spiral cut tubing over the end of the powder tube (8).
2. Connect the powder feed tubing to the gun's powder tube (8).
3. Slide the spiral cut tubing up the gun and secure with the snap clamp. The spiral cut tubing will prevent the feed tubing from kinking where it joins the gun and restricts the flow of powder.

NOTE: If possible, the powder feed tubing should be no longer than 8 m (26 ft). Longer lengths will decrease the flow of powder and cause uneven spray patterns or puffing.

4. Operation

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

Electrostatic and air pressure controls are on the front panel of the electrostatic power unit. For complete operating instructions, refer to the power unit manual.

Air Supply

Operating air must be clean and dry. Moist or contaminated air can cause powder caking and sticking to tubing walls, clogging of pump venturi throats, metering orifices and gun passages, and grounding or arcing.

Use pre-filters and coalescent filters, with automatic drains. A refrigerated or regenerative desiccant air dryer capable of producing a 3.4 °C (38 °F) or lower dewpoint at 7 bar (100 psi) is recommended.

Start Up

1. Turn on the booth exhaust fans.
2. Turn on the system electrical power and open air valves.
3. Fill the powder feed hopper two-thirds full of clean, dry powder. Start fluidizing air and adjust to pressure recommended for feed hopper (typically 10–15 psi). Allow powder the become completely fluidized before spraying.
4. Turn on the power unit. Adjust atomizing and flow rate air pressure to approximately 2.8 bar (40 psi).

NOTE: Flow rate air pressure controls the volume and velocity of the powder-air mixture delivered to the gun. Atomizing air pressure controls the density (powder to air ratio) of the mixture.

NOTE: The air pressures given are an average starting point. Adjust the air pressures for economical usage, deposition requirements, type of powder, humidity, and other variables.

5. Turn the kV potentiometer on and adjust to 100 kV. Test the spray and adjust air pressures and kV to obtain desired results.

5. Preventive Maintenance

Follow these procedures to maintain your NPE-4AH Automatic Electrostatic Powder Spray Gun.

Daily

Clean the gun and pump daily. Use compressed air to blow powder from gun, pump, and feed tubing. Do not blow out feed tubing backwards from gun to pump.

Inspect the gun and replace worn parts.

Periodically

Check the electrostatic cable and gun resistor with a megohmmeter. If you do not obtain the following readings, replace the resistor.

Cable, tip to tip:	179–269 M @ 500 volts
Barrel resistor:	68.7–81.3 M @ 500 volts
Barrel and spring end to electrode:	79.5–94.5 M @ 500 volts
Power unit end of cable to gun antenna:	258–363 M @ 500 volts

NOTE: The part 247 799 resistor/electrode assembly, used on gun models 4A and 4AH, is no longer used or required. 4A and 4AH guns must be upgraded using a new electrode and support assembly, part 229 855. This new assembly prevents leakage of any dielectric grease from the cable well. If you have questions, please contact your Nordson representative.

6. Troubleshooting

The following procedures are designed to aid in troubleshooting the NPE-4AH Automatic Electrostatic Powder Spray Gun.

Problem	Possible Cause	Corrective Action
1. Powder is puffing from the gun.	Flow rate or atomized air pressure is too low, or ratio of atomizing air pressure to flow rate air pressure is incorrect.	Increase the flow rate or atomizing air pressure. Maintain correct air pressure ratio. Refer to *Operation*.
2. Powder is surging from the gun.	Poor fluidization of powder in the hopper	Increase fluidization pressure
	Wet powder	Inspect powder in hopper, replace if damp, check air supply filters and dryer.

6. Troubleshooting (contd.)

Problem	Possible Cause	Corrective Action
3. Powder is drooling from the gun.	Poor atomization of powder	Increase atomization pressure
	Low flow rate pressure	Increase flow rate pressure
	Low kV output	Check power supply output, cable and gun resistor. Refer to *Installing Cable in the Power Unit.*
4. Uneven pattern or voids in the pattern	Worn nozzle	Replace the nozzle
	Impact fusion on interior surfaces of nozzle or powder tube	Remove nozzle and clean or replace parts as necessary. Do not use a sharp, pointed instrument to clean parts. Scratches on the wetted surfaces will accumulate powder and cause impact fusion.
	Low flow rate pressure	Increase flow rate pressure
5. Inadequate or no powder flow from the gun.	Plugged hose, pump or gun	Disassemble pump and gun and clean. Blow out feed tubing. Inspect powder supply for moisture. Refer to *Preventive Maintenance.*
	Worn pump venturi nozzle or throat	Disassemble pump, inspect parts, and replace if worn
	Power unit malfunction	Refer to power unit manual
	No or poor fluidization of powder in feed hopper	Increase fluidization pressure. Inspect fluidization plate for discoloration or other evidence of plugging.

7. Disassembly and Repair

This section covers the procedures necessary to disassemble and repair the NPE-4AH Automatic Electrostatic Powder Spray Gun.

Resistor Replacement

See Figure 2.

1. Unscrew the electrostatic cable jam nut (3) from the cable adapter (1) and pull the cable out of the gun. Clean the end of the cable with a clean, lint-free cloth and inspect for damage.

2. Unscrew the cable adapter from the mounting block (2) and pull the old insulating tube (10) and barrel resistor (11) out of the resistor tube (4).

3. Clean ID of resistor tube and inspect for signs of arcing or carbon tracking. Replace if necessary.

CAUTION: If cable is removed from insulating tube without installing an new resistor kit, apply 7–8 cc of dielectric grease to the inside of the insulating tube before reinstalling the cable.

4. Install a new resistor kit in the resistor tube (4). The kit consists of an insulating tube with the barrel resistor and dielectric grease installed.

5. Screw the cable adapter (1) into the mounting block (2). Tighten to 33.15–46.06 Nm (24.4–33.9 ft/lb).

6. Insert the clean, dry cable end through the cable adapter and mounting block and into the insulating tube (10). The cable end will act as a plunger, forcing grease around the resistor spring and cable. Push until the barrel is against the end of the electrode assembly (5).

CAUTION: Once the cable is embedded in grease inside the insulating tube, do not pull it back out. The suction created by pulling the cable out of the tube will cause air pockets to form which will allow arcing within the tube.

7. Wipe excess dielectric grease off cable, thread the cable retaining nut onto cable adapter and tighten securely.

8. Specifications

This section provides the specific technical information needed to use the NPE-4AH Automatic Electrostatic Powder Spray Gun.

Dimensions

Height:	80 mm (3.125 in.)
Length (overall):	389 mm (15.3 in.)
Length (mounting hole forward):	306.4 mm (12 in.)
Mounting hole diameter:	13 mm (0.5 in.)

Electrostatic Cables

8 m (25 ft)

16 m (50 ft)

Power Unit

Nordson model EXP-100, 100 kV

Power Feed Tubing

$^1/_2$ in. ID high-flow tubing (part 900 550)

Torque Values

Jam nut resistor tube:	3.6–5.4 N·m (2.7–4.0 ft-lb)
Cable adapter:	33.15–46.06 N·m (24.4–33.9 ft-lb)

Hand tighten all other threaded connections.

9. Gun Assembly Parts List

See Figure 2.

Item	Part	Description	Quantity	Note
	- - - - - -	Gun, auto, NPE-4AH	1	
1	247 833	• Adapter, cable	1	
2	247 688	• Block, mounting	1	
3	247 685	• Nut, jam	2	
4	247 834	• Tube, resistor, w/support	1	
5	229 855	• Kit, electrode	1	
6	229 856	• • Kit, electrode, screw and spacer	1	
7	117 158	• Nozzle, flat, 0.12 in. slot	1	
8	247 686	• Tube, powder	1	
9	982 002	• Screw, set, sq. hd., M10 x 1.5 x 20	1	
10	- - - - - -	• Tube, insulating	1	A
11	- - - - - -	• Resistor, barrel	1	A
NS	900 517	• Tubing, spiral cut	AR	B
NS	939 247	• Clamp, hose snap	1	

NOTE A: Included in part 144 680 kit, service, resistor (barrel)
B: Bulk quantity part number. Order in foot or meter increments.
AR: As Required
NS: Not Shown

9. Gun Assembly Parts List
(contd.)

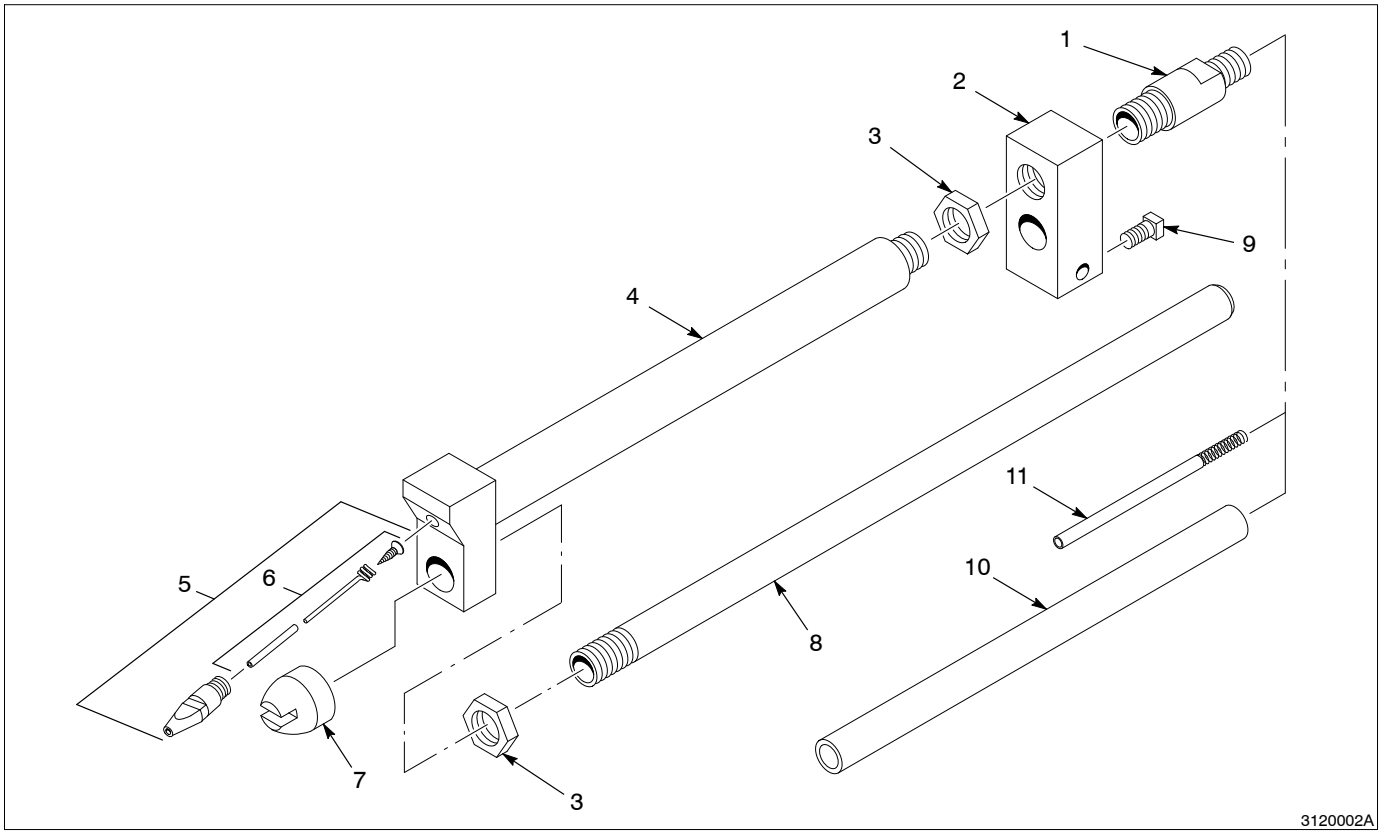

Fig. 2 NPE-4 AH Powder Spray Gun

Additional Gun Assembly Parts Use this list to order additional parts for the Powder Spray Gun

Part	Description	Note
247 682	Nozzle, flat, 0.06 in. slot	
117 157	Nozzle, flat, 0.09 in. slot	
247 658	Grease, dielectric, 10 cc applicator (carton of 12)	
144 680	Kit, service, resistor (barrel)	A
138 196	Cable, 8m, NPE, 4-A, hybrid	
144 681	Cable, 16m, NPE, 4-A, hybrid	
900 500	Tube, nylon	B

NOTE A: Kit consists of an insulating tube with grease and resistor, ready to be installed in the gun.
B: Order in foot or meter increments.