# Versa-Spray[r] IPS Demonstration Unit

Customer Product Manual
Part 108 210C

NORDSON CORPORATION D AMHERST, OHIO D USA

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**Notice**



**Trademarks**

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# Versa-Spray IPS Demonstration Unit

## *1. Safety*

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.

## *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.
- While operating manual electrostatic spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- Obtain and read Material Safety Data Sheets (MSDS) 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.

- Ground all conductive equipment in the spray area. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- 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 MSDS 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.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- 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.

### *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.

## *2. Description*

See Figure 1. The Versa-Spray IPS demo unit is a portable, self-contained unit used for electrostatic powder coating demonstrations. It can be set up and operating in minutes. All components necessary to spray powder are included. External connections are provided for electrical power and compressed air.


Fig. 1 Versa-Spray IPS Demonstration Unit

## *Components*

Components of the sytem include

- Case with removable hinged lid
- Control panel mounted in case
- Versa-Spray Integral Power Supply (IPS) manual spray gun with conical nozzle and 4 meter power/control cable
- Flat spray nozzle kit
- Miniature powder feed hopper with 3.9 lb capacity, pump mounting, and pickup tube
- 100 Plus low-flow powder feed pump
- Low-flow powder feed tubing (10 ft)
- High-flow powder feed tubing (6 ft) for venting hopper into booth
- $^1/_4$-in. flow rate, atomizing, and fluidizing polyurethane air tubing
- $^3/_8$-in. air inlet tubing with $^3/_8$-in. tube by $^1/_4$-in. NPT fitting
- Hopper and control panel ground cables
- Power cord

## *Requirements*

**Air:** 7 bar (100 psi) maximum, 4 bar (60 psi) minimum.

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

**Power:** 100, 120, 230, 240 Vac, single phase, 50–60 Hz.

## 3. Setup

**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 2 for control panel symbols and Figure 3 for the location of the control panel fittings and connections.

**NOTE:** The case must remain outside the Class II, Division 2 zone while connected to electrical power.

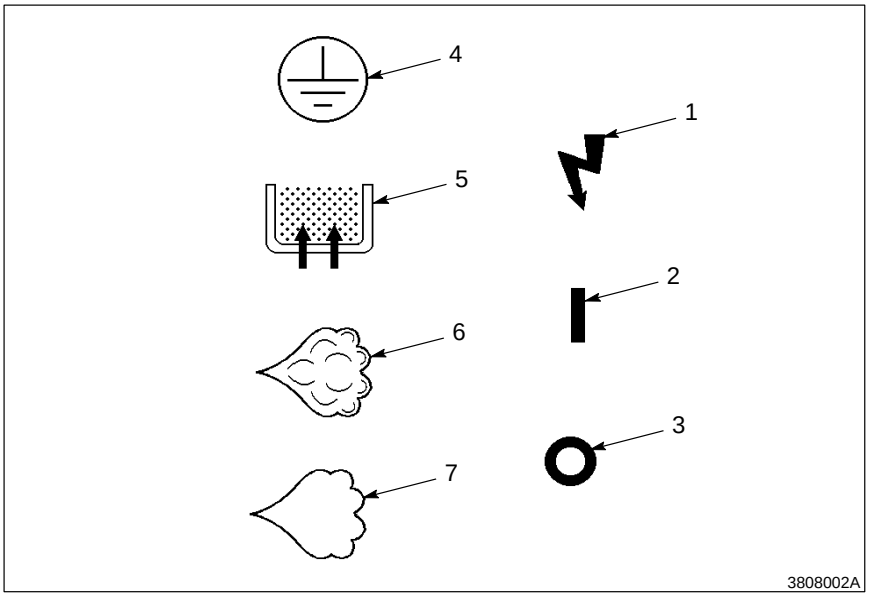



Fig. 2 Control Panel Symbols

1. Ground
2. Fluidizing air
3. Flow-rate air
4. Atomizing air
5. High voltage
6. Off
7. On

1. Open the case and remove the hopper, power cord, $^{3}/_{8}$-in. blue input air tubing, $^{1}/_{4}$-in. black poly tubing (marked F), and ground cable.

2. Remove the hopper lid. Remove the powder feed tubing, $^{1}/_{4}$-in. blue poly tubing (two 10 ft pieces, marked H and A), suction tube, and ground cable.

3. Fasten the ground cable ring terminal to the control panel ground stud. Clamp the cable to a true earth ground (cold water pipe or grounded booth).

4. Connect the blue $^{1}/_{4}$-in. tubing (marked H) to the fluidizing air quick disconnect fitting on the control panel. Connect the other end of the tubing to the quick disconnect fitting on the side of the hopper.

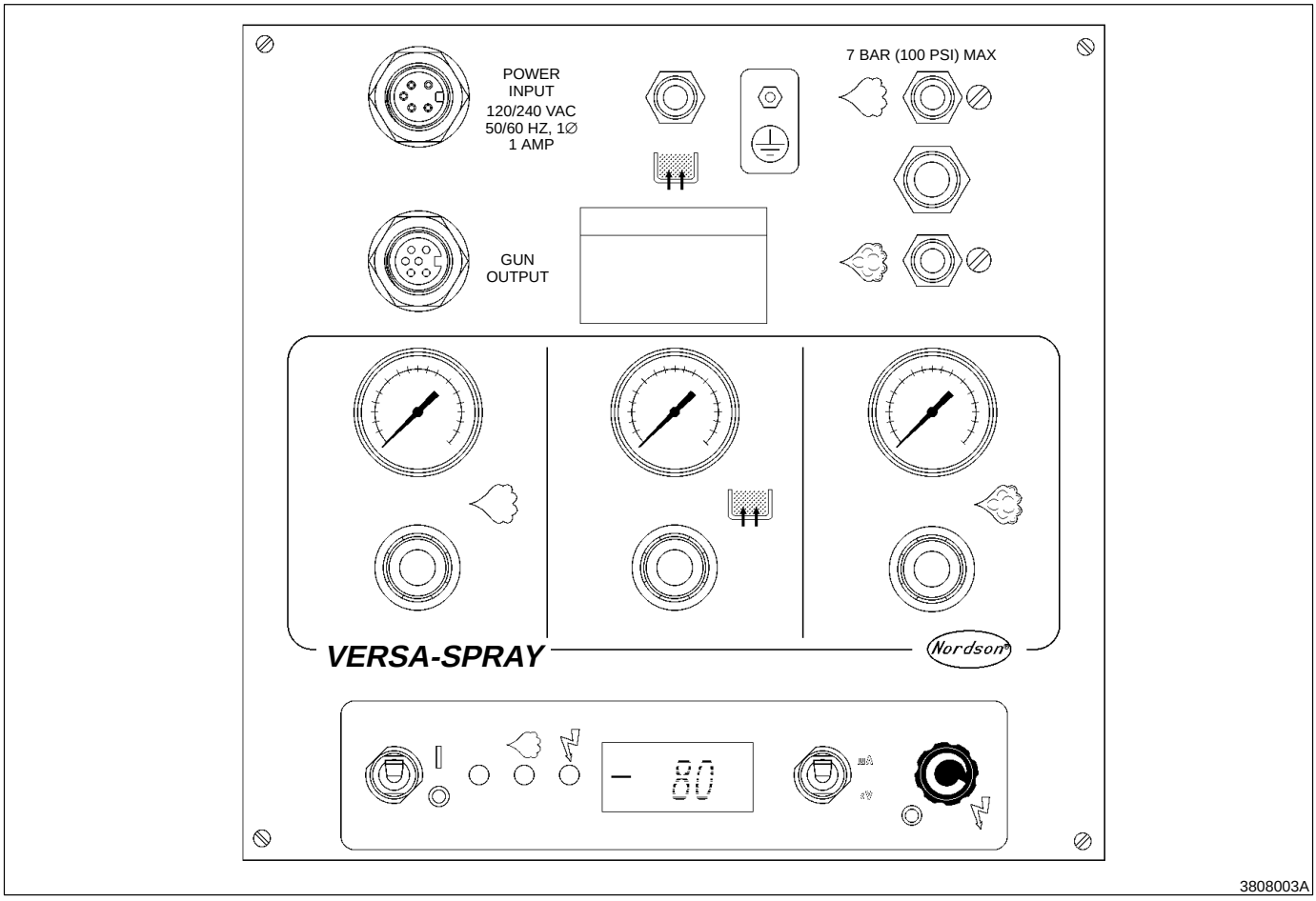



Fig. 3 Control Panel

## *3. Setup (contd.)*

5. Connect the input air tubing to the quick disconnect connector in the center of the control panel. Use the $^{1}/_{4}$-in. NPT by $^{3}/_{8}$-in. tube fitting to connect the tubing to the compressed air supply.

6. Plug the power cord into the control panel. Secure the cord to the connector with the cord nut.

   **NOTE:** The factory default power setting is 120 Vac, 60 Hz. Refer to Figure 5 for circuit board switch settings, if using a different power supply.

7. Screw the pickup tube into the pump mount from the underside of the hopper lid. Install the lid on the hopper. Secure the lid with the knob.

8. Remove the case lid by sliding it to the left, off the hinge pins. Remove the inner lid and take out the handgun and cable assembly, spiral cut tubing, and low-flow powder pump.

9. See Figure 4. Unwind the gun cable. Plug the cable into the gun output receptacle on the control panel. Secure the cable to the receptacle with the cable nut.

10. Remove the red cap from the powder inlet connector. Remove the connector and replace it with the low-flow connector from the kit.

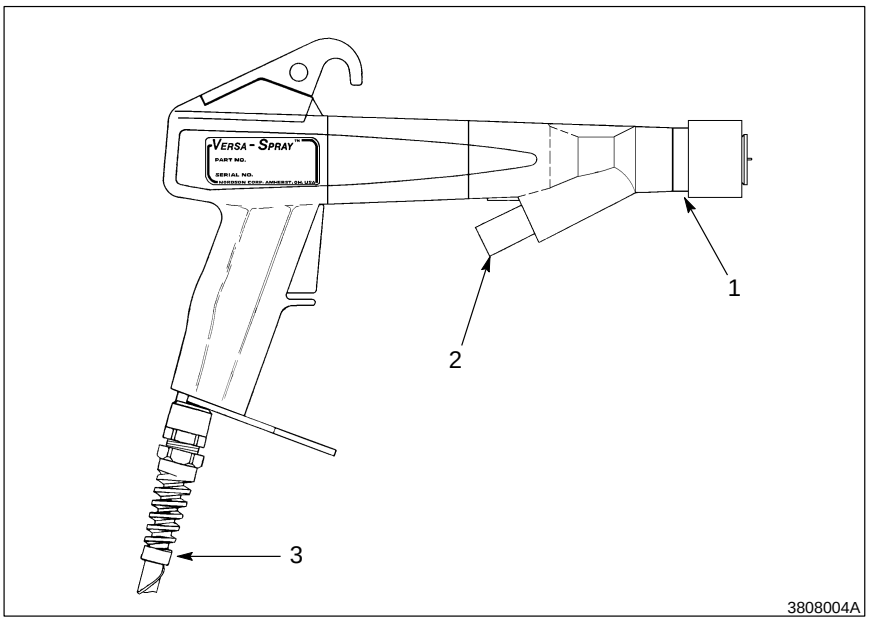



Fig. 4 Powder Gun Installation

1. Nozzle
2. Inlet connector
3. Cable

11. Install the pump on the pump mounting on the hopper lid.

    **NOTE:** The pump mounting O-rings are electrically conductive to provide a ground between the pump body and the hopper. Do not replace them with non-conductive O-rings.

12. Connect the low-flow powder feed tubing to the pump outlet and the inlet connector on the gun.

13. Connect the black $^1/_4$-in. air tubing to the quick disconnect fitting on the control panel marked F and to the powder pump fitting marked F. Connect the blue $^1/_4$-in. air tubing to the quick disconnect fitting on the control panel and to the pump fitting marked A.

14. Remove the red cap from the gun nozzle. The conical nozzle can be replaced with the flat spray nozzle, if desired.

15. Connect the 1.2-m (4-ft) length of high flow powder feed tubing to the hopper vent connection. Route the end of the tubing inside the booth, or connect it to a vent stub.

16. Plug the power cord into an appropriate power receptacle.

17. Turn the pressure regulator knobs counterclockwise to zero pressure. Pull up on the knobs to unlock, push down to lock. Supply air to the unit.

## *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.

**WARNING:** Before turning on the electrostatic voltage, make sure all conductive objects in the spray area are grounded. Electrical sparks discharged from ungrounded conductive objects may start fires or cause explosions.

**WARNING:** Breathing airborne dusts, including finishing powders, can be hazardous to your health. Use appropriate respiratory protection.

**NOTE:** The case must remain outside the Class II, Division 2 zone while connected to electrical power.

1. Fill the hopper half full of clean, dry, powder. Do not overfill. The powder will expand to fill the hopper when fluidizing air is turned on.

## *4. Operation (contd.)*

2. Adjust the fluidizing air pressure to 0.35–0.55 bar (5–8 psi). Allow powder to fluidize for a few minutes, then remove the hopper lid and make sure that the powder is properly fluidized before beginning to spray. The surface should be boiling slightly, and there should be no clumps of powder in the hopper. The hopper has a restrictor, located after the fluidizing air connector, that allows the gauge to give a reading at this low pressure.

3. Turn on the control panel power switch. The power, kV, and air LEDs will light.

4. Turn the kV potentiometer switch on and adjust it to 80 kV. The display normally shows kV output. Pressing the kV/uA switch will change the readout to microamps.

5. Adjust the flow-rate and atomizing air pressure to 2.7 bar (40 psi).

6. Make sure the booth exhaust fan is on.

7. Aim the gun into the booth and press the trigger. While coating a workpiece, adjust the flow rate and the atomizing air pressures and kV until you obtain the desired results.

### *Operating Notes*

Powder coating performance is affected by a number of variables. Use the following suggestions to tune your system.

#### *MicroAmpere Reading*

The microampere (μA) reading will fluctuate as work pieces go by the gun tip. The closer a work piece is to the gun tip, the greater will be the μA reading. μA readings are affected by gun tip-to-workpiece distance, geometry of the workpiece, and powder flow rates.

Record the μA reading when you first put the unit into service. Monitor the μA readings periodically. If the μA output increases significantly, check the resistance of your gun resistor with an ohmmeter.

#### *Electrostatic Powder Coating Variables*

**Voltage:** As the electrostatic voltage is lowered the deposition rate will decrease. Use lower voltages to coat recessed areas. Increasing the voltage will increase the deposition rate up to a point, after which the electrostatic charge on the powder already deposited will tend to repel any additional powder.

**Flow-Rate Air Pressure:** Increasing the flow-rate air pressure will increase the powder velocity and deposition rate. Increasing the velocity may help in coating recessed areas by partially defeating the electrostatic attraction of the powder to projections around the recess (called the Faraday Cage Effect). However, high flow-rate air pressure can cause a loss of wrap, a decrease in powder economy, and increased wear of powder contact parts.

**Atomizing Air Pressure**: Increasing atomizing air pressure will decrease the density of the powder cloud and lower deposition rates. Decreasing the pressure will increase the powder-to-air ratio, providing better coverage. Too low a pressure can result in powder clogging the pump venturi throat or gun passages. Too high a pressure can cause rapid wear of powder contact parts.

## *5. Maintenance*

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

**NOTE:** When cleaning parts that come in contact with powder, do not use any tools that may scratch the part surfaces. Powder will build up on scratches and cause impact fusion.

1. Empty the hopper and blow it out with compressed air. Vacuum out any remaining powder. Clean the hopper with a clean dry cloth.

2. Disconnect the powder feed tubing from the gun and pump. Place the end of the tubing into the booth. Make sure the exhaust fans are on. Blow out the tubing with compressed air.

   **NOTE:** Do not blow out the feed tubing while it is connected to the pump. Blowing powder backwards into the pump will clog atomizing air passageways and the valves in the control panel.

3. Disassemble the gun's powder path. Clean the parts with compressed air, then wipe them clean with a soft dry cloth. If necessary, use a cloth dampened with isoprophyl alcohol. Do not soak the gun parts in alcohol or use any other solvents to clean them. Replace any worn or damaged parts.

4. Remove the pump from the hopper lid. Clean the hopper lid. Disassemble the pump and clean the parts with compressed air and a clean dry cloth. Replace any worn or damaged parts.

## *6. Troubleshooting*

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

Any fault may have a number of reasons for occurring. Check all possible causes for any given fault. Obvious causes of malfunction such as broken wires, or missing fasteners should be corrected immediately.

The letter/number designations (S1, U3 etc.) given in the troubleshooting procedures refer to components on the circuit board. Refer to Figure 5 for their location. The circuit board is not repairable. If you determine that the circuit board is malfunctioning, replace it.

Use the following figures to help you troubleshoot your unit.



**WARNING:** Power is on during voltage checks. Do not touch live circuits. Failure to observe this warning could result in personal injury or equipment damage.

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| **1. All LED's off, no display** | No input power | Check for appropriate input power on J1-1 and J1-2. |
| | S1 off or open | Check S1 for proper operation. |
| | Blown F1 fuse | Correct overload problem and replace fuse F1. |
| | S4 not set properly | Check S4 for completed switch travel. |
| | J4 loose or missing | Check J4 for proper location. |
| | C2 shorted | Check C2 for short with ohmmeter. Replace board if shorted. |
| **2. Power and powder LEDs off** | Solenoid output shorted | Check solenoid wiring. |
| | Regulator U3 failed | Replace circuit board. |
| **3. kV LED off, display on** | Faulty LED D16 | Replace circuit board. |
| | Q3 defective | Replace circuit board. |
| | Q4 failed | Replace circuit board. |
| **4. Display off, kV LED on** | Faulty Q3. | Replace circuit board. |
| | U6 defective | Replace circuit board. |
| **5. Solenoid not functioning (green air LED on)** | Bad solenoid connection | Check for loose connections or broken wire. |
| | Solenoid coil open | Replace solenoid. |
| **6. Solenoid not functioning (green air LED off, all other LEDs on)** | Diode D6 shorted | Replace circuit board. |
| | Q1 failed if TP-8 is greater than 1 volt | Replace circuit board. |
| **7. No kV output, kV LED off, powder LED off, display off, all other LEDs on** | J5 in wrong position or missing | Insert J5 in proper position. |
| | S2 off or defective | Replace circuit board/switch. |
| | TP-2 is less than 6 volts dc | Replace circuit board. |
| | U1 defective | Replace circuit board. |
| | Q2 defective | Replace circuit board. |

## *6. Troubleshooting (contd.)*

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| **8. Low kV output** | S2 not fully clockwise | Check S2. |
| | Gun resistor failed | Check gun resistor with megohm meter. Resistance should be approximately 170-megohms. |
| | Multiplier failed | Replace gun multiplier. Refer to gun manual for procedures. |
| | Regulator U1 failed | Check TP-2 to ground for 21 Vdc. If 21 Vdc is not present, replace circuit board. |
| | Low input voltage | If TP-1 less than 24 volts dc, check S4 and J4 for proper configuration. |
| | Board component failure | Check TP-2 for 21 Vdc at full ON. If test fails, replace circuit board. |
| **9. Gun will not operate manually, kV LED off, powder LED off, display off** | Gun connector loose or contaminated with dirt | Check gun connections. |
| | J5 loose or missing | Place J5 jumper in Auto/Man position. |
| | Fuse F2 blown | Replace circuit board. |
| **10. Display reads zero μA output, gun spraying normally** | Gun cable feedback wire broken or loose or dirty connection | Check cable and connections. Replace cable if necessary. |
| | Feedback resistor broken | Replace gun multiplier. Refer to gun manual for procedures. |
| **11. Display reads zero μA output, loss of wrap and transfer efficiency** | Gun cable broken or loose | Tighten or replace gun cable. |
| | Multiplier failure | Replace gun multiplier. Refer to gun manual for procedures. |
| **12. Loss of wrap, poor transfer efficiency** | Poorly grounded workpiece | Inspect and clean conveyor and hangers. |
| | Multiplier not grounded | Check ground connections. |
| | Gun resistor failed | Check gun resistor with megohm meter. Resistance should be approximately 170-megohms. |
| | Moisture in air causing kV to leak to ground | Check air dryers. |
| | Dirt or powder contamination of connections are causing arcing | Check cable and resistor connections. Clean or replace components as needed. |

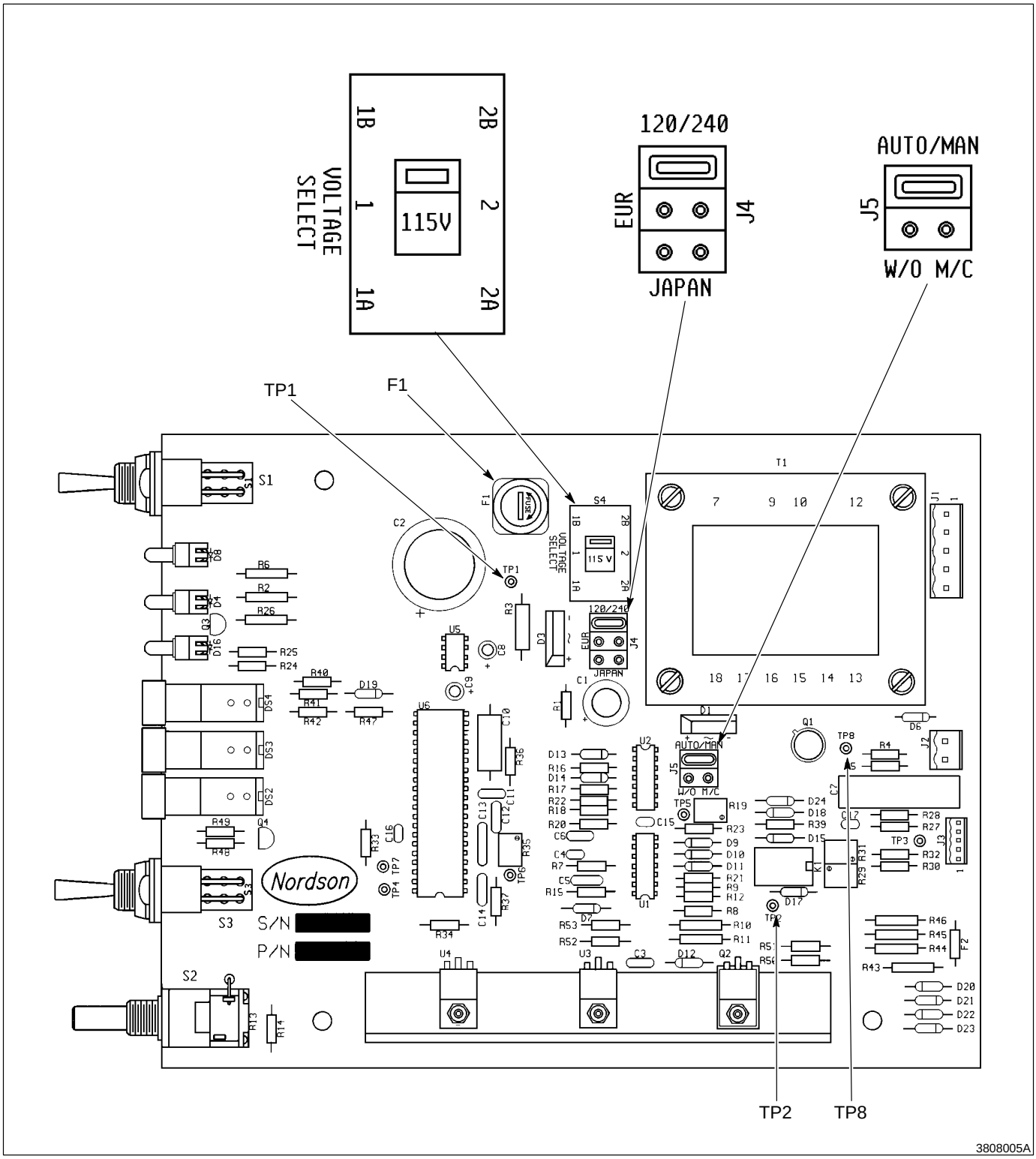



Fig. 5 Circuit Board Switches, Jumpers, Fuses, and Test Points

## *6. Troubleshooting (contd.)*

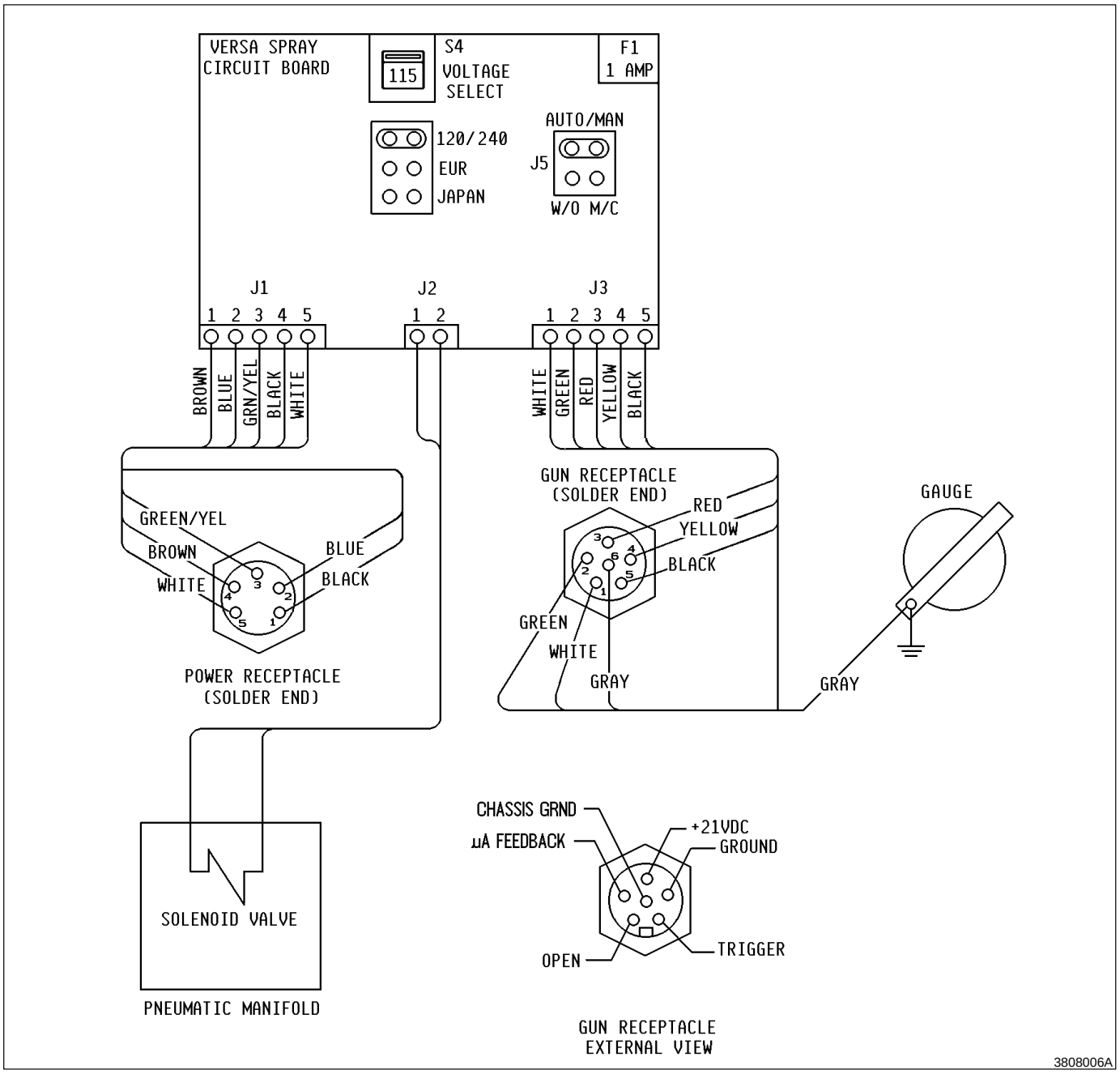
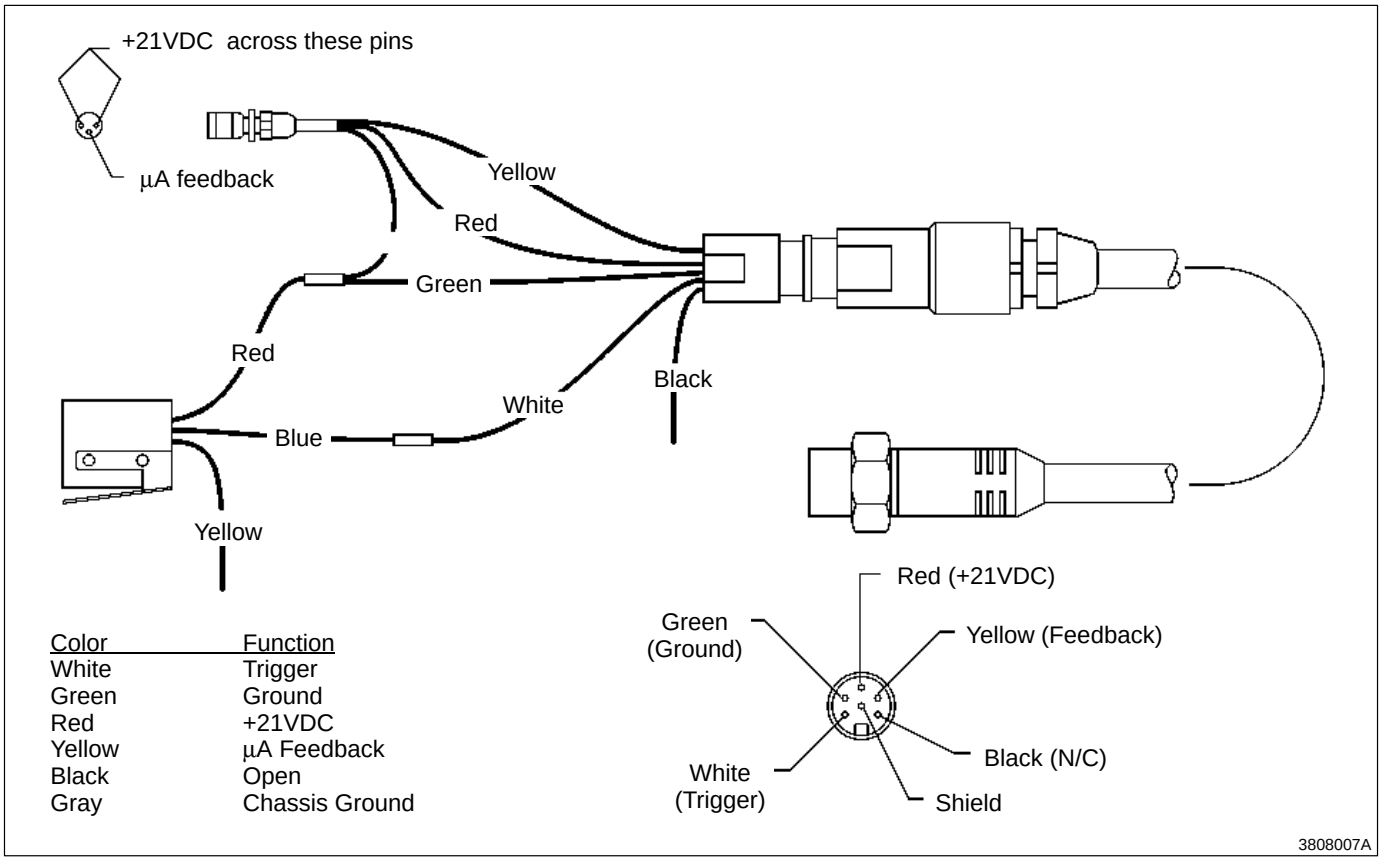



Fig. 6 Wiring Diagram




| Color | Function |
|---|---|
| White | Trigger |
| Green | Ground |
| Red | +21VDC |
| Yellow | µA Feedback |
| Black | Open |
| Gray | Chassis Ground |

Fig. 7 Gun Cable Functions and Pinouts

## *6. Troubleshooting (contd.)*

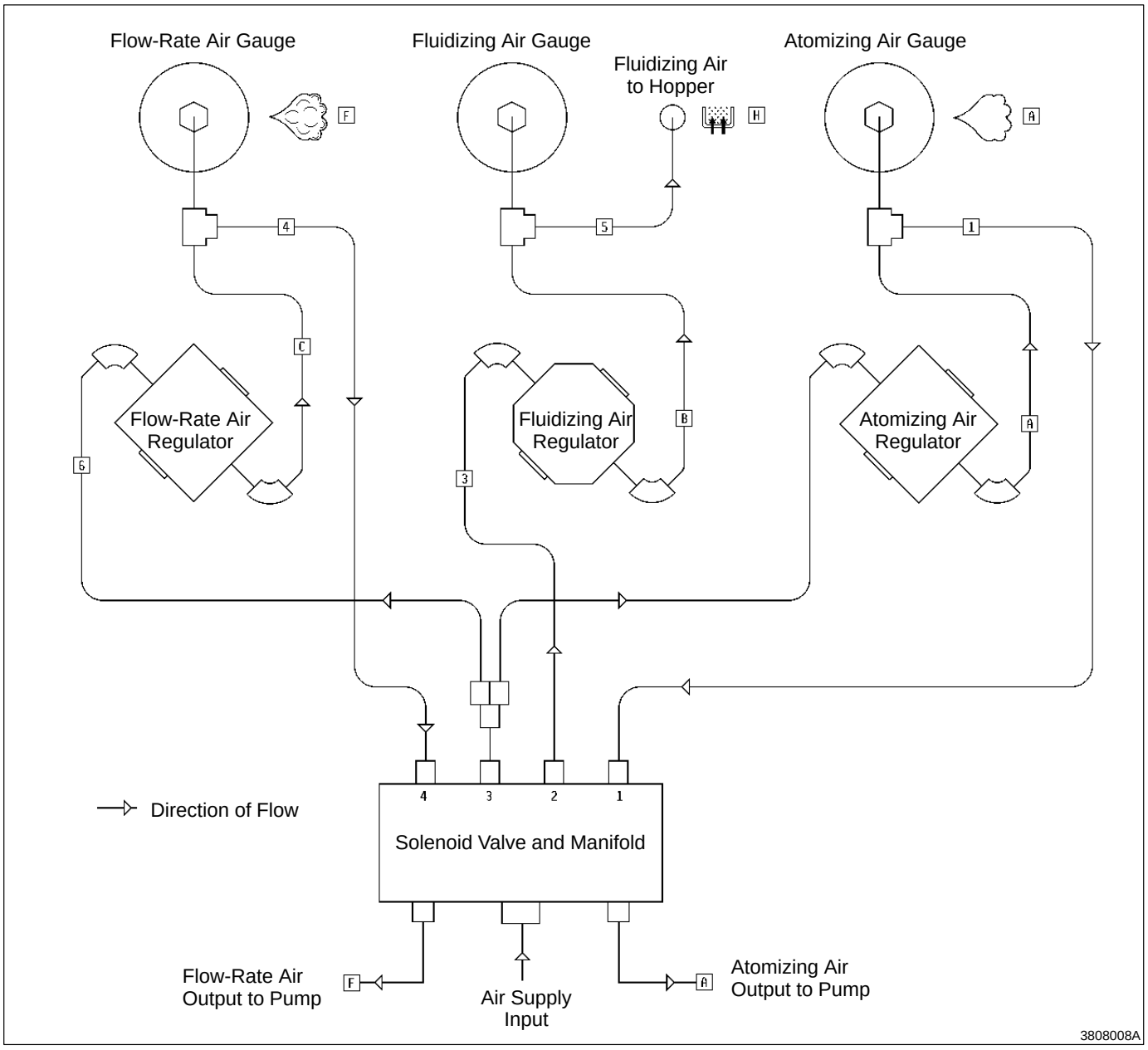



Fig. 8 Pneumatic Diagram

## *7. Parts*

To order parts, call the Nordson Customer Service Center or your loacl Nordson representative. Use this five-column parts list, and the accompanying illustration, to describe and locate parts correctly.

### *Using the Illustrated Parts List*

Numbers in the Item column correspond to numbers that idnetify parts in illustrations following each parts list. The code NS (Not Shown) indicates that a listed part is not illustrated. A dash (—) is used when the part number applies to all parts in the illustration.

The six-digit number in the Part column is the Nordson Corporation part number. A series of dashes in this column (- - - - - -) means the part cannot be ordered separately.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentations show the relationships between assemblies, subassemblies, and parts.

| Item | Part | Description | Quantity | Note |
|---|---|---|---|---|
| — | 000 000 | Assembly | 1 | |
| 1 | 000 000 | • Subassembly | 2 | A |
| 2 | 000 000 | • • Part | 1 | |

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

## *Parts List*

The parts list in this manual covers only the demonstation unit. Refer to the manuals for the spray gun, pump, and hopper for parts information. See Figure 9 for the parts in the following list.

| Item | Part | Description | Quantity | Note |
|---|---|---|---|---|
| — | 140 476 | System, Demo Unit, IPS | 1 | |
| 1 | 901 444 | • Regulator, 5–125 psi | 2 | |
| 2 | 901 260 | • Gauge, air, 0–100 psi | 2 | |
| 3 | 973 968 | • Union, bulkhead, 1/4 in. tube | 1 | |
| 4 | 972 716 | • Connector, male, 1/4 in. tube x 1/8 in. NPT | 2 | |
| 5 | 982 000 | • Screw, pan head, slotted, M5 x10 mm | 2 | |
| 6 | 983 422 | • Washer, lock, external, M5 | 2 | |
| 7 | 971 177 | • Connector, maile, 3/8 in. tube x 1/4 in. NPT | 2 | |
| 8 | 901 259 | • Gauge, air, 0–30 psi | 1 | |
| 9 | 901 507 | • Regulator, 0–25 psi | 1 | |
| NS | 141 495 | • Manifold, pneumatic output, demo | 1 | |
| 10 | 248 700 | • • Gasket, manifold | 1 | |
| 11 | 972 716 | • • Connector, 1/4 in. tube x 1/8 in. NPT | 4 | |
| 12 | 129 423 | • • Gasket, pilot manifold | 1 | |
| 13 | 982 069 | • • Screw, pan head, slotted, M4 x 16 mm | 4 | |
| 14 | 983 403 | • • Washer, lock, split, M4 | 4 | |
| 15 | 129 503 | • • Valve, solenoid, 12 vdc | 1 | |
| 16 | 248 716 | • • Valve, 3-way cartridge | 2 | |
| 17 | 335 241 | • • Connector, plug, 2 position | 1 | |
| 18 | 972 707 | • • Fitting, plug-in, Y | 1 | |
| 19 | 973 572 | • Coupling, pipe, hydraulic, SAE, 1/8 in. | 3 | |
| 20 | 973 278 | • Tee, male run, 1/4 in. tube x 1/8 in. NPT | 3 | |
| 21 | 983 011 | • Washer, lock, internal, #8 | 3 | |
| 22 | 981 064 | • Screw, pan head, slotted, #8-32 x 3/8 in. | 3 | |
| 23 | 971 266 | • Elbow, 1/4 in. tube x 1/4 in. NPT | 4 | |
| 24 | 972 119 | • Elbow, 1/4 in. tube x 1/8 in. NPT | 2 | A |
| 25 | 130 739 | • Board, circuit, Versa-Spray | 1 | |
| 26 | 248 741 | • Seal, shaft, rotary | 1 | |
| 27 | 129 593 | • Knob, collet, 21 mm, 1/4 in. shaft | 1 | |
| 28 | 129 585 | • Cap, flat, 21 mm, w/curved arrow | 1 | |
| 29 | 984 129 | • Nut, hex, #10-32, brass | 1 | |
| 30 | 983 120 | • Washer, lock, split, #10 | 1 | |
| 31 | 983 021 | • Washer, flat, 0.203 x 0.406 in., brass | 1 | |
| 32 | 981 729 | • Screw, pan head, slotted, #10-32 x 3/8 in. | 4 | |

NOTE A: Used on 0–25 psi regulator.
NS: Not Shown

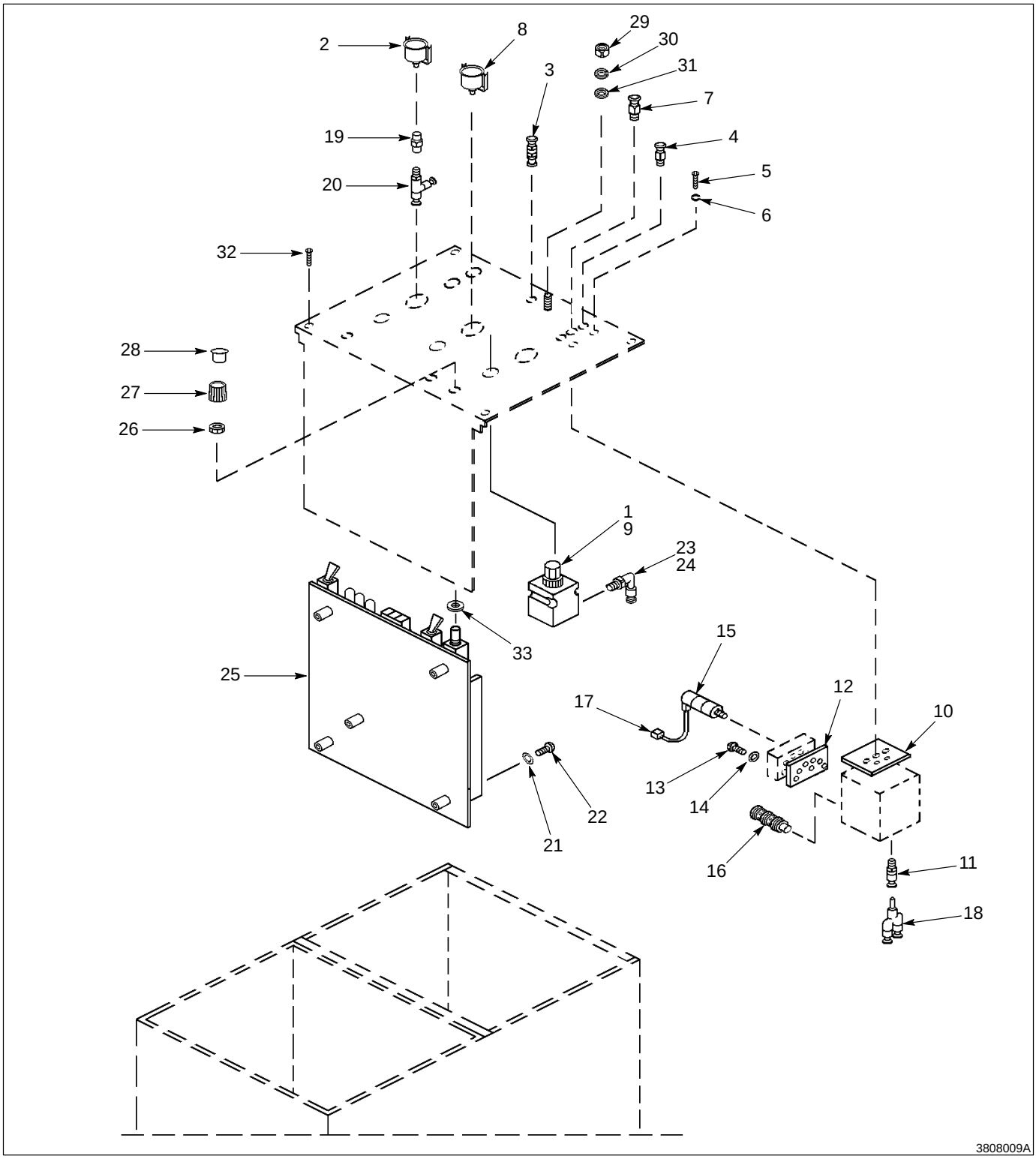



Fig. 9 Demonstration Unit Parts

## *Other Parts*

The following parts list contains demonstration unit parts not shown in the preceding illustration.

| Part | Description | Quantity | Note |
|---|---|---|---|
| 140 476 | System, Demo Unit, IPS | 1 | |
| 141 497 | • Receptacle, input, gun | 1 | A |
| 939 122 | • Seal, conduit fitting, $^1/_2$ in. | 2 | |
| 984 526 | • Nut, lock, conduit, $^1/_2$ in. | 2 | |
| 130 627 | • Receptacle, input, 6 wire, F | 1 | |
| 933 343 | • Connector, plug, 5 pin | 1 | B |
| 132 738 | • Gun, manual, Versa-Spray, IPS, 4M | 1 | |
| 142 062 | • Pump, powder, 100 Plus, low-flow | 1 | |
| 114 219 | • Throat, venturi, GF-TFE, low-flow | 1 | |
| 139 943 | • Connector, powder inlet | 1 | |
| 141 013 | • Kit, service, flat, 2.5 mm, 60 degrees | 1 | |
| 139 364 | • Hopper, round, mini | 1 | |
| 133 804 | • Jumper, wire, powder dolly | 1 | |
| 130 629 | • Cable, power, 10 ft, female | 1 | |
| 933 050 | • Plug, 3 wire, male | 1 | |
| 900 730 | • Tubing, poly, $^1/_4$ in., blue | AR | C |
| 900 511 | • Tubing, poly, $^3/_8$ in., black | AR | C |
| 900 509 | • Tubing, poly, $^1/_4$ in., black | AR | C |
| 900 549 | • Tubing, powder, low-flow | AR | C |
| 900 517 | • Tubing, spiral cut | AR | C |

NOTE A: Includes wiring and plug.
B: Used with input receptacle.
C: Order in increments of one foot.
AR: As Required