EXP-100 Electrostatic Power Unit

Customer Product Manual
Part 108242-03
Issued 05/16

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
03	05/16	Reinstated.

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.

All work conducted inside the spray booth or within 1 m (3 ft) of booth openings is considered within a Class 2, Division 1 or 2 Hazardous location and must comply with 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

This manual covers rack- and wall-mount versions of the Nordson Versa-Spray EXP-100 electrostatic power unit. These units house the electrical and pneumatic controls for cable-fed electrostatic powder spray guns.

See Figure 2-1. The rack unit is typically mounted in a 19-in. industry standard equipment cabinet, and is usually controlled by a Nordson 100 PLUS or MC-3 control unit. Rack units control and power automatic powder spray guns.

The wall unit is used with powder spray hand guns. It can be mounted on a wheeled dolly along with a hopper and pump, or on a booth wall or bracket at a manual touch-up station.

These power units are used with the 100 PLUS Series II automatic gun and the Versa-Spray cable-fed automatic and manual guns.

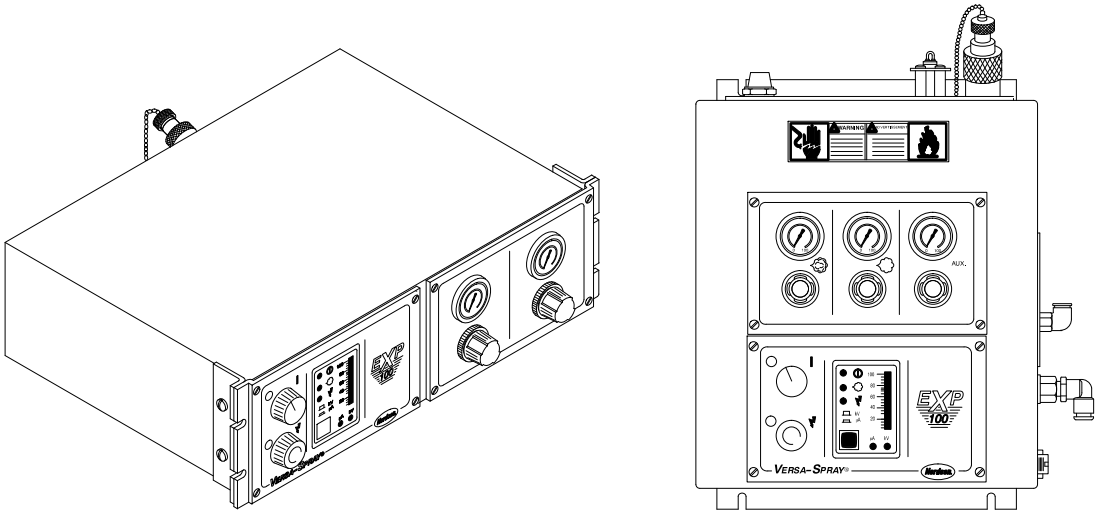

Figure 2-1 EXP-100 Rack-Mount and Wall-Mount Electrostatic Power Units

Features

- 30 to 100 kV output
- Vertical bar meter, displaying kV and microamp (μA) output
- LED indicators—main power, air, kV, μA
- Powder pump atomizing and flow rate, and fluidizing (wall unit only) air regulators and gauges.
- Individual easy-to-remove modules:

  Electronic module—houses the controls and circuit boards

  Pneumatic control module—houses air regulators and gauges

  Multiplier module—houses the voltage multiplier and connections for electrical power input and triggering

  Pneumatic output module—houses the manifold block, solenoid valve, and pneumatic input and output fittings.

Pipe Coating Applications

The pipe coating industry traditionally operates at higher speeds and uses much thicker coatings than most general finishing applications. Therefore, some of the setup instructions and typical setting will be quite different. This manual describes the information needed for general finishing. The settings that differ for pipe coating applications are listed in Table 2-1.

There are two special pumps developed specifically for pipe coating applications.

Table 2-1 Pipe Coating Application Specifications

Pipe Coating Pump...	Specification	Note
Air Lines	8-mm	
Air Fittings	8-mm	Installed in the FLOW and ATOMIZING air outlet ports of the EXP-100 controller. Refer to the *Operation* section for more information.
Air Settings	 **WARNING**: Settings over 4.1 bar (60 psi) are not recommended and will result in significantly increased wear and impact fusion in the pump, hose, and gun.	
	These are recommended starting points for fusion bond coatings on pipe.	
Flow rate	3.1 bar (45 psi)	If more powder is required, increase only the FLOW setting.
Atomizing	0.7 bar (10 psi)_	Highest powder flows will occur with the lowest possible ATOMIZING setting. Increasing ATOMIZING will reduce powder flow.
Powder Delivery Hose Recommendations	• The restriction in the powder delivery hose is the primary factor limiting powder flow. • Keep powder delivery hose lengths as short as possible to maintain high flow rates. • Lengths over 8 m (26 ft) are not recommended for this industry because the long lengths will adversely affect powder delivery rates. • Use of clear polyurethane powder hose is recommended for the NPE-4AH, HF-10, and LF-10 fusion bond guns.	

Electrical Controls

See Figure 2-2. The electronic control module houses the main circuit board and display board. The main power and high voltage (kV) controls and indicators used by the operator are on the front panel.

Press the kV/µA display switch (8) to cause the vertical bar meter (5) to display microamperes (µA).

The vertical bar meter displays the true kV output only when the cable is not connected to the multiplier well (no load). When the cable and gun are attached, the actual kV output is somewhat less than the bar meter reading, due to the resistance of the cable and gun resistor.

NOTE: When the power unit is first put into service, the µA output shown on the bar meter should be noted and then monitored periodically thereafter. A significant increase in µA output indicates a probable short in the gun resistor, electrostatic cable, or multiplier. A significant decrease in µA output indicates that the multiplier or regulator board is failing.

The red kV ON indicator (2) lights when the kV switch is turned on. It indicates that the circuits controlling the multiplier are functioning properly.

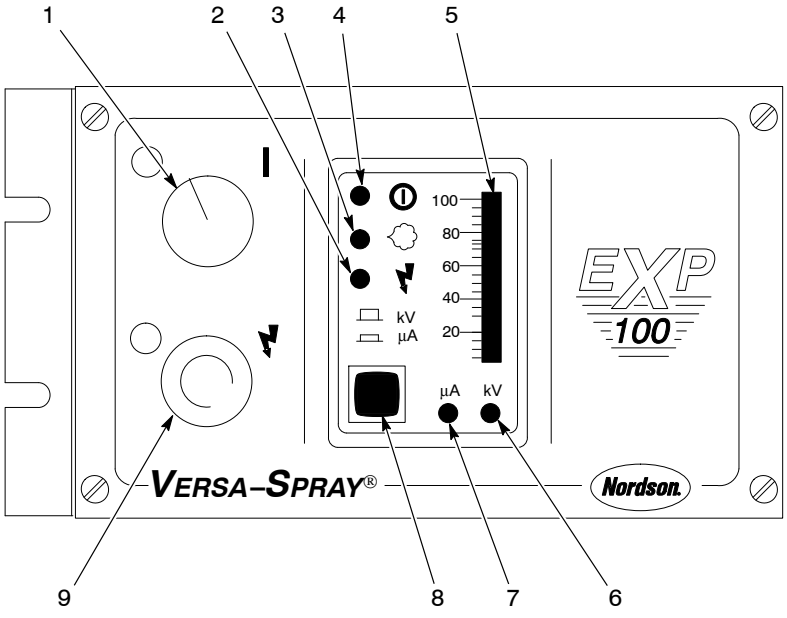

Figure 2-2 Electronic Control Module

1. Main power switch
2. kV ON indicator
3. Air ON indicator
4. Power ON indicator
5. Vertical bar meter
6. kV display indicator
7. µA display indicator
8. kV/µA display switch
9. kV potentiometer

Pneumatic Controls

NOTE: The regulators have locking knobs. Pull the knob out to change the setting—push the knob in to lock.

See Figure 4-3. Both the wall and rack units have regulators and gauges for atomizing and flow rate air. The wall unit has an additional regulator and gauge for auxiliary functions, such as fluidizing air.

The flow of atomizing and fluidizing air is controlled by the solenoid valve inside the power unit cabinet. When the spray gun is triggered, this valve is energized, allowing air to flow to the powder pump.

The operator controls the flow of auxiliary (fluidizing) air. Turn the regulator knob clockwise to allow air to flow out of the bottom-center fitting on the side of the wall unit.

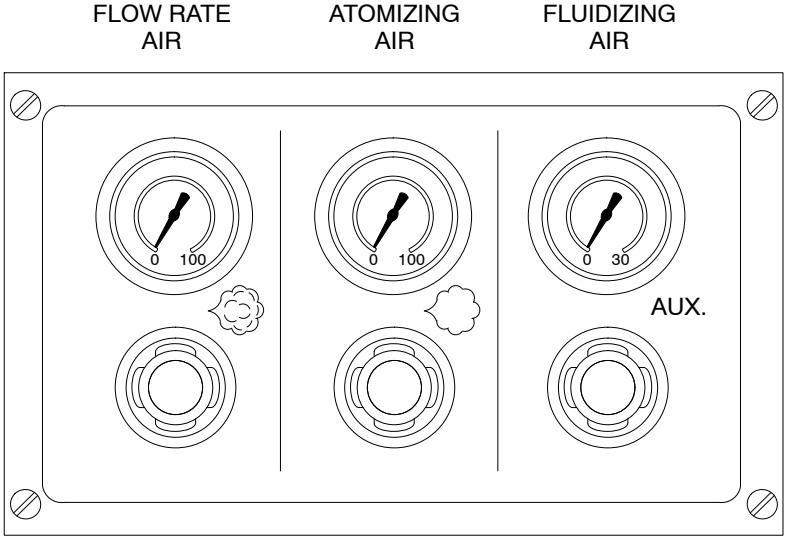

Figure 2-3 Pneumatic Control Module (Wall Unit Shown)

Symbols

A description of the symbols used on the EXP-100 power units is provided in Figure 2-4.

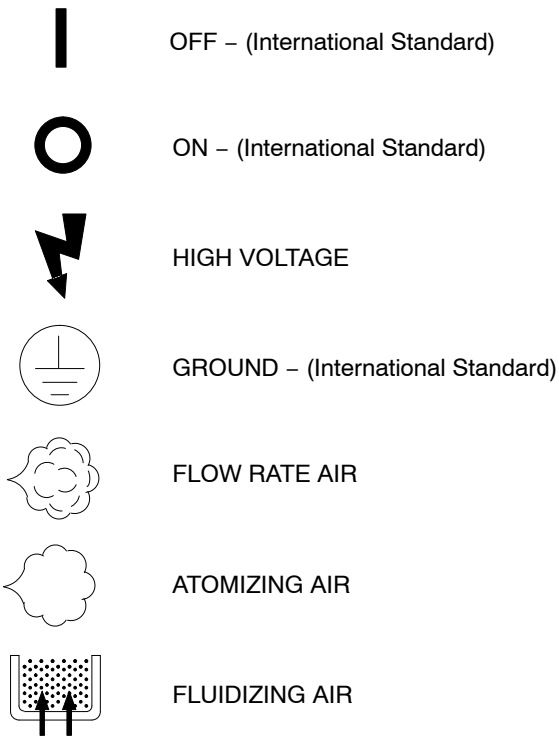

Figure 2-4 Symbols Used on the EXP-100

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.

Mounting

Before installing your power unit in a rack or mounting on a wall or bracket, make sure the power supply board jumpers are set for your input voltage and application. It is easier to do this before the unit is installed.

The rack unit is designed to be mounted in a standard 19 in. equipment rack. A mounting kit included with the rack unit contains a 6.5 ft power cable, a dust-tight bulkhead connector for connecting the power cable to the master control unit, and a ground strap and fasteners for grounding the unit to the rack. Refer to the appropriate master control manual for installation instructions.

The wall-mounted unit can be installed on a spray booth wall or operator's platform bracket. Refer to the *Specifications* section for cabinet dimensions.

NOTE: The power unit must be installed in accordance with all applicable codes.

Power Supply Circuit Board Setup

Refer to Table 3-1 and see Figure 3-1 for the circuit board factory default settings and the options if you will be changing the settings.

Table 3-1 Input Voltage Settings

Item	Factory Default Setting	Setting Options	Description
1 (J8)	W/MC	W/O[1]	wall unit and individual rack unit
		W/MC	rack unit
2 (J4)	Position 1-2	Position 1-2	120/240 Vac
		Position 3-2	other than 120/240 Vac
3 (J3)	240 Vac	Input voltage setting	Voltage showing is voltage selected

[1] The W/O position on J8 is used only when the power unit is used with an automatic gun and without a master control. In this position, the unit's power switch will function as the trigger.

Power Supply Circuit Board Setup *(contd)*

See Figure 3-1 and refer to Table 3-1. Use the following steps to change the factory default settings on the circuit board.

1. Loosen captive screws at each corner of the electronic control module. Pull the module far enough out of the cabinet to gain access to the power supply circuit board.
2. Select input voltage (3) by installing the 5 pin jumpered plug connector on J3 so the desired voltage is visible.
3. If your input voltage is lower than 120 or 240 Vac nominal (such as 100 or 200 Vac), move the shorting plug on J4 to the 3-2 position (2).

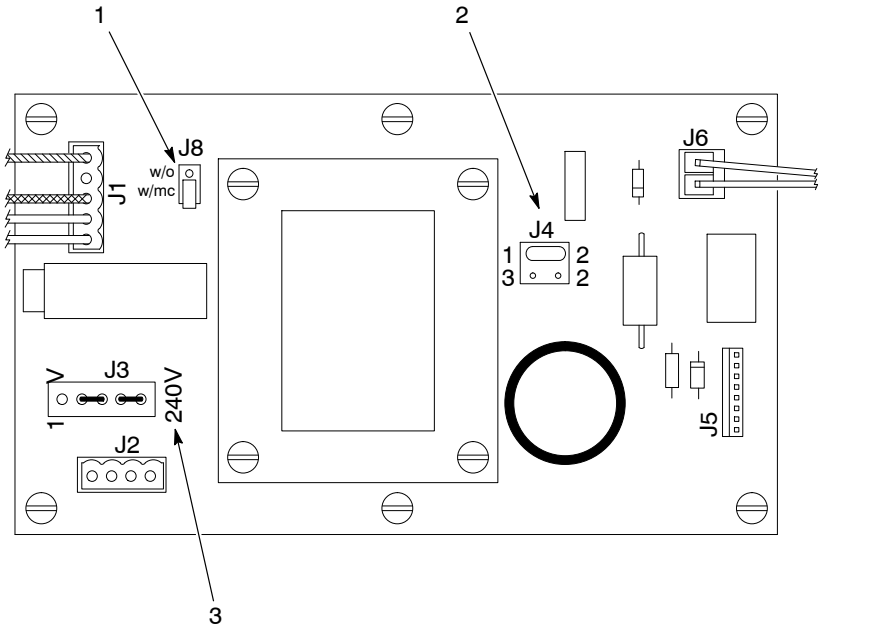

Figure 3-1 Power Supply Board Settings

Input Power Connections

WARNING: Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage. Power unit should be connected to service line by a qualified electrician.

WARNING: To prevent electrical shock during installation or servicing, a power isolation device such as a disconnect switch or breaker should be installed in the service line ahead of the power unit or master control console.

Rack Units

1. Plug the power cable into the receptacle on the multiplier module. Secure the cable to the receptacle with the cord nut. Connect the bare leads at the other end to the master control unit distribution board as shown in the master control unit manual.
2. Connect the ground wire furnished with the power unit to the external ground stud on the multiplier module. When rack units are installed in a typical equipment cabinet, each power unit is grounded to the one below, with the last power unit grounded to the cabinet. The cabinet is then connected to a true earth ground.

Wall Units

1. Install a 3-pronged plug on the end of the power cord. Plug the power cord into an appropriate electrical receptacle supplying the correct input voltage.
2. Connect the ground strap to a true earth ground.

Electrostatic Cable Connections

NOTE: EXP-100 control units are shipped with a specific length of tubing installed in the cable well for protection during shipping. Remove this tube before filling the well.

- Rack Units: See Figure 3-2.
- Wall Units: See Figure 3-3.

1. Remove the dust cap and plastic tubing from the multiplier well (1) and fill the well with dielectric oil from the 7.5 ml pipettes shipped with the unit.
2. Make sure the cable end is clean and dry. The power unit end of the cable has a small brass ball on the end. Insert the cable into the well, thread the cable nut onto the well and hand tighten.
3. Wipe up any spilled oil, and provide a protected path to the gun for the cable. The cable can be run through the clamp on the side of the wall unit. Do not bend the cable in a radius of less than six inches.
4. **Wall units used with handguns**: Remove the jumper wire from the trigger receptacle and plug the trigger cable into the receptacle (4).

   NOTE: If using an automatic gun, the jumper must be installed.

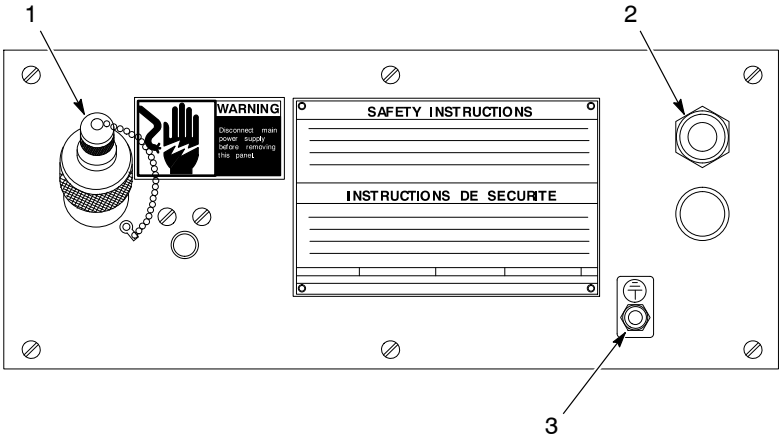

Figure 3-2 Rack Unit Multiplier Panel

1. Multiplier well
2. Dust-tight connector and power cord
3. Ground stud

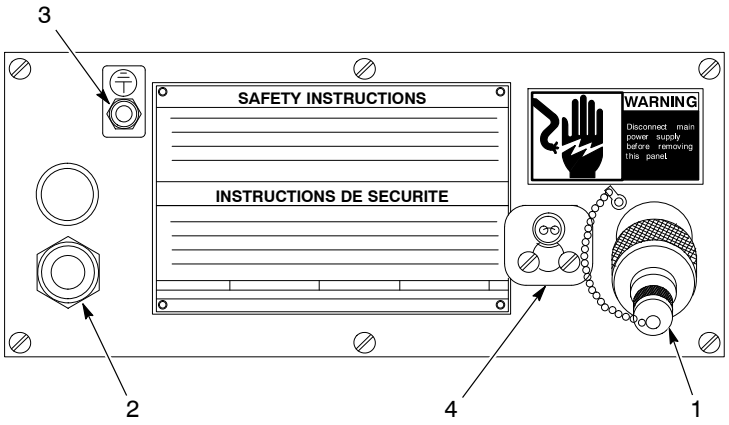

Figure 3-3 Wall Unit Multiplier Panel

1. Multiplier well
2. Dust-tight connector and power cord
3. Ground stud
4. Trigger cable receptacle (wall units only)

Pneumatic Connections

CAUTION: Maximum input air pressure must be no more than 7 bar (100 psi).

See Figure 3-4 and refer to Table 3-2 to make the air tubing connections to the pneumatic module.

Table 3-2 Air Tubing Connections

Air Type	Item	Poly Tubing size	From	To
Supply Air (Refer to Note A)	2	$^3/_8$-in.	Air supply: Air is typically supplied to the individual power units in an equipment cabinet from a pilot valve and manifold mounted at the bottom.	IN connector on the controller
Flow rate	3	$^1/_4$-in.	Flow rate connection on controller	"F" connection on powder pump
Atomizing	1	$^1/_4$-in.	Atomizing connection on controller	"A" connection on powder pump
Fluidizing (wall units only)	4	$^3/_8$-in.	Fluidizing air connection on controller	Fluidizing air fitting on the hopper plenum.
Note A: Supply air must be clean and dry. Moist or contaminated air can cause powder caking and sticking to tubing walls, clogging of pump venturi throat and metering orifices and gun passages, as well as grounding or arcing of the high voltage circuit in the gun. Prefilters and coalescent filters, with automatic drains, should be used. A refrigerated or regenerative desiccant air dryer capable of producing 3.4 °C (38 °F) or lower dewpoint at 7 bar (100 psi) is also recommended.				

Pneumatic Connections *(contd)*

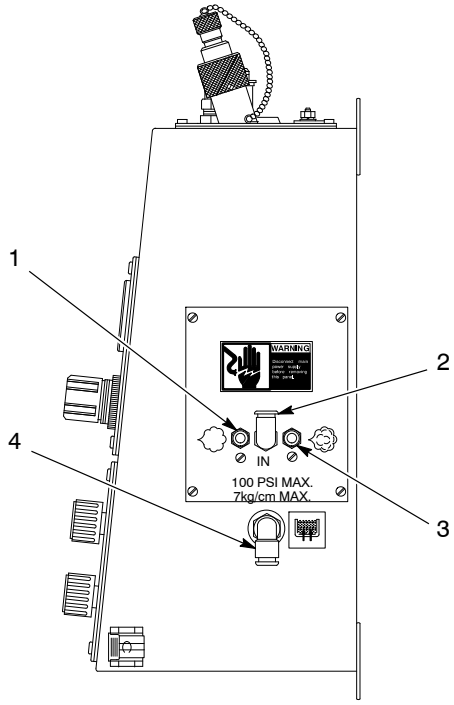

Figure 3-4 Air Tubing Connections (Wall Unit Shown)

1. Atomizing air—$^{1}/_{4}$ in. poly tubing
2. Supply air—$^{3}/_{8}$ in. poly tubing
3. Flow rate air—$^{1}/_{4}$ in. poly tubing
4. Fluidizing air—$^{3}/_{8}$ in. poly tubing (wall unit only)

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.

This section describes safety precautions, startup and shutdown procedures, and routine operating instructions, and maintenance procedures for an electrostatic powder spray system using the Versa-Spray EXP-100 power unit.

System Startup

Along with the power unit(s), master control unit, and electrostatic cables and spray guns, other components used in a typical powder spray system include a spray booth, exhaust filters, transfer pumps, distribution hopper, sieve, feed hopper, and powder pumps.

The system should be electrically connected to a safety interlock or interlocks which will shut down the system if a fire is detected, the booth fans shut down, or a spray gun comes too close to a ground.

Before activating the power unit, make sure the:

- booth vent fans are on,
- powder recovery system is operating,
- powder in the feed hopper is fluidized thoroughly.

Refer to the appropriate component manuals for startup procedures for these components.

Power Unit Operation

Rack units that use a master control unit are controlled by the master control unit. Air and power will not be available to the power unit until the master control unit is switched on.

When setting up an automatic gun system for the first time, turn all power units off, then turn on the master control unit. Turn on one power unit at a time, and adjust as described in the following procedure.

Air Output

1. Turn on the main power switch.
2. Refer to Table 4-1 to set the air pressures.

Table 4-1 Air Pressure Settings

Air Output	Pressure	Function
Flow rate	2.0 bar (30 psi)	Controls the volume and velocity of the powder-air mixture delivered to the spray gun.
Atomizing	1.0 bar (15 psi)	Controls the density (powder-to-air ratio) of the mixture.
NOTE: The pressures given are an average starting point. Adjust for economical powder use and deposition requirements, type of powder, type of pump, humidity, and other operating variables.		

3. Test the spray and adjust the gun pattern sleeve, if used, to the desired spray pattern.

kV Output

NOTE: On initial startup of the power unit, note the µA reading on the bar meter. Monitor the µA reading periodically thereafter. If there is a significant increase in the µA reading, check the gun resistor, electrostatic cable, and multiplier well. Shorting in one of these components will increase current draw and is a serious safety hazard. A significant decrease in µA reading could signal a failure in the multiplier or regulator board.

1. Turn the kV potentiometer switch (9) to 100 kV. Trigger the gun. The high-voltage LED will light and the bar meter will display kV output +/– 5 kV. The kV display LED will also light, indicating that the bar meter is displaying kV output. Pressing the kV/µA display switch will display µA output. The µA indicator will light.
2. Test the spray items to be coated. Adjust the kV output to achieve desired results.

Adjustments

Obtaining a quality powder coating while maintaining powder economy is achieved through experimentation and experience. Variables affecting results include

- Voltage
- Flow rate air pressure
- Atomizing air pressure

Voltage

As the voltage is lowered, the deposition rate decreases but the ability to coat recessed areas is generally improved. Increasing the voltage will increase deposition rates to a point after which a self-limiting action will occur.

Flow Rate Air Pressure

Using a high-flow rate air pressure increases the deposition rate. The high powder velocity helps to coat recessed areas by defeating some of the electrostatic attraction of the powder to projecting areas around the recess (Faraday Cage Effect). However, high-flow rate air pressure can cause a decrease in powder economy and increased wear on the internal parts of the spray gun and powder pump.

Atomizing Air Pressure

Increasing the atomizing air pressure will decrease the density of the cloud emitted from the gun and result in lowered deposition rates. An atomizing air pressure that is too high can cause rapid wear of powder contact parts. Decreasing the pressure will increase the powder-to-air ratio, providing better coverage. Too low a pressure, however, can cause powder to clog the pump venturi throat or gun passages.

Shutdown

Rack Units

If using a master control unit console, turn off power at the master control unit to disable all power units in the system.

Maintenance

It is important to exercise good housekeeping practices with all components of a powder spray system. Dust and powder accumulating on electrostatic equipment can cause malfunctions resulting in fire and shock hazards. The entire system should be cleaned periodically along with the surrounding area.

Daily

1. Clean the spray guns and pumps. Use compressed air to blow powder from the spray guns, pumps, and hoses. Never blow backwards from the spray gun to the pump. Wipe the power unit down with a clean cloth or brush.
2. Check all ground connections. The loss of a ground could affect transfer efficiency and create a safety hazard.
3. Drain the system air supply filters.

NOTE: Cleaning the lenses is very important. Be sure to perform this step daily to maintain optimum system performance.

4. Clean the fire detector lenses every four hours or as often as necessary to maintain operation. Do not operate the system with the fire detector in bypass mode.
5. Clean out the powder sieves.
6. Clean the booth daily with a rubber squeegee or other grounded, non-sparking device.

Periodically

1. Check the system air supply filters on a regular basis. Drain filters as often as necessary and replace filter elements when necessary.
2. Check the operation of the air dryer at least once a week.

WARNING: Do not use high pressure air to blow powder from skin or clothes. Air can be injected under skin, causing personal injury or death.

3. Periodically check the powder contact parts for wear. If the parts indicate excessive wear, replace them.
4. Strip the workpiece hangers regularly. Resistance between workpieces on hangers and ground should not be more than one megohm.
5. Check electrostatic cable and gun resistor periodically with a megohmmeter. Replace cable or resistor if resistances do not conform to ranges given in your gun manual.
6. Check for pressure drops across booth filters. Restricted filters could result in poor powder containment with the booth and create a safety hazard if airborne powder concentration exceeds safe limits. No powder should be present in the exhaust plenum. Clean or change filter cartridges when necessary.
7. Clean the booth daily with a rubber squeegee or other grounded non-sparking device. Extensive cleaning should be done weekly or biweekly. Exhaust fans should be on while the booth is being cleaned.

Section 5
Troubleshooting

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

This section contains troubleshooting procedures. These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

Pneumatic Troubleshooting

Problem	Possible Cause	Corrective Action
1. Powder puffing from gun	Low air pressure; incorrect ratio of atomizing to flow rate air	Increase the atomizing or flow rate air pressure.
2. Powder surging from gun	Poor fluidization of powder in hopper	Increase the fluidization pressure.
	Wet powder	Inspect the powder in the hopper; replace the powder if it is damp. Check the air supply filters and dryer.
3. Powder drooling from gun	Poor atomization of powder	Increase the atomizing pressure.
	Low voltage	Increase the voltage. Check the µA meter reading. If the reading is higher than normal, check the gun resistor and cable with a megohmmeter for the values given in the gun manual. If the reading is lower than normal, check the multiplier output with a kV meter. Increase the flow rate pressure.
	Low flow rate pressure	Increase the flow rate pressure.
4. Uneven pattern	Worn nozzle or deflector	Disassemble the gun and check the parts for wear; replace the parts if necessary.
	Impact fusion on nozzle or deflector	Disassemble the gun and clean or replace the parts as necessary.
5. Voids in powder pattern	Worn nozzle or deflector	Disassemble the gun and check the parts for wear. Replace the parts if necessary.
	Plugged gun powder or path	Disassemble the gun and clean it.

Continued...

Problem	Possible Cause	Corrective Action
6. No powder flow	Plugged hose, pump, or gun	Disassemble the gun and clean it. Disconnect the feed tubing from the pump and blow it out with compressed air. Disassemble the pump and clean it. Inspect the powder supply for dampness, and replace the powder if necessary.
	No or poor fluidization	Increase the fluidization pressure; inspect the fluidization plate for plugging.
	Sticking manifold valve cartridges	Remove the pneumatic module from the power unit; remove the solenoid, pilot manifold, and gasket; and check the movement of the cartridges in the manifold bore. Replace the parts if necessary. Do not lubricate.
	Malfunctioning solenoid	Check the solenoid and replace it if necessary. Refer to the *Electrical Troubleshooting* chart for more information.
7. Inadequate powder flow	Worn pump venturi nozzle or throat	Disassemble the pump and inspect the parts. Replace the parts if necessary.

Electrical Troubleshooting

See Figures 5-1 and 5-2.

Problem	Possible Cause	Corrective Action
1. No power—all LEDs off	Input power failure	Check the input power supply and the interlock system.
	Loose connection or shorted wiring	Ensure that the internal cable connections are secure; check for signs of a short.
	Fuse failure (power supply board)	Check the fuse visually or with a continuity tester. If failed, correct the reason for failure before replacing the fuse. A shorted capacitor can cause the fuse to blow.
	Switch S2 failure	Check continuity across switch S2 connector leads 11 and 12 as well as 8 and 10 with the switch ON and the cable disconnected. Remove the switch connector from J2. With the switch ON and the cable disconnected, check continuity across switch terminals C1 and 2 as well as C2 and 4.
	Power supply circuit board failure	With the power OFF, check for 7.8 to 11.7 ohms at J5, pins 4 and 5, on the power supply circuit board.
	Regulator board failure	Replace the regulator board.
2. Power pack functions normally, but LED for one or more functions off	Loose connection or short	Ensure that the cable connections are secure; check for signs of a short.
	Display board faulty	Replace the display board.
3. No output air; LED lit	Loose connection or short	Make sure the cable connections are secure; check for signs of a short.
	Solenoid failure	Disconnect the solenoid leads. The Vom reading across the leads should be 200–240 ohms. If not, replace the leads.
	12 V solenoid circuit board failure	Check the voltage across P1 on the solenoid circuit board. The voltage should be 11–13 Vdc. If the voltage is less than 11 V, replace the solenoid circuit board.
	Power supply circuit board output voltage low or failed	Check the voltage across J6–1 and J6–2 on the power supply circuit board. The voltage should be 18 to 30 Vdc. If the voltage is less than 18 V, move jumper J4 to position 3-2. Recheck the voltage. If the voltage is still low, replace the power supply circuit board.

Continued...

Problem	Possible Cause	Corrective Action
4. No kV output; green LED lit; red LED on regulator board lit	Loose connection or short	Make sure the cable connections are secure; check for signs of a short.
	kV switch failure	Check continuity across terminals 3 and 4 on the switch cable connector with the switch ON (leads 22 and 23).
	Regulator board failure	Replace the regulator board.
5. No kV output; green LED lit; red LED on regulator board off	Regulator board failure	Replace the regulator board.
6. No kV output; green LED lit; red LED lit	Gun resistor failure	Check the gun resistor with a megohmmeter for the resistance value given in the gun manual.
	Electrostatic cable failure	Check the cable with a megohmmeter for the resistance value given in the gun manual.
	Multiplier or regulator board shorted	Adjust the kV up and down. The whine produced by the multiplier should increase and decrease in pitch. If you cannot hear the whine, replace the multiplier.
7. Low kV output	Regulator board failed open; multiplier diodes failing	The voltage at board connector P3-5 or at the contact on the back of the kV switch should be approximately 13.9 Vdc at maximum kV output. If you cannot obtain this voltage, replace the regulator board.
8. Loss of wrap; poor transfer efficiency	Poorly grounded workpiece	Inspect and clean the conveyor and hangers.
	Power pack not grounded	Check the ground connection.
	Electrostatic cable or gun resistor failure	Check the cable and gun resistor with a megohmmeter for the values given in the gun manual.
	Moisture in air causing kV to leak to ground	Check the air dryers.
	Dirt or powder contamination of connections causing arcing	Check the cable and resistor connections; clean or replace the components.

Electrical Troubleshooting *(contd)*

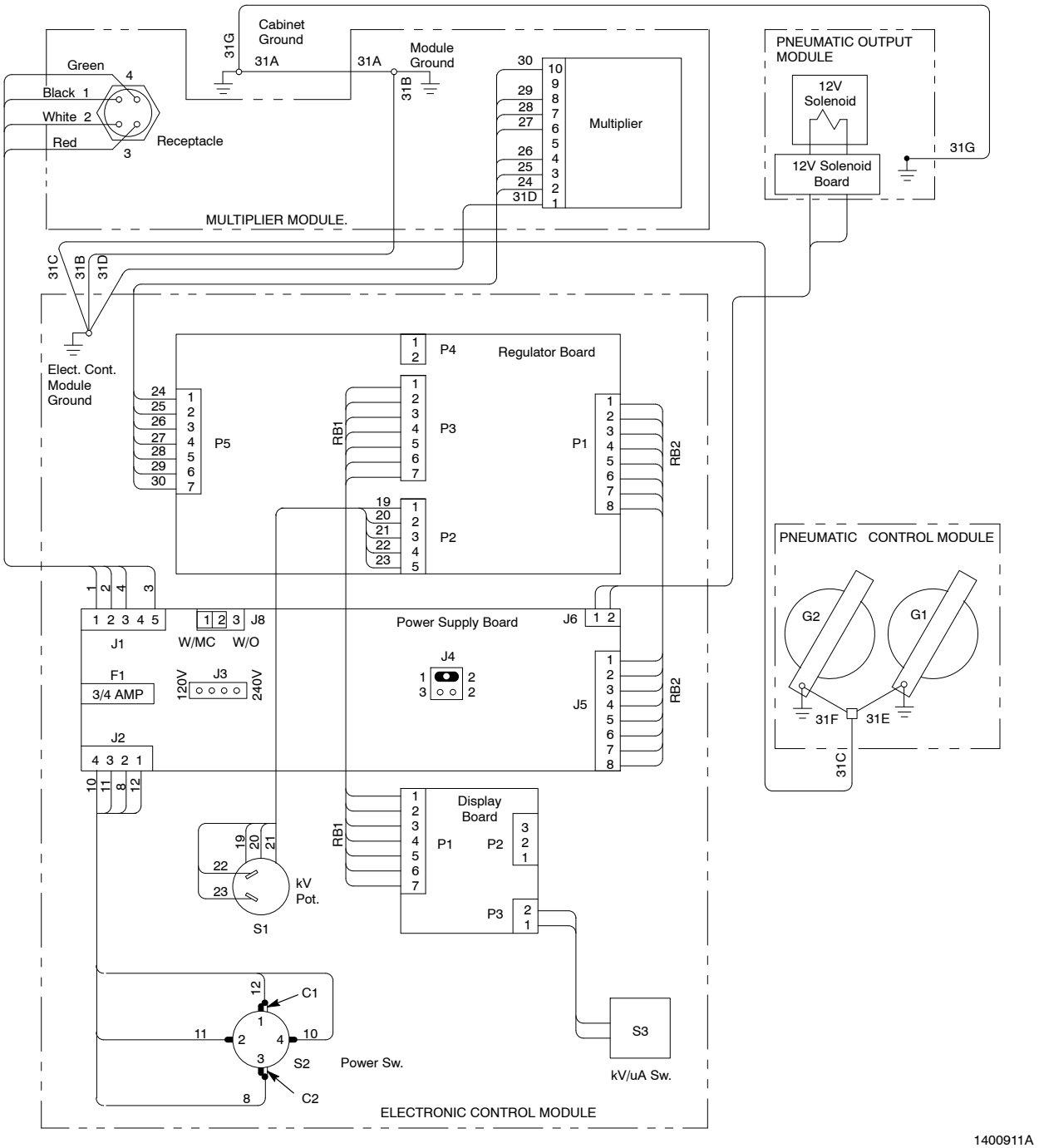

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Figure 5-1 Rack Unit Wiring Diagram

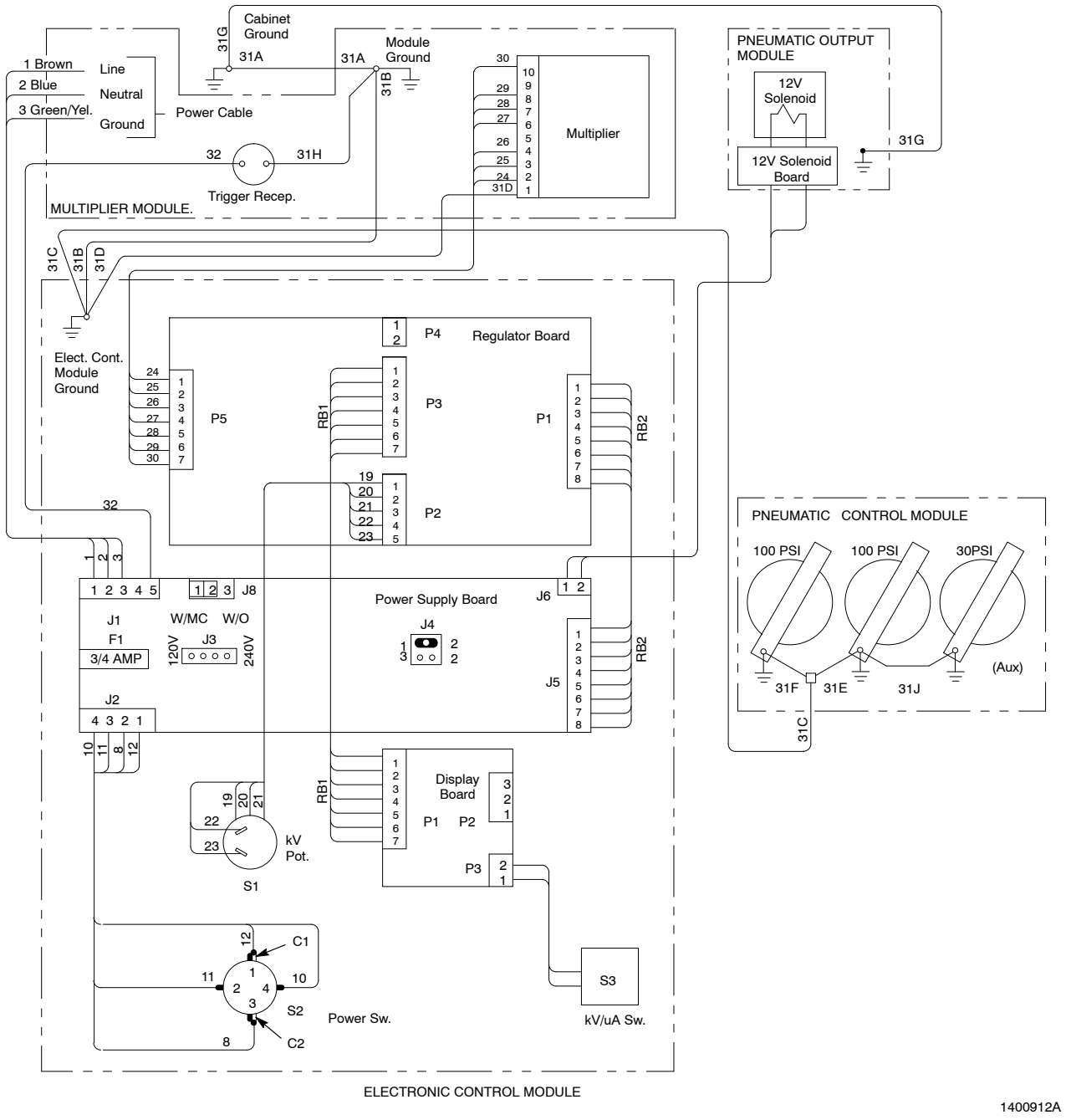

Figure 5-2 Wall Unit Wiring Diagram

Section 6
Repair

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

Introduction

WARNING: The power unit contains energized electrical components with potential which could be fatal. Disconnect and lock out input electrical power to the power unit before removing any panels or performing any repairs.

NOTE: It is important to maintain a dust-free environment inside the power unit cabinet. Make sure that all gaskets, seals, and O-rings are in good condition when replacing components. Agency approvals require a dust-free cabinet. Modifications which alter this component in any way can result in the loss of approvals.

NOTE: Whenever the multiplier or regulator board, or both, are replaced, the regulator board calibration procedure must be performed.

Refer to the *Parts* section for part numbers for all replaceable components of this power unit.

Replacing the Power Supply and Regulator Board

1. See Figure 6-1. Loosen the four captive screws on the front of the electronic control module (4) and slide the module out of the cabinet far enough to reach the wiring harnesses and ribbon cables.
2. Disconnect the wiring harnesses and ribbon cables from the power supply board connectors J1, J2, J5, and J6.
3. Disconnect harnesses and ribbon cables from regulator board connectors P5, P3, P2, and P1.
4. Disconnect the ground wires from the module ground terminals and pull the module out of the cabinet.
5. To remove the power supply board (5), unscrew the six screws and lockwashers holding the board to the module.
6. To remove the regulator board (6), unscrew the four screws and lockwashers holding the board to the module backplate.

NOTE: If you replace the power supply board, make sure the jumper settings are correct for your input voltage and application. Refer to the *Installation* section for instructions. If you replace the regulator board, calibrate the regulator circuit board as described in *Calibrating the Regulator Circuit Board* in this section.

7. After replacing the boards, reconnect the module ground wires, wiring harnesses, and ribbon cables to their proper connectors.

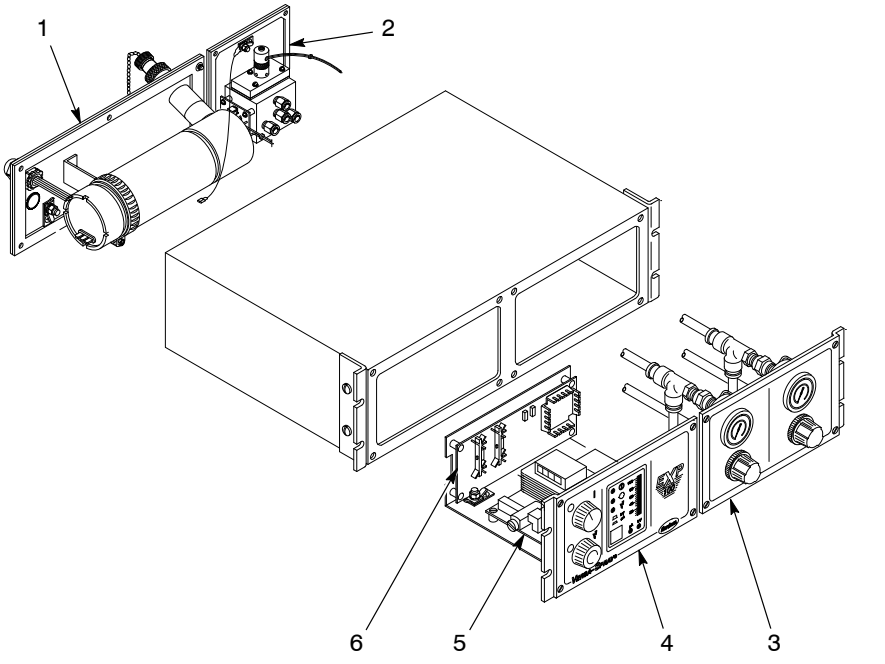

Figure 6-1 Removing Modules

1. Multiplier module
2. Pneumatic output module
3. Pneumatic control module
4. Electronic control module
5. Power supply board
6. Regulator board

Calibrating the Regulator Circuit Board

If you replace the regulator board or multiplier module, calibrate the new regulator board before placing the power unit back into service.

WARNING: Power is applied to the power unit during the calibration procedure. Make sure the power unit is grounded and that modules removed from the cabinet but still energized are also grounded. Exercise extreme caution while calibrating the regulator board. Contact with energized components may cause severe shock or death.

1. See Figure 6-2. Make sure all electronic control module wiring harnesses, ribbon cables, and ground wires are connected properly.
2. If installed, disconnect the electrostatic cable from the multiplier well. Fill the well with dielectric oil, and replace the dust cap.
3. Loosen the six screws securing the multiplier module to the cabinet and slide the module out of the cabinet. Set the module on a surface so that you can see the foil side of the finger board without disconnecting the harness connector from the multiplier. Note the adjustment voltage (1) rating inscribed on the multiplier end cap.
4. Restore electrical power to the power unit and turn the main power switch on. The Power On, Air On, and kV LEDs should light.
5. Turn the kV rotary switch on and rotate it to the maximum kV position. The kV On LED should light.
6. Measure dc voltage from pin #5 (2) on the foil side of the multiplier finger board to ground with a voltmeter.
7. Use a small screwdriver to adjust the R20 potentiometer (4) on the regulator board until the voltmeter reading is the same as that inscribed on the multiplier.
8. Check the vertical bar meter. All LEDs on the bar meter should be lit, signifying maximum output. If all LEDs are not lit, use a small screwdriver to adjust the R40 potentiometer (3) on the regulator board until the bar meter reads 100 kV.
9. Apply locking compound to the potentiometer's R20 and R40 adjustment screws.
10. Turn the kV potentiometer and power switch off.
11. Install the multiplier and electronic control modules in the cabinet and tighten the captive screws. Install the electrostatic cable. Wipe up any excess oil.

Calibrating the Regulator Circuit Board *(contd)*

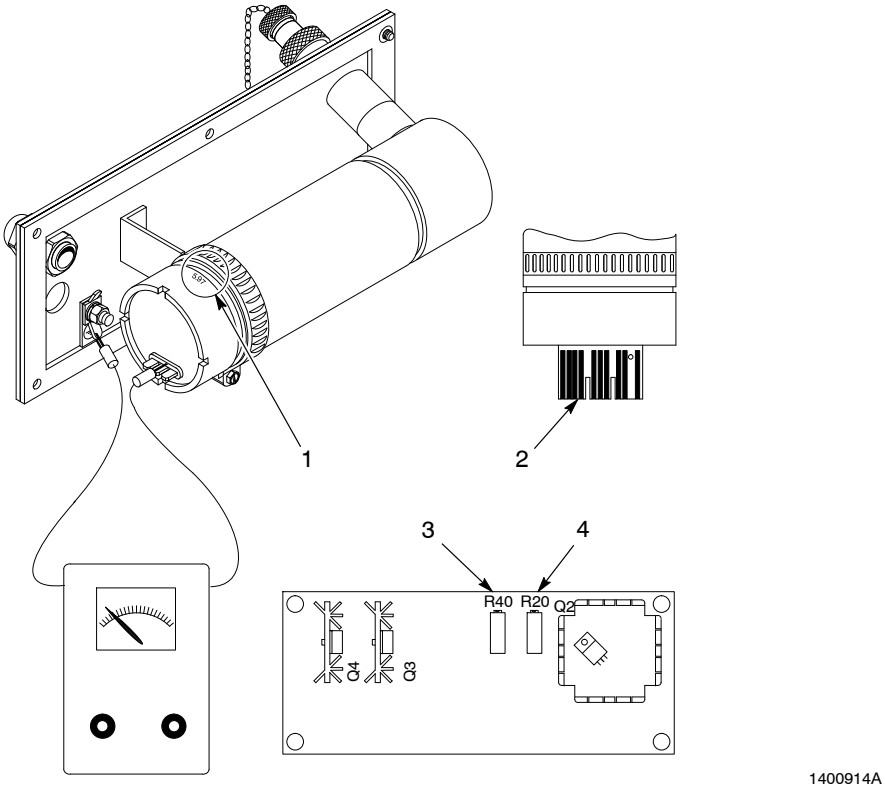

Figure 6-2 Regulator Board Calibration

1. Adjustment voltage
2. Pin #5
3. R40 potentiometer—bar meter adjustment
4. R20 potentiometer—regulator board output to multiplier adjustment

Replacing the Multiplier and Multiplier Well

See Figure 6-3.

The parts shown in this illustration can be removed and replaced. All parts shown must be ordered separately. Refer to the *Parts* section for part numbers.

Removing the Multiplier

1. Shut off electrical power to the power unit and ground the gun electrode. Disconnect the electrostatic cable from the multiplier and cap the cable well.
2. Disconnect the power cord (for rack units), or loosen the liquid-tight strain relief connector (for wall units) so that the power cord can pass through freely. Disconnect the manual trigger connector, if used.
3. Loosen the captive screws securing the multiplier module to the cabinet. Slide the module out and disconnect the module ground wire and multiplier harness.
4. Remove the dust cap and drain oil from the multiplier well (6).
5. Unscrew the retainer nut (1) from the module multiplier tube.
6. Loosen the hose clamp and remove the multiplier from the module.

Removing and Disassembling the Multiplier Well

1. Unscrew the multiplier well (6) from the multiplier and remove the upper and lower O-rings (5, 7).
2. If replacing the entire well assembly, no further disassembly is required. If reusing undamaged parts, proceed with step 3.
3. Remove the tolerance ring (4) and unscrew the cable adapter (2) from the multiplier well.

Assembling and Installing the Multiplier Well

1. Coat O-ring #1 (3) with dielectric grease and install the inside cable adapter (2).
2. Screw the cable adapter onto the multiplier well (6), and install the tolerance ring (4) over the adapter.
3. Coat O-ring #3 (7) with dielectric grease. Install O-rings #2 and #3 (5 and 7) onto the well.
4. Insert the well onto the multiplier end cap, making sure the spring-loaded contact at the bottom slides inside the well. Screw the well into the multiplier end cap and tighten to 0.90–1.13 N•m (8–10 in.-lb).

Installing the Multiplier

1. Install the multiplier on the module and secure it with the hose clamp and retainer nut.
2. Reconnect the multiplier harness and ground wire. If the multiplier is new, the regulator circuit board must be calibrated before continuing to step 3. If the multiplier is not new, proceed to step 3. Refer to *Calibrating the Circuit Board* in this section.
3. Install the module into the cabinet and secure it in place with captive screws. Fill the multiplier well with dielectric oil and reinstall the electrostatic cable.

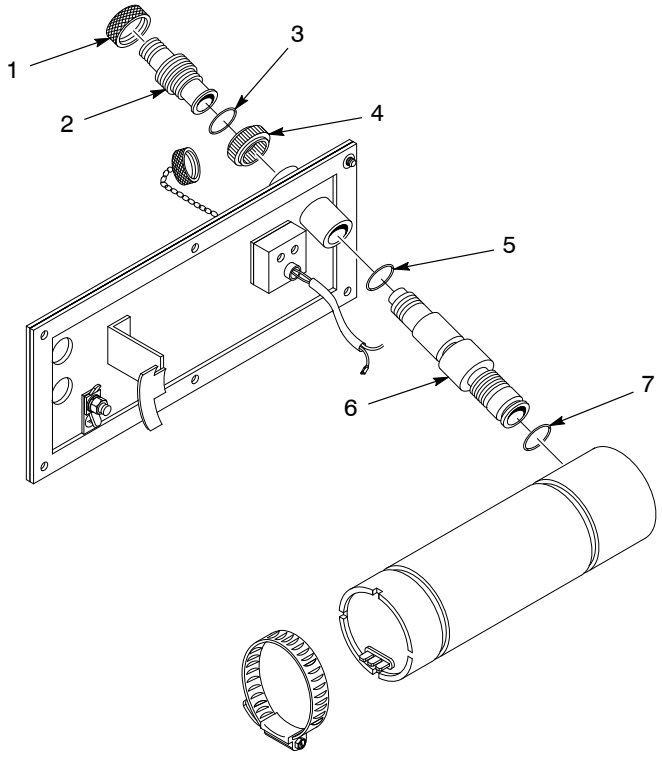

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Figure 6-3 Replacing the Multiplier and Multiplier Well

1. Retainer nut
2. Cable adapter
3. O-ring #1
4. Tolerance ring
5. O-ring #2
6. Multiplier well
7. O-ring #3

Pneumatic Output Module

On the pneumatic output module, the solenoid, solenoid circuit board, or three-way valve cartridges can be replaced.

See Figure 6-4.

To gain access to these components, loosen the four captive screws at each corner of the module and pull the module from the cabinet. The internal air tubing can be disconnected from the manifold fittings, and the ground wire can be disconnected from the module ground stud, if necessary.

Replacing the Solenoid

1. Disconnect the solenoid wiring connector from the solenoid circuit board (6) mounted on the side of the manifold.
2. Unscrew the solenoid valve (1) from the pilot manifold (2). Remove the two-position connector from the old solenoid leads and install it on the new solenoid leads. Screw the new solenoid into the pilot manifold.
3. Connect the solenoid wiring to the solenoid circuit board. Reconnect any air lines or ground wires before installing the module in the cabinet.

Replacing the Three-Way Valve Cartridges

1. See Figure 6-4. Disconnect the air tubing and ground wire. Disconnect the solenoid circuit board wiring harness from the power supply board connector J6. Remove the pneumatic output module completely from the cabinet.
2. Remove the screws and lock washers securing the pilot manifold (2) to the manifold body (5). Remove the pilot manifold and manifold gasket (7) from the manifold body.
3. Unscrew tube fittings T1 and T4 from the manifold body.
4. Using a wooden dowel, push the three-way valve cartridges (4) up and out of the manifold body.
5. Remove the valve springs from the manifold body.
6. Install valve springs in the new cartridge valve.
7. Turn the manifold body upside down and insert the valve cartridges into the manifold body, springs first.
8. Make sure the valve springs are properly seated between valve cartridges and the bottom of the bore. Also make sure that the cartridges move freely.
9. Install the gasket, pilot manifold, and solenoid valve on top of the manifold and secure it in place with screws and lockwashers. Wrap the threads of tube fittings T1 and T4 with PTFE tape and install them in the manifold body.
10. Connect wiring and air lines and install the module in the cabinet.

Replacing the Solenoid Circuit Board

1. Disconnect the circuit board harness from power supply board connector J6. Disconnect the solenoid wiring from the solenoid circuit board.
2. Remove the screws and lockwashers securing the circuit board to the manifold and replace the board with a new one. Connect the solenoid wiring and circuit board harness.

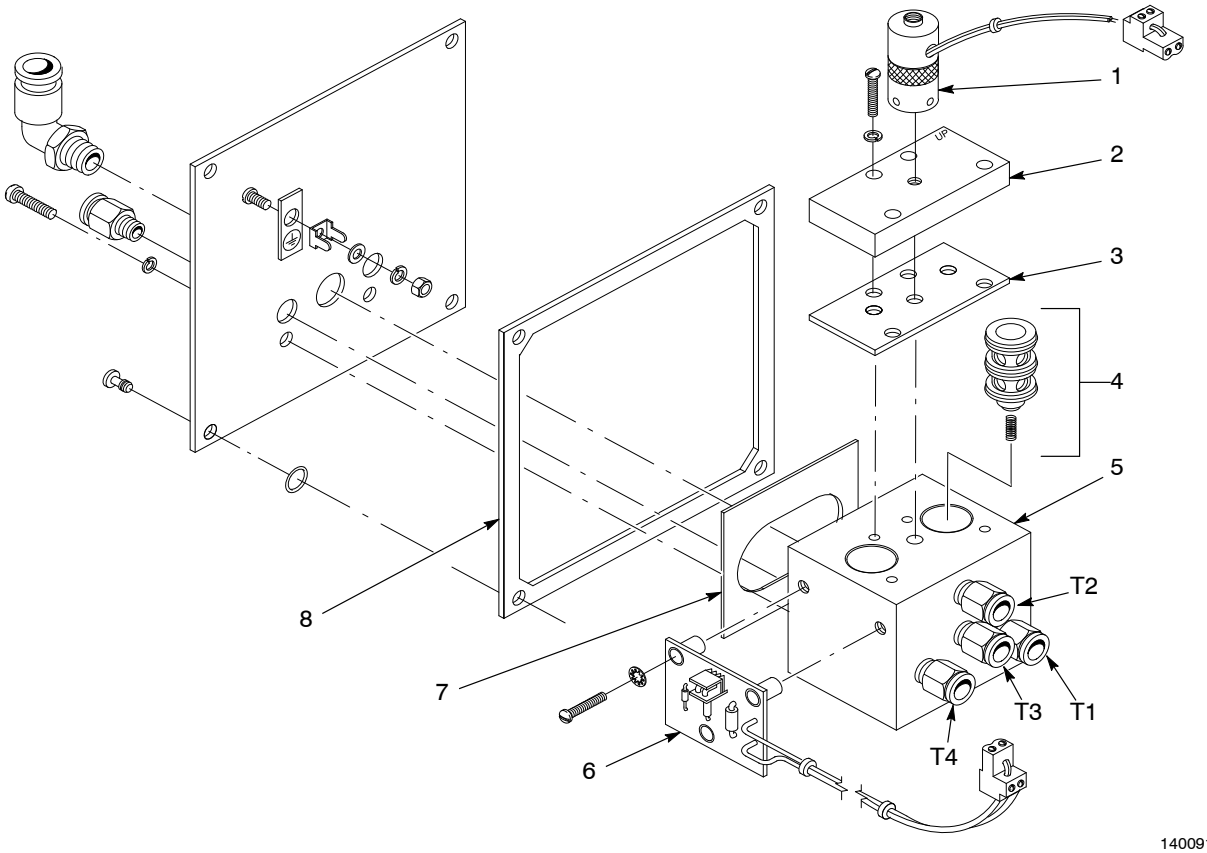

Figure 6-4 Pneumatic Output Module Assembly

1. Solenoid valve
2. Pilot manifold
3. Pilot manifold gasket
4. Cartridge valve and spring
5. Manifold body
6. Solenoid circuit board
7. Manifold gasket
8. Module gasket

Section 7
Parts

Introduction

To order parts, call the Nordson Customer Service Center or your local 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 identify 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 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. Indentions show the relationships between assemblies, subassemblies, and parts.

- 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.

Item	Part	Description	Quantity	Note
—	0000000	Assembly	1	
1	000000	• Subassembly	2	A
2	000000	• • Part	1	

Rack Unit Parts

The following list contains parts that are unique to the rack units. Refer to the *Common Parts* for additional module information.

Rack Unit General Parts—Power Unit

See Figure 7-5.

Item	Part	Description	Quantity	Note
—	144917	POWER UNIT, EXP-100, rack, negative, pkg	1	
—	Obsolete	POWER UNIT, EXP-100, rack, positive, pkg	1	A
1	105846	• MULTIPLIER MODULE, negative	1	B
2	143983	• PNEUMATIC MODULE output	1	B
3	- - - - - -	• CONTROL MODULE, pneumatic	1	B
4	143985	• CONTROL MODULE, electronic	1	B
5	984702	• NUT, hex, M5, brass	1	
6	983401	• LOCK WASHER, M5	1	
7	983021	• WASHER, flat, 0.203 x 0.406 in.	1	
8	271221	• LUG, terminal, ground	1	
9	240674	• TAG, ground	1	
10	105989	• JUMPER, ground, 20 in.	1	
11	248709	• BRACKET, rack, mount	2	
12	982286	• SCREW, flat head, M5 x 10	4	
NS	163437	• CONNECTOR, 8-mm tube x $^1/_8$-in. thread	2	D
NS	107257	• KIT, rack mount	1	
NS	247512	• • OIL, 7.5 ml, high viscosity, insulating	2	
NS	101285	• • CABLE, power, 6.5 ft, w/o terminals	1	
NS	933326	• • CONNECTOR, conduit, $^1/_2$-in. NPT	1	
NS	939122	• • SEAL, conduit fitting, $^1/_2$ in.	1	
NS	984526	• • NUT, lock, conduit	1	
NS	983121	• • LOCK WASHER, external, #10	1	
NS	981159	• • SCREW, pan head, #10-32 x 0.500 in., brass	1	
NS	163449	• • JUMPER, ground	1	
NS	972125	• • ELBOW, 10 mm x $^1/_4$-in. thread	1	C

NOTE A: Discontinued This power unit and its associated “positive” multiplier module are no longer available. See *Rack Unit Multiplier Module Parts* for individual multiplier replacement kits.

B: See illustrations and refer to parts lists throughout the *Parts* section for parts breakdowns.

C: Optional fitting for use with 10-mm input air on newer EXP rack consoles.

D: Optional fitting for use with 8-mm air tubing on newer pipe coating systems.

NS: Not Shown

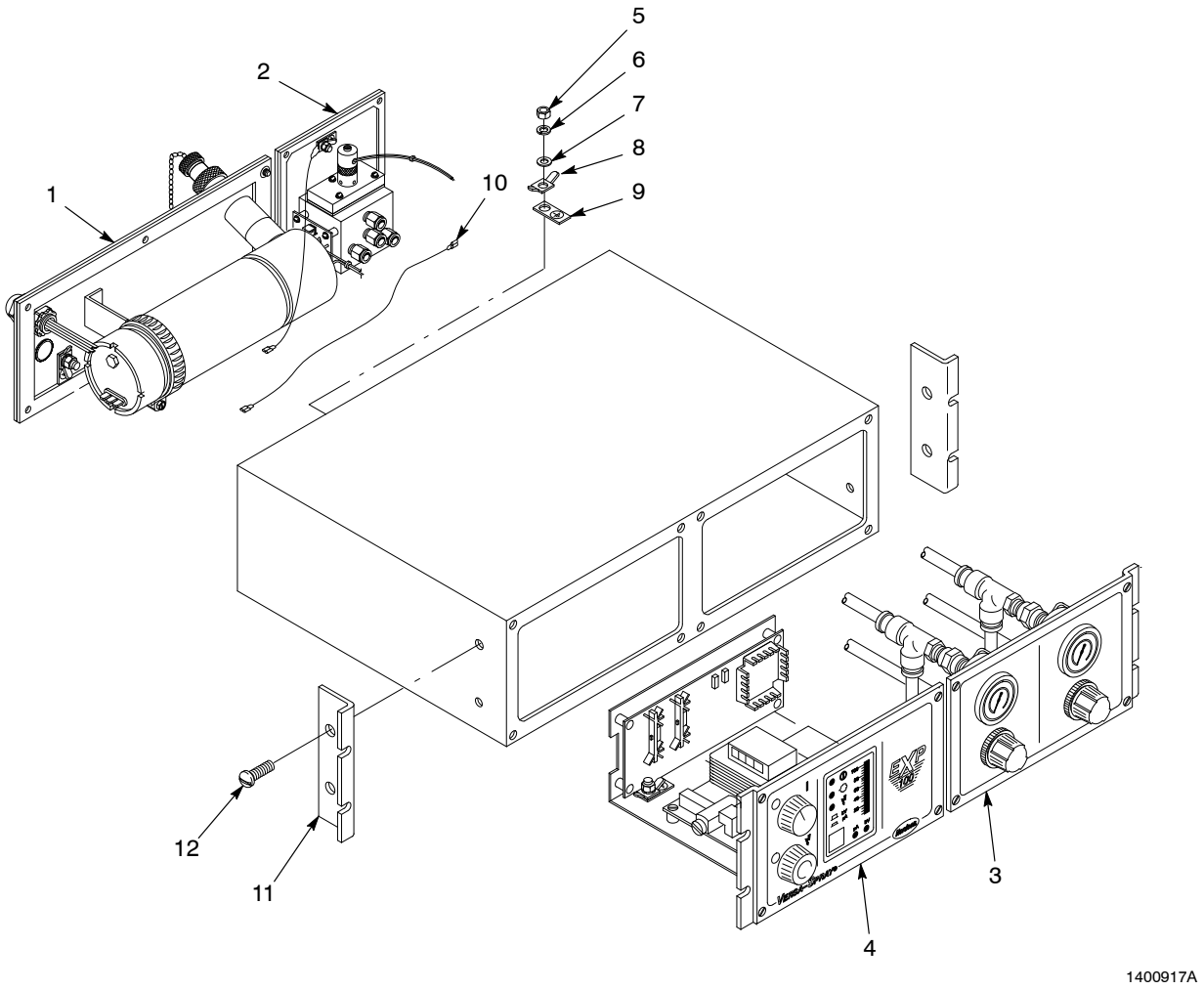

Figure 7-5 Rack Unit General Parts

Rack Unit Multiplier Module Parts

See Figure 7-6.

Item	Part	Description	Quantity	Note
—	105846	MODULE, multiplier, negative, rack	1	A
—	Obsolete	MODULE, multiplier, positive, rack	1	B
2	248729	• NUT, retainer, multiplier	1	
3	- - - - - -	• MULTIPLIER	1	C
1	248699	• • CAP, dust, with chain	1	
4	248736	• • ADAPTER, cable	1	C
5	940141	• • O-RING, Viton, 0.500 x 0.625 x 0.063 in.	1	C
6	248847	• • RING, tolerance, 1.00-in. diameter	1	C
7	941172	• • O-RING, Viton, 0.813 x 1.00 x 0.063 in.	1	C
8	248717	• • WELL, multiplier	1	C
9	940181	• • O-RING, Viton, 0.750 x 0.875 x 0.062 in.	1	C
10	982284	• SCREW, captive, M5	6	
11	248714	• GASKET, multiplier panel	1	
12	940073	• O-RING, Viton, 0.156 x 0.281 x 0.063 in.	6	
13	984121	• NUT, hex, mach, #10-24	2	
14	983120	• WASHER, lock, external, #10	2	
15	984526	• NUT, lock, conduit	1	
16	933343	• CONNECTOR, plug, 5 pin	1	
17	970970	• CLAMP, hose, #52	1	
18	984702	• NUT, hex, M5, brass	2	
19	983401	• LOCK WASHER, split, M5	2	
20	983021	• WASHER, flat, external, 0.203 x 0.406 in., brass	2	
22	240674	• TAG, ground	2	
23	900809	• CAP, flush, $^{7}/_{8}$-in. diameter	1	
24	933285	• RECEPTACLE, input, 4 wire	1	
25	939122	• SEAL, conduit fitting, $^{1}/_{2}$ in.	1	
26	- - - - - -	• CAP, flush, $^{5}/_{8}$-in. diameter	1	
27	981890	• SCREW, with seal, #10-24 x 0.500 in.	2	
21	271221	LUG, terminal, ground	1	
NS	106430	KIT, negative multiplier replacement	1	D
NS	Obsolete	KIT, positive multiplier replacement	1	E

NOTE A: To replace just the multiplier, order negative multiplier replacement kit, part 106430.

B: Discontinued To replace just the multiplier, order positive multiplier replacement kit, part 124452.

C: Contained in the multiplier replacement kits.

D: Kit used with negative multiplier module.

E: Kit used with positive multiplier module.

NS: Not Shown

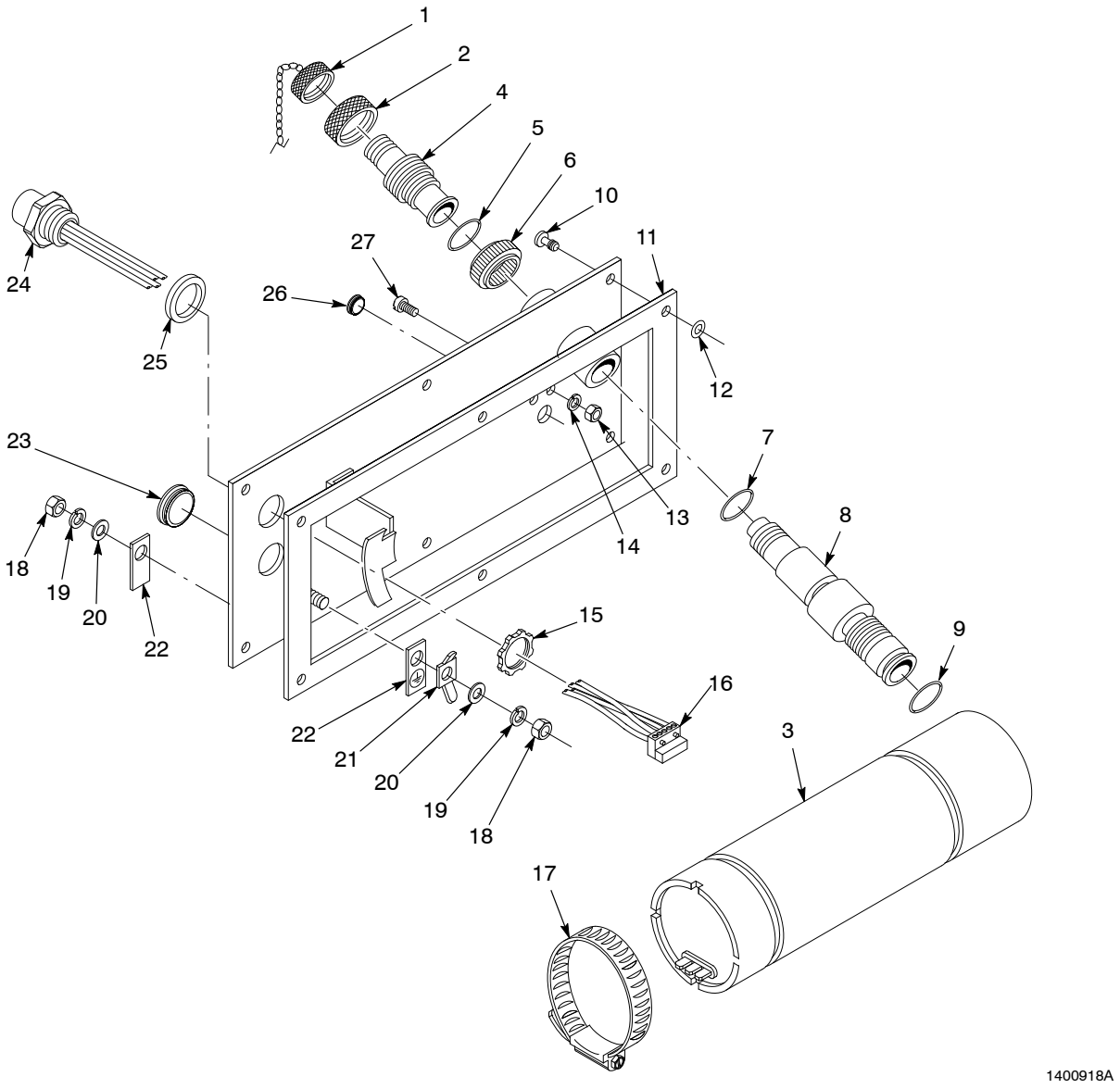

Figure 7-6 Rack Unit Multiplier Module Assembly

Rack Unit Pneumatic Control Module Parts

See Figure 7-7.

Item	Part	Description	Quantity	Note
—	- - - - - -	MODULE, pneumatic control (rack units)	1	
1	248711	• GASKET, panel, front	1	
2	901228	• GAUGE, air, 0–100, psi	2	
3	941301	• O-RING, Viton, 1.625 x 1.813 x 0.094 in.	2	
4	982284	• SCREW, captive, M5	4	
5	940073	• O-RING, Viton, 1.156 x 0.281 x 0.063 in.	4	
6	973572	• COUPLING, pipe, hydraulic, sae, $^1/_8$-in. NPT	2	
7	973278	• TEE, male run, $^1/_4$-in. tube x $^1/_8$-in. NPT	2	
8	971266	• ELBOW, $^1/_4$-in. tube x $^1/_4$-in. NPT	4	
9	900730	• TUBING, poly, $^1/_4$ in.	AR	A
10	901444	• REGULATOR, air, $^1/_8$-in. NPT	2	
11	141603	• SEAL, panel, regulator	2	

NOTE A: Bulk part number. Order quantity required in increments of one foot.
AR: As Required

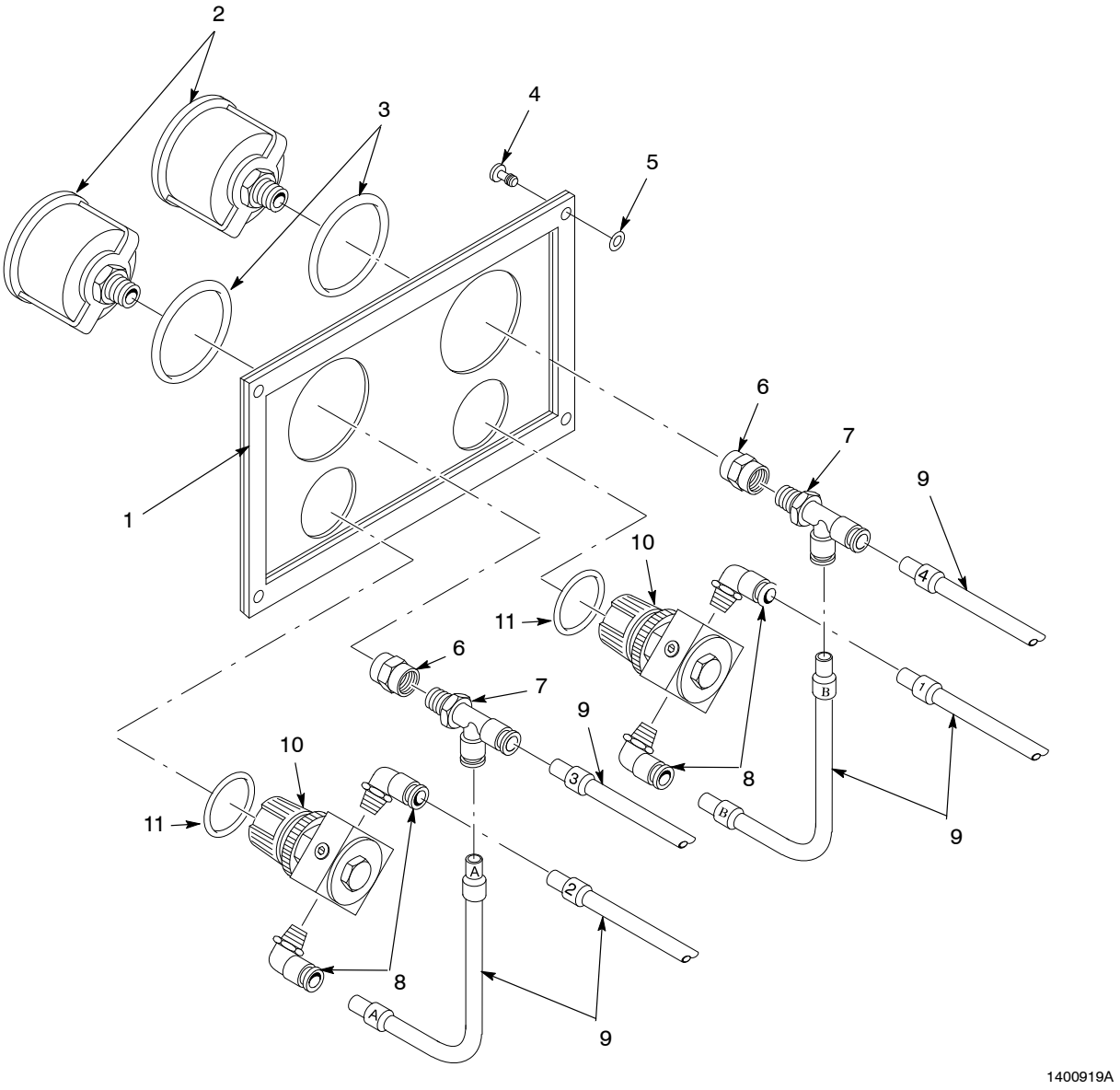

Figure 7-7 Rack Unit Pneumatic Control Module Assembly

Wall Unit Parts

The following list contains parts that are unique to the wall units. Refer to *Common Parts* for additional module information.

Wall Unit General Parts—Power Unit

See Figure 7-8.

Item	Part	Description	Quantity	Note
—	Obsolete	POWER UNIT, EXP-100, wall, 3-gauge, negative	1	A
—	Obsolete	POWER UNIT, EXP-100, wall, 3-gauge, positive	1	A
1	- - - - - -	• MULTIPLIER MODULE	1	B
2	143983	• PNEUMATIC MODULE output	1	B
3	143985	• CONTROL MODULE, electronic	1	B
4	117056	• CONTROL MODULE, pneumatic, 3-gauge	1	B
5	240976	• CLAMP, ground, with wire	1	
6	240674	• TAG, ground	1	
7	933469	• LUG, terminal, 90, tab	1	
8	983021	• WASHER, flat, 0.203 x 0.406 in.	1	
9	983401	• LOCK WASHER, M5	1	
10	984702	• NUT, hex, M5, brass	1	
11	105989	• JUMPER, ground, 20 in.	1	
12	972707	• CONNECTOR, plug-in, $^1/_4$-in. diameter	1	
13	972183	• ELBOW, male, 0.38-in. tube x $^1/_4$-in. NPT	1	
14	972725	• CONNECTOR, bulkhead, $^1/_4$-in. tube x $^1/_4$-in. NPT	1	
15	983513	• WASHER, flat, external tooth, $^9/_{16}$ in.	1	
16	945017	• O-RING, hotpoint, $^3/_8$-in. tube	1	
17	982182	• SCREW, flat head, slotted, M4 x 10	1	
18	- - - - - -	• CLAMP, adjustable, adhesive back	1	
19	- - - - - -	• JUMPER, wire, ground, gauge	1	
NS	247512	• OIL, 7.5 ml, high viscosity, insulating	2	
NS	972125	• ELBOW, male, 10 mm x $^1/_4$-in. NPT	2	

NOTE A: Discontinued Most replacement parts are still available.

B: Refer to *Wall Unit Multiplier Module Parts* for individual multiplier replacement kits.

NS: Not Shown

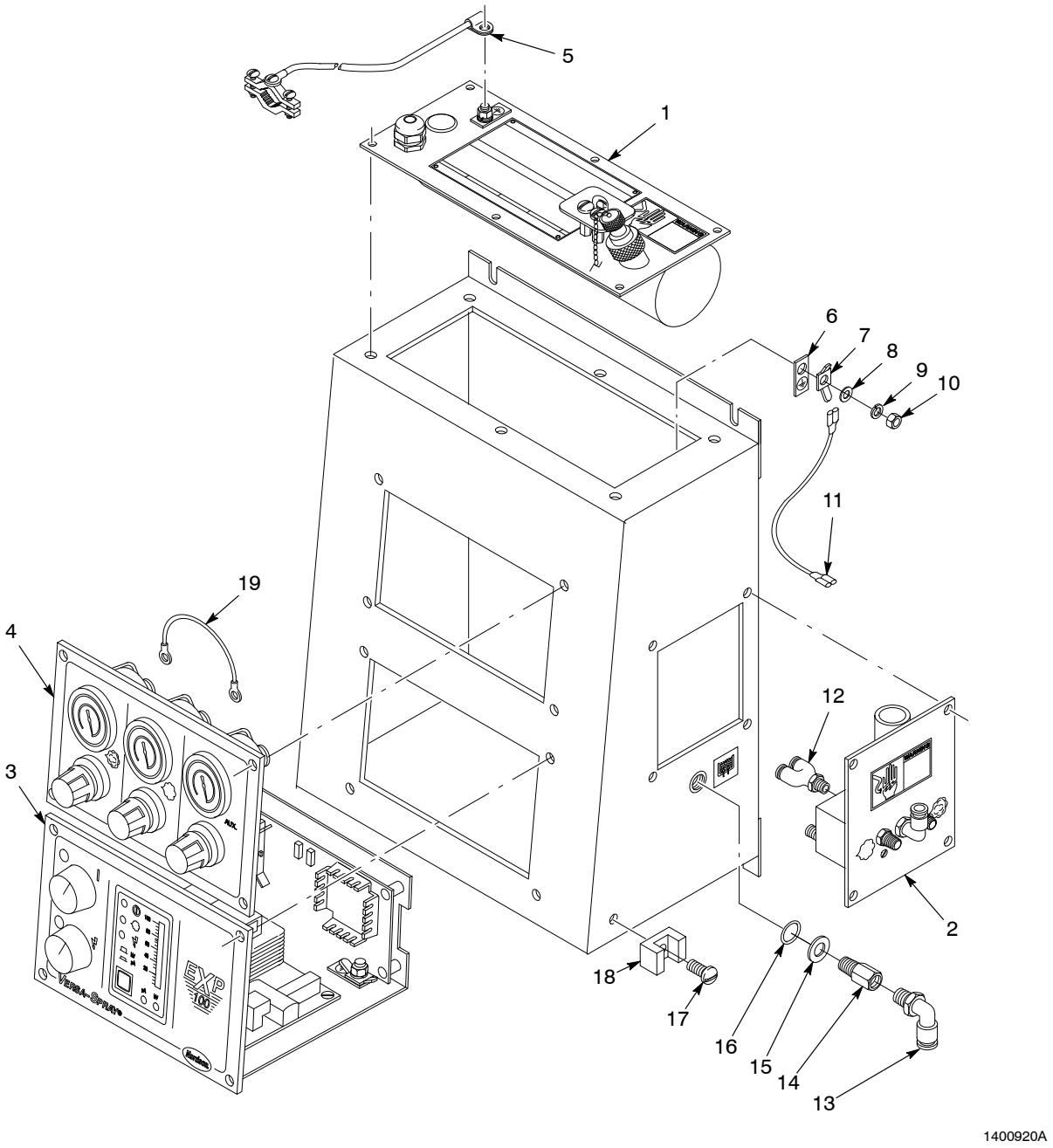

Figure 7-8 Wall Unit General Parts

Wall Unit Multiplier Module Parts

See Figure 7-9.

Item	Part	Description	Quantity	Note
—	Obsolete	MODULE, multiplier, with trigger, negative, (wall)	1	A
—	Obsolete	MODULE, multiplier, with trigger, positive, (wall)	1	B
1	248699	• CAP, dust, w/chain	1	
2	248729	• NUT, retainer, multiplier	1	
3	- - - - - -	• MULTIPLIER	1	C
4	248736	• • ADAPTER, cable	1	C
5	940141	• • O-RING, Viton, 0.500 x 0.625 x 0.063 in.	1	C
6	248847	• • RING, tolerance, 1.00-in. diameter	1	C
7	941172	• • O-RING, Viton, 0.813 x 1.00 x 0.063 in.	1	C
8	248717	• • WELL, multiplier	1	C
9	940181	• • O-RING, Viton, 0.750 x 0.875 x 0.062 in.	1	C
10	982284	• SCREW, captive, M5	6	
11	248714	• GASKET, multiplier panel	1	
12	940073	• O-RING, Viton, 0.156 x 0.281 x 0.063 in.	6	
13	- - - - - -	• RECEPTACLE, trigger	1	
14	- - - - - -	• GASKET	1	
15	984192	• NUT, lock, $^1/_2$-in. NPT, nylon	1	
16	970970	• CLAMP, hose, #52	1	
17	984702	• NUT, hex, M5, brass	2	
18	983401	• LOCK WASHER, split, M5	2	
19	983021	• WASHER, flat, external, 0.203 x 0.406 in., brass	2	
20	271221	• LUG, terminal, ground	1	
21	240674	• TAG, ground	2	
22	900809	• CAP, flush, $^7/_8$-in. diameter	1	
23	144356	• FITTING, straight, $^1/_2$-in. NPT	1	
24	983422	• LOCK WASHER, external, M5	4	
25	- - - - - -	• STANDOFF, bracket	2	
26	- - - - - -	• BRACKET, jumper	1	
27	982000	• SCREW, pan head, M5 x 10	2	
28	245857	• JUMPER, auto gun	1	
NS	106430	KIT, negative multiplier replacement	1	D
NS	Obsolete	KIT, positive multiplier replacement	1	E

NOTE A: To replace the multiplier, order negative multiplier replacement kit, part 106430.
B: To replace the multiplier, order positive multiplier replacement kit, part 124452.
C: Contained in the multiplier replacement kits.
D: Kit used with negative multiplier module.
E: Kit used with positive multiplier module.

NS: Not Shown

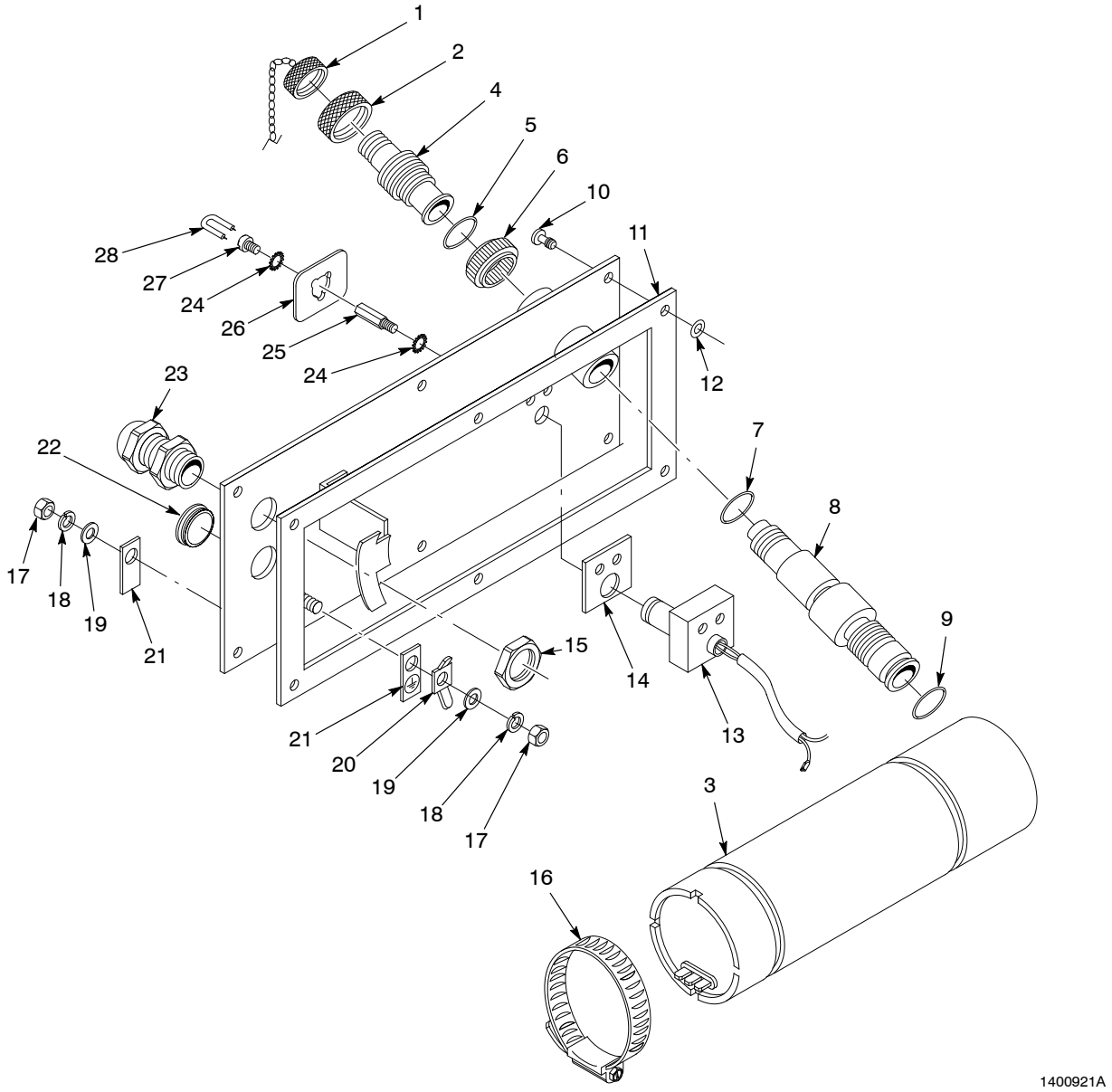

Figure 7-9 Wall Unit Multiplier Module Assembly

Wall Unit Pneumatic Control Module Parts

See Figure 7-10.

Item	Part	Description	Quantity	Note
—	Obsolete	MODULE, pneumatic control, 3-gauge (wall units)	1	
1	248711	GASKET, panel, front	1	
2	901259	• GAUGE, air, 0–30 psi	1	
3	901260	• GAUGE, air, 0–100 psi	2	
4	940065	• O-RING, EPDM rubber, 1.500 x 1.625 in.	3	
5	982284	• SCREW, captive, M5	4	
6	940073	• O-RING, Viton, 0.156 x 0.281 x 0.063 in.	4	
7	973572	• COUPLING, pipe, hydraulic, sae, $^1/_8$-in. NPT	3	
8	973278	• TEE, male run, $^1/_4$-in. tube x $^1/_8$-in. NPT	3	
9	971266	• ELBOW, $^1/_4$-in. tube x $^1/_8$-in. NPT	6	
10	900730	• TUBING, poly, $^1/_4$ in.	AR	A
11	901444	• REGULATOR, air, $^1/_8$-in. NPT	3	
12	141603	• SEAL, panel, regulator	3	

NOTE A: Bulk part number. Order quantity required in increments of one foot.

AR: As Required

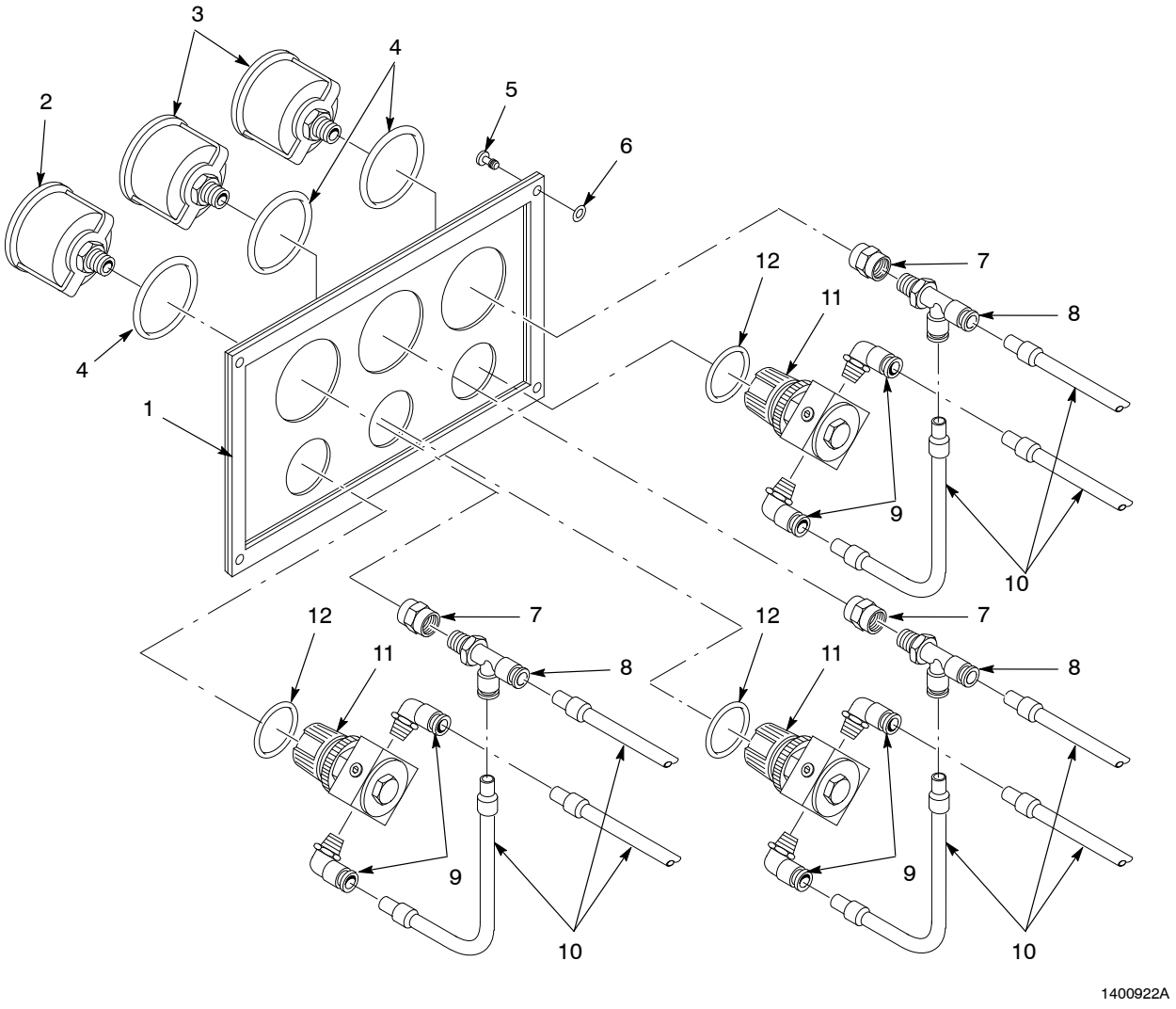

Figure 7-10 Wall Unit Pneumatic Control Module

Common Parts

The following list contains parts that are common for both wall and rack units.

Electronic Control Module Parts—All Units

See Figure 7-11.

Item	Part	Description	Quantity	Note
—	143985	MODULE, electronic control	1	
1	248696	• CAP, flat, with arrow	1	
2	248695	• CAP, flat, with line	1	
3	248694	• KNOB, collet, 28 mm, $^1/_4$-in. shaft	2	
4	248741	• SEAL, shaft, rotary	2	
5	982284	• SCREW, captive, M5 x 0.8 in.	4	
6	940073	• O-RING, Viton, 0.156 x 0.281 in.	4	
7	248711	• GASKET, panel, front	1	
8	248684	• SPACER	1	
9	249254	• CABLE, switch, power	1	
10	- - - - - -	• • CONNECTOR, plug, 4 pin	1	
11	248808	• POTIENTIOMETER, kV, wired	1	
12	248811	• SWITCH, µA/kV, wired	1	
13	248802	• GASKET, panel, display	1	
14	248705	• SPACER, nylon, #8 nominal x 0.500 in.	4	
15	248968	• CIRCUIT BOARD, universal display	1	
16	248706	• WASHER, nylon, 0.188 x 0.375 x 0.062 in.	4	
17	983416	• LOCK WASHER, internal, M4, zinc	10	
18	984715	• NUT, hex, M4 x 0.7 in. steel, zinc	7	
19	982092	• SCREW, pan head, M4 x 10	6	
20	105844	• CIRCUIT BOARD, power supply	1	
21	984702	• NUT, hex, M5 x 0.8 in. brass	1	
22	983401	• LOCK WASHER, split, M5	1	
23	983021	• WASHER, flat, brass	1	
24	933469	• LUG, terminal, 90, tab	1	
25	240674	• TAG, ground	1	
26	983526	• LOCK WASHER, split, #4	4	
27	981014	• SCREW, pan head, #4-40 x 0.25 in.	4	
28	246470	• TRIM, 0.062 in. thick panel, PVC	AR	A
29	983403	• LOCK WASHER, split, M4	3	
30	248969	• CIRCUIT BOARD, regulator	1	

NOTE A: Bulk part number. Order quantity required.

AR: As Required

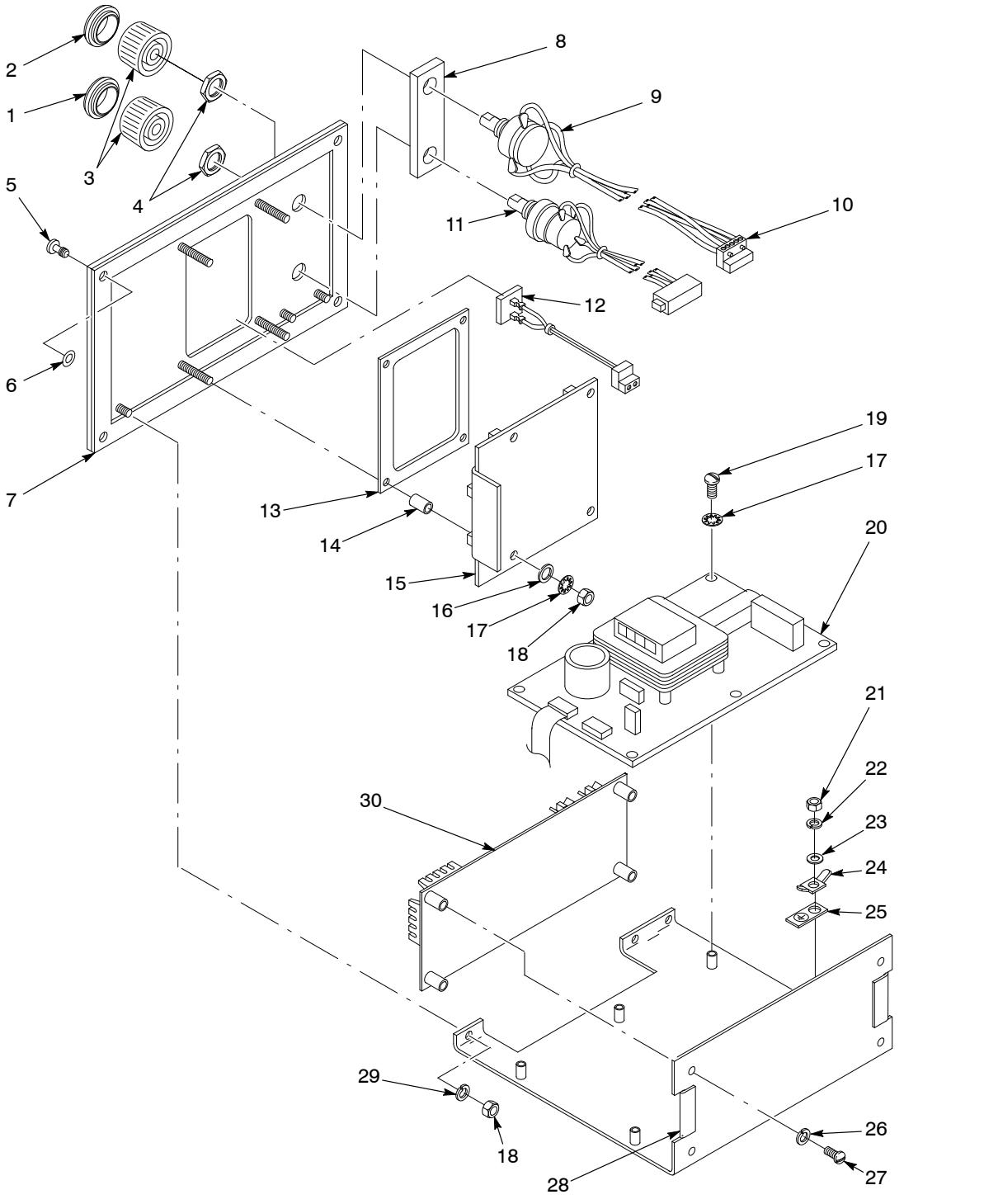

Figure 7-11 Electronic Control Module Assembly—All Units

Pneumatic Output Module Parts—All Units

See Figure 7-12.

Item	Part	Description	Quantity	Note
—	143983	MODULE, pneumatic output	1	
1	129503	• VALVE, solenoid, 12 Vdc, normally open	1	
2	335241	• CONNECTOR, plug, 2 position	1	
3	982069	• SCREW, ph, slotted, M4 x 16	6	
4	983403	• LOCK WASHER, split, M4, zinc	4	
5	129329	• MANIFOLD, pilot	1	
6	129423	• GASKET, pilot, manifold	1	
7	248716	• VALVE, 3-way cartridge	2	
8	248728	• MANIFOLD, body	1	
9	972716	• CONNECTOR, $^1/_4$-in. tube x $^1/_8$-in. thread	6	
10	143027	• CIRCUIT BOARD, 12 v, manifold	1	
11	983416	• LOCK WASHER, internal, M4	2	
12	248700	• GASKET, manifold	1	
13	248713	• GASKET, panel, manifold	1	
14	940073	• O-RING, Viton, 0.156 x 0.281 x 0.063 in.	4	
15	982284	• SCREW, captive, M5	4	
16	982239	• SCREW, fillet head, M5 x 10	2	
17	972183	• ELBOW, $^3/_8$-in. tube x $^1/_4$-in. thread	1	
18	984702	• NUT, hex, M5, brass	1	
19	983401	• LOCK WASHER, split, M5, zinc-plated	3	
20	983021	• WASHER, flat, external, 0.203 in. x 0.406 in., brass	1	
21	933469	• LUG, terminal, 90, tab	1	
22	240674	• TAG, ground	1	
NS	972125	ELBOW, 10 mm x $^1/_4$-in. thread	1	A
NS	163437	CONNECTOR, 8-mm tube x $^1/_8$-in. thread	2	B

NOTE A: Optional fitting for use with 10-mm input air on newer EXP rack consoles. Replaces item 17.

B: Optional fitting for use with 8-mm air tubing on newer pipe coating systems. Replaces item 9.

NS: Not Shown

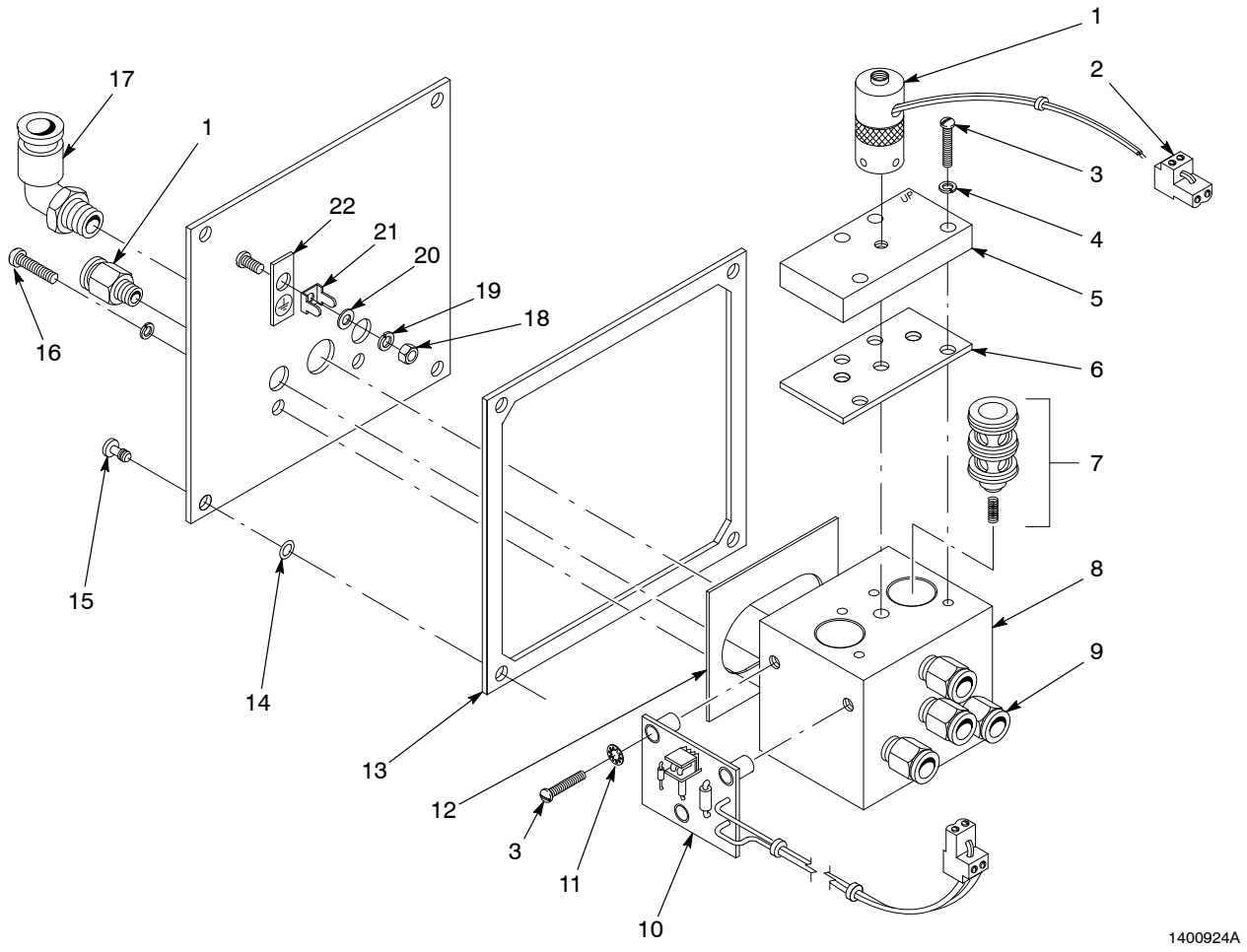

Figure 7-12 Pneumatic Output Module—All Units

Cables and Harnesses

Part	Description	Function
248804	CABLE, ribbon, 7 ckt	Regulator Board. P3 to Display Board. P1
248805	HARNESS, multiplier	Regulator Board. P5 to Multiplier.
105835	CABLE, ribbon, 8 ckt	Regulator Board. P1 to Power Supply Board. P5

Section 8
Specifications

Dimensions

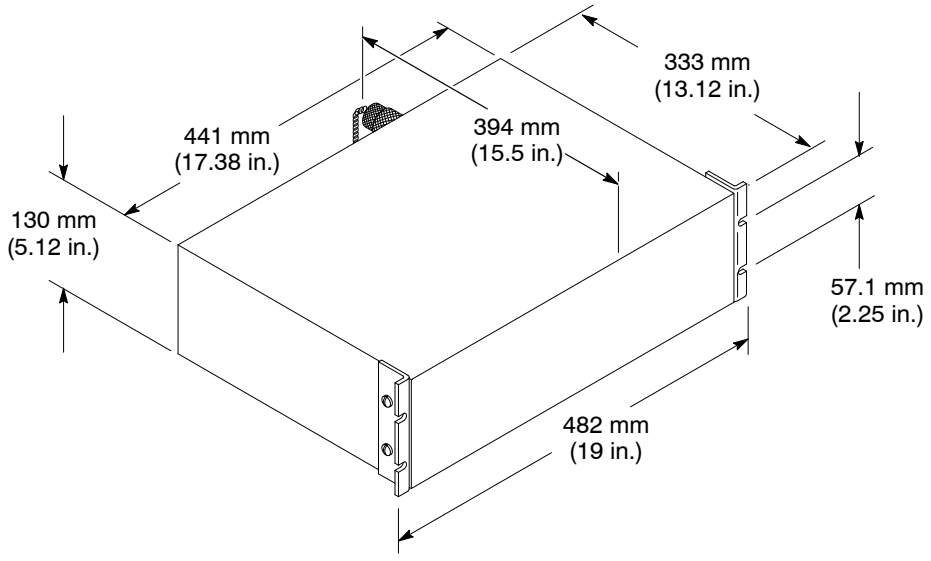

Figure 8-1 Rack Mount Unit Dimensions

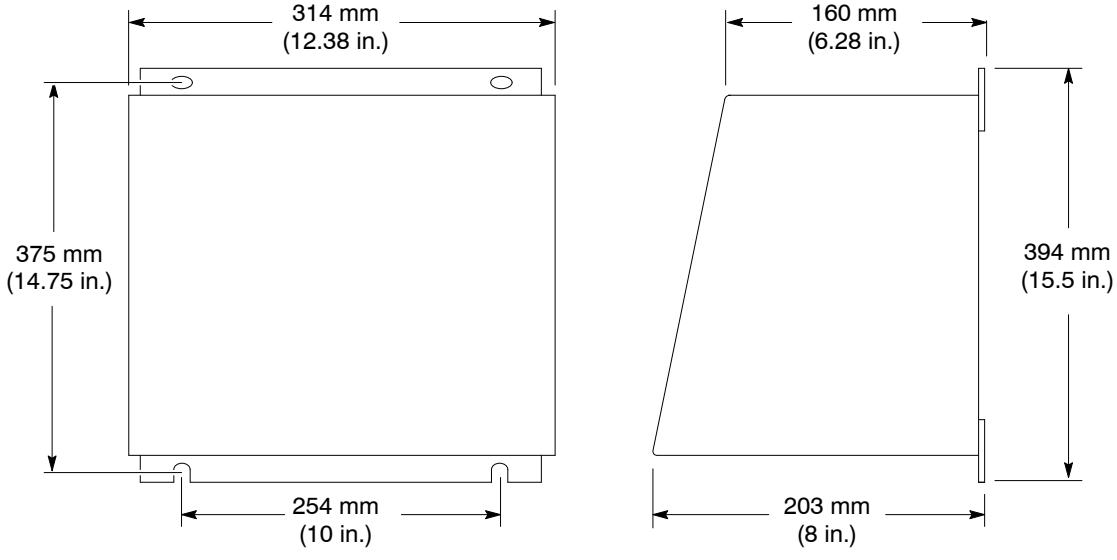

Figure 8-2 Wall Mount Unit Dimensions

Electrical

Input: 100, 120, 220, 240 Vac nominal, ± 10% @ 50/60 Hz.

Output: 30–100 kv dc

Short circuit output current: 125 Microamperes (125 μA)

Pneumatic

Minimum: 4 bar (60 psi)

Maximum: 7 bar (100 psi)

Air quality: Air must be clean and dry. Use of a regenerative desiccant or refrigerated air dryer capable of producing a 3.4 °C (38 °F) or lower dewpoint at 7 bar (100 psi), and a filter system with prefilters and coalescent type filters capable of removing oil, water, and dirt in the sub-micron range is recommended.