

Excel 3000 Series Powder Coating System

Customer Product Manual

Part 1095480-05

Issued 3/21

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Section 1

Safety

Introduction

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

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

Qualified Personnel

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

Intended Use

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

Some examples of unintended use of equipment include

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

Regulations and Approvals

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

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

Personal Safety

To prevent injury follow these instructions.

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

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material SDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.

- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Grounding



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

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 Excel 3000 powder coating systems. It includes system operation, maintenance, and troubleshooting procedures. Spray booth repair procedures and parts lists are also included. Review this manual and the manuals for the other components of your system before operating your Nordson powder coating system.

System Configuration

A complete powder coating system consists of powder application equipment and powder recovery/reclaim equipment. Systems are designed and configured for each customer's application. This manual describes a basic, manually operated system. Your system may have equipment not described in this manual, such as automatic gun triggering and air management systems. Before operating your system, please read the manuals for all equipment not covered in this manual.

The system can be permanently located under the conveyor, or mounted on casters and rails (roll-on/roll-off system) to allow it to be moved off-line for powder changes or maintenance.

Figure 2-2 illustrates the operation of the typical system. Figures 2-3, 2-4, and 2-5 shows the locations of the components in a typical system.



Figure 2-1 Excel 3000 Powder Coating System (Shown with Optional Equipment)

System Operation

See Figure 2-2.

Powder Application

A porous fluidizing plate in the bottom of the feed hopper (11) diffuses low-pressure compressed air into the powder supply. The air fluidizes the powder so it can be pumped to the spray guns. The fluidizing air flows into the color module (17) through a vent duct. In the color module, the cartridge filters separate powder dust from the fluidizing air.

The powder pumps (12) draw the powder out of the hopper, mix it with a high-velocity stream of air, and force it through feed hoses (15) to the powder spray guns (1). The spray guns electrostatically charge the powder and spray it onto the workpieces (3) passing through the booth. The charged powder sticks to the grounded workpieces.

Powder Recovery and Reclaim

An exhaust fan (5) pulls spray-room air into the enclosure (2), through the cartridge filters (4) and color module, and into the fan section (6). The air returns to the spray room through the final filters (7), free of all powder.

Most of the oversprayed powder remains suspended in the air flowing through the enclosure to the cartridge filters. The powder collects on the external surfaces of the cartridge filters. At timed intervals, the pulse valves (8) release large volumes of air through the centers of the cartridge filters. The air pulse blows the powder off the filters. The powder falls into the color module hoppers, where it is fluidized.

The transfer pumps (16) pump the reclaimed powder through the transfer hoses (14) to the accumulator (9) on top of the sieve (10). The sieve screens the reclaimed powder and discharges particles and clumps too large to pass through the sieve screen into a scrap bucket (13). The rest of the reclaimed powder falls into the feed hopper. A vent tube connects the accumulator to the color module. Venting prevents the transfer pump air from blowing the powder through the sieve screen and into the scrap bucket.

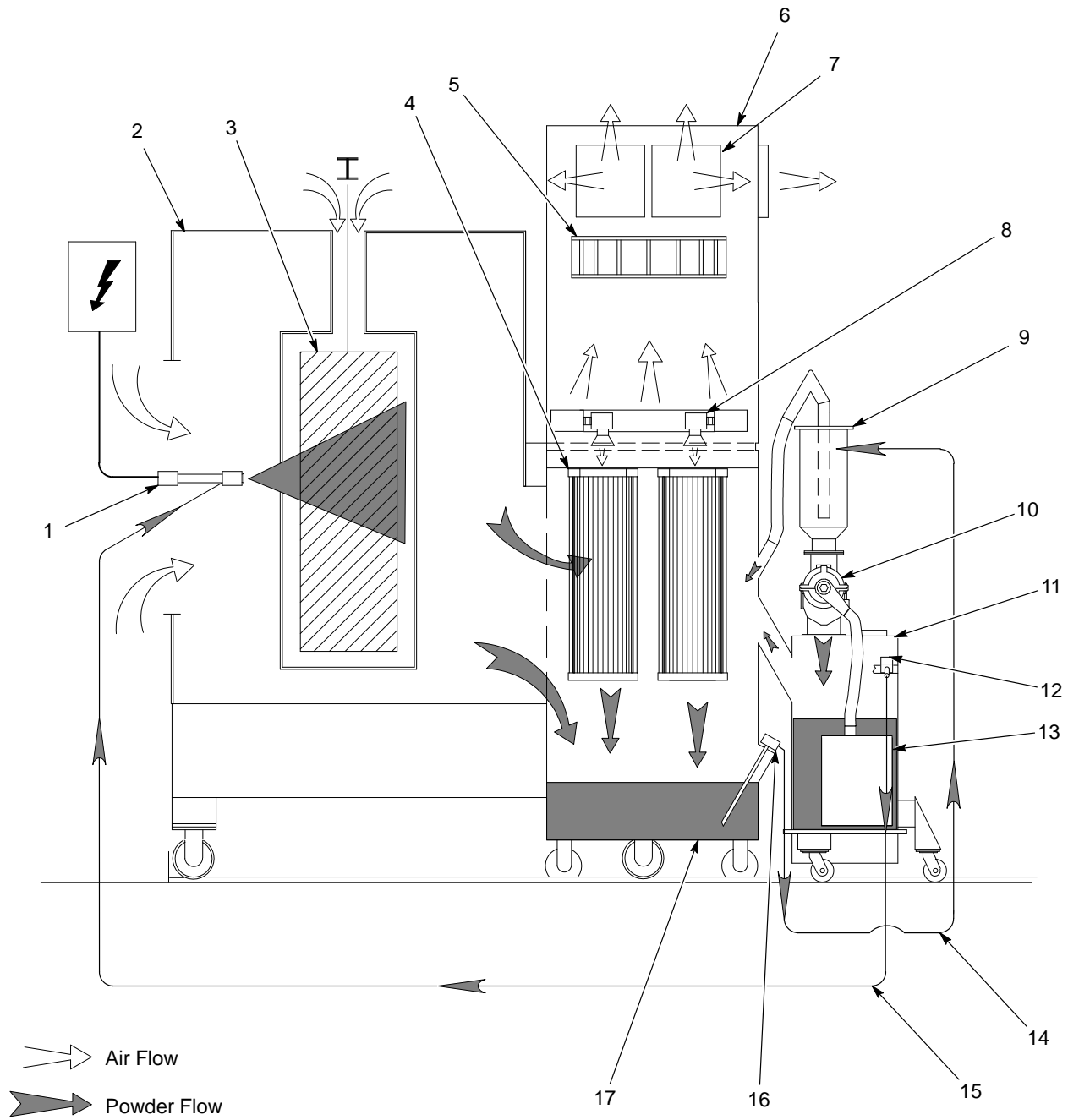


Figure 2-2 System Operation

- | | | |
|----------------------|------------------|--------------------|
| 1. Powder spray gun | 7. Final filters | 12. Powder pumps |
| 2. Enclosure | 8. Pulse valves | 13. Scrap bucket |
| 3. Workpiece | 9. Accumulator | 14. Transfer hoses |
| 4. Cartridge filters | 10. Sieve | 15. Feed hoses |
| 5. Exhaust fan | 11. Feed hopper | 16. Transfer pumps |
| 6. Fan section | | 17. Color module |

System Equipment

The following paragraphs describe the equipment used in a typical system.

Recovery and Reclaim Equipment

Refer to Table 2-1 and Figure 2-3.

Table 2-1 Recovery and Reclaim Equipment

Item	Equipment	Description
1	Booth enclosure (canopy)	Contains the sprayed powder within the booth. It has a conveyor slot in the roof; exit and entry vestibules; slots for automatic spray guns; and openings and doors in the sides for manual spray gun operators. The color module is attached to a large opening in one side.
2	Fan section	Houses the exhaust fan and motor; cartridge filter pulse valves and manifold; and final filters. A pneumatic seal provides an air-tight seal between the fan section and the color module.
3	Color module	Houses cartridge filters; fluidizing plates and plenums; and transfer pumps. Oversprayed powder accumulates in hoppers in the bottom of the module. Cartridge Filter Requirements 3001: 12–36 in. center mount cartridges 3002: 10–26 in. center mount cartridges, 10–26 in. flo-thru cartridges 3003: 12–26 in. center mount cartridges 12–26 in. flo-thru cartridges
4	Accumulator and sieve	Collect and screen the powder returned to the feed hopper from the color module. Powder particles and clumps too large to pass through the sieve screen are discarded. A vent tube and hose connect the accumulator to the color module.
5	Transfer pumps	Convey the reclaimed powder from the color module hoppers to the accumulator. A switch on the electrical panel controls pump operation.
6	Booth base	Supports the enclosure and provides mounting points for the powder inlet frame, fan section support legs, operator platform, and other equipment. The base houses most of the system's electrical wiring and pneumatic plumbing.
NS: Not Shown		

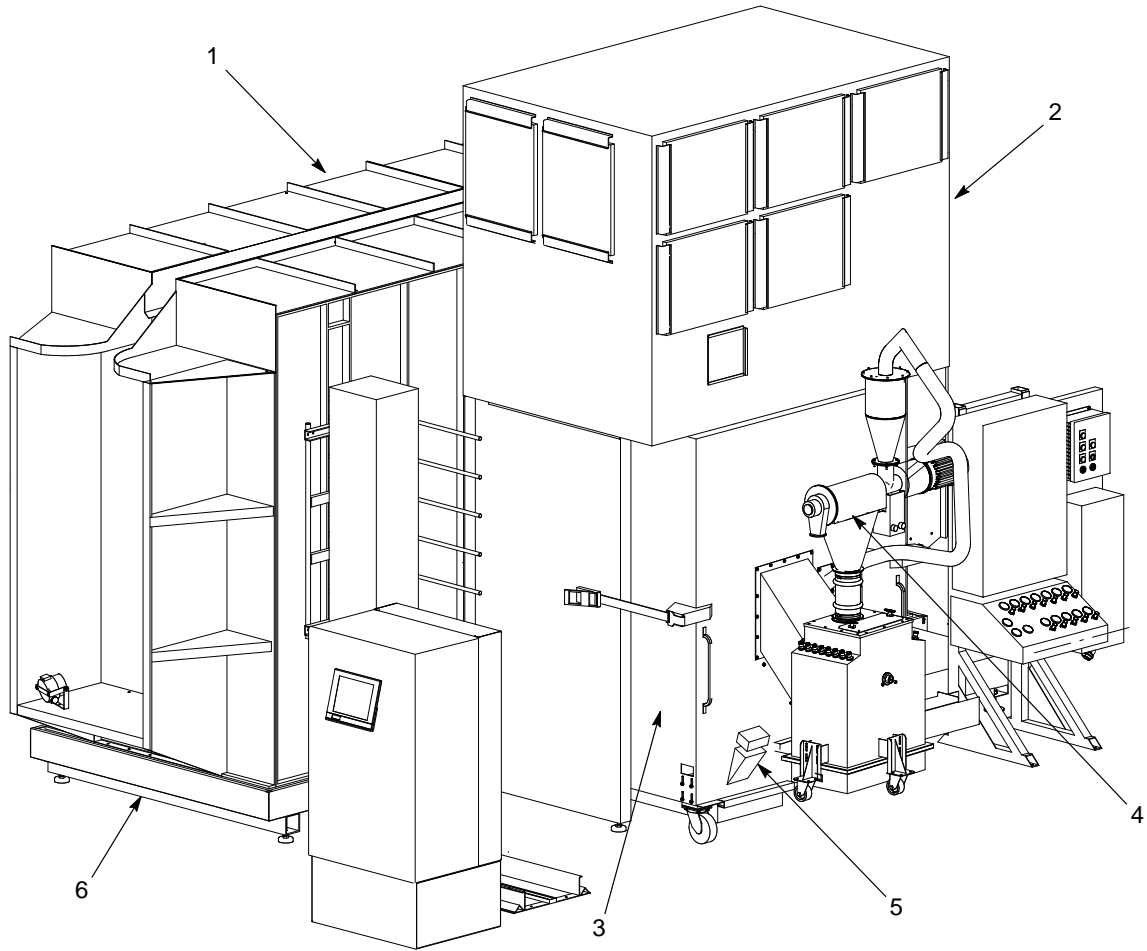


Figure 2-3 Recovery and Reclaim Equipment

- | | | |
|--------------------|--------------------------|-------------------|
| 1. Booth enclosure | 3. Color module | 5. Transfer pumps |
| 2. Fan section | 4. Accumulator and sieve | 6. Booth base |

System Controls

Refer to Table 2-2 and Figure 2-4.

Table 2-2 System Controls

Item	Equipment	Description
1	Flame detector indicator/relay panel	Provides visible and audible fault and fire alarms and process shutdown relays. If a detector senses a flame, the interlock relays shut down the conveyor, booth exhaust fan, compressed air, and electrical power to the spray guns. ANSI/NFPA-33 standards require flame detectors in all systems equipped with automatic spray guns.
2	Electrical Panel	Houses motor starters and overload protectors; transformers; interlock relays; the final filter differential-pressure switches; and basic system controls and indicator lights. A programmable controller can be installed in the panel.
3	Pneumatic panel	Houses air-pressure regulators and gauges for the feed hopper, color module, transfer pumps, and other pneumatic equipment.
4	Cartridge filter gauge	Monitors the air pressure drop across the cartridge filters.
5	Final filter gauge	Monitors the air pressure drop across the final filters. A warning light on the electrical control panel will light when the filters start to clog. The system will shut down when the clogging reaches a critical level.
6	Pulse air controls	Regulate the pulse air pressure and volume. Controls include a regulator, pressure gauge, and gate valve.
7	Pneumatic seal control valve	Inflates and deflates the seal between the color module and the fan section. The seal prevents powder from escaping into the spray room.
8	Flame detectors	Monitor the enclosure (booth) interior for flames. The detectors use IR sensing technology and provide through-the-lens self test to check for powder build-up.
9	Pulse-valve timer panel	Houses the pulse-valve timer circuit board. Trim potentiometers on the board adjust pulse delay and duration. LEDs on the board light as each valve is triggered.

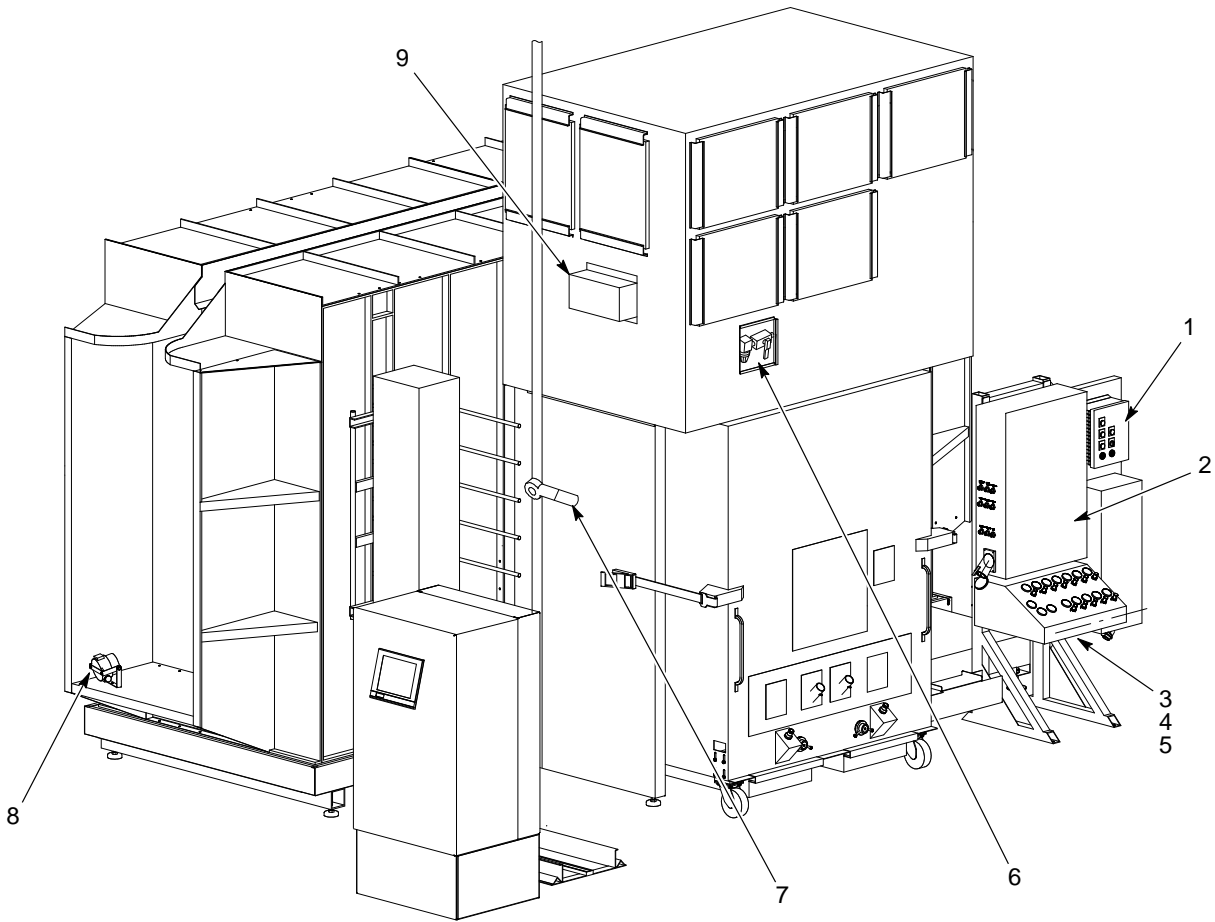


Figure 2-4 Typical System Controls

- | | | |
|---|---------------------------|---------------------------------|
| 1. Flame detector indicator/relay panel | 4. Cartridge filter gauge | 7. Pneumatic seal control valve |
| 2. Electrical panel | 5. Final filters gauge | 8. Flame detectors |
| 3. Pneumatic panel | 6. Pulse air controls | 9. Pulse valve timer panel |

Application Equipment

Refer to Table 2-3 and Figure 2-5.

Table 2-3 Application Equipment

Item	Equipment	Description
1	Automatic spray guns	Electrostatically charge powder particles and spray them toward the grounded workpieces.
2	Automatic gun control units	Control air pressure to the powder pumps and generate or control the electrostatic voltage. One gun control unit is required for each spray gun. Cabinets house gun control units, a master control unit, and air supply controls.
3	Powder pumps	Supply spray guns with powder from the feed hopper. One pump is used for each spray gun.
4	Feed hoppers	Store and fluidize the powder supply for automatic and manual spray guns.
5	Feed-hopper level sensor	Monitors the level of powder in the feed hopper. When transfer pump controls are set to AUTO, the level sensor will turn on the transfer pumps when the level of powder falls below the sensor.

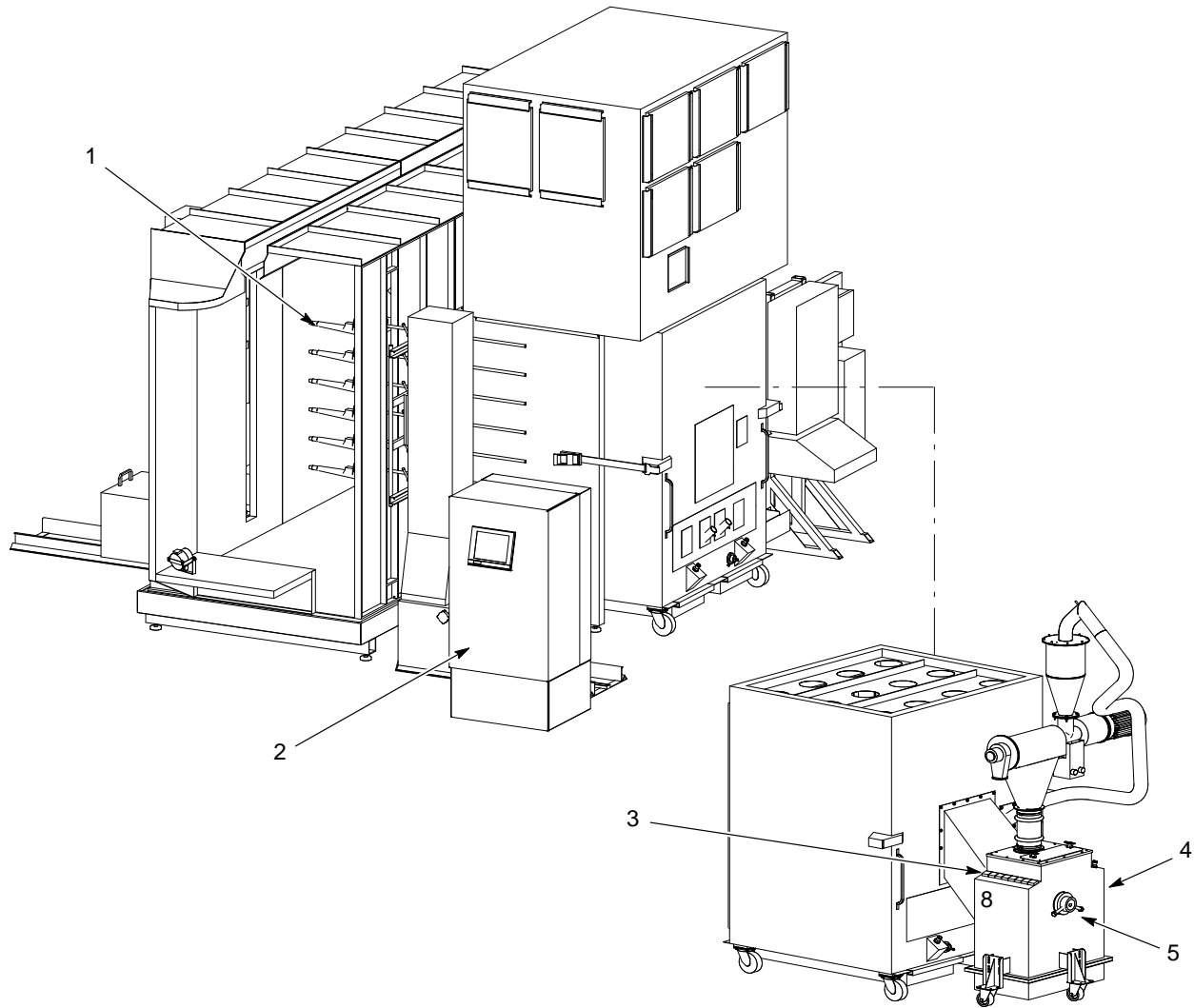


Figure 2-5 Typical Application Equipment

- | | | |
|--------------------------------|-----------------|-----------------------------|
| 1. Automatic spray guns | 3. Powder pumps | 5. Feed-hopper level sensor |
| 2. Automatic gun control units | 4. Feed hoppers | |

Typical System Options

Refer to Table 2-4 and Figure 2-6. Contact your Nordson Corporation representative for further information on these and other options.

Table 2-4 Typical System Options

Item	Equipment	Description
1	Air dryer	Removes moisture from the system air supply. Most systems use regenerative-desiccant or refrigerated air dryers.
2	Gun mover	Uses oscillators or reciprocators to move automatic spray guns in a repetitive pattern for better workpiece coverage.
3	Powder drum unloaders	Transfer powder from drums to feed hoppers or color modules.
4	Quick color change equipment	Consists of additional color modules; feed hoppers; sieves and accumulators. These contain different powders for quick changes.
5	Load chute	Allows virgin powder to be loaded into the color module instead of the feed hopper.
6	Part identification	Determines the dimensions of parts moving through system to trigger a spray pattern specific to that part.
7	Automation systems	Identify and track parts on the conveyor line; and control automatic-spray gun movement, triggering, air pressure, and voltage, such as Nordson's iControl system. These systems gather data on system operation and malfunctions and generate reports.
NS	Roll on/roll-off equipment	Move the booth and attached equipment on and off the conveyor line. Manual and powered equipment movers are available.
NS	Air management system	Automatically controls air flow through the booth, using a variable-speed motor control and pressure sensors.
NS: Not Shown		

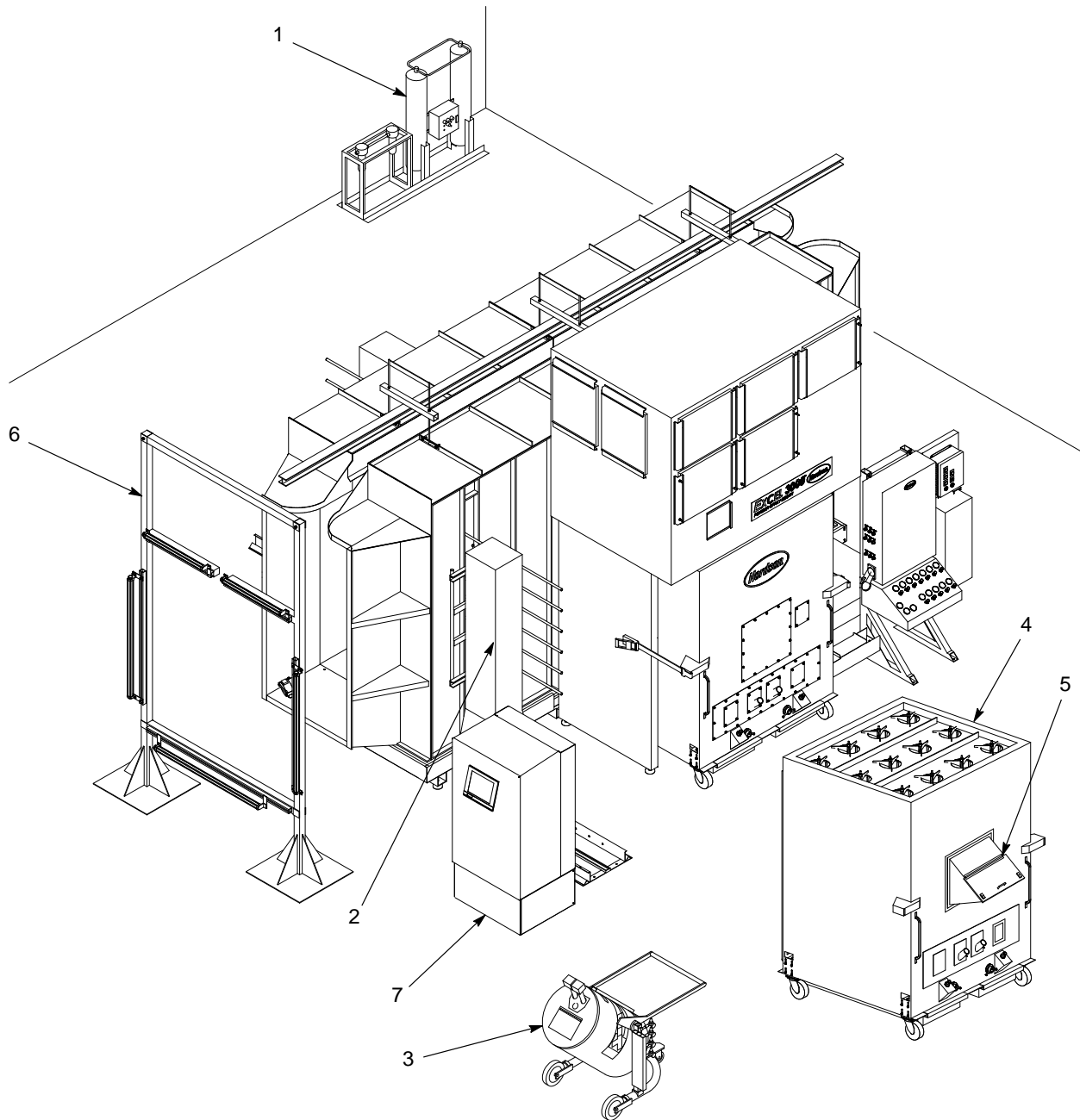


Figure 2-6 Typical System Options

- | | | |
|-------------------------|---------------------------------|------------------------|
| 1. Air dryer | 4. Quick color-change equipment | 6. Part identification |
| 2. Gun mover | 5. Load chute | 7. Automation system |
| 3. Powder drum unloader | | |

System Electrical and Pneumatic Controls

Basic system controls consist of an electrical panel, a pulse-valve timer box, and a pneumatic panel. Additional optional controls are covered in separate manuals.

Motor Starter Panel

Refer to Table 2-5 and Figure 2-7. A typical manually controlled system uses an electrical panel similar to the panel shown in Figure 2-7. Your system's electrical panel may be different.

Table 2-5 Motor Starter Panel

Item(s)	Equipment	Description
2, 11	Booth light switch (2)	NOTE: Power to the lights must be supplied by the customer. Activates the lighting contactor (11) for interior booth lights.
7, 12, 13	Final filter pressure switches	Set the pressure increase that is allowed across the final filters. At 2.5-in. w.c., the final filter warning pressure switch (13) closes and activates the final filter warning indicator light (7). At 3-in. w.c., the final filter pressure switch (12) opens and automatically shuts down the system.
3	Exhauster speed control	Used with the variable frequency drive to adjust the exhauster fan speed.
4	Exhauster stop pushbutton	NOTE: This pushbutton does not shut down power to the panel. Shuts down the exhauster fan and system.
10, 14	Transfer pump selector and indicator light (10)	Selects the transfer pump operation. When set to manual, the transfer pumps run continuously. When set to auto feed, the hopper level sensor and time delay relay (14) control the pump operation.
5	Exhauster start pushbutton/indicator light	Starts the exhauster fan and indicates that system power is on.
6	System ready indicator light	Indicates, when lit, that the fire detection module limit switch and air dryer interlocks are closed and that the system is ready to start.
8	Main disconnect switch	Turns the motor starter panel electrical power on or off.
9	Sieve and non-reclaim transfer enable indicator lights	The sieve light indicates that the sieve is in place and running. The non-reclaim enabled transfer light indicates that the system can transfer powder without the sieve in place.
1	Oscillator 1 and 2 pushbuttons/indicator lights	Turns the oscillators on or off.
15	Plug-and-spray connection	Allows for easy electrical wire connections with the flexible molded cables.

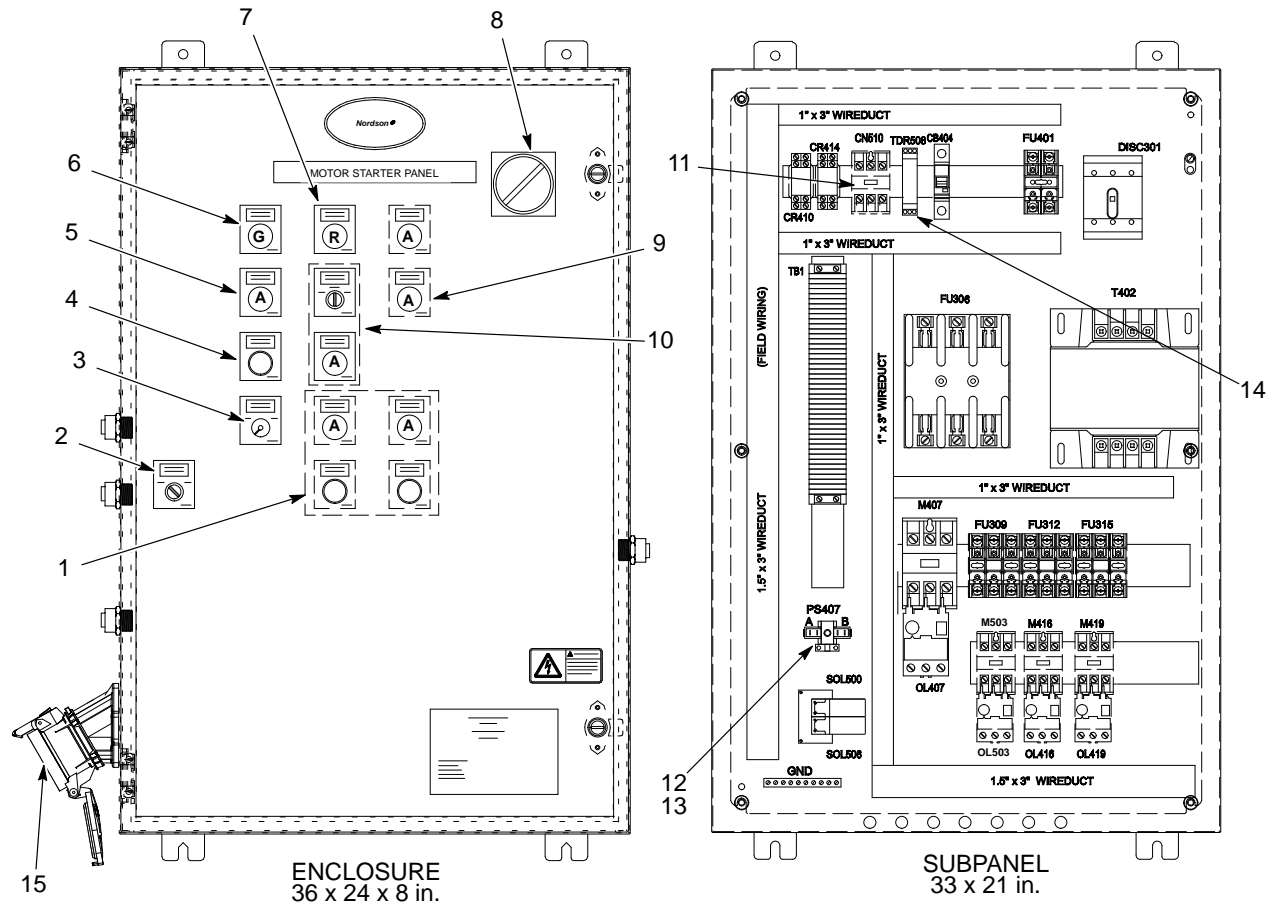


Figure 2-7 Typical Electrical Panel Controls and Indicators

- | | | |
|--|---|--|
| 1. Oscillator 1 and 2 pushbuttons/indicator lights | 6. System ready indicator light | 11. Lighting contactor |
| 2. Booth lights selector | 7. Final filter warning light indicator | 12. Final filter adjust pressure switch |
| 3. Exhauster speed control | 8. Main disconnect switch | 13. Final filter warning pressure switch |
| 4. Exhauster stop pushbutton | 9. Sieve and non-reclaim transfer enable indicator lights | 14. Transfer pump time delay relay |
| 5. Exhauster start pushbutton/indicator light | 10. Transfer pump selector and indicator light | 15. Plug-and-spray connection |

Note: Plug and spray cable connectors are equipped with locking mechanisms to prevent accidental disconnection. These locks must be closed and secured during normal system operation.

Pulse-Valve Timer Box

Refer to Table 2-6 and Figure 2-8. The pulse-valve timer panel houses the timer circuit board. The panel is usually mounted on the fan section. The timer board is wired to the electrical panel and the pulse-valve solenoid enclosure(s) inside the fan section.

Table 2-6 Pulse Valve Timer Box

Item	Equipment	Description
1	Pulse valve LEDs (red)	Indicate, when lit, which pulse valves are activated.
2	Electrical power LED	Indicates that electrical power is applied to the board.
3	Pulse valve on timer	Sets the time that the pulse valves remain open after triggering. The adjustment range is 0.05–0.5 sec.
4	Pulse valve off timer	Sets the time between cartridge filter pulses. The adjustment range is 8–180 sec.
5	Plug-and-spray connection	Allows for easy electrical wire connections with the flexible molded cables.

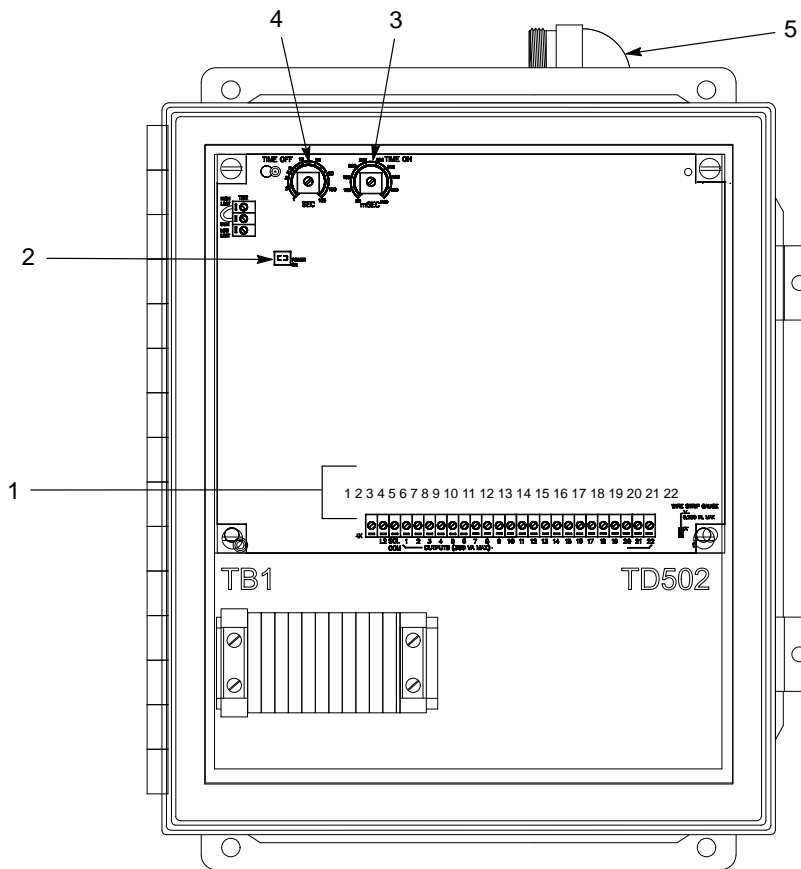


Figure 2-8 Pulse-Valve Timer Panel

- 1. Pulse-valve LEDs
- 2. Electrical power LED
- 3. Pulse valve on timer
- 4. Pulse valve off timer
- 5. Plug-and-spray connection

System Pneumatic Panel

Table 2-7 and Figure 2-9 describe a typical 12-function pneumatic panel. Functions can change depending on the pneumatic equipment used in the system and the system configuration (reclaim or non-reclaim).

Regulators and gauges are labeled according to their use. Their assignment may vary from the example in Figure 2-9.

Table 2-7 System Pneumatic Panel

Regulators and Gauges	Function
1	Feed hopper fluidizing air
2	Feed hopper vent-assist air
3	Satellite hopper fluidizing air/spare scrap drum lid
4	Satellite hopper vent-assist air/spare scrap drum lid
5	Fluidizing air #1
6	Transfer pump air #1
7	Fluidizing air #2
8	Transfer pump air #2
9	Fluidizing air #3 (spare)
10	Transfer pump air #3 (spare)
11	Fluidizing air #4 (spare)
12	Transfer pump air #4 (spare)
13	Blowdown filter pressure gauge (shows pulse-air pressure)
14	Cartridge filter pressure gauge (shows air pressure drop across the cartridge filters in w.c.) NOTE: The gauge should read 4–6-in. w.c. The gauge reading increases as the filters load up with powder.
15	Final filter pressure gauge NOTE: The gauge should read 1–2.5-in. w.c. The gauge reading increases as the filters clog. At 3.0-in. wc, the system automatically shuts down.

PNEUMATIC PANEL

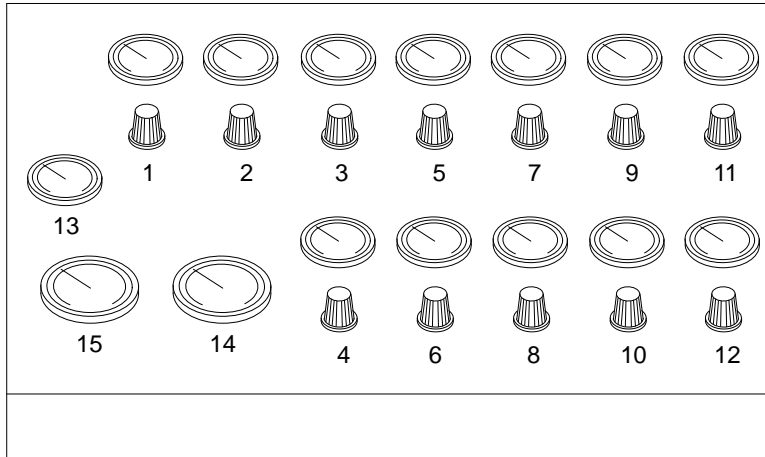


Figure 2-9 System Pneumatic Panel

Rotary Sieve Control Panel

See Figure 2-10. This pneumatic panel is used with Nordson NRPS-100 and AZO rotary sieves. Older Nordson rotary sieves did not have a pneumatic panel.

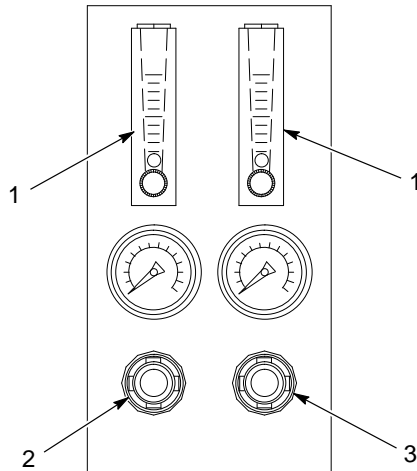


Figure 2-10 Rotary Sieve Pneumatic Panel

- 1. Flow meters
- 2. Vent-assist air regulator
- 3. Bearing air seal regulator

Section 3

Operation



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

New System Startup

Use these procedures to prepare your Excel 3000 powder coating system for production operations. Refer to the appropriate manuals for instructions if your system is equipped with a Smart-Spray or Smart-Coat system, or another type of automation system.

Your Nordson Corporation representative will help you set up your application equipment and adjust your system control settings before you start powder coating your products. Record the system settings on the charts provided at the end of this section. Make extra copies of the charts as needed.

NOTE: Since powder coating systems are custom-designed to each customer's requirements, each system will have a different combination of equipment. Your system may have equipment not described in this manual, such as automatic gun-triggering and air-management systems.



WARNING: Even with the electrical panel disconnect in the off position, the input terminals at the top of the switch are still live. Do not touch them. Failure to observe this warning could result in serious injury or death.

See Figure 3-1.

Set the Timers

1. Disconnect the system electrical power and open the system electrical panel (2).
2. Set the transfer-pump delay to 60 seconds (see Figure 2-7, (14)). Close the electrical panel.
3. Open the pulse-valve timer panel (8). Set the pulse-valve off timer (see Figure 2-8 (4)) to 15 seconds and the pulse valve on timer (see Figure 2-8, (3)) to duration to 0.07 seconds . Close the timer panel.

Set the Air Pressures

1. Set all air pressure regulators on the pneumatic panel (3) to zero.
2. Turn on the compressed air supply. Adjust the system air pressure to 5.5 bar (80 psi).
3. Turn on the system electrical power.
4. Use the seal control valve (6) to inflate the pneumatic seal between the color module and the fan section. Make sure the seal is pressing against the top of color module equally on all four sides
5. Turn on the exhaust fan (see Figure 2-7, (5)).



WARNING: Wear a NIOSH-approved respirator or dust mask and safety glasses or goggles when handling powder. Avoid getting powder on your skin. Wash powder off with soap and water only.

6. Open the feed hopper access door (5). Fill the hopper $\frac{2}{3}$ full of powder.
7. Calibrate the feed hopper level sensor. Refer to *Feed Hopper Level Sensor Calibration* in this section.
8. Set the feed hopper fluidizing air pressure to 0.6 bar (8 psi). Adjust the pressure until you see the powder gently boiling. Allow 10–15 minutes for the powder to fluidize before spraying.
9. Set the color module fluidizing air pressure to 0.7 bar (10 psi). When powder covers the fluidizing plates in the bottom of the color module hoppers, adjust the pressure. You should see the powder gently boiling.

Rotary Sieve Settings

NOTE: Sieve operation depends on system configuration. In some systems, the sieve turns on when the exhaust fan is started. In other systems the feed hopper level-sensor signal turns on the sieve.

1. If your system uses a rotary sieve equipped with a pneumatic panel, set the bearing air seal air pressure to 1.7 bar (25 psi) and the flow meters to 100 SCFH. See Figure 2-10.
2. If your system uses a vibratory sieve, set the air pressure to 3.5 bar (50 psi). Adjust the pressure up or down to maintain the flow of powder through the sieve.

Final Startup Steps

1. Set the accumulator vent-assist air pressure (5–10 psi). Refer to *Vent-Assist Air Pressure Adjustment* in this section.

NOTE: When the switch is set to AUTO, the feed-hopper level sensor turns the transfer pumps on and off.

2. Set the transfer-pump air pressure to 1.0 bar (15 psi). Set the transfer-pump selector switch to AUTO.
3. Adjust the pulse-valve air pressure and volume.
 - a. Open the left-hand slide gate on the front of the fan section to access the pulse valve air controls (7). Set the pulse valve regulator to 3.5–4.1 bar (50–60 psi). Watch the pressure gauge. The pressure will drop when the valves open.
 - b. Adjust the gate valve so the air pressure returns to 3.5–4.1 bar (50–60 psi) just before the next pulse. This adjustment will prevent the powder pumps from being deprived of air during pulses.

New System Startup *(contd)*

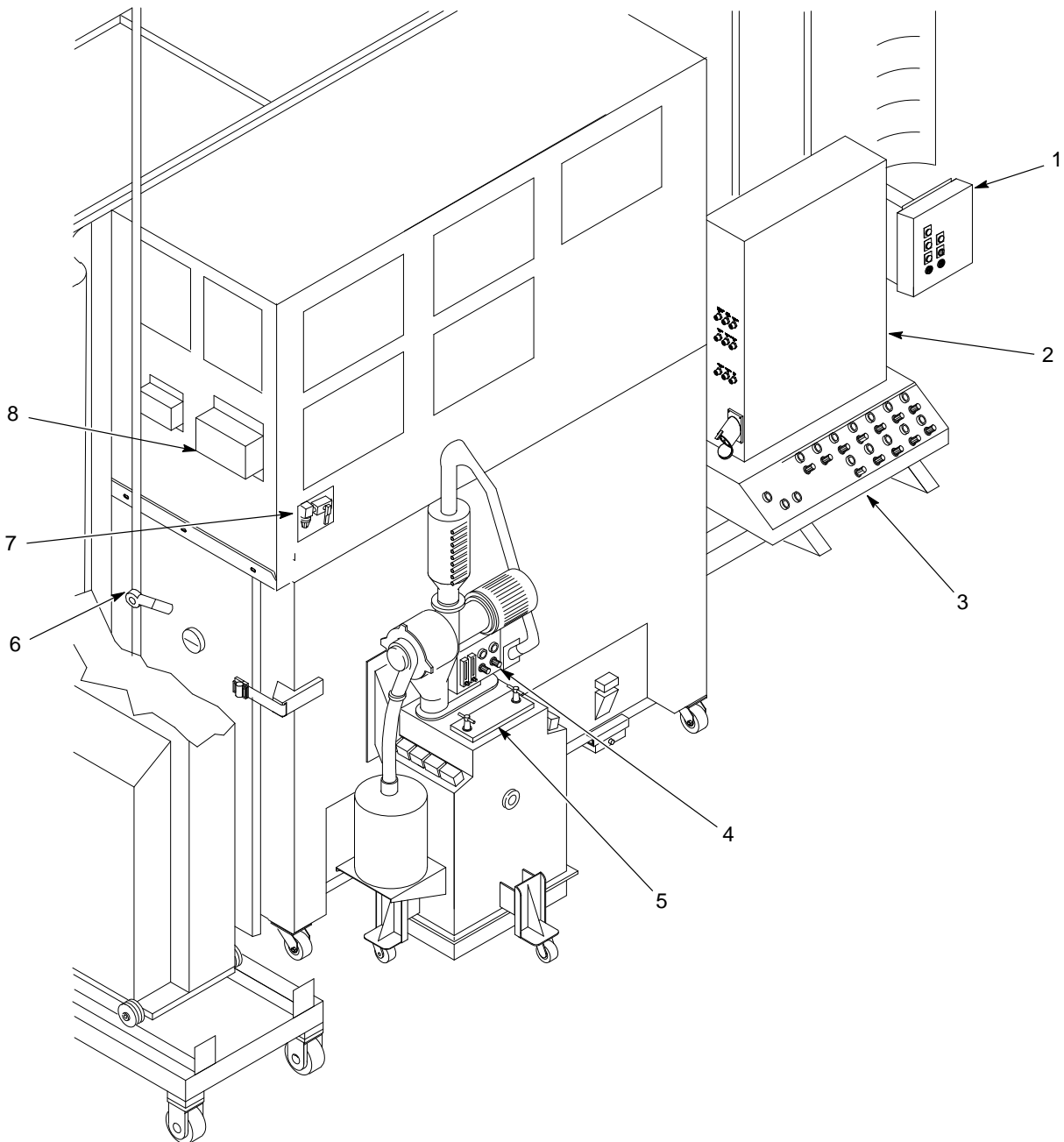


Figure 3-1 New System Startup

- | | | |
|---|---------------------------------|----------------------------|
| 1. Flame detector indicator/relay panel | 4. Sieve pneumatic panel | 7. Pulse air controls |
| 2. Electrical panel | 5. Feed hopper access door | 8. Pulse-valve timer panel |
| 3. Pneumatic panel | 6. Pneumatic seal control valve | |

Vent-Assist Air Pressure Adjustment

To maintain a neutral air pressure in the sieve so it can function properly, the compressed air used to convey the reclaimed powder to the accumulator is vented into the color module. Vent-assist air is directed through the vent tube, toward the color module, to create low pressure in the tube and increase the air flow. Use the following procedure to adjust the vent-assist air pressure.

1. Disconnect the scrap hose from the sieve.
2. Secure a paper or plastic bag to the scrap port with a worm clamp, cable tie, or rubber band.
3. Start the exhaust fan, sieve, and transfer pumps.
4. Watch the bag. If it inflates, increase the vent-assist air pressure. If it deflates, decrease the vent-assist air pressure.

NOTE: Depending on the sieve used, the vent-assist air pressure regulator is located either on the sieve pneumatic panel or on the system pneumatic panel.

Feed Hopper Level Sensor Calibration

The level sensor is a capacitive proximity switch. For it to function properly, you must calibrate it. This procedure must be done when you start up a new system and also when you replace a sensor.

1. See Figure 3-2. Insert the level sensor into the plastic mounting well (1) in the side of the feed hopper until it bottoms out, then tighten the plastic screws on the side of the well to hold the sensor securely.
2. Make sure system power is on and the exhaust fan is running.
3. Open the feed hopper lid and fill the hopper $\frac{2}{3}$ full of powder.
4. Increase the hopper fluidizing air pressure to 0.6–0.7 bar (8–10 psi). The powder level should rise above the top of the mounting well as the powder fluidizes. Add powder to the hopper if it does not.
5. Shut off the fluidizing air. The mounting well should now be coated with a film of powder.
6. If the sensor LED (3) is on, slowly turn the sensor potentiometer (2) clockwise until it goes off. If the LED is off, slowly turn the potentiometer counterclockwise until it lights, then clockwise until it goes off.
7. Increase the fluidizing pressure until the powder level rises above the mounting well. The LED should be off.
8. Turn the potentiometer counterclockwise, counting the number of turns you make, until the LED lights.

NOTE: Replacement sensors are shipped configured as normally closed (N.C.) switches.

9. Turn the potentiometer clockwise for $\frac{1}{2}$ the number of turns you counted in step 8. The LED will go off. The sensor is now set in the midpoint of its sensitivity range.

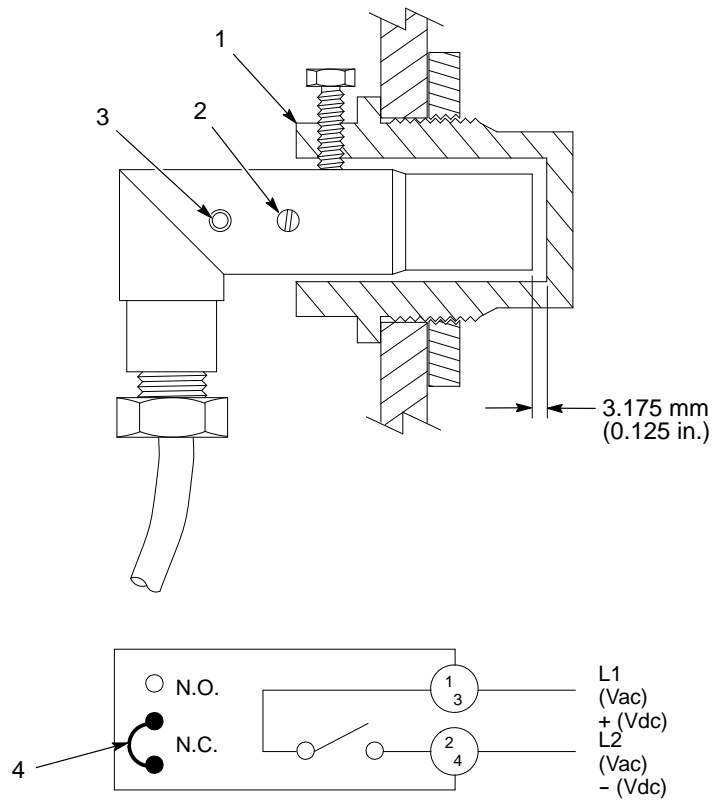


Figure 3-2 Feed Hopper Level Sensor Calibration

- | | |
|------------------|-----------------------|
| 1. Mounting well | 3. LED |
| 2. Potentiometer | 4. Bridge jumper wire |

Daily Startup and Shutdown Procedures

Use these procedures for routine operation of your system.

Startup

1. Turn on the system electrical power and compressed air supply.
2. Inflate the pneumatic seal between the color module and the fan section. Make sure it is sealing correctly.
3. Turn on the exhaust fan at the electrical panel.
4. Walk around the booth. Make sure the application equipment power and air is on. Make sure the transfer and feed hoses are connected to the pumps, accumulators, and spray guns.
5. Check all equipment ground connections.
6. Make sure the flame detector system is functioning correctly.
7. Turn on the automatic-gun master control unit and the manual-gun control units.
8. Adjust the kV settings and the powder-pump air pressures, if necessary. Refer to your spray gun and control unit manuals.
9. Start the conveyor and start spraying workpieces.
10. Measure the air flow velocity at the vestibules with a velometer. The velocity should be 30.5–36.6 m/min (100–120 ft/min). Make sure the sprayed powder is not being pulled from the spray guns and workpieces, and that the powder is not escaping from the enclosure openings.

Shutdown

1. Start the transfer pumps and sieves. Pump the reclaimed powder from the color module hoppers back into the feed hopper.
2. Turn off the automatic-gun master control unit and the manual-gun control units.
3. Perform the daily maintenance procedures described in the *Maintenance* section. Clean the powder pumps and spray guns as described in their manuals. Perform daily maintenance procedures for other system equipment, as described in their manuals.
4. Turn off the exhaust fan. Shut off the system electrical power and compressed air supply.

Changing Colors

The following procedures describe powder color-change procedures. Use the reclaim to non-reclaim procedure if you will not be reclaiming and reusing the new powder.

Color Change: Reclaim-to-Reclaim

These instructions describe color-change procedures for reclaim systems that use a separate color module with attached feed hopper and sieve for each color.

Removing the Color Module and Feed Hopper

1. Clean the enclosure as described in the *Daily Maintenance* procedures in the *Maintenance* section. Clean the spray guns and feed hoses as described in the spray gun manuals.
2. Shut off the system electrical power and compressed air supply. Relieve the system air pressure.
3. See Figure 3-3. Remove the color module quick-disconnect plates (1). Uncouple the 10-tube connectors (3) from the feed hopper receptacles.
4. If you are using a rotary sieve, disconnect the sieve electrical cables from the junction boxes (6) on the fan section supports (5).
5. Rotate the level sensor (4) to unlock it from its mounting in the side of the feed hopper. Remove the sensor and store it on one of the fan supports.
6. Disconnect the feed hoses (7) from the powder pumps.
7. Remove the ground strap from the color module.
8. Use the seal control valve (10) to release the air pressure from the pneumatic seal (2). Make sure the seal deflates.
9. Release the clamping-strap ratchets (9) on the sides of the fan section. Disconnect the clamping straps (8) from the color module.
10. Roll the color module, feed hopper, and sieve from under the fan section. Move them to a storage area.
11. Install a storage cover on top of the color module.

Removing the Color Module and Feed Hopper (contd)

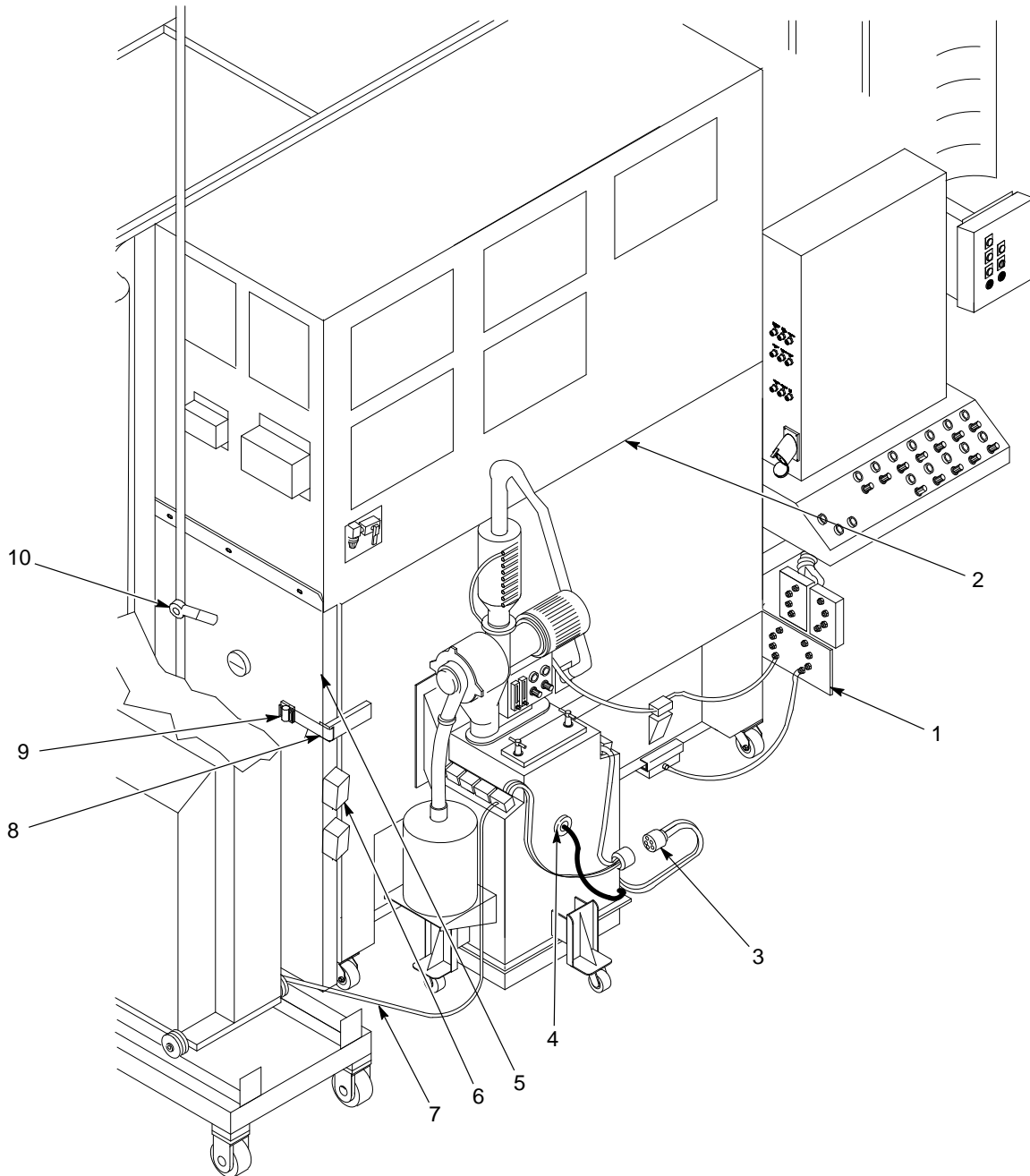


Figure 3-3 Removing the Color Module and Feed Hopper

- | | | |
|----------------------------|-------------------------|----------------------------|
| 1. Quick-disconnect plates | 5. Fan section supports | 8. Clamping straps |
| 2. Pneumatic seal | 6. Junction boxes | 9. Clamping strap ratchets |
| 3. 10-tube connectors | 7. Feed hoses | 10. Seal control valve |
| 4. Level sensor | | |

Installing a New Color Module and Feed Hopper

1. See Figure 3-4. Thoroughly clean the powder off the inlet frame (3) and surrounding area.

NOTE: If you find large amounts of powder in the fan and pulse valve compartments, the cartridge filters are leaking. Fix the problem before proceeding. Refer to the *Troubleshooting* and *Repair* sections for instructions.

2. Inspect and clean the interior of the fan section (1). Check the pneumatic seal (5), and replace it if it is damaged.
3. Remove the storage cover from the new color module (2). Inspect the module D-gasket (6) and replace it if it is damaged.
4. Position the new color module under the fan section, against the inlet frame stops.
5. Level the color module and adjust its height, if necessary, with the four leveling screws (7) on the sides of the color module. Leave a 9–16 mm (0.375–0.625 in.) gap, equal on all sides, between the bottom of the pneumatic seal track (4) and the top of the color module (2).

NOTE: The gap allows the seal to expand when it is inflated. Powder will escape into the spray room if the gap is wider than 16 mm (0.625 in.).

Installing a New Color Module and Feed Hopper *(contd)*

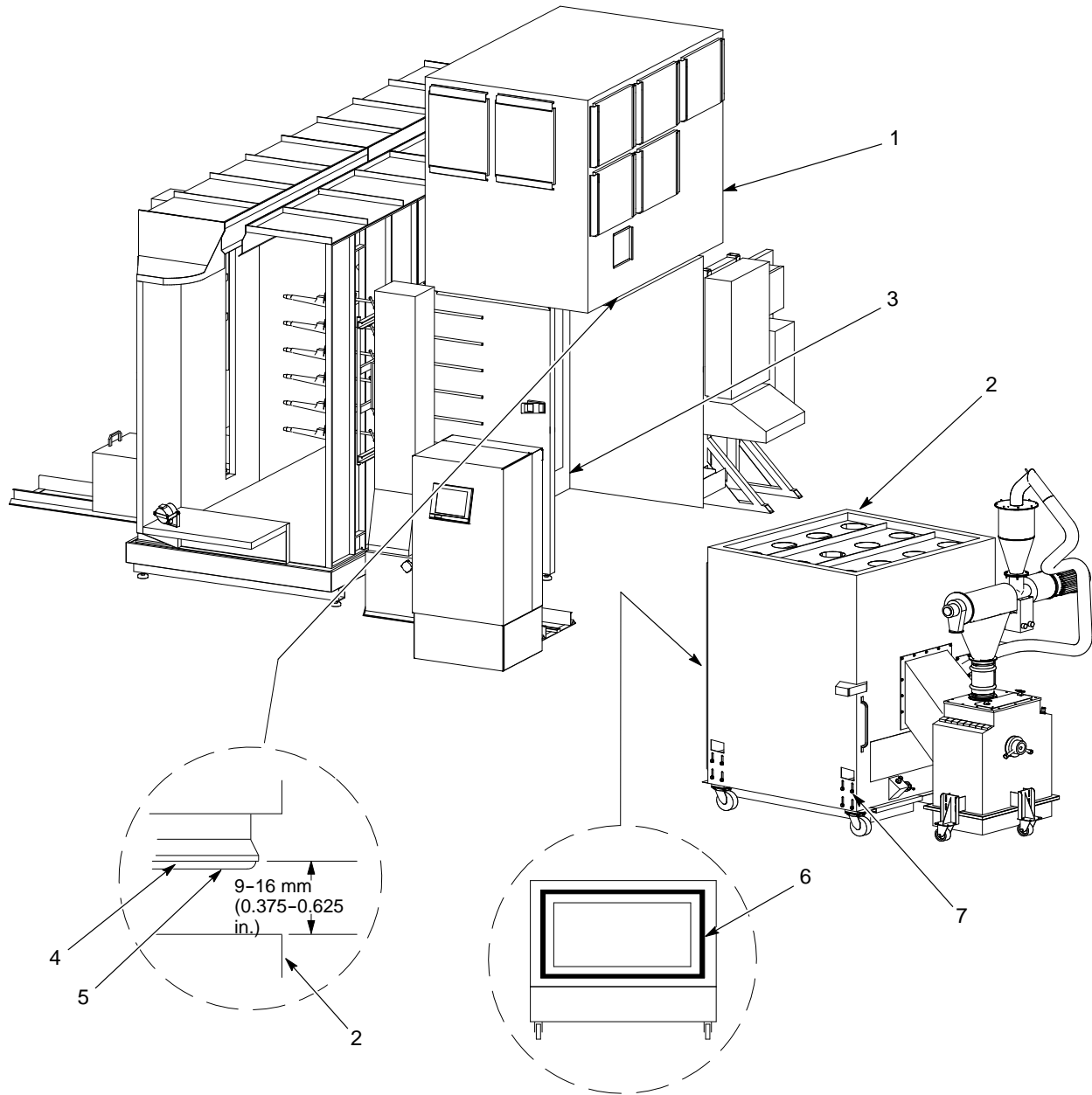


Figure 3-4 Installing a New Color Module and Feed Hopper; Steps 1-5

- | | | |
|---------------------|-------------------------|--------------------|
| 1. Fan section | 4. Pneumatic seal track | 6. D-gasket |
| 2. New color module | 5. Pneumatic seal | 7. Leveling screws |
| 3. Inlet frame | | |

NOTE: If the limit switch is not closed, you will not be able to start the system. Adjust the limit switch position by loosening the mounting screws and sliding the switch forward or back.

6. See Figure 3-5. Hook the clamping straps (14) to the color module (3). Tighten the ratchets (15) to pull the color module against the stops and compress the D-gasket against the inlet frame. This must also close the limit switch on the inlet frame.
7. Use the seal control valve (16) to inflate the pneumatic seal (1). Make sure it is sealing on all four sides of the color module.
8. Connect the quick-disconnect plates (2) to the color module.
9. Connect the 10-tube connectors (8) to the receptacles on the feed hopper.
10. Install the level sensor (9) into the mounting on the feed hopper.
11. Make sure the accumulator (4) vent hose is connected to the vent-assist plate (6), and that the vent-assist air tubing is connected to the tube fitting.
12. Connect the sieve electrical cables to the junction boxes (12) on the fan section support.
13. Disconnect the old feed hoses (13) from the guns. Install new feed hoses between the powder pumps (10) and the guns, or use hoses that have already been used with the new color.
14. Make sure the transfer hoses (7) are connected to the accumulator.
15. Connect all equipment ground straps and wiring.
16. Perform the *Startup after Color Change* procedures.

Installing a New Color Module and Feed Hopper *(contd)*

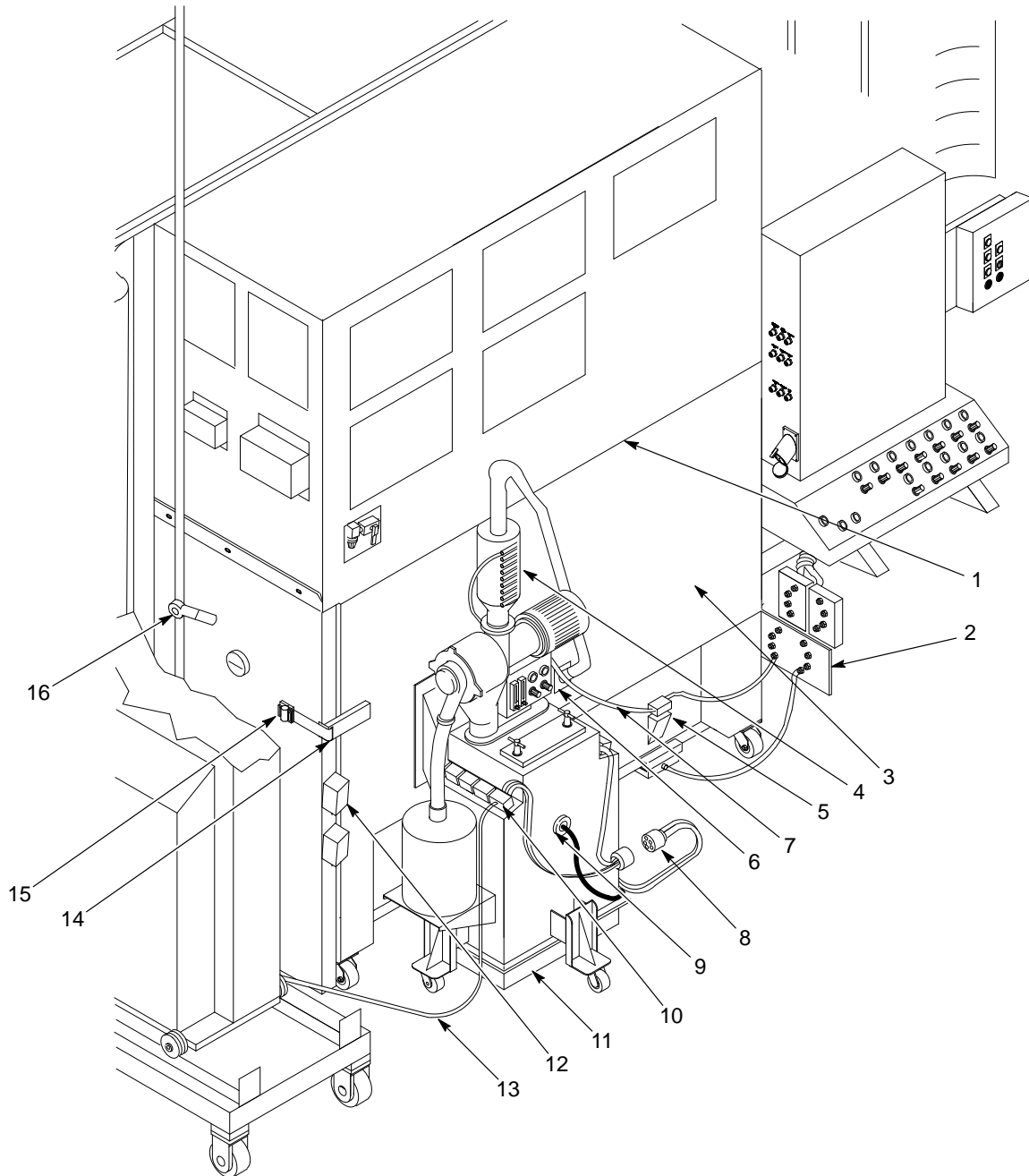


Figure 3-5 Installing a New Color Module and Feed Hopper; Steps 6-15

- | | | |
|----------------------------|-----------------------|-----------------------------|
| 1. Pneumatic seal | 7. Transfer hoses | 12. Junction boxes |
| 2. Quick-disconnect plates | 8. 10-tube connectors | 13. Feed hoses |
| 3. Color module | 9. Level sensor | 14. Clamping straps |
| 4. Accumulator | 10. Powder pumps | 15. Clamping strap ratchets |
| 5. Transfer pumps | 11. Feed hopper | 16. Seal control valve |
| 6. Vent-assist plate | | |

Color Change: Reclaim to Non-Reclaim

When you change to a powder you will not reclaim, the new powder will be collected in a new color module and pumped by the transfer pumps into a scrap drum. To supply powder to the guns, use a feed hopper attached to the color module, or an unattached, portable feed hopper.

Systems designed to use portable feed hoppers for non-reclaimed powders have a quick-disconnect plate mounted on a fan section support instead of on the color module. The air tubing for the feed hopper and the powder pumps are terminated in one or more 10-tube connectors.

New Color Module with Attached Feed Hopper

- Complete all the steps under *Removing Color Module and Feed Hopper*.
- Perform steps 1 through 9 under *Installing a New Color Module and Feed Hopper*.
- Perform steps 4 through 9 under *New Color Module with Portable Feed Hopper*.

NOTE: If the attached feed hopper is equipped with a sieve, accumulator, and level sensor, plug the ports in the accumulator after disconnecting the transfer hoses (see Figure 3-5, (7)). Plug the level sensor mounting hole.

New Color Module with Portable Feed Hopper

- Complete all the steps under *Removing Color Module and Feed Hopper*.
- Perform steps 1 through 8 under *Installing a New Color Module and Feed Hopper*.
- Perform the following steps.
 1. Block the feed-hopper vent port in the color module with a gasketed cover plate.
 2. See Figure 3-5. Position the portable feed hopper so the feed hoses (13) from the powder pumps can be connected to the guns.
 3. Install a vent hose between the vent on the feed hopper lid and the vent-assist plate (6) on the color module. Clamp the hose to the hopper vent and the vent-assist plate.
 4. Connect air tubing to the tubing connector on the vent-assist plate.
 5. Connect the 10-tube connectors to the receptacles on the fan section support.
 6. Install new feed hoses (13) between the pumps and the guns. Use hoses that have already been used with the new color, if possible.
 7. Install a scrap drum lid on a 55-gallon drum.
 8. Connect the transfer hoses (7) from the transfer pumps (5) to the scrap drum lid.
 9. Connect the portable feed-hopper ground strap to a ground connection, such as the booth base. Make sure all other equipment ground straps are connected.
 10. Set the transfer-pump selector switch to MANUAL or OFF.
 - a. Set the switch to MANUAL to continuously pump the collected powder from the color module to the scrap drum.
 - b. Set the switch to OFF if you want to wait until you are done spraying before you pump the powder into the scrap drum.
 11. Perform the *Startup after Color Change* procedure.

Startup after Color Change

Before starting the system, make sure all tubing, hoses, electrical cables, and ground straps have been reconnected.

1. Turn on the system electrical power and compressed air supply.
2. Rotate the seal control valve to inflate the seal. Make sure the seal is pressing against the color module equally on all four sides. Adjust the height of the color module and level it to correct any sealing problems.
3. Start the exhaust fan.
4. Fill the feed hopper $\frac{2}{3}$ full of powder. Adjust the hopper fluidizing-air regulator until the powder boils gently. Wait 5–10 minutes for the powder to fluidize.
5. Start spraying parts.
6. Adjust the powder-pump air pressures and gun voltages, if necessary (different colors or powders may require different settings).

Equipment	Recommended Initial Settings	Final Setting	Changes
Primary Air Pressure (plant supply)	5.5 bar (80 psi)		
Collector Module			
#1 Fluidizing	0.7 bar (10 psi)		
#2 Fluidizing	0.7 bar (10 psi)		
#3 Fluidizing	0.7 bar (10 psi)		
#4 Fluidizing	0.7 bar (10 psi)		
#1 Transfer pump	1.7 bar (25 psi)		
#2 Transfer pump	1.7 bar (25 psi)		
#3 Transfer pump	1.7 bar (25 psi)		
#4 Transfer pump	1.7 bar (25 psi)		
Feed Hopper — Reclaim			
Fluidizing	0.5 bar (8 psi)		
Vent-assist	0.7 bar (10 psi)		
Feed Hopper — Non-Reclaim			
#1 Fluidizing	0.5 bar (8 psi)		
#2 Fluidizing	0.5 bar (8 psi)		
#3 Fluidizing	0.5 bar (8 psi)		
Vent-assist	0.7 bar (10 psi)		
Pulse Manifold			
Air pressure	3.5–4.1 bar (50–60 psi)		
Nordson NFS-1000 Fire Detector			
Air pressure	0.7 bar (10 psi) (preset)		
			<i>Continued...</i>

Startup after Color Change (contd)

Equipment	Recommended Initial Settings	Final Setting	Changes
Rotary Sieve			
Flowmeter #1	2.8 m ³ /h (100 SCFH)		
Flowmeter #2	2.8 m ³ /h (100 SCFH)		
Seal air pressure	1.7 bar (25 psi)		
Vent-assist air pressure	2.8 bar (40 psi)		
Vibratory Sieve			
Air pressure	3.5 bar (50 psi)		
Pulse Timer			
Delay (OFF) time	15.0 sec		
Duration (ON) time	0.07 sec		
Filter Pressure Drop Maximum Readings			
Cartridge filters	4–6 in. w.c.		
Final filters	2 in. w.c.		
Automatic Guns			
#1 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90–100 kV		
AFC	40 A		
#2 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90–100 kV		
AFC	40 A		
#3 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90–100 kV		
AFC	40 A		
#4 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90–100 kV		
AFC	40 A		
#5 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90–100 kV		
AFC	40 A		

Continued...

3-18 Operation

Equipment	Recommended Initial Settings	Final Setting	Changes
#6 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#7 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#8 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#9 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#10 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#11 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#12 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#13 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#14 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
<i>Continued...</i>			

Startup after Color Change (contd)

Equipment	Recommended Initial Settings	Final Setting	Changes
#15 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#16 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#17 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#18 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#19 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#20 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#21 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#22 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#23 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
<i>Continued...</i>			

Equipment	Recommended Initial Settings	Final Setting	Changes
#24 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#25 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#26 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#27 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		
#28 Flow-rate	2.1 bar (30 psi)		
Atomizing	1.4 bar (20 psi)		
Voltage	90-100 kV		
AFC	40 A		

Section 4

Maintenance



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

Daily Maintenance

Perform these procedures daily to keep your system clean and functioning properly.

Cleaning

Perform this procedure daily and when changing powder color or type.




WARNING: Wear an approved respirator and safety glasses or goggles when handling powder, operating spray equipment, or performing maintenance or cleaning operations. Obtain and read Material Safety Data Sheets for each powder used.

1. Turn off the automatic-gun master-control unit(s) and manual-gun control units.
2. Turn on the exhaust fan.
3. Disconnect the powder-feed hoses from the powder pumps. Blow the powder out of the hoses and spray guns with compressed air.
4. Ground the gun electrodes and clean the spray guns according to the instructions in the gun manuals.
5. Clean the enclosure roof, walls, and floor with a rubber squeegee. Push the collected powder into the color module.
6. Remove the remaining powder residue from the enclosure with an air-powered vacuum and a soft brush attachment. Wipe down all surfaces with a damp, lint-free cloth (do not use tack cloths). If you remove the color module, clean the inlet frame and surrounding area.
7. Turn off the exhaust fan.
8. Clean the operator's platform and the floor around the booth.

Daily Equipment Maintenance

Equipment	Procedure
Filters — Check the differential pressure gauges.	<ol style="list-style-type: none"> 1. Check the final filter differential pressure gauge. It should read between 1 and 2.5 in. of water (wc). Make sure no powder is leaking from around the filter gasket or face. 2. Check the cartridge filter differential pressure gauge. It should read between 4 and 6 in. of water (wc). Check the pulse valve timing.
Vibratory Sieve	Open the hopper lid and remove the screen from the sieve. Clean the screen and replace it if it is damaged. Reconnect the ground clip to the screen after reinstalling it.
Rotary Sieves — Clean	<ol style="list-style-type: none"> 1. Empty the scrap pail. 2. Open the sieve housing and clean the rotor and screen with a soft brush. Replace the screen if it is damaged. 3. Check the seal air pressure and flow rate. Check the vent-assist air pressure. Refer to your sieve manual for more information.
Transfer Pumps	<ol style="list-style-type: none"> 1. Disconnect the transfer hoses from the pumps. Blow the powder out of the hoses with compressed air. 2. If the pumps are installed horizontally, place a small container under the transfer pumps to catch spilled powder. Remove the pumps from the adapters. Blow out the adapters. 3. Disassemble the pumps. Clean the parts with a low-pressure air gun and a clean cloth. Replace any worn or damaged parts.
Fan Section	<ol style="list-style-type: none"> 1. Remove the final filters and inspect the fan compartment. Vacuum out any powder. 2. Inspect the pulse-valve compartment. Vacuum out any powder. If significant amounts of powder have accumulated in the fan or pulse-valve compartment, the cartridge filters may be leaking. Refer to the <i>Troubleshooting</i> section for instructions. 3. Inspect the V-belts. Replace cracked or worn belts.
Powder Spray Guns	Disassemble and clean the spray guns according to the instructions in their manuals.
Powder Pumps	Disassemble and clean the pumps according to the instructions in their manuals. Replace worn parts.
Flame Detector System	Check the detector sensors every four hours and clean the lenses, if necessary. Make sure air is being supplied to the sensors. Make sure the detector system is operating properly.
Compressed Air Supply	<p>Hold a clean, white cloth under the drop leg and open the drop-leg drain valve. Water, oil, or other contaminants will stain the cloth. Eliminate any source of contamination. Drain the filters and separators and check the filter elements. Check all air pressure regulator settings.</p> <p>NOTE: The air dryer should remain on at all times to prevent moisture from accumulating in the compressed air system.</p>

Continued...

Equipment	Procedure
Air Dryers	Refer to your air dryer manual for maintenance procedures and schedules.
Gun Movers (Oscillators and Reciprocators)	Each shift, make sure the gun movers are stroking smoothly and at the proper speed. Make repairs and adjustments if necessary. Lubricate the spray gun movers as described in their manuals.
Accumulators and Vent Hoses	Vacuum out the accumulators and blow the powder out of the vent hoses with compressed air.
Workpiece and Conveyor Grounds	 <p>WARNING: An ungrounded or poorly grounded workpiece, hanger, or conveyor can cause electrical arcing. If arcing is observed, shut down the system immediately. Correct the cause before resuming operations. Failure to observe this warning could result in a fire or explosion, causing property damage and possible personal injury or death.</p> <p>Make sure all workpieces are grounded through the hangers and conveyor. The resistance between the workpieces and the hangers, and the hangers and ground, must be less than 1 megohm. You will get better transfer efficiency and workpiece coverage at 500 ohms or less. Clean or strip the hangers regularly.</p>

Weekly Maintenance

Equipment	Procedure
Booth Enclosure	Turn on the exhaust fan and vacuum the enclosure roof, walls, and floor with a soft brush attachment. Wipe down the enclosure with damp, lint-free cloths. Clean the booth exterior, all attached equipment, and the spray room.
Powder Spray Guns and Cables	Clean the spray guns. Perform electrostatic resistance checks as described in the spray gun and gun control unit (electrostatic power supply) manuals.
Powder Pumps and Feed Hoses	Disassemble the pumps and clean them according to the instructions in their manuals. Replace any worn or damaged parts. Blow out the feed hoses with compressed air. Replace damaged hoses.
Feed Hoppers	Remove the powder from the hopper. Vacuum the interior. Check the fluidizing plate. If the plate is stained, the air supply could be contaminated by oil or moisture. Check the air dryer and air filters. Replace the fluidizing plate if it is contaminated. Lubricate the casters with a lithium grease.
Color Module	<p>Start the exhaust fan and activate the pulse valves to blow off as much powder as possible off the cartridge filters. Do not vacuum the cartridge filters. Remove the cartridge filters and inspect the filter media and gaskets. Replace the filters if they are damaged.</p> <p>Pump the powder out of the color module. Disconnect the hoses from the transfer pumps. Blow the powder out of the hoses with compressed air. Remove the transfer pumps and clean them as described in their manuals.</p> <p>Vacuum the color module interior. Check the color module hopper fluidizing plates. If they are stained, the air supply could be contaminated by oil or moisture. Check the air dryer and air filters. Replace the fluidizing plates if they are contaminated.</p> <p>Check the pneumatic seal. Make sure it seals correctly when inflated.</p> <p>Lubricate the casters with a lithium grease.</p>

Periodic Maintenance

Equipment	Procedure
Electrical Connections	Check all terminal blocks, and junction boxes for loose wires. Tighten any loose connections and inspect all wiring for damaged insulation. Replace the wiring if the insulation is damaged.
Guns and Cables	Perform electrostatic resistance checks as described in the spray gun and gun control unit manuals.
Air Dryer	Check the air dryer operation. Refer to your air dryer manual for maintenance procedures and schedules.
Gaskets	Inspect all gaskets and seals for damage. Replace them if they are damaged.
Exhaust Fan V-belts	Every six months, adjust the tension of the exhaust fan V-belts. You should not be able to deflect the belts more than 19 mm (0.75 in.) (one belt diameter).
Bearings	Every six months, lubricate the fan shaft and motor bearings with two shots of lithium or polyurea grease from a grease gun. The grease fittings are on the front face of the fan section.
AZO Rotary Sieve	Every three months, lubricate the lip seals with a white lithium grease as described in your AZO sieve manual.
Differential Pressure Gauges	Observe and record the differential pressure gauges. Readings greater than the following mean that the filters are clogged and must be replaced. Correct the cause of the clogging before resuming operations. Pressure drop across cartridge filters: 4–6 in. wc. Pressure drop across final filters: 2 in. wc.
Powder Feed Hoses	Disconnect the powder feed hoses from the powder pumps. Blow the powder out of the hoses with compressed air. Never blow air through the hoses toward the pumps. Replace the hoses if they are clogged with impact-fused powder.

Maintenance Check List

Activity	Each Shift	Daily	Weekly	Monthly	Color Change
Cleaning					
Accumulator		✓			
Booth enclosure		✓	✓		✓
Color module			✓		✓
Fan and pulse-valve compartments			✓		✓
Feed hoses and transfer hoses	✓				✓
Fire detector head lenses*	✓				✓
Gun pumps	✓	✓	✓		✓
Guns	✓		✓		✓
Rotary sieve		✓			✓
Transfer pumps	✓	✓			✓
Vent hoses		✓			✓
Vibratory sieve	✓				✓
Resistance Checks—Guns and Cables			✓		
Visual Checks					
Air supply drop leg		✓			
Air dryer		✓			
Cartridge filter differential-pressure gauge	✓				
Electrical connections			✓		
Exhaust fan V-belts				✓	
Final filter differential-pressure gauge	✓				
Fire detector sensors	✓				✓
Gaskets			✓		
Gun movers	✓				
Workpiece clearance**	✓				
Workpiece grounding	✓				✓
Powder levels	✓				
Lubrication					
AZO rotary-sieve lip seals***				✓	
Fan bearings				✓	
Motor bearings				✓	
* Every 4 hours.					
** Clearances should be monitored continuously.					
*** Every 3 months.					

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.

Introduction

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.

No.	Problem	Page
1.	Spray guns are surging or spitting; powder flow is inadequate or intermittent	5-2
2.	Problems with coating uniformity, edge coverage, film build, wrap, or penetration into recesses	5-2
3.	Powder not transferring from color module to feed hopper	5-3
4.	Powder not fluidizing, or clouds of powder erupting from surface	5-4
5.	Final filters clogged; powder in fan compartment	5-4
6.	Cartridge filters clogged	5-5
7.	System shuts down or will not start	5-5
8.	Sieve not screening powder	5-5
9.	Sieve scrap bucket filling up with powder	5-6
10.	Powder escaping from booth openings	5-6

NOTE: To troubleshoot electrical problems, refer to the wiring and control panel foldouts at the back of this manual.

Troubleshooting Procedures

Problem	Possible Cause	Corrective Action
1. Spray guns are surging or spitting; powder flow is inadequate or intermittent	Powder in feed hopper inadequately fluidized	Adjust the fluidizing air pressure. The powder should be gently boiling. Refer to problem 4.
	Low powder level in feed hopper	Add powder to the feed hopper. Refer to problem 3.
	Powder pump venturi nozzles or throats worn; adapter O-rings leaking; pump or pickup tube clogged	Clean the pump and pickup tube. Replace any worn parts. Replace the adapter O-rings if they are damaged.
	Obstruction in powder-feed hose	Disconnect the feed hose from the pump. Blow the powder out of the hose with compressed air. Make sure the hose is clear. Eliminate kinks or severe bends in the hose. The hose should be no longer than 7.6 m (25 ft) with a maximum 2.7-m (9-ft) vertical rise.
	Severe tribo-charging in powder feed hose	Contact your Nordson Corporation representative for a suitable hose material. Contact your powder supplier.
	Obstruction in spray gun	Clean the spray gun. If you are using conical nozzles, make sure there is a 3-mm (0.125-in.) or larger gap between the deflector and the nozzle.
	Flow rate or atomizing air pressure incorrect	Refer to the spray gun and control unit manuals for recommended air pressures and ratios.
2. Problems with coating uniformity, edge coverage, film build, wrap, or penetration into recesses	Poor workpiece grounding	Resistance from workpiece to ground must be less than 1 megohm. For best results, resistance should not be more than 500 ohms. Clean the workpiece hangers, fixtures, and hooks if necessary. Check the conveyor ground.
	Gun placement incorrect	Position the spray guns 25.4–35.6 cm (10–14 in.) from the workpieces. Stagger the spray guns 30.5 cm (12 in.) apart vertically and 53.3 cm (21 in.) apart horizontally to avoid fan pattern and electrostatic field overlap. Contact your Nordson Corporation representative.
<i>Continued...</i>		

Problem	Possible Cause	Corrective Action
2. Problems with coating uniformity, edge coverage, film build, wrap, or penetration into recesses <i>(contd)</i>	Powder pump flow rate and atomizing air pressure incorrect	Refer to the spray gun and control unit manuals for the recommended air pressures and ratios.
	Electrostatic voltage (kV) or AFC setting incorrect for workpieces being coated	Adjust the voltage to 90–100 kV for large flat surfaces and 60–75 kV for recesses. Never set the voltage below 60 kV. Refer to the spray gun and control unit manuals for the recommended voltage, AFC, and air pressure settings and ratios.
	Wrong nozzles being used	Use flat-spray nozzles for large regular-shaped workpieces. Use conical nozzles for deep recesses and most manual touch-ups.
	Powder feed problems	Refer to problem 1.
3. Powder not transferring from color module to feed hopper	Transfer pump air pressure too low	Increase the air pressure.
	Transfer pump clogged or venturi nozzle or throat worn	Clean the pump and replace worn parts.
	Transfer hose plugged	Blow the powder out of the hose with compressed air.
	Sieve screens clogged, or motor running in wrong direction	Clean the sieve screens. Refer to the <i>Reversing Motor Direction</i> procedure in this section.
	Accumulator plugged	Clean out the inlet ports. Clean the accumulator interior.
	Accumulator vent-assist air pressure too high	Reduce the vent-assist air pressure.
	Powder in color module not fluidized. Deep hole in powder around pickup tube	Increase the fluidizing pressure. If the problem continues, go to the next cause.
	Powder damp or contaminated; cannot be fluidized or pumped	Refer to problem 4.
<i>Continued...</i>		

Troubleshooting Procedures *(contd)*

Problem	Possible Cause	Corrective Action
4. Powder not fluidizing, or clouds of powder erupting from surface	Fluidizing pressure too low or too high	Check the powder in the hoppers. Increase the fluidizing air pressure until the powder is gently boiling. Decrease the pressure if clouds of powder are erupting from the surface.
	Moist or oil-contaminated powder	Open the drain valve at the air-supply drop leg and check the air supply for water or oil. Check the filters, separators, and air dryer. Replace the powder in the hoppers. Refer to the next cause.
	Air leaking from fluidizing pan gasket instead of diffusing through fluidizing plate, or contaminated air plugging pores in fluidizing plates	Check for air leaks around the fluidizing pan gaskets. If leaks are found, remove the pan and replace the gasket. If fluidizing air pressure increases or decreases abruptly, remove the powder from the hoppers and inspect the fluidizing plates for stains, discoloration, or polished surfaces. Replace the fluidizing plates if they are contaminated or plugged.
	Transfer pumps or hoses plugged, or fluidizing plate in color module or feed hopper cracked	Clean the transfer pumps and replace worn parts. Blow the powder out of the transfer hoses with compressed air. Make sure the hoses are clear. Check the fluidizing plate and replace it if it is cracked.
	Uneven distribution of powder in hopper	Increase the fluidizing pressure. Check the powder and the fluidizing plate for contamination as previously described.
5. Final filters clogged; powder in fan compartment	Leaking cartridge filter gaskets, or hole in filter media	Make sure the gaskets are sealing correctly. If you can slip a 0.4-mm (0.015 in.) feeler gauge between the gasket and the sealing surface, tighten the draw-rod nut to compress the gaskets. If the gaskets continue to leak, remove the cartridges. Clean and inspect the gaskets, sealing surfaces, and filter media. Replace the cartridges if the gaskets or filter media are damaged. Refer to the <i>Repair</i> section. Replace clogged final filters.
	Leak in color module cartridge filter mounting plate	Locate and seal leak with RTV sealant.

Continued...

Problem	Possible Cause	Corrective Action
6. Cartridge filters clogged	Pulse air pressure inadequate	Increase the pulse air pressure or volume. Decrease the pulse timer delay (off time).
	Powder too fine or contaminated	Reduce the ratio of reclaim-to-new powder. Check the powder particle size. Replace contaminated powder and fix the source of contamination.
	Pulse valves out of position	Position the valves as described in the <i>Repair</i> section.
	Timer board settings incorrect	Adjust the timer board settings as described in the <i>Operation</i> section.
	Pulse valve or solenoid valves clogged or malfunctioning	Open the pulse valve timer panel. If you do not hear a pulse each time an LED lights, the solenoid valve or the pulse valve connected to that LED may be clogged or failed. Check the wiring to the solenoid valve before opening the solenoid box and replacing the solenoid valve.
7. System shuts down or will not start	Flame detector system sees a flame or spark, or is malfunctioning	Check the inside of the enclosure and color module, the detector head aim, and the workpiece and conveyor grounds. Follow the troubleshooting procedures in the flame detector system manual.
	Final filters clogged	Locate the source of powder leakage and correct the problem. Refer to problem 5.
	Color module not activating limit switch	Tighten the color module clamping straps, or reposition the limit switch arm. If the problem continues, replace the limit switch.
	Final filter pressure switch failed	Replace the switch.
	Air dryer not operating, or interlock not activated	Start the air dryer. Follow the troubleshooting procedures in the dryer manual. Check the interlock circuit.
	Fuse(s) blown	Check the fuses in the system electrical panel. Replace the blown fuse(s). If the fuses continue to blow, fix the electrical problem.
	Electrical failure	Trace the circuits and correct the problem.
8. Sieve not screening powder	Screen clogged or damaged	Clean or replace the screen.

Continued...

Troubleshooting Procedures *(contd)*

Problem	Possible Cause	Corrective Action
9. Sieve scrap bucket filling up with powder	Scrap bucket lid not sealed	The lid must be air-tight. Tighten the lid. Check the scrap hose connections.
	Screen clogged	Clean or replace the screen.
10. Powder escaping from booth openings	Cartridge filters clogged	If the differential pressure gauge shows more than 6 in. wc, refer to problem 6.
	Cross drafts interfering with exhaust fan draw	Check for cross drafts at all of the enclosure openings. Eliminate or divert any drafts.
	Workpieces entering booth are too hot	Cool the workpieces before moving them into the booth. The workpiece temperature should not exceed 49 °C (120 °F).
	Powder spray gun output exceeds booth containment capability	Reduce the powder flow and/or the number of the spray guns.
	Booth openings too large	Close or decrease the size of the openings.
	Workpieces too large for booth	Contact your Nordson Corporation representative.
	Spray guns too close to entrance and exit vestibules or openings	Move the spray guns farther away from the vestibules or openings.
	Fan rotation backward	Reverse the rotation of the motor. Refer to <i>Reversing Motor Direction</i> in this section.
	Air leaks around color module	Inspect the D-gasket and replace it if it is damaged. Tighten the clamping straps to compress the D-gasket. Check the pneumatic seal. Make sure it is inflated, and sealing properly around all four sides. Refer to <i>Installing a New Color Module and Feed Hopper</i> in the <i>Operation</i> section. Replace the seal if it is damaged.

Reversing Motor Direction

Improperly connecting the exhaust fan and sieve motor starters will cause them to rotate in the wrong direction. If the exhaust fan is rotating in the wrong direction, powder will be blown out of the enclosure. If the sieve rotates in the wrong direction, powder will back up in the accumulator. Use the following procedures to check and correct, if necessary, the exhaust fan and sieve motor rotation direction.

Exhaust Fan Motor

1. Turn on system electrical power.
2. Start the exhaust fan motor.
3. Observe the direction of fan rotation. The fan should rotate in the direction indicated by the yellow arrow on the front of the fan section. The fan shaft should rotate clockwise when viewed from the sheave (pulley) end (from above the fan). If the rotation is backward, go to the next step.



WARNING: Even with the electrical panel disconnect in the off position, the input terminals at the top of the switch are still live. Do not touch them. Failure to observe this warning could result in serious injury or death.

4. Shut off system electrical power. Open the electrical panel door and reverse any two wires (L1, L2, or L3) connected to the fan motor starter (M407). Close the electrical panel door.
5. Turn on electrical power. Start the fan and check the rotation direction.

Sieve Motor

1. Check your sieve manual for the proper motor rotation direction. If it is rotating in the wrong direction, perform the next step.



WARNING: Even with the electrical panel disconnect in the off position, the input terminals at the top of the switch are still live. Do not touch them. Failure to observe this warning could result in serious injury or death.

2. Shut off system electrical power. Open the electrical panel door. Reverse any two wires (L1, L2, or L3) connected to the sieve motor starter (M412). Close the electrical panel door.
3. Restore system electrical power. Start the sieve and check the rotation direction.

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.

Final Filter Replacement



WARNING: Before performing this procedure, shut off electrical power at the system electrical panel. Lock and tag the switch. Failure to observe this warning could result in personal injury or death.

1. Shut off the exhaust fan. Shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.
2. See Figure 6-1. Unscrew and remove the threaded knobs (3) and brackets (2) securing the final filters (1) to the fan section. The filters will stay in place.
3. Remove the old filters and discard them.
4. Check the interior of the fan housing. If you see large amounts of powder inside the housing, powder is leaking through the cartridge filters or mounting plate. Fix the leak before starting the system.

NOTE: Do not use damaged filters.

5. Remove the new filters from their cartons. Inspect the filter housings, gaskets, and media for damage.
6. Insert the new filters into the openings.
7. Install the brackets over the threaded studs. Thread the knobs onto the studs.
8. Tighten the knobs to compress the filter gaskets slightly. Do not overtighten the knobs.
9. Restore system electrical power. Start the exhaust fan and check for leaks around the filter gaskets.

Final Filter Replacement *(contd)*

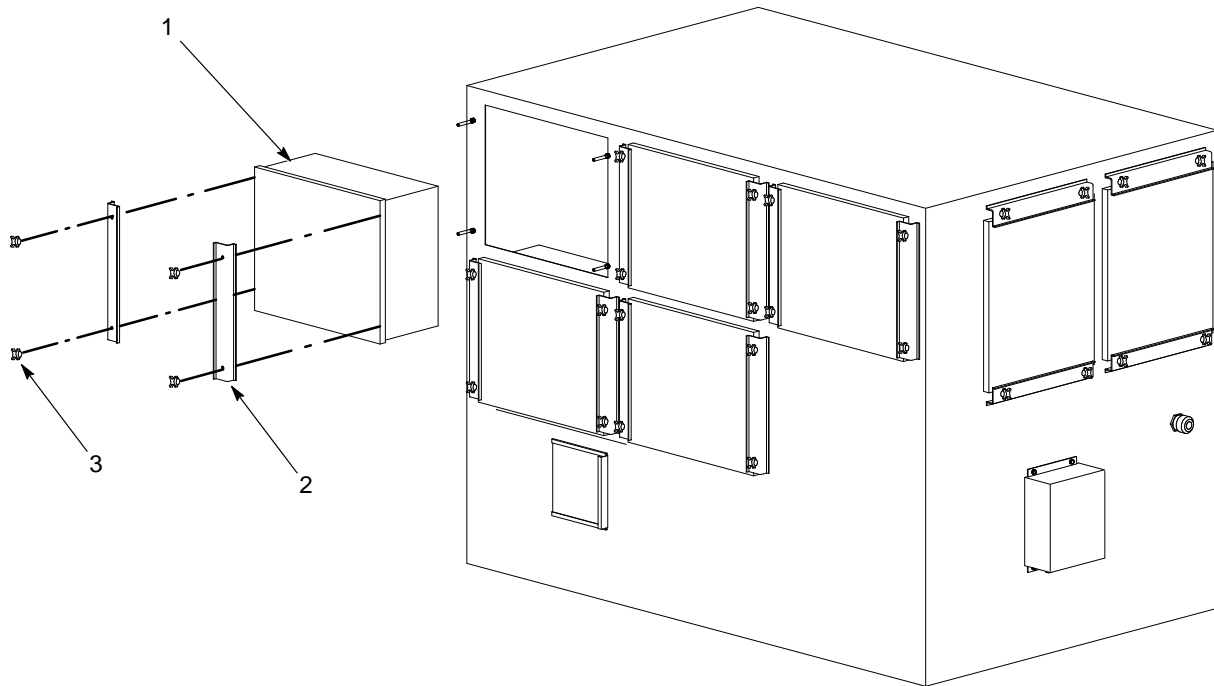


Figure 6-1 Final Filter Replacement

1. Final filter

2. Brackets

3. Threaded knobs

Cartridge Filter Replacement

Remove the color module from under the fan section as described in the *Reclaim-to-Reclaim Color Change* procedure in the *Operation* section.



CAUTION: Do not use any cartridge filters other than those specified for your system. Using unapproved cartridge filters could seriously affect the operation and performance of your system, as well as void FM approvals. Do not use damaged filters.

Carefully inspect new cartridge filters for

- cuts or other damage to the rubber gaskets.
- bent or dented end caps.
- holes or other damage to the filter media.

36-in. Cartridge Filter Replacement

1. See Figure 6-2. Remove the baffle (2).
2. Pull up on the T-handles on the draw rods (6) to hold the cartridge filters (7) against the tube sheet (1).
3. Remove the nuts (3) and filter mounts (4) from the draw rods. Save the removed parts.
4. Remove the cartridge filters (7) from the color module.
5. Unscrew the draw rods from the cartridge filter bosses and remove the filter centering brackets (5) and draw rods from the cartridge filters. Save the draw rods and centering brackets for reuse.
6. Thoroughly clean the sealing surfaces on the underside of the mounting plate (1). Dirty surfaces will prevent the cartridge filter gaskets from sealing properly and allow powder to leak into the fan section.
7. Insert the threaded end of the draw rods (5) through the centering brackets (4), then install them into the filters and screw the ends of the draw rods into the filter bosses, tightening the rods by hand.
8. Hold the cartridge filters up against the tube sheet, centered under the filter openings.
9. Use the T-handles to pull the cartridge filters up against the filter mounting plates. Install the filter mounts (3) on the draw rods, making sure the slots in the filter mounts slip over the T-handles.
10. Install nuts (2) on the draw rods.
11. Slip the ends of the filter mounts into the locating slots in the mounting plate, around the openings.



CAUTION: Do not overtighten the nuts, or you may damage the cartridge filters.

12. Tighten the nuts until the filter mounts and centering brackets are touching. This will compress the filter gaskets (8) and seal the cartridges against the mounting plate.
13. Install the color module as described in *Installing a New Color Module and Feed Hopper* in the *Operation* section.

36-in. Cartridge Filter Replacement (contd)

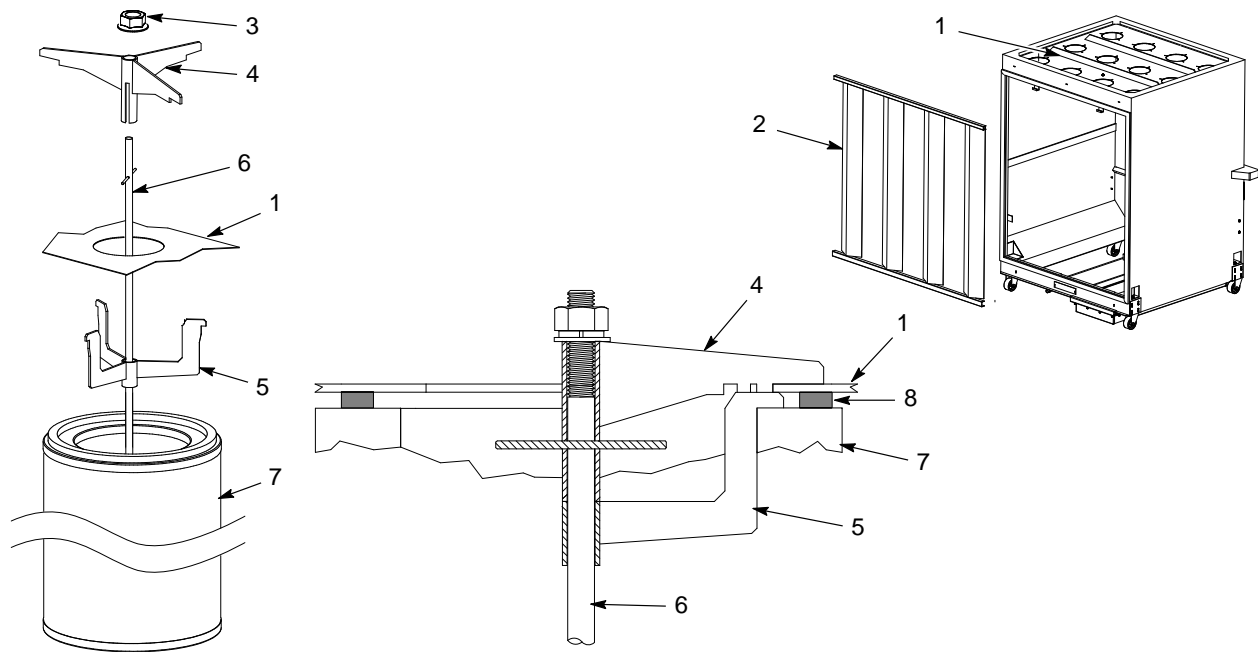


Figure 6-2 36-in Cartridge Filter Replacement

- | | | |
|---------------|----------------------|--------------------------------|
| 1. Tube sheet | 4. Filter mount | 7. Closed-end filter cartridge |
| 2. Baffle | 5. Centering bracket | 8. Filter gasket |
| 3. 5/8-11 nut | 6. Draw rod | |

26-in. Filter Cartridge Replacement

1. See Figure 6-3. Remove the baffle (2). Support the filter stack while performing the next step.
2. Remove the 3/8-16 jam nut (3), the compression nut (4), the 5/8-16 jam nut (5), and the filter mount (7). Save the removed parts.
3. Remove the filter stack from the color module.
4. Lift the open end filter and threaded tube off the threaded rod.
5. Remove the threaded tube and centering brackets from the open-end filter. Leave the jam nut and bottom centering bracket on the threaded rod.
6. Unscrew the threaded rod from the closed-end filter boss and install it and the centering bracket in the new closed-end filter.
7. Install the threaded tube and bottom centering bracket through the bottom of the open-end filter.
8. Lift the open-end filter assembly and guide the thread rod into the threaded tube, until the two filters are touching and centered.
9. Install the top centering bracket over the threaded rod and tube.

10. Install the filter assembly into the color module, and hold it up against the tube sheet over the opening.



CAUTION: Do not overtighten the jam nuts, or you may damage the cartridge filters.

11. Install the filter mount over the threaded tube, then install the 5/8-16 jam nut on the threaded rod and tighten until the top filter gasket is compressed against the tube sheet.

12. Install the compression nut on the threaded tube and tighten.

13. Install the 3/8-16 jam nut on the threaded rod and tighten to compress the filter gaskets.

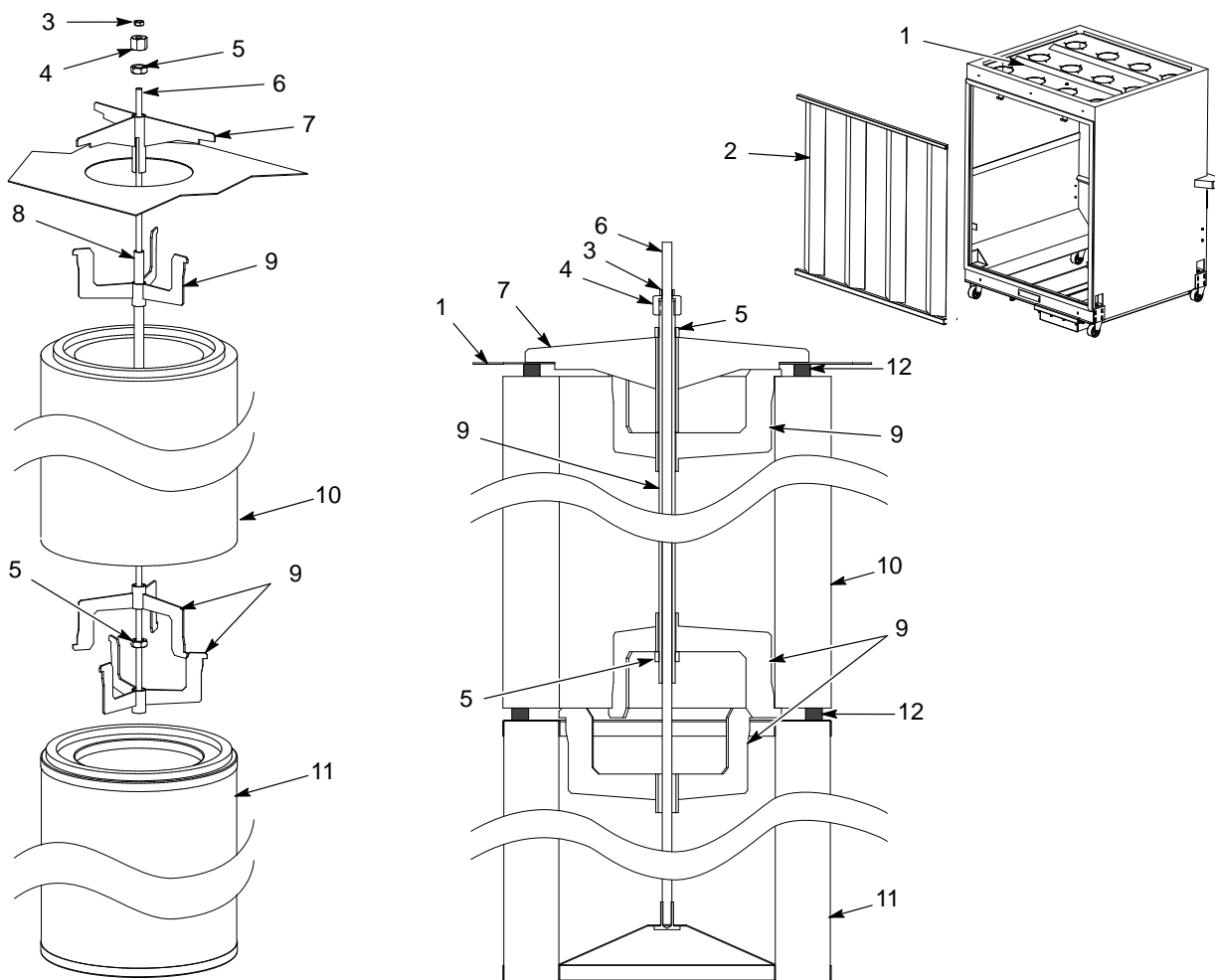


Figure 6-3 26-in. Double-Stack Cartridge Filter Replacement

- | | | |
|--------------------|--------------------|------------------------------|
| 1. Tube sheet | 5. 5/8-16 jam nuts | 9. Centering bracket |
| 2. Baffle | 6. Threaded rod | 10. Open-end 26 in. filter |
| 3. 3/8-16 jam nut | 7. Filter mount | 11. Closed-end 26 in. filter |
| 4. Compression nut | 8. Threaded tube | 12. Filter gasket |

Color Module Fluidizing Plate Replacement

Fluidizing plate replacement will only be necessary if the plates are contaminated or damaged.

Preparation

1. Start the transfer pumps and pump as much as possible of the powder in the color module hoppers back into the feed hopper. If the powder is contaminated, pump it into a scrap bucket.
2. Remove the color module from under the fan section as described in the *Reclaim-to-Reclaim Color Change* procedure in the *Operation* section.
3. Remove the baffle, transfer pumps, and cartridge filters from the color module.
4. Remove all the powder from the color module hoppers. Vacuum the hoppers and fluidizing plates and wipe them clean with damp, lint-free cloths. Do not use tack cloths.

Replacement



WARNING: Heavy equipment. Use approved, inspected lifting equipment and tackle. Make sure the capacity of the lifting equipment and tackle exceeds the weight of the equipment being lifted.

1. Use a forklift truck or suitable jacks to raise the color module several feet off the floor. Install safe, solid, support blocks under the module, then lower the module onto the blocks.
2. See Figure 6-4. Unscrew the clamping-channel screws (6) about 6–10 mm (0.25–0.375 in.) to clear the fluidizing plate gaskets (2). Support the fluidizing plenums (4) and remove the clamping channels (5).
3. Remove the fluidizing plenums from under the color module.
4. Separate the old fluidizing plates (1), gaskets (2), and diffuser plates (3). Discard the old fluidizing plates.
5. Clean the plenums, diffuser plates, and hopper flanges.
6. Assemble the fluidizing plenums, diffuser plates, gaskets, and fluidizing plates as shown in Figure 6-4. Install the diffuser plates between the gaskets and the fluidizing plates.
7. Hold the plenum assemblies in position against the color module hoppers. Install the clamping channels over the fluidizing plenums and hopper flanges. Align the plenum and hopper flanges on all four sides.
8. Tighten the clamping-channel screws with a torque wrench to 2.8 N•m (25 in.-lb) in a criss-cross pattern. This will prevent flange distortion and fluidizing plate damage.
9. Lower the color module to the floor and install the cartridge filters, transfer pumps, and baffle. Roll the color module into position under the fan section. Connect the hoses, quick disconnects, tubing, power cords, and level sensor.

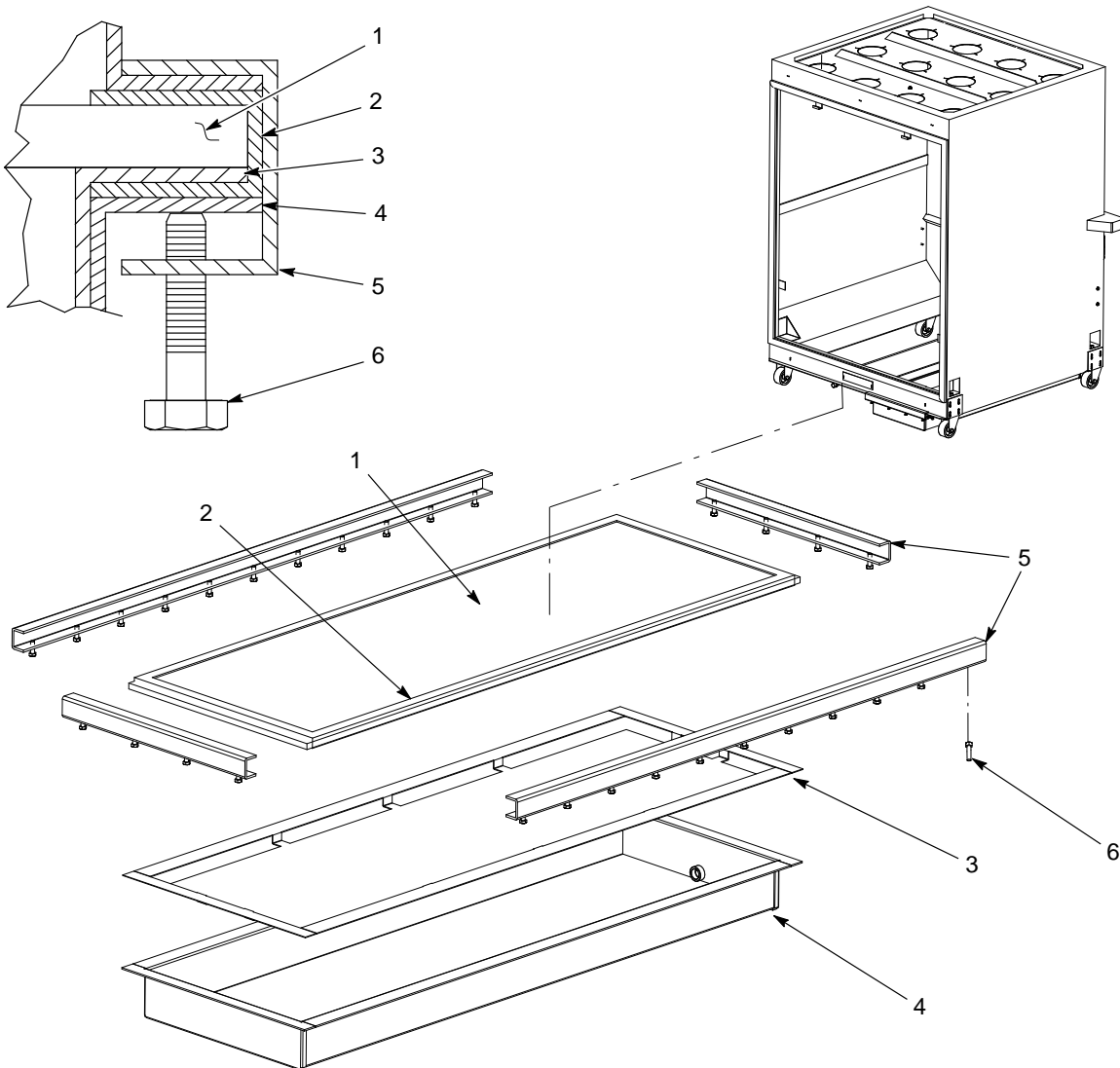


Figure 6-4 Typical Color Module Fluidizing Plate Replacement

- | | | |
|-----------------------------|-----------------------|----------------------------|
| 1. Fluidizing plates | 3. Diffuser plates | 5. Clamping channels |
| 2. Fluidizing plate gaskets | 4. Fluidizing plenums | 6. Clamping-channel screws |

Feed Hopper Fluidizing Plate Replacement

Follow these instructions to replace the feed hopper fluidizing plate.

Preparation

1. Pump as much powder as you can from the feed hopper. Disconnect the powder feed hoses, transfer hoses, accumulator vent hose, and 10-tube quick-disconnects from the feed hopper, powder pumps, and accumulator.
2. Rotate the level sensor and pull it from its mounting in the side of the feed hopper.
3. Unplug the sieve power cords (electrically driven sieves only). Disconnect the feed-hopper ground wire.
4. Remove the feed hopper from the color module and roll it to a clean work area.
5. Remove the powder from the hopper and thoroughly clean the hopper, accumulator, and sieve.

Replacement

1. See Figure 6-5. Block up the plenum (5) so the plenum and feed hopper flanges will not bend when you start removing the clamping channels (3).
2. Loosen screws (4) about 6–10 mm (0.25–0.375 in.) to clear the gasket (2). Remove the clamping channels.
3. Remove the plenum and the fluidizing plate (1) from under the feed hopper.
4. Clean the plenum interior and the plenum and feed hopper flanges.
5. Position the new fluidizing plate and gasket on the plenum.
6. Slide the plenum and fluidizing plate under the hopper. Align the edges of the feed hopper flange, gasket, and plenum flange evenly on all sides. Block the plenum to hold it in position.
7. Install the clamping channels over the plenum and hopper flanges. Tighten the clamping-channel screws with a torque wrench to 2.8 N•m (25 in.-lb) in a criss-cross pattern. This prevents flange distortion and fluidizing plate damage.
8. Attach the feed hopper to the color module. Connect the hoses, quick-disconnects, power cords, and ground wires. Install the level sensor in its mounting.

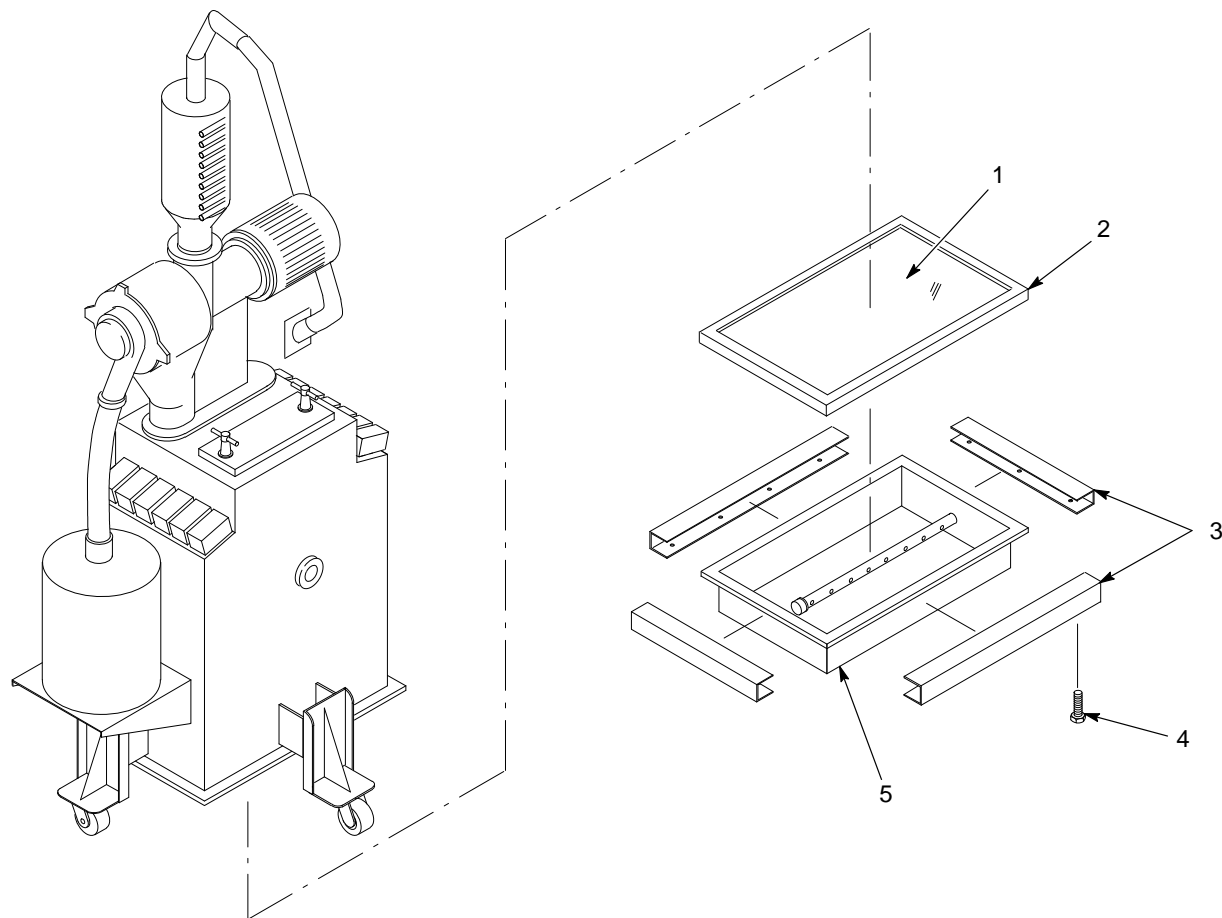


Figure 6-5 Feed Hopper Fluidizing Plate Replacement

- | | | |
|---------------------|----------------------|-----------|
| 1. Fluidizing plate | 3. Clamping channels | 5. Plenum |
| 2. Gasket | 4. Screws | |

Vibratory Sieve Repair

1. Open the feed hopper lid. Reach inside the hopper and disconnect the sieve ground wire.
2. Remove the bolts and washers from the hopper cover.
3. Lift the cover (with the accumulator and sieve attached) off the hopper. Block up the cover to prevent damage to the screen assembly on the underside.
4. Unfasten the two toggle clamps and remove the screen basket. Discard any scrap powder and vacuum out the basket. Replace the basket if it is damaged. If no further disassembly of the sieve is necessary, reattach the basket and disregard steps 5 through 7.
5. To remove the air motor, disconnect the two air lines. Remove the bolt and spacer.

NOTE: When you perform step 6, note the position of the screws, washers, nuts, rubber grommets or washers, and gaskets.

6. Remove the accumulator from the sieve, and disassemble the rest of the sieve.
7. Clean powder residue from the accumulator and sieve parts.
8. Assemble the sieve and install it on the hopper. Cap unused accumulator inlet tubes.

Pulse Valve Replacement

To avoid connecting the valves to the wrong solenoids, remove and replace one valve at a time. Incorrect connections will cause the valves to open in the wrong order.

See Figures 6-7 and 6-8 for pulse valve and solenoid connections. Timer board terminal 1 is wired to solenoid 1. Solenoid 1 is connected by air tubing to pulse valve 1. The rest of the solenoids and valves are connected in the same way.



WARNING: Before performing the following procedure, shut off the system compressed-air supply and relieve the system air pressure. Shut off electrical power at a disconnect switch ahead of the system electrical panel. Lock and tag the disconnect switch.

1. Remove the color module from under the fan section as described in the *Reclaim-to-Reclaim Color Change* procedure in the *Operation* section.
2. See Figure 6-6. Disconnect the pilot air tubing from the pulse valve tube fitting (1).
3. Unscrew the pulse valve (2) from the coupling (4).
4. Remove the tube fitting and nozzle (3) from the old valve. Wrap PTFE tape around the threads of the tube fitting and nozzle. Install the fitting and nozzle into the new valve.
5. Wrap PTFE tape around the threads of the coupling. Screw the new valve onto the coupling. Position the valve so the final adjustment will tighten the threads and form an air-tight seal.
6. Adjust the valve so the nozzle is vertically plumb and 381 mm (15 in.) from the center of the nozzle to the center of the next valve nozzle.
7. Connect the pilot air tubing to the valve.

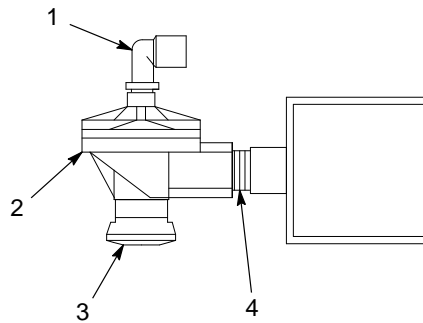


Figure 6-6 Pulse Valve Replacement

- | | |
|-----------------|-------------|
| 1. Tube fitting | 3. Nozzle |
| 2. Pulse valve | 4. Coupling |

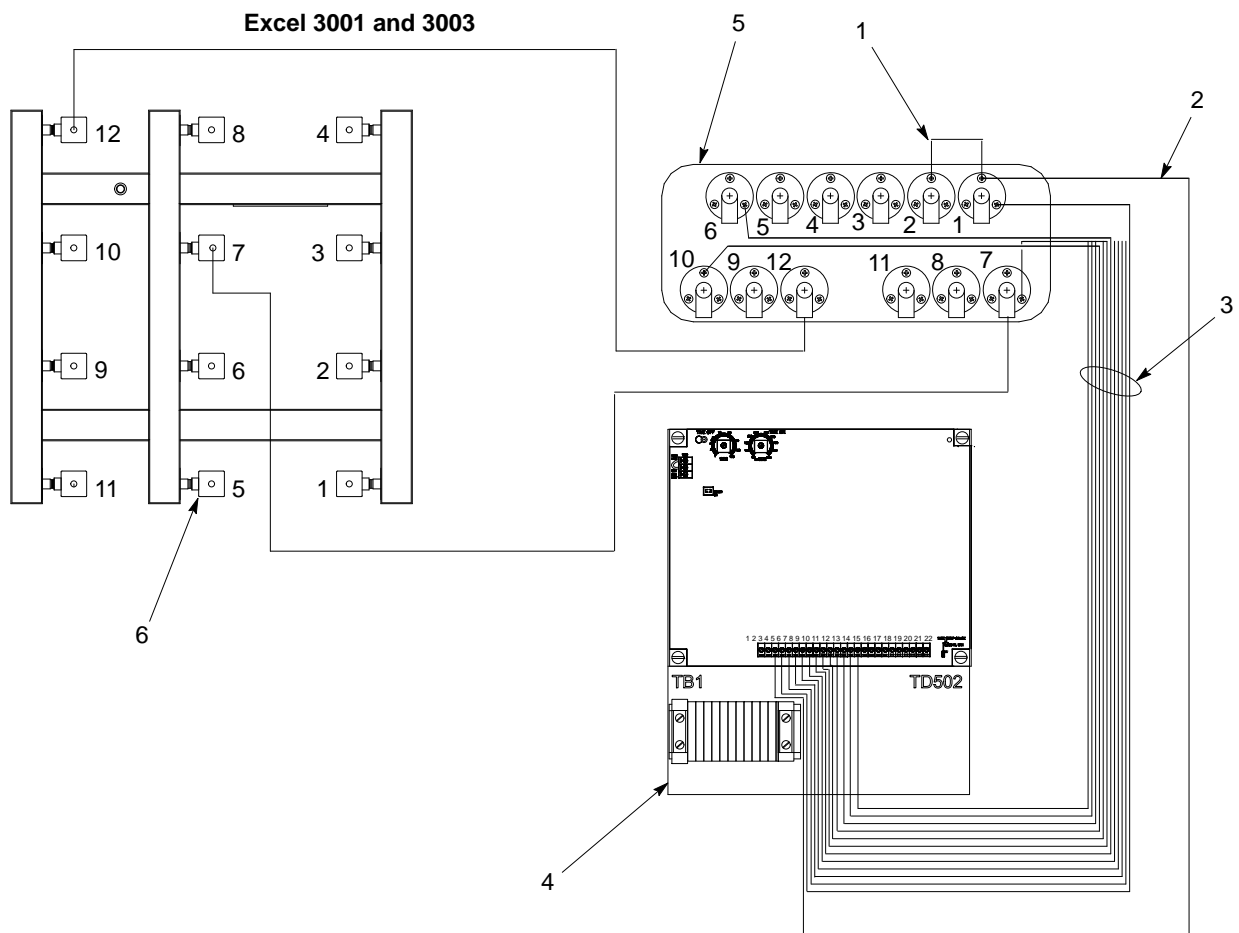


Figure 6-7 Excel 3001 Pulse Valve Air Lines and Wiring

- | | | |
|---|---------------------------------|------------------------|
| 1. 14-gauge white jumper to all solenoids | 3. 14-gauge red wire (positive) | 5. Solenoid enclosures |
| 2. 14-gauge white wire (common) | 4. Timer board | 6. Pulse valves |

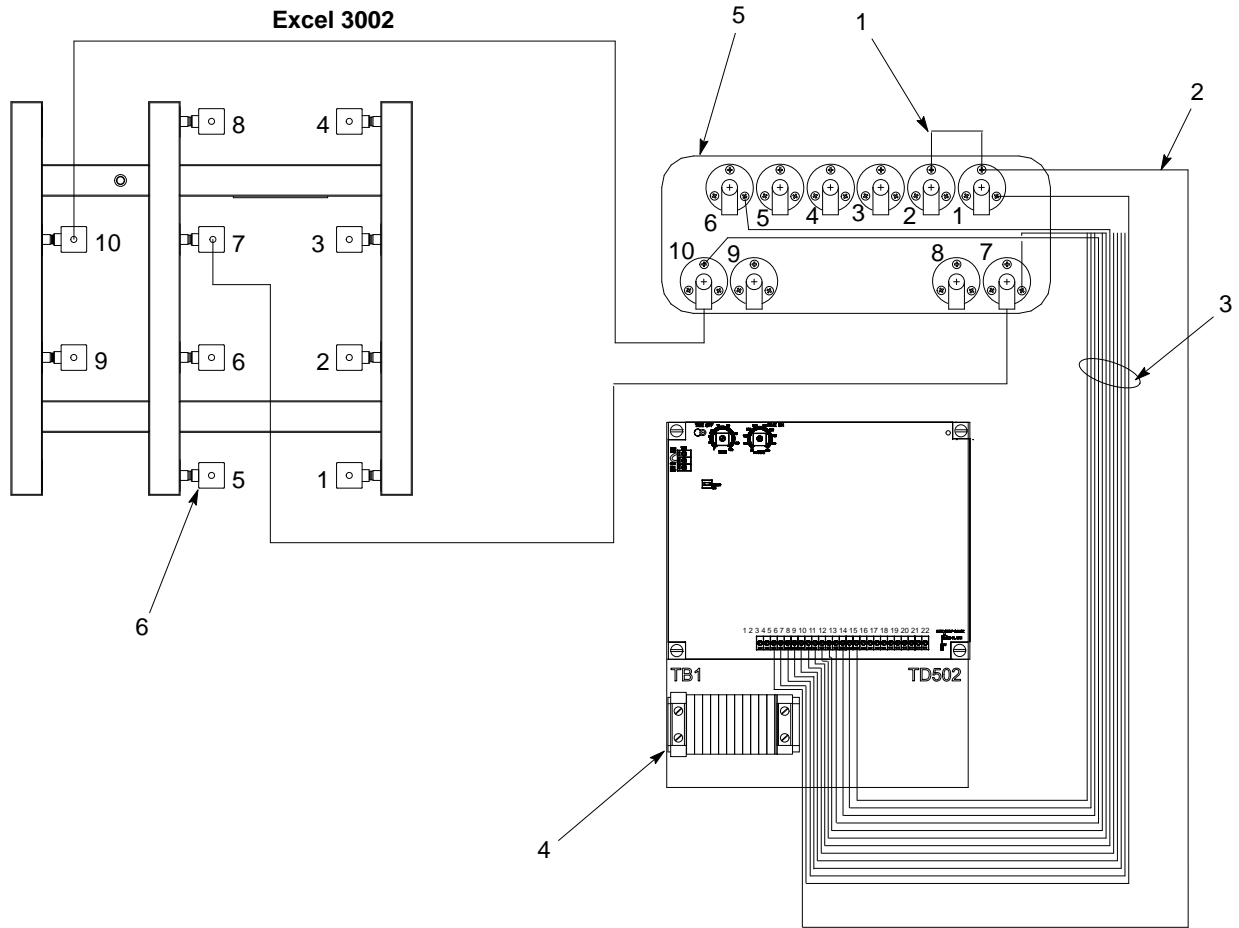


Figure 6-8 Excel 3002 Pulse Valve Air Lines and Wiring

- | | | |
|---|---------------------------------|------------------------|
| 1. 14-gauge white jumper to all solenoids | 3. 14-gauge red wire (positive) | 5. Solenoid enclosures |
| 2. 14-gauge white wire (common) | 4. Timer board | 6. Pulse valves |

V-Belt Replacement



WARNING: Before performing the following procedures, shut off electrical power at a disconnect switch ahead of the system electrical panel. Lock and tag the disconnect switch.

1. Remove the cover plates from the top of the fan section. If you have a 3002 or 3003 system, remove the top-left final filter for better access to the motor mount.
2. See Figure 6-9. Unscrew the tensioning bolts (4) on the side of the motor mount (1). This will allow you to slide the motor and mount toward the fan and loosen the V-belts (3).

3. Rotate the motor or fan by hand and roll the V-belts off the sheaves (2).
4. Roll the new belts onto the sheaves, making sure the V-sections are seated in the grooves. Use only properly sized, matched belts.
5. Tighten the belts by screwing the tensioning bolts into the motor mount. This will slide the motor and mount away from the fan.
6. Check the belt tension by pressing on the belts midway between the sheaves. You should not be able to deflect the belts more than 13–19 mm (0.5–0.75 in.) (one belt diameter).

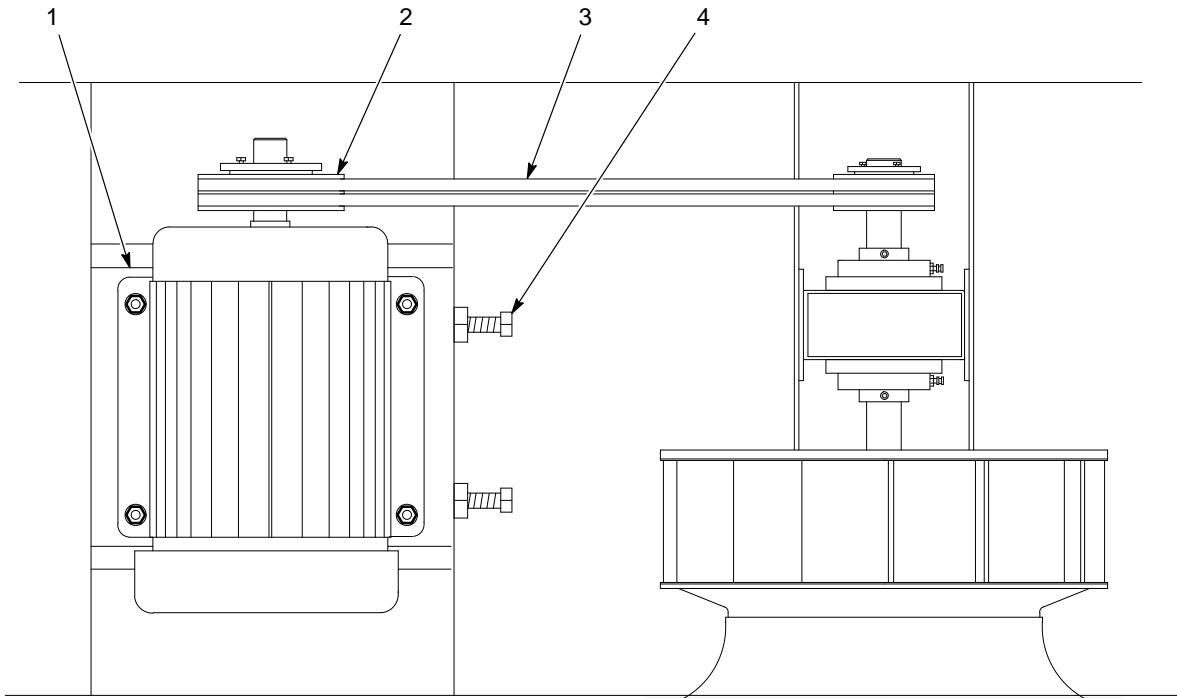


Figure 6-9 V-Belt Replacement

1. Motor mount
2. Sheave

3. V-belts

4. Tensioning bolts

Motor and Motor Sheave Replacement



WARNING: Before performing the following procedures, shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.



WARNING: Heavy equipment. Use approved, inspected lifting equipment and tackle. Make sure the capacity of the lifting equipment and tackle exceeds the weight of the equipment being lifted.

Motor Replacement

NOTE: You do not have to remove the motor from the fan section to replace the motor sheave. Refer to the *Motor Sheave Replacement* procedure.

Motor Removal

1. Remove the motor access plate.
2. See Figure 6-10. Remove the cover from the motor junction box (3). Tag and disconnect the wiring from the motor leads. Disconnect the SO cord (4) from the junction box.
3. Remove the V-belts, as described in the *V-Belt Replacement* procedure, from the motor sheave (1).
4. Secure a heavy-duty sling or chains around the motor (2). Attach the sling or chains to a chain hoist or to the forks of a lift truck. Take up the slack in the sling or chains.
5. Remove the nuts (5), lock washers (6), and flat washers (7) securing the motor to the motor mount (8).
6. Lift the motor and guide it out of the compartment. Move the motor to a clean work area.
7. Remove the motor sheave as described in the *Motor Sheave Replacement* procedure.

Motor Installation

1. Install the new motor on the motor mount with the nuts, lock washers, and flat washers.
2. Install the motor sheave as described in the *Motor Sheave Replacement* procedure.
3. Install the V-belts on the sheave and adjust the belt tension as described in the *V-Belt Replacement* procedure.
4. Remove the cover from the motor junction box. Connect the SO cord to the motor junction box and the wiring to the motor leads. Install the cover.
5. Turn on the system electrical power and start the exhaust fan. Make sure the fan rotates in the direction shown by the yellow arrow next to the fan opening on the underside of the fan section. Refer to *Reversing Motor Direction* in the *Troubleshooting* section.
6. Install the motor access plate.

Motor Replacement (contd)

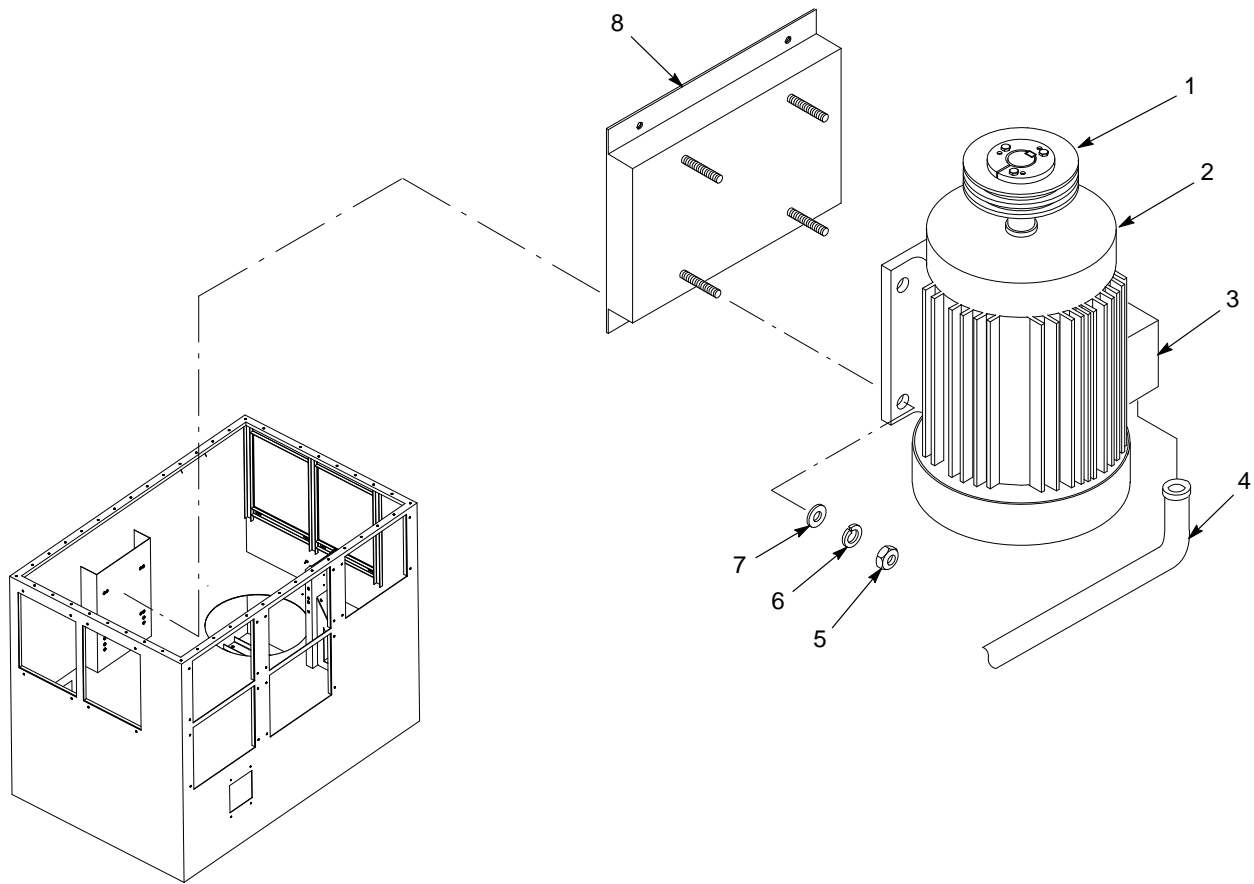


Figure 6-10 Fan Motor Replacement

- | | | |
|-----------------------|-----------------|-----------------|
| 1. Motor sheave | 4. SO cord | 7. Flat washers |
| 2. Motor | 5. Nuts | 8. Motor mount |
| 3. Motor junction box | 6. Lock washers | |

Motor Sheave Replacement

Motor Sheave Removal

1. Remove the motor access plate.
2. Remove the V-belts from the motor sheave as described in the *V-Belt Replacement* procedure.

NOTE: The cap screws shipped with the bushing are hardened. Do not use softer-grade screws to break the bushing loose from the sheave. The ends of the screws will be flattened, and you will be unable to remove them from the bushing.

3. See Figure 6-11. Unscrew the three cap screws (1) and remove them from the unthreaded holes in the bushing (2). Thread the screws through the threaded holes in the bushing until they bottom out on the sheave (3) hub.
4. Tighten the screws evenly, a quarter turn at a time, until the bushing breaks loose from the sheave.

NOTE: Do not lubricate the sheave, bushing, or motor shaft.

5. Pull the sheave and bushing off the motor shaft. Remove the screws from the bushing. Inspect the sheave, bushing, and key (4), and replace them if they are damaged. Clean the parts that will be reused.

Motor Sheave Installation

1. Install the sheave and bushing on the motor shaft (5). Line up the unthreaded holes in the bushing with the threaded holes in the sheave, and the keyway in the bushing with the keyway in the shaft.
2. Install the three cap screws through the unthreaded holes in the bushing and thread them into the sheave.
3. Install the key into the keyway.
4. Place a level across the top of the fan and motor sheaves. Slide the motor sheave and bushing up the shaft until both sheaves are level with each other. If they are not level, the belts will wear prematurely.

NOTE: Do not overtighten the cap screws. You could crack the sheave hub, or break off the screws. If the sheave pulls up against the bushing flange, the shaft diameter is too small.

5. Tighten the cap screws evenly, a quarter turn at a time, to the specifications in Table 6-1. This will pull the sheave and bushing together. Maintain a gap of 3–6 mm (0.125–0.25 in.) between the bushing flange and the sheave.

Table 6-1 Motor Busing Cap Screw and Pull Specifications

Screw Size	Torque, N•m (ft-lb)	Open-end or Socket Wrench Pull, kg (lb)
1/4-20	12.2 (9)	12.2 (27)

6. Use the level to make sure the motor and fan sheaves are level with each other. If they are not, separate the bushing and sheave and repeat the installation steps.

Motor Sheave Replacement (contd)

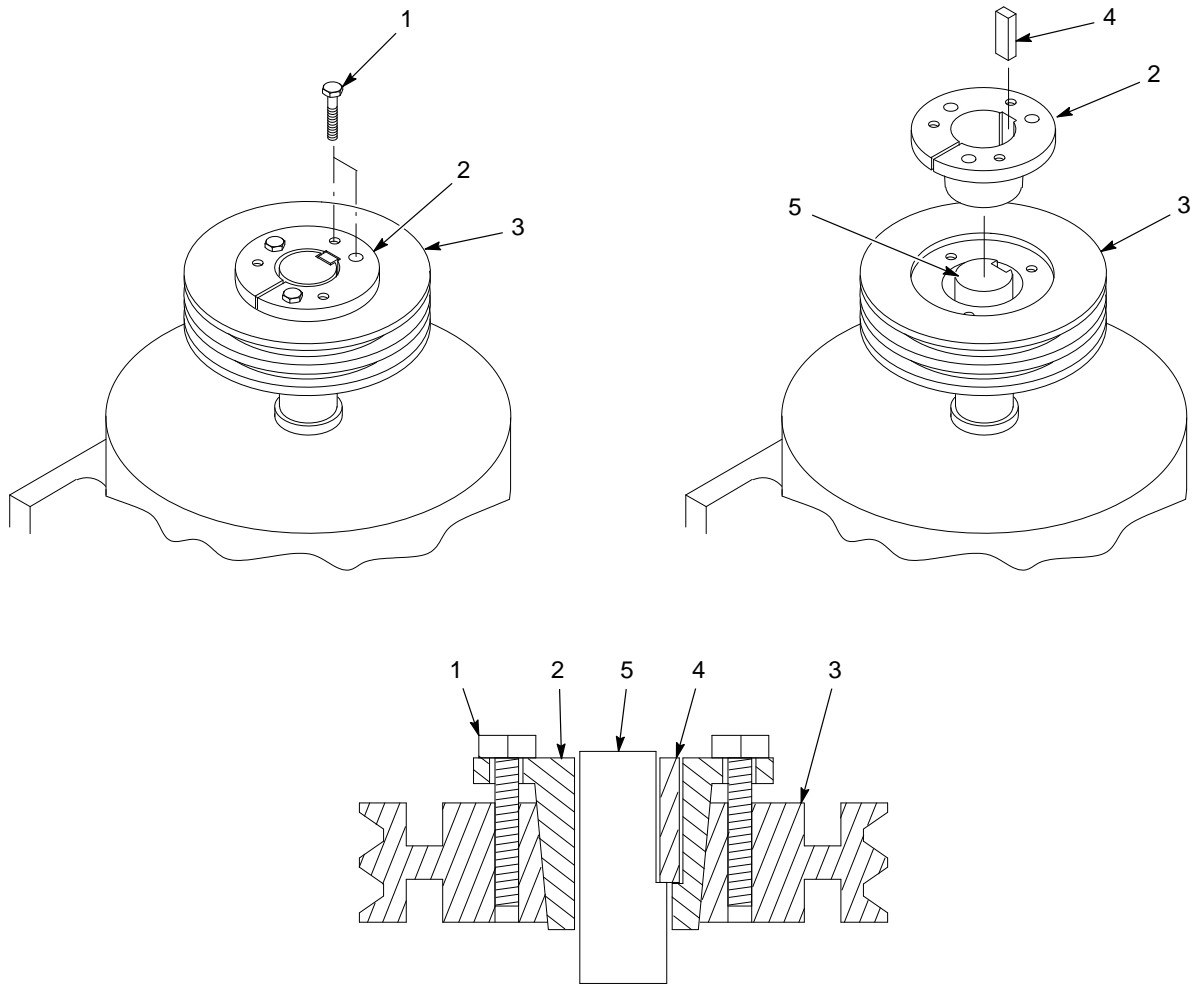


Figure 6-11 Motor Sheave Replacement

- | | | |
|-------------------|-----------|----------------|
| 1. Cap screws (3) | 3. Sheave | 5. Motor shaft |
| 2. Bushing | 4. Key | |

Fan Replacement



WARNING: Before performing the following procedures, shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.

Fan Removal

1. Remove the color module from under the fan section as described in the *Operation* section.
2. See Figure 6-14. Remove the bolts (21), retainers (20), and the inlet cone (19) from the fan section.
3. Loosen the key and shaft set screws in the hub of the fan (16).
4. Block up the fan. Remove the screw (18) and flat washer (17) from the bottom of the shaft (11).
5. Remove the blocks, fan, and key (10) from the fan section.

Fan Installation

1. Install the new fan on the shaft, line up the keyways, and install the key. Slide blocks between the fan and the floor of the fan section to hold the fan up.
2. Tighten the key set screw in the fan hub to hold the fan in place. Torque the set screw to 8.5 N•m (75.6 in.-lb).
3. Install the retainer washer and screw it onto the end of the shaft. Remove the blocks.
4. Install the inlet cone in the fan section with the retainers, washers, and screws. Do not tighten the screws.

NOTE: You will tighten the screws during the *Fan Adjustment* procedure.

Fan Adjustment

1. Refer to Figure 6-12 and Table 6-3. Adjust the height of the fan on the shaft. The bottom of the fan should sit inside the cone (overlap) 3–6 mm (0.125–0.25 in.). Tighten the shaft set screw in the fan hub.
2. Adjust the inlet cone so the gap between the fan and the cone is the same all the way around. Use your finger to check the gap.
3. Tighten the screws securing the inlet cone to the fan section and recheck the gap. Rotate the fan and make sure it does not rub against the cone.
4. Start the exhaust fan and make sure the fan does not rub against the inlet cone.

Fan Sheave Replacement



WARNING: Before performing the following procedures, shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.

Fan Sheave Removal

1. Remove the V-belts, as described in *V-Belt Replacement*, from the fan sheave.

NOTE: The cap screws shipped with the bushing are hardened. Do not use softer-grade screws to break the bushing loose from the sheave. The ends of the screws will be flattened, and you will be unable to remove them from the bushing.

2. See Figure 6-14. Unscrew the three cap screws (1) and remove them from the unthreaded holes in the bushing (3). Thread the screws through the threaded holes in the bushing until they bottom out on the sheave (4) hub.
3. Tighten the screws evenly, a quarter turn at a time, until the bushing breaks loose from the sheave.
4. Pull the sheave, bushing, and key (2) off the fan shaft. Remove the screws from the bushing.

NOTE: Do not lubricate the sheave, bushing, or fan shaft.

5. Inspect the sheave, bushing, and key. Replace them if they are damaged. Clean the parts that will be reused.

Fan Sheave Installation

1. Install the sheave and bushing on the fan shaft. Line up the unthreaded holes in the bushing with the threaded holes in the sheave, and the keyway in the bushing with the keyway in the shaft.
2. Install the three cap screws through the unthreaded holes in the bushing and thread them into the sheave. Do not tighten the screws.
3. Install the key into the keyway.
4. Place a level across the top of the fan and motor sheaves. Slide the fan sheave and bushing up the shaft until both sheaves are level with each other. If they are not level, the belts will wear prematurely.

NOTE: Do not overtighten the screws. You could crack the sheave hub, or break off the screws. If the sheave pulls up against the bushing flange, the shaft diameter is too small.

5. Tighten the cap screws evenly, a quarter turn at a time, to force the tapered bushing into the sheave. Tighten the screws as specified in Table 6-2. Maintain a gap of 3–6 mm (0.125–0.25 in.) between the bushing flange and the sheave. See Figure 6-12 and Table 6-3.

Fan Sheave Installation (contd)

Table 6-2 Fan Bushing Cap Screws Torque and Pull Specifications

Screw Size	Torque, N•m (ft-lb)	Open-End or Socket Wrench Pull, kg (lb)
1/4-20	12 (9)	12 (27)
5/16-18	20 (15)	14 (30)

- Use the level to make sure the motor and fan sheaves are level with each other. If they are not, separate the bushing and sheave and repeat the installation steps.
- Install the V-belts on the sheave and adjust the belt tension as described in the *V-Belt Replacement* procedure.

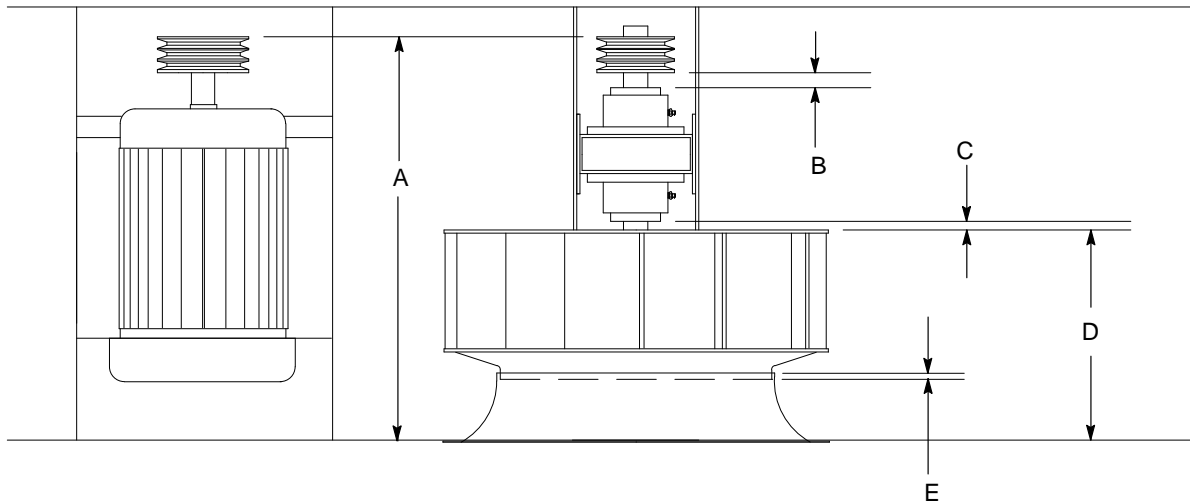


Figure 6-12 Fan and Motor Mounting Dimensions (Refer to Table 6-3)

Table 6-3 Fan and Motor Mounting Dimensions

Measurement	Dimensions
A	720 mm (28.34 in.)
B	13 mm (0.50 in.)
C (See Note)	60 mm (2.38 in.)
D (See Note)	353 ± 5 mm (13.91 ± 0.20 in.)
E (overlap)	3-6 mm (0.125-0.25 in.)

NOTE: Dimensions “C” and “D” are reference dimensions for positioning the fan wheel. The final fan wheel position should be determined using the overlap dimension “E”.

Fan Shaft and Bearing Replacement



WARNING: Before performing the following procedures, shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.

The bearings use a split adapter sleeve and lock nut to hold the inner bearing race to the fan shaft.

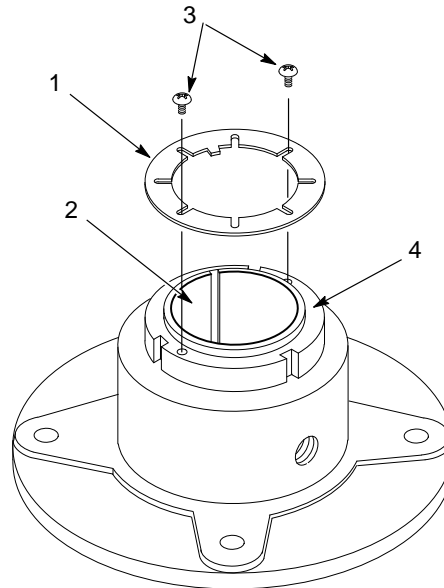


Figure 6-13 Fan Shaft Bearing

- | | |
|-----------------|-------------|
| 1. Lock plate | 3. Screws |
| 2. Adapter slot | 4. Lock nut |

Fan Shaft and Bearing Removal

1. Remove the inlet cone and fan as described in the *Fan Replacement* procedure.
2. See Figure 6-13. Remove the lock plate (1) then loosen the locknut (4) to loosen the inner bearing races.
3. See Figure 6-14. Pull the fan shaft (11) out of the bearings (8, 12).
4. If you are replacing the shaft, remove the fan sheave (4), bushing (3), and key (2) from the shaft as described in the *Fan Sheave Replacement* procedure.
5. If you are replacing the bearings, disconnect the tubing from the tube fittings (15). Remove the screws (14), washers (6, 13), and nuts (5) securing the bearings to the support (9).

NOTE: Replace the bearings with the ones listed in the *Parts* section only. Do not use unapproved bearings.

6. Remove the tube fittings from the old bearings and install them in the new bearings in place of the grease fittings.

Fan Shaft and Bearing Installation

1. New bearings are shipped configured as non-expansion bearings. The lower bearing must be configured as an expansion bearing before it is installed, using the following procedure:
 - a. On the bottom of the bearing block, opposite the collar, remove the snap ring from the inside groove.
 - b. Re-install the snap ring in the outside groove.
2. See Figure 6-14. Install the new bearings on the supports with the screws (14), washers (6, 13), and nuts (5). Do not tighten the screws. Connect the tubing to the tube fittings (15).
3. Apply a coating of light oil to the shaft (11) where the bearings will be mounted.
4. Place the lock plate (Figure 6-13, item1) on each bearing, but do not install the screws yet.
5. Install the shaft through the bearings. If you have trouble getting the shaft through the bearings, loosen the lock nuts.
6. Level the shaft and square it with the support.
7. If removed, install the fan sheave, bushing, and key on the shaft. Tighten the bushing cap screws enough to hold the sheave on the shaft. Refer to the *Sheave Replacement* procedure.
8. Adjust the fan shaft and bearings. Use the *Bearing and Fan Shaft Adjustment* section on Page 6-24 for the appropriate procedure.

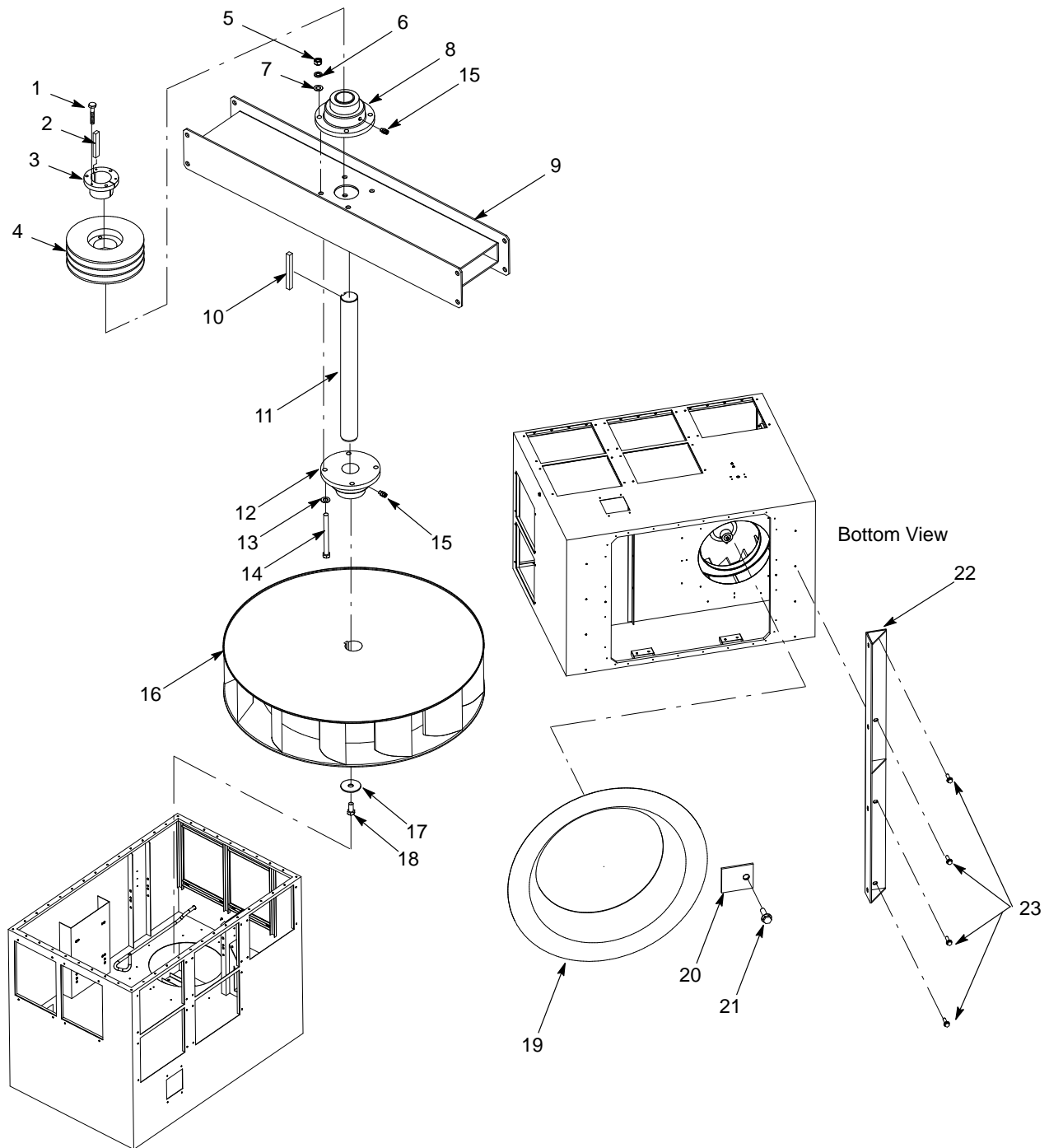


Figure 6-14 Fan, Sheave, Shaft, and Bearing Replacement

- | | | |
|------------------------------|---------------------------|-------------------|
| 1. Cap screws (3) | 9. Support | 17. Flat washer |
| 2. Key | 10. Key | 18. Screw |
| 3. Bushing | 11. Shaft | 19. Inlet cone |
| 4. Sheave | 12. Lower (fixed) bearing | 20. Retainers (8) |
| 5. Nuts (4) | 13. Flat washers (4) | 21. Bolts (8) |
| 6. Lock washers (4) | 14. Screws (4) | 22. Bracket |
| 7. Flat washers (4) | 15. Tube fitting | 23. Screws (8) |
| 8. Upper (expansion) bearing | 16. Fan | |

Bearing and Fan Shaft Adjustment:

1. Place a level across the motor and fan sheaves. Adjust the fan shaft up or down until the sheaves are level. This is a rough adjustment and will have to be repeated later.
2. See Figure 6-14. Install the fan (16) and key (10) on the shaft (11). Tighten the key set screw in the fan hub to hold the fan in place. Install the flat washer (17) and screw (18) on the end of the shaft.
3. Block up the fan to remove all weight from the bearings.
4. Adjust the upper, expansion bearing (8):
 - a. See Figure 6-13. Turn the lock nut (4) by hand as tightly as possible. Wear gloves while tightening the lock nut.
 - b. Scribe a line on the lock nut at the adapter slot (2). The line and adapter slot will serve as reference points as you tighten the lock nut.
 - c. Using a spanner wrench or a drift and hammer, tighten the lock nut $7/8n$ to one complete turn.
 - d. Install the lock plate (1) on the bearing and secure it with the screws (3).

NOTE: If the holes on the lock nut do not line up with the holes in the lock plate, tighten the lock nut until the holes line up.

NOTE: When you install the expansion bearing, make sure that its inner bearing race is pushed as far as possible toward the fixed bearing (12).

5. Push the bearing insert of the lower, fixed bearing (12) as far as possible toward the upper bearing (8), then perform steps 4a–4d.
6. Tighten the upper and lower bearing flange mounting bolts to 67.8 N•m (600 in.-lb).
7. Rotate the shaft by hand. You should not feel any binding or excessive drag.
8. Install the inlet cone (19) and adjust the fan overlap as described in the *Fan Replacement* procedures.
9. Tighten the fan sheave bushing screws (1) to the torque values in the *Sheave Replacement* procedure. Make sure the sheaves are parallel.
10. Install the V-belts on the sheaves and adjust the belt tension as described in *V-Belt Replacement*.
11. Turn on the system electrical power and start the exhaust fan. Make sure the fan is not rubbing against the inlet cone. If you hear a rumbling noise coming from the bearings, stop the fan, lock out power to the system, and check the fan shaft alignment.

Section 7

Parts

Introduction

To order parts, call the Nordson Industrial Coatings Customer Support Center at (800) 433-9319, or contact your local Nordson representative. Use the parts illustrations and part lists to identify and order parts.

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.

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

Final Filters and Miscellaneous Parts

See Figure 7-1. The following parts are used on all Excel 3000 booths. Differences between the versions are stated in the Note column.

Item	Part	Description	Quantity	Note
1	-----	BOLT, hex, 1/4-20 UNC, zinc	16	
2	-----	PLATE, damper control cover	1	
3	-----	GASKET, neoprene, 1 x 1/4 in. thick	AR	
4	971801	GREASE FITTING, straight, 1/8 in.	2	
5	176308	SLIDE GATE	1	
6	-----	BRACKET, slide gate	1	
7	176355	SCREW, thumb, 1 x 1/4 in.-20 UNC	4	
8	176366	CLAMP, final filter, 18.5 x 2.75 in.	AR	A
9	176367	KNOB, final filter	AR	A
10	156995	FILTER, final, 20.0 x 24.0 x 12.0	AR	A
11	-----	SCREW, hex, 3/8-16 x 3.0, cap, zinc	AR	A
12	-----	PANEL, roof, fan housing	1	
12a	-----	ADHESIVE, spray, high tack	AR	
12b	174715	SHEET, sound deadening	AR	
13	-----	PANEL, motor access	1	
14	-----	BOLT, hex, serrated 1 x 5/16 in.-18 UNC 2A, zinc, plated	AR	
15	805998	LOCKNUT, 1 in. conduit	1	B
16	272122	SEAL, conduit fitting, 1 in.	1	B
17	-----	CONNECTOR, cord, 0.750-0.875	1	B, D
18	971778	UNION, bulkhead, 6mm tube x 6mm tube	4	B
19	-----	BOLT, hex, serrated, 1 x 1/2 in.-13 UNC 2A, zinc, plated	AR	C
19a	-----	NUT, hex, serrated, 1 x 1/2 in.-13 UNC 2B, zinc, plated		C
20	972583	ELBOW, male, 37, 1-1/16-12 x 3/4, steel	1	C
21	971801	GREASE FITTING, straight, 1/8 in.	2	
22	-----	PLATE, filter cover	AR	A
23	1028319	MACHSCREW, hexwshhd, 3/8.16 x 1.25, zinc, serrated	8	A

NOTE A: Excel 3001 - 5 filter assemblies required for mounting on only one side of the booth.
Excel 3002 - 7 filter assemblies required for mounting on 2 sides of the booth.
Excel 3003 - 9 filter assemblies required for mounting on 3 sides of the booth.
Use filter plate covers where filter assemblies are not used.

B: Assemblies shown with the right side system controls. If system controls are on the left side, assemblies will then be installed on the left side.

C: Assemblies shown with a left side air drop. If the air drop is on the right side, assembly will be on the left side.

D: Cord grip 0.500-0.625 also available with system.

AR: As Required

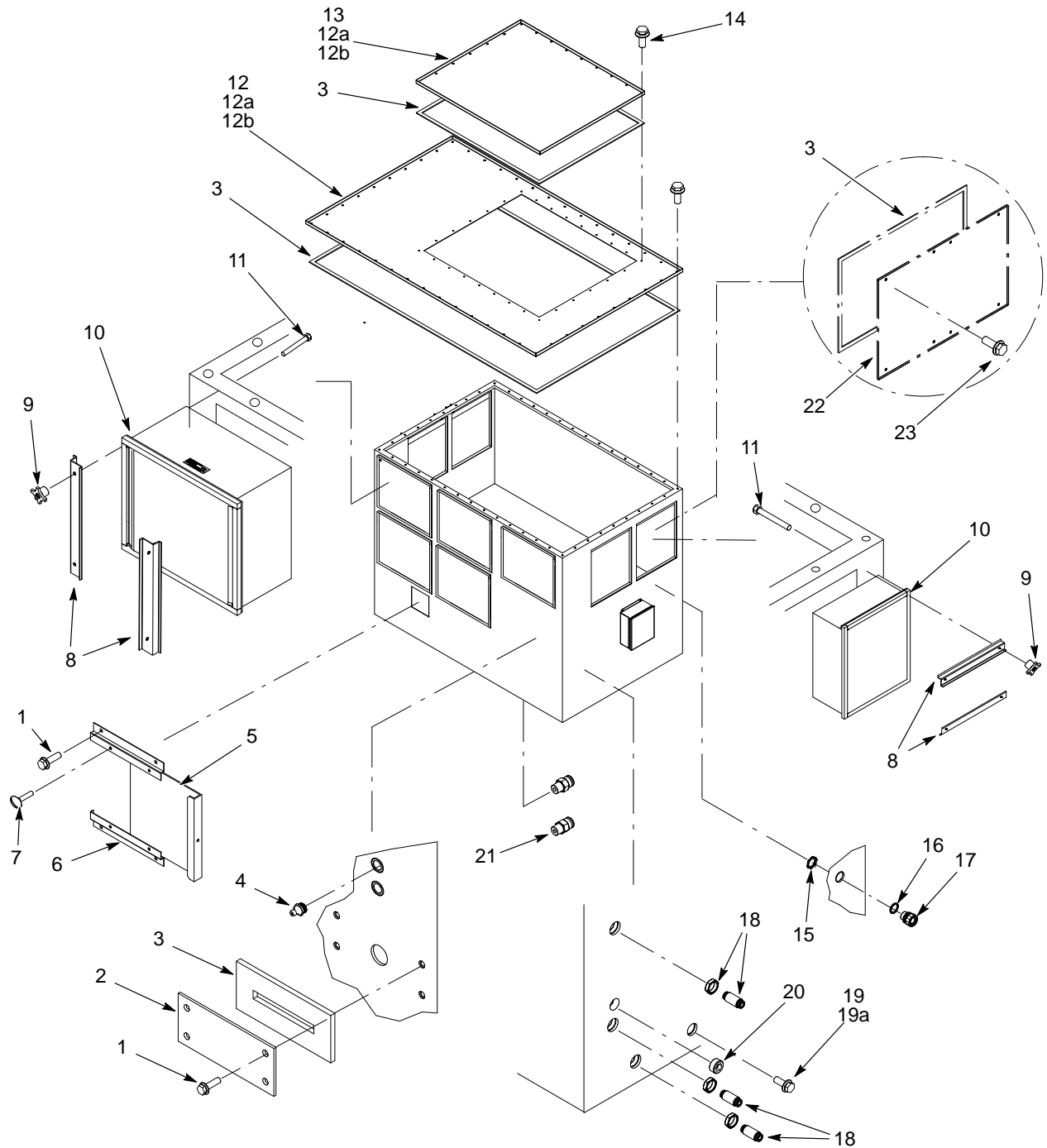


Figure 7-1 Final Filters and Miscellaneous Parts (3003 Fan Section Shown)

Pulse Valve and Solenoids

See Figure 7-2.

Item	Part	Description	Quantity	Note
1	973103	NIPPLE, steel, schedule 40, $\frac{3}{4}$ in. x 1.37 in.	5	
2	-----	WASHER, sealing, conduit, $\frac{3}{4}$ in.	9	
3	-----	ELBOW, 90°, elbow pull, $\frac{3}{4}$ in.	3	
4	183912	CONNECTOR, straight, $\frac{3}{4}$ in., conduit	2	
5	-----	CONDUIT, metal flex, $\frac{3}{4}$ in.	8	
6	-----	CONDUIT, rigid coupler, $\frac{3}{4}$ in.	AR	
7	1099857	KIT, timer board, 6 output	1	A
7	1099856	KIT, timer board, 10 output	1	A
7	1099855	KIT, timer board, 22 output	1	A
8	176299	ENCLOSURE, pilot valve	1	
9	-----	NUT, serrated flange, hex, $\frac{5}{16}$ -18 in. UNC-2B, zinc plated	2	
10	972126	CONNECTOR, male, elbow, 6mm T x $\frac{1}{8}$ UNI	AR	
11	-----	NUT, serrated flange, hex head, $\frac{5}{16}$ -18 in. UNC-2A x 1.00, zinc plated	2	
12	973102	NIPPLE, steel, schedule 40, 1. x 1.50 in.	AR	
13	174710	VALVE, pulse, 1-in. NPT ID x 1-in. NPT OD	AR	B
14	165726	NOZZLE, cartridge pulse	AR	
15	972583	ELBOW, male, 37, 1- $\frac{1}{16}$ -12 x. $\frac{3}{4}$ -in., steel	2	
16	-----	MANIFOLD, pulse	1	
17	-----	CONNECTOR, female, 37, swivel, $\frac{3}{4}$ in., hose barb	2	
18	-----	HOSE, air, push-on, $\frac{3}{4}$ -in. ID	2	
19	176301	CONTROL, air volume, assembly	1	
20	-----	NIPPLE, steel, schedule 40, $\frac{3}{4}$ in. x 6.0 in., plain	1	
21	973632	UNION, pipe, class 150, $\frac{3}{4}$ in. galvanized	1	
22	-----	NIPPLE, steel, schedule 40, $\frac{3}{4}$ in. x 4.0 in., plain	1	
23	-----	PLUG, pipe, $\frac{3}{4}$ in NPT	AR	
24	-----	CONNECTOR, male, 37 flare x NPT, $\frac{3}{4}$ in tube, $\frac{3}{4}$ in NPT, steel, zinc plated	AR	
25	973265	TEE, pipe, hyd, $\frac{3}{4}$ in., steel, zinc	1	

NOTE A: Order correct kit for your system.
 B: 3001 and 3003 systems use 12 valves, 3002 uses 10 valves.
 AR: As Required

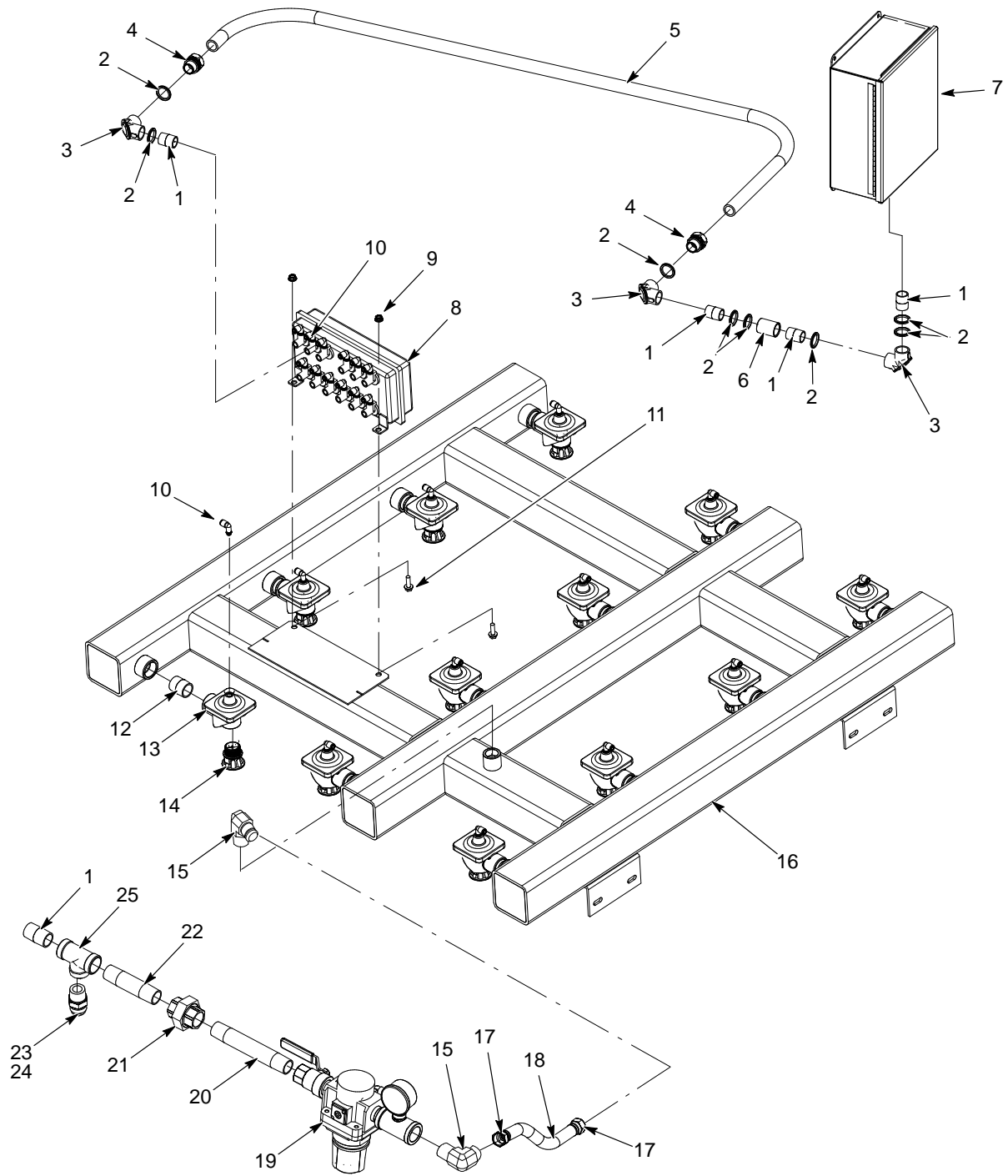


Figure 7-2 Pulse Valve and Solenoids

Pneumatic Seal

See Figure 7-3. The following parts are used on all Excel 3000 booths.

Item	Part	Description	Quantity	Note
1	1090567	SEAL, inflatable, fan section	1	
2	1090570	RETAINER, inflatable seal, fan section	1	

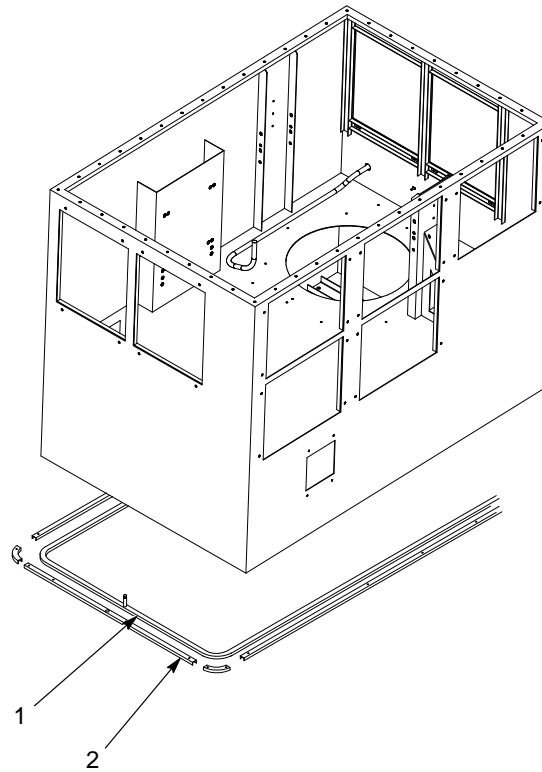


Figure 7-3 Pneumatic Seal

Color Module Fluidizing Plates

See Figure 7-4. The following parts are used on all Excel 3000 booths.

Item	Part	Description	Quantity	Note
1	-----	PLATE, baffle	1	
2	1091588	PLATE, fluidizing	2	
3	1091589	GASKET, fluid, plate	2	
4	-----	KIT, C-clamp	4	
5	1028489	GASKET, strip, 0.5 x 0.25 PSA	5	
6	981315	SCREW, hex, 0.3125-18 UNC, zinc	60	
7	-----	PLATE, diffuser	2	
8	-----	PLENUM ASSEMBLY	2	

Color Module Cartridge Filters

Cartridge Filters

Nordson PowderGrid® filters are standard; heavy duty filters are optional.

Part	Description	Qty.
Excel 3001 System		
156996	Filter, cartridge, 36 in., PowderGrid, center mount	12
OR		
286872	Filter, cartridge, 36 in., heavy duty, center mount	12
Excel 3002 System		
158661	Filter, cartridge, 26 in., PowderGrid, center mount	10
146418	Filter, cartridge, 26 in., PowderGrid, flo-thru	10
OR		
158660	Filter, cartridge, 26 in., heavy duty, center mount	10
180773	Filter, cartridge, 26 in., heavy duty, flo-thru	10
Excel 3003 System		
158661	Filter, cartridge, 26 in., PowderGrid, center mount	12
146418	Filter, cartridge, 26 in., PowderGrid, flo-thru	12
OR		
158660	Filter, cartridge, 26 in., heavy duty, center mount	12
180773	Filter, cartridge, 26 in., heavy duty, flo-thru	12

Filter Mounting Parts

See Figure 7-4.

Item	Part	Description	Quantity	Note
1	1037239	NUT, hex, 5/8-11 in., zinc	AR	A
2	174720	MOUNT, filter, cartridge	AR	
3	174722	BRACKET, centering, filter	AR	
4	174723	ROD, filter mount, 36 in.	AR	A
5	-----	FILTER, cartridge, 36 in., center mount	AR	
6	984158	NUT, hex, jam, 3/8-16, steel, zinc	AR	B
7	1094124	NUT, compression, filter cartridge	AR	B
8	984167	NUT, hex, jam, 5/8-16, steel, zinc	AR	B
9	1094123	ROD, threaded, 3/8-16	AR	B
10	1101087	TUBE, threaded, filter	AR	B
11	-----	FILTER, cartridge, 26 in., flo-thru	AR	
12	-----	FILTER, cartridge, 26 in., center mount	AR	
NOTE A: Use for 36-in. filter mounting.				
B: Use for 26-in. filter mounting.				
AR: As Required				

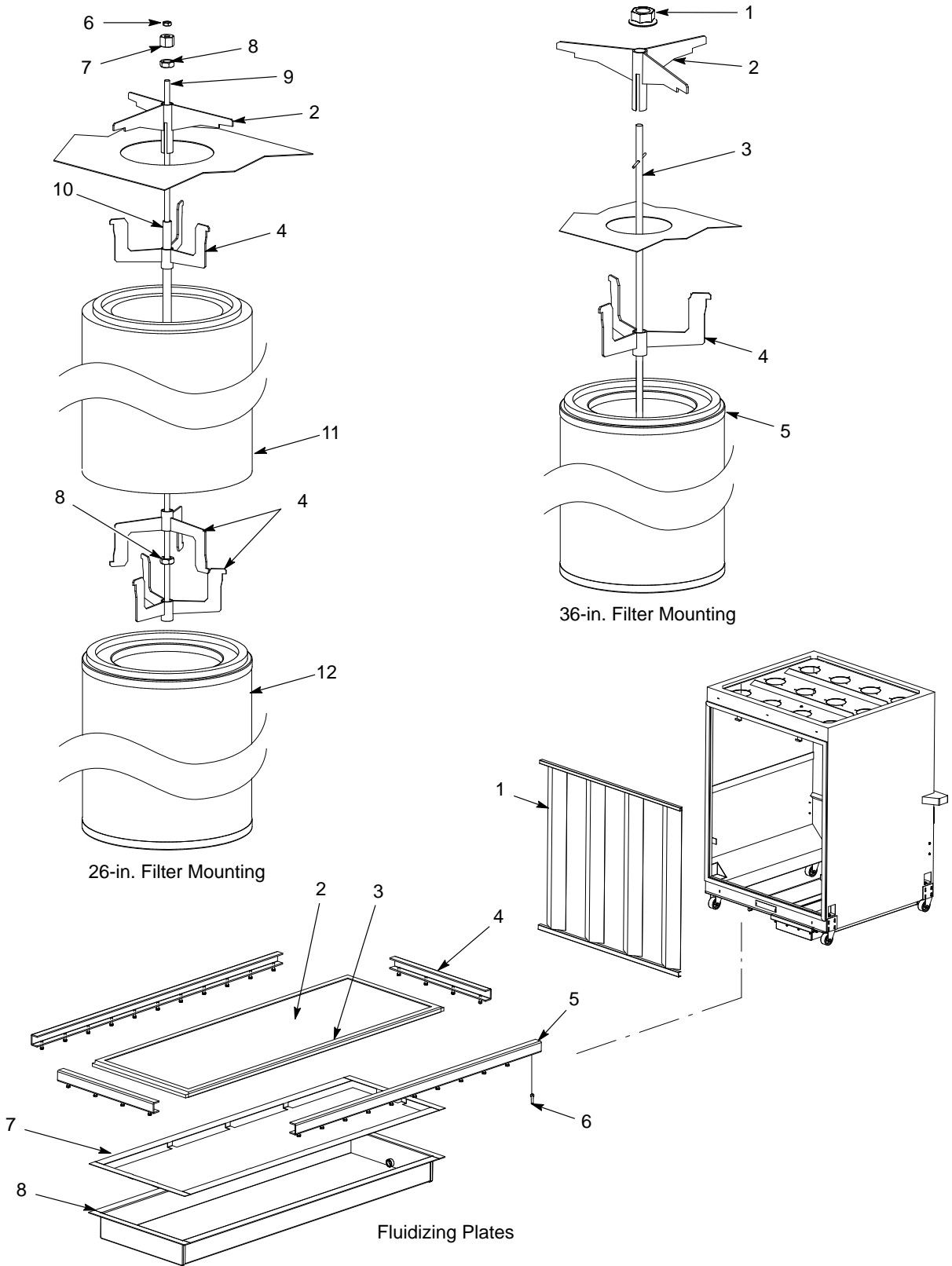


Figure 7-4 Color Module Cartridge Filters and Fluidizing Plates

Color Module Covers and Casters

See Figure 7-5.

Item	Part	Description	Quantity	Note
1	-----	SCREW, hex, $\frac{5}{16}$ -18 x .750 in., steel, zinc	46	
2	981622	SCREW, hex, $\frac{1}{2}$ -13 x 3.0 in., cap, zinc	4	
3	-----	NUT, hex, serrated, $\frac{1}{2}$ -13 in., zinc	4	
4	-----	SCREW, hex serrated, $\frac{3}{8}$ -16 x 1.0 in., steel, zinc	32	
5	-----	BLOCK, caster mount	4	
6	174545	CASTER, 4 in. swivel	4	
7	-----	SENSOR, well	2	
8	-----	PLATE, cover, blank vent	AR	A
9	-----	PLATE, hopper, HTM blank	AR	A
10	-----	PLATE, cover, vent	AR	A

NOTE A: Configured part.
AR: As Required

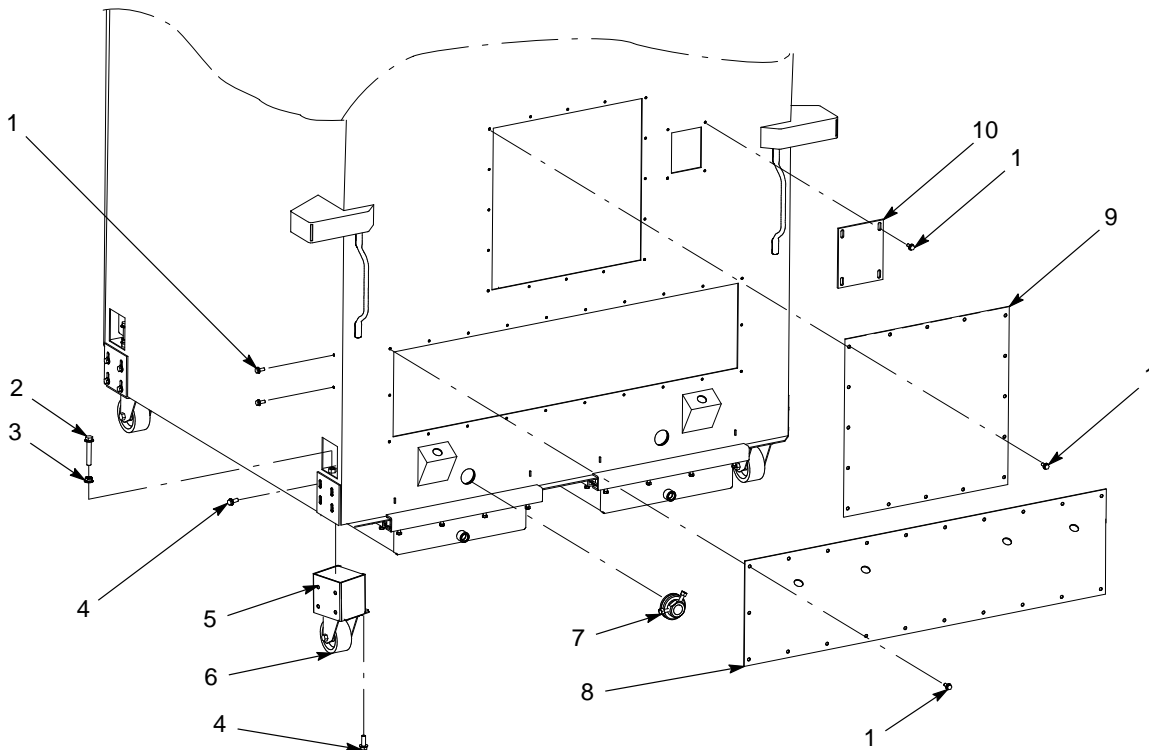


Figure 7-5 Color Module Covers and Casters

Fan and Fan Drive

See Figure 7-6.

Item	3001 Part	3002 Part	3003 Part	Description	Quantity	Note
1	174752	174755	174761	MOTOR, fan	1	A
2	174756	174757	174762	MOUNT, motor, adjustable	1	
3	-----	-----	-----	BOLT, hex, serrated flange, 1/2-13 x 1.00 in., zinc plated	AR	
4	174777	174793	1091934	SHEAVE, motor	1	
5	1091925	1092439	1091926	BELT, fan	3	
6	1091929	1091929	1091931	BUSHING, motor	1	
7	1091927	174793	174782	SHEAVE, fan	1	
8	174781	174781	174781	FAN BUSHING	1	
9	174796	174796	174796	KEY, fan, 0.50 x 0.50 x 4.79 in.	1	
10	984170	984170	984170	NUT, hex, reg, 1/2-13 in., steel, zinc	4	
11	983180	983180	983180	WASHER, lock, E, spt, 1/2-in., steel, NI	4	
12	983007	983007	983007	WASHER, flat, E, 0.531 x 1.00 x 0.063 in., zinc	8	
13	183906	183906	183906	BEARING, fan	2	
14	972141	972141	972141	CONNECTOR, male, 6mm tube x 1/8-in. UNI	4	
15	154223	154223	154223	SUPPORT, fan, bearing	1	
16	174810	174810	174810	KEY, fan, sheave, 0.50 x 0.312 x 2.72 in.	1	
17	176261	176261	176261	SHAFT, fan	1	
18	-----	-----	-----	SCREW, hex, 1/2-13 x 6.50 in., cap, zinc	4	
19	1091908	1091908	1091908	WHEEL, fan	1	
20	-----	-----	-----	WASHER, flat, special	1	
21	981530	981530	981530	SCREW, hex, 1/2-20 x 1.00 in., black, G5	1	
22	-----	-----	-----	RETAINER, inlet cone	8	
23	-----	-----	-----	BOLT, hex, serrated flange, 5/16-18 UNC 2A x 1.00 in., zinc plated	8	
24	174751	174751	174751	CONE, air inlet	1	

NOTE A: Excel 3001 uses a 15-hp motor; Excel 3002 uses a 20-hp motor; Excel 3003 uses a 25-hp motor.
AR: As Required

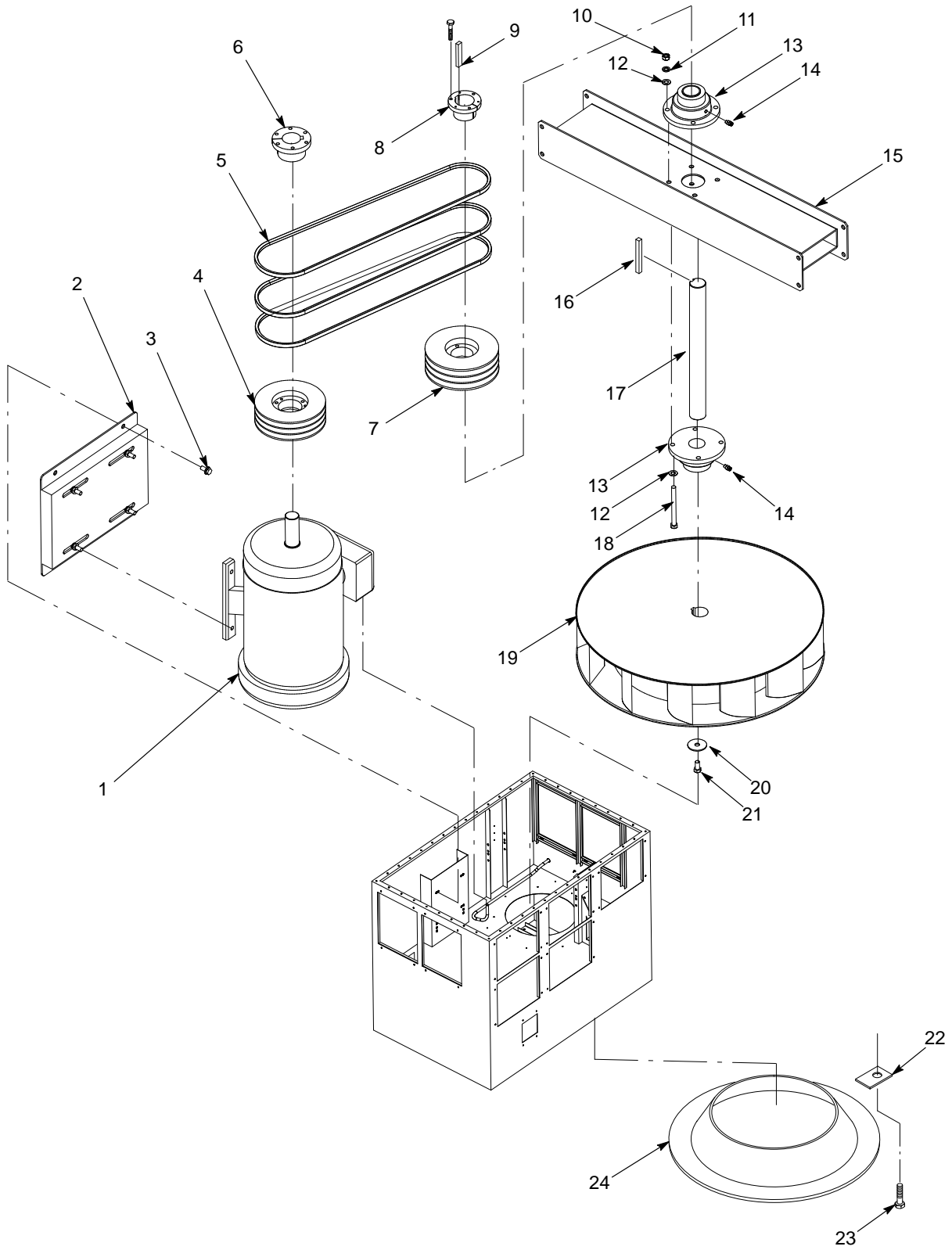


Figure 7-6 Fan and Fan Drive

Section 8

Specifications

Dimensions and Capacities

NOTE: Equipment specifications are subject to change without notice due to continuing technological and quality improvements.

Refer to Table 8-1 for a listing of the dimensions and capacities for Excel 3000 Series booths.

Table 8-1 Dimensions and Capacities

Capacities	Excel 3001	Excel 3002	Excel 3003
Air flow at 6 in. wc	227 m ³ /min (8000 cfm)	306 m ³ /min (10,800 cfm)	396 m ³ /min (15,000 cfm)
Fan rating at 4 in. wc (minimum)	225 m ³ /min (8000 cfm)	305 m ³ /min (10800 cfm)	425 m ³ /min (15000 cfm)
Number of cartridge filters	12	20	24
Number of final filters	5	7	9
Number of pulse valves	12	10	12
Manual/auto gun capacity	2/12	2/18	2/24

Compressed Air Requirements

Dimensions

See Figure 8-1.

Booth Base Dimensions:

8,000 CFM: 5 x 6 ft (1.5 x 1.8 m)

10,800 CFM: 5 x 10 ft (1.5 x 3 m)

15,000 CFM: 5 x 15 ft (1.5 x 4.5 m)

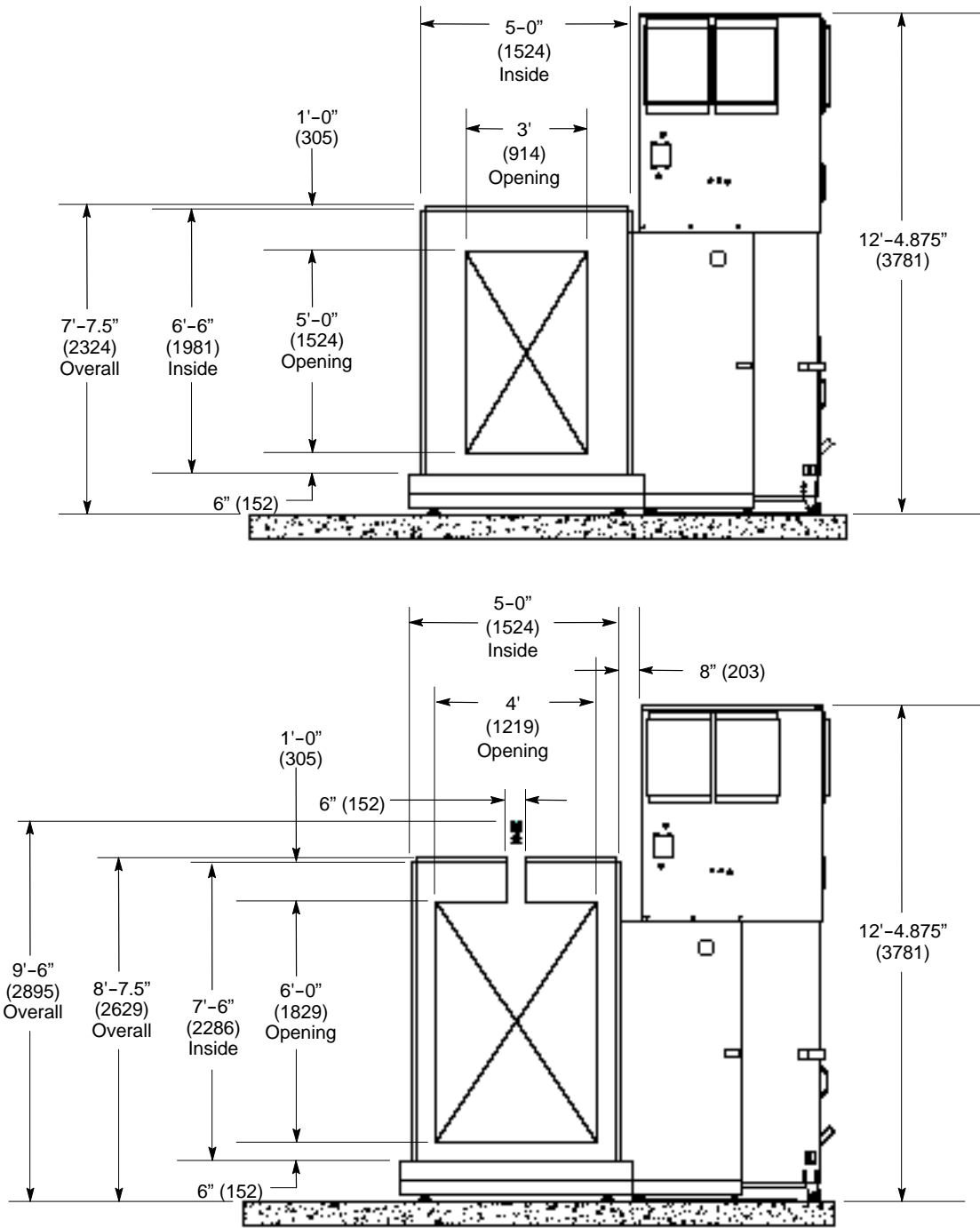


Figure 8-1 Dimensions

Operating Environment

Locate your powder coating system in a proper environment. If temperature and humidity in the spray room exceed the following ranges, you must install air conditioning equipment.

Temperature	21–27 °C (70–80 °F)
Humidity	45–55% RH

Utilities

Primary Electrical Service: 208, 230, 380, 415, 460, or 575 Vac. The customer must install a fused disconnect switch with lock-out capability, wired in accordance with the National Electric Code, NFPA-70.

Control Voltage: 110V (10 amps) for gun controllers and flame detection panel (required for systems with automatic guns).

Total Current Calculation Chart						
Equipment	208V	230V	380V	415V	460V	575V
1/2 HP (Sieve)	2.5	2.2	1.5	1.3	1.1	0.9
1.5 HP (Oscillator)	6.9	6.0	4.3	3.6	3.0	2.4
15 HP (3001 Fan)	48.3	42.0	29.4	24.2	21.0	17.0
20 HP (3002 Fan)	-	54.0	37.8	31.1	27.0	22.0
25 HP (3003 Fan)	-	-	47.6	39.1	34.0	27.0
1.0 kVA Transformer	4.8	4.2	2.6	2.4	2.1	1.7
1.5 kVA Transformer	7.2	6.2	3.9	3.6	3.1	2.5
2.0 kVA Transformer	9.6	8.3	5.2	4.8	3.3	3.3

Compressed Air Supply: The air supply line must be 38-mm (1.5-in.) ID minimum. Supply air pressure must be 5.5–6.9 bar (80–100 psi). The air must be conditioned by a dedicated, refrigerated or regenerative-desiccant air dryer that can produce a 3 °C (38 °F) or lower dewpoint at 6.9 bar (100 psi).

Compressed Air Requirements:

15 scfm for cartridge pulse air
19.4 scfm for color module fluidizing air

Normal Design Standards

Systems are custom-designed to each customer's requirements, so some may deviate from these design standards. Contact your Nordson representative if you need more information about the design of your booth.

End Openings: 15.2 cm (6 in.) clearance on all four sides of the largest part.

Part Hanger Keyhole Slot: 45.7 cm (18 in.) high.

Cross Drafts: No more than 18.3 m/min (60 FPM).

Average Face Velocity: No less than 30.5 m/min (100 FPM) through all openings in the booth enclosure.

Temperature of Parts Entering Booth: No more than 49 °C (120 °F).

Powder: Use commercially available powder coatings. Note that the characteristics and properties of a powder coating can affect system operation. Powder coatings generally have an average particle size of 25–35 microns, with no more than 10% of the total being less than 15 microns. When the percentage of particles less than 15 microns exceeds 10% of the total, the filter media can get clogged.

Cartridge Filters: Cartridge filters are considered wear items. The variables affecting the life expectancy of a cartridge filter include

- type of coating material
- particle size distribution
- humidity and temperature of the spray room air
- hours of operation
- dew point and cleanliness of the compressed air supply
- pressure and frequency of air pulses used to clean the filters

Section 9

Drawings

The attached 11 x 17 foldouts include drawings for the following:

Control Panel – Automatic System
Control Panel – Manual System
Wiring Diagram – Plug and Spray System

