Vantage® FCM Booth

Customer Product Manual
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– English –
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For parts and technical support, call the Industrial Coating Solutions Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

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Change Record

Revision	Date	Change
01	01/24	Initial Release
02	02/25	Added part number 1614490 to parts table

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 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 Material 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.

- Ground all conductive equipment. Use only grounded air and fluid hoses. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored. Do not heat materials to temperatures above those recommended by the manufacturer. Make sure heat monitoring and limiting devices are working properly.
- Provide adequate ventilation to prevent dangerous concentrations of volatile particles or vapors. Refer to local codes or your material SDS for guidance.
- Do not disconnect live electrical circuits when working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Grounding

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

Grounding inside and around the booth openings must comply with NFPA requirements for Class II, Division 1 or 2 Hazardous Locations. Refer to NFPA 33, NFPA 70 (NEC articles 500, 502, and 516), and NFPA 77, latest conditions.

- All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 megohm as measured with an instrument that applies at least 500 volts to the circuit being evaluated.
- Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator platforms, hoppers, photoeye supports, and blow-off nozzles. Personnel working in the spray area must be grounded.
- There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as an operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.
- Operators must maintain skin-to-handle contact between their hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If gloves must be worn, cut away the palm or fingers, wear electrically conductive gloves, or wear a grounding strap connected to the gun handle or other true earth ground.
- Shut off electrostatic power supplies and ground gun electrodes before making adjustments or cleaning powder spray guns.
- Connect all disconnected equipment, ground cables, and wires after servicing equipment.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out system electrical power. Close hydraulic and pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the system.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

Description

The Vantage® fixed collector module is a configurable powder collector for spray-to-waste operations. It is installed as part of a powder coating booth. The canopy bolts to the collector module. Canopy extensions are an option that can be ordered with the system.

The module is available in 6,000 and 8,000 CFM capacities.

See Figure 1 and Table 1 for common components.

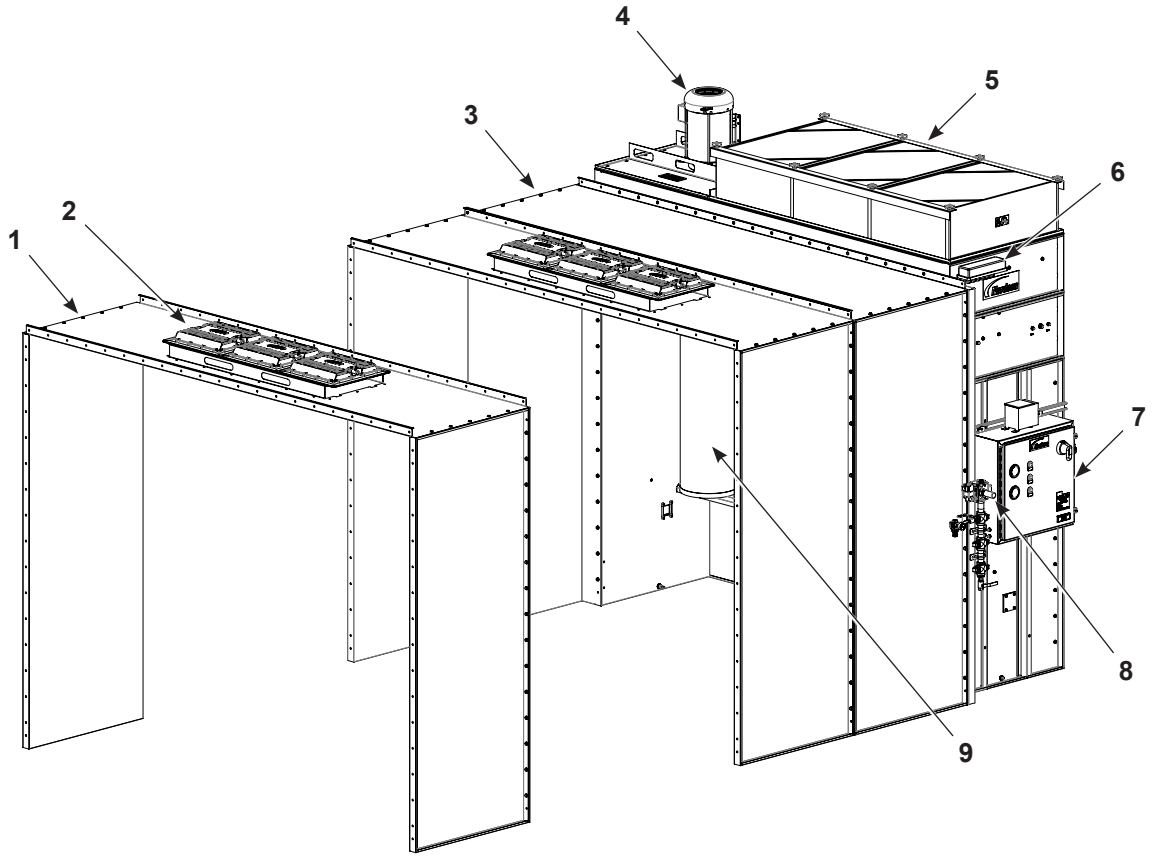

Figure 1 Vantage FCM Booth Components (8,000 CFM Collector Shown)

Table 1 Vantage FCM Booth Components

Item	Component	Description	Optional Equipment
1	Canopy extension	Extends the spraying area	X
2	LED light	Provides light inside the canopy	X
3	Canopy	Provides containment of powder and prevents powder contamination	
4	Fan motor	Provides ventilation to pull powder into the booth	
5	Final filters	Secondary filter for clean air exiting the booth	
6	Pilot valve assembly	Pneumatic trigger for internal spray off valves	
7	Control panel	Electrical panel for system, includes shut off and pneumatic controls	
8	Air drop kit	Provides connection for supplied compressed air into the system	
9	Primary cartridge filters	Captures over-sprayed powder and removes it from the booth	

Specifications

All Nordson booths are designed and constructed to meet the requirements of NFPA33 (Standard for Spray Application Using Flammable or Combustible Materials) and all electrical work complies with the National Electrical Code (NEC 70) articles 500, 501, 502, and 516. The booths also have protection systems designed and implemented in accordance with the Standard on Explosion Prevention Systems (NFPA 69) or NFPA 68 (Standard on Explosion Protection by Deflagration Venting).

Table 2 Vantage FCM Collector Module Versions and Specifications

Specification	Air Flow (CFM)			
	6,000		8,000	
Voltage (V)	**460**	**575**	**460**	**575**
Number of Primary Filters (48 in. Poly)	4	4	6	6
Number of Final Filters	2	2	3	3
Air Input Port (NPT)	1 in.	1 in.	1 in.	1 in.
Air Consumption at 100 psi (SCFM)	5	5	5	5
Air Consumption at 100 psi (SCFM) with Optional Fluid Bed	15	15	15	15
Fan Motor Horsepower	7.5	7.5	10	10
Fan Motor RPM	1768	1800	1762	1800
Fan Motor Electrical Requirement:				
Volts	460	575	460	575
Hz	60	60	60	60
Amps	19	7.6	12.5	10.8
Controls Electrical Requirement:				
Volts	110			
Hz	60			
Amps	10			
Dimensions	See Figure 2 - Figure 3			

Table 3 Optional LED Light Specification (per Light)

Color Temperature:	CCT - 5000K
Input Wattage:	75 W
Input Voltage (VAC):	120-277
Maximum Input Current (A):	0.93
Input Frequency (Hz):	50/60
Lumen Output:	8250 (Diffused Lens)
Dimensions (W x H x D):	18.11 x 18.11 x 2.32 in. (460 x 460 x 59 mm)

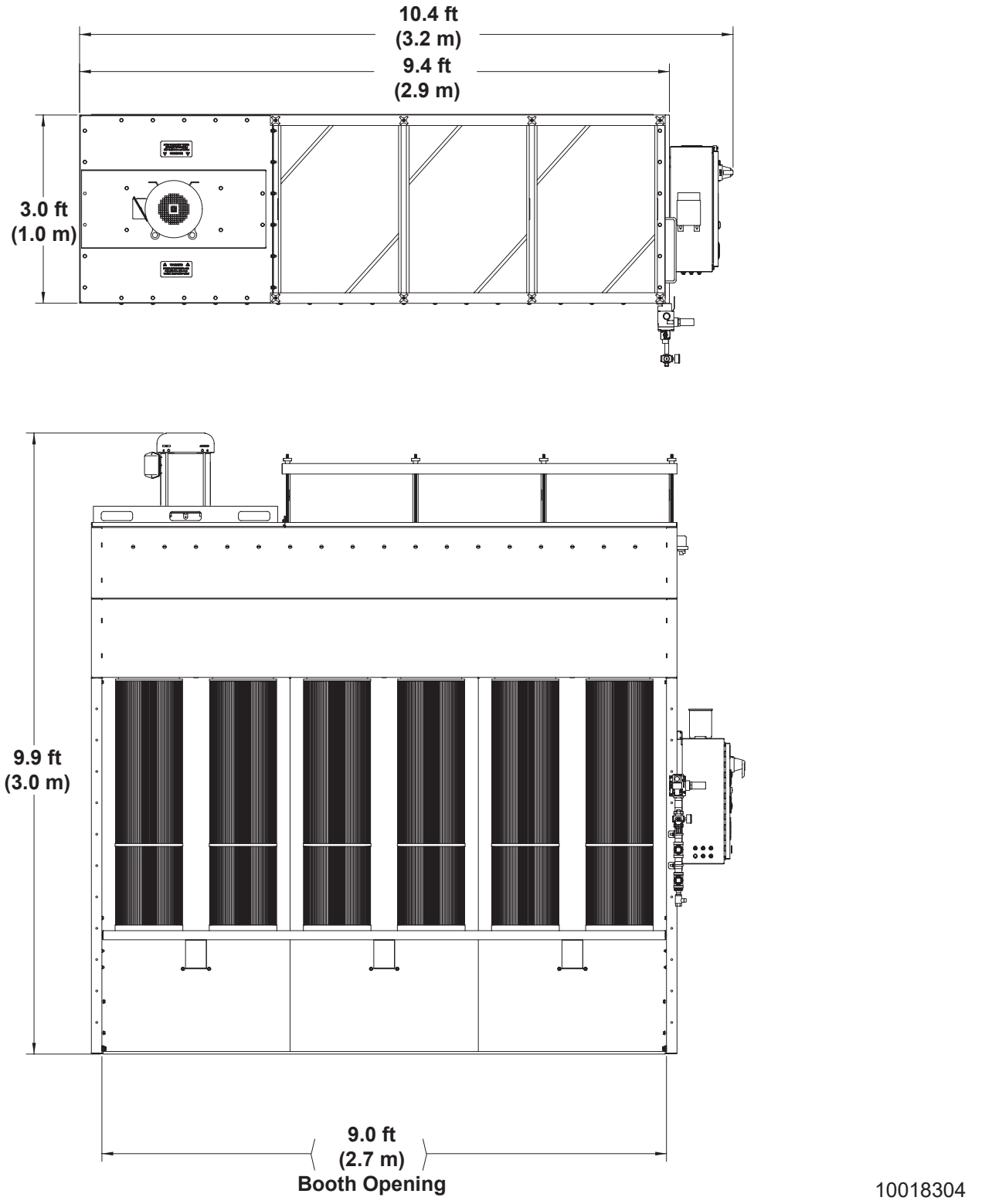

Figure 2 8,000 CFM Booth Dimensions

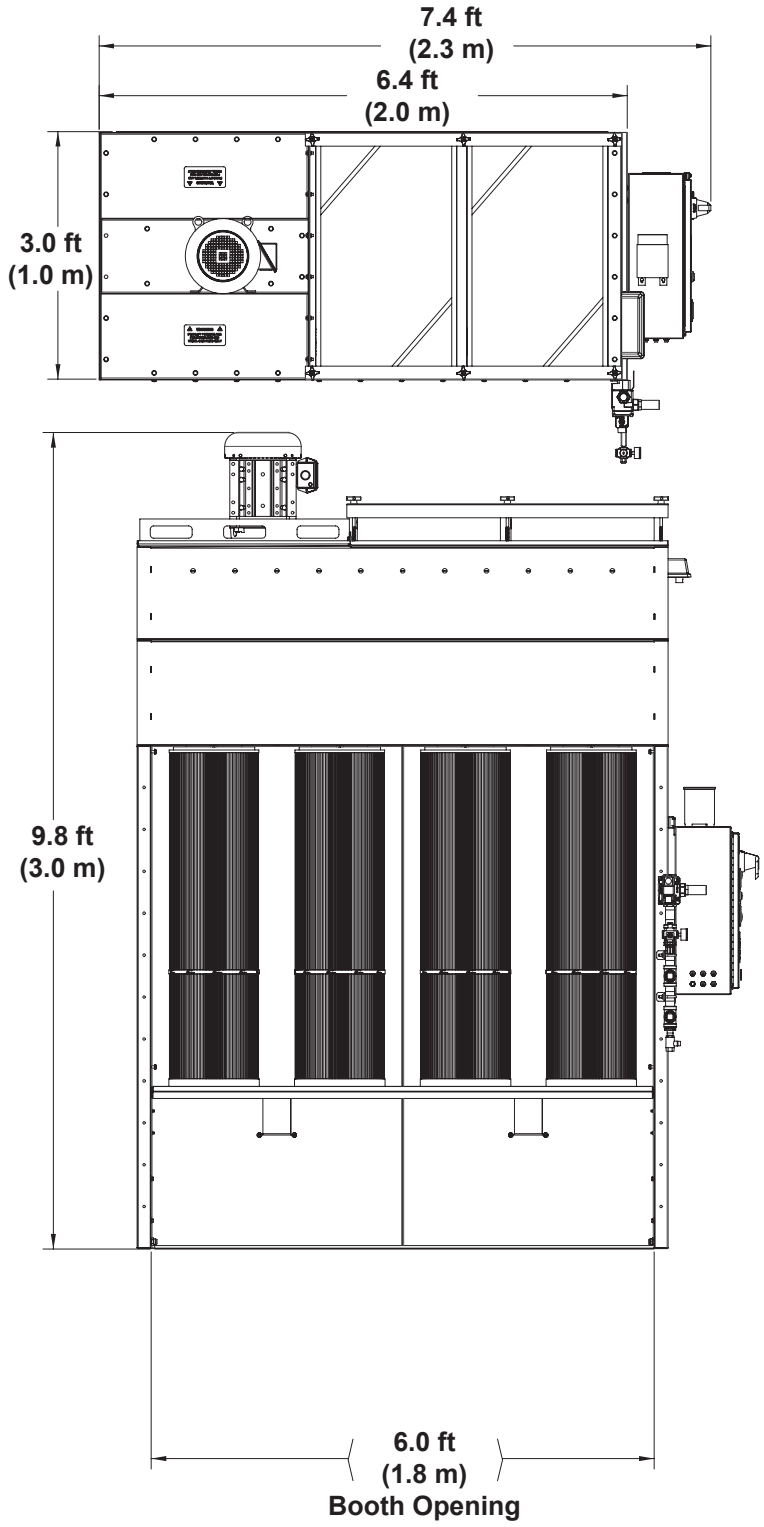

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Figure 3 6,000 CFM Booth Dimensions

Installation

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

The collector module and booth enclosure are assembled at the customer's plant and bolted to the floor.

Delivery

Perform the following tasks when the booth is delivered.

- Take inventory of all equipment. Confirm receipt of all of the materials listed on the packing slip.
- Inspect each component for damage. Document any damage found and report it to both the carrier and Nordson representative.
- Clear the area of all obstructions.
- Provide a secured, indoor storage area for equipment.
- Clear the route from the delivery site to the installation site. Make sure that there is sufficient clearance for all equipment.

Preparation

Perform the following tasks before installing the booth.

- Obtain any necessary local or state permits.

  NOTE: Compliance with local, state, and national codes including NFPA Bulletin 33 and buyer's insurance is the responsibility of the buyer.

- Make sure that the installation area has a level, class-B (fine aggregate exposure) concrete floor.
- Make any building alterations to meet local, state, and national codes in the powder coating room.
- Install sprinkler heads as required by insurance carrier or local, state, and national codes.
- Make sure to have sufficient electrical service and compressed air available for both installation and operation at the installation site.
- Locate the booth in a proper environment. If temperature and humidity in the spray room exceed the following ranges, air conditioning is recommended.

  Temperature 21−27 °C (70−80 °F)

  Humidity 45−55% RH

- If applicable, install the conveyor. The conveyor and its hangers must be built and tested at the site before the booth is assembled.
- Provide trash bins and off-site disposal for refuse, skids, and crating.

Clearances

The installation area should have ample floor space for coating operations and service. There must be at least 3-ft (1-m) clearance between the final filters and the roof or any other objects to allow free air flow.

Panels and Fan Module

Table 4 Panels and Fan Module Consumable Items

Item	Application
Caulk	Seal seams

1. See Figure 4. Mark out the booth position on the floor.
2. Lay the floor channel (3) along the location of the back panel (7) of the collector.
3. Assemble the side panels (6) and back panels (7) with 5/16-in. nuts (2) and hex screws (1). Hand-tighten the fasteners.

   NOTE: Panels should be oriented with the cutouts near the floor.
4. Make sure the panels are straight, that the side panels are square with the back panels, and that the enclosure is sitting solidly on the floor in the correct position. Use shims if necessary.
5. Tighten the panel fasteners, then lag the enclosure to the floor to provide a stable base for the fan module.
6. Install gasketing (provided in a roll) along the top of the panels.

CAUTION: Tipping hazard. Be sure to properly align and fully the support the fan module while installing on top of the panels to avoid tipping.

7. Using a tow motor, carefully raise the fan module (10) onto the panels. Use safety straps to secure the housing while lifting and positioning. Attach the module to the panels with 5/16-in. nuts (2) and hex screws (1) and tighten them securely. Do not remove the tow motor until assembly is complete.
8. Use the supplied caulk to seal seams and to caulk the booth to the floor.

NOTE: If using a hopper, cover plates (11) can be removed and replaced with pump adapter. Refer to the *Hopper and Transfer Pump Installation* section for more information.

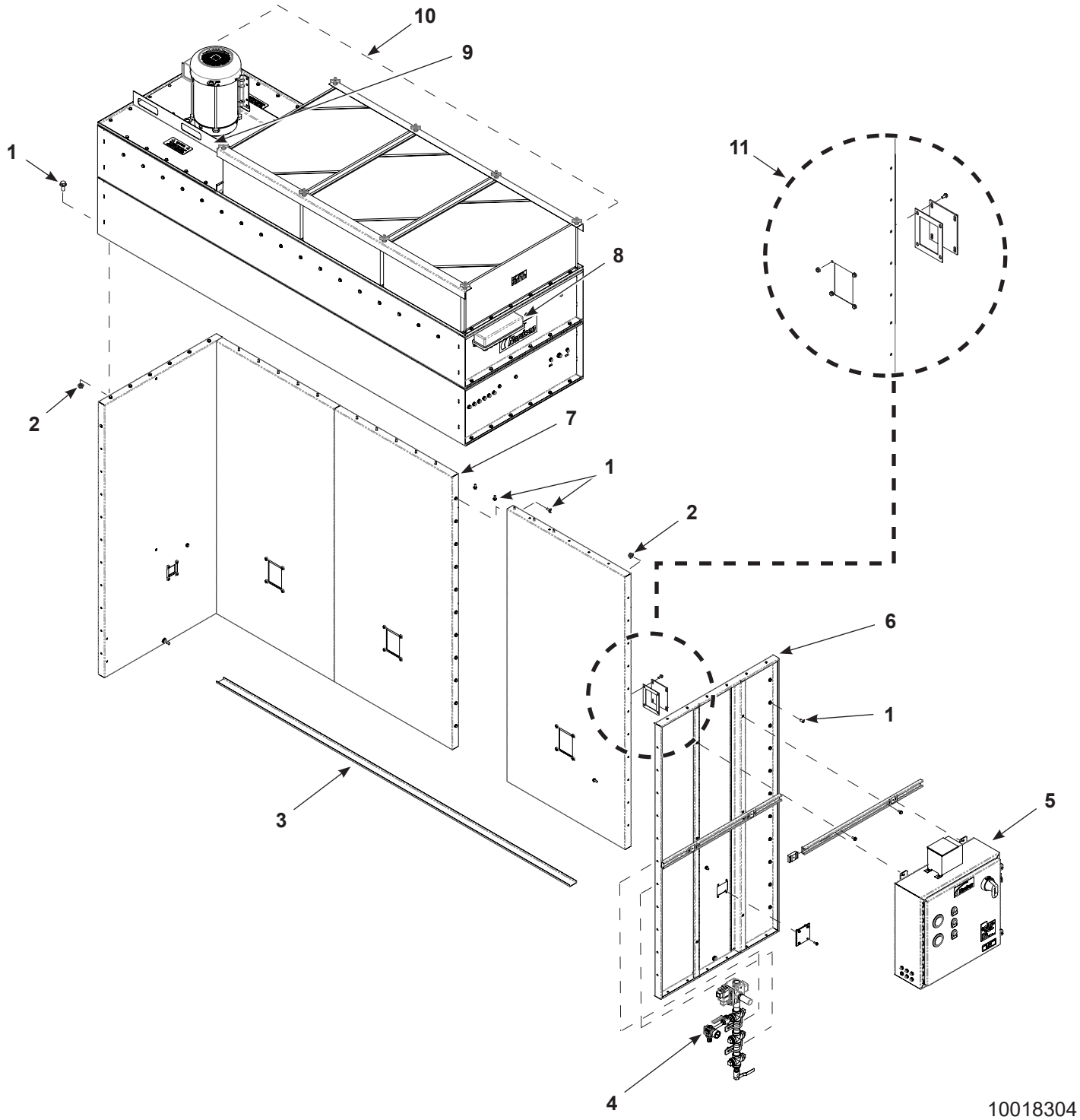

Figure 4 Collector and Fan Module Installation (8,000 CFM Collector Shown with Air Drop and Control Panel for Reference)

1. 5/16-in. hex screw
2. 5/16-in. hex nut
3. Floor channel
4. Air drop assembly
5. Control panel
6. Side panel
7. Back panel
8. Pilot valve assembly
9. Mounting bracket, fan module
10. Fan module
11. Cover plates

Mounting Air Drop Assembly

NOTE: Air drop assembly should be installed next to the control panel.

1. See Figure 5. Secure the air drop mounting brackets (12) to desired location on collector using 5/16-in. hex screws. (See Figure 4 for location example.)
2. Secure the air drop assembly (4) to the mounting brackets (12) using the U-bolts (13) and hex nuts (2).

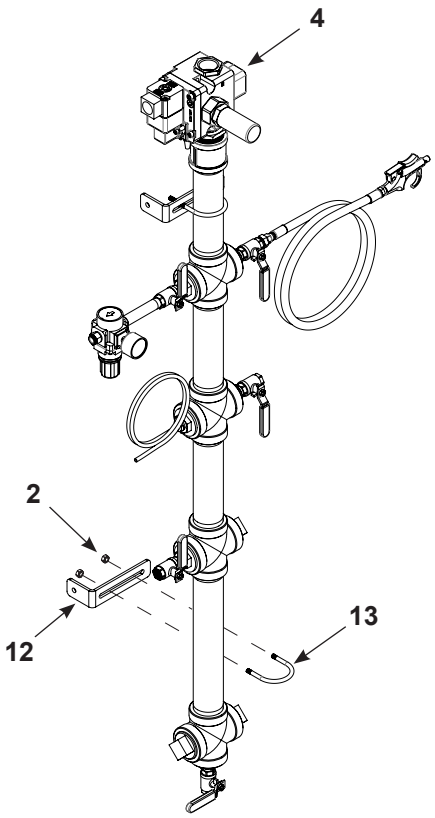

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Figure 5 Air Drop Mounting

2. 5/16-in. hex nut
4. Air drop assembly
12. Mounting bracket, air drop assembly
13. U-bolt

Mounting Control Panel and Pilot Valve Assembly

NOTE: Pilot valve assembly must be on same side as the control panel. Relocate pilot valve assembly, as needed.

1. See Figure 6. Using 5/16-in. hex screws (1), install the mounting channels (15) to the collector in desired location for control panel (5). (See Figure 4 for location example.)
2. Slide the nuts (14) into the channels (15).
3. Mount the control panel (5) to the collector using 5/16-in. hex screws (1) and slider nuts (14).

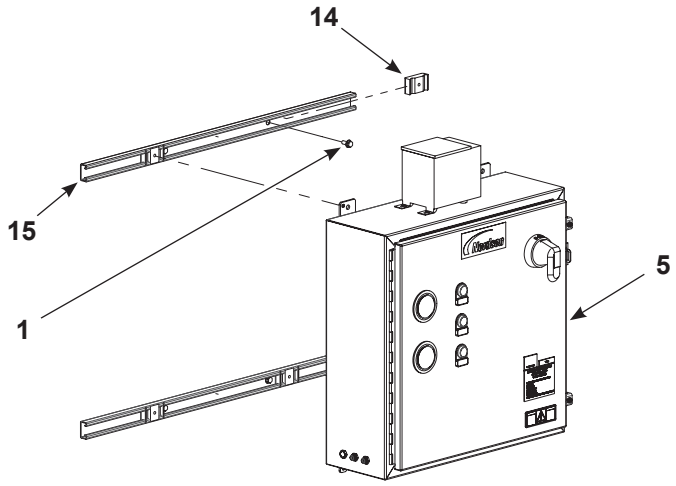

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Figure 6 Control Panel Mounting

1. 5/16-in. hex screw
14. Slider nut
15. Mounting channel
5. Control panel

4. See Figure 7. Using 5/16-in. hex screws (1), mount the pilot valve assembly (16) on the same side of the collector module as the control panel. (See Figure 4 for location example.)

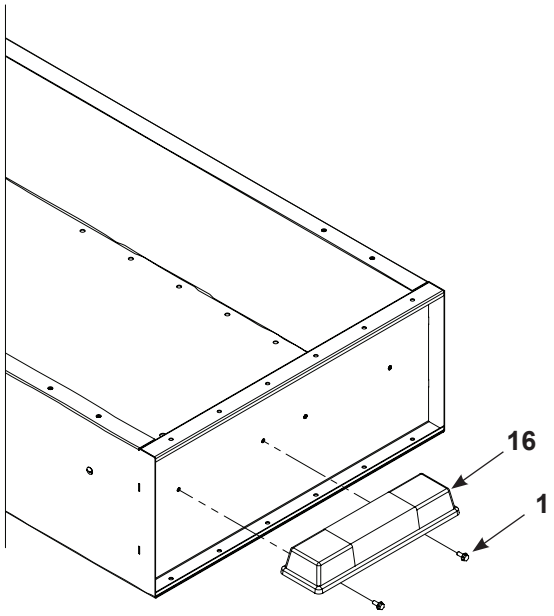

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Figure 7 Pilot Valve Mounting

1. 5/16-in. hex screw
16. Pilot valve assembly

5. See Figure 8. Connect the air tubing (A) from the pilot valve assembly to the tube fittings on the collector.
6. Connect the electrical rubber conduit (B) from the pilot valve assembly to the inside of the control panel.
7. Plug the panel vent (27) into the panel vent valve on the control panel.
8. Plug the primary pressure gauge tubing (C) into the fittings labeled Primary Filter from the collector to the control panel.
9. Plug the final pressure gauge tubing (D) into the fittings labeled Final Filter from the collector to the control panel.

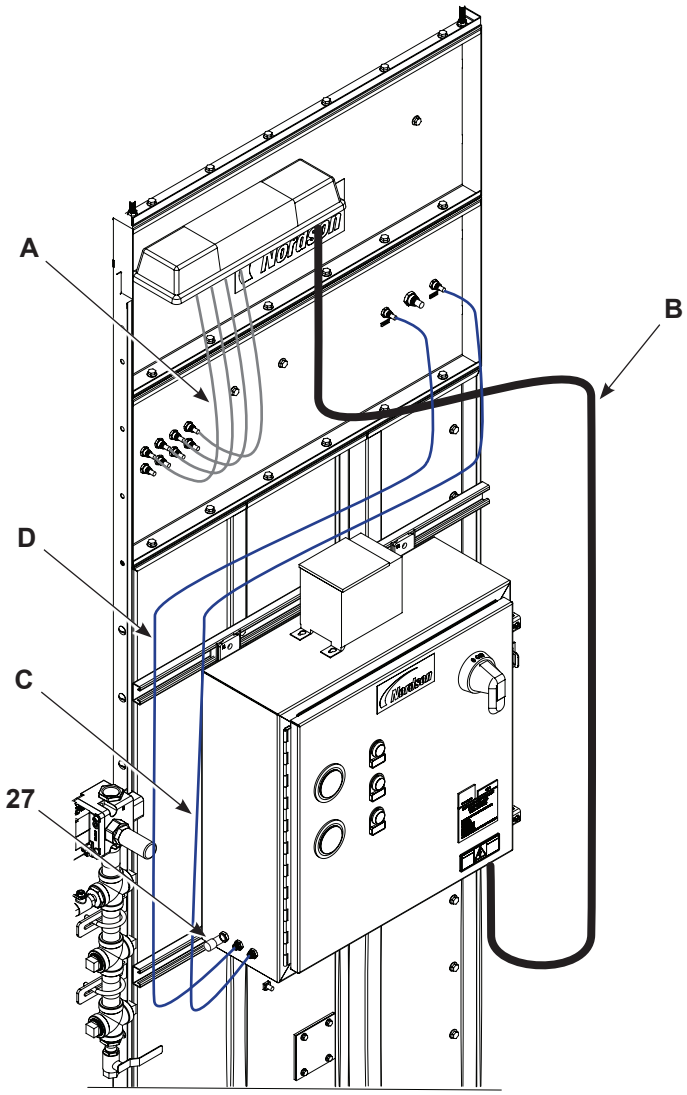

Figure 8 Air Tubing and Conduit Connections

A. Air tubing

B. Electrical rubber conduit

C. Primary pressure gauge tubing

D. Final pressure gauge tubing

27. Vent plug

Cartridge Filter Installation

See Figure 9.

1. Hang the threaded rod assemblies (items 18−21) on filter support (17) with the J-hook (21) in the notch in the support.
2. Install the cartridge filters (22) on the rods, open end first. Align the filter so the end of the filter rod slides through the mounting hole in the closed end of the filter.
3. Secure the filter with the 3/8-in. washer (23) and lock nuts (24). Tighten the nuts to compress the filter gaskets at the open ends to 3/16-in. Do not over-tighten the nuts as this could result in damage to the filter.
4. Once all filters are installed, install the filter retainer strip (25) over the ends of the threaded rods (19) and install the 3/8-in. wing nuts (26).
5. Secure the retainer strip to side panels using 5/16-in. screws.

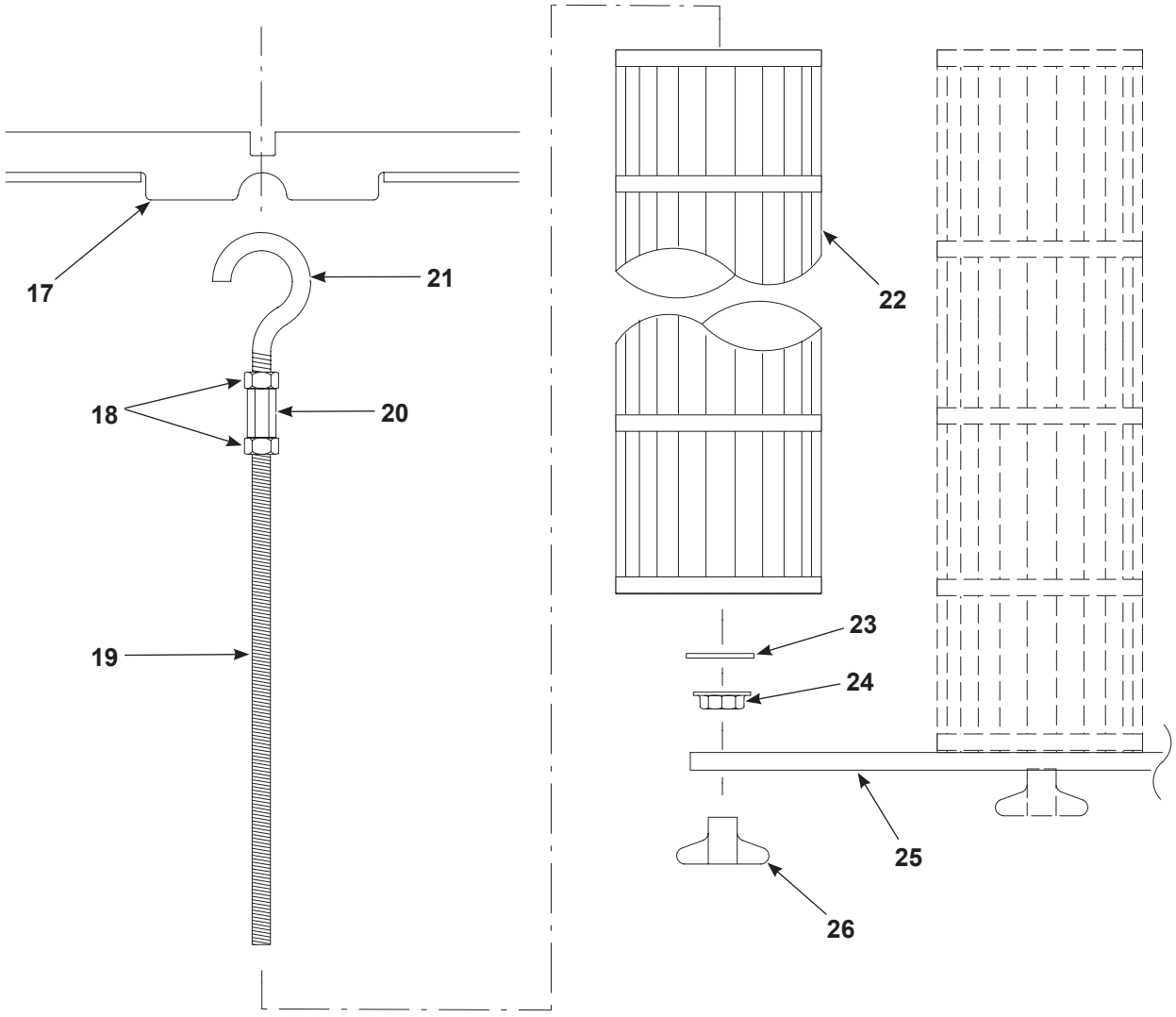

Figure 9 Cartridge Filter Installation

17. Filter support
18. Jam nuts
19. Threaded rod
20. Coupling nut
21. J-hook
22. Cartridge filter
23. Washer
24. Lock nut
25. Retainer strip
26. Wing nut

Canopy Installation

The following are canopies engineered for use with the Vantage Fixed Collector Module. Optional canopy extensions can be ordered and installed separately.

See Figure 10 canopy mounting dimensions.

NOTE: For light kit dimensions, refer to *LED Light Kit* section.

Table 5 Standard Canopy Sizes

	Collector	
	6,000	**8,000**
Canopy Dimensions (W x H x D)	7 x 8 x 3 ft (2.1 x 2.4 x 0.9 m)	8 x 10 x 3 ft (2.4 x 3.0 x 0.9 m)
Overall Dimensions (W x H x D)	7 x 9.9 x 12 ft (2.1 x 3.0 x 3.7 m)	9 x 10 x 12 ft (2.7 x 3.0 x 3.7 m)
Material (walls/roof)	Galvanized Steel	Galvanized Steel
Light Panels (roof)	1	1
LED Light Capacity	3	3

Table 6 Optional Canopy Extensions

	Collector	
	6,000	**8,000**
Canopy Dimensions (W x H x D)	7 x 8 x 3 ft (2.1 x 2.4 x 0.9 m)	9 x 10 x 3 ft (2.7 x 3.0 x 0.9 m)
Overall Dimensions (W x H x D)	7 x 9.9 x 12 ft (2.1 x 3.0 x 3.7 m)	9 x 10 x 12 ft (2.7 x 3.0 x 3.7 m)
Material (walls/roof)	Galvanized Steel	Galvanized Steel
Light Panels (roof)	1	1
LED Light Capacity	3	3
NOTE: Each additional canopy adds 3 ft to overall depth.		

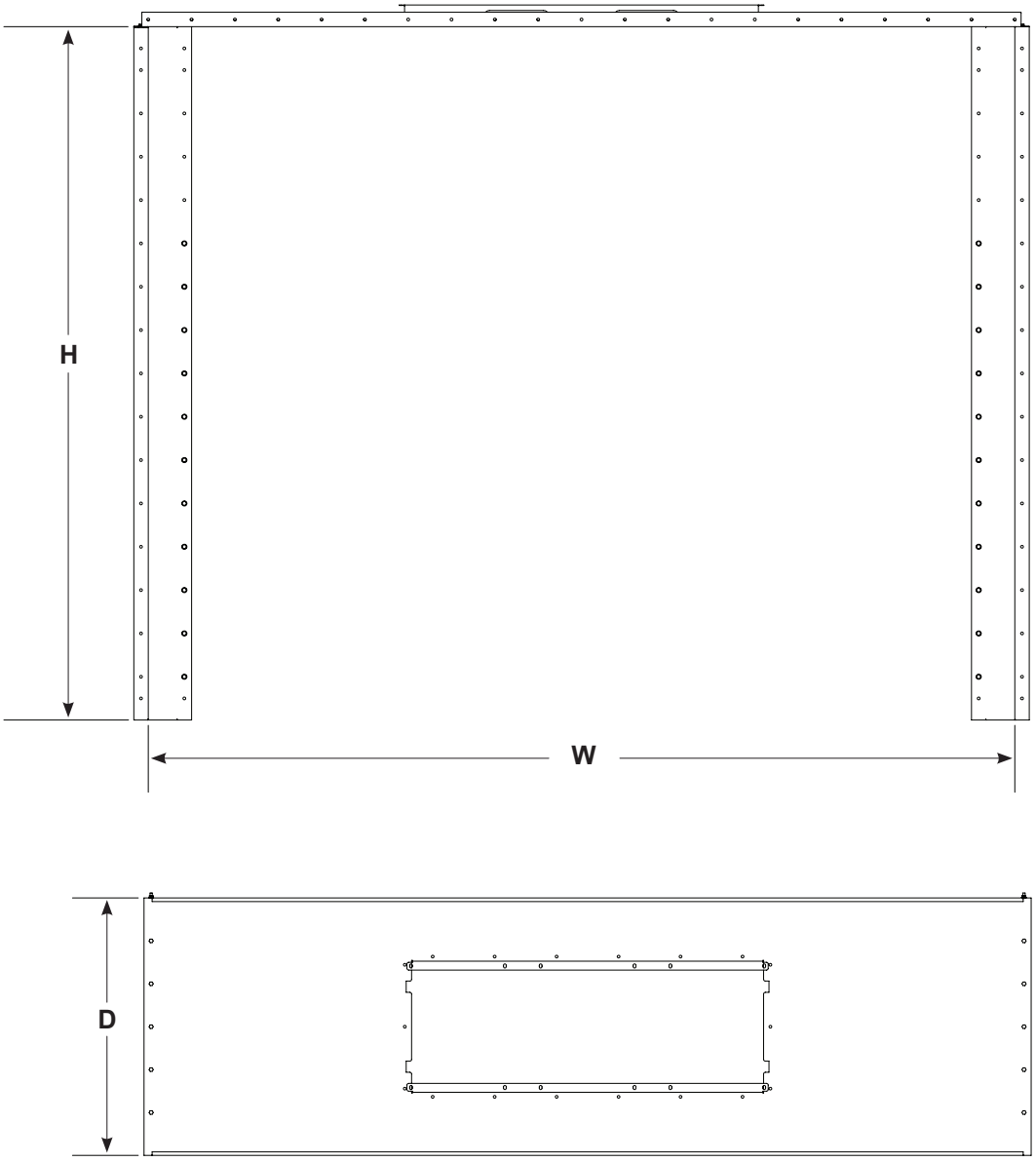

Figure 10 Canopy Dimensions

Canopy Mounting

NOTE: If using a canopy with LED light option, it is recommended to install the LED window kit lens (3) and LED lights onto the canopy roof before installing the canopy. Refer to *LED Lights* in the *Option* section for more information.

1. See Figure 11. Install the canopy side panels (2) using 5/16-in. hex screws and nuts.
2. Attach the roof panel (1) to the side panels (2), and then to each other using 5/16-in. hex screws and nuts.
3. Repeat steps 1 and 2 for any additional canopies.
4. Use the supplied caulk to seal seams and to caulk the canopies to the floor.

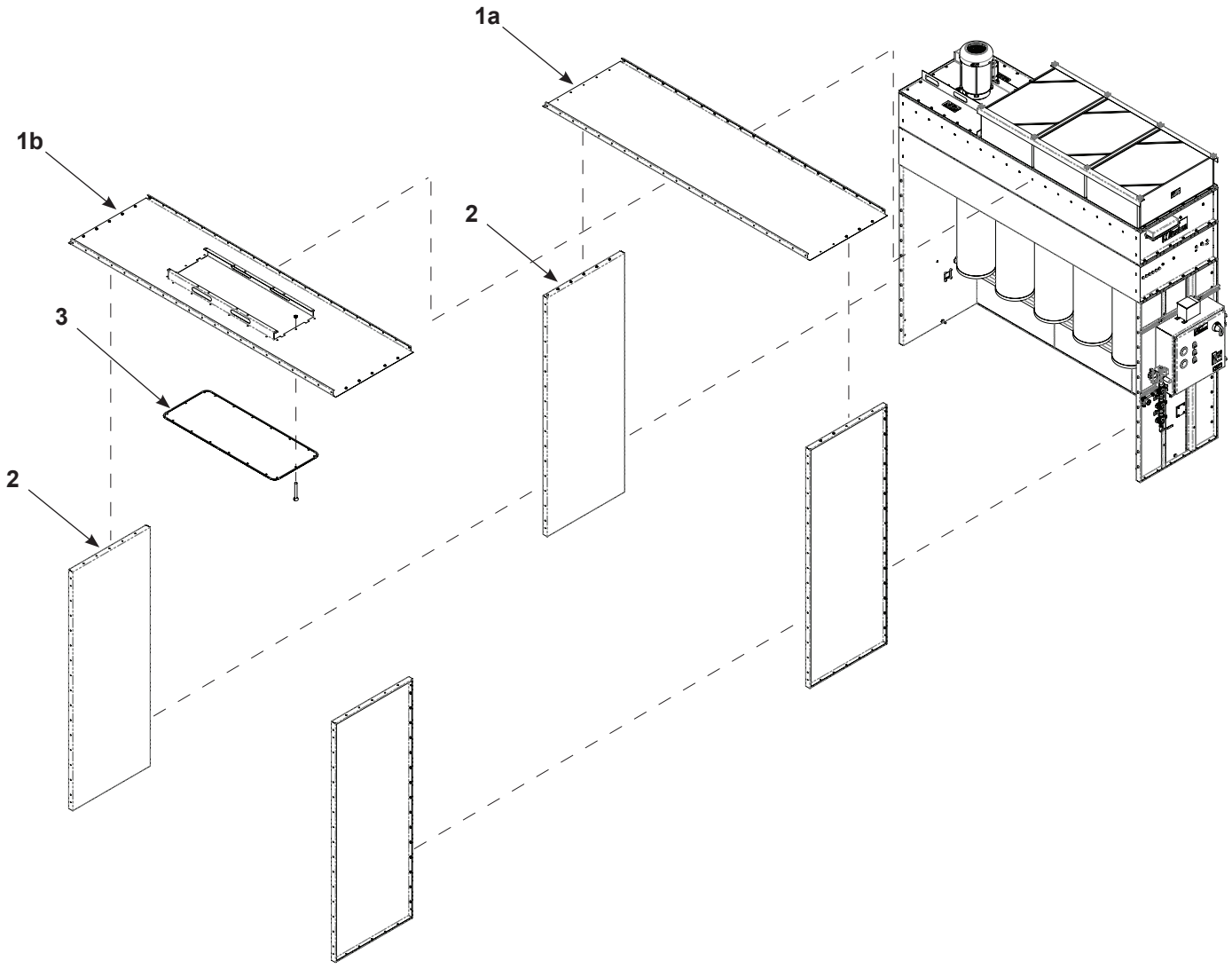

Figure 11 Installing Canopies

1a. Roof panel
1b. Roof panel with light
2. Side panel
3. Lens

Utility Installation

See Figure 12.

Pneumatic Connections

Compressed air requirements:

Pressure: 5.5−7 bar (80−100 psi)

Air Quality: Inlet air must meet or exceed ISO 8573-1:2010 Class 1.4.2 general purpose oil free air.

1. Install a shutoff valve and drop leg with drain valve ahead of the filter/regulator (4).
2. Connect the compressed air supply to the filter/regulator (4).

Electrical Connections

WARNING: Installation of electrical connections listed in this section should be completed by a certified electrician.

WARNING: All phases of installation must comply with all federal, state, and local codes. All work that is located in Class 2, Divisions 1 and 2 hazardous locations must comply with NFPA code 33, and NFPA code 70 (especially articles 500, 502, and 516, latest editions).

NOTE: For additional reference, refer to the *Drawings* section for electrical schematic drawings.

The booth requires both 3 phase power for the fan motor (1) at the voltage specified in the purchase order. The control panel (3) is equipped with a transformer to supply 120 V single phase power for other booth devices and controls.

- Install a fused, locking disconnect switch, wired in accordance with National Electric Code NFPA-70, in the mains ahead of the control panel (3). You must be able to disconnect and lock out power to the collector control panel (3).
- Use dust-tight strain reliefs or conduit connectors to bring power into the the booth control panel (3).
- As required, connect the pre-wired motor conduit to the control panel and/or motor junction box. Connect the conduit wiring to the control panel (3) or motor leads. If necessary.

NOTE: See Figure 13. The fan motor must rotate in the correct direction to draw air through the cartridge filters. To change fan direction, reverse any two motor wires at the motor starter or motor.

- As required, connect the pre-wired pilot valve conduit to the control panel and/or pilot valve assembly (2).

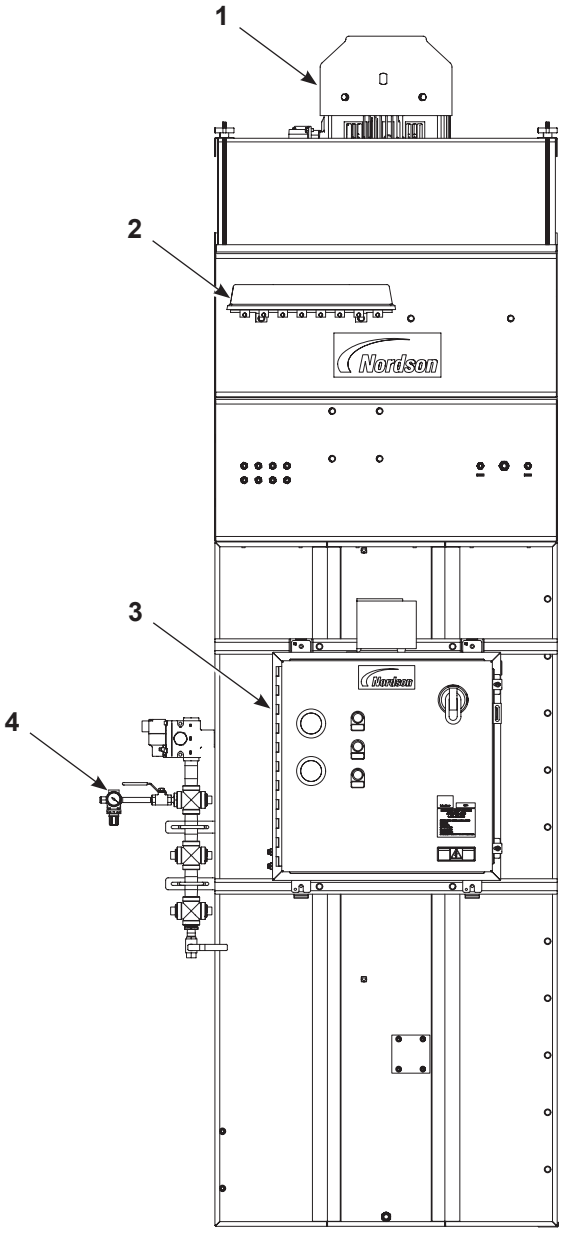

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Figure 12 Control Panel, Pilot Valve Assembly, and Filter/Regulator Installation (Left-Hand Orientation Shown)

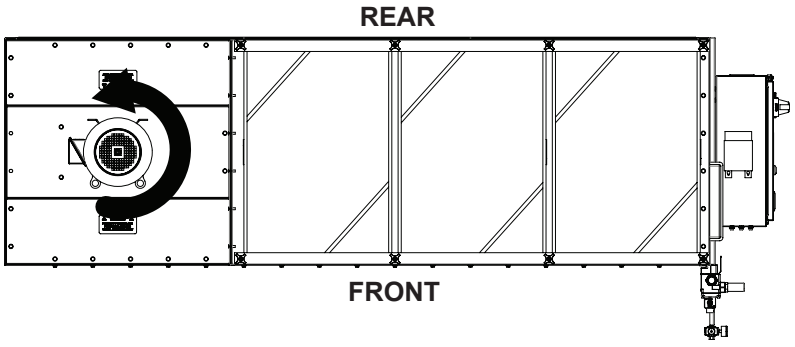


Figure 13 Fan Motor Rotation Direction (Top View)

Options

LED Lights

WARNING: LED lights must be installed by a certified electrician.

LED lights can be installed on optional canopy to provide more light through the spray area. Up to three LED lights can be installed on a single optional canopy. The LED lights are sold separately from the canopy. Refer to the *Parts* section for canopy and LED light part numbers.

NOTE: It is recommended to install the window assembly and LED lights onto the canopy roof before installing the canopy.

1. See Figure 14. Locate the roof window assembly shipped with the canopy. Remove the back of the double-sided tape on the lens (2), and align the lens to the mounting holes on the underside of the roof panel (1). Apply gentle pressure to the lens to temporarily secure to the roof panel.
2. Install the screws (3) and nuts (4) provided in the roof window assembly to fully secure the lens (2) to the roof panel (1).

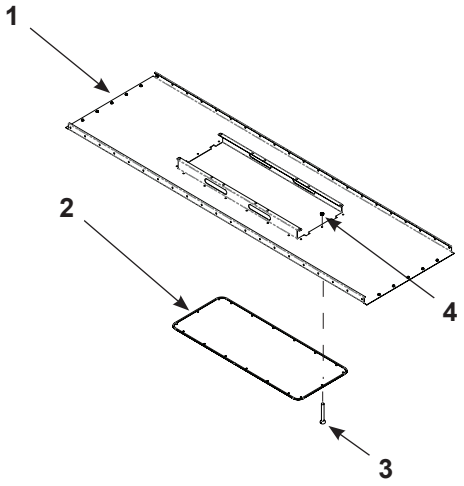


Figure 14 Installing Window Assembly

1. Roof panel with light
2. Lens
3. Flat head screw
4. Hex nut

3. See Figure 15. Place the LED light (5) on top of the mounting bracket (8) of the roof panel.
4. Secure the LED light to the roof bracket (8) using four of the 5/16-in. hex screws (6) and nuts (7) provided with the canopy.

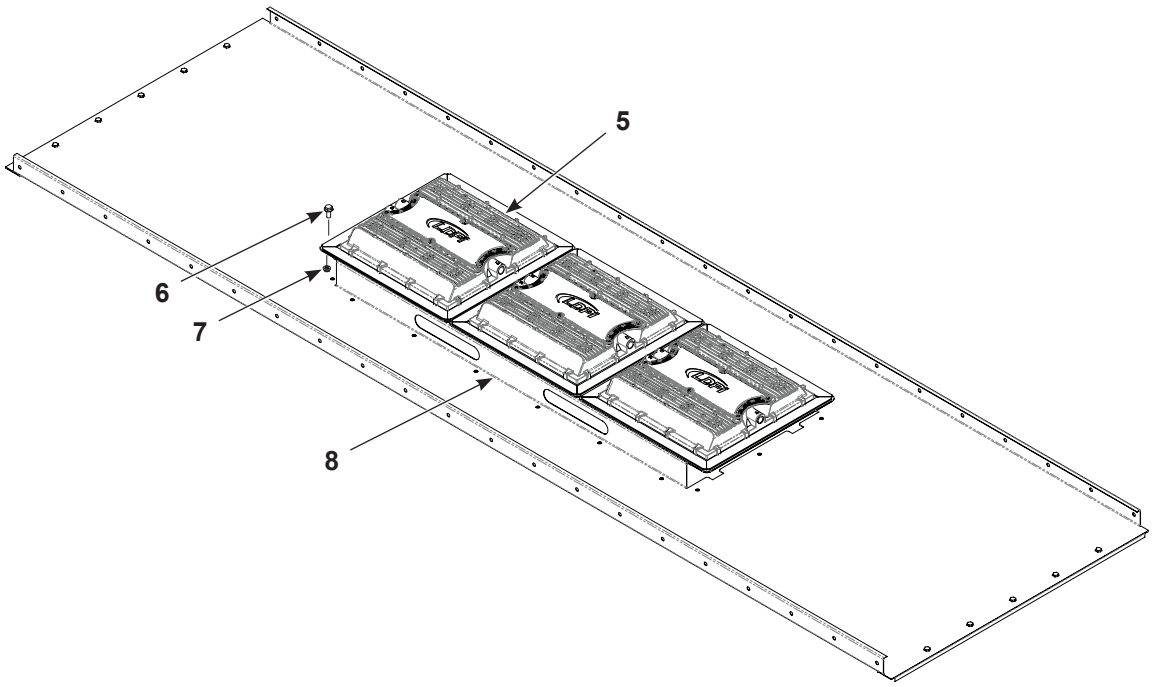


Figure 15 LED Light Installation

5. LED light
6. 5/16-in. hex screw
7. Nut
8. Roof bracket

Hopper and Transfer Pump Installation

One hopper is used for 6,000 and 8,000 CFM collector modules.

1. See Figure 16. Slide the hopper(s) (1) into the collector module, up against the back and side walls.
2. Clean the walls of the collector module above where the hopper touches them.
3. Remove the backing from the drip edge (2) adhesive tape, then press the drip edge into place slightly above the hopper.

   NOTE: If necessary, use #10 or ¼ in. self-drilling screws to hold the drip edge in place until the adhesive sets up.
4. Install the 10-mm bulkhead fitting (7) included with the hopper in the hole for fluidizing air.
5. Remove a cover plate from the side wall and install the pump adapter (5).
6. Install the pickup tube (4) into the pump adapter.
7. Install the transfer pump (6) on the adapter. Connect air tubing and powder transfer tubing to the pump.
8. Connect a short length of 10-mm tubing (3) between the hopper plenum fitting and the bulkhead fitting. Connect 10-mm tubing between the bulkhead fitting and a source of regulated compressed air. Typical fluidizing air pressure is 0.5–0.7 bar (5−10 psi).

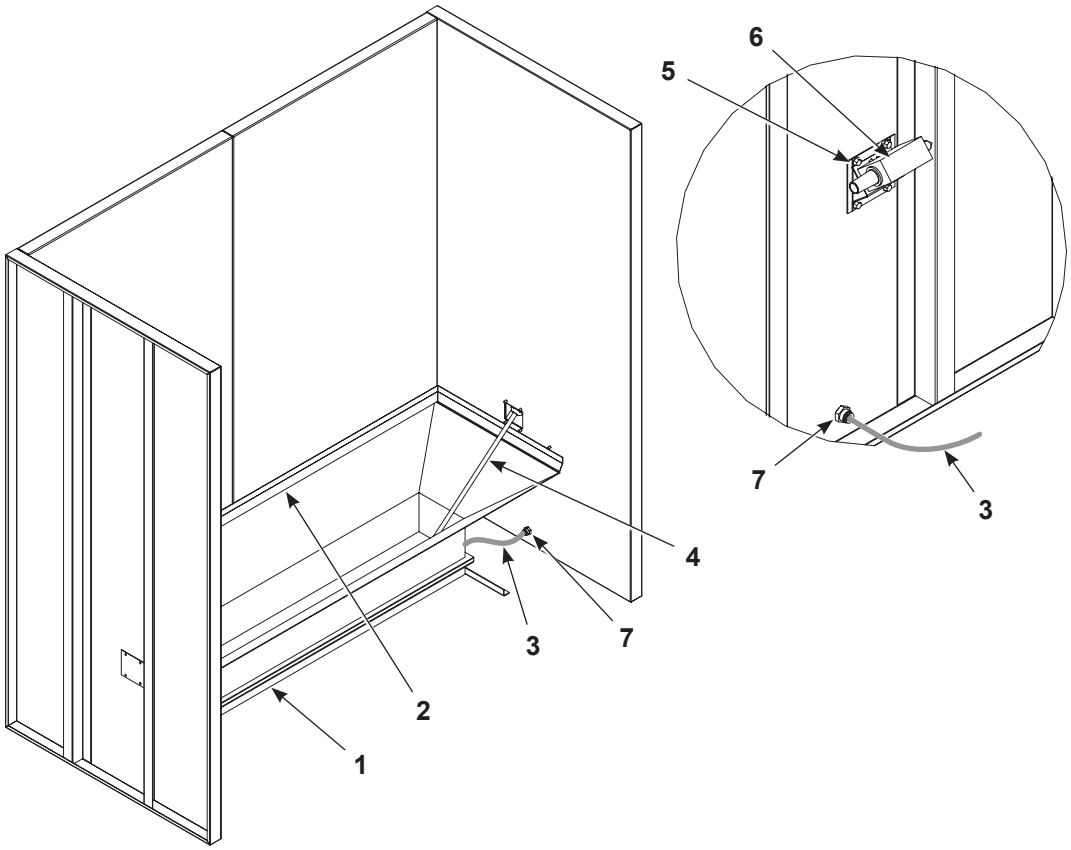


Figure 16 Hopper and Transfer Pump Installation

1. Hopper
2. Drip edge
3. 10-mm tubing
4. Pickup tube
5. Pump adapter
6. Transfer pump
7. Bulkhead fitting

Ramp Installation

Install the ramp so that the lip hangs over the forward edge of the hopper.

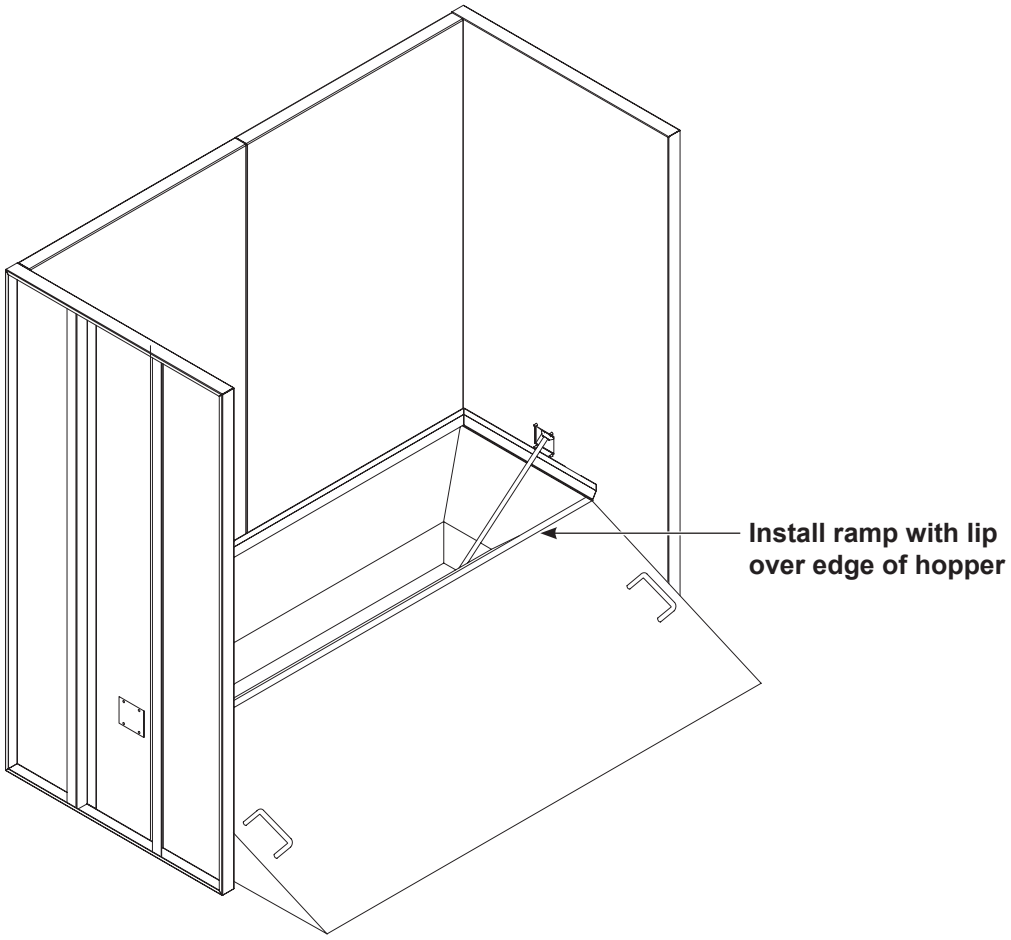


Figure 17 Ramp Installation

Baffle Installation

1. Install the four shoulder screws and nuts, included with the baffle, as shown.
2. Hang the baffle from the top shoulder screws, with the bottom edge outside the lower screws. The lower screws serve to prevent the baffle from swinging into the filters.

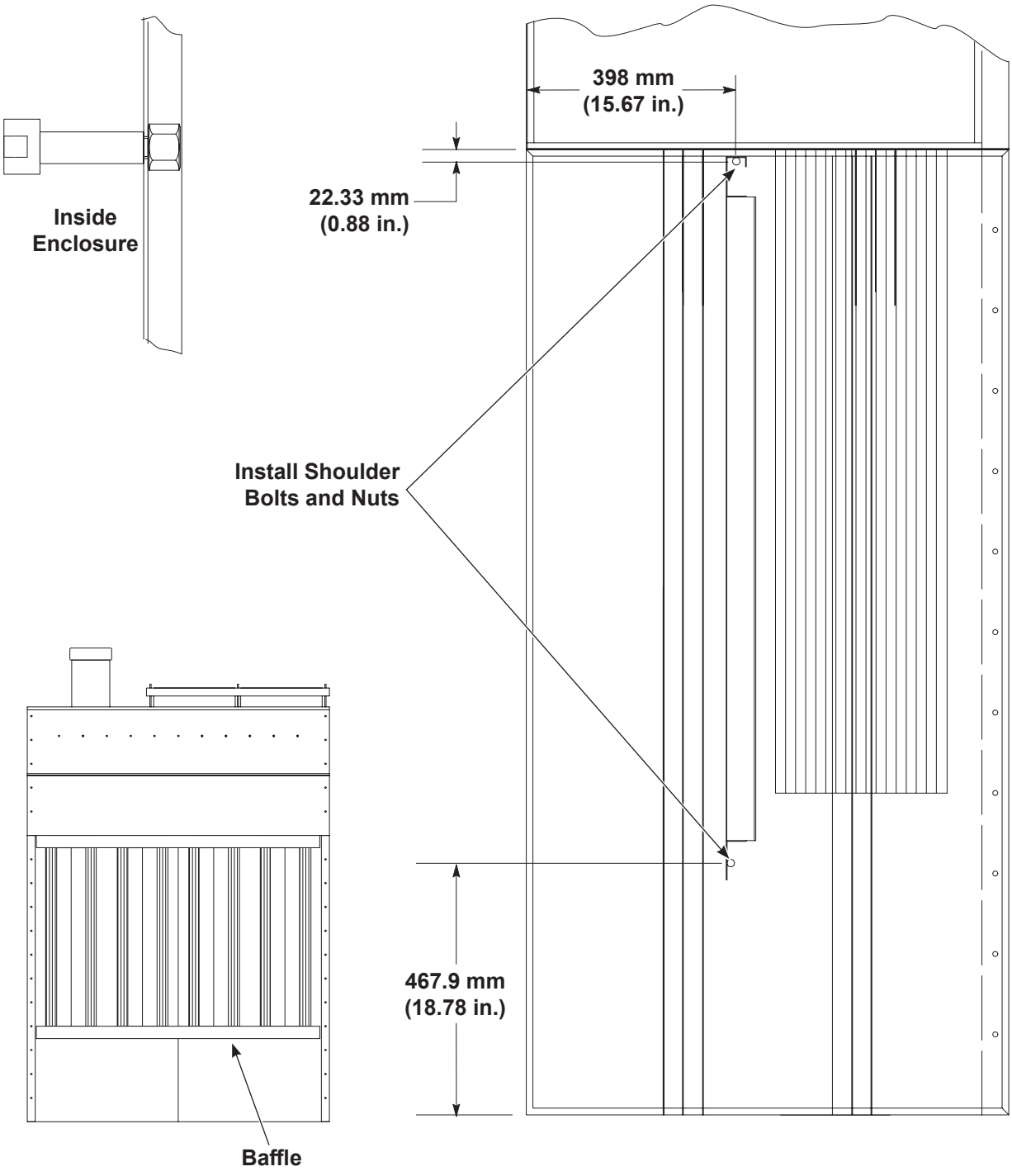


Figure 18 Baffle Installation

Kick Plate Installation

1. See Figure 19. Place the kick plate in place inside the collector enclosure, with the outside of the kick plate flush with the outside edge of the side walls.
2. Mark the location of the top of the four slots in the kick plate hangers.
3. Install the four shoulder screws and nuts, included with the kick plate, as shown.
4. Hang the kick plate from the screws.

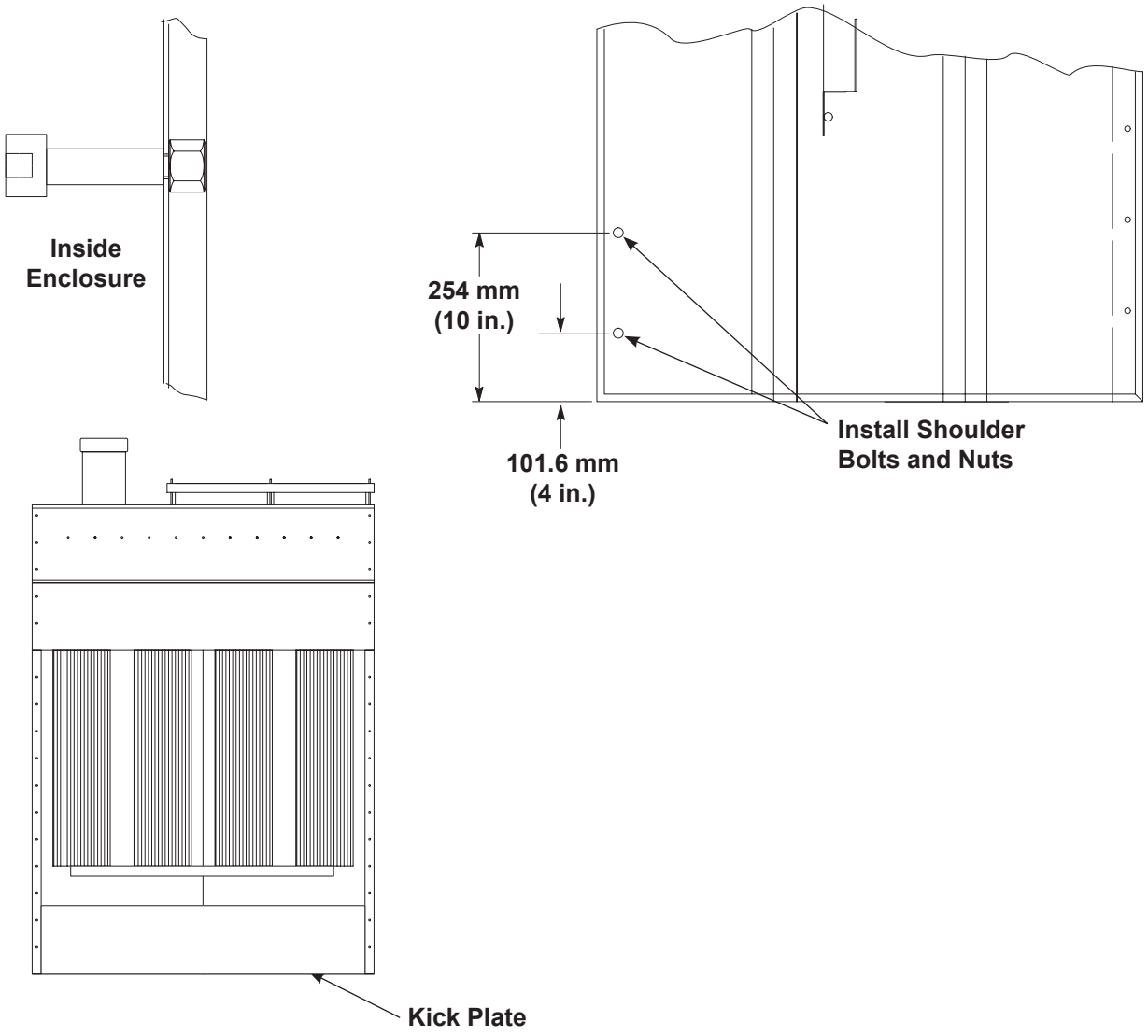


Figure 19 Kick Plate Installation

Operation

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

Startup

See Figure 20, Figure 21, and Table 7.

1. Turn on the compressed air supply. Adjust the system air pressure to 5.5 bar (80 psi).
2. Turn on the control panel disconnect switch (3).
3. Turn on the exhaust fan by pressing the exhauster start (4) button.
4. Set the pulse-valve air pressure to 1.7 bar (25 psi). Adjust as required to efficiently clean the cartridge filters.
5. Check the primary cartridge filter differential pressure gauge (2) on the control panel. The pressure should be less than 4.0-in. w.c. If it is higher, increase the filter pulsing frequency or air pressure.

NOTE: The final filter pressure switch (6) will shut down the exhaust fan as the final filter differential pressure gauge (1) reaches 3.0 in. w.c. If this happens, the final filters are clogging. Refer to *Troubleshooting* to correct this problem.

6. Check the level of the powder in the feed hopper. Fill feed hoppers no more than 2/3 full to leave room for expansion when fluidizing air is turned on.
7. Turn on the feed hopper fluidizing air.
8. Check all equipment ground connections.
9. During production, make sure the sprayed powder is not escaping from the booth. If this happens, check the primary cartridge filter differential pressure (2). Increase pulsing frequency or pressure.

Table 7 Special Operating Conditions

Primary Air Pressure (plant air)	5.5 bar (80 psi)
Primary Cartridge Filter Differential Pressure	
Normal Operation	6,000 CFM: 5.5 – 6.5 in.- w.c. 8,000 CFM: 4.0 – 6.5 in.- w.c.
Warning Level (order replacement filters)	6.5 – 7.5 in.- w.c.
Max Pressure	8.0 in.- w.c.
Final Filter Differential Pressure	
Normal Operation	1.5 – 2.5 in.- w.c.
Warning Level	2.5 in.- w.c.
Shutdown	3.0 in.- w.c.
Pulse Valve Pressure and Timer Settings	
Pulse Valve Pressure	1.7 bar (25 psi)
Pulse Duration (On Time)	Factory set to 0.1 sec. Normally does not need to be changed
Pulse Frequency (Off Time)	Set as desired. This setting is dependent on the volume of powder being sprayed and the static pressure reading on the cartridge filters. A lower setting results in more frequent pulsing and higher air consumption.

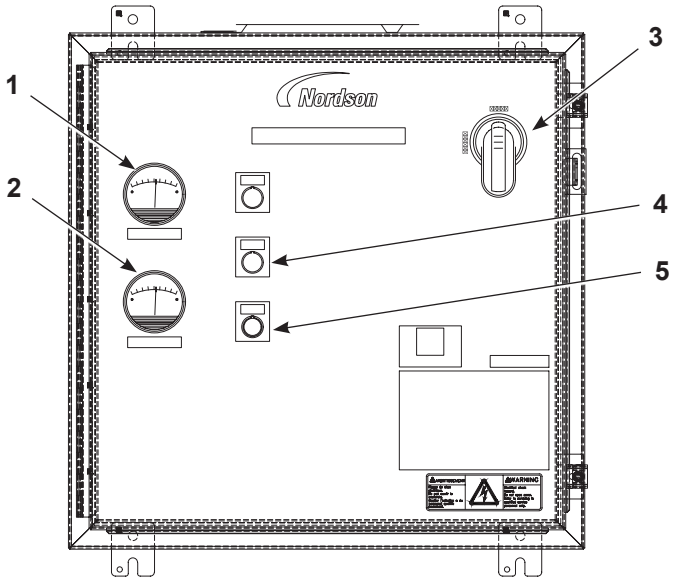


Figure 20 Control Panel

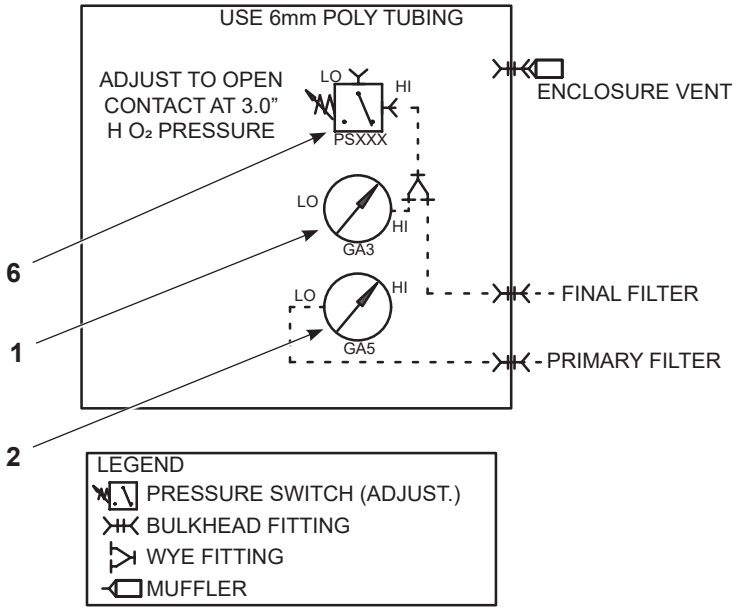


Figure 21 Pneumatic Layout

Pulse Valve Timer Settings

See Figure 22. Locate the sequential timer board on the inside door of the electrical panel.

PULSE DURATION (ON TIME): Time pulse valves are open. Factory set to 0.1 second. Normally, this setting does not have to be changed.

PULSE FREQUENCY (OFF TIME): Time between pulses. Set as desired. This setting is dependent on the volume of powder being sprayed and the static pressure reading on the cartridge filters. A lower setting results in more frequent pulsing and higher air consumption.

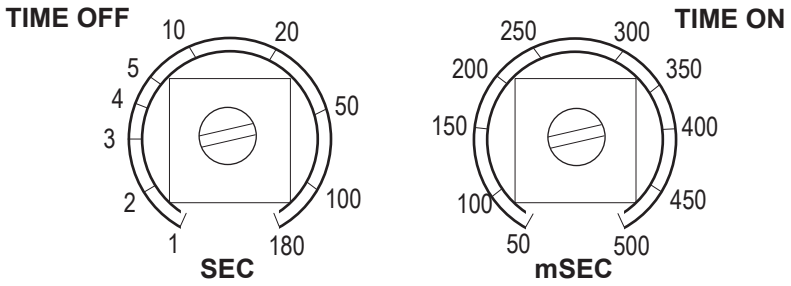


Figure 22 Pulse Valve Timer Settings

Shutdown

1. See Figure 20. Blow the powder off the canopy walls.
2. Vacuum the waste powder off the floor.
3. Clean your powder application equipment.
4. Shut off the exhaust fan (5).
5. Turn off the control panel disconnect switch (3).

Troubleshooting

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

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

Problem	Possible Cause	Corrective Action
1. Powder escaping from booth openings	Cartridge filters clogged because	
	• Inadequate pulse pressure	Increase the pulse air pressure.
	• Pulse off timing too long	Decrease the pulse off time.
	• Powder too fine or contaminated	If using reclaimed powder, reduce the ratio of reclaimed-to-virgin powder. Check powder particle size, if necessary.
	• Powder contaminated	Replace the contaminated powder.
	• Pulse valve or solenoid valve malfunction	Isolate the problem component and repair as follows: • The pulse valve diaphragm is ruptured. If you hear a hissing sound inside the fan housing, check for constant air flow from the valve. Rebuild or replace the damaged valve. • The pulse valve spring is broken, or the solenoid valve is not triggering the pulse valve. If a cartridge filter is not being pulsed, check the valve pilot air tubing and solenoid wiring; correct if disconnected or failed. Check the continuity across the solenoid terminal (with power off and locked out). If it is shorted open, replace the solenoid. If the solenoid valve is good, replace the pulse valve.
	Cross drafts	Check for cross drafts across the booth openings and correct as necessary.
	Parts entering booth are too hot	Cool the parts to 48 °C (120 °F) or below before bringing them into the booth.
	Powder flow exceeds ability of exhaust fans to contain	Reduce the powder flow or the number of guns.
	Booth openings exceed design criteria	Close off or decrease the size of the opening.
	Parts too large, interrupting flow of air through booth	Contact your Nordson representative.
	Exhaust fan rotation reversed	Reverse the rotation of the motor by switching the wiring.

Continued...

Problem	Possible Cause	Corrective Action
	Final filters are clogged	Check final filter differential pressure gauge. If over 3-in. w.c., check cartridge filter media and gaskets for damage. Replace damaged filters.
	Fuse(s) blown	Check for the reason the fuse(s) blew and correct it. Replace the blown fuse(s).
2. Exhaust fan shuts down, will not restart	Fan motor overload shutdown	Correct one of the following possible motor, contactor, fuse or operational problems as needed: • Check the exhaust fan for proper rotation direction. • Check for mechanical binding of the motor/fan assembly. • Check for contact corrosion at the motor starter in the control panel. • Check the overload protector in the control panel.
3. Cartridge pulsing will not start	No air supply to pulse manifolds	Check the air supply.
	Solenoid shorted; blows timer board fuse	Call an electrician.
	Timer board malfunction or other electrical problem	Call an electrician.

Parts

To order parts, call the Nordson Finishing Customer Support Center at (800) 433−9319 or your local Nordson representative.

Part	Description	Note
6000 CFM Fixed Collector Modules		
1614248	BOOTH, Vantage FCM 6K, 460 V, standard	
1615045	BOOTH, Vantage FCM 6K, 460 V, with canopy	
1615534	BOOTH, Vantage FCM 6K, 575 V, standard	
1615540	BOOTH, Vantage FCM 6K, 575 V, with canopy	
8000 CFM Fixed Collector Modules		
1614345	BOOTH, Vantage FCM 8K, 460 V, standard	
1615259	BOOTH, Vantage FCM 8K, 460 V, with canopy	
1615532	BOOTH, Vantage FCM 8K, 575 V, standard	
1615538	BOOTH, Vantage FCM 8K, 575 V, with canopy	

Model-Specific Parts

See Figure 23 and refer to the following parts list.

Item	Part	Description	Note
6000 CFM Fixed Collector Module			
1	1614233	FAN, wheel, BIDI20 CCW, VCII	
2	1614232	CONE, fan, 6K	
3	1614226	MOTOR, 7.5 HP, 3P, 1750R, 575V, 213TC, Rev 2	A
5	1042592	VALVE, solenoid enclosure, 4 port	
8000 CFM Fixed Collector Module			
1	1614384	FAN, wheel, BI22 CCW, RCM	
2	1614383	CONE, inlet, BI22, RCM	
3	1614377	MOTOR, 10 HP, 215T	A
5	1614387	VALVE, solenoid enclosure, 6 port	
NOTE: A. Check existing motor ID plate for voltage and order correct motor for your system.			

Parts Common to All Models

See Figure 23 and refer to the following parts list.

	Part	Description	Note
NS	1014960	VALVE, diaphram, pulse, 1-in.	
6	1042591	FILTER, cartridge, 48 in.	
4	1032826	FILTER, final, 35.5 x 20.5 x 5.5 in.	A
4	1066540	FILTER, final, 35.5 x 23.5 x 11.5 in.	B
NS	1607848	KIT, mac valve, 1 NPT, muffler	
NOTE: A. Used on 6000 CFM collector module. B. Used on 8000 CFM collector module. NS: Not Shown			

Control Panel Parts

Refer to *Drawings* section for control panel spare parts.

Service Kits

Item	Part	Description	Qty	Note
NS	211229	SERVICE KIT, caulk, clear, Lexel®	1	
NS: Not Shown				

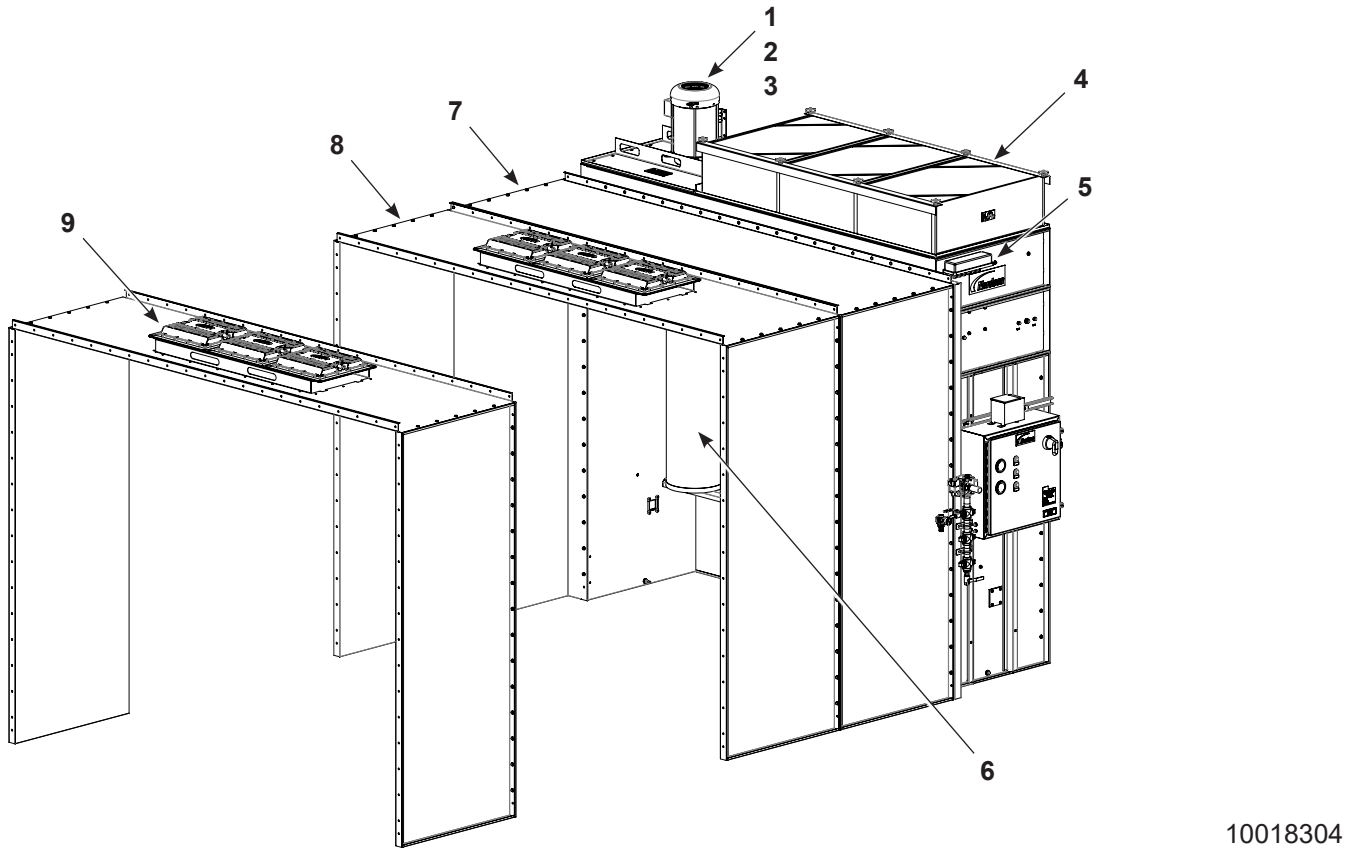


Figure 23 Collector Module Parts

Optional Parts

Canopies

See Figure 23 and refer to the following parts list.

Item	Part	Description	Note
6000 CFM Fixed Collector Module			
7	1614480	CANOPY, Vantage, extension, galvanized, 7 ft x 8 ft x 3 ft	
8	1614481	CANOPY, Vantage, extension, galvanized, 7 ft x 8 ft x 3 ft, with light	
8000 CFM Fixed Collector Module			
7	1614482	CANOPY, Vantage, extension, galvanized, 8 ft x 10 ft x 3 ft	
8	1614483	CANOPY, Vantage, extension, galvanized, 8 ft x 10 ft x 3 ft, with light	

LED Light

See Figure 23 and refer to the following parts list.

Item	Part	Description	Qty	Note
9	1621761	LIGHT, roof	AR	
AR: As Required				

Baffle and Kick Plate

See Figure 24 and refer to the following parts list.

Item	Part	Description	Note
1	1102501	BAFFLE, 6000 CFM Vantage FCM	A
	1106570	BAFFLE, 8000 CFM Vantage FCM	B
2	1106562	PLATE, kick, 6000 CFM Vantage FCM	A
	1106563	PLATE, kick, 8000 CFM Vantage FCM	B

NOTE: A. Used on 6000 CFM collector module.

B. Used on 8000 CFM collector module.

NS: Not Shown

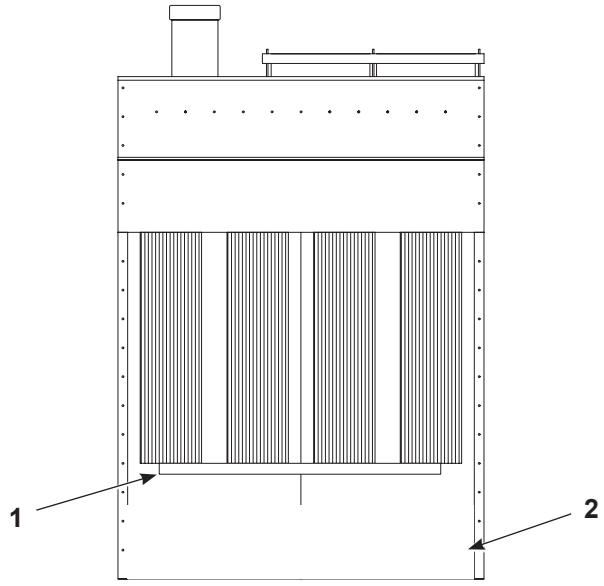


Figure 24 Baffle and Kit Plate Parts

Powder Recovery Assembly

See Figure 25 and refer to the following parts list.

Item	Part	Description	Quantity	Note
—	1614488	KIT, powder recovery, Vantage FCM, 6K	—	
—	1614489	KIT, powder recovery, Vantage FCM, 8K	—	
—	1614490	KIT, powder recovery, Vantage FCM, 10K, 12K	—	
1	- - - - - -	• HOPPER, Vantage FCM	1	
2	309476	• MOUNT, pump with tube, 18-in., 3/8 NPS	1	
3	165633	• PUMP, transfer, 10 mm inlet, 19 mm outlet	1	
NS	- - - - - -	• RAMP, powder, Vantage FCM	1	
NS	1067694	• KIT, ground bus bar, ESD, 6 position, with hardware	1	
NS	1069787	• TUBING, powder, antistatic 19 mm (0.75 in.) ID	100 ft (30.5 m)	
4	900593	TUBING, polyethylene, 10 mm x 8 mm, blue		
NS: Not Shown				

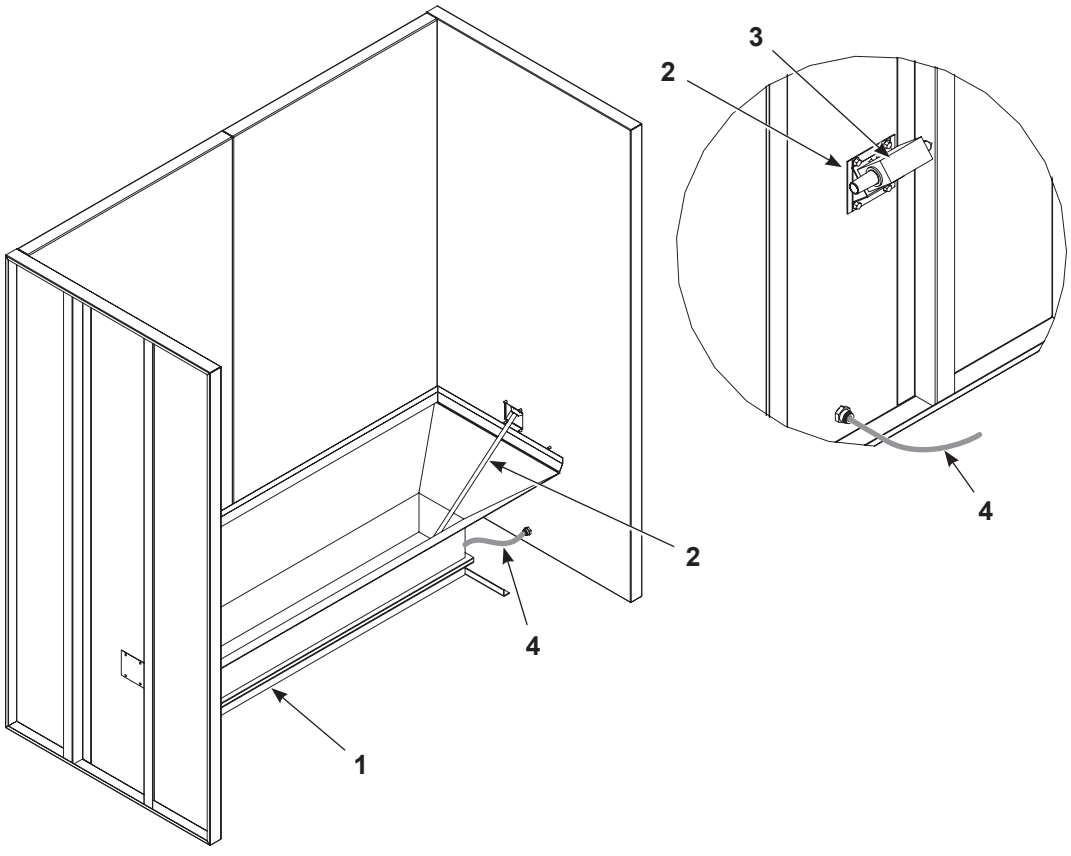


Figure 25 Hopper Parts

Miscellaneous

Part	Description	Note
176474	KIT, blowoff gun, 20 ft	
1614491	KIT, 3.5 in. vent stub, color module	A
NOTE: A. Does not include air assist.		

Drawings

Drawing Number	Description
10017488	Ref. Dwg, Control Panel, FCM

MATERIAL NO. 10017488 REVISION 05

ZONE	REV	DESCRIPTION	BY	CHK	RELEASE NO.	DATE
	00	PRELIMINARY	JRK	JK	PE-100604	23FEB18
	01	RELEASED FOR PRODUCTION	JRK	JK	PE-100604	24JUL18
	02	UPDATED P/NS IN EXHAUSTER REF. CHART	EW	EW	PE-101829	25JUN19
	03	UPDATED P/NS IN TRANSFORMER REF. CHART	JK	TAR	PE-105166	26JUN22
	04	REMOVE TDR508,SOL500,SOL508	JK	TAR	PE-105530	17OCT22
	05	REVISED OL FOR PN 1613158,M407 FOR 1615180	JK	TAR	PE-106146	22MAY23

MAIN PANEL

	DESIGNATION	QTY	DESCRIPTION	PART NO.	MFG.
		1	24 x 24 x 8 ENCLOSURE	A242408LP	HOFFMAN
		1	SUB-PANEL	A24P24	HOFFMAN
	DISC301	1	DISCONNECT SWITCH	SEE REF. CHART	ABB
	DISC301	1	HANDLE	OHB65J6	ABB
	DISC301	1	SHAFT	OXP6X210	ABB
	DISC301	1	ADAPTER, PADLOCK, OPEN PANEL	DS-SA1	ABB
	FU401	2	FUSE,T-D,CC,REJ,600V (TRANSFORMER)	SEE REF. CHART	BUSSMANN
	FU401	1	FUSEBLOCK	BCM603-2PQ	BUSSMANN
	T402	1	TRANSFORMER	SEE REF. CHART	HAMMOND
	CB404	1	CIRCUIT BREAKER	SEE REF. CHART	CUTLER-HAMMER
	M407	1	CONTACTOR,IEC,3-P,N-REV,120V	SEE REF. CHART	CUTLER-HAMMER
	M407	1	AUXILIARY CONTACT, 2NO, TOP	SEE REF. CHART	CUTLER-HAMMER
	CR410	1	RELAY,CONTROL,10A,120V,DPDT	D7PR2A	CUTLER-HAMMER
	CR410	1	RELAY BASE	D7PA9	CUTLER-HAMMER
04					
	FU401;CB404;CR410;TDR508	1FT	DIN RAIL	C-103-PM	CUSTOM CONNECTOR
	LT405	1	LIGHT, INDICATING, GREEN	M22-L-G-230G	CUTLER-HAMMER
	PBL407	1	PUSHBUTTON, ILLUM, N.O., AMBER	M22S-DL-A-K10-230W	CUTLER-HAMMER
	PB407	1	PUSHBUTTON, N.C., RED	M22S-DH-R-K01	CUTLER-HAMMER
	LT405;PBL407;PB407	3	NAMEPLATE HOLDER	4050510	CEMBRE
	LT405;PBL407;PB407	3	NAMEPLATE (WHITE)	4111171	CEMBRE
	LT405;PBL407;PB407	3	COVER WINDOW	990521	CEMBRE
	TD502	1	TIMER BOARD	DCT610	DWYER
	PS407	1	PRESSURE SWITCH	1910-5	DWYER
	PS407	1	SWITCH MOUNT BRACKET	SPEC	SANDUSKY ELECTRIC
	GA1	1	MINIHELIC GAGE 0-3 IN. W.C.	2-5003NPT	DWYER
	GA2	1	MINIHELIC GAGE 0-5 IN. W.C.	2-5005NPT	DWYER
	GA1,GA2	2	O-RING GASKET	4464T214	MCMASTER CARR
	GA1,GA2	2	PIPE COUPLING, 1/8NPT	50785K91	MCMASTER CARR
04					
04					
04	GA1,GA2	2	MALE ELBOW	KQ2L06-01S	SMC
	PS407	1	BRANCH TEE	KQ2T06-01S	SMC
04	GA2;PS407	2	BULKHEAD UNION	KQ2E06-00	SMC
04	GA1,2;PS407	A/R	6mm POLYTUBING	TS0604-BU	SMC
		1	BREATHER VENT	9833K23	MCMASTER CARR
		1	LOCKNUT	50785K143	MCMASTER CARR
		1	GROUND TERMINAL STRIP	D167-6	ILSCO
	TB1	2 FT	DIN RAIL	C-103-PM	CUSTOM CONNECTOR
	TB1	2	END ANCHOR	XBAES35C	CUTLER-HAMMER
	TB1	1	END SECTION	XBACUT10	CUTLER-HAMMER
	TB1	41	CONTROL TERMINAL BLOCK, 30A	XBUT4	CUTLER-HAMMER
	TB1	2	JUMPER, 2-POS	XBAFBS26	CUTLER-HAMMER
	TB1	1	JUMPER, 10-POS	XBAFBS106	CUTLER-HAMMER
		4 FT	WIREDUCT 1.5" X 3" / COVER	TYD1X3WPW6 / TYD1CPW6	THOMAS & BETTS
		4 FT	WIREDUCT 1" X 3" / COVER	TYD15X3WPW6 / TYD15CPW6	THOMAS & BETTS
		1	DECAL,NORDSON TRADEMARK,BLUE,5.50IN,	1107931	NORDSON
		1	WARNING LABEL	C30838-01	CLARION SAFETY
		1	CAUTION LABEL	C30838-02	CLARION SAFETY
1	EXHAUSTER OPTION				
	OL407	1	OVERLOAD,IEC,3-P,FXD HTR	SEE REF. CHART	CUTLER-HAMMER
	FU306	3	FUSE,D-E T-D,J,600V	SEE REF. CHART	BUSSMANN
	FU306	1	FUSEBLOCK	SEE REF. CHART	BUSSMANN

TOTAL CURRENT CALC. CHART

	460V	575V
1/2 HP	1.1	0.9
6000 CFM 7.5 HP	11.0	9.0
8000 CFM 10 HP	14.0	11.0
10000 CFM 15 HP	21.0	17.0
12000 CFM 20 HP	27.0	22.0
500VA TRANX	1.1	0.9
1.0KVA TRANX	2.1	1.7
= TOTAL CURRENT		

TRANSFORMER REF. CHART 03

T402	460V	575V
500VA	QC50LECB	QC50PECB
FU401	FNQ-R-2.5	FNQ-R-2
CB404	FAZ-C4-1-NA-SP	
1.0KVA	Q1C0LEKB	Q1C0PEKB
FU401	FNQ-R-5	FNQ-R-4
CB404	FAZ-C8-1-NA-SP	

EXHAUSTER REF. CHART

VANTAGE FCM 6000 – 7-1/2 HP MOTOR		
02 PART NUMBER	1613158	1615180
ITEM	460V	575V
M407	XTCE012B10A	XTCE012B10A 05
M407	XTCEXFAC20	XTCEXFAC20
05 OL407	XTOB012BC1	XTOB010BC1
FU306	LPJ-20SP	LPJ-20SP
FU306	J60030-3CR	J60030-3CR
VANTAGE FCM 8000 – 10 HP MOTOR		
PART NUMBER	1613159	1615179
ITEM	460V	575V
M407	XTCE018C10A	XTCE012B10A
M407	XTCEXFAC20	XTCEXFAC20
OL407	XTOB016CC1	XTOB012BC1
FU306	LPJ-25SP	LPJ-20SP
FU306	J60030-3CR	J60030-3CR
VANTAGE FCM 10000 – 15 HP MOTOR		
02 PART NUMBER	1615019	1615178
ITEM	460V	575V
M407	XTCE025C10A	XTCE018C10A
M407	XTCEXFAC20	XTCEXFAC20
OL407	XTOB024CC1	XTOB024CC1
FU306	LPJ-40SP	LPJ-30SP
FU306	J60060-3CR	J60030-3CR
VANTAGE FCM 12000 – 20 HP MOTOR		
02 PART NUMBER	1615033	1615177
ITEM	460V	575V
M407	XTCE032C10A	XTCE025C10A
M407	XTCEXFAC20	XTCEXFAC20
OL407	XTOB032CC1	XTOB024CC1
FU306	LPJ-50SP	LPJ-40SP
FU306	J60060-3CR	J60060-3CR

DISCONNECT REF. CHART

TOTAL SYSTEM CURRENT	PART NO.
25A	OT25F3
40A	OT40F3
60A	OT63F3
100A	OT100F3

NOTES:

1. INDICATES OPTIONAL EQUIPMENT
2. ALL PHASES OF INSTALLATION MUST COMPLY WITH ALL FEDERAL, STATE AND LOCAL CODES. ALL WORK LOCATED IN CLASS 2, DIVISIONS 1 AND 2 HAZARDOUS LOCATIONS MUST COMPLY WITH NFPA CODE 33 AND NFPA CODE 70, ESPECIALLY ARTICLES 500, 502 AND 516, LATEST EDITIONS.
3. UL 508
4. ARTWORK OF NORDSON LOGO AND EMANUALS QR CODE TO BE PROVIDED BY NORDSON

ALL DIMENSIONS IN INCHES EXCEPT AS NOTED
X.XX±.03 X.XXX±.010
MACHINED SURFACES 125
BREAK INSIDE/OUTSIDE CORNERS .005/.030
THREAD LENGTH DIMENSIONS ARE FULL THREAD
INTERPRET DRAWINGS PER ASME Y14.5-2009
PERFECT FORM AT MMC REQUIRED FOR INTERRELATED FEATURES
THIRD ANGLE PROJECTION

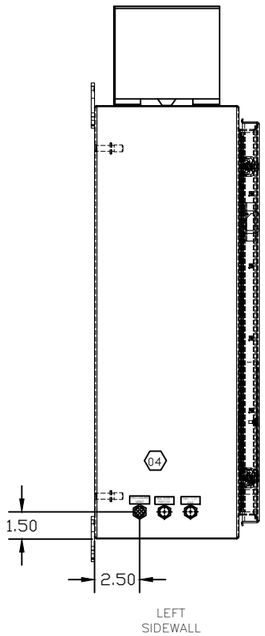
NORDSON CORPORATION
WESTLAKE, OH, U.S.A. 44145

DESCRIPTION: REF DWG,PANEL,ELECTRICAL,VANTAGE FCM

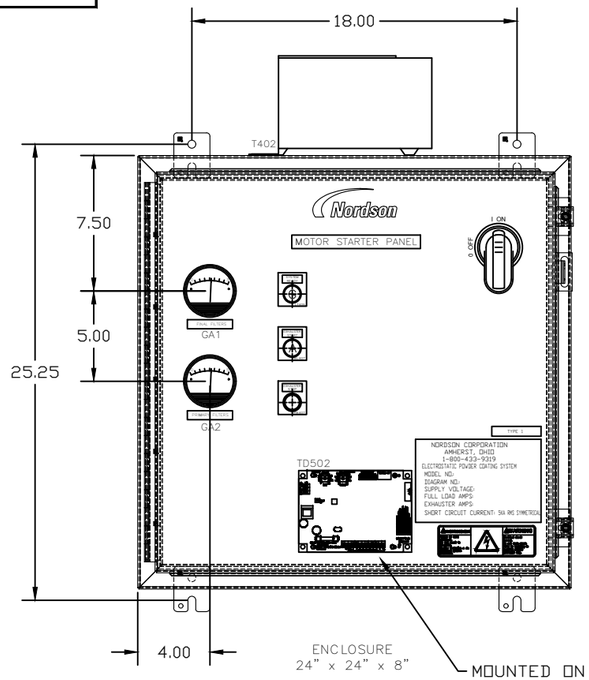
DRAWN BY JRK	DATE 23FEB18	RELEASE NO. PE-100604	
CHECKED BY JRK	APPROVED BY JRK		
SIZE D	FILE NAME 10017488	MATERIAL NO. 10017488	REVISION 05
SCALE: FULL	CADD GENERATED DWG.	SHEET 1 OF 5	

MATERIAL NO.	REVISION
10017488	05

ZONE	REV	DESCRIPTION	BY	CHK	RELEASE NO.	DATE
		SEE SHEET 1 FOR REVISION HISTORY	JRK		PE-100604	24JUL18

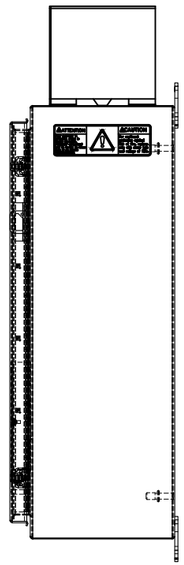


LEFT SIDEWALL

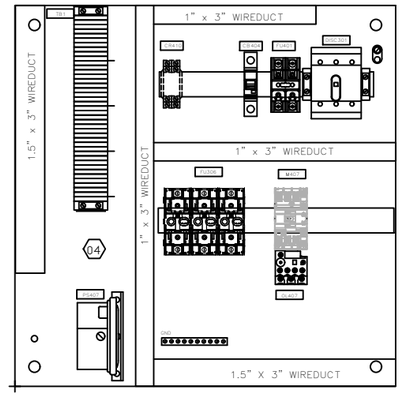


ENCLOSURE
24" x 24" x 8"

MOUNTED ON INSIDE OF DOOR



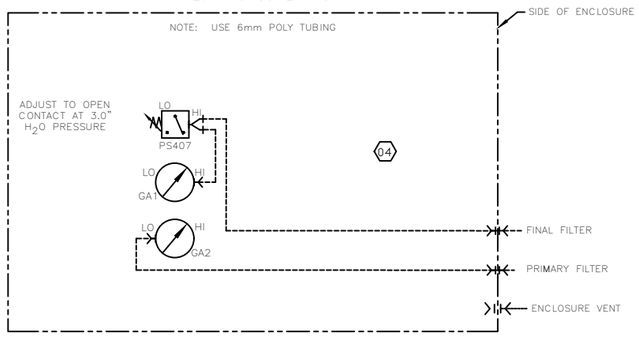
RIGHT SIDEWALL



PNEUMATIC LEGEND

- PRESSURE SWITCH (ADJUST.)
- QUICK DISCONNECT (DISCONNECTED)
- SOLENOID VALVE, 2-WAY

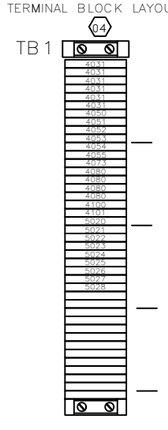
PNEUMATIC SCHEMATIC



LEGEND

- PRESSURE SWITCH (ADJUST.)
- BULKHEAD FITTING
- WYE FITTING
- MUFFLER

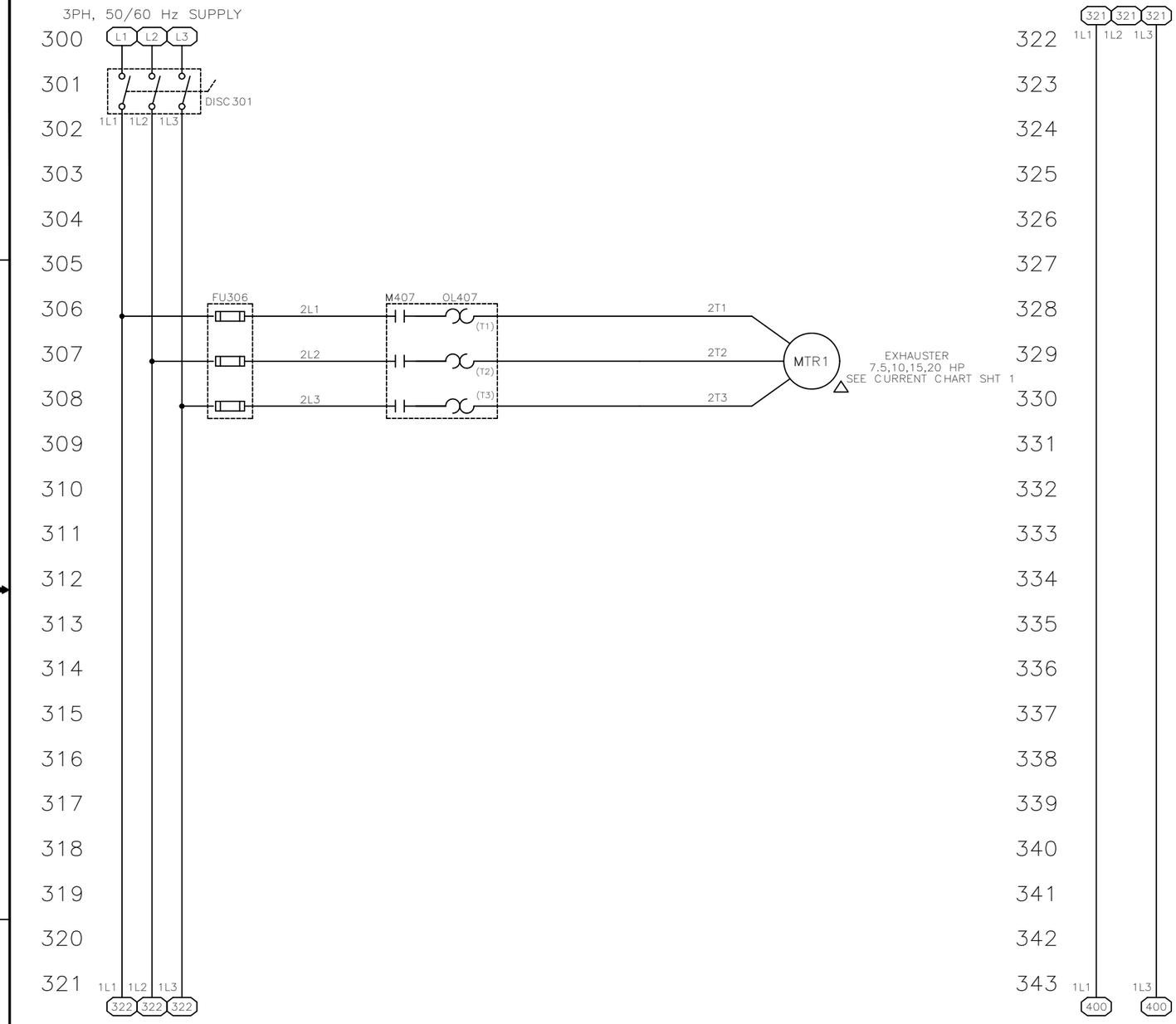
TERMINAL BLOCK LAYOUT



ALL DIMENSIONS IN INCHES EXCEPT AS NOTED	NORDSON CORPORATION WESTLAKE, OH, U.S.A. 44145		
X.XX±.03 X.XXX±.010	DESCRIPTION	REF DWG,PANEL,ELECTRICAL,VANTAGE FCM	
MACHINED SURFACES			
BREAK INSIDE/OUTSIDE CORNERS .005/.030	DRAWN BY JRK	DATE 23FEB18	RELEASE NO. PE-100604
THREAD LENGTH DIMENSIONS ARE FULL THREAD	CHECKED BY JRK	APPROVED BY JRK	
INTERPRET DRAWINGS PER ASME Y14.5-2009	SIZE D	FILE NAME 10017488	MATERIAL NO. 10017488 REVISION 05
PERFECT FORM AT MMC REQUIRED FOR INTERRELATED FEATURES			
THIRD ANGLE PROJECTION	SCALE: FULL	CADD GENERATED DWG.	SHEET 2 OF 5

MATERIAL NO. 10017488 REVISION 05

ZONE	REV	DESCRIPTION	BY	CHK	RELEASE NO.	DATE
		SEE SHEET 1 FOR REVISION HISTORY	JRK	JRK	PE-100604	24JUL18

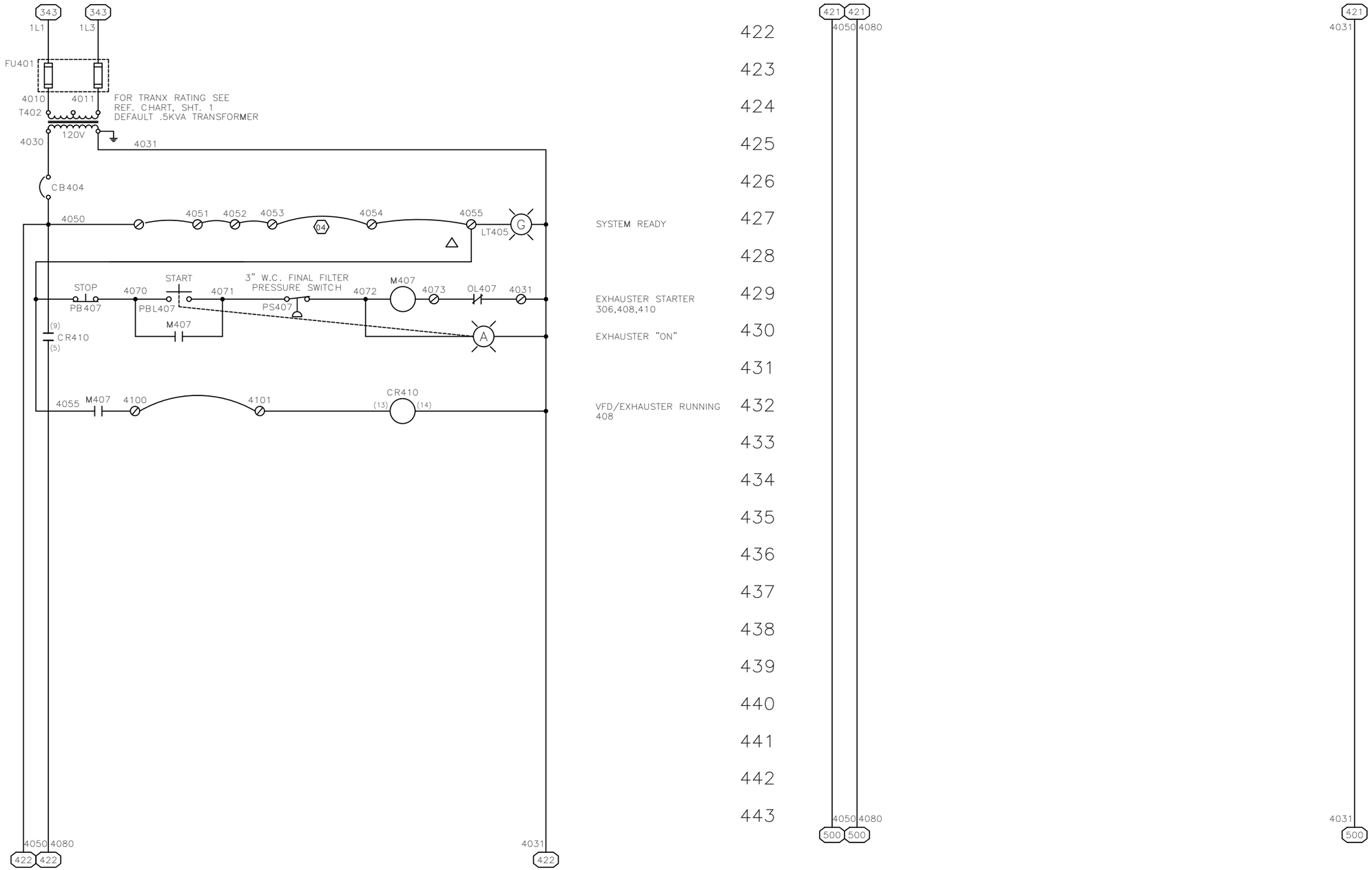


LEGEND
△ – REMOTELY LOCATED DEVICE
⊘ – MOTOR STARTER PANEL TERMINAL
⊗ – REMOTE J-BOX TERMINAL

ALL DIMENSIONS IN INCHES EXCEPT AS NOTED	NORDSON CORPORATION WESTLAKE, OH, U.S.A. 44145		
X.XXX±.03 X.XXX±.010	DESCRIPTION REF DWG,PANEL,ELECTRICAL,VANTAGE FCM		
MACHINED SURFACES 63			
BREAK INSIDE/OUTSIDE CORNERS .005/.030			
THREAD LENGTH DIMENSIONS ARE FULL THREAD	DRAWN BY JRK	DATE 23FEB18	RELEASE NO. PE-100604
INTERPRET DRAWINGS PER ASME Y14.5-2009	CHECKED BY JRK	APPROVED BY JRK	
PERFECT FORM AT MMC REQUIRED FOR INTERRELATED FEATURES	SIZE D / FILE NAME 10017488	MATERIAL NO. 10017488	REVISION 05
THIRD ANGLE PROJECTION	SCALE: FULL	CADD GENERATED DWG.	SHEET 3 OF 5

MATERIAL NO. 10017488 REVISION 05

ZONE	REV	DESCRIPTION	BY	CHK	RELEASE NO.	DATE
		SEE SHEET 1 FOR REVISION HISTORY	JRK	JRK	PE-100604	24JUL18

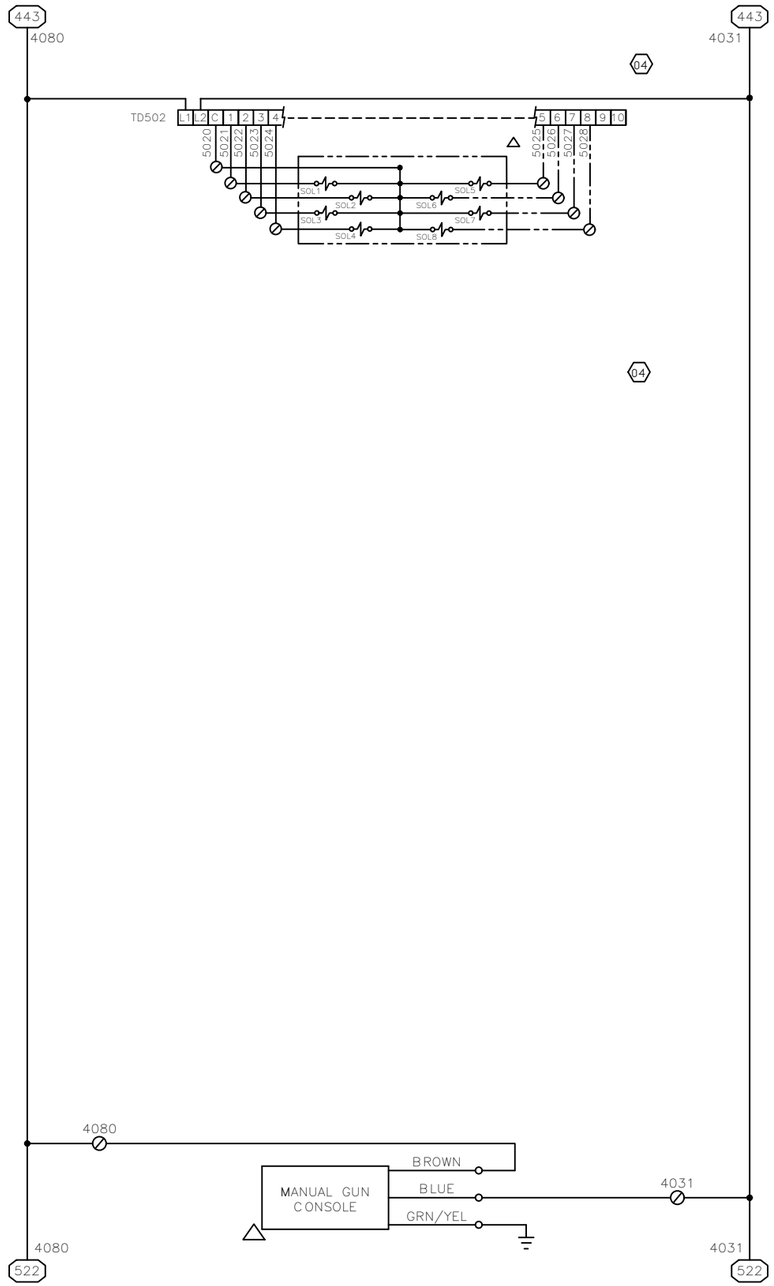


LEGEND
△ – REMOTELY LOCATED DEVICE
⊘ – MOTOR STARTER PANEL TERMINAL
⊗ – REMOTE J-BOX TERMINAL

ALL DIMENSIONS IN INCHES EXCEPT AS NOTED	NORDSON CORPORATION WESTLAKE, OH, U.S.A. 44145	
X.XXX±.03 / X.XXX±.010	DESCRIPTION REF DWG,PANEL,ELECTRICAL,VANTAGE FCM	
MACHINED SURFACES		
BREAK INSIDE/OUTSIDE CORNERS .005/.030		
THREAD LENGTH DIMENSIONS ARE FULL THREAD	DRAWN BY JRK / DATE 23FEB18	RELEASE NO. PE-100604
INTERPRET DRAWINGS PER ASME Y14.5-2009	CHECKED BY JRK / APPROVED BY JRK	
PERFECT FORM AT MMC REQUIRED FOR INTERRELATED FEATURES	SIZE D / FILE NAME 10017488 / MATERIAL NO. 10017488	REVISION 05
THIRD ANGLE PROJECTION	SCALE: NTS / CADD GENERATED DWG.	SHEET 4 OF 5

MATERIAL NO. 10017488 REVISION 05

ZONE	REV	DESCRIPTION	BY	CHK	RELEASE NO.	DATE
		SEE SHEET 1 FOR REVISION HISTORY	JRK	JRK	PE-100604	24JUL18



LEGEND
△ – REMOTELY LOCATED DEVICE
⊘ – MOTOR STARTER PANEL TERMINAL
⊗ – REMOTE J-BOX TERMINAL

ALL DIMENSIONS IN INCHES EXCEPT AS NOTED	NORDSON CORPORATION WESTLAKE, OH, U.S.A. 44145
X.XXX±.03 X.XXX±.010	DESCRIPTION REF DWG,PANEL,ELECTRICAL,VANTAGE FCM
MACHINED SURFACES	
BREAK INSIDE/OUTSIDE CORNERS .005/.030	
THREAD LENGTH DIMENSIONS ARE FULL THREAD	DRAWN BY JRK / DATE 23FEB18 / RELEASE NO. PE-100604
INTERPRET DRAWINGS PER ASME Y14.5-2009	CHECKED BY JRK / APPROVED BY JRK
PERFECT FORM AT MMC REQUIRED FOR INTERRELATED FEATURES	SIZE D / FILE NAME 10017488 / MATERIAL NO. 10017488 / REVISION 05
THIRD ANGLE PROJECTION	SCALE: NTS / CADD GENERATED DWG. / SHEET 5 OF 5