

Flame Detection System Control Panel

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

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Contact Us

Nordson Corporation welcomes requests for information, comments, and inquiries about its products. General information about Nordson can be found on the Internet using the following address:

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Change Record

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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

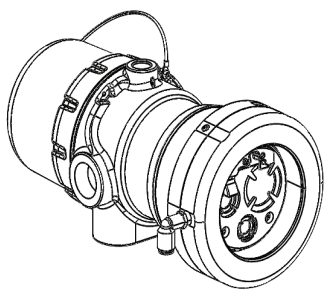
Flame Detection System Components

The flame detection system control panel houses the flame detector indicators, alarms, interlocks, and controls of the flame detection system.

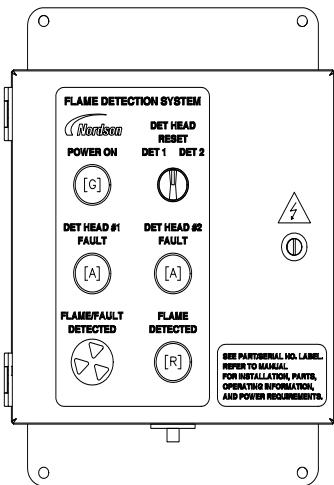
The flame detection system is installed in a coating system booth and interfaces with the booth and the application system controls. The flame detector shuts down the booth, application equipment, and the conveyor when it detects a flame in the booth.

See Figure 1. The flame detection system consists of one or two detector heads and an indicator panel. The detector circuit is available as either a 120/230 Vac or as a control board and operator controls that can be integrated into a booth control panel.

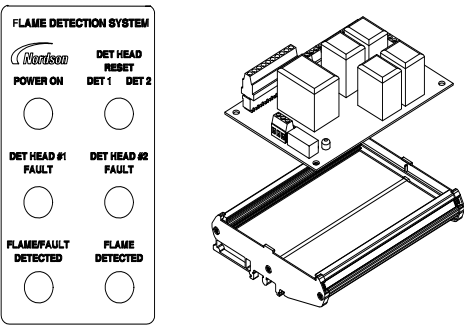
Flame Detector Head



Flame Detection AC-Power Control Panel



Flame Detector Integration Kit



Field Wiring Connector Adapter Kit

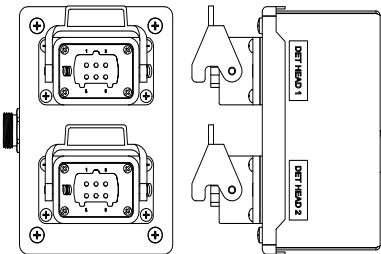


Figure 1 Flame Detection System Components

Control Panel Components

See Figure 2.

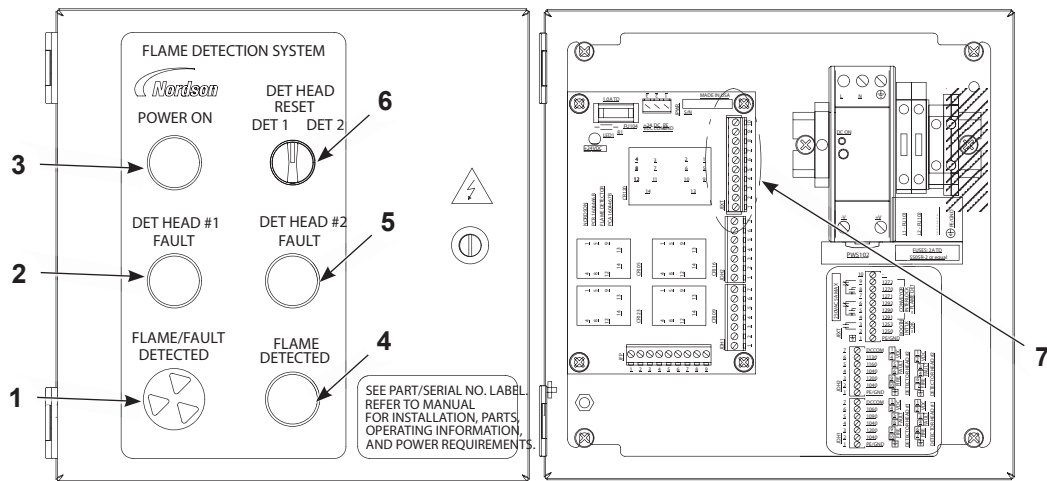


Figure 2 Flame Detector Control Panel Components

Alarm Buzzers

1. FLAME/FAULT DETECTED (continuous tone)

Indicators

2. DET. HEAD 1 FAULT (amber)
3. POWER ON (green)
4. FLAME DETECTED (red)
5. DET. HEAD 2 FAULT (amber)

Reset Switch

6. The DET. HEAD RESET switch is a three-position momentary selector switch used to reset the detector heads after a fault has been corrected. Moving the switch to the left resets DET. HEAD 1. Moving the switch to the right resets DET. HEAD 2.

NOTE: A detector fault condition will reset with the next self-test if a dirty lens fault occurs.

Interlocks

7. If a flame is detected in the booth, the conveyor interlocks will shut down the following:
 - Booth
 - Conveyor
 - Customer-use (alarm or other external device)

Refer to *Installation* for instructions on wiring these interlocks, and *Specifications* for the relay contact conditions during fault, major fault, and flame alarms.

Theory of Operation

Flame Detection

If a flame is detected inside the booth, interlock relays in the indicator panel open and shut down the exhaust fan, application equipment, and conveyor.

The red FLAME DETECTED indicator lights and the flame alarm sounds.

Faults

The FAULT DETECTED indicator light and the fault alarm alert the operators of problems with the detector heads. There are two fault modes:

Fault: A fault occurs when one detector head loses power, fails a through-the-lens test, or has a microprocessor/sensor module malfunction.

The fault indicator for that detector head lights and the fault alarm sounds.

No interlocked equipment is shut down if two detector heads are used and only one is in fault. If only one detector head is used, any fault is treated as a major fault.

Major Fault: A major fault occurs when both detector heads lose power, fail a through-the-lens test, or have microprocessor/sensor malfunctions. Both fault indicators light and the fault alarm sounds. If only one detector head is connected, then any fault is a major fault. A major fault shuts down the booth and application equipment. The conveyor will continue to run. The conveyor is shut down only if a flame is detected.

Specifications

Interlock Relay Contact Conditions

Interlock	Terminal	Condition				
		No Power	Normal Operation	Fault	Major Fault	Fire Alarm
Booth	1250–1253	○	•	•	○	○
Conveyor	1272–1271	•	•	•	•	○
	1271–1270	○	○	○	○	•
Customer Use	1292–1291	•	•	•	•	○
	1291–1290	○	○	○	○	•
• = Closed contact ○ = Open contact						
All relays are rated at 120-240 Vac, 5A.						

Item	Specification
Indicator Input Voltage	100–240 Vac, 1 phase, 1 A, 50/60 Hz
Temperature Rating	-40 °C to +85 °C, (-40 °F to +185 °F)

Dimensions

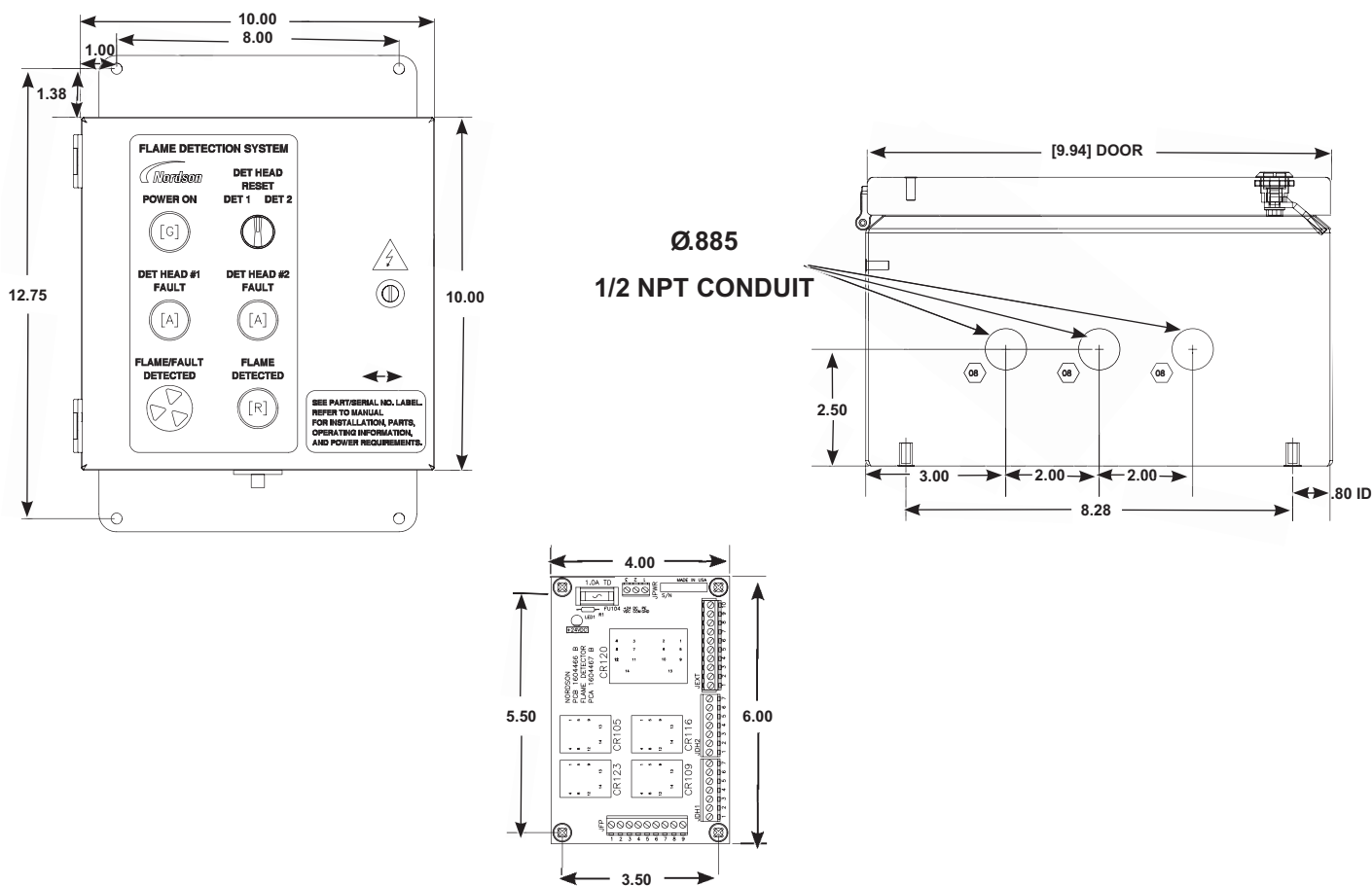


Figure 3 Dimensions

AC-Powered Control Panel

Make connections according to Figure 5. Supply 120–240 Vac, 1 phase, 50/60 Hz, 2 amp electrical service with ground to the indicator panel from the booth electrical panel. Use three-wire cable, flexible or rigid conduit, and liquid-tight conduit fittings.

NOTE: Connections must be made so that power is supplied to the indicator panel as long as the booth electrical power is turned on. Supply service must be provided from a disconnect switched source.

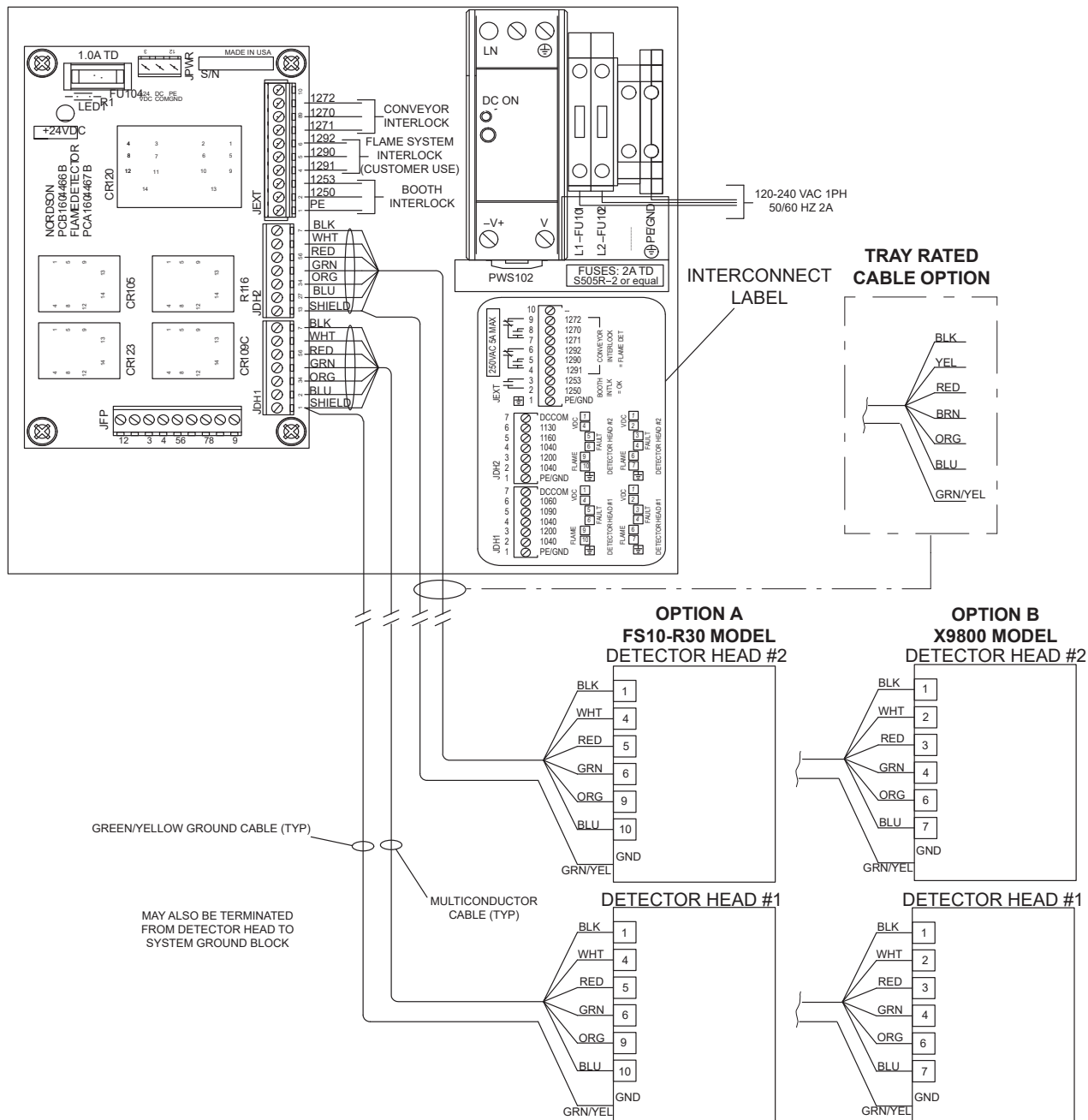


Figure 5 Installation Wiring Diagram – Flame Detection Control Panel, AC Power, Indicator Panel

Operation

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

Control Panel Interface Components

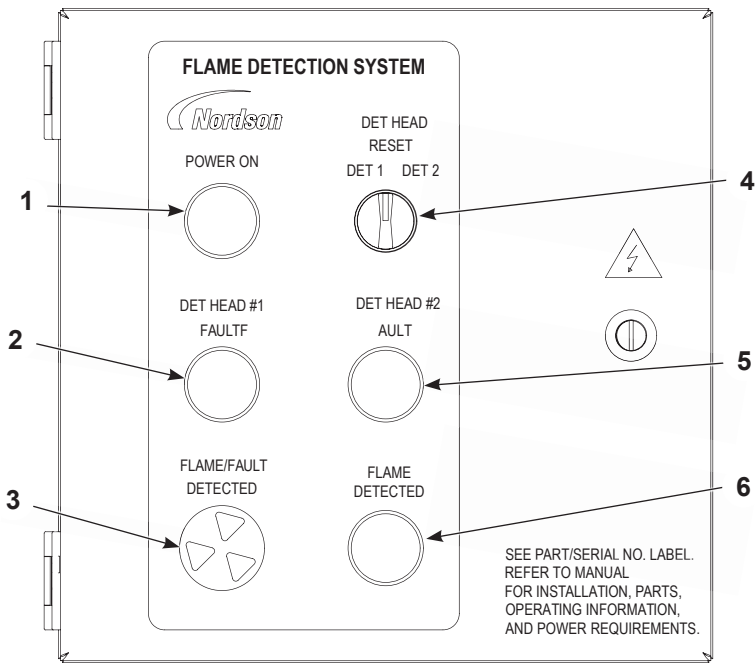


Figure 6 Flame Detector Panel Interface Components

- | | | |
|-----------------------|-------------------------|-----------------------|
| 1. Power On | 3. Flame Detector Alarm | 5. Det. Head Fault #2 |
| 2. Det. Head Fault #1 | 4. Reset | 6. Flame Detected |

Startup

NOTE: Use the main disconnect switch to turn on power to the powder coating system.

See Figure 6. During startup, the following will occur:

- The green POWER ON indicator (1) on the flame detector indicator panel will light.
- The FAULT DETECTED indicators (2,5) will light then shut off if there are no faults.
- The red FLAME DETECTED indicator (6) will stay off.

Normal Mode

See Figure 6. In normal operating mode, the following will occur:

- The green POWER ON indicator (1) is on.
- The amber FAULT (2,5) and red FLAME DETECTED indicators (6) are off.
- Interlocked equipment can be started.

Flame Mode

See Figure 6. When a flame is detected, the following will occur:

- The red FLAME DETECTED (6) indicator turns on.
- The audible alarm (3) turns on.
- The booth and conveyor interlock relays open. The booth, application equipment, and conveyor shut down.
- The flame interlock contact (customer-use) changes state. Customer-use equipment is either activated or deactivated, depending on use.

Fault Mode

See Figure 6. In fault mode, the following will occur:

- The amber FAULT DETECTED indicator (2,5) will correspond to the faulted detector head light.
- All interlocked equipment continues to run with one out of two detector heads in fault mode.



WARNING: Immediately correct any condition that causes a fault or major fault. Do not operate the coating system with the flame detector shut down or bypassed, or with a malfunctioning flame detector component.

The system indicates a fault mode if the following occurs:

- Detector head loses power.
- Through-the-lens test fails.
- Microprocessor/sensor module malfunctions in one of the detector heads in the system.

When the fault is corrected, the FAULT DETECTED indicator (2,5) turns off and normal mode resumes.

Major Fault Mode

The system goes into major fault mode when faults are detected in both detector heads, preventing the detection of a flame.



WARNING: Immediately correct any condition that causes a fault or major fault. Do not operate the coating system with the flame detector shut down or bypassed, or with a malfunctioning flame detector component.

See Figure 6. In major fault mode, the following will occur:

- Both amber FAULT DETECTED indicators (2,5) will light.
- The audible alarm (3) turns on.
- The booth flame interlock opens, shutting down the booth and application equipment.
- The conveyor continues to run.

NOTE: If only one detector head is installed, any fault is treated as a major fault.

When the fault is corrected, the FAULT DETECTED indicator(s) and siren turn off and normal mode resumes.

Reset

To reset a detector head after a fault has been corrected, move the DET. HEAD RESET switch (4) toward the appropriate detector head number, then release it.

Maintenance



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



WARNING: Keep the detector head lenses clean. Dirty lenses can prevent the detector heads from detecting a flame in the booth. Failure to observe this warning could result in property damage or personal injury.

NOTE: Keeping the lenses clean will prevent nuisance fault alarms or shutdowns. A dirty lens can cause a through-the-lens test to fail, triggering a fault. If only one detector head is installed, a fault will shut down the coating system during production.

Periodically

Check all electrical connections periodically. Tighten any loose terminals. Replace any wiring that has worn or damaged insulation. Make sure conduit fittings are tight.

Troubleshooting



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



WARNING: Hazardous voltages are present inside the indicator panel when booth power is on. Do not touch exposed terminals or wiring when checking voltages. Use insulated tools. Failure to observe could result in severe shock and personal injury.

These troubleshooting procedures cover only the most common problems. If you cannot solve a problem with the information given here, contact your local Nordson representative for help.

Problem	Possible Cause	Corrective Action
No power (green POWER ON indicator on panel is off)	Blown fuse in indicator panel or on flame detection PCA	Check the fuses on the terminal block. Replace if necessary with 2A fuse.
	Bad wiring to booth electrical panel	1. See attached wiring drawings. 2. Check for correct voltage at L1 and L2 terminals in the indicator panel terminal block. If correct voltage is present, refer to the next Possible Cause. If correct voltage is not present, repair or replace the wiring.
	Indicator panel dc power supply failed or bad wiring to detector heads	1. Check for 24 Vdc at terminals JFP –1 (+) and JFP –2 (–) of the flame detector PCA. If 24 Vdc is not present, remove the detector head wiring from flame detector PCA terminals. 2. Check for 24 Vdc again. 3. If 24 Vdc is still not present, replace the power supply. 4. If 24 Vdc is present, check the wiring to the detector heads.

Repair



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



WARNING: Disconnect and lock out electrical power before servicing.

Refer to the *Parts* section of this manual for a listing of replaceable spare parts.

Parts

To order parts, call the Nordson Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

Using the Illustrated Parts List

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

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

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

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

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

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

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

Flame Detector Control Panel

See Figure 7 and the following parts list.

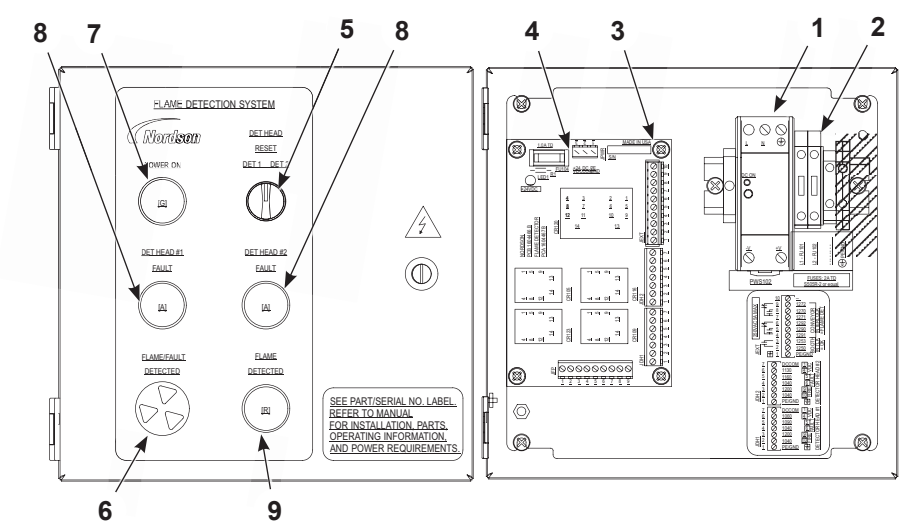


Figure 7 Flame Detector Panel

Item	Part	Description	Quantity	Note
—	1604827	CONTROL PANEL, flame detection, ac-powered	1	A
1	1606678	• POWER SUPPLY, 30 W, 24 V, 1.3 A, din rail	1	
2	939955	• FUSE, SPT, time-delay, 5x20 mm, 250 V, 2 A, UL/VDE	2	
3	1604467	• PCA, flame detector	1	
4	239213	• FUSE, time-delay, 5x20, 1 A, 250 V	1	
5	1606912	• ROTARY SW, 3 position, spring ret ctr, delay, 22 mm	1	
6	1606913	• AUDIO ALARM, piezo, continuous, pnl-mnt, 27 mm	1	
7	1606914	• LIGHT, pilot, ext rnd, 24 Vdc, green, 22 mm	1	
8	1606915	• LIGHT, pilot, ext rnd, 24 Vdc, amber, 22 mm	2	
9	1606916	• LIGHT, pilot, ext rnd, 24 Vdc, red, 22 mm	1	
NOTE: A. 1604827 replaces 307445.				

Flame Detector Panel Kit

See Figure 8 and the following parts list.

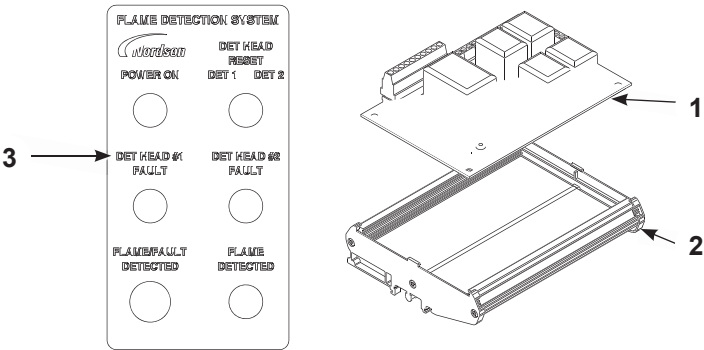


Figure 8 Flame Detector Panel Kit

Item	Part	Description	Quantity
—	1606680	KIT, flame detector panel	1
1	1604467	• PCA, flame detector	1
2	-----	• MOUNT, PCA, DIN rail	1
3	1606975	• LABEL, overlay, flame detector panel	1

Wiring Diagrams

Part	Description
1604827	Control panel, flame detection, AC power
10014504	Schematic, adapter, field wiring, flame detection

