NFS-1000 Fire Detection System

Customer Product Manual
Part 108 051E

NORDSON CORPORATION • AMHERST, OHIO • USA

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Notice

Trademarks

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NFS-1000 Fire Detection System

1. Safety

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

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

Qualified Personnel

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

Intended Use

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

Some examples of unintended use of equipment include

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

Regulations and Approvals

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

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- While operating manual electrostatic spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

Fire Safety

To avoid a fire or explosion, follow these instructions.

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

Action in the Event of a Malfunction

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

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

Disposal

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

2. Description

The Nordson NFS-1000 is a microcomputer based fire detection system. It interfaces with a coating system to alert the operator and shut down the booth, spray equipment, and conveyor in the event of a fire.

The NFS-1000 system consists of a system controller, fire sensors, and COP-I light test sources. These devices communicate through a FireBus communication link. Refer to *Parts* for system part numbers, including a controller, sensors, and light test sources.

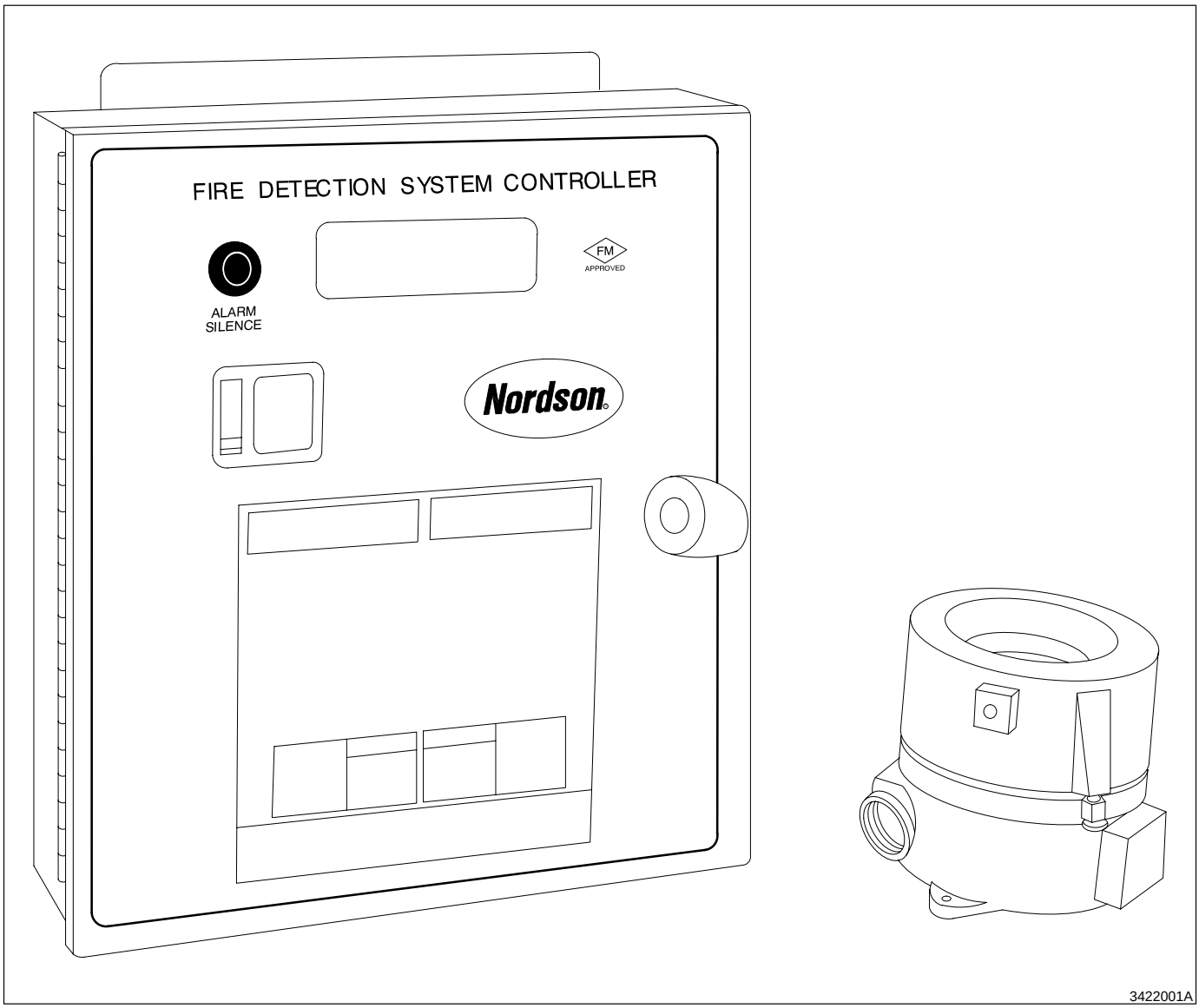

Fig. 1 NFS-1000 Fire Detection System

System Controller

The system controller is located inside a NEMA 5 dust-proof steel enclosure. The system controller governs the overall operation of the NFS-1000 Fire Detection System. The controller monitors up to twelve fire sensors or COP-I light test sources. A two-line LCD screen displays system status and fault messages.

The enclosure contains six SPDT electro-mechanical relays that shut down the spray equipment in the event of a fire. These relays can be interfaced with additional UL/FM approved equipment (alarms, extinguishers, etc.). A piezo-electric siren within the system controller sounds when a fault or fire is detected.

Fire Sensors

The fire sensors simultaneously detect UV, IR, and visible radiation. The system controller evaluates received UV and IR energy before declaring a fire, eliminating false alarms. A fire sensor can detect a fire one square foot in area within a 9,14 m (30 ft) range, over a 90° field of view.

Light Test Source

The COP-I light test source unit simulates a fire in the UV spectrum, testing the system and ensuring that the fire sensors have a clear field of view.

Theory of Operation

All system components, system controller, fire sensor(s), and COP-I light test source(s), are interconnected by a FireBus communications loop. The COP-I light test source periodically emits a simulated optical fire signal when activated by the system controller. This simulated fire is detected by the fire sensors, which notify the system controller of the observed test. This test checks the integrity of the fire sensors, system controller, COP-I light test source, and the FireBus. The test also makes sure the fire sensor(s) have a clear field of view.

Major Fault Mode

WARNING: Immediately correct any condition that causes a fault or major fault. Do not operate the coating system with the fire detection system shut down or bypassed, or with any part of the system malfunctioning.

This mode shuts down interlocked equipment if the FireBus system experiences a power or communications failure, if all sensors report a fault, or if two or more sensors, but not all, report a fault.

Fault Mode

If any fire sensor or light test source is obstructed or non-functional, the operator will be notified by the system controller via the LCD display FAULT indication and siren chirp. Fire sensor(s) and COP-I light test source(s) are kept clean during operation by air shrouds that direct air across the light source/sensor lenses.

Relay Operation

During normal operation, SPDT mechanical relays 1–4 within the controller enclosure are energized to provide a closed circuit between common and normally open contacts. These four relays will de-energize, shutting down the interlocked equipment, if a fire or major fault condition occurs, or if power to the system is removed.

Relay 5, also a SPDT relay, provides a closed circuit between common and normally closed contacts during normal operation. If a fire occurs, this relay energizes to open the circuit and shut down the interlocked equipment.

SPDT relay 6 provides normally open or normally closed contacts to initiate a customer supplied fault indicator. This relay will also de-energize if any fault condition occurs.

3. Installation

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

Mounting

Mount the system controller near the system electrical panel or operator platform.

See Figure 2. Locate mounting positions for the fire sensors (1) and COP-I light test sources (2) as follows:

- The fire sensors must be mounted and aligned so that the spray guns and workpiece hangers will be in their field of view.
- The light test sources must be mounted no more than 4.6 m (15 ft) from the fire sensors, with the fire sensor lenses inside the emission angle of the light test sources (30° on either side of the light test source centerline (3)).

NOTE: The fire sensors have a 90° field of view. The light test sources have a emission angle of 60°.

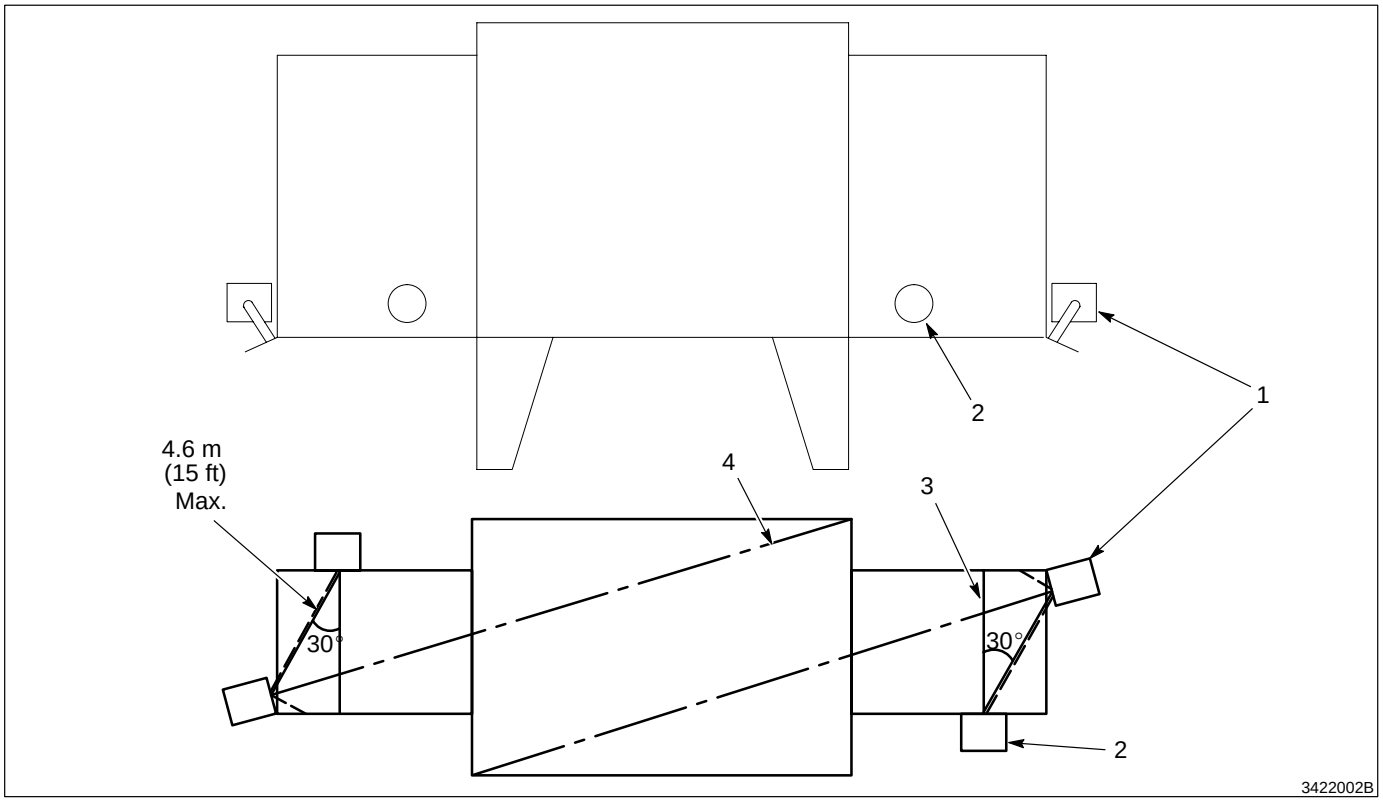

Fig. 2 Fire Sensors and Light Test Source Installation Side and Top Views

1. Flame detector
2. Light source
3. Light source centerline
4. Flame detector centerline

Light Test Source Installation

1. See Figure 3. Using the cover plate as a template, drill a 38.0-mm (1.5-in.) hole and four 7.0-mm (0.25-in.) holes in the vestibule wall of the booth.

2. Connect the cover plate (7) to the mounting bracket (4) using the screws (6). Thread the mounting studs (3) into the mounting bracket. Install the fitting (8) into the mounting bracket.

3. Slide the COP-I light test source over the mounting studs, passing the studs through the light test source mounting holes. Secure the light test source to the mounting studs with the washers (2) and nuts (1).

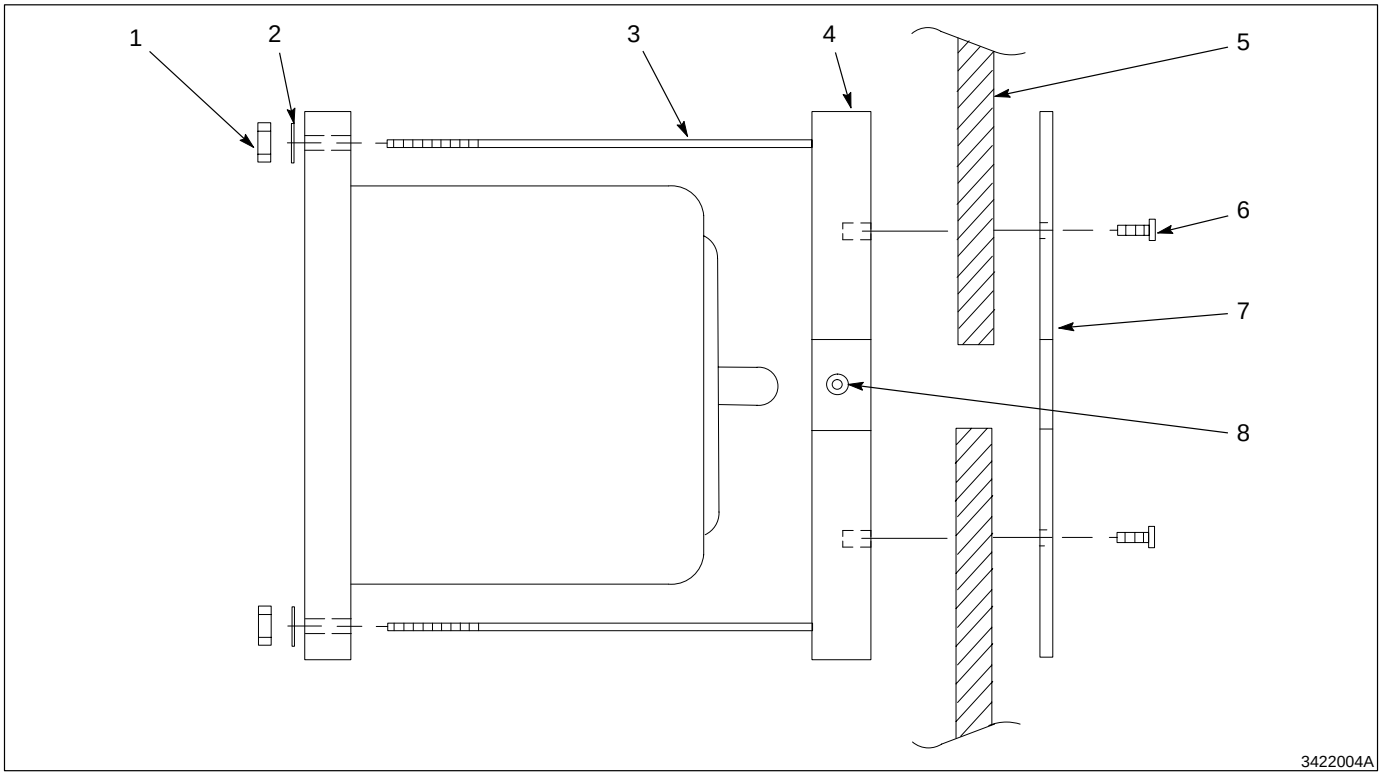

Fig. 3 Light Test Source Installation

1. Nut
2. Washer
3. Mounting studs
4. Mounting bracket
5. Vestibule wall
6. Screw
7. Cover plate
8. Fitting

Fire Sensor Installation

1. See Figure 4. Place the air disk (4) on the sensor (5).

2. Fasten the shroud bracket (2) and hold-down bracket (9) to the shroud housing (1) using the screws (10).

3. Place the shroud housing (1) over the sensor, and fasten to the sensor with the screws (6), washers (7), and nuts (8). Tighten the set screw (3).

4. Mount the fire sensors to the spray booth with the included $^{5}/_{16}$-in. hardware.

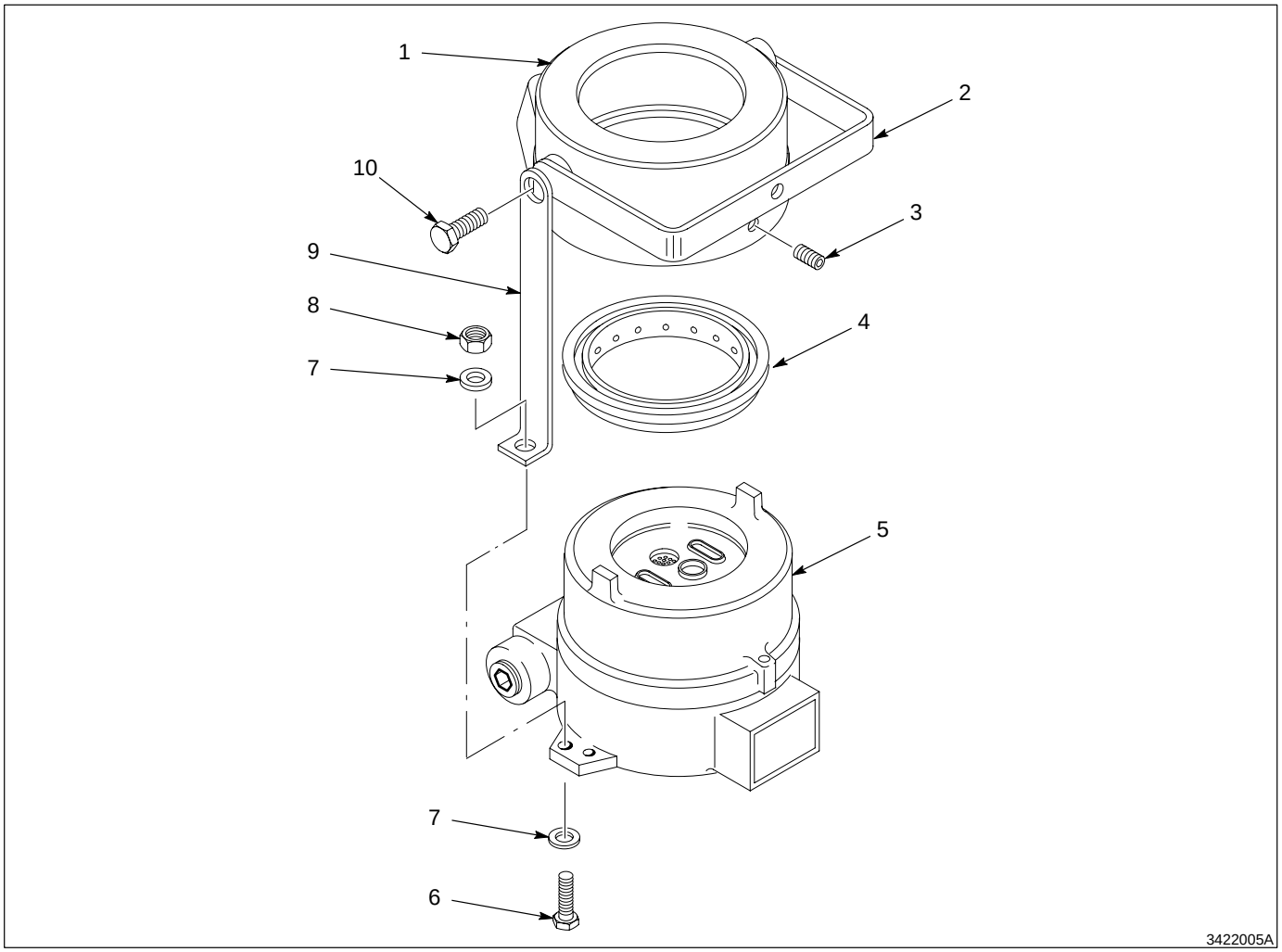

Fig. 4 Fire Sensor Installation

1. Shroud housing
2. Shroud bracket
3. Set screw
4. Air disk
5. Sensor
6. Screw
7. Washer
8. Nut
9. Hold-down bracket
10. Screw

Electrical Connections

WARNING: Shut off electrical power before connecting power supply wiring to the system controller.

Electrical connections consist of interlock wiring, FireBus wiring, and controller power supply.

Interlock Wiring

See Figure 5 and refer to the *Specifications* section for connector pin-outs. Wire SPDT relays 1 through 4 to interlock the spray equipment. Wire relay 5 to shut down the conveyor. Use relay 6 to initiate a customer supplied fault indicator. Relays 1 through 4 and relay 6 (fault relays) are normally energized. Relay 5 (fire relay) is normally de-energized.

NOTE: A loss of electrical power will cause the relays to go to their de-energized states.

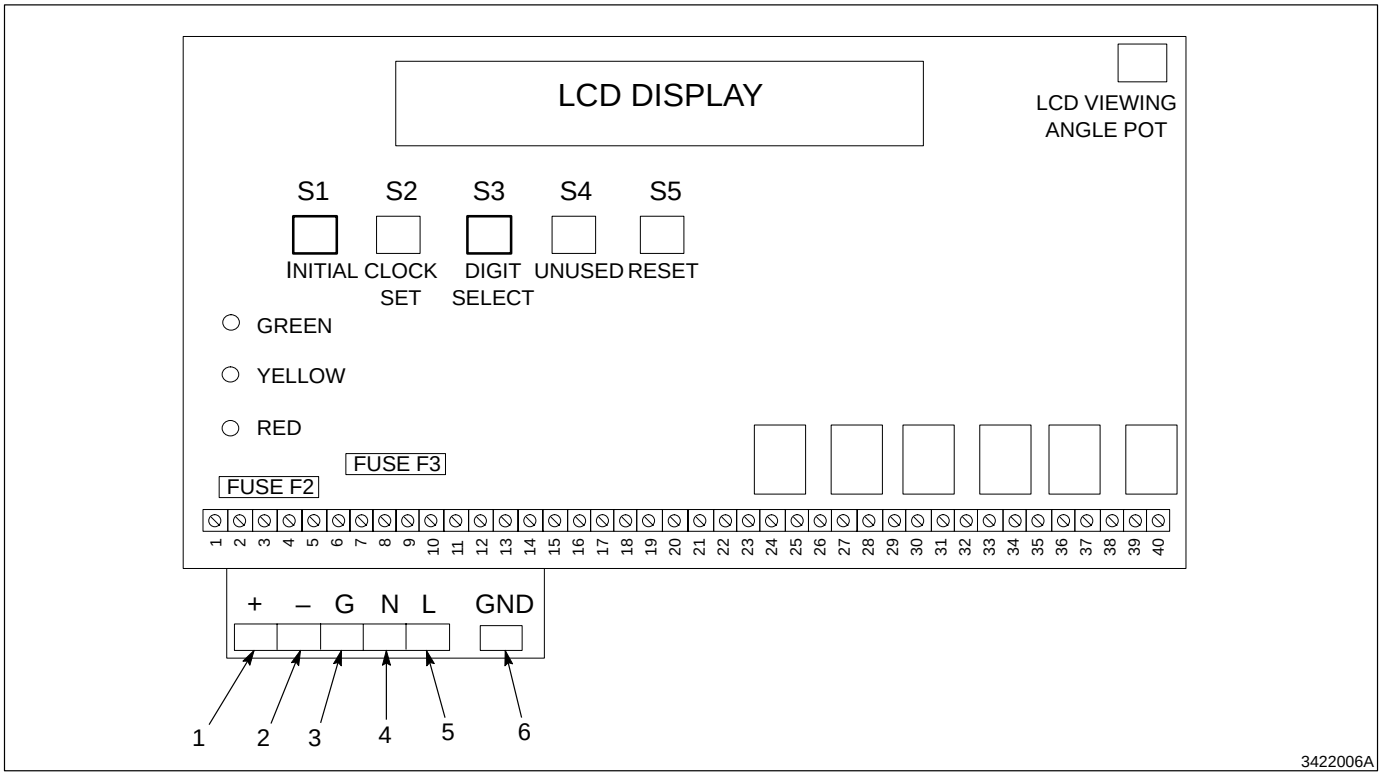

Fig. 5 Fire Detection System Controller Connection Points

1. Output +Vdc
2. Output -Vdc return
3. 110 Vac Ground input
4. 110 Vac Neutral input
5. 110 Vac Line input
6. 110 Vac chassis ground

FireBus Connections

Construct the FireBus on site, using 4-conductor 22 gauge shielded cable and the supplied connectors. A separate 18-gauge wire is required as a chassis ground for each fire sensor and light test source. Refer to the *Options* section for cable part numbers.

Total system wire length for each system controller is limited to 1219 m (4000 ft). A maximum of 12 devices may be connected to each system controller. Use a four-wire parallel loop configuration.

1. See Figure 6. Connect the cable leads to pins 5 through 8 on the 40-pin connector (2) within the system controller. Connect the chassis ground wire to the GND terminal (Fig. 5, (6)).

2. Route the cable through flexible metal conduit, along with the chassis ground wire, to the first device in the loop. Connect the conduit to the housing, using $^{3}/_{4}$-in. conduit fittings.

3. Remove the internal module from the fire sensor or light test source to connect the FireBus wiring. Refer to *the Repair* section for procedures.

CAUTION: Plugging the fire sensor and light test source connectors in backwards will cause fuse F3 on the system controller PC board to blow when power is applied.

4. Connect the wiring to the included four pin male connector, and plug the connector into the module receptacle. Make sure the respective pin numbers line up. If the connector is plugged in backwards, remove and re-insert correctly. Refer to the *Specifications* section for connector pin-outs.

   NOTE: Be sure to fill out the device location table in the controller panel. The device number is the fire sensor/light test source serial number, located on the top of the module.

5. Connect the shield (1) to terminal 5, and connect the chassis ground wire to the ground stud located within the light test source/fire sensor housing.

6. Repeat steps 2 through 5 for each fire sensor and light test source.

7. Terminate the FireBus leads on pins 9 through 12 on the system controller. Connect the separate chassis ground (3) to a true earth ground.

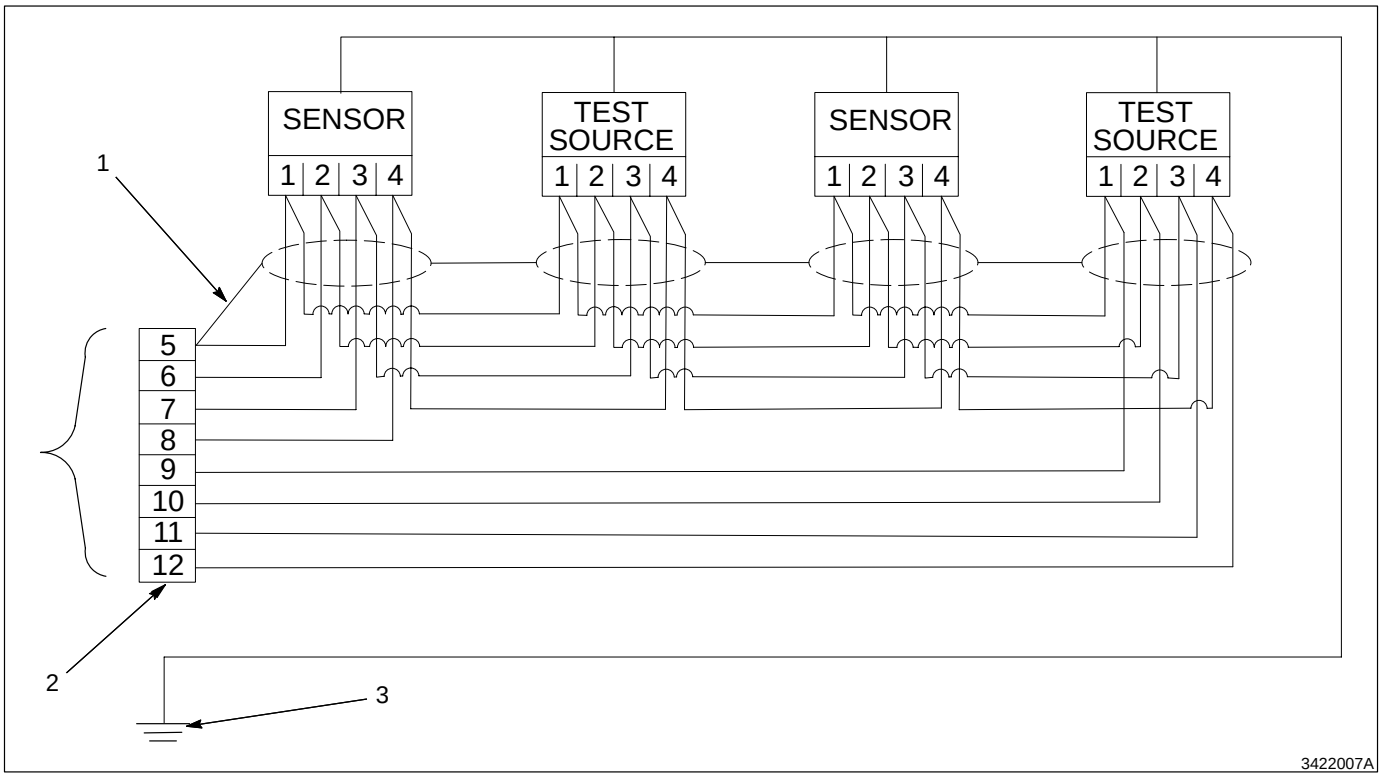

Fig. 6 FireBus Schematic

1. Shield
2. 40-pin connector
3. Chassis ground

Power Supply

See Figure 5. Connect 110 Vac power supply wiring to the Ground, Neutral, and Line terminals on the controller power supply. Connect the GND terminal to a true earth ground. The power supply is located under the controller PC board.

Pneumatic Connections

One 10-psi fixed-pressure regulator is required for each light test source/fire sensor pair. Refer to the *Parts* section for the regulator part number.

1. See Figure 7. Mount the regulators (5) as close as practical to the fire sensors and light test sources. Install a tee in the regulator output port.

2. Install $^1/_4$-in. air tubing (3) between the tee and the fire sensor and light test source. Connect a compressed air supply to the regulator input port.

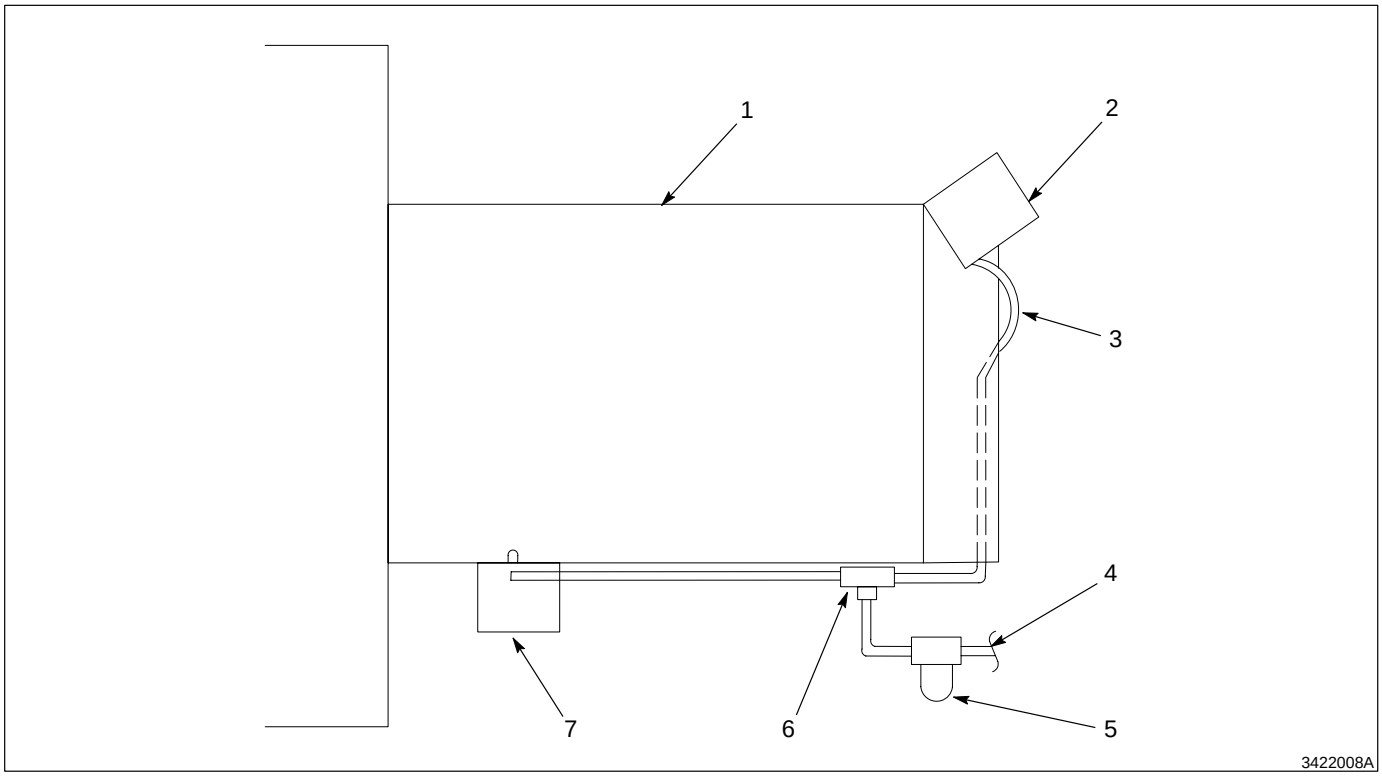

Fig. 7 Fire Sensor and Light Test Source Pneumatic Connections

1. Vestibule
2. Fire sensor
3. Air tubing
4. Air input
5. Regulator
6. Tee
7. Light test source

4. Operation

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

System Initialization

Perform this procedure after installing a new system, or any time you replace a fire sensor, light test source, or controller, or change the time or date.

1. Turn on the external power. The yellow fault LED on the controller illuminates, the red and green LEDs will remain off. The LCD display shows INITIALIZATION REQUIRED.

2. Press and hold down the INITIALIZE button. It is the black button on the controller PC board labeled S1.

3. While holding down the INITIALIZE button, press and release the RESET button. It is the red button on the controller PC board labeled S5.

4. Continue to hold down the INITIALIZE button until the SYSTEM INITIALIZING message appears on the LCD screen. Release the INITIALIZE button. The yellow FAULT LED will remain ON while the green and red LEDs remain OFF.

5. Wait for the green LED to light. The LCD should display the number of fire sensors and light test sources ON-LINE. This ensures that the system controller is communicating with each device. The procedure requires 15 to 60 seconds.

   If the procedure takes longer than 60 seconds or the wrong number of fire sensors and light test sources are shown ON-LINE, the system has not been properly configured.

6. Check the wiring connections, and make sure the terminal screws are secure, then re-initialize.

NOTE: A COP-I UNLINKED #XXXXXX message means that a fire sensor cannot detect a light test source. To correct, check for an optical path blockage, or adjust the fire sensor position to provide an optimum view angle.

7. Set the DATE/TIME. To change the DATE and TIME, press the DIGIT SELECT button until the digits to be changed are flashing. It is the black button on the controller PC board, labeled S3. Press the CLOCK SET button until the correct value is displayed. It is the white square button labeled S2.

8. Press and release the red RESET button to start the system in the NORMAL mode.

Operating Modes

Shipped systems are not initialized. Your system must be initialized before it will operate properly. Refer to *System Initialization* in this section.

Normal

- green LED on
- yellow and red LEDs off
- NFS-1000 ON VER X.X message displayed
- Relays 1 through 4 and 6 energized
- Relay 5 de-energized

Fault

WARNING: Immediately correct any condition that causes a fault or major fault. Do not operate a coating system with the NFS-1000 fire detection system shut down, bypassed, or with a malfunction. Failure to observe this warning could result in personal injury or property damage.

- yellow FAULT LED on
- siren chirps
- FAULT message displayed
- Relay 6 de-energized

The FAULT message will indicate the type of system FAULT. If the fault is corrected, the controller will turn OFF the yellow LED and siren, stop displaying a FAULT message, and revert to NORMAL mode.

Major Fault

A major fault mode shuts down interlocked equipment if conditions occur, preventing the system from detecting a fire. These conditions are:

- FireBus power failure
- FireBus communications failure
- all fire sensors report a fault
- two or more fire sensors, but not all, report a fault

When the controller determines that a major fault condition exists, the yellow FAULT LED flashes, the siren chirps once per second, a fault message is displayed, and relays 1, 2, 3, 4, and 6 are de-energized. Powder dispensing and collection equipment shut down.

The FAULT message will indicate the type of system FAULT. If the fault is corrected, the controller will turn OFF the yellow LED and siren, stop displaying a FAULT message, and revert to NORMAL mode.

Fire

- red FIRE LED turns on
- siren sounds continuously
- relays 1 through 4 are de-energized — powder dispensing and collection equipment shut down
- relay 5 is energized — conveyor system shuts down

The serial number of the fire sensor device triggering the alarm will be displayed.

Alarm Silence

Press the alarm silence button on the controller front panel to change the siren from continuous to chirp mode. The yellow FAULT LED will turn on.

The alarm silence button only works when the controller is in FIRE mode. The LCD display message will state that the alarm has been silenced, and changed to chirp mode. If an additional fire sensor detects a fire while the alarm is in the chirp mode, the alarm will begin to sound continuously.

Return to Normal Mode

To return the system to NORMAL mode, press and release the red RESET button located on the controller PC board.

Test

The controller will perform periodic automatic tests to check the operation of the fire sensors. During a test, the LCD display will indicate that a COP-I TEST is in progress.

5. Maintenance

Clean the fire sensor and light test source windows periodically, using an air blast or an oil and silicone free cloth. If necessary, use a cloth dampened with ethyl alcohol.

NOTE: Do not use a silicone-based product such as commercial window cleaner to clean the fire sensor or light test source windows.

Make sure the fire sensors and light test sources are receiving air at the correct pressure and that the air flow is keeping the windows clean.

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

6. 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.

WARNING: Immediately correct any condition that causes a fault or major fault. Do not operate a coating system with the NFS-1000 fire detection system shut down or bypassed, or with any part of the system malfunctioning.

WARNING: Hazardous voltages are present during testing procedures. Serious injury or death may result if personnel fail to observe safety precautions.

CAUTION: Printed circuit boards are susceptible to damage due to electrostatic discharge. Personnel handling printed circuit boards must be electrically grounded.

No Power

Fault	Action
No Power	Check input power source. Using a voltmeter, check for 110 Vac input power at input power connections within the system controller. See Figure 6 for test points. If power is not present, check wiring. Check for 15 Vdc output power at + and – terminals on the power supply board. See Figure 5 for test points. If power is not present at + and –, check fuses F2 and F3 on system controller PC board. Check fuse on power supply, located immediately behind GND connection for input power. Replace any blown fuse and reapply power. If fuses are not blown, replace the power supply. If power is present, remove power and verify proper wiring. There should be continuity between + and – and pins 1 and 2 respectively on system controller PC board. If continuity is not present, replace wiring. If continuity is present, proceed to next step. Check fuses. Replace any blown fuse and reapply power. If fuse blows again, check FireBus wiring and connector alignment. If the fault cannot be located, call your Nordson service representative.

Diagnostic Charts

Use the fault messages on the system controller LCD panel along with these charts to diagnose and correct problems with the fire detection system.

Faults During Start Up

LCD Fault Message	Correction	Remarks
Initialization Required	Initialize system. Refer to *System Initialization* in the *Operation* section.	**NOTE:** All faults occuring during start up will prevent the system from operating until corrected.
No Sensors On Line	Check FireBus wiring and connections. Repair or replace any damaged wiring, tighten connections. Re-initialize system.	
No Sources On Line	Check FireBus wiring and connections. Repair or replace any damaged wiring, tighten connections. Re-initialize system.	
No Devices On Line	Check FireBus wiring and connections. Repair or replace any damaged wiring, tighten connections. Re-initialize system.	
COP-I Unlinked # XXXXXX	Remove any blockage in the fire sensor/light source field of view. Check and adjust fire sensor/light source alignment. Clean lenses.	
Type Error # XXXXXX	Unsupported device connected to controller. Remove device. Check wiring and connections. Re-initialize system.	

Major Fault/Alarm Conditions

LCD Fault Message	Correction	Remarks
FireBus Power Failure	Check fuse F3 on the controller circuit board. Check FireBus power at the controller terminal strip. Refer to the *Specifications* section.	**NOTE:** These faults and alarms will cause the booth and powder application equipment to shut down.
All sensors are in fault	Check FireBus wiring and connections. If fault persists, replace sensors.	
## Sensors are in fault	Check FireBus wiring and connections. If fault persists, replace sensors.	
Fire at sensor # XXXXXX	Check for ignition source: ungrounded parts or other objects in booth.	

Normal Mode Faults

WARNING: Although Normal Mode Faults do not shut down the booth and powder application equipment, immediate action MUST be taken to correct the fault. Failure to correct a Normal Mode Fault could result in property damage or personal.

LCD Fault Message	Correction	Remarks
COP-I Path Fault # XXXXXX	Remove any blockage in the fire sensor/light source field of view. Check and adjust fire sensor/light source alignment. Clean lenses. Check the the light source bulb. Replace it if it has failed.	Clean the lenses with air, an oil-free cloth, or an oil-free cloth dampened with ethyl alcohol. After cleaning, press the Reset button on the controller.
FireBus Loop Cut	Check FireBus wiring and connections. If fault persists, replace sensors.	
ARC at Sensor # XXXXXX	Check for: ungrounded parts on conveyor or ungrounded objects in booth, gun damage, welding in area	Significant UV (spark or arcing) detected without fire being detected.
Fire Relay Fault	If this fault persists, replace the controller PC board.	
Sensor # XXXXXX Fault	Check FireBus wiring and connections. If fault persists, replace sensor module.	
Source # XXXXXX Fault	Check FireBus wiring and connections. If fault persists, replace light source module.	
Maintenance Required # XXXXXX	Check and adjust fire sensor/light source alignment. Clean lenses.	Clean the lenses with air, an oil-free cloth, or an oil-free cloth dampened with ethyl alcohol. After cleaning, press the Reset button on the controller.
Primary Power Fault	Checking incoming power for low voltage condition.	
Sen # XXXXXX Alarm (Hush)	Alarm Silence push button has been pressed.	Siren has been changed to chirp mode following a fire alarm. **NOTE:** If system is in Fire mode you will not be able to operate the booth.

7. Repair

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

Fire Sensor Repair

WARNING: Disconnect and lock out electrical power before servicing. Failure to observe could result in a severe shock.

CAUTION: Printed circuit boards are susceptible to damage due to electrostatic discharge. Personnel handling printed circuit boards must be electrically grounded.

1. See Figure 8. Remove the screw (9), washers (10), and nut (11), securing the hold-down bracket (12) to the shroud housing (1).
2. Loosen the set screws (2) securing the shroud housing (1) and air disk (3) to the lid (4).
3. Remove the shroud housing and air disk.
4. Loosen the screw (5) at the base of the lid.
5. Unscrew the lid and remove the screws (7) securing the module (6).
6. Gently lift up the module, sliding it up through the three metal standoffs.

NOTE: Be careful not to touch the detector element. If the detector is touched, gently wipe off fingerprints with a silicone- and oil-free soft cloth.

7. Disconnect the FireBus connector (8).
8. Replace failed or damaged components. Refer to the Parts section for replacement part numbers.
9. See Figure 9. With ac power off, plug the FireBus cable into the connector (8) at the bottom of the module (6). Make certain the pin numbers on the socket and plug match up.

NOTE: Plugging the connector in backwards will cause fuse F3 on the system controller PC board to blow when power is applied.

10. Re-assemble the fire sensor by reversing the disassembly procedure.

Fire Sensor Repair *(contd)*

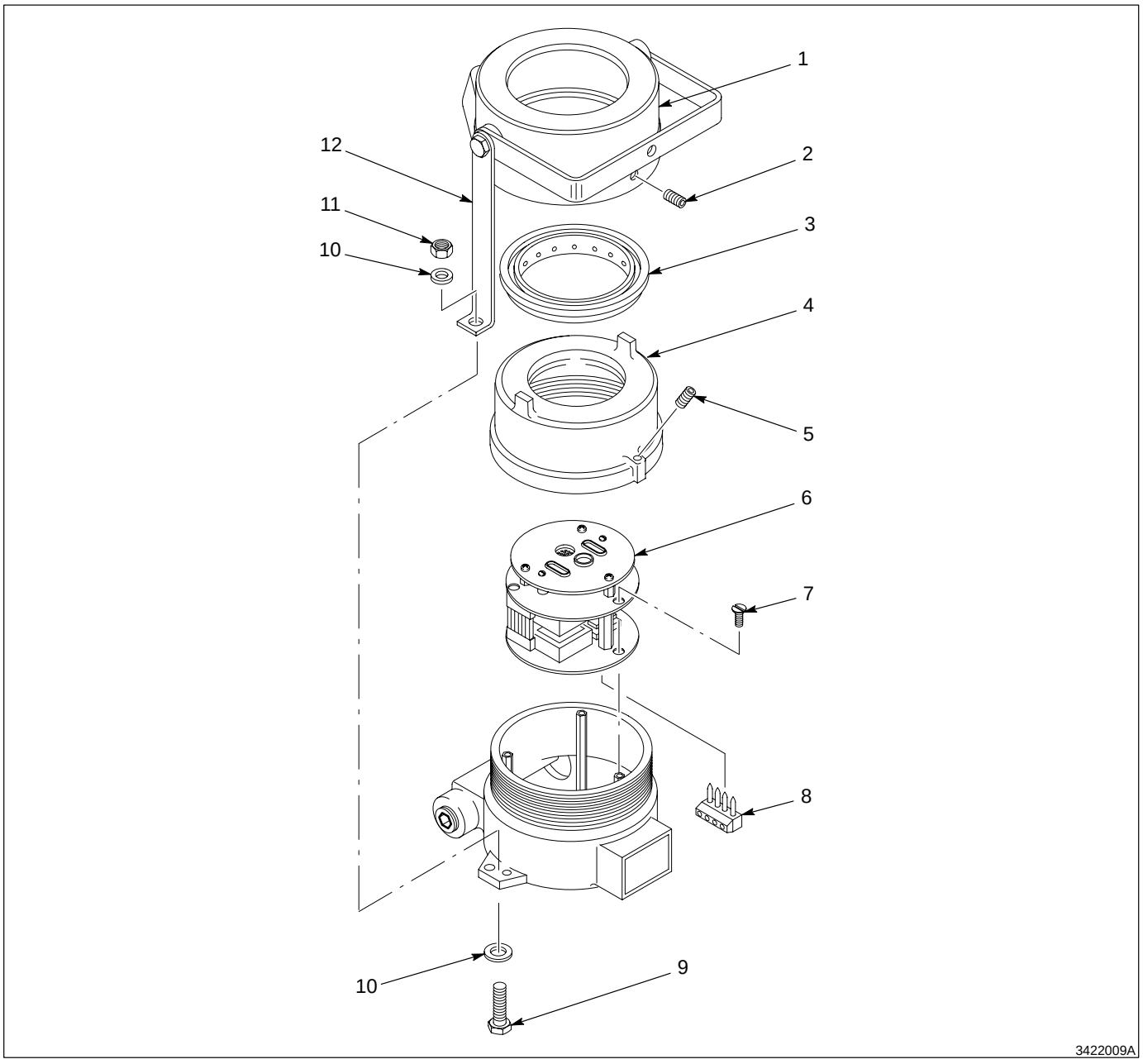

Fig. 8 Fire Sensor Disassembly/Assembly

1. Shroud housing
2. Set screw
3. Air disk
4. Lid
5. Screw
6. Module
7. Screw
8. Connector
9. Screw
10. Washer
11. Nut
12. Hold-down bracket

Light Test Source Repair

WARNING: Disconnect and lock out electrical power before servicing. Failure to observe could result in a severe shock.

CAUTION: Printed circuit boards are susceptible to damage due to electrostatic discharge. Personnel handling printed circuit boards must be electrically grounded.

NOTE: Early versions of the two-level light test source modules had a non-replaceable bulb, requiring module replacement when the bulb failed. Later versions of the two-level module were fitted with a replaceable bulb. The latest versions of the module have only one level and a replaceable bulb.

1. See Figure 9. Remove the screws (1) securing the cover plate (2) to the mounting bracket (3).
2. Remove the nuts (9) and washers (10) to remove the mounting bracket (3).
3. Loosen the screw (5) at the base of the lid (4). Unscrew the lid.
4. Refer to the note above. If only the bulb requires replacement, unplug the bulb and install a new one. Re-assemble the light test source. If replacing the module, perform the following steps.
5. Remove the screws (7) securing the module (6).
6. Gently lift up the module, sliding it up through the three metal standoffs.

NOTE: Be careful not to touch the source element. If it is accidentally touched, gently wipe off fingerprints with a silicone and oil free soft cloth.

7. Disconnect the FireBus connector (8).
8. Replace failed or damaged components. Refer to the *Parts* section for replacement part numbers.
9. See Figure 9. With ac power off, plug the FireBus cable into the connector (8) at the bottom of the module (6). Make certain the pin numbers on the socket and plug match up.

NOTE: Plugging the connector in backwards will cause fuse F3 on the system controller PC board to blow when power is applied.

10. Re-assemble the light test source by reversing the disassembly procedure.

Light Test Source Repair

(contd)

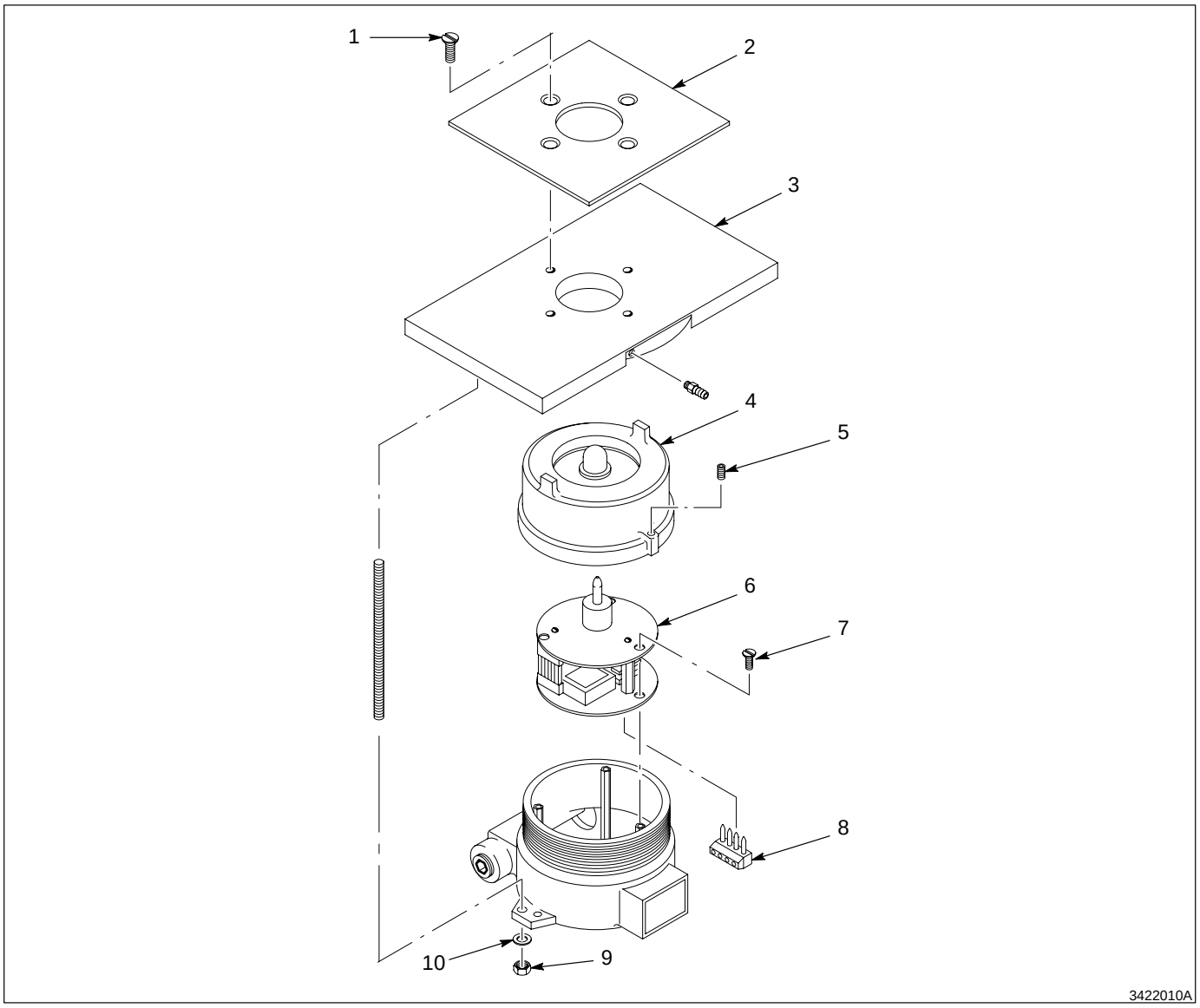

Fig. 9 Light Test Source Disassembly/Assembly

1. Screw
2. Cover plate
3. Mounting bracket
4. Lid
5. Screw
6. Module
7. Screw
8. Connector
9. Nut
10. Washer

System Controller Repair

WARNING: Disconnect and lock out electrical power before servicing. Failure to observe could result in a severe shock.

CAUTION: Printed circuit boards are susceptible to damage due to discharge. Personnel handling printed circuit boards must be electrically grounded.

1. See Figure 10. Open the enclosure door and disconnect the connectors (6) from the PC board (4).
2. Remove the screws (5). Remove the PC board from the enclosure.
3. Remove the standoffs (3) and lift the mounting plate (2) from the enclosure.
4. If necessary, remove the screws (1) and the power supply (7).
5. Replace failed or damaged components. Refer to the *Parts* section for replacement part numbers.
6. Install the power supply (7) using the screws (1).
7. Install the mounting plate (2) over the studs within the enclosure.
8. Install the standoffs (3) on the studs.
9. Install the main PC board (4) within the enclosure, using the screws (5).
10. Attach the connectors (6) to the main PC board.
11. Close and lock the enclosure door.

System Controller Repair

(contd)

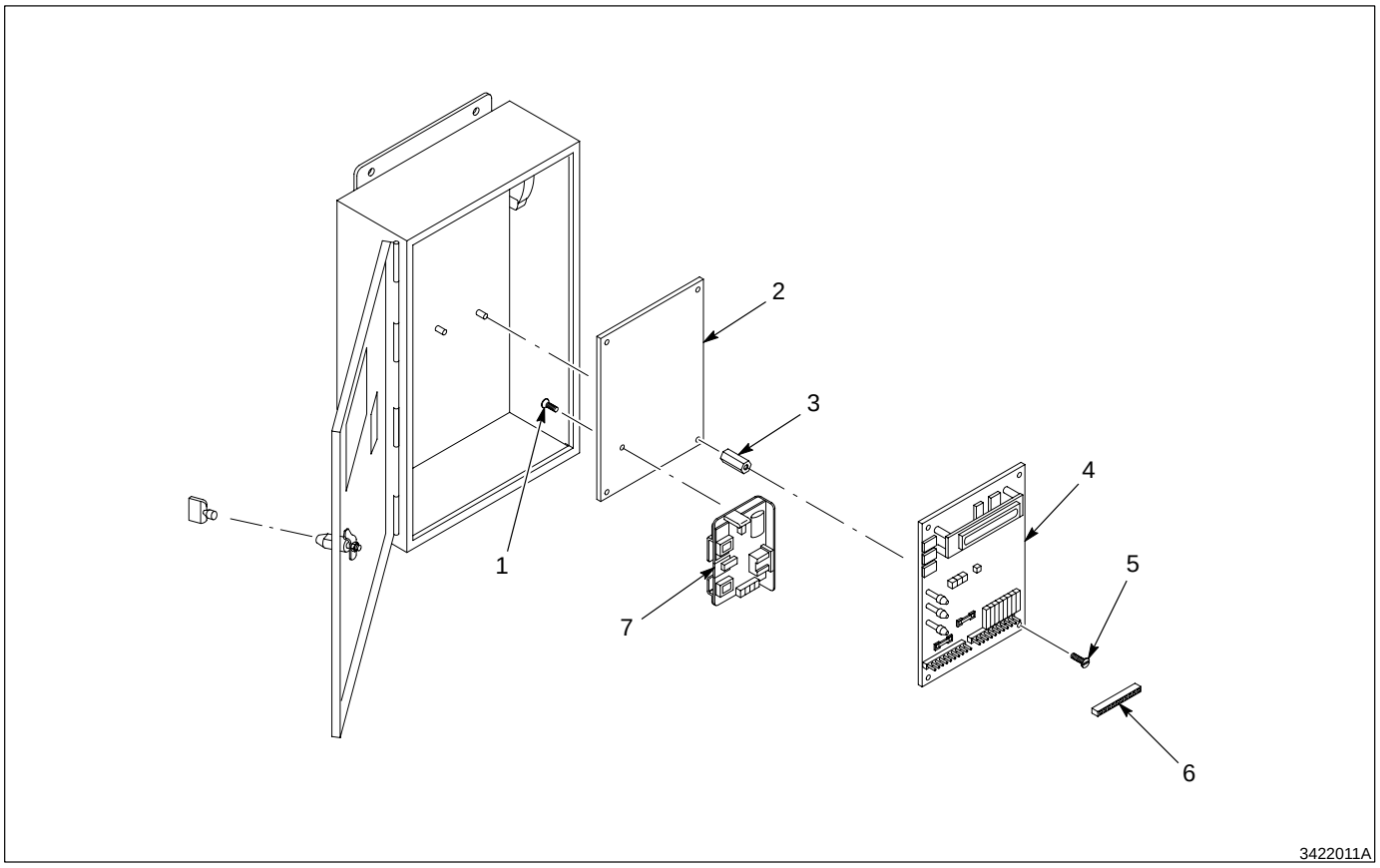

Fig. 10 System Controller Disassembly/Assembly

1. Screws
2. Mounting plate
3. Standoff
4. PC board
5. Screws
6. Connector
7. Power supply

8. Parts

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

Using the Illustrated Parts List

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

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

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

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

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

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

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

NFS-1000 Booth System

Part	Description	Quantity
140 786	Kit, installation, NFS, 1-booth	1
- - - - - -	• System, 1-booth, NFS 1000	1
124 439	• • Controller, system	1
124 440	• • Sensor, fire	2
124 441	• • Light, source, test	2
124 969	• Shroud, air, fire sensor	2
131 702	• Shroud, air, light source	2
249 467	• Regulator, fixed, 10 psi	2

System Controller

See Figure 11.

Item	Part	Description	Quantity	Note
—	124 439	Controller, system	—	
1	131 564	• Connector, PC board, fire detector	2	
2	939 923	• Fuse, main PC board, 2.5A 250 Vdc	2	
3	131 567	• PC board, main, fire detector	1	
4	939 742	• Fuse, power supply, 3.15A, 250 Vdc	1	
5	131 562	• Power supply, Vdc, fire detector	1	
6	131 561	• Key, fire detection enclosure	1	

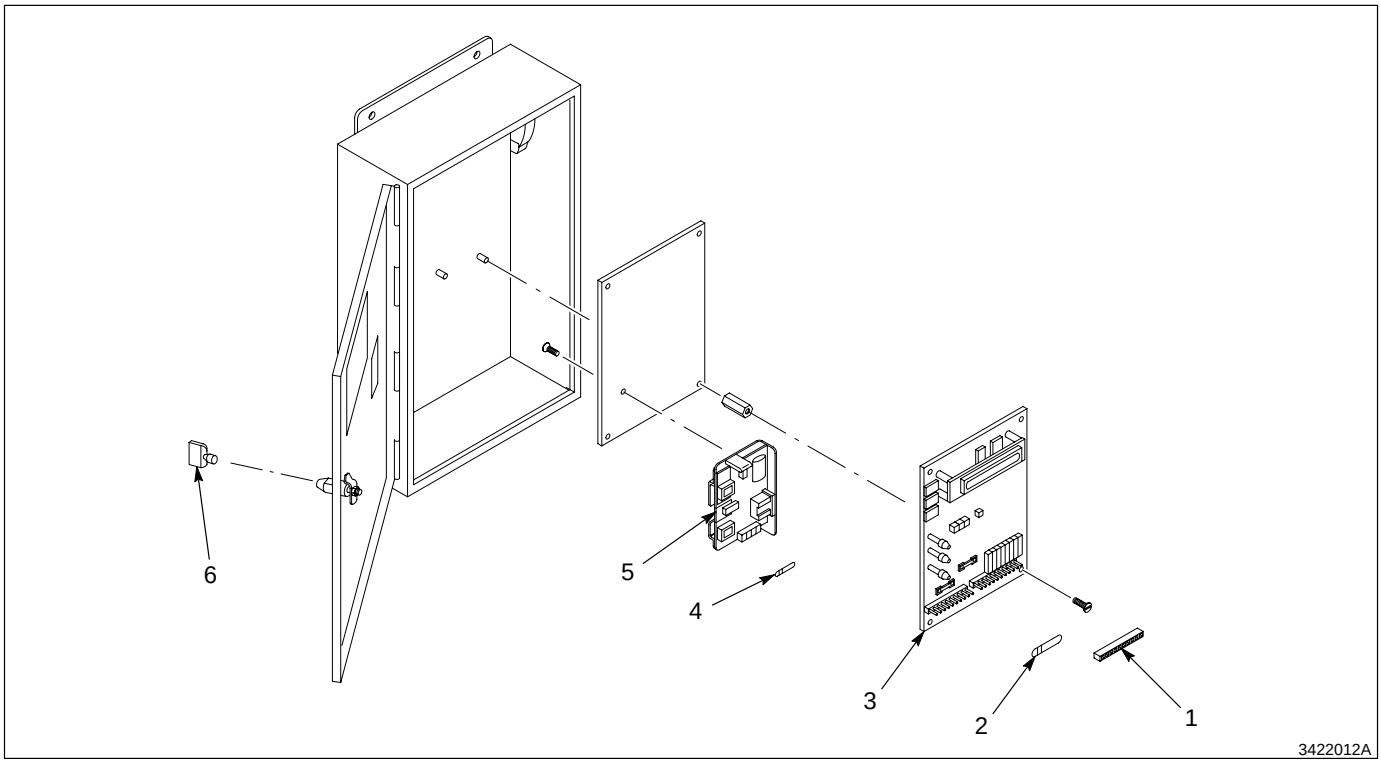

Fig. 11 System Controller

Fire Sensor

See Figure 12.

Item	Part	Description	Quantity	Note
—	124 440	Fire sensor	—	
1	131 569	• Lid, fire sensor	1	
2	131 572	• Module, fire sensor	1	
3	131 563	• Connector, fire detector, four pin, male	1	

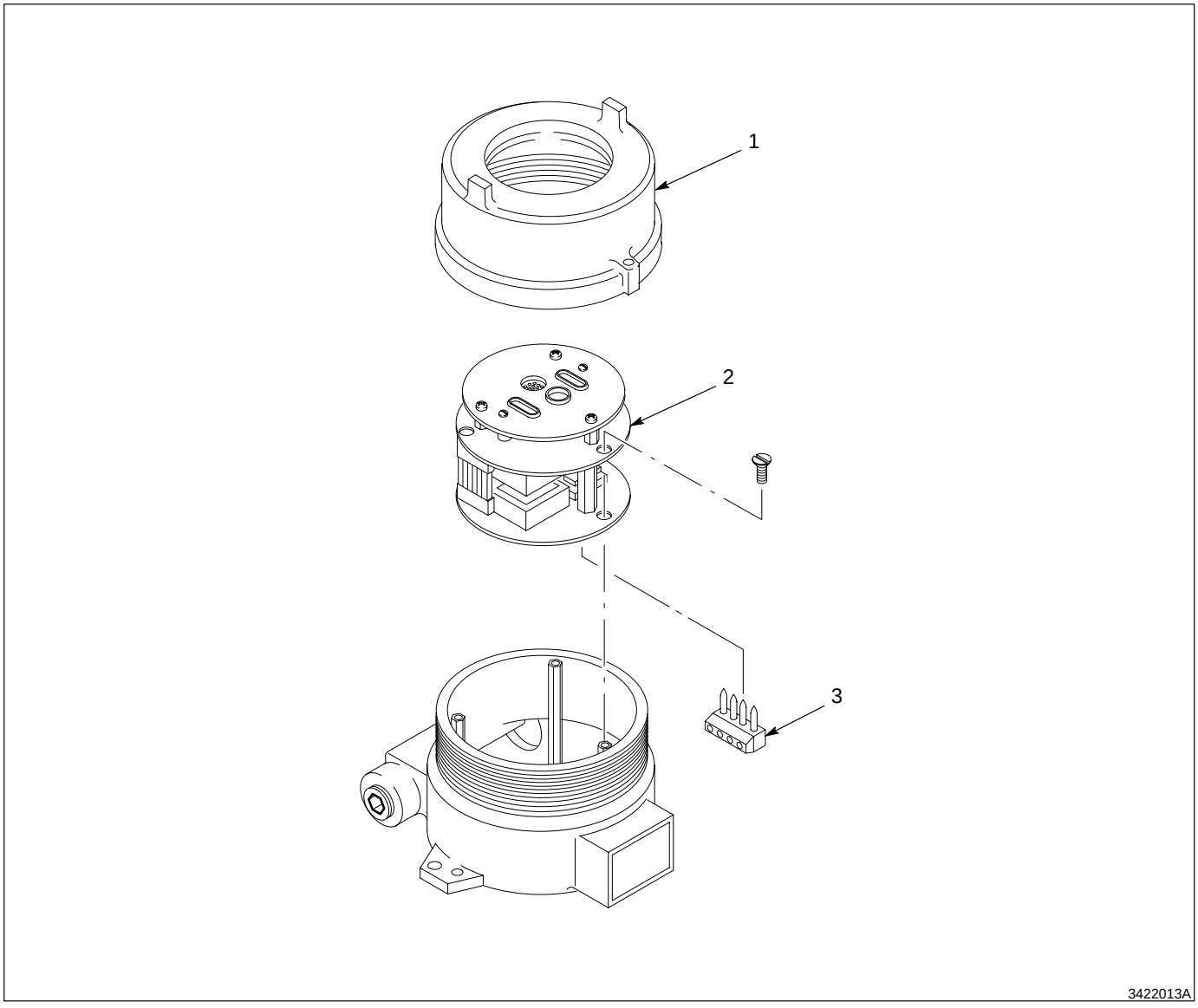

Fig. 12 Fire Sensor

Fire Sensor Air Shroud

See Figure 13.

Item	Part	Description	Quantity	Note
—	124 969	Shroud, air, fire sensor	1	
1	124 976	• Housing, shroud	1	
2	981 213	• Screw, set, $^1/_4$-20 x $^1/_4$ in.	3	
3	984 142	• Nut, hex, jam, $^5/_{16}$-18	1	
4	981 309	• Screw, hex head, $^5/_{16}$-18 x $^3/_4$ in.	1	
5	983 043	• Washer, flat, $^5/_{16}$ in.	3	
6	124 984	• Bracket, shroud	1	
7	981 326	• Screw, hex head, $^5/_{16}$-18 x $^1/_2$ in.	2	
8	981 731	• Screw, hex head, #10-32 x 1.0 in.	2	
9	983 123	• Washer, flat, #10	2	
10	940 390	• O-ring, Buna-N, 2.75 x 2.875 x 0.063 in.	1	
11	124 983	• Disk, air	1	
12	940 421	• O-ring, Buna-N, 3.250 x 3.375 x 0.063 in.	1	
13	942 450	• O-ring, Viton, 4.375 x 4.625 x 0.125 in.	1	
14	972 716	• Connector, male, $^1/_4$ in. tube x $^1/_8$ in. NPT	1	
15	131 706	• Bracket, hold-down	2	
16	983 121	• Washer, lock, #10, ext	2	
17	984 120	• Nut, hex, #10-32	2	

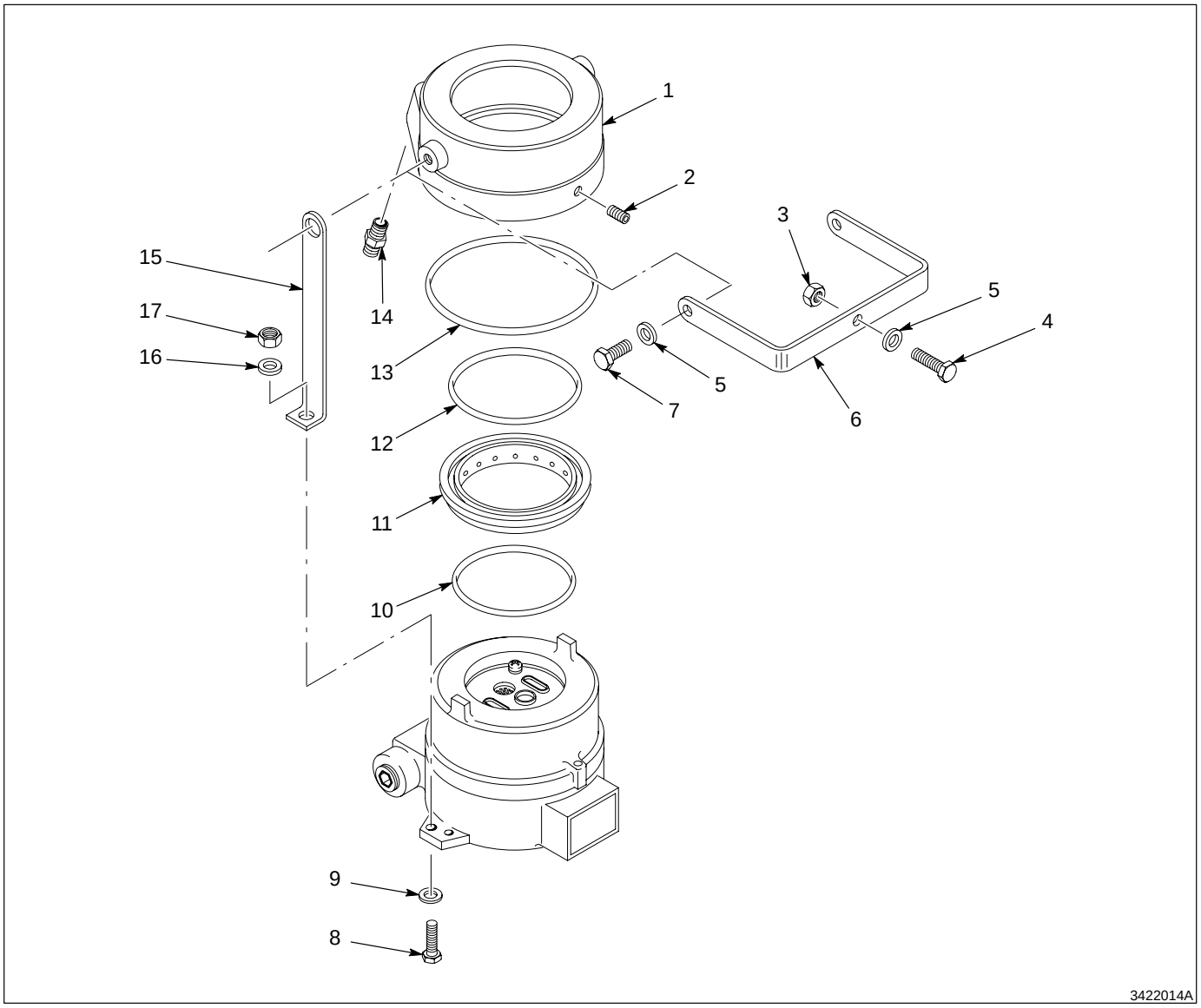

Fig. 13 Fire Sensor Air Shroud

Light Source Air Shroud

See Figure 14.

Item	Part	Description	Quantity	Note
—	131 702	Shroud, air, light source	—	
1	981 863	• Screw, #10-32 x 0.625 in.	4	
2	971 607	• Fitting, barbed	1	
3	983 123	• Washer, flat, #10	2	
4	984 120	• Nut, hex, #10-32	2	
5	131 707	• Stud, mount, #10-32	2	
6	131 704	• Bracket, mounting	1	
7	131 705	• Plate, cover	1	

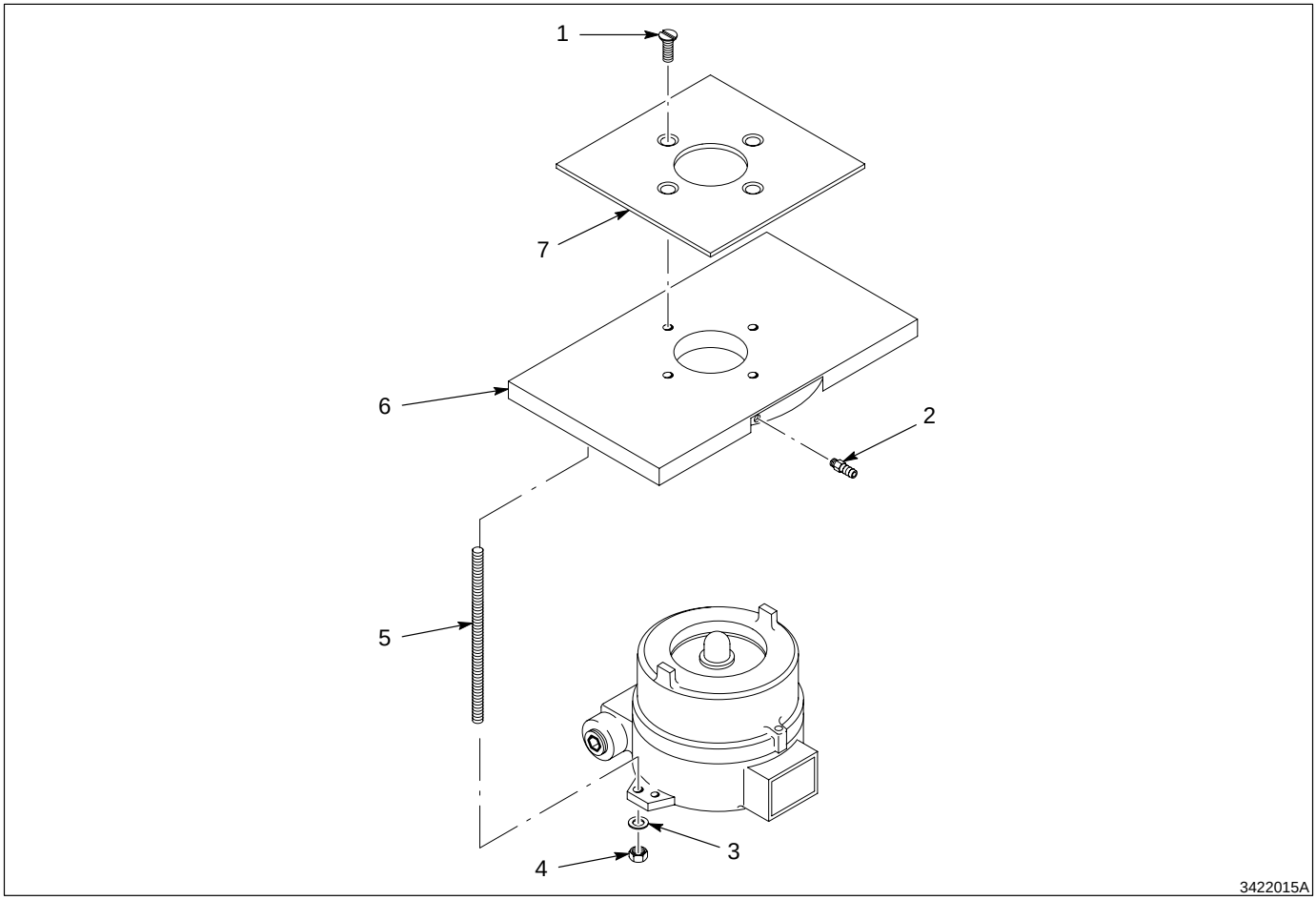

Fig. 14 Light Source Air Shroud

Light Test Source

See Figure 15.

Item	Part	Description	Quantity	Note
—	124 441	Light, source, test	—	
1	131 568	• Lid, light source	1	
2	131 563	• Connector, fire detector, four pin male	1	
3	131 571	• Module, light source	1	A
4	179 292	• • Replacement bulb, light source	1	B

NOTE A: Modules were changed from two level to one level. New modules are interchangeable with old ones.

B: Early versions of the two-level modules had non-replaceable bulbs. If bulb is not replaceable, order a new module, which has a replaceable bulb.

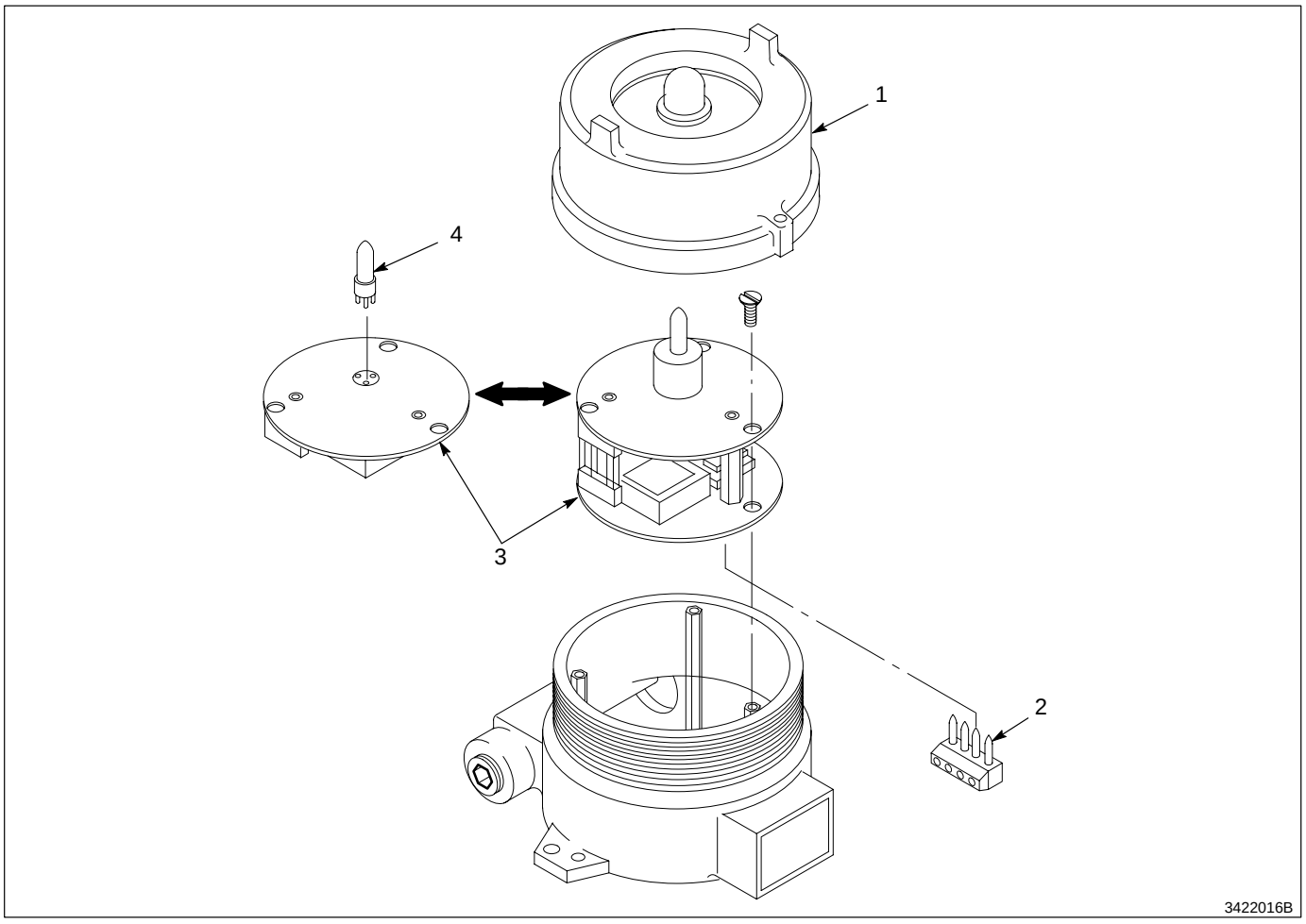

Fig. 15 Light Test Source

9. Specifications

This section includes specifications for the Nordson NFS-1000 fire detection system.

Fire Sensor and Light Test Source Terminals

Table 1 Fire Sensor and Light Test Source Terminals

Pin	Description
1	(–) Ground
2	COM –
3	COM +
4	(+) Power (Low voltage Vdc)

System Controller 40-Pin Terminal Strip

Table 2 System Controller 40-Pin Terminal Strip

Pin	Description	Note
1	Low Voltage Vdc (–) Return	
2	Low Voltage Vdc (+)	
3	Factory Use	
4	Factory Use	
5	FireBus Ground Out	
6	FireBus Com (–) Out	
7	FireBus Com (+) Out	
8	FireBus Power Out	
9	FireBus Ground Return	
10	FireBus Com (–) Return	
11	FireBus Com (+) Return	
12	FireBus Power Return	
13	Factory Use	
14	Factory Use	

Continued on next page

System Controller 40-Pin Terminal Strip (contd)

Table 2 System Controller 40-Pin Terminal Strip *(contd)*

Pin	Description	Note
15	Factory Use	
16	RS-232 Ground	
17	RS-232 TX	
18	RS-232 RX	
19	Siren Silence Button (Ground)	
20	Siren Silence Button (+)	
21	Siren Ground (–)	
22	Siren Power (+)	
23	Relay 1 Common	
24	Relay 1 Normally Closed	
25	Relay 1 Normally Open	
26	Relay 2 Common	
27	Relay 2 Normally Closed	
28	Relay 2 Normally Open	
29	Relay 3 Common	
30	Relay 3 Normally Closed	
31	Relay 3 Normally Open	
32	Relay 4 Common	
33	Relay 4 Normally Closed	
34	Relay 4 Normally Open	
35	Relay 5 Common	
36	Relay 5 Normally Closed	A
37	Relay 5 Normally Open	A
38	Relay 6 Common	B
39	Relay 6 Normally Closed	B
40	Relay 6 Normally Open	B

NOTE A: Relay 5 Fire only Relay.
B: Relay 6 Fault Relay.

Interlock Relays

NOTE: Relays 1 through 4 operate identically, energized during normal operation and de-energized during alarm conditions until alarm is reset.

Relay 5 is only energized during an alarm condition.

Relay 6 is energized during normal and alarm conditions. It is de-energized in a fault condition.

Table 3 Interlock Relay Terminal Conditions

Relay	Terminal	Condition			
		No Power	**Normal Operation**	**Fault**	**Alarm**
1	23 to 24	•	o	o	•
	23 to 25	o	•	•	o
2	26 to 27	•	o	o	•
	26 to 28	o	•	•	o
3	29 to 30	•	o	o	•
	29 to 31	o	•	•	o
4	32 to 33	•	o	o	•
	32 to 34	o	•	•	o
5	35 to 36	•	•	•	o
	35 to 37	o	o	o	•
6	38 to 39	•	o	•	o
	38 to 40	o	•	o	•

• = Closed contact
o = Open contact

Weight and Dimensions

System Controller

Weight:	6194.5 g (13.66 lb)
Height:	37.47 cm (14.75 in.)
Width:	32.72 cm (12.88 in.)
Depth:	9.53 cm (3.75 in.)
Mounting holes	
diameter:	4.78 mm (0.188 in.)
center to center distance:	
(top to bottom)	31.75 cm (12.5 in.)
(side to side)	20.32 cm (8.0 in.)

Fire Sensor (Including Air Shroud)

Weight:	2303.3 g (5.1 lb)
Height:	12.70 cm (5.0 in.)
Diameter:	10.79 cm (4.25 in.)

Light Test Source (Including Air Shroud)

Weight:	2302.2 g (5.1 lb)
Height:	12.07 cm (4.75 in.)
Mounting Plate	
Height:	10.16 cm (4 in.)
Length:	15.55 cm (6.13 in.)

10. Options

Please contact your Nordson representative to order the following options.

Part	Description
249 467	Regulator fixed at 0.69 bar (10 psi). Provides constant air flow to air shroud.
900 730	Tubing, polyurethane, $^1/_4$-in. Air supply to air shroud.
145 091	Cable, communication, four conductor, 22 gauge, shielded. FireBus communications.