[10.2] Power Board Replacement
1. Disconnect wiring from the terminal block.
2. Remove the two power board mounting screws.
3. Pull gently on the board to remove it.
4. To replace the board, align the board mounting features, holes, and the interconnect terminals.
5. Secure board with the two mounting screws.
6. Re-connect wiring to terminal block.

(12) Model D350RP Air Duct Smoke Detector Specifications

Operating Temperature Range: +32° to +131°F (0° to +55°C)
Storage Temperature Range: -22° to +158°F (-30° to +70°C)
Humidity Range: 10% to 93% (non-condensing)
Air Velocity: 500 to 4000 ft/min (2.54 to 20.32 m/sec)
Dimensions: 14 1/2" L x 9 3/4" W x 2 1/4" D (37 cm L x 14 cm W x 7 cm D)

Current Requirements (no using accessories)

<table>
<thead>
<tr>
<th>Power Supply voltage</th>
<th>Max. power use</th>
<th>Max. standby current</th>
<th>Alarm max. current</th>
<th>Alarm response time</th>
<th>Power up time</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30 VDC</td>
<td>26 mA</td>
<td>65 mA RMS</td>
<td>87 mA</td>
<td>3 to 10 Sec.</td>
<td>2 Sec.</td>
</tr>
<tr>
<td>24 VAC, 50-60 Hz</td>
<td>44 mA RMS</td>
<td>52 mA RMS</td>
<td>182 mA RMS</td>
<td>3 to 10 Sec.</td>
<td>2 Sec.</td>
</tr>
<tr>
<td>120 VAC, 50-60 Hz</td>
<td>25 mA RMS</td>
<td>30 mA RMS</td>
<td>52 mA RMS</td>
<td>3 to 10 Sec.</td>
<td>2 Sec.</td>
</tr>
<tr>
<td>220/240 VAC, 50-60 Hz</td>
<td>20 mA</td>
<td>10 mA Max.</td>
<td>182 mA RMS</td>
<td>3 to 10 Sec.</td>
<td>2 Sec.</td>
</tr>
</tbody>
</table>

Contact Ratings

- Alarm auxiliary contacts* (DPDT): 10 A @ 30 VDC
- 10 A @ 277 VAC (7.5 power factor)
- 240 VAC @ 240 VAC (0.4 power factor)
- 1/8 HP @ 120 VAC
- 1/4 HP @ 240 VAC

Accessory Current Loads at 24 VDC

<table>
<thead>
<tr>
<th>Device</th>
<th>Supervisory contact (SPST)</th>
<th>Standby Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTS451/RTS451KEY</td>
<td>10 A (30 VDC)</td>
<td>0 mA</td>
</tr>
<tr>
<td>RA400Z</td>
<td>0 mA</td>
<td>12 mA Max.</td>
</tr>
<tr>
<td>RA4000</td>
<td>0 mA</td>
<td>10 mA Max.</td>
</tr>
</tbody>
</table>

Accessories and Part Numbers

- Remote LED: RA400Z (Replacement Photo Insect Screen, 508-39-01)
- Magnetic Remote Test: RTS451 (Replacement End Cap for Plastic Sampling Tube, P48-01-00)
- Key-Activated Remote Test: RTS451/S (Replacement End Cap for Metal Sampling Tubes, P48-21-00)
- Replacement Filters: F36-09-11 (Replacement Photoelectric Sensor Board, A5053FL)
- Replacement Test Magnet: MO2-04-00 (Replacement Power Board (w/relay), A5060)

Programming Specifications/Requirements for Intelligent System Control Panels

There are a limited number of devices that can have their LEDs programmed to illuminate. The actual number of devices is determined by the control panel and its ability to support LED current. Refer to the Control Panel Installation Manual for details.

Contents Of The Duct Smoke Detector Housing Kit

- One complete duct smoke detector
- Assembly with sensor
- Two #10 1/4" sheet metal screws
- Three sampling tube filters
- One test magnet
- Drilling template
- Two foam gaskets
- Four #6 self-tapping mounting screws for the sampling tube and optional exhaust tube extension
- One sampling tube end cap
- One plastic sampling tube
- One #8 self-tapping screw for plastic sampling tube

NOTE: A detector sensor board DOES NOT need to be ordered separately.

FCT Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE: For ducts over 1 1/2 feet, longer sampling tubes must be ordered to complete the installation. They must be the correct length for the width of the duct where they will be installed. See Table 1 on page 3 to determine the sampling tube required for different duct widths.
The National Fire Protection Association has established that DUCT DETECTORS MUST NOT BE USED AS A SUBSTITUTE FOR OPEN AREA DETECTOR PROTECTION as a means of providing life safety. Nor are they a substitute for early warning in a building’s regular fire detection system. It is strongly recommended that the user read NFPA Standards 90A, 72, and 101.

This device will not operate without electrical power. Fire situations may cause an interruption of power. The system safeguards should be discussed with your local fire protection specialist.

This device will not sense smoke unless the ventilation system is operating.

In order to function properly, this detector must be installed according to the instructions. Do not exceed the electrical or ambient specifications or the detector will not function properly. This detector must be protected from the elements.

**INSTALLATION SEQUENCE**

Step 1. Verify duct air flow direction and velocity

Step 2. Drill the mounting holes

Step 2.1 Install the sampling tube for ducts less than 1 ½ feet wide

Step 3. Secure the detector housing to the duct

Step 4. Install the sampling tube for ducts greater than 1 ½ feet wide

Step 4.1 Installation for ducts greater than 1 ½ feet but less than 8 feet wide

Step 4.2 Installation for ducts more than 8 feet wide

Step 5. Install the filters

Step 6. Field wiring

Step 7. Perform detector check

Step 8. Install the cover

Step 9. Detector Maintenance and Test Procedures

**[1] Verify Duct Air Flow Direction And Velocity**

The D350RP duct smoke detector is designed to be used in air handling systems having air velocities of 500 to 4000 feet per minute. Be sure to check engineering specifications to ensure that the air velocity in the duct falls within these parameters. If necessary, use a velocity meter to check the air velocity in the duct. See Air Flow Test, section 9.1.

**[2] Drill The Mounting Holes**

Remove the paper backing from the mounting template supplied. Affix the template to the duct at the desired mounting location. Make sure the template lies flat and smooth on the duct. Center punch holes A and B. Drill the holes as indicated on the template.

**[2.1] Sampling Tube Installation for Ducts Less Than 1 ½ Feet Wide (see Figure 2)**

1. Remove the front cover.
2. Slide the plastic sampling tube into the housing bushing.
3. Align the holes in the housing with the holes in the sampling tube. Make sure there are 6 exposed holes on the plastic sampling tube. Secure with the #8 self-tapping screw into the bottom of the permanent tube (shown in Fig. 2).

**NOTE:** The sampling tube end cap is critical to the proper operation of the duct smoke detectors. The end cap is needed to create the proper air flow to the sensor of the duct smoke detector.

**NOTE:** For ducts greater than 1 ½ feet in width, refer to sections [4], [4.1] and [4.2].

**[9.2.2] Alarm Tests**

**[9.2.2.1] M02-04-00 Magnet Test**

1. Place the painted surface of the magnet onto the TEST locator on the bottom of the detector housing (Figure 13).
2. Verify system control panel alarm status and control panel execution of all intended auxiliary functions (i.e. fan shutdown, damper control, etc.)
3. The detector is self-restoring when the magnet is removed. Verify that the system control panel has reset; the panel may have to be reset.

**[9.2.2.2] RTS451/RTS451KEY Remote Station Test**

The RTS451/RTS451KEY Remote Test Station facilitates test of the alarm capability of the duct smoke detector. These accessories provide the stimulus to initiate an alarm condition at the detector. The detector is self-restoring when the accessory test stimulus is removed. Verify that the system control panel has reset; the panel may have to be reset.

**[9.2.3] Sensitivity Tests**

Notify the proper authorities that the smoke detector system is undergoing maintenance, and that the system will temporarily be out of service. Disable the device or system undergoing maintenance to prevent unwanted alarms and possible dispatch of the fire department.

**[9.3] Maintenance of Duct Smoke Detectors**

**[9.3.1] Air Filters**

1. Turn off power to the system.
2. Remove and inspect sampling tube filters.
3. If filters are heavily coated with dirt, replace them with new filters (p/n F36-09-11). If they are not heavily coated, use a vacuum cleaner or compressed air nozzle to remove dust, then reinstall the filters.

**[9.3.2] Photo Detector Boards**

1. Remove the screen by gently grasping on each side and pulling straight off.
2. Lift the photo chamber in the same fashion. Vacuum the screen and cover. Use clean, compressed air to blow out any remaining debris. Replacement screens (p/n S08-39-01) are available.
3. Vacuum photo chamber, then use clean compressed air to blow area clean.
4. Replace the chamber by pressing it onto the base. Press the screen into place. It should fit tightly on the chamber.

**[10] Board Replacement**

**[10.1] Sensor Board Replacement**

1. Remove the two sensor board mounting screws.
2. Pull gently on the board to remove it.
3. To replace the board, align the board mounting features, holes, and the interconnect terminals. Push the board into place.
4. Secure board with the two mounting screws.
[9.2] Standby, Alarm, And Sensitivity Tests

9.2.1 Standby And Trouble

Standby — If programmed by the system control panel, look for the presence of the flashing LEDs through the transparent housing cover. The LED will flash with each communication.

Trouble — If programmed by the system control panel and if the detector LEDs do not flash, then the detector lacks power (check wiring, panel programming, or power supply), the detector board is missing (replace), or the unit is defective (return for repair). Additionally, if the cover is removed for more than 20 minutes, the LEDs of the detector will not flash.

Test — The trouble condition can be caused intentionally to verify correct operation of the system. Remove the detector board to cause a trouble condition locally and at the system control panel.

Figure 8. Wiring Diagram for D350RP Duct Smoke Detector using a UL listed control panel

NOTE: J1 jumper must be removed for power board supervision. The J1 jumper must be installed for 2W applications.

Figure 10. System Wiring Diagram for D350RP Duct Smoke Detector with RTS451/RTS451KEY

NOTE: The sampling tube end cap is critical to the proper operation of the duct smoke detectors. The end cap is needed to create the proper air flow to the sensor of the duct smoke detector.

Figure 3. Installation of foam gaskets over sampling tube bushings:

Figure 4. Air duct detector sampling tube:

Table 1. Sampling tubes recommended for different Duct Widths:

<table>
<thead>
<tr>
<th>Outside Duct Width</th>
<th>Sampling Tube Recommended*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 2 ft. (0.3 to 0.6 m)</td>
<td>ST-1.5</td>
</tr>
<tr>
<td>2 to 4 ft. (0.6 to 1.2 m)</td>
<td>ST-3</td>
</tr>
<tr>
<td>4 to 8 ft. (1.2 to 2.4 m)</td>
<td>ST-5</td>
</tr>
<tr>
<td>8 to 12 ft. (2.4 to 3.7 m)</td>
<td>ST-10</td>
</tr>
</tbody>
</table>

*Must extend a minimum of 1/4 the duct width

[3] Secure The Detector Housing To The Duct

Slide the foam gaskets over the tube bushings as shown in Figure Use the two 1/4" long sheet metal screws to screw the detector housing to the duct.

CAUTION: Do not overtighten the screws.

[4] Sampling Tube Installation for Ducts Greater Than 1/2 Feet Wide

The sampling tube is identified by a series of air inlet holes on the tube. A plastic tube is included for ducts up to 1 1/2 feet wide. All other lengths must be purchased separately.

Order the correct length, as specified in Table 1, for width of the duct where it will be installed. It is recommended that the sampling length extend at least 1⁄2 across the duct width for optimal performance. The exhaust tube is molded onto the base of the duct housing, and the A2440-00 Exhaust Tube Extension is available as an accessory in those cases where the molded exhaust port does not extend at least 2 inches into the duct.

The sampling tube is always installed with the air inlet holes facing into the air flow. To assist proper installation, the tube's mounting flange is marked with an arrow. Make sure the sampling tube is mounted so that the arrow points into the air flow (see Figure 4). Figure 5 shows the various combinations of mounting configurations with respect to air flow. Mounting the detector housing in a vertical orientation is acceptable, provided that a metal sampling tube is used and the air flows directly into the sampling tube holes as indicated in Figure 4.

Figure 5. Tube mounting configurations with varying air flow direction:

NOTE: Only metal sampling tubes can be installed in the sampling tube holes. The sampling tube in Figure 4 must extend at least 1/4 the duct width.

Figure 1. Tube mounting configurations with varying air flow direction:

Table 1. Sampling tubes recommended for different Duct Widths:

<table>
<thead>
<tr>
<th>Outside Duct Width</th>
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</tr>
<tr>
<td>8 to 12 ft. (2.4 to 3.7 m)</td>
<td>ST-10</td>
</tr>
</tbody>
</table>

*Must extend a minimum of 1/4 the duct width

[4.1] Installation For Ducts Greater Than 1/2 Feet But Less Than 8 Feet Wide

1. If the tube is longer than the width of the air duct, drill a 1/4" hole in the duct opposite the hole already cut for the sampling tube. Make sure the hole is 1" to 2" below the inlet hole on the opposite side of the duct to allow moisture drainage away from the detector. If the tube is shorter than the width of the air duct, install the end cap into the sampling tube as shown in Figure 4. Sampling tubes over 3 ft. long must be supported at the end opposite the duct smoke detector.

2. Slide the tube into the housing bushing that meets the air flow first. Position the tube so that the arrow points into the air flow, as shown in Figure 4.

3. Secure the tube flange to the housing bushing with two #6 self-tapping screws.

4. For tubes longer than the width of the air duct, the tube should extend out of the opposite side of the duct. If there are more than 2 holes in the section of the tube extending out of the duct, select a different length using Table 1. Otherwise, trim the end of the tube protruding through the duct so that it extends a minimum of 1/2 across the duct. Plug this end with the end cap and tape closed any holes in the protruding section of the tube. Be sure to seal the duct where the tube protrudes.

NOTE: Only metal sampling tubes can be installed in orientations C and D.
NOTE: To install sampling tubes in ducts more than 8 feet wide, work must be performed inside the air duct. Sampling of air in ducts wider than 8 feet is accomplished by using the ST-10 sampling tube. If the tube is shorter than the width of the air duct, install the end cap into the sampling tube as shown in Figure 4 and support the end opposite the duct smoke detector.

### Installation For Ducts More Than 8 Feet Wide

**NOTE:**

The D350RP detector is designed for ease of wiring. The housing provides a terminal strip with clamping plates. Disconnect power from the communication line before installing the D350RP duct smoke detectors. Wiring connections are made by stripping about 3/8-inch of insulation from the end of the wire, sliding the bare end under the plate, and tightening the clamping plate screw.

**Wiring Instructions**

1. Panel controls the LED operation on the duct smoke detector. Operational modes are RED blink, RED continuous, GREEN blink, GREEN continuous, and off.
2. The remote output may be synchronized to the LED operation or controlled independent of the LEDs.

**Please refer to the operation manual for the UL listed control panel for specific operation of the D350RP.**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[8]</td>
<td>Install The Cover</td>
</tr>
<tr>
<td>[9]</td>
<td>Duct Smoke Detector Maintenance and Test Procedures</td>
</tr>
<tr>
<td>[9.1.]</td>
<td>Air Flow</td>
</tr>
<tr>
<td>[9.1.1.]</td>
<td>Smoke Response</td>
</tr>
</tbody>
</table>

**Wiring Connections**

From inside the duct, couple the other sections of the sampling tube to the section already installed using the 1/2-inch conduit fittings supplied. Screw the Idot ends of the conduits in the protruding section of the tube. Be sure to seal the duct where the tube protrudes.

**NOTE:**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[9.2.1.]</td>
<td>Perform STANDBY AND TROUBLE TEST per Section [9.2.1].</td>
</tr>
<tr>
<td>[9.2.2.]</td>
<td>Perform MAGNET TEST per Section [9.2.2.1]. The RTS451 test of Section [9.2.2.2] may substitute for this requirement.</td>
</tr>
<tr>
<td>[9.2.2.2]</td>
<td>Perform AIR FLOW TEST per Section [9.1].</td>
</tr>
</tbody>
</table>

**[7] Perform Detector Check**

1. Perform STANDBY AND TROUBLE TEST per Section [9.2.1].
2. Perform MAGNET TEST per Section [9.2.2.1]. The RTS451 test of Section [9.2.2.2] may substitute for this requirement.
3. Perform AIR FLOW TEST per Section [9.1].
4. Perform SMOKE RESPONSE TEST per Section [9.1.1].

**[8] Install The Cover**

Install the cover using the six screws that are captured in the housing cover. Be certain filters are installed as specified in Section 5. Make sure that the cover fits into the base groove and that all gaskets are in their proper positions. Tighten the six screws.

**[9] Duct Smoke Detector Maintenance and Test Procedures**

Test and maintain duct smoke detectors as recommended in NFPA 72. The tests contained in this manual were devised to assist maintenance personnel in verification of proper detector operation. Before conducting these tests, notify the proper authorities that the smoke detection system will be temporarily out of service. Disable the device or system under test to prevent unwanted alarms.

**Smoke Entry Tests**

**[9.1.] Air Flow**

To verify sufficient sampling of ducted air, use a manometer to measure the differential pressure created from air flow across the sampling tubes. The pressure should measure no less than 0.03 inches of water and no greater than 1.4 inches of water. The air handler must be operating for this test.

**[9.1.1.] Smoke Response**

To determine if smoke is capable of entering the sensing chamber, visually identify any obstructions. Plug the exhaust and sampling tubes hole to prevent ducted air from carrying smoke away from the detector head, then blow smoke such as cigarette, cotton wick, or punk directly at the head to cause an alarm. REMEMBER TO REMOVE THESE PLUGS AFTER THIS TEST, OR THE DETECTOR WILL NOT FUNCTION PROPERLY.

### Field Wiring Installation Guidelines

All wiring must be installed in compliance with the National Electrical Code and the local codes having jurisdiction. Proper wire gauges should be used. The conductors used to connect smoke detectors to control panels and accessory devices should be color-coded to prevent wiring mistakes. Improper connections can prevent a system from responding properly in the event of a fire.

**CAUTION**

Filters require periodic cleaning or replacement, depending on the amount of dust and dirt accumulated. Visually inspect the filters at least quarterly; inspect them more often if the dust accumulation warrants it. See Section [9.1.2] for more information. Replacement filters can be ordered (filter P/N F36-09-11).

For signal wiring, (the wiring between detectors or from detectors to auxiliary devices), it is usually recommended that single conductor wire be no smaller than 18 gauge. The duct smoke detector terminals accommodate wire sizes up to 12 gauge. The last foot of conduit should be flexible conduit (available in electrical supply houses), which facilitates easier installation and puts less strain on the conduit holes in the housing. Solid conduit connections may be used if desired.

Smoke detectors and alarm system control panels have specifications for Signaling-Line Circuit (SLC) wiring. Consult the control panel manufacturer’s specifications for wiring requirements for the particular model control panel being used before wiring the detector loop.

The D350RP detector is designed for ease of wiring. The housing provides a terminal strip with clamping plates.