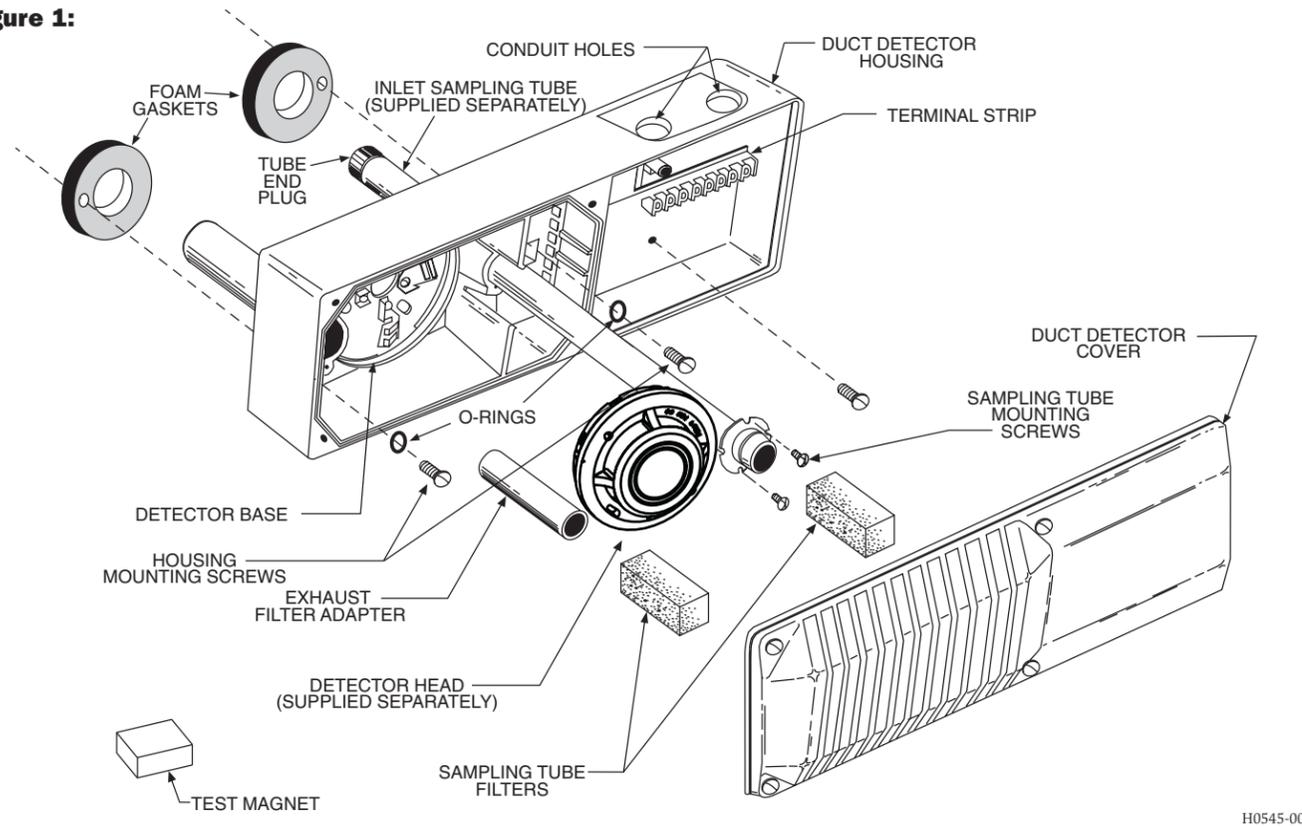




**Figure 1:**

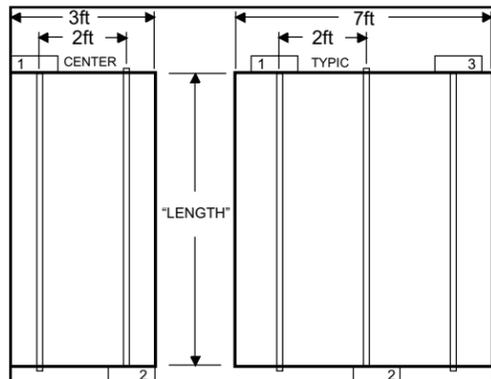


H0545-00

Each 7251DH duct smoke detector should be mounted as follows:

1. Location: Mount detector on the room side (up stream) of any air filter. NOTICE: Mounting detector after filter may filter out smoke particles and is not recommended.
2. Coverage: Each detector pipe length should be mounted along the longer direction of the return air opening (length direction). One detector and one standard, pre-drilled pipe length should be installed for every 2ft of return air opening width. When more than one detector is required (widths greater than 2ft.), detector housings should be staggered on opposite ends of the opening length. (refer to illustration).
3. Hole Direction: holes facing directly into flow for positive pressure effect
4. Insure adequate pressure differential across the detector housing according to step 8.1 of this document.

**Figure 2. APPLICATION EXAMPLES:**



C0931-00

**Step 2. Verify Duct Air Flow Direction and Velocity**

The 7251DH is designed to be used in air handling systems having air velocities of 300 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, an Alnor Model 6000-P velocity meter, Dwyer 460 differential pressure gauge, or their equivalent, may be used to check the air velocity in the duct.

**Step 3. Drill the Mounting Holes**

Remove the paper backing from the top and bottom of the template. Affix the template to the air duct at the desired mounting location. Make sure the template lies flat and smooth on the air duct. Center punch hole targets and remove the template. Drill the holes as indicated on the template. Slide the two speed nuts over the two small holes (Hole A) next to the sampling tube bushing holes (Hole B) previously drilled in the duct (See Figure 3A).

**Step 4. Mount Duct Housing**

Remove the duct housing cover. Slide the foam gaskets over the tube bushings as shown in Figure 3B. Make sure the two small holes in the gaskets line up with the two base mounting holes. Put one 5/16" O-ring over each of the two #10 sheet metal screws. Use the two sheet metal screws to secure the duct housing to the duct.



Do not overtighten the screws.

**Table 1. Sampling (Inlet) Tubes**

Tube	Outside Duct Width
ST-1.5	1 to 2 ft. (0.3 to 0.6 m)
ST-3	2 to 4 ft. (0.6 to 1.2 m)
ST-5	4 to 8 ft. (1.2 to 2.4 m)
ST-10	8 to 12 ft. (2.4 to 3.7 m)

**Recommended Detector Maintenance Procedure**

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

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. If they are not heavily coated, use a vacuum cleaner or compressed air nozzle to remove dust, then reinstall the filters.
4. Remove detector from housing (See Figure 8).

**TESTING**

Before testing, notify the proper authorities that the system is undergoing maintenance, and will temporarily be out of service. Disable the system to prevent unwanted alarms.

All sensors must be tested after installation and periodically thereafter. Testing methods must satisfy the Authority Having Jurisdiction (AHJ). Sensors offer maximum performance when tested and maintained in compliance with NFPA 72. The sensor can be tested in the following ways:

**A. Functional: Magnet Test (P/N M02-04-00 or M02-09-00)**

This sensor can be functionally tested with a test magnet. The test magnet electronically simulates smoke in the sensing chamber, testing the sensor electronics and connections to the control panel.

1. Hold the test magnet in the magnet test area as shown in Figure 7.
2. The sensor should alarm the panel.

Two LEDs on the sensor are controlled by the panel to indicate sensor status. Coded signals, transmitted from the panel, can cause the LEDs to blink, latch on, or latch off. Refer to the control panel technical documentation for sensor LED status operation and expected delay to alarm.

**B. Smoke Entry: Aerosol Generator (Gemini 501)**

The Gemini model 501 aerosol generator can be used for smoke entry testing. Set the generator to represent 4%/ft. to 5%/ft. obscuration as described in the Gemini 501 manual. Using the bowl shaped applicator, apply aerosol until the panel alarms.

A sensor that fails any of these tests should be cleaned as described under CLEANING, and retested. If the sensor fails after cleaning, it must be replaced and returned for repair.

When testing is complete, restore the system to normal operation and notify the proper authorities that the system is back in operation.

**CLEANING**

It is recommended that the detector be removed from its mounting base to facilitate cleaning. The detector is cleaned as follows:

**NOTE:** Before removing the detector, notify the proper authorities that the smoke detector system is undergoing maintenance and will be temporarily out of service. Disable the zone or system undergoing maintenance to prevent unwanted alarms.

1. Remove the detector cover by prying away the four side tabs with a small-bladed screwdriver, and then pulling the cover from the base.
2. Vacuum the screen carefully without removing it. If further cleaning is required continue with Step 3, otherwise skip to Step 7.
3. Remove the screen assembly/chamber cover by pulling it straight out (see Figure 10).
4. Clean the chamber by vacuuming or blowing out dust and particles.
5. Replace the sensing chamber cover, aligning the arrow on the top with arrow on the printed circuit board.
6. To replace the screen, place it over the chamber assembly, turning it until it snaps into place.
7. Replace the cover using the LEDs to align the cover and then gently pushing it until it locks into place.
8. Reinstall the detector.
9. Test the detector as described in TESTING.
10. Reconnect disabled circuits.
11. Notify the proper authorities that the system is back on line.

**LASER SAFETY INFORMATION**

This smoke detector does not produce any hazardous laser radiation and is certified as a Class 1 laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968.

Any radiation emitted inside the smoke detector is completely within the protective housings and external covers. The laser beam cannot escape from the detector during any phase of operation.

The Center of Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured after August 1, 1976. Compliance is mandatory for products marketed in the United States.

Accessories	Part No.
Remote LED	RA400ZA
Remote Test Station	RTS451/RTS451KEY
Piezo Alert Sounder	PA400
Replacement Filters	F36-05-00
Magnet	M02-04-00
End Plug For Sampling Tube	P48-21-00
Installation Kit (Parts bag)	A2650-01

**Please refer to insert for the Limitations of Fire Alarm Systems**

**Three-Year Limited Warranty**

System Sensor warrants its enclosed product to be free from defects in materials and workmanship under normal use and service for a period of three years from date of manufacture. System Sensor makes no other express warranty for the enclosed product. No agent, representative, dealer, or employee of the Company has the authority to increase or alter the obligations or limitations of this Warranty. The Company's obligation of this Warranty shall be limited to the replacement of any part of the product which is found to be defective in materials or workmanship under normal use and service during the three year period commencing with the date of manufacture. After phoning System Sensor's toll free number 800-SENSOR2 (736-7672) for a Return Authorization number, send defective units postage prepaid to: System Sensor, Returns

Department, RA # \_\_\_\_\_, 3825 Ohio Avenue, St. Charles, IL 60174. Please include a note describing the malfunction and suspected cause of failure. The Company shall not be obligated to replace units which are found to be defective because of damage, unreasonable use, modifications, or alterations occurring after the date of manufacture. In no case shall the Company be liable for any consequential or incidental damages for breach of this or any other Warranty, expressed or implied whatsoever, even if the loss or damage is caused by the Company's negligence or fault. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

**Figure 9:**

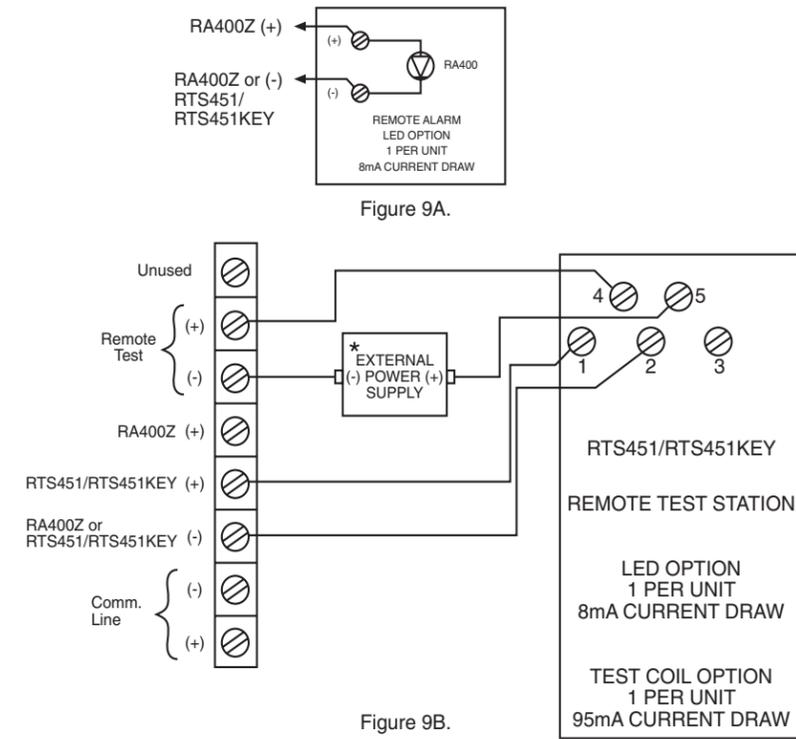


Figure 9A.

Figure 9B.

\*The RTS451/RTS451KEY test coil circuit requires an external 24VDC power supply which must be UL listed

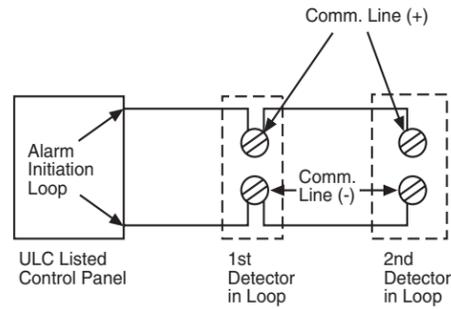
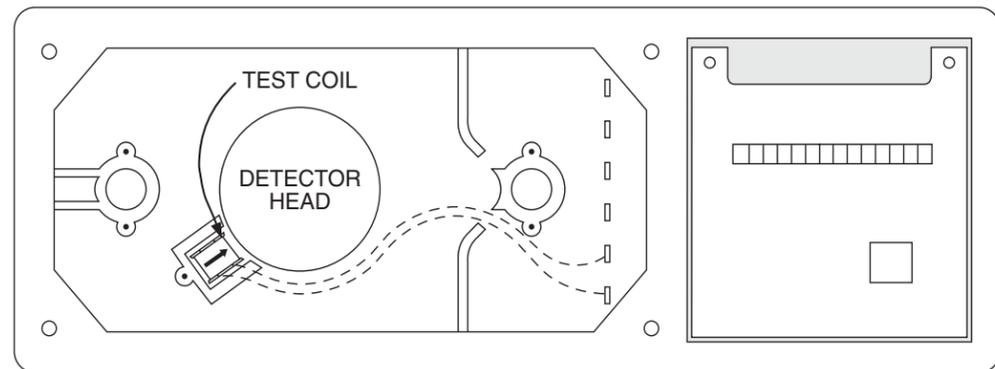


Figure 9C. System wiring diagram for duct detectors using a ULC listed control panel.

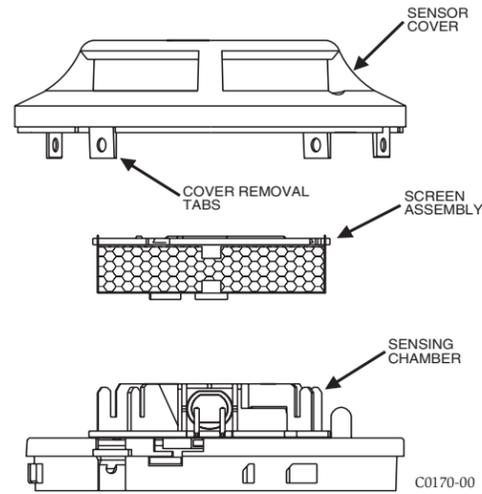
H0542-00

**Figure 11. RTS451/RTS451KEY test coil installation:**



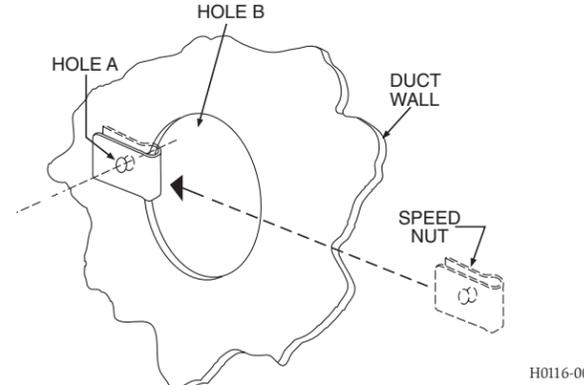
H0292-00

**Figure 10. Laser head exploded view:**



C0170-00

**Figure 3A. Speed nut mounting location:**



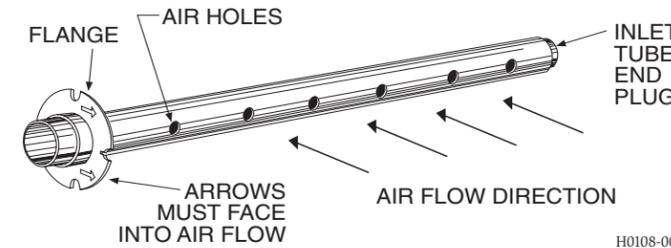
H0116-00

**Step 5. Install the Inlet Tube**

The inlet tube (shown in Figure 4) is identified by a series of air inlet holes on the tube. This tube must be purchased separately. Order the correct length, as specified in Table 1, for the width of the duct where it will be installed. The exhaust tube is molded into the base of the duct housing.

The inlet tube is always installed in the right house bushing, with the air inlet holes facing into the air flow. To assure proper installation, the tube mounting flange is marked with arrows. Mount the inlet tube so that the arrows point into the air flow. Figure 5 shows the various combinations of tube mounting configurations with respect to air flow.

**Figure 4. Air duct detector inlet sampling tube:**



H0108-00

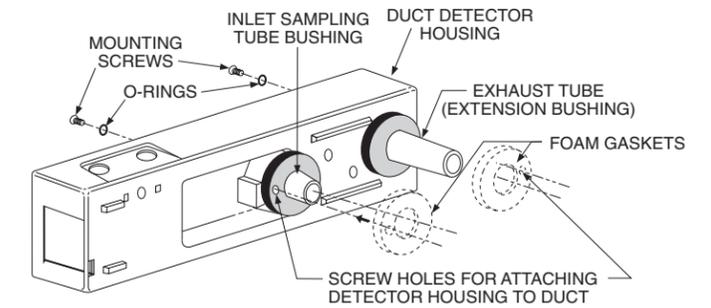
**A. Installation for Ducts Less Than 8 Feet Wide**

1. Any inlet tube over 3 feet long must be supported on the opposite side of the duct detector housing.
2. If the inlet tube is longer than the width of the air duct, drill a 3/4" hole in the duct directly opposite the hole already cut for the inlet tube. If the inlet tube is shorter than the width of the air duct, install the end cap into the inlet tube (see Figure 4).
3. Slide the inlet tube into the right housing bushing. Position the tube so that the arrows point into the air flow.
4. Secure the tube flange to the housing bushing with the two #6 self-tapping screws.
5. 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 tube length using Table 1. Otherwise, trim the end of the tube protruding through the duct so that 1 to 2 inches of the tube extends outside the duct. Plug this end with the tube end plug and tape closed any holes in the protruding section of the tube. Be sure to seal the duct when the tube protrudes.

**WARNING**

In no case should more than 2 air inlet holes be cut off the tube. There must be a minimum of 10 holes in the tube exposed to the air stream.

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



H0238-00

**B. Installation for Ducts More Than 8 Feet Wide**

**NOTE:** To install inlet 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 inlet sampling tube.

Install the inlet tube as follows:

1. Any tube (over 3 feet long) that doesn't protrude through the duct (on the side opposite the housing) must be supported by other means.
2. Drill a 3/4" hole in the duct directly opposite the hole already drilled for the inlet tube.
3. Slide the inlet tube with the flange into the right housing bushing. Position the tube so that the arrows point into the air flow. Secure the tube flange to the housing bushing with the two #6 self-tapping screws.
4. From inside the duct, couple the other section of the inlet tube to the section already installed using the 1/2" conduit fitting supplied. Make sure the holes on both of the air inlet tubes are lined up facing the air flow.
5. Trim the end of the tube protruding through the duct so that 1 to 2 inches of the tube extends outside the duct. Plug this end with the tube end cap and tape closed any holes in the protruding section of the tube. Be sure to seal the duct when the tube protrudes.

**NOTE:** An alternate method to using the ST-10 is to use two ST-5 inlet tubes. Remove the flange from one of the tubes and install as described above. After the installation, use electrician's tape to close off some of the sampling holes so that there are a total of 12 holes spaced as evenly as possible across the width of the duct.

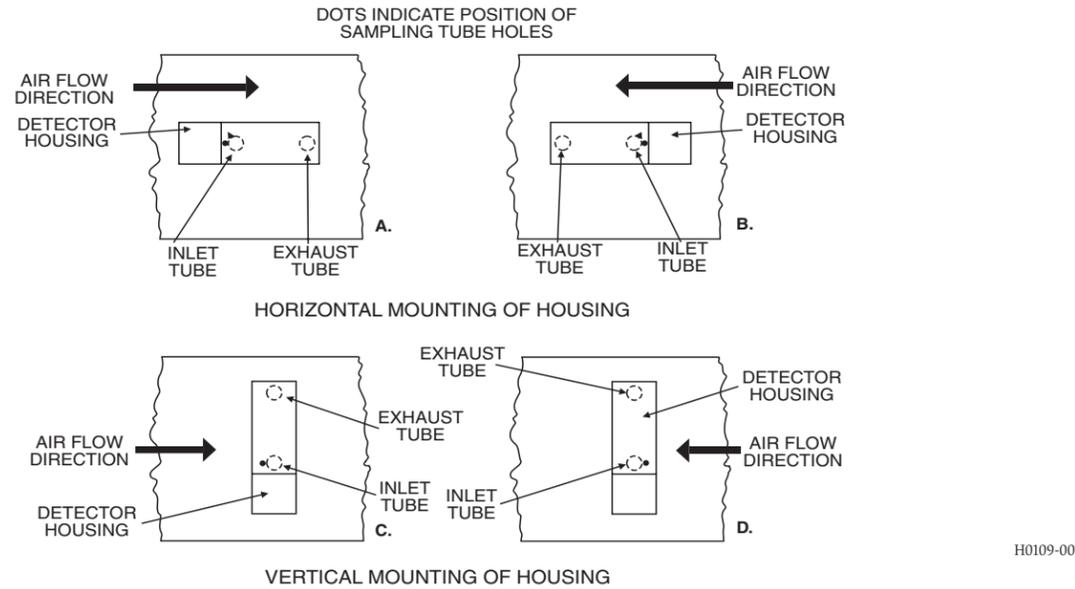
**NOTE:** Air currents inside the duct may cause excessive vibration. This vibration can slowly open the seal around the tube and permit air to escape. To prevent this from occurring, a 3" floor flange, available at most plumbing supply houses, may be used. This flange/connector mounting technique makes the initial installation easier because a 1" to 1 1/4" hole may be drilled where the flange/connector will be used. It is easier to push the inlet tube through the larger hole.

**Modification of Inlet Sampling Tubes**

There may be applications where duct widths are not what is specified for the installation. In such cases, it is permissible to modify an inlet sampling tube that is longer than necessary to span the duct width.

Use a 0.193-inch diameter (#11) drill and add the appropriate number of holes so that the total number of holes exposed to the air flow in the duct is 10 to 12. Space the additional holes as evenly as possible over the length of the tube.

**Figure 5. Tube mounting configurations with varying air flow direction and orientation of detector housing. Vertical as well as horizontal mounting is acceptable:**



**NOTE:** This procedure should only be used in an emergency, and it is not intended as a permanent substitute for ordering the correct length tubes.

**Step 6. Field Wiring**  
**Wiring Installation Guidelines**

All wiring must be installed in compliance with 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.

For signal wiring, (the wiring between interconnected detectors or from detectors to auxiliary devices), it is recommended that single-conductor wire be no smaller than 16 gauge (1.5 square mm), and that two- or three-conductor wire be no smaller than 18 gauge (1.0 square mm). The last foot or so of conduit should be flexible steel 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 allowable loop resistance. Consult the control panel manufacturer's specifications for the total loop resistance allowed for the particular model control panel being used before wiring the detector loop.

**Wiring Instructions**

The 7251DH is designed for easy wiring. The housing provides a terminal strip with clamping plates. Wiring connections are made by stripping approximately 1/2" of insulation from the end of the wire, sliding this bare end under the plate, and tightening the clamping plate screw.

**Step 7. Install the Filters**

Most duct installations are subject to dust accumulation. System filters remove a large percentage of this contamination, but cannot remove all of it. Dust inside the duct detector causes problems. First, very fine particles of dust can enter the detector sensing chamber and cause the unit to go into alarm. Second,

the accumulation of dust and dirt necessitates a more frequent periodic cleaning schedule, which can result in substantial cost and/or down time.

Disposable sampling tube filters can greatly reduce the nuisance alarms caused by dust, and can also significantly extend the maintenance interval. To install the sampling tube filters, simply push the filter adapter into the exhaust tube, and then push the filter onto the adapter tube on the left, as shown in Figure 6. Then install the other filter over the end of the inlet sampling tube.

**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. Replacement filters can be ordered from System Sensor (exhaust tube/intake tube filter P/N F36-05-00).

The filters do not substantially affect smoke performance under normal conditions. There is very little restriction of smoke entry even when up to 90% of the filter is clogged. Visual inspection is usually adequate to determine whether the filters should be replaced because such a high percentage of contamination is required to affect performance.

However, if further testing is desired, a Dwyer Model 460 (or equivalent) Differential Pressure Gauge may be used. Simply compare the differential pressure readings with and without the filters attached. There should be little or no difference. If the difference exceeds 10%, replace the filters. In no case, however, should the pressure differential be less than 0.01 inches of water or greater than 1.2 inches of water.

**Step 8. Perform Detector Check**

**8.1 Air Flow**

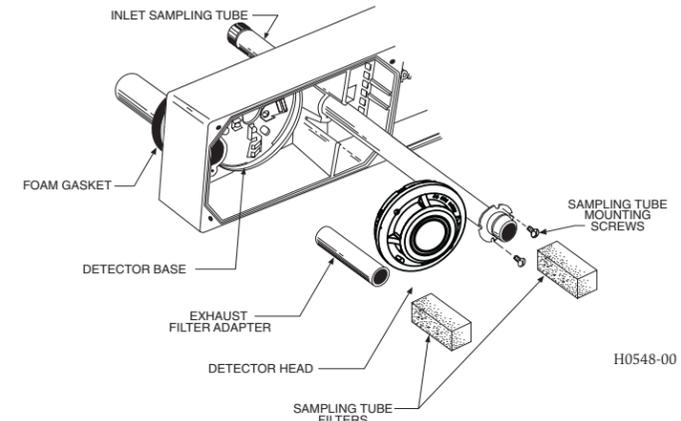
1. To verify sufficient sampling of ducted air, use a manometer to measure the differential pressure created from air flow across the sampling tubes. The pressure should measure no less than 0.01 inches of water and no greater than 1.20 inches of water.

2. To determine that smoke is capable of entering the sensing chamber, a visual examination should be conducted to note any obscurations around the sensing chamber. If a smoke test is required, smoke such as cigarette, cotton wick, or punk smoke may be blown directly at the smoke detector head. It is important to plug the exhaust and sampling tube hole to prevent ducted air from blowing smoke away from the smoke detector head. Record all test records in the Detector Test Log (page 8).

**CAUTION**

Remember to remove the plugs after this test or the detector will not sense smoke in the air duct.

**Figure 6. Sampling tube filter installation:**

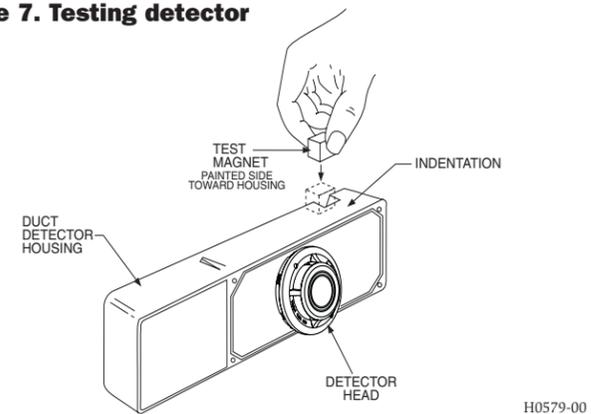


**8.2 Alarm Tests**

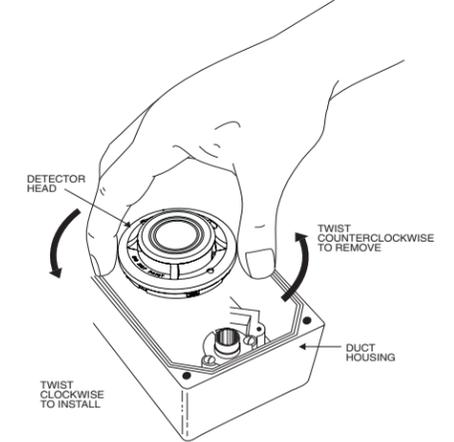
Before replacing the duct housing cover, the detector interconnections should be checked. The 7251DH may be checked as follows:

- A. M02-04-00 Magnet Test
  1. Make sure power is applied to the detector.
  2. Place the painted surface of the test magnet against the housing next to the indentation molded onto the outside of the housing (see Figure 7).
  3. The LEDs on the detector should latch on as should any accessories (i.e. RA400ZA, RTS451), and the alarm condition should be verified at the control panel.

**Figure 7. Testing detector**



**Figure 8. Detector head removal:**



**B. RTS451/RTS451KEY Remote Test Station**

The RTS451/RTS451KEY Remote Test Station facilitates test of the alarm capability of the duct smoke detector as indicated in the RTS451/RTS451KEY manual. The 7251DH duct detector cannot be reset by the RTS451/RTS451KEY. It must be reset at the system control panel.

To install the RTS451/RTS451KEY test coil, connect the device as shown in Figure 11; wire runs must be limited to 25 ohms or less per interconnecting wire. Place the coil in the detector housing with the arrow facing up and pointing toward the detector as in Figure 11. Attach the coil leads to the housing terminals as shown; polarity is not important. Firmly screw the bracket in place over the test coil.

**8.4 Trouble Test**

The capability of "TROUBLE" detection is tested by removing the detector head from the duct housing. The detector head is removed by turning it counterclockwise about 10 degrees (Figure 8). The system control panel should indicate a trouble condition. Reinserting the detector head should clear the trouble condition.

**Step 9. Install the Cover**

Install the cover using the four screws. Be certain filters are installed as specified in Step 7. Make sure that the cover fits into the base groove and that all gaskets are in their proper positions. Tighten the four cover screws to 10 in./lbs.

**Step 10. Perform the Final System Check**

Place the magnet in position as shown in Figure 7. The LEDs on the detector should light. Any accessory LED(s) will also light. The system control panel should indicate an alarm condition.

**Periodic Maintenance Requirements**

Air duct smoke detectors should be maintained at least once a year. They should be maintained more often if the detector heads become obviously dirty in less than a year. The detectors must also be cleaned immediately after a fire (see cleaning section on Page 7). Failure to properly maintain air duct smoke detectors may cause unnecessary false alarms.

It is recommended that a permanent Detector Test Log be set up and maintained, with a record for each individual smoke detector in each building. Each detector should be clearly described, with information on the type of detector, the model number, the serial number (if any), the location, and the type of environment. Data entries should include test dates, type of test mode, test results, maintenance, and comments. A detector test log is included in this manual.