

## Requirements and recommendations for proper use of fire alarm systems including smoke detectors and other fire alarm devices:

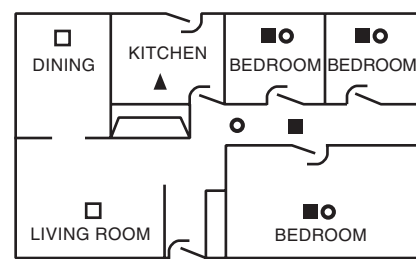
Early fire detection is best achieved by the installation and maintenance of fire detection equipment in all rooms and areas of the house or building in accordance with the requirements and recommendations of the current edition of the National Fire Protection Association Standard 72, National Fire Alarm Code (NFPA 72), the manufacturer's recommendations, State and local codes and the recommendations contained in Guide for the Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. For specific requirements, check with the local Authority Having Jurisdiction (ex. Fire Chief) for fire protection systems.

Requirements and Recommendations include:

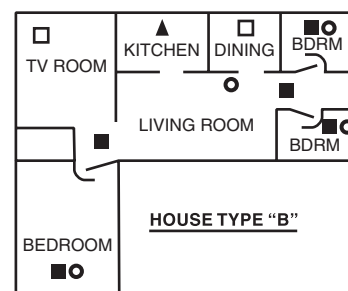
- For residential applications, smoke detectors shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms and on each additional story of the family living unit, including basements and excluding crawl spaces and unfinished attics.
- Smoke detectors shall be installed in sleeping rooms in new construction and it is recommended that they shall also be installed in sleeping rooms in existing construction.
- It is recommended that more than one smoke detector shall be installed in a hallway if it is more than 30 feet long.
- It is recommended that there shall never be less than two smoke detectors per apartment or residence.

- It is recommended that smoke detectors be located in any room where an alarm control is located, or in any room where alarm control connections to an AC source or phone lines are made.  
If detectors are not so located, a fire within the room could prevent the control from reporting a fire.
- All fire alarm systems require notification devices, including sirens, bells, horns, and/or strobes. In residential applications, each automatic alarm initiating device when activated shall cause the operation of an alarm notification device that shall be clearly audible in all bedrooms over ambient or background noise levels (at least 15dB above noise) with all intervening doors closed.
- It is recommended that a smoke detector with an integral sounder (smoke alarm) be located in every bedroom and an additional notification device be located on each level of a residence.
- To keep your fire alarm system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations and UL and NFPA standards. At a minimum the requirements of Chapter 7 of NFPA 72 shall be followed. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be performed annually by authorized personnel only.
- The most common cause of an alarm system not functioning when a fire occurs is inadequate maintenance. As such, the alarm system should be tested weekly to make sure all sensors and transmitters are working properly.
- Although designed for long life, fire alarm devices including smoke detectors may fail at any time. It is recommended that residential smoke detectors shall be replaced every 10 years.
- Any smoke detector, fire alarm system or any component of that system which fails shall be repaired or replaced immediately.

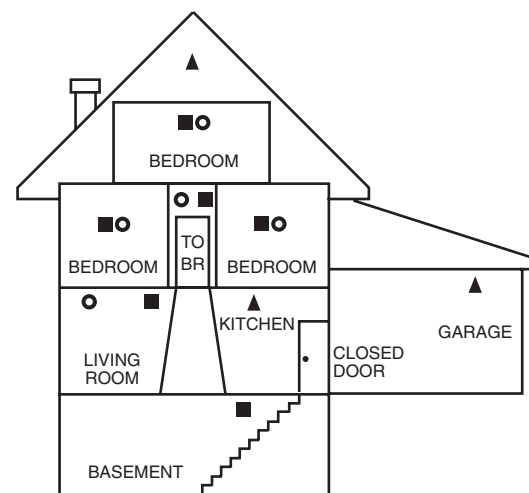
### Typical System Installations per NFPA 72



HOUSE TYPE "A"



HOUSE TYPE "B"



HOUSE TYPE "C"

- - Smoke Detectors required
- - Smoke Detectors required with integral sounders recommended
- ▲ - Heat Activated Detectors required
- - Smoke Detectors for additional protection
- - Notification Devices

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### DH400ACDCPX and DH400ACDCPS Air Duct Smoke Detector



3825 Ohio Avenue, St. Charles, Illinois 60174  
1-800-SENSOR2, FAX: 630-377-6495  
www.systemsensor.com

#### Before Installing

Please thoroughly read the System Sensor *Guide for Proper Use of Smoke Detectors in Duct Applications* (A05-1004), which provides detailed information on detector spacing, placement, zoning, wiring, and special applications. Copies of this manual are available online at [www.systemsensor.com](http://www.systemsensor.com) or via System Sensor's toll free fax-back service, Documents on Demand at 800/736-7672. NFPA Standards 72 and 90A should also be referenced for detailed information.

**NOTICE:** This manual should be left with the owner/user of this equipment.

**IMPORTANT:** This detector must be tested and maintained regularly following NFPA 72 requirements. The detector should be cleaned at least once a year.

#### Table of Contents

	Page
[1] General Description	1
[2] Exploded View of Duct Detector Components	2
[3] Contents of the Duct Detector Kit	2
[4] Limitations of Duct Detectors	2
[5] Installation Sequence	2
[6] Duct Detector Maintenance and Test Procedures	6
[7] Detector Cleaning Procedures	8
[8] Specifications	9
Warranty	10

#### List of Tables and Figures

	Page
Fig. 1: Duct Detector Exploded View	2
Table 1: Inlet Sampling Tube Selection	3
Fig. 2: Inlet Sampling Tube	3
Fig. 3: Sampling Tube Mounting Configurations	3
Fig. 4: Wiring Diagram	5
Fig. 5: Wiring Diagram - No Control Panel	6
Fig. 6: Wiring Diagram - Accessories	7
Fig. 7: Sampling Tube Filter Installation	7
Fig. 8: Testing Detector Alarm	9
Fig. 9: Detector Head Removal	9
Fig. 10: Photo Head Exploded View	9

#### [1] General Description

An HVAC system supplies conditioned air to virtually every area of a building. Smoke introduced into this air duct system will be distributed to the entire building. Smoke detectors designed for use in air duct systems are used to sense the presence of smoke in the duct.

Model DH400ACDCPX and DH400ACDCPS Air Duct Smoke Detectors utilizes photoelectric technology for the detection of smoke. This smoke detection method, when combined with an efficient housing design, samples air passing through the duct and allows detection of a developing hazardous condition. When sufficient smoke is sensed, an alarm signal is initiated at the fire control panel monitoring the detector, and appropriate action can be taken to shut off fans and blowers, change over air handling systems, etc. These actions can facilitate the management of toxic smoke and fire gases throughout the areas served by the duct system.

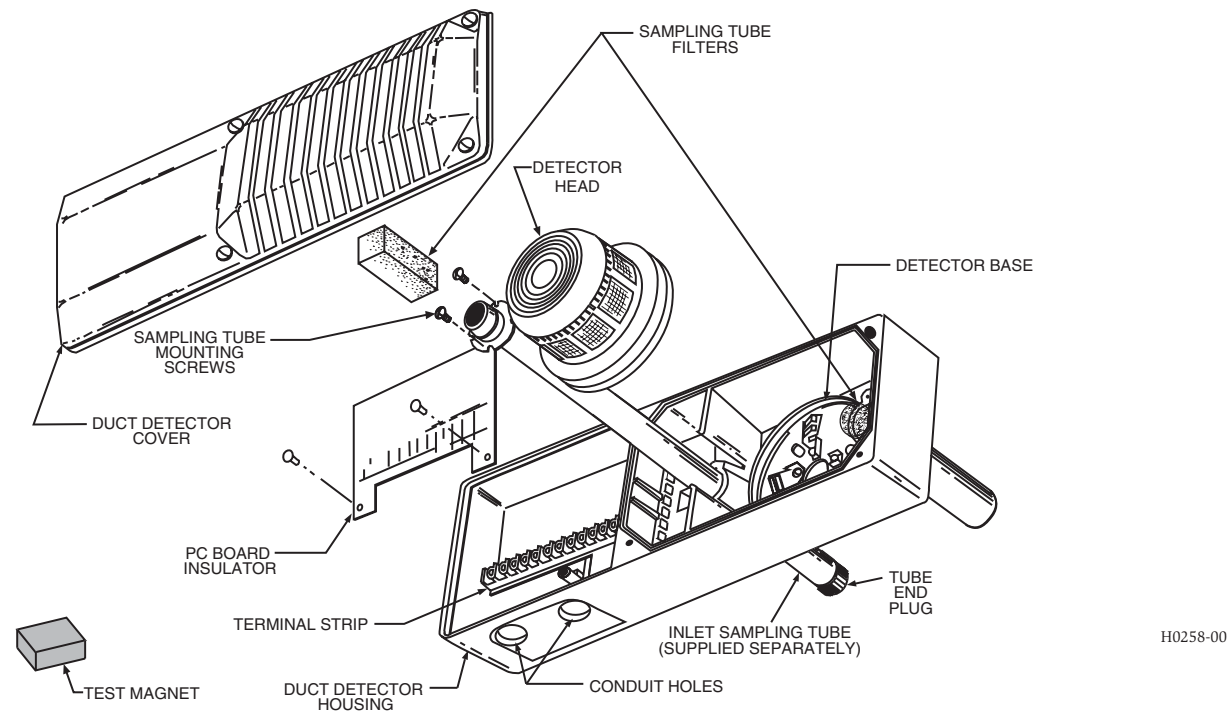
DH400ACDCPX and DH400ACDCPS detectors are designed to operate from 24 VDC, 24 VAC, 120 VAC, or 240 VAC. Alarm and supervisory relay contacts are available for control panel interface (alarm initiation), HVAC control, and other auxiliary functions. These detectors are not designed for 2-wire application.

For testing, the alarm can be enabled by a magnet activated test switch or by the optional remote test station. The duct smoke detectors latch into alarm state when alarm occurs. LEDs on each detector illuminate to provide local alarm indication, and optional accessories offer a variety of announcement capabilities.

The detector can be reset by a momentary power interruption, by the magnet activated reset switch, or by the optional remote test station.

**As of January 2000, this document supersedes any previous liability information enclosed with this product.**

[2] Figure 1. Exploded view of duct detector components:



### [3] Contents of the Duct Detector Kit

1. Complete housing base and cover assembly
2. One sampling tube filter
3. Two #6 self-tapping mounting screws for sampling tube
4. One inlet tube end plug

**NOTE:** The inlet sampling tube must be ordered separately. It must be the correct length for the width of the duct where it will be installed. See Table 1 on page 4 to determine the inlet tube required for different duct widths.

### [4] Limitations of Duct Detectors



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.

System Sensor supports this position and strongly recommends that the user read NFPA Standards 90A, 72, and 101. The DH400ACDCPX and DH400ACDCPS Air Duct Smoke Detectors are listed per UL 268A.



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



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



For this detector to function properly, it MUST be installed according to the instructions in this manual. Furthermore, the detector MUST be protected from the elements and operated within ALL electrical and environmental specifications listed in this manual. Failure to comply with these requirements may prevent the detector from activating when smoke is present in the air duct.

### [5] Installation Sequence

#### [5.1] Verify Duct Air Flow Direction and Velocity

Model DH400ACDCPX and DH400ACDCPS detectors are 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 (anemometer) to check the air velocity in the duct.

#### [5.2] Select Mounting Location

The DH400ACDCPX and DH400ACDCPS are intended for mounting on ductwork and/or brackets which have been pre-drilled with appropriate mounting holes. While other applications are possible, they are not covered within this manual.

## Limitations of Fire Alarm Systems

Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premise following the recommendations of the current edition of the National Fire Protection Association Standard 72, National Fire Alarm Code (NFPA 72), manufacturer's recommendations, state and local codes, and the recommendations contained in Guide for the Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off or give early warning in as many as 35% of all fires. While fire alarm systems are designed to provide warning against fire, they do not guarantee warning or protection against fire. Any alarm system is subject to compromise or failure to warn for a variety of reasons. For example:

- Particles of combustion or "smoke" from a developing fire may not reach the sensing chambers of the smoke detector because:
  - Barriers such as closed or partially closed doors, walls, or chimneys may inhibit flow.
  - Smoke particles may become "cold" and stratify, and may not reach the ceiling or upper walls where detectors are located.
  - Smoke particles may be blown away from detectors by air outlets.
  - Smoke particles may be drawn into air returns before reaching the detector.

In general, smoke detectors on one level of a structure cannot be expected to sense fires developing on another level.

- The amount of "smoke" present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.
- Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.
- Smoke detectors are subject to false alarms and nuisance alarms. For example, a smoke detector located in or near a kitchen may go into nuisance alarm during normal operation of kitchen appliances. In addition, dusty or steamy environments may cause a smoke detector to falsely alarm. If the location of a smoke detector causes an abundance of false alarms or nuisance alarms, do not disconnect the smoke detector; call a professional to analyze the situation and recommend a solution.
- Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially within bedrooms), smoking in bed, violent explosions (caused by escaping gas, improper storage of flammable materials, etc.).
- Heat detectors do not sense particles of combustion and are designed to alarm only when heat on their sensors increase at a predetermined rate or reaches a predetermined level. Heat detectors are designed to protect property, not life.
- Warning devices (including horns, sirens, and bells) may not alert people or wake up sleepers who are located on the other

side of closed or partially open doors. A warning device that activates on a different floor or level of a dwelling or structure is less likely to awaken or alert people. Even persons who are awake may not notice the warning if the alarm is muffled by noise from a stereo, radio, air conditioner or other appliance, or by passing traffic. Audible warning devices may not alert the hearing-impaired (strokes or other devices should be provided to warn these people). Any warning device may fail to alert people with a disability, deep sleepers, people who have recently used alcohol or drugs, or people on medication or sleeping pills.

- Please note that:

- i) Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
  - ii) Studies have shown that certain people, even when they hear a fire alarm signal, do not respond or comprehend the meaning of the signal. It is the property owner's responsibility to conduct fire drills and other training exercises to make people aware of fire alarm signals and instruct on the proper reaction to alarm signals.
  - iii) In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.
- Telephone lines needed to transmit alarm signals from a premises to a central station may be out of service or temporarily out of service. For added protection against telephone line failure, backup radio transmission systems are recommended.
  - System components, though designed to last many years, can fail at any time. As a precautionary measure, it is recommended that smoke detectors be checked, maintained, and replaced per manufacturer's recommendations.
  - System components will not work without electrical power. If system batteries are not serviced or replaced regularly, they may not provide battery backup when AC power fails.
  - Environments with high air velocity or that are dusty or dirty require more frequent maintenance.
  - To keep your fire alarm system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations and UL and NFPA standards. At a minimum the requirements of Chapter 7 of NFPA 72 shall be followed. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be performed annually by authorized personnel only.
  - The most common cause of an alarm system not functioning when a fire occurs is inadequate maintenance. As such, the alarm system should be tested weekly to make sure all sensors and transmitters are working properly.
  - Although designed for long life, fire alarm devices including smoke detectors may fail at any time. It is recommended that smoke detectors shall be replaced every 10 years.
  - Any smoke detector, fire alarm system or any component of that system which fails shall be repaired or replaced immediately.

In general, fire alarm systems and devices will not work without power and will not function properly unless they are maintained and tested regularly.

While installing a fire alarm system may make the owner eligible for a lower insurance rate, an alarm system is not a substitute for insurance. Property owners should continue to act prudently in protecting the premises and the people in the premises and should properly insure life and property and buy sufficient amounts of liability insurance to meet their needs.

**Electrical Ratings**

Power Supply Voltage	20 - 29 VDC	24 VAC 50 - 60 Hz	120 VAC 50 - 60 Hz	220/240 VAC 50 - 60 Hz
----------------------	-------------	-------------------	--------------------	------------------------

CURRENT REQUIREMENTS (USING NO ACCESSORIES)

Max. standby current	25 mA	35 mA AC avg.	20 mA AC avg.	20 mA AC avg.
Max. alarm current	95 mA	55 mA AC avg.	55 mA AC avg.	30 mA AC avg.

CONTACT RATINGS

Alarm initiation contacts (SPST)	2.0A @ 30 VAC/DC (0.6 power factor)
Alarm auxiliary contacts (DPDT)	10A @ 30 VDC 10A @ 250 VAC
Note: Alarm auxiliary contacts must switch 500 mA minimum at 24VDC. Alarm auxiliary contacts shall not be connected to initiating circuits of control panels. Use the alarm initiation contact for this purpose.	
Trouble contacts (SPST)	0.3A @ 32 VDC (resistive)

ACCESSORY CURRENT LOADS AT 24 VDC		
DEVICE	STANDBY	ALARM
APA451	12mA MAX	30mA MAX
PA400	0mA	15mA MAX
RA400Z	0mA	10mA MAX
RTS451/ RTS451KEY	0mA*	10mA MAX*

ANY COMBINATION OF ACCESSORIES MAY BE USED SUCH THAT THE GIVEN CURRENT LOADS TOTAL:  
100mA OR LESS IN THE STANDBY STATE,  
150mA OR LESS IN THE ALARM STATE.

\*NOTE: WHEN INITIATING AN ALARM, THE RTS451/ RTS451KEY REQUIRES 95 mA MAXIMUM IN PRE-ALARM AND 103 mA MAXIMUM IN ALARM. NOMINAL STANDBY CURRENT IS 0mA. ALARM CURRENT IS 10 mA MAXIMUM WHEN TEST MAGNET IS REMOVED.

**[5.3] Sampling Tube Installation**

The sampling tube (shown in Figure 2) 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 width of the duct where it will be installed. The exhaust tube is molded into 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 in the centermost housing bushing, with air inlet holes facing into the air flow. To assist proper installation, the tube's mounting flange is marked with arrows. Make sure the sampling tube is mounted so that the arrows point into the air flow. Figure 3 shows the various combinations of tube mounting configurations with respect to air flow.

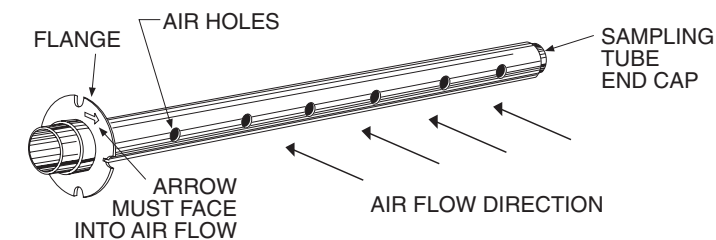
Mounting the detector housing in a vertical orientation is acceptable, provided that the air flows directly into the sampling tube holes as indicated in Figure 2.

**Table 1. Sampling tubes required for different duct widths:**

Outside Duct Width	Inlet Tube Required
1 to 2 ft.	ST-1.5
2 to 4 ft.	ST-3
4 to 8 ft.	ST-5
8 to 12 ft.	ST-10

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

**Figure 2. Air duct detector sampling tube:**



**[5.3.1] Alternate Method of Sampling Tube Installation**

The detector arrangement can also incorporate the remote mounting of the sampling tube and/or exhaust tube. In this case both the detector, sampling tube and exhaust tube (if included) should be rigidly mounted to withstand the pressure and resonant vibrations caused by the air velocity. The location of the detector's sampling tube should be such that there is uniform airflow in the cross section area.

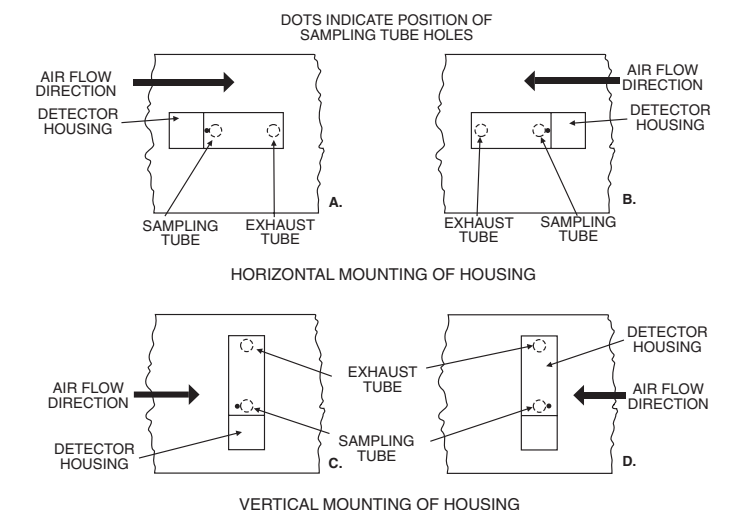
An air tight connection shall be made between the sampling tube, exhaust tube and their corresponding ports on the detector housing. Upon selection of location in the system, pressure differential across the sampling and exhaust ports in the detector housing shall be verified to be within the allowable range of the detector. This is accomplished by measuring the pressure difference between the inlet and outlet ports on the detector housing using a manometer as described in Section 6 of this manual.

**[5.4] Install the Detector Housing**

Feed the sampling tube and the exhaust port through the pre-drilled holes in the mounting location, then use two screws to secure the housing to the mounting surface.

**Caution: Do not overtighten the screws.**

**Figure 3. Tube mounting configurations with varying air flow direction:**



**Please refer to page 11 & 12 for the Limitations of Fire Alarm Systems**

**Three-Year Limited Warranty**

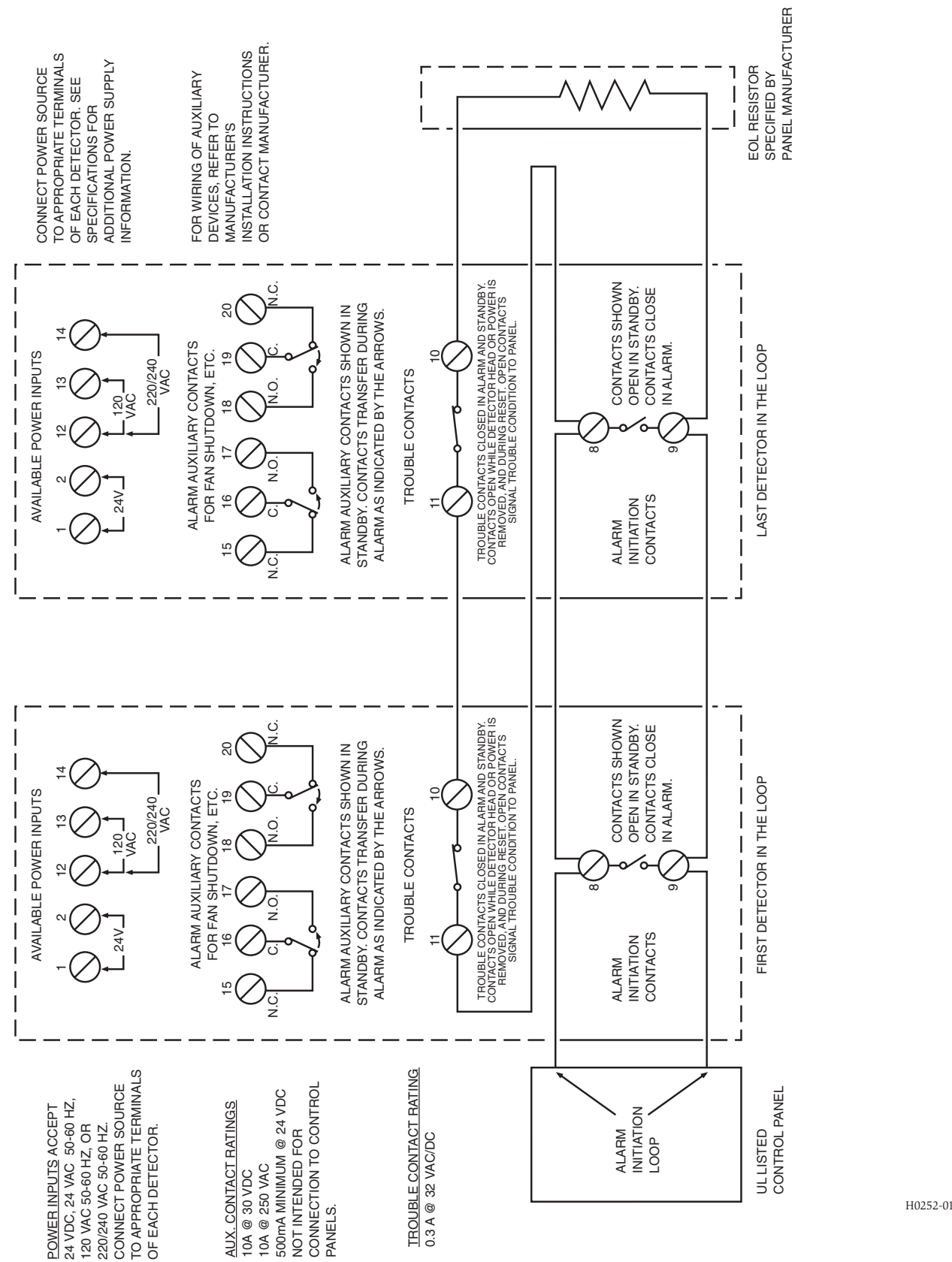
System Sensor warrants its enclosed air duct smoke detector to be free from defects in materials and workmanship under normal use and service for a period of three years from date of manufacture. System Sensor makes no other express warranty for this air duct smoke detector. No agent, representative, 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 repair or replacement of any part of the air duct smoke detector 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, Repair 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 repair or 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 4. System wiring diagram for duct detectors using a UL listed control panel (see Figure 8 for wiring of optional accessories):**

**CAUTION**

Do not loop wire under terminals when wiring detectors. Break wire runs to provide system supervision of connections.



**[8] Model DH400ACDCPX and DH400ACDCPS Air Duct Smoke Detector Specifications Description**

HVAC air duct mounted photoelectronic smoke detector for separately powered systems or stand alone systems. Auxiliary alarm relay contacts provide fan contractor shutdown to prevent HVAC circulation of smoke.

**Environmental Limits**

Temperature: 32°F to 120°F  
0°C to 49°C

Humidity: 10% to 93% R.H. non-condensing

Air Velocity: 500 to 4000 Ft/min.  
2.54 to 20.3 m/sec.

**Test Features**

Magnetic test switch, magnetic reset switch, MOD400R test module (optional), RTS451 Remote Test Station (optional), RTS451KEY Remote Test Station with Key Switch (optional).

**Mechanical Specifications**

Length: 14.5 inches 37 cm  
Width: 5 inches 13 cm  
Depth (installed): 4 inches 10 cm  
Weight: 4 pounds 1.8 kg

**Sampling (Inlet) Tubes**

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

**Electrical Specifications**

	20-29 VDC	24 VAC 50-60-Hz	120 VAC 50-60 Hz	220/240 VAC 50-60 Hz
Power supply voltage:	20-29 VDC	24 VAC 50-60-Hz	120 VAC 50-60 Hz	220/240 VAC 50-60 Hz
Input capacitance:	270 μF max.	270 μF max.	N/A	N/A
Reset voltage:	3.0 VDC min.	2.0 VAC min.	10 VAC min.	20 VAC min.
Reset time (with RTS451):	.03 to 0.3 sec.	.03 to 0.3 sec.	.03 to 0.3 sec.	.03 to 0.3 sec.
Reset time (by power down):	0.6 sec. max.	0.6 sec. max.	0.6 sec. max.	0.6 sec. max.
Power up time:	34 sec. max.	34 sec. max.	34 sec. max.	34 sec. max.
Alarm response time:	2 to 17 sec.	2 to 17 sec.	2 to 17 sec.	2 to 17 sec.
Sensitivity Test:	See head label	See head label	See head label	See head label

### [7] Detector Cleaning Procedures

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

#### [7.1] Air Filters

1. Turn off power to the system.
2. Remove and inspect the sampling tube filters.
3. If the 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.

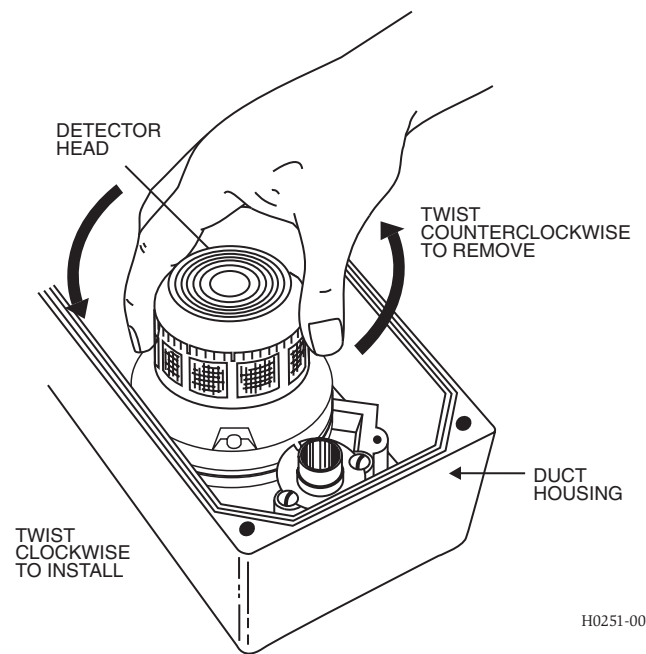
#### [7.2] Photo Heads

1. Remove the detector cover by inserting a small bladed screwdriver into the slot located 90 degrees from the field test port. Rotate the cover counterclockwise to remove (see Figure 10).
2. Lift the screen from the photo chamber. Vacuum the screen and cover before using clean, compressed air to loosen and blow out any remaining debris. Replacement screens (RS24) are available.
3. Vacuum the photo chamber. Use clean compressed air to blow it clean.
4. Replace the screen by aligning the arrow on top with the field test port on the detector. Press the screen into place. It should fit tightly on the chamber.
5. Replace the detector cover and rotate it clockwise to lock it in place.

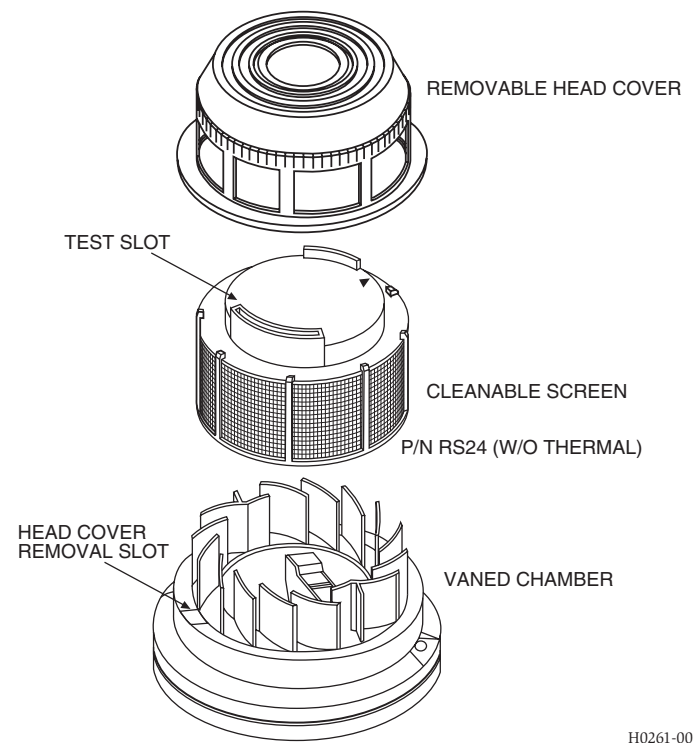
#### [7.4] Reinstallation

1. Reinstall the detector in its housing.
2. Restore system power.
3. Perform Detector Check, Section [5.7].
4. Notify the proper authorities testing has been completed and the smoke detector system is back in operation.

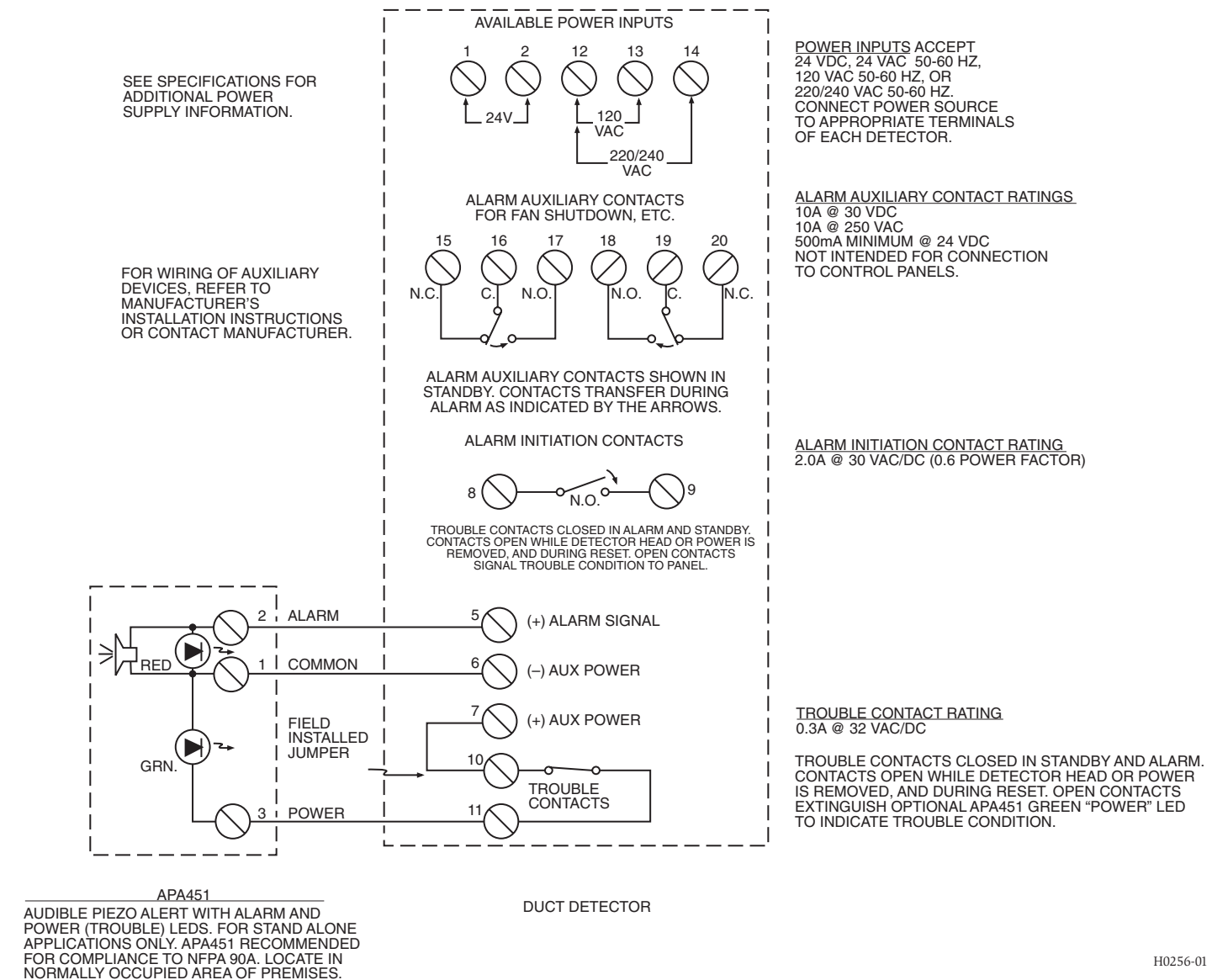
**Figure 9. Detector head removal:**



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



**Figure 5. Wiring diagram for duct detector systems equipped without a control panel (see Figure 8 for wiring of additional optional accessories):**



H0256-01

### [5.5] 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 reduce the likelihood of wiring errors. 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 usually recommended that single-conductor wire be no smaller than 18 gauge. The duct detector terminals accommodate wire sizes up to 14 gauge. The last foot of conduit should be flexible steel conduit (available in electrical supply houses), which facilitates installation and puts less strain on the conduit holes in the housing. Solid conduit connections may be used, if desired.

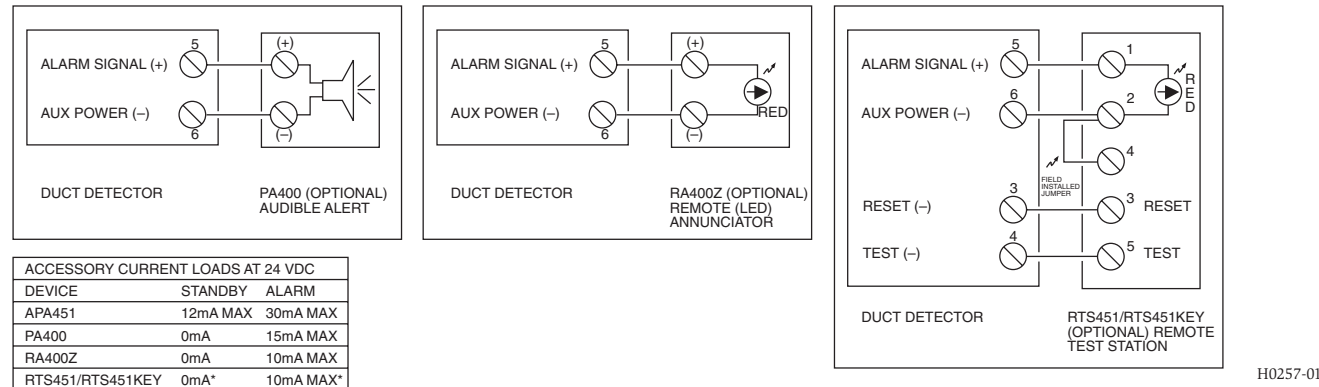
Smoke detectors and alarm system control panels have specifications for allowable loop resistance. Consult the control panel manufacturer's specifications for the total loop resistance allowed for the particular model control panel being used before wiring the detector loop.

#### Wiring Instructions

The DH400ACDCPX and DH400ACDCPS detectors are designed for easy wiring. The housing provides a terminal strip with clamping plates. 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.

The DH400ACDCPX and DH400ACDCPS duct detector are designed to operate from 24 VDC, 24 VAC, 120 VAC, or 240 VAC.

**Figure 6. Wiring diagrams for optional accessories (see Figure 7 for APA451 wiring diagram):**



ACCESSORY CURRENT LOADS AT 24 VDC		
DEVICE	STANDBY	ALARM
APA451	12mA MAX	30mA MAX
PA400	0mA	15mA MAX
RA400Z	0mA	10mA MAX
RTS451/RTS451KEY	0mA*	10mA MAX*

ANY COMBINATION OF ACCESSORIES MAY BE USED SUCH THAT THE GIVEN CURRENT LOADS TOTAL:

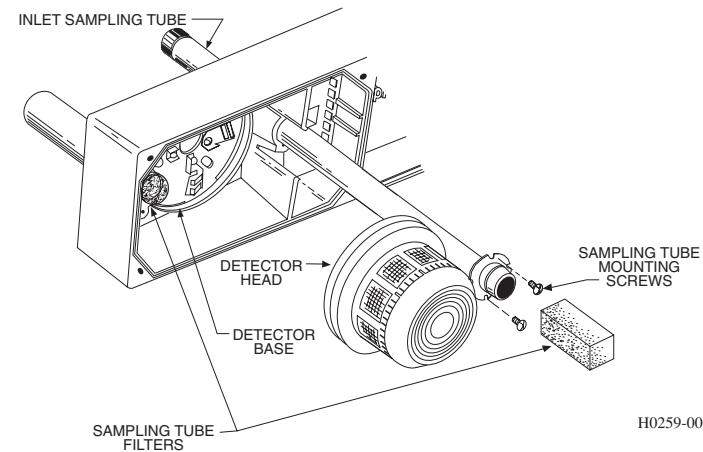
- 100mA OR LESS IN THE STANDBY STATE,
- 150mA OR LESS IN THE ALARM STATE.

\*NOTE: WHEN INITIATING AN ALARM, THE RTS451/RTS451KEY REQUIRES 95mA MAXIMUM IN PRE-ALARM AND 103mA MAXIMUM IN ALARM. NOMINAL STANDBY CURRENT IS 0mA. ALARM CURRENT IS 10mA MAXIMUM WHEN TEST MAGNET IS REMOVED.

### [5.6] Filter Installation

Air filters must be installed in both the inlet and exhaust openings inside the detector. The filter on the exhaust side has been installed by System Sensor. On the inlet side, the filter should be installed over the end of the inlet sampling tube, as shown in Figure 7.

**Figure 7. Sampling tube filter installation:**



**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 [6] for more information. Replacement filters can be ordered from System Sensor, 3825 Ohio Ave., St. Charles, IL 60174. (Exhaust tube filter P/N F36-09-11, Inlet sampling tube filter P/N F36-05-00).

### [5.7] Perform Detector Check

1. Perform the STANDBY AND TROUBLE TEST per Section [6.2.1].
2. Perform the MAGNET TEST per Section [6.2.2.1]. The RTS451 test of Section [6.2.2.2] may substitute for this requirement.
3. Perform the AIR FLOW TEST per Section [6.1.1].
4. Perform the SMOKE RESPONSE TEST per Section [6.1.2].
5. Perform the SENSITIVITY TEST per Section [6.2.3].

### [5.8] Install the Cover

Install the cover using the four screws that are fixed in the housing cover. Be certain filters are installed as specified in Section [5.6]. Make sure that the cover fits into the base groove and that all gaskets are in their proper positions. Tighten the four screws to 10 in-lbs.

### [6] Duct Detector Maintenance and Test Procedures

Test and maintain duct 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 zone or system under test to prevent unwanted alarms.

### [6.1] Smoke Entry Tests

#### [6.1.1] 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 0.01 inches of water and no greater than 1.20 inches of water.

#### [6.1.2] Smoke Response

To determine if smoke is capable of entering the sensing chamber, visually identify any obstructions. Plug the exhaust and inlet tube holes 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. REMOVE THE PLUGS AFTER TESTING OR THE DETECTOR WILL NOT FUNCTION PROPERLY.

#### [6.1.3] Filter Replacement

The filters do not substantially affect smoke behavior even when they are up to 90% clogged. Quarterly visual inspection is usually often enough to determine if filters should be replaced because only a high percentage of contamination affects duct detector performance.

### [6.2] Standby, Alarm, and Sensitivity Tests

#### [6.2.1] Standby and Trouble

**Standby** - Check for the presence of the blinking red LEDs (blinks about every 10 seconds) through the transparent housing cover. If the APA451 accessory is used, its green Power LED should be illuminated continuously.

**Trouble** - If the detector LEDs do not blink or if the APA451 Power LED is not illuminated, the detector lacks power (check wiring, panel, or power supply), the head is missing (install), or the unit is defective (return for repair).

**Test** - The trouble condition can be caused intentionally to verify correct operation of the system. Remove power to the unit, remove the detector head (see Figure 9), or place the M02-04-00 magnet into the Reset locator, as shown in Figure 8. These actions should cause a trouble condition locally and at the system control panel.

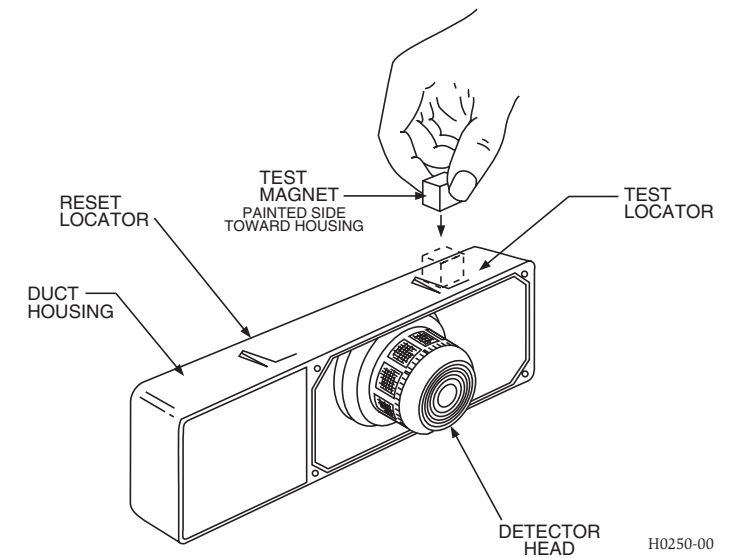
#### [6.2.2] Alarm Test

##### [6.2.2.1] M02-04-00 Magnet Test

1. Place the painted surface of the magnet into the Test locator molded into the side of the housing (see Figure 8).
2. The red alarm LEDs on the detector should latch on, as should any accessories (PA400, RA400Z, RTS451, APA451). Verify auxiliary functions (such as fan shut-down) and system control panel alarm status.

3. Place the painted surface of the magnet into the Reset locator molded into the side of the housing (see Figure 8). This should clear the latched alarm condition at the detector. If a system control panel is used, the panel may also require resetting.

**Figure 8. Testing detector alarm:**



##### [6.2.2.2] RTS451/RTS451KEY Remote Test Station

The RTS451/RTS451KEY Remote Test Station facilitates test of the alarm capability of the duct detector as indicated in the RTS451/RTS451KEY manual. The DH400ACDCPX or DH400ACDCPS duct detector can be reset by the RTS451/RTS451KEY. If a system control panel is used, the panel itself may also require resetting.

To install the RTS451/RTS451KEY, connect the device as shown in Figure 6; wire runs must be limited to 25 ohms or less per interconnecting wire. The test coil required for use with this detector has been pre-installed by System Sensor.

#### [6.2.3] Sensitivity Test

##### [6.2.3.1] MOD400R Sensitivity Test

After verification of alarm capability, use the MOD400R test module with a voltmeter to check detector sensitivity as described in the test module's manual. The housing cover must be removed to perform this test.

If test module readings indicate that the detector head is outside of the acceptable range that is printed on the back of the detector head, the detector head requires cleaning per Section [7].