



# DH100ACDCLPX Air Duct Smoke Detector with Extended Air Speed Range



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The Innovair DH100ACDCLPX model is a photoelectric detector approved for an extended air speed range of **100 to 4000 feet per minute** (0.5 m/s to 20.3 m/s) and an operational temperature range of 32°F to 131°F (0°C to 55°C).

### Before Installing

Please thoroughly read the System Sensor *Guide for Proper Use of Smoke Detectors in Duct Applications* (I56-473), which provides detailed information on detector spacing, placement, zoning, wiring, and special applications. Copies of this manual are available from System Sensor. NFPA Standards 72 and 90A should also be referenced for detailed information.

**NOTICE:** This manual shall 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.

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### [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 throughout the entire building. Smoke detectors designed for use in air duct systems are used to sense the presence of smoke in the duct.

Model DH100ACDCLPX Air Duct Smoke Detector utilizes photoelectric technology for the detection of smoke. This 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 and appropriate action can be taken to shut off fans, 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.

The DH100ACDCLPX detector is designed to operate on 24 VDC/VAC. Alarm and supervisory relay contacts are available for control panel interface (alarm initiation), HVAC con-

trol, and other auxiliary functions. Auxiliary relays are also provided for fan shut down or signaling of up to 9 other detectors in the loop for multiple fan shut down. These detectors are not designed for 2-wire applications.

For testing, the alarm can be enabled by a magnet activated test switch or by the optional remote test station. The duct smoke detector latches into alarm state when an alarm occurs. A green LED flashes to indicate power, a red LED signals local alarm indication, and optional accessories offer a variety of annunciation capabilities.

The DH100ACDCLPX can be reset by a momentary power interruption, the reset button on the front cover, the control panel, or remote reset accessory. **The DH100ACDCLPX incorporates a cover tamper feature that provides a trouble signal after 20 minutes if the cover is removed or improperly installed.** Proper installation of the cover removes the trouble condition.

### [2] Limitations Of Duct Smoke 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 DH100ACDCLPX Air Duct Smoke Detectors are listed per UL 268A.



**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.

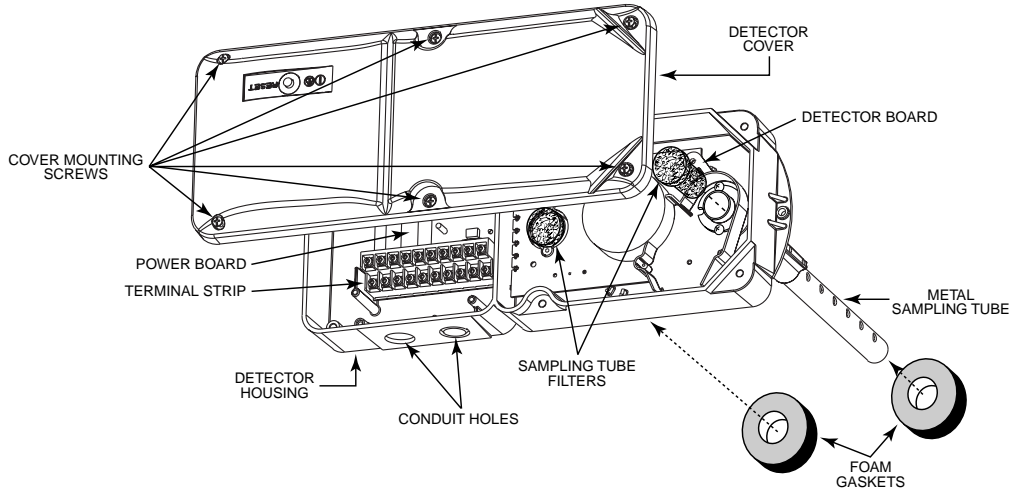


This device will not sense smoke unless the ventilation system is operating and the cover is installed.



For this detector to function properly, it **MUST** be installed according to the instructions in this manual. Furthermore, the detector **MUST** be 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.

**[3] Figure 1: Exploded View Of Duct Smoke Detector Components**



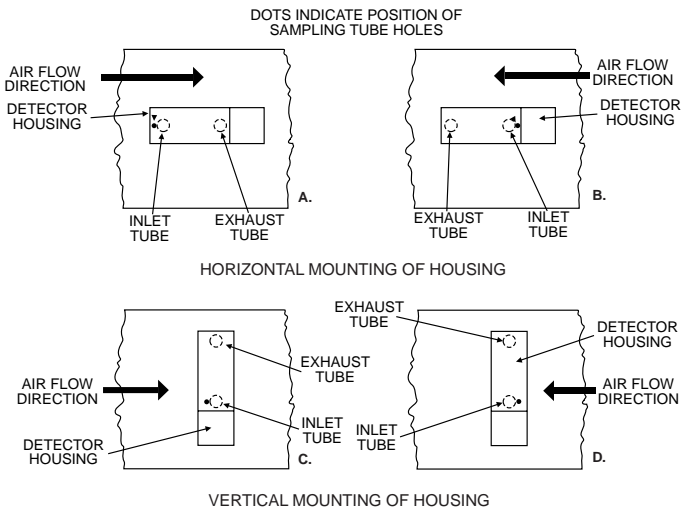
**[4] Contents Of The Duct Smoke Detector Kit**

1. Complete housing base and cover assembly
2. Pre-installed wiring harness
3. Two sampling tube filters (installed)
4. One test magnet
5. One inlet tube end plug

**NOTE:** 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. Refer to OEM supplier for correct part number.

The sampling tube must always be installed with the air inlet holes facing into the air flow. Figure 2 shows the various combinations of tube mounting configurations with respect to air flow. Mounting the detector in a vertical orientation is acceptable, provided that the air flows directly into the sampling tube holes, as indicated in Figure 3.

**Figure 2. Tube mounting configurations with varying air flow direction:**



**[5] Installation Sequence**

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

Model DH100ACDCLPX detectors are designed to be used in air handling systems having air velocities of 100 to 4000 feet per minute. Be sure to check engineering specifications to ensure that the air velocity in the duct falls within these limits. If necessary, use a velocity meter (anemometer) to check the air velocity in the duct.

**[5.2] Select Mounting Location**

The DH100ACDCLPX is 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.

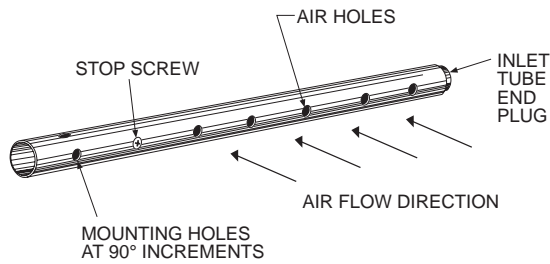
**[5.3] Sampling Tube Installation**

Sampling tubes are identified by a series of air inlet holes along the tube. The correct length tube must be ordered and installed for each application. See Table 1 for a list of tubes which are compatible with this product. For optimal performance, it is recommended that the sampling tube extend at least 2/3 of the way across the duct width.

**Table 1. Sampling Tube Lengths**

Approximate Length	Part Number to Order	Replaces
12 inches	STX-10	ST-1
18 inches	STX-16	ST-1.5
36 inches	STX-34	ST-3

**Figure 3. Air duct detector inlet sampling tube:**

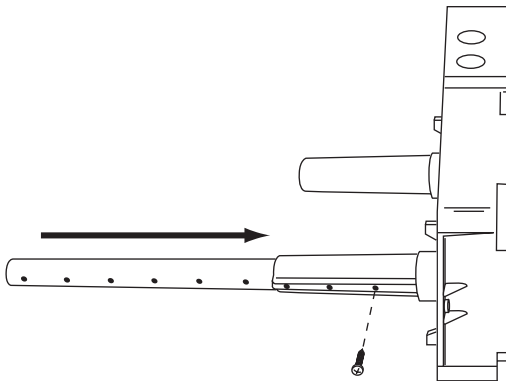


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Sampling tubes for this product are designed to be inserted from the outside, without removing the cover, prior to installing the detector into its application.

1. Install the end plug into the end of the tube farthest from the stop screw.
2. Slide the tube into whichever bushing will be used for the air inlet, and push it all the way to the stop. The end of the tube with the four small holes goes into the bushing.
3. Rotate the tube so that the holes face into the airflow, then adjust until the hole in the bushing lines up with one of the four mounting holes in the tube.
4. Secure the tube by inserting a #6  $\times$   $\frac{3}{4}$ " sheet metal screw through the hole in the bushing and the mounting hole in the tube. See Figure 4.

**Figure 4. Sampling tube connected to duct smoke detector:**



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#### [5.4] Install the Detector Housing

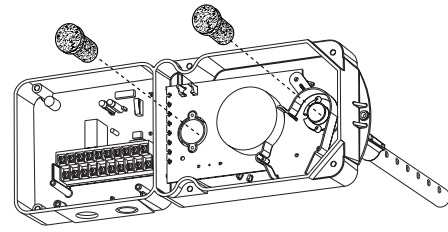
Feed the sampling tube and the exhaust port through the pre-drilled holes in the mounting location, then use two screws to secure the housing to the mounting surface.

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

#### [5.5] Air Filters

Air filters must be installed in both the inlet and exhaust openings inside the detector. These filters are initially installed at the factory. To remove for cleaning, loosen the holding tab and pull the filter out. Replace the filters by pushing them into the sampling and exhaust tube holes, as shown in Figure 5, then replacing the holding tabs.

**Figure 5. 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/intake tube filter P/N F36-09-11)

#### [5.6] 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.

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 smoke detector terminals accommodate wire sizes up to 12 gauge.

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 DH100ACDCLPX detectors are designed for easy wiring. The housing provides a terminal strip with clamping plates. Wiring connections are made by stripping about  $\frac{3}{8}$ " of insulation from the end of the wire, sliding the bare end under the plate, and tightening the clamping plate screw.

#### [5.7] Perform Detector Check

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

### [5.8] 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 [5.5]. Make sure that the cover fits into the base groove and that all gaskets are in their proper positions. Tighten the six screws.

### [6] 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 zone or system under test to prevent unwanted alarms.

#### [6.1] Smoke Entry Tests

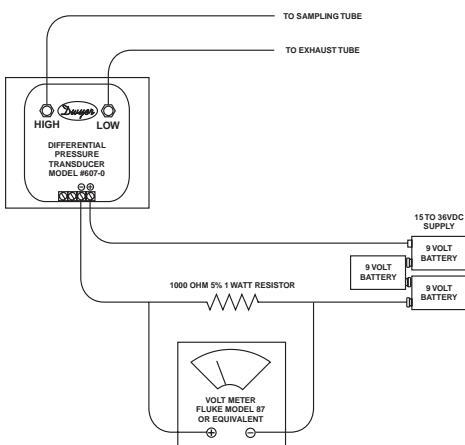
##### [6.1.1] Air Flow

The DH100ACDCLPX is designed to operate over an extended air speed range of 100 to 4000 FPM. To verify sufficient sampling of ducted air, turn the air handler on and use a manometer to measure the differential pressure between the two sampling tubes. The differential pressure should measure at least 0.0015 inches of water and no more than 1.2 inches of water. Because most commercially available manometers cannot accurately measure very low pressure differentials, applications with less than 500 FPM of duct air speed may require one of the following: 1) the use of a current-sourcing pressure transmitter (Dwyer model numbers 607-1 or 607-01) per Section 6.1.2 or; 2) the use of aerosol smoke per section 6.1.3.

##### [6.1.2] Air Flow Test using Dwyer Model 601-0 or 601-01 Differential Pressure Transmitter

Verify the air speed of the duct using an anemometer. Air speed must be at least 100 FPM. Wire the Dwyer transmitter as shown in Figure 6. Connect the leads of the meter to either side of the 1000Ω resistor. Allow unit to warm up for 15 seconds. With both HIGH and LOW pressure ports open

**Figure 6. Procedure for verifying air flow:**



to ambient air, measure and record the voltage drop across the 1000Ω resistor (measurement 1), 4.00 volts is typical. Using flexible tubing and rubber stoppers, connect the HIGH side of the transmitter to the inlet sampling tube of the duct smoke detector housing, and the LOW side of the transmitter to the exhaust sampling tube of the duct smoke detector housing. Measure and record the voltage drop across the 1000Ω resistor (measurement 2). Subtract the voltage recorded in measurement 1 from the voltage recorded in measurement 2. If the difference is greater than 0.15 volts, there is enough air flow through the duct smoke detector for proper operation.

##### [6.1.3] Air Flow Test using Aerosol Smoke

Drill a 1/4" hole 3 feet upstream from the duct smoke detector. With the air handler on, measure the air velocity with an anemometer. Air speed must be at least 100 FPM. *If the air speed is greater than 500 FPM, use a conventional manometer to measure differential pressure between the sampling tubes.* Spray aerosol smoke\* into the duct through the 1/4" hole for five seconds. Wait two minutes for the duct smoke detector to alarm. If the duct smoke detector alarms, air is flowing through the detector. Remove the duct smoke detector cover and blow out the residual aerosol smoke from the chamber and reset the duct smoke detector. Use duct tape to seal the aerosol smoke entry hole.

\*Aerosol smoke can be purchased from Home Safeguard Industries, Malibu, CA. Phone: 310/457-5813.

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. REMEMBER TO REMOVE THE PLUGS AFTER THIS TEST, OR THE DETECTOR WILL NOT FUNCTION PROPERLY.

##### [6.1.4] Filter Replacement

The filters do not substantially affect smoke performance even when up to 90% of the filter is clogged. Quarterly visual inspection usually suffices to determine whether the filters should be replaced because only a high percentage of contamination affects performance. If further testing is required, compare differential pressure readings with and without the filters installed. If the difference exceeds 10% replace the filters. In no case should the pressure differential fall below 0.0015 inches of water.

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

The cover must be removed to perform these tests. The use of a remote accessory for visible indication of power and alarm is recommended.

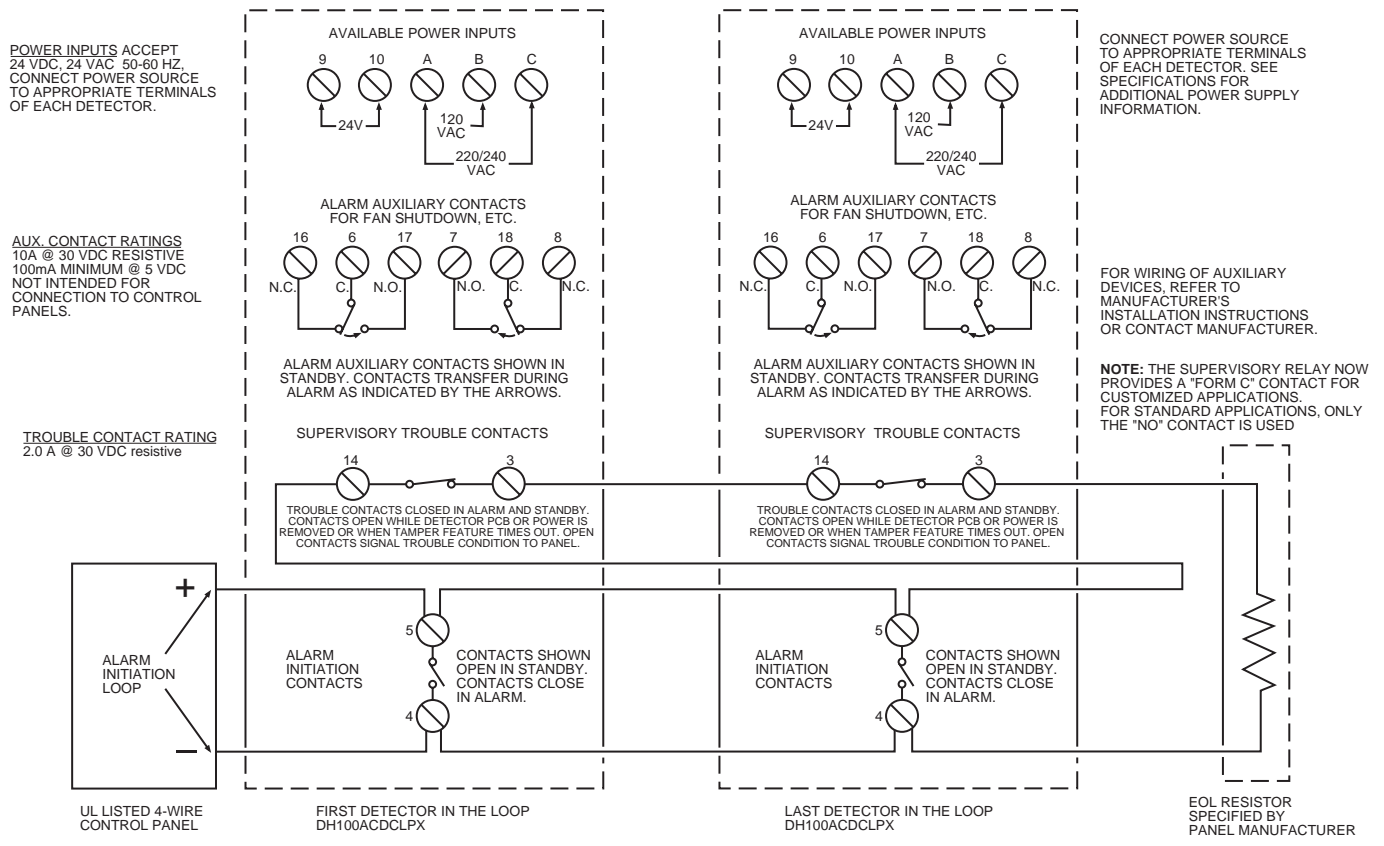
##### [6.2.1] Standby And Trouble

Standby — Look for the presence of the flashing green LED. The LED should flash approximately every 10 seconds.

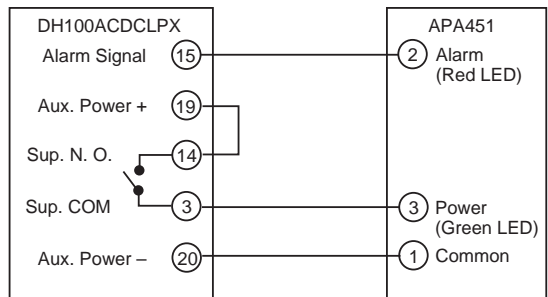
**Figure 7. System wiring diagram for 4-wire duct smoke detectors:**

**CAUTION**

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



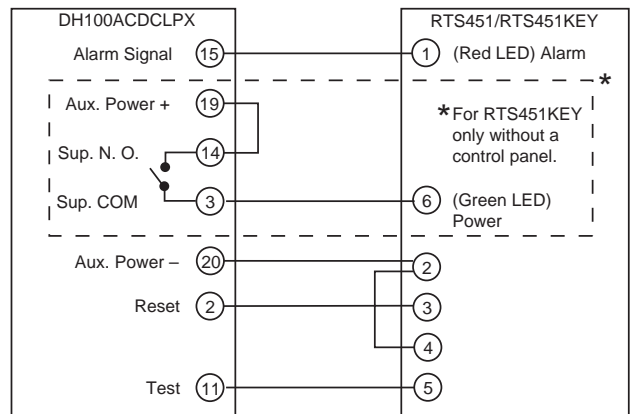
**Figure 8. Wiring diagram for DH100ACDCLPX to APA451:**



NOTE: Wiring diagram shown is for DH100ACDCLPX 4-wire duct smoke detector system equipped without a control panel.

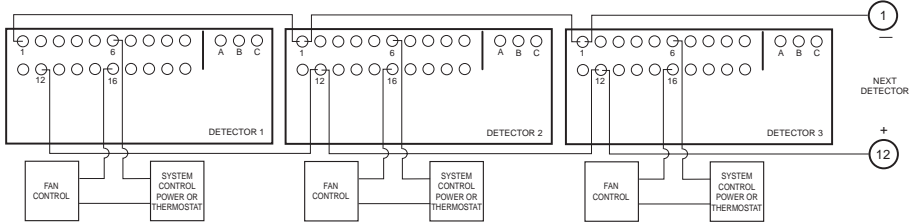
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**Figure 9. Wiring diagram for DH100ACDCLPX to RTS451KEY and interconnect feature:**



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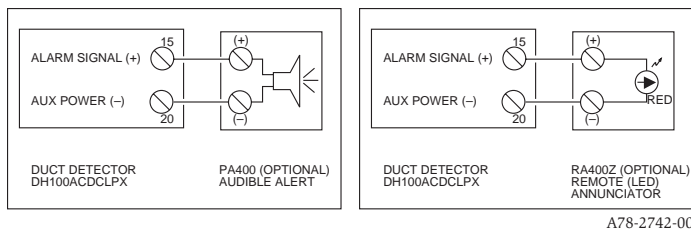
**Figure 10. Multiple fan shutdown (interconnect):**



**Important Interconnect Notes**

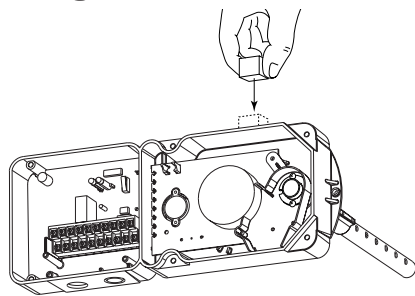
- When using the interconnect feature, all interconnected units must be powered with the same, independent supply.
- Polarity must be maintained throughout the interconnect wiring. Connect terminal 12 on unit 1 to terminal 12 on unit 2 and so on. Similarly, connect terminal 1 on unit 1 to terminal 1 on unit 2 and so on.

**Figure 11. Wiring diagrams for optional accessories:**



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**Figure 13. Testing detector alarm:**



**Trouble** — If the detector LED does not flash, then the detector lacks power (check wiring, panel, or power supply), the detector board is missing (replace), the cover has been missing or not secured properly for more than 20 minutes (secure cover properly), or the unit is defective (return for repair).

**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.

**Cover**

**Tamper** — If the cover is removed or not properly secured for a period longer than 20 minutes, a trouble signal is generated to indicate the cover is missing.

## [6.2.2] Alarm Tests

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

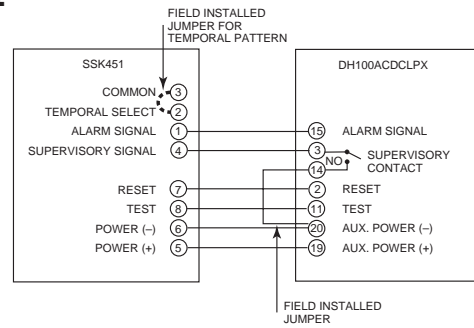
1. Place the painted surface of the magnet onto the TEST locator on the bottom of the housing (Figure 13).
2. The red alarm LED on the detector should latch on, as should any accessories (i.e. RA400Z, RTS451). Verify system control panel alarm status and control panel execution of all intended auxiliary functions (i.e. fan shutdown, damper control, etc.).
3. The detector must be reset by system control panel, front cover reset button, or remote accessory.

### [6.2.2.2] 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 DH100ACDCLPX duct smoke detector can be reset by the RTS451/RTS451KEY. If a system control panel is used, the panel itself may also require testing.

To install the RTS451/RTS451KEY, connect the device as shown in Figure 9; wire runs must be limited to 25 ohms or less per interconnecting wire.

**Figure 12. Wiring diagram for DH100ACDCLPX to SSK451**



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Please note that the magnetic coil supplied with the RTS451 and RTS451KEY is not required when these accessories are used with the DH100 Series detectors. The functionality of the magnetic coil has been designed into the circuitry of the new Innovair™ duct smoke detectors.

### [6.2.2.3] SSK451 Multi-Signaling Accessory

The System Sensor SSK451 Multi-Signaling accessory combines a sounder feature with a key activated test and reset function. Green, amber and red LEDs provide a visual indication of power, trouble, and alarm respectively. An optional strobe (PS24LO) with a smoke lens can be added to conform to the codes of certain jurisdictions.

To install the SSK451, connect the device as shown in figure 13.

## [6.2.3] Sensitivity Tests

### [6.2.3.1] MOD400 or MOD400R Test

After verification of alarm capability, use the MOD400R test module with a voltmeter to check detector sensitivity as indicated 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 label of the detector, the detector chamber requires cleaning per Section [7] of this manual.

## [7] Detector Cleaning Procedures

Notify the proper authorities that the smoke detector system is undergoing maintenance, and that 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.

### [7.1] 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. If they are not heavily coated, use a vacuum cleaner or compressed air nozzle to remove dust, then reinstall the filters.

### [7.2] Photo Detector Board

1. Remove the screen by gently grasping on each side and pulling straight off.

- Lift the photo chamber in the same fashion. Vacuum the screen and cover. Use clean, compressed air to loosen and blow out any remaining debris. Replacement screens (S08-39-01) are available.
- Vacuum photo chamber, then use clean compressed air to blow area clean.
- Replace the chamber by pressing it onto the base. Press the screen into place. It should fit tightly on the chamber.

**[8.0] Board Replacement**

**[8.1] Detector Board Replacement**

- Remove the two detector board mounting screws.
- Pull gently on the board to remove it.

- To replace the board, align the board mounting features, holes, and the interconnect terminals. Push the board into place.
- Secure board with the two mounting screws.

**[8.2] Power Board replacement**

- Disconnect wiring from the terminal block.
- Remove the two power board mounting screws.
- Pull gently on the board to remove it.
- To replace the board, align the board mounting features, holes, and the interconnect terminals. Push the board into place.
- Secure board with the two mounting screws.
- Re-connect wiring to terminal block.

**[9] Model DH100ACDCLPX Air Duct Smoke Detector Specifications**

Operating temperature:	+ 32° to + 131° F	0° to + 55° C
Storage temperature:	-22° to + 158°F	-30° to + 70°C
Humidity:	10% to 93% R.H. noncondensing	
Air Velocity:	100 to 4000 ft./min.	0.5 to 20.3 m/sec.
Dimensions:	14.38" L x 5.5" W x 2.75" D	37cm L x 14cm W x 7cm D
Weight:	3.75 pounds	1.7 kg

**Electrical Specifications**

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

Power Supply Voltage	20 - 29 VDC	24 VAC 50 - 60 Hz
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CURRENT REQUIREMENTS (USING NO ACCESSORIES)

Max. standby current	15 mA	35 mA RMS
Max. alarm current	70 mA	125 mA RMS

CONTACT RATINGS

Alarm initiation contacts (SPST)	2.0A @ 30 VDC (resistive)
Alarm auxiliary contacts (DPDT)	10A @ 30 VDC 10A @ 250 VAC
Note: Alarm auxiliary contacts must switch 100 mA minimum at 5VDC. Alarm auxiliary contacts shall not be connected to initiating circuits of control panels. Use the alarm initiation contact for this purpose.	
Trouble contacts (SPDT)	2.0A @ 30 VDC (resistive)

ACCESSORY CURRENT LOADS AT 24 VDC			
DEVICE	STANDBY	TROUBLE	ALARM
APA451	12.5mA Max.	n/a	30mA Max.
PA400	0mA	n/a	15mA Max.
RA400Z	0mA	n/a	10mA Max.
RTS451	0mA	n/a	7.5mA Max.
RTS451KEY	12mA*	n/a	7.5mA Max.
SSK451	5mA Max.	9mA Max.	30mA Max.

**Please refer to page 8 for 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, 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 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.

# 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 (strobes 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.