S Simplex

True*Alarm* Smoke Detectors

UL, ULC, CSFM Listed; FM Approved,
MEA (NYC) Acceptance*

Duct Detector Housings with TrueAlarm Photoelectric
Detector for 2-Wire or 4-Wire Operation

Features

Compact air duct detector housing with clear cover to monitor for the presence of smoke**

Includes factory installed TrueAlarm photoelectric smoke detector and features:

- On-board TrueAlarm sensitivity drift compensation and dirt accumulation tracking
- Multi-function status LED indicator
- Magnetic test that initiates an alarm and provides detailed diagnostic information
- Clear cover allowing visual inspection
- Test ports provide functional smoke testing access with cover in place
- UL listed to Standard 268A

Model availability:

- 4098-9685, 2-Wire standard operation
- 4098-9688, 2-Wire with supervised control for a single remote relay (relay included)
- 4098-9686, 4-Wire operation with supervised control for multiple remote relays (includes one remote relay)

Mounts to rectangular ducts or round ducts

- Minimum size is 8" (203 mm) square or 18" (457 mm) diameter

Magnetically operated functional test:

- Initiates alarm and displays dirt accumulation status using the detector status LED
- Assists with maintenance priorities by categorizing detector status and identifying dirty detectors

Sampling tubes (ordered separately):
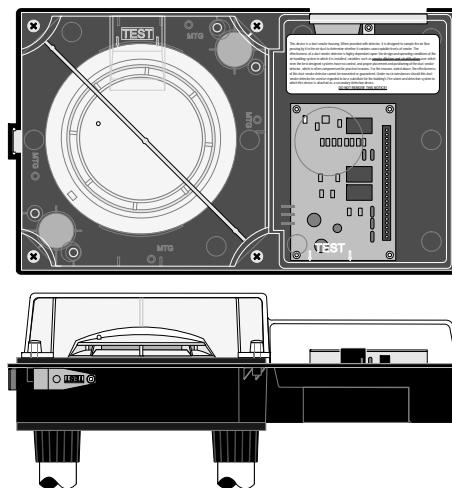
- Available in multiple lengths to match duct size
- Installed and serviced with housing in place

**Remote module options (ordered separately):**

- Red alarm LED (4098-9830)
- Test stations with LED(s) and keyswitch (refer to page 2 for compatibility)
- Relays for remote control applications

* These products have been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listing 3240-0026.241 for allowable values and/or conditions concerning material presented in this document. Accepted for use – City of New York Department of Buildings – MEA35-93E. Additional listings may be applicable; contact your local Simplex product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Fire Protection Products.
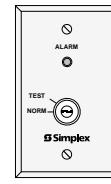
** Please note that smoke detection in air ducts is intended to provide notification of the presence of smoke *in the duct*. It is not intended to, and will not, replace smoke detection requirements for open areas or other non-duct applications.
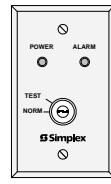
Duct Detector Housing, Front and Bottom View

4098-9830   4098-9834   4098-9835
Remote Alarm Indicators and Test Stations

Introduction

Operation. Simplex® air duct smoke detector housings provide a TrueAlarm smoke detector for monitoring air conditioning or ventilating ducts. Sampling tubes are installed into the duct allowing air to be directed to the smoke detector mounted in the housing. These duct detector housings with smoke detectors are compatible with Simplex fire alarm control panels that provide conventional two-wire or four-wire initiating device circuits (IDCs).

Model Details

Each supports a remote red alarm LED or a remote test station with LED(s). Models with relay output provide relay coil wiring supervision that will transfer a trouble to the IDC if supervision is lost.

2-Wire Model 4098-9685 provides basic smoke detection for applications that do not require a remote relay. Power is from the IDC.

2-Wire Model 4098-9688 provides a supervised relay output for connection to a single 4098-9841 relay. This model is powered from the IDC and requires connection as the only device to ensure relay operation.

4-Wire Model 4098-9686 provides a supervised relay control output that can control up to 15, 4098-9843 control relays. Relay supervision troubles are indicated by a yellow LED on the interface board. (Resettable 24 VDC is required, see page 4.) Remote test station 4098-9835 is available for use with this model to provide a test keyswitch, a red LED alarm indicator and a green power-on LED.

Duct Detector Selection Chart

Duct Smoke Detector Housing with Photoelectric Detector*

Model	Description	Compatibility	
4098-9685	2-Wire Duct Detector, standard operation	No relay(s)	Remote LED indicator and test stations per below
4098-9688	2-Wire Duct Detector with supervised single remote relay output; includes one 4098-9841 relay; **NOTE: Must be only device on IDC for proper relay operation;** (When used with the Simplex 4004 or 4005 fire alarm control panel, connect to "high current" IDCs only)	Supplied relay is required for proper operation	
4098-9686	4-Wire Duct Detector with supervised multiple remote relay output; requires resettable 24 VDC fire alarm power and relay end-of-line resistor 4081-9008; includes one 4098-9843 relay	Up to 15 total 4098-9843 relays (additional relays are ordered separately)	

LED Indicator and Remote Test Stations (Select one if required)
Each assembly is on a single gang stainless steel plate, wiring is 18 AWG (0.82 mm^2) color coded wire leads

Model	Description	Compatibility	Mounting
4098-9830	Red LED alarm indicator	4098-9685 4098-9688 4098-9686	Use single gang box, 3" H x 2" W x 2" D (76 mm x 51 mm x 51 mm)
4098-9834	Test Station with keyswitch and red LED alarm indicator (turning switch to "TEST" initiates alarm for system testing)		
4098-9835	Test Station with keyswitch, red LED alarm indicator, and green power-on LED	4098-9686 only	

Epoxy Encapsulated Remote Relays and End-of-Line Resistor
(wiring is 18 AWG (0.82 mm^2) color coded wire leads)

Model	Description		Compatibility	Mounting
4098-9841	Relay, dual Form C (1/2 A @ 120 VAC); included with 4098-9688	Refer to pages 3 and 4 for additional relay information	4098-9688 only, one maximum	Locate relays within 3 ft (1 m) of device being controlled, per NFPA 72
4098-9843	Relay, single Form C (7 A @ 120 VAC); one included with 4098-9686		4098-9686 only, connect up to 15	
4081-9008	End-of-Line Resistor Harness; 10 kΩ, 1/2 W; (ref. 733-894); required to supervise remote relay coil connection		4098-9686	At last relay location

* Each duct housing includes an internally mounted model 4098-9601 TrueAlarm photoelectric detector and an exhaust tube. A correctly sized sampling tube (ordered per application) is required, refer to chart below.

Sampling Tube Selection Chart, Ordered Separately Per Duct Width, Select One

Overall Duct Width	Tube Required	Suggested Cut Length
12" (305 mm)	**4098-9854**	1/2" (12.7 mm) longer than duct width
13" to 23" (330 mm to 584 mm)	**4098-9855**	1/2" (12.7 mm) longer than duct width
24" to 46" (610 mm to 1168 mm)	**4098-9856**	3 in" (76 mm) longer than duct width
46" to 71" (1168 mm to 1803 mm)	**4098-9857**	3 in" (76 mm) longer than duct width
71" to 95" (1803 mm to 2413 mm)	**4098-9858**	3 in" (76 mm) longer than duct width

TrueAlarm Detector Status LED Indications

LED Indication	Status
Pulses approximately every 4 seconds	Normal
Steady On	Alarm
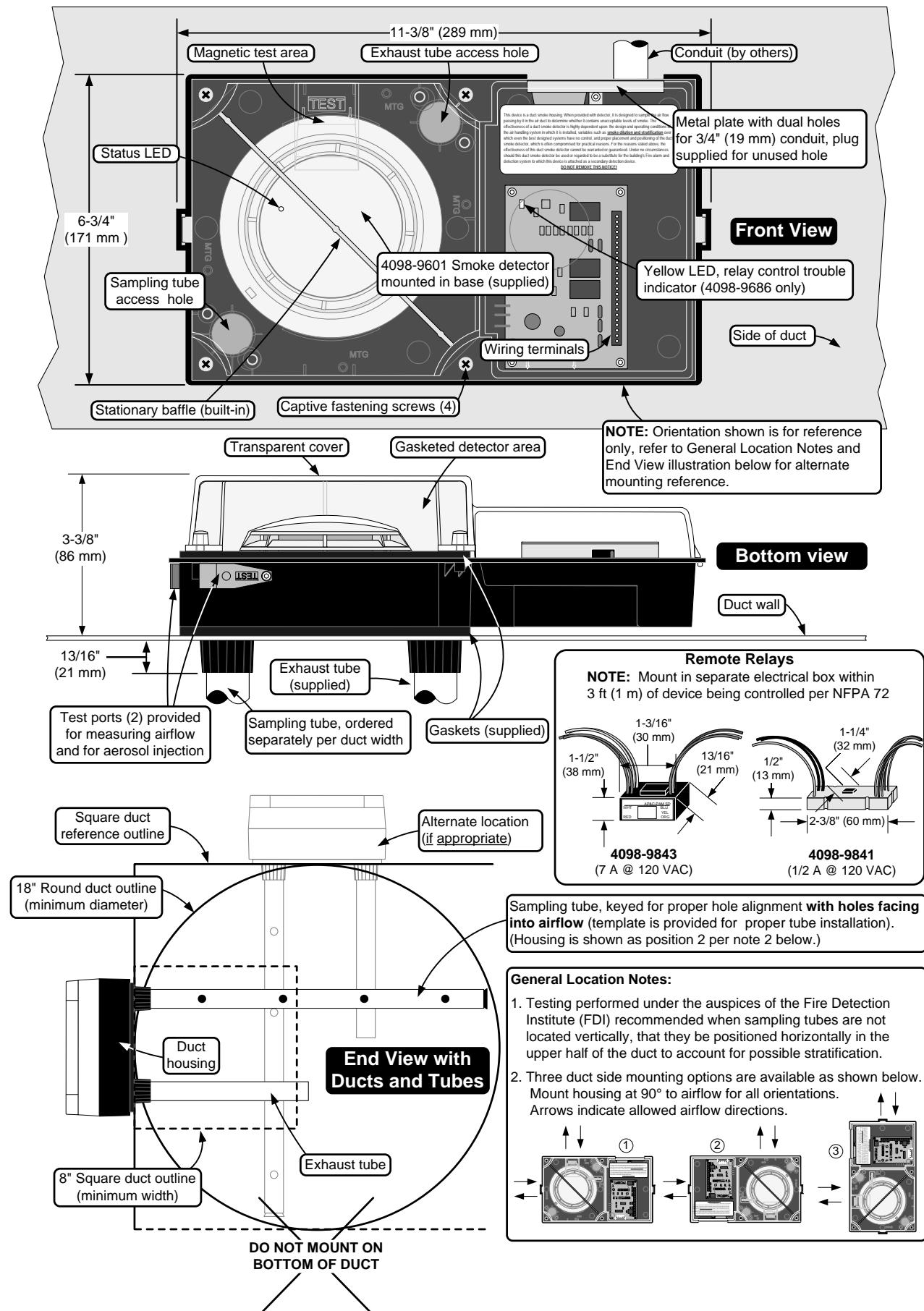
Detector LED Response to Magnetic Test **

LED Indication	Followed By	Status	Action
LED turns ON	Alarm is initiated	**Normal**, sensitivity is within compensation range	None
LED pulses *quickly*, 6 times in 3 seconds, then turns ON	Alarm is initiated	**More sensitive**, out of normal compensation range	Cleaning or other **service is required**
LED pulses *slowly*, 4 times in 8 seconds, then turns ON	Alarm is initiated	**Less sensitive**, out of normal compensation range	
	Does not initiate Alarm	**Detector is malfunctioning**	**Service is required**
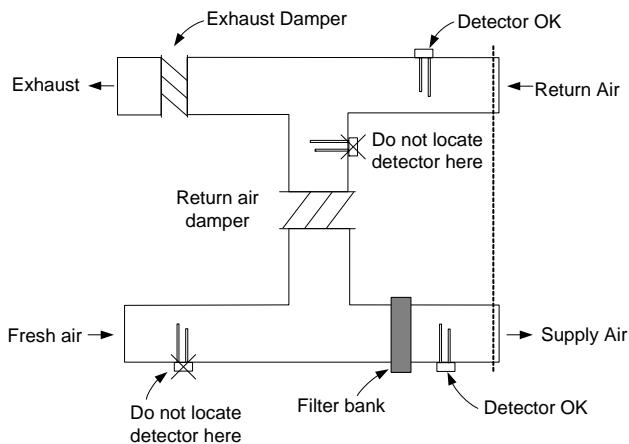
** Testing requires placing a magnet at the designated location on the duct housing cover for 4 seconds and referring to the response from the red LED status indicator on the detector. Refer to Installation Instructions 574-776 for further test and maintenance information.

Duct Detector Housing Detail Reference

NOTE: Refer to Installation Instructions 574-776 for additional detail and maintenance information.

11-3/8" (289 mm)

Magnetic test area

Exhaust tube access hole

Conduit (by others)

TEST

MTG

This device is a duct smoke housing. When provided with detector, it is designed to sample air flow passing by it in the air duct to determine whether it contains unacceptable levels of smoke. The effectiveness of a duct smoke detector is highly dependent upon the design and operating conditions of the air handling system in which it is installed, variables such as **smoke dilution and stratification** (in which even the best designed systems have no control, and proper placement and positioning of the duct smoke detector, which is often compromised for practical reasons. For the reasons stated above, the effectiveness of this duct smoke detector cannot be warranted or guaranteed. Under no circumstances should this duct smoke detector be used or regarded to be a substitute for the building's Fire alarm and detection system to which this device is attached as a secondary detection device. **DO NOT REMOVE THIS NOTICE!**

Metal plate with dual holes for 3/4" (19 mm) conduit, plug supplied for unused hole

Status LED

6-3/4" (171 mm)

Front View

4098-9601 Smoke detector mounted in base (supplied)

Yellow LED, relay control trouble indicator (4098-9686 only)

Sampling tube access hole

MTG

Side of duct

Wiring terminals

Stationary baffle (built-in)

Captive fastening screws (4)

NOTE: Orientation shown is for reference only, refer to General Location Notes and End View illustration below for alternate mounting reference.

Transparent cover

Gasketed detector area

3-3/8" (86 mm)

Bottom view

TEST

Duct wall

13/16" (21 mm)

Exhaust tube (supplied)

Test ports (2) provided for measuring airflow and for aerosol injection

Sampling tube, ordered separately per duct width

Gaskets (supplied)

Remote Relays

NOTE: Mount in separate electrical box within 3 ft (1 m) of device being controlled per NFPA 72

1-3/16" (30 mm)

1-1/2" (38 mm)

13/16" (21 mm)

1-1/4" (32 mm)

1/2" (13 mm)

2-3/8" (60 mm)

4098-9843 (7 A @ 120 VAC)

4098-9841 (1/2 A @ 120 VAC)

Square duct reference outline

Alternate location (if appropriate)

18" Round duct outline (minimum diameter)

Sampling tube, keyed for proper hole alignment **with holes facing into airflow** (template is provided for proper tube installation). (Housing is shown as position 2 per note 2 below.)

Duct housing

End View with Ducts and Tubes

Exhaust tube

8" Square duct outline (minimum width)

DO NOT MOUNT ON BOTTOM OF DUCT

General Location Notes:

1. Testing performed under the auspices of the Fire Detection Institute (FDI) recommended when sampling tubes are not located vertically, that they be positioned horizontally in the upper half of the duct to account for possible stratification.

2. Three duct side mounting options are available as shown below. Mount housing at 90° to airflow for all orientations. Arrows indicate allowed airflow directions.

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Duct Detector Location Reference

Exhaust Damper — Detector OK

Exhaust ← — Return Air

Do not locate detector here

Return air damper

Fresh air → — Supply Air

Do not locate detector here — Filter bank — Detector OK

Additional Information. Refer to NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*; NFPA 72, the *National Fire Alarm and Signaling Code*; and the *NEMA Guide for Proper Use of Smoke Detectors in Duct Applications*, and Installation Instructions 574-776.

Duct Detector Location Considerations:
1. Proper duct smoke detection location must ensure adequate airflow within the duct housing.
2. Duct air velocity rating is 300 to 4000 ft/min (91 to 1220 m/min). Pressure differential between intake and exhaust tubes is required to be between 0.015 to 1.55 inches of water (0.381 to 39.37 mm).
3. Ensure accessibility for test and service.
4. Proper Locations: downstream side of filters to detect fires in the filters; in return ducts, ahead of mixing areas; upstream of air humidifier and cooling coil.
5. Other locations and orientations may be required for proper duct smoke detection depending on duct access, system design, and duct airflow testing. Contact your local Simplex product supplier for assistance.

Locations to Avoid:
1. Where dampers closed for comfort control would interfere with airflow.
2. Next to outside air inlets (unless the intent is to monitor smoke entry from that area).
3. In return air damper branch ducts and mixing areas where airflow may be restricted.

Specifications

General Mechanical & Environmental	Air Velocity Range (linear ft/min)	300 to 4000 ft/min (91 to 1220 m/min)
	UL Listed Temperature Range	32° F to 100° F (0° C to 38° C)
	Operating Temperature Range	32° F to 122° F (0° C to 50° C)
	Storage Temperature Range	0° F to 140° F (-18° C to 60° C)
	Humidity Range	10% to 95% RH, non-condensing
	Wiring Connections	Terminal blocks, 18 to 12 AWG (0.82 mm^2 to 3.31 mm^2)
	Housing Color and Material	Black ABS base with clear polycarbonate cover
	Sampling and Exhaust Tube Material	Black CPVC, custom extrusion; sampling tubes are pre-drilled

Two-Wire Operation, Models 4098-9685 and 4098-9688

Operating Voltage		18-32 VDC, from compatible IDC
4098-9685 (no relay)	Standby Current	100 μA @ 24 VDC
	Alarm Current	40 mA maximum @ 24 VDC
4098-9688 (with single relay control) **NOTE: Only one 4098-9688 per IDC**	Standby Current	2 mA @ 24 VDC (includes relay supervision current)
	Alarm Current	40 mA maximum @ 24 VDC
	Relay Control	4098-9841 relay only, one maximum
	Relay Rating	Dual Form C, 1 A @ 28 VDC, 1/2 A @ 120 VAC, Resistive
	Relay Location	100 ft (30 m) maximum to relay coil, relay must be within 3 ft (1 m) of device being controlled per NFPA 72

Four-Wire Operation, Model 4098-9686, Requires Resettable and Fused 24 VDC from Fire Alarm Power Supply

Operating Voltage	18-32 VDC (24 VDC nominal)
Standby Current	12 mA @ 24 VDC; 32 mA @ 24 VDC with 4098-9835 Test Station
Alarm Current (one relay activated)	45 mA @ 24 VDC; 65 mA @ 24 VDC with 4098-9835 Test Station
	Add 15 mA @ 24 VDC for each additional remote 4098-9843 relay
Supervised Remote Relay Control	For use with relay 4098-9843, quantity of 15 maximum, distance of 500 ft (152 m) maximum, requires 4081-9008 (ref. 733-894), 10 kΩ, 1/2 W end-of-line resistor

4098-9843 Relay Output Ratings, Single Form C, use with Model 4098-9686 Only

Coil Current	15 mA @ 24 VDC, up to 15 maximum per relay control output
Relay Contacts, Resistive Ratings	7 A at 0.35 PF @ 28 VDC & 120 VAC; 250 μA @ 5 VDC
Location Distance	500 ft (152 m) maximum to relay coils; relays must be within 3 ft (1 m) of device being controlled per NFPA 72

Remote Alarm LED & Test Stations	LED Current	1.7 mA, no impact to alarm current	Models 4098-9830, 4098-9834, & 4098-9835
	Distance	250 ft (76 m) maximum from duct housing	

⑤Simplex