

#### Features

##### Air aspiration duct smoke detection\*\* system provides remote sensor location for ducts with difficult service access:

- Available as either a single- or dual-inlet detection system; includes a TrueAlarm® photoelectric sensor and addressable base per inlet
- For use with Simplex addressable fire alarm control units (FACUs) supporting IDNet™ or MAPNET II® communications
- Supports remote housing up to 82 ft (25 m) with 1.05 in. (26.7 mm) O.D. rigid pipe
- Supports remote housing up to 50 ft (15 m) with 3/4 in. (19 mm) O.D. flexible tubing

##### Microprocessor controlled aspiration system provides:

- Adjustable air speed settings for easy setup
- Monitoring of airflow from the HVAC ducts
- Integral indicators located under the front cover for convenient programming and status indications
- Easily accessible air filter element

##### SKU 4098-XAD-110:

- Single-inlet housing with one smoke sensor
- Duct probe kit

##### SKU 4098-XAD-210:

- Dual-inlet housing with two smoke sensors (one per inlet)
- Duct probe kit
- Compatibility with ducts wider than 90 in. (2286 mm)

##### General features:

- UL listed to Standards 268 and 268A
- ULC listed to Standard S529
- Requires separate 24 VDC power
- Duct sensor housing with supervised output for multiple remote relays
- Relay output control through programming at the FACU that can be activated or deactivated manually; in response to a separate alarm or other input; or can be bypassed for unobtrusive system testing

##### Testing functions (on interface board accessed by removing the cover):

- Remote functional smoke testing
- Magnetic testing feature for alarm initiation at housing

##### Sampling tubes (ordered separately):

- Available in multiple lengths to match duct size



Figure 1: 4098-XAD-110 Single-inlet Duct Sensor Housing (duct probe kit not shown)



Figure 2: 4098-XAD-210 Dual-inlet Duct Sensor Housing (duct probe kit not shown)

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

- Remote red status/alarm LED (2098-9808)
- Remote test station with LED (2098-9806)
- 4098-9843 remote relays

\*\* Please note that smoke detection in air ducts indicates the presence of smoke in the duct. Smoke detection in air ducts does not replace smoke detection requirements for open areas or other non-duct applications.

#### Introduction

**Remotely located smoke sensors.** For smoke detection in HVAC ducts or other area locations that are inconvenient or difficult to access, these smoke sensing systems mount the sensor remotely and sample the air using traditional air aspiration techniques.

**TrueAlarm Smoke Sensing.** Mounted in the smoke sensor housings is a Simplex TrueAlarm photoelectric smoke sensor that samples the air and reports its analog monitoring information to the FACU for processing. This provides the TrueAlarm smoke sensing feature set complete with environmental compensation including Dirty, Excessively Dirty and Almost Dirty trouble detection.

#### Operation

**Air Aspiration.** Air draws from the ducts through sampling holes in duct-mounted sampling tubes. Sampled air then filters before analysis by the TrueAlarm® sensor. Single- or dual-sensor versions are available.

\* 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 3240-0026.0367 for allowable values and/or conditions concerning material presented in this document. It is subject to re-examination, revision, and possible cancellation. Additional listings may be applicable; contact your local Simplex product supplier for the latest status.

**Airflow Supervision.** A high performance aspirator with programmable flow and monitoring circuitry provides airflow. Airflow displays on a ten element bar graph under the front cover that can be adjusted for high and low flow thresholds. Flow failure reports as a trouble to the FACU.

**Solution for humid environments.** An optional water trap with a ball valve can be ordered. The water from condensation that accumulates in a clear water trap is clearly visible and can be drained with a ball valve well before nuisance alarms or troubles develop due to moisture.

**Minimal configuration (programming) requirements.** Function buttons to setup the Simplex XAD are located on the housing. The XAD requires minimal settings – the aspirator speed and air flow monitoring are configured during commissioning phase without the use of special tools. Unlike other aspirating systems, no special engineering software is required to design the Simplex XAD detection system.

**Replaceable air filter element.** The Simplex XAD includes a replaceable air inlet filter. It is recommended that the filter element is changed every 12 months or as necessary, such as when the dust particles impede airflow. The frequency of filter replacement depends on environmental conditions.

**Remote Test Capability** You can test the XAD at the remote location where it is mounted. A convenient test port is located in the inlet tubes so that a functional test that requires smoke or simulated smoke to enter the detection chamber can be initiated.

### TrueAlarm Sensor Operation

**Digital Communication of Analog Sensing.** Analog information from the sensor transmits to the control unit for analysis. The system stores and tracks sensor input as an average value, and uses this information as a reference to detect an alarm or abnormal condition.

**Intelligent Data Evaluation.** The system monitors each photoelectric sensor's average value and compensates for environmental factors such as dust, dirt, or component aging. This provides an accurate reference for evaluating new activity and reduces the probability of false alarms.

**Control Unit Selection.** The system stores peak activity for each sensor to evaluate specific locations. The alarm set point for each sensor is determined at the control unit, selectable as the individual application requires.

**Sensor Status LED.** Each sensor's red status LED (located on the electrical interface board, accessed by removing the cover) pulses to indicate communications with the unit. If the control unit determines that a sensor is in alarm, or that it is dirty or has some other type of trouble, the details are annunciated at the control unit and that sensor housing's status LED turns on steadily. During a system alarm, any LEDs that indicate a trouble will pulse to identify an alarmed sensor.

Remote Status/Alarm LEDs track the operation of the duct sensor housing LED. See Figure 3 and Figure 4.



Figure 3: 2098-9808 Remote Status/Alarm Indicator

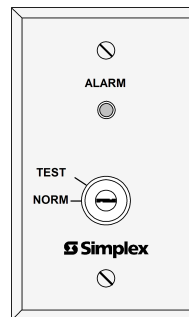


Figure 4: 2098-9806 Test Station

### Fire Alarm Control Unit Features

- Individual smoke sensitivity selection
- Sensitivity monitoring that meets NFPA 72 and CAN/ULC-S536 & S537 sensitivity testing requirements
- Peak value logging allows accurate analysis for sensitivity selection
- Automatic individual sensor calibration check every 60 seconds to verify sensor integrity
- Automatic environmental compensation
- Smoke sensitivity displays in percent per foot
- Displays and prints easy-to-understand sensor information
- 4098-9843 Remote relay is under unit control for ON, OFF, or override

## Product Selection

**Table 1: Single-inlet Duct Detection Application**

SKU	Description
4098-XAD-110	Single-inlet sensor housing with single-duct probe kit – LF42241, see Figure 5 for included equipment
Sampling Tubes	See Table 2
LF-42250	25 ft (7.5 m) Flexible single-core tubing*
LF-42249	50 ft (15m) Flexible single-core tubing*
LF-42282	Single-inlet water trap kit (Optional – recommended for humid environments)

\* Select one pair of single-core flex tubes either 25 ft or 50 ft length.

**Table 2: Sampling Tubes Selection Chart, Ordered Separately Per Duct Width, Select One**

Overall Duct Width Up to	Tube Kit Required	Description
27 in. (686 mm)	LF-42285	Includes one 18 in. (457 mm) Inlet Sampling Tube (2 Holes) and one 8 in. (203 mm) Exhaust Tube (2 Holes)
54 in. (1372 mm)	LF-42286	Includes one 36 in. (914 mm) Inlet Sampling Tube (3 Holes) and one 8 in. (203 mm) Exhaust Tube (3 Holes)
90 in. (2286 mm)	LF-42287	Includes one 60 in. (1524 mm) Inlet Sampling Tube (4 Holes) and one 8 in. (203 mm) Exhaust Tube (4 Holes)

**Table 3: Dual-inlet Duct Detection Application**

SKU	Description
4098-XAD-210	Dual-inlet sensor housing with dual-duct probe kit – LF42243, see Figure 6 for included equipment
Sampling Tubes	See Table 4
LF-42250	25 ft (7.5 m) Flexible single-core tubing**
LF-42249	50 ft (15m) Flexible single-core tubing**
LF-42283	Dual-inlet water trap kit (Optional – recommended for humid environments)

\*\* Dual-inlet Duct detection requires three single core flex tubes; select either 25 ft or 50 ft length.

**Table 4: Sampling Tubes Selection Chart, Ordered Separately Per Duct Width, Select One**

Overall Duct Width Up to	Tube Kit Required	Description
27 in. (686 mm)	LF-42288	Includes two 18 in. (457 mm) Inlet Sampling Tubes (2 Holes) and one 8 in. (203 mm) Exhaust Tube (2 Holes)
54 in. (1372 mm)	LF-42289	Includes two 36 in. (914 mm) Inlet Sampling Tubes (3 Holes) and one 8 in. (203 mm) Exhaust Tube (3 Holes)
90 in. (2286 mm)	LF-42290	Includes two 60 in. (1524 mm) Inlet Sampling Tubes (4 Holes) and one 8 in. (203 mm) Exhaust Tube (4 Holes)

**Note:** Dual-inlet Duct Sensor housing SKU 4098-XAD-210 is recommended for ducts wider than 90 in. (2286 mm) (see [System Installation Reference](#)) or fabricate sampling tubes in the field according to following specification: Sampling tube outside diameter: 3/4 in (19 mm); inside diameter: 1/2 in. (12.7 mm); Hole diameter: 1/8 in (3.175 mm); Number of holes: 1 per ft; the inlet sampling tube and exhaust tube must have same number of holes. Refer to the latest version of 4098-XAD-200/210 Product Guide document number 18576 for further installation details.

**Table 5: Accessories**

SKU	Description
02-FL53	Replacement air filter package of ten model 80-0020-0 filters
LF-42241	Single-inlet duct probe kit – includes sampling tube mounting plate, compression fittings, adaptors, elbows, and reducers. This kit is included with 4098-XAD-110.
LF-42243	Dual-inlet duct probe kit – includes sampling tube mounting plates, compression fittings, adaptors, elbows, and reducers. This kit is included with 4098-XAD-210.

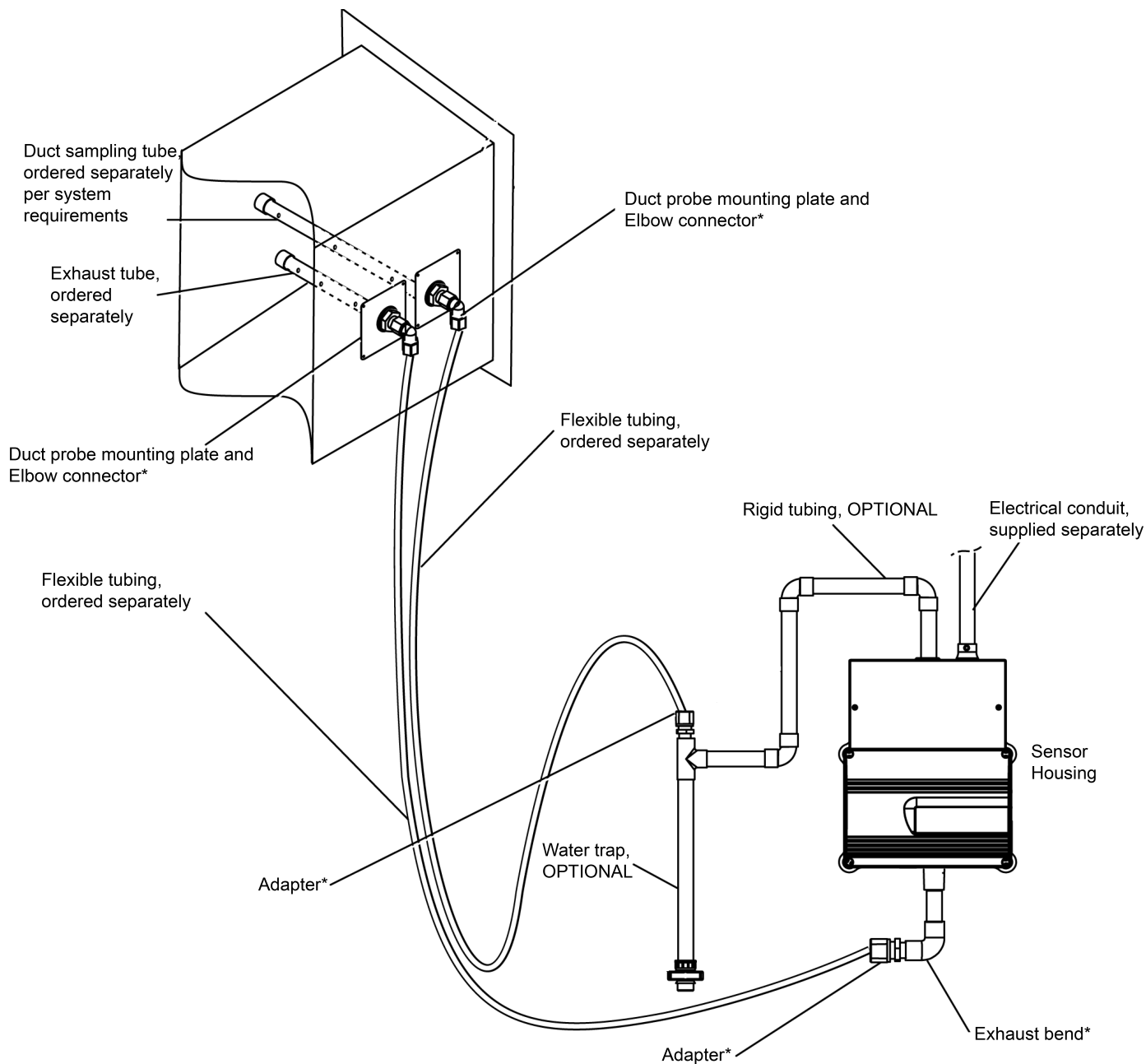
**Table 6: Remote LED Indicator and Test Station, Select One if Required, Ordered separately**

SKU	Description
2098-9808	Red LED status indicator on single-gang stainless steel plate
2098-9806	Test station with keyswitch and red LED status indicator, on single-gang stainless steel plate; turning the switch to TEST initiates alarm for system testing

**Table 7: Epoxy Encapsulated Remote Relay and End-of-Line Resistor, Ordered separately**

SKU	Description
4098-9843	Relay; single Form C (7 A @ 120 VAC); must be ordered separately; wiring is 18 AWG (0.82 mm <sup>2</sup> ) color coded wire leads; connect up to 15 relays; locate relays within 3 ft (1 m) of device being controlled per NFPA72
4081-9008	End-of-Line Resistor Harness; 10K $\Omega$ , 1/2 W; (ref. 733-894); required to supervise remote relay coil connection; locate at last relay location

**System Installation Reference**



\* Indicates items included with the duct probe kit

**Figure 5: Typical Single-inlet Duct Detection**

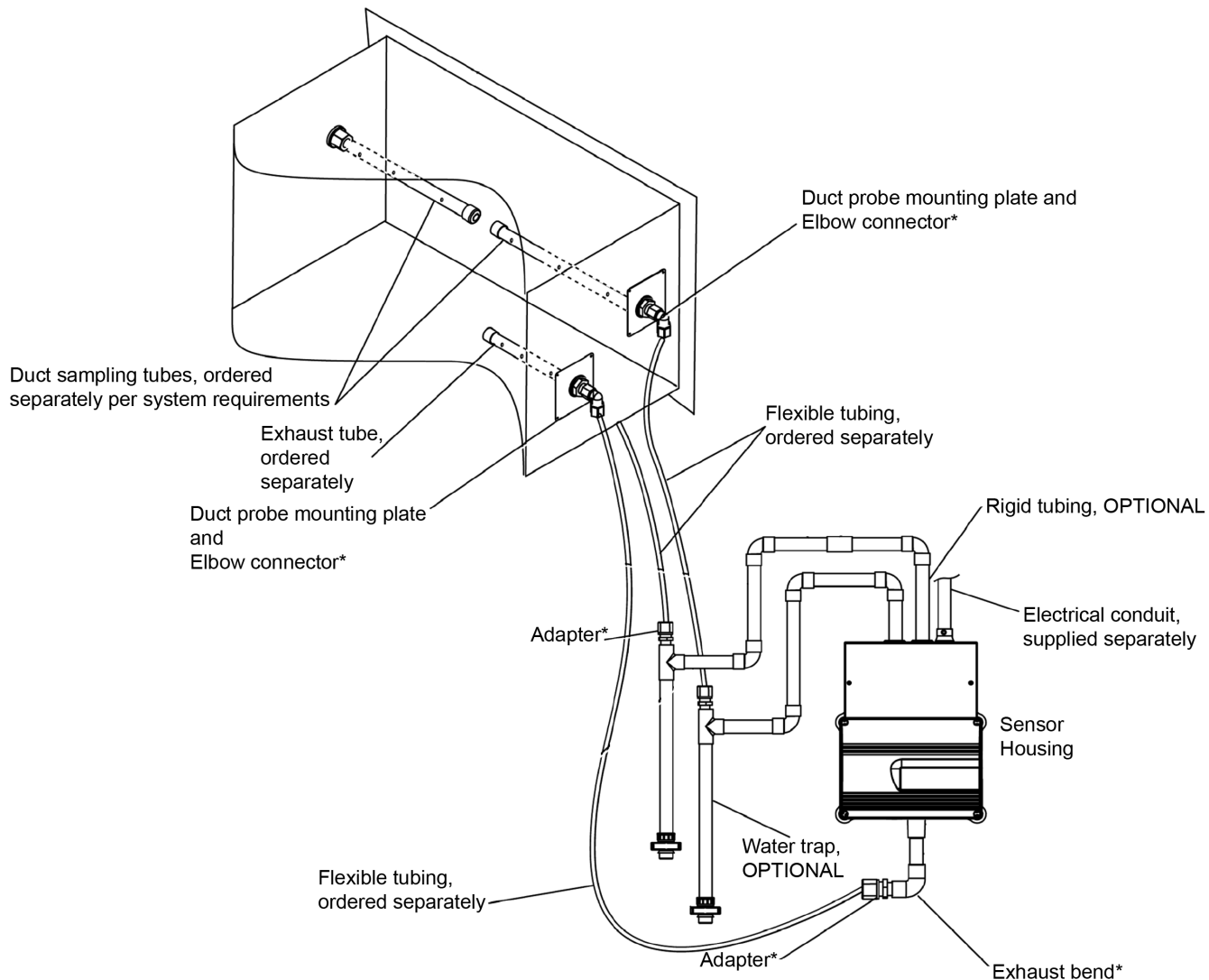


Figure 6: Typical Dual-inlet Duct Detection, for ducts greater than 90 in. width

## 4098-XAD Open Area Detection Application

**Open Area Detection.** The 4098-XAD is also suitable for use in other areas where the use of point type detectors is not always practical. Typical applications are for prison cells in correctional facilities, transformer vaults, cable tunnels, MRI rooms and for detection at the top of elevator shafts. Refer to the latest version of 4098-XAD Product Guides (Document number 18379 for 4098-XAD-100/110 and document number 18576 for 4098-XAD-200/210) for further application details.

### SKU 4098-XAD-100:

- One smoke sensor, supports up to 164 ft ( 49.9872 m) of pipe, with maximum two sampling holes per inlet.
- Provides area coverage of up to 1800 square feet.

### SKU 4098-XAD-200:

- Two smoke sensors (one per zone/run), up to 82 ft (24.9936 m) of pipe on each run, with maximum two sampling holes per inlet.
- Provides area coverage of up to 3600 square feet.

## Product Selection

Table 8: Open Area Application

SKU	Description
4098-XAD-100	Single-inlet sensor housing only (sampling pipe is ordered separately)
4098-XAD-200	Dual-inlet sensor housing only (sampling pipe is ordered separately)

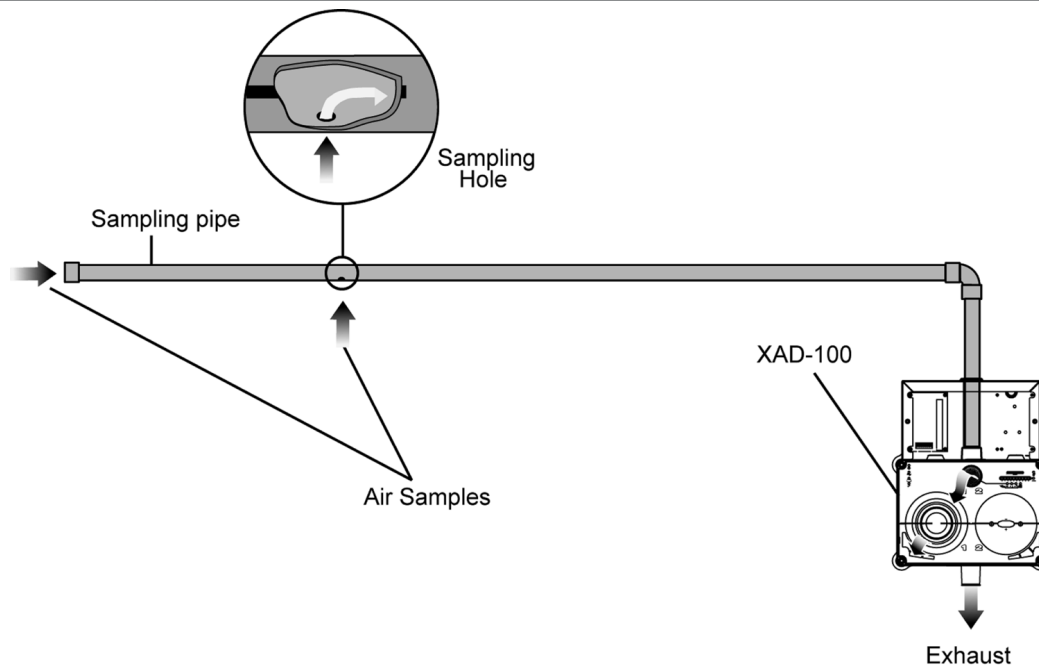


Figure 7: Typical Open Area Detection

## Specifications

Table 9: Specifications

Specification	Details										
Supply Voltage	18-30 VDC supplied from fire alarm system										
Current	In-rush current	680 mA									
	Bar graph Value	0	1	2	3	4	5	6	7	8	9
	Fan Speed	1	2	3	4	5	6	7	8	9	10
	Current (mA)	110	120	130	150	170	190	220	235	265	300
Wiring Connections	Terminal blocks, 18 to 12 AWG (0.82 mm <sup>2</sup> to 3.31 mm <sup>2</sup> )										
Data Communications	IDNet or MAPNET II communications, one address per sensor										
Alarm Current (one relay activated) add to the fan current requirements defined above	15 mA @ 24 VDC; add 15 mA for each additional remote 4098-9843 relay										
Supervised Remote Relay Control Output	For use with 4098-9843 relay only, quantity of 15 maximum; distance of 500 ft (152 m) maximum; requires 4081-9008 (ref. 733-894) 10K $\Omega$ , 1/2 W end of line resistor										
Inlet Pipe Size	Outer Diameter: 1.05 in. (26.7 mm)										
	Inner Diameter: 0.87 in. (22.1 mm)										

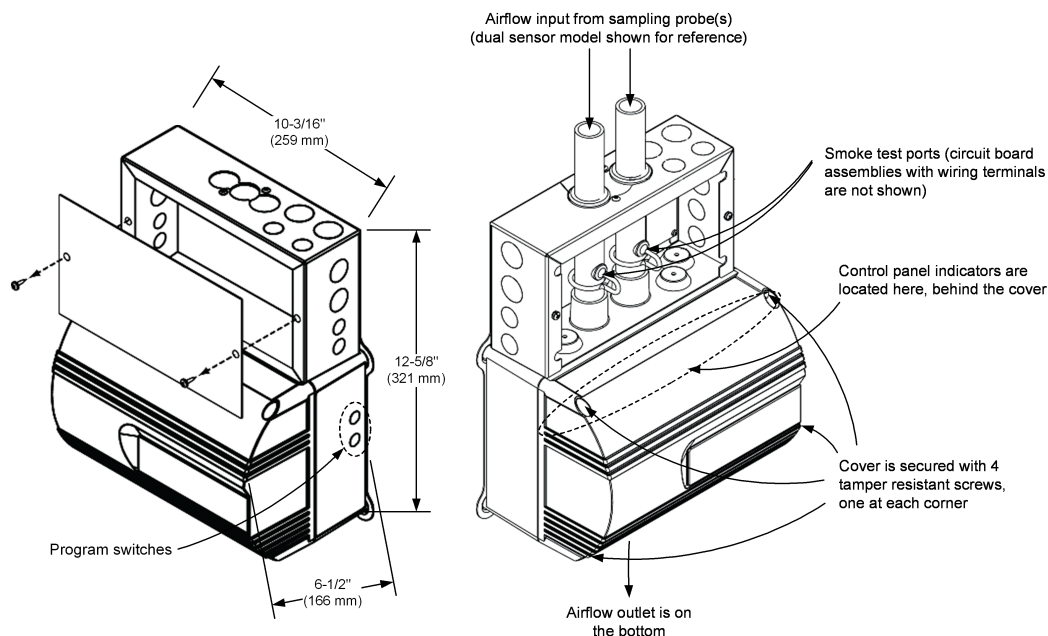
**Table 9: Specifications**

Specification	Details
Sampling Network	Inlet Pipe: O.D. = 1.05 in. (26.7 mm); I.D. = 0.87 in. (22.1 mm)
	Rigid Pipe Length = 82 ft (25 m) maximum; 3/4 in. CPVC pipe (19 mm) – For duct detection
	Rigid Pipe Length = 164 ft (50 m) maximum; 3/4 in. CPVC pipe (19 mm) – For open area detection
<b>Note:</b> Pipe length may vary subject to specifications by local codes and standards	<b>Note:</b> Total rigid pipe length including inlet and exhaust = 164 ft (50 m) maximum Flexible Tube Length = 50 ft (15 m) maximum Flexible Tube size: O.D. = 3/4 in. (19 mm); I.D. = 1/2 in. (12.7 mm)
Flow Monitoring and Reporting	High and Low adjustable
Air Velocity Range (linear ft/min)	0 to 4000 ft/min (0 to 1220 m/min)
Sensor Sensitivity Range	For duct application: 0.5% and 1.0% per foot of obscuration, selectable at host control unit For open area application: 1.5% to 3.0% per foot of obscuration, selectable at host control unit
Fan Control Settings	10 programmable speeds; Pressure = 250 Pa, approx. 1 in. of water column pressure
Filtration	Replaceable filter 80-0020-0 (inspect every 12 months and replace if necessary)
Dimensions	See Figure 8
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 Rating	10% to 95% RH (non-condensing); for indoor applications

**Table 10: 4098-9843 Relay Output Ratings, Single Form C**

Rating	Details
<b>Coil Current</b>	15 mA @ 24 VDC, up to 15 maximum per relay control output
<b>Relay Contacts</b>	7 A at 0.35 PF @ 28 VDC & 120 VAC; 250 $\mu$ A @ 5 VDC
<b>Location Distance</b>	500 ft (152 m) maximum to relay coils; locate relays within 3 ft (1 m) of device being controlled per NFPA 72

## Dimension Reference


**Figure 8: Dimension Reference**

