Simplex®

True*Alarm*® Analog Sensing

Air Aspiration Addressable Duct Smoke Detection with TrueAlarm Photoelectric Sensor(s)

*UL, ULC Listed, CSFM Approved**

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 panels supporting IDNet™ or MAPNET II® communications
- Supports remote housing up to 82 ft (25 m) with 1.05" (26.7 mm) O.D. rigid pipe
- Supports remote housing up to 50 ft (15 m) with 3/4" (19 mm) O.D. flexible tubing

Microprocessor controlled aspiration system provides:

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

Model 4098-XAD-110:

- Single inlet housing with one smoke sensor
- Includes duct probe kit

Model 4098-XAD-210:

- Dual inlet housing with two smoke sensors (one per inlet)
- Includes duct probe kit
- For ducts wider than 90"

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 is controlled through programming at the fire alarm control panel and can be activated / deactivated manually or 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 capability
- Magnetic test feature for alarm initiation at housing

Sampling tubes (ordered separately):

- Available in multiple lengths to match duct size

4098-XAD-110 Single Inlet Duct Sensor Housing (Duct Probe Kit not shown)

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 is intended to provide notification of the presence of smoke *in the duct*. Smoke detection in air ducts is not intended to, and will not, replace smoke detection requirements for open areas or other non-duct 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 3240-0026.0367 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.

Introduction

Remotely located smoke sensors. For smoke detection in HVAC ducts or other area locations that are inconvenient and/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 fire alarm control panel 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 is actively drawn from the ducts through sampling holes in duct mounted sampling tubes. Sampled air is then filtered before being analyzed by the TrueAlarm® sensor. Models are available as either a single or dual sensor version.

Airflow Supervision. Airflow is provided by a high performance aspirator with programmable flow and monitoring circuitry. Airflow is displayed on a ten element bar graph (located under the front cover) that can be adjusted for high and low flow thresholds. Flow failure is reported as a trouble to the fire alarm control panel.

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 can be easily seen and can be drained utilizing 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. The filter element will eventually become contaminated with dust particles, impeding airflow, and it is recommended that the filter element is changed every 12 months or as necessary. The frequency of filter replacement depends on environmental conditions.

Remote Test Capability The XAD can be functionally tested 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 is digitally communicated to the control panel where it is analyzed. Sensor input is stored and tracked as an average value with an alarm or abnormal condition being determined by comparing the sensor's present value against its average.

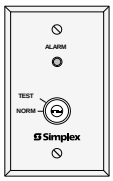
Intelligent Data Evaluation. Monitoring each photoelectric sensor's average value provides a software filtering process that compensates for environmental factors (dust, dirt, etc.) and component aging, providing an accurate reference for evaluating new activity. The result is a significant reduction in the probability of false or nuisance alarms caused by shifts in sensitivity, either up or down.

Control Panel Selection. Peak activity per sensor is stored to assist in evaluating specific locations. The alarm set point for each sensor is determined at the control panel, 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 panel. If the control panel 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 panel and that sensor housing's status LED will be turned on steadily. During a system alarm, the control panel will control the LEDs such that an LED indicating a trouble will return to pulsing to help identify any alarmed sensors.

Remote Status/Alarm LEDs (shown below) track the operation of the duct sensor housing LED.

2098-9808



2098-9806

Remote Status/Alarm Indicator and Test Station

Fire Alarm Control Panel Features

- Individual smoke sensitivity selection
- Sensitivity monitoring that satisfies NFPA 72 and CAN/ULC-S536 & S537 sensitivity testing requirements
- Peak value logging allows accurate analysis for sensitivity selection
- Automatic, once per minute individual sensor calibration check verifies sensor integrity
- Automatic environmental compensation
- Smoke sensitivity is displayed in percent per foot
- Ability to display and print detailed sensor information in easy-to-understand terms
- 4098-9843 Remote relay is under panel control for ON, OFF, or override

Product Selection

Single Inlet Duct Detection Application

Model	Description
4098-XAD-110	Single inlet sensor housing with single duct probe kit – LF42241 (refer to diagram on page 4 for included equipment)
Sampling Tubes	Refer to table below
LF-42247	25 ft (7.5 m) Flexible dual core tubing*
LF-42246	50 ft (15m) Flexible dual core tubing*
LF-42282	Single inlet water trap kit (Optional – recommended for humid environments)

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

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

* Select one either 25 ft or 50 ft length.

Dual Inlet Duct Detection Application

Model	Description
4098-XAD-210	Dual inlet sensor housing with dual duct probe kit – LF42243 (refer to diagram on page 5 for included equipment)
Sampling Tubes	Refer to table below
LF-42247	25 ft (7.5 m) Flexible dual core tubing**
LF-42250	25 ft (7.5 m) Flexible single core tubing**
LF-42246	50 ft (15m) Flexible dual core tubing**
LF-42249	50 ft (15m) Flexible single core tubing**
LF-42283	Dual inlet water trap kit (Optional – recommended for humid environments)

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

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

Note: Dual Inlet Duct Sensor housing model number 4098-XAD-210 is recommended for ducts wider than 90” (see System Installation Reference) or field fabricate sampling tubes according to following specification: Sampling tube outside diameter: 3/4”; inside diameter: ½”; Hole diameter: 1/8”; Number of holes: 1 per foot; 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.

** Dual Inlet Duct detection requires one dual core and one single core flex tubing; select either 25 ft or 50 ft length.

Accessories

Model	Description
02-FL53	Replacement air filter package of ten (10) 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.

Product Selection *(Continued)*

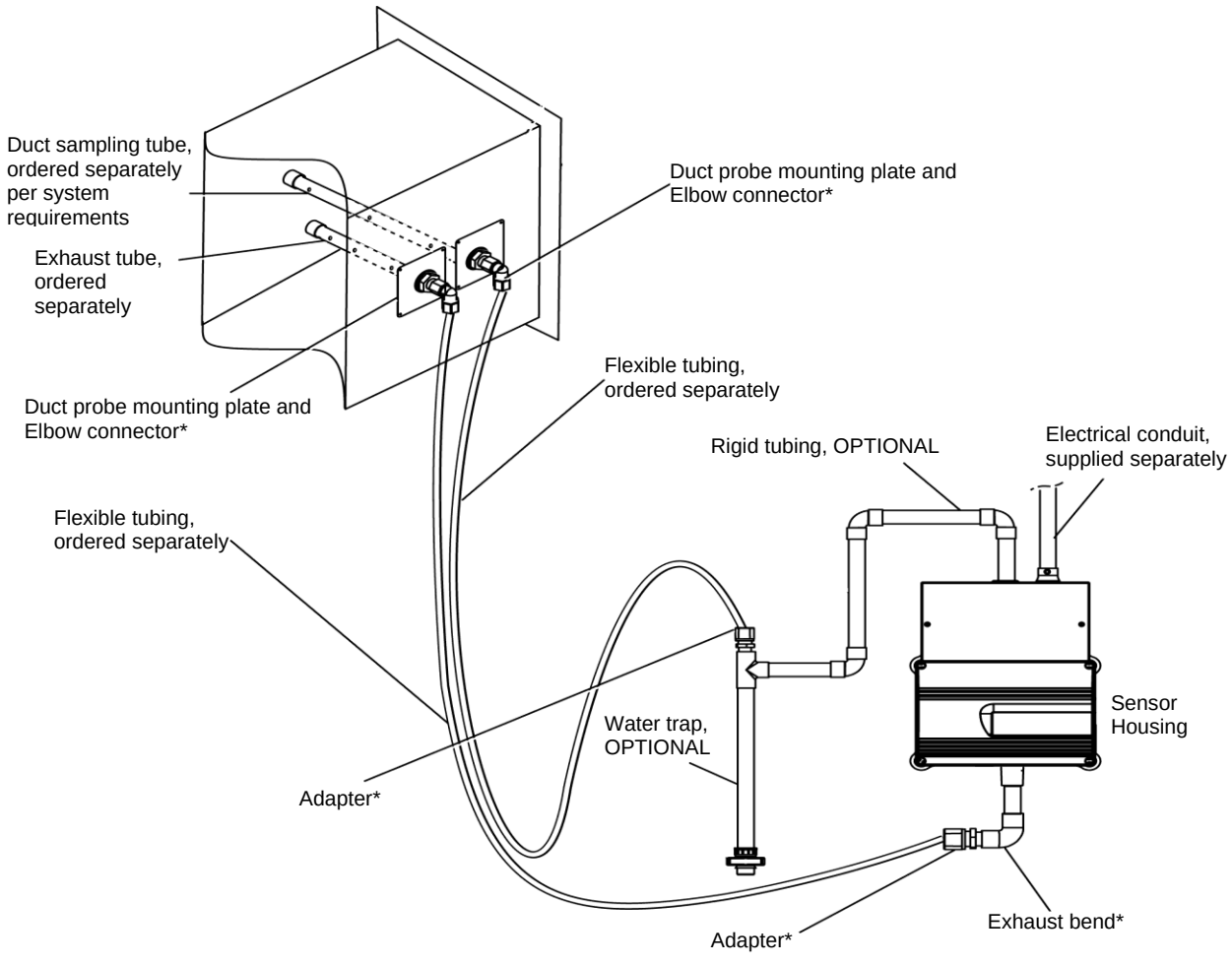
Remote LED Indicator and Test Station, Select One if Required, Ordered separately

Model	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 switch to “TEST” initiates alarm for system testing)

Epoxy Encapsulated Remote Relay and End-of-Line Resistor, Ordered separately

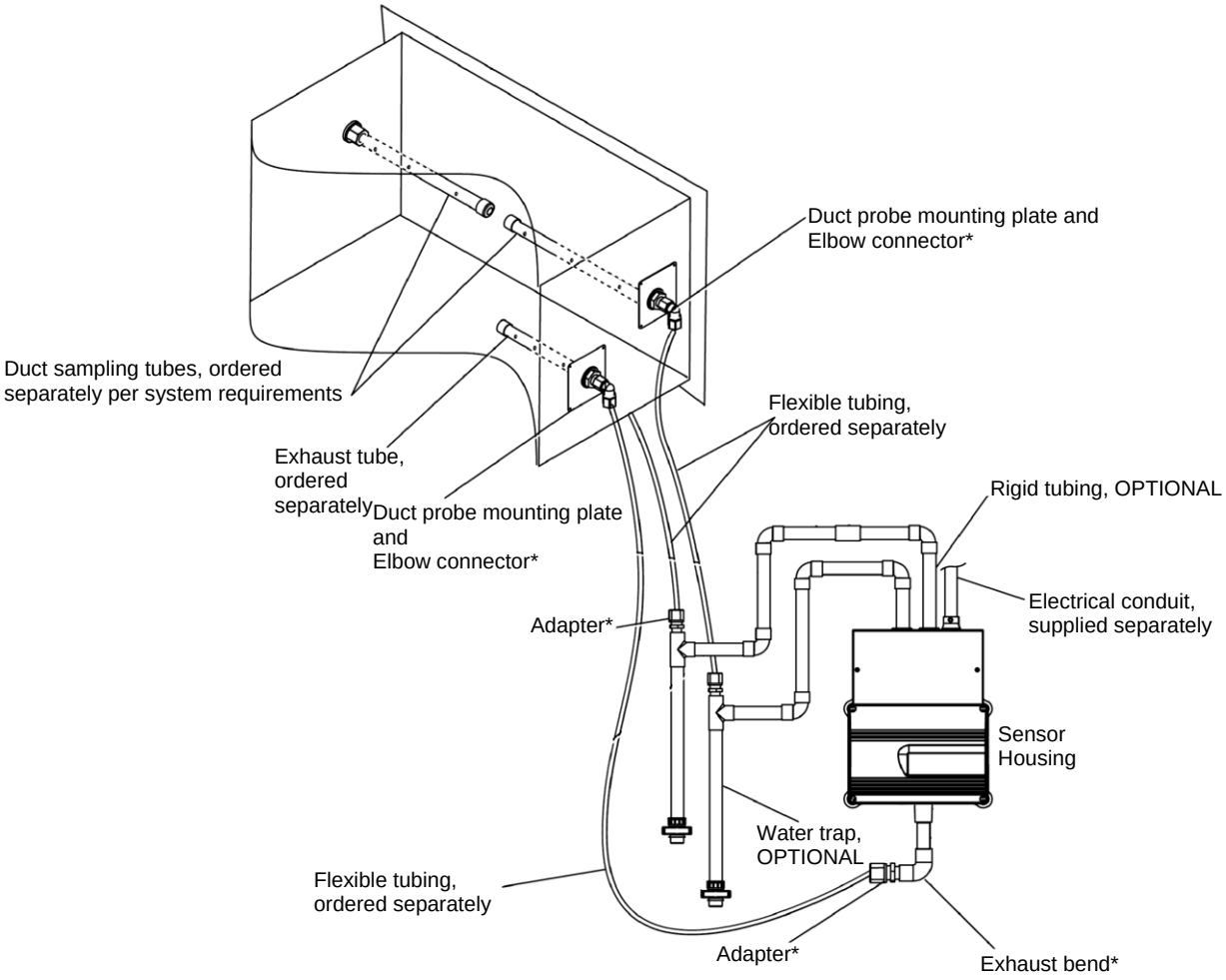
Model	Description
4098-9843	Relay; single Form C (7A @ 120VAC); must be ordered separately; wiring is 18 AWG (0.82 mm^2) color coded wire leads; connect up to 15 relays; locate relays within 3 ft (1m) of device being controlled per NFPA72
4081-9008	End-of-Line Resistor Harness; 10kΩ, ½ W; (ref. 733-894); required to supervise remote relay coil connection; locate at last relay location

System Installation Reference



* Indicates items included with the duct probe kit

Typical Single Inlet Duct Detection



* Indicates items included with the duct probe kit

Typical Dual Inlet Duct Detection (For ducts greater than 90” 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.

Model 4098-XAD-100:

- One smoke sensor, supports up to 164 feet of pipe, with maximum 2 sampling holes per inlet.
- Provides area coverage of up to 1800 square feet.

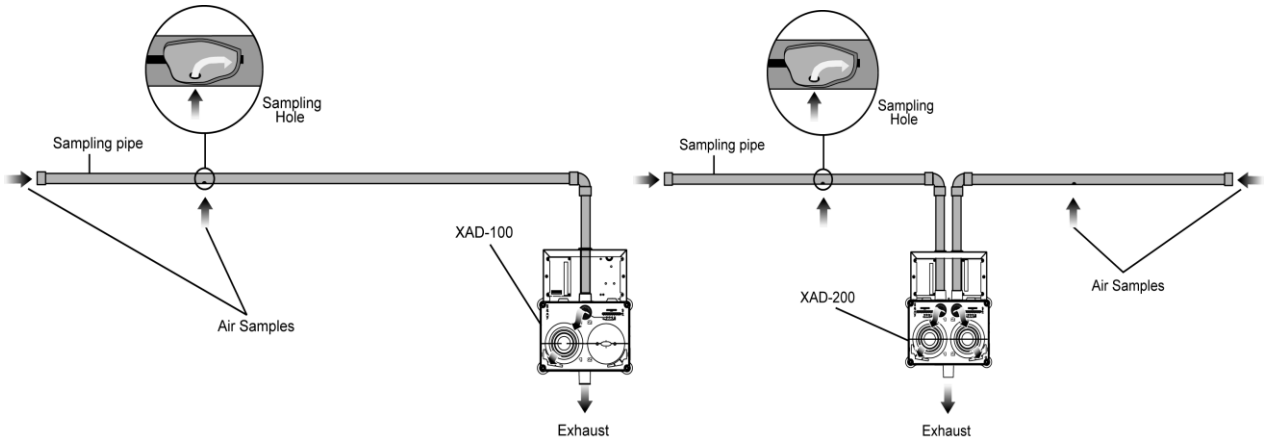
Model 4098-XAD-200:

- Two smoke sensors (one per zone/run), up to 82 feet of pipe on each run, with maximum 2 sampling holes per inlet.
- Provides area coverage of up to 3600 square feet.

Product Selection

Open Area Application

Model	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)



Typical Open Area Detection

Specifications

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^2 to 3.31 mm^2)									
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) 10kΩ, ½ W end of line resistor									
Inlet Pipe Size		Outer Diameter: 1.05 in. (26.7 mm)									
		Inner Diameter: 0.87 in. (22.1 mm)									
Sampling Network (Note: Pipe length may vary subject to specifications by local codes and standards)		Inlet Pipe: O.D. = 1.05” (26.7 mm); I.D. = 0.87” (22.1 mm)									
		Rigid Pipe Length = 82 ft (25 m) maximum; 3/4” CPVC pipe (19 mm) – For duct detection									
		Rigid Pipe Length = 164 ft (50 m) maximum; 3/4” CPVC pipe (19 mm) – For open area detection Note: 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” (19 mm); I.D. = 1/2” (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 panel For open area application: 1.5% to 3.0% per foot of obscuration, selectable at host control panel									
Fan Control Settings		10 programmable speeds; Pressure = 250 Pa, approx. 1 inch of water column pressure									
Filtration		Replaceable filter 80-0020-0 (inspect every 12 months and replace if necessary)									
Dimensions		See diagram next page									
UL Listed Temperature Range		32 to 100 °F (0 to 38 °C)									
Operating Temperature Range		32 to 122 °F (0 to 50 °C)									
Storage Temperature Range		0 to 140 °F (-18 to 60 °C)									
Humidity Rating		10 to 95% RH (non-condensing); for indoor applications									

4098-9843 Relay Output Ratings, Single Form C

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

Dimension Reference