Addressable Duct Sensor Housing 4098-5214 for the 4098-5252 and 4098-5292 Photoelectric Sensors

Introduction

The 4098-5214 duct smoke sensor housing enables a 4098-5252 or 4098-5292 MX Technology smoke sensor to monitor for smoke conditions in air conditioning or ventilation ducts. A sampling tube, selected in accordance with the duct width, is installed into the duct to direct air to the smoke sensor mounted in the housing. The system discharges the air back into the duct through the exhaust tube.

Features

- Compact air duct sensor housing.
- Includes an internally mounted base for use with a 4098-5252 or 4098-5292 Photoelectric Sensor. Order the sensor separately.
- Compatible with Simplex 4100ES, 4010ES fire alarm control panels, or 2050 and 2250 Foundation Series fire alarm control units, that are equipped with an MX Technology Addressable Loop Module.
- Clear cover for visual inspection, to monitor for the presence of smoke.
- Sampling tubes are available in multiple lengths to match duct size. Order separately.
- Communicates analog sensor information to the host control panel for accurate analysis.
- UL listed to Standard 268A.

Remote module option to order separately:

Red alarm LED 2098-9808

Note: The capacity for smoke detection in air ducts does not replace smoke detection requirements for open areas or other non-duct applications.

Sensor description

Rugged sensor construction

The MX 4098-5252 and 4098-5292 photoelectric sensors have undergone stringent environmental testing for robust construction. Electrical contacts are molded into the plastic to eliminate movement. The construction uses durable, fire resistant FR110 plastic.

MX Sensors communicate to the MX Loop Module through MX Technology communications.

Figure 1: Front view of duct sensor housing, shown with 4098-5252 sensor



Application information reference

Refer to the following:

- NFPA 90A standard for the Installation of Air Conditioning and Ventilating Systems.
- NFPA 72, the National Fire Alarm and Signaling Code.
- NEMA Guide for Proper Use of Smoke Detectors in Duct Applications.
- *Installation Instructions 579-962*

Soft addressing

Use the 850EMT programming tool for 4098-5252 to address MX technology sensors and addressable devices. The menu driven UI automatically increments addresses after each write operation. This soft addressing technique avoids misaddressing errors that often occur when you use coded switches.

The 850EMT address programmer can also change addresses stored in a sensor, or other addressable device's non-volatile memory. This makes addressing errors straightforward to rectify.

Use the Digital Enrolled mobile application to address the 4098-5292 MX technology sensor. Each device includes a permanently printed, unique QR code on the underside of the sensor and a removable sticker on the top side of the cover. This QR code includes specific device information that is used to soft address the device. Alternatively, you can address the sensor with the DIP switch on the sensor head.

Sensor details

The 4098-5252 and 4098-5292 Photoelectric Sensors incorporate a unique optical chamber design with a high signal-to-noise ratio that provides resilience to dust, dirt, and small insects. This results in reduced service cost.

- The sensor communicates analog sensor information to the host control panel and it is analyzed using the MX Fastlogic algorithm.
- The MX Fastlogic algorithm is considered an expert algorithm that uses real fire data as a basis for the alarm decision.

Figure 2: 4098-5252 Photoelectric Sensor



* 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.

© 2025 Johnson Controls. All rights reserved.

MX Fastlogic sensor operation

MX Fastlogic sensor operation is an algorithm that takes into account the pattern of smoke buildup over time and applies fuzzy logic to calculate the level of risk. This algorithm uses over 200 years of fire test data from research at the University of Duisburg, Germany to determine the likelihood that there is a real fire, and is designed to achieve faster detection of real fires and slower, preferably no detection, of false alarm sources.

MX Fastlogic sensor basics

The MX Fastlogic algorithm is an expert algorithm that uses real fire data as a basis for the alarm decision. For any application, false alarms are minimized by using the most suitable detection for response to an actual fire. This general requirement is clearly reflected in local and national standards governing fire detection system designs.

Traditionally, attempts at reducing the occurrence of false alarms have involved degrading the level of fire protection afforded by raising the alarm threshold of smoke detectors, introducing delays, or employing less responsive detection. MX Fastlogic sensors have an improved level of protection and simultaneously increase immunity to a false alarm.

MX Fastlogic algorithm, principle elements

Several elements of the detector output are monitored. The MX Fastlogic algorithm uses this raw data to execute a series of processes to evaluate the probable presence of fire, that includes the following:

- Background filtering
- Instantaneous smoke density
- Rate of change of smoke density
- Smoke density weighting
- Smoke density peak suppression
- Real fire experience comparison

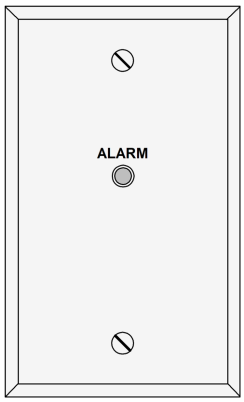
Elements synonymous with false alarms are filtered and those elements indicative of fire are weighted. These results are continually compared against data derived from real fires to produce a measure of fire risk. The decision to alarm is made against this risk measurement.

Maintain sensitivity and minimizing false alarms

MX Fastlogic sensors are designed to maintain sensitivity to fire, and to minimize false alarms. You can select different smoke detector sensitivity settings with the many analog detection systems, for example, **High**, **Normal**, or **Low**. Lowering the sensitivity setting is a typical reaction to unwanted alarms but a greater smoke density is required to initiate an alarm. This is not the case for detectors using MX Fastlogic operation because it compares the real fire experience against recognized fire patterns. For example, a sensitivity change from **Normal** to **Low** delays responses to less likely fire patterns and maintains a normal response to more likely fire patterns. This results in reduced sensitivity to possible false alarms without sensitivity reduction to clearly identifiable fires.

LED indicator details

Figure 3: 2098-9808 Remote LED indicator



The red LED indicator remotely indicates that the sensor is in alarm. See Specifications for dimensions.

Additional information

Table 1: Documents for further reference

Subject	Document
MX Loop Module	S4100-0059
4098-5214 Smoke Detector Installation Guide	579-962

© 2025 Johnson Controls. All rights reserved.

Products

Table 2: Duct smoke sensor housing

SKU	Description
4098-5214	Duct sensor housing with internally mounted sensor base, 7 in. (178 mm) exhaust tube, sampling tube end plug, mounting screws, and mounting template. It requires a 4098-5252 or 4098-5292 sensor and a sampling tube. **Note:** The 4098-5214 unit is backwards compatible with the discontinued 4098-5202 sensor.

Table 3: Smoke sensor, one required for each sensor housing, order separately

SKU	Description
4098-5252	850 series MX Technology Addressable Photoelectric Sensor for the 4098-5214
4098-5292	MX Photo Sensor with address switch

Table 4: Sampling tubes, ordered according to duct width, one required for every sensor housing, ordered separately

Model	Tube length	Duct width range
STS-2.5	30 in. (762 mm)	12 in. to 30 in. (305 mm to 762 mm)
STS-5.0	60 in. (1524 mm)	30 in. to 60 in. (762 mm to 1524 mm)
STS-10.0	120 in. (3048 mm)	60 in. to 120 in. (1524 mm to 3048 mm)
Note: The sampling tube model numbers in this table are for a quantity of one. Sampling tubes are packaged in quantities of five. Order in multiples of five in accordance with system requirements.		

Specifications

Table 5: General mechanical and environmental

Parameter	Range
Approximate dimensions	10 in. x 8 1/2 in. x 2 1/4 in. (254 mm x 216 mm x 57 mm) (H x W x D)
Air velocity, linear ft/min	500 ft/min to 4,000 ft/min (2.54 m/sec to 20.3 m/sec)
UL listed temperature range	32°F to 100°F (0°C to 38°C)
Humidity range	10% to 85% RH, non-condensing

Table 6: Electrical

Parameter	Range
Communications	MX Loop, one address for each sensor base
Wiring connections	Terminal blocks, 18 AWG to 14 AWG (0.82 mm^2 to 2.5 mm^2, or two, 1.5 mm^2)

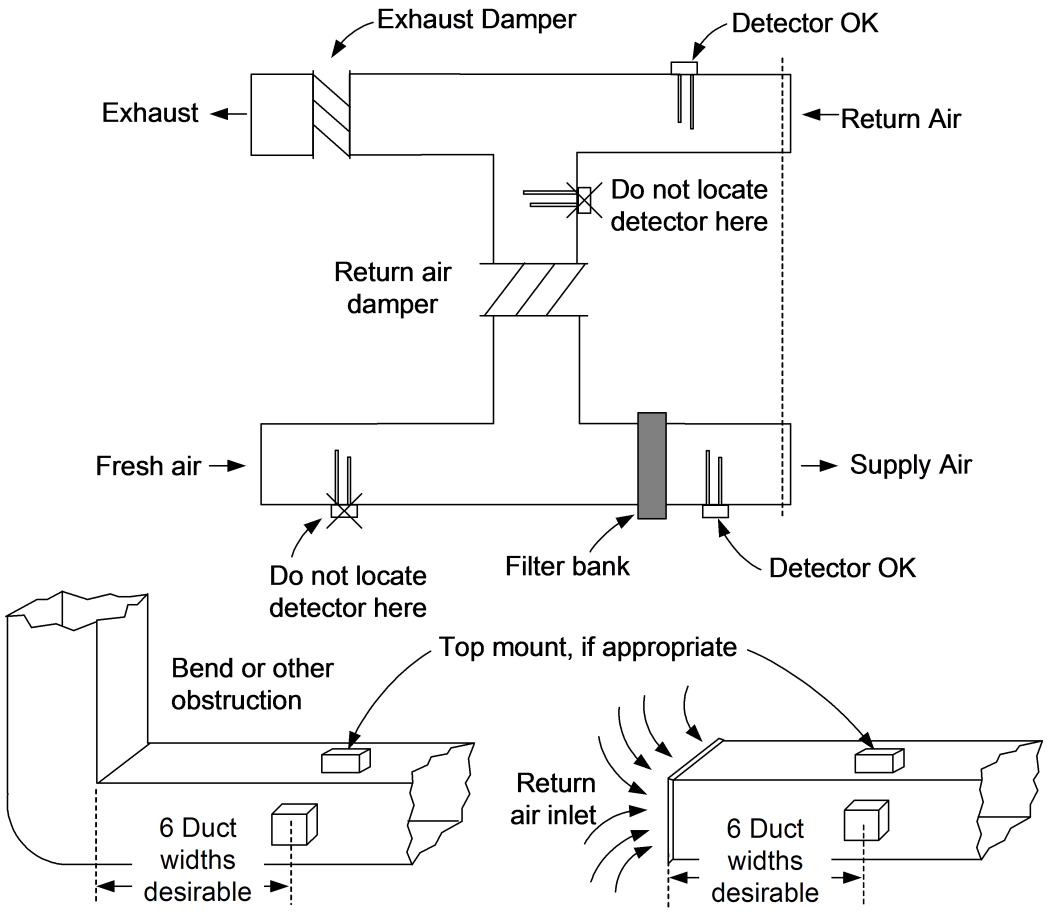
Table 7: 2098-9808 Remote LED Indicator

Parameter	Range
Dimensions	Overall: 4 3/4 in. x 2 3/4 in. (120.65 mm x 70 mm) H x W. Mounting holes: 3 9/32 in. (83 mm) apart, standard US single-gang box mounting.
Current	1 mA
Connections	Color coded wire leads, 18 AWG (0.82 mm^2)

© 2025 Johnson Controls. All rights reserved.

Duct sensor location reference

Figure 4: Duct sensor location reference



Duct sensor location considerations:

1. Correct duct smoke detection location must ensure adequate airflow within the duct housing.
2. Duct air velocity rating is 500 ft/min. to 4000 ft/min. (2.54 m/sec. to 20.3 m/sec.). The pressure differential between intake and exhaust tubes must be between 0.016 in. (0.4 mm) and 1.0 in. (25.4 mm) of water.
3. To avoid air turbulence, the best location is six duct widths downstream from bends or inlets. Ensure accessibility for testing and service.
4. Correct locations include the downstream side of filters to detect fires in the filters, in return ducts, ahead of mixing areas, and upstream of the air humidifier and the cooling coil.
5. The sensor may require other locations and orientations for correct duct smoke detection depending on duct access, system design, and duct airflow testing.

Locations to avoid:

- Where dampers that are closed for comfort control can interfere with airflow.
- Next to outside air inlets, unless you intend to monitor smoke entry from that area.
- In return air damper branch ducts and mixing areas where airflow is restricted.

All specifications and other information shown were current as of document revision and are subject to change without notice. Additional listings may be applicable, contact your local Simplex® product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. Simplex, and the product names listed in this material are marks or registered marks. Unauthorized use is strictly prohibited. NFPA 72 and National Fire Alarm Code are registered trademarks of the National Fire Protection Association (NFPA).

© 2025 Johnson Controls. All rights reserved.