VF5669-00

XP95A Ionization Smoke Sensor

Standard Features

- Responds well to fast burning, flaming fires
- Designed to operate in a variety of environments
- Minimal effects from temperature, humiditty, atmospheric pressure

Overview

The XP95A Ionization Sensor uses a low activity radioactive foil to detect fires by irradiating the air in smoke chambers and causing a current flow. If smoke enters the chamber, the current flow if reduced leading to an alarm.

Operation

The XP95A Ionization Smoke Sensor has a moulded self-extinguishing white polycarbonate case with wind resistant smoke inlets. Stainless steel wiper contacts connect the detector to the terminals in the mounting base. Inside the detector case is a printed circuit board that has the Ionization chamber mounted on one side and the address capture, signal processing and communications electronics on the other.

The ionization chamber system is an inner reference chamber contained inside an outer smoke chamber. The outer smoke chamber has smoke inlet apertures that are fitted with an insect resistant mesh.

The radioactive source holder and the outer smoke chamber are the positive and negative electrodes respectively. An Americium 241 radioactive source mounted within the inner reference chamber irradiates the air in both chambers to produce positive and negative ions. On applying a voltage across these electrodes an electric field is formed as shown in the diagram.

The ions are attracted to the electrode of the opposite sign, some ions collide and recombine, but the net result is that a small electric current flows between the electrodes. At the junction between the reference and smoke chambers is the sensing electrode that is used to convert variations in the chamber currents into a voltage.

When smoke particles enter the Ionization chamber, ions become attached to them with the result that the current flowing through the Ionization chamber decreases. This effect is greater in the smoke chamber than in the reference chamber and the imbalance causes the sensing electrode to go more positive.

The voltage on the sensing electrode is monitored by the sensor electronics and is processed to produce a signal that is translated by the A/D converter in the communications ASIC ready for transmission when the device is interrogated.

Electrical Description

The Sensor is designed to be connected to a two wire loop circuit carrying both data and a 17V to 28V dc supply. The detector is connected to the incoming and outgoing supply via terminals L1 and L2 in the mounting base. A remote LED indicator requiring not more than 4mA at 5V may be connected between +R and -R terminals. An earth connection terminal is also provided, although this is not required for the functioning of the detector.

The Sensor is calibrated to give an analog value of 25±7 counts in clean air. This value increases with smoke density. A count of 55 corresponds to the UL alarm sensitivity level. See graph overleaf. Counts of 8 or less indicate fault conditions. Count levels between 45 counts and 55 counts can be used to provide an early warning of fire.

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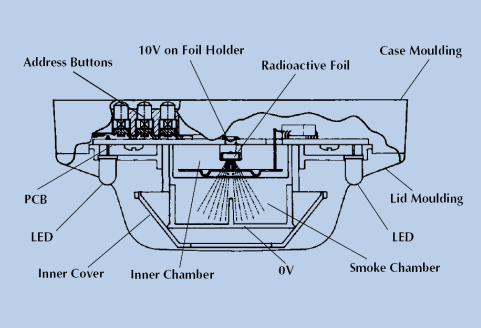
Electrical Characteristics

The VF5669 Ionization Smoke Sensors are designed to operate in a wide variety of environments. There are only small effects from temperature, humidity, atmospheric pressure and wind. Sensors are well protected against electromagnetic interference over a wide frequency range.

The VF5669 Ionization Sensor, like all Ionization Sensor's, has some sensitivity to air movement (wind). The extent to which the analog value will change depends on the wind speed and on the orientation of the detector relative to the wind direction. Relatively small changes in wind direction can cause significant changes in analog value.

For wind speeds up to 1m/s (200ft/min) the change in analog value will not exceed 5 counts. Continuous operation in wind speeds greater than 2m/s (400ft/ min) is not recommended. However, wind speeds up to 10m/s (2000ft/min) can be tolerated for short periods and will not under any conditions increase the probability of false alarms.



Sectional view - XP95A Ionization Smoke Sensor

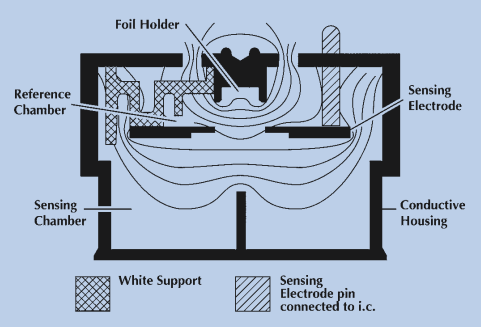


Diagram showing lines of equipotential for the XP95A Ionization Smoke Sensor

Technical Specifications

Specifications are typical and given at 73°F and 50% relative humidity unless otherwise stated.

Detection Principle: Ionization Chamber

Chamber Configuration: Twin compensating chambers using one single sided ionising radiation source

Radioactive Isotope: Americium 241

Activity: 33.3kBq, 0.9µCi

Sampling Frequency: Continuous

Sensitivity: Nominal threshold y value of 0.7 to UL

Supply Wiring: Two wire supply, polarity insensitive

Terminal Functions:

L1&L2	supply in and out connections (polarity insensitive)
+R	remote indicator positive connection (internal 2.2kΩ resistance to supply +ve)
-R	remote indicator negative connection (internal 2.2kΩ resistance to supply - ve)

Supply Voltage: 17 to 28 Volts dc

Modulation Voltage at Detector: 5 to 9 Volts peak to peak

Quiescent Current: 280µA average, 500µA peak

Power-up Surge Current: 1mA

Alarm Indicator: Red light emitting diode (LED)

Alarm LED Current: 2mA

Remote LED Current: 4mA at 5V (measured across remote load)

Storage Temperature: -22°F to +176°F

Operating Temperature: -4°F to +158°F

Humidity: (No condensation or icing) 0% to 95% relative humidity

Wind Speed: 10m/s maximum

Atmospheric Pressure: Automatic compensation by dual chambers to maintain sensitivity up to a height of 6561m above sea level

IP Rating: 23D

Detector weight: 3.7 oz

Detector with base weight: 5.68 oz

Dimensions: Diameter: 3.93", Height: 1.65", Height in base: 1.96"

Materials:	**Detector Housing:**	White polycarbonate V-0 rated to UL 94
	Terminals:	Nickel plated stainless steel

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