

ACA-E Multi-Sensor

Technology Guide

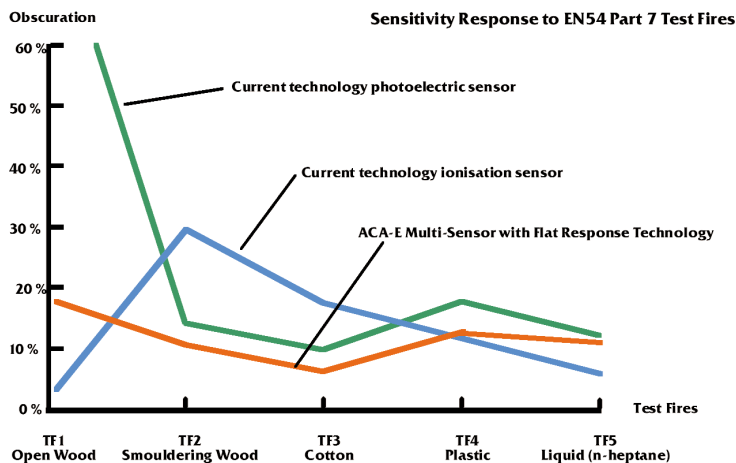
Introduction

Multi-sensor detection is becoming increasingly popular with consultants and specifiers particularly for systems where a change of detection method and/or sensitivity is required at different times of the day.

Multi-sensors are particularly valuable in situations where one detection method alone is not suitable for the environment. The ACA-E Multi-Sensor has Flat Response Capability in single Photoelectric Smoke Detection Mode as well as in Multi-Sensor Mode (incorporating photoelectric smoke and heat detection) negating the need for the ionisation smoke detection method.

Flat Response Technology

The 'Flat Response' performance within the Hochiki ALG-E Photoelectric Smoke Sensor and the ACA-E is achieved with the Photoelectric chamber only. This dramatic improvement to the chamber performance has been achieved using Hochiki's patented chamber design. The graph below shows that the 'Flat Response' characteristics prevent the sensors from being sensitive to particular particle types of smoke and insensitive to others hence extending the detection range and minimising unwanted alarms.



Note: It should be borne in mind that the sensor spacing defined in installation standards is different for smoke and heat sensors. Therefore this must be taken into consideration when designing systems that may involve a mode change, in other words, smoke to heat.

Modes of Operation

The ACA-E has 3 possible modes of operation which are selected directly from the control panel. These are [Photoelectric Smoke Detection Mode](#), [Heat Detection Mode](#) and [Multi-Sensor Mode](#).

The ACA-E will always default to the Multi-Sensor Mode on power-up. However, during initialisation, if the user has previously programmed the ACA-E to employ a different Mode then the control panel will immediately send the appropriate command to the Multi-Sensor and recalibrate the sensor for the mode selected.



Features

- Incorporates a Photoelectric Smoke & Heat element
- Flat response Photoelectric Chamber
- Twin fire LED's allow 360° viewing
- Removable chamber for maintenance
- Polling LED's controlled from Panel
- Variable sensitivity
- Electronically Addressed
- Approved to prEN54 Part 5 & 7 and CEA GEI 1-049 Standard by LPCB

Photoelectric Smoke Detection Mode

In this mode, the photoelectric chamber is the primary detection method and performs similarly to the ALG-E. The sensor continuously monitors the response back from the photodiode even in no-smoke conditions to ensure that the infra-red emitter and receiver are functioning correctly. The sensitivity is also fully adjustable which allows it to be varied from 1% through to 4.5%/m.

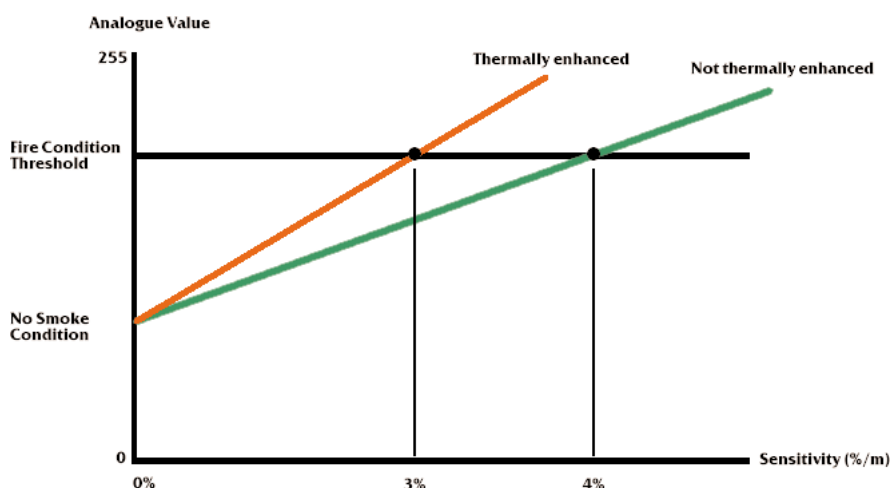
Heat Detection Mode

In this mode the thermistor is the primary detection method and performs similarly to the ATG-E. The internal processor linearises the output of the thermistor and the analogue output can be directly related to °C by the following formula : $OUTPUT = (ANALOGUE\ VALUE/2) - 20$. The sensor has adjustable sensitivity that allows the sensitivity to varied from 0 °C through to 88 °C.

Multi-Sensor Mode

In this mode **both** the photoelectric element and the heat element are active in the fire decision process. Essentially, the device is operating as a photoelectric smoke sensor but the photoelectric sensitivity is enhanced when a temperature rise above 40°C is detected by the heat-sensing element. The ACA-E achieves this utilising a microprocessor with an algorithm. This algorithm linearises the heat detection element and calculates the enhancement to the sensitivity of the photoelectric element. This additional sensitivity of the photoelectric element provides an earlier response to fire whilst still maintaining low false-alarm characteristics.

Example



This graph shows how the ACA-E Multi-Sensor's photoelectric smoke sensitivity is enhanced when the temperature exceeds 40°C in Multi-Sensor Mode .

The green line represents the analogue value output of the ACA-E increasing as the photoelectric element detects smoke without any thermal enhancement. The sensitivity in this instance is shown as 4%/m, indicated where the green line intersects the Fire Condition Threshold.

When the temperature exceeds 40°C the photoelectric smoke sensitivity is increased as shown by the red line so that the Fire Condition Threshold is reached earlier, at a sensitivity of only 3%/m.

Note: In Multi-Sensor Mode, the ACA-E cannot initiate a fire condition by the detection of heat alone, smoke must also be present. The device can however initiate a fire condition by the detection of smoke only in Multi-Sensor Mode, and this response is similar to that of the ALG-E sensor.