

Description

The Discovery multisensor detector contains an optical smoke sensor and a thermistor temperature sensor whose outputs are combined to give the final analogue value. The way in which the signals from the two sensors are combined depends on the response mode selected. The five modes provide response behaviour which incorporates pure heat detection, pure smoke detection and a combination of both. The multisensor is therefore useful over the widest range of applications.

The multisensor construction is similar to that of the optical detector but uses a different lid and optical mouldings to accommodate the thermistor temperature sensor.

The signals from the optical smoke sensing element and the temperature sensor are independent, and represent the smoke level and the air temperature respectively in the vicinity of the detector.

The detector's microcontroller processes the two signals according to the mode selected. When the detector is operating as a multisensor (i.e. modes 1, 3 and 4) the temperature signal processing extracts only rate-of-rise information for combination with the optical signal. In these modes the detector will not respond to a slow temperature increase – even if the temperature reaches a high level. A large sudden change in temperature can, however, cause an alarm without the presence of smoke, if sustained for 20 seconds.

The processing algorithms in modes 1 to 4 incorporate drift compensation.

The characteristics of the five response modes are summarised below.

Mode 1 has very high smoke sensitivity combined with high temperature sensitivity. This gives a high overall sensitivity to both smouldering and flaming fires.

Mode 2 has a smoke sensitivity similar to that of a normal optical smoke detector but has no response to temperature. This mode is therefore equivalent to a standard optical detector. It is suitable for applications in which wide temperature changes occur under normal conditions.



Mode 3 has moderate smoke sensitivity combined with a moderate sensitivity to heat. This combination is considered the optimum for most general applications since it offers good response to both smouldering and flaming fires.

Mode 4 has lower than normal smoke sensitivity combined with high heat sensitivity. This makes it suitable for applications in which a certain amount of fumes or smoke is considered normal.

Mode 5 has no smoke sensitivity at all, but gives a pure heat detector response meeting the response time requirements for a Class A1 detector in the European standard EN54–5:2000. In this mode the detector will respond to slowly changing temperatures and has a “fixed temperature” alarm threshold at 58°C. The analogue value in this mode will give the approximate air temperature over the range 15°C to 55°C.

In mode 5, the smoke sensor is still active though it does not contribute to the analogue signal. As a consequence, if the detector is used in a dirty or smoky environment the optical sensor drift flag may be activated in the heat-only mode.

Note: in situ testing of the multisensor detector should be carried out as for smoke detectors in response modes 1-4 and for heat detectors in response modes 5.

Design Note: if the multisensor is to be used in mode 5, heat detector spacing/coverage should be applied.

Discovery Multisensor Detector

ConfigManager & Discovery Multisensor – Dual Stage Detection

NOTE: *ConfigManager Version V6.0.7.36 and V6.0.43.1 Application software or later required.*

The Zone Config field drop down box within ConfigManager contains a selection called DUAL STAGE and only applies to the Discovery Multisensor detectors. If this option is chosen for any other detector type, then ConfigManager will report an error when compiled.

Multisensor detector, modes 1 thru 4 are approved as photo optical and mode 5 is approved as type A heat.

DUAL STAGE operates as follows:

The detector is programmed according to the mode setting and day/night configuration.

If the detector is programmed in modes 1 thru 4 (photo optical), and the detector goes into alarm (analogue value ≥ 55), then a PRE-ALARM condition is announced at the panel. There is a requirement for an output (or sounder) to be triggered from this condition. The Multisensor is then re-programmed to mode 5 (type A heat) and two timeouts are started.

Timeout 1 is specified in the timeout column in ConfigManager and applies to the individual detector.

Timeout 2 is specified in the EEPROM and applies to all detectors that have the Zone Config set to DUAL STAGE.

If the Multisensor goes back into alarm (analogue value ≥ 55) before the timeout 1 expires, then an ALARM condition is reported at the panel. The output that was triggered in the PRE-ALARM condition will continue to operate. The ALARM condition can be cleared by a reset.

If the timeout 1 expires, then the Multisensor is re-programmed according to the mode setting and day/night configuration. If the detector goes back into alarm within 10 seconds and remains in alarm until timeout 2 expires, then the panel shall report an ALARM condition. If the detector does not remain in alarm, then the cycle will be repeated when the detector goes back into alarm.


If the detector has been configured to operate in mode 5, then the PRE-ALARM phase is omitted.

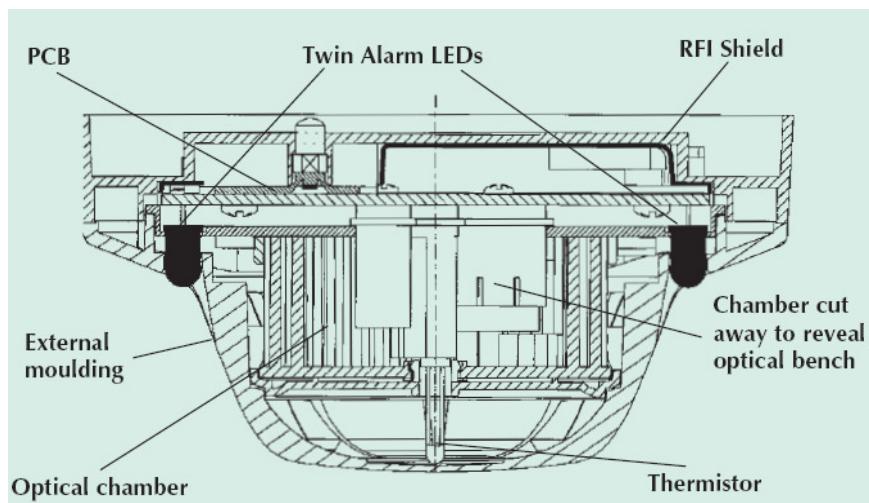
Timeout 1 and timeout 2 to have a maximum value of 999 seconds

Default value for timeout 1 is 60 seconds

Default value for timeout 2 is 180 seconds

When the multi-sensor is configured for dual stage operation, and the analogue value is greater than 45 counts (pre-alarm condition), a PRE-ALARM is not reported.

 *Note: AIF is not allowed when DUAL STAGE is selected.*



Cross Sectional View

Discovery Multisensor Detector

Specifications

Specifications are typical and apply at temperature 23°C and relative humidity 50% unless otherwise stated.

Detector principle:

Smoke: Photo-electric detection of light scattered by smoke particles
Heat: Temperature-sensitive resistance

Type code: Bits 2 1 0 4 3 7 6 5
 1 0 1 1 1 0 0 0

Supply wiring: Two-wire supply, polarity insensitive

Terminal functions:

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

Operating voltage: 17–28V DC

Communication protocol: Apollo Discovery 5–9V peak to peak

Quiescent current: 500µA average 750µA peak

Power-up surge current: 1mA

Maximum power-up time: 10s

Alarm current, LED illuminated: 3.5mA

Remote output characteristics: Connects to positive line through 4.5kΩ (5mA max)

Clean-air analogue value: 23 +4/-0

Alarm level analogue value: 55

Alarm indicator: 2 colourless Light Emitting Diodes (LEDs); illuminated red in alarm Optional remote LED

Electro-magnetic compatibility: CE marked

Temperature range:

Max. continuous operating +60°C
Min. continuous operating 0°C
Min. operating -20°C (no condensation/icing)
Storage -30°C to +80°C

Humidity: 0 to 95% relative humidity (no condensation)

Effect of temperature on optical sensor: Less than 15% change in sensitivity over rated range. Slow changes in ambient conditions will automatically be compensated for and will not affect sensitivity

Effect of atmospheric pressure on optical sensor: None

Effect of wind on optical sensor: None

IP rating: 43

Dimensions:

100mm diameter;
50mm height
58mm (height in base)

Weight:

Detector 105g
Detector in base 160g

Materials:

Housing: White polycarbonate V-0 rated to UL94
Terminals: Nickel plated stainless steel

Smoke element only:

Chamber configuration: Horizontal optical bench housing infra-red emitter and sensor, arranged radially to detect forward scattered light

Sensor: Silicon PIN photo-diode

Emitter: GaAIAs infra-red light emitting diode

Sampling frequency: 1 per second

Mode	Smoke Sensitivity (grey smoke) % per m per ft		Temperature Sensitivity (relative)	Response Type	Minimum Time to Alarm (seconds)
1	1.1	0.35	High	Multisensor	20
2	2.1	0.7	No	Response to heat	30
3	2.8	0.9	Low	Multisensor	20
4	4.2	1.4	High	Multisensor	20
5	No response to smoke		See text	Heat A1	30