

## 2 **Optical Smoke Detector**

### 2.1 **Operating Principles:**



The Series 65 Optical Smoke Detector has a moulded self-extinguishing white polycarbonate case with wind resistant smoke inlets. Nickel plated stainless steel wiper contacts connect the detector to the base. Inside the case a printed circuit board has the optical system mounted on one side and the signal processing electronics on the other.

The sensing chamber is a black moulding configured as a labyrinth which prevents penetration of ambient light. The labyrinth has a fine gauze insect-resistant cover. The chamber houses an infrared light emitting diode (LED) and a photo-diode which has an integral visible-light filter as extra protection against ambient light.

Every three seconds the LED emits a burst of collimated light, modulated at 4kHz. In clear air, light from the LED does not fall directly on the diode because the LED is positioned at an obtuse angle to the diode (as shown in Fig 2). When smoke enters the chamber, a fraction of the collimated light is scattered onto the photo-diode. If the resulting signal from the photo-diode is above a preset threshold, the LED emits two more bursts of light, this time at two-second intervals.

If light is scattered onto the photo-diode by both these pulses – due to the presence of smoke – the detector signals an alarm state by switching the alarm latch on, increasing the current drawn from the supply from about 40µA to a maximum of 75mA. This fall in the impedance of the detector is recognised by the control panel as an alarm signal.

The alarm current also illuminates the detector integral LED. A remote indicator connected between the L1 IN terminal and the –R terminal will have a voltage equal to the supply voltage less 1 volt across it and so will illuminate.

To ensure correct operation of the detector the control panel must be arranged to supply a maximum of 33 volts DC and a minimum of 9 volts DC in normal operation. The supply may fall to 6 volts DC in alarm conditions if a supply current of at least 10mA is available at this voltage. To ensure effective illumination of the integral LED and any remote indicator, the supply to the detector should exceed 12 volts. To restore the detector to quiescent condition, it is necessary to expel any smoke and interrupt the electrical supply to the detector for a minimum of one second.

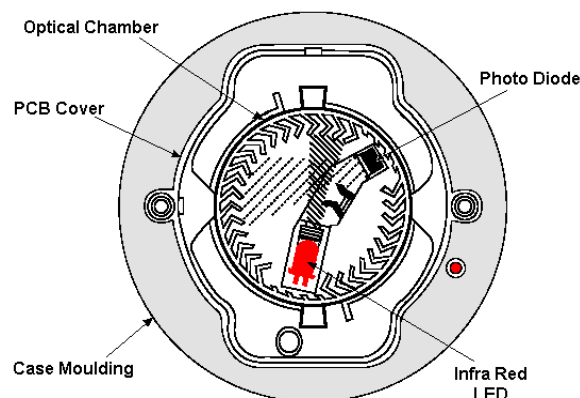


Figure 2 - Top section, Series 65 Optical Smoke Detector

### 2.2 **Product Codes**

Product Description	SAI (AS7240-7)	LPCB (EN54-7)
Series 65 Optical Smoke Detector	4106-1001	55000-317AMP

## 2.3 Options

1. Flashing LED: The integral LED flashes when the detector is in a quiescent state.
2. Magnetic test switch and Flashing LED: A magnetic test switch in the circuit of the detector can be magnetically activated from outside the case to initiate an alarm condition for test and commissioning purposes.

A flashing LED, as outlined above, is also included.

## 2.4 Technical Data:

Specifications are typical and given at 23°C and 50% relative humidity unless specified otherwise.

<b>Detector Type:</b>	Point type smoke detector for fire detection and alarm systems for buildings
<b>Detection Principle:</b>	Photo-electric detection of light scattered in a forward direction by smoke particles
<b>Chamber Configuration:</b>	Horizontal optical bench housing an infra-red emitter and sensor arranged radially to detect forward scattered light
<b>Sensor:</b>	Silicon PIN photo-diode
<b>Emitter:</b>	GaAs Infra-red light emitting diode
<b>Sampling Frequency:</b>	Once every 3 seconds
<b>Confirmation Frequency:</b>	Once every 2 seconds
<b>No of Consecutive Sensed Alarm Signals Needed to Trigger Detector Alarm:</b>	3
<b>Supply Wiring:</b>	Two wire monitored supply, polarity insensitive
<b>Terminal Functions:</b>	L1 IN and L2: supply in connections L1 OUT and L2: supply out connections -R: remote indicator negative connection
<b>Supply Voltage:</b>	9 to 33V DC
<b>Ripple Voltage:</b>	2V peak to peak maximum at 0.1Hz to 100KHz
<b>Quiescent Current:</b>	30-50µA at 24V DC
<b>Switch-on Surge Current:</b>	115 µA
<b>Alarm Voltage:</b>	6 to 28V
<b>Normal Alarm Current:</b>	61mA at 28V, 52mA at 24V and 18mA at 10V
<b>Alarm Indicator:</b>	Red, Light Emitting Diode (LED)
<b>Design Alarm Load:</b>	420Ω in series with a 2V drop
<b>Holding Voltage:</b>	6V (min)
<b>Holding Current:</b>	10mA (min)
<b>Min Voltage to Illuminate Indicator:</b>	12V
<b>Alarm Reset Voltage:</b>	1V Alarm Reset Time: = 1 second
<b>Remote Output Characteristic:</b>	Remote is a current sink to the negative line limited to 17mA
<b>Sensitivity:</b>	Nominal alarm threshold of 0.15dB/M obscuration, measured in accordance with EN54-7: 2000
<b>Temperature Range:</b>	-20°C to +60°C (no condensation or icing)
<b>Humidity:</b>	0% to 95% relative humidity (no condensation)
<b>Atmospheric Pressure:</b>	Insensitive to atmospheric pressure
<b>Wind Speed:</b>	Insensitive to wind
<b>IP Rating:</b>	23D in accordance with BS EN 60529
<b>Dimensions:</b>	Detector: 100mm Dia x 42mm H, Detector in Base: 100mm Dia x 50mm H
<b>Weights:</b>	Detector 99g, Detector in Base:150g
<b>Material:</b>	Detector housing: White polycarbonate rated V-0 in accordance with UL 94. Terminals: Nickel plated stainless steel