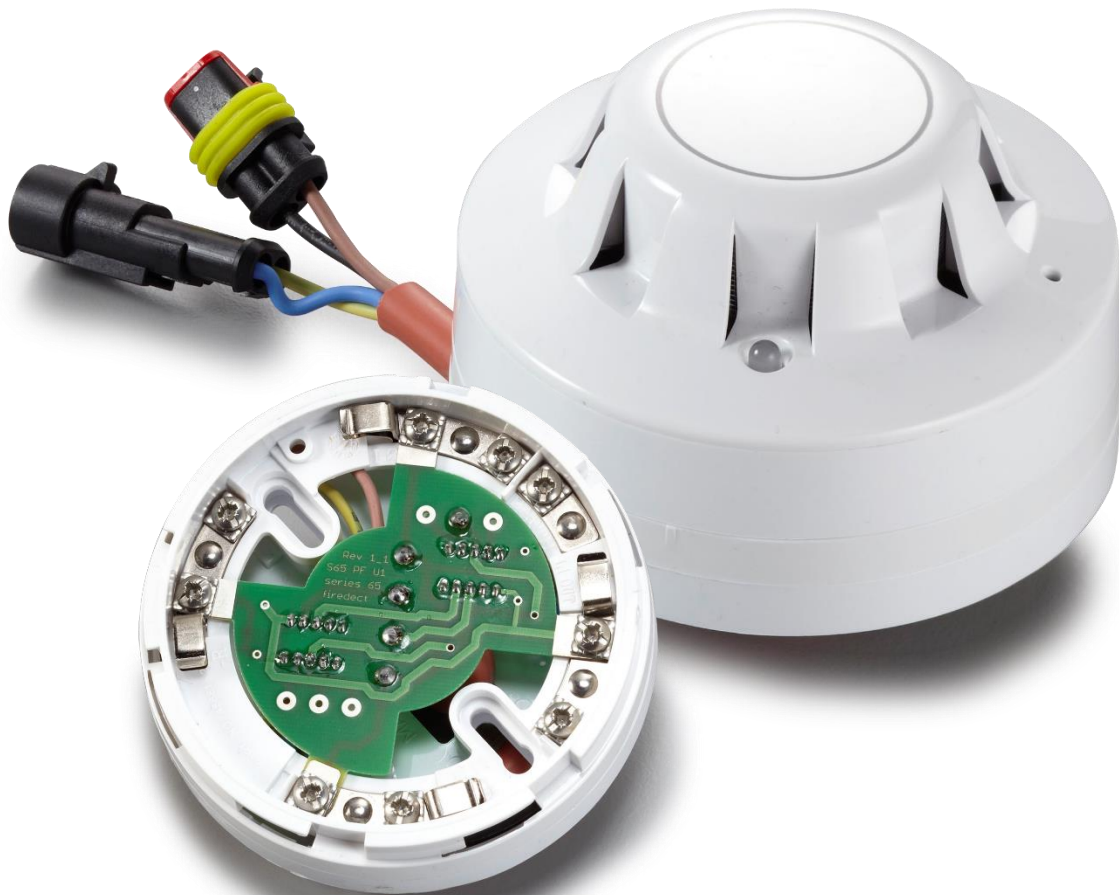




Optical Smoke Detector

with fail-safe PCB



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Operating Principles

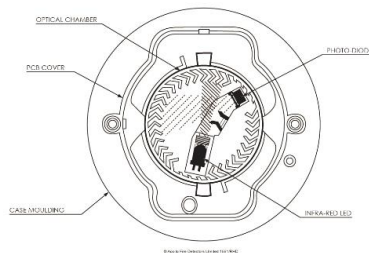
The S65PFU1-244_316 Optical Smoke Detector has a molded self-extinguishing white polycarbonate case with wind resistant smoke inlets. Nickel plated stainless steel wiper contacts connect the detector to the base. Inside the case, the optical system and signal processing electronics are mounted on the circuit board. The sensing chamber has black molding in a labyrinthine configuration to prevent 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 4 kHz. 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.

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 40 μ A to a maximum of 75 mA. This fall in the impedance of the detector is recognized 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 10 mA is available at this voltage. To ensure effective illumination of the integral LED and any remote indicator, the supply to the detector should exceed 10 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.

Enhanced Performance for Automotive Industry

The fail-safe PCB optical smoke detector S65PFU1-244_316 was specially developed for the automotive industry to fulfil the toughest requirements in the most extreme environments. Interface circuits, protective circuits and its potential-free

switching amplification are specially adapted to meet the applicable regulations of the world's biggest bus manufactures. In the event of surge voltage or load dump, the protective circuit

ensures resistance against destruction by ESD. An integral LED flashes when the detector is in a quiescent state. Removal of the sensor will light up an alarm state as an anti-theft protection.

Technical Data

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

Detector Type Point type smoke detector for fire detection and alarm systems for automotive	Detection Principle Photo-electric detection of light scattered in a forward direction by smoke particles	Chamber Configuration Horizontal optical bench housing an infra-red emitter and sensor arranged radially to detect forward scattered light
Sensor Silicon PIN photo-diode	Emitter GaAs Infra-red emitting diode	Sampling Frequency Once every 3 seconds
Confirmation Frequency Once every 2 seconds	Number of Consecutive Sensed Alarm Signals Needed To Trigger Detector Alarm 3	Supply Wiring Two wire monitored supply, polarity insensitive
Electric Contacts Normally closed (N.C.) or normally opened (N.O.) relay contacts	Anti-Theft Protection Alarm signal when sensor is removed or cable is broken	Ripple Voltage 2 V peak to peak maximum at 0,1 Hz to 100 kHz
Supply Voltage 9 to 33 V DC	Quiescent Current 30 - 50 µA at 24 V	Switch-on Surge Current 115 µA at 24 V
Alarm Voltage 6 to 28 V	Normal Alarm Current 61 mA at 28 V; 52 mA at 24 V 18 mA at 10 V	Alarm Indicator Clear light emitting diode (LED) emitting red light
Design Alarm Load 420 Ω in series with 2 V drop	Holding Voltage 6 V (min)	Holding Current 10 mA (min)
Minimum Voltage Required to Illuminate Indicator 12 V	Alarm Reset Voltage 1 V	Alarm Reset Time 1 second
Remote Output Characteristics Remote is a current sink to the negative line limited to 17 mA	Sensitivity Nominal alarm threshold of 0.15 dB/m obscuration, measured in accordance with EN 54-7:2000	Temperature Range -20 °C to +60 °C (no condensation or icing)
Humidity 0 % to 95 % relative humidity (no condensation)	Wind Speed Insensitive to wind	Atmospheric Pressure Insensitive to atmospheric pressure
IP Rating 23D in accordance with BS EN 60529	Dimensions (dia. × height in mm) 100 × 42 (Detector) 100 × 60 (Detector in Base)	Weights 90 g (Detector) 206 g (Detector in Base)
Materials Detector housing: White polycarbonate rated V-0 in accordance with UL 94. Terminals: Nickel plated stainless steel	Certificates CE0832 E13 10R-03 12710	

EMC, approvals and regulatory compliance

EN 61000-6-3 Generic Emission Standard for residential, commercial and light industrial environments	EN 61000-6-4 Generic Emission Standard for industrial environments	EN 50130-4 Alarm Systems Electromagnetic compatibility - product family standard: immunity requirements for components of fire, intruder and social alarm systems
EN 61000-4-2 Electrostatic discharge	EN 61000-4-3 Radiated immunity	EN 61000-4-4 Fast transient bursts
EN 61000-4-5 Surge immunity	EN 61000-4-6 Conducted immunity	ISO 10605 Test methods for electrical disturbances from electrostatic discharge
ISO 11452 Component test methods for electrical disturbances from narrowband radiated electromagnetic energy Pars 2: Absorber-lined shielded enclosure Part 4: Harness excitation methods	ISO 7637 Electrical disturbances from conduction and coupling Part 2: Electrical transient conduction along supply lines only Part 4: Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines	EN55025 (CISPR25) Conducted emissions from components Chapter 6.2: Voltage method, Class 3 Chapter 6.3.: Current probe method, Class 3 Chapter 6.4.: ALSE method, Class 4

30 V/m with 80 % Am sine and 100 % pulse modulation depth over the frequency ranges 415 to 467 MHz and 890 to 960 MHz. S65PFU1-244_317 has been declared to be compliant with the standard EN 50155: Railway applications: Electronic equipment used on rolling stock.

