Technical Data – IR Flame Sensor

Mechanical

Housing Material:	Die Cast Zinc Alloy (ZA12)
Housing Colour:	Blue
Dimensions:	See **Fig. 8**
Weight:	2.4kg
Cable Gland Entries:	2 x 20mm

Electrical

Supply Voltage:	14 to 28Vdc
Supply Current:	See DIL switch settings
Power Up Time:	2 seconds max.
Test Signal Voltage:	14 to 28Vdc
Relay Contact Ratings:	
Current	0.25Amp. Max.
Voltage	30Vdc. Max.
Resistive Loads Only Power	3.0W Max.

Performance

Range: (See EN54-10)	0.1m² n-heptane at 25m 0.2m² n-heptane at 35m 0.4m² n-heptane at 45m
Field of View:	90° min. Cone
Spectral Response: IR	1.0 to 2.7µm
Sensitivity: (See EN54-10)	High = Class 1 Low = Class 2

Environmental

Operating Temperature:	- 10°C to +55°C
Storage Temperature:	- 20°C to +65°C
Relative Humidity:	95% Non condensing
IP Rating:	IP65
EMC Immunity:	EN 50081-1, EN 50081-2 EN 50082-2, EN 50082-2 EN 50130-4, EN 55022

1" BSP/NPT Bayonet Mounting

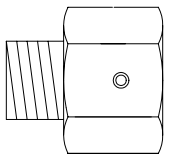


Fig. 7 Bayonet Mount Part number: 012290

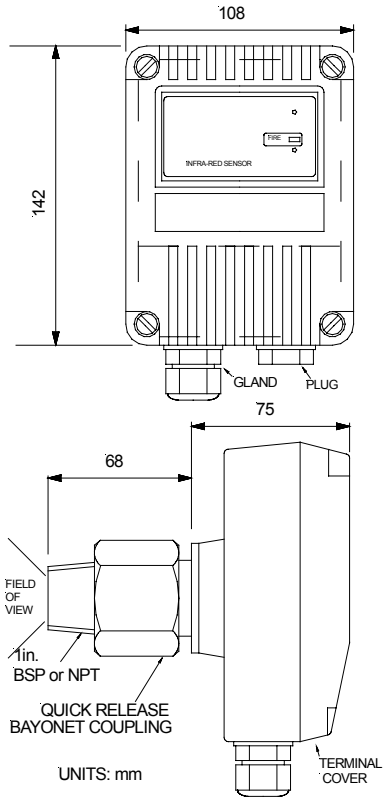


Fig. 8 Dimensions – IR Flame Sensor

Selectable Options	DIL Switch Settings	
Relay RL2 Function:	**1**	**2**
RL2 Off	0	0
RL2 Off	1	0
IR fire or pre-alarm	0	1
Fault (Energised if OK)	1 ~	1
Alarm Current: [RL1 Flame Relay]	**3**	**4**
3/9mA RL1 Only, 4/8/14mA RL2 & RL1	0	0
4-20mA, 4/20mA, No Relays	1	0
/ Or 8-20mA, 8/20mA, & Relays	0	1
- Proportional 8/28mA, & Relays	1 ~	1
Output Mode:	**5**	
Non-latching (-)	0	
Latching (/)	~1	
Flicker Counts: Pre-alarm(RL2), Flame(RL1)	**6**	**7**
Slowest 4 10	0	0
Medium 3 8	1 ~	0
Fast 2 6	0	1
Very Fast 1 4	1	1
Sensitivity:	**8**	
Low	0	
High	~ 1	

Factory settings ~

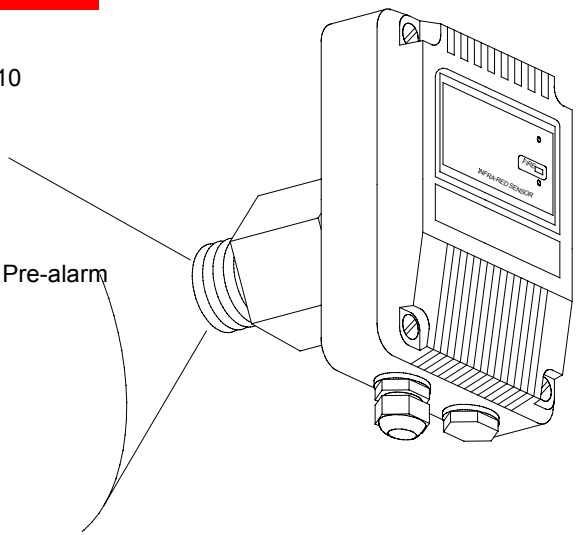
1. EN54: Part 10: Fire detector and fire alarm systems; Part 10: Flame detectors – point detectors.
2. This sensor is not suitable where normal light is visible and daylight should be prevented from being in view. The immunity of the sensor to false sources will be reduced when the sensor is set to fast response times.

Data Sheet

016580 IR FLAME & SPARK SENSOR
012290 BAYONET MOUNT 1" BSP/NPT MALE IN PLATED STEEL

Features

- Class 1 Sensitivity to EN54-10
- High Sensitivity to Embers
- Selectable Output Options
  Conventional 2 wire
  4-20mA
  Relay Contacts; Fire/Fault, Pre-alarm
  Latching or Non-latching
- Selectable Response Speed
- Remote Control Self Test
- Low Power Consumption
- CE Marked



Operating Principles

The sensor responds to low-frequency (1 to 15 Hz.) flickering IR radiation emitted from flames during combustion.

IR flame flicker techniques enable the sensor to operate through a layer of oil, dust, water vapour, or ice.

Most IR flame sensors respond to 4.3µm light, emitted by hydrocarbon flames. By responding to 1.0 to 2.7µm light emitted by every fire all flickering flames can be detected. Gas fires not visible to the naked eye e.g. hydrogen may also be detected.

The single IR photoelectric detector responds also to IR wavelengths, emitted from glowing embers and sparks.

The combination of filters and signal processing allows the sensor to be used without risk of false alarms on dark machinery and ductwork.

Electrical Connections

The sensor is can be connected to a two wire circuit supplying 14V to 28V dc. The sensor is connected to the supply via terminals 1(+IN) and 2(-IN) under the front terminal cover. Connections to the sensor are polarity sensitive.

A remote sensor test input is available on terminals 3(+R) for +IN and 4(-R) 0V. When a 14V to 28V dc supply is applied to this input IR test sources activate within the sensor and a flame detected state on the outputs. See **Fig. 1**

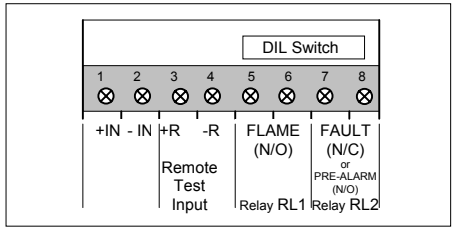


Fig. 1 Connection Terminals (Front Cover Removed)

Flame Detection Characteristics

The sensor responds to varying sizes of flame and embers at given distances. The further away the flame is from the sensor the larger the fire has to be, with detection beyond 50m becoming unpredictable. An n-heptane flame with a base area of 0.1m² will be detected on the sensor centre line at 25m, with the sensitivity set high for class 1 performance.
See **Fig. 2**
If the sensitivity switch were set to low, for class 3 performance, the same 0.1m² flame would be detected at 12m.

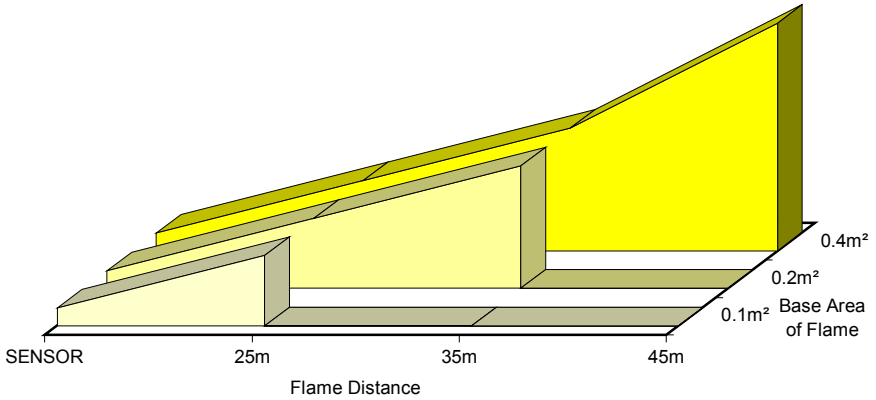


Fig. 2 Sensor centre line detection range for n-heptane fire (yellow sooty flame - IR Flame Sensor, sensitivity set high for class 1 performance

The polar diagram shows that the sensor sensitivity is at its greatest along the central axis. The variation in relative range against viewing angle is show as a percentage of peak performance. The diagram is a section through the sensors conical field of view. See **Fig. 3**

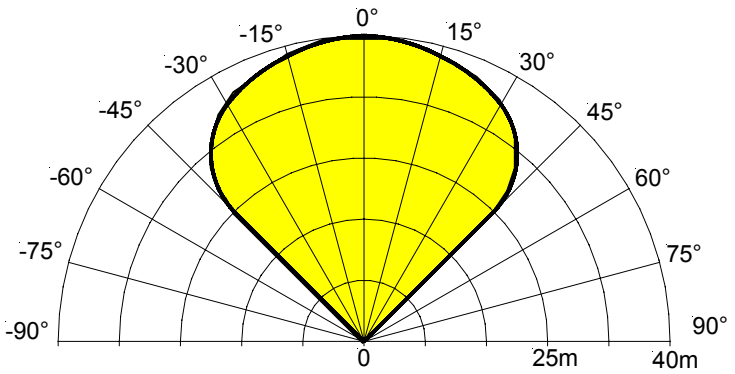


Fig. 3 Relative range as a function of viewing angle - IR Flame Sensor

Proportional Output Values (Non-latching)

When the sensor sees any flame flicker the proportional values of (4-20mA or 8-20mA) will increase.
The sensor is set to give a proportional value of 4mA or 8mA with no flame in view. The value increments when flame flicker pulses are seen.
With an output value approaching 20mA the fire LED will illuminate.
Values below 3.0mA are an indication of a fault conditions. See **Fig. 4**

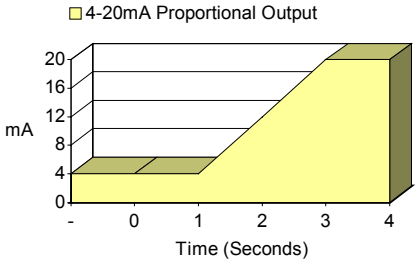


Fig. 4 Typical Response on seeing Flame - IR Flame Sensor

Once illuminated the red Fire LED and output value are held for 5 seconds after the last flame has been seen, after which the output value decrements back to 4 or 8mA. See **Fig. 5**

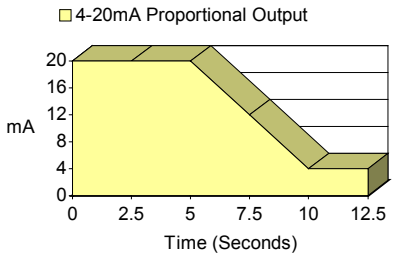


Fig. 5 Typical Response after last Flame seem - IR Flame Sensor

Proportional output values between 4 or 8mA and 20mA can be used to provide an early warning of fire. These values hold only for 3 seconds from the last flame sighting. See **Fig. 6**

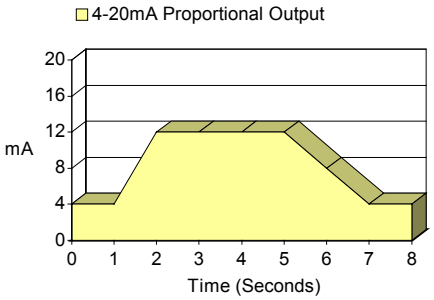


Fig. 6 Typical Response to Burst of Flame - IR Flame Sensor

Applications for Flame Sensors

Flame sensors are used when detection is required to be;

- unaffected by convection currents, draughts or wind
- tolerant of fumes, vapours, steam, dust and mist
- responsive to a flame more than 25m away
- fast reacting

Typical application examples are;

- agriculture – grain and malt processing, animal feed manufacture
- chipboard and MDF manufacture
- dryers
- dust filters
- news print – presses, waste, dust collection
- textiles
- wallpaper production
- woodworking

Applications and locations to avoid;

- ambient temperatures above 55°C
- close proximity to cell phone and CB transmitters
- light falling directly onto IR optics
- exposure to severe rain and ice
- flickering or moving hot objects
- flood or spot lighting falling directly on IR optics
- large amounts of flickering reflections
- large IR sources above 200°C – heaters, burners, flare stacks
- microwave ovens and dryers
- RF heaters
- obstructions to field of view