

## Technical Data – EExd UV/IR<sup>2</sup> Flame Sensor

### Mechanical

Housing Material:	Copper Free Aluminium Alloy LM25
Housing Colour:	Red
Dimensions:	See Fig. 9
Weight:	2.5kg
Cable Gland Entries:	3 x 20mm

### Electrical

Supply Voltage:	14 to 30Vdc
Supply Current:	See DIL switch settings
Power Up Time:	2 seconds max.
Test Signal Voltage:	14 to 30Vdc
Relay Contact Ratings:	
Current	1.0Amp. Max.
Voltage	50Vdc. Max.
Resistive Loads Only Power	30W Max.

### Performance

Range:	- Class 1 (Sensitivity Setting - Class 3 see EN54-10)	0.1m <sup>2</sup> n-heptane at 25m 0.1m <sup>2</sup> n-heptane at 12m
Field of View:		90° min. Cone
Spectral Response:		
UV		185 to 260nm
IR		1.0 to 2.7µm
Sensitivity: (See EN54-10)		High = Class 1 Low = Class 3

### Environmental

ATEX Approval Category	II 2 G D - Category 2 or 3
CENELEC / IEC Marking	EEx d IIC T6 (85°C) - Zone 1, 21, 2 and 22
ISSeP Notified body No. 492 Apparatus Certificate No.	ISSeP 03ATEX012
Operating Temperature:	- 10°C to +55°C
Storage Temperature:	- 20°C to +65°C
IP Rating:	IP66
EMC Immunity / Emissions:	EN61000-6-1, EN61000-6-2 EN61000-6-3, EN61000-6-4 EN 50130-4, EN 55022

See Flame Detector Installation Guides for more details

### Product Approvals

ISSeP Notified body No. 492 Apparatus Certificate No.	ISSeP 03ATEX012
LPCB Standard Certificate No.	EN54-10 729a/13
CPD Certificate No.	0832-CPD-0971

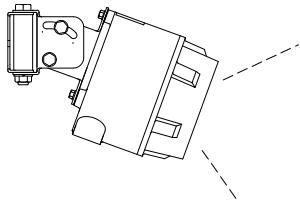
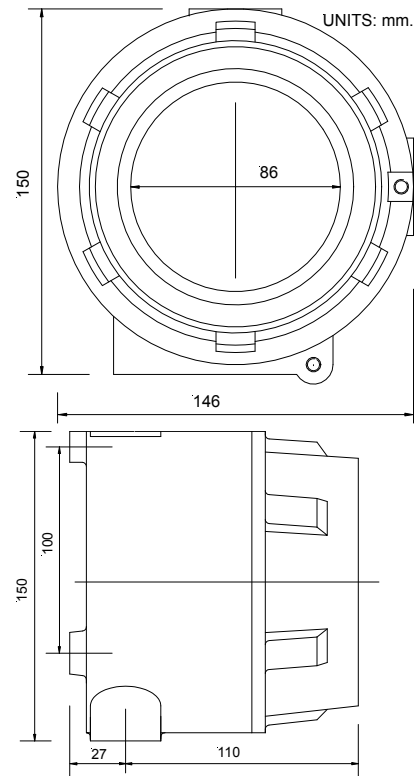


Fig. 8 Adjustable Mounting Part number: 007127

- EN54: Part 10 Fire detector and fire alarm systems; Part 10: Flame detectors – point detectors.
- Has been tested and approved at Class 1 but was not assessed for Class 3.
- Although this sensor is not affected by normal daylight conditions, sunlight should be prevented from falling directly on to the UV/IR optics.



FIXING HOLES 2 X TAPPED M6 (8 DEEP)

Fig. 9 Dimensions – UV / IR<sup>2</sup> Flame Sensor

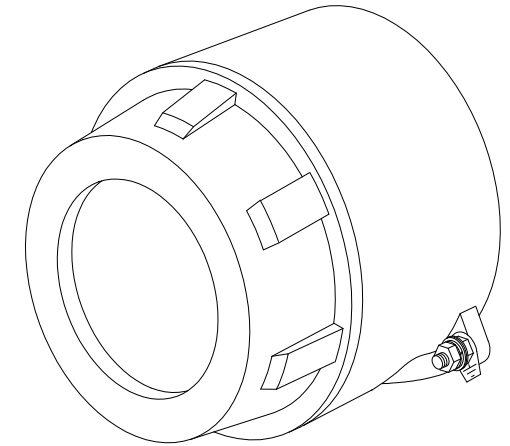
Selectable Options	DIL Switch Settings	
Relay RL2 Function:	1	2
RI2 Off	0	0
UV fire or pre-alarm	1	0
IR fire or pre-alarm	0	1
Fault (Energised if OK)	1	~ 1
Alarm Current: [RL1 Flame Relay]	3	4
3/9mA RL1 Only, 4/8/14mA RL2 & RL1	0	0
4-20mA, 4/20mA, No Relays	1	0
/ Or 8-20mA, 8/20mA, & Relays	0	1
- Proportional 8/28mA, & Relays	1	~ 1
Output Mode:	5	
Non-latching (-)	0	
Latching (/)	~1	
Response Time:	6	7
Slowest ≈ 8s	0	0
Medium ≈ 4s	1	~ 0
Fast ≈ 2s	0	1
Very Fast ≈ 1s	1	1
Sensitivity:	8	
Low	0	
High	~ 1	

Factory settings ~

## 016521 FLAMEPROOF UV/IR<sup>2</sup> FLAME SENSOR

### Features

- ATEX certified: II 2 G D
- CENELEC/IEC certified: EEx d – IIC T6  
- Zone 1, 21, 2 and 22
- Class 1 Sensitivity to EN54-10  
Detects 0.1m<sup>2</sup> fire @ 25m
- Highest Optical Interference Immunity
- 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
- LPCB & CPD Approved to EN54-10



### Operating Principles

The sensor responds to Ultra Violet (UV) and Infra Red (IR) flickering radiation emitted from flames during combustion.

The narrow spectral response (185 to 260nm) of the UV detector is completely insensitive to visible light, but quickly detects weak UV radiation emitted from flames. The UV detector also responds to high-voltage electrical discharges.

The dual IR detectors (IR<sup>2</sup>), respond to adjacent IR wavelengths (1.0 to 2.7µm), enable it to discriminate between flames and spurious IR sources. The IR detectors also respond to glowing embers but will ignore electrical discharges.

The combination of UV and IR<sup>2</sup> detection, plus signal processing allows the sensor to be used without risk of false alarms in difficult situations characterised by factors such as flickering blackbody radiation or arc welding.

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

### Electrical Connections

The sensor can be connected to a two-wire circuit supplying 14V to 30V 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 30V dc supply is applied to this input UV and IR test sources activate within the sensor and a flame detected state on the outputs. See Fig. 1

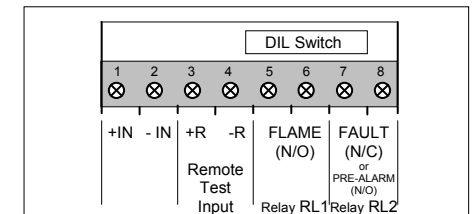
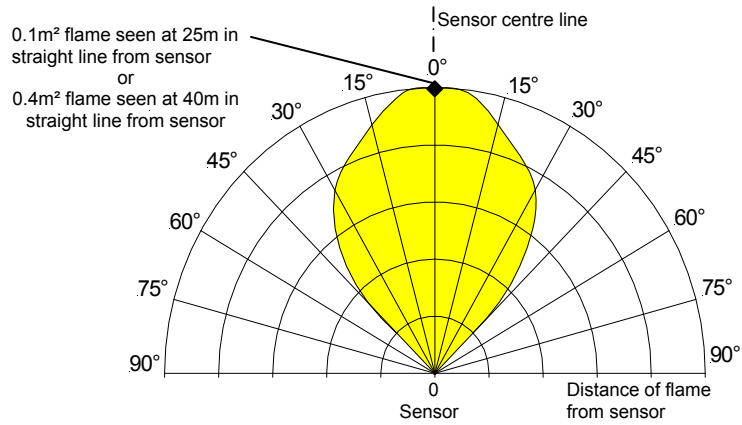


Fig. 1 Connection Terminals (Front Cover Removed)

## Flame Detection Characteristics

The sensor responds to varying sizes of flame 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 0.1m<sup>2</sup> will be detected on the sensor centre line at 25m, with the sensitivity set high for class 1 performance. See Fig. 2

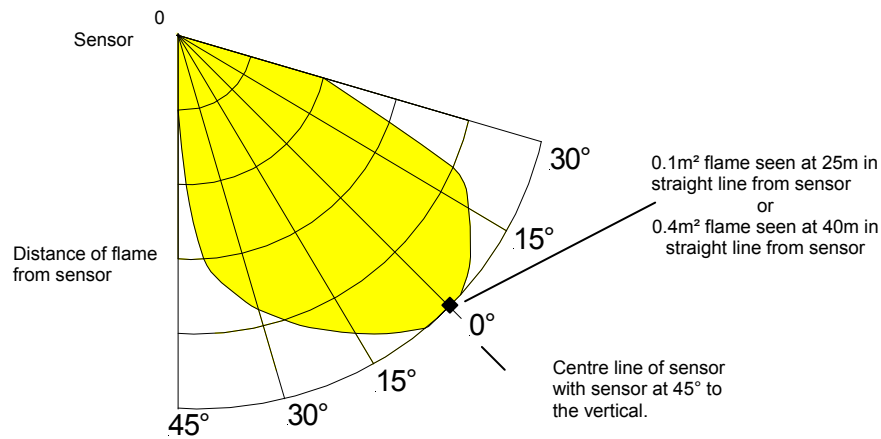
If the sensitivity switch were set to low, for class 3 performance, the same 0.1m<sup>2</sup> flame would be detected at 12m.



**Fig. 2** Sensor horizontal angle of view and range for n-heptane fire (yellow sooty flame) - UV/IR<sup>2</sup> Flame Sensor, sensitivity set high for class 1 performance

To meet the requirements of EN54:10 clause 5.1.2, all testing has been performed at the highest sensitivity (class1) setting.

The polar diagrams show that the sensor sensitivity is at its greatest along the central axis. The variation in relative range against viewing angle is show as a proportion of peak performance. The diagrams are sections through the sensors conical field of view.



**Fig. 3** Sensor vertical viewing angle and range - UV/IR<sup>2</sup> Flame Sensor, sensitivity set high for class 1 performance

To meet the requirements of EN54:10 clause 5.4, were the ratio of the response points D<sub>max</sub>:D<sub>min</sub> should not exceed 1.41. The horizontal viewing angles  $\alpha_{max}$  should not exceed  $\pm 30^\circ$  and the vertical viewing angles for  $\alpha_{max}$  should not exceed  $+20^\circ$  ( $\beta=45^\circ, 90^\circ, 135^\circ$ ) or  $-30^\circ$ .

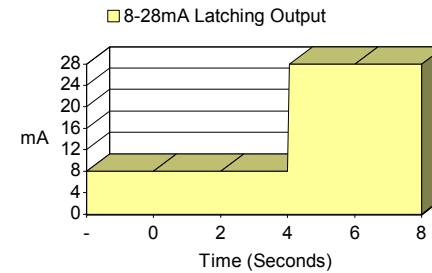
## Alarm Current Output Values (Latching)

When the sensor detects a flame the sensor supply current value (4-20mA or 8-28mA) will increase.

The sensor is shipped with the internal DIL switch (5) set to give a latching alarm current. Normally the current required by the sensor is 4mA or 8mA at 24Vdc with no flame in view. When a flame is in view, the supply current value will increase to 20mA or 28mA, the fire relay RL1 will energise and red fire LED will illuminate.

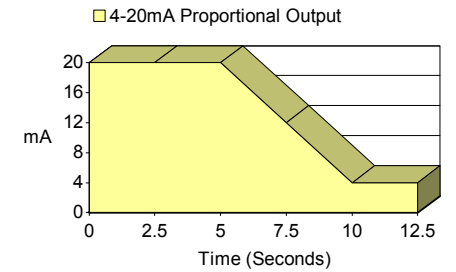
The supply to the sensor has to be broken in order to reset the sensor.

Values below 3.0mA are an indication of a fault conditions. See Fig. 4



**Fig. 4** Typical Response on seeing Flame - UV/IR<sup>2</sup> 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. 6



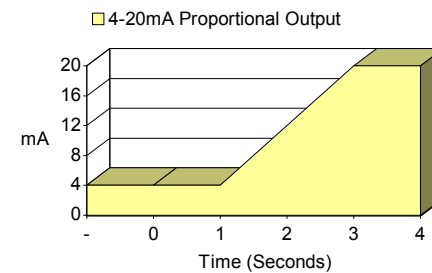
**Fig. 6** Typical Response after last Flame seen - UV/IR<sup>2</sup> Flame Sensor

## Proportional Output Values (Non-latching)

When the sensor sees any flame flicker the proportional values of (4-20mA or 8-20mA) will increase.

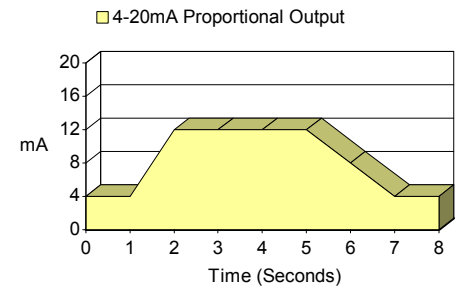
The sensor is set to give a proportional value of 4mA or 8mA with no flame in view. The value increments when flame flicker pulses are seen. With an output value approaching 20mA the fire LED will illuminate.

Values below 3.0mA are an indication of a fault conditions. See Fig. 5



**Fig. 5** Typical Response on seeing Flame - UV/IR<sup>2</sup> 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. 7



**Fig. 7** Typical Response to Burst of Flame - UV/IR<sup>2</sup> Flame Sensor