Technical Data

Supply voltage   17–28V DC
Protocol   5-9V
Quiescent current   2.8mA
Alarm current   4.2mA
Switch-on surge current9mA (peak) for 85ms
Power-up time   4 seconds
Remote output characteristics   connects to positive through 4.5KΩ
              (5mA Maximum)

Fire alarm thresholdAnalogue value 55 returned after 10Hz
 flame flicker for 1.5 seconds
Operating range25m for 0.1m² n-heptane fire
              (EN54-10, Class 1)

Operating temperature–40°C to +70°C (no condensation or icing)
Storage temperature–40°C to +70°C
Relative humidity0-95% (no condensation)
IP rating   66

Housing materialwhite polycarbonate
              V-0 rated to UL94
Dimensions100mm diameter
40mm height, 48mm in base
Weight150g detector - 210g in base

Additional Equipment

Portable flame detector test unit   Part no. 29600-226
Adjusted Mounting Bracket   Part no. 29600-458

Intelligent Base Mounted UV/IR² Flame Detector, Installation & Maintenance Guide

General

The Intelligent Base Mounted Ultraviolet and Dual Infra-red (UV/IR²) Flame Detector, part no 55000-023, is designed for use where open flaming fires may be expected. It is sensitive to ultra-violet and low frequency, flickering Infra-red radiation emitted by flames during combustion. False alarms due to such factors as lightning and flickering sunlight are minimised by combining the UV/IR² signals. This product is not compatable with the 45681-321 isolator base.

Response to flames

In quiescent condition, i.e., in the absence of a flame, the detector returns an analogue value of 25. When a flame is visible, the detector signals an alarm by increasing the analogue value returned to 55, usually within 1.5 seconds. The analogue value may continue to rise until it reaches a pre-set maximum of 64.

In the alarm state the UV/IR² Flame Detector latches for 20 seconds, with the analogue value decreasing to 25 once the flame is no longer detected.

Electrical considerations

The UV/IR² Flame Detector is loop powered and needs no external supply. It is connected to a control panel using either the XP95® or Discovery® protocol. A remote LED alarm indicator may be connected to the flame detector.

Sensor window contamination

It is important to keep the sensor window clean and checks should be carried out at regular intervals–determined locally according to the type and degree of contamination encountered–to ensure optimal performance of the flame detector.

It is recommended that the UV/IR² Flame Detector be disabled when the window is being cleaned.

Applications for UV/IR² Flame Detectors

UV/IR² Flame Detectors 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 and fast reacting.

Typical applications examples are:

- aircraft hangars
- automotive industry – spray booths, parts manufacture
- engine rooms
- factory
- garage
- hospital
- power plants
- printing
- transformer stations

Applications and locations to avoid:

- ambient temperatures above 55°C (continuous)
- sunlight falling directly onto UV/IR² optics
- exposure to rain and ice
- flood or spot lighting falling directly on UV/IR² optics
- gathering of dust or oil films on sensor window
- large amounts of flickering reflections
- obstructions to field of view

Functional testing

When polled by a compatible panel or test set, the UV/IR² Flame Detector, in quiescent condition, should return an analogue value of 25 and input bits set to '0'.

When output bit 2 is set to logic 1 on two or more consecutive pollings, the red LED on the flame detector will illuminate.

When output bit 1 is set to 1 on two or more consecutive pollings the UV/IR² Flame Detector will perform a self test. It does this by causing internal LEDs to flicker in the field of view of the flame detector, thus simulating the behavior of flames.

When output bit 0 is set to 1 on two or more consecutive pollings the UV/IR² Flame Detector will switch on a remote LED.

Finally, provided it is safe to do so, carry out a flame test using a flickering flame source, such as a portable bunsen burner. A still, non-flickering flame will not produce a response from the detector.

Maintenance Guide

The UV/IR² Flame Detector is designed to give years of trouble-free operation with minimal attention. However the periodic maintenance steps listed below are essential to maintain reliable fire protection.

1. Inform all appropriate personnel of intention to work on the flame detector.

2. Disable any automatic systems that may be activated by the flame detector if not required as part of the maintenance check.

Alarms	Extinguishers	Control
Audio/Visual	Gas systems	Plant stops
Auto diallers	Water sprays	Dampers/doors

3. Check that the flame detector's control panel is functioning correctly and shows no faults.

4. Inspect the detector viewing window for any build-up of dust or other contaminants on the optical surface. If necessary clean the optical surface with a cotton wipe wet with commercial liquid glass cleaner and wipe clean.

   The detector specification for performance is with a clean optical sensor window. Contaminants like dust, oil and paint will reduce sensitivity.

5. Ensure the detector still has a clear line of sight of the area it is protecting and no obstacles obstruct its view.

6. Check that the detector is securely fitted.

7. Visually check the exterior of the detector for any mechanical or corrosive damage.

8. Test the operation of the detector with either a portable flame sensor test unit or if practical a flickering yellow flame.

9. Reinstate any automatic system disabled during maintenance.

10. Inform all appropriate personnel on completion of the maintenance work and if necessary record this work.

Sensitivity setting

A sensitivity switch is available and is used to set the sensitivity of the UV/IR² Flame Detector to Class 1 or Class 3. For most practical purposes the switch should be set to Class 1 (default setting), the sensitivity required to detect flames as described in the section 'Quantities required and positioning of detectors'.

In exceptional cases the UV/IR² Flame Detector may be set to Class 3 operation in order to avoid nuisance alarms being caused by radiation sources that are close to the detector and can not be moved.

The rotary sensitivity switch is located on the detector rear behind the label. To set to Class 3, rotate the switch 90° clockwise. To return the sensitivity switch to the class 1 setting, rotate the switch 90° counter clockwise. Reseal label or seal hole with suitable sealant if the sensitivity has been changed.

Installation

The UV/IR² Flame Detector is mounted on any XP95 or Discovery base and would normally be wall or ceiling mounted preferably on an adjustable bracket to adjust the angle of view.

The standard base mounting is used for horizontal viewing, e.g., along corridors or along the length of industrial processes or vertical viewing inside fume cupboards or over hoppers.

Flame detectors should be fitted to solid walls or rigid constructions that do not move and are not subject to vibration.

The UV/IR² Flame Detector must be assigned an address by addressing the XPERT card in the usual way. A list of address settings is shown in Table 1.

Wiring

The flame detector has five connections: – Line 1, + Line 2, +Remote, –Remote and functional earth/screen. The connections are accessed by removing the detector from it's base. See Fig 3 for connection diagram.
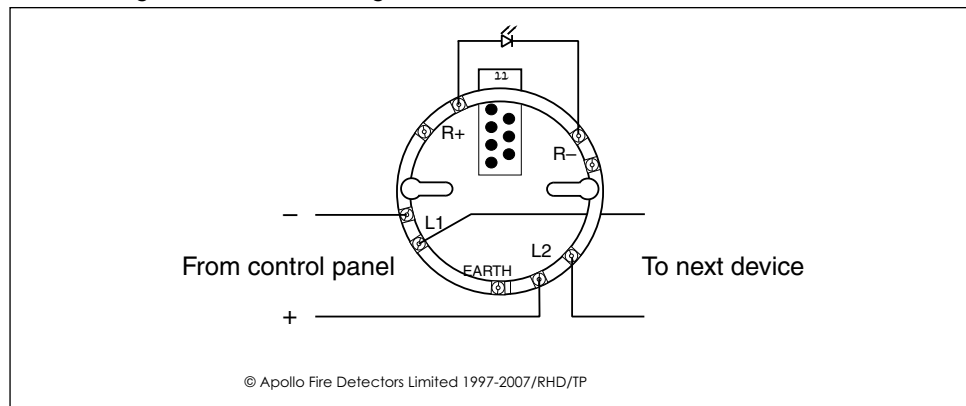

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Fig 4 *UV/IR² Flame Detector base connections*

Terminal Descriptions

1	+L2	+Line IN and OUT
2	–L1	–Line IN and OUT
3	+R	+Remote LED
4	–R	–Remote LED
5	EARTH	Functional Earth/Screen (Isolated)

Quantities required and positioning of detectors

The number of detectors required and their positioning depends on:

- the anticipated size of the flame
- the distance of the flame from the detector and
- the angle of view of the flame detector

The UV/IR² Flame Detector is designed to operate to Class 1 performance as defined in EN54: Part 10. The detector will, therefore, detect a yellow flickering flame of approximately 0.1m² or a clear flame of 0.25m² at 25m.

In fact, the flame detector will detect fires at distances of up to 40 metres, but the flame size at such distances needs to be proportionally greater in order to be sure of reliable detection. Thus the yellow flickering flame that can be detected at 25m, provided that its size is not less than 0.1m², will have to be 0.4m² in order to be detected at 40 metres. In a rectangular room the distance from the flame detector to the fire is calculated by the formula:

$$\sqrt{L^2 + W^2 + H^2}$$

In the example shown in Fig 1 the room in which the flame detector is to be installed measures 20m x 10m x 5m; the distance from the detector to the flame will therefore be:

$$\sqrt{20^2 + 10^2 + 5^2}$$

$$= 22.9m$$

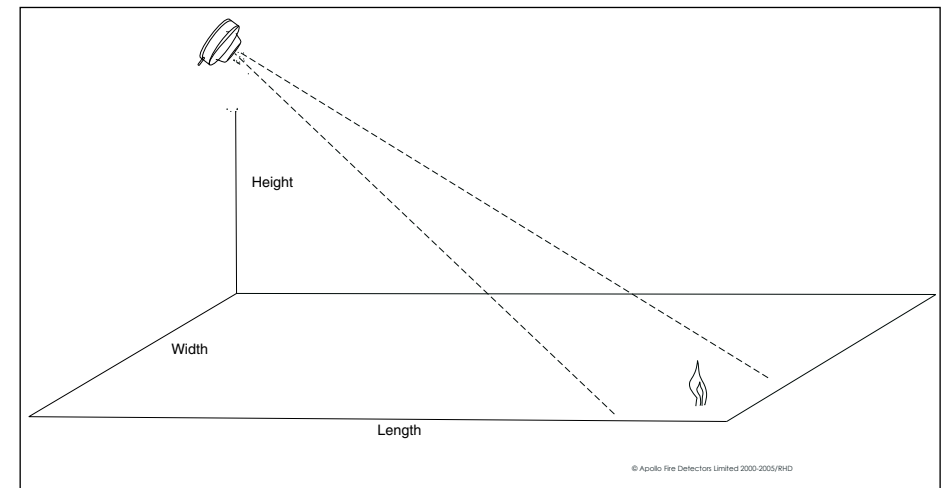© Apollo Fire Detectors Limited 2000-2005/RHD

Fig 1 *Calculation of distance from detector to flame*

The UV/IR² Flame Detector should be positioned at the perimeter of the room, pointing directly at the area of the anticipated flame or at the centre of the area to be protected. If the detector cannot 'see' the whole of the area to be protected, one or more additional detectors may be required.

The UV/IR² Flame Detector is not affected by normal light sources but should be positioned so that sunlight does not fall directly onto the viewing window.

The UV/IR² Flame Detector can also be ceiling mounted, positioned above the anticipated flame source or at the centre of the area to be protected, perpendicular to the floor below. If the detector cannot see the whole of the area to be protected, one or more additional detectors may be required. Refer to the angle of view diagram Fig. 3 to establish the detector performance. The area of detection is dependent on the detectors height above the likely source of flame. The detector has a 90° conical field of view or 45° either side of the viewing axis centre line. The maximum ceiling height is 20m.
If the detector is perpendicular to floor and at a height of 10m then the detector will view a circular floor area below with a 10m radius (20m diameter circle).
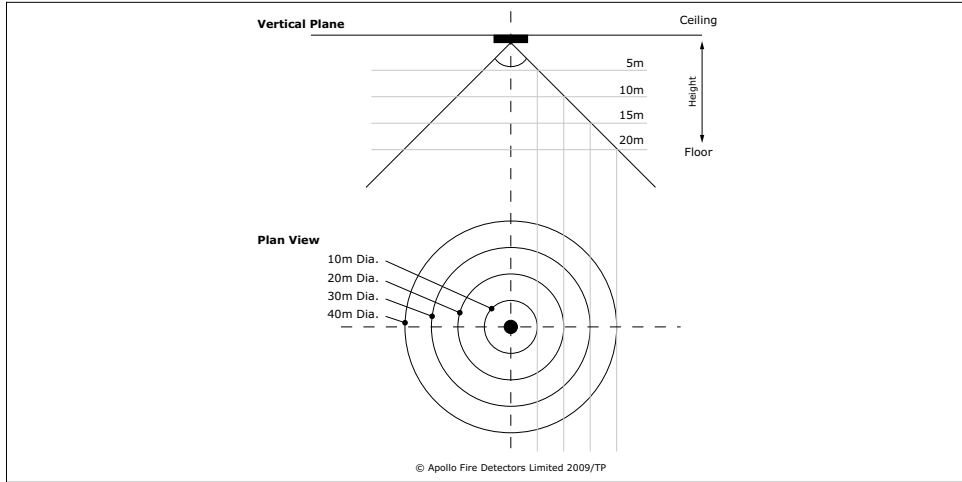
Fig 2 *Ceiling mounting example*

The flame detector has an angle of view of approximately 90°, as shown in the diagram below.
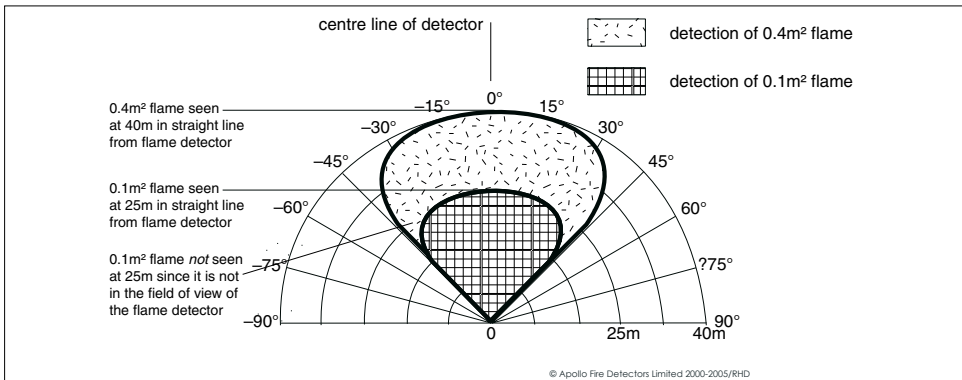
Fig 3 *Angle of view of UV/IR² Flame Detector*

To meet the requirements of EN54:10 clause 5.4, were the ratio of the response points Dmax:Dmin should not exceed 1.41. The horizontal and vertical viewing angles a_{max} should not exceed ±37.5°

Loop design
The UV/IR² Flame Detector is powered from the loop; it draws 2.8mA in quiescent state and 4.2mA in alarm. In order to determine the number of flame detectors that can be connected to a given loop, please refer to the Loop Calculation program, which can be downloaded from the Apollo website.

Address Setting
Before installing the UV/IR² Flame Detector it is necessary to set the address using the XPERT card, select the desired address and remove pips indicated in black. Remove with a small screwdriver.

A complete list of address settings is shown in the table below.

Table 2 *XPERT card address settings*