

# Flameproof – (Ex d) IR<sup>2</sup> and IR<sup>3</sup> Flame Detector Installation Guide

## General

This Installation Guide gives information on the Flameproof (Exd) version of the flame detectors that have been approved by Baseefa. The requirements of the European Community Directive 94/9/EC, the ATmosphere EXplosives ATEX Directive have been met. The approval has been accessed to the following European Standards EN60079-0, EN 60079-1 and EN 60079-26.

Also the flame detector has been accessed and approved to IECEx requirements.

The detector enclosures are certified category  II 2 G D, Ex d IIC T4 Gb

Ex tb IIIC T135°C Db IP66 A21

Tamb = -40°C to +125°C

The range comprises dual infra-red (IR<sup>2</sup>), triple infra-red (IR<sup>3</sup>) and UV/IR<sup>2</sup> flame detectors. The detector housings are available in copper free aluminium alloy (LM25) and stainless steel (316).

The guide also provides information on Flameproof (type'd') enclosures, the application, maintenance, installation and adjustments of the detectors. Reference to other individual detector publications can be made for more information on none Flameproof issues. These publications are available on request.

*Information in this guide is given in good faith, but the manufacturer cannot be held responsible for any omissions or errors. The company reserves the right to change the specifications of products at any time and without prior notice.*

## Introduction to Flameproof Enclosures

There are many places where an explosive mixture of air and gas or vapour is or may be present, intermittently or as a result of an accident. These are defined as hazardous areas by EN 60079-0 (formally EN 50014), Electrical apparatus for explosive gas atmospheres – General requirements.

Hazardous areas are common in petroleum and chemical engineering plants and in factories processing and storing gases, solvents, paints and other volatile substances.

Electrical equipment for use in these areas needs to be designed so that it cannot ignite an explosive mixture, not only in normal operation but also in fault conditions. There are a number of methods available to achieve this – oil immersion, pressurised apparatus and powder filling, for example, but the two most common used are intrinsic safety and flameproof enclosures.

Flameproof equipment is contained in a box so strong that an internal explosion will neither damage the box nor be transmitted outside the box. The surface must remain cool enough not to ignite the explosive mixture.

When flameproof equipment is interconnected, flameproof wiring must be used. This method is most valuable when high power levels are unavoidable but it is not acceptable for areas in which an explosive gas/air mixture may be continuously present or present for long periods.

For this reason these flame detectors are made intrinsically safe rather than flameproof. Intrinsically safe equipment operates at such low power and with such small amounts of stored energy that it is incapable of causing ignition:

- In normal conditions
- With a single fault (for **ib** type of protection code)
- With any combination of two faults (for **ia** type of protection code)

In any of these conditions every component must remain cool enough not to ignite gases for which it is approved. See Table 4

## Classification of Hazardous Areas

EN 60079-0 (formally EN50014) states that electrical apparatus for potentially explosive atmospheres is divided into:

- Gas Group I: Electrical apparatus for mines susceptible to fire damp;
- Gas Group II: Electrical apparatus for places with a potentially explosive atmosphere, other than mines susceptible to fire damp.

These flame detectors are designed to meet the requirements of Group II apparatus. For the type of protection “d” Flameproof, Group II is subdivided into Equipment Categories, Type of Explosive Atmosphere (Table 1), Type of Protection Code (Table 2), Temperature Class (Table 3) and Gas Group (Table 4).

## EC Declaration of Conformity

to

### Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

EC-Type Examination Certificate Job Number: **6553**

Equipment or Protective System: **Type 016xxx Series Flame Sensor**

Manufacturer: **Talentum Developments Ltd.  
Beal Lane, Shaw,  
Oldham,  
Lancs.  
OL2 8PF, UK**

This equipment or protective system and any acceptable variation thereto is specified in the schedule of documents to this certificate.

The Baseefa Ltd., Rockhead Business Park, Staden Lane, Buxton UK, notified body number 1180 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, have certified for Talentum Developments Ltd. that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protection systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

Baseefa, EC-Type Examination Certificate Number: **Baseefa08ATEX0270**


Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 60079-0: 2007**

**EN 60079-1: 2007**

**EN 61241-1: 2004**

The markings of the equipment or protective system shall include the following:-

 **II 2 GD Ex d IIC T4 Gb  
Ex tb IIIC T135°C Db IP66 A21  
(Tamb -40°C to +125°C)**

Authorised Representative: \_\_\_\_\_

*J.A. Broadbent*  
J.A. BROADBENT MIET  
Director

Date of Issue:

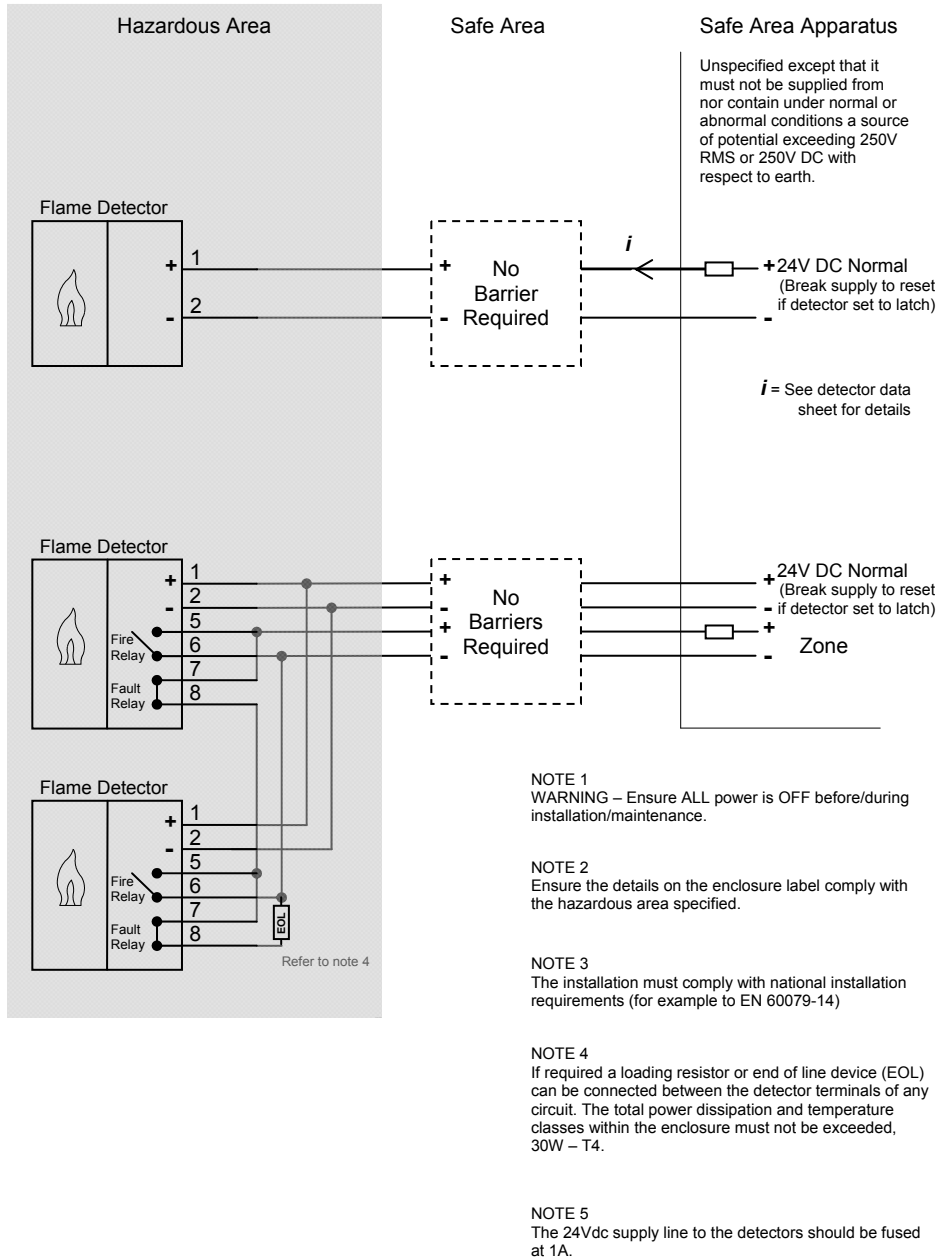
13<sup>th</sup> January 2009

Talentum File Reference:

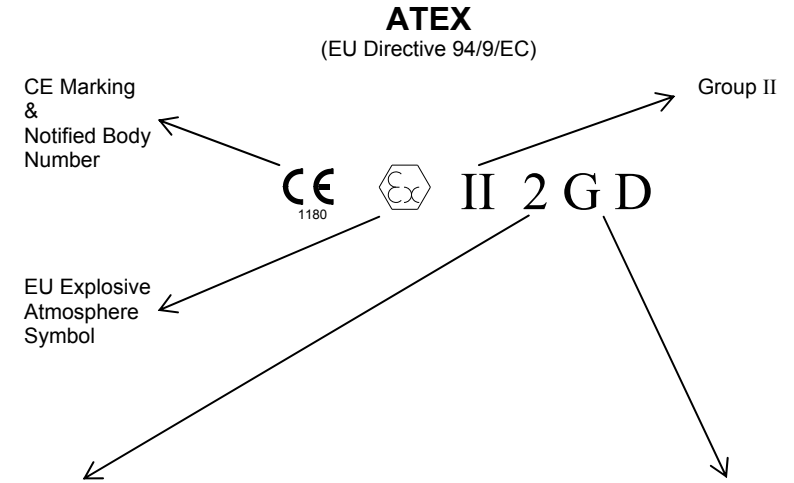
WORDAPPROVALS\Baseefa\Exd\IEC Dec.DOC

TALENTUM

# Exd System Drawing



# Equipment Markings



| Equipment Category | Definition – ATEX Equipment Group II  | Zone    |          |
|--------------------|---|---------|----------|
|                    |   | G - gas | D - dust |
| 1                  | - very high level of protection<br>in which explosive atmosphere mixtures of air gases, vapours or mist are present continuously, for long periods                                    | 0       | 20       |
| 2                  | - high level of protection<br>in which explosive atmosphere mixture of air and gases, vapours or mist are likely to occur   | 1       | 21       |
| 3                  | - normal level of protection<br>in which explosive atmosphere mixtures of air and gases, vapours or mist are unlikely to occur and if it occurs it will exist only for a short period | 2       | 22       |

These Flame Detectors are suitable for equipment categories 2 and 3, G or D.  
Note: The detectors are not certified for category 1 areas, see 'IS' products.

Table 1 Equipment Categories and Type of Explosive Atmosphere (Group II)

## CENELEC / IEC

Explosion Protection symbol

**Ex d IIC T4 Gb**

Equipment Protection Level Gas (EPL) [See EN60079-26]

| Code                                    | Type of Protection Code | Equipment Category |
|---|-------------------------|--------------------|
| ia                                      | Intrinsic safety        | 1                  |
| ib                                      | Intrinsic safety        | 2                  |
| d                                       | Flameproof              | 2                  |
| These Flame Detectors are approved 'd'. |                         |                    |

Table 2 Type of Protection Codes

| Temperature Class<br>Referred to ambient of -20°C to +40°C | Maximum Surface Temperature |
|--|-----------------------------|
| T6   | 85°C                        |
| T5   | 100°C                       |
| T4   | 135°C                       |
| T3   | 200°C                       |
| T2   | 300°C                       |
| T1   | 450°C                       |
| Detectors approved to T4.                                  |                             |

Table 3 Temperature Classification

| Gas Group  | Representative Gas | Other Gases, Liquids, Vapours                 |
|--|--------------------|---|
| IIC  | Hydrogen           | Acetylene, Carbon Disulphide                  |
| IIB  | Ethylene           | Diethyl ether, Tetrafluoroethylene            |
| IIA  | Methane            | Butane, Methanol, Petroleum, Propane, Styrene |
| These Flame Detectors are approved IIC for listed gases in EN 60079-0. |                    |   |

Table 4 Subdivisions of Group II Gases

**Ex tb IIIC T135°C Db**

Dust Protection Concept [See EN61241-1]

| Dust Group |                     |
|------------|---------------------|
| IIIC       | Conductive Dust     |
| IIIB       | Non-conductive Dust |
| IIIA       | Combustible Flyings |

Maximum External Surface Temperature

Equipment Protection Level Dust (EPL) [See EN60079-26]

## Health and Safety at Work Act

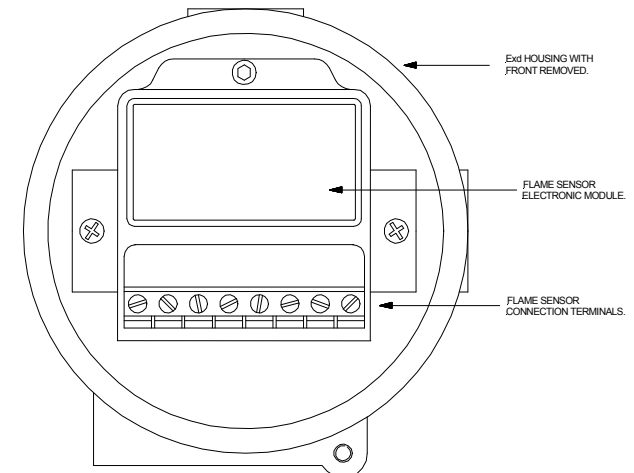
In the UK all equipment must be installed and disposed of (as required) within the legislative requirements of the Health & Safety at Work Act 1974.

## Installation

No modification should be made to the enclosure without reference to the manufacturer as unauthorised modification to an approved enclosure will invalidate the certificate/approval.

1. The enclosures are supplied with drilled and tapped entries. See enclosure drawing
2. The surface of the machined/threaded flamepaths between cover and body must be protected from scratches or damage during installation. Any such damage can destroy the validity of the enclosure.
3. Before the cover is refitted, the flamepath/threaded joint between cover and body must be thoroughly wiped clean of dirt, grit or other foreign substances, and then a thin coating of an approved form of non-setting grease applied to joint/threads. Ensure the gasket o-ring is free from damage.
4. Threaded covers must be screwed on to a minimum of 5 full threads of engagement and then locked in position with the locking screw provided.
5. All tapped entries must be fitted with an approved flameproof (Exd) device which is equivalent or superior to the gas group and temperature of the enclosure.
6. The enclosure should be mounted using the two rear M6 tapped holes.
7. Do not scratch the glass.
8. Glanding of cables should be as in Selection of Cable Gland section.

## Enclosure with Front Cover Removed



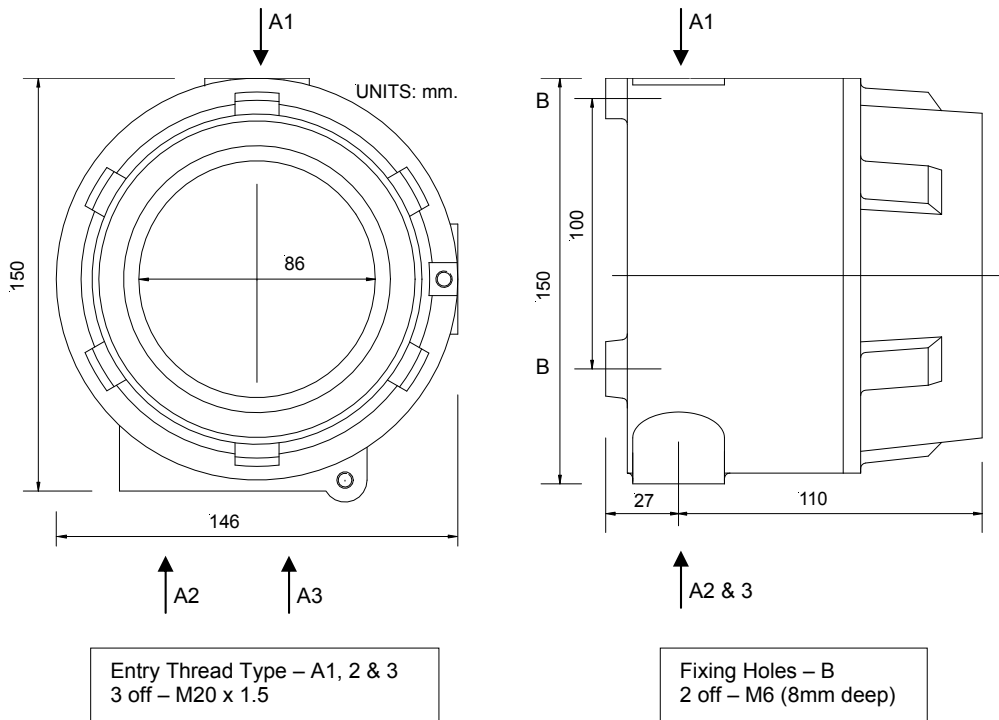
## Selection of Cable Glands

Application of barrier glands certified and approved to meet EN 60079-14 for Thermo Plastic, Thermosetting and Elastomeric Cables. The external cables and glands used for high temperature application must be compatible with the temperature.

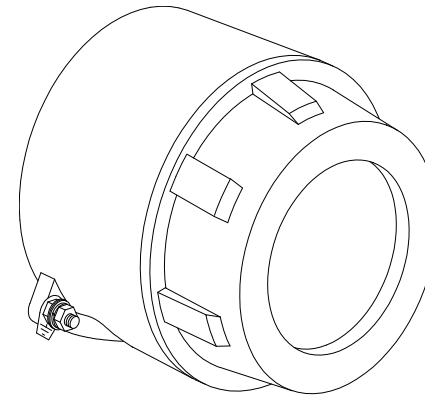
|    | Hazardous Area Type  | Gland Method                 |
|----|--|------------------------------|
| 1) | Zone 1, 2 21 & 22 Hazardous areas requiring IIC apparatus  | Exd Barrier Glands mandatory |
| 2) | Zone 2 & 22 Hazardous areas requiring IIA & IIB apparatus. | Any Exd Gland permitted      |

Table 5 Examples of barrier glands

## Enclosure Details



## Flameproof Products



Flameproof Flame Detector  
(Alloy Housing)  
**Fig. 1**

The flame detectors respond to light emitted from flames during combustion.

The detectors discriminate between flames and other light sources by responding only to low frequency flickering produced by flames (typically 1 to 15Hz). The detectors ignore fixed light sources and rapidly flickering illumination predominantly produced by lighting.

The flame flicker techniques have the advantage of still allowing the detection of flames through a thin layer of oil, water vapour, ice or dust. This makes these detectors particularly useful in industrial applications.

Full details of the principles of operation, electrical description, and other detailed technical data are published in the products individual data sheet.

## Technical Data

### Mechanical

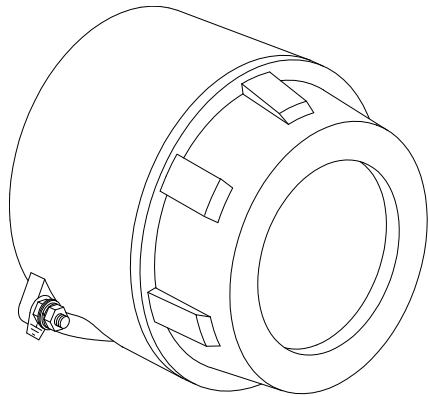
|   |  |               |
|---|--|---------------|
| Housing Material:<br>See figure 1       | Copper<br>Aluminium<br>LM25                      | Free<br>Alloy |
| Housing Colour:                         | Red  |               |
| Housing Dimension:<br>(Excluding Mount) | Height = 150mm<br>Width = 146mm<br>Depth = 137mm |               |
| Cable Gland Entries:                    | 3 X 20mm   |               |

### Electrical

|   |   |
|---|---|
| Supply In:<br>Voltage<br>Current<br>Polarity sensitive                            | Terminals 1(+) & 2(-)<br>14 to 30Vdc<br>2 to 28mA See data sheet for detail |
| Optional Input:<br>Voltage<br>Current<br>Polarity sensitive                       | Terminals 3(+) & 4(-)<br>14 to 30Vdc<br>40µA typ. @ 24V IN                  |
| Power Up Time:  | 2 seconds   |
| Relays<br>Contact Ratings:<br>Voltage<br>Current<br>Power<br>Resistive Loads Only | Terminals 5 to 8<br>30Vdc. Max.<br>1 Amp. Max.<br>30W Max.                  |

### Environmental

|   |  |
|---|--|
| ATEX<br>Approval Category   | Ex II 2 GD   |
| CENELEC / IEC<br>Marking  | Ex d IIC T4 Gb<br>Ex tb IIIC T135°C Db<br>(Zone 1, 21, 2 & 22) |
| Ambient Temperature<br>Range:<br>Also<br>check detector data sheet. | Tamb -40°C to +125°C   |
| Apparatus<br>Certificate<br>Numbers                                 | Baseefa08ATEX0270<br>IECEX BAS08.0073                          |
| IP Rating   | IP66   |



Flameproof Flame Detector  
(Stainless Steel Housing)  
**Fig. 2**

## Technical Data


### Mechanical

|  |  |
|--|--|
| Housing Material:<br>See figure 2        | 316 Stainless Steel                              |
| Housing Colour:                          | Natural  |
| Housing Dimension:<br>(Excluding Mounts) | Height = 150mm<br>Width = 146mm<br>Depth = 137mm |
| Cable Gland Entries:                     | 3 X 20mm - typical                               |

### Electrical

|  |   |
|--|---|
| Supply In:<br>Voltage<br>Current<br>Polarity sensitive                         | Terminals 1(+) & 2(-)<br>14 to 30Vdc<br>2 to 28mA See data sheet for detail |
| Optional Input:<br>Voltage<br>Current<br>Polarity sensitive                    | Terminals 3(+) & 4(-)<br>14 to 30Vdc<br>40µA typ. @ 24V IN                  |
| Power Up Time:   | 2 seconds   |
| Relays Contact Ratings:<br>Voltage<br>Current<br>Power<br>Resistive Loads Only | Terminals 5 to 8<br>30Vdc. Max.<br>1 Amp. Max.<br>30W Max.                  |

### Environmental

|  |  |
|--|--|
| <b>ATEX</b><br>Approval Category   |  II 2 GD |
| <b>CENELEC / IEC</b><br>Marking  | Ex d IIC T4 Gb<br>Ex tb IIIC T135°C Db<br>(Zone 1, 21, 2 & 22)                             |
| Ambient Temperature Range:<br><small>Also check detector data sheet.</small> | Tamb -40°C to +125°C   |
| Apparatus Certificate Numbers  | Baseefa08ATEX0270<br>IECEX BAS08.0073  |
| IP Rating  | IP66   |

## System Design

Engineers familiar with codes of practice for hazardous area systems should only undertake the design of a flameproof fire detection system. In Europe the standard is EN 60079-0 (formally EN 50014), Electrical apparatus for potentially explosive atmospheres – General requirements.

The fire detector performance is the same as the standard none flameproof counterparts. Performance information given in standard product guides is therefore applicable to the flameproof range.

The Baseefa certification of the flameproof device enclosure covers their characteristics as components of a flameproof system. This indicates that the flame detectors can be used with a margin of safety in such systems.

## Service & Repairs

1. Frequent inspection should be made. A schedule for the maintenance check should be determined by the environment and frequency of use but should be regular enough to ensure the detector continues to operate in the designed manner. It is recommended that it should be at least once a year.
2. External surfaces of the enclosure should be periodically cleaned to ensure dust deposits are not allowed to accumulate.
3. Check flamepath/threads on enclosure body and lid for signs of corrosion. If badly pitted, replace component.
4. All components that are replaced must be in accordance with the manufactures specification. Failure to use such components may invalidate the certification/approval on the enclosure and may make the enclosure dangerous.
5. After inspection and maintenance have been carried out, items 3 & 4 of the installation instructions should be adhered to when resealing the enclosure.

Servicing of the fire protection system should be carried out as recommended by the local regulation in force.