# IFD-E(Exd)

# Explosion-Proof Flame Detector

# User Manual

# General

## Description

This Installation Guide gives information on the Flameproof (EExd) version of the flame detectors that have been approved by ISSeP (Institut Scientifique de Service Public; notified body number:492). The requirements of the European Community Directive 94/9/EC, the ATmosphere EXplosives ATEX Directive have been met. The approval has been assessed by reference to the following standards, EN50014:1997+A1 and A2:1999, EN 50018:2000 and pr AA EN 50018 plus a review against EN60079-1:2004 which showed that there were no changes which materially affected the “state of technological progress” with respect to the product. EN50281-1-1:1998.

The detector enclosure is certified  II 1 G EEx ia IIC T4 and can be used with all listed gases.

The detector is triple infra-red ($IR^3$) and the housing is copper-free aluminium alloy (LM25).

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 available for more information on none Flameproof issues. These publications are available on request.

NOTE: 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

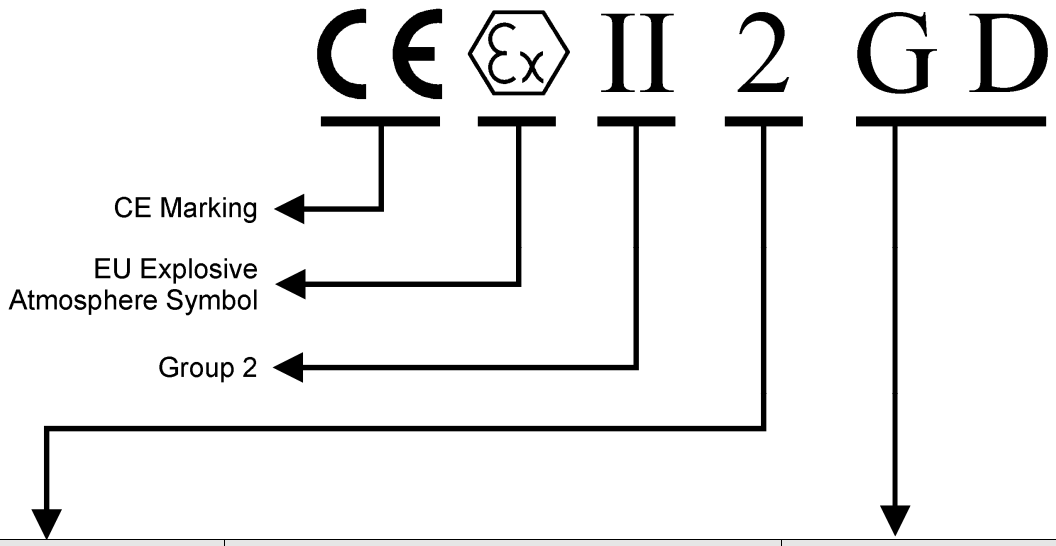
EN 60079-0 (formally EN50014) states that electrical apparatus for potentially explosive atmospheres is divided into:

- Group I: Electrical apparatus for mines susceptible to fire damp;
- 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).

# Equipment Markings

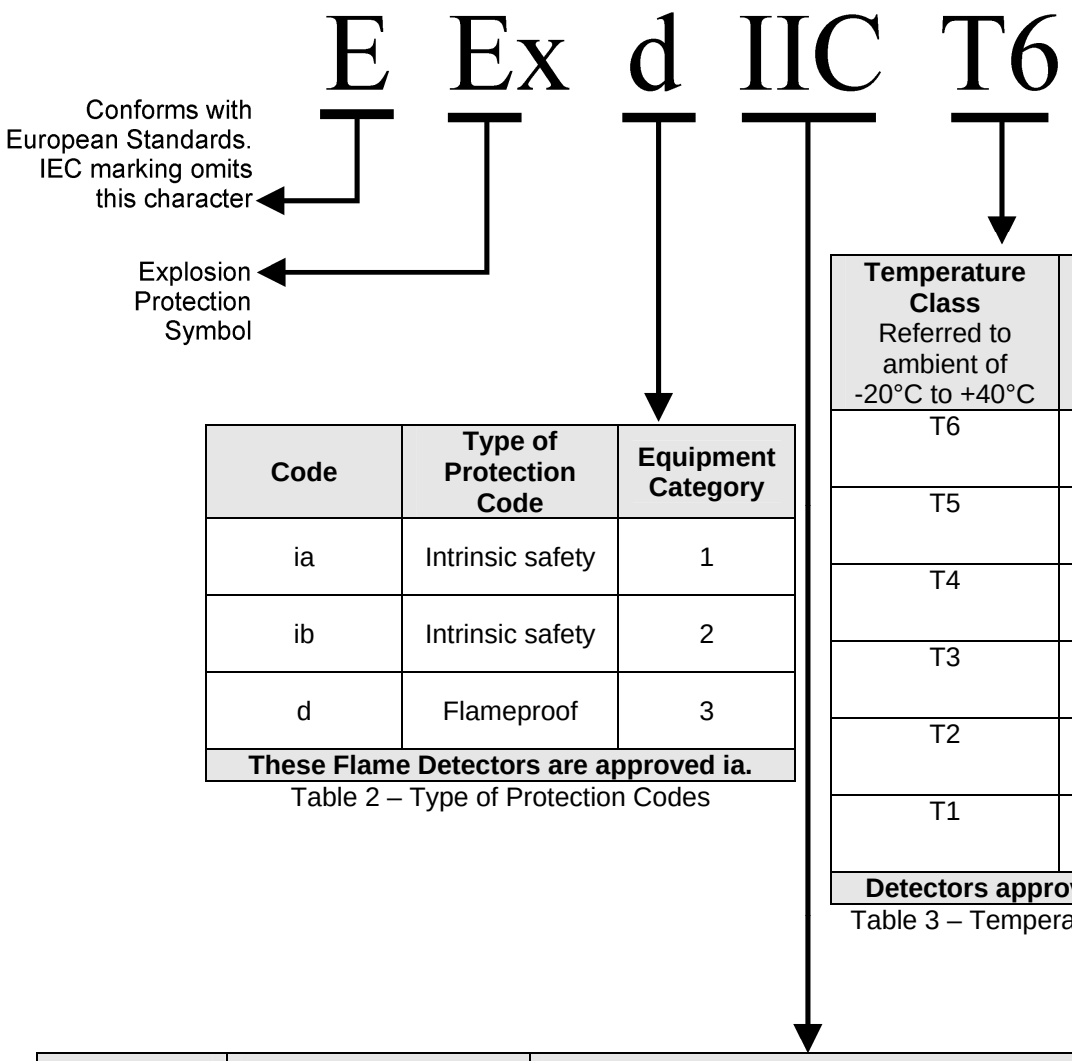
## ATEX
(EU Directive 94/9/EC)




| Equipment Category | Definition | Type of Explosive Atmosphere Group II<br>G - gas vapour mist<br>D - dust<br>Zone |
|---|---|---|
| 1 | - very high level of protection<br><br>in which explosive atmosphere mixtures of air gases, vapours or mist are present continuously, for long periods | 0 |
| 2 | - high level of protection<br><br>in which explosive atmosphere mixture of air and gases, vapours or mist are likely to occur | 1 |
| 3 | - normal level of protection<br><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 |
| These Flame Detectors are suitable for equipment categories 2 and 3, G or D.<br>Note: The detectors are not certified for category 1 areas, see 'IS' products. | | |

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

# CENELEC / IEC




| Code | Type of Protection Code | Equipment Category |
|---|---|---|
| ia | Intrinsic safety | 1 |
| ib | Intrinsic safety | 2 |
| d | Flameproof | 3 |
| **These Flame Detectors are approved ia.** | | |

Table 2 – Type of Protection Codes

| **Temperature Class** 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 at 40°C** | |

Table 3 – Temperature Classifications

| Gas Group | Representative Gas | Other Gases, Liquids & Vapours |
|---|---|---|
| IIC | Hydrogen | Acetylene, Carbon Disulphide |
| IIB | Ethylene | Diethyl ether, Tetrafluroethylene |
| IIA | Methane | Butane, Methanol, Petroleum, Propane, Styrene |
| **These Flame Detectors are approved IIC for listed gases in EN 50014.** | | |

Table 4 – Subdivisions of Group II Gases

# Flameproof Safe Products

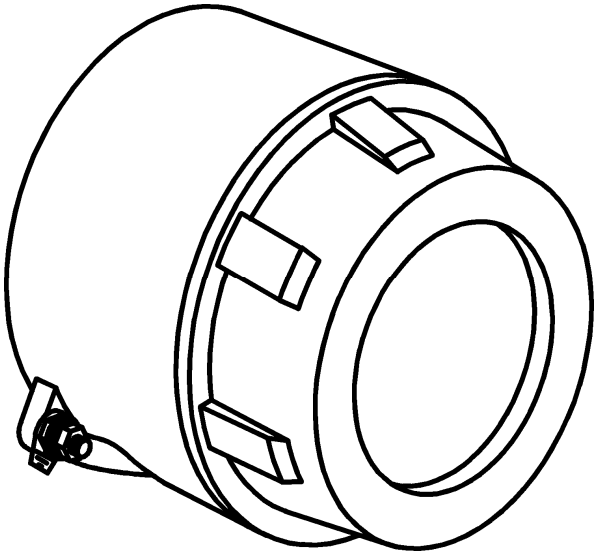


Fig. 1

Flameproof Flame Detector
(Alloy Housing)

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: See Fig 1 | Copper Free Aluminium Alloy LM25 |
| Housing Colour: | Red |
| Housing Dimension: (Excluding Mount) | Height = 150mm<br>Width = 146mm<br>Depth = 137mm |
| Weight | 2.5kg |
| 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 datasheet 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 | Terminals 5 to 8<br><br>50Vdc max<br>1A max<br>30W max |

| Environmental | |
|---|---|
| Operating Ambient Temperature: | -10°C to +40°C(T4)<br>-10°C to +55°C(Sensor limit) |
| ATEX Approval Category | Ⓔx II 2 G D |
| CENELEC / IEC Marking | EEx d IIC T6 (85°C)<br>- Zone 1, 21, 2 and 22 |
| Apparatus Certificate Number | ISSeP 03ATEX012 |
| IP Rating | IP66 |

## System Design

Engineers familiar with codes of practice for hazardous area systems should only undertake the design of an 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 ISSeP 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

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.

1. External surfaces of the enclosure should be periodically cleaned to ensure dust deposits are not allowed to accumulate.
2. Check flamepath/threads on enclosure body and lid for signs of corrosion. If badly pitted, replace component.
3. All components that are replaced must be in accordance with the manufactures specification. Failure to use such components may invalidate the certication/approval on the enclosure and may make the enclosure dangerous.
4. After inspection and maintenance have been carried out, items 3 & 4 of the installation instructions should be adhered to when resealing the enclosure.
5. Servicing of the fire protection system should be carried out as recommended by the local regulation in force.

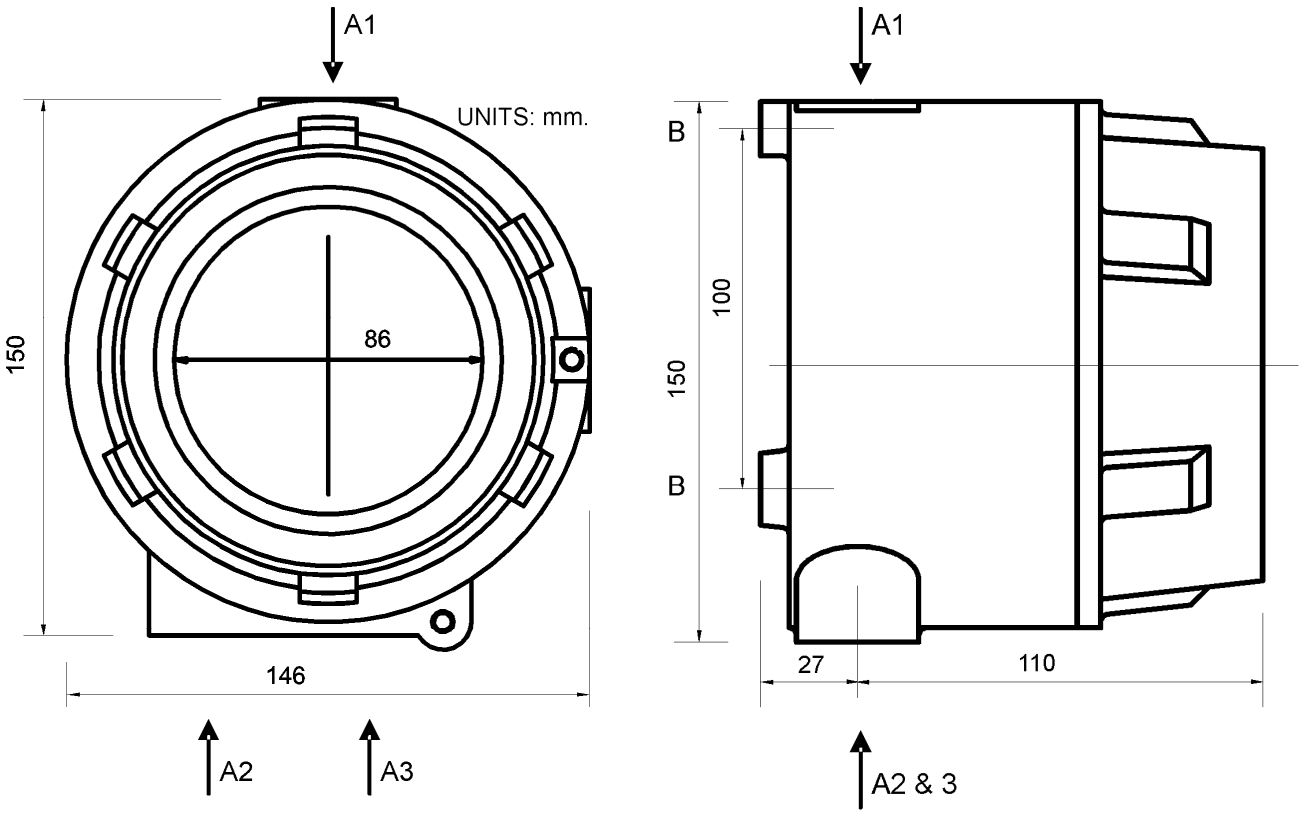
## Selection of Cable Glands

Application of barrier glands certified and approved to meet EN 60079-14 for Thermo Plastic, Thermosetting and Elastomeric Cables.

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

Table 5 Examples of barrier glands

## Enclosure Details




Entry Thread Type – A1, 2 & 3
3 off – M20 x 1.5

Fixing Holes – B
2 off – M6 (8mm deep)

## Health and Safety at Work Act

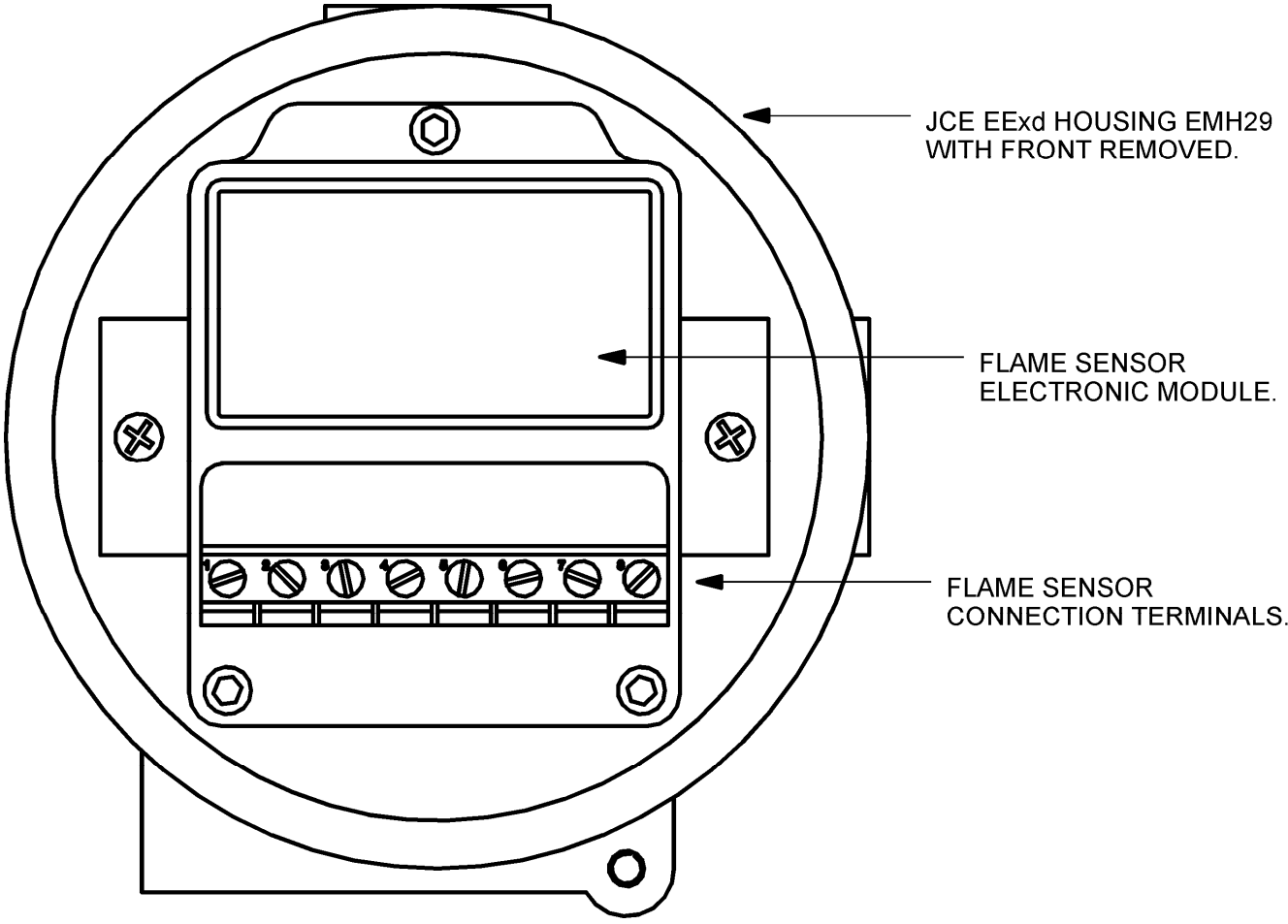
In the UK all equipment must be installed and disposed of (as required) within the legislative requirements of the Health & Safety at Work Act 1974.

## Installation

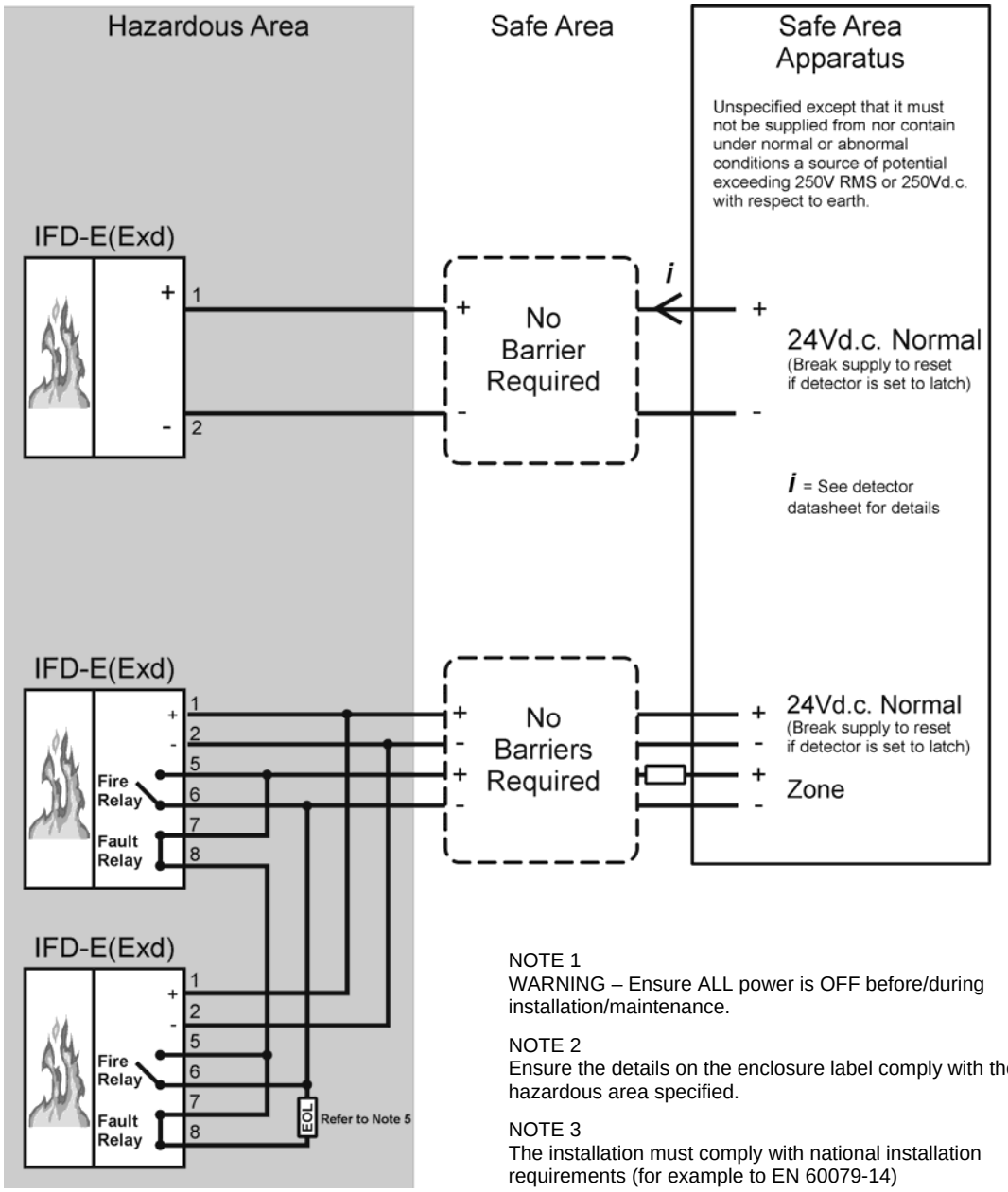
No modification should be made to the enclosure without reference to the manufacturer as unauthorised modification to an approved enclosure will invalidate the certificate/approval

1. The enclosures are supplied with drilled and tapped entries. See enclosure drawing
2. The surface of the machined/threaded flame paths 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 flame path/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 poison with the locking screw provided.
5. All tapped entries must be fitted with an approved flameproof (EExd) device which is equivalent or superior to the gas group 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



# EExd System Drawing




NOTE 1
WARNING – Ensure ALL power is OFF before/during installation/maintenance.

NOTE 2
Ensure the details on the enclosure label comply with the hazardous area specified.

NOTE 3
The installation must comply with national installation requirements (for example to EN 60079-14)

NOTE 4
If required a loading resistor or end of line device (EOL) can be connected between the detector terminals of any circuit. The total power dissipation and temperature classes within the enclosure must not be exceeded, 30W – T6.

NOTE 5
If required a loading resistor of not less than 3k 0.5 watt and having a surface area between 20cm² and 10cm² may be connected between the terminals of any circuit, but not between circuits.

# Hochiki CHQ Module Connection Information

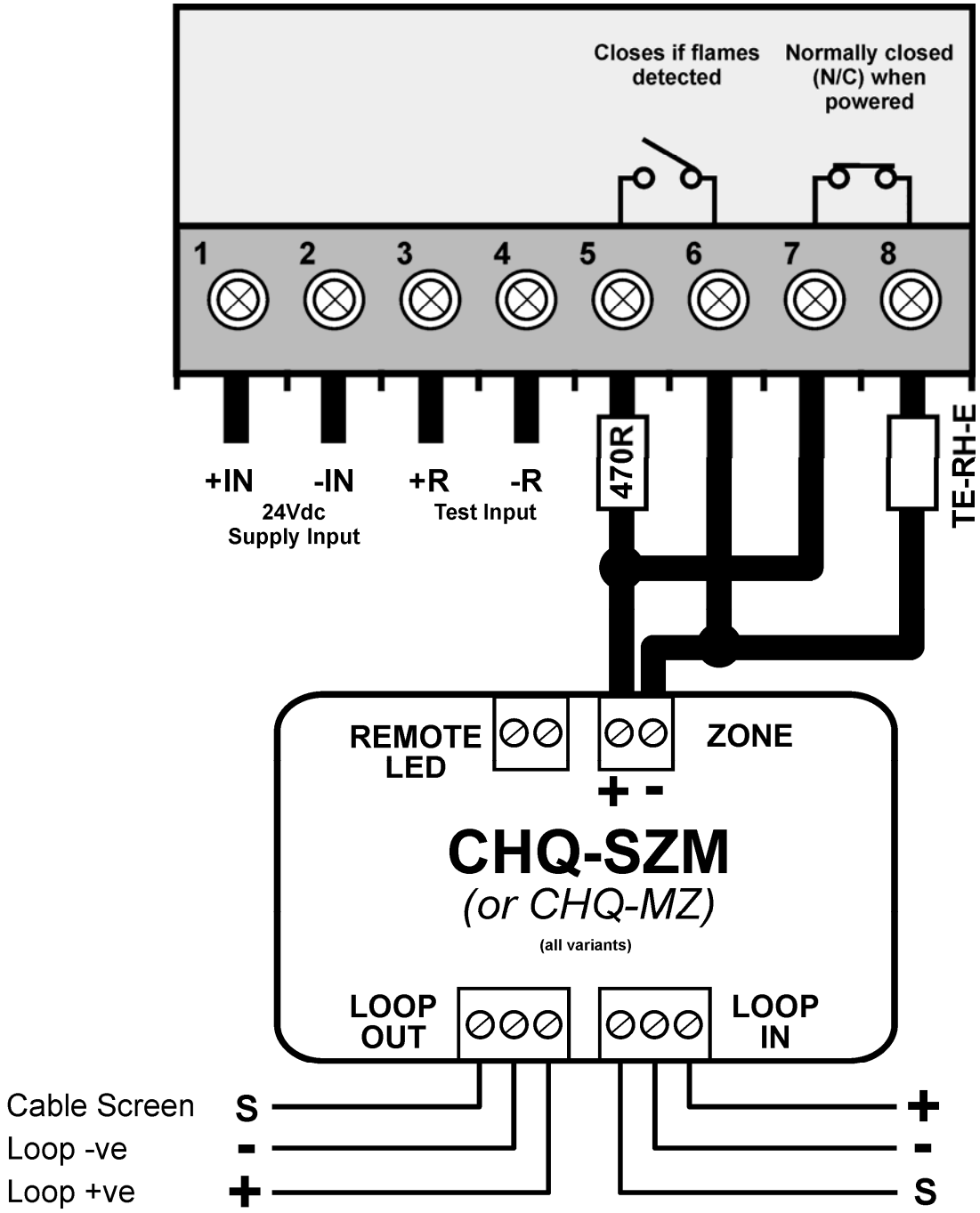



**Fig 10** Connection Diagram using a CHQ-SZM Single Zone Monitor (or CHQ-MZ)

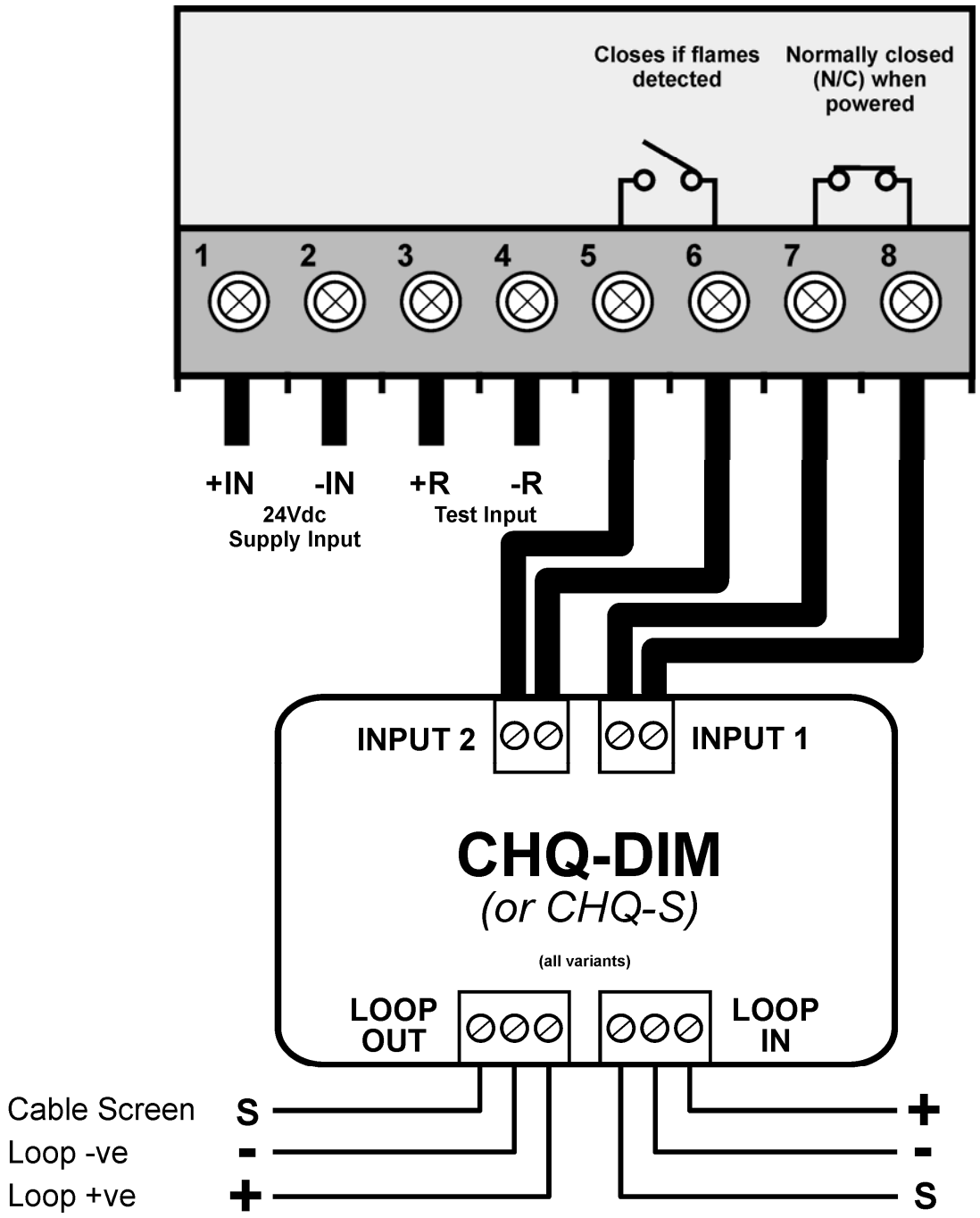



**Fig 11** Connection Diagram using a CHQ-DIM Dual Input Module (or CHQ-S)

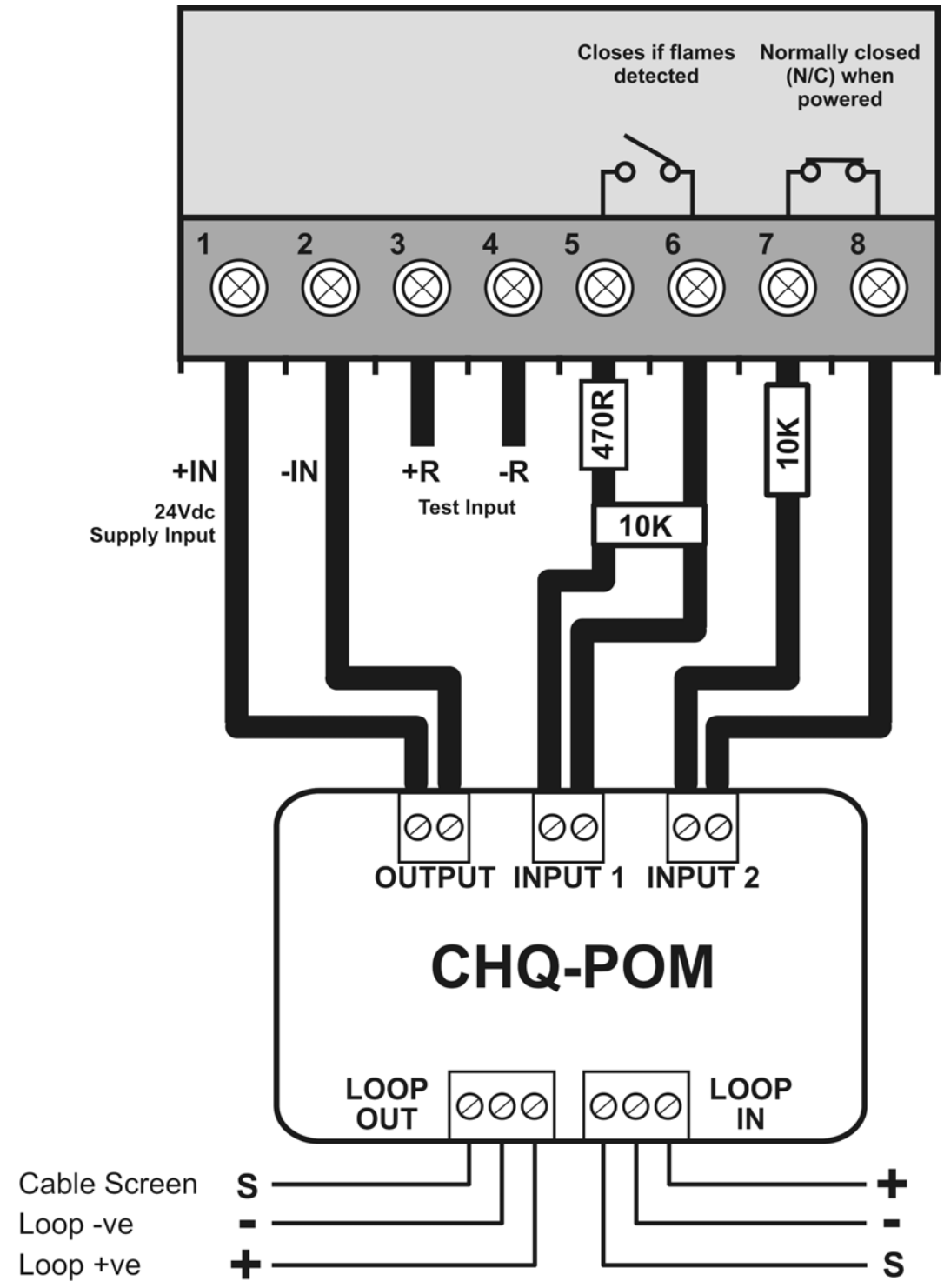



**Fig 12** Connection Diagram using a CHQ-POM Powered Output Module

NOTE: The CHQ-POM has a variable output, this should be set at **30mA**.

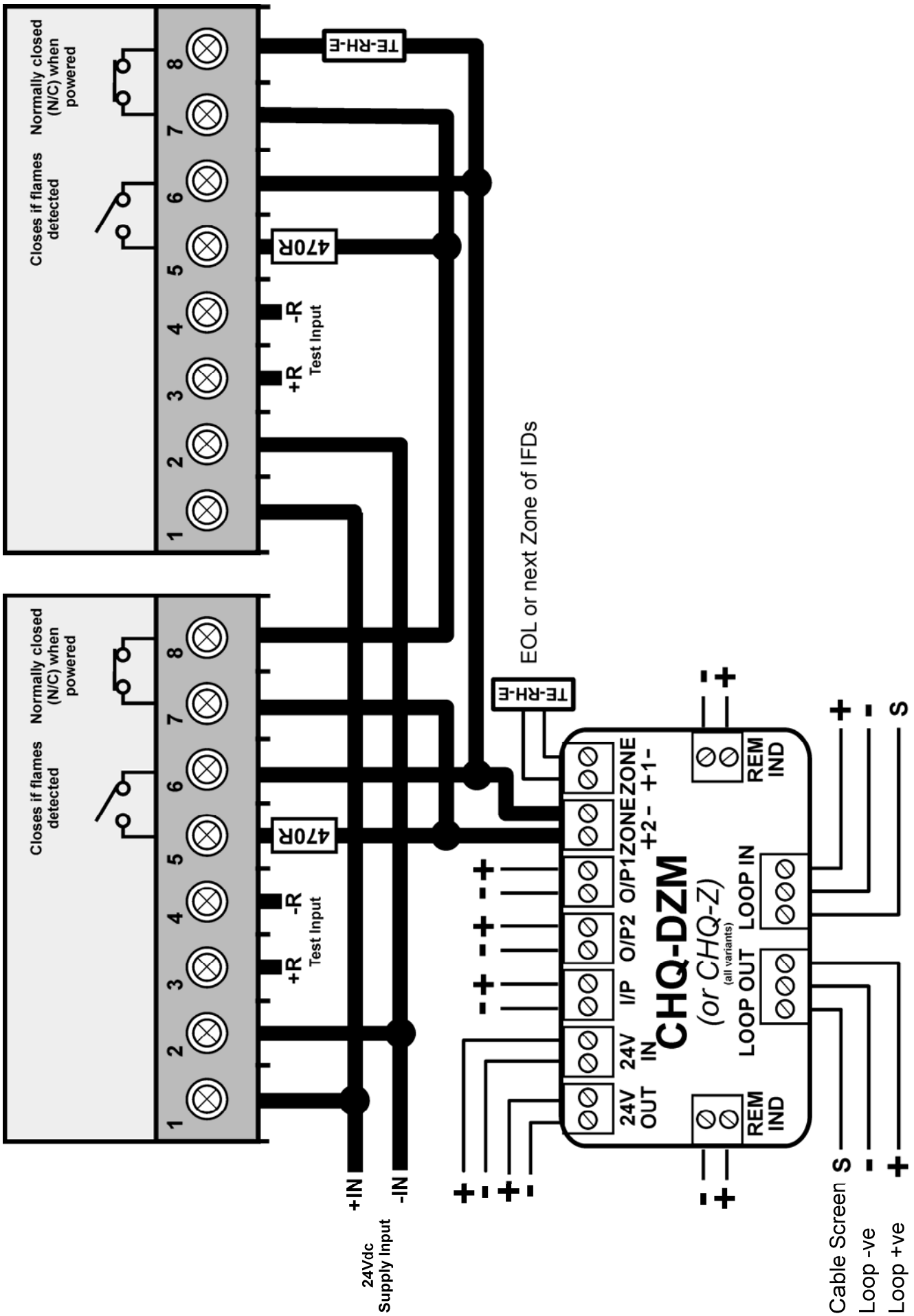



**Fig 13** Connection Diagram using a CHQ-DZM Dual Zone Monitor (or CHQ-Z)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