FRAY5000-EN Linear Smoke Detector

The FRAY5000-EN Linear Smoke Detector covers distances between 8 m and 100 m. A reflective prism allows for the accurate detection of smoke particles within the given distance range.

For ranges between 8 m and 50 m, one prism is sufficient. For ranges between 50 m and 100 m, four prisms are required. The additional prisms are included in the FRay5000-LR-Kit Long Range Kit.

Key application areas are large halls such as historical buildings, churches, museums, shopping centers, factory halls, warehouses, etc.

The FRAY5000-EN Linear Smoke Detector is suitable for use in areas where point-type detectors are not effective.

The FRAY5000-EN Linear Smoke Detector can be upgraded with three FRAY5000-HEAD-EN Detector Heads. The system controller can control up to four detectors. Each head can be programmed separately.

If the IR beam is obscured by smoke and the signal received drops below the selected threshold (standard 10 s, adjustable), the detector triggers a fire alarm and the alarm relay closes.

The sensitivity can be adjusted according to the environmental conditions. The default settings of 25% (sensitive), 35% and 50% (non-sensitive) can be changed in steps of 1%. Each detector can be adjusted individually. The standard setting is 35%.

The alarm relay can be set to auto-reset or latched mode. The LEDs indicate three different operating states:
- Alarm
- Fault
- Operation

You can control and set all parameters via the system controller and LCD display for each FRAY5000-EN Detector Head.

Slow changes in the operating states (e.g., component aging, optics contamination, etc.) do not cause false alarms, but are compensated by the automatic gain control. Every 15 minutes, the system state is compared with a default reference value and in the case of a deviation, is corrected automatically to 0.17 dB/h. If the compensation limit is reached, “Fault” the fault signal is indicated.

Functions

The transmitter emits an invisible infrared light beam (850 nm) that is focused through a lens. The light beam is reflected by the prism mounted opposite and returned to the transmitter/receiver combination.
If the IR beam is obscured within 2 s and the obscuration is more than 87% and lasts for 10 seconds and above (operator changeable), the fault relay switches. Faults may be caused by an obstacle in the beam path, by the covering of the reflector, etc. As soon as the fault cause is removed, the fault relay is cleared and after 5 s, the detector is automatically reset to standard operation. The fire panel must be reset separately.

The system has an alarm output, which is a relay with a potential-free change-over contact.

### Certifications and Approvals

Comply with:
- EN54-12:2002

<table>
<thead>
<tr>
<th>Region</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>VdS G 208017 FRAY5000-EN</td>
</tr>
<tr>
<td>Switzerland</td>
<td>VKF A 19202 Fireray 5000</td>
</tr>
<tr>
<td>Europe</td>
<td>CE FRAY5000-EN</td>
</tr>
<tr>
<td></td>
<td>CPD 0832-CPO-0565 FRAY5000-EN</td>
</tr>
<tr>
<td>Belgium</td>
<td>BOSEC TCC2-K803/b FRAY5000-HEAD-EN</td>
</tr>
<tr>
<td>Great Britain</td>
<td>BRE 831a/04 FRAY5000-EN</td>
</tr>
<tr>
<td>USA</td>
<td>FM 3037125 Fireray 5000</td>
</tr>
<tr>
<td>Sweden</td>
<td>INTYG 08-722 FRAY5000-EN</td>
</tr>
</tbody>
</table>

### Installation/Configuration Notes

- For connection to the LSN, one FLM-420/4-CON Conventional Interface Module is required.
- For direct connection to the FPA-5000, one CZM 0004 A module is required.
- The line of sight between the detector and the reflector always has to be clear and may not be interfered by moving objects (e.g. overhead crane).
- Heat accumulation under the roof may prevent smoke from rising up to the ceiling. Thus, the detector must be mounted below the expected heat accumulation. Accordingly, the benchmark values for X1 specified in the table have to be exceeded.
- The mounting surface for the detector must be firm and vibration-free. Metal supports that may be affected by heat or cold are unsuitable for the installation.
- The detector and the reflector are usually installed at the same height and aligned with one another. The wide angle of the IR beam allows for an easy adjustment and for a reliable long-term stability.
- The detector must be mounted in a position where the detector’s optical system is not exposed to direct sunlight or artificial light. Normal ambient light has no influence on the IR beam and the analysis.

### Detector arrangement

The detectors must be arranged according to the following distances:

- X1. Distance from the ceiling: 0.3 m to 0.6 m
- X2. Horizontal distance detector/wall: min. 0.5 m
- X3. Horizontal distance between two detectors under gable roofs

Example: Gable roof, 10° roof pitch

\[
X_3 = 7.5 \text{ m} + (7.5 \text{ m} \times 10%) \\
X_3 = 7.5 \text{ m} + 0.75 \text{ m} \\
X_3 = 8.25 \text{ m}
\]

- The maximum distance between two detectors with parallel IR beams is 15 m.
- The centre line of the monitoring beam may not be closer than 0.5 m to walls, furniture or stored goods.
- The reflectors allow an angle deviation of up to 5° from the centre line without causing a weakening of the signal.

### Positioning the detectors on flat ceilings

- For flat ceilings, the detector arrangement should follow the diagrams below.
- The detectors must be placed at least 30-60 cm apart to ensure proper monitoring.
- The detectors should not be placed closer than 0.3 m to 0.6 m from the ceiling or 0.5 m to 1.5 m from adjacent structures.

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<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Ceiling</td>
</tr>
<tr>
<td>B</td>
<td>Mushroom cloud</td>
</tr>
<tr>
<td>C</td>
<td>Heat accumulation</td>
</tr>
<tr>
<td>D</td>
<td>IR beam</td>
</tr>
</tbody>
</table>

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**Diagram:**
- Diagram showing the positioning of detectors on flat ceilings with distance markings and annotations.
Positioning the detectors under a shed roof

Positioning the detectors under a gable roof

Detector arrangement in accordance with VdS/VDE

- The number of light beam smoke detectors must be selected according to the maximum monitoring area A listed in the table and which must not be exceeded (meets VdS 2095 and DIN VDE 0833-2).

<table>
<thead>
<tr>
<th>Room height RH</th>
<th>X2</th>
<th>A</th>
<th>X1 at α &lt; 20°</th>
<th>X1 at α &gt; 20°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 6 m</td>
<td>6 m</td>
<td>1200 m²</td>
<td>0.3 m to 0.5 m</td>
<td>0.3 m to 0.5 m</td>
</tr>
<tr>
<td>6 m to 12 m</td>
<td>6.5 m</td>
<td>1300 m²</td>
<td>0.4 m to 0.7 m</td>
<td>0.4 m to 0.9 m</td>
</tr>
<tr>
<td>12 m to 16 m (*)</td>
<td>7 m (*)</td>
<td>1400 m² **</td>
<td>0.6 m to 0.9 m **</td>
<td>0.8 m to 1.2 m **</td>
</tr>
</tbody>
</table>

X2 = greatest permissible horizontal distance of any point of the ceiling to the next-closest beam

A = maximum monitoring area per detector (= double the product of the greatest horizontal distance DH and the highest allowable detector/reflector distance)

X1 = distance between the detector and the ceiling

α = angle which the roof/ceiling pitch forms with the horizontal; if a roof has different pitches (e.g. sheds), use the smallest pitch.

* With a room height of more than 12 m, it is recommended that you provide a second monitoring level on which the detectors are arranged offset to the first monitoring level

** Depends on use and environmental conditions (e.g. quick fire and spread of smoke)

- Depending on the roof construction (flat, tilted or gable), the detectors and reflectors must be arranged according to the roof pitch α and the room height RH so that the light beam runs along the roof in a distance DL (see table).

Parts Included

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FRAY5000-EN Linear Smoke Detector: compact device with integrated transmitter and receiver</td>
</tr>
<tr>
<td>1</td>
<td>Reflective prism</td>
</tr>
<tr>
<td>1</td>
<td>Control unit</td>
</tr>
<tr>
<td>1</td>
<td>Installation kit</td>
</tr>
</tbody>
</table>

Technical Specifications

Electrical

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>14 V DC to 28 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current consumption</td>
<td></td>
</tr>
<tr>
<td>• In standby (1 detector)</td>
<td>≤ 12 mA @ 28 V DC</td>
</tr>
<tr>
<td>• In standby for each additional detector</td>
<td>≤ 2.2 mA @ 28 V DC</td>
</tr>
<tr>
<td>• In alarm/fault (with 1-4 detectors)</td>
<td>≤ 52 mA @ 28 V DC</td>
</tr>
<tr>
<td>Reset control by power disruption</td>
<td>&gt; 5 s</td>
</tr>
<tr>
<td>Alarm relay (contact load)</td>
<td>100 mA @ 36 V</td>
</tr>
<tr>
<td>Fault relay (contact load)</td>
<td>100 mA @ 36 V</td>
</tr>
</tbody>
</table>

Mechanics

LED indicators for

| • Alarm | Flashes red every 10 s |
| • Fault | Flashes yellow every 10 s |
| • Operation | Flashes green every 10 s |

Dimensions (W x H x D)

| • Detector | 135 x 135 x 135 mm |
| • Prism reflector | 100 x 100 x 10 mm |
| • Control unit | 200 x 235 x 81 mm |

Housing

| • Color | Light gray/black |
| • Material | C6600, non-flammable |

Weight

| • Detector | 500 g |
| • Prism reflector | 100 g |
| • Control unit | 1000 g |

Environmental conditions

| Protection class as per EN 60529 | IP 54 |
| Permissible operating temperature | -10 °C to 50°C |
Planning

Permissible distance detector-reflector

Min. 8 m – max. 50 m

•with FRay5000-LR-Kit Long Range Kit
  Min. 50 m – max. 100 m

Lateral detection (on either sides of the light beam)

Max. 7.5 m (heed local guidelines!)

Connectable detectors per system controller

1 to 4

Special features

Optical wavelength

850 nm

Tolerance of the axial deviation

• Detector
  ± 0.3°

• Reflective prism
  ± 5.0°

Ordering Information

FRAY5000-EN Linear Smoke Detector
with one Detector Head, retro-operation,
with building shift compensation, range 8 m -
50 m

FRAY5000-EN

FRAY5000-HEAD-EN Detector Head
additional Detector Head

FRAY5000-HEAD-EN

Accessories

FRAY5000-1PRISM Prism Plate for 1 prism
Prism Plate for 1 prism for use with
FRAY5000-BR Universal Bracket Accessory
for Fireray 5000 (not included).

FRAY5000-1PRISM

FRAY5000-4PRISM Prism Plate for 4 prism
Prism Plate for 4 prisms for use with
FRAY5000-BR Universal Bracket Accessory
for Fireray 5000 (not included).

FRAY5000-4PRISM

FRAY5000-BR Universal Bracket Accessory for Firay5000
Universal Bracket for use with Fireray 5000
detector head or FRAY5000-4PRISM Prism Plate for 4 prism or FRAY5000-1PRISM
Prism Plate for 1 prism.

FRAY5000-BR

FRay5000-LR-Kit Long Range Kit
3 additional prisms for ranges between
164 ft and 328 ft (50 m and 100 m).

FRay5000-LR-Kit