FLAME DETECTION
SPECTREX FLAME DETECTOR RANGE

KEEP AN EYE ON YOUR SAFETY

APPLICATIONS & INDUSTRIES
- Offshore Oil & Gas
- Onshore Oil & Gas
- Chemical & Petrochemical Plants
- Pipelines
- Loading Stations
- Compressor Decks
- Air Ventilation Ducts
- Hydrogen
- Power Industry
- Automotive
- Mining Vehicles
- Aviation
- Paint Industry
- Waste Treatment
- Pharmaceuticals
- Semiconductors
**SP-4040 SERIES WARRANTY**

The Spectrex SP-4040 Flame Detector Series offers the highest performance and reliability matched with a full five year warranty.

The range includes the proven IR3 (Triple IR) Multi-Spectrum detector that enables detection of small hydrocarbon-based fires at distances up to 65 metres, with an enlarged 100° cone of vision and enhanced immunity to false alarms.

**FLAME DETECTOR SELECTION GUIDE**

**RECOMMENDED TYPES OF FIRE DETECTORS**

<table>
<thead>
<tr>
<th>Fire Source</th>
<th>UV (A)</th>
<th>IR (B)</th>
<th>UV/IR (C)</th>
<th>IR3 (D)</th>
<th>Hydrogen (E)</th>
<th>Multi IR (F)</th>
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</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>1</td>
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<td>Diesel Fuel</td>
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<td>N-Heptane</td>
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<td>Kerosene</td>
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<td>Alcohol (Ethanol)</td>
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<td>Methane</td>
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<td>LPG</td>
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<td>Hydrogen</td>
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<td>4</td>
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<td>Petrochemicals</td>
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<td>Metals</td>
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<td>3</td>
<td>4</td>
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<td>Propellants (black powder)</td>
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<td>3</td>
<td>4</td>
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<tr>
<td>Textiles (cotton)</td>
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<td>Aromatic Solvents</td>
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<td>4</td>
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<td>Wood, Paper</td>
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<td>4</td>
<td>3</td>
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<tr>
<td>Bonding Glue Substances</td>
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<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

(A) SP-4040-U, SP-4040-UB  
(B) SP-4040-R  
(C) SP-2020-ML, SP-4040-L, SP-4040-LB  
(D) SP-2020-M1, SP-2020-Mi3, SP-2020-CTIPS, SP-4040-I  
(E) SP-2020-SH (special order)  
(F) SP-4040-MSS

1 100%-75% of the detector sensitivity  
2 75%-50% of the detector sensitivity  
3 50%-25% of the detector sensitivity  
4 Not suitable
The SP-4040-I, a multi-spectrum based on three IR bands (IR3), detects fuel and gas fires at long distances with the highest immunity to false alarms. The SP-4040-I IR3 can detect a 0.1 m² gasoline pan fire at 65 metres in less than 5 seconds.

The SP-4040-I is the most durable and weather resistant flame detector currently on the market. Its features include a heated window, to eliminate condensation and icing; HART capabilities for digital communications; lower power requirements; and a compact, lighter design.

The SP-4040-M Multi IR Flame Detector is specifically designed for detection of hydrocarbon and hydrogen flames. It detects hydrocarbon-based fuel and gas fires at long distances with the highest immunity to false alarms. The SP-4040-M can detect a gasoline pan fire at 65 metres or a hydrogen flame at 30 metres in less than 5 seconds.

The SP-4040-M is the most durable and weather resistant range of flame detectors currently on the market. Its new features include a heated window, to eliminate condensation and icing; HART capabilities, for digital communications; lower power requirements, and a compact, lighter design.

The SP-4040-L (SP-4040-LB, with Built-in Test option) provides a combination of UV and IR sensors, where the IR sensor operates at a wavelength of 2.5-3.0 µm, and can detect hydrocarbon-based fuel and gas fires, hydroxyl and hydrogen fires, as well as metal and inorganic fires.

The UV/IR flame detector senses radiant energy in the short wave section of both the ultraviolet and infrared portions of the electromagnetic spectrum. The signals from both sensors are analysed for frequency, intensity and duration. Simultaneous detection of radiant energy in both the UV and IR sensors triggers an alarm signal. The UV sensor incorporates a special logic circuit that helps prevent false alarms caused by solar radiation.

The SharpEye UV/IR High-Speed Optical Flame detector, SP-4040-UFL, is designed to meet two major requirements:
- High-Speed Response (20 msec)
- High Reliability (immunity to False Alarm)

This detector is based on Spectrex’s well-known military detector used in Armoured Vehicle Explosion Suppression System, combined with the industrial UV-IR detectors SP-2020-LB and SP-4040-LB.

The UV/IR flame detector senses radiant energy in the short wave section of both the ultraviolet and infrared portions of the electromagnetic spectrum. The signals from both sensors are analysed for frequency, intensity and duration. Simultaneous detection of radiant energy in both the UV and IR sensors triggers an alarm signal. The UV sensor incorporates a special logic circuit that helps prevent false alarms caused by solar radiation.

The SP-4040-UV Flame Detector detects hydrocarbon-based fuel and gas fires, invisible hydrogen flames, and fires from hydrides, ammonia, Silane and other organics.

The SP-4040-U (SP-4040-UB with Built-in Test feature) is the most durable and weather resistant UV flame detector currently on the market.

Its features include a heated window to eliminate condensation and icing; HART capabilities, for digital communications; lower power requirements; and a compact, lighter design. Note: This type of detector should not be exposed to UV radiation sources such as welding, sparks, and electric arcs as it will cause false alarms.

The SP-4040-R Single IR Flame Detector detects hydrocarbon-based fuel and gas fires using advanced flame analysis tools. The detector provides early warning of flaming fires working at 4.4 µm for maximum sensitivity, and immunity to false alarms from IR sources such as sunlight and IR projectors.

The SP-4040-R is the most durable and weather resistant single IR flame detectors currently available.

Its features include a heated window, to eliminate condensation and icing; HART capabilities, for digital communications; lower power requirements, and a compact, lighter design.

The SP-4040-L & SP-4040-LB UV/IR is a combination of UV and IR sensors, where the IR sensor operates at a wavelength of 2.5-3.0 µm, and can detect hydrocarbon-based fuel and gas fires, hydroxyl and hydrogen fires, as well as metal and inorganic fires.

The detector incorporates a special logic circuit that helps prevent false alarms caused by solar radiation.

The SP-2020-MI1 & SP-2020-MI3 MINI IR3 is an economical and compact Triple IR (IR3) Flame Detector in a rugged stainless steel housing. It is available in either general purpose non-Ex approved, or intrinsically safe approved (EExia) format.

The detector retains all the benefits of IR3 technology - long distance detection (up to 40 metres) along with highest immunity to false alarms.

The SP-2020-ML UV/IR Flame Detector has a compact, lightweight but rugged design for general purpose (non-Ex approved) areas. It detects hydrocarbon fire at distances up to 15 metres.

The SP-2020-ML provides a combination of UV and IR sensors and can detect hydrocarbon-based fuel and gas fires, hydroxyl and hydrogen fires, as well as metal and inorganic fires.

The UV sensor incorporates a special logic circuit that helps prevent false alarms caused by solar radiation. Simultaneous detection of radiant energy in both the UV and IR sensors triggers an alarm signal.
# Flame Detector Selection Guide

## CURRENT MODEL RANGE & CHARACTERISTICS

<table>
<thead>
<tr>
<th>Model Number*</th>
<th>Detector Type</th>
<th>Max. Detection Range** (m)</th>
<th>Response Time (Typical)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP-4040-U*</td>
<td>UV</td>
<td>15</td>
<td>3 sec</td>
<td>UV detector for indoor applications, detects organic and inorganic flames.</td>
</tr>
<tr>
<td>SP-4040-L*</td>
<td>UV/IR</td>
<td>15</td>
<td>5 sec</td>
<td>Dual UV/IR for detection of organic and inorganic flames for indoor and outdoor applications.</td>
</tr>
<tr>
<td>SP-4040-R</td>
<td>IR</td>
<td>15</td>
<td>5 sec</td>
<td>Single IR Detector for hydrocarbon fires for indoor applications.</td>
</tr>
<tr>
<td>SP-4040-L**</td>
<td>Triple IR (IR3)</td>
<td>65, 60</td>
<td>5 sec</td>
<td>Triple IR (IR3) offers two to three times the detection distance of single IR or UV/IR detectors and the highest immunity to false alarms. This model includes heated optics, HART and complies with SIL-2.</td>
</tr>
<tr>
<td>SP-4040-MSS</td>
<td>Multi IR</td>
<td>HCs - 65, H2 - 30</td>
<td>5 sec</td>
<td>Special design for the detection of invisible hydrogen flames and hydrocarbon fires.</td>
</tr>
<tr>
<td>SP-2020-CTIPS</td>
<td>CCTV - IR3</td>
<td>60 &amp; video 30</td>
<td>5 sec</td>
<td>CCTV Flame detector is a Triple IR (IR3) detector with a video colour camera.</td>
</tr>
<tr>
<td>SP-2020-M1</td>
<td>Triple IR (IR3)</td>
<td>10 - 40, 2.5 - 10</td>
<td>5 sec</td>
<td>Triple IR (IR3) performance in a compact design with 80% less power consumption.</td>
</tr>
<tr>
<td>SP-2020-ML</td>
<td>UV/IR</td>
<td>15</td>
<td>5 sec</td>
<td>Special compact design UV/IR flame detector for industrial applications.</td>
</tr>
</tbody>
</table>

## COMPARISON OF VARIOUS TYPES OF FLAME DETECTOR

Each of the Spectrex flame detector ranges uses one or more of the Ultraviolet (UV) and/or Infrared (IR) techniques. However, each range is recommended only for specific applications, usually determined by evaluating to what extent false alarms could create problems.

<table>
<thead>
<tr>
<th>Detector Type</th>
<th>Applications</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triple IR (IR3)</td>
<td>Hydrocarbon fires indoors and outdoors</td>
<td>Moderate speed, Highest sensitivity, High immunity to false alarms, Longer detection range, Unaffected by solar radiation</td>
<td>Affected by IR sources only at short range in certain rare fire scenarios.</td>
</tr>
<tr>
<td>Multi IR</td>
<td>Hydrocarbon and Hydrogen fires indoors and outdoors</td>
<td>As IR3, but with hydrocarbon and hydrogen fire detection.</td>
<td>Affected by IR sources only at short range in certain rare fire scenarios.</td>
</tr>
<tr>
<td>Hydrogen (IR3)</td>
<td>Hydrogen fires only indoors and outdoors</td>
<td>Detects invisible Hydrogen flames, Longer detection range, High immunity to false alarms, Unaffected by solar radiation</td>
<td>Not to be used for Hydrocarbon fire detection.</td>
</tr>
<tr>
<td>Dual Band UV/IR</td>
<td>Hydrocarbon, Hydrogen, Silane, Ammonia, other hydrogen-based fuel fires and Metal fires indoors and outdoors</td>
<td>Moderate speed, Moderate sensitivity, Low false alarm rate, Unaffected by solar radiation</td>
<td>Affected by specific UV/IR ratio created by false stimuli. Blinded by thick smoke, vapours, grease and oil deposits on the detector window.</td>
</tr>
<tr>
<td>Single I (IR)</td>
<td>Hydrocarbon fires indoors</td>
<td>Moderate speed, Moderate sensitivity, Unaffected by solar radiation, Low cost</td>
<td>Subject to false alarms (in the presence of flickering IR sources).</td>
</tr>
<tr>
<td>Single Ultraviolet (UV)</td>
<td>Hydrocarbon, Hydrogen, Silane, Ammonia, other hydrogen-based fuel fires and Metal fires indoors</td>
<td>High speed, Moderate sensitivity, Unaffected by solar radiation, Unaffected by hot objects, Low cost</td>
<td>Subject to false alarms from UV sources (arc welding, electrical sparks, halogen lamps). Blinded by thick smoke, vapours, grease and oil deposits on the detector window.</td>
</tr>
</tbody>
</table>

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**Note:** All SP-4040 Models incorporate heated optics, HART and are SIL2 (TUV) approved to IEC 61508.

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* *All models, except those marked *, have automatic and manual Built-in-Test (BIT) to verify proper operation and cleanliness of lens.  
** Max detection range based upon a 0.1 m² gasoline / heptane pan fire.*