

## How Fixed Gas and Flame Detectors can improve mapping design

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## How Fixed Gas and Flame Detectors can affect mapping design and the probability of detection

This document is intended for Fire and Gas Mapping design engineers and highlights how different detectors can improve detection probability and can potentially reduce the number of detectors required without reducing the detection coverage.

### This design guide covers three types of Flame Detectors:

UV/IR (Ultraviolet/Infrared), UV/IR for Hydrogen and MSIR (Multi-Spectrum Infrared)

It's important to remember that there is no such thing as a "perfect flame detector" and the most suitable flame detector has to be selected for the specific application, based on the below design criteria:

- The type of fuel (hydrocarbon or non-hydrocarbon) to be detected will determine the sensor technologies that can be used
- Possible sources of nuisance radiation which may be detected and may result in the flame detector giving a false alarm
- Size of the risk area
- Where the flame detectors can be positioned, as this will determine the detection range
- What size of fire needs to be detected within the required response time
- What percentage of the risk area needs covering for the specified size of fire
- Does the total risk area need monitoring by a single detector or two detectors for a 2ooN voting system

Once the design criteria have been established, the most suitable flame detector for the application can be selected. As one site may have multiple and different types of risks and applications, a combination of different technologies may be the best solution.

### Benefits of MSA flame detectors:

**General Monitors FL500 UV/IR / FL500 UV/IR-H<sub>2</sub> – for detecting Hydrocarbon / Hydrogen fires.**

#### **Spec: Long detection ranges for the FM (Factory Mutual) approved fire test<sup>1</sup>**

Benefit: Fewer flame detectors will often be required to cover a large area, especially if a 2ooN voting system is required and the whole area requires 100% coverage by two detectors. Ranges are FL500: 27 metres, FL500-H<sub>2</sub>: 18 metres.

#### **Spec: A wider field of view (FoV), both horizontally and vertically**

Benefit: The FL500 and FL500-H<sub>2</sub> both have a cone of vision up to 130° cone of vision, meaning both on the vertical and horizontal axis. As many UV/IR flame detectors only have a 90° or 100° FoV, it means designing a system based on the

wider FoV of the FL500 can reduce the number of detectors required for a large area.

#### **False alarm algorithms to limit unwanted shutdowns and evacuations**

Benefit: The FL500 / FL500-H<sub>2</sub> flame detectors incorporate advanced algorithms that are designed to distinguish between real fires and unwanted sources of UV and IR radiation, which helps reduce false alarms.

When selecting a flame detector, it is not only important to select one that has independent performance approval (e.g. FM) for the detection of fires, but will also limit false alarms.

## General Monitors FL4000H MSIR – for detecting hydrocarbon fires only.

### Spec: Long detection range of 70 metres for the FM (Factory Mutual) approved fire test.

Benefit: Fewer flame detectors will often be required to cover a large area, especially if a 2ooN voting system is required and the whole area requires 100% coverage by two detectors.

### Spec: A wide field of view (FoV) for an MSIR flame detector, both horizontally and vertically

Benefit: The FL4000H has a 100° cone of vision at 30 metres and at 70 metres it's 90°. This can significantly reduce the number of detectors required for a large area.

### Spec: False alarm algorithms incorporating the advanced Neural Network Technology (NNT)

Benefit: The FL4000H has sophisticated algorithms which are designed to distinguish between real fires and unwanted

sources of IR radiation, which helps reduce false alarms.

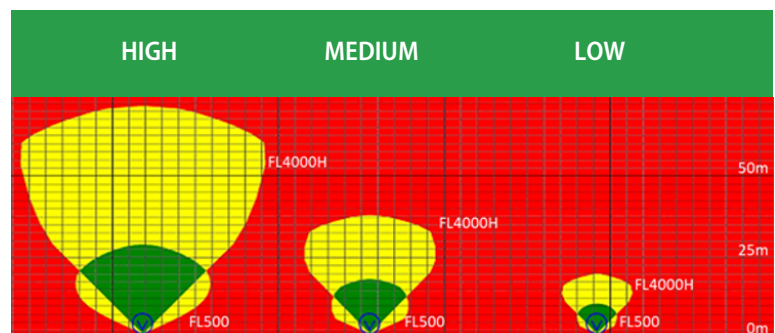
When selecting a flame detector, it is not only important to select one that has independent performance approval (e.g. FM) for the detection of fires, but also helps reduce false alarms.

### Spec: Sensitivity adjustment on site by the user

Benefit with all MSA flame detectors: Once installed, the detector's sensitivity (detection range) can easily and quickly be adjusted in line with the mapping design. Selecting a lower sensitivity may be required to reduce false alarms from flares on site and other sources of radiation. Being able to adjust this on site – unlike detectors which have to be removed from site and sometimes returned to the factory – can provide flexibility, save time, and reduce costs. Removing detectors from site can also compromise the flame detection system and safety of the site.

This diagram shows the differences in the FoV of the FL4000H and the FL500, each showing the high, medium and low sensitivity settings. The green area being the area which is covered by both detectors. The FL500 has a much shorter range, but wider FoV, therefore, when the detection range is limited to below 27 metres, fewer FL500 UV/IR detectors would be required to cover the same area. This would also be the case when comparing the FL500 to other flame detectors that have a narrower FoV than the 130° of the FL500.

### Sensitivity Setting:



FM approved FoV is based on 1 sq. ft. n-Heptane fire

Typically mapping designs for oil, gas, and petrochemical applications protecting process areas, will require a detection range between 20 and 30 metres. This often makes the FL500 – with its ultra-wide FoV of 130° and 27 metre detection range – the most cost-effective solution.

When the detection range must be longer than 27 metres, then the FL4000H MSIR would be the most suitable detector for these applications, as the FL500 only has an approved range of 27 meters.

*Notes: <sup>1</sup> The FM 3260 standard fire test is based on a 1 sq. foot n-Heptane pan fire. Other fuels can be tested and approved by FM, based on the manufacturer's requirements. All flame detectors can detect fires at greater distances than the FM approved distance, however the fires must be larger and produce more radiation to be detected.*

To learn more about MSA's mapping capabilities and how our products can help in optimising your design, please contact us by [clicking here](#).

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