

Guide to Flame Detection

Finding the correct Flame Detection technology for the right application

Past events have demonstrated that fires can spread rapidly, completely devastating industrial plants and surrounding areas. Used extensively in Petrochemical, Oil and Gas industries, flame detection systems can reliably detect a wide range of hydrocarbon and non-hydrocarbon-based fires. As an ideal solution to the growing demand for flame detection in industrial applications, they are also increasingly used alongside gas detection equipment as part of a safety solution.

Offshore or Onshore, Petrochemical or Chemical, Utilities or General industry - the type of application is the first of many considerations when selecting flame detection equipment.

Not sure which is the most suitable? Learn more about the two fundamental types of flame detectors, namely: Radiation and Visual.

Radiation Flame Detectors

These detectors work by determining the total radiation within the field of view, recognizing any flicker frequency that might exist and calculating the intensity of the radiation in that area.

UV Flame Detection

As all fires give off UV radiation, a UV Flame Detector can be a good general-purpose flame detector. Suitable for inorganic fires, such as those that are metal-based, they can also be used to detect fires invisible to the human eye, such as a Hydrogen flame. Housing UV tube sensors, these detectors have a fast response time of under 1 second. The tubes generate pulses which are then counted. The greater the number of pulses, the larger the source of UV radiation and the larger the fire.

However, some fires do not emit a large amount of UV radiation and such sensors, being very sensitive, can be susceptible to false alarms from sources like electric arc welding, lightning and X-rays. As such, UV Flame Detectors are best suited for clean, indoor applications.

The Dräger Flame 1700 is a hazardous area approved UV Flame Detector designed to detect organic-based fires and non-organic-based fires such as those of pure Hydrogen, Methanol, Sulfur, Sodium and metals. The detector provides flexibility with its numerous output modes and its advanced design ensures reliability and speed in detecting such fires.

Single Frequency IR Flame Detection IR Flame Detectors are used to detect hydrocarbon-based fires and usually sense radiation at 4.4 μm , which is the wavelength at which hot CO₂ gases are emitted from fires of that type. Many IR detectors incorporate algorithms that seek a flicker frequency of 2 to 10 Hz and ensure that signals received from the sensor are random in terms of time and frequency.

As for other potential inhibitors, solar radiation has no effect on the detector as it does not reach the Earth's surface at 4.4 μm . Both arc welding and X-rays do not affect detection either. Should its optical surfaces be contaminated by oil or solvents, the device will still perform to specifications.

The Dräger Flame 1300 is a hazardous area approved IR Flame Detector, designed to detect organic-based fires such as hydrocarbon fuels and vapors. The detector provides enhanced flexibility with its numerous output modes, while its advanced features ensure reliability in the detection of fires with excellent immunity to potential false alarm sources.

UVIR Flame Detection

In effect, these instruments combine both IR and UV detectors in a single housing. Both detectors are required to detect simultaneous radiation before generating an alarm, therefore ensuring the greatest immunity to false alarms.

The Dräger Flame 2300 is a hazardous area approved combined UVIR Flame Detector used for the detection of hydrocarbon-based fires. With numerous output modes and advanced design features, it provides flexibility while ensuring reliable detection by being immune to false alarm sources.

FD-10 Range

The Dräger FD-10 Range combines the detection power of Dräger 1300, 1700 and 2300 Flame Detectors to provide a range of benefits.

Installing the Dräger FD-10 Range is simple. The detectors, easily installed with a stainless steel mounting bracket, can be optimally positioned to face the potential fire source. Specific degree markings allow for greater precision and the positioning angles of the detectors to be recorded for future reference.

The 4-20mA (0-20 mA) output and 3 relays provide a number of options for detector monitoring and the triggering of the necessary control upon the detection of a fire.

Automatic checks of the detector electronics and optics also ensure no fault goes undetected. Additionally, tests can be triggered manually at any time.

Complete flexibility enables the detectors to be operated from a separate power supply as a 3- or 4-wire device where there is no requirement for an isolated output.

Visual acknowledgement - verification from a safe location

A tri-colored LED visible at the front of the detectors provides a simple status indication to personnel in close proximity to each detector, with the following indications:

- Green indicates normal operation
- Yellow indicates a fault
- Red indicates the presence of radiation

The Dräger Flame 1300, 1700 and 2300 carry the following certifications: ATEX, IECEx, FM and CSA.

Visual Flame Detectors

Evolving technology means that the cost of ownership as well as reliability, accuracy and ease of use have all improved over the years. In addition, the latest systems, such as those that boast an integrated CCTV, are able to overcome many of the problems associated with more traditional detection methods. Eliminating these problems reduces the risk of injury and helps save both time and money.

Visual Flame detection systems use CCTV and advanced algorithms to process live video images and interpret flame characteristics. While some systems simply strap a CCTV camera to a standard Flame Detector, the more advanced systems use the camera itself to detect the flame. As such, those with an integrated CCTV capability are not affected by false alarms and as an added bonus, can be used over longer distances. The use of video also means that no one needs to enter a potentially dangerous environment to monitor the system, minimising the risk of injury.

Since black body radiation and hot CO₂ emissions have no effect on visual flame detection, false alarms are virtually eradicated. Such systems also work in the presence of water, as light is easily transmitted through water and in any event the detectors are not concerned with heat energy.

What's more, with the use of live video, even the dimmest of fires can be detected.

The Dräger Flame 5000 is a color-imaging-based Flame Detector. Comprising an integrated CCTV, this state-of-the-art system uses digital signal processing and software algorithms to process live video images and interpret the characteristics of a flame. The system's advanced imaging algorithms are so discriminating that false alarms are all but non-existent.

The detector can be used as a stand-alone device providing live video feeds or integrated with a control system or fire panel to provide fault and fire signalling by using a 4-20mA (0-20 mA) signal or relay contacts. With remote surveillance, operators no longer need to investigate alarms, reducing the risk of injury and improving response time.

Easily installed with a stainless steel mounting bracket that can be rotated for optimum positioning, this innovative system can be used to detect fires of 0.1 m² or more at 44m within a 90° horizontal field of view. An advanced optical verification facility automatically checks the window for contamination and ensures that this field of view is not compromised by obstructions placed immediately in front of the detector.

A built-in memory card allows the detector to record both before and after every alarm. For immediate on-site visual verification, a tri-color LED is located on the front of the detector with the following indications:

- Green for normal operation
- Yellow indicates a fault
- Red indicates the presence of fire