

## Application Note

### X3301 for Compressor and Pipeline

This paper will review the advantages and benefits the model X3301 Protect•ir multi-spectrum infrared (IR) flame detector offers for the protection of compressor and pipeline applications.

The X3301 was designed specifically for installations in applications that have normally high levels of background IR radiation, yet still require fast fire detection. The X3301 is ideal for the protection of compressor or pipeline applications that have medium to high background infrared present from reciprocating engines, turbine engines, or hot piping due to high-pressure gas compression.

There are typically two different fire scenarios present in compressor or pipeline protection. The first type fire is a fast ignition fire, usually caused by the pressurized gas leaking from a seal or fitting contacting an ignition source. The fire will grow and impinge upon other pipes and/or machinery creating secondary fires. The second fire scenario is



usually caused by a reciprocating engine failure, generating a small, or momentary fire that grows slowly until surrounding materials are also on fire. Key differences are that the first fire type requires a flame detector that can respond to gaseous and liquid fires over greater distances and also to detect partially obscured fires. The second type requires a flame detector that can respond rapidly to small momentary fires that traditional flame detectors, utilizing time delays of seconds, would miss.

Most optical flame detectors available today process fire signals using ultraviolet, infrared radiation, or a combination of spectral wavelengths. The detectors use standard measurements of IR energy threshold and flicker rate or simple ratio measurements combined with a UV sensor. This limits their use in most compressor applications due to the long alarm integration time and limited area of coverage, which could result in a fire being undetected. The X3301

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Protect•ir's patented sensor sensitivity wavelengths and processing algorithms guarantee fire detection to multiple fuels and fire scenarios. The advanced signal processing algorithms of the X3301 provide a detector that can detect more fire types, faster, and at substantially longer distances, than any detector available on the market today.

The X3301 is Factory Mutual approved to respond to a 30-inch methane plume fire out to 100 feet on axis *and* 100 feet off axis. It's the only detector approved with a perfect cone of vision for methane. The detector will also detect a 1X1-foot gasoline fire at 210-feet, and diesel at 150-feet. In addition, a variety of other flammable liquid and gas fires can be detected by the X3301 at ranges unequaled by any other flame detector technology.

The Protect•ir incorporates optical integrity for its built-in test feature, it would be impossible for the user to always know that detection capabilities are not compromised by possible settling of blinding compounds on the detector's optical surface. By using a calibrated optical integrity test on all of the sensors, the device is able to differentiate between sensitivity loss due to optical contamination, or a general fault or failure. The X3301 provides different current signal output levels to differentiate these fault conditions. The optical integrity can also be activated manually or magnetically to provide the same calibrated test feature with the addition of an actual alarm generation. Also, a laser-aiming device is available to aim the detector and confirm proper detector orientation.

Reliable, high performance, fast fire detection without nuisance alarms, is a requirement of today's compressor or pipeline fire detection systems. The X3301 Protect•ir offers a new level of detection for this application.