PROTECTOWIRE® FireSystems

Stratos® Classifire® Perceptive Artificial Intelligence

The Stratos ranges of aspirating smoke detectors use a patented system of Perceptive Artificial Intelligence to continually adjust the detector sensitivity to maintain a consistent level of performance.

Traditionally, aspirating detectors are adjusted to a sensitivity that is a set level above the highest peak in the normal environmental smoke density. With the traditional method it is very easy to set systems too sensitive and suffer from an unacceptable rate of nuisance alarms, neither does this method permit particularly early warning. As the normal environment changes, the system is unable to adapt and needs more (or less) smoke to generate an alarm. Although with this method the detector has 'fixed' sensitivity, the amount of smoke needed to generate an alarm is not constant, as depicted in Figure 1 below:

Fig. 1
Traditional fixed sensitivity

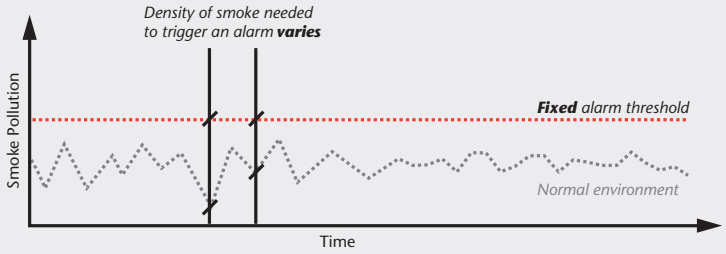
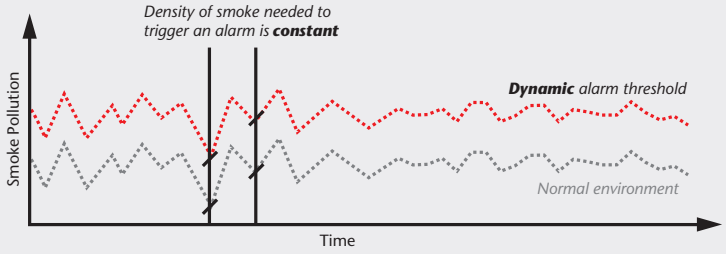


Fig. 2
Perceptive artificial intelligence



ClassiFire® dynamically adjusts the detector sensitivity to match changes in the normal environmental smoke density, thus the amount of smoke needed to generate an alarm remains constant, irrespective of environmental conditions. See Figure 2.

Benefits

- High sensitivity can be provided reliably.
- Alarm rates can be predicted.
- Seasonal time changes are automatically adapted to.
- Contaminated dust filters that normally reduce effective sensitivity are adapted to.
- Changes in air filtration efficiency do not affect smoke detection performance.
- Provides extremely simple set-up.

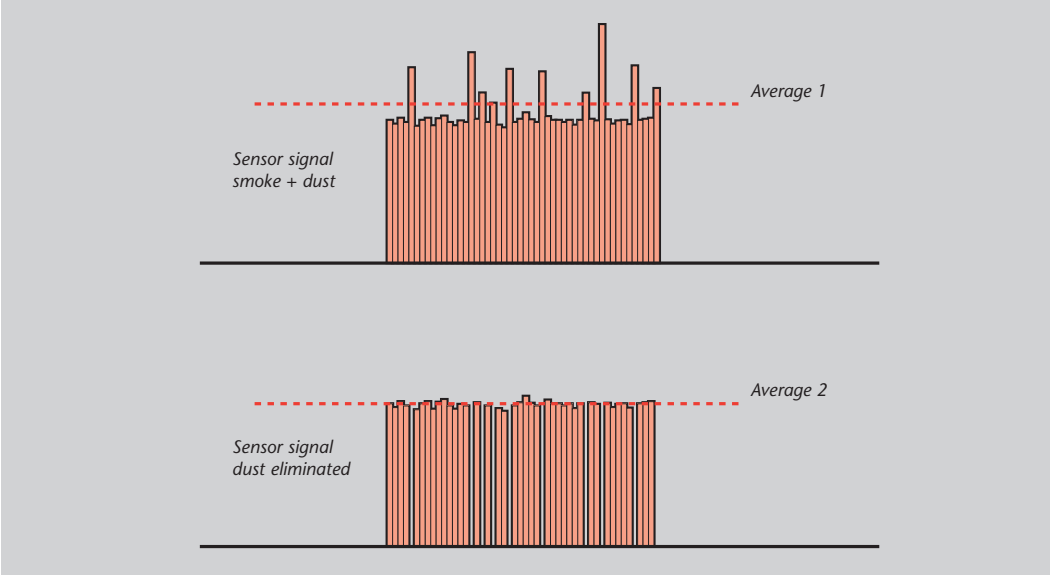
ClassiFire® works as follows:

- The detector output produces a histogram of 64 classes of potential pollution density.
- The laser is pulsed twice per second and each pulse output is allocated to a pollution density class. Over a period of 24 hours the smoke pollution distribution in the protected environment is compiled and a data bank created.
- The data bank is used to predict the probability that a particular pollution level will be achieved using statistical analysis.
- Alarm thresholds are based on an acceptable probability of nuisance alarm (for example 1 alarm per year or 1 alarm every 1,000 years).
- Because the smoke pollution data bank is continually updated, the detector continually adjusts its sensitivity to match any changes in the normal ambient smoke density, ensuring that the detector provides a consistent response.
- The histogram represents a record covering several days. This gives optimum stability and ensures that slow growing fires are not 'learned'.

Stratos® Laser Dust Discrimination (LDD-3D3 ™)

The Stratos-High Sensitivity Smoke Detector (series 2) and Stratos-Micra series of aspirating smoke detectors use a new and updated dust discrimination algorithm known as LDD-3D3™.

The system works on the principle that the laser sensor signal will show a steady output (caused by the homogeneous distribution of smoke particles throughout the moving air sample), with 'spikes' caused by any dust particles intermittently passing through the point of laser focus on the moving airstream. Any dust present will cause these 'spikes' to be superimposed on the smoke reading signal. LDD-3D3™ works on the principle that if these spikes can be eliminated from the underlying detector signal, then the steady output which remains would represent the underlying smoke density present. The result is greatly enhanced dust rejection by these detection products.



The algorithm works as follows:

- The laser is pulsed at a frequency of approximately twice per second, with a pulse duration of approximately 15 milliseconds. During each 15ms pulse, a total of 50 readings of 'light scatter' signal are taken and temporarily stored in RAM.
- The average signal (arithmetic mean) of the 50 readings is calculated. All readings above the average are removed.
- A second average (arithmetic mean) is calculated using all the remaining readings (those below or equal to the previously calculated average).
- The second average is considered to be the detector output for this cycle. It is passed to a selectable moving average arithmetic routine to reduce slower variations in chamber output.
- The result of the moving average is compared to the alarm thresholds to establish if a fire condition exists and passed to ClassiFire® to be added to the histogram.

This cycle is repeated twice per second.

The calculation of the moving average in stage 4 can be omitted. This is set by the "LDD enable" tick box in the function settings of the detector. Omitting this stage will make the detector faster-responding but more prone to alarms caused by dust.

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