TRUE MULTI-SENSOR CERTIFICATION: READING THE SMALL PRINT

ISS 1 / JUN20

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WHITEPAPER

A New Level of Fire Safety

According to the British Standards Institute, within the BS5839 standard this is the actual definition of a multi-sensor

"a fire sensor that monitors more than one physical and/or chemical phenomenon associated with fire"

Typically these are sensors that detect smoke and heat and with a multi-sensor, sometimes monitored simultaneously but not always

Now some would argue that this definition might be a little grey, when you consider the word "monitors" doesn't suggest that both phenomenon are simultaneously monitored.

So why should we use them?

The all-round protection offered by multi-sensors makes them a popular choice for specifiers and installers for a number of reasons:

All-round Protection
They tend to be more effective than traditional single phenomenon sensors, because they are considering more than one external factor when making that fire decision

Advanced Technology
They can also help reduce false alarms because generally they are much more accurate when determining the difference between a transient signal and a real fire situation

Reduce False Alarms
Regular false alarms breed complacency in building users, eventually occupants of a building will simply ignore an alarm. This is known as "alarm fatigue" and can be a serious issue.

What Traditional Multi-Sensors Can Detect

Traditional multi-sensors are most commonly used to detect heat and smoke, the two main elements of a fire.

With more advanced multi sensors even more criteria is monitored and factored into the fire decision, and this accounts for even more reliable fire decision making.

What More Advanced Multi-Sensors Can Detect

For example, more advanced models offer a further layer of protection though carbon monoxide detection, and even being able to determine the presence of water vapour, steam and burning food smoke, the main culprits when it comes to false alarms.

The reason CO is monitored is that this gas is often released very early during a smoldering fire – i.e. one that isn't necessarily producing enough visible smoke or heat, particularly in furniture fires. So CO is generally a good indicator of a real fire.

When CO is monitored in combination with an optical chamber detecting the presence of smoke, this produces even more accurate results when differentiating a real fire from a false alarm. If the multi-sensor is part of an addressable fire detection system then it is also possible to determine where the fire might be spreading, by monitoring and comparing the levels of CO and smoke at various sensor locations

Vaporised water is another term here for steam and is a common cause for false alarms, particularly in hotel rooms with showers producing steam that makes its way into the main bedroom, for example

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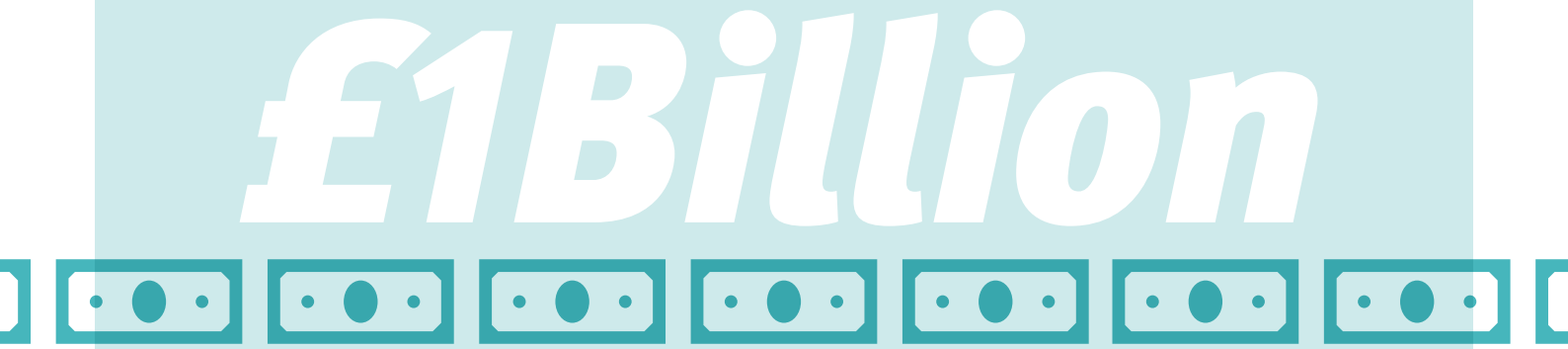
WHY IS IT IMPORTANT TO USE ADVANCED MULTI-SENSORS?

One billion pounds is the cost to UK economy from loss of productivity due to false alarms (from London Fire Service web site).



The Building Research Establishment (BRE) and Fire Industry Association (FIA) through their combined research proved that advanced multi-sensors which detect multiple criteria can outperform more basic models in reducing false alarms.

In general it was found that the more sophisticated the optical heat multi-sensors were, the less prone they were to common causes of false alarms, whilst their ability to detect real fires was not compromised. This research will most likely further the development of product standards and codes of practice for smoke and multi-sensor detectors.

So investing in more intelligent models to reduce false alarms will provide long term benefits for facility managers and their clients through reduced business interruption and the operational cost this generates.

That BRE research briefing paper can be found on their web site, and its linked from the FIA web site also.

"Advanced multi-sensors will reduce false alarms"

Research Paper >>>

bre

Ensuring More Accurate Fire Detection

Single optical sensors can be susceptible to giving false alarms if certain unwanted elements are present within the device's chamber, so in order to reduce false alarms we need to understand what causes a sensor to signal a fire condition in this scenario.

By their nature Photoelectric/optical sensors are designed to look for contaminants within a constantly monitored chamber, they look for smoke particles.

So anything entering this chamber has the ability to create a false impression that smoke is present, unless the device is intelligent enough to distinguish between this occurrence and the presence of real smoke

Contaminants can include things like insects. For example midges and harvest thrips are small enough to gain access to the chamber, around 1 mm long. Some manufacturers mesh size is considerably smaller, specifically to reduce infestation. There are more of these types of false alarms during the Spring when the winged adults swarm

Steam from kettles, showers, or cooking can confuse some smoke chambers as can cigarette smoke. Also bear in mind false alarms from smoke entering a building from outside during warm weather when more windows are open, for example smoking sheds

The Rise of Vaping

Between 2012 and 2019, the number of UK residents alone turning to e-cigarettes sky-rocketed to 3.6 million. Worldwide this number could reach **55 million by 2021** according to research from the Euromonitor Research Group.

False alarms can be caused by the Infra Red scattered light technology in traditional (single optical) smoke sensors being unable to distinguish between true smoke particles and larger size particles found in e-cigarette vapour, which is basically the steam exhaled when using e-cigarettes.

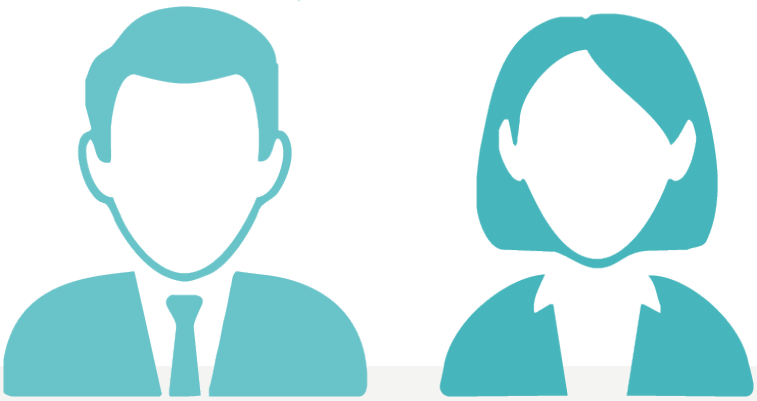
This can lead to false alarm issues for hotels and student accommodation blocks – with public access areas.

Getting A Second Opinion

Most advanced multi-sensors will employ a range of sensing elements, in various combinations, depending on the mode they are operating in.

These modes allow the sensor to be tailored to operate according to the needs of its environment. For example, a mode for kitchen areas where a smoke element operating independently is likely to be activated in error due to cooking fumes, would also incorporate data from the heat element, and others if applicable, all monitoring the environment and collectively coming to a fire decision based on all data.

In this kitchen environment scenario, the addition of a CO sensing element would allow the device to provide not only a faster response but a more accurate response – then just heat supporting smoke alone.



Ensuring accuracy

Primary sensing element backed up by secondary

Reading the Small Print

When it comes to advanced multi-sensors, the testing and approval process isn't as clear cut as with more traditional sensors. With advanced technology comes increased testing.

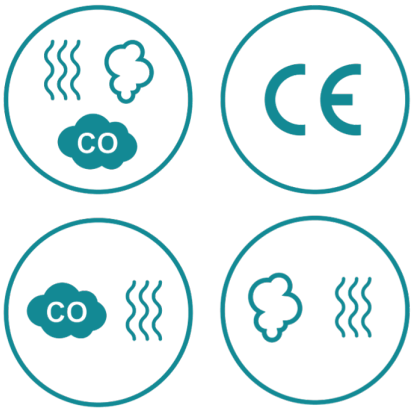
Multi-sensors that test for CO should be tested to all of these European standards, if they claim to be a true 'multi-sensor' as this type of aaccreditation sets a benchmark for reliability.

What is seen most often are sensors claiming to be multi sensors but approved only to EN54 5 or 7 (heat or smoke) not to some of the newer multiple criteria standards such as parts 29, 30 and 31.

Therefore not all multi-sensors are tested as a device using inputs from two (or more) different phenomenon, typically we see devices marketed as multi-sensors tested to work as a smoke sensor or a heat sensor – but not capable of employing both elements simultaneously.

Get the Right Accreditation

- EN54-5 (Fire)
- EN54-7 (Smoke)
- **EN54-29 (Smoke and Heat)**
- **EN54-30 (CO and Heat)**
- **EN54-31 (Smoke, CO and Heat)**



Confusion or Ignorance?

Because these newer standards haven't been ratified universally, there is a current grey area when it comes to legal requirements for true multi-sensor accreditation.

It has been known for certain manufacturers to avoid testing their products to all pertinent standards, because this would simply highlight the limitations of their products in light of these new standards.

This would then most likely lead to a complete redesign of the product, something they might try and avoid.

Instead manufacturers might knowingly only test their 'multi-sensors' against single criteria, such as EN54-7 which only assesses a device's ability to detect smoke alone, for example.

Grey area for new standards

Some avoid testing to new standards

Only testing to smoke or heat

Misleading Certification

This means that these devices will not be tested or certified to detect smoke, heat and CO simultaneously before making a fire decision.

Consequently, this leaves products in the market which claim to have these advanced detection capabilities with some but not all the most up-to-date approvals, and this is something installers, specifiers and end-users need to be aware of.

If the device is not tested as a multi-sensor – but is being used in a multi mode that hasn't actually been tested - then it's probably because the device probably doesn't hold the correct certification

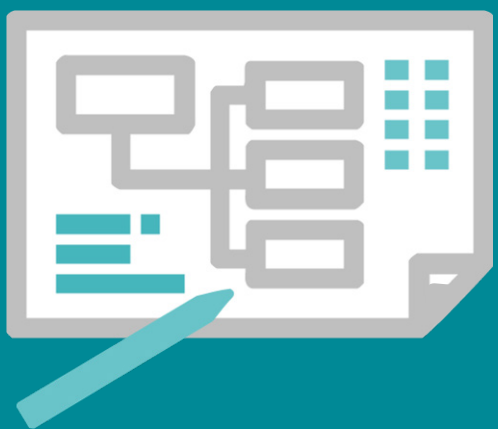
But we still think true multi-sensors should be able to demonstrate this intelligent, multiple criteria monitoring capability by being designed with these new published standards in mind.

Tested for simultaneous detection?

Certificate matches the performance claims?

So Why Does All Of This Matter To The You?

In case of fire system engineers or designers – imagine you have designed a system for your client, you have quite rightly specified a multi-sensor for a very specific reason, for example there are certain environmental requirements, or a history or potential for false alarm activations.



You trust a manufacturer's description of their own product, *right?*
They are calling it a multi-sensor in the datasheet.

But once installed, you then discover that it is unable to offer simultaneous detection using more than one sensing element, and therefore it's not going to be fit for purpose, something you then have to explain to your client.

What to look for.

It is even the case that there are multi-sensors on the market incorporating CO detection into their programming but still holding inaccurate certification; sold as multi-sensors, but only tested and certified as a smoke sensor or heat sensors and they cannot offer any third-party accreditation in regards to using that criteria in combination with others

Our Advice is to quite simply – DO YOUR RESEARCH.

Check the manufacturers packaging and instruction leaflets, which legally should carry accurate approval data.

If in doubt, go online and look for the manufacturer's products listed on third-party accreditation databases such as "Red Book Live" – The LPCB's own reference site – to check which approvals are currently in place.