VISUAL FLAME DETECTION
20 YEARS OF
WHEN SAFETY MATTERS

APPLICATION OF VISUAL FLAME DETECTION™

SILANE FIRES

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Silane use around the globe is growing massively, with its use in the manufacturing of solar PV panels and the semi-conductor industry. With a long list of fatalities attributed to Silane explosions, its use and safety measures should be carefully considered.

Flame detection is critical when fires are unpredictable.

Introduction

There are numerous industrial and medical applications where Silane is utilised. Since the late 1990's the semiconductor industry has used over 300 metric tons per year and this figure is seen to be continually increasing. An overall annual figure of several thousands of tons was recently quoted as being the overall consumption. With the swell in demand around the globe for renewable energy sources, the use of Solar Photovoltaic panels has increased and as such so has the production of these units. Silane is critical in the manufacturing process of solar panels because it is the most efficient way of delivering silicon molecules to their surface. Along with the production of solar panels, it is also used in micro-electronics and the production of flat LCD panels.

The greatest hazard of Silane is its unpredictable behaviour when released. It is a pyrophoric gas meaning that it will spontaneously combust in air without an ignition source.

Go Further with Confidence

In the high hazard applications that Silane is utilised, safety matters and that is why Visual Flame Detection™ from Micropack will allow you to go further with confidence. The explosion proof FDS301 Visual Flame Detector™ from Micropack has been tested and certified by FM Global for the detection of a 0.61m (2ft) Silane plume fire at a distance of 13m (42 ft.). The FDS301 is one of the only flame detectors in the world certified to detect this type of fire.

Visual Flame Detection Application

Visual Flame Detection™ has been successfully installed in various applications around the globe where Silane is used. One such example being a blue chip LCD panel manufacturing plant in the US where the technology is being used to protect the Silane gas bunker.

Visual Flame Detection™ is designed for use in the harshest environments, with its roots being traced back to the offshore Oil and Gas industry where fast response flame detection is critical and false alarms are not an option. The FDS301 is also certified as SIL 2 capable by Exida further demonstrating the high reliability of the technology.

On-board Flame Video Recording

Each FDS301 incorporates an on-board Micro-SD card capable of recording 17 seconds of the alarm video – 8.5 seconds pre-alarm and 8.5 seconds post-alarm. This video recording proves invaluable during incident analysis and allows the operator to pinpoint the exact cause of the fire. This further protects people, property and the environment from further incidents.

The FDS301 is also capable of outputting a live colour video feed from each detector. This ensures operators have the most critical information to hand when making split second decisions in the event of a fire. The live video feed has proved invaluable in saving lives during real fires.

5 reasons to use Visual Flame Detection™ for the detection of Silane fires

When Safety Matters. Visual Flame Detector will provide a fast response to Silane fires and with a pyrophoric gas, this is even more critical.

Challenging environment. Technology born out of the harsh offshore oil and gas industry responds rapidly with high false alarm immunity.

Go further with confidence. Onboard micro-SD card in every unit capable of recording any occurring fire. Lessons could be learned from this video and preventative safety measures introduced.

Cost of ownership. Incorporating a colour camera in each unit, the FDS301 offers a cost effective combined flame detection and CCTV solution.

When compliance is critical. The FDS301 is certified by FM Global to detect a 0.61m (2ft) Silane plume fire at a distance of 13m (42 ft.)

FDS301 TECHNICAL SPECIFICATION

Environmental

Operating Temp	-60°C to +85°C (-76°F to +185°F)
Storage Temp:	-60°C to +85°C (-76°F to +185°F)
Humidity	0 to 95% RH non-condensing

Operating Voltage

24Vdc Nominal – (18 to 32 Vdc Range)

Power Consumption

6 watts minimum (no heater), 10 watts typical, 15 watts maximum (with heater)

## Speed of Response

~7 seconds (Typical)

Flame Sensitivity

Fuel	Fire Size	Distance
Methane Jet Fire	0.9m (3ft) plume	30 (100 feet)
Ethanol	0.1m^2 (1sqft) pan	25m (85 feet)
n-Heptane: Pan Fire	0.1m^2 (1sqft) pan	44m (144 feet)
n-Heptane: in direct sunlight	0.1m^2 (1sqft) pan	44m (144 feet)
n-Heptane: in modulated sunlight	0.1m^2 (1sqft) pan	44m (144 feet)
n-Heptane: modulated black body	0.1m^2 (1sqft) pan	44m (144 feet)
n-Heptane: Arc welding	0.1m^2 (1sqft) pan	44m (144 feet)
n-Heptane: 1000watt lamp	0.1m^2 (1sqft) pan	44m (144 feet)
Gasoline Fire	0.1m^2 (1sqft) pan	44m (144 feet)
JP4	0.36m^2 (3.8sqft)	61m (200 feet)
Ethylene Glycol	0.1m^2 (1sqft) pan	15m (50 feet)
Diesel	0.1m^2 (1sqft) pan	40m (130 feet)
Crude Oil (heavy fuel oil) Pan Fire	0.25m^2 (2.7sqft)	40m (130 feet)
Silane fire	0.61m (2ft) plume	13m (42ft)

Enclosure

Dimensions:	100 Diameter x 200 Length Overall (mm)
Material:	LM25 (Red epoxy), 316L stainless steel
Entries:	1 – M25, ¾"NPT (Variants on Request)
Weight:	2.5kg (LM25) or 6kg (316L)

Field of View

Horizontal FOV -90°

Vertical FOV - 65°
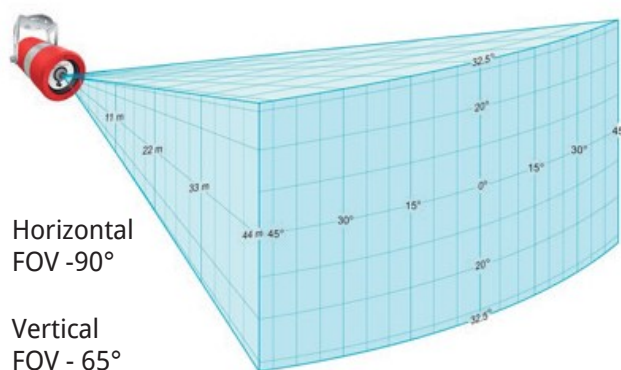
Outputs

Relay contacts - alarm and fault
Current source 4-20mA
RS485, HART
Live colour video – PAL and NTSC

Certification

ATEX : II 2 G Ex db IIC T4 (FM07ATEX0033)
Factory Mutual : 3260 (3029978)
IEC 61508 : SIL 2 (MP 080203 C001)
IECEx FME 07.0002
Class 1 DIV 1 GROUPS B,C,D,T4
Class 1 Zone 1 AEx/Ex d IIC T4
EN54-10 (VdS)