Base Load Power Hub (BLPH)

F&G DETECTORS COVERAGE REPORT

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

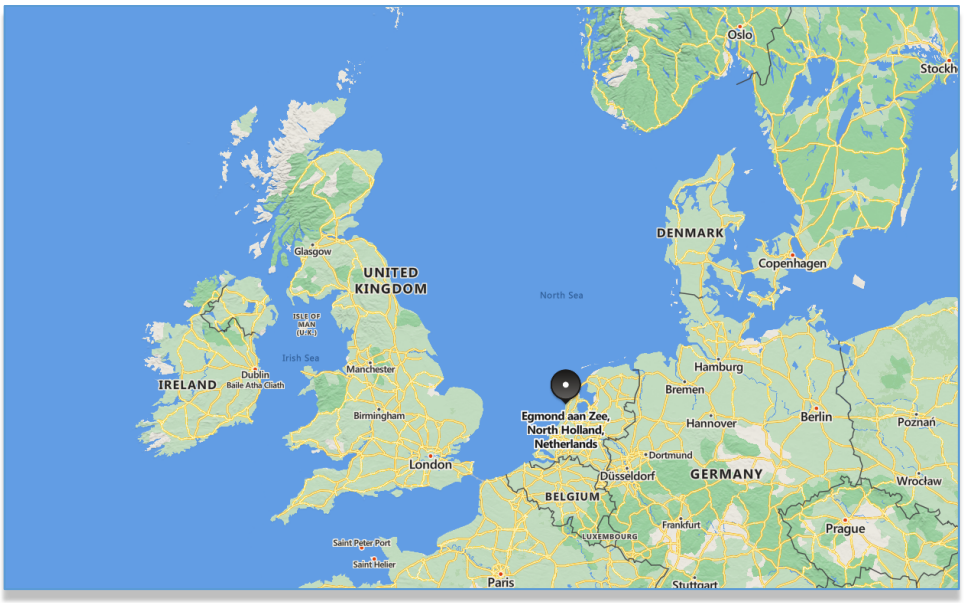


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

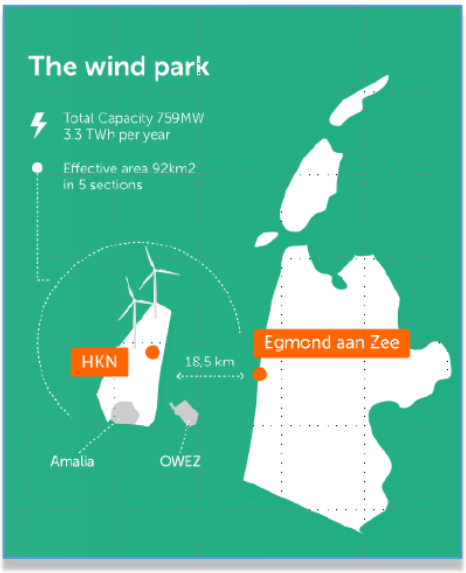


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

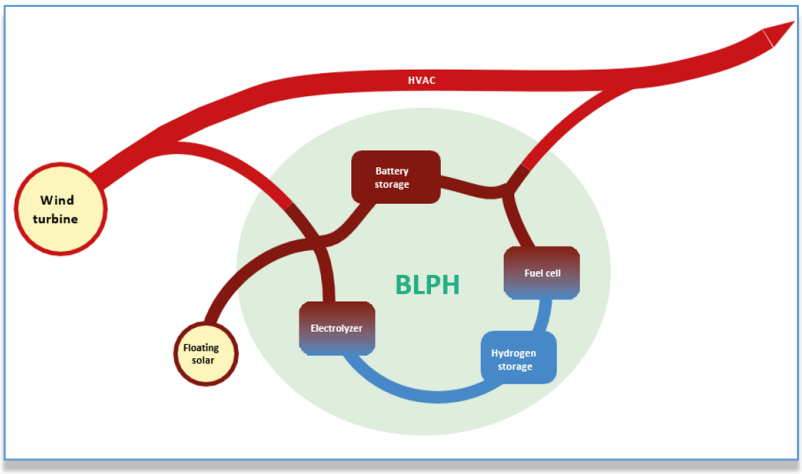


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2 DOCUMENT SCOPE

This document has the scope of describing the coverage at the platform of the F&G detection system, in order to confirm that the design done is sufficiently robust to protect from any hazardous scenario.

2.1 REFERENCES

Doc. No.	Description
[1] 123A90-DDL-SAF-RE-30001	Fire Protection Philosophy
[2] 123A90-DDL-SAF-RE-30020	FERA
[3] 123A90-DDL-SAF-DL-30027	F&G Layout – Lower and Upper deck
[4] 123A90-DDL-SAF-DL-30028	F&G Layout – Below lower deck
[5] -	3D model
[6] 123A90-DDL-IN-CE-40002	Fire and Gas Cause and Effect Matrix
[7] 123A90-DDL-SAF-RE-30041	Noise Assessment Study Report
[8] DEP32.30.20.11	DEP Specification - Fire, Gas and Smoke Detection Systems

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	CROSSWIND
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

BESS	Battery Energy Storage System

BLPH	Base Load Power Hub
EPC	Engineering, Procurement and Construction
FGS	Fire and Gas Detection System
F&G	Fire and Gas
FERA	Fire and Explosion Risk Assessment
HKN	Hollandse Kust Noord
IR	Infra-Red
LEL	Lower Explosive Limit
UEL	Upper Explosive Limit
LFL	Lower Flammability Limit
UV	Ultraviolet
2ooN	Two out of N Voting Logic where N=1,2,3…

Table 2 - Definitions and Abbreviations

3 FIRE AND GAS DETECTION

Fire and Gas Detection System is required to continuously monitor all areas to detect unplanned process releases and fire events so as to prevent escalation of the initiating event and minimize its consequences. The intervention of the system shall be as early as possible to enable raising of an alarm and prompt intervention by the fire protection system. F&G system is installed at BLPH in case of confirmed fire and gas event, a site warning via speakers and beacons will be initiated.

For additional details refer to the Fire Protection philosophy, ref. [1].

3.1 FIRE AND GAS DETECTOR DESIGN APPROACH

Design of the F&G Detector layout was based on the following approach:

1. Identify hazards and characterize their effects using results from the Fire and Explosion Risk Assessment, ref. [2].
2. Identify and divide the platform in Fire Zones. Seven zones where identified in open area, in addition each enclosure represent a separate fire zone. This subdivision is clearly reported also in the F&G Cause and Effect Matrix, ref. [6]
3. Develop the detectors design, by assessing the hazard characteristics at each Fire Zone and determine detector type, number, principle of operation and location.

The Fire and Gas Layouts, ref.[3] and [4], was finally updated, after passing different reviews and location of each detector was determined as per the final 3D model, ref. [5], version.

All fire and gas detectors are connected to the Platform Fire & Gas Detection System (FGS) and are suitable for both the area where they are installed and the detection system to which they are connected.

All field mounted flammable fire and gas detectors (i.e. excluding smoke detectors inside unclassified buildings) are certified for use in a hazardous area Zone 1, even where they are installed in areas that are normally classified as non-hazardous.

3.2 FIRE ZONES

Platform areas are divided into seven fire zones and the enclosures, defined by segregation distance, equipment functions, or fire rated divisions, so as to assist with identification of fire and gas event location and to provide definition for detector voting group as well as control of extinguishing systems.

Automatic actions started in case of fire and gas alarm and fire and gas confirmation are detail in the Fire and Gas Cause and Effect Matrix, ref. [6].

3.3 FLAME DETECTORS

Flame Detectors are positioned toward the areas where a flame is expected. Their exact location, numbers and spacing depend on the layout of the area and selected position avoid any obstruction such as beams, piping and equipment as much as possible.

To avoid spurious flame detection for any detectors located in open areas, location and voting was carefully assessed. Hydrogen/air mixtures require very little energy to be ignited, and hydrogen has a very large range between its Lower Explosive Limits (LEL) and Upper Explosive Limits (UEL). This means a hydrogen leak can easily result in a jet fire. Furthermore, hydrogen burns with an invisible flame, thus UV type flame detectors are necessary for detection of hydrogen fires. However, to avoid spurious detection from any detectors located in open areas, UV-IR flame detectors are preferred since they generate an alarm signal only if a flame is detected on both bands.
The coverage of the flame detectors, as per Supplier data sheet, refer to Attachment 2 – Flame Detectors data-sheet, page 3 for details, cover a maximum distance of 20m in radius with a response time of around 6 s, while, being more conservative in terms of response time (1s) it guarantee a distance of 10m radius.

3.4 HYDROGEN GAS

Electro-chemical point gas detectors for hydrogen gas detection have been strategically located at elevated level (since hydrogen is lighted than gas), in proximity of enclosed spaces and air intakes where the risk of hydrogen loss of containment exists and they were mixed with acoustic gas detectors, located in some strategically areas, to increase the robustness of the F&G detection system. A minimum of two detectors was provided at each fire zone to guarantee 2ooN voting logic anywhere,, with N as minimum 3 at each fire zone.

Operations and maintenance personnel, when going to the platform, shall be equipped also with personal gas detection equipment, that will be the last layer of personal protection, selection of type and purchasing is not included in the EPC Contractors Scope of Work.

The correct location of reliable sensors is crucial for timely detection and alarming of hydrogen leaks before an explosive mixture is ignited. Hydrogen gas detectors were installed near possible leak sources (valves, hoses, flanges, connections, bellows, etc.), at elevation, below ceilings of enclosed spaces, and in correspondence to forced ventilation system inlets and outlets.

In relation with the gas point detectors, it was defined as per best practice and then also confirmed by the Supplier of these detectors (Draeger), that a coverage level with a radius of 5m is properly assigned to each of these sensors, considering the location in the platform. This indication is also matching with the DEP definition following "flammable gas in open area" as per DEP32.30.20.11 par. 5.3.3.1, ref. [8].

Therefore, a sphere with a diameter of 10m was included in the 3D model, to ensure proper coverage of the areas but these detectors, as shown in the appendix.

Regarding ultrasonic detectors, the sensor range depends on the Mass Flow leak to be detected, that is related with the hole size that is assumed to happen. Draeger provided the curve for the Mass Flow of 40g/sec for Signal [dB] vs Source Distance for the Ultrasonic detectors purchased. In our case, considering the case of H2 leaks we can follow the following table shared by Draeger:

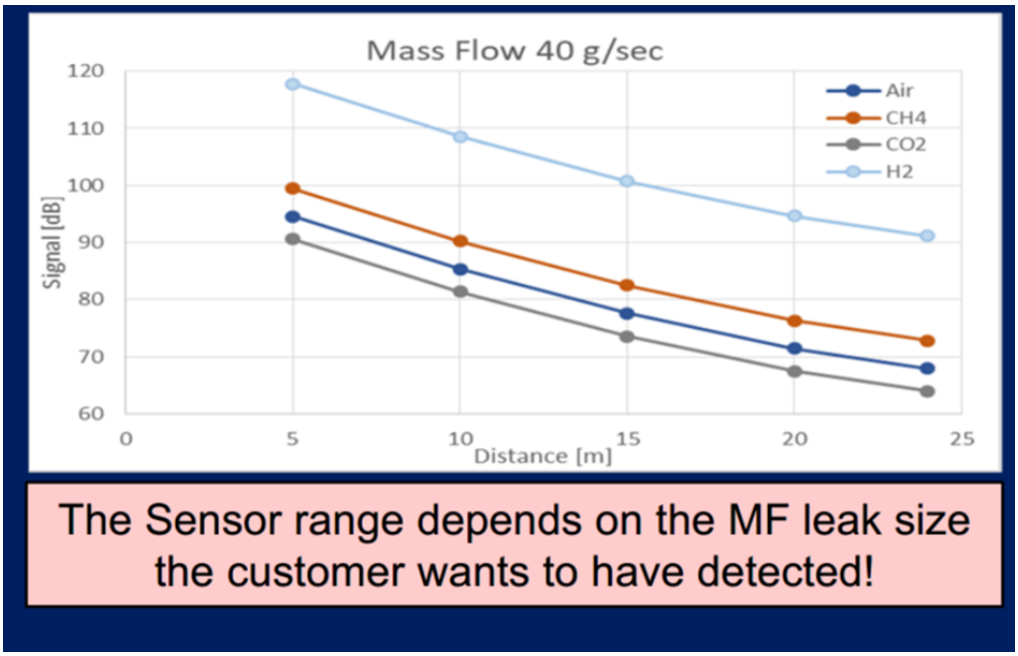


Figure 4 – Noise level versus Coverage

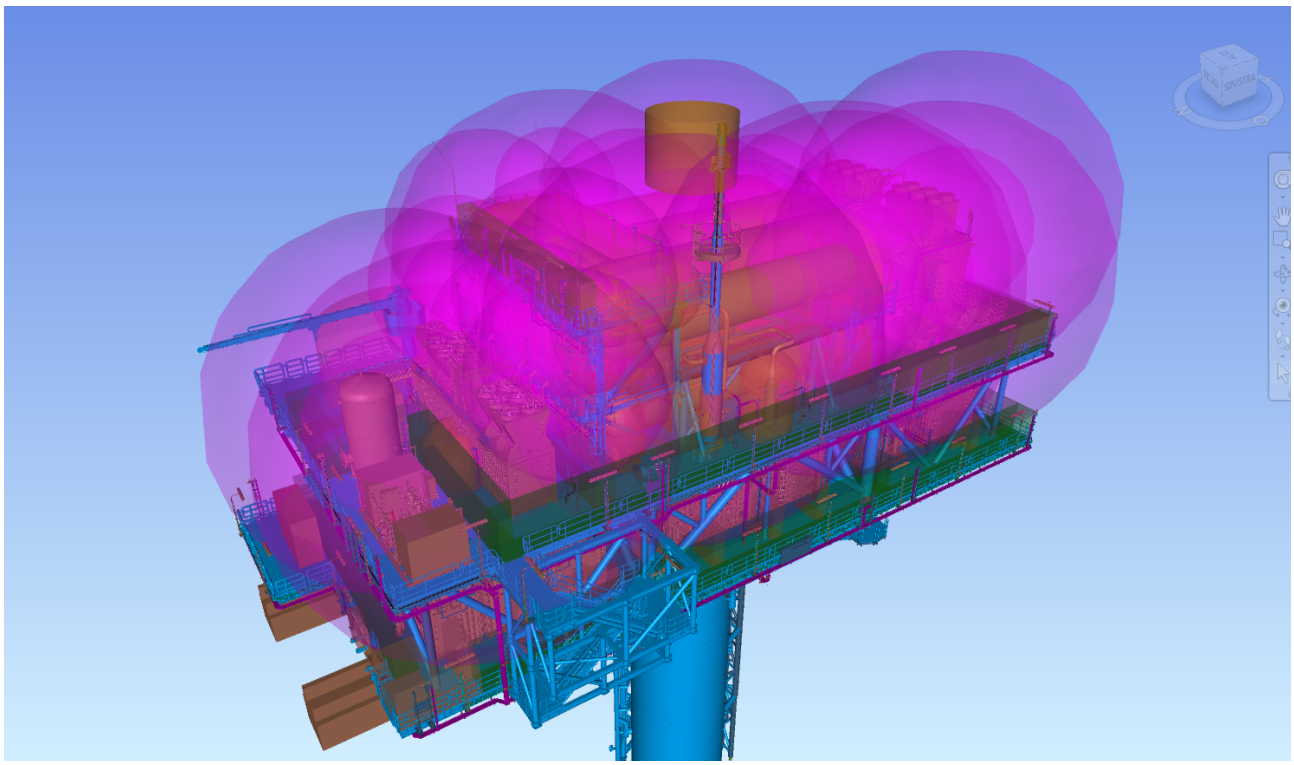
In our case, the minimum mass flow considered in the Fire and Explosion Risk Assessment, ref. [2], is 30g/s as per minimum hole size (5mm) and for 25mm, it is 760 g/s. Considering a background noise for normal operation, as per the noise study, ref. [7], lower than 80dB(A), we can confirm, that in a conservative approach the 10m of radius was properly assumed.

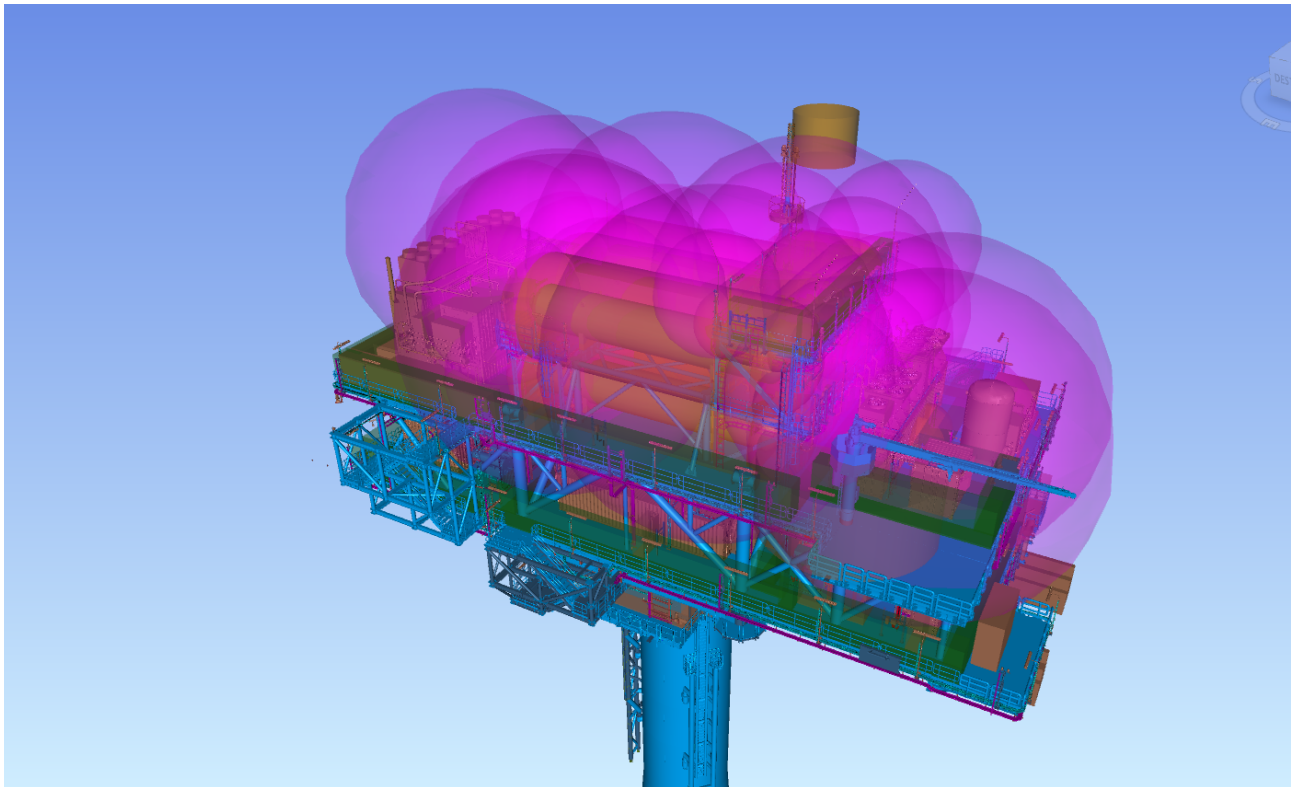
Above clarifications, in conjunction with Supplier data-sheets of detectors, the fire protection philosophy, ref. [1], the F&G layouts, ref.[3] and [4] and the 3D model, ref.[5], provide EPC Contractor with sufficient justification to the conclusion that the platform is properly designed and covered with the actual position of the fire and gas detectors.

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ANNEX 1 – GAS AND FLAME DETECTORS 3D DRAWINGS

The below picture shows the gas detectors coverage at the platform, extracted by the 3D model.





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ANNEX 2 – GAS AND FLAME DETECTORS DATASHEETS

HYDROGEN POINT DETECTORS

POS.	TAG NUMBER	SERVICE
1	950-GDZ-02101	H2 GD FZ-02 H2 STORAGE VESSELS AREA
2	950-GDZ-02102	H2 GD FZ-02 H2 STORAGE VESSELS AREA
3	950-GDZ-02103	H2 GD FZ-02 H2 STORAGE VESSELS AREA
4	950-GDZ-02104	H2 GD FZ-02 H2 STORAGE VESSELS AREA
5	950-GDZ-02105	H2 GD FZ-02 H2 STORAGE VESSELS AREA
6	950-GDZ-02106	H2 GD FZ-02 H2 STORAGE VESSELS AREA
7	950-GDZ-02107	H2 GD FZ-02 H2 STORAGE VESSELS AREA
8	950-GDZ-02108	H2 GD FZ-02 H2 STORAGE VESSELS AREA
9	950-GDZ-02109	H2 GD FZ-02 H2 STORAGE VESSELS AREA
10	950-GDZ-02110	H2 GD FZ-02 H2 STORAGE VESSELS AREA
11	950-GDZ-02111	H2 GD FZ-02 H2 STORAGE VESSELS AREA
12	950-GDZ-02112	H2 GD FZ-02 H2 STORAGE VESSELS AREA
13	950-GDZ-02113	H2 GD FZ-02 H2 STORAGE VESSELS AREA
14	950-GDZ-02114	H2 GD FZ-02 H2 STORAGE VESSELS AREA
15	950-GDZ-02115	H2 GD FZ-02 H2 STORAGE VESSELS AREA
16	950-GDZ-02116	H2 GD FZ-02 H2 STORAGE VESSELS AREA
17	950-GDZ-04201	H2 GD FZ-04 B-400 HVAC AIR INTAKE
18	950-GDZ-04202	H2 GD FZ-04 B-400 HVAC AIR INTAKE
19	950-GDZ-04203	H2 GD FZ-04 B-400 HVAC AIR INTAKE
20	950-GDZ-04204	H2 GD FZ-04 B-400 AMBIENT
21	950-GDZ-04205	H2 GD FZ-04 B-400 AMBIENT
22	950-GDZ-04206	H2 GD FZ-04 B-400 AMBIENT
23	950-GDZ-04207	H2 GD FZ-04 B-300 HVAC AIR INTAKE
24	950-GDZ-04208	H2 GD FZ-04 B-300 HVAC AIR INTAKE
25	950-GDZ-04209	H2 GD FZ-04 B-300 HVAC AIR INTAKE
26	950-GDZ-04210	H2 GD FZ-04 B-300 AMBIENT
27	950-GDZ-04211	H2 GD FZ-04 B-300 AMBIENT
28	950-GDZ-04212	H2 GD FZ-04 B-300 AMBIENT
29	950-GDZ-04213	H2 GD FZ-04 B-200 HVAC AIR INTAKE
30	950-GDZ-04214	H2 GD FZ-04 B-200 HVAC AIR INTAKE
31	950-GDZ-04215	H2 GD FZ-04 B-200 HVAC AIR INTAKE
32	950-GDZ-04216	H2 GD FZ-04 B-200 AMBIENT
33	950-GDZ-04217	H2 GD FZ-04 B-200 AMBIENT
34	950-GDZ-04218	H2 GD FZ-04 B-200 AMBIENT
35	950-GDZ-05101	H2 GD FZ-05 BESS AREA
36	950-GDZ-05102	H2 GD FZ-05 BESS AREA
37	950-GDZ-05103	H2 GD FZ-05 BESS AREA
38	950-GDZ-05104	
39	950-GDZ-05105	
40	950-GDZ-05106	
41	950-GDZ-06201	H2 GD FZ-06 B-100 HVAC AIR INTAKE
42	950-GDZ-06202	H2 GD FZ-06 B-100 HVAC AIR INTAKE
43	950-GDZ-06203	H2 GD FZ-06 B-100 HVAC AIR INTAKE
44	950-GDZ-06204	H2 GD FZ-06 B-100 AMBIENT
45	950-GDZ-06205	H2 GD FZ-06 B-100 AMBIENT
46	950-GDZ-06206	H2 GD FZ-06 B-100 AMBIENT
47	950-GDZ-03104	H2 GD FZ-03 ELECTROLYZER PK AREA
48	950-GDZ-03105	H2 GD FZ-03 ELECTROLYZER PK AREA
49	950-GDZ-01103	H2 GD FZ-03 ELECTROLYZER PK AREA

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Dräger Polytron® 8200 CAT
Detection of flammable gases and vapors

The Dräger Polytron® 8200 CAT is an advanced explosion-proof transmitter for the detection of combustible gases in the lower explosion limit (LEL). It uses a catalytic bead DrägerSensor® Ex that will detect most flammable gases and vapors. In addition to a 3-wire 4 to 20-mA analog output with relays it also offers HART®, Modbus and Fieldbus protocols, making it compatible with most control systems.



Dräger. Technology for Life®

Benefits

Fast and stable – the DrägerSensor® Ex

The built-in DrägerSensor® Ex is based on the proven catalytic bead measuring principle. It has excellent long-term stability with outstanding poison resistance. And this is the reason for its durability. Due to the novel gas inlet opening, the sensor responds to gas in only a few seconds. This allows you to react immediately with countermeasures and prevent the development of a flammable atmosphere.

Easy device management via digital communication

The Dräger Polytron 8200 is equipped with digital interfaces allowing for quick and easy remote interrogation of the transmitter's state. Integration with existing asset management systems such as PACTware™ is possible via DTM. In addition to the common HART® communication system, the fieldbus interfaces PROFIBUS® PA, FOUNDATION fieldbus™ H1, and Modbus RTU are also available.

Same design, same operating principle

The Dräger Polytron 8200 belongs to the Polytron 8000 series. All transmitters in this series have the same design and user interface. This allows for uniform operation with reduced training and maintenance requirements. The large graphic backlit display shows status information clearly and in an easy to use format. The measured gas concentration, selected gas type, and measuring unit are displayed during normal operation. Colored LEDs (green, yellow and red) provide additional alarm and status information.

The Polytron 8200 is operated by means of a magnetic wand over contact surfaces.

Three relays for controlling external equipment

Upon request, the Dräger Polytron 8200 can also be supplied with three integrated relays. This enables you to use it as an independent gas detection system with two arbitrarily adjustable concentration alarms and one fault alarm. Audible alarms, signal lights or similar devices can thus be controlled locally without an additional cable between the transmitter and central controller.

Safe, robust housing for every application

Polytron 8200 features a Class I, Div. 1 rated explosion proof enclosure made from aluminium or stainless steel, making it suitable for a wide range of environmental conditions.

Make the impossible possible with the remote sensor

A remote explosion proof junction allows installation of the sensor up to 350' away from the transmitter in difficult to access areas. A permanently attached remote calibration adapter allows for remote bump testing or calibration from the Polytron display by using permanently attached tubing that takes the calibration gas to the sensor.

Technical Data

Dräger Polytron® 8200 CAT

Type	Explosion proof / flameproof enclosed transmitter (“d”)		
Gases	Flammable gases and vapors		
Measuring ranges	DQ	0 to 100 % LEL	
	LC	0 to 10 % LEL	
Display	Backlit graphic LCD; 3 Status LEDs (green/yellow/red)		
Performance Characteristics	Accuracy/repeatability	Zero	≤ 1 % LEL
		Span	≤ 1 % LEL
		Long-term drift	≤ 3 % LEL after 6 months
	Response time	T50	< 7 seconds (methane)
		T90	< 13 seconds (methane)
Electrical data	Signal output analog	Normal operation	4 to 20 mA, 3- or 4-wire, sink or source
		Maintenance	Constant 3.4 mA (adjustable)
		Fault	< 1.2 mA
	Signal output digital	HART® w/ 3- or 4-wire, PROFIBUS® PA, FOUNDATION fieldbus™ H1 and Modbus RTU w/ 5-wires	
	Power supply	10 to 30 V DC	
	Power consumption (max.)	DQ w/o relay, non-remote	105 mA at 24 V
		DQ w/ relay, remote	145 mA at 24 V
	Relay specification (option)	2 alarm relays and 1 fault relay, SPDT 5 A @ 230 VAC, 5 A @ 30 VDC	
Environmental conditions (see sensor data sheet)	Temperature	-40 to 80 °C (-40 to 176 °F) without relay -40 to 70 °C (-40 to 158 °F) with relay- -50 to 85 °C (-122 to 185 °F) remote sensor	
	Pressure	23.6 to 38.4 inch Hg / 800 to 1,200 mbar	
	Humidity	5 to 95% r. h., non-condensing	
Housing	Transmitter housing	Epoxy coated copper-free aluminium or stainless steel SS316 L	
	Sensor housing	Stainless steel 303	
	Enclosure protection type	NEMA 4X & 7, IP65/66/67	
	Cable entry point	3/4" NPT threaded holes or M20 cable gland	
	Dimensions (H x W x D)	11.0" x 5.9" x 5.1" / 280 x 150 x 130 mm	
	Weight, approx.	Aluminium	4.9 lbs / 2.2 kg
		SS316 L	8.8 lbs / 4.0 kg
Approvals*	UL & CSA	Class I, Div 1, Groups A, B, C, D;	
		Class II, Div 1, Groups E, F, G;	
		Class I, Zone 1, Group IIC;	
		T-Code T6/T4	
	IECEx	Ex db IIC T6/T4 Gb, -40 ≤ Ta ≤ +40/+70 °C;	
	ATEX	II 2G Ex db IIC T6/T4 Gb, -40 ≤ Ta ≤ +40/+70 °C;	
	CE markings	ATEX (Directive 2014/34/EU)	
		Electromagnetic Compatibility (Directive 2014/30/EU)	
		Low Voltage (Directive 2014/35/EU)	
	Shipping approvals (for DQ sensor only)	DNV GL, ABS, LR, CCS, RMRS	
	MED approval (for DQ sensor only)	Certificate No. MEDB0000411	

Technical Data

	DEKRA Performance approval (for DQ sensor only)	Certificate No. BVS 13 ATEX G 001 X
	SIL 2 certified by TUEV Sued	Certificate No. Z10 053474 0023

* All docking station versions are only ATEX/IECEx approved

Ordering Information

Dräger Polytron® 8200 CAT	Approval Code	Order Number
Dräger Polytron® 8200 CAT DQ d A 4-20/HART®	XTR 0410	83 44 439
Dräger Polytron® 8200 CAT DQ d A 4-20/HART® relay	XTR 0411	83 44 440
Dräger Polytron® 8200 CAT DQ d S 4-20/HART®	XTR 0510	83 44 448
Dräger Polytron® 8200 CAT DQ d S 4-20/HART® relay	XTR 0511	83 44 449
Dräger Polytron® 8xx0 Kit (Custom configuration e. g. LC sensor or bus communication)		83 44 800

Accessories		Order Number
Magnetic wand		45 44 101
Pipe mount bracket		45 44 198
Aluminum junction box for remote sensor ‘d’		45 44 099
Stainless steel junction box for remote sensor ‘d’		45 44 098
Duct mount kit		68 12 725
IR Connection Kit Polytron® 5000/8000		45 44 197
PolySoft licence (1 year)		83 28 600
PolySoft licence (subscription)		83 28 601
Splash guard		68 12 510
Weather protection kit Dräger Polytron® 5/6/8xxx		37 02 198
Gassing adapter	PE, w/o tubing	68 06 978
	PE incl. tubing	46 09 314
Calibration adapter Viton®		68 10 536
Process adapter (Stainless steel) for DQ		68 12 470
Process adapter (Stainless steel) for LC		68 12 465

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FOUNDATION fieldbus™ is a registered trademark of the Fieldbus Foundation™.
PROFIBUS® is a registered trademark of PROFIBUS and PROFINET International (PI).
PACTware™ is a registered trademark of Pepperl+Fuchs GmbH.
Viton® is a registered trademark of the DuPont company.
Windows® is a registered trademark of Microsoft Corporation.

HYDROGEN ULTRASONIC LEAK DETECTORS

POS.	TAG NUMBER	SERVICE
1	950-GDZ-01101	H2 GD FZ-01 FUEL CELL PK AREA
2	950-GDZ-01102	H2 GD FZ-01 FUEL CELL PK AREA
3	950-GDZ-02117	H2 GD FZ-02 H2 STORAGE VESSELS AREA
4	950-GDZ-02118	H2 GD FZ-02 H2 STORAGE VESSELS AREA
5	950-GKDZ-02119	H2 GD FZ-02 H2 STORAGE VESSELS AREA
6	950-GDZ-02120	H2 GD FZ-02 H2 STORAGE VESSELS AREA
7	950-GDZ-03101	H2 GD FZ-03 ELECTROLYZER PK AREA
8	950-GDZ-03102	H2 GD FZ-03 ELECTROLYZER PK AREA
9	950-GDZ-03103	H2 GD FZ-03 ELECTROLYZER PK AREA

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Dräger Polytron® 8900 UGLD
Ultrasonic Gas Leak Detector

The Dräger Polytron® 8900 UGLD transmitter is an early warning area monitor for detecting high-pressure gas leaks in outdoor industrial process environments. Thanks to an ultrasonic acoustic sensor, it responds earlier than conventional gas detectors because it registers the sound of leaking gas instead of measuring the concentration of accumulated gas clouds. As gas escapes, leaks are immediately detected in the surrounding area, regardless of the wind direction.



Dräger. Technology for Life®

Benefits

Ultrasonic sensor technology – the early warning system for gas leaks

Typical gas detection systems used to monitor pressurised gas pipes or containers in industrial environments only detect a gas leak if the gas is in the immediate vicinity of the gas sensor. Environmental influences such as wind can delay or prevent a gas cloud from being detected by gas sensors. On the contrary, the Dräger Polytron 8900 UGLD is not affected by environmental factors and detects a high-pressure gas leak as soon as gas escapes. Effective early gas leak warnings can prevent unnecessary shutdowns, saving time and money.

A perfect complement to your gas detection system

The Dräger Polytron 8900 extends the Polytron 8000 series family with acoustic gas leak detection. All transmitters in this series have the same design and an identical user interface. A common user interface ensures that little training or maintenance is required for existing users. The Polytron 8900 UGLD perfectly complements existing flame and gas detection systems with reliable early gas leak warnings.

Delivers results that are easy to understand

For easy interpretation of results, the measured values on the display of the Polytron 8900 UGLD are shown from 0 to 100 percent of the full scale decibel sensitivity range. The ultrasound level is immediately displayed and transmitted without the use of difficult to interpret artificial intelligence. Alarms are configured at a specific level above a predetermined background noise level. Additionally, a time delay of up to 30 seconds can be set in the control system.

Can even detect gas leaks in loud industrial environments

Loud process areas generate noise which is mostly in the audible spectrum. Gas leaks from pressurized vessels above 10 bar generate both audible sound and inaudible ultrasound. Since Polytron 8900 is tuned to measure in the ultrasound spectrum, it can easily identify gas leaks with a leak rate of 100 g/sec in a 65 ft radius circle.

Robust design and fully-sealed sensor

The Polytron 8900 UGLD is an explosion-proof transmitter with a sensor housed in a galvanically-isolated, intrinsically-safe enclosure. The sensor is an ultrasonic microphone that is completely sealed in PVCC, making it impervious to water and dirt. It provides reliable readings without the need for an additional environmental protection baffle. Regular calibration is not necessary, but unlike some other UGLDs on the market, calibration is possible and easy. The expected lifespan of the ultrasonic sensor is more than 10 years.

Technical Data

Dräger Polytron® 8900 UGLD

Type	Explosion proof / flameproof enclosed transmitter (“d”) or combined with increased safety (“d/e”)		
Gases	Flammable and toxic gases such as hydrogen, methane, ethylene, propane, CO_2, nitrogen and hydrogen sulphide		
Measurement ranges	0-100% equivalent to 55-110 dB; typical alarm setting 10% UGLD signal above background		
Display	Back-lit graphic LCD display; 3 status LEDs (green/yellow/red)		
Sensor Type	PVCC coated piezoelectric microphone with built-in automatic self-test sound generator		
Sensor Performance	Response Time	< 3 sec.	
	Minimum Pressure	> 2 bar (29 psi) Methane	
	Coverage Radius	6.5ft -65 ft depending on gas type, leak rate and background noise	
	Frequency Range	18 kHz - 80 kHz	
Electrical data	Analogue signal output	Normal operation	4 to 20 mA
		Maintenance	Constant 3.4 mA or
			4 mA ±1 mA
			1 Hz modulation; (adjustable)
		Fault	< 1,2 mA
	Digital signal output	HART®	
	Power supply	10 to 30 V DC, 3-wire	
	Power consumption	w/ relay, remote	100 mA at 24 V
	Relay specification	Two alarm relays and one error relay, SPDT 5 A @ 230 VAC, 5 A @ 30 VDC	

Environmental conditions (See sensor data sheet)	Temperature	-40 to 70°C (-40 to 158°F) with relays
	Pressure	700 to 1,300 mbar
	Humidity	0 to 100 % relative humidity
Housing	Transmitter housing	Stainless steel SS316L
	Sensor housing	Polyamide 6
	Housing protection type	NEMA 4X & 7, IP65/66/67
	Cable entry	Three ¾" NPT thread openings or M20 cable gland
	Dimensions (H × W × D)	11.02" x 5.90" x 5.12" inches
	Weight, approx.	11 lbs
Approvals	UL	Class I, Div 1, Groups A, B, C, D; Class I, Zone 1, Group IIC; T-Code T4
	CSA*	Class I, Div 1, Groups A, B, C, D; Class I, Zone 1, Group IIC; T-Code T4
	IECEx	Ex db [ia] IIC T4 Gb, -40 ≤ Ta ≤ +40 / +70 °C Ex db eb [ia] IIC T4 Gb, -40 ≤ Ta ≤ +40/ +70°C; “e” version;
	ATEX	II 2G Ex db [ia] IIC T4 Gb, -40 ≤ Ta ≤ +40 / +70 °C II 2G Ex db eb [ia] IIC T4 Gb, -40 ≤ Ta ≤ +40/+70°C; “e” version
	CE Markings	ATEX (Directive 2014/34/EU) Electromagnetic compatibility (Directive 2014/30/EU) Low voltage (Directive 2014/35/EU)
	Marine approval*	DNV-GL

Technical Data

	SIL 2	Certificate TÜV Süd

* Pending

Ordering Information

Dräger Polytron® 8900 UGLD	Approval code	Part number
Polytron® 8900 UGLD d S 4-20/HART® Relay Stainless Steel Ex d Housing with 4-20mA HART® output and 3 Relays	ETR 0521	83 28 030

Accessories		Part number
Magnetic Wand		45 44 101
Remote Sensing Head with wall mount kit		83 28 021
Connecting cable with plug for the Remote Sensing Head	5 m	83 23 305
	15 m	83 23 315
	30 m	83 23 330
UGLD Calibration and Bump Test Kit w/o Air Cylinder		83 28 042
Zero Air Gas Cylinder 103L for Calibration and Bump Test Kit		45 10 058
Pole Mount Kit		45 44 198
Polysoft Basic (one year license)		83 28 600
Polysoft Basic (Subscription – yearly fee)		83 28 601
IR Connection Kit (requires PolySoft)		45 44 197

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FLAME DETECTOR

POS.	TAG NUMBER	SERVICE
1	950-FDZ-01101	FZ-01 FUEL CELL PK AREA
2	950-FDZ-01102	FZ-01 FUEL CELL PK AREA
3	950-FDZ-01103	FZ-01 FUEL CELL PK AREA
4	950-FDZ-01104	FZ-01 FUEL CELL PK AREA
5	950-FDZ-02101	FZ-02 H2 STORAGE VESSELS AREA
6	950-FDZ-02102	FZ-02 H2 STORAGE VESSELS AREA
7	950-FDZ-02103	FZ-02 H2 STORAGE VESSELS AREA
8	950-FDZ-02104	FZ-02 H2 STORAGE VESSELS AREA
9	950-FDZ-03101	FZ-03 ELECTROLYZER PK AREA
10	950-FDZ-03102	FZ-03 ELECTROLYZER PK AREA
11	950-FDZ-03103	FZ-03 ELECTROLYZER PK AREA
12	950-FDZ-03104	FZ-03 ELECTROLYZER PK AREA
13	950-FDZ-04101	FZ-04 B-400/B-300/B-200 AREA
14	950-FDZ-04102	FZ-04 B-400/B-300/B-200 AREA
15	950-FDZ-04103	FZ-04 B-400/B-300/B-200 AREA
16	950-FDZ-04104	FZ-04 B-400/B-300/B-200 AREA
17	950-FDZ-05101	FZ-05 BESS AREA
18	950-FDZ-05102	FZ-05 BESS AREA
19	950-FDZ-05103	FZ-05 BESS AREA
20	950-FDZ-05104	FZ-05 BESS AREA
21	950-FDZ-06101	FZ-06 B-100 AREA
22	950-FDZ-06103	FZ-06 B-100 AREA

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FlameSpec
UV-IR
UV-IR Flame Detector



The FlameSpec UV-IR will detect fires and explosions extremely quickly, thereby allowing mitigation steps to be initiated more rapidly to limit event escalation.

Introduction

The FlameSpec-UV-IR flame detector provides ultra-fast response, high performance and reliable detection of a large variety of fires including hydrocarbon fires (visible and non-visible), as well as hydrogen and methane/hydrogen mixed fires. The detector addresses slow growing fires as well as fast eruptions of fire using improved UV-IR technology. The detector operates in all weather and light conditions.

Key Benefits

- High immunity to false alarm
- High sensitivity – up to 100 ft. (30m) for a 1 ft^2 (0.1m^2) n-heptane pan fire.
- Hydrocarbon and non-hydrocarbon flame detection.
- Ultra-fast detection mode detection within 5 milliseconds for fireballs or explosions
- High speed (<0.5s) model [X5] available for compliance with NFPA 33.
- Four sensitivity levels.
- Universal outputs, 3 and 4 wire, 4-20 mA sink / source, Fire, Auxiliary and Fault Relays. RS485 port using Modbus RTU.
- Event logger – alarms, faults and other relevant events are logged to non-volatile memory
- Built-in-Test (BIT) – Automatic and manual self-test of window cleanliness and overall detector operation.
- Dirty optics warning for preventive maintenance needs.
- HART® 7, for configuration & maintenance - option available.
- Window heater to avoid condensation and icing.
- Stainless steel tilt mount with horizontal and vertical adjustment.
- Functional safety - SIL 2 capable - option available.
- Detect high UV (sparks and arcs) or IR levels via auxiliary relay and 4-20mA.

Fire and Gas Detection Technologies Inc. | 4222 E. La Palma Ave. Anaheim, CA 92807 USA
Tel: (+1) 714-671-8500 | support@fg-detection.com
Version: F110V0010.08 • May 2023

FlameSpec UV-IR

UV-IR Flame Detector

Model: FLS-UV-IR

Response Characteristics

Fuel	Size	Sensitivity	Distance ft. (m)	Avrg Resp.Time (s)
N-Heptane	1 x 1 ft.	Extreme	98 (30)	2.0
N-Heptane	1 x 1 ft.	High	75 (23)	1.7
N-Heptane	1 x 1 ft.	Medium	49 (15)	1.0
N-Heptane	1 x 1 ft.	Low	16 (5)	1.0
Gasoline	2 x 2 ft.	Extreme	197 (60)	3.3
Gasoline	1 x 1 ft.	Extreme	98 (30)	1.8
Gasoline	1 x 1 ft.	Medium	49 (15)	1.3
Methane	32-in Plume	Extreme	59 (18)	1.4
Methane	32-in Plume	Medium	30 (9)	0.9
LPG	32-in Plume	Extreme	75 (23)	1.2
LPG	32-in Plume	High	56 (17)	1.6
LPG	32-in Plume	Medium	33 (10)	1.2
LPG	32-in Plume	Low	13 (4)	1.2
Diesel	1 x 1 ft.	Extreme	75 (23)	2.6
Diesel	1 x 1 ft.	Medium	36 (11)	1.2
JP5	1 x 1 ft.	Extreme	75 (23)	3.3
JP5	1 x 1 ft.	High	56 (17)	1.8
JP5	1 x 1 ft.	Medium	36 (11)	1.2
JP5	1 x 1 ft.	Low	16 (5)	1.2
Kerosene	1 x 1 ft.	Extreme	75 (23)	1.8
Kerosene	1 x 1 ft.	Medium	36 (11)	0.9
Methanol	1 x 1 ft.	Extreme	52 (16)	0.8
Methanol	1 x 1 ft.	High	43 (13)	3.2
Methanol	1 x 1 ft.	Medium	30 (9)	1.3
Methanol	1 x 1 ft.	Low	10 (3)	2.7
Ethanol	1 x 1 ft.	Extreme	62 (19)	4.1
Ethanol	1 x 1 ft.	Medium	31 (9.5)	2.9
Isopropanol	1 x 1 ft.	Extreme	75 (23)	2.2
Isopropanol	1 x 1 ft.	Medium	36 (11)	0.8
Polypropylene	1 x 1 ft.	Extreme	49 (15)	1.4
Polypropylene	1 x 1 ft.	Medium	23 (7)	0.9
Hydrogen	32-in Plume	Extreme	66 (20)	6.4
Hydrogen	32-in Plume	Medium	33 (10)	1.0
Syngas (30%CH_4:70%H_2)	32-in Plume	Extreme	59 (18)	3.2
Syngas (30%CH_4:70%H_2)	32-in Plume	Medium	33 (10)	1.2

FlameSpec UV-IR

UV-IR Flame Detector

Model: FLS-UV-IR

Immunity to False Alarm

False Alarm Source	Modulated		Unmodulated	
	Distance ft. (m)	Response	Distance ft. (m)	Response
Sunlight, Direct, Reflected		No Alarm		No Alarm
Incandescent frosted glass light, 300W	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Fluorescent, 70W (3x23.3W)	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Electric arc	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Arc welding	10.0 (3.0)	No Alarm	10.0 (3.0)	No Alarm
Radiation heater, 2000W	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Halogen lamp (500W) non-shielded	7.0 (2.0)	No Alarm	7.0 (2.0)	No Alarm
Halogen lamp (1000W)	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Mercury vapor lamp 160Wx3	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Exhausts	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Projector led	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Solenoid bell	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
soldering iron	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm
Electric Drill	2.0 (0.5)	No Alarm	2.0 (0.5)	No Alarm

FlameSpec UV-IR

UV-IR Flame Detector

Model: FLS-UV-IR

FIRE DETECTION	**Detection time and distance**	5ms for fast burst of explosion 1s for 1 ft² (0.1m²) n-heptane pan fire at 0–50 ft. (0–15m) < 2s for 1 ft² (0.1m²) n-heptane pan fire at 50–100 ft. (15–30m)
	Sensitivity Range	4 sensitivity ranges: Extreme, High, Medium, Low
	Field of view (IR detection)	90° Horizontal, 80° Vertical
	Time Delay	0-30 seconds
	Built in Test	Automatic and Manual
ELECTRICAL SPECIFICATIONS	**Operating Voltage**	24 VDC nominal (18-32 VDC)
	Current Consumption	Standby: 120mA 180mA all systems in operation (including window heater)
	Electrical Entries	2x cable and conduit entries 3/4" NPT(F) or M25x1.5
	Wiring	14-17 AWG (2.5–1.0 mm²)
OUTPUTS	**Relays**	SPST volt-free contacts rated 2A at 30 VDC 3 relays: Alarm & Auxiliary – normally open; Fault – normally closed
	0-20mA (stepped) current output	3 wire and 4 wire (isolated) configurations (sink and source) HART® rev 7.0 (option available)
	Indication	Tri-color LED (Green, Yellow, Red)
	Modbus	RTU compatible on RS-485
MECHANICAL SPECIFICATIONS	**Size**	5.51 x 3.54 × 3.54" (140×90×90mm)
	Weight	Detector (Stainless Steel 316): 6.6 lbs. (3.0 kg) Tilt mount (Stainless Steel 316): 3.3 lbs. (1.5 kg)
ENVIRONMENTAL SPECIFICATIONS	**Temperature Range**	Operating: -67°F to +185°F (-55°C to +85°C) Storage: -67°F to +185°F (-55°C to +85°C)
	Humidity	Up to 99% (RH), non-condensing
	Ingress Protection	IP66 & 68 (2m, 24hr); NEMA 4X & 6P
APPROVALS	**ATEX**	ATEX: II 2 G D Ex db IIC T5 Gb or Ex db eb IIC T5 Gb and Ex tb IIIC T95°C Db -55°C<Ta<75°C Ex db IIC T4 Gb or Ex db eb IIC T4 Gb and Ex tb IIIC T105°C Db -55°C<Ta<85°C
	IECEx, INMETRO & PESO	Ex db IIC T5 Gb -50°C≤Ta≤75°C Ex db IIC T4 Gb -50°C≤Ta≤85°C
	FMus & FMc	Class I, Div. 1, Groups B, C & D; T4 Class I, Zone 1, AEx/Ex db IIC T4 Gb T4 -50°C≤Ta≤85°C T5 -50°C≤Ta≤75°C
	EAC CU TR	1Ex d IIC T5 Gb or 1Ex de IIC T5 Gb and Ex tb IIIC T95°C Db -55°C≤Ta≤75°C 1Ex d IIC T4 Gb or 1Ex de IIC T4 Gb and Ex tb IIIC T105°C Db -55°C≤Ta≤85°C
	Performance	ANSI FM 3260 EN 54-10
	Functional safety	Certified SIL2 capable per IEC 61508:2010 High & Low demand (option available)
ACCESSORIES	**Tilt mount, model FLS-TMO-S01**	**High vibration mounting bracket, model FLS-MIL-S01**
	Weather cover, model FLS-WCO-S01	**Flame simulator, model FLS-FSIM-UV-IR-KIT**
	2" & 3" pole mount adapter, model FLS-PMA-S23	**Airshield, model FLS-ASD-S01**
	Duct mount with window, model FLS-DMW-S01	**Duct mount for airshield, model FLS-DMX-S01**
WARRANTY	**5 years**	