



IREX
Pellistor Replacement Infrared
Gas Detector

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1. Introduction

IREX is specifically designed to enable pellistor based gas detection systems to be upgraded to infrared technology without changing the original control system, junction boxes or cables.

IREX is a sinter-free, fully featured infrared gas detector that produces a mV Wheatstone Bridge output as used on conventional pellistor based systems.

IREX replaces old pellistor heads by simply mounting on the original junction box, and connecting to the original cable. The IREX concept enables upgrade to dual-wavelength IR gas detector technology without incurring the very significant costs associated with replacing the control system and re-installation.

The problem with pellistors

Pellistors (or Catalytic Beads) have been the flammable gas sensor of choice for oil and gas applications and general industry. Pellistors do however have several technical limitations:

- They do not fail safe: pellistors are easily poisoned by substances such as silicones, sulphur and lead, rendering them insensitive to gas.
- Pellistors must be operated behind a sinter (flame arrestor): which may become blocked; thus preventing gas from reaching the sensor.
- Pellistors are high maintenance: sensors must be regularly tested with gas to ensure they are operational. Pellistors typically last 3-5 years only.
- Pellistors may burn-out if exposed to flammable gas concentrations above 100%lel.
- Pellistors need oxygen to be present to work; their efficiency reduces in oxygen deficient environments.

IREX overcomes all of these issues, and delivers highly dependable and rapid gas detection with no un-revealed failures.

2. Product Description

IREX is a completely new IR gas detector designed specifically for replacing pellistor-based detectors (IREX stands for *InfraRed EXchange*). IREX first and foremost is a highly sophisticated IR flammable gas detector, which utilises the very latest IR gas sensing components and techniques.

IREX is constructed using 316 stainless steel and is compliant with the latest safety and performance standards. IREX is a match for any IR gas detector on the market; regardless of price in terms of gas sensitivity, stability and response time.

IREX is supplied with an M20 spigot gland (1/2" NPT optional) to enable fitment to existing detector junction boxes. Once the original detector head has been removed IREX can be fitted and connected to the original cable terminals. The control card can then be set-up and calibrated as before.



DI5/6 Pellistor Based Detector



IREX fitted to original junction box

IREX is designed to replace any pellistor-based detector with a mV Bridge output signal (ie not 4-20mA), and for compatibility with any pellistor control module.

Crowcon/DI detector heads suitable for replacement:

- DI 5/6
- DI 9
- 81HD
- 96HD



DI Control Rack

Crowcon, DI and other manufacturers control cards to which IREX can be connected:

- | | |
|--|---|
| <ul style="list-style-type: none"> • DI-800 • DI 1-11 • Gaswarden | <ul style="list-style-type: none"> • Wormald 2003A-1 • GP Elliot • Ferranti FG 501 |
|--|---|

IREX is designed for compatibility with virtually any mV Bridge type detector or control system.

Contact Crowcon to confirm compatibility with any controller not listed above.

3. Markets and Applications

IREX is primarily designed to meet the requirements of the up-stream oil and gas drilling and production industries, and can replace pellistor detectors in virtually any hydrocarbon application.

Offshore oil and gas production

Many production platforms and vessels still rely on pellistor-based detectors for flammable gas detection, and are still equipped with old control systems that are not compatible with conventional 4-20mA type IR detectors.

Platform technicians generally understand the benefits of IR gas detectors, but are unable to upgrade their detectors without also swapping-out the control system. With the growing requirement to comply with the IEC61508 functional safety standard, any control system upgrade would be hugely expensive.

IREX will work with the original control system, thus operators can improve safety and reduce maintenance without incurring significant costs.

IREX complies with the general needs of this market:

- Point IR hydrocarbon detectors with fast response.
- 316 Stainless Steel construction (corrosion resistance in a saline environment).
- Dependability: IEC61508 SIL 2 compliance.
- Long life with low maintenance costs.
- ATEX Zone 1 & 2 Gas group IIB, or Class 1 Div 1 Groups B,C,D approvals (pending).

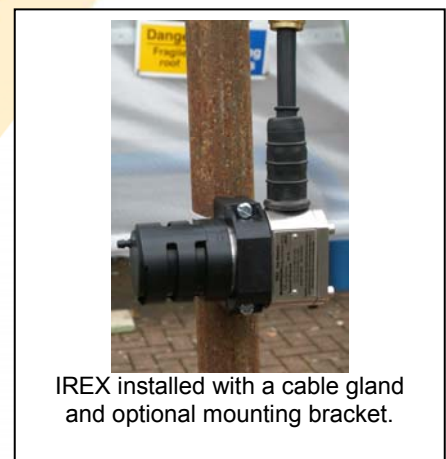


General Markets

IREX can in theory be used to replace any pellistor detector head, or complete detector. IREX can be supplied without the M20 spigot gland (refer to diagram on Page 11), and is then suitable for direct cable connection using an M20 cable gland. The optional bracket can be used to secure IREX to a wall or 2" (50mm) pipe (see photo opposite).

There are two important factors to consider when replacing detector heads:

1. Certification: if the pellistor head is mounted to an Exd certified junction box, changing the detector may breach the certification.



IREX installed with a cable gland and optional mounting bracket.

2. Compatibility: tests may be necessary first to ensure IREX is compatible with the amplifier circuitry.

It is advised that Crowcon are contacted before quoting IREX for new applications so that compatibility and certification issues can be investigated.

4. Sales Platform

IREX is targeted primarily at older installations that still utilise Gas detection systems designed 15+ years ago. The vast majority of older installations will have been designed to use pellistor gas sensors, and the control systems will be incompatible with modern 4-20mA type devices. Owners and operators will be very familiar with the high maintenance requirements of pellistors, but might not be so aware of the risk of poisoning or of blocked sinters; both of which may represent a dangerous 'un-revealed failure' (ie the sensor will not detect gas, but appears healthy to the control card).

IR gas detector technology overcomes the limitations of pellistors, but IR detectors are generally 4-20mA type devices and are thus inherently incompatible with older control systems. Owners/operators are thus left with two options:

1. Change-out the whole system, which can be very expensive and may involve complicated and time-consuming 'SIL' assessment of the new system.
2. Persevere with pellistors and accept the high maintenance costs and inherent sensor limitations.

IREX provides a third option: upgrade detectors to IR technology and retain the original control system.

IREX will be sold via quotation only. It is essential that Crowcon know the specific model of control system to which IREX is to be connected for any project.

Features and Benefits

- **Sinter-free operation:** pellistor based detectors and other IR type gas detectors are fitted with sinters (flame arrestors) to achieve Exd Flameproof certification. Sintors slow response time significantly and can become blocked by contaminants: a dangerous un-revealed failure.
- **Fast response:** with a T90 response time of less than 7 seconds, IREX competes with even the most expensive conventional IR gas detectors.
- **Excellent zero stability:** drift issues associated with pellistors and cables are eliminated.

- **Condensation-free optics:** optical components are treated with a coating to prevent potential obscuration in condensing atmospheres, without increasing power requirements above that of a pellistor.
- **Minimal maintenance:** IREX employs sophisticated systems and algorithms to ensure reliable operation at all times. No adjustments are necessary at the detector, zero and span adjustments (if required) are performed at the control panel only.
- **Remote gassing:** gas response tests and calibration can be performed without the need to access the detector. Test gas can be applied remotely via a tube to the standard weather cover.
- **Minimal operating costs:** IREX is designed to provide in excess of 10 years operation; there are no sensors which need to be replaced, and routine testing requirements are minimised.
- **Ultimate dependability:** IREX is designed to achieve IEC61508 SIL 2 compliance.
- **3rd-Party validation:** IREX will be fully tested in simulated offshore environments by a highly respected testing authority.
- **No un-revealed failures:** a fault signal is produced when the optical system becomes 75% obscured by contaminants, or in the unlikely event of any component failure.
- **Replaceable mirror:** the mirror used in IREX is designed to be highly durable. However 12 years of IR detector manufacturing experience has proved that mirrors can become damaged on-site. IR detectors usually need to be returned to the manufacturer in order for mirrors to be replaced. The mirror can simply be replaced on-site, avoiding unnecessary down-time.

Legislation

Local authorities such as the UK Health and Safety Executive (HSE) issue guidelines and standards for specific industries. Standards may oblige plant operators to consider the latest technologies for their safety systems. IREX provides the solution for complying with any such requirements: Infrared is the most dependable technology for fixed-point hydrocarbon gas detection.

5. Competitor Comparisons

Detailed specification comparison chart available on request.

Selling Against the Amgas LEDPoint PRS

Feature	Benefit	Comment on LEDPoint PRS
Sinter-free design	No sinter to become blocked, fast response time, no un-revealed failures	LEDPoint PRS is also sinter-free, but has a longer response time.
Fast response	IREX has a T90 response time <7 seconds for rapid hazard detection.	The standard version T90 is 15 seconds; a 'special' 5 second version is available but may entail stability/price compromises.
Zero stability by design.	Provides dependable zero stability with old cables/terminals.	The LEDPoint PRS is promoted as being zero-stable.
Remote calibration	IREX can be calibrated by applying gas remotely. No calibration cap or access to the detector is required in normal conditions.	Similar options are offered.
Minimal maintenance	IREX requires only annual gas testing, with cleaning only as required. Zero/span adjustments are made at the control card only.	Similar claims are made.
Condensation-free coated optics	IREX will not allow moisture to form, or dirt to stick to the window and mirror. Power consumption and routine cleaning are reduced.	LEDPoint PRS requires twice as much power as IREX, and windows/mirrors will require more regular cleaning.
Connect to existing JB's, or mount direct using optional bracket glands.	IREX can be connected to existing cables or via glands direct without requiring an additional junction box.	LEDPoint PRS must always be installed on a junction box.

What arguments will Amgas use against IREX?

- IREX is a new un-proven product: IREX is new, but prototypes have had extensive testing in arduous environments around the world for many months. IREX has undergone extensive performance tests, and is also being independently performance tested by a respected UK test authority.
- Amgas have Shell approval: IREX is being independently performance tested by a respected UK test authority.
- LEDPoint PRS uses a non-filament IR source: IREX uses the same IR lamp as Cirrus and Nimbus. The lamp has proven in use to last in excess of 10 years, Nimbus and Cirrus lamp failures are very rare indeed.

Selling Against the DragerSensor IR

Feature	Benefit	Comment on DragerSensor IR
Sinter-free design	No sinter to become blocked, fast response time, no un-revealed failures	DragerSensor IR has a sinter which slows response and may present an un-revealed failure.
Fast response	IREX has a T90 response time <7 seconds for rapid hazard detection.	DragerSensor IR is very slow: T50 response is 20 secs, T90 is almost 60secs.
Zero stability by design	Provides dependable zero stability with old cables/terminals.	No zero compensation claimed. May be prone to drift.
Remote calibration	IREX can be calibrated by applying gas remotely. No calibration cap or access to the detector is required in normal conditions.	A calibration adaptor is required, plus calibration using a magnet. Detectors must be accessed each time.
Minimal maintenance	IREX requires only annual gas testing, with cleaning only as required. Zero/span adjustments are made at the control card only.	Due to the risk of sinter blocking, Drager recommend 3-monthly inspection.
Condensation-free coated optics	IREX will not allow moisture to form, or dirt to stick to the window and mirror. Power consumption and routine cleaning are reduced.	All optical components are located behind the sinter. Sinter-blocking may be an issue.
Connect to existing JB's, or mount direct using optional bracket glands.	IREX can be connected to existing cables or via glands direct without requiring an additional junction box.	DragerSensor IR must be connected to a JB, and only M25 or 3/4" NPT entries (not M20).

What arguments will Drager use against IREX?

- IREX is a new un-proven product: IREX is new, but prototypes have had extensive testing in arduous environments around the world for many months. IREX has undergone extensive performance tests, and is also being independently performance tested by a respected UK test authority.
- DragerSensor IR can be calibrated with a magnet: IREX is designed to require no local calibration; the control card only should need adjustment. In the unlikely event that some detector adjustment or re-configuration is required, a PC can be connected (in a safe area).
- Price: The DragerSensor IR is priced lower than IREX, but offers less dependable operation. IREX delivers fast, dependable gas detection with no unrevealed failures. DragerSensor IR has a sinter which is a significant disadvantage.

Selling Against the Status FGD5/6

Feature	Benefit	Comment on FGD5/6
Sinter-free design	No sinter to become blocked, fast response time, no un-revealed failures	FGD5/6 has a sinter which slows response and may present an un-revealed failure.
Fast response	IREX has a T90 response time <7 seconds for rapid hazard detection.	FGD5/6 is much slower; T90 response time is 30 seconds.
Zero stability by design	Provides dependable zero stability with old cables/terminals.	No compensation claimed. May be prone to drift.
Remote calibration	IREX can be calibrated by applying gas remotely. No calibration cap or access to the detector is required in normal conditions.	A calibration adaptor is required. Detectors must be accessed each time.
Minimal maintenance	IREX requires only annual gas testing, with cleaning only as required. Zero/span adjustments are made at the control card only.	Risk of sinter blocking, detector must be gas tested regularly.
Condensation-free coated optics	IREX will not allow moisture to form, or dirt to stick to the window and mirror. Power consumption and routine cleaning are reduced.	All optical components are located behind the sinter. Sinter-blocking may be an issue.
Connect to existing JB's, or mount direct using optional bracket glands.	IREX can be connected to existing cables or via glands direct without requiring an additional junction box.	FGD5/6 must be connected to a JB.

What arguments will Status use against us?

- IREX is a new un-proven product: IREX is new, but prototypes have had extensive testing in arduous environments around the world for many months. IREX has undergone extensive performance tests, and is also being independently performance tested by a respected UK test authority.
- Price: The FGD5/6 is priced lower than IREX, but offers less dependable operation. IREX delivers fast, dependable gas detection with no un-revealed failures. The FGD5/6 has a sinter which is a significant disadvantage.

6. Life-time Cost Analysis

Xgard IR versus DI5/6 (pellistor head) operating cost analysis

Data used is based on a typical application on an offshore platform.
Costs are estimated over a typical 10-year operating period

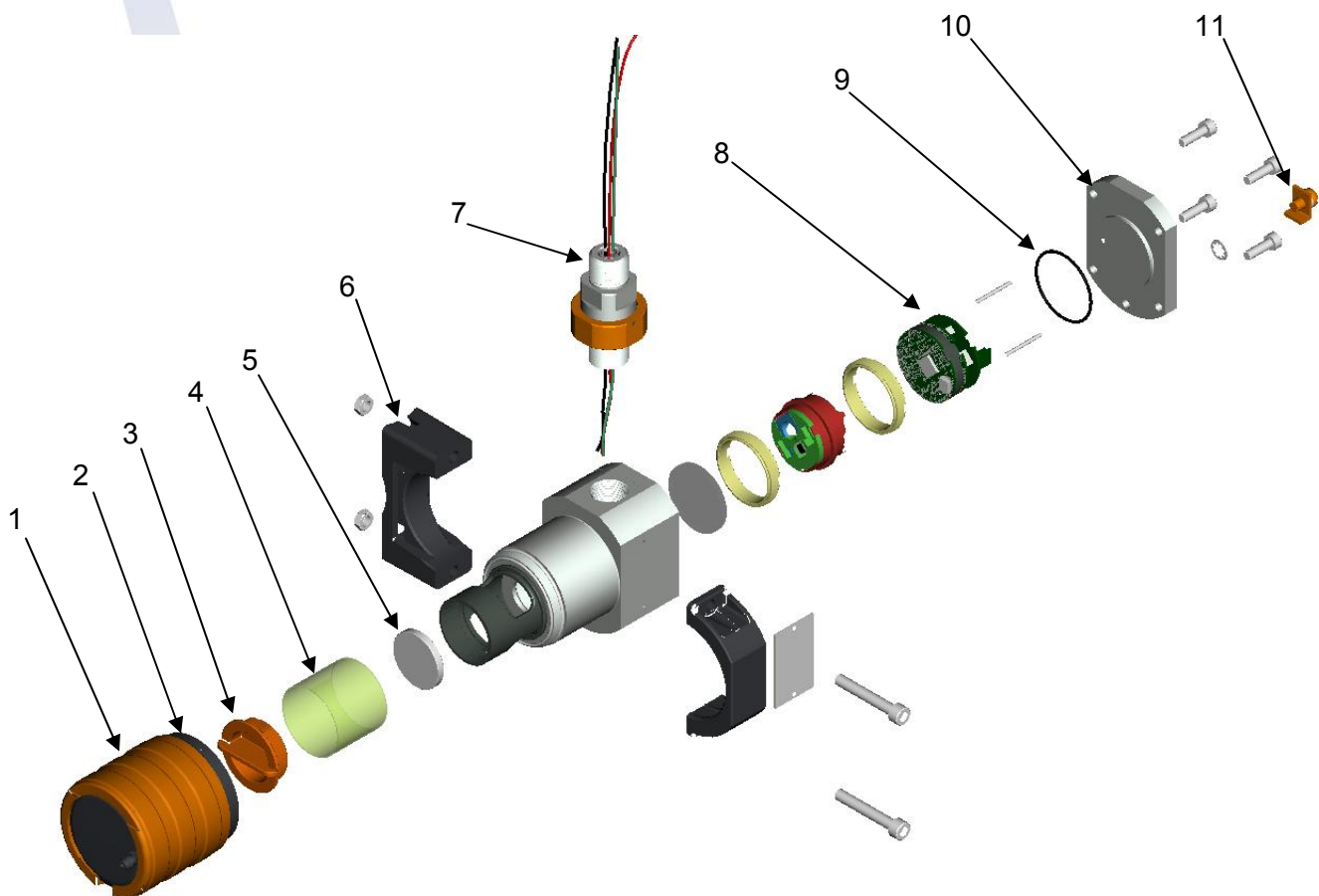
	DI5/6	Total	IREX	Total	Comment
Purchase Price	N/A		£599.00	£599.00	Assumes DI 5/6 has been installed many years
3-month bump test	£27.50	£1100.00	n/a	£0.00	Assumed site engineer costs
6-month calibration	£55.00	£1100.00	£27.50	£550.00	Pellistors need to be accessed directly, IREX can be calibrated remotely.
Sensor replacement	£108.00	£432.00	n/a	£0.00	Assumes sensor life-time of 2.5 years.
Sinter replacement	£45.00	£180.00		£0.00	Assumes replacement every 2 years
Total	DI5/6	£2812.00	IREX	£1149.00	

Note: this model assumes an hourly cost of £55.00 for engineer labour. Actual costs for engineers offshore may be higher.

7. Exploded View

The major IREX components are described below.

1. Calibration cap (optional: only required for calibration in strong winds)
2. Weatherproof cap with gas test/calibration spigot suitable for 6mm tube.
3. Mirror retainer
4. Dust filter (optional: for use in very dusty conditions only)
5. Mirror
6. Mounting bracket (optional, only required if IREX is not going to be supported by an M20 junction box)
7. Spigot gland (enables IREX to be fitted to an M20 junction box)
8. Connector PCB
9. Back-plate o-ring
10. Back plate
11. Earth tag



8. Accessories

A range of accessories are available to ensure that IREX is compatible with the needs of most applications.



Mounting Bracket Kit
For mounting IREX direct to a wall or 2" (50mm) pipe.



Calibration Cap
Required for calibration if wind-speed exceeds 2 metres per second.



Dust Filter
For use in very dusty environments. Must be inspected regularly.



Sunshade/Collector Cone
Protects against direct sunlight and aids detection of lighter-than-air gases.

Photo not available

Duct Mounting Kit
For monitoring HVAC ducts.



Flow Adaptor
Enables IREX to be used for gas sampling applications.

9. Technical Specifications

Description	Dual-beam infrared pellistor replacement hydrocarbon gas detector
Gases	0-100%LEL methane, propane, butane and other hydrocarbons
Enclosure material	316 stainless steel
Size	120h x 55w x 130d mm
Weight	1.5Kg
Ingress protection	IP66
Connection	Supplied either with M20 spigot gland for installation into existing junction boxes or with one M20 cable gland entry
Power	<1W
Operating voltage and current	2.9 – 3.2Vdc, 330 – 400mA. Over-voltage and reverse-polarity protected.
Electrical output	3-wire mV (Wheatstone) Bridge. Typically 10-20mV per % volume Methane
Operating temperature	-40°C to +75°C
Humidity	0 to 100% RH non-condensing
Repeatability	+/- 2% FSD
Zero drift	+/- 2%FSD per year maximum
Response time	T90 <7 secs.
Performance	Tested in accordance with EN61779:2000
Functional safety	Validated to IEC61508 SIL 2 (pending)
Warranty	3 years
Approvals	Ex II 2 G Exd IIB+H ₂ T6 (-40°C to +50°C), T4 (to +75°C) ATEX & IECEx
EMC compliance	EN 50270

10. IREX Launch Schedule

Available 3rd November 2008

- CH₄ 0-100% LEL
- ATEX and IECEx approved
- Calibration cap
- Mounting bracket kit
- IIB+H₂ approval
- Spigot gland (ATEX/IECEx certified)
- PC interface kit
- SIL 2 validation of hardware

Available from December 2008

- Dust filter
- Flow adaptor for sampling applications
- Sunshade/collector cone

Launch date to be confirmed:

- Duct mounting kit
- SIL 2 validation of software
- FM/UL approval
- ½" NPT cable entry
- Group IIC approval (ATEX/IECEx)

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