DYNAMENT

GOLD SERIES

*TAKING INVENTIVE STEPS IN INFRARED….*

# TECHNICAL DATA SHEET

Premier

Range of InfraRed Gas Sensors

**HYDROCARBON INFRARED SENSOR**

**CERTIFIED VERSION**

**TYPE MSH-P-HC**


**Patent Numbers : GB 2 401 432 & GB 2 403 291**
**US Patent Application No. 10/929, 350**
**Other World Patents Pending**

ATEX Certificate No. SIRA 04ATEX1357U, Ex I M2 EExd I and Ex II 2 G EEx d IIC

IECEx Certificate No. SIR 05.0053U, Ex d I and/or Ex d IIC

UL recognised Class 1,Groups A, B, C and D, T4 with 60°C ambient

## ***FEATURES***

- ★ Contains all the necessary optics, electronics and firmware to provide a linearized, temperature-compensated output.
- ★ Choice of output format – direct pellistor replacement, industry standard 0.4 to 2 volts dc or digital.
- ★ Instantly converts existing compatible pellistor-based instruments to infrared.
- ★ Sensors can be factory configured to customer specification.
- ★ All sensor types are user configurable using configuration equipment available from Dynament.
- ★ Fast track route for original equipment manufacturers to introduce the latest infrared technology – without any specialist knowledge.
- ★ Internal Flash memory allowing sensor firmware updates via configuration equipment.

**Dynament Limited**
Premier House · The Village · South Normanton · Derbyshire · DE55 2DS · UK.
Tel: 44 (0)1773 864580 · Fax: 44 (0)1773 864599
email: sales@dynament.com · www.dynament.com

## DESCRIPTION

Dynament infrared sensors operate by using the NDIR principle to monitor the presence of target gas. The sensor contains a long life tungsten filament infrared light source, an optical cavity into which gas diffuses, a dual temperature compensated pyroelectric infrared detector, an integral semiconductor temperature sensor and electronics to process the signals from the pyroelectric detector .

Two versions are available:-

### *3 Pin Version - Pellistor Replacement Infrared*

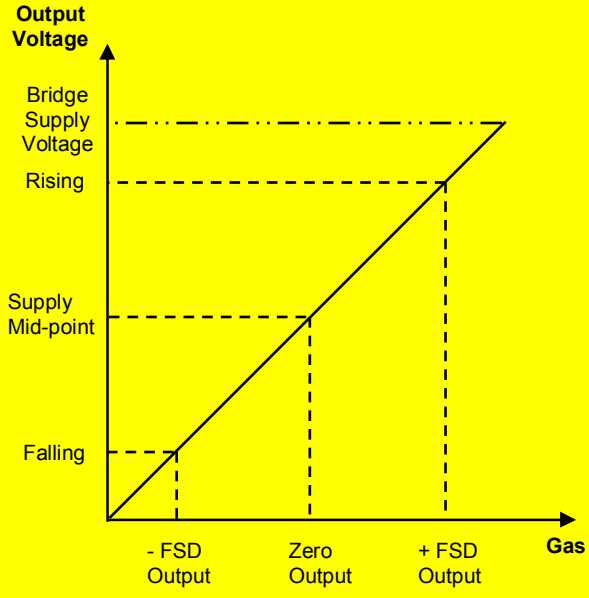
These sensors provide a pellistor style linearized, temperature-compensated output as shown in Graph 1.
They can either be supplied pre-set to customer specification or may be configured by the user by means of a configuration unit available from Dynament Ltd. The output signal can be set to rise or fall with increase in the gas level.

### *5 Pin Version - Multi-Purpose Range*

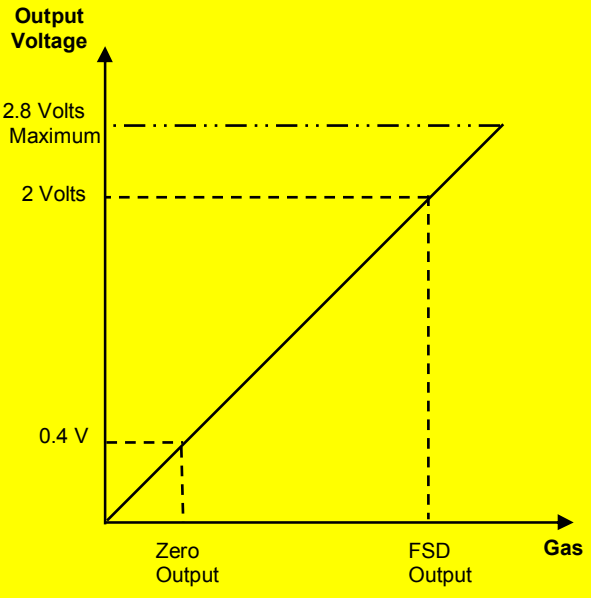
This version of the sensor provides maximum user flexibility by providing the following output options:-

- ★ Industry Standard 0.4 to 2 volt linearized, temperature-compensated output as shown in Graph 2, or alternative voltages for zero and FSD outputs.
- ★ Digital output for direct communications with instrument electronics.
- ★ Rising or falling output with increasing gas level.

The digital output is a UART format comprising 8 data bits, 1 stop bit and no parity.
Refer to specification for available baud rates.




**Graph 1**
**Pellistor Replacement Output Characteristic**




**Graph 2**
**0.4 – 2 Volt Output Characteristic**

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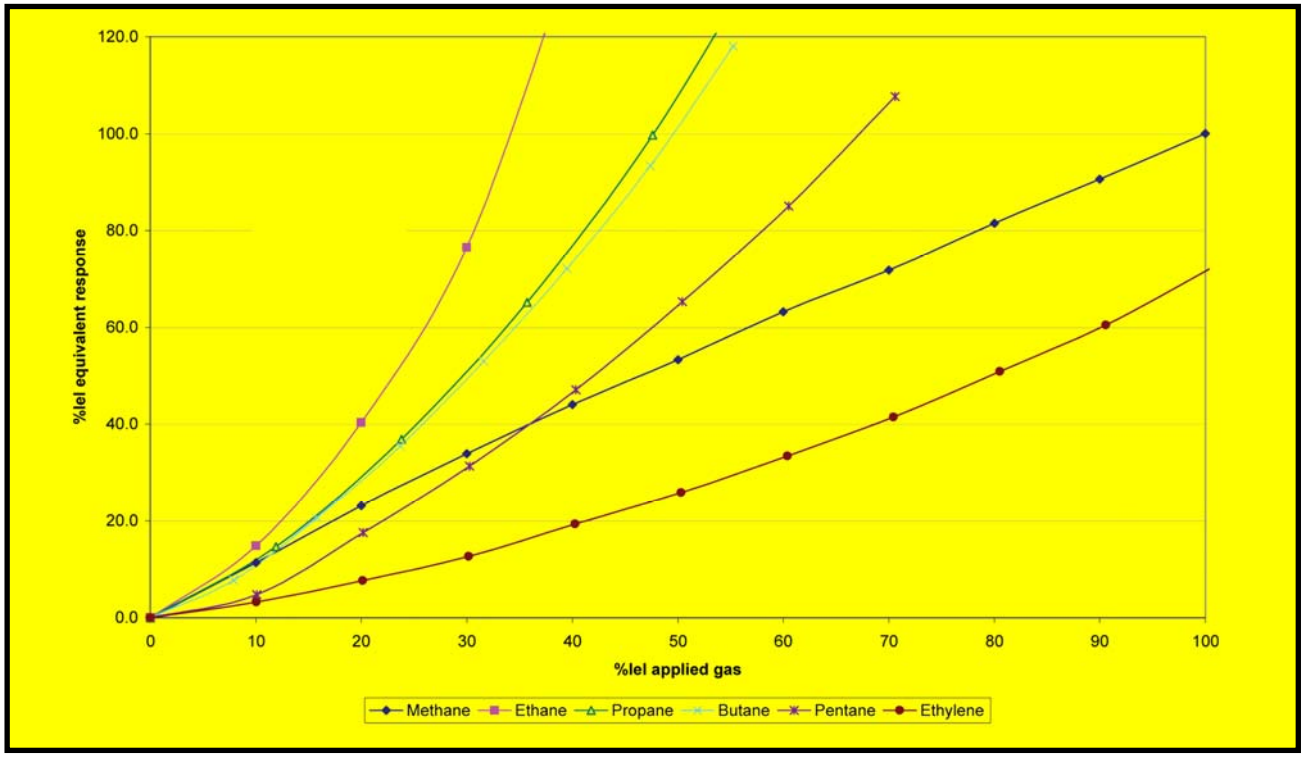
## *Hydrocarbon Response Characteristics*

Unless otherwise specified, the Premier Range of Hydrocarbon infrared sensors are calibrated to provide an output signal linearized for methane ($CH_4$) during manufacture.

However, the sensor will also respond to a range of hydrocarbon gases. The characteristics shown in Graph 3 demonstrate the relative response to some of the common hydrocarbons.

If the expected target gas is other than methane, or a general response is required, then the characteristics can be used as a guide to setting up the associated instrument alarm levels.




Note – Cross reference data is also available for other gas such as Ethanol, Hexane, Acetone.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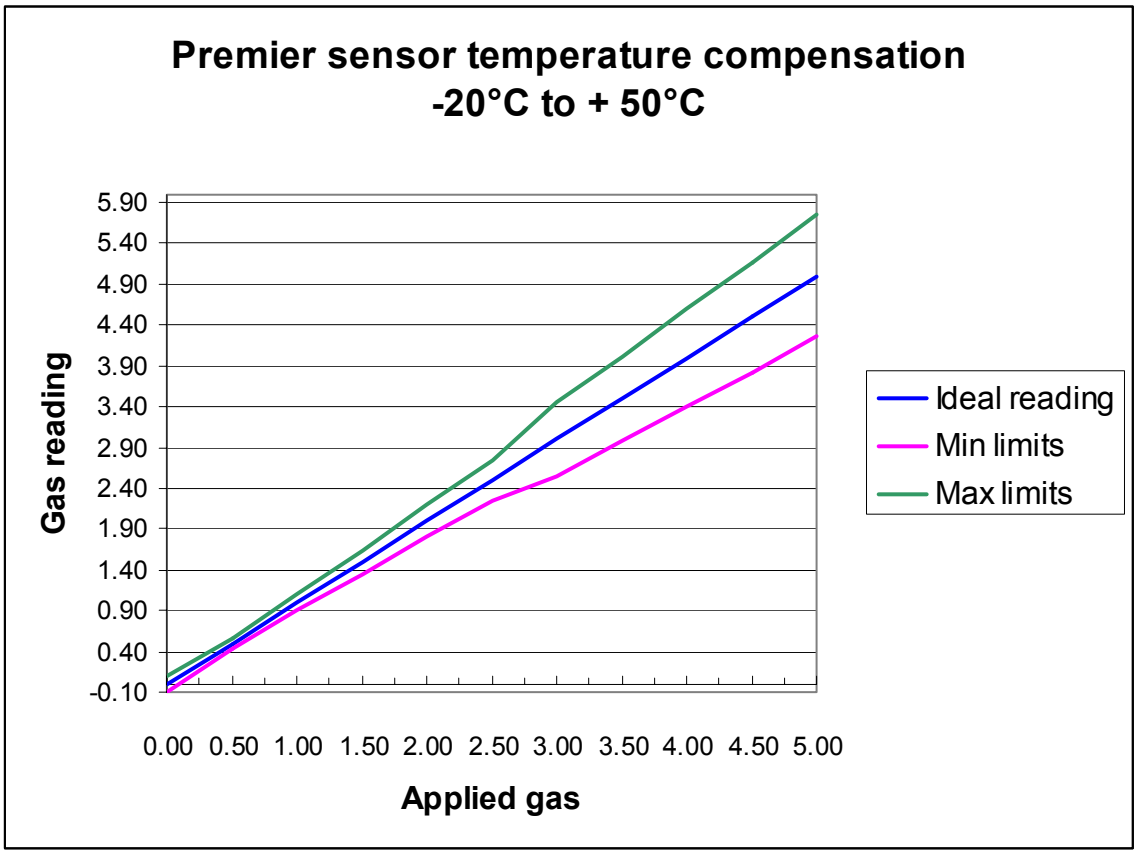
## *Hydrocarbon Temperature Compensation*

The Premier sensor is temperature compensated over the range of -20°C to +50°C.
The output variation is ± 2% FSD or 10% of the reading up to 50% FSD and ± 15% of the reading from 50% to 100% FSD, which ever is greater.

The following graph is based on the hydrocarbon sensor being characterised for methane.





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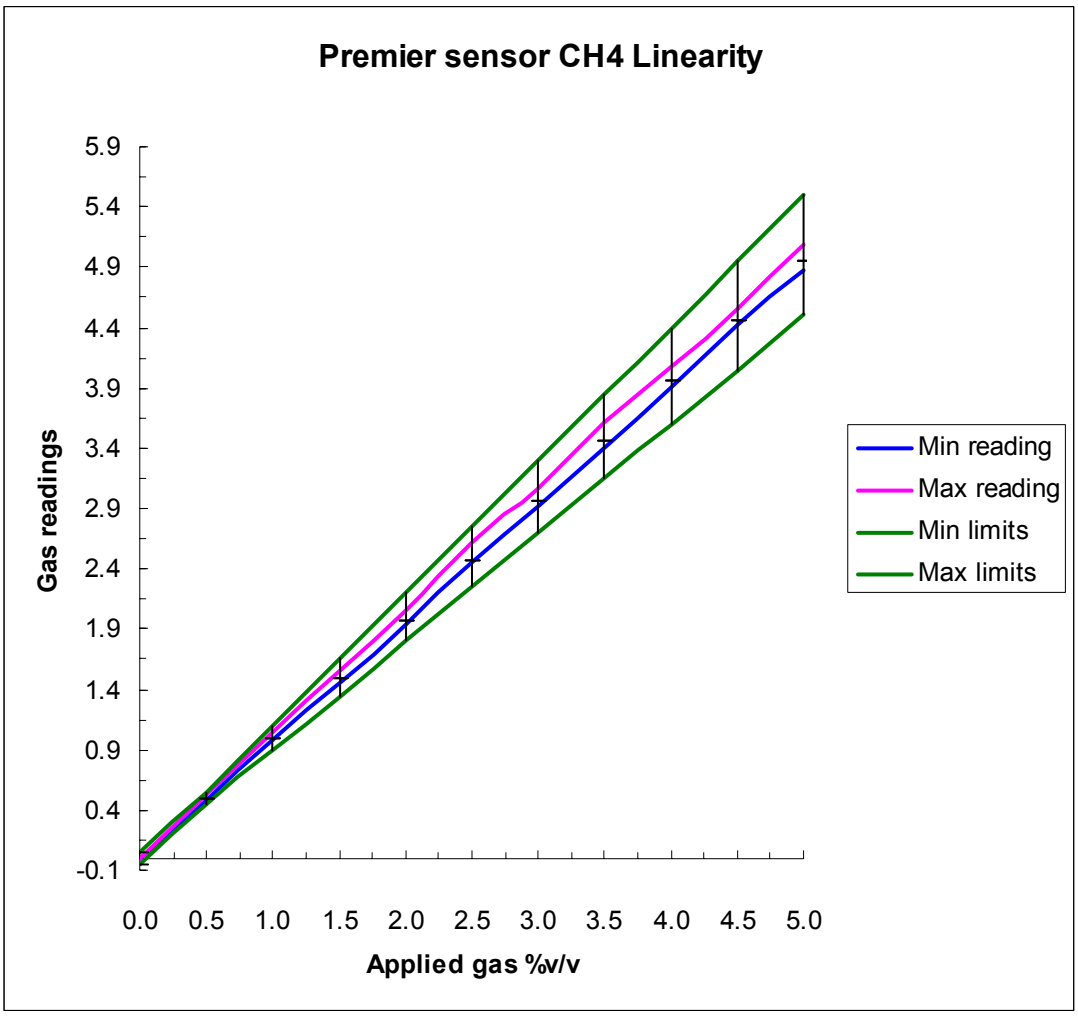
## Hydrocarbon Linearity

The Premier sensor linearity at ambient temperature is ± 2% FSD or 10% of the reading which ever is greater.

The following graph is based on the hydrocarbon sensor being characterised for methane, data based on 24 sensors.




## Sensor warm-up time

When power is first applied to the sensor, the voltage at the output pin is held at a pre-determined value, by default, this is the “zero gas” value. This condition is maintained for a default “warm-up” time of 15 seconds, after this time the output voltage represents the calculated gas value. Sensors can take up to 1 minute to indicate the correct gas reading. Note: the sensor can output any reading from -100% FSD to +200% FSD in the first minute.

The output value that is read using the communications pins is always held at zero during the “warm-up” time.

Both the voltage at the output pin during the “warm-up” time, and the duration of the “warm-up” time can be pre-programmed to alternative values at the time of ordering sensors.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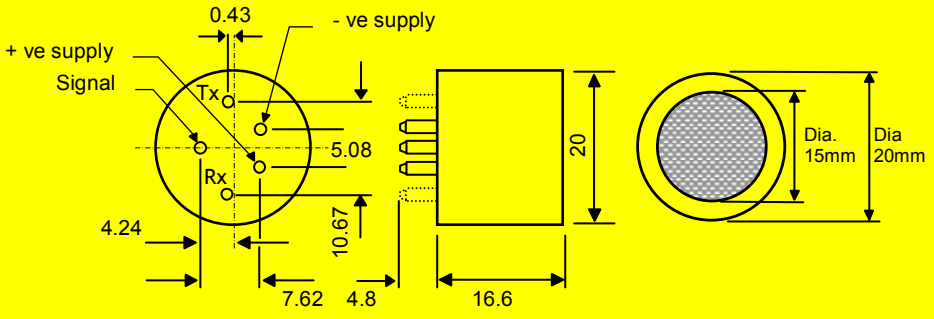
## SPECIFICATION

| | |
|---|---|
| **Operating Voltage Range:** | 3.0 – 5.0 V d.c. |
| **Operating Current:** | Constant current operation, current range 75 – 85mA |
| **Programmable Output Voltage Ranges:** | Voltage Output Types – 0v to 2.8 volts d.c.<br>Bridge Output Types – 0v to Bridge Supply Voltage |
| **Methane measuring range:** | 0 — 5% volume up to 0 — 100% volume |
| **Hydrocarbon measuring range** | 0 — 100% LEL equivalent |
| **Resolution:** | 1% of measuring range for readings above 50% of range,<br>0.5% of measuring range for readings below 50% of range |
| **Warm up time:** | To final zero ± 2% FSD : 1 minute @20°C (68°F) ambient |
| **Response Time $T_{90}$:** | <30s @20°C (68°F) ambient |
| **Zero Repeatability:** | ± 1% FSD @20°C (68°F) ambient |
| **Span Repeatability:** | ± 2% FSD @20°C (68°F) ambient |
| **Long term zero drift:** | ± 1% FSD per month @20°C (68°F) ambient,<br>(max ± 3% FSD per year) |
| **Operating temperature range:** | -20°C to +50°C (-4°F to 122°F) |
| **Temperature performance:**<br>* May not be applicable when using gas cross-reference factors | ± 10% of reading up to 50% FSD, ± 15% of reading from 50% to 100% FSD, or 2% FSD whichever is greater over the range -20°C to +50°C<br>(-4°F to 122°F) |
| **Storage temperature range:** | -20°C to +50°C (-4°F to 122°F) |
| **Humidity range:** | 0 to 95% RH non-condensing. |
| **Digital signal format:** | 8 data bits, 1 stop bit, no parity |
| **Standard baud rates:** | 38,400, 19,200, 9600 |
| **User configurable parameters:** | Zero output voltage<br>FSD output voltage<br>Positive or negative going output<br>Sensor 'zero' function<br>Sensor 'span' function |
| **MTBF:** | > 5 years |
| **Weight :** | 15 grams |

## MECHANICAL DETAIL




Pins viewed from underside Diameter of pins = 1.5mm
Tx & Rx communication connections are available as either pads or pins

**NOTES**

1. DIMENSIONS W ITHOUT TOLERANCES ARE NOMINAL.
2. RECOMMENDED PCB SOCKET WEARNES CAMBION LTD CODE: 450-3326-01-06-00.
3. WEIGHT: 15g
4. USE ANTI-STATIC PRECAUTIONS WHEN HANDLING
5. DO NOT CUT PINS
6. DO NOT SOLDER DIRECTLY TO PINS

**NOTE – The above pin configuration is shown for the POSITIVE version of the sensor. The NEGATIVE version has the +ve and –ve supply pin positions exchanged. See ordering details.**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## *Ordering Details*

In order to completely specify the type of sensor that is required, the customer needs to provide the following information:-

- An Order Code (see below) that specifies the sensors' basic physical and electrical characteristics.
- The sensor configuration requirements.

**Available sensor options:**

**F = Replaceable, self adhesive microporous PTFE filter**

**EXAMPLE OF ORDER CODES**

**MSH – P / HC / 3 / B / P / F**

Option
FILTER : BLANK = OMITTED
F = FITTED

SUPPLY POLARITY : P = Positive, N = Negative

OUTPUT TYPE : B = Bridge, V = Voltage

NUMBER OF PINS : 3 or 5

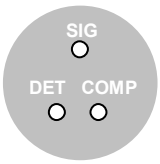
GAS TYPE : HC = Hydrocarbon

PREMIER SENSOR

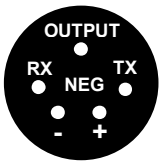
**CONFIGURATION OPTIONS**
**(To be stated on customer order in addition to the Order Code)**

1. Output voltage for zero.
2. Output voltage for span.
3. Rising or falling output voltage with increasing gas level.
4. Sensitivity e.g. 20 mV / % volume $CH_4$.
5. Communication speed – 38,400 baud (default), specify alternative rate if required.

## *Pellistor Replacement - Explanation of Positive & Negative Polarity*

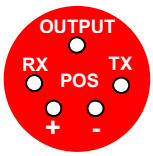



**Typical Pellistor Pinout**




**Premier Negative Polarity Option**

Use where the DET pin of the existing pellistor is connected to the Negative of the pellistor bridge supply.




**Premier Positive Polarity Option**

Use where DET pin of the existing pellistor is connected to the Positive of the pellistor bridge supply.

Note – the RX and TX connections are pads on the 3 pin versions of the sensor.

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