# GENERAL DESCRIPTION

## GOLD SERIES
## MINIATURE INFRARED GAS SENSORS


**PATENT NUMBERS: GB 2372099B; US 6,753,967 B2**

Dynament miniature infrared sensors are self contained, plug in sensors with integrated optics contained within standard sized miniature gas sensor housings. There are no mirrors or moving parts within the sensors. The internal light source self heats the optics to approximately 7°C above ambient temperature when running, thus avoiding condensation issues under high humidity conditions. An internal temperature sensor is included to enable the temperature to be monitored at the detectors, thereby providing the best means of compensating for temperature effects, including ideal gas law corrections.

**General Overview:**

There are two basic forms of the sensors:

a) Metal housed sensors with an integral sinter flame arrestor:

These are temperature compensated devices with the following type designations:-

| Sensor Type | Gas Types | Ranges |
|---|---|---|
| MSH-HC/TC | Hydrocarbons including Methane | 0 - 100% LEL |
| MSH-HHC/TC | Hydrocarbons including Methane | 0 - 100% Volume |
| MSH-CO2/TC | Carbon Dioxide | 0-2000ppm , 0-5% Volume |
| MSH-HCO2/TC | Carbon Dioxide | 0-100% Volume |
| MSH-N2O/TC | Nitrous Oxide | 0-2000ppm , 0-1% Volume |

They are certified as flameproof components, designed for portable and fixed instrumentation intended for use in hazardous areas. They are also perfectly suited for general purpose monitoring in non-hazardous areas. Specified over the temperature range -20°C to +50°C with additional experience over extended ranges, they are used worldwide and are capable of operation in extremely arduous conditions.

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b) Plastic housed sensors:

These are the non-certified form of the sensors; they are temperature compensated with the following type designations:-

| Sensor Type | Gas Types | Ranges |
|---|---|---|
| MSH-HC/NC/TC | Hydrocarbons including Methane | 0 - 100% LEL |
| MSH-HHC/NC/TC | Hydrocarbons including Methane | 0 - 100% Volume |
| MSH-CO2/NC/TC | Carbon Dioxide | 0-2000ppm , 0-5% Volume |
| MSH-HCO2/NC/TC | Carbon Dioxide | 0-100% Volume |
| MSH-N2O/NC/TC | Nitrous Oxide | 0-2000ppm , 0-1% Volume |

These sensors are designed for use in non-certified equipment or in certified head assemblies where the certification is carried by the housing and not the sensor. Their performance is identical to the metal-housed sensors, except that they offer a faster response time. This is important when located behind a sinter in a fixed head where the response time is dominated by gas diffusion through that sinter.

**Main Characteristics:**

a) Concentration ranges:

The MSH-HC/TC and MSH-HC/NC/TC Hydrocarbon sensors are generally used for 0-100% lel ranges of hydrocarbon gases and vapours. For methane they can also be used over the range 0-100% by volume. The stronger absorbance present with heavier hydrocarbons limits their range in %volume propane terms with the sensors saturating at around 6% volume propane. At the low concentration end they can be used to detect down to 50ppm of hexane as an example higher hydrocarbon.

Carbon dioxide sensors saturate at around 7% volume $CO_2$ and the default range is 0-5% volume. They can be used for ranges as low as 0-2000ppm with better than 50ppm resolution.

b) Response time:

Metal-housed sensors with integral sinter have an intrinsic response time under normal free diffusion conditions dependent on the gas. The observed response times in a final instrument are also subject to time taken in digital filtering within user software. Typical T90 times for methane on the MSH-HC are 20 seconds excluding filtering delay. When these sensors are located behind a sinter, which forms part of a fixed head assembly, then provided the sensor is directly behind the external sinter a T90 time of less than 30 seconds is achievable for methane. However, any filtering delay in software will increase this.
It is important to note that continuity between the 0V pin of the sensor and the sensor case is guaranteed and therefore the sensor should be electrically isolated from any external conductive housing component.

Plastic sensors do not have a sinter diffusion barrier and therefore the response time is much quicker, a typical T90 time for methane being 8 seconds excluding filtering delay. Again, continuity between the 0V pin and the gold plated plastic housing is guaranteed and therefore the sensor should be electrically isolated from any external conductive housing component. When these sensors are located behind a sinter in a fixed head assembly a T90 time for methane of less than 20 seconds is readily achievable, depending on the external sinter porosity.

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c) Temperature ranges:

The sensors are specified over the temperature range -20°C to +50°C and can tolerate rates of change of temperature exceeding 2°C/minute. However, they are fully functional down to -40°C and have been taken as high as +60°C with no detrimental effect. The internal temperature sensor is invaluable when operating over wide temperature ranges since compensation of the detector signals requires a temperature measurement and correction for the ideal gas law also has to be made. The internal temperature sensor monitors the gas temperature inside the optical chamber so gives the best measuring means available.