High-Temperature CO_2 Detection up to 180 °C with New Hermetic Sealing, Dedicated Reference Sensor

Introduction

Non-Dispersive Infrared (NDIR) spectroscopy is a well-established method for precise gas concentration measurement, especially for greenhouse gases such as CO_2. This thermopile-based sensor system combines ruggedness, accuracy and adaptability for use in demanding environments.

Designed to meet the toughest industrial conditions, it features high-temperature operation up to 180 °C, hermetically sealed packaging for long-term durability, a separate, dedicated reference channel sensor and integrated temperature reference for thermal compensation.

CO_2 Detection with High Selectivity

This HTS-HT sensor is available in a configuration specifically tailored for carbon dioxide (CO_2) detection, using a narrow-band IR filter centered around 4.26 µm, the absorption peak of CO_2.
This ensures high selectivity and measurement sensitivity, even at low concentrations.

Optional Dual-Sensor Design with Dedicated Reference Channel

This dual-channel system comprises two physically separate thermopile sensors: the active sensor measures IR radiation after passing through a sample containing CO_2 and the reference sensor serves to track IR source stability and environmental influences.

By continuously comparing signals from both sensors, the system achieves drift-compensated, stable readings, even over long operating periods and in fluctuating environments.

Integrated Temperature Reference

Each sensor includes a built-in temperature reference, allowing for thermal compensation of the thermopile signal. This ensures that changes in ambient or device temperature do not affect the accuracy of the gas concentration reading—a critical feature in applications with wide or rapidly changing thermal profiles.

Durability for Harsh Conditions

Both active and reference sensors are designed to withstand operating temperatures up to 180 °C, humidity, dust, and chemical exposure, thanks to hermetically sealed housings. On top, they can resist vibration and mechanical shock, typical in automotive and industrial installations.

Applications

This dual-sensor system is ideal for emission monitoring in combustion engines or industrial furnaces, exhaust gas analysis where direct sensor exposure to hot gases is required. Further application fields include process control in harsh chemical environments with temperature and humidity extremes as well as high-reliability safety applications, such as gas leak detection in hazardous areas.

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Benefits at a Glance

- Thermopile sensors rated up to 180 °C for direct integration into high-temperature zones
- Hermetically sealed design ensures maximum durability and resistance to environmental effects
- Long-term signal stability and reduced need for recalibration
- Integrated temperature reference for thermal compensation
- Independent reference measurement enables real-time correction for source fluctuations and contamination

Conclusion

This advanced NDIR sensor system is engineered for high-precision CO_2 monitoring in challenging conditions. With two physically separate thermopile sensors, a built-in temperature reference and hermetic protection, it provides reliability and measurement stability - even at extreme temperatures.
It is the perfect solution for applications where CO_2 accuracy, environmental resistance, and thermal robustness are non-negotiable.

For more information visit: www.heimannsensor.com

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