Quick Guide for SemeaTech Gas Sensor Selection

SemeaTech specializes in the development of advanced gas sensors utilizing cutting-edge technologies, including electrochemical (EC or Echem), photoionization detection (PID), non-dispersive infrared (NDIR), and Pellistor (Catalytic Bead, LEL). These sensors are engineered to meet the rigorous standards of industrial applications.

To simplify the integration and use of SemeaTech gas sensors, we provide smart modules designed to compensate for environmental variations and seamlessly convert analog outputs into digital signals. These modules primarily support digital communication protocols such as I2C and UART, enabling enhanced compatibility and ease of implementation across various applications.

Electrochemical (EC or Echem) Gas Sensors

The majority of our gas sensors leverage advanced electrochemical (EC) technology and are capable of detecting a wide range of gases, including CO, H2S, O2, H2, NH3, SO2, NO, NO2, ETO, O3, Cl2, ClO2, PH3, HF, HCN, HCl, CH3SH, C2H3Cl, COCl2, H2O2, THT, CH2O, C2H2, C2H4, AsH3, SiH4, GeH4, HBr, and more. These sensors are offered in a variety of platforms tailored to diverse applications:

- 4-Series Sensors: Compact and lightweight, these sensors are ideal for use in portable gas monitoring devices.
- 7-Series Sensors: Designed for outdoor fixed gas monitoring systems, these sensors are built for long-term, reliable operation in stationary applications.
- 3-Series Sensors: Slightly larger in size, these sensors are preferred for demanding applications such as flue gas analysis and stack emission monitoring due to their robust design and exceptional stability in providing accurate readings.
- Mini-Series Sensors: These sensors are optimized for integration into compact gas detectors with much lower cost, making them ideal for personal protection and portable safety devices.
- SM-Series Sensors: Specifically engineered for monitoring gas leaks in semiconductor manufacturing processes, these sensors offer high precision and reliability tailored to the unique demands of the semiconductor industry.
- 4-Electrode AQM Sensors: Designed to meet stringent requirements for long-term stability, high resolution, and superior signal-to-noise ratio, these sensors deliver precise and consistent performance in air quality monitoring (AQM) applications, ensuring accurate detection and monitoring of air quality parameters over extended periods.

Our range of sensors reflects our commitment to providing innovative, high-quality solutions for a broad spectrum of industrial, environmental, and personal safety needs. For more information, please refer to the following link to our EC sensors: https://semeatech.com/Products/Electrochemical%20Sensors/

For a deeper understanding and guidance on the proper use of electrochemical gas sensors, please refer to the Q&A

section available at the following link: https://semeatech.com/Support/

Photoionization Detection (PID)

In collaboration with Senovol Corporation, we manufacture high-performance PID (Photoionization Detection) sensors, renowned as one of the most effective methods for detecting total volatile organic compounds (VOCs). These sensors play a critical role in industrial safety and air quality monitoring applications. The performance of a PID sensor is largely determined by its core component - the vacuum ultraviolet (VUV) lamp. Essential attributes such as the lamp's intensity, stability, and lifespan are pivotal in defining the sensor's sensitivity, resolution, and overall reliability. With high-intensity VUV lamps, our PID sensors deliver exceptional resolution, enabling the detection of VOC concentrations down to parts per billion (ppb) or even sub-ppb levels.

We manufacture three distinct PID platforms: the 4-Series, 7-Series, and Digital PID.

- 4-Series PID: With a compact footprint, the 4-Series PID is optimized for handheld gas monitors and applications where the sensor's lifespan is expected to be around one year or slightly longer.
- 7-Series PID: Featuring a larger and more robust design, the 7-Series PID incorporates a larger VUV lamp, making it ideal for applications requiring extended lifespans of two years or more.
- Digital PID: Based on the 4-Series platform and integrates digital outputs via UART and I2C interfaces, the Digital PID facilitates seamless and rapid integration into existing systems for enhanced functionality and ease of use.

For further details about our PID sensors, please refer to the following link:
https://senovol.com/Products/PID/
And here is the instruction of UV Lamps with long-life and long-term stability for PID sensors:
https://www.senovol.com/uploads/products/Tech_Notes/TN241216_UV%20Lamps%20with%20Long-Life%20and%20Long-Term%20Stability.pdf

Non-Dispersive Infrared (NDIR) Gas Sensors

NDIR (Non-Dispersive Infrared) sensors are specifically designed to detect gases with distinct infrared absorption characteristics, such as CO2 and CH4. These sensors offer several key advantages, including high reliability, excellent selectivity, minimal susceptibility to environmental interference, extended lifespan, and independence from oxygen levels. However, they can be sensitive to humidity and are limited in the types of gases they can effectively detect.

SemeaTech provides a comprehensive range of NDIR sensors, catering to both high-end industrial-grade applications and cost-effective commercial-grade requirements. For more detailed information, please visit: https://semeatech.com/Products/NDIR%20&%20LEL%20Sensors/

Pellistor (Catalytic Bead, LEL)

A pellistor, also known as a catalytic bead sensor, is widely used for detecting combustible gases and vapors in the air. It functions on the principle of catalytic combustion, making it a highly effective technology for identifying and measuring flammable gases such as methane, propane, and hydrogen. The performance and reliability of pellistor sensors are consistent across different sizes, such as the 4-series or 7-series, as the catalytic beads inside the sensors remain identical. These sensors are well-suited for use in harsh environments, reliably operating in ambient temperatures as low as -20°C or even -40°C.

The term LEL (Lower Explosive Limit) is often associated with pellistor sensors, as they are commonly used to detect and monitor flammable gas concentrations below explosive thresholds. LEL sensors are particularly popular in industrial safety applications, where they are among the most widely used gas sensors due to their robustness and effectiveness. However, pellistor sensors are susceptible to damage from silicon contamination and mechanical shocks, which can impair their performance.

For more information, please visit the following link to explore SemeaTech LEL sensors:
https://semeatech.com/Products/NDIR%20&%20LEL%20Sensors/4LEL-3.0.html

Smart Modules

To streamline the integration and operation of SemeaTech gas sensors, we offer smart modules equipped to manage environmental variations and convert analog signals into digital outputs. These modules support widely used digital communication protocols, including I2C and UART, ensuring easy compatibility with existing systems and simplifying implementation in a variety of applications.

For detailed information, please visit: https://semeatech.com/Products/Products/Sensor%20Module/