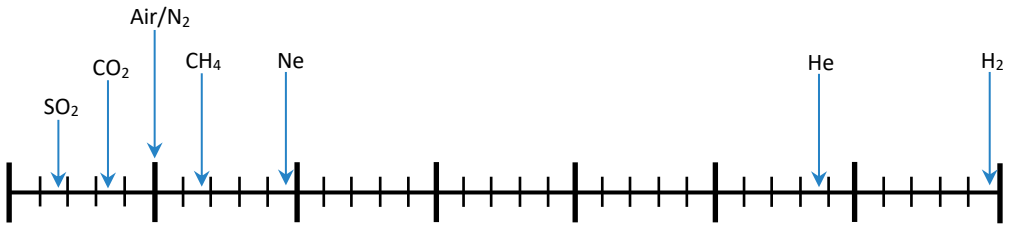
Thermal Conductivity

Thermal conductivity (TC) is a property of all gases. This can be exploited as each gas has a different TC value and is used to determine the level of one gas in a binary or pseudo-binary mix. Air is a good example of a pseudo-binary mix as it has a fixed proportion of oxygen and nitrogen (both with very similar thermal conductivities). The XEN-5320 Gas sensor utilizes thermal conductivity property to accurately measure one of the two gases present in the sample.

Relative Thermal Conductivity of Common Gases at 0 °C and 100 °C



Gas	Chemical Formula	0 °C (32 °F)	100 °C (212 °F)
Sulfur Dioxide	SO_2	0.350	0.381
Carbon Dioxide	CO_2	0.603	0.704
Air	N_2/O_2	1.000	1.000
Methane	CH_4	1.25	1.45
Neon	Ne	1.90	1.84
Helium	He	5.97	5.53
Hydrogen	H_2	6.968	6.803

Principle of operation

The XEN-5320 determines the gas composition by measuring the temperature elevation of a micromachined heater element. For each binary gas mixture, the ratio of temperature increase to heating power is dependent on the mix ratio. For enhanced accuracy, the correction is made for ambient temperature and humidity. The biasing, measurements and correction is done via a Xensor-designed ASIC that utilizes the output from the XEN-3880 thermal conductivity gauge and the temperature and humidity sensor.

Applications

Monitoring and leak detection of hydrogen, helium, nitrogen and methane gas mixtures in medical, research and development and industrial environments.

Measurement Ranges

- 0% to 1%
- 0% to 2%
- 0% to 5%
- 0% to 10%
- 0% to 25%
- 0% to 50%
- 0% to 100%
- 50% to 100%
- 80% to 100%
- 90% to 100%

Measurement Gases (Typical)

- H_2 in N_2, air or CO_2
- He in N_2 or air
- CO_2 in N_2 or air
- SO_2 in air
- Argon in air
- H_2 / CO_2 / Air

Application examples

- H_2 in N_2: atmosphere in metal heat treating furnaces
- H_2 in cooling systems for generators
- H_2 in hydrocarbon streams
- H_2 in ammonia synthesis gas
- H_2 in methanol synethesis gas
- CO_2 in methane
- N_2 in methane
- CO_2 in biogas
- CH_4 in biogas
- Purity monitoring of argon, hydrogen, nitrogen and helium