smart GasDetection Technologies

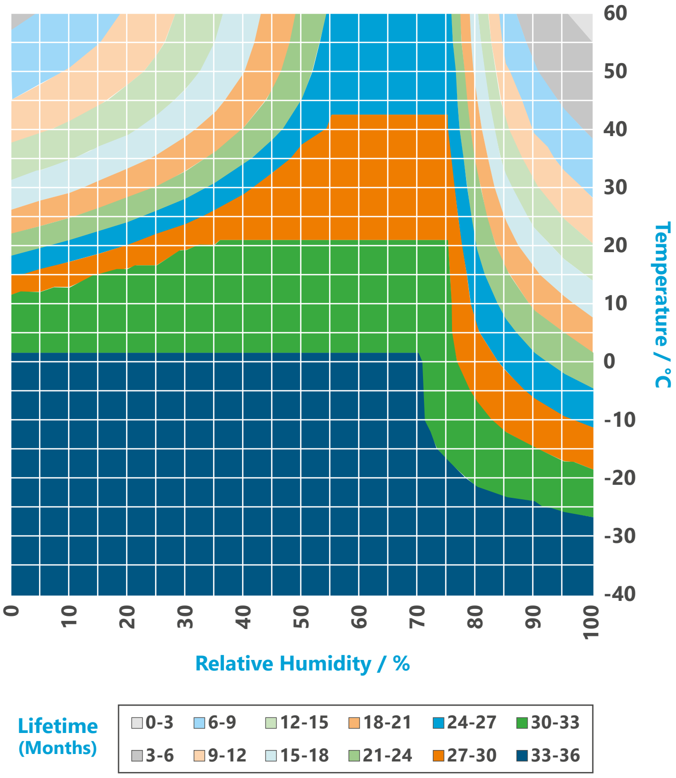
Reliably detect O_2 under tropical conditions

GfGsafety.com

Reliably detect O_2 under tropical conditions

GfG is addressing the challenge of operating O_2 sensors in high humidity and high temperatures ambient with a new generation of smart sensors.

Lifetime predictions of lead-based sensor for continuous operation at selected temperatures and relative humidities.



Source: Sensors 2014, 14, page 6087

Whether in industrial safety environments, in areas classified as confined spaces or in cases of emergency, the ability to reliably measure oxygen concentration and provide warning of abnormal conditions is a critical requirement.
Hazards to work and rescue forces arise primarily because of the risk associated with asphyxiation on entering areas where oxygen levels have become depleted by displacement, combustion, oxidation or other chemical processes.

Since the late 1970s electrochemical sensors based on consumable lead anodes have been the de facto standard for most applications. It's a proven method that works reliably on the principle of a galvanic cell in most environments, but it has its limits.

Challenge 1: Extremes in temperature and humidity

Unlike solid electrolyte sensors, the aqueous electrolyte in these sensors can take up water from the air or lose it, to it depending on temperature and humidity. Too low humidity can degrade important operating parameters such as response time or sensitivity. Conversely, too much water uptake can lead to sensor failure once the entire free volume inside the cell is filled.

The schematic illustrates the correlation between temperature, relative humidity and expected lifetime of lead-based sensors.

Up to about 70 percent relative humidity ambient temperature is the determining factor regarding the lifetime of a sensor. Above this point, the service life becomes disproportionately dependent on the humidity of the air.

Challenge 2: Coping with Venting Requirements

In the past GfG has utilized lead-based sensors that provided a single gas access immediately above the sensing electrode. In such a design the lower parts of the sensor should operate in an essentially anaerobic condition.

Practice has shown that this design presented challenges in terms of venting pressure differentials which build up between the internal cell volume and the external environment when the sensor is exposed to temperature or pressure transients. As a result there have been undesirable output "glitches" and in rare cases a leakage of electrolyte.

GfG has addressed this challenge by providing a second vent on the bottom of the sensor casing of its lead based solutions. Modern materials research has developed a new type of electrically conductive adhesive with a silver content of 85 percent, which makes the necessary changes to the design and manufacturing processes possible. Like soldering, it provides very good conductivity and adhesion, but does not place any thermal stress on the sensor.

Challenge 3: A Solution to the Increase in Volume

A particular problem with all lead-based sensors is the increase in volume of the anode material, which occurs during oxidation. Lead oxide has a lower density hence a higher volume. This can cause a higher pressure inside the sensor to disturb the functionality or force the electrolyte to leak due to a destroyed sensor housing.

Therefore, for the harshest of environments, GfG now offers a new series of lead-free smart sensors, which offer a longer operating life for a wider temperature and humidity range. In addition, they meet latest legal requirements regarding lead-free products and restrictions of hazardous substances.

A New Series of GfG O_2 Sensors – always the perfect solution

Whether for controlled or temperate ambiences or even the most demanding environments, GfG offers world leading smart O_2 sensors for its portable gas detection devices.

Oxygen Sensors Standard

MK464-8 Electrochemical 2 Year Life Smart Oxygen (O_2) Sensor with Vent

Measurement range:	0 to 25 vol.%		
Resolution / tolerance band:	0.1 vol.% / ±0.3 vol.%		
Response time:	t_{90} < 10 seconds (typically < 5 seconds)		
Pressure:	80 to 120 kPa:	max. ±0.3 vol.% or ±3.0 % of the reading	(referred to 100 kPa)
Humidity:	5 to 95 % r. h.:	max. ±0.5 vol.% or ±3.0 % of the reading	(referred to 50 % r. h.)
Temperature:	-30 to +50 °C:	max. ±0.5 vol.% or ±3.0 % of the reading	(referred to 20° C)
Expected operating life:	> 2 years in air		

2 Year Life
with Vent

MK465-8 Electrochemical 3 Year Life Smart Oxygen (O_2) Sensor with Vent

Measurement range:	0 to 25 vol.%		
Resolution / tolerance band:	0.1 vol.% / ±0.3 vol.%		
Response time:	t_{90} < 10 seconds (typically < 5 seconds)		
Pressure:	80 to 120 kPa:	max. ±0.3 vol.% or ±3.0 % of the reading	(referred to 100 kPa)
Humidity:	5 to 95 % r. h.:	max. ±0.5 vol.% or ±3.0 % of the reading	(referred to 50 % r. h.)
Temperature:	-30 to +50 °C:	max. ±0.5 vol.% or ±3.0 % of the reading	(referred to 20 °C)
Expected operating life:	> 3 years in air		

3 Year Life
with Vent

Oxygen Sensors Lead Free

MK466-8 Electrochemical 5 Year Life Lead Free Smart Oxygen (O_2) Sensor with Vent

Measurement range:	0 to 25 vol.%		
Resolution / tolerance band:	0.1 vol.% / ±0.3 vol.%		
Response time:	t_{90} < 10 seconds (typically < 5 seconds)		
Pressure:	80 to 120 kPa:	max. ±0.3 vol.% or ±3.0 % of the reading	(referred to 100 kPa)
Humidity:	15 to 90 % r. h.:	max. ±0.5 vol.% or ±3.0 % of the reading	(referred to 50 % r. h.)
(short term)	0 to 99 % r. h.:		
Temperature:	-40 to +60 °C:	max. ±0.5 vol.% or ±3.0 % of the reading	(referred to 20 °C)
Expected operating life:	> 5 years in air		

5 Year Life
Lead Free
with Vent

For more detailed information about the smart O_2 sensors from GfG please contact your account manager or visit GfGsafety.com

GfG France SAS
Immeuble le St Amour | 95 rue Pouilly Loché | 71 000 MACON LOCHE | France

Phone: +33 3 58 79 35 35 | **Fax:** +33 3 85 20 87 39
Phone SAV: +33 3 58 19 01 50 | **E-mail:** info@gfg-gasdetection.fr

smart GasDetection Technologies

GfGsafety.com