alphasense
AMETEK®

Technical specifications Version 1.0

Dual Sensor Carbon Monoxide – Hydrogen Sulfide – Miniature Size

Introduction

The world wide use of multigas, portable, personal safety monitors has grown since the 1970s to include an ever-increasing number of industries. The one requirement in common to the majority of these instruments is the need to measure both Carbon Monoxide and Hydrogen Sulfide simultaneously.

Alphasense now offers a compact, dual gas sensor which allows designers to reduce significantly instrument size and cost. The D2 sensor provides a unique approach to the dual gas sensor in both its size and working electrode configuration. The use of a high-capacity filter over the Carbon Monoxide working electrode eliminates Hydrogen Sulfide cross sensitivity to Carbon Monoxide.

Proven in the field over many years, these sensors perform well even under long-term, challenging conditions.

D2 Specification Carbon Monoxide Channel

Performance	Sensitivity	nA/ppm in 400ppm CO		27 to 55
	Response time	t90 (s) from zero to 400ppm CO		< 25
	Zero current	ppm equivalent in zero air		< ± 6
	Resolution	rms noise (ppm equivalent)		1
	Range	ppm CO limit of performance warranty		1,000
	Linearity	ppm error at full scale, linear at zero and 400 ppm CO		< 40
	Overgas limit	maximum CO for stable response to gas pulse		5,000
Lifetime	Zero drift	ppm equivalent change/year in lab air		< 0.5
	Sensitivity drift	% change/year in lab air, monthly test		< 4
	Operating life	months until 80% original signal (24-month warranted)		18
Environmental	Sensitivity @ -20°C	% (output @ -20°C/output @ 20°C) @ 100ppm CO		45 to 70
	Sensitivity @ 50°C	% (output @ 50°C/output @ 20°C) @ 100ppm CO		105 to 125
	Zero @ -20°C	ppm equivalent change from 20°C		-1 to 1
	Zero @ 50°	ppm equivalent change from 20°C		-1 to 4
Cross Sensitivity	Filter capacity	ppm hours of Hydrogen Sulfide		15,000
	H_2S sensitivity	% measured gas @ 20ppm	H_2S	< 8
	NO_2 sensitivity	% measured gas @ 10ppm	NO_2	< 0.1
	Cl_2 sensitivity	% measured gas @ 10ppm	Cl_2	< 0.1
	NO sensitivity	% measured gas @ 50ppm	NO	< 50
	SO_2 sensitivity	% measured gas @ 20ppm	SO_2	< 0.1
	H_2 sensitivity	% measured gas @ 400ppm	H_2 @ 20°C	< 55
	C_2H_4 sensitivity	% measured gas @ 400ppm	C_2H_4	< 200
	NH_3 sensitivity	% measured gas @ 20ppm	NH_3	< 0.1
Key Specifications	Temperature range	°C		-30 to 50
	Pressure range	kPa		80 to 120
	Humidity range	% rh (see note below)		15 to 90
	Storage period	months @ 3 to 20°C (stored in sealed pot)		6
	Load resistor	Ω (recommended)		10 to 47
	Weight	g		< 2

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Figure 1 CO Channel Sensitivity Temperature Dependence

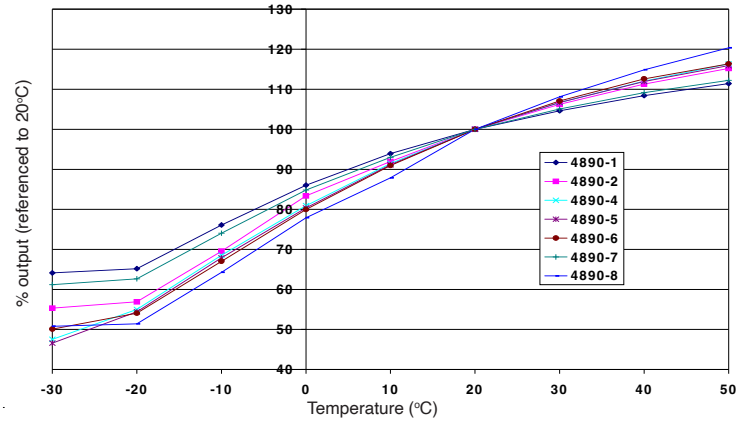


Figure 1 shows the variation in sensitivity caused by changes in temperature.

The data is taken from a typical batch of sensors.

Figure 2 CO Channel Zero Temperature Dependence

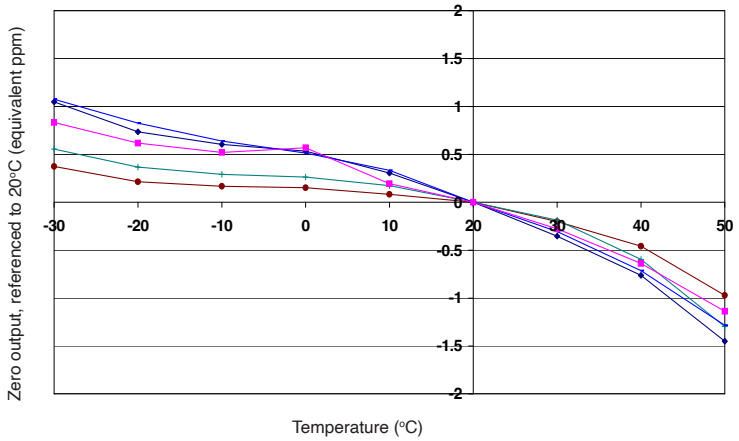


Figure 2 shows the variation in zero output caused by changes in temperature, expressed as ppm gas equivalent referenced to the zero at 20°C.

This data is taken from a typical batch of sensors.

Figure 3 CO Channel Response to High CO Concentration

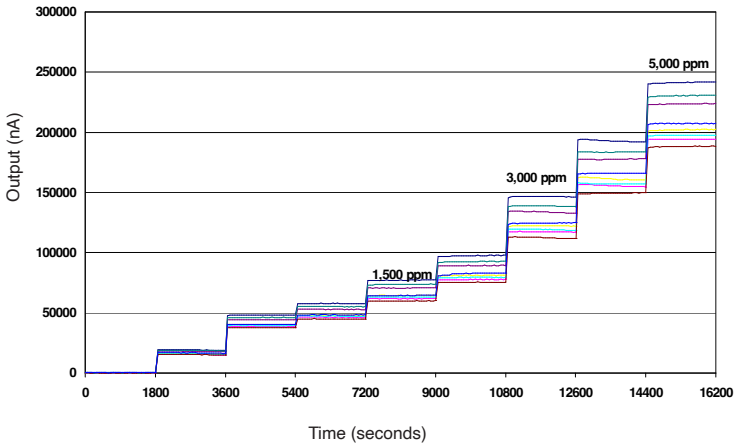
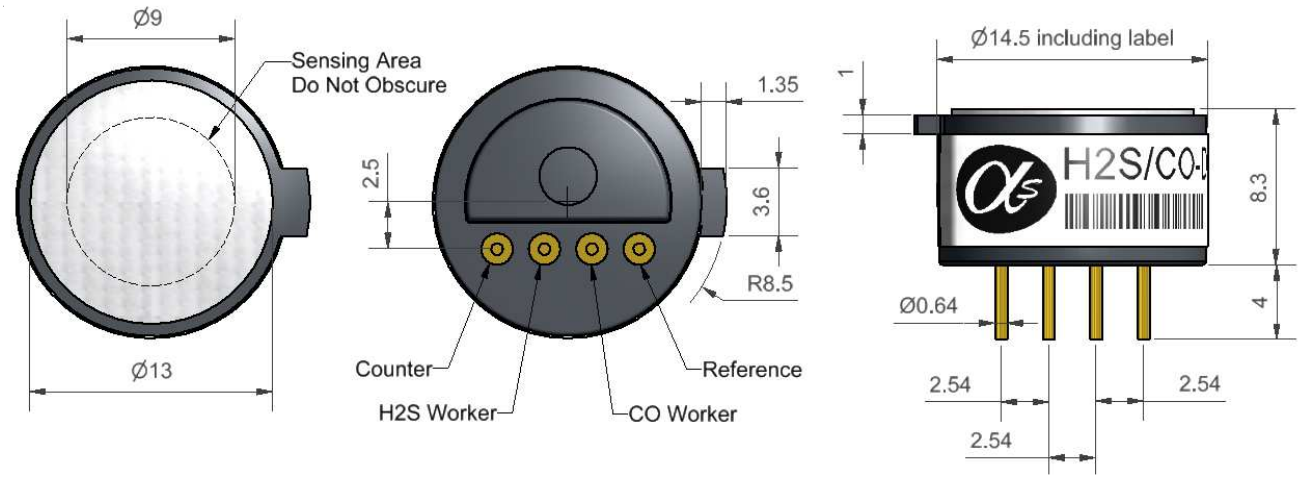


Figure 3 shows the response for a batch of D2 sensors tested with CO gas up to 5000ppm. The fast, stable response shows a robust sensor that operates well above its specification.



Top View **Bottom View** **Side View**

Dimensions are in millimetres (± 0.1 mm).

D2 Specification Hydrogen Sulfide Channel

Performance	Sensitivity	nA/ppm in 20ppm H2S	90 to 175
	Response time	t90 (s) from zero to 20ppm H_2S @ 20°C	< 30
	Zero current	ppm equivalent in zero air	< ± 1
	Resolution	rms noise (ppm equivalent)	< 0.25
	Range	ppm H_2S limit of performance warranty	100
	Linearity	ppm error at full scale, linear at zero and 20ppm H_2S	0 to -9
	Overgas limit	maximum ppm H2S for stable response to gas pulse	400
Lifetime	Zero drift	ppm equivalent change/year in lab air	< 0.1
	Sensitivity drift	% change/year in lab air, monthly test	< 2
	Operating life	months until 80% original signal (24-month warranted)	18
Environmental	Sensitivity @ -20°C	% (output @ -20°C/output @ 20°C) @ 20ppm H_2S	75 to 90
	Sensitivity @ 50°C	% (output @ 50°C/output @ 20°C) @ 20ppm H_2S	103 to 112
	Zero @ -20°C	ppm equivalent change from 20°C	-0.3 to 0.2
	Zero @ 50°	ppm equivalent change from 20°C	< ±1

Cross Sensitivity	NO_2 sensitivity	% measured gas @ 10ppm	NO_2	< -10
	Cl_2 sensitivity	% measured gas @ 10ppm	Cl_2	< -10
	NO sensitivity	% measured gas @ 50ppm	NO	< 10
	SO_2 sensitivity	% measured gas @ 20ppm	SO_2	< 10
	CO sensitivity	% measured gas @ 400ppm	CO	< 2
	H_2 sensitivity	% measured gas @ 400ppm	H_2	< 1
	C_2H_4 sensitivity	% measured gas @ 400ppm	C_2H_4	< 1
	NH_3 sensitivity	% measured gas @ 20ppm	NH_3	0

Figure 4 H_2S Channel Sensitivity Temperature Dependence

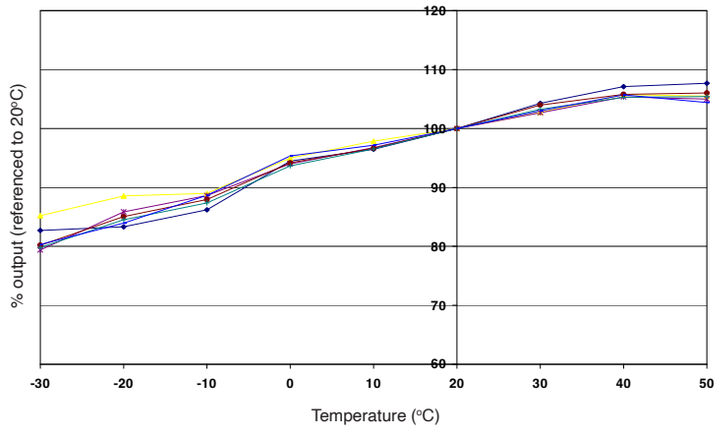


Figure 4 shows the variation in sensitivity caused by changes in temperature.

The data is taken from a typical batch of sensors.

Figure 5 H_2S Channel Zero Temperature Dependence

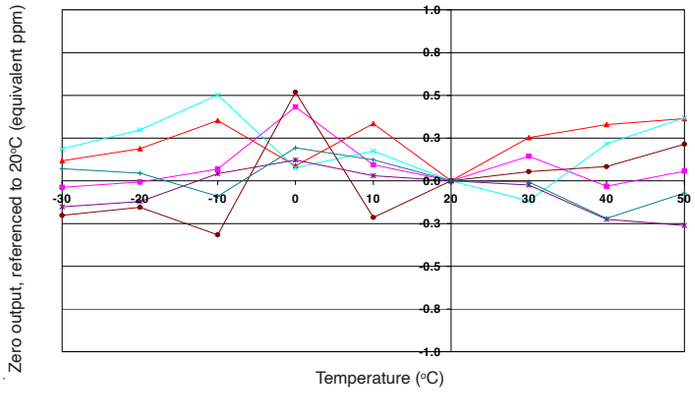


Figure 5 shows the variation in zero output caused by changes in temperature, expressed as ppm gas equivalent referenced to 20°C.

This data is taken from a typical batch of sensors.

Figure 6 Ambient Long-term Test Results

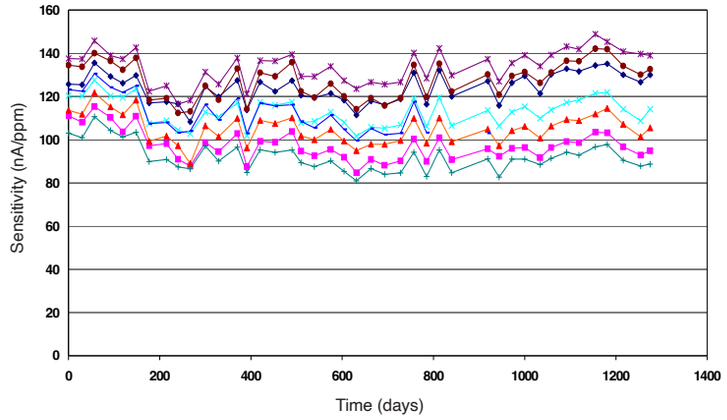


Figure 6 shows good long-term stability to H_2S for the D2 sensor.

Sensors were tested monthly and stored at ambient laboratory conditions.

Note: Above 85% rh and 40°C a maximum continuous exposure period of 10 days is warranted. Where such exposure occurs the sensor will recover normal electrolyte volumes, when allowed to rest at lower %rh and temperature levels for several days.

At the end of the product's life, do not dispose of any electronic sensor, component or instrument in the domestic waste, but contact the instrument manufacturer, Alphasense or its distributor for disposal instructions. NOTE: all sensors are tested at ambient environmental conditions unless otherwise stated. As applications of use are outside our control, the information provided is given without legal responsibility. Customers should test under their own conditions, to ensure that the sensors are suitable for their own requirements.

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