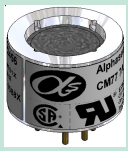
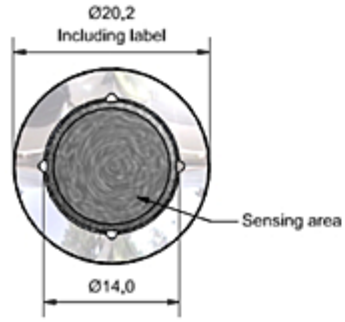
Carbon Monoxide Sensor

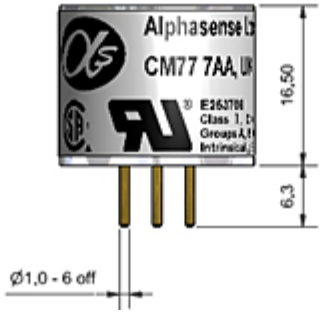
Metal Oxide Technology

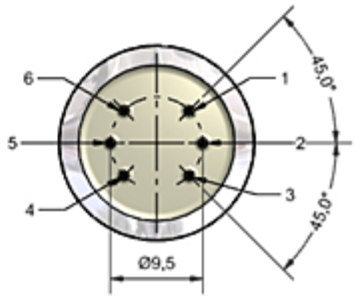


Technical Specification

CO-AFF* Figure 1 Schematic Diagram





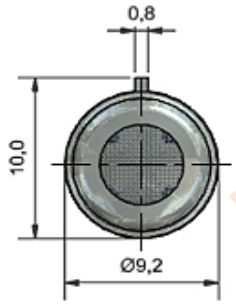


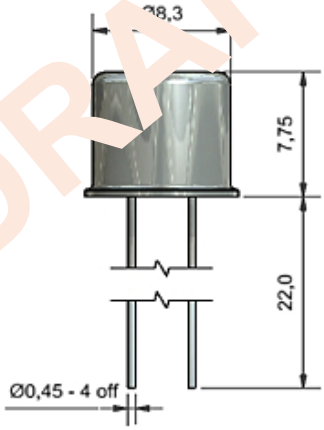
Pins 1 & 6	Detector
Pins 2 & 5	Heater
Pins 3 & 4	Detector

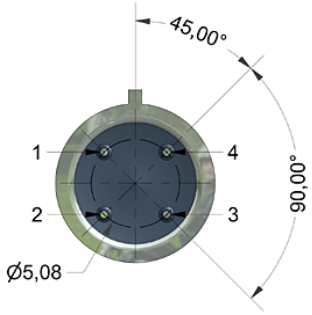
All dimensions in millimetres (± 0.1mm)

Top View | Side View | Bottom View

CO-MFF* Figure 2 Schematic Diagram







Pins 1 & 3	Heater
Pins 2 & 4	Detector

All dimensions in millimetres (± 0.1mm)

Top View | Side View | Bottom View

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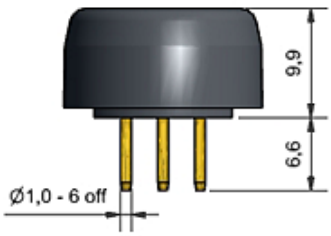
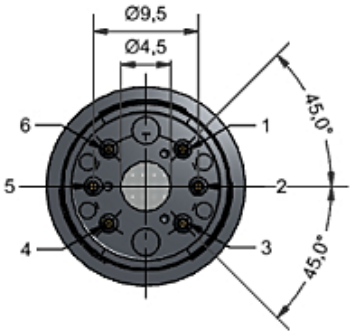
CO-PFF* Figure 3 Schematic Diagram





Pins 1 & 6	Detector
Pins 2 & 5	Heater
Pins 3 & 4	Detector

All dimensions in millimetres (± 0.1mm)

Top View | Side View | Bottom View

* also available as CO-*x*F1 (without external filter; dimensions as above)

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CO Performance Data

Technical Specification

GENERAL DESCRIPTION

The p-type metal oxide gas sensor is equipped with integrated filters to be selective to CO. The sensor is thermally cycled* to provide improved sensitivity with a large dynamic range and repeatable time-independent responses. The sensor also has low humidity response. The measured resistance of the sensing material increases in the presence of CO. This change in conductivity can be converted to an output voltage via a simple electrical circuit.

*The sensor is operated to alternate repeatedly between 400°C (the sensing temperature) and 525°C (the reset temperature). In this way, the exposure time in CO is fixed at the dwell time at 400°C . The dwell time is determined by the detection range required by the end user. For further advice, please contact Technical Support.

PERFORMANCE

Range	ppm CO limit of performance warranty	5 to 500
Response time	t_{90} (s) from zero to 20ppm CO	150**
Sensor resistance (R_o)	kΩ (humid air)	155 ±30
Sensor resistance (R_g)	kΩ; CO @ 20ppm in air	190 ±35
Sensor resistance ratio (R_g/R_o x 100%)	%; CO @ 20ppm in air	125 ±5
Gas response relationship (R_g/R_o - 1 = k.Conc^n) (5 - 50ppm)	k is ppm^{-1} ; power n is dimensionless ; Conc. is ppm	0.01 +/- 10% (k) 1.0 (n)
Gas response relationship (R_g/R_o - 1 = k.Conc^n) (50 - 500ppm)	k is ppm^{-1} ; power n is dimensionless ; Conc. is ppm	0.09 +/- 10% (k) 0.5 (n)
Heater resistance (R_H at RT)	Ω (23 ±1°C)	10 ±1.5
Heater resistance (R_H at sensing temp.)	Ω (400 ±10°C)	22 ±3
Heater resistance (R_H at reset temp.)	Ω (525 ±10°C)	26 ±3
Heater power consumption (mW) typical for 5:1	V_H = 2.7 ±0.2V (400°C) 3.7 ±0.3V (525°C)	340 ±30 530 ±50
Operating Temperature Range	°C	-20 to 120

** for a dwell time of 5 mins; shorter dwell times lead to faster t90's.

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CROSS SENSITIVITY - TBA following tests with filtered sensors

H_2 sensitivity	% measured gas @ 100 ppm H_2	TBA
EtOH sensitivity	% measured gas @ 50 ppm EtOH	TBA
C_3H_8 sensitivity	% measured gas @ 500 ppm C_3H_8	TBA
NH_3 sensitivity	% measured gas @ 25 ppm NH_3	TBA

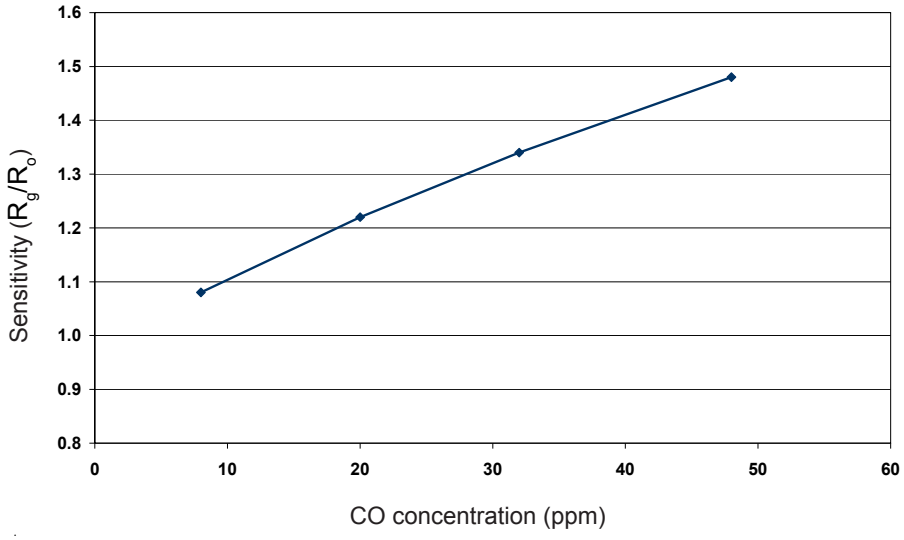
At the end of the product's life, do not dispose of any electronic sensor, component or instrument in the domestic waste, but contact the instrument manufacturer, Alphasense or its distributor for disposal instructions.

For further information on the performance of this sensor, on other sensors in our range. please contact Alphasense Ltd.

CO Performance Data

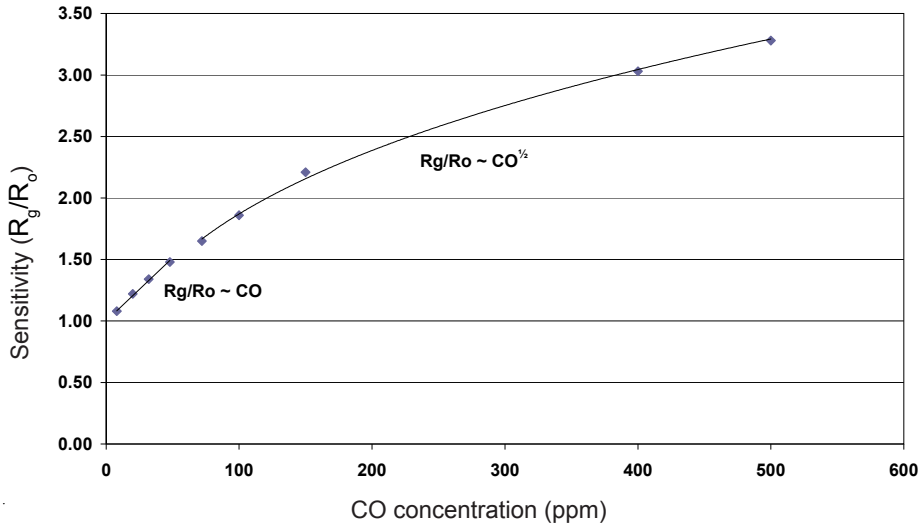
Technical Specification

Figure 4 Sensitivity as a function of Concentration



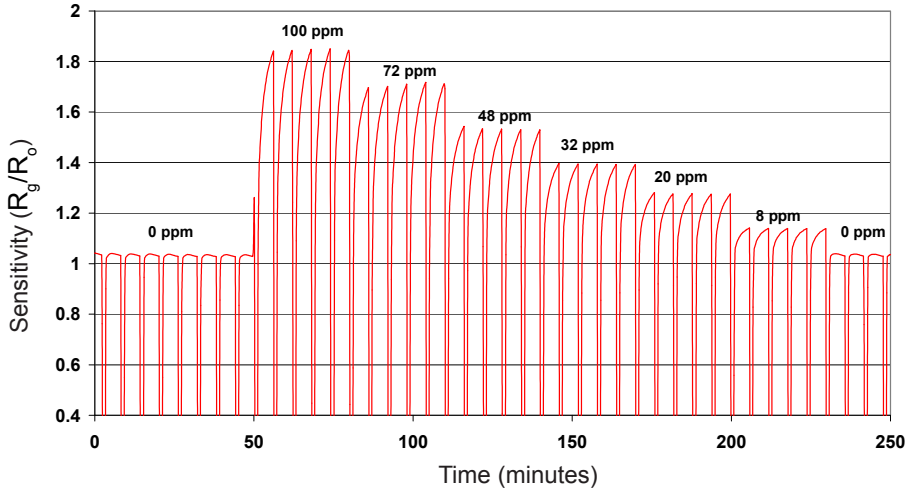
Sensitivity over range 8-50ppm CO operating in 2-temperature mode with a 5:1 cycle ratio of sensing (400°C) and resetting (525°C). Linear behaviour is observed.

Figure 5 Sensitivity as a function of Concentration



Sensitivity over range 8 - 500ppm CO operating in 2-temperature mode with a 5:1 cycle ratio of sensing (400°C) and resetting (525°C). Note linear behaviour <50ppm and power law behaviour >50ppm.

Figure 6 Real-time sensitivity as a function of low CO Concentration



Real-time sensitivity data for 8 - 100ppm CO in 50% rh air. Sensor operating in 2-temperature mode, pulsing between 400°C for 5 min and 525°C for 1 min.

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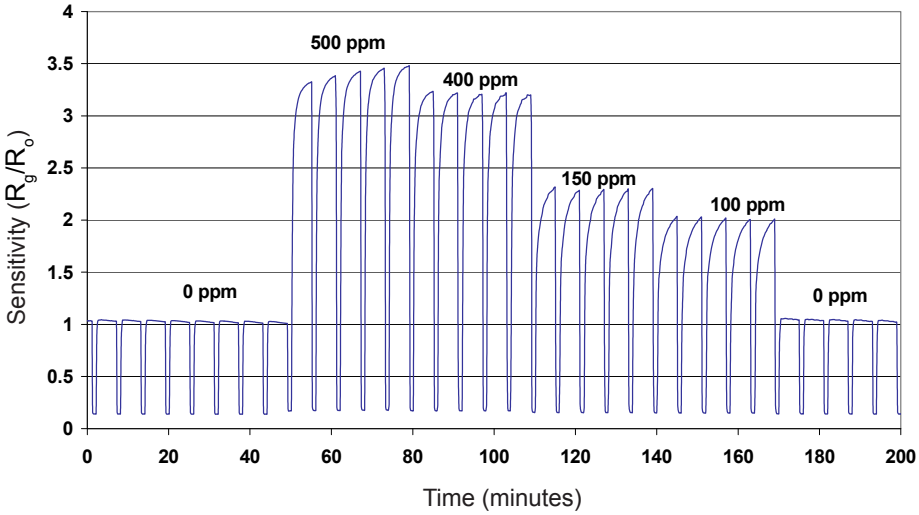
CO Performance Data

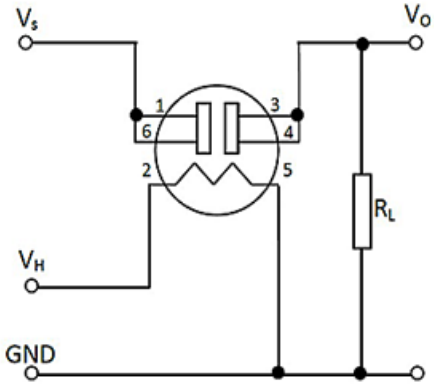
Technical Specification

Figure 7 Real-time sensitivity as a function of high CO Concentration



Real-time sensitivity data over range 100 - 500ppm CO in 50% rh air. Sensor operating in 2-temperature mode, pulsing between 5 mins at 400°C for 5 mins and 525°C for 1 min.

Figure 8 Basic Measuring Circuit for CO-AFF or CO-PFF package



Pins on the measuring circuit, shown in Figure 8, correspond with the pin numbers in Figure 1, 2 & 3 above.

When the sensor is connected in this half Wheatstone bridge configuration, V_O decreases as the sensing material resistance increases.

Heater Voltage	(V_H)	2.7 ± 0.2 V (AC or DC)
Circuit Voltage	(V_s)	Max. 24 VDC
Load Resistance	(R_L)	> 1k Ω

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CO-AFF EXPLOSION PROOF CERTIFICATION

This certification does not apply to CO-MFF or CO-PFF

CERTIFICATION

Sira 07ATEX 1088X	Ex	II 2 G Ex d IIC T4 -40°C to 50°C 5V, 1.25 W	IECEx SIR07.0031X	Ex d IIC T4 5VRc, 1.25 W, T_a -40° to 50°C
UL913 091007-E253708		Class I, II and III, Division 1 10 V, 1.5 W, 10 µH	CSA 22.2 1906313	Class 4828 31

SPECIAL CONDITIONS FOR SAFE USE (denoted by X after the certificate number)

The non-metallic parts of the Flameproof Sensor Housings shall only be installed in enclosures that offer protection from mechanical impact damage and shall not be exposed to ultraviolet radiation.

The final installation of the Flameproof Sensor Housings shall ensure that any likely damage from dropping the complete device has been considered.

The Flameproof Sensor Housings shall only be connected to an electrical supply that is certified as compliant with IEC 60079-11 and limited to the following: Type D - 5 Vdc, 1.25 W

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