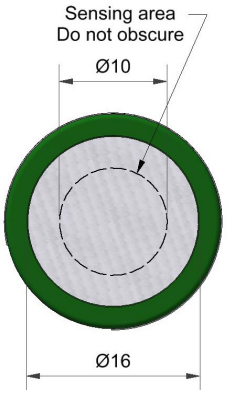
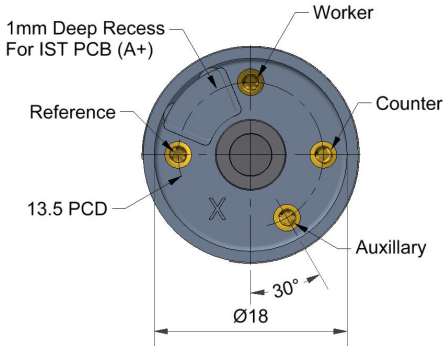
CO-A4F/CO-A4F+ Carbon Monoxide Sensor

The CO-A4F sensor is a PPB sensor that is designed for industrial safety and environmental air quality applications with best-in-class baseline stability. The A series is the most widely used sensor format for portable gas detection applications. This product is available in our standard format (CO-A4F) and with our patented Integrated Smart Technology (CO-A4F+) that has an IST board with a memory chip and temperature sensor integrated in the sensor. The + sensors store specific calibration, specification, and identification data on every sensor allowing plug and play operation. The on-board temperature sensor improves the accuracy and simplicity of temperature compensation algorithms.

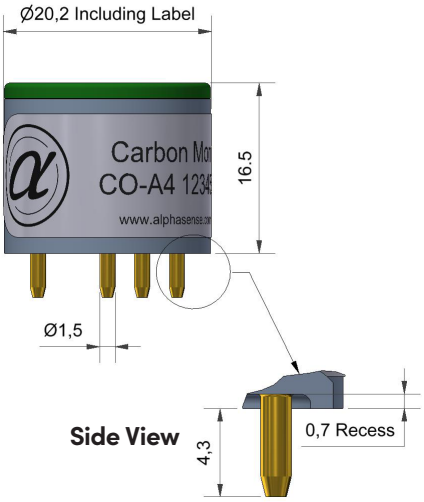
CO-A4F Carbon Monoxide Sensor – 4-Electrode



Top View

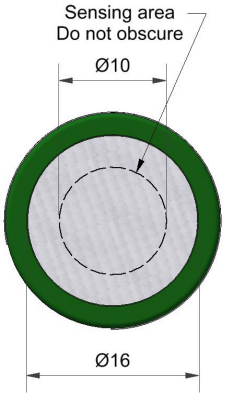


Bottom View

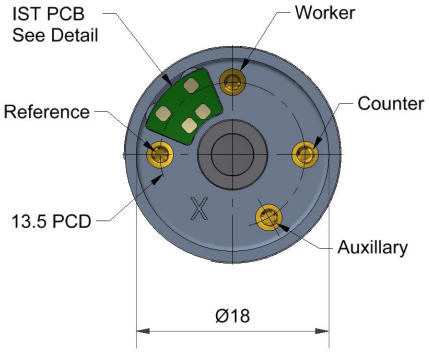


Side View

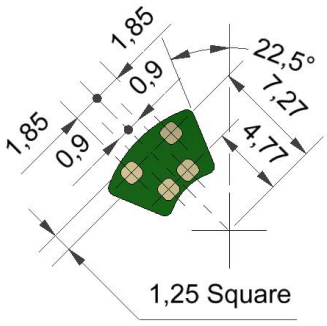
CO-A4F+ Carbon Monoxide Sensor – 4-Electrode (with Integrated Smart Technology)



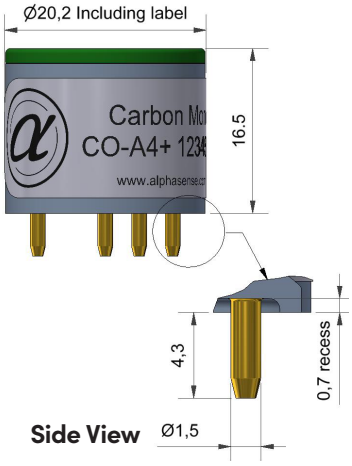
Top View



Bottom View



IST Board



Side View

Dimensions are in millimetres (± 0.15 mm).

T: +44 (0)1376 556700 **E:** sensors.alphasense@ametek.com **W:** www.alphasense.com

For further information on the performance of this sensor, on other sensors in the range or any other subject, please contact Alphasense Ltd. or visit our website at "www.alphasense.com".

Sensor Data

Performance	Sensitivity	nA/ppm in 2ppm CO		220 to 450
	Response time	t90 (s) from zero to 10ppm CO		< 30
	Zero current (typical)	nA in zero air at 20°C		-100 to +10
	Noise*	±2 standard deviations (ppb equivalent)		20
	Range ppm limit of performance warranty			500
	Linearity	ppm CO error at full scale, linear at zero, 15ppm CO		< ± 1
	Overgas limit	maximum ppm for stable response to gas pulse		2000
	***Tested with Alphasense AFE low noise circuit**			
Lifetime	Zero drift	ppb equivalent change/year in lab air		< ±100
	Sensitivity drift	% change/year in lab air, monthly test		< 10
	Operating life	months until 50% original signal (24-month warranted)		> 36
Environmental	Sensitivity @ -20°C	(% output @ -20°C/output @ 20°C) @ 5ppm CO		50 to 85
	Sensitivity @ 50°C	(% output @ 50°C/output @ 20°C) @ 5ppm CO		110 to 125
	Zero @ -20°C	nA change from 20°C		10 to 40
	Zero @ 50°	nA change from 20°C		-120 to -200
Cross Sensitivity	Filter capacity	ppm·hrs	H_2S	250,000
	H_2S sensitivity	% measured gas @ 5ppm	H_2S	< 0.1
	NO_2 sensitivity	% measured gas @ 5ppm	NO_2	< -2
	CL_2 sensitivity	% measured gas @ 5ppm	CL_2	< 0.1
	NO sensitivity	% measured gas @ 5ppm	NO	< -2
	SO_2 sensitivity	% measured gas @ 5ppm	SO_2	< 0.1
	H_2 sensitivity	% measured gas @ 100ppm	H_2 at 20°C	< 50
	C_2H_4 sensitivity	% measured gas @ 100ppm	C_2H_4	< 0.5
	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 continuous		15 to 90
	Storage period	months @ 3 to 20°C (stored in sealed pot)		6
	Load resistor	Ω (AFE circuit is recommended)		33 to 100
	Weight	g		< 6

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Figure 1 Sensitivity Temperature Dependence

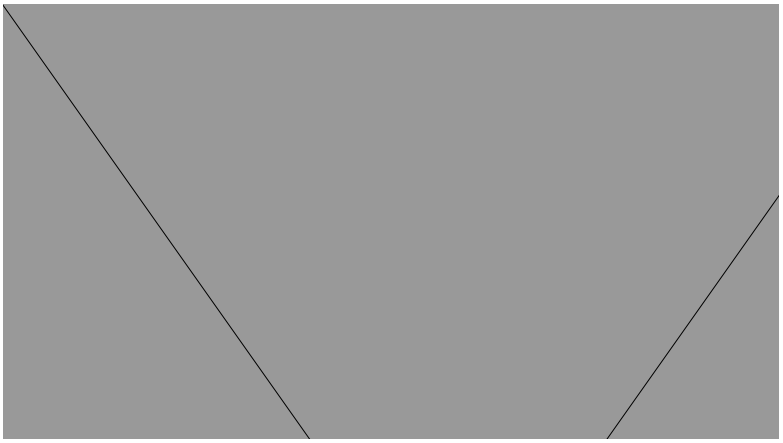

Figure 1 shows the temperature dependence of sensitivity at 2ppm CO.

This data is taken from a typical batch of sensors.

Figure 2 Zero Temperature Dependence

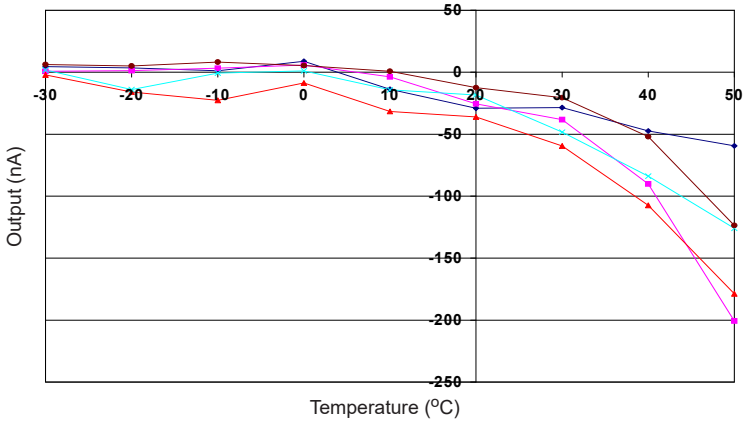

Figure 2 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.

This data is taken from a typical batch of sensors.

Contact Alphasense for futher information on zero current correction.

Figure 3 Linearity from 0 to 1ppm

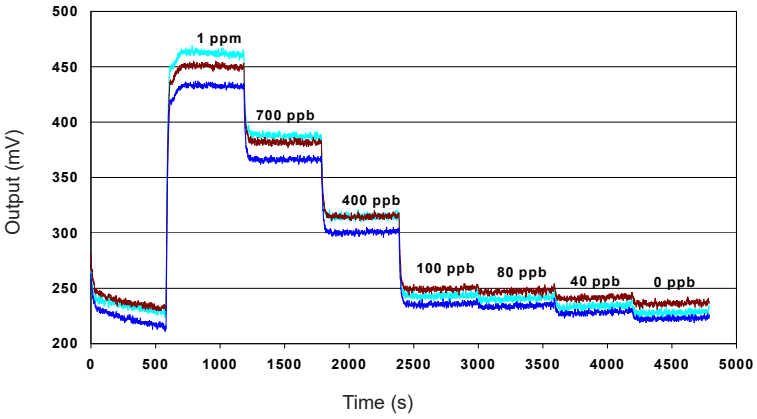

Figure 3 shows response from 0 to 1ppm CO.

Use of Alphasense AFE circuit reduces noise to 20ppb, with the opportunity of digital smoothing to reduce noise even further.

IST Board Data

Interface	Communication Bus	Compatible with the 400 kHz I²C protocol
	Max. Bus Speed	Up to 1 MHz
	Input Logic Levels	High (Recessive) < 2.3 V | Low (Dominant) < 0.2 V
	Absolute Max. Input Signal	3.6 V
Electrical	Supply Voltage Range	1.7 V to 3.6 V
	Supply current – Stand-By	< 5 µA
	Supply current – Operating	< 0.15 mA (temperature reading only) < 2.15 mA (temperature reading + memory reading/writing)
	Power Supply Conditioning	Built-In 100 nF decoupling capacitor
	ESD Protection	4 kV (human body model) - Enhanced ESD / Latch-Up protection
	Bus Pins Input Capacitance	15 pF max.
Performance	Operational Temperature	–40 °C to +85 °C
	Temperature Sensor Accuracy	±1°C (-0°C to +70°C)
	Memory Data Retention	> 200 years
	Memory Write Cycles	> 4,000,000
Data & Communication	Memory IC & I2C Address	M24128X-FCU | Device Address: R - 0xA0 / W – 0xA1
	Temperature IC & I2C Address	MAX31875R0TZS+T | Device Address: R - 0x90 / W – 0x91
	Product Data Start Address	0x0900
	Calibration Data Start Address	0x0B00
	User Data Area	0x0D00 – 0x18FF (3,072 Bytes)
	CRC Polynomial	0x 01 04C1 1DB7
	Digital Signature Algorithm	SHA-256

Factory-populated data

Product Data
- Data Format Version
- Customer (OEM) ID
- Product ID
- Type of Sensor / Target Gas
- Sensor Serial Number
- End of Storage Period Date
- Sensor Replacement Date
- Product Data Checksum
- Alphasense Digital Signature
- Customer Digital Signature

Calibration
- Calibration Data Units
- Zero (clean dry air) Output
- Calibration Span
- Calibration Output
- Sensitivity
- Calibration Date
- Calibration Data Checksum
- Calibration Data Signature

Sensor Specification
- Over-gas limit
- Concentration Range
- Temperature Range Low
- Temperature Range High
- Humidity Range Low
- Humidity Range High
- Pressure Range Low
- Pressure Range High
- Specification Checksum

15,000+ locations

Customer Specific
- Custom Parameters
- Re-Calibration Due Date
- Operational Limits:
- Low | High | STEL | TWA
- Next Bump Test Due Date
- User Data Area

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.

In the interest of continued product improvement, we reserve the right to change design features and specifications without prior notification. The data contained in this document is for guidance only. Alphasense Ltd accepts no liability for any consequential losses, injury or damage resulting from the use of this document or the information contained within.(©ALPHASENSE LTD) Doc. Ref. CO-A4F/AUG26

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