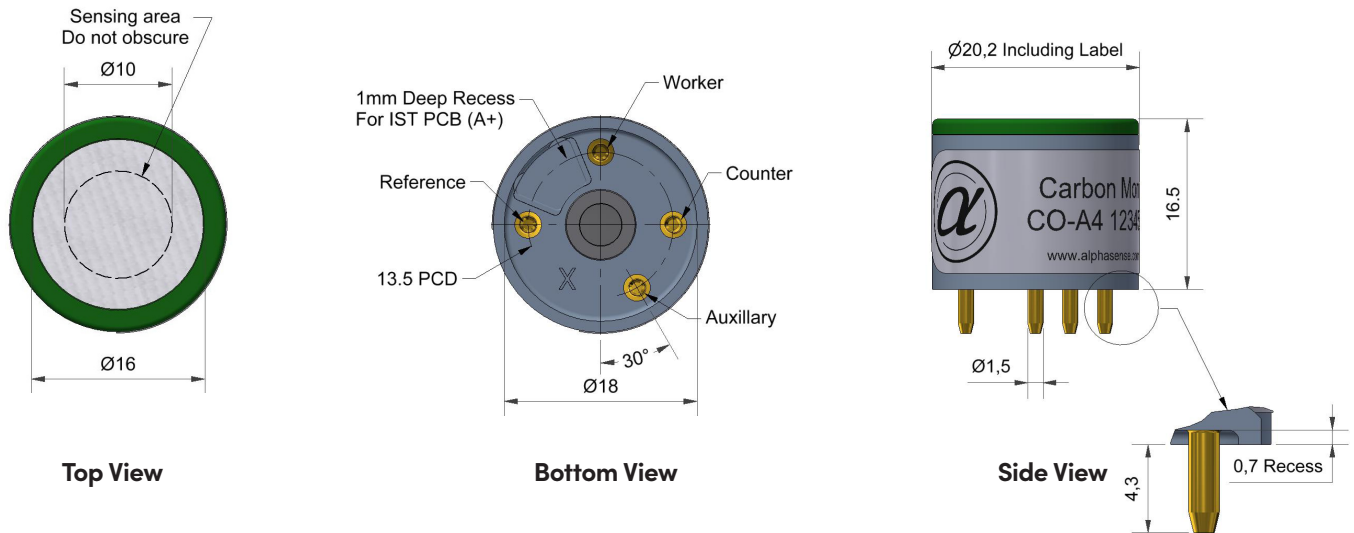


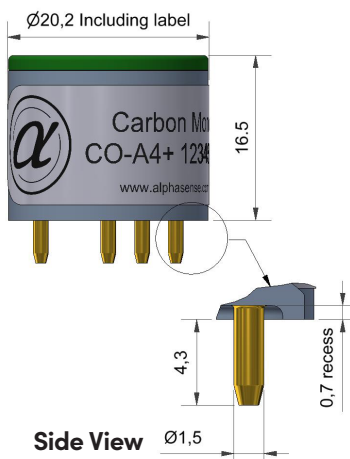
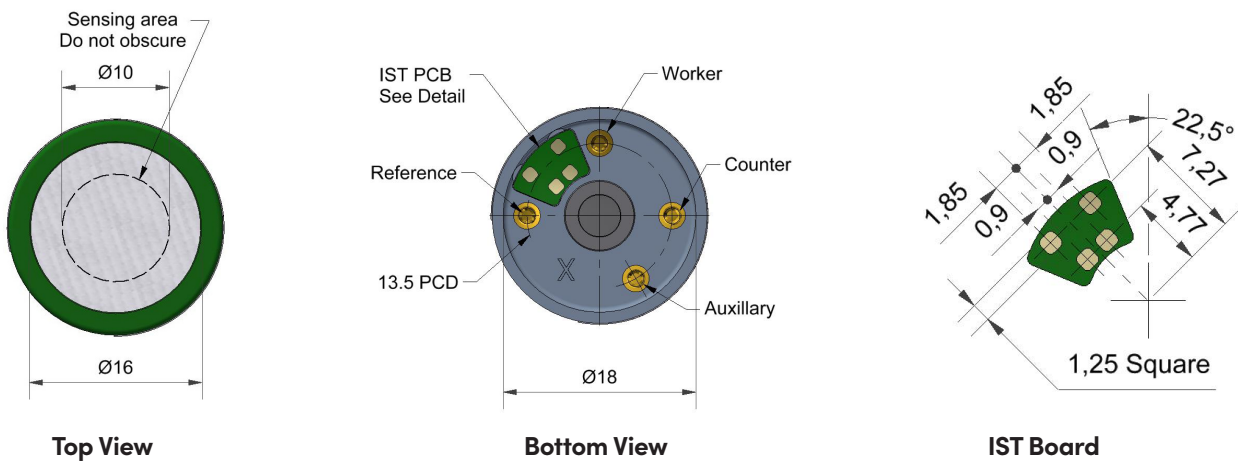
CO-A4/CO-A4+ Carbon Monoxide Sensor

The CO-A4 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-A4) and with our patented Integrated Smart Technology (CO-A4+) 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-A4 Carbon Monoxide Sensor – 4-Electrode



CO-A4+ Carbon Monoxide Sensor – 4-Electrode (with Integrated Smart Technology)



Dimensions are in millimetres (± 0.15 mm).

Sensor Data

Performance	Sensitivity	nA/ppm in 2ppm CO	220 to 410
	Response time	t90 (s) from zero to 10ppm CO	< 30
	Zero current	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 ₂ S 250,000
	H ₂ S sensitivity	% measured gas @ 5ppm	H ₂ S < 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 ₂ H ₄ sensitivity	% measured gas @ 100ppm	C ₂ H 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

Figure 1 Sensitivity Temperature Dependence

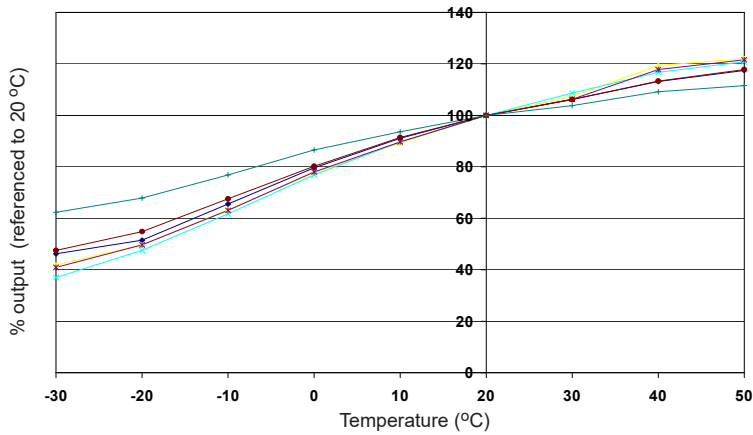


Figure 1 shows the temperature dependence of sensitivity at 2ppm CO.

This data is taken from a typical batch of sensors.

Figure 2 Zero Temperature Dependence

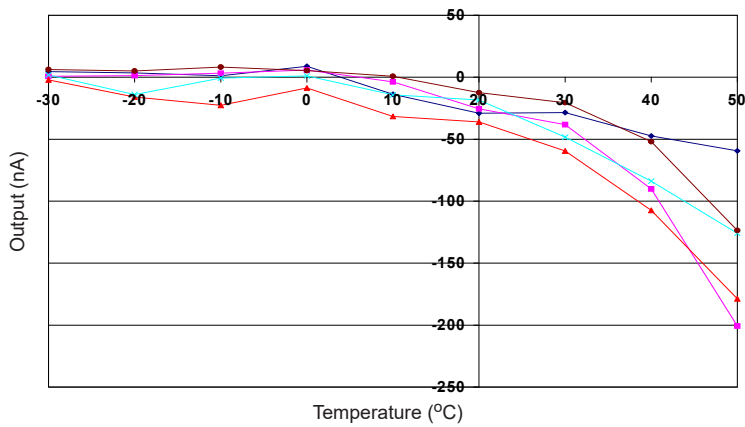


Figure 2 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.

This data is taken from a typical batch of sensors.

Contact Alphasense for further information on zero current correction.

Figure 3 Linearity from 0 to 1ppm

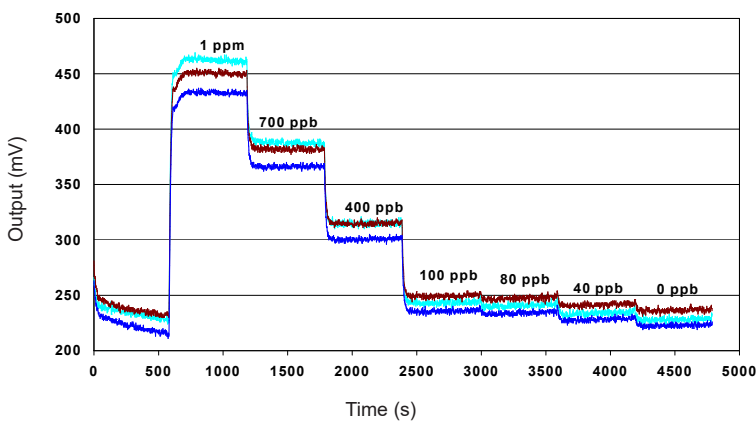


Figure 3 shows response from 0 to 1ppm CO.

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 I ² C 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.

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