

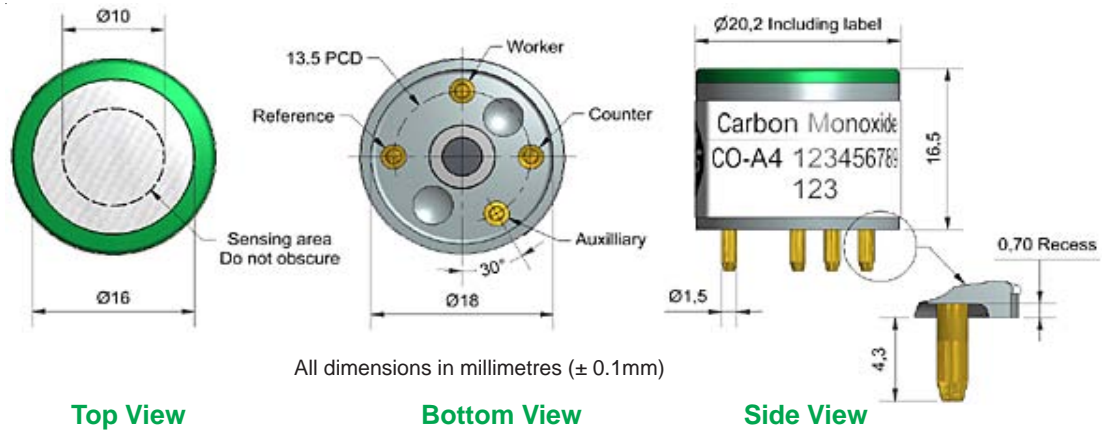


CO-A4 Carbon Monoxide Sensor 4-Electrode



PATENTED

Figure 1 CO-A4 Schematic Diagram



Technical Specification

PERFORMANCE	Parameter	Specification	Range
	Sensitivity	nA/ppm in 2ppm CO	220 to 375
	Response time	t_{90} (s) from zero to 10ppm CO	< 20
	Zero current	nA in zero air at 20°C	0 to -100
	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	Parameter	Specification	Range
	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	Parameter	Specification	Range
	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°C	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	< 10
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	Parameter	Specification	Range
	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



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, with 10 ohm load resistor, 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.



CO-A4 Performance Data

Technical Specification

Figure 2 Sensitivity Temperature Dependence

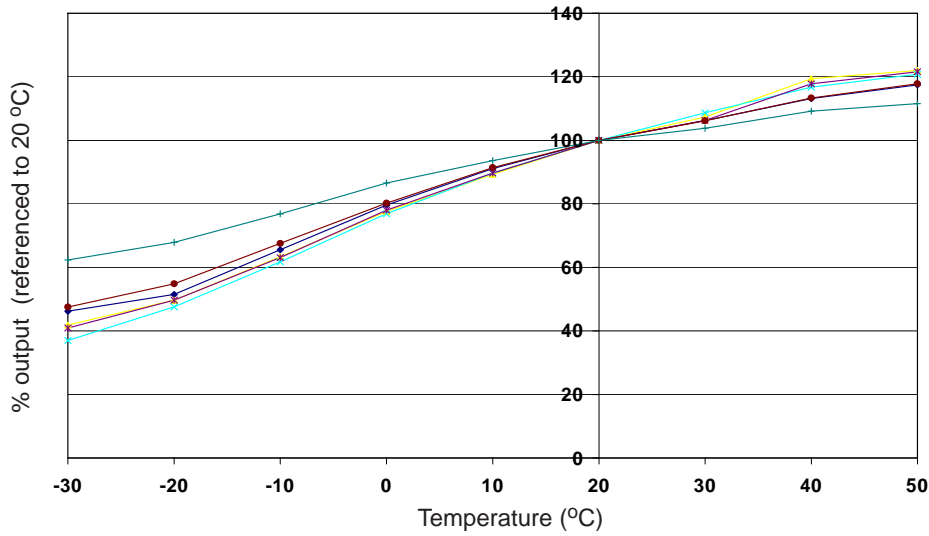


Figure 2 shows the temperature dependence of sensitivity at 2ppm CO.

This data is taken from a typical batch of sensors.

Figure 3 Zero Temperature Dependence

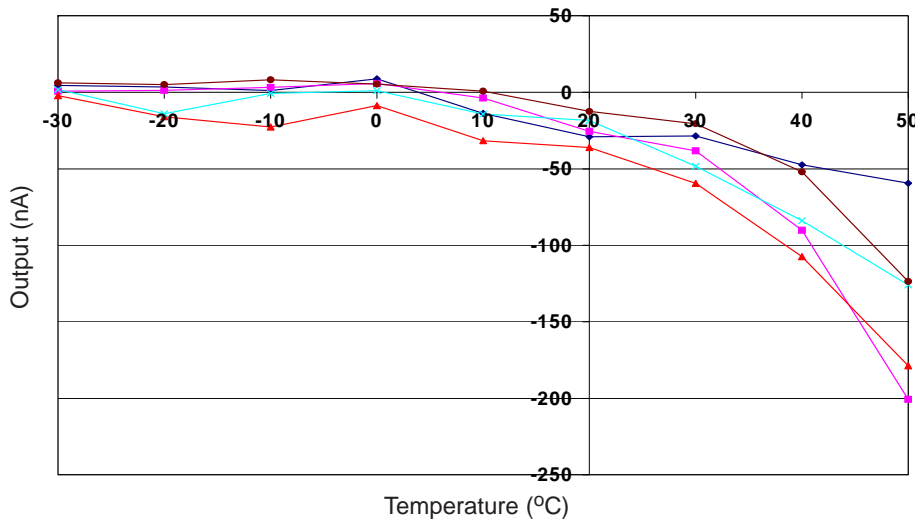


Figure 3 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.

This data is taken from a typical batch of sensors.

Contact Alphasense for further information on zero current correction.

Figure 4 Linearity from 0 to 1ppm

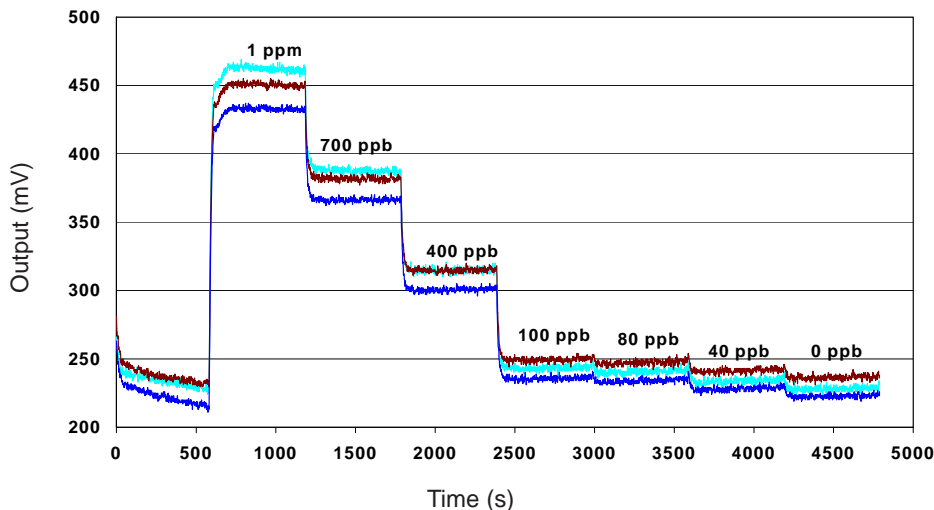


Figure 4 shows response from 0 to 1ppm CO.

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

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

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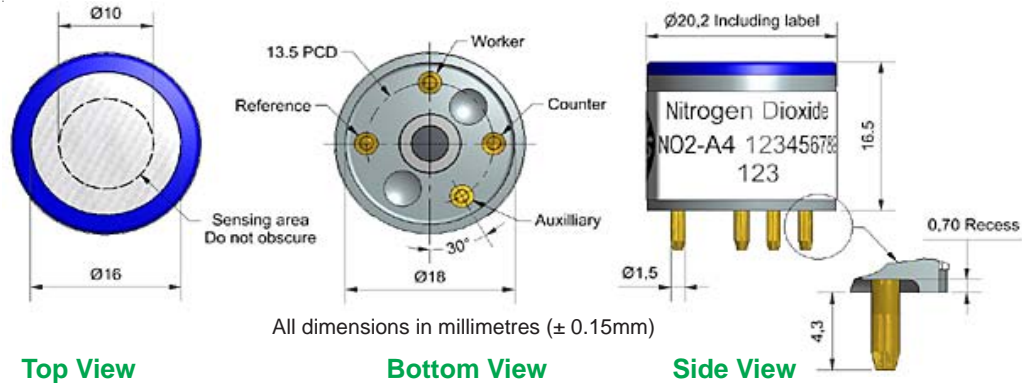


NO2-A4 Nitrogen Dioxide Sensor 4-Electrode



Patented

Figure 1 NO2-A4 Schematic Diagram



Technical Specification

PERFORMANCE

Sensitivity	nA/ppm at 1ppm NO ₂	-300 to -600
Response time	t ₉₀ (s) from zero to 1ppm NO ₂	< 30
Zero current	nA in zero air at 20°C	< ± 30
Noise*	± 2 standard deviations (ppb equivalent)	15
Range	ppm NO ₂ limit of performance warranty	20
Linearity	ppm error at full scale, linear at zero and 20ppm NO ₂	< ± 0.5
Overshoot limit	maximum ppm for stable response to gas pulse	50

* Tested with Alphasense AFE low noise circuit

LIFETIME

Zero drift	ppb equivalent change/year in lab air	0 to 20
Sensitivity drift	% change/year in lab air, monthly test	< -20 to -40
Operating life	months until 50% original signal (12 month warranted)	> 18

ENVIRONMENTAL

Sensitivity @ -20°C	(% output @ -20°C/output @ 20°C) @ 2ppm NO ₂	30 to 60
Sensitivity @ 50°C	(% output @ 50°C/output @ 20°C) @ 2ppm NO ₂	120 to 180
Zero @ -20°C	nA change from 20°C	< ± 20
Zero @ 50°C	nA change from 20°C	90 to 150

CROSS SENSITIVITY

H ₂ S	sensitivity % measured gas @ 5ppm	H ₂ S	< -80
NO	sensitivity % measured gas @ 5ppm	NO	< 2
Cl ₂	sensitivity % measured gas @ 5ppm	Cl ₂	< 70
SO ₂	sensitivity % measured gas @ 5ppm	SO ₂	< -5
CO	sensitivity % measured gas @ 5ppm	CO	< 0.1
C ₂ H ₄	sensitivity % measured gas @ 100ppm	C ₂ H ₄	< 0.1
NH ₃	sensitivity % measured gas @ 20ppm	NH ₃	< 0.1
H ₂	sensitivity % measured gas @ 100ppm	H ₂	< 0.1
CO ₂	sensitivity % measured gas @ 5% Vol	CO ₂	0.1
O ₃	sensitivity % measured gas @ 100ppb	O ₃	30 to 60
Halothane	sensitivity % measured gas @ 100ppm	Halothane	< 0.1

KEY SPECIFICATIONS

Temperature range	°C	-30 to 50
Pressure range	kPa	80 to 120
Humidity range	% rh continuous	15 to 85
Storage period	months @ 3 to 20°C (stored in sealed pot)	6
Load resistor	Ω (AFE circuit recommended)	33 to 100
Weight	g	< 6



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, with 47 ohm load resistor, 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.



NO₂-A4 Performance Data

Technical Specification

Figure 2 Sensitivity temperature dependence

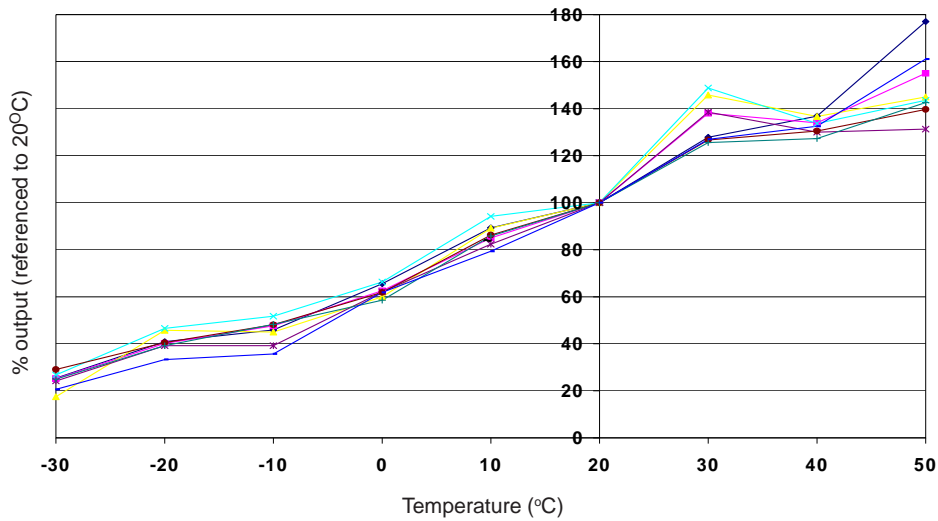


Figure 2 shows the temperature dependence of sensitivity at 1ppm NO₂.

This data is taken from a typical batch of sensors.

Figure 3 Zero temperature dependence

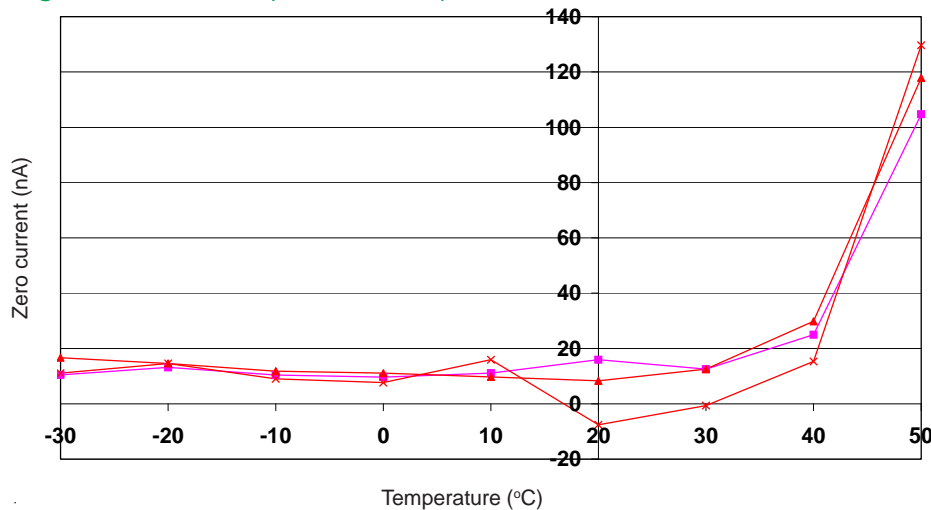


Figure 3 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.

This data is taken from a typical batch of sensors.

Contact Alphasense for further information on zero current correction.

Figure 4 Response to 200 ppb NO₂

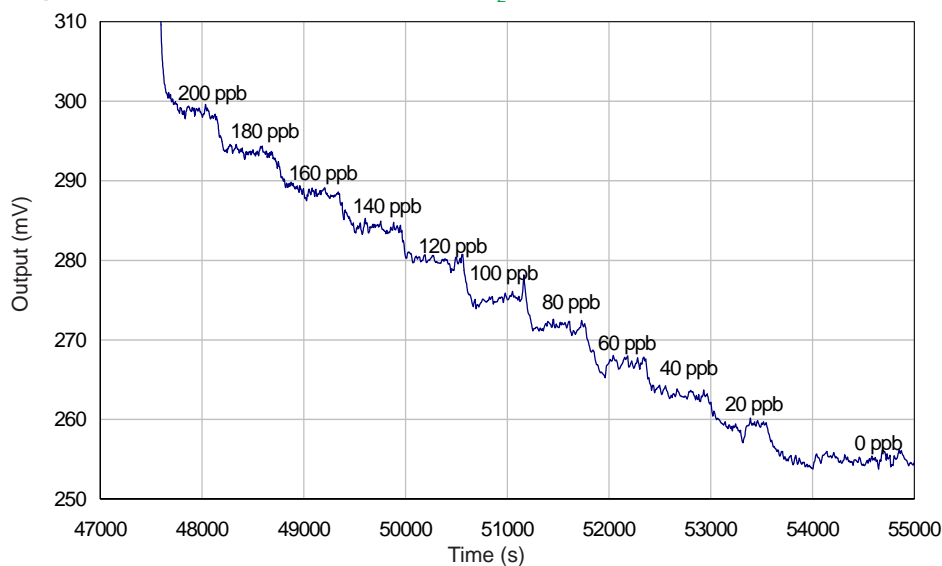


Figure 4 shows response to 200ppb NO₂.

Use of Alphasense AFE circuit reduces noise to 15ppb, with the opportunity of digital smoothing to reduce noise even further

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

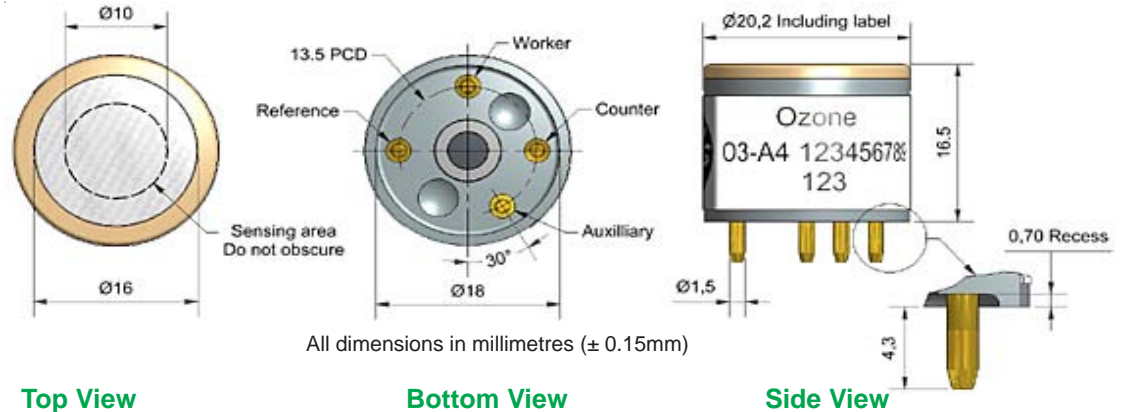
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O3-A4 Ozone Sensor 4-Electrode



Figure 1 O3-A4 Schematic Diagram



Technical Specification

PERFORMANCE

Sensitivity	nA/ppm at 100ppb O ₃	-200 to -400
Response time	t ₉₀ (s) from zero to 100ppb	< 15
Zero current	nA in zero air at 20°C	10 to 30
Noise*	±2 standard deviations (ppb equivalent)	5
Range	ppm O ₃ limit of performance warranty	5
Linearity	ppb error at full scale, linear at zero and 1ppm O ₃	200 to 500
Overgas limit	maximum ppm for stable response to gas pulse	10

* Tested with Alphasense AFE low noise circuit

LIFETIME

Zero drift	ppb equivalent change/year in lab air	0 to 50
Sensitivity drift	% change/year in lab air, monthly test	-20 to -35
Operating life	months until 50% original signal (12 month warranted)	> 18

ENVIRONMENTAL

Sensitivity @ -20°C	(% output @ -20°C/output @ 20°C) @ 500ppb O ₃	
Sensitivity @ 50°C	(% output @ 50°C/output @ 20°C) @ 500ppb O ₃	
Zero @ -20°C	nA change from 20°C	-10 to -30
Zero @ 50°C	nA change from 20°C	170 to 360

CROSS SENSITIVITY

H ₂ S sensitivity	% measured gas @ 5ppm	H ₂ S	< -70
NO ₂ sensitivity	% measured gas @ 5ppm	NO ₂	70 to 120
Cl ₂ sensitivity	% measured gas @ 5ppm	Cl ₂	< 30
NO sensitivity	% measured gas @ 5ppm	NO	< -5
SO ₂ sensitivity	% measured gas @ 5ppm	SO ₂ (initial transient)	< -4
CO sensitivity	% measured gas @ 5ppm	CO	< 0.1
H ₂ sensitivity	% measured gas @ 100ppm	H ₂	< 2
C ₂ H ₄ sensitivity	% measured gas @ 100ppm	C ₂ H ₄	< 0.1
NH ₃ sensitivity	% measured gas @ 20ppm	NH ₃	< 1
CO ₂ sensitivity	% measured gas @ 5%	CO ₂	< 0.1

KEY SPECIFICATIONS

Temperature range	°C	-20 to +50
Pressure range	kPa	80 to 120
Humidity range	% rh non-condensing	15 to 85
Flow rate	minimum sccm during calibration	500 (0.5L/m)
Bias voltage	V	0
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



O3-A4 Performance Data

Technical Specification

Figure 2 Sensitivity Temperature Dependence

Figure 2 shows the temperature dependence of sensitivity at 100ppb O₃.

This data is taken from a typical batch of sensors.

Figure 3 Zero Temperature Dependence

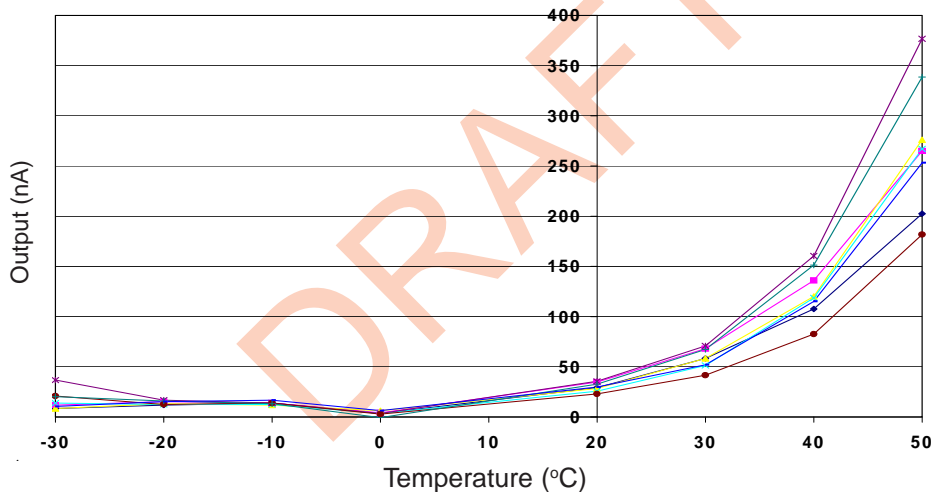


Figure 3 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.

This data is taken from a typical batch of sensors.

Contact Alphasense for further information on zero current correction.

Figure 4 Response to 200ppb Ozone

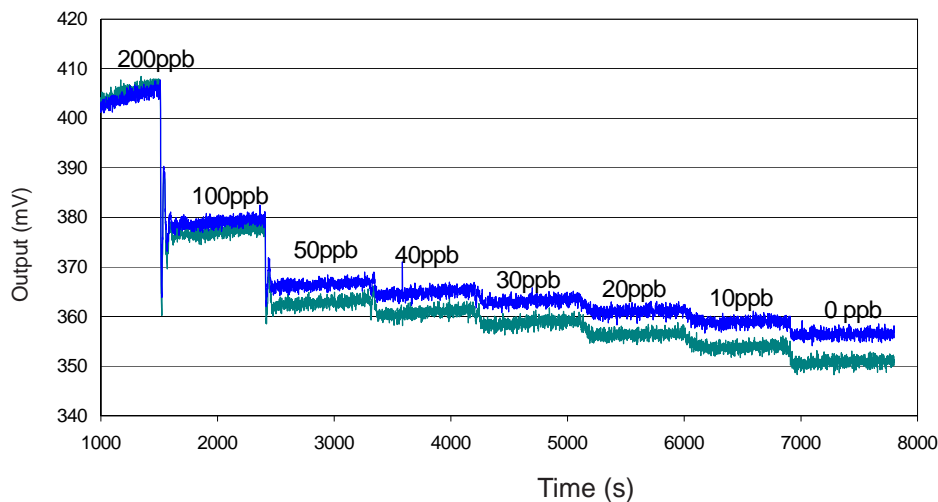


Figure 4 shows response to 200ppb O₃.

Use of Alphasense AFE circuit reduces noise to 5ppb, with the opportunity of digital smoothing to reduce noise even further.

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