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Technical specifications Version 1.0

# OX-B431 Oxidising Gas Sensor – Ozone + Nitrogen Dioxide – 4-Electrode



Dimensions are in millimetres (± 0.15 mm).

### Specification O<sub>3</sub> Sensing

Performance	Sensitivity Response time Zero current Noise <sup>*</sup> Range Linearity Overgas limit <b>*Tested with Alphasense</b>	nA/ppm at 1ppm O <sub>3</sub> t90 (s) from zero to 1ppm O <sub>3</sub> nA in zero air at 20°C ±2 standard deviations (ppb equivalent) ppm O <sub>3</sub> limit of performance warranty ppm error at full scale, linear at zero and 20ppm O <sub>3</sub> maximum ppm for stable response to gas pulse AFE low noise circuit	-225 to -750 < 80 -80 to +80 15 20 < ± 0.5 50
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 (24-month warranted	) > 24
Environmental	Sensitivity @ -20°C	% (output @ -20°C/output @ 20°C) @ 2ppm O <sub>3</sub>	70 to 90
	Sensitivity @ 40°C	% (output @ 40°C/output @ 20°C) @ 2ppm O <sub>3</sub>	95 to 125
	Zero @ -20°C	nA	0 to 25
	Zero @ 40°C	nA	5 to 100
Cross Sensitivity	H2SsensitivityNOsensitivityCl2sensitivitySO2sensitivityCOsensitivityC2H4sensitivityNH3sensitivityH2sensitivityCO2sensitivityHalothanesensitivity	% measured gas @ 5ppmH2S% measured gas @ 5ppmNO% measured gas @ 5ppmCl2% measured gas @ 5ppmSO2% measured gas @ 5ppmCO% measured gas @ 100ppmC2H4% measured gas @ 100ppmH2% measured gas @ 100ppmH2% measured gas @ 5% volumeCO2% measured gas @ 100ppmH2% measured gas @ 5% volumeCO2% measured gas @ 100ppmHalothane	< -80 < 5 < 100 < -3 < -3 < 0.1 < 0.1 < 0.1 < 0.1 < 0.1
Key Specifications	Temperature range	°C	-30 to 40
	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 is recommended)	33 to 100
	Weight	g	< 13

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".

## Figure 1 Sensitivity Temperature Dependence To 1ppm O<sub>3</sub>



Figure 1 shows the temperature dependence of sensitivity at 1ppm  $O_3$ . 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 shows response from 200ppb  $O_3$  to 0ppb  $O_3$ .

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

Offset voltage is due to intentional ISB circuit electronic offset.

The OX-B431 detects both ozone and nitrogen dioxide ( $O_3 + NO_2$ ). The NO2-B43F measures only nitrogen dioxide, filtering out ozone. Using these sensors together allows you to calculate the  $O_3$  concentration by subtracting the corrected NO2-B43F concentration from the corrected OX-B431 concentration.

Before subtracting to determine ozone concentration, ensure that the signals from the two sensors have been corrected for electronic zero offset, sensor zero offset and temperature dependence, and sensitivity (nA/ppm) calibration and temperature dependence.

#### Specification NO<sub>2</sub> Sensing

Performance	Sensitivity to NO <sub>2</sub> Response time Zero current Noise <sup>*</sup> Range Linearity Overgas limit <b>*Tested with Alphasense</b>	nA/ppm at 2ppm NO <sub>2</sub> t90 (s) from zero to 2ppm NO <sub>2</sub> nA in zero air at 20°C ±2 standard deviations (ppb equivalent) ppm NO <sub>2</sub> limit of performance warranty ppm error at full scale, linear at zero and 20ppm NO <sub>2</sub> maximum ppm for stable response to gas pulse AFE low noise circuit		-250 to -750 < 80 -80 to +80 15 20 < ± 0.5 50
Lifetime	Zero drift Sensitivity drift Operating life	ppb equivalent change/year in lab air % change/year in lab air, monthly test months until 50% original signal (24-month warranted)		0 to 20 < -20 to -40 > 24
Environmental	Sensitivity @ -20°C Sensitivity @ 40°C Zero @ -20°C Zero @ 40°C	% (output @ -20°C/output @ 20°C) @ 2ppm NO <sub>2</sub> % (output @ 50°C/output @ 20°C) @ 2ppm NO <sub>2</sub> nA nA		70 to 90 95 to 110 0 to 25 5 to 50
Cross Sensitivity	H2SsensitivityNOsensitivityCl2sensitivitySO2sensitivityCOsensitivityC2H4sensitivityNH3sensitivityH2sensitivityCO2sensitivityHalothanesensitivity	% measured gas @ 5ppm % measured gas @ 100ppm % measured gas @ 100ppm % measured gas @ 5% volume % measured gas @ 5% volume	H <sub>2</sub> S NO Cl <sub>2</sub> SO <sub>2</sub> CO C <sub>2</sub> H <sub>4</sub> NH <sub>3</sub> H <sub>2</sub> CO <sub>2</sub> Halothane	< -80 < 5 < 100 < -3 < -3 < 0.1 < 0.1 < 0.1 < 0.1 < 0.1
Key Specifications	Temperature range Pressure range Humidity range Weight	°C kPa % rh continuous 9		-30 to 40 80 to 120 15 to 85





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#### Figure 4 Sensitivity temperature dependence to 2ppm NO,



Figure 4 shows the temperature dependence of sensitivity at 2ppm NO<sub>2</sub>. This data is taken from a typical batch of sensors.

Figure 5 Response to 50ppb NO,



Figure 5 shows the fast response and good baseline recovery of the OX-B431 to 50ppb NO<sub>2</sub>.

#### Figure 6 Response from 200ppb to 0ppb NO,



Figure 6 shows response from 200ppb  $NO_2$  to 0ppb  $NO_3$ .

Use of Alphasense AFE circuit reduces noise to 15ppb, with the opportunity of digital smoothing to reduce noise to less than ± 5ppb.

Offset voltage is due to intentional ISB circuit electronic offset.

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.

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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