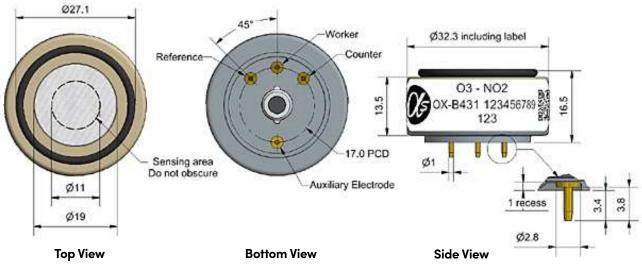


OX-B431 Oxidising Gas Sensor – Ozone + Nitrogen Dioxide – 4-Electrode



Dimensions are in millimetres (± 0.15 mm).

Specification O₃ Sensing

| Performance | Sensitivity Response time Zero current Noise* Range Linearity Overgas limit *Tested with Alphasense | nA/ppm at 1ppm O ₃ t90 (s) from zero to 1ppm O ₃ nA in zero air at 20°C ±2 standard deviations (ppb equivalent) ppm O ₃ limit of performance warranty ppm error at full scale, linear at zero and 20ppm O ₃ maximum ppm for stable response to gas pulse | -225 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 warrante | 0 to 20 < -20 to -40 ed) > 24 |
| Environmental | Sensitivity @ -20°C Sensitivity @ 40°C Zero @ -20°C Zero @ 40°C | % (output @ -20°C/output @ 20°C) @ 2ppm ${\rm O_3}$ % (output @ 40°C/output @ 20°C) @ 2ppm ${\rm O_3}$ nA nA | 70 to 90 95 to 125 0 to 25 5 to 100 |
| Cross Sensitivity | $\begin{array}{lll} {\rm H_2S} & {\rm sensitivity} \\ {\rm NO} & {\rm sensitivity} \\ {\rm CI_2} & {\rm sensitivity} \\ {\rm SO_2} & {\rm sensitivity} \\ {\rm CO} & {\rm sensitivity} \\ {\rm CO_2H_4} & {\rm sensitivity} \\ {\rm NH_3} & {\rm sensitivity} \\ {\rm NH_2} & {\rm sensitivity} \\ {\rm CO_2} & {\rm sensitivity} \\ {\rm CO_2} & {\rm sensitivity} \\ {\rm Halothane} & {\rm sensitivity} \\ \end{array}$ | % measured gas @ 5ppm H ₂ S % measured gas @ 5ppm NO % measured gas @ 5ppm CI ₂ % measured gas @ 5ppm SO ₂ % measured gas @ 5ppm CO % measured gas @ 100ppm C ₂ H ₄ % measured gas @ 20ppm NH ₃ % measured gas @ 100ppm H ₂ % measured gas @ 5% volume CO ₂ % measured gas @ 100ppm Halothane | < -80 < 5 < 100 < -3 < -3 < -3 < 0.1 < 0.1 < 0.1 < 0.1 < 0.1 |
| Key Specifications | Temperature range Pressure range Humidity range Storage period Load resistor Weight | $^{\circ}\text{C}$ kPa $^{\circ}\text{K}$ rh continuous months @ 3 to 20 $^{\circ}\text{C}$ (stored in sealed pot) Ω (AFE circuit is recommended) g | -30 to 40 80 to 120 15 to 85 6 33 to 100 < 13 |



Figure 1 Sensitivity Temperature Dependence To 1ppm O₃

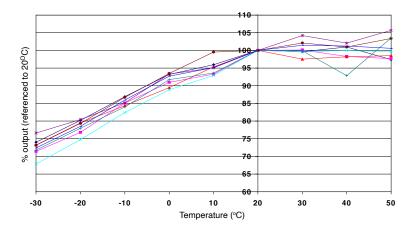


Figure 1 shows the temperature dependence of sensitivity at 1ppm O_3 .

This data is taken from a typical batch of sensors.

Figure 2 Zero Temperature Dependence

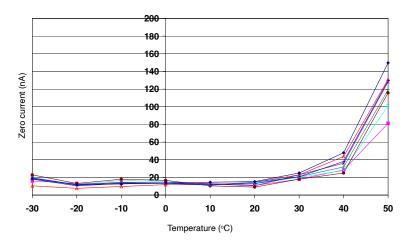


Figure 2 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.

This data is taken from a typical batch of sensors.

Contact Alphasense for futher information on zero current correction.

Figure 3 Response from 200ppb to 0ppb O,

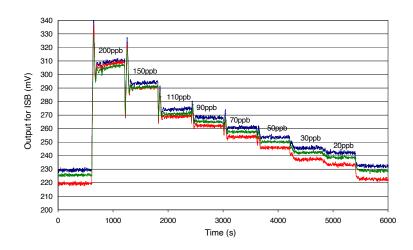


Figure 3 shows response from 200ppb ${\rm O_3}$ to 0ppb ${\rm O_3}$.

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 NO₂ Sensing

| Performance | Sensitivity to NO ₂ Response time Zero current Noise* Range Linearity Overgas limit *Tested with Alphasense | nA/ppm at 2ppm NO ₂ t90 (s) from zero to 2ppm NO ₂ nA in zero air at 20°C ±2 standard deviations (ppb equivalent) ppm NO ₂ limit of performance warranty ppm error at full scale, linear at zero and 20ppm NO ₂ 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 ${ m NO_2}$ % (output @ 50°C/output @ 20°C) @ 2ppm ${ m NO_2}$ nA | | 70 to 90 95 to 110 0 to 25 5 to 50 |
| Cross Sensitivity | $\begin{array}{lll} \text{H}_2\text{S} & \text{sensitivity} \\ \text{NO} & \text{sensitivity} \\ \text{CI}_2 & \text{sensitivity} \\ \text{SO}_2 & \text{sensitivity} \\ \text{CO} & \text{sensitivity} \\ \text{C}_2\text{H}_4 & \text{sensitivity} \\ \text{NH}_3 & \text{sensitivity} \\ \text{H}_2 & \text{sensitivity} \\ \text{CO}_2 & \text{sensitivity} \\ \text{Halothane} & \text{sensitivity} \end{array}$ | % measured gas @ 5ppm % measured gas @ 100ppm % measured gas @ 20ppm % measured gas @ 100ppm % measured gas @ 100ppm % measured gas @ 5% volume % measured gas @ 100ppm | H ₂ S NO Cl ₂ SO ₂ CO C ₂ H ₄ NH ₃ H ₂ CO ₂ Halothane | < -80 < 5 < 100 < -3 < -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 g | | -30 to 40 80 to 120 15 to 85 |



Figure 4 Sensitivity temperature dependence to 2ppm NO,

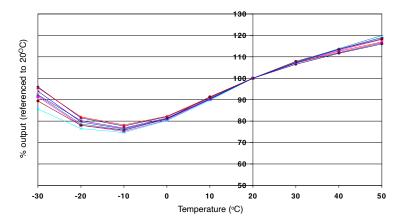


Figure 4 shows the temperature dependence of sensitivity at 2ppm NO_3 .

This data is taken from a typical batch of sensors.

Figure 5 Response to 50ppb NO,

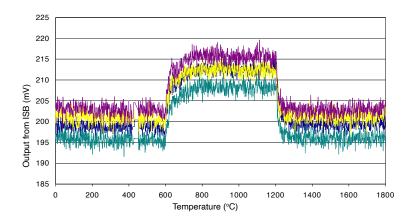


Figure 5 shows the fast response and good baseline recovery of the OX-B431 to 50ppb NO₂.

Figure 6 Response from 200ppb to 0ppb NO,

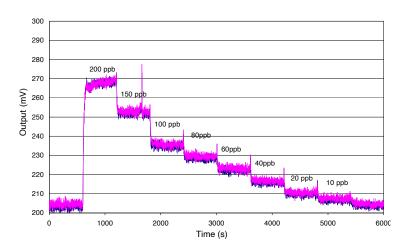


Figure 6 shows response from 200ppb $\mathrm{NO_2}$ to 0ppb $\mathrm{NO_2}$.

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.

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. OX-B431/SEP22