VOC Sensor
Metal Oxide Technology

**VOC-A11** Figure 1 Schematic Diagram

All dimensions in millimetres (± 0.1mm)

- Pins 1 & 6: Detector
- Pins 2 & 5: Heater
- Pins 3 & 4: Detector

**VOC-M11** Figure 2 Schematic Diagram

All dimensions in millimetres (± 0.1mm)

- Pins 1 & 3: Heater
- Pins 2 & 4: Detector

**VOC-P11** Figure 3 Schematic Diagram

All dimensions in millimetres (± 0.1mm)

- Pins 1 & 6: Detector
- Pins 2 & 5: Heater
- Pins 3 & 4: Detector
VOC Performance Data

GENERAL DESCRIPTION
The p-type metal oxide gas sensor is sensitive to VOCs. It has a large dynamic detection range, and gives a composite response in the presence of multiple gases. It is also has low humidity response. The sensor is thermally cycled\(^*\) to provide a stable response. The measured resistance increases in the presence of typical reducing gases; this change in conductivity can be converted to an output voltage via a simple electrical circuit.

\(^*\)The sensor is operated to alternate repeatedly between 400°C (the sensing temperature) and 525°C (the reset temperature). In this way, the exposure time in VOC is fixed at the dwell time at 400°C. The dwell time is determined by the detection range required by the end user. For further advice, please contact Technical Support.

<table>
<thead>
<tr>
<th>PERFORMANCE</th>
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<tbody>
<tr>
<td>Range</td>
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<tr>
<td>Sensor resistance ((R_s))</td>
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<tr>
<td>Sensor resistance ((R_g))</td>
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<tr>
<td>Sensor resistance ratio ((R_g/R_o \times 100%))</td>
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</table>

\[ (R_g/R_o = 1 = \sum \kappa \times \text{Conc}^n) \]

where \(\kappa\) = constant for gas \(i\), \(n = 1\) or 0.5

Gas response relationship
\[ k \text{ is ppm}^{-1}; \quad 0.05 +/- 10\% (k \text{ for isobutylene}) \]

power \(n\) is dimensionless; \(0.5\) (n for isobutylene)

Conc. is ppm

| Heater resistance (\(R_h\) at RT) | Ω (23 ±1°C) | 10 ±1.5 |
| Heater resistance (\(R_h\) at sensing temp.) | Ω (400 ±10°C) | 22 ±3 |
| Heater resistance (\(R_h\) at reset temp.) | Ω (525 ±10°C) | 26 ±3 |
| Heater power consumption (mW) typical for 5:1 | \(V_h = 2.7 \pm 0.2V \) (400°C) | 340 ±30 |
| | \(3.7 \pm 0.3V \) (525°C) | 530 ±50 |

Operating Temperature Range °C
-20 to 120

SENSITIVITY TO OTHER GASES

| EtOH sensitivity | % measured gas @ 10 ppm EtOH | < 15 ppm |
| C\(_2\)H\(_8\) sensitivity | % measured gas @ 500 ppm C\(_2\)H\(_8\) | < 5 ppm |

Figure 4 Real-time sensitivity as a function of Concentration

Sensitivity towards 20, 10 and 5 ppm Isobutylene in 50% rh. Sensor operating in 2-temperature mode, pulsing between 400°C for 5 mins and 525°C for 1 min.

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.

For further information on the performance of this sensor, on other sensors in our range, please contact Alphasense Ltd.
VOC Performance Data

Figure 5 Basic Measuring Circuit for VOC-A11 and VOC-P11 package

- Pins on the measuring circuit, shown in Figure 5, correspond with the pin numbers in Figure 1, 2 & 3 above.
- When the sensor is connected in this half Wheatstone bridge configuration, $V_o$ decreases as the sensing material resistance increases.

Heater Voltage $(V_H)$ 2.7 ± 0.2 V (AC or DC)
Circuit Voltage $(V_S)$ Max. 24 VDC
Load Resistance $(R_L)$ > 1kΩ

VOC-A11 EXPLOSION PROOF CERTIFICATION

This certification does not apply to VOC-M11 or VOC-P11

CERTIFICATION

<table>
<thead>
<tr>
<th>Sira 07ATEX 1086X</th>
<th>IECEx SIR07.0031X</th>
<th>Ex d IIC T4 SVRc, 1.25 W, $T_a$ -40° to 50°C</th>
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<tr>
<td>UL913 091007-E253708</td>
<td>Class I, II and III, Division 1</td>
<td>CSA 22.2 1906313 Class 4828 31</td>
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SPECIAL CONDITIONS FOR SAFE USE (denoted by X after the certificate number)

The non-metallic parts of the Flameproof Sensor Housings shall only be installed in enclosures that offer protection from mechanical impact damage and shall not be exposed to ultraviolet radiation.

The final installation of the Flameproof Sensor Housings shall ensure that any likely damage from dropping the complete device has been considered.

The Flameproof Sensor Housings shall only be connected to an electrical supply that is certified as compliant with IEC 60079-11 and limited to the following: Type D - 5 Vdc, 1.25 W