Performance Characteristics

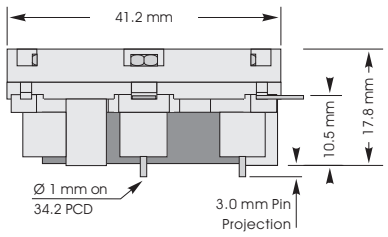
Nominal Range	0-2ppm
Maximum Overload	5ppm
Expected Operating Life	Two years in air
Output Signal	7.2µA/ppm ± 20%
Resolution	20ppb
Temperature Range	-20°C to +50°C
Pressure Range	Atmospheric ± 10%
Pressure Coefficient	No data
T_{90} Response Time	≤150 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	0 to +120ppb equivalent
Maximum Baseline Shift (+20°C to +40°C)	+36ppb equivalent
Long Term Output Drift	<4% signal loss/month
Recommended Load Resistor	33Ω
Bias Voltage	Not required
Repeatability	5% of signal
Output Linearity	Linear

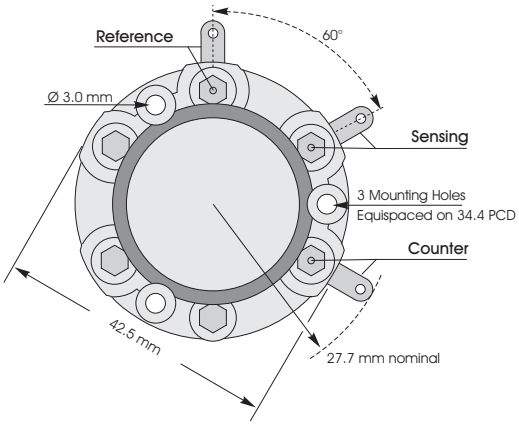
N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013mBar

Physical Characteristics

Weight	22g
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch

Product Dimensions





All tolerances ±0.15mm unless otherwise stated.
Sensor shown with side tags and gold pins.

Ordering Information

The 3OZ Ozone CiTiceL is available with both gold-plated PCB pins and side tags.

Type 3OZ
With side tag and PCB pin connections - **3OZ**

Temperature Dependence

The output of a CiTiceL can vary with temperature. A programme of data acquisition is currently underway at City Technology to establish a statistically based relationship for 3OZ sensors. For applications where accurate data is required please contact City Technology.

Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 3OZ CiTiceLs have been tested with a number of commonly cross-interfering gases and the results are given below. The table shows the typical response to be expected from a sensor when exposed to a given test gas concentration (relevant to safety, e.g. TLV levels). The results are based on the chlorine sensitivity and assume the response of the sensor to ozone is 120% of the chlorine response.

Gas	Conc.	3OZ	Gas	Conc.	3OZ
Carbon monoxide:	300ppm	0ppm	**Chlorine:**	1ppm	0.5 ppm ≤ x$ ≤ 1ppm
Hydrogen sulphide:	15ppm	≈-2ppm	**Hydrogen:**	100ppm	0ppm
Sulphur dioxide:	5ppm	0ppm	**Hydrogen cyanide:**	10ppm	0ppm
Nitric oxide:	35ppm	0ppm	**Hydrogen chloride:**	5ppm	0ppm
Nitrogen dioxide:	5ppm	≈3.5ppm	**Ethylene:**	100ppm	0ppm

For information on other possible cross-interferents please contact City Technology.

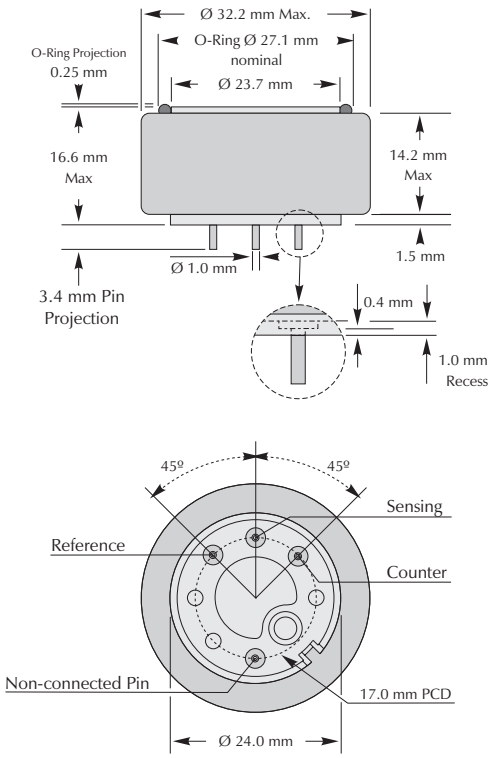
SAFETY NOTE
This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

7OZ CiTiceL®

Performance Characteristics

Nominal Range	0-2 ppm
Maximum Overload	5 ppm
Expected Operating Life	Two years in air
Output Signal	7.2 ± 2.3 µA/ppm
Resolution	20 ppb
Temperature Range	-20°C to +50°C
Pressure Range	Atmospheric ± 10%
Pressure Coefficient	No data
T_{90} Response Time	≤150 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	0 to +120 ppb equivalent
Maximum Baseline Shift (+20°C to +40°C)	+36 ppb equivalent
Long Term Output Drift	<4% signal loss/month
Recommended Load Resistor	33 Ω
Bias Voltage	Not required
Repeatability	5% of signal
Output Linearity	Linear

N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013 mBar



All tolerances ±0.15 mm unless otherwise stated.
Do not solder to pin connections

IMPORTANT NOTE: Connection should be made via PCB sockets only. Soldering to the pins will render your warranty void.

Physical Characteristics

Weight	17 g
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch

Temperature Dependence

The output of a CiTiceL can vary with temperature. A programme of data acquisition is currently underway at City Technology to establish a statistically based relationship for 7OZ sensors. For applications where accurate data is required please contact City Technology.

Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 7OZ CiTiceLs have been tested with a number of commonly cross-interfering gases and the results are given below. The table shows the typical response to be expected from a sensor when exposed to a given test gas concentration (relevant to safety, e.g. TLV levels).

Gas	Conc.	7OZ	Gas	Conc.	7OZ
Carbon monoxide:	300ppm	0ppm	**Chlorine:**	1ppm	<1ppm
Hydrogen sulphide:	15ppm	≈–2ppm	**Hydrogen:**	100ppm	0ppm
Sulphur dioxide:	5ppm	0ppm	**Hydrogen cyanide:**	10ppm	0ppm
Nitric oxide:	35ppm	0ppm	**Hydrogen chloride:**	5ppm	0ppm
Nitrogen dioxide:	5ppm	≈3.5ppm	**Ethylene:**	100ppm	0ppm

For information on other possible cross-interferents please contact City Technology.

SAFETY NOTE
This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

Ozone

Sensoric O3 3E 1

Sensoric O3 3E 1

FEATURES

Amperometric 3 electrode sensor cell
Long life time
High reliability
High resolution
Fast response time
Fixed organic gel electrolyte

TYPICAL APPLICATIONS

Environmental monitoring
Indoor Air Quality, water treatment plants

PART NUMBER INFORMATION

MINI	1531-031-30009
SENSORIC CLASSIC	1531-031-30069
CTL 4 series adaptation	1531-031-30049
CTL 7 series adaptation	1531-031-30079

Sensoric O3 3E 1

TECHNICAL SPECIFICATIONS

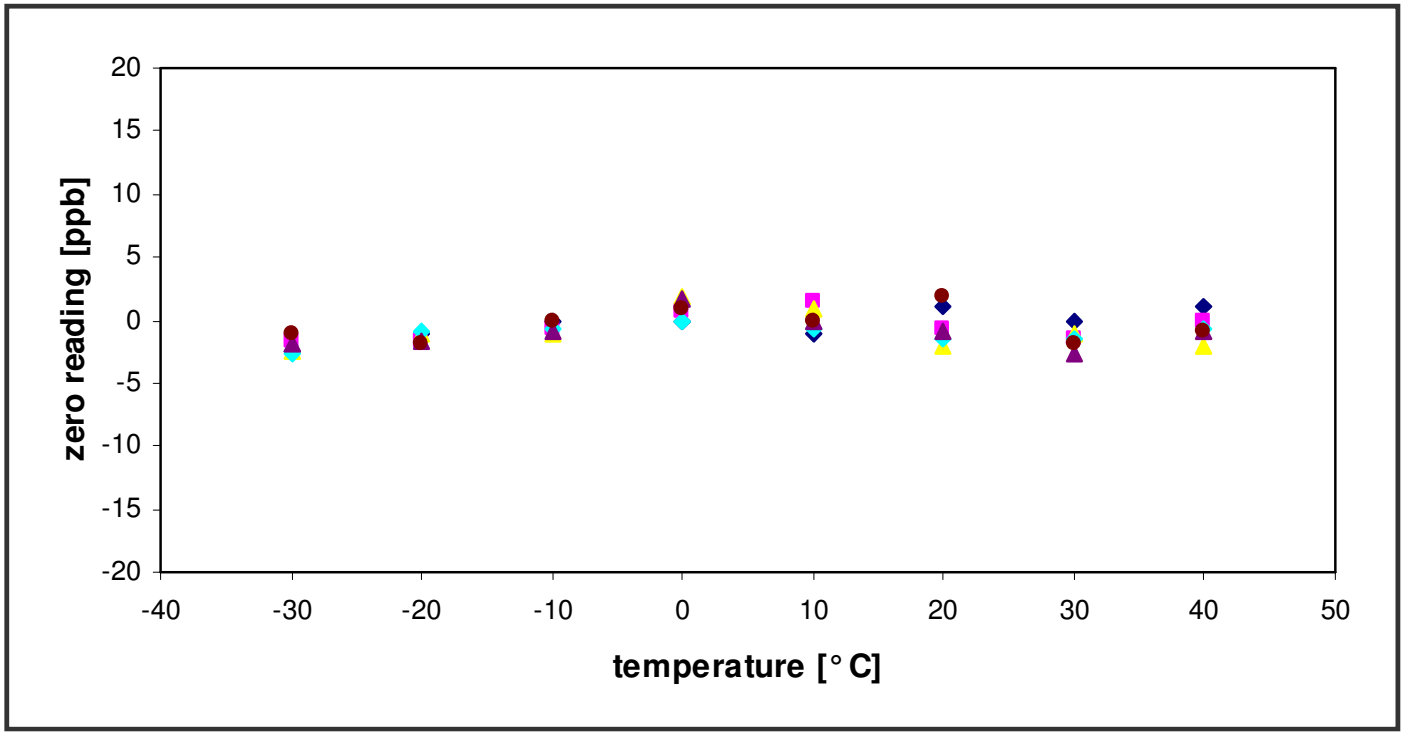
Measuring Range	0–1 ppm
Sensitivity Range	1000 - 2000 nA/ppm (negative signal)
Zero Current at 20 °C	< ± 20 nA
Resolution at 20 °C	< 0.02 ppm
Bias Potential	0 mV
Linearity	< 10% full scale
Response Time at 20 °C	
t50	< 15 s calculated from 3 min. exposure time[1)]
t90	< 60 s calculated from 3 min. exposure time[1)]
Long Term Sensitivity Drift	< 10% per 6 months [2)]
Operation Conditions	
Temperature Range	-20 °C to +40 °C
Humidity Range	15–90% r.H., non–condensing
Effect of Humidity	abrupt changes will cause a short term drift
Sensor Life Expectancy	> 18 months
Warranty	12 months

1) At approx. 30 ccm/ min. (tolerance range to t_{90} : 30 to 60 sec.; depend on air velocity; minimum gas flow 5 l/h)

2) At 20 °C and 30-50% r.H.; Sensitivity might increase over life time depending on application; high air flow conditions might effect life time.

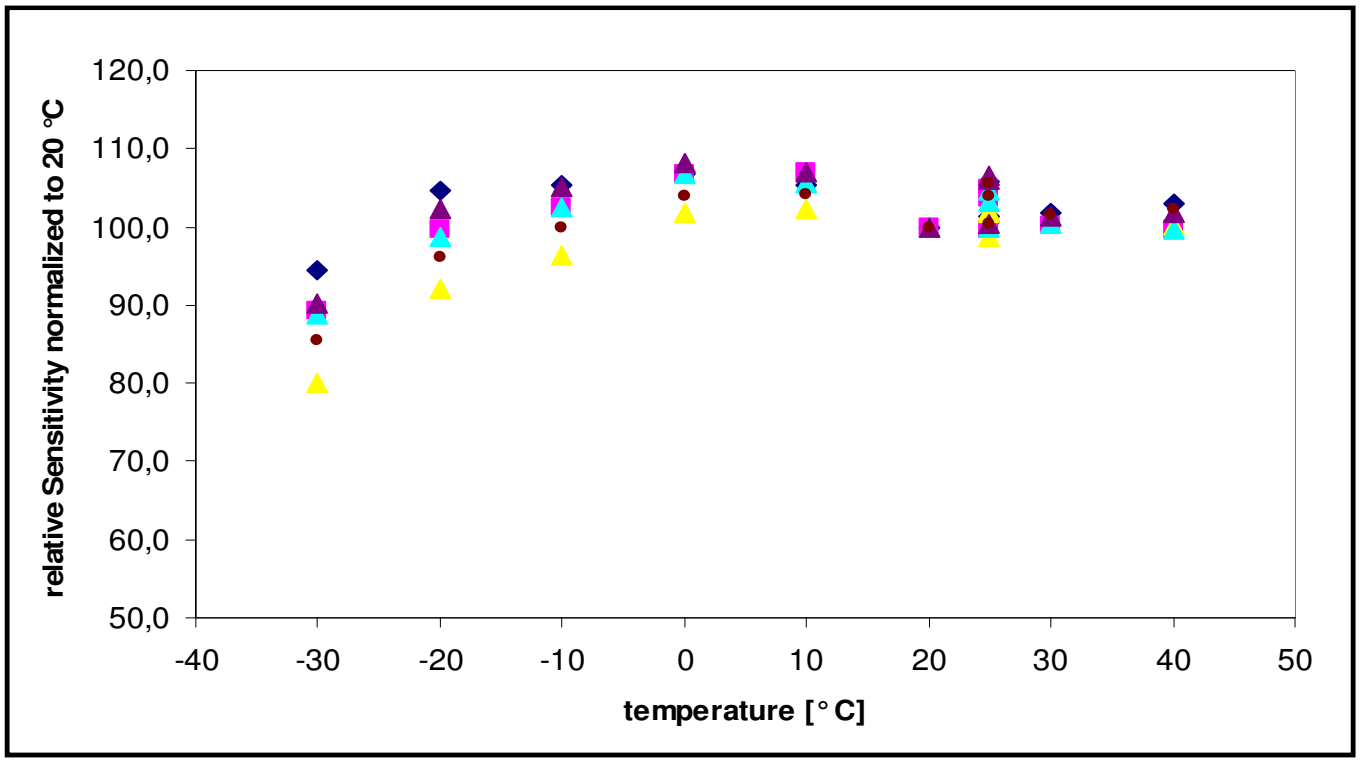
Sensoric O3 3E 1

Temperature dependence on zero reading:



Sensoric O3 3E 1

RELATIVE OUTPUT vs. TEMPERATURE:
(normalized to the output at 20 °C)



Sensoric O3 3E 1

CROSS SENSITIVITIES AT 20 °C

Gas	Concentration	Reading [ppm]
Bromine, Iodine		yes; n/d
Carbon Dioxide	5000 ppm	0
Carbon Monoxide	100 ppm	0
Chlorine	1 ppm	1.2
Chlorine Dioxide	1 ppm	1.5
Hydrazine	3 ppm	-3
Hydrogen	3000 ppm	0
Hydrogen Sulfide	20 ppm	-1.6 [1)]
Nitrogen	100 %	0
Nitrogen Dioxide	10 ppm	6

1) Continuous exposure at ppm level over more than 30 min. might blind the sensor.

Notes:
1. Interference factors may differ from sensor to sensor and with life time. It is not adviseable to calibrate with interference gases.
2. This table does not claim to be complete. The sensor might also be sensitive to other gases.

Safety Note

This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

Attention

Use of the Sensoric range sensors requires complete understanding of the instructions. Before using Sensoric range sensors please carefully read 'Application Notes' which can be found at www.citytech.com under the heading '*Support' -> 'Application Notes' -> 'Sensoric'*

Product Safety Data Sheets (PSDS) can be obtained at www.citytech.com under the heading '*Support' -> 'Product Safety Datasheets'*

For further assistance on sensor selection and use, please contact a member of the Technical Sales team.

Ozone

Sensoric O3 3E 1 F

Sensoric O3 3E 1 F

FEATURES

Amperometric 3 electrode sensor cell
Long life time
High reliability
Fast response
Fixed organic gel electrolyte

TYPICAL APPLICATIONS

Environmental monitoring
Indoor Air Quality, water treatment plants

PART NUMBER INFORMATION

MINI	1531-231-30009
SENSORIC CLASSIC	1531-231-30069
CTL 4 series adaptation	1531-231-30049
CTL 7 series adaptation	1531-231-30079

Sensoric O3 3E 1 F

TECHNICAL SPECIFICATIONS

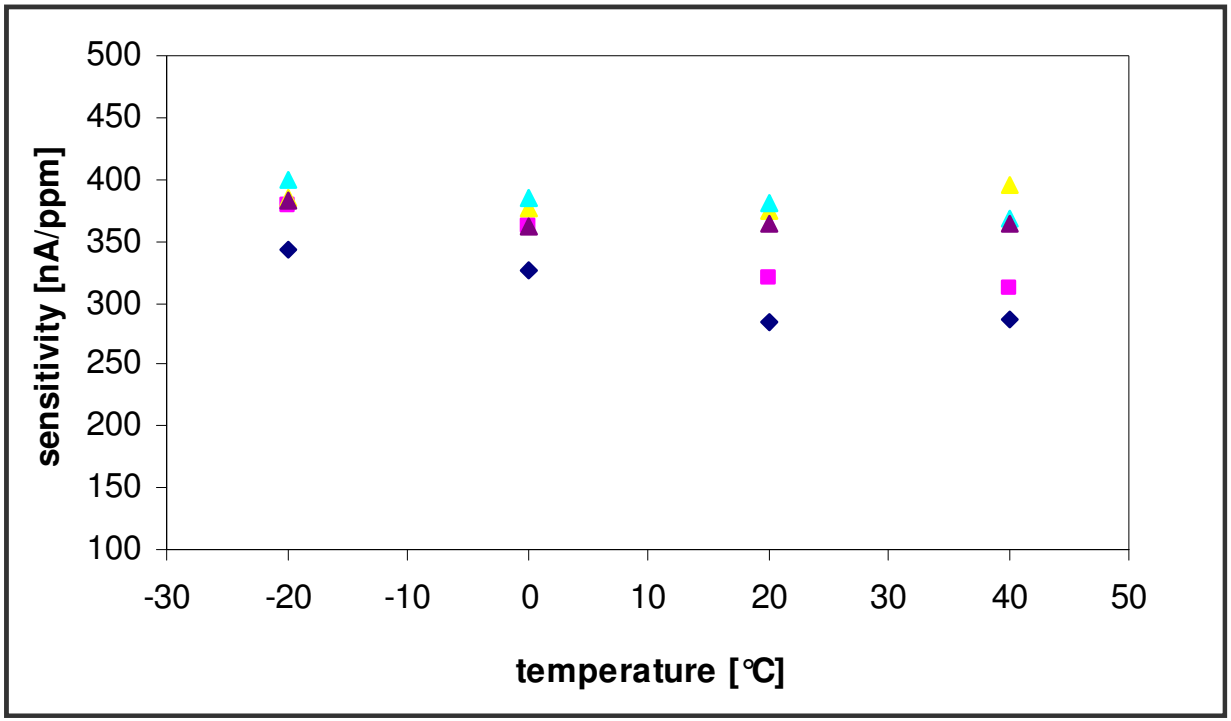
Measuring Range	0–1 ppm
Sensitivity Range	450 +/- 150 nA/ppm (negative signal)
Zero Current at 20 °C	< ± 10 nA
Resolution at 20 °C	< 0.03 ppm
Bias Potential	0 mV
Linearity	< 10% full scale
Response Time at 20 °C	
t50	< 15 s calculated from 3 min. exposure time[1)]
t90	< 60 s calculated from 3 min. exposure time[1)]
Long Term Sensitivity Drift	< 5% per month [2)]
Operation Conditions	
Temperature Range	-20 °C to +40 °C
Humidity Range	15–90% r.H., non–condensing
Effect of Humidity	abrupt changes will cause a short term drift
Sensor Life Expectancy	> 18 months
Warranty	12 months

1) At approx. 200 ccm/ min. (tolerance range to t_{90} : 30 to 60 sec.; depend on air velocity; minimum gas flow 5 l/h)

2) At 20 °C and 30-50% r.H.; Sensitivity might increase over life time depending on application; high air flow conditions might effect life time

Sensoric O3 3E 1 F

OUTPUT vs. TEMPERATURE:



ZERO READING vs. TEMPERATURE: no effect

Sensoric O3 3E 1 F

CROSS SENSITIVITIES AT 20 °C

Gas	Concentration	Reading [ppm]
Bromine, Iodine		yes; n/d
Carbon Dioxide	5000 ppm	0
Carbon Monoxide	100 ppm	0
Chlorine	1 ppm	1.2
Chlorine Dioxide	1 ppm	1.5
Hydrazine	3 ppm	-3
Hydrogen	3000 ppm	0
Hydrogen Sulfide	20 ppm	-1.6 [1)]
Nitrogen	100 %	0
Nitrogen Dioxide	10 ppm	6

1) Continuous exposure at ppm level over more than 30 min. might blind the sensor.

Notes:
1. Interference factors may differ from sensor to sensor and with life time. It is not adviseable to calibrate with interference gases.
2. This table does not claim to be complete. The sensor might also be sensitive to other gases.

Safety Note

This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

Attention

Use of the Sensoric range sensors requires complete understanding of the instructions. Before using Sensoric range sensors please carefully read 'Application Notes' which can be found at www.citytech.com under the heading '*Support' -> 'Application Notes' -> 'Sensoric'*

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For further assistance on sensor selection and use, please contact a member of the Technical Sales team.

A3OZ EnviroceL®

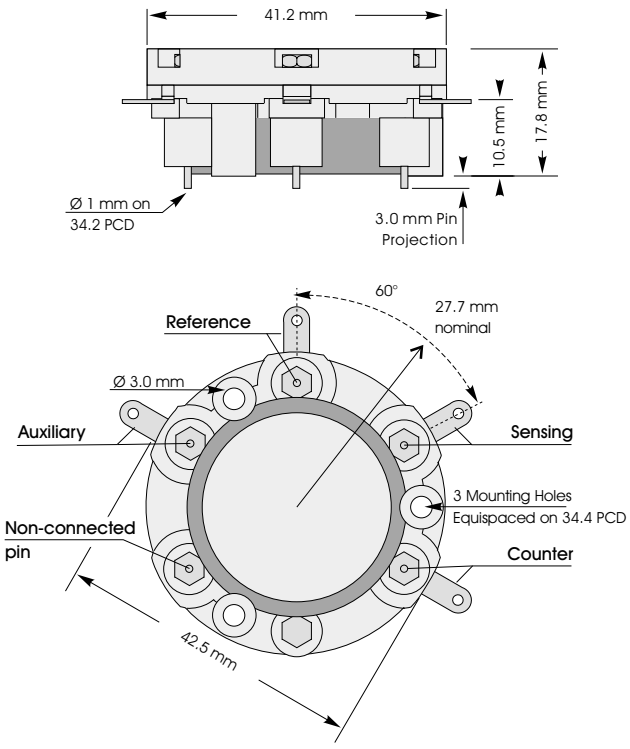
This sensor is one of a range for monitoring gases at levels found in the environment. It is designed to give accurate readings of O_3 or NO_2 in ambient air.

Performance Characteristics

Nominal Range	0-10ppm
Maximum Overload	100ppm
Expected Operating Life	Two years
Output Signal	2.2 ± 0.5 µA/ppm
Resolution at 20°C	20ppb
Temperature Range	-20°C to +50°C
Pressure Range	Atmospheric ± 10%
Pressure Coefficient	No data
T_{90} Response Time	<40 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	0 to 0.1ppm equivalent
Maximum Zero Shift (+20°C to +40°C)	0.1ppm equivalent
Typical Long Term Output Drift	<10% signal loss/year in air
Recommended Load Resistor	33Ω
Bias Voltage	Not required
Repeatability	1% of signal
Output Linearity	Linear

N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013mBar

Outline Dimensions



All tolerances ±0.15mm unless otherwise stated.
A3OZ shown with side tags and gold pins.
Do not solder to pin connections

Physical Characteristics

Material	Polycarbonate
Weight	22g
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch

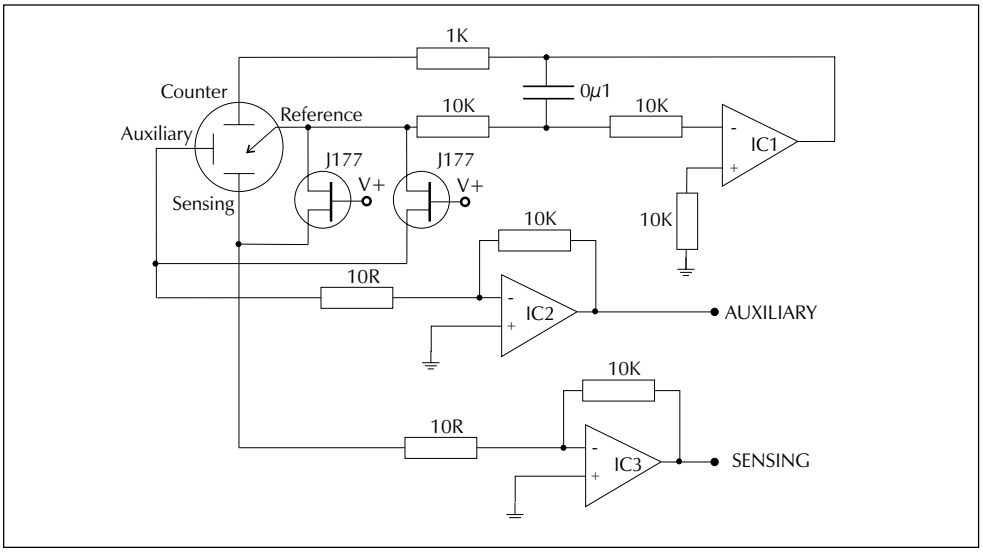
Cross-Sensitivity Data

Carbon monoxide	None
Nitrogen Dioxide	100%
Chlorine	100%
Sulphur Dioxide	None
Hydrogen Sulphide	None

Circuitry required

The A3OZ EnviroceL differs from standard three electrode sensors by the introduction of a second working electrode, known as the **Auxiliary**. A suitable operating circuit is shown below.

Figure 1.
A3OZ Operating Circuit



IC1 - This amplifier should have either a low offset or have its offset nulled out. The PMI OP-77, OP-90, Intersil or Teledyne 7650, and Linear Technology LT1078 are all suitable.

IC2, IC3 - This amplifier acts as a current to voltage converter and its offset performance is less critical. The OP-77 or similar is a suitable choice

Recommended value of $\mathbf{R_{load}}$ is given in the specification overleaf.

When no gas is present, there is a small zero gas (baseline) signal from each electrode. Upon exposure to nitrogen dioxide/ozone, the *sensing* electrode produces a signal proportional to the concentration of gas. Virtually all the gas is reacted on contact with this electrode, so the *auxiliary* electrode remains largely unaffected and hence the signal remains at its baseline level. It can therefore be assumed the *auxiliary* signal is wholly attributed to the baseline.

The baseline signal of both electrodes is slightly affected by changes in atmospheric conditions (e.g. temperature). However as both are subject to the same conditions, any shift in baseline on the *sensing* electrode will be followed by a similar shift in the *auxiliary*. Hence by comparing the two signals any baseline changes may be compensated.

Evaluating the nitrogen dioxide/ozone concentration of a sample from the two signals is a straightforward subtraction:-.

Let:

I_S= *Sensing* electrode signal;
I_A=*Auxiliary* electrode signal;
I_{gas}=Baseline compensated nitrogen dioxide/ozone signal.

Then

$$I_{gas} = I_S - I_A$$