



## 2CF CiTiceL<sup>®</sup>

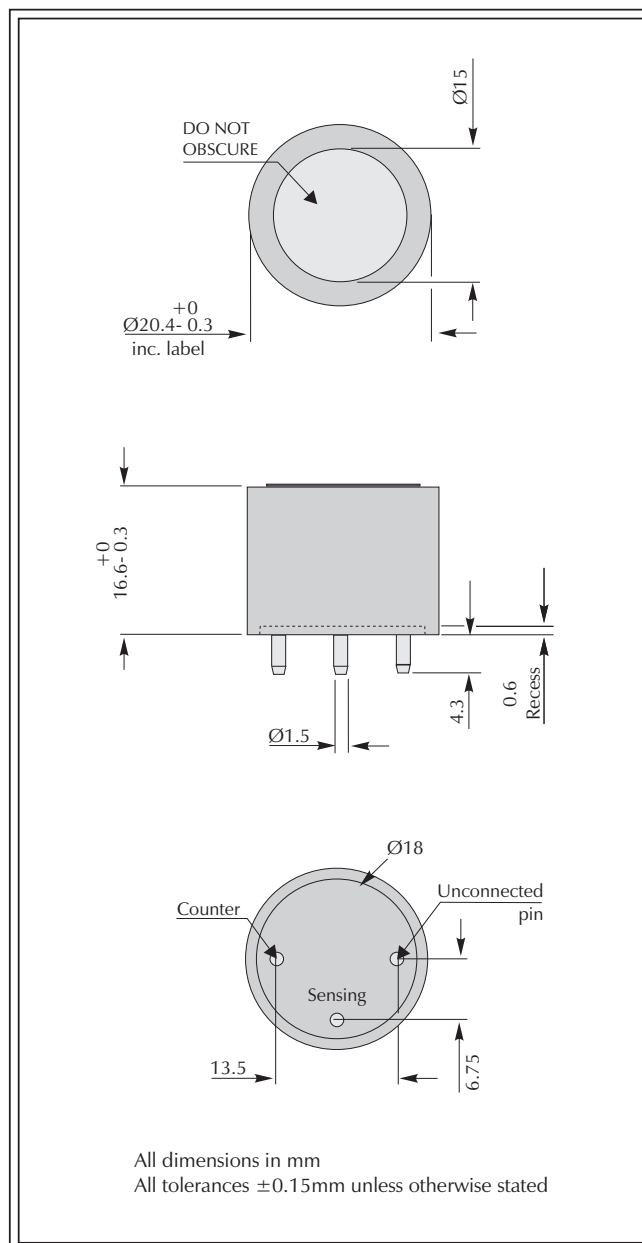
### Performance Characteristics

Nominal Range	0-500 ppm
Maximum Overload	1000 ppm
Expected Operating Life	Two years in air
Output Signal	50 ± 20 nA/ppm
Inboard Filter	To remove SO <sub>2</sub> and H <sub>2</sub> S
Resolution	1 ppm
Temperature Range	-20°C to +50°C
Pressure Range	Atmospheric ± 10%
T <sub>90</sub> Response Time	≤17 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	-1 to +3 ppm equivalent
Maximum Zero Shift (+20°C to +40°C)	9 ppm equivalent
Long Term Output Drift	<10% signal loss/year
Recommended Load Resistor	10 Ω
Bias Voltage	Not required
Repeatability	<3% of signal
Output Linearity	Linear

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

### Physical Characteristics

Weight	Approx 5 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



**IMPORTANT NOTE:** Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor.



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 2CF 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).

<u>Gas</u>	<u>Conc</u>	<u>2CF</u>
Hydrogen Sulphide	15ppm	-0.5ppm < x\$ < +0.5ppm
Sulphur Dioxide	5ppm	0ppm
Nitrogen Dioxide	5ppm	<0.5ppm
Hydrogen	100ppm	-5ppm < x\$ < +5ppm
Nitric Oxide	35ppm	12ppm
Ethylene	100ppm	60ppm

\*\*For details of other possible cross-interfering gases 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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

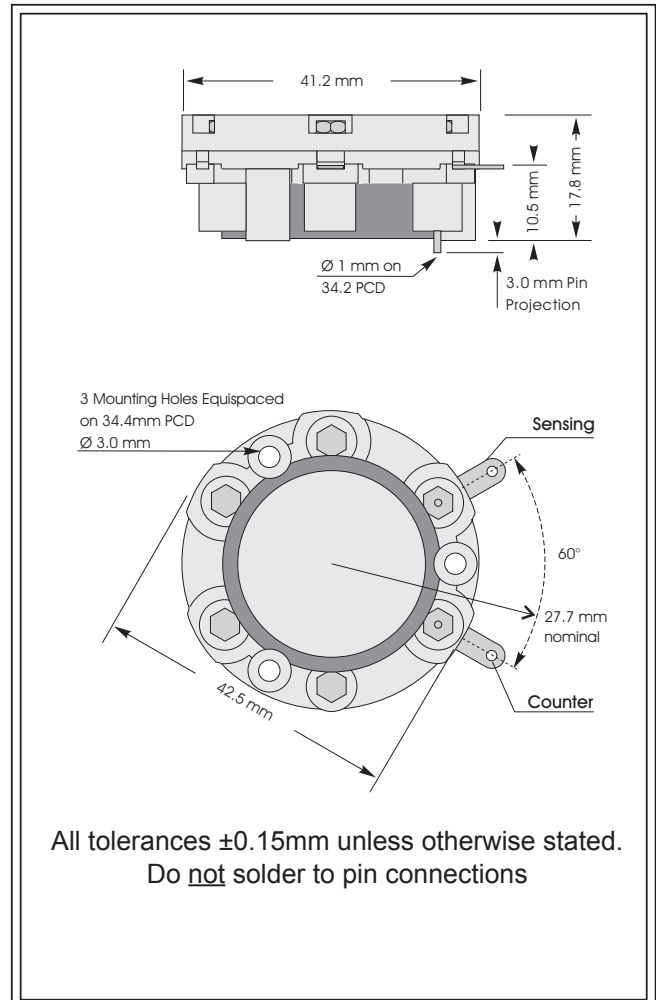


## 2E/F CiTiceL<sup>®</sup>

### Performance Characteristics

<b>Nominal Range</b>	0-200ppm
<b>Maximum Overload</b>	500ppm
<b>Expected Operating Life</b>	Two years in air
<b>Output Signal</b>	0.10 ± 0.02 µA/ppm
<b>Inboard Filter</b>	To remove SO <sub>2</sub> and H <sub>2</sub> S
<b>Resolution</b>	1ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	No data
<b>T<sub>90</sub> Response Time</b>	≤40 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	-1 to +3ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	9ppm equivalent
<b>Long Term Output Drift</b>	<5% signal loss/year
<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	Not required
<b>Repeatability</b>	1% of signal
<b>Output Linearity</b>	Linear

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



### Physical Characteristics

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



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 2E/F 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.	2E/F	Gas	Conc.	2E/F
Hydrogen sulphide:	15ppm	<1ppm	Hydrogen:	100ppm	<20ppm
Sulphur dioxide:	5ppm	0ppm	Hydrogen cyanide:	10ppm	0ppm
Nitric oxide:	35ppm	<±2ppm	Hydrogen chloride:	5ppm	0ppm
Nitrogen dioxide:	500ppm	5<x\$<25ppm	Ethylene:	100ppm	<50ppm
Chlorine:	1ppm	0ppm	**For details of other possible cross-interfering gases contact City Technology.**		

## Ordering Information

The 2E/F Carbon Monoxide CiTiceL is supplied with side tags and tin-plated PCB pins.

**Type 2E/F:-** With side tag and PCB pin connections - **2E/F**

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

- Key Features & Benefits:**
- Robust, 3-Series packaging
  - Range of accessories available

## Technical Specifications

### MEASUREMENT

<b>Operating Principle</b>	3-electrode electrochemical
<b>Measurement Range</b>	0-1000 ppm CO
<b>Maximum Overload</b>	2000 ppm CO
<b>Filter</b>	To remove SO <sub>x</sub> /NO <sub>x</sub> & H <sub>2</sub> S
<b>Sensitivity</b>	0.10 ± 0.02 µA/ppm
<b>Resolution</b>	0.5 ppm CO
<b>Response Time (T<sub>90</sub>)</b>	<30 seconds
<b>Baseline Offset (clean air)</b>	-1 to +3 ppm equivalent
<b>Zero Shift (+20°C to +40°C)</b>	<9 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	Not Required

### MECHANICAL

<b>Weight</b>	22 g
<b>Housing Material</b>	20% Glass Filled Polypropylene
<b>Orientation</b>	Any

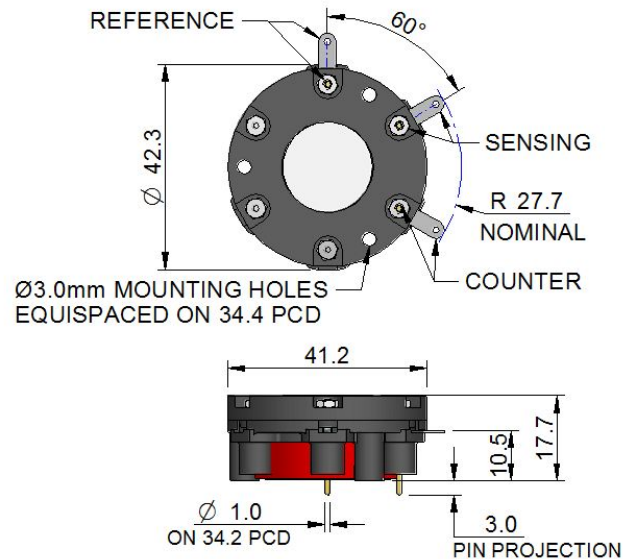
### ENVIRONMENTAL

<b>Typical Applications</b>	Fixed Life Safety
<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.020 ± 0.008 % signal/mBar
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

### LIFETIME

<b>Long Term Sensitivity Drift</b>	<5% signal loss/year
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

## Product Dimensions



All dimensions in mm  
All tolerances ±0.15 mm  
unless otherwise stated

## AVAILABLE OPTIONS

Sensor	Description	Part Number
3EF	With side tag and PCB pin connections	AB004-J08
3EF(S)	With side tag connection	AB004-008
3EF(G)	With gold-plated PCB pin connection	AB004-308

## IMPORTANT NOTE:

Soldering to the pin connections will seriously damage the sensor and invalidate the warranty.

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, refer to Operating Principles OP08 or contact City Technology.

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used</b>	<b>3EF (ppm CO)</b>
Hydrogen Sulfide, H <sub>2</sub> S	15	≈ 1
Sulfur Dioxide, SO <sub>2</sub>	5	0
Nitric Oxide, NO	35	< 3.5
Nitrogen Dioxide, NO <sub>2</sub>	5	0
Chlorine, Cl <sub>2</sub>	1	0
Hydrogen, H <sub>2</sub>	100	<60
Hydrogen Cyanide, HCN	10	0
Hydrogen Chloride, HCl	5	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	100	<75

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **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.

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- Key Features & Benefits:**
- Robust, 3-Series packaging
  - Range of accessories available

## Technical Specifications

### MEASUREMENT

<b>Operating Principle</b>	3-electrode electrochemical
<b>Measurement Range</b>	0-1000 ppm CO
<b>Maximum Overload</b>	2000 ppm CO
<b>Filter</b>	None
<b>Sensitivity</b>	0.075 ± 0.010 µA/ppm
<b>Resolution</b>	0.5 ppm CO
<b>Response Time (T<sub>90</sub>)</b>	<35 seconds
<b>Baseline Offset (clean air)</b>	-1 to +3 ppm equivalent
<b>Zero Shift (-20°C to +40°C)</b>	<2 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	Not Required

### MECHANICAL

<b>Connections</b>	Side tag and PCB pin connections
<b>Weight</b>	22 g
<b>Housing Material</b>	20% Glass Filled Polypropylene
<b>Orientation</b>	Any

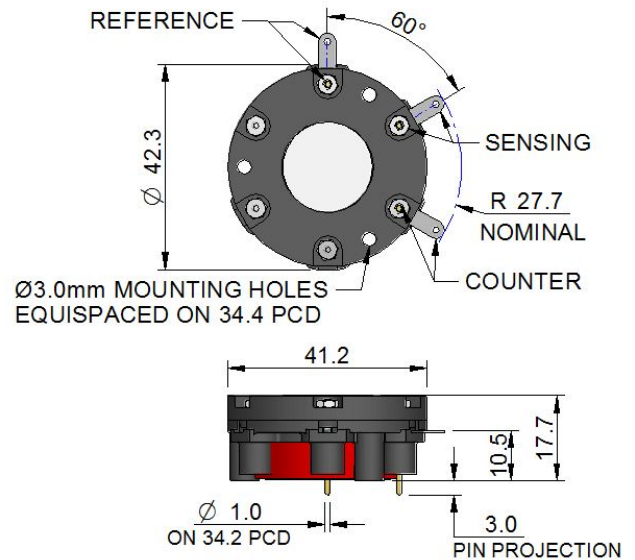
### ENVIRONMENTAL

<b>Typical Applications</b>	Fixed Life Safety
<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.020 ± 0.008 % signal/mBar
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

### LIFETIME

<b>Long Term Sensitivity Drift</b>	<5% signal loss/year
<b>Expected Operating Life</b>	Two years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

## Product Dimensions



All dimensions in mm  
All tolerances ±0.15 mm  
unless otherwise stated

### IMPORTANT NOTE:

Soldering to the pin connections will seriously damage the sensor and invalidate the warranty.

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, refer to Operating Principles OP08 or contact City Technology.

## **Poisoning**

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When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Cross Sensitivity (%)</b>
Carbon Monoxide	100
Hydrogen Sulfide, H <sub>2</sub> S	≈ 350
Sulfur Dioxide, SO <sub>2</sub>	≈ 65
Nitric Oxide, NO	≈ 25
Nitrogen Dioxide, NO <sub>2</sub>	≈ -60
Chlorine, Cl <sub>2</sub>	≈ -40
Hydrogen, H <sub>2</sub>	< 60
Hydrogen Cyanide, HCN	≈ 40
Hydrogen Chloride, HCl	≈ 5
Ethylene, C <sub>2</sub> H <sub>4</sub>	≈ 90

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **SAFETY NOTE**

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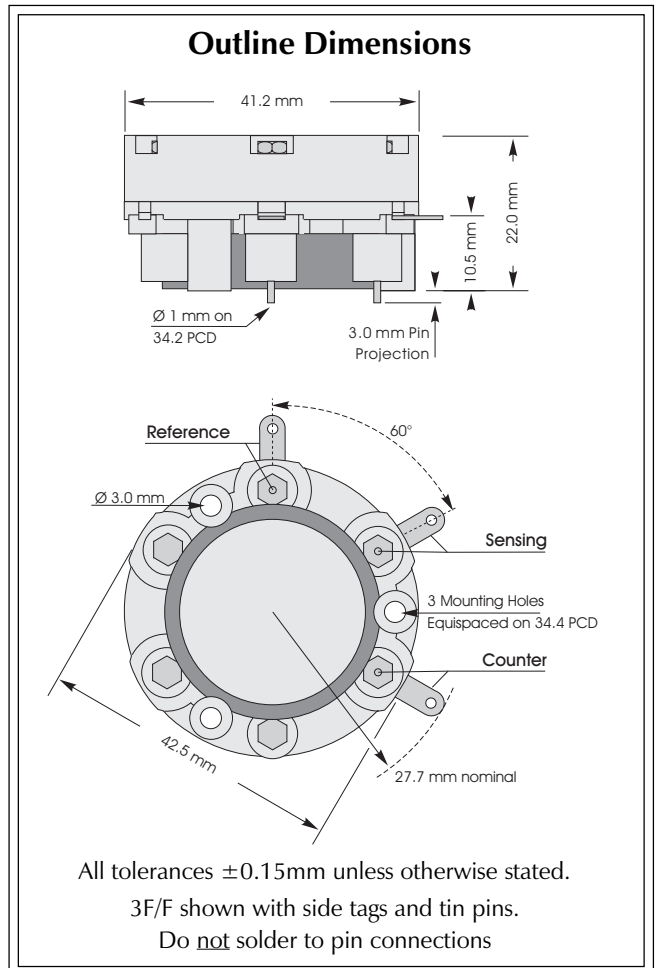


## 3F/D CiTiceL

### Performance Characteristics

<b>Nominal Range</b>	0-4000ppm
<b>Maximum Overload</b>	20 000ppm
<b>Inboard Filter</b>	'Double size' filter to remove acid gases from flue stream
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	0.030 ± 0.006 µA/ppm
<b>Resolution</b>	1ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.007 ± 0.003 %signal/mBar
<b>T<sub>90</sub> Response Time</b>	<30 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	-3 to +10ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	20ppm equivalent
<b>Long Term Output Drift</b>	<2% signal loss/month
<b>Recommended Load Resistor</b>	10Ω
<b>Bias Voltage</b>	Not required
<b>Repeatability</b>	1% of signal
<b>Output Linearity</b>	Linear

### Outline Dimensions



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

### Physical Characteristics

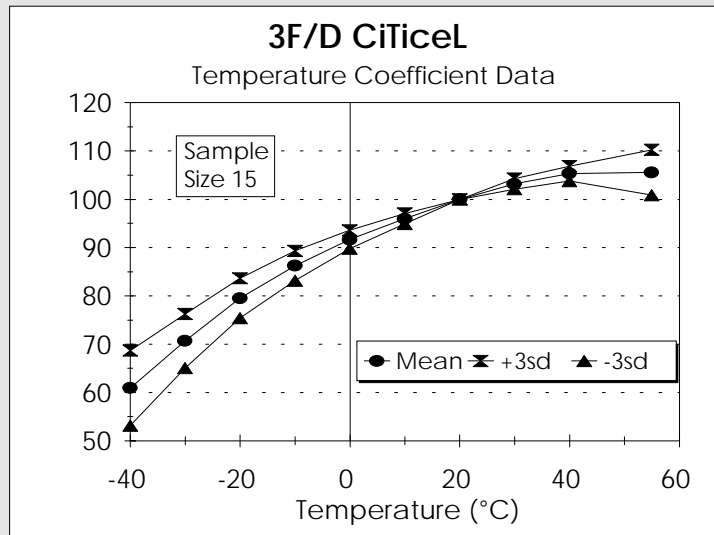
<b>Weight</b>	29g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of desparh



## Temperature Dependence

The output of a CiTiceL can vary with temperature. The graph here shows the variation in output with temperature for 3F/D CiTiceLs based on a sample of about 15 sensors. The results are shown in the graph as a mean for the batch, and expressed as a percentage of the signal at 20°C.

From a statistical viewpoint, for a sample of this size, the range in values observed for all sensors of this type will fall within a range three times the standard deviation above or below the mean. Assuming this sample is typical of the 3F/D, then the temperature behaviour of all 3F/D CiTiceLs will fall in the band +3SD to -3SD.



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. The table below shows the typical response of 3F/D sensors to a number of common cross-interfering gases. The figures are expressed as a percentage of the primary sensitivity (i.e. carbon monoxide = 100%).

Gas	Response	Gas	Response
Hydrogen sulphide:	0	Hydrogen:	<60 <sup>1</sup>
Sulphur dioxide:	0	Hydrogen chloride:	0
Nitric oxide:	0	Ethylene:	n/d
Nitrogen dioxide:	0		

\*\* For details of other possible cross-interfering gases contact City Technology.\*\*

<sup>1</sup>For applications where a hydrogen compensated output is required the A3E/D CiTiceL should be used

n/d: No data, under investigation

## Ordering Information

The 3F/D Carbon Monoxide CiTiceL is available with side tags, gold-plated PCB pins, or both PCB pins and side tags. To ensure the appropriate option is supplied care must be taken to provide the correct code when ordering.

**Type 3F/D:-** With side tag and PCB pin connections - **3F/D**  
 With side tag connection - **3F/D(S)**  
 With gold-plated PCB pin connection - **3F/D(G)**

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# 3F/F CiTiceL<sup>®</sup>

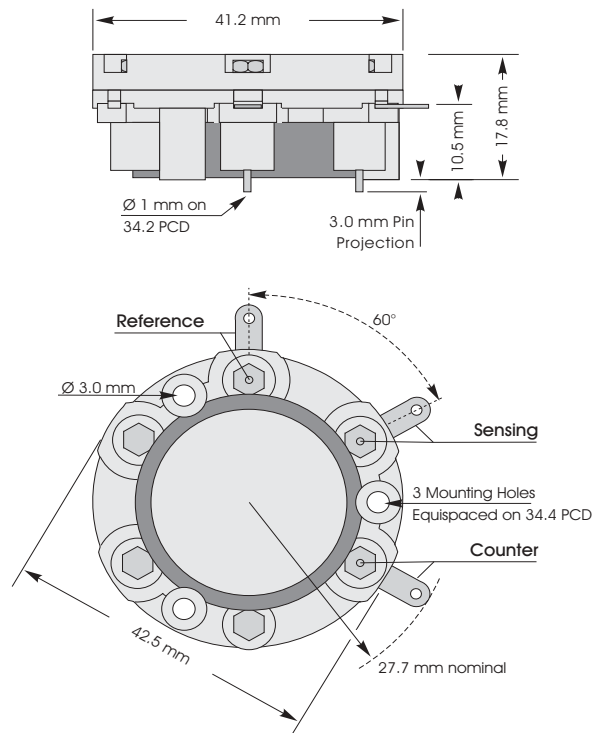
## Performance Characteristics

<b>Nominal Range</b>	0-4000ppm
<b>Maximum Overload</b>	20 000ppm
<b>Inboard Filter</b>	To remove acid gases from flue stream.
<b>Filter Life</b>	560,000 ppm hours *see Note
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	0.030 ± 0.006 µA/ppm
<b>Resolution</b>	1ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.007 ± 0.003 %signal/mBar
<b>T<sub>90</sub> Response Time</b>	<30 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Rang (pure air)</b>	-3 to +10ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	20ppm equivalent
<b>Long Term Output Drift</b>	<2% signal loss/month
<b>Recommended Load Resistor</b>	10Ω
<b>Bias Voltage</b>	Not required
<b>Repeatability</b>	1% of signal
<b>Output Linearity</b>	Linear

Note NO removal based on continuous exposure to 1000ppm and 5% breakthrough

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.  
3F/F shown with side tags and tin pins.  
Do not solder to pin connections

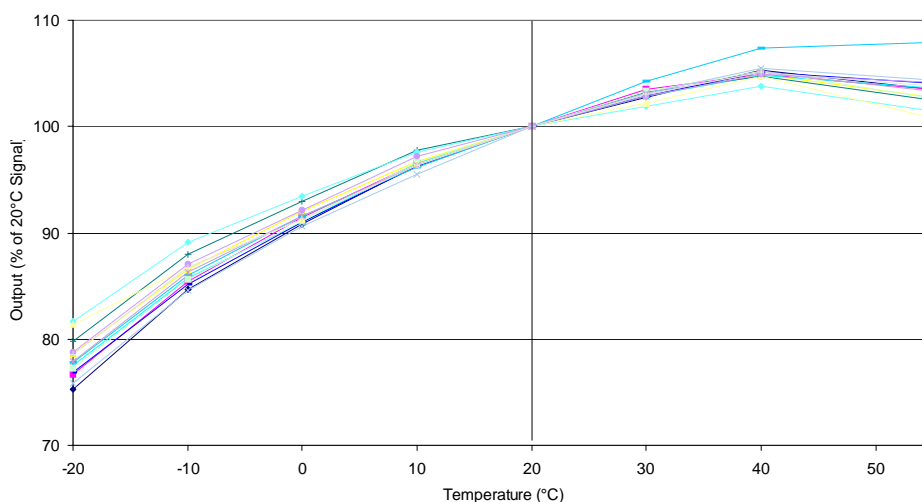
## Physical Characteristics

<b>Colour of Ring</b>	Red
<b>Weight</b>	22g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

# Carbon monoxide CiTiceL<sup>®</sup> Specification



**3F/F Carbon Monoxide - Output vs Temperature**



## Ordering Information

The 3F/F Carbon Monoxide CiTiceL is available with side tags, gold-plated PCB pins, or both PCB pins and side tags. To ensure the appropriate option is supplied care must be taken to provide the correct code when ordering.

**Type 3F/F:-** With side tag and PCB pin connections - **3F/F**  
 With side tag connection - **3F/F(S)**  
 With gold-plated PCB pin connection - **3F/F(G)**

## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 3F/F 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).

<u>Gas</u>	<u>Conc.</u>	<u>3F/F</u>	<u>Gas</u>	<u>Conc.</u>	<u>3F/F</u>
<b>Hydrogen sulphide:</b>	15ppm	0ppm	<b>Sulphur dioxide:</b>	5ppm	0ppm
<b>Nitric oxide:</b>	50ppm	-1<x\$<0ppm	<b>Nitrogen dioxide:</b>	50ppm	-1<x\$<0ppm
<b>Hydrogen:</b>	100ppm	<60ppm <sup>1</sup>	<b>Hydrogen chloride:</b>	5ppm	0ppm
<b>Ethylene:</b>	100ppm	0<x\$<20ppm			

<sup>1</sup>For applications where a hydrogen compensated output is required the A3E/D CiTiceL should be used

\*\*For details of other possible cross-interfering gases contact City Technology.\*\*

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

- Key Features & Benefits:**
- Robust, 3-Series packaging
  - Range of accessories available

**Technical Specifications**

**MEASUREMENT**

<b>Operating Principle</b>	3-electrode electrochemical
<b>Measurement Range</b>	0-40,000 ppm CO
<b>Maximum Overload</b>	100,000 ppm CO
<b>Filter</b>	None
<b>Sensitivity</b>	0.007 ± 0.002 µA/ppm
<b>Resolution</b>	10 ppm CO
<b>Response Time (T<sub>90</sub>)</b>	<30 seconds
<b>Baseline Offset (clean air)</b>	-20 to +30 ppm equivalent
<b>Zero Shift (+20°C to +40°C)</b>	<200 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

**ELECTRICAL**

<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	Not Required

**MECHANICAL**

<b>Weight</b>	22 g
<b>Housing Material</b>	20% Glass Filled Polypropylene
<b>Orientation</b>	Any

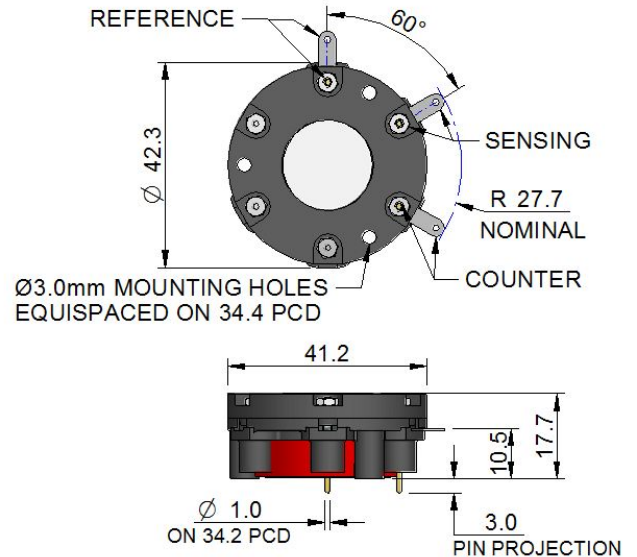
**ENVIRONMENTAL**

<b>Typical Applications</b>	Fixed Life Safety
<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

**LIFETIME**

<b>Long Term Sensitivity Drift</b>	<2% signal loss/month
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

**Product Dimensions**



All dimensions in mm  
All tolerances ±0.15 mm  
unless otherwise stated

**AVAILABLE OPTIONS**

Sensor	Description	Part Number
3M	With side tag and PCB pin connections	AB008-J30
3M(S)	With side tag connection	AB008-030
3M(G)	With gold-plated PCB pin connection	AB008-330

**IMPORTANT NOTE:**

Soldering to the pin connections will seriously damage the sensor and invalidate the warranty.

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, refer to Operating Principles OP08 or contact City Technology.

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used</b>	<b>3M (ppm CO)</b>
Hydrogen Sulfide, H <sub>2</sub> S	1000	≈ 3500
Sulfur Dioxide, SO <sub>2</sub>	1000	650
Hydrogen, H <sub>2</sub>	1000	<1000
Nitric Oxide, NO	1000	≈ 250

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **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.

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## 3M/F CiTiceL<sup>®</sup>

### Performance Characteristics

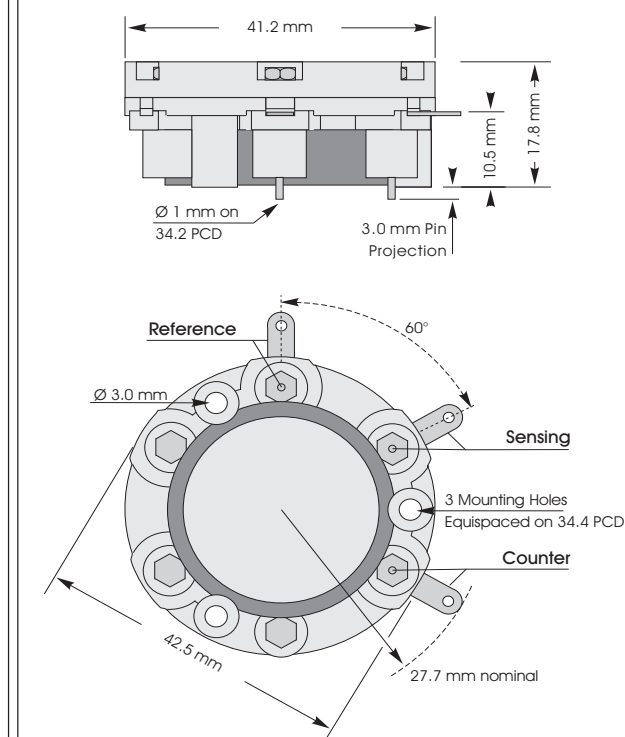
<b>Nominal Range</b>	0-40 000ppm
<b>Maximum Overload</b>	100 000ppm
<b>Inboard Filter</b>	High capacity to remove acid gases from flue stream
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	0.007 ± 0.002 µA/ppm
<b>Resolution</b>	10ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	No data
<b>T<sub>90</sub> Response Time</b>	<30 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	-20 to +30ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	200ppm equivalent
<b>Long Term Output Drift</b>	<2% signal loss/month
<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	Not required
<b>Repeatability</b>	1% of signal
<b>Output Linearity</b>	Linear

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

### Physical Characteristics

<b>Colour of Ring</b>	Red
<b>Weight</b>	22g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

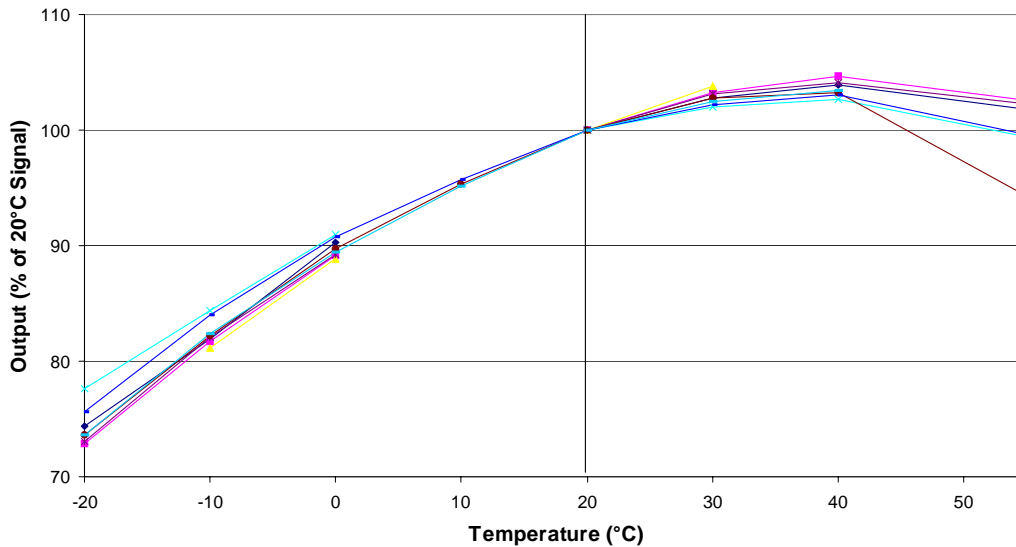
### Outline Dimensions



All tolerances ±0.15mm unless otherwise stated.  
3M/F shown with side tags and gold pins.  
Do not solder to pin connections.



## 3M/F Carbon Monoxide - Output vs Temperature



### Ordering Information

The 3M/F Carbon Monoxide CiTiceL is available with side tags, gold-plated PCB pins, or both PCB pins and side tags. To ensure the appropriate option is supplied care must be taken to provide the correct code when ordering.

**Type 3M/F:-** With side tag and PCB pin connections - **3M/F**  
 With side tag connection - **3M/F(S)**  
 With gold-plated PCB pin connection - **3M/F(G)**

### Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 3M/F CiTiceLs have been tested with some common cross-interfering gases at concentrations relevant to emissions applications. The table below details the concentrations used and the typical response observed.

<u>Gas</u>	<u>Conc.</u>	<u>Response</u>	<u>Gas</u>	<u>Conc.</u>	<u>Response</u>
<b>Hydrogen sulphide:</b>	2000ppm	≈20ppm	<b>Hydrogen:</b>	2000ppm	1200<x\$<2800ppm <sup>1</sup>
<b>Sulphur dioxide:</b>	1000ppm	0ppm	<b>Hydrogen chloride:</b>	n/d	n/d
<b>Nitric oxide:</b>	1000ppm	0ppm	<b>Ethylene:</b>	n/d	n/d
<b>Nitrogen dioxide:</b>	n/d	n/d			

\*\* For details of other possible cross-interfering gases contact City Technology.\*\*

<sup>1</sup>For applications where a hydrogen compensated output is required the A3E/D CiTiceL should be used

n/d: No data, under investigation

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



## Key Features & Benefits:

- Robust 3-Series packaging
- Factory calibrated mV output

## Technical Specifications

### MEASUREMENT

<b>Sensor Type Used</b>	3E/F
<b>Maximum Range</b>	2000 ppm CO
<b>Sensitivity</b>	
Standard	1 mV/ppm ± 5%
High	10 mV/ppm ± 5%
<b>Filter</b>	To remove SO <sub>x</sub> /NO <sub>x</sub> & H <sub>2</sub> S
<b>Baseline Offset (Clean Air)</b>	±1 mV
<b>Response Time (T<sub>90</sub>)</b>	<30 Seconds at 20°C
<b>Resolution</b>	0.5 ppm
<b>Zero Shift (-20°C to +40°C)</b>	<3 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Power Supply Required</b>	7 to 18 VDC single-ended or ±3.5 to ±9 VDC dual
<b>Power Consumption</b>	250 µA @ 9 VDC
<b>Calibration</b>	Via built-in span and zero potentiometers (Refer to OP14)

### MECHANICAL

<b>Weight</b>	38 g (with connector)
<b>Body Material</b>	20% glass filled polypropylene
<b>Position Sensitivity</b>	None

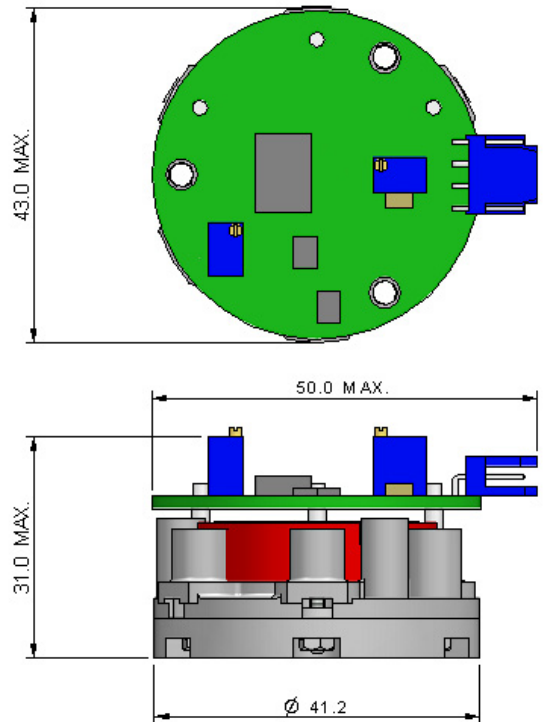
### ENVIRONMENTAL

<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Temperature Compensation</b>	None
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.020 ± 0.008% signal/mBar
<b>Operating Humidity Range</b>	15 to 90% RH non-condensing

### LIFETIME

<b>Long Term Sensitivity Drift</b>	<5% signal loss/year
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

## Product Dimensions



All dimensions in mm

All tolerances ±0.15 mm unless otherwise stated

### IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology mV output sensors, please refer to OP14.

### RANGES AVAILABLE

3ME/F is available with the following precalibrated sensitivities.

Sensitivity	Order Code
1 mV/ppm	MBE60-014
10 mV/ppm	MBE60-024

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react. The figures are expressed as a percentage of the primary sensitivity (i.e. CO = 100%).

<b>Gas</b>	<b>Concentration Used (ppm)</b>	<b>3ME/F (%)</b>
Hydrogen Sulfide, H <sub>2</sub> S	15	~ 7
Sulfur Dioxide, SO <sub>2</sub>	5	0
Nitric Oxide, NO	35	<10
Nitrogen Dioxide, NO <sub>2</sub>	5	0
Chlorine, Cl <sub>2</sub>	1	0
Hydrogen, H <sub>2</sub>	100	<60
Hydrogen Cyanide, HCN	10	0
Hydrogen Chloride, HCl	5	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	100	<75

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time

## Performance Characteristics

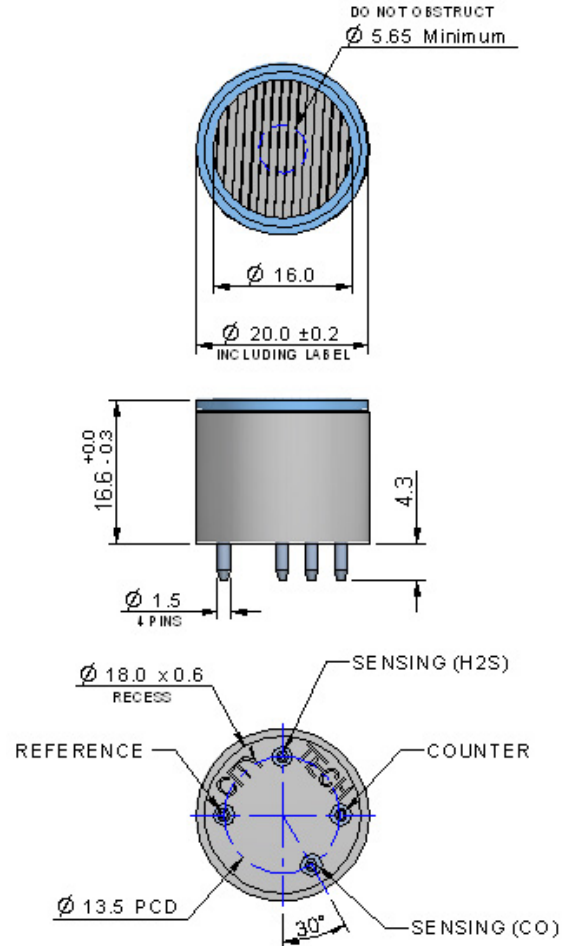
<b>Nominal Range</b>	For CO: 0-500 ppm For H <sub>2</sub> S: 0-200 ppm
<b>Maximum Overload</b>	For CO: 1500 ppm For H <sub>2</sub> S: 500 ppm
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	For CO: 80 ± 30 nA / ppm For H <sub>2</sub> S: 775 ± 275 nA / ppm
<b>Resolution</b>	For CO: ±1.0 ppm For H <sub>2</sub> S: ±0.5 ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>T<sub>90</sub> Response Time</b>	For CO: ≤35 seconds For H <sub>2</sub> S: ≤35 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (ppm equiv.)</b>	For CO: -2 to +3 ppm For H <sub>2</sub> S: -0.4 to +0.4 ppm
<b>Long Term Output Drift</b>	<5% signal loss/year
<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	Not required
<b>Repeatability</b>	For CO: ≤3% of signal For H <sub>2</sub> S: ≤2% of signal
<b>Output Linearity</b>	Linear

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

## Physical Characteristics

<b>Weight</b>	5g approx.
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

## Product Dimensions

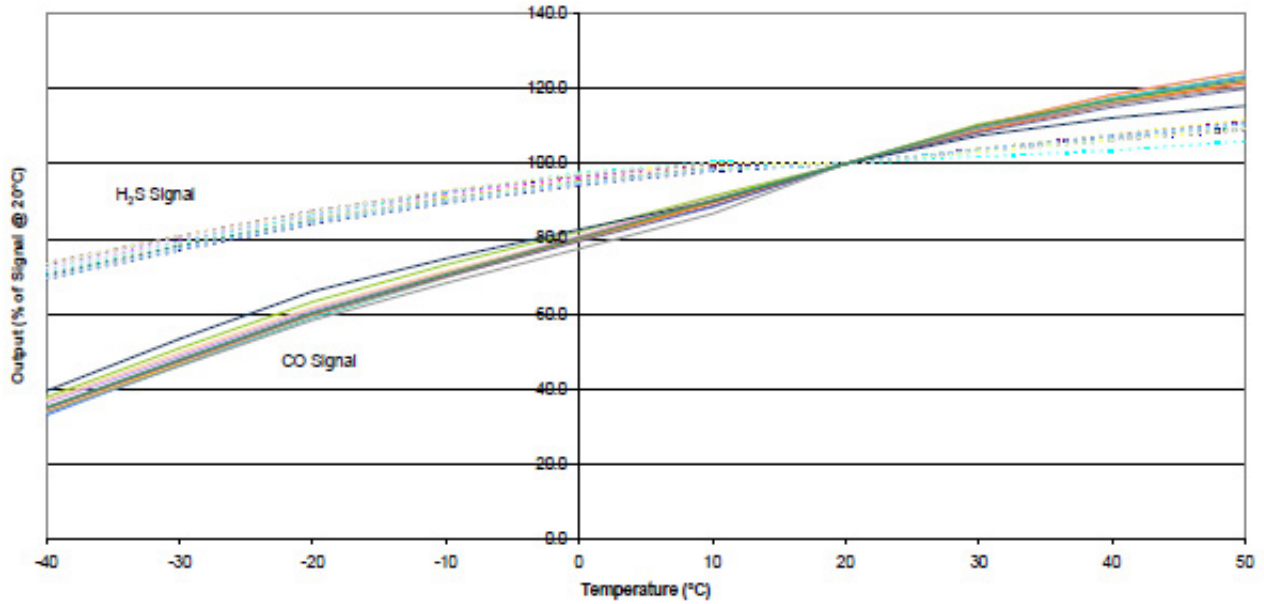


All dimensions in mm  
All tolerances ±0.15 mm unless otherwise stated.

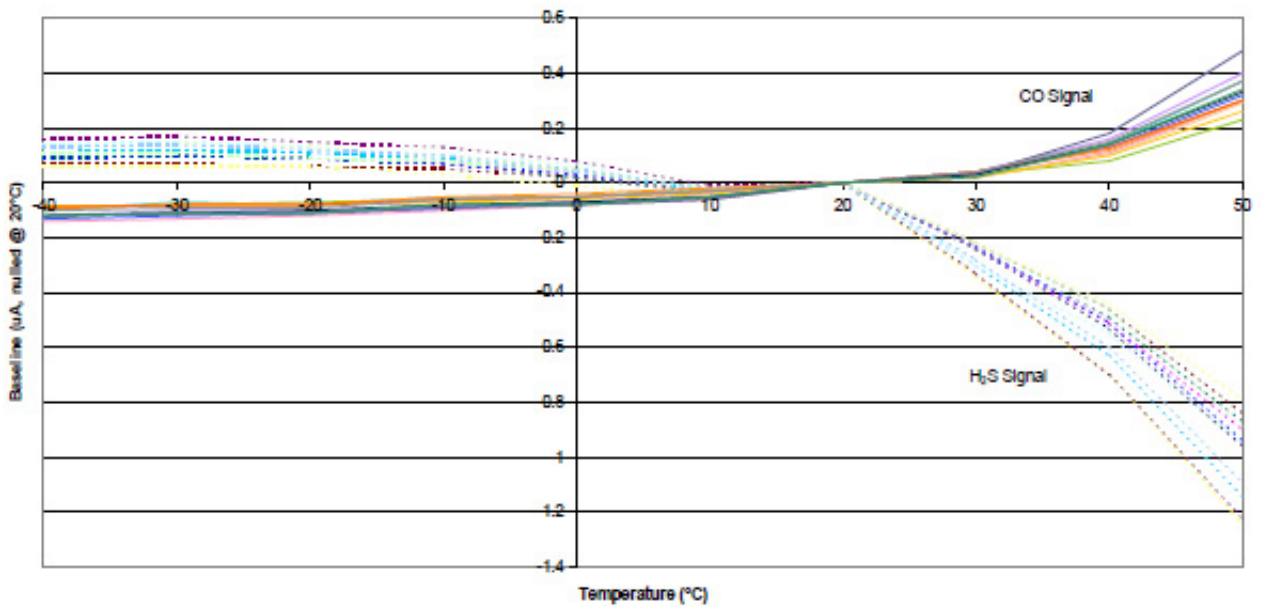
Dimensions are for indication purposes only. For further details, contact City Technology Ltd.

**IMPORTANT NOTE:** Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor.

4COSH Hydrogen Sulphide/Carbon Monoxide CiTiceL  
Output vs Temperature



4COSH Hydrogen Sulphide/Carbon Monoxide CiTiceL  
Baseline vs Temperature



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 4COSH 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):

Test gas	Test gas conc. (ppm)	ppm on H <sub>2</sub> S channel	ppm on CO channel
Carbon Monoxide, CO	300	<6	300
Hydrogen Sulfide, H <sub>2</sub> S	15	16	0 to 6
Hydrogen	100	0.03	~ 20
Nitric Oxide, NO	35	<1	<0.1
Nitrogen Dioxide, NO <sub>2</sub>	5	~ -1	<0.1
Chlorine, Cl <sub>2</sub>	1	0	0
Sulfur Dioxide, SO <sub>2</sub>	5	<1	0

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



## Key Features & Benefits:

- Fast response and recovery time
- Superior long-term performance at temperature and humidity extremes.

## Technical Specifications

### MEASUREMENT

<b>Operating Principle</b>	3-electrode electrochemical
<b>Nominal Range</b>	0 to 10,000 ppm
<b>Maximum Overload</b>	20,000 ppm
<b>Filter</b>	To remove acid gases
<b>Filter Life</b>	See page 2
<b>Sensitivity</b>	70 ± 15 nA/ppm
<b>Response Time (T<sub>90</sub>)</b>	< 15 s
<b>Recovery Time (R<sub>90</sub>)</b>	< 15 s
<b>Baseline Offset (clean air)</b>	< ±2 ppm CO equivalent
<b>Baseline Shift:</b>	
-20°C to +20°C	< ±2 ppm CO equivalent
+20°C to +55°C	Typically < +4 ppm (+9 ppm max.)
<b>Repeatability</b>	< ±2% CO equivalent
<b>Linearity</b>	Linear up to 20,000 ppm

### ELECTRICAL

<b>Resolution</b>	< 1 ppm
(Electronics dependent)	
<b>Recommended Load Resistor</b>	5 Ω
<b>Bias Voltage</b>	Not required

### MECHANICAL

<b>Housing Material</b>	Noryl N110
<b>Pin Material</b>	Gold over nickel plated brass
<b>Weight</b>	5 g (nominal)
<b>Orientation Sensitivity</b>	None

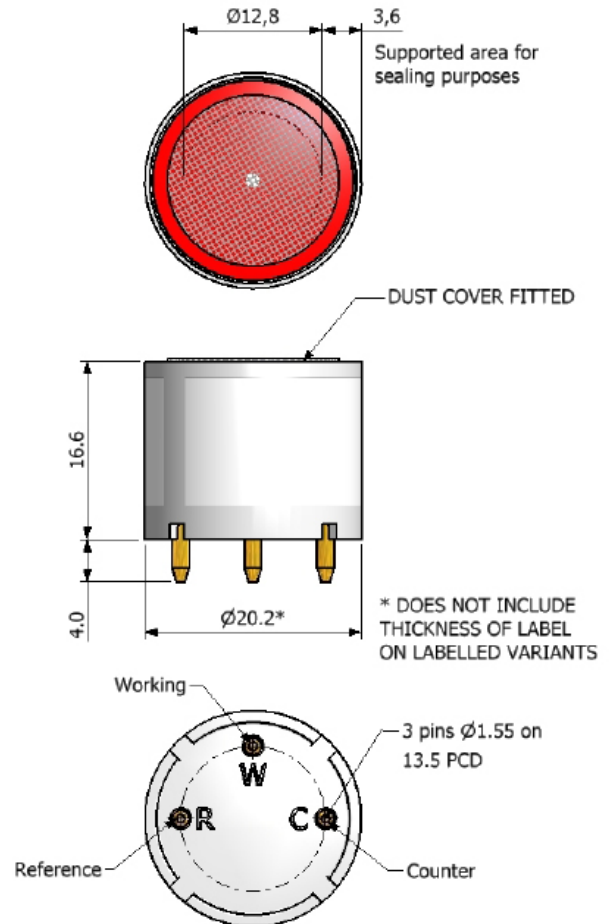
### ENVIRONMENTAL

<b>Intended Use</b>	Portable instruments for Flue Gas analysis
<b>Operating Temperature Range</b>	-40°C to +55°C See Characterisation Note
<b>Temperature Coefficient:</b>	
<b>at -40°C</b>	65 ± 25% of signal w.r.t. +20°C
<b>at -20°C</b>	80 ± 15% of signal w.r.t. +20°C
<b>at +55°C</b>	105 ± 15% of signal w.r.t. +20°C
<b>Operating Pressure Range</b>	800 to 1200 mbar
<b>Operating Humidity Range</b>	15% RH to 95% RH

### LIFETIME

<b>Long Term Output Drift</b>	< 5% per annum
<b>Recommended Storage Temp</b>	0°C to +20°C in sealed container
<b>Expected Operating Life</b>	36 months in air
<b>Standard Warranty</b>	24 months from date of despatch

## Product Dimensions



All dimensions in mm  
 All tolerances ±0.15 mm unless otherwise stated

### IMPORTANT NOTE:

Connection should be made via recommended mating parts only. Soldering to the sensor will result in damage and invalidate the warranty.

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry and flow rates.

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments, and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Filter Information**

High surface area high capacity filter removes acid gases such as SO<sub>2</sub>, NO & NO<sub>2</sub>

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used (ppm)</b>	<b>Cross Sensitivity (ppm CO equiv.)</b>	<b>Cross Sensitivity (%)</b>	<b>Filter Life (ppm hours)</b>
Hydrogen Sulfide (H <sub>2</sub> S)	20	0 < x\$ < 1.5	0 < x\$ < 8	TBC
Sulfur Dioxide (SO <sub>2</sub> )	200	0	0	> 200,000
Nitric Oxide (NO)	100	-3 < x\$ < 0	-3% < x\$ < 0	> 60,000
Nitrogen Dioxide (NO <sub>2</sub> )	100	-3 < x\$ < 0	-3% < x\$ < 0	TBC
Hydrogen (H <sub>2</sub> )	800	< 480	< 60	n/a
Hydrogen Chloride (HCl)	150	0	0	n/a

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and may vary from batch to batch and with time from the values quoted.

### **SAFETY NOTE**

Although this product is not designed for use in safety applications, if it is used in such applications 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, to ensure that the sensor and/or instrument in which it is used, are operating properly. Failure to carry out such tests may jeopardize the safety of people and property.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



# Product Data Sheet

## Key Features & Benefits:

- Fast response and recovery time
- Superior long-term performance at temperature and humidity extremes

## Technical Specifications

### MEASUREMENT

<b>Operating Principle</b>	3-electrode electrochemical
<b>Nominal Range</b>	0 to 40,000 ppm
<b>Maximum Overload</b>	100,000 ppm
<b>Filter</b>	To remove acid gases
<b>Filter Life</b>	See page 2
<b>Sensitivity</b>	15 ± 5 nA/ppm
<b>Response Time (T<sub>90</sub>)</b>	≤ 30 s
<b>Recovery Time (R<sub>90</sub>)</b>	< 90 s
<b>Baseline Offset (clean air)</b>	±10 ppm CO equivalent
<b>Baseline Shift:</b>	
<b>-20°C to +20°C</b>	< ±2 ppm CO equivalent
<b>+20°C to +55°C</b>	Typically < +4 ppm (+9 ppm max.)
<b>Repeatability</b>	< ±2% CO equivalent
<b>Linearity</b>	Linear up to 100,000 ppm

### ELECTRICAL

<b>Resolution</b>	<1 ppm
(Electronics dependent)	
<b>Recommended Load Resistor</b>	5 Ω
<b>Bias Voltage</b>	Not required

### MECHANICAL

<b>Housing Material</b>	Noryl N110
<b>Pin Material</b>	Gold over nickel plated brass
<b>Weight</b>	5 g (nominal)
<b>Orientation Sensitivity</b>	None

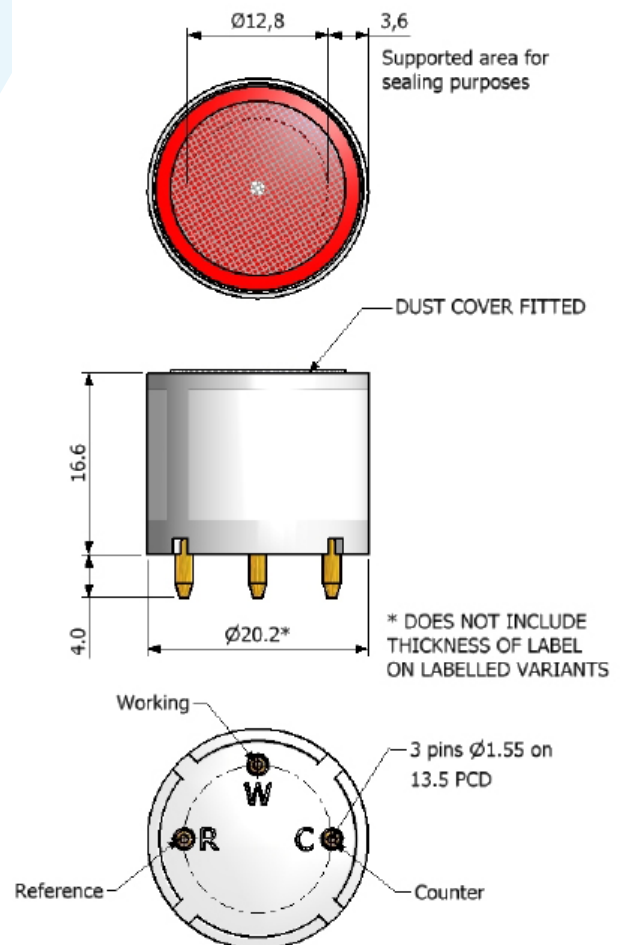
### ENVIRONMENTAL

<b>Intended Use</b>	Portable instruments for Flue Gas analysis
<b>Operating Temperature Range</b>	-40°C to +55°C See Characterisation Note
<b>Temperature Coefficient:</b>	
<b>at -40°C</b>	65 to 75% of signal w.r.t. +20°C
<b>at -20°C</b>	83 to 88% of signal w.r.t. +20°C
<b>at +55°C</b>	94 to 113% of signal w.r.t. +20°C
<b>Operating Pressure Range</b>	800 to 1200 mbar
<b>Operating Humidity Range</b>	15% RH to 95% RH

### LIFETIME

<b>Long Term Output Drift</b>	< 5% per annum
<b>Recommended Storage Temp</b>	0°C to +20°C in sealed container
<b>Expected Operating Life</b>	36 months in air
<b>Standard Warranty</b>	24 months from date of despatch

## Product Dimensions



All dimensions in mm

All tolerances ±0.15 mm unless otherwise stated

### IMPORTANT NOTE:

Connection should be made via recommended mating parts only. Soldering to the sensor will result in damage and invalidate the warranty.

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry and flow rates.



# Product Data Sheet

## Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments, and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## Filter Information

High surface area high capacity filter removes acid gases such as SO<sub>2</sub>, NO, NO<sub>2</sub>

Gas	Concentration Used (ppm)	Filter Life (ppm hours)
Sulfur Dioxide (SO <sub>2</sub> )	200	> 30,000
Nitric Oxide (NO)	100	> 80,000
Nitrogen Dioxide (NO <sub>2</sub> )	100	> 600,000

## Data Matrix

Type: 2D (ECC 200) Data Matrix Code

Compliance: ISO 16022 Standard (Grades A - D)

Format: **AABBBBBBCCC**

AA = Rev no

BBBBBBB = Serial Number

CCC = Production Date Code (*expressed as MMY*)

### **SAFETY NOTE**

Although this product is not designed for use in safety applications, if it is used in such applications 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, to ensure that the sensor and/or instrument in which it is used, are operating properly. Failure to carry out such tests may jeopardize the safety of people and property.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



## 5F CiTiceL<sup>®</sup>

### Performance Characteristics

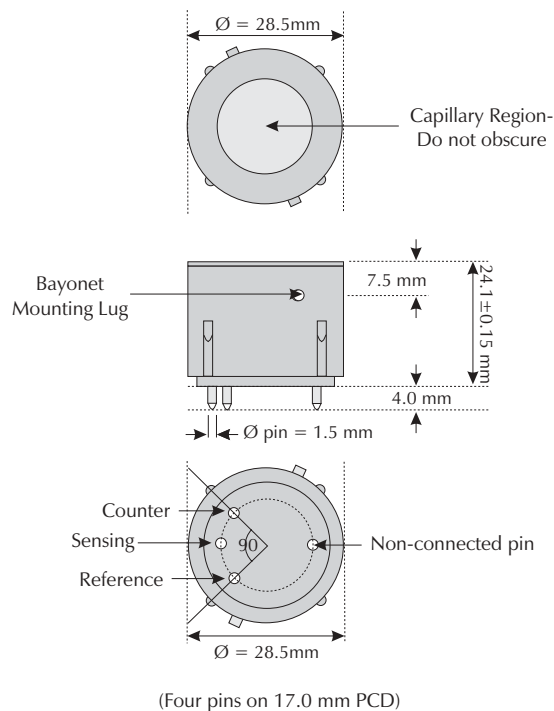
<b>Nominal Range</b>	0-4000ppm
<b>Maximum Overload</b>	20 000ppm
<b>Fixed Filter Life</b>	> 200,000ppm hours (1000ppm NO @ 500ml/min)
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	0.030 ± 0.006 µA/ppm
<b>Resolution</b>	1ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.007 ± 0.003 %signal/mBar
<b>T<sub>90</sub> Response Time</b>	<40 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	-10 to +5ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	-10ppm equivalent
<b>Long Term Output Drift</b>	<2% signal loss/month
<b>Recommended Load Resistor</b>	10Ω
<b>Bias Voltage</b>	Not required
<b>Repeatability</b>	1% of signal
<b>Output Linearity</b>	Linear
<b>Colour Coding</b>	Red

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

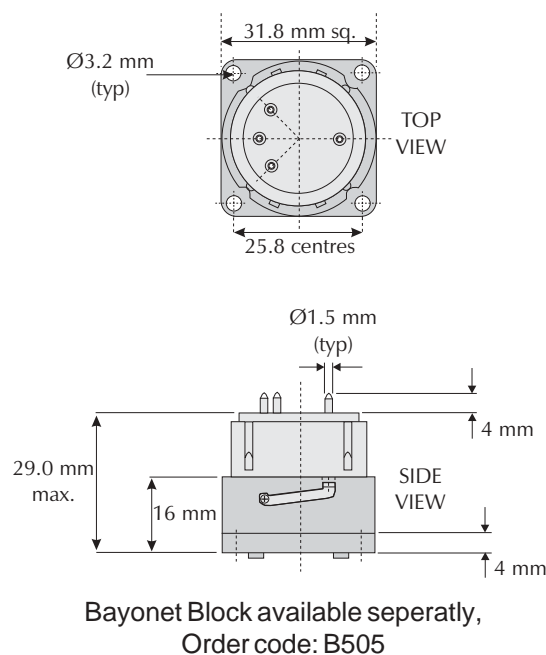
### Physical Characteristics

<b>Weight</b>	12.5 g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

### Outline Sensor Dimensions



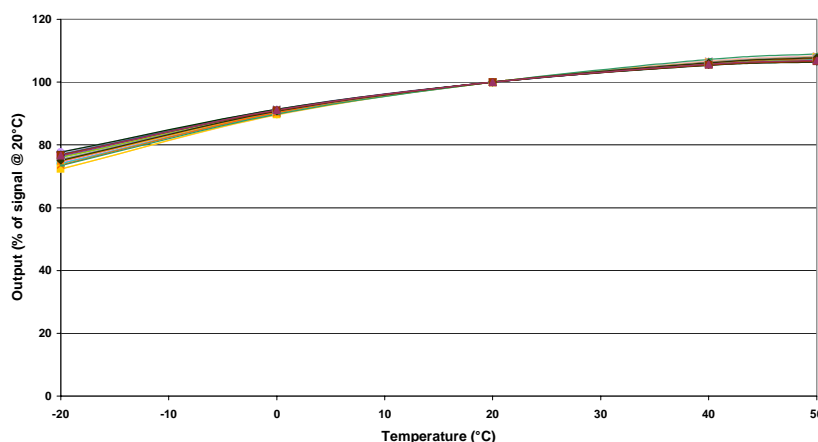
### With Bayonet Fitting Accessory



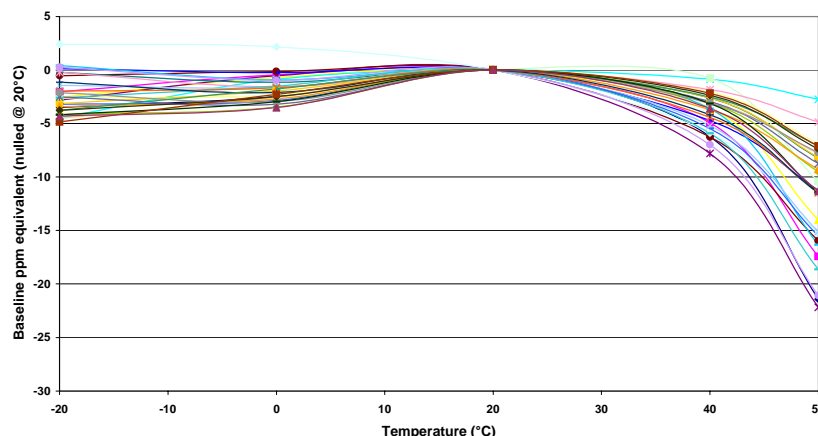
# Carbon Monoxide CiTiceL<sup>®</sup> Specification



5F Carbon Monoxide CiTiceL - Output vs Temperature



5F Carbon Monoxide CiTiceL - Baseline vs Temperature



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. The table below shows the typical response of 5F sensors to a number of common cross-interfering gases. The figures are expressed as a percentage of the primary sensitivity (i.e. carbon monoxide = 100%).

<u>Gas</u>	<u>Response</u>	<u>Gas</u>	<u>Response</u>
Hydrogen sulphide:	0	Hydrogen:	<60 <sup>1</sup>
Sulphur dioxide:	0	Hydrogen chloride:	0
Nitric oxide:	0	Ethylene:	<10
Nitrogen dioxide:	0		

\*\* For details of other possible cross-interfering gases contact City Technology.\*\*

<sup>1</sup>For applications where a hydrogen compensated output is required the A5F CiTiceL should be used

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



# 5MF CiTiceL<sup>®</sup>

## Performance Characteristics

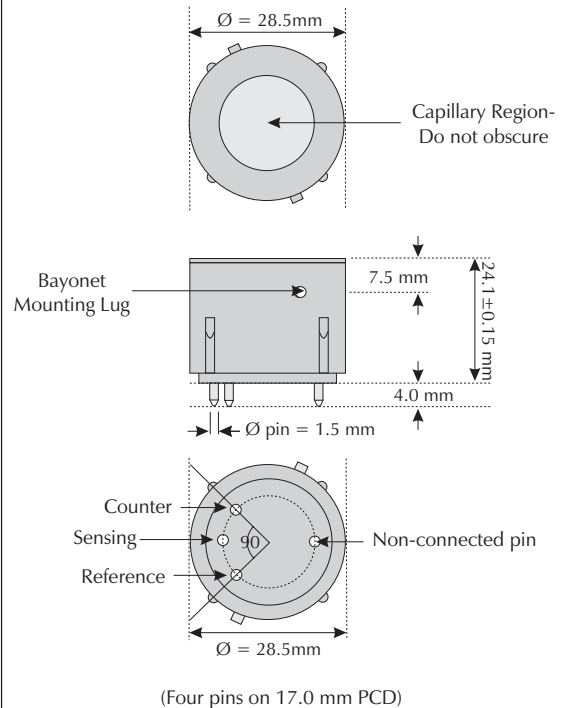
<b>Nominal Range</b>	0-40,000ppm
<b>Maximum Overload</b>	0-100,000ppm
<b>Inboard Filter</b>	To remove acid gases
<b>Filter Life</b>	> 400,000 ppm hours (1000ppm NO @ 200ml/min)
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	0.010 ± 0.004 µA/ppm
<b>Resolution</b>	10ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.007 ± 0.003 %signal/mBar
<b>T<sub>90</sub> Response Time</b>	<40 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	-30 to +100ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	-100ppm equivalent
<b>Long Term Output Drift</b>	<2% signal loss/month
<b>Recommended Load Resistor</b>	10Ω
<b>Bias Voltage</b>	Not required
<b>Repeatability</b>	1% of signal
<b>Output Linearity</b>	Linear
<b>Colour Coding</b>	Red

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

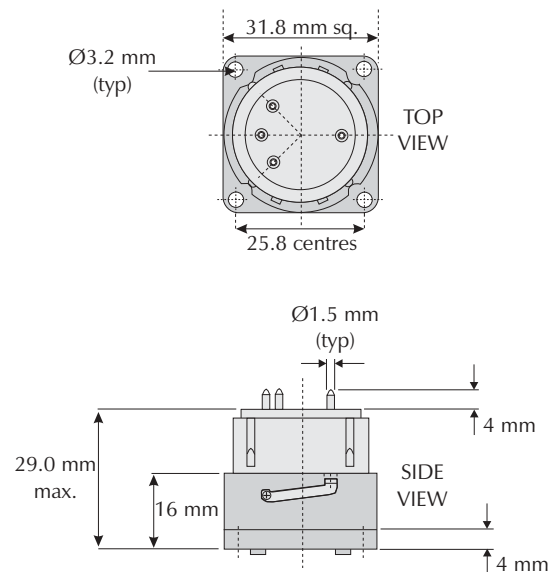
## Physical Characteristics

<b>Weight</b>	12.5g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

## Outline Sensor Dimensions



## With Bayonet Fitting

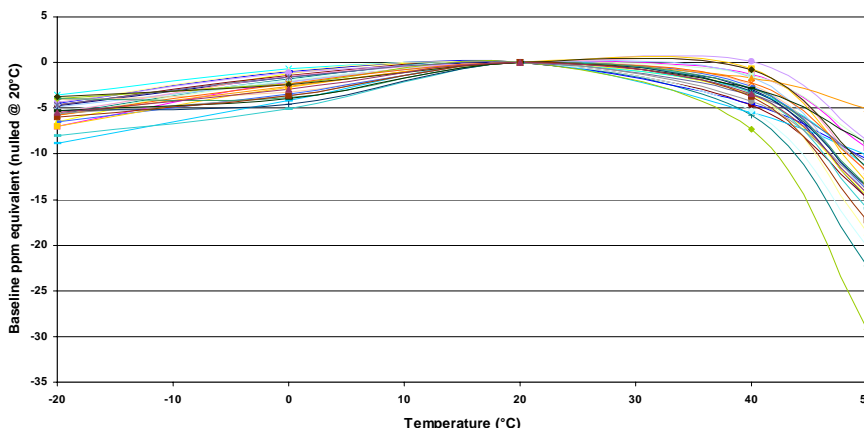


All tolerances ±0.15mm unless otherwise stated

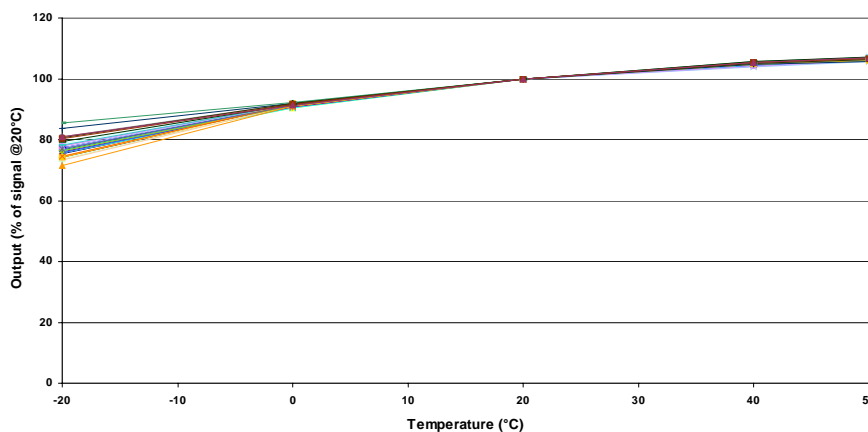
# Carbon Monoxide CiTiceL<sup>®</sup> Specification



5MF CiTiceL - Typical Baseline vs Temperature



5MF CiTiceL - Typical Output vs Temperature



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. The table below shows the typical response of 5MF sensors to a number of common cross-interfering gases. The figures are expressed as a percentage of the primary sensitivity (i.e. carbon monoxide = 100%).

<u>Gas</u>	<u>Response</u>	<u>Gas</u>	<u>Response</u>
Hydrogen sulphide:	0	Hydrogen:	<60 <sup>1</sup>
Sulphur dioxide:	0	Hydrogen chloride:	0
Nitric oxide:	0	Ethylene:	<10
Nitrogen dioxide:	0		

\*\* For details of other possible cross-interfering gases contact City Technology.\*\*

<sup>1</sup>For applications where a hydrogen compensated output is required the A5F CiTiceL should be used

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

## Key Features & Benefits:

- Robust, industry standard 7-Series packaging
- Compact Size

## Technical Specifications

### MEASUREMENT

<b>Operating Principle</b>	3-electrode electrochemical
<b>Measurement Range</b>	0-1000 ppm CO
<b>Maximum Overload</b>	2000 ppm CO
<b>Filter:</b>	
7E	None
7E/F	To remove SO <sub>x</sub> /NO <sub>x</sub> and H <sub>2</sub> S
<b>Sensitivity</b>	0.10 ± 0.02 μA/ppm
<b>Response Time (T<sub>90</sub>):</b>	
7E	<25 Seconds at 20°C
7E/F	<30 Seconds at 20°C
<b>Baseline Offset (clean air)</b>	-1 to +3 ppm equivalent
<b>Zero Shift (-20°C to +40°C)</b>	<9 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	Not Required

### MECHANICAL

<b>Weight</b>	17 g
<b>Housing Material:</b>	
Cap	Polycarbonate
Body	ABS
<b>Orientation</b>	Any

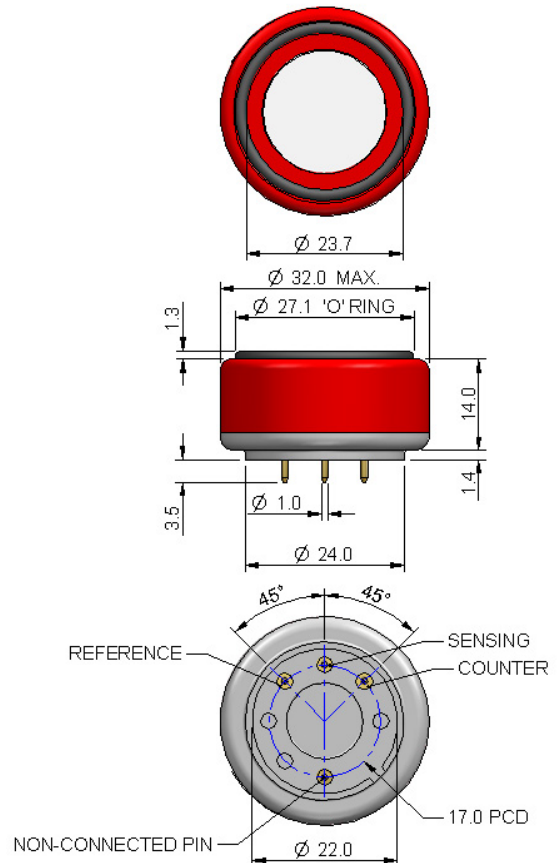
### ENVIRONMENTAL

<b>Typical Applications</b>	Portable Life Safety
<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.020 ± 0.008 % signal/mBar
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

### LIFETIME

<b>Long Term Sensitivity Drift</b>	<5% signal loss/year
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	24 months from date of despatch

## Product Dimensions



All dimensions in mm  
All tolerances ±0.15 mm  
unless otherwise stated

### IMPORTANT NOTE:

Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor and invalidate the warranty.

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, refer to Operating Principles OP08 or contact City Technology.

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used</b>	<b>7E (ppm CO)</b>	<b>7E/F (ppm CO)</b>
Hydrogen Sulfide, H <sub>2</sub> S	15	38	<0.3
Sulfur Dioxide, SO <sub>2</sub>	5	3	0
Nitric Oxide, NO	35	10	<7
Nitrogen Dioxide, NO <sub>2</sub>	5	-3	-1 < X\$ <0
Chlorine, Cl <sub>2</sub>	1	-0.5	0
Hydrogen, H <sub>2</sub>	100	<60	<60
Hydrogen Cyanide, HCN	10	5	<2
Hydrogen Chloride, HCl	5	0	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	100	<100	<100
Ethanol, C <sub>2</sub> H <sub>5</sub> OH	200	-	0

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **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.

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## Key Features & Benefits:

- Robust, industry standard 7-Series packaging
- Compact Size

## Technical Specifications

### MEASUREMENT

<b>Operating Principle</b>	3-electrode electrochemical
<b>Measurement Range</b>	0-1000 ppm CO
<b>Maximum Overload</b>	2000 ppm CO
<b>Filter:</b>	
7E	None
7E/F	To remove SO <sub>x</sub> /NO <sub>x</sub> and H <sub>2</sub> S
<b>Sensitivity</b>	0.10 ± 0.02 µA/ppm
<b>Response Time (T<sub>90</sub>):</b>	
7E	<25 Seconds at 20°C
7E/F	<30 Seconds at 20°C
<b>Baseline Offset (clean air)</b>	-1 to +3 ppm equivalent
<b>Zero Shift (-20°C to +40°C)</b>	<9 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	Not Required

### MECHANICAL

<b>Weight</b>	17 g
<b>Housing Material:</b>	
Cap	Polycarbonate
Body	ABS
<b>Orientation</b>	Any

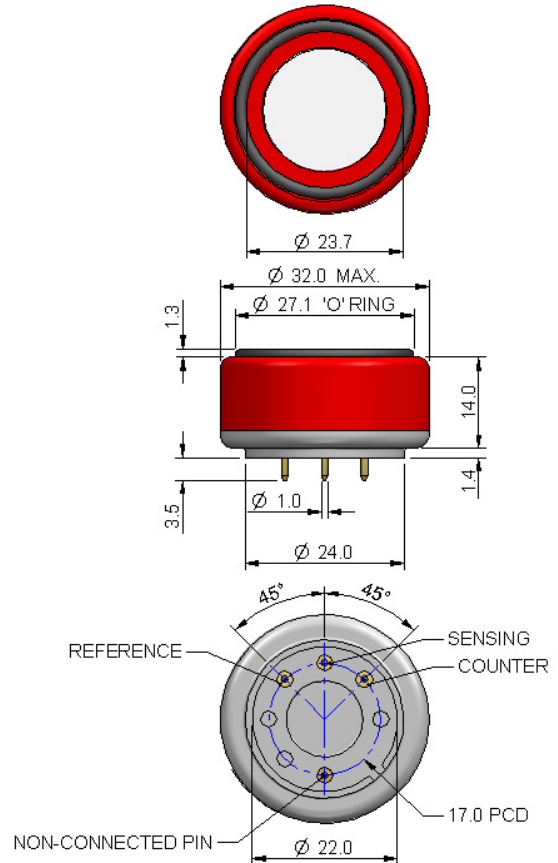
### ENVIRONMENTAL

<b>Typical Applications</b>	Portable Life Safety
<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.020 ± 0.008 % signal/mBar
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

### LIFETIME

<b>Long Term Sensitivity Drift</b>	<5% signal loss/year
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	24 months from date of despatch

## Product Dimensions



All dimensions in mm  
All tolerances ±0.15 mm  
unless otherwise stated

### IMPORTANT NOTE:

Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor and invalidate the warranty.

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, refer to Operating Principles OP08 or contact City Technology.



## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used</b>	<b>7E (ppm CO)</b>	<b>7E/F (ppm CO)</b>
Hydrogen Sulfide, H <sub>2</sub> S	15	38	<0.3
Sulfur Dioxide, SO <sub>2</sub>	5	3	0
Nitric Oxide, NO	35	10	<7
Nitrogen Dioxide, NO <sub>2</sub>	5	-3	-1 < X\$ <0
Chlorine, Cl <sub>2</sub>	1	-0.5	0
Hydrogen, H <sub>2</sub>	100	<60	<60
Hydrogen Cyanide, HCN	10	5	<2
Hydrogen Chloride, HCl	5	0	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	100	<100	<100
Ethanol, C <sub>2</sub> H <sub>5</sub> OH	200	-	0

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **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.

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# Carbon Monoxide MediceLs<sup>®</sup>

## A2E/F Characteristics

<b>Nominal Range</b>	0-200ppm
<b>Maximum Overload</b>	1000ppm
<b>Output Signal</b>	10.15±0.03µA/ppm
<b>Typical Baseline Range (pure air)</b>	<3ppm
<b>Maximum Zero Shift (-20°C to +40°C)</b>	<5ppm
<b>Bias Voltage</b>	Zero
<b>Recommended Gain</b>	2.2
<b>Weight</b>	25g

## A3E/F Characteristics

<b>Nominal Range</b>	0-2000ppm
<b>Maximum Overload</b>	4000ppm
<b>Output Signal</b>	0.075±0.025µA/ppm
<b>Typical Baseline Range (pure air)</b>	-2 to +17ppm equivalent
<b>Bias Voltage</b>	<sup>2</sup> 0 or +250mV
<b>Recommended Gain</b>	0.5 to 2.5
<b>Weight</b>	26g

Note 1: in recommended circuit with Gain=2.2

Note 2: User adjusts Gain to set H<sub>2</sub> to zero

## Performance Characteristics

<b>Inboard Filter</b>	To remove acid gases/alcohol
<b>Auxiliary Electrode</b>	To compensate for H <sub>2</sub> cross-interference
<b>Expected Operating Life</b>	3 years
<b>Resolution</b>	1ppm
<b>Temperature Range</b>	-20°C to +50 °C
<b>Pressure</b>	
<b>Operating Range</b>	800-1200mBar
<b>Storage Range</b>	800-1200mBar
<b>Max Diff (capillary to amb.)</b>	±100mBar
<b>Pressure Coefficient</b>	0.02% signal/mBar
<b>T<sub>90</sub> Response Time</b>	<40 seconds
<b>Relative Humidity Range</b>	15% to 90% non-condensing
<b>Long Term Output Drift</b>	<10% signal loss/year
<b>Repeatability</b>	2% of signal
<b>Output Linearity</b>	Linear

## A2E/F Cross Sensitivity Data

Gas	Response
Hydrogen (H <sub>2</sub> )	-4 to + 4%
Hydrogen Sulphide (H <sub>2</sub> S)	None
Sulphur Dioxide (SO <sub>2</sub> )	None
Nitric Oxide (NO)	None
Nitrogen Dioxide (NO <sub>2</sub> )	None
Hydrogen Chloride (HCl)	None

## A3E/F Cross Sensitivity Data

Gas	Response
Hydrogen (H <sub>2</sub> )	
Bias: 0mV	<5%
Bias: 250mV	<1%
Hydrogen Sulphide (H <sub>2</sub> S)	None
Sulphur Dioxide (SO <sub>2</sub> )	None
Nitric Oxide (NO)	None
Nitrogen Dioxide (NO <sub>2</sub> )	None
Hydrogen Chloride (HCl)	None

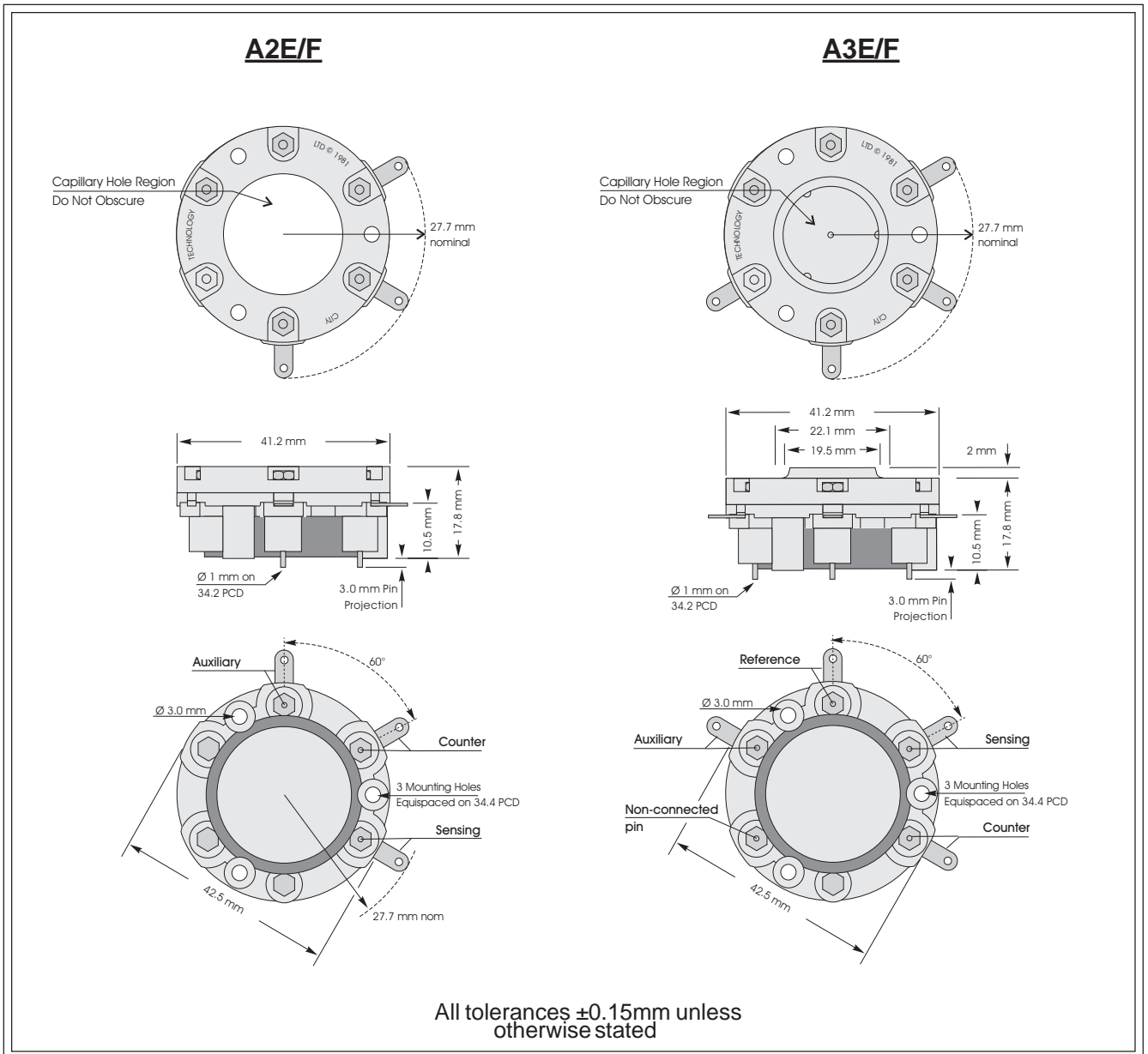
## Products

<b>A2E/F</b>	Two-electrode CO sensor with auxiliary electrode for H <sub>2</sub> compensation
<b>A3E/F</b>	Three-electrode CO sensor with auxiliary electrode for H <sub>2</sub> compensation

## Physical Characteristics

<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Colour Coded Ring</b>	Red
<b>Warranty Period</b>	12 months from date of despatch

# Carbon Monoxide MediceL<sup>®</sup> Specification



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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

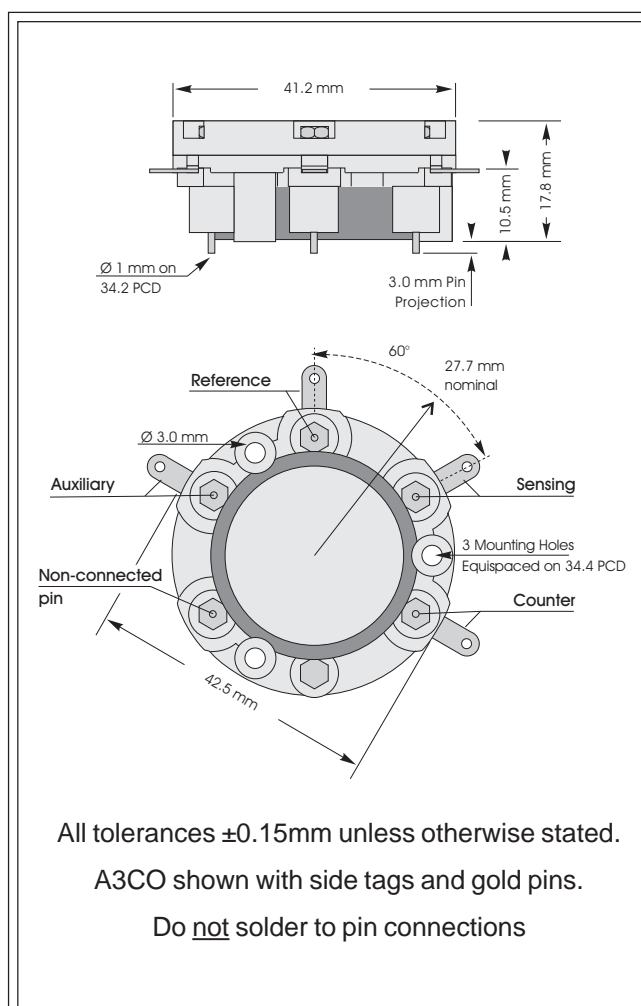


# A3CO EnviroceL<sup>®</sup>

This sensor is for monitoring gases at levels found in the environment. It is designed to give accurate readings of CO in ambient air.

## Performance Characteristics

<b>Nominal Range</b>	0-500ppm
<b>Maximum Overload</b>	1000ppm
<b>Expected Operating Life</b>	Two years
<b>Output Signal</b>	0.2 ± 0.04 μA/ppm
<b>Resolution</b>	100ppb
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	No data
<b>T<sub>90</sub> Response Time</b>	<40 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	0 to 1ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	2ppm equivalent
<b>Long Term Output Drift</b>	<10% signal loss/year in air
<b>Recommended Load Resistor</b>	10Ω (see over)
<b>Bias Voltage</b>	Not required
<b>Repeatability</b>	1% of signal
<b>Output Linearity</b>	Linear



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

## Physical Characteristics

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

## Cross-Sensitivity Data

<b>Sulphur Dioxide</b>	None
<b>Hydrogen Sulphide</b>	None
<b>Nitrogen Dioxide</b>	None
<b>Nitric Oxide</b>	None



## Circuitry required

The A3CO 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.

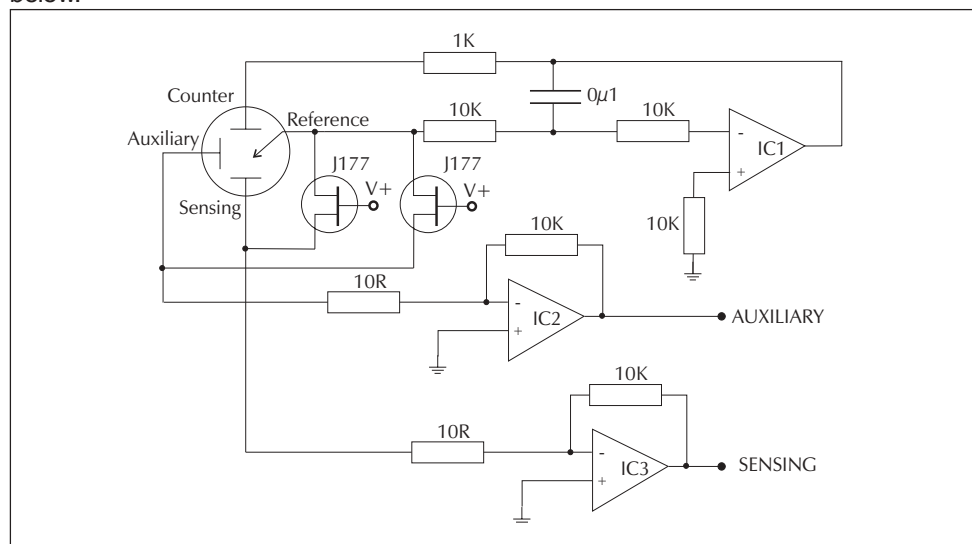
**Figure 1.**

A3CO 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  $R_{load}$  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 carbon monoxide, 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 carbon monoxide concentration of a sample from the two signals is a straightforward subtraction:-

Let:

$I_S$	=	Sensing electrode signal;
$I_A$	=	Auxiliary electrode signal;
$I_{CO}$	=	Baseline compensated carbon monoxide signal.

Then

$I_{CO}$	=	$I_S - I_A$
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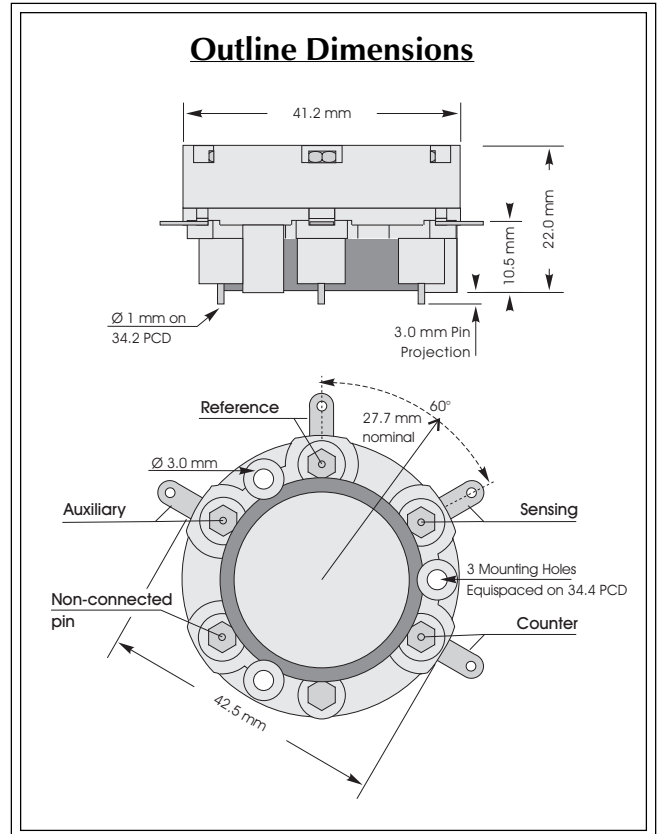
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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

## A3E/D CiTiceL

### Performance Characteristics

<b>Nominal Range</b>	0-2000ppm
<b>Maximum Overload</b>	4000ppm
<b>Inboard Filter</b>	'Double size' filter to remove acid gases from flue stream
<b>Auxiliary Electrode</b>	To compensate for H <sub>2</sub> cross-interference
<b>Expected Operating Life</b>	Two years in air
<b>Output Signal</b>	0.075 ± 0.025 μA/ppm
<b>Resolution</b>	1ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.02% signal/mBar
<b>T<sub>90</sub> Response Time</b>	< 38 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	-2 to +17ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	No data
<b>Long Term Output Drift</b>	< 2% signal loss/month
<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	0 or +250mV (See page tox-10)
<b>Repeatability</b>	< 1% of signal
<b>Output Linearity</b>	Linear



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

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

### Physical Characteristics

<b>Weight</b>	31g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch



## Temperature Dependence

The output of a CiTiceL can vary with temperature. As the operation of the A3E/D CiTiceL is different to that of standard CiTiceLs, the temperature behaviour of these sensors is very different. Further details can be obtained from City Technology.

## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. The table below shows the typical response of A3E/D sensors to a number of common cross-interfering gases. The figures are expressed as a percentage of the primary sensitivity (i.e. carbon monoxide = 100%).

<b>Gas</b>	<b>Response</b>	<b>Gas</b>	<b>Response</b>
<b>Hydrogen sulphide:</b>	0	<b>Hydrogen:</b>	<1 (see note)
<b>Sulphur dioxide:</b>	0	<b>Hydrogen chloride:</b>	0
<b>Nitric oxide:</b>	0	<b>Ethylene:</b>	≈35
<b>Nitrogen dioxide:</b>	0	** For details of other possible cross-interfering gases contact City Technology.**	

**Note:** Cross-sensitivity to H<sub>2</sub> <1% after compensation

## Ordering Information

The A3E/D Carbon Monoxide CiTiceL is available with both PCB pins and side tags only.

**Type A3E/D:- With side tag and PCB pin connections - A3E/D**





# Carbon Monoxide MediceL<sup>®</sup>

## A2E/F Characteristics

<b>Nominal Range</b>	0-200ppm
<b>Maximum Overload</b>	1000ppm
<b>Output Signal</b>	10.15±0.03µA/ppm
<b>Typical Baseline Range (pure air)</b>	<3ppm
<b>Maximum Zero Shift (-20°C to +40°C)</b>	<5ppm
<b>Bias Voltage</b>	Zero
<b>Recommended Gain</b>	2.2
<b>Weight</b>	25g

## A3E/F Characteristics

<b>Nominal Range</b>	0-2000ppm
<b>Maximum Overload</b>	4000ppm
<b>Output Signal</b>	0.075±0.025µA/ppm
<b>Typical Baseline Range (pure air)</b>	-2 to +17ppm equivalent
<b>Bias Voltage</b>	±20 or +250mV
<b>Recommended Gain</b>	0.5 to 2.5
<b>Weight</b>	26g

Note 1: in recommended circuit with Gain=2.2

Note 2: User adjusts Gain to set H<sub>2</sub> to zero

## Performance Characteristics

<b>Inboard Filter</b>	To remove acid gases/alcohol
<b>Auxiliary Electrode</b>	To compensate for H <sub>2</sub> cross-interference
<b>Expected Operating Life</b>	3 years
<b>Resolution</b>	1ppm
<b>Temperature Range</b>	-20°C to +50 °C
<b>Pressure</b>	
<b>Operating Range</b>	800-1200mBar
<b>Storage Range</b>	800-1200mBar
<b>Max Diff (capillary to amb.)</b>	±100mBar
<b>Pressure Coefficient</b>	0.02% signal/mBar
<b>T<sub>90</sub> Response Time</b>	<40 seconds
<b>Relative Humidity Range</b>	15% to 90% non-condensing
<b>Long Term Output Drift</b>	<10% signal loss/year
<b>Repeatability</b>	2% of signal
<b>Output Linearity</b>	Linear

## A2E/F Cross Sensitivity Data

Gas	Response
Hydrogen (H <sub>2</sub> )	-4 to + 4%
Hydrogen Sulphide (H <sub>2</sub> S)	None
Sulphur Dioxide (SO <sub>2</sub> )	None
Nitric Oxide (NO)	None
Nitrogen Dioxide (NO <sub>2</sub> )	None
Hydrogen Chloride (HCl)	None

## A3E/F Cross Sensitivity Data

Gas	Response
Hydrogen (H <sub>2</sub> )	
Bias: 0mV	<5%
Bias: 250mV	<1%
Hydrogen Sulphide (H <sub>2</sub> S)	None
Sulphur Dioxide (SO <sub>2</sub> )	None
Nitric Oxide (NO)	None
Nitrogen Dioxide (NO <sub>2</sub> )	None
Hydrogen Chloride (HCl)	None

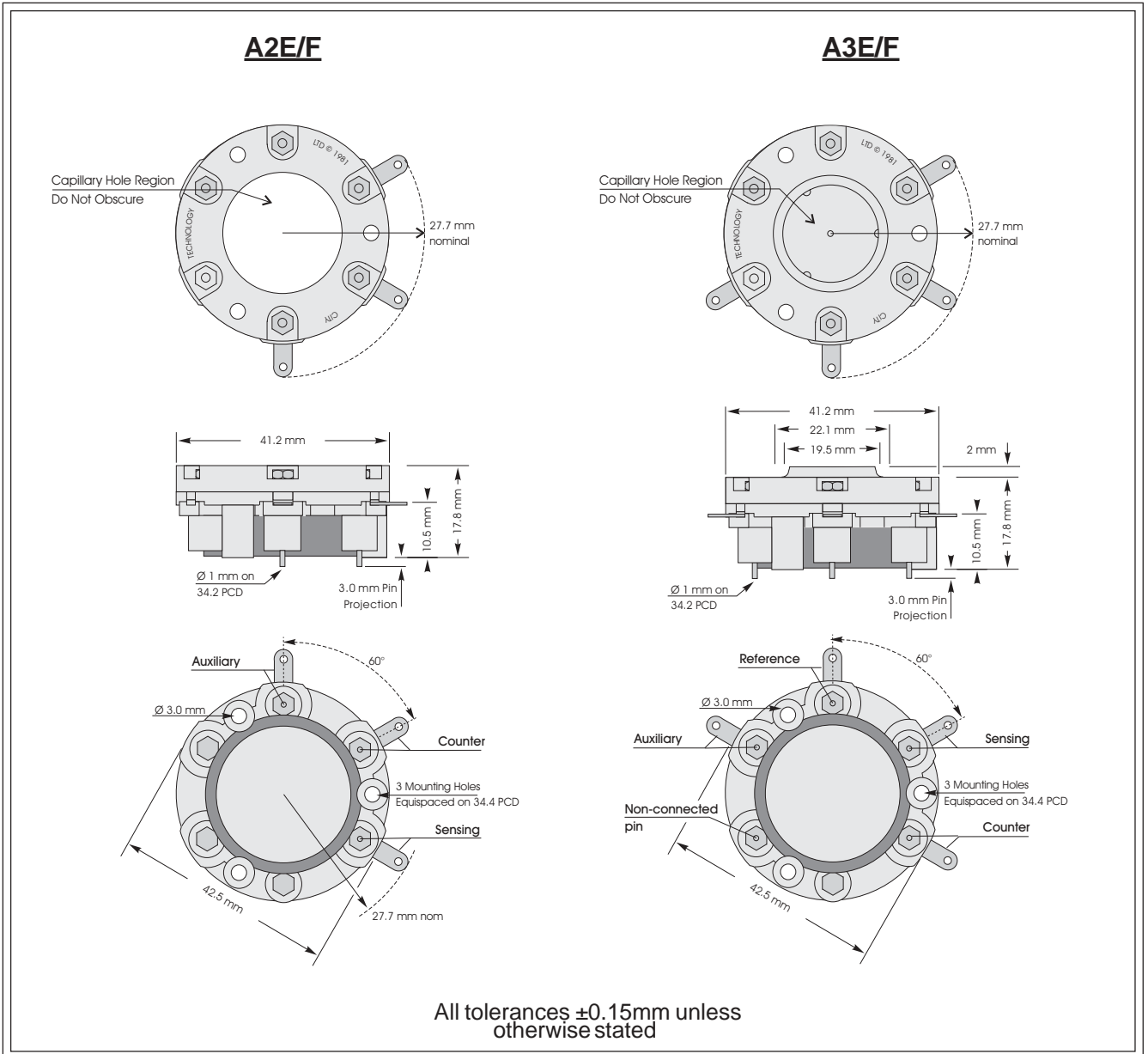
## Products

<b>A2E/F</b>	Two-electrode CO sensor with auxiliary electrode for H <sub>2</sub> compensation
<b>A3E/F</b>	Three-electrode CO sensor with auxiliary electrode for H <sub>2</sub> compensation

## Physical Characteristics

<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Colour Coded Ring</b>	Red
<b>Warranty Period</b>	12 months from date of despatch

# Carbon Monoxide MediceL<sup>®</sup> Specification



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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

## Key Features & Benefits:

- Robust 3-Series packaging
- Factory calibrated mV output
- On-board hydrogen and temperature compensation

## Technical Specifications

### MEASUREMENT

<b>Sensor Type Used</b>	A3E/D
<b>Maximum Range</b>	4000 ppm CO
<b>Sensitivity</b>	1 mV/ppm ± 5%
<b>Filter</b>	To remove acid gases (high capacity)
<b>Baseline Offset (Clean Air)</b>	±1 mV
<b>Auxiliary Electrode</b>	To compensate for hydrogen cross-interference (to < 1%)
<b>Response Time (T<sub>90</sub>)</b>	<38 Seconds at 20°C
<b>Resolution</b>	1 ppm
<b>Zero Shift (-20°C to +40°C)</b>	<3 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Power Supply Required</b>	Recommended 9 VDC Limits 3-10 VDC
<b>Power Consumption</b>	500 µA quiescent
<b>Calibration</b>	Via built-in span and zero potentiometers (Refer to OP15)

### MECHANICAL

<b>Weight</b>	34 g (including leads)
<b>Body Material</b>	Polycarbonate
<b>Position Sensitivity</b>	None

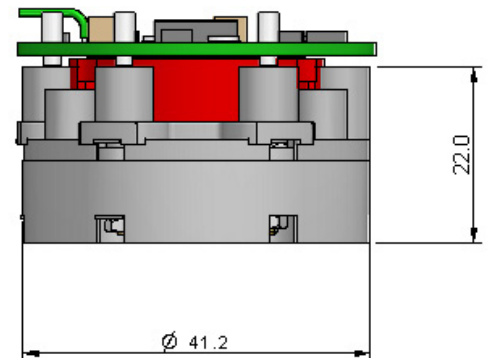
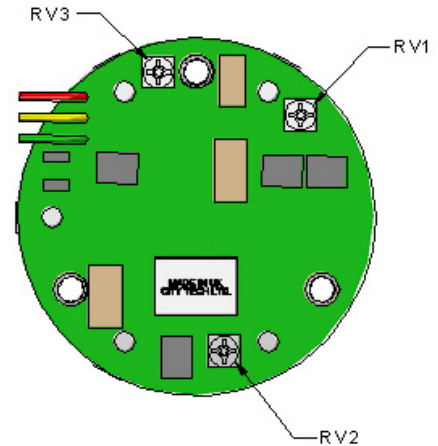
### ENVIRONMENTAL

<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Temperature Compensation</b>	Yes - refer to OP15
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.02% signal/mBar
<b>Operating Humidity Range</b>	15 to 90% RH non-condensing

### LIFETIME

<b>Long Term Sensitivity Drift</b>	<2% signal loss/month
<b>Expected Operating Life</b>	Two years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

## Product Dimensions



All dimensions in mm

All tolerances ±0.15 mm unless otherwise stated

### IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of the A3ME/D mV output sensor, please refer to OP15.

## Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## Cross Sensitivity Table

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react. The figures are expressed as a percentage of the primary sensitivity (i.e. CO = 100%).

Gas	A3ME/D (%)
Hydrogen Sulfide, H <sub>2</sub> S	0
Sulfur Dioxide, SO <sub>2</sub>	0
Nitric Oxide, NO	0
Nitrogen Dioxide, NO <sub>2</sub>	0
Hydrogen, H <sub>2</sub>	<1 (see note)
Hydrogen Chloride, HCl	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	~ 35

**Note:** Cross sensitivity to H<sub>2</sub> <1% after compensation

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time

## Key Features & Benefits:

- Robust 3-Series packaging
- Factory calibrated mV output
- On-board hydrogen and temperature compensation

## Technical Specifications

### MEASUREMENT

<b>Sensor Type Used</b>	A3E/F
<b>Maximum Range</b>	4000 ppm CO
<b>Sensitivity</b>	1 mV/ppm ± 5%
<b>Filter</b>	To remove acid gases
<b>Baseline Offset (Clean Air)</b>	±1 mV
<b>Auxiliary Electrode</b>	To compensate for hydrogen cross-interference (to < 1%)
<b>Response Time (T<sub>90</sub>)</b>	<40 Seconds at 20°C
<b>Resolution</b>	1 ppm
<b>Zero Shift (-20°C to +40°C)</b>	<3 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Power Supply Required</b>	Recommended 9 VDC Limits 3-10 VDC
<b>Power Consumption</b>	500 µA quiescent
<b>Calibration</b>	Via built-in span and zero potentiometers (Refer to OP15)

### MECHANICAL

<b>Weight</b>	34 g (including leads)
<b>Body Material</b>	Polycarbonate
<b>Position Sensitivity</b>	None

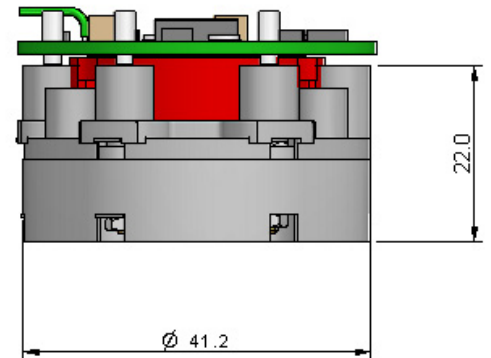
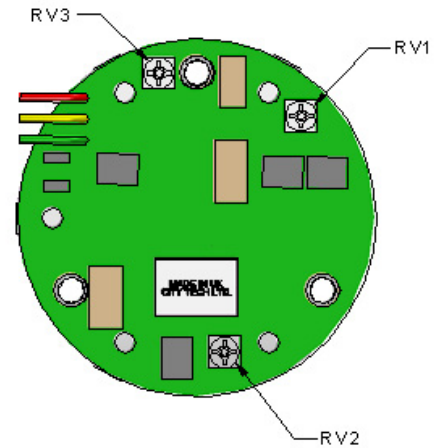
### ENVIRONMENTAL

<b>Operating Temperature Range</b>	-20°C to +40°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Temperature Compensation</b>	Yes - refer to OP15
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.02% signal/mBar
<b>Operating Humidity Range</b>	15 to 90% RH non-condensing

### LIFETIME

<b>Long Term Sensitivity Drift</b>	<2% signal loss/month
<b>Expected Operating Life</b>	Two years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

## Product Dimensions



All dimensions in mm

All tolerances ±0.15 mm unless otherwise stated

### IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of the A3ME/F mV output sensor, please refer to OP15.

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react. The figures are expressed as a percentage of the primary sensitivity (i.e. CO = 100%).

<b>Gas</b>	<b>A3ME/F (%)</b>
Hydrogen Sulfide, H <sub>2</sub> S	0
Sulfur Dioxide, SO <sub>2</sub>	0
Nitric Oxide, NO	0
Nitrogen Dioxide, NO <sub>2</sub>	0
Hydrogen, H <sub>2</sub>	<1 (see note)
Hydrogen Chloride, HCl	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	~ 35

**Note:** Cross sensitivity to H<sub>2</sub> <1% after compensation

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time



# A5F CiTiceL<sup>®</sup>

## Performance Characteristics

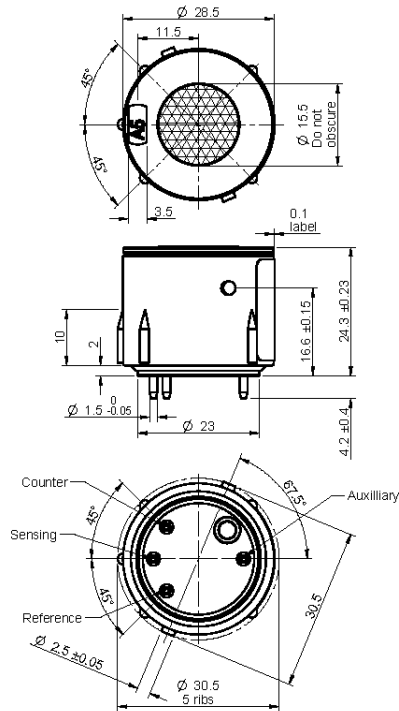
<b>Nominal Range</b>	0-2000ppm
<b>Maximum Overload</b>	4000ppm
<b>Internal Filter</b>	To remove acid gases
<b>Internal Filter Life</b>	>100,000ppm hours (1000ppm NO at 200ml/min)
<b>Auxiliary Electrode</b>	To compensate for maximum 2000ppm H <sub>2</sub> cross-interference
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	0.075 ± 0.025 μA/ppm
<b>Resolution</b>	1ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.010% signal/mbar
<b>T<sub>90</sub> Response Time</b>	< 40 seconds
<b>Relative Humidity Range</b>	15 to 90 % non-condensing
<b>Typical Net Baseline Range (pure air)</b>	-2 to +17ppm equivalent
<b>Maximum Net Zero Shift (+20°C to +40°C)</b>	5ppm CO equivalent
<b>Long Term Output Drift</b>	<2% signal loss/month
<b>Recommended Load Resistor</b>	10Ω
<b>Bias Voltage</b>	0mV or +250mV
<b>Repeatability</b>	<1% of signal
<b>Output Linearity</b>	Linear

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

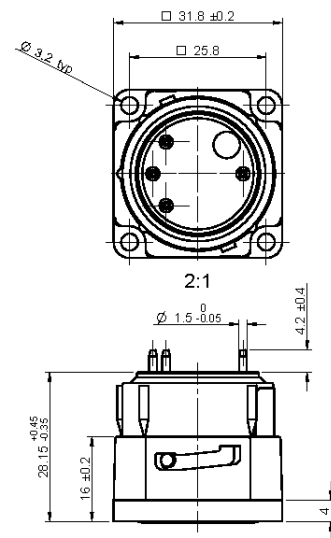
## Physical Characteristics

<b>Colour Coding</b>	Red
<b>Weight</b>	13g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

### Outline Sensor Dimensions



### With Bayonet Fitting



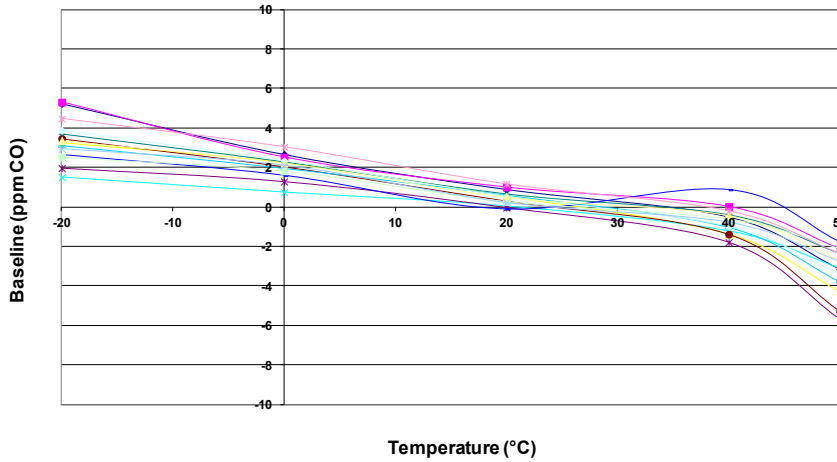
All tolerances ±0.15mm unless otherwise



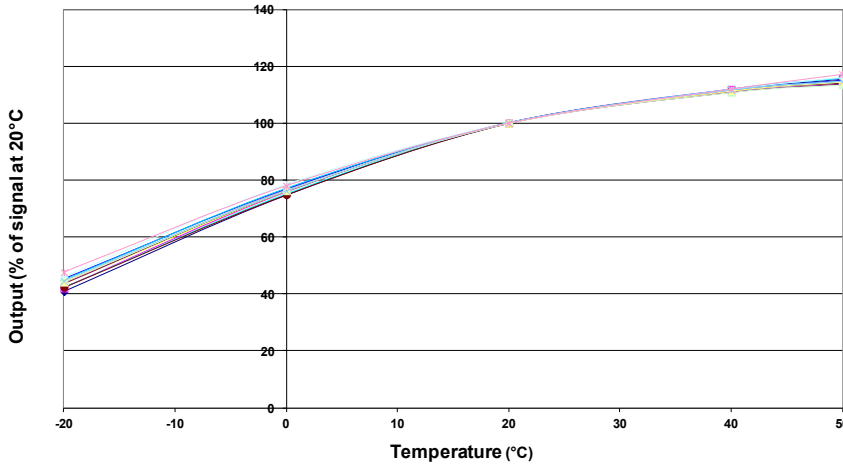
# Carbon Monoxide CiTiceL<sup>®</sup> Specification



A5F CiTiceL - Typical Baseline vs Temperature



A5F CiTiceL - Typical Output vs Temperature



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. The table below shows the typical response of A5F sensors to a number of common cross-interfering gases. The figures are expressed as a percentage of the primary sensitivity (i.e. nitric oxide = 100%).

Gas	Response	Gas	Response
Hydrogen sulphide:	0	Hydrogen:	<1 (see note)
Sulphur dioxide:	0	Hydrogen chloride:	5
Nitric oxide:	0	Nitrogen dioxide:	0

\*\* For details of other possible cross-interfering gases contact City Technology.\*\*  
**Note:** Cross-sensitivity to H<sub>2</sub> <1% after compensation

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



## A7E CiTiceL

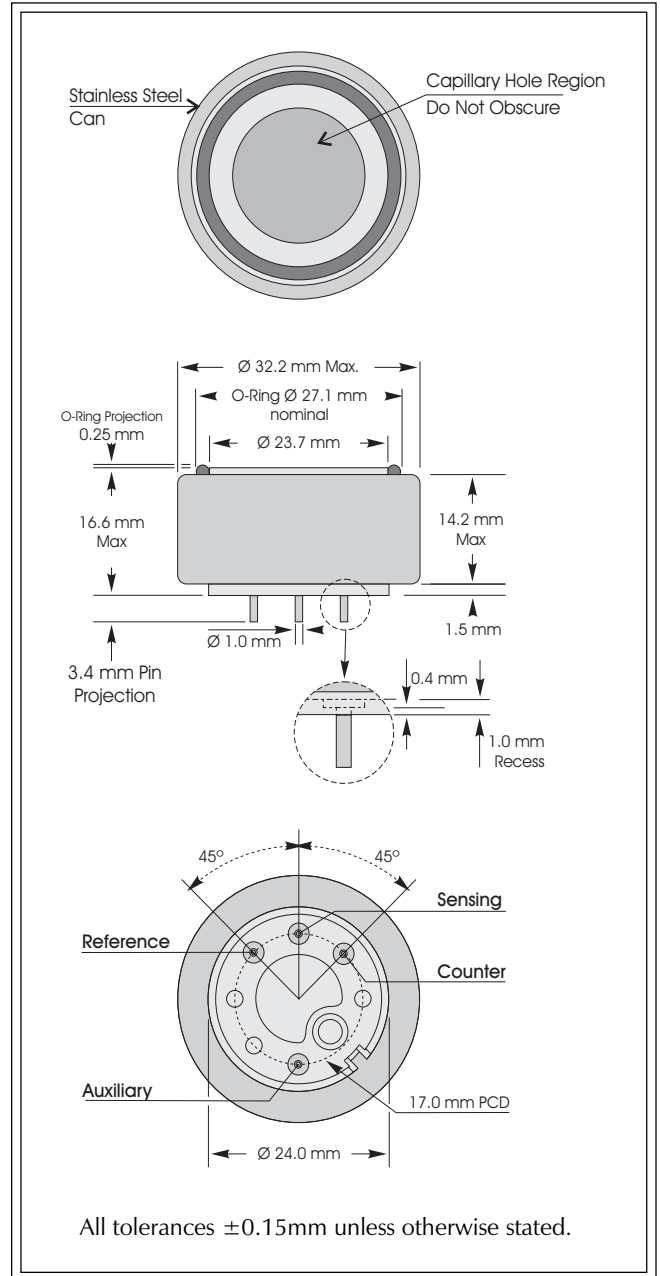
### Performance Characteristics

<b>Nominal Range</b>	0-1000ppm
<b>Maximum Overload</b>	2000ppm
<b>Auxiliary Electrode</b>	To compensate for H <sub>2</sub> cross-interference
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	0.1 ± 0.02 μA/ppm
<b>Resolution</b>	0.5ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.02% signal/mBar
<b>T<sub>90</sub> Response Time</b>	≤35 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	-2 to +15ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	No data
<b>Long Term Output Drift</b>	<5% signal loss/year
<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	0 or +250mV
<b>Repeatability</b>	<1% of signal
<b>Output Linearity</b>	Linear

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

### Physical Characteristics

<b>Weight</b>	25g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

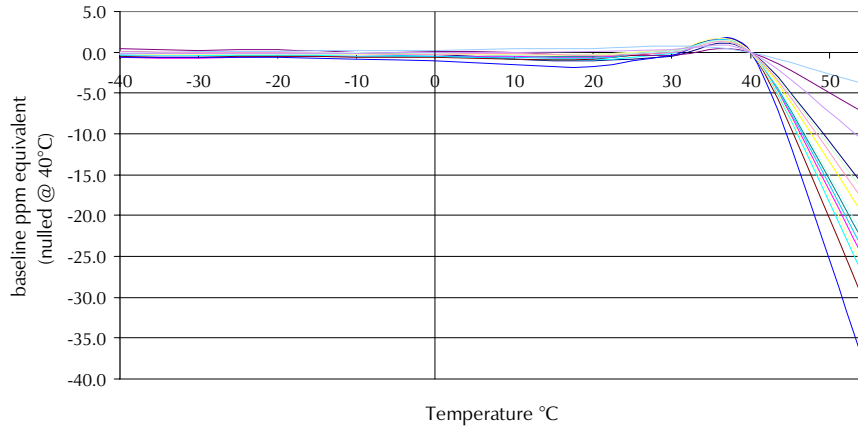


**IMPORTANT NOTE:** Connection should be made via PCB sockets only. Soldering to the pins will render your warranty void.

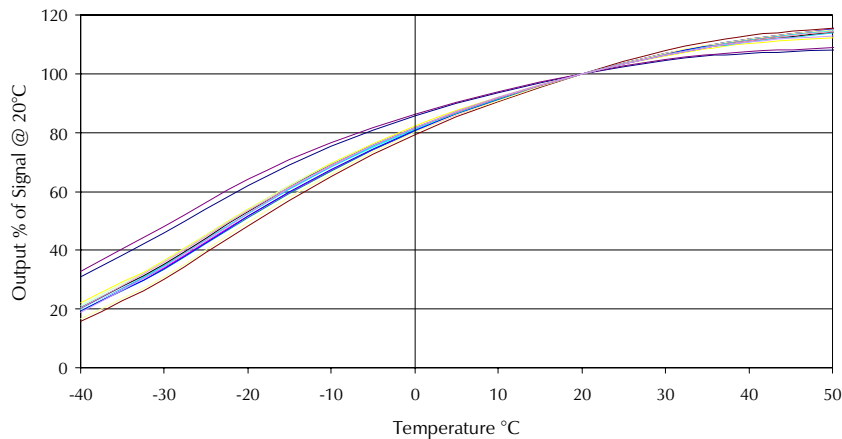


The A7E will have a similar temperature response to the A7E/F.

**A7E/F Carbon Monoxide CiTiceL Baseline Vs Temperature  
assuming baseline nulled at 40°C**



**A7E/F Carbon Monoxide CiTiceL - Output Vs Temperature**



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 7E 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 response of the A7E is expected to be similar to the 7E CiTiceL although some of the partially responding gases, e.g. NO, HCN, C<sub>2</sub>H<sub>4</sub>, may give lower cross-sensitivity.

Gas	Conc.	7E	Gas	Conc.	7E
Hydrogen sulphide:	15ppm	≈38ppm	Sulphur dioxide:	5ppm	≈3ppm
Nitric oxide:	35ppm	≈10ppm	Nitrogen dioxide:	5ppm	≈3ppm
Chlorine:	1ppm	≈-0.5ppm	Hydrogen cyanide:	10ppm	≈5ppm
Hydrogen chloride:	5ppm	0ppm	Ethylene:	100ppm	<100ppm

\*\*For details of other possible cross-interfering gases contact City Technology.\*\*



# A7E/F CiTiceL<sup>®</sup>

N.B. For emissions monitoring applications use the A3E/F CiTiceL

## Performance Characteristics

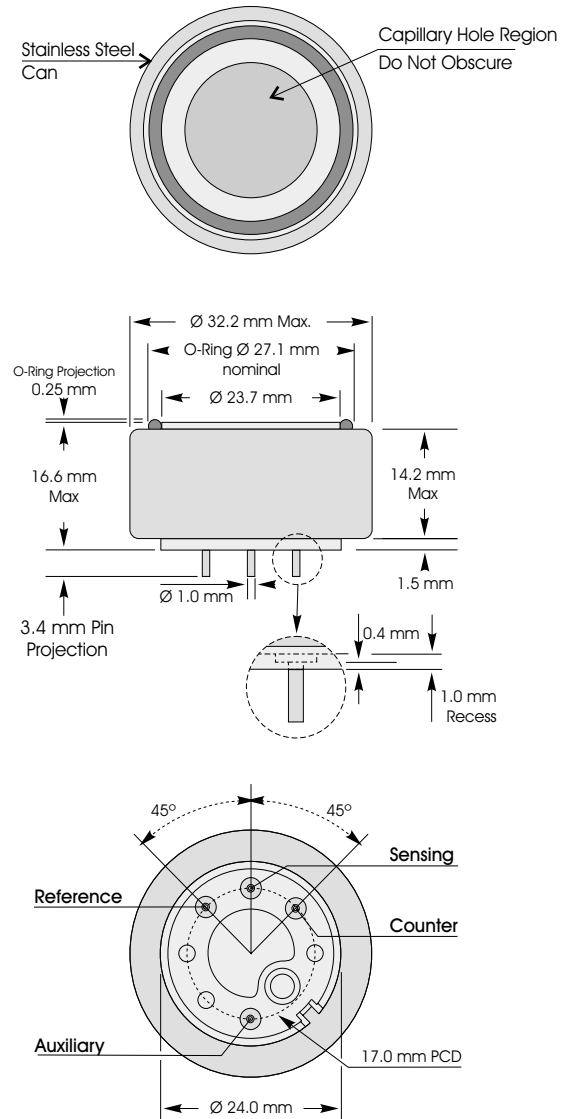
<b>Nominal Range</b>	0-1000ppm
<b>Maximum Overload</b>	2000ppm
<b>Inboard Filter</b>	To remove H <sub>2</sub> S
<b>Auxiliary Electrode</b>	To compensate for H <sub>2</sub> cross-interference
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	0.1 ± 0.02 µA/ppm
<b>Resolution</b>	0.5ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.02% signal/mBar
<b>T<sub>90</sub> Response Time</b>	≤35 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Baseline Range (pure air)</b>	-2 to +15ppm equivalent
<b>Maximum Zero Shift (+20°C to +40°C)</b>	No data
<b>Long Term Output Drift</b>	<5% signal loss/year
<b>Recommended Load Resistor</b>	10 Ω
<b>Bias Voltage</b>	0 or +250mV
<b>Repeatability</b>	<1% of signal
<b>Output Linearity</b>	Linear

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

## Physical Characteristics

<b>Weight</b>	25g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

## Outline Dimensions



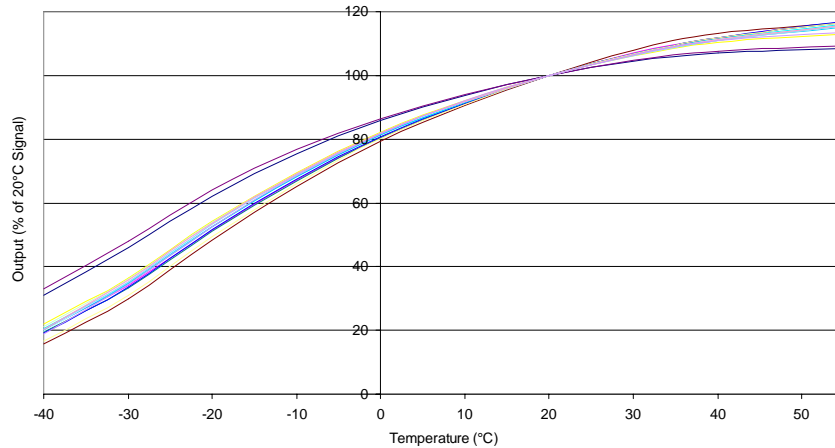
All tolerances ±0.15mm unless otherwise stated.

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

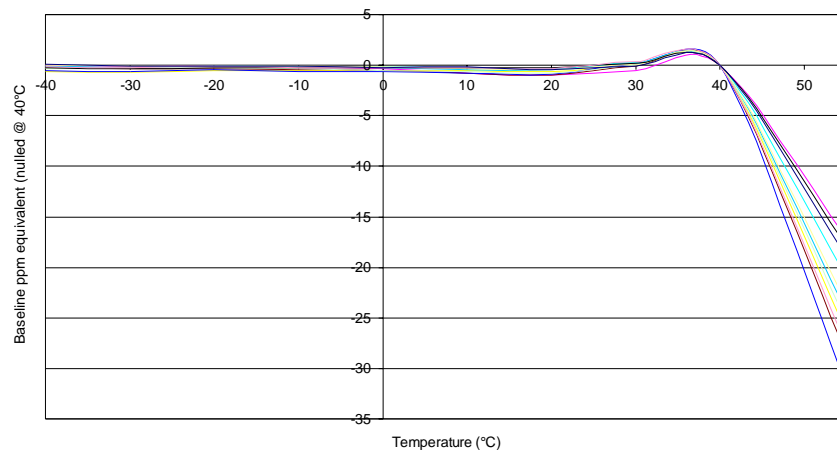
# Carbon monoxide CiTiceL<sup>®</sup> Specification



**A7E/F Carbon monoxide CiTiceL - Output vs Temperature**



**A7E/F Carbon Monoxide CiTiceL Baseline vs Temperature**



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. A7E/F 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).

<b>Gas</b>	<b>Conc.</b>	<b>A7E/F</b>	<b>Gas</b>	<b>Conc.</b>	<b>A7E/F</b>
<b>Hydrogen sulphide:</b>	15ppm	~1ppm	<b>Hydrogen:</b>	100ppm	0ppm
<b>Sulphur dioxide:</b>	5ppm	0ppm	<b>Hydrogen cyanide:</b>	10ppm	<2ppm
<b>Nitric oxide:</b>	35ppm	≤7ppm	<b>Hydrogen chloride:</b>	5ppm	0ppm
<b>Nitrogen dioxide:</b>	50ppm	-0.5<x\$<+1.0ppm	<b>Ethylene:</b>	100ppm	≤75ppm
<b>Chlorine:</b>	1ppm	0ppm			

**\*\*For details of other possible cross-interfering gases contact City Technology.\*\***

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## Key Features & Benefits:

- Robust 3-Series packaging
- Industry standard 4-20 mA output

## Technical Specifications

### MEASUREMENT

<b>Sensor Type Used</b>	3E/F
<b>Filter</b>	To remove H <sub>2</sub> S and SO <sub>2</sub>
<b>Output</b>	4-20 mA d.c., two wire loop powered
<b>Response Time (T<sub>90</sub>)</b>	<30 Seconds at 20°C
<b>Resolution</b>	0.5 ppm
<b>Zero Shift (-20°C to +40°C)</b>	< 9 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Power Supply Required</b>	10 - 35 VDC single-ended
<b>Calibration</b>	Via built-in push buttons

### MECHANICAL

<b>Mounting</b>	Via mounting nose supplied
<b>Weight</b>	58 g including mounting accessory
<b>Position Sensitivity</b>	None

### ENVIRONMENTAL

<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Temperature Compensation</b>	None
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.020 ± 0.008% signal/mBar
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

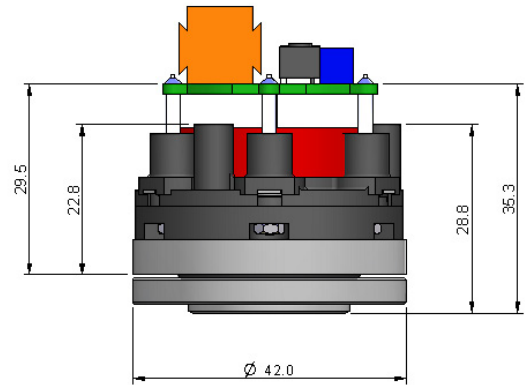
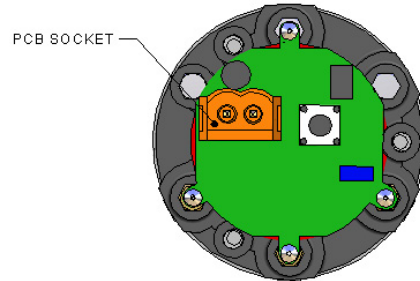
### LIFETIME

<b>Long Term Sensitivity Drift</b>	<5% signal loss/year
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

### IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology EasyCal 4-20mA transmitters, please refer to OP-13.

## Product Dimensions



All dimensions in mm  
All tolerances ±0.15 mm unless otherwise stated

### RANGES AVAILABLE

3E/F CiTiceL 4-20 mA EasyCal Transmitters are available with the following precalibrated ranges, and can be recalibrated to intermediate ranges.

Range	Order Code
0-50 ppm	2TB7E-1A
0-100 ppm	2TB7F-1A
0-200 ppm	2TB7G-1A
0-300 ppm	2TB7H-1A
0-500 ppm	2TB7I-1A

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used (ppm)</b>	<b>3E/F (ppm CO)</b>
Hydrogen Sulfide, H <sub>2</sub> S	15	≈ 1
Nitric Oxide, NO	35	<3.5
Chlorine, Cl <sub>2</sub>	1	0
Hydrogen Cyanide, HCN	10	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	100	<75
Sulfur Dioxide, SO <sub>2</sub>	5	0
Nitrogen Dioxide, NO <sub>2</sub>	5	0
Hydrogen, H <sub>2</sub>	100	<60
Hydrogen Chloride, HCl	5	0

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time

## Key Features & Benefits:

- Robust 3-Series packaging
- Industry standard 4-20 mA output

## Technical Specifications

### MEASUREMENT

<b>Sensor Type Used</b>	3F/F
<b>Filter</b>	To remove acid gases from flue stream
<b>Output</b>	4-20 mA d.c., two wire loop powered
<b>Response Time (T<sub>90</sub>)</b>	<30 Seconds at 20°C
<b>Resolution</b>	1 ppm
<b>Zero Shift (-20°C to +40°C)</b>	< 20 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Power Supply Required</b>	10 - 35 VDC single-ended
<b>Calibration</b>	Via built-in push buttons

### MECHANICAL

<b>Mounting</b>	Via mounting nose supplied
<b>Weight</b>	58 g including mounting accessory
<b>Position Sensitivity</b>	None

### ENVIRONMENTAL

<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Temperature Compensation</b>	None
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.007 ± 0.003% signal/mBar
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

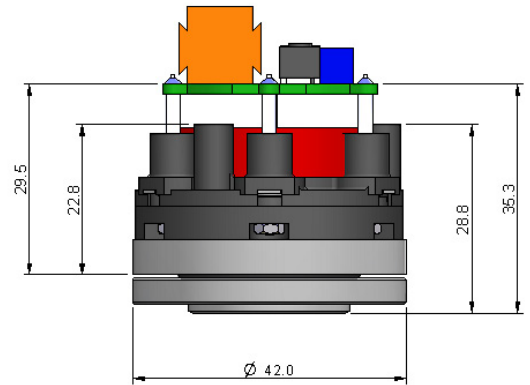
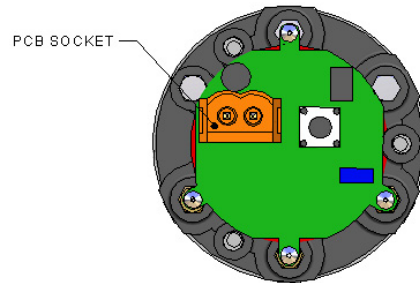
### LIFETIME

<b>Long Term Sensitivity Drift</b>	<2% signal loss/month
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

### IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology EasyCal 4-20mA transmitters, please refer to OP-13.

## Product Dimensions



All dimensions in mm  
All tolerances ±0.15 mm unless otherwise stated

### RANGES AVAILABLE

3F/F CiTiceL 4-20 mA EasyCal Transmitters are available with the following precalibrated ranges, and can be recalibrated to intermediate ranges.

Range	Order Code
0-500 ppm	2TBAI-1A
0-1000 ppm	2TBAJ-1A
0-2000 ppm	2TBAK-1A

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used (ppm)</b>	<b>3F/F (ppm CO)</b>
Hydrogen Sulfide, H <sub>2</sub> S	15	0
Nitric Oxide, NO	50	-1 < X < 0
Hydrogen, H <sub>2</sub>	100	<60 <sup>1</sup>
Ethylene, C <sub>2</sub> H <sub>4</sub>	100	0 < X < 20
Sulfur Dioxide, SO <sub>2</sub>	5	0
Nitrogen Dioxide, NO <sub>2</sub>	5	0
Hydrogen Chloride, HCl	5	0

Note 1 : For applications where a hydrogen compensated output is required, the A3E/D CiTiceL should be used

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time



## Key Features & Benefits:

- Robust 3-Series packaging
- Industry standard 4-20 mA output

## Technical Specifications

### MEASUREMENT

<b>Sensor Type Used</b>	3E/F
<b>Filter</b>	To remove SO <sub>x</sub> /NO <sub>x</sub> and H <sub>2</sub> S
<b>Output</b>	4-20 mA d.c.
<b>Response Time (T<sub>90</sub>)</b>	<30 Seconds at 20°C
<b>Resolution</b>	0.5 ppm
<b>Zero Shift (-20°C to +40°C)</b>	<9 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Power Supply Required</b>	10 - 35 VDC single-ended
<b>Output Impedance</b>	10 MΩ
<b>Calibration</b>	Via built-in span and zero potentiometers

### MECHANICAL

<b>Mounting</b>	Via mounting nose supplied
<b>Weight</b>	58 g including mounting accessory
<b>Position Sensitivity</b>	None

### ENVIRONMENTAL

<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Temperature Compensation</b>	None
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.020 ± 0.008 % signal/mBar
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

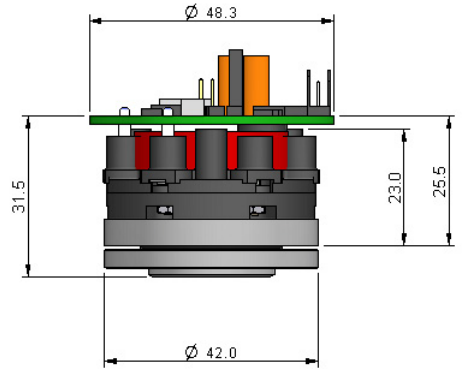
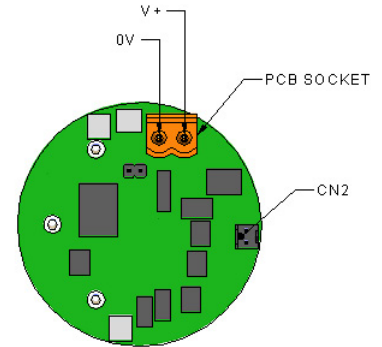
### LIFETIME

<b>Long Term Sensitivity Drift</b>	<5% signal loss/year
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

### IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology 4-20mA transmitters, please refer to OP-12.

## Product Dimensions



All dimensions in mm

All tolerances ±0.15 mm unless otherwise stated

## RANGES AVAILABLE

3E/F CiTiceL 4-20 mA Transmitters are available with the following precalibrated ranges, and can be recalibrated to intermediate ranges.

Range	Order Code
0-50 ppm	TB7E-1A
0-100 ppm	TB7F-1A
0-200 ppm	TB7G-1A
0-300 ppm	TB7H-1A
0-500 ppm	TB7I-1A
0-1000 ppm	TB7J-1A
0-2000 ppm	TB7K-1A

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used (ppm)</b>	<b>3E/F (ppm CO)</b>
Hydrogen Sulfide, H <sub>2</sub> S	15	≈ 1
Sulfur Dioxide, SO <sub>2</sub>	5	0
Nitric Oxide, NO	35	<3.5
Nitrogen Dioxide, NO <sub>2</sub>	5	0
Chlorine, Cl <sub>2</sub>	1	0
Hydrogen, H <sub>2</sub>	100	<60
Hydrogen Cyanide, HCN	10	0
Hydrogen Chloride, HCl	5	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	100	<75

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time

## Key Features & Benefits:

- Robust 3-Series packaging
- Industry standard 4-20 mA output

## Technical Specifications

### MEASUREMENT

<b>Sensor Type Used</b>	3F/F
<b>Filter</b>	To remove acid gases
<b>Output</b>	4-20 mA d.c.
<b>Response Time (T<sub>90</sub>)</b>	<30 Seconds at 20°C
<b>Resolution</b>	1 ppm
<b>Zero Shift (-20°C to +40°C)</b>	<20 ppm equivalent
<b>Repeatability</b>	1% of signal
<b>Linearity</b>	Linear

### ELECTRICAL

<b>Power Supply Required</b>	10 - 35 VDC single-ended
<b>Output Impedance</b>	4 MΩ
<b>Calibration</b>	Via built-in span and zero potentiometers

### MECHANICAL

<b>Mounting</b>	Via mounting nose supplied
<b>Weight</b>	58 g including mounting accessory
<b>Position Sensitivity</b>	None

### ENVIRONMENTAL

<b>Operating Temperature Range</b>	-20°C to +50°C
<b>Recommended Storage Temp</b>	0°C to 20°C
<b>Temperature Compensation</b>	None
<b>Operating Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.007 ± 0.003% signal/mBar
<b>Operating Humidity Range</b>	15 - 90% RH non-condensing

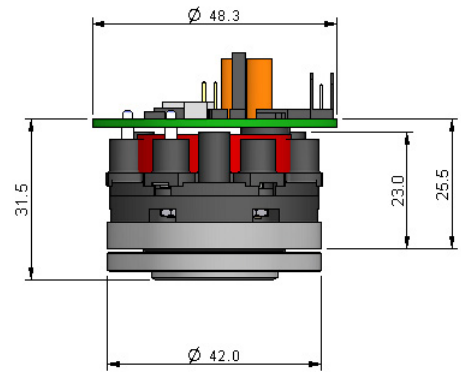
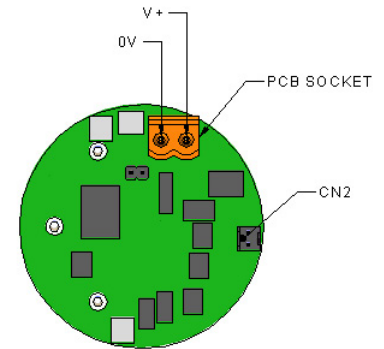
### LIFETIME

<b>Long Term Sensitivity Drift</b>	<2% signal loss/month
<b>Expected Operating Life</b>	Three years in air
<b>Storage Life</b>	6 months in CTL container
<b>Standard Warranty</b>	12 months from date of despatch

### IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology 4-20mA transmitters, please refer to OP-12.

## Product Dimensions



All dimensions in mm

All tolerances ±0.15 mm unless otherwise stated

## RANGES AVAILABLE

3F/F CiTiceL 4-20 mA Transmitters are available with the following precalibrated ranges, but can be recalibrated to intermediate ranges.

Range	Order Code
0-500 ppm	TBAI-1A
0-1000 ppm	TBAJ-1A
0-2000 ppm	TBAK-1A
0-3000 ppm	TBAL-1A
0-4000 ppm	TBAM-1A
0-10000 ppm	TBAN-1A
0-20000 ppm	TBAO-1A

## **Poisoning**

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react. The figures are expressed as a percentage of the primary sensitivity (i.e. CO = 100%).

<b>Gas</b>	<b>3FF (%)</b>
Carbon Monoxide, CO	100
Hydrogen Sulfide, H <sub>2</sub> S	0
Sulfur Dioxide, SO <sub>2</sub>	0
Nitric Oxide, NO	0
Nitrogen Dioxide, NO <sub>2</sub>	0
Hydrogen, H <sub>2</sub>	<60 <sup>1</sup>
Hydrogen Chloride, HCl	0
Ethylene, C <sub>2</sub> H <sub>4</sub>	<10

Note 1 : For applications where a hydrogen compensated output is required, the A3E/D CiTiceL should be used

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

### **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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time



## Key Features & Benefits:

- Industry leading reliability
- Improved performance variability

## Technical Specifications

### MEASUREMENT

<b>Operating Principle</b>	3-electrode electrochemical
<b>Measurement Range</b>	0-500 ppm CO
<b>Maximum Overload</b>	2000 ppm CO
<b>Filter</b>	To remove acid gases and hydrocarbons
<b>Sensitivity</b>	0.07 ± 0.015 µA/ppm
<b>Response Time (T<sub>90</sub>)</b>	< 20 Seconds
<b>Baseline Offset (clean air)</b>	< ±2 ppm equivalent
<b>Zero Shift (-40°C to +50°C)</b>	< +12 ppm equivalent
<b>Repeatability</b>	< ±3%
<b>Linearity</b>	Within ±5%

### ELECTRICAL

<b>Recommended Load Resistor</b>	5 Ω
<b>Bias Voltage</b>	Not required

### MECHANICAL

<b>Housing Material</b>	Noryl 110
<b>Weight</b>	5 g (nominal)
<b>Orientation</b>	Any

### ENVIRONMENTAL

<b>Typical Applications</b>	Portable life safety
<b>Operating Temperature Range:</b>	
Continuous	-20°C to +40°C
Intermittent	-40°C to +55°C
<b>Operating Pressure Range</b>	1 atm ± 10%
<b>Operating Humidity Range:</b>	
Continuous	15% to 90% RH non-condensing

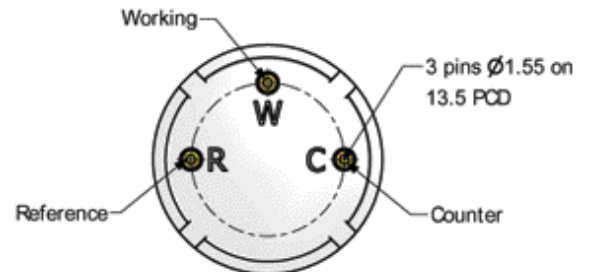
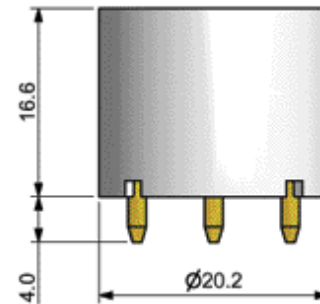
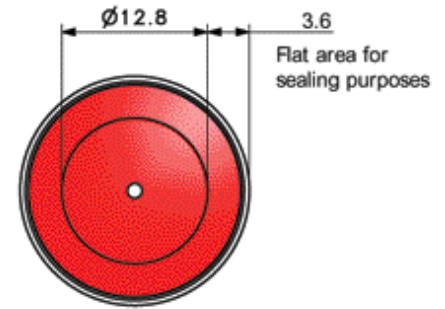
### INTRINSIC SAFETY DATA

<b>Maximum at 2000 ppm</b>	0.2 mA
<b>Maximum o/c Voltage</b>	1.3 V
<b>Maximum s/c Current</b>	<1.0 A

### LIFETIME

<b>Long Term Output Drift</b>	< 5% per annum
<b>Recommended Storage Temp</b>	10°C to +30°C
<b>Expected Operating Life</b>	2 years in air
<b>Storage Life</b>	6 months in original packaging
<b>Standard Warranty</b>	18 months from date of despatch

## Product Dimensions



All dimensions in mm  
All tolerances ±0.15mm  
unless otherwise stated

**IMPORTANT NOTE:** All performance data is based on conditions at 20°C, 50%RH and 1 atm, using City Technology recommended circuitry.

Sensor performance is temperature dependant. For sensor performance at temperatures other than 20°C, please contact City Technology.

# Product Data Sheet

## Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments, and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

## Cross Sensitivity Table

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

Gas	Concentration Used (ppm)	Reading (ppm CO)
Carbon Monoxide	50	50
Hydrogen Sulfide	20	<5
Sulphur Dioxide	20	<5
Nitrogen Dioxide	20	$-5 \leq X \leq 0$
Nitric Oxide	50	<25
Chlorine	0.5	0
Hydrogen	200	~25
Ethylene	100	100
Carbon Dioxide	5000	0
Ammonia	50	0
Methanol	200	0

**Note:** The figures in this table are typical values and should not be used as a basis for cross calibration. Cross sensitivities may not be linear and should not be scaled. All data based on a 5 minute gassing. For some cross interferences break through will occur if gas is applied for a longer time period.

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

**WARNING:** By the nature of the technology used, any electrochemical or catalytic bead sensor can potentially fail to meet specification without warning. Although City Technology makes every effort to ensure the reliability of our products of this type, where life safety is a performance requirement of the product, and we recommend that all sensors and instruments using these sensors are checked for response to gas before use

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



# A5F+ CiTiceL<sup>®</sup>

## Performance Characteristics

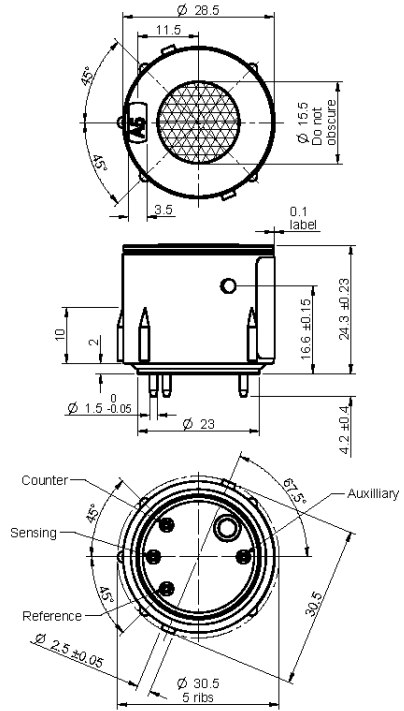
<b>Nominal Range</b>	0-10,000 ppm
<b>Maximum Overload</b>	20,000 ppm
<b>Internal Filter Life</b>	>275,000 ppm hours (900 ppm NO @ 200 ml/min)
<b>Auxiliary Electrode</b>	To compensate for maximum 2,000 ppm H <sub>2</sub> cross- interference.
<b>Expected Operating Life</b>	Three years in air
<b>Output Signal</b>	60 ± 20 nA/ppm
<b>Resolution</b>	1 ppm
<b>Temperature Range</b>	-20°C to +50°C
<b>Pressure Range</b>	Atmospheric ± 10%
<b>Pressure Coefficient</b>	0.010% signal/mbar
<b>T<sub>90</sub> Response Time</b>	< 30 seconds
<b>Relative Humidity Range</b>	15 to 90% non-condensing
<b>Typical Net Baseline Range (pure air)</b>	-2 to +17 ppm equivalent
<b>Maximum Net Zero Shift (+20°C to +40°C)</b>	5 ppm CO equivalent
<b>Long Term Output Drift</b>	<2% signal loss/month
<b>Recommended Load Resistor</b>	10Ω
<b>Bias Voltage</b>	0mV or +250mV
<b>Repeatability</b>	<1% of signal
<b>Output Linearity</b>	Linear

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

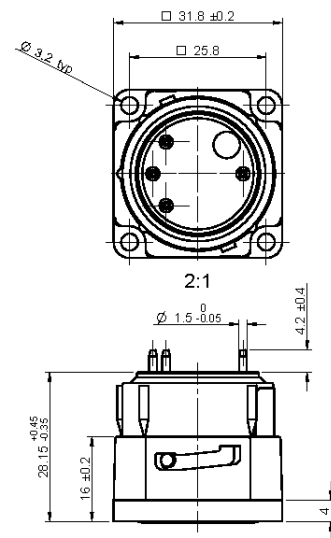
## Physical Characteristics

<b>Colour Coding</b>	Red
<b>Weight</b>	13g
<b>Position Sensitivity</b>	None
<b>Storage Life</b>	Six months in CTL container
<b>Recommended Storage Temperature</b>	0-20°C
<b>Warranty Period</b>	12 months from date of despatch

### Outline Sensor Dimensions



### With Bayonet Fitting



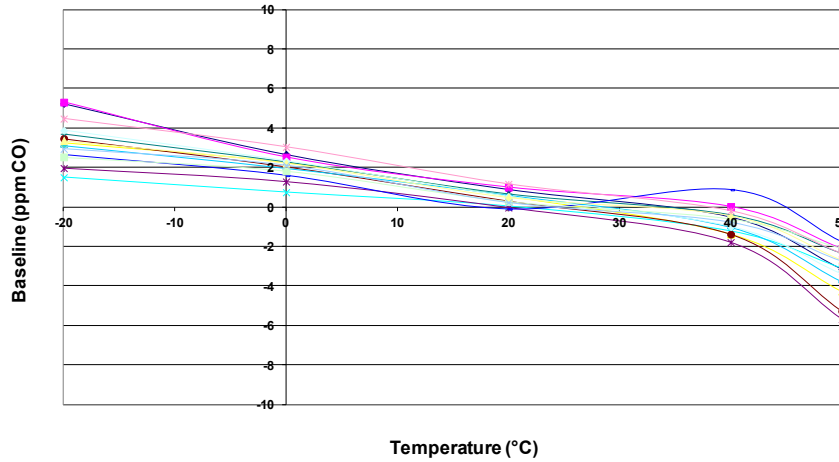
All tolerances ±0.15mm unless otherwise



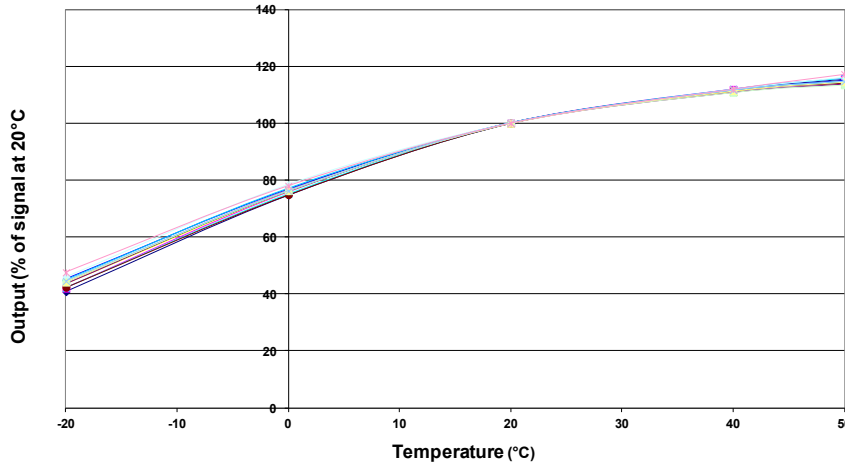
# Carbon Monoxide CiTiceL<sup>®</sup> Specification



A5F CiTiceL - Typical Baseline vs Temperature



A5F CiTiceL - Typical Output vs Temperature



## Cross-sensitivity Data

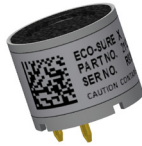
CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. The table below shows the typical response of A5F+ sensors to a number of common cross-interfering gases. The figures are expressed as a percentage of the primary sensitivity (i.e. nitric oxide = 100%).

Gas	Response	Gas	Response
Hydrogen sulphide:	0	Hydrogen:	<1 (see note)
Sulphur dioxide:	0	Hydrogen chloride:	5
Nitric oxide:	0	Nitrogen dioxide:	0

\*\* For details of other possible cross-interfering gases contact City Technology.\*\*  
**Note:** Cross-sensitivity to H2 <1% after compensation

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



- Features:**  
**10 Year Warranted Life**  
**Stable Performance**  
**UL Certified - UL2075**

## Technical Specifications

### MEASUREMENT

<b>Operating Principle</b>	2-electrode electrochemical
<b>Measurement Range</b>	0-500 ppm CO
<b>Maximum Overload</b>	1000 ppm CO
<b>Sensitivity</b>	40 - 60 nA/ppm
<b>Response Time (T90)</b>	<30 seconds
<b>Baseline Offset (clean air)</b>	-2 to 4 ppm equivalent
<b>Zero Shift* (-10°C to +50°C)</b>	< +10 ppm equivalent
<b>Repeatability</b>	< ±5%
<b>Linearity</b>	Within ±5%

### ELECTRICAL

<b>Recommended Load Resistor</b>	5 Ω
<b>Bias Voltage</b>	Not required

### MECHANICAL

<b>Housing Material</b>	Noryl N110
<b>Weight</b>	5 g (nominal)
<b>Orientation</b>	Any

### ENVIRONMENTAL

<b>Operating Temperature Range*:</b>	
Continuous	-10°C to +50°C
Intermittent	-20°C to +50°C
<b>Operating Pressure Range</b>	1 atm ± 10%
<b>Operating Humidity Range*:</b>	
Continuous	15% to 90% RH non-condensing
Intermittent	0% to 99% RH non-condensing

### INTRINSIC SAFETY DATA\*

<b>Maximum at 1000ppm</b>	0.1 mA
<b>Maximum o/c Voltage</b>	1.3 V
<b>Maximum s/c Current</b>	<1.0 A

### LIFETIME

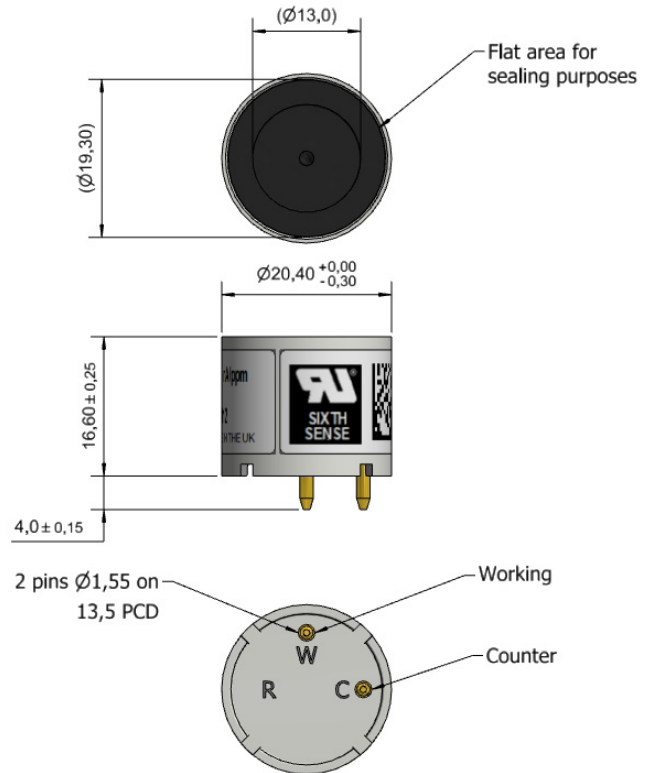
<b>Long Term Output Drift</b>	< 5% per annum
<b>Recommended Storage Temp</b>	+10°C to +30°C
<b>Expected Operating Life*</b>	> 10 years in normal use from date of manufacture
<b>Storage Life</b>	6 months in original packaging
<b>Warranty Period</b>	10 years from date of despatch

All measurements were taken at 20°C and 50% rH at 1 atm pressure unless otherwise indicated. The performance data detailed in this document refers to new sensors.

Sensor performance is temperature dependant. For sensor performance at temperatures other than 20°C, please contact City Technology.

With the exception of items marked \* the stated parameters have been verified under the UL component recognition programme.

## Product Dimensions



All dimensions in mm

All tolerances ±0.15 mm

unless otherwise stated

### Available Options

ECOSURE X is available with or without shorting spring fitted. For further information regarding the shorting spring, please refer to the Operating Principles

Option	Order Code
Without Shorting Spring	2112B3001
With Shorting Spring	2112B3001B

## **Poisoning**

ECOSURE X is designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments, and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the sensor as the solvent may cause crazing of the plastic.

## **Cross Sensitivity Table**

Whilst ECOSURE X is designed to be highly specific to carbon monoxide, it will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

<b>Gas</b>	<b>Concentration Used (ppm)</b>	<b>Exposure Time (mins)</b>	<b>Reading (ppm CO)</b>
Carbon Monoxide	100	5	100
Hydrogen Sulfide	25	5	0
Sulfur Dioxide	50	600	<0.5
Nitrogen Dioxide	50	900	-1
Nitric Oxide	50	5	8
Chlorine	2	5	0
Hydrogen	100	5	20
Carbon Dioxide	5000	5	0
Ammonia	100	5	0
Ethanol	2000	30	5
Iso-Propanol	200	120	0
Acetone	1000	5	0
Acetylene	40	5	80

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

**WARNING:** By the nature of the technology used, any electrochemical or catalytic bead sensor can potentially fail to meet specification without warning. Although City Technology makes every effort to ensure the reliability of our products of this type, where life safety is a performance requirement of the product, and where practical we recommend that all sensors and instruments using these sensors are checked for response to gas before use

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



**特征：**  
 长效使用寿命  
 稳定性能  
 UL认证-UL2075

**应用：**  
 家庭住宅  
 火情检测  
 通风控制

### 技术参数

#### 测量参数

测量原理	2电极电化学
测量范围	0-500 ppm CO
最大超程	1000 ppm CO
灵敏度	0.045 ± 0.015 μA/ppm
响应时间(T90)	< 30 s
基线偏移(干净空气)	-2 到 4 ppm
零点漂移(-10 到50 )	< +10 ppm
重复性	< ±5%
线性度	±5%内

#### 电参数

建议负载电阻	5
偏置电压	无要求

#### 物理参数

外壳材料	改性聚苯醚
重量	5 g
方向	任意

#### 使用参数

工作温度范围	
持续	-10 到 50
短暂	-20 到 50
工作压力范围	标准大气压 ± 10%
工作湿度范围	
持续	15% 到 90%RH 非冷凝
短暂	0% 到 99%RH 非冷凝

#### 内在安全数据

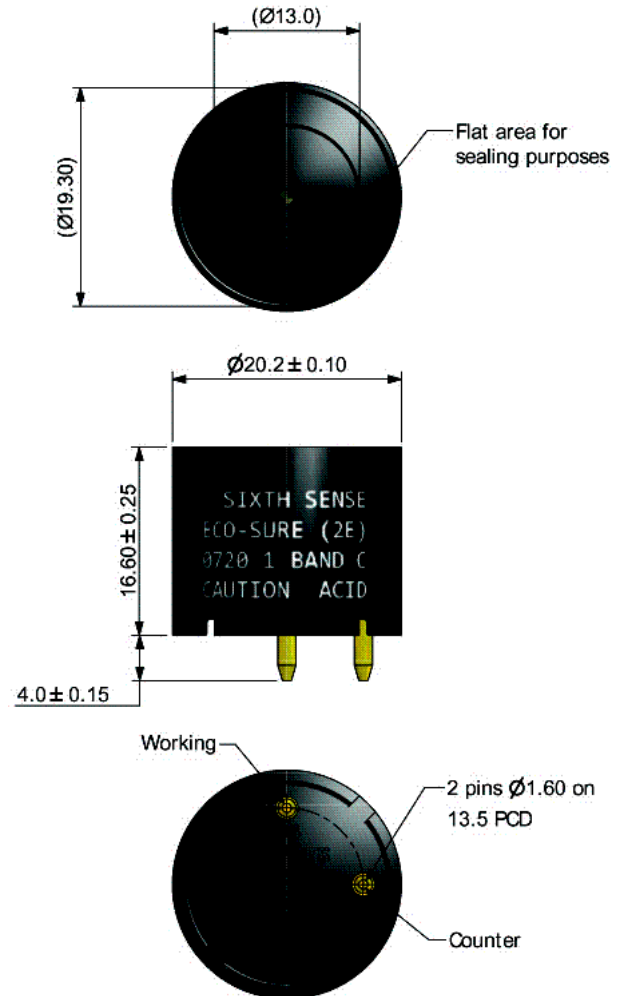
1000ppm最大值	0.1mA
最大o/c电压	1.3V
最大s/c电流	< 1.0A

#### 使用寿命

长期输出漂移	< 5%/年
建议保存温度	10 到 30
预期使用寿命	> 6年 自生产日期起，常规应用中。

保存期	6个月 密封包装
质量担保期	长达60个月

### 产品尺寸



所有尺寸单位均为mm  
 允许误差 ± 0.15mm

文档中性能参数对应的是新传感器，所有测量均在一个大气压下，20 和50%RH条件下进行，除非特殊说明。

传感器性能与温度有关，需解除20 外更多有关传感器性能，请联系城市技术公司。

## 毒性

CiTiceLs是针对大范围和严苛的使用环境条件而设计，但不管是在保存和使用的过程中，都须避免暴露于高浓度腐蚀性蒸汽中。在将传感器用到印刷电路板上时，应该做到在安装前使用脱脂剂。请勿直接在CiTiceLs上或近旁进行使用黏胶，避免对塑料造成损伤。

## 交叉灵敏度

尽管CiTiceLs都是为测量特定气体而设计，但在一定程度上它们仍旧会对其他气体产生响应。下表并不完全，其他未在表中列出的气体也可能会与传感器进行反应。

气体	使用浓度(ppm)	暴露时间(分钟)	读数(ppm CO)
一氧化碳	100	5	100
硫化氢	25	5	0
二氧化硫	50	600	<0.5
一氧化氮	50	900	-1
二氧化氮	50	5	8
氯气	2	5	0
氢气	100	5	20
二氧化碳	5000	5	0
氨气	100	5	0
乙醇	2000	30	5
异丙醇	200	120	0
丙酮	1000	5	0
乙炔	40	5	80

表中交叉灵敏度所引用的数据基于少量的传感器测试所得，目的在于说明传感器并非只对目标气体产生响应。传感器在不同环境条件下具有明显的差异性，并且任何批次的传感器都可能与表中所引用的数据显著不同。

### 警告：

由于测量原理上的原因，任何电化学或催化燃烧传感器，都会潜在出现达不到预定参数的情况且无任何警示。我们建议所有传感器和仪器请在使用前，检查其是否能正常工作。

本档在进行编写时已尽可能确保其准确性。根据本公司产品后续改进提升相关条例，城市技术有权在不通知用户的情况下，对产品做出修改。文档中信息仅供用户参考，而非售卖品。任何因使用该文档信息或因文档信息遗漏和错误而造成的财产损失、人身伤害和损毁，本公司概不承担。因更新或测试的因素，产品参数会与文档中有所出入。鉴于产品所使用的场合可能超出城市技术能力所及，因此，我们不能对这些与之相关的应用进行担保。产品的可用性及操作过程中的安全性须由用户自行测试后决策。

**主要特征&优势**

- 行业领先的可靠性
- 性能提升的变动性

**技术规格**
**测量参数**

测量原理	3电极电化学
测量范围	0-1000 ppm
最大超程	2000 ppm
过滤器	去除酸性气体和碳氢化合物
灵敏度*	0.07 ± 0.015 μA/ppm
响应时间(T <sub>90</sub> )*	< 20 s
基线偏移(干净空气)*	< ± 2 ppm
零点漂移(-40 到 50 )*	< +12 ppm
重复性*	< ± 3%
线性度*	± 5%以内

**电参数**

建议负载电阻	5
偏置电压	无要求

**物理参数**

外壳材料	改性聚苯醚110
重量	5 g
方向	任意

**使用参数**

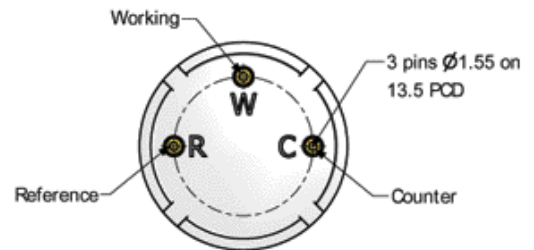
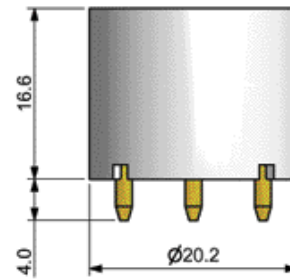
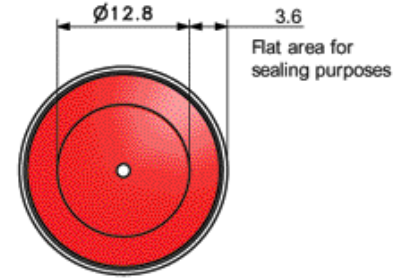
典型应用	便携式生命安全
工作温度范围:	
持续	-20 到 40
间歇	-40 到 55
工作压力范围	1个大气压 ± 10%
工作湿度范围:	
持续	15% 到 90% RH 非冷凝

**内在安全数据**

2000ppm最大值	0.2 mA
最大o/c电压	1.3 V
最大s/c电流	< 1.0 A

**使用寿命**

长期输出漂移*	< 5%/年
建议保存温度	10 到 30
预期使用寿命	空气中2年
保存期	原包装6个月
质量担保期	发货后起18个月

**产品尺寸**


所有尺寸单位为mm

允许误差范围 ± 0.15mm, 除非特殊说明。

**重要提示：** 所有性能参数基于使用城市技术推荐测量电路，在20 °C, 50%RH和1个大气压下测得。

传感器性能与温度密切相关，了解除20 °C外更多传感器参数请联系城市技术。

带\*参数在20 °C, 50%RH和1013mbar压力下有效，并使用城市技术推荐测量电路。文档中展示的是传感器最初三个月的性能参数，逾期输出信号会低于最低水平。

# Product Data Sheet

# DRAFT

## 毒性

CiTiceLs是针对大范围和严苛的使用环境条件而设计，但不管是在保存和使用的过程中，都须避免暴露于高浓度腐蚀性蒸汽中。在将传感器用到印刷电路板上时，应该做到在安装前使用脱脂剂。请勿直接在CiTiceLs上或近旁进行使用黏胶，避免对塑料造成损伤。

## 交叉灵敏度

尽管CiTiceLs都是为测量特定气体而设计，但在一定程度上它们仍旧会对其他气体产生响应。下表并不完全，其他未在表中列出的气体也可能与传感器进行反应。

**重要提醒：**下表所展示的交叉灵敏度数据并非产品参数规格的一部分，仅供用户参考而已。表中所引用的数据基于少数传感器测试所得，并且每一批次可能存在比较大的差异性。在绝大多数的精确测量中，仪器/设备都须采用调查过气体进行校准。

气体	使用浓度(ppm)	读数(ppm CO)
氨气, NH <sub>3</sub>	50	0
二氧化碳, CO <sub>2</sub>	5000	0
一氧化碳, CO	50	50
氯气, Cl <sub>2</sub>	0.5	0
乙烯, C <sub>2</sub> H <sub>4</sub>	100	100
氢气, H <sub>2</sub>	200	~25
硫化氢, H <sub>2</sub> S	20	<5
甲醇, CH <sub>3</sub> OH	200	0
二氧化氮, NO <sub>2</sub>	20	-5 ≤ X ≤ 0
一氧化氮, NO	50	<25
二氧化硫, SO <sub>2</sub>	20	<5

### 安全提示！

本传感器是针对重要安全应用而设计。为确保该传感器或用了该传感器的设备/仪器能正常工作，请务必在使用前用目标气体进行测试。未能依照规定进行测试，可能会危及人员、财产安全。

本文档在进行编写时已尽可能确保其准确性。根据本公司产品后续改进提升相关条例，城市技术有权在不通知用户的情况下，对产品做出修改。文档中信息仅供用户参考，而非售卖品。任何因使用该文档信息或因文档信息遗漏和错误而造成的财产损失、人身伤害和损毁，本公司概不承担。因更新或测试的因素，产品参数会与文档中有所出入。鉴于产品所使用的场合可能超出城市技术能力所及，因此，我们不能对这些与之相关的应用进行担保。产品的可用性及操作过程中的安全性须由用户自行测试后决策。



一氧化碳低氢传感器 0-500 ppm

**特性指标**

产品型号	CLE-0052-403
正常检测范围	0-500 ppm
最大检测浓度	2000 ppm
灵敏度	0.065±0.015 $\mu$ A/ppm
底电流 (20 °C)	< $\pm$ 0.2 $\mu$ A
基线漂移(-20 至 50 °C)	相当于 0 - 3 ppm CO
分辨率	1 ppm
响应时间(T <sub>90</sub> )	≤30 秒
线性度	线性
长期稳定性	<2% 信号值/月

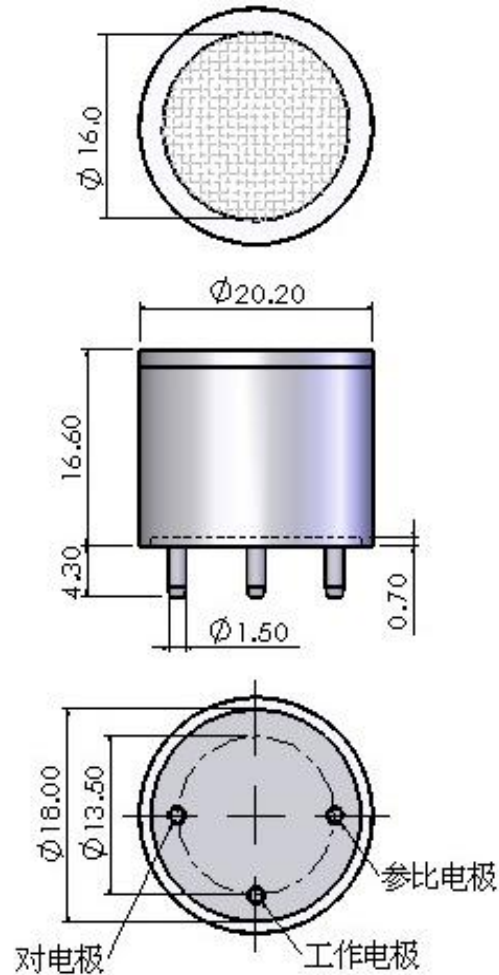
**工作条件**

工作温度	-20 - 50°C
工作湿度	15 - 90%RH (无冷凝)
工作压力	80 - 120 kPa
偏压	0 mV
储存时间	6 个月 (密封包装盒中)
储存温度	0 - 20°C
使用寿命	空气中 3 年
质保期	交货后 18/36 个月

**物理指标**

重量	约 5 克
方位要求	无

**外形尺寸**

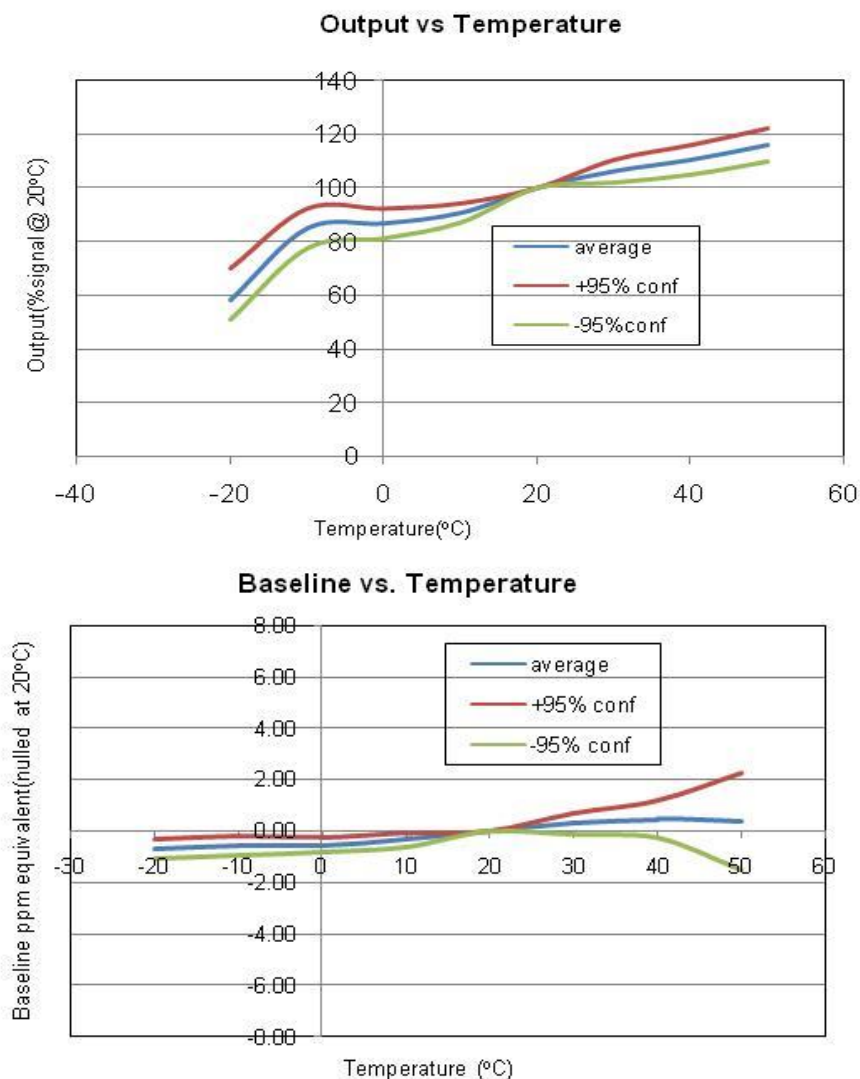


尺寸单位为mm  
默认公差为±0.20mm

注：所有性能指标在以下条件下测试：20°C, 50% RH and 1 atm (1013 mBar)

注：建议以 PCB 插座连接传感器针脚。禁止焊接传感器针脚。

温度影响



交叉灵敏度 (20 °C)

气体种类	浓度 (ppm)	输出信号 (相当于 CO 浓度, ppm)
硫化氢	24	0
二氧化硫	5	0
一氧化氮	25	-8 ~ 0
二氧化氮	5	0
氯气	10	-1 ~ 0
氢气	100	<8
乙烯	100	<16

使用须知

1. 以上所有性能规格都是在环境条件：温度 20 °C, 相对湿度 50% RH, 一个大气压 (100 kPa 或环境压力) 下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定, 我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动, 并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体, 该传感器有可能对其他气体有响应。

## 一氧化碳传感器 0-500 ppm

### 性能表征

产品型号	CLE-0052-400
量程	0 to 500 ppm
最大荷载	2000 ppm
灵敏度	$0.070 \pm 0.015 \mu\text{A/ppm}$
基线 (20 °C)	$< \pm 0.2 \mu\text{A}$
基线漂移 (-20 to 40 °C)	相当于 0 to 3 ppm
分辨率	1 ppm
响应时间 (T <sub>90</sub> )	≤ 30 秒
线性度	线性
长期稳定性	< 2% 信号值/月

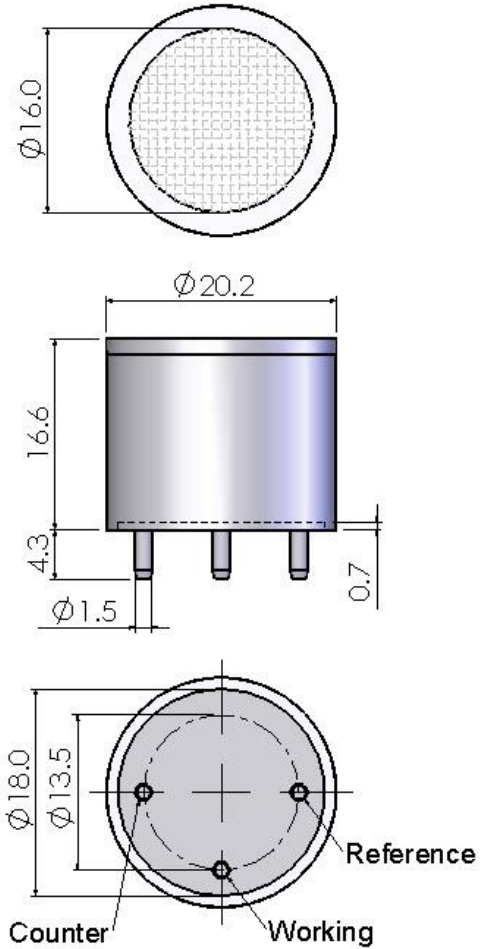
### 工作条件

工作温度	-20 °C to 50 °C
工作湿度	15 to 90 %RH (无冷凝)
工作压力	90 to 110 kPa
偏压	0 mV
储存时间	6 个月 (专用包装盒中)
储存温度	0 °C to 20 °C
使用寿命	空气中 2 年
质保期	交货后 18 个月

### 物理性能

重量	约 5 g
方位要求	无

### Outline Dimensions

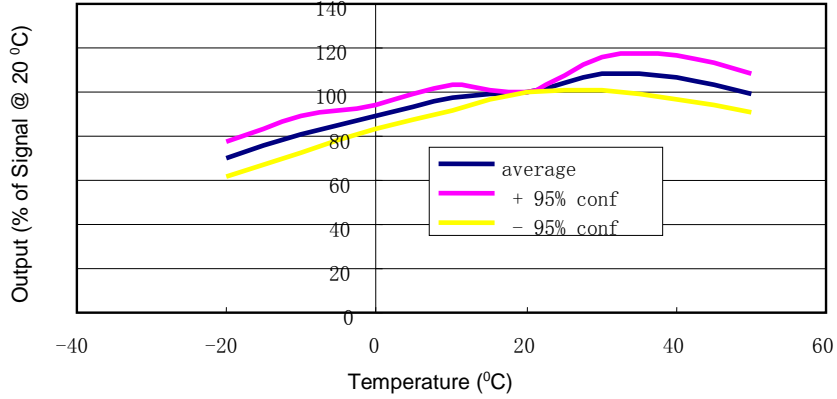


All dimensions are in millimeters.  
All tolerances are  $\pm 0.2\text{mm}$ .

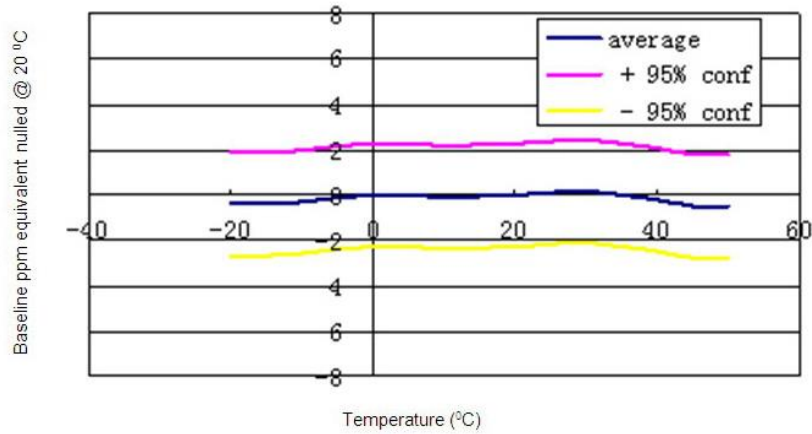
**Note:** 推荐使用 PCB 插座来连接传感器，焊接会损害传感器。

**温度影响**

**Output vs Temperature**



**Baseline vs Temperature**



**交叉灵敏度**

气体	浓度 (ppm)	输出信号 (相当于 ppm CO)
硫化氢	24	0
二氧化硫	5	0
氯气	10	0 ~ 1
一氧化氮	25	0
二氧化氮	5	0
氢气	100	40
乙烯	100	16

**使用须知**

1. 以上所有性能规格都是在环境条件：温度 20 °C, 相对湿度 50% RH, 一个大气压（100 kPa 或环境压力）下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动，并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体，该传感器有可能对其他气体有响应。

## 一氧化碳传感器 0-500 ppm

### 性能表征

产品型号	CLE-0052-300
量程	0 - 500 ppm
最大负载	1500 ppm
灵敏度	0.08 ± 0.02 μA/ppm
基线 (20 °C)	< ±0.2 μA
基线漂移 (-20 to 50 °C)	相当于 0 to 3 ppm CO
分辨率	1 ppm
响应时间 (T90)	≤ 30 秒
线性度	线性
长期稳定性	<2%信号值/月

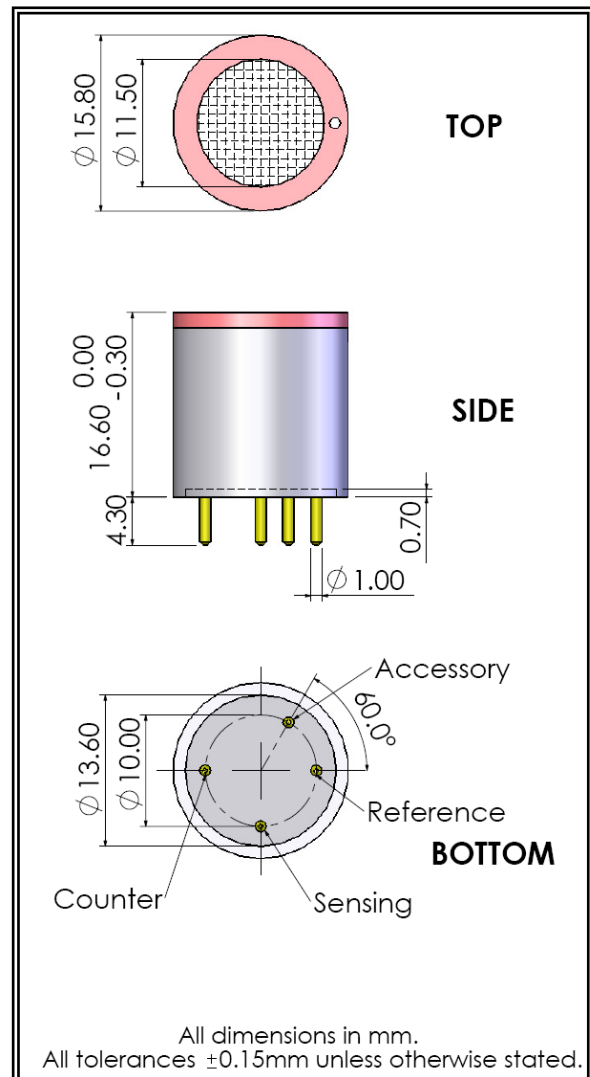
### 工作条件

工作温度	-20°C to 50°C
工作湿度	15 to 90 %RH (无冷凝)
工作压力	90 to 110 kPa
偏压	0 mV
存储时间	6 个月 (专用包装盒中)
存储温度	0°C to 20°C
使用寿命	空气中 2 年
质保期	交货后 18/36 个月

### 物理性能

重量	约 3 g
方位要求	无

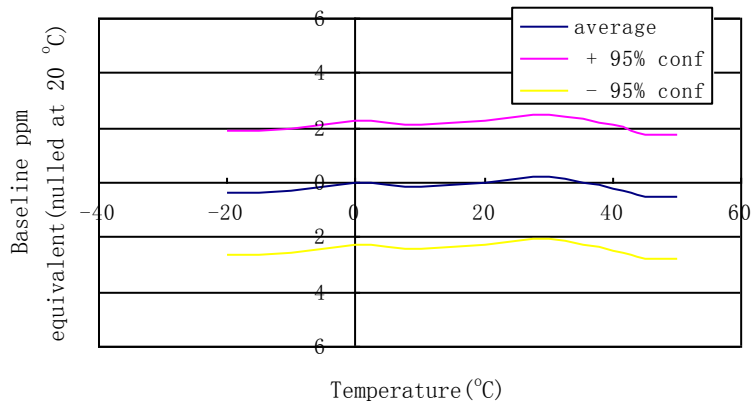
### Outline Dimensions



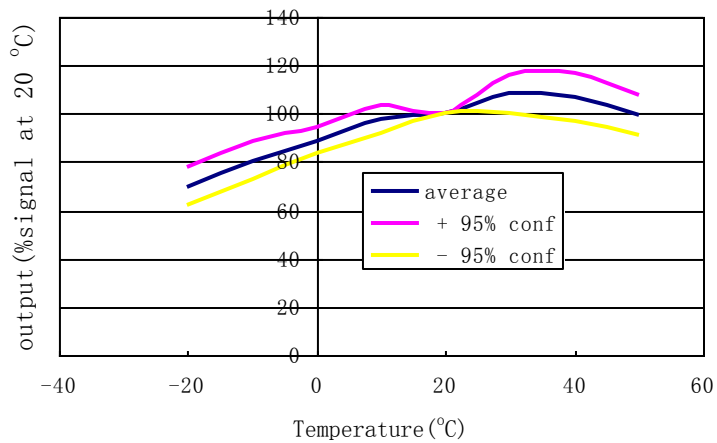
**Note:** 推荐使用 PCB 插座来连接传感器，焊接会损害传感器。

## 温度影响

3CO-500-Baseline vs. Temperature



3CO-500-Sensitivity temperature dependence



## 交叉灵敏度

气体	浓度 (ppm)	输出信号 (相当于 ppm CO)
硫化氢	15	1
二氧化硫	5	0
一氧化氮	35	<3
二氧化氮	5	-1 ~ 0

## 使用须知

1. 以上所有性能规格都是在环境条件：温度 20 °C, 相对湿度 50% RH, 一个大气压 (100 kPa 或环境压力) 下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动，并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体，该传感器有可能对其他气体有响应。

## 一氧化碳传感器 0-1000 ppm

### 性能表征

产品型号	CLE-0013-700
量程	0 to 1000 ppm
最大荷载	2000 ppm
灵敏度	0.085 ± 0.025 μA/ppm
基线 (20 °C)	< ±0.2 μA
基线漂移 (-20 to 50 °C)	相当于 0 to 3 ppm
分辨率	0.5 ppm
响应时间 (T90)	≤ 30 秒
线性度	线性
长期稳定性	< 2% 信号值/月

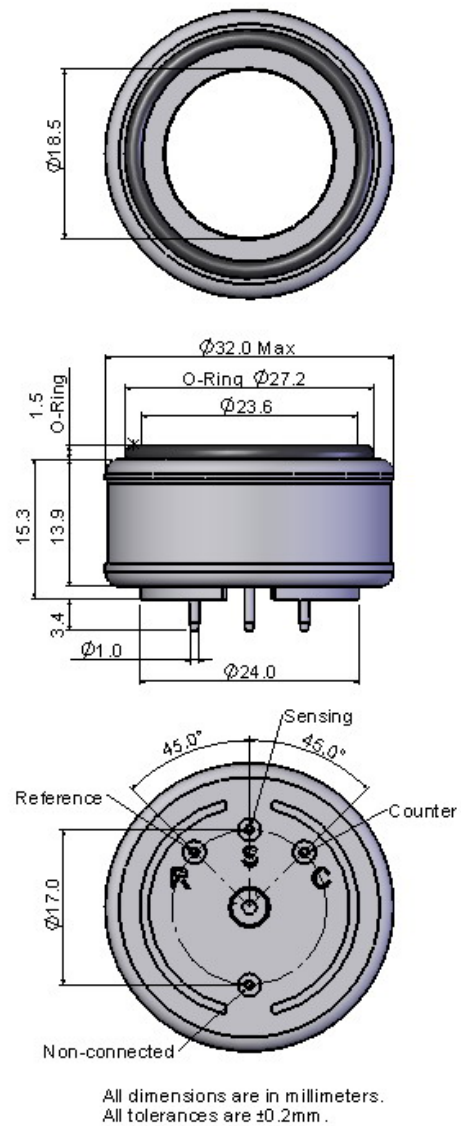
### 工作条件

工作温度	-20 °C to 50 °C
工作湿度	15 to 90%RH (无冷凝)
工作压力	90 to 110 kPa
偏压	0 mV
储存时间	6 个月 (专用包装盒中)
储存温度	0 °C to 20 °C
使用寿命	空气中 2 年
质保期	交货后 18 个月

### 物理性能

重量	约 8 克
方位要求	无

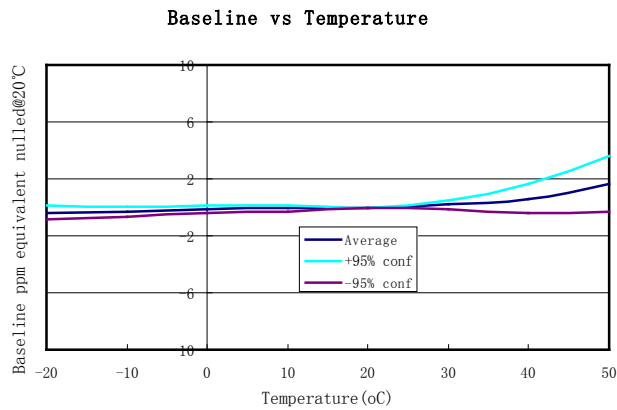
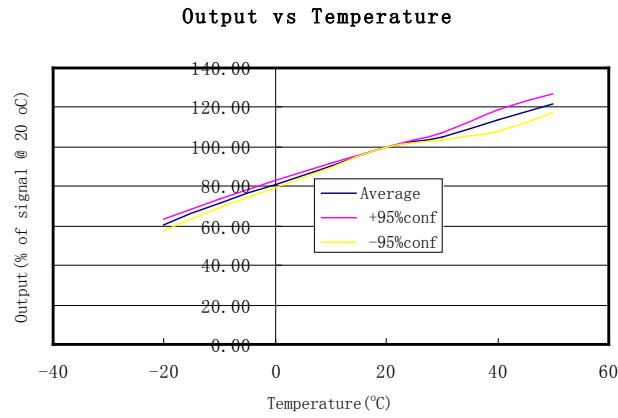
### Outline Dimensions



**Note:** 推荐使用 PCB 插座来连接传感器，焊接会损害传感器。



## 温度影响



## 交叉灵敏度 (20 °C)

气体	浓度 (ppm)	输出信号(相当于 ppm CO)
硫化氢	15	<0.3
二氧化硫	5	0
一氧化氮	35	≤7
二氧化氮	5	1.5
氯气	10	0 ~ 1
氢气	100	<60
乙烯	100	16

## 使用须知

1. 以上所有性能规格都是在环境条件：温度 20 °C, 相对湿度 50% RH, 一个大气压 (100 kPa 或环境压力) 下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定, 我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动, 并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体, 该传感器有可能对其他气体有响应。



# 2CF-3 CiTiceL<sup>®</sup>

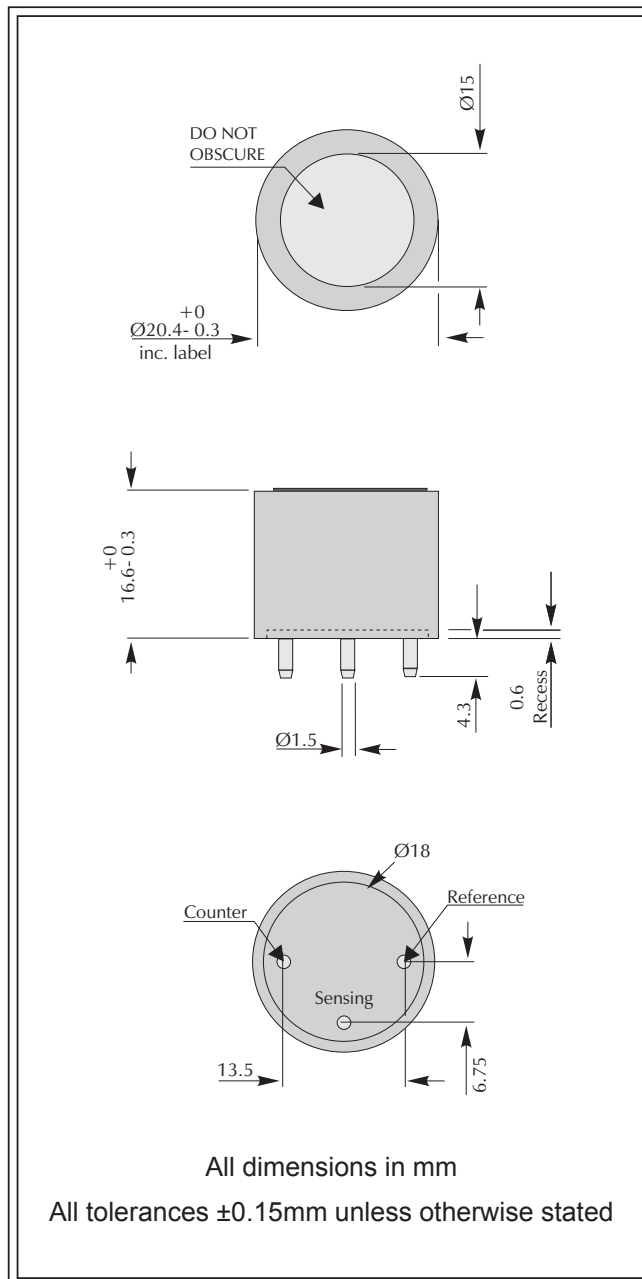
## Performance Characteristics

Nominal Range	0-500 ppm
Maximum Overload	1000 ppm
Expected Operating Life	Two years in air
Output Signal	50±20 nA/ppm
Inboard Filter	To remove SO <sub>2</sub> and H <sub>2</sub> S
Resolution	1ppm
Temperature Range	-20°C to +50°C
Pressure Range	Atmospheric ± 10%
T <sub>90</sub> Response Time	≤17 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	-1 to +3ppm equivalent
Maximum Zero Shift (+20°C to +40°C)	9ppm equivalent
Long Term Output Drift	<10% signal loss/year
Recommended Load Resistor	10 Ω
Bias Voltage	Not required
Repeatability	<3% of signal
Output Linearity	Linear

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

## Physical Characteristics

Weight	Approx 5g
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch



**IMPORTANT NOTE:** Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor.



## Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 2CF3 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).

<u>Gas</u>	<u>Conc</u>	<u>2CF3</u>
Hydrogen Sulphide	15ppm	-0.5ppm < x\$ < +0.5ppm
Sulphur Dioxide	5ppm	0ppm
Nitrogen Dioxide	5ppm	<0.5ppm
Hydrogen	100ppm	-5ppm < x\$ < +5ppm
Nitric Oxide	35ppm	12ppm
Ethylene	100ppm	60ppm

\*\*For details of other possible cross-interfering gases 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.

Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company's policy of continued product improvement City Technology Limited reserves the right to make product changes without notice. No liability is accepted for any consequential losses, injury or damage resulting from the use of this document or from any omissions or errors herein. The data is given for guidance only. It does not constitute a specification or an offer for sale. The products are always subject to a programme of improvement and testing which may result in some changes in the characteristics quoted. As the products may be used by the client in circumstances beyond the knowledge and control of City Technology Limited, we cannot give any warranty as to the relevance of these particulars to an application. It is the clients' responsibility to carry out the necessary tests to determine the usefulness of the products and to ensure their safety of operation in a particular application.

Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

# 1CO Sensor

Carbon Monoxide (CO) Gas Sensor  
Part Number: 2023B1010

## Document Purpose

The purpose of this document is to present the performance specification of the 1 Series 1CO carbon monoxide gas sensor.

This document should be used in conjunction with the 1CO Characterization Note, the Operating Principles (OP08) and the Product Safety Datasheet (PSDS 5).

To the best of City Technology's knowledge, the data provided in this document is more suitable when the sensor is used at 20°C, 50% rH and 1013 mBar for 3 months from the date of sensor manufacture. For guidance on sensor performance outside of these limits, please refer to the 1CO Characterization Note.

Output signal can drift below the lower limit over time. For guidance on the safe use of the sensor, please refer to the Operating Principles (OP08).



## KEY FEATURES & BENEFITS



Enables smaller instruments



Designed to meet global performance standards



Enhanced performance over an extended environmental range



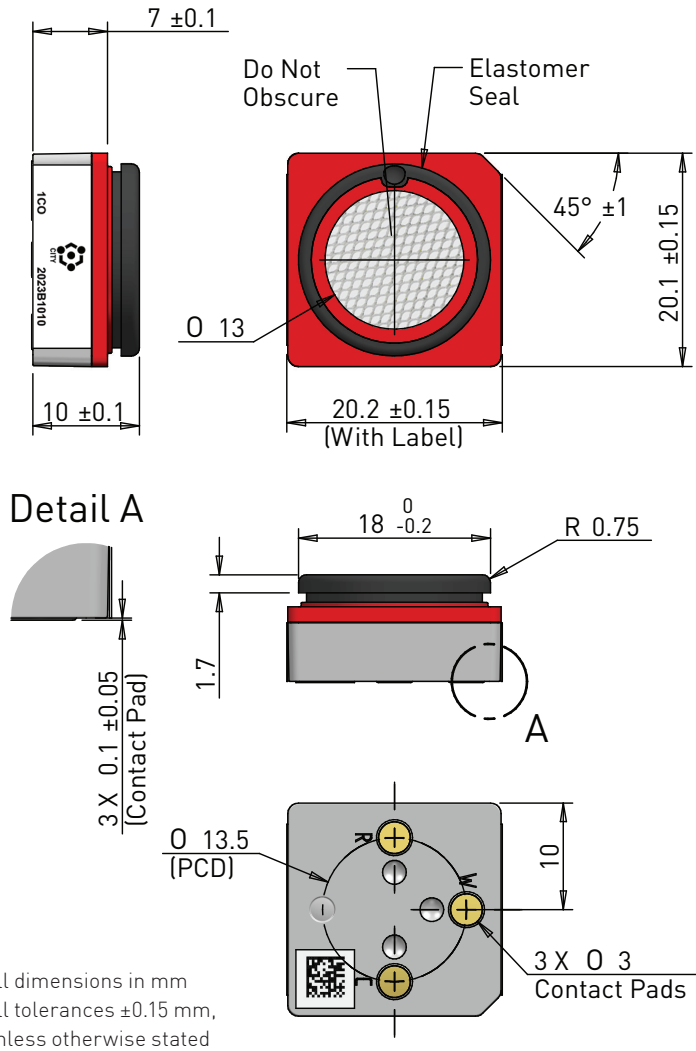
5-year life and warranty

**RoHS** 

RoHS compliant

TECHNICAL SPECIFICATIONS	
Measurement	
Technology	Electrochemical
Measurement Range	0.5 to 1000 ppm CO (EN45544 applications)
Maximum Overload	2000 ppm CO
Onboard Filter	To remove acid gases (see note on page 3)
Sensitivity*	50 ± 10 nA/ppm
T50 Response Time	< 15 seconds (@ 20°C) < 20 seconds (@ -40°C to +60°C)
T90 Response Time*	Typically < 20 seconds
Recovery Time from 2000 ppm to <40 ppm from 100 ppm to <2 ppm	< 180 seconds < 30 seconds
Baseline Offset* (in clean air)	< ±3 ppm CO equivalent
Baseline Shift -40°C to +60°C	< ±12 ppm CO equivalent
Repeatability*	< ±2% of measured value
Linearity*	Linear ± 5% (0 - 2000 ppm CO)
Electrical	
Recommended Load Resistor	5 - 10 Ω
Bias Voltage	No Bias
Mechanical	
Weight	< 5 g
Outer Plastic Body Material	Noryl N110
Sealing Gasket Material	TPU
Contact Material	Gold plated niobium
Orientation Sensitivity	None
Environmental	
Operating Temperature Range	-40°C to +60°C
Recommended Storage Temp	0°C to +20°C in sealed container
Operating Humidity Range	5% rH to 95% rH non- condensing (Refer to Characterization Note)
Operating Pressure Range	600 to 1200 mbar
Lifetime	
Storage Life	6 months in original packaging
Long Term Output Drift*	< 5% signal loss per annum
Expected Operating Life	5 years in air

## Product Dimensions



\* Specifications are more ideal when the sensor is used at 20°C, 50% rH and 1013 mBar, using City Technology recommended circuitry. Performance characteristics outline the performance of sensors supplied within the first 3 months. Output signal can drift below the lower limit over time.

## Filter Information

Activated carbon cloth filter with high surface area:

- Removes acid gases such as SO<sub>2</sub>, NO<sub>2</sub>, and H<sub>2</sub>S
- 25,000 ppm hours H<sub>2</sub>S filter capacity
- Protects from exposure to alcohol such as methanol, ethanol and IPA (<1000 ppm hours).

## Poisoning

Gas sensors are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapors is avoided, both during storage, fitting into instruments, and operation.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted.

Do not glue directly on or near the sensor as the solvent may cause crazing of the plastic.

### 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.

Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company's policy of continued product improvement City Technology reserves the right to make product changes without notice. The products are always subject to a programme of improvement and testing which may result in some changes in the characteristics quoted. As the products may be used by the client in circumstances beyond the knowledge and control of City Technology, we cannot give any warranty as to the relevance of these particulars to an application. City Technology warrants goods of its manufacture as being free of defective materials and faulty workmanship. City Technology's standard product warranty applies unless agreed to otherwise by City Technology in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to City Technology during the period of coverage, City Technology will repair or replace, at its option, without charge those items it finds defective. The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall City Technology be liable for consequential, special, or indirect damages. Though City Technology provides application assistance personally, or through our literature and website, it is up to the customer to determine the suitability of the product in the application.

**Carbon Monoxide**  
**Sensoric CO 2E 300**



# Product Data Sheet

## Sensoric CO 2E 300

### FEATURES

Amperometric 2 electrode sensor cell  
Very selective  
Highly sensitive  
Long lifetime

### TYPICAL APPLICATIONS

TLV-monitoring, leakage detection  
portable & fixed point applications

### PART NUMBER INFORMATION

MINI	0248-024-30009
SENSORIC CLASSIC	0248-024-30069
CTL 4 series adaptation	0248-024-30049
CTL 7 series adaptation	0248-024-30079

# Product Data Sheet

## Sensoric CO 2E 300

### TECHNICAL SPECIFICATIONS

Measuring Range	0–300 ppm
Sensitivity Range	30 nA/ppm $\pm$ 12 nA/ppm
Zero Current at 20 °C	< $\pm$ 150 nA
Resolution at 20 °C	< 2 ppm
Bias Potential	not required
Linearity	< 5% full scale
Response Time at 20 °C	
t50	< 10 s calculated from 2 min. exposure time
t90	< 35 s calculated from 2 min. exposure time
Long Term Sensitivity Drift	< 10% per 6 months
Operation Conditions	
Temperature Range	-40 °C to +50 °C
Humidity Range	15–90% r.H, non–condensing
Effect of Humidity	no effect on base line shift, longer exposure to dry gas will decrease the sensitivity
Sensor Life Expectancy	> 36 months in air
Warranty	24 months

# Product Data Sheet

## Sensoric CO 2E 300

### CROSS SENSITIVITIES AT 20 °C

Gas	Concentration	Reading [ppm]
Acetic Acid	sat. vapor	0
Alcohols (i.e. IPA)	1025ppm	0 <sup>1</sup>
Ammonia	100 ppm	0 <sup>1</sup>
Carbon Dioxide	10%	0
Chlorine	1 ppm	0
Chlorine Dioxide	1 ppm	0
Gasoline Vapour	% range	0 <sup>1</sup>
Hydrogen	3000 ppm	1200
Hydrogen Sulfide	20 ppm	0 <sup>1</sup>
Nitric Oxide	100 ppm	30
Nitrogen Dioxide	10 ppm	0 <sup>1</sup>
Sulfur Dioxide	20 ppm	0 <sup>1</sup>

- 1) with inboard filter;  
to remove TLV levels of interfering gases;  
continuous high level exposure may reduce the efficiency of the filter material

Notes:

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

# Product Data Sheet

## 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](http://www.citytech.com) under the heading '*Support*' -> '*Application Notes*' -> '*Sensoric*'

Product Safety Data Sheets (PSDS) can be obtained at [www.citytech.com](http://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.

**Carbon Monoxide**  
**Sensoric CO 3E 300**

# Product Data Sheet

## Sensoric CO 3E 300

### FEATURES

Amperometric 3 electrode sensor cell  
Very selective  
Highly sensitive  
Long lifetime

### TYPICAL APPLICATIONS

TLV-monitoring, leakage detection  
portable & fixed point applications  
Oil & Petrochemical industry, parking garages, Mining, Steel Industry

### PART NUMBER INFORMATION

MINI	0248-034-30009
SENSORIC CLASSIC	0248-034-30069
CTL 4 series adaptation	0248-034-30049
CTL 7 series adaptation	0248-034-30079

# Product Data Sheet

## Sensoric CO 3E 300

### TECHNICAL SPECIFICATIONS

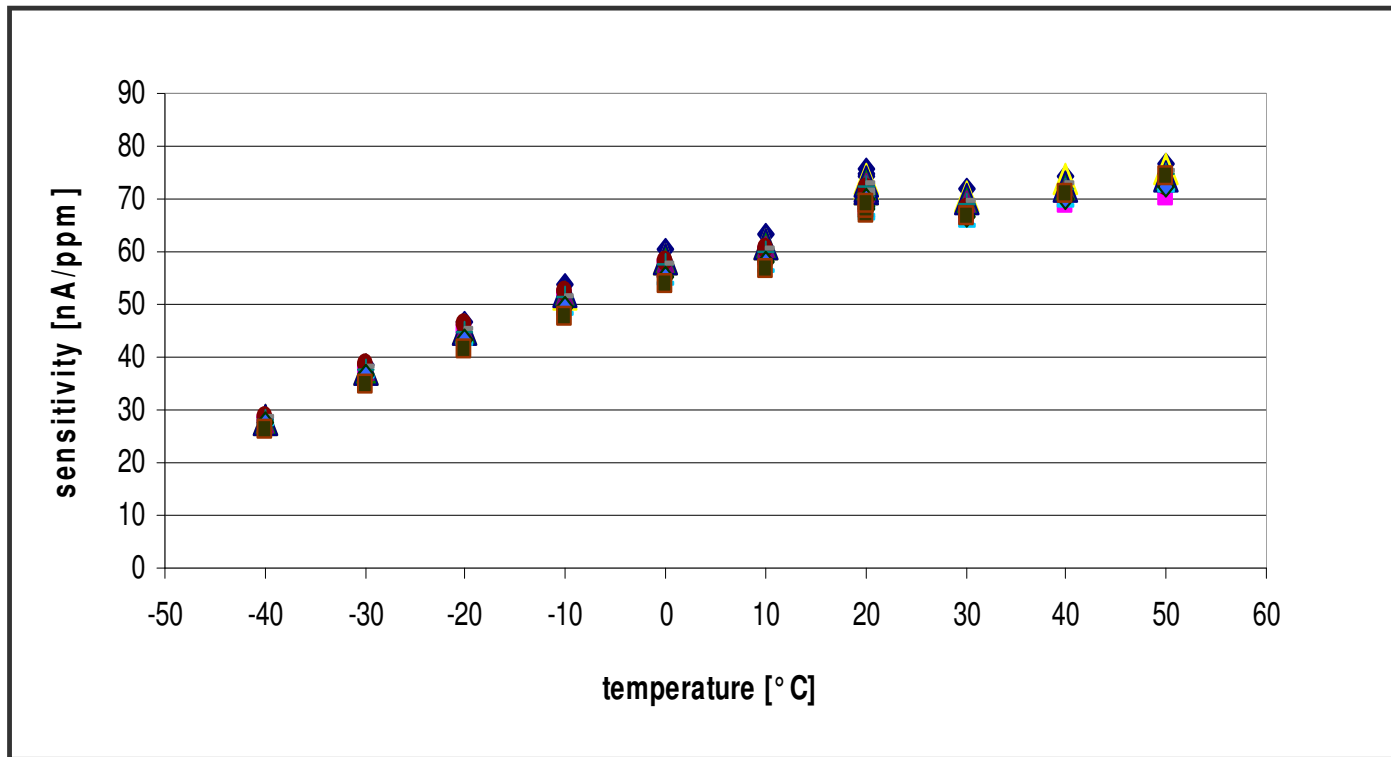
Measuring Range	0-500 ppm
Sensitivity Range	70 nA/ppm $\pm$ 20 nA/ppm
Zero Current at 20°C	< 150 nA
Resolution at 20°C	< 3 ppm
Bias Potential	0 mV
Linearity	< 5% full scale
Response Time at 20°C	
t50	< 10 s calculated from 2 min. exposure time
t90	< 30 s calculated from 2 min. exposure time
Long Term Sensitivity Drift	< 10% per 6 months
Operation Conditions	
Temperature Range	-40°C to + 50°C
Humidity Range	15-90 % r.H., non-condensing
Effect of Humidity	no effect on base line shift, longer exposure to dry gas might decrease the sensitivity
Sensor Life Expectancy	> 4 years
Warranty	24 months



# Product Data Sheet

## Sensoric CO 3E 300

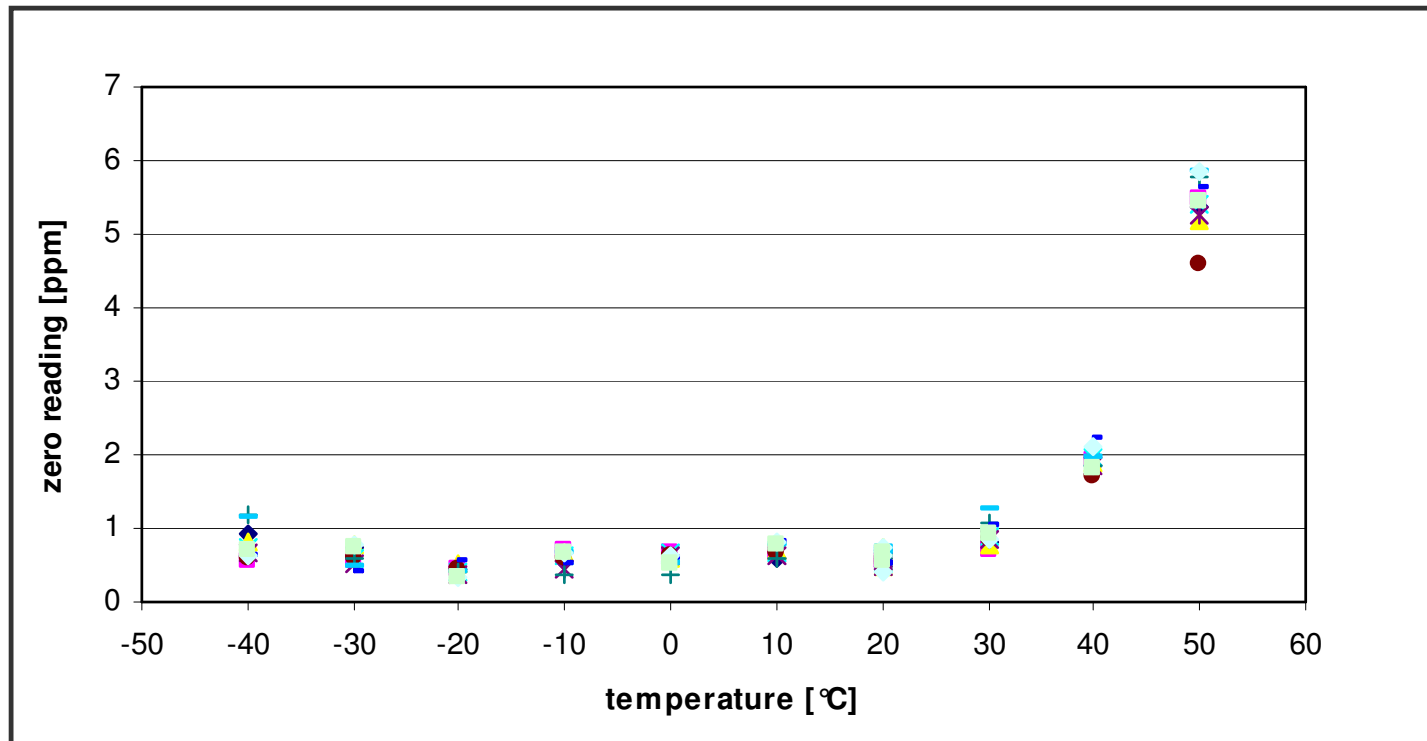
OUTPUT vs. TEMPERATURE:



# Product Data Sheet

## Sensoric CO 3E 300

### ZERO READING vs. TEMPERATURE:



# Product Data Sheet

## Sensoric CO 3E 300

### CROSS SENSITIVITIES AT 20 °C

Gas	Concentration	Reading [ppm]
Acetic Acid	sat. vapor	0
Alcohols (i.e. IPA)	1025 ppm	0 <sup>1</sup>
Ammonia	100 ppm	0.1
Carbon Dioxide	10 %	0
Chlorine	1 ppm	0
Chlorine Dioxide	1 ppm	0
Gasoline Vapour	% range	0 <sup>1</sup>
Hydrogen	3000 ppm	1000
Hydrogen Sulfide	20 ppm	0 <sup>1</sup>
Nitric Oxide	100 ppm	25
Nitrogen Dioxide	10 ppm	0 <sup>1</sup>
Sulfur Dioxide	20 ppm	0 <sup>1</sup>

1) With inboard filter; to remove TLV levels of interfering gases; continuous high level exposure may reduce the efficiency of the filter material.

#### Notes:

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

# Product Data Sheet

## 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

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Product Safety Data Sheets (PSDS) can be obtained at [www.citytech.com](http://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.

**Carbon Monoxide**  
**Sensoric CO 3E 500 S**

# Product Data Sheet

## Sensoric CO 3E 500 S

### FEATURES

Amperometric 3 electrode sensor cell  
Low susceptibility to hydrogen  
High reliability  
Fast response  
0 voltage biased operation

### TYPICAL APPLICATIONS

Portable & fixed point applications  
Where hydrogen can be present in the background  
Note: Further information is available at [www.citytech.com](http://www.citytech.com) under the heading Support - Application notes

### PART NUMBER INFORMATION

MINI	0250-134-30009
SENSORIC CLASSIC	0250-134-30069
CTL 4 series adaptation	0250-134-30049
CTL 7 series adaptation	0250-134-30079

# Product Data Sheet

## Sensoric CO 3E 500 S

### TECHNICAL SPECIFICATIONS

Measuring Range	0–500 ppm
Sensitivity Range	70 nA/ppm $\pm$ 20 nA/ ppm
Zero Current at 20°C	< $\pm$ 200 nA
Resolution at 20°C	< 3 ppm
Bias Potential	0 mV
Linearity	< 5% full scale
Response Time at 20°C	
t50	< 30 s calculated from 2 min. exposure time <sup>1</sup>
t90	< 60 s calculated from 2 min. exposure time <sup>1</sup>
Long Term Sensitivity Drift	< 2% per month
Operation Conditions	
Temperature Range	-20°C to +50°C
Humidity Range	15–90% r.H., non–condensing
Effect of Humidity	no effects
Sensor Life Expectancy	> 24 months in air
Warranty	12 months

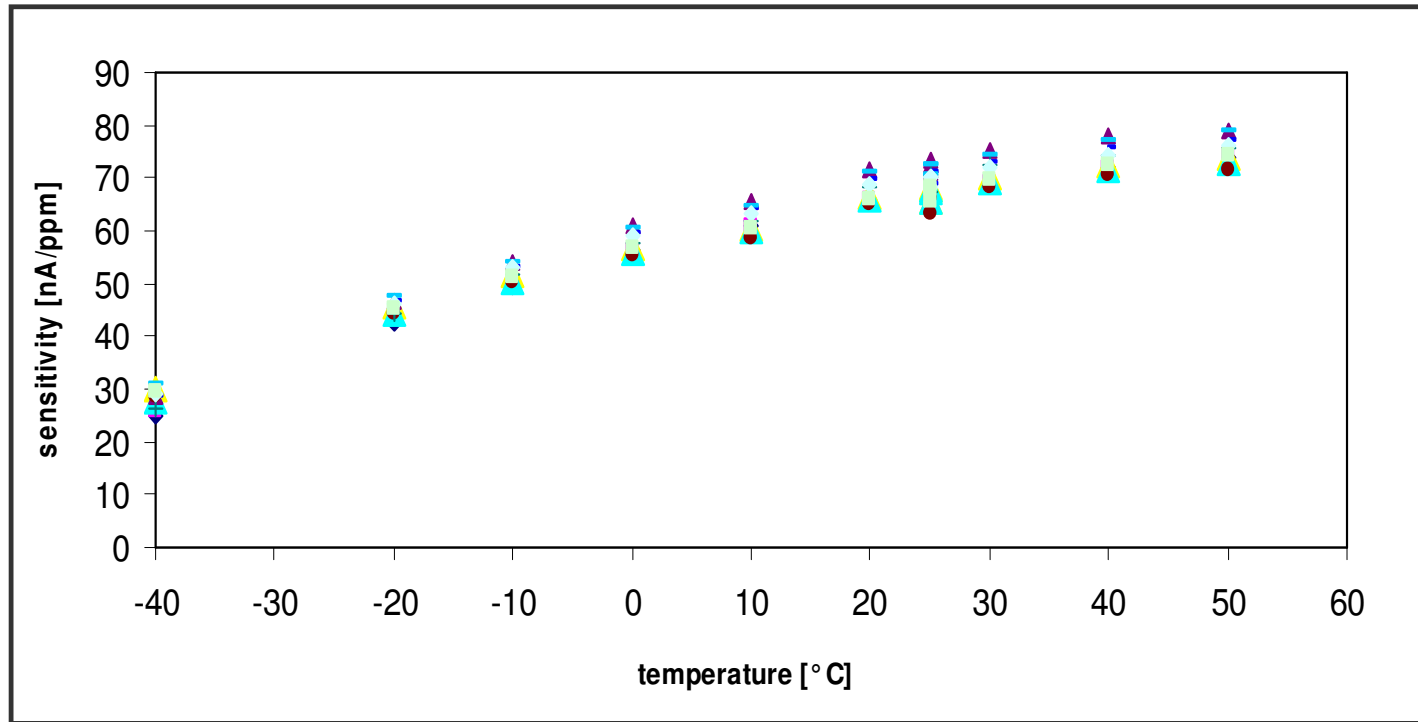


# Product Data Sheet

## Sensoric CO 3E 500 S

### Temperature dependence – CO reading:

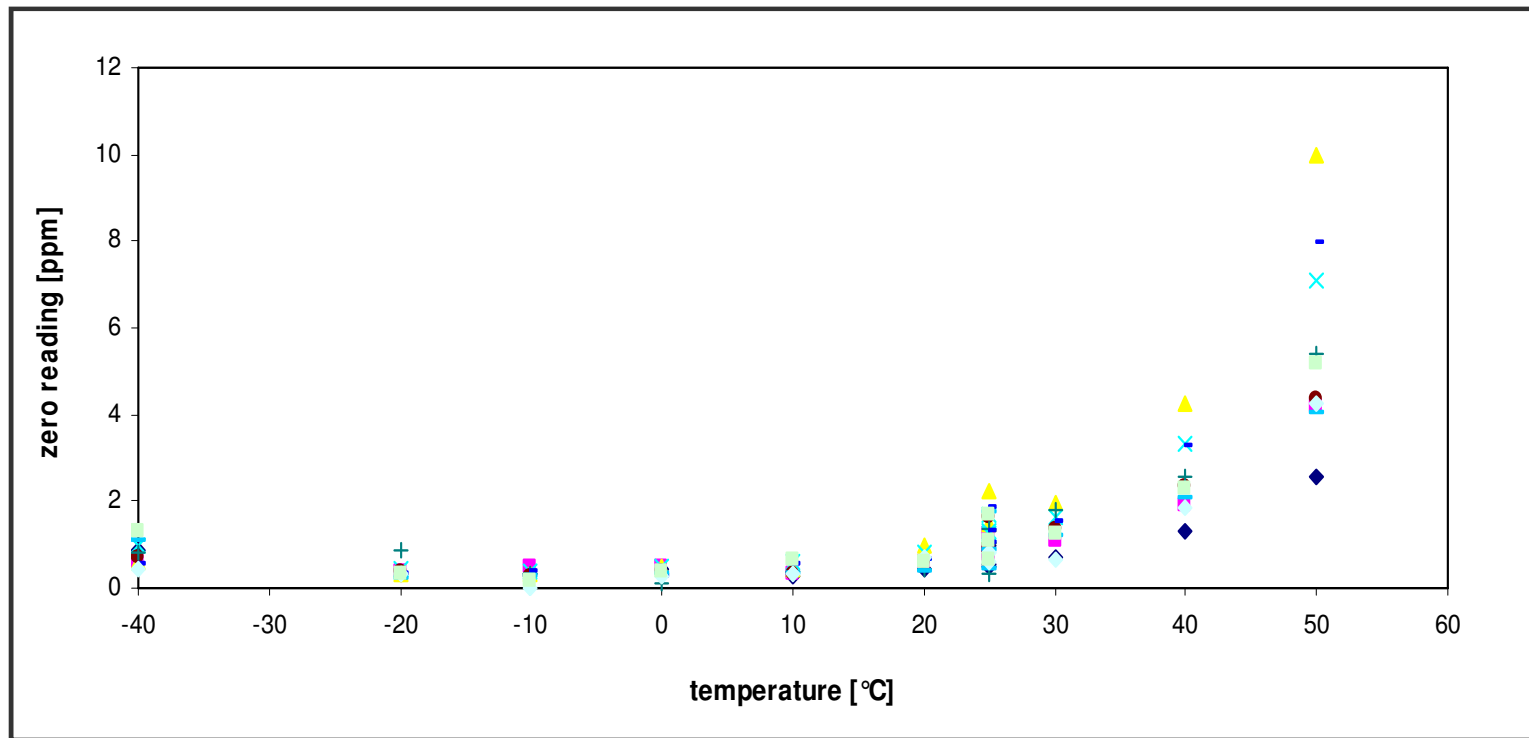
Calibration with 100 ppm CO / air at each listed temperature



# Product Data Sheet

## Sensoric CO 3E 500 S

Temperature dependence – zero reading:



# Product Data Sheet

## Sensoric CO 3E 500 S

### CROSS SENSITIVITIES AT 20 °C

Gas	Concentration	Reading [ppm]
Alcohols (i.e. IPA)	600 ppm	0 <sup>1</sup>
Gasoline Vapour	% range	0 <sup>1</sup>
Hydrogen	3000 ppm	<300
Hydrogen Chloride	10 ppm	7
Hydrogen Sulfide	20 ppm	0 <sup>1</sup>
Nitric Oxide	20 ppm	20
Nitrogen Dioxide	10 ppm	0
Sulfur Dioxide	2 ppm	0

1) With inboard filter; to remove TLV levels of interfering gases; continuous high level exposure may reduce efficiency of filter material.

#### Notes:

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

# Product Data Sheet

## 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

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