

# MOX2 MediceL® Sensor

MOX2 Oxygen Sensor Part Number: AA829-220

## **Document Purpose**

The purpose of this document is to present the performance specification of the MOX2 oxygen gas sensor.

This document should be used in conjunction with the Operating Principles (OP04) and the Product Safety Datasheet (PSDS 4).

The data provided in this document are valid at  $20^{\circ}$ C,  $50^{\circ}$ C RH and  $1013^{\circ}$  mBar for 3 months from the date of sensor manufacture.

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 (0P04).



## KEY FEATURES & BENEFITS



Meets the requirements of ISO 80601-2-55



Linear output from 0% to 100%  $0_{\circ}$ 



13-month warranty

**RoHS** Ø

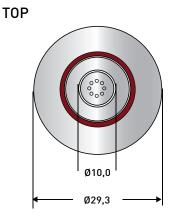
RoHS compliant

MEASUREMENT         Partial pressure electrochemical           Output         9 mV to 13 mV in 210 mBar 02           Measurement Range         0 mBar to 1500 mBar 02           Response Time (T <sub>70</sub> )         <15 s (air to 100% 02)           Baseline Offset         <200 μV           Linearity         Linear 0% to 100% 02 (See Notes)           ELECTRICAL         - (2% 02 equivalent (0°C to 40°C)           External Load Resistor         10 kΩ minimum (See Important Note)           External Load Resistor         0.141 in/3,5 mm mini phone jack           Recommended Mating Part         CTL lead part number: B047           MECHANICAL         White ABS           Weight         42 g (nominal)           Orientation         Any           ENVIRONMENTAL         Typical Applications           Operating Temperature Range         0.5 Bar to 2.0 Bar           Operating Humidity Range         0% to 99% RH noncondensing           LIFETIME         Long-Term Ouput Drift in 100% 02           LIFETIME         - 10°C to +40°C (Short excursions to +50°C allowed)           Expected Operating Life: Ra 20°C (B 40°C)         1.5 x 10°% 02 hours           Recommended Storage Temperature         - 10°C to +40°C (Short excursions to +50°C allowed)           Expected Operating Life: Ra 20°C (B 40°C)         1.5 x 10°% 02 hour	TECHNICAL SPECIFICATIONS	
Output   Principle   electrochemical	MEASUREMENT	
Measurement Range   0 mBar to 1500 mBar O₂	Operating Principle	
Response Time (T <sub>90</sub> )	Output	
Baseline Offset  Linearity  Linear 0% to 100% O₂  ELECTRICAL  Temperature Compensation  External Load Resistor  Connector  Recommended Mating Part  MECHANICAL  Housing Material  Weight  Orientation  ENVIRONMENTAL  Typical Applications  Operating Temperature Range  Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% O₂  Recommended Storage Temperature Recommended Storage Temperature  (B 20°C (B 40°C)  Standard Warranty  -200 μ V  Linear 0% to 100% O₂  Linear 0% O₂  Linear 0% to 100% O₂  Linear 0% to 100% O₂  Linear 0% to 100% O₂  Linear 0% O₂  Linear 0% O₂  Linear 0% to 100% O₂  Linear 0% O₂  Linear 100% O₂  Linear	Measurement Range	0 mBar to 1500 mBar $0_2$
Linearity  Linear 0% to 100% 02  [See Note1]  ELECTRICAL  Temperature Compensation  External Load Resistor  Connector  Connector  Recommended Mating Part  MECHANICAL  Housing Material  Weight  Orientation  ENVIRONMENTAL  Typical Applications  Operating Temperature Range  Operating Pressure Range  Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% 02  Recommended Storage Temperature Recommended Storage Temperature Recommended Storage Temperature Recommended Storage Temperature  Recommended Storage Temperature  Recommended Storage Temperature  Sale 20°C Recommended Storage Temperature  Expected Operating Life: Recommended Second	Response Time (T <sub>90</sub> )	<15 s (air to 100% O <sub>2</sub> )
ELECTRICAL  Temperature Compensation  External Load Resistor  Connector  Recommended Mating Part  MECHANICAL  Housing Material  White ABS  Weight  Orientation  Operating Temperature Range  Operating Humidity Range  Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% O <sub>2</sub> Recommended Storage Temperature Range  Expected Operating Life:	Baseline Offset	<200 μV
Temperature Compensation  40°C)  External Load Resistor  Connector  Connector  Recommended Mating Part  MECHANICAL  Housing Material  White ABS  Weight  42 g (nominal)  Orientation  ENVIRONMENTAL  Typical Applications  Operating Temperature Range  Operating Pressure Range  Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% 0₂  Recommended Storage Temperature  G 20°C  G 40°C  G 40°C  Standard Warranty  C2% O₂ equivalent (0°C to 40°C   1.5 x 106 % O₂ hours 0.8 x 106 % O₂ hours on despatch (This amounts to a variation of condition 1 of our standard terms and conditions which otherwise	Linearity	
Compensation       40°C)         External Load Resistor       10 kΩ minimum (See Important Note)         Connector       0.141 in/3,5 mm mini phone jack         Recommended Mating Part       CTL lead part number: B047         MECHANICAL       White ABS         Weight       42 g (nominal)         Orientation       Any         ENVIRONMENTAL       Critical care anesthesia         Operating Temperature Range       -20°C to +50°C         Operating Pressure Range       0.5 Bar to 2.0 Bar         Operating Humidity Range       0% to 99% RH non-condensing         LIFETIME       < 5% signal loss/year         Long-Term Ouput Drift in 100% 02       < 5% signal loss/year         -10°C to +40°C (Short excursions to +50°C allowed)          Expected Operating Life: G 20°C G 40°C G A0°C          G 40°C G 40°C G G A0°C          Packaging       Sealed blister         Standard Warranty       13 months from date of despatch (IThis amounts to a variation of condition 1 of our standard terms and conditions which otherwise and conditions which otherwise	ELECTRICAL	
Connector  Connector  Recommended Mating Part  MECHANICAL  Housing Material  White ABS  Weight  Orientation  Any  ENVIRONMENTAL  Typical Applications  Operating Temperature Range  Operating Humidity Range  Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% O <sub>2</sub> Recommended Storage Temperature  G 20°C to +40°C (Short excursions to +50°C allowed)  Expected Operating Life:  G 20°C to 40°C (Short excursions to +50°C allowed)  Standard Warranty  Life in a months from date of despatch (This amounts to a variation of conditions which otherwise and conditions which otherwise	1 -	
Recommended Mating Part B047  MECHANICAL  Housing Material White ABS  Weight 42 g (nominal)  Orientation Any  ENVIRONMENTAL  Typical Applications Critical care anesthesia  Operating Temperature Range 0.5 Bar to 2.0 Bar  Operating Humidity Range 0% to 99% RH non-condensing  LIFETIME  Long-Term Ouput Drift in 100% O2  Recommended Storage Temperature (Short excursions to +50°C allowed)  Expected Operating Life: 0.20°C (Short excursions to +50°C allowed)  Expected Operating Life: 1.5 x 106 % O2 hours 0.8 x 106 % O2 hours  Packaging Sealed blister  13 months from date of despatch (This amounts to a variation of condition 1 of our standard terms and conditions which otherwise	External Load Resistor	
Part  MECHANICAL  Housing Material  White ABS  Weight  42 g (nominal)  Orientation  Any  ENVIRONMENTAL  Typical Applications  Operating Temperature Range  Operating Pressure Range  Operating Humidity Range  UIFETIME  Long-Term Ouput Drift in 100% O <sub>2</sub> Recommended Storage Temperature  Expected Operating Life:  @ 20°C @ 40°C	Connector	
Housing Material Weight 42 g (nominal) Orientation Any ENVIRONMENTAL Typical Applications Operating Temperature Range Operating Pressure Range Operating Humidity Range UIFETIME Long-Term Ouput Drift in 100% O <sub>2</sub> Recommended Storage Temperature Expected Operating Life:	_	
Weight  Orientation  Any  ENVIRONMENTAL  Typical Applications  Operating Temperature Range  Operating Pressure Range  Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% O <sub>2</sub> Recommended Storage Temperature  (Short excursions to +50°C allowed)  Expected Operating Life: (A 20°C (Short excursions to +50°C allowed)  Expected Operating Life: (A 20°C (Short excursions to +50°C allowed)  Packaging  Sealed blister  13 months from date of despatch [This amounts to a variation of condition 1 of our standard terms and conditions which otherwise	MECHANICAL	
Orientation Any  ENVIRONMENTAL  Typical Applications Critical care anesthesia  Operating Temperature Range -20°C to +50°C  Operating Pressure Range 0.5 Bar to 2.0 Bar  Operating Humidity Range 0% to 99% RH non-condensing  LIFETIME  Long-Term Ouput Drift in 100% 02  Recommended Storage Temperature -10°C to +40°C (Short excursions to +50°C allowed)  Expected Operating Life: 0 20°C 0.8 x 106 % 02 hours 0.8 x 106 % 02 hours  Packaging Sealed blister  13 months from date of despatch (This amounts to a variation of condition 1 of our standard terms and conditions which otherwise	Housing Material	White ABS
Typical Applications  Operating Temperature Range  Operating Pressure Range  Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% O <sub>2</sub> Recommended Storage Temperature  Expected Operating Life:  © 20°C © 40°C © 40°C © 40°C  Standard Warranty  Critical care anesthesia  Critical care anesthesia  Critical care anesthesia  Critical care anesthesia  (20°C to +50°C  Shar to 2.0 Bar  0% to 99% RH non-condensing  C5% signal loss/year  -10°C to +40°C  (Short excursions to +50°C allowed)  Expected Operating Life:  © 20°C to +50°C  Shart o 2.0 Bar  -10°C to 99% RH non-condensing  -10°C to +40°C  Short excursions to +50°C allowed)  Expected Operating Life:  1.5 x 10° % O <sub>2</sub> hours  0.8 x 10° % O <sub>2</sub> hours  13 months from date of despatch  [This amounts to a variation of condition 1 of our standard terms and conditions which otherwise	Weight	42 g (nominal)
Typical Applications  Operating Temperature Range  Operating Pressure Range  Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% O2  Recommended Storage Temperature  Expected Operating Life:  © 20°C (Short excursions to +50°C allowed)  Expected Operating Life:  © 20°C (Short excursions to +50°C allowed)  Packaging  Sealed blister  13 months from date of despatch [This amounts to a variation of condition 1 of our standard terms and conditions which otherwise	Orientation	Any
Operating Temperature Range  Operating Pressure Range  Operating Humidity Range  Uperating Uperating Life:  Uperating Life: Up	ENVIRONMENTAL	
Range  Operating Pressure Range  Operating Humidity Range  UIFETIME  Long-Term Ouput Drift in 100% O2  Recommended Storage Temperature  Expected Operating Life:  © 20°C © 40°C  © 40°C  Readsing  Condition 1 of our standard terms and conditions which otherwise	Typical Applications	Critical care anesthesia
Operating Humidity Range  LIFETIME  Long-Term Ouput Drift in 100% O₂  Recommended Storage Temperature  Expected Operating Life:		-20°C to +50°C
LIFETIME  Long-Term Ouput Drift in 100% 02	Operating Pressure Range	0.5 Bar to 2.0 Bar
Long-Term Ouput Drift in 100% O2 < 5% signal loss/year < 10°C to +40°C (Short excursions to +50°C allowed) < 1.5 x 106 % O2 hours	Operating Humidity Range	
Recommended Storage Temperature  Expected Operating Life:	LIFETIME	
Temperature  [Short excursions to +50°C allowed]  Expected Operating Life:	Long-Term Ouput Drift in 100% O <sub>2</sub>	< 5% signal loss/year
$\begin{array}{c c} \textbf{G 20^{\circ}C} & 1.5 \times 10^{6} \% \ O_{2} \ \text{hours} \\ \hline \textbf{O.8 \times 10^{6} \% \ O_{2}} \ \text{hours} \\ \hline \textbf{Packaging} & Sealed \ \text{blister} \\ \hline \textbf{Standard Warranty} & 13 \ \text{months from date of despatch} \\ \hline \textbf{IThis amounts to a variation of condition 1 of our standard terms and conditions which otherwise} \\ \hline \end{array}$	Temperature	
Standard Warranty  13 months from date of despatch [This amounts to a variation of condition 1 of our standard terms and conditions which otherwise	a 20°C	
Standard Warranty  despatch (This amounts to a variation of condition 1 of our standard terms and conditions which otherwise	Packaging	Sealed blister
	Standard Warranty	despatch (This amounts to a variation of condition 1 of our standard terms and conditions which otherwise

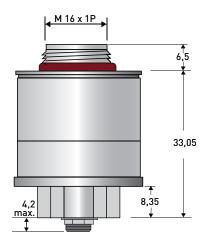
Note 1: Use of a regression coefficient shows a best fit straight line better than 0.9995 when measured through the four data points from testing with 100%  $\rm N_2$ , 21%  $\rm O_2$ , 60%  $\rm O_2$ , and 100%  $\rm O_2$ .

#### **Product Dimensions** mm

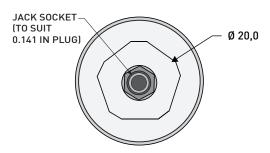
N.B. All tolerances ±0.15 mm unless otherwise stated



### SIDE



## воттом



**Important Note:** Connection should be made via recommended mating parts only. Soldering to the sensor will damage it and invalidate the warranty.

For further information on the external load resistance and connection to the recommended mating part, please see Operating Principle OP-04 or contact City Technology.

All performance data is based on measurements made with cylinder gases using a flow rate of 100 mls/min. Conditions at 20°C, 50% RH and 1013 mBar. For sensor performance data under other conditions, contact City Technology.

Performance characteristics outline the performance of sensors supplied within the first 3 months. Output signal can drift below the lower limit over time.

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## **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.

#### **Intended Use**

These sensors are designed to be used to monitor the partial pressure of oxygen in anaesthesia (not including xenon), critical care, neonatal incubators, and general oxygen monitors.

#### **Stabilisation Time**

Allow at least 15 minutes to stabilise in the instrument before calibration or refer to manufacturers instructions.

#### **Cleaning and Sterilisation**

In case of contamination the sensor may be cleaned with distilled water and allowed to dry naturally. The sensor is not suitable for sterilisation by steam or exposure to chemicals such as ethylene oxide or hydrogen peroxide.

#### **Calibration Interval**

These sensors are designed to have minimal drift over their useful lifetime. For maximum accuracy however they should be calibrated before each use.

#### If the Sensor is Dropped

If a sensor is dropped, then it should be placed in quarantine for 24 hours and a follow-up check made by a 2 point calibration.

#### **Mechanical Installation**

When installing the sensor, it must only be screwed in hand-tight and a gas tight seal ensured. Spanners and similar mechanical aids may not be used, as excessive force may damage the sensor thread.

### **RFI/EMI Susceptibility**

MediceLs contain metal and may be susceptible to RFI or EMI. They are not suitable for use in MRI environments. For further information please contact City Technology.

#### Certifications



Manufacturer: EnviteC-Wismar GmbH, Alter Holzhafen 18, 23966 Wismar, Germany This product has been liscensed for sale by the FDA in the US. For confirmation, see: http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfrl/rl.cfm?lid=604764&lpcd=CCL

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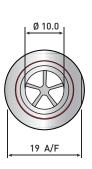
## **Cross Sensitivity**

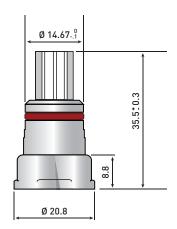
The table below shows how MOX2 MediceLs respond when tested with the gas mixtures listed in ISO 80601-2-55

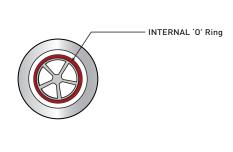
Test Gas	% O <sub>2</sub> Error
50% He / 50% O <sub>2</sub>	< 1%
60% N <sub>2</sub> 0 / 40% O <sub>2</sub>	< 1%
2% Halothane / 40% $\mathrm{O_2}$ / 30% $\mathrm{N_2O}$ / 5% $\mathrm{CO_2}$ / Bal $\mathrm{N_2}$	< 1.5%
2% Enflurane / $40%$ O <sub>2</sub> / $30%$ N <sub>2</sub> 0 / $5%$ CO <sub>2</sub> / Bal N <sub>2</sub>	< 1.5%
$2\%$ Isoflurane / 40% $\mathrm{O_2}$ / 30% $\mathrm{N_2}$ 0 / 5% $\mathrm{CO_2}$ / Bal $\mathrm{N_2}$	< 1.5%

## MOX Adaptor (15 mm Taper)

MOX2 sensors are supplied with and adaptor that can be fitted to the sensor thread and used to direct gas flow to the sensor.







#### **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.

