City Technology Limited

April 1999

TECHNICAL BULLETIN

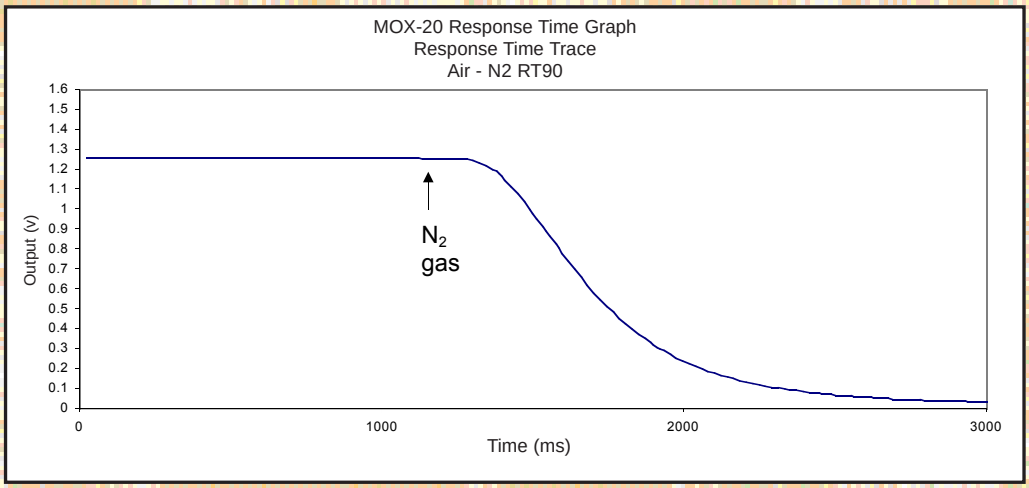
product news

New: the MOX-20 Fast Medical Oxygen Sensor

At the Sensor '99 exhibition in Germany in May, we will be launching an addition to our highly successful range of medical oxygen and toxic sensors. The MOX-20 is a fast response medical sensor that is capable of breath-by-breath analysis of oxygen.

This will be highly valuable to clinicians in the assessment of lung function and fitness. Using proven electrochemical methodology, the MediceL currently boasts a T_{10-90} response time of 500 milliseconds. Its response performance is depicted in the graph below.

More information on the MOX-20 sensor and the rest of the medical range of products is available from either the Technical Support Team or Mauro Lantschner, Account Manager.



Product Replacement - C2N

The City Technology C2N CiTiceL®, is to be phased out over the next year and from 1 May 2000, will cease production. Users of the C2N will be able to utilise the 2FO and 5FO oxygen CiTiceLs®, both suitable alternatives, which have been developed for monitoring oxygen in flue gas. They are manufactured in high grade, chemically resistant materials and also feature bayonet connections which allow a simple fit to existing and new instruments with our Bayonet Mounting accessory.

For further advice on switching products or more detailed technical information, please contact the Technical Support Team.

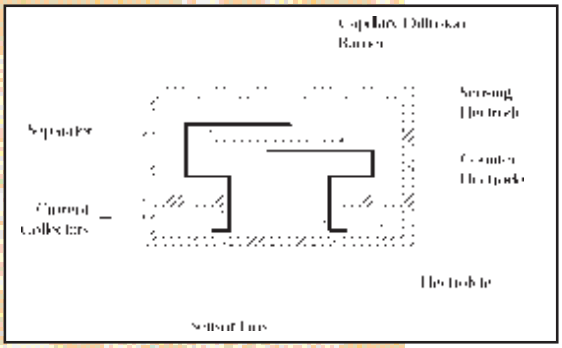
Sensor '99 - Nürnberg

Sensor, the world's largest exhibition of sensors, electronic processing and associated services takes place for the ninth time from 18-20 May at the Exhibition Centre in Nürnberg, Germany. City Technology will be exhibiting as usual and Kevin Breen, John Finbow, David Baines and Jonathan Gilby will all be available on the stand to meet you and discuss your sensor requirements. Sensor '99 will see the launch of our new sensor: the MOX-20, a fast response, medical oxygen sensor.

The City Technology stand will be in Hall 4, stand number 4346. We look forward to seeing you there.

Technical Titbits

Over the past three months, we have presented a series of technical articles on City Technology oxygen sensors. The following five monthly articles will focus on electrochemical toxic sensors. They will include a design overview (see right) and an explanation of some of the parameters that we routinely measure to ensure the quality of our product. If you have any questions about these articles or if you would like a particular topic explained in more detail, please contact Rob White (rjw@citytech.co.uk).



Toxic Sensors 1 - Design Overview

The simplest form of City Technology electrochemical toxic sensor comprises two electrodes: sensing and counter, separated by a thin layer of electrolyte. This is enclosed in a plastic housing that has a small capillary to allow gas entry to the sensing electrode and includes pins which are electrically attached to both electrodes and allow easy external interface. These pins may be connected to a simple resistor circuit that allows the voltage drop resulting from any current flow to be measured. Gas diffusing into the sensor is either oxidised or reduced at the sensing electrode and, coupled with a corresponding (but converse) counter reaction at the other electrode, a current is generated through the external circuit. Since the rate of gas entry into the sensor is controlled by the capillary diffusion barrier, the current generated is proportional to the concentration of gas present outside the sensor and gives a direct measure of the toxic gas present.

The reactions that take place at the electrodes in a carbon monoxide sensor are:

Sensing: $CO + H_2O \rightarrow CO_2 + 2H^+ + 2e^-$

Counter: $\frac{1}{2} O_2 + 2H^+ + 2e^- \rightarrow H_2O$

And the overall reaction is:

$CO + \frac{1}{2} O_2 \rightarrow CO_2$

Similar reactions take place for all other toxic gases that are capable of being electrochemically oxidised or reduced.

From the reaction at the counter electrode, it is evident that oxygen is required for the current generation process to take place. This is usually provided in the sample stream by air diffusing to the front of the sensor, or by diffusion through the sides of the sensor (a few thousand ppm is normally sufficient). However, continuous exposure to an anaerobic sample gas may result in signal drift, despite the oxygen access paths and so we recommend that toxic sensors are never potted with resin or completely immersed in an anaerobic gas mixture.

Next Month: 3- and 4-electrode toxic sensors.

7ETO - detects 18 organic compounds

Over the past few months, a number of customers have contacted City Technology for sensors that can detect more unusual organic compounds at ppm level. Whilst it is often difficult to suggest a CiTiceL® that is completely specific to these target gases, we do have a general purpose electrochemical sensor that is capable of detecting a number of different volatile organic vapours. The 7ETO is essentially an extension of existing electrochemical methodology. The range of gases that it can be used to detect, as well as the associated sensitivities, are shown below:

Gas	Cross Interference (% relative to CO)	Gas	Cross Interference (% relative to CO)
Acetaldehyde	40	Ethanol	180
Acetylene	340	Ethylene	220
Acrylonitrile	75	Ethylene Oxide	275
Butadiene	170	Formaldehyde	330
Carbon disulphide	140	Methanol	415
Carbon monoxide	100	Methyl mercaptan	275
Carbonyl sulphide	135	Thiophane	45
Dimethyl sulphide	150	Vinyl acetate	200
Epichlorohydrin	50	Vinyl chloride	200

The 7ETO (which is also available in the 3 and 4 Series format) can be used with standard three electrode circuitry although it requires an anodic bias voltage of 300mV to function correctly. Further technical information on these sensors is available from the Technical Support Team.

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Speedy City Kanbans

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