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Instrumenting scientific ideas

OxyMini Oxygen Meter

A new generation of oxygen meters for fiber-optic minisensors



Measuring Principle

The OxyMini measures the **luminescence lifetime** of the immobilized luminophore as the oxygen dependent parameter to avoid problems that are inherent with intensity based measurements. Lifetime based measurements are *not* affected by bending of the fiber or the optical properties of the sample (turbidity, refractive index, coloration).

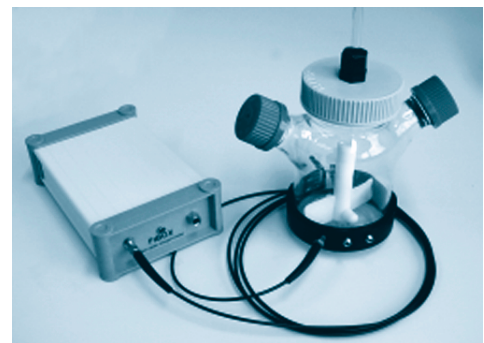
Small in size: The OxyMini is a compact, easy to transport and PC-controlled oxygen meter for small fiber-optic sensors.

Novel technology: This technology is superior to conventional intensity based sensors in creating very stable, internal referenced values.

Stable signals: This enables a more flexible use of optical oxygen sensors in many different fields of interest.

Temperature compensation: The OxyMini compensates for variations in the oxygen content of the sample caused by temperature variations.

Control: TTL trigger input and analog output.



Possible Applications

Biotechnology

- control of cell culture media
- online and non-invasive control of bioreactors

Implantation

- implantation of oxygen sensors into soil, trees, etc.

In-Process Control

- bottling plant in breweries
- sewage plants
- water-recycling plants
- quality control of packages

Fiber-Optic Oxygen Minisensors

Sensors and housings

WPI fiber-optic oxygen minisensors are based on 2 mm polymer optical fibers (POF). Depending on the respective application, WPI offers a set of different standard designs. Of course, it is possible to build customer-specific designs.



Flow-Through Cell with Integrated Oxygen Sensor

- very robust
- excellent long-term stability
- online monitoring
- stands CIP (Cleaning In Place) conditions
- **sterilizable** (autoclave (130°C, 1.5 atm), EtOH, H₂O₂)
- measurement is possible in both **liquids** and **dry gases**

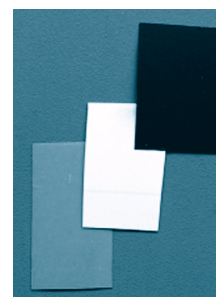


POF Coated with an Oxygen-Sensitive Foil

- POF with a polished distal tip coated with a planar oxygen-sensitive foil
- usable for process application
- very robust sensor
- sterilizable (H₂O₂, EtOH)
- not autoclavable (POF does not stand autoclaving conditions)
- excellent long-term stability

Planar Oxygen Sensitive Foils

- non-invasive and non-destructive measurement from outside through the wall of a flask or a package
- excellent long-term stability
- online monitoring
- stands CIP (Cleaning In Place) conditions
- sterilizable (autoclave (130°C, 1.5 atm), EtOH, H₂O₂)



	Dissolved Oxygen	Gaseous Oxygen
Measuring Range	0 - 45 mg/L 0 - 1013 hPa	0 - 500 % air-saturation 0 - 1013 hPa
Response time	(t ₉₀) < 40 s (< 60 s with optical isolation)	< 10 s (< 15 s with optical isolation)
Resolution (at 20° C)	60 ± 0.3 hPa; 200 ± 1.0 hPa; 500 ± 3.4 hPa; 2.75 ± 0.01 mg/L; 9.00 ± 0.05 mg/L; 22.0 ± 0.15 mg/L	
Accuracy (at 20° C)	± 1% air-saturation	
Temperature Range	-10 to 50° C	
Chemical Resistance	Sensors can be used in methanol, ethanol and alcohol-water mixtures. Not useful in organic solvents, such as acetone or chloroform.	
Cross-Sensitivity	No interference to carbon dioxide (CO ₂), hydrogen sulfide (H ₂ S), ammonia (NH ₃), pH, and any ionic species like sulfide, sulfate or chloride. Only affected by gaseous sulfur dioxide (SO ₂) and gaseous chlorine (Cl ₂).	
Calibration	Two-point calibration 100% air-saturation (air-saturated water, or water-saturated air) 0 % air saturation (deaerated water)	
Drift	< 0.5 % air-saturation (continuous sensor illumination; 100000 data points; 20° C, 100 % air-saturation)	



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