# OxyMini Oxygen Meter

*A new generation of oxygen meters for fiber-optic minisensors*


**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.

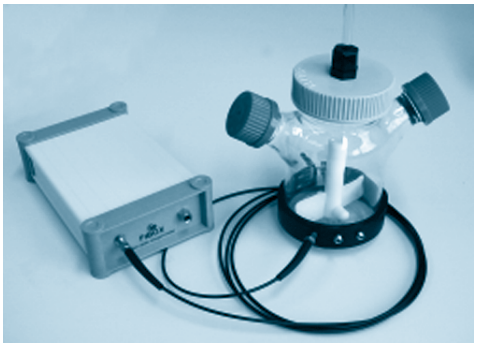
## Measuring Principle

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).

## Possible Applications

***Biotechnology***

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



***Implantation***

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

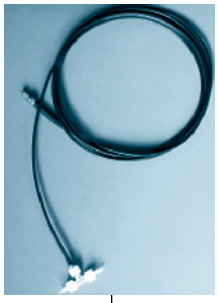
***In-Process Control***

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

# Fiber-Optic Oxygen Minisensors

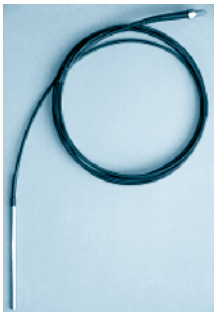
*Sensors and housings*

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, $H_2O_2$)
- measurement is possible in both **liquids** and **dry gases**

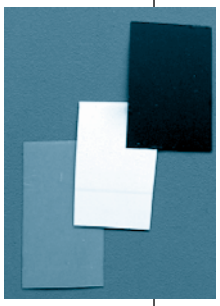


## POF Coated with an Oxygen-Sensitive Foil

- POF with a polished distal tip coated with a planar oxygen-sensitive foil
- usable for process application
- very robust sensor
- sterilizable ($H_2O_2$, 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, $H_2O_2$)



| | Dissolved Oxygen | Gaseous Oxygen |
|---|---|---|
| **Measuring Range** | 0 - 45 mg/L<br>0 - 1013 hPa | 0 - 500 % air-saturation<br>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 ± 0.9 hPa; 500 ± 3.6 hPa;<br>2.75 ± 0.01 ppm; 9.00 ± 0.04 ppm; 22.0 ± 0.17 ppm<br>45.0 ± 0.25 mmHg; 150 ± 0.75 mmHg; 375 ± 2.6 mmHg | |
| **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.<br>Not useful in organic solvents, such as acetone or chloroform. | |
| **Cross-Sensitivity** | **No interference** to carbon dioxide ($CO_2$), hydrogen sulfide ($H_2S$), ammonia ($NH_3$), pH, and any ionic species like sulfide, sulfate or chloride.<br>Only affected by gaseous sulfur dioxide ($SO_2$) and gaseous chlorine ($Cl_2$). | |
| **Calibration** | Two-point calibration<br>***100% air-saturation*** (air-saturated water, or water-saturated air)<br>***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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