

# O<sub>2</sub>



## Oxygen Probes

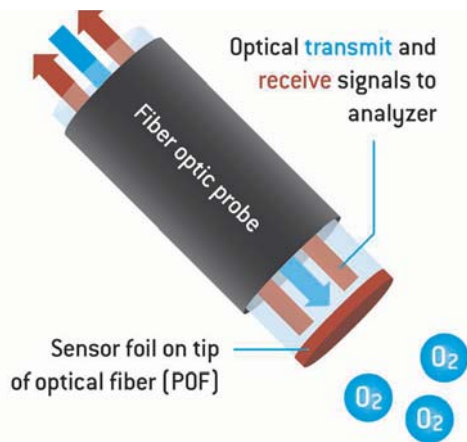
Robust, process conditions, autoclavable

- Oxygen in-line measurement in stainless steel fermenters
- In-line measurement of trace oxygen in brewing and beverage industries
- Small in size for environmental applications



**PreSens**  
PRECISION SENSING

# Oxygen Probes



Oxygen probes measure the partial pressure of both dissolved oxygen and gaseous oxygen. The oxygen sensor coating is integrated into high grade stainless steel fittings. The oxygen probes show an excellent long-term stability and stand rough process conditions. PreSens oxygen probes operate in industrial process control, trace oxygen measurement in the brewing and beverage industry and in various research applications.

## Features

- Autoclavable SIP (130 °C, 1.5 atm) & CIP (90 °C, 5 % NaOH)
- Probe is polarization free
- No membrane cleaning and replacement is necessary
- No electrolyte solutions to replenish
- Pressure resistant
- Long shelf-life



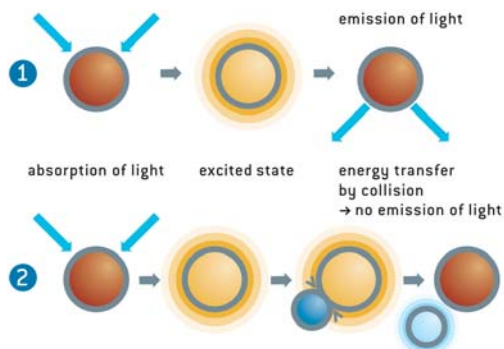
## Oxygen Probe for In-Line Measurement

The oxygen probe for in-line measurement (OIM) consists of a fitting made of stainless steel with optical exchange cap (OEC). The OEC is screwed to the top of the metal fitting. The OIM is connected to the instrument via an optical fiber. The OIM has a standardized thread and length and is compatible with most bioreactors and port adapters. In addition, customized fittings for e. g. sight glasses are offered.



## Oxygen Dipping Probe

The Oxygen Dipping Probe consists of a polymer optical fiber with a polished distal tip which is coated with an oxygen-sensitive foil. The end of the polymer optical fiber is covered with a high-grade steel tube to protect both the sensor material and the optical fiber. Due to the use of a polymer optical fiber, this probe is not compatible to temperatures above 70°C. The steel tube has an outer diameter of 4 mm and a length of 10 cm. Other lengths are available on request.



## The Smart Measurement Method

The light from the blue-green LED excites the oxygen sensor to emit fluorescence. If the sensor spot encounters an oxygen molecule, the excess energy is transferred to the oxygen molecule in a non-radiative transfer, decreasing or quenching the fluorescence signal. The degree of quenching correlates to the partial pressure of oxygen in the matrix, which is in dynamic equilibrium with oxygen in the sample. The decay time measurement is internally referenced.

# Oxygen Probes



## Process Control in Biotech & Pharma

The OIMs, the oxygen probes for in-line measurement, are designed for harsh conditions like high pressure or oil/water mixtures. These systems give high accuracy and are almost maintenance-free as they do not contain any membranes and electrolytes. The sensors are fully autoclavable and sterilizable (CIP & SIP).



## In-Line Oxygen Measurement in Brewing and Beverage Industry

Even low concentrations of oxygen influence shelf-life and the taste of certain beverages. Due to the extraordinary low detection limit of 1 ppb dissolved oxygen and outstanding accuracy of PreSens trace oxygen sensors, the quality of oxygen-sensitive products such as beer, wine and soft drinks is secured.

The optical sensors have – compared to standard electrodes – a very fast response time and they are very easy to maintain.



## Long-term Measurements in Soil

PreSens offers dipping probes for oxygen measurement that does not consume oxygen. Due to their small dimensions they do not disturb the flow and mass-transport and consequently display the in-situ oxygen concentration. As mini-sensors from PreSens are long-term stable they can be implanted in soil for many years! With this new method the process of soil aeration, which is very critical for plant productivity, can be investigated.

*Dr. Heidi Heuberger, Technical University of Munich, Munich, Germany*



## Environmental Research – Investigation in Soil Filters

Due to the small outer dimension and mechanical robustness the oxygen dipping probe offers the possibility to measure the oxygen content in-situ in columns filled with filter sands during the flow of sewage (see picture on the left). The results show that a lack of oxygen stops the nitrification process.

Specifications	Sensor Type PSt3		Sensor Type PSt6	
	Gaseous & Dissolved Oxygen	Dissolved Oxygen	Gaseous & Dissolved Oxygen	Dissolved Oxygen
Measurement range	0 – 100% O <sub>2</sub> 0 – 1000 hPa	0 – 45 mg/L 0 – 1400 µmol	0 – 4.2% O <sub>2</sub> 0 – 41.4 hPa	0 – 1.8 mg/L 0 – 56.9 µmol
Limit of detection	0.03% oxygen	15 ppb	0.002% oxygen	1 ppb
Resolution	± 0.01% O <sub>2</sub> at 0.21% O <sub>2</sub> ± 0.1% O <sub>2</sub> at 20.9% O <sub>2</sub> ± 0.1 hPa at 2 hPa ± 1 hPa at 207 hPa	± 1.4 µmol at 283.1 µmol ± 0.14 µmol at 2.83 µmol	± 0.0007% O <sub>2</sub> at 0.002% O <sub>2</sub> ± 0.0015% O <sub>2</sub> at 0.2% O <sub>2</sub> ± 0.007 hPa at 0.023 hPa ± 0.015 hPa at 2.0 hPa	± 0.010 µmol at 0.03 µmol ± 0.020 µmol at 2.8 µmol
Accuracy	± 0.4% O <sub>2</sub> at 20.9% O <sub>2</sub> ; ± 0.05% O <sub>2</sub> at 0.2% O <sub>2</sub> ;		± 1 ppb or ± 3% of the respective concentration; whichever is higher	
Drift at 0% oxygen	< 0.03% O <sub>2</sub> within 30 days (sampling interval of 1 min)		< 2 ppb within 30 days (sampling interval of 1 min)	
Measurement temperature range	0 – 50°C		0 – 50°C	
Response time (t90)	< 6s	< 40 s	< 6s	< 40 s
<b>PROPERTIES</b>				
Compatibility	Aqueous solutions, ethanol, methanol			
No cross-sensitivity with	pH 1 – 14 CO <sub>2</sub> , H <sub>2</sub> S, SO <sub>2</sub> Ionic species			
Cross-sensitivity to	Organic solvents, such as acetone, toluene, chloroform or methylene chloride Chlorine gas			
Sterilization procedures	Steam sterilization Ethylene oxide (EtO) Gamma irradiation			
Cleaning procedures	Cleaning in place (CIP, 5% NaOH, 90°C, 194°F) 3% H <sub>2</sub> O <sub>2</sub> Acidic agents (HCl, H <sub>2</sub> SO <sub>4</sub> ), max. 4 – 5%			
Calibration	Two-point calibration with oxygen-free environment (nitrogen, sodium sulfite) and air-saturated environment		Two-point calibration in oxygen-free environment (nitrogen) and a second calibration value optimally between 1 and 2% oxygen	
Storage Stability	2 years provided the sensor material is stored in the dark (-10 – 60°C)			

## Transmitters and Accessories



**Fibox 3/Fibox 3-trace**  
Single-channel oxygen meter



**Oxygen exchange cap**  
OEC is designed for easy exchange



**OXY-10 mini/OXY-10 mini trace**  
10-channel oxygen meter



**Fibox 3 LCD/Fibox 3 LCD trace**  
Single-channel oxygen meter with LCD display



**OXY-4 mini/OXY-4 mini trace**  
4-channel oxygen meter



**OAD-25, Adapter for 25mm ports**  
The OAD-25 is used to connect all OIMs to 25 mm ports

Technical data can change without prior notice.

Bring to light what's inside. Ask our experts:

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