



## Dissolved Oxygen Measurement

### Dissolved Oxygen

Some oxygen is dissolved in practically every liquid. For example, at a temperature of 68 °F (20 °C) and an atmospheric pressure of 1013 mbar saturated water contains about 9 mg/l oxygen. Ethanol can contain up to 40 mg/l whereas glycerol only has about 2 mg/l.

Each liquid takes up oxygen until the partial pressure of oxygen in the liquid is in equilibrium with the air or gas phase in contact with it. The actual oxygen concentration depends on a number of factors, such as temperature, air pressure, oxygen consumption by microorganisms in a biodegradation process or oxygen production by algae, etc.

**The oxygen concentration is important for the:**

- **Living conditions for fish and microorganisms in waters**
- **Degradation processes in wastewater treatment**
- **Corrosion processes in pipelines**
- **Shelf life of beverages, etc.**

The determination of the oxygen concentration was formerly carried out by the WINKLER titration method. Today electrochemical measurement is a recognized method in numerous standard procedures.

In its simplest form an oxygen sensor contains a working electrode and a counterelectrode. Both electrodes are located in an electrolyte system which is separated from the sample by a gas-permeable membrane. The working electrode reduces the oxygen molecules to hydroxide ions. In this electrochemical reaction a current flows from the counterelectrode to the working electrode. The more oxygen present in the sample, the larger the current signal. The oxygen meter calculates the oxygen concentration in the sample from this signal.

**Application range Oxygen Meters**

● recommended by WTW    ○ conditionally applicable    – not recommended

Application Range	inoLab®			Profiline Oxi 197i	Handheld Meters		
	Oxi 730	Oxi 740	BSB/ BOD 740		Oxi 315i	Oxi 330i	Oxi 340i
Routine measurement	-	-	-	-	●	●	-
Routine measurement with documentation	●	●	●	●	-	-	●
AQA with documentation	●	●	●	●	-	-	●
R&D high precision	●	●	●	●	-	●	●
Control measurements	●	●	●	●	○	●	●
LIMS connection	●	●	●	●	-	-	○
Quality assurance	●	●	●	●	-	●	●
Training	●	●	●	○	●	●	○
Service	-	-	-	●	●	●	●
Laboratory measurements	●	●	●	●	-	-	○
Field measurements	-	-	-	●	●	●	●
Depth measurements	-	-	-	●	-	-	-
External control/ PC connection/ PC control	● ● -	● ● ●	● ● ●	● ● -	-	-	● ● -
BOD measurements with self-stirring sensor	●	●	●	●	-	-	-
BOD measurements with assessment program	-	-	●	-	-	-	-
<i>see page</i>	30	31	62	32	33	34	34

For oxygen measurement with multi-parameter instruments see page 48

**Application Range Sensors**

Application Range	ConOx	DurOx®	CellOx® 325	StirrOx® G	TA 197 Oxi
BOD measurements	-	-	○	●	-
Fish farming	●	●	○	-	-
Surface waters	●	○	●	-	-
Ground water	○	-	○	-	●
Control measurements	●	●	●	○	-
Depth measurements	-	-	-	-	●
Laboratory measurements	○	-	●	○	-
Pharmaceutics	○	○	●	-	-
Biotechnology (non-autoclavable)	○	○	●	-	-
Wastewater treatment plant: aeration basin	○	●	○	-	-
<i>applicable instruments:</i>	<i>Multi 350i</i>	<i>Oxi 3xxi, Multi 350i</i>	<i>all</i>	<i>inoLab®, 197i</i>	<i>197i</i>



# Laboratory Oxygen Meters

Oxygen is one of the most frequently measured parameters in the laboratory. It plays a large role in the degradation of substances and the growth of microorganisms, both in environmental technology and in biotechnology.

The inoLab® Oxi 740 instrument is particularly suitable for monitoring such processes. For routine measurements the inoLab® Oxi 730 is equipped with all the necessary functions which are required for documentation according to GLP.

## inoLab® Oxi 730

**inoLab**  
innovations that make sense

- GLP documentation
- Comprehensive datalogging (800 data sets)
- Interface for self-stirring oxygen sensor StirrOx® G

### compact and communicative

Standard laboratory oxygen meter with large multifunctional display for routine use in the laboratory. Automated functions such as air pressure correction, temperature compensation and OxiCal® rapid calibration make work easier. Datalogger, analog and digital output RS 232 as well as the optional built-in printer guarantee QA-conform documentation.

### Features

- Simplified operator convenience
- Easy-to-clean touch-sensitive keypad
- Optional built-in printer

The StirrOx® G can be operated by the inoLab® Oxi 730 for BOD<sub>5</sub> determination according to DIN EN 1899-1 resp. DIN EN 1899-2 with manual start/stop functions.



## inoLab® Oxi 740



- Precision instrument
- Firmware/Softwareupdate
- External control (MultiLab® pilot)

### Features

- Built-in digital recorder
- Graphic evaluation possible
- Connection of bar-code reader or PC keyboard
- Automatic memory function if bar-code reader is used
- User Selectable Languages
- Multi-Level GLP Functions (password-protected operator levels)
- Limit input with acoustic alarm
- Free-of-charge software downloads for MultiLab® pilot or terminal

### inoLab® Oxi 740 with Terminal or PC Software: flexible and powerful

High-performance oxygen meter with graphic display and digital recorder function for oxygen measurement in the laboratory. Automated functions such as air pressure correction, temperature compensation by the IMT method and OxiCal® rapid calibration make work easier. The built-in measurement store, the digital output RS 232 and the optional built-in printer (paper width 4.4" resp. 112 mm) guarantee QA-conform documentation.



### Technical Data

Model	Oxi 730	Oxi 740
Range/Resolution	O <sub>2</sub> Conc. 0.00 ... 19.99 mg/l. 0.0 ... 90.0 mg/l* O <sub>2</sub> saturation 0.0 ... 199.9%. 0 ... 600%* O <sub>2</sub> part. pressure 0.0 ... 199.9 mbar. 0 ... 1250 mbar Temperatur 23 ... 122 °F (-5.0 ... +50.0 °C)	O <sub>2</sub> Conc. 0.00 ... 20.00 mg/l, 0.0 ... 90.0 mg/l* O <sub>2</sub> saturation 0.0 ... 200.0%. 0 ... 600%* O <sub>2</sub> part. pressure 0.0 ... 200.0 mbar. 0 ... 1250 mbar 23 ... 122 °F (-5.0 ... +50.0 °C)
Accuracy (±1 digit)	O <sub>2</sub> Conc. ±0.5% of value O <sub>2</sub> saturation ±0.5% of value Temperature ±0.1 K	
Temperature compensation	32 ... 122 °F (0 ... +50 °C) automatic via IMT compensation	
Salinity correction	Automatic from 0.0 ... 70.0 adjustable via display	
Calibration	OxiCal® rapid calibration in OxiCal®-SL	

### Ordering Information

inoLab® Laboratory Oxygen Meter SETs – with wide-range power supply 100-240 VAC (50/60 Hz) included	Order No.
inoLab® Oxi 730P With built-in printer, including CellOx® 325, passive multifunction box and accessories	1B21-0111
inoLab® Oxi 740 Including terminal, PC software, CellOx® 325 and accessories	1B30-0111



\* = depends on oxygen sensor and medium

# Portable Oxygen Meters

The WTW oxygen meter **ProfiLine Oxi 197i** supplied with integrated powerful NiMH rechargeable batteries is both hose-proof (IP 66) and submersible (IP 67). This easy to use meter conforms to GLP and has an 800 data point datalogger and accurate recorder output.

## ProfiLine Oxi 197i

- High-precision, indestructible, waterproof
- Recorder output corresponding to display
- Depths measurement down to 330 ft (100 m)

External control via PC with MultiLab® pilot. They are equipped with a carrying/support handle and carrying strap as standard. The Oxi 197i is suitable for depth measurements down to 330 ft (100 m) in combination with the TA 197 Oxi depth armature.

## TA 197 Oxi

Oxygen depth armature **TA 197 Oxi** with built-in temperature sensor, up to 100 m cable with waterproof plug (IP 67), pressure-resistant steel armoring with screw-off protective hood, fits into small bore-holes (2" dia.).



## BR 325

Battery-powered stirrer **BR 325** for profile and depth measurements.



### Technical Data

<b>Model</b>	<b>ProfiLine Oxi 197i</b>	
<b>Range/Resolution</b>	<b>O<sub>2</sub> Conc.</b>	0.00 ... 19.99 mg/l (19.9 mg/l*), 0.0 ... 90.0 mg/l (90 mg/l*)
	<b>O<sub>2</sub> saturation</b>	0.0 ... 199.9% (199%*), 0 ... 600%
<b>Accuracy (±1 digit)</b>	<b>O<sub>2</sub> Conc.</b>	±0.5% of value
	<b>O<sub>2</sub> saturation</b>	±0.5% of value
	<b>Temperature</b>	±0.1 K
<b>Air pressure compen.</b>	Automatic with built-in pressure sensor (500 ... 1100 hPa)	
<b>Temperature compen.</b>	<2% at 32 ... 104 °F (0 ... +40 °C)	
<b>Salinity correction</b>	Automatic from 0.0 ... 70.0, adjustable via display	
<b>Calibration</b>	OxiCal® rapid calibration in OxiCal®-SL or OxiCal®-D	

### Ordering Information

<b>Portable Oxygen Meters</b>		<b>Order No.</b>
<b>ProfiLine Oxi 197i</b>	Robust, waterproof, submersible oxygen meter	3B30-010



\* depends on oxygen sensor and medium  
**Depth armatures for measurements down to depths of 330 ft (100 m)**  
 see brochure "Product Details"

# Handheld Oxygen Meters

WTW handheld oxygen meters are available in three versions: Oxi 315i, Oxi 330i, Oxi 340i.

They are suitable for checking both oxygen values in the field and for laboratory measurements. In combination with galvanic oxygen sensors DurOx® 325 or CelloX® 325 (no polarization time required) the measuring system is ready for immediate use anywhere.

## Oxi 315i

- Robust, shockproof, waterproof
- Keypad with large, easy-to-operate silicone keys
- Extremely Long Battery Life

Simple, robust handheld meter with simplified keypad, without memory function and with no manual input facilities; in combination with DurOx® 325 with its protective hood it is particularly suitable for measurements in the fish-farming sector.



D.O. measurement with Oxi 315i and DurOx® incl. protection cap in fish farming



Parameter

pH

ORP

ISE

 Oxygen  
(D.O.)

Conductivity

 Multi-  
parameter

 BOD/  
Respiration

Photometers

Turbidity

 Colony  
Counter

 Software/  
Printers

## Oxi 330i, 340i

- Robust, shockproof, waterproof
- Keypad with large, easy-to-operate silicone keys
- Extremely long battery life

### Oxi 330i

Proven robust battery-operated handheld meter with manual input functions, built-in datalogger (800 data records), GLP-supporting functions, automatic temperature and air pressure compensation and salinity correction ...

### Oxi 340i

As Oxi 330i, but with additional analog and digital RS 232 output and optional line adaptor. External control via MultiLab® pilot software.



Oxi 340i with field armoring  
FM 325 (optional)

Oxi 330i with protective  
armoring  
SM 325 (optional)



complete as SET

## Technical Data

Model	Oxi 315i	Oxi 330i	Oxi 340i
Range/Resolution	O <sub>2</sub> Conc. 0.00 ... 19.99 mg/l (19.9 mg/l*) O <sub>2</sub> saturation 0.0 ... 199.9% (199%*) O <sub>2</sub> part. pressure 0 ... 600%	0.0 ... 90.0 mg/l (90 mg/l*)	
Accuracy (±1 digit)	Temperature -5.0 ... +50.0 °C O <sub>2</sub> Conc. ±0.5% of value O <sub>2</sub> saturation ±0.5% of value O <sub>2</sub> part. pressure - Temperature ±0.1 K	0.0 ... 199.9 mbar (199 mbar*), 0 ... 1250 mbar -5.0 ... +50.0 °C ±0.5% of value ±0.5% of value ±0.5% of value ±0.1 K	
Temperature compensation	2% at 32 ... 104 (0 ... +40 °C)		
Air pressure compensation	Automatic with built-in pressure sensor (500 ... 1100 hPa)		
Salinity correction	0 or 30 solid SAL	Automatic from 0.0 ... 70.0, adjustable via display	
Calibration	OxiCal® rapid calibration in OxiCal®-SL or OxiCal®-D		

## Ordering Information

Handheld Oxygen Meter SETs	Order No.
Oxi 315i Handheld oxygen meter, including DurOx® 325-3, professional case and accessories	2B10-0017
Oxi 330i Handheld oxygen meter, including CellOx® 325, professional case and accessories	2B20-0011
Oxi 340i Handheld oxygen meter, including CellOx® 325, professional case and accessories	2B30-0011
Universal wide-range power supply 100 V - 240 V 50-60 Hz; for 340i series	902 867



Other sensors in SET see brochure "Product Details"  
\* if DurOx® oxygen sensor is used

## Oxygen Sensors

- Galvanic sensors: immediately ready for measurement
- Equipped with protective hood for rough conditions
- Simple air calibration using calibration vessel

### DurOx® 325

only for handheld and field meters  
Oxi 3xxi/Oxi 197i and Multi 350i

Membrane covered galvanic oxygen sensor

- Temperature compensation
- Long working life – up to 6 months with one electrolyte filling
- Low approach flow
- Waterproof sensor (IP 68 – 2 bar)
- Incl. calibration vessel OxiCal®-D
- With protective hood SK-D as standard



### CellOx® 325

Membrane covered galvanic oxygen sensor

- Temperature compensation
- Up to 6 months usage of membrane
- High signal resolution
- Rapid response
- Waterproof sensor (IP 68 – 2 bar)
- Incl. calibration vessel OxiCal®-SL
- Membrane leakage monitoring



### StirrOx® G

for inoLab® Oxi 730, inoLab® Oxi 740 and ProfiLine Oxi 197i

Self-stirring oxygen sensor – simultaneous stirring and measurement

- Single-handed operation for rapid series measurements
- Constant approach flow for high reproducibility
- Extremely low self-consumption of oxygen – only 0.008 µg h<sup>-1</sup> (mg/l)<sup>-1</sup>
- Incl. calibration vessel OxiCal®-ST
- Temperature compensation
- Membrane leakage monitoring



## Accessories

Various calibration and storage vessels are available for oxygen sensors.

see brochure "Product Details".

## Ordering Information

Oxygen sensors (The sensor prices include the corresponding accessory case with spare parts and maintenance supplies)	Order No.
StirrOx® G Self-stirring oxygen sensor for oxygen determination in Karlsruhe bottles and Winkler bottles, with OxiCal®-ST calibration and storage vessel	201 425
CellOx® 325 Galvanic oxygen sensor with OxiCal®-SL calibration and storage vessel, waterproof plug, cable length 1.5 m	201 533
DurOx® 325-3 Galvanic oxygen sensor with OxiCal®-D calibration vessel, water proof plug, cable length 3 m	201 570

Calibration and storage vessels and other sensors and accessories see brochure "Product Details".