

# Lab and Field Instrumentation

pH · ORP · ISE · DISSOLVED OXYGEN · CONDUCTIVITY ·  
MULTI-PARAMETER · BOD/RESPIRATION · PHOTOMETRY · TURBIDITY



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# Dissolved Oxygen measurement



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# Applications and meters overview

The oxygen dissolved in water does not only play a crucial role for the organisms living in it, but is also an important factor in many technical processes. The dissolved oxygen measurement is actually a partial pressure measurement; the solubility depends on the partial pressure of the oxygen in the atmosphere above the liquid surface. It is measured either electrochemically with an amperometric sensor or optically via a fluorescence method with an optical dissolved oxygen sensor.

- ✓ yes
- yes
- ✓ recommended
- ✓ recommended for some applications
- not recommended

	Digital			Analogue	Digital			Analogue			
	Benchtop dissolved oxygen meters				Portable dissolved oxygen meters						
	inoLab® IDS			inoLab®	MultiLine® IDS			ProfiLine			
	Multi 9630	Multi 9620	Multi 9310	Oxi 7310	Multi 3630	Multi 3620	Multi 3510	Multi 3320	Oxi 3310	Oxi 3205	
2 parameters simultaneously	✓	✓			✓	✓		✓			
3 parameters simultaneously	✓				✓						
Dissolved oxygen optical	●	●	●		●	●	●				
Gelöster Sauerstoff galvanisch				●				●	●	●	
Additional parameters	●	●	●		●	●	●	●			
Routine measurement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Routine measurement with documentation	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
AQA with documentation	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
R&D High resolution and precision	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
Control measurements	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
LIMS connection	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
Quality assurance	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
Education	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Service	–	–	–	–	✓	✓	✓	✓	✓	✓	
Laboratory measurements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Field measurements	–	–	–	–	✓	✓	✓	✓	✓	✓	
Depth measurements	–	–	–	–	✓	✓	✓	–	–	–	
PC connection	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
Memory	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
USB interface	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	
Graphic display			✓	✓				✓	✓	✓	
Color graphic display	✓	✓			✓	✓					
	Compatible sensors										
	Digital IDS electrodes										
IDS Optical dissolved oxygen sensor	33	✓	✓	✓		✓	✓	✓			
	Analogue electrodes										
Dissolved oxygen sensors	92				✓			✓	✓	✓	
Self-stirring dissolved oxygen sensor	93				✓						
		Multi 9630	Multi 9620	Multi 9310	Oxi 7310	Multi 3630	Multi 3620	Multi 3510	Multi 3320	Oxi 3310	Oxi 3205
	see page	40	40	41	88	44	45	46	49	91	91

# Benchtop dissolved oxygen meters

Dissolved oxygen is mainly used to determine the biochemical oxygen demand (BOD), but also as a parameter for other biological and chemical processes such as corrosion.

## inoLab® IDS – digital



Dissolved oxygen measurement with the new digital multi-parameter meters inoLab® IDS:

### inoLab® Multi 9630 IDS: Measure three parameters simultaneously

High-tech for demanding laboratory applications. The digital inoLab® multi-parameter meter for IDS sensors for parallel measurement of the same or different parameters. Up to three sensors can be connected. The optical sensor FDO® 925 is also suitable and approved for BOD measurement.



inoLab® Multi 9630 IDS

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### inoLab® Multi 9620 IDS: Measure two parameters simultaneously

As inoLab® Multi 9630 IDS, but up to two sensors can be connected.



inoLab® Multi 9620 IDS

see page 40

### inoLab® Multi 9310 IDS: Digital individual parameter solution

The new inoLab® Multi 9310 IDS is well suited for dissolved oxygen measurement in the laboratory. The IDS technology allows optimized measurements and efficient documentation in the simplest manner.



inoLab® Multi 9310 IDS

see page 41

# inoLab® - analogue

All benchtop meters are available in application-oriented sets including sensors and accessories.



**inoLab**  
innovations that make sense



inoLab® Oxi 7310

## Technical specifications: Benchtop oxygen meter inoLab® Oxi 7310

inoLab® Oxi 7310 (all values ±1 digit)	
<b>Concentration</b>	0.000 ... 20.00 mg/l ± 0.5 % 0 ... 90 mg/l ± 0.5 %
<b>Saturation</b>	0.0 ... 200.0 % ± 0.5 % of measured value 0 ... 600 % ± 0,5 % of measured value
<b>Partial pressure</b>	0 ... 200,0 hPa, 0 ... 1250 hPa
<b>Temperature</b>	-5.0 ... 105.0 °C ± 0.1 °C
<b>Celsius/Fahrenheit</b>	Yes
<b>AutoRead</b>	Can be switched automatically/manually
<b>Calibration</b>	Calibration against external standard
<b>Calibration memory</b>	retrieve up to 10 calibrations
<b>Built-in pressure sensor</b>	Yes
<b>Display</b>	LCD graphics, backlit
<b>Data memory</b>	Manual 500/5000 automatic
<b>Logger</b>	Manually/time-controlled
<b>Interface</b>	Mini USB
<b>Printer (optional)</b>	Thermal printer, width 58 mm
<b>Power Supply</b>	Universal power supply 100 to 240 V, 50/60 Hz, 4 x 1.5 V AA or 4 x 1.2 V NiMH battery pack

## inoLab® Oxi 7310: reliable documentation of dissolved oxygen



inoLab® Oxi 7310P (with built-in printer)

- **USB interface for rapid data transfer**
- **Data output in \*.csv-Format or via optionally built-in printer**
- **Calibration against external standard possible**

The inoLab® Oxi 7310 is perfectly suited for precision measurement and automatic GLP/AQA compliant documentation in quality laboratories of all industries. The meter has a special connector for the connection of the self-stirring dissolved oxygen sensor StirrOx® G. Also available with optionally built-in printer.

### Reliable measurement

- Repeatable measurement results due to active automatic AutoRead function with detection of stable measuring values
- Easy calibration in water vapour saturated air
- Graphic display with clear text menus for convenient and safe operation

### GLP/AQA compliant documentation

- Alphanumeric input of the electrode serial number
- Transfer of all data in \*.csv format via USB interface at the PC, formatted takeover into Excel (MultiLab® Importer)
- Output possible via optionally built-in printer

### Flexible and high performance:

- Measures partial pressure, concentration and saturation
- Salinity correction
- Storage for large measurement series
- Connection for self-stirring dissolved oxygen sensor StirrOx® G



## Order information: Benchtop dissolved oxygen meters

Model	Description	Bestell-Nr.
<b>inoLab® Oxi 7310 SET 1</b>	Professional, menu-controlled benchtop D.O. meter for GLP/AQA-compliant measurements/documentation. Set with galvanic oxygen sensor CellOx® 325 and accessories.	1BA301
<b>inoLab® Oxi 7310 SET 4</b>	Professional, menu-controlled benchtop D.O. meter for GLP/AQA-compliant measurements/documentation. Set with self-stirring galvanic oxygen electrode StirrOx® 325 and accessories.	1BA304
<b>inoLab® Oxi 7310P</b>	Professional, menu-controlled benchtop D.O. meter for GLP/AQA-compliant measurements/documentation with built-in thermo printer.	1BA300P

Further articles see price list or [www.WTW.com](http://www.WTW.com).

# Portable dissolved oxygen meters

The oxygen measurement plays a large role in mobile environment analytics. Portable systems are used in the water wastewater treatment plant for monitoring stationary measurement, fish farming, in limnology and many other fields.

## MultiLine® IDS - digital



Portable optical dissolved oxygen measurement with the new digital MultiLine® multi-parameter meters:



MultiLine® Multi 3630 IDS

### Multi 3630 IDS: Measure three parameters simultaneously

Three galvanically isolated measurement channels, can be freely combined for the same or different parameters. It also allows oxygen measurement in conjunction with a depth sonde of the MPP IDS type.

*see page 44*



MultiLine® Multi 3620 IDS

### Multi 3620 IDS: Measure two parameters simultaneously

Two galvanically isolated measurement channels, can be freely combined for the same or different parameters. Measures dissolved oxygen also in connection with other parameters.

*see page 45*



MultiLine® Multi 3510 IDS

### Multi 3510 IDS: Digital single parameter solution

The single channel multi-parameter meter Multi 3510 IDS is ideally suited for portable dissolved oxygen measurement in wastewater treatment plants, surface waters and industrial applications.

*see page 46*

## ProfiLine - analogue



ProfiLine Multi 3320

### ProfiLine Multi 3320: The environment specialist

Dissolved oxygen, pH/ORP, ISE and conductivity: the Multi 3320 is a perfect meter for environmental monitoring with electrochemical sensors. Especially in combination with the dissolved oxygen, applications can be covered in surface water, in fish farming and in wastewater treatment plants.

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# ProfiLine – analogue

All analogue ProfiLine oxygen meters are also available in application-oriented carrying case kits.



ProfiLine Oxi 3310 Set 1



## Technical specifications: ProfiLine portable oxygen meters

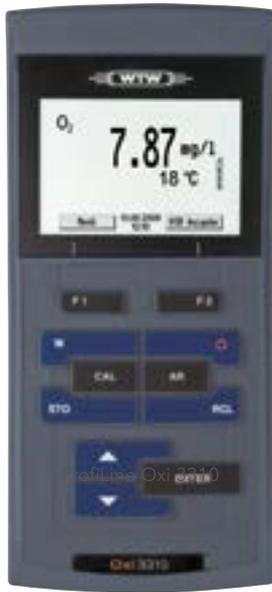
Models	Oxi 3205	Oxi 3310
<b>Measuring ranges/ Dissolving/ accuracy</b>	O <sub>2</sub> conc. 0.00 ... 20.00 mg/l (20.0 mg/l*) ±0.5 % of measured value O <sub>2</sub> saturation 0 ... 90 mg/l ±0.5 % of measured value O <sub>2</sub> partial pressure 0.0 ... 200.0 % (200 %*) ±0.5 % of measured value temperature 0 ... 600 % ±0.5 % of measured value 0,0 ... 200.0 mbar (200 mbar*) ±0.5 % of measured value; 0 ... 1250 mbar ±0.5 % v. Mw. -5.0 ... +105.0 °C ±0.1 °C	
<b>Temperature compensation</b>	Better than 2 % at 0 ... +40 °C	
<b>Air pressure compensation</b>	Automatic with integrated pressure sensor (500 ... 1100 mbar)	
<b>Salinity correction</b>	0 or 35 fixed	
<b>Calibration</b>	OxiCal® fast calibration in OxiCal®-SL or OxiCal®-D	
<b>Data memory/logger</b>	-	manual 500/5000 automatic
<b>Display</b>	LCD graphics, backlit	
<b>Continuous operation</b>	Up to 800 h without/100 h with illumination	

## Order information: ProfiLine portable oxygen meters

Model	Description	Order no.
<b>Oxi 3205 Set 1</b>	Robust and waterproof oxygen meter in a carrying case kit with galvanic dissolved oxygen sensor CellOx® 325 and accessories	2BA101
<b>Oxi 3310 Set 1</b>	Professional, waterproof oxygen meter with data logger and USB interface in the carrying case with galvanic dissolved oxygen sensor CellOx® 325 and accessories	2BA301

For additional products, see price list or [www.WTW.com](http://www.WTW.com)

## ProfiLine Oxi 3310: Measure and document dissolved oxygen



ProfiLine Oxi 3310

The Oxi 3310 is a robust portable meter with built-in data logger for recording series of measurements.

### Reliable measurements

- Repeatable measuring results due to automatic AutoRead function
- Automatic barometric pressure compensation
- Silicon keyboard with tactile key click and acoustic feedback

### GLP/AQA compliant documentation

- Data transfer in \*.csv format via USB interface at the PC
- Formatted takeover into Excel (MultiLab® Importer, included in the delivery or as a download)

### Flexible and high performance:

- Measures partial pressure, concentration and saturation
- Built-in salinity correction
- Memory for large measurement series

- **Waterproof USB interface for rapid data transfer**
- **Data output in \*.csv-Format**
- **Calibration against external standard possible (Winkler titration)**

## ProfiLine Oxi 3205: Measure dissolved oxygen in a simple manner



ProfiLine Oxi 3205

The Oxi 3205 is a easy, reliable meter for routine measurement

- Repeatable measurement results due to active automatic AutoRead function with detection of stable measuring values
- Simple operation: Automated functions reduce the number of keys (6)
- OxiCal® Air calibration
- Waterproof 8 pin socket for measurements under outdoor conditions

- **Compatible with CelOx® and DurOx® probes**
- **Backlit graphics display**
- **Automatic barometric pressure compensation**

# Dissolved oxygen sensors

## IDS optical dissolved oxygen sensor–digital

Optical measurement is the most advanced method of determining dissolved oxygen. Using fluorescence quenching as described in DIN ISO 17289, the fluorescence signal of special dyes changes as a function of the oxygen concentration. This is measured, and converted to dissolved oxygen concentration. The method is described in DIN ISO 17289.

The optical dissolved oxygen sensor is only available in the IDS system, and is described in the multi-parameter measurement chapter.



FDO® 925/FDO® 925-P

see page 33

## Galvanic dissolved oxygen sensors – analogue

The electrochemical method is the second currently used method for measuring the dissolved oxygen. It measures oxygen proportional to the current signal of a polarographic or galvanic dissolved oxygen sensor according to DIN ISO 5814.

- **Universal application due to wide measuring range between 0 and 50 mg/l**
- **Easy handling through proven technology**
- **Sensors available for special applications (fish farming, BOD measurement)**
- **Simple calibration in water vapour saturated air (calibration vessel included)**

### Technical specifications: Galvanic dissolved oxygen sensors - analogue

	<b>CellOx® 325</b>	<b>DurOx® 325-3</b>	<b>StirrOx® G</b>
<b>Order no.</b>	201533	201570	2013425
<b>Method</b>	Electrochemical/galvanic	Electrochemical/galvanic	Electrochemical/galvanic
<b>Response time T99 (20 °C)</b>	< 60 s	< 125 s	< 45 s
<b>Measuring range</b>	<b>Concentration</b>	0 ... 50 mg/l	0 ... 50 mg/l
	<b>Saturation</b>	0 ... 600 %	0 ... 600 %
	<b>Partial pressure</b>	0 ... 1250 hPa	0 ... 1250 hPa
<b>Temperature</b>	0 ... 50 °C	0 ... 50 °C	0 ... 50 °C
<b>Shaft material</b>	POM, stainless steel	POM, stainless steel	POM, stainless steel
<b>Shaft length</b>	145 mm	110 mm	49 (83) mm
<b>Diameter</b>	15.3 mm	17.5 mm	12 mm
<b>Cable length</b>	1.5 m (further cable lengths see price list)	3 m	2 m



CellOx® 325



DurOx® 325



StirrOx® G

### CellOx® 325

This universal galvanic dissolved oxygen sensor with IMT temperature compensation can be used both in the laboratory and in the field. It is available in versions with cable lengths up to 20 m.

### DurOx® 325

Thanks to a special membrane technology, this well-priced galvanic dissolved oxygen sensor is particularly insensitive to strongly fluctuating measured values, for example when testing stationary oxygen meters in the wastewater process. Also suitable for training purposes.

### StirrOx® G

Special dissolved oxygen sensor for the BOD (biochemical oxygen demand) measurement. With a motor-operated stirring paddle for mixing the samples and flow to the sensor. This probe features extremely low intrinsic oxygen consumption and built-in membrane monitoring.

## Order information: Accessories for analogue galvanic dissolved oxygen sensors

Model	Description	Order no.
ZBK-D	Accessories box with replacement and maintenance kit for DurOx® sensors.	201578
ZBK 325	Replacement and maintenance kit for dissolved oxygen sensors CellOx® 325	202706
ZBK ST	Accessories box with replacement and maintenance kit for dissolved oxygen sensors StirrOx® G.	202710
WP 90/3	3 changeable membrane heads suitable for all dissolved oxygen sensors, except StirrOx® G, DurOx® 325	202725
WP3-ST	3 changeable membrane heads for StirrOx® G	202738
WP3-D	3 changeable membrane heads for DurOx® sensors.	202740
RL-G	Cleaning solution for galvanic dissolved oxygen sensors StirrOx® G, CellOx® 325, DurOx® 325 and TA 197 Oxi, 1 bottle of 30 ml	205204
ELY/G	Electrolyte for galvanic dissolved oxygen sensors StirrOx® G, CellOx® 325, DurOx® 325	205217
SC-FDO® 925	Replacement membrane cap for optical dissolved oxygen sensor	201310

For additional products, see price list or [www.WTW.com](http://www.WTW.com)