



## BOD measurements/Respiration

### Biological Oxygen Demand

**BOD measurement according to EN 1899-1 and EN 1899-2 and for self-checks**

Biological Oxygen Demand (BOD) is an important parameter in water resource management. BOD is a parameter used to measure the quality of water and treatment results in wastewater. In addition, BOD analysis potential is used in the planning and design wastewater treatment facilities.

In routine use BOD determination is used to check the wastewater in the inflow and discharge of wastewater treatment plants. Depending on the measurement site and type of wastewater the BOD value can lie between a few mg/l and several thousand mg/l. Several methods are available for carrying out the measurement.

**WTW offers various measuring systems for these methods.**

In “dilution BOD” the oxygen content of a sample is measured with an oxygen sensor before and after an incubation period of 5 days. The difference between the measurements is the BOD<sub>5</sub> value; this is the official EPA method.

In “BOD self-checks” with the respirometer the reduction in oxygen causes a definite pressure difference which can be measured by a pressure sensor. This method is very easy to carry out and is a practical method.

Also both methods are very different, the measurements correlate for discharge analysis in municipal wastewater treatment facilities. Both methods requires the samples to be kept at 68 °F (20 °C) for 5 days. WTW offers a wide range of temperature controlled incubators.

### Depletion/Respiration

In the course of growing environmental consciousness, microbiological degradability tests have become increasingly important. These can be, for example, soil surveys from waste sites or environmental impact surveys for new chemical substances. The necessary respiration measurements for anaerobic or aerobic degradation can be easily carried out using the OxiTop®-C systems with excellent analysis. WTW offers a wide range of application specific packages with appropriate sample vessels.



inoLab® BSB/BOD 7400 with StirrOx® G



Oxi 1970i



OxiTop® IS 12



OxiTop® Control



Biogas determination



Soil respiration

<b>“Dilution BOD”</b>		
according to EN 1899-1/EN 1899-2; official EPA method		<i>see page</i>
with inoLab® BSB/BOD 7400	with easy-to-use analysis program, with PC control.	62
with ProfiLine Oxi 1970i	Recommended electrode: self-stirring oxygen sensor StirrOx® G	63

<b>“BOD self-check measurement”</b>		
worldwide approved method according to the self-check regulations		<i>see page</i>
OxiTop®	Simple routine measurement, mercury-free pressure measurement	66
OxiTop® Control	Routine, standard and special measurement, with automatic sample management	67

<b>Depletion/Respiration</b>		
Special measurements		<i>see page</i>
OxiTop® Control OC 110	Respiration	68/72
	Biogas determination	
	Soil respiration	
	Biodegradability	

<b>Accessories/Incubators</b>		
		<i>see page</i>
Upgrading and general Accessories		70
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# Dilution BOD

according to DIN EN 1899-1 and DIN EN 1899-2; official EPA method

## inoLab® BSB/BOD 7400 inoLab innovations that make sense

- Simple sample management
- Automatic BOD calculation
- EPA approved

### flexible and powerful

This laboratory oxygen meter has been specially developed for BOD<sub>n</sub> measurements. BOD measurements are determined by regulation EN 1899-1 and is **EPA approved**. You can store up to 7 of your own routines for frequently occurring dilution ratios. A maximum of 30 measuring samples each with 18 dilutions allow the management of up to 540 diluted samples. The inoLab® BSB/BOD 7400 can also be used as a conventional high-end oxygen meter (For technical data such as inoLab® Oxi 7400 refer to page 33). Additional memory and editing options are available when operated using the MultiLab® pilot. The entire measurement and sample management can thus be easily handled via PC.

In combination with StirrOx® G with its automatic start/stop function the inoLab® BSB/BOD 7400 is the ideal measuring system for routine oxygen measurement in the BOD<sub>5</sub> determination according to DIN EN 1899-1 and DIN EN 1899-2.

### Special features:

- BOD/depletion
- Determination of the biochemical oxygen demand according to DIN EN 1899-1
- Determination of oxygen depletion according to DIN 38 414 P6
- Up to 5 samples for dilution water
- Up to 30 measuring samples
- Up to 18 dilutions per measuring sample
- Up to 7 routines can be stored
- Adjustable incubation time, 5 ... 30 days



### Additional features when using the MultiLab® pilot:

- Management of an arbitrary number of samples
- Max. of 32 dilutions per measuring sample
- Max. of 32 dilution waters (blank solutions)
- Adjustable incubation period, 1 to 32 days
- Allocation of names for dilution waters, samples, diluted samples and routines (max. of 255 characters per name)
- Warning indication for BOD values that are too high or too low
- Calculations by mouse click
- Automatic protocols

## ProfiLine Oxi 1970i

- EPA approved method
- Accurate
- Battery and line power operation

Laboratory oxygen meter ProfiLine Oxi 1970i with self-stirring oxygen sensor StirrOx® G.



## StirrOx® G

Self-stirring oxygen sensor – simultaneous stirring and measurement

- Single-handed operation for series measurements
- Constant flow for high reproducibility
- Immediately ready for measuring – no polarization period required
- Extremely low self-consumption of oxygen – only  $0.008 \mu\text{g h}^{-1} (\text{mg/l})^{-1}$
- Zero-current free – no zero point calibration necessary
- With calibration and storage vessel OxiCal®-ST as standard
- Membrane life – Up to 6 months
- Temperature compensation with 2 built-in sensors
- Membrane leakage monitoring – damaged membranes are indicated



## Ordering Information

BOD measurement		Order No.
inoLab® BSB/BOD 7400P	High-end oxygen/BOD meter including terminal with built-in printer, active multifunction box, with self-stirring oxygen sensor StirrOx® G, wide range power pack and accessories	1H31-0114
ProfiLine Oxi 1970i	ProfiLine oxygen meter, extremely robust, hose-water proof (IP 66), RS 232 digital output, operation from mains supply or rechargeable batteries, with wide-range power supply with connection for self-stirring oxygen sensor StirrOx® G and CelloX® 325	1B30-0111
StirrOx® G	Self-stirring oxygen sensor for oxygen determination in Karlsruhe bottles, with OxiCal®-ST calibration and storage vessel and accessory case with spare parts and maintenance supplies	201 425

inoLab® BSB/BOD 7400:



ProfiLine Oxi 1970i:



For technical data such as inoLab® Oxi 7400 refer to page 31

Technical Data ProfiLine Oxi 1970i see page 32



# BOD self-check measurement

Respiration/Biogas Determination with OxiTop® and OxiTop® Control

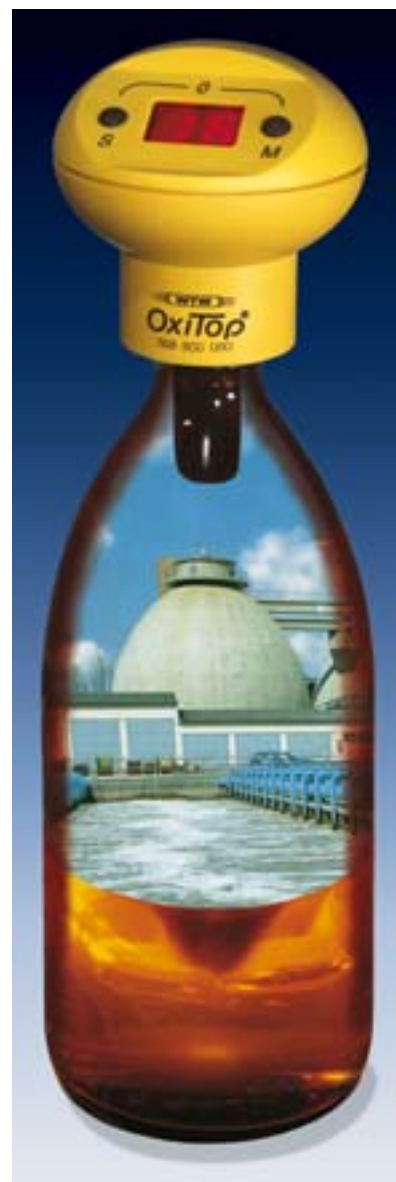
**OxiTop® & OxiTop® Control**

- Undiluted samples
- AutoTemp function for delayed start of cold samples
- Non-volatile memory of measured values

## Mercury-free measurement

Biochemical oxygen demand BOD determination is still one of the most important parameters in water resource management. It can be used to evaluate the impact of biodegradable substances in waters and wastewater. With its OxiTop® systems, WTW offers a unique, modular and mercury-free instrument system. It is not only suitable for BOD determination, but also for measuring biodegradability and depletion.

The advantages of **OxiTop®** and **OxiTop® Control**: simple operation, improved controllability and non-toxicity, and measuring ranges of up to 400 000 mg/l BOD (with OxiTop® Control OC 110). As the measured pressure is automatically converted the values can be directly read as mg/l BOD.



Application range			
	OxiTop®	OxiTop® Control OC 100	OxiTop® Control OC 110
Application	BOD routine	BOD routine, BOD standard	BOD routine, standard and BOD special, Respiration/Dilution, Soil respiration, Biodegradability, Biogas determination
BOD range	0 – 4.000 mg/l	0 – 4.000 mg/l	0 – 400,000 mg/l
Measured value memory	5 days	0.5 h – 99 days	0.5 h – 99 days
Pressure mode	—	—	Pressure p 500 – 1.350 hPa
Sample volume	Fixed	Fixed	Definable

# OxiTop® Complete Sets for 6 or 12 Measuring Vessels

The complete packages have been assembled so that they contain everything necessary to carry out the measurements. The make up of each package depends on the application and varies by number of vessels, controllers and utensils for sample preparation.

Special stirring platforms were developed in order to maintain a constant temperature and guarantee optimum oxygen distribution in the sample. These stirrer platforms have space for either 6 or 12 standard bottles or 6 large vessels for special applications.

### Applicable systems

- **BOD**  
OxiTop® IS 6 / IS 12  
OxiTop® Control 6/12
- **Soil respiration**  
OxiTop® Control B6M / B6
- **OECD / aerobic applications**  
OxiTop® Control A6 / A12  
OxiTop® Control S6 / S12
- **Biogas determination**  
OxiTop® Control AN 6 / AN 12
- **Microbial applications**  
OxiTop® Control AN 6 / AN 12  
OxiTop® Control A6 / A12

## Composition of complete packages



	OxiTop®	OxiTop® Control				
	IS 6/ IS 12	6 / 12	B6 / B6M / B6M 2.5	A6 /A12	S6 / S12	AN6 / AN12
<b>Accessories</b>	IS 6/ IS 12	6 / 12	B6 / B6M / B6M 2.5	A6 /A12	S6 / S12	AN6 / AN12
<b>Vessel with measuring head</b>	Amber bottle, 510 ml with rubber sleeve	Amber bottle, 510 ml with rubber sleeve	Duran bottle 500 ml / 1,0 l vessel / 2,5 l vessel; with adapter	1000 ml vessel / 250 ml vessel with adapter	Amber bottle, 510 ml with rubber sleeve	1000 ml vessel / 250 ml vessel
<b>Number</b>	6 / 12	6 / 12	6 / 6 / 6	6 / 12	6 / 12	6 / 12
<b>Measuring heads</b>	OxiTop®	OxiTop®-C	OxiTop®-C	OxiTop®-C	OxiTop®-C	OxiTop®-C
<b>Stirrer</b>	IS 6/IS 12	IS 6/IS 12	—	IS 6-Var/IS 12	IS 6/IS 12	IS 6-Var/IS 12
<b>Controller</b>	—	OC 100	OC 110	OC 110	OC 110	OC 110
<b>Software + Cable</b>	—	—	●	●	●	●
<b>CO<sub>2</sub> absorbent</b>	●	●	●	●	●	●
<b>Nitrification inhibitor</b>	●	●	—	●	●	●
<b>Overflow measuring flask</b>	164/432 ml	164/432 ml	—	—	—	—
<b>Stirrer bars</b>	6/12	6/12	—	6/12	6/12	6/12
<b>Stirrer bar remover</b>	●	●	—	●	●	●
<b>Blocks of chart paper</b>	●	●	—	—	—	—
<i>see page</i>	66	67	73	74	74	75

# BOD self-check measurement

## OxiTop® IS 6, IS 12

- High-precision
- 5-day automatic storage of measured values
- Mobile
- Extendable



OxiTop® IS 12

### Complete packages for 6 or 12 simultaneous measurements

Measurement using OxiTop® is based on pressure measurement in a closed system: microorganisms in the sample consume the oxygen and form CO<sub>2</sub>. This is absorbed by NaOH, creating a vacuum which can be read directly as a measured value in mg/l BOD.

The used sample volume regulates the amount of oxygen available for a complete BOD. Measurement ranges of up to 4,000 mg/l can be measured using different volumes.

The OxiTop® heads (green and yellow for differentiation of inflow/outflow) have an AutoTemp function: if the sample

temperature is too cold, the start of measurement is automatically delayed (by at least 1 hour) until a constant temperature has been reached.

Apart from the automatic storage of 5 measured values (1 value per day), further measured values can be read at all times during or after the period of 5 days, which permits the tracking of check values or measurements over longer periods.

Technical Data OxiTop®-C Measuring Head		
Measuring principle	Manometric with pressure sensor	
Measurement of	BODn	
Pressure range	500 - 1350 hPa	
Accuracy	±1% of value ±1 hPa	
Resolution	1 hPa (corresponds to 0.7% of BODn measuring range)	
Power supply	lithium batteries (280 mAh), 2 x CR2430	
Ambient temperature	Storage: -13 ... 149 °F (-25 ... +65 °C) Operation: 41 ... 122 °F (+5 ... +50 °C)	
Dimensions	H: 2.8 in (70 mm), Ø 2.8 in (70 mm)	
Ordering Information		
OxiTop® complete packages		Order No.
OxiTop® IS 6	Complete package, ready for use, for 6 simultaneous measurements, with IS 6 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 6 OxiTop® measuring systems, including accessories	208 210
OxiTop® IS 12-6	Complete package, ready for use, for 6 simultaneous measurements (extendable to 12 simultaneous measurements), with IS 12 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 6 OxiTop® measuring systems, including accessories	208 212
OxiTop® IS 12	Complete package, ready for use, for 12 simultaneous measurements, with IS 12 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 12 OxiTop® measuring systems, including accessories	208 211



Note: versions for 120 VAC/60 Hz see brochure "Product Details"

# BOD self-check measurement – for a larger number of samples

with simple sample management

## OxiTop® Control 6, Control 12

- Controller-driven
- Simultaneous measurement of up to 100 samples
- Statistical evaluation
- Automatic sample ID
- Worldwide approved method

### Complete package for 6 or 12 simultaneous measurements



OxiTop® Control is the logical further development of the successful OxiTop® system using software-controlled functions and infrared interface to communicate with a handy controller, the OC 100. This system enables the simultaneous and grouped start, management, storage and tracking

of 100 measuring heads via the controller and tracked on a large display with graphic evaluation. Data can be transferred to the PC for evaluation and documentation via the **AK-540/B** cable (order no. 902 842) and the communication program **Achat OC** (order no. 208 990).

Controller OC 110 in combination with the OxiTop® Control S6 / S12 is ideal for users with other applications apart from BOD (see page 74).



OxiTop® Control 12

### Check sampling progress!

The data can be called up at any time, even during sampling, thus enabling checking of the samples for errors. The display of the progress curve allows immediate detection of irregularities and interferences, such as a BOD value set too high for the volume used or undesired nitrification. Corrections can thus be made at an early stage.



Parameter

pH

ORP

ISE

Oxygen (D.O.)

Conductivity

Multi-parameter

BOD/Respiration

Photometers

Turbidity

Colony Counter

Software/Printers



## Controller OC 100/OC 110

### common features

- Simultaneous sample management with option of grouping up to 100 OxiTop®-C measuring heads.
- Data call-up of one parallel sample with statistical evaluation and as individual data.
- Automatic calculation and graphical display of BOD value.
- Data transfer even through glass doors.
- Protocol and documentation of data via Achat OC communication program in combination with a PC
- GLP and AQS with inspection intervals for calibration with the OxiTop® PM calibration tablets (see page 70: Accessories)



OxiTop® OC 100

## OxiTop®-C Measuring Head

- Instead of the display and keys, the OxiTop®-C measuring head has an infrared interface with which it communicates with Controller OC 100 or OC 110. By "pointing" the controller at an OxiTop®-C measuring head it can be identified and started, data can be called up or deleted and sampling progress can be displayed.
- Each measuring head has its own identification number; this means that manual identification of samples is no longer necessary, even for parallel samples. In addition, statistical evaluations can be easily performed for parallel samples.
- The OxiTop®-C measuring heads have an AutoTemp function for delaying the start of samples which are too cold by up to 4 hours. This mode can be deactivated for BOD standard.
- The measuring heads can store up to 360 data sets. Data are automatically stored in the corresponding interval according to the interval period set (0.5 h to 99 days).
- The built-in pressure sensor can register differences in pressure ranging from 500 to 1,350 hPa.



Application range/Technical Data OxiTop® Control		
	OxiTop® Control OC 100	OxiTop® Control OC 110
BOD routine	Individual samples up to 4,000 mg/l	Individual samples up to 4,000 mg/l
BOD standard	Parallel samples with statistical evaluation up to 4,000 mg/l	Parallel samples with statistical evaluation up to 4,000 mg/l
BOD special	—	Freely definable volumes, 0.5 h – 99 days, up to 400,000 mg/l BOD
Soil respiration	—	freely definable volume determination
OECD / Aerobic applications	—	freely definable volume determination
Biogas determination	—	Pressure p 500 - 1350 hPa 10 intermediate values
Data sets per measurement	180 ... 360 (depending on duration)	
Measurement period	0.5 h ... 99 days	
Power supply	3 mignon (AA); alkaline 1.5 V	
Interface	IR (infrared); RS 232 for communication with PC	
Ambient temperature	Storage: -13 °F ... 149 °F (-25 °C ... +65 °C), Operations: 41 °F ... 104 °F (+5 °C ... +40 °C)	
Dimensions	1.7 x 3.9 x 7.9 in (45 x 100 x 200 mm) (H x W x D)	
Weight	Approx. 390 g	

Technical Data OxiTop®-C Measuring Head	
Measuring principle	Manometric with pressure sensor
Measurement of	BOD <sub>n</sub>
Pressure range	500 - 1350 hPa
Accuracy	±1% of value ±1 hPa
Resolution	1 hPa (corresponds to 0.7% of BOD <sub>n</sub> measuring range)
Power supply	lithium batteries (280 mAh), 2 x CR2430
Ambient temperature	Storage: -13 ... 149 °F (-25 ... +65 °C) Operation: 41 ... 122 °F (+5 ... +50 °C)
Dimensions	H: 2.8 in (70 mm), Ø 2.8 in (70 mm)

Ordering Information		
OxiTop® Control		Order No.
OxiTop® Control 6	Complete package, ready for use, for 6 simultaneous measurements, with Controller OC 100 and IS 6 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 6 OxiTop®-C measuring systems, including 6 sample bottles, 6 rubber sleeves, 6 stirrer bars and other accessories	208 201
OxiTop® Control 12	Complete package, ready for use, for 12 simultaneous measurements, with Controller OC 100 and IS 12 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 12 OxiTop®-C measuring systems, including 12 sample bottles, 12 rubber sleeves, 12 stirrer bars and other accessories	208 204
OxiTop® Control S6/S12	Complete package with Controller OC110 and software	see page 74

OxiTop® Control:

Controller OC 100 & OC 110, OxiTop®-C Measuring Head:

For applications also refer to p. 72 – 75 Respiration/Depletion measurement

Note: versions for 120 VAC/60 Hz see brochure "Product Details"

# System Extensions and general Accessories

## OxiTop® Measuring Heads & SETs

### ... for Retrofitting

In order to meet the growing demand and the extension of potential applications, OxiTop® and OxiTop®-C systems are also available as individual items in different combinations, such as:

- Individual measuring heads OxiTop®/OxiTop®-C
- A set of two OxiTop® heads (yellow and green).
- Upgrade sets for a further 6 positions with 6 heads each and flasks, sleeves and stirring bars, as well as the stirring platform.



## Stirrers

### ... for BOD measurement

Stirrers IS 6 and IS 12 have been specially developed for BOD measurement with the OxiTop® system. Software-controlled speed regulation prevents the magnetic stirrer bar from getting caught or wobbling.

The speed is selected so that an optimal gas exchange with the sample takes place. The stirrer is maintenance-free and non-wearing as it contains no moving parts.

The IS 6-Var model has been specially developed for use with large measuring vessels and has space for 6 measuring vessels. Its outer dimensions are identical to those of the IS 12.

Stirrer IS 6 and IS 12



IS 6-Var

# Testing Aids for the OxiTop® system for Quality Control

Two testing aids are available for monitoring measurement and checking system leakage, which can be called up during a corresponding time interval using the AQA function in the controller.

## OxiTop® PM

These calibration tablets simulate a complete BOD and perform quantitative monitoring of measurement (approx. 308 mg/l, batch-dependent) as well as checks for leakage over the entire period.

## OxiTop® PT

This testing aid performs a "quick" check for under-pressure and leakage. The OxiTop® contains the pressure table required for the individual place of installation. OxiTop®-C automatically includes these values.

# General Accessories

## Storage racks

For safe storage of OxiTop® measuring systems and OxiTop®-C measuring heads, for 6 measuring heads each.



## Marking rings

For identification of BOD bottles for OxiTop® instruments.

## Overflow measuring flasks

... in different standard sizes for OxiTop®

Apart from the supplied 164 ml and 432 ml overflow measuring flasks contained in the standard scope of supply, the following sizes are also available: 22.7 ml, 43.5 ml, 97 ml, 250 ml, 365 ml.



Parameter

pH

ORP

ISE

 Oxygen  
(D.O.)

Conductivity

 Multi-  
parameter

 BOD/  
Respiration

Photometers

Turbidity

 Colony  
Counter

 Software/  
Printers

## Technical Data Stirrers

Model	IS 6	IS 12	IS 6-Var
No. of stirring positions	6	12	6
Stirrer speed	Program-controlled 180 ... 450 min <sup>-1</sup>		
Ambient temperature	Lagerung: -25 °C ... +65 °C Betrieb: +5 °C ... +40 °C		
Dimensions (H x W x D in mm)	67 x 265 x 181	67 x 350 x 266	67 x 265 x 181

Please refer to the brochure "Product Details" for a precise listing of all available components.  
Ordering Information for accessories and spare parts

# Depletion/Respiration with OxiTop® Control OC 110

The investigation and monitoring of biological cleaning treatment processes are becoming more and more important with respect to the environmental requirements such as wastewater treatment, soil remediation and waste treatment.

Biological tests are often in the foreground as well as the usual physical-chemical measuring methods. In order to determine the biodegradability of foodstuffs, pollutants, harmful substances or waste substances and the microbial activity so-called respiration (depletion) measurements are often carried out. In these measurements the respiration of the organisms is determined under defined conditions as the oxygen uptake or release of carbon dioxide.

Measurements are carried out via closed systems using the OxiTop®-C in combination with the OC 110 controller. Depending on the field of use, specially adapted measuring vessels, which are all equipped with the necessary connection thread and some of which are autoclavable, come into operation. For this task there are various complete packages available which come equipped with all required utensils.

For the incubation of larger measuring vessels, WTW offers the TS 1006-i thermostat cabinet as well as the IS 6-VAR stirrer platform, which has been specially designed for vessels with large base diameter.



Depletion/Respiration		
	Applications and Procedures	Measuring
<b>Soil respiration</b>	Soil analysis/ biodegradability of pollutants: laboratory method according to DIN 19 737	Aerobic using CO <sub>2</sub> absorption, quantitative CO <sub>2</sub> determination possible
<b>Biodegradability</b>	Determination according to OECD 301 F / DIN EN 29 408 / ISO 9408	Aerobic using CO <sub>2</sub> absorption
<b>Biogas determination</b>	Determination of anaerobic degradation processes	Anaerobic, determination of CO <sub>2</sub> + Methane
<b>Microbiology</b>	Growth and stress investigations: determination of the respiration rate	Aerobic, warning pressure possible



# Determination of soil respiration

Laboratory method for determining the microbial soil respiration according to DIN 19 737.

## OxiTop® Control B6/BM6

- Simple and precise
- Cost-efficient
- Optimum measuring vessels for subsequent quantitative determination of CO<sub>2</sub>

Soil respiration measurements are used for forecasting, surveying and checking remediation work, for biodegradability measurements of substances (pesticides, fungicides, fertilizers, etc.) as well as for carrying out toxicity tests.

This determination is possible with the OxiTop® Control System and special, practically-tested measuring vessels in a very accurate, simple and favorably-priced way.

The expenditure for personnel and apparatus is considerably reduced when compared with conventional methods.

Soil respiration measurements can be carried out in 2 different types of vessel.

For actively respiring soils with strong CO<sub>2</sub> development the MG 1.0 measuring vessel is recommended: its large opening (approx. 3.9 in / 100 mm dia.) means that it can be easily used with large-volume CO<sub>2</sub> absorber vessels for afterwards quantitative CO<sub>2</sub> determination.



Example of application using PF/45... sample vessels



Example of application using MG/... measuring vessels

## Ordering Information

OxiTop® Control	Complete soil respiration package	Order No.
OxiTop® Control BM6	Package for soil respiration (aerobic) with 6 MG 1.0 measuring vessels, 1000 ml, with stopper adapters for OxiTop®-C	208 232
OxiTop® Control B6	Package for soil respiration (aerobic) with 6 PF 45/500 sample vessels, 500 ml, Duran and 6 OxiTop® AD/SK adapters, autoclavable	208 230

# Determination of biodegradability

Laboratory procedures for determination of biodegradability according to DIN EN 29 408 / ISO 9408 / OECD 301 F

OxiTop® Control A6/A12

OxiTop® Control S6/S12



The determination of the biodegradability should be checked before “new” chemicals are used for the first time, not only for environmental reasons but also to minimize disposal charges.

The sample and a blank are stirred at a constant temperature for 28 days in closed bottles.

The CO<sub>2</sub> produced is removed from the gas space by means of an absorber so that the resulting negative pressure is a measure of the biodegradability.

The continuous recording of the values in the OxiTop®-C means that the required documentation can be guaranteed in an optimal manner.

The measuring bottles and adapters can be autoclaved at 249.8 °F (121 °C).

## Ordering Information

Model	Complete OECD packages	Order No.
OxiTop® Control A6	Package for aerobic applications with 6 x 1000 ml measuring units	208 220
OxiTop® Control A12	Package for aerobic applications with 12 x 250 ml measuring units	208 222
OxiTop® Control S6	Package for aerobic applications with 6 x 510 ml measuring units	208 196
OxiTop® Control S12	Package for aerobic applications with 12 x 510 ml measuring units	208 198

*Note: versions for 115 VAC/50/60 Hz see brochure “Product Details”*

# Biogas determination

Determination of anaerobic degradation processes: biogas determination

## OxiTop® Control AN6/AN12

Anaerobic degradation processes take place in the absence of oxygen. In order to be able to fill the gas space above the sample with inert gas the measuring bottle has a septum sealed nozzle. When anaerobic degradation has taken place the dissolved CO<sub>2</sub> can be driven off and then removed from the gas space by means of a CO<sub>2</sub> absorber. The resulting pressure difference is proportional to the CO<sub>2</sub> concentration, the remaining overpressure is proportional to the methane concentration.

The degradation process can be comfortably followed in the "pressure" operating mode.



# Determination of the Respiration Rate

Microbiological growth and stress investigations: determination of the respiration rate (aerobic/anaerobic measuring operation)

## OxiTop® Control AN6/AN12

## OxiTop® Control A6/A12

The use of special measuring bottles with a septum sealed nozzle allows the interference-free addition of substrates and solutions.

Pressure alterations could indicate a reduction in oxygen concentration, for example, which could make the addition of oxygen or air necessary (possibly other gases as well).

It is possible to set a "warning pressure" or a pressure limit so that the operator can carry out manipulations on the system.



The momentary pressure can be stored so that the manipulation is fully documented. The recording of measured values (max. 10 values) permits long-term measurement.

Ordering Information		
Model	Complete packages for microbiology	Order No.
OxiTop® Control AN6	Package for aerobic or anaerobic applications with 6 x 1000 ml measuring units	208 225
OxiTop® Control AN12	Package for aerobic or anaerobic applications with 12 x 250 ml measuring units	208 227
Model	Complete packages for aerobic measurements	Order No.
OxiTop® Control A6	Package for aerobic applications with 6 x 1000 ml measuring units	208 220
OxiTop® Control A12	Package for aerobic applications with 12 x 250 ml measuring units	208 222

Note: versions for 115 VAC/50/60 Hz see brochure "Product Details"

# Incubators

## OxiTop® Box

- Compact
- Precise
- Uniform temperature distribution

**Thermostat box with forced air circulation  
for 68 °F (tolerance 67.1 - 68.9 °F / 20 ±0.5 °C)**

OxiTop® Box is a benchtop model with hinged clear-view cover which can accommodate a maximum of either 12 OxiTop® simultaneous measurements or 20 Karlsruhe bottles.

The chamber is equipped with a connection for an IS 6 or IS 12 stirrer.

A special compartment is provided for thermostating 6 methylene blue samples.

The box is made of non-corrosive materials and the compressor is CFC-free.

A cross-flow fan ensures uniform temperature distribution.

The box has an automatic defrosting system with condensate evaporation.



*Example of an application:  
OxiTop® Box with OxiTop® Control 12*

## Technical Data

Model	OxiTop® Box
Temperature control	68 °F (tolerance 67.1 - 68.9 °F) (20 °C ±0.5 °C)
Ambient temperature	Storage: -13 ... +122 °F (25 °C ... +50 °C) Operation: +50 ... 89.6 °F (+10 °C ... +32 °C)
Power consumption	200 W
Dimensions (H x W x D)	14.76 x 16.73 x 23.62 in (375 x 425 x 600 mm)
Weight	Approx. 30 kg

## Ordering Information

BOD thermostat boxes		Order No.
OxiTop® Box	BOD OxiTop® Box, thermostat box with temperature-controlled forced ventilation for 230 V 50 Hz mains supply	208 432



*Note: versions for 115 V / 60 Hz see brochure "Product Details"*



## Thermostat Cabinets

- Versatile
- Powerful
- Inexpensive

To incubate samples at a constant, desired temperature during the reaction period, a thermostat cabinet is necessary. WTW offers thermostat cabinets in various sizes with a variably adjustable temperature range of 50 °F - 104 °F (10 °C - 40 °C) and a power supply of 230 V/50 Hz. Temperature accuracy lies at  $\pm 1$  °C deviation from the set temperature.

As the samples must be additionally stirred the thermostat cabinets are fitted with internal sockets to provide the stirrers with electricity. 2 – 4 shelves are available, according to the thermostat cabinet size, thus enabling simultaneous thermostating of up to 48 standard BOD samples, or equipping with 4 IS 12 or IS 6-Var stirrer platforms.

The largest model TS 1006-i is especially suited for special applications, as the compartment height between the 4 shelves leaves enough space for 1.5 l vessels or flasks with side nozzles.

The sizes TS 606/2-i aTS 606/4-i are available with transparent insulating glass doors and especially suited for use in combination with the OxiTop® Control system, as data



can be called up through the closed glass door. This has the advantage that temperature fluctuations caused by opening the door can be avoided.

### Technical Data

Model	TS 606/2-i	TS 606/3-i	TS 606/4-i	TS 1006-i
Shelves	2	3	4	4 widely spaced
Number of samples	2 x 12 BOD Standard	3 x 12 BOD Standard	4 x 12 BOD Standard	4 x 12 BOD Standard 4 x 6 special vessels
Glass door	Optional	—	Optional	—
Temp. control range	50 °F ... 104 °F (+10 °C ... +40 °C) $\pm 1$ K; Adjustment interval: 1 °C			
Ambient temperature	Operation: 50 °F ... 89.6 °F (+10 °C ... +32 °C) (Climate class SN); Storage: -13 °F ... 149 °F (-25 °C ... +65 °C)			
Gross contents	180 l	260 l	360 l	500 l
Dimensions (H x B x D in mm)	outside 850 x 602 x 600 inside 734 x 513 x 433	1215 x 602 x 600 1047 x 513 x 433	1589 x 602 x 600 1418 x 513 x 433	1515 x 755 x 715 1338 x 646 x 516
Weight	37 kg	45 kg	50 kg	72 kg

### Ordering Information

BOD thermostat cabinets – only available for 230 V/50 Hz		Order No.
TS 606/2-i	Thermostat cabinet for 2 BOD OxiTop® systems	208 380
TS 606/3-i	Thermostat cabinet for 3 BOD OxiTop® systems	208 382
TS 606/4-i	Thermostat cabinet for 4 BOD OxiTop® systems	208 383
TS 1006-i	Thermostat cabinet for 4 BOD OxiTop® systems	208 385



**1** Year  
Warranty

Other thermostat cabinet see brochure "Product Details"