

PRODUCT DATASHEET

BioMonitor™

Monitoring biological treatment processes.
Online measurements of BOD and ASR.



Highly Sensitive

Fast and Precise

Reliable

- Monitor biological treatment processes
- Built for efficient and economical control of aeration systems
- Fast results in 3-4 minutes
- A flexible 2-stream respirometer with a fast degradation

Reliable Water Monitoring Solution

Our LAR™ BioMonitor™ is an online water analyzer designed for continuous monitoring of organic and inorganic compounds (BOD – Biochemical Oxygen Demand) in water. It uses UV-VIS spectrometry and electrochemical sensors to measure various parameters in real-time, such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), total organic carbon (TOC), total nitrogen bound (TN_b), and total phosphorus (TP). The BioMonitor online water analyzer is commonly used in wastewater treatment plants, industrial process monitoring, and environmental monitoring. It can provide real-time data to operators, enabling them to optimize treatment processes and make informed decisions about plant operations.

Measurements

- Total Organic Carbon (TOC)
- Chemical Oxygen Demand (COD)
- Biochemical Oxygen Demand (BOD)
- Total Nitrogen Bound (TN_b)

Applications

- Industrial process water monitoring
 - Environmental protection
 - BOD monitoring
 - WWTP control
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Features/Benefits

In contrast to the standard BOD₅ method the BioMonitor measures the total BOD.

- Measurement range: 1-200.000 mg/l BOD, 0-100 % Toxicity, Respiration in mg O₂/l x min
 - Short-time monitoring of total BOD and Sludge Activity (ASR)
 - High reproducibility
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Advantages

The measurement of the BOD takes place in less than 4 minutes and therefore it is faster than the BOD₅ measurement, which requires 5 days.



- Monitoring of BOD and Sludge Activity allows to maintain maximum treatment performance
- BioMonitor reproduces most closely the treatment processes and delivers results within only 3-4 minutes (customizable)
- High degradation
- Sludge activity
- Reduced consumption of chemicals using the plant's own biomass
- No memory effects

Fast, Reliable Online Monitoring of BOD and ASR

Consistent Correlation to Standards

BioMonitor measures the total BOD including the oxygen demand for the nitrification as well as the activated sludge respiration (ASR) to monitor the sludge activity. The results allow a more consistent correlation ($r > 0,95$) to the standard methods for BOD₅ (DIN 38409-H51, APHA-AWWA-WPCF 5210 B, EPA).

Closely Replicates Actual Treatment Processes

With the BioMonitor the biological degradation processes take place at conditions quite like those of a wastewater treatment plant. The measured oxygen consumption delivers direct information about the oxygen demand of the plant's activated sludge. By optionally adding the nitrification inhibitor it may measure the BOD₅. However, as the BioMonitor determines the total BOD, it monitors the complete treatment process.

Multi-Step Respiration Measurement for Fast Results

Compared to systems with just one reaction vessel the BioMonitor is a flexible 2-stream respirometer with a fast degradation. With the multi-step construction even hard degradable substances are decomposed without any extra dilution - exactly like in the original treatment plant. The benefit of this unique measuring principle is the precise and fully continuous determination of the BOD in 3 - 4 minutes.

Simultaneous Measurement of ASR and BOD

The measurement of the activated sludge respiration (ASR) ensures not only the exact calculation of the BOD. The ASR provides also important information on the condition of the plant's own biomass (activated sludge) which is especially of importance for controlling and supervision. For Example: If the ASR is falling slowly, it may be an indication of a slow poisoning of the activated sludge by toxic substances.

Ease of Operations - Alarms & Alerts

The BioMonitor is equipped with a 10.4" touch screen display that allows clear graphical surveys of measured values. All graphics and results may be printed out through the printer interface or transferred to a PC. A remote control option is available. Also the electronics are separated from the analytical instrumentation for easy accessibility.

The BioMonitor online water analyzer can be used in conjunction with an automated sampler to collect water samples and perform measurements automatically. The analyzer can be set up to send alerts and alarms to operators when certain parameters exceed predetermined levels, allowing for timely corrective actions.

The Importance of Rapid Monitoring of BOD

Fluctuating wastewater volumes and unexpected load concentrations may disturb biological degradation, which may significantly reduce the treatment performance. For an effective biological treatment process its important to consider:

- How much is the sludge able to decompose?
- How high is the oxygen demand for this?
- How can an effective and efficient treatment be achieved?



Common BOD Method and its Limitations

In the first step of the BOD₅ measurement, the water sample is diluted with high oxygen water to ensure that there is enough oxygen. Then, for five days, the sample is incubated at 20°C (68°F) in the dark. The decomposition of nitrogen compounds is suppressed by adding allylthiourea (ATU).

The conditions of the BOD₅ measurement are internationally standardized and the method is commonly used at laboratories. Due to its long duration, the timely control and monitoring of wastewater is hardly realizable. Additionally, once a toxin appears, the whole measurement system may be affected making the complete replacement of the test organisms necessary.

Consequently, this lab method is not suitable for continuous online monitoring.



The Importance of Rapid Monitoring of BOD – Continued

Total BOD and Sludge Activity

The total BOD is the sum of cBOD and the oxygen demand of the nitrification. As the nitrification is an important part of the biological sewage treatment, it must be provided with sufficient oxygen in the aeration tank. Its monitoring cannot be neglected. As a result, the efficient and economical control of the aeration system can only be ensured by determining the oxygen demand for the nitrification as well - that is by monitoring the total BOD.

The sludge activity indicates the degradation potential of the plant's activated sludge. It can be disturbed significantly resulting in an insufficient treatment performance. Thus, its monitoring is essential for the effective treatment of wastewater.

BioMonitor the Rapid Measurement Solution

The BioMonitor helps operators maintain maximum performance of their treatment processes with an automated, online method. This provides the most useful data as quickly as possible. Using the plant's own activated sludge, it delivers direct information on the treatment processes.

Its design allows the reproduction of the processes within the sewage plant, guaranteeing the direct applicability of the gained results on the wastewater treatment plant's real process parameters. BioMonitor is the online respirometer that most closely reproduces the biological treatment processes.

Revolutionize Your Water Analysis with BioMonitor

- **Real-time monitoring:** Provides real-time data on multiple water parameters, enabling operators to quickly identify changes in water quality and take appropriate actions.
- **Multiple parameter analysis:** Can analyze multiple parameters simultaneously, reducing the need for multiple instruments and saving time and resources.
- **Automatic sampling and analysis:** Can be used in conjunction with an automated sampler to collect water samples and perform measurements automatically, reducing the need for manual sampling and analysis.
- **Regulatory compliance:** Can help ensure compliance with regulations by providing accurate and reliable data on water quality parameters.
- **Process optimization:** Helps optimize treatment processes by providing operators with real-time data to make informed decisions about plant operations.
- **Cost-effective:** Is a cost-effective solution for water analysis, reducing the need for multiple instruments and manual labor.



Principle of Operation

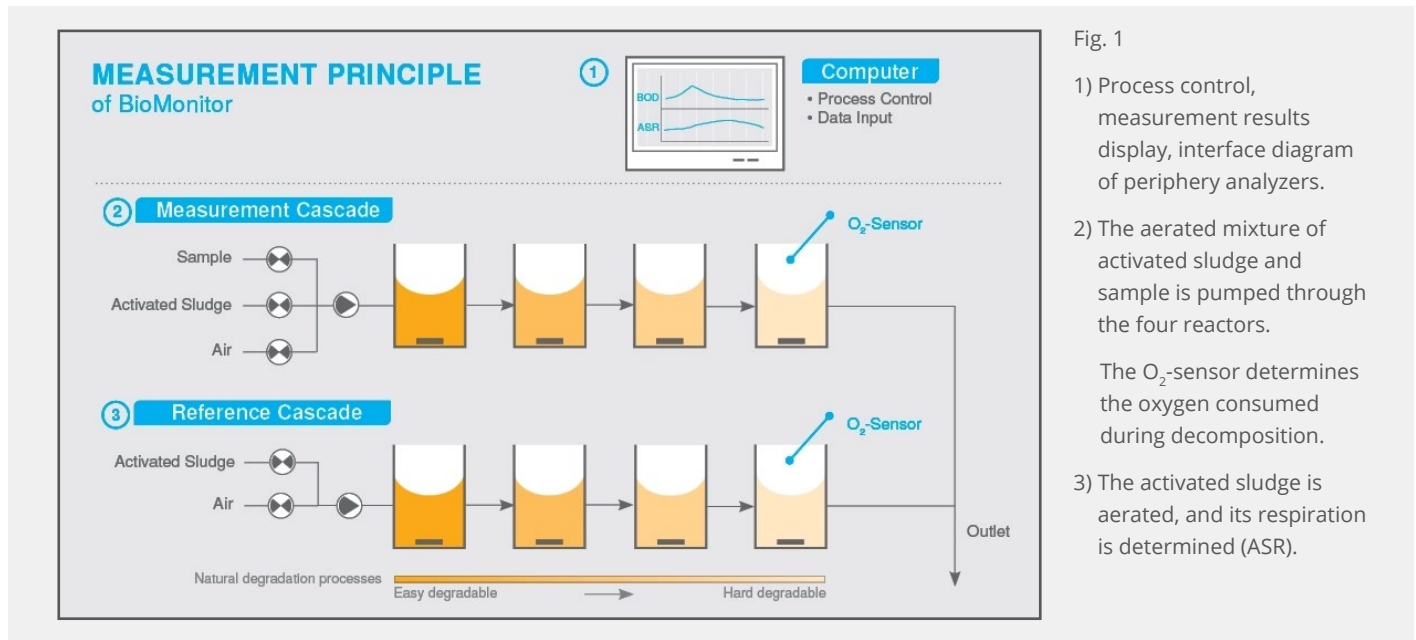


Fig. 1

- 1) Process control, measurement results display, interface diagram of periphery analyzers.
- 2) The aerated mixture of activated sludge and sample is pumped through the four reactors. The O₂-sensor determines the oxygen consumed during decomposition.
- 3) The activated sludge is aerated, and its respiration is determined (ASR).

Imitating the Natural Processes of a Wastewater Treatment Plant (WWTP)³⁴

The BioMonitor's measurement principle (Figure. 1) allows the reproduction of the processes within the sewage plant. The activated sludge, either supplied directly from the plant or circulating with the sludge recycling system, degrades the substances present in the wastewater. The oxygen required for this process is measured by a O₂-sensor. This process takes place in the measurement cascade which works exactly like an aeration tank.

Two Reactor Cascades, Four-Step Degradation

The two reactor cascades - measurement cascade and reference cascade - with four reactors each, ensure the extensive decomposition of the organic load as well as the monitoring of the activated sludge respiration (ASR). Both cascades are maintained by predefined conditions ensuring high reproducibility.

Imitating the Natural Degradation Processes

The four reactors allow the imitation of the natural degradation processes, whereby the easily degradable substances are decomposed first. The increasingly difficult to decompose substances will be gradually converted within the following reactors. At the end of the fourth reactor the degradation rate allows to draw conclusions about the biodegradability of the activated sludge.

Detecting the Oxygen Consumption

Within the measurement cascade both the activated sludge and the sample are aerated continuously. Simultaneously, within the reference cascade only the activated sludge is aerated. At the last reactor of each cascade the oxygen consumption is detected during the gas phase by use of O₂-sensors with exceptionally wide measurement ranges. In addition, having no contact to the wastewater these sensors are maintenance-free.

The Results

The measurement cascade delivers the total biochemical oxygen consumption (mg/l) and the reference cascade delivers the activated sludge respiration (ASR in mg/l/min). Subtracting the result of the total biochemical oxygen consumption from the ASR, the oxygen consumed for the biological degradation of the ingredients is determined. This measurement parameter is called Biological Oxygen Consumption (BOC in mg/l).

TECHNICAL DATA

Measurement Technique and Sample Preparation	
Measurement Method	Continuous 2-stream respiration measurement
Measurement Ranges	BOD: 1 - 50 mg/l, 1 - 200,000 mg/l, ASR: 0 - 5 mg/l/min
Sensitivity	1ppm
Oxidation Principle	Determination of oxygen consumption by reactor cascade using the plants activated sludge, measurement of the self consumption of the activated sludge
Accuracy	2% of FSR
Repeatability	2% of FSR
Cycle Time	Continuous determination
Response Time TOC	min. 3 - 4 minutes (application dependent)
Bacteria Culture	Original Activated Sludge
Accessories	Maintenance-free particle separator, Sludge recycling unit
Temperature and Humidity	
Permissible Sample Temperature	5 - 25 °C
Ambient Temperature recommended	10 - 25 °C
Ambient Air Humidity	Max. 80% (non condensing)
Dimensions and Weight	
Housings	IP 54
Dimensions	W 630 x H 862 x D 575 mm
Weight	90 kg approx.
Particle size	Soft particles max. 2mm
Electric and Hydraulic Specifications	
Inflow and Outflow	30 mm ID tube or threaded, 32 mm OD or as specified
Power Supply	230 /115 V~, 50 / 60 Hz, 100 VA
Analogue Output	0/4 - 20 mA
Serial Interface	RS 232, Combined alarms, Life-Zero, USB 2.0
Remote Control	Through TCP/IP Protocol (Internet)
Equipment Devices and Data Output	
High resolution and back-lit TFT touch screen graphic display, 10.4"	
Self explanatory software and service checklist; Autostart funktion	
Standard data interfaces, e. g. office PC	

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REVOLUTIONIZING MEASUREMENT

EVERYWHERE