BOD Measurement System
BD 600 & BD 600 GLP



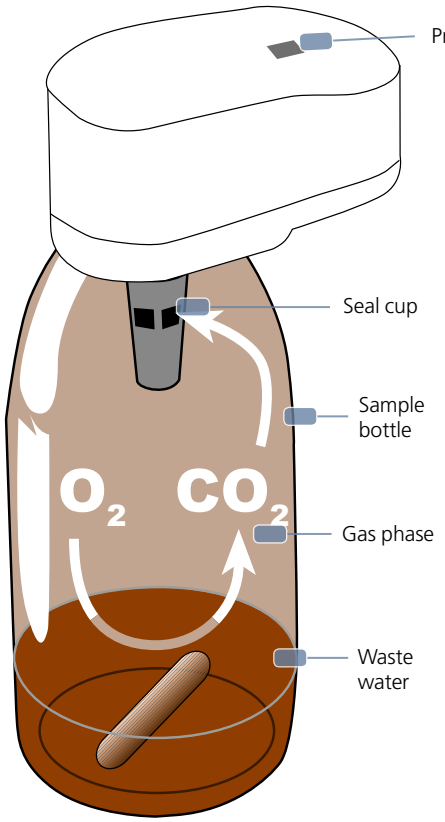
Accurate, automatic and direct control of your waste water samples

References

- APHA, AWWA, WEF Standard Methods 5210 D, OECD 301 F, 301 C, 302 C

Applications

- Waste Water
- Determination of Biological Activity
- Waste Water Treatment Plants
- Analytical Laboratories
- Science & Research



Biochemical Oxygen Demand (BOD)

BOD – biochemical oxygen demand – is an expression for the quantity of oxygen required for biological degradation of organic matter in a waste water sample. BOD measurement is therefore used as a basis for the detection of biologically degradable organic matter in water.
The difference between BOD and chemical oxygen demand (COD) is that COD additionally registers biologically non-degradable organic matter.

BOD measurement is therefore an important measurement of the effects of domestic and industrial waste water on sewage plants and outflow points.

Manometric, respirometric BOD measurement using the Lovibond® BD 600

The Lovibond® sensor system BD 600 is a 6 sample system that allows precise measurements of BOD based on the manometric principle. Manometric respirometers relate oxygen uptake to the change in pressure caused by oxygen consumption while maintaining a constant volume.
Thanks to the modern integral pressure sensors, it is no longer necessary to use mercury for pressure measurements.

Respirometric principle

Respirometric methods provide direct measurements of the oxygen consumed by microorganisms from an air or the oxygen-enriched environment in a closed vessel under conditions of constant temperature and agitation. Carbon dioxide produced metabolically by the bacteria is chemically bound by the potassium hydroxide solution contained in the sealed cup in the bottle.

The result is a pressure drop in the system, which is directly proportional to the BOD value and is measured by the BOD sensor. The BOD level is then displayed directly in mg/l.

The BOD values are stored automatically in the sensor memory in regular intervals and can be called up on the large-format display at any time without the need for time-consuming conversion using factors. This means that test series that end on a Sunday can be evaluated during the following week without any problem.
Measurement series can be stored on USB stick/SD card or transfered via the USB cable to evaluate the data on a computer.

The measurement period is user-selectable between 1 and 28 days to suit the application. While short measurement periods are useful for scientific applications, standard BOD measurements typically extend over a period of 5 days – and manometric determination of OECD, for example, generally takes place over a period of 28 days.

Evaluation of measurements

The BD 600 measuring system records a measurement once every hour, independent of the length of the measuring period. This way the quality of the series of measurement can be evaluated at an early stage. Current values and stored values may be called up at any time. Stored values can be displayed numerically or graphically. The table/graph on the left illustrates an example of BOD_5 evaluation. The development of BOD over a period of five days is easily seen.

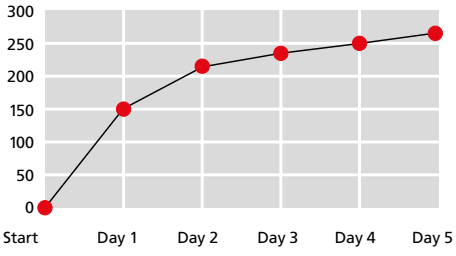
Complete measuring system

In addition to the BOD unit for the measurement and storage of BOD levels, the Lovibond® BD 600 BOD measuring system includes the sample bottles, measuring sensors, non-wearing inductive stirring system, overflow measuring flasks for metering of sample volumes, nitrification inhibitor and potassium hydroxide as an absorbent.

Automatic start function

Variations in sample temperature prior to testing result in pressure variations within the measuring system during the temperature equalisation period in the thermostatically controlled cabinet (if BOD measurement is to take place at 20°C, for example). Such variations would normally cause errors during manometric measurement. In order to prevent such errors, the Lovibond® BD 600 BOD meter is equipped with an automatic start feature:
measurement does not commence until the temperature in the samples is the same as that in the thermostatically controlled cabinet.
This rules out the possibility of temperature (and hence pressure) fluctuations that are not related to the manometric measurement.

Day	Display
1. Day	150 mg/l
2. Day	220 mg/l
3. Day	240 mg/l
4. Day	250 mg/l
5. Day	260 mg/l



BOD_5 Diagram



- Supports the requirements for GLP
- Suitable for BOD measurements and tests according to OECD 301F
- Protected, more permanent memory for all data over the lifetime of the instrument (1 GB)
- Long term tests of up to 90 days measurement duration possible
- Simplified data transfer to the PC via USB
- Graphical user interface

Technical data	BD 600	BD 600 GLP
Meas. principle	Manometric; mercury-free; electronic pressure sensor	
Ranges [mg/l O_2]	0 - 40, 0 - 80, 0 - 200, 0 - 400, 0 - 800, 0 - 2000, 0 - 4000 mg/l	
Applications	BSB_5, BSB_7	OECD 301 F, 301 C, 302 C
Display	128 x 240 Pixel, 45 x 84 mm backlit	Large graphic display
Measurement period	User-selectable, between 1 and 28 days	5, 28, 60 and 90 days
Auto result storage	Up to 744 results, depending on measurement period and amount of sample bottles	up to 50.000 measurements (1GB)
Storage interval	- hourly (1. day) - every 2 hours (2. day) - 1x daily (3.-28. day)	- every 2 hours (5 days) - every 12 hours (28 days) - every 24 hours (60 days) - every 24-48 hours (90 days)
Autostart function	equalisation of samples with a temperature of 15 to 21 °C, can be switched off	-
Power supply	3 alkaline-manganese batteries ("Baby" cells/size "C") or via power supply unit using y-cable with stirring unit	100 - 240 V / 50-60 Hz
Interface	USB-host port (USB-storage medium) USB-Instrument-Port (Computer) SD-card (for BD 600 GLP occupied)	
Clock	Real-time clock with date	
Dimensions (L x W x H)	375 x 181 x 230 mm including stirring unit	
Weight	ca. 4100 g, unit with bottles & batteries approx 5775 g, complete with stirring unit	
Approval	CE	

BD 600 GLP

(OECD 301 F, 301 C, 302 C)

Optimized for biodegradability tests under GLP requirements

The REACH provisions stipulate that every chemical with a production volume of more than one tonne / year must be registered and tested.
These tests follow precise guidelines and procedures, which, among other things, examine the residence time of chemicals in the environment. Therefore, the demand for tests for the measurement of biodegradability according to OECD standard 301F is correspondingly high. While performing these tests laboratories need to comply with GLP (Good Laboratory Practice) standards.

With the BD 600 GLP, we have developed a new system that combines modern design and up-to-date data exchange via USB with GLP-compliant data management and a lifetime of the instrument's protected resident memory (1 GB).
All settings and changes are registered and logged. Any manipulation is thus prevented, erasure of data is impossible. The sensor heads are validated and delivered with a test certificate.

Delivery Content

- **BD 600 (Order code: 2 44 44 60)** or **BD 600 GLP (Order code: 2 44 44 61),** complete unit with 6 sensors and control unit with batteries (BD 600 GLP with certificate)
- Power supply unit incl. Y-cable for common power supply of BD 600 and stirring unit
- 1 x remote control (without batteries)
- Inductive stirring unit
- 6 sample bottles
- 6 rubber gaskets
- 6 magnetic stirring rods
- 1 overflow flask, 157 ml
- 1 overflow flask, 428 ml
- 1 bottle, 50 ml potassium hydroxide solution
- 1 bottle, 50 ml Nitrifikationshemmstoff
- 1 instruction manual
- 1 x USB cable (BD 600 only)
- Warranty

BD 606 **Order code: 2 44 44 65**

- 2 x BD 600 complete unit with 12 sensor heads and control units with batteries
- 2 x Power supply unit incl. Y-cable for common power supply of BD 606 and stirring unit
- 2 x USB cable
- 2 x Inductive stirring unit
- 12 sample bottles
- 12 rubber gaskets
- 12 magnetic stirring rods
- 1 overflow flask, 157 ml
- 1 overflow flask, 428 ml
- 1 bottle, 50 ml potassium hydroxide solution
- 1 bottle, 50 ml nitrification inhibitor solution
- 1 instruction manual
- 1 x remote control (without batteries)
- Warranty

Accessories

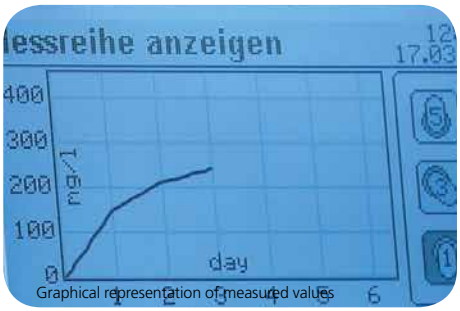
Item	BD 600	BD 600 GLP	Order code
BSB-Sensor	•		2 44 44 70
Sensor BOD GLP validated with certificate		•	2444470-GLP
Sensor validation with certificate		•	999610-GLP
BOD sample bottle, Brown glass, 500 ml	•	•	41 86 44
BOD sample bottle, Brown glass, 500 ml, set of 6 bottles	•	•	41 86 45
Inductive stirring system for 6 samples, 100-240 V / 50-60 Hz, incl. power supply	•	•	2 44 44 56
Power supply unit for inductive stirring system, 100 - 240 V / 50 - 60 H	•	•	44 44 54
Magnetic stir bar	•	•	41 86 33
Magnetic stir bar, 100 pc.		•	41 86 33-100
Stir bar remover	•	•	41 86 38
Rubber gasket 4,5 cm	•		41 86 36
Rubber gasket GLP 6,5 cm	•	•	41 86 76
Potassium hydroxide solution 45 %, 50 ml	•	•	2 41 86 34
Nitrification inhibitor (N-ATH) 50 ml	•	•	2 41 86 42
Overflow flask, 21,7 ml	•	•	41 86 64
Overflow flask, 56 ml	•	•	41 86 55
Overflow flask, 94 ml	•	•	41 86 56
Overflow flask, 157 ml	•	•	41 86 57
Overflow flask, 244 ml	•	•	41 86 58
Overflow flask, 360 ml	•	•	41 86 59
Overflow flask, 428 ml	•	•	41 86 60
Complete set overflow flasks	•	•	41 86 54
Test set, BOD CM test tablets, box with 10 tablets	•	•	2 41 83 28
USB cable 3 m	•	•	2 44 44 82
Y cable	•	•	2 44 44 75
Remote control	•	•	2 44 44 81


BOD Accessoires



BOD CM test tablets, order code: 2 41 83 28


Inductive stirring system



Graphical representation of measured values


Remote control

Test set for BD 600

We also supply a test set to check for the correct operation of the Lovibond® BD 600 BOD meter. The set contains 10 BOD CM1 test tablets that cause a defined oxygen consumption.

The tablets are easy to use. Simply place a tablet in the BOD bottle, start the measurement process, read off the BOD value after 5 days, and then compare with the defined value. If this value is within the quoted tolerance, this means that the BOD measuring system is functioning correctly.

Temperature equalisation during BOD measurement

Temperature equalisation is essential prior to biological testing, as temperature has a major effect on biological activity. BOD measurements, for example, are always performed in a thermostatically controlled cabinet at a temperature of 20°C.

For temperature equalisation, we recommend Lovibond® thermostatically controlled cabinets with a user-selectable temperature from 2°C to 40°C.