

BOD Measurement System BD 600

Accurate,
automatic and
direct control of
your wastewater
samples

Highlights

- User friendly
- Large brilliant graphic display
- Graphical representation of measured values
- USB & SD Card interface
- Mercury-free, environmentally-friendly
- Remote control
- User-selectable time span from 1 to 28 days
- Free individual programming of each of the six samples
- Inductive stirring system, 110 - 240 V / 50 - 60 Hz



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.

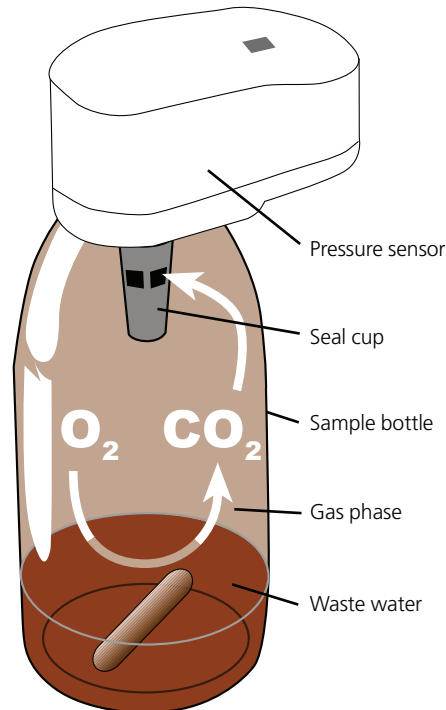
Manometric, respirometric BOD measurement using the Lovibond® BD 600

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.

Measuring ranges and sample volumes

The BOD level of a sample depends on the quantity of organic matter present, which can vary considerably. The Lovibond® BOD measuring system BD 600 is therefore calibrated for the various sample volumes and the corresponding measuring ranges listed in the table below. The overall measuring range of the system is 0 – 4000 mg/l.

For all measuring ranges, BOD is shown directly in mg/l.



Range mg / l BOD	Sample Volume ml
0 – 40	428
0 – 80	360
0 – 200	244
0 – 400	157
0 – 800	94
0 – 2000	56
0 – 4000	21.7

BD 600 Principle

Respirometric methods provide direct measurements of the oxygen consumed by microorganisms from an air or 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 seal 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 transferred via 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.



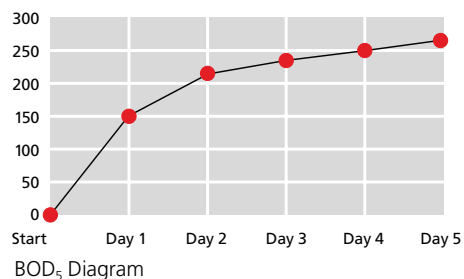
Applications

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

References

- APHA, AWWA, WEF
Standard Methods 5210 D
- H55 as a supplement to EN 1899-2

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 accessories

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 in an early stage. Current values and stored values may be called up at any time. Stored value can be displayed numerically or graphically. The table/graph below illustrates an example of BOD₅ evaluation. The development of BOD over a period of five days is easily seen.

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.

The complete BD 600 measuring system

In addition to the BOD unit for measurement and storage of BOD levels, the Lovibond® BD 600 BOD measuring system includes 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.

Delivery Content BD 600

- BD 600, complete unit with 6 sensor heads and control unit with batteries
- Power supply unit incl. Y-cable for common power supply of BD 600 and stirring unit
- 1 x USB-cable
- 1 x remote control
- 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 nitrification inhibitor solution
- 1 instruction

Order code: 2 44 44 60

Delivery Content BD 606

- 2 x BD 600, complete unit each with 6 sensor heads and control unit with batteries
- 2 x power supply unit incl. Y-cable for common power supply of BD 600 and stirring unit
- 2 x USB-Kabel
- 1 x remote control
- 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

Order code: 2 44 44 65

Technical data

Meas. principle	Manometric; mercury-free; electronic pressure sensor
Ranges [mg/l O₂]	0 - 40, 0 - 80, 0 - 200, 0 - 400, 0 - 800, 0 - 2000, 0 - 4000 mg/l
Applications	BOD ₅ , BOD ₇ , OECD 301 F ...
Display	128 x 240 pixel, 45 x 84 mm, backlit
Measurement period	User-selectable, between 1 and 28 days
Auto result storage	Up to 672 results, depending on measurement period
Storage interval	– hourly (1 day) – every 2 hours (2 days) – daily (3-28 days)
Automatic start function	– After temperature equalisation of samples – Can be switched off
Power supply	3 alkaline-manganese batteries ("Baby" cells/size "C") or via power supply unit using y-cable together with stirring unit
Interface	USB host port (USB stick) USB device port (computer) SD card
Clock	Real-time clock
Protection class	IP 54 (sensor head)
Dimensions (L x W x H)	375 x 181 x 230 mm including stirring unit
Weight	4100 g, unit with bottles & batteries 5775 g, complete with stirring unit
Housing	ABS
Approval	CE



Remote control

Accessories

Item	Order code
Sensor head	2 44 44 70
BOD sample bottle Brown glass, 500 ml	41 86 44
BOD sample bottles , Brown glass, 500 ml, set of 6 bottles	41 86 45
Inductive stirring system for 6 samples, 110-240 V / 50-60 Hz	2 44 44 56
Stirring rod	41 86 33
Stirring rod remover	41 86 38
Rubber gasket	41 86 36
Chemicals:	
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 8 tablets	41 83 28
USB-cable, length 3 meter	2 44 44 82
Y-cable	2 44 44 75
Remote control	2 44 44 81

Test set for BD 600

We also supply a test set to check for correct operation of the Lovibond® BD 600 BOD meter. The set contains 8 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.



BOD CM test tablets, order code: 41 83 28

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.

Inductive stirring system



Inductive stirring system

The microprocessor-controlled Lovibond® inductive stirring system is non-wearing and maintenance-free. In other words, there are no moving parts in the system.

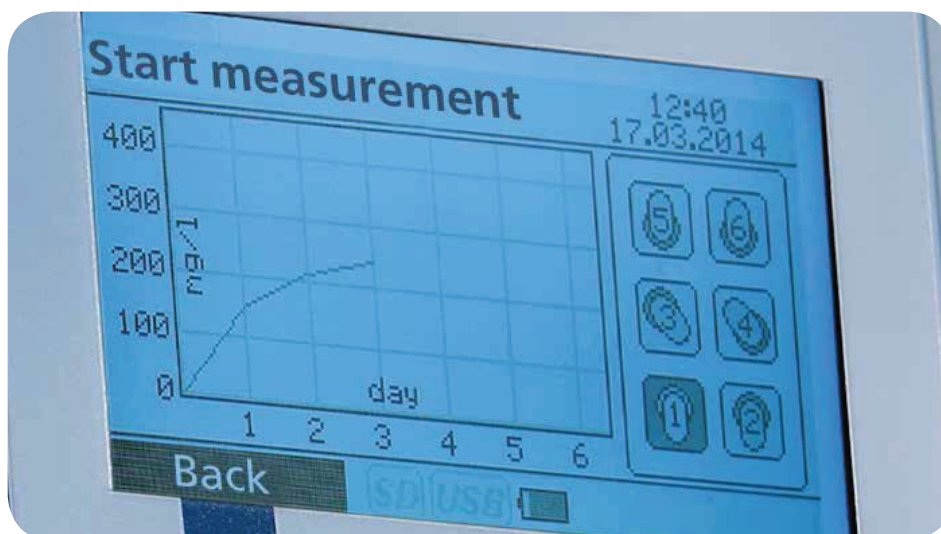
At regular intervals, the magnetic stirring rods are accelerated and slowed down again, taking them up to maximum speed and back down again. This ensures the centralization of the stirring rods.

Stirring rods that move away from the centre of the bottle are re-centered quickly and reliably.

The inductive actuation system guarantees maintenance-free operation (no need to replace drive belts or burnt-out drive motors) for many years.

Highlights

- Maintenance-free and non-wearing
- Regular change in stirring speed
- Automatic centering of stirring rods
- No mechanical components in the stirring system



Graphical representation of measured values

Thermostatically controlled incubators - TC series



The TC series of thermostatically controlled cabinets is used for continuous temperature control over a range of 2 °C to 40 °C. This makes them ideal for a wide range of different applications in industrial and research laboratories.

In particular they are ideal for the temperature-controlled storage of samples or BOD determination in effluent analysis work.

The temperature can be set in steps of 0.1 °C and an LED display shows both the set temperature and the current temperature in the cabinets. Devices such as magnetic agitators, which require a power supply, can be connected to sockets incorporated in the interior of the cabinet. The integral temperature control unit meets the requirements of the EMC directive issued as IEC 61326: "Electrical devices for measurement, monitoring and for use in laboratories".

Improved, robust, insulated housing and highly efficient components provide maximum energy efficiency.

There are 4 models available with standard doors from 135 to 445 litres net capacity, and 2 models with glass doors with 140 and 255 litres net capacity.

Standard or glass door - lockable

Highlights

- Temperature range 2 °C to 40 °C, continuously adjustable in steps of 0,1 °C
- Low power consumption
- Illuminated LED display of preset and current temperatures
- Ideal for BOD determination at 20 °C
- Power sockets inside the incubator
- 6 models in 4 sizes
- Standard door or glass door

Applications

- BOD-Measurement
- Microbiological Research
- Food Industry
- Dairies
- Laboratories
- Research Centres
- Universities

Models with standard door

TC 135 S

3 metal racks + 1 bottom grid + 4 sockets

Consumption: approx. 1.35 kWh / 24 h*

I. D. (approx.): 513 W x 441 D x 702 H mm

Net capacity: approx. 135 l

O. D. (approx.):

600 W x 600 D x 850 H mm with work top

600 W x 600 D x 819 H mm without work top

Suitable for built under applications

Weight: approx. 39.0 kg

Order code: 2 43 82 00

TC 175 S

3 metal racks + 1 bottom grid + 5 sockets

Consumption: approx. 1.23 kWh / 24 h*

I. D. (approx.): 470 W x 440 D x 1062 H mm

Net capacity: approx. 175 l

O. D. (approx.): 600 W x 610 D x 1250 H x mm

Weight: approx. 51.0 kg

Order code: 2 43 82 20

* Ambient temperature 25 °C

Target temperature 20 °C

Variations possible

Models with standard door

TC 255 S

4 metal racks + 1 bottom grid + 7 sockets

Consumption: approx. 1.54 kWh / 24 h*

I. D. (approx.): 470 W x 440 D x 1452 H mm

Net capacity: approx. 255 l

O. D. (approx.):

600 W x 610 D x 1640 H x mm

Weight: approx. 61.0 kg

Order code: 2 43 82 30

TC 445 S

4 metal racks + 1 bottom grid + 9 sockets

Consumption: approx. 1.42 kWh / 24 h*

I. D. (approx.): 600 W x 560 D x 1452 H mm

Net capacity: approx. 445 l

O. D. (approx.): 750 W x 730 D x 1640 H x mm

Weight: approx. 78.5 kg

Order code: 2 43 82 40

* Ambient temperature 25 °C

Target temperature 20 °C

Variations possible

Models with glass door

TC 140 G

3 metal racks + 1 bottom grid + 4 sockets

Consumption: approx. 1.77 kWh / 24 h**

I. D. (approx.): 513 W x 441 D x 702 H mm

Net capacity: approx. 140 l

O. D. (approx.):

600 W x 600 D x 850 H x mm with work top

600 W x 600 D x 819 H mm without work top

Suitable for built under applications

Weight: approx. 48.0 kg

Order code: 2 43 82 10

TC 256 G

4 metal racks + 1 bottom grid + 7 sockets

Consumption: approx. 1.56 kWh / 24 h**

I. D. (approx.): 470 W x 440 D x 1452 H mm

Net capacity: approx. 255 l

O. D. (approx.): 600 W x 610 D x 1640 H x mm

Weight: approx. 77.0 kg

Order code: 2 43 82 35

** Ambient temperature 25 °C

Target temperature 20 °C

with interior lighting switched on (15 W)

Variations possible

Technical Data

Design	Fully insulated cabinet with universal temperature control unit	Temperature tolerance	± 1 °C, specified for a stirred 500 ml water sample. For BOD (T=20 °C ±0,5 °C)
Lock	existing	Display	Backlit LED display Resolution 0.1 °C
Models with glass door	Insulating glass door in an ABS frame. ceiling lighting, separately switchable	Fan	Axial, output 320 m³/h
Operation	Splash-proofed keypad, 2 buttons with tactile feedback	Cooling/Heating	Integrated powerful cooling and heating
Control range	+ 2 °C to + 40 °C, steps of 0.1 °C	Power supply	220 - 240 V / 50 Hz
Climate class	+ 10 °C to + 32 °C,	Sockets	CEE 7/5, type E with hinged lid, 230 V / 16 A 2p + E, IP 44
		Coolant	R134a
		Approval	CE

Space for BD 600 systems

Model	Systems, standard ¹⁾	Systems, comfort ²⁾
TC 135 S / TC 140 G	3	2
TC 175 S	5	2
TC 255 S / TC 256 G	7	3
TC 445 S	12	9

¹⁾ Change of bottles **by** removing racks.

²⁾ Change of bottles **without** removing racks.

Temperature control unit

The temperature control unit fulfills the EMC requirements according IEC 61326 : Electrical equipment for measurement, control and laboratory use.

