

# The Becquerel Monitor LB 200 ...

## Scintillation Measuring System for Assessment of Gamma Activity in Foodstuffs, Liquids, Bulk Goods in Bq/l

The Becquerel Monitor LB 200 features:

- completely new approach to data evaluation
- detection limit approx. 20 Bq/l
- sample volume 0.5 liter
- small dimensions
- easy and error-free operation
- display of the statistical accuracy for each measuring result
- operated by dry batteries or mains supply
- calibration and display for nCi/l on request

## Setup and Function

The Becquerel Monitor LB 200 comprises the detector part including amplifier and high voltage unit, the evaluation electronics including power supply, and accessories for accommodating and shielding the samples to be measured. Its microprocessor electronics allows the non-professional user to directly determine the radioactivity of gamma emitting radionuclides in liquids and solid matter in an easy and reliable manner down to approx. 20 Becquerel per liter or per kilogram (about 0.5 nCi/l).

A printer interface for connection of a logging printer or a PC or a more powerful computer are available as special equipment for further processing and documentation of the measuring data.



# ... the step-by-step guide to activity

## Easy Operation

There are only 3 push-buttons. Press the "ON/OFF"-button once to operate the monitor in the countrate mode. The measuring result is displayed in counts per second (cps). To determine the background, this measurement must be performed prior to the sample measurement.

## Measuring Sequence

### Count background



Fill counting vessel with distilled water and put it into the lead chamber.  
Press red button to start the monitor.

```
RATE    6.0 iPs
GENAU  AUF  1 %
```

Wait for display of the requested measuring accuracy

Press "STOP" to terminate the measurement

Pressing the "STOP" button has interrupted the measurement. The monitor is in the standby mode. The preceding measuring result is still being displayed. If a printer is connected, the measuring results are printed out. The previously counted background is stored. Fill the counting vessel with the sample to be measured and place it inside the lead chamber.

### Change samples

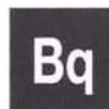


```
STOP    6.0 iPs
WEITER MIT BQ
```

Place counting sample in the lead chamber.

Press the button "Bq" – only operational if "STOP" was pressed before – to switch from the countrate mode to the sample counting mode. The result is displayed in Becquerel per liter (Bq/l).

### Count activity



Press the "Bq" button to start the measurement.

```
AKTIV.  288 Bq/l
+/-     34 Bq/l
```

Wait for display of the requested measuring accuracy.

Press "STOP" to terminate the measurement.

Press "Stop" to switch the monitor to the standby mode. Remove the sample and count the next sample by pressing "Bq".

To switch from the sample measurement back to the countrate mode, the monitor must first be switched off and then on again. That's all.

### Change samples



Place next sample in the lead chamber.

Press the "Bq" button to start again the measurement.

## Some Things You Should Know

### Self-Monitoring

The Becquerel Monitor LB 200 uses its modern microprocessor electronics for self-checking purposes. As soon as the monitor is switched on, it runs an automatic self-test. In addition, detector failure, range overflow and battery exhaustion will be displayed.

### Calibration

The display on the Becquerel Monitor LB 200 is calibrated in the measuring unit Bq/l. However, you will only obtain the correct value if you

- use the plastic counting vessel supplied and fill it up to the marker (0.5 l volume);
- count liquids (specific weight of the product to be measured around 1 g/ml);
- are sure that the radioactivity consists mainly of the nuclides  $^{137}\text{Cs}$ , a  $^{137}\text{Cs}/^{134}\text{Cs}$  mixture or  $^{131}\text{J}$ .

When other conditions than those specified above should prevail, the displayed value has to be corrected as described in the Operating Manual.

### Influence of the Natural Radioactivity

Most foodstuffs contain the natural radionuclide potassium 40 ( $^{40}\text{K}$ ). Since the Becquerel Monitor LB 200 does not have an energy window, it measures the entire energy range above a level of approx. 40 keV, and thus it will also account the gamma radiation emitted by the  $^{40}\text{K}$  nuclide.

1 g of potassium per liter will result in a display of approx. 2 Bq/l, related to the calibration factor for  $^{137}\text{Cs}$ . The Operating Manual includes a table listing the potassium content of some typical foodstuffs. With very accurate measurements you should thus take into account the potassium fraction of the measuring value.

## A Completely New Approach to Data Evaluation

The measuring results are either displayed in cps (counts per second) or – after conversion by the instrument – in Bq/l (Becquerel per liter).

The programming of the incorporated microprocessor provides automatic adjustment of the displayed value to the new value in case the count rate changes. If the average count rate remains constant over a long time, which is the case when monitoring food samples, the averaging interval is automatically extended continuously and thus the displayed measuring result will become increasingly more accurate. Thus, the single pulse counting over a preselected time period required up to now will be redundant. The statistical accuracy is displayed for each measuring result. The user him/herself decides how accurate – and thus how long – the measurement should be. In any case, the approximate result can be read off a few seconds after the start of the measurement!

Moreover, the Becquerel Monitor LB 200 is capable of storing the background measurement result and to subtract it automatically from the next sample measurement.

## Technical Data

### Detector Unit

NaI(Tl)-crystal 25 mm  $\phi$  x 25 mm

Probe with built-in threshold amplifier and high-voltage generator; 1.5 m cable fixed to the instrument.

Dimensions:

bottom 95 x 120 mm  
height 185 mm (with lead shielding 240 mm)  
weight approx. 0.8 kg

### Measuring Unit

Display:  
bright transmitted light LCD,  
2 x 16 characters, 74 mm x 28 mm

Measuring ranges:

0.1 to 999 cps  
1 to 9999 Bq/l

Statistical error:

in the measuring mode "cps" display in % of the measured value  
in the measuring mode "Bq/l" display in  $\pm$  Bq/l

Calibration factor:

preset inside the instrument via code switches, adjustable from 1 to 255 Bq/l per cps. The factors for the individual radionuclides are listed in the Operating Manual. Manufacturer's setting for  $^{137}\text{Cs}/^{134}\text{Cs}$ .

Voltage supply:

via 6 V mains adapter or via built-in dry batteries (4 x LR 20 Mono); operation life with batteries approx. 80 h.

Box casing with combined handle/support, 220 mm wide x 230 mm deep x 70 mm high, approx. 1.5 kg.

Connections for:

mains adapter, probe cable (5-pin Tuchel socket), printer or computer (optional)

### Lead shielding

Wall thickness 15 mm, height 115 mm, dia 120 mm, approx. 8 kg

### Beaker

Plastic, useful volume 0.5 l

### Transport and Storage Case

Dimensions:

approx. 400 mm x 400 mm x 180 mm

### Automatic Status and Error Messages Displayed

Self-test

Detector failure

Display outside measuring range

Change Batteries

### Acoustic Signal

Sounds as soon as the total measuring accuracy is within 3%