UMo Universal Monitor of Radiation Protection LB 123

RADIATION PROTECTION

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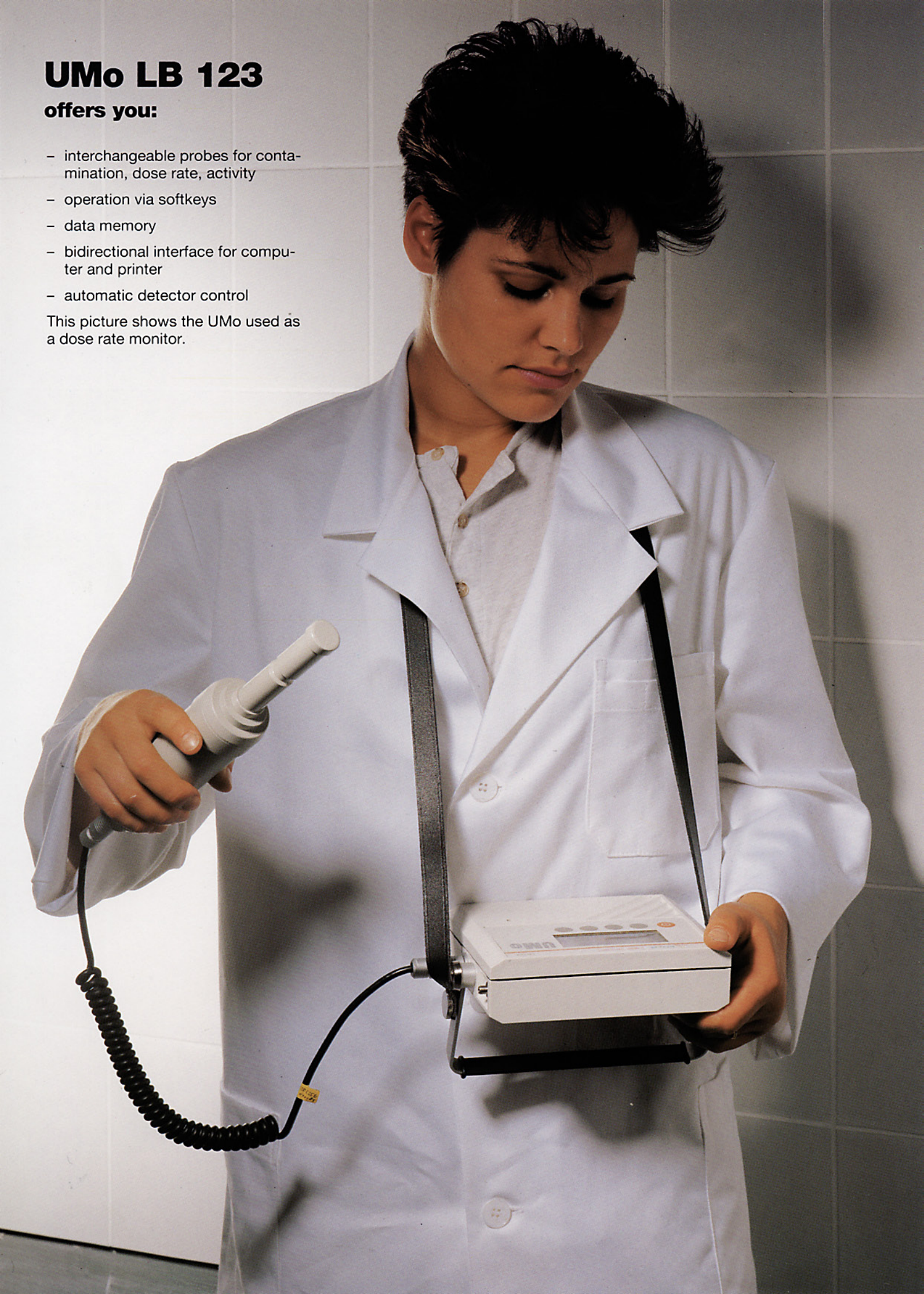
UMo LB 123

offers you:

- interchangeable probes for contamination, dose rate, activity
- operation via softkeys
- data memory
- bidirectional interface for computer and printer
- automatic detector control

This picture shows the UMo used as a dose rate monitor.



The Universal Monitor for Radiation Protection

System Concept

The Universal Monitor LB 123 "UMo" is a versatile instrument for contamination, dose rate and activity measurements in radiation protection.

The LB 123 UMo allows the use of application dedicated detectors via a single measurement and display unit.

The basic instrument LB 1230 identifies the detector that is connected and adjusts the program firmware accordingly. So, the use of another detector does not require re-setting of detector-specific parameters, high voltage, or measuring units.

A wall bracket incorporating a mains-connection unit permits stationary, continuous operation, e.g. as a local dose rate measuring system or as an exit contamination monitor, as well as operation with rechargeable batteries. However, even in such a configuration the LB 123 can be removed from the wall bracket and used as a portable instrument.

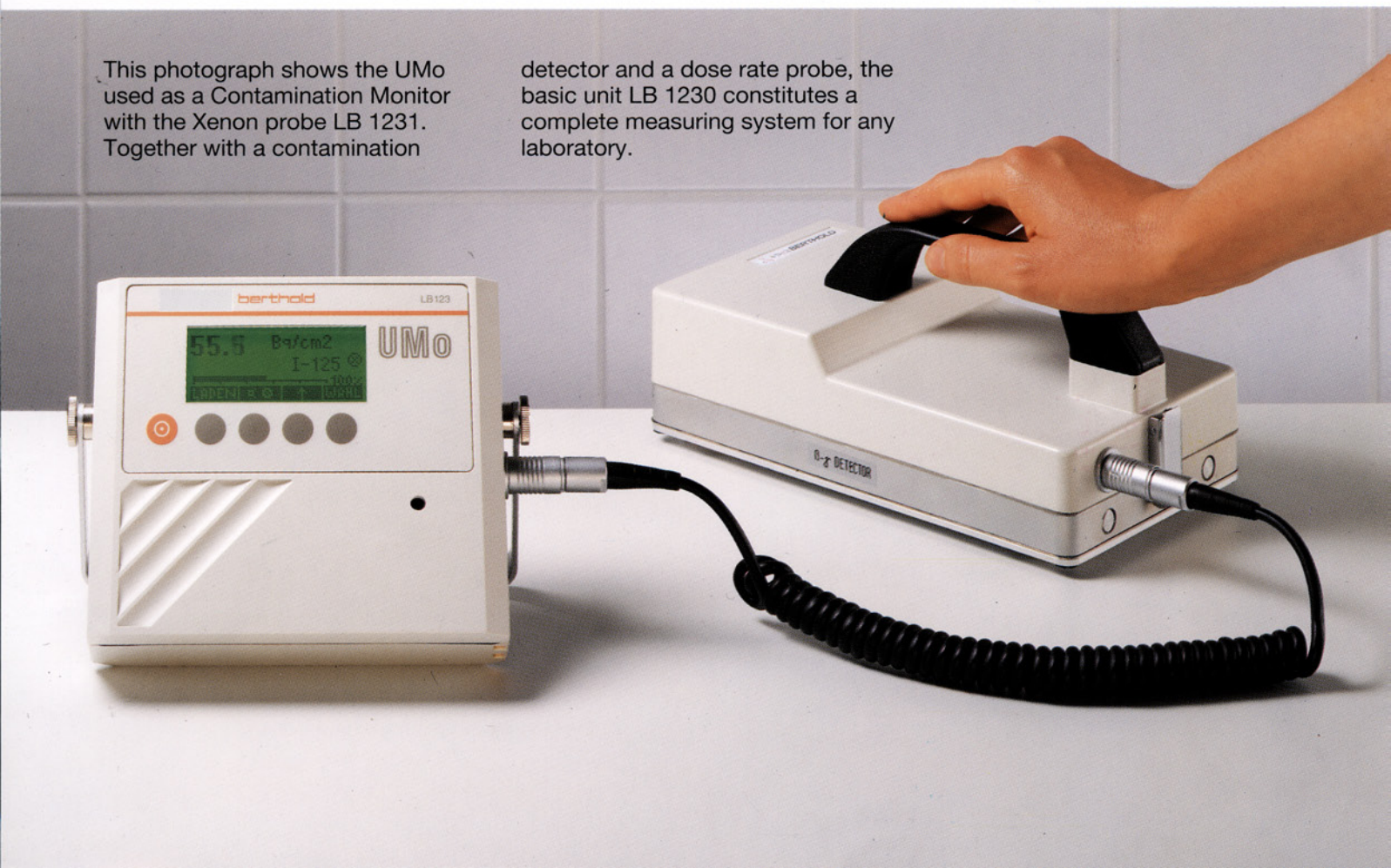
The basic module LB 1230 is capable of storing data and of downloading it via a serial interface either directly to a printer or to a PC.

Data-communication is possible when a computer is connected.

The UMo is operated via a 5-button membrane keypad comprising one On/Off button and four softkeys. This ensures clear user guidance via the display even for complex operations and provides a level of convenience and reliability which was hitherto unavailable in portable instruments.

The UMo's display is a high-contrast dot-matrix display with background illumination. Universal application of the instrument and programming via softkeys are possible only due to the high flexibility of this display. For example, different units can be selected for the measured values, such as mSv/h or mrem/h.

This photograph shows the UMo used as a Contamination Monitor with the Xenon probe LB 1231. Together with a contamination detector and a dose rate probe, the basic unit LB 1230 constitutes a complete measuring system for any laboratory.



UMo LB 123 as Contamination Monitor

LB 1231 contains the beta/gamma contamination detector with Xenon fill gas and titanium window.

LB 1232 contains the alpha/beta contamination detector that uses Butane fill gas and has a thin mylar window.

LB 1233 contains the alpha/beta contamination detector that uses P-10 counting gas and has a thin mylar window.

The LB 123 uses the same detectors as used in the Berthold Model LB 122: Xenon, Butane and P-10 proportional counters. These detectors are directly interchangeable between the LB 122 and the LB 123 via a special adapter. Three probes, i.e. adapter-detector combinations, are available:

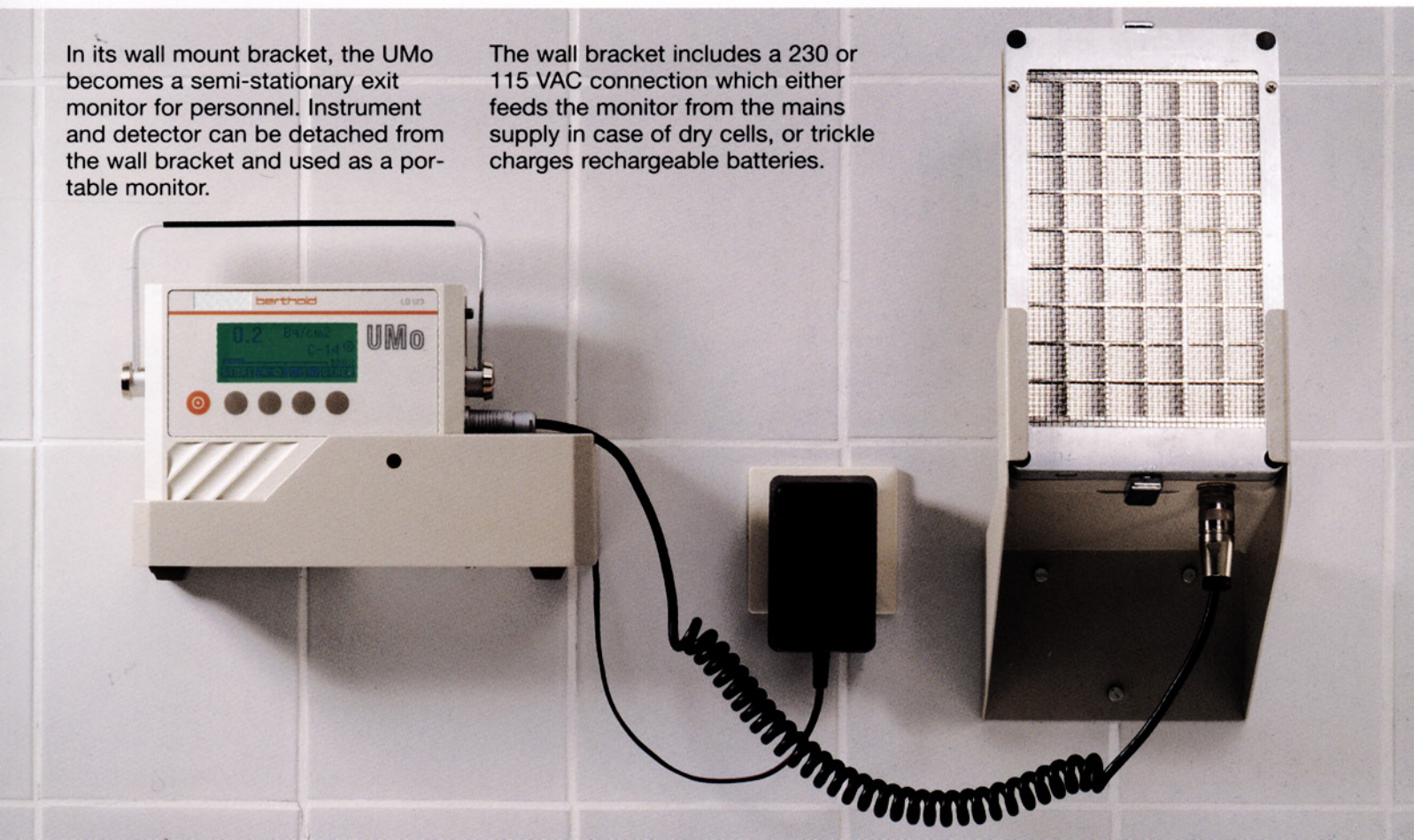
The calibration factors for 25 radionuclides are stored in the instrument. Several free memory locations are available for the customer to enter his or her own calibration factors.

The nuclides with their associated calibration factors are selected via the sub-menu "Select Nuclide".

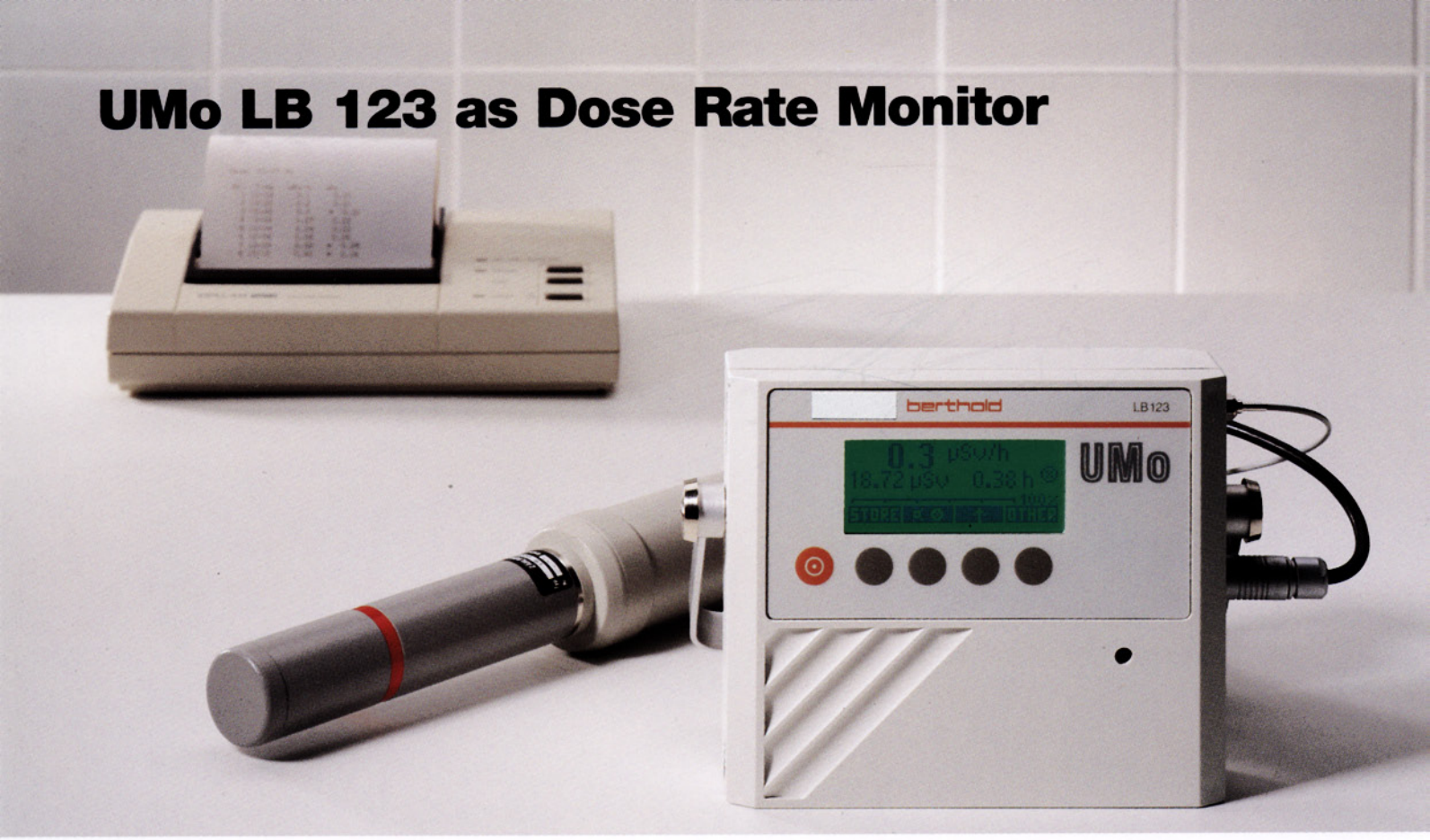
The display also shows the adjacent nuclides stored in the memory in order to facilitate the setup procedure when scrolling through the nuclide library. The designation of the softkeys in the display provides clear operating instructions.

In its wall mount bracket, the UMo becomes a semi-stationary exit monitor for personnel. Instrument and detector can be detached from the wall bracket and used as a portable monitor.

The wall bracket includes a 230 or 115 VAC connection which either feeds the monitor from the mains supply in case of dry cells, or trickle charges rechargeable batteries.



UMo LB 123 as Dose Rate Monitor



The proportional counter probe LB 1236 is used for dose and dose rate measurements. It has been tested and approved by the German Office of Standards (PTB).

The energy range from 30 keV up allows measurements in the ^{125}I-lab as well as in some parts of Radiology. The dose rate range covers 6 decades from 50 nSv/h to 10 mSv/h (0,5 µrem/h to 1 rem/h).

The photograph shows the LB 123 UMo with the dose rate probe LB 1236. In the background you can see a battery-operated printer for output and documentation of the stored data.

```
LB 123              0          Version 0.3
LB 1236     CF: 0.800     TH: 0.300
BKG:    0      CPS


Date: 23.07.92

 Nr.  Time   uSv/h    uSv
   1 10:02     0.1     0.21
   2 10:02     0.2     0.21
   3 10:02     0.3   * 0.21
   4 10:03    0.27     0.22
   5 10:04    0.24     0.22
   6 10:08    0.29     0.25
   7 10:09    0.30   * 0.25
```

Example printout for dose rate measurements on a Seiko DPU 411 thermal printer.

In addition to using the UMo as a portable instrument, as shown in this picture, the instrument may also be used for stationary applications as a room or area dose rate monitor.

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UMo LB 123 as Dose Rate Monitor for Neutrons

Connected to the completely new designed moderator detector LB 6411, the LB 123 UMo becomes a very sensitive neutron dose rate monitor. The high response sensitivity of the LB 6411 of about 3 counts per nSv allows a measuring range from 100 nSv/h to 100 mSv/h. For the first time in a commercial neutron monitor, the energy dependence was adapted to the new conversion factors stipulated by ICRP 60; in the range from 50 keV to 10 MeV neutron energy it is about +/- 40 %.

UMo LB 123 as Activity Monitor

The probe LB 1238 with proportional end-window counter tube allows the simultaneous, separate measurement of the alpha and beta activity of samples with a diameter of up to 25 mm in the lead chamber LB 7431. Furthermore, the activity of filters, wipe tests or other sample formats can be verified by direct measurement. When connecting the probe LB 1238 to the basic unit LB 1230, the UMo can either operate in the Ratemeter or Timer/Counter mode. Either cps or Bq are displayed; the calibration factors for α and β activity can be determined and entered by the user depending on the existing sample geometry.

Simple Operation

Twenty-two clearly structured sub-menus facilitate the setup procedure and the operation of the LB 123. The user simply scrolls through the list of selections and chooses the one that is required. Three basic features which control the user-interface are:

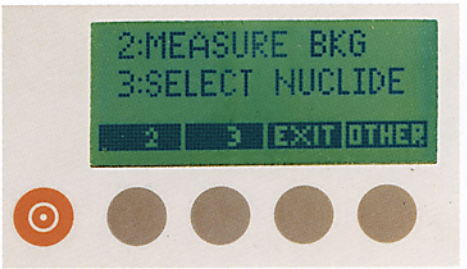
- only those sub-menus which are required by the current measurement mode are active
- the measurement mode whether contamination measurement, dose and dose rate measurement or activity measurement is determined automatically by the LB 123 UMo when the required detector is connected
- the large display provides clear instructions as to the softkey functions as well as direct user-guidance, without having to consult the operating manual.

Just press the softkey "Other" to access the sub-menus from the measurement mode and to proceed from one sub-menu to the next. "Exit" leads back to the measurement mode.

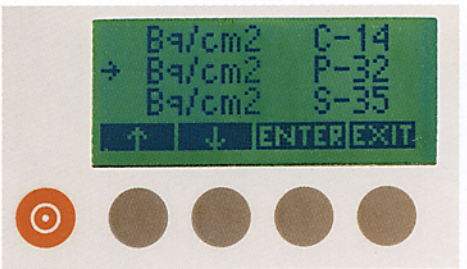
The sub-menus are divided into three general function categories:

- parameter setting: thresholds, calibration factors and time/date; or

  definition of operating conditions: units of measurement, language, timeout and device ID #;
- operator instructions to the monitor: measure background, reset dose value to zero and read out memory contents;
- service functions: take plateau, set high voltage.



Sub-menu 2 includes the nuclides for a contamination measurement.



The desired nuclide is selected via the keys marked by an arrow.

Software Functions

Measurement and Display

The software of the UMo supports the basic functions "Contamination Measurement", "Dose Rate Measurement" and "Activity Measurement", depending on which type of probe has been connected.

In the Contamination Monitor mode, the software includes about 25 calibration factors for Bq/cm² or pCi/cm² calculation.The user is also able to program several of his or her own calibration factors.

In the dose rate measurement mode, a program for dose integration may be activated as well. Alarm thresholds for all measured values can be defined via the function "Set Threshold". When these thresholds are exceeded the UMo gives a visual and audible signal.

Automatic Plateau Recording of the Connected Detectors

The sub-menu 11 "Take Plateau" allows the automatic plateau recording of the connected detectors without any additional instruments.

Data Storage

By pressing the "Store" softkey the value currently being displayed is saved in the memory together with the time and a consecutive storage number.

The user can pre-program the time interval for the cyclical auto-save function.The data is called or output in the same manner as in the manual save mode.

Printout

Via the sub-menu 10 "Call Memory" one can recall stored values into the display, or, when a printer is hooked up, print out the memory data together with a parameter heading. Most serial printers, including battery-operated printers, may be connected.

Counter/Timer Mode

This mode enables measurements with counts and time preselection. Depending on the type of probe attached, doserate or contamination measurements are also possible. The actual statistical error of the measurement is live displayed as percentage.

Technical Data LB 123 UMo

Basic Unit LB 1230

Result display:	High-contrast dot-matrix display with 32 x 84 pixels Background illumination can be switched off 4-digits numerical values with floating decimal point and automatic prefix switchover when changing a range
Operating elements:	Membrane keypad comprising 1 On/Off button and 4 softkeys
Detector connection:	8-pin connector socket Fischer 04, spiral cable LB 75576 as standard
Data output: (Option)	FSMA connector, via beam waveguide and beam waveguide interface LB 75306 with D 25 connector
Temperature range:	-15° C to 50° C
Dimensions:	145 mm (H) x 170 mm (W) x 45 mm (D)
Weight:	approx. 800 g (with batteries)
Power supply:	3 x IEC-R14 (baby cell) or 3 x rechargeable cells Varta NiCd # 5014
Operating life:	with R14 > 150 hours

Probe Adapter LB 7637 for Contamination Probes

Dimensions:	160 mm (H, with handle), 140 mm (W), 240 mm (D)

Weight including detector: 1.5 kg

Wall Bracket LB 1250

Low voltage supply:	+ 5 V via mains adapter LB 7619
Dimensions:	68 mm (H) x 245 mm (W) x 77 mm (D)

Transport Case

Dimensions:	180 mm (H) x 450 mm (W) x 350 mm (D)

Contamination Probes LB 1231, LB 1232 and LB 1233

Probes:	**LB 1231**	**LB 1232**	**LB 1233*)**
Type of radiation	β – γ	α – β	α – β
Counter tube	LB 6357	LB 6358 G	LB 6359
Counting gas	Xenon	Butane	P-10
Type of filling	sealed	filled	flow-through
Window area	120 x 190 mm^2	120 x 190 mm^2	120 x 190 mm^2
Window thickness	5 mg/cm^2	0.4 mg/cm^2	0.4 mg/cm^2
Efficiency)**			
^{14}C	3.6 %	17 %	17 %
^{90}Sr	30 %	34 %	34 %
^{241}Am	11 %***)	14 %	14 %
Temperatur range	-15° C to 50° C	5° C to 30° C	-15° C to 30° C

* operational only with wall bracket
** including protection grid with 70 % transmission
*** measurement via 59 keV quanta

Doserate Probe LB 1236

Dimensions and weight:	
Max. diameter	50 mm
Length	275 mm
Weight	0.46 kg
Temperature range	-10° C to 60° C
Counter tube	LB 6006 A
Calibration factor	0.20 µSv/h per 1 cps
Measuring range	0.05 µSv/h-10 mSv/h
Energy range: (+/- 30 % relative to ^{137}Cs)	30 keV – 2 MeV

α – β Activity Measurement Probe LB 1238

Counter tube	End-window proportional counter tube
Window	28 mm ∅, 2 mg/cm^2
Efficiency for point-shaped sources:	^{90}Sr 46 %, ^{241}Am 18 %
Temperature range	-10° C to 50° C
Dimensions	50 mm ∅ x 275 mm
Weight	0.46 kg

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