



LB 147 / LB 148

Personal Contamination Monitors

Equipment concept

LB 147 / LB 148

The Personal Contamination Monitors LB 147 and LB 148 are contamination monitors designed for use in the radiation protection field to detect contamination caused by alpha and beta/gamma radiation. Low-maintenance thin-layer ZnS (Ag) scintillators are used as detectors.

Four automated guided hand detectors of LB 148 enable a simultaneous measurement of both palms and backs of hands. For LB 147 it is possible to activate an automatic request for back of hand measurement. LB 147 is also available as a narrow version (LB 147 Slim) with a changed positioning of the hand probes. All versions have a removable hand probe for frisker measurements.

Each detector has its own calibration factor for each nuclide and its own spillover factor for each alpha nuclide. More than 50 nuclides with their calibration factors according to DIN ISO 7503-1 and A-100 (DIN 44801) are already deposited in the software.

By means of the scintillation technology it is possible to measure alpha and beta/gamma contaminations simultaneously but the devices can also be used as pure alpha or pure beta/gamma monitor. The results can be represented in the optional units Bq/cm² or cps.

The detection limits of each measured value is calculated according to DIN ISO 11929 and stored together with the measurement values.

The background radiation is continuously monitored for each detector and used to compensate the measurement with the long-term average background value. Before the start of each measurement the background is checked for fluctuations.

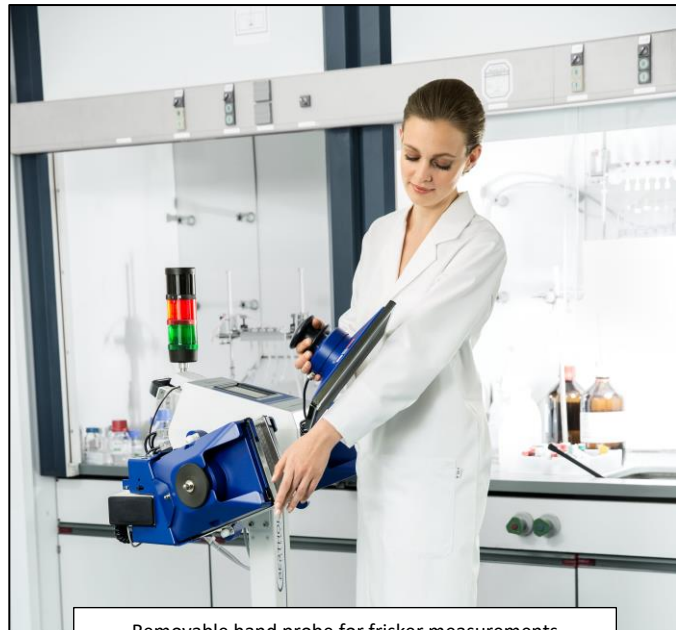
Both LB 147 and LB 148 meet the requirements of standard IEC 61098. This applies in particular to the properties of the detectors, factory calibrations and determination of efficiencies.

A clear menu guidance provides a simple operation via touch panel on a graphical display.

The built-in power supply adjusts automatically to the various alternating voltage supplies.



LB 147 with signal tower and LB 147 Slim



Removable hand probe for frisker measurements

Functions and accessories

Numerous service functions permit easily measurements for necessary periodical tests. This includes automatic calibration routines for all detectors and a fast system test. All in- and outputs can be checked very quickly by means of further service functions.

A personal identification is possible by means of an optional card reader or transponder. Evaluation of personal data and acquisition of measured values in a database are carried out using the optional HFC program.

An optional signal tower is connected via USB or via a built-in relay. In addition it is possible to connect a door controller with configuration possibilities in the software, too.

A remote parameter program is available for configuration and documentation. Besides the direct communication, the application can also be used offline to create or edit file settings.

Following interfaces are available: 5 USB (Host), 1 USB (Device), 1 Ethernet 10/100/1000 Mb, 1 RS232 und 1 RS485. The signal tower, transponder, magnetic card reader or printer (all optional) are connected to the USB interface.

Up to 10000 measuring data can be stored and transferred via USB or Ethernet to an external computer. As an alternative a serial port can be used. An extensive communication protocol permits the integration into a measurement network.

Reading measured data and performing software updates can be done very quickly via one of five USB (Host) ports.



LB 148 with detectors for backs of hands



Display representation of the measuring data LB 148



Back of LB 147 with electrical connections

Technical Data

LB 147 / LB 148 Personal contamination monitors

Detectors

Radiation detector	ZnS(Ag) Scintillator
Material entrance window	2 x 3 µm metallized plastic (0.4 mg/cm ²)

Hand Detectors

Dimensions entrance window	150 mm x 230 mm	
Sensitive area	345 cm ²	
Transmission protective grid	80 %	
Background	α-channel	about 0.1 cps
	β-γ-channel	about 15 cps
Typ. Efficiencies (according to ISO 7503-1)	²⁴¹ Am	33 %
	¹⁴ C	20 %
	³⁶ Cl	49 %
	⁹⁰ Sr/ ⁹⁰ Y	52 %
Typ. MDA (according to ISO 11929) with 10 s measuring time	²⁴¹ Am	0.026 Bq/cm ²
	¹⁴ C	0.649 Bq/cm ²
	³⁶ Cl	0.135 Bq/cm ²
	⁹⁰ Sr/ ⁹⁰ Y	0.126 Bq/cm ²

Foot Detectors

Dimensions entrance window	150 mm x 370 mm	
Sensitive area	555 cm ²	
Transmission protective grid	72 %	
Background	α-channel	about 0.2 cps
	β-γ-channel	about 40 cps
Typ. Efficiencies (according to ISO 7503-1)	²⁴¹ Am	19 %
	¹⁴ C	21 %
	³⁶ Cl	54 %
	⁹⁰ Sr/ ⁹⁰ Y	43 %
Typ. MDA (according to ISO 11929) with 10 s measuring time	²⁴¹ Am	0.055 Bq/cm ²
	¹⁴ C	0.954 Bq/cm ²
	³⁶ Cl	0.191 Bq/cm ²
	⁹⁰ Sr/ ⁹⁰ Y	0.254 Bq/cm ²

Ambient Conditions

Temperature range	- 5 °C to + 40 °C
Rel. humidity	0 % to 90 %, no condensation

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Electronics

CPU	NXP i.MX 6 ARM Cortex-A9 Windows Embedded Compact 2013
Display	Coloured 7" Touch Panel 800 x 480 pixels
Ports	5 USB(Host), 1 USB(Device), 1 Ethernet 10/100/1000Mb, 1 RS 232, 1 RS 485
External signal transmitters	3 relays max. 50 V, 5A
Power supply	100 - 240 VAC wide-range input
Power consumption	approx. 14.5 W, Fuse 2A

Mechanical Data

Dimensions	(W x H x D)
LB 147	about 65 x 125 x 80 cm ³
LB 147 Slim	about 45 x 125 x 90 cm ³
LB 148	about 85 x 125 x 82 cm ³
Weight	
LB 147 / LB 147 Slim	approx. 35 kg
LB 148	approx. 45 kg

Accessories (optional)

	Ident. No.
LB 147	45356-10
LB 147 Slim	45356-15
LB 148	56542
Mobile set (only LB 147)	52874
Transponder system (RFID)	66164
Chip / Card (RFID)	59495 / 59503
Magnetic card reader	66442
Magnetic card	34481
Signal tower for LB 147	65252
Signal tower for LB 148	66458
Calibration source ³⁶ Cl/ ²⁴¹ Am	29336 / 25509
HFC program	UMAD HFK

This instrument is not intended to be used for diagnostic and/or therapeutic purpose for human beings and is not a medical device according to the definitions of the European Council Directive 93/42/EEC concerning medical devices.