LB 9140 / LB 9150

Transportable Alpha-Beta monitors

BERTHOLD

TRANSPORTABLE FILTERBAND MONITOR

High-precision aerosol monitors

The aerosol monitors LB 9140 and LB 9150 are used to measure airborne alpha/beta particles under the influence of natural radioactivity (radon) and fluctuating gamma background.

The display is equipped with self-monitoring functions that continuously monitor the functionality and alarm status of the monitor. The system is quiet and vibration-free and has the advantage of being maintenance-free and durable.

The portable monitor consists of the following components:

- Dusting unit: Direct measurement of radioactive alpha/beta particles by means of a Si-CAM detector.
- Alpha/beta detector: Measures directly above the dusting surface to ensure real-time monitoring.
- Cassette: Made of aluminum with IP45 degree of protection, includes the dust extraction unit and filter rolls. A plexiglass front door enables visual inspection of the filter supply on the filter roll.
- Pump unit with free-piston linear motor: The system is quiet and vibration-free. It has the advantage that it is maintenance-free and has a long service life. and has a long service life. The nominal flow rate is approx. 3 m³/h with a maximum noise level of 60 dB(A) at 1m distance.

Highlights and functions

- Real-time continuous monitoring.
- Removable monitor with small footprint.
- Modern data acquisition system: data logger with 7" color touch panel and intelligent digital input/output module.
- Low-noise and low-maintenance pump unit: External pump unit with low noise level and low maintenance, Air flow rate of approx. 3 m³/h.
- Alarm: visual and acoustic signals.
- Si-CAM detector unit 600 mm² for simultaneous separate alpha/beta measurement on a flat dusting area of 25 x 25 mm².
- Radon compensation: pseudo-incidence method for LB 9140, spectroscopic selection method for LB 9150.
- Fixed filter, quasi-fixed filter or moving filter modes.
- Efficient fixed filter operation: Seamless fixed filter operation with simple filter change option.
- Calculations according to DIN EN ISO 11929-1.
- Integrate monitoring of the volume flow.

SELF-TEST & ALARM FUNCTIONS

Continuous monitoring of functionality

The monitor is equipped with self-monitoring functions that continuously check its performance and alarm status:

- **Monitoring of the pump function**
  A deviation of the flow rate from the setpoint triggers a failure message on the evaluation electronics. Even when the pump is switched off, a failure message is also generated.
- **Monitoring of the filter tape paper**
  The rotary coding switch makes it possible to track the amount of filter tape used. At end of the paperroll or if the filter tape paper tears off the message 'Paper Fail' is generated.
- **Detector failure threshold alpha and beta (also gamma if installed)**
  If the count rate falls below a preset value, an error message (detector failure) is generated.
- **Pre-alarm threshold alpha or beta**
  If the alpha or beta pre-alarm threshold defined by the user is exceeded, an alarm message appears on the screen.
- **Alarm threshold alpha or beta**
  If an alpha or beta alarm threshold is defined by the user, an alarm message is generated as soon as this threshold is exceeded. Alarms can be set for activity concentrations, emission rates and balance values (Bq/m³ - Bq/h –Bq per day, week, month).
- **Relay activation**
  Every alarm or pre-alarm ca be configured to activate a relay, that can be coupled to an optical or acustical signal.
- **Lamp test**
  Pressing the 'Lamp test' switch closes a digital input in the electronics, which in turn triggers and activates all output relays.

Radon compensation

LB 9140

- Compensation by pseudo-incidence method.
- Glass fibre filter.

LB 9150

- Membrane filter.
- The radon compensation method in the LB 9150 ensures the direct measurement of artificial alpha/beta radioactivity with radon follow-up compensation, which utilises the spectroscopic properties of the alpha and beta energy spectrum of the radon and thoron decay products.
- Lower detection limit compared to the LB 9140:
  - Three times better in the alpha range.
  - Twice as good in the beta range.
- More stable against radon/thoron fluctuations in the indoor air.

TECHNICAL SPECIFICATIONS

Technical data LB 9140 / LB 9150

LB 9140 and LB 9150	
Filter cassette	
Construction type	300 x 300 x 530 mm³ (B x T x H) Operating hours counter, Flow-low and filter fault indicators (LED), Fast filter feed button, Reset button for operating hours counter, Plexiglas door for parts in contact with media
Dusting area	25 x 25 mm²
Sampling from inlet to filter	according to DIN 25423 (06/96) Stainless steel RS 316L
System losses	< 3.5 % (IEC 60761)
Pressure	Surroundings: 650 – 1100 hPa Sample air: max. -150 hPa/ +25 hPa relative to atm. pressure
Temperature	Surroundings: -15 / +40 °C Sample air: -20 / +40 °C
Filter	
Type LB 9140	Glass fibre particle filter Whatman No. 10, Role 12 m x 50 mm, Winding spool inner diameter 25 mm
Type LB 9150	Fluoropore membrane filter 40mm x 20mm IdNo. 73192
Feed rate	continuous selectable speed 5/10/12,5/15 mm/h Fast feed 1000 mm/h front panel button
Autonomy	> 3 months at 5 mm/h filter speed
Monitoring	Filter crack, Filter supply low (< 3 m)
Pump unit	
Pump	Low maintenance (> 10.000 h) Low-noise operation (< 60 dB(A) bei 1 m) Pump capacity max. -440 mbar Typical operation -160 mbar
Flow rate	typical 3 m³/h with standard condition
Controls	Pressure switch (Flow low) Typical setpoint 3 m³/h for standard conditions

Alpha-Beta Detector			
Type	Si-CAM 600 mm² lightproof		
Efficiency solid sources	Alpha Beta	^{241}Am ^{36}Cl ^{60}Co	typ. 25% / 4 pi typ. 25% / 4 pi, typ. 7-10% / 4 pi
Energy sector (Threshold values preamplifier)	Beta: 100 keV – 2.5 MeV Alpha: 2.5 MeV – 10 MeV Alpha Nat.: 7 MeV – 10 MeV		
Zero effect (System)	Alpha < 0.002 cps, Beta < 0.2 cps		
Gamma sensitivity	Beta Kanal < 0.4 cps per µSv/h Cs-137 (front) < 0.2 cps per µSv/h (back)		
Electronics			
Type	Data logger LB 5340 (see LB 5340 Flyer)		
Housing LB 9140/LB 5340			
Type	Stainless steel		
Dimensions	530 x 300 x 300 mm³ (H x B x T)		
Protection class	IP 45 (according to IEC 60529)		
Weight	approx. 43 kg incl. pump & trolley		
Trolley			
Type	Aluminium, RAL5002 paint finish, 2 wheels		
Dimensions	approx. 1035 x 420 x 395 mm (H x B x T)		
Alarm unit			
Type	LB 9140-ALARM, green light (normal state), orange light and red flashing light, resettable horn 90 dB(A) at 1 m		
Functions	Horn reset button, lamp test push-button		
General electrical specifications			
Net	230 VAC / 50 Hz / Single phase, I Norm 1 A Fuse: 1.6 A T, therm. safety 1.3 A		
Security	EN 60601 conform		
Radiological	IEC 61172 (in parts), IEC 60761 part 2		
EMC	CE conform: EN 61000-4		
Subject changes without prior notice.			

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LB 9140/LB 9150 en · Id. DC00994PR2 · Rev.00