

# Product Information LB 9140

## Transportable Alpha-Beta Moving Filter Monitor



### Applications

All applications where airborne Alpha and Beta particulates radioactivity has to be measured to prevent personnel exposure and to measure release rates in ducts and stacks

- Decommissioning
- Nuclear power
- Source manufacturing
- Industrial safety
- Research

### Key Features/Highlights

- Si-CAM detector unit 600 mm<sup>2</sup> for simultaneous separated Alpha-/Beta measurement on a flat dust collection area of 25 x 25 mm<sup>2</sup>
- Prompt artificial Alpha-/Beta activity measurement with Radon progeny compensation through ABPD & AED compensation method
- Optional gamma compensation detector mountable in the same geometry as the prompt Alpha-/Beta detector
- Continuously moving filter with 4 selectable speeds from 5 to 15 mm/h, filter change warning before end of tape. Stepwise filter mode option
- Small footprint, transportable monitor
- Data logger electronics LB 5340 with graphical 7" color display, intelligent peripheral modules
- Silent, low maintenance pump unit with flow low check and 3 m<sup>3</sup>/h flow rate
- Optional flow meter (Mass flow meter or Vortex)



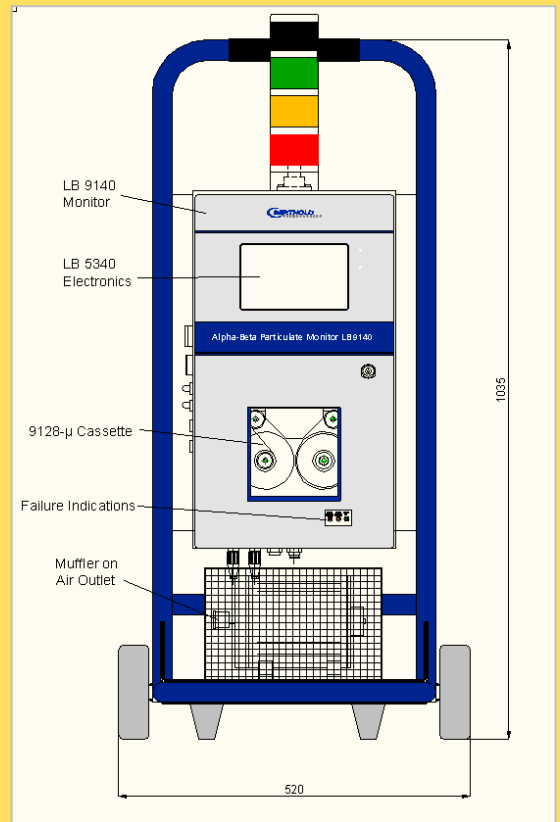
# LB 9140 Transportable Alpha-Beta Moving Filter Monitor

## Monitoring concept

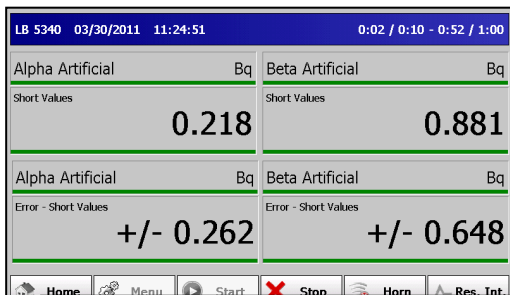
The particulates monitor LB 9140 is used to measure airborne Alpha-/Beta particulates in the presence of naturally occurring (Radon) activity and fluctuating gamma backgrounds.

The portable monitor consists of following main building blocks:

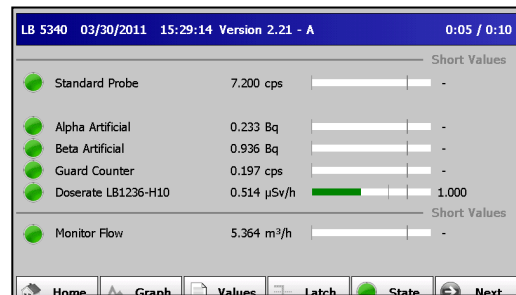
- **Dust collection unit** 9128 $\mu$ : Allows the prompt measurement of radioactive Alpha-/beta particles using Si-CAM detector
  - **Prompt Alpha-/Beta detector:** measures directly on the collection area to have a real time monitoring system
  - **Cassette:** made of aluminum with protection degree IP68 envelopes the dust collection unit, filter supply and take-up spools. A plexi-glass front door allows visual inspection of the filter supply on the feed spool.
- The filter advance is driven by a stepper motor unit, which allows continuous advancement of the filter tape at user selectable speeds (5/10/12.5 and 15 mm/h). Alternatively the filter can be advanced in step wise mode with user selectable time intervals.
- **Pump Unit:** with linear motor-driven Free Piston System (Pat.) has an internal piston inside the cylinder which is driven by an electro-magnet and spring system controlled by the alternating input current cycle. The system is quiet and vibration free, and offers the advantages of easy maintenance and a long operating life. The nominal flow is 3 m<sup>3</sup>/h with a noise level of max. 60 dB(A) at 1m. Optionally a flow meter can be offered.



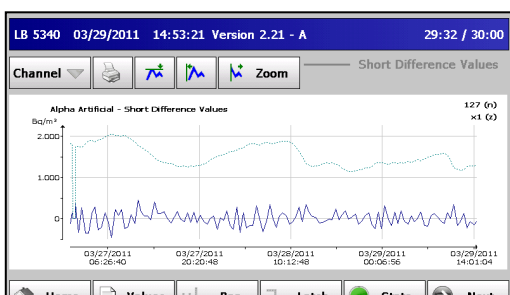
## - User interface / Display Features



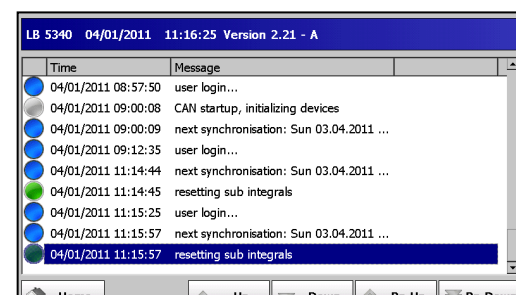
Zoom-function of the displayed values



Measured values presented in a bar graph with corresponding thresholds



Chronological trend of the measured values with declaration of the detection limit



Alarm- and status page LB 5340

# LB 9140 Transportable Alpha-Beta Moving Filter Monitor

## Self-Checking & Alarming Features LB 9140

The monitor is equipped with self-check routines that continuously monitor the system health and alarm status:

### - Monitoring of the Pump function:

Deviation of the flow rate below a set point triggers a failure message on the Data logger electronics. Also when the pump is switched off a failure message is generated.

### - Monitoring of the Filter tape:

The rotary encoder switch allows tracking the amount of the filter tape used. When about 5 m is left on the supply spool a warning "Pre-paper end" message is generated. When the filter tape supply is fully used or when the filter ruptures the message "Paper fail" is generated. In both cases the red LED on the control panel goes on.

### - Detector Failure threshold Alpha and Beta (and Gamma if installed):

Detector failure when the count rate drops below a preset value a failure message is generated. The Alarm beacon healthy light extinguishes, if programmed an orange failure light goes on (factory setting).

### - Pre-Alarm Threshold Alpha or Beta:

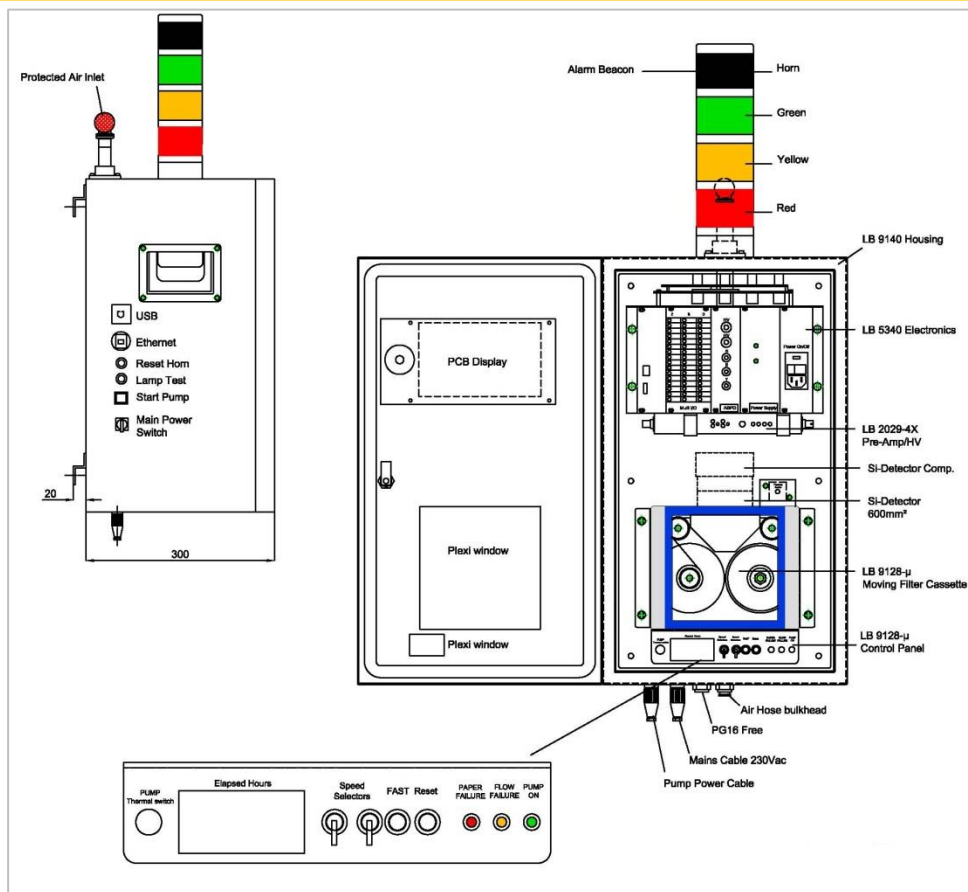
When the user defined Alpha resp. Beta pre-alarm threshold is breached an Alarm message is generated. The Alarm beacon pre-alarm (red) light goes on; the normal (green) light goes out (factory setting).

### - Alarm Threshold Alpha or Beta:

When the user defined Alpha resp. Beta alarm threshold is breached an Alarm message is generated. Alarms can be set on volumetric, release rate and integral release activities ( $\text{Bq}/\text{m}^3$  -  $\text{Bq}/\text{h}$  -  $\text{Bq}$  per day, week, month). The Alarm beacon red & sounder goes on. If programmed the sounder can be muted by pushing the mute sounder button on the side of the enclosure (factory setting).

### - Lamp test:

Pushing the lamp test button on the side of the enclosure closes a digital input on the electronics which in turn triggers all output relays to go to active state.



# Technical Data Transportable Moving Filter Monitor LB 9140

Filter cassette	
Structural shape	300 x 300 x 530 mm <sup>3</sup> (W x D x H) elapsed hour counter, flow low, filter trouble indicators (led), fast filter advance pushbutton, fast reset filter timer pushbutton, plexiglass door for access wetted parts
Dust collection area	25 x 25 mm <sup>2</sup>
Wetted parts mat'l	Ni plated brass to MIL standard / Stainless steel
Construction mat'l	Alum side & back plate, Plexiglas cover front
Sampling section from inlet to filter	to DIN 25423 (06/96) Stainless steel RS 316L
System In leakage	< 3.5 % (IEC 60761)
Pressure	Ambient: 650 – 1100 hPa Sample: max. -150 hPa/ +25 hPa to atm. pressure
Temperature	Ambient: -15 / +40 °C Sample: -20 / +40 °C
Humidity	Ambient: 0-95 % RH non condensing Sample: 0-95 % RH non condensing
Filter	
Type	Glass fiber Particulates filter to DIN Whatman N° 10, roll 12 m x 50 mm, Core 25 mm diameter
Advance	continuous, speed selectable 5/10/12.5/15 mm/h fast 1000 mm/h pushbutton (front panel)
Autonomy	> 3 months at 5 mm/h speed
Controls	Filter ruptured, Filter supply low (< 3 m)
Pump Unit	
Pump	low maintenance (> 10.000 h) silent operation (< 60 dB(A) at 1 m) Pump head max. -440 mbar typical operating -160 mbar
Flow rate	typical 3.3 m <sup>3</sup> /h at NTP
Controls	pressure switch (flow low) typical set point 3.2 m <sup>3</sup> /h at NTP
Alpha-Beta Detector	
Type	Si-CAM 600 mm <sup>2</sup> light tight
Efficiencies solid Sources	Alpha <sup>241</sup> Am typ. 25% / 4 pi Beta <sup>36</sup> Cl typ. 25% / 4 pi, <sup>60</sup> Co typ. 7-10% / 4 pi
Energy range (preamp threshold setting)	Beta: 100 keV – 2.5 MeV Alpha: 2.5 MeV – 10 MeV Alpha Nat.: 7 MeV – 10 MeV
Background in system	Alpha < 0.002 cps Beta < 0.2 cps
Lead shield	2 cm / 4 pi
Ambient gamma	Beta channel
Sensitivity	< 0.4 cps per μSv/h Cs-137 radiation (front) < 0.2 cps per μSv/h (back)

Guard Detector	
Type	Si-CAM 600 mm <sup>2</sup> light tight (optional)
Background in system	Beta window < 0.2 cps
Ambient gamma	Beta channel
Sensitivity	< 0.6 cps per μSv/h Cs-137 radiation (front)
Preamplifier	
Type	LB 2029-40 (one detector) / LB 2029-41 (two detectors): dual preamplifier / discriminator stage Built in bias voltage generator 0-100 V for Detector 1 & 2
Electronics	
Type	Data logger LB 5340 (Refer to LB 5340 Flyer)
Enclosure LB 9140/LB 5340	
Type	Stainless steel
Dimensions	530 x 300 x 300 mm <sup>3</sup> (H x W x D)
Protection degree	IP 65 (according to IEC 60529)
Weight	approx. 43 kg incl. pump & cart
Cart	
Type	Aluminum, RAL5002 painting, 2 wheels
Dimensions	height: approx. 1035 mm width: approx. 420 mm depth: approx. 395 mm
Alarm Unit	
Type	LB 9140-ALARM, green system healthy lamp, orange lamp, and red flushing lamp, resettable horn 90 dB(A) at 1 m
Lamps	LED's 230 VAC WERMA
Functions	Reset horn, lamp test pushbutton
Overall Electrical Specifications	
Mains	230 VAC / 50 Hz / Single phase, I norm 1 A Fuse: 1.6 A T, thermal safety 1.3 A
Safety	EN 60601 compliant
Radiological	IEC 61172 (in parts) IEC 60761 Part 2
EMC	CE compliant: EN 61000-4

Subject changes without prior notice.

