LB 9000 Data Logger

Data Logger for measurement applications in radiation protection

Equipment concept

The Data Logger LB 9000 with its PC software is a universal data acquisition system for a variety of detector systems in radiation protection. All kinds of different probes, sensors and peripheral devices can be connected.

The 19“-rack design enables the usage in a desktop housing or as a rack mounted device. Both versions are characterized by a compact and visually attractive designed metal enclosure and equipped with a colored touch screen.

The Data Logger has a modular structure so that it can be set up and retrofitted depending on the application. Intelligent modules are used to which the detectors and sensors are connected:

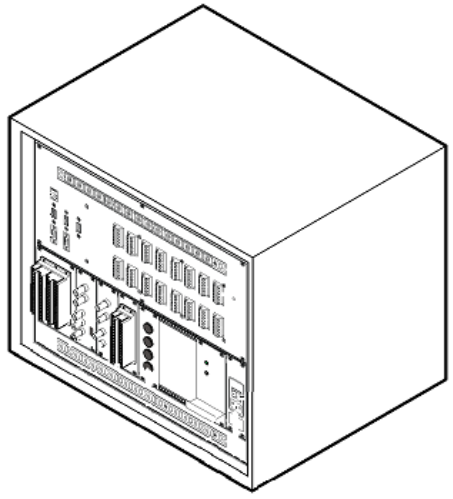
- ABPD-board for pseudo-coincidence measurement
- Detector DAQ-board
- Universal IO-board
- 8-fold current-output-board
- Relay-board with 8- or 16-fold relay card with double changers
- Detector Power Supply module (4 Tuchel-connectors)

If necessary the modules can be used in a multiple way. Up to 10 slots are available so that you can configure a large-scale system with up to 50 virtual measuring channels combined with 20 analog outputs and 70 digital outputs.

The system can be upgraded to max. 15 boards by using an additional rack.

All connections are located on the backplane and are easily accessible. One USB-connector is available on the front panel of the device.

Application example of the LB 9000 in the aerosol monitor LB 150 DR



Backside LB 9000

Graphic Layout (Example)

Cyclic test, created: 1/23/2017, 2:52:54 PM

```
Device type:        LB9000
Device name:        No Name
Serial number:      0000
Device comment:
```

Test 1 of 1

LB9000 - Multi IO - Background measurement, created: 1/23/2017 2:52:55 PM

```
Input channel                    : CI100 => Counter Input 01
High voltage channel             :
High voltage                     : 100.0 V
Measuring time                   : 00:00:02 (hh:mm:ss)

Comment                          :
```

MEASUREMENT RESULT

```
Old background                   : 20.01 cps  ± 2.886 %
New background                   : 19.85 cps  ± 15.87 %
Max. permissible background      : 25.00 cps
Background > maximum             : No
```

VALIDATION SUCCEEDED - the measured value is within the tolerance.
The new background was applied

Periodical Testing Report (Example)

Software system

The Data Logger features the latest state of the art technology and a technically mature software system that can be configured by the user. It takes over the complete control of all modules, calculation and integral calculation as well as the graphical presentation on the screen.

All measured values, different integral values and exceeding or not reaching limit values can be monitored and outputted depending on the user's requirements.

The configuration of the virtual channels is individually programmable for each channel via provided software assistants. Averaging algorithms (rate meter or moving average) and alarm thresholds can be selected.

Besides the definition of radiometric channels the configuration of the digital in- and outputs as well as the relay outputs are possible.

There are various service functions: Background measurement, determination of calibration factors, plateau measurement and determination of pseudo-coincidence factors.

Optionally, it is possible to set up and perform system-specific routines for periodical tests via an additional software module. Such routines can be completed with a periodical testing report.

The application software features three password-protected access levels: The Guest account has very restricted access rights. The User password allows you to set up the system and measurement parameters, run measurements and carry out recurrent test functions. With the Administrator password you can, in addition, configure the complete system: Installation and configuration of the cards, execution of calibration functions, setup of measuring channels, definition of in- and outputs and creating of layouts for the data presentation.

Technical Data

LB 9000 Data logger

Mechanical Data

Hardware:	19“ rack, desktop housing or rack mounting device; passive backplane with 10 slots for plug in boards (modules); Communication between the modules via CAN-bus, On-Off switch and mains fuse
Processor board:	Mini-PC, 15“ TFT-Monitor with touch screen CAN card: PC-104/PCI Windows® 10, keyboard with trackball
Interfaces:	Back panel: 3 x USB port, 1 x Ethernet, 2 x RS 232 Front panel: 1 x USB port
Mains supply:	110/230 VAC, max. 100 W, fuse: 3A,T

Ambient conditions

Operating temperature range:	0°C to 50°C
Relative humidity:	20% to 80%, non-condensing

Software

Watchdog function:	Integrated into the relay board firmware
Data communication:	F²C Protocol via RS 232 or Ethernet
Data buffer:	10.000 measurement records per channel
Back up function:	Parameter up-/download for external back up, setup configuration report in rtf format
Periodical testing function: (optional)	Software module for installation and performing of system-specific periodical testings incl. report

Hardware modules

Multi I/O module LB 39417-01:	4 counting inputs, 2 current inputs (0/4-20 mA), 2 current outputs (0/4-20 mA), 4 digital inputs, 4 control voltages for probe high voltage 0-5 V, 8 open-collector-outputs, connection via phoenix terminal block (48 pin connector)
ABPD module LB 39415:	Pseudo-coincidence board with α,β,γ- counter BNC inputs for norm pulses, 2 independent HV-outputs (up to 4 kV)
ABPD module LB 39415-02:	Pseudo-coincidence board with α,β,γ- counter BNC inputs for norm pulses, 2 independent HV-outputs (up to 2.8 kV)
DAQ module LB 39414:	1 HV-supply unit up to 4 kV (12 Bit resolution), preamplifier for GM-, Proportional-Counters and Scintillation detectors, software controlled main amplifier (8 Bit), 2 x freely selectable Regions of Interest (ROI´s), 1 integral discriminator, 2 HV-outputs (1 x direct and 1 x over voltage Tripler stage HVx3), 1 BNC counter input and 1 BNC counter output
DAQ module extension LB 39414-01:	2 more energy windows to the DAQ module using the same detector input, allows to set 4 ROI´s on the spectrum
8-fold current output board:	8 independent current outputs (0/4-20 mA), linear or logarithmic scale selectable
Relay boards:	16 potential-free, freely programmable relay-outputs with double changer, embedded watchdog function
Low Voltage Board LB 39416:	4 x Tuchel connectors with 5 V and ± 15 V each

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