

# Product Information

## LB 790 10-Channel Alpha-Beta Low-Level Counter with PC-Software AMS



### Applications

- Environmental monitoring
- Water treatment plants
- Nuclear Facilities
- Radiation Protection
- Radiochemistry
- Nuclear Physics

### Functions

- Simultaneous Alpha and Beta measurement (10-fold sample drawer for planchets up to  $\varnothing$  60 mm)
- Guard counter directly above measuring counters to suppress cosmic ray (anticoincidence)
- 10 cm lead shielding in all directions for optimal low background performance
- Modular sample detector construction (2 detectors per module)
- Easy servicing concerning maintenance and repair
- Detectors and sample drawer are one unit
- Preamplifiers integrated in the detector
- New PC Windows-Program AMS (Activity-Measuring-System for Data Acquisition)



# LB 790 10-Channel Alpha-Beta Low-Level Counter

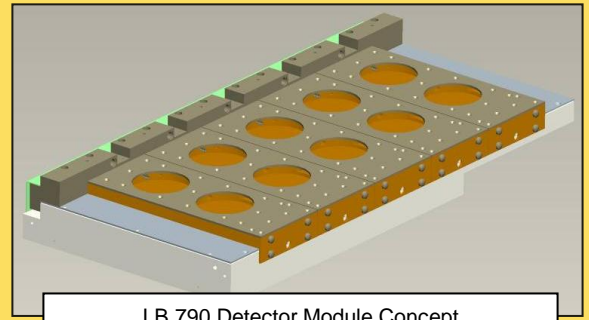
## Device Setup

The 10-Channel Low-Level Counter - LB 790 allows simultaneous and separate measurements of low activities for alpha and beta radiation emitting radionuclides with a detection limit of approx. 12 mBq for Alpha (Am-241) and approx. 22 mBq for Beta (Sr-90) (according to ISO 11929; 1 h measuring time)<sup>1)</sup>.

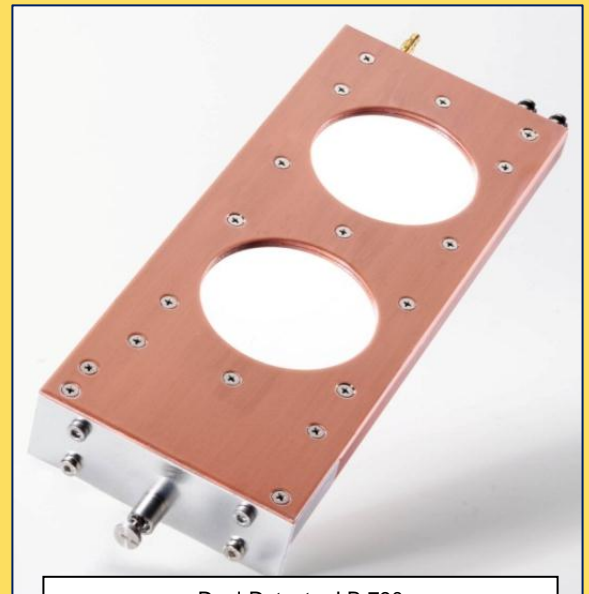
The planchets ( $\varnothing$  60 mm) are arranged in 2 rows on, 5 planchets each, a tray made of copper. The 10 ultra-flat flow-through proportional counter tubes are located directly above the planchets and their entrance window is protected by a thin foil. On the rear side all counters are capped by a large-area flow-through counter tube acting as a common guard counter. This guard counter operates in anticoincidence with the measuring counters to suppress the cosmic radiation.

The tray and counter tubes are surrounded by a shielding, 10 cm thick, made of standard lead bricks, for reduction of the environmental radiation (Total weight: approx. 1200 kg).

The detector unit is connected with the interface LB 5330 for registration, preprocessing of the count rates, transfer of the measured values to a PC via RS 232 port and supply of the high voltage.



LB 790 Detector Module Concept



Dual-Detector LB 790

The detectors and the sample drawer - one single unit - can be pulled out of the lead shielding in case of repair. Should this be necessary a metal support and 9 lead bricks have to be removed. This enables an easy servicing of the low-level system, such as detector exchange, as well as exchange of entrance windows.

Nevertheless, the measurements can be continued during exchange / repair of one detector module using a special dummy detector which guarantees the gas flow.

With the integration of the preamplifiers, as well as the optimisation of the high voltage supply concerning distance, dirt and crosstalk, the detectors of the LB 790 are less susceptible against their environment.



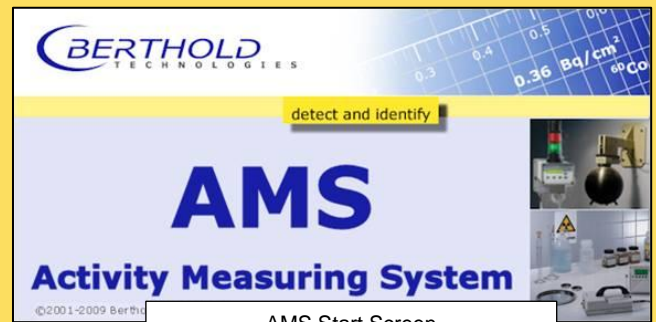
Exchange of Detector Modules LB 790

1) Detection limit is calculated regardless of spillover and calibration uncertainty.  
Measuring times (probe = background), 5% error probability, background value of 0.1 cpm for Alpha and 1 cpm for Beta.  
For Am-241 an efficiency of 34% and for Sr-90 an efficiency of 50% is used.  
Sources are located at the upper edge of the planchet

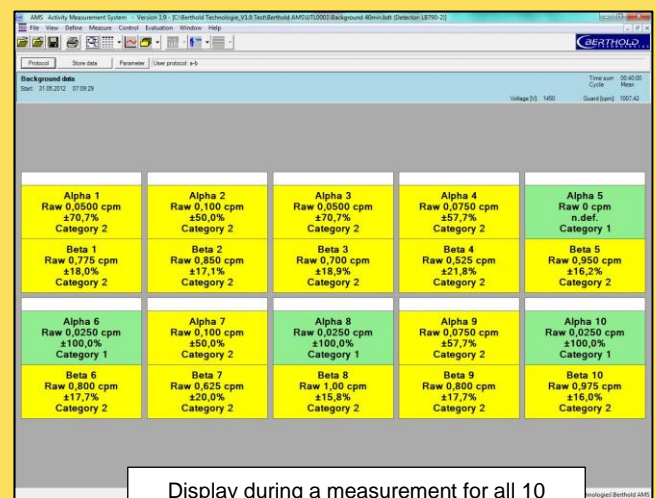
# LB 790 10-Channel Alpha-Beta Low-Level Counter

## PC Software: AMS

- Simultaneous measurement of 10 samples - Alpha and Beta radioactivity in freely selectable units
- Parallel connection of several detector systems simultaneously (up to 4 systems). This depends on the number of RS 232 ports in your PC and the unblocking of the dongle (licence)
- Definition of the measuring time: either by entering the preset time or the statistical accuracy
- Automatic background subtraction after storage of the measured background in the user protocol
- Nuclide chart with parameters and additional chart for calibration and quality assurance
- Automatic half-life correction independently adjustable for Alpha and Beta channels
- Live display of the detected activities, cpm values, statistical uncertainties for Alpha and Beta channels during the measurement, with different categories for measurement ranges
- Statistical screening of the measured values concerning outliers. Outliers are displayed coloured
- Stored measurements can be displayed on the monitor and evaluated at any time

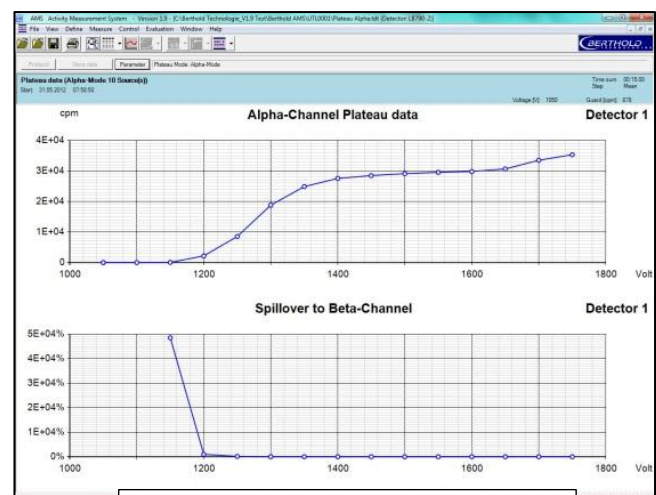


AMS Start Screen



Display during a measurement for all 10 detectors and both channels

- Data analysis: Storing of measurements (Background, Calibration, and Performance Check) in a history file with graphical display of the process. Possibility to show the changes in a defined time period, for example trend of background values
- Graphical representation of measuring cycles in a time diagram
- Compilation of test reports (e.g. Excel, Word or Access)
- Data transfer of sample parameters from an input data file (e.g. generated by LIMS) and data output via Excel-Sheet for data processing in LIMS or reports [LIMS – Laboratory Information Management System]



Plateau and spillover for a selected detector

# Technical Data LB 790

## Mechanical Data

External dimensions (with lead shielding):	850 x 545 x 320	(L x W x H in mm)
Weight (with lead shielding):	approx. 1200 kg	
Dimension detector unit with sample drawer and electronics:	590 x 520 x 120	(L x W x H in mm)
Weight detector unit:	37.5 kg	
Dimensions dual-detector module:	262 x 92 x 30	(L x B x H in mm)
Weight dual-detector module:	1.55 kg	
Material detector module:	Cathode copper	
Material guard counter:	Aluminium	

## Power Supply LB 5330

90 – 260 VAC 50/60 Hz, Fuse: 1 A,T at 230 VAC, 2 A,T at 110 VAC

## Physical & electrical Data

Power supply electronics:	+15/-15 V via LB 5330
Total current consumption:	250 mA
Current consumption of amplifiers:	+15 V = 8 mA/ -15 V = 6 mA
Connector:	25 pol. SUB-D for signals and power supply
Operating point with P-10 (typical):	1450 V
Counting gas:	ArCH <sub>4</sub> (90/10) or ArCO <sub>2</sub> (82/18) / ArCO <sub>2</sub> (90/10)
Purity:	ArCH <sub>4</sub> : Argon 4.8 = 99.998% Methane 3.5 = 99.95% ArCO <sub>2</sub> : Argon 5.0 = 99.9990% CO <sub>2</sub> 4.5 = 99.995%
Detector window:	1.5 µm Hostafan foil (0.21 mg/cm <sup>2</sup> )

## Metrological Data (P-10)

Typical background:	< 0.1 cpm (Alpha) < 1.0 cpm (Beta)
Typical efficiency:	
Alpha radiation:	Am-241: 34% Pu-238: 38%
Beta radiation:	C-14: 25% Cl-36: 50%

## Ambient Conditions

Operating temperature range:	0°C to 50°C
Relative humidity:	10 to 80%, no condensing
Protection degree:	IP 50 (according to DIN IEC 60529)

Subject to change without prior notice

