LOW-LEVEL COUNTER SERIES LB 761 & LB 790

Reliable measurement of low α/β activities

BERTHOLD

ALPHA-BETA LOW-LEVEL COUNTERS

High detection sensitivity for lowest activities of alpha and beta radiation

LB 790 with 10 samples within a single drawer

Accurate measurement of radioactivity is crucial in the working environment.

Rapid and accurate analysis of activity in water or air samples enables compliance with regulatory requirements. Reliable results are also vital when carrying out wipe tests to check equipment for even very low-level radioactive contamination. This is especially important when tools or parts are leaving a controlled area.

Berthold's Low Level Counters provide the ideal solution, using background reduction techniques, special detectors and lead shielding to ensure precise readings at all times. Our Low-Level product line consists of different models with up to 20 detectors and up to Ø 30-60 mm (LB 790 series) or Ø 200 mm (LB 761 series) samples. Detection limits are calculated according to ISO 11929.

Berthold Low-Level Counter Benefits

- **Designed to minimise the impact of interfering environmental background:**
  - 10 cm lead shielding from all sides
  - Only selected low activity materials are used
  - Guard counter to eliminate the influence of cosmic radiation

- **Flexible configurations from 1 up to 20 detectors:**
  - Systems with one common or with separate drawers for each detector module
  - Hybrid-systems with Ø 60 mm and Ø 200 mm sample slides or TWIN Systems with up to 20 Ø 60 mm detectors
  - Various conversion kits with the option of upgrading the systems at a later date (e.g., from LB 790 to LB 790 TWIN or LB 790 Hybrid)

- **Service & Maintenance:**
  - Modular detector concept
  - Easy access to detectors and other components

MEASURE LOW ACTIVITIES WITH HIGH DETECTION SENSITIVITY

Designed to minimise the impact of interfering environmental background

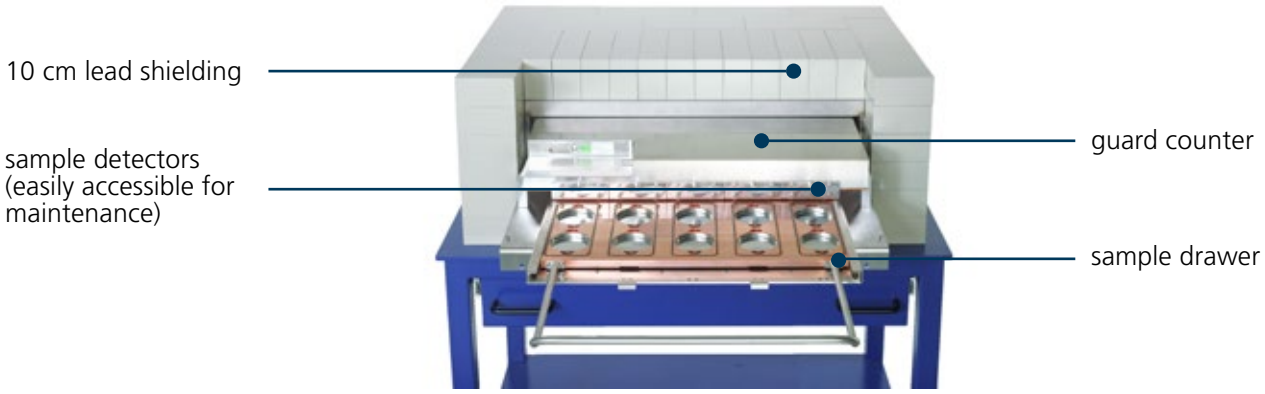
The LB 761 and LB 790 series enable the simultaneous and separate measurement of low alpha and beta activities emitted by radionuclides whilst minimising the interference of environmental radiation. The following characteristics contribute to the sensitivity:

Efficient lead shielding
The drawer and the counting tubes are surrounded by a 10 cm thick shielding to reduce the ambient radiation in a 4π geometry, which mainly consists of standard lead bricks.

Guard counter
To eliminate the influence of cosmic radiation on the measurement, a large surface proportional counter covers the Low-Level detectors from above. This detector works in anticoincidence with the sample detectors to reduce the influence of cosmic radiation to a minimum.

Counting tube
The counting tube is made of low active copper.

An efficient reduction of background radiation enables the Berthold Low-Level-Series to achieve extremely low detection limits and therefore a short measuring time.



The special design of the Berthold Low-Level counters eliminates not only the ambient radiation, but also eliminates the influence of cosmic radiation.

AVAILABLE IN DIFFERENT VERSIONS...

Various models for different applications

The LB 790 series is a 2- to 20-channel Low-Level counter designed to measure wipe test or samples of similar geometry with a high throughput. Depending on sample throughput and type, the number of samples belonging to a measurement series can be varied and adjusted as desired.

Up to 5 separate flow counter tubes with 2 Low-Level detectors enable the measurement of 10 samples at a time. With an LB 790 TWIN or LB 790-5L TWIN you can upgrade to a system with up to 20 Low-Level detectors.

The detection limit* of our LB 790 is 11 mBq for alpha (Am-241) and 21 mBq for beta (Sr-90/Y-90) (according to ISO 11929; 1 h measuring time).

LB 790 / LB 790 TWIN

Conceived with one or two single drawers with 10 sample holders each, the system allows for the simultaneous measurement of multiple samples, with the same or several different measurement routines. An existing LB 790 can be upgraded to an LB 790 TWIN.

LB 790-5L / LB 790-3L

Equipped with 5 or 3 individual drawers for 2 samples each, the LB 790-5L / LB 790-3L offers a high degree of flexibility. Each drawer can be loaded individually, enabling up to five independent measuring routines for diverse samples. Connecting all drawers with one handle speeds up sample exchange. The LB 790-3L can be upgraded to a LB 790-5L later on.

The LB 790-5L and LB 790-5 UL Low-Level counter provide 5 individual sample drawers for measuring up to 2 planchets each with Ø 60 mm with independently configurable measurement routines.

... TO MEET YOUR SPECIFIC NEEDS

Enjoy the benefits of flexibility

LB 790 UL – Ultra Low-Level Counter

The UL-model (UL = Ultra Low-Level Counter) has been designed to further minimise environmental background. The specially developed 4π guard counter surrounds the single detector modules. Only selected materials with minimal intrinsic activity are used. The detection limit* is 8 mBq for Alpha (Am-241) and 16 mBq for Beta (Sr-90/Y-90) (according to ISO 11929; 1 h measuring time).

LB 790 UL

The system is equipped with a **single** drawer for measuring up to 2 planchets with Ø 60 mm each and can easily be upgraded with an additonal LB 790-UL unit using the same electronics.

LB 790-UL

LB 790-5 UL

The LB 790-5 UL provides the flexibility of the LB 790-5L combined with a particularly low background level.

Service and maintenance-friendly design

The detector modules and the sample drawer of the LB 790/-5/-3/-UL form a single unit that can be easily pulled out of the lead shielding in case of repair.

The modular detector concept reduces downtime of the device and supports an easy maintenance.

Only one metal support and nine (two for the LB 790-UL) lead bricks need to be removed for this purpose. That allows easy maintenance of the Low-Level system, such as replacement of the detectors.

In the event of a detector module failure, the system can be still used further for measurements until repaired. As an interim solution, a special dummy detector can be used to guarantee the gas flow.

Double detector module spare part and transport case

Close-up LB 790-UL Ultra Low-Level counter

EFFICIENT SOLUTIONS FOR LARGE TO SMALL SAMPLES

LB 761 for Ø 200 mm samples

The Low-Level measuring system LB 761 for Ø 200 mm planchets enables the measurement of alpha and beta radiation components of airborne particulates collected on a large Ø 200 mm glass fibre filter or evaporated environmental samples.

The background rates of the system are exceptionally low, resulting in excellent detection limits*: 59 mBq for alpha (Am-241) and 60 mBq for beta (Sr-90/Y-90) (according to ISO 11929; 1 h measuring time).

The LB 761 Low-Level counter provides a single sample drawer for measuring planchets up to Ø 200 mm.

LB 790 Hybrid systems

Our LB 790 Hybrid systems enable the measurement of up to ten Ø 60 mm samples and one Ø 200 mm sample independently from each other at the same time and within the same unit. This decreases the space requirement and the costs. Weight is also significantly reduced compared to the use of two separate systems.

DESIGNED TO MEET YOUR SPECIFIC NEEDS

Find the best configuration for your application

	LB 790 TWIN LB 790-5L TWIN	LB 790	LB 790-5L	LB 790-3L	LB 790 UL	LB 790-5 UL	LB 790-5 UL 30	LB 761	LB 790 Hybrid
Sample size	Planchet with Ø 60 mm, with adapter rings Ø 50 mm and Ø 30 mm				Planchet with Ø 60 mm, with adapter rings Ø 50 mm and Ø 30 mm		Planchet with Ø 30 mm	Planchet with Ø 200 mm	1 planchet with Ø 200 mm and 10 planchets with Ø 60 mm
Detector size	Ø 60 mm				Ø 60 mm		Ø 30 mm	Ø 200 mm	Ø 200 mm und Ø 60 mm
Number of samples	20	10		6	2	10	10	1	10 + 1
MDA* (α) [Bq] ^{241}Am	0.011				0.008		0.006	0.059	see LB 790 and LB 761
MDA* (β) [Bq] ^{14}C	0.041				0.033		0.022	0.113	see LB 790 and LB 761
MDA* (β) [Bq] ^{90}Sr/ ^{90}Y	0.021				0.016		0.011	0.060	see LB 790 and LB 761
Typical Back-ground (α) [cpm]	0.08				≤ 0.05		≤ 0.02	1.2	siehe LB 790 und LB 761
Typical Back-ground (β) [cpm]	0.90				≤ 0.50		≤ 0.21	8.0	see LB 790 and LB 761
Typical efficiencies α ^{241}Am	34 %							20 %	see LB 790 and LB 761
Typical efficiencies β ^{14}C	25 %				24 %			26 %	see LB 790 and LB 761
Typical efficiencies β ^{90}Sr/ ^{90}Y	49 %				49 %			49 %	see LB 790 and LB 761

***The following data is to be read as according to ISO 11929 with 1 h background and sample measurement time and 5 % error probability.

EVALUATION AND REPORTING WITH AMS

Easy-to-use and optimising your productivity

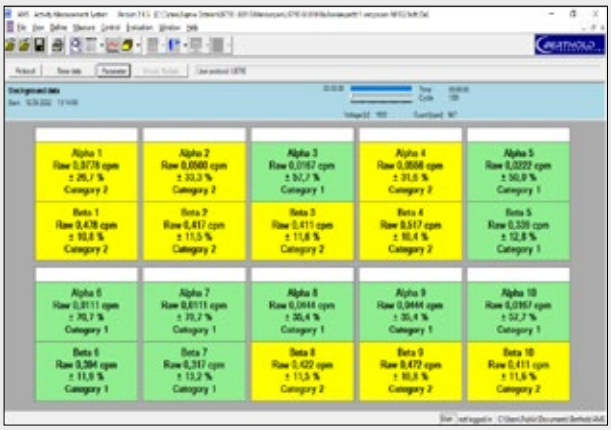
The LB 761 and the LB 790 incorporate the user friendly AMS Evaluation Software for improved data analysis and instrument control.

Innovative approaches to analyse your data

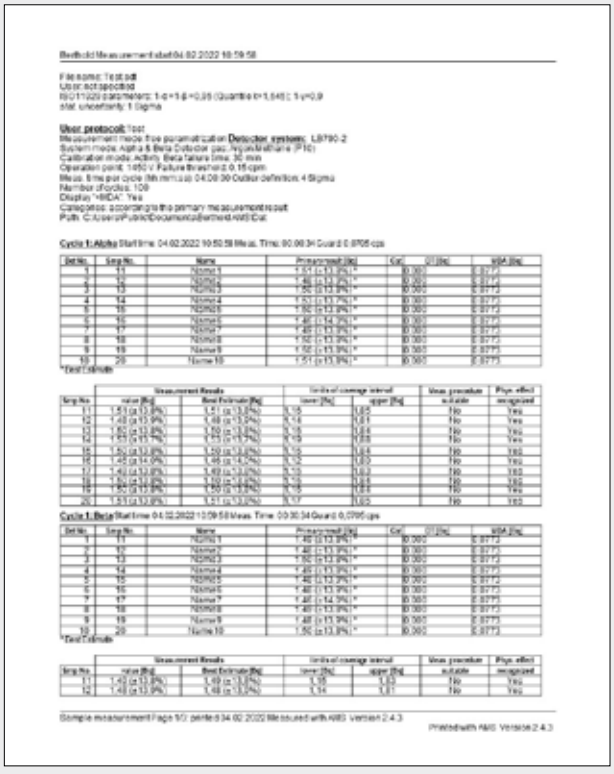
- With the help of user protocols, measurement parameters for different applications can be stored in the AMS software.
- Data analysis (ISO 11929 compliance)
- Statistical screening of the measured data for outliers.
- Automatic half-life correction separately for alpha and beta channels.

Powerful productivity features

- Control up to four systems operating with individual system parameters.
- Monitor your systems in real-time: live display of activities, cpm values, statistical uncertainties for alpha and beta channels during the measurement, and the different measuring range categories.
- Integrated service functions like background measurement, calibration, system tests with reports.
- Simple generation of measurement protocols with the possibility to configure them individually.



LB 790 AMS display of measurement values for all 10 detectors and both channels



Example of a measurement report

CONSUMABLES

Equipment from A to Z

The Berthold Low-Level series offers a wide range of accessories:

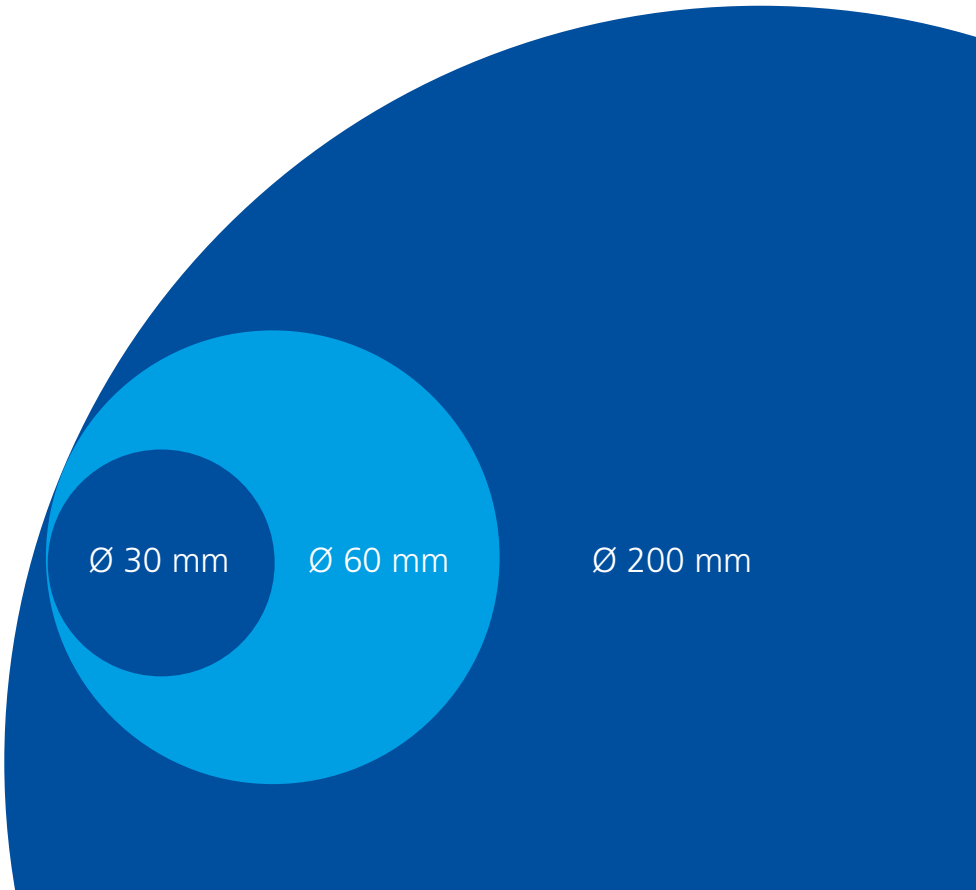
Measuring planchets in the aluminum or in the steel version in the sizes Ø 30, 50 and 60 mm are optionally available in packages of 100. Ø 200 mm planchets in single packs are also available.

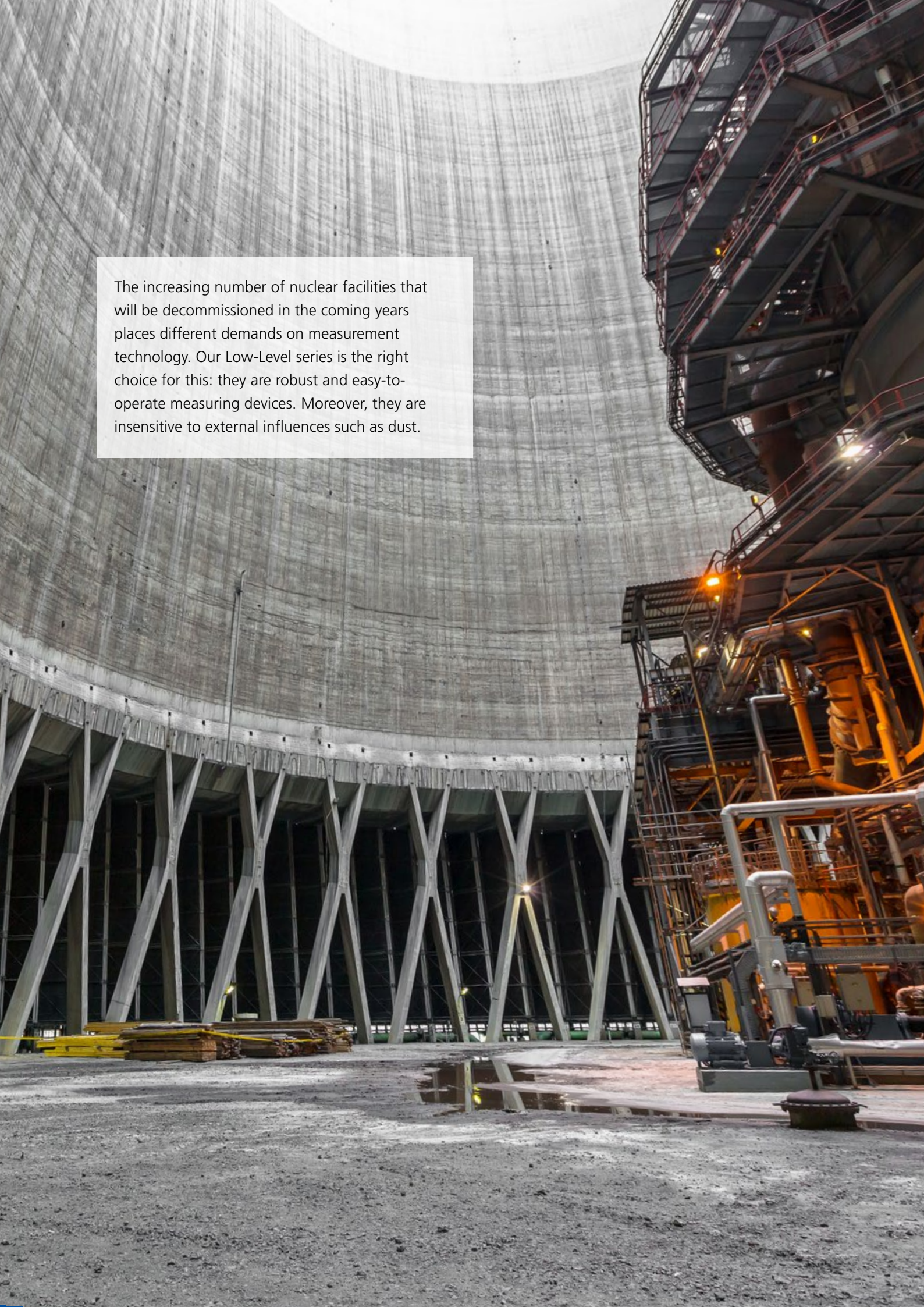
If the diameter of 60 mm is not suitable for your application and you wish to measure smaller wipe tests or samples with optimal measurement geometry, we offer adapter rings in the sizes Ø 30 and 50 mm.

Reference sources for calibrating the units are available on request:

ID No.	Product	Source	Activity	Type	Diameter
26873	LB 790	^{241}Am	185 Bq	α	60 mm
26874	LB 790	^{90}Sr/^{90}Y	185 Bq	β	60 mm
28703	LB 761/ LB 790 Hybrid	^{241}Am	1 kBq	α	200 mm
33959	LB 761/ LB 790 Hybrid	^{90}Sr/^{90}Y	1 kBq	β	200 mm

With most low-level devices available on the market, the failure of a detector module leads to a complete failure of the system and a service call. In such a case, the Berthold LB 790 series can continue to operate by means of a dummy detector module. A quick and easy exchange of the defective module is possible without a service call by means of a replacement detector.





The increasing number of nuclear facilities that will be decommissioned in the coming years places different demands on measurement technology. Our Low-Level series is the right choice for this: they are robust and easy-to-operate measuring devices. Moreover, they are insensitive to external influences such as dust.

TECHNICAL SPECIFICATIONS

Mechanical Data		
Counting gas	P10 $ArCO_2$ (82/18) $ArCO_2$ (90/10)	
Dimensions (L x W x H)	LB 790/-5L/-3L/-5UL LB 790 UL LB 761 LB 790 TWIN	850 x 545 x 320 mm 550 x 350 x 300 mm 600 x 600 x 270 mm 850 x 555 x 480 mm
Weight	LB 790/-5L/-3L/-5UL LB 790 UL LB 761 LB 790 TWIN	approx. 1200 kg approx. 750 kg approx. 1000 kg approx. 1500 kg
Ambient Conditions		
Temperature range		0 °C to 50 °C
Relative humidity		10 to 80 % not condensating
Protection class		IP 50 (According to DIN IEC 60529)

Ordering Information	
LB 790	42182-10
LB 790-5L	65082
LB 790-3L	69079
LB 790-5UL	74426
LB 790-UL	60687-10
LB 790-UL extra module	60687-20
LB 761	45946-10
LB 790-TWIN	65729
LB 790-5L TWIN	67067
LB 790 Hybrid	91231
Extension Kit LB 790 to LB 790 Hybrid	72502

Ordering Information/ Accessoires		
Replacement detector module		42389
Replacement detector module LB 790-5UL		74360
Dummy detector		55024
Dummy detector LB 790-5UL		74465
Sample planchets aluminium (100 pcs. per pack):		
	50 mm x 3 mm	6061
	50 mm x 8 mm	6059
	60 mm x 3 mm	6067
	60 mm x 8 mm	6063
Sample planchets stainless steel (100 pcs. per pack):		
	50 mm x 3 mm	6062
	50 mm x 8 mm	6060
	60 mm x 3 mm	6065
	60 mm x 8 mm	6064
	30 mm x 8 mm	6066
Sample planchets for LB 761 (1 piece):		
rolled rim	Ø 199 mm	50107
flat rim	Ø 201 mm (models after 2018)	68014
Adapter rings (10 pcs. per pack):		
	For 30 mm x 8 mm/ 50 mm x 3 mm	6654
	For 50 mm x 8 mm/ 60 mm x 3 mm	6655
Calibration sources:		
Ø 60 mm x 3 mm	Am-241, 185 Bq	26873
	Sr-90/Y-90, 185 Bq	26874
Ø 194 mm x 3 mm	Am-241, 1 kBq	28703
	Sr-90/Y-90, 1 kBq	33959
Steel support table (880 x 630 x 745-765 mm)		51582

TRANSFORMING SCIENCE INTO SOLUTIONS

BERTHOLD

Experience and expertise are of great importance to be able to ensure safety-relevant measurements properly and reliably. With more than 70 years of experience in planning and design, installation and commissioning, calibration, documentation and service of radiation protection measurement systems, we continue to support our customers in their task to continuously optimize their work processes and to ensure the safety of the environment and personnel.

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