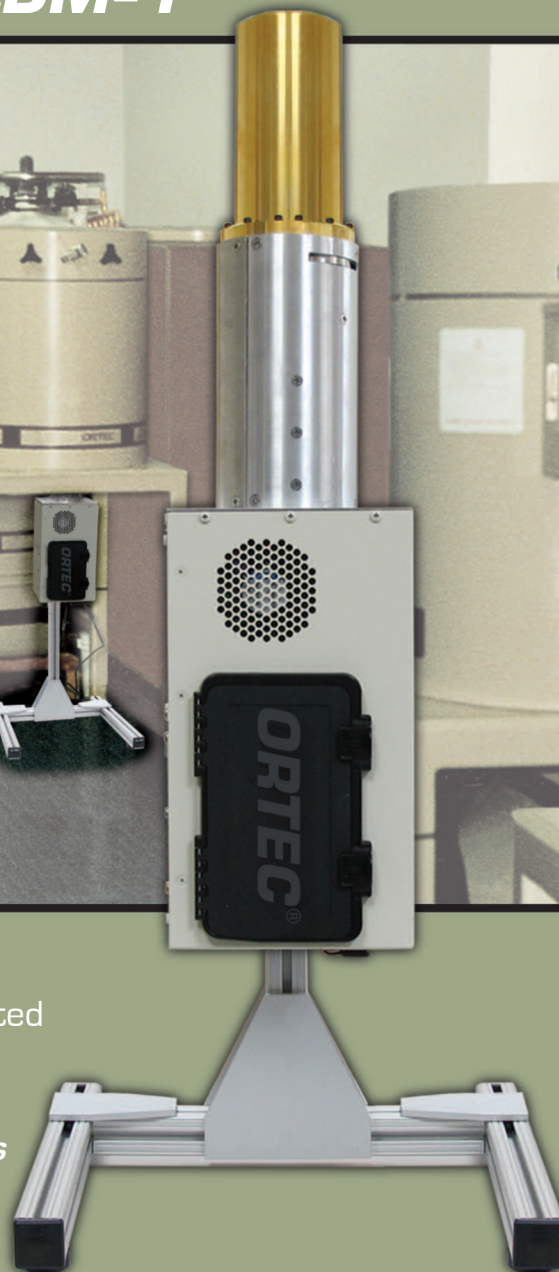


ORTEC[®]

Laboratory Detector Module LDM-1



The next generation fully integrated High-Purity Germanium (HPGe) digital spectroscopy system that *eliminates liquid nitrogen* and is *immune to thermal cycling*.



AMETEK[®]
ADVANCED MEASUREMENT TECHNOLOGY

Laboratory Detector Module LDM-1

The LDM-1 is a highly sensitive all-in-one HPGe gamma-ray spectrometer for use in a variety of applications ranging from counting labs to mobile laboratories.

A Complete Turn-Key Solution. . .

- **Increases productivity and instrument uptime** due to the fact that thermal cycling is never required on a partial warm up. The HPGe detector element is encapsulated in a metal sealed high reliability cryostat that does not contain molecular sieve.
- **Reduces cost and improves safety** since liquid nitrogen is not required. The Stirling-cycle cooler keeps the detector at a stable cryogenic temperature.
- **Space saving integrated design** eliminates desk mounted hardware and excessive cabling that frees up additional lab space.
- **Eases installation** due to lightweight design of only 7.3 kg. The LDM-1 is ideal for confined spaces and mobile labs. It easily fits into standard existing lead shields and only requires a single USB cable to connect to the computer.
- **Low power consumption reduces operating costs.** The LDM-1 is powered from a small 10–17 V DC supply that consumes less than 30 watts. This also makes mobile installations simple.
- **Continuous operation** via redundant power options. The LDM-1 comes standard with an integrated battery that keeps the entire system operating and counting for up to 4 hours. Additionally, with the optional battery extender LDM-1-OPT-1, the system continues operating for 18 hours. The battery extender is also hot swappable so the system never stops counting.

HPGe Detector and Cooler

The LDM-1 incorporates an ORTEC GEM Series P-type HPGe crystal that is 65 mm in diameter x 50 mm in length and 40% relative efficiency.

The large HPGe crystal increases sensitivity and reduces time to MDA. The "over-square" geometry means best absolute efficiency up to energies in excess of 2 MeV. All LDM-1 instruments use nominally identical germanium crystals. A cutaway drawing showing the construction materials is available on request from ORTEC and is suitable for most Monte-Carlo modeling programs. A typical relative efficiency curve is shown in figure 1.

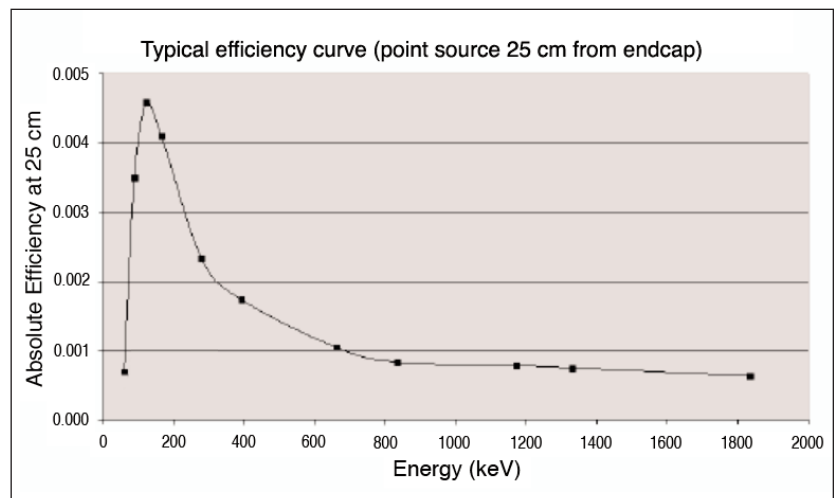


Figure 1. Typical Efficiency Curve.

Proven Cooling Technology

Liquid nitrogen is not required to cool the HPGe detector. The high reliability Stirling-cycle cooler maintains the detector temperature without the use of any refrigerants. The cooler has the additional benefit of safe and reliable operation in any physical orientation. It can be moved at no risk, even while operational.

The LDM-1 leverages the superior technology employed in the ORTEC Detective line of HPGe nuclide identifiers. The ultra-reliable hardened cryostat and robust Stirling-cycle coolers, field-proven hundreds of times over, are now available for a laboratory instrument. The hardened cryostat design allows removal or reapplication of power at any point of the cool down cycle. No longer does a partially warmed detector need to be cycled back to room temperature before cooling restarts.

Laboratory Detector Module LDM-1

Digital Electronics

The LDM-1 combines an integrated digital spectrometer with LFR active noise filtering to improve energy resolution, which reduces the effects of mechanically generated microphonic noise. Full control of the electronics parameter settings is allowed from the user interface.

Instrument State-of-Health and Status

The LDM-1 HPGe detector incorporates SMART-1 diagnostics, which verify that it is operating properly. State-of-health and instrument status is available at a glance.

ORTEC CONNECTIONS programs, such as MAESTRO which is included with the LDM-1, can read the state-of-health status parameters and display them on a PC or laptop that is connected to the instrument via USB 2.0. User-developed packages may read the status register through the LDM-1 for maintaining the spectrum QA.

Software

The LDM-1 includes the highly successful MAESTRO MCA Emulator. MAESTRO is a member of the ORTEC CONNECTIONS family of products and provides full networking with other ORTEC spectrometers and supporting computers.

The latest 64-bit compatible MAESTRO includes features for identifying peaks, editing libraries, and creating, printing and saving Regions of Interest (ROI), performing energy calibrations, and automating tasks via using simple "Job Streams".

The integral USB connection in the instrument hardware provides full PC control, real-time live MCA display, fast data transfer of single and multiple spectra to the PC, and full ORTEC CONNECTIONS network support.

Separate ORTEC software products that offer more advanced spectrum analysis are also available. These include well-known ORTEC Gamma Spectroscopy packages such as GammaVision for generalized HPGe spectrum analysis, PC/FRAM and MGAHI for Pu and U isotopic ratio analysis and ISOPlus for in-situ waste assay analysis. (Request a brochure or download from www.ortec-online.com.)

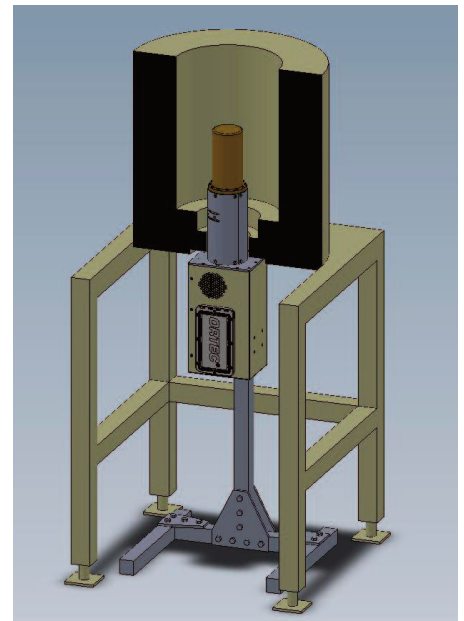
Create Custom Software with the Optional A11-B32 Toolkit

The A11-B32 CONNECTIONS Programmer's Toolkit is also available for those who wish to integrate the LDM-1 into their own software systems. The Toolkit offers ActiveX Controls to simplify programming with LabVIEW, Visual C++, and Visual Basic. For more information on the Toolkit, ask for the A11-B32 Programmer's Toolkit brochure or download from www.ortec-online.com.

Simplicity of Installation

Just attach the LDM-1 to the stand and slide the detector up into the lead shield. It requires only two electrical connections to be ready for use: a source of power and a USB 2.0 connection to the host computer. There are no interconnecting cables required between subsystems.

Plug in the power cable and attach the USB cable to a PC or laptop. The initial cool down takes less than 12 hours, and the LDM-1 is ready to calibrate and count samples.



Laboratory Detector Module LDM-1

Detector Specifications

Type	HPGe Detector Crystal. P-type GEM high-purity germanium.
Physical Dimensions	Coaxial construction 65 mm diameter x 50 mm length.
Relative Efficiency	40% typical (ANSI/IEEE 325-1996).
Resolution	1500 eV @ 122 keV and 2.3 keV @ 1332 keV (FWHM Warranted at optimum settings).
Peak Shape	1.95 typical (FWTM/FWHM).
Cooling Technique	Low power Stirling-cooler requires no Liquid Nitrogen.
Cryostat	Metal sealed "Hardened" for zero maintenance. No Molecular Sieve is used.
Cool Down Time	Typically <12 hours at 25°C.

Electrical Hardware Specifications

System Gain Settings	Coarse: 1, 2, 4, 8, 16, or 32. Fine: 0.45 to 1.
Energy Range	40 keV to 7 MeV Full Scale.
Conversion Gain	Software controlled from 512 to 16k channels.
Dead-Time Correction	Gedcke-Hale extending dead time method.
Dead-Time Correction Accuracy	Area of reference peak changes $\pm 3\%$ from 0 to 50,000 counts/second.
Integral Nonlinearity	$< \pm 0.025\%$ over top 99.5% of spectrum, measured with a mixed source.
Differential Nonlinearity	$< \pm 1\%$.
Digital Spectrum Stabilizer	Controlled via computer, stabilizes gain and zero errors.
Overload Recovery	At maximum gain, recovers to within 2% of rated output from X1000 overload in 2.5 non-overloaded pulse widths.
Digital Gated Baseline Restorer	Computer controlled adjustment (High, Low and Auto). U.S. Patent No. 5,912,825.
Pulse Pile-Up Rejector	Automatically set threshold. Pulse-pair resolution typically 500 ns.
Discrimination	LLD Digital lower level discriminator set in channels. Hard cutoff of data in channels below the LLD setting. ULD Digital upper level discriminator set in channels. Hard cutoff of data in channels above the ULD setting.
Ratemeter	Count-rate display on PC screen.
Communications Ports	1 USB connection for control of the MCA from an external computer.
Input Power	10-17 V DC 30 Watt or via auto-sensing mains powered battery charger.
Internal Battery Life	Up to 4 hours at 25°C with a cold detector on fully charged internal battery. The unit is expected to be kept running once cold.
Relative Humidity	<90% at 30°C, non-condensing.
Operating Temp	0 to +30°C.
Dimensions of LDM-1 and Stand	LDM-1 only: 25.28 H x 6.5 W x 6.275 in D (64.21 x 16.51 x 15.94 cm) LDM-1 at full stand extension 45.42 in H (115.37 cm) Stand Height 30.75 in (78.11 cm) Stand Base 17 W x 16 in D (43.18 x 40.64 cm)
LDM-1 Detector Endcap Size	Endcap Diameter 3 in (76 mm) Endcap Length 6.2 in (157.5 mm)
Weights	LDM-1 16 lb (7.26 kg) Stand 15 lb (6.80 kg)

Ordering Information

Model	Description
LDM-1	Laboratory Detector Module with MAESTRO MCA emulation software, USB cable, universal mains adaptor and detachable stand for use under counting laboratory lead shield.
LDM-1-OPT-1	LDM-1 Battery Extender

Specifications subject to change
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