



GAMMA SPECTROSCOPY

MicroGe™

A novel ultra-compact HPGe detector for high flux and confined environments



The MicroGe detector is electrically cooled, fanless and lightweight. It comes fully equipped as a high-resolution gamma-ray spectroscopy detector.

The MicroGe detector is a compact electrically cooled, fanless, lightweight High Purity Germanium detector. With a short cooling downtime, this state-of-the-art detector opens the possibility to do spectroscopic measurement in less than 30 minutes while keeping the benefits of a laboratory grade detector. It implies an excellent energy resolution for gamma-ray energies from a few tens of keV up to several MeV. In addition, the MicroGe ultra-high vacuum technology provides a thermal cycle free detector. The detector can be switched on and off as needed, without going through an entire heat-cycle up to room temperature. This is an effective time-saving feature for optimize use of the MicroGe detector.

FEATURES

- ✓ Compact and lightweight
- ✓ Fanless electrically cooled germanium detector
- ✓ Straightforward start up and use with a short cooling downtime. The MicroGe detector is ready to be used in less than 30 minutes
- ✓ Thermal cycle free, the MicroGe ultra-high vacuum cryostat technology allows partial thermal cycles
- ✓ Energy resolution of 1.2 keV at 122 keV, 1.7 at 661.7 keV and 2.5 keV at 1332.5 keV
- ✓ Suitable for high gamma-ray flux environments
- ✓ Environmental operating temperature conditions 0 °C to 40 °C (Norm 61010-1) with wide range of operating temperature between -20 °C to 50 °C in a humidity environment from 20% to 90%
- ✓ Perfectly adapted to challenging environments such as narrow space, high temperature and high count rate

MicroGe A NOVEL ULTRA-COMPACT HPGe DETECTOR FOR HIGH FLUX AND CONFINED ENVIRONMENTS



MicroGe detector with Supply Station and cables

POWER-UP AND DATA ACQUISITION

The MicroGe detector comes with a dedicated supply station that provides the electrical power needed for the cryocooler. The operational readiness of the MicroGe detector is ensured by a temperature validation LED on the front panel of the supply station. A high-voltage shutdown protection is also integrated inside the supply station.

The MicroGe detector is typically operated with the DSA-LX[®] (or Lynx[®]) Multi-Channel Analyzer (MCA) that powers up the electronics and provides the needed digital signal processing for an optimal energy resolution, data throughput, and gain linearity. The MicroGe detector system is fully compatible with the Genie[™] analysis software which ensures high reliability and remote control data acquisition possibility. In addition, ISOCS[™]/LabSOCS[™] characterization of the MicroGe detector can be proposed.

MULTI-APPLICATION DETECTOR

The germanium crystal size is a cylinder of 10 mm diameter and 10 mm height (0.4 x 0.4 in.). Its volume of 0.78 cm³ implies a relative efficiency of the MicroGe detector of 0.04% at 1332.5 keV (IEC 60973). The small detector efficiency provides a clear advantage for the measurement in extreme dose environments. As an example, the MicroGe detector equipped with specific electronics will be able to sustain a dose rate of up to 0.1 Gy/h.



MicroGe detector in use

The lightweight, small footprint and wide range of operating temperature make the detector perfectly suitable for measurements in extreme conditions. The MicroGe detector is aimed at reducing the human exposure to unnecessary dose. Among other applications the MicroGe detector is designed to be used in dismantling operations, nuclear ventilation monitoring, field measurement, nuclear waste cooling pool, environmental monitoring, glove box sample measurements, high activity sample measurement, nuclear reactor safeguard and monitoring, spent fuel measurement and non-destructive analysis of high activity samples in the nuclear medicine isotope production industry.

TRANSPORTABLE AND EASY TO SETUP

The complete system consisting of the MicroGe detector, the supply station and the cable set are organized inside a protective case. The case dimension of 52.5 x 43.7 x 21.3 cm (20.7 x 17.2 x 8.4 in.) for a weight of ~9.4 kg (20.7 lb) makes the complete system robust and easily transportable. The full system requires only one main power supply to be powered up. By following the quick startup manual, the system will be taken out of the protector case, cabled, cooled down and bias in less than one hour.



Compact system in protector case

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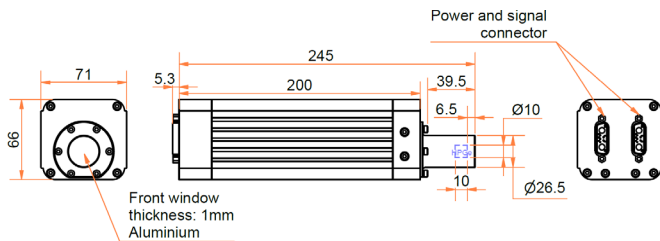
SPECIFICATIONS

CRYOGENIC SYSTEM

- Typical cool downtime: <30 minutes
- Ultra-High Vacuum

DETECTION HEAD CHARACTERISTICS

- High purity germanium crystal
- Dimension: cylinder of 10 mm diameter x 10 mm long (0.4 x 0.4 in.)
- Typical high voltage: <1000 V (negative)
- Guaranteed* energy resolution at Full Width Half Max (FWHM):
 - 1.2 keV at 122 keV
 - 1.7 keV at 661.7 keV
 - 2.5 keV at 1332.5 keV
- Energy range: from ~10 keV up to 3 MeV
- Relative efficiency of 0.04% at 1332.5 keV (defined by IEC 60973)
- 200 x 71 x 66 mm (7.9 x 2.8 x 2.6 in.)
- Weight: 1.7 kg (3.7 lb)



Typical MicroGe external housing dimensions

HOUSING

- Material: aluminum

MULTI-CHANNEL ANALYZER AND SPECTROSCOPY

- LYNX-MCA – Digital Signal Analyzer
- DSA-LX Digital Signal Analyzer. Requires Genie 2000 V3.3 with DSA-LX Support software, or later
- Connection to a computer via USB with DSA-LX MCA or via Ethernet with the Lynx MCA
- S573C – a specific ISOCS characterization can be ordered via ISOXCAL3 model number
- Genie Basic Spectroscopy Software and Analysis package is not included and can be ordered via S502C and S150C
- Virtual Basic ISOCS measurement training is not included and can be ordered via SU-474-V
- Continuous Monitoring System Data Analysis solution and software is not included and can be ordered via DA-PRO and DA-Prospector

POWER SUPPLY STATION

- LED status of the cooler
- Universal AC adapter with 100 to 240 V, 50 to 60 Hz input frequency
- Current 0.6 A
- Maximum power consumption is 20 W; up to 25 W during cooling. Up to 15 W when stationary situation is established at 25 °C
- BNC connector for Bias Shut Down (BSD) signal to connect to HV Inhibit in case the detector is warming up
- Electromagnetic compatibility with other system
- 240 x 165 x 58 mm (9.44 x 6.49 x 2.24 in.)
- Weight: 1.52 kg (3.35 lb)



CABLES AND CONNECTORS

- Standard 3.5 m (11.5 ft) cable, custom 10 m (32.8 ft) and 25 m (82 ft) cables upon request
- Multi-purpose connector for signal, low voltage, high voltage, temperature sensor and cryo-cooler power

TRANSPORT

- Protector case for easy transportation (typical dimension of 52.5 x 43.7 x 21.3 cm) (20.7 x 17.2 x 8.4 in.)
- Complete system is 9.4 kg (20.7 lb)

REMARKS

- A laptop or tablet computer is not included

* Above specifications are in accordance with IEEE Std 325-1996, as measured at 23 °C (74 °F) ambient temperature.

MicroGe A NOVEL ULTRA-COMPACT HPGe DETECTOR FOR HIGH FLUX AND CONFINED ENVIRONMENTS

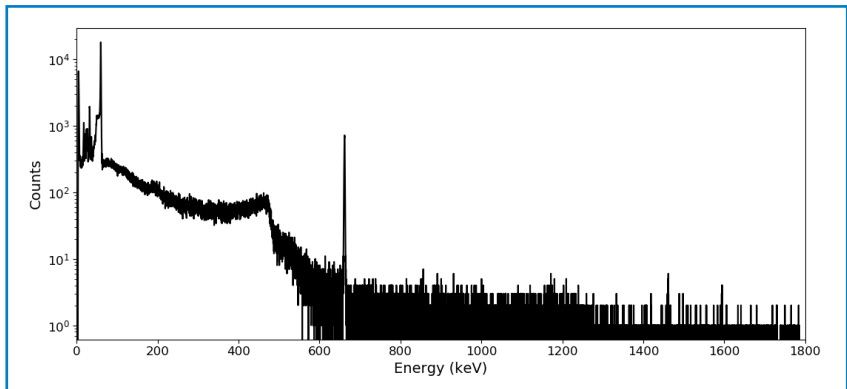
OPTIONAL ACCESSORIES

The MicroGe detector is part of the Specialty Products family and customization required by different applications and environments are available upon request. Please consult us for additional information.

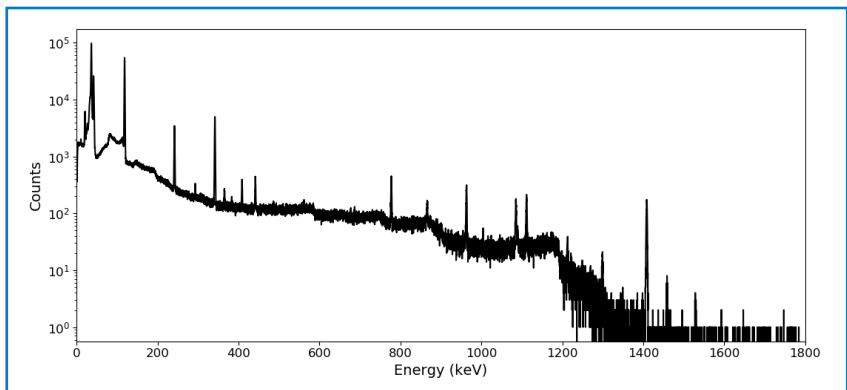
| PARAMETERS | VALUE |
|--|--|
| HPGe crystal | 0.04% relative efficiency at 1332.5 keV (10 mm diameter x 10 mm long) |
| Overall dimensions for housing | 245 x 71 x 66 mm (9.5 x 2.8 x 2.6 in.) (without cable connectors) |
| Probe weight | 1.7 kg |
| Housing | Aluminium |
| Cooling | Fully automatic electrical cryocooler (no LN ₂) |
| Power consumption | <15 W (30 W maximum) |
| Time to reach temperature of operation | <30 minutes |
| Guaranteed* energy resolution at Full Width Half Max (FWHM): | 1.2 keV at 122 keV |
| | 1.7 keV at 661.7 keV |
| | 2.5 keV at 1332.5 keV |
| Count rate capability | Up to 7*10 ⁴ counts per second at 661.7 keV with 50% dead time. For higher count rate applications contact the factory. |
| Preamplifier | Included in the probe housing. Resistive feedback. Gain 200 mV/MeV |
| Alarm card | For automatic high-voltage shutdown |
| Typical high voltage | <1000 V (negative) |
| Connections | Two bulkhead connectors to interface signal processing and power supplies. Connectors and cables can be customized on request. |
| Cable length | Standard 3.5 m cable, custom 10 m and 25 m cables upon request |

*Above specifications are in accordance with IEEE Std 325-1996, as measured at 23 °C (74 °F) ambient temperature.

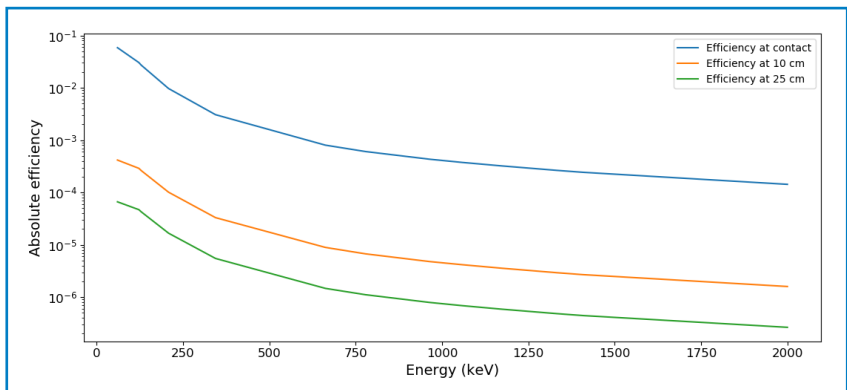
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¹³⁷Cs and ²⁴¹Am sources spectra



¹⁵²Eu source spectra



Absolute efficiency of MicroGe detector



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