

MGS Series – Miniature Gamma Spectrometer



Under licence from the French "Commissariat à l'énergie atomique et aux énergies alternatives" (C.E.A.)



The MGS series is a product line of **Miniature Gamma Spectrometers**. This type of instrument belongs to the Radionuclide Identification Devices category and measures the distribution of the intensity of Gamma radiation in order to reliably identify radioisotopes.


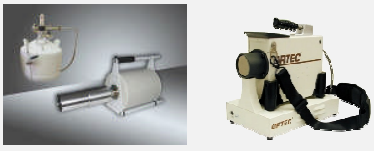
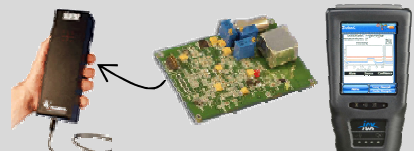
Detection Principe : The spectrometer detector is a CZT semi-conductor. When irradiated, electron-hole pairs are created in the material, producing a current. The energy collected at the detector output is proportional to the energy lost by the radiation in the collision. With a proper calibration, the spectrometer will deliver a spectral decomposition of the energy levels existing in the radiation, which characterizes the emitting element.

MGS Series – key features

- Main nuclear attributes:**

Detector	CdZnTe quasi-hemispherical detector	Energy resolution	6.7 keV at 662 keV
Detector Volume	<60 mm ³ to 500 mm ³	Energy range	10 keV to 3 MeV

- Smart electronic architecture, including all key components of hardware circuitry (Microprocessor, Amplifier, Analyzer, Converter, HV module, Memory...) and the intelligence controlling those components**
- Emerging CZT detection technology: Cadmium zinc telluride (CZT) crystals have been the focus of numerous studies in the past decade due to their unique properties that make them attractive for portable room temperature nuclear detection applications. Table of comparison with the most common technologies :**

	NaI and CsI scintillators	Germanium semi conductor	CZT semi conductor
+	<ul style="list-style-type: none"> Allow Gamma detection Mature technology 	<ul style="list-style-type: none"> Excellent resolution of Gamma rays 	<ul style="list-style-type: none"> Efficient and compact Good energy resolution of gamma rays Tolerance of temperature variations More rugged than NaI
-	<ul style="list-style-type: none"> Poor energy resolution 	<ul style="list-style-type: none"> Need to be cooled to the temperature of liquid nitrogen (77K) Mechanical cooling : heavy, high consumption 	<ul style="list-style-type: none"> Large crystals are difficult to produce Smaller detector size require longer counting times compared to large NaI
Product illustration			

- Miniature electronics : Leveraging CEA experience in detection electronics, and SDS experience in miniature high voltage electronics, the electronic part of the CZT detector (V1) weighs 20g and sizes 75 x 40 mm, which is far more light and compact than other existing spectrometer with other technologies (Ge, NaI...) and between 2 and 4 more compact than the two instrument**



MGS Series – Current developments

MGS Version 1 : module in course of industrialisation	MGS Version 2 : module in course of development
<ul style="list-style-type: none"> • Display provided by host instrument or PC • Very low power consumption allowing all sort of mobile application • Standard spectrum data format allow the instrument to work with any radionuclide identification software on the market 	<p>Two main development axis are currently being considered with the CEA, and will lead to a second evolution of the MGS within 18 months:</p> <ul style="list-style-type: none"> • First axis is an evolution of the circuitry to have signal treatment (filtering, spectrum construction) being made numerically (on the version one the signal is send to an external analysis mean for numerical treatment and analysis). • Second axis targets the development of an embedded software for analysis of acquired spectrum and radionuclide identification. So the MGS V2 directly delivers information on radiation level and radionuclides presence in the environment.

MGS Series – Technical features

NUCLEAR	
Emitter	Gamma
Detector	CdZnTe quasi-hemispherical detector
Detector volume	<60 mm ³ to 500 mm ³
Energy range	10 keV to 3 MeV
Energy resolution	6.7 keV at 662 keV
Display	Provided by host instrument or PC
ELECTRICAL	
Power	Supplied by PC , external battery (USB, RS 282) or internal battery
Battery life	Up to 10 hours of internal battery autonomy
Communication	RS 232 (optional USB cable), Zigbee
Interface	PC software for visualization and acquisition of spectrometric data
MECHANICAL	
Housing	Aluminum
Dimensions	75 x 40 mm (2.9 in. x 1.57 in.) (L x D)
Weight	20 g (0.044 lb) (Only electronics)
ENVIRONMENTAL	
Temperature	0 °C to +40 °C (32 to +104 °F)

MGS Series – Use cases

