




Patented – Under licence from the French “Commissariat à l’Energie Atomique” (C.E.A.)

Instrument designation	The device is a smart gamma probe. It is composed of a Gamma radiation detectors (Geiger Muller) and also features several electronic modules providing a high level of autonomy.	
Detection Principe	A Geiger Muller is a particle gas detector that fully ionize at each interaction between a particle (here Gamma particle) and the gaz. It is associated to a counter electronic mechanism that gives the number of ionization (i.e impulsion) that occurred in the tube. This number can then be transformed in radiation intensity.	
Embedded electronic modules	Detector	Memory
	HV module	Microprocessor
	Pulse processing electronics : Amplifier, converter, analyzer	Communication module
		Rechargeable battery
Major applications	Detection solutions for embedded, remote, discreet or harsh environment conditions, in : - Operational safety in electronuclear activities - Homeland security	

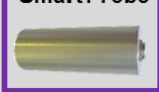
The SGP series has been specifically developed by the CEA LIST to answer the need to integrate in unmanned intervention systems a radiation dosimeter providing a warning signal to intervention staff. Its smart architecture, high compactedness (89 x ø32 mm) and patented filtering algorithm for stochastic perturbations, make it a product designed for all kind of new mobile or embedded applications.

Novel product architecture


Probe



Smart Probe



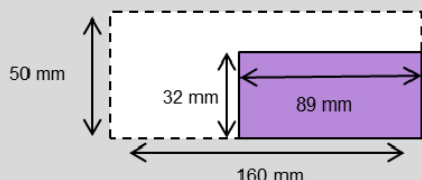
Rate meter



Detector Preamplifier	→	<div style="display: flex; flex-direction: column-reverse; align-items: center;"> <div style="margin-bottom: 5px;">← HV module</div> <div style="margin-bottom: 5px;">← Power supply</div> <div style="margin-bottom: 5px;">← Amplifier, converter, analyzer</div> <div style="margin-bottom: 5px;">← Memory</div> <div style="margin-bottom: 5px;">← Microprocessor</div> <div style="margin-bottom: 5px;">← Communication module</div> <div style="margin-bottom: 5px;">Display</div> <div style="margin-bottom: 5px;">Multiple I/O ports</div> <div style="margin-bottom: 5px;">Keypad interface</div> </div>
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Miniature electronics

- Leveraging CEA experience in detection electronics, and SDS experience in miniature high voltage electronics, the GAM probe is over 10 times more compact than any other instrument in the smart probe category, and two time lighter

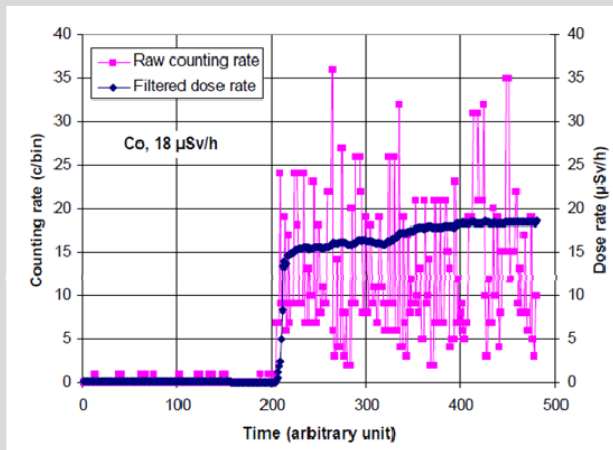


50 mm
32 mm
89 mm
160 mm

Figure 1: Illustrative comparison of SGP module size against average size of competitor smart probes

Innovative signal filtering algorithm

- An innovative filtering algorithm developed and patented by the CEA, is integrated in the device. It implements a non-linear approach that takes into account the stochastic nature of the nuclear signal. It delivers a smoothed signal that allow detection without false alarm of small variation of nuclear activity within a high intrinsic statistical noise.



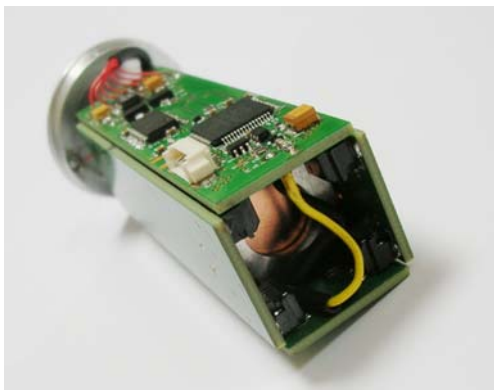
Co, 18 µSv/h

Counting rate (c/bin) vs Time (arbitrary unit) and Dose rate (µSv/h)

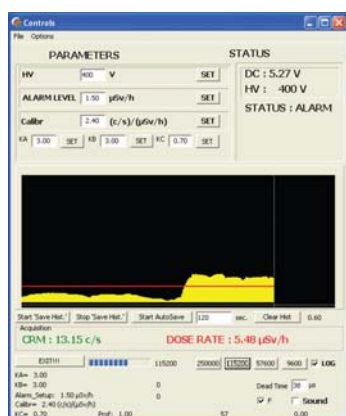
Figure 2: Real time counting rate and filtered dose rate measured with a 60Co irradiator at 18 µSv/h

- Time response radiometer is less than 10s for dose rates below 100 µSv/h and less than 2s for other dose rates

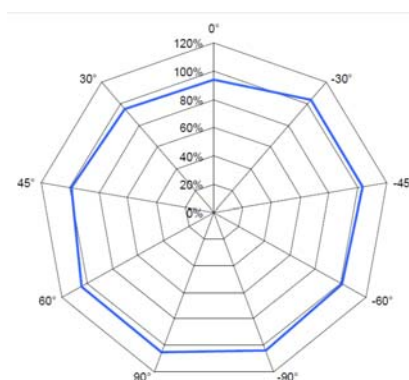
SPECIFICATIONS



Warning Geiger Müller Gamma Radiometer for dose rate measurement



PC interface



Normalized counting rate with regard to the orientation. The angular response is very uniform with a standard deviation of ca. 5 %.

NUCLEAR	
Display units	µSv/h, µSv or µrem, µrem/h depending on meter connected; H*(10) ambient gamma dose equivalent rate
Emitter	Gamma
Detector	Energy Compensated Geiger Mueller
Sensitivity	2.4 c/s for µSv/h (137Cs)
Measurement range	0.1 µSv/h to 100 mSv/h (10 µrem/h to 10 rem/h)
Energy range	Gamma 36 keV to 1.5 MeV
Background	Ambient <0.1 µGy/h (10 µR/h), 0.16 c/s. Ergonomic
Display	Provided by host instrument or PC
Alarm setpoint	Saved in probe memory. It can be changed with a PC
ELECTRICAL	
Power	Supplied by PC (USB) or Battery
Battery life	Up to 10 hours of battery autonomy
MECHANICAL	
Housing	Aluminium
Dimensions	90 x 32 mm (3.54 in. x 1.26 in.) (L x D)
Weight	88 g (0.176 lb), without cable
ENVIRONMENTAL	
Tempertaure	0 °C to +45 °C (32 °F to 113 °F) with Battery and -25 °C to +60 °C (13 °F to +140 °F) without Battery
Cleaning	Housing easy to decontaminate
Water resistance	Waterproof 1 m deep underwater connected (IP67)