



# New SPRD “SPECTRA”

## Search Dosimeter-Radiometer MKS-11GN

- Highly-sensitive and compact SPRD
- Complies with the ANSI 42.48 standard
- State Sanitary-Epidemiological Conclusion # 05.03.02-04/66343 as of June 21, 2011
- TY Y 33.2-22362867-021:2011



# Description

A highly-sensitive and compact device intended to detect, localize and identify radioactive and nuclear materials by their gamma and neutron radiation as well as the amplitude gamma spectra. SPECTRA identifies radionuclides with indication of the category that they belong to (in compliance with the IAEA requirements). It is used to prevent illicit transfer of these materials across the state borders, as well as at the companies and institutions dealing with gamma and neutron radiation sources.

A brand new search algorithm provides high sensitivity of the device and its instant actuation at the slightest change of gamma or neutron background level. New generation scintillation detectors with the silicon photomultiplier ensure high thermal stability of the device and entirely eliminate the “microphone effect”.

The device offers an outstanding user experience due to its innovative design, compact size, large colour display and a 45 hours continuous operation time.



## Purpose of Use

- Measurement of ambient dose equivalent rate of gamma, X-ray and neutron radiation (photon and neutron ionizing radiation DER).
- Determination of gamma and neutron radiation intensity.
- Identification of the radionuclides type by their amplitude gamma spectra.
- Saving amplitude gamma spectra and events logs in the nonvolatile memory.

## Branches of Use





# Features

- New generation high sensitivity CsI scintillation detectors of gamma and LiI of neutron radiation with solid state (silicon) photomultiplier.
- Color display with high resolution.
- Storage and transfer of 250 complete gamma radiation spectra.
- Powerful CPU and improved algorithms for spectra processing.
- New software for detailed laboratory research and spectra processing.
- Integrated GPS/GLONASS-receiver.
- No “microphone effect”.
- High thermal stability.
- Powered by built-in lithium polymer storage batteries that can be charged via USB-cable.
- The dosimeter communicates with a PC via USB-port.
- Real-time identification of spectra.

- Identification of radionuclides with specification of the categories they belong to (in compliance with IAEA requirements):
  - medical radionuclides:  $^{18}\text{F}$ ,  $^{67}\text{Ga}$ ,  $^{51}\text{Cr}$ ,  $^{75}\text{Se}$ ,  $^{89}\text{Sr}$ ,  $^{99}\text{Mo}$ ,  $^{99\text{m}}\text{Tc}$ ,  $^{103}\text{Pd}$ ,  $^{111}\text{In}$ ,  $^{123}\text{I}$ ,  $^{125}\text{I}$ ,  $^{131}\text{I}$ ,  $^{153}\text{Sm}$ ,  $^{201}\text{Tl}$ ,  $^{133}\text{Xe}$ ;
  - industrial radionuclides:  $^{57}\text{Co}$ ,  $^{60}\text{Co}$ ,  $^{133}\text{Ba}$ ,  $^{137}\text{Cs}$ ,  $^{192}\text{Ir}$ ,  $^{152}\text{Eu}$ ,  $^{22}\text{Na}$ ,  $^{241}\text{Am}$ ;
  - special nuclear materials:  $^{233}\text{U}$ ,  $^{235}\text{U}$ ,  $^{237}\text{Np}$ , Pu [Reactor grade plutonium (more than 6%  $^{240}\text{Pu}$ )];
  - naturally occurring radioactive materials:  $^{40}\text{K}$ ,  $^{138}\text{La}$ ,  $^{226}\text{Ra}$ ,  $^{232}\text{Th}$ -decay series,  $^{238}\text{U}$ -decay series.

**Note.** The list of nuclides the device is able to identify may be extended if needed.
- Threshold alarm system with four independent threshold levels:
  - search threshold level (threshold level of count rate from the detector photon and neutron ionizing radiation);
  - safety threshold level (threshold level of photon and neutron ionizing radiation DER).
- Light color alarm (indication) of threshold levels exceeding (gamma radiation – red color, neutron – blue) and visual alarm on the side of the device.
- Ingress protection rating IP67.

## Specifications

Gamma radiation sensitivity for  $^{137}\text{Cs}$ , not less than                      cps/( $\mu\text{Sv/h}$ )                      200

Neutron radiation sensitivity for:

– thermal neutrons, not less than	pulse·cm <sup>2</sup> /neutron	1.2 ± 0.12
– fast neutrons, not less than	pulse·cm <sup>2</sup> /neutron	0.120 ± 0.012
Measurement range of photon-ionizing radiation DER	0.01 μSv/h ... 1 Sv/h	
Measurement range of neutron radiation DER	0.01 μSv/h ... 10 mSv/h	
Indication range of photon-ionizing radiation count rate	cps	1 ... 25000
Indication range of neutron radiation count rate	cps	0.01 ... 25000
Main relative permissible error limits of photon-ionizing radiation DER measurement	%	±(15+1/H*(10)), where H*(10) is a numeric value of measured DER equivalent to μSv/h
Energy range of registered photon-ionizing radiation	MeV	0.02 ... 3.00
Energy dependence of the device readings during photon-ionizing radiation DER measurement in the energy range from 0.05 to 3.00 MeV relative to 0.662 MeV energy ( <sup>137</sup> Cs)	%	±25
Energy range of registered neutron radiation	from thermal neutrons to 14 MeV	

Number of amplitude gamma spectrum channels	channel	2048
Setup time of operating mode of the device, not more than	min	1
Calibration time relative to gamma background	s	2 ... 60
Response time for photon-ionizing radiation DER variation greater than 10 times	s	0.25
Operating supply voltage of the dosimeter from Li-Ion storage battery	V	3,7
Time of continuous operation with fully charged storage batteries under conditions of normal background radiation with switched off display backlight, not less	hours	45
Operating temperature range	°C	-20 ... +50
Dimensions of the dosimeter, not more than	mm	67 x 126 x 30
Weight of the dosimeter, not more than	kg	0.28