

AT6101C, AT6101CM Spectrometers

Backpack-based Radiation Detector



BDKG-11M (γ)
[AT6101C]

BDKG-19M (γ)
[AT6101CM]

BDKG-04 (X, γ)

BDKN-05 (n)

The spectrometer is designed for detection of radioactive sources and is an efficient tool for prevention of radiological terrorist threats and other unauthorized activities like illicit storage, use, transfer and traffic of radioactive substances and materials. Can also be used for radiation monitoring of areas, routes, isolated grounds, industrial sites and buildings with GPS-referencing of measurement data.

The spectrometer can comprise the following detection units:

- BDKG-11M / BDKG-19M Spectrometric gamma radiation detection unit (basic version)
- BDKN-05 Neutron radiation detection unit (option).
- BDKG-04 Wide-range dosimetric gamma radiation detection unit (option).

In cases when higher spectrometer sensitivity to gamma radiation is required BDKN-05 detection unit can be replaced by additional BDKG-11M (BDKG-19M) detection unit (option).

The spectrometer can be delivered in a backpack (basic version) or in a sealed shock-proof case (option).



Version of AT6101C
in shock-proof case

Operating principle



As a control and indication device the handheld computer (HPC) is used. Data transfer from detection units to HPC is carried out via Bluetooth. Data transfer by cable is carried out in the places where transfer via radiochannel is impossible or undesirable.

The spectrometer operates in continuous radiation environment scan mode: continuous search, detection, localization and identification of gamma radiation sources; search and detection of neutron radiation sources. When radioactive source is detected the spectrometer activates alarm and identifies its radionuclide composition.

Types of identified radionuclides are displayed on HPC screen and operator hears a corresponding voice message in a wireless headset.

Measurement results are continuously transmitted into HPC for subsequent processing by PC and can be plotted onto a map using application software tools.

Applications

- Radioactive substances and materials traffic control
- Radioactive contamination monitoring of areas by mobile tools
- Public events radiation safety control
- Radiation protective measures in case of nuclear disasters
- Radiation monitoring of facilities and sites
- Dosimetric and spectrometric survey of ground and facilities, radioactive mapping

Key users

- Organizations for nuclear energy use control
- Security service
- Customs service
- Border control service
- Radiation monitoring service
- Emergency rescue squads

Features

- Automatic simultaneous gamma-neutron radiation scanning
- Search, detection and localization of radioactive source and real-time identification of its isotopic composition
- Automatic accommodation to radiation background level change
- Dose rate measurement range can be expanded to 10 Sv/h
- Simultaneous measurement of gamma radiation spectral distribution and dose rate
- Scanning data are constantly recorded for further analysis
- Measurement results can be tied to a location (GPS function)
- "GARM" application software for further data processing and analysis in expert mode
- "ARMS" application software (option) for automatic data transfer to a remote server (Over FTP server and if HPC has a 3G communication function or can be connected to a Wi-Fi network)
- 20 hours of operation time
- 130 hours memory capacity
- Minimum weight in its class



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INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR
MEASUREMENTS AND RADIATION MONITORING

AT6101C, AT6101CM Spectrometers

Specification	AT6101C	AT6101CM
GAMMA RADIATION DETECTION UNIT	BDKG-11M (1 / 2 pcs.)	BDKG-19M (1 / 2 pcs.)
Gamma radiation detector	Scintillator, NaI(Tl) Ø63x63 mm	Scintillator, NaI(Tl) Ø63x160 mm
Energy range In Spectrometric mode In Dosimetric mode	20 keV – 3 MeV 50 keV – 3 MeV	
Ambient gamma radiation dose equivalent rate measurement range	0.03 – 150 µSv/h	0.03 – 50 µSv/h
Limits of intrinsic relative measurement error	±20%	
Typical sensitivity to gamma radiation ²⁴¹ Am ¹³⁷ Cs ⁶⁰ Co	cps/(µSv·h ⁻¹) 13500 (27000)* 2200 (4400)* 1200 (2400)*	cps/(µSv·h ⁻¹) 37000 (74000)* 6000 (12000)* 2500 (5000)*
Radionuclide identification	Medical, Industrial, Natural, Bremsstrahlung (The library content can be modified on request)	
Minimal detectable level of gamma radiation dose rate from a source, moving at 0.5 m/s	0.05 µSv/h (0.035 µSv/h)*	0.03 µSv/h (0.02 µSv/h)*
Detectable activity of ¹³⁷Cs source , located at the distance of 1 m in a time not longer than 2 s. 95% probability of source detection with false alarm rate not above 1 in 10 minutes	(450±10) kBq [(320±10) kBq]*	300±10 kBq [(210±10) kBq]*
Alarm response time	<2 s	
Typical resolution at 662 keV (¹³⁷Cs)	7.5%	8%
Number of ADC channels	1024	1024
Maximum input statistical load	10 ⁵ s ⁻¹ (2·10 ⁵ s ⁻¹)*	10 ⁵ s ⁻¹ (2·10 ⁵ s ⁻¹)*
* Configuration with two BDKG-11M (BDKG-19M) detection units		
GAMMA RADIATION DETECTION UNIT	BDKG-04	
Purpose	Additional accessory for expanding dose rate measurement range of X-ray and gamma radiation (Up to 10 Sv/h)	
NEUTRON RADIATION DETECTION UNIT	BDKN-05 **	
Neutron radiation detector	2 proportional counters ³ He Ø30x360mm in a polyethylene moderator	
Energy range	0.025 eV – 14 MeV	
Typical sensitivity to ²⁵²Cf neutron radiation	20 cps/(neutron·s ⁻¹ ·cm ²)	
Detectable activity of Pu-Be source , located at the distance of 1.25 m in a time not longer than 3 s. 95% probability of source detection with false alarm rate not above 1 in 1 h	(5±1.25)·10 ⁴ neutron·s ⁻¹	
** Not available for configuration with two BDKG-11M /BDKG-19M detection units		
Other parameters and operating conditions		
GPS	GPS-receiver, integrated into HPC. Positioning accuracy ≥3 m	
Burn-up life	≥100 Sv	
Protection class backpack version shock-proof case version	IP55 IP65	
Continuous run time	~20 h	
Working temperature range	-20°C to +50°C	
Relative humidity	≤95% (with air temperature ≤35°C without condensation)	
Overall dimensions backpack version shock-proof case version	450x330x250 mm 625x500x300 mm	500x330x250 mm 625x500x300 mm
Weight*** backpack version shock-proof case version	7 kg 17 kg	8.5 kg 18.5 kg
*** Configuration with BDKG-11M /BDKG-19M, BDKG-04 and BDKN-05 detection units		

Design and specifications are subject to change without notice

Spectrometers meet IAEA requirements (technical and functional specifications for border monitoring equipment); ANSI 42.43 standard requirements; Safety standard requirements: IEC 61010-1:2001; EMC requirements: EN 55011:2009, IEC 61000-4-2:2008, IEC 61000-4-3:2008.