AT6101C, AT6101CM Spectrometers

Backpack-based Radiation Detector

BDKG-11M (γ)
[AT6101C]

BDKG-19M (γ)
[AT6101CM]

BDKG-04 (X,γ)

BDKN-05M (n)

The spectrometer is designed for inconspicuous detection of radiation sources and is an effective tool for prevention of radiological threats and other unauthorized activities, e.g. illicit storage, use, transfer and traffic of radioactive materials.

Can be used for radiation monitoring of areas, routes, buildings with GPS-referencing.

Basic version of the spectrometer fits in a backpack (Backpack-based Radiation Detector). For better experience on-board a vehicle, the spectrometer can be delivered in a rugged case (*option*).

The spectrometer fitted in plastic cabinet (*AT6101C only, option*) can be used as spectrometric radiation portal monitor to scan pedestrians at checkpoints.

Rugged Android smartphone (4.7" or 6") for control and indication

AT6101C / AT6101CM configuration:

- **BDKG-11M / BDKG-19M** NaI(Tl)-based spectrometric gamma radiation detection unit (*basic version*)
- **BDKN-05M** He-3-based neutron radiation detection unit (*option*)
- **BDKG-04** Wide-range plastic-based dosimetric gamma radiation detection unit (*option*)

To enhance gamma radiation sensitivity **BDKN-05M** detection unit can be replaced by additional **BDKG-11M / BDKG-19M** detection unit (*option*).

Application

- Control of radioactive materials traffic
- Control of public events radiation safety
- Radiation protective measures in case of nuclear emergencies
- Radiation control of facilities and areas
- Dosimetric and spectrometric survey of land and facilities, radioactive mapping

Our Customers

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

Features

- Shares leading market position
- 20 hours of continuous operation time, memory for 130 hours of scan time
- Automatic simultaneous gamma and neutron radiation scanning with radionuclide identification
- Continuous recording of scan data with GPS-referencing for further analysis
- Automatic accommodation to changes in radiation background level
- Simultaneous measurement of gamma radiation spectral distribution and dose rate
- Expandable dose rate measuring range of gamma radiation to 10 Sv/h
- Expert-level "GARM" software for further data processing and analysis

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Operating principle

All detection units are smart devices and can transmit measurement data over Bluetooth wireless link into the smartphone.

The spectrometer operates in continuous radiation environment scan mode: continuous search, detection, localization and identification of gamma sources; search and detection of neutron radiation sources.

When a radioactive source is detected, the spectrometer generates an alarm and identifies radionuclide composition of the source.

The smartphone displays the types of identified radionuclides and operator hears a corresponding voice message in a wireless headset. The scan results are continuously saved into memory for further processing and analysis on a PC and can be mapped using the application software.

Basic spectrometer arrangement

Inside a backpack without identification marks for concealed operation

Optional spectrometer arrangement

Inside a rugged case for better experience on-board a vehicle

Inside a fixed plastic cabinet for comfortable operation at checkpoints

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Specification		AT6101C	AT6101CM
GAMMA RADIATION DETECTION UNIT		**BDKG-11M (*1 or 2 units*)**	**BDKG-19M (*1 or 2 units*)**
Detector		Scintillator, NaI(Tl) Ø63x63 mm	Scintillator, NaI(Tl) Ø63x160 mm
Energy range		20 keV – 3 MeV (In Spectrometric mode) 50 keV – 3 MeV (In Dosimetric mode)	
Measurement range of ambient dose equivalent rate		0.03 – 150 μSv/h	0.03 – 50 μSv/h
		Limits of tolerable intrinsic relative 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)*
Identified radionuclides		Industrial, natural, medical *(The library content can be modified on request)*	
Detectable activity of ^{137}Cs source, moving at the speed of 0.6 m/s and located at the distance of 1 m in a time not longer than 2 s		400 kBq (280 kBq)*	250 kBq (170 kBq)*
		95% probability of source detection with false alarm rate not above 1 in 10 min	
Alarm activation time		<2 s	
Typical resolution at 662 keV (^{137}Cs)		7.5%	8%
Number of ADC channels		1024	
Maximum input statistical load		≥10^5 s^{-1} (≥2·10^5 s^{-1})*	
** Configuration with two BDKG-11M (BDKG-19M) detection units*			
GAMMA RADIATION DETECTION UNIT		**BDKG-04**	
Option		Extends the X-ray and gamma radiation dose rate measurement range (up to 10 Sv/h)	
NEUTRON RADIATION DETECTION UNIT		**BDKN-05M ****	
Detector		2 proportional counters ^{3}He Ø30x360 mm in a polyethylene moderator	
Energy range		0.025 eV – 14 MeV	
Typical sensitivity to ^{252}Cf 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		(5.00±1.25)·10^4 neutron/s	
		95% probability of source detection with false alarm rate not above 1 in 1 h	
*** Not available for configuration with two BDKG-11M (BDKG-19) detection units*			
Other parameters and operating conditions			
GPS		Smartphone with integrated GPS receiver; Positioning accuracy ≥3 m	
Burn-up life		≥100 Sv	
Protection class	*backpack* *rugged case* *plastic cabinet*	IP55 IP65 IP30	
Continuous operation time		~20 h	
Working temperature range		-20°C to +50°C	
Relative air humidity		≤95% (with air temperature ≤35°C without condensation)	
Overall dimensions	*backpack* *rugged case* *plastic cabinet*	520x380x220 mm 625x500x300 mm 400x450x180 mm	550x340x220 mm 625x500x300 mm –
Weight***	*backpack* *rugged case* *plastic cabinet*	7 kg 16.5 kg 17.5 kg	9 kg 18 kg –
**** Configuration with BDKG-11M (BDKG-19M) and BDKN-05M detection units*			

The spectrometers comply with: IAEA requirements (technical and functional specifications for border monitoring equipment), ANSI 42.43, GOST 27451-87, Safety requirements of IEC 61010-1:2010, EMC requirements of EN 55011:2009, IEC 61000-4-2:2008, IEC 61000-4-3:2008

Design and specifications are subject to change without notice

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