

AT6102, A6102A, AT6102B Spectrometers



Radionuclide Identification Device

Portable multifunctional radiation monitoring devices, primarily designed for search and detection of gamma radiation sources with automatic identification of radionuclide composition.

Can be used for area and land radiation monitoring with data GPS-referencing.

AT6102 model can detect neutron radiation and measure neutron count rate.

Application

- Unauthorized traffic control of radioactive sources and materials
- Radioactive waste control, recycling and disposal
- Radiation monitoring of ecological environment, areas and facilities
- Nuclear and radiation accidents management, radiation monitoring during decontamination operations
- Nuclear industry and Nuclear power plants
- Radiopharmaceuticals production and Nuclear medicine
- Geological survey
- Research activities

Features

- Detection of gamma, neutron, alpha and beta radiation
- Real-time spectra analysis and radionuclide identification
- Multiple functions
- Single-block design
- One-hand operation
- Automatic accommodation to change of radiation background level
- On-line and expert mode operation
- Automatic logging of scan data with GPS-referencing for further analysis
- Digital automatic LED stabilization and temperature compensation system
- Sound, visual and vibration notification
- Recording and storing measurement result and spectra in memory
- Field operation in a wide temperature range
- Instrument-to-PC data exchange over USB or Bluetooth interface
- External detection units can be connected

Operating principle

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

When radioactive source is detected the spectrometer activates alarm and identifies its radionuclide composition.

High-sensitivity scintillation NaI(Tl) gamma radiation detector is used in these devices. The spectrometer is equipped with Geiger-Muller counter with filter, which aligns energy dependence of appliance sensitivity to extend dose rate measurement range.

Two integrated proportional helium counters of slow neutrons in polyethylene moderator are used in AT6102 model.



Storage and transportation bag for spectrometer and accessories



BDKN-03



BDPA-01
BDPB-01

The possibility of external detection unit connection allows measurement of alpha and beta particles flux density from contaminated surfaces (BDPA-01/BDPB-01) and neutron radiation dose rate (BDKN-03).

Application software

- «SpectEx» Real time display of data measured by instrument with further ability to process and save it into PC, as well as instrument file system management
- «GARM» Processing and analysis of stored data with display on a base map



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Instruments and Technologies for Nuclear
Measurements and Radiation Monitoring



Zievert

Ionizing radiations
detectors and
instruments

AT6102, A6102A, AT6102B Spectrometers

Specifications of spectrometers	AT6102 (γ , n)	AT6102A (γ)	AT6102B (γ)
Gamma radiation detector	Scintillator NaI(Tl), Ø40x40 mm; Geiger-Muller counter tube		Scintillator NaI(Tl), Ø40x80 mm; Geiger-Muller counter tube
Neutron radiation detector	Two ^3He proportional neutron counter	–	–
Gamma radiation energy range	20 keV – 3 MeV		
Neutron radiation energy range	0.025 eV – 14 MeV	–	–
Radionuclide identification	Medical, Industrial and Natural (Library of identified radionuclides can be modified)		
Typical resolution at 662 keV (^{137}Cs)	7.5%		8%
Maximum input statistical load	$\geq 1.5 \cdot 10^5 \text{ s}^{-1}$		
Detectable activity of ^{137}Cs source, located at the distance of 20 cm in a time not longer than 2 s	(50±10) kBq		
Detectable activity of ^{252}Cf source, located at the distance of 20 cm in a time not longer than 5 s	$1.8 \cdot 10^4$ neutron/s (Probability of detection is 0.9)	–	–
Measurement range of gamma radiation ambient dose equivalent rate	0.03 – 300 $\mu\text{Sv/h}$ [NaI(Tl)] 10 $\mu\text{Sv/h}$ – 100 mSv/h [G-M]		0.03 – 150 $\mu\text{Sv/h}$ [NaI(Tl)] 10 $\mu\text{Sv/h}$ – 100 mSv/h [G-M]
Limits of tolerable intrinsic relative error	±20%		
Typical sensitivity to gamma radiation ^{241}Am ^{137}Cs ^{60}Co	6600 cps/($\mu\text{Sv} \cdot \text{h}^{-1}$) 850 cps/($\mu\text{Sv} \cdot \text{h}^{-1}$) 430 cps/($\mu\text{Sv} \cdot \text{h}^{-1}$)		11600 cps/($\mu\text{Sv} \cdot \text{h}^{-1}$) 1700 cps/($\mu\text{Sv} \cdot \text{h}^{-1}$) 840 cps/($\mu\text{Sv} \cdot \text{h}^{-1}$)
Response time for dose rate change from 0.1 $\mu\text{Sv/h}$ to 1 $\mu\text{Sv/h}$	<2 s (accuracy error $\leq \pm 10\%$)		
Energy dependence relative to 662 keV (^{137}Cs)	±20% [NaI(Tl)] (in 50 keV – 3 MeV energy range) ±25% [G-M] (in 60 keV – 3 MeV energy range)		
Typical sensitivity to direct neutron radiation Pu-Be ^{252}Cf	0.28 cps/(neutron $\cdot \text{s}^{-1} \cdot \text{cm}^{-2}$) 0.5 cps/(neutron $\cdot \text{s}^{-1} \cdot \text{cm}^{-2}$)	–	–
Number of ADC channels	1024		
Operation mode setup time	≤ 1 min		
Continuous run time With external smart probes connected	≥ 18 h ≥ 15 h		≥ 25 h ≥ 17 h
Burn-up life	≥ 100 Sv		
Protection class	IP65		
Working temperature range	-20°C to +50°C		
Relative air humidity	$\leq 95\%$ (with air temperature $\leq 35^\circ\text{C}$ without condensation)		
Connection to PC	USB, Bluetooth		
Overall dimensions, weight	230x115x212 mm, 2.5 kg	230x115x177 mm, 1.9 kg	230x115x177 mm, 2.15 kg
The spectrometers comply with: 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			

Specifications of external detection units	BDPA-01 (α)	BDPB-01 (β)	BDAKN-03 (n)
Detector	ZnS(Ag) scintillator, Ø60 mm	Scintillation plastic, Ø60 mm	^3He counter in polyethylene moderator
Measurement range	$0.5 - 1 \cdot 10^5$ particle $\cdot \text{min}^{-1} \cdot \text{cm}^{-2}$ (Flux density)	$3 - 5 \cdot 10^5$ particle $\cdot \text{min}^{-1} \cdot \text{cm}^{-2}$ (Flux density)	0.1 $\mu\text{Sv/h}$ – 10 mSv/h (Dose rate)
Energy range	4 – 7 MeV	155 keV – 3.5 MeV	0.025 eV – 14 MeV
Sensitivity	0.15 cps/(particle $\cdot \text{min}^{-1} \cdot \text{cm}^{-2}$) (^{239}Pu)	0.3 cps/(particle $\cdot \text{min}^{-1} \cdot \text{cm}^{-2}$) ($^{90}\text{Sr} + ^{90}\text{Y}$)	0.355 cps/($\mu\text{Sv} \cdot \text{h}^{-1}$) (Pu-Be)
Limits of tolerable intrinsic relative error	±20%		
Protection class	IP64		
Overall dimensions, Weight	Ø85x200 mm, 0.5 kg	Ø85x205 mm, 0.55 kg	316x220x265 mm, 8 kg

Design and specifications are subject to change without notice



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