

AT2327 Alarm Dosimeter (Pedestrian Radiation Monitors)



Application

- Radiation monitoring of pedestrians walking in front of PRM:
 - In public places and institutions
 - In airports, bus terminals, railway and underground stations
 - At entry/exit of nuclear industry objects
 - In border control and customs clearance points



Stationary two-channel Pedestrian radiation monitor (PRM) is designed for continuous and automatic detection of gamma and neutron radiation sources in a stream of people crossing borders of secured facilities.

PRM without neutron channel is available as an option.

Operating principle

PRM is based on smart gamma and neutron detection units.

PRM automatically activates natural gamma background measurement mode after power on. This measurement value is used to calculate and set the threshold gamma radiation level – alarm level.

When a pedestrian crosses the control zone line PRM switches into continuous gamma radiation measurement mode with count rate calculation where it compares the measured values to alarm threshold level and detects whether the neutron radiation is present/absent. When one of the pre-set alarm thresholds level is exceeded the sound and light (red) alarm triggers to inform staff (security) that a gamma or neutron radiation source is detected.

Multiple PRMs (up to 32) can be joined into a radiation monitoring network controlled by dedicated software on personal computer. In this case the personal computer displays status of each PRM, its location on monitored site plan, keeps alarm records and logs. Video recorder allows logging of monitored site video frames.

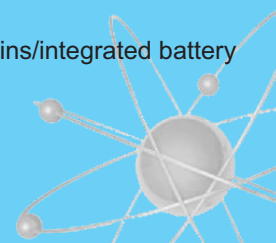
PRM consisting of:
BDKG-19 (BDKG-35) and
BDKN-01 (BDKN-05)



PRM consisting of:
BDRM-05 and BDKN-05

Features

- Fast 2-second response when background level is exceeded:
 - by 0.03 $\mu\text{Sv/h}$ (BDKG-19)
 - by 0.04 $\mu\text{Sv/h}$ (BDKG-35)
 - by 0.01 $\mu\text{Sv/h}$ (BDRM-05)
- Rapid accommodation to radiation background change
- Activation of sound and light alarm when a gamma and/or neutron radiation is detected
- Multiple pedestrian radiation monitors can be joined into a network controlled by dedicated software on personal computer
- Mobility and safely lane capability
- Component self-testing during operation
- Continuous and occasional radiation monitoring
- 230V-50Hz mains/integrated battery operation



ATOMTEX[®]

INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR
MEASUREMENTS AND RADIATION MONITORING

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PRM specifications

Alarm	Sound and light
Initialisation time	≤5 min
Power supply	1) Mains: 110-230 VAC, 50-60 Hz 2) Rechargeable battery for emergency operation
Continuous operation time when powered from rechargeable battery	≥6 h
False response quantity	≤1 for 8 h of continuous operation
PC interface	RS485
Number of monitors connected to a single PC	1 – 32
Burn-up life	≥100 Sv
Protection rating	IP65
Operation temperature range	-30°C to +50°C (-20°C to +50°C with BDKG-19)
Dimensions	800x600x200 mm [with BDKG-35 (BDKG-19) and BDKN-01 (BDKN-05)] 1400x600x300 mm [with BDKR-05 and BDKN-01 (BDKN-05)]
Relative air humidity	≤95% (Air temperature ≤35 °C without condensation)
The alarm dosimeter complies with: GOST 27451-87, GOST 29074-91, Safety requirements of IEC 61010-1:2010, EMC requirements of EN 55011:2009, IEC 61000-4-2:2008, IEC 61000-4-3:2008, IEC 61000-4-4:2004, IEC 61000-4-5:2005, IEC 61000-4-6:2008, IEC 61000-4-8:2009, IEC 61000-4-11:2004	

Specifications of detection units in pedestrian radiation monitors

Gamma radiation detection units (DU)		BDKG-19	BDKG-35	BDRM-05	
Scintillation detector		Nal(Tl) Ø63x160 mm	Plastic Ø70x150 mm	Plastic 1000x100x50mm	
Energy range		50 keV – 3 MeV	20 keV – 3 MeV	50 keV – 3 MeV	
Typical sensitivity, cps/(µSv·h ⁻¹)	²⁴¹ Am	32500	10000	60000	
	¹³⁷ Cs	4900	3600	31500	
	⁶⁰ Co	2800	2300	16500	
Response time for dose rate change from 0.1 to 1 µSv/h		<2 s	<2 s	<2 s	
Minimal detectable gamma radiation dose rate level above background value 0.1 µSv/h in a period not longer than 2 s		0.03 µSv/h	0.04 µSv/h	0.01 µSv/h	
Detection threshold for unshielded source at 1 m height under natural radiation background conditions not more than 0.1 µSv/h (Distance to source 1 m, source travel speed 5 km/h, probability of source detection 80 % under confidence level P=0.95)	1 DU	²⁴¹ Am ¹³⁷ Cs ⁶⁰ Co	430 kBq 220 kBq 100 kBq	1180 kBq 230 kBq 100 kBq	800 kBq 110 kBq 60 kBq
	2 DU	²⁴¹ Am ¹³⁷ Cs ⁶⁰ Co	320 kBq 160 kBq 70 kBq	860 kBq 170 kBq 70 kBq	580 kBq 80 kBq 40 kBq

Neutron radiation detection units		BDKN-01	BDKN-05	
Detector		He-3 proportional counter in polyethylene moderator	Two He-3 proportional counters in polyethylene moderator	
Energy range		0.025 eV – 14 MeV		
Typical sensitivity to source radiation at the distance of 1 m	²⁵² Cf	1.3 cps/(neutron·s ⁻¹ ·cm ⁻²)	20 cps/(neutron·s ⁻¹ ·cm ⁻²)	
	Source detection threshold at 1 m height (Distance to source 1 m, source travel speed 5 km/h, probability of source detection 80% under confidence level P=0.95)	1 DU	²⁵² Cf	2.2·10 ⁵ neutron/s
	2 DU	²⁵² Cf	–	1.6·10 ⁴ neutron/s

Design and specifications are subject to change without notice