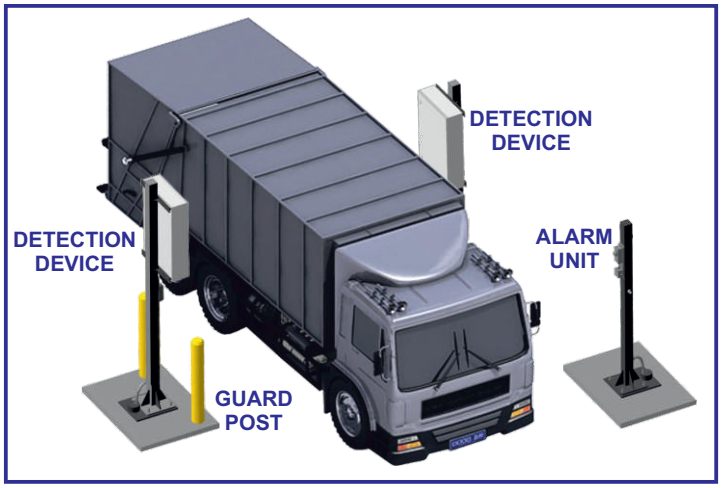
AT2327 Alarm Dosimeter (Vehicle Radiation Monitor)



Automatic stationary solution for continuous radiation monitoring designed to detect sources of gamma and neutron radiation in vehicles crossing access control points.

Applications

- Access control points
- Public utility companies for solid domestic waste disposal
- Scrap metal salvage and reprocessing facilities and smelters
- Nuclear industry facilities

Features

- Automatic switching from background radiation measurement to detection when control zone line is crossed by a passing vehicle
- Rear semisphere of smart probes is screened by lead plates
- Automatic correction of set threshold levels according to changes in natural radiation background
- Sound and light alarm for exceeded threshold levels
- Self-testing of components during operation
- Severe operating conditions
- Count rate levels and cases of threshold crossing are automatically recorded into the history log
- Backup power supply with a fully charged battery can provide continuous operation for up to 6 hours (4 smart probes)

Operating principle

Operating principle of Vehicle radiation monitor is based on smart probes, which detect gamma and neutron radiation. Two smart probes are located and wired inside a cabinet, which forms a measurement device. Measurement devices are mounted on posts arranged on both sides of vehicle passage lane. Two or one measurement device are mounted on each side of the passage depending on external dimensions of vehicles to control.

After initialization the monitor switches to radiation background measuring mode. This procedure is indicated by a yellow light on Alarm unit. When this measurement procedure is over the count rate threshold levels is calculated and a green indicator lights when the alarm dosimeter is ready for operation.

When a moving vehicle crosses the control zone line, it breaks the beam from the IR emitter to the photoelectric detector IR receiver, and all detecting units are automatically switched from the background measurement mode to the detection mode.

Count rate data from each smart probe in detection mode is transferred through RS485 interface to a remote control panel, which is located in a control room.

When the set count rate threshold level is exceeded the audio and red light alarm is actuated on the Alarm unit to inform the staff about gamma or neutron radiation source detection.

In case of malfunction of one or multiple smart probes, the radiation monitor recalculates threshold levels for the rest smart probes.

Control panel is used for setting threshold calculation parameters for each smart probe, controlling smart probes state, correcting real-time clock, password protection of selected functions, viewing count rate fluctuation history and threshold levels crossing in each reference point.

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Specification of Vehicle radiation monitors

Detection time per one vehicle	≤20 s
Maximum vehicle speed	5 km/h
Maximum vehicle width	5 m
Alarm	3-stage light alarm and sound alarm
False response rate	≤1 per 1000 crossings
Initialisation time	≤5 min
Maximum communication line distance between components of the radiation monitor, when interface cable is used	≤1000 m
Power supply	1) AC supply, 230V, 50Hz 2) Rechargeable battery in case of emergency power off
Continuous operation time from rechargeable battery	≥6 h
PC connection	RS485
Operation temperature range	-30°C ... +50°C (-20°C ... +50°C for BDKG-19)
Relative humidity with air temperature ≤35°C without condensation	≤95%
Protection class	IP57

AT2327 Alarm dosimeter meets requirements of IEC 61017-1:1991 & EN 50371:2002 standards, and the following safety standards: IEC 61010-1:2001, and Electromagnetic compatibility requirements of: IEC 61000-4-2:2006, IEC 61000-4-3:2008, IEC 61000-4-4:2004, IEC 61000-4-5:2005, IEC 61000-4-11:2004, EN 55022:1998+A1:2000+A2:2003.
AT2327 Alarm dosimeter is listed in national registries of measurement instruments of Republic of Belarus, Russian Federation, Ukraine and Kazakhstan.

Specifications of smart probes

Gamma radiation smart probes	BDKG-11/1	BDKG-19
Detector	Scintillator, NaI(Tl) Ø63x63 mm	Scintillator, NaI(Tl) Ø63x160 mm
Energy range	50 keV ... 3 MeV	
Sensitivity to gamma radiation, not less ^{241}Am ^{137}Cs ^{60}Co	 2360 cps/μSv·h^{-1} 1810 cps/μSv·h^{-1} 1030 cps/μSv·h^{-1}	 7070 cps/μSv·h^{-1} 4430 cps/μSv·h^{-1} 2340 cps/μSv·h^{-1}
Triggering threshold (Minimal detectable gamma radiation dose rate level above background value (0.10±0.05) μSv/h for period ≤2 s)	0.05 μSv/h	0.03 μSv/h
Detection threshold (Minimal detectable ^{137}Cs radionuclide activity in a non-screened source for passage width 3 m and measurement time ≤2 s) *[one smart probe on each side of the passage]*	0.8 MBq *(1 smart probe in measurement device)* 0.53 Mbq *(2 smart probe in measurement device)*	0.5 MBq *(1 smart probe in measurement device)* 0.32 Mbq *(2 smart probe in measurement device)*

Neutron radiation smart probes	BDKN-01	BDKN-05
Detector	^{3}He proportional counter in polyethylene moderator	Two ^{3}He proportional counters in polyethylene moderator
Energy range	0.025 eV ... 14 MeV	
Sensitivity to neutron radiation, not less Pu-Be ^{252}Cf	 0.5 impulse·cm^{2}/neutron 0.8 impulse·cm^{2}/neutron	 8 impulse·cm^{2}/neutron 12.5 impulse·cm^{2}/neutron
Static sensitivity (Static efficiency of neutron ^{252}Cf source detection at 1 m distance from detector), not less	1.3 impulse·cm^{2}/neutron	20 impulse·cm^{2}/neutron
Detection time of Pu-Be source (at 1 m distance) with 0.9 probability and neutron yield: (5±1.25)·105 neutron/s [for BDKN-01], (5±1.25)·104 neutron/s [for BDKN-05]	≤3 s	

Design and specifications are subject to change without notice

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