

AT1117M Radiation Monitor (Hand and coat surface contamination monitors)



Purpose

This radiation monitor configuration can be used to:

- Measure flux density and surface activity of ^{239}Pu alpha particles with BDPA-02 / BDPA-03
- Measure beta flux density and surface activity of $^{90}\text{Sr}+^{90}\text{Y}$ with BDPB-02 / BDPB-03.

PU2 processing unit features integrated detection module, allowing in situ measurement of gamma radiation ambient dose equivalent dose and ambient dose equivalent rate.

Radiation monitor can be operated both as fixed and portable instrument. In fixed version all probes are attached to a wall-mounted bracket and can be easily removed without special tools to be used as a portable variant.

Operating principle

Monitor's operating principle is based on highly sensible scintillation measurement method with ZnS(Ag) detector for alpha radiation detection units and plastic detector for beta radiation detection units.

Detection unit sends data to PU2 processing unit, where it is displayed on a big LCD screen. Operator can manually record measurement results.

Operation algorithm provides measurement continuity and real time statistical processing of measurement results.

Components:

- **Alpha/beta radiation detection unit**
(can be selected):
BDPA-02 (α) / BDPA-03 (α)
BDPB-02 (β) / BDPB-03 (β)
- **PU2 Processing unit**
- **Cable** (connects detection unit to PU2)
- **Wall bracket**

Application

- Dosimetric and radiometric monitoring in Nuclear Power Plants, manufacturing facilities, research laboratories, medical institutions, etc

Features

- High sensitivity
- Quick response to changes in radiation environment
- Wide measurement range
- Integrated stabilisation and continuous performance monitoring systems
- Sound, light and visual alarm for exceeded threshold levels
- Measurement results can be written and stored in non-volatile memory of Radiation monitor
- Operation in harsh weather conditions



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INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR
MEASUREMENTS AND RADIATION MONITORING

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Specifications

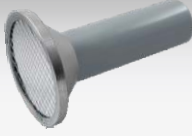

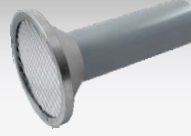

Processing unit	PU2
Registered radiation	Gamma radiation (γ)
Detector	Geiger-Muller counter tube
Energy range	60 keV – 3 MeV
Measurement range of ambient radiation dose rate equivalent	1 μ Sv/h – 10 mSv/h
Measurement range of ambient radiation dose equivalent	1 μ Sv – 1 Sv
Limit of intrinsic relative error of measurement	$\pm 20\%$
Sensitivity to gamma radiation from ^{137}Cs	$\geq 1.0 \text{ cps}/\mu\text{Sv}\cdot\text{h}^{-1}$
Response time for dose rate change from 10 to 100 $\mu\text{Sv}/\text{h}$	$\leq 2 \text{ s}$
Energy dependence relative to 662 keV (^{137}Cs)	From -25% to +35% (for 60 keV – 3 MeV energy range)
Protection rating	IP64
Power supply	1) By integrated rechargeable battery pack 2) By external 230 VAC, 50 Hz power source 3) By external 12 VDC power source 4) By external battery
Continuous run time	$\geq 24 \text{ h}$
Overall dimensions, weight	210x88x36 mm, 0.6 kg



AT117M Radiation monitor: General characteristics	
Connection interface of detection unit to PU2	RS232
Burn-up life	$\geq 100 \text{ Sv}$
Operation temperature range	from -40°C to $+50^\circ\text{C}$
Relative humidity with air temperature $\leq 35^\circ\text{C}$ without condensation	$\leq 95\%$

Wall bracket	
Dimensions:	296x175 mm
Weight:	1.4 kg
<i>Supplied with all attachment hardware</i>	



Detection units	BDPA-02	BDPA-03	BDPB-02	BDPB-03
Registered radiation	Alpha radiation (α)	Alpha radiation (α)	Beta radiation (β)	Beta radiation (β)
Detector	Scintillation, ZnS(Ag), 100 cm^2	Scintillation, ZnS(Ag), 300 cm^2	Scintillation plastic, 100 cm^2	Scintillation plastic, 300 cm^2
Energy range	4 – 7 MeV	4 – 7 MeV	155 keV – 3.5 MeV	155 keV – 3.5 MeV
Alpha particles flux density measurement range	0.05 – $5 \cdot 10^4$ particle $\cdot\text{min}^{-1}\cdot\text{cm}^{-2}$	0.05 – $2 \cdot 10^4$ particle $\cdot\text{min}^{-1}\cdot\text{cm}^{-2}$	–	–
^{239}Pu surface activity measurement range	$1.7 \cdot 10^{-3}$ – $1.7 \cdot 10^3$ Bq $\cdot\text{cm}^{-2}$	$1.7 \cdot 10^{-3}$ – $0.68 \cdot 10^3$ Bq $\cdot\text{cm}^{-2}$	–	–
Sensitivity to alpha radiation from ^{239}Pu source	≥ 0.7 cps/(particle $\cdot\text{min}^{-1}\cdot\text{cm}^{-2}$)	≥ 2.5 cps/(particle $\cdot\text{min}^{-1}\cdot\text{cm}^{-2}$)	–	–
Beta particles flux density measurement range	–	–	0.5 – $1.5 \cdot 10^5$ particle $\cdot\text{min}^{-1}\cdot\text{cm}^{-2}$	0.5 – $0.5 \cdot 10^5$ particle $\cdot\text{min}^{-1}\cdot\text{cm}^{-2}$
Measurement range of ^{90}Sr + ^{90}Y surface activity	–	–	$2.2 \cdot 10^{-2}$ – $0.66 \cdot 10^4$ Bq $\cdot\text{cm}^{-2}$	$2.2 \cdot 10^{-2}$ – $0.22 \cdot 10^4$ Bq $\cdot\text{cm}^{-2}$
Sensitivity to beta radiation from ^{90}Sr + ^{90}Y source	–	–	≥ 0.9 cps/(particle $\cdot\text{min}^{-1}\cdot\text{cm}^{-2}$)	≥ 2.4 cps/(particle $\cdot\text{min}^{-1}\cdot\text{cm}^{-2}$)
Limit of intrinsic relative measurement error	$\pm 20\%$	$\pm 20\%$	$\pm 20\%$	$\pm 20\%$
Protection rating	IP64	IP64	IP64	IP64
Power supply	By PU2	By PU2	By PU2	By PU2
Overall dimensions, weight	$\varnothing 137 \times 230 \text{ mm}$, 0.7 kg	$\varnothing 222 \times 277 \text{ mm}$, 1.4 kg	$\varnothing 137 \times 235 \text{ mm}$, 0.87 kg	$\varnothing 222 \times 281 \text{ mm}$, 1.8 kg
Outside appearance				

Design and specifications are subject to change

Radiation monitor meets requirements of GOST 27451-87 (Ionizing radiation measuring means), safety requirements of IEC 61010-1:2001, Electromagnetic compatibility requirements of: EN 55011:2009, IEC 61000-4-2:2008, IEC 61000-4-3:2008, IEC 61000-4-4:2004+A1:2010, IEC 61000-4-6:2008. Radiation monitor is listed in national registries of measurement instruments of Republic of Belarus, Russian Federation, Ukraine, Kazakhstan, Uzbekistan, Azerbaijan and Turkmenistan.



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