

# AT117M Radiation Monitor (Neutron Dosimeter)

## Version 1



### Components:

- BDKN-03 Neutron radiation detection unit
- PU2 Processing unit
- Cable
- Holder (For attaching PU2 to BDKN-03)

This configuration of Radiation monitor is a hand-carried measurement instrument and is designed to measure neutron radiation ambient dose equivalent rate and ambient dose equivalent, as well as to simultaneously monitor gamma radiation ambient dose equivalent rate and ambient dose equivalent.

PU2 / PU4 Processing unit can be used for control and indication.

### 1) PU2 Processing unit (Version 1)

Detection unit sends data over cable to PU2 processing unit, where it is displayed on LCD screen.

PU2 has recording and memory option for up to 99 measurement results, which can further be uploaded to a personal computer via dedicated application software.

Sound, light and visual alarms activate when user-adjustable threshold levels are exceeded.

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

## Version 2



### Components:

- BDKN-03 Neutron radiation detection unit
- PU4 Processing unit
- BT-DU4 Adapter
- Cable
- Holder (For attaching BT-DU4 to BDKN-03)

### Application

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

### Features

- Quick accommodation to changes in radiation level
- Wide energy range
- Sound and visual alarm of exceeded threshold level
- Performance self-check
- Operation in harsh weather conditions



### 2) PU4 Processing unit (version 2)

PU4 is a hand-held PC (HPC) with integrated detection module, providing in situ measurement of gamma radiation dose and dose rate. Operation algorithm provides measurement continuity and real time statistical processing of measurement results.

Data from detection unit into PU4 can transferred in two ways:

- Bluetooth interface by BT-DU4 adapter
- Direct cable connection to PU4

PU4 has the following functions:

- Processing and display of measurement data
- GPS referencing of measurement results
- Automatic recording and storing over 10,000 measurements with GPS referencing
- Sound and visual alarm when threshold level are exceeded
- Indication of battery charge level in PU4 and BT-DU4 adapter
- Loading data to PC for further analysis and processing in professional "GARM" software (Option)
- Automatic data transfer to a remote server by "ARMS" software [over FTP server; integrated 3G modem or connection to a Wi-Fi network shall be available] (Option).



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INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR  
MEASUREMENTS AND RADIATION MONITORING

# AT117M Radiation Monitor (Neutron Dosimeter)

## Specifications

Detection unit	BDKN-03
Registered radiation	Neutron radiation
Detector	$^3\text{He}$ proportional counter in polyethylene moderator
Energy range	0.025 eV – 14 MeV
Measurement range of ambient radiation dose rate equivalent	0.1 $\mu\text{Sv/h}$ – 10 mSv/h
Measurement range of ambient radiation dose equivalent	0.1 $\mu\text{Sv}$ – 10 Sv
Sensitivity to neutron radiation of Pu-Be source (In dose rate measurement mode)	$\geq 0.355 \text{ cps}/(\mu\text{Sv}\cdot\text{h}^{-1})$
Neutron flux density measurement range	$0.1 - 10^4 \text{ neutron}\cdot\text{s}^{-1}\cdot\text{cm}^{-2}$
Sensitivity to neutron radiation of Pu-Be source (In flux density measurement mode)	$\geq 0.5 \text{ cps}/(\text{neutron}\cdot\text{s}^{-1}\cdot\text{cm}^{-2})$
Limit of intrinsic relative measurement error	$\pm 20\%$
Protection rating	IP64
Overall dimensions, weight	314x220x264 mm, 8 kg

Relative sensitivity coefficients for standard neutron radiation sources with different energies for ambient dose equivalent rate measurement	<i>n-radiation source</i>	<b>BDKN-03</b>	Relative sensitivity coefficients for standard neutron radiation sources with different energies for flux density measurement	<i>n-radiation source</i>	<b>BDKN-03</b>
	Thermal, $E_n=0.025 \text{ eV}$	0.225 $\pm$ 0.045		Thermal, $E_n=0.025 \text{ eV}$	0.0064 $\pm$ 0.0013
	Ra-Be, $E_n=100 \text{ keV}$	0.81 $\pm$ 0.08		Ra-Be, $E_n=100 \text{ keV}$	0.182 $\pm$ 0.018
	$^{252}\text{Cf}$ , $E_n=2.13 \text{ MeV}$	1.02 $\pm$ 0.10		$^{252}\text{Cf}$ , $E_n=2.13 \text{ MeV}$	1.01 $\pm$ 0.10
	Pu-Be, $E_n=4.16 \text{ MeV}$	1.0		Pu-Be, $E_n=4.16 \text{ MeV}$	1.0

Controls and indicators	PU2 [Version 1]	PU4 [Version 2]
Registered radiation	Gamma radiation	Gamma radiation
Detector	Geiger-Muller counter tube	Geiger-Muller counter tube
Energy range	60 keV – 3 MeV	60 keV – 3 MeV
Measurement range of ambient radiation dose rate equivalent	1 $\mu\text{Sv/h}$ – 10 mSv/h	0.3 $\mu\text{Sv/h}$ – 100 mSv/h
Measurement range of ambient radiation dose equivalent	1 $\mu\text{Sv}$ – 1 Sv	30 nSv – 100 Sv
Energy dependence relative to 662 keV ( $^{137}\text{Cs}$ )	From -25% to +35% (In energy range from 60 keV to 3 MeV)	From -25% to +35% (In energy range from 60 keV to 3 MeV)
Sensitivity to $^{137}\text{Cs}$ gamma radiation	$\geq 1.0 \text{ cps}/(\mu\text{Sv}\cdot\text{h}^{-1})$	$\geq 0.33 \text{ cps}/(\mu\text{Sv}\cdot\text{h}^{-1})$
Response time for dose rate change	Up to 2 s (For dose rate change from 10 to 100 $\mu\text{Sv/h}$ )	Up to 7 s (For dose rate change from 10 to 100 $\mu\text{Sv/h}$ )
Limit of intrinsic relative measurement error	$\pm 20\%$	$\pm 20\%$
Protection rating	IP64	IP67
Overall dimensions, weight	210x88x36 mm, 0.6 kg	265x90x40 mm, 0.6 kg

### AT117M Radiation monitor: General characteristics

<b>Power supply</b> - Detection unit	1) By PU2 / PU4 2) By BT-DU4 adapter	<b>Interface</b> - Connection of detection unit to PU2 - Connection of detection unit to PU4	RS232 Bluetooth (via BT-DU4 adapter), RS232
	- PU2 / PU4 / BT-DU4		1) By integrated rechargeable batteries 2) By +12 VDC power source 3) By 230 VAC 50 Hz power source
<b>Continuous operation time</b> in case of rechargeable battery supply	24 h minimum (PU2) 8 h minimum (PU4)	<b>Relative air humidity</b> with temperature $\leq 35^\circ\text{C}$ without condensation	$\leq 95\%$

Radiation monitor meets requirements of GOST 27451-87 (ionizing radiation measuring means), safety requirements of IEC 61010-1:2001 and 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. The radiation monitor is listed in national registries of measurement instruments of Republic of Belarus, Russian Federation, Ukraine, Kazakhstan, Uzbekistan, Azerbaijan and Turkmenistan.

Design and specifications are subject to change



**ATOMTEX**®

<http://www.atomtex.com>

5, Gikalo st., 220005 Minsk,  
Republic of Belarus

Tel./fax: +375 17 2928142

E-mail: [info@atomtex.com](mailto:info@atomtex.com)



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