

ATOMTEX  
Scientific and Production Enterprise

INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR  
MEASUREMENTS AND RADIATION MONITORING

Product Catalogue

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# About

ATOMTEX is a leading research and manufacturing centre of the Republic of Belarus highly recognised worldwide in the area of development and production of equipment for nuclear measurements and radiation monitoring.

ATOMTEX was established in 1995 as a subsidiary of Minsk Scientific and Research Instrument-Making Institute. Highly qualified professionals with broad experience in nuclear instrumentation acquired in this senior and respected research centre are at the core of our team.



Over **200** employees, including R&D, production and support staff



Over **100** products



Export share **90%**



Deliveries to **120** countries of the world.  
Status of permanent vendor of IAEA, CTBTO and ROSATOM.

25 years our professional team bears responsibility for measurement quality of each device produced by our company as well as its functionality, usability and reliability.

Compliance of product parameters with stated performance and features is not just a slogan, but the basis of our company-to-customer relationship.



Quality management system is certified



Member of IEC TC 45  
"Nuclear Instrumentation"  
from Republic of Belarus



European Nuclear Society  
Corporate Member

Our high-precision and multifunctional metrological infrastructure, promotion of innovative ideas and advanced technologies, as well as orientation to international standards – all this helps us to create state-of-the-art products of high scientific and technological level.

Close cooperation with leading national, foreign and international organizations propels us in our continuous commitment to progress and improvement.

## APPLICATION



Atomic Energy



Environmental  
Radiation Monitoring



Special vehicles and  
Robotic Systems



Industry



Homeland Security



Science and Education



Health Care



Calibration Facilities



Geophysics

## AT2522 Radiation Detector (Alpha SENSOR)

Quick assessment of surface contamination by alpha nuclides, in particular by polonium-210.

Easy-to-operate detectors can be used by persons of any skill level even in everyday life

- Scintillation detector
- Silicon photomultiplier
- High sensitivity
- Light and sound notification of registered alpha particles
- Extended operation without recharging
- Colour 1" OLED screen



Detector	Scintillation, ZnS(Ag), surface area 25 cm <sup>2</sup>
Registration efficiency	≥50% ( $\alpha$ particles <sup>238</sup> Pu)
Time of continuous operation - with display ON - with display OFF	≥40 h ≥500 h
Power supply	Built-in battery
PC connection interface and charger connector	microUSB
Protection class	IP40
Overall dimensions, weight	106x60x31 mm, 170 g



## AT2503B, B/1, B/2 Personal Dosimeters



AT2503 and AT3509 Personal dosimeters meet requirements of **IEC 61526:2005** (Confirmed by IAEA-EURADOS, IAEA-TECDOC-1564 intercomparisons)

Control of X-ray and gamma radiation personal dose equivalent.  
The dosimeter together with the PC reader and the software forms an efficient automatic system for staff radiation exposure control.

- Simultaneous measurement of gamma radiation personal dose equivalent and personal dose equivalent rate
- Autocompensation of intrinsic detector background

Measurement range of personal dose equivalent	0.1 $\mu$ Sv – 10 Sv (AT2503B, B/1) 1 $\mu$ Sv – 10 Sv (AT2503B/2)
Measurement range of personal dose equivalent rate	0.1 $\mu$ Sv/h – 1 Sv/h (AT2503B) 0.1 $\mu$ Sv/h – 0.2 Sv/h (AT2503B/1) 1 $\mu$ Sv/h – 10 Sv/h (AT2503B/2)
Energy range	50 keV – 10 MeV
Energy dependence relative to 662 keV ( $^{137}\text{Cs}$ )	$\pm 30\%$
Response time to 10-fold dose rate change	$\leq 5$ s (for dose rate value $> 1$ mSv/h)
Time of continuous operation	$\geq 1000$ h
Protection class	IP54
Overall dimensions, weight	85x46x16 mm, 70 g (w/o batteries)

## AT3509, A, B, C Personal Dosimeters

Control of X-ray and gamma radiation personal dose equivalent.  
The dosimeter together with the PC reader and the software forms an efficient automatic system for staff radiation exposure control.

- Silicone planar detector
- Zero intrinsic background
- Simultaneous measurement of depth dose Hp(10) and skin dose Hp(0.07)



Measurement	AT3509,A	AT3509B,C
Hp(10) / Hp(10)	+	+
Hp(0.07) / Hp(0.07)	-	+

Measurement range of personal dose equivalent Hp(10), Hp(0,07)	1 $\mu$ Sv – 10 Sv
Measurement range of personal dose equivalent rate Hp(10), Hp(0,07)	0.1 $\mu$ Sv/h – 1 Sv/h (AT3509,A,B) 0.1 $\mu$ Sv/h – 5 Sv/h (AT3509C)
Energy range	15 keV – 10 MeV (AT3509,B,C) 30 keV – 10 MeV (AT3509A)
Energy dependence relative to 662 keV ( $^{137}\text{Cs}$ )	$\pm 25\%$ (15 keV – 1.5 MeV) $\pm 60\%$ (1.5 MeV – 10 MeV)
Energy dependence relative to 59.5 keV ( $^{241}\text{Am}$ )	$\pm 30\%$ (15 – 300 keV) (AT3509B,C)
Response time to 10-fold dose rate change	$\leq 5$ s (for dose rate value $> 1$ mSv/h)
Time of continuous operation	$\geq 500$ h
Protection class	IP54
Overall dimensions, weight	105x58x23 mm, 100 g(w/o batteries)

# Pocket Dosimeters / Pocket Radiation Monitors



## AT2140, A, A/1 Dosimeters

Measurement of X-ray and gamma radiation ambient dose equivalent and ambient dose equivalent rate.

- Unique combination of efficiency, response and usability
- Time of continuous operation without battery replacement (2 x AA): AT2140 – 5000 h, AT2140A, A/1 – 10000 h
- Search mode
- USB port and software for dosimeter setup and viewing measurement results (AT2140A/1)

Measurement range: - Ambient dose equivalent rate	0.1 μSv/h – 10 mSv/h (AT2140) 0.1 μSv/h – 100 mSv/h (AT2140A, A/1)
- Ambient dose equivalent	0.1 μSv – 1.99 Sv
Limits of intrinsic relative measurement error	±15%
Energy range	50 keV – 3 MeV
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±30% (AT2140) ±25% (AT2140A, A/1)
Typical sensitivity to <sup>137</sup> Cs gamma radiation	1.8 cps/(μSv·h <sup>-1</sup> )
Response time for dose rate change from 1 to 10 μSv/h	≤10 s (AT2140) ≤5 s (AT2140A, A/1)
Protection class	IP40
Drop protection	≤1.0 m height (AT2140A, A/1)
PC interface	USB (AT2140A/1)
Overall dimensions, weight	111x70x28 mm, 110 g (w/o batteries)



## AT6130C Radiation Monitor

Measurement of X-ray and gamma radiation ambient dose equivalent and ambient dose equivalent rate.

- Robust housing from impact-resistant ABS plastic
- Convenient menu
- Search mode

Measurement range: - Ambient dose equivalent rate	0.1 μSv/h – 1 mSv/h
- Ambient dose equivalent	0.1 μSv – 100 mSv
Limits of intrinsic relative measurement error	±20%
Energy range	50 keV – 3 MeV
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±30%
Typical sensitivity to <sup>137</sup> Cs gamma radiation	2.8 cps/(μSv·h <sup>-1</sup> )
Response time for dose rate change from 1 to 10 μSv/h	≤7 s
Time of continuous operation	≥700 h
Protection class	IP40
Drop protection	≤1.5 m height
Overall dimensions, weight	111x70x28 mm, 0.2 kg

Design and specifications are subject to change without notice



## AT6130, A, D Radiation Monitors

Measurement of X-ray and gamma radiation ambient dose equivalent rate and ambient dose equivalent, as well as measurement of beta particle flux density (AT6130).



- Rugged metal housing
- Convenient menu
- Selective measurement of beta and gamma radiation in mixed fields (AT6130)
- Dose rate measurement up to 100 mSv/h (AT6130D)
- Search mode
- Headphones for work in noisy environments (option)

Measurement range: - Ambient dose equivalent rate	0.1 µSv/h – 10 mSv/h (AT6130,A) 0.1 µSv/h – 100 mSv/h (AT6130D)
- Ambient dose equivalent	0.1 µSv – 100 mSv (AT6130,A) 0.1 µSv – 1 Sv (AT6130D)
Measurement range of beta particle flux density	10 – 10 <sup>4</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> (AT6130)
Limits of intrinsic relative measurement error	±20%
Energy range: - X-ray and gamma radiation	20 keV – 3 MeV (AT6130) 50 keV – 3 MeV (AT6130A,D)
- Beta radiation	155 keV – 3.5 MeV (AT6130)
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±30%
Time of continuous operation	≥500 h
Protection class	IP57
Drop protection	≤1.5 m height
Overall dimensions, weight	110x60x38 mm, 0.25 kg



Gamma and beta radiation detector (AT6130)

## AT1103M X-ray Radiation Dosimeter

Measurement of continuous X-ray and gamma radiation directional dose equivalent and directional dose equivalent rate.

- Unique highly-sensitive device for controlling radiation dose on the eye lens, mucous membranes and skin
- Spectrum display when connected to a PC
- Not for natural background measurement



Scintillation detector	Nal(Tl), Ø9x2 mm with beryllium window
Measurement range: - Directional dose equivalent rate	50 nSv/h – 100 µSv/h
- Directional dose equivalent	50 nSv – 5 mSv
Limits of intrinsic relative measurement error	±15%
Energy range	5 – 160 keV
Energy dependence relative to 59.5 keV ( <sup>241</sup> Am)	±35% (5 – 60 keV) ±30% (60 – 160 keV)
Typical sensitivity to <sup>241</sup> Am gamma radiation	400 cps/(µSv·h <sup>-1</sup> )
Detectable <sup>241</sup> Am activity at the distance of 0.5 m in <2 s	1000 kBq (27 µCi)
Protection class	IP54
Overall dimensions, weight	233x85x67 mm, 0.9 kg



## AT1121, AT1123 X-ray and Gamma Radiation Dosimeters



- Measurement of continuous, short-term and pulse X-ray and gamma radiation ambient dose equivalent and ambient dose equivalent rate
- Search and detection of X-ray and gamma radiation sources
- Search and detection of high-level beta radiation sources with maximum spectrum energy of more than 500 keV
- Measurement over a wide range of dose rates and energies
- Measurement of dose rate and exposure time during short-term exposure (from 0.03 s)
- Measurement of pulse radiation average dose rate, where the pulse duration is 10 ns and longer (AT1123)
- Automatic record of over 500,000 measurement results into non-volatile memory
- One of four available averaging modes can be selected
- The remote control is available for distant measurements
- Possibility of stationary placement with external audio-visual alarm and potential-free contacts for actuator control
- Connection to a PC to form a continuous monitoring system with the documenting function



Detector	Scintillation tissue-equivalent plastic Ø30x15 mm
Measurement range of ambient dose equivalent rate: - Continuous radiation - Short-term radiation - Pulse radiation	50 nSv/h – 10 Sv/h 5 μSv/h – 10 Sv/h 0.1 μSv/h – 10 Sv/h (AT1123)
Measurement range of ambient dose equivalent	10 nSv – 10 Sv
Limits of intrinsic relative measurement error	±15% (Continuous and short-term radiation) ±30% (Pulse radiation)
Energy range: - Continuous and short-term radiation - Pulse radiation	15 keV – 10 MeV 15 keV – 10 MeV (AT1123)
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±35% (15 – 60 keV) ±25% (60 keV – 10 MeV)
Typical sensitivity to <sup>137</sup> Cs gamma radiation	70 cps/(μSv h <sup>-1</sup> )
Measurement time of <sup>137</sup> Cs gamma radiation dose rate - Dose rate: 50 – 300 nSv/h - Dose rate: 0.3 – 2 μSv/h - Dose rate: 2 μSv/h – 10 Sv/h	≤60 s ≤10 s ≤2 s
Response time for dose rate change from 0.1 to 1 μSv/h	<2 s
Protection class	IP54
Overall dimensions, weight	233x85x67 mm, 0.9 kg



## AT1125, AT1125A Radiation Monitors

- Measurement of X-ray and gamma radiation ambient dose equivalent and ambient dose equivalent rate
- Control of  $^{137}\text{Cs}^*$  content in samples inside 0.5-liter Marinelli beaker, both with and without protection unit (PrU)
- Measurement of alpha and beta particle flux density from contaminated surfaces (external BDPS-02 detection unit\*\*)
- Search and detection of X-ray and gamma radiation sources
- High sensitivity
- Spectrum display when connected to a PC



Activity measurement in samples with protection unit (1 cm lead)

Detector	- AT1125 - AT1125A  - BDPS-02	Scintillation NaI(Tl) Ø25x40 mm Scintillation NaI(Tl) Ø25x40 mm and Geiger-Mueller counter tube End-type Geiger-Mueller counter tube
Measurement range: - Ambient dose equivalent rate  - Ambient dose equivalent		30 nSv/h – 300 µSv/h (AT1125) 30 nSv/h – 100 mSv/h(AT1125A) 10 nSv – 10 mSv(AT1125) 10 nSv – 10 Sv(AT1125A)
Measurement range of $^{137}\text{Cs}$ specific activity		50 – $10^5$ Bq/kg (with PrU) 100 – $10^5$ Bq/kg (w/o PrU)
Measurement range of flux density: - Alpha particles - Beta particles		2.4 – $10^6$ particle·min <sup>-1</sup> ·cm <sup>-2</sup> (BDPS-02) 6 – $10^6$ particle·min <sup>-1</sup> ·cm <sup>-2</sup> (BDPS-02)
Limits of intrinsic relative measurement error		±15% (dose rate AT1125, A) ±20% (dose rate BDPS-02) ±20% (specific activity) ±20% (flux density BDPS-02)
Energy range of X-ray and gamma radiation		50 keV – 3 MeV (AT1125, A) 20 keV – 3 MeV (BDPS-02)
Energy dependence relative to 662 keV ( $^{137}\text{Cs}$ )		±15% (AT1125,A) ±30% (BDPS-02)
Typical sensitivity to $^{137}\text{Cs}$ gamma radiation		350 cps/(µSv·h <sup>-1</sup> ) (AT1125,A) 6.6 cps/(µSv·h <sup>-1</sup> ) (BDPS-02)
Detectable activity of $^{137}\text{Cs}$ source, located at the distance of 5 cm in a time not longer than 2 s		10 kBq
Protection class		IP54 (AT1125, A) / IP64 (BDPS-02)
Overall dimensions, weight		258x85x67 mm, 1.0 kg (AT1125,A) 138x86x60 mm, 0.3 kg (BDPS-02) Ø150x155 mm, 10.5 kg (PrU)

\* The list of controlled radionuclides can be adjusted on request.

Available variants: a)  $^{137}\text{Cs}$ ,  $^{134}\text{Cs}$  +  $^{137}\text{Cs}$ ; b)  $^{131}\text{I}$ ,  $^{137}\text{Cs}$ ,  $^{134}\text{Cs}$  +  $^{137}\text{Cs}$

\*\* BDPS-02 can be substituted by the following detection units:

BDPA-01, BDPA-02, BDPA-03, BDPB-01, BDPB-02 and BDPB-03.

For specification of detection units see AT117M Radiation monitor (page 13)



Design and specifications are subject to change without notice

Express sample activity measurement

0.5-liter Marinelli beaker



External BDPS-02 detection unit





Depending on the set of detection units (DU) the radiation monitor can be used for the measurement of:

- X-ray, gamma and neutron radiation ambient dose equivalent and ambient dose equivalent rate
- Air kerma and air kerma rate of X-ray and gamma radiation
- Directional dose equivalent and directional dose equivalent rate of continuous X-ray and gamma radiation
- Flux density of alpha and beta particles from contaminated surfaces
- Flux density and fluence of neutrons with known energy distribution
- Surface activity and disintegrations of  $^{239}\text{Pu}$  and  $^{90}\text{Sr} + ^{90}\text{Y}$
- Real-time search for sources of ionizing radiation and radioactive materials.

Operator can use either processing unit (PU/PU2/PU4) or desktop PC for operation and indication.



PU



PU2

PU4

Processing unit	PU / PU2	PU4
Detector	Geiger-Mueller counter tube	
Measurement range: - Ambient dose equivalent rate - Ambient dose equivalent	1 $\mu\text{Sv/h}$ – 10 mSv/h 1 $\mu\text{Sv}$ – 1 Sv	1 $\mu\text{Sv/h}$ – 100 mSv/h 1 $\mu\text{Sv}$ – 100 Sv
Limits of intrinsic relative measurement error	$\pm 20\%$	
Energy range	60 keV – 3 MeV	
Energy dependence relative to 662 keV ( $^{137}\text{Cs}$ )	-25% to +35%	
Typical sensitivity to $^{137}\text{Cs}$ gamma radiation	1 cps/ $(\mu\text{Sv}\cdot\text{h}^{-1})$	0.33 cps/ $(\mu\text{Sv}\cdot\text{h}^{-1})$
Protection class	IP64	
Overall dimensions	177x85x124 mm (PU) 210x88x36 mm (PU2)	265x90x40 mm
Weight	1.2 kg (PU) / 0.6 kg (PU2)	0.6 kg

**PU and PU2** offer the following functionality:

- Indication of dose, dose rate and count rate measurement results with statistical error value
- Manual recording, storage and transferring measurement results to a PC
- Setting threshold alarm levels

**PU4** is a hand-held PC (HPC) with integrated detection module, which offers the following functionality:

- Processing and display of measurement data
- Collection of data from detection unit via Bluetooth (adapter) or cable
- GPS-referencing of measurement results
- Automatic recording and storage of large-scale measurement results
- Data import to a PC for further processing
- Automatic data transfer to a remote server (If 3G option in HPC is available)

# Radiation Monitors

## AT1117M. X-ray and gamma radiation detection units

 BDKG-01	Detector	<ul style="list-style-type: none"> <li>- BDKG-01</li> <li>- BDKG-03</li> <li>- BDKG-04</li> <li>- BDKG-05</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-24</li> <li>- BDKG-30</li> <li>- BDKG-32</li> <li>- BDKR-01</li> <li>- BDPS-02</li> </ul>	Geiger-Mueller counter tube NaI(Tl) scintillator, Ø25x40 mm Scintillation plastic, Ø30x15 mm NaI(Tl) scintillator, Ø40x40 mm NaI(Tl) scintillator, Ø63x63 mm Geiger-Mueller counter tube Scintillation plastic, Ø50x40 mm Scintillation plastic, Ø50x40 mm Scintillation plastic, Ø70x80 mm NaI(Tl) scintillator, Ø9x2 mm Geiger-Mueller counter tube
 BDKG-03			
 BDKG-04	Measurement range of ambient radiation dose equivalent rate (Ambient dose equivalent)	<ul style="list-style-type: none"> <li>- BDKG-01</li> <li>- BDKG-03</li> <li>- BDKG-04</li> <li>- BDKG-05</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-24</li> <li>- BDKG-32</li> <li>- BDPS-02</li> </ul>	0.1 µSv/h – 10 Sv/h (0.1 µSv – 10 Sv) 0.03 – 300 µSv/h (0.03 µSv – 1 Sv) 0.05 µSv/h – 10 Sv/h (0.7 nSv – 100 Sv) 0.03 – 300 µSv/h (0.03 µSv – 0.3 Sv) 0.03 – 100 µSv/h (0.01 µSv – 10 mSv) 1 mSv/h – 100 Sv/h (1 mSv – 100 Sv) 0.03 µSv/h – 1 Sv/h (0.1 nSv – 100 Sv) 0.03 µSv/h – 0.5 Sv/h (0.1 nSv – 100 Sv) 0.1 µSv/h – 30 mSv/h (0.1 µSv – 1 Sv)
 BDKG-05			
 BDKG-11	Measurement range of air kerma rate (Air kerma)	- BDKG-30	0.03 µGy/h – 1 Gy/h (0.1 nGy – 100 Gy)
 BDKG-17	Measurement range of directional dose equivalent rate (Directional dose equivalent)	- BDKR-01	0.05 – 100 µSv/h (0.05 µSv – 5 mSv)
 BDKG-24	Limits of intrinsic relative measurement error	- all DUs	±20%
 BDKG-30	Energy dependence relative to 662 keV ( <sup>137</sup> Cs) (Energy range)	<ul style="list-style-type: none"> <li>- BDKG-01</li> <li>- BDKG-03</li> <li>- BDKG-04</li> <li>- BDKG-05</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-24</li> <li>- BDKG-30</li> <li>- BDKG-32</li> <li>- BDPS-02</li> </ul>	-25% to +35% (60 keV - 3 MeV) ±20% (50 keV - 3 MeV) ±25% (15 keV - 3 MeV), ±40% (3 - 10 MeV) ±20% (50 keV - 3 MeV) ±20% (50 keV - 3 MeV) -25% to +35% (60 keV - 3 MeV) ±25% (25 keV - 3 MeV), ±40% (3 - 10 MeV) ±25% (50 keV - 3 MeV), ±40% (3 - 10 MeV) ±25% (40 keV - 3 MeV), ±40% (3 - 10 MeV) ±30% (20 keV - 3 MeV)
 BDKG-32			
	Energy dependence relative to 59.5 keV ( <sup>241</sup> Am) (Energy range)	- BDKR-01	±35% (5 - 60 keV), ±30% (60 - 160 keV)
	Typical sensitivity to <sup>137</sup> Cs gamma radiation	<ul style="list-style-type: none"> <li>- BDKG-01</li> <li>- BDKG-03</li> <li>- BDKG-04</li> <li>- BDKG-05</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-24</li> <li>- BDKG-30</li> <li>- BDKG-32</li> <li>- BDPS-02</li> </ul>	4 cps/(µSv·h <sup>-1</sup> ) 350 cps/(µSv·h <sup>-1</sup> ) 70 cps/(µSv·h <sup>-1</sup> ) 760 cps/(µSv·h <sup>-1</sup> ) 2200 cps/(µSv·h <sup>-1</sup> ) 0.005 cps/(µSv·h <sup>-1</sup> ) 530 cps/(µSv·h <sup>-1</sup> ) 600 cps/(µSv·h <sup>-1</sup> ) 1660 cps/(µSv·h <sup>-1</sup> ) 6.6 cps/(µSv·h <sup>-1</sup> )
	Typical sensitivity to <sup>241</sup> Am gamma radiation	- BDKR-01	400 cps/(µSv·h <sup>-1</sup> )

Design and specifications are subject to change without notice

## AT1117M. X-ray and gamma radiation detection units



BDKR-01



BDPS-02

Response time for dose rate change from 0.1 to 1 $\mu\text{Sv/h}$		- BDKG-03 - BDKG-04 - BDKG-05 - BDKG-11 - BDKG-24 - BDKG-32	$\leq 2$ s
Response time for dose rate change from 0.1 to 1 $\mu\text{Gy/h}$		- BDKG-30	$\leq 2$ s
Response time for dose rate change from 1 to 10 $\mu\text{Sv/h}$		- BDKG-01 - BDKR-01 - BDPS-02	$\leq 3$ s $\leq 2$ s $\leq 3$ s
Protection class		- all DUs	IP64
Overall dimensions, weight		- BDKG-01 - BDKG-03 - BDKG-04 - BDKG-05 - BDKG-11 - BDKG-17 - BDKG-24 - BDKG-30 - BDKG-32 - BDKR-01 - BDPS-02	$\varnothing 54 \times 256$ mm, 0.5 kg $\varnothing 60 \times 299$ mm, 0.6 kg $\varnothing 60 \times 200$ mm, 0.46 kg $\varnothing 60 \times 290$ mm, 1.2 kg $\varnothing 78 \times 320$ mm, 1.9 kg $\varnothing 54 \times 167$ mm, 0.28 kg $\varnothing 60 \times 205$ mm, 0.5 kg $\varnothing 60 \times 207$ mm, 0.6 kg $\varnothing 80 \times 245$ mm, 0.78 kg $\varnothing 60 \times 261$ mm, 0.55 kg $138 \times 86 \times 60$ mm, 0.33 kg

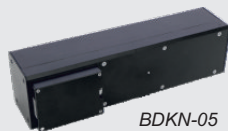
## AT1117M. Neutron radiation detection units



BDKN-01



BDKN-03







BDKN-05







BDKN-06

Detector: He-3 counter in polyethylene moderator		- BDKN-01 - BDKN-03 - BDKN-05 - BDKN-06	one He-3 counter one He-3 counter two He-3 counters one He-3 counter
Measurement range of ambient dose equivalent rate [ambient dose equivalent]		- BDKN-01 - BDKN-03 - BDKN-06	0.1 $\mu\text{Sv/h}$ – 10 $\text{mSv/h}$ [0.1 $\mu\text{Sv}$ – 10 Sv] 0.1 $\mu\text{Sv/h}$ – 10 $\text{mSv/h}$ [0.1 $\mu\text{Sv}$ – 10 Sv] 0.1 $\mu\text{Sv/h}$ – 30 $\text{mSv/h}$ [0.1 $\mu\text{Sv}$ – 10 Sv]
Measurement range of neutron flux density		- BDKN-01 - BDKN-03 - BDKN-05	0.1 – $10^4$ $\text{neutron} \cdot \text{s}^{-1} \cdot \text{cm}^{-2}$ 0.1 – $10^4$ $\text{neutron} \cdot \text{s}^{-1} \cdot \text{cm}^{-2}$ * 0.1 – $2 \cdot 10^3$ $\text{neutron} \cdot \text{s}^{-1} \cdot \text{cm}^{-2}$
Limits of intrinsic relative measurement error	Dose rate measurement mode	- BDKN-01 - BDKN-03 - BDKN-06	$\pm 35\%$ $\pm 20\%$ $\pm 20\%$
	Flux density measurement mode	- BDKN-01 - BDKN-03 - BDKN-05	$\pm 20\%$ $\pm 35\%$ $\pm 20\%$
Energy range		- all DUs	0.025 eV – 14 MeV
Typical sensitivity to Pu-Be radiation	Dose rate measurement mode	- BDKN-01 - BDKN-03 - BDKN-06	0.355 cps/( $\mu\text{Sv} \cdot \text{h}^{-1}$ ) 0.355 cps/( $\mu\text{Sv} \cdot \text{h}^{-1}$ ) 0.7 cps/( $\mu\text{Sv} \cdot \text{h}^{-1}$ )
	Flux density measurement mode	- BDKN-01 - BDKN-03 - BDKN-05 - BDKN-06	0.5 cps/( $\text{neutron} \cdot \text{s}^{-1} \cdot \text{cm}^{-2}$ ) 0.5 cps/( $\text{neutron} \cdot \text{s}^{-1} \cdot \text{cm}^{-2}$ ) 10 cps/( $\text{neutron} \cdot \text{s}^{-1} \cdot \text{cm}^{-2}$ ) 1 cps/( $\text{neutron} \cdot \text{s}^{-1} \cdot \text{cm}^{-2}$ )
Protection class		- all DUs	IP64
Overall dimensions, weight		- BDKN-01 - BDKN-03 - BDKN-05 - BDKN-06	$\varnothing 90 \times 260$ mm, 2 kg $316 \times 220 \times 265$ mm, 8 kg $105 \times 115 \times 380$ mm, 3.5 kg $550 \times 254 \times 254$ mm, 10 kg (w/o tripod)

## AT1117M. Alpha radiation detection units

 BDPA-01	Detector	- BDPA-01 - BDPA-02 - BDPA-03 - BDPS-02	ZnS(Ag) scintillator, 30 cm <sup>2</sup> ZnS(Ag) scintillator, 100 cm <sup>2</sup> ZnS(Ag) scintillator, 300 cm <sup>2</sup> Geiger-Mueller counter tube
 BDPA-02	Measurement range of alpha particles flux density	- BDPA-01 - BDPA-02 - BDPA-03 - BDPS-02	0.1 – 10 <sup>5</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> 0.05 – 5·10 <sup>4</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> 0.05 – 2·10 <sup>4</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> 2.4 – 10 <sup>6</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup>
 BDPA-03	Measurement range of <sup>239</sup> Pu surface activity	- BDPA-01 - BDPA-02 - BDPA-03	3.4·10 <sup>-3</sup> – 3.4·10 <sup>3</sup> Bq·cm <sup>-2</sup> 1.7·10 <sup>-3</sup> – 1.7·10 <sup>3</sup> Bq·cm <sup>-2</sup> 1.7·10 <sup>-3</sup> – 0.68·10 <sup>3</sup> Bq·cm <sup>-2</sup>
 BDPS-02	Limits of intrinsic relative measurement error	- all DUs	±20%
	Energy range	- all DUs	4 – 7 MeV
	Typical sensitivity to <sup>239</sup> Pu radiation	- BDPA-01 - BDPA-02 - BDPA-03 - BDPS-02	0.15 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> ) 0.7 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> ) 2.5 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> ) 0.045 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> )
	Protection class	- all DUs	IP64
	Overall dimensions, weight	- BDPA-01 - BDPA-02 - BDPA-03 - BDPS-02	Ø85x200 mm, 0.5 kg Ø137x230 mm, 0.7 kg Ø222x277 mm, 1.4 kg 138x86x60 mm, 0.33 kg

## AT1117M. Beta radiation detection units

 BDPB-01	Detector	- BDPB-01 - BDPB-02 - BDPB-03 - BDPS-02	Scintillation plastic, 30 cm <sup>2</sup> Scintillation plastic, 100 cm <sup>2</sup> Scintillation plastic, 300 cm <sup>2</sup> Geiger-Mueller counter tube
 BDPB-02	Measurement range of beta particles flux density	- BDPB-01 - BDPB-02 - BDPB-03 - BDPS-02	1 – 5·10 <sup>5</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> 0.5 – 1.5·10 <sup>5</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> 0.5 – 0.5·10 <sup>5</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> 6 – 10 <sup>6</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup>
 BDPB-03	Measurement range of <sup>90</sup> Sr + <sup>90</sup> Y surface activity	- BDPB-01 - BDPB-02 - BDPB-03	4.4·10 <sup>-2</sup> – 2.2·10 <sup>4</sup> Bq·cm <sup>-2</sup> 2.2·10 <sup>-2</sup> – 0.66·10 <sup>4</sup> Bq·cm <sup>-2</sup> 2.2·10 <sup>-2</sup> – 0.22·10 <sup>4</sup> Bq·cm <sup>-2</sup>
 BDPS-02	Limits of intrinsic relative measurement error	- all DUs	±20%
	Energy range	- all DUs	155 keV – 3.5 MeV
	Typical sensitivity to <sup>90</sup> Sr + <sup>90</sup> Y radiation	- BDPB-01 - BDPB-02 - BDPB-03 - BDPS-02	0.3 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> ) 0.9 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> ) 2.4 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> ) 0.12 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> )
	Protection class	- all DUs	IP64
	Overall dimensions, weight	- BDPB-01 - BDPB-02 - BDPB-03 - BDPS-02	Ø85x205 mm, 0.55 kg Ø137x235 mm, 0.87 kg Ø222x281 mm, 1.8 kg 138x86x60 mm, 0.33 kg

## AT117M. Typical solutions

### Remote measurements

- Detection unit (any except BDKN-03, BDKN-05, BDKN-06)
- PU / PU2 / PU4
- Telescopic bar (1.7 m / 3.2 m)



### Control of hands and coats contaminated by alfa/beta particles



- PU2
- Detection unit (BDPA-02 / BDPA-03 / BDPB-02 / BDPB-03)



### Handle for comfortable use

- Detection unit (any except BDKN-03, BDKN-05, BDKN-06)
- PU2
- Handle



### Mounting on a tripod

- Detection unit (any except BDKN-03, BDKN-05, BDKN-06)
- PU2 / PU4
- Tripod



### Measurements with GPS-referencing

- Detection unit (any)
- PU4
- BT-DU4 Adapter



### Neutron dosimeter

- BDKN-03
- PU2 / PU4



### Connection of alarm unit

- Detection unit (any)
- PU / PU2 / PU4
- Alarm unit

### Sealed protective cases



### Measurements in water, wells, etc.



- Detection unit (BDKG-01, BDKG-03, BDKG-04, BDKG-05, BDKG-17, BDKG-24, BDKG-30)
- PU / PU2 / PU4

## AT2533, AT2533/1 Dosimeters



Measurement of ambient dose equivalent rate and ambient dose equivalent of continuous X-ray and gamma radiation in an extremely wide range and under harsh operating conditions, including emergency response.

Measurement of pulsed radiation dose and average dose rate directly at linear accelerators (LINACs) and other pulsed-radiation facilities.

- High burn-up life, rugged construction and integrity of detection unit
- Measurement in liquids at depths up to 40 m
- User friendly and easy to operate, highly available and can be used in gloves
- Instrument-to-PC data exchange over USB or Bluetooth interface (AT2533/1)
- The PU is able to control the radiation situation at operator location
- Available accessories: cable reel, wall brackets, etc.



Detector	Two silicon semiconductor detectors
Energy range	50 keV – 10 MeV
Measurement range of ambient dose equivalent rate $\dot{H}^*(10)$	1 $\mu\text{Sv/h}$ – 1000 Sv/h
Measurement range of ambient dose equivalent $H^*(10)$	10 $\mu\text{Sv}$ – 5000 Sv
Limit of intrinsic relative measurement error of ambient dose equivalent and dose equivalent rate	$\pm 25\%$ (for $\dot{H}^*(10) \leq 10 \mu\text{Sv/h}$ ) $\pm 15\%$ (for $\dot{H}^*(10) > 10 \mu\text{Sv/h}$ )
Measurement range of average pulsed radiation dose rate	80 $\mu\text{Sv/s}$ – 0.3 Sv/s (pulse repetition rate is not less than 20 cps, duration not less than 1 $\mu\text{s}$ )
Measurement range of pulsed radiation dose	10 $\mu\text{Sv}$ – 5000 Sv
Limit of intrinsic relative measurement error of pulsed radiation dose and average dose rate	$\pm 15\%$
Energy dependence relative to 662 keV ( $^{137}\text{Cs}$ )	$\pm 25\%$ (50 keV – 3 MeV)
Typical sensitivity to $^{137}\text{Cs}$ gamma radiation	0.32 cps/ $(\mu\text{Sv} \cdot \text{h}^{-1})$ (for $\dot{H}^*(10) \leq 0.5 \text{ Sv/h}$ ) 58 mV/ $(\text{Sv} \cdot \text{h}^{-1})$ (for $\dot{H}^*(10) > 0.5 \text{ Sv/h}$ )
Response time for 10-fold dose rate change	$\leq 10 \text{ s}$ (for $\dot{H}^*(10) > 10 \mu\text{Sv/h}$ )
Burn-up life	$\geq 5000 \text{ Sv}$ (BDKG-33 and cable)
Protection class (BDKG-33)	IP68 (withstands static hydraulic pressure up to 400 kPa at 40 m immersion depth)
PC interface	USB 2.0 (AT2533) USB 2.0 / Bluetooth (AT2533/1)
Overall dimensions, weight	$\varnothing 30 \times 130 \text{ mm}$ , 0.25 kg (BDKG-33) 85x155x35 mm, 0.3 kg (PU-33)

Design and specifications are subject to change without notice

## AT5350/1 Dosimeter

Highly functional precision dosimeter. Measurement of direct current rate, electric charge, charge by the method of numerical integration of current, air kerma and air kerma rate, kerma by the method of numerical integration of kerma rate and other radiological values.

### Application:

- Metrology of ionizing radiation
- Measurement of low level current and charge
- Physical research of photon radiation fields
- Clinical dosimetry
- Radiation therapy
- Radiation protection



### Delivery set:

- Electrometer measurement unit (Electrometer)
- Optional ionization chambers by PTW-Freiburg (Germany):
  - TM23342  
Parallel-plane X-ray chamber (0.02 cm<sup>3</sup>)
  - TM31010  
Cylindrical ionization chamber (0.125 cm<sup>3</sup>)
  - TM30010  
Thimble ionization chamber (0.6 cm<sup>3</sup>)
  - TM23361  
Cylindrical ionization chamber (30 cm<sup>3</sup>)
  - TM32002  
Spherical ionization chamber (1000 cm<sup>3</sup>)

Measurement range: - Direct current rate - Electric charge - Charge by the method of numerical integration of current	1·10 <sup>-15</sup> – 1·10 <sup>-6</sup> A 1·10 <sup>-15</sup> – 1·10 <sup>-8</sup> C 1·10 <sup>-14</sup> – 1·10 <sup>-1</sup> C
Measurement accuracy	≤(0.1 – 0.5)%
Measurement range: - Air kerma rate - Air kerma - Air kerma by the method of numerical integration of kerma rate	0.4 μGy/min – 10 kGy/min 0.05 μGy – 15 Gy 0.05 μGy – 1.5 MGy
Measurement accuracy	±3% max
X-ray and gamma radiation energy range	8 keV – 1.33 MeV
Leakage current	≤1·10 <sup>-15</sup> A
Integration time	<99999 s
Power supply	230 VAC, 50 Hz
Power consumption	≤12 V·A
Overall dimensions / weight	294x112.5x250 mm / 3.8 kg
Integrated high voltage power source ±(1 – 500) V for ionization chambers with 1 V setup steps	
Library of parameters for 20 ionization chambers	
Memory for up to 500 measurement results	
Automatic correction of measurement results taking into account air density for unpressurised chambers based on the entered temperature and pressure values	
Selectable unit of measurement (Gy, Sv, R, A, C)	
RS232C interface and dedicated digital inputs/outputs	



# Spectrometers (Radionuclide Identification Devices)

## AT1321 Spectrometer (Spectrometric Personal Radiation Detector)



- Search and detect gamma radiation sources with identification of radionuclide composition
- Measure gamma radiation ambient dose equivalent rate
- Highly-sensitive to gamma radiation and compact
- Spectrum analysis and radionuclide identification without PC
- Integrated GPS module
- Sound, light and vibration notification
- "GARM" application software for further data processing and analysis in expert mode and radiological mapping



Detectors	Scintillation, NaI(Tl) Ø25x40 mm Geiger-Muller counter tube
Energy range	20 keV – 3 MeV
Detectable activity of <sup>137</sup> Cs source, located at the distance of 15 cm in a time not longer than 2 s	(50±10) kBq
Typical resolution at 662 keV ( <sup>137</sup> Cs)	8.5%
Measurement range of ambient dose equivalent rate	30 nSv/h – 100 mSv/h
Limits of intrinsic relative measurement error	±20%
Typical sensitivity to <sup>137</sup> Cs gamma radiation	425 cps/(μSv·h <sup>-1</sup> )
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±20% (50 keV to 3 MeV)
Response time for dose rate change from 0.1 to 1 μSv/h	<2 s
Protection class	IP54
Overall dimensions, weight	145x100x50 mm, 0.7 kg



*Design and specifications are subject to change without notice*

## AT1120M, AT1120MA Spectrometers



- Quick search and detection of gamma radiation sources with identification of radionuclide composition
- Measurement of gamma radiation ambient dose equivalent rate
- High sensitivity and wide energy range
- Quick accommodation to changes in radiation level
- Short measurement cycle (1/3 s) provided by the search algorithm, enables highly confident estimation of rapidly changing radiation field dynamics and highly precise localization of radioactive sources
- GPS-referencing of scan data
- "GARM" application software for further data processing and analysis in expert mode and radiological mapping
- "ARMS" application software for automatic data transfer to a remote server (option)



		AT1120M	AT1120MA
Detection unit (DU)		BDKG-11M	BDKG-05M
Processing unit (PU4)		PU4 is a hand-held PC (HPC) with integrated detection module	
Detector	DU PU4	Scintillation, NaI(Tl) Ø63x63 mm Geiger-Muller counter tube	Scintillation, NaI(Tl) Ø40x40 mm Geiger-Muller counter tube
Energy range	DU PU4	20 keV – 7 MeV 60 keV – 3 MeV	
Detectable activity of <sup>137</sup> Cs source, located at the distance of 20 cm in a time not longer than 2 s	DU	(30±6) kBq	(50±10) kBq
Typical resolution at 662 keV ( <sup>137</sup> Cs)	DU	7.5%	
Measurement range of ambient dose equivalent rate	DU PU4	0.03 – 150 µSv/h 1 µSv/h – 100 mSv/h	0.03 – 300 µSv/h 1 µSv/h – 100 mSv/h
Limits of intrinsic relative measurement error	DU PU4	±20%	
Typical sensitivity to <sup>137</sup> Cs gamma radiation	DU	2700 cps/(µSv·h <sup>-1</sup> )	870 cps/(µSv·h <sup>-1</sup> )
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	DU PU4	±15% (50 keV to 7 MeV) -25% to +35% (60 keV to 3 MeV)	
Response time for dose rate change from 0.1 to 1 µSv/h	DU	≤2 s	
Protection class	DU PU4	IP54 IP64	
Overall dimensions, weight	DU PU4	Ø78x320 mm, 1.7 kg 265x90x40 mm, 0.6 kg	Ø60x300 mm, 0.9 kg 265x90x40 mm, 0.6 kg



## AT6102, A, B Spectrometers

- Search and detection of gamma radiation sources with automatic identification of radionuclide composition
- Measurement of gamma radiation ambient dose equivalent rate
- Detection of neutron radiation and measurement of neutron count rate (AT6102)
- Measurement of neutron radiation dose rate (BDKN-03)
- Measurement of alpha and beta particles flux density from contaminated surfaces (BDPA-01/BDPB-01)



- Single-block design
- Multiple functions
- Integrated GPS module
- Sound, vibration and light alarm
- Connection of external detection units
- 25 hours (AT6102A, B) and 18 hours (AT6102) of battery operation time

Gamma radiation detectors	AT6102	NaI(Tl) scintillator, Ø40x40 mm; Geiger-Mueller counter tube
	AT6102A	
	AT6102B	
Neutron radiation detector	AT6102	Two <sup>3</sup> He-proportional neutron counters
Energy range - Gamma radiation - Neutron radiation		20 keV – 3 MeV 0.025 eV – 14 MeV (AT6102)
Detectable activity of <sup>137</sup> Cs source, located at the distance of 20 cm in a time not longer than 2 s		(50±10) kBq
Detectable activity of <sup>252</sup> Cf source, located at the distance of 20 cm in a time not longer than 5 s		1.8·10 <sup>4</sup> neutrons/s (Probability of detection is 0.9)
Typical resolution at 662 keV ( <sup>137</sup> Cs)		7.5% (AT6102, A) 8% (AT6102B)
Measurement range of ambient dose equivalent rate		30 nSv/h – 100 mSv/h
Limits of intrinsic relative measurement error		±20%
Typical sensitivity to <sup>137</sup> Cs gamma radiation		850 cps/(µSv·h <sup>-1</sup> ), (AT6102, A) 1700 cps/(µSv·h <sup>-1</sup> ), (AT6102B)
Protection class		IP65
Overall dimensions, weight		230x115x212 mm, 2.5 kg (AT6102) 230x115x177 mm, 1.9 kg (AT6102A) 230x115x177 mm, 2.15 kg (AT6102B)

Detection unit	BDPA-01 (α)	BDPB-01 (β)	BDKN-03 (n)
Detector	ZnS(Ag) scintillator, Ø60 mm	Scintillation plastic, Ø60 mm	<sup>3</sup> He counter in polyethylene moderator
Measurement range	0.5 – 10 <sup>5</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> (Flux density)	3 – 5·10 <sup>5</sup> particle·min <sup>-1</sup> ·cm <sup>-2</sup> (Flux density)	0.1 µSv/h – 10 mSv/h (Dose rate)
	Limits of intrinsic relative measurement error: ±20%		
Energy range	4 – 7 MeV	155 keV – 3.5 MeV	0.025 eV – 14 MeV
Typical sensitivity	0.15 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> ) [ <sup>239</sup> Pu]	0.3 cps/(particle·min <sup>-1</sup> ·cm <sup>-2</sup> ) [ <sup>90</sup> Sr+ <sup>90</sup> Y]	0.355 cps/(µSv·h <sup>-1</sup> ) [Pu-Be]
Dimensions, weight	Ø85x200 mm, 0.5 kg	Ø85x205 mm, 0.55 kg	316x220x265 mm, 8 kg
Protection class	IP64	IP64	IP64
Image			

Design and specifications are subject to change without notice

## AT6101DR Spectrometer



Rugged HPC or tablet PC for control and indication



- Measurement of  $^{134}\text{Cs}$  and  $^{137}\text{Cs}$  surface contamination and specific activity in soils
- Measurement of  $^{137}\text{Cs}$ ,  $^{134}\text{Cs}$  and  $^{131}\text{I}$  specific activity in water, foodstuffs, agricultural and forestry products and liquid radioactive wastes
- Determination of  $^{40}\text{K}$ ,  $^{226}\text{Ra}$  and  $^{232}\text{Th}$  natural radionuclides content
- Radionuclide identification:  $^{134}\text{Cs}$ ,  $^{137}\text{Cs}$ ,  $^{131}\text{I}$ ,  $^{40}\text{K}$ ,  $^{226}\text{Ra}$ ,  $^{232}\text{Th}$
- Measurement of gamma radiation ambient dose equivalent rate
- No-sampling measurement with GPS-referencing
- Smart detection unit in sealed container
- Automatic determination of soil layer thickness contaminated by  $^{137}\text{Cs}$  and  $^{134}\text{Cs}$  radionuclides
- "GARM" application software for further data processing and analysis in expert mode and radiological mapping

Scintillation detector	Nal(Tl) Ø63x63 mm
Energy range	50 keV – 3 MeV
Measurement ranges ( $2\pi$ geometry)	
- Surface activity of $^{134}\text{Cs}$ and $^{137}\text{Cs}$	4 – 3700 kBq/m <sup>2</sup> (0.1 – 100 Ci/km <sup>2</sup> )
- Specific activity of $^{134}\text{Cs}$ and $^{137}\text{Cs}$ ( <i>in situ</i> )	50 – 10 <sup>6</sup> Bq/kg
- Specific effective activity of $^{40}\text{K}$ , $^{226}\text{Ra}$ , $^{232}\text{Th}$	100 – 10 <sup>4</sup> Bq/kg
Measurement ranges ( $4\pi$ geometry)	
- Specific activity of $^{134}\text{Cs}$ and $^{137}\text{Cs}$	50 – 10 <sup>6</sup> Bq/kg
- Specific activity of $^{131}\text{I}$	30 – 10 <sup>6</sup> Bq/kg
- Specific effective activity of $^{40}\text{K}$ , $^{226}\text{Ra}$ , $^{232}\text{Th}$	50 – 10 <sup>4</sup> Bq/kg
Typical resolution at 662 keV ( $^{137}\text{Cs}$ )	8%
Measurement range of ambient dose equivalent rate	0.03 – 130 µSv/h
Limits of intrinsic relative error of activity and dose rate measurement	±20%
Typical sensitivity to $^{137}\text{Cs}$ gamma radiation	2200 cps/(µSv·h <sup>-1</sup> )
Protection class	IP67
Overall dimensions, weight	Ø130x500 mm, 4.5 kg



Design and specifications are subject to change without notice

## AT6104DM, AT6104DM1 Spectrometers

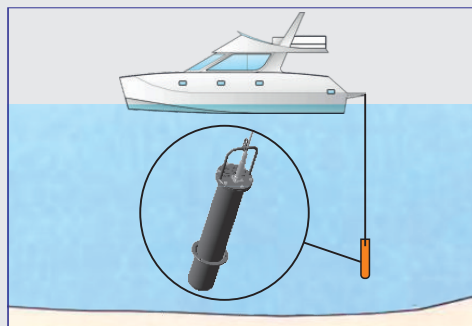


Radioactive contamination control of water and bottom sediments at depths up to 500 meters with GPS-referencing

- Determination of spatial position of detection device during measurement
- Cable reel with a current feedthrough
- Display of measurement results on index maps of controlled radionuclides concentration or gamma radiation dose rate distribution
- Expert mode for instrument spectrum analysis with automatic identification of sample radionuclide content
- "GARM" application software for further data processing and analysis in expert mode and radiological mapping



	AT6104DM	AT6104DM1
Scintillation detector	Nal(Tl) Ø63x63 mm	Nal(Tl) Ø63x160 mm
Energy range	70 keV – 3 MeV	
Identified radionuclides	<sup>137</sup> Cs, <sup>134</sup> Cs, <sup>131</sup> I, <sup>40</sup> K, <sup>226</sup> Ra, <sup>232</sup> Th, <sup>60</sup> Co, <sup>24</sup> Na, <sup>54</sup> Mn, <sup>65</sup> Zn, etc.	
Measurement range of specific activity in water ( $4\pi$ geometry) <sup>134</sup> Cs, <sup>137</sup> Cs, <sup>131</sup> I, etc. <sup>40</sup> K	3 – 1·10 <sup>6</sup> Bq/kg 250 – 2·10 <sup>4</sup> Bq/kg	1 – 1·10 <sup>6</sup> Bq/kg 100 – 2·10 <sup>4</sup> Bq/kg
Measurement range of specific activity in bottom sediments ( $2\pi$ geometry) <sup>134</sup> Cs, <sup>137</sup> Cs <sup>40</sup> K	100 – 1·10 <sup>6</sup> Bq/kg 250 – 2·10 <sup>4</sup> Bq/kg	–
Typical resolution at 662 keV ( <sup>137</sup> Cs)	8%	9%
Measurement range of ambient dose equivalent rate	0.03 – 130 µSv/h	0.03 – 50 µSv/h
Limits of intrinsic relative error of specific activity and dose rate measurement	±20%	
Typical sensitivity to <sup>137</sup> Cs gamma radiation	2350 cps/(µSv·h <sup>-1</sup> )	5100 cps/(µSv·h <sup>-1</sup> )
Protection class of the detection device	IP68 (Withstands static hydraulic pressure up to 5 MPa for not less than 24 h)	
Overall dimensions and weight of detection device	Ø130x510 mm, 4.5 kg	Ø130x633 mm, 6.5 kg



Design and specifications are subject to change without notice

## AT6101C, AT6101CM Spectrometers (Backpack-based Radiation Detectors)



Rugged HPC for control and indication

Discreet detection of sources of ionizing radiation with radionuclide identification. Effective technical solution to prevent illegal traffic of radioactive materials



- Best in class
- 20 hours of operation time
- Automatic simultaneous gamma and neutron radiation scanning with radionuclide identification
- Continuous recording of scanning data with GPS-referencing for further analysis
- Dose rate measurement range can be expanded to 10 Sv/h
- "GARM" application software for further data processing and analysis in expert mode and radiological mapping
- "ARMS" application software for automatic transfer of data to a remote server (option)
- Spectrometer arrangement inside a sealed shock-proof case (option)

		AT6101C	AT6101CM
Gamma radiation detection unit		<b>BDKG-11M (1 or 2 units)</b> NaI(Tl) scintillator, Ø63x63 mm	<b>BDKG-19M (1 or 2 units)</b> NaI(Tl) scintillator, Ø63x160 mm
Energy range		20 keV – 3 MeV	
Measurement range of ambient dose equivalent rate		0.03 – 150 µSv/h	0.03 – 50 µSv/h
		Limits of intrinsic relative measurement error: ±20%	
Typical sensitivity to <sup>137</sup> Cs gamma radiation		2200 cps/(µSv·h <sup>-1</sup> ) [4400 cps/(µSv·h <sup>-1</sup> )]*	6000 cps/(µSv·h <sup>-1</sup> ) [12000 cps/(µSv·h <sup>-1</sup> )]*
Detectable level of gamma radiation dose rate from a source, travelling at the speed of 0.5 m/s		0.05 µSv/h [0.035 µSv/h]*	0.03 µSv/h [0.02 µSv/h]*
Detectable activity of <sup>137</sup> Cs source, located at the distance of 1 m in a time not longer than 2 s		(450±10) kBq [(320±10) kBq]*	(300±10) kBq [(210±10) kBq]*
		95% probability of source detection with false alarm rate not above 1 in 10 min	
Alarm activation time		<2 s	
Typical resolution at 662 keV ( <sup>137</sup> Cs)		7.5%	8%
Identified radionuclides		Industrial, natural, medical, bremsstrahlung of beta emitters <i>(The library content can be modified on request)</i>	
Option to extend the dose rate measurement range		<b>BDKG-04</b> detection unit, up to 10 Sv/h	
Neutron radiation detection unit		<b>BDKN-05**</b> , Two He-3 proportional counters Ø30x360 mm in polyethylene moderator	
Energy range		0.025 eV – 14 MeV	
Typical sensitivity to <sup>252</sup> Cf neutron radiation		20 cps/(neutron·s <sup>-1</sup> ·cm <sup>-2</sup> )	
Detectable activity of Pu-Be source, located at the distance of 1.25 m in a time not longer than 3 s		(5.00±1.25)·10 <sup>4</sup> neutron/s	
		95% probability of source detection with false alarm rate not above 1 in 1 h	
Protection class	in a backpack in a case	IP55 IP65	IP55 IP65
Overall dimensions, weight ***	in a backpack in a case	450x330x250 mm, 7 kg 625x500x300 mm, 17 kg	500x330x250 mm, 8.5 kg 625x500x300 mm, 18.5 kg

\* Configuration with two BDKG-11M (BDKG-19) detection units

\*\* Not available for configuration with two BDKG-11M (BDKG-19) detection units

\*\*\* Configuration with BDKG-11M (BDKG-19M), BDKG-04 and BDKN-05 detection units

*Design and specifications are subject to change without notice*

## AT6103 Mobile Radiation Scanning System



Radiation survey of the area in real time and search for gamma and neutron radiation sources with GPS-referencing

The system can be mounted on a motor vehicle, marine vessel or aircraft without any special tools



- User-selectable set of smart detection units
- High system scalability in terms of sensitivity to gamma and neutron radiation
- Automatic simultaneous gamma and neutron radiation scanning
- Real-time display of measurement results with GPS-referencing
- Search and detection of radioactive sources and real-time identification of its isotopic composition
- Storage and operation in sealed shock-proof cases
- Assessment of surface contamination with  $^{137}\text{Cs}$  radionuclide ( $\text{kBq}/\text{m}^2, \text{Ci}/\text{km}^2$ )
- "GARM" application software for further data processing and analysis in expert mode and radiological mapping
- "ARMS" application software for automatic transfer of data to a remote server (option)



Rugged 10" tablet PC for control and indication



Highly-sensitive gamma radiation and neutron radiation monitor: BDKG-28 (1 unit), BDKN-05 (2 units)



Highly-sensitive gamma radiation and neutron radiation counting monitor: BDRM-05 (1 unit), BDKN-05 (2 units)



Gamma radiation and neutron radiation monitor: BDKG-11M (1 unit), BDKG-04 (1 unit), BDNG-05 (1 unit)



Accessories

### Available monitors

[Each monitor may contain 1 – 3 detection units (DU)]

[The configuration of the system is user-defined]

- 1) **Gamma radiation and neutron radiation monitor** [1 – 3 units of BDKG -11M and/or BDKG-19M, 1 – 3 units of BDKN-05, 1 unit of BDKG-04]
- 2) **Highly-sensitive gamma radiation and neutron radiation monitor** [1 – 3 units of BDKG-28 and/or BDKG-34, 1 – 2 units of BDKN-05, 1 unit of BDKG-04]
- 3) **Highly-sensitive gamma radiation and neutron radiation counting monitor** [1 – 2 units of BDRM-05, 1 – 2 units of BDKN-05, 1 unit of BDKG-04]

Total number of monitors in the system

18

Identified radionuclides

Medical, industrial and natural  
(The library content can be modified on request)

Continuous run time

~ 10 h (With lowest brightness of Tablet PC screen)

Protection class

IP55

# Radiation Scanning Equipment

## AT6103 Mobile Radiation Scanning System

Gamma radiation detection unit		BDKG-11M	BDKG-19M	BDKG-04	BDKG-28	BDKG-34	BDRM-05
Scintillation detector		Nal(Tl) Ø63x63 mm	Nal(Tl) Ø63x160 mm	Plastic Ø30x15 mm	Nal(Tl) 400x100x100 mm	Nal(Tl) 400x100x50 mm	Plastic 1000x100x50 mm
Energy range		20 keV – 3 MeV	20 keV – 3 MeV	15 keV – 3 MeV	50 keV – 3 MeV	50 keV – 3 MeV	50 keV – 3 MeV
Measurement range of ambient dose equivalent rate		30 nSv/h – 150 µSv/h	30 nSv/h – 50 µSv/h	50 nSv/h – 10 Sv/h	30 nSv/h – 7 µSv/h	30 nSv/h – 10 µSv/h	Count rate indication range 0 – 5 · 10 <sup>5</sup> s <sup>-1</sup>
Limits of intrinsic relative measurement error: ±20%							
Typical sensitivity, cps/(µSv·h <sup>-1</sup> )	<sup>241</sup> Am	13500	37000	370	130000	118000	62000
	<sup>137</sup> Cs	2200	6000	70	33000	26500	32000
	<sup>60</sup> Co	1200	2500	40	19000	15500	17000
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)		±15% (50 keV - 3 MeV)	±15% (50 keV - 3 MeV)	±35% (15 - 60 keV) ±25% (60 keV - 3 MeV)	±20% (50 keV - 3 MeV)	±20% (50 keV - 3 MeV)	–
Response time for dose rate change from 0.1 to 1 µSv/h		<2 s	<2 s	<3 s	<2 s	<2 s	–
Typical resolution at 662 keV ( <sup>137</sup> Cs)		7.5 %	8 %	–	8.5 %	8.5 %	–

The system in "Search" mode detects the <sup>137</sup>Cs source of gamma radiation in less than 2 s in the following conditions:

Gamma radiation detection unit	BDKG-11M	BDKG-19M	BDKG-28	BDKG-34	BDRM-05
Source activity	(450±10) kBq	(300±10) kBq	(105±5) kBq	(105±5) kBq	(100±5) kBq
Distance from source to surface of detection unit	(100.0±0.5) cm				
Detection probability	95%				
False alarm rate	≤1 / 10 min				

Neutron radiation detection unit	BDKN-05
Detector	Two He-3 proportional counters Ø30x360 mm in polyethylene moderator
Indication range of neutron radiation impulse count rate	0 – 2.5 · 10 <sup>4</sup> s <sup>-1</sup>
Energy range	0.025 eV – 14 MeV
Typical sensitivity to source radiation at the distance of 1 m, cps/(neutron·s <sup>-1</sup> ·cm <sup>-2</sup> )	8 (Pu-Be) 20 ( <sup>252</sup> Cf)

The system in "Search" mode detects the Pu-Be source of neutron radiation in less than 3 s in the following conditions:

Neutron radiation detection unit	BDKN-05
Average neutron flux from source to solid angle 4π sr	(5.00±1.25) · 10 <sup>4</sup> neutron/s
Distance from source to surface of detection unit	(125±1) cm
Detection probability	95%
False alarm rate	≤1 / 1 h

Design and specifications are subject to change without notice



## AT1320, A, B, C Gamma Activity Monitors

Measurement of volume activity and specific activity of gamma emitting radionuclides in water, foodstuff, agricultural raw materials and fodder, industrial raw materials, forestry products, building materials, soil and other objects of environment

- Smart spectrometric detection unit
- AT1320B: Radiation control of mushrooms and berries in 10-litre shipping box takes only 20 s
- AT1320C: Preliminary analysis of sample radionuclide composition in the process of measurement. Calculation of sample radionuclide activity on the basis of identification results
- Ready-to-use measurement procedures



**AT1320, A, B**  
with processing unit



**AT1320C**

Scintillation detector		Nal(Tl) Ø63x63 mm
Energy range		50 keV – 3 MeV
Measurement range of volume (specific) activity	<sup>131</sup> I	3 – 1·10 <sup>6</sup> Bq/l (Bq/kg)
	<sup>134</sup> Cs	3 – 1·10 <sup>6</sup> Bq/l (Bq/kg)
	<sup>137</sup> Cs	3.7 – 1·10 <sup>6</sup> Bq/l (Bq/kg)
	<sup>40</sup> K	50 – 2·10 <sup>4</sup> Bq/l (Bq/kg)
	<sup>226</sup> Ra	10 – 1·10 <sup>4</sup> Bq/l (Bq/kg)
	<sup>232</sup> Th	10 – 1·10 <sup>4</sup> Bq/l (Bq/kg)
Limits of intrinsic relative measurement error		±20%
Density range of controlled samples		0.1 – 3 g/cm <sup>3</sup>
Typical resolution at 662 keV ( <sup>137</sup> Cs)		8.5%
Number of ADC channels		512 / 1024 (AT1320C)
Overall dimensions, weight	Detection unit Processing unit Protection unit	Ø97x350 mm, 2 kg 200x106x35 mm, 0.62 kg Ø600x700 mm, 125 kg
Measurement geometry	Marinelli beaker Flat vessel Plastic box, 380x280x100 mm	1 and 0.5 litre 0.5 and 0.1 litre 10 litre

	Controlled radionuclides	Control and indication	Measurement vessels
AT1320	<sup>137</sup> Cs, <sup>40</sup> K, <sup>226</sup> Ra, <sup>232</sup> Th	Processing unit or External PC (option)	1, 0.5 and 0.1 litre
AT1320A	<sup>137</sup> Cs, <sup>40</sup> K		1, 0.5 and 0.1 litre
AT1320B	<sup>137</sup> Cs, <sup>40</sup> K		1, 0.5, 0.1 and 10 litre (w/o protection unit lid)
AT1320C	<sup>131</sup> I, <sup>134</sup> Cs, <sup>137</sup> Cs, <sup>40</sup> K, <sup>226</sup> Ra, <sup>232</sup> Th	External PC (option)	1, 0.5 and 0.1 litre



## AT1135 Portable Radiometric Laboratory

- Specific activity measurement of gamma-emitting <sup>134</sup>Cs, <sup>137</sup>Cs, <sup>40</sup>K radionuclides in food products
- In situ measurement of gamma radiation ambient dose equivalent rate

Scintillation detector	Nal(Tl) Ø25x40 mm
Energy range	50 keV – 1.5 MeV
Measurement range of specific activity for samples with 1 g/cm <sup>3</sup> density (measurement geometry: 0.5-litre Marinelli beaker)	25 – 1·10 <sup>5</sup> Bq/kg ( <sup>134</sup> Cs) 25 – 1·10 <sup>5</sup> Bq/kg ( <sup>137</sup> Cs) 360 – 2·10 <sup>4</sup> Bq/kg ( <sup>40</sup> K)
Density range of measured samples	0.5 – 1.5 g/cm <sup>3</sup>
Dose rate measurement range	0.03 – 300 µSv/h
Overall dimensions, weight	200x200x437 mm, 14 kg
Control and indication	External PC (option)



## AT1315 Gamma Beta Spectrometer

Simultaneous and selective activity measurement of gamma emitting radionuclides in potable water, food, agricultural raw materials and fodder, industrial raw materials, forestry products, building materials, soil and other objects of environment

Support of quick radioactive purity test for standardized sample metal heats

- Computer processing of spectra by means of maximum likelihood method
- Automatic allowance for sample density
- Simultaneous metering and processing of spectra
- Ready-to-use measurement procedures



**Gamma Beta Spectrometer**



**Gamma Spectrometer**

Scintillation detector	<i>Gamma channel Beta channel</i>	NaI(Tl), Ø63x63 mm Plastic, Ø128x9 mm
Control and indication	External PC ( <i>option</i> )	
Energy range	<i>Gamma radiation Beta radiation</i>	50 keV – 3 MeV 150 keV – 3.5 MeV
Measurement range of volume (specific) activity without sample concentration (Spectrometric and radiometric measurement modes)	<sup>137</sup> Cs <sup>40</sup> K <sup>232</sup> Th, <sup>226</sup> Ra <sup>90</sup> Sr (Radiometric mode only) <sup>131</sup> I (Spectrometric mode only) <sup>134</sup> Cs (Spectrometric mode only)	1 – 10 <sup>6</sup> Bq/l (Bq/kg) 20 – 2·10 <sup>4</sup> Bq/l (Bq/kg) 3 – 10 <sup>4</sup> Bq/l (Bq/kg) 10 – 10 <sup>6</sup> Bq/l (Bq/kg) 10 – 10 <sup>5</sup> Bq/l (Bq/kg) 6 – 10 <sup>5</sup> Bq/l (Bq/kg)
Limits of intrinsic relative measurement error	±20%	
Density range of controlled samples	0.2 – 1.6 g/cm <sup>3</sup>	
Lower limit of <sup>90</sup> Sr measurement range with sample concentration in conversion to "wet" sample	0.1 Bq/l 0.8 Bq/l 1.0 Bq/kg	
	- For potable water	
	- For milk, baby food	
	- For potatoes, corn, grain and agricultural raw materials	
Typical resolution at 662 keV ( <sup>137</sup> Cs)	8%	
Number of ADC channels	1024	
Power supply	PC USB port	
Overall dimensions, weight ( <i>Protection unit with gamma and beta radiation detection units</i> )	Ø474x910 mm, 194 kg	
Volume of measurement vessels	<i>For "wet" samples</i> <i>For concentrated samples</i>	Marinelli beaker 1 l, Flat vessels 0.5 and 0.1 l Flat vessels 0.2 and 0.03 l



## AT1329, A, B Sample Counters

Smear radiometry and simultaneous or independent measurement of gross alpha and beta activity in aerosol filters, counting samples

Scintillation detector	AT1329	Phoswich detector ( $\alpha$ and $\beta$ channel): 28 cm <sup>2</sup> , plastic with a layer of ZnS(Ag)
	AT1329A	ZnS(Ag) 28 cm <sup>2</sup> ( $\alpha$ channel)
	AT1329B	Plastic 28 cm <sup>2</sup> ( $\beta$ channel)
Control and indication		External PC (option)
Sensitivity	$\alpha$ channel $\beta$ channel	$\geq 0.25$ Bq <sup>-1</sup> ·s <sup>-1</sup> ( <sup>239</sup> Pu) $\geq 0.30$ Bq <sup>-1</sup> ·s <sup>-1</sup> ( <sup>90</sup> Sr+ <sup>90</sup> Y)
Energy range	$\alpha$ channel $\beta$ channel	3 – 7 MeV 155 keV – 3.5 MeV
Count rate measurement range	$\alpha$ channel $\beta$ channel	0 – 10 <sup>5</sup> s <sup>-1</sup> 0 – 10 <sup>5</sup> s <sup>-1</sup>
Gross activity measurement range	$\alpha$ channel $\beta$ channel	0.01 – 10 <sup>4</sup> Bq 0.1 – 10 <sup>4</sup> Bq
Minimum measured activity (measurement time - 1 h)	$\alpha$ channel $\beta$ channel	0.02 Bq ( <sup>239</sup> Pu) 0.28 Bq ( <sup>90</sup> Sr+ <sup>90</sup> Y)
Background count rate	$\alpha$ channel $\beta$ channel	$\leq 0.001$ s <sup>-1</sup> $\leq 0.75$ s <sup>-1</sup>
Limits of intrinsic relative measurement error	±20%	
Protection class	IP43	
Overall dimensions	230x230x290 mm	
Weight	AT1329	21 kg
	AT1329A	9 kg
	AT1329B	21 kg

- Custom calibration settings
- Selectable units of measurement
- LED stabilization of measuring paths
- Automatic subtraction of external background
- Passive background radiation protection – lead shield (30 mm)
- Memory for measurement results
- Ready-to-use measurement procedures

### Available configurations:

- AT1329 (*alpha-beta*)
- AT1329A (*alpha*)
- AT1329B (*beta*)





AT1316 (AT1316A) and AT1322 (AT1322/1) can be used in combination

WBCs can be installed into a van as part of mobile radiation monitoring laboratory



## AT1316 Whole Body Counter

Activity measurement of  $^{137}\text{Cs}$  and  $^{134}\text{Cs}$  gamma-emitting radionuclides in human body.

- Calculation of expected annual effective internal exposure dose for incorporated  $^{137}\text{Cs}$  and  $^{134}\text{Cs}$  radionuclides
- Flexible software function controls, database and report generation on the basis of measurement results
- Express test productivity is 15 persons/hour



Scintillation detector	Nal(Tl), Ø150x100 mm
Energy range	50 keV – 3 MeV
Measurement range of activity	80 – 7.5·10 <sup>5</sup> Bq ( $^{137}\text{Cs}$ ) 80 – 4·10 <sup>5</sup> Bq ( $^{134}\text{Cs}$ )
Minimum measurable activity of $^{137}\text{Cs}$ and $^{134}\text{Cs}$ in adult body in 3 min	300 Bq
Limits of intrinsic relative measurement error	±15%
Weight	250 kg

## AT1316A Whole Body Counter

Activity measurement of  $^{60}\text{Co}$  and other gamma-emitting radionuclides in human lungs.

- Control of gross activity threshold exceeding for  $^{51}\text{Cr}$ ,  $^{54}\text{Mn}$ ,  $^{58}\text{Co}$ ,  $^{59}\text{Fe}$ ,  $^{65}\text{Zn}$ ,  $^{95}\text{Nb}$ ,  $^{100\text{m}}\text{Ag}$ ,  $^{103}\text{Ru}$ ,  $^{124}\text{Sb}$ ,  $^{141}\text{Ce}$ ,  $^{144}\text{Ce}$  radionuclides in lungs
- Flexible software function controls, database and report generation on the basis of measurement results
- Express test productivity is 15 persons/hour



Scintillation detector	Nal(Tl), Ø150x100 mm
Energy range	50 keV – 2 MeV
Measurement range of activity	40 – 1·10 <sup>5</sup> Bq ( $^{60}\text{Co}$ )
Minimum measurable activity of $^{60}\text{Co}$ in adult lungs in 3 min	60 Bq
Limits of intrinsic relative measurement error	±20%
Weight	250 kg

## AT1322, AT1322/1 Whole Body Counters

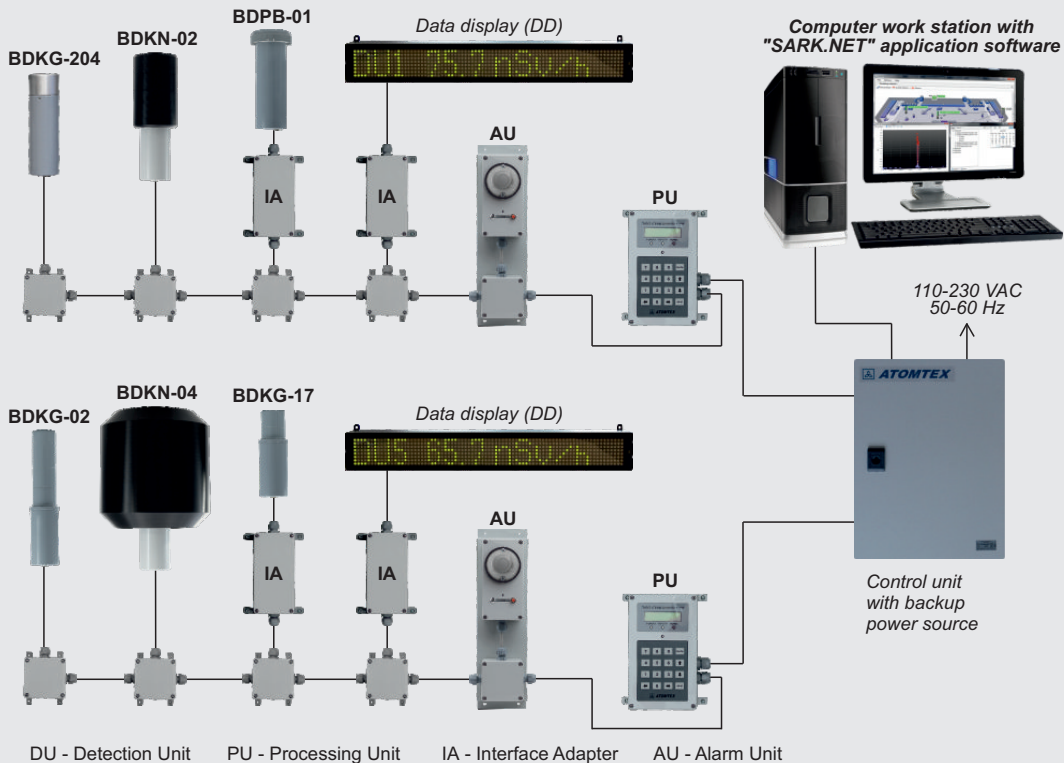
Activity measurement of  $^{131}\text{I}$  and  $^{133}\text{I}$  gamma-emitting radionuclides in human thyroid gland.

- Flexible software function controls, database and report generation on the basis of measurement results
- Express test productivity is 15 persons/hour



Scintillation detector	AT1322 AT1322/1	Nal(Tl), Ø40x40 mm Nal(Tl), Ø63x63 mm
Energy range		50 keV – 1.5 MeV
Measurement range of activity	AT1322 AT1322/1	85 – 10 <sup>5</sup> Bq ( $^{131}\text{I}$ ) / 110 – 10 <sup>5</sup> Bq ( $^{133}\text{I}$ ) 30 – 10 <sup>5</sup> Bq ( $^{131}\text{I}$ ) / 40 – 10 <sup>5</sup> Bq ( $^{133}\text{I}$ )
Minimum measurable activity of $^{131}\text{I}$ and $^{133}\text{I}$ in the thyroid gland in 3 min	AT1322 AT1322/1	200 Bq ( $^{131}\text{I}$ ) / 240 Bq ( $^{133}\text{I}$ ) 80 Bq ( $^{131}\text{I}$ ) / 100 Bq ( $^{133}\text{I}$ )
Limits of intrinsic relative measurement error		±20%
Weight		70 kg

## AT2327 Alarm Dosimeter



Sample functional chart of **AT2327 Alarm Dosimeter**

Radiation control of:

- radiation-sensitive and radiation-dangerous sites and facilities
- environment
- restricted area beamline at linear accelerators (LINACs) and other pulsed-radiation facilities

- Building a flexible and reliable multichannel stationary system
- Independent measurements of wide range gamma and neutron radiation dose rate and flux density of neutron and beta particles for each channel
- Sound and light alarm
- Self-check function
- Software for displaying current radiation environment in controlled area on PC screen
- Data logging
- Backup power source
- Integration into external security systems



Number of detection units in one alarm dosimeter	1 – 10
Number of alarm dosimeters in the system for PC configuration	Up to 32
Distance between detection unit and processing unit/PC when interface cable is used	1000 m
Burn-up life	$\geq 100$ Sv $\geq 10^8$ Sv (BDKG-27) $\geq 5 \cdot 10^4$ Sv (UDKG-37/2)

Design and specifications are subject to change without notice

# Area Monitors

## AT2327 Alarm Dosimeter

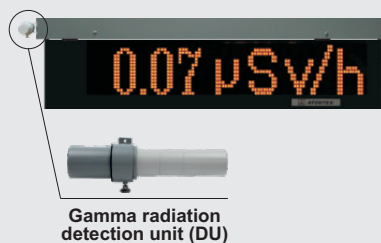
Detector	<ul style="list-style-type: none"> <li>- BDKG-02 / -17</li> <li>- BDKG-204</li> <li>- BDKG-11</li> <li>- BDKG-27</li> <li>- UDKG-37/2</li> <li>- BDPB-01</li> <li>- BDKN-02 / -04</li> </ul>	<p>Geiger-Mueller counter tube Scintillation plastic, Ø30x15 mm NaI(Tl) scintillator, Ø63x63 mm Ion chamber</p> <p>Silicon semiconductor detector + Geiger-Mueller counter tube Scintillation plastic, 30 cm<sup>2</sup> He-3 counter in polyethylene moderator</p>
Measurement range of gamma radiation ambient dose equivalent rate	<ul style="list-style-type: none"> <li>- BDKG-02</li> <li>- BDKG-204</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-27</li> <li>- UDKG-37/2</li> </ul>	<p>0.1 µSv/h – 10 Sv/h 0.05 µSv/h – 10 Sv/h 0.03 – 100 µSv/h 1 mSv/h – 100 Sv/h 50 mSv/h – 4000 Sv/h 1 µSv/h – 5000 Sv/h</p>
Measurement range of gamma radiation average pulsed radiation dose rate	<ul style="list-style-type: none"> <li>- UDKG-37/2</li> </ul>	<p>80 µSv/s – 0.3 Sv/s (pulse repetition rate is not less than 20 cps, duration not less than 1 µs)</p>
Measurement range of ambient neutron radiation dose equivalent rate	<ul style="list-style-type: none"> <li>- BDKN-02</li> <li>- BDKN-04</li> </ul>	<p>0.1 µSv/h – 10 mSv/h [From Pu-Be source] 0.1 µSv/h – 10 mSv/h</p>
Measurement range of beta particles flux density	<ul style="list-style-type: none"> <li>- BDPB-01</li> </ul>	<p>1 – 5·10<sup>5</sup> particle·min<sup>-1</sup>·cm<sup>-2</sup></p>
Measurement range of neutron flux density	<ul style="list-style-type: none"> <li>- BDKN-02</li> <li>- BDKN-04</li> </ul>	<p>0.1 – 10<sup>4</sup> neutron·s<sup>-1</sup>·cm<sup>-2</sup> 0.1 – 10<sup>4</sup> neutron·s<sup>-1</sup>·cm<sup>-2</sup> [From Pu-Be source]</p>
Energy range of gamma radiation	<ul style="list-style-type: none"> <li>- BDKG-02</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-27</li> <li>- BDKG-204</li> <li>- UDKG-37/2</li> </ul>	<p>60 keV – 3 MeV 50 keV – 3 MeV 60 keV – 3 MeV 60 keV – 1.5 MeV 20 keV – 10 MeV 50 keV – 10 MeV</p>
Energy range of beta radiation	<ul style="list-style-type: none"> <li>- BDPB-01</li> </ul>	<p>155 keV – 3.5 MeV</p>
Energy range of neutron radiation	<ul style="list-style-type: none"> <li>- BDKN-02 / -04</li> </ul>	<p>0.025 eV – 14 MeV</p>
Typical sensitivity to <sup>137</sup> Cs gamma radiation	<ul style="list-style-type: none"> <li>- BDKG-02</li> <li>- BDKG-204</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-27</li> <li>- UDKG-37/2</li> </ul>	<p>4.0 cps/(µSv·h<sup>-1</sup>) 70.0 cps/(µSv·h<sup>-1</sup>) 1970 cps/(µSv·h<sup>-1</sup>) 0.005 cps/(µSv·h<sup>-1</sup>) 2.1 µC/Sv 0.15 cps/(µSv·h<sup>-1</sup>), for dose rate ≤0.2 Sv/h 58 mV/(Sv·h<sup>-1</sup>), for dose rate &gt;0.2 Sv/h</p>
Typical sensitivity to <sup>90</sup> Sr+ <sup>90</sup> Y beta radiation	<ul style="list-style-type: none"> <li>- BDPB-01</li> </ul>	<p>0.3 cps/(particle·min<sup>-1</sup>·cm<sup>-2</sup>)</p>
Typical sensitivity to Pu-Be neutron radiation	<ul style="list-style-type: none"> <li>- BDKN-02 / -04</li> <li>- BDKN-02 / -04</li> </ul>	<p>0.5 cps/(neutron·s<sup>-1</sup>·cm<sup>-2</sup>) 0.355 cps/(µSv·h<sup>-1</sup>)</p>
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	<ul style="list-style-type: none"> <li>- BDKG-02</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-27</li> <li>- UDKG-37/2</li> <li>- BDKG-204</li> </ul>	<p>-20%...+35% ±20% -25%...+35% ±30% ±30% -45% to +35% (20 - 60 keV), ±25% (60 keV - 3 MeV) ±50% (3 - 10 MeV)</p>

Design and specifications are subject to change without notice

## AT2327 Alarm Dosimeter

Protection class	<ul style="list-style-type: none"> <li>- BDKG-02</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-27</li> <li>- BDKG-204</li> <li>- UDKG-37/2</li> <li>- BDPB-01</li> <li>- BDKN-02</li> <li>- BDKN-04</li> <li>- PU</li> <li>- AU</li> <li>- DD</li> </ul>	<p>IP57 IP65 (In sealed container) IP64 IP65 (Processing unit) IP65 (Ion chamber) IP67 IP68 (Detection unit) IP65 (Interface unit) IP64 IP54 IP54 IP55 IP65 IP21</p>
Overall dimensions, weight	<ul style="list-style-type: none"> <li>- BDKG-02</li> <li>- BDKG-11</li> <li>- BDKG-17</li> <li>- BDKG-27</li> <li>- BDKG-204</li> <li>- UDKG-37/2</li> <li>- BDPB-01</li> <li>- BDKN-02</li> <li>- BDKN-04</li> <li>- PU</li> <li>- AU</li> <li>- DD</li> </ul>	<p>Ø55x260 mm, 0.5 kg Ø141x473 mm, 6.5 kg (In sealed container) Ø54x167mm, 0.27kg 206x82x56 mm, 0.45 kg (Processing unit) 190x58x65 mm, 0.7 kg (Ion chamber) Ø60x210 mm, 0.55 kg Ø30x130 mm, 0.25 kg (Detection unit) 170x80x55 mm, 0.3 kg (Interface unit) Ø85x205 mm, 0.55 kg Ø91x260 mm, 2.4 kg 235x264x315 mm, 8.0 kg 200x160x90 mm, 0.7 kg 183x103x98 mm, 0.4 kg 644x98x67 mm, 4.0 kg</p>

## AT2327 Alarm Dosimeter with Data Display

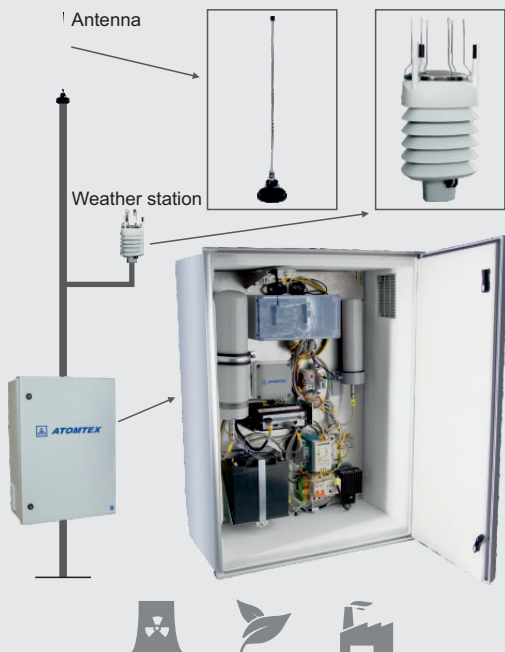


Control of radiation-sensitive and radiation-dangerous sites and territories with visual display of readings on a large screen.

- Logging of dose rate levels and threshold exceeding events
- The distance between the screen and a detection unit with temperature probe can be up to 1 km
- Additional protection from direct weather effects

Detector	Geiger-Mueller counter tube	
Energy range	60 keV – 3 MeV	
Measurement range of ambient dose equivalent rate	0.1 µSv/h – 10 Sv/h	
Typical sensitivity to <sup>137</sup> Cs gamma radiation	4 cps/(µSv·h <sup>-1</sup> )	
Visual display of data on screen	Dose rate, temperature, current date and time	
Screen readability	30 m at any time of day	
Protection class	IP57 (DU), IP53 (Display) IP31 (Control unit)	
Dimensions, weight	<i>Display with DU</i>	1095x392x300 mm, 25 kg
	<i>Control unit</i>	500x650x150 mm, 30 kg

## AT2341 Radiation Monitoring Station



Continuous radiation and weather control in the zone of influence of nuclear power plants and other radiation-hazardous facilities.

Combine stations into a single network (up to 256 units) and use dedicated software to build an automated radiation situation monitoring system.

- High-sensitive spectrometric measurement channel
- Simultaneous monitoring of radiation and weather data
- Redundant power supply for at least 72 hours operation time
- Wireless modem for receiving/transmitting digital data over narrowband radio channels (VHF) and/or GPRS wireless communication channel

Protection rating	IP65 (IP66 for weather station)
Operation temperature range	-40...+50°C
Relative air humidity	≤98% (Air temperature ≤35°C without condensation)
Dimensions	800x600x300 mm
Weight	≤45 kg

### SPECTROMETRIC CHANNEL

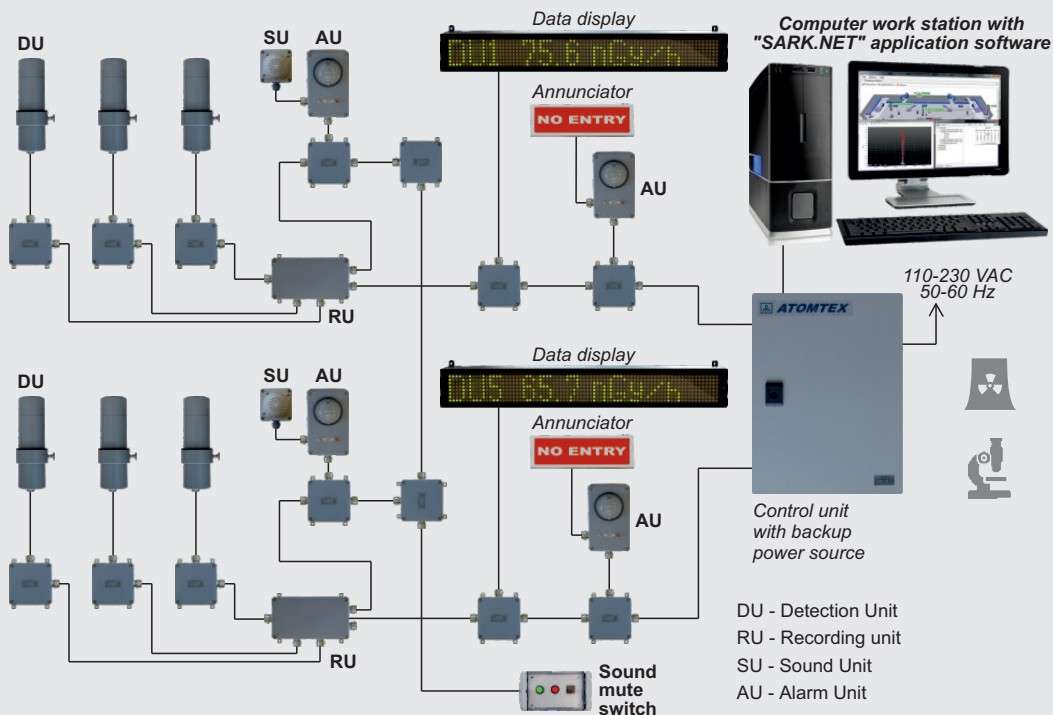
Detection unit	<b>BDKG-211M</b>
Detector	NaI(Tl) scintillator, ø63x63 mm
Energy range	20 keV – 3 MeV
Measurement range of ambient dose equivalent rate	30 nSv/h – 120 µSv/h
Limit of intrinsic relative measurement error	±20%
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±20% (40 keV – 3 MeV)
Typical sensitivity to gamma radiation, cps/(µSv·h <sup>-1</sup> )	13900 ( <sup>241</sup> Am) / 2450 ( <sup>137</sup> Cs) / 1300 ( <sup>60</sup> Co)
Response time for dose rate change from 0.1 to 1 µSv/h	≤2 s
Typical resolution at 662 keV ( <sup>137</sup> Cs)	7.5%

### DOSIMETRIC CHANNEL (available options)

Detection unit	<b>BDKG-22</b>	<b>BDKG-204</b>	<b>BDKG-224</b>
Detector	Geiger-Muller counter tube	Tissue-equivalent scintillation plastic, Ø30x15 mm	Tissue-equivalent scintillation plastic, Ø50x40 mm
Energy range	60 keV – 3 MeV	20 keV – 10 MeV	30 keV – 10 MeV
Measurement range of ambient dose equivalent rate	100 nSv/h – 10 Sv/h	50 nSv/h – 10 Sv/h	40 nSv/h – 1 Sv/h
	Limits of intrinsic relative measurement error: ±20%		
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	-25% to +35% (60 keV – 3 MeV)	-45% to +35% (20 – 60 keV) ±25% (60 keV – 3 MeV) ±50% (3 – 10 MeV)	±25% (30 keV – 3 MeV) ±40% (3 – 10 MeV)
Typical sensitivity to gamma radiation, cps/(µSv·h <sup>-1</sup> )	4 ( <sup>241</sup> Am) 4 ( <sup>137</sup> Cs) 4 ( <sup>60</sup> Co)	370 ( <sup>241</sup> Am) 70 ( <sup>137</sup> Cs) 40 ( <sup>60</sup> Co)	3200 ( <sup>241</sup> Am) 530 ( <sup>137</sup> Cs) 270 ( <sup>60</sup> Co)
Response time for dose rate change from 0.1 to 1 µSv/h	≤7 s	≤2 s	≤2 s



## AT2331 Emergency Alarm Dosimeter



Sample functional chart of Alarm system for detection of occurrence of self-sustaining chain reaction

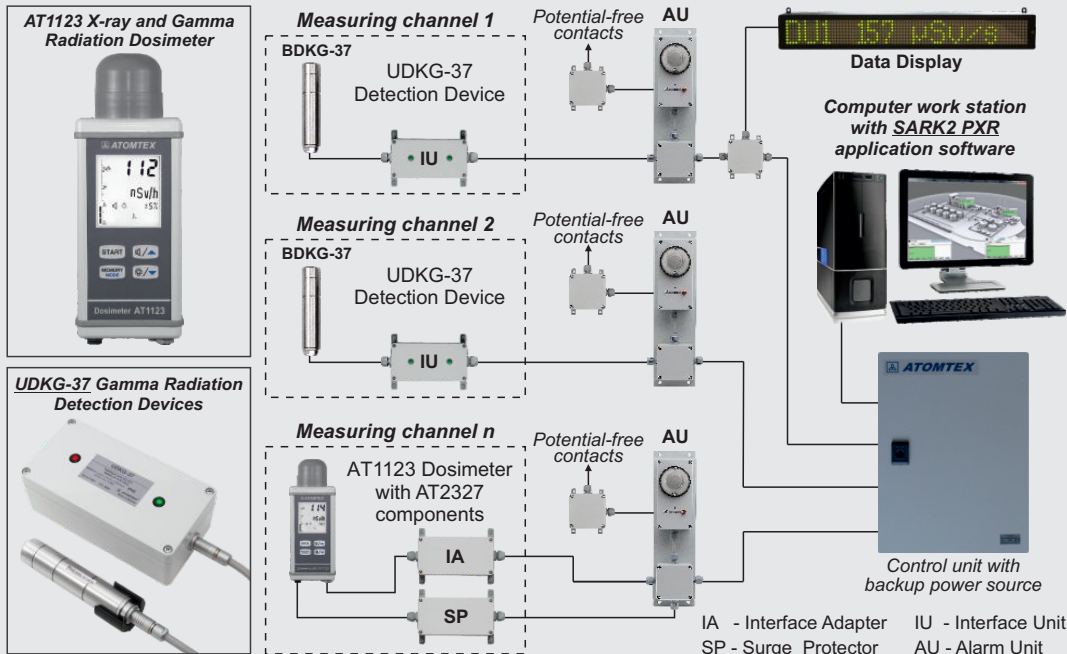
Detection of self-sustaining chain reaction and generation of alarm signals to evacuate personnel from hazardous area.

AT2331 can be combined with AT2327 Alarm Dosimeter and a personal computer running "SARK.NET" software to create an alarm system for detection of occurrence of self-sustaining chain reaction.

- Detection of self-sustaining chain reaction in full range of its characteristics
- High reliability
- Self-monitoring of component parts
- Backup power source
- Logging measurement results into non-volatile memory of alarm dosimeter
- Integration into external security systems

Scintillation detector	Plastic Ø10x5 mm
Minimum duration of a registered self-sustaining chain reaction	1 ms
Measurement range: - Absorbed dose rate - Absorbed dose	0.1 µGy/h – 1 Gy/h 0.05 µGy – 10 Gy
Energy range	60 keV – 3 MeV
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±35%
Selectable dose rate threshold range	1 µGy/h – 1 Gy/h
Time interval from the moment of response to the moment when the rated alarm sound level is reached	≤0.5 s
Alarm sound level at 1-meter distance	100 dB
Number of measurement channels	Up to 32
Continuous battery operation time	≥6 h
Protection class	DU and switches other components
	IP57 IP65

## Area Monitor for Pulse Radiation



Restricted area beamline radiation control at linear accelerators (LINACs) and other pulse radiation facilities.

Measurement point may be either in the operator's room or directly at the LINAC or facility location.

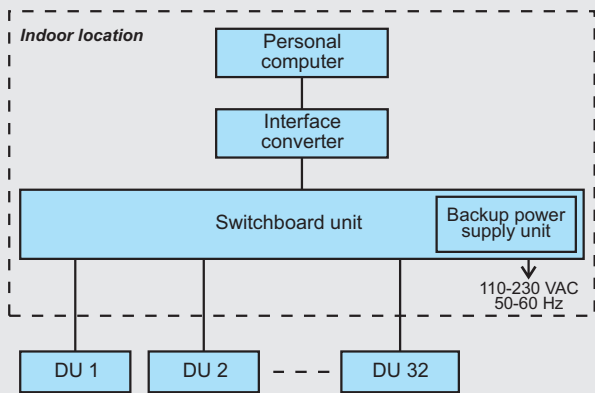


- Logging of dose rate levels and threshold exceeding events
- Software for displaying current radiation environment in controlled area on PC screen
- Backup power source for autonomous operation up to 6 hours
- Fault diagnostics

Measuring channel	UDKG-37	AT1123
Detector	Silicon semiconductor detector; Geiger-Muller counter tube	Scintillation tissue-equivalent plastic Ø30x15 mm
Measurement range of average ambient dose equivalent rate of pulse radiation	30 µSv/s – 0.3 Sv/s (100 mSv/h – 1000 Sv/h)  (pulse repetition rate is not less than 20 cps, duration not less than 1 µs)	30 pSv/s – 3 mSv/s (0.1 µSv/h – 10 Sv/h)  (pulse repetition rate is not less than 10 cps, duration not less than 10 ns)
Measurement range of ambient dose equivalent rate of continuous radiation	1 µSv/h – 5000 Sv/h	50 nSv/h – 10 Sv/h
Measurement range of ambient dose equivalent	–	10 nSv – 10 Sv
Energy range	50 keV – 10 MeV	15 keV – 10 MeV
Typical sensitivity to <sup>137</sup> Cs gamma radiation	0.15 cps/(µSv·h <sup>-1</sup> ), for dose rate ≤0.1 Sv/h  58 mV/(Sv·h <sup>-1</sup> ), for dose rate >0.1 Sv/h	70 cps/(µSv·h <sup>-1</sup> )
Burn-up life	≥50000 Sv	≥100 Sv
Number of measurement channels	Up to 32	
Protection class	IP68 (BDKG-37), IP54 (AT1123), IP65 (other components)	

*Design and specifications are subject to change without notice*

## Spectrometric System for Radiation Monitoring



Structural diagram of the system

Spectrometric and dosimetric radiation control of area, facilities, wells and other sites.

- Indication of spectra and dose rate readings by each detection unit (DU) on site plan or terrain map
- Identification of source radionuclide composition
- Energy range expandable to 5 MeV
- Hermetically sealed construction (IP68)
- Backup power source



Number of detection units (DUs) in the system	1 – 32
Maximum distance of communication line between DUs and the PC	1000 m
Maximum distance of communication line between switchboard unit and PC	100 m
Identified radionuclides	Medical, industrial, natural (The library content can be modified on request)
Continuous battery operation time	≥6 h
PC interface	USB / Ethernet / Bluetooth (via interface adapter)

Detection Unit	BDKG-201M	BDKG-203M	BDKG-205M	BDKG-211M	BDKG-219M
Scintillation detector	NaI(Tl) Ø25x16 mm	NaI(Tl) Ø25x40 mm	NaI(Tl) Ø40x40 mm	NaI(Tl) Ø63x63 mm	NaI(Tl) Ø63x160 mm
Energy range	20 keV – 3 MeV				
Measurement range of ambient dose equivalent rate	50 nSv/h – 1 mSv/h	30 nSv/h – 500 µSv/h	30 nSv/h – 300 µSv/h	30 nSv/h – 120 µSv/h	30 nSv/h – 50 µSv/h
	Limits of intrinsic relative measurement error: ±20%				
Typical sensitivity to gamma radiation, cps/(µSv·h <sup>-1</sup> )	<sup>241</sup> Am 1400 <sup>137</sup> Cs 165 <sup>60</sup> Co 80	3600 400 190	5400 800 420	13900 2450 1300	37000 6000 2500
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±15% (50 keV – 3 MeV)				
Typical resolution at 662 keV ( <sup>137</sup> Cs)	8.5%	8%	7.5%	7.5%	8%
Protection class	IP68 (Fresh water measurement at depths up to 50 m. Holds hydrostatic pressure up to 5 atm or 0.6 MPa)				
Interface	RS485				
Operation temperature range	-35...+55°C	-35...+55°C	-35...+55°C	-35...+55°C	-35...+55°C
Dimensions, weight	Ø63x313 mm, 1 kg	Ø63x333 mm, 1 kg	Ø63x333 mm, 1 kg	Ø90x350 mm, 2 kg	Ø90x430 mm, 3.3 kg
Image					

Design and specifications are subject to change without notice

## AT920B, AT920P Pedestrian Radiation Monitors

Detection of gamma radiation sources in a stream of people crossing borders of controlled facilities.

- Rapid accommodation to changes in radiation background
- Sound and light alarm
- Multiple pedestrian radiation monitors (up to 32) can be joined into a network controlled by dedicated software running on a PC
- Mobility and rapid deployment for passage control
- High reliability and self-check function
- Backup power source



		AT920B	AT920P
Scintillation detector		Nal(Tl) Ø63x160 mm	Plastic Ø70x150 mm
Energy range		50 keV – 3 MeV	20 keV – 3 MeV
Typical sensitivity, cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ )	$^{241}\text{Am}$	30650	10000
	$^{137}\text{Cs}$	4900	3200
	$^{60}\text{Co}$	3140	1600
Minimal detectable gamma radiation dose rate level above background value 0.1 $\mu\text{Sv/h}$ in a period not longer than 2 s		0.03 $\mu\text{Sv/h}$	0.04 $\mu\text{Sv/h}$
Detection threshold for unshielded source at 1 m height under natural radiation background conditions not more than 0.1 $\mu\text{Sv/h}$	$^{241}\text{Am}$	1 MBq	2.3 MBq
	$^{137}\text{Cs}$ $^{60}\text{Co}$	320 kBq 130 kBq	370 kBq 190 kBq
<i>(Distance to source 1 m, source travel speed 5 km/h, probability of source detection 80 % under confidence level <math>P=0.95</math>)</i>			
False alarm rate		$\leq 1$ for 8 h of continuous operation	
PC interface		RS485	
Continuous battery operation time		$\geq 6$ h	
Protection class		IP54	
Overall dimensions		Ø350x1220 mm	
Weight		14.5 kg	13.5 kg

## AT930 Pedestrian Radiation Monitor

Detection of gamma radiation sources in a stream of people crossing borders of secure facilities.

- Rapid accommodation to radiation background change
- Sound and light alarm
- Continuous and occasional radiation monitoring
- Mobility and capability to create safety lanes
- High integrity and self-checking function
- Backup power source



Conformance to international standard **IEC 62244:2006**

Radiation protection instrumentation - Installed radiation monitors for the detection of radioactive and special nuclear materials at national borders

Detector	Scintillation plastic 1000x100x50 mm	
Energy range	60 keV – 3 MeV	
Typical sensitivity, cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ )	<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co	60000 31000 16500
False alarm rate	≤1 per 1000 passings	
PC interface	RS485	
Protection class	IP54	
Overall dimensions	1610x450x300 mm when anchored to the floor (An additional base of 930x760 mm size is included into the delivery set for operation without anchoring)	
Weight	70 kg (83 kg with additional base)	



Detection threshold for unshielded source at 1 m height under natural radiation background conditions not more than 0.1 $\mu\text{Sv}/\text{h}$  (Distance to source 1 m, source travel speed 5 km/h, probability of source detection 80 % under confidence level P=0.95)	<sup>241</sup> Am	530 kBq
	<sup>137</sup> Cs	70 kBq
	<sup>60</sup> Co	35 kBq
	<sup>99m</sup> Tc	180 kBq
	<sup>133</sup> Ba	75 kBq
	<sup>131</sup> I	50 kBq

Minimum detectable amount of radioactive materials at 1 m height under natural radiation background conditions not more than 0.1 $\mu\text{Sv}/\text{h}$  (Distance to source 1 m, source travel speed 5 km/h, probability of source detection 95% under confidence level P=0.95)	<sup>235</sup> U	15 g
	<sup>239</sup> Pu	1.2 g

## Pedestrian Radiation Monitors (based on AT2327 Alarm Dosimeter)



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



Consisting of:  
BDRM-05 and BDKN-05

Detection of gamma and neutron radiation sources in a stream of people crossing borders of controlled facilities.

- Rapid accommodation to changes in radiation background
- Sound and light alarm
- Multiple pedestrian radiation monitors (up to 32) can be joined into a network controlled by dedicated software running on a PC
- High reliability and self-check function
- Backup power source

False alarm rate	≤1 for 8 h of continuous operation
PC interface	RS485
Continuous battery operation time	≥6 h
Protection class	IP65
Overall dimensions, weight	depending on configuration

Gamma radiation detection unit (DU)		BDKG-19	BDKG-35	BDRM-05
Scintillation detector		Nal(Tl) Ø63x160 mm	Plastic Ø70x150 mm	Plastic 1000x100x50 mm
Energy range		50 keV – 3 MeV	20 keV – 3 MeV	50 keV – 3 MeV
Typical sensitivity, cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ )		<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co	7070 4430 2340	10000 3200 1600
Minimal detectable gamma radiation dose rate level above background value 0.1 $\mu\text{Sv}/\text{h}$ in a period not longer than 2 s		0.03 $\mu\text{Sv}/\text{h}$	0.04 $\mu\text{Sv}/\text{h}$	0.01 $\mu\text{Sv}/\text{h}$
Detection threshold for unshielded source at 1 m height under natural radiation background conditions not more than 0.1 $\mu\text{Sv}/\text{h}$	1 DU	<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co	17 MBq 260 kBq 120 kBq	12.3 MBq 300 kBq 150 kBq
	2 DU	<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co	11.6 MBq 180 kBq 95 kBq	8.4 MBq 210 kBq 110 kBq
			650 kBq 70 kBq 35 kBq	450 kBq 50 kBq 25 kBq
<i>(Distance to source 1 m, source travel speed 5 km/h, probability of source detection 80 % under confidence level P=0.95)</i>				

Neutron radiation detection unit (DU)		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	0.025 eV – 14 MeV	
Typical sensitivity to source radiation at the distance of 1 m		<sup>252</sup> Cf	1.3 cps/(neutron·s <sup>-1</sup> ·cm <sup>-2</sup> )	
Source detection threshold at 1 m height	1 DU	<sup>252</sup> Cf	3.0·10 <sup>5</sup> neutron/s (1.65·10 <sup>5</sup> neutron/s)*	
	2 DU	<sup>252</sup> Cf	–	
			20 cps/(neutron·s <sup>-1</sup> ·cm <sup>-2</sup> )	
			3.1·10 <sup>4</sup> neutron/s (1.9·10 <sup>4</sup> neutron/s)*	
			2.0·10 <sup>4</sup> neutron/s (1.35·10 <sup>4</sup> neutron/s)*	
<i>(Distance to source 1 m, source travel speed 5 km/h, probability of source detection 90% (50%*) under confidence level P=0.95)</i>				

*Design and specifications are subject to change without notice*

## Vehicle Radiation Monitors (based on AT2327 Alarm Dosimeter)



Version of the vehicle radiation monitor with the following configuration:

**BDKG-19 (2 units), BDKN-05 (2 units)**

Detection of gamma and neutron radiation sources in vehicles crossing access control points.

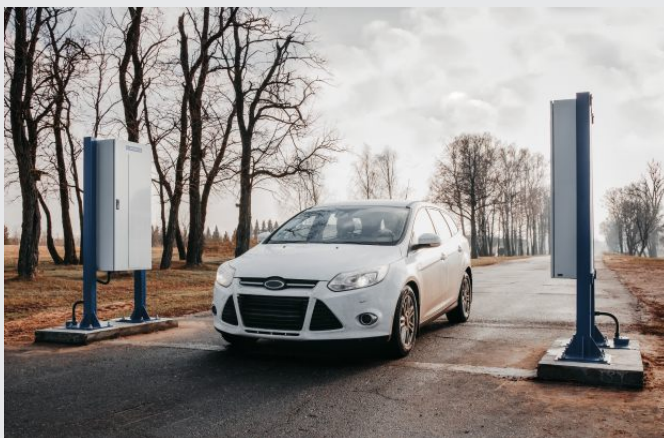
- Screening of the rear wall of the gamma radiation detection unit by lead plates
- Automatic adjustment of set threshold levels according to changes in natural radiation background
- High reliability and self-check function
- Backup power source
- Automatic data logging



Version of the vehicle radiation monitor with the following configuration:

**BDRM-05 (4 units), BDKN-05 (4 units)**

Passage width / height	6 m / 4 m
Detection time per one vehicle	≤20 s
False alarm rate	≤1 per 1000 crossings
Continuous battery operation time	≥6 h
Protection class	IP65
Overall dimensions, weight	depending on configuration



Version of the vehicle radiation monitor with the following configuration:

**BDRM-05 (8 units), BDKN-05 (8 units)**



# Pedestrian and Vehicle Radiation Monitors

## Vehicle Radiation Monitors (based on AT2327 Alarm Dosimeter)

Gamma radiation detection unit (DU)		BDKG-19	BDKG-35	BDRM-05
Scintillation detector		Nal(Tl) Ø63x160 mm	Plastic Ø70x150 mm	Plastic 1000x100x50 mm
Energy range		50 keV – 3 MeV	20 keV – 3 MeV	50 keV – 3 MeV
Typical sensitivity, cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ )	$^{241}\text{Am}$	7070	10000	60000
	$^{137}\text{Cs}$	4430	3200	31500
	$^{60}\text{Co}$	2340	1600	15000
Minimal detectable gamma radiation dose rate level above background value 0.1 $\mu\text{Sv/h}$ in a period not longer than 2 s		0.03 $\mu\text{Sv/h}$	0.04 $\mu\text{Sv/h}$	0.01 $\mu\text{Sv/h}$

Detection threshold for unshielded source under natural radiation background conditions not more than 0.1 $\mu\text{Sv/h}$ (Probability of source detection 80% under confidence level $P=0.95$ )			BDKG-19	BDKG-35	BDRM-05
<i>For motor vehicles</i> Passage: Width – 6 m, height – 4 m Travel speed is 10 km/h	1 DU at each side of passage	$^{137}\text{Cs}$	1.3 MBq	1.6 MBq	0.34 MBq
	2 DU at each side of passage	$^{137}\text{Cs}$	0.9 MBq	1.1 MBq	0.24 MBq
	4 DU at each side of passage	$^{137}\text{Cs}$	–	–	0.19 MBq
<i>For railway vehicles</i> Passage: Width – 6 m, height – 4 m Travel speed is 25 km/h	1 DU at each side of passage	$^{137}\text{Cs}$	–	–	0.49 MBq
	2 DU at each side of passage	$^{137}\text{Cs}$	–	–	0.34 MBq
	4 DU at each side of passage	$^{137}\text{Cs}$	–	–	0.26 MBq

Neutron radiation detection unit (DU)		BDKN-05	
Detector		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	$^{252}\text{Cf}$	20 cps/(neutron $\cdot\text{s}^{-1}\cdot\text{cm}^{-2}$ )	

Source detection threshold (Probability of source detection 90% (50%) under confidence level $P=0.95$ )			BDKN-05	
			Probability is 90%	Probability is 50%
<i>For motor vehicles</i> Passage: Width – 6 m, height – 4 m Travel speed is 10 km/h	1 DU at each side of passage	$^{252}\text{Cf}$	$6.5\cdot 10^4$ neutron/s	$4.2\cdot 10^4$ neutron/s
	2 DU at each side of passage	$^{252}\text{Cf}$	$4.3\cdot 10^4$ neutron/s	$2.9\cdot 10^4$ neutron/s
	4 DU at each side of passage	$^{252}\text{Cf}$	$3.0\cdot 10^4$ neutron/s	$2.2\cdot 10^4$ neutron/s
<i>For railway vehicles</i> Passage: Width – 6 m, height – 4 m Travel speed is 25 km/h	1 DU at each side of passage	$^{252}\text{Cf}$	–	–
	2 DU at each side of passage	$^{252}\text{Cf}$	–	–
	4 DU at each side of passage	$^{252}\text{Cf}$	$4.0\cdot 10^4$ neutron/s	$2.9\cdot 10^4$ neutron/s

Design and specifications are subject to change without notice



## AT6110 Portal Radiation Monitor (rapid deployable)



**Monitor**  
1630x460x190 mm, 45 kg



**Case with frames (x2)  
and accessories**  
1550x550x465 mm, 65 kg

Detects sources of gamma and neutron radiation in vehicles, cargo and pedestrian traffic.

- Rapid deployment
- High sensitivity
- Categorization of radiation sources into natural and man-made
- Up to 20 h of operation time on built-in batteries
- Storage and operation in protective shock-proof cases
- Severe operating conditions



Total number of monitors in the system	Up to 8
Time of continuous operation	~ 20 h
Monitors power supply	Built-in rechargeable battery pack
Protection class	IP55
Dimensions and weight of monitor attached to frame (in operating position)	2090x1025x955 mm, 78 kg



# Pedestrian and Vehicle Radiation Monitors

## AT6110 Portal Radiation Monitor (rapid deployable)

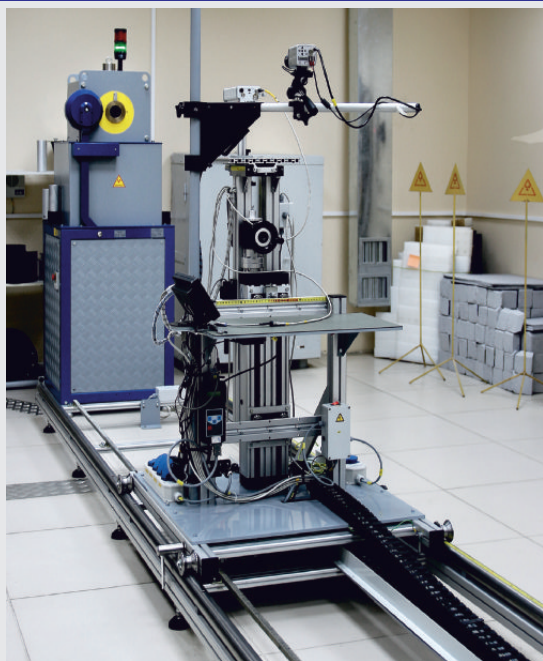
Gamma radiation detection units		BDRM-05	
Scintillation detector		Plastic, 1000x100x50 mm	
Energy range		50 keV – 3 MeV	
Typical sensitivity to source radiation	<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co	60000 cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ )	32000 cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ ) 17000 cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ )

<b>Source detection threshold</b> under conditions of natural radiation background not above 0.1 $\mu\text{Sv/h}$ (Probability of source detection is 80% (50%*) under confidence level $P=0.95$ )			BDRM-05			
			Detection		Categorization	
			Probability is 80%	Probability is 50%	Probability is 80%	Probability is 50%
For motor vehicles Passage: Width – 6 m, height – 4 m Travel speed is 10 km/h	One BDRM-05 at each side of passage	<sup>137</sup> Cs	170 kBq	145 kBq	490 kBq	420 kBq
		<sup>60</sup> Co	85 kBq	70 kBq	525 kBq	435 kBq

Neutron radiation detection units		BDKN-05	
Detector		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	<sup>252</sup> Cf	20 cps/(neutron·s <sup>-1</sup> ·cm <sup>2</sup> )	

<b>Source detection threshold</b> (Probability of source detection is 90% (50%*) under confidence level $P=0.95$ )			BDKN-05	
			Probability is 90%	Probability is 50%
For motor vehicles Passage: Width – 6 m, height – 4 m Travel speed is 10 km/h	Two BDKN-05 at each side of passage	<sup>252</sup> Cf	2.2·10 <sup>4</sup> neutron/s	1.5·10 <sup>4</sup> neutron/s

## AT110, AT130 Gamma Beam Irradiators with Calibration Bench



Reproduction and transfer of air kerma, exposure dose, ambient dose equivalent, personal dose equivalent units and their respective rates into working standards and measurement instruments during verification, calibration and test procedures.

- Irradiator with collimator of typical design
- Rotary drum magazine for sources in tungsten and lead protection
- Software control of source movement and moving platform positioning
- Alarm and interlock systems, area monitors
- Control by operator panel or personal computer with automatic calibration capability



	AT110	AT130
Gamma radiation sources, maximum activity	$^{137}\text{Cs}$ : $1.3 \cdot 10^{12}$ Bq (35 Ci)	$^{137}\text{Cs}$ : $9.6 \cdot 10^{13}$ Bq (2600 Ci) $^{60}\text{Co}$ : $7.2 \cdot 10^9$ Bq (0.2 Ci) $^{241}\text{Am}$ : $1.6 \cdot 10^{10}$ Bq (0.4 Ci)
Number of sources	up to 5	up to 6
Ranges: - Air kerma rate - Exposure dose rate - Ambient and personal dose equivalent rates	0.25 $\mu\text{Gy/h}$ – 350 mGy/h 30 $\mu\text{R/h}$ – 40 R/h 0.30 $\mu\text{Sv/h}$ – 420 mSv/h	0.36 $\mu\text{Gy/h}$ – 48.6 Gy/h 40 $\mu\text{R/h}$ – 5540 R/h 0.42 $\mu\text{Sv/h}$ – 58 Sv/h
Intrinsic relative error <i>for certification as a working standard of 1-st category (2-nd category)</i>	$\pm 2.5\%$ ( $\pm 5\%$ ) for air kerma rate and exposure dose rate $\pm 4.5\%$ ( $\pm 7\%$ ) for ambient and personal dose equivalent rates	

*Actual values of range limits and errors are determined by calibration  
Design and specifications are subject to change without notice*

## AT140 Neutron Calibration Facility



Reproduction and transfer of neutron flux density, ambient dose equivalent rate and personal dose equivalent rate units of neutron radiation during calibration, verification and testing of neutron radiation monitors and dosimeters.

Source of neutrons, peak neutron flux	$^{238}\text{Pu-Be}$ : $5 \cdot 10^7$ neutron/s $^{252}\text{Cf}$ : $5 \cdot 10^8$ neutron/s
Number of sources	up to 3
Ranges: - Fast neutron flux density - Slow neutron flux density - Ambient and personal dose equivalent rates	$2.5 - 3.5 \cdot 10^3$ neutron/(s·cm <sup>2</sup> ) $1 - 1.4 \cdot 10^3$ neutron/(s·cm <sup>2</sup> ) $3.5 - 4.0 \cdot 10^3$ μSv/h
Intrinsic relative error: - Neutron flux density - Ambient and personal dose equivalent rates	±5% ±7%

- Fast and slow neutrons field in collimated beam
- Fast neutron field in "open" geometry using shielding cone according to ISO 8529-2
- Drum magazine for sources in polyethylene and concrete protection at the depth of 1 m
- Software control of source movement and moving platform positioning
- Alarm and interlock systems, area monitors
- Control by operator panel or personal computer with automatic calibration capability



*Actual values of range limits and errors are determined by calibration  
Design and specifications are subject to change without notice*

## Combined use of AT130 and AT140 facilities



Automated calibration facilities are the next generation equipment providing high quality metrology support of radiation monitoring instruments, top-level radiation safety and durability.



AT130 and AT140  
Control area  
(Operator's room)

## AT300, AT300/1, AT300/2 X-ray Calibration Systems



Storage and transfer of air kerma, ambient, individual and directional dose equivalents and dose equivalent rates of X-ray radiation into working standards and measurement instruments.

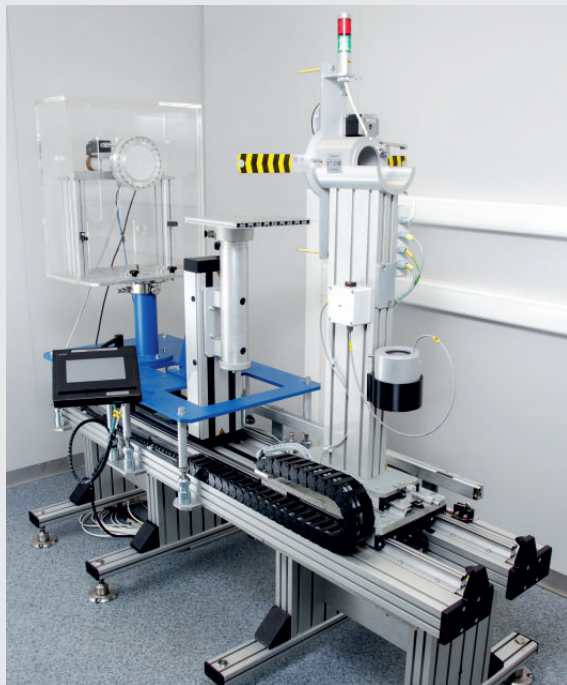


- High-stable ISOVOLT X-ray units with metal-ceramic tubes
- Field shaper with radiation quality according to GOST 8.087, ISO 4037, IEC 61267, etc.
- Interchangeable disks with 11 sockets for filters; 3 interchangeable diaphragms
- Additional filters with thickness up to 50 mm
- Tungsten safety shutter attenuates the beam by a factor of 1000 and has operating time of less than 0.1 s
- The camera-monitor assembly and spectrometric unit control the availability and stability of radiation output
- The system for 3-axes positioning in radiation beam
- Laser tools for detector alignment
- Video surveillance system for measurements
- Alarm and interlock systems, area monitors
- Control system based on PC and operator panels

	AT300	AT300/1	AT300/2
Type of X-ray unit	ISOVOLT Titan E 320	ISOVOLT Titan E 225	ISOVOLT Titan E 160
Anode voltage range	5 – 320 kV	5 – 225 kV	5 – 160 kV
Filtration of X-ray tube	<4 mm Be	<1 mm Be	<1 mm Be
Air kerma rate range (Air kerma)	$2 \cdot 10^{-8} - 2 \cdot 10^{-2}$ Gy/s ( $2.8 \cdot 10^{-7} - 20$ Gy)	$2 \cdot 10^{-8} - 1.5 \cdot 10^{-2}$ Gy/s ( $2.5 \cdot 10^{-7} - 15$ Gy)	$2 \cdot 10^{-8} - 1.5 \cdot 10^{-2}$ Gy/s ( $3.5 \cdot 10^{-7} - 15$ Gy)
Ambient, individual and directional dose equivalent rate (Ambient, individual and directional dose equivalent)	$2.7 \cdot 10^{-8} - 3.2 \cdot 10^{-3}$ Sv/s ( $3.3 \cdot 10^{-7} - 3.2$ Sv)	$2.7 \cdot 10^{-8} - 3.2 \cdot 10^{-3}$ Sv/s ( $3.3 \cdot 10^{-7} - 3.2$ Sv)	$5.3 \cdot 10^{-8} - 3.2 \cdot 10^{-3}$ Sv/s ( $5.2 \cdot 10^{-7} - 3.2$ Sv)
Intrinsic relative error for certification as a working standard of 1-st category	±3% for air kerma and air kerma rate ±5% for ambient, individual and directional dose equivalent and their rates		

Actual values of range limits and errors are determined by calibration  
Design and specifications are subject to change without notice

## AT200 Beta Calibration Facility



Transfer of absorbed dose, directional and personal dose equivalents and dose equivalent rates of beta radiation into working standards, dosimeters for absorbed dose measurement into tissues and personal dosimeters of beta radiation during their calibration and verification.



- Sealed radionuclide sources of beta radiation  $^{90}\text{Sr}+^{90}\text{Y}$  (BIS-50, 22 Gbq),  $^{85}\text{Kr}$  (KAC.D3, 15 GBq) and  $^{147}\text{Pm}$  (BIP-50, 10 GBq) can be used
- The shape of reference field around sources can be changed by movable irradiator unit using smoothing filters
- Source holders with a shutter and safety shields
- Calibrated rods and a laser device for centering and digitization
- Video surveillance system for measurements
- Can be used as part of an automated beta-radiation extrapolation chamber for simulation of absorbed dose (absorbed dose rate) of beta radiation in tissue
- Measurement of ionization current values starting from 1 fA using extrapolation chamber and precision electrometer
- Software for facility control, performing calibration and for calculations
- Alarm and interlock system, photon radiation monitoring system in measurement and control rooms



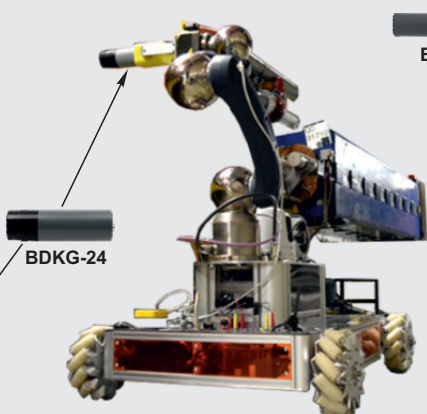
The range of beta radiation absorbed dose rate $D_r(0.07)$ (rated limits)		10 – 5.5 · 10 <sup>3</sup> μGy/s
Source positioning error		0.1 mm
Travel range of irradiator unit in measurement geometry:	"Dosimeters"	100 – 1000 mm
	"Camera"	
Intrinsic error for absorbed dose rate of beta radiation		±5%
Diameter of irradiator exit window		55 mm
Height of radiation beam axis		1300 mm

*Actual values of range limits and errors are determined by calibration  
Design and specifications are subject to change without notice*

## Part of robot devices for land, aircraft and marine applications



- Wide range of detection units:
- For X-ray, gamma, alpha, beta and neutron radiation
  - Of dosimetric, spectrometric and radiometric type
  - For operating temperatures from -40 to + 70°C
  - With USB/RS232/RS485/Bluetooth interfaces
  - Capability to import all measurement data to a PC for further expert software-assisted processing



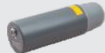



Courtesy of CERN



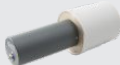
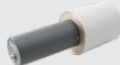
Courtesy of CERN

For specifications of the detection units see pages 47-51 and pages 11-13 (Detection units in the complete set of AT1117M Radiation monitor)

# Smart Detection Units and Detection Devices

## Dosimetric Gamma Radiation Detection Units

Detection Unit	BDKG-04	BDKG-24	BDKG-25	BDKG-30
Scintillation detector	Tissue-equivalent plastic, Ø30x15 mm	Tissue-equivalent plastic, Ø50x40 mm	Scintillation plastic, Ø10x5 mm	Tissue-equivalent plastic, Ø50x40 mm
Energy range	15 keV – 10 MeV	25 keV – 10 MeV	60 keV – 3 MeV	50 keV – 10 MeV
Measurement range of ambient dose equivalent rate	50 nSv/h – 10 Sv/h	30 nSv/h – 1 Sv/h	–	–
Measurement range of air kerma rate	–	–	0.1 µGy/h – 1 Gy/h	30 nGy/h – 1 Gy/h
Limit of intrinsic relative measurement error	±20%	±20%	±20%	±20%
Typical sensitivity to gamma radiation, cps/(µSv·h <sup>-1</sup> )	<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co 370 70 40	3200 530 270	cps/(µGy·h <sup>-1</sup> ) 75 3.5 2	cps/(µGy·h <sup>-1</sup> ) 2800 600 290
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±25% (15 keV - 3 MeV) ±40% (3 - 10 MeV)	±25% (25 keV - 3 MeV) ±40% (3 - 10 MeV)	±35%	±25% (50 keV - 3 MeV) ±50% (3 - 10 MeV)
Protection class	IP64	IP64	IP57	IP64
Interface	RS232	RS232	RS485	RS232
Operation temperature range	-50...+50°C	-50...+50°C	-40...+50°C	-50...+50°C
Dimensions, weight	Ø60x200 mm, 0.46 kg	Ø60x205 mm, 0.5 kr	Ø60x210 mm, 0.6 kr	Ø60x207 mm, 0.6 kr
Image				




Detection Unit	BDKG-32	BDKG-35	BDKG-36	BDKG-38
Scintillation detector	Tissue-equivalent plastic, Ø70x80 mm	Plastic, Ø70x150 mm	Tissue-equivalent plastic, Ø89x89 mm	Tissue-equivalent plastic, Ø89x89 mm
Energy range	40 keV – 10 MeV	20 keV – 10 MeV	40 keV – 10 MeV	40 keV – 10 MeV
Measurement range of ambient dose equivalent rate	30 nSv/h – 500 mSv/h	Count rate indication range: 0 – 1.5·10 <sup>5</sup> s <sup>-1</sup>	30 nSv/h – 200 mSv/h	–
Measurement range of air kerma rate	–		–	30 nGy/h – 200 mGy/h
Limit of intrinsic relative measurement error	±20%		±10%	±10%
Typical sensitivity to gamma radiation, cps/(µSv·h <sup>-1</sup> )	<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co 8300 1660 850	11500 3300 1700	10500 2600 1450	cps/(µGy·h <sup>-1</sup> ) 12800 3000 1600
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±25%(40keV-3MeV) ±40%(3-10MeV)	–	±30%(40-60 keV) ±15%(60keV-3MeV) ±20%(3-10MeV)	±30%(40-60keV) ±15%(60keV-3MeV) ±20%(3-10MeV)
Protection class	IP64	IP64	IP64	IP64
Interface	RS232	RS232	RS232	RS232
Operation temperature range	-50...+50°C	-40...+50°C	-50...+50°C	-50...+50°C
Dimensions, weight	Ø80x245 mm, 0.78 kg	Ø80x320 mm, 1.2 kg	Ø93x250 mm, 1.2 kg	Ø93x250 mm, 1.2 kg
Image				




*Design and specifications are subject to change without notice*



# Smart Detection Units and Detection Devices

## Dosimetric Gamma Radiation Detection Units

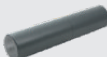
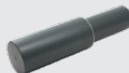
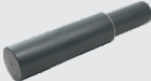
Detection Unit		BDKG-22	BDKG-23/1	BDKG-23
Detector		Geiger-Mueller counter tube	Two Geiger-Mueller counter tubes	Two Geiger-Mueller counter tubes
Energy range		60 keV – 3 MeV	60 keV – 3 MeV	60 keV – 3 MeV
Measurement range of ambient dose equivalent rate		0.1 $\mu\text{Sv/h}$ – 10 Sv/h	0.1 $\mu\text{Sv/h}$ – 100 Sv/h	–
Measurement range of air kerma rate		–	–	0.1 $\mu\text{Gy/h}$ – 100 Gy/h
Limit of intrinsic relative measurement error		$\pm 20\%$	$\pm 20\%$	$\pm 20\%$
Typical sensitivity to gamma radiation, cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ )	<sup>241</sup> Am	4	4	cps/( $\mu\text{Gy}\cdot\text{h}^{-1}$ ) 4.6
	<sup>137</sup> Cs	4	4	4.6
	<sup>60</sup> Co	4	4	4.6
				4.6
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)		-25...+35%	-25...+35%	-25...+35%
Protection class		IP67	IP67	IP67
Interface		RS422 / RS485	RS422 / RS485	RS422 / RS485
Operation temperature range		-40...+70°C	-40...+70°C	-40...+70°C
Dimensions, weight		Ø60x255 mm, 0.5 kg	Ø60x255 mm, 0.55 kg	Ø60x255 mm, 0.55 kg
Image				






Detection Unit		BDKG-204	BDKG-224	BDKG-230
Scintillation detector		Tissue-equivalent plastic, Ø30x15 mm	Tissue-equivalent plastic, Ø50x40 mm	Tissue-equivalent plastic, Ø50x40 mm
Energy range		20 keV – 10 MeV	40 keV – 10 MeV	50 keV – 10 MeV
Measurement range of ambient dose equivalent rate		50 nSv/h – 10 Sv/h	30 nSv/h – 1 Sv/h	–
Measurement range of air kerma rate		–	–	30 nGy/h – 1 Gy/h
Limit of intrinsic relative measurement error		$\pm 20\%$	$\pm 15\%$	$\pm 15\%$
Typical sensitivity to gamma radiation, cps/( $\mu\text{Sv}\cdot\text{h}^{-1}$ )	<sup>241</sup> Am	370	3200	cps/( $\mu\text{Gy}\cdot\text{h}^{-1}$ ) 2800
	<sup>137</sup> Cs	70	530	600
	<sup>60</sup> Co	40	270	290
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)		-45%...+35% (20 - 60 keV) $\pm 25\%$ (60 keV - 3 MeV) $\pm 50\%$ (3 - 10 MeV)	$\pm 25\%$ (40 keV - 3 MeV) $\pm 50\%$ (3 - 10 MeV)	$\pm 25\%$ (50 keV - 3 MeV) $\pm 50\%$ (3 - 10 MeV)
Protection class		IP67	IP66 / IP67	IP66 / IP67
Interface		RS485	RS485 / RS422	RS485 / RS422
Operation temperature range		-40...+60°C	-40...+55°C	-40...+55°C
Dimensions, weight		Ø60x210 mm, 0.55 kg	Ø60x250 mm, 0.6 kg	Ø60x250 mm, 0.6 kg
Image				

Design and specifications are subject to change without notice

# Smart Detection Units and Detection Devices

## Spectrometric Gamma Radiation Detection Units

Detection Unit	BDKG-05M	BDKG-11M	BDKG-19M
Scintillation detector	Nal(Tl), Ø40x40 mm	Nal(Tl), Ø63x63 mm	Nal(Tl), Ø63x160 mm
Energy range	20 keV – 3 MeV	20 keV – 3 MeV	20 keV – 3 MeV
Measurement range of ambient dose equivalent rate	30 nSv/h – 300 µSv/h	30 nSv/h – 150 µSv/h	30 nSv/h – 50 µSv/h
Limit of intrinsic relative measurement error	±20%	±20%	±20%
Typical sensitivity to gamma radiation, cps/(µSv·h <sup>-1</sup> )	<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co 5400 800 420	13500 2200 1200	37000 6000 2500
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±15% (50 keV – 3 MeV)	±15% (50 keV – 3 MeV)	±15% (50 keV – 3 MeV)
Typical energy resolution at 662 keV ( <sup>137</sup> Cs)	7.5%	7.5%	8%
Protection class	IP54	IP54	IP54
Interface	USB/RS232/RS485/Bluetooth (Interface adapter)		
Operation temperature range	-20...+50°C	-20...+50°C	-20...+50°C
Dimensions, weight	Ø60x300 mm, 0.9 kg	Ø78x320 mm, 1.7 kg	Ø78x350 mm, 3 kg
Image			



Detection Unit	BDKG-201M	BDKG-203M	BDKG-205M	BDKG-211M	BDKG-219M
Scintillation detector	Nal(Tl), Ø25x16 mm	Nal(Tl), Ø25x40 mm	Nal(Tl), Ø40x40 mm	Nal(Tl), Ø63x63 mm	Nal(Tl), Ø63x160 mm
Energy range	20 keV – 3 MeV	20 keV – 3 MeV	20 keV – 3 MeV	20 keV – 3 MeV	20 keV – 3 MeV
Measurement range of ambient dose equivalent rate	50 nSv/h – 1 mSv/h	30 nSv/h – 500 µSv/h	30 nSv/h – 300 µSv/h	30 nSv/h – 120 µSv/h	30 nSv/h – 50 µSv/h
Limit of intrinsic relative measurement error	±20%	±20%	±20%	±20%	±20%
Typical sensitivity to gamma radiation, cps/(µSv·h <sup>-1</sup> )	<sup>241</sup> Am <sup>137</sup> Cs <sup>60</sup> Co 1400 165 80	3600 400 190	5400 800 420	13900 2450 1300	37000 6000 2500
Energy dependence relative to 662 keV ( <sup>137</sup> Cs)	±15% (50 keV - 3 MeV)	±15% (50 keV - 3 MeV)	±15% (50 keV - 3 MeV)	±15% (50 keV - 3 MeV)	±15% (50 keV - 3 MeV)
Typical energy resolution at 662 keV ( <sup>137</sup> Cs)	8.5%	8%	7.5%	7.5%	8%
Protection class	IP68	IP68	IP68	IP68	IP68
Interface	(Fresh water measurement at depths up to 50 m. Holds hydrostatic pressure up to 5 atm or 0.6 MPa)				
Interface	USB / RS232 / RS485 / Bluetooth (Interface adapter)				
Operation temperature range	-35...+55°C	-35...+55°C	-35...+55°C	-35...+55°C	-35...+55°C
Dimensions, weight	Ø63x313 mm, 1 kg	Ø63x333 mm, 1 kg	Ø63x333 mm, 1 kg	Ø90x350 mm, 2 kg	Ø90x430 mm, 3.3 kg
Image					

Design and specifications are subject to change without notice

# Smart Detection Units and Detection Devices



## Dosimetric Gamma Radiation Detection Devices



Measurement of ambient dose equivalent rate of continuous radiation and average dose rate of pulsed X-ray and gamma radiation in an extremely wide range and under harsh operating conditions.

Detection Device		UDKG-37	UDKG-37/1
Components		BDKG-37 Detection Unit	
		IU-37 Interface Unit	IU-37/1 Interface Unit
Detector		Silicon semiconductor detector; Geiger-Muller counter tube	
Energy range		50 keV – 10 MeV	
Measurement range of ambient dose equivalent rate $\dot{H}^*(10)$		1 $\mu\text{Sv/h}$ – 5000 Sv/h	
Limit of intrinsic relative measurement error ambient dose equivalent rate $\dot{H}^*(10)$		$\pm 25\%$ , for $\dot{H}^*(10) \leq 10 \mu\text{Sv/h}$ $\pm 15\%$ , for $\dot{H}^*(10) > 10 \mu\text{Sv/h}$	
Measurement range of average pulsed radiation dose rate		30 $\mu\text{Sv/s}$ – 0.3 Sv/s (100 mSv/h – 1000 Sv/h) (pulse repetition rate is not less than 20 cps, duration not less than 1 $\mu\text{s}$ )	
Limit of intrinsic relative measurement error of pulsed radiation average dose rate		$\pm 25\%$	
Typical sensitivity to $^{137}\text{Cs}$ gamma radiation		0.15 cps/ $(\mu\text{Sv}\cdot\text{h}^{-1})$ , for $\dot{H}^*(10) \leq 0.1 \text{ Sv/h}$ 58 mV/ $(\text{Sv}\cdot\text{h}^{-1})$ , for $\dot{H}^*(10) > 0.1 \text{ Sv/h}$	
Energy dependence relative to 662 keV ( $^{137}\text{Cs}$ )		$\pm 30\%$	
Response time for 10-fold dose rate change		$\leq 10 \text{ s}$ , for $\dot{H}^*(10) > 10 \mu\text{Sv/h}$	
Burn-up life		$\geq 50000 \text{ Sv}$	
Protection class	BDKG-37	IP68 (Resistance to static hydraulic pressure up to 400 kPa; water immersion depth up to 40 m)	
	IU-37	IP65	
Interface		RS485	RS232
Operation temperature range		$-40\dots+60^\circ\text{C}$	
Dimensions, weight	BDKG-37	$\varnothing 30 \times 130 \text{ mm}$ , 0.25 kg	
	IU-37	170x80x55 mm, 0.3 kg	
Image		 <p>IU-37</p> <p>BDKG-37</p>	 <p>IU-37/1</p> <p>BDKG-37</p>

# Smart Detection Units and Detection Devices

## Neutron Radiation Detection Units

Detection Unit		BDKN-01	BDKN-02	BDKN-03	BDKN-04
Detector: He-3 proportional counter in polyethylene moderator		One He-3 counter		One He-3 counter	
Energy range		0.025 eV – 14 MeV		0.025 eV – 14 MeV	
Measurement range of ambient dose equivalent rate		0.1 $\mu\text{Sv/h}$ – 10 mSv/h [Pu-Be source]		0.1 $\mu\text{Sv/h}$ – 10 mSv/h	
Typical sensitivity to Pu-Be radiation, (In dose rate measurement mode)		0.355 cps/ $(\mu\text{Sv}\cdot\text{h}^{-1})$		0.355 cps/ $(\mu\text{Sv}\cdot\text{h}^{-1})$	
Measurement range of flux density		0.1 - $10^4$ neutrons $\cdot\text{s}^{-1}\cdot\text{cm}^{-2}$		0.1 - $10^4$ neutrons $\cdot\text{s}^{-1}\cdot\text{cm}^{-2}$	
Typical sensitivity to Pu-Be radiation, (In flux density measurement mode)		0.5 cps/ $(\text{neutrons}\cdot\text{s}^{-1}\cdot\text{cm}^{-2})$		0.5 cps/ $(\text{neutrons}\cdot\text{s}^{-1}\cdot\text{cm}^{-2})$	
Limit of intrinsic relative measurement error	<i>dose rate</i> <i>flux density</i>	$\pm 35\%$ $\pm 20\%$		$\pm 20\%$ $\pm 35\%$	
Protection class		IP64		IP64	
Interface		RS232	RS485	RS232	RS485
Operation temperature range		-40...+50°C		-40...+50°C	
Dimensions, weight		$\varnothing 90 \times 260$ mm, 2 kg		316x220x265 mm, 8 kg	
Image					

Detection Unit		BDKN-05	BDKN-06
Detector: He-3 proportional counter in polyethylene moderator		Two He-3 counters	One He-3 counter
Energy range		0.025 eV – 14 MeV	0.025 eV – 16 MeV
Measurement range of ambient dose equivalent rate		–	0.1 $\mu\text{Sv/h}$ – 30 mSv/h
Typical sensitivity to Pu-Be radiation, (In dose rate measurement mode)		–	0.7 cps/ $(\mu\text{Sv}\cdot\text{h}^{-1})$
Measurement range of flux density		0.1 – $2\cdot 10^3$ neutrons $\cdot\text{s}^{-1}\cdot\text{cm}^{-2}$	–
Typical sensitivity to Pu-Be radiation, (In flux density measurement mode)		10 cps/ $(\text{neutrons}\cdot\text{s}^{-1}\cdot\text{cm}^{-2})$	1 cps/ $(\text{neutrons}\cdot\text{s}^{-1}\cdot\text{cm}^{-2})$
Limit of intrinsic relative measurement error	<i>dose rate</i> <i>flux density</i>	– $\pm 20\%$	$\pm 20\%$ –
Protection class		IP54	IP64
Interface		RS232	RS232
Operation temperature range		-20...+50°C	-30...+50°C
Dimensions, weight		105x115x380 mm, 3.5 kg	550x254x254 mm, 10 kg (w/o tripod)
Image			

Design and specifications are subject to change without notice