Ionizing radiations detectors and instruments
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Zievert
a CapeSym Company

PRODUCT CATALOG

Official distributor of ATOMTEX SPE in the USA and Canada

Contents

About

Zievert
a CapeSym Company

Ionizing radiations detectors and instruments

Zievert is an exclusive sales representative of ATOMTEX Spe. in the United States and Canada. Zievert is a subsidiary of CapeSym Inc, a multi-faceted company with expertise in scintillators, semiconductors, and radiation detection instruments.

Founded in 1992, Cape Simulations, CapeSym, offers novel technical crystals for nuclear detection, including ScintiClear(TM) and ElpasoLight(TM) scintillators, and TIBr and CdZnTe semiconductors. In addition, CapeSym offers SYMMIC thermal analysis software. CapeSym's ongoing R&D leverages decades of experience in radiation detection, crystal growth, solid state physics, analytical chemistry, materials science, thermo-fluid transport, and engineering design.

CapeSym's consulting services have supported more than 70 companies in thermal management, crystal growth, advanced materials technologies, biomedical devices, and industrial equipment design and fabrication. CapeSym's research team also supports the missions of multiple US government agencies including NASA, MDA, USAF, DoE, DTRA, NIH, and CWMD.

Zievert has it's warehouse facilities and customer support staff located in Natick, MA, USA.

ATOMTEX®

INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR MEASUREMENTS AND RADIATION MONITORING

ATOMTEX was established in 1995 and now is a leading research and manufacturing centre of the Republic of Belarus, widely recognised internationally in the area of development and production of equipment for nuclear measurements and radiation monitoring.

Highly qualified professionals with broad experience in nuclear instrumentation are at the core of our team.

For over 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.

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.

- Homeland Security and Defense
- Medical Physics
- Industry
- Environmental Monitoring
- Waste Management
- Scrap Metal, Steel and Recycling
- OEM Components
- Rugged Computers
- Software

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AT2522 Radiation Detector (Alpha SENSOR)

Detection and quick assessment of surface contamination by alpha emitting radionuclides, in particular by polonium-210.

Easy-to-operate detector can be used by personnel with minimal training.

- Scintillation detector with solid-state readout
- High sensitivity
- Selectable units of measurement (cps, Bq, Bq/cm^2)
- Light, sound and vibration alarms
- Extended operation without recharging
- Color 1" OLED screen

Scintillation detector	ZnS(Ag), surface area 25 cm^2
Registration efficiency	≥50% (α *particles* ^{239}*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

Design and specifications are subject to change without notice

AT2503B, B/1, B/2 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.

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

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

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) / $\dot{H}$p(10)	+	+
Hp(0.07) / $\dot{H}$p(0.07)	–	+

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

Design and specifications are subject to change without notice

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
- Software for radiation exposure control and instrument set-up by USB (*AT2140A/1*)

Measurement range: - *Ambient dose equivalent rate* - *Ambient dose equivalent*	0.1 µSv/h – 10 mSv/h *(AT2140)* 0.1 µSv/h – 100 mSv/h *(AT2140A, A/1)* 0.1 µSv – 1.99 Sv
Limits of tolerable intrinsic relative error	±15%
Energy range	50 keV – 3 MeV
Energy dependence relative to 662 keV (^{137}Cs)	±30% (*AT2140*) ±25% (*AT2140A, A/1*)
Typical sensitivity to ^{137}Cs gamma radiation	1.8 cps/(µSv·h^{-1})
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* - *Ambient dose equivalent*	0.1 µSv/h – 1 mSv/h 0.1 µSv – 100 mSv
Limits of tolerable intrinsic relative error	±20%
Energy range	50 keV – 3 MeV
Energy dependence relative to 662 keV (^{137}Cs)	±30%
Typical sensitivity to ^{137}Cs gamma radiation	2.8 cps/(µSv·h^{-1})
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

Gamma and beta radiation detector (AT6130)

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* - *Ambient dose equivalent*	 0.1 µSv/h – 10 mSv/h (*AT6130,A*) 0.1 µSv/h – 100 mSv/h (*AT6130D*) 0.1 µSv – 100 mSv (*AT6130,A*) 0.1 µSv – 1 Sv (*AT6130D*)
Measurement range *of beta particle flux density*	$10 – 10^4$ particle·min^{-1}·cm^{-2} (*AT6130*)
Limits of intrinsic relative measurement error	±20%
Energy range: - *X-ray and gamma radiation* - *Beta radiation*	 20 keV – 3 MeV (*AT6130*) 50 keV – 3 MeV (*AT6130A,D*) 155 keV – 3.5 MeV (*AT6130*)
Energy dependence relative to 662 keV (^{137}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

AT1103M X-ray Radiation Dosimeter

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

- Unique highly sensitive dosimeter for control of the radiation dose on eye lenses, mucous membranes and skin
- Display of the radionuclide energy spectrum when connected to a PC
- Not designed for natural background radiation measurements

Scintillation detector	NaI(Tl), Ø9x2 mm with beryllium window
Measurement range: - *Directional dose equivalent rate* - *Directional dose equivalent*	 50 nSv/h – 100 µSv/h 50 nSv – 5 mSv
Limits of intrinsic relative measurement error	±15%
Energy range	5 – 160 keV
Energy dependence relative to 59.5 keV (^{241}Am)	±35% (5 – 60 keV) ±30% (60 – 160 keV)
Typical sensitivity to ^{241}Am gamma radiation	400 cps/(µSv·h^{-1})
Detectable ^{241}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

Design and specifications are subject to change without notice

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 recording of over 500,000 measurement results into non-volatile memory
- One of four available averaging modes can be selected
- Remote control is optionally available for distant measurements
- Optional stationary placement with external audio-visual alarm and potential-free contacts for actuator control
- PC communication interface for a continuous monitoring and data logging

Dosimeter with remote control and alarm unit

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	0.1 nSv – 100 Sv
Limits of tolerable intrinsic relative 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 (^{137}Cs)	±35% (*15 – 60 keV*) ±25% (*60 keV – 10 MeV*)
Typical sensitivity to ^{137}Cs gamma radiation	70 cps/(μSv·h^{-1})
Measurement time of ^{137}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

Design and specifications are subject to change without notice

AT1125, AT1125A Radiation Monitors

- Measurement of X-ray and gamma radiation ambient dose equivalent and ambient dose equivalent rate
- Control of ^{137}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

▪ Display of the radionuclide energy spectrum when connected to a PC

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}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^{-1}·cm^{-2} (*BDPS-02*) 6 – 10^6 particle·min^{-1}·cm^{-2} (*BDPS-02*)
Limits of tolerable intrinsic relative 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}Cs)		±15% (*AT1125,A*) ±30% (*BDPS-02*)
Typical sensitivity to ^{137}Cs gamma radiation		350 cps/(μSv·h^{-1}) (*AT1125,A*) 6.6 cps/(μSv·h^{-1}) (*BDPS-02*)
Detectable activity of ^{137}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}Cs, ^{134}Cs + ^{137}Cs; b) ^{131}I, ^{137}Cs, ^{134}Cs + ^{137}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 AT1117M Radiation monitor (page 13)

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

Express sample activity measurement

0.5-liter Marinelli beaker

External BDPS-02 detection unit

Design and specifications are subject to change without notice

AT1117M Radiation Monitor

Depending on the combination of the detection units radiation monitor can be used for measuring 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}Pu and ^{90}Sr + ^{90}Y
- Real-time search for sources of ionizing radiation and radioactive materials.

Either processing unit (PU/PU2/PU4) or a PC can be used for control of the detection units.

PU

PU2

PU4

Processing unit	PU / PU2	PU4
Detector	Geiger-Mueller counter tube	
Measurement range: - *Ambient dose equivalent rate* - *Ambient dose equivalent*	1 µSv/h – 10 mSv/h 1 µSv – 1 Sv	1 µSv/h – 100 mSv/h 1 µSv – 100 Sv
Limits of tolerable intrinsic relative error	±20%	
Energy range	60 keV – 3 MeV	
Energy dependence relative to 662 keV (^{137}Cs)	-25% to +35%	
Typical sensitivity to ^{137}Cs gamma radiation	1 cps/(µSv·h^{-1})	0.33 cps/(µSv·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

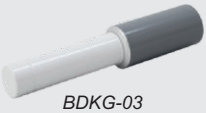
PU and PU2 are offering the following functionality:
- Indication of dose, dose rate and count rate with a statistical error
- Manual recording, storage and transfer of the radiological data to a PC
- Setting alarm threshold levels

PU4 is a hand-held PC (HPC) with integrated detection module, which offers an extended functionality:
- Radiological data processing and display
- Data collection from a detection unit wirelessly via Bluetooth (using adapter) or directly via cable
- Radiological data GPS- geotagging
- Automatic data acquisition mode - Possibility of further data processing on a PC
- Optional automatic data transfer to a remote server (If 3G option in PU4 is available).

Design and specifications are subject to change without notice

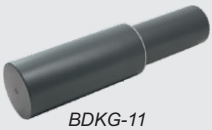
AT1117M. X-ray and gamma radiation detection units

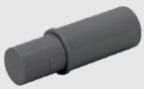

BDKG-01


BDKG-03


BDKG-04


BDKG-05


BDKG-11


BDKG-17


BDKG-24

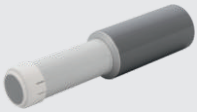

BDKG-30


BDKG-32

Detector	- *BDKG-01* - *BDKG-03* - *BDKG-04* - *BDKG-05* - *BDKG-11* - *BDKG-17* - *BDKG-24* - *BDKG-30* - *BDKG-32* - *BDKR-01* - *BDPS-02*	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
Measurement range of ambient radiation dose equivalent rate (Ambient dose equivalent)	- *BDKG-01* - *BDKG-03* - *BDKG-04* - *BDKG-05* - *BDKG-11* - *BDKG-17* - *BDKG-24* - *BDKG-32* - *BDPS-02*	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)
Measurement range of air kerma rate (Air kerma)	- *BDKG-30*	0.03 µGy/h – 1 Gy/h (0.1 nGy – 100 Gy)
Measurement range of directional dose equivalent rate (Directional dose equivalent)	- *BDKR-01*	0.05 – 100 µSv/h (0.05 µSv – 5 mSv)
Limits of tolerable intrinsic relative error	- *all DUs*	±20%
Energy dependence relative to 662 keV (^{137}Cs) (Energy range)	- *BDKG-01* - *BDKG-03* - *BDKG-04* - *BDKG-05* - *BDKG-11* - *BDKG-17* - *BDKG-24* - *BDKG-30* - *BDKG-32* - *BDPS-02*	-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)
Energy dependence relative to 59.5 keV (^{241}Am) (Energy range)	- *BDKR-01*	±35% (5 - 60 keV), ±30% (60 - 160 keV)
Typical sensitivity to ^{137}Cs gamma radiation	- *BDKG-01* - *BDKG-03* - *BDKG-04* - *BDKG-05* - *BDKG-11* - *BDKG-17* - *BDKG-24* - *BDKG-30* - *BDKG-32* - *BDPS-02*	4 cps/(µSv·h^{-1}) 350 cps/(µSv·h^{-1}) 70 cps/(µSv·h^{-1}) 760 cps/(µSv·h^{-1}) 2200 cps/(µSv·h^{-1}) 0.005 cps/(µSv·h^{-1}) 530 cps/(µSv·h^{-1}) 600 cps/(µSv·h^{-1}) 1660 cps/(µSv·h^{-1}) 6.6 cps/(µSv·h^{-1})
Typical sensitivity to ^{241}Am gamma radiation	- *BDKR-01*	400 cps/(µSv·h^{-1})

Design and specifications are subject to change without notice

AT1117M. X-ray and gamma radiation detection units

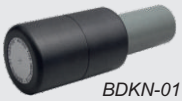


BDKR-01

BDPS-02

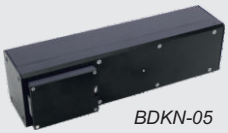
Response time for dose rate change from 0.1 to 1 μSv/h	- *BDKG-03* - *BDKG-04* - *BDKG-05* - *BDKG-11* - *BDKG-24* - *BDKG-32*	≤2 s
Response time for dose rate change from 0.1 to 1 μGy/h	- *BDKG-30*	≤2 s
Response time for dose rate change from 1 to 10 μSv/h	- *BDKG-01* - *BDKR-01* - *BDPS-02*	≤3 s ≤2 s ≤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*	Ø54x256 mm, 0.5 kg Ø60x299 mm, 0.6 kg Ø60x200 mm, 0.46 kg Ø60x290 mm, 1.2 kg Ø78x320 mm, 1.9 kg Ø54x167 mm, 0.28 kg Ø60x205 mm, 0.5 kg Ø60x207 mm, 0.6 kg Ø80x245 mm, 0.78 kg Ø60x261 mm, 0.55 kg 138x86x60 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 μSv/h – 10 mSv/h [0.1 μSv – 10 Sv] 0.1 μSv/h – 10 mSv/h [0.1 μSv – 10 Sv] 0.1 μSv/h – 30 mSv/h [0.1 μSv – 10 Sv]
Measurement range of neutron flux density		- *BDKN-01* - *BDKN-03* - *BDKN-05*	$0.1 – 10^4$ neutron·s^{-1}·cm^{-2} $0.1 – 10^4$ neutron·s^{-1}·cm^{-2} * $0.1 – 2·10^3$ neutron·s^{-1}·cm^{-2}
Limits of tolerable intrinsic relative error	*Dose rate measurement mode*	- *BDKN-01* - *BDKN-03* - *BDKN-06*	±35% ±20% ±20%
	Flux density measurement mode	- *BDKN-01* - *BDKN-03* - *BDKN-05*	±20% ±35% ±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/(μSv·h^{-1}) 0.355 cps/(μSv·h^{-1}) 0.7 cps/(μSv·h^{-1})
	Flux density measurement mode	- *BDKN-01* - *BDKN-03* - *BDKN-05* - *BDKN-06*	0.5 cps/(neutron·s^{-1}·cm^{-2}) 0.5 cps/(neutron·s^{-1}·cm^{-2}) 10 cps/(neutron·s^{-1}·cm^{-2}) 1 cps/(neutron·s^{-1}·cm^{-2})
Protection class		- *all DUs*	IP64
Overall dimensions, weight		- *BDKN-01* - *BDKN-03* - *BDKN-05* - *BDKN-06*	Ø90x260 mm, 2 kg 316x220x265 mm, 8 kg 105x115x380 mm, 3.5 kg 550x254x254 mm, 10 kg (w/o tripod)

AT1117M. Alpha radiation detection units

BDPA-01

BDPA-02

BDPA-03

BDPS-02

Detector	- *BDPA-01* - *BDPA-02* - *BDPA-03* - *BDPS-02*	ZnS(Ag) scintillator, 30 cm^2 ZnS(Ag) scintillator,100 cm^2 ZnS(Ag) scintillator, 300 cm^2 Geiger-Mueller counter tube
Measurement range of alpha particles flux density	- *BDPA-01* - *BDPA-02* - *BDPA-03* - *BDPS-02*	0.1 – 10^5 particle·min^{-1}·cm^{-2} 0.05 – $5·10^4$ particle·min^{-1}·cm^{-2} 0.05 – $2·10^4$ particle·min^{-1}·cm^{-2} 2.4 – 10^6 particle·min^{-1}·cm^{-2}
Measurement range of ^{239}Pu surface activity	- *BDPA-01* - *BDPA-02* - *BDPA-03*	$3.4·10^{-3}$ – $3.4·10^3$ Bq·cm^{-2} $1.7·10^{-3}$ – $1.7·10^3$ Bq·cm^{-2} $1.7·10^{-3}$ – $0.68·10^3$ Bq·cm^{-2}
Limits of tolerable intrinsic relative error	- *all DUs*	±20%
Energy range	- *all DUs*	4 – 7 MeV
Typical sensitivity to ^{239}Pu radiation	- *BDPA-01* - *BDPA-02* - *BDPA-03* - *BDPS-02*	0.15 cps/(particle·min^{-1}·cm^{-2}) 0.7 cps/(particle·min^{-1}·cm^{-2}) 2.5 cps/(particle·min^{-1}·cm^{-2}) 0.045 cps/(particle·min^{-1}·cm^{-2})
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

BDPB-02

BDPB-03

BDPS-02

Detector	- *BDPB-01* - *BDPB-02* - *BDPB-03* - *BDPS-02*	Scintillation plastic, 30 cm^2 Scintillation plastic, 100 cm^2 Scintillation plastic, 300 cm^2 Geiger-Mueller counter tube
Measurement range of beta particles flux density	- *BDPB-01* - *BDPB-02* - *BDPB-03* - *BDPS-02*	1 – $5·10^5$ particle·min^{-1}·cm^{-2} 0.5 – $1.5·10^5$ particle·min^{-1}·cm^{-2} 0.5 – $0.5·10^5$ particle·min^{-1}·cm^{-2} 6 – 10^6 particle·min^{-1}·cm^{-2}
Measurement range of ^{90}Sr + ^{90}Y surface activity	- *BDPB-01* - *BDPB-02* - *BDPB-03*	$4.4·10^{-2}$ – $2.2·10^4$ Bq·cm^{-2} $2.2·10^{-2}$ – $0.66·10^4$ Bq·cm^{-2} $2.2·10^{-2}$ – $0.22·10^4$ Bq·cm^{-2}
Limits of tolerable intrinsic relative error	- *all DUs*	±20%
Energy range	- *all DUs*	155 keV – 3.5 MeV
Typical sensitivity to ^{90}Sr + ^{90}Y radiation	- *BDPB-01* - *BDPB-02* - *BDPB-03* - *BDPS-02*	0.3 cps/(particle·min^{-1}·cm^{-2}) 0.9 cps/(particle·min^{-1}·cm^{-2}) 2.4 cps/(particle·min^{-1}·cm^{-2}) 0.12 cps/(particle·min^{-1}·cm^{-2})
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

Design and specifications are subject to change without notice

AT1117M. 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 design and robustness of the detection unit
- Measurement in liquids at depths up to 40 m
- Easy to operate in gloves or hazmat suite
- Instrument-to-PC data exchange over USB or Bluetooth interface *(AT2533/1)*
- Additional detector for operator radiation safety
- Accessories: cable reel, wall brackets, etc.

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 μSv/h – 1000 Sv/h
Measurement range of ambient dose equivalent $H^*(10)$	10 μSv – 5000 Sv
Limits of variation of the response due to dose $H^*(10)$ and dose rate $H^*(10)$	±15%
Measurement range of average pulsed radiation dose rate	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)
Measurement range of pulsed radiation dose	10 μSv – 5000 Sv
Limits of variation of the response due to dose and average dose rate of pulsed radiation	±20%
Limits of variation of relative response due to gamma radiation energy (50 keV to 3 MeV) and angle of incidence (0° to ±45°)	-29% to +67%
Typical sensitivity to ^{137}Cs gamma radiation	0.15 cps/(μSv·h^{-1}) (for $\dot{H}^*(10)$≤0.1 Sv/h) 58 mV/(Sv·h^{-1}) (for $\dot{H}^*(10)$>0.1 Sv/h)
Response time for 10-fold dose rate change	≤10 s (for $\dot{H}^*(10)$ >10 μSv/h)
Burn-up life	≥25000 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	Ø30x130 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^3)*
  - *TM31010 Cylindrical ionization chamber (0.125 cm^3)*
  - *TM30010 Thimble ionization chamber (0.6 cm^3)*
  - *TM23361 Cylindrical ionization chamber (30 cm^3)*
  - *TM32002 Spherical ionization chamber (1000 cm^3)*

Measurement range: - *Direct current rate* - *Electric charge* - *Charge by the method of numerical integration of current*	$1 \cdot 10^{-15}$ – $1 \cdot 10^{-6}$ A $1 \cdot 10^{-15}$ – $1 \cdot 10^{-8}$ C $1 \cdot 10^{-14}$ – $1 \cdot 10^{-1}$ 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	≤$1 \cdot 10^{-15}$ 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

Design and specifications are subject to change without notice

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 ^{137}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 (^{137}Cs)	8.5%
Measurement range of ambient dose equivalent rate	30 nSv/h – 100 mSv/h
Limits of tolerable intrinsic relative error	±20%
Typical sensitivity to ^{137}Cs gamma radiation	425 cps/(μSv·h^{-1})
Energy dependence relative to 662 keV (^{137}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 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
- Continuously recorded scanning data with GPS georeferencing
- Voice messaging option for identification results is available
- "GARM" application software for further data processing and analysis in expert mode and radiological mapping

		AT1120M	AT1120MA
Detection unit (DU)		BDKG-11M	BDKG-05M
Processing unit (PU4)		PU5 is a hand-held PC (HPC) with integrated detection module	
Detector	DU PU5	Scintillation, NaI(Tl) Ø63x63 mm Geiger-Muller counter tube	Scintillation, NaI(Tl) Ø40x40 mm Geiger-Muller counter tube
Energy range	DU PU5	20 keV – 7 MeV 60 keV – 3 MeV	
Detectable activity of ^{137}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 (^{137}Cs)	DU	7.5%	
Measurement range of ambient dose equivalent rate	DU PU5	0.03 – 150 μSv/h 1 μSv/h – 100 mSv/h	0.03 – 300 μSv/h 1 μSv/h – 100 mSv/h
Limits of tolerable intrinsic relative error	DU PU5	±20%	
Typical sensitivity to ^{137}Cs gamma radiation	DU	2700 cps/(μSv·h^{-1})	870 cps/(μSv·h^{-1})
Energy dependence relative to 662 keV (^{137}Cs)	DU PU5	±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 PU5	IP54 IP67	
Overall dimensions, weight (assembled with handle)		355x190x170 mm, 2.65 kg	330x180x160 mm, 1.85 kg

Design and specifications are subject to change without notice

AT1120ME Spectrometer

- Quick search and detection of gamma radiation sources with radionuclide identification
- Measurement of gamma radiation ambient dose equivalent rate

- High energy resolution
- Light weight
- IP67 dust proof and water resistant
- High sensitivity and low minimal detectable activity
- Short response time enabling high fidelity assessment of rapidly changing radiation field and high precision localization of radioactive sources
- Continuously recorded scanning data with GPS georeferencing
- Voice messaging option for identification results
- "GARM" application software for further data processing and analysis in expert mode and radiological mapping

Detection Unit (DU)		BDKG-05S
Processing Unit (PU5)		PU5 is a hand-held PC (HPC) with integrated detection module
Detector	DU PU5	Scintillation $SrI_2(Eu)$ Ø38x38 mm Geiger-Muller counter tube
Energy range	DU PU5	20 keV – 3 MeV 60 keV – 3 MeV
Detectable activity of ^{137}Cs source, located at the distance of 20 cm in a time not longer than 2 s	DU	(40±4) kBq
Typical resolution at 662 keV (^{137}Cs)	DU	3.2%
Measurement range of ambient dose equivalent rate	DU PU5	0.03 – 150 μSv/h 1 μSv/h – 100 mSv/h
Limits of tolerable intrinsic relative error	DU PU5	±20%
Typical sensitivity to ^{137}Cs gamma radiation	DU	850 cps/(μSv·h^{-1})
Energy dependence relative to 662 keV (^{137}Cs)	DU PU5	±20% (50 keV to 3 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		IP67
Overall dimensions, weight (assembled with handle)		320x180x160 mm, 1.85 kg

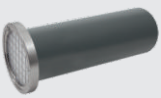
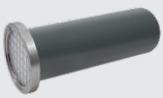
Design and specifications are subject to change without notice

AT6102, A, B Spectrometers

- Search and detection of gamma radiation sources with automatic radionuclide identification
- 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 with external detection unit BDKN-03 (optional)
- Measurement of alpha and beta particles flux density from contaminated surfaces with external detection units BDPA-01/BDPB-01 (optional)

- Monoblock design for one hand operation
- Integrated GPS module for georeferencing (optional)
- Sound, vibration and light alarm of radiation presence
- Extendable configuration with optional external detection units
- Extended battery life: 25 hours (*AT6102A, B*) and 18 hours (*AT6102*) of continuous operation

Gamma radiation detectors	AT6102 AT6102A	NaI(Tl) scintillator, Ø40x40 mm; Geiger-Mueller counter tube
	AT6102B	NaI(Tl) scintillator, Ø40x80 mm; Geiger-Mueller counter tube
Neutron radiation detector	AT6102	Two ^{3}He-proportional neutron counters
Energy range		*Gamma radiation*: 20 keV – 3 MeV *Neutron radiation*: 0.025 eV – 14 MeV (*AT6102*)
Detectable activity of ^{137}Cs source, located at the distance of 20 cm in a time not longer than 2 s		(50±10) kBq
Detectable activity of ^{252}Cf source, located at the distance of 20 cm in a time not longer than 5 s		$1.8 \cdot 10^{4}$ neutron/s (Probability of detection is 0.9)
Typical resolution at 662 keV (^{137}Cs)		7.5% *(AT6102, A)* / 8% *(AT6102B)*
Measurement range of ambient dose equivalent rate		30 nSv/h – 100 mSv/h
Limits of tolerable intrinsic relative error		±20%
Typical sensitivity to ^{137}Cs gamma radiation		850 cps/(μSv·h^{-1}) *(AT6102, A)* 1700 cps/(μSv·h^{-1}) *(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	^{3}He counter in polyethylene moderator
Measurement range	0.5 – 10^{5} particle·min^{-1}·cm^{-2} (Flux density)	3 – $5 \cdot 10^{5}$ particle·min^{-1}·cm^{-2} (Flux density)	0.1 μSv/h – 10 mSv/h (Dose rate)
	Limits of tolerable intrinsic relative error: ±20%		
Energy range	4 – 7 MeV	155 keV – 3.5 MeV	0.025 eV – 14 MeV
Typical sensitivity	0.15 cps/(particle·min^{-1}·cm^{-2}) [^{239}Pu]	0.3 cps/(particle·min^{-1}·cm^{-2}) [^{90}Sr+^{90}Y]	0.355 cps/(μSv·h^{-1}) [Pu-Be]
Dimensions, weight	Ø85x200 mm, 0.5 kg	Ø85x205 mm, 0.55 kg	316x220x265 mm, 8 kg
Protection class	IP64	IP64	IP64
Image			

AT6101DR Spectrometer

- Measurement of ^{134}Cs and ^{137}Cs surface contamination and specific activity in soils
- Measurement of ^{137}Cs, ^{134}Cs and ^{131}I specific activity in water, agricultural and forestry products and liquid radioactive wastes
- Determination of ^{40}K, ^{226}Ra and ^{232}Th natural radionuclides content
- TENORM radionuclides identification: ^{134}Cs, ^{137}Cs, ^{131}I, ^{40}K, ^{226}Ra, ^{232}Th
- Measurement of gamma radiation ambient dose equivalent rate

- No-sampling in-situ activity measurements with GPS-georeferencing
- Sealed IP67 container for field measurements and harsh environments
- Automatic determination of soil layer thickness contaminated by ^{137}Cs and ^{134}Cs radionuclides
- "GARM" software for further radiological data processing, expert analysis, and mapping

Rugged HPC or tablet PC for control and indication

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

Design and specifications are subject to change without notice

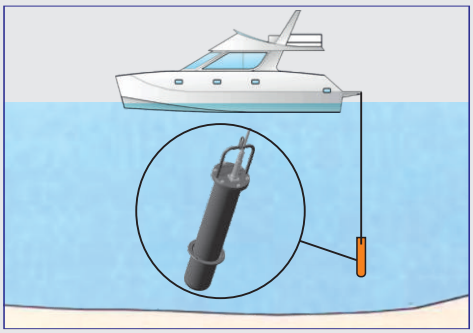
AT6104DM, AT6104DM1 Spectrometers

Rugged HPC or tablet PC for control and indication

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

- Monitoring of the instrument spatial position during measurement
- Cable reel with a current feedthrough
- Display of the controlled radionuclides concentration or gamma radiation dose rate distribution with geotagging
- Expert mode for instrument spectrum analysis with automatic identification of sample radionuclide content
- Expert "GARM" software for further data processing and analysis, and radiological mapping

	AT6104DM	AT6104DM1
Scintillation detector	NaI(Tl) Ø63x63 mm	NaI(Tl) Ø63x160 mm
Energy range	70 keV – 3 MeV	
Identified radionuclides	^{137}Cs, ^{134}Cs, ^{131}I, ^{40}K, ^{226}Ra, ^{232}Th	
	Extended library (add ^{60}Co, ^{24}Na, ^{54}Mn, etc.) available on request	
Measurement range of specific activity in water (*4π geometry*)	3 – 1·10^{6} Bq/kg [^{134}Cs, ^{137}Cs, ^{131}I] 250 – 2·10^{4} Bq/kg [^{40}K]	1 – 1·10^{6} Bq/kg [^{134}Cs, ^{137}Cs, ^{131}I] 100 – 2·10^{4} Bq/kg [^{40}K]
	Extended library (add ^{60}Co, ^{54}Mn, etc.) available on request	
Measurement range of specific activity in bottom sediments (*2π geometry*)	50 – 1·10^{6} Bq/kg [^{134}Cs, ^{137}Cs] 250 – 2·10^{4} Bq/kg [^{40}K]	–
Typical resolution at 662 keV (^{137}Cs)	7.5%	8.5%
Measurement range of ambient dose equivalent rate	0.03 – 130 μSv/h	0.03 – 50 μSv/h
Limits of tolerable intrinsic relative error	±20% (for specific activity and dose rate measurement)	
Typical sensitivity to ^{137}Cs gamma radiation	2350 cps/(μSv·h^{-1})	5100 cps/(μSv·h^{-1})
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



AT6101C, AT6101CM Spectrometers (Backpack-based Radiation Detectors)

Rugged Android smartphone (4.7" or 6") for control and indication

Inconspicuous search and detection of radiation sources with radionuclide identification.

Effective technical solution for illicit traffic of radioactive materials prevention, public safety, and consequences management.

- High reliability and proven customer satisfaction
- 20 hours of continuous operation time
- Automatic gamma and neutron radiation sources search, detection, and identification
- Continuous recording of radiological data with GPS-referencing for further analysis
- Dose rate measurement range can be expanded to 10 Sv/h
- "GARM" software for further data processing and analysis

		AT6101C	AT6101CM
Gamma radiation detection units, scintillation detector		**BDKG-11M (*1 or 2 units*),** NaI(Tl) Ø63x63 mm	**BDKG-19M (*1 or 2 units*),** NaI(Tl) 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 tolerable intrinsic relative error: ±20%	
Typical sensitivity to ^{137}Cs gamma radiation		2200 cps/(μSv·h^{-1}) [4400 cps/(μSv·h^{-1})]*	6000 cps/(μSv·h^{-1}) [12000 cps/(μSv·h^{-1})]*
Detectable activity of ^{137}Cs source, moving at the speed of 0.6 m/s and located at the distance of 1 m in a time not longer than 2 s		400 kBq [280 kBq]*	250 kBq [170 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 (^{137}Cs)		7.5%	8%
Identified radionuclides		Industrial, natural, medical *(The library content can be modified on request)*	
Option to extend the dose rate measurement range		**BDKG-04** detection unit, up to 10 Sv/h	
Neutron radiation detection unit, detector		**BDKN-05M****, Two He-3 proportional counters Ø30x360 mm in polyethylene moderator	
Energy range		0.025 eV – 14 MeV	
Typical sensitivity to ^{252}Cf neutron radiation		20 cps/(neutron·s^{-1}·cm^{-2})	
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)·10^4 neutron/s	
		95% probability of source detection with false alarm rate not above 1 in 1 h	
Protection class		IP55 (in a backpack) / IP65 (in a case)	
Overall dimensions, weight ***	in a backpack	520x380x220 mm, 7 kg	550x340x220 mm, 9 kg
	in a case	625x500x300 mm, 16.5 kg	625x500x300 mm, 18 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) and BDKN-05M detection units

Design and specifications are subject to change without notice

AT6101CE Spectrometer (Backpack-based Radiation Detector)

Rugged Android smartphone (4.7" or 6") for control and indication

Inconspicuous search, detection, and identification of weak and heavily shielded radiation sources.

Effective technical solution for illicit traffic of radioactive materials prevention, public safety, and consequences management.

- $SrI_2(Eu)$ scintillator with high energy resolution: 3% for 662 keV (^{137}Cs)
- Reliable identification of complex radionuclide mixtures and shielded sources
- 20 hours of continuous operation time, memory for 130 hours of scan time
- Automatic gamma and neutron radiation sources search, detection, and identification
- Continuous recording of radiological data with GPS-referencing for further analysis
- "GARM" software for further data processing and analysis

		AT6101CE
Gamma radiation detection units, scintillation detector		**BDKG-05S,** $SrI_2(Eu)$ Ø38x38 mm **BDKG-35,** plastic Ø70x150 mm
Energy range		20 keV – 3 MeV
Measurement range of ambient dose equivalent rate		0.03 – 150 μSv/h
		Limits of tolerable intrinsic relative error: ±20%
Typical sensitivity to ^{137}Cs gamma radiation		4500 cps/(μSv·h^{-1})
Detectable activity of ^{137}Cs source, moving at the speed of 0.6 m/s and located at the distance of 1 m in a time not longer than 2 s		350 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 (^{137}Cs)		3.2% (BDKG-05S)
Identified radionuclides		Industrial, natural, medical *(The library content can be modified on request)*
Neutron radiation detection unit, detector		**BDKN-05M**, Two He-3 proportional counters Ø30x360 mm in polyethylene moderator
Energy range		0.025 eV – 14 MeV
Typical sensitivity to ^{252}Cf neutron radiation		20 cps/(neutron·s^{-1}·cm^{-2})
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)·10^4 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
Overall dimensions, weight	in a backpack in a case	520X380x220 mm, 7.5 kg 594X473x215 mm, 16 kg

Design and specifications are subject to change without notice

AT6103 Mobile Radiation Scanning System

Real time large area radiation survey and search for gamma and neutron radiation sources with GPS-geotagging.

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

- User-selectable set of smart detection units
- High sensitivity to gamma and neutron radiation
- Automatic simultaneous gamma and neutron radiation scanning
- Real-time radiological data display with GPS-geotagging
- Search, detection, and real-time identification of radioactive materials
- Storage and operation in rugged cases
- Assessment of surface contamination with ^{137}Cs radionuclide (kBq/m^2, Ci/km^2)
- "GARM" software for further radiological data processing, expert analysis, and mapping
- "ARMS" software for automatic data transfer to a remote server - feedback (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 – 2 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 – 3 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

AT6103 Mobile Radiation Scanning System

Gamma radiation detection unit		BDKG-11M	BDKG-19M	BDKG-04	BDKG-28	BDKG-34	BDRM-05
Scintillation detector		NaI(Tl) Ø63x63 mm	NaI(Tl) Ø63x160 mm	Plastic Ø30x15 mm	NaI(Tl) 400x100x100 mm	NaI(Tl) 400x100x50 mm	Plastic 1000x100x50 mm
Energy range		20 keV – 3 MeV	20 keV – 3 MeV	15 keV – 3 MeV	50 keV – 3 MeV	30 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 $0 – 5 \cdot 10^5$ s^{-1}
		Limits of tolerable intrinsic relative error: ±20%					
Typical sensitivity, cps/(μSv·h^{-1})	^{241}Am ^{137}Cs ^{60}Co	13500 2200 1200	37000 6000 2500	370 70 40	130000 33000 19000	118000 26500 15500	60000 32000 17000
Energy dependence relative to 662 keV (^{137}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 (^{137}Cs)		7.5 %	8 %	–	8.5 %	8.5 %	–

The system in "Search" mode detects the ^{137}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	$0 – 2.5 \cdot 10^4$ s^{-1}
Energy range	0.025 eV – 14 MeV
Typical sensitivity to source radiation at the distance of 1 m, cps/(neutron·s^{-1}·cm^{-2})	8 (Pu-Be) 20 (^{252}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	$(5.00 \pm 1.25) \cdot 10^4$ 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
with processing unit

AT1320C

AT1320, A, B, C Gamma Activity Monitors

Measurement of volume activity and specific activity of gamma emitting radionuclides in water, foodstuff, agricultural materials and fodder, industrial materials, forestry products, construction materials, soil and other environmental materials.

- Smart spectrometric detection unit
- AT1320B: Radiation control of mushrooms and berries directly in 10-liters shipping box takes only 20 s
- AT1320C: Preliminary analysis of radionuclide composition during the measurement. Radionuclide specific activity calculation based on identification results
- Ready-to-use standard measurement procedures

Scintillation detector		NaI(Tl) Ø63x63 mm
Energy range		50 keV – 3 MeV
Measurement range of volume (specific) activity	^{131}I	3 – $1\cdot10^6$ Bq/l (Bq/kg)
	^{134}Cs	3 – $1\cdot10^6$ Bq/l (Bq/kg)
	^{137}Cs	3.7 – $1\cdot10^6$ Bq/l (Bq/kg)
	^{40}K	50 – $2\cdot10^4$ Bq/l (Bq/kg)
	^{226}Ra	10 – $1\cdot10^4$ Bq/l (Bq/kg)
	^{232}Th	10 – $1\cdot10^4$ Bq/l (Bq/kg)
Limits of tolerable intrinsic relative error		±20%
Density range of controlled samples		0.1 – 3 g/cm^3
Typical resolution at 662 keV (^{137}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	^{137}Cs, ^{40}K, ^{226}Ra, ^{232}Th	Processing unit *or* External PC *(option)*	1, 0.5 and 0.1 litre
AT1320A	^{137}Cs, ^{40}K		1, 0.5 and 0.1 litre
AT1320B	^{137}Cs, ^{40}K		1, 0.5, 0.1 and 10 litre (w/o protection unit lid)
AT1320C	^{131}I, ^{134}Cs, ^{137}Cs, ^{40}K, ^{226}Ra, ^{232}Th	External PC *(option)*	1, 0.5 and 0.1 litre

AT1135 Portable Radiometric Laboratory

- Specific activity measurement of gamma-emitting ^{134}Cs, ^{137}Cs, ^{40}K radionuclides in food products
- In situ measurement of gamma radiation ambient dose equivalent rate

Scintillation detector	NaI(Tl) Ø25x40 mm
Energy range	50 keV – 1.5 MeV
Measurement range of specific activity for samples with 1 g/cm^3 density (measurement geometry: 0.5-litre Marinelli beaker)	25 – $1\cdot10^5$ Bq/kg (^{134}Cs) 25 – $1\cdot10^5$ Bq/kg (^{137}Cs) 360 – $2\cdot10^4$ Bq/kg (^{40}K)
Density range of measured samples	0.5 – 1.5 g/cm^3
Dose rate measurement range	0.03 – 300 μSv/h
Overall dimensions, weight	200x200x437 mm, 14 kg
Control and indication	External PC (option)

Gamma Beta Spectrometer

Gamma Spectrometer

AT1315 Gamma Beta Spectrometer

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

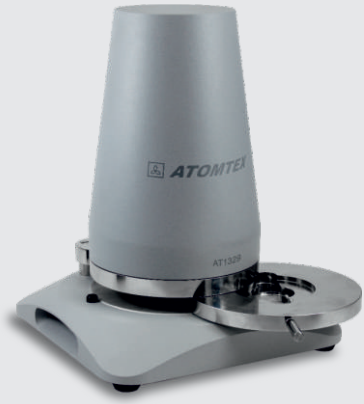
Support of quick radioactive purity test for standardized sample metal heats.

- Advanced spectra processing on a PC
- Automatic allowance for sample density
- Live data processing during the measurement
- Ready-to-use standard measurement procedures

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

Design and specifications are subject to change without notice

AT1329, A, B Sample Counters



Sample counter is designed for simultaneous or discrete measurement of gross alpha activity and gross beta activity in various samples.

Scintillation detector	*AT1329*	Phoswich detector (*α and β channel*): 28 cm^2, plastic with a layer of ZnS(Ag)	
	AT1329A	ZnS(Ag) 28 cm^2 (*α channel*)	
	AT1329B	Plastic 28 cm^2 (*β channel*)	
Control and indication		External PC (*option*)	
Sensitivity		*α channel* *β channel*	≥0.25 $Bq^{-1}\cdot s^{-1}$ (^{239}Pu) ≥0.30 $Bq^{-1}\cdot s^{-1}$ ($^{90}Sr+^{90}Y$)
Energy range		*α channel* *β channel*	3 – 7 MeV 155 keV – 3.5 MeV
Count rate measurement range		*α channel* *β channel*	0 – 10^5 s^{-1} 0 – 10^5 s^{-1}
Gross activity measurement range		*α channel* *β channel*	0.01 – 10^4 Bq 0.1 – 10^4 Bq
Background count rate		*α channel* *β channel*	≤0.001 s^{-1} ≤0.75 s^{-1}
Limits of tolerable intrinsic relative error		±20%	
Protection class		IP43	
Overall dimensions		230x230x290 mm	
Weight	*AT1329*	≤22 kg	
	AT1329A	≤10 kg	
	AT1329B	≤22 kg	

- Instrument control and data processing by a PC
- Custom calibration settings
- Selectable units of measurement
- LED stabilization
- Passive background radiation protection
- Software for data processing and tabulation
- Methodological support of measurements - ready-to-use standard measurement procedures

Available configurations:

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

Design and specifications are subject to change without notice

AT1316 Whole Body Counter

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

- Calculation of expected annual effective internal exposure dose for incorporated ^{137}Cs and ^{134}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	NaI(Tl), Ø150x100 mm
Energy range	50 keV – 3 MeV
Measurement range of activity	80 – 7.5·10^5 Bq (^{137}Cs) 80 – 4·10^5 Bq (^{134}Cs)
Minimum measurable activity of ^{137}Cs and ^{134}Cs in adult body in 3 min	300 Bq
Limits of tolerable intrinsic relative error	±15%
Weight	250 kg

AT1316A Whole Body Counter

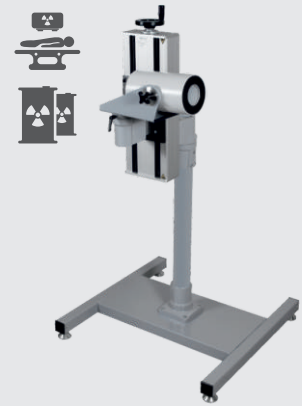
Activity measurement of ^{60}Co and other gamma-emitting radionuclides in human lungs.

- Control of gross activity threshold exceeding for ^{51}Cr, ^{54}Mn, ^{58}Co, ^{59}Fe, ^{65}Zn, ^{95}Nb, ^{100m}Ag, ^{103}Ru, ^{124}Sb, ^{141}Ce, ^{144}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	NaI(Tl), Ø150x100 mm
Energy range	50 keV – 2 MeV
Measurement range of activity	40 – 1·10^5 Bq (^{60}Co)
Minimum measurable activity of ^{60}Co in adult lungs in 3 min	60 Bq
Limits of tolerable intrinsic relative error	±20%
Weight	250 kg

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



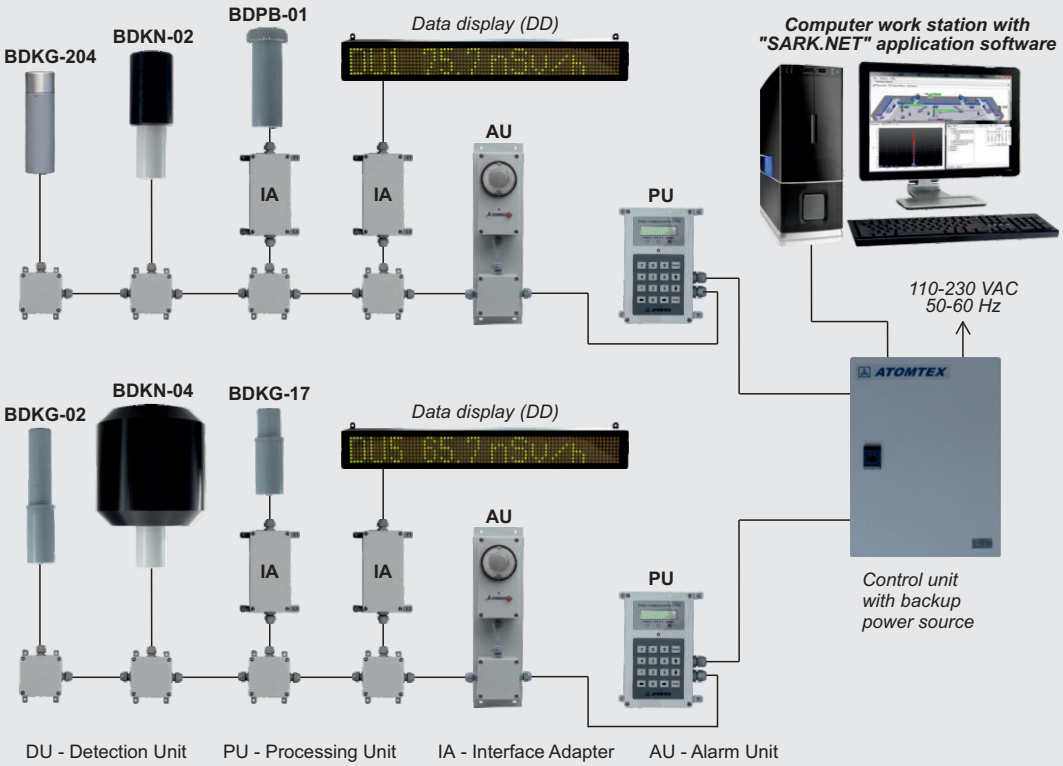
AT1322, AT1322/1 Whole Body Counters

Activity measurement of ^{131}I and ^{133}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*	NaI(Tl), Ø40x40 mm NaI(Tl), Ø63x63 mm
Energy range		50 keV – 1.5 MeV
Measurement range of activity	*AT1322* *AT1322/1*	85 – 10^5 Bq (^{131}I) / 110 – 10^5 Bq (^{133}I) 30 – 10^5 Bq (^{131}I) / 40 – 10^5 Bq (^{133}I)
Minimum measurable activity of ^{131}I and ^{133}I in the thyroid gland in 3 min	*AT1322* *AT1322/1*	200 Bq (^{131}I) / 240 Bq (^{133}I) 80 Bq (^{131}I) / 100 Bq (^{133}I)
Limits of tolerable intrinsic relative 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

- Flexible and reliable multichannel stationary monitoring system
- Independent measurements of gamma and neutron radiation dose rates and flux densities of neutron and beta particles
- Integrated sound and light alarms
- System health self-check function
- Software for centralized radiation environment monitoring on a remote terminal
- Automatic data logging
- Backup power source
- Open communication protocols for 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	≥100 Sv ≥10^8 Sv (BDKG-27) ≥$5 \cdot 10^4$ Sv (UDKG-37/2)

Design and specifications are subject to change without notice

AT2327 Alarm Dosimeter		
Detector	- *BDKG-02 / -17* - *BDKG-204* - *BDKG-11* - *BDKG-27* - *UDKG-37/2* - *BDPB-01* - *BDKN-02 / -04*	Geiger-Mueller counter tube Scintillation plastic, Ø30x15 mm NaI(Tl) scintillator, Ø63x63 mm Ion chamber Silicon semiconductor detector + Geiger-Muller counter tube Scintillation plastic, 30 cm^2 He-3 counter in polyethylene moderator
Measurement range of gamma radiation ambient dose equivalent rate	- *BDKG-02* - *BDKG-204* - *BDKG-11* - *BDKG-17* - *BDKG-27* - *UDKG-37/2*	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
Measurement range of gamma radiation average pulsed radiation dose rate	- *UDKG-37/2*	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)
Measurement range of neutron radiation ambient dose equivalent rate	- *BDKN-02* - *BDKN-04*	0.1 µSv/h – 10 mSv/h [From Pu-Be source] 0.1 µSv/h – 10 mSv/h
Measurement range of beta particles flux density	- *BDPB-01*	1 – $5 \cdot 10^5$ particle·min^{-1}·cm^{-2}
Measurement range of neutron flux density	- *BDKN-02* - *BDKN-04*	0.1 – 10^4 neutron·s^{-1}·cm^{-2} 0.1 – 10^4 neutron·s^{-1}·cm^{-2} [From Pu-Be source]
Energy range of gamma radiation	- *BDKG-02* - *BDKG-11* - *BDKG-17* - *BDKG-27* - *BDKG-204* - *UDKG-37/2*	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
Energy range of beta radiation	- *BDPB-01*	155 keV – 3.5 MeV
Energy range of neutron radiation	- *BDKN-02 / -04*	0.025 eV – 14 MeV
Typical sensitivity to ^{137}Cs gamma radiation	- *BDKG-02* - *BDKG-204* - *BDKG-11* - *BDKG-17* - *BDKG-27* - *UDKG-37/2*	4.0 cps/(µSv·h^{-1}) 70.0 cps/(µSv·h^{-1}) 1970 cps/(µSv·h^{-1}) 0.005 cps/(µSv·h^{-1}) 2.1 µC/Sv 0.15 cps/(µSv·h^{-1}), for dose rate ≤0.2 Sv/h 58 mV/(Sv·h^{-1}), for dose rate >0.2 Sv/h
Typical sensitivity to $^{90}Sr+^{90}Y$ beta radiation	- *BDPB-01*	0.3 cps/(particle·min^{-1}·cm^{-2})
Typical sensitivity to Pu-Be neutron radiation	- *BDKN-02 / -04* - *BDKN-02 / -04*	0.5 cps/(neutron·s^{-1}·cm^{-2}) 0.355 cps/(µSv·h^{-1})
Energy dependence relative to 662 keV (^{137}Cs)	- *BDKG-02* - *BDKG-11* - *BDKG-17* - *BDKG-27* - *UDKG-37/2* - *BDKG-204*	-20%...+35% ±20% -25%...+35% ±30% ±30% -45% to +35% (20 - 60 keV), ±25% (60 keV - 3 MeV) ±50% (3 - 10 MeV)

Design and specifications are subject to change without notice

AT2327 Alarm Dosimeter

Protection class	- *BDKG-02* - *BDKG-11* - *BDKG-17* - *BDKG-27* - *BDKG-204* - *UDKG-37/2* - *BDPB-01* - *BDKN-02* - *BDKN-04* - *PU* - *AU* - *DD*	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
Overall dimensions, weight	- *BDKG-02* - *BDKG-11* - *BDKG-17* - *BDKG-27* - *BDKG-204* - *UDKG-37/2* - *BDPB-01* - *BDKN-02* - *BDKN-04* - *PU* - *AU* - *DD*	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

AT2327 Alarm Dosimeter with Data Display

Gamma radiation detection unit (DU)

Control of radiation-sensitive and radiation-dangerous sites and facilities with visual radiological data display.

- Automatic logging of dose rate levels and threshold exceeding events
- Up to 1km distance between the screen and a detection unit
- Designed for harsh environmental conditions

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 ^{137}Cs gamma radiation		4 cps/(µSv·h^{-1})
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	*Display with DU* *Control unit*	1095x392x300 mm, 25 kg 500x650x150 mm, 30 kg

Design and specifications are subject to change without notice

AT2341 Radiation Monitoring Station

Continuous unattended radiation and weather monitoring around nuclear power plants or other radiation-hazardous facilities.

Up to 256 stations can be combined into a centralized radiation monitoring network.

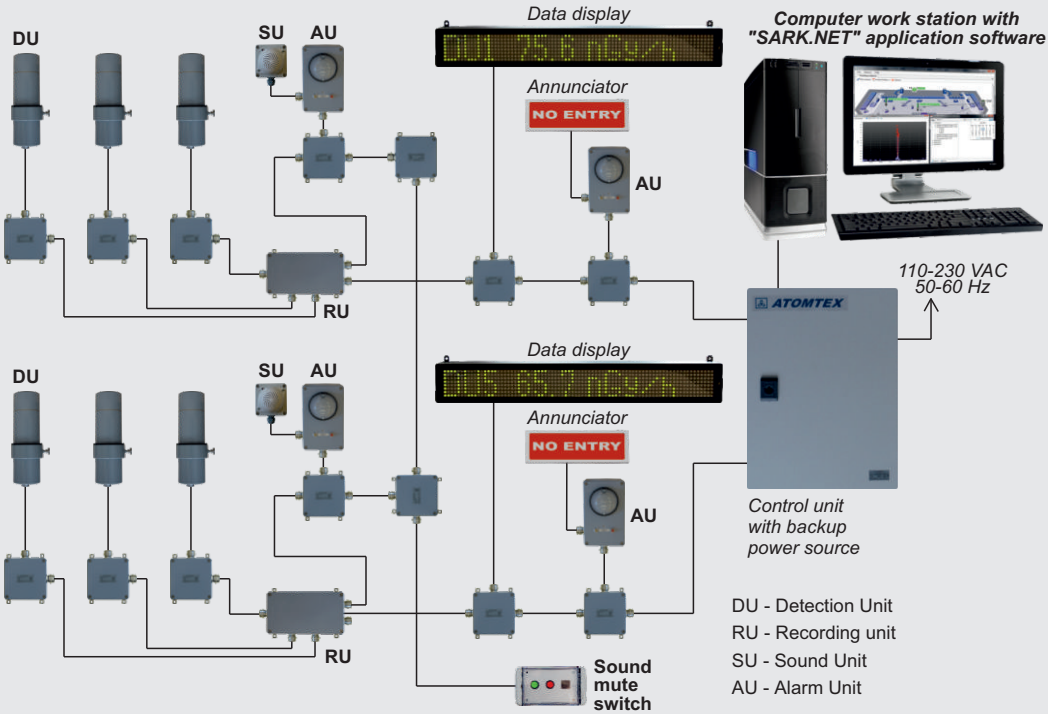
- High-sensitivity to gamma radiation
- Simultaneous monitoring of radiation and meteorological data
- Back-up power supply for at least 72 hours of autonomous operation
- Wireless data communication capabilities for remote area monitoring

Protection rating	IP65 IP66 for weather station
Operation temperature range	-40 to +50°C
Relative air humidity	≤98% (≤35°C, non-condensing)
Dimensions	800x600x300 mm
Weight	≤45 kg

SPECTROMETRIC CHANNEL	
Detection unit	**BDKG-211M**
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 (^{137}Cs)	±20% (40 keV – 3 MeV)
Typical sensitivity to gamma radiation, cps/(μSv·h^{-1})	13900 (^{241}Am) / 2450 (^{137}Cs) / 1300 (^{60}Co)
Response time for dose rate change from 0.1 to 1 μSv/h	≤2 s
Typical resolution at 662 keV (^{137}Cs)	7.5%

DOSIMETRIC CHANNEL (available options)			
Detection unit	**BDKG-22**	**BDKG-204**	**BDKG-224**
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 tolerable intrinsic relative error: ±20%		
Energy dependence relative to 662 keV (^{137}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^{-1})	4 (^{241}Am) 4 (^{137}Cs) 4 (^{60}Co)	370 (^{241}Am) 70 (^{137}Cs) 40 (^{60}Co)	3200 (^{241}Am) 530 (^{137}Cs) 270 (^{60}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

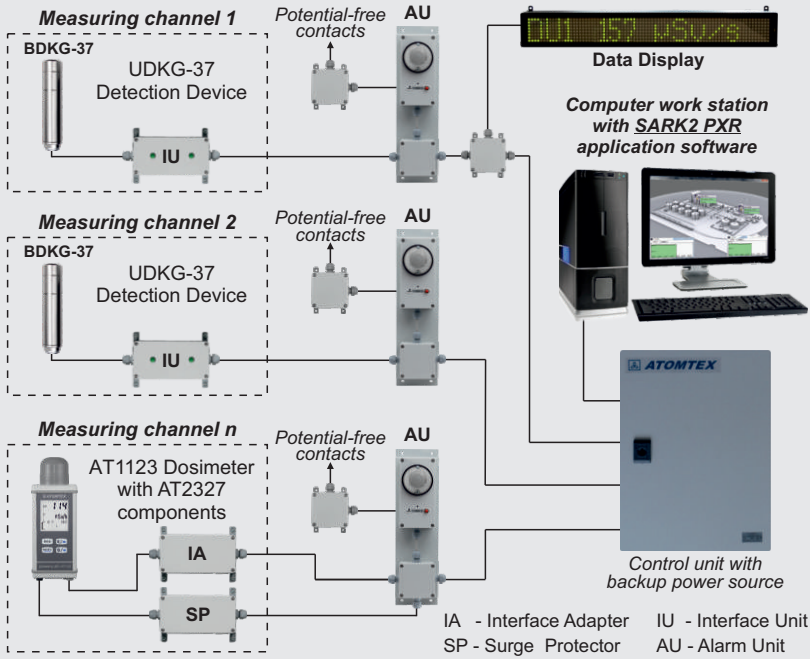
Scintillation detector		Plastic Ø10x5 mm
Minimum duration of a registered self-sustaining chain reaction		1 ms
Measurement range: - *Absorbed dose rate* - *Absorbed dose*		0.1 μGy/h – 1 Gy/h 0.05 μGy – 10 Gy
Energy range		60 keV – 3 MeV
Energy dependence relative to 662 keV (^{137}Cs)		±35%
Selectable 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

Design and specifications are subject to change without notice

Area Monitor for Pulse Radiation

AT1123 X-ray and Gamma Radiation Dosimeter

UDKG-37 Gamma Radiation Detection Devices



IA - Interface Adapter
SP - Surge Protector
IU - Interface Unit
AU - Alarm Unit

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

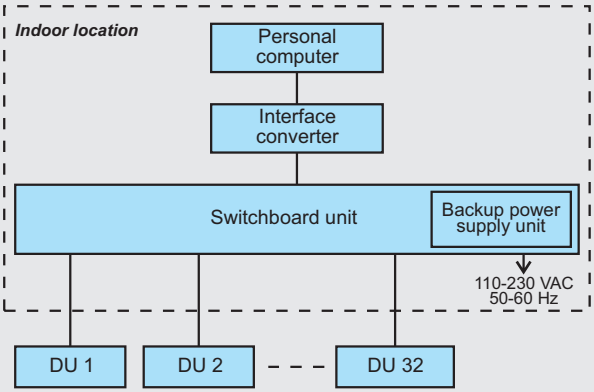
Measurement point may be either in the operator's room or directly at the LINAC or facility location.

- 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 ^{137}Cs gamma radiation	0.15 cps/(µSv·h^{-1}), for dose rate ≤0.1 Sv/h; 58 mV/(Sv·h^{-1}), for dose rate >0.1 Sv/h	70 cps/(µSv·h^{-1})
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

AT6105 Spectrometric System for Radiation Monitoring

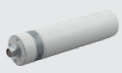
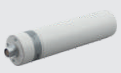
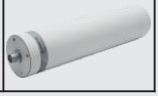


Structural diagram of the system

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 tolerable intrinsic relative error: ±20%				
Typical sensitivity to gamma radiation, cps/(µSv·h^{-1})	^{241}Am ^{137}Cs ^{60}Co	1400 165 80	3600 400 190	5400 800 420	13900 2450 1300	37000 6000 2500
Energy dependence relative to 662 keV (^{137}Cs)		±15% (50 keV – 3 MeV)				
Typical resolution at 662 keV (^{137}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		NaI(Tl) Ø63x160 mm	Plastic Ø70x150 mm
Energy range		50 keV – 3 MeV	20 keV – 3 MeV
Typical sensitivity, cps/(μSv·h^{-1})	^{241}Am ^{137}Cs ^{60}Co	30650 4900 3140	10000 3200 1600
Minimal detectable gamma radiation dose rate level above background value 0.1 μSv/h in a period not longer than 2 s		0.03 μSv/h	0.04 μSv/h
Detection threshold for unshielded source at 1 m height under natural radiation background conditions not more than 0.1 μSv/h	^{241}Am ^{137}Cs ^{60}Co	1 MBq 320 kBq 130 kBq	2.3 MBq 370 kBq 190 kBq
	(Distance to source 1 m, source travel speed 5 km/h, probability of source detection 80 % under confidence level P=0.95)		
False alarm rate		≤1 for 8 h of continuous operation	
PC interface		RS485	
Continuous battery operation time		≥6 h	
Protection class		IP54	
Overall dimensions		Ø350x1220 mm	
Weight		14.5 kg	13.5 kg

Design and specifications are subject to change without notice

AT930 Pedestrian Radiation Monitor

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

- Rapid accommodation to changing radiation background
- Optional sound and light alarm
- Continuous and occasional radiation monitoring
- Safe operation without anchoring for rapid deployment and reconfiguring
- Rugged design
- Automatic system health diagnostics
- Backup power source

Conformance to **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/(μSv·h^{-1})	^{241}Am ^{137}Cs ^{60}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)	

Additional base for operation without anchoring to the floor

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

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

Design and specifications are subject to change without notice

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			NaI(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/(μSv·h^{-1})		^{241}Am ^{137}Cs ^{60}Co	32500 4900 2800	10000 3600 2300	60000 31500 16500
Minimal detectable gamma radiation dose rate level above background value 0.1 μSv/h in a period not longer than 2 s			0.03 μSv/h	0.04 μSv/h	0.01 μSv/h
Detection threshold for unshielded source at 1 m height under natural radiation background conditions not more than 0.1 μSv/h	1 DU	^{241}Am ^{137}Cs ^{60}Co	430 kBq 220 kBq 100 kBq	1180 kBq 230 kBq 100 kBq	800 kBq 110 kBq 60 kBq
	2 DU	^{241}Am ^{137}Cs ^{60}Co	320 kBq 160 kBq 70 kBq	860 kBq 170 kBq 70 kBq	580 kBq 80 kBq 40 kBq
(Distance to source 1 m, source travel speed 5 km/h, probability of source detection 80 % under confidence level P=0.95)					

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		^{252}Cf	1.3 cps/(neutron·s^{-1}·cm^{-2})	20 cps/(neutron·s^{-1}·cm^{-2})
Source detection threshold at 1 m height	1 DU	^{252}Cf	2.2·10^5 neutron/s	2.3·10^4 neutron/s
	2 DU	^{252}Cf	–	1.6·10^4 neutron/s
(Distance to source 1 m, source travel speed 5 km/h, probability of source detection 80% under confidence level P=0.95)				

Design and specifications are subject to change without notice

AT2329 Radiation Portal Monitor

Highly sensitive non-intrusive system providing continuous radiation monitoring to detect gamma and neutron radiation sources and nuclear materials inside vehicles and cargo crossing the checkpoints.

Smart detection units with large-volume detectors and efficient algorithms allow fast and precise detection of radiation sources with definition of its type (categorization) as a natural or an artificial.

- ANSI N42.35 compliant
- Gamma and neutron sensitive channels
- Categorization (differentiation) of radiation sources into natural and artificial
- High reliability and lifetime
- Backup power source
- Automatic data logging
- Parallel operation with CCTV

AT2329 Radiation Portal Monitor

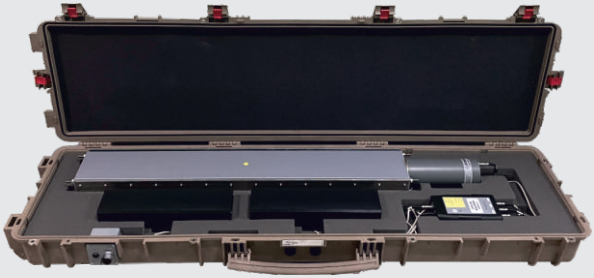
RPM configuration (4 x Measurement Units) on a frame or inside standard ROSA type boxes	
Measurement Unit configuration	Gamma channel: **BDRM-11** detection unit Neutron channel: **BDKN-08** detection unit
Radiation sources detection	**Meets ANSI N42.35**
Control zone	width – 5 m, height – 4.5 m
Inspection speed	8 km/h (2.2 m/s)
Alarm	sound and light alarm
False alarm rate	1 in 10,000 passages (standard) *Can be configurable*
Continuous battery operation time	≥6 h
Protection class	IP65

Gamma radiation detection unit		**BDRM-11**
Detector		Scintillation plastic 1000x220x50 mm (11 liters)
Energy range		50 keV – 3 MeV
Typical sensitivity to source radiation	^{241}Am ^{137}Cs ^{60}Co	108000 cps/(μSv·h^{-1}) 67000 cps/(μSv·h^{-1}) 35000 cps/(μSv·h^{-1})

Neutron radiation detection unit		**BDKN-08**
Detector		He-3 proportional counter in polyethylene moderator
Energy range		0.025 eV – 14 MeV
Typical sensitivity to source radiation at the distance of 1 m	^{252}Cf	125 cps/(neutron·s^{-1}·cm^{-2})

Design and specifications are subject to change without notice

AT6110 Radiation Portal Monitor (Rapidly 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.

- Rapidly deployable
- High-sensitivity
- Categorization of radiation sources into natural and man-made
- Up to 20 h of autonomous operation
- Storage and operation in protective shock-proof cases
- Designed for harsh operating conditions
- Up to 8 monitors can be integrated in a single system

Rugged 10" tablet PC for control and indication

AT6110 Portal Radiation Monitor (rapid deployable)

Monitor configuration	Gamma channel: 1 x **BDRM-05** Neutron channel: 2 x **BDKN-05**
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

Gamma radiation detection units		**BDRM-05**
Scintillation detector		Plastic, 1000x100x50 mm
Energy range		50 keV – 3 MeV
Typical sensitivity to source radiation	^{241}Am ^{137}Cs ^{60}Co	60000 cps/(μSv·h^{-1}) 32000 cps/(μSv·h^{-1}) 17000 cps/(μSv·h^{-1})

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	^{252}Cf	20 cps/(neutron·s^{-1}·cm^{-2})

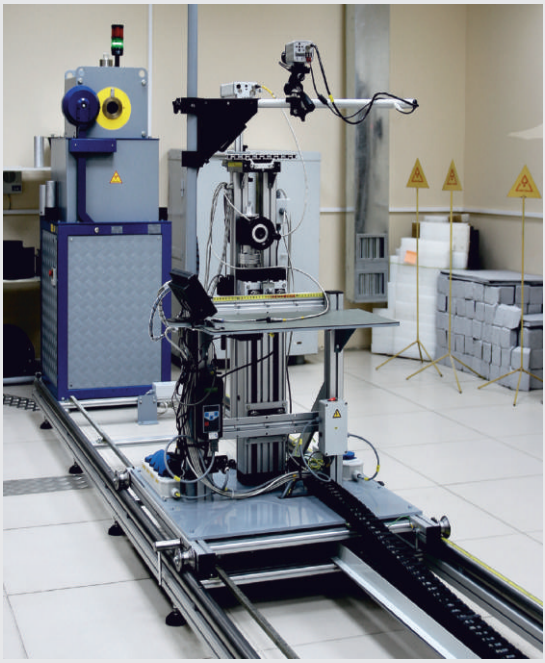
Detection threshold for unshielded source
under natural radiation background conditions not more than 0.1 μSv/h
(Probability of source detection 80% under confidence level P=0.95)

Road vehicles. Travel speed 8 km/h

	Monitors configuration (location and number)	Gamma channel		Neutron channel
		Detection	***Categorization***	
Control zone width – 3 m, height – 2 m		940 kBq [^{241}Am] 130 kBq [^{137}Cs] 70 kBq [^{60}Co]	1100 kBq [^{241}Am] 310 kBq [^{137}Cs] 330 kBq [^{60}Co]	2.1·10^{4} neutron/s [^{252}Cf]
		690 kBq [^{241}Am] 100 kBq [^{137}Cs] 50 kBq [^{60}Co]	800 kBq [^{241}Am] 240 kBq [^{137}Cs] 250 kBq [^{60}Co]	1.2·10^{4} neutron/s [^{252}Cf]
Control zone width – 6 m, height – 4.5 m		2140 kBq [^{241}Am] 290 kBq [^{137}Cs] 150 kBq [^{60}Co]	2500 kBq [^{241}Am] 690 kBq [^{137}Cs] 710 kBq [^{60}Co]	2.2·10^{4} neutron/s [^{252}Cf]
		1570 kBq [^{241}Am] 210 kBq [^{137}Cs] 110 kBq [^{60}Co]	1900 kBq [^{241}Am] 500 kBq [^{137}Cs] 520 kBq [^{60}Co]	1.4·10^{4} neutron/s [^{252}Cf]

Design and specifications are subject to change without notice

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}Cs: $1.3 \cdot 10^{12}$ Bq (35 Ci)	^{137}Cs: $9.6 \cdot 10^{13}$ Bq (2600 Ci) ^{60}Co: $7.2 \cdot 10^{9}$ Bq (0.2 Ci) ^{241}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 μGy/h – 350 mGy/h 30 μR/h – 40 R/h 0.30 μSv/h – 420 mSv/h	 0.36 μGy/h – 50 Gy/h 40 μR/h – 5400 R/h 0.43 μSv/h – 58 Sv/h
Intrinsic relative error *for certification as a working standard of 1-st category (2-nd category)*	±2.5% (±5%) for air kerma rate and exposure dose rate ±4.5% (±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}Pu-Be: $5 \cdot 10^{7}$ neutron/s ^{252}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^2) $1 – 1.4 \cdot 10^{3}$ neutron/(s·cm^2) $3.5 – 4.0 \cdot 10^{3}$ 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

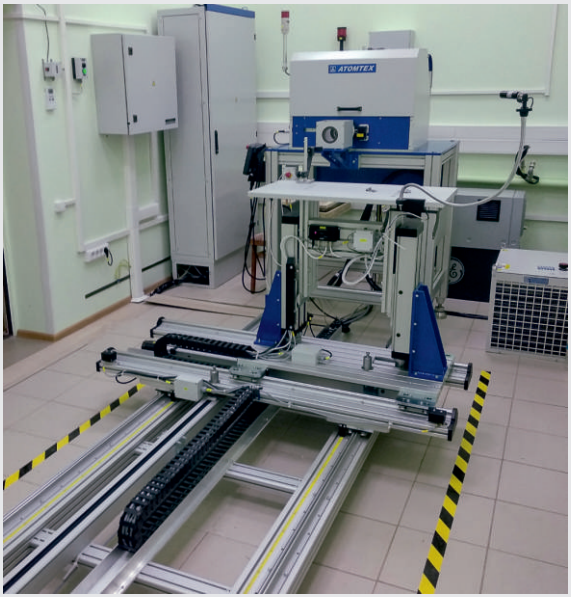
Actual values of range limits and errors are determined by calibration
Design and specifications are subject to change without notice

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



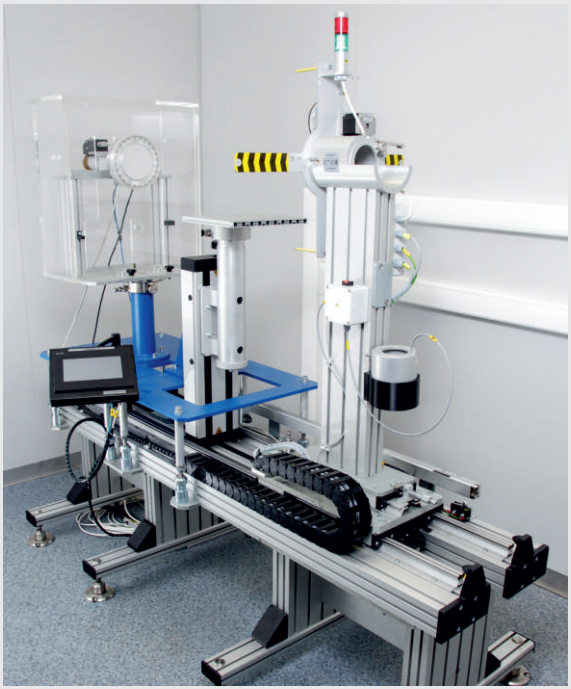
Storage and transfer of air kerma, ambient, individual and directional dose equivalents and dose equivalent rates of X-ray radiation into working standards and measurement instruments.

- 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)	$2\cdot10^{-8}$ – $2\cdot10^{-2}$ Gy/s ($2.8\cdot10^{-7}$ – 20 Gy)	$2\cdot10^{-8}$ – $1.5\cdot10^{-2}$ Gy/s ($2.5\cdot10^{-7}$ – 15 Gy)	$2\cdot10^{-8}$ – $1.5\cdot10^{-2}$ Gy/s ($3.5\cdot10^{-7}$ – 15 Gy)
Ambient, individual and directional dose equivalent rate (Ambient, individual and directional dose equivalent)	$2.7\cdot10^{-8}$ – $3.2\cdot10^{-3}$ Sv/s ($3.3\cdot10^{-7}$ – 3.2 Sv)	$2.7\cdot10^{-8}$ – $3.2\cdot10^{-3}$ Sv/s ($3.3\cdot10^{-7}$ – 3.2 Sv)	$5.3\cdot10^{-8}$ – $3.2\cdot10^{-3}$ Sv/s ($5.2\cdot10^{-7}$ – 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 $^{90}Sr+^{90}Y$ (BIS-50, 22 Gbq), ^{85}Kr (KAC.D3, 15 GBq) and ^{147}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 $D_t(0.07)$ (rated limits)		10 – $5.5 \cdot 10^3$ μGy/s
Source positioning error		0.1 mm
Travel range of irradiator unit in measurement geometry:	"Dosimeters"	100 – 500 mm
	"Extrapolation Chamber"	
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

AT1117M Radiation Monitor with BDKN-06 Detection Unit and a set of spherical moderators

Measurement of neutron radiation characteristics to reconstruct the energy distribution of neutron flux density.

PU4 Processing Unit

Obtained energy distribution of neutron flux density is used to calculate such values as:

- Integral neutron flux density
- Average energy of neutron radiation by spectrum
- Average energy of neutron radiation by dose
- Dose equivalent per unit flux density
- Dose equivalent
- Effective dose

- Ready-to-use measurement procedures
- Advanced set of spherical polyethylene moderators is available with the following diameters: 3.5"; 4.5"; 5"; 7"; 9"; 9.5"

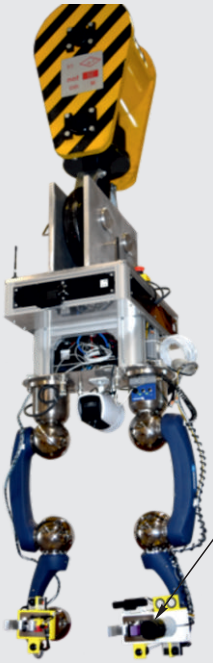
Detector	^{3}He proportional counter
Energy range	0.025 eV – 20 MeV
Measurement range of neutron count rate	0.01 – $5 \cdot 10^{4}$ cps
Limit of tolerable intrinsic relative error (P=0.95) for neutron measurement	±10%
Detection range of neutron flux density	$1 \cdot 10^{-16}$ – $5 \cdot 10^{12}$ neutron/(s·cm^{2}·MeV)
Typical neutron sensitivity	1 cps/(neutron·s^{-1}·cm^{-2}) [Pu-Be]
Relative sensitivity due to the incidence angle of neutrons	up to -25%
Protection class	IP64
Overall dimensions, weight	550x254x254 mm, 10 kg (with Ø254 mm (Ø10") spherical moderator without tripod)

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

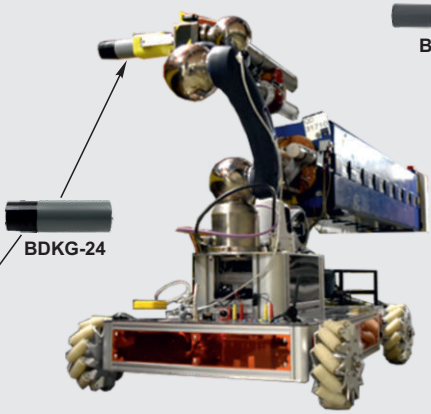
Part of robot devices for land, aircraft and marine applications

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

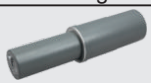


Courtesy of CERN

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

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
Limits of tolerable intrinsic relative error		±20%	±20%	±20%	±20%
Typical sensitivity to gamma radiation, cps/(μSv·h^{-1})	^{241}Am ^{137}Cs ^{60}Co	370 70 40	3200 530 270	cps/(μGy·h^{-1}) 75 3.5 2	cps/(μGy·h^{-1}) 2800 600 290
Energy dependence relative to 662 keV (^{137}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 кг	Ø60x210 mm, 0.6 кг	Ø60x207 mm, 0.6 кг
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 – 1.5·10^5 s^{-1}	30 nSv/h – 200 mSv/h	–
Measurement range of air kerma rate		–		–	30 nGy/h – 200 mGy/h
Limits of tolerable intrinsic relative error		±20%		±10%	±10%
Typical sensitivity to gamma radiation, cps/(μSv·h^{-1})	^{241}Am ^{137}Cs ^{60}Co	8300 1660 850	11500 3300 1700	10500 2600 1450	cps/(μGy·h^{-1}) 12800 3000 1600
Energy dependence relative to 662 keV (^{137}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					

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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 µSv/h – 10 Sv/h	0.1 µSv/h – 100 Sv/h	–
Measurement range of air kerma rate		–	–	0.1 µGy/h – 100 Gy/h
Limits of tolerable intrinsic relative error		±20%	±20%	±20%
Typical sensitivity to gamma radiation, cps/(µSv·h^{-1})	^{241}Am ^{137}Cs ^{60}Co	4 4 4	4 4 4	cps/(µGy·h^{-1}) 4.6 4.6 4.6
Energy dependence relative to 662 keV (^{137}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
Limits of tolerable intrinsic relative error		±20%	±15%	±15%
Typical sensitivity to gamma radiation, cps/(µSv·h^{-1})	^{241}Am ^{137}Cs ^{60}Co	370 70 40	3200 530 270	cps/(µGy·h^{-1}) 2800 600 290
Energy dependence relative to 662 keV (^{137}Cs)		-45%...+35% (20 - 60 keV) ±25% (60 keV - 3 MeV) ±50% (3 - 10 MeV)	±25% (40 keV - 3 MeV) ±50% (3 - 10 MeV)	±25% (50 keV - 3 MeV) ±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				

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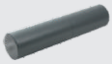
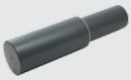
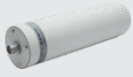
Spectrometric Gamma Radiation Detection Units

Detection Unit	BDKG-05S	BDKG-05M	BDKG-11M	BDKG-19M
Scintillation detector	$SrI_2(Eu)$, Ø38x38 mm	NaI(Tl), Ø40x40 mm	NaI(Tl), Ø63x63 mm	NaI(Tl), Ø63x160 mm
Energy range	20 keV – 3 MeV	20 keV – 3 MeV	20 keV – 3 MeV	20 keV – 3 MeV
Measurement range of ambient dose equivalent rate	30 nSv/h – 150 μSv/h	30 nSv/h – 300 μSv/h	30 nSv/h – 150 μSv/h	30 nSv/h - 50 μSv/h
Limits of tolerable intrinsic relative error	±15%	±20%	±20%	±20%
Typical sensitivity to gamma radiation, cps/(μSv·h^{-1}) ^{241}Am ^{137}Cs ^{60}Co	5500 850 450	5400 800 420	13500 2200 1200	37000 6000 2500
Energy dependence relative to 662 keV (^{137}Cs)	±20% (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 (^{137}Cs)	3.2%	7.5%	7.5%	8%
Protection class	IP67	IP54	IP54	IP54
Interface	USB / RS232 / RS485 / Bluetooth (Interface adapter)			
Operation temperature range	-20...+50°C	-20...+50°C	-20...+50°C	-20...+50°C
Dimensions, weight	Ø60x282 mm, 0.9 kg	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	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	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
Limits of tolerable intrinsic relative error	±20%	±20%	±20%	±20%	±20%
Typical sensitivity to gamma radiation, cps/(μSv·h^{-1}) ^{241}Am ^{137}Cs ^{60}Co	1400 165 80	3600 400 190	5400 800 420	13900 2450 1300	37000 6000 2500
Energy dependence relative to 662 keV (^{137}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 (^{137}Cs)	8.5%	8%	7.5%	7.5%	8%
Protection class	IP68	IP68	IP68	IP68	IP68
	(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					

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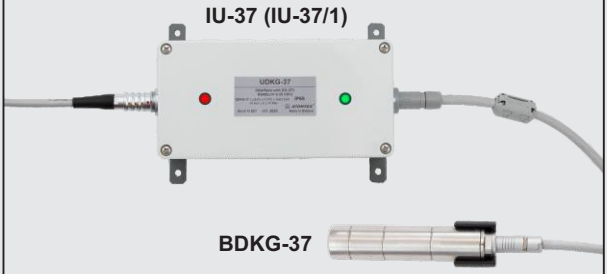
Dosimetric Gamma Radiation Detection Devices

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 μSv/h – 5000 Sv/h	
Limits of tolerable intrinsic relative error		±25% (for $\dot{H}^*(10)$≤10 μSv/h) ±15% (for $\dot{H}^*(10)$>10 μSv/h)	
Measurement range of average pulsed radiation dose rate		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)	
Limits of tolerable intrinsic relative error		±25% (for measurement of average dose rate of pulse radiation)	
Typical sensitivity to ^{137}Cs gamma radiation		0.15 cps/(μSv·h^{-1}) (for $\dot{H}^*(10)$≤0.1 Sv/h) 58 mV/(Sv·h^{-1}) (for $\dot{H}^*(10)$>0.1 Sv/h)	
Energy dependence relative to 662 keV (^{137}Cs)		±30%	
Response time for 10-fold dose rate change		≤10 s (for $\dot{H}^*(10)$>10 μSv/h)	
Burn-up life		≥50 000 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...+60°C	
Dimensions, weight	BDKG-37	Ø30x130 mm, 0.25 kg	
	IU-37	170x80x55 mm, 0.3 kg	
Image			

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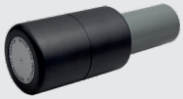
Neutron Radiation Detection Units

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 µSv/h – 10 mSv/h [Pu-Be source]		0.1 µSv/h – 10 mSv/h	
Typical sensitivity to Pu-Be radiation, (In dose rate measurement mode)		0.355 cps/(µSv·h^{-1})		0.355 cps/(µSv·h^{-1})	
Measurement range of flux density		0.1 - 10^4 neutrons·s^{-1}·cm^{-2}		0.1 - 10^4 neutrons·s^{-1}·cm^{-2}	
Typical sensitivity to Pu-Be radiation, (In flux density measurement mode)		0.5 cps/(neutrons·s^{-1}·cm^{-2})		0.5 cps/(neutrons·s^{-1}·cm^{-2})	
Limits of tolerable intrinsic relative error	*dose rate*	±35%		±20%	
	flux density	±20%		±35%	
Protection class		IP64		IP64	
Interface		RS232	RS485	RS232	RS485
Operation temperature range		-40...+50°C		-40...+50°C	
Dimensions, weight		Ø90x260 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 µSv/h – 30 mSv/h
Typical sensitivity to Pu-Be radiation, (In dose rate measurement mode)		–	0.7 cps/(µSv·h^{-1})
Measurement range of flux density		0.1 – 2·10^3 neutrons·s^{-1}·cm^{-2}	–
Typical sensitivity to Pu-Be radiation, (In flux density measurement mode)		10 cps/(neutrons·s^{-1}·cm^{-2})	1 cps/(neutrons·s^{-1}·cm^{-2})
Limits of tolerable intrinsic relative error	*dose rate*	–	±20%
	flux density	±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			

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