

Dosimeter-radiometer MKS-18 alpha, beta, X-ray, gamma and neutron radiation

Purpose

Portable multifunctional professional device is intended to measure (depending on the set of radiation detectors):

- ambient dose equivalent rate and $H^*(10)$ and ambient dose equivalent $H^*(10)$ of continuous gamma-radiation;
- ambient dose equivalent rate and $H^*(10)$ and ambient dose equivalent $H^*(10)$ of X-ray and gamma-radiation (including pulse);
- ambient dose equivalent rate and $H^*(10)$ and ambient dose equivalent $H^*(10)$ of neutron-radiation;
- flux density of alpha-, beta-, gamma-radiation.

Features:

- consists of radiation detector (depending on the type of ionization radiation) and one of consoles (at the Customer's choice): UIK-09 (a metal case, built-in accumulator block), UIK-10 (a plastic case, built-in accumulator block, OLED-display), UIK-11 (a plastic case, built-in accumulator block, LCD-display).
- console UIK-09 (at the Customer's choice) can be equipped with an embedded detector BDBG-201-RS, which expands the functionality;
- automatic detection of the type of the connected detector and activation of measurement modes for this type of detector;
- a possibility to select the measurement algorithm and set the threshold setting for each measurement mode;
- audible and visual alarms of exceeding the limits during measurements;
- simplicity and reliability, the ability to equip with additional detector;
- a short time of measurement and fast automatic adaption to change in radiation situation;
- unique algorithms of search, localization of sources and fields of ionization radiation;
- work in a wide range of temperatures in the field, carrying logs of wells and boreholes
- radiation survey of the area with geo-references, stored in the nonvolatile memory of up to 4000 measurement results with possibility of transfer to PC and imposition to electronic maps (additional option);
- embedded communication module Bluetooth which provides data exchange between console and detector by auxiliary device MOB-01 (additional option).



MKS-18: UIK-09 with embedded detector BDBG-201-RS (additional option)



Console UIK-10, UIK-11



BDZA-96-RSF

α



BDZA-96t-RS

α



BDZA-96d-RSF

α



BDZB-96-RSF

β



BDZB-96b-RS

β



BDZB-96s-RS

β



BDZB-400-RSF

β



BDKS-96s-RS

γ,β,α



BDKS-96-RS

x,γ



BDMG-96-RS

γ



BDMN-96-RSF

n



BDKN-96-RS

n



BDPS-96-RSF

α, β



BDVG-96-RSF

γ



BDBG-96s-RSF

γ



BDPG-96-RSF

γ



BDKG-96-RS

γ

Main technical characteristics

Measurement console			
	UIK-09	UIK-10	UIK-11
Power supply	accumulators, not less 5300 mA·h (1 pcs)	Li-ion battery, not less 3100 mA·h (1 pcs)	accumulators, AA, not less 1900 mA·h (3 pcs)
Type of case	steel		plastic
Operating supply voltage, V	3,7		4,2
Sound alarm	✓	✓	✓
Embedded GPS-sensor	✓	✓	✓
Embedded communication module Bluetooth which provides data exchange between console and detector by auxiliary device MOB-01	✓	✓	✓
Type of display	OLED		LCD
Embedded in the console detector BDBG-201-RS	✓	-	-
Degree of protection	IP 67		IP 54
Operating temperature range	from minus 40 °C to 50 °C		from minus 20 °C to 50 °C
Dimensions, mm	125×190×86	165×80×50	165×80×50
Weight, kg	1,4	0,4	0,4

Alpha radiation detectors			
	BDZA-96-RSF	BDZA-96d-RSF	BDZA-96t-RS
Type of registered radiation	flux density of α -radiation		
Energy range of registered alpha particles	4 MeV – 7 MeV		
Measurement range of alpha particles flux density, $\text{min}^{-1}\cdot\text{cm}^{-2}$	0,1 – 1·10 ⁵	0,1 – 3·10 ⁴	0,1 – 1·10 ⁶
Measurement range of alpha surface activity, $\text{Bq}\cdot\text{cm}^{-2}$	0,01 - 3·10 ³	0,01-1·10 ³	0,01-3·10 ⁴
Limits of tolerable intrinsic relative error, %	$\pm (20 + 5/Ax)^1$		
Typical sensitivity, $\text{s}^{-1}\cdot\text{min}\cdot\text{cm}^2$, no less	0,40	0,6	0,04
Active area of detector, cm^2	70	110	5
Type of detector	scintillation ZnS(Ag)		semiconductor
Registration efficiency of alpha-radiation ²³⁹ Pu, no less	45 %		
Own background, $\text{min}^{-1}\cdot\text{cm}^{-2}$, no more than	0,3		0,1
Protection class	IP 67	IP 54	
Operating temperature range	from minus 40 °C to 50 °C		
Dimensions, mm	Ø 120 × 140	130×180×100	Ø 50 × 60
Weight, kg	1,0	1,5	0,2

Beta radiation detectors				
	BDZB-96-RSF	BDZB-96b-RS	BDZB-96s-RS	BDZB-400-RSF
Type of registered radiation	flux density of β -radiation			
Energy range of registered beta particles	from 0,12 to 3,5 MeV			
Measurement range of beta particles flux density, $\text{min}^{-1}\cdot\text{cm}^{-2}$	1-5·10 ⁵	5-1·10 ⁴	5-1·10 ⁵	5-1·10 ⁵
Measurement range of beta surface activity, $\text{Bq}\cdot\text{cm}^{-2}$	0,1-3·10 ²	0,1-3·10 ²	0,1-3·10 ³	0,1-3·10 ³
Limits of tolerable intrinsic relative error, %	$\pm (20 + 5/Ax)^2$			
Typical sensitivity, $\text{s}^{-1}\cdot\text{min}\cdot\text{cm}^2$, no less	0,15	0,50	0,10	2,56
Active area of detector, cm^2	28	80	15	330
Type of detector	scintillation plastic detector	CБТ-10 - 2 pcs	scintillation plastic detector	
Registration efficiency of beta-radiation ⁹⁰ Sr+ ⁹⁰ Y, no less	45 %			
Own background, $\text{min}^{-1}\cdot\text{cm}^{-2}$, no more than	20			
Protection class	IP 54	IP 67	IP 54	
Operating temperature range	from minus 40 °C to 50 °C			
Dimensions, mm	Ø 90 × 130	130×180×120	Ø 65 × 65	170 x 280 x60
Weight, kg	0,9	1,5	0,3	2,7

Alpha and beta radiation detectors	
	BDPS-96-RSF
Type of registered radiation	flux density of α - and β -radiation
Energy range of registered alpha particles, MeV	from 4,0 to 7,0
Energy range of registered beta particles, MeV	from 0,12 to 3,5
Measurement range of alpha particles flux density, $\text{min}^{-1}\cdot\text{cm}^{-2}$	from 0,1 to 1·10 ⁵
Measurement range of alpha surface activity, $\text{Bq}\cdot\text{cm}^{-2}$	from 0,01 to 3·10 ³
Measurement range of beta surface activity, $\text{Bq}\cdot\text{cm}^{-2}$	from 1 to 5·10 ⁵

¹ For alpha-radiation sources with a radionuclide ²³⁹Pu.

² For beta-radiation sources with a radionuclide ⁹⁰Sr+⁹⁰Y.

Диапазон измерения поверхностной активности бета-излучения, Bq·cm ⁻²	from 0,1 to 3·10 ³
Limits of tolerable intrinsic relative error of alpha-radiation, %	± (20 + 5/Ax) ³
Limits of tolerable intrinsic relative error of alpha-radiation, %	± (20 + 5/Ax) ⁴
Typical sensitivity, s ⁻¹ ·min·cm ² , no less:	
• alpha-channel	0,10
• beta-channel	0,10
Own background:	
• alpha-radiation, min ⁻¹ ·cm ⁻² , no more than	0,3
• beta-radiation, min ⁻¹ ·cm ⁻² , no more than	20
Active area of detector, cm ²	28
Type of detector	scintillation ZnS(Ag)
Protection class	IP 54
Operating temperature range	from minus 40 °C to 50 °C
Dimensions, mm	Ø 90 × 130
Weight, kg	1,2

Gamma radiation detectors

	BDMG-96-RS	BDBG-201-RS ⁵	BDVG-96-RSF	BDPG-96-RSF	BDBG-96s-RSF	BDKG-96-RS
Type of registered radiation	ADER γ, ADE γ		ADER γ, FD γ		ADER γ, ADE γ FD γ	Exposure dose rate γ Flux γ
Energy range of registered gamma particles	from 50 keV to 3 MeV					
Measurement range of ambient dose equivalent rate H*(10)	0,05 μSv/h - 10 Sv/h		0,03-30 μSv/h	0,03-300 μSv/h	0,005-100 μSv/h	-
Measurement range of ambient dose equivalent H*(10)	0,1 μSv-10 Sv		-	-	0,1 μSv-10 Sv	-
Measurement range of gamma particles flux density, s ⁻¹ ·cm ⁻²	-	-	3-2400	3-3·10 ⁴	1-8000	-
Measurement range of gamma exposure dose rate, μR/h	-	-	-	-	-	5-1·10 ⁴
Measurement range of gamma flux, s ⁻¹	-	-	-	-	-	20-4·10 ⁴
Limits of tolerable intrinsic relative error, %	± (15 + 5/Ax) ⁶		± 15			
Typical sensitivity, no less	4,0 s ⁻¹ ·μSv ⁻¹ ·h (sens.subrange) 4,0 s ⁻¹ ·mSv ⁻¹ ·h (rough subrange)		2500 s ⁻¹ ·μSv ⁻¹ ·h	400 s ⁻¹ ·μSv ⁻¹ ·h	400 s ⁻¹ ·μSv ⁻¹ ·h	1,5 s ⁻¹ ·μR ⁻¹ ·h
Active area of detector	-	-	Ø 63 × 63 mm	Ø 25 × 40 mm	Ø 25 × 40 mm	Ø 18 × 30 mm
Type of detector	СБМ-20 Gamma-1- 1	-	Monocrystal NaI(Tl)	Monocrystal NaI(Tl)	Monocrystal NaI(Tl)	СБМ-20 Gamma-1- 1
Protection class	IP 67			IP 54	IP 67	IP 54
Operating temperature range	from minus 40 °C to 50 °C					
Dimensions, mm	Ø 40 × 235	-	Ø 90 × 180	480×191×50	Ø 40 × 180	Ø 38 × 400
Weight, kg	0,3	-	3,0	1,0	1,0	2,0

Gamma-, beta, alpha- radiation detectors

	BDKS-96s-RS
Type of registered radiation	ADER γ, ADE γ, FD α, FD β
Energy range of registered alpha particles, MeV	from 4,0 to 7,0
Energy range of registered beta particles, MeV	from 0,12 to 3,5
Energy range of registered gamma particles	from 50 keV to 3 MeV
Measurement range of alpha particles flux density, min ⁻¹ ·cm ⁻²	from 1 to 1·10 ⁵
Measurement range of alpha surface activity, Bq·cm ⁻²	from 0,1 to 3·10 ³

³ For alpha-radiation sources with a radionuclide ²³⁹Pu.

⁴ For beta-radiation sources with a radionuclide ⁹⁰Sr+⁹⁰Y.

⁵ An embedded radiation detector in measurement console UIK-09

⁶ For gamma-radiation sources with a radionuclide ¹³⁷Cs

Measurement range of beta particles flux density, $\text{min}^{-1}\cdot\text{cm}^{-2}$	from 1 to $5\cdot 10^5$
Measurement range of alpha surface activity, $\text{Bq}\cdot\text{cm}^{-2}$	from 0,1 to $3\cdot 10^3$
Measurement range of ambient dose equivalent rate $H^*(10)$	from 0,1 $\mu\text{Sv}/\text{h}$ to 1 mSv/h
Measurement range of ambient dose equivalent $H^*(10)$	from 0,1 μSv to 10 Sv
Limits of tolerable intrinsic relative error of alpha-radiation, %	$\pm (30 + 5/Ax)^7$
Limits of tolerable intrinsic relative error of beta-radiation, %	$\pm (20 + 5/Ax)^8$
Limits of tolerable intrinsic relative error of gamma-radiation, %	$\pm (20 + 5/Ax)^9$
Typical sensitivity, no less:	
• alpha-channel, $\text{s}^{-1}\cdot\text{min}\cdot\text{cm}^2$:	0,04
• beta-channel, $\text{s}^{-1}\cdot\text{min}\cdot\text{cm}^2$:	0,10
• gamma-channel, $\text{s}^{-1}\cdot\mu\text{Sv}^{-1}\cdot\text{h}$:	4,0
Own background during measurement:	
• alpha-radiation, $\text{min}^{-1}\cdot\text{cm}^{-2}$, no more than	0,3
• beta-radiation, $\text{min}^{-1}\cdot\text{cm}^{-2}$, no more than	20
Active area of detector (Counter type Beta-2), cm^2	15
Type of detector	Counter type Beta-2 Counter type Beta-2m
Protection class	IP 54
Operating temperature range	from minus 40 °C to 50 °C
Dimensions, mm	$\varnothing 80 \times 80$
Weight, kg	0,4

X-ray and gamma radiation detector

	BDKS-96-RS
Type of registered radiation	ADER, ADE x, γ
Energy range of registered X-ray and gamma-radiation	from 15 keV to 10 MeV
Measurement range of ambient dose equivalent rate $H^*(10)$ of registered X-ray and gamma-radiation	0,01 $\mu\text{Sv}/\text{h}$ -30 Sv/h
Measurement range of ambient dose equivalent $H^*(10)$ of registered X-ray and gamma-radiation	0,1 μSv -10 Sv
Limits of tolerable intrinsic relative error, %	$\pm (15 + 5/Ax)^7$
Typical sensitivity, no less:	
• sensitive subrange, $\text{s}^{-1}\cdot\mu\text{Sv}^{-1}\cdot\text{h}$	8,0
• rough subrange, $\text{s}^{-1}\cdot\text{mSv}^{-1}\cdot\text{h}$	4,0
Active area of detector, mm^2	$\varnothing 30 \times 15$
Type of detector	Tissue equivalent scintillation detector
Protection class	IP 67
Operating temperature range	from minus 40 °C to 40 °C
Dimensions, mm	$\varnothing 60 \times 235$
Weight, kg	1,0

Neutron radiation detector

	BDMN-96-RSF	BDKN-96-RS
Type of registered radiation	ADER, ADE, FD n	
Energy range of registered neutron-radiation	from 0,025 eB to 14 MeV	
Measurement range of ambient dose equivalent rate $H^*(10)$ of neutron-radiation	0,1 $\mu\text{Sv}/\text{h}$ -0,1 Sv/h	
Measurement range of ambient dose equivalent $H^*(10)$ of neutron-radiation	0,1 μSv -10 Sv	
Measurement range of flux density of neutron-radiation	$0,1\text{-}1\cdot 10^5 \text{ s}^{-1}\cdot\text{cm}^{-2}$	
Limits of tolerable intrinsic relative error, %	$\pm (20 + 5/Ax)^{11}$	
Energy dependence, %	± 40	not standardized
Typical sensitivity, no less	0,40 $\text{s}^{-1}\cdot\mu\text{Sv}^{-1}\cdot\text{h}$	1,0 $\text{s}^{-1}\cdot\mu\text{Sv}^{-1}\cdot\text{h}$
Own background	0,03 $\mu\text{Sv}/\text{h}$ ($\text{s}^{-1}\cdot\text{cm}^{-2}$)	
Active area of detector, mm	$\varnothing 30 \times 5$	$\varnothing 18 \times 140$
Type of detector	thermal neutron detector (in polyethylene moderator, ball $\varnothing 240$ mm)	slow neutron counter filled with ^3He (in polyethylene moderator, cylinder $\varnothing 100$ mm)
Protection class	IP 67	
Operating temperature range	from minus 40 °C to 50 °C	
Dimensions, mm	240 \times 310 \times 290	295 \times 156 \times 100
Weight, kg	8,3	2,5

⁷ For measuring range FD α : 1-30 $\text{min}^{-1}\cdot\text{cm}^{-2}$; surface activity α : 0,1-3 $\text{Bq}\cdot\text{cm}^{-2}$

⁸ For measuring range FD α : 30-1 $\cdot 10^5 \text{ min}^{-1}\cdot\text{cm}^{-2}$; surface activity α : 3-3 $\cdot 10^3 \text{ Bq}\cdot\text{cm}^{-2}$

⁹ For beta-radiation sources with a radionuclide $^{90}\text{Sr}+^{90}\text{Y}$.

¹⁰ For gamma-radiation sources with a radionuclide ^{137}Cs

¹¹ For radiation of Pu- α -Be neutron sources