

## MKS-UM

**NATO Stock Number (NSN) 6665 12 408 7282 (for the model SVGps)**

**Measurement of alpha, beta, gamma and X-ray radiation**

**Solar panel, integrated GPS receiver**

**Wide operating temperature range from minus 30 °C to + 55 °C**

**Display temperature resistance + 95 °C**

**Complies with MIL-STD-810G, MIL-STD-461F standards**

**Complies with IEC 60846, IEC 60325 standards**



### FEATURES

- Gas-discharge Geiger-Muller counters without return run of counting response
- Silicon beta radiation detector
- Possibility to measure ambient dose equivalent rate (DER) of gamma radiation with the detector which is built in the control unit
- Automatic selection between measurement intervals and ranges
- Audio signaling of each registered gamma-quantum or beta particle
- Backlight of display and control buttons for operation in the dark
- Rechargeable Li-Ion battery charging by the built-in charger from:
  - solar panel
  - 12 V automobile battery
  - industrial network 220 V/50 Hz
- Multilevel indication of battery discharge
- Analog indicator of radiation intensity
- IP56 of control unit and IP57 of detecting units
- Logging of up to 1 500 measurement results tagged to location coordinates in the non-volatile memory via USB/IrDA adapter to the PC (built-in GPS receiver)
- Viewing of logged measurement results on the display
- Easy to operate even if wearing personal protection – rubber gloves



### DESCRIPTION

MKS-UM is a full-range radiation survey device in the field environment, which measures alpha, beta, gamma and X-ray radiation. The gamma radiation dose rate is measured from the background to emergency levels. High protection rating and a hard shell allow using the device in harsh climatic and dusty conditions.

### PURPOSE OF USE

- Measurement of ambient dose equivalent rate (DER) of gamma and X-ray radiation
- Measurement of ambient dose equivalent (DE) of gamma and X-ray radiation
- Measurement of beta-particles surface flux density and beta-particles surface activity
- Measurement of alpha-particles surface flux density and alpha-particles surface activity
- Measurement of accumulation time of gamma and X-ray radiation DE
- Archive of measurement results tagged to location coordinates

## SPECIFICATIONS

Specifications of the control unit of the MKS-UM dosimeter-radiometer	
Measurement range of photon-ionizing radiation DER	$10^{-1} \dots 10^6 \mu\text{Sv/h}$
Indication range of pulse count rate from gamma radiation detector	0 ... 9 999 cps
Measurement range of photon-ionizing radiation DE	0.001 ... 9 999 mSv
Main relative permissible error limit during DER measurement at $^{137}\text{Cs}$ calibration with 0.95 confidence probability	$(15+2/H^*(10)) \%$ , where $H^*(10)$ is a dimensionless quantity, numerically equal to DER value measured in $\mu\text{Sv/h}$
Main relative permissible error limit during DE measurement at $^{137}\text{Cs}$ calibration with 0.95 confidence probability	15 %
Energy range of recorded photon-ionizing radiation	0.05 ... 3 MeV
Energy dependence during photon-ionizing radiation DER and DE measurement in the energy range from 0.05 MeV to 1.25 MeV, relative to 0.662 MeV energy, not more	$\pm 30 \%$
Measurement range of DE accumulation time	1 min ... 9 999 hrs
Accuracy of DE accumulation time measurement for 24 hrs	$\pm 1$ min
Operating supply voltage of the dosimeter from Li-Ion storage battery (4 000 mAh)	3.7 V
Additional relative permissible error limit during measurement caused by supply voltage deviation from the reference value in the voltage range from 3.4 V to 4.2 V, for all measured physical quantities, not more	5 %
Additional relative permissible error limit during measurement caused by deviation of environmental temperature from 20 °C in the temperature variation range from minus 30 °C to + 55 °C	5 % per each 10 °C deviation from 20 °C
Operating mode setup time while the control unit is exposed to photon-ionizing radiation with DER equal to 5 $\mu\text{Sv/h}$ , not more	5 min
Time of continuous operation of the dosimeter powered from a fully charged, Li-Ion battery of 4 000 mAh capacity under normal climatic conditions	
- at gamma background up to 0.5 $\mu\text{Sv/h}$ when ABG/BG probes are disconnected and the display backlight and GPS-receiver are switched off, not less	1 200 hrs
- at gamma background up to 0.5 $\mu\text{Sv/h}$ when ABG/BG probes are disconnected, the display backlight and GPS-receiver are switched on, not less	70 hrs
- when ABG or BG probe is connected in the mode of any radiation type measurement, the display backlight and GPS-receiver are switched off, not less	300 hrs
- when ABG or BG probe is connected in the mode of any radiation type measurement, the display backlight and GPS-receiver are switched on, not less	50 hrs
Unstable readings of the dosimeter during DER measurement for an 8-hour continuous operation, not more	5 %
Dimensions of the control unit (in hard shell with solar panel), not more	166 × 70 × 132 mm
Weight of the control unit, not more	0.75 kg
Weight of the control unit (in hard shell with solar panel), not more	1.3 kg
Specifications of the BDKS-01 combined detecting unit of gamma, beta radiation (BG Probe)	
Measurement range of photon-ionizing radiation DER	$10^{-1} \dots 10^7 \mu\text{Sv/h}$
Indication range of pulse count rate from gamma radiation detector	0 ... 9 999 cps
Main relative permissible error limit during photon-ionizing radiation DER measurement at $^{137}\text{Cs}$ calibration with 0.95 confidence probability	$(15+2/H^*(10)) \%$ , where $H^*(10)$ is a dimensionless quantity, numerically equal to DER value measured in $\mu\text{Sv/h}$
Energy range of recorded photon-ionizing radiation	0.05 ... 3 MeV
Additional relative permissible error limit during measurement of photon-ionizing radiation DER caused by deviation of environmental temperature from 20 °C in the temperature variation range from minus 30 °C to + 55 °C	5 % per each 10 °C deviation from 20 °C

Operating mode setup time while the BG probe is exposed to photon-ionizing radiation with DER equal to 5 µSv/h, not more	1 min
Operating mode setup time when measuring surface beta-particles flux density and surface activity of beta-emitting radionuclides, not more	1 min
Measurement range of surface beta-particles flux density	10 ... 200 000 part./cm <sup>2</sup> ·min)
Measurement range of surface activity of beta-emitting radionuclides	0.5 ... 9 000 Bq/cm <sup>2</sup> for C0 source type ( <sup>90</sup> Sr/ <sup>90</sup> Y) (efficiency of C0 type sources is 0.377)
Indication range of pulse count rate from beta radiation detector	0 ... 9 999 cps
Energy range of recorded beta radiation	0.3 ... 3 MeV
Main relative permissible error limit during measurement of surface beta-particles flux density in the range from 10 part./cm <sup>2</sup> ·min) to 200 000 part./cm <sup>2</sup> ·min) at <sup>90</sup> Sr/ <sup>90</sup> Y calibration with 0.95 confidence probability	(20+200/Fβ) %, where Fβ is a dimensionless quantity, numerically equal to surface beta-particles flux density value measured in part./cm <sup>2</sup> ·min)
Main relative permissible error limit during measurement of surface activity of beta-emitting radionuclides in the range from 0.5 Bq/cm <sup>2</sup> to 9 000 Bq/cm <sup>2</sup> at <sup>90</sup> Sr/ <sup>90</sup> Y calibration with 0.95 confidence probability from C0 type source	(20+10/Aβ) %, where Aβ is a dimensionless quantity, numerically equal to surface activity of beta-emitting radionuclides value measured in Bq/cm <sup>2</sup>
Area of the detector's sensitivity	1 cm <sup>2</sup>
Beta-particles recording efficiency, not less - for <sup>14</sup> C isotope - for <sup>204</sup> Tl isotope - for <sup>90</sup> Sr/ <sup>90</sup> Y isotope	- - 0.25
Additional relative permissible error limit during measurement of surface beta-particles flux density and surface activity of beta-emitting radionuclides caused by variation of environmental temperature from minus 30 to + 55 °C	5 % per each 10 °C of deviation from 20 °C
Unstable readings during measurement of all physical quantities for an 8-hour continuous operation, not more	5 %
Dimensions of the BG probe, not more	∅ 47 × 96 × 176 mm
Weight of the BG probe, not more	0.3 kg
<b>Specifications of the BDKS-02 combined detecting unit of alpha, beta, gamma radiation (ABG Probe)</b>	
Measurement range of photon-ionizing radiation DER	10 <sup>-1</sup> ... 2·10 <sup>6</sup> µSv/h
Indication range of pulse count rate from photon-ionizing radiation detector	0 ... 9 999 cps
Main relative permissible error limit during measurement of photon-ionizing radiation DER at <sup>137</sup> Cs calibration with 0.95 confidence probability	(15+2/H*(10)) %, where H*(10) is a dimensionless quantity, numerically equal to DER value measured in µSv/h
Energy range of detected photon-ionizing radiation	0.05 ... 3 MeV
Additional relative permissible error limit during measurement of photon-ionizing radiation DER caused by deviation of environmental temperature from 20 °C in the temperature variation range from minus 30 °C to + 55 °C	5 % per each 10 °C of deviation from 20 °C
Setup time of operating mode while the ABG Probe is exposed to photon-ionizing radiation with DER equal to 5 µSv/h, not more	1 min
Setup time of operating mode when measuring beta-particles flux density and surface activity of beta-emitting radionuclides, not more	1 min
Measurement range of surface beta-particles flux density	10 ... 300 000 part./cm <sup>2</sup> ·min)
Measurement range of surface activity of beta-emitting radionuclides	0.5 ... 13 500 Bq/cm <sup>2</sup> for C0 source type ( <sup>90</sup> Sr/ <sup>90</sup> Y) (efficiency of C0 type sources is 0.377)
Indication range of pulse count rate from beta radiation detector	0 ... 9 999 cps
Energy range of detected beta-particles	0.15 ... 3 MeV
Area of the detector's sensitivity	7 cm <sup>2</sup>

Main relative permissible error limit during measurement of surface beta-particles flux density in the range from 10 to 300 000 part./.(cm <sup>2</sup> ·min) at <sup>90</sup> Sr/ <sup>90</sup> Y calibration with 0.95 confidence probability	$(20+200/F\beta) \%$ , where Fβ is a dimensionless quantity, numerically equal to surface beta-particles flux density value measured in part./.(cm <sup>2</sup> ·min)
Main relative permissible error limit during measurement of surface activity of beta-emitting radionuclides in the range from 0.5 to 13 500 Bq/cm <sup>2</sup> at <sup>90</sup> Sr/ <sup>90</sup> Y calibration with 0.95 confidence probability from standard source of C0 type	$(20+10/A\beta) \%$ , where Aβ is dimensionless quantity, numerically equal to surface activity of beta-emitting radionuclides value measured in Bq/cm <sup>2</sup>
Beta-particles detection efficiency, not less - for <sup>14</sup> C isotope - for <sup>204</sup> Tl isotope - for <sup>90</sup> Sr/ <sup>90</sup> Y isotope	- 0.4
Additional relative permissible error limit during measurement of surface beta-particles flux density and surface activity of beta-emitting radionuclides caused by variation of environmental temperature from minus 30 to + 55 °C	± 5 % per each 10 °C of deviation from 20 °C
Measurement range of surface alpha-particles flux density	10 ... 300 000 part./.(cm <sup>2</sup> ·min)
Measurement range of surface activity of alpha-emitting radionuclides	0.5 ... 10 000 Bq/cm <sup>2</sup> for П9 source type ( <sup>239</sup> Pu) (efficiency of П9 type sources is 0.490)
Energy range of detected alpha-particles	4 ... 8 MeV
Indication range of pulse count rate from alpha radiation detector	0 ... 9 999 cps
Main relative permissible error limit during measurement of surface alpha-particles flux density in the range from 10 to 300 000 part./.(cm <sup>2</sup> ·min) at <sup>239</sup> Pu calibration with 0.95 confidence probability	$(15+300/Fa) \%$ , where Fa is a dimensionless quantity, numerically equal to surface alpha-particles flux density value measured in part./.(cm <sup>2</sup> ·min)
Main relative permissible error limit during measurement of surface activity of alpha-emitting radionuclides in the range from 0.5 to 10 000 Bq/cm <sup>2</sup> at <sup>239</sup> Pu calibration with 0.95 confidence probability from standard source of П9 type	$(15+15/Aa) \%$ , where Aa is a dimensionless quantity, numerically equal to surface activity of alpha-emitting radionuclides value measured in Bq/cm <sup>2</sup>
Area of the detector's sensitivity	7 cm <sup>2</sup>
Alpha-particles detection efficiency from <sup>239</sup> Pu isotope, not less	0.06
Additional relative permissible error limit during measurement of surface alpha-particles flux density and surface activity of alpha-emitting radionuclides caused by variation of environmental temperature from minus 30 °C to + 55 °C	5 % per each 10 °C of deviation from 20 °C
Setup time of operating mode when measuring alpha-particles flux density and surface activity of alpha-emitting radionuclides, not more	1 min
Unstable readings during measurement of all physical quantities during an 8-hour continuous operation, not more	5 %
Dimensions of the ABG probe, not more	72 × 186 × 53 mm
Weight of the ABG probe, not more	0.7 kg





BG probe



ABG probe



Control unit



## DELIVERY KIT

- control unit
- BDKS-01 combined detecting unit of gamma, beta radiation (BG probe)
- BDKS-02 combined detecting unit of alpha, beta, gamma radiation (ABG probe)
- earpiece
- cable
- spare parts set
- tools and accessories (hoop, 2 carrying straps, telescopic tube armrest, telescopic tube, carrying case, USB/IrDA adapter, solar panel, power cable DC, hard shell, screwdriver, power supply unit with AC cord)
- set of operational documents (operating manual, logbook, software and USB/IrDA drives on CD-R mini)
- package

THE DELIVERY KIT MAY BE COMPLETED UPON CUSTOMER'S REQUEST

## BRANCHES OF USE



RADIOLOGICAL LABORATORIES



RADIOACTIVE WASTE STORAGE SITES



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