Multipurpose Hand-Held Radiation Monitor/Identifier PM1401K-3

PM1401K-3 is the smallest and the most lightweight instrument in the world, which is capable to operate simultaneously as an alarming device, search instrument, survey meter, spectrometer and identifier.

Operation Principle

Instrument performs continuous measurement of ambient dose equivalent rate of gamma and X-ray radiation in the wide energy range, monitors alpha, beta and neutron (PM1401K-3, PM1401K-3P, PM1401K-3E) radiation, operates as spectrometer of gamma radiation and radioisotope identifier (PM1401K-3, PM1401K-3P, PM1401K-3M), and measures food/soil contamination with ^{137}Cs radionuclide (PM1401K-3, PM1401K-3M, PM1401K-3P).
Instrument is equipped with built-in audible and visual alarms, GPS module, USB interface for PC communication. Non-volatile memory allows recording and storing up to 10 000 events. PM1401K-3 has compact size and lightweight, bright and color LCD, shockproof hermetic case and can be used in both indoor and outdoor environments.

Modifications:

- PM1401K-3 – basic model is equipped with built-in alpha, beta, gamma and neutron detectors;
- PM1401K-3M – modification is equipped with built-in alpha, beta and gamma detectors, without neutron detection capabilities;
- PM1401K-3P – modification is equipped with built-in alpha, beta, gamma and neutron (based on three scintillation units) detectors;
- PM1401K-3E – gamma-neutron modification without functions of ^{137}Cs activity measurement and radionuclides indetification.

Standard Delivery Set

- The PM1401K-3 instrument
- Protective case
- Set of spacer rings (for α-, β-radiation measurement)
- Set of α-radiation filters (for α-, β-radiation measurement)
- USB Power Cable (for PC-communication and recharging and rechargable batteries)
- AA-LR6 batteries (2 pcs.)
- Belt Clip
- Operation Manual and Software Guide (CD-ROM)
- Calibration and Warranty Certificates

Optional Accessories

- External vibrator with the wristband (for operation in noisy environment and/or performing a hidden search)
- Calibration cap (for energy calibration check and calibration)
- Telescopic extension pole (for operating the instrument in remote and hard-to-reach areas);
- Additional neutron moderator (increases the instrument sensitivity to neutron radiation);
- Tripod (for measurement of the ^{137}Cs activity in solid/food water);
- Protective holster (for protection of the instrument)
- Set of Marinelli beakers (for measurement of the ^{137}Cs activity in soil/food water).

Application

- Illicit Trafficking of Nuclear and Radioactive Materials
- Inspection of Raw Materials, Waste & Goods
- Surface Contamination
- Inspection of Raw Materials, Waste & Goods

Standards Compliance

Designed to meet ANSI N42.33 -2006, ANSI 42.34 - 2006, IEC 62327: 2006, ANSI N42.48 - 2008, ANSI N42.42: 2012 requirements

Specifications

Detector	CsI(Tl), GM, He-3
DER indication range	from 0.01 μSv/h to 200 mSv/h
DER measurement accuracy	±(15 + 0.0015 / Ḣ) %; where Ḣ - measured dose equivalent rate value in mSv/h (in the range from 0.1 μSv/h to 100 mSv/h)
Energy range	0.015 – 15 MeV (for gamma radiation)
Energy range:	
within the range of energies from 0.015 to 0.045 MeV	± 40 %;
within the range of energies from 0.045 to 15.0 MeV	± 30 %
Neutron count rate	from thermal to 14MeV
of β- radiation flux	0.15 – 3.5 MeV
Sensitivity, gamma radiation:	
for ^{241}Am in a Search mode	≥ 200.0 s^{-1}/(μSv/h)
for ^{137}Cs in a Search mode	≥ 200.0 s^{-1}/(μSv/h)
for ^{137}Cs in activity measurement mode	≥ 0,003 pulses·kg/s(cps·l/s)·Bq
Indication range:	
gamma (in a search mode)	1 – 9999 cps
neutron (in a search mode)	0.01 – 999 cps
Sensitivity, neutron radiation:	
for Pu-α-Be	≥ 0.09 pulses·cm^2
for thermal neutrons	≥ 4.0 pulses·cm^2
for Pu-α-Be (with neutron moderator)	≥ 0.6 pulses·cm^2
Count rate indication range in the search mode	1.00 – $2.7 \cdot 10^5$ s^{-1} - α-, β-, γ-radiation
Sensitivity to α-radiation (for Pu-239)	≥ 0.5 pulses·cm2
α-radiation flux density measurement range	15.0 to 10^5 $min^{-1} \cdot cm^{-2}$
α- radiation flux density accuracy:	
in 200 μR/h gamma radiation field	± 30 %
in $3.0 \cdot 10^3$ s^{-1} β-radiation field from the ^{90}Sr+^{90}Y source placed at 50 mm from the mica window of the detector	± 15 %
α- radiation flux density accuracy:	
on ^{239}Pu in the range from 15.0 to 10^5 $min^{-1} \cdot cm^{-2}$	±(20 + 450/φ) %, where φ – measured α-radiation flux density, $^{-1} \cdot cm^{-2}$
β- radiation flux density measurement range	6.0 to 10^5 $min^{-1} \cdot cm^{-2}$

β- radiation flux density accuracy:	
on $^{90}Sr+^{90}Y$	± (20 + 60/φ) %, where φ - measured β-radiation flux density, $min^{-1}\cdot cm^{-2}$
Sensitivity for β-radiation:	
for $^{90}Sr+^{90}Y$	≥ 3.5 pulses·cm^2
Activity measurement sample density range	0.2 – 1.6 g/cm^3
The number of γ-radiation scintillation spectra saved in the instrument's memory	up to 1000
PC communication	USB interface
Power supply	3.0 (+ 0.2; -0.4) V; two AA batteries or USB
Battery lifetime:	
(in normal radiation background and provided LCD backlight, sound and light alarms are used no more than 5 minutes/day), at least	300 h.
Ingress protection	IP65
Drop test on concrete floor	0.7 m.
Operating temperature	-30 to up to +50 °C
Humidity	up to 95 % at 35 °C
Atmospheric pressure	from 84 to 106.7 kPa
Dimensions	262x60x65 mm
Weight	≤ 0.82 kg
Mean service lifetime	≥ 10 years