



Personal Dosimeter of Internal Exposure

The Mission Support model MS-DIE is designed as a personal dosimeter of internal exposure caused by inhalation of alpha- and beta-radioactive aerosols present in the air. It also operates as a personal continuous air monitor (CAM) by measuring volume activity of radioactive airborne particulates and Equilibrium Equivalent Concentration (EEC) of Rn-222 and Rn-220 progeny in real time, providing audio and visual alarms when preset thresholds are exceeded.

The dosimeter has a compact and lightweight design, which allows carrying it close to the breathing zone of the person during the performance of regular duties. The MS-DIE continuously samples air drawn to the monitor and measures airborne alpha and beta particulate activity deposited on membrane filter media. The advanced measurement algorithm then calculates the committed effective dose of internal exposure received by the operator during their work hours due to inhalation.

The weight of the instrument is only 450 g, which makes it the lightest and most convenient device of its kind in the world. The plastic case of the MS-DIE is rugged and designed for use in severe industrial environments and ease of decontamination. The built-in rechargeable lithium-ion battery is suitable for continuous operation during a whole working shift.

The MS-DIE is invaluable in applications where individual monitoring of personal inhalation exposure is needed: in controlled areas of nuclear power plants, mines and ore processing facilities, as an emergency monitor in case of accidents at NPPs and similar applications.

ADVANTAGES

- Insensitive to mechanical impacts and cell phone radiation
- Ultra compact and lightweight
- Support of Modbus-RTU communication protocol for ease of system integration to personal exposure monitoring systems
- Proprietary algorithm providing low false alarm rate
- Simple calibration procedure using electroplated check sources

FUNCTIONAL HIGHLIGHTS

- Automatic selection between Pu or natural U dose coefficients
- Measurement of flow rate and differential pressure on the membrane filter
- Real-time measurement of committed effective dose and airborne activity concentration
- Designed for group deployment and system integration

TYPICAL APPLICATIONS

- Uranium mining and mineral processing
- Occupational safety and workplace monitoring
- Nuclear fuel cycle industry and Nuclear Power Plants
- Environmental monitoring





Specifications

Radiological		Operational and mechanical	
Airborne activity concentration measurement range — alpha	from 0,1 to 1×10^7 Bq/m ³	Membrane filter type	Ø25 mm Alpha-Spectra-d25
Airborne activity concentration measurement range — beta	from 2 to 1×10^7 Bq/m ³	Flow rate, not less	1,2 l/min
Energy range — alpha	from 2,5 to 10 MeV	Case protection	IP65 (excluding air inlet/outlet)
Energy range — beta	from 100 keV to 2,5 MeV	Size, mm	57×80×164
Relative error, alpha-active particulates $0,1 \div 5$ Bq/m ³	less than ±50%	Weight, g	450
Relative error, alpha-active particulates $5 \div 1 \times 10^7$ Bq/m ³	less than ±15%	Operation time from one battery charge (pump ON), not less	8 hours
Relative error, beta-active particulates $2 \div 10$ Bq/m ³	less than ±50%	Data communication interfaces	RS-485, USB
Relative error, beta-active particulates $10 \div 10^7$ Bq/m ³	less than ±15%	Environmental	
Committed effective dose of internal exposure range — alpha	from 3 µSv to 10 Sv	Temperature range	from -20 to +50 °C
Committed effective dose of internal exposure range — beta	from 0,15 µSv to 1,5 Sv	Pressure	from 84,0 to 106,7 kPa
Dose coefficients used for estimation — alpha	²³⁹ Pu, ^U ²³⁸ automatically	Humidity	up to 95% at +40 °C
Dose coefficients used for estimation — beta	⁹⁰ Sr+ ⁹⁰ Y	Alpha-Spectra-d25 filter	
Relative error of equivalent dose, alpha $3 \div 50$ µSv	less than ±50%	Description	Homogeneous composite fiber material without through holes with membrane working layer
Relative error of equivalent dose, alpha $50 \mu\text{Sv} \div 10 \text{ Sv}$	less than ±15%	Diameter, mm	25±1
Relative error of equivalent dose, beta $0,15 \div 10 \mu\text{Sv}$	less than ±50%	Airflow resistance, at linear velocity 1 cm/sec, not more, Pa	50
Relative error of equivalent dose, beta $10 \mu\text{Sv} \div 1,5 \text{ Sv}$	less than ±15%	Filtration efficiency, 0,1 µm at 1 / 20 / 100 cm/sec, %	99,0 / 98,5 / 99,0
EEC measurement range — Radon (²²² Rn)	$1 \times 10^{-1} \div 2 \cdot 10^6$ Bq/m ³	Filtration efficiency, 0,4 µm at 1 / 20 / 100 cm/sec, %	99,9 / 99,5 / 99,9
EEC measurement range — Thoron (²²⁰ Rn)	$1 \times 10^{-1} \div 2 \cdot 10^6$ Bq/m ³	Surface density of the working layer, g/m ² , not more	1,0
		Working layer membrane fiber diameter, nm	80-150

* given the relative error of air flow rate measurement not more than ± 15 %

Specifications are subject to change without notice.

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