ENVIRONMENTAL RADIATION DETECTION

ENVINET

MONA–MOBILE SPECTROSCOPIC RADIATION DETECTION SYSTEM

MONA is ENVINET's mobile spectroscopic detection and survey system for vehicle or airborne use. It is able to detect smallest amounts of artificial radiation in the environment, coming from potential threats like nuclear incidents or accidents, non-authorized usage of sources used in medical application or in the industry, or other incidents in connection with radioactive materials, e.g. during transportation or in case of terroristic attacks. MONA is used by mobile emergency response teams for the detection and localization of radiation and contamination in the environment. The system acquires the gamma spectra and identifies the isotopes, calculates the total gamma dose rate as well as the dose rate for each identified nuclide. It compares the measured and calculated results against predefined alarm levels and uses GPS data to assign the actual monitoring location to the related data records and spectra. The complete data set is stored in a local database.

The nuclide-related data are displayed on an included mobile PC in the vehicle as color-coded tracks on a map, and are linked to spectra, waterfall diagrams, graphs and tables, thus easing the identification and localization of any contamination in the field. Measured tracks and isotope information can be transmitted to the monitoring center as well, using cellular networks like 3G or LTE (satellite as an option) in order to provide online information to radiation protection specialists and decision makers, to take action and manage countermeasures. The monitoring center based on ENVINET's server application NMC can display and compare survey results from numerous survey vehicles simultaneously.

MONA uses a high sensitive large volume NaI(Tl) scintillation detector. Optionally, the system can be extended with up to three auxiliary detector of smaller or larger size (max. 4 liter scintillator detector), e.g. to cover a larger range for spectroscopic measurements or to support airborne applications. If several spectroscopic gamma detectors are used directional information can be provided. A Geiger-Mueller based gamma dose rate detector for the high dose rate range and a neutron detector for neutron survey are available as an option, too.

MONA consists of two parts; the self-contained detection unit in a sealed cabinet and the mobile PC. The detection unit can be either installed outside the vehicle, typically on the roof of the car or inside of the vehicle. For additional protection and to avoid attracting attention, the detection unit can be integrated in a top box mounted on top of the car. No wired connection is needed between the detection units. The detection unit can be powered from its integrated rechargeable battery for approx. 24 hours.

FUNCTIONS

- Acquisition and storage of gamma spectra every cycle
- In-situ isotope identification
- Measurement of total gamma dose rate H*(10)
- Provision of nuclide-specific gamma dose rate H*(10)
- Online visualization on maps (tracking)
- Visible and audible alarms
- Storage and retrieval of survey data ("tracks")
- Data exports in different formats (ANSI N42.42, CSV)
- Display of data on tables, charts and waterfall diagram with 2D sectional views
- Two operation modes: "tracking" (mobile use) and "recording" (stationary use at fixed locations)
- Remote control from central station and online visualization on central station via remote desktop

FEATURES

- Real time detection and directional localization of very low artificial contamination because of spectrum measurements and analysis
- Fast acquisition (up to 0.1 s, depending on configuration) provides high spatial resolution
- Automatic energy calibration
- Stand-alone operation of detection unit
- Supervision of detectors and electronic devices

- No wiring between detector unit and PC due to
  - Wireless data link via WiFi
  - Integrated battery supply for autonomous operation
- Integrated GPS receiver
- Selectable monitoring intervals and alarm levels
- Map server with preinstalled OpenStreet maps
- Comprehensive track management and visualization
- Standardized data format ANSI N42.42
- Data transmission of tracks to monitoring center NMC
- Mobile PC including
  - Web based local data display with integrated GIS
  - Local database
  - LTE adapter for data export to monitoring center NMC
- Extendable with additional detectors (option)

PERFORMANCE SPECIFICATION

	Unit	MONA-100-303 (central unit) MONA-100-030 (aux. unit)	MONA-100-302 (central unit) MONA-100-020 (aux. unit)	MONA-100-301 (central unit) MONA-100-010 (aux. unit)
Spectroscopic detector				
Material		NaI(Tl)	NaI(Tl)	NaI(Tl)
Size	Inch	4x4x4	2x4x16	4x4x16
Detector volume	litre	1	2	4
Dose rate range[1]	µSv/h	0.001...50	0.001...25	0.001…12
Accuracy	%	+/-20	+/-20	+/-20
Energy resolution[1]	FWHM (guaranteed)	typ. 7.9 % (<8.5 %)		
Energy range	keV	30...3000		
Total efficiency[1]	cpm / µSv/h	457 900	904 000	1 604 000
Photopeak efficiency[1]	cpm / µSv/h	152 500	304 000	588 000
Intrinsic background	nSv/h	<5		
Acquisition interval		0.1 s or longer, depending on configuration		
MCA				
Number of channels		8192 (2048 used, depends on configuration)		
ADC	Bit	12		
Clock speed	MHz	16		
Environmental specification				
Operation temperature detector unit	°C °F	-40…+60 -40…+140		
IP class detector unit		IP68 (except battery compartment)		
Humidity detector unit	%	0…100		
Electrical specification				
Power central unit	W	5.8		
Supply voltage	V	10…16 V (min. 4 A for charging)		
EMC-proofed		EN55022:2006 + A1:2007 + A2:2010 Class B EN55024:1998 + A1:2001 + A2:2003		
Size and weight specification				
Dimension	mm	775 mm x 180 mm x 198 mm	1075 mm x 180 mm x 198 mm	1075 mm x 180 mm x 198 mm
Weight	kg	18	25	33
Comm. interface		WiFi, Ethernet, RS232 (Service), LTE (4G), Satellite (optional), other on request		
Option additional Geiger Mueller tube (GM)				
Detector		MIRA-100-L (details s. MIRA data sheet)		
Range	mSv/h	0.000 01..10 000		
Option additional He-3 detector				
Detector		Internal MONA-500-M	External MONA-500-N	
Pressure	bar	2		
Effective volume	cm^3	18.6	1514	
Dimension	mm	Integrated in MONA central unit	1075 mm x 180 mm x 198 mm	
Thermal neutron sensitivity	cps / nv	4.4	258	
Optional Accessory s. product description for details		Extended system with several spectroscopic gamma detectors (e.g. 2x4 liter) Various test sets (s. production description) MIRA-100-L: MIRA (GMT) for extended dose rate range (up to 10 Sv/h) MONA-500-M: Integrated Neutron detector MONA-500-N: External Neutron detector MONA-800-B: Vehicle top box; Dimension 1770 mm x 770 mm x 420 mm; Weight 15 kg MONA-800-T: Transport box with damping; Dimension 1430x415x296 mm; Weight 14 kg		

[1] Cs-137

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